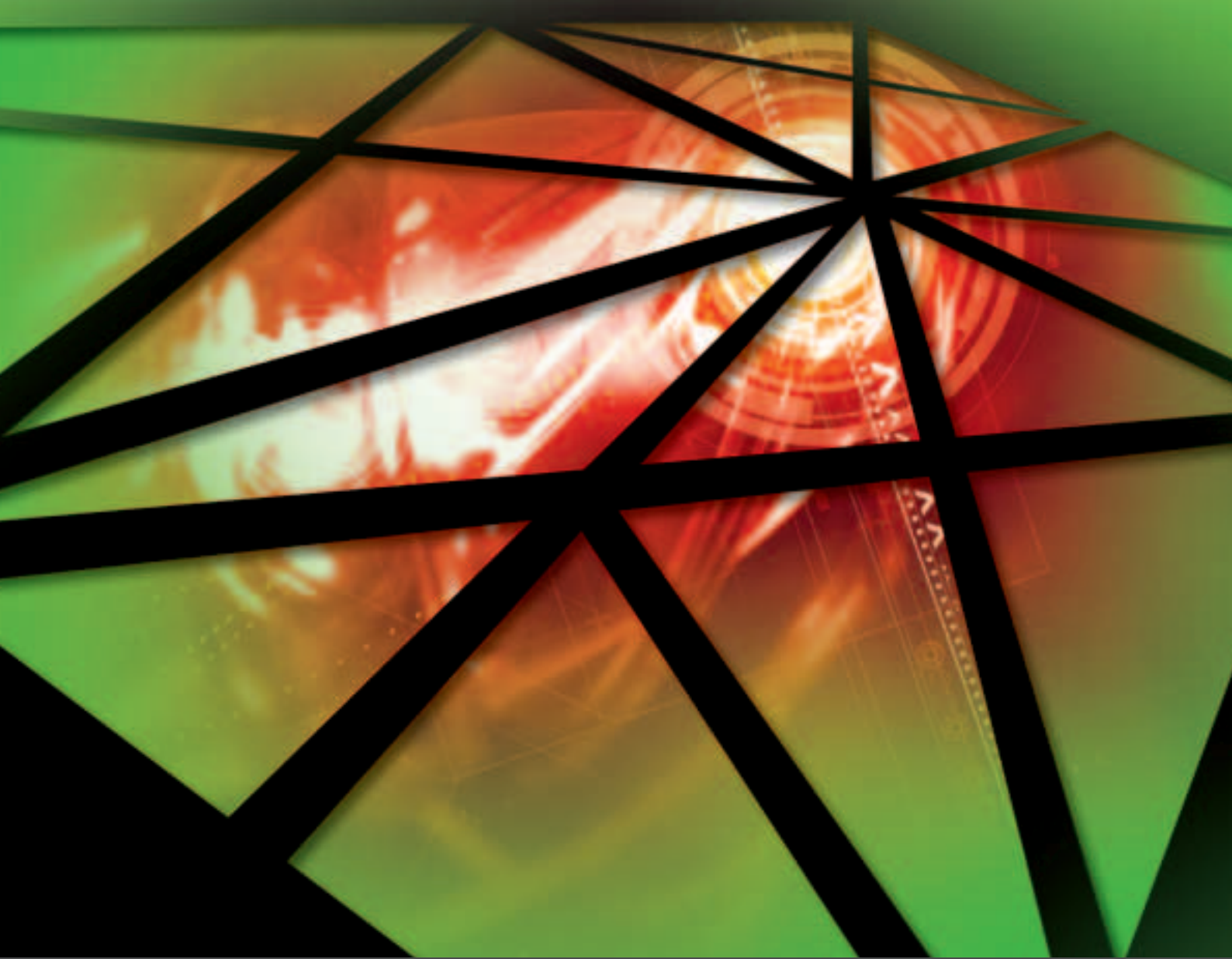


PRODUCT GUIDE

**MOSFETs**



S E M I C O N D U C T O R

Toshiba's MOSFET devices meet the needs of a wide range of ultra-high-density applications.

# POWER-MOSFETS CONTENTS

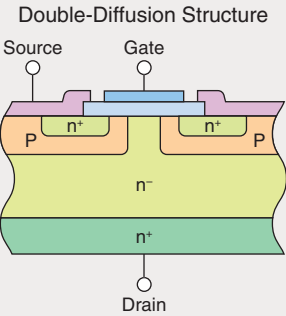
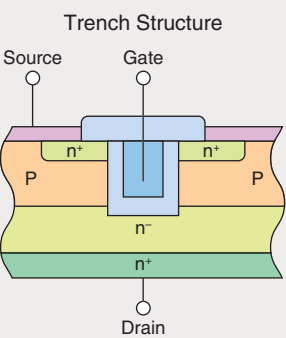
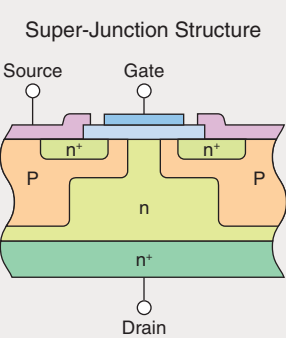
<b>1 Features and Structures</b> .....	<b>3</b>
<b>2 Toshiba's MOSFET Product Lines and Part Numbering Schemes</b> .....	<b>4</b>
2-1 MOSFET Product Lines .....	4
2-2 Part Numbering Schemes .....	5
<b>3 Selection Guide (By Absolute Maximum Ratings)</b> .....	<b>6</b>
<b>4 Low-V<sub>DSS</sub> MOSFETs (in Small SMD Packages)</b> .....	<b>16</b>
4-1 Packaging Options .....	16
• SSM Series	
• TPC Series	
4-2 Application Examples and Block Diagrams .....	17
• Cell Phone (Power Supply Circuit)	
• Notebook PC (Power Supply Circuit)	
• Lithium-Ion Secondary Battery (Battery Protection Circuits)	
• Motor Driver (Power Driver Circuit)	
4-3 Low-V <sub>DSS</sub> MOSFET Roadmaps .....	19
• Roadmap for Trench MOSFETs	
• Package Options	
4-4 Low-V <sub>DSS</sub> , High-Speed MOSFETs .....	21
• Synchronous Rectification DC-DC Converters	
– Block Diagram, Timing Chart and Power Loss Factors	
– Summary Results of Power Loss Simulation and Key Parameters for MOSFETs	
– Efficiency Improvement by Thermally Enhanced Package and New Process Technology	
– MOSBD (MOSFET with SBD)	
• High-Speed MOSFET Offerings	
4-5 Low-V <sub>DSS</sub> , Low-R <sub>DS(ON)</sub> MOSFETs (for Lithium-Ion Battery Protection) .....	26
• Lithium-Ion Battery Protection Circuit Trend	
• MOSFET Roadmap	
• Low-ON-resistance N-Channel Power MOSFETs	
• Low-ON-resistance P-Channel Power MOSFETs	
4-6 Semi-Power MOSFET Offerings .....	28
• Semi-Power P-Channel Single MOSFETs	
• Semi-Power N-Channel Single MOSFETs	
• Semi-Power Dual MOSFETs	
• MOSFET with a Schottky Barrier Diode	
• VS-6 Series ... [Part Number: TPC6xxx]	
• VS-8 Series ... [Part Number: TPCF8xxx]	
• PS-8 Series ... [Part Number: TPCP8xxx]	
• Chip LGA Series ... [Part Number: TPCL4xxx]	
• STP2 Series ... [Part Number: TPCT4xxx]	
• TSON Advance Series ... [Part Number: TPCC8xxx]	
• TSSOP Advance Series ... [Part Number: TPCM8xxx]	
• SOP-8 Series ... [Part Number: TPC8xxx]	
• SOP Advance Series ... [Part Number: TPCA8xxx]	
• DPAK Series ... [Part Number: TKxxPxxxM1]	
4-7 Standard MOSFET Series (I <sub>D</sub> < 500 mA) .....	37
• Single MOSFETs	
• Dual MOSFETs	
<b>5 Low-V<sub>DSS</sub>, High-Q<sub>g</sub> MOSFETs</b> .....	<b>38</b>
5-1 TO-220SM(W) Series .....	38
5-2 U-MOS (Trench Type) Series .....	39
5-3 U-MOS Series for Synchronous Rectification (V <sub>DSS</sub> = 60 V to 150 V) .....	40
<b>6 Mid- and High-V<sub>DSS</sub> MOSFETs</b> .....	<b>41</b>
6-1 -MOSVII Series (V <sub>DSS</sub> = 400 V to 650 V) .....	41
6-2 Super-Junction DTMOS Series (V <sub>DSS</sub> = 600 V, 650 V) .....	42
6-3 High-speed -MOS Diode Series (V <sub>DSS</sub> = 450 V to 600 V) .....	43
6-4 -MOS Series .....	44
<b>7 MOSFET Part Numbers</b> .....	<b>47</b>
7-1 Alphanumeric Index of Part Numbers .....	47
<b>8 Product Obsolescence</b> .....	<b>55</b>
8-1 End-of-Life Products .....	55
<b>9 Packaging</b> .....	<b>58</b>
9-1 Compact Surface-Mount Packages .....	58
9-2 Through-Hole Packages .....	70

- 1) No carrier storage effect; superior frequency and switching characteristics
- 2) Rugged and no current concentration
- 3) Voltage-controlled device, hence low drive power
- 4) Easy parallel connection

■ Toshiba MOSFETs have the following additional features:

- 1) Guaranteed avalanche capability..... Allows an absorber circuit to be simplified
- 2) Improved functioning of built-in diodes ..... Enhanced circuit design flexibility
- 3) High ruggedness ..... Increased margin for circuit design
- 4) High-speed switching ..... Higher speed in end-product's operation
- 5) Low  $R_{(DS)ON}$  ..... Reduced end-product's power consumption
- 6) Smaller packages ..... Reduced end-product size
- 7) Low drive loss ..... Reduced end product's power

■ Structures of Toshiba MOSFETs

<p>Double-Diffusion Structure</p> 	<p>● <b>-MOS</b></p> <p>Toshiba Power MOSFETs use a double-diffusion MOS (D-MOS) structure, which produces high-withstand voltage, to form channels. This structure is especially well suited to high-withstand voltage and high-current devices. A high level of integration yields a high-performance Power MOSFET with low ON-resistance and low power loss.</p>
<p>Trench Structure</p> 	<p>● <b>U-MOS</b></p> <p>Higher channel density is achieved by connecting channels vertically to form a U-groove at the gate region, a structure that yields a lower ON-resistance than other MOSFET structures.</p>
<p>Super-Junction Structure</p> 	<p>● <b>DTMOS</b></p> <p>The super-junction structure, which has P-type pillar layers as shown left, realizes high withstand voltage and ON-resistance lower than the conventional theoretical limit of silicon.</p>

## 2-1 MOSFET Product Lines

### SSM Series ( $V_{DSS} = 12\text{ V to }60\text{ V}$ )

Very compact and thin, the SSM Series is suitable for use in various electronic devices. The SSM Series is available in a wide range of packages and features low voltage drive.

#### ■ Applications

- Cell phones
- Notebook PCs
- Portable electronic devices
- Small-signal switching

### VS and PS Series ( $V_{DSS} = 12\text{ V to }40\text{ V}$ )

Very compact and thin, the VS and PS Series are suitable for use in various electronic devices.

#### ■ Applications

- Cell phones
- Notebook PCs
- Portable electronic devices

### Chip LGA and STP Series ( $V_{DSS} = 20\text{ V to }30\text{ V}$ )

The LGA and STP Series are housed in an ultra-small and thin package and are suitable for use in lithium-ion secondary battery protection circuits in various portable electronic devices.

#### ■ Applications

- Lithium-ion secondary battery protection circuits

### SOP and TSON Series ( $V_{DSS} = 20\text{ V to }250\text{ V}$ )

The SOP and TSON Series are compact and thin, and require only a small mounting area. They are suitable for lithium-ion secondary battery protection circuits and notebook PCs.

#### ■ Applications

- Lithium-ion secondary battery protection circuits
- Notebook PCs
- Portable electronic devices
- DC-DC converters

### TO-220SM(W) Series ( $V_{DSS} = 40\text{ V to }150\text{ V}$ )

The TO-220SM package, which uses Cu connectors and a wide source terminal, realizes low ON-resistance and a high current-carrying capability.

#### ■ Applications

- Motor drivers
- Switching power supplies

### Low- $V_{DSS}$ , High- $Q_g$ U-MOS Series ( $V_{DSS} = 40\text{ V to }100\text{ V}$ )

High integration is achieved using a trench technology. Low-voltage drive ( $V_{GS} = 4\text{ V}$ ) is possible due to ultra-low ON-resistance.

#### ■ Applications

- Motor drivers
- Solenoids and lamp drivers

### U-MOS Series for Synchronous Rectification ( $V_{DSS} = 60\text{ V to }150\text{ V}$ )

Fabricated using a trench technology, the U-MOS Series is ideal for synchronous rectification on the secondary side of power supply circuits.

#### ■ Applications

- Switching power supplies
- AC adapters
- Motor drivers

### New -MOSVII Series ( $V_{DSS} = 400\text{ V to }650\text{ V}$ )

The latest addition to the -MOS portfolio, the -MOSVII Series offers reduced capacitances due to optimized chip design and is available with a greatly wider range of electrical characteristics.

#### ■ Applications

- Switching power supplies
- AC adapters

### Super-Junction DTMOS Series ( $V_{DSS} = 600, 650\text{ V}$ )

The super-junction DTMOS Series achieves low ON-resistance and low gate charge ( $Q_g$ ) due to the use of the latest super-junction structure.

#### ■ Applications

- Switching power supplies
- AC adapters
- Motor drivers

### High-Speed -MOS Diode Series

The integrated diode of the -MOS series provides a fast reverse recovery time through minority carrier lifetime control.

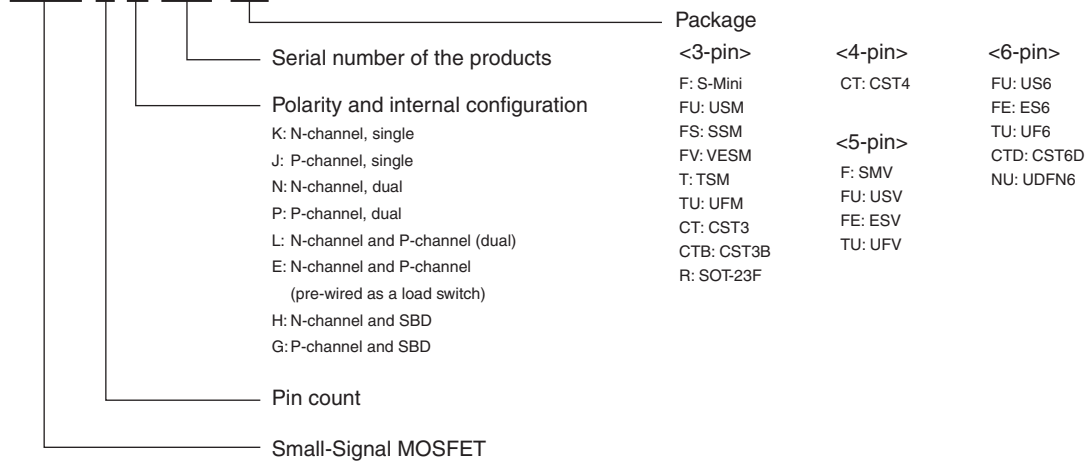
#### ■ Applications

- Inverters
- Switching power supplies
- Motor drivers
- AC adapters

## 2-2 Part Numbering Schemes

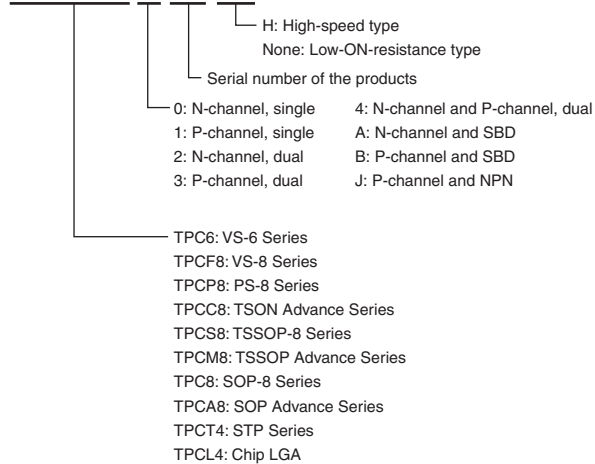
### Small-Signal MOSFET (SSM) Series

**SSM 3 K 101 TU**



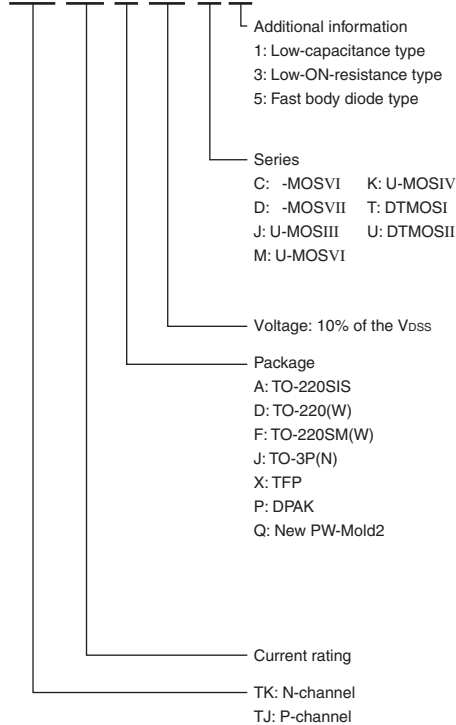
### Multi-Pin Series

**TPCM8 0 01 -H**



### New Series

**TK 55 A 10 J 1**



### Conventional Series

**2SK \*\*\*\***

N-channel MOS

**2SJ \*\*\*\***

P-channel MOS

V <sub>DSS</sub> (V) I <sub>D</sub> (A)	12	20	24	30	40	50	60	100	150	180	200	250	400	450	500	525	550	600	650	V <sub>DSS</sub> (V) I <sub>D</sub> (A)	
0.05						*2SJ343(50)① *2SJ344(50)①														0.05	
0.1		*SSM3K04FU(12)③ *SSM3K16FU(15)③ *SSM3J16FU(45)③ △SSM3K04FS(12)③ △SSM3K16FS(15)③ △SSM3J16FS(45)③ △SSM3J35FS(44)⑥ +SSM3K03FV(12)③ +SSM3K04FV(12)③ +SSM3J16FV(45)③ +SSM3J35MFV(44)⑥ +SSM3K16CT(15)③ +SSM3J16CT(45)③ +SSM3J35CT(44)⑥ △SSM6N04FU(12)③ △SSM6N16FU(15)③ △SSM6P16FU(45)③ △SSM6P35FU(44)⑥ +SSM6N03FE(12)③ +SSM6P16FE(45)③ +SSM6L16FE(15)③ +SSM6P35FE(45)③ △SSM5N16FU(15)③ △SSM5P16FU(45)③ △SSM5N03FE(12)③ △SSM5N16FE(15)③ △SSM5P16FE(45)③		*SSM3K15F(7)③ *SSM3J15F(32)③ *SSM3K15FU(7)③ *SSM3J15FU(32)③ △SSM3K15FS(7)③ △SSM3J15FS(32)③ +SSM3K15FV(7)③ +SSM3J15FV(32)③ +SSM3K15CT(7)③ +SSM3J15CT(32)③ △SSM6N15FU(7)③ △SSM6P15FU(32)③ △SSM5N15FU(7)③ △SSM5P15FU(32)③ +SSM6N15FE(7)③ +SSM6P15FE(32)③ △SSM5N15FE(7)③ △SSM5P15FE(32)③ △SSM3K44FV(7)③ +SSM3K44MFV(7)③ △SSM6N44FU(7)③ +SSM6N44FE(7)③			*SSM3K17FU(40)② △SSM6N17FU(40)②													0.1	
0.18		△SSM3K35FS(20)⑥ +SSM3K35MFV(20)⑥ +SSM3K35CT(20)⑥ △SSM6N35FU(20)⑥ △SSM6L35FU(20)⑥ +SSM6N35FE(20)⑥ +SSM6L35FE(20)⑥																			0.18
0.2		△SSM6P05FU(4)③ △SSM5P05FU(4)③		*2SJ305(4)① *2SK2009(2)① *SSM3J09FU(4.2)③ △SSM6P09FU(4.2)③			*SSM3K7002BF(3.3)② △SSM6N7002BF(3.3)② △SSM3K7002BFS(3.3)② △SSM6N7002AFU(3.3)② *SSM3K7002AF(3.3)② *2SJ168(2)① *SSM3K7002AFU(3.3)② *2SK1062(1)① +SSM6N7002BFE(3.3)②														0.2
0.25		*SSM6N37CTD(3.1)⑥ +SSM6N37FE(3.1)⑥ +SSM3K37MFV(3.1)⑥																			0.25
0.33		△SSM3J36TU(3.6)⑥ △SSM3J36FS(3.6)⑥ +SSM3J36MFV(3.6)⑥ *SSM6P36TU(3.6)⑥ +SSM6P36FE(3.6)⑥																			0.33
0.4		△SSM6L05FU(1.2)③ △SSM6N05FU(1.2)③ *SSM3K05FU(1.2)③ △SSM5N05FU(1.2)③		△SSM6L09FU(1.2)③ △SSM6N09FU(1.2)③ *SSM3K09FU(1.2)③																	0.4
0.5		△SSM4K27CT(0.205)⑥ *SSM6L10TU(0.145)⑥ *SSM6L11TU(0.145)⑥ *SSM6L12TU(0.145)⑥ *SSM6N25TU(0.145)⑥ *SSM6N36TU(1.52)⑥ *SSM6P25TU(0.26)⑥ *SSM6P26TU(0.23)⑥ +SSM6J25FE(0.26)⑥ +SSM6J26FE(0.23)⑥ +SSM6K25FE(0.145)⑥ *SSM6L36TU(1.52)⑥ △SSM3K36FS(1.52)⑥ +SSM3K36MFV(1.52)⑥ △SSM3K36TU(1.52)⑥ +SSM6N36FE(1.52)⑥ +SSM6L36FE(1.52)⑥ △SSM6N43FU(1.52)⑥ △SSM3K43FS(1.52)⑥		*SSM6N24TU(0.145)⑥ +SSM6K24FE(0.145)⑥																	0.5
0.65		△SSM6J06FU(0.5)③																			0.65
0.72		+SSM6L14FE(0.3)⑥ +SSM6P41FE(0.3)⑥																			0.72
0.8		*SSM6L13TU(0.143)⑥ *SSM6N29TU(0.143)⑥ *SSM6P28TU(0.234)⑥ +SSM6N42FE(0.24)⑥ +SSM6J205FE(0.234)⑥		△SSM6J07FU(0.8)③																	0.8

**Legend** Product series ①: π-MOSIII ②: π-MOSV ③: π-MOSVI ④: L<sup>2</sup>-π-MOSV ⑤: L<sup>2</sup>-π-MOSVI ⑥: U-MOS ⑦: π-MOSVII ⑧: π-MOSIV ⑨: DTMOSI ⑩: DTMOSII

**Package** ◊PW-Mini ◊VS-6 ♥VS-6 ♣PS-8 ◊STP ▲TO-92MOD ▼PW-Mold J New PW-Mold ○TSON Advance ◊SOP-8 Lead Clamp ▶SOP Advance ◆TO-220NIS ⊗TO-220SIS ■TO-220AB □TO-220(W) ♣TFP ○TO-220FL/SM

\* S-Mini +TSM \*USM △UFM ☆SSM +VESM +CST3 ◊CST3B ◊CST4 +SMV △US6 \*UF6

♫ New PW-Mold2 ▽DP ☆TPS ◀TSSOP Advance ▼TSSOP-8 ★SOP-8

♣TO-220SM(W) □TO-3P(N) ○TO-3P(N)IS ●TO-3P(L) □Chip LGA

+ES6 \*CST6D △USV \*UFV ☆ESV

**Notes:**  
 ( ) = R<sub>DS(on)</sub> max \* = 1.8-V drive P = P-ch NS = N-ch + SBD PD = P-ch + Driver  
 \$ = 10-V drive V = High-speed diode CN = Complementary N-ch PS = P-ch + SBD (load switch)  
 # = 2.5-V drive N = N-ch CP = Complementary P-ch [ ] = Under development

V <sub>oss</sub> (V) I <sub>d</sub> (A)	12	20	24	30	40	60	100	150	180	200	250	400	450	500	525	550	600	650	800	900	1000	V <sub>oss</sub> (V) I <sub>d</sub> (A)		
1	PS + SSM5G02TU (0.16)Ⓞ PS + SSM5G04TU (0.24)Ⓞ PD + SSM6E01TU (0.16)Ⓞ	△SSM3J1111TU (0.48)Ⓞ		PS + SSM5G01TU (0.8)Ⓞ		◇ 2SJ360 (0.73)Ⓞ ▲ 2SJ507 (0.7)Ⓞ	◇ 2SK2963 (0.7)Ⓞ ▲ 2SK2962 (0.7)Ⓞ ◇ 2SJ508 (1.9)Ⓞ ▲ 2SJ509 (1.9)Ⓞ	▲ 2SK3670 (1.7)	◆ 2SJ313 (5.0) ▼ 2SJ338 (5.0) ◆ 2SK2013 (5.0) ▼ 2SK2162 (5.0)	◇ 2SK2992 (3.5)Ⓞ	CP★TPC8404(2.55)Ⓞ CN★TPC8404(1.7)Ⓞ	▼ 2SK3498 (5.5)Ⓞ	Ⓞ 2SK4023 (4.6)Ⓞ ☆ 2SK3374 (4.6)Ⓞ				Ⓞ 2SK3371 (9)Ⓞ Ⓞ 2SK4026 (9)Ⓞ				■ 2SK2733 (9)Ⓞ Ⓞ TK1090A (9)Ⓞ ▼ 2SK3301 (20)Ⓞ		1	
1.1		△SSM6K06FU (0.16)Ⓞ		△SSM3J1121TU (0.79)Ⓞ																			1.1	
1.2	◆ SSM6J23FE (0.16)Ⓞ	△SSM3K106TU (0.53)Ⓞ ◆ SSM6P54TU (0.228)Ⓞ NS + SSM5H07TU (0.54)Ⓞ ◆ SSM6K31FE (0.54)Ⓞ ◆ SSM6K30FE (0.42)Ⓞ																					1.2	
1.3		△SSM6J08FU (0.18)Ⓞ PS + TPCP8BA1 (0.18)Ⓞ		◆ SSM6J207FE (0.491)Ⓞ						Ⓞ TPCS8004-H (0.8)Ⓞ												1.3		
1.4	NS + SSM5H03TU (0.3)Ⓞ	◆ SSM6K22FE (0.17)Ⓞ		△SSM3J118TU (0.48)Ⓞ ◆ SSM6P40TU (0.403)Ⓞ PS + SSM5G11TU (0.403)Ⓞ NS + SSM5H01TU (0.45)Ⓞ ◆ SSM6K210FE (0.371)Ⓞ																		1.4		
1.5	PS + SSM5G09TU (0.13)Ⓞ	△SSM3K107TU (0.41)Ⓞ ◆ SSM6P39TU (0.213)Ⓞ NS + SSM5H05TU (0.16)Ⓞ NS + SSM5H08TU (0.16)Ⓞ		◆ SSM3J02T (0.5)Ⓞ △SSM3K128TU (0.36)Ⓞ PS + SSM5G10TU (0.213)Ⓞ △SSM6K07FU (0.22)Ⓞ																		1.5		
1.6		◆ SSM6N42FE (0.252)Ⓞ NS + SSM5H10TU (0.119)Ⓞ NS + TPCP8AA1 (0.105)Ⓞ ◆ SSM6L39TU (0.119)Ⓞ ◆ SSM6N39TU (0.119)Ⓞ △SSM6K08FU (0.105)Ⓞ		◆ SSM3J313T (0.268)Ⓞ NS + SSM5H11TU (0.182)Ⓞ ◆ SSM6L40TU (0.182)Ⓞ ◆ SSM6N40TU (0.182)Ⓞ																			1.6	
1.7		△SSM3J113TU (0.169)Ⓞ		◆ SSM3J01T (0.4)Ⓞ ◆ SSM3J305T (0.477)Ⓞ																		1.7		
1.8	PD + SSM6E03TU (0.144)Ⓞ	△SSM3J114TU (0.149)Ⓞ PD + SSM6E02TU (0.136)Ⓞ ◆ SSM6J53FE (0.136)Ⓞ								★ TPC8012-H (0.4)Ⓞ												1.8		
1.9				NS + SSM5H16TU (0.133)Ⓞ ◆ SSM6K208FE (0.133)Ⓞ						NS + TPCS8007-H (0.45)Ⓞ												1.9		
2		△SSM3K122TU (0.123)Ⓞ ◆ SSM6K405TU (0.126)Ⓞ ◆ SSM6J206FE (0.13)Ⓞ ◆ SSM6K204FE (0.126)Ⓞ PS + SSM6G13NU (0.133)Ⓞ ◇ SSM3J46CTB (0.103)Ⓞ * SSM3J325F (0.15)Ⓞ		△SSM3J117TU (0.225)Ⓞ △SSM3K127TU (0.123)Ⓞ ◆ SSM6J402TU (0.225)Ⓞ		◇ 2SK2615 (0.3)Ⓞ ▲ 2SK2961 (0.3)Ⓞ ◇ 2SK3658 (0.3)Ⓞ ◆ SSM6K407TU (0.44)Ⓞ ◆ SSM6K32TU (0.44)Ⓞ					▼ 2SJ610 (2.55)Ⓞ		Ⓞ 2SK3757 (2.45)Ⓞ Ⓞ 2SK3766 (2.45)Ⓞ	☆ 2SK2599 (3.2)Ⓞ Ⓞ 2SK3373 (3.2)Ⓞ				☆ 2SK2846 (5.0)Ⓞ Ⓞ 2SK2865 (5.0)Ⓞ Ⓞ 2SK3767 (4.5)Ⓞ Ⓞ 2SK4002 (5)Ⓞ Ⓞ TK2Q60D (4.3)Ⓞ Ⓞ TK2P60D (4.3)Ⓞ	Ⓞ TK2A65D (3.26)Ⓞ					2
2.1				△SSM3K116TU (0.1)Ⓞ				NS + TPCS8009-H (0.35)Ⓞ														2.1		
2.2		△SSM3J115TU (0.098)Ⓞ △SSM3K101TU (0.103)Ⓞ		△SSM3K105TU (0.2)Ⓞ		◆ TPCP8003-H (0.18)Ⓞ ★ TPC8214-H (0.18)Ⓞ																2.2		
2.3	◆ SSM3J304T (0.127)Ⓞ			◆ SSM6K202FE (0.085)Ⓞ																		2.3		
2.4				◆ SSM3J306T (0.225)Ⓞ △SSM3K124TU (0.12)Ⓞ																		2.4		
2.5		◆ SSM6J50TU (0.064)Ⓞ		△SSM3K119TU (0.074)Ⓞ ◆ SSM3K02T (0.2)Ⓞ ◆ SSM6J401TU (0.145)Ⓞ		◆ SSM3K318T (0.145)Ⓞ				Ⓞ 2SJ567 (2.0)Ⓞ Ⓞ 2SJ680 (2.0)Ⓞ							Ⓞ TK3A60DA (2.8)Ⓞ Ⓞ TK3A65DA (2.51)Ⓞ			Ⓞ 2SK3566 (6.4)Ⓞ		2.5		
2.7	◆ SSM3J312T (0.091)Ⓞ	P# + TPC6105 (0.11)Ⓞ P# + TPCF8301 (0.11)Ⓞ PS# + TPCF8B01 (0.11)Ⓞ P# + TPCF8103 (0.11)Ⓞ		◆ SSM3J14T (0.17)Ⓞ																		2.7		
2.8		◆ SSM6K203FE (0.061)Ⓞ																				2.8		
3	◆ SSM3J13T (0.07)Ⓞ ◆ SSM6J21TU (0.05)Ⓞ	N# + TPCF8201 (0.049)Ⓞ NS# + TPCF8A01 (0.049)Ⓞ P# + TPCF8302 (0.059)Ⓞ P# + TPCF8303 (0.058)Ⓞ △SSM3K104TU (0.056)Ⓞ ◆ SSM6K404TU (0.055)Ⓞ		◆ SSM3K12T (0.175)Ⓞ ◆ SSM6K34TU (0.077)Ⓞ NS + SSM5H14F (0.078)Ⓞ		☆ 2SK2200 (0.35)Ⓞ Ⓞ 2SK2201 (0.35)Ⓞ Ⓞ 2SK4018 (0.35)Ⓞ				Ⓞ 2SK3462 (1.7)Ⓞ Ⓞ 2SK4022 (1.7)Ⓞ			◆ 2SK2862 (3.2)Ⓞ				Ⓞ 2SK4003 (2.2)Ⓞ Ⓞ (Short lead) Ⓞ 2SK3975 (2.2)Ⓞ	Ⓞ TK3A65D (2.25)Ⓞ	◆ 2SK2603 (3.6)Ⓞ ○ 2SK2883 (3.6)Ⓞ	◆ 2SK2608 (4.3)Ⓞ □ 2SK2719 (4.3)Ⓞ Ⓞ 2SK3564 (4.3)Ⓞ			3	
3.2		△SSM3K121TU (0.048)Ⓞ ◆ SSM6K211FE (0.047)Ⓞ		CP# + TPCF8402 (0.077)Ⓞ P# + TPCF8304 (0.072)Ⓞ ◆ SSM3K01T (0.12)Ⓞ																		3.2		
3.5		◆ SSM3K301T (0.056)Ⓞ * SSM3J327F (0.095)Ⓞ		◆ SSM3J314T (0.1)Ⓞ ◆ SSM3K329R (0.126)Ⓞ													Ⓞ TK4A55DA (2.45)Ⓞ ▷ TK4P55DA (2.45)Ⓞ	◆ 2SK3085 (2.2)Ⓞ Ⓞ 2SK3567 (2.2)Ⓞ Ⓞ TK4A60DA (2.2)Ⓞ ▷ TK4P60DA (2.2)Ⓞ	Ⓞ TK4A65DA (3.5)Ⓞ					3.5
3.6		◆ SSM3J317T (0.107)Ⓞ																				3.6		
3.7																						3.7		
3.8		P# + TPCP8303 (0.04)Ⓞ				NS + TPC8216-H (0.057)Ⓞ																3.8		
3.9		◆ SSM3J327R (0.093)Ⓞ □ SSM6P47NU (0.095)Ⓞ																				3.9		
4	◆ SSM6J51TU (0.054)Ⓞ	△SSM3J120TU (0.038)Ⓞ ◆ SSM6K18TU (0.04)Ⓞ ◆ SSM6J212FE (0.0407)Ⓞ ◆ SSM6J412TU (0.0427)Ⓞ □ SSM6H15NU (0.053)Ⓞ		CN# + TPCF8402 (0.05)Ⓞ CN# + TPCP8404 (0.05)Ⓞ CP# + TPCP8404 (0.05)Ⓞ ◆ SSM3K316T (0.065)Ⓞ ◆ SSM3K14T (0.067)Ⓞ							N + TPCA8008-H (0.58)Ⓞ			Ⓞ TK4A50D (2.0)Ⓞ ▷ TK4P50D (2.0)Ⓞ	Ⓞ TK4A53D (1.7)Ⓞ	Ⓞ TK4A55D (1.88)Ⓞ ▷ TK4P55D (1.88)Ⓞ	Ⓞ TK4A60D (1.7)Ⓞ				Ⓞ 2SK3798 (3.5)Ⓞ	◆ 2SK1119 (3.8) ○ 2SK1930 (3.8)	4	

**Legend** Product series ① : π-MOSIII ② : π-MOSV ③ : π-MOSVI ④ : L<sup>2</sup>-π-MOSV ⑤ : L<sup>2</sup>-π-MOSVI ⑥ : U-MOS ⑦ : π-MOSVII ⑧ : π-MOSIV ⑨ : DTMOSI ⑩ : DTMOSII

**Package** ◇PW-Mini ⓄVS-8 ♥VS-6 ♣PS-8 ⓄSTP ▲TO-92MOD ▼PW-Mold ⓄNew PW-Mold ⓄTSON Advance ⓄNew PW-Mold2 ▽DP ☆TPS ◀TSSOP Advance ⓄTSSOP-8 ★SOP-8 ⓄSOP-8 Lead Clamp ▶SOP Advance ◆TO-220NIS ⓄTO-220SIS ⓄTO-220AB ⓄTO-220(W) ⓄTFP ○TO-220FL/SM ⓄTO-220SM(W) □TO-3P(N) ⓄTO-3P(N)IS ⓄTO-3P(L) ⓄChip LGA ⓄES6 \*CST6D ▲USV \*UFV ⓄESV ▷DPAK ⓄSOT-23F □UDFN6 \*S-Mini +TSM \*USM △UFM ☆SSM +VESM +CST3 ◇CST3B ⓄCST4 +SMV △US6 \*UF6

Notes:  
 ( ) = R<sub>DS(on)</sub> max \* = 1.8-V drive P = P-ch NS = N-ch + SBD PD = P-ch + Driver  
 \$ = 10-V drive Ⓞ = High-speed diode CN = Complementary N-ch PS = P-ch + SBD  
 # = 2.5-V drive N = N-ch CP = Complementary P-ch [ ] = Under development  
 ( ) = load switch

V <sub>oss</sub> (V) I <sub>d</sub> (A)	12	20	24	30	40	50	60	100	150	180	200	250	400	450	500	525	550	600	650	700	800	900	1000	V <sub>oss</sub> (V) I <sub>d</sub> (A)	
4.2		△SSM3K123TU (0.028)Ⓢ ●SSM6K403TU (0.028)Ⓢ		N★TPC8204 (0.05)Ⓢ -±SSM3K320T (0.077)Ⓢ																				4.2	
4.4		△SSM3J130TU (0.0258)Ⓢ		●SSM6K406TU (0.0388)Ⓢ																				4.4	
4.5				P♥TPC6110 (0.056)Ⓢ CP★TPC8405 (0.033)Ⓢ								J 2SK3342 (1.0)Ⓢ J 2SK4021 (1.0)Ⓢ		⊗TK5A45DA (1.75)Ⓢ						⊗TK5A65DA (1.67)Ⓢ				4.5	
4.6		△SSM3J129TU (0.046)Ⓢ																						4.6	
4.7		-±SSM3K309T (0.031)Ⓢ																						4.7	
4.8				P★TPC8103-H (0.040)Ⓢ																				4.8	
5	△SSM3J132TU (0.0178)Ⓢ P★TPC8208 (0.05)Ⓢ -±SSM3J307T (0.031)Ⓢ -±SSM3K310T (0.028)Ⓢ P♥TPC6113 (0.056)Ⓢ	N★TPC8208 (0.05)Ⓢ P★TPC8104-H (0.065)Ⓢ P♥TPC8109-H (0.059)Ⓢ	N★TPC8208 (0.05)Ⓢ P★TPC8104-H (0.065)Ⓢ P♥TPC8109-H (0.059)Ⓢ	N★TPC8208 (0.05)Ⓢ P★TPC8104-H (0.065)Ⓢ P♥TPC8109-H (0.059)Ⓢ	CP★TPC8406 (0.041)Ⓢ	▲2SK2989 (0.15)Ⓢ ▲2SJ537 (0.19)Ⓢ	J 2SJ668 (0.17)Ⓢ J 2SJ681 (0.17)Ⓢ ☆2SJ378 (0.19)Ⓢ ☆2SJ669 (0.17)Ⓢ ◆2SJ438 (0.19)Ⓢ ☆2SK2229 (0.16)Ⓢ J 2SK4017 (0.1)Ⓢ J 2SK4033 (0.1)Ⓢ N★TPC8007-H (0.057)Ⓢ	J 2SK2399 (0.23)Ⓢ ☆2SK2400 (0.23)Ⓢ J 2SK4019 (0.23)Ⓢ N⊙TPC8012-H (0.12)Ⓢ	▼2SK3205 (0.52)			◆2SJ407 (1.0)Ⓢ ◆2SK2381 (0.8)Ⓢ ☆2SK2835 (0.8)Ⓢ J 2SK2920 (0.8)Ⓢ J 2SK4020 (0.8)Ⓢ	◆2SJ512 (1.25)Ⓢ			○2SK2991 (1.5)Ⓢ ◆2SK3466 (1.5)Ⓢ J 2SK4103 (1.5)Ⓢ ▽○2SK3417 (1.8)Ⓢ ▽Ⓢ2SK3868 (1.7)Ⓢ ⊗TK5A50D (1.5)Ⓢ ▷TK5P50D (1.5)Ⓢ	⊗TK5A53D (1.5)Ⓢ ▷TK5P53D (1.5)Ⓢ	⊗TK5A55D (1.88)Ⓢ	⊗TK5A60D (1.43)Ⓢ	⊗TK5A65D (1.45)Ⓢ	◆2SK2274 (1.7)	○2SK2884 (2.2)Ⓢ	⊗2SK3565 (2.5)Ⓢ □2SK3700 (2.5)Ⓢ ⊗2SK3742 (2.5)Ⓢ	□2SK1359 (3.8)	5
5.2		-±SSM3J321T (0.046)Ⓢ																						5.2	
5.3				N♥TPC8009-H (0.081)Ⓢ																				5.3	
5.5	PD★TPC8401 (0.038)Ⓢ P♥TPC6103 (0.035)Ⓢ	P★TPC6111 (0.04)Ⓢ P★TPC8305 (0.03)Ⓢ		N★TPC8211 (0.036)Ⓢ								NTPCA8010-H (0.45)Ⓢ			○2SK2838 (1.2)Ⓢ ◆2SK2679 (1.2)Ⓢ				⊗TK6A55DA (1.48)Ⓢ					5.5	
5.6		P★TPC8101 (0.030)Ⓢ		-±SSM3J326T (0.0457)Ⓢ																				5.6	
5.9				N♥TPC8008-H (0.060)Ⓢ																				5.9	
6	P★TPC8101 (0.028)Ⓢ ■SSM3J328R (0.0298)Ⓢ □SSM6J502NU (0.026)Ⓢ □SSM6J503NU (0.026)Ⓢ N⊙TPC4201 (0.031)Ⓢ N⊙TPC4203 (0.031)Ⓢ ★TPC8207 (0.02)Ⓢ NTPCL4201 (0.031)Ⓢ N♥TPC6012 (0.02)Ⓢ P★TPC8105 (0.03)Ⓢ	NTPCL4203 (0.036)Ⓢ	N⊙TPC4202 (0.038)Ⓢ N⊙TPC4204 (0.038)Ⓢ N♥TPC6011 (0.020)Ⓢ N♥TPC6005 (0.028)Ⓢ PD★TPC8401 (0.05)Ⓢ P★TPC8104 (0.028)Ⓢ CN★TPC8405 (0.026)Ⓢ -±SSM3K315T (0.0415)Ⓢ NTPCL4202 (0.04)Ⓢ △SSM3K131TU (0.0415)Ⓢ CP★TPC8405 (0.031)Ⓢ	N⊙TPC4202 (0.038)Ⓢ N⊙TPC4204 (0.038)Ⓢ N♥TPC6011 (0.020)Ⓢ N♥TPC6005 (0.028)Ⓢ PD★TPC8401 (0.05)Ⓢ P★TPC8104 (0.028)Ⓢ CN★TPC8405 (0.026)Ⓢ -±SSM3K315T (0.0415)Ⓢ NTPCL4202 (0.04)Ⓢ △SSM3K131TU (0.0415)Ⓢ CP★TPC8405 (0.031)Ⓢ	CN★TPC8406 (0.032)Ⓢ									◆2SJ516 (0.8)Ⓢ		⊗TK6A50D (1.48)Ⓢ ⊗TK6A53D (1.3)Ⓢ ▽TK6P53D (1.3)Ⓢ			□2SK2602 (1.25)Ⓢ ○2SK2777 (1.25)Ⓢ ◆2SK3312 (1.25)Ⓢ ⊗TK6A60D (1.25)Ⓢ ▽Ⓢ2SK3947 (1.4)Ⓢ	⊗TK6A65D (1.11)Ⓢ		⊗2SK4013 (1.7)Ⓢ ⊗2SK4014 (2.0)Ⓢ			6
6.1							N♥TPC6010-H (0.059)Ⓢ																	6.1	
6.5				N★TPC8216-H (0.020)Ⓢ CN★TPC8405 (0.026)Ⓢ N★TPC8205-H (0.026)Ⓢ											⊗TK7A45DA (1.2)Ⓢ							○2SK3879 (1.7)Ⓢ ⊗2SK3880 (1.7)Ⓢ		6.5	
6.8				NS★TPC8A07-H (0.023)Ⓢ																				6.8	
7	N★TPC8003 (0.018)Ⓢ			N★TPC8001 (0.023)Ⓢ N★TPC8002 (0.023)Ⓢ	CN★TPC8406-H (0.027)Ⓢ CP★TPC8406-H (0.03)Ⓢ				N▶TPC8009-H (0.35)Ⓢ					⊗TK7A50DA (1.22)Ⓢ	⊗TK7A50D (1.22)Ⓢ ▷TK7P50D (1.22)Ⓢ		⊗TK7A55D (1.25)Ⓢ		⊗TK7A65D (0.98)Ⓢ		□2SK3633 (1.7)Ⓢ □2SK4115 (2.0)Ⓢ ⊗2SK1365 (1.8)		7		
7.2		P★TPC8102 (0.018)Ⓢ																						7.2	
7.5					N▶TPC8020-H (0.027)Ⓢ N★TPC8022-H (0.027)Ⓢ P★TPC8116-H (0.03)Ⓢ P▶TPC8107-H (0.03)Ⓢ								◆2SK2417 (0.5)Ⓢ ■2SK2914 (0.5)Ⓢ	⊗TK8A45DA (1.1)Ⓢ	⊗TK8A50DA (1.0)Ⓢ		⊗TK8A55DA (1.07)Ⓢ	⊗TK8A60DA (1.0)Ⓢ						7.5	
8				N★TPC8021-H (0.017)Ⓢ N★TPC8061-H (0.025)Ⓢ N★TPC8005 (0.0129)Ⓢ				⊗TK8A10K3 (0.12)Ⓢ N▶TPC8072-H (0.071)Ⓢ						⊗TK8A45D (0.9)Ⓢ	■2SK2542 (0.85)Ⓢ ○2SK2776 (0.85)Ⓢ ◆2SK3538 (0.85)Ⓢ ⊗TK8A50D (0.85)Ⓢ ▽Ⓢ2SK4042 (0.97)Ⓢ				⊗TK8A65D (0.84)Ⓢ		⊗2SK2606 (1.2)Ⓢ ⊗2SK2847 (1.4)Ⓢ ⊗2SK3799 (1.3)Ⓢ	□2SK2613 (1.7)Ⓢ	8		
8.3				N★TPC8004 (0.009)Ⓢ																				8.3	
8.5				NS★TPC8A07-H (0.015)Ⓢ																				8.5	
9		N★TPC8006 (0.01)Ⓢ					N⊙TPC8053-H (0.0225)Ⓢ ⊗TJA10M3 (0.16)Ⓢ					◆2SK2350 (0.4)Ⓢ		◆2SK2952 (0.55)Ⓢ	⊗TK9A45D (0.77)Ⓢ					⊗TK9A55DA (0.86)Ⓢ		⊗2SK3017 (1.25)Ⓢ □2SK3473 (1.6)Ⓢ □2SK3878 (1.3)Ⓢ		9	
9.5		●SSM6J409TU (0.0221)Ⓢ																						9.5	
10		P★TPC8115 (0.01)Ⓢ □SSM6J501NU (0.02)Ⓢ ●SSM6K411TU (0.020)Ⓢ		P★TPC8109 (0.02)Ⓢ P★TPC8125 (0.013)Ⓢ NS⊙TPC8A05-H (0.012)Ⓢ			J 2SK3669 (0.125)Ⓢ N★TPC8054-H (0.0199)Ⓢ		□2SJ200 (0.83) □2SK1529 (0.83) □2SK3497 (0.15) □2SJ618 (0.37)				■2SK2841 (0.55)Ⓢ ○2SK2949 (0.55)Ⓢ ◆TK10X40D (0.55)Ⓢ	○2SK3309 (0.65)Ⓢ ⊗2SK3869 (0.68)Ⓢ	□2SK2601 (1.0)Ⓢ ⊗TK10A50D (0.72)Ⓢ		⊗TK10A55D (0.72)Ⓢ	■2SK2866 (0.75)Ⓢ ○2SK2869 (0.75)Ⓢ ◆2SK3438 (1.0)Ⓢ ○2SK3437 (1.0)Ⓢ ○2SK3399 (0.75)Ⓢ ⊗TK10A60D (0.75)Ⓢ ▽Ⓢ2SK4015 (0.86)Ⓢ		◆2SK3265 (1.0)Ⓢ ⊗2SK3453 (1.0)Ⓢ		□2SK2968 (1.25)Ⓢ		10	

**Legend** Product series ①: π-MOSIII ②: π-MOSV ③: π-MOSVI ④: L<sup>2</sup>-π-MOSV ⑤: L<sup>2</sup>-π-MOSVI ⑥: U-MOS ⑦: π-MOSVII ⑧: π-MOSIV ⑨: DTMOI ⑩: DTMOII

Package ◊PW-Mini ↗VS-6 ♥VS-6 ◆PS-8 ⊕STP ▲TO-92MOD ▼PW-Mold J New PW-Mold ⊕TSON Advance ⊕ New PW-Mold2 ▽DP ☆TPS ◀TSSOP Advance ⊕TSSOP-8 ★SOP-8  
 ◊SOP-8 Lead Clamp ▶SOP Advance ◆TO-220NIS ⊗TO-220SIS ■TO-220AB ⊞TO-220(W) ⊕TFP ○TO-220FL/SM  
 \* S-Mini †TSM \*USM △UFM ☆SSM †VESM †CST3 ◊CST3B ◊CST4 †SMV △US6 ●UF6 †ES6 \*CST6D △USV \*UFV †ESV ▷DPAK ■SOT-23F □UDFN6

Notes:  
 ( ) = Rds(on) max  
 \$ = 10-V drive  
 # = 2.5-V drive  
 \* = 1.8-V drive  
 ¥ = High-speed diode  
 N = N-ch  
 P = P-ch  
 CN = Complementary N-ch  
 CP = Complementary P-ch  
 NS = N-ch + SBD  
 PS = P-ch + SBD  
 [ ] = Under development  
 PD = P-ch + Driver (load switch)



V <sub>DSS</sub> (V) I <sub>b</sub> (A)	20	30	40	50	60	75	80	100	150	200	250	450	500	525	550	600	650	900/1000	V <sub>DSS</sub> (V) I <sub>b</sub> (A)		
11		N★TPC8025 (0.009)Ⓢ N★TPC8014 (0.014)Ⓢ P★TPCS8105 (0.0135)Ⓢ P★TPCS8104 (0.012)Ⓢ N★TPC8030 (0.0095) N★TPC8031-H (0.0133)Ⓢ N★TPC8005-H (0.0129)Ⓢ P★TPC8123 (0.0090)Ⓢ				N○TPC8050-H (0.0145)Ⓢ			TJ11A10M3 (0.1)Ⓢ		◆2SK2965 (0.26)Ⓢ		⊗TK11A45D (0.62)Ⓢ			⊗TK11A55D (0.63)Ⓢ	⊗TK11A60D (0.65)Ⓢ			11	
12		N○TPC8037-H (0.0114)Ⓢ N○TPC8038-H (0.0114)Ⓢ NS○TPC8A06-H (0.0101)Ⓢ	N○TPC8052-H (0.0115)Ⓢ P★TPC8124 (0.008)Ⓢ				N▶TPC8070-H (0.035)Ⓢ	◆2SJ380 (0.21)Ⓢ ⊗TK12A10K3 (0.08)Ⓢ		◆2SJ201 (0.625) ◆2SK1530 (0.625)		⊗TK12A45D (0.52)Ⓢ	○2SK3068 (0.52)Ⓢ ◆2SK3398 (0.52)Ⓢ ⊗TK12A50D (0.52)Ⓢ ¥⊗TK12A50D5 (0.73)Ⓢ	⊗TK12A53D (0.58)Ⓢ ⊗TK12X53D (0.58)Ⓢ	□TK12J55D (0.57)Ⓢ ⊗TK12A55D (0.57)Ⓢ	□2SK2699 (0.65)Ⓢ ⊗TK12A60U (0.4)Ⓢ ⊗TK12D60U (0.4)Ⓢ □TK12J60U (0.4)Ⓢ ⊗TK12A60D (0.55)Ⓢ ◆TK12X60U (0.42)Ⓢ		1000V: ◆2SK1489 (1.0)		12	
12.5													⊗TK13A50DA (0.47)Ⓢ		⊗TK13A55DA (0.48)Ⓢ					12.5	
13		N★TPC8041 (0.007)Ⓢ N★TPC8026 (0.0066)Ⓢ P★TPC8107 (0.007)Ⓢ P★TPC8127 (0.065)Ⓢ P○TPC8112 (0.006)Ⓢ N⊗TPCC8003-H (0.0169)Ⓢ N○TPC8040-H (0.0097)Ⓢ				N○TPC8049-H (0.0107)Ⓢ		N○TPC8051-H (0.0097)Ⓢ			◆2SK2508 (0.25)Ⓢ ○2SK2598 (0.25)Ⓢ		○2SK3403 (0.4)Ⓢ ◆2SK3544 (0.4)Ⓢ ⊗TK13A45D (0.46)Ⓢ	⊗TK13A50D (0.4)Ⓢ			⊗TK13A60D (0.43)Ⓢ ¥⊗2SK4016 (0.5)Ⓢ	⊗TK13A65U (0.38)Ⓢ □TK13J65U (0.38)Ⓢ	900V: □2SK4207 (0.95)		13
13.5													⊗TK14A45DA (0.41)Ⓢ							13.5	
14					◆2SJ304 (0.12) 2SJ312 (0.12)								⊗TK14A45D (0.34)Ⓢ		⊗TK14A55D (0.37)Ⓢ		□2SK3903 (0.44)Ⓢ			14	
15		P○TPCC8102 (0.0189)Ⓢ	P▶TJ15P04M3 (0.036)Ⓢ N⊗TPCC8011-H (0.012)Ⓢ		▶TPCA8053-H (0.0223)Ⓢ N▶TPCA8069-H (0.023)Ⓢ					◆2SK2382 (0.18)Ⓢ ○2SK2401 (0.18)Ⓢ			⊗TK15A50D (0.3)Ⓢ ¥□2SK3314 (0.49)Ⓢ □TK15J50D (0.4)Ⓢ			○2SK2953 (0.4)Ⓢ ⊗TK15A60U (0.3)Ⓢ ⊗TK15D60U (0.3)Ⓢ □TK15J60U (0.3)Ⓢ ⊗TK15A60D (0.37)Ⓢ ◆TK15X60U (0.31)Ⓢ				15	
16		NS★TPC8A02-H (0.0056)Ⓢ P★TPC8128 (0.005)Ⓢ N★TPC8064-H (0.0073)Ⓢ	N○TPC8047-H (0.0076)Ⓢ		N○TPC8048-H (0.0069)Ⓢ			○2SJ412 (0.21)Ⓢ ◆2SJ619 (0.21)Ⓢ				⊗TK16A45D (0.27)Ⓢ			□TK16J55D (0.37)Ⓢ ⊗TK16A55D (0.33)Ⓢ					16	
17		NS○TPC8A03-H (0.0056)Ⓢ N○TPC8039-H (0.006)Ⓢ N★TPC8063-H (0.0061)Ⓢ												□2SK3905 (0.31)Ⓢ						17	
18		P○TPC8114 (0.0045)Ⓢ N★TPC8027 (0.0027)Ⓢ N★TPC8028 (0.0043)Ⓢ N★TPC8029 (0.0038)Ⓢ N★TPC8042 (0.0034)Ⓢ N★TPC8062-H (0.0049)Ⓢ N★TPC8059-H (0.0041)Ⓢ N★TPC8058-H (0.0033)Ⓢ N★TPC8057-H (0.0028)Ⓢ N★TPC8056-H (0.0024)Ⓢ N★TPC8082 (0.0041)Ⓢ N★TPC8081 (0.0033)Ⓢ N★TPC8080 (0.0028)Ⓢ N★TPC8079 (0.0024)Ⓢ P○TPC8117 (0.0039)Ⓢ N○TPC8036-H (0.0045)Ⓢ NS○TPC8A04-H (0.0036)Ⓢ P○TPC8120 (0.0032)Ⓢ P⊗TPCC8103 (0.012)Ⓢ N○TPC8035-H (0.0032)Ⓢ N○TPC8060-H (0.0037)Ⓢ N★TPC8055-H (0.0021)Ⓢ N★TPC8060-H (0.0037)Ⓢ N★TPC8077 (0.0021)Ⓢ	N○TPC8045-H (0.0039)Ⓢ N○TPC8046-H (0.0057)Ⓢ				◆2SJ464 (0.12)Ⓢ ◆2SJ620 (0.09)Ⓢ □TK18E10K3 (0.042)Ⓢ		◆2SK2882 (0.12)Ⓢ ◆2SK3387 (0.12)Ⓢ					○2SK2917 (0.27)Ⓢ ⊗TK18A50D (0.27)Ⓢ							18
19													□2SK3904 (0.26)Ⓢ ⊗TK19A45D (0.24)Ⓢ		□TK19K55D (0.33)Ⓢ					19	
20		NS▶TPC8A05-H (0.0129)Ⓢ NS▶TPC8A05-H (0.0129)Ⓢ P⊗TPCC8104 (0.0088)Ⓢ N▶TPC8A064-H (0.0071)Ⓢ	N▶TPCA8052-H (0.0115)Ⓢ N▶TK20P04M1 (0.025)Ⓢ		◆2SJ349 (0.045)Ⓢ ○2SJ401 (0.045)Ⓢ			◆2SK2391 (0.085)Ⓢ ⊗TJ20A10M3 (0.090)Ⓢ N▶TPCA8054-H (0.0197)Ⓢ N▶TPCA8071-H (0.02)Ⓢ				○2SK2993 (0.105)Ⓢ ◆2SK3445 (0.105)Ⓢ ◆2SK3994 (0.105)Ⓢ		□TK20J50D (0.27)Ⓢ			□2SK3911 (0.32)Ⓢ ⊗TK20A60U (0.19)Ⓢ ⊗TK20D60U (0.19)Ⓢ □TK20J60U (0.19)Ⓢ ¥□2SK3906 (0.33)Ⓢ ◆TK20X60U (0.20)Ⓢ				20
21		NS○TPCC8A01-H (0.0099)Ⓢ																		21	
22		N▶TPCA8063-H (0.0059)Ⓢ N⊗TPCC8001-H (0.0083)Ⓢ N⊗TPCC8002-H (0.0083)Ⓢ N⊗TPCC8006-H (0.008)Ⓢ																			22
23		N▶TPCA8040-H (0.0094)Ⓢ P⊗TPCC8105 (0.0078)Ⓢ												□2SK3907 (0.23)Ⓢ ¥□2SK3936 (0.25)Ⓢ						23	

**Legend** Product series ①: /-MOSIII ②: /-MOSV ③: /-MOSVI ④: L<sup>2</sup>/-MOSV ⑤: L<sup>2</sup>/-MOSVI ⑥: U-MOS ⑦: /-MOSVII ⑧: /-MOSIV ⑨: DTMOSI ⑩: DTMOSII

Package ◊PW-Mini ◊VS-8 ◊PS-8 ◊STP ▲TO-92MOD ▼PW-Mold J New PW-Mold ○TSON Advance

◊SOP-8 Lead Clamp ▶SOP Advance ◆TO-220NIS ⊗TO-220SIS ■TO-220AB ⊞TO-220(W) □TO-220 ◆TFP

\*S-Mini +TSM +USM △UFM ☆SSM +VESM +CST3 ◆CST3B ◆CST4 +SMV /US6 \*UF6

♫ New PW-Mold2 ▽DP ☆TPS ◀TSSOP Advance ◀TSSOP-8 ★SOP-8

○TO-220FL/SM ◆TO-220SM(W) □TO-3P(N) ○TO-3P(N)IS ●TO-3P(L) ⊞ Chip LGA

+ES6 \*CST6D /USV \*UFV ☆ESV ▷DPAK ■SOT-23F □UDFN6

Notes:  
 ( ) = R<sub>DS(on)</sub> max \* = 1.8-V drive P = P-ch NS = N-ch + SBD PD = P-ch + Driver  
 \$ = 10-V drive ¥ = High-speed diode CM = Complementary N-ch PS = P-ch + SBD  
 # = 2.5-V drive N = N-ch CP = Complementary P-ch [ ] = Under development (load switch)

V <sub>DSS</sub> (V) I <sub>D</sub> (A)	20	30	40	50	60	75	80	100	150	200	250	300	450	500	525	550	600	900/1000	V <sub>DSS</sub> (V) I <sub>D</sub> (A)		
24		N ◀ TPCM8004-H (0.011)Ⓢ N ▶ TPCA8030-H (0.011)Ⓢ N ▶ TPCA8031-H (0.011)Ⓢ P ▶ TPCA8109 (0.009)Ⓢ N ⊖ TPCC8009 (0.007)Ⓢ				N ▶ TPCA8050-H (0.0142)Ⓢ														24	
25		P ◀ TPCM8102 (0.0077)Ⓢ N ◀ TPCA8006 (0.007)Ⓢ N ⊖ TPCC8008 (0.0068)Ⓢ		◆ 2SK2507 (0.046)Ⓢ	◆ 2SK2232 (0.046)Ⓢ ○ 2SK2311 (0.046)Ⓢ ▣ TK25E06K3 (0.018)Ⓢ			⊗ TK25A10K3 (0.040)Ⓢ		◆ 2SK3444 (0.082)Ⓢ ○ 2SK3625 (0.082)Ⓢ				● 2SK1544 (0.2)						25	
26		N ⊖ TPCC8007 (0.0046)Ⓢ		◆ 2SK3846 (0.016)Ⓢ																26	
27								■ 2SK2314 (0.085)Ⓢ ○ 2SK2789 (0.085)Ⓢ												27	
28		N ▶ TPCA8062-H (0.0047)Ⓢ				N ▶ TPCA8049-H (0.0104)Ⓢ	N ▶ TPCA8051-H (0.0094)Ⓢ													28	
30					◆ 2SJ334 (0.038)Ⓢ ○ 2SJ402 (0.038)Ⓢ ⊗ TK30A06J3A (0.026)Ⓢ				◆ 2SK3443 (0.055)Ⓢ	□ 2SK3176 (0.052)Ⓢ	□ 2SK2967 (0.068)Ⓢ ● 2SK2995 (0.068)Ⓢ									30	
32		N ▶ TPCA8059-H (0.0039)Ⓢ N ▶ TPCA8082 (0.0039)Ⓢ	○ 2SK3847 (0.016)Ⓢ N ▶ TPCA8047-H (0.0073)Ⓢ											● 2SK1486 (0.095)						32	
34		NS ▶ TPCA8024-H (0.0053)Ⓢ N ▶ TPCA8039-H (0.0057)Ⓢ P ▶ TPCA8128 (0.0048)Ⓢ																		34	
35		N ▶ TPCA8024 (0.0043)Ⓢ				◆ 2SK3662 (0.0125)Ⓢ N ▶ TPCA8048-H (0.0066)Ⓢ														35	
36					◆ 2SK2385 (0.03)Ⓢ															36	
38		NS ▶ TPCA8008-H (0.0042)Ⓢ N ▶ TPCA8036-H (0.0038)Ⓢ N ▶ TPCA8058-H (0.0031)Ⓢ N ▶ TPCA8081 (0.0031)Ⓢ	N ▶ TPCA8046-H (0.0054)Ⓢ																	38	
40	N ▶ TPCA8011-H (0.0035)Ⓢ	P ▶ TPCA8102 (0.006)Ⓢ P ▶ TPCA8106 (0.0037)Ⓢ N ▶ TPCA8025 (0.0036)Ⓢ N ▶ TK40P03M1 (0.0108)Ⓢ	P ▶ TPCA8108 (0.0095)Ⓢ N ▶ TK40P04M1 (0.011)Ⓢ		P ▶ TPCA8104 (0.016)Ⓢ	⊗ TK40A08K3 (0.009)Ⓢ		▣ TK40D10J1 (0.015)Ⓢ ⊗ TK40A10J1 (0.015)Ⓢ ⊗ TK40A10K3 (0.015)Ⓢ ◆ TK40X10J1 (0.020)Ⓢ ▣ TK40E10K3 (0.015)Ⓢ										□ TK40J60T (0.08)Ⓢ		40	
42		N ▶ TPCA8057-H (0.0026)Ⓢ N ▶ TPCA8080 (0.0026)Ⓢ																		42	
44		NS ▶ TPCA8044-H (0.0032)Ⓢ																		44	
45		□ 2SK3506 (0.02) N ▶ TPCA8026 (0.0022)Ⓢ N ▶ TPCA8042 (0.0033)Ⓢ N ▶ TPCA8060-H (0.0034)Ⓢ P ▶ TPCA8120 (0.003)Ⓢ N ▶ TK45P03M1 (0.0094)Ⓢ		□ 2SK2550 (0.03)Ⓢ ◆ 2SK2886 (0.02)Ⓢ □ 2SK2744 (0.02)Ⓢ □ 2SK3051 (0.03)Ⓢ	□ 2SK2233 (0.03)Ⓢ ○ 2SK2266 (0.03)Ⓢ ○ 2SK2376 (0.017)Ⓢ □ 2SK2398 (0.03)Ⓢ ◆ 2SK3844 (0.0058)Ⓢ																45
46			N ▶ TPCA8045-H (0.0036)Ⓢ																	46	
48		N ▶ TPCA8056-H (0.0022)Ⓢ N ▶ TPCA8079 (0.0022)Ⓢ																		48	
50		N ▶ TPCA8028-H (0.0028)Ⓢ N ▶ TK50P03M1 (0.0075)Ⓢ	N ▶ TK50P04M1 (0.0087)Ⓢ	□ 2SK2551 (0.011)Ⓢ □ 2SK2745 (0.0095)Ⓢ	□ 2SK2173 (0.017)Ⓢ □ 2SK2445 (0.018)Ⓢ ▣ TK50E06K3A (0.0085)Ⓢ	▣ TK50E08K3 (0.012)Ⓢ		□ 2SK1381 (0.032)	◆ TK50X15J1 (0.03)Ⓢ ◆ TK50F15J1 (0.03)Ⓢ				● 2SK3132 (0.09)Ⓢ Y ● 2SK3131 (0.11)Ⓢ					□ TK50J60U (0.065)Ⓢ		50	
55																				55	
56		N ▶ TPCA8055-H (0.0019)Ⓢ N ▶ TPCA8077-H (0.0019)Ⓢ																		56	
60		N ▶ TK60P03M1 (0.0062)Ⓢ				● 2SK2267 (0.011)Ⓢ □ 2SK2313 (0.011)Ⓢ	▣ TK60D06J1 (0.0078)Ⓢ ⊗ TK60A06J1 (0.0078)Ⓢ ▣ TK60E08K (0.009)Ⓢ		● 2SK1382 (0.020)											60	
70			□ TK70J04J3 (0.0038)Ⓢ ◆ TK70X04K3 (0.0056)Ⓢ ◆ TK70X04K3L (0.0056)Ⓢ		□ 2SK3845 (0.0058)Ⓢ ▣ TK70D06J1 (0.0064)Ⓢ ⊗ TK70A06J1 (0.0064)Ⓢ ⊗ TJ70A06J3 (0.008)Ⓢ ◆ TK70X06K3 (0.008)Ⓢ															70	
75			◆ 2SK3843 (0.0035)Ⓢ		◆ 2SK4034 (0.0058)Ⓢ ◆ 2SK3842 (0.0058)Ⓢ															75	
80			◆ TK80X04K3 (0.0035)Ⓢ				⊗ TK80A08K3 (0.0045)Ⓢ ▣ TK80D08K3 (0.0045)Ⓢ													80	
100			◆ TK100F04K3 (0.003)Ⓢ ◆ TK100F04K3L (0.003)Ⓢ		◆ TK100F06K3 (0.005)Ⓢ															100	
120					◆ TJ120F06J3 (0.008)Ⓢ															120	
130					◆ TK130F06K3 (0.0034)Ⓢ															130	
150			◆ TK150F04K3 (0.0021)Ⓢ ◆ TK150F04K3L (0.0021)Ⓢ																	150	

**Legend** Product series ① : π-MOSIII ② : π-MOSV ③ : π-MOSVI ④ : L<sup>2</sup>-π-MOSV ⑤ : L<sup>2</sup>-π-MOSVI ⑥ : U-MOS ⑦ : π-MOSVII ⑧ : π-MOSIV ⑨ : DTMOSI ⑩ : DTMOSII

Package ◁ PW-Mini ▷ VS-8 ♥ VS-6 ♣ PS-8 ⊕ STP ▲ TO-92MOD ▼ PW-Mold ↓ New PW-Mold ⊙ TSON Advance ◊ SOP-8 Lead Clamp ▶ SOP Advance ◆ TO-220NIS ⊗ TO-220SIS ■ TO-220AB ▣ TO-220(W) □ TO-220 ♣ TFP

\* S-Mini \* TSM \* USM △ UFM ☆ SSM +VESM +CST3 ◊ CST3B ◊ CST4 +SMV /US6 \*UF6

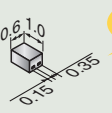
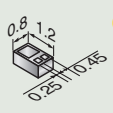
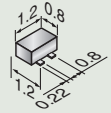
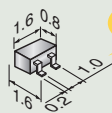
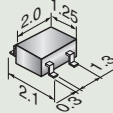
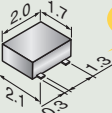
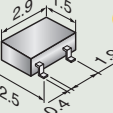
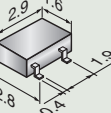
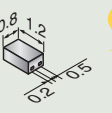
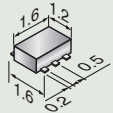
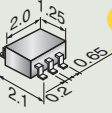
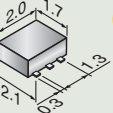
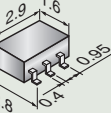
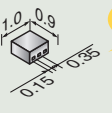
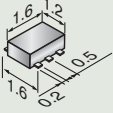
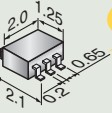
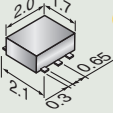
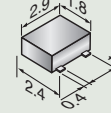
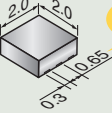
▣ New PW-Mold2 ▽ DP ☆ TPS ◀ TSSOP Advance ✕ TSSOP-8 ★ SOP-8 ○ TO-220FL/SM ◆ TO-220SM(W) □ TO-3P(N) ⊙ TO-3P(N)IS ● TO-3P(L) ▣ Chip LGA

Notes: ( ) = R<sub>DS(on)</sub> max \* = 1.8-V drive P = P-ch NS = N-ch + SBD PD = P-ch + Driver (load switch)  
 \$ = 10-V drive Y = High-speed diode CN = Complementary N-ch PS = P-ch + SBD  
 # = 2.5-V drive N = N-ch CP = Complementary P-ch [ ] = Under development

## 4-1 Packaging Options

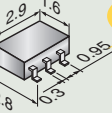
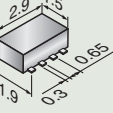
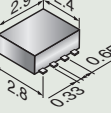
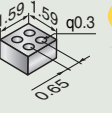
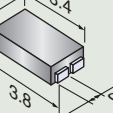
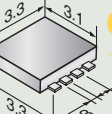
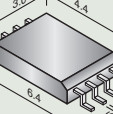
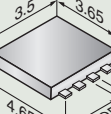
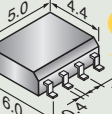
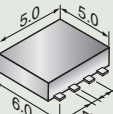
### SSM Series

The SSM Series comes in small, thin packages suitable for portable devices. Chip-scale packages (1006 size) help reduce system size.

<b>CST3</b> Chip-Scale Package, Transfer Molded, 3-Pin Typical product: SSM3K35CT  Thickness: 0.38 typ. Unit: mm	<b>CST3B</b> Chip-Scale Package, Transfer Molded, 3-Pin, B-Type Typical product: SSM3J46CTB  Thickness: 0.48 typ. Unit: mm	<b>VESM (SOT-723)</b> Very Extreme Super-Mini Typical product: SSM3K35MFV  Thickness: 0.5 typ. Unit: mm	<b>SSM (SOT-416)(SC-75)</b> Small Super-Mini Typical product: SSM3K35FS  Thickness: 0.7 typ. Unit: mm	<b>USM (SOT-323)(SC-70)</b> Ultra-Super-Mini Typical product: SSM3K15FU  Thickness: 0.9 typ. Unit: mm
<b>UFM</b> Ultra-super-Mini Flat lead Typical product: SSM3J130TU  Thickness: 0.7 typ. Unit: mm	<b>S-Mini (SOT-346)(SC-59)</b> Super-Mini Typical product: SSM3K15F  Thickness: 1.1 typ. Unit: mm	<b>TSM</b> Thin Super-Mini Typical product: SSM3J304T  Thickness: 0.7 typ. Unit: mm	<b>CST4</b> Chip-Scale Package, Transfer Molded, 4-Pin Typical product: SSM4K27CT  Thickness: 0.38 typ. Unit: mm	<b>ESV (SOT-553)</b> Extreme Super-mini, 5-pin Typical product: SSM5N15FE  Thickness: 0.55 typ. Unit: mm
<b>USV (SOT-353)(SC-88A)</b> Ultra-Super-mini, 5-pin Typical product: SSM5N15FU  Thickness: 0.9 typ. Unit: mm	<b>UFV</b> Ultra-super-mini, Flat lead, 5-pin Typical product: SSM5H12TU  Thickness: 0.7 typ. Unit: mm	<b>SMV (SOT-25)(SC-74A)</b> Super-Mini, 5-pin Typical product: SSM5H14F  Thickness: 1.1 typ. Unit: mm	<b>CST6D</b> Chip-Scale Package, Transfer Molded, 6-Pin, D-Type Typical product: SSM6N37CTD  Thickness: 0.38 typ. Unit: mm	<b>ES6 (SOT-563)</b> Extreme Super-mini, 6-pin Typical product: SSM6N36FE  Thickness: 0.55 typ. Unit: mm
<b>US6 (SOT-353)(SC-88A)</b> Ultra-Super-mini, 6-pin Typical product: SSM6N15FU  Thickness: 0.9 typ. Unit: mm	<b>UF6</b> Ultra Super mini Flat lead 6-pin Typical product: SSM6J409TU  Thickness: 0.7 typ. Unit: mm	<b>SOT-23F</b> SOT-23 Flat lead Typical product: SSM3J327R  Thickness: 0.8 typ. Unit: mm	<b>UDFN6</b> Ultra Small Dual Flat Non-leaded 6-pin Typical product: SSM6G13NU  Thickness: 0.75 typ. Unit: mm	

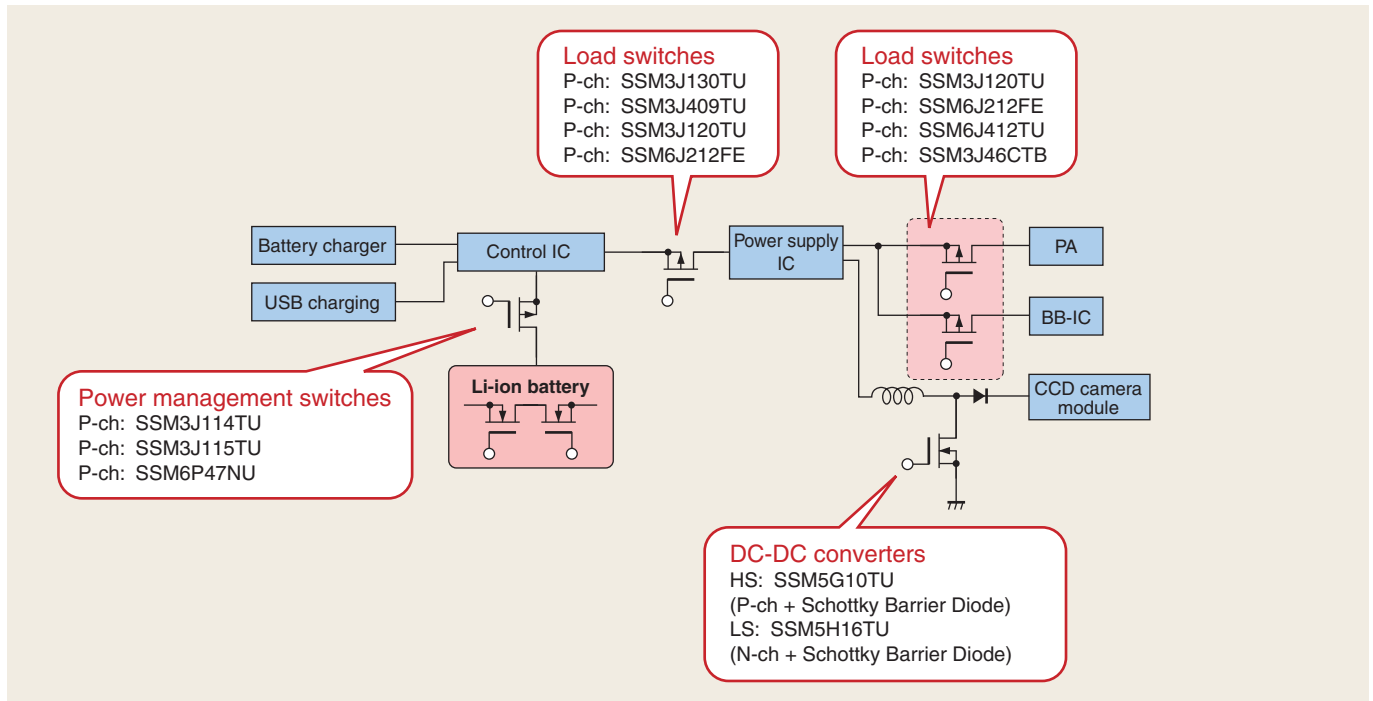
### TPC Series

The TPC Series comes in small, thin packages suitable for portable devices. The latest TSON Advance package allows the maximum permissible power dissipation equivalent to SOP-8, but occupies 64% less board space.

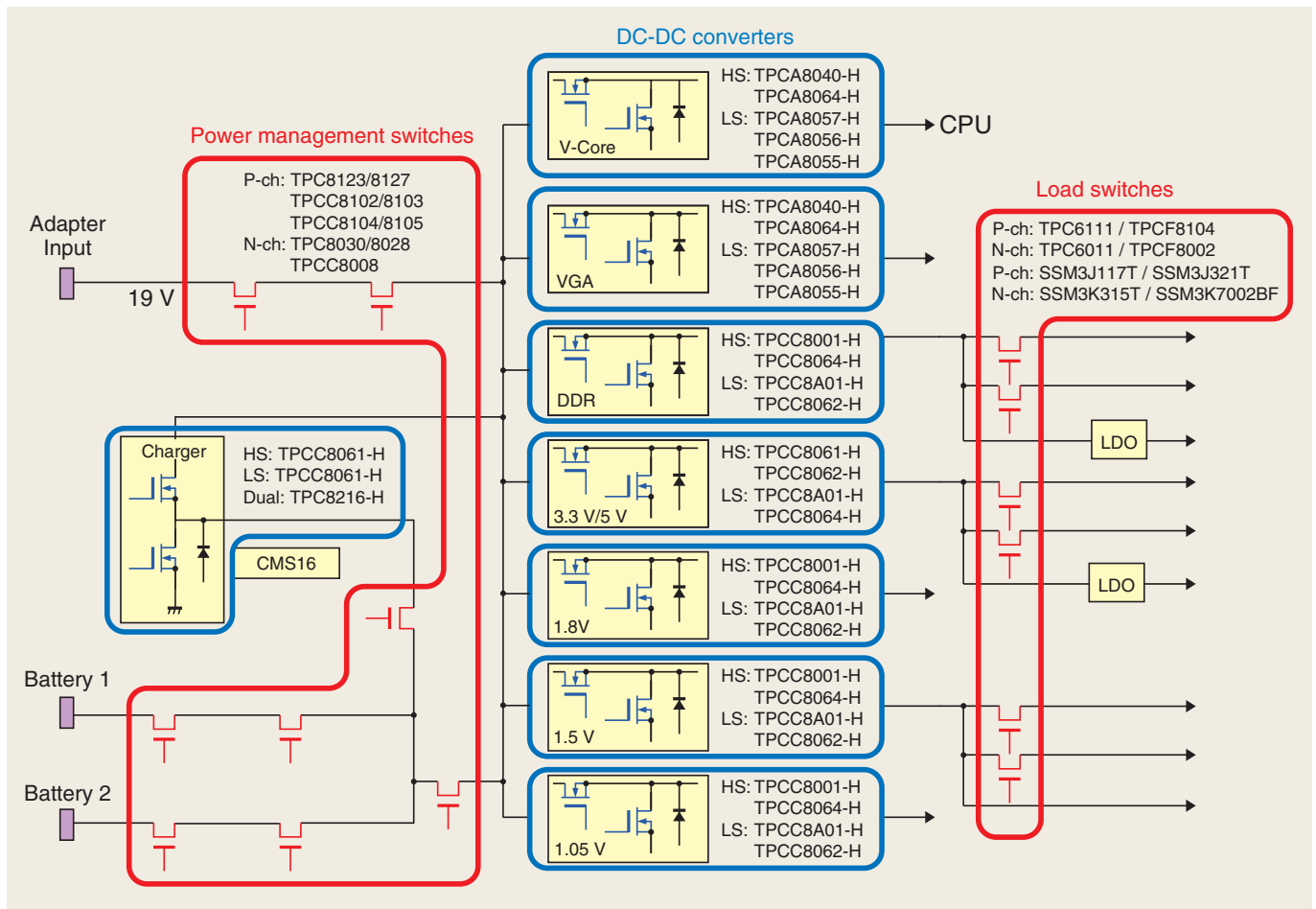
<b>VS-6</b> Very Thin & Small, 6-pin Typical product: TPC6003  Thickness: 0.75 typ. Unit: mm	<b>VS-8</b> Very Thin & Small, 8-pin Typical product: TPCF8101  Thickness: 0.8 typ. Unit: mm	<b>PS-8</b> Progressive & Small 8-pin Series Typical product: TPCP8402  Thickness: 0.8 typ. Unit: mm	<b>Chip LGA</b> Land Grid Array Typical product: TPCL4201  Thickness: 0.25 typ. Unit: mm	<b>STP2</b> Small Thin Package Typical product: TPCT4204  Thickness: 0.65 typ. Unit: mm
<b>TSON Advance</b> Typical product: TPC8005-H  Thickness: 0.85 typ. Unit: mm	<b>TSSOP-8</b> Typical product: TPCS8208  Thickness: 0.9 typ. Unit: mm	<b>TSSOP Advance</b> Typical product: TPCM8001-H  Thickness: 0.75 typ. Unit: mm	<b>SOP-8</b> Typical product: TPC8035-H  Thickness: 1.6 typ. Unit: mm	<b>SOP Advance</b> Typical product: TPCA8028-H  Thickness: 0.95 typ. Unit: mm

## 4-2 Application Examples and Block Diagrams

### Cell Phone (Power Supply Circuit)

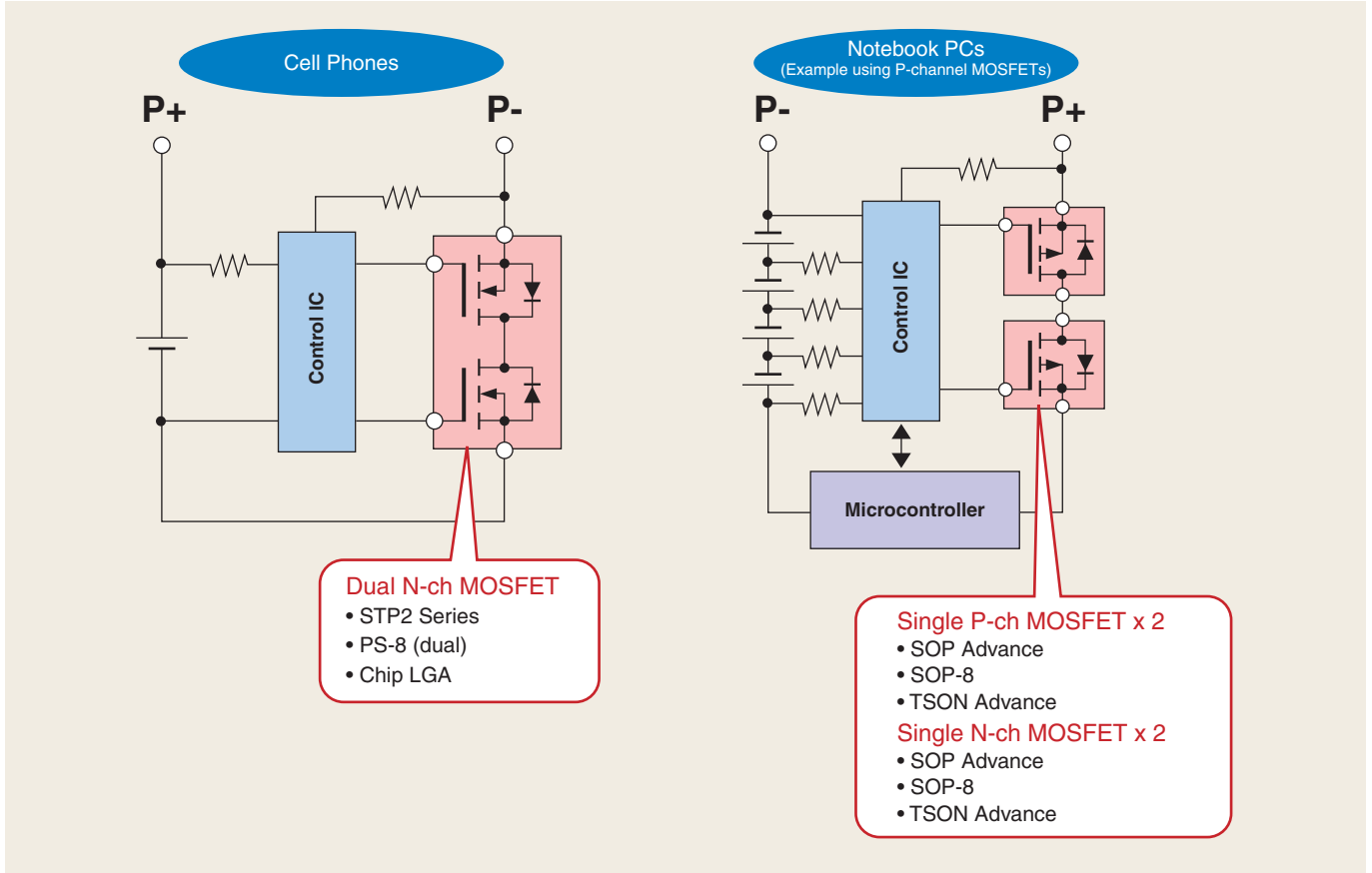


### Notebook PC (Power Supply Circuit)

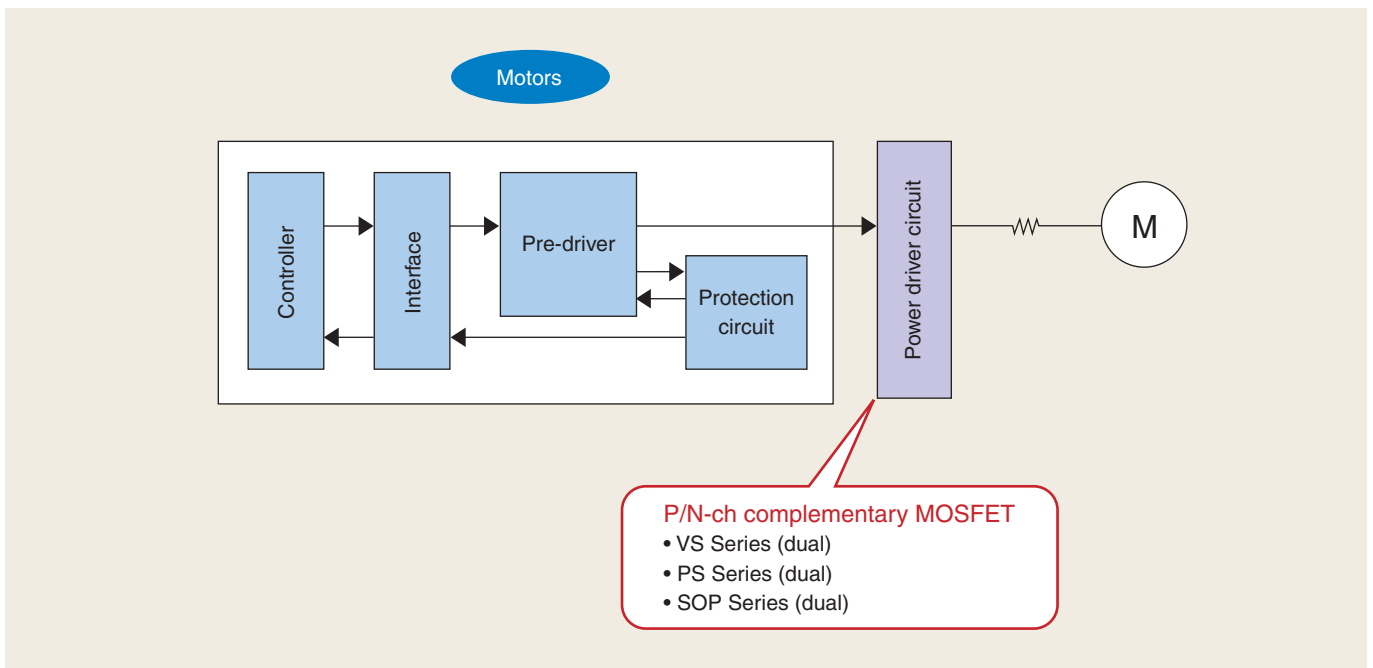


## 4-2 Application Examples and Block Diagrams

### Lithium-Ion Secondary Battery (Battery Protection Circuits)



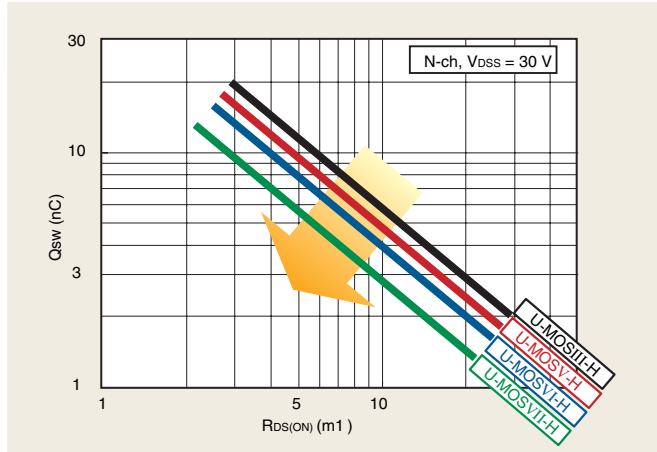
### Motor Driver (Power Driver Circuit)



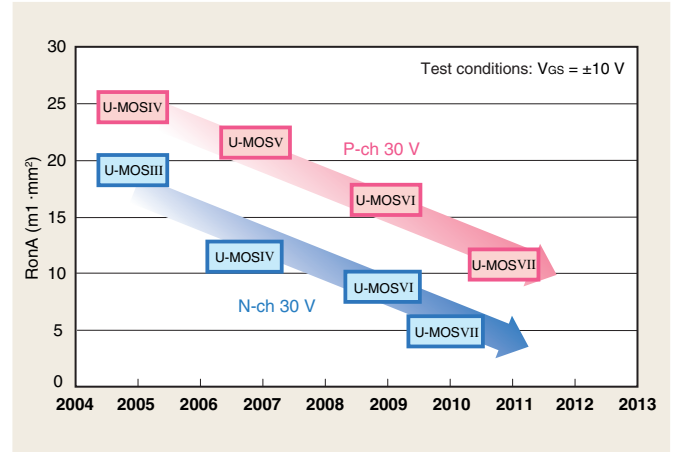
## 4-3 Low- $V_{DS}$ MOSFET Roadmaps

### Roadmap for Trench MOSFETs

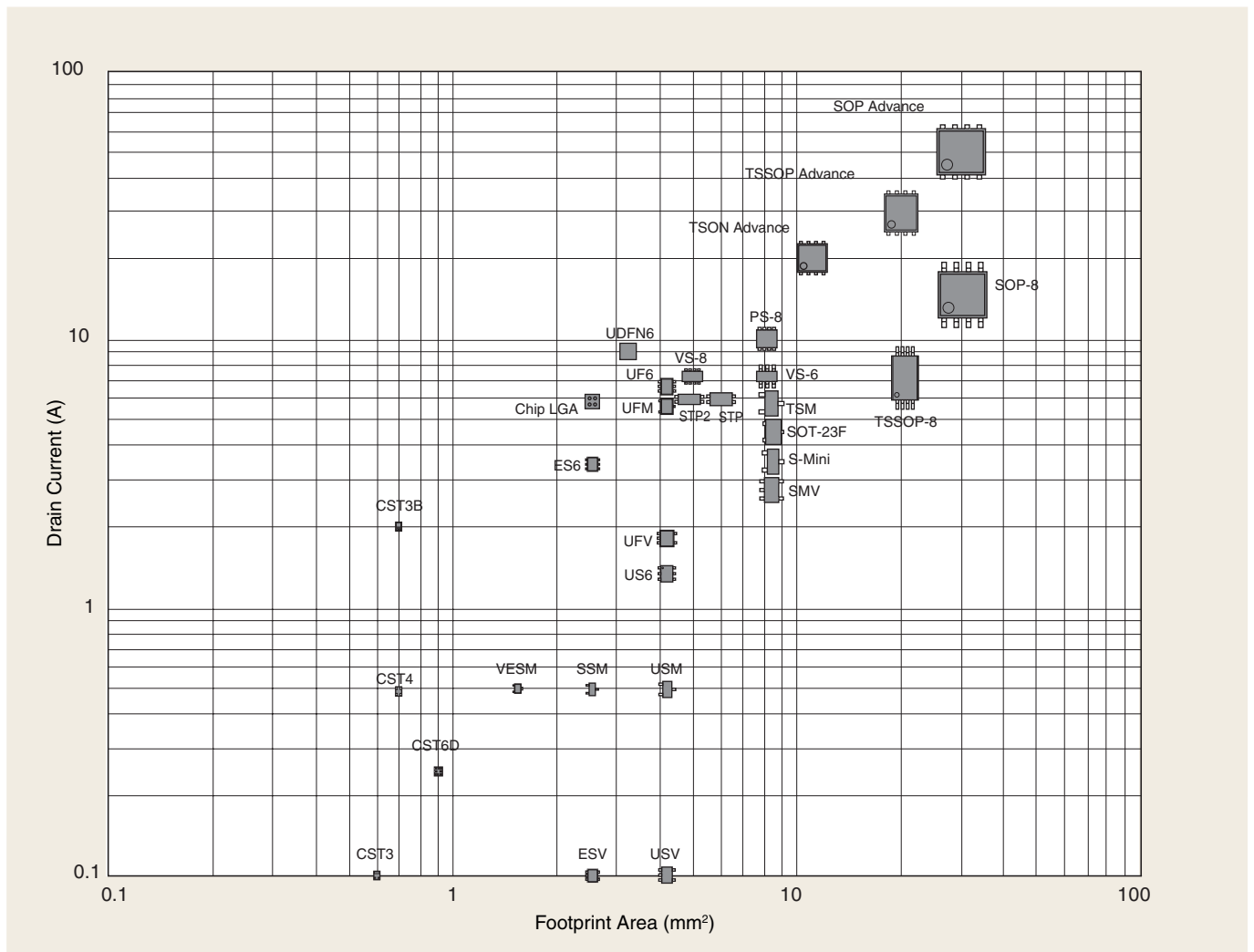
■ High-Speed, Low- $V_{DS}$  U-MOS



■ Low-Ron Trench MOSFETs



### Package Options



### ■ Ultra-Small Packages

	S-Mini	USM	SSM	VESM	CST3	US6	USV	ESV	CST6D
Footprint Area	7.3 mm <sup>2</sup>	4.2 mm <sup>2</sup>	2.6 mm <sup>2</sup>	1.4 mm <sup>2</sup>	0.6 mm <sup>2</sup>	4.2 mm <sup>2</sup>	4.2 mm <sup>2</sup>	2.6 mm <sup>2</sup>	0.9 mm <sup>2</sup>
Permissible Power Dissipation (Note)	0.2 W	0.2 W	0.1 W	0.15 W	0.1 W	0.2 W	0.2 W	0.15 W	0.14 W
Height (MAX)	1.4 mm	1.1 mm	0.9 mm	0.55 mm	0.4 mm	1.1 mm	1.1 mm	0.6 mm	0.4 mm

Note: Mounted on FR4 Board (25.4 x 25.4 mm)

### ■ Thermally-Enhanced Compact Packages

	TSM	UF6	SMV	UFV	UFM	ES6	CST3B	CST4	SOT-23F	UDFN6
Footprint Area	8.1 mm <sup>2</sup>	4.2 mm <sup>2</sup>	8.1 mm <sup>2</sup>	4.2 mm <sup>2</sup>	4.2 mm <sup>2</sup>	2.6 mm <sup>2</sup>	1.0 mm <sup>2</sup>	1.0 mm <sup>2</sup>	8.1 mm <sup>2</sup>	4.0 mm <sup>2</sup>
Permissible Power Dissipation (Note)	0.7 W	0.5 W	0.75 W	0.5 W	0.5 W	0.5 W	1.0 W	0.4 W	1.0 W	1.0 W
Height (MAX)	0.85 mm	0.75 mm	1.4 mm	0.75 mm	0.75 mm	0.6 mm	0.5 mm	0.4 mm	0.88 mm	0.8 mm

Note: Mounted on FR4 Board (25.4 x 25.4 mm)

### ■ Thermally Enhanced Packages

	SOP Adv.	SOP-8	TSSOP Adv.	TSON Adv.
Footprint Area	30 mm <sup>2</sup>	30 mm <sup>2</sup>	16.3 mm <sup>2</sup> (-46%)	10.9 mm <sup>2</sup> (-64%)
Permissible Power Dissipation	2.8 W (+47%)	1.9 W	2.3 W (+21%)	1.9 W
Height	1.0 mm (-47%)	1.9 mm	0.8 mm (-58%)	0.9 mm (-53%)

(Percentage relative to SOP-8)

### ■ Compact Packages

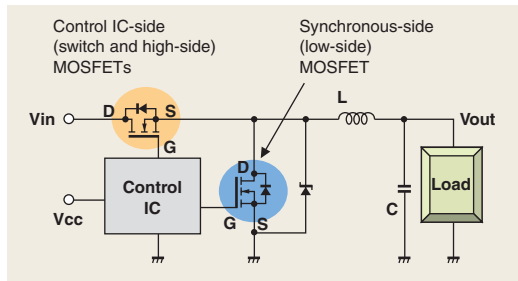
	VS-8	VS-6	PS-8	Chip LGA
Footprint Area	5.5 mm <sup>2</sup> (-32%)	8.1 mm <sup>2</sup>	8.1 mm <sup>2</sup>	2.56 mm <sup>2</sup> (-68%)
Permissible Power Dissipation	2.5 W (+14%)	2.2 W	1.68 W (-24%)	—
Height	0.85 mm	0.85 mm	0.85 mm	0.25 mm (-71%)

(Percentage relative to VS-6)

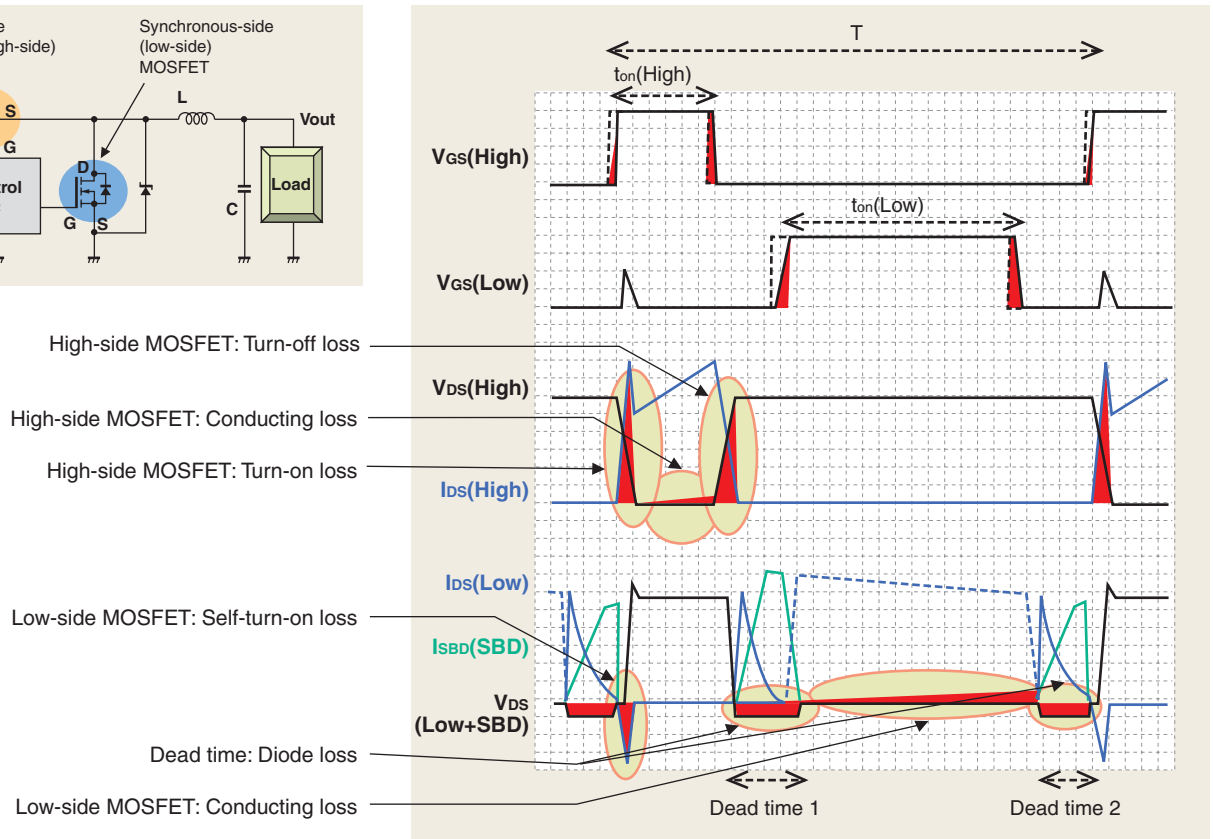
## 4-4 Low- $V_{DS}$ , High-Speed MOSFETs

### Synchronous Rectification DC-DC Converters – Block Diagram, Timing Chart and Power Loss Factors

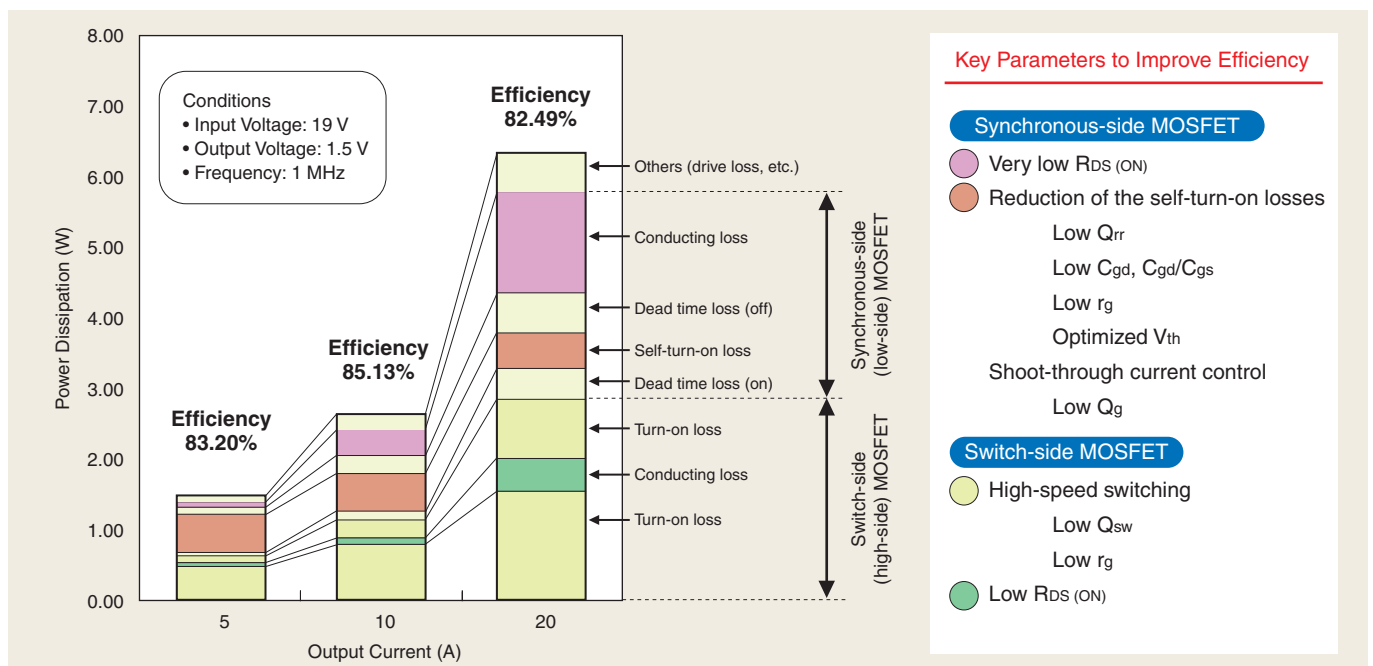
#### Block Diagram



#### Timing Chart



### Synchronous Rectification DC-DC Converters – Summary Results of Power Loss Simulation and Key Parameters for MOSFETs

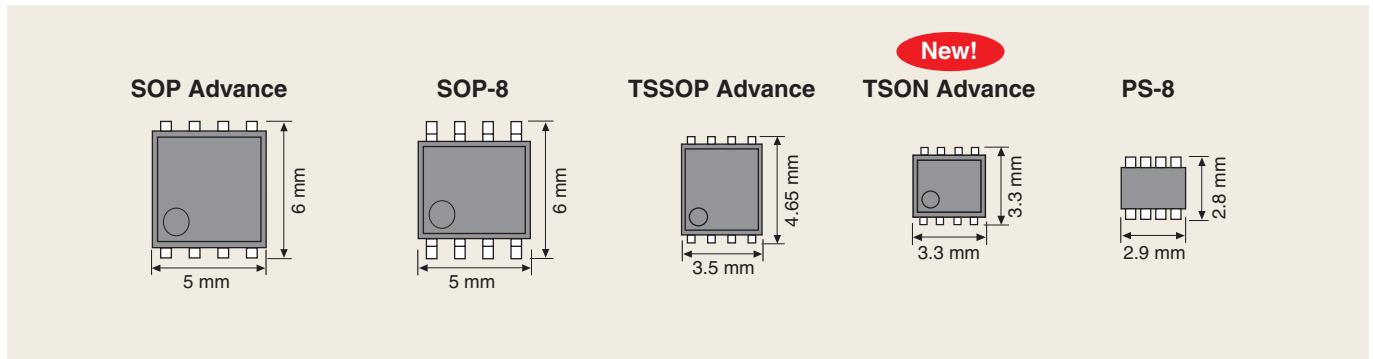




## Synchronous Rectification DC-DC Converters – Efficiency Improvement by Thermally Enhanced Package and New Process Technology

### Thermally Enhanced Package

In addition to the "SOP Advance" and "TSSOP Advance" packages, Toshiba has developed "TSON Advance" package which keep equivalent power dissipation while reducing the footprint area by 64% compared to the industry-standard SOP-8 package. Toshiba offers a variety of packages that can realize high-power density.



	SOP Advance	SOP-8	TSSOP Advance	TSON Advance	PS-8
Footprint Area	30 mm <sup>2</sup>	30 mm <sup>2</sup>	16.3 mm <sup>2</sup> (-46%)	10.9 mm <sup>2</sup> (-64%)	8.1 mm <sup>2</sup> (-73%)
Power Dissipation	2.8 W (+47%)	1.9 W	2.3 W (+21%)	1.9 W	1.68 W (-12%)
Height	1.0 mm (-47%)	1.9 mm	0.8 mm (-58%)	0.9 mm (-53%)	0.85 mm (-55%)

Percentage relative to SOP-8

### New Process Technology

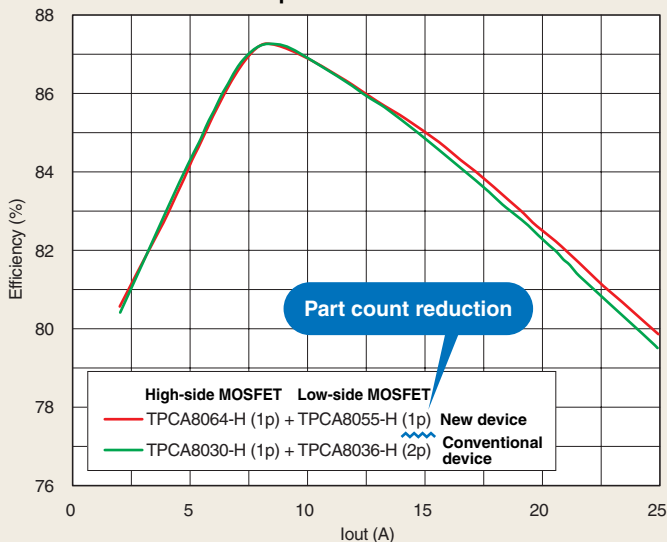
Toshiba has developed a new process technology to further reduce an internal gate resistance ( $r_g$ ) and gate capacitance ratio ( $C_{gd}/C_{gs}$ ) for minimizing the self-turn-on loss while maintaining both the low ON-resistance and low gate charge characteristics.

	$R_{DS(ON)}$ Typ. @4.5 V (m $\Omega$ )	$r_g$ Typ. ( $\Omega$ )	$C_{gd}/C_{gs}$ Typ. (%)
TPCA8055-H(U-MOSVII-H) New Product	1.9	1.4	5.9
TPCA8028-H(U-MOSVI)	2.3	1.0	6.8
TPCA8019-H(U-MOSV)	3.1	1.0	6.6

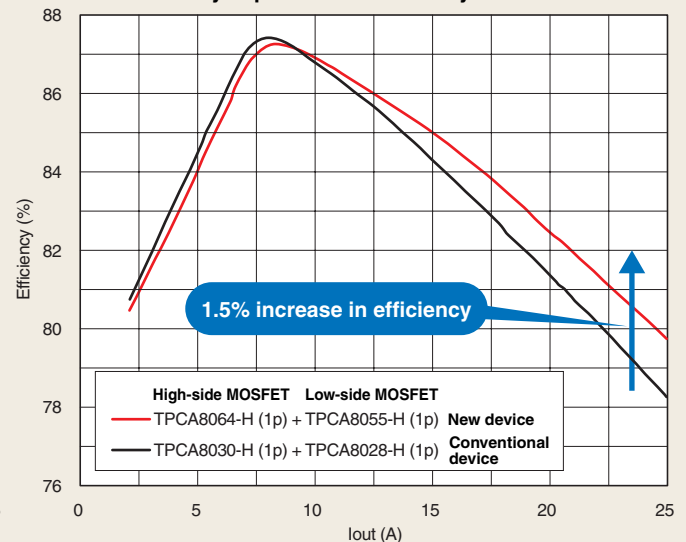
### Efficiency Characteristics

$f = 300$  kHz,  $V_{IN} = 19.5$  V,  $V_{OUT} = 1.1$  V

Maintains efficiency while reducing the footprint areas and costs

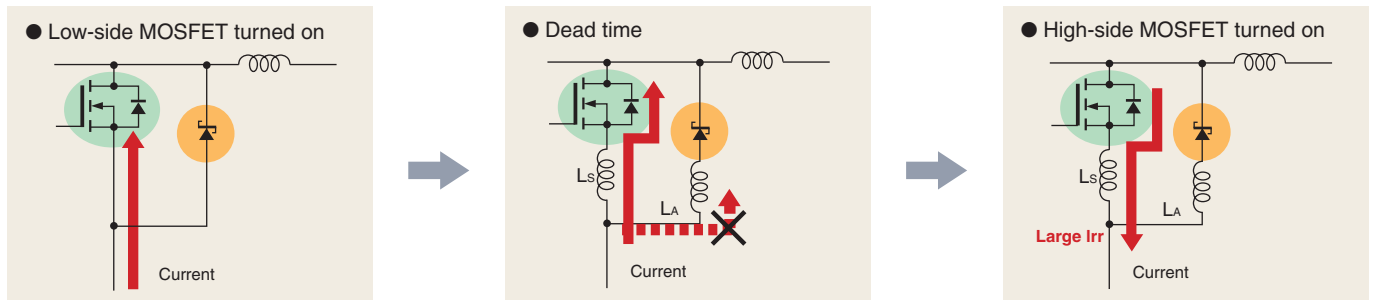


Efficiency improvement offered by new MOSFETs



## Synchronous Rectification DC-DC Converters – MOSBD (MOSFET with SBD)

### External SBD



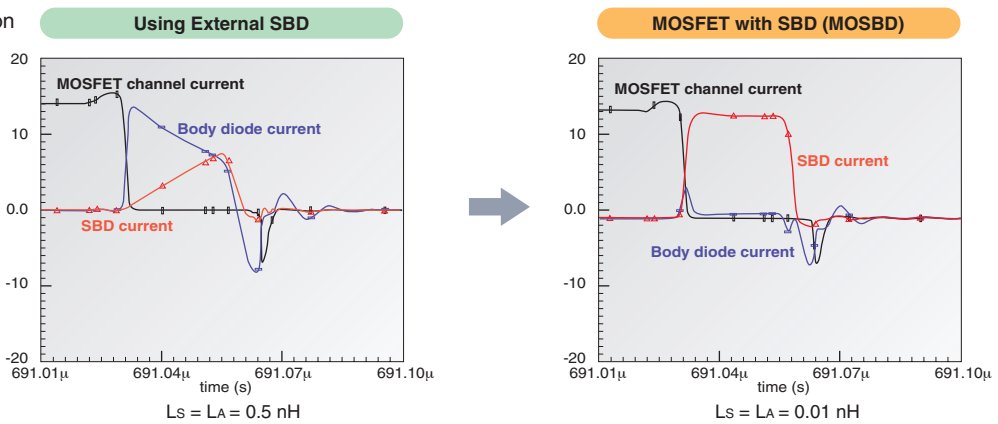
When an SBD is added externally, the SBD can't function fully due to the influence of wire inductances ( $L_s$  and  $L_A$ ); thus a body diode current during the dead time becomes larger and causes the following penalties.

- 1: Increase in the conducting loss of the body diode.
- 2: Increase in the reverse recovery loss due to high  $di/dt$ .
- 3: Induces a self-turn-on phenomenon.

### MOSFET with SBD (MOSBD)

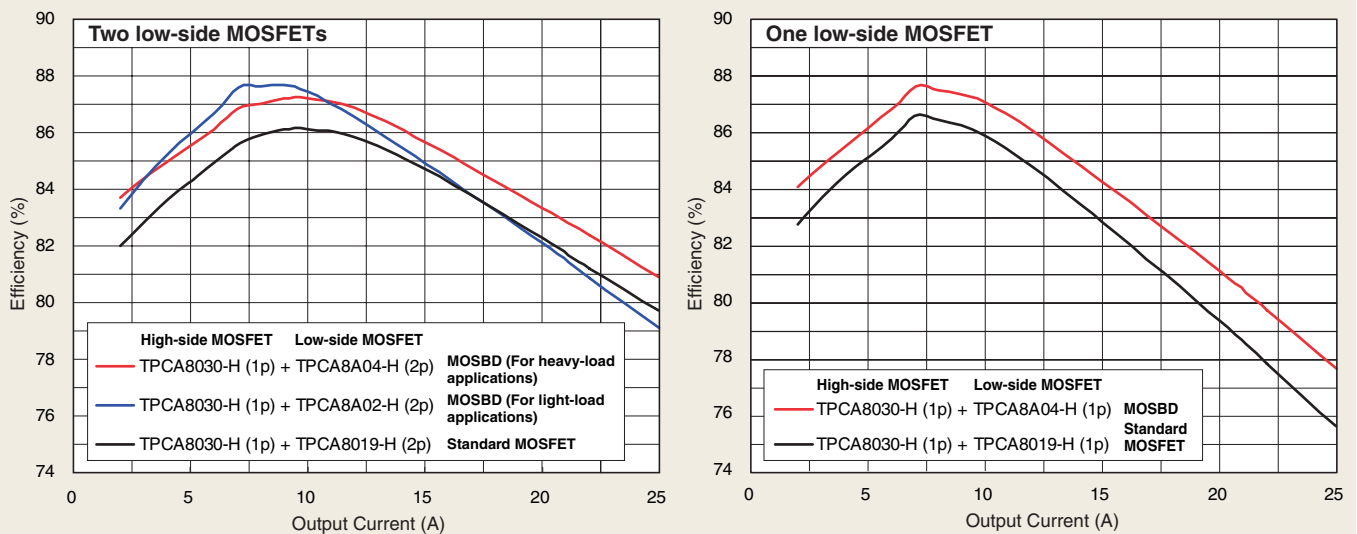
A MOSFET with SBD using a monolithic structure reduces a wire inductance ( $L_A$ ) and a parasitic inductance ( $L_s$ ). This structure makes it possible for the SBD to function fully and to reduce losses.

#### Current Waveform Simulation



### Efficiency Characteristics

$f = 300 \text{ kHz}$ ,  $V_{IN} = 19.5 \text{ V}$ ,  $V_{OUT} = 1.1 \text{ V}$



## High-Speed MOSFET Offerings

Circuit Configuration	Absolute Maximum Ratings			Part Number	Package	$R_{DS(ON)}$ Max ( $m\Omega$ )			$Q_{sw}$ Typ.(nC) @ $V_{DS} = V_{DSS} \times 0.8$	$C_{iss}$ (pF)	Series	
	$V_{DSS}$ (V)	$V_{GS}$ (V)	$I_D$ (A)			10 V	4.5 V	2.5 V				
N-ch	Single	20	$\pm 12$	40	TPCA8011-H	SOP Advance	—	3.5	7.5	16	2900	U-MOSIII-H
			$\pm 20$	5.9	TPC6008-H ☆	VS-6	60	74	—	0.9	232	U-MOSVI-H
			$\pm 20$	8	TPCP8008-H ☆	PS-8	20	23	—	3.8	900	U-MOSVI-H
			$\pm 20$	11	TPCP8005-H ☆		12.9	15.7	—	5	1433	U-MOSV-H
			$\pm 20$	TBD	TPCC8061-H ☆	TSON Advance	(25.6)	(28.6)	—	TBD	600	U-MOSVI-H
			$\pm 20$	13	TPCC8003-H ☆		16.9	19.3	—	4.2	990	U-MOSVI-H
			$\pm 20$	22	TPCC8006-H ☆		8	9.3	—	7.4	1700	U-MOSVI-H
			$\pm 20$	22	TPCC8001-H ☆		8.3	10.6	—	7.1	1900	U-MOSV-H
			$\pm 20$	22	TPCC8002-H ☆		8.3	10.6	—	7.1	1900	U-MOSV-H
			$\pm 20$	TBD	TPCC8064-H ☆		7.1	9.5	—	TBD	1640	U-MOSVII-H
			$\pm 20$	26	TPCC8005-H ☆		6.4	7.4	—	9.1	2200	U-MOSVI-H
			$\pm 20$	TBD	TPCC8062-H ☆		4.7	6.4	—	TBD	2480	U-MOSVII-H
		$\pm 20$	24	TPCM8004-H ☆	TSSOP Advance		11	13.4	—	5	1433	U-MOSV-H
		$\pm 20$	8	TPC8061-H ☆	SOP-8		25	29	—	TBD	600	U-MOSVI-H
		$\pm 20$	12	TPC8037-H ☆		11.4	13.9	—	5	1433	U-MOSV-H	
		$\pm 20$	12	TPC8038-H ☆		11.4	13.9	—	5	1433	U-MOSV-H	
		$\pm 20$	13	TPC8040-H ☆		9.7	11.1	—	5.1	1700	U-MOSVI-H	
		$\pm 20$	16	TPC8064-H ☆		7.3	9.7	—	TBD	1600	U-MOSVII-H	
		$\pm 20$	17	TPC8063-H ☆		6.1	8.1	—	TBD	1900	U-MOSVII-H	
		$\pm 20$	17	TPC8039-H ☆		6	6.9	—	8.5	2600	U-MOSVI-H	
		$\pm 20$	18	TPC8062-H ☆		4.9	6.6	—	TBD	2400	U-MOSVII-H	
		$\pm 20$	18	TPC8036-H ☆		4.5	5.1	—	13	3500	U-MOSVI-H	
		$\pm 20$	18	TPC8059-H ☆		4.1	5.4	—	TBD	2900	U-MOSVII-H	
		$\pm 20$	18	TPC8060-H ☆		3.7	4.2	—	16	4600	U-MOSVI-H	
		$\pm 20$	18	TPC8058-H ☆		3.3	4.3	—	TBD	3600	U-MOSVII-H	
		$\pm 20$	18	TPC8035-H ☆		3.2	3.6	—	17	6000	U-MOSVI-H	
		$\pm 20$	18	TPC8057-H ☆		2.8	3.6	—	TBD	4300	U-MOSVII-H	
		$\pm 20$	18	TPC8056-H ☆		2.4	3.2	—	TBD	5200	U-MOSVII-H	
		$\pm 20$	18	TPC8055-H ☆		2.1	2.6	—	TBD	5600	U-MOSVII-H	
		$\pm 20$	20	TPCA8064-H ☆		SOP Advance	7.1	9.5	—	TBD	1600	U-MOSVII-H
		$\pm 20$	22	TPCA8063-H ☆			5.9	7.9	—	TBD	1900	U-MOSVII-H
		$\pm 20$	23	TPCA8040-H ☆			9.4	10.8	—	5.7	1700	U-MOSVI-H
		$\pm 20$	24	TPCA8031-H ☆			11	13.4	—	5	1433	U-MOSV-H
		$\pm 20$	24	TPCA8030-H ☆	11		13.4	—	5	1433	U-MOSV-H	
		$\pm 20$	28	TPCA8062-H ☆	4.7		6.4	—	TBD	2400	U-MOSVII-H	
		$\pm 20$	32	TPCA8059-H ☆	3.9		5.2	—	TBD	2900	U-MOSVII-H	
		$\pm 20$	34	TPCA8039-H ☆	5.7		6.6	—	8.6	2600	U-MOSVI-H	
		$\pm 20$	38	TPCA8036-H ☆	4.2		4.8	—	13	3500	U-MOSVI-H	
		$\pm 20$	38	TPCA8058-H ☆	3.1		4.1	—	TBD	3600	U-MOSVII-H	
		$\pm 20$	42	TPCA8057-H ☆	2.6		3.4	—	TBD	4300	U-MOSVII-H	
		$\pm 20$	45	TPCA8060-H ☆	3.4		3.9	—	17	4600	U-MOSVI-H	
		$\pm 20$	50	TPCA8028-H ☆	2.8		3.2	—	20	6000	U-MOSVI-H	
		$\pm 20$	48	TPCA8056-H ☆	2.2		3	—	TBD	5200	U-MOSVII-H	
		$\pm 20$	56	TPCA8055-H ☆	1.9		2.4	—	TBD	6400	U-MOSVII-H	
		$\pm 20$	40	TK40P03M1 ☆	DPAK		10.8	14.4	—	5.7	1150	U-MOSVI-H
		$\pm 20$	45	TK45P03M1 ☆			9.4	12	—	8	1500	U-MOSVI-H
		$\pm 20$	50	TK50P03M1 ☆			7.5	9.8	—	8.2	1700	U-MOSVI-H
		$\pm 20$	60	TK60P03M1 ☆			6.2	7.9	—	13	2700	U-MOSVI-H
		$\pm 20$	5.3	TPC6009-H ☆	VS-6		81	98	—	1.0	225	U-MOSVI-H
		$\pm 25$	(15)	TPCC8011-H ☆	TSON Advance	(12)	—	—	TBD	(1410)	U-MOSVI-H	
		$\pm 20$	7.5	TPC8022-H	SOP-8	27	35	—	3.5	650	U-MOSIII-H	
		$\pm 20$	12	TPC8052-H ☆		11.5	13.3	—	6.6	1620	U-MOSVI-H	
		$\pm 20$	16	TPC8047-H ☆		7.6	8.8	—	11	2590	U-MOSVI-H	
		$\pm 20$	18	TPC8046-H ☆		5.7	6.6	—	15	3545	U-MOSVI-H	
		$\pm 20$	18	TPC8045-H ☆		3.9	4.4	—	23	5800	U-MOSVI-H	
		$\pm 20$	7.5	TPCA8020-H		SOP Advance	27	35	—	3.5	650	U-MOSIII-H
$\pm 20$	20	TPCA8052-H ☆	11.3	13.1			—	6.6	1620	U-MOSVI-H		

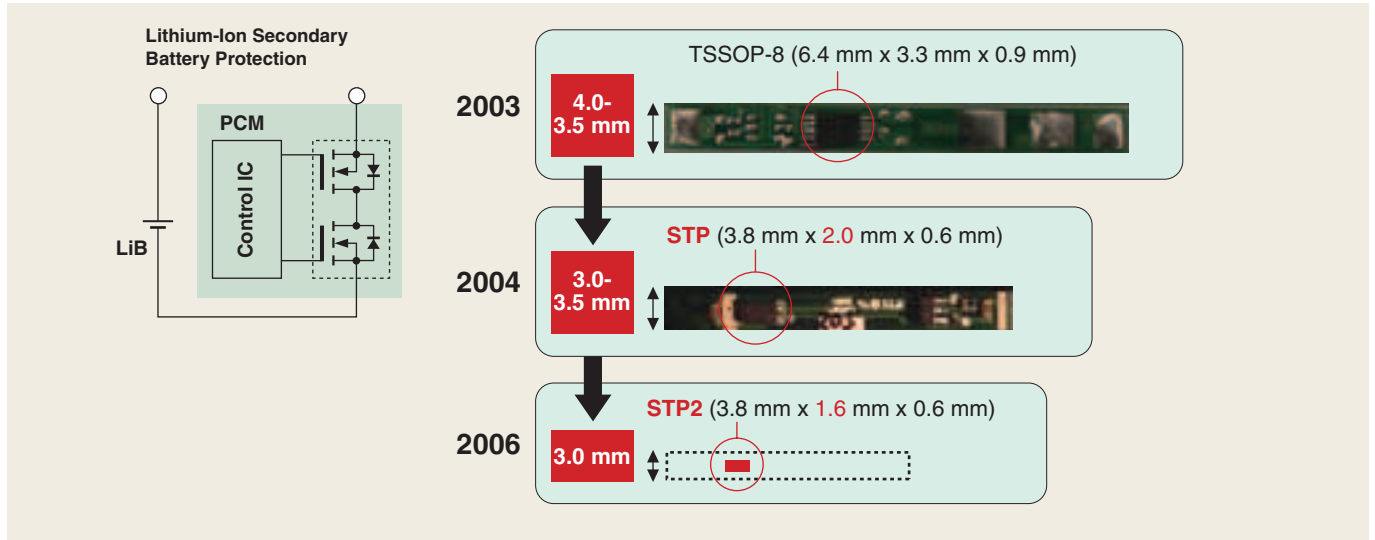
☆: No protection Zener diode between gate and source

Circuit Configuration		Absolute Maximum Ratings			Part Number	Package	R <sub>DS(ON)</sub> Max (mΩ)			Q <sub>sw</sub> Typ.(nC) @ V <sub>DS</sub> = V <sub>DSS</sub> x 0.8	C <sub>iss</sub> (pF)	Series	
		V <sub>DSS</sub> (V)	V <sub>GSS</sub> (V)	I <sub>D</sub> (A)			10 V	4.5 V	2.5 V				
N-ch	Single	40	±20	32	TPCA8047-H ☆	SOP Advance	7.3	8.5	—	13	2590	U-MOSVI-H	
			±20	38	TPCA8046-H ☆		5.4	6.3	—	15	3545	U-MOSVI-H	
			±20	46	TPCA8045-H ☆		3.6	4.1	—	23	5800	U-MOSVI-H	
			±20	20	TK20P04M1 ☆	DPAK	25	30	—	3.7	890	U-MOSVI-H	
			±20	40	TK40P04M1 ☆		11	13.4	—	7.4	1920	U-MOSVI-H	
			±20	50	TK50P04M1 ☆		8.7	10.2	—	9.4	2600	U-MOSVI-H	
		60	±20	6.1	TPC6010-H ☆	VS-6	59	63	—	2.7	640	U-MOSVI-H	
			±20	5	TPCP8007-H ☆	PS-8	57	64	—	2.7	640	U-MOSVI-H	
			±20	9	TPC8053-H ☆	SOP-8	22.5	24.2	—	6.7	1620	U-MOSVI-H	
			±20	11	TPC8050-H ☆		14.5	15.6	—	9.2	2590	U-MOSVI-H	
			±20	13	TPC8049-H ☆		10.7	11.5	—	13	3545	U-MOSVI-H	
			±20	16	TPC8048-H ☆		6.9	7.4	—	17	5800	U-MOSVI-H	
			±25	(15)	TPCA8069-H ☆	SOP Advance	(23)	—	—	6.1	(1420)	U-MOSVI-H	
			±20	15	TPCA8053-H ☆		22.3	24	—	6.9	1620	U-MOSVI-H	
			±20	24	TPCA8050-H ☆		14.2	15.3	—	10	2590	U-MOSVI-H	
			±20	28	TPCA8049-H ☆		10.4	11.2	—	13	3545	U-MOSVI-H	
			±20	35	TPCA8048-H ☆	SOP-8	6.6	7.1	—	19	5800	U-MOSVI-H	
			80	±20	13		TPC8051-H ☆	9.7	10.1	—	16	5800	U-MOSVI-H
				±25	(12)		TPCA8070-H ☆	(35)	—	—	5.8	(1600)	U-MOSVI-H
				±20	28	TPCA8051-H ☆	9.4	9.8	—	18	5800	U-MOSVI-H	
	100	±20	2.2	TPCP8003-H	PS-8	180	190	—	2	360	U-MOSIII-H		
			(5)	TPCC8012-H ☆	TSON Advance	(120)	—	—	3.9	(990)	U-MOSVI-H		
		±25	10	TPC8054-H ☆	SOP-8	19.9	21.5	—	18	6300	U-MOSVI-H		
			(8)	TPCA8072-H ☆	SOP Advance	(71)	—	—	5.5	(1530)	U-MOSVI-H		
			20	TPCA8071-H ☆		(20)	—	—	18	(5400)	U-MOSVI-H		
			20	TPCA8054-H ☆		19.7	21.3	—	18	6300	U-MOSVI-H		
		±20	7	TPCA8009-H		350	—	—	3.7	600	π-MOSV"MACH II"		
		200	±20	5.5	TPCA8010-H	450	—	—	3.7	600	π-MOSV"MACH II"		
	250	±20	4	TPCA8008-H	580	—	—	3.7	600	π-MOSV"MACH II"			
	Dual	30	±20	6.5	TPCP8205-H ☆	PS-8	26	29	—	—	830	U-MOSVI-H	
±20			6.4	TPC8216-H ☆	SOP-8	20	23	—	3.4	900	U-MOSVI-H		
40		±20	(5.1)	TPC8217-H ☆		(33)	(40)	—	2.4	(640)	U-MOSVI-H		
60		±20	3.8	TPC8218-H ☆		57	64	—	2.6	640	U-MOSVI-H		
80		±20	(3.2)	TPC8220-H ☆		(80)	(87)	—	2.4	(640)	U-MOSVI-H		
100		±20	(2)	TPC8219-H ☆	(173)	(180)	—	2.5	(750)	U-MOSVI-H			
P-ch	Single	30	±20	-5	TPC6109-H	VS-6	59	83	—	4.8	471	U-MOSIII-H	
		40	±20	-4.8	TPCP8103-H	PS-8	40	54	—	6.5	800	U-MOSIII-H	
			±20	-7.5	TPC8116-H	SOP-8	30	37	—	9.7	1190	U-MOSIII-H	
			±20	-7.5	TPCA8107-H	SOP Advance	30	37	—	9.7	1190	U-MOSIII-H	
MOSBD	Single	30	±20	8	TPCP8A05-H ☆	PS-8	17.5	21.9	—	3.7	1300	U-MOSV-H	
			±20	21	TPCC8A01-H ☆	TSON Advance	9.9	12.6	—	4.1	1430	U-MOSV-H	
			±20	20	TPCM8A05-H ☆	TSSOP Advance	12.9	17.2	—	3.7	1300	U-MOSV-H	
			±20	10	TPC8A05-H ☆	SOP-8	13.3	17.6	—	3.7	1300	U-MOSV-H	
			±20	12	TPC8A06-H ☆		10.1	12.9	—	4.5	1400	U-MOSV-H	
			±20	17	TPC8A03-H ☆		5.6	7	—	8.4	2640	U-MOSV-H	
		±20	18	TPC8A04-H ☆	3.6		4.5	—	13.4	4400	U-MOSV-H		
		N-ch + P-ch Complementary	30	±20	20	TPCA8A05-H ☆	SOP Advance	12.9	17.2	—	3.7	1300	U-MOSV-H
				±20	34	TPCA8A02-H ☆		5.3	6.7	—	8.6	2640	U-MOSV-H
				±20	38	TPCA8A08-H ☆		4.2	5.3	—	11	3500	U-MOSV-H
				±20	44	TPCA8A04-H ☆		3.2	4.1	—	13.4	4400	U-MOSV-H
				±20	6.8	TPC8A07-H ☆		SOP-8	23	28	—	3.4	830
	±20			8.5	15				19	—	3.6	1100	U-MOSV-H
	N-ch + P-ch Complementary	40	±20	6.5	TPC8406-H	SOP-8	27	35	—	3.5	650	U-MOSIII-H	
-40			±20	-6.5			30	37	—	9.7	1190	U-MOSIII-H	

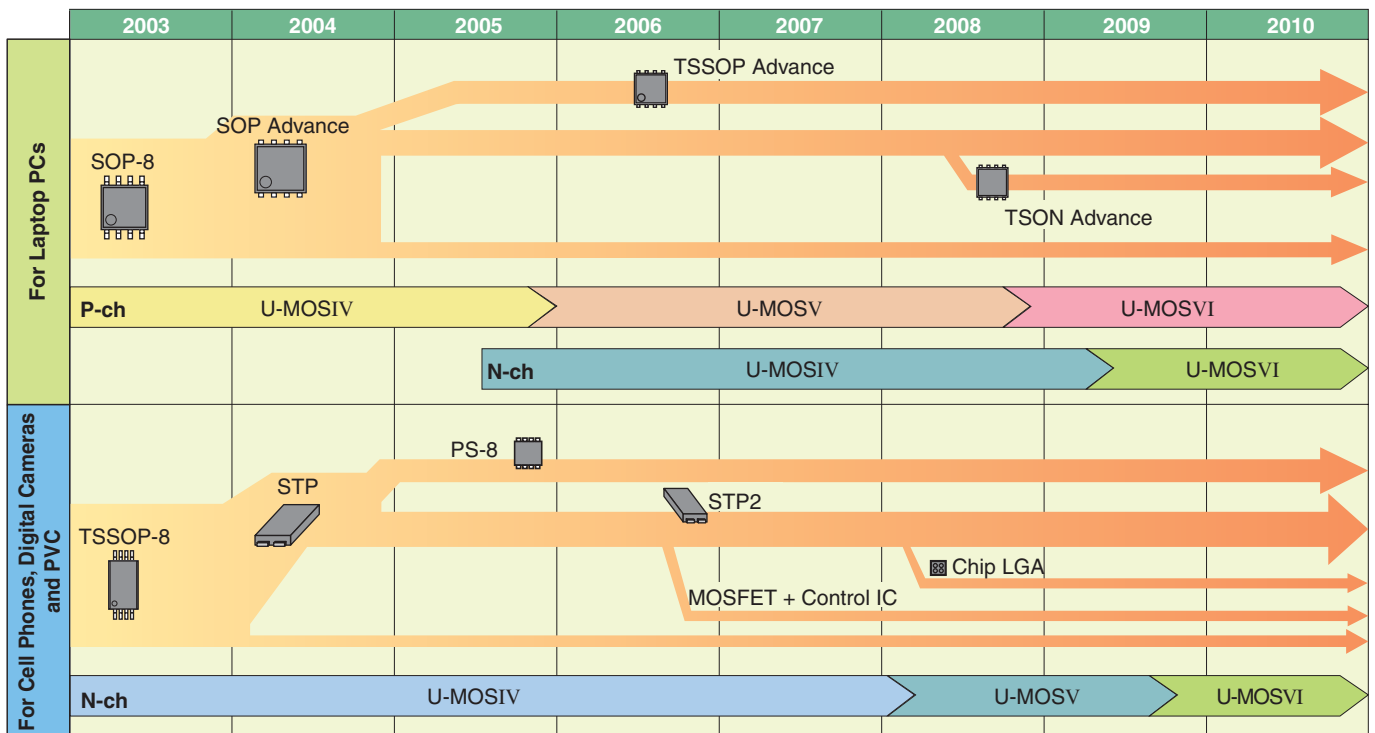
☆: No protection Zener diode between gate and source

## 4-5 Low- $V_{DSS}$ , Low- $R_{DS(ON)}$ MOSFETs (for Lithium-Ion Battery Protection)

### Lithium-Ion Battery Protection Circuit Trend



### MOSFET Roadmap



## ● Low-ON-resistance N-Channel Power MOSFETs

Part Number	Absolute Maximum Ratings			Package	Circuit Configuration	R <sub>DS(ON)</sub> Max (mΩ)				Series	
	V <sub>DSS</sub> (V)	V <sub>GSS</sub> (V)	I <sub>D</sub> (A)			10 V	4.5 V	4.0 V	2.5 V		
TPCT4203	20	±12	6	STP2	N-ch Dual	—	31	32	49	U-MOSIV	
TPCT4204	30	±12	6			—	38	39	52	U-MOSIV	
TPCL4201 ☆	20	±12	6	Chip LGA		—	31	33	52	U-MOSV	
TPCL4203 ☆	24	±12	(6)			—	(36)	(38)	(55)	U-MOSV	
TPCL4202 ☆	30	±12	(6)			—	(40)	(42)	(64)	U-MOSV	
TPCC8009	30	±20	24	TSON Advance		N-ch Single	7	—	—	—	U-MOSIV
TPCC8008 ☆	30	±20	25		6.8		12.8	—	—	U-MOSIV	
TPC8025 ☆	30	±20	11	SOP-8	9		14.5	—	—	U-MOSIV	
TPC8030 ☆	30	±20	11		8.5		17	—	—	U-MOSIV	
TPC8041 ☆	30	±20	13		7		13.5	—	—	U-MOSIV	
TPC8026 ☆	30	±20	13		6.6		10	—	—	U-MOSIV	
TPC8028 ☆	30	±20	18		4.3		8	—	—	U-MOSIV	
TPC8029 ☆	30	±20	18		3.8		7	—	—	U-MOSIV	
TPC8042 ☆	30	±20	18		3.4		6.5	—	—	U-MOSIV	
TPC8027 ☆	30	±20	18		2.7		5.5	—	—	U-MOSIV	
TPC8082 ☆	30	±20	18		4.1		5.4	—	—	U-MOSVII	
TPC8081 ☆	30	±20	18		3.3		4.3	—	—	U-MOSVII	
TPC8080 ☆	30	±20	18		2.8		3.6	—	—	U-MOSVII	
TPC8079 ☆	30	±20	18		2.4		3.2	—	—	U-MOSVII	
TPC8077 ☆	30	±20	(18)		(2.1)		(2.6)	—	—	U-MOSVII	
TPCA8024 ☆	30	±20	35		SOP Advance		4.3	7.8	—	—	U-MOSIV
TPCA8025 ☆	30	±20	40				3.5	6	—	—	U-MOSIV
TPCA8042 ☆	30	±20	45				3.3	5.7	—	—	U-MOSIV
TPCA8026 ☆	30	±20	45				2.2	4.5	—	—	U-MOSIV
TPCA8082 ☆	30	±20	32				3.9	5.2	—	—	U-MOSVII
TPCA8081 ☆	30	±20	38	3.1			4.1	—	—	U-MOSVII	
TPCA8080 ☆	30	±20	42	2.6			3.4	—	—	U-MOSVII	
TPCA8079 ☆	30	±20	48	2.2			3	—	—	U-MOSVII	
TPCA8077 ☆	30	±20	(56)	(1.9)			(2.4)	—	—	U-MOSVII	

☆: No protection Zener diode between gate and source

## ● Low-ON-resistance P-Channel Power MOSFETs

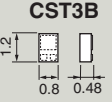
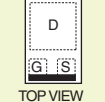
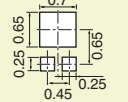
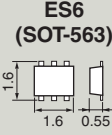
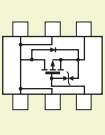
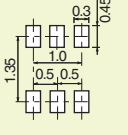
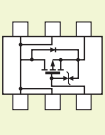
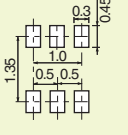
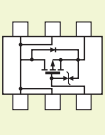
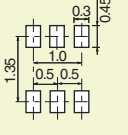
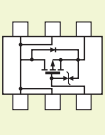
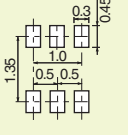
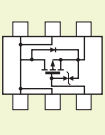
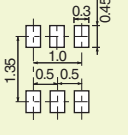
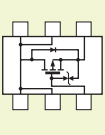
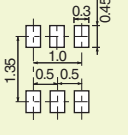
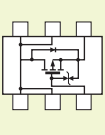
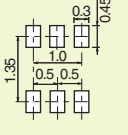
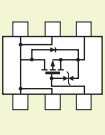
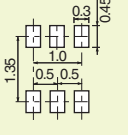
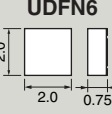
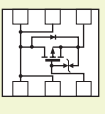
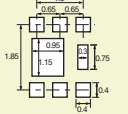
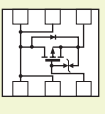
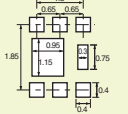
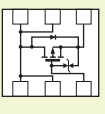
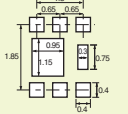
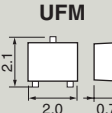
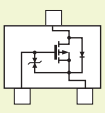
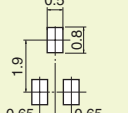
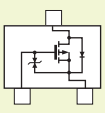
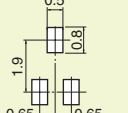
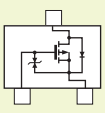
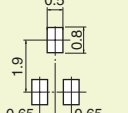
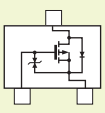
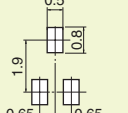
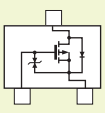
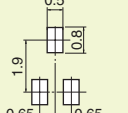
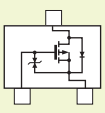
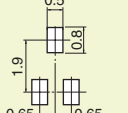
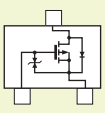
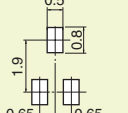
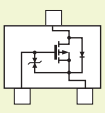
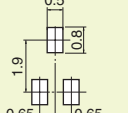
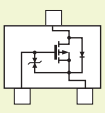
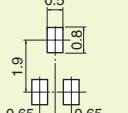
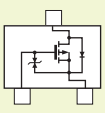
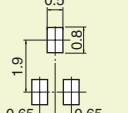
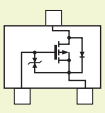
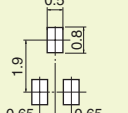
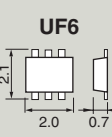
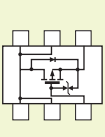
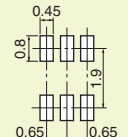
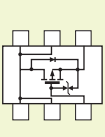
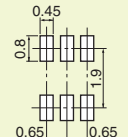
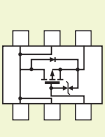
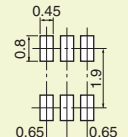
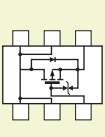
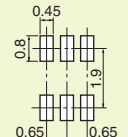
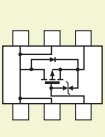
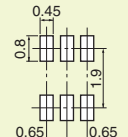
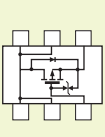
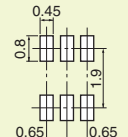
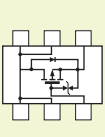
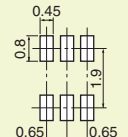
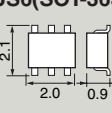
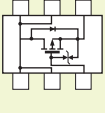
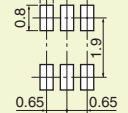
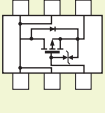
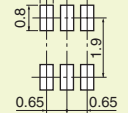
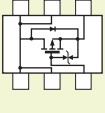
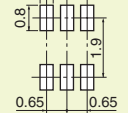
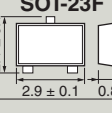
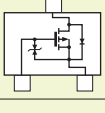
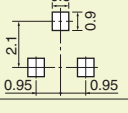
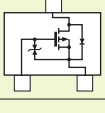
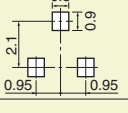
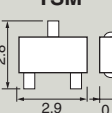
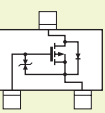
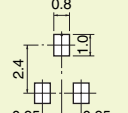
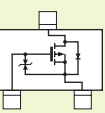
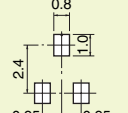
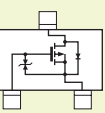
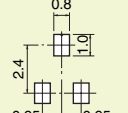
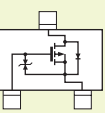
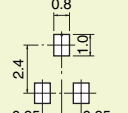
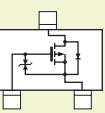
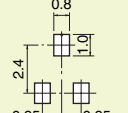
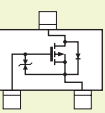
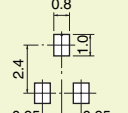
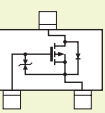
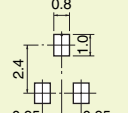
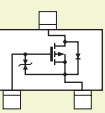
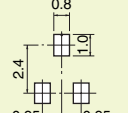
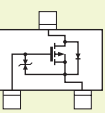
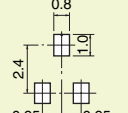
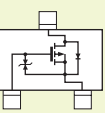
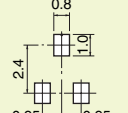
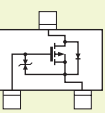
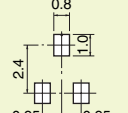
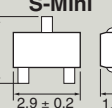
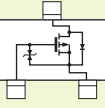
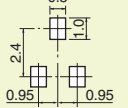
Part Number	Absolute Maximum Ratings			Package	Circuit Configuration	R <sub>DS(ON)</sub> Max (mΩ)				Series	
	V <sub>DSS</sub> (V)	V <sub>GSS</sub> (V)	I <sub>D</sub> (A)			10 V	4.4 V	4 V	2.5 V		
TPCC8102 ☆	-30	±20	-15	TSON Advance	P-ch Single	18.9	—	33.2	—	U-MOSV	
TPCC8103 ☆	-30	±20	-18			12	—	25	—	U-MOSV	
TPCC8104 ☆	-30	-25/+20	-20			8.8	12.4	—	—	U-MOSVI	
TPCC8105 ☆	-30	±20	-23			7.8	10.4	—	—	U-MOSVI	
TPC8125 ☆	-30	-25/+20	-10	SOP-8		13	17	—	—	U-MOSVI	
TPC8126 ☆	-30	-25/+20	-11			10	14	—	—	U-MOSVI	
TPC8123 ☆	-30	-25/+20	-11			9	12.5	—	—	U-MOSVI	
TPC8122 ☆	-30	±20	-12			8	—	16.5	—	U-MOSV	
TPC8127 ☆	-30	-25/+20	-13			6.5	8.9	—	—	U-MOSVI	
TPC8128 ☆	-30	-25/+20	-16			5	6.9	—	—	U-MOSVI	
TPC8117 ☆	-30	±20	-18			3.9	—	7.9	—	U-MOSV	
TPC8120 ☆	-30	-25/+20	-18			3.2	4.2	—	—	U-MOSVI	
TPC8124 ☆	-40	-25/+20	-12			8	10	—	—	U-MOSVI	
TPCM8102 ☆	-30	±20	-25			TSSOP Advance	7.7	—	16	—	U-MOSV
TPCA8109 ☆	-30	-25/+20	-24			SOP Advance	9	13	—	—	U-MOSVI
TPCA8128 ☆	-30	-25/+20	-34				(4.8)	(6.7)	—	—	U-MOSVI
TPCA8106 ☆	-30	±20	-40	3.7			—	7.8	—	U-MOSV	
TPCA8120 ☆	-30	-25/+20	(-45)	(3)			(4)	—	—	U-MOSVI	

☆: No protection Zener diode between gate and source

## 4-6 Semi-Power MOSFET Offerings

### Semi-Power P-Channel Single MOSFETs

Unit: mm

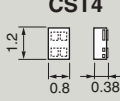
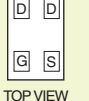
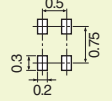
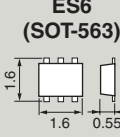
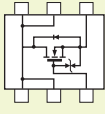
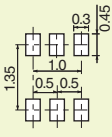
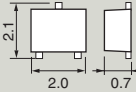
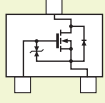
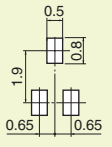
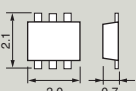
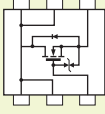
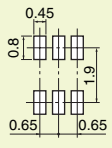
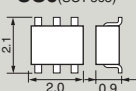
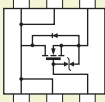
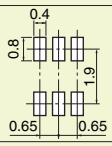
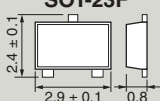
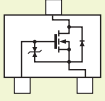
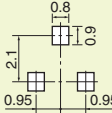
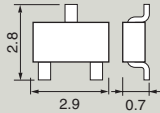
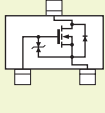
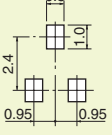
Package	Part Number	$V_{DSS}$ (V)	$V_{GS}$ (V)	$I_D$ (A)	$R_{DS(ON)}$ Max (m $\Omega$ )				Ciss (pF)	Series	*Internal Connections	Land Pattern Example																											
					$V_{GS} =  1.5V $	$V_{GS} =  1.8V $	$V_{GS} =  2.5V $	$V_{GS} =  4.0V $																															
	SSM3J46CTB	-20	$\pm 8$	-2.0	250	178	133	103 (@4.5V)	290	U-MOSVI																													
	SSM6J212FE	-20	$\pm 8$	-4.0	94.0	65.4	49.0	40.7(@4.5V)	970	U-MOSVI																													
	SSM6J53FE	-20	$\pm 8$	-1.8	364	204	136	—	568				U-MOSIV																										
	SSM6J206FE	-20	$\pm 8$	-2.0	—	320	186	130	335							U-MOSIII																							
	SSM6J205FE	-20	$\pm 8$	-0.8	—	460	306	234	250										U-MOSIII																				
	SSM6J26FE	-20	$\pm 8$	-0.5	—	980	330	230	250													U-MOSIII																	
	SSM6J23FE	-12	$\pm 8$	-1.2	—	—	210	160	420																U-MOSIII														
	SSM6J25FE	-20	$\pm 12$	-0.5	—	—	430	260	218																			U-MOSIII											
SSM6J207FE	-30	$\pm 20$	-1.4	—	—	—	491	137	U-MOSII																														
	SSM6J501NU*	-20	$\pm 8$	-10	48	33	25	20(@4.5V)	2300	U-MOSVI																													
	SSM6J502NU*	-20	$\pm 8$	-6.0	63	41	31	26(@4.5V)	1800				U-MOSVI																										
	SSM6J503NU*	-20	$\pm 8$	-6.0	88.4	56	39.7	29.8(@4.5V)	840							U-MOSVI																							
	SSM3J132TU*	-12	$\pm 5$	-5.0	43.7	33.3	25.6	21(@4.5V)	2700	U-MOSVI																													
	SSM3J130TU	-20	$\pm 8$	-4.4	63.2	41.1	31	25.8(@4.5V)	1800				U-MOSVI																										
	SSM3J120TU	-20	$\pm 8$	-4.0	140	78	49	38	1484							U-MOSIV																							
	SSM3J129TU	-20	$\pm 8$	-4.6	137	88	62	46(@4.5V)	640										U-MOSV																				
	SSM3J115TU	-20	$\pm 8$	-2.2	353	193	125	98	568													U-MOSIV																	
	SSM3J114TU	-20	$\pm 8$	-1.8	526	321	199	149	331																U-MOSIV														
	SSM3J113TU	-20	$\pm 12$	-1.7	—	—	249	169	370																			U-MOSIII											
	SSM3J111TU	-20	$\pm 12$	-1.0	—	—	680	480	160																						U-MOSIII								
	SSM3J117TU	-30	$\pm 20$	-2.0	—	—	—	225	280																									U-MOSII					
	SSM3J118TU	-30	$\pm 20$	-1.4	—	—	—	480	137																												U-MOSII		
SSM3J112TU	-30	$\pm 20$	-1.1	—	—	—	790	86	U-MOSII																														
	SSM6J409TU	-20	$\pm 8$	-9.5	72.3	46.3	30.2	22.1(@4.5V)	1100	U-MOSV																													
	SSM6J412TU	-20	$\pm 8$	-4.0	99.6	67.8	51.4	42.7(@4.5V)	840				U-MOSVI																										
	SSM6J51TU	-12	$\pm 8$	-4.0	150	85	54	—	1700							U-MOSIV																							
	SSM6J50TU	-20	$\pm 10$	-2.5	—	205(@2.0V)	100	64(@4.5V)	800										U-MOSIV																				
	SSM6J21TU	-12	$\pm 12$	-3.0	—	—	88	50	1300													U-MOSIII																	
	SSM6J401TU	-30	$\pm 20$	-2.5	—	—	—	145	730																U-MOSIII														
SSM6J402TU	-30	$\pm 20$	-2.0	—	—	—	225	280	U-MOSIII																														
	SSM6J08FU	-20	$\pm 12$	-1.3	—	460(@2.0V)	260	180	370	U-MOSII																													
	SSM6J06FU	-20	$\pm 12$	-0.65	—	—	700	500	160				$\pi$ -MOSVI																										
	SSM6J07FU	-30	$\pm 20$	-0.8	—	—	—	800	130							$\pi$ -MOSVI																							
	SSM3J327R	-20	$\pm 8$	-3.9	240	168	123	93(@4.5V)	290	U-MOSVI																													
	SSM3J328R*	-20	$\pm 8$	-6.0	88.4	56	39.7	29.8(@4.5V)	840				U-MOSVI																										
	SSM3J307T	-20	$\pm 8$	-5.0	83	56	40	31(@4.5V)	1170	U-MOSV																													
	SSM3J321T	-20	$\pm 8$	-5.2	137	88	62	46(@4.5V)	640				U-MOSV																										
	SSM3J326T	-30	$\pm 12$	-5.6	—	115	62.5	45.7(@4.5V)	650							U-MOSVI																							
	SSM3J312T	-12	$\pm 8$	-2.7	—	237	142	91	550										U-MOSIII																				
	SSM3J304T	-20	$\pm 8$	-2.3	—	297	169	127	335													U-MOSIII																	
	SSM3J313T	-20	$\pm 8$	-1.6	—	640	396	268	170																U-MOSIII														
	SSM3J01T	-30	$\pm 10$	-1.7	—	—	600	400	240																			$\pi$ -MOSVI											
	SSM3J02T	-30	$\pm 10$	-1.5	—	—	700	500	150																						$\pi$ -MOSVI								
	SSM3J314T	-30	$\pm 20$	-3.5	—	—	—	100	505																									U-MOSIII-H					
	SSM3J14T	-30	$\pm 20$	-2.7	—	—	—	170	413																												U-MOSII		
	SSM3J306T	-30	$\pm 20$	-2.4	—	—	—	225	280																														
SSM3J305T	-30	$\pm 20$	-1.7	—	—	—	477	137	U-MOSII																														
	SSM3J325F	-20	$\pm 8$	-2.0	311	231	179	150(@4.5V)	270	U-MOSVI																													

\*: Under development

\* The internal connection diagrams only show the general configurations of the circuits.

## Semi-Power N-Channel Single MOSFETs

Unit: mm

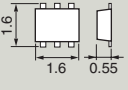
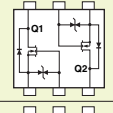
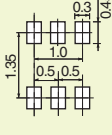
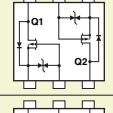
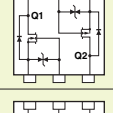
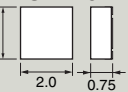
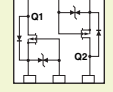
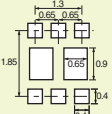
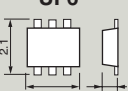
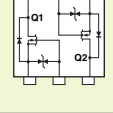
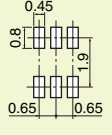
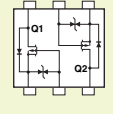
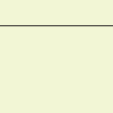
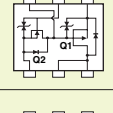
Package	Part Number	V <sub>DSS</sub> (V)	V <sub>GSS</sub> (V)	I <sub>b</sub> (A)	R <sub>DS(ON)</sub> Max (mΩ)				C <sub>iss</sub> (pF)	Series	*Internal Connections	Land Pattern Example
					V <sub>GS</sub> =   1.5 V	V <sub>GS</sub> =   1.8 V	V <sub>GS</sub> =   2.5 V	V <sub>GS</sub> =   4.0 V				
<b>CST4</b> 	SSM4K27CT	20	±12	0.5	—	390	260	205	174	U-MOSIII	 TOP VIEW	
<b>ES6 (SOT-563)</b> 	SSM6K211FE	20	±10	3.2	118	82	59	47(@4.5 V)	510	U-MOSIII		
	SSM6K203FE	20	±10	2.8	153	106	76	61	400	U-MOSIII		
	SSM6K202FE	30	±12	2.3	—	145	101	85	270	U-MOSIII		
	SSM6K204FE	20	±10	2.0	307	214	164	126	195	U-MOSIII		
	SSM6K208FE	30	±12	1.9	—	296	177	133	123	U-MOSIII		
	SSM6K25FE	20	±12	0.5	—	395	190	145	268	U-MOSIII		
	SSM6K24FE	30	±12	0.5	—	—	180	145	245	U-MOSIII		
	SSM6K22FE	20	±12	1.4	—	—	230	170	125	U-MOSIII		
	SSM6K210FE	30	±20	1.4	—	—	—	371	57	U-MOSIII		
	SSM6K30FE	20	±20	1.2	—	—	—	420	60	π-MOSVII		
SSM6K31FE	20	±20	1.2	—	—	—	540	36	π-MOSVII			
<b>UFM</b> 	SSM3K123TU	20	±10	4.2	66	43	32	28	1010	U-MOSIII		
	SSM3K121TU	20	±10	3.2	140	93	63	48	400	U-MOSIII		
	SSM3K104TU	20	±12	3.0	—	110	74	56	320	U-MOSIII		
	SSM3K119TU	30	±12	2.5	—	134	90	74	270	U-MOSIII		
	SSM3K122TU	20	±10	2.0	304	211	161	123	195	U-MOSIII		
	SSM3K101TU	20	±12	2.2	—	230	138	103	125	U-MOSIII		
	SSM3K127TU	30	±12	2.0	—	286	167	123	123	U-MOSIII		
	SSM3K116TU	30	±12	2.2	—	—	135	100	245	U-MOSIII		
	SSM3K131TU	30	±20	6.0	—	—	—	41.5(@4.5 V)	450	U-MOSIV		
	SSM3K124TU	30	±20	2.4	—	—	—	120	180	π-MOSVII		
	SSM3K105TU	30	±20	2.1	—	—	—	200	102	π-MOSVI		
	SSM3K128TU	30	±20	1.5	—	—	—	360	57	U-MOSIII		
	SSM3K107TU	20	±20	1.5	—	—	—	410	60	π-MOSVII		
	SSM3K106TU	20	±20	1.2	—	—	—	530	36	π-MOSVII		
<b>UF6</b> 	SSM6K403TU	20	±10	4.2	66	43	32	28	1050	U-MOSIII		
	SSM6K404TU	20	±10	3.0	147	100	70	55	400	U-MOSIII		
	SSM6K405TU	20	±10	2.0	307	214	164	126	195	U-MOSIII		
	SSM6K411TU	20	±12	10	—	—	23.8	12(@4.5 V)	710	U-MOSIV		
	SSM6K18TU	20	±12	4.0	—	—	54	40	1100	U-MOSIII		
	SSM6K406TU	30	±20	4.4	—	—	—	38.5(@4.5 V)	490	U-MOSIV		
	SSM6K34TU	30	±20	3.0	—	—	—	77(@4.5 V)	470	U-MOSIII		
	SSM6K407TU	60	±20	2.0	—	—	—	440	150	π-MOSV		
SSM6K32TU	60	±20	2.0	—	—	—	440	140	π-MOSV			
<b>US6 (SOT-363)</b> 	SSM6K08FU	20	±12	1.6	—	210(@2.0 V)	140	105	306	U-MOSII		
	SSM6K06FU	20	±12	1.1	—	—	210	160	125	π-MOSVI		
	SSM6K07FU	30	±20	1.5	—	—	—	220	102	π-MOSVI		
<b>SOT-23F</b> 	SSM3K329R	30	±12	3.5	—	289	170	126	123	U-MOSIII		
<b>TSM</b> 	SSM3K310T	20	±10	5.0	66	43	32	28	1120	U-MOSIII		
	SSM3K309T	20	±12	4.7	—	47	35	31	1020	U-MOSIII		
	SSM3K301T	20	±12	3.5	—	110	74	56	320	U-MOSIII		
	SSM3K316T	30	±12	4.0	—	131	87	65(@4.5 V)	270	U-MOSIII		
	SSM3K01T	30	±10	3.2	—	—	150	120	152	π-MOSVI		
	SSM3K02T	30	±10	2.5	—	—	250	200	115	π-MOSVI		
	SSM3K315T	30	±20	6.0	—	—	—	41.5(@4.5 V)	450	U-MOSII		
	SSM3K14T	30	±20	4.0	—	—	—	67	460	U-MOSIV		
	SSM3K320T	30	±20	4.2	—	—	—	77(@4.5 V)	190	U-MOSIV		
SSM3K318T	60	±20	2.5	—	—	—	145(@4.5 V)	235	U-MOSIV			

\* The internal connection diagrams only show the general configurations of the circuits.



## Semi-Power Dual MOSFETs

Unit: mm

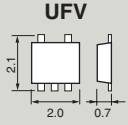

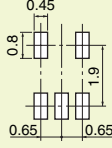
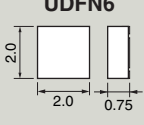
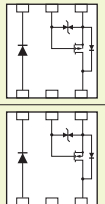
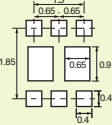
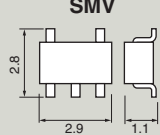
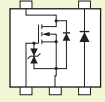
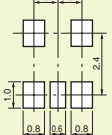
Package	Polarity	Part Number	$V_{DSS}$ (V)	$V_{GSS}$ (V)	$I_D$ (A)	$R_{DS(ON)}$ Max (m $\Omega$ )				$C_{iss}$ (pF)	Series	*Internal Connections	Land Pattern Example			
						$V_{GS} = 1.5V$	$V_{GS} = 1.8V$	$V_{GS} = 2.5V$	$V_{GS} = 4.0V$							
<b>ES6 (SOT-563)</b> 	N-ch x 2	<b>SSM6N42FE</b>	20	$\pm 10$	0.8	600	450	330	240 (@4.5V)	90	U-MOSIII					
	P-ch x 2	<b>SSM6P41FE</b>	-20	$\pm 8$	-0.72	1040	670	440	300 (@4.5V)	110	U-MOSV					
	N-ch + P-ch	<b>SSM6L14FE*</b>	20 -20	$\pm 10$ $\pm 8$	-0.8 -0.72	600 1040	450 670	330 440	240 300 (@4.5V)	90 110	U-MOSIII U-MOSV					
<b>UDFN6</b> 	P-ch x 2	<b>SSM6P47NU*</b>	-20	$\pm 8$	-4	242	170	125	95	290	U-MOSVI					
<b>UF6</b> 	N-ch x 2	<b>SSM6N39TU</b>	20	$\pm 10$	1.6	247	190	139	119	260	U-MOSIII					
		<b>SSM6N29TU</b>	20	$\pm 12$	0.8	—	235	178	143	268	U-MOSIII					
		<b>SSM6N25TU</b>	20	$\pm 12$	0.5	—	395	190	145	268	U-MOSIII					
		<b>SSM6N24TU</b>	30	$\pm 12$	0.5	—	—	180	145	245	U-MOSIII					
		<b>SSM6N40TU</b>	30	$\pm 20$	1.6	—	—	—	182	180	U-MOSIII					
	P-ch x 2	<b>SSM6P54TU</b>	-20	$\pm 8$	-1.2	555	350	228	—	331	U-MOSIV					
		<b>SSM6P39TU</b>	-20	$\pm 8$	-1.5	—	430	294	213	250	U-MOSIII					
		<b>SSM6P28TU</b>	-20	$\pm 8$	-0.8	—	460	306	234	250	U-MOSIII					
		<b>SSM6P26TU</b>	-20	$\pm 8$	-0.5	—	980	330	230	250	U-MOSIII					
		<b>SSM6P25TU</b>	-20	$\pm 12$	-0.5	—	—	430	260	218	U-MOSIII					
	N-ch + P-ch	<b>SSM6P40TU</b>	-30	$\pm 20$	-1.4	—	—	—	403	120	U-MOSIII					
		<b>SSM6L39TU</b>	20 -20	$\pm 10$ $\pm 8$	1.6 -1.5	247 —	190 430	139 294	119 213	260 250	U-MOSIII U-MOSIII					
		<b>SSM6L13TU</b>	20 -20	$\pm 12$ $\pm 8$	0.8 -0.8	— —	235 460	178 306	143 234	268 250	U-MOSIII U-MOSIII					
		<b>SSM6L10TU</b>	20 -20	$\pm 12$ $\pm 8$	0.5 -0.5	— —	395 980	190 330	145 230	268 250	U-MOSIII U-MOSIII					
		<b>SSM6L11TU</b>	20 -20	$\pm 12$ $\pm 12$	0.5 -0.5	— —	395 —	190 —	145 430	268 218	U-MOSIII U-MOSIII					
		<b>SSM6L12TU</b>	30 -20	$\pm 12$ $\pm 12$	0.5 -0.5	— —	180 —	145 —	245 430	245 218	U-MOSIII U-MOSIII					
		<b>SSM6L40TU</b>	30 -30	$\pm 20$ $\pm 20$	1.6 -1.4	— —	— —	— —	182 403	180 120	U-MOSIII U-MOSIII					
		P-ch + N-ch (Load Switch)	<b>SSM6E01TU</b>	-12 20	$\pm 12$	-1.0	—	—	—	240	160			310	U-MOSIII	
			<b>SSM6E02TU</b>	-20 20	$\pm 8$ $\pm 10$	-1.8 0.1	364 15 $\Omega$	204 —	136 4 $\Omega$	— 3 $\Omega$	568 9.3			U-MOSIV $\pi$ -MOSVI		
			<b>SSM6E03TU</b>	-20 20	$\pm 8$ $\pm 10$	-1.8 0.1	— 15 $\Omega$	335 —	180 4 $\Omega$	144 3 $\Omega$	335 9.3			U-MOSIII $\pi$ -MOSVI		
	<b>SSM6E03TU</b>		20	$\pm 10$	0.1	15 $\Omega$	—	—	4 $\Omega$	3 $\Omega$	9.3	$\pi$ -MOSVI				

\*: Under development

\* The internal connection diagrams only show the general configurations of the circuits.

## MOSFET with a Schottky Barrier Diode

Unit: mm

Package	Polarity	Part Number	MOSFET							SBD			*Internal Connections	Land Pattern Example					
			V <sub>DSS</sub> (V)	V <sub>GSS</sub> (V)	I <sub>D</sub> (A)	R <sub>DS(ON)</sub> Max (mΩ)				C <sub>iss</sub> (pF)	Series	V <sub>R</sub> (V)			I <sub>O</sub> (A)	V <sub>F</sub> Max (V) @ I <sub>F</sub> (A)			
						V <sub>GS</sub> = 1.5V	V <sub>GS</sub> = 1.8V	V <sub>GS</sub> = 2.5V	V <sub>GS</sub> = 4.0V										
	P-ch+ SBD	SSM5G09TU	-12	±8	-1.5	—	—	200	130	550	U-MOSII	12	0.5	0.43	0.5				
		SSM5G02TU	-12	±12	-1.0	—	—	240	160	310	U-MOSII	12	0.5	0.43	0.5				
		SSM5G10TU	-20	±8	-1.5	—	—	430	294	213	250	U-MOSIII	20	0.7	0.39			0.5	
		SSM5G04TU	-12	±12	-1.0	—	—	420	240	170	U-MOSII	12	0.5	0.43	0.5				
		SSM5G11TU	-30	±20	-1.4	—	—	—	—	403	120	U-MOSIII-H	30	0.7	0.41			0.5	
	N-ch+ SBD	SSM5G01TU	-30	±20	-1.0	—	—	—	—	800	86	U-MOSII	20	0.5	0.45			0.3	
		SSM5H10TU	20	±10	1.6	247	190	139	119	260	U-MOSIII	20	0.7	0.39	0.5				
		SSM5H16TU	30	±12	1.9	—	—	296	177	133	123	U-MOSIII	30	0.8	0.45			0.5	
		SSM5H05TU	20	±12	1.5	—	—	—	—	220	160	125	U-MOSIII	12	0.5			0.43	0.5
		SSM5H08TU	20	±12	1.5	—	—	—	—	220	160	125	U-MOSIII	20	0.5			0.45	0.3
		SSM5H03TU	12	±12	1.4	—	—	—	—	300	125	U-MOSII	12	0.5	0.43			0.5	
		SSM5H11TU	30	±20	1.6	—	—	—	—	182	180	U-MOSIII	30	0.7	0.41			0.5	
		SSM5H01TU	30	±20	1.4	—	—	—	—	450	106	U-MOSII	20	0.5	0.45			0.3	
SSM5H07TU	20	±20	1.2	—	—	—	—	540	36	π-MOSVII	12	0.5	0.43	0.5					
	P-ch+ SBD	SSM6G13NU*	-20	±8	-2.0	388	265	186	133	260	U-MOSV	30	1.0	0.45	0.5				
	N-ch+ SBD	SSM6H15NU*	30	±8	4.0	—	—	124	71	56	280	U-MOSVI-H	30	1.0	0.55			0.7	
	N-ch+ SBD	SSM5H14F	30	±12	3.0	—	—	138	94	78	270	U-MOSIII	45	0.1	0.6	0.1			

\*: Under development

\*The internal connection diagrams only show the general configurations of the circuits.

## VS-6 Series ... [Part Number: TPC6xxx]

### Features

- Zener diode between gate and source for all products
- Thin package, with a board mounting height as low as 0.85 mm (max)



### Product Offerings

Circuit Configuration	Part Number	Absolute Maximum Ratings			R <sub>DS(ON)</sub> Max (mΩ)						Q <sub>g</sub> Typ. (nC)	C <sub>iss</sub> Typ. (pF)	Marking	Series
		V <sub>DSS</sub> (V)	V <sub>GSS</sub> (V)	I <sub>D</sub> (A)	10 V	4.5 V	4 V	2.5 V	2.0 V	1.8 V				
N-ch Single	TPC6012 ☆	20	±12	6	—	20	—	38	—	—	9	630	S2M	U-MOSIV
	TPC6008-H ☆	30	±20	5.9	60	74	—	—	—	—	4.8	232	S2H	U-MOSVI-H
	TPC6011	30	±20	6	20	32	—	—	—	—	14	640	S2L	U-MOSIV
	TPC6005	30	±12	6	—	28	—	35	41	—	19	1420	S2E	U-MOSIII
	TPC6009-H ☆	40	±20	5.3	81	98	—	—	—	—	4.7	225	S2J	U-MOSVI-H
	TPC6010-H ☆	60	±20	6.1	59	63	—	—	—	—	12	640	S2K	U-MOSVI-H
P-ch Single	TPC6105	-20	±8	-2.7	—	110	—	160	—	300	6	470	S3E	U-MOSIII
	TPC6113 ☆	-20	±12	-5	—	56	—	85	—	—	10	690	S3N	U-MOSVI
	TPC6111	-20	±8	-5.5	—	40	—	57	—	80	10	700	S3L	U-MOSV
	TPC6110 ☆	-30	-25/+20	-4.5	56	77	—	—	—	—	14	510	S3K	U-MOSVI
	TPC6109-H	-30	±20	-5	59	83	—	—	—	—	7.2	471	S3J	U-MOSIII-H

☆: No protection Zener diode between gate and source \* : Under development

### ● VS-8 Series ... [Part Number: TPCF8xxx]

#### ■ Features

- Ultra-low ON-resistance achieved by employing the U-MOS process
- Thin package, with a board mounting height as low as 0.85 mm (max)
- 32% reduction in mounting area compared with the VS-6 (TSOP-6) Series, due to the use of a high-density flat package
- $P_D = 2.5 \text{ W @ } t = 5 \text{ s}$  when the device is mounted on a glass epoxy board

#### ■ Product Offerings

Circuit Configuration	Part Number	Absolute Maximum Ratings			$R_{DS(ON)}$ Max ( $m\Omega$ )						$Q_g$ Typ. (nC)	$C_{iss}$ Typ. (pF)	Marking	Series	
		$V_{DSS}$ (V)	$V_{GSS}$ (V)	$I_D$ (A)	10 V	4.5 V	4 V	2.5 V	2.0 V	1.8 V					
N-ch	Single	TPCF8003 ☆	20	±12	7	—	18	—	34	—	—	9.5	500	F2C	U-MOSIV
		TPCF8002 ☆	30	±20	7	21	32	—	—	—	—	11.5	500	F2B	U-MOSIV
	Dual	TPCF8201	20	±12	3	—	49	—	66	100	—	7.5	590	F4A	U-MOSIII
P-ch	Single	TPCF8101	-12	±8	-6	—	28	—	40	—	85	18	1600	F3A	U-MOSIII
		TPCF8103	-20	±8	-2.7	—	110	—	160	—	300	6	470	F3C	U-MOSIII
		TPCF8105 ☆	-20	±12	-6	—	30	—	41	—	—	17	1100	F3E	U-MOSVI
		TPCF8104	-30	±20	-6	28	38	—	—	—	—	34	1760	F3D	U-MOSIV
	Dual	TPCF8301	-20	±8	-2.7	—	110	—	160	—	300	6	470	F5A	U-MOSIII
		TPCF8302	-20	±10	-3	—	59	—	95	200	—	11	800	F5B	U-MOSIV
		TPCF8303	-20	±8	-3	—	58	—	87	—	250	11	860	F5C	U-MOSIV
		TPCF8304	-30	±20	-3.2	72	105	—	—	—	—	14	600	F5D	U-MOSIV
N-ch + P-ch Complementary	TPCF8402	30	±20	4	50	77	—	—	—	—	10	470	F6B	U-MOSIII	
		-30	±20	-3.2	72	105	—	—	—	—	14	600	F6B	U-MOSIV	
N-ch + SBD	TPCF8A01	20	±12	3	—	49	—	66	100	—	7.5	590	F7A	U-MOSIII	
P-ch + SBD	TPCF8B01	-20	±8	-2.7	—	110	—	160	—	300	6	470	F8A	U-MOSIII	

☆: No protection Zener diode between gate and source



### ● PS-8 Series ... [Part Number: TPCP8xxx]

#### ■ Features

- Same mounting area as for the VS-6 (TSOP-6) Series
- Using flat leads and the latest U-MOS process (U-MOSIV), the PS-8 Series offers a 70% reduction in  $R_{DS(ON)}$  compared with the VS-6 Series.

#### ■ Product Offerings

Circuit Configuration	Part Number	Absolute Maximum Ratings			$R_{DS(ON)}$ Max ( $m\Omega$ )						$Q_g$ Typ. (nC)	$C_{iss}$ Typ. (pF)	Series	
		$V_{DSS}$ (V)	$V_{GSS}$ (V)	$I_D$ (A)	10 V	4.5 V	4 V	2.5 V	2.0 V	1.8 V				
N-ch	Single	TPCP8006 ☆	20	±12	9.1	—	10	—	13.7	—	—	22	1480	U-MOSIV
		TPCP8008-H ☆	30	±20	8	20	23	—	—	—	—	8	900	U-MOSVI-H
		TPCP8004 ☆	30	±20	8.3	8.5	14	—	—	—	—	26	1270	U-MOSIV
		TPCP8005-H ☆	30	±20	11	12.9	15.7	—	—	—	—	11	1433	U-MOSV-H
		TPCP8007-H ☆	60	±20	5	57	64	—	—	—	—	5.8	640	U-MOSVI-H
		TPCP8003-H	100	±20	2.2	180	190	—	—	—	—	4.5	360	U-MOSIII-H
	Dual	TPCP8204 ☆	30	±20	4.2	50	77	—	—	—	—	4.6	190	U-MOSIV
		TPCP8205-H ☆	30	±20	6.5	26	29	—	—	—	—	14	830	U-MOSVI
P-ch	Single	TPCP8101	-20	±8	-5.6	—	30	—	41	—	90	19	1550	U-MOSIII
		TPCP8102	-20	±12	-7.3	—	18	—	30	—	—	33	2560	U-MOSIV
	Dual	TPCP8103-H	-40	±20	-4.8	40	54	—	—	—	—	19	800	U-MOSIII-H
		TPCP8303	-20	±8	-3.8	—	46	—	60	—	90	10	640	U-MOSV
N-ch + P-ch Complementary	TPCP8404 ☆	-20	±12	-6	—	(30)	—	(42)	—	—	(21.5)	(1500)	U-MOSVI	
		30	±20	4	50	100	—	—	—	—	4.6	190	U-MOSIV	
	TPCP8405 ☆	-30	±20	-4	50	100	—	—	—	—	13	510	U-MOSV	
		30	±20	6.5	(26)	(29)	—	—	—	—	(13.8)	(830)	U-MOSVI-H	
TPCP8406 ☆	-30	±20	-6	(31)	(42)	—	—	—	—	(24.1)	(1075)	U-MOSVI		
	40	±20	6	(32)	(36)	—	—	—	—	(13.7)	(850)	U-MOSVI-H		
		-40	±20	-5	(41)	(53)	—	—	—	(24.2)	(1105)	U-MOSVI		

☆: No protection Zener diode between gate and source



## ■ Product Offerings

Circuit Configuration	Part Number	Absolute Maximum Ratings			R <sub>DS(ON)</sub> Max (mΩ)						Q <sub>g</sub> Typ. (nC)	C <sub>iss</sub> Typ. (pF)	Series
		V <sub>DSS</sub> (V)	V <sub>GSS</sub> (V)	I <sub>D</sub> (A)	10 V	4.5 V	4 V	2.5 V	2.0 V	1.8 V			
P-ch + driver	TPCP8401	-12	±8	-5.5	—	38	—	58	—	103	20	1520	U-MOSIII
		20	±10	0.1	—	—	3Ω	4Ω	—	—	—	—	π-MOSVI
	TPCP8J01	-32	±20	-5.5	35	—	49	—	—	—	34	1760	U-MOSIV
		50(V <sub>CEO</sub> )	—	0.1	—	—	—	—	—	—	—	—	NPN
MOSBD Single	TPCP8A05-H ☆	30	±20	8	17.5	21.9	—	—	—	—	8.3	1300	U-MOSV-H
	TPCP8BA1	-20	±12	-1.3	—	—	180	260	—	—	—	—	U-MOSII
	TPCP8AA1	20	±12	1.6	—	—	105	140	—	—	—	—	U-MOSII

☆: No protection Zener diode between gate and source

## ● Chip LGA Series ... [Part Number: TPCL4xxx]

### ■ Features

- Chip-scale package for high-density board assembly (58% reduction in mounting area compared with the STP2 package)

### ■ Product Offerings

Circuit Configuration	Part Number	Absolute Maximum Ratings			R <sub>DS(ON)</sub> Max (mΩ)						Q <sub>g</sub> Typ. (nC)	C <sub>iss</sub> Typ. (pF)	Series
		V <sub>DSS</sub> (V)	V <sub>GSS</sub> (V)	I <sub>D</sub> (A)	10 V	4.5 V	4 V	3.1 V	2.5 V	1.8 V			
N-ch Dual	TPCL4201 ☆	20	±12	6	—	31	33	44	52	—	11.5	720	U-MOSV
	TPCL4203 ☆	24	±12	(6)	—	(36)	(38)	(46)	(55)	—	(10)	(685)	U-MOSV
	TPCL4202 ☆	30	±12	(6)	—	(40)	(42)	(50)	(64)	—	(10)	(780)	U-MOSV

☆: No protection Zener diode between gate and source

## ● STP2 Series ... [Part Number: TPCT4xxx]

### ■ Features

- The combination of a new chip design using Toshiba U-MOSIV process technology and a new small pump-structured package, offers low ON-resistance.

### ■ Product Offerings

Circuit Configuration	Part Number	Absolute Maximum Ratings			R <sub>DS(ON)</sub> Max (mΩ)						Q <sub>g</sub> Typ. (nC)	C <sub>iss</sub> Typ. (pF)	Series
		V <sub>DSS</sub> (V)	V <sub>GSS</sub> (V)	I <sub>D</sub> (A)	10 V	4.5 V	4 V	2.5 V	2.0 V	1.8 V			
N-ch Dual	TPCT4203	20	±12	6	—	31	32	49	—	—	11	790	U-MOSIV
	TPCT4204	30	±12	6	—	38	39	52	—	—	12	780	U-MOSIV

## ● TSON Advance Series ... [Part Number: TPCC8xxx]

### ■ Features

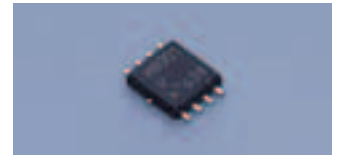
- The small thermally enhanced package gives a 64% reduction in mounting area compared with SOP-8, yet an equivalent maximum permissible power dissipation.

### ■ Product Offerings

Circuit Configuration	Part Number	Absolute Maximum Ratings			R <sub>DS(ON)</sub> Max (mΩ)						Q <sub>g</sub> Typ. (nC)	C <sub>iss</sub> Typ. (pF)	Series
		V <sub>DSS</sub> (V)	V <sub>GSS</sub> (V)	I <sub>D</sub> (A)	10 V	4.5 V	4 V	2.5 V	2.0 V	1.8 V			
N-ch Single	TPCC8007 ☆	20	±12	27	—	4.6	—	8.7	—	—	26	1870	U-MOSIV
	TPCC8061-H ☆	30	±20	TBD	(25.6)	(28.6)	—	—	—	—	TBD	600	U-MOSVI-H
	TPCC8003-H ☆	30	±20	13	16.9	19.3	—	—	—	—	8.6	990	U-MOSVI-H
	TPCC8002-H ☆	30	±20	22	8.3	10.6	—	—	—	—	14.3	1900	U-MOSV-H
	TPCC8001-H ☆	30	±20	22	8.3	10.6	—	—	—	—	14.3	1900	U-MOSV-H
	TPCC8006-H ☆	30	±20	22	8	9.3	—	—	—	—	15	1700	U-MOSVI-H
	TPCC8064-H ☆	30	±20	TBD	7.1	9.5	—	—	—	—	TBD	1640	U-MOSVII-H
	TPCC8009	30	±20	24	7	—	—	—	—	—	26	1270	U-MOSIV
	TPCC8008 ☆	30	±20	25	6.8	12.8	—	—	—	—	30	1600	U-MOSIV
	TPCC8005-H ☆	30	±20	26	6.4	7.4	—	—	—	—	19	2200	U-MOSVI-H
	TPCC8062-H ☆	30	±20	TBD	4.7	6.4	—	—	—	—	TBD	2480	U-MOSVII-H
	TPCC8011-H ☆	40	±25	(15)	(12)	—	—	—	—	—	TBD	(1410)	U-MOSVI-H
TPCC8012-H ☆	100	±25	(5)	(120)	—	—	—	—	—	15	(990)	U-MOSVI-H	
P-ch Single	TPCC8102 ☆	-30	±20	-15	18.9	—	33.2	—	—	—	26	1200	U-MOSV
	TPCC8103 ☆	-30	±20	-18	12	—	25	—	—	—	38	1600	U-MOSV
	TPCC8104 ☆	-30	-25/+20	-20	8.8	12.4	—	—	—	—	58	2260	U-MOSVI
	TPCC8105 ☆	-30	±20	-23	7.8	10.4	—	—	—	—	76	3240	U-MOSVI
MOSBD Single	TPCC8A01-H ☆	30	±20	21	9.9	12.6	—	—	—	—	10.1	1430	U-MOSV-H

☆: No protection Zener diode between gate and source

### ● TSSOP Advance Series ... [Part Number: TPCM8xxx]



#### ■ Product Offerings

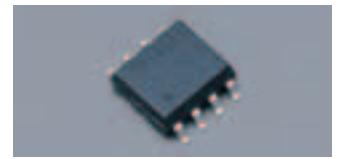
Circuit Configuration	Part Number	Absolute Maximum Ratings			$R_{DS(ON)}$ Max ( $m\Omega$ )						$Q_g$ Typ. (nC)	$C_{iss}$ Typ. (pF)	Series	
		$V_{DSS}$ (V)	$V_{GSS}$ (V)	$I_D$ (A)	10 V	4.5 V	4 V	2.5 V	2.0 V	1.8 V				
N-ch	Single	TPCM8004-H ☆	30	±20	24	11	13.4	—	—	—	—	11	1433	U-MOSV-H
		TPCM8006 ☆	30	±20	25	7	13.5	—	—	—	—	26	1270	U-MOSIV
P-ch	Single	TPCM8102 ☆	-30	±20	-25	7.7	—	16	—	—	60	2450	U-MOSV	
MOSBD	Single	TPCM8A05-H ☆	30	±20	20	12.9	17.2	—	—	—	7.4	1300	U-MOSV-H	

☆: No protection Zener diode between gate and source

### ● SOP-8 Series ... [Part Number: TPC8xxx]

#### ■ Features

- Low ON-resistance and high-speed-switching series are available.  
Low ON-resistance series: U-MOSIV/V/VI  
High-speed-switching series: U-MOSIII-H and U-MOSV-H
- ON-resistance reduction through the use of an AI strap structure



#### ■ Product Offerings

Circuit Configuration	Part Number	Absolute Maximum Ratings			$R_{DS(ON)}$ Max ( $m\Omega$ )						$Q_g$ Typ. (nC)	$C_{iss}$ Typ. (pF)	Series	
		$V_{DSS}$ (V)	$V_{GSS}$ (V)	$I_D$ (A)	10 V	4.5 V	4 V	2.5 V	2.0 V	1.8 V				
N-ch	Single	TPC8025 ☆	30	±20	11	9	14.5	—	—	—	—	26	1270	U-MOSIV
		TPC8030 ☆	30	±20	11	8.5	17	—	—	—	—	24	1140	U-MOSIV
		TPC8041 ☆	30	±20	13	7	13.5	—	—	—	—	27	1270	U-MOSIV
		TPC8026 ☆	30	±20	13	6.6	10	—	—	—	—	42	1800	U-MOSIV
		TPC8028 ☆	30	±20	18	4.3	8	—	—	—	—	45	1800	U-MOSIV
		TPC8029 ☆	30	±20	18	3.8	7	—	—	—	—	49	2200	U-MOSIV
		TPC8042 ☆	30	±20	18	3.4	6.5	—	—	—	—	56	2900	U-MOSIV
		TPC8027 ☆	30	±20	18	2.7	5.5	—	—	—	—	113	4200	U-MOSIV
		TPC8037-H ☆	30	±20	12	11.4	13.9	—	—	—	—	11	1433	U-MOSV-H
		TPC8038-H ☆	30	±20	12	11.4	13.9	—	—	—	—	11	1433	U-MOSV-H
		TPC8061-H ☆	30	±20	8	25	29	—	—	—	—	6.2	600	U-MOSVI-H
		TPC8040-H ☆	30	±20	13	9.7	11.1	—	—	—	—	12	1700	U-MOSVI-H
		TPC8039-H ☆	30	±20	17	6	6.9	—	—	—	—	18	2600	U-MOSVI-H
		TPC8036-H ☆	30	±20	18	4.5	5.1	—	—	—	—	26	3500	U-MOSVI-H
		TPC8060-H ☆	30	±20	18	3.7	4.2	—	—	—	—	34	4600	U-MOSVI-H
		TPC8035-H ☆	30	±20	18	3.2	3.6	—	—	—	—	44	6000	U-MOSVI-H
		TPC8082 ☆	30	±20	18	4.1	5.4	—	—	—	—	TBD	2900	U-MOSVII
		TPC8081 ☆	30	±20	18	3.3	4.3	—	—	—	—	TBD	3600	U-MOSVII
		TPC8080 ☆	30	±20	18	2.8	3.6	—	—	—	—	TBD	4300	U-MOSVII
		TPC8079 ☆	30	±20	18	2.4	3.2	—	—	—	—	TBD	5200	U-MOSVII
		TPC8077 ☆	30	±20	(18)	(2.1)	(2.6)	—	—	—	—	TBD	6400	U-MOSVII
		TPC8064-H ☆	30	±20	16	7.3	9.7	—	—	—	—	TBD	1600	U-MOSVII-H
		TPC8063-H ☆	30	±20	17	6.1	8.1	—	—	—	—	TBD	1900	U-MOSVII-H
		TPC8062-H ☆	30	±20	18	4.9	6.6	—	—	—	—	TBD	2400	U-MOSVII-H
		TPC8059-H ☆	30	±20	18	4.1	5.4	—	—	—	—	TBD	2900	U-MOSVII-H
		TPC8058-H ☆	30	±20	18	3.3	4.3	—	—	—	—	TBD	3600	U-MOSVII-H
		TPC8057-H ☆	30	±20	18	2.8	3.6	—	—	—	—	TBD	4300	U-MOSVII-H
		TPC8056-H ☆	30	±20	18	2.4	3.2	—	—	—	—	TBD	5200	U-MOSVII-H
		TPC8055-H ☆	30	±20	18	2.1	2.6	—	—	—	—	TBD	6400	U-MOSVII-H
		TPC8022-H ☆	40	±20	7.5	27	35	—	—	—	—	6.2	650	U-MOSIII-H
		TPC8052-H ☆	40	±20	12	11.5	13.3	—	—	—	—	13	1620	U-MOSVI-H
		TPC8047-H ☆	40	±20	16	7.6	8.8	—	—	—	—	23	2590	U-MOSVI-H
		TPC8046-H ☆	40	±20	18	5.7	6.6	—	—	—	—	31	3545	U-MOSVI-H
		TPC8045-H ☆	40	±20	18	3.9	4.4	—	—	—	—	48	5800	U-MOSVI-H
		TPC8053-H ☆	60	±20	9	22.5	24.2	—	—	—	—	13	1620	U-MOSVI-H
		TPC8050-H ☆	60	±20	11	14.5	15.6	—	—	—	—	21	2590	U-MOSVI-H
TPC8049-H ☆	60	±20	13	10.7	11.5	—	—	—	—	29	3545	U-MOSVI-H		
TPC8048-H ☆	60	±20	16	6.9	7.4	—	—	—	—	46	5800	U-MOSVI-H		
TPC8051-H ☆	80	±20	13	9.7	10.1	—	—	—	—	43	5800	U-MOSVI-H		
TPC8054-H ☆	100	±20	10	19.9	21.5	—	—	—	—	48	6300	U-MOSVI-H		
Dual	TPC8208	20	±12	5	—	—	50	70	—	—	9.5	780	U-MOSIII	
	TPC8207	20	±12	6	—	—	20	30	—	—	22	2010	U-MOSIII	
	TPC8211	30	±20	5.5	36	44	—	—	—	—	25	1250	U-MOSIII	

☆: No protection Zener diode between gate and source

■ Product Offerings

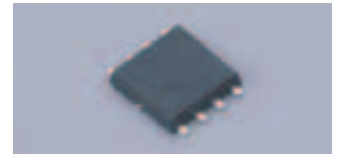
Circuit Configuration	Part Number	Absolute Maximum Ratings			R <sub>DS(ON)</sub> Max (mΩ)						Q <sub>g</sub> Typ. (nC)	C <sub>iss</sub> Typ. (pF)	Series	
		V <sub>DSS</sub> (V)	V <sub>GSS</sub> (V)	I <sub>D</sub> (A)	10 V	4.5 V	4 V	2.5 V	2.0 V	1.8 V				
N-ch	Dual	TPC8216-H ☆	30	±20	6.4	20	23	—	—	—	—	7.6	900	U-MOSVI-H
		TPC8217-H ☆	40	±20	(5.1)	(33)	(40)	—	—	—	—	5.3	(640)	U-MOSVI-H
		TPC8218-H ☆	60	±20	3.8	57	64	—	—	—	—	5.7	640	U-MOSVI-H
		TPC8220-H ☆	80	±20	(3.2)	(80)	(87)	—	—	—	—	5.4	(640)	U-MOSVI-H
		TPC8219-H ☆	100	±20	(2)	(173)	(180)	—	—	—	—	6	(750)	U-MOSVI-H
P-ch	Single	TPC8115	-20	±8	-10	—	10	—	14	—	30	115	9130	U-MOSIV
		TPC8125 ☆	-30	-25/+20	-10	13	17	—	—	—	—	64	2580	U-MOSVI
		TPC8126 ☆	-30	-25/+20	-11	10	14	—	—	—	—	56	2400	U-MOSVI
		TPC8123 ☆	-30	-25/+20	-11	9	12.5	—	—	—	—	68	2940	U-MOSVI
		TPC8122 ☆	-30	±20	-12	8	—	16.5	—	—	—	62	2450	U-MOSV
		TPC8127 ☆	-30	-25/+20	-13	6.5	8.9	—	—	—	—	92	3800	U-MOSVI
		TPC8128 ☆	-30	-25/+20	-16	5	6.9	—	—	—	—	115	4800	U-MOSVI
		TPC8117 ☆	-30	±20	-18	3.9	—	7.9	—	—	—	130	4600	U-MOSV
		TPC8114	-30	±20	-18	4.5	—	6.8	—	—	—	180	7480	U-MOSV
		TPC8120 ☆	-30	-25/+20	-18	3.2	4.2	—	—	—	—	180	7420	U-MOSVI
		TPC8116-H	-40	±20	-7.5	30	37	—	—	—	—	15	1190	U-MOSIII-H
		TPC8124 ☆	-40	-25/+20	-12	8	10	—	—	—	—	104	4750	U-MOSVI
N-ch + P-ch Complementary		TPC8405	30	±20	6	26	33	—	—	—	—	27	1240	U-MOSIII
			-30	±20	-4.5	33	42	—	—	—	—	40	1540	U-MOSIV
		TPC8406-H	40	±20	6.5	27	35	—	—	—	—	6.2	650	U-MOSIII-H
			-40	±20	-6.5	30	37	—	—	—	—	15	1190	U-MOSIII-H
		TPC8404	250	±20	1.1	1.7Ω	—	—	—	—	—	10	267	π-MOSV
-250	±20	-0.9	2.55Ω	—	—	—	—	—	—	12	381	π-MOSV		
MOSBD	Single	TPC8A05-H ☆	30	±20	10	13.3	17.6	—	—	—	—	7.4	1300	U-MOSV-H
		TPC8A06-H ☆	30	±20	12	10.1	12.9	—	—	—	—	9.6	1400	U-MOSV-H
		TPC8A03-H ☆	30	±20	17	5.6	7	—	—	—	—	19	2640	U-MOSV-H
		TPC8A04-H ☆	30	±20	18	3.6	4.5	—	—	—	—	29	4400	U-MOSV-H
	N-ch + MOSBD	TPC8A07-H ☆	30	±20	6.8	23	28	—	—	—	—	6.9	830	U-MOSV-H
		30	±20	8.5	15	19	—	—	—	—	8.1	1100	U-MOSV-H	

☆: No protection Zener diode between gate and source

● SOP Advance Series ... [Part Number: TPCA8xxx]

■ Features

- Low ON-resistance and high-speed-switching series are available.  
Low ON-resistance series: U-MOSIV/V  
High-speed-switching series: U-MOSIII-H, U-MOSV-H and U-MOSVI-H
- High-current, thin and thermally enhanced package



■ Product Offerings

Circuit Configuration	Part Number	Absolute Maximum Ratings			R <sub>DS(ON)</sub> Max (mΩ)						Q <sub>g</sub> Typ. (nC)	C <sub>iss</sub> Typ. (pF)	Series	
		V <sub>DSS</sub> (V)	V <sub>GSS</sub> (V)	I <sub>D</sub> (A)	10 V	4.5 V	4 V	2.5 V	2.0 V	1.8 V				
N-ch	Single	TPCA8011-H	20	±12	40	—	3.5	—	7.5	—	—	32	290	U-MOSIII-H
		TPCA8024 ☆	30	±20	35	4.3	7.8	—	—	—	—	45	1800	U-MOSIV
		TPCA8025 ☆	30	±20	40	3.5	6	—	—	—	—	49	2200	U-MOSIV
		TPCA8042 ☆	30	±20	45	3.3	5.7	—	—	—	—	56	2900	U-MOSIV
		TPCA8026 ☆	30	±20	45	2.2	4.5	—	—	—	—	113	4200	U-MOSIV
		TPCA8031-H ☆	30	±20	24	11	13.4	—	—	—	—	11	1433	U-MOSV-H
		TPCA8030-H ☆	30	±20	24	11	13.4	—	—	—	—	11	1433	U-MOSV-H
		TPCA8040-H ☆	30	±20	23	9.4	10.8	—	—	—	—	11.7	1700	U-MOSVI-H
		TPCA8039-H ☆	30	±20	34	5.7	6.6	—	—	—	—	19	2600	U-MOSVI-H
		TPCA8036-H ☆	30	±20	38	4.2	4.8	—	—	—	—	26	3500	U-MOSVI-H
		TPCA8060-H ☆	30	±20	45	3.4	3.9	—	—	—	—	34	4600	U-MOSVI-H
		TPCA8028-H ☆	30	±20	50	2.8	3.2	—	—	—	—	46	6000	U-MOSVI-H
		TPCA8082 ☆	30	±20	32	3.9	5.2	—	—	—	—	TBD	2900	U-MOSVII
		TPCA8081 ☆	30	±20	38	3.1	4.1	—	—	—	—	TBD	3600	U-MOSVII
		TPCA8080 ☆	30	±20	42	2.6	3.4	—	—	—	—	TBD	4300	U-MOSVII
		TPCA8079 ☆	30	±20	48	2.2	3	—	—	—	—	TBD	5200	U-MOSVII
		TPCA8077 ☆	30	±20	56	1.9	2.4	—	—	—	—	TBD	6400	U-MOSVII
		TPCA8064-H ☆	30	±20	20	7.1	9.5	—	—	—	—	TBD	1600	U-MOSVII-H
		TPCA8063-H ☆	30	±20	22	5.9	7.9	—	—	—	—	TBD	1900	U-MOSVII-H
		TPCA8062-H ☆	30	±20	28	4.7	6.4	—	—	—	—	TBD	2400	U-MOSVII-H
TPCA8059-H ☆	30	±20	32	3.9	5.2	—	—	—	—	TBD	2900	U-MOSVII-H		
TPCA8058-H ☆	30	±20	38	3.1	4.1	—	—	—	—	TBD	3600	U-MOSVII-H		
TPCA8057-H ☆	30	±20	42	2.6	3.4	—	—	—	—	TBD	4300	U-MOSVII-H		

☆: No protection Zener diode between gate and source

## ■ Product Offerings

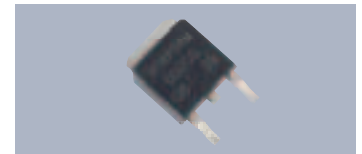
Circuit Configuration	Part Number	Absolute Maximum Ratings			$R_{DS(ON)}$ Max (m $\Omega$ )						$Q_g$ Typ. (nC)	$C_{iss}$ Typ. (pF)	Series	
		$V_{DSS}$ (V)	$V_{GSS}$ (V)	$I_D$ (A)	10 V	4.5 V	4 V	2.5 V	2.0 V	1.8 V				
N-ch	Single	TPCA8056-H ☆	30	±20	48	2.2	3	—	—	—	—	TBD	5200	U-MOSVII-H
		TPCA8055-H ☆	30	±20	56	1.9	2.4	—	—	—	—	TBD	6400	U-MOSVII-H
		TPCA8020-H	40	±20	7.5	27	35	—	—	—	—	6.2	650	U-MOSIII-H
		TPCA8052-H ☆	40	±20	20	11.3	13.1	—	—	—	—	13	1620	U-MOSVI-H
		TPCA8047-H ☆	40	±20	32	7.3	8.5	—	—	—	—	23	2590	U-MOSVI-H
		TPCA8046-H ☆	40	±20	38	5.4	6.3	—	—	—	—	29	3545	U-MOSVI-H
		TPCA8045-H ☆	40	±20	46	3.6	4.1	—	—	—	—	47	5800	U-MOSVI-H
		TPCA8069-H ☆	60	±25	(15)	(23)	—	—	—	—	—	22	(1420)	U-MOSVI-H
		TPCA8053-H ☆	60	±20	15	22.3	24	—	—	—	—	13	1620	U-MOSVI-H
		TPCA8050-H ☆	60	±20	24	14.2	15.3	—	—	—	—	21	2590	U-MOSVI-H
		TPCA8049-H ☆	60	±20	28	10.4	11.2	—	—	—	—	29	3545	U-MOSVI-H
		TPCA8048-H ☆	60	±20	35	6.6	7.1	—	—	—	—	46	5800	U-MOSVI-H
		TPCA8070-H ☆	80	±25	(12)	(35)	—	—	—	—	—	21	(1600)	U-MOSVI-H
		TPCA8051-H ☆	80	±20	28	9.4	9.8	—	—	—	—	47	5800	U-MOSVI-H
		TPCA8072-H ☆	100	±25	(8)	(71)	—	—	—	—	—	22	(1530)	U-MOSVI-H
		TPCA8071-H ☆	100	±25	20	(20)	—	—	—	—	—	70	(5400)	U-MOSVI-H
TPCA8054-H ☆	100	±20	20	19.7	21.3	—	—	—	—	46	6300	U-MOSVI-H		
TPCA8009-H	150	±20	7	350	—	—	—	—	—	10	600	/-MOSV"MACH II"		
TPCA8010-H	200	±20	5.5	450	—	—	—	—	—	10	600	/-MOSV"MACH II"		
TPCA8008-H	250	±20	4	580	—	—	—	—	—	10	600	/-MOSV"MACH II"		
P-ch	Single	TPCA8105	-12	±8	-6	—	33	—	51	—	92	18	1600	U-MOSIV
		TPCA8109 ☆	-30	-25/+20	-24	9	13	—	—	—	—	56	2400	U-MOSVI
		TPCA8128 ☆	-30	-25/+20	-34	(4.8)	(6.7)	—	—	—	—	(115)	(4800)	U-MOSVI
		TPCA8106 ☆	-30	±20	-40	3.7	—	7.8	—	—	—	120	4600	U-MOSV
		TPCA8120 ☆	-30	-25/+20	(-45)	(3)	(4)	—	—	—	—	(TBD)	(7420)	U-MOSVI
		TPCA8107-H	-40	±20	-7.5	30	37	—	—	—	—	15	1190	U-MOSIII-H
		TPCA8108	-40	±20	-40	9.5	—	—	—	—	—	100	4820	U-MOSIII
TPCA8104	-60	±20	-40	16	—	24	—	—	—	90	4300	U-MOSIII		
MOSBD	Single	TPCA8A05-H ☆	30	±20	20	12.9	17.2	—	—	—	—	7.4	1300	U-MOSV-H
		TPCA8A02-H ☆	30	±20	34	5.3	6.7	—	—	—	—	19	2640	U-MOSV-H
		TPCA8A08-H ☆	30	±20	38	4.2	5.3	—	—	—	—	24	3500	U-MOSV-H
		TPCA8A04-H ☆	30	±20	44	3.2	4.1	—	—	—	—	30	4400	U-MOSV-H

☆: No protection Zener diode between gate and source

## ● DPAK Series ... [Part Number: TKxxPxxxM1]

## ■ Features

- High-current, thermally enhanced package









## ■ Product Offerings

Circuit Configuration	Part Number	Absolute Maximum Ratings			$R_{DS(ON)}$ Max (m $\Omega$ )						$Q_g$ Typ. (nC)	$C_{iss}$ Typ. (pF)	Series	
		$V_{DSS}$ (V)	$V_{GSS}$ (V)	$I_D$ (A)	10 V	4.5 V	4 V	2.5 V	2.0 V	1.8 V				
N-ch	Single	TK40P03M1 ☆	30	±20	40	10.8	14.4	—	—	—	—	9.4	1150	U-MOSVI-H
		TK45P03M1 ☆	30	±20	45	9.4	12	—	—	—	—	13	1500	U-MOSVI-H
		TK50P03M1 ☆	30	±20	50	7.5	9.8	—	—	—	—	13.3	1700	U-MOSVI-H
		TK60P03M1 ☆	30	±20	60	6.2	7.9	—	—	—	—	21	2700	U-MOSVI-H
		TK20P04M1 ☆	40	±20	20	25	30	—	—	—	—	7.6	890	U-MOSVI-H
		TK40P04M1 ☆	40	±20	40	11	13.4	—	—	—	—	15	1920	U-MOSVI-H
		TK50P04M1 ☆	40	±20	50	8.7	10.2	—	—	—	—	20	2600	U-MOSVI-H
P-ch	Single	TJ15P04M3 ☆	-40	±20	-15	36	48	—	—	—	—	24	1100	U-MOSVI







## 4-7 Standard MOSFET Series ( $I_D < 500 \text{ mA}$ )

### Single MOSFETs

Polarity	Absolute Maximum Ratings			Package						$V_{th}$ (V)	$R_{DS(on)}$ Typ. (Max) (1)	$V_{GS}$ (V)
	$V_{DSS}$ (V)	$V_{GSS}$ (V)	$I_D$ (mA)	S-Mini (SOT-346) 2925 size, 3-pin 	USM (SOT-323) 2021 size, 3-pin 	UFM 2021 size, 3-pin 	SSM (SOT-416) 1616 size, 3-pin 	VSEM (SOT-723) 1212 size, 3-pin 	CST3 1006 size, 3-pin 			
N-ch	20	$\pm 10$	180	—	—	—	SSM3K35FS	SSM3K35MFV	SSM3K35CT	0.4 to 1.0	5 (20)	1.2
	20	$\pm 10$	100	—	SSM3K16FU	—	SSM3K16FS	—	SSM3K16CT	0.6 to 1.1	5.2 (15)	1.5
	20	$\pm 10$	250	—	—	—	—	SSM3K37MFV	—	0.35 to 1.0	3.1 (5.6)	1.5
	20	$\pm 10$	500	—	—	SSM3K36TU	SSM3K36FS	SSM3K36MFV	—	0.35 to 1.0	0.95 (1.52)	1.5
	20	$\pm 10$	500	—	—	—	SSM3K43FS	—	—	0.35 to 1.0	0.95 (1.52)	1.5
	20	10	100	—	—	—	—	SSM3K03FV	—	0.7 to 1.3	4 (12)	2.5
	20	10	100	—	**SSM3K04FU	—	**SSM3K04FS	**SSM3K04FV	—	0.7 to 1.3	4 (12)	2.5
	20	$\pm 12$	400	—	SSM3K05FU	—	—	—	SSM3K15CT	0.6 to 1.1	0.85 (1.20)	2.5
	30	$\pm 20$	100	SSM3K15F	SSM3K15FU	—	SSM3K15FS	SSM3K15FV	—	0.8 to 1.5	4.0 (7.0)	2.5
	30	$\pm 20$	100	—	—	—	SSM3K44FS	SSM3K44MFV	—	0.8 to 1.5	4.0 (7.0)	2.5
	30	$\pm 20$	200	2SK2009	—	—	—	—	—	0.5 to 1.5	1.2 (2.0)	2.5
	30	$\pm 20$	400	—	SSM3K09FU	—	—	—	—	1.1 to 1.8	0.8 (1.2)	4.0
	50	$\pm 7$	100	—	SSM3K17FU	—	—	—	—	0.9 to 1.5	22 (40)	2.5
	60	$\pm 20$	200	2SK1062	—	—	—	—	—	2.0 to 3.5	0.6 (1.0)	10
	60	$\pm 20$	200	SSM3K7002F	SSM3K7002FU	—	—	—	—	1.0 to 2.5	2.2 (3.3)	4.5
	60	$\pm 20$	200	SSM3K7002AF	SSM3K7002AFU	—	—	—	—	1.0 to 2.5	1.8 (3.3)	4.5
60	$\pm 20$	200	SSM3K7002BF	SSM3K7002BFU	—	SSM3K7002BFS	—	SSM3J35CT	1.5 to 3.1	2.1 (3.3)	4.5	
P-ch	-20	$\pm 10$	-100	—	—	—	SSM3J35FS	SSM3J35MFV	SSM3J16CT	-0.4 to -1.0	11 (44)	-1.2
	-20	$\pm 10$	-100	—	SSM3J16FU	—	SSM3J16FS	SSM3J16FV	—	-0.6 to -1.1	18 (45)	-1.5
	-20	$\pm 8$	-330	—	—	SSM3J36TU	SSM3J36FS	SSM3J36MFV	—	-0.3 to -1.0	2.23 (3.6)	-1.5
	-20	$\pm 12$	-200	—	SSM3J05FU	—	—	—	SSM3J15CT	-0.6 to -1.1	3.2 (4.0)	-2.5
	-30	$\pm 20$	-100	SSM3J15F	SSM3J15FU	—	SSM3J15FS	SSM3J15FV	—	-1.1 to -1.7	14 (32)	-2.5
	-30	$\pm 20$	-200	2SJ305	—	—	—	—	—	-0.5 to -1.5	2.4 (4.0)	-2.5
	-30	$\pm 20$	-200	—	SSM3J09FU	—	—	—	—	-1.1 to -1.8	3.3 (4.2)	-4.0
	-50	-7	-50	2SJ343	2SJ344	—	—	—	—	-0.8 to -2.5	20 (50)	-4.0
-60	$\pm 20$	-200	2SJ168	—	—	—	—	—	-2.0 to -3.5	1.3 (2.0)	-10	

\*\* Built-in 1-M1 gate-source resistor

### Dual MOSFETs

Polarity	Absolute Maximum Ratings			Package						$V_{th}$ (V)	$R_{DS(on)}$ Typ. (Max) (1)	$V_{GS}$ (V)	Constituent Devices
	$V_{DSS}$ (V)	$V_{GSS}$ (V)	$I_D$ (mA)	US6 (SOT-363) 2021 size, 6-pin 	UF6 2021 size, 6-pin 	USV (SOT-353) 2021 size, 5-pin 	ES6 (SOT-563) 1616 size, 6-pin 	ESV (SOT-553) 1616 size, 5-pin 	CST6D 1009 size, 6-pin 				
N-chx2	20	$\pm 10$	180	SSM6N35FU	—	—	SSM6N35FE	—	—	0.4 to 1.0	5 (20)	1.2	SSM3K35FSx2
	20	$\pm 10$	100	SSM6N16FU	—	SSM5N16FU	—	SSM5N16FE	—	0.6 to 1.1	5.2 (15)	1.5	SSM3K16FUx2
	20	$\pm 10$	250	—	—	—	SSM6N37FE	—	SSM6N37CTD	0.35 to 1.0	3.07 (5.6)	1.5	SSM3K37MFVx2
	20	$\pm 10$	500	—	SSM6N36TU	—	SSM6N36FE	—	—	0.35 to 1.0	0.95 (1.52)	1.5	SSM3K36FSx2
	20	$\pm 10$	500	SSM6N43FU	—	—	—	—	—	0.35 to 1.0	0.95 (1.52)	1.5	SSM3K43FSx2
	20	10	100	—	—	—	SSM6N03FE	SSM5N03FE	—	0.7 to 1.3	4 (12)	2.5	SSM3K03FEx2
	20	10	100	**SSM6N04FU	—	—	—	—	—	0.7 to 1.3	4 (12)	2.5	SSM3K04FUx2
	20	$\pm 12$	400	SSM6N05FU	—	SSM5N05FU	—	—	—	0.6 to 1.1	0.85 (1.2)	2.5	SSM3K05FUx2
	30	$\pm 20$	100	SSM6N15FU	—	SSM5N15FU	SSM6N15FE	SSM5N15FE	—	0.8 to 1.5	4.0 (7.0)	2.5	SSM3K15FUx2
	30	$\pm 20$	100	SSM6N44FU	—	—	SSM6N44FE	—	—	0.8 to 1.5	4.0 (7.0)	2.5	SSM3K44FSx2
	30	$\pm 20$	400	SSM6N09FU	—	—	—	—	—	1.1 to 1.8	0.8 (1.2)	4.0	SSM3K09FUx2
	50	$\pm 7$	100	SSM6N17FU	—	—	—	—	—	0.9 to 1.5	22 (40)	2.5	SSM3K17FUx2
60	$\pm 20$	200	SSM6N7002FU	—	—	—	—	—	1.0 to 2.5	2.2 (3.3)	4.5	SSM3K7002FUx2	
60	$\pm 20$	200	SSM6N7002AFU	—	—	—	—	—	1.0 to 2.5	1.8 (3.3)	4.5	SSM3K7002AFUx2	
60	$\pm 20$	200	SSM6N7002BFU	—	—	SSM6N7002BFE	—	—	1.5 to 3.1	2.1 (3.3)	4.5	SSM3K7002BFUx2	
P-chx2	-20	$\pm 10$	-100	SSM6P35FU	—	—	SSM6P35FE	—	—	-0.4 to -1.0	11 (44)	-1.2	SSM3K35FSx2
	-20	$\pm 10$	-100	SSM6P16FU	—	SSM5P16FU	SSM6P16FE	SSM5P16FE	—	-0.6 to -1.1	18 (45)	-1.5	SSM3J16FUx2
	-20	$\pm 8$	-330	—	SSM6P36TU	—	SSM6P36FE	—	—	-0.3 to -1.0	2.23 (3.6)	-1.5	SSM3J36FSx2
	-20	$\pm 12$	-200	SSM6P05FU	—	SSM5P05FU	—	—	—	-0.6 to -1.1	3.2 (4.0)	-2.5	SSM3J05FUx2
	-30	$\pm 20$	-100	SSM6P15FU	—	SSM5P15FU	SSM6P15FE	SSM5P15FE	—	-1.1 to -1.7	14 (32)	-2.5	SSM3J15FUx2
N-ch+ P-ch	-30	$\pm 20$	-200	SSM6P09FU	—	—	—	—	—	-1.1 to -1.8	3.3 (4.2)	-4.0	SSM3J09FUx2
	20	$\pm 10$	180	SSM6L35FU	—	—	SSM6L35FE	—	—	0.4 to 1.0	5 (20)	1.2	SSM3K35FS
	-20	$\pm 10$	-100	—	—	—	—	—	—	-0.4 to -1.0	11 (44)	-1.2	+SSM3J35FS
	20	$\pm 10$	100	—	—	—	SSM6L16FE	—	—	0.6 to 1.1	5.2 (15)	1.5	SSM3K16FS
	-20	$\pm 10$	-100	—	—	—	—	—	—	-0.6 to -1.1	18 (45)	-1.5	+SSM3J16FS
	20	$\pm 10$	500	—	SSM6L36TU	—	SSM6L36FE	—	—	0.35 to 1.0	0.95 (1.52)	1.5	SSM3K36FS
	-20	$\pm 8$	-330	—	—	—	—	—	—	-0.3 to -1.0	2.23 (3.6)	-1.5	+SSM3J36FS
	20	$\pm 12$	400	SSM6L05FU	—	—	—	—	—	0.6 to 1.1	0.85 (1.2)	2.5	SSM3K05FU
-20	$\pm 12$	-200	—	—	—	—	—	—	-0.6 to -1.1	3.2 (4.0)	-2.5	+SSM3J05FU	
30	$\pm 20$	400	SSM6L09FU	—	—	—	—	—	1.1 to 1.8	0.8 (1.2)	4.0	SSM3K09FU	
-30	$\pm 20$	-200	—	—	—	—	—	—	-1.1 to -1.8	3.3 (4.2)	-4.0	+SSM3J09FU	

\*\* Built-in 1-M1 gate-source resistor



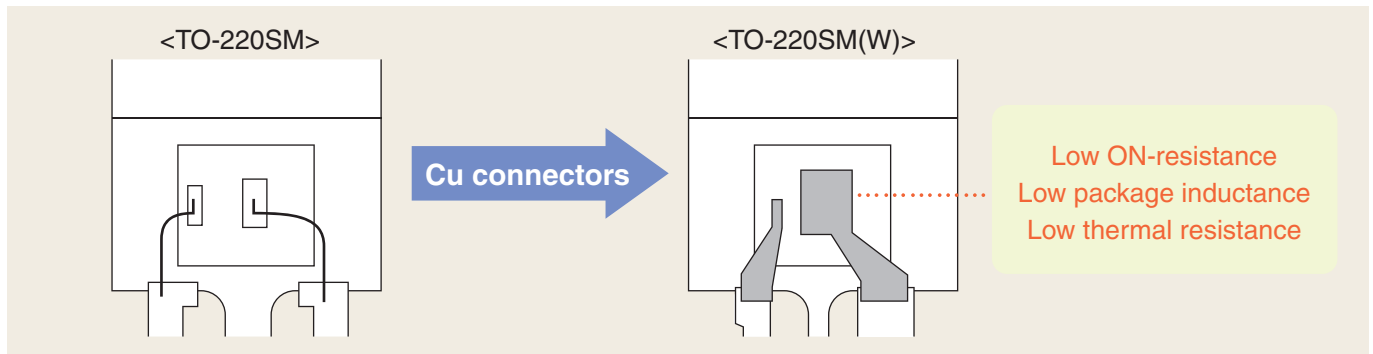
## 5-1 TO-220SM(W) Series

The TO-220SM(W) package, which uses Cu connectors and a wide source terminal, realizes low ON-resistance and a high current-carrying capability.

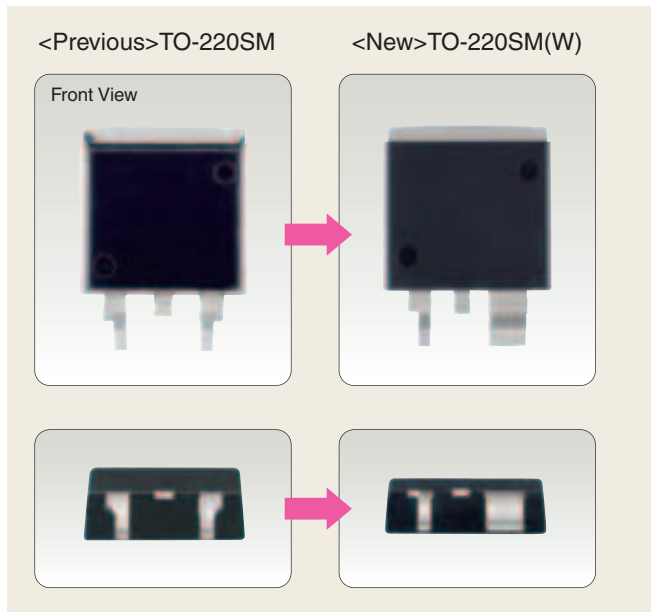
#### ■ Features

- Achieves low ON-resistance, low package inductance and low thermal resistance due to the use of Cu connectors.
- Achieves a high current-carrying capability due to the use of a wide source terminal ( $I_D$  (DC) = 150 A max)
- AEC-Q101-qualified at a channel temperature ( $T_{ch}$ ) of 175°C
- Thin package: 3.7-mm (max) thick, much thinner than the previous TO-220SM package with a thickness of 4.7 mm (max)

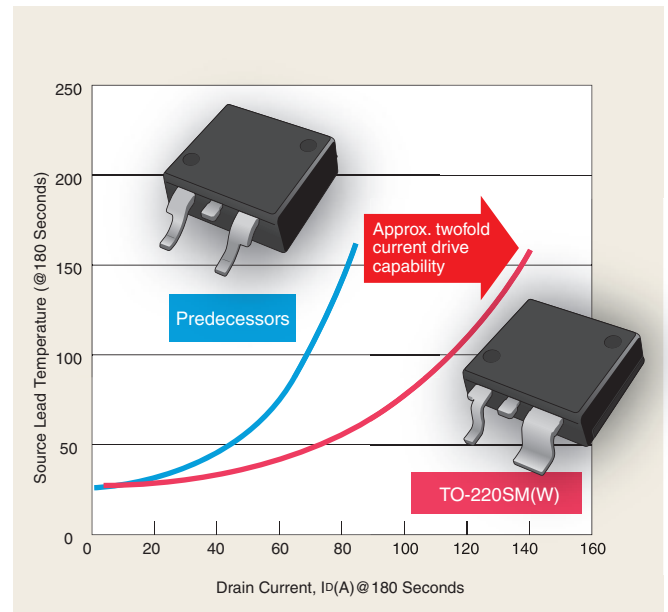
#### ■ Characteristics of the WARP Series



#### ■ Package



#### ■ Comparison of the Source Lead Temperature



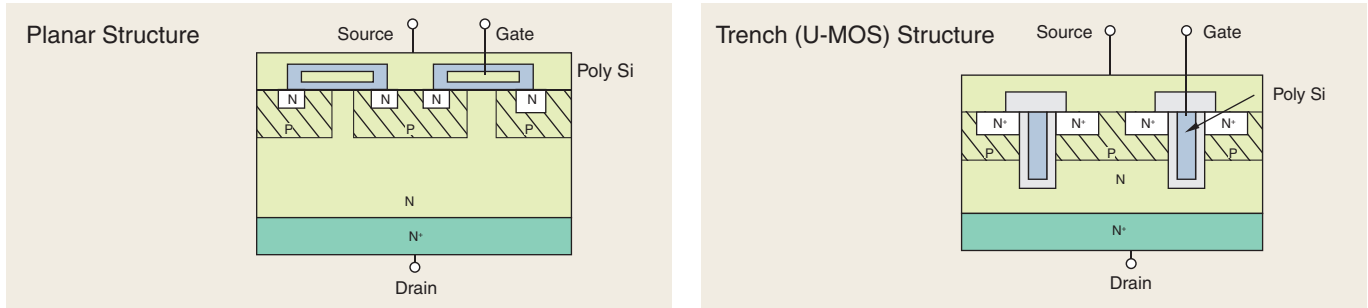
#### ■ Product Offerings

Part Number	Absolute Maximum Ratings			$R_{DS(ON)}$ Max (m $\Omega$ )		$C_{iss}$ Typ. (pF)	$Q_g$ Typ. (nC)	Series
	$V_{DSS}$ (V)	$V_{GS}$ (V)	$I_D$ (A)	$V_{GS} = 10$ V	$V_{GS} = 6$ V			
TJ120F06J3	-60	$\pm 20$	-120	8	—	11500	258	U-MOSIII
TJ150F06M3 ☆☆	-60	(-20/+10)	-150	(5.2)	(5.8)	(20000)	(TBD)	U-MOSVI
TK100F04K3	40	$\pm 20$	100	3	—	4500	102	U-MOSIV
TK100F04K3L	40	$\pm 20$	100	3	4.5	4980	105	U-MOSIV
TK150F04K3	40	$\pm 20$	150	2.1	—	7500	166	U-MOSIV
TK150F04K3L	40	$\pm 20$	150	2.1	3.2	9400	190	U-MOSIV
TK100F06K3	60	$\pm 20$	100	5	—	4500	98	U-MOSIV
TK130F06K3	60	$\pm 20$	130	3.4	—	8400	170	U-MOSIV
TK50F15J1	150	$\pm 20$	50	30	—	4300	75	U-MOSIII

☆: No protection Zener diode between gate and source ☆☆: Under development

## 5-2 U-MOS (Trench Type) Series

Fabricated using a trench structure, the U-MOS Series ultra-high integration density and thus



### ■ Features

- High density through the use of submicron technology
- 60% reduction in  $R_{DS(ON)}$  by per unit area (as compared with the maximum  $R_{DS(ON)}$  of  $L^2$ -MOSV)
- Guaranteed avalanche capability and improved  $di/dt$  rate

### ■ Product Offerings

Applications	Part Number	Absolute Maximum Ratings				Package	$R_{DS(ON)}$ Max (m $\Omega$ )				$Q_g$ Typ. (nC)	Series		
		$V_{DSS}$ (V)	$V_{GSS}$ (V)	$I_D$ (A)	$P_D$ (W)		10 V	6 V	4.5 V	4 V				
motor drive Solenoids Lamp drivers DC-DC converters	2SJ668	-60	$\pm 20$	-5	20	PW-Mold	170	—	—	250	15	U-MOSIII		
	2SJ681	-60	$\pm 20$	-5	20	New PW-Mold2	170	—	—	250	15			
	2SJ669	-60	$\pm 20$	-5	1.2	TPS	170	—	—	250	15			
	TPCA8104	-60	$\pm 20$	-40	45	SOP Advance	16	—	—	24	90			
	TJ70A06J3	-60	$\pm 20$	-70	54	TO-220SIS	8.0	—	10	—	246			
	TJ120F06J3	-60	$\pm 20$	-120	300	TO-220SM(W)	8.0	—	—	—	258			
LCD backlight inverter	TJ9A10M3 ☆	-100	$\pm 20$	-9	19	TO-220SIS	170	—	—	—	47	U-MOSVI		
	TJ11A10M3 ☆	-100	$\pm 20$	-11	24	TO-220SIS	130	—	—	—	76			
	TJ20A10M3 ☆	-100	$\pm 20$	-20	35	TO-220SIS	90	—	—	—	120			
motor drive Solenoids Lamp drivers DC-DC converters	2SK3754	30	$\pm 20$	5	25	TO-220NIS	89	—	99	—	2.5	U-MOSIII		
	2SK3846	40	$\pm 20$	26	25	TO-220NIS	16	—	28	—	40			
	2SK3847	40	$\pm 20$	32	30	TO-220SM	16	—	28	—	40			
	TK70J04J3	40	$\pm 20$	70	150	TO-3P(N)	3.8	—	8.3	—	210			
	TK70X04K3 ☆	40	$\pm 20$	70	80	TFP	5.6	—	—	—	62	U-MOSIV		
	TK70X04K3Z	40	$\pm 20$	70	80	TFP	5.6	—	—	—	62			
	2SK3843	40	$\pm 20$	75	125	TFP	3.5	—	8.0	—	210	U-MOSIII		
	TK80X04K3 ☆	40	$\pm 20$	80	125	TFP	3.5	—	—	—	100			
	TK100F04K3 ☆	40	$\pm 20$	100	200	TO-220SM(W)	3.0	—	—	—	102	U-MOSIV		
	TK100F04K3L	40	$\pm 20$	100	200	TO-220SM(W)	3.0	4.5	—	—	105			
	TK150F04K3 ☆	40	$\pm 20$	150	300	TO-220SM(W)	2.1	—	—	—	166			
	TK150F04K3L	40	$\pm 20$	150	300	TO-220SM(W)	2.1	3.2	—	—	190			
	motor drive Solenoids Lamp drivers DC-DC converters	2SK4017	60	$\pm 20$	5	20	New PW-Mold2	100	—	—	150	15	U-MOSIII	
		2SK4033	60	$\pm 20$	5	20	New PW-Mold	100	—	—	150	15		
		TK30A06J3A	60	$\pm 20$	30	25	TO-220SIS	26	—	35	—	36		
		2SK3662	60	$\pm 20$	35	35	TO-220NIS	12.5	—	—	19	91		
		2SK3844	60	$\pm 20$	45	45	TO-220NIS	5.8	—	—	—	196		
		TK70X06K3 ☆	60	$\pm 20$	70	80	TFP	8.0	—	—	—	62		
		2SK3845	60	$\pm 20$	70	125	TO-3P(N)	5.8	—	—	—	196		
		2SK3842	60	$\pm 20$	75	125	TFP	5.8	—	—	—	196		
2SK4034		60	$\pm 20$	75	125	TFP	5.8	—	10	—	196			
2SK3940		75	$\pm 20$	70	150	TO-3P(N)	7.0	—	—	—	200			
LCD backlight inverter		TK8A10K3 ☆	100	$\pm 20$	8	18	TO-220SIS	120	—	—	—	12.9		U-MOSIV
		TK12A10K3 ☆	100	$\pm 20$	12	20	TO-220SIS	80	—	—	—	18		
		TK25A10K3 ☆	100	$\pm 20$	25	25	TO-220SIS	40	—	—	—	34		
		TK40X10J1	100	$\pm 20$	40	125	TFP	20	—	—	—	59		U-MOSIII
	TK50F15J1	150	$\pm 20$	50	300	TO-220SM(W)	30	—	—	—	75			

☆: No protection Zener diode between gate and source

## 5-3 U-MOS Series for Synchronous Rectification ( $V_{DSS} = 60\text{ V to }150\text{ V}$ )

### ■ Features

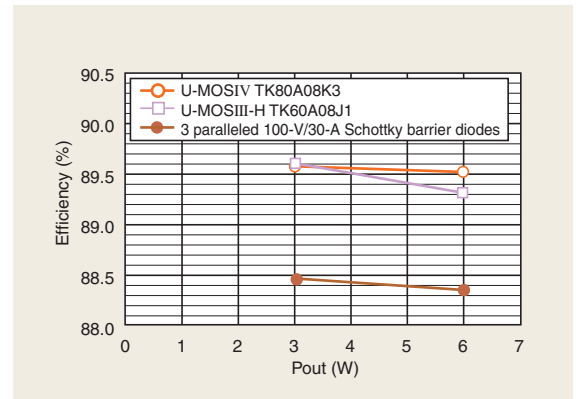
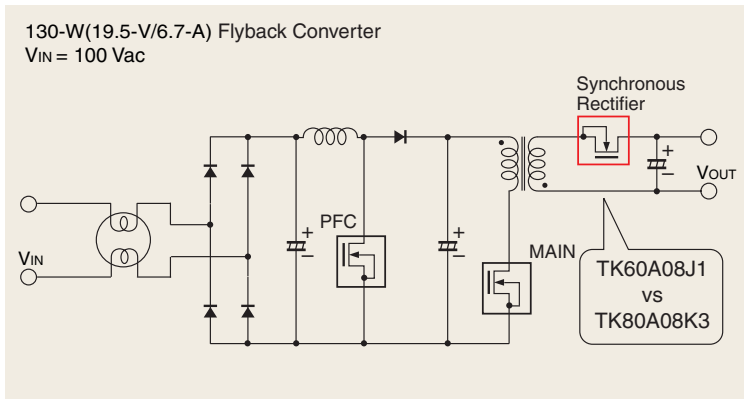
- Low ON-resistance achieved by high density through the use of submicron technology
- Guaranteed avalanche capability
- High power dissipation achieved by having the series housed in the TO-220(W) package with an exposed heatsink on the bottom of the package

### ■ Comparisons Between Synchronous Rectification MOSFETs

Characteristic	Symbol	Test Conditions	TK80A08K3			TK60A08J1			Unit
			Min	Typ.	Max	Min	Typ.	Max	
Gate leakage current	+IGSS	$V_{GS}$ condition*, $V_{DS} = 0\text{ V}$	—	—	1	—	—	10	$\mu\text{A}$
	-IGSS	$V_{GS}$ condition*, $V_{DS} = 0\text{ V}$	—	—	-1	—	—	-10	$\mu\text{A}$
Drain cut-off current	$I_{DSS}$	$V_{DS} = 75\text{ V}, V_{GS} = 0\text{ V}$	—	—	10	—	—	10	$\mu\text{A}$
Drain-source breakdown voltage	$V_{(BR)DSS}$	$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$	75	—	—	75	—	—	V
	$V_{(BR)DSX}$	$I_D = 10\text{ mA}, V_{GS} = -20\text{ V}$	50	—	—	60	—	—	V
Gate threshold voltage	$V_{th}$	$V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$	2.0	—	4.0	1.1	—	2.3	V
Drain-source ON-resistance	$R_{DS(ON)}$	$V_{GS} = 10\text{ V}, I_D = 40\text{ A}$	—	3.6	4.5	—	6.2	7.8	$\text{m}\Omega$
Input capacitance	$C_{iss}$	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}$ $f = 1\text{ MHz}$	—	8200	—	—	5450	—	pF
Reverse transfer capacitance	$C_{rss}$		—	770	—	—	320	—	pF
Forward voltage	$V_{DSF}$	$I_{DR} = 80\text{ A}, V_{GS} = 0\text{ V}$	—	-0.9	-1.2	—	-0.9	-1.2	V

\*: Test conditions: TK80A08K3:  $V_{GS} = \pm 20\text{ V}$ , TK60A08J1:  $V_{GS} = \pm 16\text{ V}$

### ■ Efficiency Test Circuit



Efficiency approx. 1% higher than Schottky barrier diodes

### ■ Product Offerings

Part Number	Absolute Maximum Ratings				$R_{DS(ON)}$ ( $\text{m}\Omega$ ) @ $V_{GS} = 10\text{ V}$		$Q_g$ (nC) Typ.	$Q_{sw}$ (nC) Typ.	Package	Series
	$V_{DSS}$ (V)	$V_{GSS}$ (V)	$I_D$ (A)	$P_D$ (W)	Typ.	Max				
TK25E06K3	60	$\pm 20$	25	64	14	18	TBD	TBD	TO-220	U-MOSIV
TK50E06K3A	60	$\pm 20$	50	104	6.8	8.5	TBD	TBD	TO-220	U-MOSIV
TK70A06J1	60	$\pm 20$	70	45	5.1	6.4	87	30	TO-220SIS	U-MOSIII-H
TK70D06J1	60	$\pm 20$	70	140	5.1	6.4	87	30	TO-220(W)	U-MOSIII-H
TK40A08K3	75	$\pm 20$	40	42	7	9	80	30	TO-220SIS	U-MOSIV
TK50E08K3	75	$\pm 20$	50	104	9.5	12	TBD	TBD	TO-220	U-MOSIV
TK60E08K3	75	$\pm 20$	60	128	7.5	9	TBD	TBD	TO-220	U-MOSIV
TK60A08J1	75	$\pm 20$	60	45	6.2	7.8	86	27	TO-220SIS	U-MOSIII-H
TK60D08J1	75	$\pm 20$	60	140	6.2	7.8	86	27	TO-220(W)	U-MOSIII-H
TK80A08K3	75	$\pm 20$	80	40	3.6	4.5	175	80	TO-220SIS	U-MOSIV
TK80D08K3	75	$\pm 20$	80	100	3.6	4.5	175	80	TO-220(W)	U-MOSIV
TK18E10K3	100	$\pm 20$	18	71	33	42	TBD	TBD	TO-220	U-MOSIV
TK40X10J1	100	$\pm 20$	40	125	15	20	59	19	TFP	U-MOSIII
TK40A10J1	100	$\pm 20$	40	40	11.5	15	76	24	TO-220SIS	U-MOSIII-H
TK40D10J1	100	$\pm 20$	40	100	11.5	15	76	24	TO-220(W)	U-MOSIII-H
TK40E10K3	100	$\pm 20$	40	147	12	15	TBD	TBD	TO-220	U-MOSIV
TK40A10K3	100	$\pm 20$	40	40	11.5	15	85	40	TO-220SIS	U-MOSIV
TK55A10J1	100	$\pm 20$	55	45	8.4	10.5	110	38	TO-220SIS	U-MOSIII-H
TK55D10J1	100	$\pm 20$	55	140	8.4	10.5	110	38	TO-220(W)	U-MOSIII-H
TK50X15J1	150	$\pm 20$	50	125	22	30	75	33	TFP	U-MOSIII-H

## 6-1 $\pi$ -MOSVII Series ( $V_{DSS} = 400\text{ V to }650\text{ V}$ )

The latest addition to the  $\pi$ -MOS portfolio, the  $\pi$ -MOSVII Series offers reduced capacitances due to optimized chip design and is available with a greatly wider range of electrical characteristics.

### ■ Features

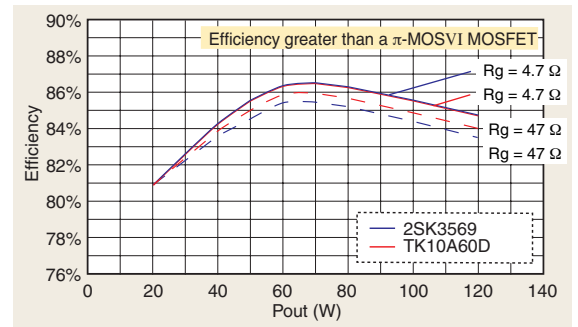
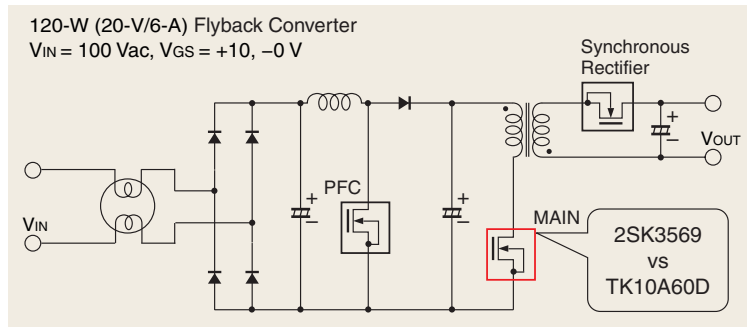
- 40% reduction in  $Q_g$  from  $\pi$ -MOSVI due to optimized chip design
- Available in 50-V steps of  $V_{DSS}$  and in finer steps of  $R_{DS(ON)}$ .
- Rated avalanche and reverse recovery current capabilities

### ■ Performance Comparisons Between $\pi$ -MOSVII and $\pi$ -MOSVI Devices (600 V/10 A)

Characteristic	Symbol	Test Conditions	Series			Series			Unit
			Min	Typ.	Max	Min	Typ.	Max	
Gate leakage current	$\pm I_{GSS}$	$V_{GS}$ condition*, $V_{DS} = 0\text{ V}$	—	—	$\pm 1$	—	—	$\pm 10$	$\mu\text{A}$
Drain cut-off current	$I_{DSS}$	$V_{DS} = 600\text{ V}, V_{GS} = 0\text{ V}$	—	—	10	—	—	100	$\mu\text{A}$
Drain-source breakdown voltage	$V_{(BR)DSS}$	$I_D = +10\text{ mA}, V_{GS} = 0\text{ V}$	600	—	—	600	—	—	V
Gate threshold voltage	$V_{th}$	$V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$	2.0	—	4.0	2.0	—	4.0	V
Drain-source ON-resistance	$R_{DS(ON)}$	$V_{GS} = 10\text{ V}, I_D = 5\text{ A}$	—	—	0.75	—	—	0.75	$\Omega$
Total gate charge	$Q_g$	$V_{DD} = 400\text{ V}, V_{GS} = 10\text{ V}, I_D = 10\text{ A}$	—	25	—	—	42	—	nC
Diode forward voltage	$V_{DSF}$	$I_{DR} = 10\text{ A}, V_{GS} = 0\text{ V}$	—	—	-1.7	—	—	-1.7	V

\*: Test conditions: TK10A60D:  $V_{GS} = \pm 30\text{ V}$ , 2SK3569:  $V_{GS} = \pm 25\text{ V}$

### ■ Efficiency Test Circuit



### ■ Product Offerings

Part Number	Absolute Maximum Ratings		$R_{DS(ON)}$ ( $\Omega$ ) $V_{GS} = 10\text{ V}$	Equivalent $\pi$ -MOSVI Part	Package	
	$V_{DSS}$ (V)	$I_D$ (A)				
TK10X40D	400	10	0.55	2SK3499	TFP	
TK11A45D	450	11	0.62	2SK3869	TO-220SIS	
TK13A45D		13	0.46	2SK3743	TO-220SIS	
TK16A45D		16	0.27	2SK3935	TO-220SIS	
TK4A50D		4	2	—	TO-220SIS	
TK5A50D	500	5	1.5	2SK3563	TO-220SIS	
TK5P50D		5	1.5	2SK3863/2SK4103	DPAK	
TK6A50D		6	1.4	—	TO-220SIS	
TK7A50D		7	1.2	—	TO-220SIS	
TK7P50D		7	1.22	—	DPAK	
TK8A50D		8	0.85	2SK3561	TO-220SIS	
TK10A50D		10	0.72	—	TO-220SIS	
TK12A50D		12	0.52	2SK3568	TO-220SIS	
TK13A50D		13	0.4	2SK4012	TO-220SIS	
TK15J50D		15	0.4	2SK4107	TO-3P(N)	
TK15A50D		15	0.3	2SK3934	TO-220SIS	
TK18A50D		18	0.27	—	TO-220SIS	
TK20J50D		20	0.27	2SK4108	TO-3P(N)	
TK4A53D		525	4	1.7	—	TO-220SIS
TK5A53D	5		1.5	2SK3563	TO-220SIS	
TK5P53D	5		1.5	—	DPAK	
TK6A53D	6		1.3	—	TO-220SIS	
TK6P53D	6		1.3	—	DPAK	
TK12A53D	12		0.58	—	TO-220SIS	
TK12X53D	12		0.58	2SK3398	TFP	
TK4A55DA	550		3.5	2.45	—	TO-220SIS
TK4A55D			4	1.9	—	TO-220SIS
TK4P55D			4	1.88	—	DPAK

Part Number	Absolute Maximum Ratings		$R_{DS(ON)}$ ( $\Omega$ ) $V_{GS} = 10\text{ V}$	Equivalent $\pi$ -MOSVI Part	Package	
	$V_{DSS}$ (V)	$I_D$ (A)				
TK5A55D	550	5	1.7	—	TO-220SIS	
TK8A55DA		7.5	1.07	—	TO-220SIS	
TK9A55DA		8.5	0.86	—	TO-220SIS	
TK11A55D		11	0.63	—	TO-220SIS	
TK12A55D		12	0.57	—	TO-220SIS	
TK12J55D		12	0.57	—	TO-3P(N)	
TK14A55D		14	0.37	—	TO-220SIS	
TK16A55D		16	0.33	—	TO-220SIS	
TK16J55D		16	0.37	—	TO-3P(N)	
TK2P60D		2	4.3	2SK2865	New PW-Mold	
TK2Q60D		2	5	2SK4002	New PW-Mold 2	
TK3A60DA		2.5	2.8	—	TO-220SIS	
TK4A60DA		3.5	2.2	2SK3567	TO-220SIS	
TK4P60DA		3.5	2.2	2SK3975	DPAK	
TK4A60D	600	4	1.7	—	TO-220SIS	
TK6A60D		6	1.25	2SK3562	TO-220SIS	
TK8A60DA		7.5	1	2SK3667	TO-220SIS	
TK10A60D		10	0.75	2SK3569	TO-220SIS	
TK12A60D		12	0.55	—	TO-220SIS	
TK13A60D		13	0.43	2SK3797	TO-220SIS	
TK15A60D		15	0.37	—	TO-220SIS	
TK2A65D		650	2	3.26	—	TO-220SIS
TK3A65DA			2.5	2.51	—	TO-220SIS
TK5A65D			5	1.43	—	TO-220SIS
TK8A65D	8		0.84	—	TO-220SIS	
TK12A65D *	12		0.54	—	TO-220SIS	
TK13A65D *	13		0.47	—	TO-220SIS	

\*: Under development

## 6-2 Super-Junction DTMOS Series ( $V_{DSS} = 600\text{ V}, 650\text{ V}$ )

The DTMOS devices employ a new super-junction structure that enables an ultra-low ON-resistance with the maximum  $V_{DSS}$  rating of 600 V. The DTMOS Series helps reduce the power consumption and size of electronic equipment.

### ■ Features

- Low ON-resistance TK50J60U: 65 m $\Omega$  (max) @ $V_{GS} = 10\text{ V}, I_D = 25\text{ A}$
- Low gate charge TK20A60U:  $Q_g = 27\text{ nC}$  typ., 600 V / 20 A
- The rugged internal drain-source diode is not damaged at  $di/dt = 500\text{ A}/\mu\text{s}$  (@ $V_{DS} = 400\text{ V}, 150^\circ\text{C}$ ).

### ■ Product Offerings

Part Number	Absolute Maximum Ratings		$R_{DS(ON)}$ Max ( $\Omega$ )		$Q_g$ Typ. (nC)	$C_{iss}$ Typ. (pF)	Package	Series					
	$V_{DSS}$ (V)	$I_D$ (A)	$V_{GS} = 10\text{ V}$										
TK12A60U	600	12	0.4		14	720	TO-220SIS	DTMOSII					
TK12D60U							TO-220(W)						
TK12J60U			TO-3P(N)										
TK12X60U			TFP										
TK15A60U		15	0.3				17		950	TO-220SIS			
TK15D60U										TO-220(W)			
TK15J60U			TO-3P(N)										
TK15X60U		TFP											
TK20A60U		20	0.19							27	1470	TO-220SIS	
TK20D60U												TO-220(W)	
TK20J60U	TO-3P(N)												
TK20X60U	TFP												
TK40J60T	40	0.08		67	3900	TO-3P(N)		DTMOSI					
TK50J60U *	50	0.065		67	4050	TO-3P(N)		DTMOSII					
TK13A65U	650	13	0.38		17	TO-220SIS							
TK13J65U						TO-3P(N)							
TK17A65U *						17	0.26		27			TO-220SIS	
TK17J65U *												TO-3P(N)	

\*: Under development

### ■ Performance Comparisons Between the DTMOS and Conventional MOSFETs ( $\pi$ -MOSVI) Devices (600 V/20 A)

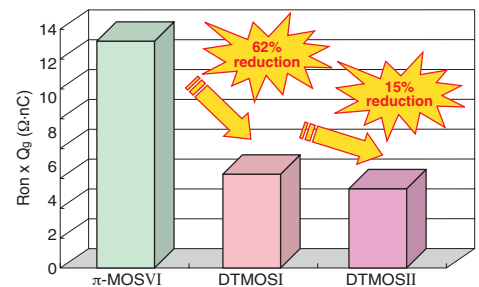
Characteristic	Symbol	Test Conditions	Series			Series			Unit
			DTMOSII			$\pi$ -MOSVI			
			Part Number	Min	Typ.	Max	Part Number	Min	
Gate leakage current	$\pm I_{GSS}$	$V_{GS}$ condition*, $V_{DS} = 0\text{ V}$	—	—	$\pm 1$	—	—	$\pm 10$	$\mu\text{A}$
Drain cut-off current	$I_{DSS}$	$V_{DS} = 600\text{ V}, V_{GS} = 0\text{ V}$	—	—	100	—	—	100	$\mu\text{A}$
Drain-source breakdown voltage	$V_{(BR)DSS}$	$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$	600	—	—	600	—	—	V
Gate threshold voltage	$V_{th}$	$V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$	3.0	—	5.0	2.0	—	4.0	V
Drain-source ON-resistance	$R_{DS(ON)}$	$V_{GS} = 10\text{ V}, I_D = 10\text{ A}$	—	0.165	0.19	—	0.22	0.32	$\Omega$
Total gate charge	$Q_g$	$V_{DD} = 400\text{ V}, V_{GS} = 10\text{ V}, I_D = 20\text{ A}$	—	27	—	—	60	—	nC
Diode forward voltage	$V_{DSF}$	$I_{DR} = 20\text{ A}, V_{GS} = 0\text{ V}$	—	—	-1.7	—	—	-1.7	V

\*: Test conditions: TK20J60U:  $V_{GS} = \pm 30\text{ V}$ , 2SK3911:  $V_{GS} = \pm 25\text{ V}$

### ■ Figure-of-Merit (FOM) Comparison

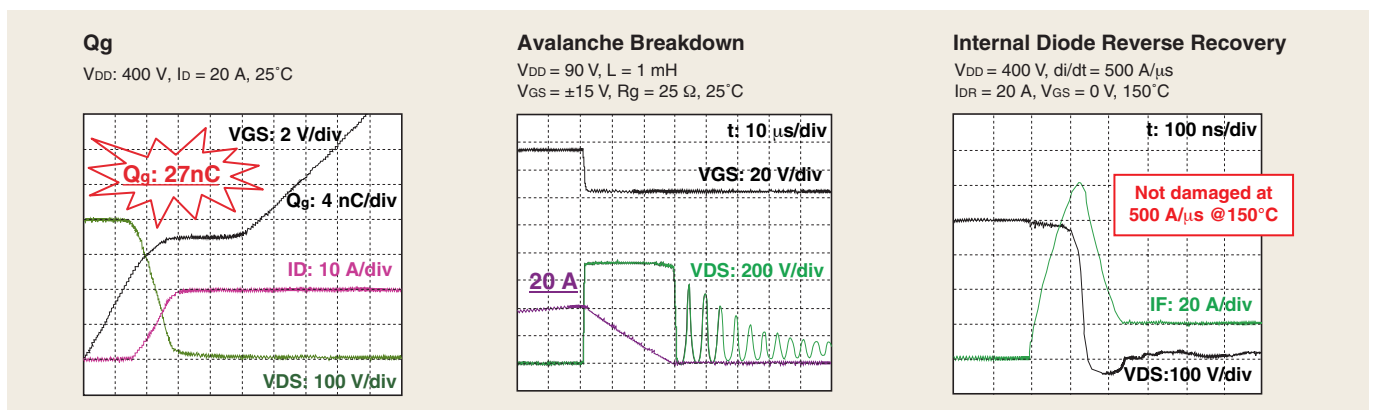
$R_{on} \times Q_g$ , the product of ON-resistance and total gate charge, is reduced by 62%, compared with the conventional MOSFETs with the same chip size.

\* $R_{on} \times Q_g$  is a figure-of-merit index for the switching speed of MOSFETs.



### ■ Performance Characteristics of the DTMOS Series

#### TK20A60U Electrical Characteristics



## 6-3 High-Speed $\pi$ -MOS Diode(HSD) Series ( $V_{DSS} = 450\text{ V}, 600\text{ V}$ )

The HSD Series integrates a high-speed diode, which provides an efficiency improvement for a variety of equipment. The integrated diode reduces the reverse recovery time ( $t_{rr}$ ) through minority carrier lifetime control. The HSD Series suitable for motor and inverter applications.

### ■ Product Offerings

#### ● High-Speed Diode Series (HSD Series)

Applications	Part Number	Absolute Maximum Ratings			Package	$R_{DS(ON)}$ Max ( $\Omega$ ) VGS = 10 V	$T_{rr}$ Typ. (ns)	Standard Type	Series
		$V_{DSS}$ (V)	$I_D$ (A)	$P_D$ (W)					
Motor control Inverters Switching power supplies	2SK3868	500	5	35	TO-220SIS	1.7	150	2SK3563	$\pi$ -MOSV
	TK5A50D5 *			35	TO-220SIS	2.1	130	TK5A50D	$\pi$ -MOSVII
	2SK3417			50	TO-220FL/SM	1.8	60	2SK2991	$\pi$ -MOSV
	TK7A50D5 *	7	35	TO-220SIS	1.68	130	TK7A50D	$\pi$ -MOSVII	
	2SK4042	8	40	TO-220SIS	0.97	185	2SK3561	$\pi$ -MOSVI	
	TK12A50D5	12	45	TO-220SIS	0.73	120	TK12A50D	$\pi$ -MOSVII	
	2SK3314	15	1850	TO-3P(N)	0.49	105	2SK2698	$\pi$ -MOSV	
	2SK3131	50	250	TO-3P(L)	0.11	105	2SK3132	$\pi$ -MOSVI	
	2SK3936	23	150	TO-3P(N)	0.25	380	2SK3907	$\pi$ -MOSVI	
	TK4A60DA5 *	3.5	35	TO-220SIS	3.08	130	TK4A60DA	$\pi$ -MOSVII	
	TK4A60D5 *	4	35	TO-220SIS	2.38	130	TK4A60D	$\pi$ -MOSVII	
	2SK3947	6	40	TO-220SIS	1.4	150	2SK3562	$\pi$ -MOSVI	
	2SK4015	600	10	45	TO-220SIS	0.86	170	2SK3569	$\pi$ -MOSVI
	TK10A60D5 *			45	TO-220SIS	1.05	90	TK10A60D	$\pi$ -MOSVII
	2SK4016			13	50	TO-220SIS	0.5	160	2SK3911
	2SK3906	20	150	TO-3P(N)	0.33	400	2SK3797	$\pi$ -MOSVI	

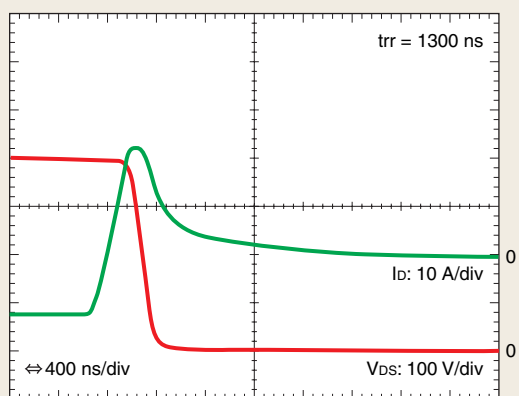
\*: Under development

### ■ Characteristics of the High-Speed Diode Series

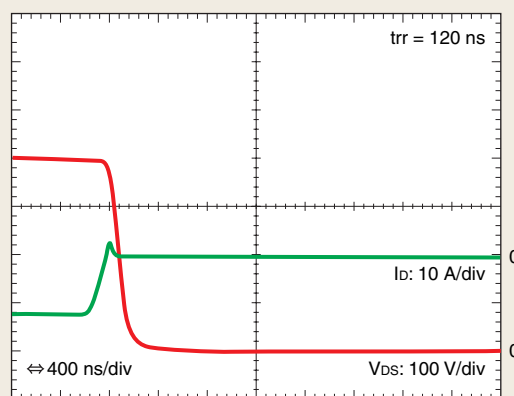
Faster internal diode

$V_{DD} = 400\text{ V}$ ,  $di/dt = 100\text{ A}/\mu\text{s}$ ,  $I_{BR} = 12\text{ A}$ ,  $25^\circ\text{C}$

MOSFET with a standard diode: TK12A50D



MOSFET with a high-speed diode: TK12A50D5



6-4  $\pi$ -MOS Series■  $\pi$ -MOSVI Series ( $V_{DSS} = 450\text{ V to }600\text{ V}$ )

Series	Part Number	Absolute Maximum Ratings		$R_{DS(ON)}$ Max ( $\Omega$ )		$Q_g$ Typ. (nC)	$C_{iss}$ Typ. (pF)	Equivalent Predecessor Part	Package
		$V_{DSS}$ (V)	$I_D$ (A)	$V_{GS} = 10\text{ V}$					
$\pi$ -MOSVI	2SK3757	450	2	2.45	9	330	2SK3543	TO-220SIS	
	2SK3766		2	2.45	8	270	2SK3543	TO-220SIS	
	2SK3869		10	0.68	28	1050	2SK3407	TO-220SIS	
	2SK3935		17	0.25	62	3100	—	TO-220SIS	
	2SK3904		19	0.26	62	3100	—	TO-3P(N)	
	2SK3563	500	5	1.5	16	550	2SK2662	TO-220SIS	
	2SK3863		5	1.5	16	550	—	DP	
	2SK4103		5	1.5	16	550	2SK3863	New Pw-Mold	
	2SK3561		8	0.85	28	1050	2SK2543	TO-220SIS	
	2SK3568		12	0.52	42	1500	2SK2842	TO-220SIS	
	2SK4012		13	0.4	50	2400	—	TO-220SIS	
	2SK3934		15	0.3	62	3100	—	TO-220SIS	
	2SK4107		15	0.4	48	2450	2SK2698	TO-3P(N)	
	2SK3905		17	0.31	62	3100	—	TO-3P(N)	
	2SK4108		20	0.27	70	3400	2SK2837	TO-3P(N)	
	2SK3767		600	2	4.5	9	320	2SK3067	TO-220SIS
	2SK3567			3.5	2.2	17	550	2SK2750	TO-220SIS
	2SK3562			6	1.25	28	1050	2SK2545	TO-220SIS
	2SK3667			7.5	1.0	33	1300	2SK2996	TO-220SIS
	2SK3569			10	0.75	42	1500	2SK2843	TO-220SIS
2SK3797	13	0.43		62	3100	—	TO-220SIS		
2SK3903	14	0.44		62	3100	—	TO-3P(N)		

■  $\pi$ -MOSIV Series ( $V_{DSS} = 450\text{ V to }600\text{ V}$ )

Series	Part Number	Absolute Maximum Ratings		$R_{DS(ON)}$ Max ( $\Omega$ )		$Q_g$ Typ. (nC)	$C_{iss}$ Typ. (pF)	Equivalent Predecessor Part	Package
		$V_{DSS}$ (V)	$I_D$ (A)	$V_{GS} = 10\text{ V}$					
$\pi$ -MOSIV	2SK3633	800	7	1.7	35	1500	2SK2746	TO-3P(N)	
	2SK3879		6.5	1.7	35	1500	—	TO-220FL/SM	
	2SK3880		6.5	1.7	35	1500	—	TO-3P(N)IS	
	2SK4013		6	1.7	45	1400	—	TO-220SIS	
	2SK3566	900	2.5	6.4	12	470	2SK2718	TO-220SIS	
	2SK3564		3	4.3	17	700	2SK2700	TO-220SIS	
	2SK3798		4	3.5	26	800	—	TO-220SIS	
	2SK3565		5	2.5	28	1150	2SK2717	TO-220SIS	
	2SK3742		5	2.5	25	1150	2SK2717	TO-220SIS	
	2SK3700		5	2.5	28	1150	2SK2610	TO-3P(N)	
	2SK4014		6	2.0	45	1400	—	TO-220SIS	
	2SK4115		7	2.0	45	1650	2SK2749	TO-3P(N)	
	2SK3799		8	1.3	60	2200	—	TO-220SIS	
	2SK3473		9	1.6	38	1450	—	TO-3P(N)	
	2SK3878		9	1.3	60	2200	2SK2611	TO-3P(N)	
	2SK4207		13	0.95	45	2790	—	TO-3P(N)	

■  $L^2$ - $\pi$ -MOSV and VI Series ( $V_{DSS} = 30\text{ V to }100\text{ V}$ )

Part Number	$V_{DSS}$ (V)	$I_D$ (A)	$P_D$ (W)	Package	$R_{DS(ON)}$ ( $\Omega$ )				$R_{DS(ON)}$ ( $\Omega$ )				$Q_g$ Typ. (nC)
					Typ.	Max	$V_{GS}$ (V)	$I_D$ (A)	Typ.	Max	$V_{GS}$ (V)	$I_D$ (A)	
2SJ537	-50	-5	0.9	LSTM	0.16	0.19	-10	-2.5	0.27	0.34	-4	-1.3	18
2SJ360	-60	-1	0.5	PW-Mini	0.55	0.73	-10	-0.5	0.86	1.2	-4	-0.5	6.5
2SJ507	-60	-1	0.9	LSTM	0.5	0.7	-10	-0.5	0.72	1.0	-4	-0.5	5.6
2SJ438	-60	-5	25	TO-220NIS	0.16	0.19	-10	-2.5	0.24	0.28	-4	-2.5	22
2SJ378	-60	-5	1.2	TPS	0.16	0.19	-10	-2.5	0.24	0.28	-4	-2.5	22
2SJ349	-60	-20	45	TO-220NIS	0.033	0.045	-10	-10	0.05	0.09	-4	-10	90
2SJ401	-60	-20	100	TO-220FL/SM	0.033	0.045	-10	-10	0.05	0.09	-4	-10	90
2SJ334	-60	-30	45	TO-220NIS	0.029	0.038	-10	-15	0.046	0.06	-4	-15	110
2SJ402	-60	-30	100	TO-220FL/SM	0.029	0.038	-10	-15	0.046	0.06	-4	-15	110
2SJ508	-100	-1	1.5	PW-Mini	1.34	1.9	-10	-0.5	1.68	2.5	-4	-0.5	6.3
2SJ509	-100	-1	0.9	LSTM	1.34	1.9	-10	-0.5	1.68	2.5	-4	-0.5	6.3
2SJ380	-100	-12	35	TO-220NIS	0.15	0.21	-10	-6	0.25	0.32	-4	-6	48
2SJ412	-100	-16	60	TO-220FL/SM	0.15	0.21	-10	-6	0.25	0.32	-4	-6	48
2SJ619	-100	-16	75	TFP	0.15	0.21	-10	-6	0.25	0.32	-4	-6	48
2SJ620	-100	-18	25	TFP	0.063	0.09	-10	-9	0.085	0.12	-4	-9	140
2SJ464	-100	-18	45	TO-220NIS	0.064	0.09	-10	-9	0.085	0.12	-4	-9	140
2SK3506	30	45	100	TO-3P(N)	0.016	0.02	10	25	—	—	—	—	39
2SK2989	50	5	0.9	LSTM	0.12	0.15	10	2.5	0.24	0.33	4	1.3	6.5
2SK2614	50	20	40	DP	0.032	0.046	10	10	0.055	0.08	4	5	25
2SK2507	50	25	30	TO-220NIS	0.034	0.046	10	12	0.058	0.08	4	6	25
2SK2886	50	45	40	TO-220NIS	0.014	0.02	10	25	0.027	0.036	4	25	66
2SK3051	50	45	40	TO-220FL/SM	0.024	0.03	10	25	—	—	—	—	36
2SK2744	50	45	125	TO-3P(N)	0.015	0.02	10	25	—	—	—	—	68
2SK2745	50	50	150	TO-3P(N)	0.007	0.0095	10	25	0.011	0.016	4	25	130

Part Number	V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	P <sub>D</sub> (W)	Package	R <sub>DS(ON)</sub> (Ω)				R <sub>DS(ON)</sub> (Ω)				Qg Typ. (nC)
					Typ.	Max	V <sub>GS</sub> (V)	I <sub>D</sub> (A)	Typ.	Max	V <sub>GS</sub> (V)	I <sub>D</sub> (A)	
2SK2615	60	2	0.5	PW-Mini	0.23	0.3	10	1	0.33	0.44	4	1	6
2SK2961	60	2	0.9	LSTM	0.2	0.27	10	1	0.26	0.38	4	1	5.8
2SK2229	60	5	1.2	TPS	0.12	0.16	10	2.5	0.2	0.3	4	1.3	12
2SK2782	60	20	40	DP	0.039	0.055	10	10	0.06	0.090	4	5	25
2SK2232	60	25	35	TO-220NIS	0.036	0.046	10	12	0.057	0.08	4	12	38
2SK2311	60	25	40	TO-220FL/SM	0.036	0.046	10	12	0.057	0.08	4	12	38
2SK2385	60	36	40	TO-220NIS	0.022	0.03	10	18	0.04	0.055	4	15	60
2SK2233	60	45	100	TO-3P(N)	0.022	0.03	10	25	0.04	0.055	4	15	60
2SK2266	60	45	65	TO-220FL/SM	0.022	0.03	10	25	0.04	0.055	4	15	60
2SK2376	60	45	100	TO-220FL/SM	0.013	0.017	10	25	0.019	0.025	4	25	110
2SK2398	60	45	100	TO-3P(N)	0.022	0.03	10	25	—	—	—	—	60
2SK2173	60	50	125	TO-3P(N)	0.013	0.017	10	25	0.019	0.025	4	25	110
2SK2445	60	50	125	TO-3P(N)	0.014	0.018	10	25	—	—	—	—	110
2SK2267	60	60	150	TO-3P(L)	0.008	0.011	10	30	0.012	0.015	4	30	170
2SK2313	60	60	150	TO-3P(N)	0.008	0.011	10	30	0.012	0.015	4	30	170
2SK2962	100	1	0.9	LSTM	0.5	0.7	10	0.5	0.65	0.95	4	0.5	6.3
2SK2963	100	1	0.5	PW-Mini	0.5	0.7	10	0.5	0.65	0.95	4	0.5	6.3
2SK2200	100	3	1.3	TPS	0.28	0.35	10	2	0.36	0.45	4	2	13.5
2SK2201	100	3	20	New PW-Mold	0.28	0.35	10	2	0.36	0.45	4	2	13.5
2SK4018	100	3	20	New PW-Mold2	0.28	0.35	10	2	0.35	0.45	4	2	13.5
2SK2399	100	5	20	New PW-Mold	0.17	0.23	10	2.5	0.22	0.3	4	2.5	22
2SK2400	100	5	1.2	TPS	0.17	0.23	10	2.5	0.22	0.3	4	2.5	22
2SK4019	100	5	20	New PW-Mold2	0.17	0.23	10	2.5	0.22	0.3	4	2.5	22
2SK2391	100	20	35	TO-220NIS	0.066	0.085	10	10	0.09	0.13	4	10	50
2SK2314	100	27	75	TO-220AB	0.066	0.085	10	15	0.09	0.13	4	15	50
2SK2789	100	27	60	TO-220FL/SM	0.066	0.085	10	15	0.09	0.13	4	15	50
2SK3387	150	18	100	TFP	0.08	0.12	10	9	0.09	0.18	4	9	57

■ π-MOSV Series (V<sub>DSS</sub> = 150 V to 250 V)

Applications	Part Number	Absolute Maximum Ratings			Package	R <sub>DS(ON)</sub> (Ω)				Qg Typ. (nC)
		V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	P <sub>D</sub> (W)		R <sub>DS(ON)</sub> (Ω)		V <sub>GS</sub> (V)	I <sub>D</sub> (A)	
						Typ.	Max			
DC-DC converters Monitors Motor controllers	2SJ618	-180	-10	130	TO-3P(N)	—	0.37	-10	-5	18
	2SJ407	-200	-5	30	TO-220NIS	0.8	1.0	-10	-2.5	20
	2SJ567	-200	-2.5	20	New PW-Mold	1.6	2.0	-10	-1.5	10
	2SJ676	-200	-2.5	1.3	TPS	1.6	2.0	-10	-1.5	10
	2SJ680	-200	-2.5	20	New PW-Mold2	1.6	2.0	-10	-1.5	10
	2SJ610	-250	-2	20	PW-Mold	1.85	2.55	-10	-1.0	24
	2SJ512	-250	-5	30	TO-220NIS	1.0	1.25	-10	-2.5	22
	2SJ516	-250	-6.5	35	TO-220NIS	0.6	0.8	-10	-3	29
	2SK3670	150	0.67	0.9	LSTM	1.0	1.7	4	0.5	4.6
	2SK3205	150	5	20	PW-Mold	0.36	0.5	10	2.5	12
	2SK2882	150	18	45	TO-220NIS	0.08	0.12	10	9	57
	2SK3497	180	10	130	TO-3P(N)	—	0.15	10	5	—
	2SK2992	200	1	1.5	PW-Mini	2.2	3.5	10	0.5	3
	2SK2835	200	5	1.3	TPS	0.56	0.8	10	2.5	10
	2SK2381	200	5	25	TO-220NIS	0.56	0.8	10	2.5	10
	2SK2920	200	5	20	New PW-Mold	0.56	0.8	10	2.5	10
	2SK4020	200	5	20	New PW-Mold2	0.56	0.8	10	2.5	10
	2SK2350	200	8.5	30	TO-220NIS	0.26	0.4	10	5	17
	2SK2965	200	11	35	TO-220NIS	0.15	0.26	10	5.5	30
	2SK2382	200	15	45	TO-220NIS	0.13	0.18	10	10	40
	2SK2401	200	15	75	TO-220FL/SM	0.13	0.18	10	10	40
	2SK3625	200	25	100	TO-220FL/SM	0.065	0.082	10	12.5	44
	2SK3444	200	25	125	TFP	0.067	0.082	10	12.5	44
	2SK3176	250	30	150	TO-3P(N)	0.038	0.052	10	15	125
	2SK3462	250	3	20	New PW-Mold	1.2	1.7	10	1.5	12
	2SK4022	250	3	20	New PW-Mold2	1.2	1.7	10	1.5	12
	2SK3342	250	4.5	20	New PW-Mold	0.8	1.0	10	2.5	10
	2SK4021	250	4.5	20	New PW-Mold2	0.8	1.0	10	2.5	10
	2SK2417	250	7.5	30	TO-220NIS	0.42	0.5	10	3.5	20
	2SK2914	250	7.5	20	TO-220AB	0.42	0.5	10	3.5	20
	2SK2508	250	13	45	TO-220NIS	0.18	0.25	10	6.5	40
	2SK2598	250	13	60	TO-220FL/SM	0.18	0.25	10	6.5	40
2SK2993	250	20	100	TO-220FL/SM	0.082	0.105	10	10	100	
2SK3994	250	20	45	TO-220NIS	0.090	0.105	10	10	45	
2SK3388	250	20	125	TFP	0.082	0.105	10	10	100	
2SK3445	250	20	125	TFP	0.09	0.105	10	10	45	
2SK2967	250	30	150	TO-3P(N)	0.048	0.068	10	15	132	
2SK2995	250	30	90	TO-3P(N)IS	0.048	0.068	10	15	132	



### ■ $\pi$ -MOSV Series ( $V_{DSS} = 400\text{ V to }700\text{ V}$ )

Applications	Part Number	Absolute Maximum Ratings			Package	$R_{DS(ON)}$ ( $\Omega$ )				Qg Typ. (nC)
		$V_{DSS}$ (V)	$I_D$ (A)	$P_D$ (W)				$V_{GS}$ (V)	$I_D$ (A)	
						Typ.	Max			
115-V AC switching power supplies Ballast inverters Motor controllers	2SK3498	400	1	20	PW-Mold	4.2	5.5	10	0.5	5.7
	2SK2838	400	5.5	40	TO-220FL/SM	0.84	1.2	10	3	17
	2SK2679	400	5.5	35	TO-220NIS	0.84	1.2	10	3	17
	2SK2952	400	8.5	40	TO-220NIS	0.4	0.55	10	5	34
	2SK2841	400	10	80	TO-220AB	0.4	0.55	10	5	34
	2SK2949	400	10	80	TO-220FL/SM	0.4	0.55	10	5	34
	2SK3499	400	10	80	TFP	0.4	0.55	10	5	34
	2SK3374	450	1	20	TPS	3.7	4.6	10	5	5
	2SK4023	450	1	20	New PW-Mold2	4.0	4.6	10	0.5	5
	2SK3544	450	13	100	TFP	0.29	0.4	10	6	34
	2SK2998	500	0.5	0.9	LSTM	10	18	10	0.25	3.8
	2SK3302	500	0.5	1.3	TPS	10	18	10	0.25	3.8
	2SK3471	500	0.5	0.5	PW-Mini	10	18	10	0.25	3.8
	2SK2599	500	2	1.3	TPS	2.9	3.2	10	1	9
	2SK3373	500	2	20	New PW-Mold	2.9	3.2	10	1	9
	2SK2862	500	3	25	TO-220NIS	2.9	3.2	10	1	9
	2SK2991	500	5	50	TO-220FL/SM	1.35	1.5	10	2.5	17
	2SK3466	500	5	50	TO-220FL/SM	1.35	1.5	10	5	17
	2SK2542	500	8	80	TO-220AB	0.75	0.85	10	4	30
	2SK2776	500	8	65	TO-220FL/SM	0.75	0.85	10	4	30
	2SK3538	500	8	65	TFP	0.75	0.85	10	4	30
	2SK2601	500	10	125	TO-3P(N)	0.56	1.0	10	5	30
	2SK3068	500	12	100	TO-220FL/SM	0.4	0.52	10	6	45
	2SK3398	500	12	100	TFP	0.4	0.52	10	6	45
	2SK2917	500	18	90	TO-3P(N)IS	0.21	0.27	10	10	80
	2SK3132	500	50	250	TO-3P(L)	0.07	0.095	10	25	280
	2SK3371	600	1	20	New PW-Mold	6.4	9.0	10	0.5	9
	2SK4026	600	1	20	New PW-Mold2	6.4	9	10	0.5	9
	2SK2846	600	2	1.3	TPS	4.2	5.0	10	1	9
	2SK2865	600	2	20	New PW-Mold	4.2	5.0	10	1	9
	2SK4002	600	2	20	New PW-Mold2	4.2	5	10	1	9
	2SK4003	600	3	20	New PW-Mold2	1.7	2.2	10	1.5	20
	2SK3975	600	3	20	New PW-Mold	1.7	2.2	10	1.5	20
	2SK3085	600	3.5	75	TO-220AB	1.7	2.2	10	1.8	20
	2SK3130	600	6	40	TO-220NIS	1.26	1.55	10	3	30
	2SK2777	600	6	65	TO-220FL/SM	0.9	1.25	10	3	30
	2SK2602	600	6	125	TO-3P(N)	0.9	1.25	10	3	30
	2SK3312	600	6	65	TO-220FL/SM	0.95	1.25	10	3	22
	2SK3438	600	10	80	TFP	0.78	1.0	10	5	28
	2SK2889	600	10	100	TO-220FL/SM	0.54	0.75	10	5	45
2SK2866	600	10	125	TO-220AB	0.54	0.75	10	5	45	
2SK2699	600	12	150	TO-3P(N)	0.5	0.65	10	6	58	
2SK2953	600	15	90	TO-3P(N)IS	0.31	0.4	10	8	80	
2SK3265	700	10	45	TO-220NIS	0.72	1.0	10	5	53	
2SK3453	700	10	80	TO-3P(N)IS	0.72	1.0	10	5	53	

### ■ $\pi$ -MOSIII Series ( $V_{DSS} = 800\text{ V to }1000\text{ V}$ )

Applications	Absolute Maximum Ratings			Package	$R_{DS(ON)}$ ( $\Omega$ )				Qg Typ. (nC)
	$V_{DSS}$ (V)	$I_D$ (A)	$P_D$ (W)		Typ.	Max	$V_{GS}$ (V)	$I_D$ (A)	
2SK2603	800	3	100	TO-220AB	3.0	3.6	10	1.5	25
2SK2883	800	3	75	TO-220FL/SM	3.0	3.6	10	15	25
2SK2884	800	5	100	TO-220FL/SM	1.9	2.2	10	3.0	34
2SK2606	800	8	85	TO-3P(N)IS	1.0	1.2	10	4.0	68
2SK2607	800	9	150	TO-3P(N)	1.0	1.2	10	4.0	68
2SK3301	900	1	20	PW-Mold	15	20	10	0.5	6
2SK2733	900	1	60	TO-220AB	8.0	9.0	10	0.5	15
2SK2608	900	3	100	TO-220AB	3.73	4.3	10	1.5	25
2SK2719	900	3	125	TO-3P(N)	3.7	4.3	10	1.5	25
2SK2847	900	8	85	TO-3P(N)IS	1.05	1.25	10	4.0	58
2SK3017	900	8.5	90	TO-3P(N)IS	1.2	1.4	10	4.0	70
2SK2968	900	10	150	TO-3P(N)	1.05	1.25	10	4	70
2SK2613	1000	8	150	TO-3P(N)	1.4	1.7	10	8.0	65

## 7-1 Alphanumeric Index of Part Numbers

Part Number	Series	Package	Main Characteristics			Page
			V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	R <sub>DS(ON)</sub> Max ( $\Omega$ )	
2SJ168	$\pi$ -MOSIII	S-MINI	-60	-0.2	2	37
2SJ200	$\pi$ -MOSII	TO-3P (N)	-180	-10	0.83	-
2SJ201	$\pi$ -MOSII	TO-3P (L)	-200	-12	0.63	-
2SJ304	L <sup>2</sup> - $\pi$ -MOSIV	TO-220NIS	-60	-14	0.12	-
2SJ305	$\pi$ -MOSIII	S-MINI	-30	-0.2	4	37
2SJ312	L <sup>2</sup> - $\pi$ -MOSIV	TO-220FL/SM	-60	-14	0.12	-
2SJ313	$\pi$ -MOSII	TO-220NIS	-180	-1	5	-
2SJ334	L <sup>2</sup> - $\pi$ -MOSV	TO-220NIS	-60	-30	0.038	44
2SJ338	$\pi$ -MOSII	PW-Mold	-180	-1	5	-
2SJ343	$\pi$ -MOSIII	S-MINI	-50	-0.05	50	37
2SJ344	$\pi$ -MOSIII	USM	-50	-0.05	50	37
2SJ349	L <sup>2</sup> - $\pi$ -MOSV	TO-220NIS	-60	-20	0.045	44
2SJ360	L <sup>2</sup> - $\pi$ -MOSV	PW-Mini	-60	-1	0.73	44
2SJ378	L <sup>2</sup> - $\pi$ -MOSV	TPS	-60	-5	0.19	44
2SJ380	L <sup>2</sup> - $\pi$ -MOSV	TO-220NIS	-100	-12	0.21	44
2SJ401	L <sup>2</sup> - $\pi$ -MOSV	TO-220FL/SM	-60	-20	0.045	44
2SJ402	L <sup>2</sup> - $\pi$ -MOSV	TO-220FL/SM	-60	-30	0.038	44
2SJ407	$\pi$ -MOSV	TO-220NIS	-200	-5	1	45
2SJ412	L <sup>2</sup> - $\pi$ -MOSV	TO-220FL/SM	-100	-16	0.21	44
2SJ438	L <sup>2</sup> - $\pi$ -MOSV	TO-220NIS	-60	-5	0.19	44
2SJ440	$\pi$ -MOSII	TO-3P (N)IS	-180	-9	0.8	-
2SJ464	L <sup>2</sup> - $\pi$ -MOSV	TO-220NIS	-100	-18	0.09	44
2SJ507	L <sup>2</sup> - $\pi$ -MOSV	LSTM	-60	-1	0.7	44
2SJ508	L <sup>2</sup> - $\pi$ -MOSV	PW-Mini	-100	-1	1.9	44
2SJ509	L <sup>2</sup> - $\pi$ -MOSV	LSTM	-100	-1	1.9	44
2SJ512	$\pi$ -MOSV	TO-220NIS	-250	-5	1.25	45
2SJ516	$\pi$ -MOSV	TO-220NIS	-250	-6.5	0.8	45
2SJ537	L <sup>2</sup> - $\pi$ -MOSV	LSTM	-50	-5	0.19	44
2SJ567	$\pi$ -MOSV	New PW-Mold	-200	-2.5	2	45
2SJ610	$\pi$ -MOSV	PW-Mold	-250	-2	2.55	45
2SJ618	$\pi$ -MOSV	TO-3P (N)	-180	-10	0.37	45
2SJ619	L <sup>2</sup> - $\pi$ -MOSV	TFP	-100	-16	0.21	44
2SJ620	L <sup>2</sup> - $\pi$ -MOSV	TFP	-100	-18	0.09	44
2SJ668	U-MOSIII	New PW-Mold	-60	-5	0.17	39
2SJ669	U-MOSIII	TPS	-60	-5	0.17	39
2SJ676	$\pi$ -MOSV	TPS	-200	-2.5	2	45
2SJ680	$\pi$ -MOSV	New PW-Mold2	-200	-2.5	2	45
2SJ681	U-MOSIII	New PW-Mold2	-60	-5	0.17	39
2SK1062	$\pi$ -MOSIII	S-MINI	60	0.2	1	37
2SK1119	$\pi$ -MOSII.5	TO-220AB	1000	4	3.8	-
2SK1359	$\pi$ -MOSII.5	TO-3P (N)	100	5	3.8	-
2SK1365	$\pi$ -MOSII.5	TO-3P (N)IS	1000	7	1.8	-
2SK1381	L <sup>2</sup> - $\pi$ -MOSIII	TO-3P (N)	100	50	0.032	-
2SK1382	L <sup>2</sup> - $\pi$ -MOSIII	TO-3P (L)	100	60	0.02	-
2SK1486	$\pi$ -MOSIII.5	TO-3P (L)	300	32	0.095	-
2SK1489	$\pi$ -MOSIII.5	TO-3P (L)	1000	12	1	-
2SK1529	$\pi$ -MOSII	TO-3P (N)	180	10	0.83	-
2SK1530	$\pi$ -MOSII	TO-3P (N)	200	12	0.63	-
2SK1544	$\pi$ -MOSIII.5	TO-3P (L)	500	25	0.2	-
2SK1930	$\pi$ -MOSII.5	TO-220FL/SM	1000	4	3.8	-
2SK2009	$\pi$ -MOSIII	S-MINI	30	0.2	2	37
2SK2013	$\pi$ -MOSII	TO-220NIS	180	1	5	-

Part Number	Series	Package	Main Characteristics			Page
			V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	R <sub>DS(ON)</sub> Max ( $\Omega$ )	
2SK2162	$\pi$ -MOSII	PW-Mold	180	1	5	-
2SK2173	L <sup>2</sup> - $\pi$ -MOSV	TO-3P (N)	60	50	0.017	45
2SK2200	L <sup>2</sup> - $\pi$ -MOSV	TPS	100	3	0.35	45
2SK2201	L <sup>2</sup> - $\pi$ -MOSV	New PW-Mold	100	3	0.35	45
2SK2229	L <sup>2</sup> - $\pi$ -MOSV	TPS	60	5	0.16	45
2SK2232	L <sup>2</sup> - $\pi$ -MOSV	TO-220NIS	60	25	0.046	45
2SK2233	L <sup>2</sup> - $\pi$ -MOSV	TO-3P (N)	60	45	0.03	45
2SK2266	L <sup>2</sup> - $\pi$ -MOSV	TO-220FL/SM	60	45	0.03	45
2SK2267	L <sup>2</sup> - $\pi$ -MOSV	TO-3P (L)	60	60	0.011	45
2SK2274	$\pi$ -MOSII.5	TO-220NIS	700	5	1.7	-
2SK2311	L <sup>2</sup> - $\pi$ -MOSV	TO-220FL/SM	60	25	0.046	45
2SK2313	L <sup>2</sup> - $\pi$ -MOSV	TO-3P (N)	60	60	0.011	45
2SK2314	L <sup>2</sup> - $\pi$ -MOSV	TO-220AB	100	27	0.085	45
2SK2350	$\pi$ -MOSV	TO-220NIS	200	8.5	0.4	45
2SK2376	L <sup>2</sup> - $\pi$ -MOSV	TO-220FL/SM	60	45	0.017	45
2SK2381	$\pi$ -MOSV	TO-220NIS	200	5	0.8	45
2SK2382	$\pi$ -MOSV	TO-220NIS	200	15	0.18	45
2SK2385	L <sup>2</sup> - $\pi$ -MOSV	TO-220NIS	60	36	0.03	45
2SK2391	L <sup>2</sup> - $\pi$ -MOSV	TO-220NIS	100	20	0.085	45
2SK2398	L <sup>2</sup> - $\pi$ -MOSV	TO-3P (N)	60	45	0.03	45
2SK2399	L <sup>2</sup> - $\pi$ -MOSV	New PW-Mold	100	5	0.23	45
2SK2400	L <sup>2</sup> - $\pi$ -MOSV	TPS	100	5	0.23	45
2SK2401	$\pi$ -MOSV	TO-220FL/SM	200	15	0.18	45
2SK2417	$\pi$ -MOSV	TO-220NIS	250	7.5	0.5	45
2SK2445	L <sup>2</sup> - $\pi$ -MOSV	TO-3P (N)	60	50	0.018	45
2SK2467	$\pi$ -MOSII	TO-3P (N)IS	180	9	0.8	-
2SK2507	L <sup>2</sup> - $\pi$ -MOSV	TO-220NIS	50	25	0.046	44
2SK2508	$\pi$ -MOSV	TO-220NIS	250	13	0.25	45
2SK2542	$\pi$ -MOSV	TO-220AB	500	8	0.85	46
2SK2598	$\pi$ -MOSV	TO-220FL/SM	250	13	0.25	45
2SK2599	$\pi$ -MOSV	TPS	500	2	3.2	46
2SK2601	$\pi$ -MOSV	TO-3P (N)	500	10	1	46
2SK2602	$\pi$ -MOSV	TO-3P (N)	600	6	1.25	46
2SK2603	$\pi$ -MOSIII	TO-220AB	800	3	3.6	46
2SK2606	$\pi$ -MOSIII	TO-3P (N)IS	800	8	1.2	46
2SK2607	$\pi$ -MOSIII	TO-3P (N)	800	9	1.2	46
2SK2608	$\pi$ -MOSIII	TO-220AB	900	3	4.3	46
2SK2613	$\pi$ -MOSIII	TO-3P (N)	1000	8	1.7	46
2SK2615	L <sup>2</sup> - $\pi$ -MOSV	PW-Mini	60	2	0.3	45
2SK2679	$\pi$ -MOSV	TO-220NIS	400	5.5	1.2	46
2SK2699	$\pi$ -MOSV	TO-3P (N)	600	12	0.65	46
2SK2719	$\pi$ -MOSIII	TO-3P (N)	900	3	4.3	46
2SK2733	$\pi$ -MOSIII	TO-220AB	900	1	9	46
2SK2744	L <sup>2</sup> - $\pi$ -MOSV	TO-3P (N)	50	45	0.02	44
2SK2745	L <sup>2</sup> - $\pi$ -MOSV	TO-3P (N)	50	50	0.0095	44
2SK2776	$\pi$ -MOSV	TO-220FL/SM	500	8	0.85	46
2SK2777	$\pi$ -MOSV	TO-220FL/SM	600	6	1.25	46
2SK2789	L <sup>2</sup> - $\pi$ -MOSV	TO-220FL/SM	100	27	0.085	45
2SK2835	$\pi$ -MOSV	TPS	200	5	0.8	45
2SK2838	$\pi$ -MOSV	TO-220FL/SM	400	5.5	1.2	46

Part Number	Series	Package	Main Characteristics			Page
			V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	R <sub>DS(ON)</sub> Max (1)	
2SK2841	/ -MOSV	TO-220AB	400	10	0.55	46
2SK2846	□MOSV	TPS	600	2	5	46
2SK2847	□MOSIII	TO-3P (N)IS	900	8	1.4	46
2SK2862	□MOSV	TO-220NIS	500	3	3.2	46
2SK2865	□MOSV	New PW-Mold	600	2	5	46
2SK2866	□MOSV	TO-220AB	600	10	0.75	46
2SK2882	□MOSV	TO-220NIS	150	18	0.12	45
2SK2883	□MOSIII	TO-220FL/SM	800	3	3.6	46
2SK2884	□MOSIII	TO-220FL/SM	800	5	2.2	46
2SK2886	L <sup>2</sup> - / -MOSV	TO-220NIS	50	45	0.02	44
2SK2889	□MOSV	TO-220FL/SM	600	10	0.75	46
2SK2914	□MOSV	TO-220AB	250	7.5	0.5	45
2SK2917	□MOSV	TO-3P (N)IS	500	18	0.27	46
2SK2920	□MOSV	New PW-Mold	200	5	0.8	45
2SK2949	□MOSV	TO-220FL/SM	400	10	0.55	46
2SK2952	□MOSV	TO-220NIS	400	8.5	0.55	46
2SK2953	□MOSV	TO-3P (N)IS	600	15	0.4	46
2SK2961	L <sup>2</sup> - / -MOSV	LSTM	60	2	0.27	45
2SK2962	L <sup>2</sup> - / -MOSV	LSTM	100	1	0.7	45
2SK2963	L <sup>2</sup> - / -MOSV	PW-Mini	100	1	0.7	45
2SK2965	□MOSV	TO-220NIS	200	11	0.26	45
2SK2967	□MOSV	TO-3P (N)	250	30	0.068	45
2SK2968	□MOSIII	TO-3P (N)	900	10	1.25	46
2SK2989	L <sup>2</sup> - / -MOSV	LSTM	50	5	0.15	44
2SK2991	□MOSV	TO-220FL/SM	500	5	1.5	43,46
2SK2992	□MOSV	PW-Mini	200	1	3.5	45
2SK2993	□MOSV	TO-220FL/SM	250	20	0.105	45
2SK2995	□MOSV	TO-3P (N)IS	250	30	0.068	45
2SK2998	□MOSV	LSTM	500	0.5	18	46
2SK3017	□MOSIII	TO-3P (N)IS	900	8.5	1.25	46
2SK3051	L <sup>2</sup> - / -MOSV	TO-220FL/SM	50	45	0.03	44
2SK3068	□MOSV	TO-220FL/SM	500	12	0.52	46
2SK3085	□MOSV	TO-220AB	600	3.5	2.2	46
2SK3130	□MOSV	TO-220NIS	600	6	1.55	46
2SK3131	□MOSV(HSD)	TO-3P (L)	500	50	0.11	43
2SK3132	/ -MOSV	TO-3P (L)	500	50	0.095	43,46
2SK3176	□MOSV	TO-3P (N)	200	30	0.052	45
2SK3205	□MOSV	PW-Mold	150	5	0.5	45
2SK3265	□MOSV	TO-220NIS	700	10	1	46
2SK3301	□MOSIII	PW-Mold	900	1	20	46
2SK3302	□MOSV	TPS	500	0.5	18	46
2SK3309	MACH	TO-220FL/SM	450	10	0.65	-
2SK3312	/ -MOSV	TO-220FL/SM	600	6	1.25	46
2SK3314	□MOSV(HSD)	TO-3P (N)	500	15	0.49	43
2SK3342	/ -MOSV	New PW-Mold	250	4.5	1	45
2SK3371	□MOSV	New PW-Mold	600	1	9	46
2SK3373	□MOSV	New PW-Mold	500	2	3.2	46
2SK3374	□MOSV	TPS	450	1	4.6	46
2SK3387	L <sup>2</sup> - / -MOSV	TFP	150	18	0.12	45
2SK3388	□MOSV	TFP	250	20	0.105	45
2SK3398	□MOSV	TFP	500	12	0.52	46
2SK3399	MACH	TO-220FL/SM	600	10	0.75	-
2SK3403	MACH	TO-220FL/SM	450	13	0.4	-
2SK3417	/ -MOSV(HSD)	TO-220FL/SM	500	5	1.8	43
2SK3437	MACH	TO-220FL/SM	600	10	1	-

Part Number	Series	Package	Main Characteristics			Page
			V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	R <sub>DS(ON)</sub> Max (1)	
2SK3438	/ -MOSV	TFP	600	10	1	46
2SK3444	□MOSV	TFP	200	25	0.082	45
2SK3445	□MOSV	TFP	250	20	0.105	45
2SK3453	□MOSIV	TO-3P (N)IS	700	10	1	46
2SK3462	□MOSV	New PW-Mold	250	3	1.7	45
2SK3466	□MOSV	TFP	500	5	1.5	46
2SK3471	□MOSV	PW-Mini	500	0.5	18	46
2SK3497	□MOSV	TO-3P (N)	180	10	0.15	45
2SK3498	□MOSV	PW-Mold	400	1	5.5	46
2SK3499	□MOSV	TFP	400	10	0.55	46
2SK3506	□MOSVI	TO-3P (N)	30	45	0.02	44
2SK3538	□MOSV	TFP	500	8	0.85	46
2SK3544	□MOSV	TFP	450	13	0.4	46
2SK3561	□MOSVI	TO-220SIS	500	8	0.85	41,43,44
2SK3562	□MOSVI	TO-220SIS	600	6	1.25	41,43,44
2SK3563	□MOSVI	TO-220SIS	500	5	1.5	41,43,44
2SK3564	□MOSIV	TO-220SIS	900	3	4.3	44
2SK3565	□MOSIV	TO-220SIS	900	5	2.5	44
2SK3566	□MOSIV	TO-220SIS	900	2.5	6.4	44
2SK3567	□MOSVI	TO-220SIS	600	3.5	2.2	41,44
2SK3568	□MOSVI	TO-220SIS	500	12	0.52	41,44
2SK3569	□MOSVI	TO-220SIS	600	10	0.75	41,43,44
2SK3625	□MOSV	TO-220FL/SM	200	25	0.082	45
2SK3633	□MOSIV	TO-3P (N)	800	7	1.7	44
2SK3662	U-MOSIII	TO-220NIS	60	35	0.0125	39
2SK3667	□MOSVI	TO-220SIS	600	7.5	1	41,44
2SK3669	□MOSVII	New PW-Mold	100	10	0.125	-
2SK3670	□MOSV	LSTM	150	0.67	1.7	45
2SK3700	□MOSIV	TO-3P (N)	900	5	2.5	44
2SK3742	□MOSIV	TO-220SIS	900	5	2.5	44
2SK3743	MACH	TO-220NIS	450	13	0.6	41
2SK3754	U-MOSIII	TO-220NIS	30	5	0.089	39
2SK3757	□MOSVI	TO-220SIS	450	2	2.45	44
2SK3766	□MOSVI	TO-220SIS	450	2	2.45	44
2SK3767	□MOSVI	TO-220SIS	600	2	4.5	44
2SK3797	□MOSVI	TO-220SIS	600	13	0.43	41,43,44
2SK3798	□MOSIV	TO-220SIS	900	4	3.5	44
2SK3799	□MOSIV	TO-220SIS	900	8	1.3	44
2SK3842	U-MOSIII	TFP	60	75	0.0058	39
2SK3843	U-MOSIII	TFP	40	75	0.0035	39
2SK3844	U-MOSIII	TO-220NIS	60	45	0.0058	39
2SK3845	U-MOSIII	TO-3P (N)	60	70	0.0058	39
2SK3846	U-MOSIII	TO-220NIS	40	26	0.018	39
2SK3847	U-MOSIII	TO-220SM	40	32	0.016	39
2SK3868	□MOSVI (HSD)	TO-220SIS	500	5	1.7	43
2SK3869	/ -MOSVI	TO-220SIS	450	10	0.68	41,44
2SK3878	□MOSIV	TO-3P (N)	900	9	1.3	44
2SK3879	□MOSIV	TO-220FL/SM	800	6.5	1.7	44
2SK3880	□MOSIV	TO-3P (N)IS	800	6.5	1.7	44
2SK3903	□MOSVI	TO-3P (N)	600	14	0.44	44
2SK3904	□MOSVI	TO-3P (N)	450	19	0.26	44
2SK3905	□MOSVI	TO-3P (N)	500	17	0.31	44
2SK3906	MACH (HSD)	TO-3P (N)	600	20	0.33	43
2SK3907	MACH	TO-3P (N)	500	23	0.23	43
2SK3911	MACH	TO-3P (N)	600	20	0.32	42,43

Part Number	Series	Package	Main Characteristics			Page
			V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	R <sub>DS(ON)</sub> Max (1)	
2SK3934	□MOSVI	TO-220SIS	500	15	0.3	41,44
2SK3935	□MOSVI	TO-220SIS	450	17	0.25	41,44
2SK3936	MACH (HSD)	TO-3P (N)	500	23	0.25	43
2SK3947	/-MOSVI (HSD)	TO-220SIS	600	6	1.4	43
2SK3975	/-MOSV	New PW-Mold	600	3	2.2	41,46
2SK3994	□MOSV	TO-220NIS	250	20	0.105	45
2SK4002	□MOSV	New PW-Mold2	600	2	5	41,46
2SK4003	□MOSV	New PW-Mold2	600	3	2.2	46
2SK4012	□MOSVI	TO-220SIS	500	13	0.4	41,44
2SK4013	□MOSIV	TO-220SIS	800	6	1.7	44
2SK4014	□MOSIV	TO-220SIS	900	6	2	44
2SK4015	□MOSVI (HSD)	TO-220SIS	600	10	0.86	43
2SK4016	/-MOSVI (HSD)	TO-220SIS	600	13	0.5	43
2SK4017	U-MOSIII	New PW-Mold2	60	5	0.1	39
2SK4018	L <sup>2</sup> -/-MOSV	New PW-Mold2	100	3	0.35	45
2SK4019	L <sup>2</sup> -/-MOSV	New PW-Mold2	100	5	0.23	45
2SK4020	□MOSV	New PW-Mold2	200	5	0.8	45
2SK4021	□MOSV	New PW-Mold2	250	4.5	1	45
2SK4022	□MOSV	New PW-Mold2	250	3	1.7	45
2SK4023	□MOSV	New PW-Mold2	450	1	4.6	46
2SK4026	□MOSV	New PW-Mold2	600	1	9	46
2SK4033	U-MOSIII	New PW-Mold	60	5	0.1	39
2SK4034	U-MOSIII	TFP	60	75	0.0058	39
2SK4042	□MOSVI (HSD)	TO-220SIS	500	8	0.97	43
2SK4103	/-MOSVI	New PW-Mold	500	5	1.5	41,44
2SK4107	□MOSVI	TO-3P (N)	500	15	0.4	41,44
2SK4108	□MOSVI	TO-3P (N)	500	20	0.27	41,44
2SK4115	□MOSIV	TO-3P (N)	900	7	2	44
2SK4207	□MOSIV	TO-3P (N)	900	13	0.95	44
SSM3J01T	□MOSVI	TSM	-30	-1.7	0.4	28
SSM3J02T	□MOSVI	TSM	-30	-1.5	0.5	28
SSM3J09FU	□MOSVI	USM	-30	-0.2	4.2	37
SSM3J111TU	U-MOSIII	UFM	-20	-1	0.48	28
SSM3J112TU	U-MOSII	UFM	-30	-1.1	0.79	28
SSM3J113TU	U-MOSIII	UFM	-20	-1.7	0.169	28
SSM3J114TU	U-MOSIV	UFM	-20	-1.8	0.149	28
SSM3J115TU	U-MOSIV	UFM	-20	-2.2	0.098	28
SSM3J117TU	U-MOSII	UFM	-30	-2	0.225	28
SSM3J118TU	U-MOSII	UFM	-30	-1.4	0.48	28
SSM3J120TU	U-MOSIV	UFM	-20	-4	0.038	28
SSM3J129TU	U-MOSV	UFM	-20	-4.6	0.046	28
SSM3J130TU	U-MOSVI	UFM	-20	-4.4	0.0258	28
SSM3J132TU	U-MOSVI	UFM	-12	-5	0.0178	28
SSM3J14T	U-MOSII	TSM	-30	-2.7	0.17	28
SSM3J15CT	□MOSVI	CST3	-30	-0.1	32	37
SSM3J15F	□MOSVI	S-MINI	-30	-0.1	32	37
SSM3J15FS	□MOSVI	SSM	-30	-0.1	32	37
SSM3J15FU	□MOSVI	USM	-30	-0.1	32	37
SSM3J15FV	□MOSVI	VESM	-30	-0.1	32	37
SSM3J16CT	□MOSVI	CST3	-20	-0.1	45	37
SSM3J16FS	□MOSVI	SSM	-20	-0.1	45	37
SSM3J16FU	□MOSVI	USM	-20	-0.1	45	37
SSM3J16FV	□MOSVI	VESM	-20	-0.1	45	37
SSM3J304T	U-MOSIII	TSM	-20	-2.3	0.127	28
SSM3J305T	U-MOSII	TSM	-30	-1.7	0.477	28

Part Number	Series	Package	Main Characteristics			Page
			V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	R <sub>DS(ON)</sub> Max (1)	
SSM3J306T	U-MOSII	TSM	-30	-2.4	0.225	28
SSM3J307T	U-MOSV	TSM	-20	-5.0	0.031	28
SSM3J312T	U-MOSIII	TSM	-12	-2.7	0.091	28
SSM3J313T	U-MOSIII	TSM	-20	-1.6	0.268	28
SSM3J314T	U-MOSIII-H	TSM	-30	-3.5	0.1	28
SSM3J321T	U-MOSV	TSM	-20	-5.2	0.046	28
SSM3J325F	U-MOSVI	S-MINI	-20	-2.0	0.155	28
SSM3J326T	U-MOSVI	TSM	-30	-5.6	0.0457	28
SSM3J327R	U-MOSVI	SOT-23F	-20	-3.9	0.093	28
SSM3J328R	U-MOSVI	SOT-23F	-20	-6.0	0.0298	28
SSM3J35CT	□MOSVI	CST3	-20	-0.1	44	37
SSM3J35FS	□MOSVI	SSM	-20	-0.1	44	37
SSM3J35MFV	□MOSVI	VESM	-20	-0.1	44	37
SSM3J36FS	U-MOSIII	SSM	-20	-0.33	3.6	37
SSM3J36MFV	U-MOSIII	VESM	-20	-0.33	3.6	37
SSM3J36TU	U-MOSIII	UFM	-20	-0.33	3.6	37
SSM3J46CTB	U-MOSVI	CST3B	-20	-2	0.103	28
SSM3K01T	□MOSVI	TSM	30	3.2	0.12	29
SSM3K02T	□MOSVI	TSM	30	2.5	0.2	29
SSM3K03FV	□MOSVI	VESM	20	0.1	12	37
SSM3K04FS	□MOSVI	SSM	20	0.1	12	37
SSM3K04FU	□MOSVI	USM	20	0.1	12	37
SSM3K04FV	□MOSVI	VESM	20	0.1	12	37
SSM3K05FU	□MOSVI	USM	20	0.4	1.2	37
SSM3K09FU	□MOSVI	USM	30	0.4	1.2	37
SSM3K101TU	U-MOSIII	UFM	20	2.2	0.103	29
SSM3K104TU	U-MOSIII	UFM	20	3	0.056	29
SSM3K105TU	□MOSVI	UFM	30	2.1	0.2	29
SSM3K106TU	□MOSVII	UFM	20	1.2	0.53	29
SSM3K107TU	□MOSVI	UFM	20	1.5	0.41	29
SSM3K116TU	U-MOSIII	UFM	30	2.2	0.1	29
SSM3K119TU	U-MOSIII	UFM	30	2.5	0.074	29
SSM3K121TU	U-MOSIII	UFM	20	3.2	0.048	29
SSM3K122TU	U-MOSIII	UFM	20	2	0.123	29
SSM3K123TU	U-MOSIII	UFM	20	4.2	0.028	29
SSM3K124TU	□MOSVII	UFM	30	2.4	0.12	29
SSM3K127TU	U-MOSIII	UFM	30	2	0.123	29
SSM3K128TU	U-MOSIII	UFM	30	1.5	0.36	29
SSM3K131TU	U-MOSIV	UFM	30	6.0	0.0415	29
SSM3K14T	U-MOSII	TSM	30	4	0.067	29
SSM3K15CT	□MOSVI	CST3	30	0.1	7	37
SSM3K15F	□MOSVI	S-MINI	30	0.1	7	37
SSM3K15FS	□MOSVI	SSM	30	0.1	7	37
SSM3K15FU	□MOSVI	USM	30	0.1	7	37
SSM3K15FV	□MOSVI	VESM	30	0.1	7	37
SSM3K16CT	□MOSVI	CST3	20	0.1	15	37
SSM3K16FS	□MOSVI	SSM	20	0.1	15	37
SSM3K16FU	□MOSVI	USM	20	0.1	15	37
SSM3K17FU	□MOSV	USM	50	0.1	40	37
SSM3K301T	U-MOSIII	TSM	20	3.5	0.056	29
SSM3K309T	U-MOSIII	TSM	20	4.7	0.031	29
SSM3K310T	U-MOSIII	TSM	20	5	0.028	29
SSM3K315T	U-MOSIV	TSM	30	6	0.0415	29
SSM3K316T	U-MOSIII	TSM	30	4	0.065	29
SSM3K318T	U-MOSIV	TSM	60	2.5	0.145	29

Part Number	Series	Package	Main Characteristics			Page
			V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	R <sub>DS(ON)</sub> Max ( $\Omega$ )	
SSM3K320T	U-MOSIV	TSM	30	4.2	0.077	29
SSM3K329R	U-MOSIII	SOT-23F	30	3.5	126	29
SSM3K35CT	$\pi$ -MOSVI	CST3	20	0.18	20	37
SSM3K35FS	$\pi$ -MOSVI	SSM	20	0.18	20	37
SSM3K35MFV	$\pi$ -MOSVI	VESM	20	0.18	20	37
SSM3K36FS	U-MOSIII	SSM	20	0.5	1.52	37
SSM3K36MFV	U-MOSIII	VESM	20	0.5	1.52	37
SSM3K36TU	U-MOSIII	UFM	20	0.5	1.52	37
SSM3K37MFV	U-MOSIII	VESM	20	0.25	5.6	37
SSM3K43FS	U-MOSIII	SSM	20	0.5	1.52	37
SSM3K44FS	$\pi$ -MOSVI	SSM	30	0.1	7	37
SSM3K44MFV	$\pi$ -MOSVI	VESM	30	0.1	7	37
SSM3K7002AF	$\pi$ -MOSV	S-MINI	60	0.2	3.3	37
SSM3K7002AFU	$\pi$ -MOSV	USM	60	0.2	3.3	37
SSM3K7002BF	U-MOSIV	S-MINI	60	0.2	3.3	37
SSM3K7002BFS	U-MOSIV	SSM	60	0.2	3.3	37
SSM3K7002BFU	U-MOSIV	USM	60	0.2	3.3	37
SSM4K27CT	U-MOSIII	CST4	20	0.5	0.205	29
SSM5G01TU	U-MOSII	UFV	-30	-1	0.8	31
SSM5G02TU	U-MOSII	UFV	-12	-1	0.16	31
SSM5G04TU	U-MOSII	UFV	-12	-1	0.24	31
SSM5G09TU	U-MOSII	UFV	-12	-1.5	0.13	31
SSM5G10TU	U-MOSIII	UFV	-20	-1.5	0.213	31
SSM5G11TU	U-MOSIII-H	UFV	-30	-1.4	0.403	31
SSM5H01TU	U-MOSII	UFV	30	1.4	0.45	31
SSM5H03TU	U-MOSII	UFV	12	1.4	0.3	31
SSM5H05TU	U-MOSIII	UFV	20	1.5	0.16	31
SSM5H07TU	$\pi$ -MOSVII	UFV	20	1.2	0.54	31
SSM5H08TU	U-MOSIII	UFV	20	1.5	0.16	31
SSM5H10TU	U-MOSIII	UFV	20	1.6	0.119	31
SSM5H11TU	U-MOSIII	UFV	30	1.6	0.182	31
SSM5H16TU	U-MOSIII	UFV	30	1.9	0.133	31
SSM5H14F	U-MOSIII	SMV	30	3	0.078	31
SSM5N03FE	$\pi$ -MOSVI	ES6	20	0.1	12	37
SSM5N05FU	$\pi$ -MOSVI	US6	20	0.4	1.2	37
SSM5N15FE	$\pi$ -MOSVI	ES6	30	0.1	7	37
SSM5N15FU	$\pi$ -MOSVI	US6	30	0.1	7	37
SSM5N16FE	$\pi$ -MOSVI	ES6	20	0.1	15	37
SSM5N16FU	$\pi$ -MOSVI	US6	20	0.1	15	37
SSM5P05FU	$\pi$ -MOSVI	US6	-20	-0.2	4	37
SSM5P15FE	$\pi$ -MOSVI	ES6	-30	-0.1	32	37
SSM5P15FU	$\pi$ -MOSVI	US6	-30	-0.1	32	37
SSM5P16FE	$\pi$ -MOSVI	ES6	-20	-0.1	45	37
SSM5P16FU	$\pi$ -MOSVI	US6	-20	-0.1	45	37
SSM6E01TU	U-MOSIII	UF6	-12	-1	0.16	30
SSM6E02TU	U-MOSIV	UF6	-20	-1.8	0.136	30
SSM6E03TU	U-MOSIII	UF6	-20	-1.8	0.144	30
SSM6J06FU	$\pi$ -MOSVI	US6	-20	-0.65	0.5	28
SSM6J07FU	$\pi$ -MOSVI	US6	-30	-0.8	0.8	28
SSM6J08FU	U-MOSII	US6	-20	-1.3	0.18	28
SSM6J205FE	U-MOSIII	ES6	-20	-0.8	0.234	28
SSM6J206FE	U-MOSIII	ES6	-20	-2	0.13	28
SSM6J207FE	U-MOSII	ES6	-30	-1.3	0.491	28
SSM6J21TU	U-MOSIII	UF6	-12	-3	0.05	28
SSM6J212FE	U-MOSVI	ES6	-20	-4.0	0.0407	28

Part Number	Series	Package	Main Characteristics			Page
			V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	R <sub>DS(ON)</sub> Max ( $\Omega$ )	
SSM6J23FE	U-MOSIII	ES6	-12	-1.2	0.16	28
SSM6J25FE	U-MOSIII	ES6	-20	-0.5	0.26	28
SSM6J26FE	U-MOSIII	ES6	-20	-0.5	0.23	28
SSM6J401TU	U-MOSIII	UF6	-30	-2.5	0.145	28
SSM6J402TU	U-MOSIII	UF6	-30	-2	0.225	28
SSM6J409TU	U-MOSV	UF6	-20	-9.5	0.0221	28
SSM6J412TU	U-MOSVI	UF6	-20	-4.0	0.0427	28
SSM6J50TU	U-MOSIV	UF6	-20	-2.5	0.064	28
SSM6J501NU	U-MOSVI	UDFN6	-20	-10	0.02	28
SSM6J502NU	U-MOSVI	UDFN6	-20	-6.0	0.026	28
SSM6J503NU	U-MOSVI	UDFN6	-20	-6.0	0.0298	28
SSM6J51TU	U-MOSIV	UF6	-12	-4	0.054	28
SSM6J53FE	U-MOSIV	ES6	-20	-1.8	0.136	28
SSM6K06FU	$\pi$ -MOSVI	US6	20	1.1	0.16	29
SSM6K07FU	$\pi$ -MOSVI	US6	30	1.5	0.22	29
SSM6K08FU	U-MOSII	US6	20	1.6	0.105	29
SSM6K18TU	U-MOSIII	UF6	20	4	0.04	29
SSM6K202FE	U-MOSIII	ES6	30	2.3	0.085	29
SSM6K203FE	U-MOSIII	ES6	20	2.8	0.061	29
SSM6K204FE	U-MOSIII	ES6	20	2	0.126	29
SSM6K208FE	U-MOSIII	ES6	30	1.9	0.133	29
SSM6K210FE	U-MOSIII	ES6	30	1.4	0.371	29
SSM6K211FE	U-MOSIII	ES6	20	3.2	0.047	29
SSM6K22FE	U-MOSIII	ES6	20	1.4	0.17	29
SSM6K24FE	U-MOSIII	ES6	30	0.5	0.145	29
SSM6K25FE	U-MOSIII	ES6	20	0.5	0.145	29
SSM6K30FE	$\pi$ -MOSVII	ES6	20	1.2	0.42	29
SSM6K31FE	$\pi$ -MOSVII	ES6	20	1.2	0.54	29
SSM6K32TU	$\pi$ -MOSV	UF6	60	2	0.44	29
SSM6K34TU	U-MOSIII	UF6	30	3	0.077	29
SSM6K403TU	U-MOSIII	UF6	20	4.2	0.028	29
SSM6K404TU	U-MOSIII	UF6	20	3	0.055	29
SSM6K405TU	U-MOSIII	UF6	20	2	0.126	29
SSM6K406TU	U-MOSIV	UF6	30	4.4	0.0385	29
SSM6K407TU	$\pi$ -MOSV	UF6	60	2	0.44	29
SSM6K411TU	U-MOSIV	UF6	20	10	0.012	29
SSM6L05FU	$\pi$ -MOSVI	US6	-20	-0.2	4	37
SSM6L09FU	$\pi$ -MOSVI	US6	-30	-0.2	4	37
SSM6L10TU	U-MOSIII	UF6	-20	-0.5	0.23	30
SSM6L11TU	U-MOSIII	UF6	-20	-0.5	0.26	30
SSM6G13NU	U-MOSV	UDFN6	-20	-2	0.133	31
SSM6H15NU	U-MOSVI-H	UDFN6	30	4	0.056	31
SSM6L12TU	U-MOSIII	UF6	-20	-0.5	0.26	30
SSM6L13TU	U-MOSIII	UF6	-20	-0.8	0.234	30
SSM6L14FE	U-MOSIII	ES6	-20	-0.72	0.3	30
SSM6L16FE	U-MOSIII	ES6	-20	-0.1	45	37
SSM6L35FE	U-MOSIII	ES6	-20	-0.1	44	37
SSM6L35FU	U-MOSIII	US6	-20	-0.1	44	37
SSM6L36FE	U-MOSIII	ES6	-20	-0.33	3.6	37
SSM6L36TU	U-MOSIII	UF6	-20	-0.33	3.6	37
SSM6L39TU	U-MOSIII	UF6	-20	-1.5	0.213	30
SSM6L40TU	U-MOSIII	UF6	-30	-1.4	0.403	30
SSM6N03FE	$\pi$ -MOSVI	ES6	20	0.1	12	37
SSM6N04FU	$\pi$ -MOSVI	US6	20	0.1	12	37
SSM6N05FU	$\pi$ -MOSVI	US6	20	0.4	1.2	37

Part Number	Series	Package	Main Characteristics			Page
			V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	R <sub>DS(ON)</sub> Max (Ω)	
SSM6N09FU	π-MOSVI	US6	30	0.4	1.2	37
SSM6N15FE	π-MOSVI	ES6	30	0.1	7	37
SSM6N15FU	π-MOSVI	US6	30	0.1	7	37
SSM6N16FU	π-MOSVI	US6	20	0.1	15	37
SSM6N17FU	π-MOSV	US6	50	0.1	40	37
SSM6N24TU	U-MOSIII	UF6	30	0.5	0.145	30
SSM6N25TU	U-MOSIII	UF6	20	0.5	0.145	30
SSM6N29TU	U-MOSIII	UF6	20	0.8	0.143	30
SSM6N35FE	π-MOSVI	ES6	20	0.18	20	37
SSM6N35FU	π-MOSVI	US6	20	0.18	20	37
SSM6N36FE	U-MOSIII	ES6	20	0.5	1.52	37
SSM6N36TU	U-MOSIII	UF6	20	0.5	1.52	37
SSM6N37CTD	U-MOSIII	CST6D	20	0.25	5.6	37
SSM6N37FE	U-MOSIII	ES6	20	0.25	5.6	37
SSM6N39TU	U-MOSIII	UF6	20	1.6	0.119	30
SSM6N40TU	U-MOSIII	UF6	30	1.6	0.182	30
SSM6N42FE	U-MOSIII	ES6	20	0.8	0.24	30
SSM6N43FU	U-MOSIII	US6	20	0.5	1.52	37
SSM6N44FE	π-MOSVI	ES6	30	0.1	7	37
SSM6N44FU	π-MOSVI	US6	30	0.1	7	37
SSM6N7002AFU	π-MOSV	US6	60	0.2	3.3	37
SSM6N7002BFE	U-MOSIV	ES6	60	0.2	3.3	37
SSM6N7002BFU	U-MOSIV	US6	60	0.2	3.3	37
SSM6P05FU	π-MOSVI	US6	-20	-0.2	4	37
SSM6P09FU	π-MOSVI	US6	-30	-0.2	4.2	37
SSM6P15FE	π-MOSVI	ES6	-30	-0.1	32	37
SSM6P15FU	π-MOSVI	US6	-30	-0.1	32	37
SSM6P16FE	π-MOSVI	ES6	-20	-0.1	45	37
SSM6P16FU	π-MOSVI	US6	-20	-0.1	45	37
SSM6P25TU	U-MOSIII	UF6	-20	-0.5	0.26	30
SSM6P26TU	U-MOSIII	UF6	-20	-0.5	0.23	30
SSM6P28TU	U-MOSIII	UF6	-20	-0.8	0.234	30
SSM6P35FE	π-MOSVI	ES6	-20	-0.1	44	37
SSM6P35FU	π-MOSVI	US6	-20	-0.1	44	37
SSM6P36FE	U-MOSIII	ES6	-20	-0.33	3.6	37
SSM6P36TU	U-MOSIII	UF6	-20	-0.33	3.6	37
SSM6P39TU	U-MOSIII	UF6	-20	-1.5	0.213	30
SSM6P40TU	U-MOSIII	UF6	-30	-1.4	0.403	30
SSM6P41FE	U-MOSV	ES6	-20	-0.72	0.3	30
SSM6P47NU	U-MOSVI	UDFN6	-20	-4	0.095	30
SSM6P54TU	U-MOSIV	UF6	-20	-1.2	0.228	30
TJ11A10M3	U-MOSVI	TO-220SIS	-100	-11	0.13	39
TJ120F06J3	U-MOSIII	TO-220SM(W)	-60	-120	0.008	38,39
TJ20A10M3	U-MOSVI	TO-220SIS	-100	-20	0.09	39
TJ70A06J3	U-MOSIII	TO-220SIS	-60	-70	0.008	39
TJ9A10M3	U-MOSVI	TO-220SIS	-100	-9	0.17	39
TK100F04K3	U-MOSIV	TO-220SM(W)	40	100	0.003	38,39
TK100F04K3L	U-MOSIV	TO-220SM(W)	40	100	0.003	38,39
TK100F06K3	U-MOSIV	TO-220SM(W)	60	100	0.005	38
TK10A50D	π-MOSVII	TO-220SIS	500	10	0.72	41
TK10A60D	π-MOSVII	TO-220SIS	600	10	0.75	41,43
TK10X40D	π-MOSVII	TFP	400	10	0.55	41
TK11A45D	π-MOSVII	TO-220SIS	450	11	0.62	41
TK11A50D	π-MOSVII	TO-220SIS	500	11	0.6	-
TK11A55D	π-MOSVII	TO-220SIS	550	11	0.63	41

Part Number	Series	Package	Main Characteristics			Page
			V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	R <sub>DS(ON)</sub> Max (Ω)	
TK11A60D	π-MOSVII	TO-220SIS	600	11	0.65	-
TK12A10K3	U-MOSIV	TO-220SIS	100	12	0.08	39
TK12A45D	π-MOSVII	TO-220SIS	450	12	0.52	-
TK12A50D	π-MOSVII	TO-220SIS	500	12	0.52	41,43
TK12A50D5	π-MOSVII(HSD)	TO-220SIS	500	12	0.73	43
TK12A53D	π-MOSVII	TO-220SIS	525	12	0.58	41
TK12A55D	π-MOSVII	TO-220SIS	550	12	0.57	41
TK12A60D	π-MOSVII	TO-220SIS	600	12	0.55	41
TK12A60U	DTMOSII	TO-220SIS	600	12	0.4	42
TK12D60U	DTMOSII	TO-220(W)	600	12	0.4	42
TK12J55D	π-MOSVII	TO-3P(N)	550	12	0.57	41
TK12J60U	DTMOSII	TO-3P(N)	600	12	0.4	42
TK12A53D	π-MOSVII	TFP	550	12	0.58	41
TK12X60U	DTMOSII	TFP	600	12	0.42	42
TK130F06K3	U-MOSIV	TO-220SM(W)	60	130	0.0034	38
TK13A45D	π-MOSVII	TO-220SIS	450	13	0.46	41
TK13A50D	π-MOSVII	TO-220SIS	500	13	0.4	41
TK13A50DA	π-MOSVII	TO-220SIS	500	12.5	0.47	-
TK13A55DA	π-MOSVII	TO-220SIS	550	12.5	0.48	-
TK13A60D	π-MOSVII	TO-220SIS	600	13	0.43	41
TK13A65U	DTMOSII	TO-220SIS	650	13	0.38	42
TK13J65U	DTMOSII	TO-3P(N)	650	13	0.38	42
TK14A45D	π-MOSVII	TO-220SIS	450	14	0.34	-
TK14A45DA	π-MOSVII	TO-220SIS	450	13.5	0.41	-
TK14A55D	π-MOSVII	TO-220SIS	550	14	0.37	41
TK150F04K3	U-MOSIV	TO-220SM(W)	40	150	0.0021	38,39
TK150F04K3L	U-MOSIV	TO-220SM(W)	40	150	0.0021	38,39
TK15A50D	π-MOSVII	TO-220SIS	500	15	0.3	41
TK15A60D	π-MOSVII	TO-220SIS	600	15	0.37	41
TK15A60U	DTMOSII	TO-220SIS	600	15	0.3	42
TK15D60U	DTMOSII	TO-220(W)	600	15	0.3	42
TK15J50D	π-MOSVII	TO-3P(N)	500	15	0.4	41
TK15J60T	DTMOSI	TO-3P(N)	600	15	0.28	-
TK15J60U	DTMOSII	TO-3P(N)	600	15	0.3	42
TK15X60U	DTMOSII	TFP	600	15	0.31	42
TK16A45D	π-MOSVII	TO-220SIS	450	16	0.27	41
TK16A55D	π-MOSVII	TO-220SIS	550	16	0.33	41
TK16J55D	π-MOSVII	TO-3P(N)	550	16	0.37	41
TK18A50D	π-MOSVII	TO-220SIS	500	18	0.27	41
TK18E10K3	U-MOSIV	TO-220	100	18	0.042	40
TK19A45D	π-MOSVII	TO-220SIS	450	19	0.24	-
TK19J55D	π-MOSVII	TO-220SIS	600	5	1.43	-
TK20A60T	DTMOSI	TO-220SIS	600	20	0.19	-
TK20A60U	DTMOSII	TO-220SIS	600	20	0.19	42
TK20D60T	DTMOSI	TO-220(W)	600	20	0.19	-
TK20D60U	DTMOSII	TO-220(W)	600	20	0.19	42
TK20J50D	π-MOSVII	TO-3P(N)	500	20	0.27	41
TK20J60T	DTMOSI	TO-3P(N)	600	20	0.19	-
TK20J60U	DTMOSII	TO-3P(N)	600	20	0.19	42
TK20P04M1	U-MOSVI-H	DPAK	40	20	0.025	25,36
TK20X60U	DTMOSII	TFP	600	20	0.20	42
TK25A10K3	U-MOSIV	TO-220SIS	100	25	0.04	39
TK25E06K3	U-MOSIV	TO-220	60	25	0.018	40

Part Number	Series	Package	Main Characteristics			Page
			V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	R <sub>DS(ON)</sub> Max ( $\Omega$ )	
TK2A65D	$\pi$ -MOSVII	TO-220SIS	650	2	3.26	41
TK2P60D	$\pi$ -MOSVII	NewPW-Mold	600	2	4.3	41
TK2Q60D	$\pi$ -MOSVII	NewPW-Mold2	600	2	4.3	41
TK30A06J3A	U-MOSIII	TO-220SIS	60	30	0.026	39
TK3A60DA	$\pi$ -MOSVII	TO-220SIS	600	2.5	2.8	41
TK3A65D	$\pi$ -MOSVII	TO-220SIS	650	3	2.25	-
TK3A65DA	$\pi$ -MOSVII	TO-220SIS	650	2.5	2.51	41
TK40A08K3	U-MOSIV	TO-220SIS	75	40	0.009	40
TK40A10J1	U-MOSIII-H	TO-220SIS	100	40	0.015	40
TK40A10K3	U-MOSIV	TO-220SIS	100	40	0.015	40
TK40D10J1	U-MOSIII-H	TO-220(W)	100	40	0.015	40
TK40E10K3	U-MOSIV	TO-220	100	40	0.015	40
TK40J60T	DTMOSI	TO-3P(N)	600	40	0.08	42
TK40P03M1	U-MOSVI-H	DPAK	30	40	0.0108	24,36
TK40P04M1	U-MOSVI-H	DPAK	40	40	0.011	25,36
TK40X10J1	U-MOSIII-H	TFP	100	40	0.02	39,40
TK45P03M1	U-MOSVI-H	DPAK	30	45	0.0094	24,36
TK4A50D	$\pi$ -MOSVII	TO-220SIS	500	4	2	41
TK4A53D	$\pi$ -MOSVII	TO-220SIS	525	4	1.7	41
TK4A55D	$\pi$ -MOSVII	TO-220SIS	550	4	1.9	41
TK4A55DA	$\pi$ -MOSVII	TO-220SIS	550	3.5	2.45	41
TK4A60D	$\pi$ -MOSVII	TO-220SIS	600	4	1.7	43
TK4A60DA	$\pi$ -MOSVII	TO-220SIS	600	3.5	2.2	41,43
TK4P60DA	$\pi$ -MOSVII	DPAK	600	3.5	2.2	41,43
TK4A60DB	$\pi$ -MOSVII	TO-220SIS	600	3.7	2	-
TK4P60DB	$\pi$ -MOSVII	DPAK	600	3.7	2	-
TK4A65DA	$\pi$ -MOSVII	TO-220SIS	650	3.5	2	-
TK4P50D	$\pi$ -MOSVII	DPAK	500	4	2	-
TK4P55D	$\pi$ -MOSVII	DPAK	550	4	1.88	41
TK4P55DA	$\pi$ -MOSVII	DPAK	550	3.5	2.45	-
TK50E06K3A	U-MOSIV	TO-220	60	50	0.0085	40
TK50E08K3	U-MOSIV	TO-220	75	50	0.012	40
TK50F15J1	U-MOSIII	TO-220SM(W)	150	50	0.03	38,39
TK50J60U	DTMOSII	TO-3P(N)	600	50	0.65	42
TK50P03M1	U-MOSVI-H	DPAK	30	50	0.0075	24,36
TK50P04M1	U-MOSVI-H	DPAK	40	50	0.0087	25,36
TK50X15J1	U-MOSIII-H	TFP	150	50	0.03	40
TK55A10J1	U-MOSIII-H	TO-220SIS	100	55	0.0105	40
TK55D10J1	U-MOSIII-H	TO-220(W)	100	55	0.0105	40
TK5A45DA	$\pi$ -MOSVII	TO-220SIS	450	4.5	1.75	-
TK5A50D	$\pi$ -MOSVII	TO-220SIS	500	5	1.5	41,43
TK5A53D	$\pi$ -MOSVII	TO-220SIS	525	5	1.5	41
TK5A55D	$\pi$ -MOSVII	TO-220SIS	550	5	1.88	41
TK5A60D	$\pi$ -MOSVII	TO-220SIS	600	5	1.43	-
TK5A65D	$\pi$ -MOSVII	TO-220SIS	650	5	1.45	41
TK5A65DA	$\pi$ -MOSVII	TO-220SIS	650	4.5	1.67	-
TK5P50D	$\pi$ -MOSVII	DPAK	500	5	1.5	41
TK5P53D	$\pi$ -MOSVII	DPAK	525	5	1.5	41
TK60A08J1	U-MOSIII-H	TO-220SIS	75	60	0.0078	40
TK60D08J1	U-MOSIII-H	TO-220(W)	75	60	0.0078	40
TK60E08K3	U-MOSIV	TO-220	75	60	0.009	40
TK60P03M1	U-MOSVI-H	DPAK	30	60	0.0062	24,36
TK6A45DA	$\pi$ -MOSVII	TO-220SIS	450	5.5	1.35	-

Part Number	Series	Package	Main Characteristics			Page
			V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	R <sub>DS(ON)</sub> Max ( $\Omega$ )	
TK6A50D	$\pi$ -MOSVII	TO-220(W)	500	6	1.4	41
TK6A53D	$\pi$ -MOSVII	TO-220SIS	525	6	1.3	41
TK6A55DA	$\pi$ -MOSVII	TO-220SIS	550	5.5	1.48	-
TK6A60D	$\pi$ -MOSVII	TO-220SIS	600	6	1.25	41
TK6A65D	$\pi$ -MOSVII	TO-220SIS	650	6	1.11	-
TK6P53D	$\pi$ -MOSVII	DPAK	525	6	1.3	41
TK70A06J1	U-MOSIII-H	TO-220SIS	60	70	0.0064	40
TK70D06J1	U-MOSIII-H	TO-220(W)	60	70	0.0064	40
TK70J04J3	U-MOSIII	TO-3P(N)	40	70	0.0038	39
TK70X04K3	U-MOSIV	TFP	40	70	0.0056	39
TK70X04K3L	U-MOSIV	TFP	40	70	0.0056	-
TK70X04K3Z	U-MOSIV	TFP	40	70	0.0056	39
TK70X06K3	U-MOSIV	TFP	60	70	0.008	39
TK7A45DA	$\pi$ -MOSVII	TO-220SIS	450	6.5	1.2	-
TK7A50D	$\pi$ -MOSVII	TO-220SIS	500	7	1.22	41,43
TK7A55D	$\pi$ -MOSVII	TO-220SIS	550	7	1.25	-
TK7A65D	$\pi$ -MOSVII	TO-220SIS	650	7	0.98	-
TK7P50A	$\pi$ -MOSVII	DPAK	500	7	1.22	-
TK80A08K3	U-MOSIV	TO-220SIS	75	80	0.0045	40
TK80D08K3	U-MOSIV	TO-220(W)	75	80	0.0045	40
TK80X04K3	U-MOSIV	TFP	40	80	0.0035	39
TK8A10K3	U-MOSIV	TO-220SIS	100	8	0.12	39
TK8A45D	$\pi$ -MOSVII	TO-220SIS	450	8	0.9	-
TK8A45DA	$\pi$ -MOSVII	TO-220SIS	450	7.5	1.1	-
TK8A50D	$\pi$ -MOSVII	TO-220SIS	500	8	0.85	41
TK8A50DA	$\pi$ -MOSVII	TO-220SIS	500	7.5	1	-
TK8A55DA	$\pi$ -MOSVII	TO-220SIS	550	7.5	1.07	41
TK8A60DA	$\pi$ -MOSVII	TO-220SIS	600	7.5	1	41
TK8A65D	$\pi$ -MOSVII	TO-220SIS	650	8	0.84	41
TK9A45D	$\pi$ -MOSVII	TO-220SIS	450	9	0.77	-
TK9A55DA	$\pi$ -MOSVII	TO-220SIS	550	8.5	0.86	41
TK9A60D	$\pi$ -MOSVII	TO-220SIS	600	9	0.83	-
TPC6005	U-MOSIII	VS-6	30	6	0.028	31
TPC6008-H	U-MOSVI-H	VS-6	30	5.9	0.06	24,31
TPC6009-H	U-MOSVI-H	VS-6	40	5.3	0.081	24,31
TPC6010-H	U-MOSVI-H	VS-6	60	6.1	0.059	25,31
TPC6011	U-MOSIV	VS-6	30	6	0.02	31
TPC6012	U-MOSIV	VS-6	20	6	0.032	31
TPC6105	U-MOSIII	VS-6	-20	-2.7	0.11	31
TPC6109-H	U-MOSIII-H	VS-6	-30	-5	0.059	25,31
TPC6110	U-MOSVI	VS-6	-30	-4.5	0.056	31
TPC6111	U-MOSV	VS-6	-20	-5.5	0.04	31
TPC6113	U-MOSVI	VS-6	-20	-5	0.056	31
TPC8022-H	U-MOSIII-H	SOP-8	40	7.5	0.027	24,34
TPC8025	U-MOSIV	SOP-8	30	11	0.009	27,34
TPC8026	U-MOSIV	SOP-8	30	13	0.0066	27,34
TPC8027	U-MOSIV	SOP-8	30	18	0.0027	27,34
TPC8028	U-MOSIV	SOP-8	30	18	0.0043	27,34
TPC8029	U-MOSIV	SOP-8	30	18	0.0038	27,34
TPC8030	U-MOSIV	SOP-8	30	11	0.0085	27,34
TPC8035-H	U-MOSVI-H	SOP-8	30	18	0.0032	24,34
TPC8036-H	U-MOSVI-H	SOP-8	30	18	0.0045	24,34
TPC8037-H	U-MOSV-H	SOP-8	30	12	0.0114	24,34

Part Number	Series	Package	Main Characteristics			Page
			V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	R <sub>DS(ON)</sub> Max ( $\Omega$ )	
TPC8038-H	U-MOSV-H	SOP-8	30	12	0.0114	24,34
TPC8039-H	U-MOSVI-H	SOP-8	30	17	0.006	24,34
TPC8040-H	U-MOSVI-H	SOP-8	30	13	0.0097	24,34
TPC8041	U-MOSIV	SOP-8	30	13	0.007	27,34
TPC8042	U-MOSIV	SOP-8	30	18	0.0034	27,34
TPC8045-H	U-MOSVI-H	SOP-8	40	18	0.0039	25,34
TPC8046-H	U-MOSVI-H	SOP-8	40	18	0.0057	25,34
TPC8047-H	U-MOSVI-H	SOP-8	40	16	0.0076	25,34
TPC8048-H	U-MOSVI-H	SOP-8	60	16	0.0069	25,34
TPC8049-H	U-MOSVI-H	SOP-8	60	13	0.0107	25,34
TPC8050-H	U-MOSVI-H	SOP-8	60	11	0.0145	25,34
TPC8051-H	U-MOSVI-H	SOP-8	80	13	0.0097	25,34
TPC8052-H	U-MOSVI-H	SOP-8	40	12	0.0115	24,34
TPC8053-H	U-MOSVI-H	SOP-8	60	9	0.0225	25,34
TPC8054-H	U-MOSVI-H	SOP-8	100	10	0.0199	25,34
TPC8055-H	U-MOSVII-H	SOP-8	30	18	0.0021	24,34
TPC8056-H	U-MOSVII-H	SOP-8	30	18	0.0024	24,34
TPC8057-H	U-MOSVII-H	SOP-8	30	18	0.0028	24,34
TPC8058-H	U-MOSVII-H	SOP-8	30	18	0.0033	24,34
TPC8059-H	U-MOSVII-H	SOP-8	30	18	0.0041	24,34
TPC8060-H	U-MOSVI-H	SOP-8	30	18	0.0037	24,34
TPC8061-H	U-MOSVI-H	SOP-8	30	8	0.025	24,34
TPC8062-H	U-MOSVII-H	SOP-8	30	18	0.0049	24,34
TPC8063-H	U-MOSVII-H	SOP-8	30	17	0.0061	24,34
TPC8064-H	U-MOSVII-H	SOP-8	30	16	0.0073	24,34
TPC8077	U-MOSVII	SOP-8	30	18	0.0021	27,34
TPC8079	U-MOSVII	SOP-8	30	18	0.0024	27,34
TPC8080	U-MOSVII	SOP-8	30	18	0.0028	27,34
TPC8081	U-MOSVII	SOP-8	30	18	0.0033	27,34
TPC8082	U-MOSVII	SOP-8	30	18	0.0041	27,34
TPC8114	U-MOSIV	SOP-8	-30	-18	0.0045	27,35
TPC8115	U-MOSIV	SOP-8	-20	-10	0.01	35
TPC8116-H	U-MOSIII-H	SOP-8	-40	-7.5	0.03	25,35
TPC8117	U-MOSV	SOP-8	-30	-18	0.0039	27,35
TPC8120	U-MOSVI	SOP-8	-30	-18	0.0032	27,35
TPC8122	U-MOSV	SOP-8	-30	-12	0.008	27,35
TPC8123	U-MOSVI	SOP-8	-30	-11	0.009	27,35
TPC8124	U-MOSVI	SOP-8	-30	-12	0.008	27,35
TPC8125	U-MOSVI	SOP-8	-30	-10	0.013	27,35
TPC8126	U-MOSVI	SOP-8	-30	-11	0.01	27,35
TPC8127	U-MOSVI	SOP-8	-30	-13	0.0065	27,35
TPC8128	U-MOSVI	SOP-8	-30	-16	0.005	27,35
TPC8207	U-MOSIII	SOP-8	20	6	0.02	27,35
TPC8208	U-MOSIII	SOP-8	20	5	0.05	27,35
TPC8211	U-MOSIII	SOP-8	30	5.5	0.036	27,35
TPC8216-H	U-MOSVI-H	SOP-8	30	6.4	0.02	25,35
TPC8217-H	U-MOSVI-H	SOP-8	40	(5.1)	(0.033)	25,35
TPC8218-H	U-MOSVI-H	SOP-8	60	3.8	0.057	25,35
TPC8219-H	U-MOSVI-H	SOP-8	100	(2)	(0.173)	25,35
TPC8220-H	U-MOSVI-H	SOP-8	80	(3.2)	(0.08)	25,35
TPC8404	$\pi$ -MOSV/ $\pi$ -MOSV	SOP-8	-250/250	-0.9/1.1	2.55/1.7	35
TPC8405	U-MOSIV/U-MOSIII	SOP-8	-30/30	-4.5/6	0.033/0.026	35
TPC8406-H	U-MOSIII-H/U-MOSIII-H	SOP-8	-40/40	-6.5/6.5	0.03/0.027	35
TPC8A03-H	U-MOSV-H	SOP-8	30	17	0.0056	25,35
TPC8A04-H	U-MOSV-H	SOP-8	30	18	0.0036	25,35

Part Number	Series	Package	Main Characteristics			Page
			V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	R <sub>DS(ON)</sub> Max ( $\Omega$ )	
TPC8A05-H	U-MOSV-H	SOP-8	30	10	0.0133	25,35
TPC8A06-H	U-MOSV-H	SOP-8	30	12	0.0101	25,35
TPC8A07-H	U-MOSV-H	SOP-8	30/30	6.8/8.5	0.023/0.015	25,35
TPCA8008-H	$\pi$ -MOSV"MACH II"	SOP Advance	250	4	0.58	25,36
TPCA8009-H	$\pi$ -MOSV"MACH II"	SOP Advance	150	7	0.35	25,36
TPCA8010-H	$\pi$ -MOSV"MACH II"	SOP Advance	200	5.5	0.45	25,36
TPCA8011-H	U-MOSIII-H	SOP Advance	20	40	0.0035	24,35
TPCA8020-H	U-MOSIII-H	SOP Advance	40	7.5	0.027	24,36
TPCA8024	U-MOSIV	SOP Advance	30	35	0.0043	27,35
TPCA8025	U-MOSIV	SOP Advance	30	40	0.0035	27,35
TPCA8026	U-MOSIV	SOP Advance	30	45	0.0022	27,36
TPCA8028-H	U-MOSVI-H	SOP Advance	30	50	0.0028	24,36
TPCA8030-H	U-MOSV-H	SOP Advance	30	24	0.011	24,35
TPCA8031-H	U-MOSV-H	SOP Advance	30	24	0.011	24,35
TPCA8036-H	U-MOSVI-H	SOP Advance	30	38	0.0042	24,35
TPCA8039-H	U-MOSVI-H	SOP Advance	30	34	0.0057	24,35
TPCA8040-H	U-MOSVI-H	SOP Advance	30	23	0.0094	24,35
TPCA8042	U-MOSIV	SOP Advance	30	45	0.0033	27,36
TPCA8045-H	U-MOSVI-H	SOP Advance	40	46	0.0036	25,36
TPCA8046-H	U-MOSVI-H	SOP Advance	40	38	0.0054	24,36
TPCA8047-H	U-MOSVI-H	SOP Advance	40	32	0.0073	24,36
TPCA8048-H	U-MOSVI-H	SOP Advance	60	35	0.0066	25,36
TPCA8049-H	U-MOSVI-H	SOP Advance	60	28	0.0104	25,36
TPCA8050-H	U-MOSVI-H	SOP Advance	60	24	0.0142	25,36
TPCA8051-H	U-MOSVI-H	SOP Advance	80	28	0.0094	25,36
TPCA8052-H	U-MOSVI-H	SOP Advance	40	20	0.0113	24,36
TPCA8053-H	U-MOSVI-H	SOP Advance	60	15	0.0223	25,36
TPCA8054-H	U-MOSVI-H	SOP Advance	100	20	0.0197	25,36
TPCA8055-H	U-MOSVII-H	SOP Advance	30	56	0.0019	24,36
TPCA8056-H	U-MOSVII-H	SOP Advance	30	48	0.0022	24,36
TPCA8057-H	U-MOSVII-H	SOP Advance	30	42	0.0026	24,35
TPCA8058-H	U-MOSVII-H	SOP Advance	30	38	0.0031	24,35
TPCA8059-H	U-MOSVII-H	SOP Advance	30	32	0.0039	24,35
TPCA8060-H	U-MOSVI-H	SOP Advance	30	45	0.0034	24,36
TPCA8062-H	U-MOSVII-H	SOP Advance	30	28	0.0047	24,35
TPCA8063-H	U-MOSVII-H	SOP Advance	30	22	0.0059	24,35
TPCA8064-H	U-MOSVII-H	SOP Advance	30	20	0.0071	24,35
TPCA8069-H	U-MOSVI-H	SOP Advance	60	(15)	(0.023)	25,36
TPCA8070-H	U-MOSVI-H	SOP Advance	80	(12)	(0.035)	25,36
TPCA8071-H	U-MOSVI-H	SOP Advance	100	20	(0.02)	25,36
TPCA8072-H	U-MOSVI-H	SOP Advance	100	(8)	(0.071)	25,36
TPCA8077	U-MOSVII	SOP Advance	30	56	0.0019	27,35
TPCA8079	U-MOSVII	SOP Advance	30	48	0.0022	27,35
TPCA8080	U-MOSVII	SOP Advance	30	42	0.0026	27,35
TPCA8081	U-MOSVII	SOP Advance	30	38	0.0031	27,35
TPCA8082	U-MOSVII	SOP Advance	30	32	0.0039	27,35
TPCA8104	U-MOSIII	SOP Advance	-60	-40	0.016	36,39
TPCA8105	U-MOSIV	SOP Advance	-12	-6	0.0033	36
TPCA8106	U-MOSV	SOP Advance	-30	-40	0.0037	27,36
TPCA8107-H	U-MOSIII-H	SOP Advance	-40	-7.5	0.03	25,36
TPCA8108	U-MOSIII	SOP Advance	-40	-40	0.0095	36
TPCA8109	U-MOSVI	SOP Advance	-30	-24	(0.009)	27,36
TPCA8120	U-MOSVI	SOP Advance	-30	(-45)	(0.003)	27,36
TPCA8128	U-MOSVI	SOP Advance	-30	-34	(0.0048)	27,36
TPCA8A02-H	U-MOSV-H	SOP Advance	30	34	0.0053	25,36



Part Number	Series	Package	Main Characteristics			Page
			V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	R <sub>DS(ON)</sub> Max (Ω)	
TPCA8A04-H	U-MOSV-H	SOP Advance	30	44	0.0032	25,36
TPCA8A05-H	U-MOSV-H	SOP Advance	30	20	0.0129	25,36
TPCA8A08-H	U-MOSV-H	SOP Advance	30	38	0.0042	25,36
TPCC8001-H	U-MOSV-H	TSON Advance	30	22	0.0083	24,33
TPCC8002-H	U-MOSV-H	TSON Advance	30	22	0.0083	24,33
TPCC8003-H	U-MOSVI-H	TSON Advance	30	13	0.0169	24,33
TPCC8005-H	U-MOSVI-H	TSON Advance	30	26	0.0064	24,33
TPCC8006-H	U-MOSVI-H	TSON Advance	30	22	0.008	24,33
TPCC8007	U-MOSIV	TSON Advance	20	27	0.0046	27,33
TPCC8008	U-MOSIV	TSON Advance	30	25	0.0068	27,33
TPCC8009	U-MOSIV	TSON Advance	30	24	0.007	27,33
TPCC8011-H	U-MOSVI-H	TSON Advance	40	(15)	(0.012)	24,33
TPCC8012-H	U-MOSVI-H	TSON Advance	100	(5)	(0.12)	25,33
TPCC8061-H	U-MOSVI-H	TSON Advance	30	TBD	(0.0256)	24,33
TPCC8062-H	U-MOSVII-H	TSON Advance	30	TBD	0.0047	24,33
TPCC8064-H	U-MOSVII-H	TSON Advance	30	TBD	0.0071	24,33
TPCC8102	U-MOSV	TSON Advance	-30	-15	0.0189	27,33
TPCC8103	U-MOSV	TSON Advance	-30	-18	0.012	27,33
TPCC8104	U-MOSVI	TSON Advance	-30	-20	0.0088	27,33
TPCC8105	U-MOSVI	TSON Advance	-30	-23	0.0078	27,33
TPCC8A01-H	U-MOSV-H	TSON Advance	30	21	0.0099	25,33
TPCF8002	U-MOSIV	VS-8	30	7	0.021	32
TPCF8003	U-MOSIV	VS-8	20	7	0.018	32
TPCF8101	U-MOSIII	VS-8	-12	-6	0.028	32
TPCF8103	U-MOSIII	VS-8	-20	-2.7	0.11	32
TPCF8104	U-MOSIV	VS-8	-30	-6	0.028	32
TPCF8105	U-MOSVI	VS-8	-20	-6	0.03	32
TPCF8201	U-MOSIII	VS-8	20	3	0.049	32
TPCF8301	U-MOSIII	VS-8	-20	-2.7	0.11	32
TPCF8302	U-MOSIV	VS-8	-20	-3	0.059	32
TPCF8303	U-MOSIV	VS-8	-20	-3	0.058	32
TPCF8304	U-MOSIV	VS-8	-30	-3.2	0.072	32
TPCF8402	U-MOSIV/U-MOSIII	VS-8	-30/30	-3.2/4	0.072/0.05	32
TPCF8A01	U-MOSIII	VS-8	20	3	0.049	32
TPCF8B01	U-MOSIII	VS-8	-20	-2.7	0.11	32
TPCL4201	U-MOSV	Chip LGA	20	6	0.0031	27,33
TPCL4202	U-MOSV	Chip LGA	30	6	0.04	27,33
TPCL4203	U-MOSV	Chip LGA	24	6	0.036	27,33
TPCM8004-H	U-MOSV-H	TSSOP Advance	30	24	0.011	24,34
TPCM8006	U-MOSIV	TSSOP Advance	30	25	0.007	34
TPCM8102	U-MOSV	TSSOP Advance	30	25	0.0077	27,34
TPCM8A05-H	U-MOSV-H	TSSOP Advance	30	20	0.0129	25,34
TPCP8003-H	U-MOSIII-H	PS-8	100	2.2	0.18	25,32
TPCP8004	U-MOSIV	PS-8	30	8.3	0.0085	32
TPCP8005-H	U-MOSV-H	PS-8	30	11	0.0129	24,32
TPCP8006	U-MOSIV	PS-8	20	9.1	0.01	32
TPCP8007-H	U-MOSVI-H	PS-8	60	5	0.057	25,32
TPCP8008-H	U-MOSVI-H	PS-8	30	8	0.02	24,32
TPCP8101	U-MOSIII	PS-8	-20	-5.6	0.03	32
TPCP8102	U-MOSIV	PS-8	-20	-7.3	0.018	32
TPCP8103-H	U-MOSIII-H	PS-8	-40	-4.8	0.04	25,32
TPCP8203	U-MOSIII	PS-8	40	4.7	0.04	32
TPCP8204	U-MOSIV	PS-8	30	4.2	0.05	32
TPCP8205-H	U-MOSVI-H	PS-8	30	6.5	0.026	25,32
TPCP8303	U-MOSV	PS-8	-20	-3.8	0.046	32

Part Number	Series	Package	Main Characteristics			Page
			V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	R <sub>DS(ON)</sub> Max (Ω)	
TPCP8305	U-MOSVI	PS-8	-20	-5.5	0.03	32
TPCP8401	U-MOSIII	PS-8	-12/20	-5.5/0.1	0.038/3	33
TPCP8404	U-MOSV/U-MOSIV	PS-8	-30/30	-4/4	0.05/0.05	32
TPCP8405	U-MOSVI/U-MOSVI-H	PS-8	-30/30	-6/6.5	(0.031)/(0.026)	32
TPCP8406	U-MOSVI/U-MOSVI-H	PS-8	-40/40	-5/6	(0.041)/(0.032)	32
TPCP8A05-H	U-MOSV-H	PS-8	30	8	0.0175	25,33
TPCP8AA1	U-MOSII	PS-8	20	1.6	0.105	33
TPCP8BA1	U-MOSII	PS-8	-20	-1.3	0.18	33
TPCP8J01	U-MOSIV	PS-8	-32/50	-5.5/0.1	0.035	33
TPCT4203	U-MOSIV	STP2	20	6	0.031	27,33
TPCT4204	U-MOSIV	STP2	3	6	0.038	27,33

## 8-1 End-of-Life Products

The part numbers in the left-hand column below are end-of-life or obsolete products. When ordering, please choose from the replacement products in the right-hand column.

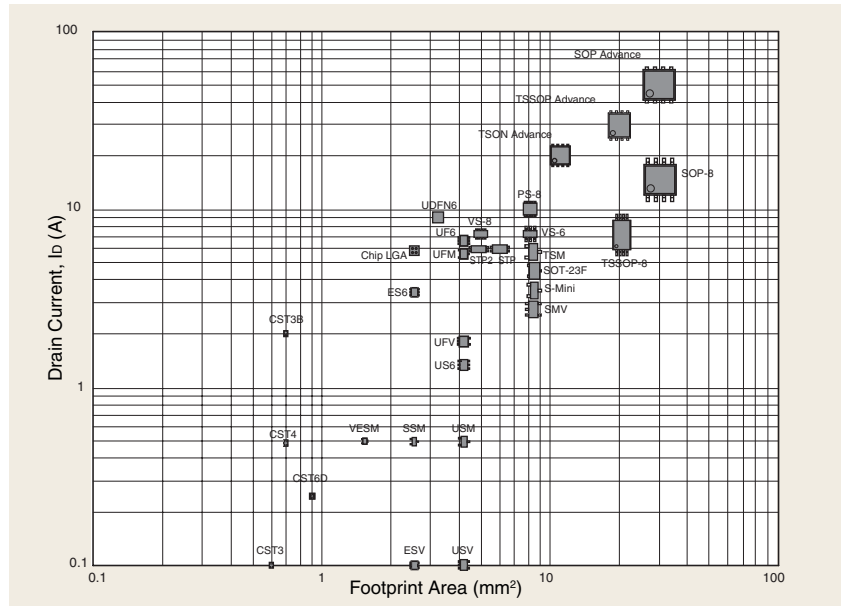
End-of-Life Products					Replacement Products				
Part Number	Electrical Characteristics			Package	Part Number	Electrical Characteristics			Package
	V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	R <sub>DS(ON)</sub> Max(Ω)			V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	R <sub>DS(ON)</sub> Max(Ω)	
2SJ148	-60	-0.2	2	TO-92	2SJ168	-60	-0.2	2	S-MINI
2SJ167	-60	-0.2	2	N-MINI	2SJ168	-60	-0.2	2	S-MINI
2SJ200	-16	-2	0.71	PW-Mini	TPC6105	-20	-2.7	0.11	VS-6
2SJ342	-50	-0.05	50	N-MINI	2SJ343	-50	-0.05	50	S-MINI
2SJ345	-20	-0.05	40	S-MINI	SSM3J16FU	-20	-0.1	45	USM
2SJ346	-20	-0.05	40	USM	SSM3J16FU	-20	-0.1	45	USM
2SJ347	-20	-0.05	40	SSM	SSM3J16FS	-20	-0.1	45	SSM
2SJ511	-30	-2	0.76	PW-Mini	TPC6108	-30	-4.5	0.006	VS-6
2SJ525	-30	-5	0.12	TPS	TPCF8104	-30	-6	0.028	VS-8
2SK1061	60	0.2	1	N-MINI	SSM3K7002BF	60	0.2	2.1	S-MINI
2SK1120	1000	8	1.8	TO-3P (N)	2SK2613	1000	8	1.7	TO-3P (N)
2SK1825	50	0.05	50	N-MINI	SSM3K7002BF	60	0.2	2.1	S-MINI
2SK1826	50	0.05	50	S-MINI	SSM3K7002BF	60	0.2	2.1	S-MINI
2SK1827	50	0.05	50	USM	SSM3K7002BFU	60	0.2	2.1	USM
2SK1828	20	0.05	40	S-MINI	SSM3K15F	30	0.1	7	S-MINI
2SK1829	20	0.05	40	USM	SSM3K15FU	30	0.1	7	USM
2SK1830	20	0.05	40	SSM	SSM3K15FS	30	0.1	7	SSM
2SK2033	20	0.1	12	S-MINI	SSM3K15F	30	0.1	7	S-MINI
2SK2034	20	0.1	12	USM	SSM3K15FU	30	0.1	7	USM
2SK2035	20	0.1	12	SSM	SSM3K15FS	30	0.1	7	SSM
2SK2036	20	0.1	6	S-MINI	SSM3K15F	30	0.1	7	S-MINI
2SK2037	20	0.1	6	USM	SSM3K15FU	30	0.1	7	USM
2SK2231	60	5	0.16	PW-Mold (Straight)	2SK4017	60	5	0.1	New PW-Mold2
2SK2231	60	5	0.16	New PW-Mold	2SK4033	60	5	0.1	New PW-Mold
2SK2312	60	45	0.017	TO-220NIS	2SK3844	60	45	0.0058	TO-220NIS
2SK2466	100	30	0.046	TO-220NIS	TK40A10K3	100	40	0.015	TO-220SIS
2SK2543	500	8	0.85	TO-220NIS	TK8A50D	500	8	0.85	TO-220SIS
2SK2544	600	6	1.25	TO-220AB	2SK3761	600	6	1.25	TO-220AB
2SK2545	600	6	1.25	TO-220NIS	TK6A60D	600	6	1.25	TO-220SIS
2SK2549	16	2	0.29	PW-Mini	TPC6004	20	6	0.024	VS-6
2SK2604	800	5	2.2	TO-3P (N)	2SK3633	800	7	1.7	TO-3P (N)
2SK2605	800	5	2.2	TO-220NIS	2SK4013	800	6	1.7	TO-220SIS
2SK2610	900	5	2.5	TO-3P (N)	2SK3700	900	5	2.5	TO-3P (N)
2SK2611	900	9	1.4	TO-3P (N)	2SK3878	900	9	1.3	TO-3P (N)
2SK2614	50	20	0.046	PW-Mold (Straight)	-	-	-	-	-
2SK2614	50	20	0.046	New PW-Mold	-	-	-	-	-
2SK2661	500	5	1.5	TO-220AB	2SK3758	500	5	1.5	TO-220AB
2SK2662	500	5	1.5	TO-220NIS	TK5A50D	500	5	1.5	TO-220SIS
2SK2698	500	15	0.4	TO-3P (N)	TK15J50D	500	15	0.4	TO-3P (N)
2SK2700	900	3	4.3	TO-220NIS	2SK3564	900	3	4.3	TO-220SIS
2SK2717	900	5	2.5	TO-220NIS	2SK3565	900	5	2.5	TO-220SIS
2SK2718	900	2.5	6.4	TO-220NIS	2SK3566	900	2.5	6.4	TO-220SIS
2SK2746	800	7	1.7	TO-3P (N)	2SK3633	800	7	1.7	TO-3P (N)
2SK2749	900	7	2	TO-3P (N)	2SK4115	900	7	2	TO-3P (N)
2SK2750	600	3.5	2.2	TO-220NIS	TK4A60DA	600	3.5	2.2	TO-220SIS
2SK2782	60	20	0.055	PW-Mold (Straight)	-	-	-	-	-
2SK2782	60	20	0.055	New PW-Mold	-	-	-	-	-
2SK2823	20	0.1	40	S-MINI	SSM3K35FS	20	0.18	20	SSM
2SK2824	20	0.1	40	USM	SSM3K35FS	20	0.18	20	SSM
2SK2825	20	0.1	40	SSM	SSM3K35FS	20	0.18	20	SSM

End-of-Life Products					Replacement Products				
Part Number	Electrical Characteristics			Package	Part Number	Electrical Characteristics			Package
	V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	R <sub>DS(ON)</sub> Max(Ω)			V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	R <sub>DS(ON)</sub> Max(Ω)	
2SK2837	500	20	0.27	TO-3P (N)	TK20J50D	500	20	0.27	TO-3P (N)
2SK2842	500	12	0.52	TO-220NIS	TK12A50D	500	12	0.52	TO-220SIS
2SK2843	600	10	0.75	TO-220NIS	TK10A60D	600	10	0.75	TO-220SIS
2SK2844	30	35	0.02	TO-220AB	TK70D06J1	60	70	0.0064	TO-220 (W)
2SK2845	900	1	9	PW-Mold (Straight)	TK1Q90A	900	1	9	New PW-Mold2
2SK2915	600	16	0.4	TO-3P (N)	2SK3903	600	14	0.44	TO-3P (N)
2SK2916	500	14	0.4	TO-3P(N)IS	TK13A50D	500	13	0.4	TO-220SIS
2SK2964	30	2	0.18	PW-Mini	TPC6003	30	6	0.024	VS-6
2SK2996	600	10	1	TO-220NIS	2SK4112	600	10	1	TO-220HIS
2SK3067	600	2	5	TO-220NIS	2SK3767	600	2	4.5	TO-220SIS
2SK3084	100	30	0.046	TO-220FL/SM	-	-	-	-	-
2SK3089	30	40	0.03	TO-220FL/SM	2SK3847	40	32	0.018	TO-220SM
2SK3090	30	45	0.02	TO-220FL/SM	2SK3847	40	32	0.018	TO-220SM
2SK3125	30	70	0.007	TO-3PSM	2SK3843	40	75	0.0035	TFP
2SK3126	450	10	0.65	TO-220NIS	2SK3869	450	10	0.68	TO-220SIS
2SK3127	30	45	0.012	TO-220FL/SM	2SK3847	40	32	0.018	TO-220SM
2SK3128	30	60	0.012	TO-3P (N)	2SK3843	40	75	0.0035	TFP
2SK3129	50	60	0.007	TO-3P (N)	2SK3845	60	70	0.0058	TO-3P (N)
2SK3130	600	6	1.55	TO-220NIS	2SK3947	600	6	1.4	TO-220SIS
2SK3236	60	35	0.02	TO-220NIS	2SK3662	60	35	0.0125	TO-220NIS
2SK3310	450	10	0.65	TO-220NIS	TK12A50D5	500	12	0.73	TO-220SIS
2SK3313	500	12	0.62	TO-220HIS	TK12A50D5	500	12	0.73	TO-220SIS
2SK3316	500	5	1.8	TO-220NIS	2SK3868	500	5	1.7	TO-220NIS
2SK3389	30	75	0.005	TFP	2SK3843	40	75	0.008	TFP
2SK3397	30	75	0.006	TFP	2SK3843	40	75	0.0035	TFP
2SK3407	450	10	0.65	TO-220NIS	2SK3869	450	10	0.68	TO-220SIS
2SK3439	30	75	0.005	TFP	2SK3843	40	75	0.0035	TFP
2SK3440	60	50	0.008	TFP	2SK3842	60	75	0.0058	TFP
2SK3441	60	75	0.0058	TFP	2SK4034	60	75	0.0058	TFP
2SK3442	100	45	0.02	TFP	TK40D10J1	100	40	0.015	TO-220 (W)
2SK3443	150	30	0.055	TFP	TK50X15J1	150	50	0.03	TFP
2SK3472	450	1	4.6	PW-Mold (Straight)	2SK4023	450	1	4.6	New PW-Mold2
2SK3499	400	10	0.55	TFP	TK10X40D	400	10	0.55	TFP
2SK3543	450	2	2.45	TO-220NIS	2SK3757	450	2	2.45	TO-220SIS
2SK3743	450	13	0.4	TO-220NIS	TK14A45DA	450	13.5	0.41	TO-220SIS
2SK3863	500	5	1.5	DP	TK5P50D	500	5	1.5	DPAK
2SK982	60	0.2	1	TO-92	SSM3K7002BF	60	0.2	2.1	S-MINI
HN1J02FU	-20	-0.05	40	US6	SSM6P16FU	-20	-0.1	45	US6
HN1K02FU	20	0.05	40	US6	SSM6N16FU	20	0.1	15	US6
HN1K03FU	20	0.1	12	US6	SSM6N16FU	20	0.1	15	US6
HN1K04FU	50	0.05	50	US6	SSM6K7002BFU	60	0.2	2.1	US6
HN1K05FU	20	0.1	40	US6	SSM6N35FU	20	0.18	20	US6
HN1K06FU	20	0.1	6	US6	SSM6N15FU	30	0.1	7	US6
HN1L02FU	20	0.05	40	US6	SSM6L35FU	20	0.18	20	US6
HN1L03FU	50	0.05	50	US6	-	-	-	-	-
HN4K03JU	20	0.1	12	UFV	SSM5N15FU	30	0.1	7	USV
SSM3J01F	-30	-0.7	0.6	S-MINI	SSM3J01T	-30	-1.7	0.6	TSM
SSM3J02F	-30	-0.6	0.7	S-MINI	SSM3J02T	-30	-1.6	0.7	TSM
SSM3J05FU	-20	-0.2	4	USM	SSM3J36TU	-20	-0.33	3.6	UFM
SSM3J108TU	-20	-1.8	0.158	UFM	SSM3J114TU	-20	-1.8	0.149	UFM
SSM3J109TU	-20	-2	0.13	UFM	SSM3J115TU	-20	-2.2	0.098	UFM
SSM3J110TU	-20	-2.3	0.094	UFM	SSM3J115TU	-20	-2.2	0.098	UFM
SSM3J13T	-12	-3	0.07	TSM	SSM3J321T	-20	-5.2	0.046	TSM
SSM3J15TE	-30	-0.1	32	TESM	SSM3J15FV	-30	-0.1	32	VESM
SSM3J16TE	-20	-0.1	45	TESM	SSM3J16FV	-20	-0.1	45	VESM
SSM3J317T	-20	-3.6	0.107	TSM	SSM3J327R	-20	-3.9	0.093	SOT-23F
SSM3K01F	30	1.3	0.15	S-MINI	SSM3K01T	30	3.2	0.15	TSM

End-of-Life Products					Replacement Products				
Part Number	Electrical Characteristics			Package	Part Number	Electrical Characteristics			Package
	V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	R <sub>DS(ON)</sub> Max(Ω)			V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	R <sub>DS(ON)</sub> Max(Ω)	
<b>SSM3K02F</b>	30	1	0.25	S-MINI	<b>SSM3K02T</b>	30	2.5	0.25	TSM
<b>SSM3K03C</b>	20	0.1	12	SS-CSP	<b>SSM3K16CT</b>	20	0.1	15	CST3
<b>SSM3K03FE</b>	20	0.1	12	ESM	<b>SSM3K16FS</b>	20	0.1	15	SSM
<b>SSM3K03TE</b>	20	0.1	12	TESM	<b>SSM3K37MFV</b>	20	0.25	5.6	VESM
<b>SSM3K04FE</b>	20	0.1	12	ESM	<b>SSM3K04FS</b>	20	0.1	12	SSM
<b>SSM3K102TU</b>	20	2.6	0.071	UFM	<b>SSM3K119TU</b>	30	2.5	0.074	UFM
<b>SSM3K126TU</b>	30	3.9	0.043	UFM	<b>SSM3K131TU</b>	30	6	0.0415	UFM
<b>SSM3K12T</b>	30	3	0.175	TSM	<b>SSM3K320T</b>	30	4.2	0.077	TSM
<b>SSM3K15TE</b>	30	0.1	7	TESM	<b>SSM3K15FV</b>	30	0.1	7	VESM
<b>SSM3K16FV</b>	20	0.1	15	VESM	<b>SSM3K37MFV</b>	20	0.25	5.6	VESM
<b>SSM3K16TE</b>	20	0.1	15	TESM	<b>SSM3K37MFV</b>	20	0.25	5.6	VESM
<b>SSM3K302T</b>	30	3	0.071	TSM	<b>SSM3K316T</b>	30	4	0.065	TSM
<b>SSM3K303T</b>	30	2	0.12	TSM	<b>SSM3K320T</b>	30	4.2	0.077	TSM
<b>SSM3K311T</b>	30	4.6	0.043	TSM	<b>SSM3K315T</b>	30	6	0.0415	TSM
<b>SSM3K7002F</b>	60	0.2	3.3	S-MINI	<b>SSM3K7002BF</b>	60	0.2	3.3	S-MINI
<b>SSM3K7002FU</b>	60	0.2	3.3	USM	<b>SSM3K7002BFU</b>	60	0.2	3.3	USM
<b>SSM5H12TU</b>	30	1.9	0.133	UFV	<b>SSM5H16TU</b>	30	1.9	0.133	UFV
<b>SSM6G06FE</b>	-20	-0.1	45	ES6	-	-	-	-	-
<b>SSM6H06FE</b>	20	0.1	15	ES6	-	-	-	-	-
<b>SSM6N16FE</b>	20	0.1	15	ES6	<b>SSM6N37FE</b>	20	0.25	5.6	ES6
<b>SSM6N7002FU</b>	60	0.2	3.3	US6	<b>SSM6N7002BFU</b>	60	0.2	3.3	US6
<b>TPC6106</b>	-40	-3.9	0.08	VS-6	-	-	-	-	-
<b>TPC6201</b>	30	2.5	0.095	VS-6	<b>TPCP8202</b>	30	5.5	0.023	PS-8
<b>TPC8301</b>	-30	-3.5	0.12	SOP-8	<b>TPCF8304</b>	-30	3.2	0.105	SOP-8
<b>TPC8303</b>	-30	-4.5	0.035	SOP-8	-	-	-	-	-
<b>TPCT4201</b>	20	6	0.031	STP	<b>TPCT4203</b>	20	6	0.031	STP2
<b>TPCT4202</b>	30	6	0.038	STP	<b>TPCT4204</b>	30	6	0.038	STP2

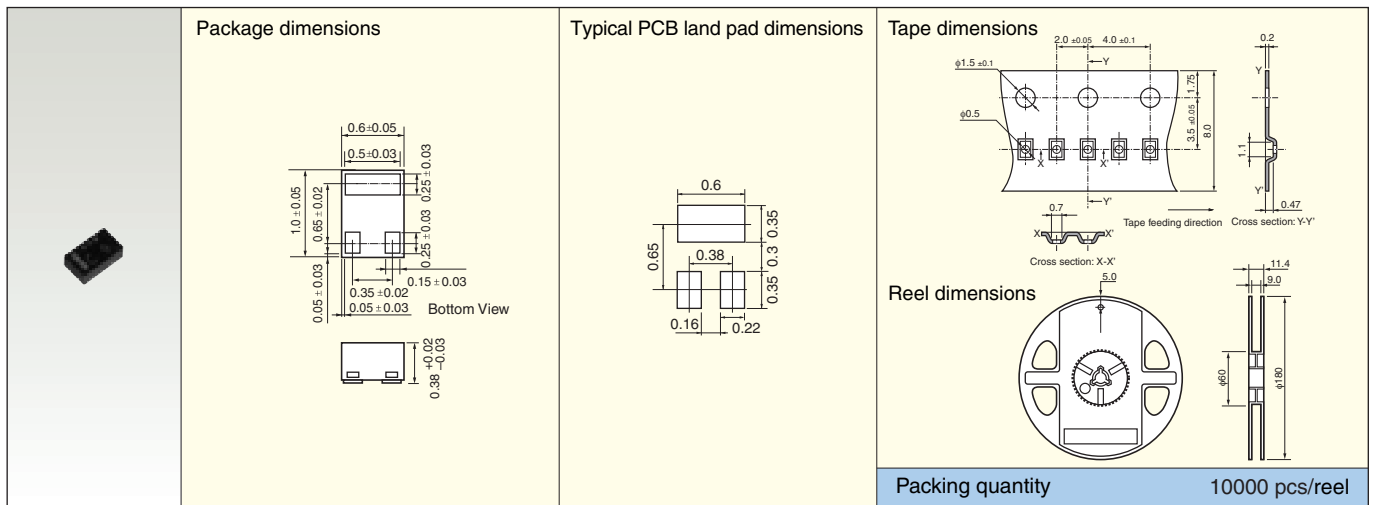
## 9-1 Compact Surface-Mount Packages

Toshiba offers a broad range of packaging options suitable for various mobile applications, including ultra-small, thin packages; those specifically designed for lithium-ion battery protection circuits; high-current packages with a thermal fin on the bottom.



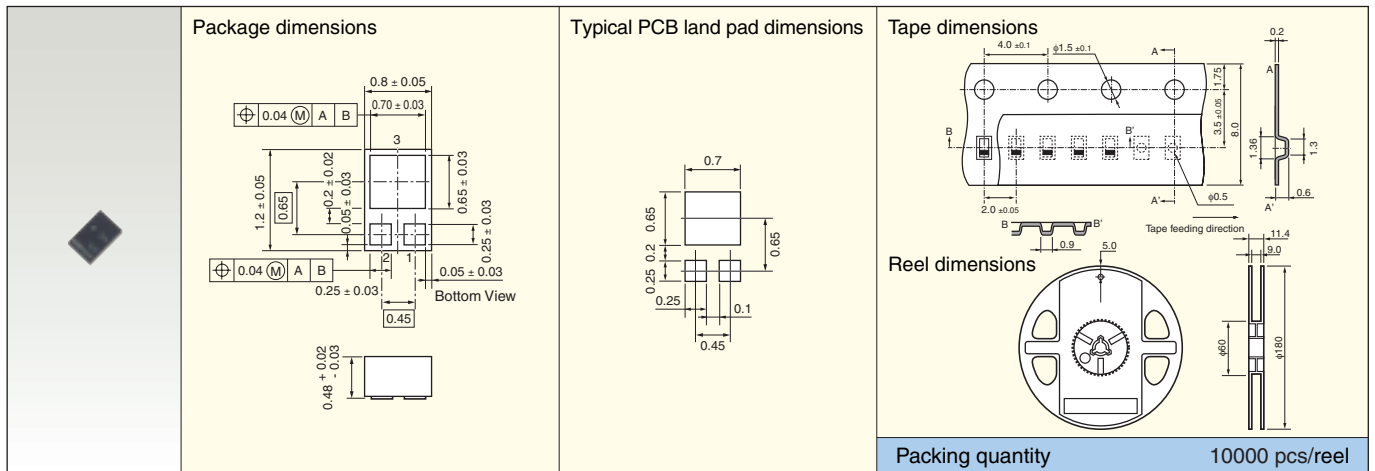
### ■ CST3

Unit: mm



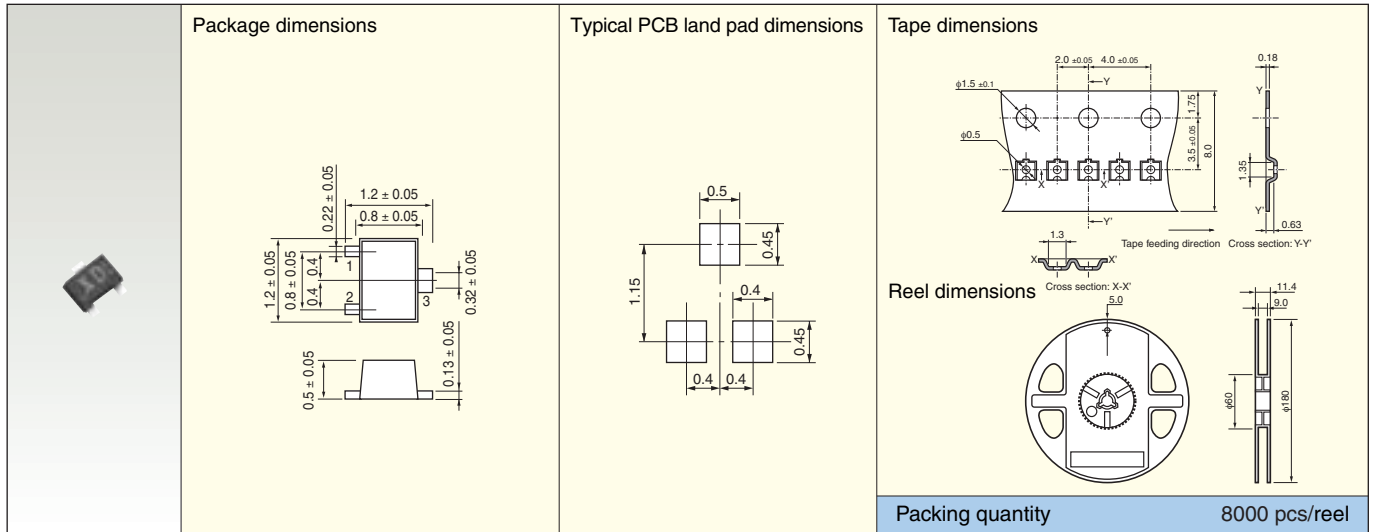
### ■ CST3B

Unit: mm



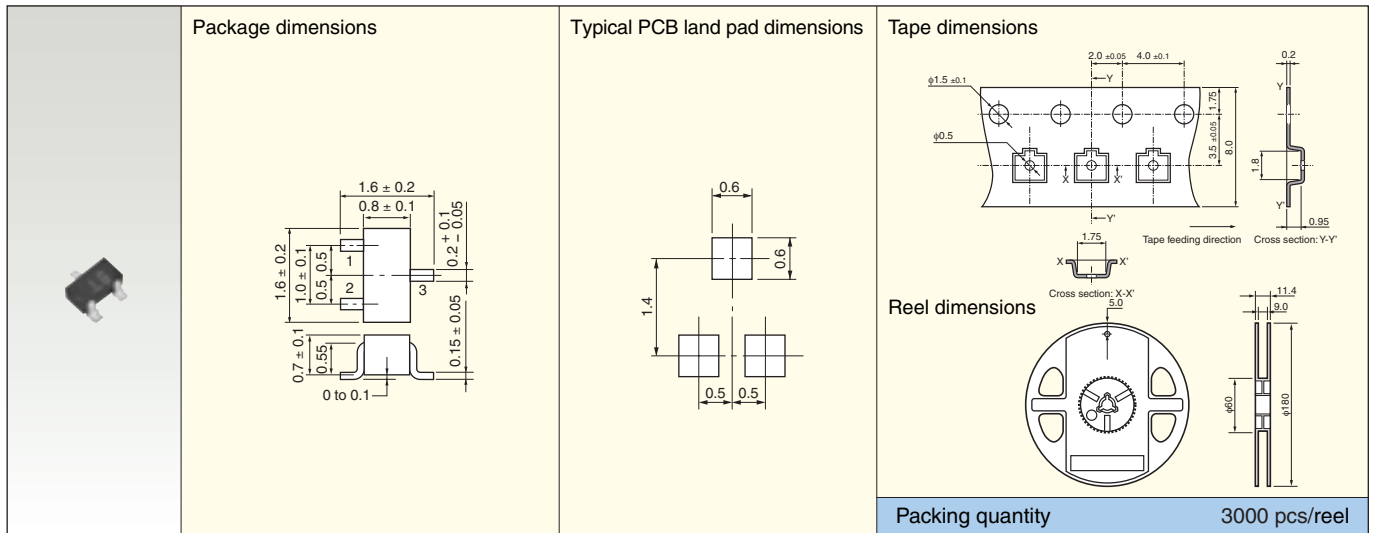
■ VESM (SOT-723)

Unit: mm



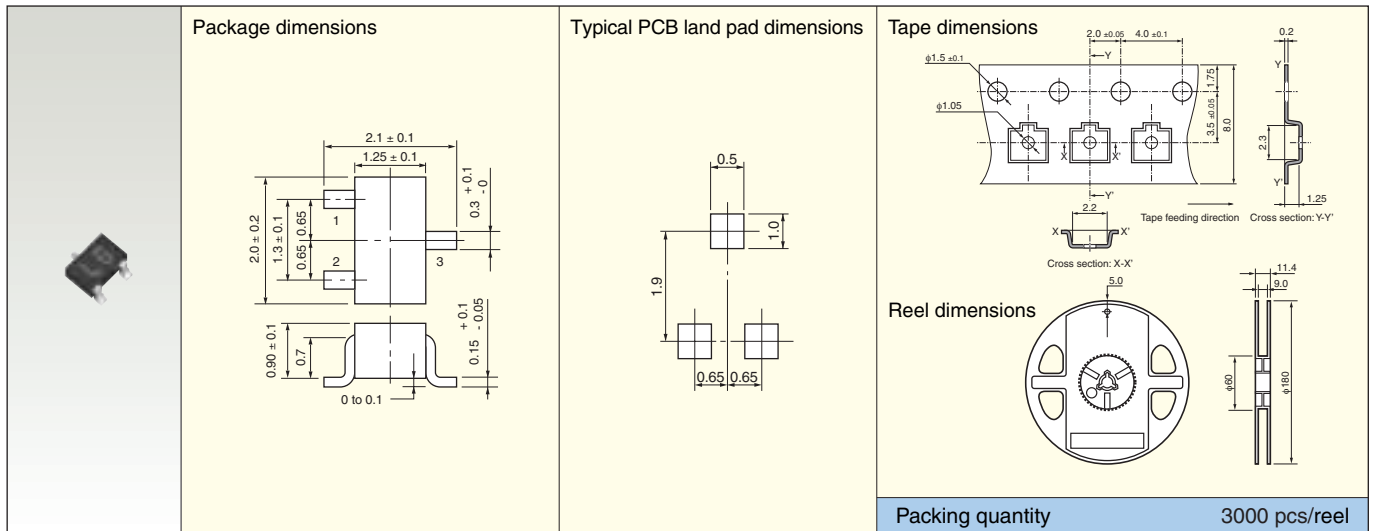
■ SSM (SOT-416)(SC-75)

Unit: mm



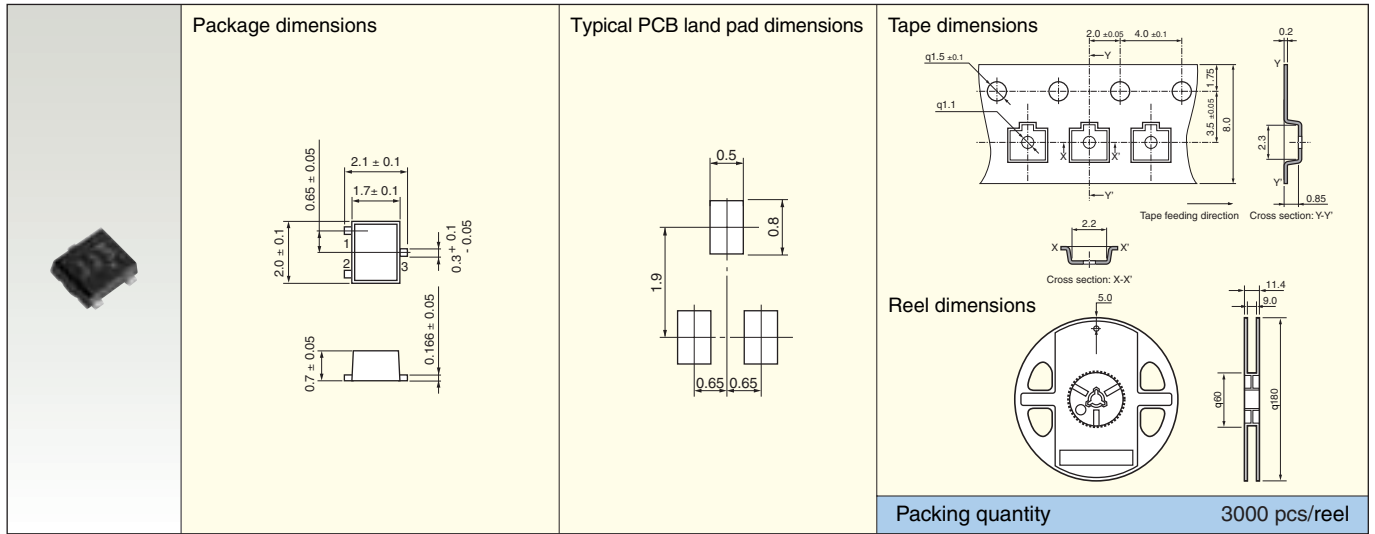
■ USM (SOT-323)(SC-70)

Unit: mm



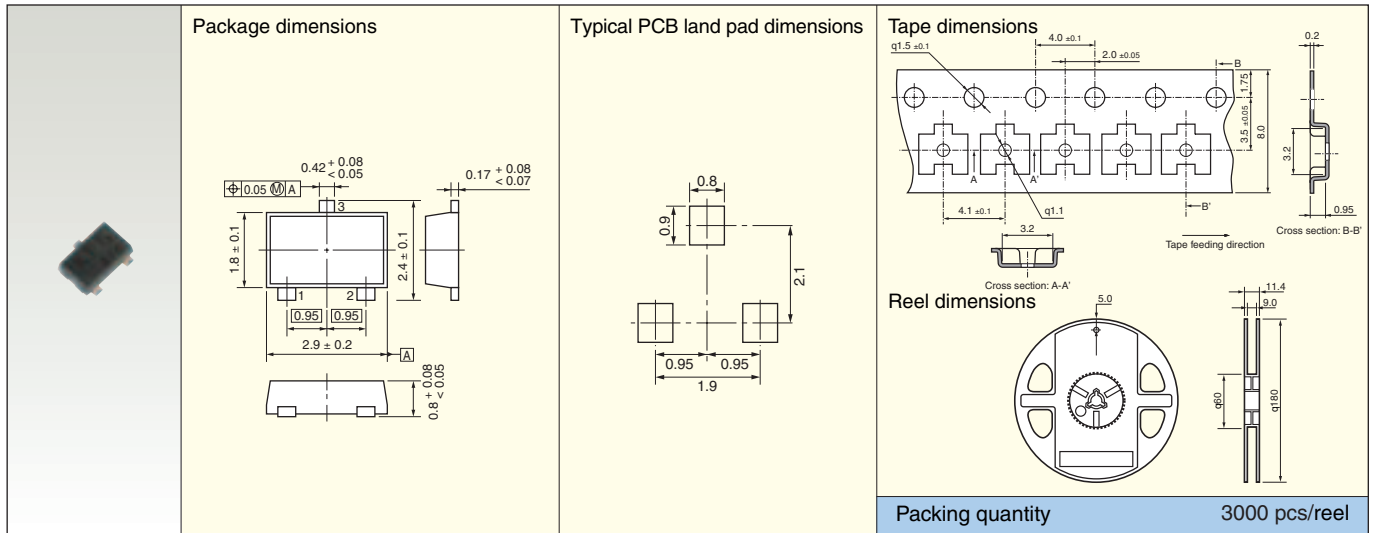
■ UFM

Unit: mm



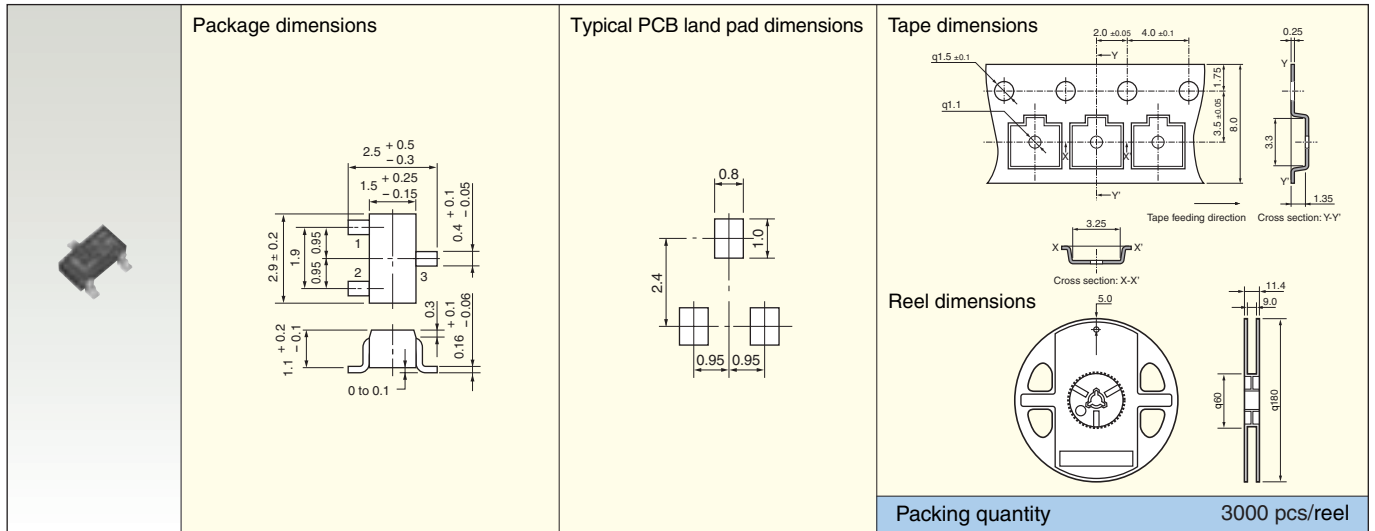
■ SOT-23F

Unit: mm



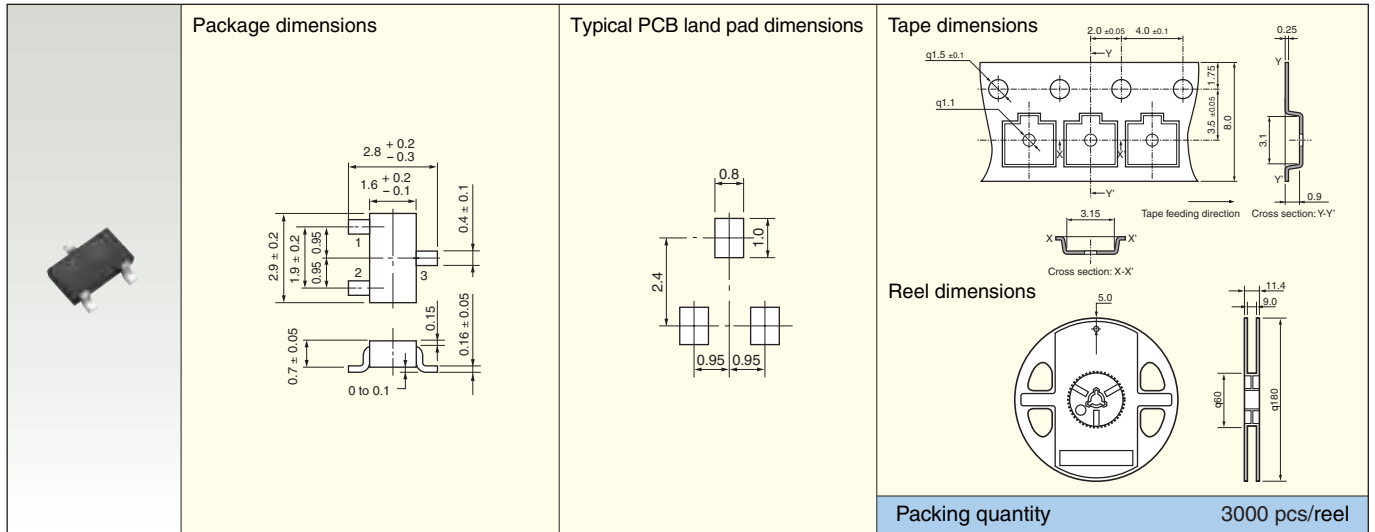
■ S-Mini (SOT-346)(SC-59)

Unit: mm



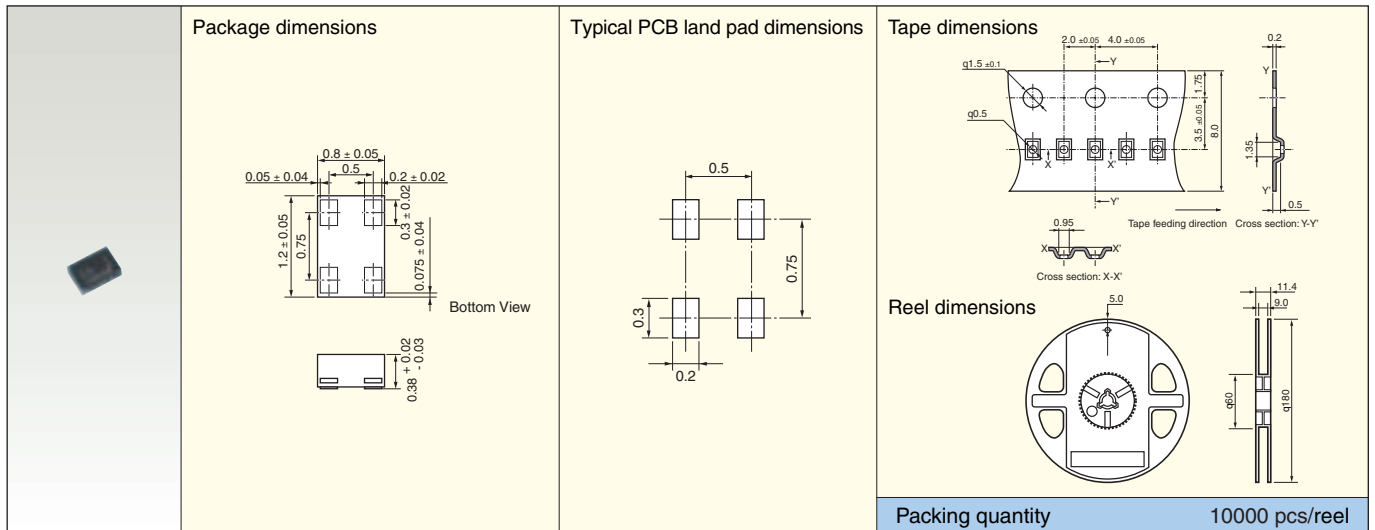
■ TSM

Unit: mm



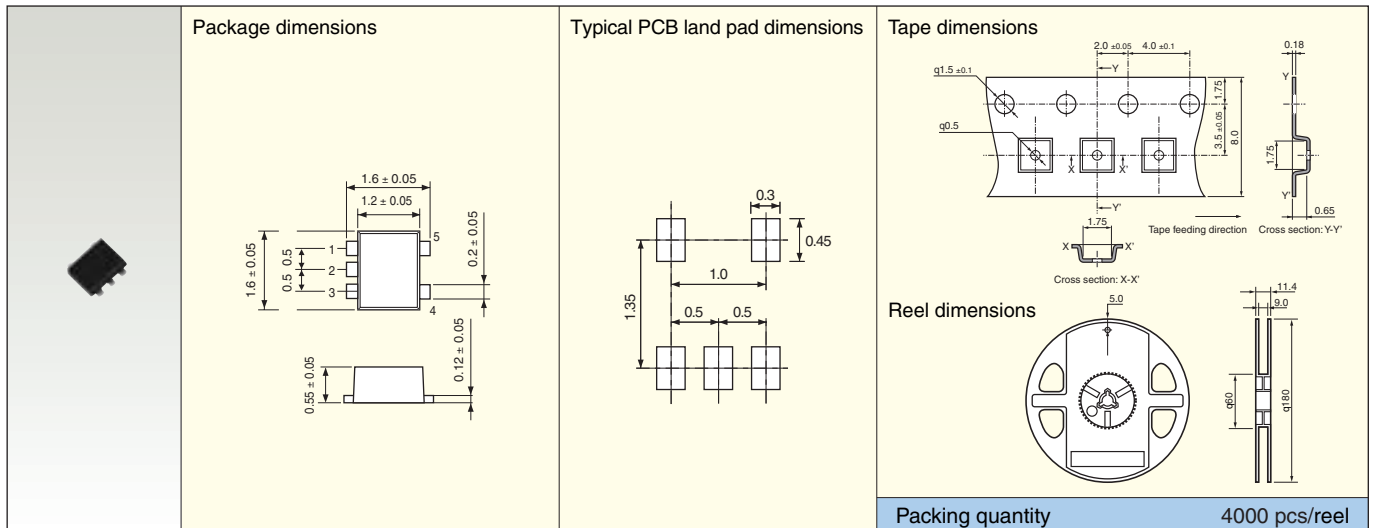
■ CST4

Unit: mm



■ ESV (SOT-553)

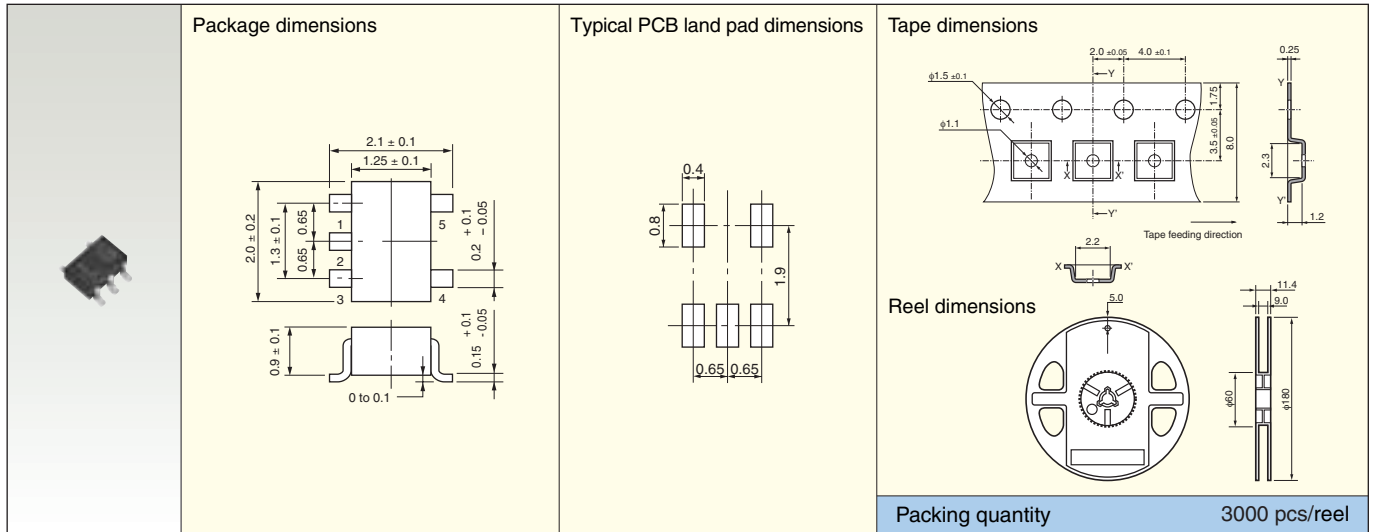
Unit: mm





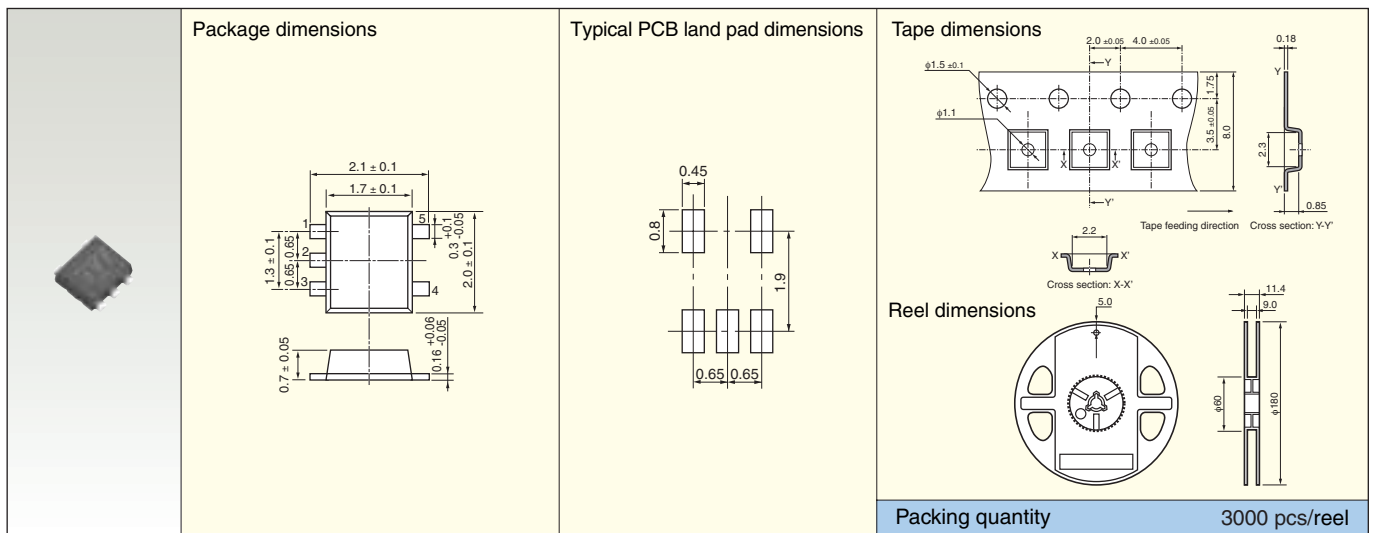
■ USV (SOT-353)(SC-88A)

Unit: mm



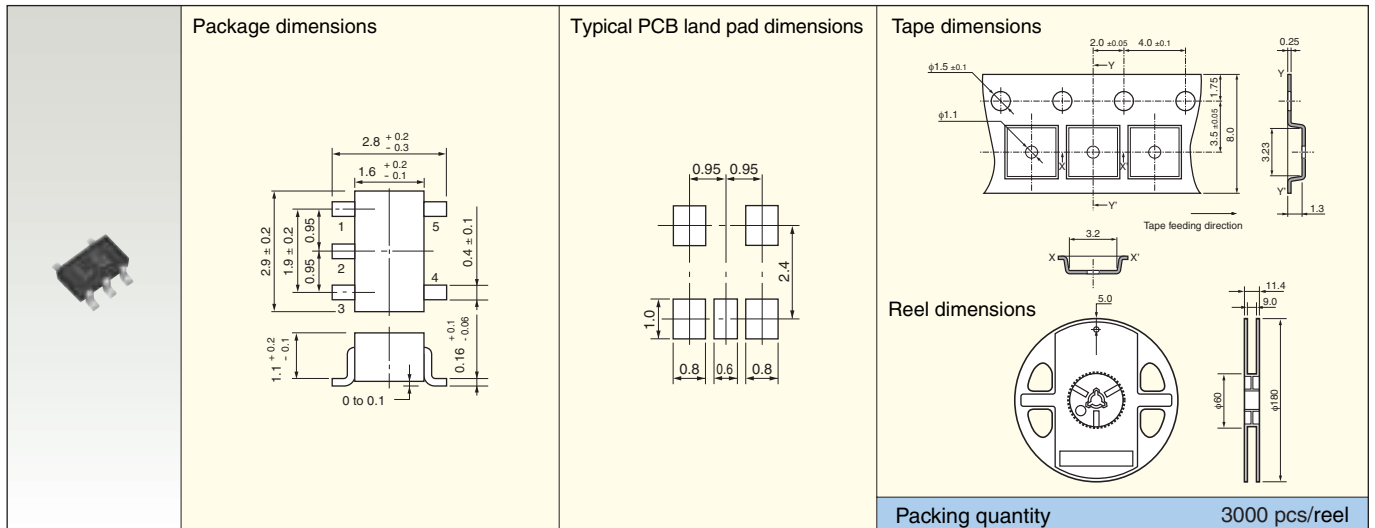
■ UFV

Unit: mm



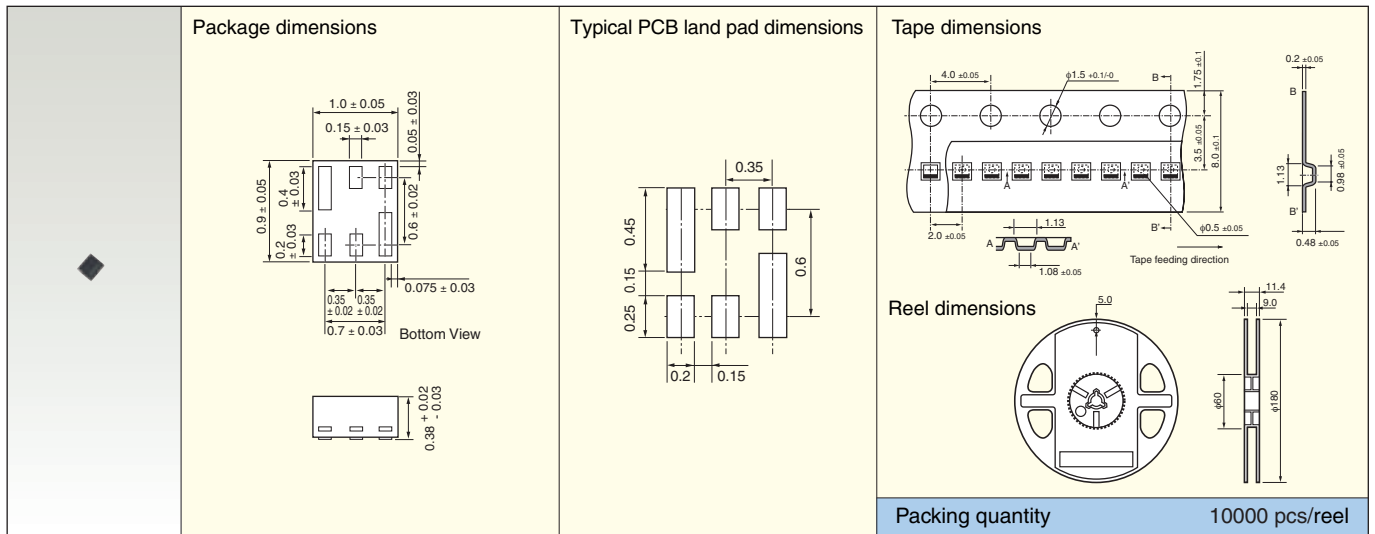
■ SMV (SOT-25)(SC-74A)

Unit: mm



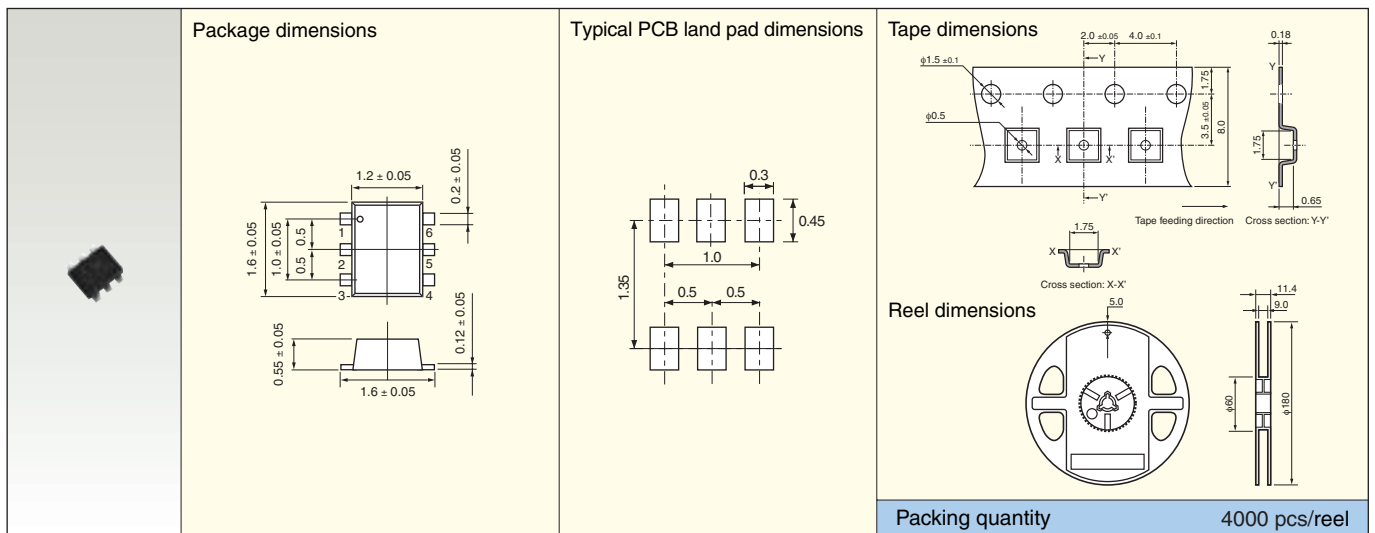
■ **CST6D**

Unit: mm



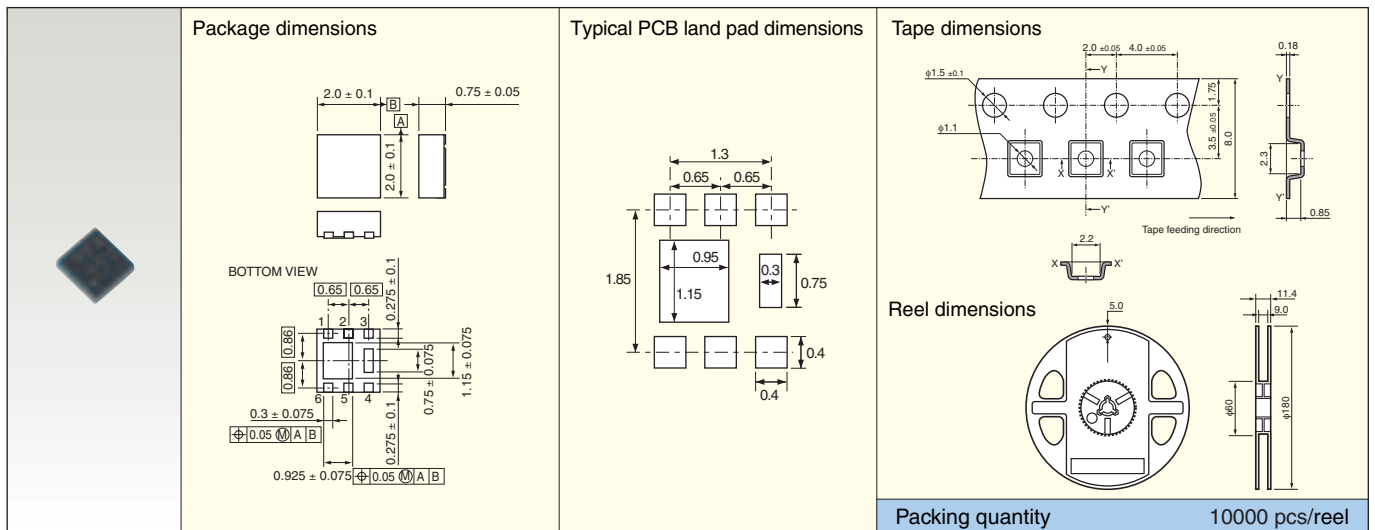
■ **ES6 (SOT-563)**

Unit: mm



■ **UDFN6 (1in1)**

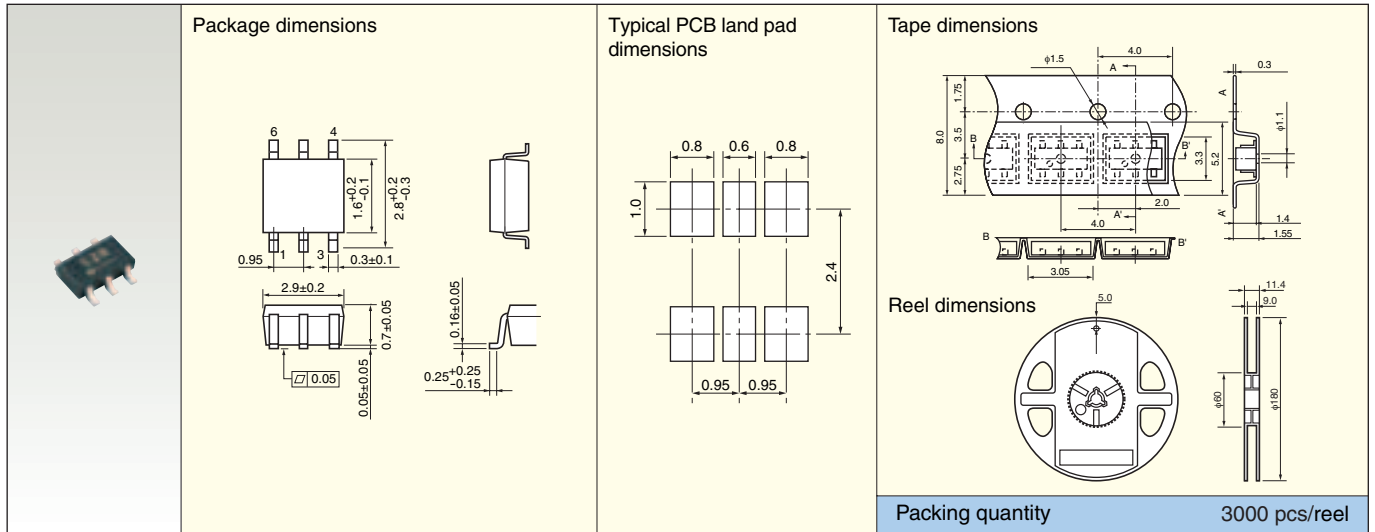
Unit: mm





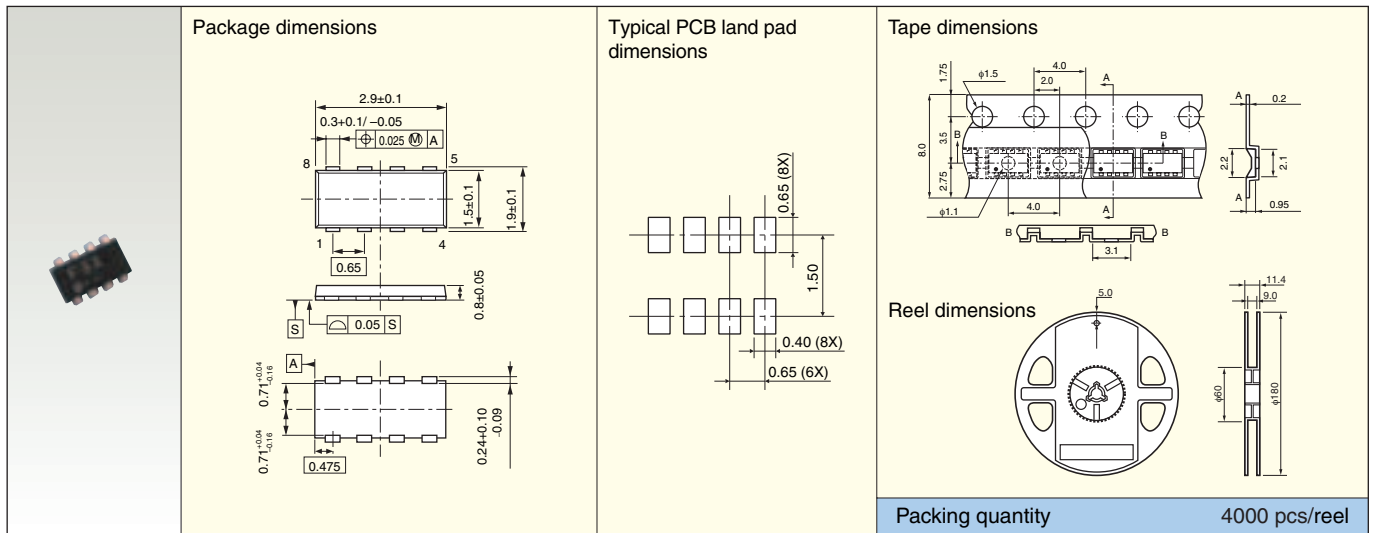
■ VS-6

Unit: mm



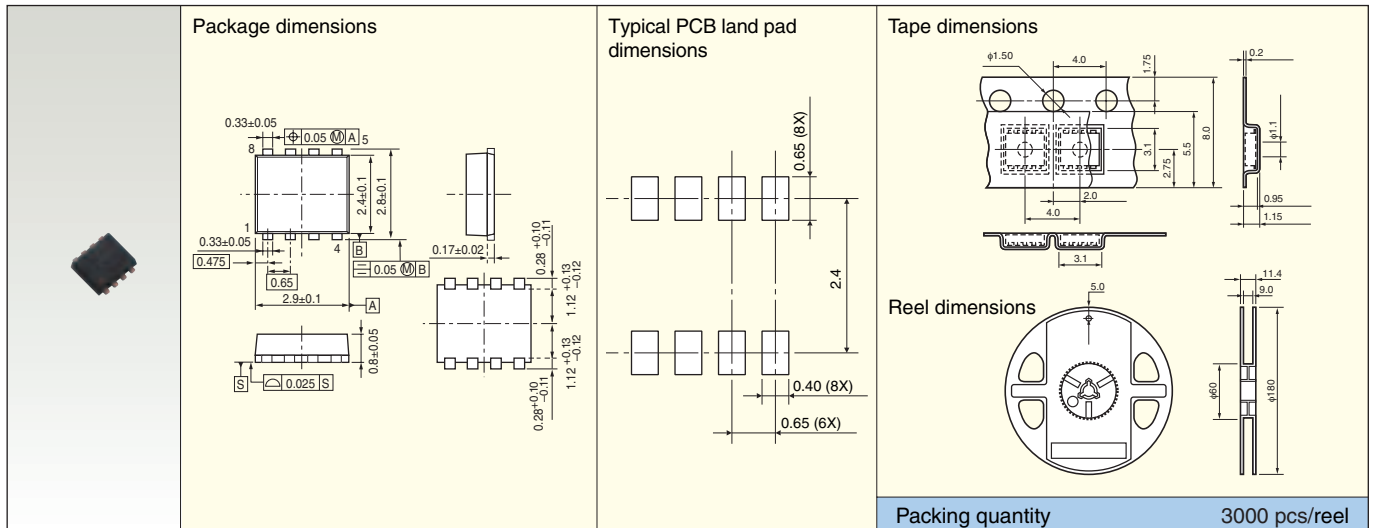
■ VS-8

Unit: mm



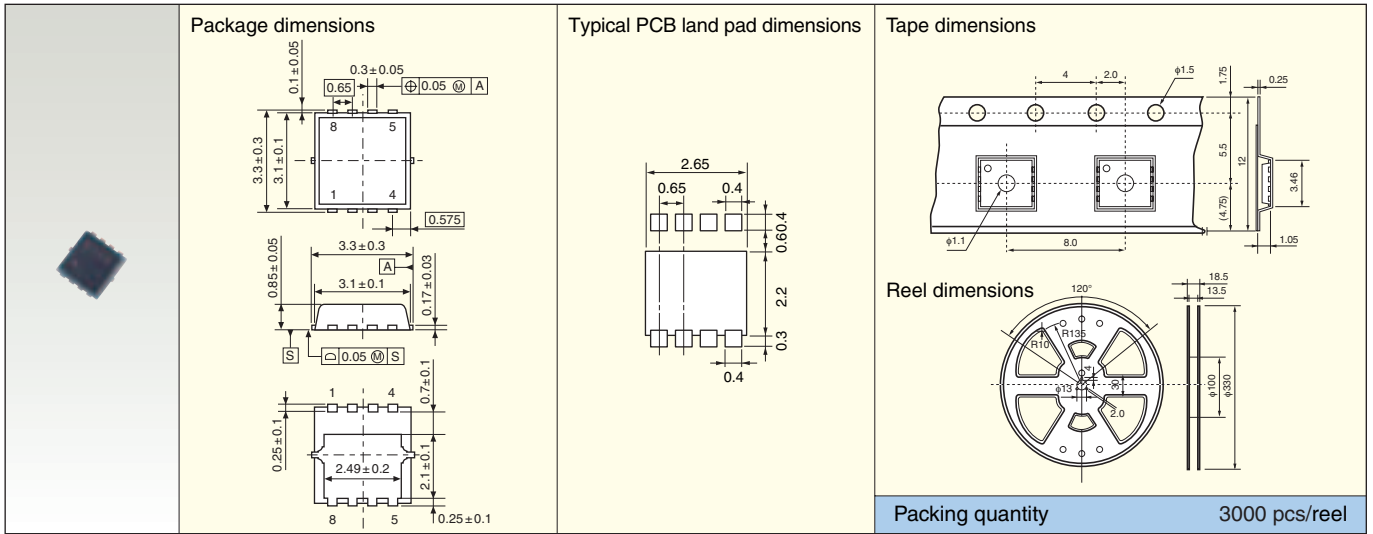
■ PS-8

Unit: mm



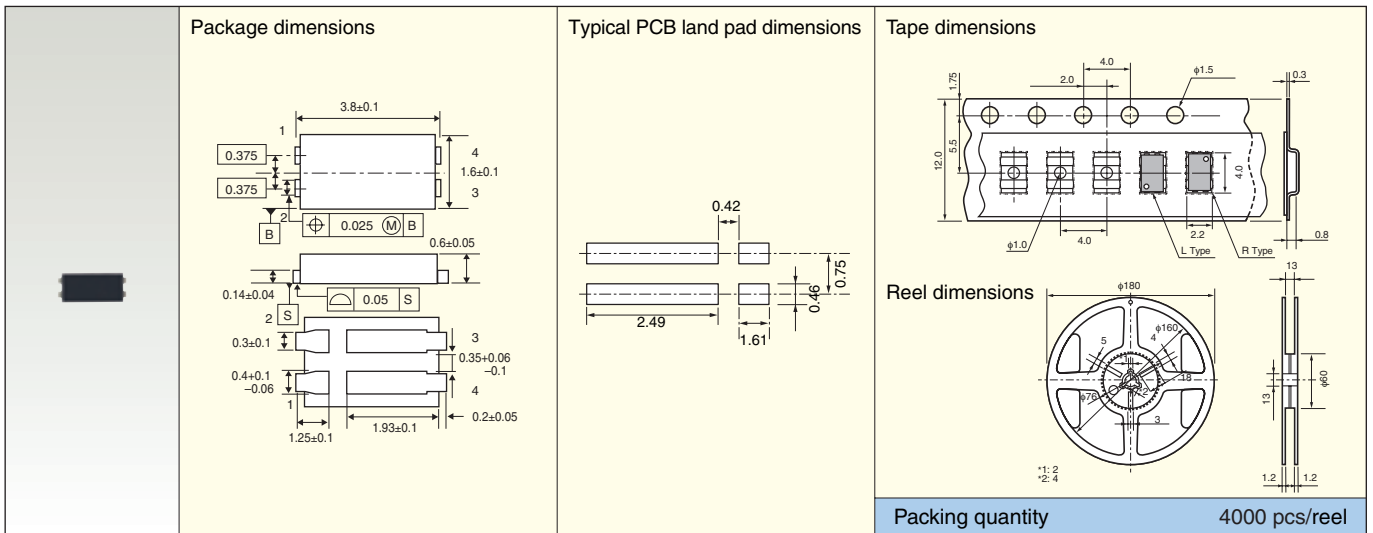
■ TSON Advance

Unit: mm



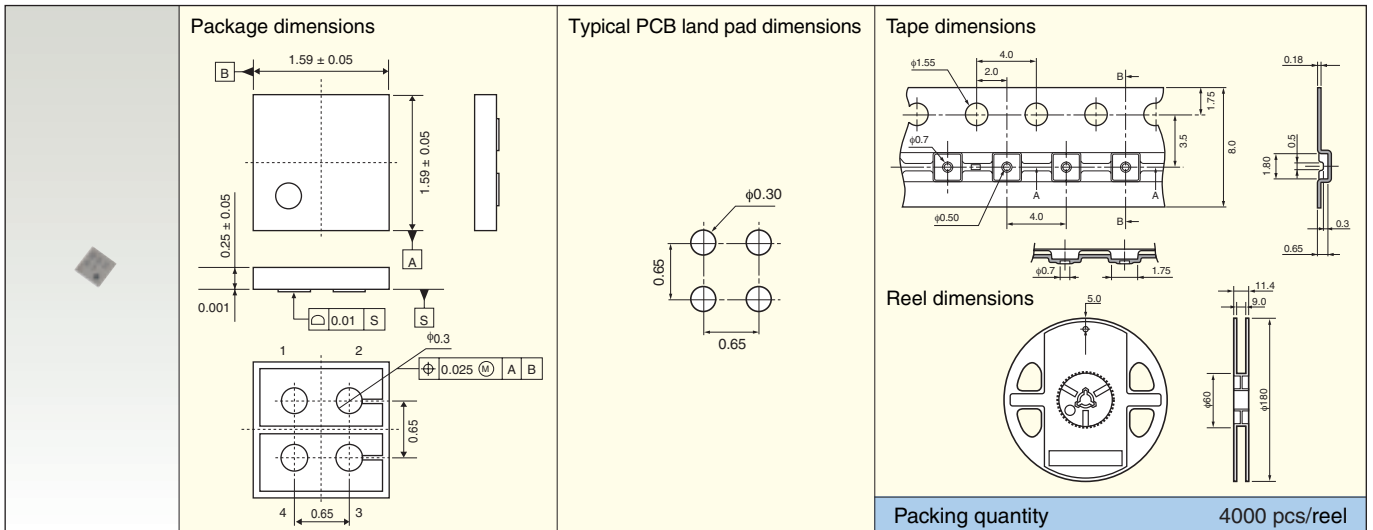
■ STP2

Unit: mm



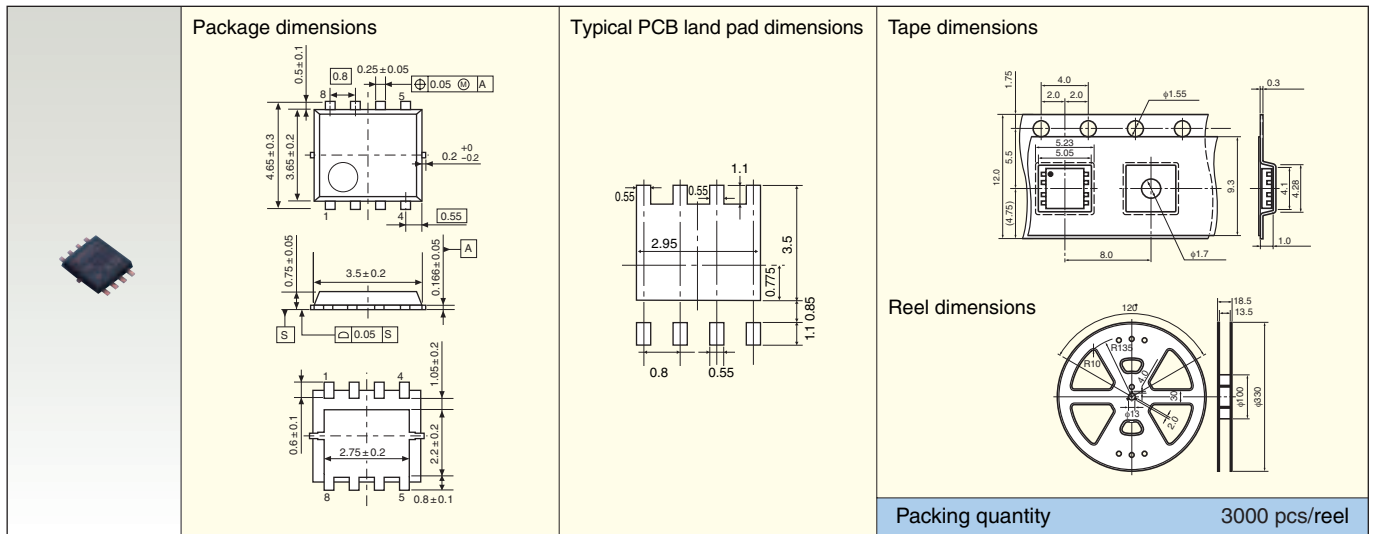
■ Chip LGA

Unit: mm



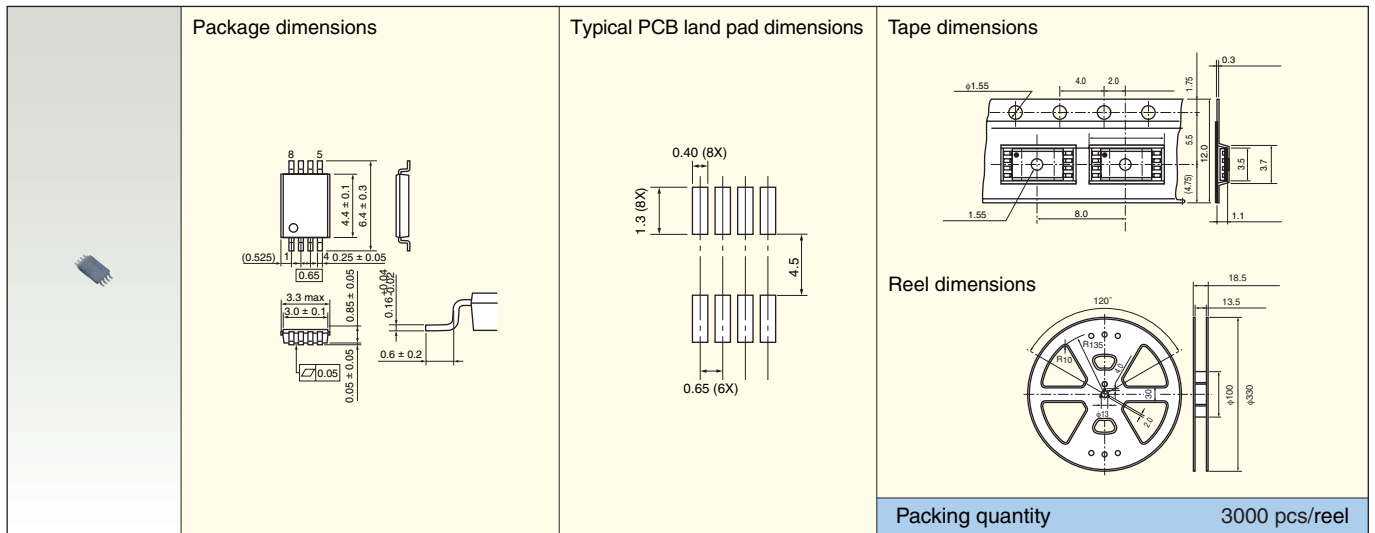
## ■ TSSOP Advance

Unit: mm



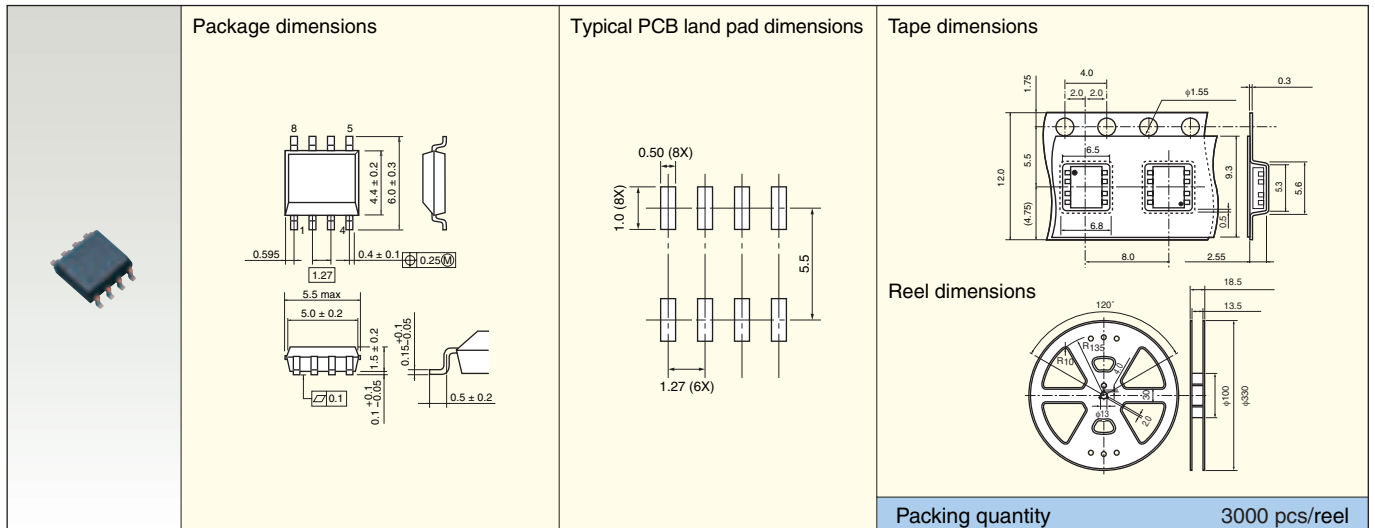
## ■ TSSOP-8

Unit: mm



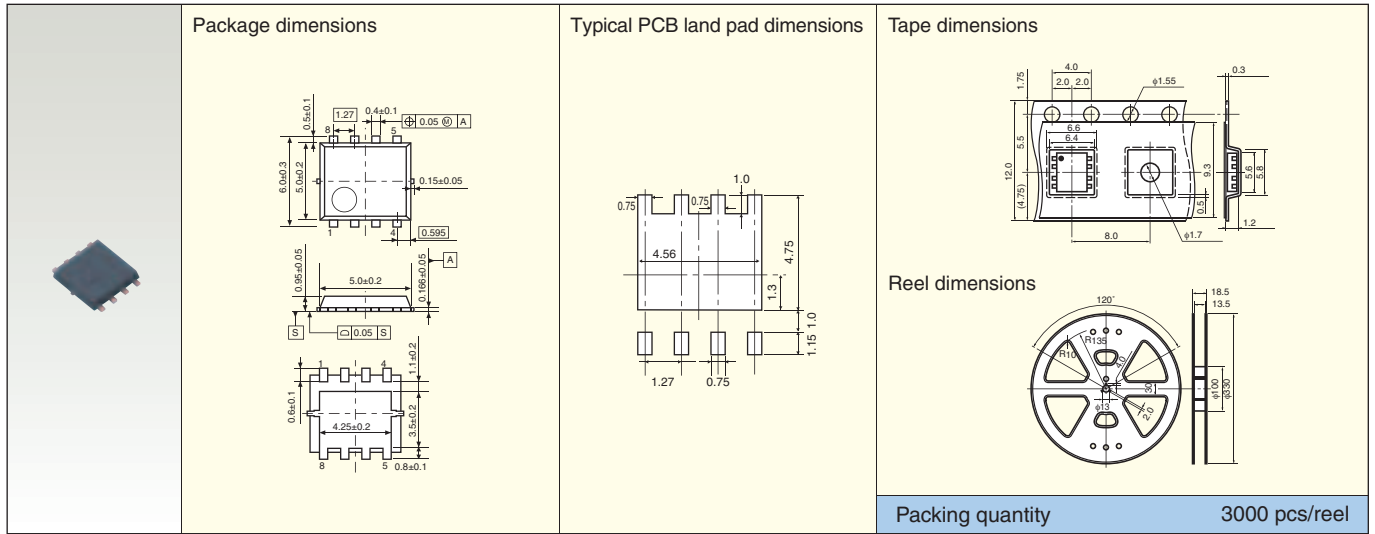
## ■ SOP-8

Unit: mm



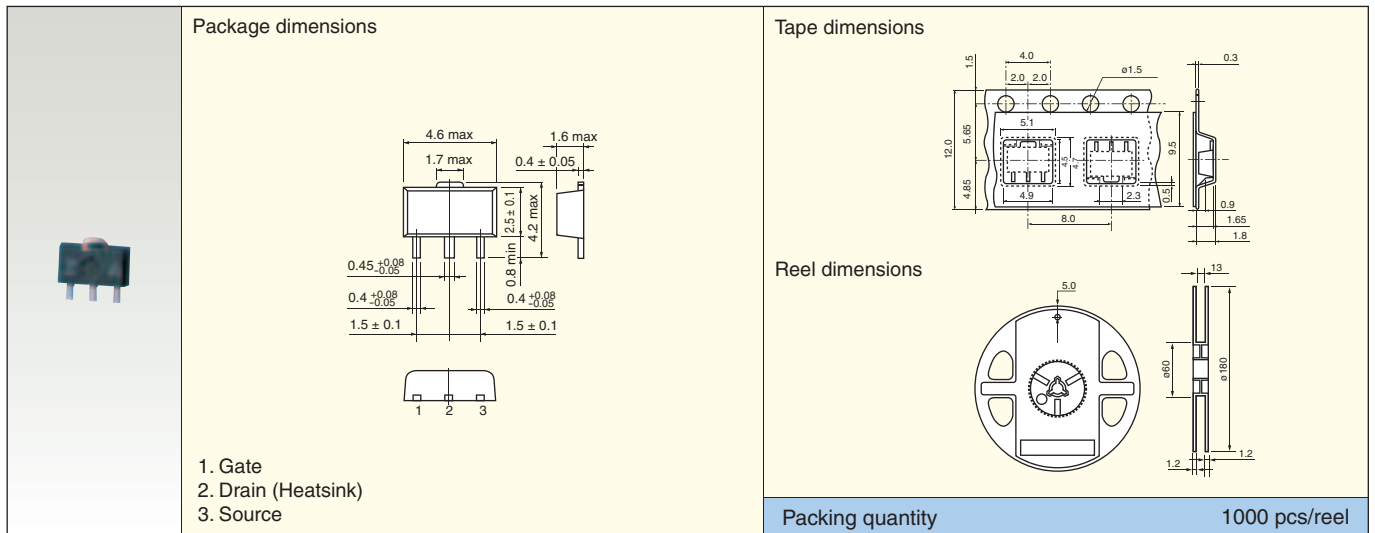
## ■ SOP Advance

Unit: mm



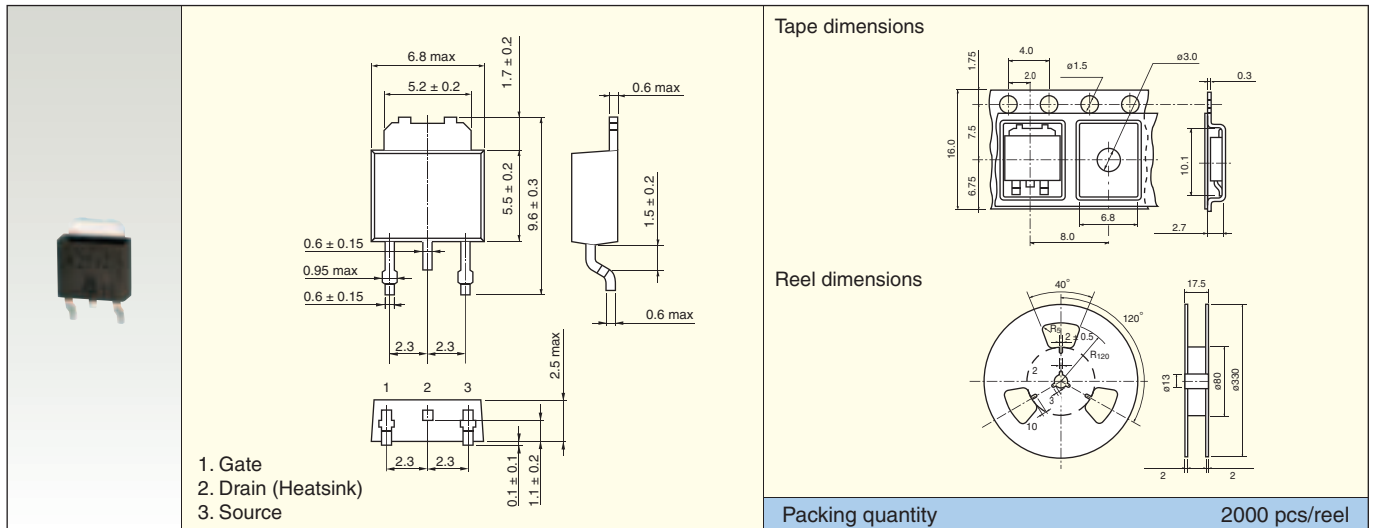
## ■ PW-Mini

Unit: mm



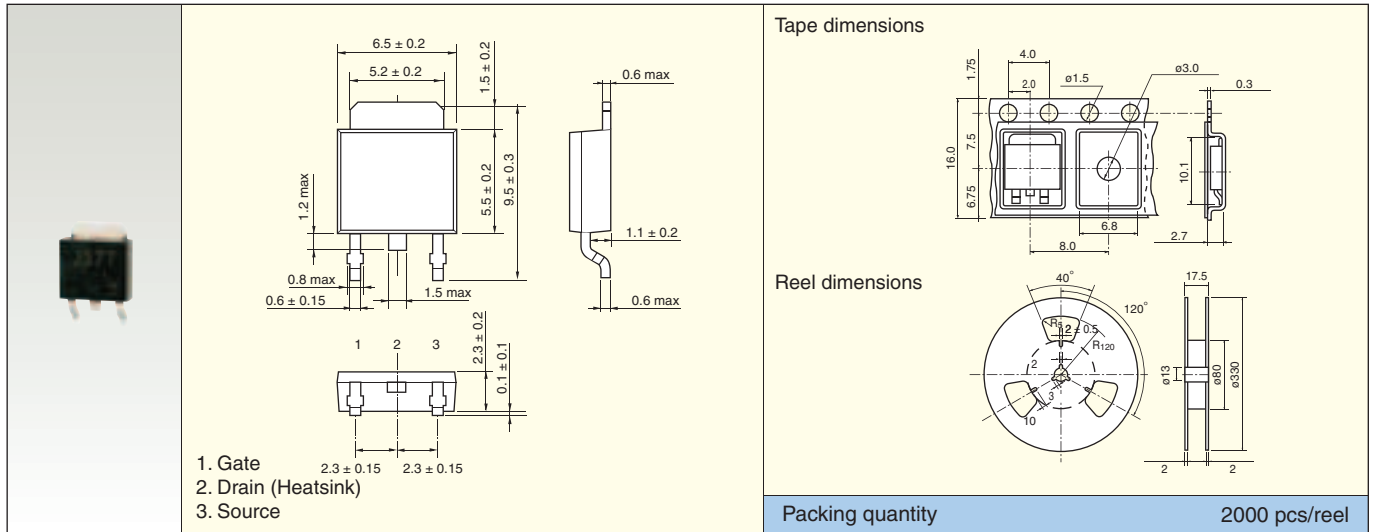
## ■ DP

Unit: mm



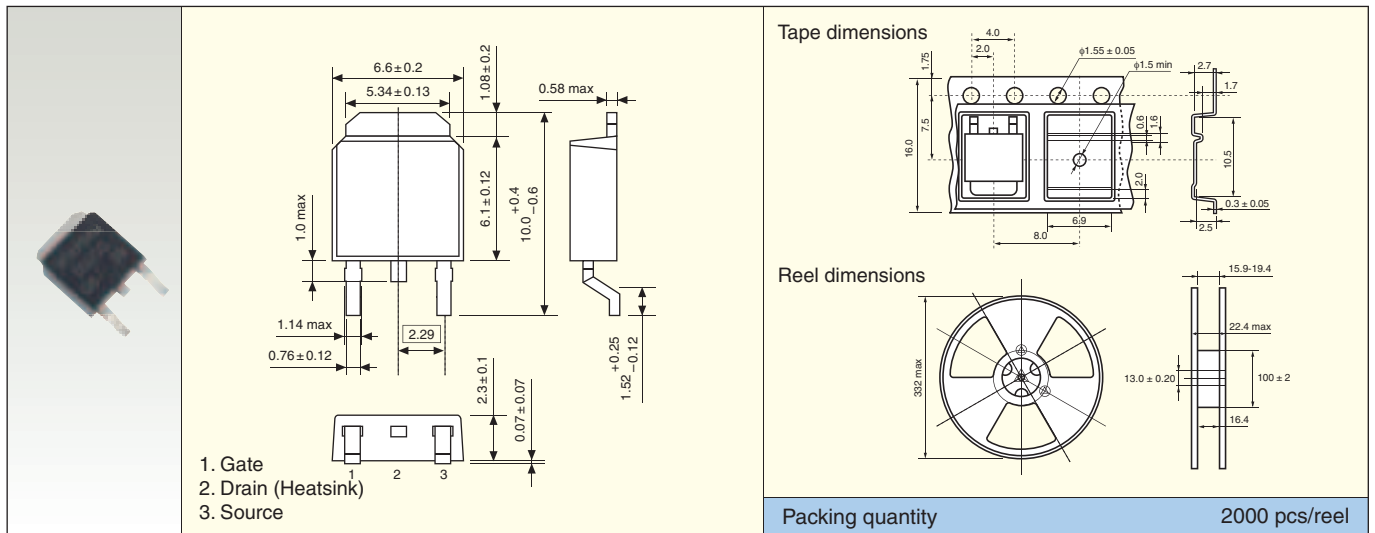
## ■ New PW-Mold

Unit: mm



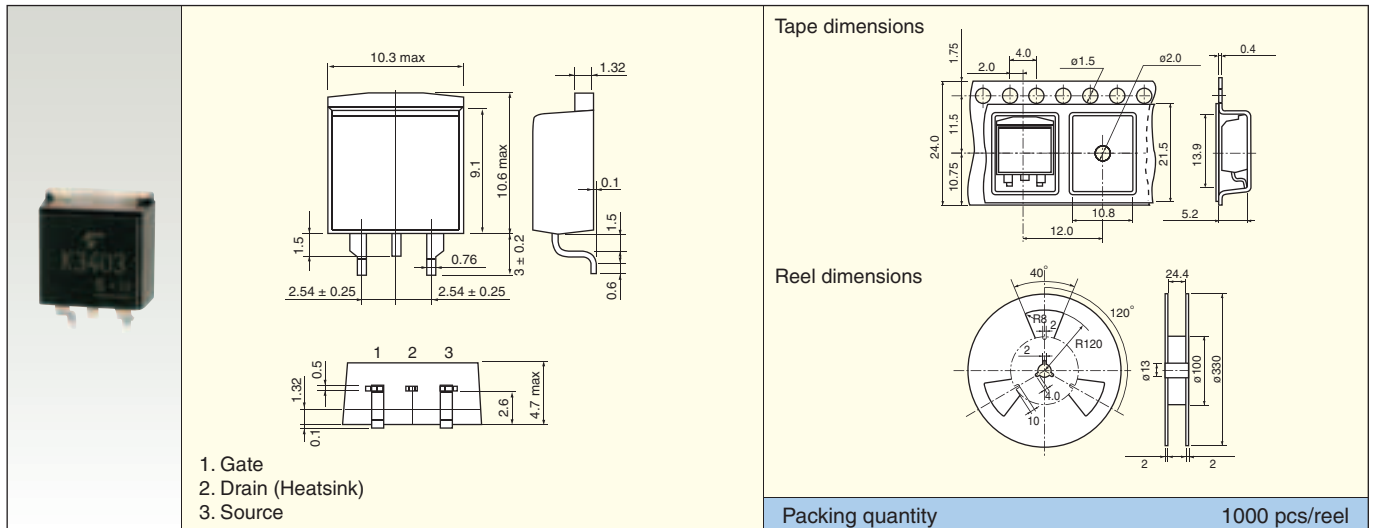
## ■ DPAK

Unit: mm



## ■ TO-220SM

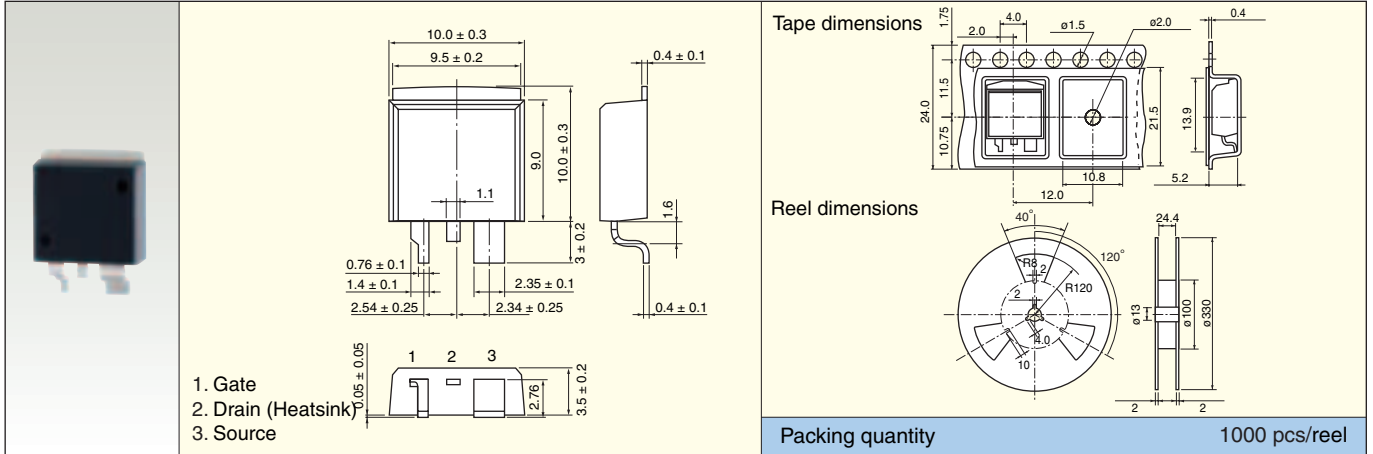
Unit: mm





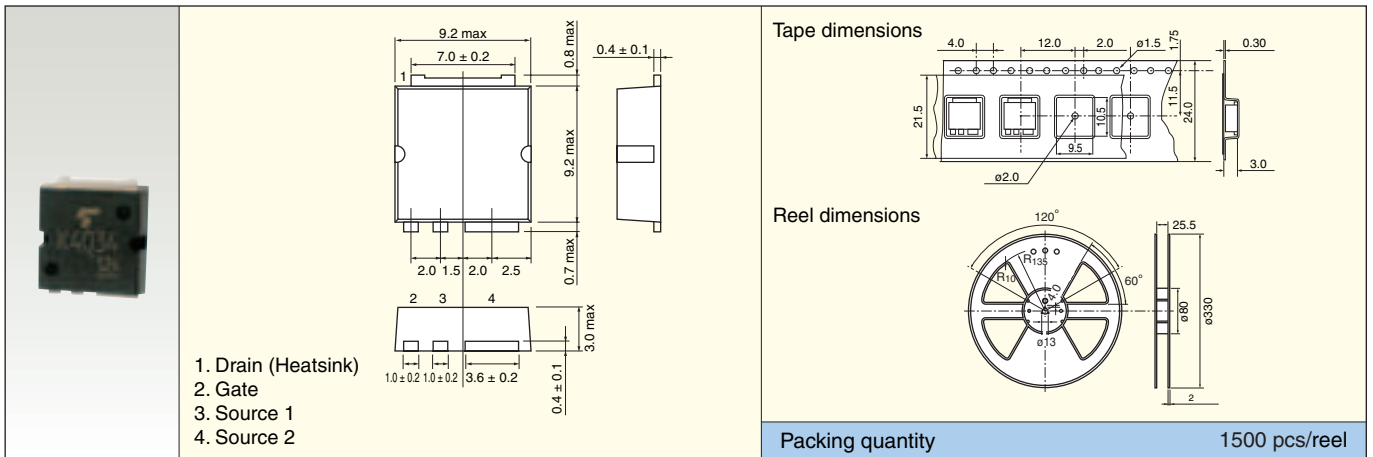
## TO-220SM(W)

Unit: mm



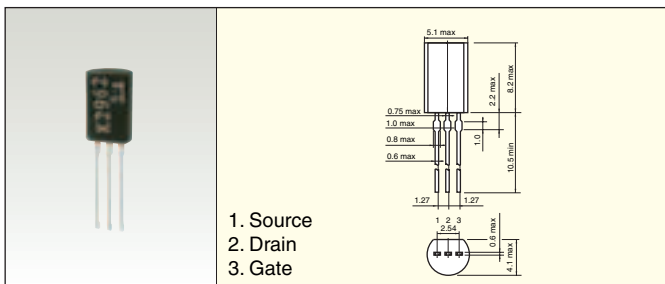
## TFP

Unit: mm



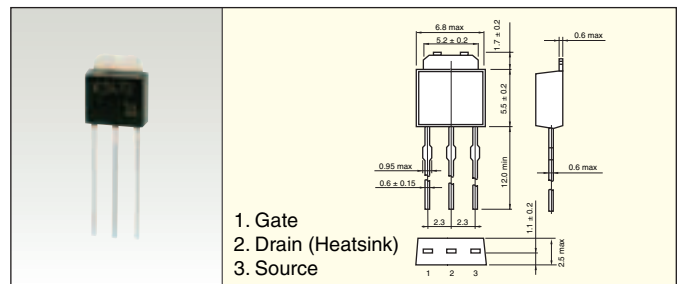
## 9-2 Through-Hole Packages

### LSTM

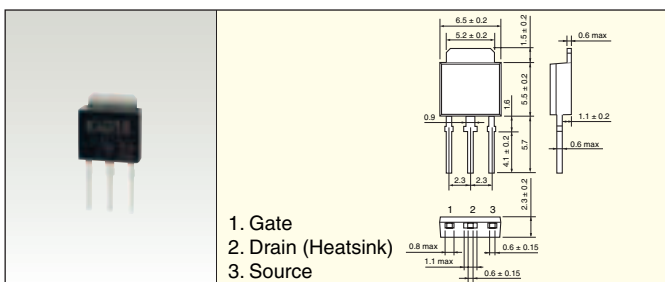


### PW-Mold (Straight)

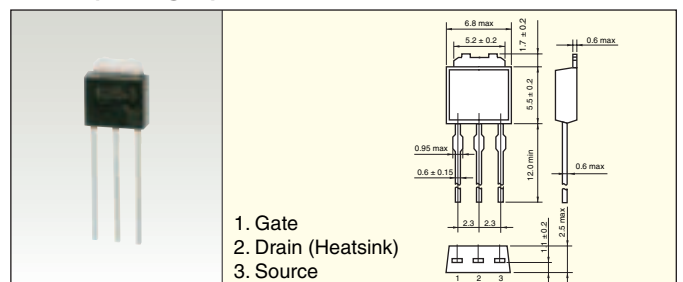
Unit: mm



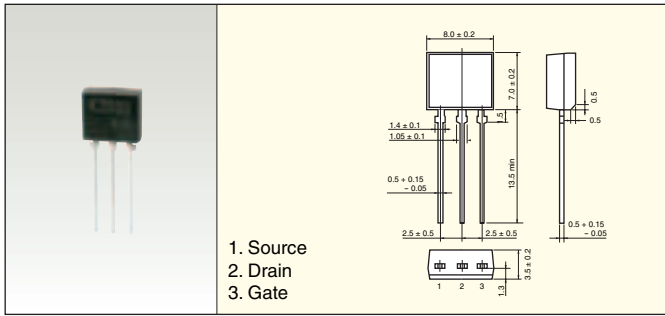
### New PW-Mold2



### DP (Straight)



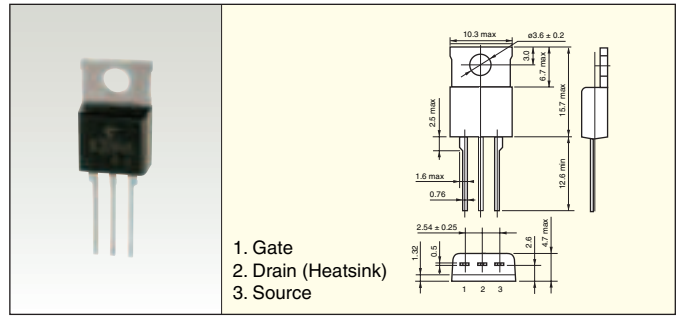
■ TPS



1. Source
2. Drain
3. Gate

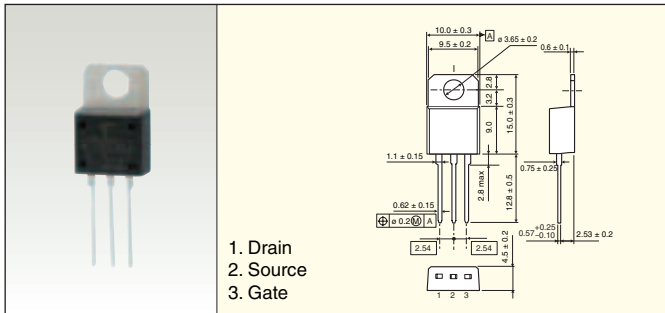
■ TO-220AB

Unit: mm



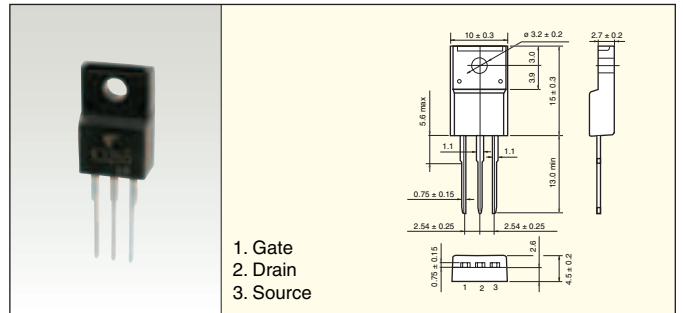
1. Gate
2. Drain (Heatsink)
3. Source

■ TO-220(W)



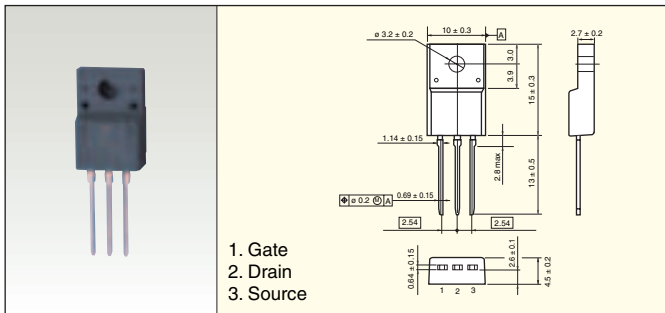
1. Drain
2. Source
3. Gate

■ TO-220NIS



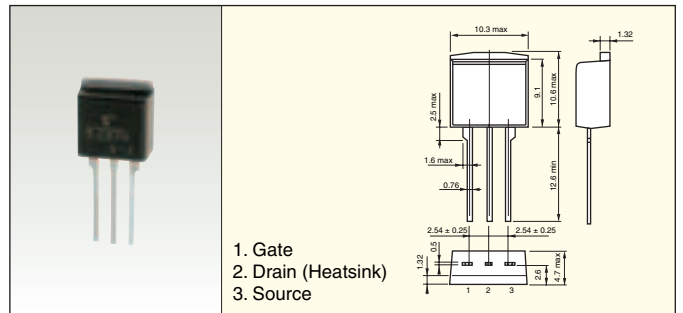
1. Gate
2. Drain
3. Source

■ TO-220SIS



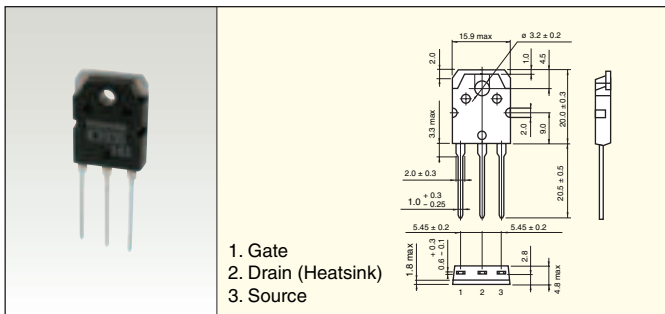
1. Gate
2. Drain
3. Source

■ TO-220FL



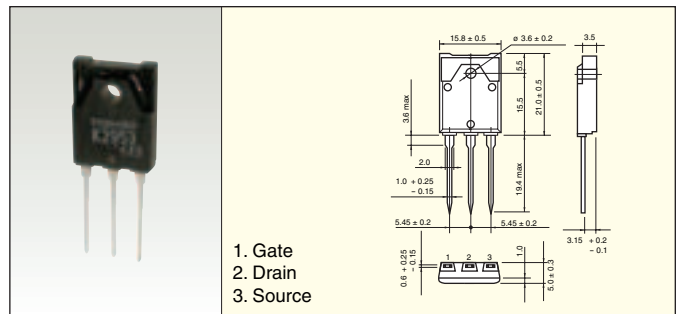
1. Gate
2. Drain (Heatsink)
3. Source

■ TO-3P(N)



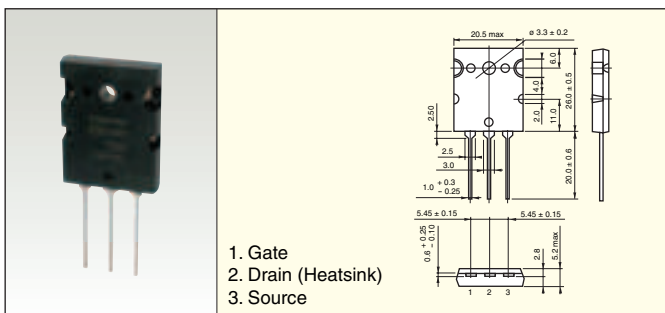
1. Gate
2. Drain (Heatsink)
3. Source

■ TO-3P(N)IS



1. Gate
2. Drain
3. Source

■ TO-3P(L)



1. Gate
2. Drain (Heatsink)
3. Source

**Toshiba America****Electronic Components, Inc.**

- Irvine, Headquarters  
Tel: (949)623-2900 Fax: (949)474-1330
- Buffalo Grove (Chicago)  
Tel: (847)484-2400 Fax: (847)541-7287
- Duluth/Atlanta  
Tel: (770)931-3363 Fax: (770)931-7602
- El Paso  
Tel: (915)771-8156
- Houston  
Tel: (713)466-6277
- Marlborough  
Tel: (508)481-0034 Fax: (508)481-8828
- Parsippany  
Tel: (973)541-4715 Fax: (973)541-4716
- San Jose  
Tel: (408)526-2400 Fax: (408)526-2410
- Wixom (Detroit)  
Tel: (248)347-2607 Fax: (248)347-2602

**Toshiba Electronics do Brasil Ltda.**

Tel: (011)2539-6681 Fax: (011)2539-6675

**Toshiba India Private Ltd.**

Tel: (011)2331-8422 Fax: (011)2371-4603

**Toshiba Electronics Europe GmbH**

- Düsseldorf Head Office  
Tel: (0211)5296-0 Fax: (0211)5296-400
- France Branch  
Tel: (1)47282828 Fax: (1)42046491
- Italy Branch  
Tel: (039)68701 Fax: (039)6870205
- Spain Branch  
Tel: (91)660-6798 Fax: (91)660-6799
- U.K. Branch  
Tel: (1252)5300 Fax: (1252)53-0250
- Sweden Branch  
Tel: (8)704-0900 Fax: (8)80-8459

**Toshiba Electronics Asia (Singapore) Pte. Ltd.**

Tel: (6278)5252 Fax: (6271)5155

**Toshiba Electronics Service (Thailand) Co., Ltd.**

Tel: (02)501-1635 Fax: (02)501-1638

**Toshiba Electronics Trading (Malaysia) Sdn. Bhd.**

- Kuala Lumpur Head Office  
Tel: (03)5631-6311 Fax: (03)5631-6307
- Penang Office  
Tel: (04)226-8523 Fax: (04)226-8515

**Toshiba Electronics Asia, Ltd.**

- Hong Kong Head Office  
Tel: 2375-6111 Fax: 2375-0969
- Beijing Office  
Tel: (010)6590-8796 Fax: (010)6590-8791
- Chengdu Office  
Tel: (028)8675-1773 Fax: (028)8675-1065
- Qingdao Office  
Tel: (532)8579-3328 Fax: (532)8579-3329

**Toshiba Electronics Shenzhen Co., Ltd.**

Tel: (0755)2399-6897 Fax: (0755)2399-5573

**Toshiba Electronics (Shanghai) Co., Ltd.**

- Shanghai Head Office  
Tel: (021)6841-0666 Fax: (021)6841-5002

- Hangzhou Office  
Tel: (0571)8717-5004 Fax: (0571)8717-5013

- Nanjing Office  
Tel: (025)8689-0070 Fax: (025)8689-0125

**Toshiba Electronics (Dalian) Co., Ltd.**

Tel: (0411)8368-6882 Fax: (0411)8369-0822

**Tsurong Xiamen Xiangyu Trading Co., Ltd.**

Tel: (0592)226-1398 Fax: (0592)226-1399

**Toshiba Electronics Korea Corporation**

- Seoul Head Office  
Tel: (02)3484-4334 Fax: (02)3484-4302
- Daegu Office  
Tel: (053)428-7610 Fax: (053)428-7617

**Toshiba Electronics Taiwan Corporation**

- Taipei Head Office  
Tel: (02)2508-9988 Fax: (02)2508-9999
- Kaohsiung Office  
Tel: (07)237-0826 Fax: (07)236-0046

- ▶ Toshiba Corporation, and its subsidiaries and affiliates (collectively "TOSHIBA"), reserve the right to make changes to the information in this document, and related hardware, software and systems (collectively "Product") without notice.
- ▶ This document and any information herein may not be reproduced without prior written permission from TOSHIBA. Even with TOSHIBA's written permission, reproduction is permissible only if reproduction is without alteration/omission.
- ▶ Though TOSHIBA works continually to improve Product's quality and reliability, Product can malfunction or fail. Customers are responsible for complying with safety standards and for providing adequate designs and safeguards for their hardware, software and systems which minimize risk and avoid situations in which a malfunction or failure of Product could cause loss of human life, bodily injury or damage to property, including data loss or corruption. Before customers use the Product, create designs including the Product, or incorporate the Product into their own applications, customers must also refer to and comply with (a) the latest versions of all relevant TOSHIBA information, including without limitation, this document, the specifications, the data sheets and application notes for Product and the precautions and conditions set forth in the "TOSHIBA Semiconductor Reliability Handbook" and (b) the instructions for the application with which the Product will be used with or for. Customers are solely responsible for all aspects of their own product design or applications, including but not limited to (a) determining the appropriateness of the use of this Product in such design or applications; (b) evaluating and determining the applicability of any information contained in this document, or in charts, diagrams, programs, algorithms, sample application circuits, or any other referenced documents; and (c) validating all operating parameters for such designs and applications. **TOSHIBA ASSUMES NO LIABILITY FOR CUSTOMERS' PRODUCT DESIGN OR APPLICATIONS.**
- ▶ Product is intended for use in general electronics applications (e.g., computers, personal equipment, office equipment, measuring equipment, industrial robots and home electronics appliances) or for specific applications as expressly stated in this document. Product is neither intended nor warranted for use in equipment or systems that require extraordinarily high levels of quality and/or reliability and/or a malfunction or failure of which may cause loss of human life, bodily injury, serious property damage or serious public impact ("Unintended Use"). Unintended Use includes, without limitation, equipment used in nuclear facilities, equipment used in the aerospace industry, medical equipment, equipment used for automobiles, trains, ships and other transportation, traffic signaling equipment, equipment used to control combustions or explosions, safety devices, elevators and escalators, devices related to electric power, and equipment used in finance-related fields. Do not use Product for Unintended Use unless specifically permitted in this document.
- ▶ Do not disassemble, analyze, reverse-engineer, alter, modify, translate or copy Product, whether in whole or in part.
- ▶ Product shall not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable laws or regulations.
- ▶ The information contained herein is presented only as guidance for Product use. No responsibility is assumed by TOSHIBA for any infringement of patents or any other intellectual property rights of third parties that may result from the use of Product. No license to any intellectual property right is granted by this document, whether express or implied, by estoppel or otherwise.
- ▶ **ABSENT A WRITTEN SIGNED AGREEMENT, EXCEPT AS PROVIDED IN THE RELEVANT TERMS AND CONDITIONS OF SALE FOR PRODUCT, AND TO THE MAXIMUM EXTENT ALLOWABLE BY LAW, TOSHIBA (1) ASSUMES NO LIABILITY WHATSOEVER, INCLUDING WITHOUT LIMITATION, INDIRECT, CONSEQUENTIAL, SPECIAL, OR INCIDENTAL DAMAGES OR LOSS, INCLUDING WITHOUT LIMITATION, LOSS OF PROFITS, LOSS OF OPPORTUNITIES, BUSINESS INTERRUPTION AND LOSS OF DATA, AND (2) DISCLAIMS ANY AND ALL EXPRESS OR IMPLIED WARRANTIES AND CONDITIONS RELATED TO SALE, USE OF PRODUCT, OR INFORMATION, INCLUDING WARRANTIES OR CONDITIONS OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, ACCURACY OF INFORMATION, OR NON-INFRINGEMENT.**
- ▶ Do not use or otherwise make available Product or related software or technology for any military purposes, including without limitation, for the design, development, use, stockpiling or manufacturing of nuclear, chemical, or biological weapons or missile technology products (mass destruction weapons). Product and related software and technology may be controlled under the Japanese Foreign Exchange and Foreign Trade Law and the U.S. Export Administration Regulations. Export and re-export of Product or related software or technology are strictly prohibited except in compliance with all applicable export laws and regulations.
- ▶ Product may include products subject to foreign exchange and foreign trade control laws.
- ▶ Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product. Please use Product in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. TOSHIBA assumes no liability for damages or losses occurring as a result of noncompliance with applicable laws and regulations.