

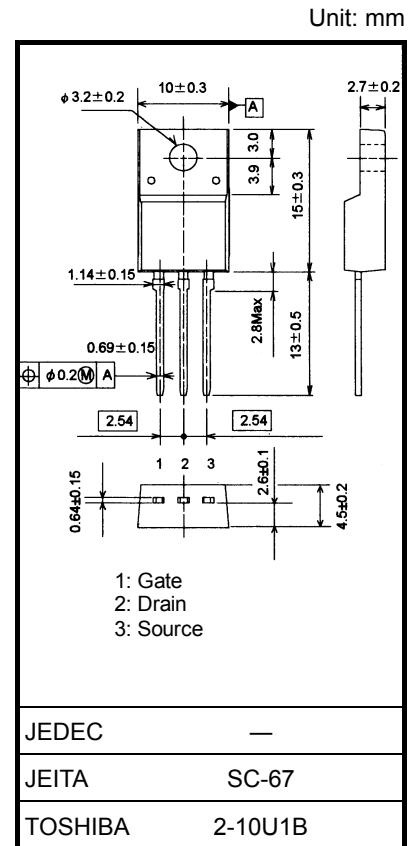
TK30A06J3A

Switching Regulator Applications

- Low drain-source ON-resistance: $R_{DS(ON)} = 19\text{ m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 34\text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = 10\text{ }\mu\text{A}$ (max) ($V_{DS} = 60\text{ V}$)
- Enhancement mode: $V_{th} = 1.3\text{ to }2.5\text{ V}$ ($V_{DS} = 10\text{ V}$, $I_D = 1\text{ mA}$)

Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

Characteristics	Symbol	Rating	Unit
Drain-source voltage	V_{DSS}	60	V
Drain-gate voltage ($R_{GS} = 20\text{ k}\Omega$)	V_{DGR}	60	V
Gate-source voltage	V_{GSS}	± 20	V
Drain current	DC (Note 1)	I_D	30 A
	Pulse (Note 1)	I_{DP}	90 A
Drain power dissipation ($T_c = 25^\circ\text{C}$)	P_D	25	W
Single pulse avalanche energy (Note 2)	E_{AS}	40	mJ
Avalanche current	I_{AR}	30	A
Repetitive avalanche energy (Note 3)	E_{AR}	2.5	mJ
Channel temperature	T_{ch}	150	$^\circ\text{C}$
Storage temperature range	T_{stg}	-55 to 150	$^\circ\text{C}$



Weight : 1.7 g (typ.)

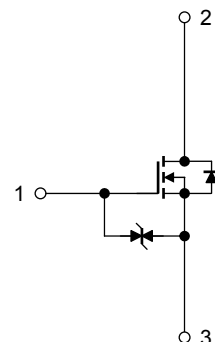
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings. Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook (“Handling Precautions”/“Derating Concept and Methods”) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case	$R_{th(ch-c)}$	5.0	$^\circ\text{C} / \text{W}$
Thermal resistance, channel to ambient	$R_{th(ch-a)}$	62.5	$^\circ\text{C} / \text{W}$

- Note 1: Ensure that the channel temperature does not exceed 150°C .
 Note 2: $V_{DD} = 25\text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 60\text{ }\mu\text{H}$, $R_G = 25\text{ }\Omega$, $I_{AR} = 30\text{ A}$
 Note 3: Repetitive rating: Pulse width limited by maximum channel temperature

This transistor is an electrostatic-sensitive device. Handle with care.



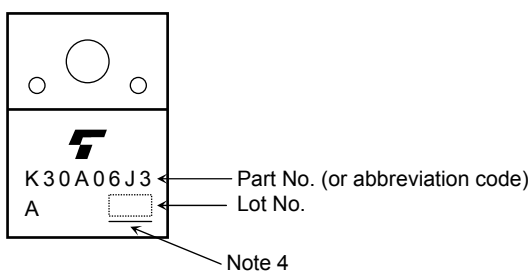
Electrical Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit	
Gate leakage current	I_{GSS}	$V_{GS} = \pm 16\text{ V}, V_{DS} = 0\text{ V}$	—	—	± 10	μA	
Drain cut-off current	I_{DSS}	$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}$	—	—	10	μA	
Drain-source breakdown voltage	$V_{(BR)DSS}$	$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$	60	—	—	V	
	$V_{(BR)DSX}$	$I_D = 10\text{ mA}, V_{GS} = -20\text{ V}$	35	—	—		
Gate threshold voltage	V_{th}	$V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$	1.3	—	2.5	V	
Drain-source ON-resistance	$R_{DS(ON)}$	$V_{GS} = 4.5\text{ V}, I_D = 15\text{ A}$	—	24	35	m Ω	
		$V_{GS} = 10\text{ V}, I_D = 15\text{ A}$	—	19	26		
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 15\text{ A}$	17	34	—	S	
Input capacitance	C_{iss}	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	1950	—	pF	
Reverse transfer capacitance	C_{rss}		—	140	—		
Output capacitance	C_{oss}		—	230	—		
Switching time	Rise time	t_r		—	4	—	ns
	Turn-on time	t_{on}		—	16	—	
	Fall time	t_f		—	8	—	
	Turn-off time	t_{off}		Duty $\leq 1\%$, $t_w = 10\ \mu\text{s}$	—	48	
Total gate charge (Gate-source plus gate-drain)	Q_g	$V_{DD} \approx 48\text{ V}, V_{GS} = 10\text{ V}, I_D = 30\text{ A}$	—	36	—	nC	
Gate source charge	Q_{gs}		—	26	—		
Gate-drain ("miller") charge	Q_{gd}		—	10	—		

Source-Drain Ratings and Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I_{DR}	—	—	—	30	A
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	90	A
Forward voltage (diode)	V_{DSF}	$I_{DR} = 30\text{ A}, V_{GS} = 0\text{ V}$	—	—	-1.5	V
Reverse recovery time	t_{rr}	$I_{DR} = 30\text{ A}, V_{GS} = 0\text{ V}$	—	40	—	ns
Reverse recovered charge	Q_{rr}	$dI_{DR} / dt = 50\text{ A} / \mu\text{s}$	—	32	—	nC

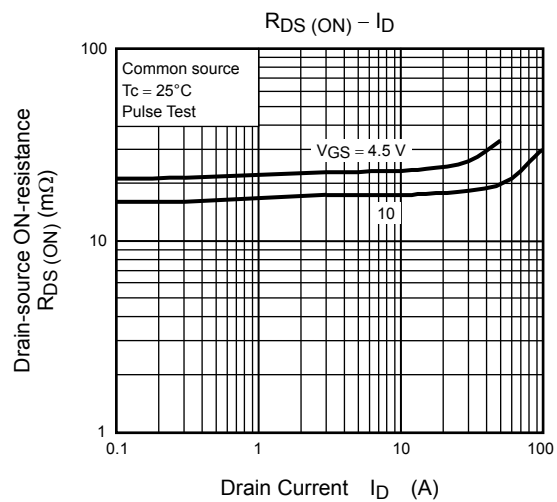
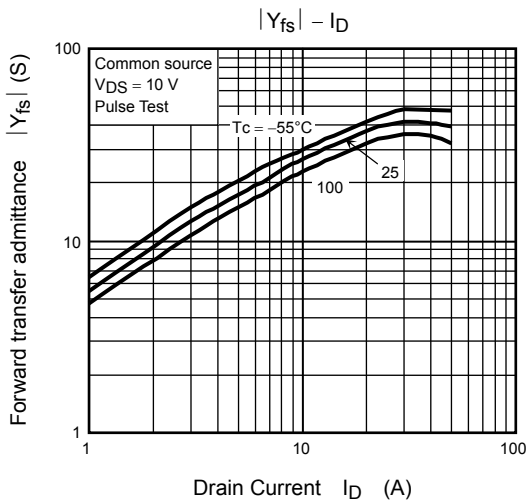
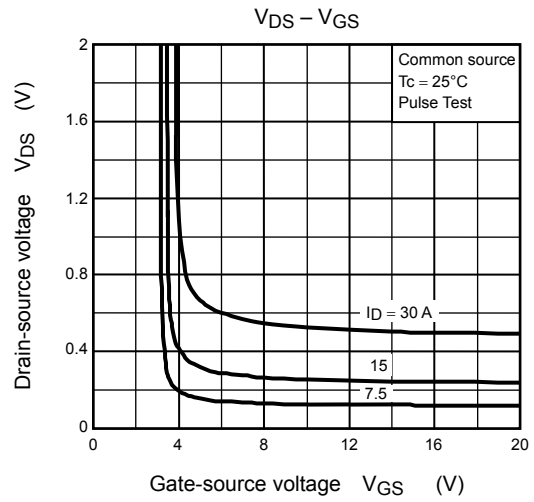
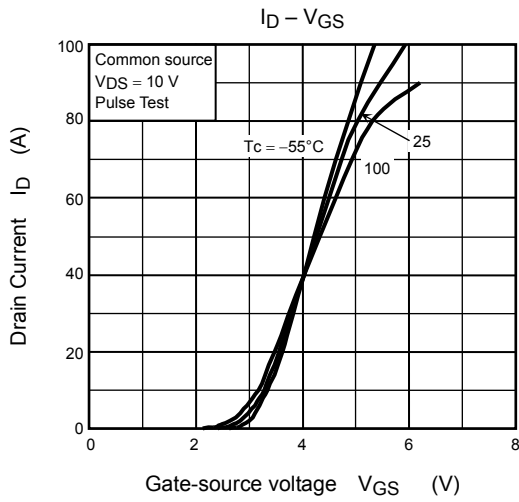
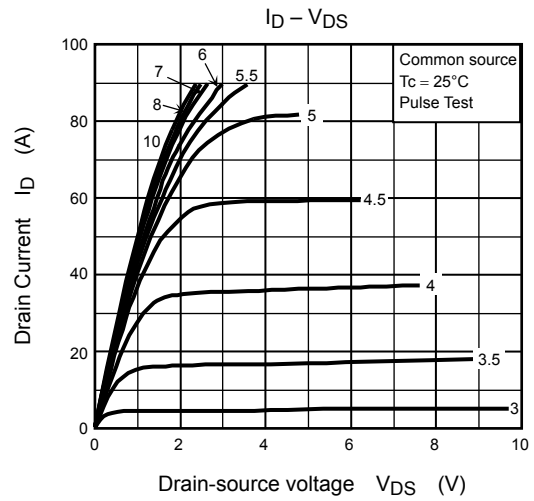
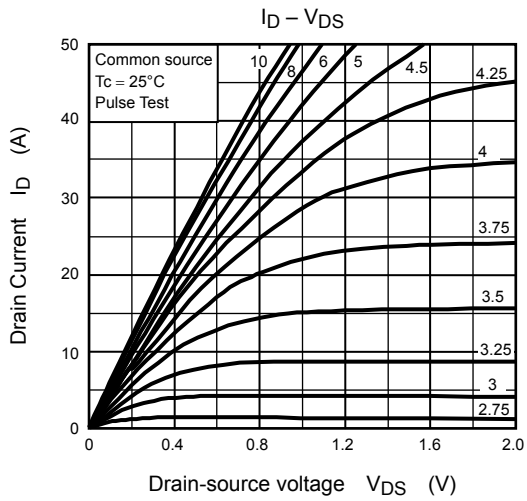
Marking

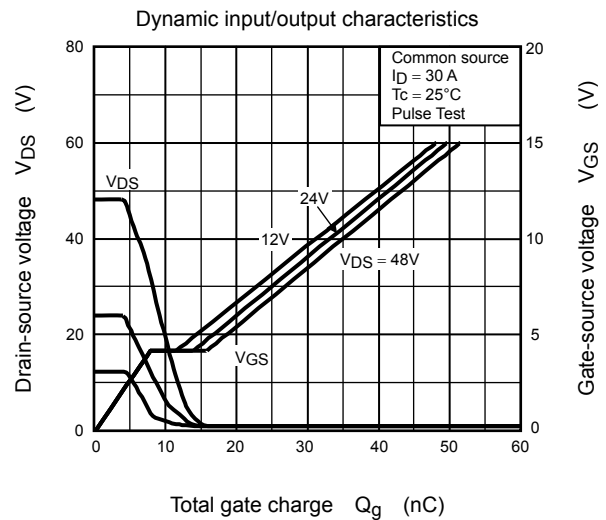
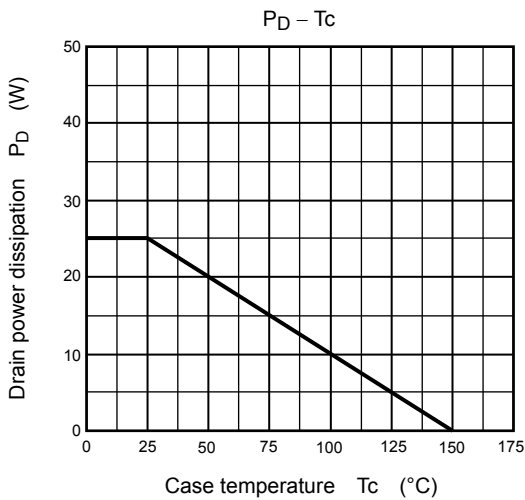
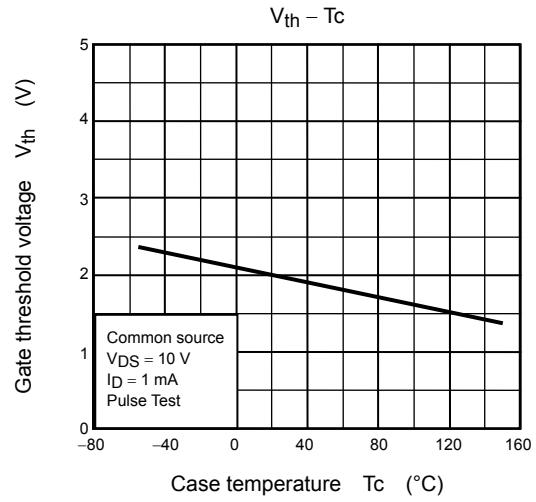
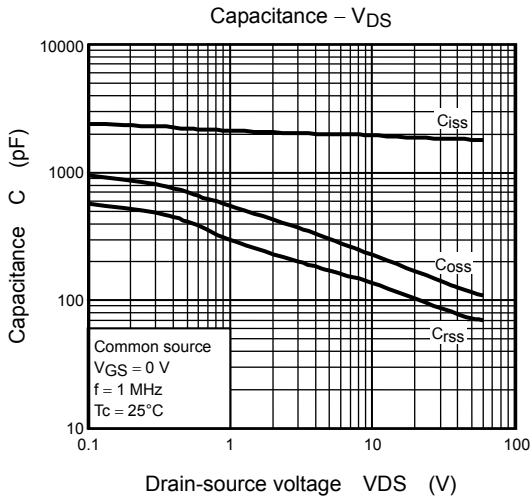
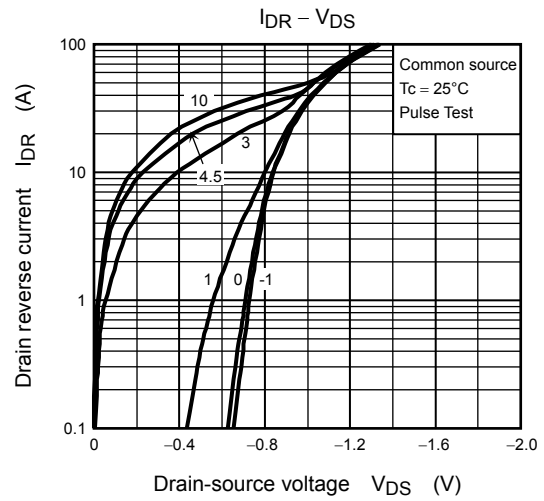
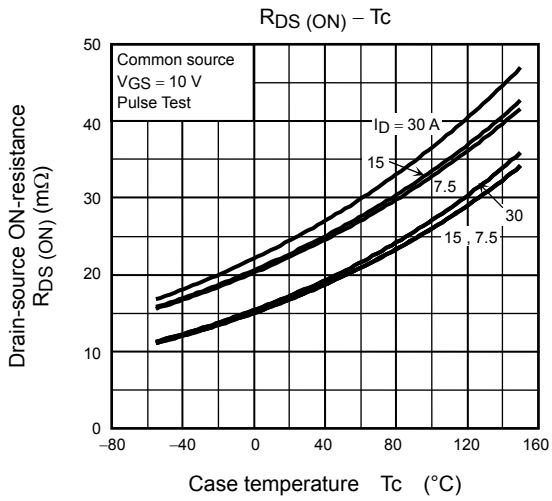


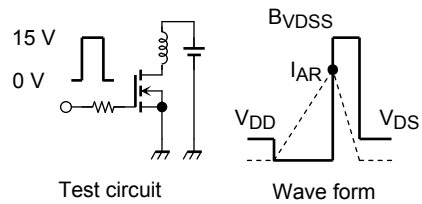
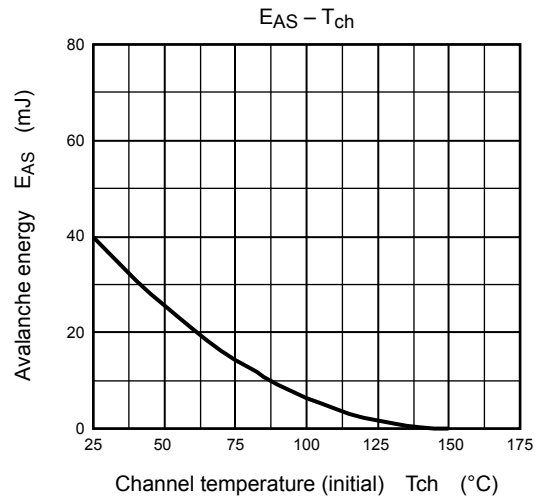
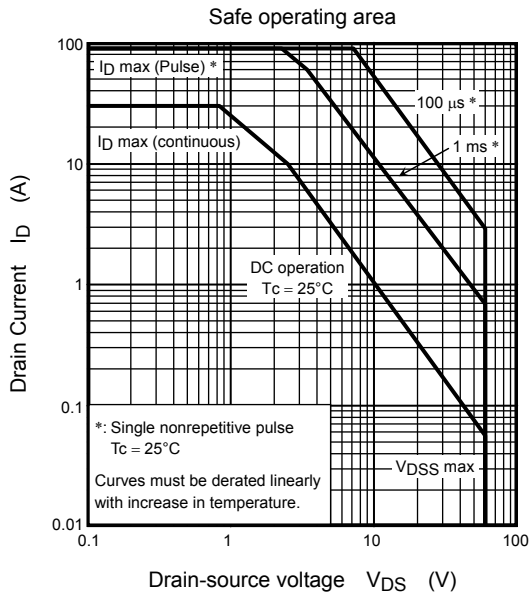
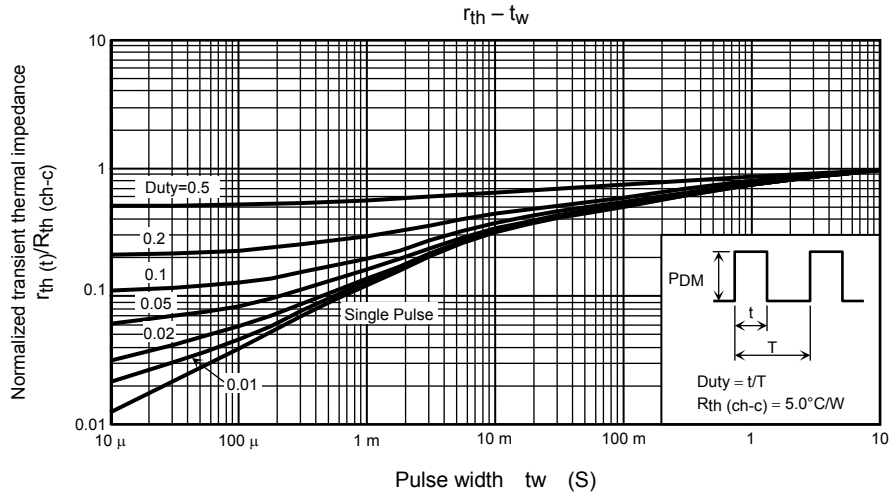
Note 4: A line under a Lot No. identifies the indication of product Labels.

[[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

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$$R_G = 25 \Omega$$

$$V_{DD} = 25 \text{ V}, L = 60 \mu\text{H}$$

$$E_{AS} = \frac{1}{2} \cdot L \cdot I^2 \cdot \left(\frac{BVDSS}{BVDSS - V_{DD}} \right)$$

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