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# *Thunderbolt Cable Presentation*



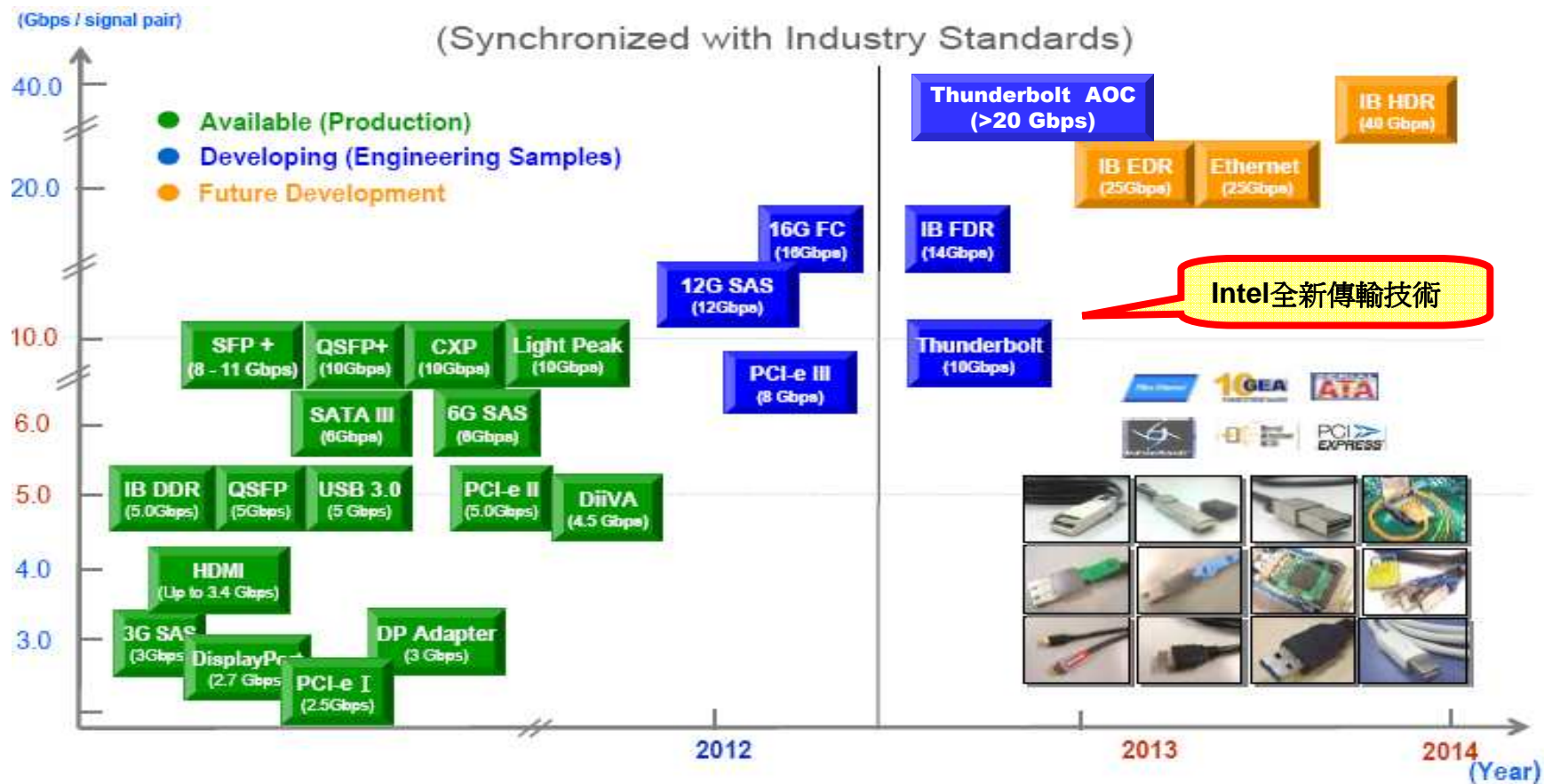
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# 1. Roadmap

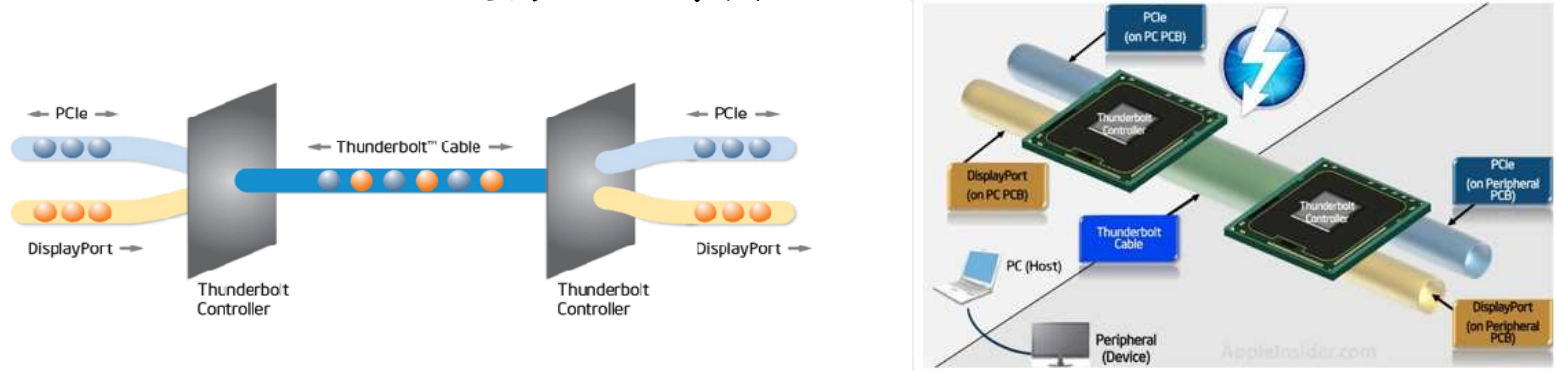
## High Speed Cable Product Roadmap



Key Message: Thunderbolt ACC/AOC 為 Foxconn 正在開發之產品

## 2. Thunderbolt ACC優勢

### 2.1 Thunderbolt ACC優勢-----傳輸信號特性



Key Message: 同時傳輸 PCIe and DisplayPort 信號

### 2.2 Thunderbolt ACC優勢-----接口小型化

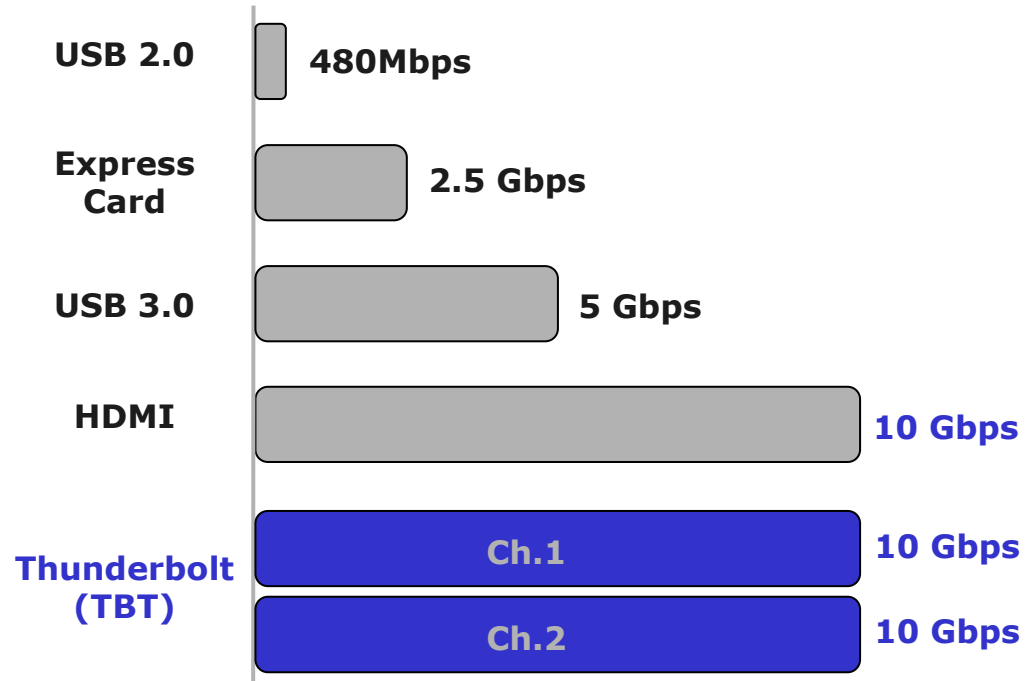


Key Message: 更小的界面符合產品小型化和高密度接口排列市場趨勢要求



### 2.3 Thunderbolt ACC優勢-----傳輸速率快

#### \*Highest Transfer Speed



**Key Message:** 双通道各10 Gbps传输速率，理论上每秒传1280 MB数据；而在 Engadget 的上手试验中，5GB 的数据传输仅用了“几秒钟”，相当华丽。



### 2.4 Thunderbolt 優勢-----擴展性強



- Key Message:**
1. 多显示器支持，由于可以单端口连接 6 个设备，理论上，你可以组织 7 屏工作平台了。
  2. 超高速磁盘阵列，通过用 SSD 架设 Raid，配合 Thunderbolt 可以获得极为夸张的磁盘性能，这对于图形处理、影像渲染等专业工作会有好处。
  3. Thunderbolt 还可为外设供给 10 W 功率，以便从事工作站级别的项目。

### 3. Thunderbolt Application



TV



Notebook



PC



Cameras

Video Capture Interfaces



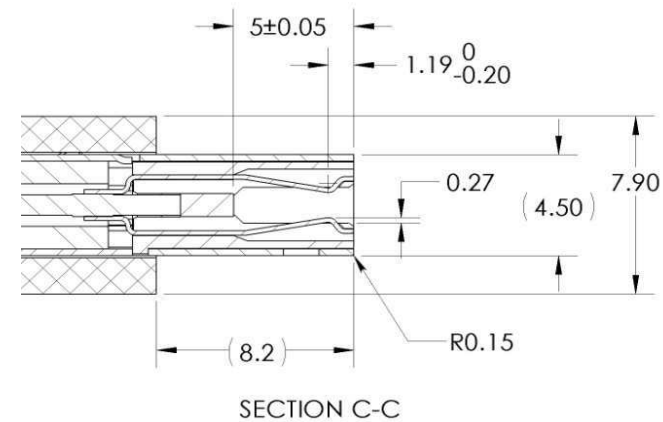
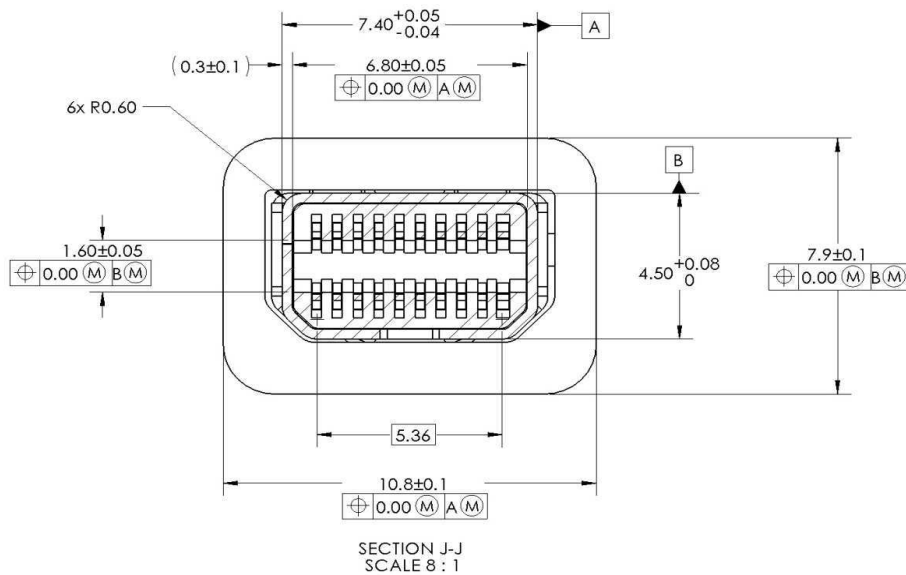
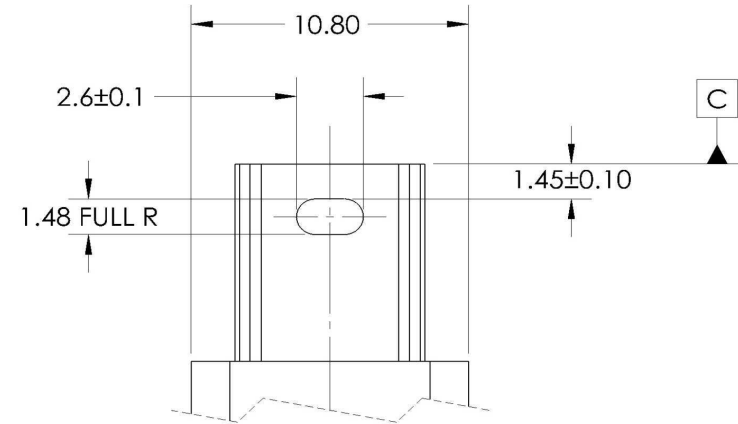
Audio, Video Creation Interfaces



**Key Message:** 廣泛應用與 TV、Notebook、PC、Storage、音/視頻播放器及數碼產品；  
結合適配器轉換Firewire、千兆以太网等更多應用

# 4. Thunderbolt Cable Spec.

## 4.1 Thunderbolt Cable Spec.-----Plug Size





## 4. Thunderbolt Cable Spec.

### 4.2 Thunderbolt Cable Spec.----- *Electrical Performance*

Table 7-2. Thunderbolt Mated Connector S-parameter Specifications, referenced to 85 Ohm Differential Impedance

Symbol	Channel Parameters	Min	Target Value	Max	Units	Conditions
S <sub>DD21</sub>	Insertion Coefficient	See Note 1			dB	0.01 to 7 GHz, <a href="#">Figure 7-11</a>
		See Note 2		Figure 7-11	dB	7-20 GHz, <a href="#">Figure 7-11</a>
S <sub>DD11</sub> , S <sub>DD22</sub>	Differential Return Coefficient			-12	dB	0.01 to 2.5 GHz, <a href="#">Figure 7-13</a>
				See Note 3	dB	2.5 to 15 GHz, <a href="#">Figure 7-13</a>
S <sub>CC11</sub> , S <sub>CC22</sub>	Common Mode Return Coefficient			-5	dB	0.01 to 5.5 GHz
				-3	dB	5.5 to 10 GHz
S <sub>CD21</sub>	Common Mode to Differential Insertion Coefficient			-20	dB	0.01 to 5.5 GHz
				-14	dB	5.5 to 10 GHz
Symbol	Channel Parameters	Min	Target Value	Max	Units	Conditions
S <sub>CD11</sub>	Common Mode to Differential Return Coefficient			-20	dB	0.01 to 5.5 GHz
				-14	dB	5.5 to 10 GHz
NEXT	Near End Crosstalk Coefficient			-27	dB	0.01 to 10 GHz
Differential Insertion Coefficient given by equation $S_{DD21}(dB) > -0.1 - 0.5 \times f$ , with f in GHz for $0.01 < f < 7$ Differential Insertion Coefficient given by equation $S_{DD21}(dB) > 6.9 - 1.5 \times f$ , with f in GHz for $7 < f < 20$ Differential Return Coefficient given by equation $S_{DD11}/S_{DD22} (dB) > -6.87 + 15 \times \log_{10}(f/5.5)$ , with f in GHz for $2.5 < f < 15$						

## 4. Thunderbolt Cable Spec.

### 4.2 Thunderbolt Cable Spec.----- *Electrical Performance*

Table 2-5. TBT-C Electrical Performance Requirements

Item	Test condition	Acceptance criteria	
Low level contact resistance	Mated connectors. Contact: measured by dry circuit, 20mV maximum and 10mA. Shell: measured by open circuit, 5V maximum and 100mA. (EIA-364-23)	Contact resistance	Contact: 30mΩ maximum change from initial value Shell: 50mΩ maximum change from initial value
Dielectric strength	Unmated connectors. Apply 500Vrms between adjacent terminal and ground. (EIA-364-20, method 301)	Dielectric strength	No breakdown
	Mated connectors. Apply 300Vrms between adjacent terminal and ground. (EIA-364-20, method 301)	Dielectric strength	No breakdown
Insulation resistance	Unmated connector. Apply 500V DC between adjacent terminal and ground. (EIA-364-21, method 302)	Insulation resistance	100MΩ minimum
	Mated connector. Apply 150V DC between adjacent terminal and ground. (EIA-364-21, method 302)	Insulation resistance	10MΩ minimum

Item	Test condition	Acceptance criteria	
Contact current rating	55C, maximum ambient 85C, maximum temperature change (EIA-364-70)	Contact current rating	0.5A minimum
Applied voltage rating	40Vrms continuous maximum on any signal pin with respect to the shield.	Applied voltage rating	No breakdown
ESD	Test unmated connectors from 1kV to 8kV in 1kV steps using 8mm ball probe. (IEC61000-4-2)	ESD	No evidence of discharge to contacts at 8kV.

## 4. Thunderbolt Cable Spec.

### 4.3 Thunderbolt Cable Spec.----- Mechanical Performance

Table 9-5. TBT-C Mechanical Performance Requirements

Item	Test condition	Acceptance criteria	
Vibration	Amplitude: 1.52mm P-P or 147m/s <sup>2</sup> [15G]  Sweep time: 50-2000-50Hz in 20 minutes.  Duration: 12 times in each of X, Y, Z axes (total of 36 times)  (EIA-364-28 condition III method 5A)	Appearance	No physical damage
		Link Communication	No Link Loss
Shock	Amplitude of 30g, 11ms duration, half-sine shock pulse.  Duration: 3 times in each of X, Y, Z axes (total of 18 times).  (EIA-364-27 condition H)	Appearance	No physical damage
		Link Communication	No link loss except on cable disengage direction
Cable pull out	40N axial load for at least 1 minute with plug head clamped.  (EIA-364-38)	Appearance	No physical damage
		Link Communication	No link loss
Strain relief	100 cycles in each of 2 planes.	Appearance	No physical damage
Item	Test condition	Acceptance criteria	
flexing	(EIA-364-41, condition I)	Link Communication	No link loss

## 4. Thunderbolt Cable Spec.

### 4.3 Thunderbolt Cable Spec.----- *Environment Performance*

Table 9-6. TBT-C Environmental Performance Requirements

Item	Test condition	Requirement	
Thermal shock	Cable or plug is not mated to receptacle.  10 cycles of: a) -55C for 30 minutes b) +85C for 30 minutes  Measurements taken after test.  (EIA-364-32, condition I)	Appearance	No physical damage
		Link Communication	No Link Loss
Temperature and humidity cycling	Cable or plug is mated to receptacle.  Temperature: +25C to 85C  Relative humidity: 80 to 95%  Duration: four cycles (96 hours)  Upon completion of the test, DUT must be conditioned at ambient room conditions for 24 hours, after which the specified measurements must be performed.  (EIA-364-31)	Link Communication	No Link Loss
Item	Test condition	Requirement	
Thermal aging	Cable or plug is mated to receptacle and is exposed to (105±2C) for 250 hours. Upon completion of the exposed period, the test specimens must be conditioned at ambient room conditions for one to two hours after which the specified measurements to be performed.  (EIA-364-17, condition 4, method time condition B)	Link Communication	No Link Loss



Thank You!