

## TECHNICAL SPECIFICATIONS

### PROTOCOL

- **Thunderbolt**  
700MB/s max PCIe 2.0 x4  
750MB/s max DP 1.1a
- **Thunderbolt 2**  
1375MB/s max PCIe 2.0 x4
- **Thunderbolt 3**  
2750MB/s max PCIe 3.0 x4

### BITRATE

- **Thunderbolt™ – 10Gbps**  
10Gb/s dedicated to Display; 10Gb/s dedicated to PCIe
- **Thunderbolt™ 2 – 20Gbps**  
(2) 10Gb/s bi-directional channels aggregated into a single 20Gb/s bi-directional channel
- **Thunderbolt™ 3 – 40Gbps**  
(2) 20Gb/s bi-directional channels aggregated into a single 40Gb/s bi-directional channel.

### CABLING

- Same cable for Thunderbolt and Thunderbolt 2
- Optical – 100m max distance
- Copper – 3m max distance
- Thunderbolt 3 uses USB-C passive and active Thunderbolt cabling

### OS SUPPORT

- Mac OS X
- Windows

## PERFORMANCE SPECS

### COMPATIBILITY

- 10Gb Thunderbolt technology is forwards compatible with Thunderbolt 2.
- 20Gb Thunderbolt 2 technology is backwards compatible with Thunderbolt.
- 40Gb Thunderbolt 3 technology is backwards compatible with Thunderbolt 1 and 2

### LIMITATIONS

- Performance will be bottlenecked for every device downstream of a previous generation. Thunderbolt technology-enabled device in the chain.
- Note: Legacy Thunderbolt technology-enabled devices should be connected at the end of the chain.
- Display traffic takes priority over PCIe traffic.

### 4K WORKFLOW

- Thunderbolt 3 supports uncompromised 4K workflows.
- Thunderbolt 2 supports 4K output via one Thunderbolt connector.
- Thunderbolt supports 4K output through dual Thunderbolt connectors, each on a dedicated bus.

Thunderbolt™ technology, co-development by Intel and Apple, is a transformational I/O protocol that significantly simplify the end-user experience by concurrently supporting data (PCI Express) and display (DisplayPort) connections over a single cable.

## THUNDERBOLT BENEFITS




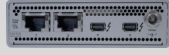




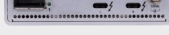
- Capture and edit multiple uncompressed video streams in real time.
- Edit and view video while simultaneously backing up your content over a single cable connection.
- Backup and restore 1TB of content in less than 5 minutes.
- Daisy chain data and displays to simplify your workflow.

## THUNDERBOLT 2 BENEFITS

- Display raw 4K video and backup content at the same time.
- Transfer the total production quantity of a typical 4K TV drama in less than an hour.
- Faster digital content archiving and back up.

## THUNDERBOLT 3 BENEFITS

- Connect to new high-speed protocols via mobile workstations.
- Transfer Rate: Up to 40Gb/s
- Transfer 4K movie in under 30 seconds
- Capture, ingest, edit and backup uncompressed footage at exciting new speeds
- Backwards compatible via legacy adapter

Device	Model	Front End Protocol	Back End Protocol	OS Support
	TSSC-4808	(2) Thunderbolt™ 2	(2)x4 6Gb SAS/SATA RAID	Mac OS® X 10.9 or later Windows® 7 or later
	TLSH-2068	(2) Thunderbolt™ 2	(2)x4 6Gb SAS/SATA	Mac OS® X 10.9 or later Windows® 7 or later
	TLFC-2082	(2) Thunderbolt™ 2	(2) 8Gb Fibre Channel	Mac OS® X 10.9 or later Windows® 7 or later
	TLNT-2102	(2) Thunderbolt™ 2	(2) 10GbE RJ-45 Copper	Mac OS® X 10.9 or later Windows® 7 or later
	TLNS-2102	(2) Thunderbolt™ 2	(2) 10GbE SFP+ LC Optical	Mac OS® X 10.9 or later Windows® 7 or later
	TLNS-2101	(2) Thunderbolt™ 2	(1) 10GbE SFP+ LC Optical	Mac OS® X 10.9 or later Windows® 7 or later
	TLFC-2162	(2) Thunderbolt™ 2	(2) 16Gb Fibre Channel	Mac OS® X 10.9 or later Windows® 7 or later
	TLNQ-3402	(2) Thunderbolt™ 3	(2) 40GbE QSFP+	Windows® 7 or later
	TLNQ-3401	(2) Thunderbolt™ 3	(1) 40 GbE QSFP	Windows® 7 or later