Electronic Links International, Inc.

Interconnecting Components and Systems.

Data Sheet

Thunderbolt Cable

The fastest connection to your PC.

Thunderbolt™ Technology

Transforming device interconnectivity, Thunderbolt™ technology is a dual protocol I/O innovation that dramatically increases transfer performance with bi-directional 10Gbps speed and offers daisy chaining to multiple devices, providing flexibility and simplicity for innovative, thin system designs like laptops and Ultrabooks™.

Overview:

This specification defines the requirement and behavior of Thunderbolt (TBT) cable. The cable connect to host systems or devices' Thunderbolt connector, which provides concurrent support for PCI Express transaction and DisplayPort format isochronous communication on a single network style interface, allowing the host or device to communicate at high bandwidth with multiple data/display device through a single physical connector.

The configuration of TBT controller connected with PCB traces to a TBT connector are allowed for the TBT cable. The TBT cable is either an active electrical cable or an active optical cable. This document specifies the electrical and mechanical properties of the TBT2CExxx cable.

Key innovations introduced in TBT technology includes:

- A highly efficient, low-overhead packet format with flexible QoS support that allows multiplexing of bursty PCI express transactions with isochronous DisplayPort communication on the same link.
- A symmetric architecture that supports flexible topologies and enables peer-to-peer communica tions between devices.
- A novel time synchronization protocol that allows the TBT products to synchronize their time of each other.

Available in 0.5M, 1M and 2M. White / black color.

Features:

- An active electrical cable use Thunderbolt technology to deliver great responsiveness with data and display transfers at 20 Gbps no sharing of bandwidth between connectors
- Dual-protocol support (PCI Express and DisplayPort), and compatible with existing DisplayPort devices .
- Can be used for daisy-chaining devices.
- Low latency with highly accurate time synchronization for professional audio and video applications.
- Based on a switched fabric architecture with dual simplex links.
- Provides the connections for short and long distance, and provides for at least 12W of power deliverable to a cable, and the remaining power going to the end device.

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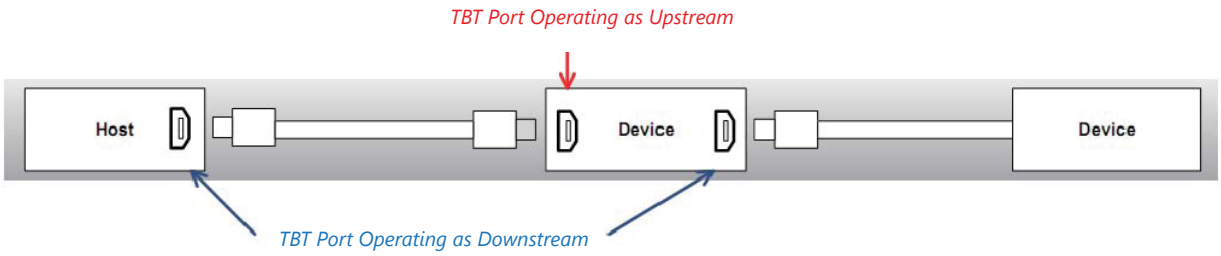
THUNDERBOLT(TBT) SYSTEM COMPONENTS

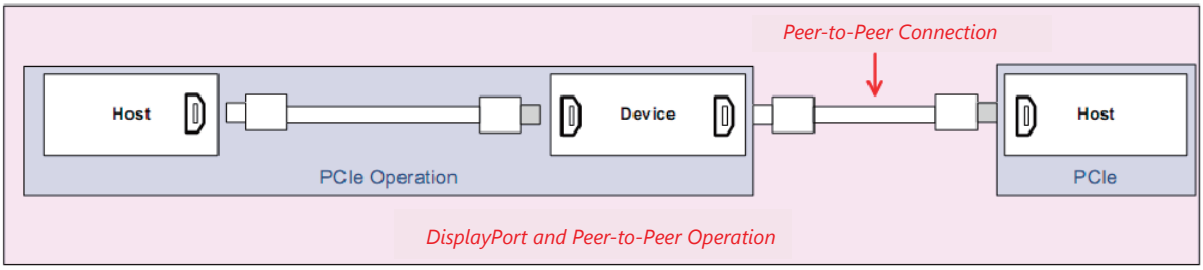
The flexible networking architecture of the TBT technology permits a range of system device to be constructed. In the case of TBT links, the two TBT ports on the TBT controller operate over a single TBT connector. The TBT link is characterized by its TBT ports operating either as "Upstream" (i.e. pointing towards a Host) or "Downstream" (pointing towards an Endpoint). When connected and configured, a network of TBT links will form a tree topology with the Upstream ports leading to a TBT Host at the root of the tree. For example, a device may exchange information with the Host on its upstream TBT connector, and may act as a conduit for information between the Host and devices connected, directly or indirectly, to its Downstream port(s). See the figure below.

TBT Link Connection Block Diagram



It is possible to connect two Host systems, resulting in an inter-domain connection, also referred to as a peer-to-peer connection. This type of connection results when two downstream ports which are leaves of two different Host trees are connected. In the inter-domain connection case, the Host systems can communicate with each other using memory to memory transactions and system software can configure display port connections over the whole TBT network, but PCIe transactions to devices can only be carried out with the Host in their tree.

TBT Peer-to-Peer Connection Block Diagram



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1.1 Key Specifications

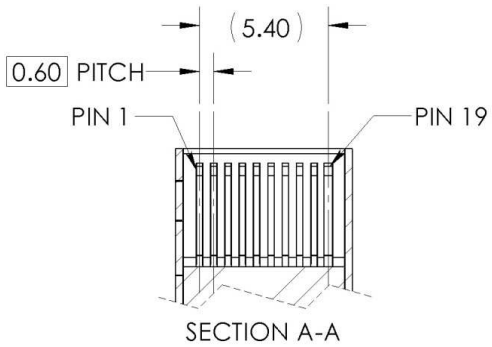
General Specification
- Length: 0.3m / 0.5m / 1m / 2m / 3m
- Connector: LOTES thunderbolt connector or compatible
- Color: Black or White
- Thunderbolt Logo Silk-Print Color: Pantone #432U (B lack) or Cool Gray 6C (White)
- Weight: 43g (typical)

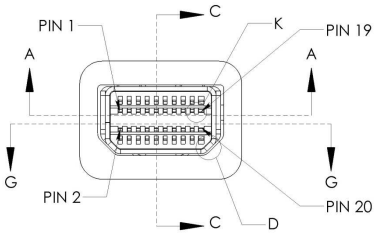
Electrical Specification
- Support 2 Lane Operation
- Throughput: 10Gbps/Channel
- Link Operating Power Consumption: 1.7W (typical)
- Operating Voltages:
  -- Low Voltage: 3.1~3.4V
  -- High Voltage: 10.5~15.75V
- Power delivery:
  -- Low Voltage: 3.1~3.4V
  -- High Voltage: 10.5~15.75V (8.5W for bus powered mode)
- UART Bound Rate: 1MHz (typical)

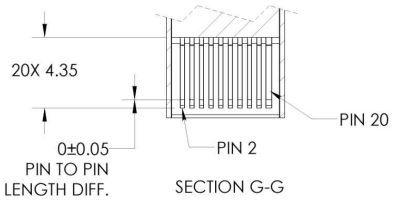
Storage and Operation temperature
- Storage Temperature: Intel Thunderbolt Standard -20~ 85°C ambient.
- Operation Temperature: Intel Thunderbolt Standard 0 ~50°C ambient.

1.2 Thunderbolt Cable Pin Definitions

PIN#	Signal Name	PIN#	Signal Name
1	PWR_Remote	2	HPD_GND
3	TBT_HD2CA_0+	4	TBT_CA2HD_0+
5	TBT_HD2CA_0-	5	TBT_CA2HD_0-
7	GND	8	GND
9	LSX_HD2CA	10	TERMINATED
11	LSX_CA2HD	12	TERMINATED
13	GND	14	GND
15	TBT_HD2CA_1+	16	TBT_CA2HD_1+
17	TBT_HD2CA_1-	18	TBT_CA2HD_1-
19	RETURN	20	Power_Local







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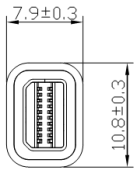
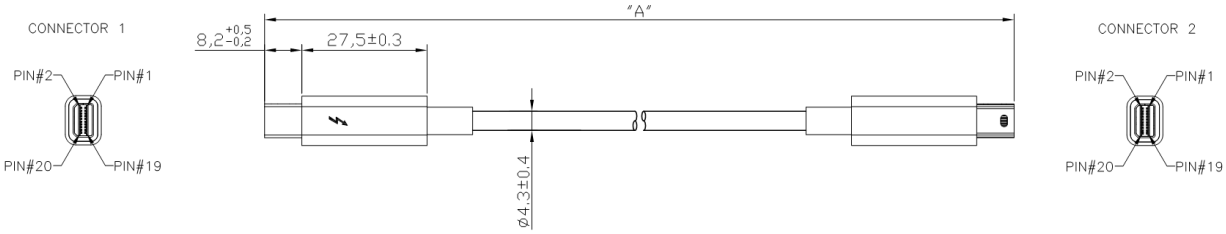
1.3 Thunderbolt Cable Mechanical Dimensions



Scale Connector1



NO	Description	"A" Dim	Tolerance
1	0.5m Electrical Thunderbolt Cable	500 mm	±20mm
2	1m Electrical Thunderbolt Cable	1,000 mm	±20mm
3	2m Electrical Thunderbolt Cable	2,000mm	±20mm

ORDER INFORMATION:

ELII-XXXX-E- F

I I I__ FIBER
I I____ ELECTRICAL
I
I_____ LENGTH: 0500 mm
1,000 mm
2, 000 mm

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