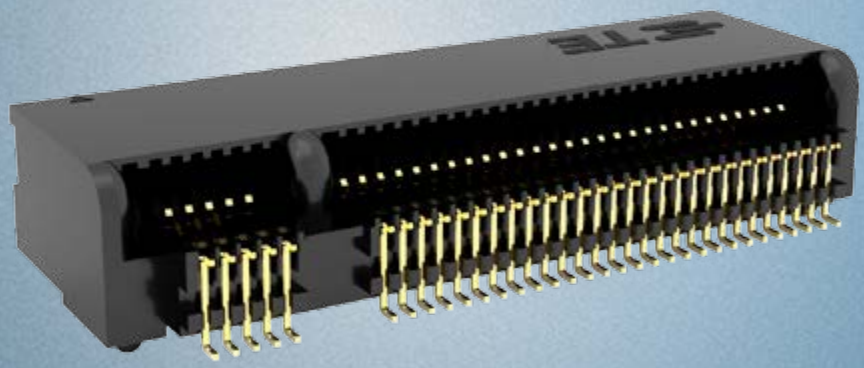
M.2 | Next Generation Form Factor



Miniature in size.
Big in possibilities.

- 0.5MM PITCH WITH 67 POSITIONS & AVAILABLE IN VARIOUS HEIGHTS
- SUPPORTS HIGHER DATA RATES IN A DENSE FORM FACTOR
- 20% SAVES MORE THAN 20% PCB REAL ESTATE COMPARED TO PCIe MINI CARD
- ENSURES PROPER MATING WITH VARIOUS MODULE CARDS

Quick Reference Guide

M.2 (NGFF) Connectors

The M.2 (Next Generation Form Factor) product line is a natural transition from the Mini Card and Half Mini Card to a smaller form factor in both size and volume. It supports multiple function add-in cards / modules including: WiFi, Bluetooth, Global Navigation Satellite Systems, Near Field Communication, Hybrid Digital Radio, Wireless Gigabit Alliance (WiGig), Wireless Wide Area Network and Solid-State Storage Devices. It also adds functionality to PCIe Gen 3, SATA 3, SATA I/O and USB 3. The new smaller form factor is suitable for applications in new thin platforms.

Features

- Available in various heights
- 0.5mm pitch with 67 positions
- Designed for both single and double-sided modules
- Available in various keying options for module cards
- Support PCI Express 3.0, USB 3.0, & SATA 3.0

Benefits

- Wide product offering to meet customers' design needs
- Save more than 20% PCB real estate compared to PCIe Mini Card
- Reduces connector height by 15%
- Ensures proper mating with various module cards
- Supports higher data rates

Applications

- Notebooks, Ultrabooks & Desktops
- Tablets
- Servers
- Portable Gaming Devices
- Devices that require SSDs
- Portable Mobile Devices

Wireless Applications

- Wi-Fi
- WWAN (2G, 3G, 4G)
- Bluetooth
- WiGig
- GPS
- Solid State Storage Device (SSD)
- Global Navigation Satellite System (GNSS)
- Near Field Communication (NFC)
- Hybrid Digital Radio (HDR)

Host Interfaces

- PCIe, PCIe LP
- SSIC
- USB (2.0, HS, 3.0)
- SDIO
- UART
- PCM/ I2S
- I2C
- SATA
- DisplayPort
- Future variants of the above

Module Nomenclature

Example: Type 2242-D2-B-M

Used for double slot module cards. Note only single slot connectors are availale.

Type XX XX - XX - X - X*

Width (mm)
12
16
22
30

Length (mm)
16
26
30
38
42
60
80
110

	Component Max Ht. (mm)	
	T Max	B Max
S1	1.2	0*
S2	1.35	0*
S3	1.5	0*
D1	1.2	1.35
D2	1.35	1.35
D3	1.5	1.35
D4	1.5	1.0

Key ID	Pin	Interface
A	8-15	PCIe X2/USB/I2C/DP X4
B	12-19	PCIe X2/SATA/USB/PCM/UIM/ SSIC/UART-12C
C	16-23	Reserved for Future Use
D	20-27	Reserved for Future Use
E	24-31	PCIe/USB/I2C/SDIO/UART/PCM
F	28-35	Reserved for Future Use
G	39-46	Future Memory Interface (FMI)
H	43-50	Reserved for Future Use
J	47-54	Reserved for Future Use
K	51-58	Reserved for Future Use
L	55-62	Reserved for Future Use
M	59-66	PCIe X4/SATA

* Only for dual slot cards.

M.2 (NGFF) Module Card Frequently Asked Questions

What type of applications use key A?

TE's M.2 key A connectors are found in applications that use wireless connectivity including Wi-Fi, Bluetooth, NFC, and / or WiGig. Module card types used include 1630, 2230 and 3030.

What type of applications use key B?

TE's M.2 key B connectors are found in applications that use WWAN+GNSS or Solid State Storage Devices (SSD). Module card types used include 3042, 2230, 2242, 2260, 2280 and 22110.

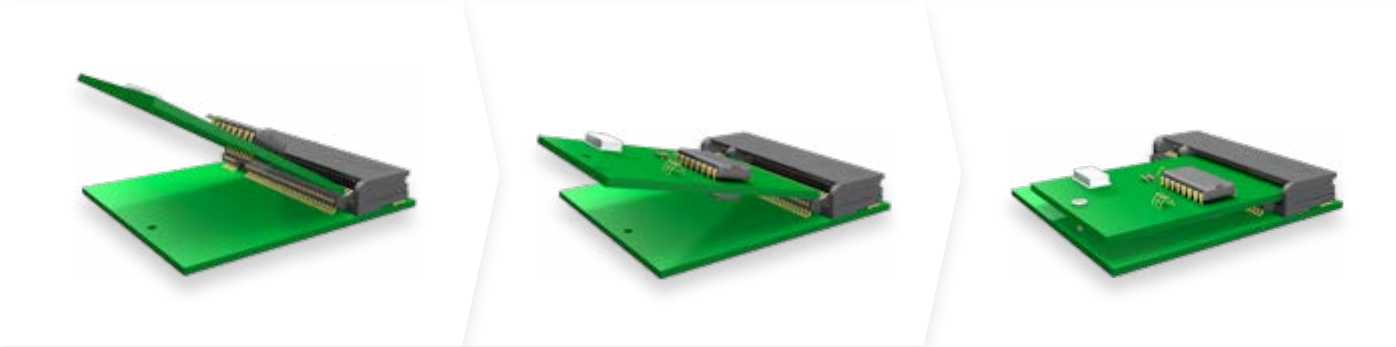
What type of applications use key E?

TE's M.2 key E connectors are found in applications that use wireless connectivity including Wi-Fi, Bluetooth, NFC of GNSS. Module card types used include 1630, 2230 and 3030.

What type of applications use key M?

TE's M.2 key M connectors are found in applications that use Host I/Fs that are supported by either PCIe with up to four lanes or SATA, as well as Solid State Storage Devices (SSD). Module card types used include 2242, 2260, 2280 and 22110.

Triple Insertion Module Method

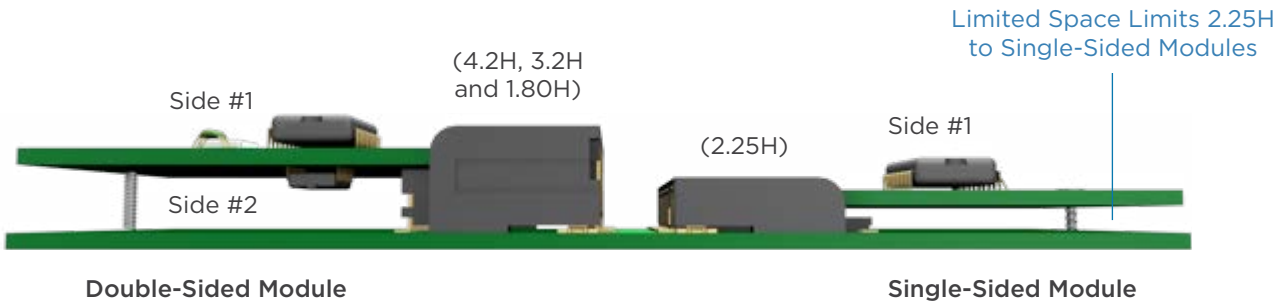


- Step 1: Move the module against the housing's chamber
- Step 2: Rotate the module to 25 degrees and insert it until the bottom of the module surface reaches the ramp
- Step 3: Rotate the module to horizontal position by hand
- Step 4: Fix the module with a PCB screw to secure the module

Please refer to the application specification for a complete description of both the insertion and removal method for modules. Note that midplane type product has a different method compared to the standard top mount product.

Application Specification: 114-115006

M.2 (NGFF) Single vs. Double-Sided Modules

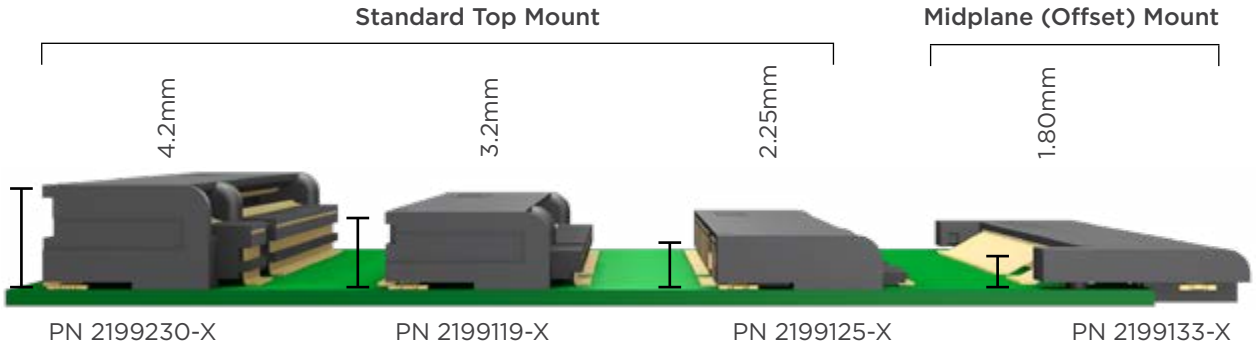


The difference between single and dual-sided modules is functionality. All soldered down type module cards are single-sided and do not have a pin layout. Single-sided modules are intended to be used in low profile applications.

There are two type of module cards, soldered down and connectorized. TE's M.2 (NGFF) product line supports the connectorized modules/ add-in cards.

Standard Product Portfolio

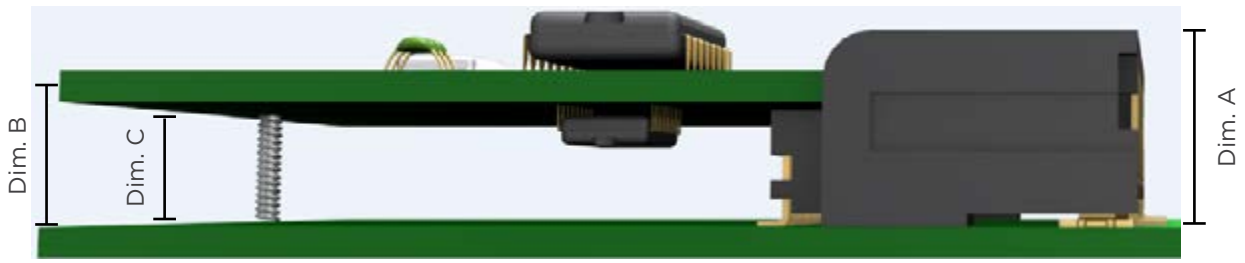
Four Heights



Base PN	Max. Height	Nominal Height Dim. A	Dim. B	Dim. C	For Double Sided Moduleses	Gold Plating			
						Key	Gold Flash	15u"	30u"
2199125-X	2.25	2.15	1.08	0.63	No	A	-7	-8	-9
						B	-1	-3	-5
						E	-2	-4	-6
						M	-13	-14	-15
2199119-X	3.2	3.1	1.94	1.48	Yes	A	-7	-8	-9
						B	-1	-3	-5
						E	-2	-4	-6
						M	-13	-15	-16
2199230-X	4.2	4.1	2.94	2.48	Yes	A	-7	-8	-9
						B	-1	-3	-5
						E	-2	-4	-6
						M	-13	-15	-16
2199133-X Midplane	1.80	1.70	-	-	Yes	A	-7	-8	-9
						B	-1	-3	-5
						E	-2	-4	-6
						M	-10	-11	-12

All Dimensions in millimeters

Dim. A: Max. connector height **Dim. B**: Card Centerline to PCB **Dim. C**: Bottom of Card to PCB



Midplane Type = Offset Type
Note that the PN list will be extended in the future to support all key types designated by industry standards groups. Please visit the product landing page for current information.

Performance Ratings

Product Specifications: 108-115042/ 108-115049

Specifications	108-115042	108-115049
Ratings		
Rated Voltage	50 VAC (per pin)	
Rated Current	0.5 A (per pin)	
Service Temperature	-40 ~ +80˚C	
Electrical Requirement		
Low-Signal Level Contact Resistance	55 m Ohm Max (Initial) & 20 m Ohm Max change allowed (Final)	
Dielectric Withstanding Voltage	No creeping discharge or flashover shall occur	
Insulation Resistance	500 M Ohm Min. (Initial) & 500 M Ohm Min. (Final)	
Current Rating	30˚C Max change allowed at rated current	
Mechancial Requirement		
Mating Force	20 N Max.	
Unmating Force	25 N Max.	
Durability	60 Cycles	
Durability (Preconditioning)	5 cycles	N/A
Vibration	No electrical discontinuity greater than 1u sec shall occur.	
Mechanical Shock	No electrical discontinuity greater than 1u sec shall occur.	
Environmental Requirement		
Humidity - Temperature Cycle	20 m Ohm Max change allowed (Final)	
Thermal Shock	20 m Ohm Max change allowed (Final)	
Temperature Life	20 m Ohm Max change allowed (Final)	
Thermal Disturbance	20 m Ohm Max change allowed (Final)	
Resistance to Reflow Soldering Heat	No evidence of physical damage	

Please refer to the product selection matrix to determine the specification per PN. There are two specifications because gold flash contact plating has a difference in durability (Preconditioning). The gold flash spec is 108-115049, and spec. 108-115042 pertains to other gold plating options.

Frequently Asked Questions

Have you considered using M.2 in applications where you currently use PCI express Mini Card connectors?

M.2 was designed to meet both the current and future market needs. M.2 saves approximately 20% of PCB real estate, reduces connector height by 15%, and supports enhanced data rates compared to PCIe Mini Card connectors.

What standards and data rates are required by your application?

M.2 can support next generation data rates which include PCIe 3.0, SATA 3.0 and USB 3.0. As the market moves towards enhanced data rates, TE Connectivity is leading the market to take advantage of enhanced data rates.

What functionality will your module card provide and how do I know which key is required by my application?

TE's M.2 connectors are designed to support all 12 keys from A to M. Choosing the appropriate key depends on the module card that you will be using. It is important to note that there are no dual key M.2 connectors but TE's M.2 connectors can support dual key modules.

Is the module / add-in card either single or double-sided?

M.2 connectors support both single and double-sided module cards. However, if your application requires double-sided module / mobile add-in cards, the 3.2H, 4.2H and Midplane products can support this need.

What are the height constraints in your application?

If your application has a height constraint, TE understands your challenges. In order to support the growing need for slimmer solutions, TE provides a very low profile, 2.25mm height top mount SMT connector, as well as an offset Midplane connector that measures 1.80mm from the PCB to the top of the connector.

Miniature in size.
Big in possibilities.

FOR MORE INFORMATION

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1-1773702-1 CS 04/2013

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