



OPEN

Compute Project

Server

DC Connectors with Sideband Pins for Peripheral Power and Control Connections

1.0.0

Product Specification

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Author: Raymond Law, LOTES

Author: Howard Andrews, LOTES

Author: Jon Lewis, Dell

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1.2. Acknowledgements

The Contributors of this Specification would like to acknowledge all the Rack and Power Project members and OCP Foundation staff for all the valuable comments during the review process.

2. Compliance with OCP Tenets

2.1. Openness

These DC power connectors are products of collaboration between multiple parties including the end-users. This specification will allow other manufacturers to build these connectors and participate in the OCP ecosystem.

2.2. Efficiency

These power connectors improve design efficiency by providing a set of standardized DC connectors that can be used for DC-MHS 48V/12V power connections as they are suitable for various peripheral applications. The additional signal pins allow for sideband control to improve component performance and reduce power consumption. These connectors are complementary to the M-PIC connectors.

2.3. Impact

As shown by numerous examples in OCP, open standards and specifications accelerate time-to-market. Furthermore, this specification will enable suppliers around the globe and thus ensure best possible supply chain and accessibility to end-users worldwide.

2.4. Scale

This specification is written to make large scale manufacturing and deployment of the connectors possible. By sharing the details of footprints and interchangeable receptacles and plugs, the community can build and deploy at scale while leveraging components from each other.

2.5. Sustainability

These power connectors promote power-saving features in server peripherals by providing signal pins for sideband control to optimize the component's function for different situations. For example, cooling fan speed could be reduced or completely stopped when surrounding temperature is below certain thresholds; this allows lower power consumption and reduces noise impact in the data center.

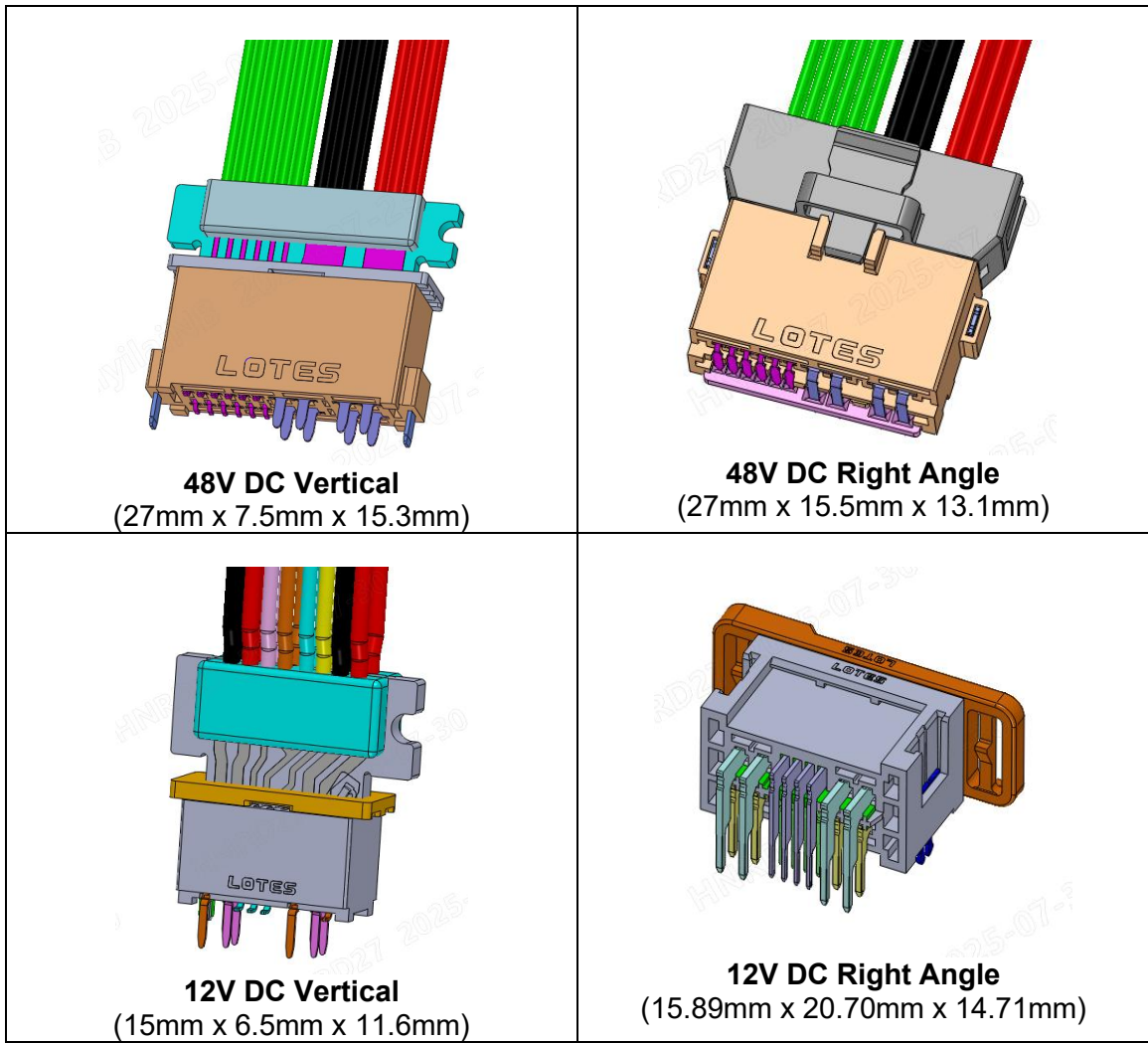
3. Description

This specification defines a set of four DC power connectors with signal pins for sideband control purposes. These connectors are suitable for 48V and 12V power connections, and they incorporate additional signal pins designed to complement the M-PIC power-connector specification. They are suitable for deployment across various peripheral applications.

This document provides a common specification for component manufacturers and system integrators on the application of these power connectors. The table and drawings below give high-level descriptions of the 4 power connectors.

Table 3-1 Summary of The Four Connectors

Voltage (V DC)	Orientation	Number of Power Pins	Number of Control Pins
48	Vertical card edge	2	12
48	Right Angle card edge	2	12
12	Vertical card edge	4	8
12	Right Angle pin plug	4	8



**Figure 3-1 Connector Assembly 3D Drawings with Receptible Dimensions
(L x W x H)**

3.1. Features

As outlined above, this set of connectors support both 48V and 12V DC power supplies, which are common DC supply levels in a server rack. Furthermore, the two orientations (vertical and right angle) and small form factors provide flexibility on mounting the connectors on a PCB for ease of connection to various peripheral components in the rack.

All four connectors have multiple signal pins perfect for providing sideband control to peripheral such as cooling fans. With their high current and voltage ratings, these connectors are suitable for many applications.

4. Electrical and Thermal Specifications

The table below contains the electrical and thermal specifications of the power connectors.

Table 4-1 Electrical and Thermal Specifications

Voltage (V DC)	Connector Orientation	Power Pins	Ground Pins	Signal Pins	Max Power Current (A per pin)	Max Voltage (V DC)
48	Vertical	2	2	12	9.0	51
48	Right Angle	2	2	12	9.0	51
12	Vertical	4	5 ¹	7 ¹	4.5	250
12	Right Angle	4	4	8	7.0	250
Note 1: Pins 15 and 16 are the sideband ID and its associated ground pin, see pin map for details. All signal pins can carry 1A per pin max. Insulation resistance: 1000 MΩ min. Dielectric withstand voltage 500V AC for 1 minute ROHS2.0 and HF compliant Soldering reflow temperature: 265 +/- 5°C for 10 seconds max. Thermal rating: - Temperature rise: $\Delta T < 30^{\circ}\text{C}$ - Ambient temperature range: -25°C to 85°C						

5. Pin Maps

Below are the pin maps of the four power connectors on the receptacle side.

Pin15	SB	SB	Pin16
Pin13	SB	SB	Pin14
Pin11	SB	SB	Pin12
Pin9	SB	SB	Pin10
Pin7	SB	SB	Pin8
Pin5	SB	SB	Pin6
Pin3	GND	GND	Pin4
Pin1	48V	48V	Pin2

Figure 5-1 48V Vertical Connector

	Pin1	Pin3	Pin5	Pin7	Pin9	Pin11	Pin13	Pin15
	48V	GND	SB	SB	SB	SB	SB	SB
	48V	GND	SB	SB	SB	SB	SB	SB
PCB surface	Pin2	Pin4	Pin6	Pin8	Pin10	Pin12	Pin14	Pin16

Figure 5-2 48V Right Angle Connector

Pin1	12V	12V	Pin2
Pin3	GND	GND	Pin4
Pin5	SB	SB	Pin6
Pin7	SB	SB	Pin8
Pin9	SB	SB	Pin10
Pin11	12V	12V	Pin12
Pin13	GND	GND	Pin14
Pin15	ID	GND	Pin16

Figure 5-3 12V Vertical Connector

	Pin1	Pin3	Pin5	Pin7	Pin9	Pin11	Pin13	Pin15
	12V	GND	SB	SB	SB	SB	12V	GND
	12V	GND	SB	SB	SB	SB	12V	GND
PCB surface	Pin2	Pin4	Pin6	Pin8	Pin10	Pin12	Pin14	Pin16

Figure 5-4 12V Right Angle Connector

6. Mechanical Design

This section contains the mechanical design details of the four connectors.

6.1. 48V Vertical Connector

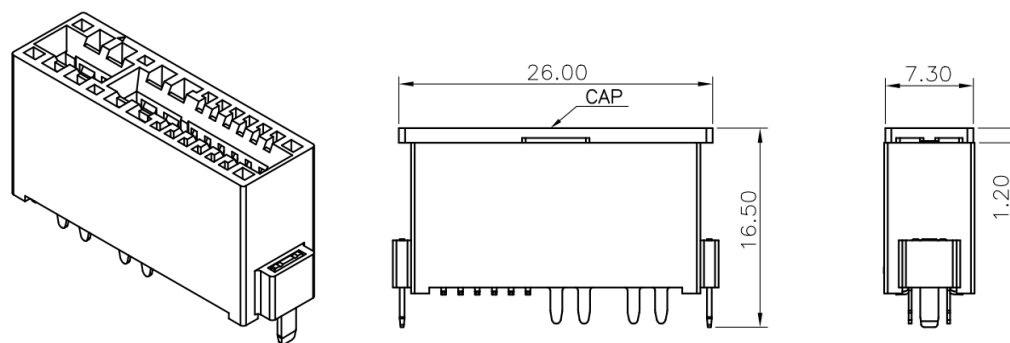


Figure 6-1 48V Vertical Connector 3D and Overall Drawing with Cap



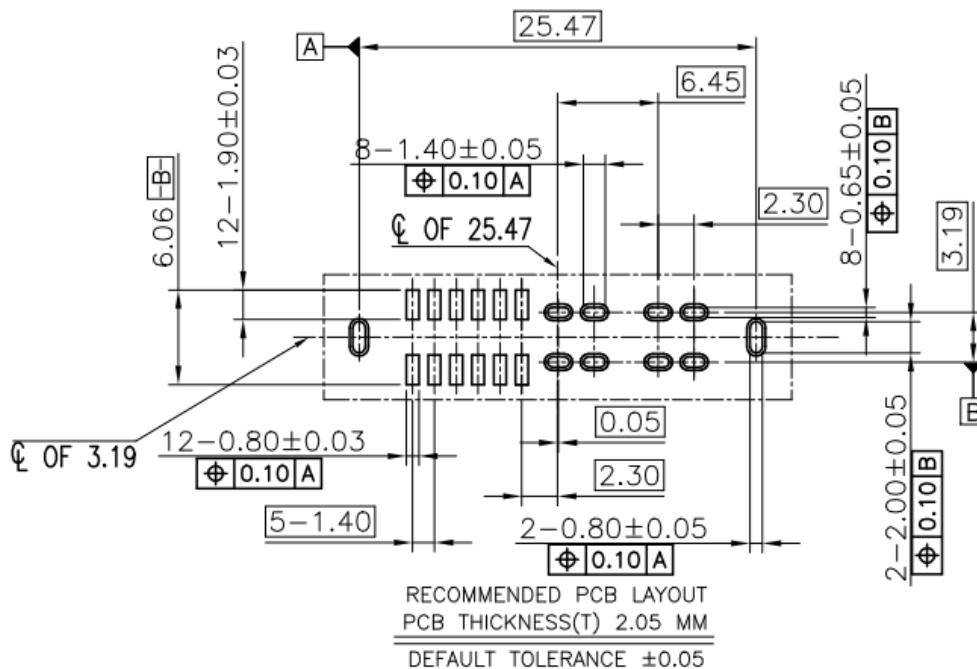


Figure 6-3 48V Vertical Connector PCB Footprint

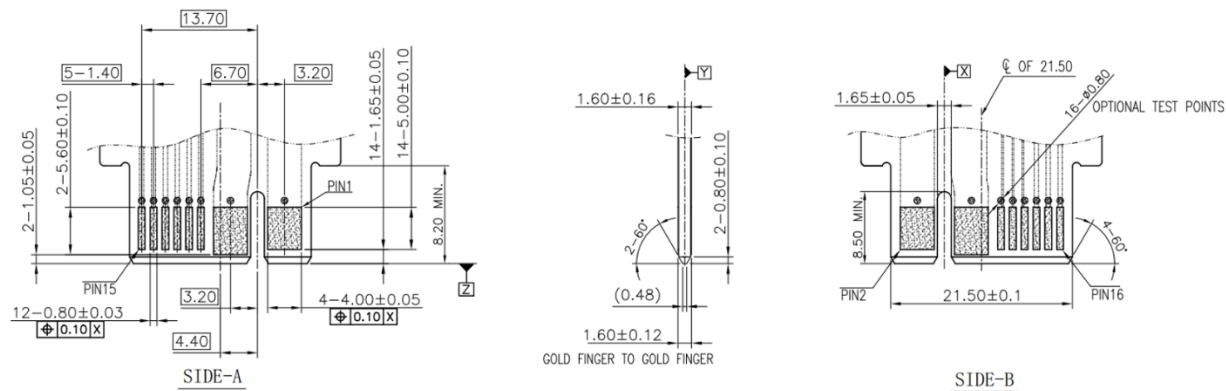


Figure 6-4 48V Vertical Connector Card Edge Details

Notes:

- Material specification
 - Housing: High temperature thermoplastic PA9T with glass fiber; UL94V-0; black
 - Cap: High temperature thermoplastic LCP with glass fiber; UL94V-0; black
 - Terminal: Copper alloy; T=0.25mm
 - Nail: C2680; T=0.40mm
- Plating specification

- Power and signal terminals:
 - Ni 50 micro-inch min underplated over all
 - Au 20 micro-inch min plating contact area
 - Matte mist Tin 100 micro-inch min plating solder area
- Nail:
 - Ni 50 micro-inch min underplated over all
 - Matte mist Tin 100 micro-inch min plating over all
- Mechanical performance
 - Durability: 80 Cycles
 - Mating force and un-mating force: Full pin 20.0N max

6.2. 48V Right Angle Connector

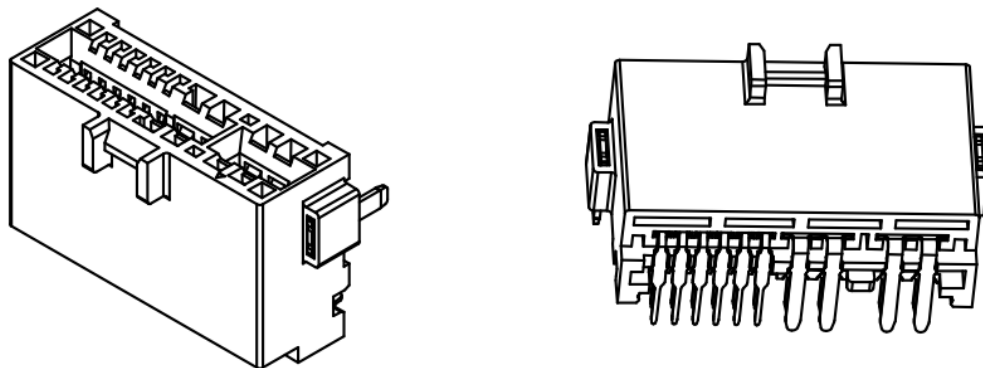


Figure 6-5 48V Right Angle Connector 3D Drawing

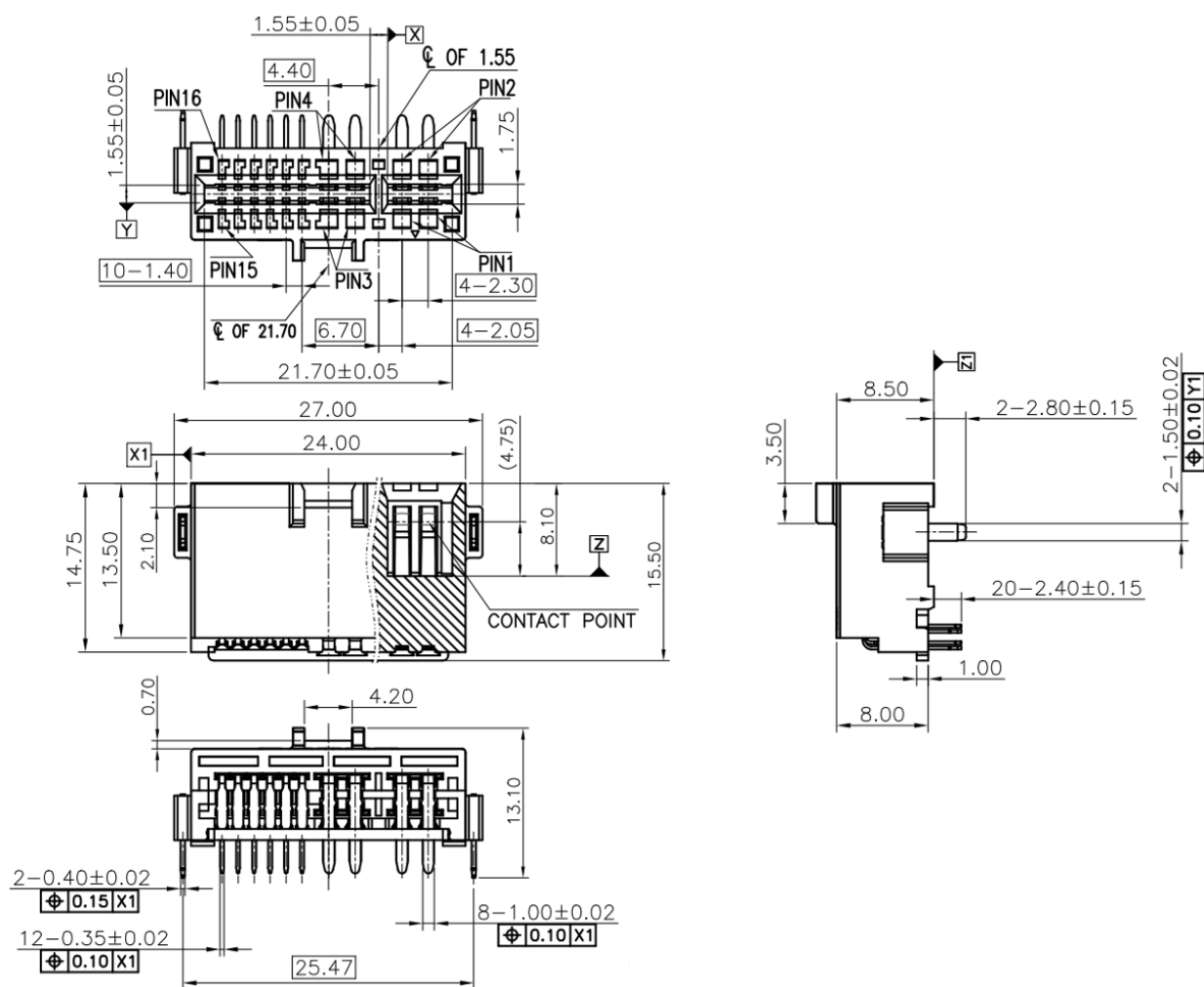


Figure 6-6 48V Right Angle Connector Details

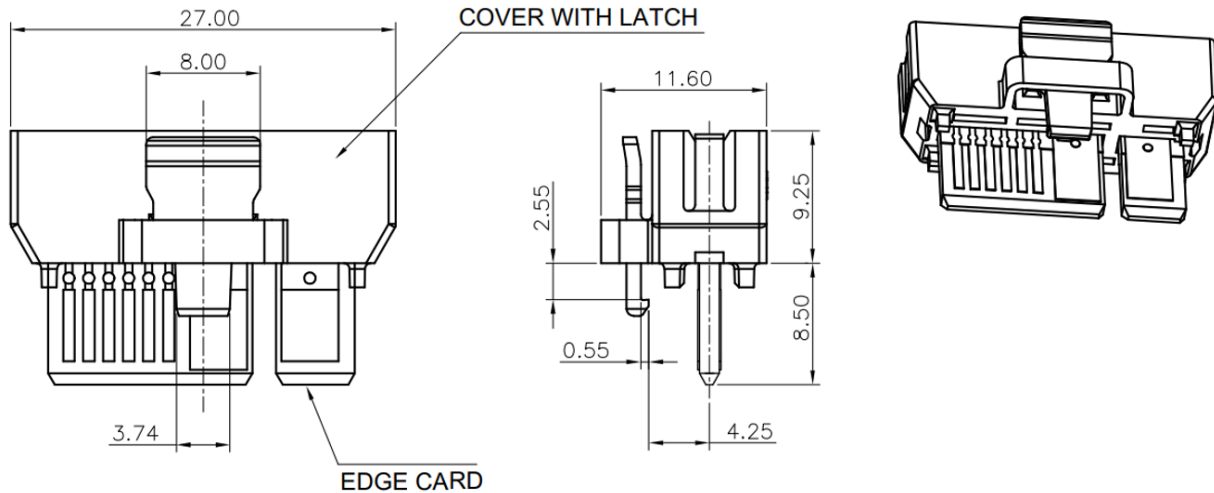


Figure 6-9 48V Right Angle Connector Card Edge Assembly

Notes:

- Material specification
 - Housing: High temperature thermoplastic PA9T with glass fiber; UL94V-0; black
 - Fixed piece: High temperature thermoplastic LCP with glass fiber; UL94V-0; black
 - Terminal: Copper alloy; T=0.25mm
 - Nail: C2680; T=0.40mm
- Plating specification
 - Power and signal terminals:
 - Ni 50 micro-inch min underplated over all
 - Au 20 micro-inch min plating contact area
 - Matte mist Tin 100 micro-inch min plating solder area
 - Nail:
 - Ni 50 micro-inch min underplated over all
 - Matte mist Tin 100 micro-inch min plating over all
- Mechanical performance
 - Durability: 80 Cycles
 - Mating force and un-mating force: Full pin 20.0N max

6.3. 12V Vertical Connector

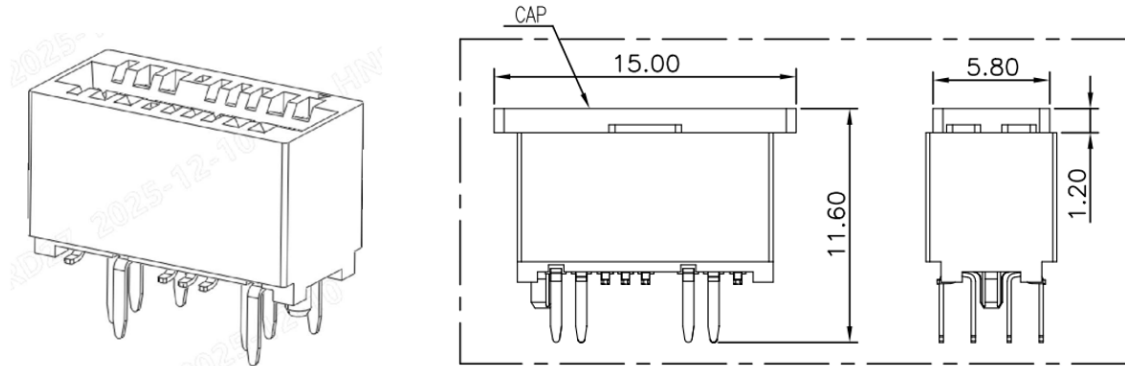


Figure 6-10 12V Vertical Connector 3D and Overall Drawing with Cap

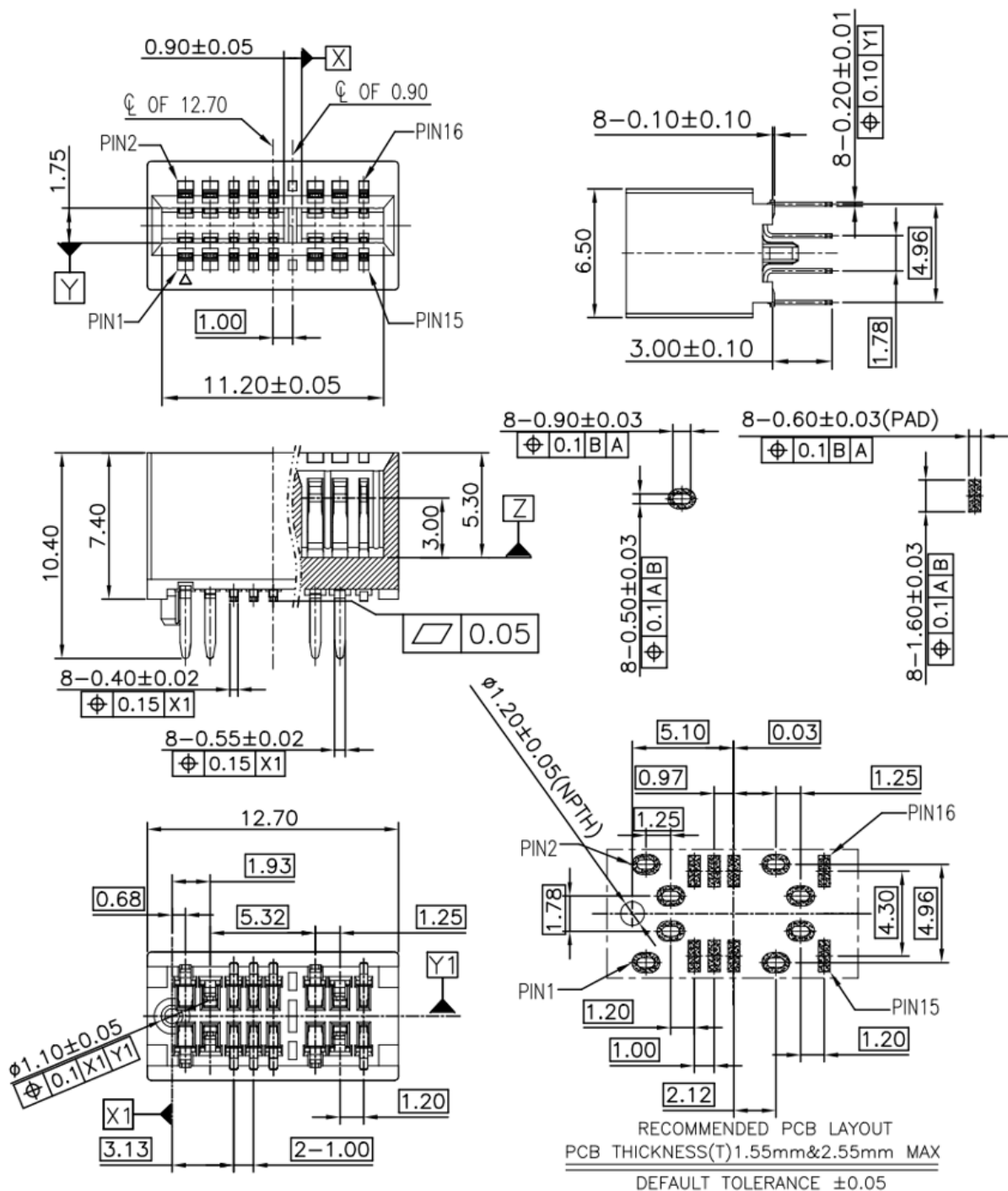


Figure 6-11 12V Vertical Connector Details and PCB Footprint

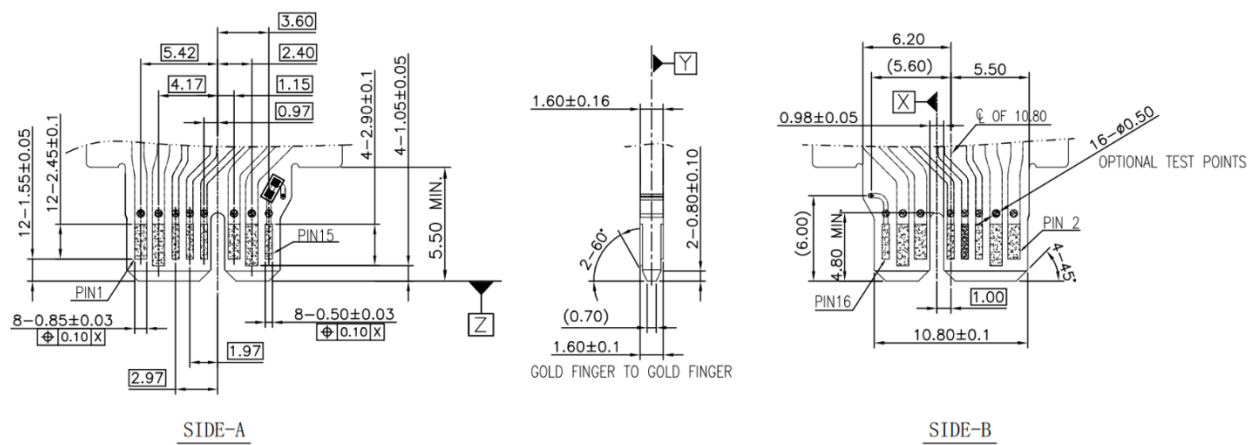


Figure 6-12 12V Vertical Connector Card Edge Details

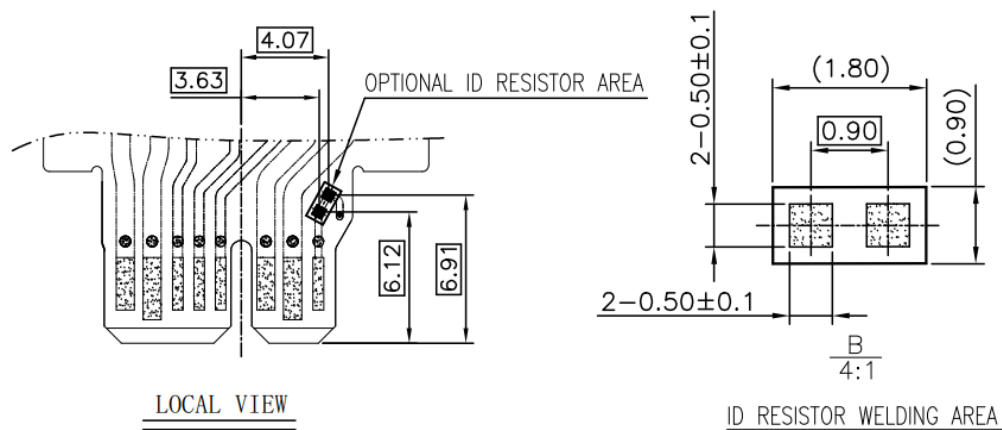


Figure 6-13 12V Vertical Connector Card Edge ID Resistor Details

Notes:

- Material specification
 - Housing: High temperature thermoplastic PA10T with glass fiber; UL94V-0; black
 - Cap: High temperature thermoplastic LCP with glass fiber; UL94V-0; black
 - Terminal: Copper alloy; T=0.25mm
- Plating specification
 - Power and signal terminals:
 - Ni 50 micro-inch min underplated over all
 - Au 20 micro-inch min plating contact area
 - Matte mist Tin 100 micro-inch min plating solder area
- Mechanical performance
 - Durability: 80 Cycles

- Mating force and un-mating force: 16.0N max

6.4. 12V Right Angle Connector

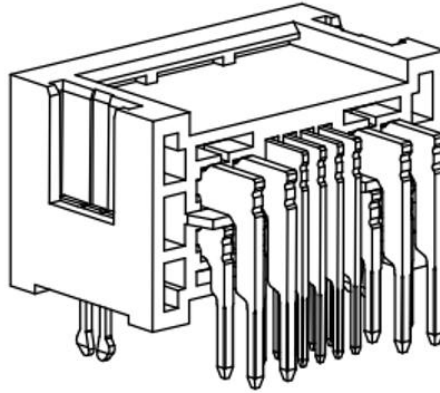


Figure 6-14 12V Right Angle Connector 3D Drawing

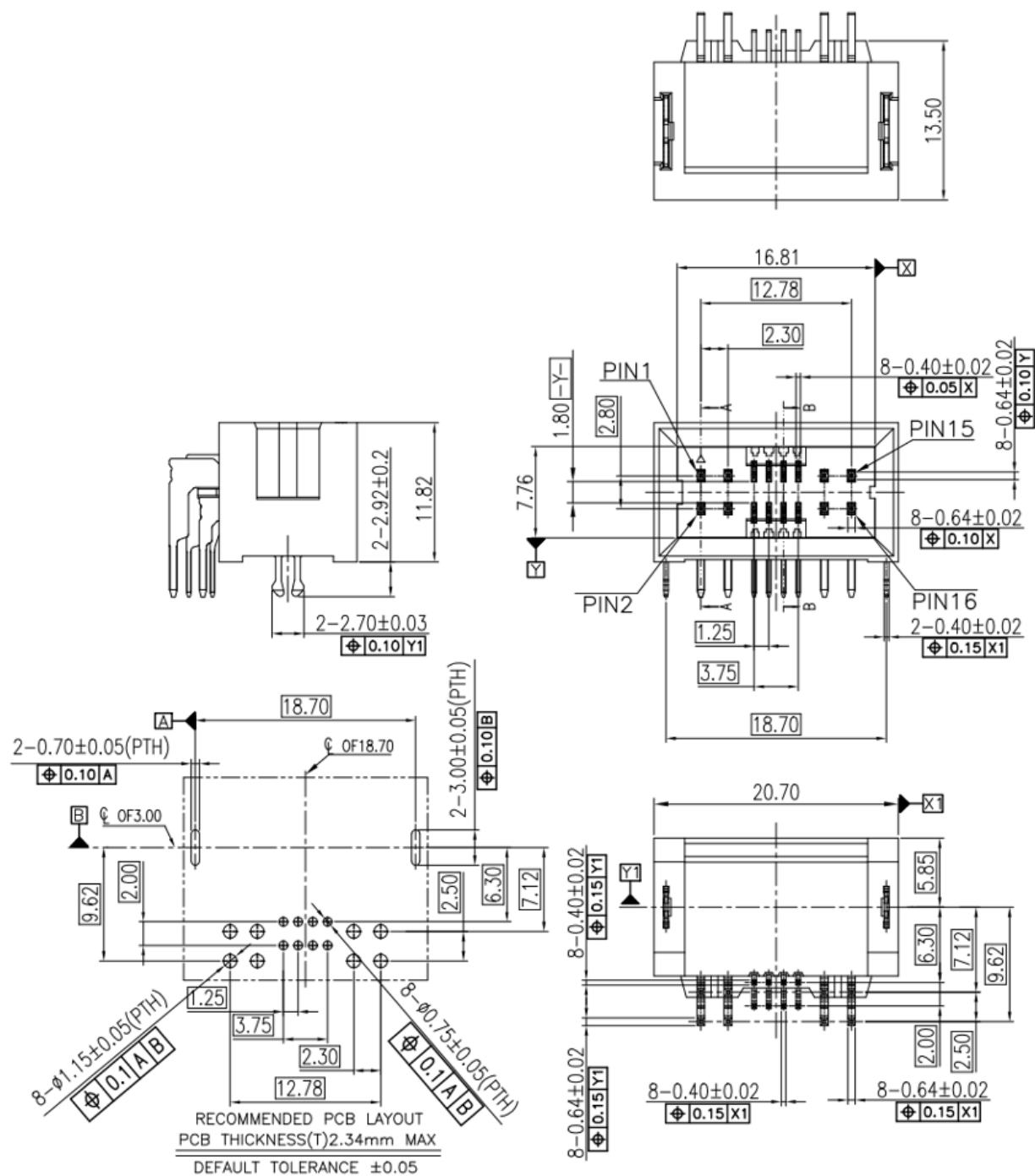


Figure 6-15 12V Right Angle Connector Details and PCB Footprint

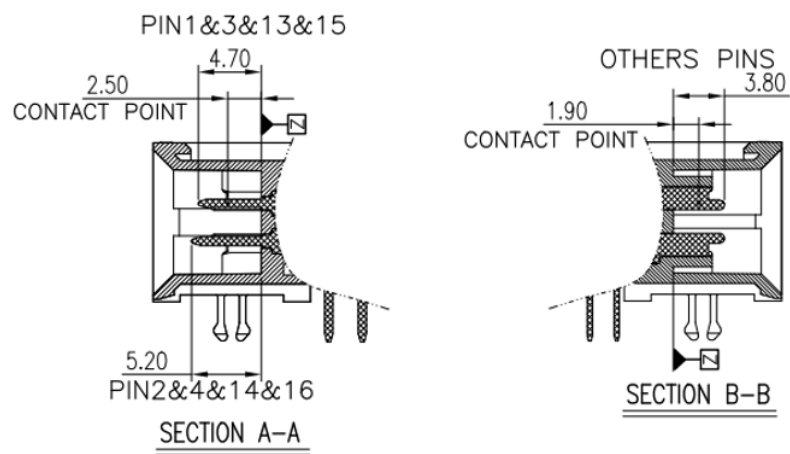


Figure 6-16 12V Right Angle Connector Cross Section Details

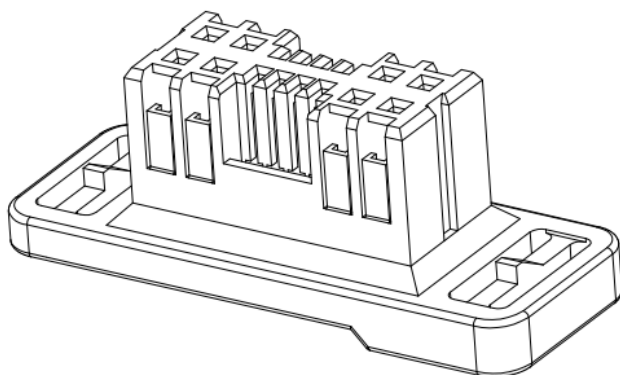


Figure 6-17 12V Right Angle Connector Plug 3D Drawing

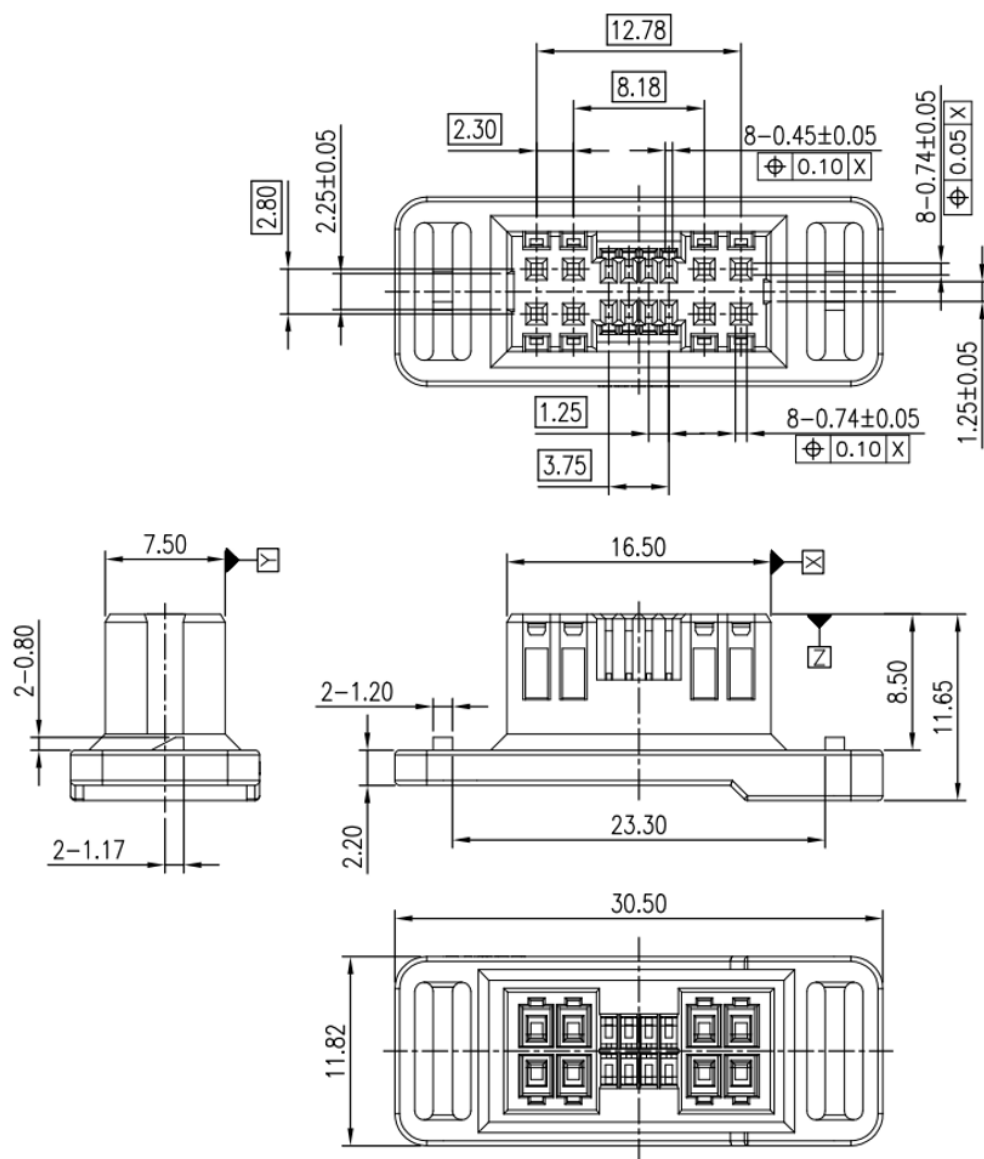


Figure 6-18 12V Right Angle Connector Plug Details

Notes:

- Material specification
 - Housing: High temperature thermoplastic PA10T +35%GF; UL94V-0; black
 - Power terminal: C1100; T=0.25mm
 - Signal terminal: C2680; T=0.40mm
 - Nail: C2680; T=0.40mm
- Plating specification
 - Power and signal terminals:

- Ni 50 micro-inch min underplated over all
 - Au 20 micro-inch min plating contact area
 - Au 1 micro-inch min plating on terminal non-contact area
 - Matte mist Tin 100 micro-inch min plating solder area
- Nail:
 - Ni 50 micro-inch min underplated over all
 - Matte mist Tin 100 micro-inch min plating over all
- Mechanical performance
 - Durability: 80 Cycles
 - Insertion force: 6.4 kg-F max for all pins
 - Removal force: 0.6 kg-F min for all pins

7. Test and Compliance

Connectors must pass all relevant tests detailed in the EIA-364-1000 specification.

The product must be safety certified (RU recognition) by UL (Underwriters Laboratories, Inc.) or other equivalent NRTL in accordance with UL/CSA 62368-1 safety standards. It must also be CE certified in accordance with the applicable harmonized standards.

8. Validation

8.1. Compliance

ITEM	REQUIREMENT	REFERENCE	MANDATORY
1	Comply to all electrical and thermal requirements specified in Section 4	Section 4	Y
2	Comply with pin maps specified in Section 5	Section 5	Y
3	Comply with all mechanical dimensions and notes specified in Section 6	Section 6	Y
4	Meet all test and compliance items listed in Section 7	Section 7	Y

8.2. Prescribed Materials

See notes for each connector in Section 6.

8.3. References

[1] “Platform Infrastructure Connectivity (M-PIC) Base Specification”, 2025, OCP specification, version 1.11, <https://www.opencompute.org/documents/m-pic-r1-v1-11-pdf>