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22.0 OEM Versions [T-Series Datasheet]

Overview

The T-Series device variants can be ordered in an OEM form factor. The OEM versions of the T-Series devices are designed for companies or individuals to be able to easily customize the connection ports with pin-headers to build them into larger systems. The devices are sold without cases, cables, and other accessories, in order to reduce cost. The devices are also manufactured without screw terminals and the DB15 and DB37 connectors which allow them to be sold at a lower cost from the primary devices.

Ordering

For pricing/ordering, go to the main product pages and select the appropriate OEM variant:

- T4 Product Page
- T7 Product Page

Customization: Custom OEM boards carry additional cost, but they are often necessary for specialized enclosures, and seamless integration with other products. LabJack offers a device customization service that allows for -OEM devices to be ordered with custom parts installed prior to shipping. Through this service, LabJack acquires the parts from Digikey or Mouser (with a price mark-up) and performs the required through-hole soldering that needs to be performed to install the parts onto the PCB. LabJack also re-calibrates and tests the device after performing the modifications to ensure the devices are still working properly before shipping. For customization, please send us an email or contact us—we will most likely need to generate a custom quote and order to fulfill and bill against. Please don't hesitate to contact us.

Lead Time: Custom OEM board lead times can vary from 1-3 weeks depending on complexity, part availability, etc. Assuming that we don't keep stock of the custom parts required for a build we will order and ship components via UPS ground from a part distributor when the order gets placed. After receiving the parts it will take us an additional 1-2 weeks to install the components and run various device tests to ensure the custom OEM device(s) are in proper working condition before shipping the devices to the customer.

Pinouts: The OEM versions of the T4, T7, and T7-Pro are shown below: with the pinouts of the (T4) H2, H3, J2, J5 and (T7) J2, J3, J5 connectors:

T4-OEM:

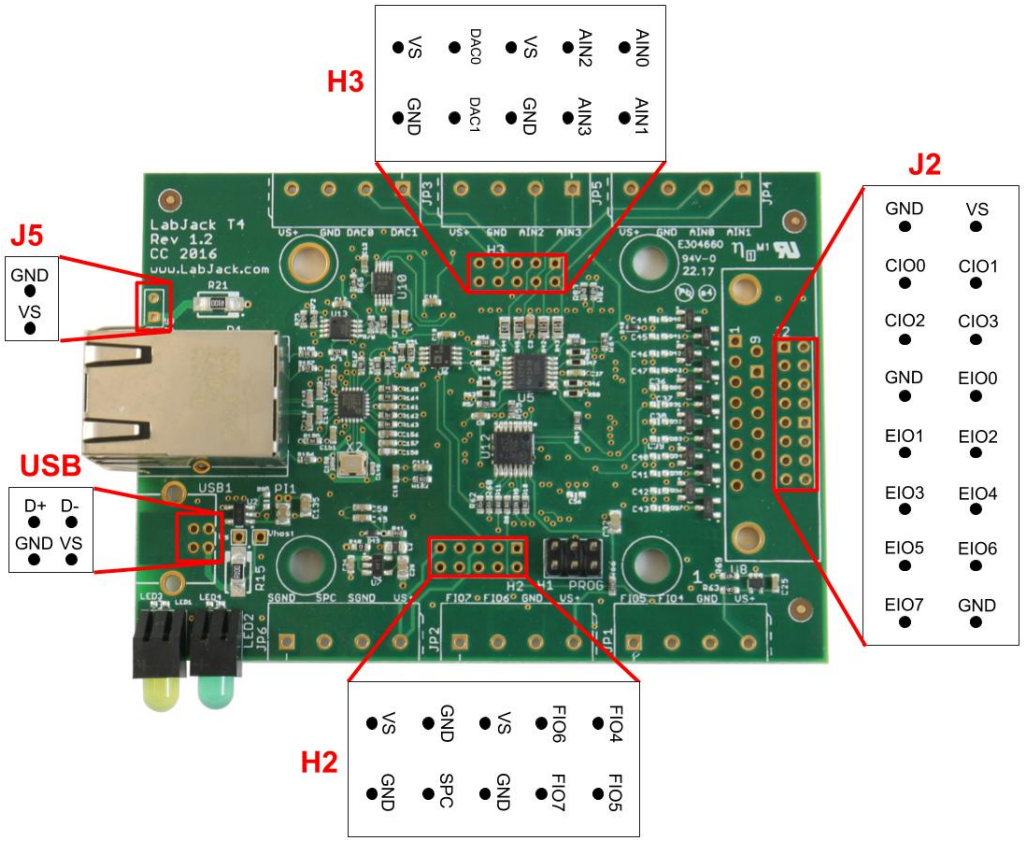

Image 22-1. T4-OEM Pinout

The T4-OEM exposes all of its I/O lines through the pin-headers H2, H3, and J2. The device can be externally powered with a regulated 5V supply using the J5 connector. If needed, a USB connector can also be installed, see the USB section below for more details. More details about the PCB dimensions for the T7 OEM versions can be found in Appendix B-2 T4 Enclosure and PCB Drawings.

T7-OEM and T7-Pro-OEM:

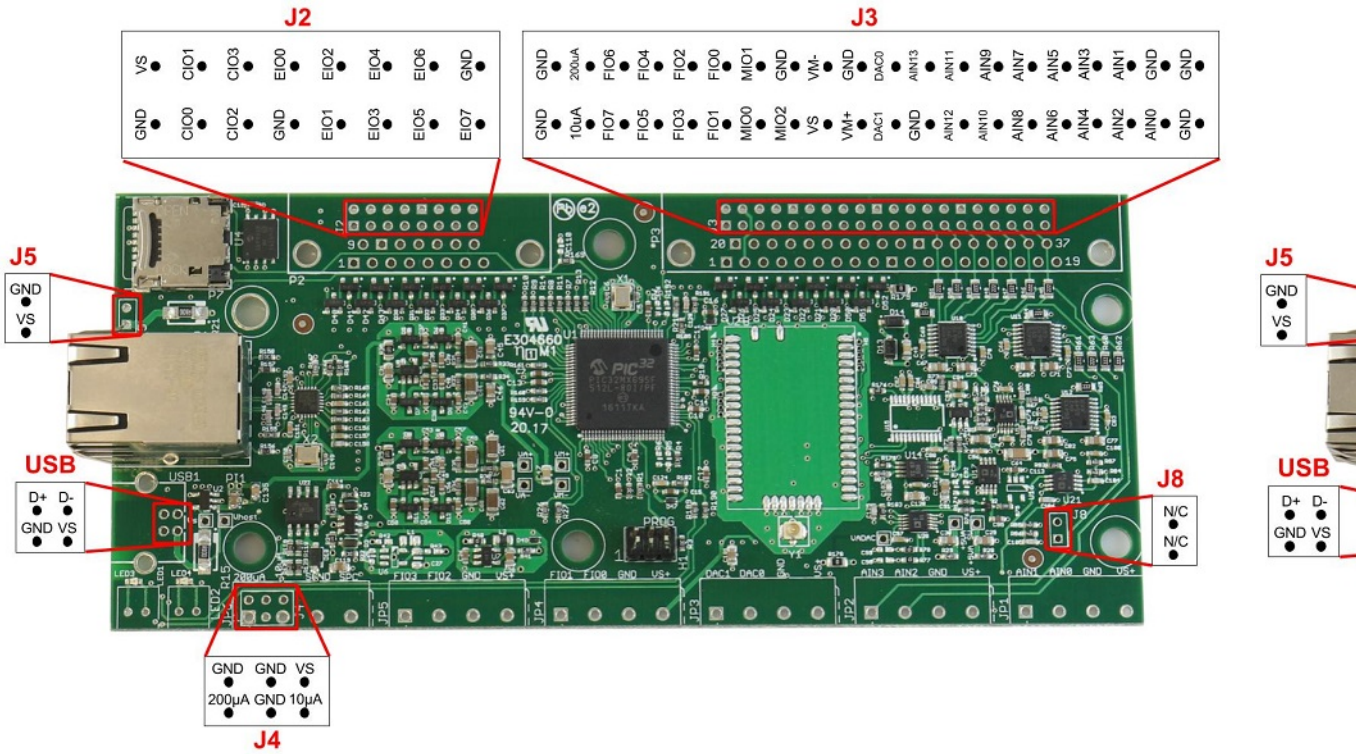

Image 22-2. T7-OEM Pinout

The T7-OEM and T7-Pro-OEM devices expose all of their I/O lines through the J2 and J3 pin-header locations. Both devices can be externally powered w for more details. More details about the PCB dimensions for the T7 OEM versions can be found in Appendix B-2 T7 Enclosure and PCB Drawings.

Suggested Part Orientations: We suggest that customers install pin headers on the top side of our devices to prevent there from being any issues with device re-calibration. During the calibration process, our OEM devices are mounted to the top of our test jigs (pogo pins make contact with the holes on the bottom side). Our device calibration test jigs use a combination of the screw terminal holes as well as the DB15 and DB37 holes to test each of the I/O lines.

Pin-Headers: The T4 and T7 OEM devices have pin-outs compatible with pin-headers that have a pin pitch of 0.100" (2.54mm). Below is a list of the standard pin-headers that we install into the J2, J3, J5, H2, and H3 locations. Other parts can be installed upon request including shrouded or directional pin-headers.

Name	Pins	Parts
J5	1x2	Jameco 1x2 2.54mm pin-header.
H2 and H3	2x5	Jameco 2x5 2.54mm pin-header.
J2	2x8	Jameco 2x8 2.54mm pin-header.
J3	2x20	Jameco 2x20 2.54mm pin-header.

Table 22-1. Pin-Headers

PCB Dimensions: The PCB dimensions and a variety of mechanical drawings can be found in theEnclosure and PCB Drawings section of the T-Series datasheet.

ESD: Proper ESD precautions should be taken when handling the PCB directly. Many of the parts are ESD resistant, but depending on the size or location of the shock, the board might be damaged.

Part Categories: Optional parts that can be installed can be broken down into the following categories:

- USB
- Alternate Power Supply (J5)
- DB15 and DB37 equivalent Pin-Header Locations (J2, J3)
- DB15/DB37 (D-Sub) Locations (P2 and P3)
- Screw Terminals (JP1-JP6)
- Ethernet Connector
- WiFi Antenna (T7-Pro Only, Y1)
- Current Sources (T7 Only, J4)
- Mechanical Header (T7 Only, J8)

USB

The USB connector is not installed on any of the T-Series OEM devices. The T-Series devices use through-hole Type-B connectors and there are a large number of compatible connectors.

Mounting Location: The USB connector must be installed on the component side of the PCB.

Suggested Parts: We have several suggested USB connectors however most USB Type-B through hole connectors are compatible with the T-Series OEM devices. Standard retention USB connectors are what gets installed on all LabJack DAQ devices and are enough for most OEM device applications. High retention USB connectors are higher in cost however they more securely connect a USB cable to a device which is important in many industrial applications.

Standard Retention:

- On Shore Technology Inc USB-B1HSW6
- FCI 61729-0010BLF
- TE Connectivity 292304-2

High Retention:

- Samtec USBR-B-S-S-O-TH

USB Pin-Out: Below are wo pictures of the bottom side of the T4 and T7 devices indicating the purpose of the four USB pins. Pin-outs relative to the top side are documented in the more general T-Series OEM device pinout pictures above.

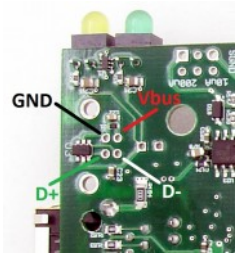

Image 22-4. T7 USB Pinout

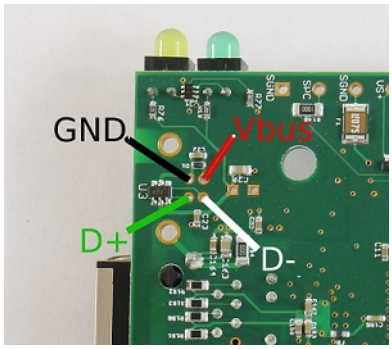

Image 22-5.T4 USB Pinout

USB Cables: A normal USB cable has a shield, and the normal Type-B connector connects the cable shield to the mounting tabs on the connector which are then soldered into the large USB mounting holes on the PCB. If you are not using a normal USB connector, and have a shield in your USB cable, we recommend that the shield be connected to either of the large USB mounting holes on the PCB. Usually the USB shield wires are aluminum, which doesn't take solder very well, so use a crimp connector like the Molex 02-06-2103, TE 61388-1, TE 350015-2, or the TE 60017-3. Secure the crimp connector to USB shield wires, then squish down the tip of the connector to fit into the large USB mounting holes on the PCB.

Alternate Power Supply (J5)

The T-Series OEM devices can be powered through either their USB connectors or through the J5 pin-header holes. The J5 pin-header is useful for individuals who only need Ethernet or WiFi device connections. The square shaped pad of the J5 pin-header is V+, and the circular pad is GND. The J5 connector is a 2-pin 0.1" pitch rectangular header. To prevent accidentally switching V+ and GND, use a keyed connector such as TE Connectivity 3-641215-2.

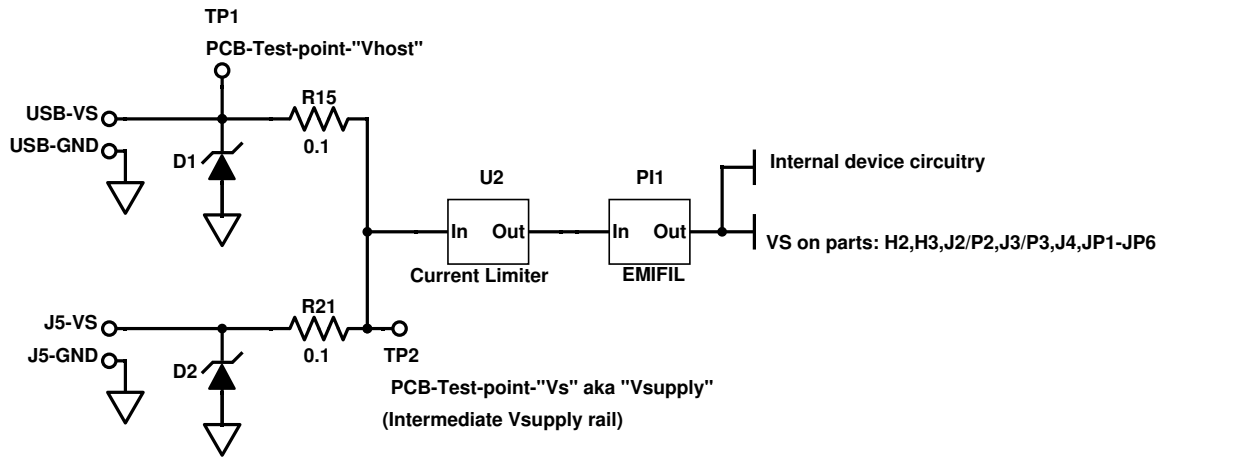

Image 22-6. T-Series Power Supply

Both the J5 pin-header and the USB voltage supply rails require a 5V input voltage (see the power supply input section ofAppendix-A-5 for detailed specs). The 5V supply from J5 (J5-VS) is protected by a TVS (transient voltage suppressor diode D2), then goes through R21 (0.1 ohms), and then connects to the internal Vsupply rail. The 5V supply from the USB (USB-VS) is exposed through a test point on the PCB labeled "Vhost" and is protected by the TVS diode D1

and R15 (0.1 ohms) before connecting to the internal Vsupply rail. The internal Vsupply rail can be measured using the test point on the PCB labeled "Vs". After joining, power flows through a current limiting chip (currently the Diodes AP2141WG) and an EMIFIL (EMI suppression filter) before connecting to the device-wide VS bus and out to each of the screw terminals labeled as VS.

Dual Power Supply: On all T-Series devices, R15 and R21 are installed by default and thus the connections for both sources are essentially shorted to each other. Both power supply options should not be connected to a voltage source at the same time. If this happens, one power supply could back-feed the other which may cause damage. If a device is going to be powered using the J5 connector and there is a possibility of power at the USB connection (and USB power is not required) then it is recommended to remove R15 so that only the J5 pin-header is used to power the device. If a dual-power supply method is required it is recommended to replace the R15 and R21 resistors with Schottky diodes (SMA package). There will still be a small voltage drop that needs to be considered but the device should operate correctly as long as the voltage present on the VS screw terminals is above 4.75V (reference).

DB15 and DB37 equivalent Pin-Header Locations (J2, J3)

Connectors J2 & J3 provide pin-header alternatives to the DB15 and DB37 connectors. The J2 & J3 holes are always present, but are obstructed when the DB15 and DB37 are installed. The T4-OEM only has the J2 header while both the T7-OEM and T7-Pro-OEM have J2 and J3.

J2 & J3 can be seen in the pictures at the top of this page which show the component side of each of the T-Series device PCBs. For both the DBs and pin headers, holes with a square solder pad indicate pin number 1, 10, 20, or 30. For both the DBs and pin headers, pin 1 is at the lower-left. For the DB connectors the pin numbers increment from 1 left to right across the bottom row, and then continue left to right across the top row. For the pin headers, the odd pins increment left to right across the bottom row (1, 3, 5, ...) and the even pins increment left to right across the top row (2, 4, 6, ...).

J2 - 16 position, 2 row, 0.1" pitch, male pin rectangular header

- Unshrouded - Harwin Inc M20-9980846
- Unshrouded 3x Taller - Samtec Inc TSW-108-17-T-D
- Shrouded, Gold Finish - On Shore Technology Inc 302-S161
- Shrouded, Right Angle - TE Connectivity 1-1634689-6

J3 - 40 position, 2 row, 0.1" pitch, male pin rectangular header

- Unshrouded - Harwin Inc M20-9762046
- Unshrouded 3x Taller - Samtec Inc TSW-120-17-T-D
- Shrouded, Gold Finish - On Shore Technology Inc 302-S401
- Shrouded, Right Angle - TE Connectivity 5103310-8
- Shrouded, Gold-Palladium Finish - TE Connectivity 5104338-8

Sometimes customers order tall pin headers that mate directly to a separate custom PCB. Refer to the pinout details below for electrical connections.

Table 22-2. J2 Pinouts

1	GND	2	VS
3	CIO0	4	CIO1
5	CIO2	6	CIO3
7	GND	8	EIO0
9	EIO1	10	EIO2
11	EIO3	12	EIO4
13	EIO5	14	EIO6
15	EIO7	16	GND

Table 22-3. J3 Pinouts

1	GND	2	GND	3	PIN20 (10uA)
4	PIN2 (200uA)	5	FIO7	6	FIO6
7	FIO5	8	FIO4	9	FIO3
10	FIO2	11	FIO1	12	FIO0
13	MIO0	14	MIO1	15	MIO2
16	GND	17	Vs	18	Vm-
19	Vm+	20	GND	21	DAC1
22	DAC0	23	GND	24	AIN13
25	AIN12	26	AIN11	27	AIN10
28	AIN9	29	AIN8	30	AIN7
31	AIN6	32	AIN5	33	AIN4
34	AIN3	35	AIN2	36	AIN1
37	AIN0	38	GND	39	GND
				40	GND

DB15/DB37 (D-Sub) Locations (P2 and P3)

The DB15 and DB37 connectors are not installed on OEM T-Series devices. Customers will typically use the rectangular header locations (J2, J3) instead of

the DB connectors. However, if a different DB mating style is required, it is possible to buy an OEM variant and specify custom parts that need to be installed. The DB connectors are standard D-Sub two row receptacles (female sockets), through hole, 15 pin, and 37 pin. The following represent a few valid options.

- FCI 10090099-S154VLF
- FCI D15S33E4GV00LF
- Sullins Connector Solutions SDS101-PRW2-F15-SN13-1
- FCI 10090099-S374VLF
- FCI D37S33E4GV00LF
- Sullins Connector Solutions SDS101-PRW2-F37-SN83-6

Screw Terminals (JP1-JP6)

The screw terminals are not installed on the T-Series OEM device variants. Customers will typically use the rectangular header locations (J2, J3) instead of the screw terminals. However, if a different screw terminal style is required, it is possible to buy an OEM variant and specify custom parts that need to be installed. The screw terminal holes are compatible with almost all 4 position, 0.198" (5.00mm) pitch terminal blocks. A Weidmuller 9993300000 works quite well, and accepts 14-24 AWG wire.

Ethernet Connector

The Ethernet connector (XFMRS XFATM9-CTCY1-4M, Wurth 74990112116A) is installed on all T-Series device variations due to the inherent magnetic complexities. However, it is possible to 'bring out' a duplicate Ethernet jack to any custom enclosure with one of the following:

- A short Ethernet cable segment and an RJ45 coupler (Plug to Plug). These couplers come in a few varieties: Free hanging (in-line), Chassis Mount, Panel Mount, Bulkhead, Wall Plate, etc. Conec 33TS3101S-88N and Emerson 30-1008KUL are both good options.
- A RJ45 Jack to Plug cable, which is just a standard Ethernet plug on one end, and a Jack (female) on the other end. Again, these come in a wide variety of mounting styles, the simplest of which is the panel mount. TE Connectivity 1546414-4 and Amphenol RJFEZ2203100BTX are both good options.

If selecting your own Ethernet interconnect, insure that it is RJ45, straight-through, and without magnetics.

WiFi Antenna (T7-Pro Only, Y1)

> The T7-Pro-OEM ships with a simple 30mm U.FL whip antenna such as the Anaren 66089-2406. See "Antenna Details" in the WiFi section of this datasheet for additional information.

Current Sources (T7 Only, J4)

> Since the screw terminals are not installed on an OEM T7, the J4 header location can be used to gain access to the constant current sources. Any 6 position 0.1" pitch rectangular header will work.

1	200µA
2	GND
3	10µA
4	GND
5	GND
6	VS

Table 22-4. J4 Pinout

Mechanical Header (T7 Only, J8)

> The J8 pin header location is purely for mechanical support for that region of the board. There are no electrical connections to either of these pins. It is a 2 position 0.1" pitch rectangular header.