

## USER GUIDE

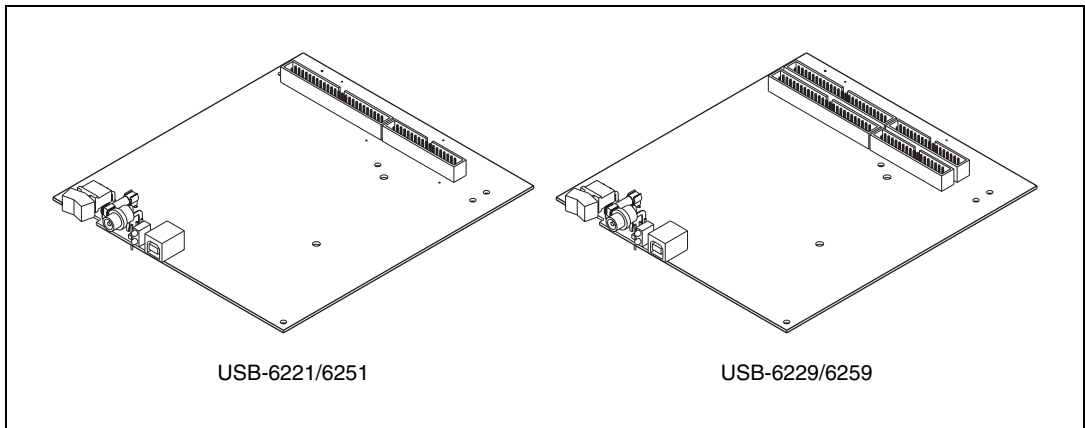
# NI USB-6221/6229/6251/6259 OEM

This document provides dimensions, pinouts, and information about the connectors, switch, LEDs, and chassis ground of the NI USB-6221/6229/6251/6259 OEM devices.



**Caution** There are no product safety, electromagnetic compatibility (EMC), or CE marking compliance claims made for the USB-6221/6229/6251/6259 OEM devices. Conformity to any and all compliance requirements rests with the end product supplier.

Figure 1 shows the USB-6221/6251 OEM and USB-6229/6259 OEM devices.



**Figure 1.** USB-6221/6251 and USB-6229/6259 OEM Devices

Refer to the *NI 622x Specifications* document for USB-6221/6229 specifications and the *NI 625x Specifications* document for USB-6251/6259 specifications. Refer to the *M Series User Manual* for more information about USB-6221/6229/6251/6259 devices. You can find all documentation at [ni.com/manuals](http://ni.com/manuals).

# Dimensions

Figure 2 shows the dimensions of the USB-6221/6251 OEM device.

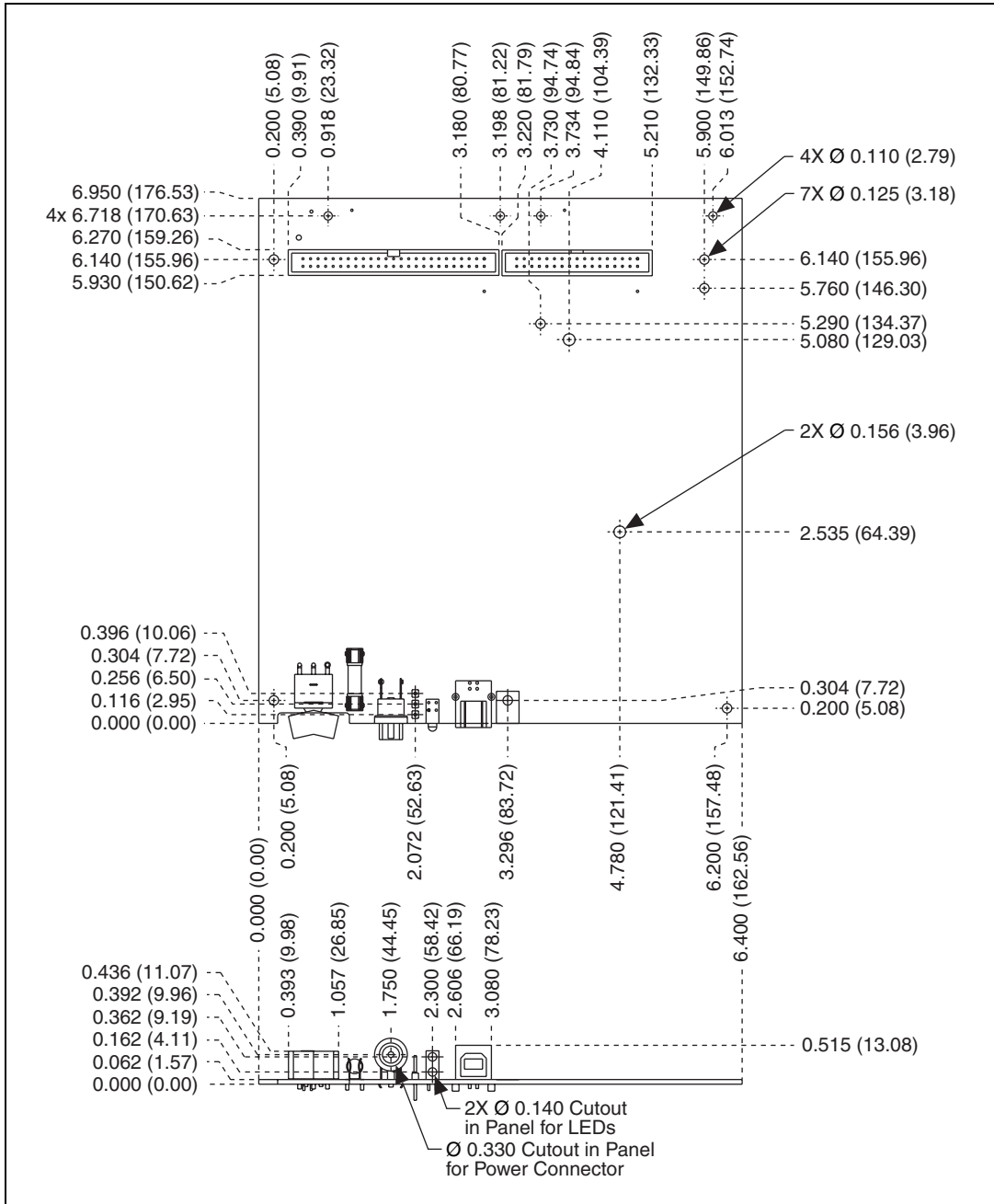


Figure 2. USB-6221/6251 OEM Dimensions in Inches (Millimeters)

Figure 3 shows the dimensions of the USB-6229/6259 OEM device.

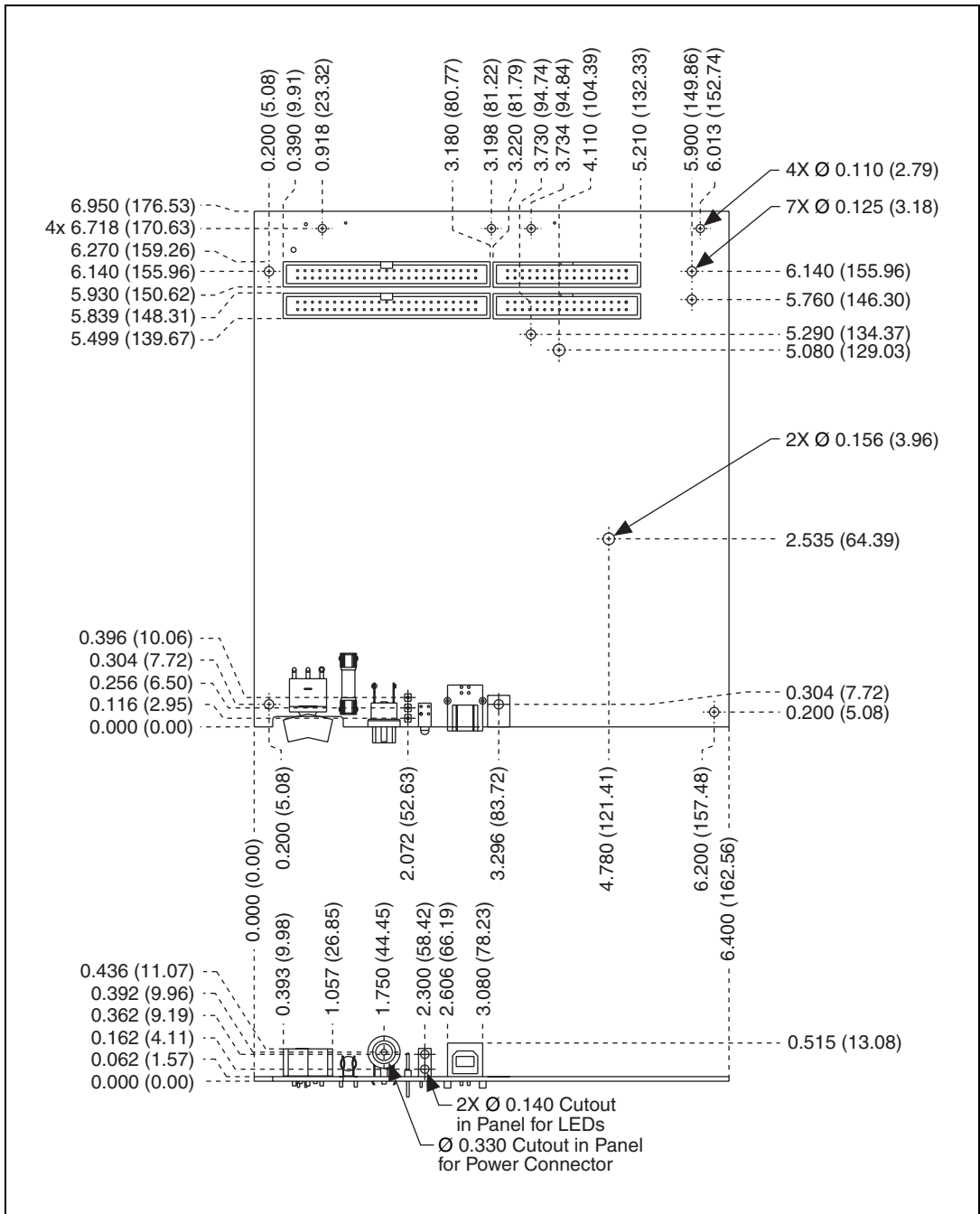


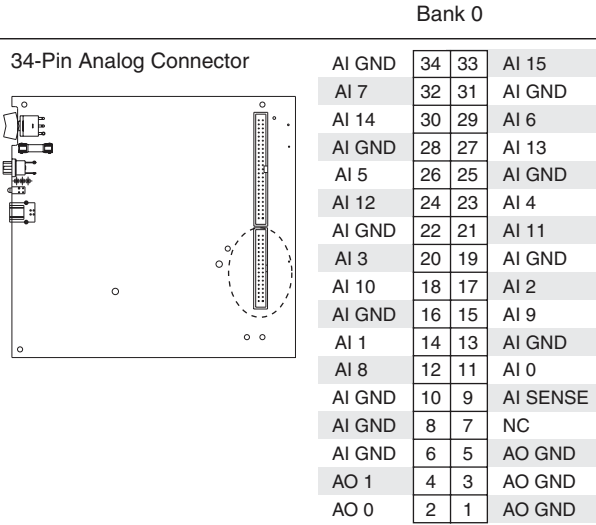
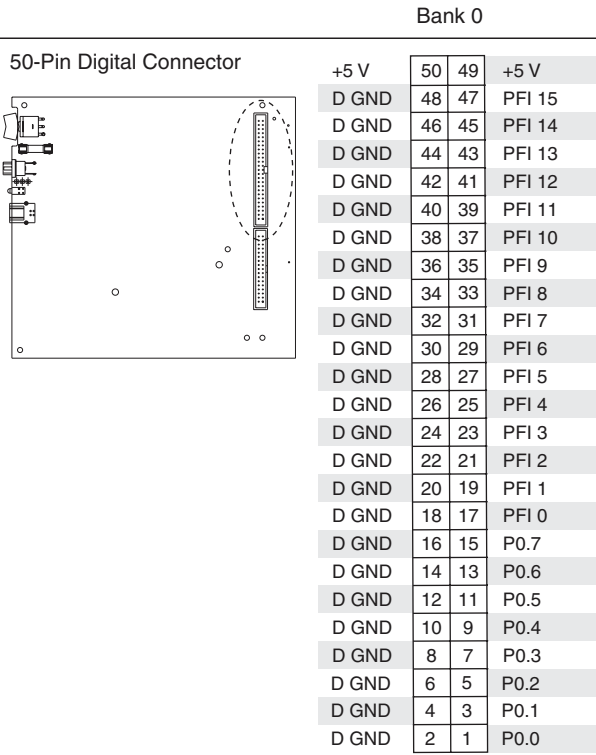
Figure 3. USB-6229/6259 OEM Dimensions in Inches (Millimeters)

# I/O Connector Pinouts

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Figures 4 through 7 show the connector pinouts for the USB-6221 OEM, USB-6229 OEM, USB-6251 OEM, and USB-6259 OEM devices.

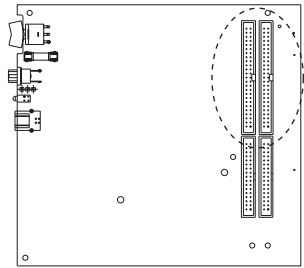
Refer to the *M Series User Manual* at [ni.com/manuals](http://ni.com/manuals) for more information about USB-6221/6229/6251/6259 signals and how to connect them.



NC = No Connect

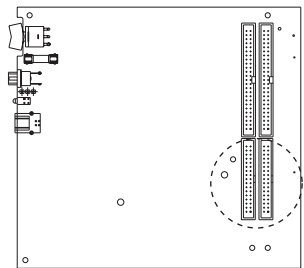
**Figure 4.** USB-6221 OEM Connector Pinout

**50-Pin Digital Connectors**



Bank 1			Bank 0			
+5 V	50	49	+5 V	50	49	
D GND	48	47	P0.31	D GND	48	47
D GND	46	45	P0.30	D GND	46	45
D GND	44	43	P0.29	D GND	44	43
D GND	42	41	P0.28	D GND	42	41
D GND	40	39	P0.27	D GND	40	39
D GND	38	37	P0.26	D GND	38	37
D GND	36	35	P0.25	D GND	36	35
D GND	34	33	P0.24	D GND	34	33
D GND	32	31	P0.23	D GND	32	31
D GND	30	29	P0.22	D GND	30	29
D GND	28	27	P0.21	D GND	28	27
D GND	26	25	P0.20	D GND	26	25
D GND	24	23	P0.19	D GND	24	23
D GND	22	21	P0.18	D GND	22	21
D GND	20	19	P0.17	D GND	20	19
D GND	18	17	P0.16	D GND	18	17
D GND	16	15	P0.15	D GND	16	15
D GND	14	13	P0.14	D GND	14	13
D GND	12	11	P0.13	D GND	12	11
D GND	10	9	P0.12	D GND	10	9
D GND	8	7	P0.11	D GND	8	7
D GND	6	5	P0.10	D GND	6	5
D GND	4	3	P0.9	D GND	4	3
D GND	2	1	P0.8	D GND	2	1

**34-Pin Analog Connectors**

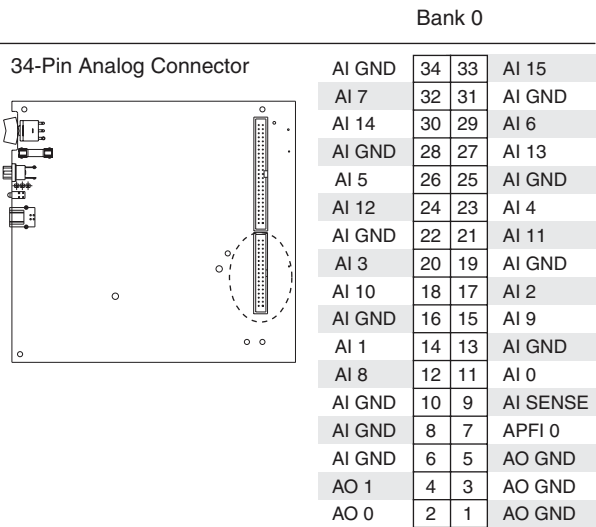
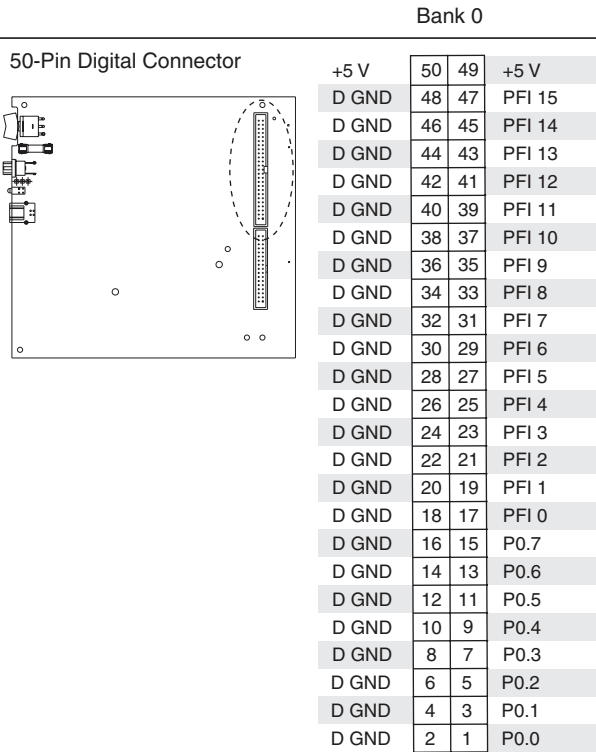


Bank 1			Bank 0			
AI GND	34	33	AI 31	AI GND	34	33
AI 23	32	31	AI GND	AI 7	32	31
AI 30	30	29	AI 22	AI 14	30	29
AI GND	28	27	AI 29	AI GND	28	27
AI 21	26	25	AI GND	AI 5	26	25
AI 28	24	23	AI 20	AI 12	24	23
AI GND	22	21	AI 27	AI GND	22	21
AI 19	20	19	AI GND	AI 3	20	19
AI 26	18	17	AI 18	AI 10	18	17
AI GND	16	15	AI 25	AI GND	16	15
AI 17	14	13	AI GND	AI 1	14	13
AI 24	12	11	AI 16	AI 8	12	11
AI GND	10	9	AI SENSE 2	AI GND	10	9
AI GND	8	7	NC	AI GND	8	7
AI GND	6	5	AO GND	AI GND	6	5
AO 3	4	3	AO GND	AO 1	4	3
AO 2	2	1	AO GND	AO 0	2	1

NC = No Connect

NC = No Connect

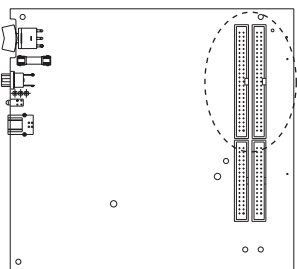
**Figure 5.** USB-6229 OEM Connector Pinout



**Figure 6.** USB-6251 OEM Connector Pinout

**Bank 1** **Bank 0**

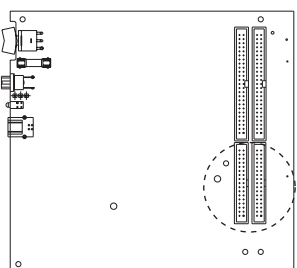
**50-Pin Digital Connectors**



+5 V	50	49	+5 V	+5 V	50	49	+5 V
D GND	48	47	P0.31	D GND	48	47	PFI 15
D GND	46	45	P0.30	D GND	46	45	PFI 14
D GND	44	43	P0.29	D GND	44	43	PFI 13
D GND	42	41	P0.28	D GND	42	41	PFI 12
D GND	40	39	P0.27	D GND	40	39	PFI 11
D GND	38	37	P0.26	D GND	38	37	PFI 10
D GND	36	35	P0.25	D GND	36	35	PFI 9
D GND	34	33	P0.24	D GND	34	33	PFI 8
D GND	32	31	P0.23	D GND	32	31	PFI 7
D GND	30	29	P0.22	D GND	30	29	PFI 6
D GND	28	27	P0.21	D GND	28	27	PFI 5
D GND	26	25	P0.20	D GND	26	25	PFI 4
D GND	24	23	P0.19	D GND	24	23	PFI 3
D GND	22	21	P0.18	D GND	22	21	PFI 2
D GND	20	19	P0.17	D GND	20	19	PFI 1
D GND	18	17	P0.16	D GND	18	17	PFI 0
D GND	16	15	P0.15	D GND	16	15	P0.7
D GND	14	13	P0.14	D GND	14	13	P0.6
D GND	12	11	P0.13	D GND	12	11	P0.5
D GND	10	9	P0.12	D GND	10	9	P0.4
D GND	8	7	P0.11	D GND	8	7	P0.3
D GND	6	5	P0.10	D GND	6	5	P0.2
D GND	4	3	P0.9	D GND	4	3	P0.1
D GND	2	1	P0.8	D GND	2	1	P0.0

**Bank 1** **Bank 0**

**34-Pin Analog Connectors**



AI GND	34	33	AI 31	AI GND	34	33	AI 15
AI 23	32	31	AI GND	AI 7	32	31	AI GND
AI 30	30	29	AI 22	AI 14	30	29	AI 6
AI GND	28	27	AI 29	AI GND	28	27	AI 13
AI 21	26	25	AI GND	AI 5	26	25	AI GND
AI 28	24	23	AI 20	AI 12	24	23	AI 4
AI GND	22	21	AI 27	AI GND	22	21	AI 11
AI 19	20	19	AI GND	AI 3	20	19	AI GND
AI 26	18	17	AI 18	AI 10	18	17	AI 2
AI GND	16	15	AI 25	AI GND	16	15	AI 9
AI 17	14	13	AI GND	AI 1	14	13	AI GND
AI 24	12	11	AI 16	AI 8	12	11	AI 0
AI GND	10	9	AI SENSE 2	AI GND	10	9	AI SENSE
AI GND	8	7	APFI 1	AI GND	8	7	APFI 0
AI GND	6	5	AO GND	AI GND	6	5	AO GND
AO 3	4	3	AO GND	AO 1	4	3	AO GND
AO 2	2	1	AO GND	AO 0	2	1	AO GND

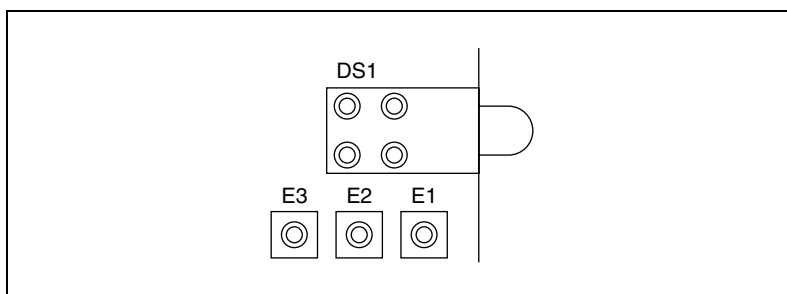
**Figure 7. USB-6259 OEM Connector Pinout**



# LEDs

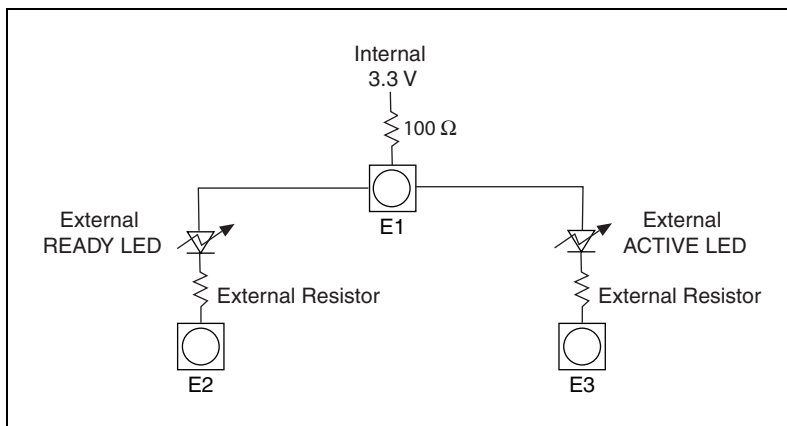
USB-6221/6229/6251/6259 OEM devices have two LEDs that reflect the device state. The green READY LED indicates whether the device is powered on and configured as a USB device. The yellow ACTIVE LED indicates whether there is USB bus activity.

Three connectors on the device allow you to connect an external LED circuit to the device. To connect an external READY LED, use E1 as the positive connection (+3.3 V) and E2 as the negative connection. To connect an external ACTIVE LED, use E1 as the positive connection and E3 as the negative connection. E1 is current limited with a 100  $\Omega$  resistor to the 3.3 V internal supply. This configuration limits the current to approximately 16 mA into a single external LED or approximately 8 mA each when both LEDs are on. You also can limit this current further by using external resistors as shown in Figure 8.



**Figure 8.** USB-6221/6229/6251/6259 OEM LEDs

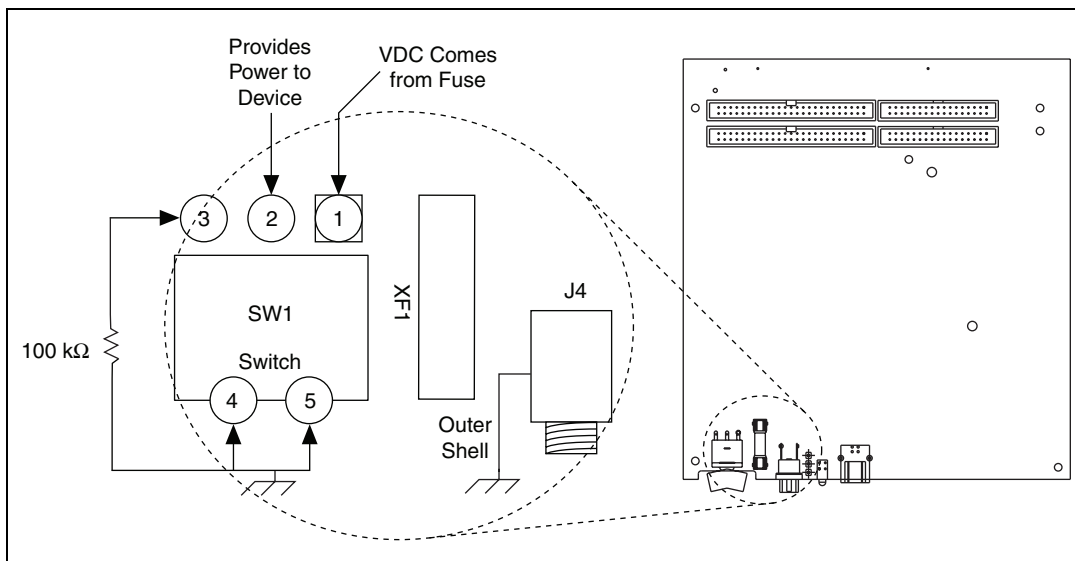
Figure 9 shows how to connect an external READY or ACTIVE LED circuit to the device.



**Figure 9.** Schematics of the USB-6221/6229/6251/6259 OEM LEDs

# Power Switch

The power switch on the USB-6221/6229/6251/6259 OEM device powers the device on and off. Figure 10 shows the pins on the power switch.

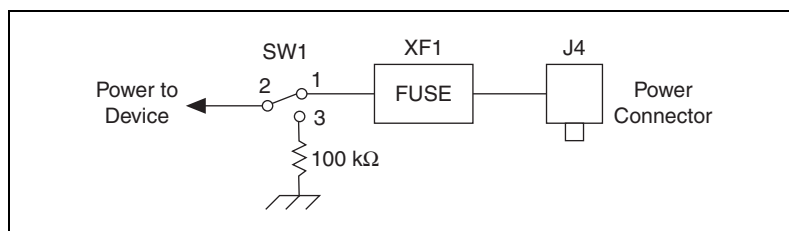


**Figure 10.** Power Switch (USB-6229/6259 OEM Shown)

Pin 1 is connected to VDC through the fuse (reference designator XF1). The VDC is the voltage provided by the power supply through the power connector (reference designator J4) and must be 11–30 V, 20 W.

Pin 2 provides power to the circuitry on the USB-6221/6229/6251/6259 OEM device. When the switch is in the On position, the VDC power supply from pin 1 is routed to pin 2.

Pin 3 connects pin 2 to ground through a 100 kΩ resistor when the switch is in the Off position. This allows the internal power supply in the USB-6221/6229/6251/6259 OEM device to safely discharge to ground when it is powered off. Figure 11 shows a schematic of the switch.



**Figure 11.** Schematic of the USB-6221/6229/6251/6259 OEM Switch

# Chassis Ground

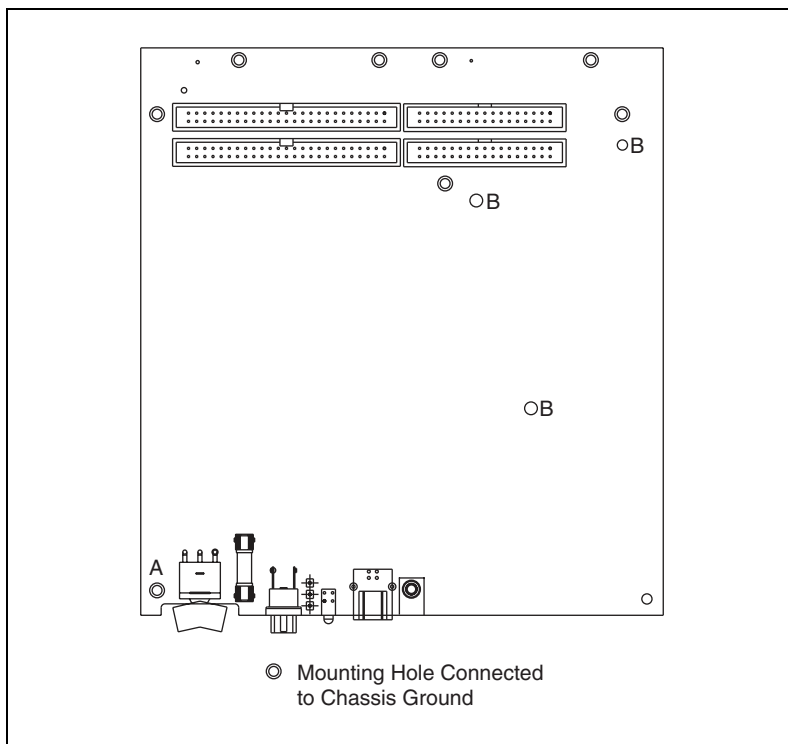
Chassis ground provides a connection between the enclosure and USB ground.

D GND is connected to the chassis ground through an internal connection to hole A, shown in Figure 12. The chassis ground directly connects to USB shield ground.

The USB-6221/6229/6251/6259 OEM device includes several mounting holes that are plated and designed for user-configured ground connections between the device chassis ground and the appropriate system ground. Figure 12 shows where the different grounds are connected.



**Note** The holes that are labeled B are reserved for an external shield. Do *not* use these holes as mounting holes.



**Figure 12.** Ground Connections (USB-6229/6259 OEM Shown)

# Device Components

Table 1 contains information about the components used for interfacing and interacting with the USB-6221/6229/6251/6259 OEM device.

**Table 1.** USB-6221/6229/6251/6259 OEM Components

<b>Component</b>	<b>Reference Designator(s) on PCB</b>	<b>Manufacturer</b>	<b>Manufacturer Part Number</b>
LEDs	DS1	Dialight	553-0332
34-pin connectors	J1, J2*	3M	N2534-6002RB
50-pin connectors	P1, P2*	3M	N2550-6002UB
USB connector	J3	AMP	787780-1
Power connector	J4	Switchcraft	722RA
Power switch	SW1	ITT Industries, Cannon	E101J1A3QE2
F 2A L 250V fuse	XF1	Littelfuse	217.002
68-pin connectors <sup>†</sup>	J6*, J7	Honda	PCS-E68RLMD1+
* J2, P2, and J6 are available on USB-6229/6259 OEM devices only. <sup>†</sup> Optional mass termination connectors. These are not populated by default.			

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