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ISO-CABLEZ User Guide

FEATURES

Isolated communication
- **I²C**
- **SPI**
- **GPIO**

Isolated power
USB to isolated serial interface

HARDWARE REQUIREMENT

Serial input/output interface USB-SDP-CABLEZ

GENERAL DESCRIPTION

The ISO-CABLEZ isolated serial interface board is used to communicate with certain Analog Devices, Inc., evaluation boards for customer evaluation. The isolated serial input/output interface is required to communicate between two systems that require galvanic isolation between two different ground planes The ISO-CABLEZ isolated serial interface board provides connectivity through the USB-SDP-CABLEZ to the PC, allowing the USB-SDP-CABLEZ to be used to evaluate the evaluation board from the PC application. The ISO-CABLEZ design has isolated power, I²C, and serial peripheral interface (SPI) capabilities.

For more information on the ISO-CABLEZ isolated serial interface board, go to www.analog.com/ISO-CABLEZ.

ISO-CABLEZ ISOLATED SERIAL INTERFACE BOARD PHOTOGRAPH

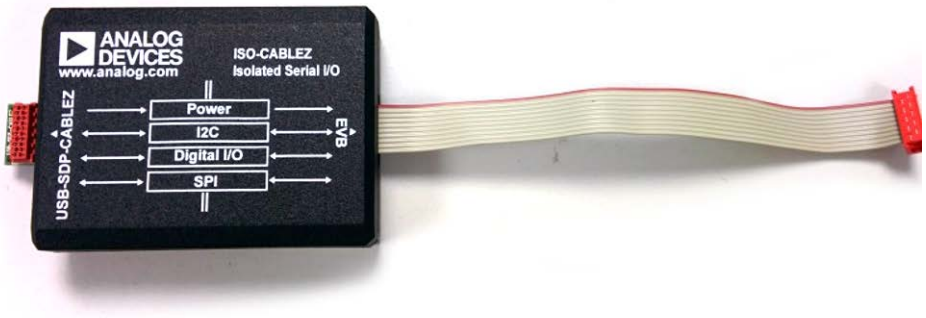

Figure 1.

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REVISION HISTORY

8/14—Revision 0: Initial Version

EVALUATION BOARD DESCRIPTION

The ISO-CABLEZ isolated serial interface board is required to communicate between two systems that require galvanic isolation between two different ground planes, such as applications that have a large ground level difference between the evaluation board and the PC or microcontroller.

The USB-SDP-CABLEZ is usually referenced to a 0 V ground plane, whereas the evaluation board is referenced to a different ground plane. In this case, the I²C signals, SPI signals, and digital input and output signals that go to and from the evaluation board must also be isolated. The ISO-CABLEZ isolator board block diagram is shown in Figure 2 and details the capabilities of the board.

Analog Devices provides a range of various isolators using *i*Coupler® technology. The ISO-CABLEZ isolation board includes the following isolators:

- The ADuM1250 is used to demonstrate the I²C isolation.
- The ADuM5402 provides quad-channel digital isolation with *iso*Power®. When the primary side is powered, the *iso*Power device powers the isolated side of the board.
- The ADuM3152 provides 7-channel digital isolation optimized for isolated SPI interfaces.

The ISO-CABLEZ is powered by the 5 V power supply from the USB-SDP-CABLEZ. The ADuM5402 only needs power from one side and can provide power across the isolation barrier via the integrated dc-to-dc converter. The ADuM1250 and ADuM3152 must be powered from both the primary and secondary sides. The primary side is powered by the USB-SDP-CABLEZ, and the secondary side is powered by the ADuM5402 isolated power. The 10-way connectors (J1 and J2) are used to connect the ISO-CABLEZ board with the USB-SDP-CABLEZ dongle to connect the evaluation board to a PC.

Figure 3 shows how to connect the ISO-CABLEZ to one evaluation board. Only one ISO-CABLEZ isolated serial interface board is required for multiple evaluation board cascade setup.

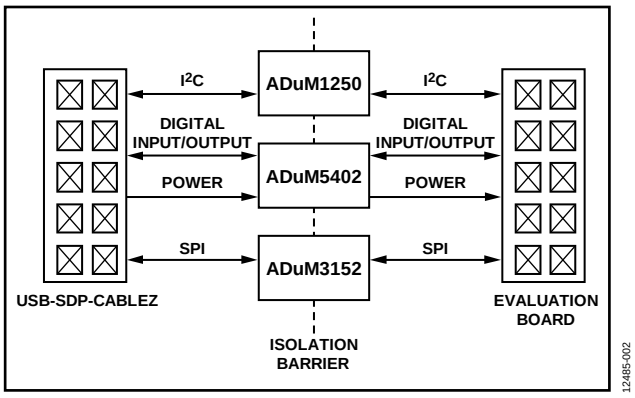

Figure 2. ISO-CABLEZ Isolated Serial Interface Board Block Diagram

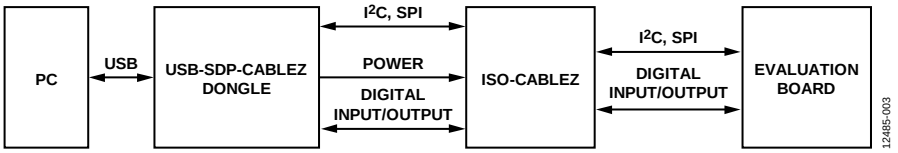

Figure 3. Board Setup for Evaluating One Evaluation Board

EVALUATION BOARD HARDWARE

CONNECTORS AND LED FUNCTIONS

Table 1. LED Functions

LED	Description
ISO_PWR	Secondary side board power; yellow LED.

Table 2. Connector Functions

Connector	Description
J1	Connect J1 with the USB-SDP-CABLEZ dongle.
J2	Connect J2 with the 10-way Micro-MaTch ribbon cable to link to the evaluation board.

Table 3. 10-Pin Connector Assignments for J1

Pin No.	Pin Name	Description
1	PC_I2C_SCL	I^2C serial clock.
2	PC_GND	Ground connection.
3	PC_I2C_SDA	I^2C serial data.
4	PC_VBUS_5V	Voltage bus. Connected directly to the USB 5 V supply.
5	PC_SPI_MISO	SPI master in, slave out data.
6	PC_GPIO	General-purpose input/output.
7	PC_SPI_SCLK	SPI clock.
8	PC_SPI_MOSI	SPI master out, slave in data.
9	PC_SPI_CS_A	SPI Chip Select A.
10	PC_GND	Ground connection.

Table 4. 10-Pin Connector Assignments for J2

Pin No.	Pin Name	Description
1	ISO_SCL	I^2C serial clock.
2	ISO_GND	Ground connection.
3	ISO_SDA	I^2C serial data.
4	ISO_5V	Voltage bus. Connected directly to the USB 5 V supply.
5	ISO_MISO	SPI master in, slave out data.
6	ISO_GPIO1	General-purpose input/output.
7	ISO_SCLK	SPI clock.
8	ISO_MOSI	SPI master out, slave in data.
9	ISO_CS_A	SPI Chip Select A.
10	ISO_GND	Ground connection.

EVALUATION BOARD SCHEMATICS AND ARTWORK

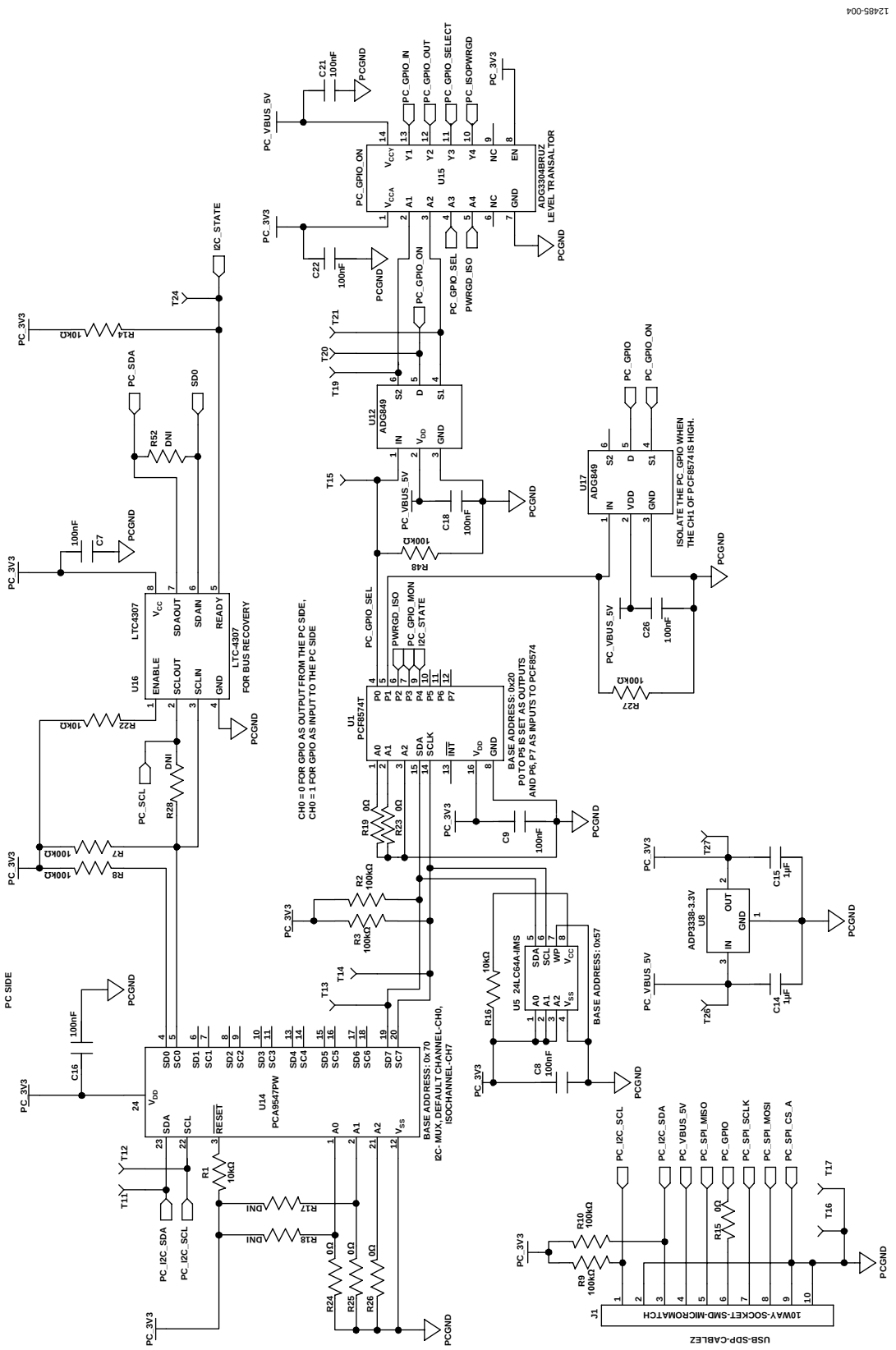

Figure 4. ISO-CABLEZ, PC Side

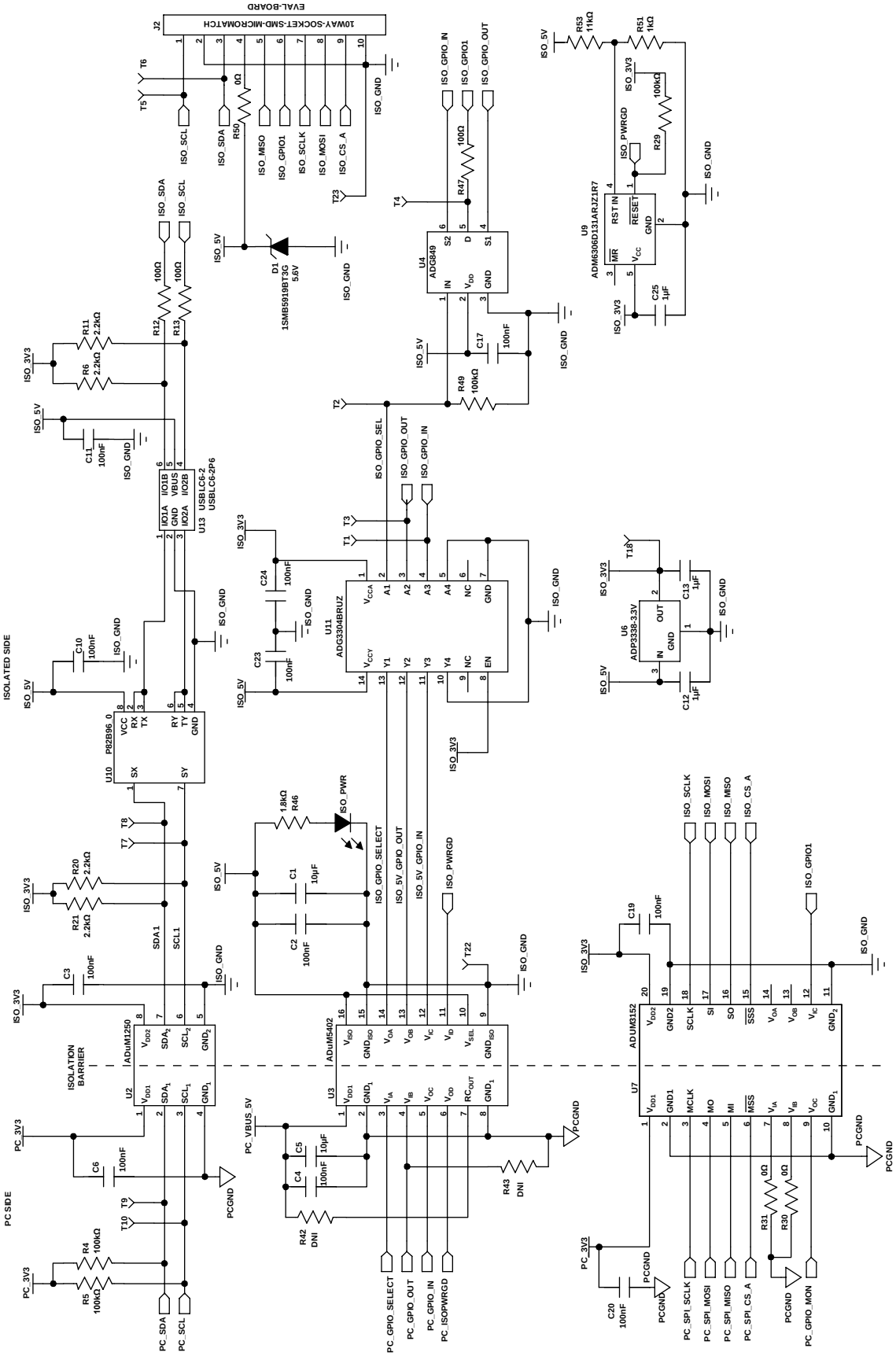

Figure 5. ISO-CABLEZ, PC Side and Isolated Side

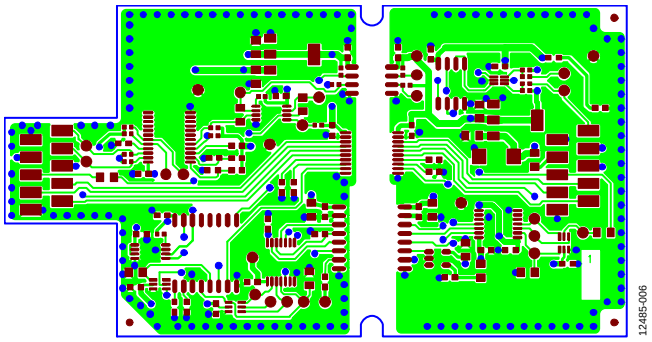

Figure 6. ISO-CABLEZ Layer 1

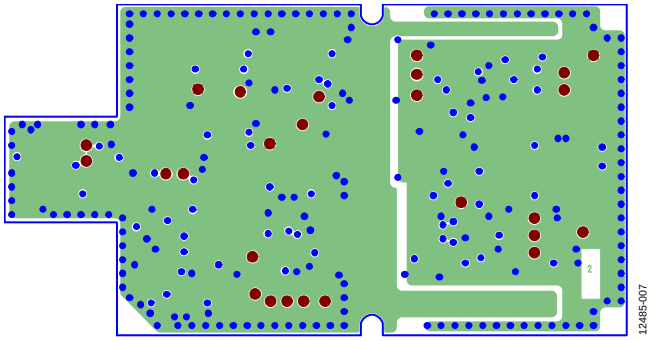

Figure 7. ISO-CABLEZ Layer 2

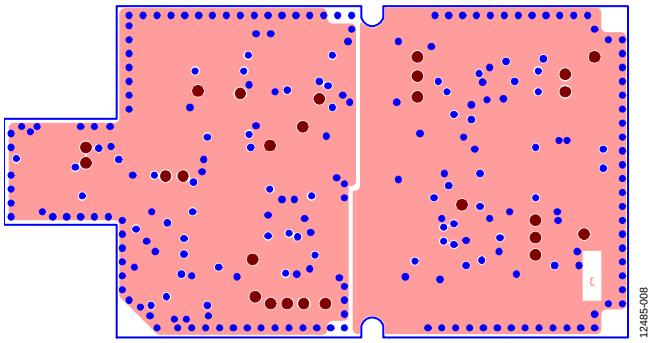

Figure 8. ISO-CABLEZ Layer 3

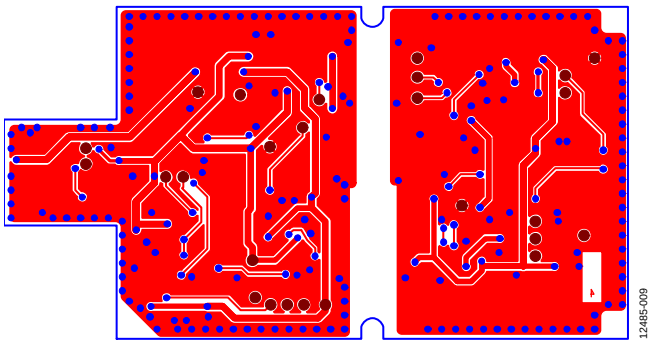

Figure 9. ISO-CABLEZ Layer 4

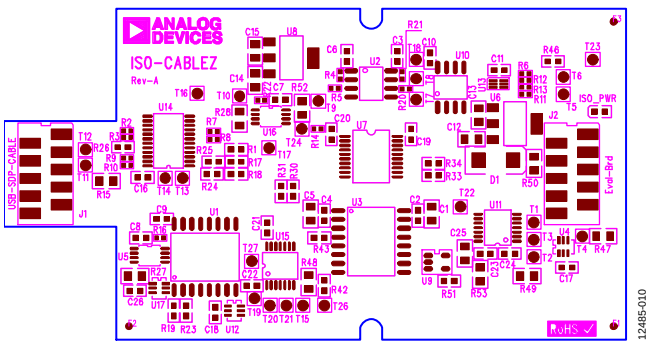

Figure 10. ISO-CABLEZ Assembly Top

ORDERING INFORMATION

BILL OF MATERIALS

Table 5.

Designator	Description	Stock Code
C1, C5	SMD capacitor	FEC 1288204
C2 to C4, C6 to C11, C16 to C24, C26	SMD capacitor	FEC 1692286
C12 to C15, C25	SMD capacitor	FEC 1833845
D1	Zener diode, 5.6 V, 3 W	FEC 1431162
ISO_PWR	LED, yellow, 0603, SMD	FEC 1685069
J1, J2	10-way, female SMD Micro-MaTch	FEC 3784745
R1	Resistor, 10 kΩ, 0.063 W, 1%, 0603	FEC 9330399
R2 to R5, R7 to R10	Resistor, 100 kΩ, 0.063 W, 1%, 0402	FEC 1358096
R6	SMD resistor	FEC 2059231RL
R11, R20, R21	Resistor, 2.2 kΩ, 0.063 W, 1%, 0402	FEC 1358051
R12, R13	Resistor, 100 Ω, 0.063 W, 1%, 0402	FEC 1358015
R14, R16, R22	Resistor, 10 kΩ, 0.063 W, 1%, 0402	FEC 1358069
R15, R28, R50, R52	Resistor, 0805, 1%, 0 Ω	FEC 9333681
R17, R18	Resistor, 0 Ω, 0603	Do not insert
R19, R23 to R26, R30, R31	Resistor, 0603, 1%, 0 Ω	FEC 9331662
R27, R48, R49	Resistor, 100 kΩ, 0.1 W, 1%, 0805	FEC 9332405
R29	Resistor, 100 kΩ, 0.063 W, 1%, 0603	FEC 9330402
R42, R43	Resistor, 0 Ω, 0603	Do not insert
R46	Resistor, 1.8 kΩ, 0.063 W, 1%, 0603	FEC 9330712
R47	Resistor, 100 Ω, 0.1 W, 1%, 0805	FEC 9332375
R51	Resistor, 1.1 kΩ, 0.063 W, 1%, 0603	FEC 9330445
R53	Resistor, 11 kΩ, 0.1 W, 1%, 0805	FEC 9332456
T1	Test point, ISO_GPIO_IN	Do not insert
T2	Test point, ISO_GPIO_SEL	Do not insert
T3	Test point, ISO_GPIO_OUT	Do not insert
T4	Test point, ISO_GPIO1	Do not insert
T5, T6, T11, T13, T14, T19 to T21, T24, T26, T27	Test point, keep free of solder	Do not insert
T7	Test point, SCL1	Do not insert
T8	Test point, SDA1	Do not insert
T9	Test point, SDA_IN	Do not insert
T10	Test point, SCL_IN	Do not insert
T12	Test point, PC_I2C_SCL	Do not insert
T15	Test point, PC_GPIO_SEL	Do not insert
T16, T17	Test point, PCGND	Do not insert
T18	Test point, ISO_3V3	Do not insert
T22, T23	Test point, ISO_GND	Do not insert
U1	PCF8574, input/output expander, 8-bit, 16-lead SOIC	FEC 1690393
U2	Digital isolator	ADuM1250ARZ
U3	Digital isolator	ADuM5402ARWZ
U4, U12, U17	Analog switch; single; single-pole, double throw (SPDT); 6-lead SC70	ADG849YKSZ-REEL7
U5	IC, EEPROM, serial 64 kb, SMD, MSOP8	FEC 1331335
U6, U8	Voltage regulator	ADP3338AKCZ-3.3RL7
U7	Digital isolator	ADuM3152ARSZ
U9	Programmable supervisory IC	ADM6306D131ARJZ1R7
U10	I^2C bus buffer	FEC 8906068
U11, U15	Bidirectional, logic level translator	ADG3304BRUZ
U13	Low capacitance ESD protection	FEC 1295310RL
U14	8-channel, I^2C bus multiplexer with reset	FEC 2212121
U16	Bidirectional, I^2C buffer with enable/ready signals	FEC 1627455 (US)

NOTES

I²C refers to a communications protocol originally developed by Philips Semiconductors (now NXP Semiconductors).

ESD Caution

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

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