DS9481P-300
USB-to-1-Wire/I2C Adapter

Evaluates: 1-Wire Slave and I2C Devices

General Description

The DS9481P-300 is a USB-to-1-Wire®/I2C adapter for easy PC connectivity to 1-Wire and I2C devices. The adapter provides a 6-pin female connector with the signals to communicate with 1-Wire and I2C devices that support a 3.3V data I/O level. The DS9481P-300 driver runs under Windows® 10, Windows 8, and Windows 7 operating systems, both 64-bit and 32-bit versions. The virtualized COM port provides a convenient communication interface.

EV Kit Contents

QTY	DESCRIPTION
1	DS9481P-300# USB to 1-Wire/I2C Adapter
1	USB Type A-to-USB Micro-Type B cable

Ordering Information **appears at end of data sheet.**

Features

- Driver Support for Windows 10, Windows 7 Operating Systems
- 1-Wire/I2C USB Adapter Creates a Virtual COM Port on Windows, Linux, and Mac Operating Systems
- Emulates the DS2480B Command Set
- 3.3V Read/Write Operation to 1-Wire
- Supports Standard and Overdrive 1-Wire Communication
- Strong Pullup to 3.3V Provides the Additional Current Required for 1-Wire EEPROM, Environmental Sensors, and Cryptographic Devices
- 1-Wire Active Pullup Accommodates Long Lines
- 3.3V I2C Operation with SDA and SCL Pullups
- Supports I2C Speeds of 100kHz and 400kHz
- 6-Pin Female Interface
- Fully Compliant with USB Specification v2.0
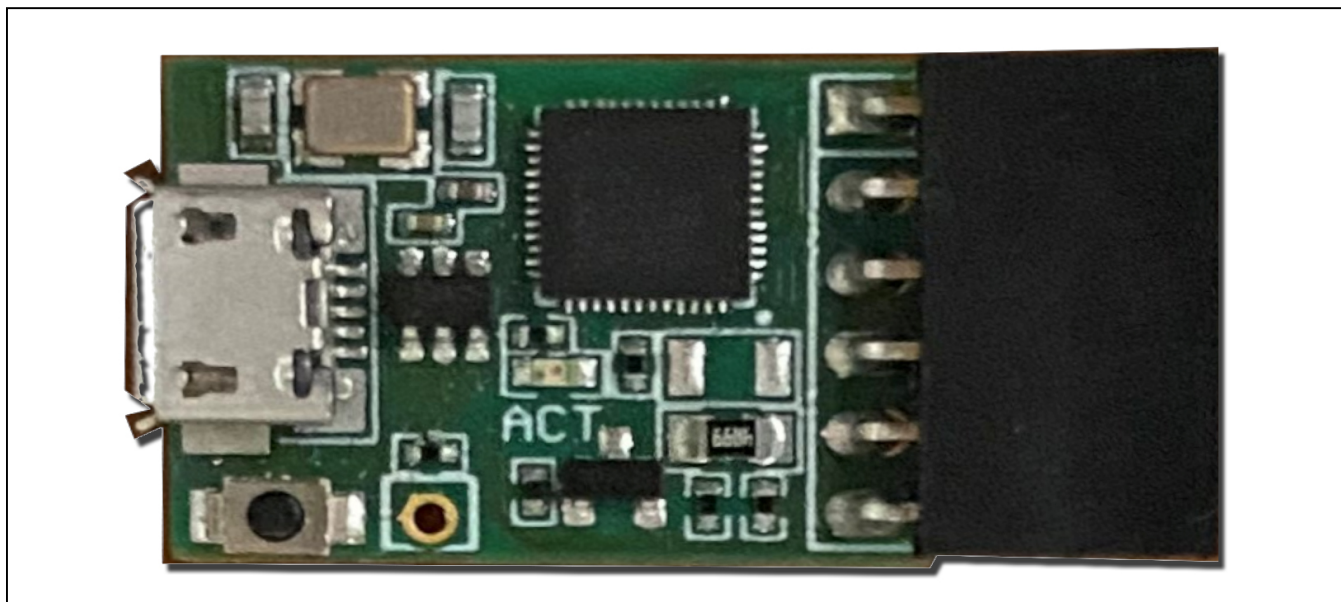
DS9481P-300# USB-to-1-Wire/I2C Adapter

Figure 1. DS9418P-300

1-Wire is a registered trademark of Maxim Integrated Products, Inc.
Windows is a registered trademark of Microsoft Corporation.

maxim **integrated**™

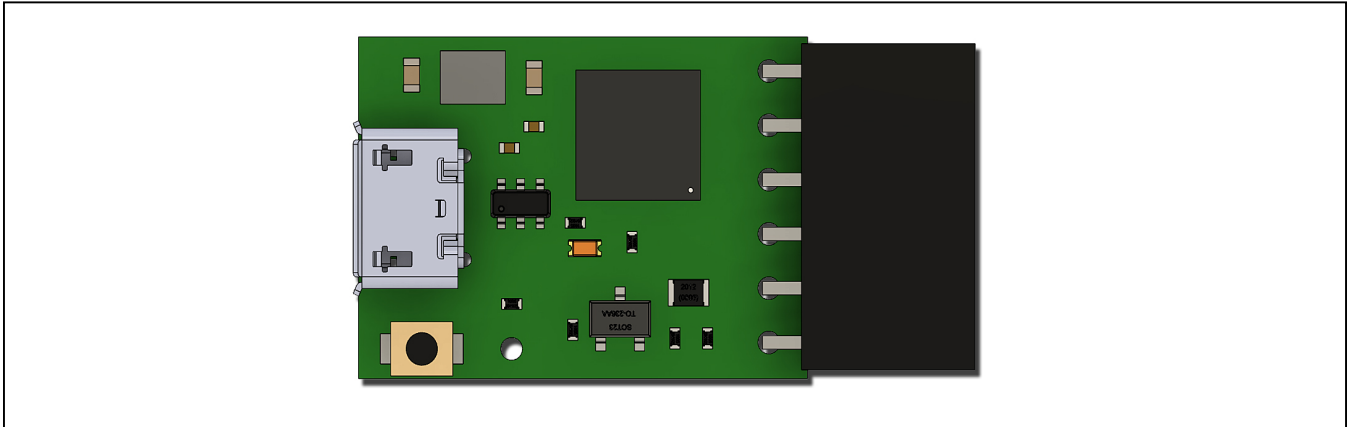## DS9481P-300# USB-to-1-Wire/I2C Adapter (continued)
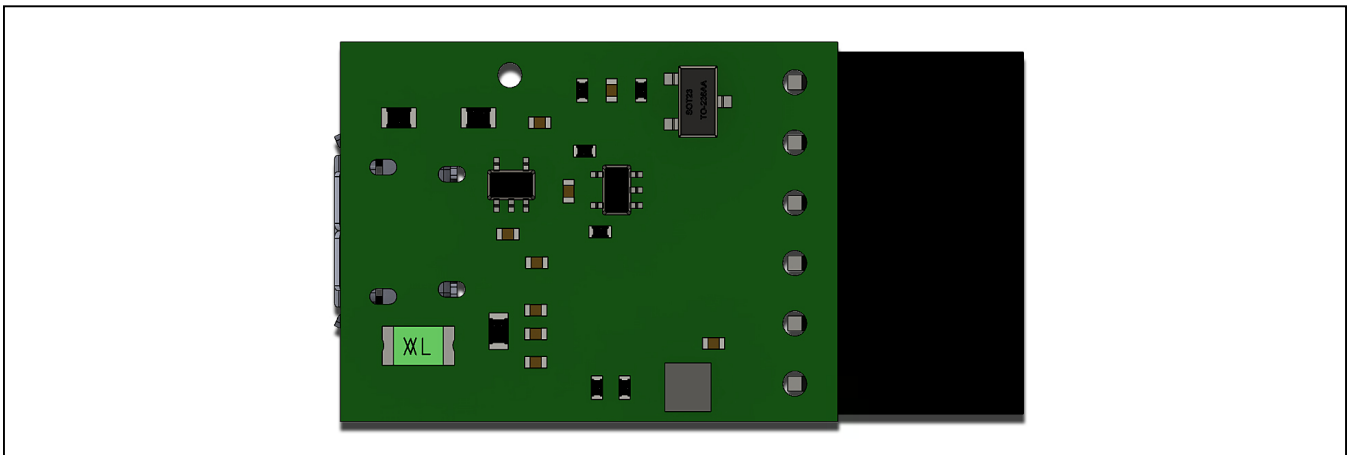

Figure 2. DS9481P-300 Top

Figure 3. DS9481P-300 Bottom

Quick Start

Required Equipment

- DS9481P-300# USB to I2C/1-Wire Adapter (included)
- USB Type A to Micro-USB Type B cable (included)
- PC with a Windows 10, Windows 8, or Windows 7 operating system (64 bit or 32 bit) and a spare USB 2.0 or higher port
- Maxim DS9481P-300 USB to 1-Wire drivers

Note: In the following sections, software-related items are identified in **bold**. The text in bold refers to items directly from the EV kit software. The text in **bold and underlined** refers to items from the Windows operating system.

Procedure

Request the DS9481P-300_drivers.zip package. Follow this procedure for first-time evaluation:

1) Do the following to install the Maxim DS9481P-300 USB to the 1-Wire/I2C Adapter:

   a. Extract the DS9481P-300_drivers.zip package and open the folder with the DS9481P-300 drivers.

   b. Right click the **DS9481P-300.inf** file and select **Install**.

   c. Follow the directions of the installation.

2) Follow the steps to install the 1-Wire drivers:

   a. Download the 1-Wire drivers from:
   https://www.maximintegrated.com/en/prod-ucts/ibutton-one-wire/one-wire/software-tools/drivers/download-1-wire-ibutton-drivers-for-windows.html

b. **Choose Operating System** from the dropdown.

c. From the **Select File** dropdown, select 32-bit or 64-bit 1-Wire drivers for the architecture used by the OS.

d. Click **Download**.

e. When prompted by **Do you want to run or save this file?**, select **Run**.

f. When a security warning says **Do you want to run the software?**, select **Run**.

g. Read and check the box to accept the license agreement and click **Install**.

h. Click **Finish** to exit the Setup Wizard.

3) Find the enumeration of the virtual COM port by inserting the DS9481P-300 into a spare USB port on the computer. Determine the COM port by looking in **Control Panel→System→Hardware→Device Manager** and expand the Ports (COM and LPT). The port is COM39 in the example in Figure 5.

The installation of the DS9481P-300 adapter is complete now.
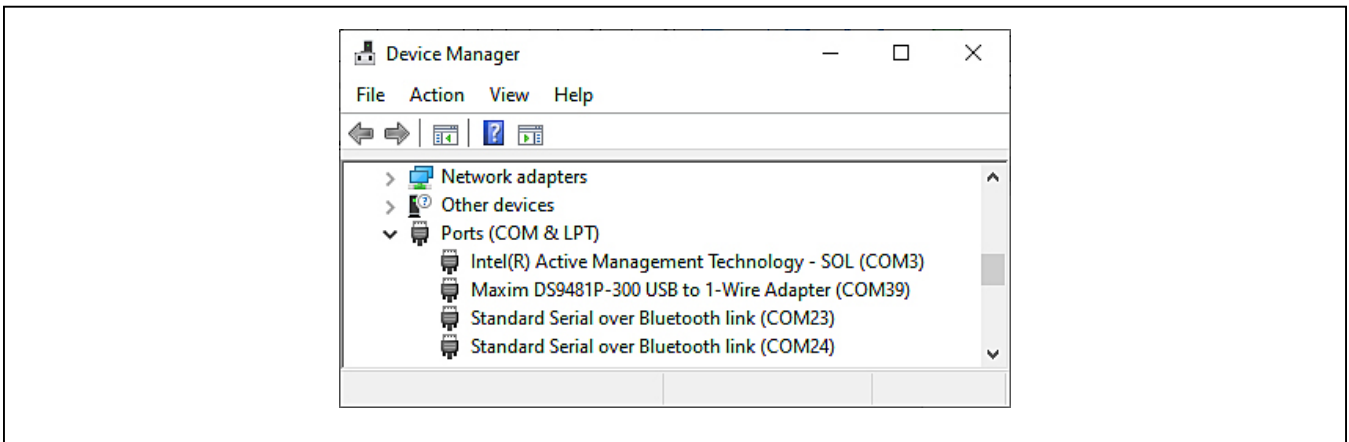

Figure 4. DS9481P-300 and USB Cable

Figure 5. COM Selection

Detailed Description of Connectors

J1 Pinout

Table 1 shows the pinout for J1 on the DS9481P-300. Pin 6 (V_{CC}) supplies 3.3V power to the I2C and 1-Wire devices that require external power, while Pin 5 (GND) is the corresponding ground return. Pin 4 (1W) is the bidirectional 1-Wire data bus, while Pins 2 (SCL) and 3 (SDA) are the I2C communication interface pins. The GPIO (Pin 1) is currently not implemented.

Device Operation

The DS9481P-300 supports the 1-Wire and I2C modes. By default, the DS9481P starts in the 1-Wire mode on power-up.

The DS9481P-300 1-Wire mode emulates the DS2480B operation. Use the 1-Wire SDK to access the 1-Wire commands under the Windows environment. Download SDK and documentation from **https://www.maximintegrated. com/en/products/ibutton-one-wire/one-wire/software-tools/sdk-windows.html**

After downloading the zip file, extract and navigate to **SDK\Lib\Compact.Net** and use the **OneWireLinkLayer. dll** to access the 1-Wire commands.

For documentation, navigate to **SDK\Docs\Compact. Net**.

For I2C communication, switch the adapter mode to the I2C mode. To use 1-Wire mode again under I2C, send a command to return to the 1-Wire mode. If device is in the I2C mode, return to the 1-Wire mode before closing the software application. This ensures the adapter is back into the default mode. See Table 3 and Table 4 for adapter commands, how to develop them, and instructions. Maxim Integrated does not have an API or dll for the I2C interface.

To start the operation, set the COM port Baud Rate to 115200 with a read timeout of 1000ms.

Follow the next recommendation if the **OneWireLinkLayer. dll** is being used when connecting to the adapter:

- Declare a variable as DalSemi.OneWire.Adapter. PortAdapter USB_adapter=DalSemi.OneWire. Adapter.PortAdapter

- Connect the adapter as USB_adapter =DalSemi.OneWire.AccessProvider. GetAdapter("DS9097U", portNumber) 'UPDATE FROM "{DS9097U_DS9481}" this fixes issue with port number not working above COM 15'

*Example provided in Visual Basic. Consult the **OneWireLinkLayer.dll** documentation for more information.*

Note: The DS9481P-300 commands are sent using basic writes and reads to the serial port.

Table 1. 1-Wire/I2C J1 Pinout

CONNECTOR PIN	SIGNAL NAME
1	GPIO *(future use)*
2	SCL
3	SDA
4	1W
5	GND
6	V_{CC}

Table 2. Micro-USB Type B USB Pinout

CONNECTOR PIN	SIGNAL NAME
1	V+
2	D-
3	D+
4	DNC
5	V-
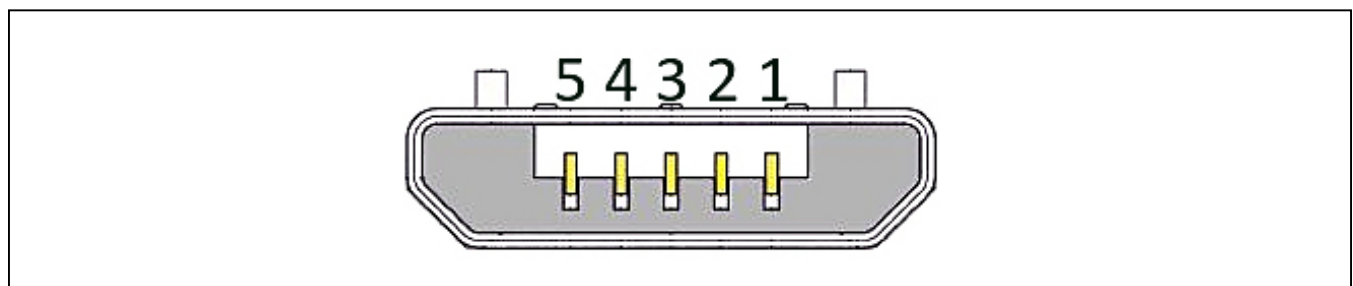
Figure 6. USB Connector

Table 3. DS9481P-300 I²C Commands

COMMAND	HEX VALUE	PARAMETER	RETURN	DESCRIPTION	RESTRICTIONS
Reset Adapter	C1h	Serial Byte to Write	None	Resets the Serial Adapter.	The serial port must be freed from the *OneWireLinkLayer.dll* using **Adapter. FreePort()** if the adapter is being used in the 1-Wire mode.
Enter I2C Mode	E5h	I²C Byte to Write	None	Sets the Adapter into I²C Mode.	The adapter must be in the 1-Wire Mode. Send a Reset Adapter Command (C1h) to reset the serial port.

Table 4. DS9481P-300 I²C Commands

I²C COMMAND	ASCII COMMAND	HEX VALUE	PARAMETER BYTE	RETURN VALUE	SIDE EFFECTS	DESCRIPTION
Start	"S"	53h	None	None	Clears Error Flag and error LED.	Issues an I²C Start.
Stop	"P"	50h	None	None	None	Issues an I²C Stop.
Repeated Start	"T"	54h	None	None	None	Issues an I²C Repeated Start.
Write Byte	"W"	57h	I²C Byte to Write	None	Sets internal Error Flag and illuminates Red LED on error.	Writes parameter byte to I²C port.
Write Byte Status	"Q"	51h	I²C Byte to Write	Error Flag Byte 00h = No Error 01h = Error	Sets internal Error Flag and illuminates Red LED on error.	Writes parameter byte to I²C port and returns error flag status.
Read Byte ACK	"R"	52h	None	I²C Data Byte Read	None	Reads a byte with master ACK and returns the value.
Read Byte NACK	"N"	4Eh	None	I²C Data Byte Read	None	Read a byte with master NACK and returns the value.
Read Status	"H"	48h	None	Error Flag Byte 00h = No Error 01h = Error	Clears Error Flag and error LED.	Checks if error flag is set.
Read Version	"V"	56h	None	Version Byte	None	Responds with version. Upper nibble is major revision and lower nibble is minor. Ex. 12h = v1.2.
Set Mode	"M"	4Dh	Speed Byte: "F" = 400kHz anything else reverts adapter back to 100kHz	None	Changes I²C speed between 100kHz and 400kHz. The baud rate register is set accordingly.	Sets speed: If the parameter byte is "F", then it switches to 400kHz, otherwise reverts to 100kHz.
Return to 1-Wire mode	"CO"	43h,4Fh	I²C Write Bytes	None	Returns to 1-Wire Mode.	Sets the device in 1-Wire Mode.

Table 5. DS9481P-300 I2C Additional Command

I2C COMMAND	ASCII COMMAND	HEX VALUE	SUB CMD	WRITE LENGTH	WRITE DATA	SIDE EFFECTS	DESCRIPTION
Packetized Data	"Z"	5Ah	01h	Write Length Byte	CRC8 of Sub Command, Data and Error Flag	Sets internal Error Flag and illuminates Red LED on error.	Write Only – I2C Start, Write Data Bytes, I2C Stop.

The DS9481P-300 also supports packetized data as shown in Table 5.

Switching Between Modes

By default, the DS9481P starts in 1-Wire mode on power-up.

To switch to the I2C mode:

1) The adapter must be in the default 1-Wire mode. A flag variable can be used in the software to track the adapter mode.

2) If the adapter is being used by **OneWireLinkLayer. dll**, release the serial port using **Adapter.FeePort()**.

3) Write to the serial port C1h (reset adapter), then E5h (enter the I2C mode).

4) Wait at least 100ms before sending I2C commands.

To switch to the 1-Wire mode:

1) The adapter must be in the I2C mode. A flag variable can be used in the software to track the adapter mode.

2) Write to the serial port CO (43h,4Fh).

3) Release the serial port in the software and use the **OneWireLinkLayer.dll** to communicate with the adapter. This reopens the COM port and establishes communication.

Ordering Information

PART	TYPE
DS9481P-300#	Adapter

#Denotes RoHS compliant

DS9481P-300 EV Kit Bill of Materials

| DESIGNATOR	QTY	DESCRIPTION
C1, C2, C4, C7, C9, C11, C12	7	CAP CER 1UF 6.3V 20% X5R 0402
C3, C8, C13	3	CAP CER 0.1UF 6.3V 10% X5R 0402
C5, C6	2	CAP CER 10PF 50V C0G 0603
C10	1	CAP CER 10PF 50V 5% NP0 0402
CN1	1	CONN RCPT STD MICRO USB TYPE B
D1	1	LED ORANGE HIGH BRIGHT USS 0603
FB1, FB2	2	FERRITE CHIP 220 OHM 2200MA 0603
J1	1	CONN RCPT .100" 6POS R/A SGL TIN
Q1	1	MOSFET N-CH 60V 115MA SOT23-3
Q2	1	MOSFET P-CH 20V 2.8A SOT-23
R1	1	RES SMD 10 OHM 5% 1/10W 0603
R2	1	RES SMD 1.5K OHM 5% 1/16W 0402
R3, R6, R7	3	RES SMD 100K OHM 1% 1/16W 0402
R4	1	RES SMD 32.4K OHM 1% 1/16W 0402
R5	1	RES SMD 4.7K OHM 5% 1/10W 0402
R8	1	RES SMD 1K OHM 5% 1/16W 0402
R9	1	RES SMD 2.2K OHM 5% 1/10W 0402
R10	1	RES SMD 499 OHM 1% 1/16W 0402
R11	1	RES SMD 4.99 OHM 1% 1/8W 0805
R12	1	RES SMD 680 OHM 5% 1/10W 0402
R13, R14	2	RES SMD 1.74K OHM 1% 1/10W 0402
RT1	1	PTC Fuse 1206
S1	1	SWITCH TACTILE SPST-NO 0.05A 12V
U1	1	Security Token Microcontroller with RTC and USB
U2	1	High PSRR, Low-Dropout, 150mA Linear Regulator
U3	1	Dual High-Speed Differential ESD Protection IC
U4		40ns Single-Supply Comparator
U5	1	4 Channel +/- 30kv ESD Protector
X1	1	CRYSTAL 12MHZ 10PF SMD
X2	1	Do not Populate

DS9481P-300 Schematic Diagram
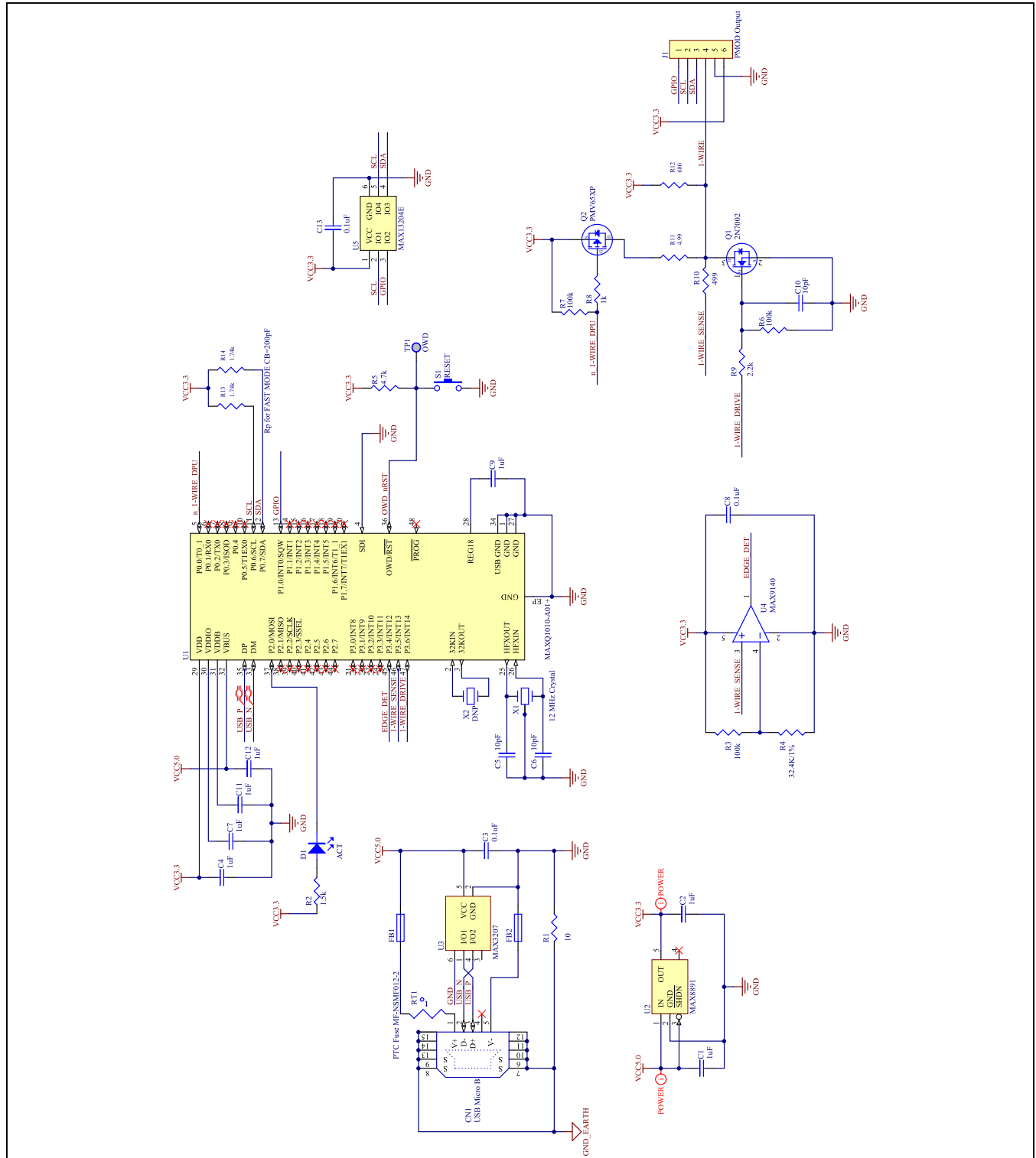
DS9481P-300 PCB Layout Diagrams
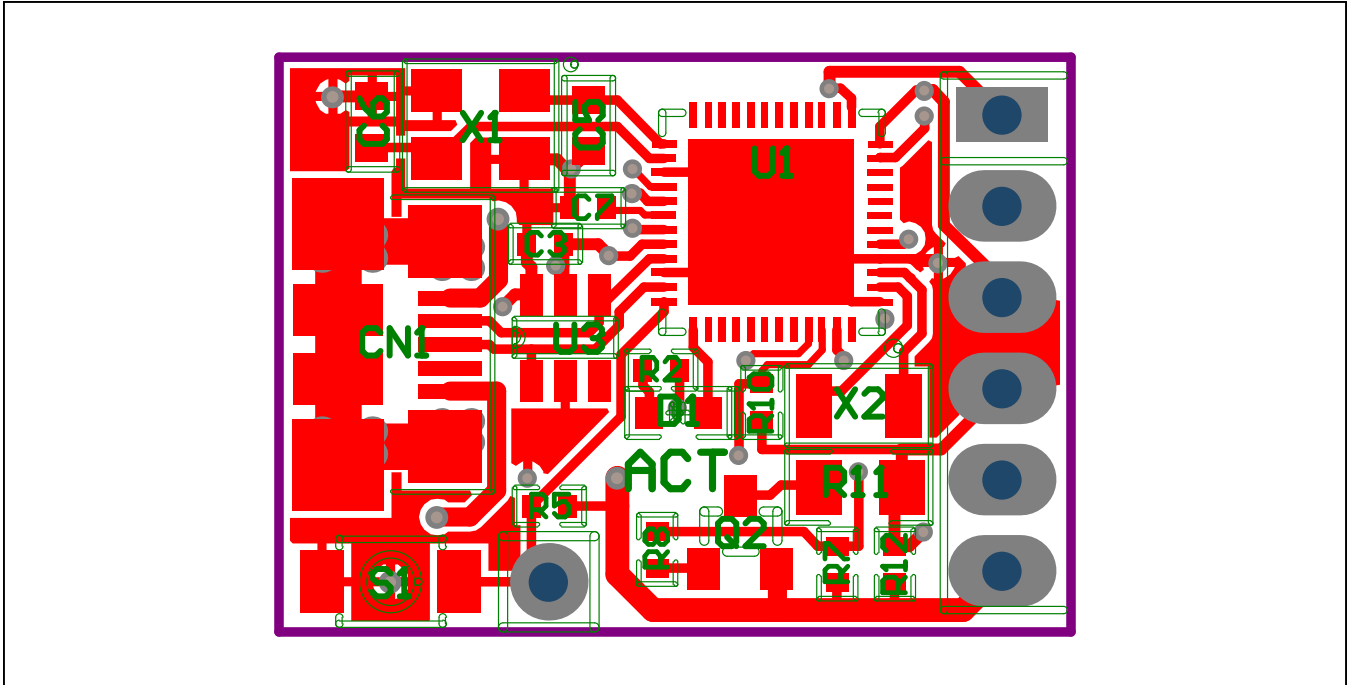
DS9481P-300 PCB Layout Diagram—Top View
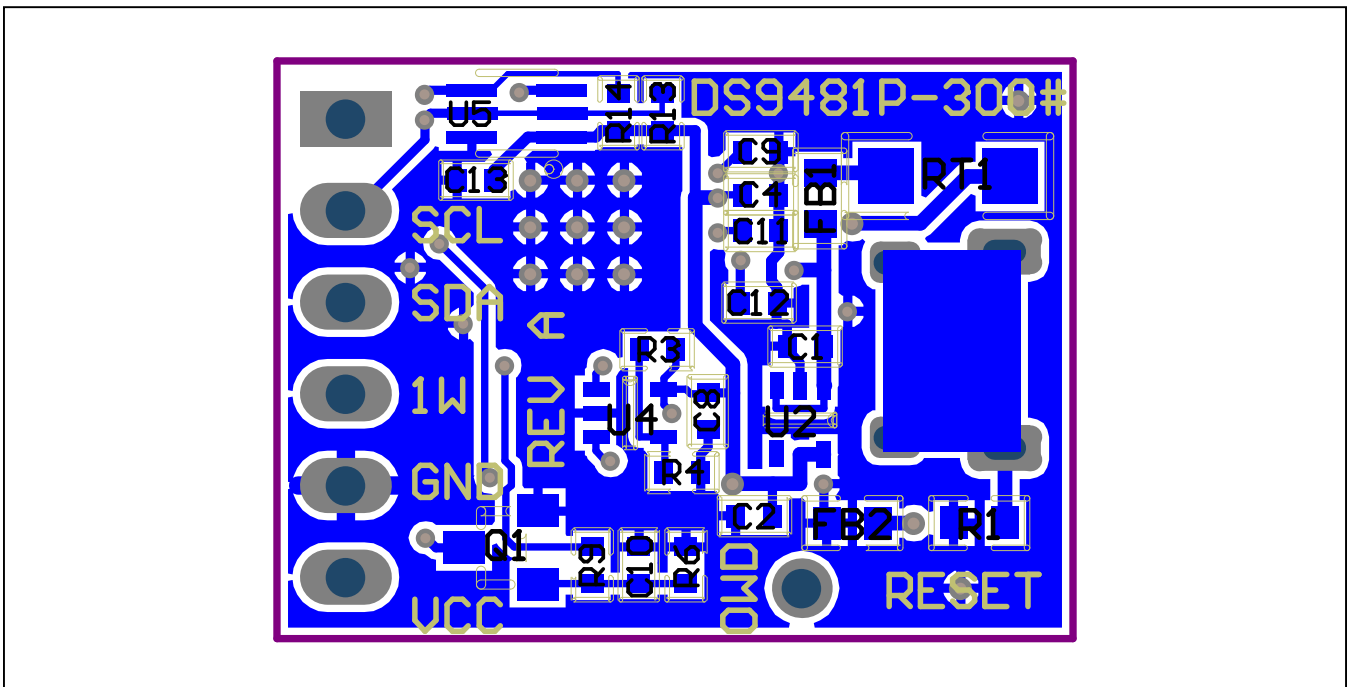
DS9481P-300 PCB Layout Diagram—Bottom View

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	6/21	Initial release	—
1	7/21	Updated *Procedure*	2