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DS28S60 Evaluation Kit

Evaluates: DS28S60

General Description

The DS28S60 evaluation system (EV system) provides the hardware and software necessary to exercise the features of the DS28S60. The EV system consists of five DS28S60Q+ devices in a 12-pin TDFN package, a DS9121E evaluation TDFN socket board, and a DS9482P# USB-to-I²C/SPI/1-Wire[®] adapter. The evaluation software runs under Windows[®] 10, Windows 8, and Windows 7 operating systems, both 64-bit and 32-bit versions. It provides a handy user interface to exercise the features of the DS28S60.

Ordering Information appears at end of data sheet.

EV Kit Contents

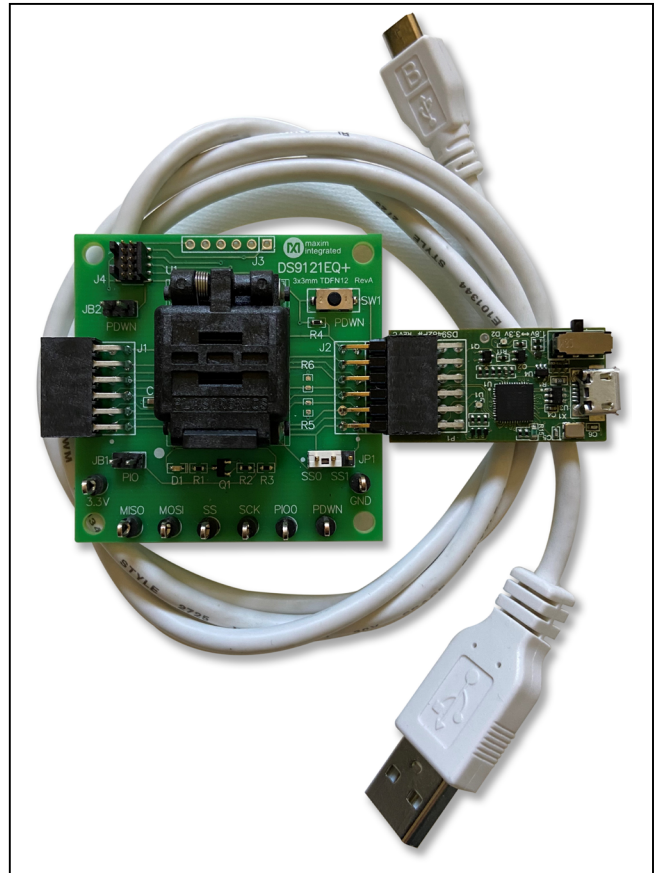
| QTY | DESCRIPTION |
|-----|--|
| 5 | DS28S60Q+ DeepCover SPI Secure Authenticator (12 TDFN) |
| 1 | DS9121EQ+ Socket Board (12 TDFN) |
| 1 | DS9482P# USB to I ² C/SPI/1-Wire Adapter |
| 1 | USB Type-A to Micro-USB Type-B Cable |

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

Features

- Demonstrates the Features of the DS28S60 DeepCover[®] Secure Coprocessor
- SPI Communication is Logged to Aid Firmware Designers Understanding of DS28S60
- SPI/1-Wire/I²C USB Adapter Creates a Virtual COM Port on Any PC
- Fully Compliant with USB Specification v2.0
- Software Runs on Windows 10, Windows 8, and Windows 7 for Both 64-Bit and 32-Bit Versions
- 3.3V ±3% Operating Voltage
- Convenient On-Board Test Points, TDFN Socket
- Evaluation Software Available by Request

DS28S60 EV System



Quick Start

This section includes a list of recommended equipment and instructions on how to set up the Windows-based PC for the evaluation software.

Required Equipment

- DS9482P# USB to I2C/SPI/1-Wire Adapter (included)
- DS9121EQ+ TDFN socket board (included)
- DS28S60Q+ (five devices 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
- Download [DS28S60 EV kit software \(light version\)](#) or request full [DS28S60 EV kit developer software](#)

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

Hardware Setup and Driver Installation Quick Start

The following steps were performed on a Windows 10 PC to set up the DS28S60 EV kit hardware/software:

- 1) Obtain and unpack the **DS28S60 Evaluation Kit Lite Version Setup V1_0_0** file or the latest version.
- 2) In a file viewer ([Figure 1](#)), double click on the **DS28S60 Evaluation Kit Lite Version Setup V1_0_0.exe** file to begin the installation.
- 3) The setup wizard opens; click **Next** as shown in [Figure 2](#).

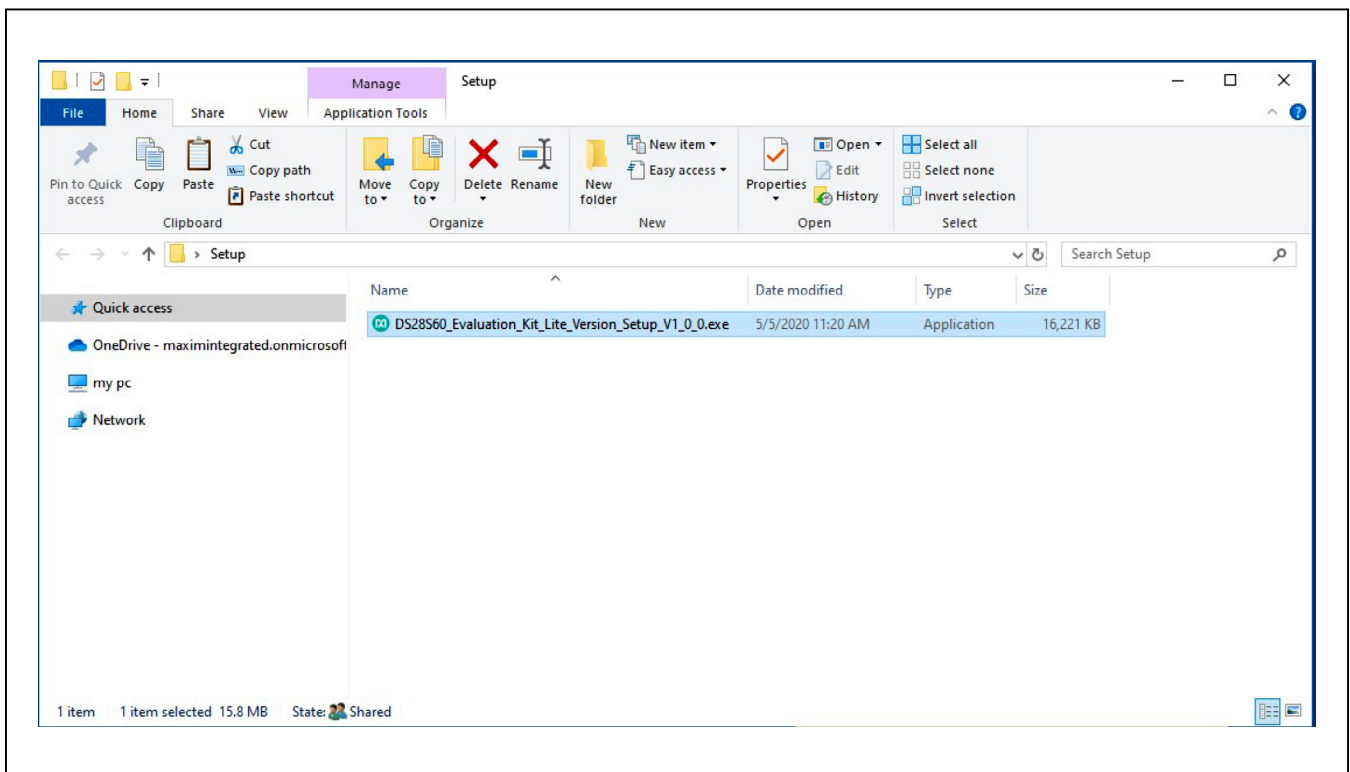


Figure 1. File Viewer

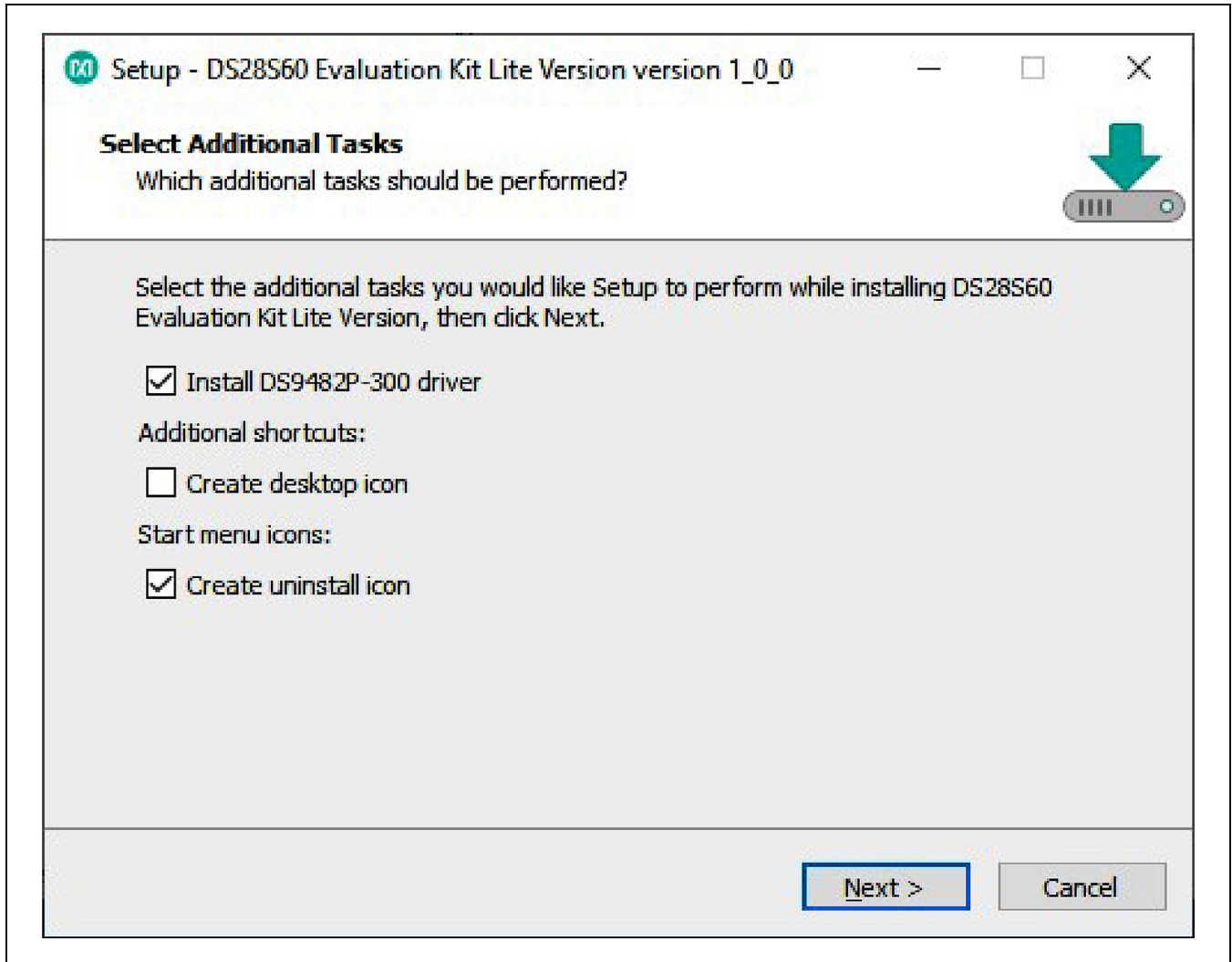


Figure 2. DS28S60 Setup Wizard

- 4) Follow the instructions in the wizard and click **Next** to install the EV kit software and required drivers ([Figure 3](#) and [Figure 4](#)).

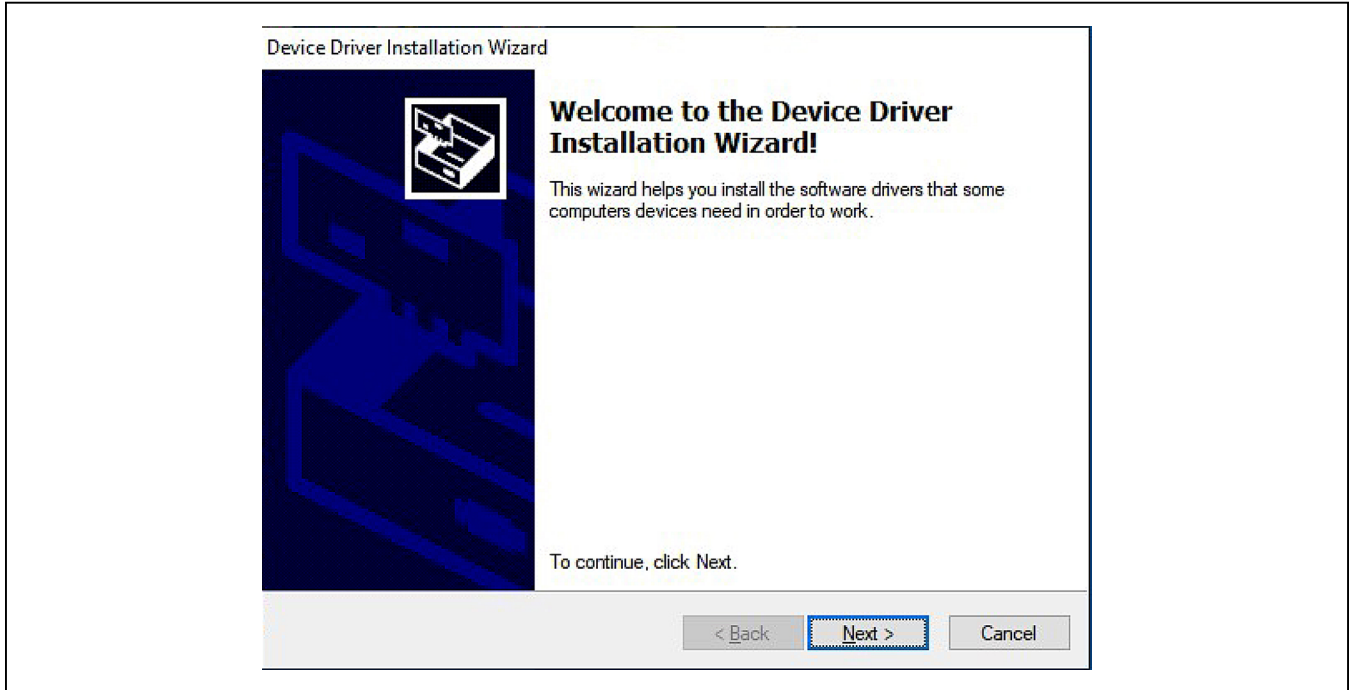


Figure 3. DS9482P# Driver Installation

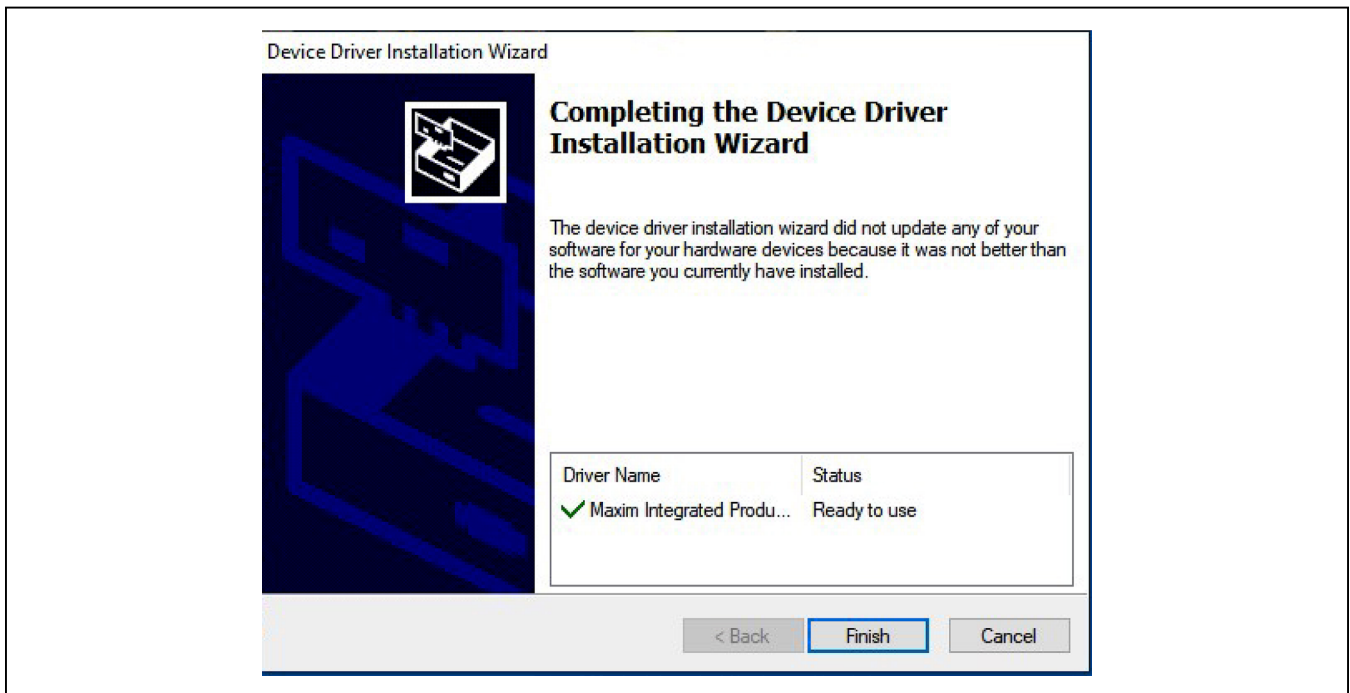


Figure 4. Finish DS9482P# Drivers Installation

5) Wait for the Installation to complete and launch program if desired after completion (Figure 5 and Figure 6).

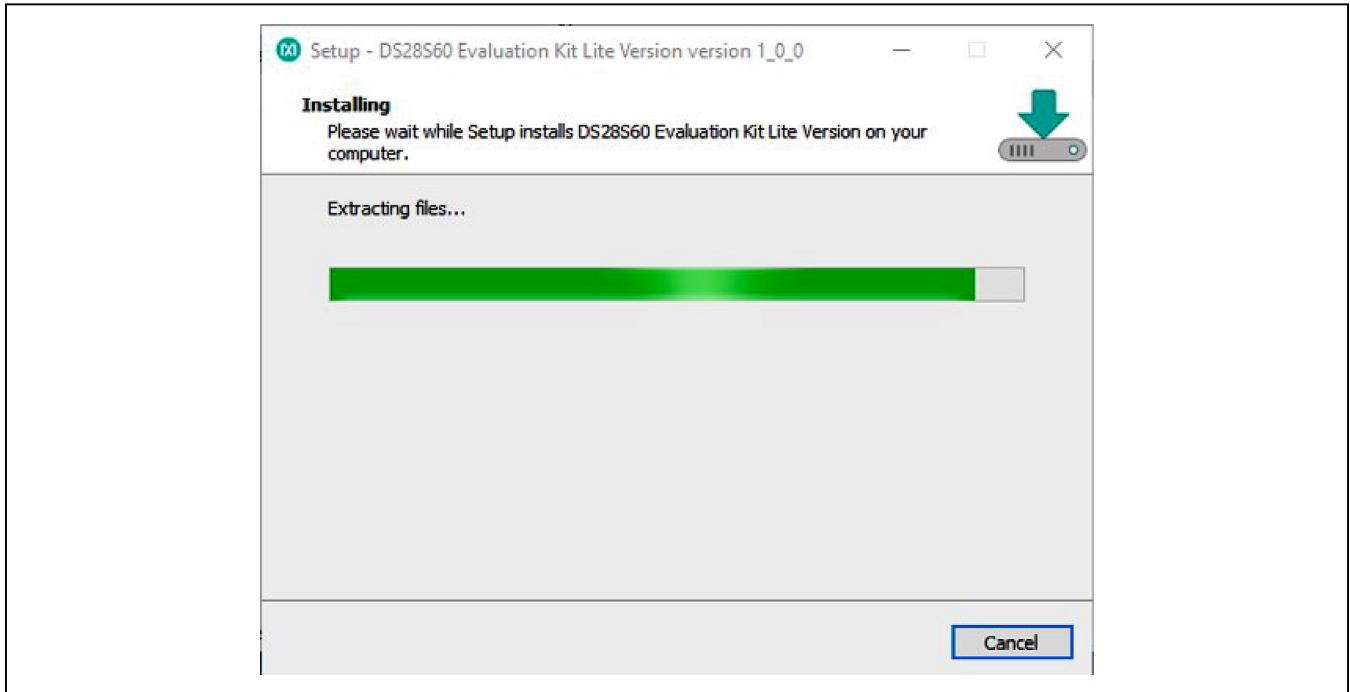


Figure 5. Installation Progress

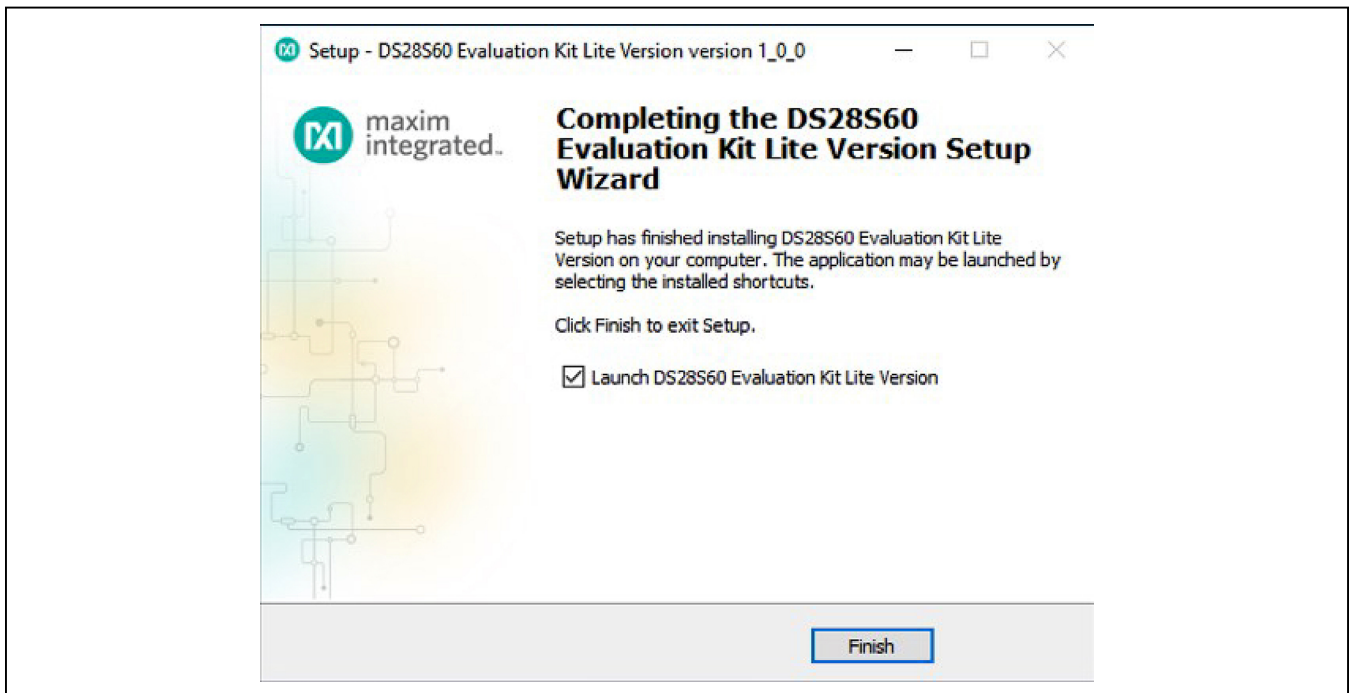


Figure 6. Run Software After Installation

- 6) Plug the DS9482P# into the PC with DS9121EQ+ socket board by doing the following:
 - a. Open socket and insert a DS28S60Q+ as shown in [Figure 7](#). **Note:** Do not use the socket's pin 1 indicator. The pin 1 indicator is denoted on the PCB as a white dot and is located on the opposite side of the socket's marking.
 - b. Close burn-in socket.
 - c. Connect the DS9121EQ J2 12-pin male plug into the DS9482P# 12-pin female socket per [Figure 8](#).
 - d. Set the DS9482P# switch to 3.3V as shown in [Figure 9](#).
 - e. Plug the DS28S60 EV kit, using a USB Type-A to Micro-USB Type-B cable, into the PC.

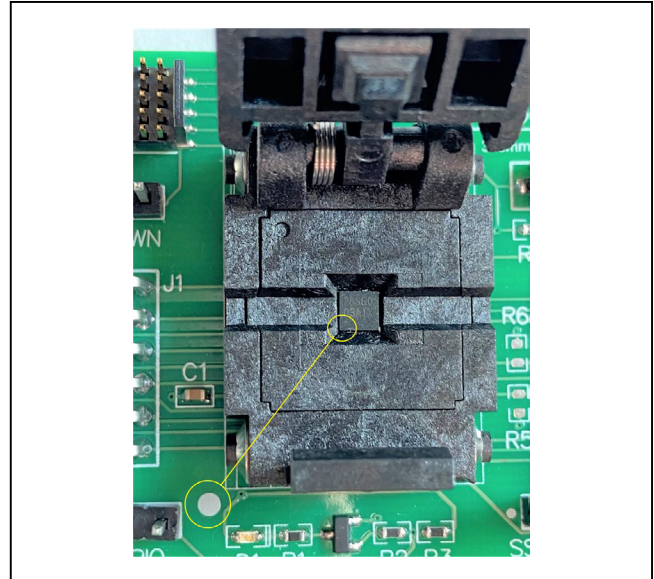


Figure 7. Orientation of the DS28S60 in Burn-In Socket

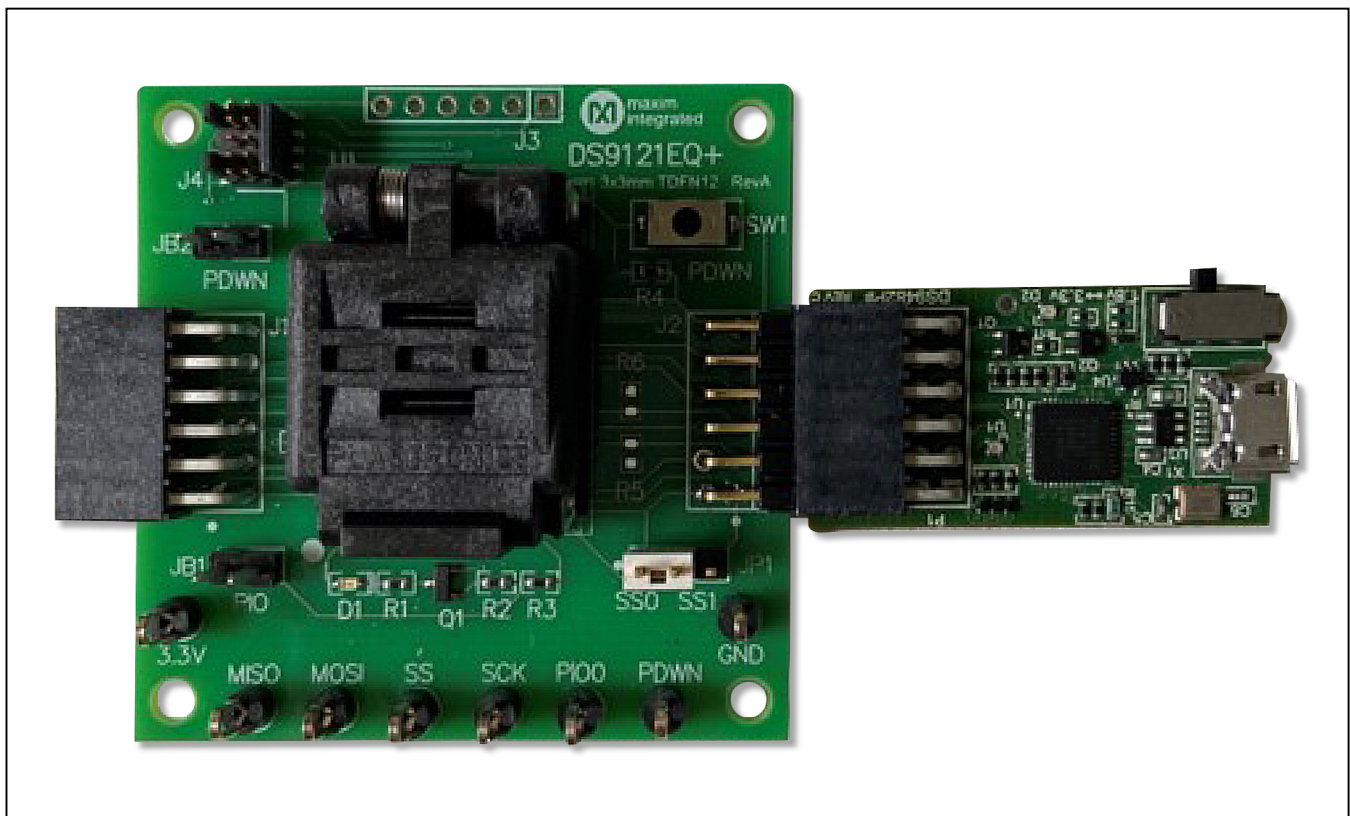


Figure 8. DS9482P# and DS9121EQ

EV Kit Supported Functions

The DS28S60 EV kit program is designed as a usage example. The GUI optionally displays all the SPI command sequence transactions as well as SHA and ECDSA computations when Settings→Debug Info is enabled. See [Table 1](#) for descriptions of the functions in the GUI.

Table 1. GUI Setup and Usage Flows Supported

| FLOW | DESCRIPTION |
|-------------------------|--|
| Generic Commands | Generic DS28S60 commands without SHA or ECDSA encryption, authentication, or protection. (e.g., Read Device, Read and Write Memory, Set and Read Protection and RNG function) |
| ECDSA Functions* | Examples to set up device for ECDSA authentication, certificate generation and verification. Examples for ECDSA encryption, authentication, signature generation and verification. |
| HMAC SHA-256 Functions* | Examples provided to setup device for HMAC authentication and verification and for HMAC encryption, authentication and the SHA-256 Generator. |
| AES Bulk Encrypt* | Examples to execute the DS28S60 AES Bulk Encrypt feature. |
| AES Bulk Decrypt* | Examples to execute the DS28S60 AES Bulk Decrypt feature. |

*Available only in full EV Kit Version.

Ordering Information

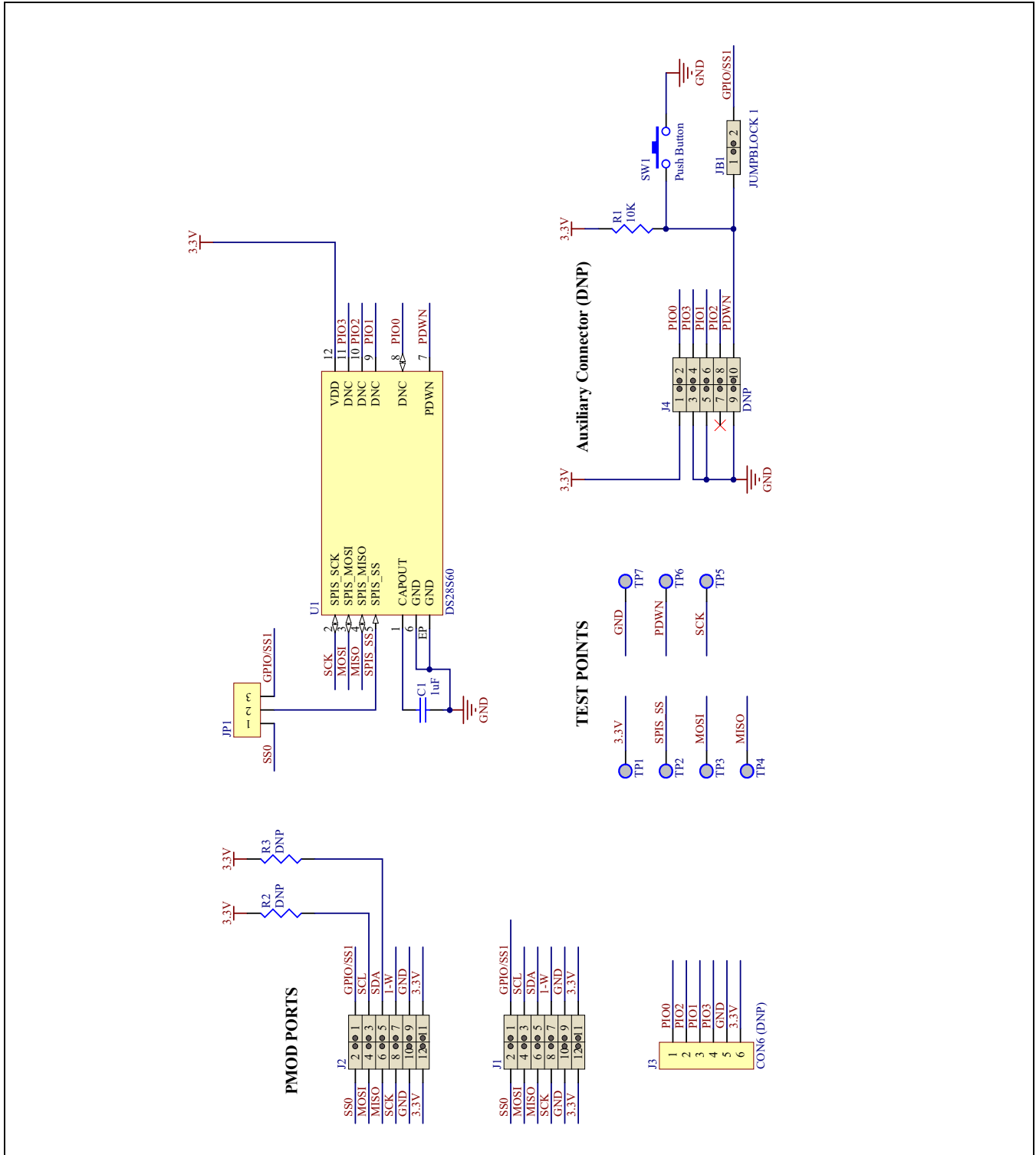
| PART | TYPE |
|---------------|--------|
| DS28S60EVKIT# | EV Kit |

#Denotes RoHS compliant.

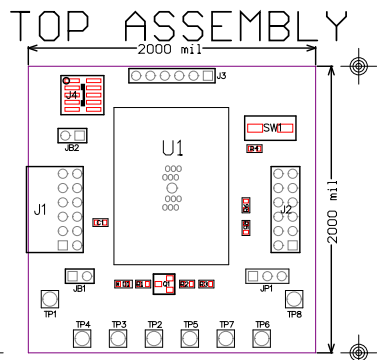
DS28S60 EV Kit Bill of Materials

| DESIGNATOR | QTY | DESCRIPTION | MANUFACTURER | PART NO. |
|------------|-----|-----------------------------------|---------------------------------|-------------------|
| U1 | 1 | DS28S60 12P TDFN 3x3 socket | Plastronics | 12QN50S33030 |
| C1 | 1 | CAP CER 1µF 25V X7R 0603 | Kemet | 06033C105KAT2A |
| J1 | 1 | CONN HEADER R/A 12POS 2.54MM | Sullins Connector Solutions | PRPC006DBAN-M71RC |
| J2 | 1 | CONN RCPT 12POS 0.1 TIN PCB R/A | Samtec Inc. | SSW-106-02-T-D-RA |
| JB1 | 1 | 2P jumper block | Sullins Connector Solutions | PEC02SAAN |
| JP1 | 1 | HDR, BRKWAY,.100 3POS VERT,0.318" | Tyco Electronics | 9-146276-0 |
| R1 | 1 | RES SMD 10KΩ 1% 1/10W 0603 | Panasonic Electronic Components | ERJ-3EKF1002V |
| SW1 | 1 | SWITCH TACTILE SPST-NO 0.05A 32V | C&K Components | KSR221GLFS |
| TP1-TP7 | 7 | Test points | Keystone Electronics | 36-5011-ND |

DS28S60 EV Schematic Diagram



DS28S60 EV Kit PCB Layout Diagrams



TOP ASSEMBLY

2000 mil

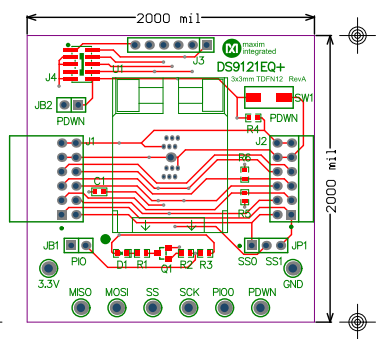
2000 mil

| DS9121EQ+ | | | | | |
|---------------------------------|-----|-----|--------|-----------|-----|
| Part Number: 89-??? | | | | | |
| Property of | | | | | Rev |
| maxim integrated | | | | | A |
| Drill and Mechanical Layer | | | | | |
| Date: JAN 06 2020 Units in mils | | | | | |
| SIZE | QTY | SYM | PLATED | TOLERANCE | |
| 12 | 23 | | YES | +/- 0.003 | |
| 18 | 12 | | YES | +/- 0.003 | |
| 39 | 37 | | YES | +/- 0.003 | |
| 45 | 1 | | YES | +/- 0.003 | |
| 59 | 1 | | NO | +/- 0.003 | |
| 59 | 8 | | YES | +/- 0.003 | |
| 70 | 1 | | NO | +/- 0.003 | |
| 125 | 4 | | NO | +/- 0.003 | |

Notes:

1. Fabricate using FR4 or similar material
2. Material: Must be RoHS Compliant
3. Board Dimensions: (2000 x 2000 mils)
4. Board Thickness: 62 mils +/- 10%
5. Layers: 2
6. Minimum Trace/Spacing: 10mil / 7mil
7. Copper Thickness: 1oz on all layers
8. Surface mount pads: 31 Through Hole Pads: 57 Nonplated through holes: 6
9. Soldermask: GREEN
10. Legend: White, Double-Sided, Non-Conductive Epoxy ink or Equiv.
- 11.
12. Finish: Most Economical Lead free and RoHS compliant process
13. Vendor Logo & date code: Allowed on bottom side only
14. Through holes: quantity 87, Slot holes 0, minimum size 12 mil
15. Tolerances:
 - Plated-through holes +/- 3 mil
 - Pattern to pattern +/- 6 mil
 - Legend to legend no preference
 - Soldermask to pattern +/- 6 mil
16. Electrical testing needed: YES

DS28S60 EV Kit—Top Assembly



TOP SILKSCREEN

2000 mil

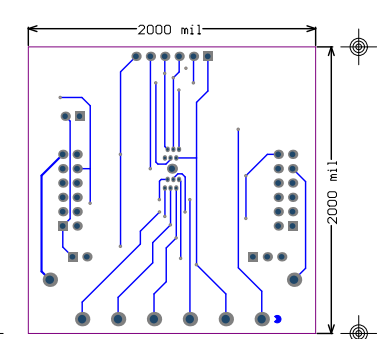
2000 mil

| DS9121EQ+ | | | | | |
|---------------------------------|-----|-----|--------|-----------|-----|
| Part Number: 89-??? | | | | | |
| Property of | | | | | Rev |
| maxim integrated | | | | | A |
| Drill and Mechanical Layer | | | | | |
| Date: JAN 06 2020 Units in mils | | | | | |
| SIZE | QTY | SYM | PLATED | TOLERANCE | |
| 12 | 23 | | YES | +/- 0.003 | |
| 18 | 12 | | YES | +/- 0.003 | |
| 39 | 37 | | YES | +/- 0.003 | |
| 45 | 1 | | YES | +/- 0.003 | |
| 59 | 1 | | NO | +/- 0.003 | |
| 59 | 8 | | YES | +/- 0.003 | |
| 70 | 1 | | NO | +/- 0.003 | |
| 125 | 4 | | NO | +/- 0.003 | |

Notes:

1. Fabricate using FR4 or similar material
2. Material: Must be RoHS Compliant
3. Board Dimensions: (2000 x 2000 mils)
4. Board Thickness: 62 mils +/- 10%
5. Layers: 2
6. Minimum Trace/Spacing: 10mil / 7mil
7. Copper Thickness: 1oz on all layers
8. Surface mount pads: 31 Through Hole Pads: 57 Nonplated through holes: 6
9. Soldermask: GREEN
10. Legend: White, Double-Sided, Non-Conductive Epoxy ink or Equiv.
- 11.
12. Finish: Most Economical Lead free and RoHS compliant process
13. Vendor Logo & date code: Allowed on bottom side only
14. Through holes: quantity 87, Slot holes 0, minimum size 12 mil
15. Tolerances:
 - Plated-through holes +/- 3 mil
 - Pattern to pattern +/- 6 mil
 - Legend to legend no preference
 - Soldermask to pattern +/- 6 mil
16. Electrical testing needed: YES

DS28S60 EV Kit—Top Silkscreen



BOTTOM METAL

2000 mil

2000 mil

| DS9121EQ+ | | | | | |
|---------------------------------|-----|-----|--------|-----------|-----|
| Part Number: 89-??? | | | | | |
| Property of | | | | | Rev |
| maxim integrated | | | | | A |
| Drill and Mechanical Layer | | | | | |
| Date: JAN 06 2020 Units in mils | | | | | |
| SIZE | QTY | SYM | PLATED | TOLERANCE | |
| 12 | 23 | | YES | +/- 0.003 | |
| 18 | 12 | | YES | +/- 0.003 | |
| 39 | 37 | | YES | +/- 0.003 | |
| 45 | 1 | | YES | +/- 0.003 | |
| 59 | 1 | | NO | +/- 0.003 | |
| 59 | 8 | | YES | +/- 0.003 | |
| 70 | 1 | | NO | +/- 0.003 | |
| 125 | 4 | | NO | +/- 0.003 | |

Notes:

1. Fabricate using FR4 or similar material
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7. Copper Thickness: 1oz on all layers
8. Surface mount pads: 31 Through Hole Pads: 57 Nonplated through holes: 6
9. Soldermask: GREEN
10. Legend: White, Double-Sided, Non-Conductive Epoxy ink or Equiv.
- 11.
12. Finish: Most Economical Lead free and RoHS compliant process
13. Vendor Logo & date code: Allowed on bottom side only
14. Through holes: quantity 87, Slot holes 0, minimum size 12 mil
15. Tolerances:
 - Plated-through holes +/- 3 mil
 - Pattern to pattern +/- 6 mil
 - Legend to legend no preference
 - Soldermask to pattern +/- 6 mil
16. Electrical testing needed: YES

DS28S60 EV Kit—Bottom Metal