Click here to ask about the production status of specific part numbers.

#### **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-I<sup>2</sup>C/SPI/1-Wire<sup>®</sup> adapter. The evaluation software runs under Windows<sup>®</sup> 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**

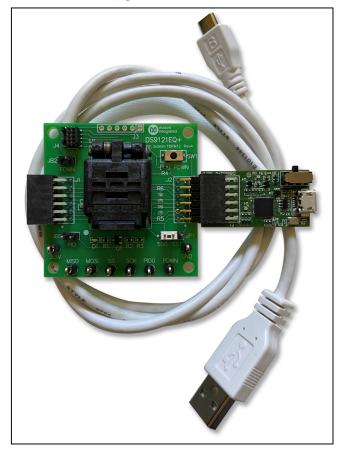
QTY	DESCRIPTION
5	DS28S60Q+ DeepCover SPI Secure Authenticator (12 TDFN)
1	DS9121EQ+ Socket Board (12 TDFN)
1	DS9482P# USB to I <sup>2</sup> C/SPI/1-Wire Adapter
1	USB Type-A to Micro-USB Type-B Cable

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<sup>®</sup> Secure Coprocessor
- SPI Communication is Logged to Aid Firmware Designers Understanding of DS28S60
- SPI/1-Wire/I<sup>2</sup>C 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 I<sup>2</sup>C/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 <u>DS28S60 EV kit software (light version)</u> or request full <u>DS28S60 EV kit developer software</u>

**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:

- Obtain and unpack the <u>DS28S60\_Evaluation\_</u> <u>Kit\_Lite\_Version\_Setup\_V1\_0\_0</u> file or the latest version.
- 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.
- The setup wizard opens; click <u>Next</u> as shown in <u>Figure 2</u>.

	Manage Setup					1000	
in to Quick Copy Paste Copy path access Clipboard	Move Copy to Organize	New item • T Easy access • New folder New	Properties • Open • • • • • • • • • • • • • •	Select all Select none Invert selection Select			
← → · · ↑ 📴 > Setup				~	v ق Sei	arch Setup	م
★ Quick access	Name		Date modified	Туре	Size		
☑ my pc							

Figure 1. File Viewer

Select Additional Tasks		24	-
Which additional tasks should be performed?		(III	ř
Select the additional tasks you would like Setup to perform while Evaluation Kit Lite Version, then dick Next.	installing DS	28560	
✓ Install DS9482P-300 driver			
Additional shortcuts:			
Create desktop icon			
Start menu icons:			
Create uninstall icon			
		1	

Figure 2. DS28S60 Setup Wizard

## Evaluates: DS28S60

4) Follow the instructions in the wizard and click <u>Next</u> to install the EV kit software and required drivers (<u>Figure 3</u> and <u>Figure 4</u>).

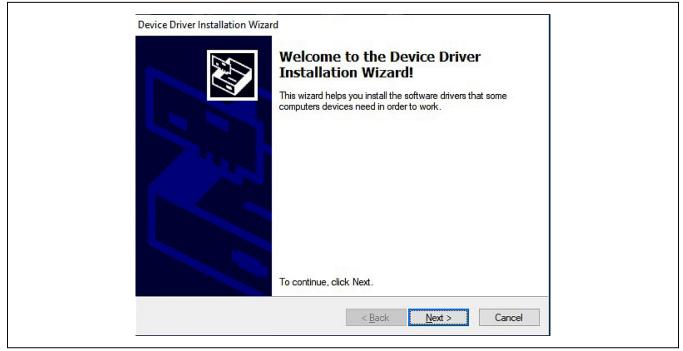


Figure 3. DS9482P# Driver Installation

Completing the De Installation Wizar	evice Driver d
The device driver installation wi software for your hardware devi the software you currently have	ces because it was not better than
Driver Name Maxim Integrated Produ	Status Ready to use

Figure 4. Finish DS9482P# Drivers Installation

#### Evaluates: DS28S60

Setup - DS28560 Evaluation Kit Lite Version version 1\_0\_0 — ×
Installing
Please wait while Setup installs DS28560 Evaluation Kit Lite Version on your
computer.
Extracting files...
Cancel

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

Figure 5. Installation Progress

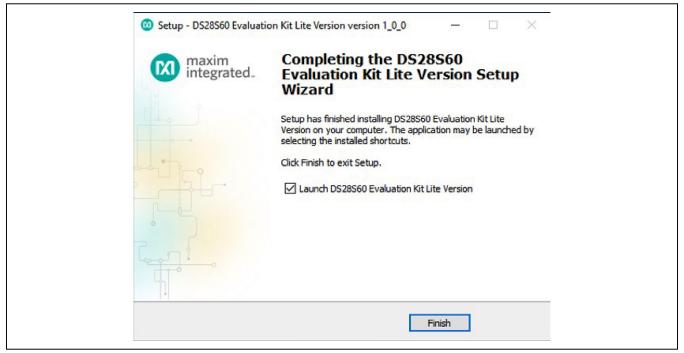


Figure 6. Run Software After Installation

#### Evaluates: DS28S60

- 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 denotated 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 <u>Figure 9</u>.
  - e. Plug the DS28S60 EV kit, using a USB Type-A to Micro-USB Type-B cable, into the PC.

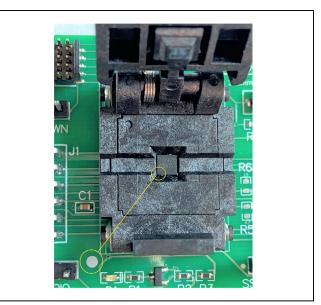


Figure 7. Orientation of the DS28S60 in Burn-In Socket

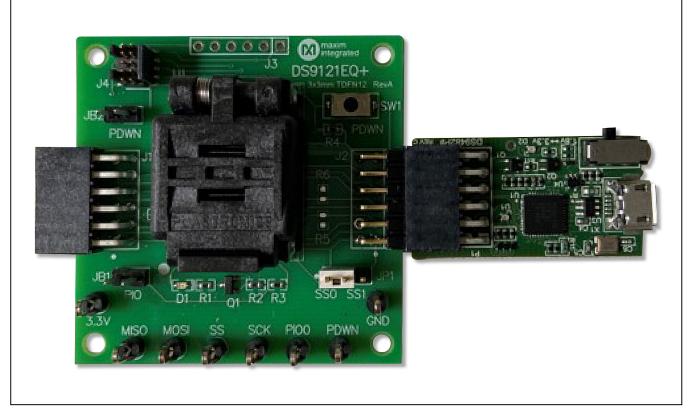


Figure 8. DS9482P# and DS9121EQ

right corner of the window, as shown in Figure 10.

#### Evaluates: DS28S60

7) The DS28S60 EV kit program opens and automatically connects to the COM port. This can be verified in the lower

Figure 9. Set DS9482P# to 3.3V

Eile Edit Settings <u>H</u> elp ⊕ <u>Generic Commands</u> ⊕ ECDSA Functions ⊕ HMAC SHA-256 Functions ⊕ AES Bulk Encrypt ⊕ AES Bulk Decrypt Searching DS9482P DS9482 Connected on COM37 DS9482P Firmware Rev 1.00 Using SPI Mode	Back         Next         Info         Run         Generic Commands           Generic Device Function Commands         The commands used in this section provide basic device functionality. More complex           1. Read DeviceReturns the DS28560 ROM ID and MAN ID         2. Write MemoryWrite memory page (no protection)           3. Read MemoryRead memory page (no protection)         4. Set Block ProtectionSet block protection for specified block. Each block for the           5. Get Block ProtectionGet block protection for specified block. Each block for the         6. Read RNGCommand used to read random data from the DS28560.	user memory contains 4 pages.
IS9482 Connected on COM37 IS9482P Firmware Rev 1.00		
ommand TX,RX Log Enable		
(: 01 74		
Α Α Α Α Α Α Α Α Α Α Α Α Α Α Α Α Α Α Α		DS9482P Adapter Connected on Port: COM37

Figure 10. DS28S60 EV Kit Program (Default View Upon Opening)

#### **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  $\rightarrow$  Debug Info is enabled. See <u>Table 1</u> 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**

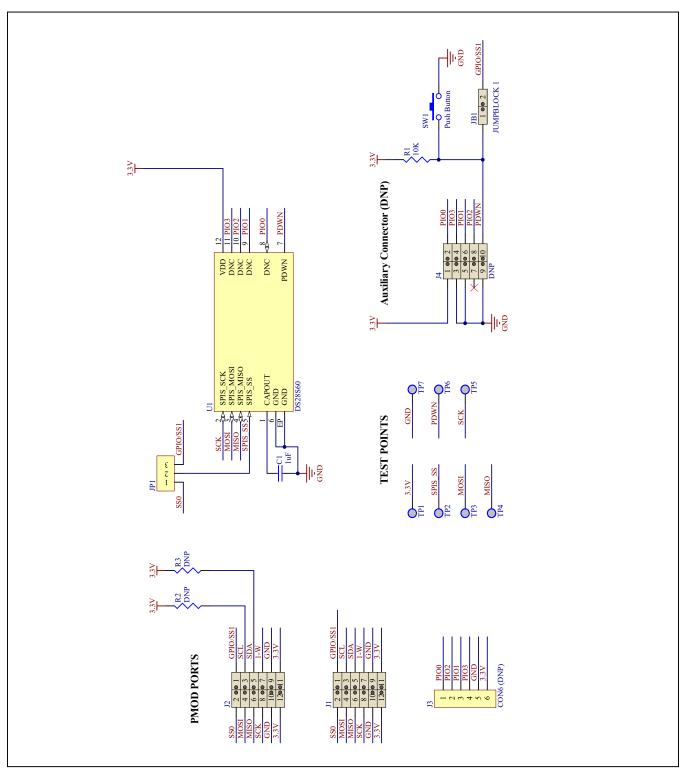
PART	ТҮРЕ
DS28S60EVKIT#	EV Kit

#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

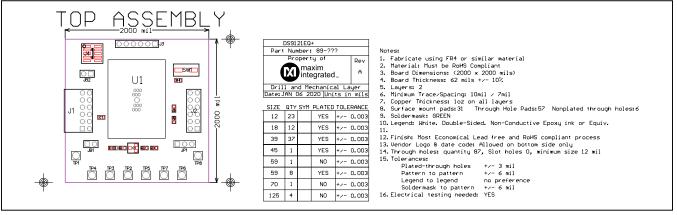
## Evaluates: DS28S60



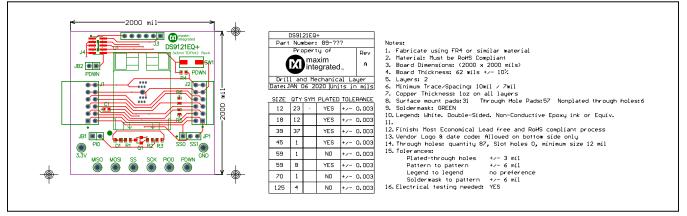
## DS28S60 EV Schematic Diagram

## Evaluates: DS28S60

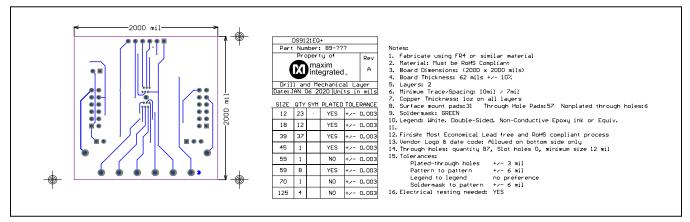
#### DS28S60 EV Kit PCB Layout Diagrams



DS28S60 EV Kit—Top Assembly



DS28S60 EV Kit—Top Silkscreen



DS28S60 EV Kit—Bottom Metal

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#### **Revision History**

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	6/20	Initial release	—
1	7/20	Updated General Description, Features, and Quick Start	1, 6

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