*Click here for production status of specific part numbers.*

# DS28C40 Evaluation System Lite Version

**Evaluates: DS28C40**

## General Description

The DS28C40 evaluation system (EV system) provides the hardware and software necessary to exercise the features of the DS28C40. The EV system consists of five DS28C40 devices in a 10-pin TDFN package, a DS9121CQ+ evaluation TDFN socket board, and a DS9481P-300# USB-to-I²C/1-Wire® adapter. The evaluation software runs under Windows® 10, Windows 8, and Windows 7 operating systems, both 64- and 32-bit versions. It provides a handy user interface to exercise the features of the DS28C40.

## Features

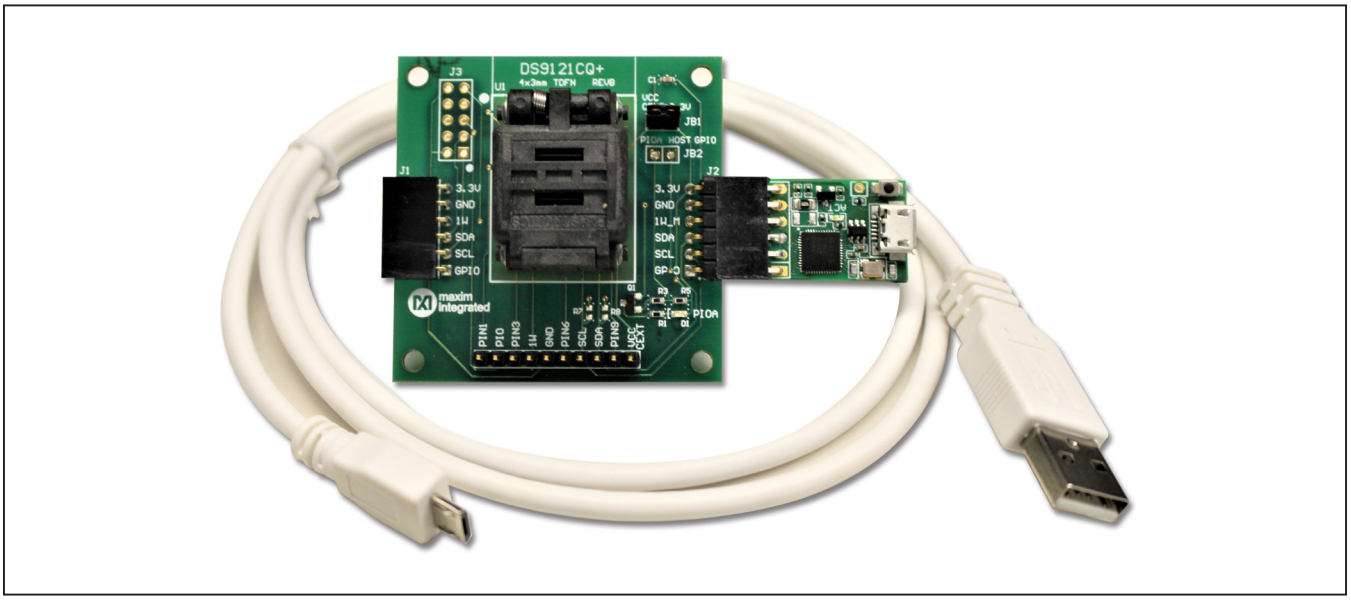
- Demonstrates the Features of the DS28C40 DeepCover Secure Authenticator
- Logs 1-Wire/I²C Communication to Aid Firmware Designers Understanding of DS28C40
- 1-Wire/I²C USB Adapter Creates a Virtual COM Port on Any PC
- Fully Compliant with USB Specification v2.0
- Software Runs on Windows 10, Windows 8, and Windows 7 for Both 64- and 32-Bit Versions
- 3.3V ±3% I²C Operating Voltage
- Convenient On-Board Test Points, TDFN Socket
- Evaluation Software Available by Request

## EV Kit Contents

| QTY | DESCRIPTION |
|---|---|
| 5 | DS28C40Q+ DeepCover secure authenticator with (10 TDFN) |
| 1 | DS9121CQ+ socket board (10 TDFN) |
| 1 | DS9481P-300# USB to 1W/I²C Adapter |
| 1 | USB Type-A to USB Mini Type-B cable |

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

## DS28C40 EV System with a USB Cable

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*Windows is registered trademarks of Microsoft Corp.*
*Windows is a registered trademark and registered service mark of Microsoft Corporation.*

*319-100391; Rev 0; 6/19*

maxim integrated™

## Quick Start

This section is intended to give the DS28C40 evaluator a list of recommended equipment and instructions on how to set up the Windows-based computer for the evaluation software.

### Recommended Equipment

- DS9481P-300# USB to 1W/I²C Adapter
- DS9121CQ+ TDFN socket board
- DS28C40Q+ (five devices included)
- USB Type A-to-USB Micro-Type B cable (included)
- Computer with a Windows 10, Windows 8, or Windows 7 operating system (64- or 32-bit) and a spare USB 2.0 or higher port
- DS28C40 EV kit software. If needed go to the Maxim website and search for the DS28C40 EV kit. Click the **Design Resources** link. Then click the **DS28C40EVKIT Software Lite** link to download the **DS28C40_Evaluation_Kit_Lite_Version_Setup_V1_2_0.zip** file or newer version software.

**Note:** In the following sections, EV kit software related items are identified in **bold**. Windows operating system related items are identified in **bold and underline**.

### Hardware Setup and Driver Installation Quick Start

The following steps were performed on a Windows 7 PC to setup the DS28C40 EV kit hardware/software:

1) Obtain and unpack **DS28C40_Evaluation_Kit_Lite_Version_Setup_V1_2_0.zip** file or newer version.
2) In a file viewer, double click on the **DS28C40_Evaluation_Kit_Lite_Version_Setup_V1_2_0** to begin the installation.

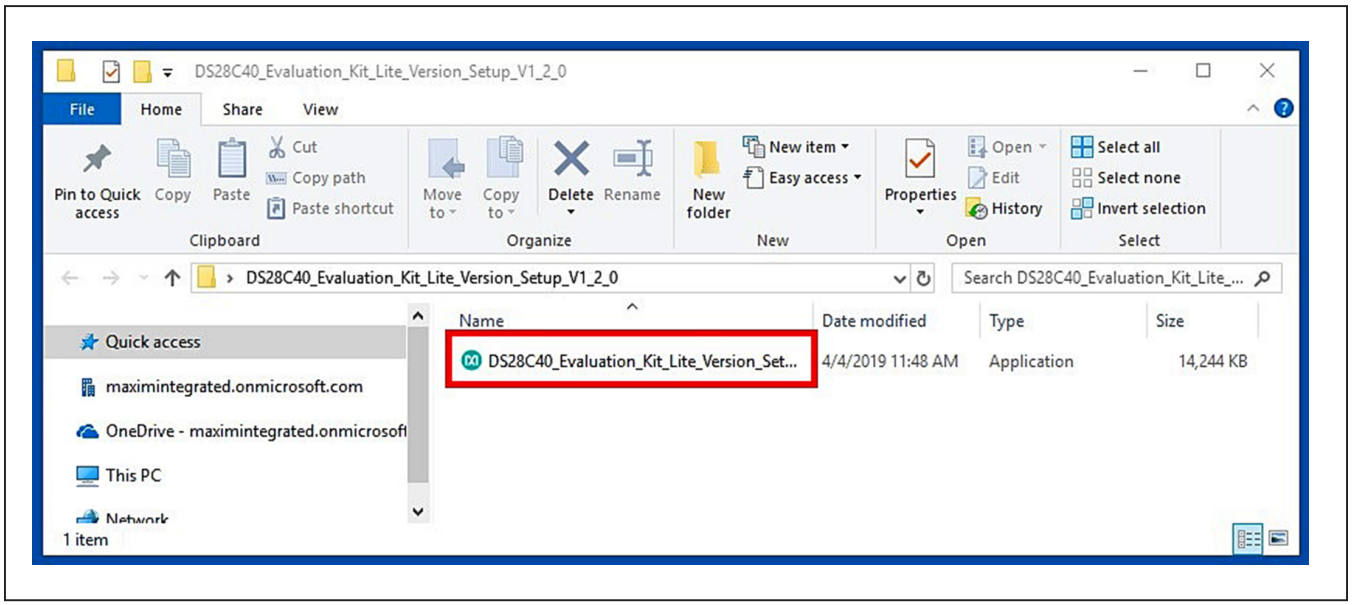



*Figure 1. File Viewer*

3) The setup wizard opens. Click on **Next** (Figure 2):

4) Click **Next** (Figure 3) to install to the default folder.

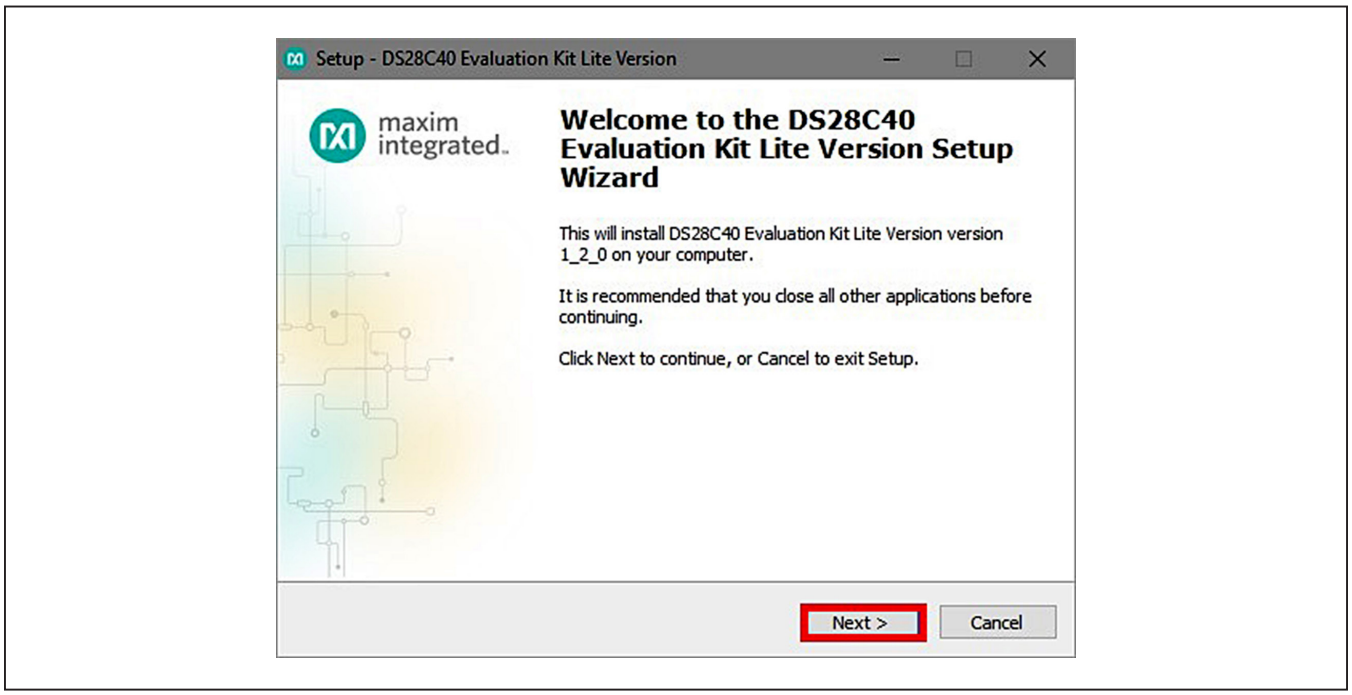



*Figure 2. DS28C40 Setup Wizard*

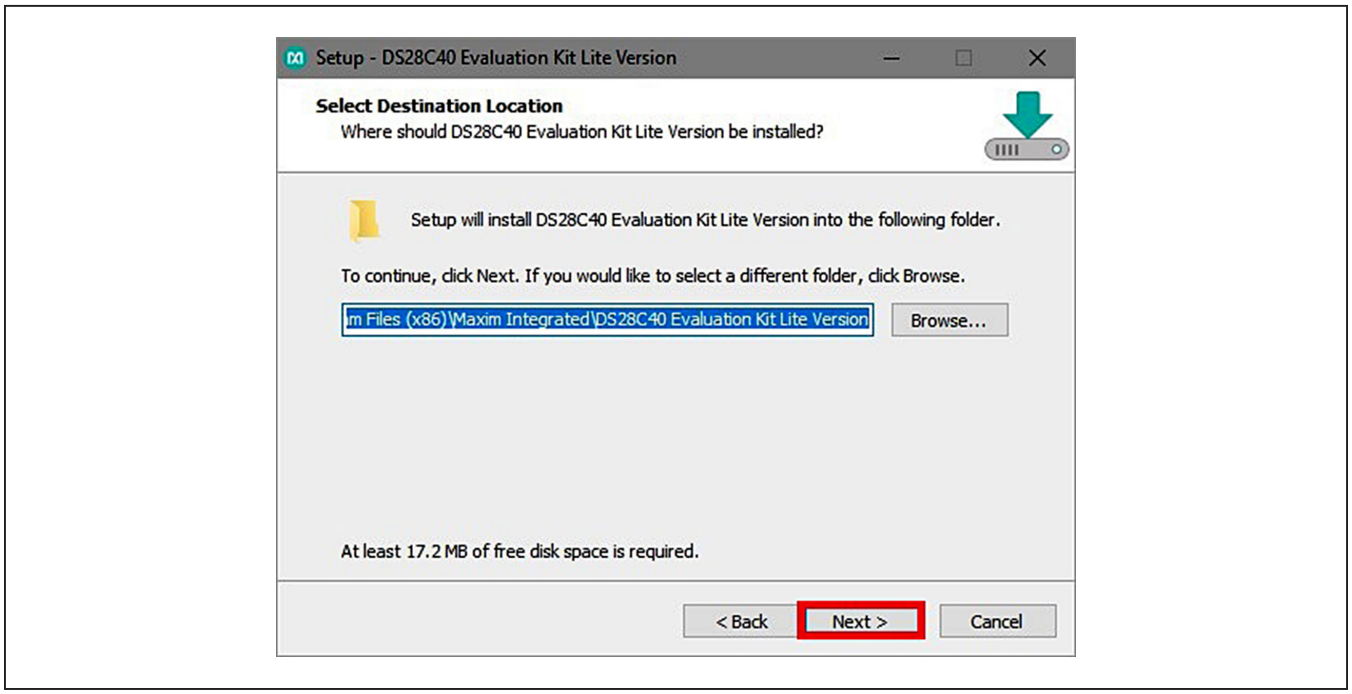



*Figure 3. Install Folder Location*

5) Click **Next** to install shortcuts to the default folder (Figure 4).

6) Unplug any Maxim adapter and click on **Next** (Figure 5) with the default settings checked. This action installs the DS9481P-300 driver that is needed to communicate through the USB by a virtual COM port.

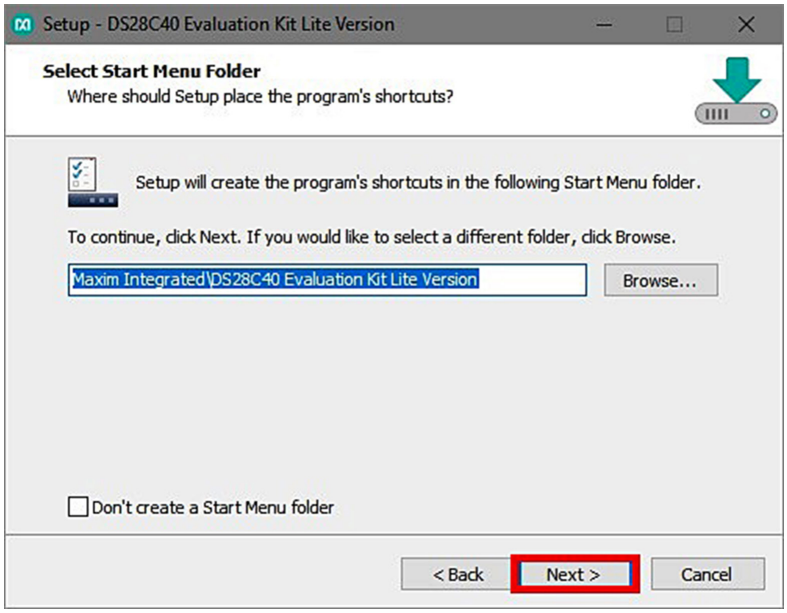



*Figure 4. Program Shortcuts Location*

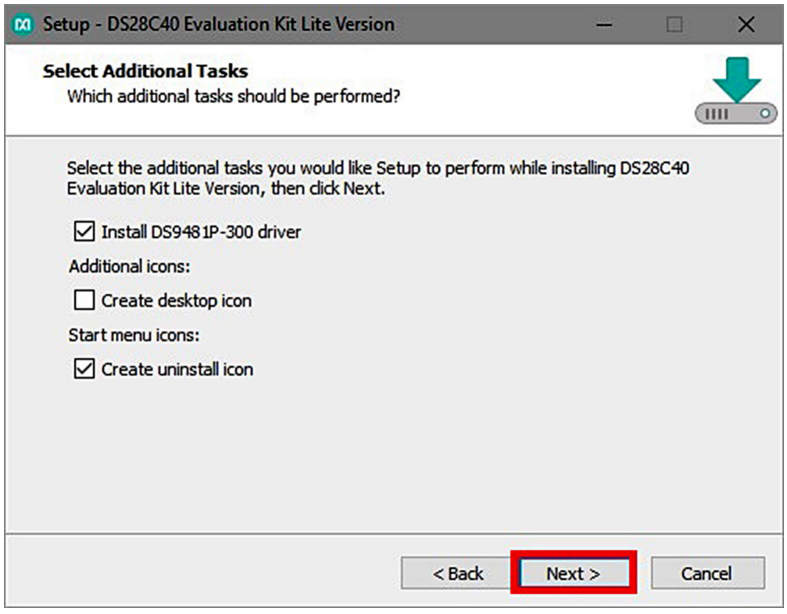



*Figure 5. Select to Install the Driver*

7) Next click on **Install** (Figure 6). A new window pops up to show progress of the installation.

8) Click on **Next** (Figure 7) when the **Device Driver Installation Wizard** appears.

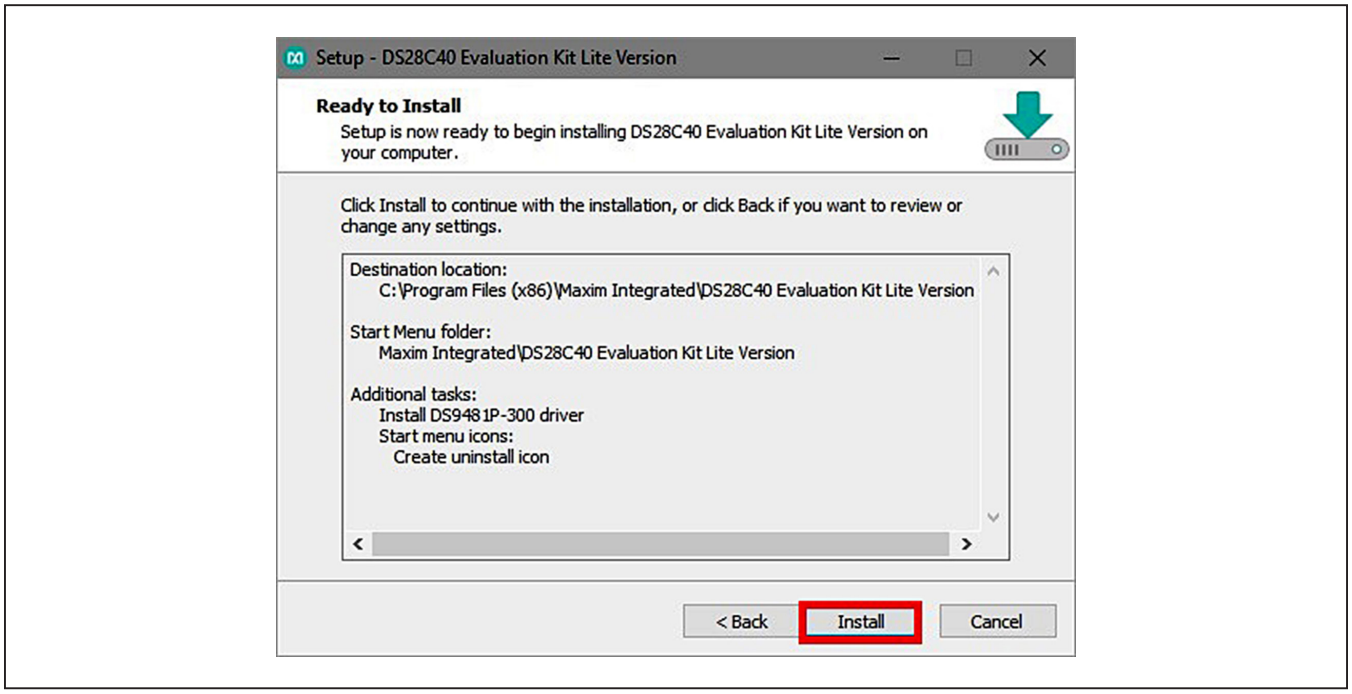



*Figure 6. Ready to Install*

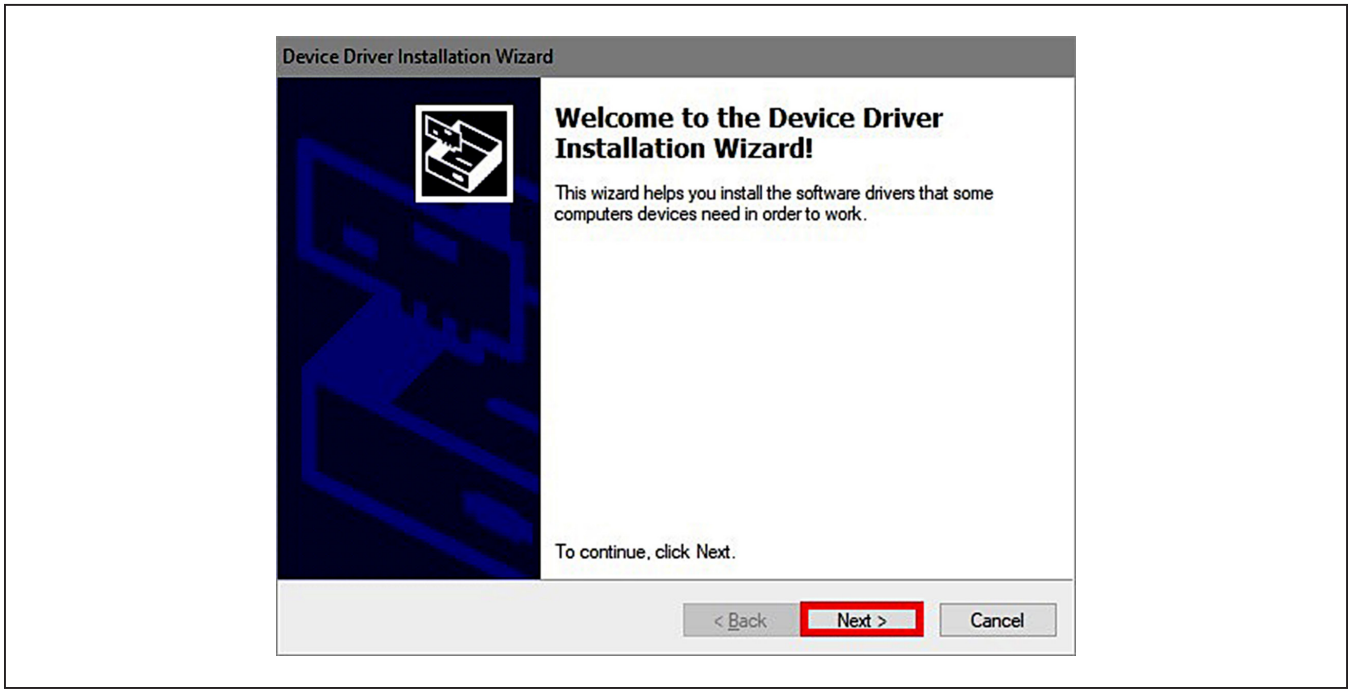



*Figure 7. Device Driver*

9) Click on **Finish** (Figure 8) to close the final window confirming the driver was installed correctly.

10) Now that the driver is installed, connect the hardware by doing the following:

   a) Open the socket and insert a DS28C40 into one of the cavities, as shown in Figure 9. **Note:** The plus (+) on the package must be on aligned with the top of the marker in the socket.

   b) Close the clamshell socket.

   c) Connect the DS9121CQ J2, 10-pin male plug, into the DS9481P-300#, 10-pin female socket (Figure 10).

   d) For the DS9121CQ+, insert jumper JB1 to use VCC (Figure 10).

   e) Plug-in the DS9481P-300# using USB Type-A to USB Micro Type-B cable into the PC.

*Figure 8. Device Driver Installed Finished*

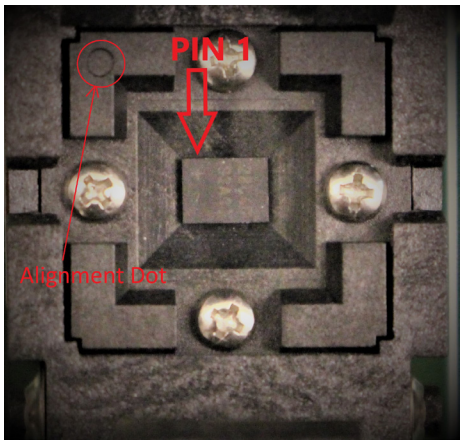



*Figure 9. Orientation of the DS28C40 in the Clamshell Socket*

11) Click on **Finish** (Figure 11) to close the final window confirming the software was installed correctly.

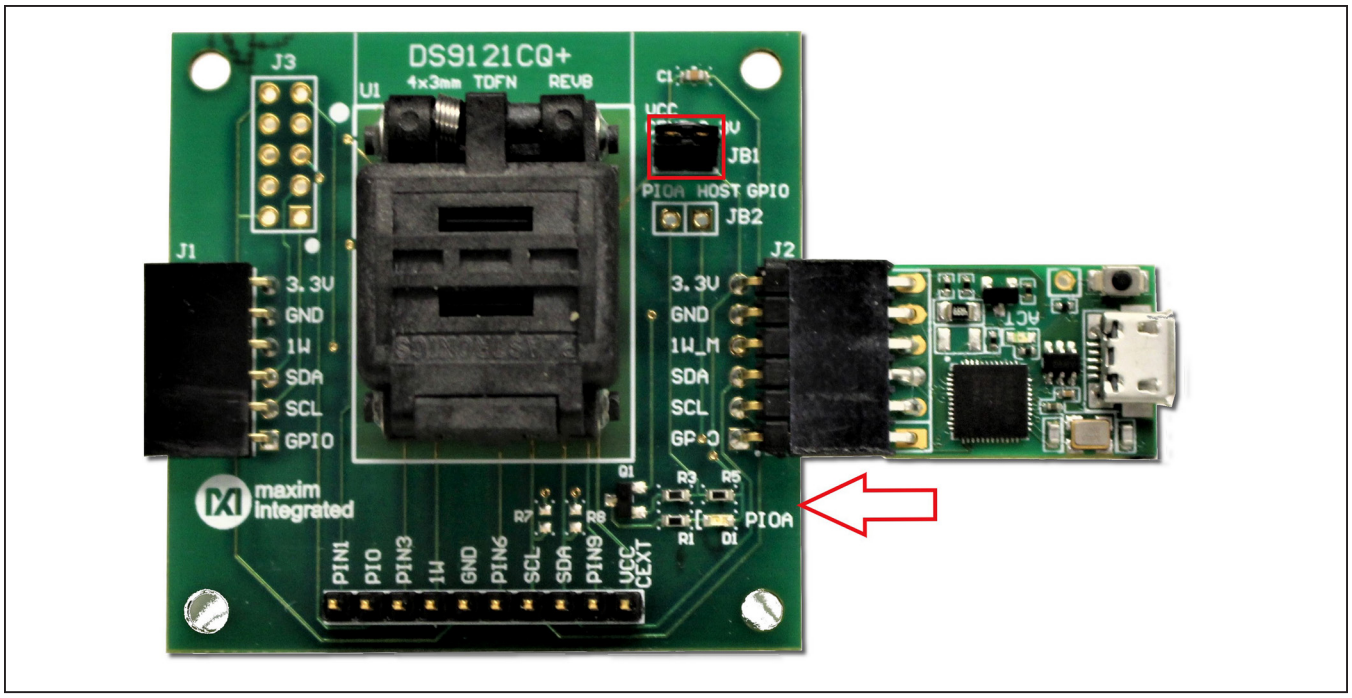



*Figure 10. DS9481QA-300 and DS9121CQ*

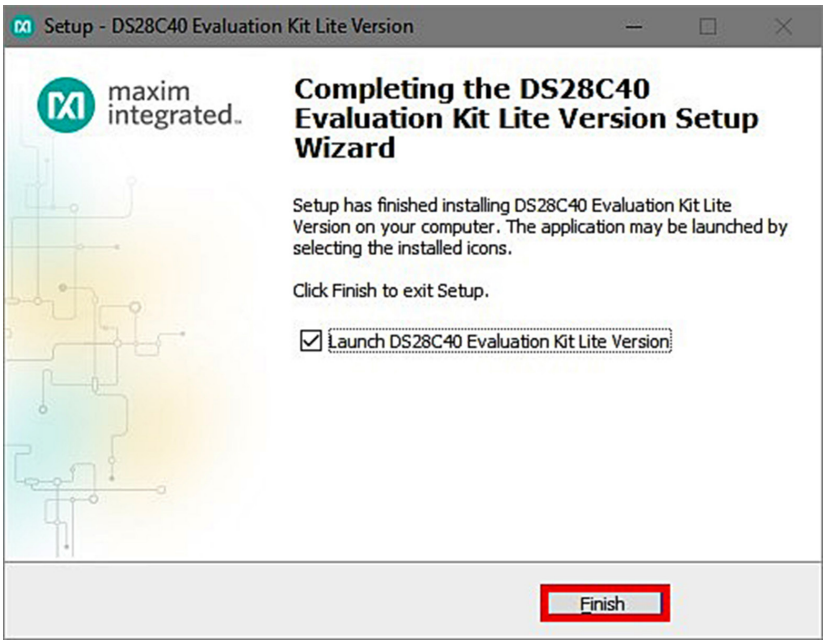



*Figure 11. Software Installation Finished*

12) The DS28C40 EV kit program now opens and connects to the DS9481P-300 COM port. This can be verified in the lower right corner of the window as shown in Figure 12.

## Available Options

The DS28C40 EV Kit Lite Program is designed as a usage example to show step by step how to use the DS28C40 device. This version includes options to write, read, and run a compute authentication page using SHA2 or ECDSA. To access the full potential of the DS28C40, request the full version available under NDA request.

The GUI displays all the $I^2C$ sequences for each step performed to assist the firmware engineer.

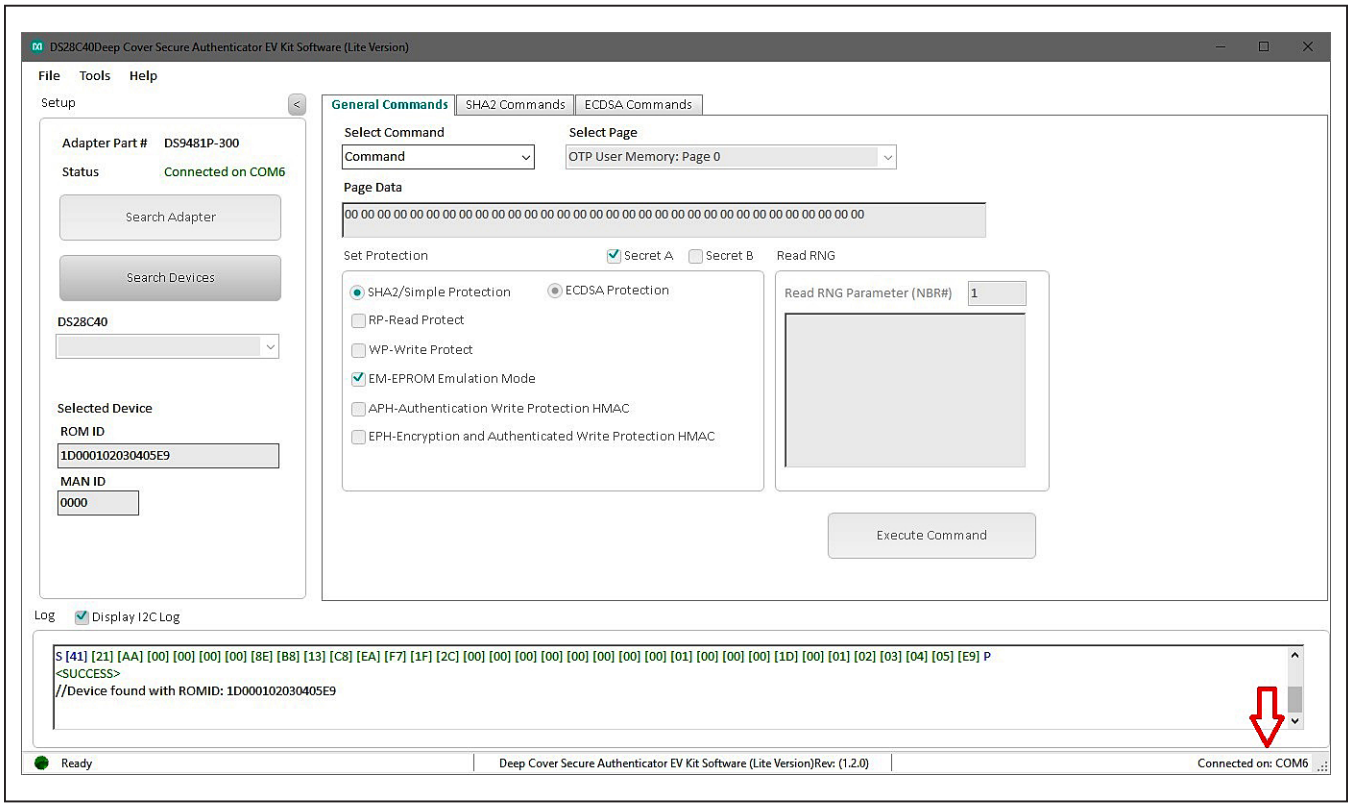



*Figure 12. DS28C40 EV Kit Program (Default View upon Opening)*

## Usage Example—Feature Write Memory and Read Memory

1) Select the **General Commands** tab (Figure 13).
2) Select the **Write Memory** command from the combo box selection (Figure 13).

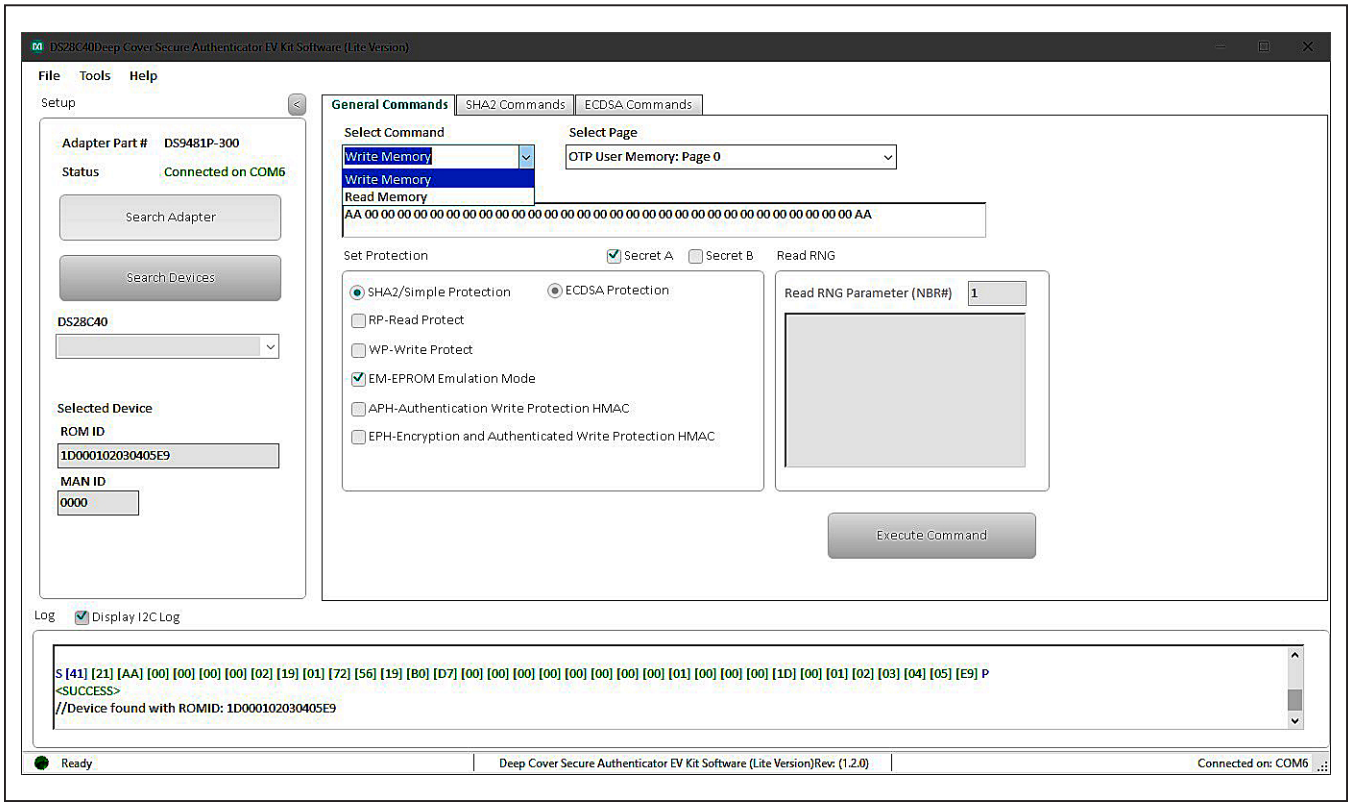



*Figure 13. Selecting Command*

3) Write the desired data on the **Page Data** textbox (Figure 14).

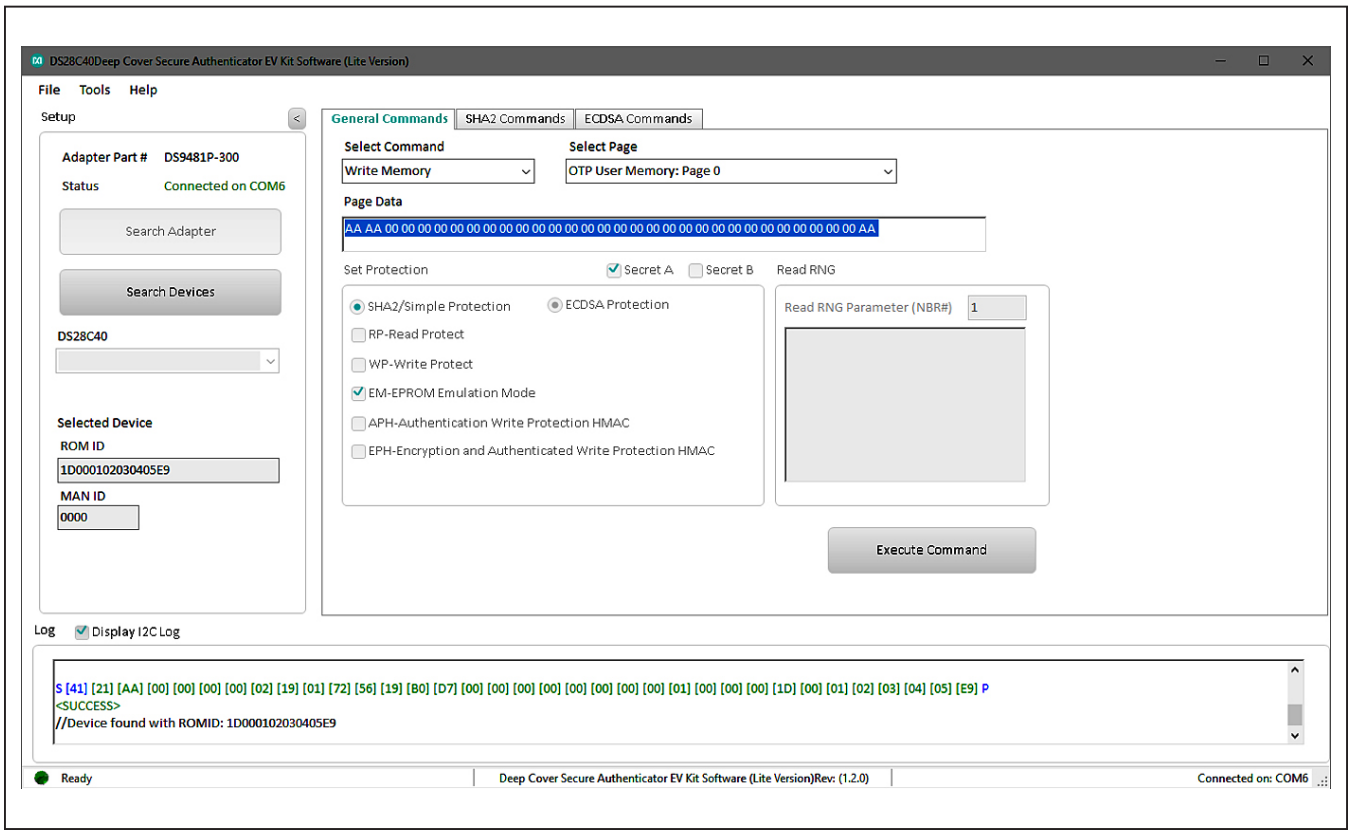



*Figure 14. Write Data*

4) Select the page for writing (Figure 15).

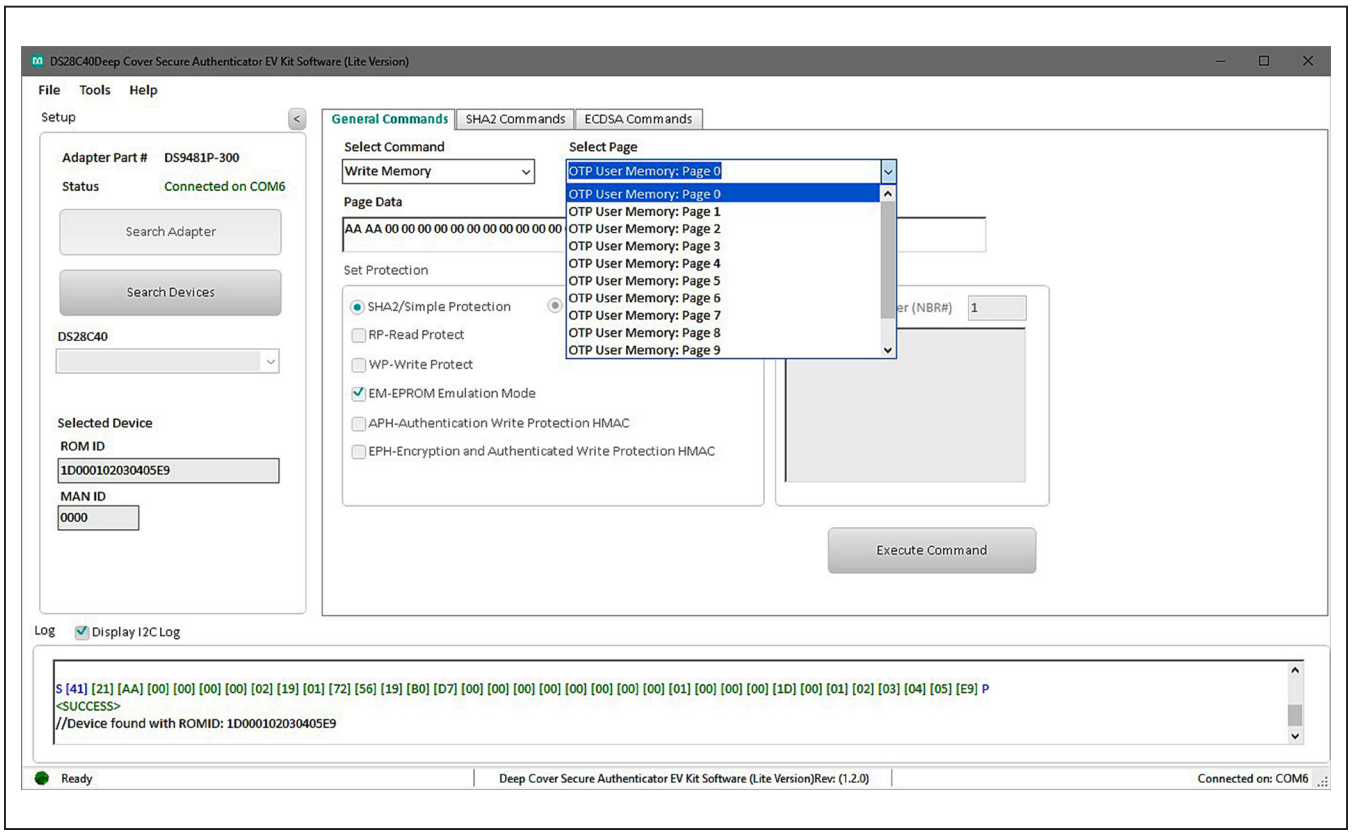



*Figure 15. Select Page*

5) Click the **Execute Command** button (Figure 16). The I2C communication is displayed on the **Log** window and aids to understand how the command is executed.
6) To perform a memory read, in the **General Commands** tab, select the command from the **Select Command** drop-down menu (Figure 13).
7) From the **Select Page** drop-down menu, select the desired page to read (Figure 15).
8) Click the **Execute Command** button (Figure 16).

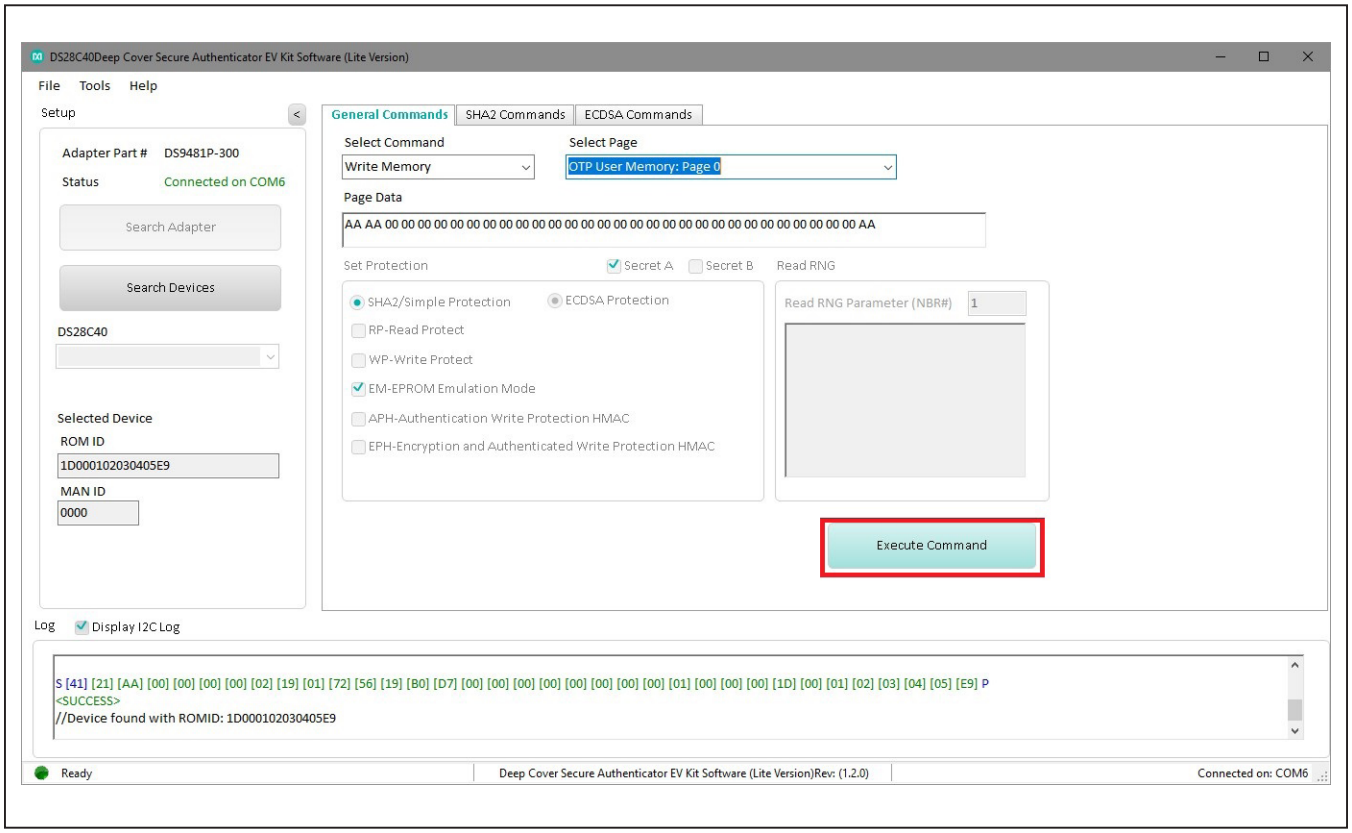



*Figure 16. Execute Command*

## Usage Example—SHA2 Compute and Read Page Authentication

1) Under the **General Commands** tab, in the **Select Command** drop-down menu, select **Write Memory** (Figure 13).
2) Select the Secret A or B from **Select Page** drop-down menu for writing (Figure 17).
3) Write the desired secret on the **Page Data** text box and click **Execute Command** button (Figure 18).
4) Select the **SHA2 Commands** tab.
5) Select the **Compute and Read Page Authentication** command from the **Select Command** drop-down menu selection (Figure 19).

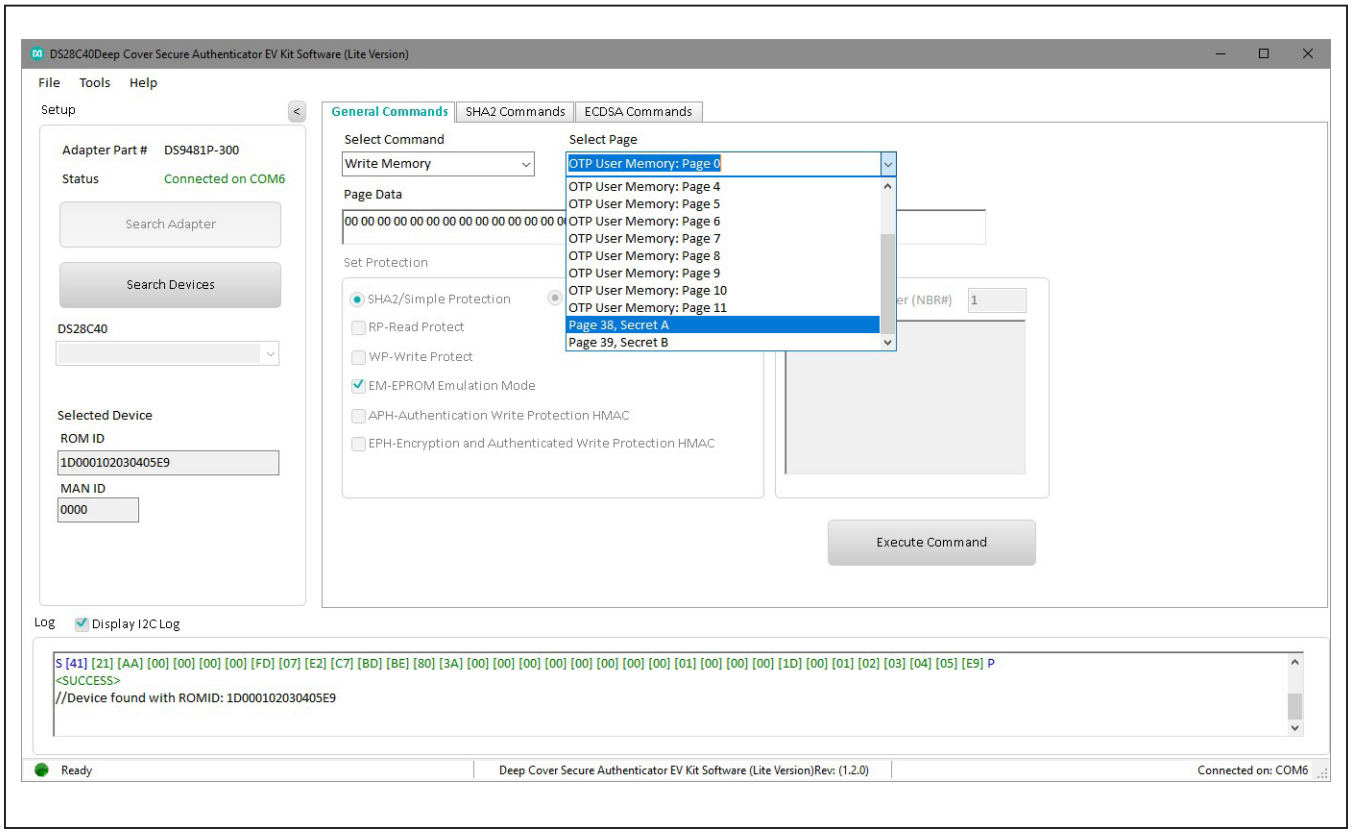



*Figure 17. Selecting SHA2 Command*

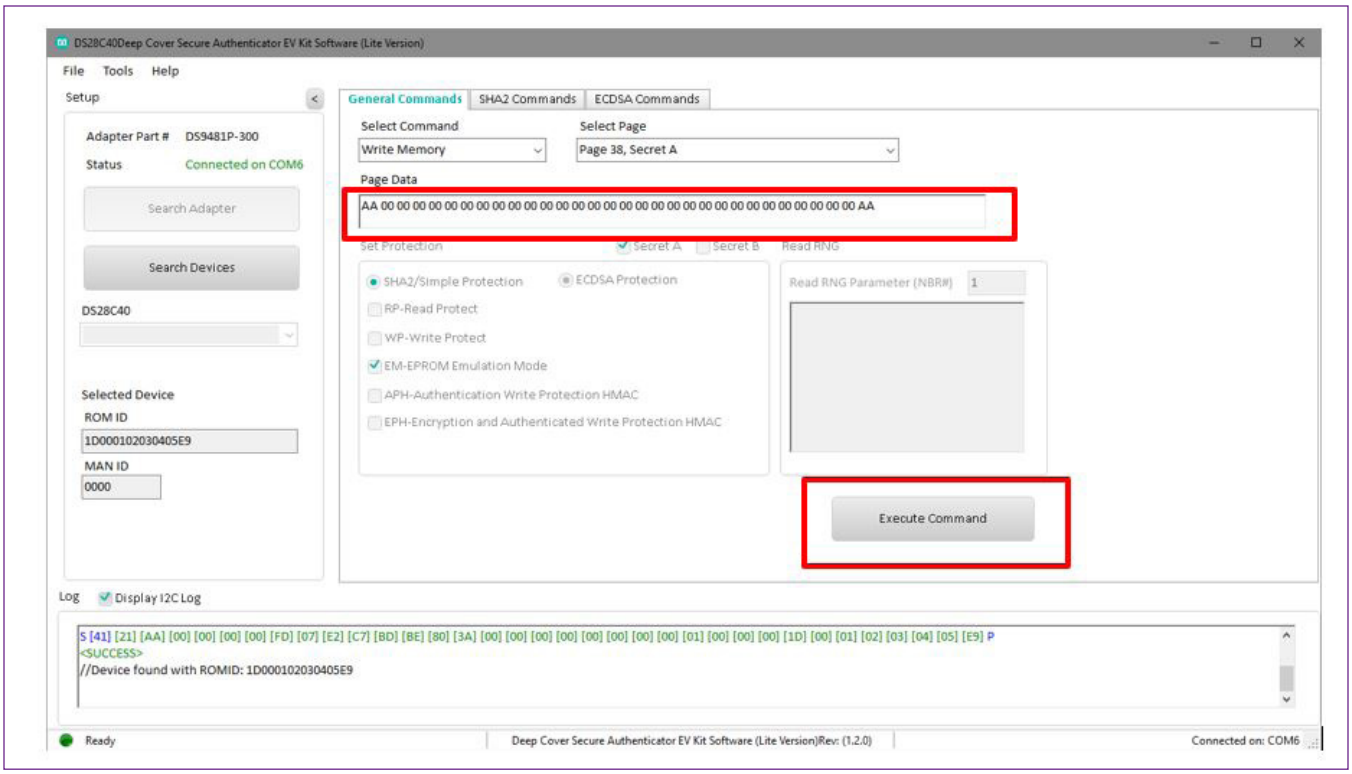



*Figure 18. Selecting SHA2 Command*

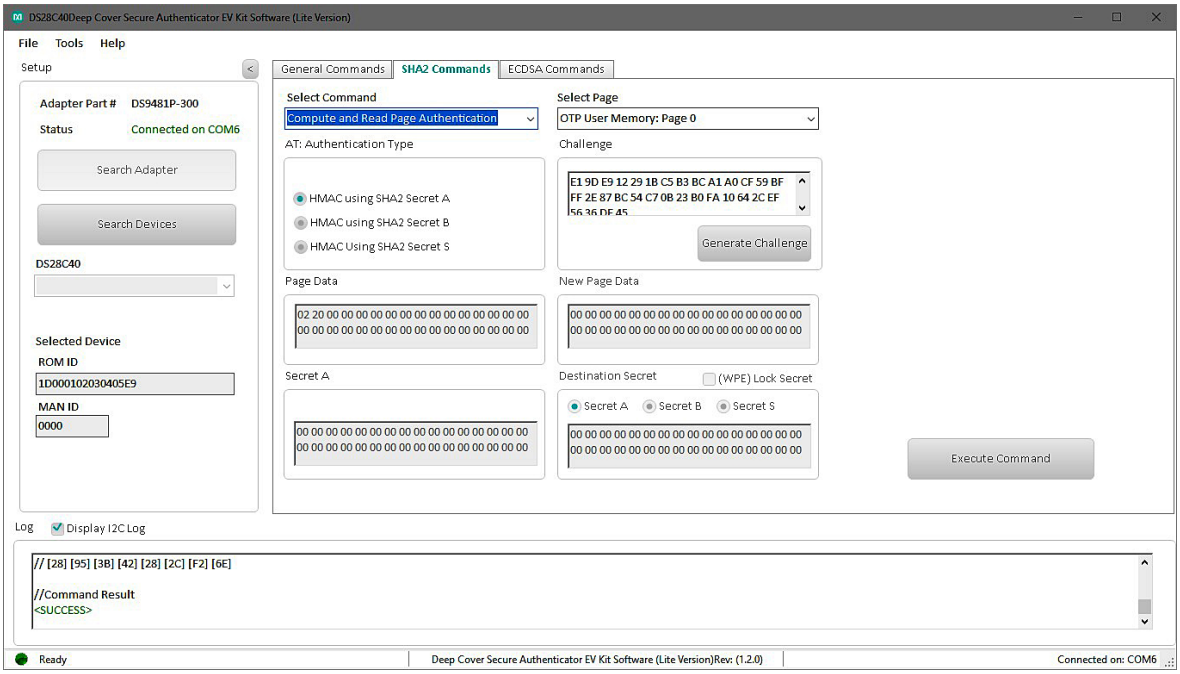



*Figure 19. Selecting SHA2 Command*

6) From the **Select Page** drop-down menu, select a page to execute the command (Figure 20).

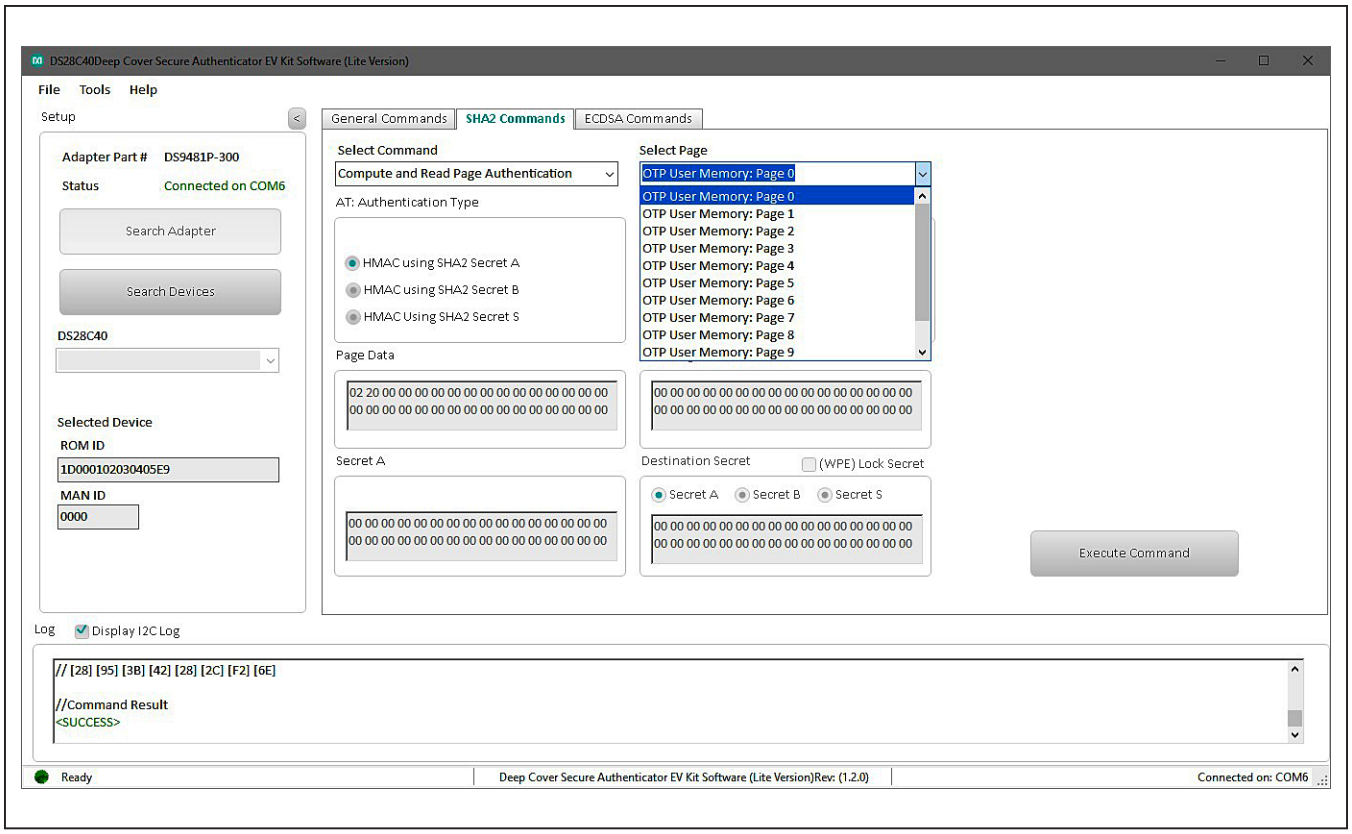



*Figure 20. Select Page*

7) In the **AT: Authentication Type** combo box, select a secret to compute the HMAC on selected page (Figure 21).

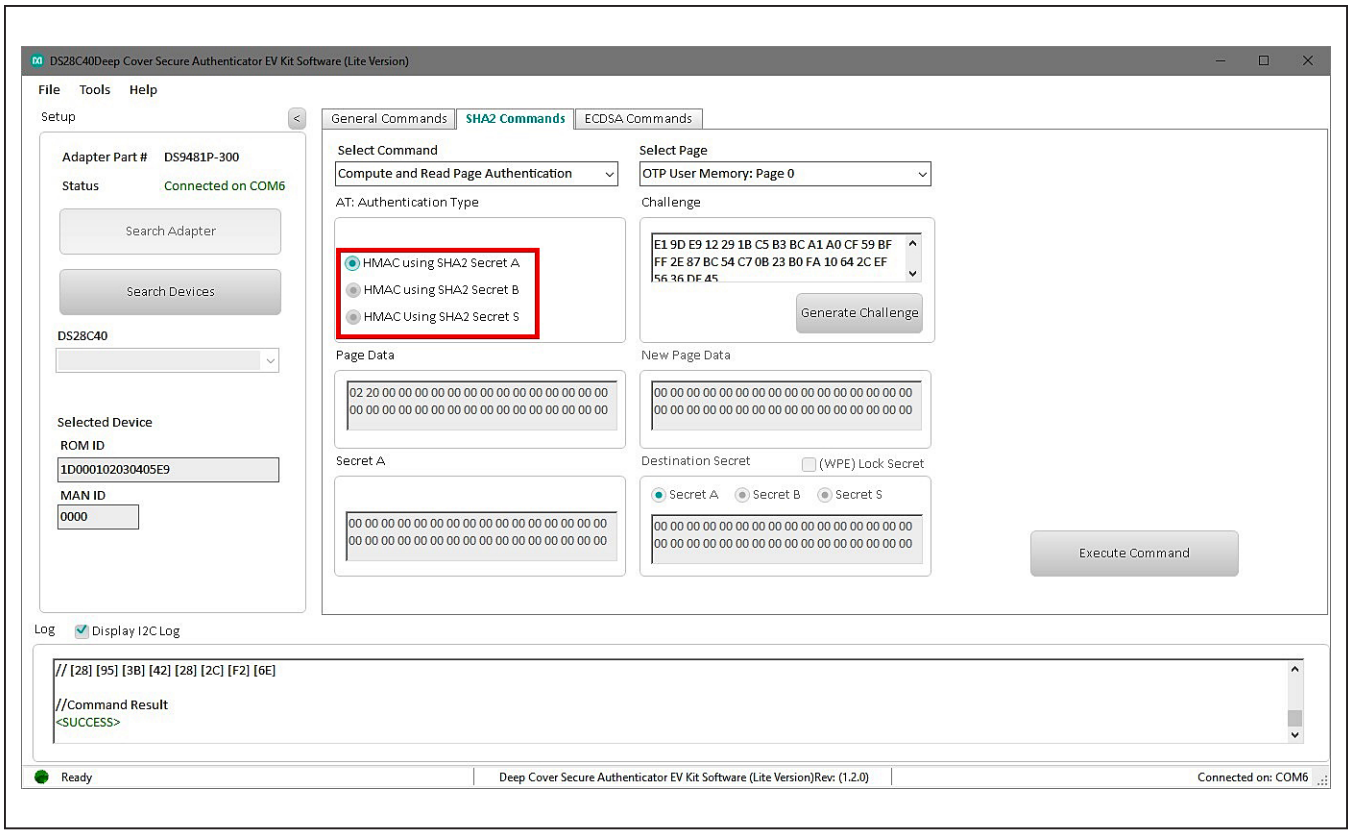



*Figure 21. Select Secret*

8) Click the **Generate Challenge** button to create a random challenge for command (Figure 22).

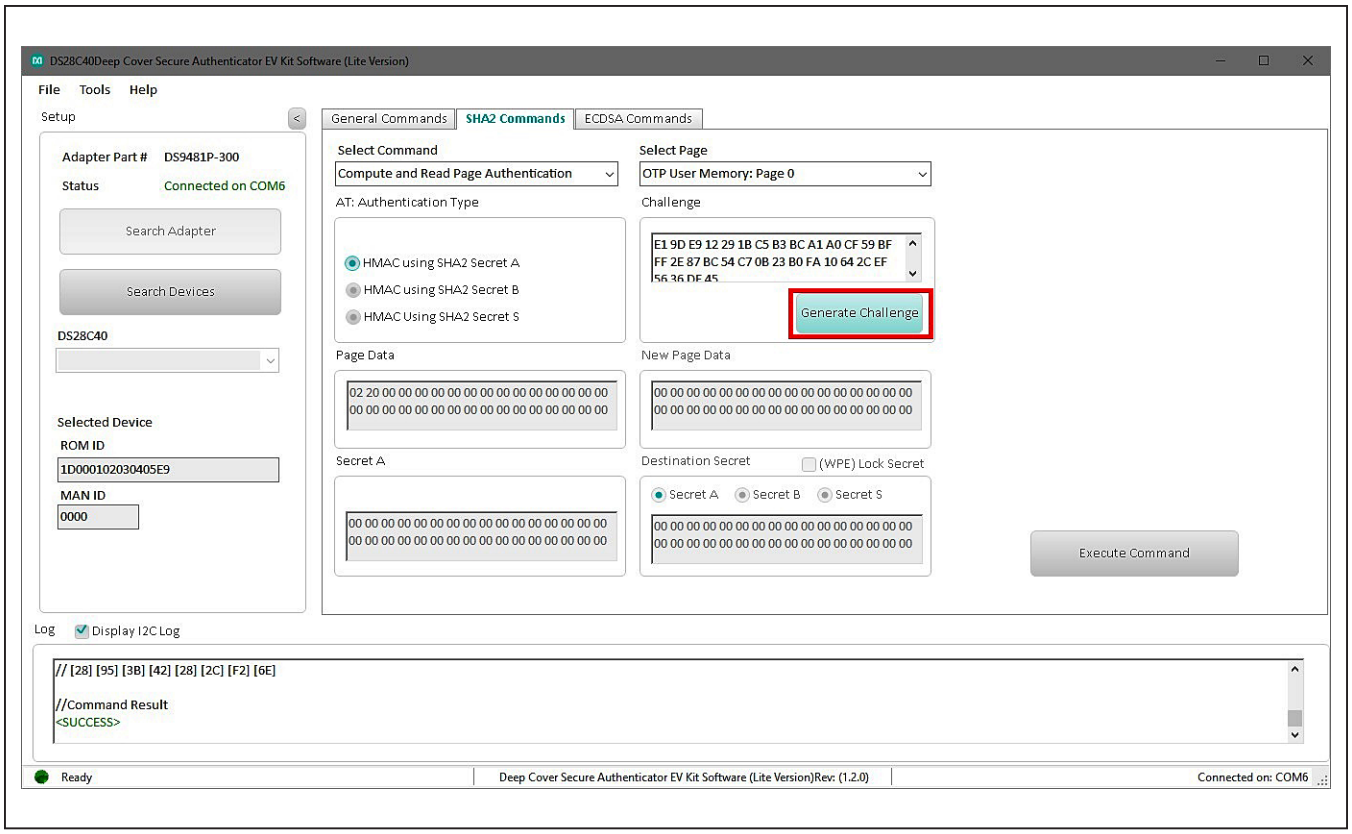



*Figure 22. Generate Challenge*

9) Click the **Execute Command** button to run the sequence (Figure 23). The command result is displayed on the **Log** box.

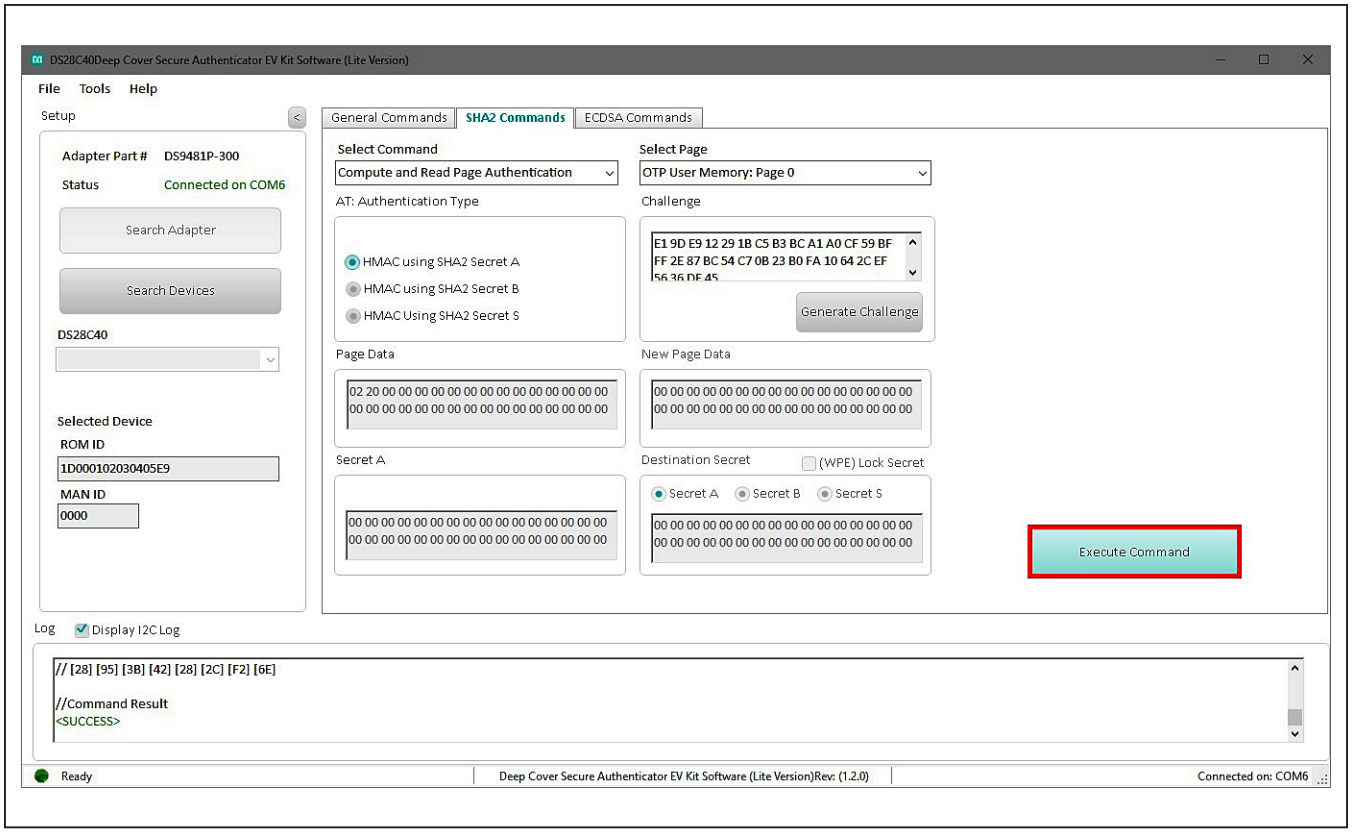



*Figure 23. Execute Command*

## Usage Example—ECDSA Compute and Read Page Authentication

1) Select the **ECDSA Commands** tab (Figure 24).
2) From the **Select Command** drop-down menu, select the **Generate ECC-256 Key Pair** and select the desired **Public/Private Key** from the **Key Selection** combo box (Figure 24).

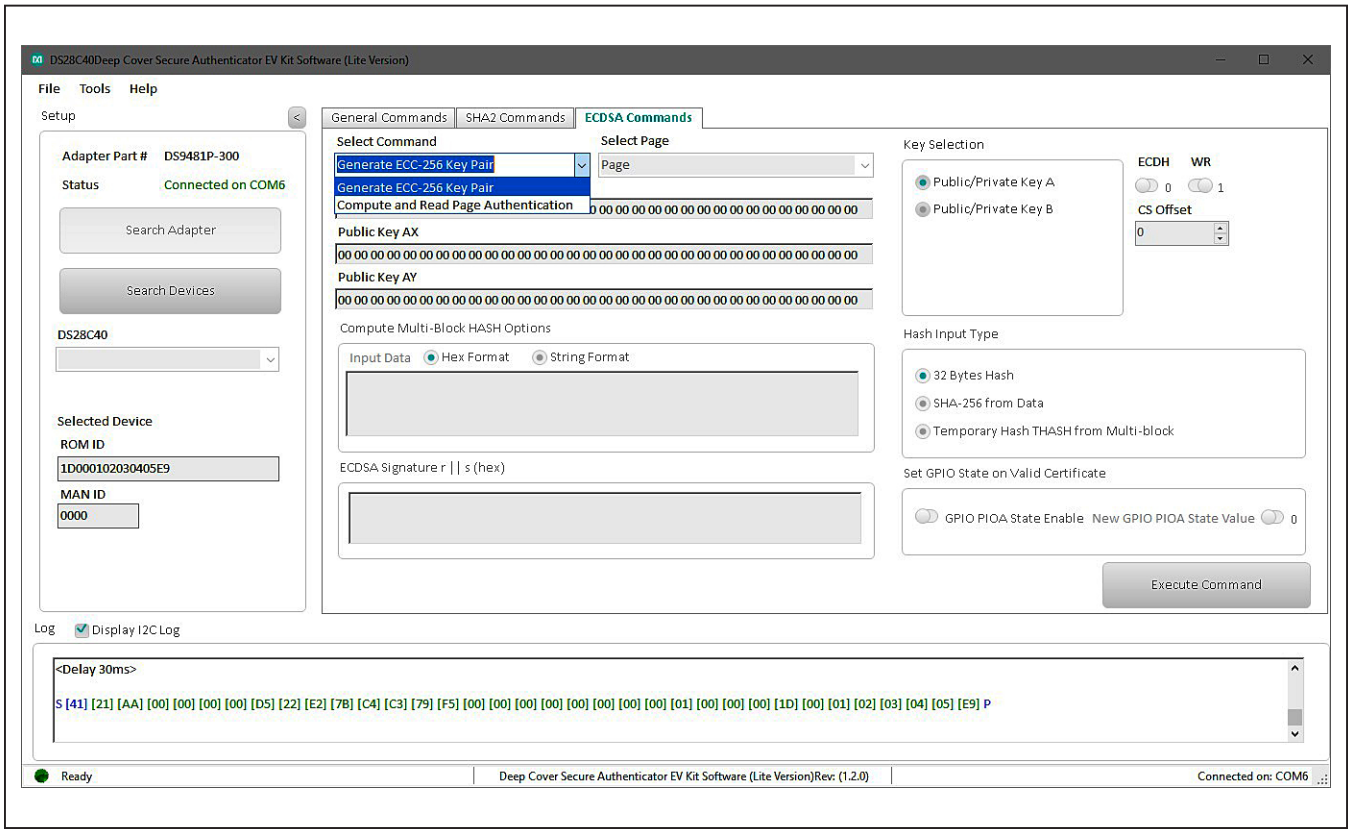



*Figure 24. Generate ECC Key pair*

3) Click the **Execute Command** button (Figure 25).

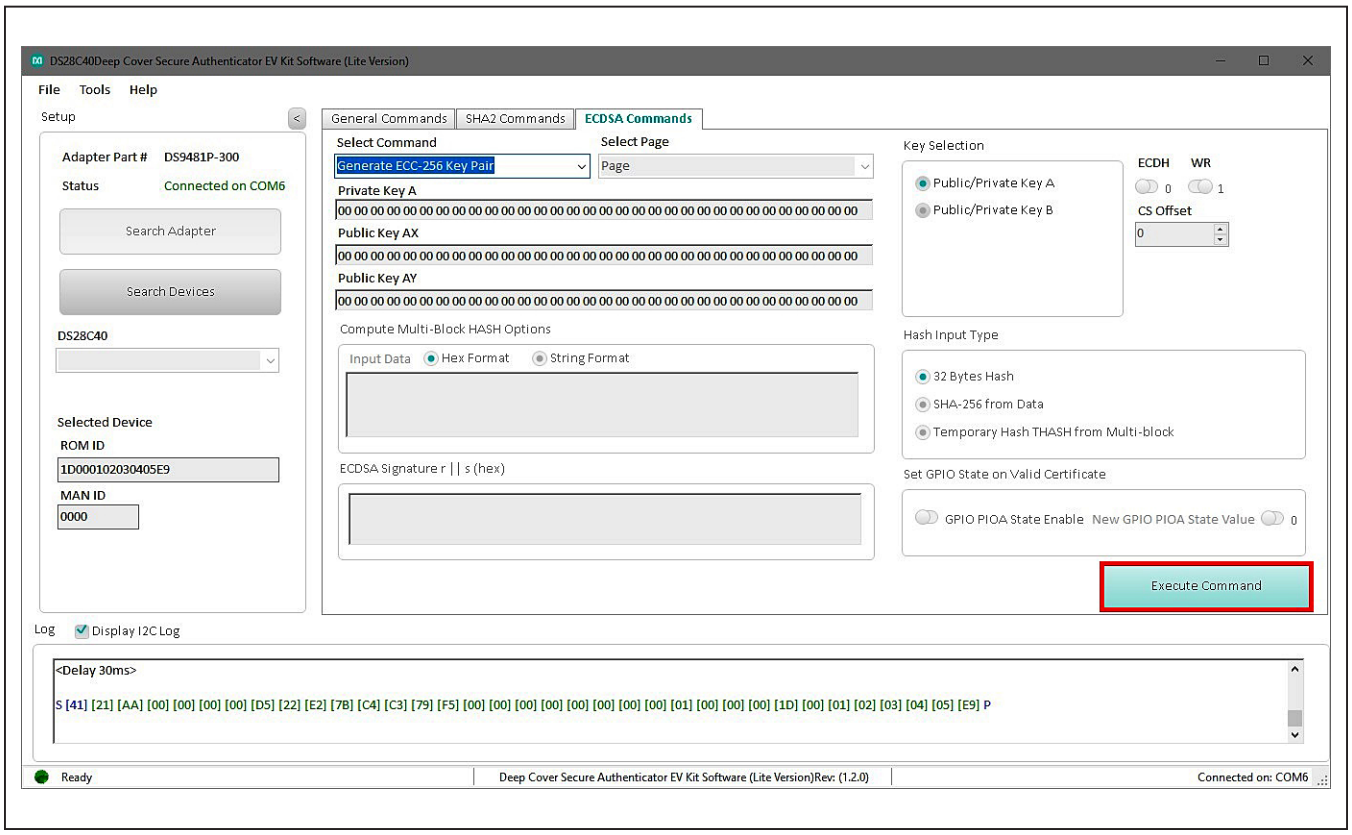



*Figure 25. Execute Generate ECC Key*

4) In the **Select Command** drop-down menu, select the **Compute and Read Page Authentication** command and the **Public/Private Key** from the **Key Selection** combo box (Figure 26).

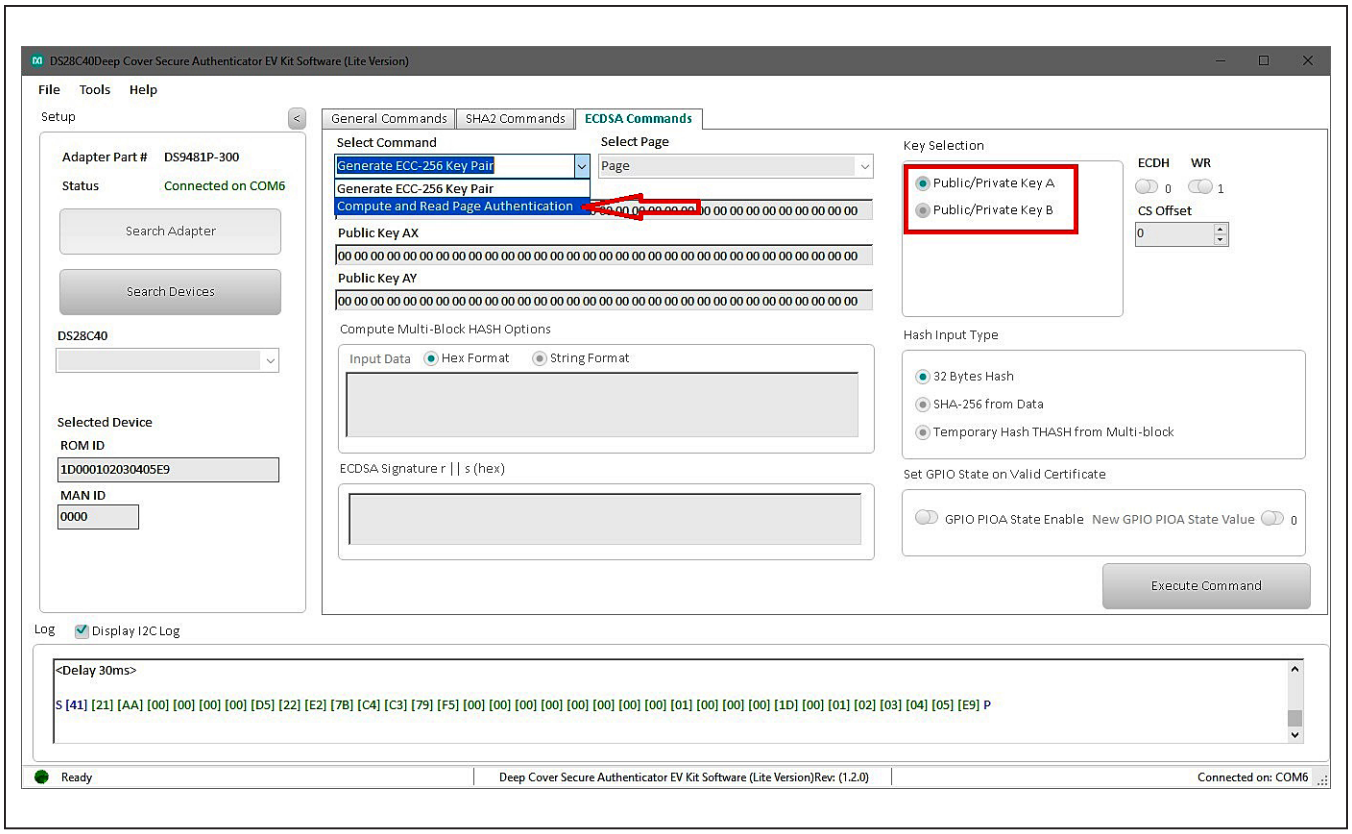



*Figure 26. Selecting Command*

5) From the **Select Page** drop-down menu, select the desired page and public key (Figure 27).
6) From the **AT: Authentication Type** combo box, select the private key (Figure 27).
7) Click the **Generate Challenge** button and then click **Execute Command** button to perform the sequence (Figure 28). Results are displayed in the **Log** box.

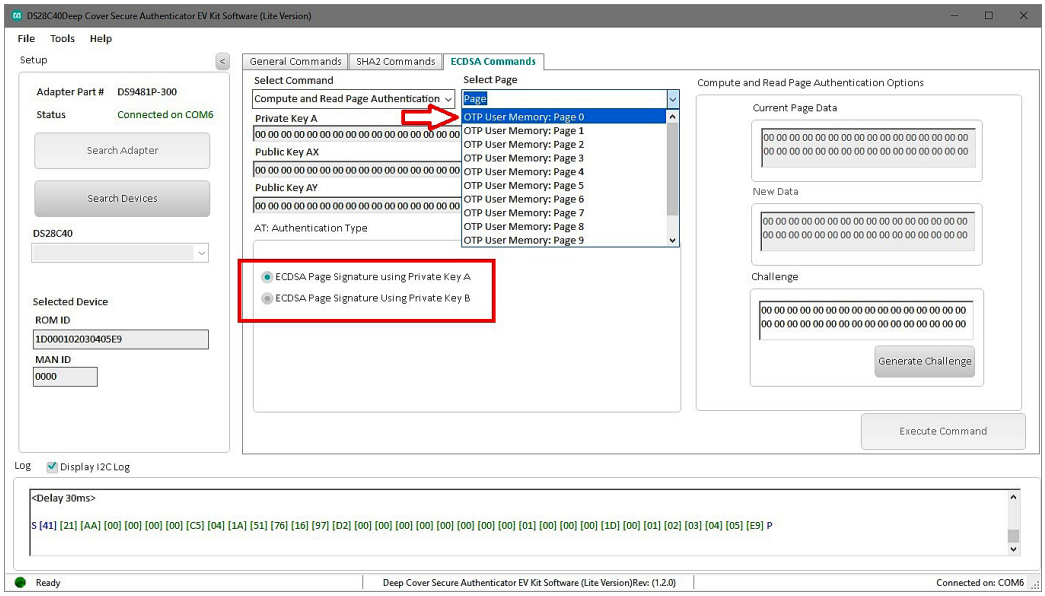



*Figure 27. Selecting Page and Key*

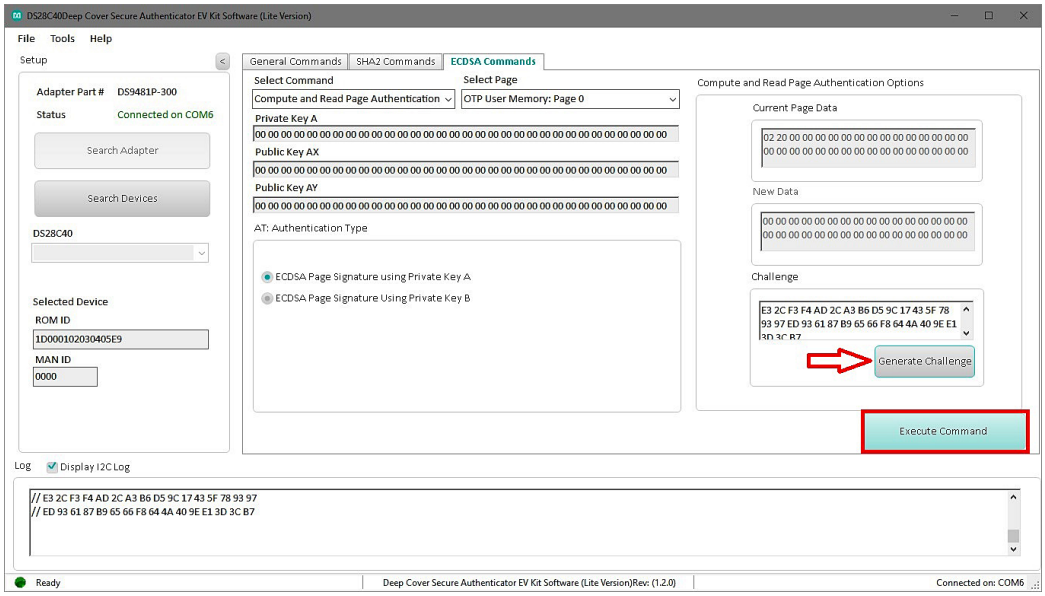



*Figure 28. Execute Command*

## Navigating

The DS28C40 EV Kit Lite Program is divided in five sections: the top menu bar, **Setup** panel, tab control, **Log**, and the status bar.

- **Menu Bar:** Provides additional software features and information used to support the software operation.
- **Setup Panel:** Information for hardware connection and device status.
- **Command Panel:** Main section for command execution and command option selection.
- **Log:** Software communication results for all commands and software transaction. Shows the $I^2C$ results and command's inputs and results.
- **Status Bar:** Displays the state of the software after connection the hardware necessary for operation

## Connecting and Detecting Hardware

The DS28C40 EV Kit Lite Program detects automatically the required hardware on initialization. To exercise a different DS28C40, open the DS9121CQ socket and replace the device (Figure 9). Then click the **Search Device** button to detect then new DS28C40.

If, for any reason, the DS9481P-300 is not detected during the initial software load, click the **Search Adapter** button to detect and initialize the USB adapter.

## Ordering Information

| PART | TYPE |
|---|---|
| DS28C40EVKIT# | EV System |

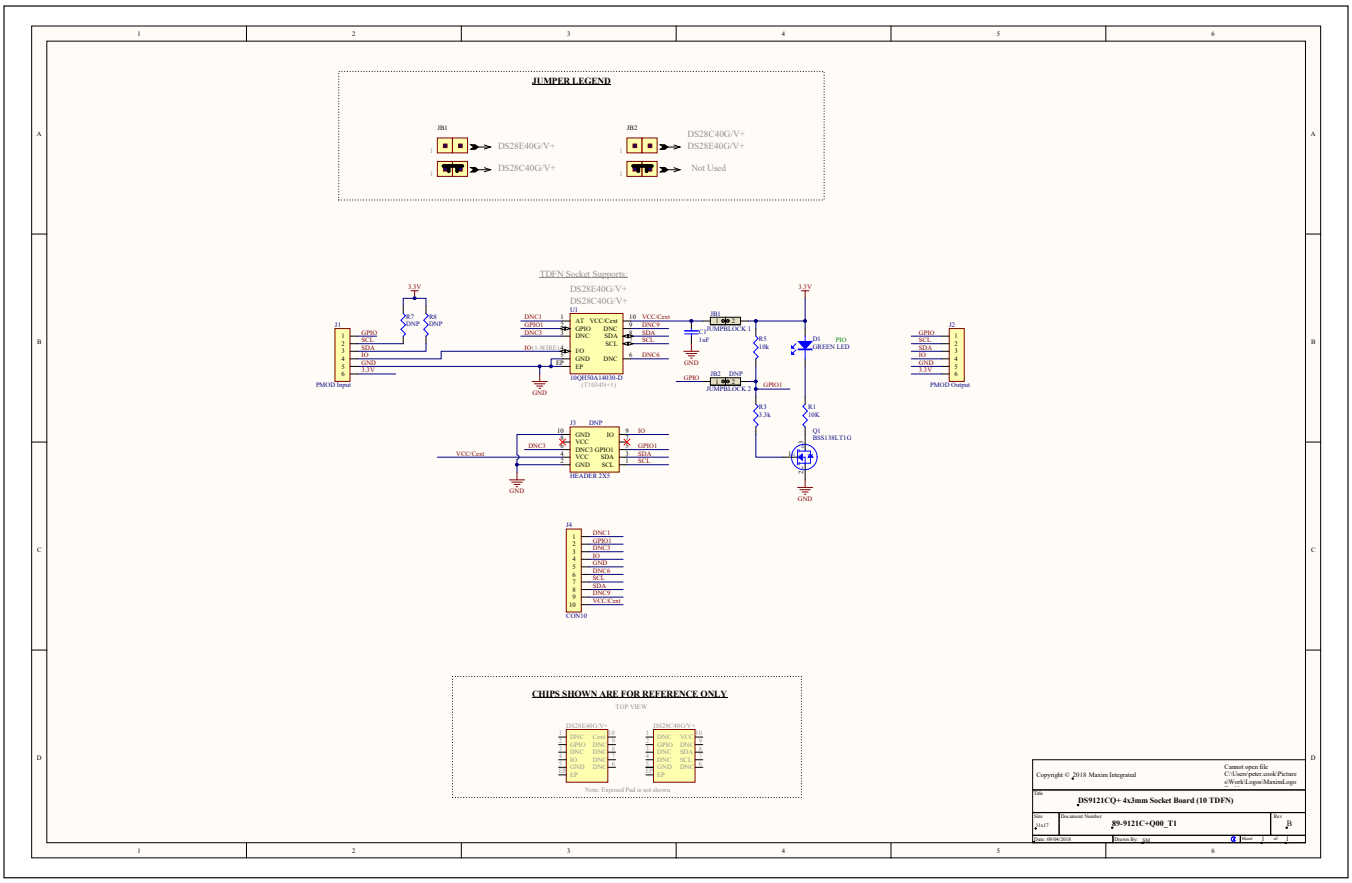
*#Denotes RoHS compliance.*

## DS9121CQ EV Kit Bill of Materials

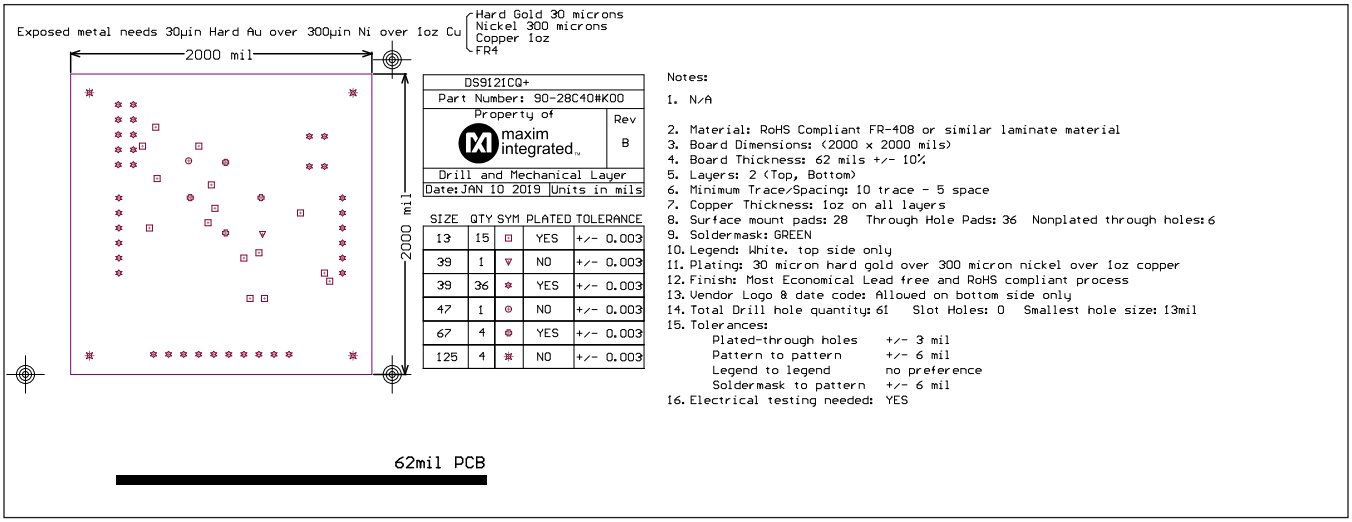
| DESIGNATION | QTY | DESCRIPTION |
|---|---|---|
| Pack-Out | 1 | I2C AUTHENTICATOR AUTO, EV KIT DS28C40EVKIT# |
| Pack-Out | 5 | AUTOMOTIVE I2C AUTHENTICATOR, 6Kb DS28C40G/V+ |
| Pack-Out | 1 | CABLE, USB A-TO-MICRO-B CABLE (1M) 68784-0001 |
| Pack-Out | 1 | 1W/I2C 4x3MM TDFN SOCKET BOARD DS9121CQ+ |
| Pack-Out | 1 | BOX, BROWN, 9 3/16" X 7" X 1 1/4" |
| Pack-Out | 1 | FOAM, ANTI-STATIC PE 12X12X3.175MM |
| Pack-Out | 2 | LABEL, SATIN 1-3/4" X 1-3/8" |
| Pack-Out | 1 | 2X3", STATISHIELDING, ZIPTOP |
| Pack-Out | 1 | INSERT+, MAXIM WEB INSTRUCTION |
| Pack-Out | 1 | DS9481P-300 EVAL KIT# DS9481P-300# |
| Pack-Out | 1 | 1W/I2C 4X3MM TDFN SOCKET BOARD DS9121CQ+ |
| DS9121CQ+ PCB | 1 | PCB+, DS9121CQ+ |
| J4 | 1 | CONN HEADER VERT 10POS 2.54MM 22284103 |
| J2 | 0.1 | CONN+,HEADER,50PS, 100 SGL, R/A, AU TSW-150-08-G-S-RA |

| DESIGNATION | QTY | DESCRIPTION |
|---|---|---|
| J1 | 1 | CONN+, RCPT, 100" 6POS, R/A GOLD PPPC061LGBN-RC |
| U1 | 1 | SOCKET+, IC, TDFN10, 4X3MM, CLAMSHELL 10QH50A14030-D |
| PACK-OUT | 1 | LABEL BLANK THT-1-423 0.75 X 0.25 |
| PACK-OUT | 1 | BAG, STATIC SHIELDZIP4X6, W/ESD LO |
| C1 | 1 | CAP+, 0.1µF, 10%, 10V, X7R, 0603 C0603C104K8RACTU |
| D1 | 1 | LED+,GREEN CLEAR, 3.2V,20MA,0603 598-8081-107F |
| JB1 | 0.1 | HEADER 36-40 PINS (CUT TO FIT) 22-28-4363 |
| Populate to JB1 | 1 | SHUNT+, LP W/HANDLE 2 POS 30AU 881545-2 |
| Q1 | 1 | MOSFET, N-CH ENHANCEMENT BSS138LT1G |
| R3 | 1 | 3.3KΩ 1% RESISTOR (0603 PB FREE) ERJ-3EKF3301V |
| R1, R5 | 2 | RES,10KΩ 1% 0603 ERJ-3EKF1002V |

## DS28C40 EV Kit Schematic

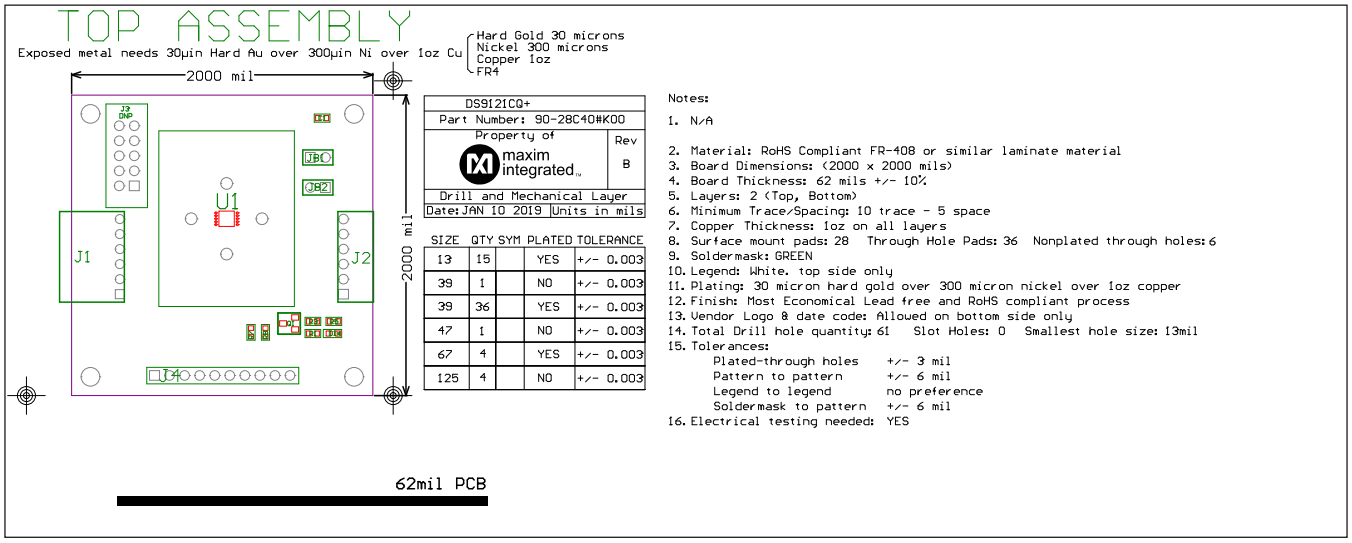



## DS28C40 EV Kit PCB Layout Diagrams

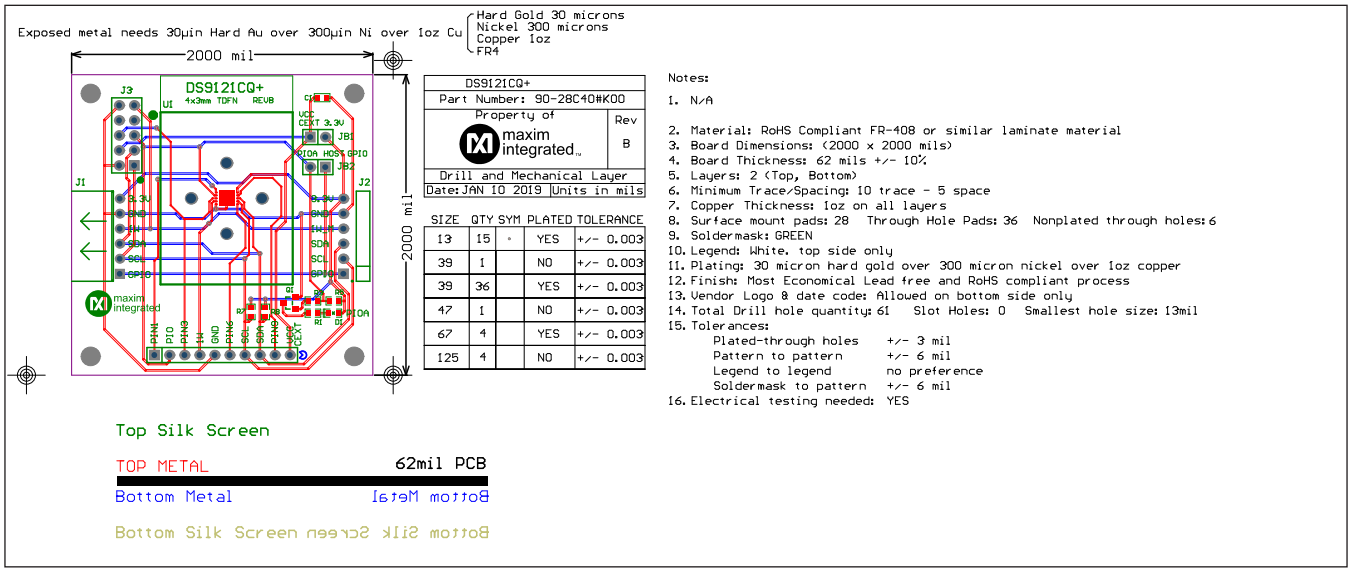



*Drill and Mechanical Layer (1 of 3)*

## DS28C40 EV Kit PCB Layout Diagrams (continued)




*Drill and Mechanical Layer (2 of 3)*




*Drill and Mechanical Layer (3 of 3)*

## Revision History

| REVISION NUMBER | REVISION DATE | DESCRIPTION | PAGES CHANGED |
|---|---|---|---|
| 0 | 6/19 | Initial release | — |

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# OCEAN CHIPS
## Океан Электроники
## Поставка электронных компонентов

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «**JONHON**», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «**FORSTAR**».

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