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Evaluates: MAX66242/DS7505

MAX66242 Evaluation Kit

General Description

The MAX66242 evaluation kit (EV kit) reference board is a ready-to-use PCB that showcases one of Maxim's MAX662XX family of secure dual-interface tag/transponder ICs. The board is built with a octagonal-shaped antenna construction (see the *MAX66242 EV Kit Photo* and Figure 2) tuned to 13.56MHz.

The EV kit is a platform that allows designers, test, and systems engineers to evaluate our MAX66242 tag solution. The EV kit allows users to evaluate the performance and capabilities of certain key features of the part and is a great platform to get started on a new NFC/RFID tag design.

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

Features and Benefits

- HF Interface at 13.56MHz
- I²C with Communications with the On-Board Temperature Sensor IC (DS7505)
- User EEPROM Authenticated Memory Page Read/Write Transactions
- User EEPROM Page/Block Read/Write Transactions
- Secure Transaction that Writes "Secret Keys" and Computes Message Authentication Code
- Energy-Harvested VOUT Used to Power an LED On/Off

EV Kit Contents

- MAX66242 EV Kit Motherboard

MAX66242 EV Kit Photo

19-7402; Rev 2; 3/23

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Quick Start

MAX6624x Mobile Application

The MAX66242 NFC Reader Mobile Application supports multiple MAX662xx EV kit boards. This demo application provides a quick path to demonstrating the features of both the MAX66242 and the MAX66240. To run the demo, the application should be downloaded to either an iOS® or Android™ NFC-compatible smartphone or tablet.

How to Download Application

The mobile application is available for both iOS and Android. It can be found in the Apple App Store and in Google Play for downloading and installation. Search with the "MAX66242 NFC Reader" keyword (Figure 1).

The application allows the user to send commands through the NFC interface to evaluate the features of the MAX6624x devices. The app can also be found through the following links:

- Android Store: **MAX66242 NFC Reader**
- Apple App Store: **MAX66242 NFC Reader**

iOS is a registered trademark of Cisco Technology, Inc.

Android is a trademark of Google LLC.

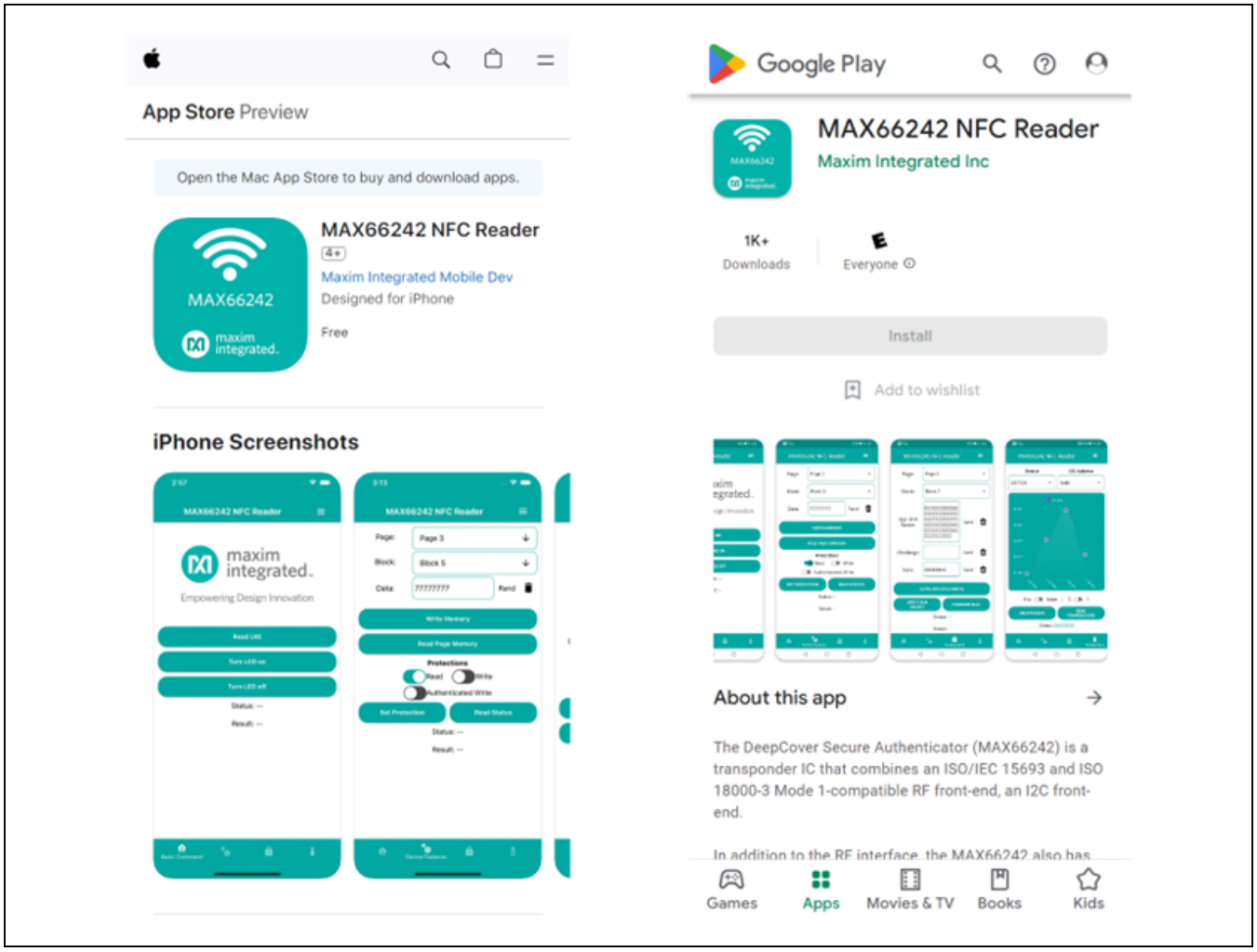

Figure 1. MAX66242 Mobile Applications Available in the Market

EV Kit Setup

The EV kit requires jumpers to be properly placed on the JB1 header for the energy-harvesting mode and the LED to be exercised. Figure 3 shows the jumper locations on the header. Table 1 describes the jumpers and their function. With the Android application already downloaded on the NFC-enabled phone or tablet, the user has everything needed to run the demo.

Table 1. Jumper Functions (JB1)

SHUNT POSITION	EFFECT
1-2 (Open*)	N/A
3-4 (Closed*)	Connects SDA to the DS7505
5-6 (Closed*)	Connects SCL to the DS7505
7-8 (Open*)	N/A
9-10 (Closed*)	Connects VCC to the DS7505
11-12 (Closed*)	Connects GND to the DS7505
13-14 (Closed*)	Connects VOUT to the LED

**Default position.*

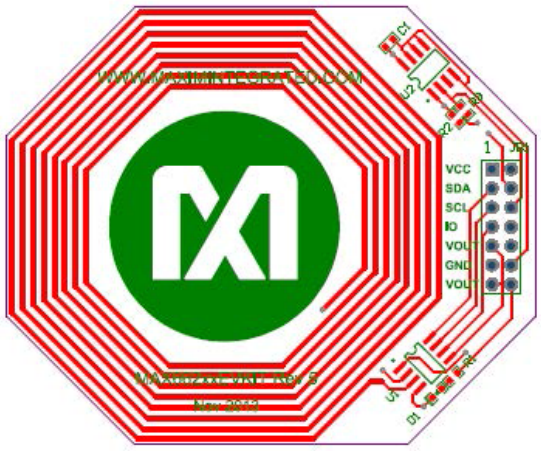

Figure 2. MAX662XX Antenna Layout

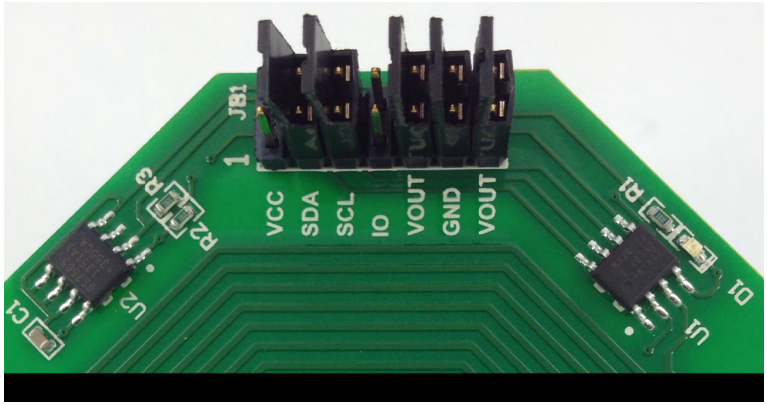

Figure 3. Jumper Placements for VOUT and LED to be Exercised

Energy Harvesting (VOUT)

To demonstrate the energy-harvesting function, the energy-harvested VOUT pin is connected to an LED through a resistor and jumper (see Figure 9).

The application provides functions to enable/disable the VOUT pin through a configuration register bit. When the tag is configured to enable the VOUT pin, the LED turns on when the tag is placed in an HF field. The VOUT can also be configured to be disabled. When this is the case, VOUT remains in the off state when the tag is placed in an HF field. However, note that the VOUT pin must remain enabled for the temperature read exercise to return the correct temperature reading (i.e., a slightly stronger field is needed to run the temperature sensor and the LED). The temperature sensor (DS7505) is powered from the harvested voltage on the VOUT pin.

I²C Interface

The I²C interface is demonstrated by reading the local temperature of the environment from the on-board DS7505 temperature-sensor IC through its I²C port.

The NFC phone sends an HF “peripheral read” command through the I²C port. This temperature data is funneled through the tag and the HF interface and is displayed on the phone. While the MAX66242 can function either as an I²C master or as a slave, in this case it assumes the role as master.

Note: If the temperature reading displayed on the phone appears to be off, check to make sure the jumpers are properly installed on the header (see Figure 3), and/or the LED “on” has been enabled.

Running the Demo

MAX662XX SHA2 Android Application

The **MAX662XX SHA2** Android application supports several functions on the EV kit. These include reading tag UID and the local temperature, reading/writing data into tag user memory (ASCII data entry for block-write is not supported with this version), toggling the LED on/off (powered from the harvested energy from the HF link), and performing authenticated writes, and computing/comparing message authentication codes (MAC), among others.

The user only needs to make a selection from the Menu and bring the tag/EV kit into the vicinity of the phone or tablet. It helps to know where the NFC antenna on the phone or tablet is located. The user can get an idea as to where the antenna is located by doing several UID reads while touching the EV kit at several locations on the phone or tablet. On many phones, the antenna is located on the upper half of the backside of the phone.

Note: To navigate within the NFC application, movement to the "Next Screen" is accomplished by using the Menu "blue arrow" on the right side (Figure 4a). Return back to the "First Screen" by using the Menu "blue arrow" on the left side (Figure 4b).

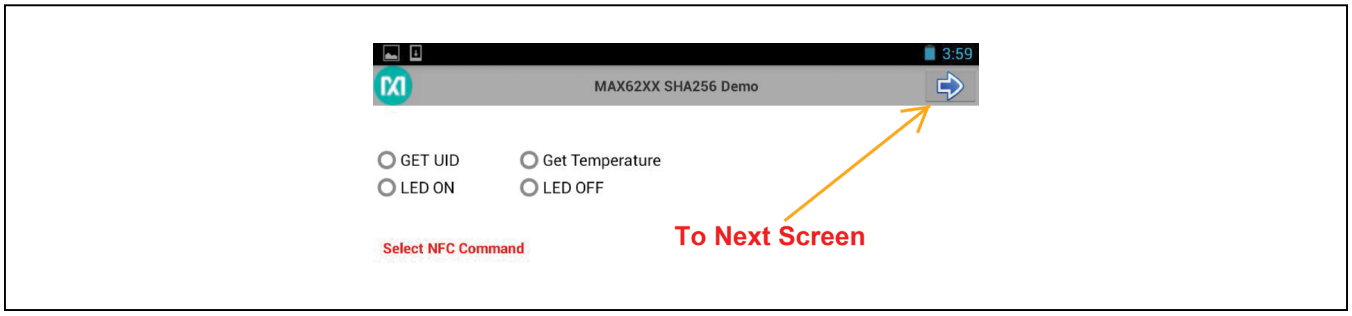

Figure 4a. Application Menu with Landing Screen

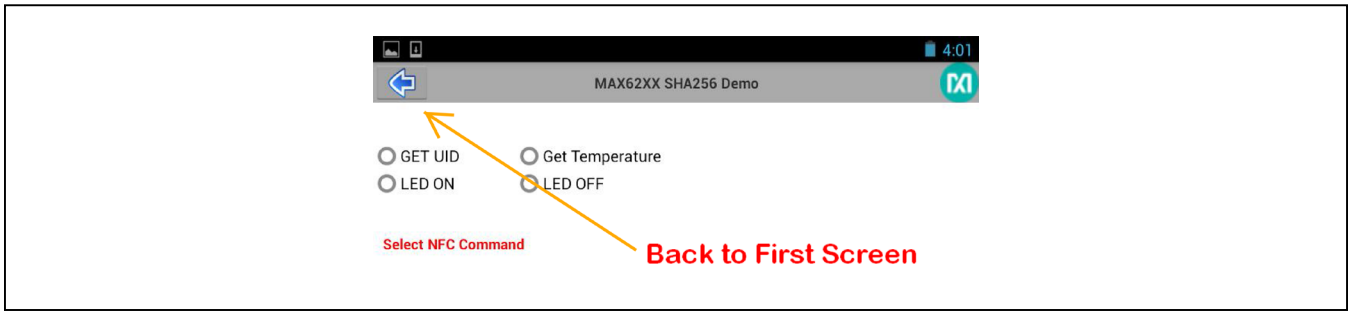

Figure 4b. Next Screen

Reading Tag UID

Select the Menu item **Get UID** (Figure 5) and bring the EV kit into the vicinity of the phone/tablet.

Reading/Selecting Memory Page

Select the Menu item to read memory and a specific block to read (Figure 6a). The MAX66242 has a 4Kb memory, organized as pages. Touch the Page 0 Menu item (Figure 6b) to get a drop box. After the specific page number selection, bring the EV kit into the vicinity of the phone/tablet.

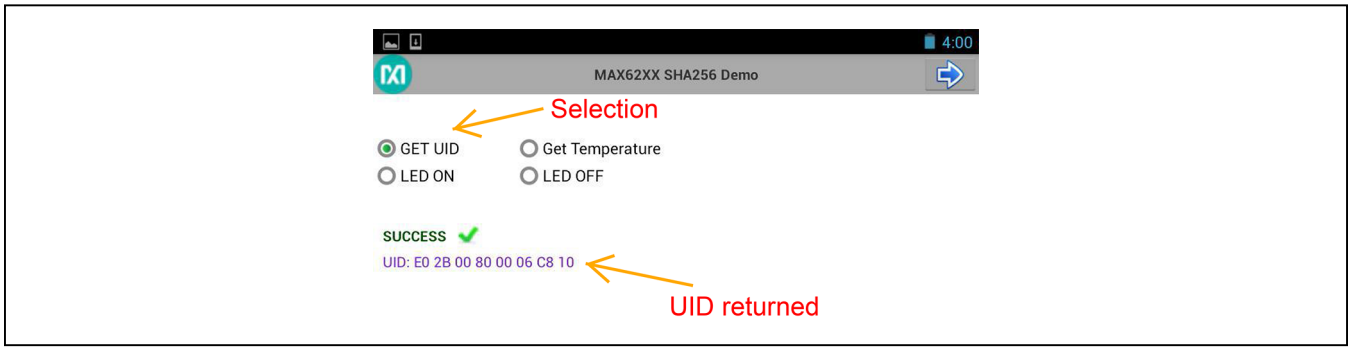

Figure 5. Reading Tag UID

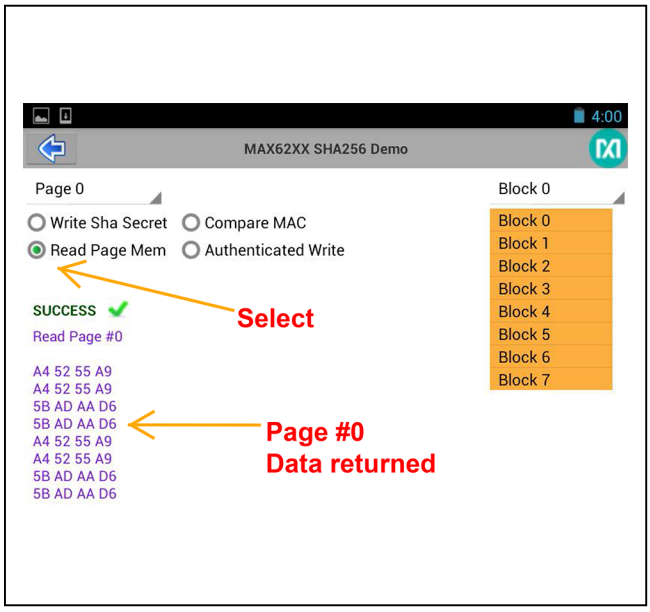

Figure 6a. Reading Tag Memory

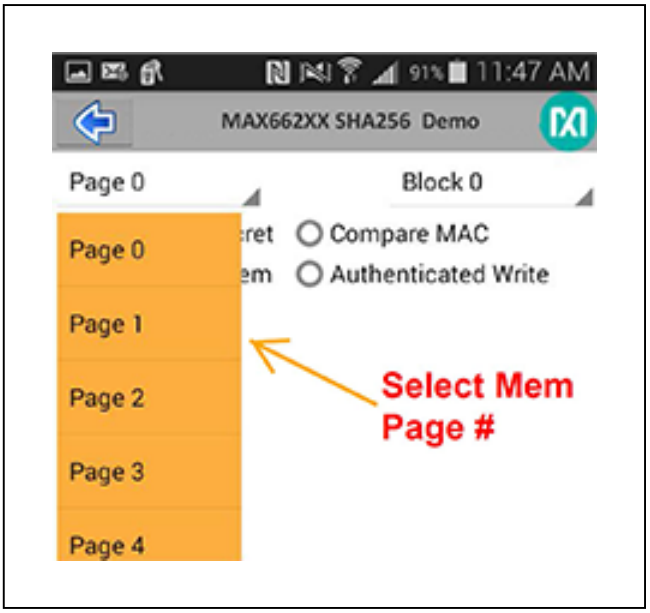

Figure 6b. Selecting Tag Memory

Reading Temperature and Toggling LED On/Off

Select the Menu item and bring the EV kit into the vicinity of the phone/tablet (see Figure 7a and Figure 7b).

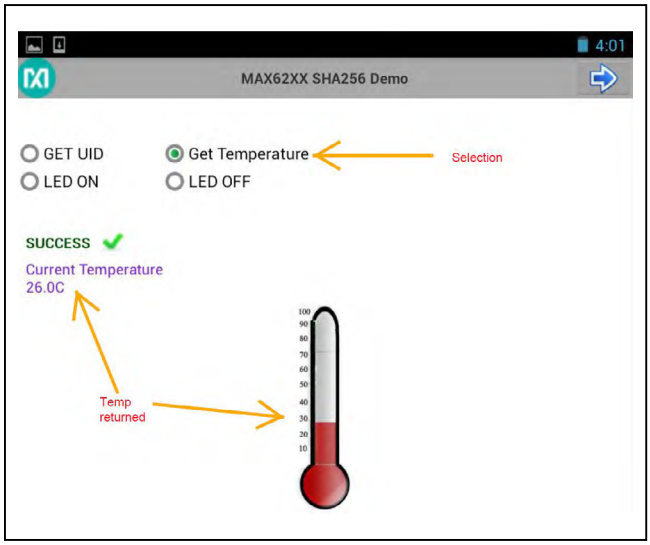

Figure 7a. Reading Temperature from DS7505

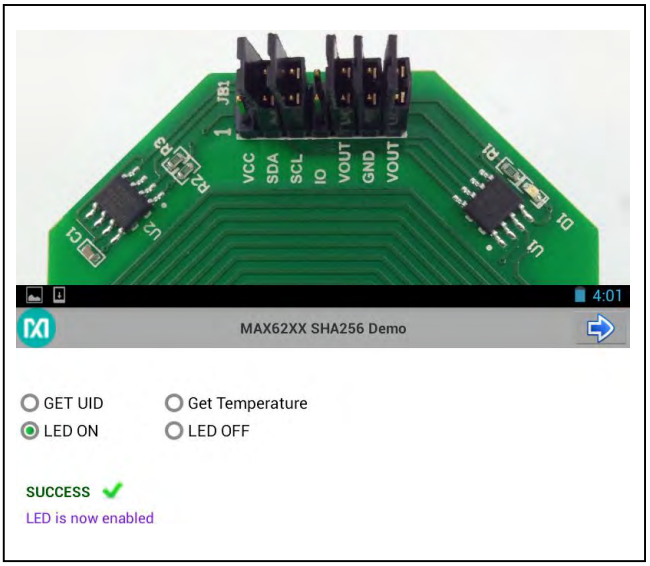

Figure 7b. Toggling LED On/Off

Loading a SHA-2 Secret and Performing a MAC Compare

Select the Menu item and bring the EV kit into the vicinity of the phone/tablet.

The MAX62XX represents a family of products. The features covered are shown in Figure 8a and Figure 8b.

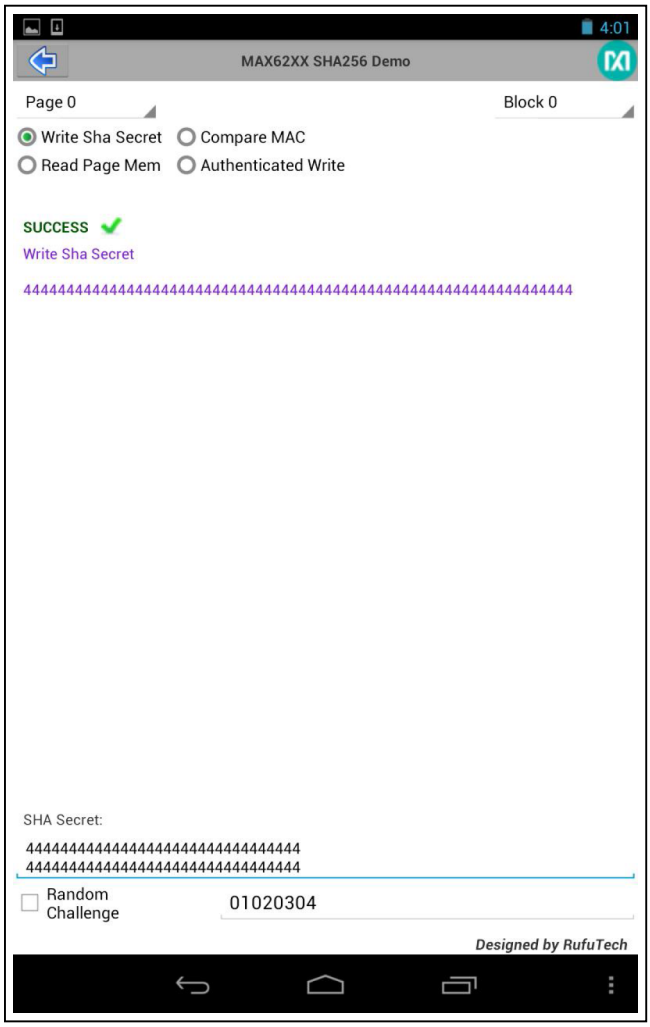

Figure 8a. Writing a SHA-256 Secret

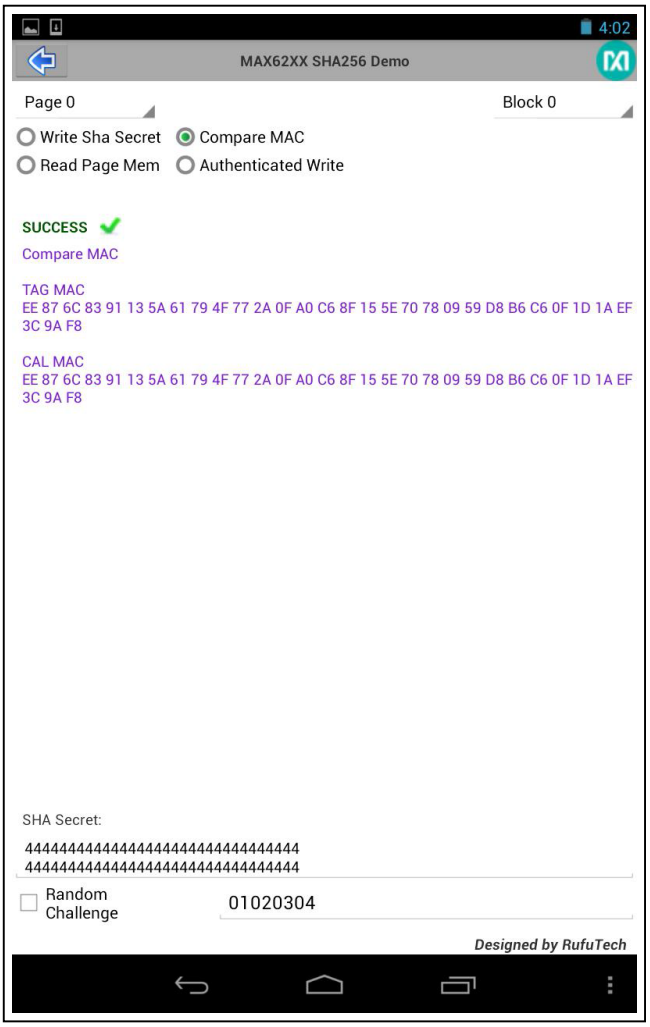

Figure 8b. Performing a MAC Compare

Component List

DESIGNATION	QTY	DESCRIPTION
C1	1	0.1µF ±10%, 25V X7R ceramic capacitor (0603)
D1	1	20mA, 3.2V clear green LED (0603)
JB1	1	14-pin (7 x 2) header
R1–R3	3	3.2kΩ ±0.1% resistors (0603)
U1	1	DeepCover® secure authenticator with ISO 15693, I²C, SHA-256, and 4Kb user EEPROM (8 SO) Maxim MAX66242+
U2	1	High-precision digital thermometer and thermostat (8 SO) Maxim DS7505+
—	5	2-position shunts, LP w/handle (30AU)
—	1	PCB#: Assembled for MAX66242#K00 kit

+Denotes a lead(Pb)-free/RoHS-compliant package.

Ordering Information

PART	TYPE
MAX66242EVKIT#	EV Kit

#Denotes RoHS compliant.

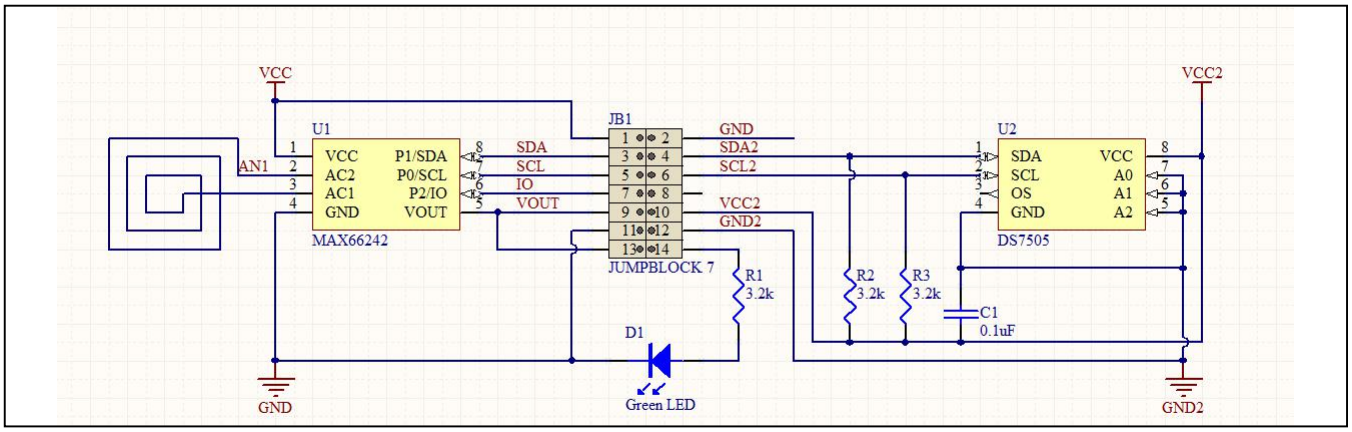

Figure 9. MAX66242 EV Kit Schematic

DeepCover is a registered trademark of Maxim Integrated Products, Inc.

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	2/15	Initial release	—
1	4/17	Updated software download and Figure numbers and corresponding references	2–8
2	3/23	Updated Android app link and added iOS app link	2