

MAX66903 Evaluation Kit

Evaluates: MAX66100/MAX66120/MAX66140

General Description

The MAX66903 evaluation kit (EV kit) is a fully functional ISO 15693 reader that supports all the mandatory and optional commands in the ISO 15693 protocol. The EV kit also performs a SHA-1 calculation using the on-board microcontroller. SHA-1 is a secure hash algorithm with a challenge-and-response authentication (ISO/IEC 10118-2 SHA-1). This feature was added to support the MAX66140.

The EV kit is complete with an on-board HF antenna, an in-circuit jumper option for an external 50Ω antenna, USB connectivity with parasitic power, and on-board microcontroller with modulation and demodulation circuitry. The EV kit also includes Windows XP®, Windows Vista®, and Windows® 7-compatible software that provides a simple graphical user interface (GUI) that supports the features of the MAX661x0 devices.

Features

- ◆ Fully Functional Low-Cost ISO 15693 Reader
- ◆ SHA-1 Support
- ◆ On-Board HF Antenna
- ◆ External 50Ω Antenna Option
- ◆ USB 2.0 Support
- ◆ Power Provided Through USB
- ◆ External Circuitry for Modulation and Demodulation of the ISO 15693 Frame
- ◆ Windows-Compatible GUI Available for Download
- ◆ Schematics and Firmware Available for Quick Development

Ordering Information appears at end of data sheet.

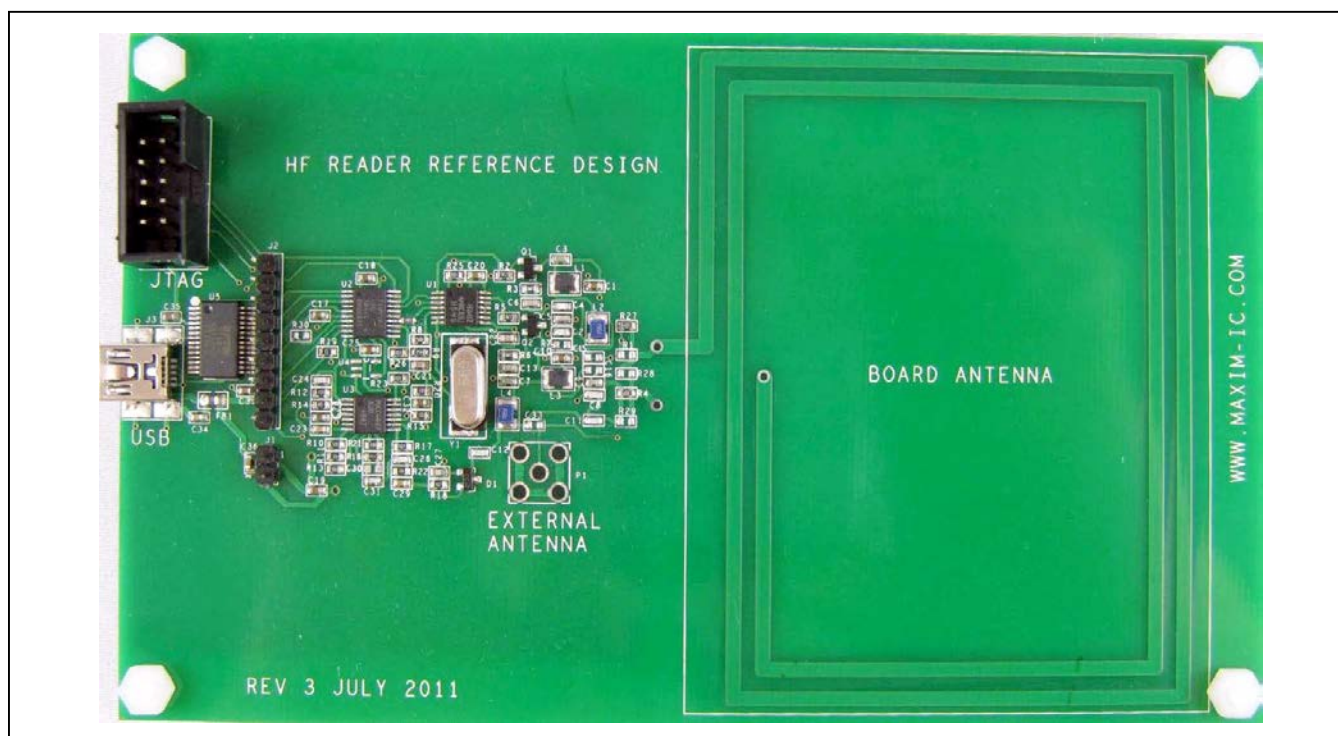


Figure 1. MAX66903 Evaluation Kit

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For pricing, delivery, and ordering information, please contact Maxim Direct at 1-888-629-4642, or visit Maxim Integrated's website at www.maximintegrated.com.

19-6422; Rev 0; 8/12

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Component List

DESIGNATION	QTY	DESCRIPTION
C1, C10, C17, C18, C20, C25, C28, C32, C33, C36, C37	11	0.10 μ F, 50V Y5V ceramic capacitors (0603)
C2, C11, C27	3	68pF $\pm$ 5%, 50V C0G ceramic capacitors (0603)
C3, C7	2	91pF 50V C0G ceramic capacitors (0603)
C4, C8	2	180pF $\pm$ 5%, 50V C0G ceramic capacitors (0603)
C5	1	270pF $\pm$ 5%, 50V C0G ceramic capacitor (0603)
C6, C13	2	22pF $\pm$ 5%, 50V C0G ceramic capacitors (0603)
C9	1	270pF $\pm$ 5%, 50V C0G ceramic capacitor (0603)
C12, C24, C26	3	12pF $\pm$ 5%, 50V C0G ceramic capacitors (0603)
C15, C16, C30	2	Capacitors, do not populate
C19, C35	2	0.47 μ F, 50V Y5V ceramic capacitors (0603)
C21, C22	2	18pF $\pm$ 5%, 50V C0G ceramic capacitors (0603)
C23, C29, C34	3	1000pF $\pm$ 10%, 50V X7R ceramic capacitors (0603)
C31	1	110pF $\pm$ 5%, 50V C0G 570 ceramic capacitor (0603)
D1	1	200mA, 70V Schottky diode (SOT23)
FB1	1	220 Ω EMI/RFI suppressor and ferrite (0805)
J1	1	0.100 single-strip 2-position connector header
J2	1	Breakaway 0.100 9-position strip connector header
J3	1	Mini-B USB
L1, L3	2	1.5 μ H $\pm$ 5% RF power inductors

DESIGNATION	QTY	DESCRIPTION
L2, L4	2	0.56 μ H power inductors (1008)
P1	1	Connector plug, do not populate
P10	1	Conn plug 10pos 3a 300v strt dip
Q1, Q2	2	GP npn amp transistors (SOT23)
R1, R29, R28, R30	4	Resistors, do not populate
R2, R5	2	22 Ω $\pm$ 5%, 1/8W SMD resistors (0805)
R3, R6	2	18 Ω $\pm$ 5%, 1/10W SMD resistors (0603)
R4, R27	2	1.40 Ω $\pm$ 1%, 1/10W SMD resistors (0603)
R7, R9, R11, R14, R18, R22	6	1.1k Ω $\pm$ 5%, 1/10W SMD resistors (0603)
R8	1	1.0m Ω $\pm$ 5%, 1/10W SMD resistors (0603)
R10, R12, R15, R17, R20, R21, R23, R25, R26	9	10k Ω $\pm$ 5%, 1/10W SMD resistors (0603)
R13	1	560 Ω $\pm$ 5%, 1/10W SMD resistor (0603)
R16	1	11k Ω $\pm$ 5%, 1/10W $\pm$ 5% SMD resistor (0603)
R19	1	0 Ω 1/4W SMD resistor (1206)
U1	1	Quad 2in pos-nor gate (14 TSSOP) 74AHC02
U2	1	Microcontroller AVR 16kb fl 512b EE 512B RAM 16MHz ind-g ATiny87/167
U3	1	Quad op amp r-r 8MHz (14 TSSOP) Maxim MAX4487AUD
U4	1	Do not populate
U5	1	USB interface , USB-to-serial UART enhanced (28 SSOP) FT232RL
Y1	1	13.560MHz, 18pF SMD crystal

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Component Suppliers

SUPPLIER	PHONE	WEBSITE
FTDI	+44 (0) 141-429-2777	www.ftdichip.com
Maxim Integrated Products	408-601-1000	www.maxim-ic.com
Micro Commercial Components	818-701-4933	www.mccsemi.com
Molex Connector	800-786-6539	www.molex.com
Murata	770-436-1300	www.murata-northamerica.com
OMRON	847-882-2288	www.omron.com
Panasonic	800-344-2112	www.panasonic.com
Sullins Connector Solutions	888-774-3100	www.sullinscorp.com
TDK Corporation	847-803-6100	www.component.tdk.com
TE Connectivity	800-522-6752	www.te.com
Texas Instruments	972-644-5580	www.ti.com
Vishay/Dale	402-563-6866	www.vishay.com

Note: Indicate the specific Maxim part number you are using when contacting these component suppliers.

HF Antenna Configuration

The MAX66903 EV kit has two available antenna configurations: internal coil and external 50Ω coax. The EV kit is shipped in the internal coil configuration.

INTERNAL ANTENNA COIL CONFIGURATION	
Populate	L2, L4 = 0.56μH
Do not populate	C15, C16, C33, P1, R7
EXTERNAL 50Ω COAX CONFIGURATION	
Populate	C4 = 0.1μF; L2, L4 = 1.2μH
Do not populate	C2, C5, C8, C9, C11, R1, R4, R27, R28, R29

MAX66903 EV Kit Files

FILE	DESCRIPTION
CDM20814_SETUP.EXE	FTDI installation software
MAXIMHFRFID.APPLICATION.EXE	Application manifest file
SETUP.EXE	Installs the EV kit files on your computer
VISUALBASICPOWERPACKSSETUP.EXE	Visual Basic® Power Pack installation files

Visual Basic is a registered trademark of Microsoft Corp.

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Quick Start

Required Equipment

- MAX66903 EV kit (USB cable included)
- User-supplied Windows XP, Windows Vista, or Windows 7 PC with a spare USB port
- MAX66140 ISO card (supplied with EV kit)

Software Installation and Instruction Procedure

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.

The EV kit is fully assembled and tested. Follow the steps below for proper operation.

- 1) Visit www.maximintegrated.com/evkitsoftware to download the latest version of the kit software, **66903Rxx.ZIP**. Save the file to a temporary folder and uncompress the ZIP file.
- 2) Install the EV kit software on your computer by running the **SETUP.EXE** program inside the temporary folder. The program files are copied and icons are created in the Windows **Start | Programs** menu.
- 3) Install the FTDI USB drivers by running the **CDM20814_SETUP.EXE** program inside the temporary folder.
- 4) Connect the provided Mini-USB cable to the MAX66903 and the PC. A **Building Driver Database** window pops up in addition to **New Hardware Found** message when installing the USB driver for the first time. Administrator privileges are required to install the USB device driver on Windows platforms.
- 5) Run the **MAXIMHFRFID.APPLICATION.EXE** program in the **Start | Programs | MAXHFRFID** menu. If you get an error requesting Microsoft VisualBasic.PowerPacks, close the **MAXIMHFRFID.APPLICATION.EXE** program and install the **VISUALBASICPOWERPACKSSETUP.EXE** program in the temporary folder. When program has completed the installation, close it and then rerun the **MAXIMHFRFID.APPLICATION.EXE** program.
- 6) When the **MAXIMHFRFID.APPLICATION.EXE** is running, select the COM Port associated with the USB device. See [Figure 2](#).
- 7) Place a MAX66140 ISO card on the on-board antenna and select the **Find Tags** button. See [Figure 3](#).
- 8) Read and display the memory of the tag by pressing the **Read Memory** button. This can only occur if a tag has been found. See [Figure 4](#).
- 9) Load the secret in the **SHA Secret** text box then click the **Load** button.
- 10) Select any page number and click **Authenticate**. If the SHA-1 MAC received is the same as what was calculated, the pass/fail button will be **GREEN**. Otherwise, it will be **RED**. See [Figure 5](#).
- 11) For more information about SHA-1 authentication or the MAX66140, refer to the MAX66140 IC data sheet.

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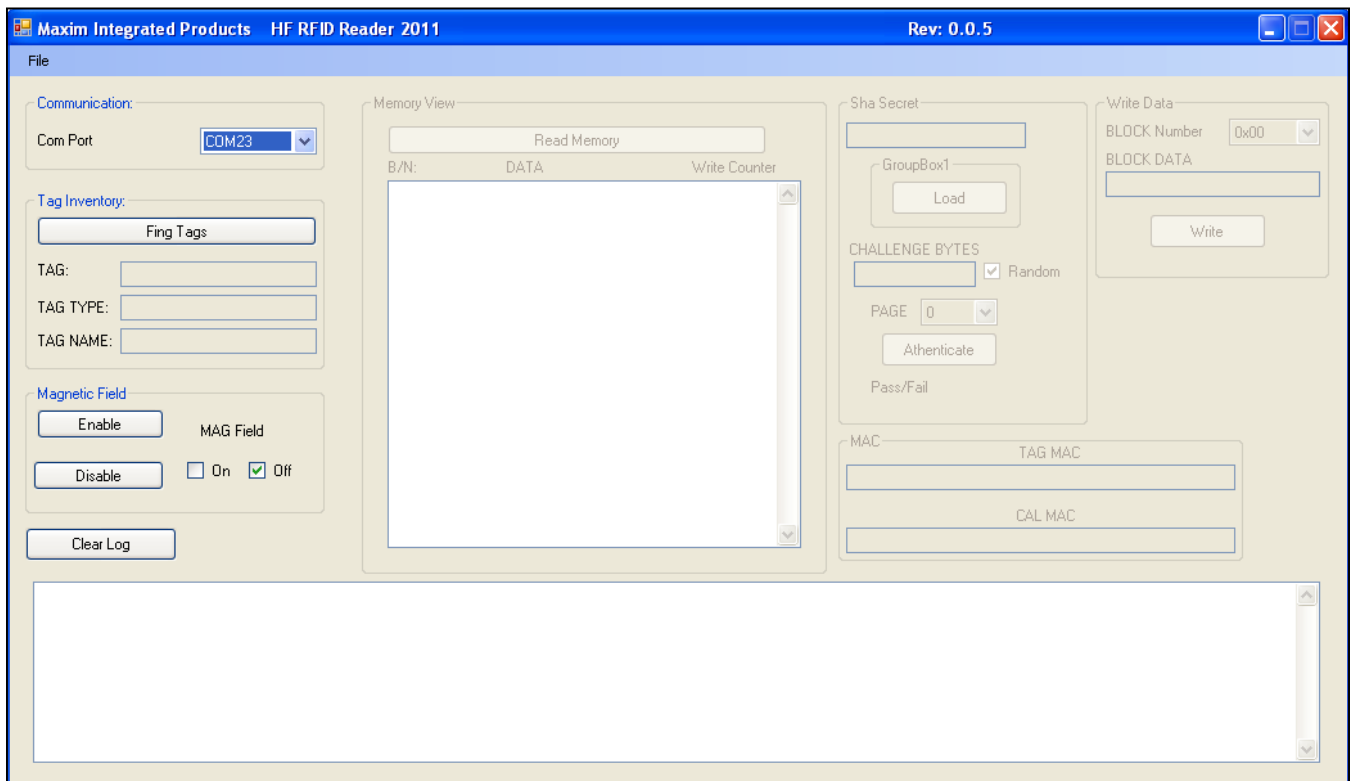


Figure 2. Select Com Port

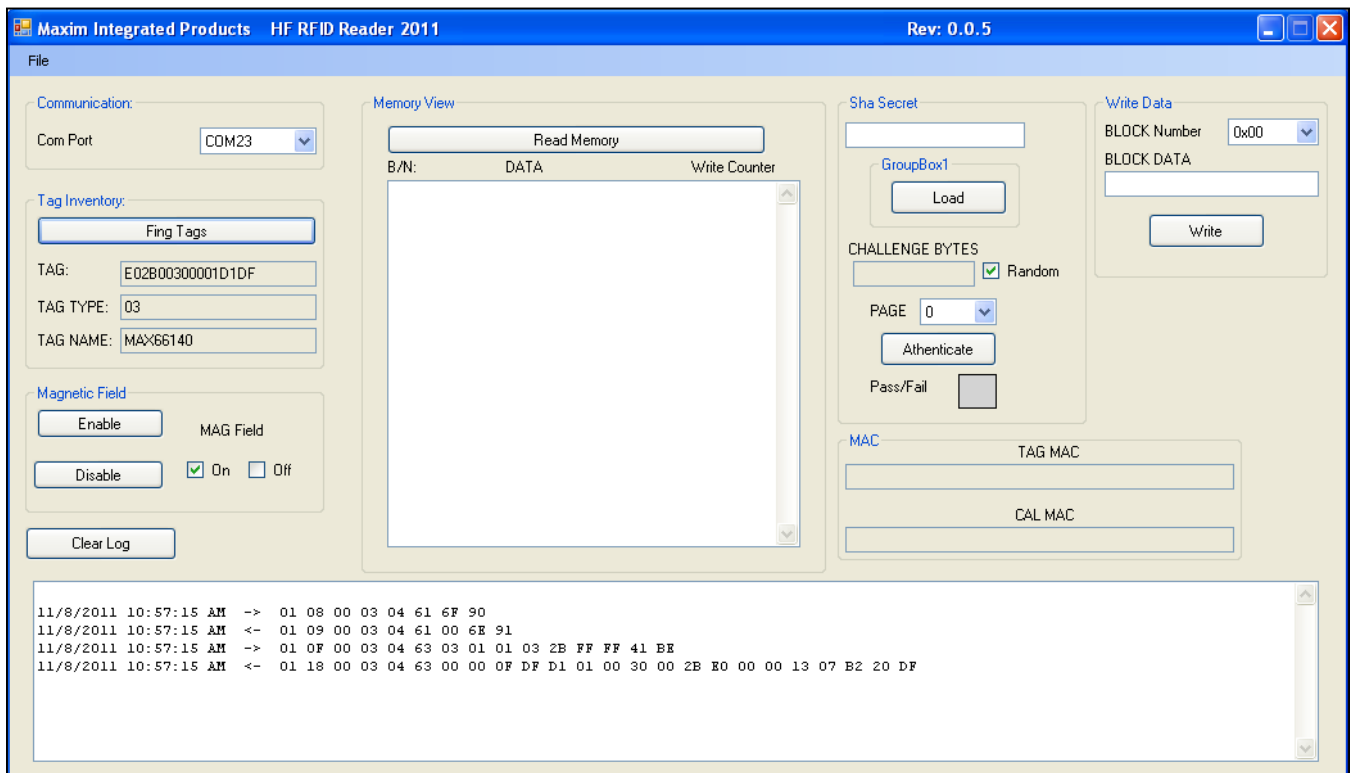


Figure 3. Find Tags
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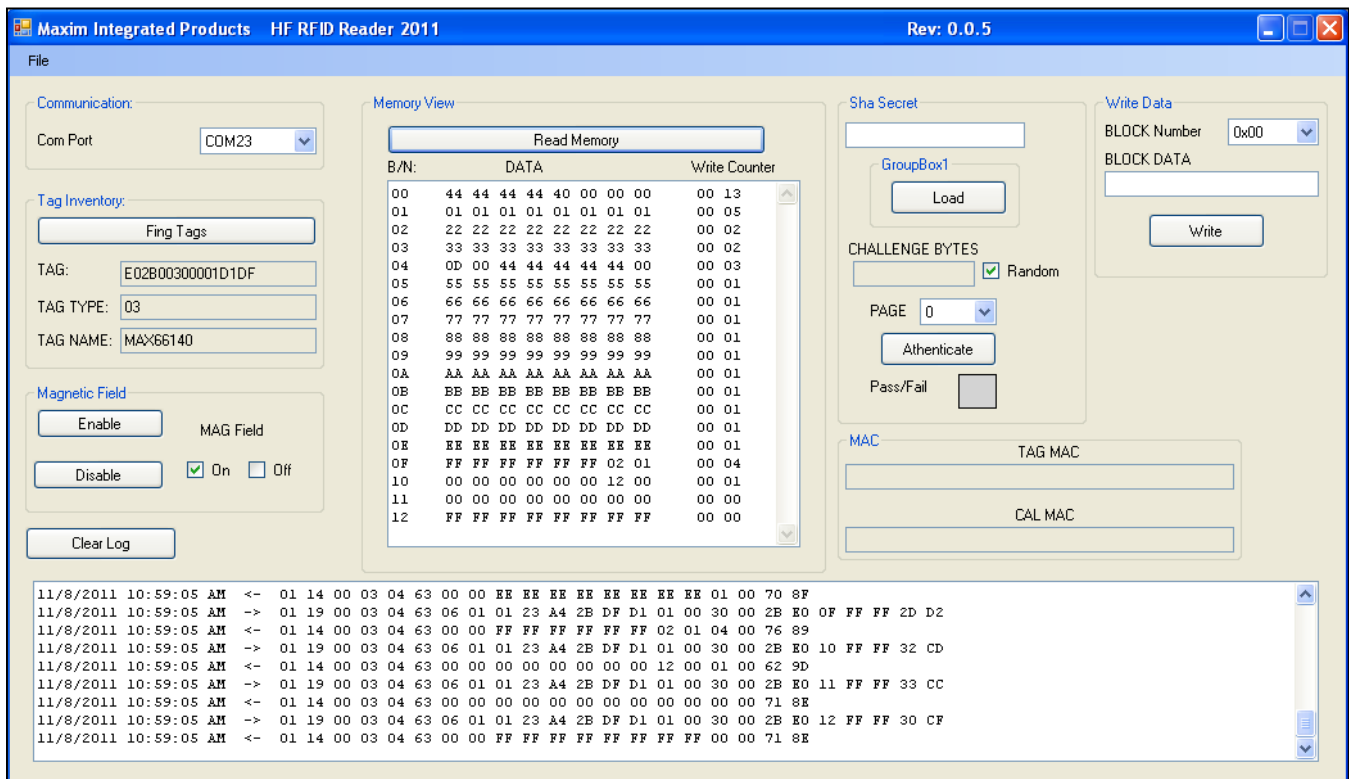


Figure 4. Select Read Memory

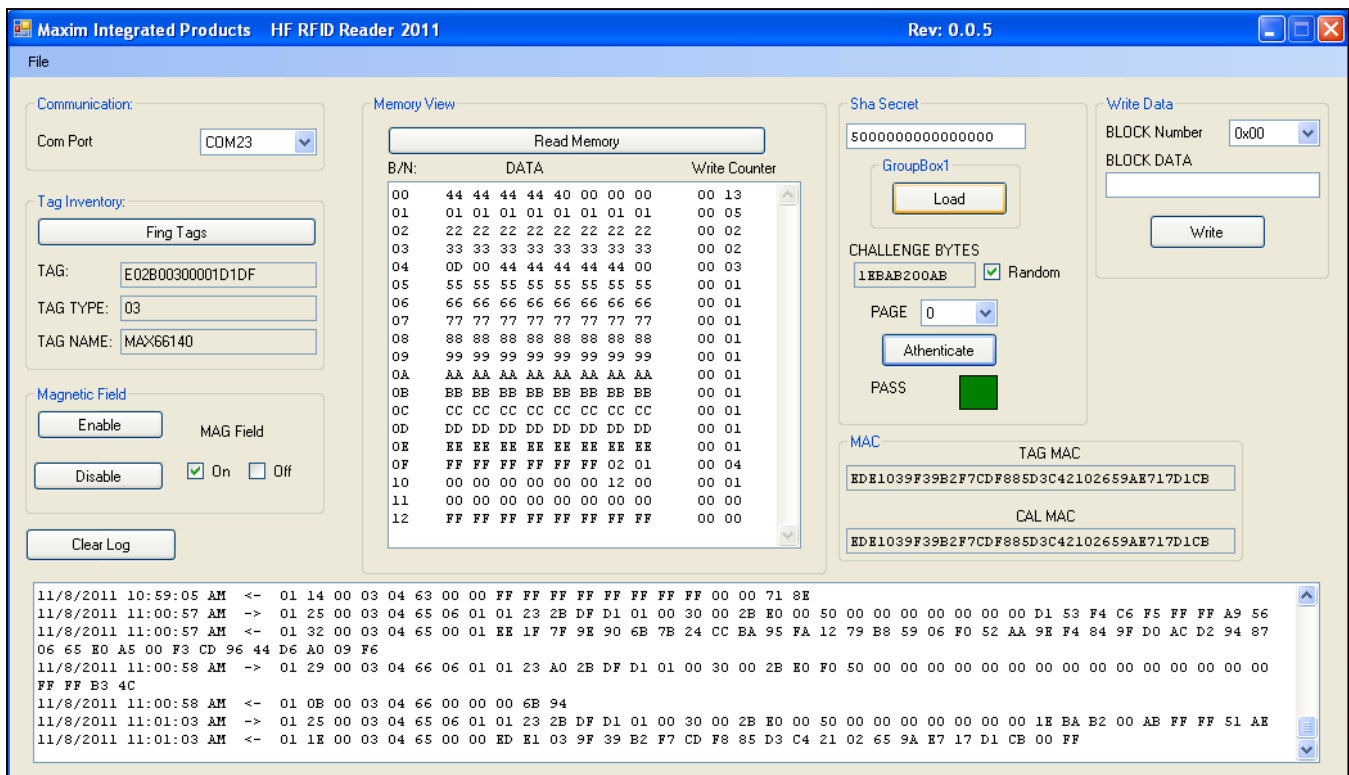


Figure 5. Load Secret and Authenticate Tag

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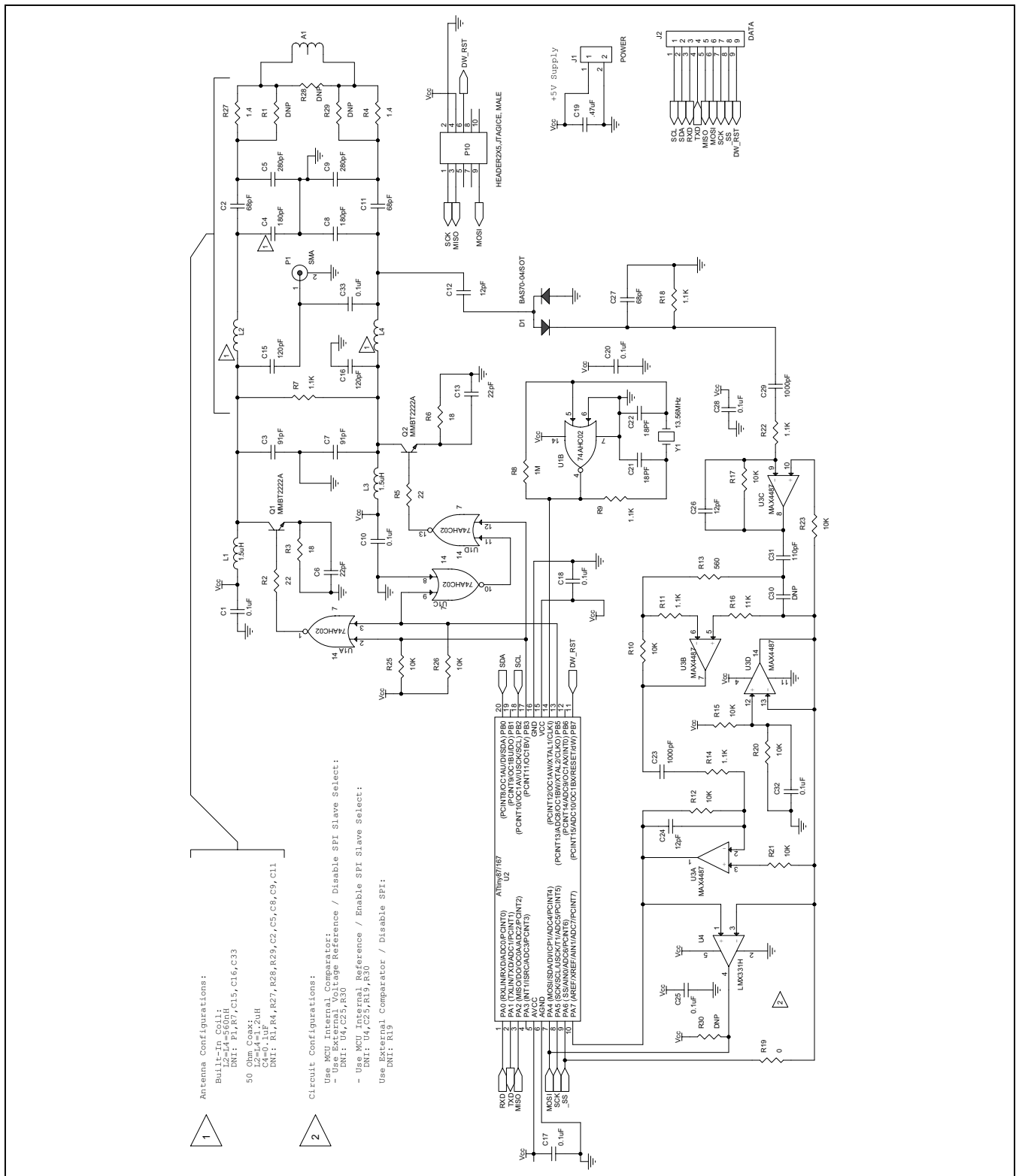


Figure 6. MAX66903 EV Kit Schematic (Sheet 1 of 2)

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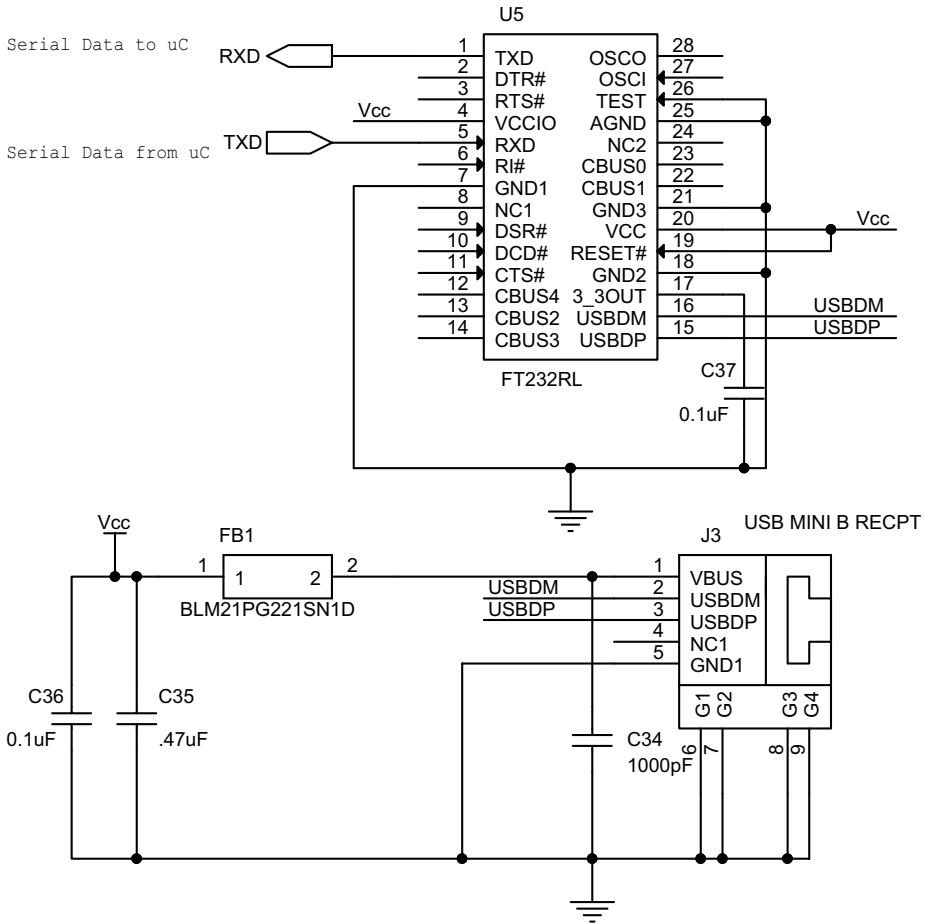


Figure 7. MAX66903 EV Kit Schematic (Sheet 2 of 2)

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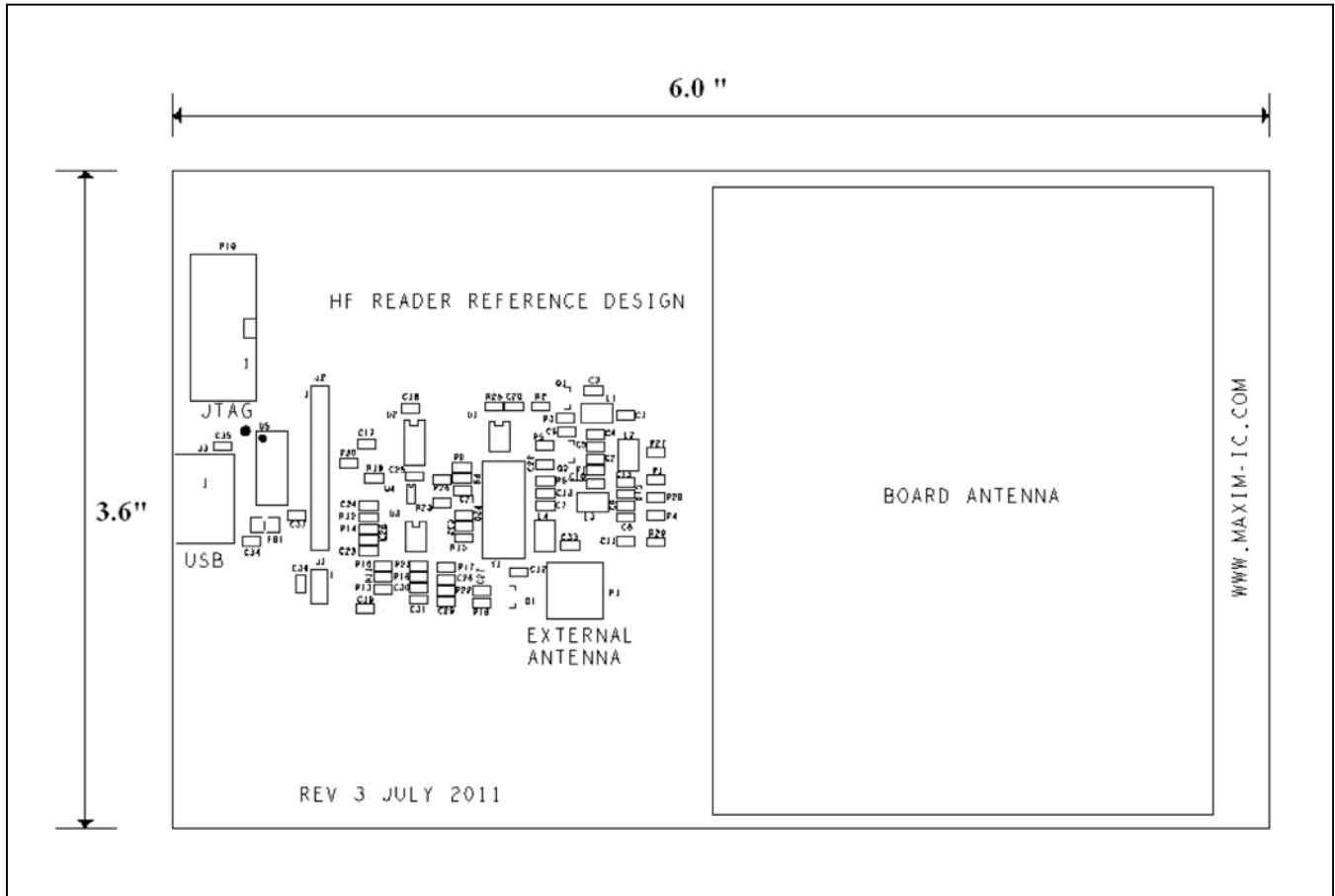


Figure 8. MAX66903 EV Kit Component Placement Guide—Component Side

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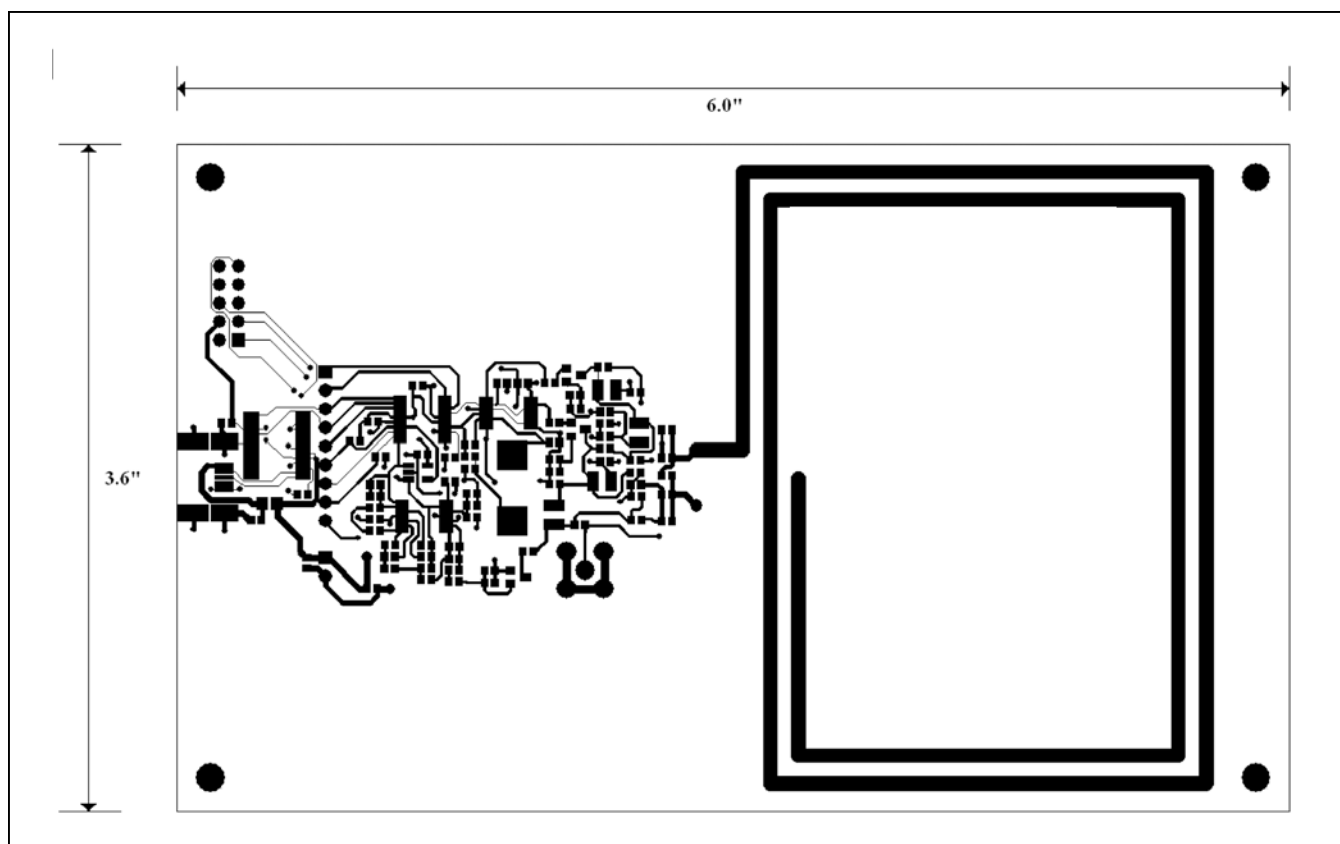


Figure 9. MAX66903 EV Kit PCB Layout—Top Copper

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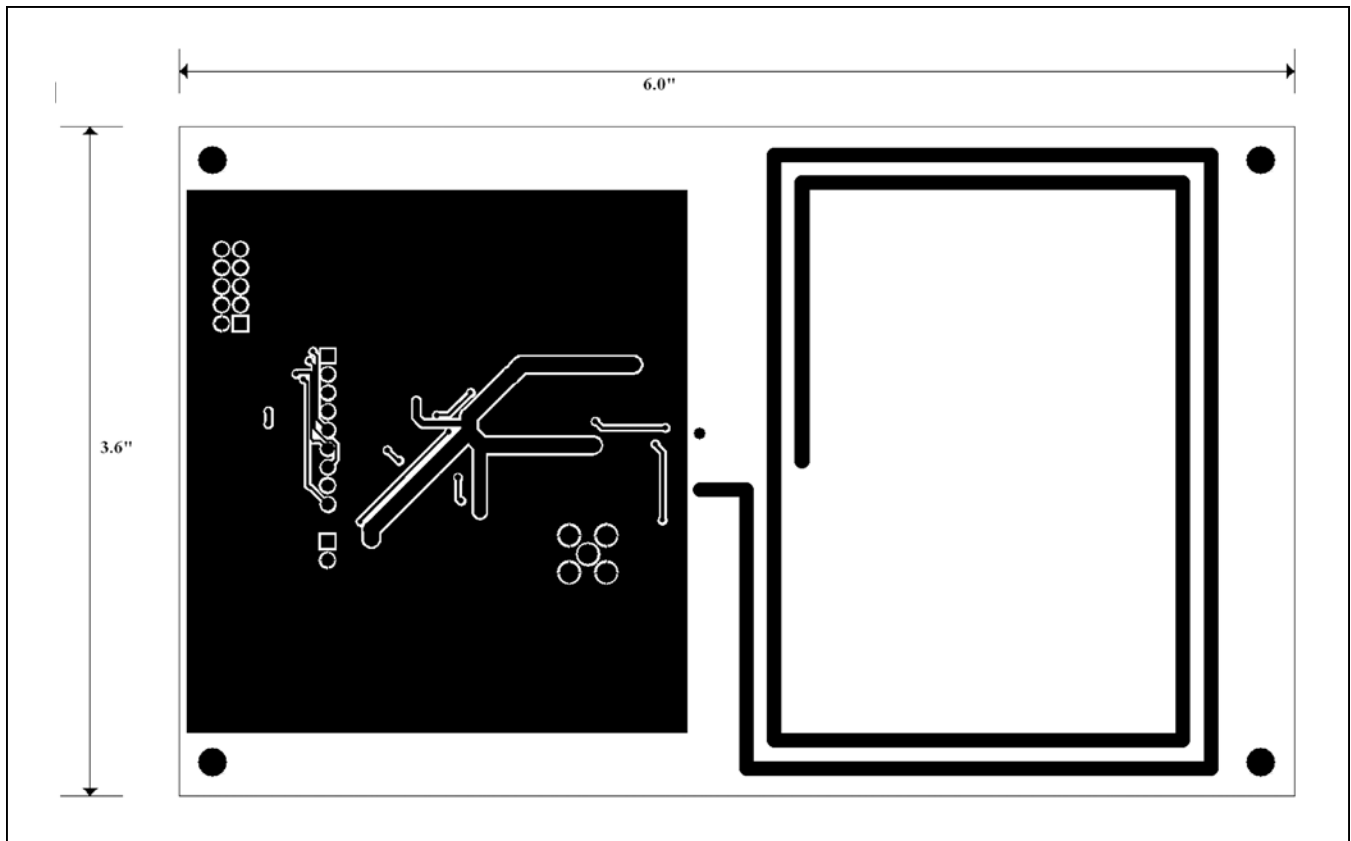


Figure 10. MAX66903 EV Kit PCB Layout—Bottom Copper

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Ordering Information

PART	TYPE
MAX66903-K00	EV Kit

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Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	8/12	Initial release	—



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