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

# MAX3523 Evaluation Kit

# Evaluates: MAX3523

## General Description

The MAX3523 evaluation kit (EV kit) provides the hardware and software graphical user interface (GUI) necessary to evaluate the MAX3523 low-power DOCSIS 3.1 programmable-gain amplifier. The EV kit includes a MAX3523 installed EV board, as well as a micro-USB cable to communicate with a PC.

## Features

- Easy Evaluation of the MAX3523
- USB-3-Wire Serial Programmable Interface (SPI)
- PC, Laptop, or Tablet with Windows® 7 and 10 Compatible Software
- Proven PCB Layout
- Fully Assembled and Tested

## MAX3523 EV Kit Files

| FILE | DECRIPTION |
|---|---|
| MAX3523 Programmable Gain Amplifier EV Kit Software | Application program |

## Quick Start

### Required Equipment

- One power supply capable of supplying at least 1000 mA at +5V.
- One RF signal generator capable of delivering at least -10dBm of output power up to 204 MHz frequency.
- One RF spectrum analyzer capable of covering the operating frequency range of the device.
- One Windows PC with USB jack.
- 50Ω SMA cables, quantity = 2
- (Optional) One network analyzer to measure return loss.
- (Optional) One ammeter to measure supply current.
- MAX3523 EV kit GUI installation package: SetupPGA EvKit_5.X.XXXXXXXX.0_Win7.msi.

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



*319-100272; Rev 0; 10/18*

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## Procedure

### Software / Driver preparation

1) EV Kit GUI Installation: double-click SetupPGA_EvKit_5.X.XXXXXX.0_Win7.msi. After successful installation, DeviceStudio5.exe should be created at desktop.
2) USB driver installation: connect EV kit micro-USB port to Windows PC USB port. When first connecting the EV kit, Windows will automatically search/install the USB driver. It could take few minutes. In the rare case that Windows fails to find the driver, please contact Maxim support for assistant.
3) Check USB driver installation status: if Windows successfully installs the USB driver, a new device called “Teensy USB Serial” should appear in the Windows Device Manager (Figure 1).

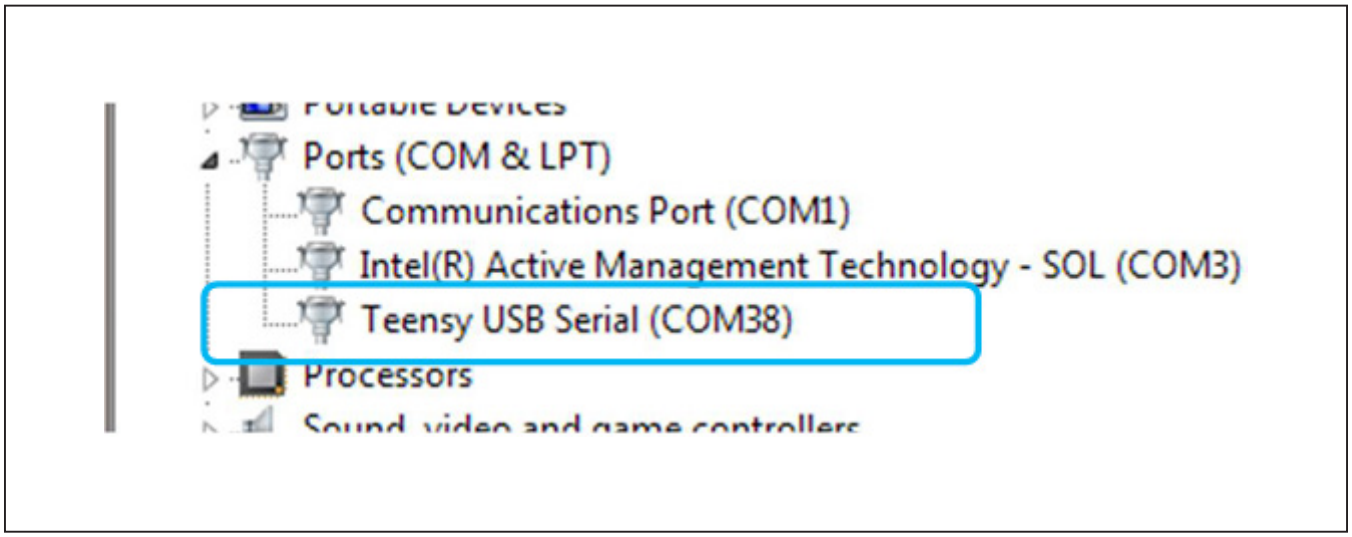



*Figure 1. USB Driver Installation Status*

4) Check GUI/EV Kit communication status: Launch DeviceStudio5.exe, and DeviceStudio will automatically search for the connected MAXIM EV kit. After few seconds, MAX3523 should appear in device list (Figure 2).

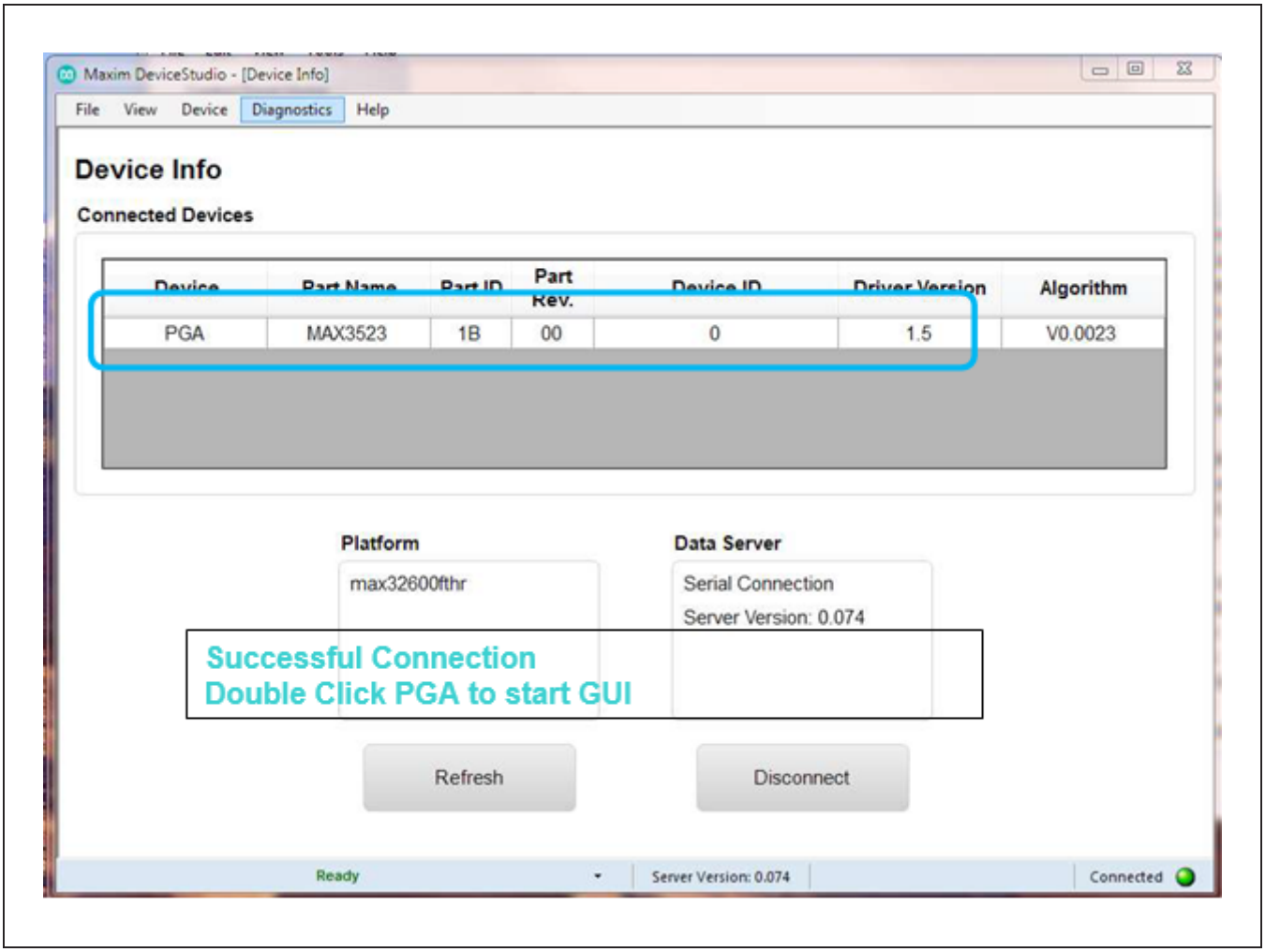



*Figure 2. MX3523 EV Kit GUI, Successful Connection*

5) In rare case DeviceStudio fails to find MAX3523 EV Kit, push the reset button (see Figure 4), hold for 2 seconds, and release. Then click the Scan button at DeviceStudio (see Figure 3).

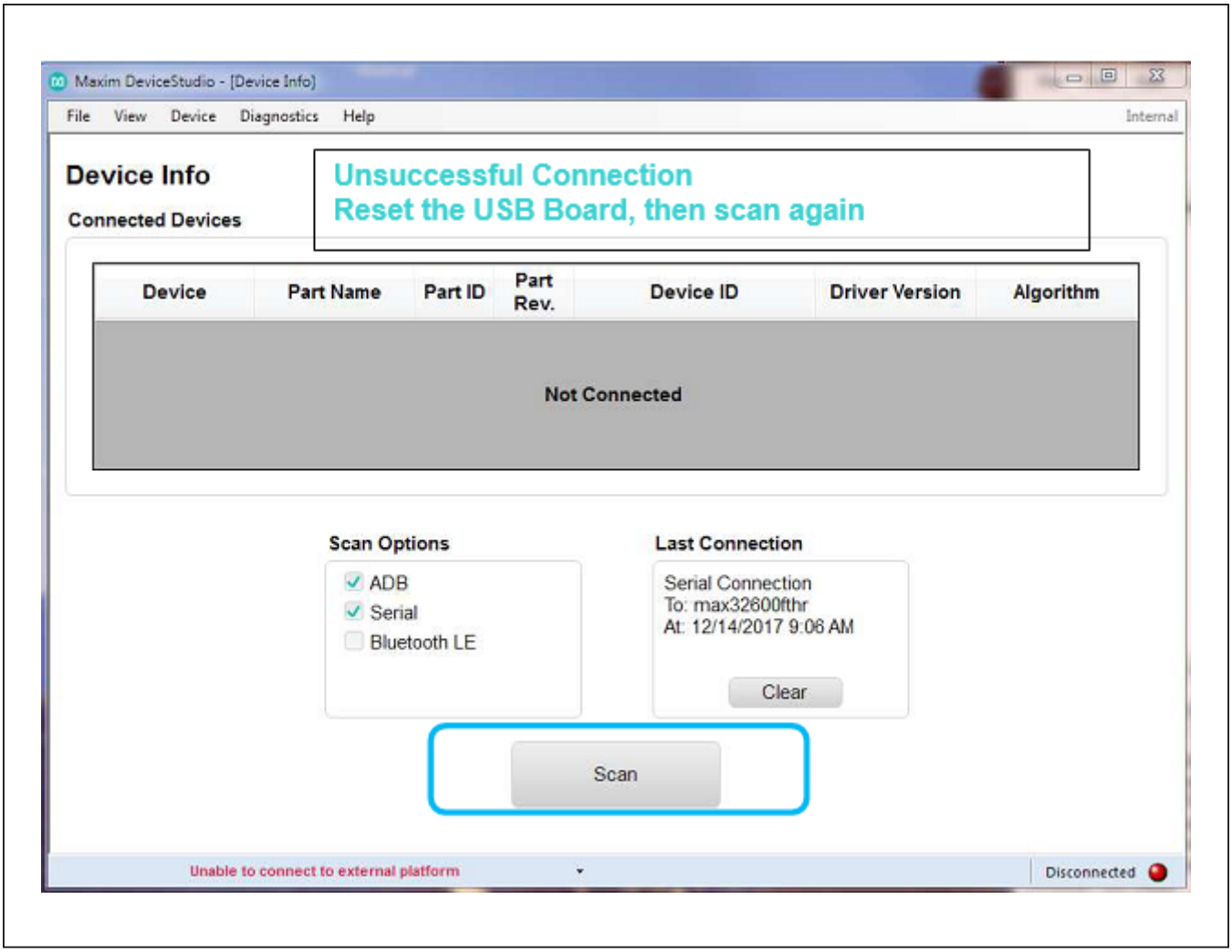



*Figure 3. MX3523 EV Kit GUI, Unsuccessful Connection*

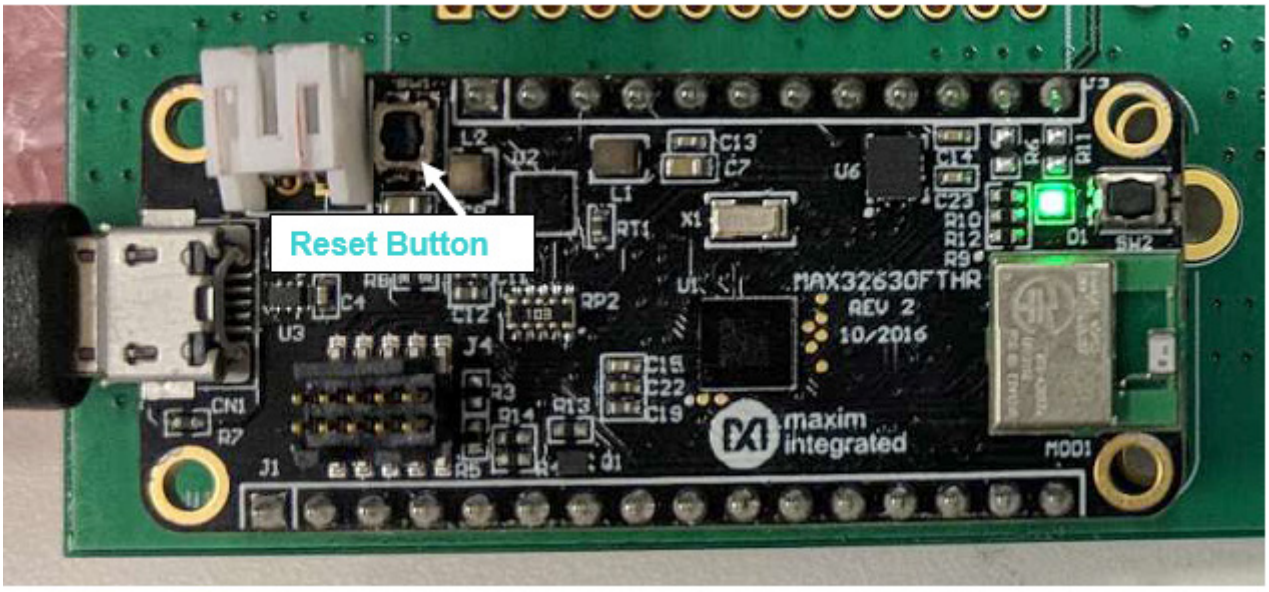



*Figure 4. MAX3523 EV Kit USB Communication*

**Setup Procedure:**

1) With its output disabled, set the DC power supply to +5V. If available, set the power supply's current limit to 1000mA. Connect the power supply to the +5V (through an ammeter if desired) and GND terminals on the EV kit, as shown in Figure 5.
2) With its output disabled, set the RF signal generator to 85MHz and a power level of -32.5dBm. Connect the signal generator to the SMA J1 RF IN on the evaluation board, as shown in Figure 5.
3) Connect the SMA labeled J2 RFOUT on the evaluation board to a spectrum analyzer and set spectrum analyzer center frequency to 85MHz.
4) Connect the EV kit's micro-USB port to the Windows PC USB port.
5) Turn on the +5V power supply.
6) If the EV kit GUI is currently running, close it and relaunch (DeviceStudio5.exe), after few seconds, the MAX3523 should appear in device list.
7) Double-click PGA section at DeviceStudio to launch MAX3523 GUI. (Figure 2)
8) MAX3523 GUI should be launched, as shown Figure 6. Click "set Default"
9) Toggle the TX_ENABLE switch at MAX3523 GUI. The MX3523 will be powered-up in default mode (GainCode = 63, PC = 3).
10) The supply current from the +5V supply should read approximately 700 mA. Be sure to adjust the power supply to account for any voltage drop across the power supply cable.
11) Enable the RF signal generator's output.
12) Check the output level on the spectrum analyzer. With -32.5dbm at input, the expected output power level is about 0 dBm, which implies the EV kit board gain is 32.5dB, correct it by adding 4.5dB (board loss, detailed explanation is below), the MAX3523 voltage gain is 37 (32.5 + 4.5)dB.

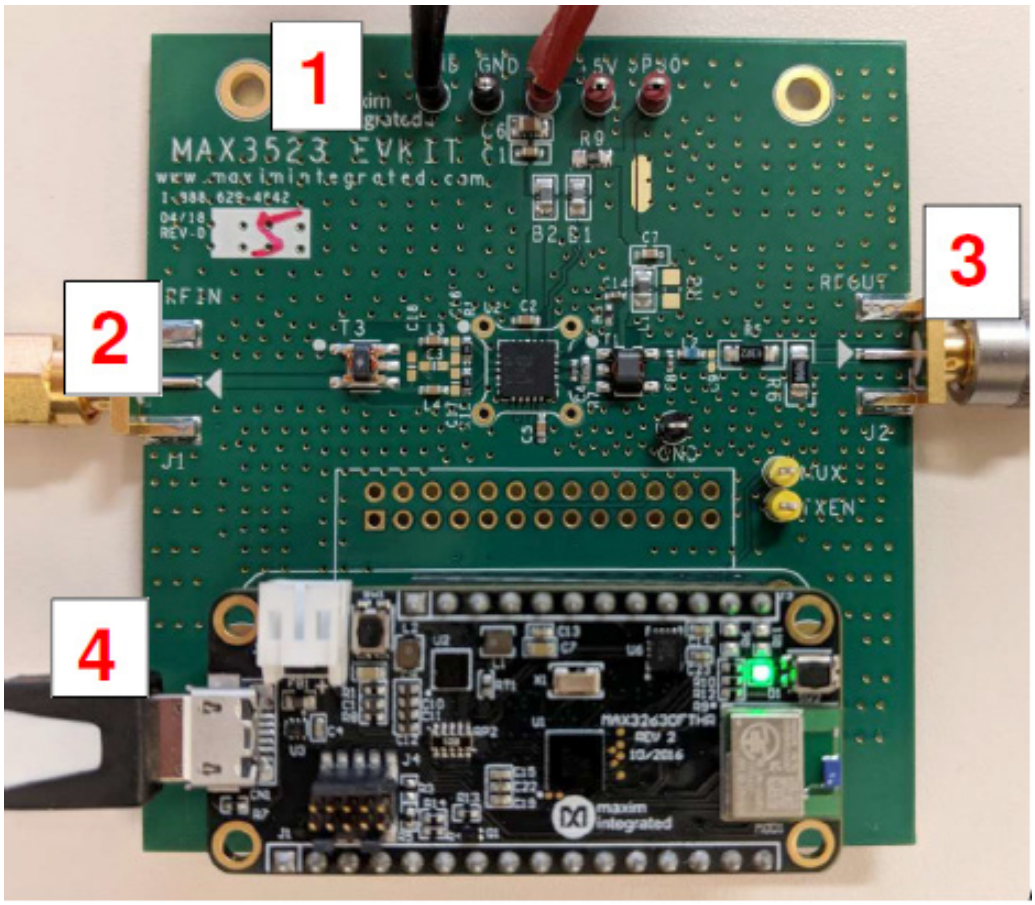



*Figure 5. MAX3523 EV Kit Connection*

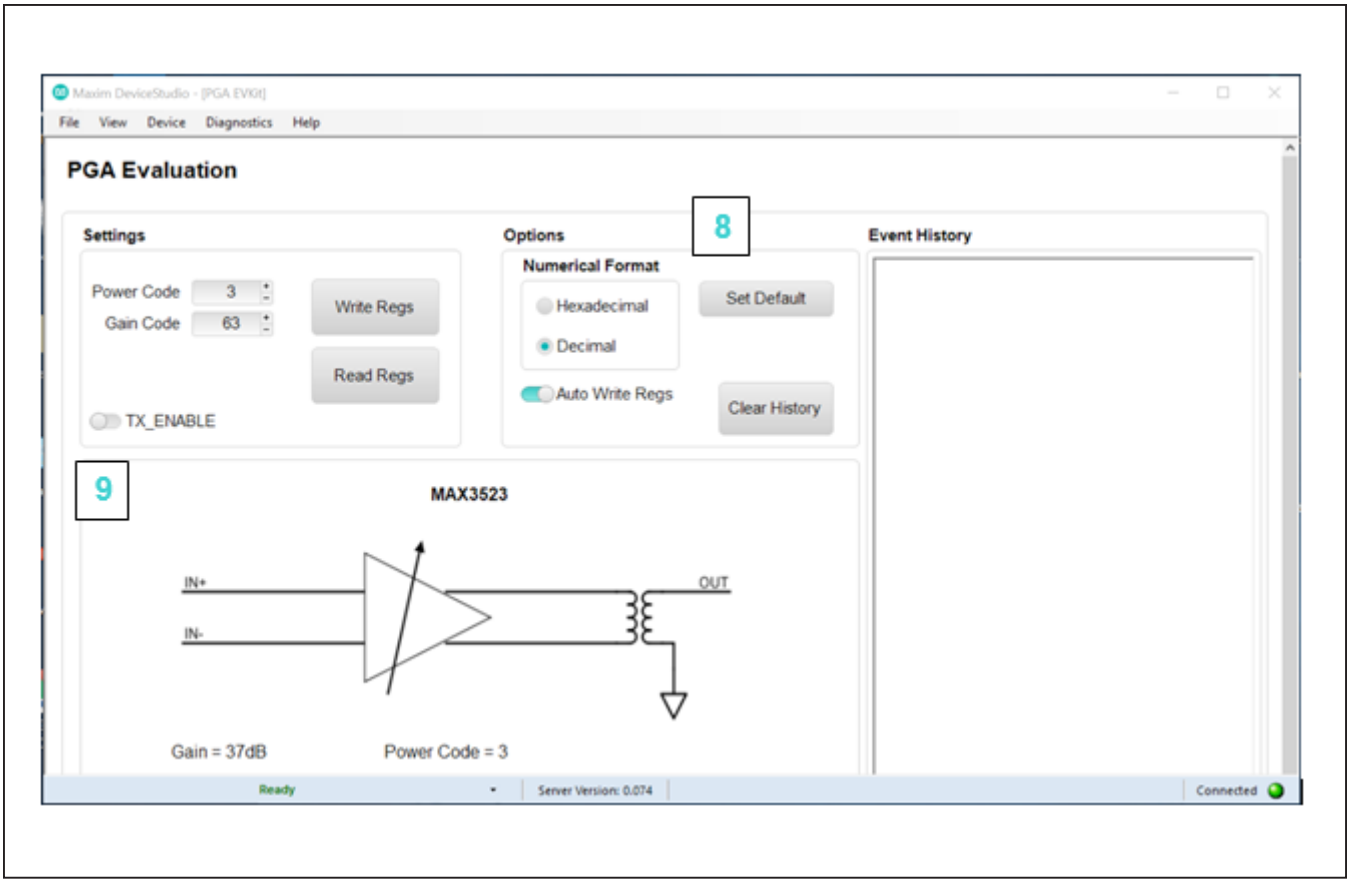



*Figure 6. MX3523 EV Kit GUI*

### Gain Correction factor explanation

Input balun T3 transforms the 50Ω test equipment impedance to 100Ω MAX3523 input impedance, with a voltage gain of 3dB.

Output minimum loss pad (R5/R6) transforms the 75Ω output impedance to 50Ω test equipment impedance, with a voltage "Gain" of -7.5dB.

MAX3523 Voltage Gain = VOUT @ last matching component (C9) – $V_{IN}$ @ MAX3523 In±

= (SMAOUT- MLP "gain") – (SMAIN + T3 Gain)

= (SMAOUT-SMAIN) - (-7.5) - 3

= EVK Gain + 4.5

## Component Suppliers

| SUPPLIER | WEBSITE |
|---|---|
| MURATA | https://www.murata.com/ |
| LAIRD | https://www.lairdtech.com/ |

***Note:*** *Indicate that you are using the MAX3523 when contacting these component suppliers.*

## Ordering Information

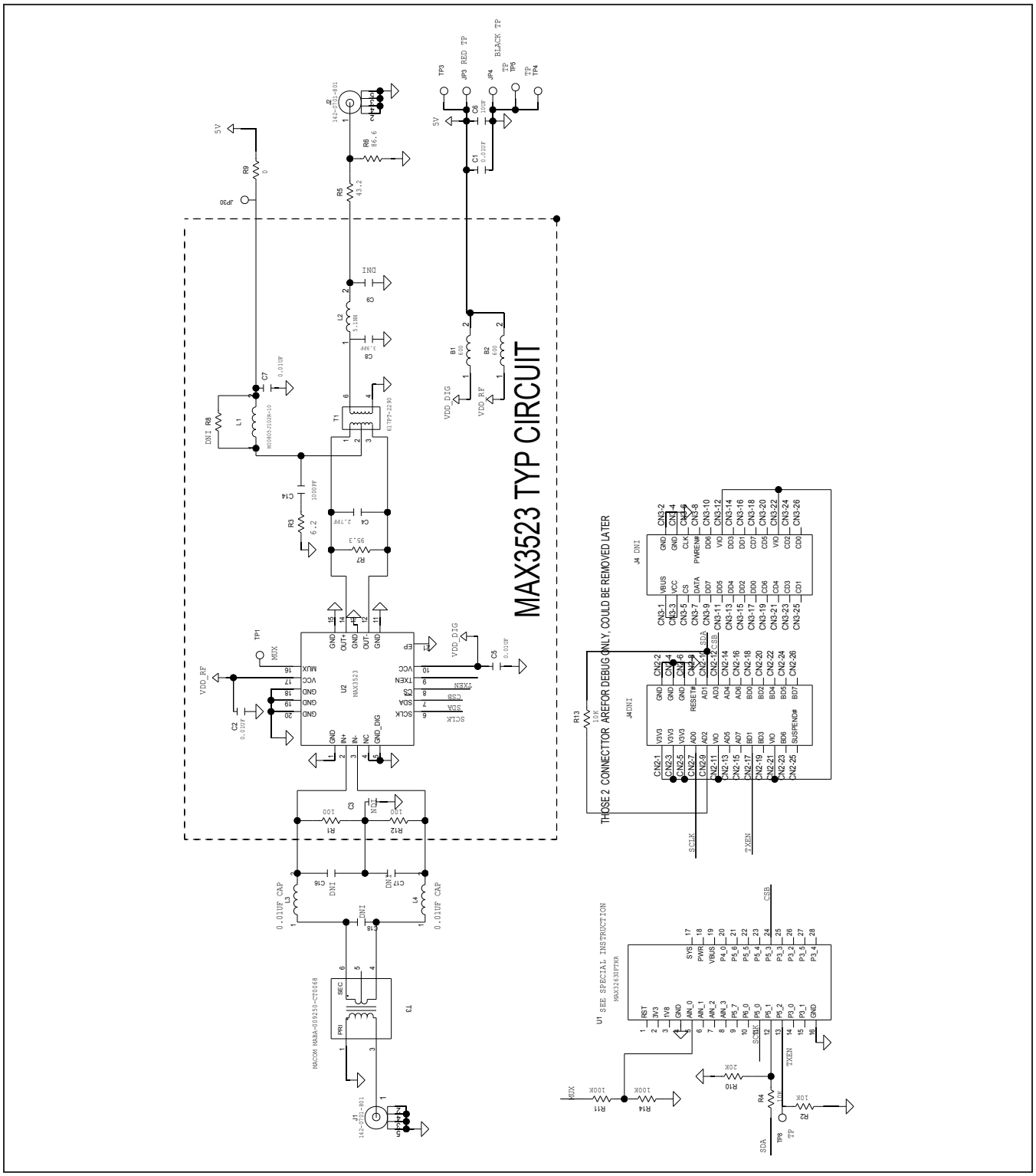
| PART | TYPE |
|---|---|
| MAX3523EVKIT# | EV Kit |

*#Denotes RoHS compliant.*

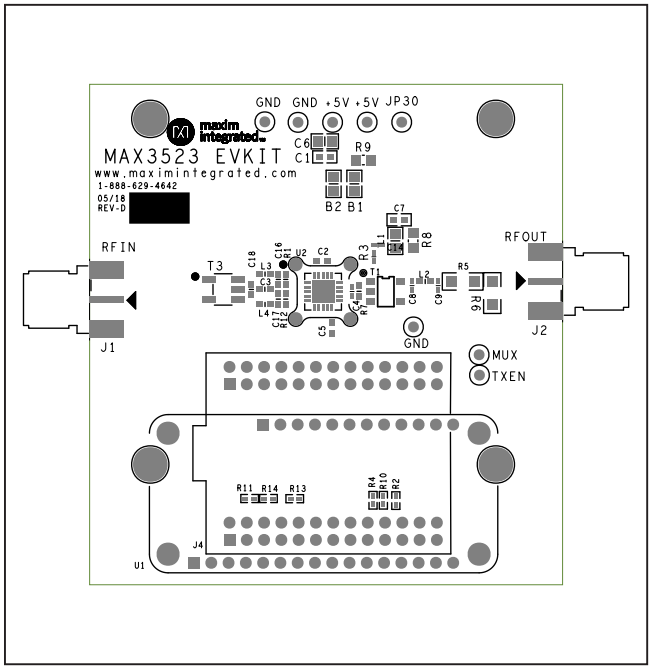
## MAX3523 EV Kit Bill of Materials

| COMPONENT | DESCRIPTION | VALUE / PART NUMBER | SUPPLIER |
|---|---|---|---|
| | Components in TYP operation Circuit | | |
| B1, B2 | FERRITE-BEAD, 600 | BLM21AG601SN1D | MURATA |
| C2, C5, C7 | CAPACITOR; SMT (0603) | 0.01 uF | |
| C4 | CAPACITOR; SMT (0402) | 2.7 pF | |
| C8 | CAPACITOR; SMT (0402) | 3.9 pF | |
| C14 | CAPACITOR; SMT (0402) | 1000pF | |
| L1 | FERRITE-BEAD, 1K | MI0805J102R-10 | LAIRD |
| L2 | INDUCTOR; SMT (0402) | 5.1 nH | |
| R1, R12 | RESISTOR; SMT (0603) | 100 Ohm | |
| R3 | RESISTOR; (0402) 1% | 6.2 Ohm | |
| R7 | RESISTOR; (0603) | 95.3 Ohm | |
| U2 | DOCSIS 3.1 PGA | MAX3523 | MAXIM |
| T1 | TRANSFORMER, Impedance ratio: 50:75 | 617PT-2290 | MURATA |
| | Components used only in this EV kit | | |
| R8 | Place holder | OPEN | |
| C3 | Place holder | OPEN | |
| C9 | Place holder | OPEN | |
| C1 | CAPACITOR; SMT (0603) | 0.01UF | |
| C6 | CAPACITOR; SMT (0805) | 10UF | |
| C16, C17 | Place holder | OPEN | |
| C18 | Place holder | OPEN | |
| J1, J2 | SMA | SMA | |
| JP3, TP3, JP30 | Test Point | Red Test Point | |
| JP4, TP4, TP5 | Test Point | Black Test Point | |
| L3, L4 | Place holder, AC coupling Cap | 0.01uF | |
| R2, R4, R13 | RESISTOR; 0402 | 10K | |
| R5 | RESISTOR; 1206<br>75-50 MLP | 43.2 | |
| R6 | RESISTOR; 1206<br>75-50 MLP | 86.6 | |
| R9 | RESISTOR; 0603 | 0 | |
| R10 | RESISTOR; 0402; | 20K | |
| R11, R14 | RESISTOR; 0402; | 100K | |
| T3 | TRANSFORMER, Impedance ratio: 50:100 | MABA-009250-CT0068 | |
| TP1, TP2, TP8 | Test Point | Yellow Test Point | |
| U1 | USB-SPI communication module | MAX32630FTHR | MAXIM |

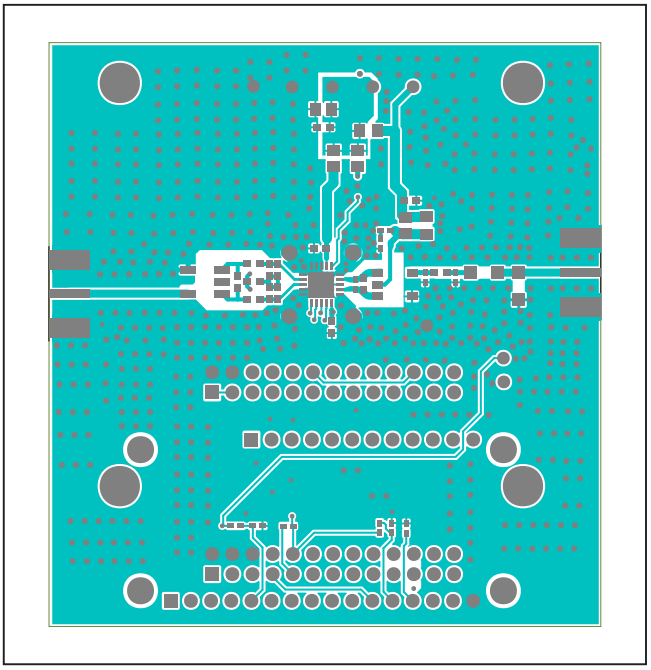
## MAX3523 EV Kit Schematic



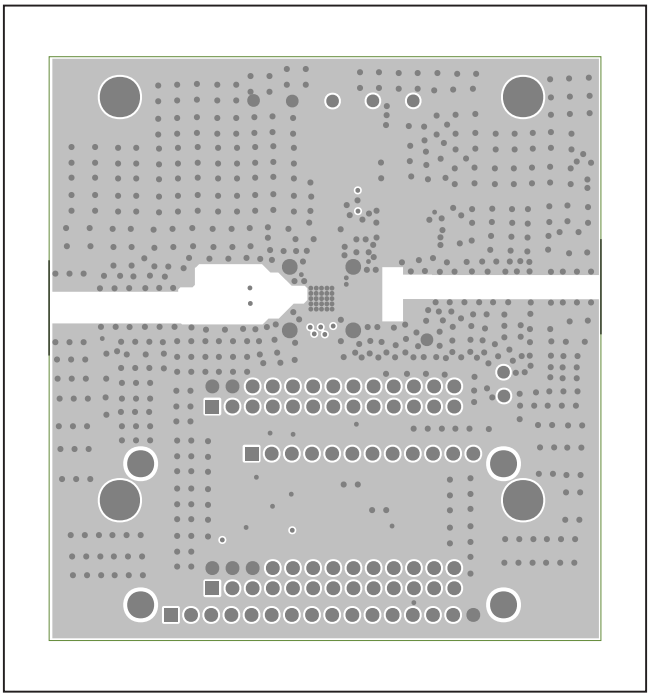
## MAX3523 EV Kit PCB Layout Diagrams




*MAX3523 EV Kit—Top Silkscreen*

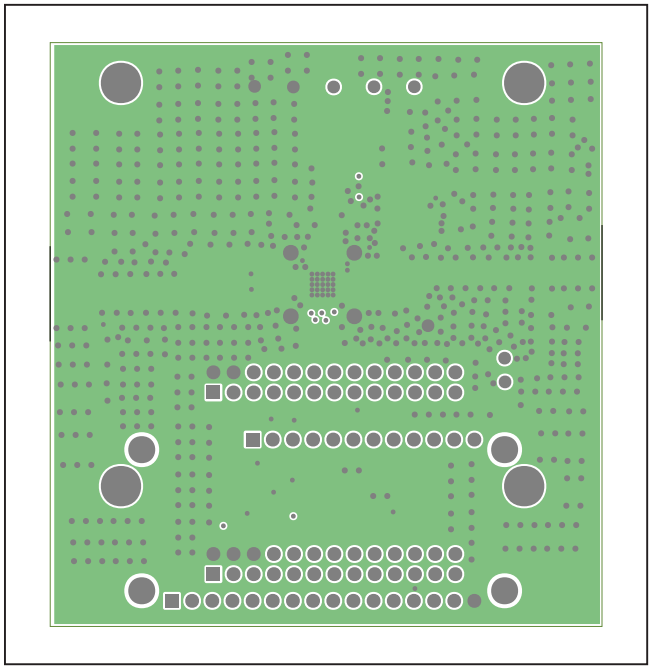


*MAX3523 EV Kit—Top*

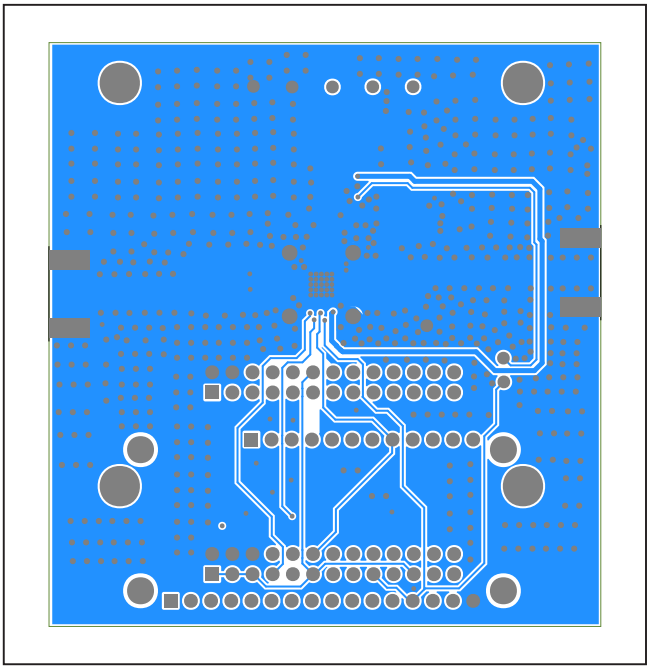


*MAX3523 EV Kit—Internal 2*

## MAX3523 EV Kit PCB Layout Diagrams (continued)



*MAX3523 EV Kit—Internal 3*



*MAX3523 EV Kit—Bottom*

## Revision History

| REVISION NUMBER | REVISION DATE | DESCRIPTION | PAGES CHANGED |
|---|---|---|---|
| 0 | 10/18 | Initial release | — |

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