

General Description

The MAX7037 evaluation kit (EV kit) is a fully assembled and tested PCB to evaluate the MAX7037 sub-1GHz, Ultra-Low-Power, RF ISM transceiver. The EV kit is connected to the PC through a Siam Kitty board. The EV kit gets power from the Siam Kitty board and runs from a minimum supply voltage of only 2.1V.

A particular EV kit will only work at a specific carrier frequency. The frequencies supported are: 315MHz, 434MHz, 868MHz, 902MHz, 915MHz, and 928MHz. EV kits are shipped configured for 315MHz operation. It is necessary to change the RF matching components to configure an EV kit to work at one of the other frequencies. Further details are provided in the [Changing EV Kit for Operation at Other Frequencies](#) section.

Note that, if an EV kit is used at a frequency other than that for which it is configured, it will likely either not work at all or display very poor performance. Ensure that both EV kits match the frequency for which they are configured.

Features

- Easy Evaluation of the MAX7037
- Proven PCB Layout
- Fully Assembled and Tested

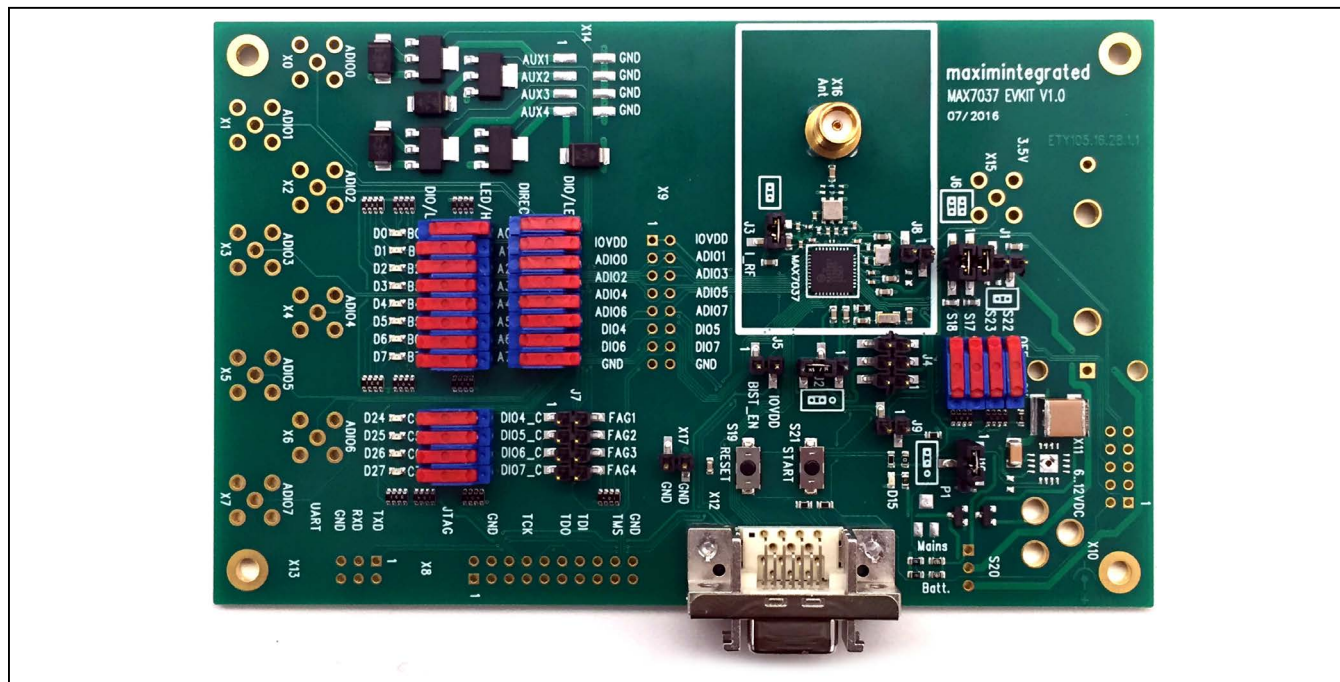
EV Kit Contents

- Assembled circuit board including MAX7037.
- Assembled Siam Kitty Board.
- 14 POS Mini D Ribbon (MDR) Cable
- A Male-to-Micro B Male USB Cable

Note: For testing the MAX7037 EV kit, two sets of above-mentioned packages of EV kits are required; one used as a transmitter and one as a receiver.

[Ordering Information](#) appears at end of data sheet.

MAX7037 EV Kit Board Photo



Quick Start

Required Equipment and Accessories

- One PC or laptop
- Two A Male-to-Micro-B male USB cables
- Two 14 POS Mini-D Ribbon (MDR) cables
- One SMA cable and several attenuators, total 60dB
- Two MAX7037 EV kits
- Two Siam Kitty boards

Jumper Configurations

Shunt J2, J3, J6, J10. J2 has three pins. The two that are shunted are the ones indicated as shunted on the silkscreen of the EV kit ([Figure 1](#), they are the left-most two pins). J10 also has three pins. The two that are shunted are the ones indicated as shunted on the silkscreen of the EV kit (top-most two pins in [Figure 1](#)). Any jumpers or headers not mentioned here should be left unshorted. [Figure 1](#) shows the location of these jumpers.

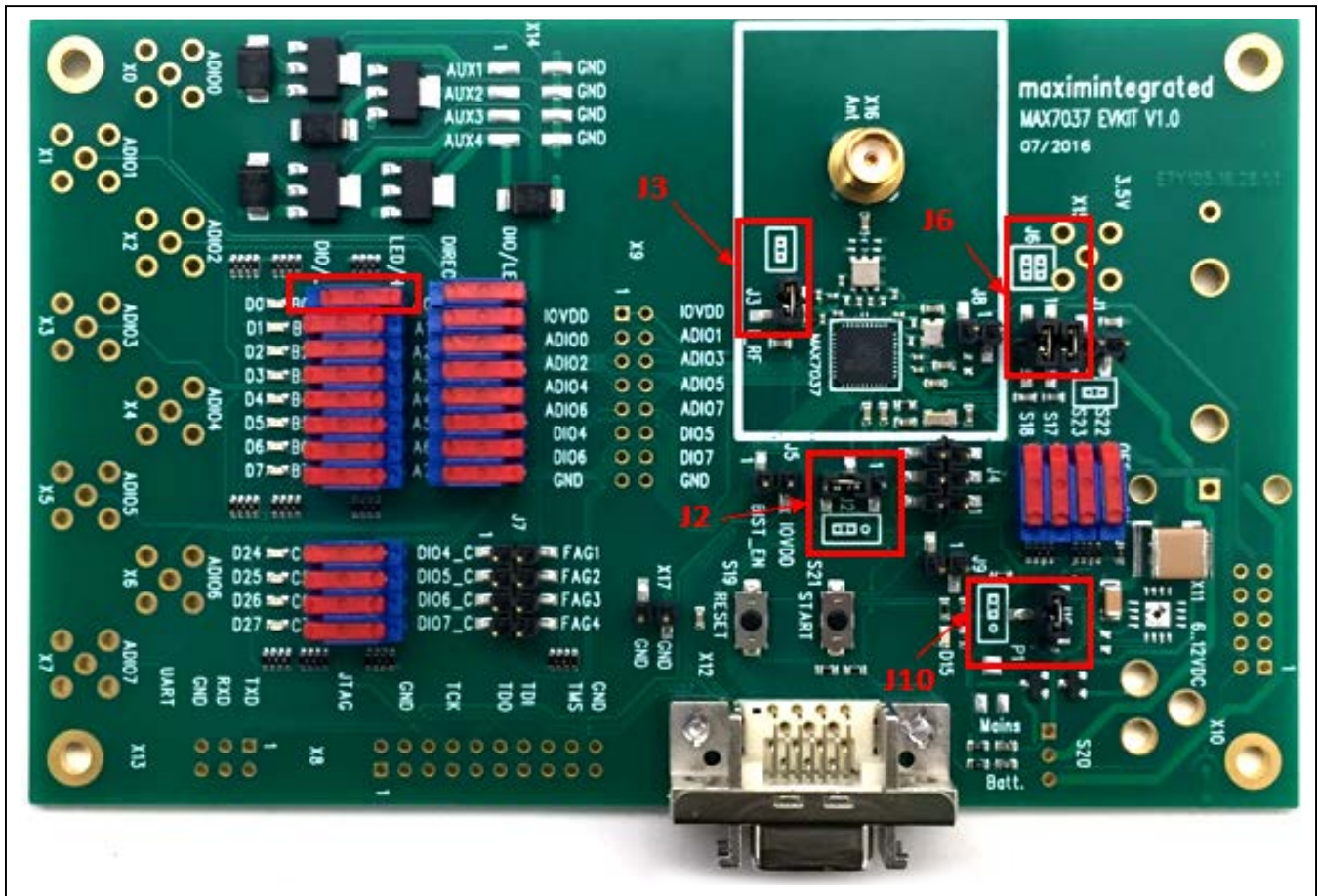


Figure 1. MAX7037 EV Kit Photo Jumpers Location

DIP Switch Settings

Four DIP switches on the EV kit should be configured as described below:

- The four-switch DIP labeled S22, S23, S17, and S18 should all be slid to the upper position, as displayed in [Figure 1](#).
- The four-switch DIP labelled DIO4–DIO7 should all be slid to the left position, as shown in [Figure 1](#).
- The 8-switch DIP labelled IOVDD, ADI00–ADI02, ADI04, ADI06, DI04, DI06, and GND should all be slid to the right position, as shown in [Figure 1](#).
- The 8-switch DIP labelled A0 – A7 should have all but the top-most switch slid to the left, as shown in [Figure 1](#). The top switch of this particular DIP (i.e., the A0 switch) should be slid to the right.

Installing the Host Software

The host software is used to download the firmware to the MAX7037 IC.

Download the *MAX7037host.exe* file from [Maxim](#).

- 1) Save the file to whatever working folder you wish. Note the location of the folder and make sure that the Siam Kitty Board is unplugged during install.
- 2) Download the FTDI drivers from [Maxim](#).
- 3) Extract the drivers and install.
- 4) Connect the first Siam Kitty board to a USB port of the computer and wait at least 30 seconds. If the drivers are installed correctly, the yellow LED in the Siam Kitty board should be illuminated.
- 5) Open a DOS command window and navigate to the directory where the host software is located. For example, if it is in C:\myfolder\MAX7037, then issue the command "cd C:\myfolder\MAX7037".
- 6) In the command window, type "*MAX7037host.exe*" and hit enter. You should see all the options of the command line tool and their descriptions. Type "*MAX7037host.exe -scan*" and hit "Enter". If the device is connected, at the bottom of the screen you will see a line containing the serial number of the first Siam Kitty board, for example "**Device 0: SKZ8TKQZA**". Note the serial number obtained with the scan operation (e.g., "**SKZ8TKQZA**"), and designate this Siam Kitty board as the transmitter.
- 7) Connect the second Siam Kitty board to the same computer and wait at least 30 seconds. Type "*MAX7037host.exe -scan*" and hit enter. If both Siam Kitty boards are connected, you will see a screen that shows two lines containing the serial number of the first and second Siam Kitty boards, for example "**Device 0: SKZ8TKQZA**" and "**Device 1:**

SKZ8TN4TA". Note the serial number of the **Device 1** obtained with scan operation (e.g., "**SKZ8TN4TA**") and designate the second Siam Kitty board as the receiver.

Connections

- 1) Connect the first MAX7037 EV kit, X12 connector, to the first Siam Kitty board (i.e., SKZ8TKQZA) through a Mini-D Ribbon (MDR) cable and consider it to be the transmitter. The power for the EV kit is provided by the Siam Kitty board.
- 2) Connect the second MAX7037 EV kit to the second Siam Kitty Board (i.e., SKZ8TN4TA) and consider it as the receiver.
- 3) Connect an SMA Cable to the Ant SMA connector (X16) of the EV kit designated as the transmitter. Then connect 60dB of attenuation at the other end of the SMA Cable and connect it to the Ant SMA connector (X16) of the EV kit designated as the receiver.

Downloading Firmware

- 1) Download the *MAX7037_FW_V1.0.hex* firmware binary file from [Maxim](#) to the same folder the *MAX7037host.exe* file was downloaded.
- 2) To program *MAX7037_FW_V1.0.hex* to the MAX7037 IC of the transmitter EV kit, type the command "*MAX7037host.exe -sn SKZ8TKQZA -wprg MAX7037_FW_V1.0.hex*" into the command line interface, then hit "Enter". Note that this is an example. Replace the serial number with the one obtained with the scan operation.
- 3) To program *MAX7037_FW_V1.0.hex* to MAX7037 IC of the receiver EV kit, type the command "*MAX7037host.exe -sn SKZ8TN4TA -wprg MAX7037_FW_V1.0.hex*" into the command line interface, then hit "Enter". Note that this is an example. Replace the serial number with the one obtained with the scan operation.

Downloading TeraTerm Program

This program can be downloaded for free from the [TeraTerm Homepage](#). Since it is known that TeraTerm works well with no issues, it is recommended for use with the MAX7037 EV kit.

- 1) Start TeraTerm. A dialog box will be opened along with a terminal window. Click on the Serial button. Then, click on the pull down menu for Port. At this point, you have to select which COM port to use. Typically, the only way to find this out is by trial-and-error; that is, select each port in turn and see if it works. Once the port is known, it will not change, so it should just be noted. Then, on subsequent startups, you can just directly select the known COM

port.

As an example, if COM1 is the first COM port indicated by the TeraTerm New Connection dialog box, select this, and click "OK". Then, in the terminal window, select Setup -> Serial Port... Click on Baud rate, and select 38400. All other serial port parameters should remain as default. The default settings are Data = 8 bit, Parity = none, Stop = 1 bit, Flow Control = none. Click on "OK".

Note: *An important point is that the serial link only operates correctly at a baud rate of 38400 bits per second.*

- 2) Press the RESET button on the transmitter EV kit and see if the following command prompt appears in the terminal window: **"Welcome to 7037 command line interface, type 'help' for available commands"**. If no text appears, then the correct COM port is not selected, and you have to repeat the procedure with the next COM port in the list. Select Setup -> Serial Port..., then select the next COM port in the Serial Port Setup window. Click OK, then press the EV kit's RESET button. Once you have found the correct COM port, the command prompt will appear.

Note: *When starting up the terminal display, it is common to forget to configure the Baud rate (defaults to 9600bps). In this case, when you press the EV kit RESET button, some strange characters will be printed to the display.*
- 3) Repeat the whole procedure to find and configure the COM port of the receiver EV kit. Open a second TeraTerm display, and find which COM port it is connected to.
- 4) In the typical usage case, where two EV kits are connected to the same PC, and where one EV kit is designated the transmitter and the other the receiver, it is recommended to put a label on the transmitter and receiver EV kits indicating which is the transmitter and which is the receiver. Make a note of which COM port number corresponds to the transmitter and which to the receiver. Position the two terminal windows on the PC display with transmitter on left and receiver on right just so as to be able to keep track of which is which. It is also possible to change the text at the top of the terminal window to indicate the transmitter or receiver. Select Setup -> Window and type the desired header text into the Title field.

Procedure

The EV kit is configured and controlled via the serial communication port of the MAX7037. The details of the commands are contained in the MAX7037 data sheet, *Communication* section. Refer to that document for detailed information.

- 1) Configure the transmitter EV kit to the desired mode, e.g., FSK, 315MHz, 31.25Kbps operation:

On the transmitter terminal window, type the command: **>>config_tx_radio 3**, then press Enter. Note that the value of 3 is specifically for FSK, 315MHz, 31.25Kbps operation. If using a different configuration, use the corresponding parameter value as described in the MAX7037 data sheet.
 - 2) Configure the receiver EV kit to the same mode as transmitter:

On the receiver terminal window, type the command: **>>config_rx_radio 3**, then hit enter. Note that the value of 3 is specifically for FSK, 315 MHz, 31.25 Kbps operation. If using a different configuration, use the corresponding parameter value as described in the MAX7037 data sheet.
 - 3) Load the packet to be used in the test to the transmitter EV kit:

On the transmitter terminal window, type the command: **>>write_tx_pkt 3**, then press Enter.

Load the packet to be used in the test to the receiver EV kit:

On the receiver terminal window, type the command: **>>write_rx_pkt 3**, then press Enter.
- Reset the BER value of the receiver EV kit:

On the receiver terminal window, type the command: **>>reset_ber**, then press Enter.

Enable BER measurement at the receiver EV kit:

On the receiver terminal window, type the command: **>>ber_enable**, then press Enter.

- 4) Set the interval of the transmitter EV kit:

On the transmitter terminal window, type the command: **>>tx_interval 20**, then press Enter.
- 5) Configure transmitter EV kit to transmit the packet continuously:

On the transmitter terminal window, type the command: **>>send_pkt 0**, then hit enter. Once you press **Enter**, the **D0 LED** (located beside the A0 switch of the 8-switch DIP labelled A0 - A7) on the transmitter EV kit will start blinking.

- 6) Configure receiver EV kit to receive packets:
On the receiver terminal window, type the command: **>>rx_pkt_start**, then hit enter. Once you press Enter, the **D0 LED** on the receiver EV kit also will start blinking.
- 7) Run the test until at least 100,000 bits have been received. For this purpose, the test should be run for at least 42 seconds. You can monitor the current Bit Error Rate (BER) value, and how many bits have been transmitted, by issuing command **>>read_ber**, on the receiver terminal window. When you type the command, you may not see the command on the terminal window. In such a case, type the command and press Enter. If you mistype, you will receive the “**not a valid cmd**”, then, retype the command and press Enter.
- 8) After 100,000 bits have been received, stop transmission at transmitter EV kit:
On the transmitter terminal window, type the command: **>>q**, then press Enter. Once you press Enter, the **D0 LEDs** on the transmitter and receiver EV kits will stop blinking.
- 9) Stop reception at receiver EV kit:
On the receiver terminal window, type the command: **>>rx_pkt_stop**, then press Enter. The numerator of the BER value should be 0.
- 10) Reset both EV kits by pressing the RESET button on the EV kit.
- 11) Swap the role of transmit and receive EV kits by designating the transmitter terminal window as receiver and vice versa. Then repeat the above procedure from step 1.

Note that this procedure is testing two EV kits at a time. In the first pass, the transmit functionality of one EV kit and the receive functionality of the other EV kit is being tested. In the second pass, the roles of transmitter and receiver are reversed. This two-pass procedure provides test coverage of both transmit and receive functionality of both EV kits.

Changing EV Kit for Operation at Other Frequencies

In order to change the operating frequency of an EV kit, it is necessary to install the correct RF matching components between the IC and the antenna SMA connector. EV kits are shipped from Maxim with the components corresponding to the 315MHz frequency. Refer to [Table 1](#) to determine how to modify the RF front-end circuitry to allow operation at other frequencies.

Table 1. RF Matching Components

RF MATCHING COMPONENTS TO CONFIGURE AN EV KIT TO WORK AT ONE OF THE BELOW FREQUENCIES						
FREQUENCY (MHz)	C33	L1	F11	L2/L3	C30/C31	L4
315	Not Loaded	68nH	B3741	33nH	220pF	120nH
434	Not Loaded	47nH	B3743	27nH	220pF	100nH
868	2.7pF	22nH	B3744	8.2nH	8.2pF	100nH
902/915/928	Not Loaded	0Ω Resistor	B3588	7.5nH	1.9pF	100nH

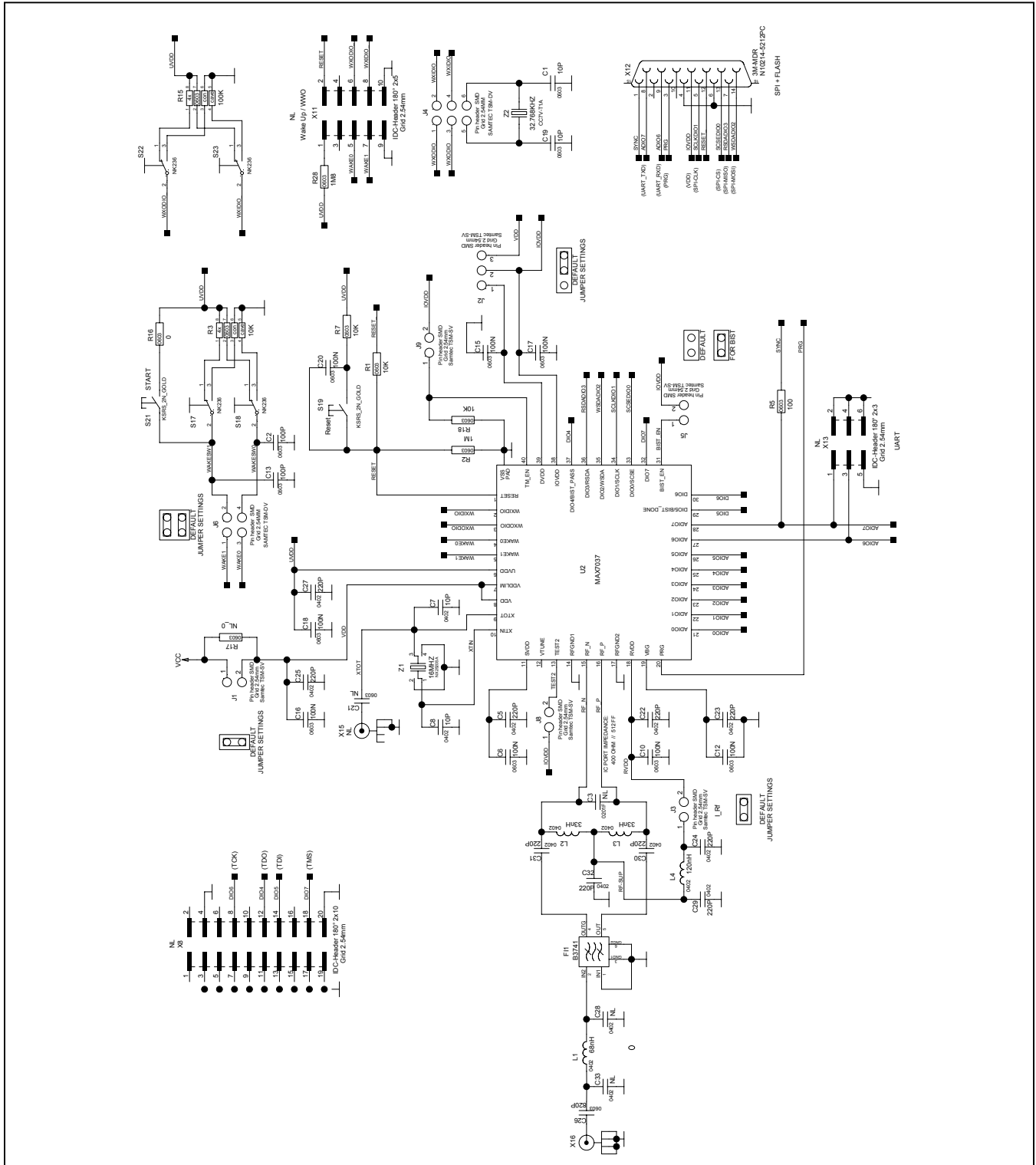
Component Suppliers

SUPPLIER	WEBSITE
Murata	http://www.murata.com/
TDK	http://www.tdk.com/
Taiyo Yuden	http://www.t-yuden.com/
Vishay	http://www.vishay.com/
Lite-On Inc.	http://www.us.liteon.com/
Diodes Incorporated	http://www.diodes.com/
Broadcom Limited (Avago)	http://www.avagotech.com/
EPCOS (TDK)	http://en.tdk.eu/
Samtec Inc.	https://www.samtec.com/
Apem Inc.	http://www.apem.com/
C&K Component	http://www.ck-components.com/
3M	http://www.3m.com/
Johnson	http://www.cinch.com/
NDK	http://www.ndk.com/
TXC Corporation	http://www.txccrystal.com/

MAX7037 EV Kit Bill of Materials

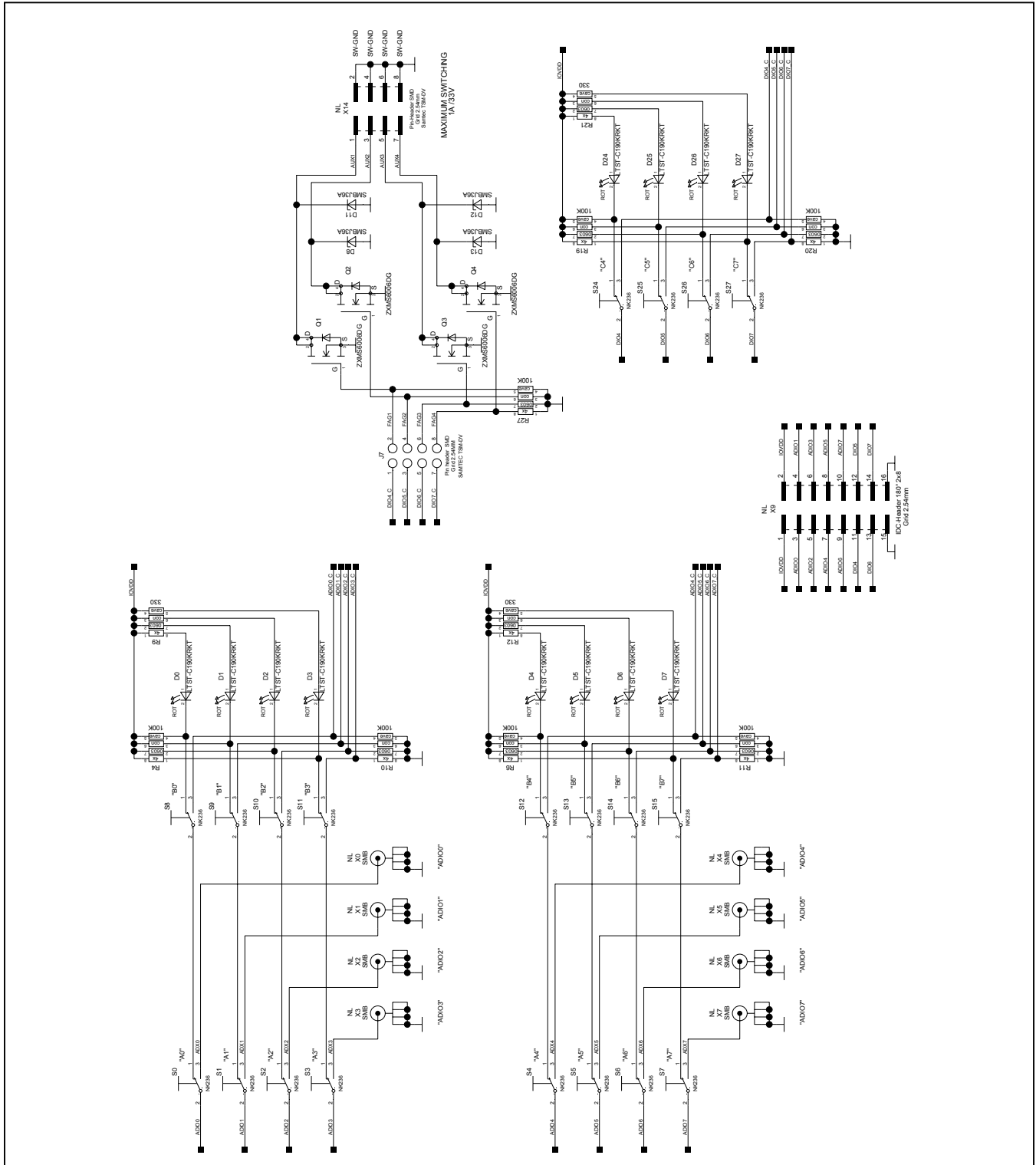
ITEM	REFDES	QTY	PARTDECAL	VALUE	MURATA	PART NUMBER	DESCRIPTION
1	C1, C19	2	SMD_0603	10P	Murata	GRM1885C1H100J	10pF ±5%, 0603 Ceramic Capacitor
2	C2, C13	2	SMD_0603	100P	---	GRM1885C1H101J	100pF ±5%, 0603 Ceramic Capacitor
3	C3	1	SMD_0201F	Do not install	Murata	---	---
4	C4, C6, C10, C12, C15-C18, C20	9	SMD_0603	100N	Murata	GRM188R71C104K	0.1µF ±10%, 0603 Ceramic Capacitor
5	C5, C22-C25, C27, C29-C32	10	SMD_0402	220P	Murata	GRM155R71H221K	220pF ±10%, 0402 Ceramic capacitor
6	C7, C8	2	SMD_0402	10P	---	GRM1555C1H100J	10pF ±5%, 0402 Ceramic capacitor
7	C9, C21	2	SMD_0603	Do not install	Murata	---	---
8	C11	1	SMD_1206	22U(6V3)X7R	TK Corporation	GRM31CR70J226K	22µF ±10%, 1206 Ceramic capacitor
9	C14	1	SMD_2220	47U(25V)	Murata	C5750Y5V1E476Z	47µF, 2220 Ceramic capacitor
10	C26	1	SMD_0603	820P	---	GRM188R71H821K	820pF ±10%, 0603 Ceramic capacitor
11	C28, C33	2	SMD_0402	Do not install	Lite-On Inc	---	---
12	D0-D7, D24-D27	12	OLS_0603	LTST-C190KRKT	Vishay Semiconductor Diodes Division	LTST-C190KRKT	SMD Red LED, 0402 Lamp
13	D8, D11-D13	4	DO-214AA	SMBJ36A	Diodes Incorporated	SMBJ36A-E3/62	SMBJ36A TVS Diode
14	D9, D10	2	SOT23	BAS16	Avago Technologies US Inc	BAS16-7-F	BAS16 Diode
15	D15	1	OLS_0603	HSMG-C190	Epcos/TDK	HSMG-C190	Green LED, 0603
16	F11	1	FIS_DCC8E	B3741	Samtec Inc	B39321B3741H110	315.00MHz SAW Filter, SMD
17	J1, J3, J5, J8-J9	5	XHTSM1_2V	2 Positions Header	Samtec Inc	TSM-102-01-L-SV-TR	2 Positions Header, Unshrouded Connector
18	J2, J10	2	XHTSM1_3V	3 Positions Header	Samtec Inc	TSM-103-01-T-SV-TR	3 Positions Header, Unshrouded Connector
19	J4	1	XHTSM2_3V	6 Positions Header	Samtec Inc	TSM-103-01-T-DV-TR	6 Positions Header, Unshrouded Connector
20	J6	1	XHTSM2_2V	4 Positions Header	Samtec Inc	TSM-102-01-T-DV-P-TR	4 Positions Header, Unshrouded Connector
21	J7	1	XHTSM2_4V	8 Positions Header	Murata	TSM-104-01-L-DV-AM-TR	8 Positions Header, Unshrouded Connector
22	L1	1	SMD_0402	68NH, LQM15AN	Taiyo Yuden	LQM15AN68NG00D	68nH ±2%, 0402 Inductor
23	L2-L3	2	SMD_0402	33NH, HK1005	Taiyo Yuden	HK100533NJ-T	33nH ±5%, 0402 Inductor
24	L4	1	SMD_0402	120NH, HK1005	---	HK1005R12J-T	120nH ±5%, 0402 Inductor
25	P1	1	PS23A	Do not install	Diodes Incorporated	---	---
26	Q1-Q4	4	SOT223	ZXMS6006DGT	Vishay Dale	ZXMS6006DGT	MOSFET N-CH 60V SOT223
27	R1, R7, R18	3	SMD_0603	10K	Vishay Dale	CRCW060310K0FKEA	10K0 ±1%, 0603 Resistor
28	R2	1	SMD_0603	1M	Vishay Dale	CRCW06031M00FKEA	1M0K ±1%, 0603 Resistor
29	R3	1	RSA4V0603	10K	Vishay Dale	CRA06P08310K00TA	10K0 ±5%, 1206 Resistor, 8 pins
30	R4, R6, R10-R11, R15, R19-R20, R27	8	RSA4V0603	100K	Vishay Dale	CRA06P083100KJTA	100K0 ±5%, 1206 Resistor, 8 pins
31	R5	1	SMD_0603	100	Vishay Dale	CRCW0603100RFKEA	100Q ±1%, 0603 Resistor
32	R8	1	SMD_0603	270	Vishay Dale	CRCW0603270RFKEA	270Q ±1%, 0603 Resistor
33	R9, R12, R21	3	RSA4V0603	330	Vishay Dale	CRA06P083330J0TA	330Q ±5%, 1206 Resistor, 8 pins
34	R13, R26	2	SMD_0603	33K	Vishay Dale	CRCW060333K0FKEA	33KQ ±1%, 0603 Resistor
35	R14, R25	2	SMD_0603	56K	Vishay Dale	CRCW060356K0FKEA	56KQ ±1%, 0603 Resistor
36	R16	1	SMD_0603	0	---	CRCW0603000Z0EA	0Q Jumper, 0603 Resistor
37	R17	1	SMD_0603	Do not install	Vishay Dale	---	---
38	R28	1	SMD_0603	1M8	Apem Inc	CRCW06031M80FKEA	1.8MQ ±1%, 0603 Resistor
39	S0-S15, S17-S18, S22-S27	24	SW_NK236	NK236	C&K Components	NK236	Slide Switch SPDT Through Hole
40	S19, S21	2	STS_KSR2	KSR2_2N_GOLD	---	KSR211GLFS	Tactile Switch SPST-NO Top Actuated Surface Mount
41	S20	1	SW_AS1LD	Do not install	Maxim	---	---
42	U1	1	QFN16_8_PM05	Do not install	Maxim	---	---
43	U2	1	QFN40_PM18	MAX7037EGL+	---	MAX7037EGL+	Sub-1 GHz Ultra Low Power RF ISM Transceiver
44	VB1	1	VBW_108	Do not install	---	---	---
45	X0-X11, X13-X15	15	---	Do not install	3M	---	---
46	X12	1	XMDR-N10214_12	N10214-5212PC	Johnson	N10214-5212PC	14 Position Receptacle Connector Panel Mount, Through Hole, Right Angle Solder
47	X16	1	XSWA_5	142-0701-201	Samtec Inc	142-0701-201	SMA Jack Assembly, straight Mount
48	X17	1	XHTSM1_2V	2 Positions Header	NDK	TSM-102-01-L-SV-TR	2 Positions Header, Unshrouded Connector 0.100
49	Z1	1	Q_NX2520SA	16MHZ	TXC Corporation	NX2520SA-16.000000MHZ	16MHz ±10ppm Crystal 10pF 80 Ohm
50	Z2	1	Q_CC7V	32.768KHZ	---	9HT10-32.768KEZF-T	32.768KHz ±10ppm Crystal 12.5pF 70 kOhm

MAX7037 EV Kit Schematics



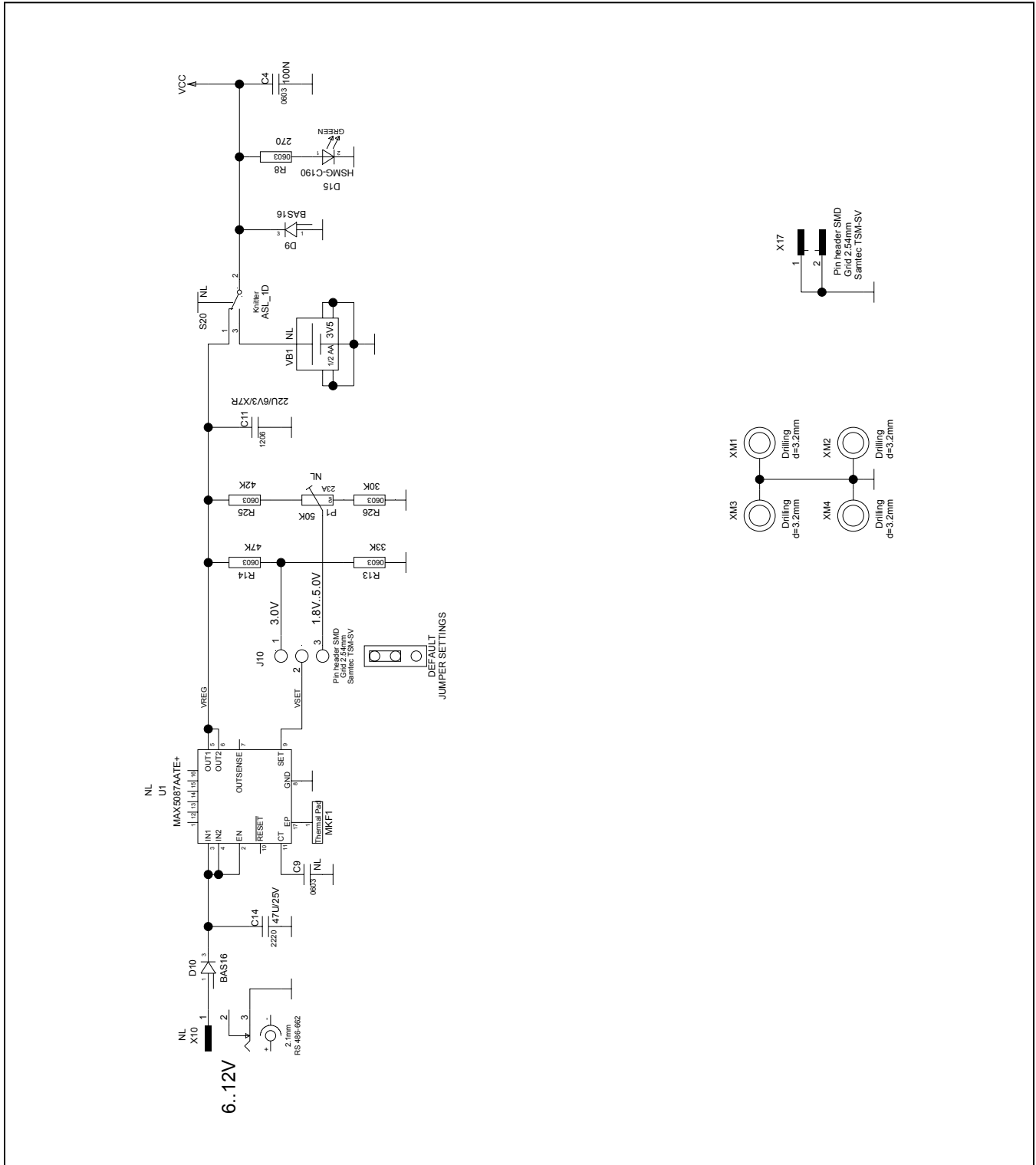
MAX7037 EV Kit Schematic (Page 1/3)

MAX7037 EV Kit Schematics (continued)



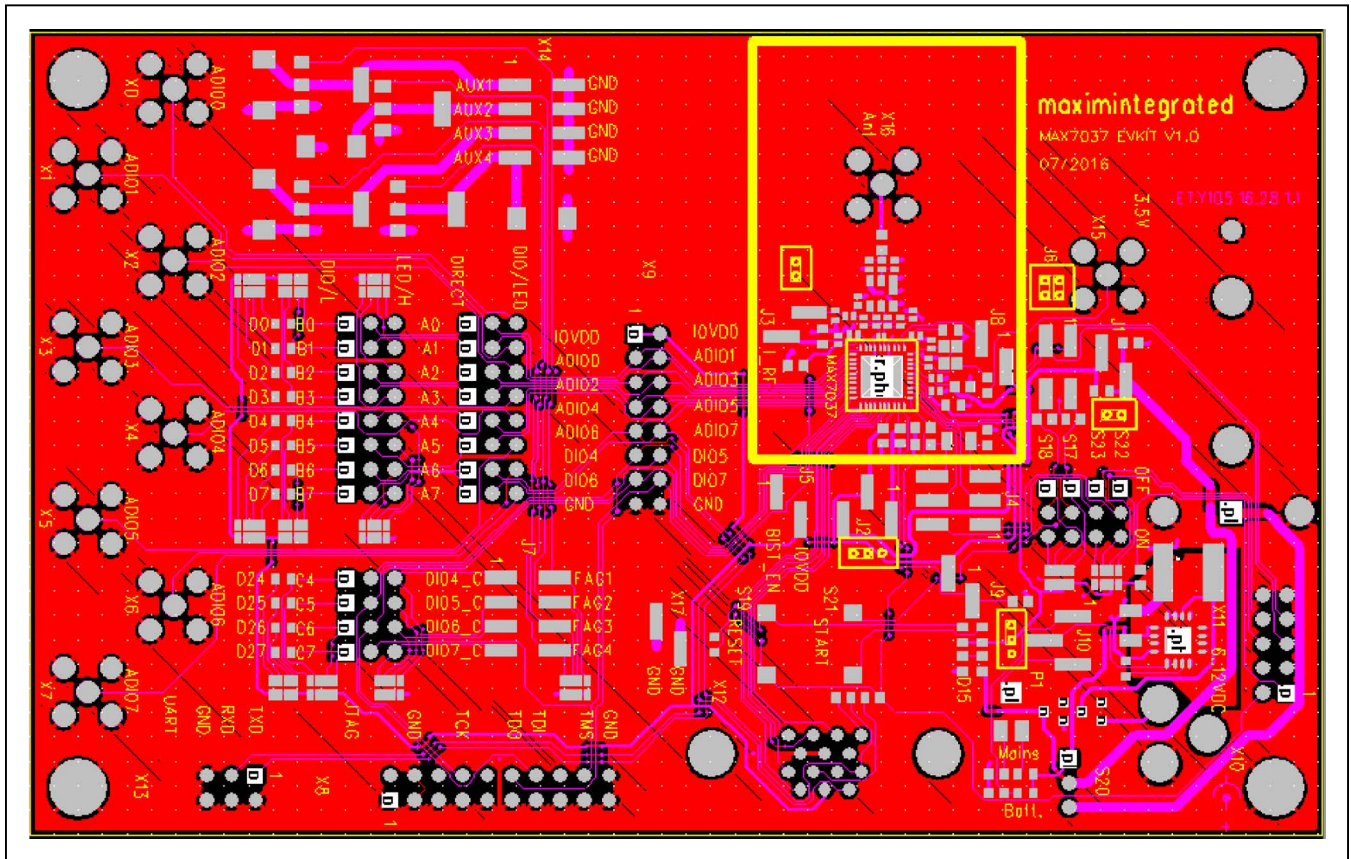
MAX7037 EV Kit Schematic (Page 2/3)

MAX7037 EV Kit Schematics (continued)



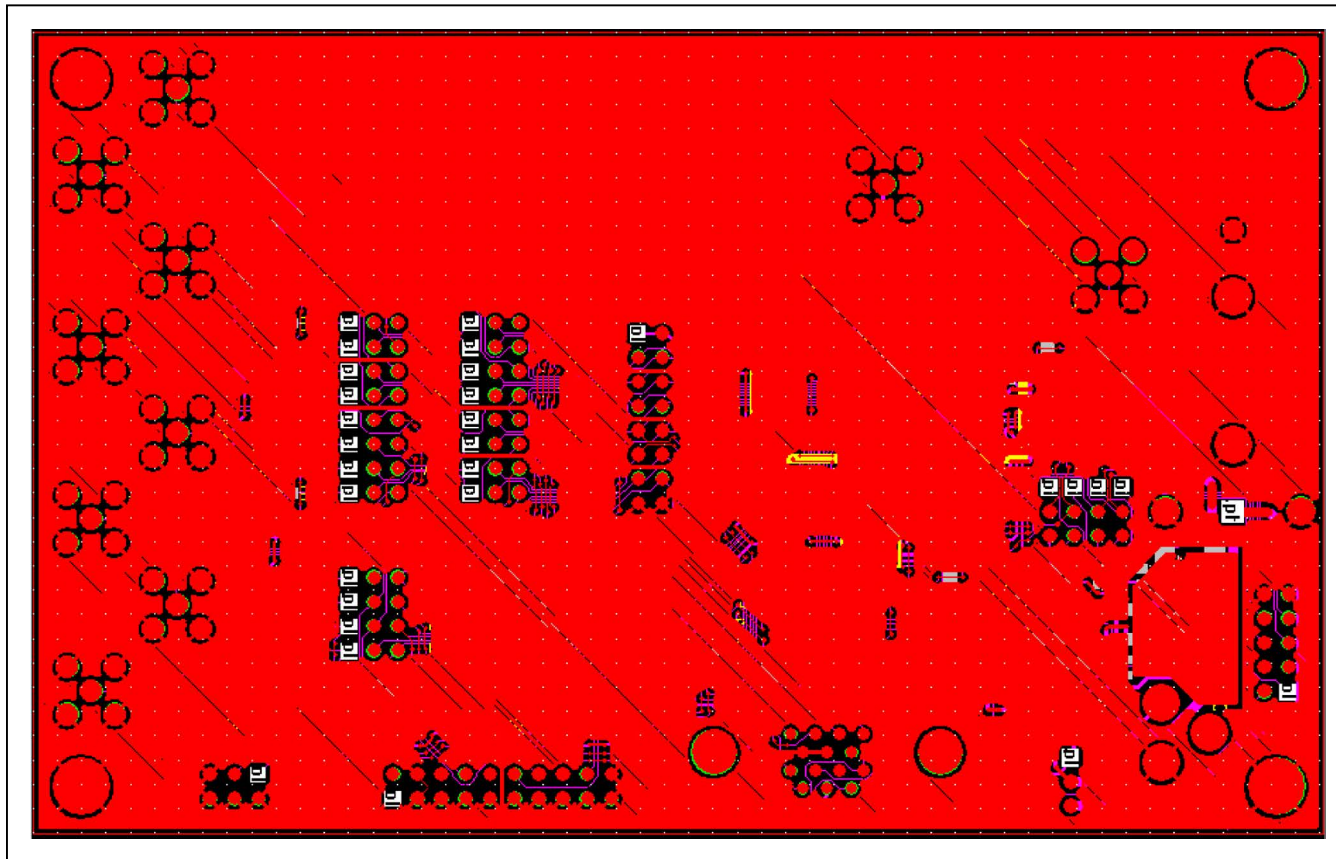
MAX7037 EV Kit Schematic (Page 3/3)

MAX7037 EV Kit PCB Layout Diagrams



MAX7037 EV Kit—Top Layer

MAX7037 EV Kit PCB Layout Diagrams (continued)



MAX7037 EV Kit—Bottom Layer

Ordering Information

PART	TYPE
MAX7037EVKIT#	EV Kit
Siam Kitty Board	Interface

#Denotes RoHS compliant.

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	11/16	Initial release	—
1	2/17	Updated Table 1	5

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.

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