

## General Description

The MAX30105 evaluation kit (EV kit) provides a proven design to evaluate the MAX30105 particle-sensing module. The EV kit consists of two boards. USBOSMB is the mother board and MAX30105DBEVKIT is the daughter board that includes the MAX30105 and an accelerometer. The EV kit is powered using the USB supply to generate +1.8V for the sensor and +4.5V for the internal LEDs of the MAX30105, and +3.3V for the accelerometer. However, users do not need the accelerometer to evaluate the MAX30105.

The EV kit comes with a MAX30105EFD+ installed in a 14-pin OESIP package.

## Features and Benefits

- Real-Time Monitoring
- Flexible PCB Design
- USB-Powered
- On-Board Accelerometer
- Proven PCB Layout
- Fully Assembled and Tested
- Windows® 7, and Windows 8/8.1-Compatible Software

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

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

## Quick Start

### Required Equipment

- MAX30105 EV kit (MAX30105DBEVKIT#, USBOSMB#, 10-pin FFC cable, and micro-USB cable included)
- Windows PC

**Note:** 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.

### Procedure

The EV kit is fully assembled and tested. Follow the steps below to verify board operation:

- 1) Visit [www.maximintegrated.com/evkit-software](http://www.maximintegrated.com/evkit-software) to download the most recent version of the EV kit software, MAX30105EVKitSetupVx.x.ZIP. Save the EV kit software to a temporary folder and uncompress the ZIP file.
- 2) Open up MAX30105EVKitSetupVx.x.exe and follow the instructions from the pop-up windows.
- 3) Insert one end of the ribbon cable to the J3 connector of the USBOSMB and the other end of the ribbon cable to the J1 connector of the MAX30105DBEVKIT. Make sure that both connectors and blue ends of the ribbon cable is facing the user.
- 4) Connect the USB cable from the PC to the EV kit board. Windows will automatically install all drivers.
- 5) Open the MAX30105EVKit.exe and verify that the EV kit is connected by observing the status bar at the lower left corner of the GUI. See [Figure 1](#).
- 6) Press the **Start Monitor** button.
- 7) Direct the LEDs of the MAX30105 (U4) of the EV kit towards the particles of interest and observe the **Measurement** graphs. See [Figure 2](#).

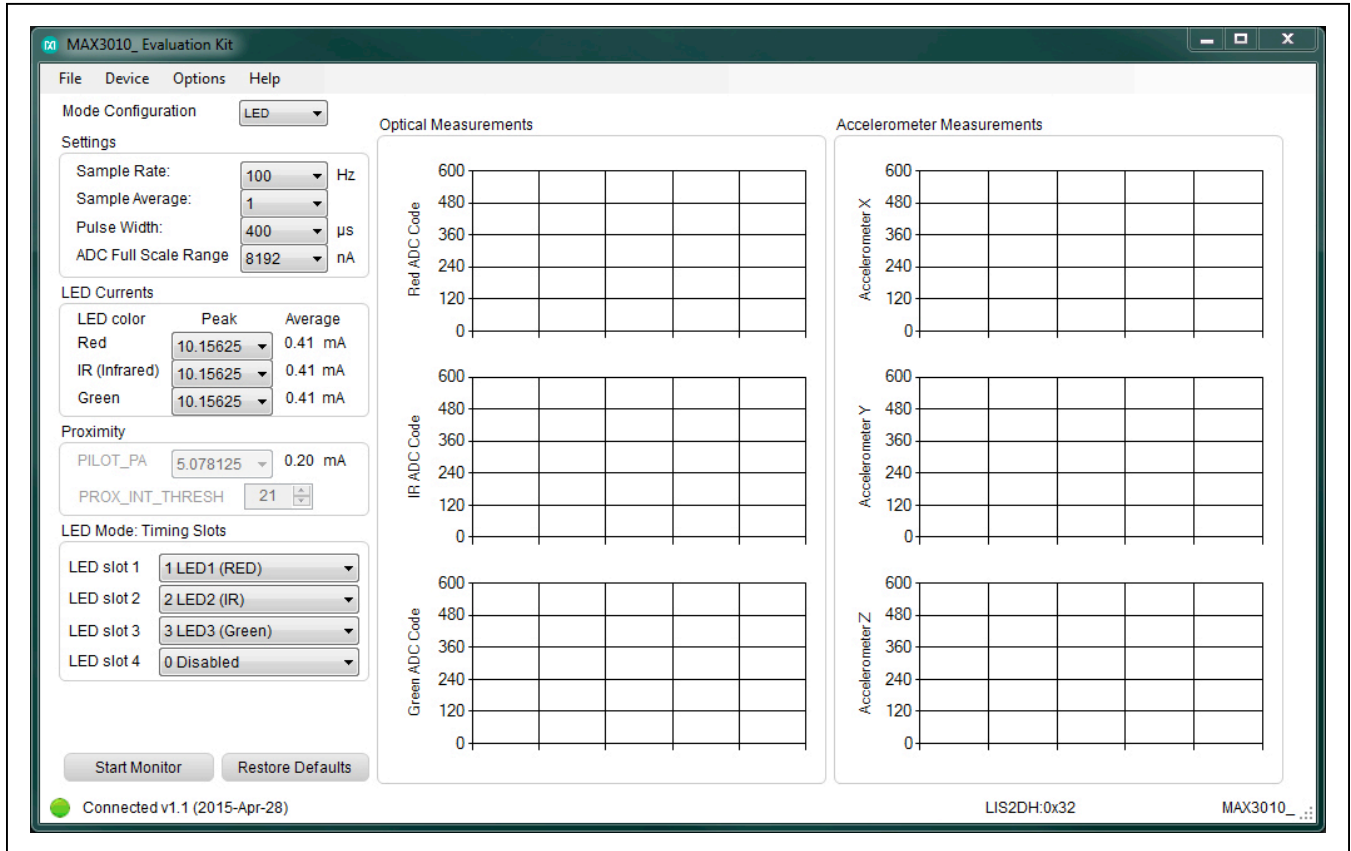


Figure 1. MAX30105 EV Kit Main Window

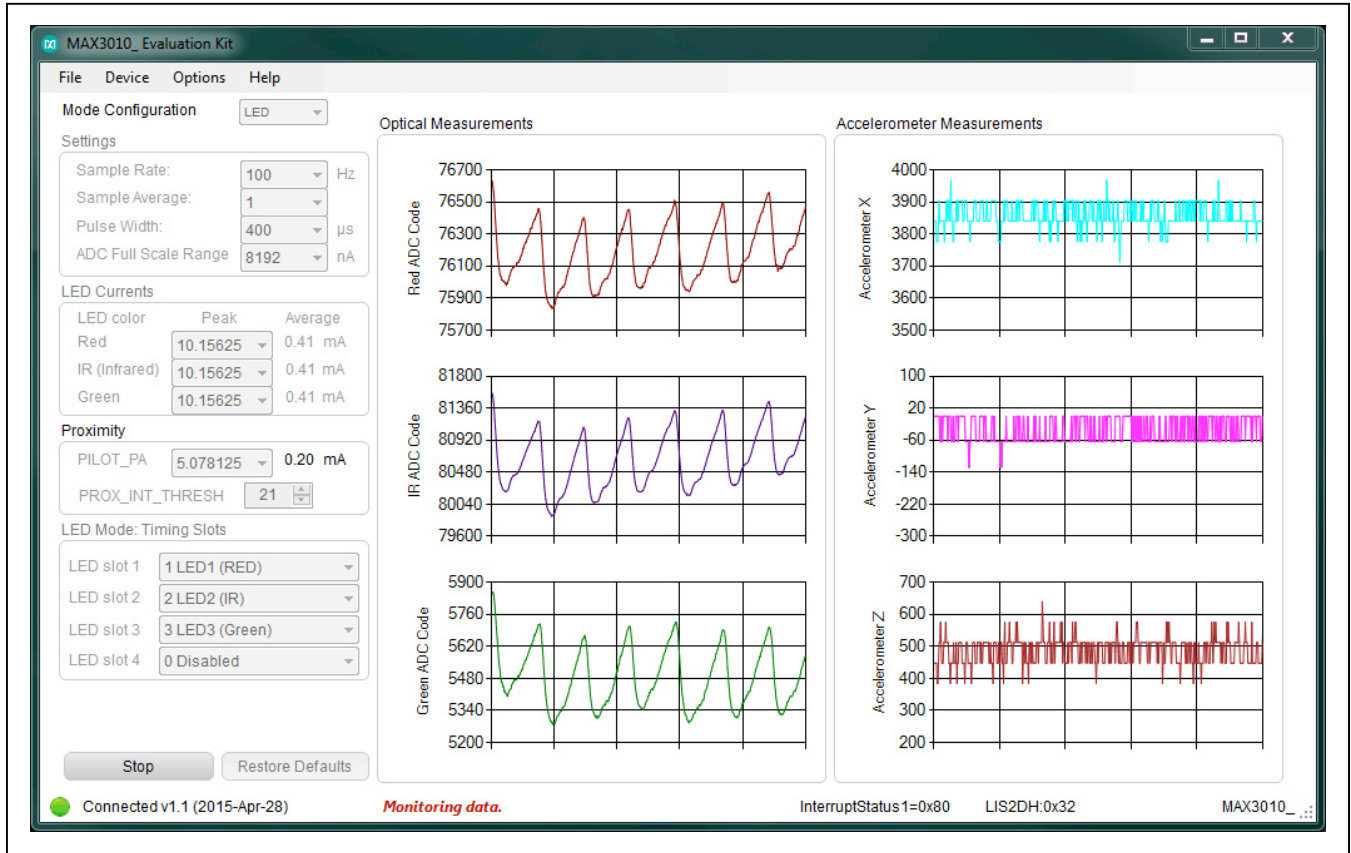


Figure 2. MAX30105 EV Kit Main Window (Sampling Data)

## Detailed Description of Software

The main window of the MAX30105 EV kit software displays the mode configuration, settings, LED currents, proximity, timing slots of the LED mode, ADC code measurements, of both the MAX30105 and the accelerometer and example algorithms.

### Mode Configuration

The **Mode Configuration** drop-down list allows for three options: 1 LED, 2 LEDs, and multi LEDs. When 1 LED mode is selected, only red ADC codes are plotted. When 2 LEDs mode is selected, only the Red and IR channels will be active when the GUI is operational. When Multi LED mode is selected, the user can select any combination of Red, IR, and Green channels to be active when the GUI is operational. Within LED mode, the **LED Mode Timing Slots** groupbox selections allow the user to enable the desired LEDs at each LED slot.

### Settings

The **Settings** groupbox consist of controls to the sample rate and average, pulse width, and ADC full-scale range.

The **Sample Rate** drop-down list is adjustable from 50Hz to 400Hz.

The **Sample Average** drop-down list is adjustable from 1 to 32.

The **Pulse Width** dropdown list is adjustable from 50 $\mu$ s to 400 $\mu$ s.

The **ADC Full Scale Range** dropdown list is adjustable from 2048nA to 16384nA.

### LED Currents

Within the **LED Currents** groupbox, the peak currents are adjustable from **0** to **50** mA for each LED. The average current based on the **Pulse Width** and **Sample Rate** is recalculated with each change in peak current.

### Proximity

Under Proximity, **PILOT\_PA** is adjustable from **0** to **50** mA.

### Accelerometer

The accelerometer provides three degrees of freedom (3DOF). Moving the MAX30105DBEVKIT board will trigger changes in ADC data of the X, Y, and/or Z graphs.

## Algorithms

Along with Maxim's sensor, customers will need smart algorithms to detect the particles of interest. Maxim is partnering with Valor Inc. to develop state-of-the-art algorithms for smoke detection application using MAX30105. Please contact Valor for licensing information at <http://www.valorfiresafety.com/licensing/>.

## Data Logging

From the menu bar, select **File | Log** and ADC data can be logged to a .csv file with the option of collecting data for a specific time using the **File | Timed Data Collection** selection from **5** to **60 seconds**. Once the desired configuration is set, press the **Start Monitor** button to capture data. The header for each data set includes the settings for sample rate, LED current, pulse width, and the mode. If the file name is not changed, subsequent data collection will append to the existing file and will include a new header.

## Options

From the menu bar, **Options** allows the user to adjust the plot length and the x-axis, hide unused channels, show/hide the algorithm windows, and access registers from a bit level.

## Detailed Description of Hardware

The MAX30105 EV kit provides a proven design to evaluate the MAX30105 integrated particle-sensing module. The EV kit is powered through the +5V from the USB port to generate the regulated +1.8V to  $V_{DD}$  supply and +4.5V to the +VLED supply of the MAX30105. Use [Table 1](#) to change the R10 resistor to obtain the desired +VLED supply. The IC U1 of the USBOSMB is the on-board microcontroller that communicates with the MAX30105 through GPIO for the interrupt signal and I<sup>2</sup>C interface.

There is also a 3.3V supply on the EV board and is intended for the on-board MCU.

**Table 1. Resistor Selection for +VLED Supply**

+VLED	R10 (k $\Omega$ )
2.5V	14.3
3.3V	23.2
4.0V	31.6
4.5V	36.5*

\*Default

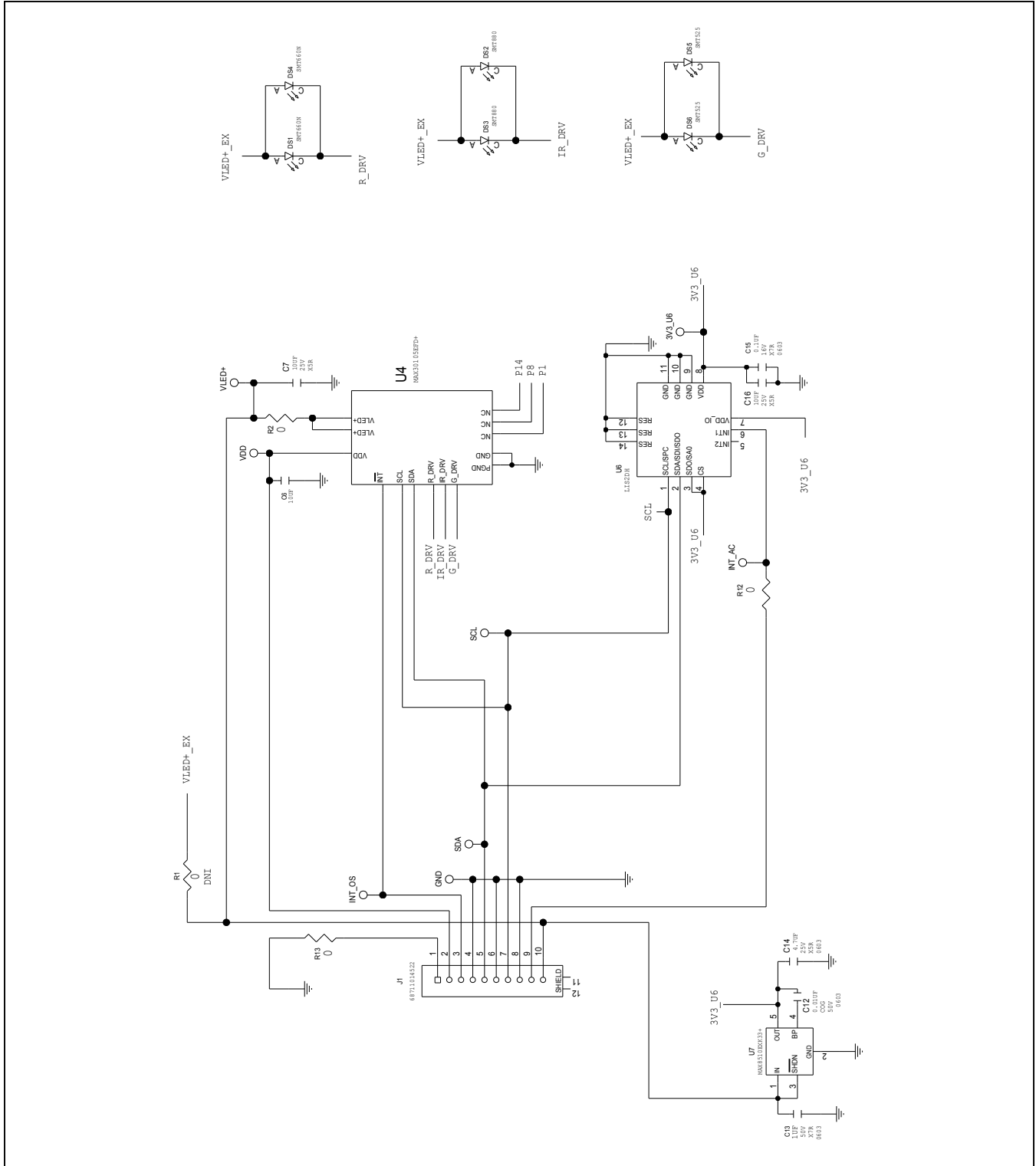


Figure 3. MAX30105 Daughter Board Schematic

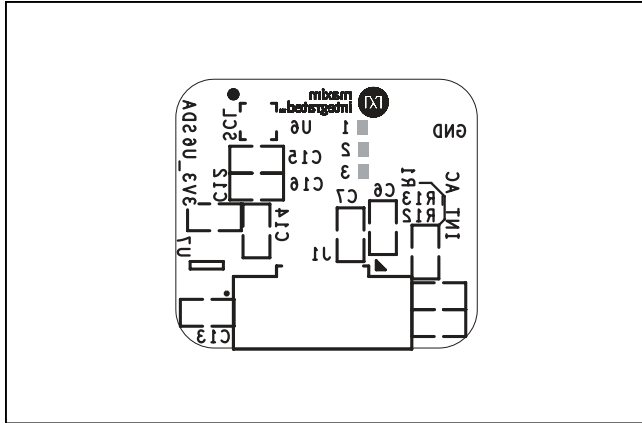


Figure 4. MAX30105 Daughter Board Component Placement Guide—Component Side

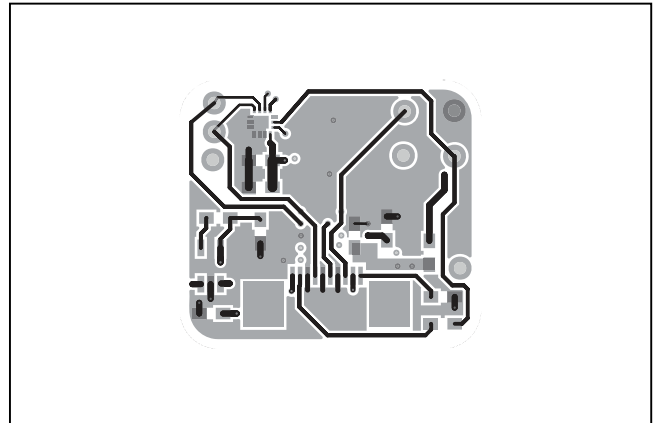


Figure 5. MAX30105 Daughter Board PCB Layout—Layer 2

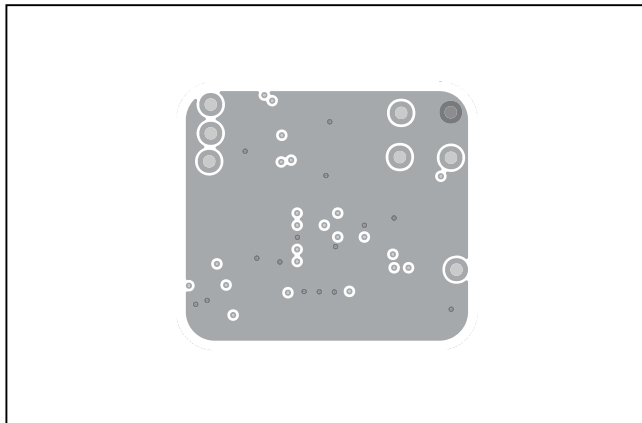


Figure 6. MAX30105 Daughter Board PCB Layout—Layer 3

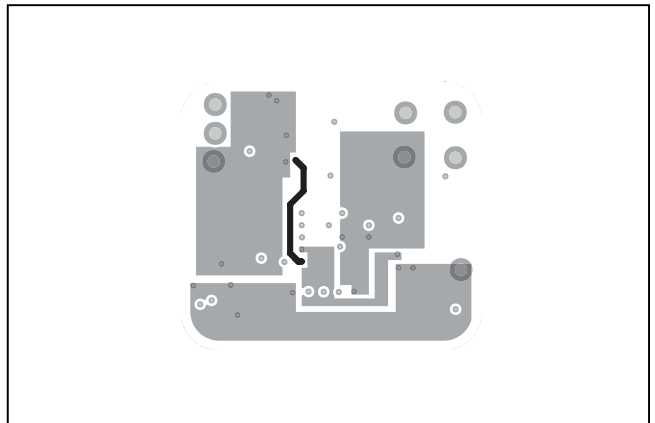


Figure 7. MAX30105 Daughter Board PCB Layout—Component Side

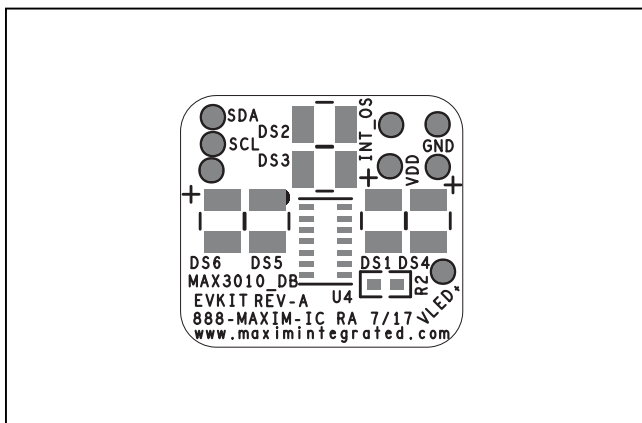


Figure 8. MAX30105 Daughter Board PCB Layout—Solder Side

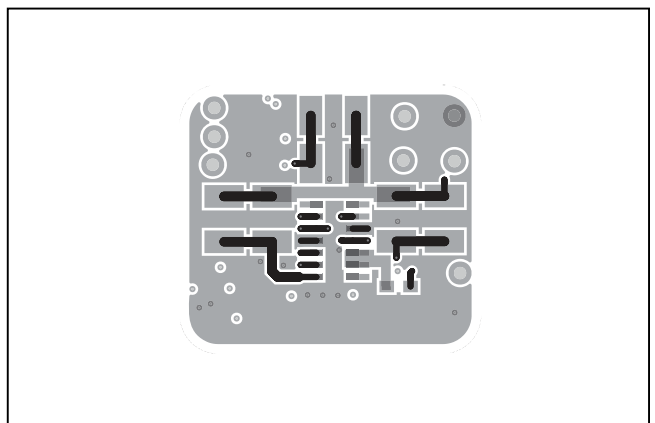


Figure 9. MAX30105 Daughter Board Component Placement Guide—Solder Side

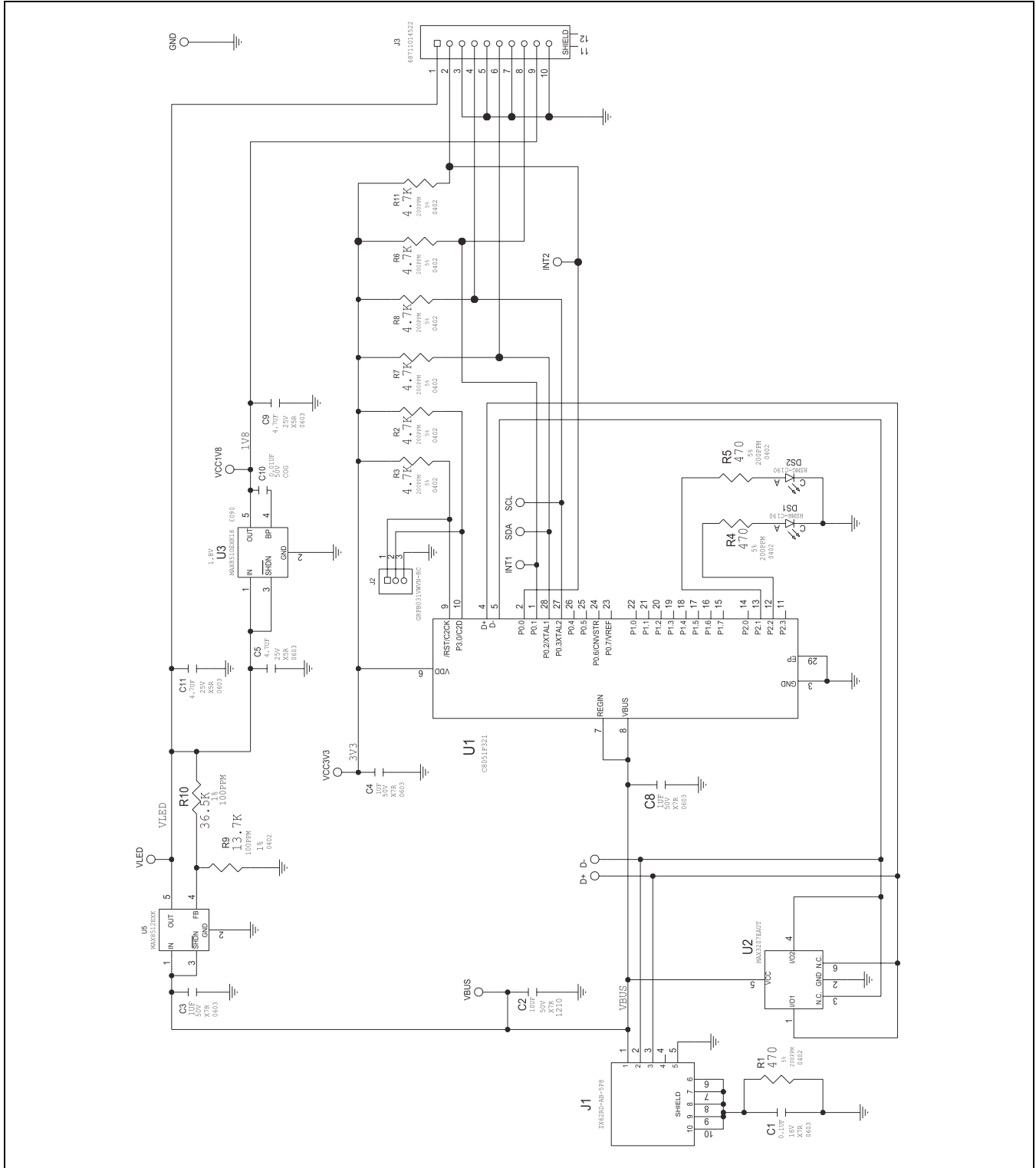


Figure 10. USBOSMB Mother Board Schematic





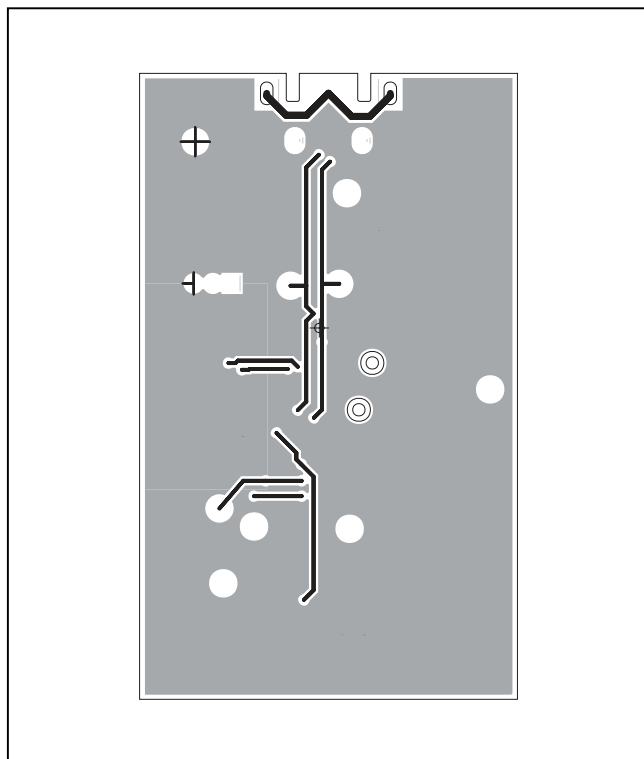


Figure 13. USBOSMB Mother Board PCB Layout—Solder Side

## Component Lists

### MAX30105 EV Kit

PART	QTY	DESCRIPTION
MAX30105DBEVKIT#	1	MAX30105 Daughter Board
USBOSMB#	1	Serial Interface Mother Board

## Component Information

See the following links for component information.

- [MAX30105 DB EV BOM](#)
- [MAX30105 USBOSMB EV BOM](#)

## Ordering Information

PART	TYPE	LED
MAX30105ACCEVKIT#	EV Kit	IR, Red, Green

#Denotes RoHS compliant.

## Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	5/16	Initial Release	—
1	7/16	Updated schematic and bill of materials	1, 4–6, 10

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](http://www.maximintegrated.com).

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TITLE: Bill of Materials

DATE: 07/12/2016

DESIGN: max30105\_db\_evkit\_a

NOTE: DNI--> DO NOT INSTALL ; DNP--> DO NOT PROCURE

ITEM	REF_DES	DNI/DNP	QTY	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION
1	C6	-	1	C1608X5R1A106K	TDK	10UF	CAPACITOR; SMT (0603); 10V; TOL=10%; MODEL=; DEGC; TC=X5R
2	C7, C16	-	2	C1608X5R1E106M080AC; CL10A106MA8NRNC	TDK/SAMSUNG ELECTRONICS	10UF	CAPACITOR; SMT (0603); 25V; TOL=20%; TG=-55 DE TC=X5R
3	C12	-	1	C1608C0G1H103J; CGA3E2C0G1H103J080AD; GRM1885C1H103JA01	TDK; MURATA	0.01UF	CAPACITOR; SMT (0603); 50V; TOL=5%; TG=-55 DEG
4	C13	-	1	UMK107AB7105KA	TAIYO YUDEN	1UF	CAPACITOR; SMT (0603); TOL=10%; TG=-55 DEGC T
5	C14	-	1	C1608X5R1E475K080AC	TDK	4.7UF	CAPACITOR; SMT (0603); 25V; TOL=10%; MODEL=C +85 DEGC; TC=X5R
6	C15	-	1	C0603C104K4RACAUTO	KEMET	0.1UF	CAPACITOR; SMT (0603); 16V; TOL=10%; TG=-55 DE TC=X7R AUTO
7	DS1, DS4	-	2	SMT660N	EPITEX	SMT660N	DIODE; LED; HIGH PERFOR SMT; VF=2V; IF=0.02A
8	DS2, DS3	-	2	SMT880	EPITEX	SMT880	DIODE; LED; HIGH PERFOR INFRARED; SMT; VF=1.45V
9	DS5, DS6	-	2	SMT525	EPITEX	SMT525	DIODE; LED; HIGH PERFOR GREEN; SMT; VF=3.2V; IF=

10	J1	-	1	68711014522	WURTH ELECTRONICS INC.	6.87E+10	CONNECTOR; FEMALE; SM HORIZONTAL BOTTOM CO ANGLE; 10PINS
11	R2, R12, R13	-	3	CRCW06030000ZS; MCR03EZPJ000; ERJ- 3GEY0R00	VISHAY DALE/ROHM/PAN ASONIC	0	RESISTOR; 0603; 0 OHM; 0 THICK FILM
12	U4	-	1	MAX30105EFD+	MAXIM	MAX3010 5EFD+	IC; SNSR; HIGH-SENSITIVIT SMOKE DETECTION APPLI
13	U6	-	1	LIS2DH	ST MICROELECTRONI CS	LIS2DH	IC; MEMS; MEMS DIGITAL SENSOR; ULTRA LOW-POW 3-AXIS FEMTO ACCELERON
14	U7	-	1	MAX8510EXK33+	MAXIM	MAX8510 EXK33+	IC; VREG; ULTRA-LOW-NO DROPOUT; 0.12A LINEAR
15	R1	DNP	0	RC1608J000CS; CR0603-J/- 0000ELF;RC0603JR-070RL	SAMSUNG ELECTRONICS/BO URNS/YAGEO PH	0	RESISTOR; 0603; 0 OHM; 5 THICK FILM
16	PCB	-	1	MAX	MAXIM	PCB	PCB Board:MAX30105 DB
TOTAL			21				

TITLE: Bill of Materials  
 DATE: 03/27/2015, Rev 0  
 DESIGN: usbosmb\_evkit\_a

ITEM	QTY	REF DES	MFG PART	MANUFACTURER	VALUE	DESCRIPTION	STATUS
1	1	C1	C0603C104	KEMET	0.1UF	CAPACITOR; SMT (0603); CERAMIC CHIP; 0.1UF; 16V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R AUTO	EVKIT-NOT FOR TEST
2	1	C2	GRM32ER7	MURATA; SAMSUNG ELECTRONICS	10UF	CAPACITOR; SMT (1210); CERAMIC CHIP; 10UF; 50V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R	ACTIVE
3	3	C3, C4, C8	UMK107AE	TAIYO YUDEN	1UF	CAPACITOR; SMT (0603); CERAMIC CHIP; 1UF; 50V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R	ACTIVE
4	3	C5, C9, C11	C1608X5R1	TDK	4.7UF	CAPACITOR; SMT (0603); CERAMIC CHIP; 4.7UF; 25V; TOL=10%; MODEL=C SERIES; TG=-55 DEGC TO +85 DEGC; TC=X5R	ACTIVE
5	1	C10	C1608C0G	TDK; MURATA	0.01UF	CAPACITOR; SMT (0603); CERAMIC CHIP; 0.01UF; 50V; TOL=5%; TG=-55 DEGC TO +125 DEGC; TC=C0G	ACTIVE
6	1	DS1	HSMH-C19	AVAGO TECHNOLOGIES	HSMH-C190	DIODE; LED; SURFACE MOUNT CHIP LED; RED; SMT (0603); PIV=1.8V; IF=0.02A	EVKIT-NOT FOR TEST
7	1	DS2	HSMG-C19	AVAGO TECHNOLOGIES	HSMG-C190	DIODE; LED; SURFACE MOUNT CHIP LED; GREEN; SMT (0603); PIV=2.2V; IF=0.02A	EVKIT-NOT FOR TEST
8	1	J1	ZX62RD-AB	HIROSE ELECTRIC CO LTD.	ZX62RD-AB-5P8	CONNECTOR; MALE; SMT; MICRO-USB CONNECTOR MEETING REQUIREMENTS OF USB 2.0 STANDARD; RIGHT ANGLE; 5PINS	ACTIVE
9	1	J2	GRP8031V	SULLINS ELECTRONICS CORP.	GRP8031VWVN-RC	CONNECTOR; MALE; THROUGH HOLE; 0.050" SINGLE ROW MALE HEADER CONNECTOR; STRAIGHT; 3PINS; -40 DEGC TO +105 DEGC	EVKIT-NOT FOR TEST
10	1	J3	6.87E+10	WURTH ELECTRONICS INC.	68711014522	CONNECTOR; FEMALE; SMT; 0.5MM ZIF HORIZONTAL BOTTOM CONTACT WR-FPC; RIGHT ANGLE; 10PINS	EVKIT-NOT FOR TEST
11	3	R1, R4, R5	ERJ-2GEJ47	PANASONIC	470	RESISTOR; 0402; 470 OHM; 5%; 200PPM; 0.10W; THICK FILM	EVKIT-NOT FOR TEST
12	6	R2, R3, R6	ERJ-2GEJ47	PANASONIC	4.7K	RESISTOR; 0402; 4.7K OHM; 5%; 200PPM; 0.10W; THICK FILM	EVKIT-NOT FOR TEST
13	1	R9	CRCW0402	VISHAY DALE	13.7K	RESISTOR; 0402; 13.7K OHM; 1%; 100PPM; 0.063W; THICK FILM	ACTIVE
14	1	R10	CRCW0402	PANASONIC	36.5K	RESISTOR; 0402; 36.5K OHM; 1%; 100PPM; 0.063W; THICK FILM	EVKIT-NOT FOR TEST
15	1	U1	C8051F321	SILICON LABORATORIES	C8051F321	IC; CTRL; FULL SPEED USB, 16K ISP FLASH MCU FAMILY; QFN28-EP	EVKIT-NOT FOR TEST
16	1	U2	MAX3207E	MAXIM	MAX3207EAUT	IC; PROT; DUAL, QUAD, AND HEX HIGH-SPEED DIFFERENTIAL ESD-PROTECTION IC; SOT23-6	ACTIVE
17	1	U3	MAX8510E	MAXIM	MAX8510EXK18	IC; VREG; ULTRA-LOW-NOISE; HIGH PSRR; LOW-DROPOUT; 0.12A LINEAR REGULATOR; SC70-5	ACTIVE
18	1	U5	MAX8512E	MAXIM	MAX8512EXK	IC, VREG, Ultra-Low-Noise, High PSRR, Adjustable Vout, SC70-5	ACTIVE
19	1	EPCB	MAX		MAXIM	PCB	PCB: MAX
TOTAL	30						
PACK_OUT							
1	1		6.88E+11	WURTH ELECTRONICS INC.		WR_FFC 0.50mm TYPE 1 CABLE	

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