

## Evaluates: MAX33076E

## MAX33076E Shield

### General Description

The MAX33076E Shield is a fully assembled and tested printed circuit board (PCB) that demonstrates the functionality of the MAX33076E quad channel RS-485/422 receivers with data rate up to 20Mbps  $\pm 65V$  fault protection, extended  $\pm 25V$  common mode input range, and  $\pm 25kV$  ESD Human Body Model (HBM). The shield features a digital isolator, which is used as a level translator between the RS-485/422 transceiver and the controller interface.

### Features and Benefits

- Easy Evaluation of the MAX33076E
- I/O interface compatibility from 1.71V to 5.5V
- Proven PCB Layout
- Mbed™/Arduino® Platform Compatible
- Fully Assembled and Tested

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

### EV Kit Photo

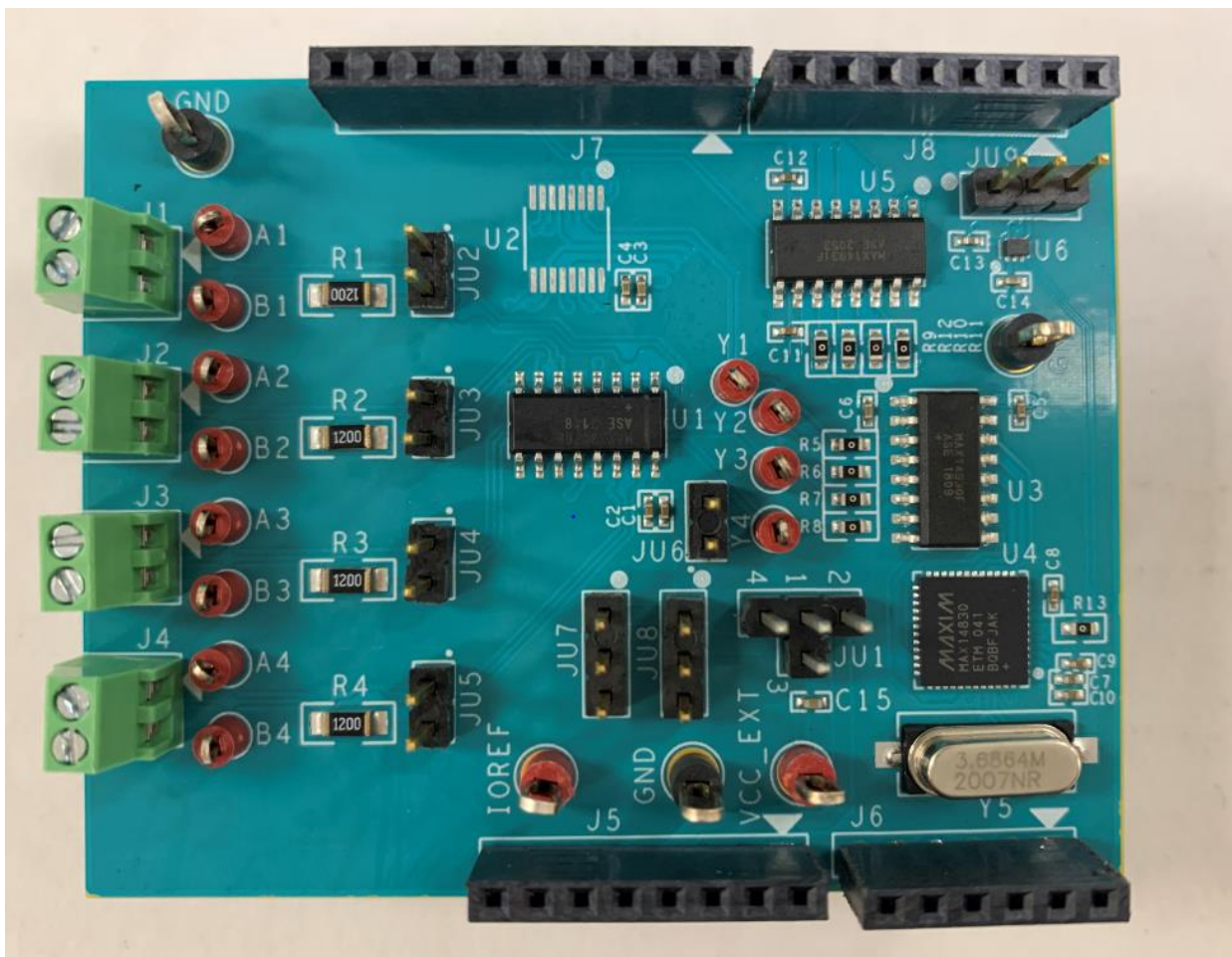


Figure 1. MAX33076E Shield

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Mbed is a registered trademark and service mark of Arm Limited

## Quick Start

### Required Equipment

- MAX33076E Shield
- 5V, 500mA DC power supply
- Signal/function generator that can generate 10MHz square wave signal
- Oscilloscope

### Procedure

Follow the steps below to test the MAX33076E Shield as a standalone evaluation board.

1. Place the MAX33076E Shield on a nonconductive surface to ensure that nothing on the PCB gets shorted to the workspace.
2. Set all the jumpers to their default positions as shown in Table 1.
3. With +5V power supply disabled, connect the positive terminal to VCC\_EXT test point. Connect the negative terminal to the GND test point.
4. For Channel 1 testing, connect the positive terminal of the function generator to A1 test point and the negative terminal to any GND test point on the shield. Connect B1 test point to GND.
5. Set function generator output to a 10MHz square wave between -1V and +1V, and then enable function generator output.
6. Turn on the +5V DC power supply.
7. Connect an oscilloscope probe on Y1 and verify the signals on A1, B1, and Y1 test points.
8. Repeat the same for channels 2–4.

**Table 1. Jumper Settings**

JUMPER	SHUNT POSITION	DESCRIPTION
JU1	1-2	V <sub>CC</sub> is shorted to +5V supply.
	1-3*	V <sub>CC</sub> is shorted to V <sub>CC_EXT</sub> supply.
	1-4	V <sub>CC</sub> is shorted to +3.3V supply.
	Open	V <sub>CC</sub> is open.
JU2	1-2*	Connects 120Ω between CH1 A and B inputs
	Open	No load is connected between CH1 A and B
JU3	1-2*	Connects 120Ω between CH2 A and B inputs
	Open	No load is connected between CH2 A and B
JU4	1-2*	Connects 120Ω between CH3 A and B inputs
	Open	No load is connected between CH3 A and B inputs
JU5	1-2*	Connects 120Ω between CH4 A and B inputs
	Open	No load is connected between CH4 A and B inputs
JU6	1-2*	V <sub>CC</sub> is shorted to V <sub>CC_1</sub> of MAX33076E IC supply
	Open	V <sub>CC_1</sub> of MAX33076E is open
JU7	1-2*	Enable input (G) is connected to V <sub>CC</sub>
	1-3	Enable input (G) is connected to GND
	Open	Enable input (G) is open
JU8	1-2	Enable input (G) is connected to V <sub>CC</sub>
	1-3*	Enable input (G) is connected to GND
	Open	Enable input (G) is open
JU9	1-2*	IRQ is connected to D2 of Arduino connector

	1-3	IRQ is connected to D3 of Arduino connector
	Open	IRQ is open

**Note:** \* indicates default jumper state.

## Detailed Description of Hardware

The MAX33076E Shield is a fully assembled and tested circuit board for evaluating the MAX33076E fault-protected RS-485/422 transceiver (U1) with  $\pm 65V$  of fault protection. The Shield is designed to evaluate MAX33076E alone or in an RS-485/422 system. The MAX33076E Shield enables Mbed or Arduino platform to communicate on an RS-485/422 receiver, or it may be used as a standalone evaluation board. The MAX14931 digital isolator is used as a level translator with a 1.71V to 5.5V supply range.

If external protection is desired beyond the device's built-in protection, the Shield also features footprints for TVS diodes (D1 and D2) that can be connected to the A1 and B1 lines, respectively. Similarly, footprints are provided for channels 2–4.

## Powering the Board

The MAX33076E Shield requires two power supplies – one 3.3V or 5V supply for the MAX33076E (U1) transceiver applied at the  $V_{CC\_EXT}$  test point and one 1.71V–5.5V supply for the microcontroller domain applied at the IOREF test point. When the Shield board is used with an Arduino/Mbed board, the power supply for U1 can also come from the Arduino/Mbed board's 5V rail. Place the shunt on 1-3 position of JU1 to connect  $V_{CC}$  to external supply. Place the shunt of JU1 on 1-2 position to connect the  $V_{CC}$  of U1 to Arduino/Mbed 5V supply rail and 1-4 position for 3.3V. In this scenario, IOREF is directly taken from the Arduino/Mbed header.

## Output Configuration

The MAX33076E converts RS-485 differential signals (A and B) to single ended signals (Y). The quad outputs are interfaced to Arduino/Mbed board through the MAX14830, a quad channel universal asynchronous receiver-transmitter (UART). The MAX14830 is controlled by Arduino/Mbed using SPI communication.

## Ordering Information

PART	TYPE
MAX33076ESHLD#	EV Kit

#Denotes RoHS compliance.

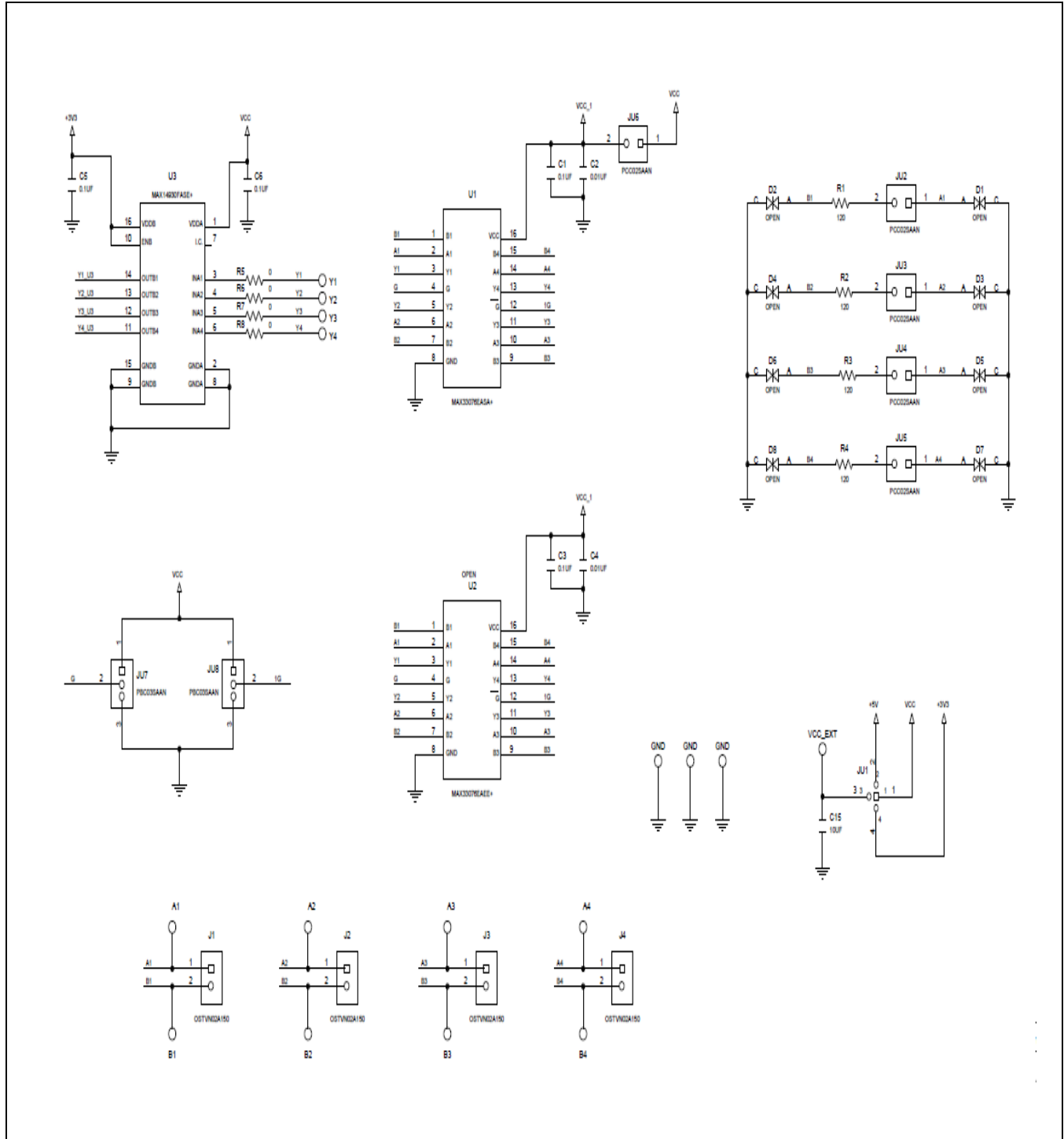
## MAX33076E Shield Bill of Materials

ITEM	QTY	REF DES	MFG PART #	DESCRIPTION	MANUFACTURER	STATUS	VALUE
1	12	A1- A4, B1- B4, Y1- Y4	5000	TEST POINT; PIN DIA=0.1IN; TOTAL LENGTH=0.3IN; BOARD HOLE=0.04IN; RED; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH; RECOMMENDED FOR BOARD THICKNESS=0.062IN;	KEystone		N/A
2	10	C1, C3, C5, C6, C8- C12, C14	C0402C104J4R AC;GCM155R71 C104JA55	CAP; SMT (0402); 0.1UF; 5%; 16V; X7R; CERAMIC	KEMET;MURATA		0.1UF
3	2	C2, C4	C0402X7R160- 103JNP; X7R0402CTT;	CAP; SMT (0402); 0.01UF; 5%; 16V; X7R; CERAMIC;	VENKEL LTD;KOA SPEER ELECTRONICS INC;AVX		0.01UF
4	2	C7, C13	EMK105BJ105K V	CAP; SMT (0402); 1UF; 10%; 16V; X5R; CERAMIC;	TAIYO YUDEN		1UF
5	1	C15	GRM155R60J10 6ME44; GRM155R60J10 6ME47; C1005X5R0J106 M050BC; CL05A106MQ5N UN; C0402C106M9P AC	CAP; SMT (0402); 10UF; 20%; 6.3V; X5R; CERAMIC	MURATA;MURATA;TD K;SAMSUNG ELECTRONICS;KEME T		10UF
6	3	GND, GND 1, GND 2	5011	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; BLACK; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH; RECOMMENDED FOR BOARD THICKNESS=0.062IN;	KEystone		N/A
7	2	IORE F, VCC_ EXT	5010	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN; RED; PHOSPHOR BRONZE WIRE SIL;	KEystone		N/A
8	4	J1-J4	OSTVN02A150	CONNECTOR; FEMALE; THROUGH HOLE; TERMINAL BLOCK; RIGHT ANGLE; COLOR: GREEN; 2PINS	ON-SHORE TECHNOLOGY INC		OSTVN02A1 50

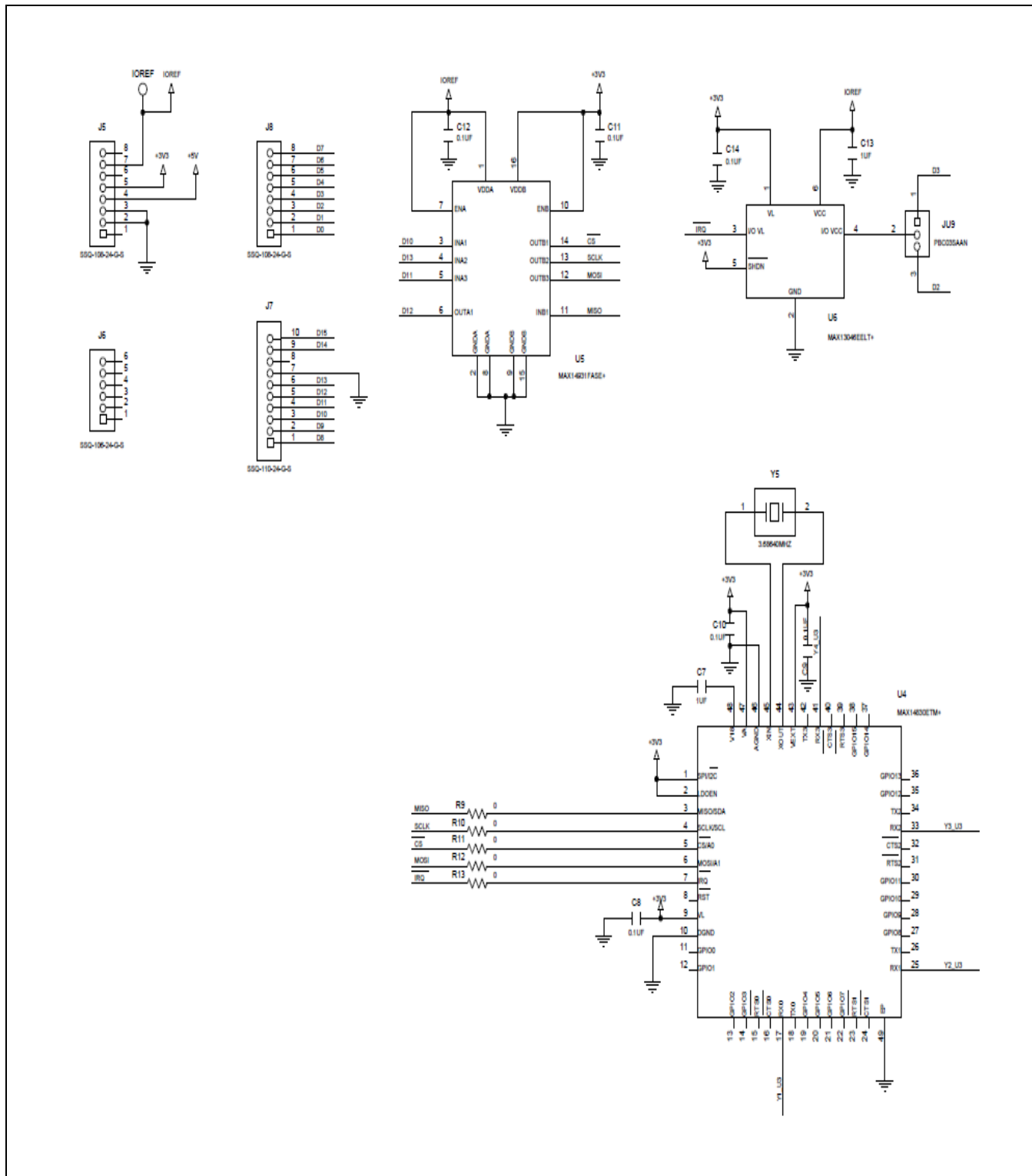
9	2	J5, J8	SSQ-108-24-G-S	CONNECTOR; FEMALE; THROUGH HOLE; .025INCH SQ POST SOCKET; STRAIGHT; 8PINS	SAMTEC		SSQ-108-24-G-S
10	1	J6	SSQ-106-24-G-S	CONNECTOR; FEMALE; THROUGH HOLE; .025INCH SQ POST SOCKET; STRAIGHT; 6PINS ;	SAMTEC		SSQ-106-24-G-S
11	1	J7	SSQ-110-24-G-S	CONNECTOR; FEMALE; THROUGH HOLE; .025INCH SQ POST SOCKET; STRAIGHT; 10PINS	SAMTEC		SSQ-110-24-G-S
12	1	JU1	PEC04SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 4PINS	SULLINS ELECTRONICS CORP.		PEC04SAAN
13	5	JU2-JU6	PCC02SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT THROUGH; 2PINS; -65 DEGC TO +125 DEGC	SULLINS		PCC02SAAN
14	3	JU7-JU9	PBC03SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 3PINS; -65 DEGC TO +125 DEGC	SULLINS		PBC03SAAN
15	4	R1-R4	CRCW1206120 RFK; MCR18EZPF1200; ERJ-8ENF1200	RES; SMT (1206); 120; 1%; +/-100PPM/DEGC; 0.2500W	VISHAY DALE; ROHM; PANASONIC		120
16	9	R5-R13	RC1608J000CS; CR0603-J-000ELF; RC0603JR-070RL	RES; SMT (0603); 0; 5%; JUMPER; 0.1000W	SAMSUNG ELECTRONICS; BOURNS; YAGEO PH		0
17	9	SU1-SU9	S1100-B; SX1100-B; STC02SYAN	TEST POINT; JUMPER; STR; TOTAL LENGTH=0.24IN; BLACK; INSULATION=PBT; PHOSPHOR BRONZE CONTACT=GOLD PLATED	KYCON; KYCON; SULLINS ELECTRONICS CORP.		SX1100-B
18	1	U1	MAX33076EASA+	IC; RECV; MAX33076EASA+; PACKAGE OUTLINE NUMBER: 21-0041; PACKAGE LAND PATTERN NUMBERL 90-0097; PACKAGE CODE: S16+1C; SOIC16	MAXIM		MAX33076E ASA+
19	1	U3	MAX14930FASE+	IC; DISO; 4/0 CHANNEL; 150MBPS; DEFAULT LOW; 2.75KVRMS DIGITAL	MAXIM		MAX14930FASE+

				ISOLATOR; NSOIC16 150MIL			
20	1	U4	MAX14830ETM +	IC; UART; QUAD SERIAL UART WITH 128-WORD FIFOS; TQFN48-EP	MAXIM		MAX14830E TM+
21	1	U5	MAX14931FASE +	IC; DISO; 3/1 CHANNEL; 150MBPS; DEFAULT LOW; 2.75KVRMS DIGITAL ISOLATOR; NSOIC16 150MIL	MAXIM		MAX14931F ASE+
22	1	U6	MAX13046EELT +	IC; TRANS; SINGLE- BIDIRECTIONAL LOW- LEVEL TRANSLATOR; UDFN6 1X1.5	MAXIM		MAX13046E ELT+
23	1	Y5	LFXTAL030798	CRYSTAL; SMT; 3.68640MHZ; 16PF; TOL = +/-30PPM	IQD FREQUENCY PRODUCT		LFXTAL0307 98
24	1	PCB	MAX33076ESHI ELD	PCB:MAX33076ESHIELD	MAXIM		PCB
25	0	D1- D8	P6SMB18CA	DIODE; TVS; SMB (DO- 214AA); VRM=15.3V; IPP=24.2A	LITTELFUSE		15.3V
26	0	U2	MAX33076EAEE +	EVKIT PART - IC; RECV; MAX33076EAEE+; PACKAGE OUTLINE NUMBER: 21-0055; PACKAGE LAND PATTERN NUMBERL 90- 0167; PACKAGE CODE: E16+11C; QSOP16	MAXIM		MAX33076E AEE+

MAX33076E Shield Schematic

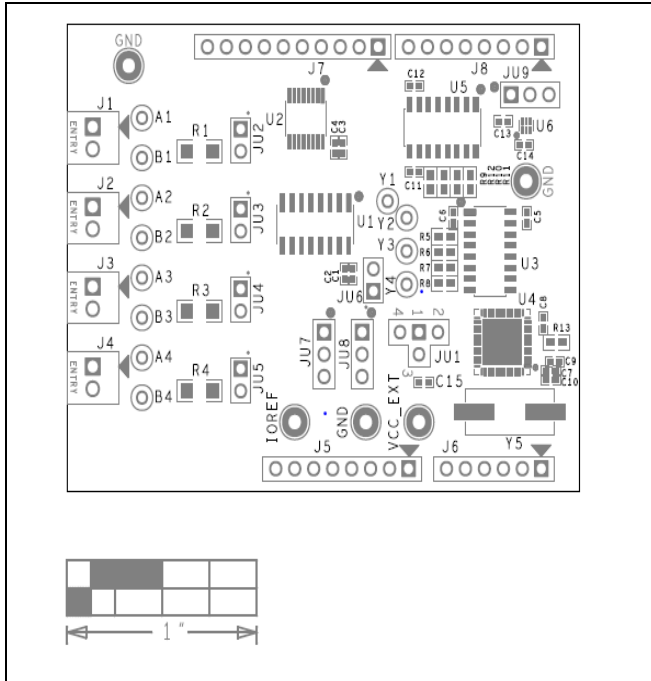


MAX33076E Shield Schematic (continued)

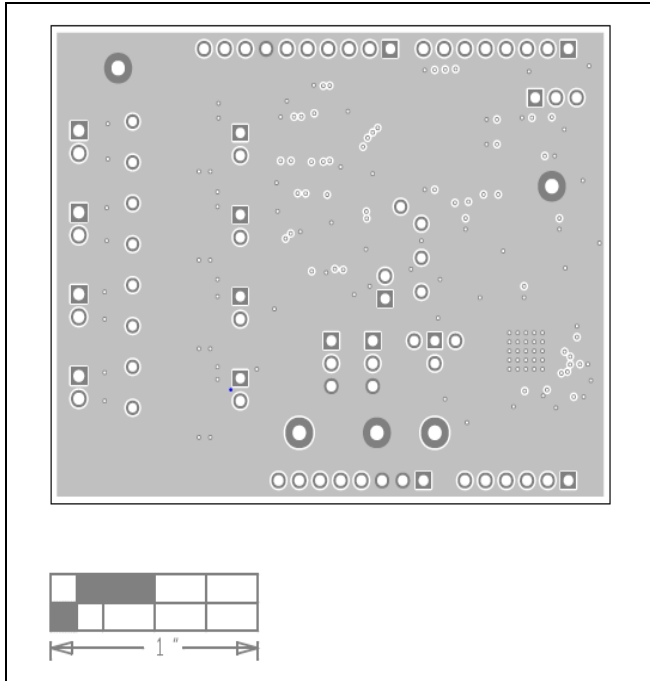




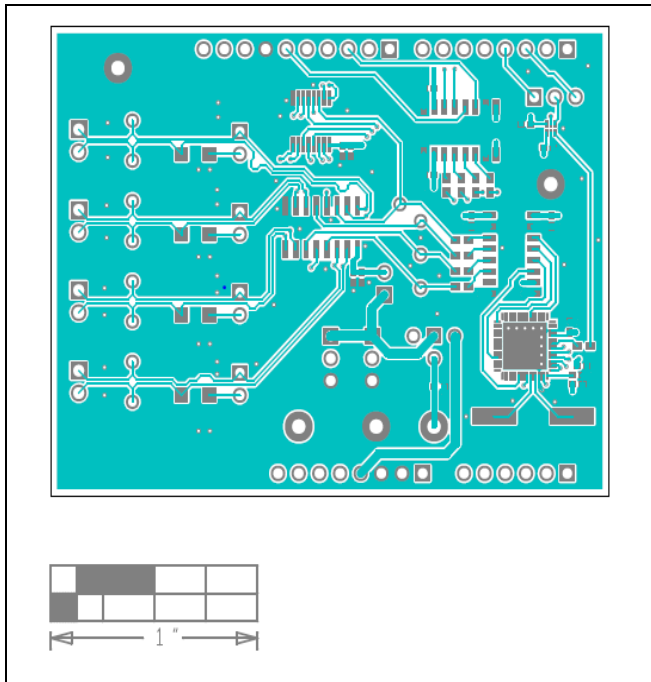
MAX33076E Shield PCB Layout



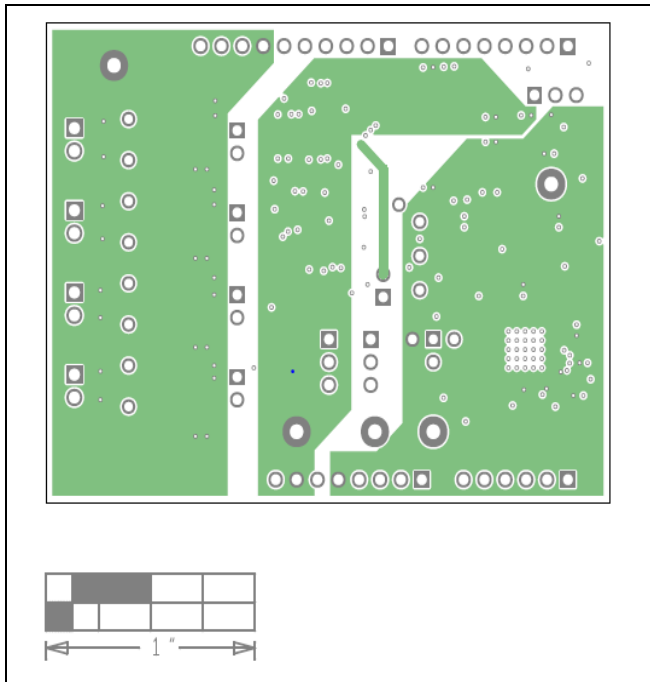
MAX33076E Shield Component Placement Guide—Top Silkscreen



MAX33076E Shield PCB Layout—Layer 2\_GND

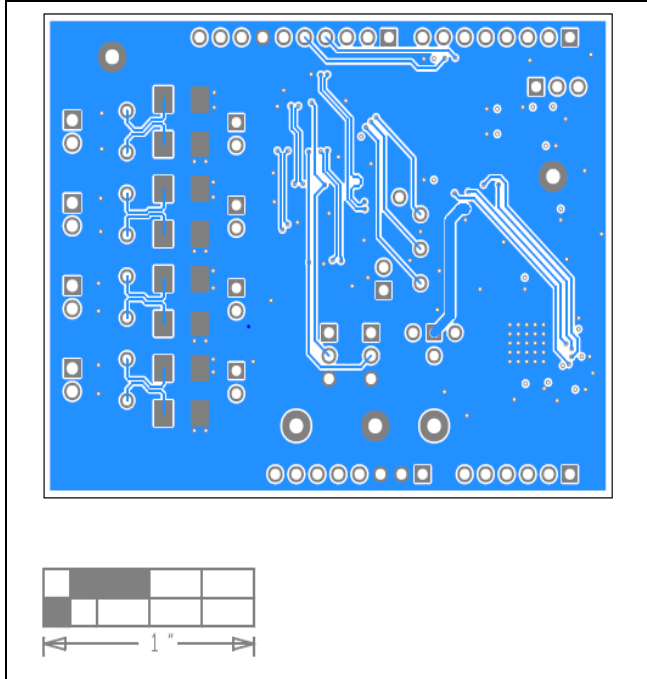


MAX33076E Shield PCB Layout—Top

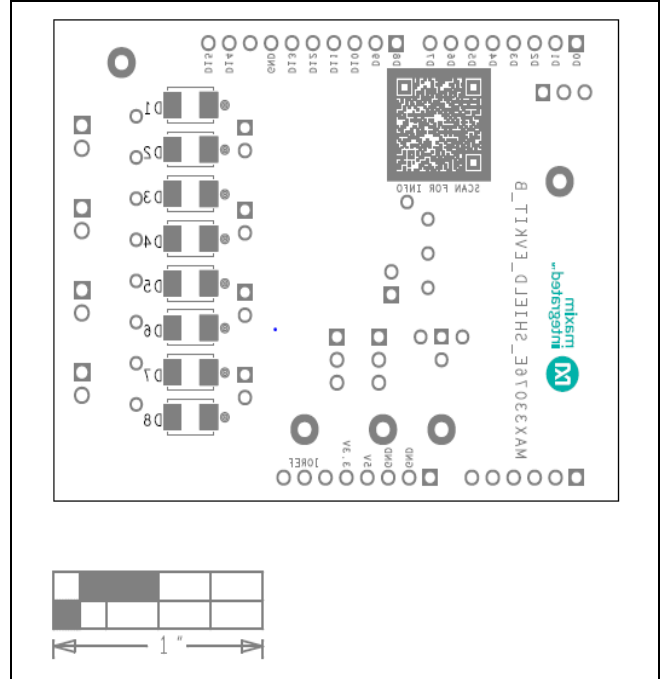


MAX33076E Shield PCB Layout—Layer 3\_PWR

MAX33076E Shield PCB Layout (Continued)



MAX33076E Shield PCB Layout—Bottom



MAX33076E Shield Component Placement Guide—Bottom Silkscreen

**Revision History**

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	09/21	Initial release	—

