### MAXM22510/MAXM22511 Evaluation Kit

Evaluates: MAXM22510/MAXM22511

#### **General Description**

The MAXM22510/MAXM22511 evaluation kit (EV kit) is a fully assembled and tested PCB that demonstrates the functionality of the MAXM22510/MAXM22511 isolated RS-485/RS-422 transceiver module. The EV kit operates from a single 3.3V supply.

#### **Features**

- Operates From a Single 3.3V Supply
- Terminal Block Connectors for Easy RS-485/RS-422 Evaluation
- Up to 2500V<sub>RMS</sub> Isolation for 60s
- · Fully Assembled and Tested

#### **Quick Start**

#### **Required Equipment**

- MAXM22510/MAXM22511 EV kit
- 3.3V, 300mA DC power supply
- Signal/function generator
- Oscilloscope

#### **Startup Procedure**

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

- Set the DC power supply to 3.3V and connect the DC power supply between the EV kits V<sub>DDA</sub> and GNDA connectors.
- 2) Ensure that all jumpers are in their default positions (see Table 1).
- 3) Turn on the power supply.
- Set the signal/function generator to output a 100kHz 0-to-3.3V square wave.
  - **NOTE:** Set the signal/function generator to operate with a high-impedance load. If needed, the R1 pad is available to add a  $50\Omega$  impedance to ground.
- 5) Connect the signal/function generator to the TXD test point.
- 6) Using the oscilloscope, verify that the Y, Z, and RXD outputs switch as the TXD signal toggles.

Ordering Information appears at end of data sheet.



# MAXM22510/MAXM22511 Evaluation Kit

#### **Detailed Description of Hardware**

The EV kit is a fully assembled and tested circuit board for evaluating the MAXM22510/MAXM22511 isolated RS-485/RS-422 transceiver module (U1). The EV kit is designed to evaluate the MAXM22510/MAXM22511 alone or in a standard RS-485 configuration.

#### **Powering the Board**

The MAXM22510/MAXM22511 operates from a single supply. Connect an external 3.3V supply to the V<sub>DDA</sub> test point (TP6). Connect the ground terminal of the supply to the GNDA test point (TP7). The integrated DC/DC in the MAXM22510/MAXM22511 generates the isolated power for the B-side/isolated side of the board.

# **Evaluating the Isolated RS-485 Interface**

#### **Driver and Receiver Enable Selection**

The EV kit features two jumpers (J2 and J4) to enable/ disable the driver and receiver outputs.

To enable the driver outputs (Y and Z), set the J4 jumper to 1-2 ('H'). Set J4 to 2-3 to disable the Y and Z outputs.

To enable the receiver on the MAXM22510/MAXM22511, set the J2 jumper to 2-3 ('L'). Set J2 to 1-2 to disable the receiver.

#### **Enabling/Disabling Shutdown Mode**

In shutdown mode, the internal DC/DC is disabled and no power is generated on the isolated side of the board. The J3 jumper is available to enable/disable shutdown mode for the MAXM22510/MAXM22511. Set the J3 jumper to 2-3 for normal operation. Set J3 to 1-2 to enter shutdown mode.

The SBA output is high impedance during shutdown and is not pulled high. The R6 pad on the board is available to add a pull-up resistor to SBA if SBA must be high when the MAXM22510/MAXM22511 is in shutdown mode.

#### **Loopback Configuration**

The MAXM22510/MAXM22511 features one drive channel and one receive channel. Driver outputs are Y and Z and receiver inputs are A and B. To configure the device for loopback testing, close J7 and J8 to connect B to Z and A to Y, respectively.

### Evaluates: MAXM22510/MAXM22511

#### **On-Board Resistor Configurations**

To evaluate the MAXM22510/MAXM22511 at the end-of-the-line in a RS-485/RS-422 bus, close J6 to connect a 120 $\Omega$  termination resistor (R3) between the A and B RS-485 receiver inputs.

Close J5 to connect a  $120\Omega$  termination resistor (R2) between the Y and Z driver outputs.

Pullup and pulldown resistors are generally used on the receiver inputs to guarantee a known state in the event that all nodes on the bus are in receive mode, or the cable becomes disconnected. The exact value for these resistors varies with the application. R7 and R9 pads are provided for pullup and pulldown resistors on the Y and Z lines. R10 and R12 pads provide for pullup and pulldown resistors on the A and B lines, if needed. The use of any of these resistors is purely optional. Note that the MAXM22510/MAXM22511 features true fail-safe receiver inputs, which ensures that RXD is high when the receiver inputs are shorted, open, or connected to an idle bus.

#### **RS-485 Interface Protection**

The MAXM22510/MAXM22511 RS-485 interface pins (Y, Z, A and B) feature internal ESD protection up to ±35kV ESD (HBM), ±18kV ESD (Air gap), ±8kV ESD (Contact). SM712 TVS diodes have been added to the I/O lines for added protection up to ±30kV ESD (Air) and ±30kV ESD (Contact). The SMT712 is also rated for protection against EFT up to 40A (5/50ns).

#### **Optimized EMI Layout**

The MAXM22510/MAXM22511 EV kit has been designed for easy evaluation and is not optimized for EMI performance/evaluation. See the Design Resources tab on the MAXM22510/MAXM22511 web page for more information about best design practices for optimum EMI performance.

www.maximintegrated.com Maxim Integrated | 2

# MAXM22510/MAXM22511 Evaluation Kit

Evaluates: MAXM22510/MAXM22511

Table 1. Jumper Table (J2-J8)

JUMPER	SHUNT POSITION	DESCRIPTION		
J2	1-2	RE is high. The RS-485 receiver is disabled.		
J2	2-3*	RE is low. The RS-485 receiver is enabled.		
J3	1-2	SD is high. The MAXM22510/MAXM22511 is in shutdown mode.		
J3	2-3*	SD is low. The MAXM22510/MAXM22511 is not in shutdown mode.		
J4	1-2*	DE is high. The RS-485 driver outputs are enabled.		
J4	2-3	DE is low. The RS-485 driver outputs are disabled.		
J5	Open	Y and Z are not connected through the on-board 120Ω termination resistor.		
J5	Closed*	Y and Z are connected through the on-board $120\Omega$ termination resistor.		
J6	Open	A and B are not connected through the on-board $120\Omega$ termination resistor.		
30	Closed*	A and B are connected through the on-board 120Ω termination resistor.		
J7	Open*	B is not connected to Z.		
37	Closed	B is connected to Z.		
J8	Open*	A is not connected to Y.		
18	Closed	A is connected to Y.		

<sup>\*</sup>Default position.

# **Ordering Information**

PART	TYPE
MAXM22510EVKIT#	EV Kit
MAXM22511EVKIT#	EV Kit

#Denotes RoHS compliant.

www.maximintegrated.com Maxim Integrated | 3

# MAXM22510/MAXM22511 Evaluation Kit

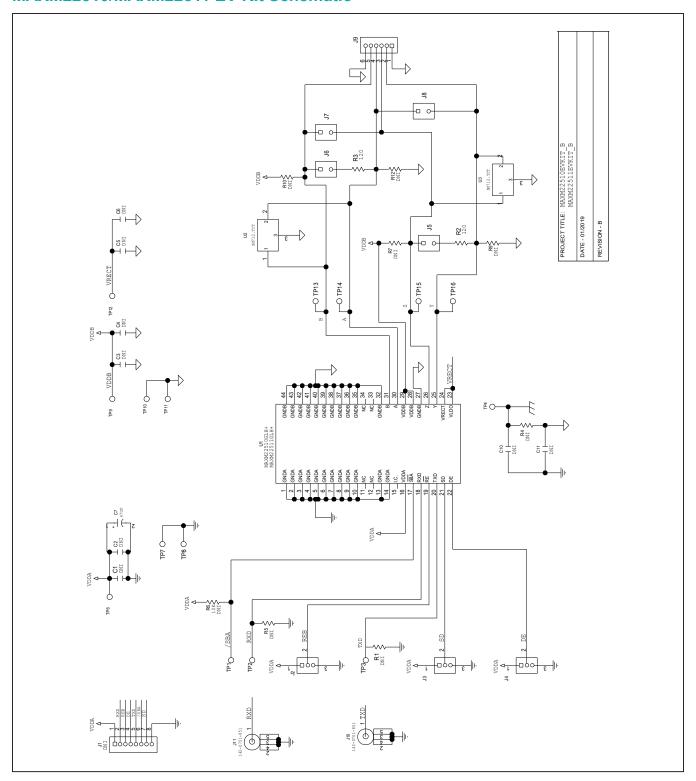
Evaluates: MAXM22510/MAXM22511

### MAXM22510/MAXM22511 EV Kit Bill of Materials

ITFM	REF DES	DNI/DNP	ОТУ	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION
							CAPACITOR; SMT (CASE C); ALUMINUM-ELECTROLYTIC; 47UF; 10V; TOL=20%;
1	C7	_	1	EEE-HA1A470WR	PANASONIC	47UF	MODEL=HA SERIES; TG=-40 DEGC to +105 DEGC; TC=
	-						CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT THROUGH; 3PINS;
2	J2-J4	_	3	PCC03SAAN	SULLINS	PCC03SAAN	65 DEGC TO +125 DEGC
3	J5-J8	-	4	PEC02SAAN	SULLINS	PEC02SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 2PINS
							CONNECTOR; FEMALE; THROUGH HOLE; GREEN TERMINAL BLOCK; STRAIGHT;
4	19	-	1	1935200	PHOENIX CONTACT	1935200	6PINS
							CONNECTOR; END LAUNCH JACK RECEPTACLE; BOARDMOUNT; STRAIGHT
5	J10. J11	-	2	142-0701-851	JOHNSON COMPONENTS	142-0701-851	THROUGH; 2PINS;
6	R2, R3	-	2	CRCW0603120RJN	VISHAY DALE	120	RESISTOR; 0603; 120 OHM; 5%; 200PPM; 0.10W; THICK FILM
							TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN;
7	TP1, TP2, TP3, TP13-TP16	-	7	5014	N/A	5014	YELLOW; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;
							TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN;
8	TP4, TP7, TP8, TP10, TP11	-	5	5011	N/A	5011	BLACK; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;
							TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.445IN; BOARD HOLE=0.063IN;
9	TP6, TP9, TP12	-	3	5010	KEYSTONE	N/A	RED; PHOSPHOR BRONZE WIRE SIL;
						MAXM22510GLH+ OR	IC; TXRXMOD; 2.5KVRMS COMPLETE ISOLATED RS-485/RS-422 MODULE
10	U1	-	1	MAXM22510GLH+ OR MAXM22511GLH+	MAXIM	MAXM22511GLH+	TRANSCEIVER + POWER; LGA44
							IC; PROT; ASYMMETRICAL TVS DIODE FOR EXTENDED COMMON-MODE RS-485;
11	U2, U3	-	2	SM712.TCT	SEMTECH	SM712.TCT	SOT23-3
12	PCB	-	1	MAXM22510/MAXM22511	MAXIM	PCB	PCB:MAXM22510/MAXM22511
				GRM188R71E105KA12;CGA3E1X7R1E105K;TM			
				K107B7105KA;06033C105KAT2A;GCM188R71E			CAPACITOR; SMT (0603); CERAMIC CHIP; 1UF; 25V; TOL=10%; TG=-55 DEGC TO
13	C1, C4, C6	DNP	0	105KA64	MURATA;TDK;TAIYO YUDEN;AVX;MURATA	1UF	+125 DEGC; TC=X7R
							CAPACITOR; SMT (0603); CERAMIC CHIP; 0.1UF; 25V; TOL=10%; MODEL=C SERIES;
	C2, C3, C5	DNP		C1608X7R1E104K080AA	TDK	0.1UF	TG=-55 DEGC TO +125 DEGC; TC=X7R
15	C10	DNP	0	VJ2220Y332KXUSTX1	VISHAY VITRAMON	3300PF	CAP; SMT (2220); 3300PF; 10%; 250V; X7R; CERAMIC CHIP
16	C11	DNP	0	GA352QR7GF102KW01	MURATA	1000PF	CAP; SMT (2211); 1000PF; 10%; 250V; X7R; CERAMIC CHIP
							CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 8PINS; -65 DEGC
17		DNP		PBC08SAAN	SULLINS ELECTRONICS CORP.	PBC08SAAN	TO +125 DEGC
	R1, R5	DNP	0	CRCW060349R9FK	VISHAY DALE	49.9	RESISTOR; 0603; 49.9 OHM; 1%; 100PPM; 0.10W; THICK FILM
	R4	DNP	0	CRCW12100000Z0	VISHAY DALE		RESISTOR; 1210; 0 OHM; 0%; JUMPER; 0.5W; THICK FILM
_	R6	DNP	0	CRCW060310K0FK;ERJ-3EKF1002	VISHAY DALE;PANASONIC	10K	RESISTOR; 0603; 10K; 1%; 100PPM; 0.10W; THICK FILM
	R7, R9, R10, R12	DNP	0	CRCW06031K00FK;ERJ-3EKF1001	VISHAY DALE;PANASONIC	1K	RESISTOR; 0603; 1K; 1%; 100PPM; 0.10W; THICK FILM
TOTAL			32	<u>'</u>	<u>'</u>		

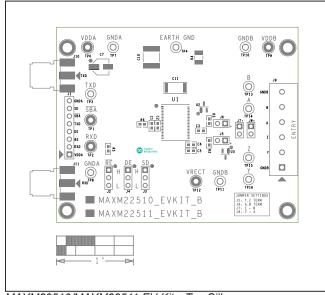
www.maximintegrated.com Maxim Integrated | 4

### MAXM22510/MAXM22511 EV Kit Schematic

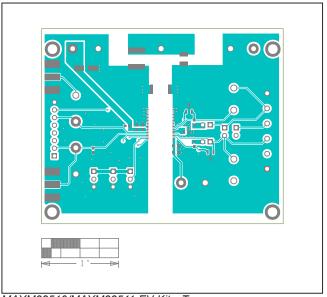


### Evaluates: MAXM22510/MAXM22511

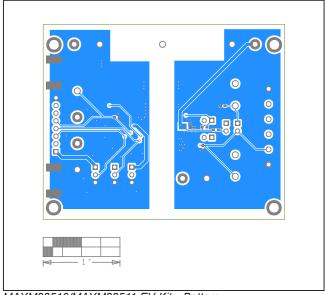
# MAXM22510/MAXM22511 EV Kit PCB Layout Diagrams



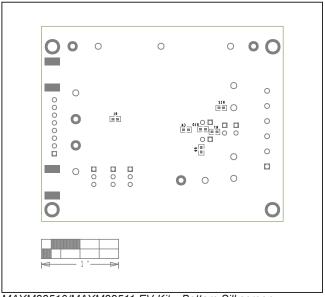
MAXM22510/MAXM22511 EV Kit—Top Silkscreen



MAXM22510/MAXM22511 EV Kit—Top



MAXM22510/MAXM22511 EV Kit—Bottom



MAXM22510/MAXM22511 EV Kit—Bottom Silkscreen

# MAXM22510/MAXM22511 **Evaluation Kit**

Evaluates: MAXM22510/MAXM22511

### **Revision History**

REVISION NUMBER	REVISION DATE	DESCRIPTION			
0	8/18	Initial release	_		
1	1/19	Update the Title on all pages to add MAXM22510 and to all sections where MAXM22511 is also mentioned; updated Table 1, the <i>Bill of Materials, Schematic, PCB Layout,</i> and added MAXM22510EVKIT# to the <i>Ordering Information</i> table	1–7		

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.

Maxim Integrated cannot assume responsibility for use of any circuitry other than circuitry entirely embodied in a Maxim Integrated product. No circuit patent licenses are implied. Maxim Integrated reserves the right to change the circuitry and specifications without notice at any time.