



## MAX2232/MAX2233 Evaluation Kits

### General Description

The MAX2232/MAX2233 evaluation kits (EV kits) simplify testing of the MAX2232/MAX2233 900MHz ISM-band, 24dBm RF power amplifiers (PAs). They allow testing of all device functions and require no additional support circuitry. Signal inputs and outputs use SMA connectors to facilitate the connection of RF test equipment. For evaluation of the PA with analog gain control, order the MAX2232EVKIT; for evaluation of the PA with 2-bit programmable gain control, order the MAX2233EVKIT.

### Features

- ◆ Easy Evaluation of MAX2232/MAX2233
- ◆ SMA Input and Output RF Signal Connectors
- ◆ All Critical Peripheral Components Included
- ◆ 902MHz to 928MHz Operating Frequency Range
- ◆ +2.7V to +5.5V Single-Supply Operation

### Ordering Information

PART	TEMP. RANGE	IC PACKAGE
MAX2232EVKIT	-40°C to +85°C	16 Pwr-QSOP
MAX2233EVKIT	-40°C to +85°C	16 Pwr-QSOP

### Component List

DESIGNATION	QTY	DESCRIPTION
C1	1	10pF ±5% ceramic cap (0603) Murata GRM39COG100D050 or Taiyo Yuden UMK107CH100DZ
C2, C21	2	0.1µF ±10% ceramic caps (0603) Murata GRM39X7R104K016 or Taiyo Yuden EMK107BJ104KA
C3	1	3.9pF ±0.25pF porcelain capacitor Murata MA183R9C
C4	1	0.1µF ±10% ceramic cap (0805) Murata GRM40X7R104K025 or Taiyo Yuden TMK212 B104KT
C5, C11, C16	3	100pF ±5% ceramic caps (0805) Murata GRM40COG101J050 or Taiyo Yuden UMK212CH101JQ
C6, C17, C23	3	0.01µF ±10% ceramic caps (0805) Murata GRM40X7R103K050 or Taiyo Yuden UMK212 B103KQ
C7, C12, C24	3	0.22µF ±10% ceramic caps (0805) Murata GRM40X7R224K016 or Taiyo Yuden EMK212BJ224KG
C8, C13	2	100pF ±5% ceramic caps (0402) Murata GRM36COG101J050 or Taiyo Yuden UMK105CH101JW
C9	1	2200pF ±10% ceramic cap (0603) Murata GRM39X7R222K050 or Taiyo Yuden UMK107 B222KZ
C10, C14	2	0.01µF ±10% ceramic caps (0402) Murata GRM36X7R103K016 or Taiyo Yuden EMK105 B103KW

DESIGNATION	QTY	DESCRIPTION
C15, C25	2	10µF, 16V tantalum capacitors AVX TAJC106K016
C18, C19	2	100pF ±5% ceramic caps (0603) Murata GRM39COG101J050 or Taiyo Yuden UMK107CH101JZ
C20	1	0.1µF ±20% ceramic cap (0402) Taiyo Yuden LMK105BJ104MV
C26	0	Not installed
B1, B2	2	0Ω ±5% resistors (0805)
L1	1	1.65nH ±10% air core inductor Coilcraft 0906-2K
L2	1	39nH ±5% inductor (0603) Murata LQG11A39NJ00
L3	1	12nH ±5% inductor (0603) Murata LQG11A12NJ00
R1	1	49.9Ω ±1% resistor (0402)
RFIN, RFOUT	2	SMA connectors (PC edge mount) EF Johnson 142-0701-801 or Digi-Key J502-ND
JU1, JU2	2	3-pin headers
None	2	Shunts (JU1, JU2)
VCC, GND	2	Test points Mouser 151-203
U1	1	MAX2232EEE (16-pin Pwr-QSOP) (for MAX2232 EV kit)
	1	MAX2233EEE (16-pin Pwr-QSOP) (for MAX2233 EV kit)

Evaluate: MAX2232/MAX2233

# MAX2232/MAX2233 Evaluation Kits

## Component Suppliers

SUPPLIER	PHONE	FAX	WEB
Coilcraft	847-639-6400	847-639-1469	www.coilcraft.com
Murata	814-237-1431	814-238-0490	www.murata.com
Taiyo Yuden	408-573-4150	408-573-4159	www.t-yuden.com

## Quick Start

The MAX2232/MAX2233 EV kits are fully assembled and factory tested. Follow the instructions in the *Connections and Signal Conditions* section for proper device evaluation.

## Test Equipment Required

This section lists the test equipment recommended to verify the operation of the MAX2232/MAX2233. It is intended as a guide only and some substitutions are possible:

- One DC power supply capable of supplying a minimum of 1A from +2.7V to +5.5V
- One DC power supply capable of supplying a minimum of 50mA from +2.7V to +5.5V
- HP 438A power meter or equivalent
- Digital multimeter (DMM) to monitor DC supply voltage and supply current (if desired)
- HP 8648C RF signal generator or equivalent 50Ω sine wave source
- One 50Ω SMA cable (RG-58A/U or equivalent)
- One 20dB fixed attenuator capable of handling +30dBm

## Connections and Signal Conditions

- 1) Verify the DC power supply is set to less than +5.5V and is turned off before connecting the supply to the EV kit. A good starting point is +3.6V. Connect the power supply between VCC and GND, and turn the power supply on.
- 2) Verify jumper JU1 is in the VCC position, D1 / SHDN = VCC. This enables the PA. Verify jumper JU2 is in the VCC position, D0 / CTRL = VCC. This places both the MAX2232 and MAX2233 in peak output power mode. If desired, connect a second DC power supply to the center pin of jumper JU2 after removing the shunt from JU2. This allows for experimentation with

the analog gain control feature of the MAX2232. Set the CTRL voltage above 2.2V (do not exceed VCC) for peak output power operation.

- 3) Connect the 20dB fixed attenuator to the EV kit's RFOUT SMA connector. Connect the attenuator's output to the power meter's input. The 20dB attenuator protects against overloading the input of the power meter. Again, it is useful to measure the actual loss of the attenuator with a properly calibrated power meter. This is important for accurate output power and power-added efficiency (PAE) measurements. Enter the measured attenuation, plus 0.1dB to compensate for SMA connector loss, as an offset into the power meter.
- 4) Use a 50Ω SMA cable to connect a signal generator to the RFIN SMA connector of the EV kit. Make sure that the RF output of the signal generator is off. Set the signal generator's output frequency to 915MHz, and adjust the output power level to deliver 0dBm to the RFIN SMA connector of the EV kit. It is good practice to use a properly calibrated power meter to measure the power at the end of the cable prior to connecting to the EV kit. This will account for cable losses and signal generator inaccuracies to guarantee that the correct signal level is delivered to the PA. Consult the power meter's operating manual for proper calibration procedures.

## Analysis

- 1) Turn on the RF output of the signal generator. The power meter should nominally read +24dBm.
- 2) For the MAX2232, adjust the CTRL voltage from 0.6V to 2.2V to vary the PA's output power from 0dBm to +24dBm. Adjust the CTRL voltage below 0.4V or short jumper JU2 to ground to place the device in standby mode. Refer to Table 1 in the MAX2232/MAX2233 data sheet for operating modes.
- 3) For the MAX2233, adjust the logic-level signals to vary the output power in 10dB steps. Refer to Table 2 in the MAX2232/MAX2233 data sheet for programming output power levels.

# MAX2232/MAX2233 Evaluation Kits

Evaluate: MAX2232/MAX2233

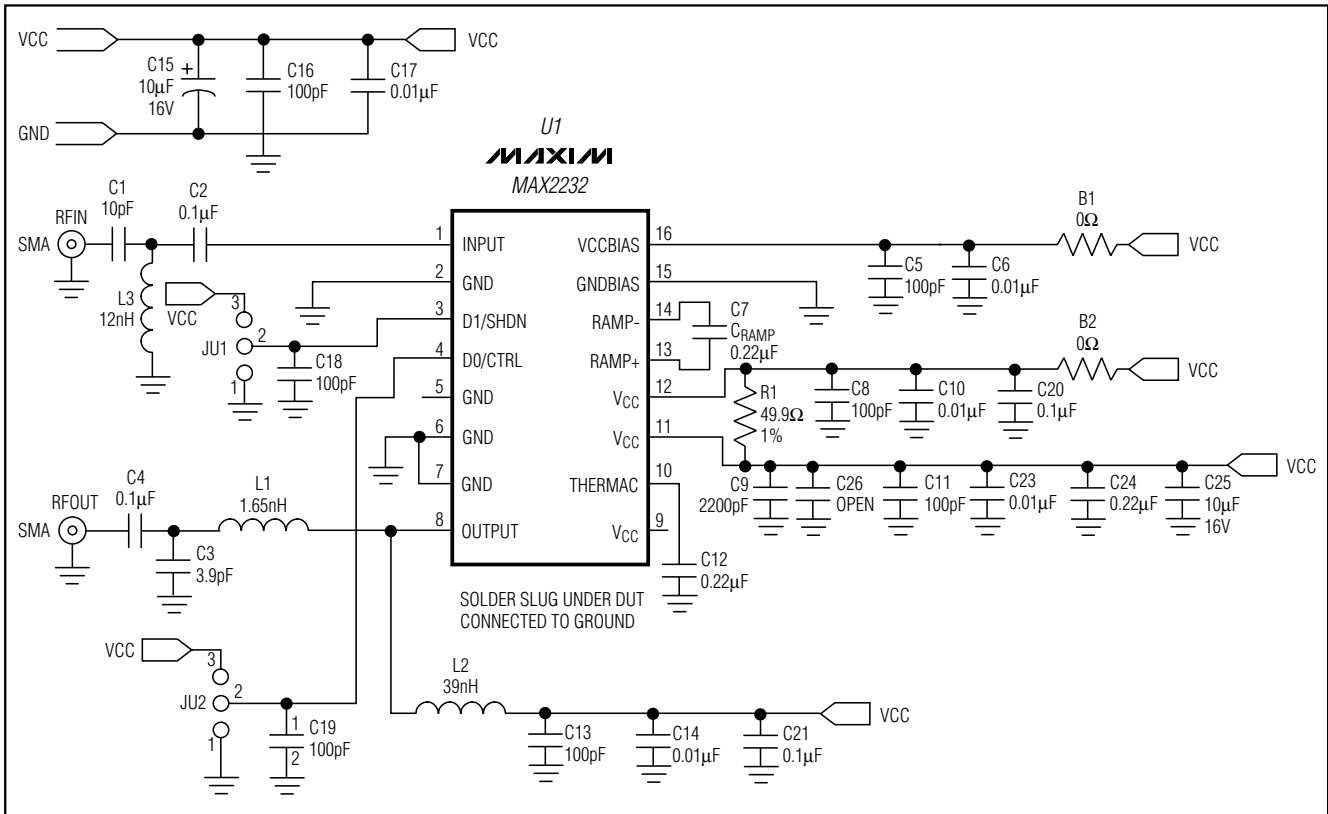


Figure 1. MAX2232/MAX2233 EV Kits Schematic

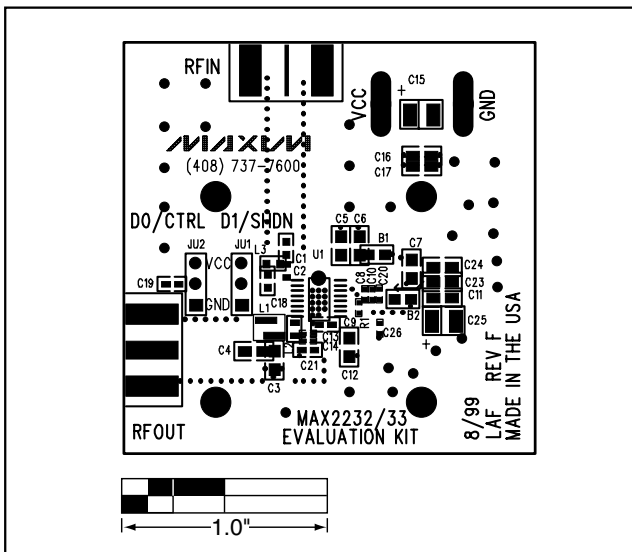


Figure 2. MAX2232/MAX2233 EV Kits Component Placement Guide—Component Side

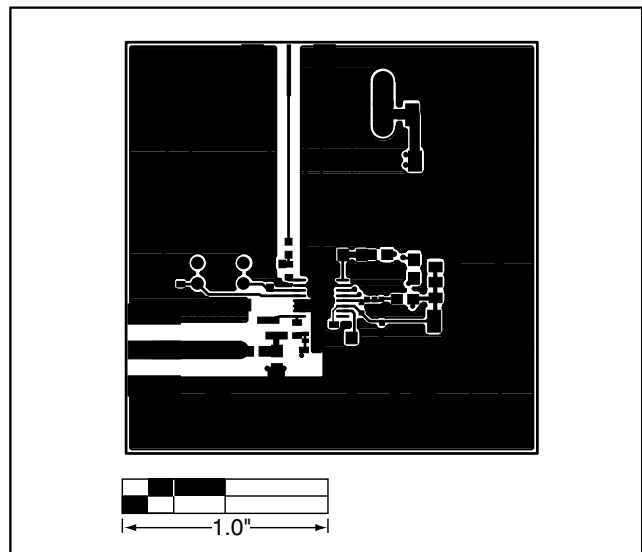


Figure 3. MAX2232/MAX2233 EV Kits PC Board Layout—Component Side Metal

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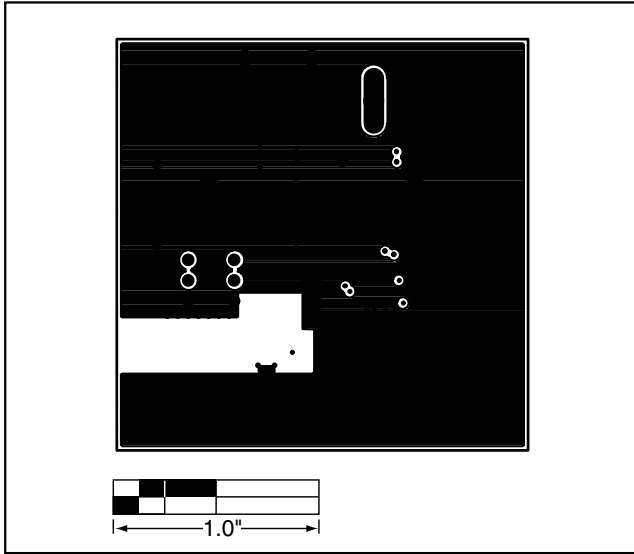


Figure 4. MAX2232/MAX2233 EV Kits PC Board Layout—Ground Plane

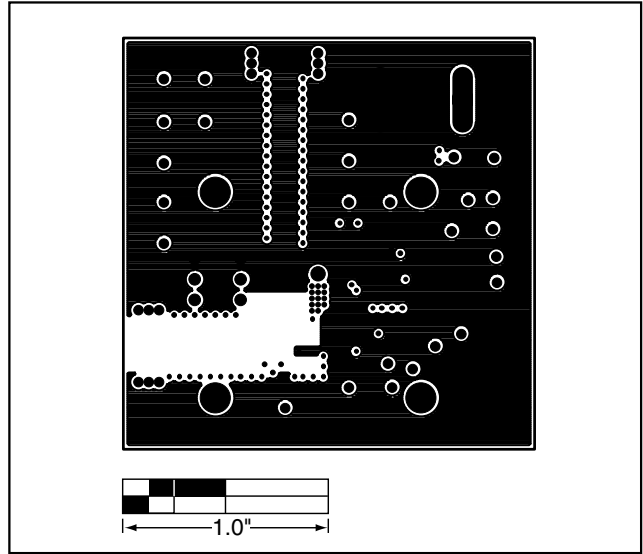


Figure 5. MAX2232/MAX2233 EV Kits PC Board Layout—Power Plane

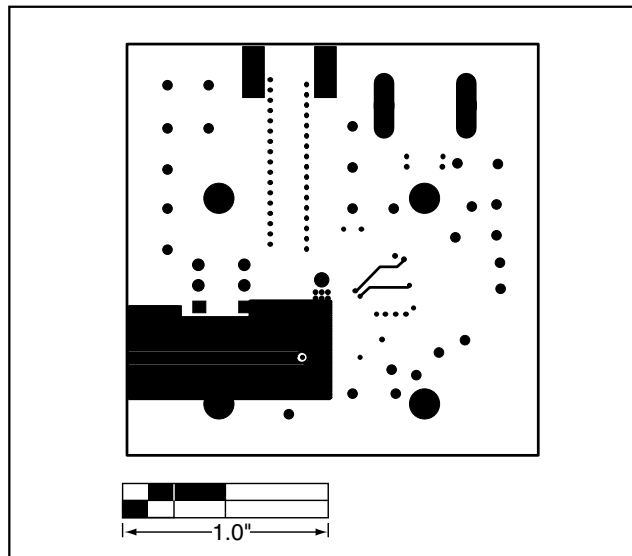


Figure 6. MAX2232/MAX2233 EV Kits PC Board Layout—Solder Side

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