



# MAX2310/MAX2314 Evaluation Kits

## General Description

The MAX2310/MAX2314 evaluation kits (EV kits) simplify testing of the MAX2310/MAX2314 IF receivers. These kits allow evaluation of the devices' variable-gain amplifier (VGA), I/Q demodulator, dual-band voltage-controlled oscillators (VCOs), synthesizer, 3-wire programming interface and power-management features. Figures 1 and 2 show MAX2310 and MAX2314 kit schematics, respectively.

The EV kits provide 50Ω SMA connectors for all signal inputs and outputs. A varactor-based tank circuit is provided for the on-chip VCO and can be tuned by a potentiometer or an external voltage or phase locked with the on-chip phase-locked loop (PLL). PC board pads (J12, J13, J14, J15) are available for installing low-inductance oscilloscope probe points, if desired.

## Features

- ◆ 3-Wire Interface
- ◆ Differential Baseband Outputs
- ◆ +2.7V to +5.5V Single-Supply Operation
- ◆ SMA Connectors on All Signal Ports
- ◆ Low-Power Shutdown Mode
- ◆ PC Control Software (available at [www.maxim-ic.com](http://www.maxim-ic.com))

## Ordering Information

PART	TEMP. RANGE	IC PACKAGE
MAX2310EVKIT	-40°C to +85°C	28 QSOP
MAX2314EVKIT	-40°C to +85°C	28 QSOP

**Note:** To evaluate the MAX2312 or MAX2316, order the MAX2312EVKIT or MAX2316EVKIT.

## Component List

DESIGNATION	QTY	DESCRIPTION
C1, C33, C34	3	47pF ±10%, 25V min ceramic capacitors (0402)
C2	1	5pF ±0.1pF, 25V min ceramic capacitor (0402)
C3, C4	2	18pF ±10%, 25V min ceramic capacitors (0402)
C5	1	1.5pF ±0.1pF, 25V min ceramic capacitor (0402) (MAX2310)
C6, C7	2	12pF ±10%, 25V min ceramic capacitors (0402) (MAX2310)
C8, C12, C23, C24, C25	5	330pF ±10%, 25V min ceramic capacitors (0402)
C9, C10, C11, C13, C14, C15, C18, C21, C22, C28, C35, C37, C38, C42, C46	15	0.01μF ±10%, 25V min ceramic capacitors (0402)
C16, C26, C31, C32, C36, C39, C40, C41, C45	9	Open
C17	1	10pF ±10%, 25V min ceramic capacitor (0402)
C19, C20	2	8pF ±10%, 25V min ceramic capacitors (0402)

DESIGNATION	QTY	DESCRIPTION
C27	1	10μF ±10%, 16V min tantalum cap AVX TAJC106K016
C29	1	0.033μF ±10%, 25V min ceramic capacitor (0402)
C30	1	3300pF ±10%, 25V min ceramic capacitor (0402)
D1	1	Open
D3	1	Varactor diode Alpha SMV1255-003
D4	1	Varactor diode (MAX2310) Alpha SMV1255-003
INTF2300 Interface Board	1	3-wire programming and interface board
L1	1	68nH inductor Coilcraft 0805CS-680 XJBC
L2	1	18nH inductor (MAX2310) Coilcraft 0805CS-220 XJBC
L3	1	1μH inductor Coilcraft 1008CS-102 XKBC
L4	1	180nH inductor Coilcraft 0805CS-181TKBC (MAX2310) 680nH inductor Coilcraft 0805CS-681TKBC (MAX2314)
L5	1	270nH inductor Coilcraft 0805CS-271 XKBC



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## Component List (continued)

DESIGNATION	QTY	DESCRIPTION
Q1	1	Open
R1, R10, R12, R31-R34	6	0Ω resistors (0402)
R11	1	0Ω resistors (0402) (MAX2310)
R4, R5	2	10kΩ ±5% (0402) (MAX2310)
R2, R3, R23	3	10kΩ ±5% resistors (0402)
C43	1	1000pF ±10% (0402) (MAX2314)
R6	1	100Ω ±5% resistor (0402) (MAX2310)
R8, R14, R16, R18	4	100Ω ±5% resistors (0402)
R7	1	49.9Ω ±1% resistor (0402)
R9	1	680Ω ±1% resistor (0402)
R13, R24	2	10kΩ Bourns variable resistors Digi-Key 3296W-104-ND
R15, R17, R19, R20, R21, R25, R27-R30, R35	11	Open
R22, R26	2	47kΩ ±5% resistors (0402)
T1	1	Balun transformer Toko DB458-1011
U1	1	Maxim MAX2310EEI or MAX2314EEI IC
None	1	MAX2310/MAX2314 circuit board
None	1	MAX2310/MAX2312/MAX2314/MAX2316 data sheet
None	1	20-pin ribbon cable

## Component Suppliers

SUPPLIER	PHONE	FAX
Alpha Industries	617-935-5150	617-933-2359
AVX	803-946-0690	803-626-3123
Coilcraft	847-639-6400	847-639-1469
Digi-Key	218-681-6674	218-681-3380
Murata	949-852-2001	949-852-2002
Toko	708-297-0070	708-699-1194

## Quick Start

The MAX2310/MAX2314 EV kits are fully assembled and factory tested. Follow the instructions in the *Connections and Setup* section.

## Table 1. Recommended Equipment

EQUIPMENT	DESCRIPTION
RF Signal Generators (2)	HP 8648A or equivalent. Capable of delivering -70dBm to -10dBm of output power in the 10MHz to 500MHz frequency range. One generator is required to test the receive signal path and the other is for the reference frequency.
Oscilloscope	For viewing the demodulator outputs, 3-wire serial interface, and other functions
Power Supply	Capable of providing at least 100mA at +2.7V to +5.5V
Additional Voltage Source	For external control of VGA functions (optional)
Personal Computer	486DX33 or better, with Windows95 <sup>®</sup> or Windows98 <sup>®</sup> operating system and a functional parallel port.
INTF2300 Interface Board	Provided with EV kit

*Windows95 and Windows98 are registered trademarks of Microsoft Corp.*

## Recommended Test Equipment

The test equipment recommended to verify MAX2310/MAX2314 operation is listed in Table 1. This list is intended as a guide only; substitutions may be possible.

## Connections and Setup

The following sections provide instructions for getting the EV kit running in both the CDMA and FM modes.

### CDMA Mode

Perform the following steps to evaluate the MAX2310/MAX2314 in CDMA mode:

- 1) Verify that shunts JU3, JU10, and JU11 are in place.
- 2) Connect the INTF2300 interface cable as shown in Figure 8. (Pin 1 of the interface cable corresponds to the red wire; pin 1 is designated in silk screen on each of the PC boards.)
- 3) Connect a +2.75V power supply to the VCC and GND terminals.
- 4) Install and run Maxim's CDMA control software (available at [www.maxim-ic.com](http://www.maxim-ic.com)). Click on the Maxim CDMA software on the Windows task bar. On the IC selection form, click on the MAX2310/MAX2314 control button.

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- 5) With the MAX2310/MAX2314 control screen active, bring the SHDN pin high by clicking on the "H" control button located near the middle of the screen.
- 6) (MAX2310 only) With the MAX2310/MAX2314 control screen active, bring the MODE pin high by clicking on the "H" control button located near the middle of the screen. The mode pin is floated on the MAX2314 board. In the control register set the DIV\_SEL bit and the VCO\_SEL bit to "0." Click on the "send data" button.
- 7) Connect a function generator to the REF port, configured for a sine wave with a 19.68MHz frequency and a -10dBm amplitude. (The REF port is 50Ω terminated.)
- 8) Connect a signal generator with 210.48MHz (MAX2310) or 85.48MHz (MAX2314) at -66dBm and apply it to the CDMA differential port.
- 9) Set VGC to 2.5VDC by rotating potentiometer R13. Optionally, an external VGC voltage may be used by removing jumper JU3 and applying a DC voltage to JU2.
- 10) Configure an oscilloscope to measure a high-impedance (10kΩ), 1Vp-p, 100kHz differential waveform. Connect it to the I or Q output.

Voltage gain can be calculated by:

$$\text{Gain} = 20\log\left(\frac{V_{\text{OUTp-p}}}{2\sqrt{2}V_{\text{IN}}}\right)$$

$$V_{\text{IN(RMS)}} = \sqrt{1/2 \times 10\left(\frac{\text{PIN(dBm)}}{10}\right)}$$

Gain = approximately 60dB

**Note:** The balun loss is not taken into account. This loss is typically less than 0.5dB.

## FM Mode

Perform the following steps to change to FM mode:

- 1) With the MAX2310/MAX2314 control screen active, bring the MODE pin low by clicking on the "L" control button located near the middle of the screen (MAX2310). Set the IN\_SEL bit to "0." Click on the "send data" button (MAX2314).
- 2) Connect a signal generator with 85.48MHz at -66dBm and apply it to the FM port.
- 3) Configure an oscilloscope to measure a high-impedance (10kΩ), 1Vp-p, 100kHz, differential waveform. Connect it to the I or Q output.

## Adjustments and Control

### VGC Adjust

The MAX2310/MAX2314 EV kits are configured with a 10kΩ trim pot for setting and adjusting the VGA gain. An external supply can be used by removing the 2-pin shunt (JU3) and by directly connecting the supply to JU2. The VGC voltage must be clean to minimize undesired amplitude modulation.

### Interface Control

The interface port is designed to use a 20-pin ribbon cable. Ten pins are signal lines, and the other 10 pins are digital grounds. Pin 1 of the interface cable is red. Pin 1 is also designated in silk screen on each of the PC boards.

## Detailed Description

The following sections cover the EV kits' circuit blocks in detail. (Refer to the MAX2310/MAX2312/MAX2314/MAX2316 data sheet for additional information.)

### CDMA Inputs

The CDMA+ and CDMA- pins are differential inputs to the VGAs of the MAX2310/MAX2314. The EV kit is configured for single-ended (50Ω) operation at the CDMA differential input connector. The on-board balun converts this input to a differential signal for the MAX2310/MAX2314. The impedance is set by the combination of L4, R9, C19, C20, and the 4:1 impedance ratio of the input balun.

### FM Inputs

The FM+ and FM- pins are differential inputs to the VGAs of the MAX2310/MAX2314. The EV kit is configured for single-ended (50Ω) operation at the FM connector. The matching network transforms 50Ω to 850Ω.

### REF Inputs

The REF port is AC-coupled and terminated for use with a 50Ω signal source.

### I/Q Outputs

The I/Q outputs are self-biased baseband outputs.

## PC Board Layout/Construction

The MAX2310/MAX2314 EV kits can serve as board layout guides. Keep PC board trace lengths as short as possible to minimize parasitics. Keep decoupling capacitors close to the device, with a low-inductance via connection to the ground plane.

The MAX2310/MAX2314 EV kits' PC boards use 14mil-wide traces for 50Ω traces. The PC board has an 8mil-layer profile on FR4, with a 4.5 dielectric and 75mil trace-to-ground-plane spacing.

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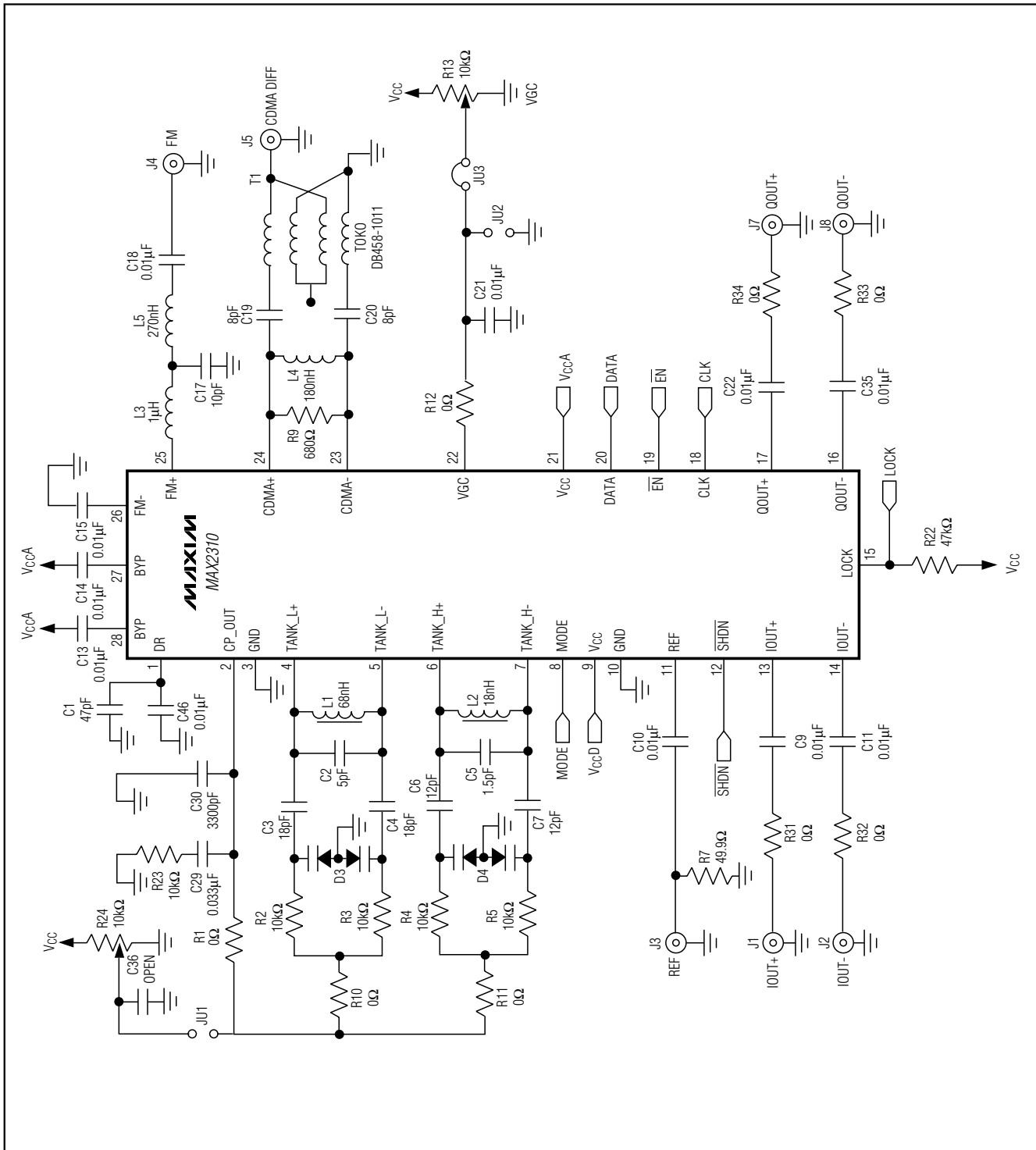


Figure 1. MAX2310EV Kit Schematic

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Evaluate: MAX2310/MAX2314

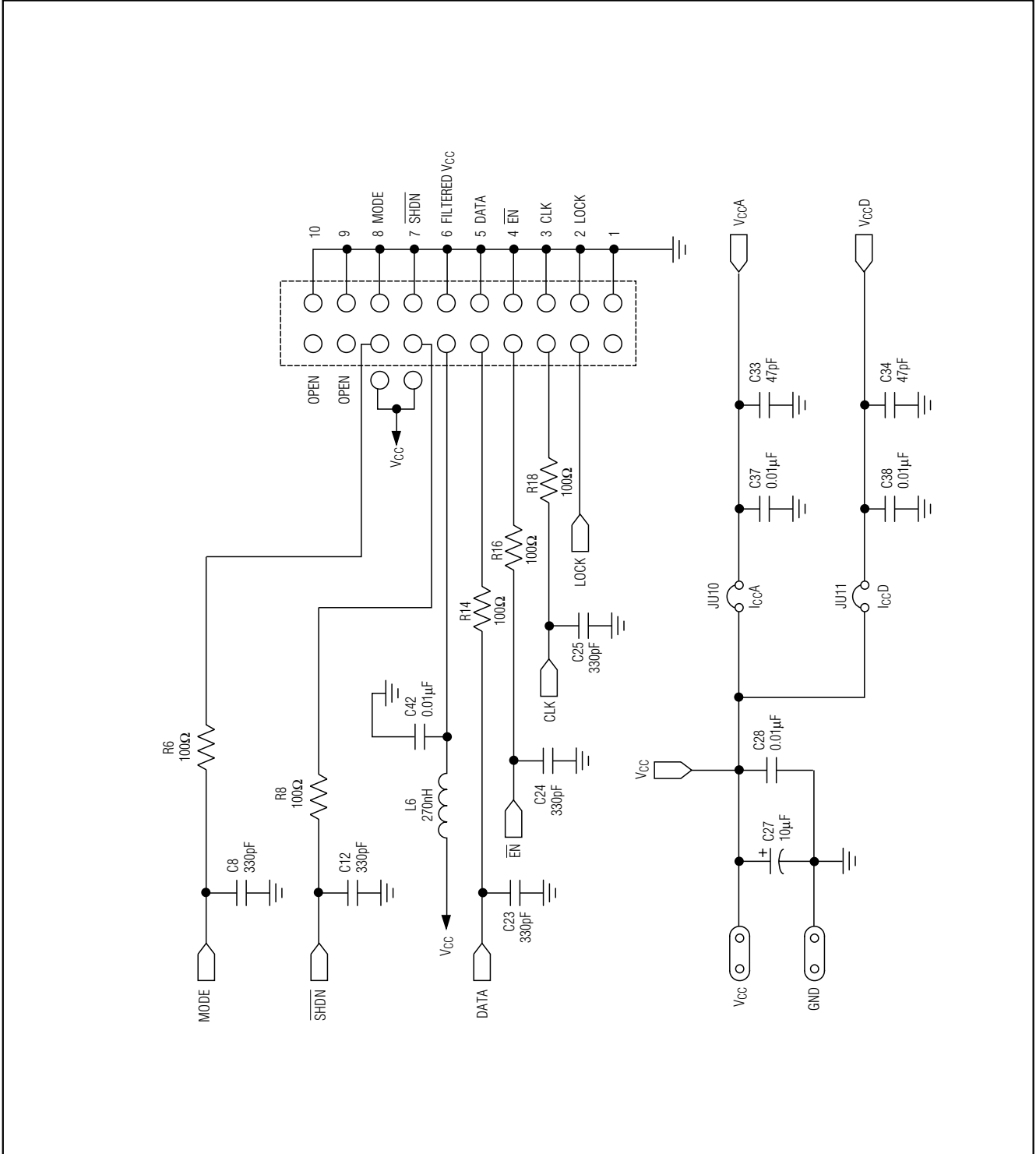


Figure 1. MAX2310EV Kit Schematic (continued)

# MAX2310/MAX2314 Evaluation Kits

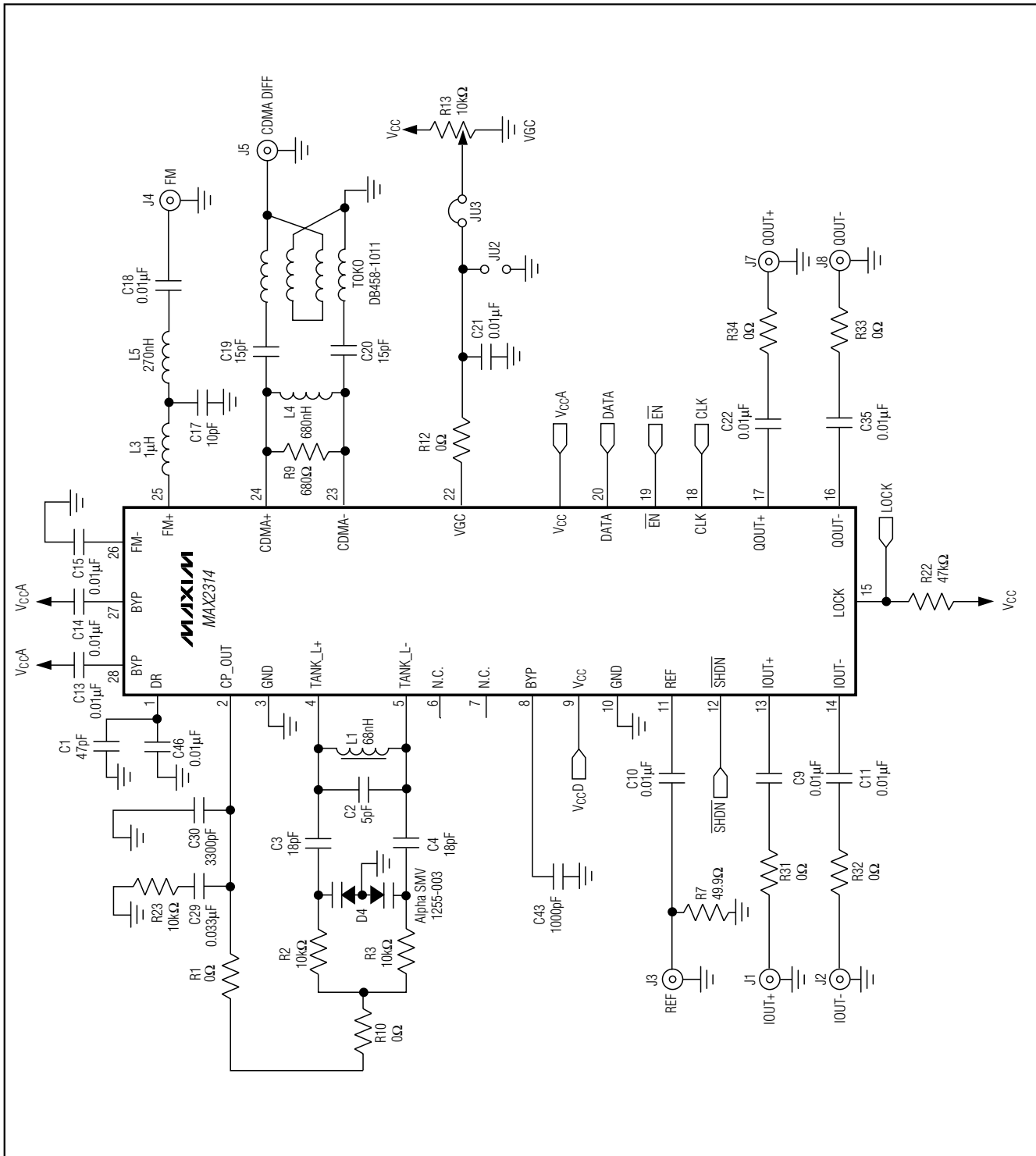


Figure 2. MAX2314EV Kit Schematic

# MAX2310/MAX2314 Evaluation Kits

Evaluate: MAX2310/MAX2314

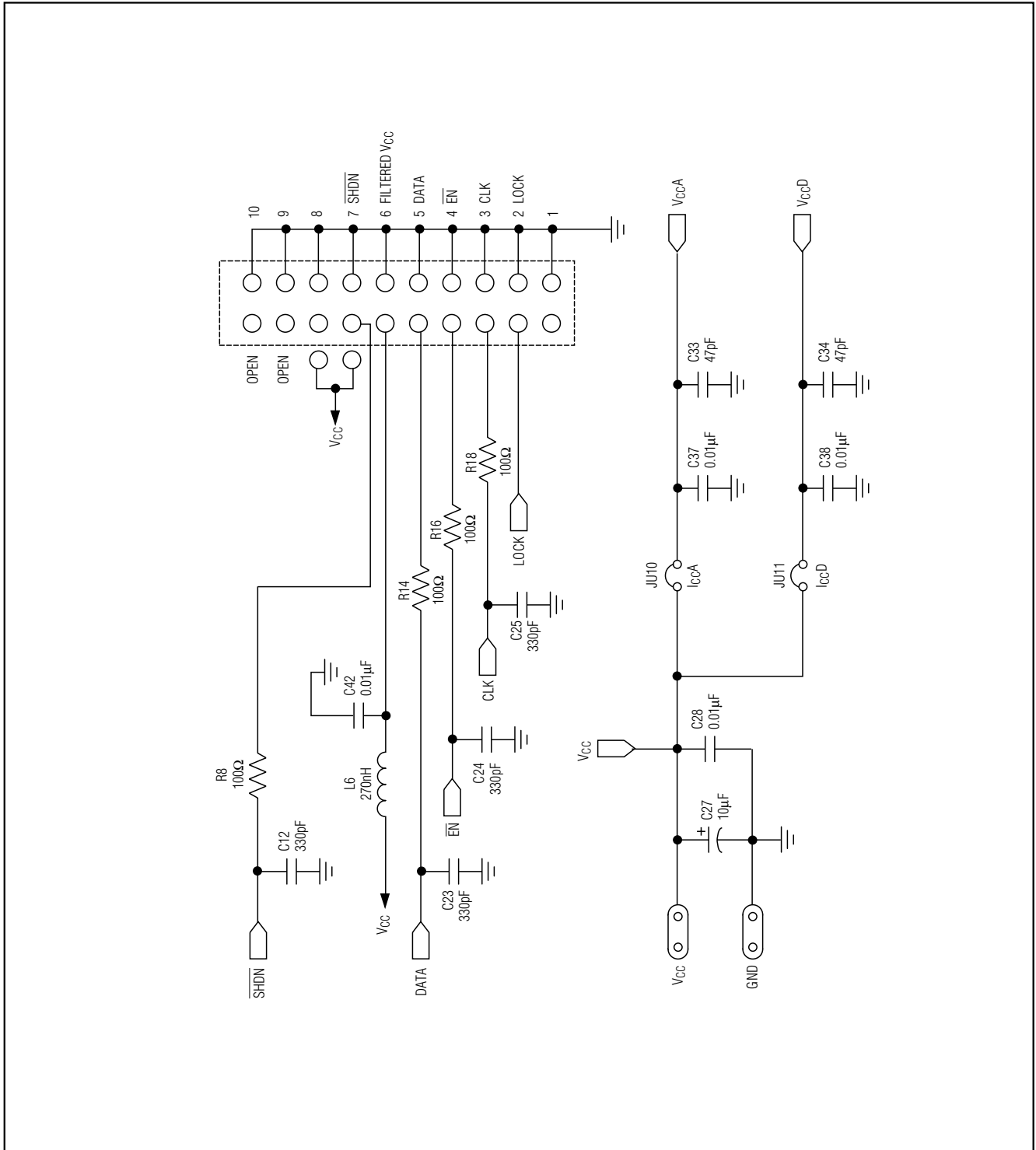


Figure 2. MAX2314EV Kit Schematic (continued)

# MAX2310/MAX2314 Evaluation Kits

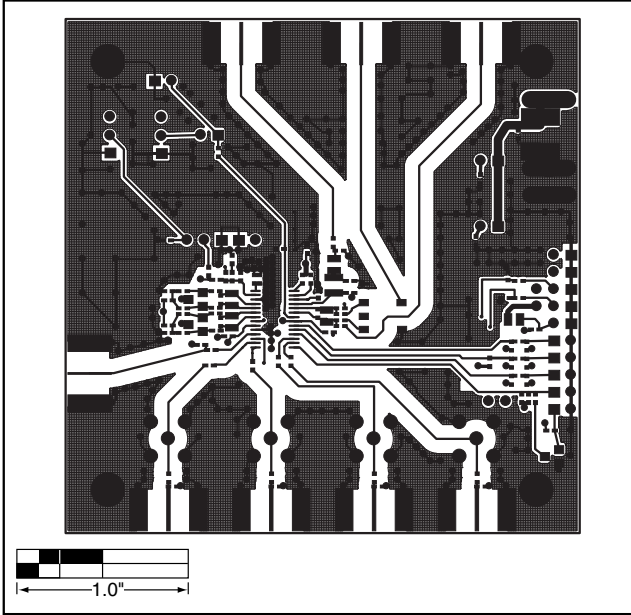


Figure 3. MAX2310/MAX2314 EV Kit Component Side—Layer 1

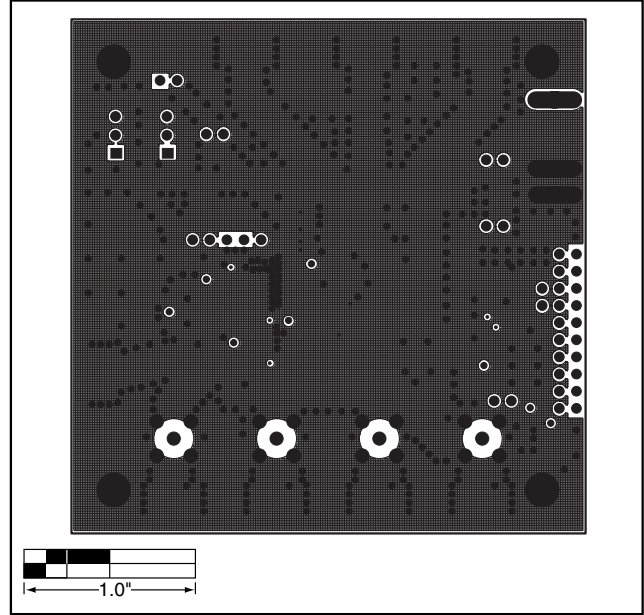


Figure 4. MAX2310/MAX2314 EV Kit Ground Plane—Layer 2

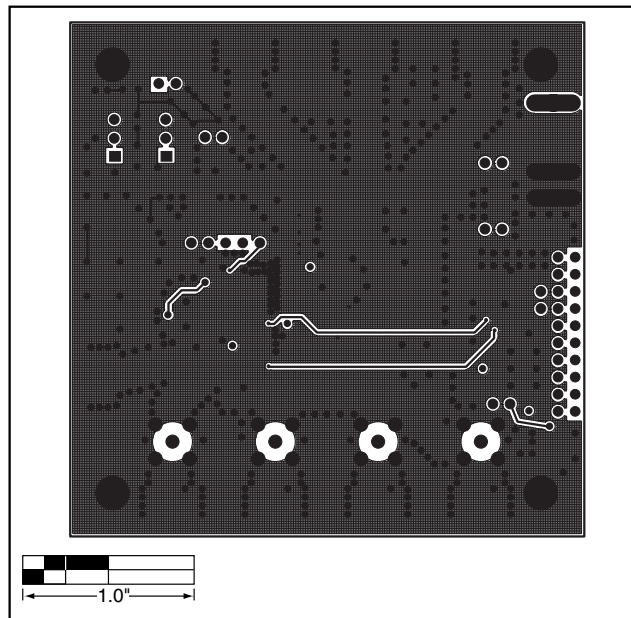


Figure 5. MAX2310/MAX2314 EV Kit Inner Layer—Layer 3



# MAX2310/MAX2314 Evaluation Kits

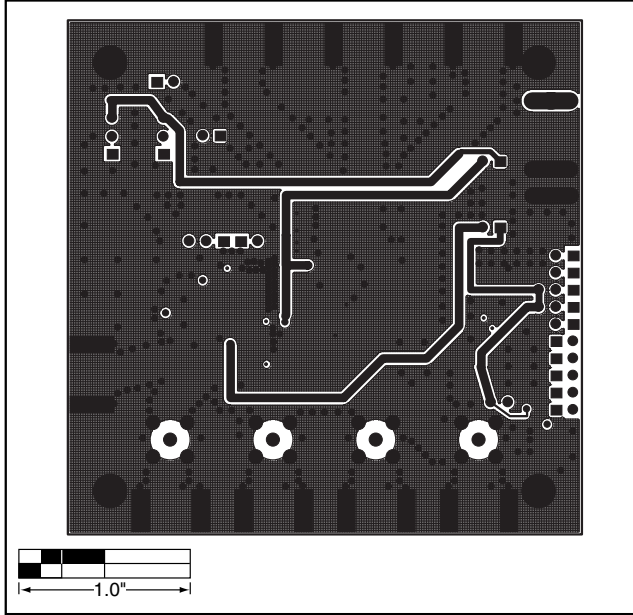


Figure 6. MAX2310/MAX2314 EV Kit Solder Side—Layer 4

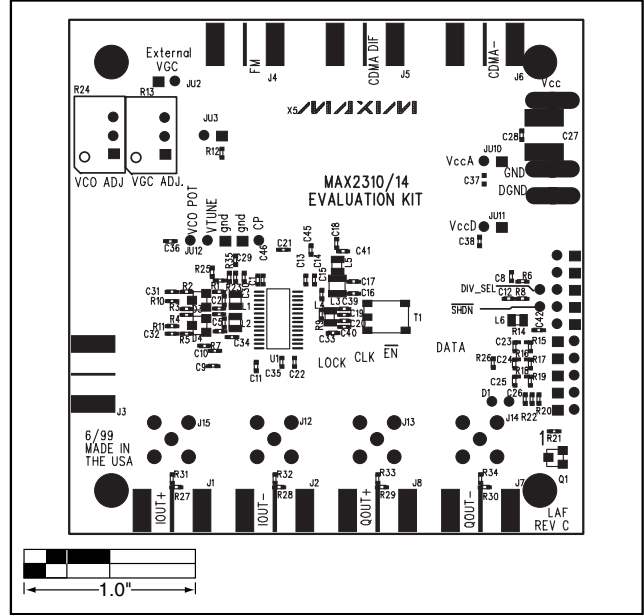


Figure 7. MAX2310/MAX2314 EV Kit Silk Screen

Evaluate: MAX2310/MAX2314

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## INTF2300

### Interface Board

The INTF2300 interface board is used to control the 3-wire interface of a device under test from the parallel port of a PC. This board level translates 5V logic from the PC to V<sub>CC</sub> of the device under test. The INTF2300

also provides buffering and EMI filtering. The recommended operating supply voltage range is +2.7V to +3.6V. For operation of the MAX2310/MAX2314 above +3.6V, jumper JU1 may be removed and an external supply voltage of +3.6V may be applied between V<sub>CC</sub> (pin 2) and GND (pin 1) (Figure 8).

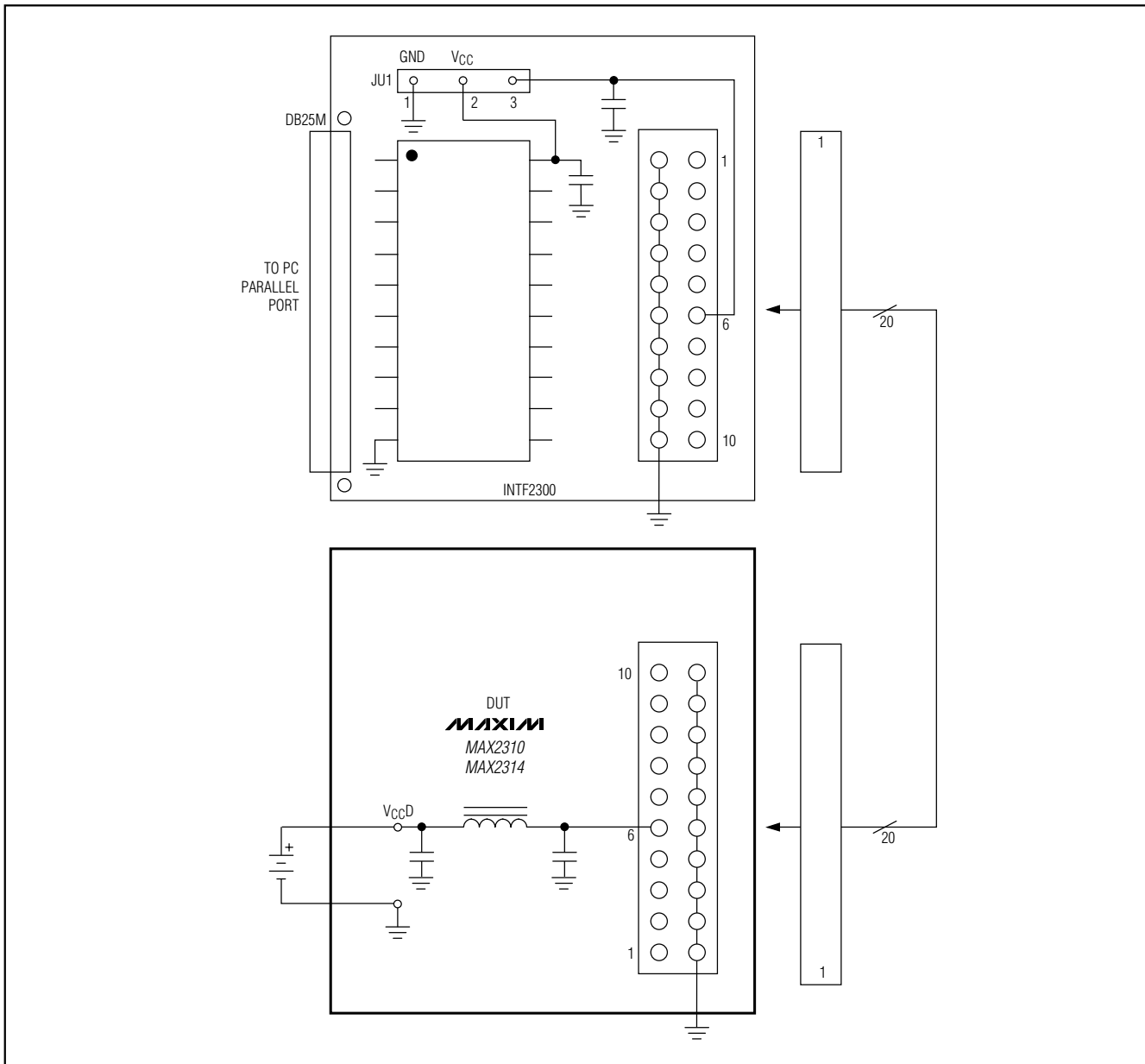


Figure 8. INTF2300 Interface Board

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