General Description

The MAX2839AS evaluation kit (EV kit) simplifies testing of the MAX2839AS receive and transmit performance in WiMAXTM applications operating in the 2.3GHz to 2.7GHz band. The EV kit provides 50 Ω SMA connectors for all RF and baseband inputs and outputs. Differential to singleended and single-ended to differential line drivers are provided to convert the differential I/Q baseband inputs and outputs to single ended.

Component List

DESIGNATION	QTY	DESCRIPTION
+5V, -5V, VBAT, VCCAUX	4	Test points, PCB red Keystone 5010
B0–B7, CSB, DIN, DOUT, ENABLE, LOAD, PABIAS, RSSI, RXBBIA+, RXBBIA-, RXBBQA+, RXBBQA-, RXBBQB+, RXBBQA-, RXHP, SCLK, TPCLKOUT, TUNEM, TUNEP, TXBBI+, TXBBI-, TXBBQ+, TXBBQ-, TXRX, VCM	34	Test points, PCB mini-red Keystone 5000
CLKOUT, FREF, RXBBIA, RXBBIB, RXBBQA, RXBBQB, RXINA, RXINB, TXBBI, TXBBQ, TXRF	11	SMA edge-mount connectors, round Johnson 142-0701-801
C1, C3, C8, C21, C22, C24, C30, C36, C38, C41, C42, C44, C49, C76	0	Open, ±10%, 0402 capacitors Leave site open
C2, C15	2	2.2pF ±0.1pF, 0402 capacitors Murata GRM1555C1H2R2B
C4–C7, C10, C13, C17, C18, C35, C40, C43, C45–C48, C50, C51, C52, C59, C60, C67	21	0.1µF ±10%, 0402 capacitors Murata GRM155R61C104K
C9, C16, C19, C70, C89	5	22pF ±5%, 0402 capacitors Murata GRM1555C1H220J

Features

- On-Board Line Drivers and Voltage References
- 50Ω SMA Connectors on All RF and Baseband Ports

Ordering Information

PART	TYPE
MAX2839ASEVKIT+	EV Kit

+Denotes lead(Pb)-free and RoHS compliant.

DESIGNATION	QTY	DESCRIPTION
C11, C23, C26, C32, C74, C75, C87, C88	8	0.01µF ±10%, 0402 capacitors Murata GRM155R71C103K
C12, C53, C55, C66	4	10µF ±10%, 0805 capacitors Murata GRM21BR61A106K
C14	1	2200pF ±10%, 0402 capacitor Murata GRM155R71H222K
C25, C77	2	1000pF ±10%, 0402 capacitors Murata GRM155R71H102K
C27	1	2.2µF ±10%, 0805 capacitor Murata GRM21BR71A225K
C29, C86	2	1.0μF ±10%, 0402 capacitors Murata GRM155R60J105K
C33	1	100pF ±5%, 0402 capacitor Murata GRM155C1H101J
C37, C39	2	2.2µF ±10%, 0603 capacitors Murata GRM188R61A225K
C54, C56	2	1.8pF ±0.1pF, 0402 capacitors Murata GRM1555C1H1R8B
C68, C69	2	4.3pF ±0.1pF, 0402 capacitors Murata GRM1555C1H4R3B
C79	1	120pF ±5%, 0402 capacitor Murata GRM1555C1H121J
GND1, GND2	2	Test points, PCB black Keystone 5011
J17	0	Not installed, 2 x 13-pin header
J18	1	DB25 horizontal male PCB connector AMP 5747238-4



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Component List (continued)

DESIGNATION	QTY	DESCRIPTION
JPB0–JPB7, JPENABLE, JPLOAD, JPRXHP, JPTXRX, RXBBBUF1, RXBBBUF2, VBAT_ LDO, SYNTH_LDO	16	1 x 3-pin headers Sullins PEC36SAAN
JPCSB, JPDIN, JPDOUT, JPSCLK	0	Not installed, 1 x 3-pin headers
L1, L6, L13–L16	0	Do not install, ±0%, 0402 inductors Murata LQP15MN2N7B02
L2, L4, L5, L7, L9, L10	0	Not installed, inductors
L3, L8	2	3.6nH ±0.1nH, 0402 inductors Murata LQP15MN3N6B02
R1, R7	2	200Ω ±1%, 0402 resistors*
R2, R5, R6, R38	4	205Ω ±1%, 0402 resistors*
R3, R10	2	226Ω ±1%, 0402 resistors*
R4, R26, R40, R57	4	49.9Ω ±1%, 0402 resistors*
R8, R11, R12, R14–R19, R24, R25, R28, R30, R31, R35, R42, R45, R47, R48, R50, R52, R53, R54, R58, R59, R60	0	Open, ±1%, 0402 resistors Leave site open
R9, R13, R23, R27, R29, R32, R39, R41, R55, R56	10	0Ω ±0%, 0402 resistors*
R20, R51	2	750Ω ±1%, 0402 resistors*
R21, R22	2	61.9Ω ±1%, 0402 resistors*
R33, R36	2	$1k\Omega \pm 0\%$, trimmer potentiometers Bourns 3296W-1-102LF
R34	1	$576\Omega \pm 1\%$, 0402 resistor; use lead-free parts only
R37	1	$332\Omega \pm 1\%$, 0402 resistor; use lead-free parts only
SYNTH_LDO	1	1 x 3-pin header Sullins PEC36SAAN

DESIGNATION	QTY	DESCRIPTION			
SYNTH_LDO	1	Shorting jumper Sullins SSC02SYAN			
T1, T2, T4	3	3.6GHz RF baluns Murata LDB182G5010G-120			
U1, U3	2	Low-noise-differential ADC drivers ADI AD8139ARDZ			
U2, U5, U6, U15	4	Maxim MAX4444ESE+ (16 SO)			
U4	1	Maxim MAX2839ASEWO+T			
U7	1	Low-dropout linear regulator Maxim MAX8887EZK29+ (5 SOT23)			
U8, U9	2	SN74LVTH244ADB Texas Instruments SN74LVTH244ADBR			
U10	1	Low-dropout voltage reference Maxim MAX6062AEUR+ (3 SOT23)			
U11	1	40MHz TCXO Kyocera KT3225N40000ECV28ZAA			
U13	1	Ultra-low-noise LDO Maxim MAX8510EXK29+ (5 SC70)			
VCCCP, VCCLNA_A, VCCLNA_B, VCCRXBB1, VCCRXBB2, VCCRXMX, VCCTCXO, VCCTXMX, VCCVCO, VCCXTAL, VCC_DB, VCC_PAD, VCC_REF	0	Not installed, 1 x 2-pin headers			
Y1	0	Not installed, quartz crystal			
_	1	PCB: MAX2839AS EVALUATION KIT+			

*Use lead-free parts only.

Component Suppliers

SUPPLIER	PHONE	WEBSITE
Analog Device	800-262-5643	www.analog.com
Digi-Key Corp.	800-344-4539	www.digikey.com
Keystone Electronics	800-221-5510	www.keyelco.com
Murata Americas	770-436-1300	www.murataamericas.com

Note: Indicate that you are using the MAX2839AS when contacting these component suppliers.

Quick Start

The MAX2839AS EV kit is fully assembled and factory tested. Follow the instructions in the *Connections and Setup* section to test the devices.

Recommended Test Equipment

This section lists the recommended test equipment to verify the operation of the MAX2839AS. It is intended as a guide only and substitutions may be possible.

- DC supply capable of delivering +5V and 250mA of continuous current
- DC supply capable of delivering -5V and 250mA of continuous current
- DC supply capable of delivering +3.3V and 250mA of continuous current
- One HP 8648 or equivalent signal source capable of generating 0dBm up to 2.7GHz
- Two HP or equivalent arbitrary waveform generators
- One HP 8561E or equivalent RF spectrum analyzer with a minimum 100kHz to 3GHz frequency range
- One HP 437B power meter and power head
- PC laptop or tablet with Microsoft Windows XP[®], Windows[®] 7, 8 OS and a USB port
- USB-A male to USB-B male cable
- US keyboard

Connections and Setup

The EV kit is fully assembled and factory tested. Follow the instructions below to test the devices. This section provides step-by-step instructions for getting the EV kit up and running in all modes:

 Install and run the MAX2839AS control software. Select MAX2839AS Ev.Kt for "select IC" under Options.

Windows and Windows XP are registered trademarks and registered service marks of Microsoft Corporation.

- Connect the PC to the INTF3000 interface board using the USB-A male to USB-B male cable. On INTF3000, place a jumper between pins 1-2 on JU1 (VBUS Pos). Connect the 25-pin connector of the INTF3000 (J4) directly to the 25-pin connector on the EV kit (J18).
- With the power supply turned off, connect the +3.3V power supply to VBAT and VCCAUX. Connect the power-supply ground to the header labeled GND.
- 4) With the power supply turned off, connect the +5V power supply to the +5V pin and the -5V power supply to the -5V pin. Connect the power-supply ground to the header labeled GND. Connect all the power-supply grounds together.
- 5) Set the RXBBBUF jumper across pins 1-2 to enable the Rx baseband buffers.
- 6) Turn on the +3.3V power supply, and the +5V and -5V power supplies.
- 7) In the enables panel of the software, check the EN_SPI box to enable the 3-wire interface.
- Adjust the Tx common-mode potentiometer (R36) until measuring 0.9V common-mode voltage at the VCM test point.
- In the register panel of the software, set ENABLE to 0, and set JPTXRX jumper across pins 1-2 to put the IC into standby mode.
- 10) In the synth panel of the software, set the LO frequency to 2500MHz.

Receive Mode

- Use the power meter to calibrate the RF signal generator to deliver -98dBm at 2501MHz. After calibration, turn the RF signal generator off, disconnect it from the power meter, and connect it to the RXINA port of the EV kit.
- Connect either the I or the Q baseband output of receiver A to a spectrum analyzer. Set the center frequency to 1MHz and the span to 1MHz.

- 3) In the register panel of the software, enter the recommended register setting shown in Figure 1 for operating the MAX2839AS in steady state receive mode bench measurement. This setup fixes the VGA highpass corner at 1kHz.
- 4) Press the Send All button.
- 5) In the register panel of the software, set ENABLE to be 1, and set JPTXRX jumper across pins 1-2 to activate the receive path.
- In the Rx panel of the software, toggle the LNA gain enable and the baseband VGA enable both to be SPI. Set both of the gain controls to be max.
- Turn on the RF signal source. The output CW tone at 1MHz should be approximately 0dBm.

Transmit Mode

- Connect the spectrum analyzer to the TXRF port. Set the center frequency to 2500MHz and the span to 5MHz.
- Connect a 1MHz I/Q signal to pins TXBBI and TXBBQ, respectively. Set the input amplitude of each channel to 90mV_{RMS} with 90° phase shift.
- In the register panel of the software, set ENABLE to 1, and set JPTXRX jumper across pins 2-3 to activate the transmit path.
- 4) In the register panel of the software, enter the recommended register setting shown in Figure 2.
- 5) Press the Send All button.

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Registers Enables	Synth	RX	ТΧ	Misc	Defaults	Send All	🔮 LOCK ? 🧖
RXENABLE		000	0 4 3	000	000 Send	Block SPI E	n. 160000011101 01 <u>Send</u> 9876543210
BXBF1		000	01 43	100	00C Send	FRAC1	170101010101155 Send Control Pins:
RXRF2	200	100 765	00 43	001 210	081 Send	FRAC2	1801010101011011155 Send RX TXRX
RXRF & LPF	301 9 8	101	1 1 4 3	001 210	1B9 Send	INT DIV.	
LPF		1 1 1 7 6 5	00 43	110	3E6 Send	SYNTH1	201001001001001 249 Send 0 KAHP
RX1 LPF & VGA		000 765	0 4 3	000 210	100 Send	SYNTH2	21 0 0 0 1 0 1 0 1 0 1 0 2 Send Pulse "LOAD"
RX2 LPF & VGA	600 98	000	00 43	0000 210	000 Send	VAS	220110101010105 9 8 7 6 5 4 3 2 1 0
RSSI & VGA	710	000	01 43	0000 210	208 Send	LO CONFIG	23 TOOTOOTIIT 9 8 7 6 5 4 3 2 1 0
RXTOP & BIAS	81 0 9 8	001	00 43	0 1 0 2 1 0	222 Send	XTAL	2401100000000 9876543210
RX_TOP	900	001	0 4 3	0000 210	028 Send	VCO	2500000000000000000 9 8 7 6 5 4 3 2 1 0
TX_TOP		000	01 43	100 210	OOC Send	LOGEN	267117000000 3C0 Send
Temp. Sens.		101	10 43	100	OB4 Send	TXLO I/Q	27 T O T O O O O O O O Z80 Send
HPFSM1	1210	010765	0 4 3	1111 210	24F Send	PADAC	2800110000000000 9876543210
HPFSM2		010765	10	0000 210	150 Send	TX Gain	29 0 0 0 0 0 0 0 0 0 0 0 Send 9 8 7 6 5 4 3 2 1 0 Help
HPFSM3		110765	0 4 3	101	1C5 Send	TX DC Cor.	1 30]1 1 0 0 0 0 0 0 0 300 Send Send All
HPFSM4	1510	001	1 1 4 3	001 210	239 Send	TX DC Cor. (Q 31 T 0 1 T 0 0 0 0 0 0 200 Send Read All Read All

Figure 1. Receive Mode Register Setting

6) Enable the output of the baseband signal sources. The desired tone, LO leakage, and the sideband appear at 2501MHz, 2500MHz, and 2499MHz, respectively. Set the Tx VGA gain to be 3dB below the max gain. The power level of the desired tone is approximately -1dBm in the spectrum analyzer marker reading, assuming that the balun on board contributes 1dB of loss.

Layout Considerations

The EV kit can serve as a guide for board layout. Keep PCB trace lengths as short as possible to minimize parasitic inductance. Also, keep decoupling capacitors as close as possible to the IC with a direct connection to the ground plane.

Power-Supply Layout

To minimize coupling between different sections of the IC, use a "star" power-supply routing configuration with a large decoupling capacitor at a central V_{CC} node. The V_{CC} traces branch out from this node, each going to a separate V_{CC} node in the circuit. Place a bypass capacitor as close as possible to each supply pin. This arrangement provides local decoupling at each V_{CC} pin. Use at least one via per bypass capacitor for a low-inductance ground connection. Do not share the capacitor ground vias with any other branch.

Registers Enables	Synth	RX T	X Misc		Defaults	Send All			LOCK ?		
RXENABLE		000		000	Send	Block SPI En.	16000			01 Send	1
BXRF1	100 98	000 7654		00C	Send	FRAC1	17010	1010 6543	2 1 0	155 Send	Control Pins:
RXRF2	200	100 7654	D 0 0 0 1 + 3 2 1 0	081	Send	FRAC2	18010 987	1010 6543	2 1 0	155 Send	
RXRF & LPF	301	101	1 1 0 0 1 3 2 1 0	189	Send	INT DIV.	19010 987	1010 6543	2 1 0	153 Send	
LPF	411	1 1 1		3E6	Send	SYNTH1	20100	1001 6543	2 1 0	249 Send	
RX1 LPF & VGA	501	0000 7654	00000 + 3 2 1 0	100	Send	SYNTH2	21 0 0 0		101 210	02 Send	
RX2 LPF & VGA	600 98	0000 7654	00000 +3210	000	Send	VAS			2 1 0	1A9	
RSSI & VGA		0 0 0 7 6 5 4 7 15 15 1		208	Send	LO CONFIG.	23 1 0 0 9 8 7	1 10 10 11 6 5 4 3	1 1 1	24F Send	1
	이 10 9 8 이 고미	0 0 1 7 6 5 4 7 10 17 10		1222	Send		24 JU 11 11 7 8 9 25 0 0 0 2	0 0 0 0 0 3 4 3 0 0 0 0 0		180 Send	1
	10000	0 10 11 1 7 6 5 4 7 6 5 6		1028	Send	LOGEN	25101010	6 5 4 3 1 0 0 0 0		1000 <u>Send</u>	-1 -1
		7654 767			Send		27101	6 5 4 3 6 6 6 6 6		280 Send	-1 -1
HPFSM1	1210	7 6 5 4 0 1 0 1	3210 01111	24F	Send	PADAC	987 28001	6543 1000	2 1 0	OCO Send	
HPFSM2	98 1301	7654 010	100000	150	Send	TX Gain	987 29000	6543 0000	2 1 0	000 Sen	
HPFSM3	98 14 <u>01</u>	7 6 5 4 1 1 0 0		105	Send	TX DC Cor. I	987 30110	6543 000000		300 Send	Help Send All
HPFSM4	15 1 0			201	Send	TX DC Cor. Q	31101			2C0 Send	Bead All
	. y 0		- 3 2 1 0				301	0 5 4 3	210		

Figure 2. Transmit Mode Register Setting



Figure 3a. MAX2839AS EV Kit Schematic (Sheet 1 of 2)



Figure 3b. MAX2839AS EV Kit Schematic (Sheet 2 of 2)





Figure 5. MAX2839AS EV Kit PCB Layout—Component Side



Figure 6. MAX2839AS EV Kit PCB Layout—Inner Layer 2 (Ground Layer)



Figure 7. MAX2839AS EV Kit PCB Layout—Inner Layer 3 (Routes)



Figure 8. MAX2839AS EV Kit PCB Layout—Solder Side



Figure 9. MAX2839AS EV Kit PCB Layout—Bottom Silkscreen

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Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	4/09	Initial release	—
1	5/10	Changed the part number from MAX2839S to MAX2839AS	1–13
2	11/14	Updated Quick Start section	3

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.

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