

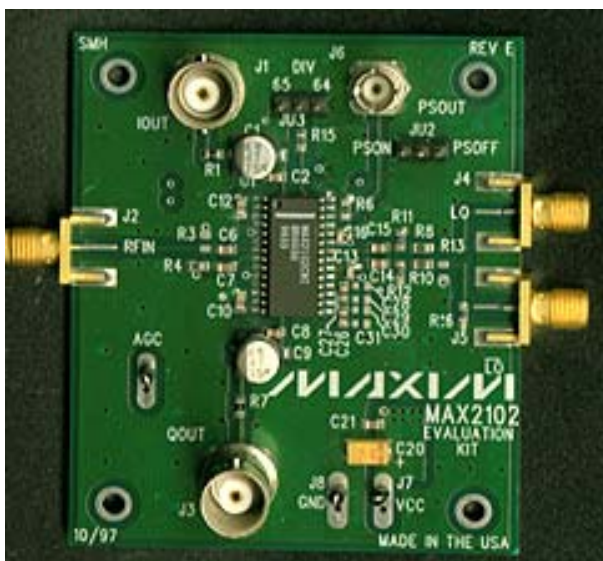
APPLICATION NOTE 1007

REP035: The MAX2102 ZIF Satellite DBS Tuner I-Q Quadrature Measurements

Rapid engineering prototypes are real circuits that Maxim application engineers have built and measured in our labs. They can provide a starting point for new RF designs. They are not available as evaluation kits.

- Additional Information [Wireless Product Line Page](#)
- [Quick View Data Sheet for the MAX2102](#)
- [Applications Technical Support](#)

The MAX2102 is a low-cost, direct-conversion tuner IC designed for use in digital direct-broadcast satellite (DBS) television set-top box units. It directly tunes L-band signals to baseband using a broadband I/Q downconverter. In addition, the device includes a low-noise amplifier with automatic gain control, two downconverter mixers, an oscillator buffer with 90 degree quadrature generator and prescaler, and baseband amplifiers. Though designed to operate in the 950MHz to 2150MHz input frequency range, the MAX2102 can operate in the 869MHz to 894MHz range, as well.



Test Condition

The MAX2102 EV Kit

Index	Description	Value	Unit
1	Vcc	5.00	Volt
2	Temperature	0, 25, and 70	°C
3	LO Power Level	-10.00	dBm
4	LO Frequency	869.3 & 894.3	MHz

5	RF Frequency	869.0 - 894.0	MHz
6	Pin per tone for IIP3 and Gain Measurement	-20 to -70	dBm
7	Two Tones for Low band IIP3 Measurement	869.0 & 869.05	MHz
8	Two Tones for High Band IIP3 Measurement	894.0 & 894.05	MHz

Performance Matrix

Temp = 25C, Vcc = 5V F1 = 869.0MHz, F2 = 869.05MHz Flo = 869.3MHz, Plo = -10dBm							F1 = 869.0MHz Pin = -60dBm Flo = 869.2MHz Plo = -10dBm Vagc = 2.906V			
Pin/tone (dBm)	Vin (mV rms)	Vagc (V)	Vout (mV rms)	IMD's (dBc)	IIP3 (dBm)	Vgain (dB)	I & Q Phase Imbalance (deg)	I & Q Amplitude Imbalance (dB)		
-20	22.361	1.73	177.0	-44.0	2.0	17.97	+/- 0.32 deg	+/- 0.085		
-40	2.236	2.24	177.0	-47.3	-16.4	37.97				
-60	0.224	2.92	177.0	-47.5	-36.3	57.97				
-70	0.071	3.30	130.6	-51.5	-44.3	65.33				
F1 = 894.0MHz, F2 = 894.05MHz, Flo = 894.3MHz, Plo = -10dBm									+/- 0.32 deg	+/- 0.085
Pin/tone (dBm)	Vin (mV rms)	Vagc (V)	Vout (mV rms)	IMD's (dBc)	IIP3 (dBm)	Vgain (dB)				
-20	22.361	1.73	177.0	-44.2	2.1	17.97				
-40	2.236	2.24	177.0	-46.8	-16.6	37.97				
-60	0.224	2.92	177.0	-47.8	-36.1	57.97				
-70	0.071	3.30	130.6	-51.5	-44.3	65.33				

Temp = 0C, Vcc = 5V F1 = 869.0MHz, F2 = 869.05MHz Flo = 869.3MHz, Plo = -10dBm							F1 = 869.0MHz Pin = -60dBm Flo = 869.2MHz Plo = -10dBm Vagc = 2.906V			
Pin/tone (dBm)	Vin (mV rms)	Vagc (V)	Vout (mV rms)	IMD's (dBc)	IIP3 (dBm)	Vgain (dB)	I & Q Phase Imbalance (deg)	I & Q Amplitude Imbalance (dB)		
-20	22.361	1.73	133.2	-48.3	4.165	15.50	+/- 0.27 deg	+/- 0.084		
-40	2.236	2.24	184.3	-44.7	-17.665	38.32				
-60	0.224	2.92	219.0	-40.2	-39.92	59.82				
-70	0.071	3.30	146.0	-50.3	-44.835	66.30				
F1 = 894.0MHz, F2 = 894.05MHz Flo = 894.3MHz, Plo = -10dBm									+/- 0.27 deg	+/- 0.084
Pin/tone (dBm)	Vin (mV rms)	Vagc (V)	Vout (mV rms)	IMD's (dBc)	IIP3 (dBm)	Vgain (dB)				
-20	22.361	1.73	135.7	-47.2	3.59	15.66				
-40	2.236	2.24	187.9	-44.6	-17.70	38.49				
-60	0.224	2.92	219.0	-40.9	-39.56	59.82				
-70	0.071	3.3	143.7	-50.8	-44.59	66.16				

Temp = +70C, Vcc = 5V F1 = 869.0MHz, F2 = 869.05MHz Flo = 869.3MHz, Plo = -10dBm							F1 = 869.0MHz Pin = -60dBm Flo = 869.2MHz Plo = -10dBm Vagc = 2.906V			
Pin/tone (dBm)	Vin (mV rms)	Vagc (V)	Vout (mV rms)	IMD's (dBc)	IIP3 (dBm)	Vgain (dB)	I & Q Phase Imbalance (deg)	I & Q Amplitude Imbalance (dB)		
-20	22.361	1.73	270.7	-31.2	-4.42	21.66	+/- 0.16 deg	+/- 0.08		
-40	2.236	2.24	191.6	-48.5	-15.75	38.66				
-60	0.224	2.92	140.9	-53.7	-33.165	55.99				
-70	0.071	3.3	99.7	-55.0	-42.5	62.98				
F1 = 894.0MHz, F2 = 894.05MHz Flo = 894.3MHz, Plo = -10dBm									+/- 0.16 deg	+/- 0.08
Pin/tone (dBm)	Vin (mV rms)	Vagc (V)	Vout (mV rms)	IMD's (dBc)	IIP3 (dBm)	Vgain (dB)				
-20	22.361	1.73	260.6	-32.0	-4.00	21.33				
-40	2.236	2.24	184.5	-48.7	-15.67	38.33				
-60	0.224	2.92	138.4	-54.7	-32.67	55.83				
-70	0.071	3.3	96.16	-55.0	-42.50	62.67				

More Information

MAX2102: [QuickView](#) -- [Full \(PDF\) Data Sheet](#) -- [Free Samples](#)