Polyphase Microwave
A Technology Service Corporation Company

AM0260A
QUADRATURE MODULATOR
0.2 – 6.0 GHz

FEATURES

LO/RF Frequency:	0.2 – 6.0 GHz
Input IP3:	+32 dBm
Sideband Suppression:	-45 dBc (Typical)
LO Leakage:	-50 dBm (Typical)
LO Power:	-10 to +10 dBm
DC Power:	+5V @ 500 mA

DESCRIPTION

The AM0260A is ideal for applications requiring exceptional local oscillator (LO) leakage (-50 dBm Typical and <-80 dBm Nulled) and Input Intercept Point (IIP3) (+32 dBm) performance. Both the LO leakage and IIP3 can be optimized manually via a USB 2.0 interface or the LO leakage can be nulled automatically within seconds by simply sending a calibration command to the AM0260A.
With a wide LO input power range of -10dBm to +10dBm the AM0260A alleviates the demand of a high power LO source.

LO FEEDTHROUG NULLING

- Manual LO Nulling
  LO Leakage can be minimized at any frequency within the operating rage of the AM0260A.
- Automatic LO Nulling
  Built-in power detector allows the AM0260A to perform self LO Feedthrough nulling for LO frequencies up to 4GHz.

APPLICATIONS

Doppler weather radar

Quantum computing

Heterodyne Transmitters

ELECTRICAL SPECIFICATIONS

Test Conditions: +25°C, LO = 0dBm, I/Q inputs = -3.5dBm @ 70MHz, I:0º, Q:90º

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
LO/RF Frequency Range		0.2		6.0	GHz
+5V DC Supply Range		+4.9	+5.0	+5.2	V
+5V DC Supply Current			500		mA
LO Power		-10	0	+10	dBm
I/Q Baseband Bandwidth (AC Coupled)	-1dB Bandwidth	10		430	MHz
I/Q Baseband Amplitude				1	V_{p-p}
Conversion Loss	0.7GHz < RF < 4GHz RF < 0.7GHz RF > 4GHz		7 $5.5*RF^{-1.1}$ $0.5*RF^{2}$	10	dB
Input IP3	2-Tone, Δf = 1 MHz		+32		dBm
Output P1dB	LO = 2130MHz, -10dBm		+6		dBm
LO Feedthrough at RF Port	Un-Nulled Nulled		-50 <-80	-40	dBm
Sideband Suppression	0.5GHz < RF < 5GHz		-45	-40	dBc
Operating Temperature Range		-40		+65	ºC
LO/RF/IQ Input Power w/o Damage				+16	dBm

Polyphase Microwave Inc.
1983 South Liberty Drive
Bloomington, IN 47403
USA

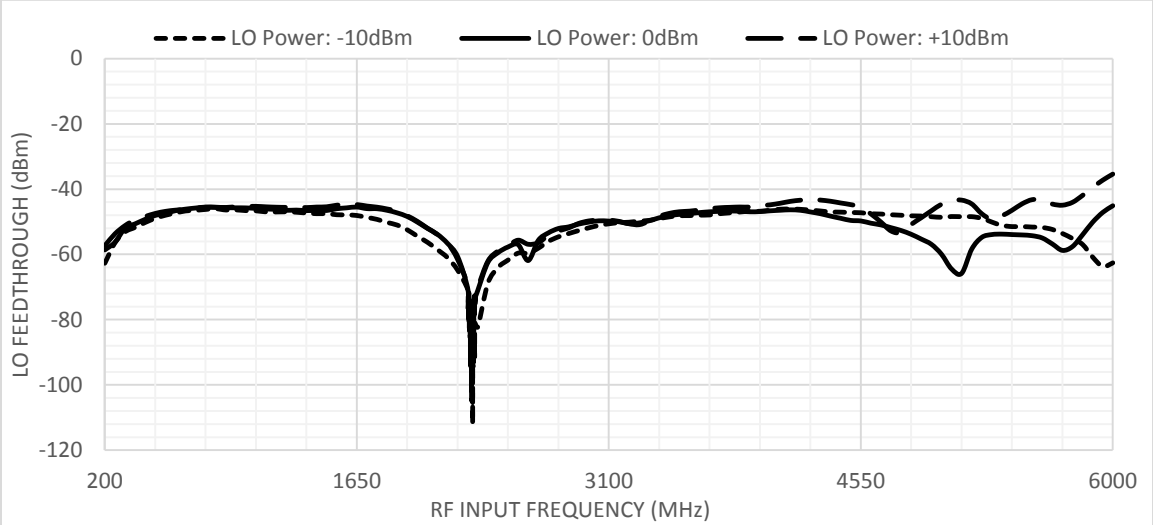
Polyphase Microwave

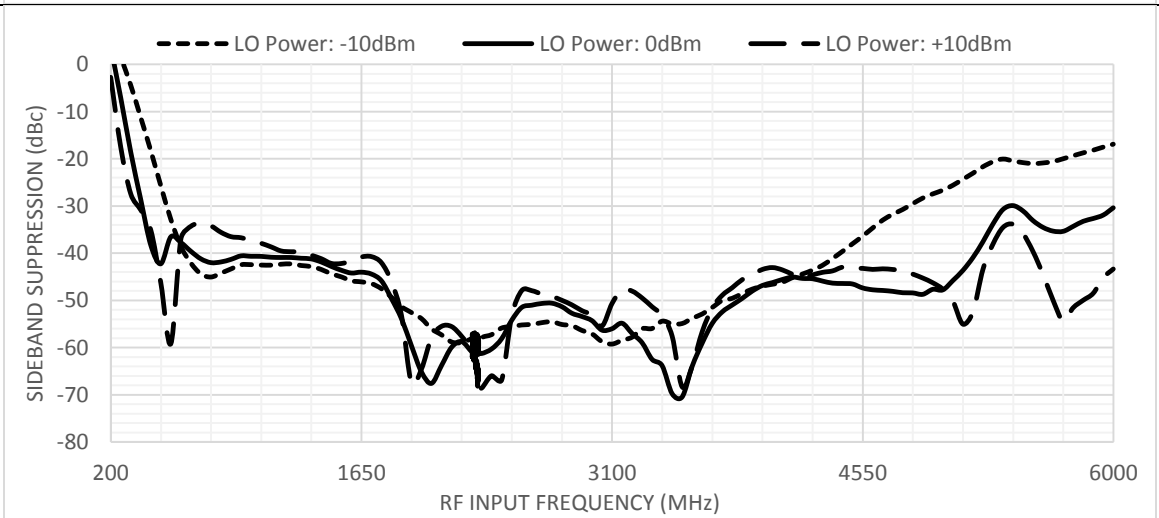
© 2010 Polyphase Microwave Inc.

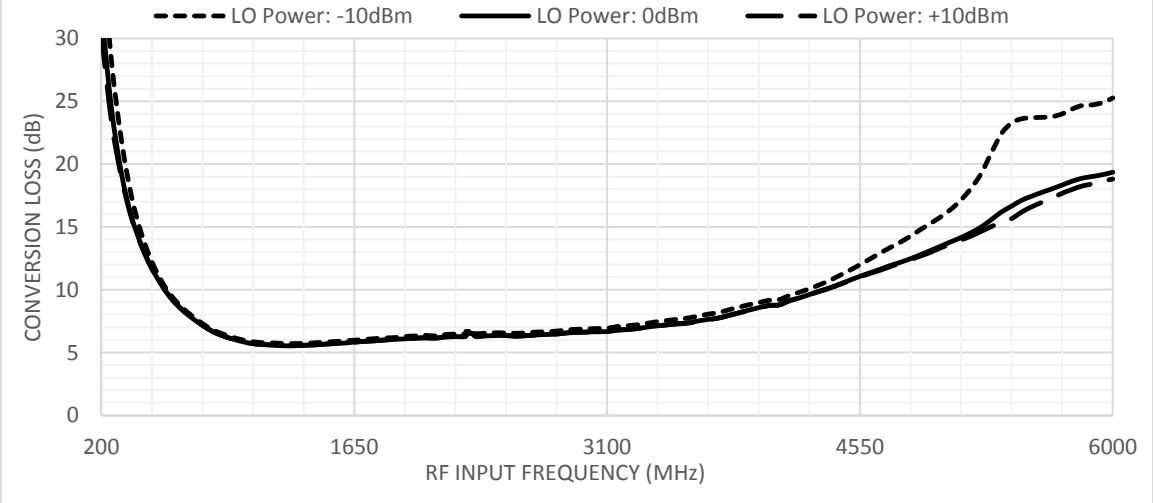
Tel: +1 (812) 323-8708
Fax: +1 (812) 323-8709
Web: www.polyphasemicrowave.com

TYPICAL PERFORMANCE CHARACTERISTICS

Standard Test Conditions: +25°C, I/Q inputs = -3.5 dBm @ 70 MHz, I:0º, Q:90º





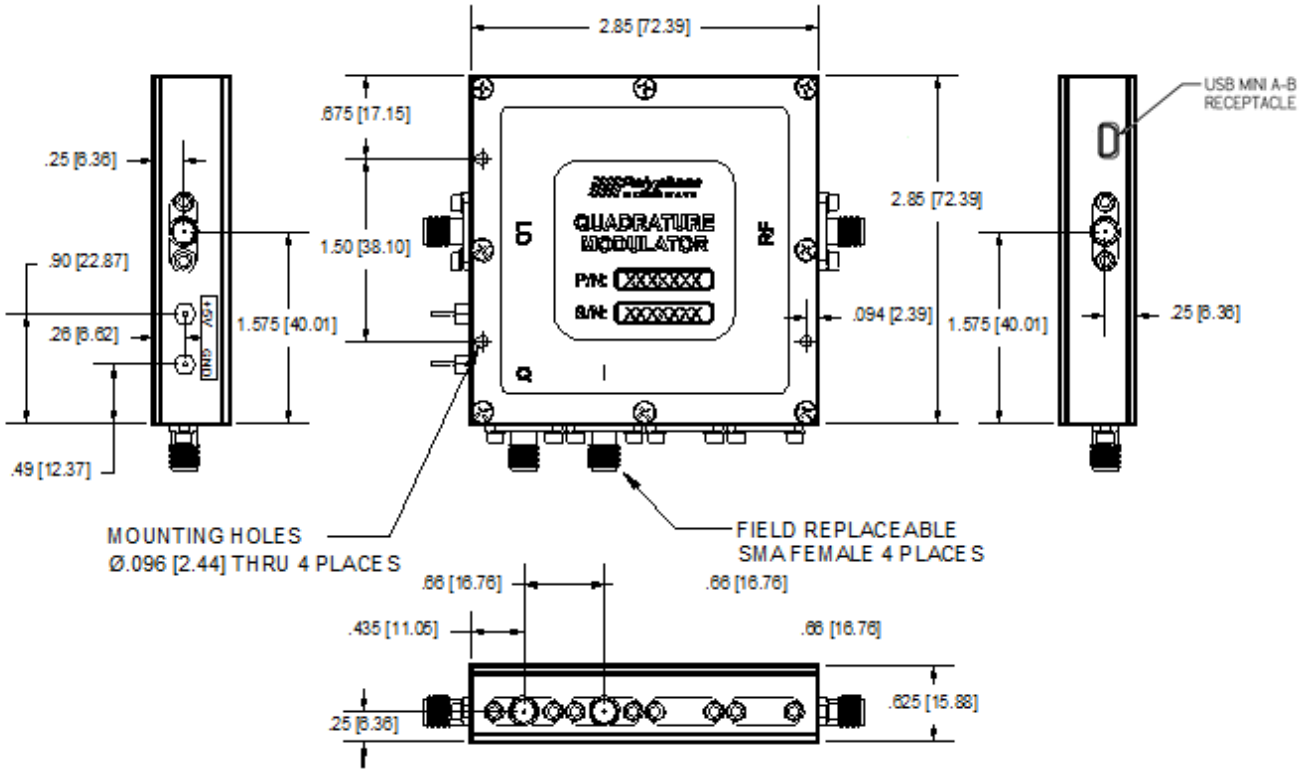


Polyphase Microwave Inc.
1983 South Liberty Drive
Bloomington, IN 47403
USA

© 2010 Polyphase Microwave Inc.

Tel: +1 (812) 323-8708
Fax: +1 (812) 323-8709
Web: www.polyphasemicrowave.com

DIMENSION DRAWING



Polyphase Microwave Inc.
1983 South Liberty Drive
Bloomington, IN 47403
USA

© 2010 Polyphase Microwave Inc.

Tel: +1 (812) 323-8708
Fax: +1 (812) 323-8709
Web: www.polyphasemicrowave.com

LO NULLING

The AM0260A generates internal I and Q DC offsets using two 12-bit DACs that null (cancel) the LO leakage signal at the RF output port. User DC offsets can be entered to null the LO leakage power at any LO frequency in the range of 200MHz to 6000MHz. Using a spectrum analyzer or power meter to monitor the LO leakage, first adjust the I-channel DC offset to minimize the LO leakage spur power. Then adjust the Q-channel DC offset. Repeat the process until the LO leakage is nulled.

The AM0260A also has the ability to self-null the LO leakage for LO frequencies in the range of 200MHz to 4000MHz. When the unit is performing the self-nulling routine the IQ inputs to the modulator must be removed or set to a power of at least -60dBm. If the IQ inputs are not removed or their power levels are not reduced then the on board power detector will be saturated and the returned I and Q DC offsets for the null point will be incorrect. The algorithm used to locate the I and Q DC offsets for the null is very efficient and typically returns a result in less than 2 seconds. The returned values are typically very close to achieving the absolute minimum LO leakage but if further cancelation is required the method described about for manual nulling can be performed. For example the self-nulling routine will typically return I and Q DC offsets to achieve at least -60dBm of LO leakage and manual nulling can achieve <-100dBm (limited for me by the noise floor of my spectrum analyzer). It should be noted that if desired the user can use an external power meter and an RF switch at the output of the AM0260A to support development of their own self-nulling algorithm. This type of custom setup can potentially improve the search results to obtain the values from manual tuning.

The self-nulling routine is initiated via a software command and the resulting I and Q DC offset values are automatically saved to on board non-volatile memory. These saved values are then automatically recalled and set when power to the unit is removed and reconnected. The AM0260A also provides memory to save 200 IQ DC offset pairs. Therefore system calibration can be performed at 200 unique LO frequencies (approximately every 30MHz from 200MHz to 6000MHz) and then recalled at any point during operation.

Polyphase Microwave Inc.
1983 South Liberty Drive
Bloomington, IN 47403
USA

© 2010 Polyphase Microwave Inc.

Tel: +1 (812) 323-8708
Fax: +1 (812) 323-8709
Web: www.polyphasemicrowave.com