

DESCRIPTION:

THE PIQ-1-SMT IS AN INTEGRATED BROADBAND IQ VECTOR MODULATOR WITH FULLY DIFFERENTIAL INPUTS AND OUTPUTS (LO AND RF) PORTS AND SINGLE ENDED ON THE BASEBAND (I AND Q) INPUTS. AN ON-CHIP BROADBAND QUADRATURE GENERATOR NETWORK ALLOWS THE PIQ-1-SMT TO ACHIEVE MULTI-OCTAVE FREQUENCY COVERAGE. THE PIQ-1-SMT OPERATES WITH A SINGLE POSITIVE VCC = 4V @ 250 mA SUPPLY AND IS SUPPLIED IN A QFN PACKAGE.

SPECIFICATIONS (PAGE 1):

- INPUTS:

LO+ (POSITIVE PHASE TERMINAL OF THE LO)
LO- (NEGATIVE PHASE TERMINAL OF THE LO)
LO PORTS ARE 100Ω DIFFERENTIAL
LO COMMON MODE DC LEVEL IS NOMINALLY 2.16V ± 100 mV
LO INPUTS MUST BE DC BLOCKED
I (IN-PHASE COMPONENT)
Q (QUADRATURE-PHASE COMPONENT)
I AND Q PORTS ARE 50Ω SINGLE-ENDED
- OUTPUTS:

RF+ (POSITIVE PHASE TERMINAL OF THE RF)
RF- (NEGATIVE PHASE TERMINAL OF THE RF)
RF PORTS ARE 100Ω DIFFERENTIAL
COMMON MODE DC LEVEL IS NOMINALLY 3.4V ± 100 mV
RF OUTPUTS MUST BE DC BLOCKED
- LO FREQUENCY RANGE:

100 MHz TO 20 GHz
- LO INPUT POWER:

-10 TO 10 dBm
- RF FREQUENCY RANGE:

100 MHz TO 20 GHz
- RF OUTPUT POWER:

-12 dBm TYP.
- BASEBAND I/Q BANDWIDTH:

10 GHz (DC TO 10 GHz)
I AND Q INPUT CAN BE USED DC COUPLED OR AC COUPLED
DC: 0 TO 2.16V. COMMON MODE LEVEL IS 1.08V ± 50 mV
AC: UP TO 10 GHz. LINEAR TO 0 dBm IN TOTAL (EQUIVALENT TO -3 dBm AT BOTH I AND Q)
- I/Q COMMON-MODE BIAS:

1.08V ± 50 mV
- CARRIER (LO) LEAKAGE:

-42 dBc TYP.
- VOLTAGE CONVERSION GAIN:

-20 dB TYP.
- I/Q GAIN IMBALANCE:

0.5 dB TYP.
- QUADRATURE PHASE ERROR:

1° MAX.
- SIDEBAND SUPPRESSION:

30 dB TYP. (W/ ARB AT 1 MHz, SIN & COS ON I AND Q)
- VSWR:

2.5:1 TYP. (LO+, LO-, RF+, RF-)
2.0:1 TYP. (I, Q)
- RF-LO ISOLATION:

-50 dBc TYP.
- LO-BASEBAND ISOLATION:

-45 dBc TYP.
- RF-BASEBAND ISOLATION:

-40 dBc TYP.
- I-Q CROSSTALK:

-40 dBc TYP.
- P1dB:

-5 dBm TYP.
- IP3:

5 dBm TYP.
- IP2:

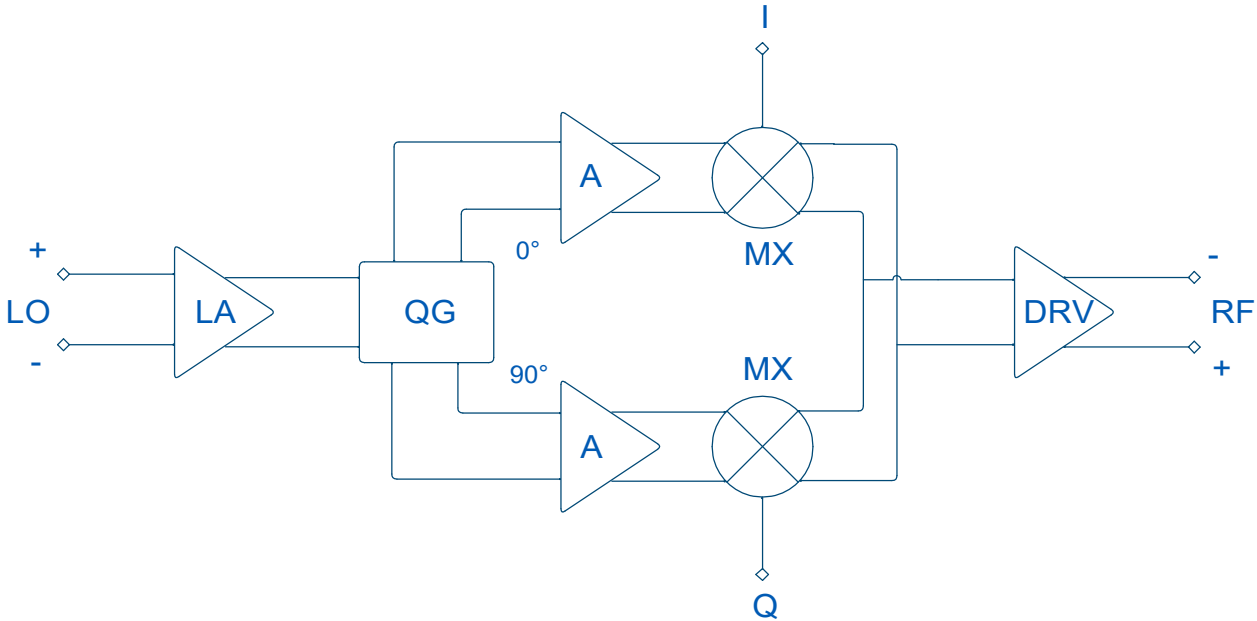
45 dBm TYP.
- HARMONIC DISTORTION:

2nd HARMONIC: -35 dBc TYP.
3rd HARMONIC: -20 dBc TYP.
4th HARMONIC: -50 dBc TYP.
5th HARMONIC: -35 dBc TYP.
- SPURIOUS EMISSIONS:

-30 dBm TYP.
- SFDR:

20 dB TYP.

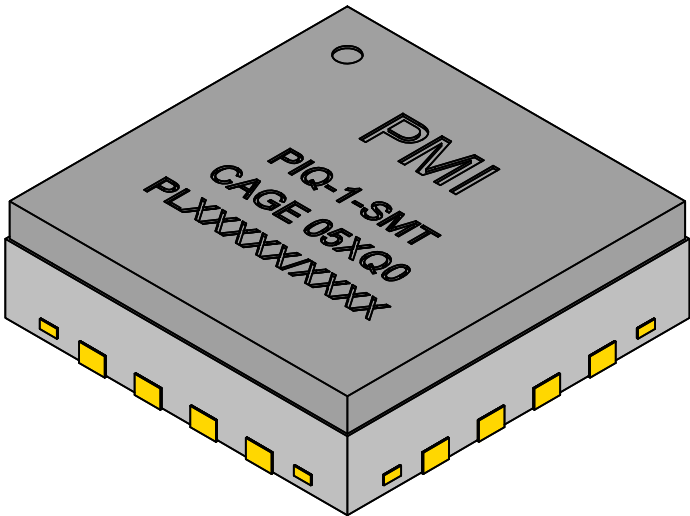
PIN FUNCTIONS	
EP	GND
PIN 1	GND
PIN 2	LO+
PIN 3	LO-
PIN 4	GND
PIN 5	VCC
PIN 6	GND
PIN 7	Q
PIN 8	GND
PIN 9	GND
PIN 10	RF+
PIN 11	RF-
PIN 12	GND
PIN 13	GND
PIN 14	I
PIN 15	GND
PIN 16	VCC



LO = Local oscillator input
LA = Limiting amplifier
QG = Quadrature generator

MX = Mixer
DRV = Driver
A = Amplifier

RF = RF output
I/Q = Vector modulation inputs



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NOTE: SPECIFICATIONS WILL VARY OVER TEMPERATURE
NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ± .XX ± 0.02 ± .XXX ± 0.01					PMI PLANAR MONOLITHICS 7309-A GROVE ROAD FREDERICK MARYLAND 21704 USA TEL: (301) 662-5019, FAX: (301) 662-1731 WEB: WWW.QUANTICPMI.COM, EMAIL: SALES@QUANTICPMI.COM ISO 9001 CERTIFIED							
			APPROVALS		DATE		TITLE FINAL ASSEMBLY PIQ-1-SMT					
			DRAWN AL		7/28/2025							
REDRAWN												
ISSUED												
					SIZE B		FSCM NO. 05XQ0		DWG NO. 27052640		REV. A4	
					SCALE 16:1					SHEET 1 OF 2		

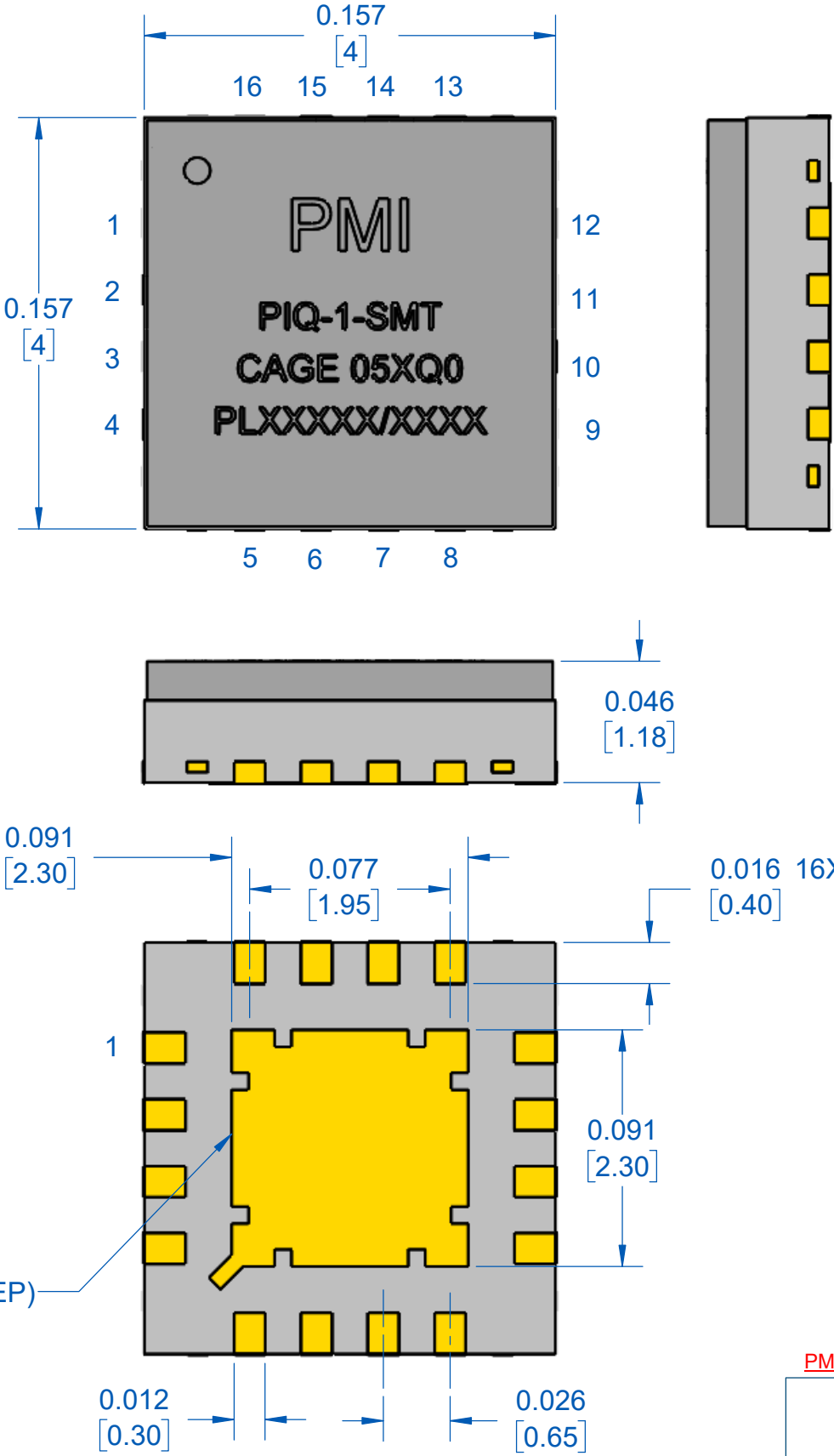
SPECIFICATIONS (PAGE 2):

- AM/AM CONVERSION:..... LINEAR UP TO $V_p = 1080$ mV
- AM/PM CONVERSION:..... $\pm 3^\circ$ TYP.
- OUTPUT NOISE SPECTRAL DENSITY:..... -150 dBm/Hz TYP.
- RESIDUAL PHASE NOISE:..... -100 dBm/Hz TYP. @ 1 KHz
-110 dBm/Hz TYP. @ 1 MHz
- RESIDUAL AM NOISE:..... -80 dBm/Hz MAX. (REFERENCED TO LO LEAKAGE CARRIER)
- SNR:..... 55 dB TYP. (FOR BW = 1 MHz)
- EVM (RMS):..... 3.5% TYP. (NOT IMPAIRED)
1% TYP. (IMPAIRED)
- MER (RMS):..... 30 dB (NOT IMPAIRED)
40 dB TYP. (IMPAIRED)
- BER:..... 10^{-4} TYP. (NOT IMPAIRED)
 10^{-9} TYP. (IMPAIRED)
- ACPR:..... -40 dBc. TYP.
- IBW:..... 400 MHz MIN.
- OBW:..... 5.5 MHz TYP. (FOR QAM-64 BW = 6.25 MHz)
- BASEBAND MAGNITUDE FLATNESS:..... ± 0.5 dB (OVER 375 MHz BASEBAND BW)
- BASEBAND LINEARITY:..... ± 1 dB MAX. UP TO 1.08 V_p
- VCC:..... $4V \pm 5\%$
BYPASS CAPACITORS RECOMMENDED
- CURRENT:..... 250 mA TYP.
- DC POWER DISSIPATION (W):..... 1.2 W MAX.
- PACKAGE SIZE:..... 0.157" x 0.157" x 0.047"
[4.0 mm x 4.0 mm x 1.2 mm]
- EXPOSED PAD (EP) SIZE:..... 0.091 x 0.091"
[2.3 mm x 2.3 mm]
- JEDEC OUTLINE:..... MO-220 (VGGC-2)
- ADDITIONAL NOTES:..... FOR SINGLE ENDED LO DRIVE OR SINGLE ENDED RF OUTPUT,
USE BROADBAND BALUNS (DC BLOCKING CAPACITORS ARE STILL REQUIRED). ALTERNATIVELY, USE ONE LO INPUT (OR RF OUTPUT) WHILE TERMINATING THE UNUSED INPUT INTO A 50 Ω LOAD (DC BLOCKING IS STILL REQUIRED)
HEAT SINKING REQUIRED
MAX REFLOW TEMPERATURE: 245°C

ENVIRONMENTAL RATINGS:

- TEMPERATURE:..... -55°C TO +85°C (OPERATING)
-64°C TO +125°C (STORAGE)
- HUMIDITY:..... MIL-STD-202, METHOD 103B COND. B
- SHOCK:..... MIL-STD-202, METHOD 213B COND. B
- VIBRATION:..... MIL-STD-202, METHOD 204D COND. B
- ALTITUDE:..... MIL-STD-202, METHOD 105C COND. B
- TEMPERATURE CYCLE:..... MIL-STD-202, METHOD 107D COND. A

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