

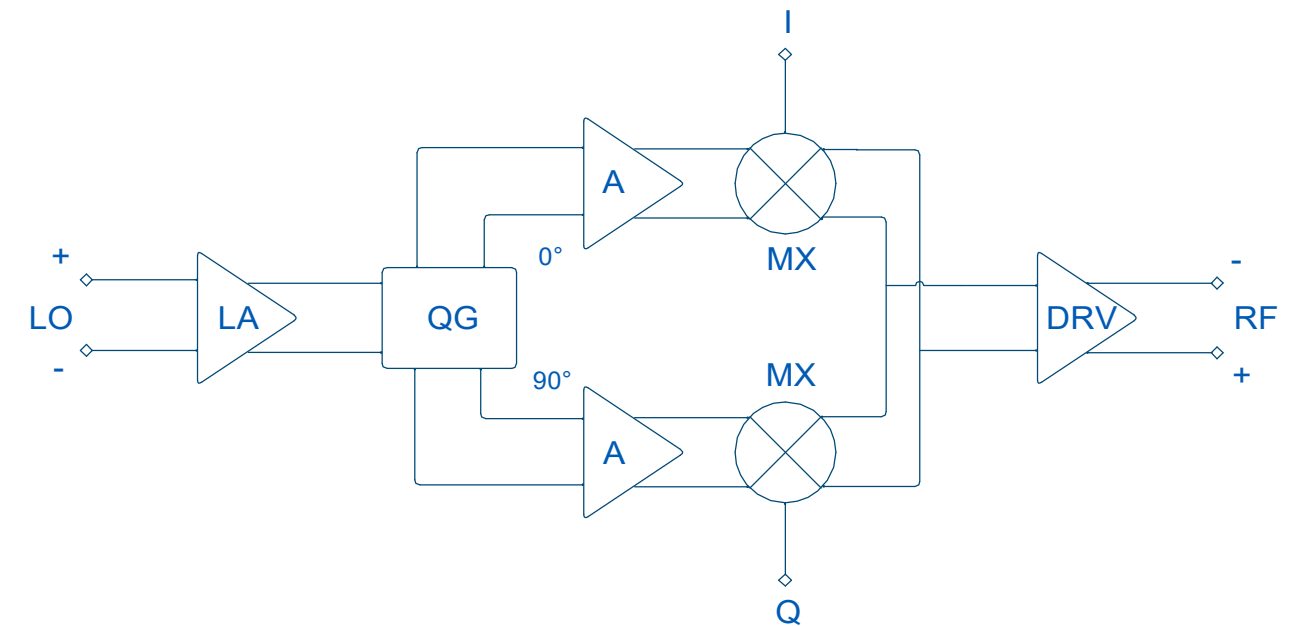
**DESCRIPTION:**

THE PIQ-1-SMT-EVAL IS AN EVALUATION BOARD FOR PIQ-1-SMT. 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. THE EVALUATION BOARD FEATURES FOUR FEMALE 2.92 mm BOARD EDGE MOUNT CONNECTORS (LO+, LO-, RF+, RF-) AND TWO SMA EDGE MOUNT CONNECTORS (I, Q). IT HAS TWO 2 POS HEADER CONNECTORS FOR SUPPLYING POWER (4V) AND GROUND TO THE IQ VECTOR MODULATOR CHIP.

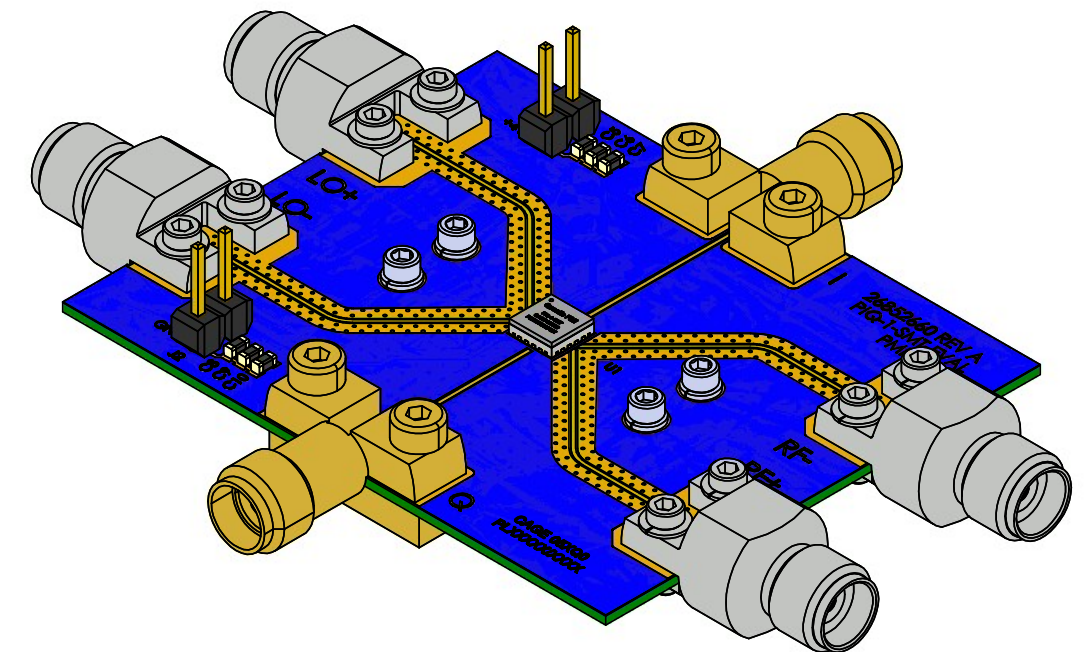
**SPECIFICATIONS (PAGE 1):**

- **INPUTS:**..... LO+ (POSITIVE PHASE TERMINAL OF THE LO): 2.92 mm FEMALE  
 LO- (NEGATIVE PHASE TERMINAL OF THE LO): 2.92 mm FEMALE  
 LO PORTS ARE 100Ω DIFFERENTIAL  
 I (IN-PHASE COMPONENT): SMA FEMALE  
 Q (QUADRATURE-PHASE COMPONENT): SMA FEMALE  
 I AND Q PORTS ARE 50Ω SINGLE-ENDED
- **OUTPUTS:**..... RF+ (POSITIVE PHASE TERMINAL OF THE RF): 2.92 mm FEMALE  
 RF- (NEGATIVE PHASE TERMINAL OF THE RF): 2.92 mm FEMALE  
 RF PORTS ARE 100Ω DIFFERENTIAL
- **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.

ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A1	ORIGINAL RELEASE	8/7/25	
	A2	ECN #26-0022	2/8/26	
	A3	ECN #26-0071	3/24/26	



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		APPROVALS    DATE DRAWN            AL                    8/7/2025 REDRAWN ISSUED		TITLE OUTLINE PIQ-1-SMT-EVAL		SIZE    FSCM NO.    DWG NO.    REV. B        05XQ0        27052660    A3	
SCALE 1:1				SHEET 1 OF 3			



**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.
- NOISE FIGURE:..... 50 dB 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:.....  $\pm 0.5$  dB (OVER 375 MHz BASEBAND BW)
- BASEBAND LINEARITY:.....  $\pm 1$  dB MAX. UP TO 1.08  $V_p$
- VCC:.....  $4V \pm 5\%$   
POWER HAS TO BE SUPPLIED THROUGH BOTH 2 POS HEADER CONNECTORS
- CURRENT:..... 250 mA TYP.
- DC POWER DISSIPATION (W):..... 1.2 W MAX.
- BOARD SIZE:..... 2.0" X 1.6" X 0.031"
- HEAT SINK SIZE:..... 1.2" X 0.8" X 0.25"
- MOUNTING HOLES:..... 4X 4-40 UNC-2B
- ADDITIONAL NOTES:..... FOR SINGLE ENDED LO DRIVE OR SINGLE ENDED RF OUTPUT,  
USE ONE LO INPUT AND RF OUTPUT WHILE TERMINATING THE  
UNUSED LO INPUT AND RF OUTPUT INTO A 50  $\Omega$  LOAD.

**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

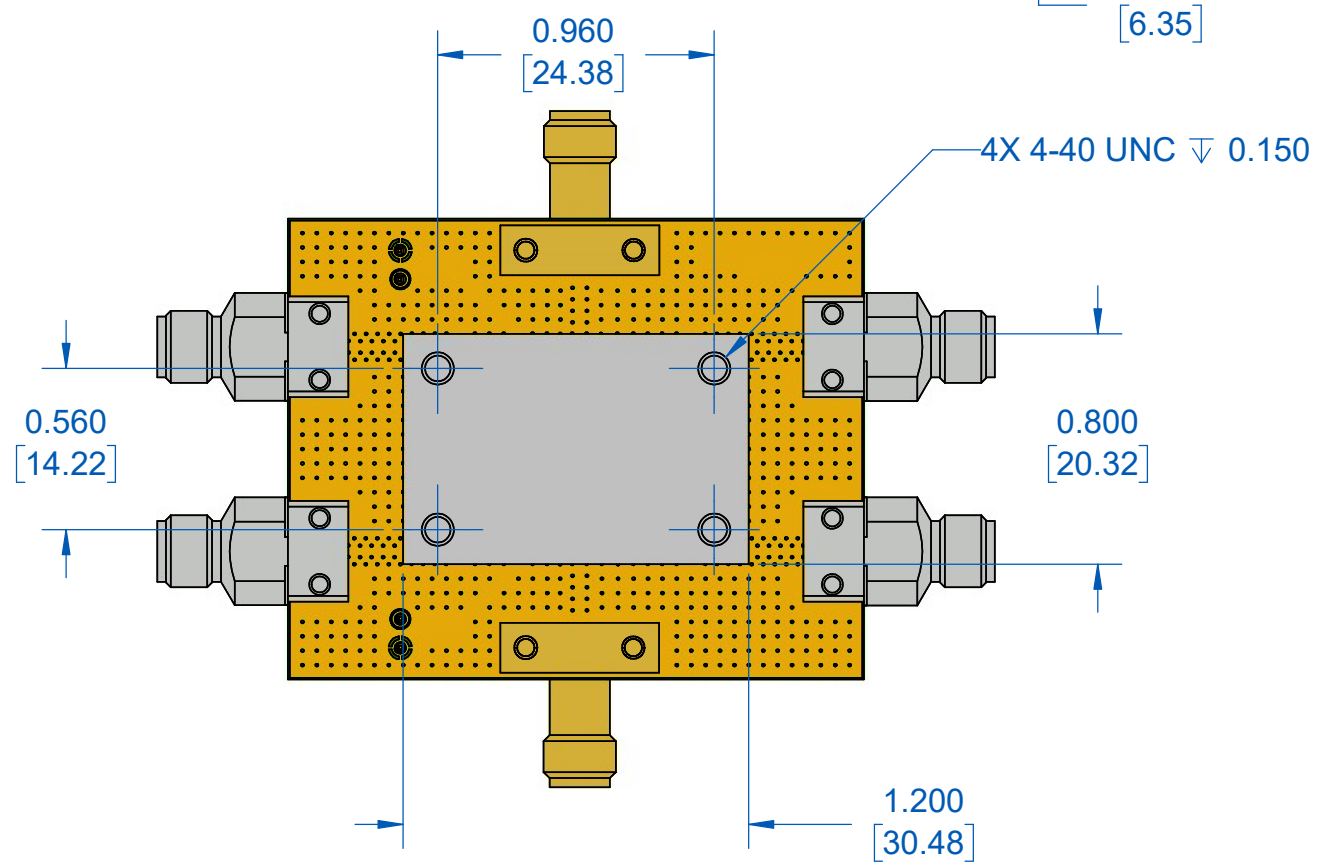
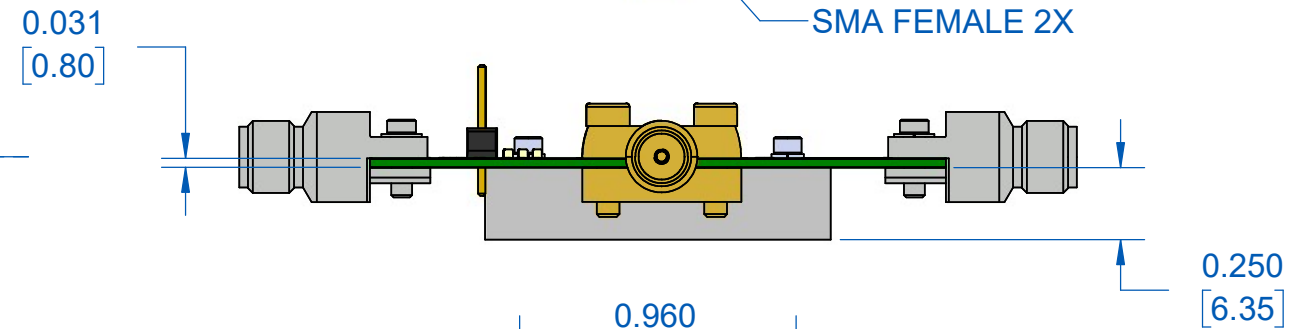
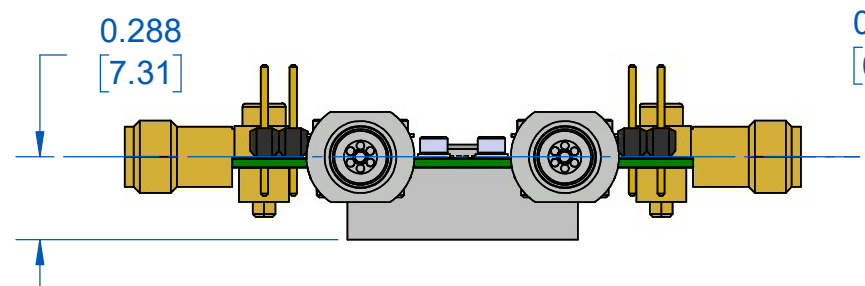
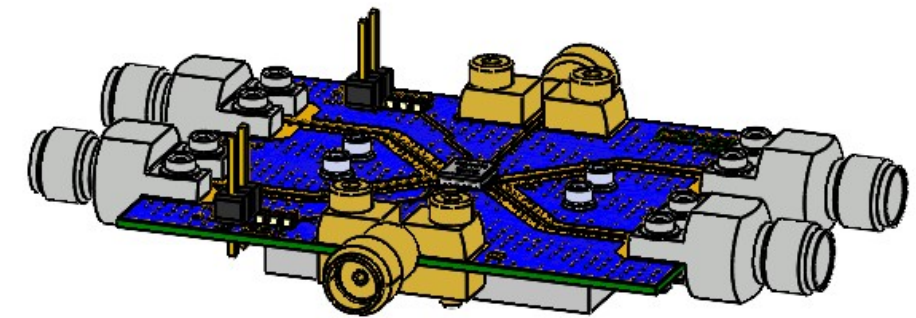
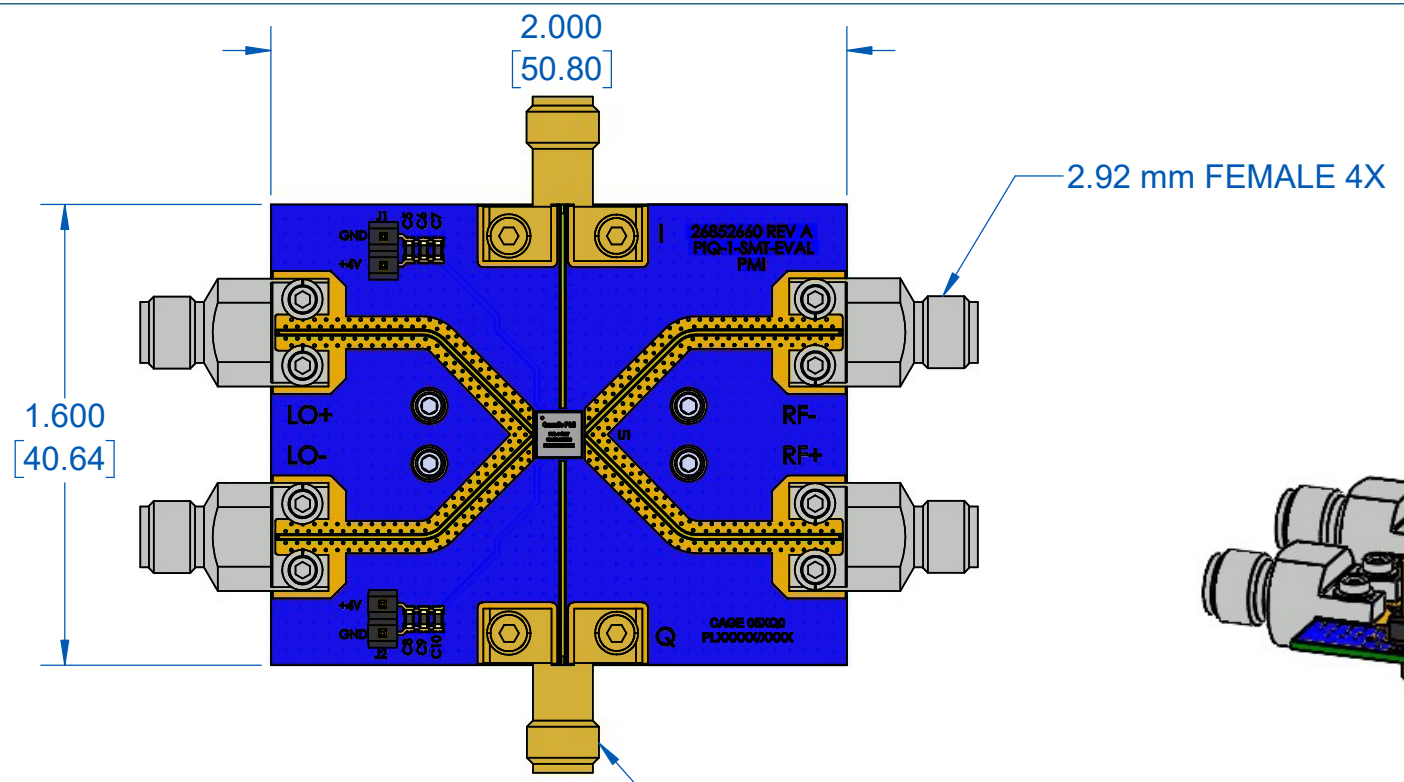
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ISO 9001 CERTIFIED

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SCALE 1:1			SHEET 2 OF 3		



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SCALE 1.5:1			SHEET 3 OF 3