



**IQ Mixer Operating From 4 GHz to 8.5 GHz With
an IF Range From DC to 3.5 GHz And LO Power of
+15 dBm, Field Replaceable SMA**

Mixers Technical Data Sheet

PE86X9000

Features

- I/Q Double Balanced Mixer Module
- IRM or Single Sideband Upconverter Functionality
- RF/LO mm-wave frequency 4 GHz to 8.5 GHz
- IF Bandwidth DC to 3.5 GHz
- GaAs MESFET MMIC Technology
- High image rejection 35 dB
- High LO/RF Isolation 40 dB
- High input IP3 +23 dBm
- LO drive level +15 dBm
- Hermetically Sealed Module
- Mil Spec Compliant
- Field Replaceable Connectors
- -55°C to +85°C Operating Temperature

Applications

- Electronic Warfare
- Point-to-Point Radios
- Point-to-Multipoint Radios
- VSAT
- Radar
- Space Systems
- Test Instrumentation
- Sensors
- Telecom Infrastructure
- Military End-Use

Description

The PE86X9000 is an I/Q double balanced millimeter-wave mixer module that operates across an RF and LO frequency range from 4 GHz to 8.5 GHz with an IF frequency range of DC to 3.5 GHz. The design utilizes GaAs MESFET MMIC technology that offers high linearity with reliable and consistent performance. This I/Q mixer design incorporates 2 double balanced mixer cells and a 90° hybrid and can operate as a single sideband upconverter, or an image reject mixer (IRM). For downconversion applications, an external quadrature IF hybrid can be used to select the desired sideband while rejecting image signals. Typical performance is impressive with 35 dB image rejection, 40 dB LO to RF isolation, and +23 dBm input IP3. The LO drive level is +15 dBm with typical conversion loss of 7.5 dB. The drop-in package is hermetically sealed with field replaceable SMA connectors. Operating temperature range is -55°C to +85°C. And for added confidence, this rugged package assembly is designed to meet MIL-STD-883 test conditions for Hermeticity and Temperature Cycle.

Electrical Specifications (TA = +25° C, IF= 100 MHz, LO = +15 dBm)

Description	Minimum	Typical	Maximum	Units
RF Frequency Range	4		8.5	GHz
LO Frequency Range	4		8.5	GHz
IF Frequency Range	DC		3.5	GHz
Impedance		50		Ohms
RF Input Power			+20	dBm
LO Input Power		+15	+27	dBm
IF Input Power			+20	dBm

Click the following link (or enter part number in "SEARCH" on website) to obtain additional part information including price, inventory and certifications: [IQ Mixer Operating From 4 GHz to 8.5 GHz With an IF Range From DC to 3.5 GHz And LO Power of +15 dBm, Field Replaceable SMA PE86X9000](#)

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Performance by Frequency

Description	Min.	Typ.	Max.	Min.	Typ.	Max.	Units
Frequency Range, RF/LO		4.0 - 8.5			5.5 - 7.5		GHz
Frequency Range, IF		DC - 3.5			DC - 3.5		GHz
Conversion Loss		7.5	10.5		7.5	9.5	dB
Image Rejection	22	35		28	34		dB
1 dB Compression (Input)		14			15		dBm
LO to RF Isolation	32	40		35	40		dB
LO to IF Isolation	14	20		15	20		dB
IP3 (Input)		23			23		dBm
Amplitude Balance		0.3			0.2		dB
Phase Balance		8			6		Deg

Harmonics of LO

LO Freq. (GHz)	nLO Spur at RF Port			
	1	2	3	4
3.5	41	54	59	57
4.5	43	43	59	58
5.5	46	57	52	71
6.5	44	60	71	60
7.5	43	66	69	62
8.5	44	65	69	70

LO = +15 dBm
 Values in dBc below input LO level measured at RF Port.
 Data taken with IF ports terminated in 50 Ohms.

MxN Spurious Outputs

mRF	nLO				
	0	1	2	3	4
0	xx	-10	35	25	51
1	35	0	45	54	74
2	94	64	72	67	95
3	95	97	99	84	97
4	90	93	95	97	106

RF = 5.6 GHz @ -10 dBm
 LO = 5.5 GHz @ +15 dBm
 Data taken without IF hybrid
 All values in dBc below IF power level

Absolute Maximum Ratings

RF / IF Input	+20 dBm
LO Drive	+27 dBm
Storage Temperature	-65 to +150 °C
Operating Temperature	-55 to +85 °C

Electrical Specification Notes:

All measurements performed as downconverter unless otherwise noted.

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Conversion loss measure as IRM.

Mechanical Specifications

Size

Length	0.89 in [22.61 mm]
Width	0.68 in [17.27 mm]
Height	0.36 in [9.14 mm]
Weight	0.08 lbs [36.29 g]

Configuration

Design	IQ
Connector Option	Field Replaceable
RF Connector	SMA Female
LO Connector	SMA Female
IF Connector	SMA Female

Environmental Specifications

Temperature

Operating Range	-55 to +85 deg C
Storage Range	-65 to +150 deg C

Temperature Cycle
Hermetic Seal

MIL-STD-883, Method 101C, Cond B
Gross Leak MIL-STD-883 Method 1014C1/Fine Leak
MIL-STD-883, Method 1014A2, 5 x 10-8 atm cc
ESD Sensitive Material, Transport material in Approved
ESD bags. Handle only in ESD Workstation.

ESD Sensitive



Compliance Certifications (see [product page](#) for current document)

Plotted and Other Data

Notes:

- *Conversion gain data taken with external IF 90° hybrid.

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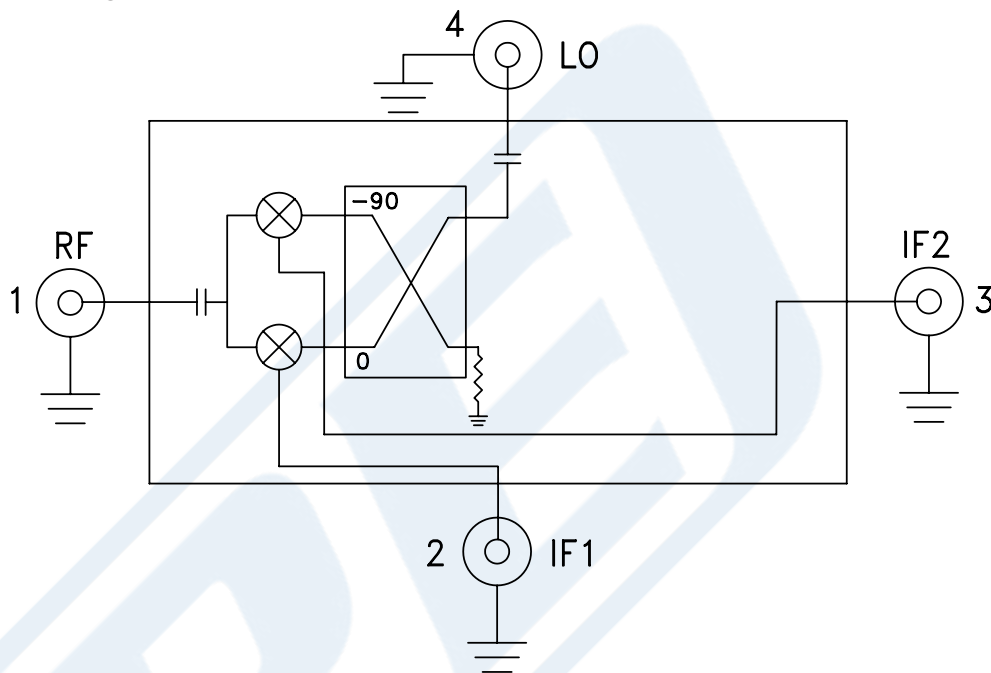


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Functional Block Diagram



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Typical Performance Data

**Data taken As IRM With External IF Hybrid
Conversion Gain vs. Temperature**

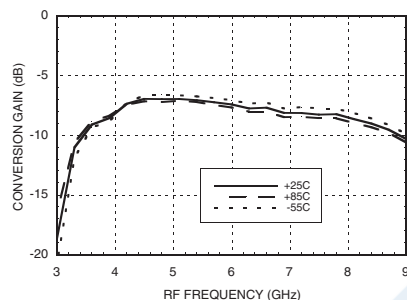
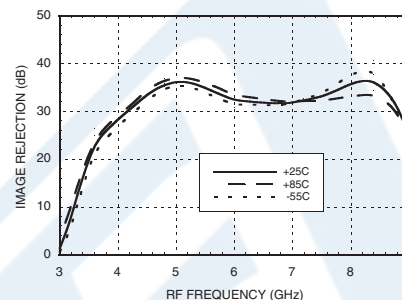
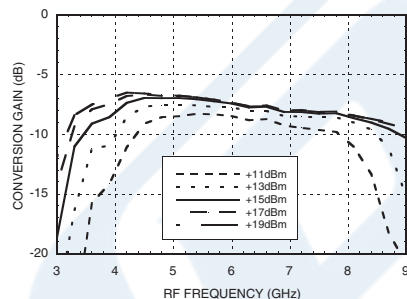


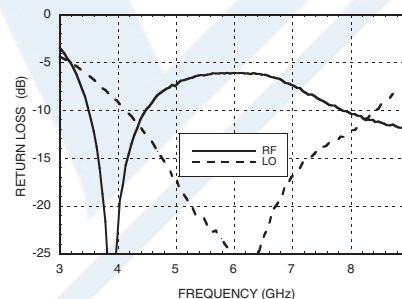
Image Rejection vs. Temperature



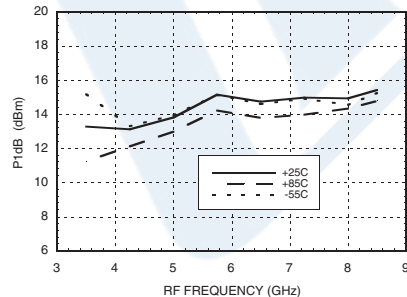
Conversion Gain vs. LO Drive



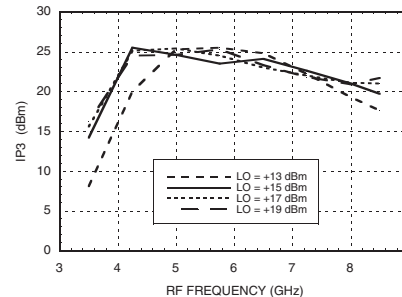
Return Loss



Input P1dB vs. Temperature



Input IP3 vs. LO Drive



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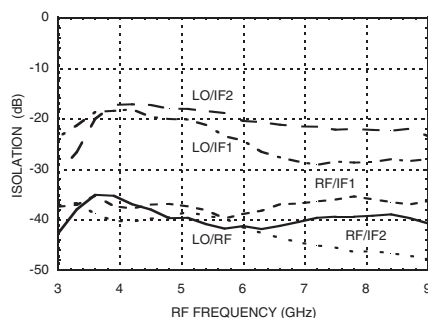


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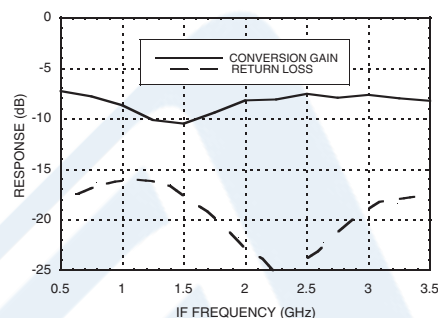
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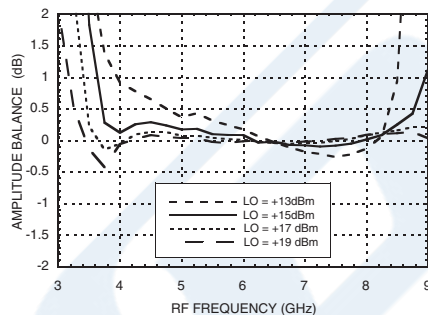
Isolations



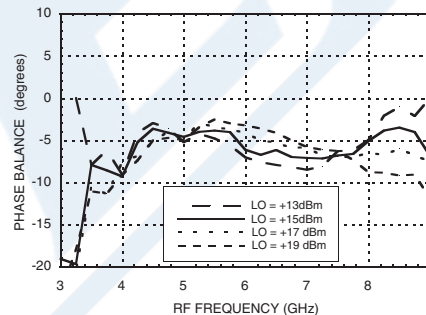
IF Bandwidth*



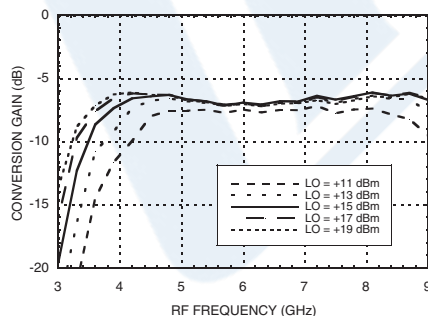
Amplitude Balance vs. LO Drive



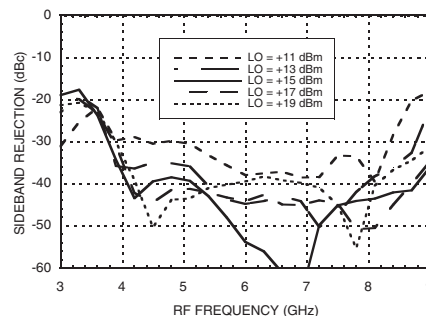
Phase Balance vs. LO Drive



Upconverter Performance Conversion Gain vs. LO Drive*



Upconverter Performance Sideband Rejection vs. LO Drive*



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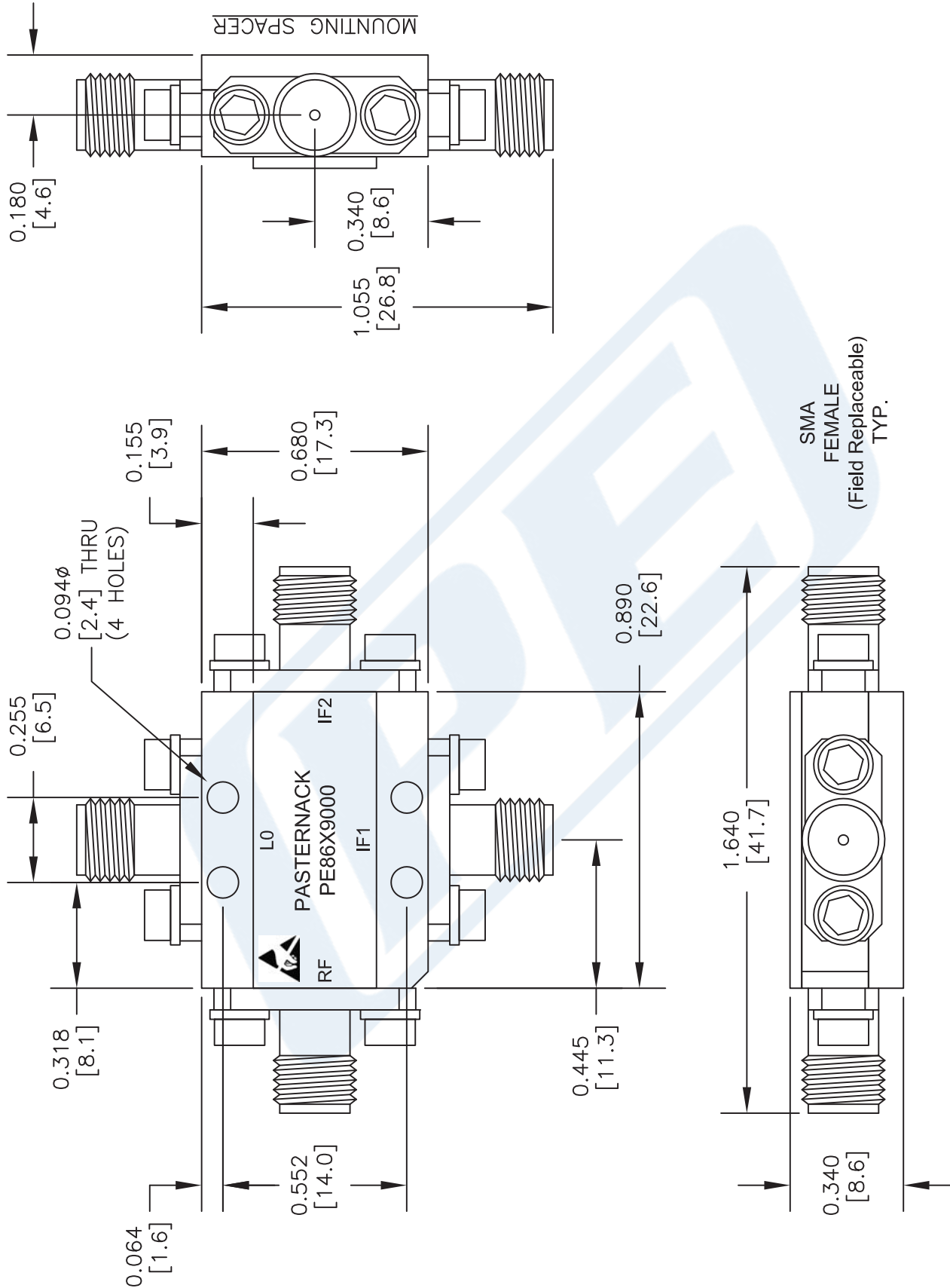
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PE86X9000 CAD Drawing

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DWG TITLE

PE86X9000

NOTES:
1. UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE NOMINAL.
2. ALL SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE AT ANY TIME.
3. DIMENSIONS ARE IN INCHES [mm].

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CAD FILE 042716

SIZE A

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