



**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](#)

The information contained in this document is accurate to the best of our knowledge and representative of the part described herein. It may be necessary to make modifications to the part and/or the documentation of the part, in order to implement improvements. Pasternack reserves the right to make such changes as required. Unless otherwise stated, all specifications are nominal. Pasternack does not make any representation or warranty regarding the suitability of the part described herein for any particular purpose, and Pasternack does not assume any liability arising out of the use of any part or documentation.



**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

### 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.

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](#)

The information contained in this document is accurate to the best of our knowledge and representative of the part described herein. It may be necessary to make modifications to the part and/or the documentation of the part, in order to implement improvements. Pasternack reserves the right to make such changes as required. Unless otherwise stated, all specifications are nominal. Pasternack does not make any representation or warranty regarding the suitability of the part described herein for any particular purpose, and Pasternack does not assume any liability arising out of the use of any part or documentation.



**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

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.

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](#)

The information contained in this document is accurate to the best of our knowledge and representative of the part described herein. It may be necessary to make modifications to the part and/or the documentation of the part, in order to implement improvements. Pasternack reserves the right to make such changes as required. Unless otherwise stated, all specifications are nominal. Pasternack does not make any representation or warranty regarding the suitability of the part described herein for any particular purpose, and Pasternack does not assume any liability arising out of the use of any part or documentation.

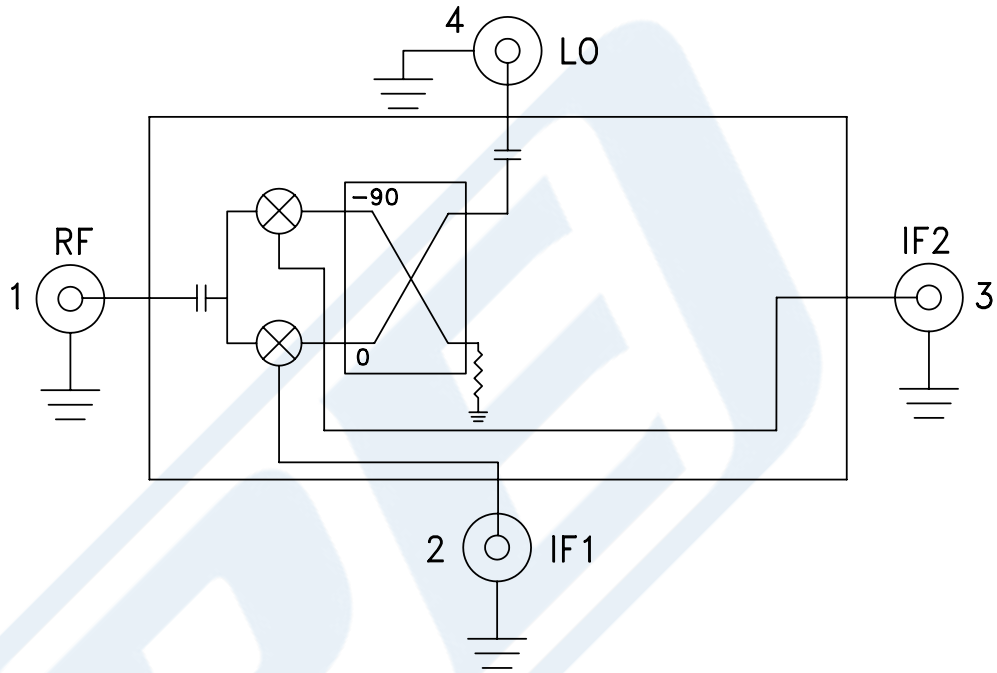


**IQ Mixer Operating From 4 GHz to 8.5 GHz With an IF Range From DC to 3.5 GHz And LO Power of +15 dBm, Field Replaceable SMA**

Mixers Technical Data Sheet

PE86X9000

Functional Block Diagram



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](#)

The information contained in this document is accurate to the best of our knowledge and representative of the part described herein. It may be necessary to make modifications to the part and/or the documentation of the part, in order to implement improvements. Pasternack reserves the right to make such changes as required. Unless otherwise stated, all specifications are nominal. Pasternack does not make any representation or warranty regarding the suitability of the part described herein for any particular purpose, and Pasternack does not assume any liability arising out of the use of any part or documentation.



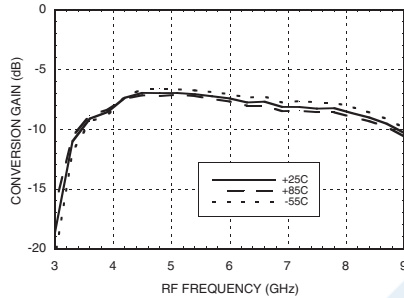
**IQ Mixer Operating From 4 GHz to 8.5 GHz With an IF Range From DC to 3.5 GHz And LO Power of +15 dBm, Field Replaceable SMA**

Mixers Technical Data Sheet

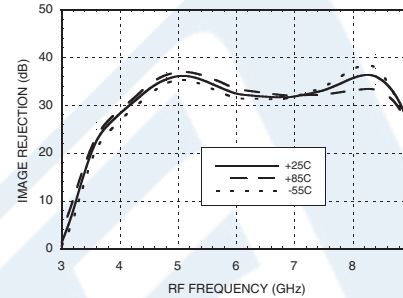
PE86X9000

**Typical Performance Data**

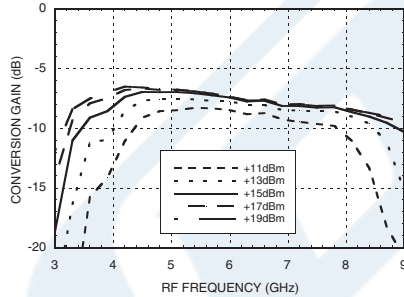
*Data taken As IRM With External IF Hybrid*  
**Conversion Gain vs. Temperature**



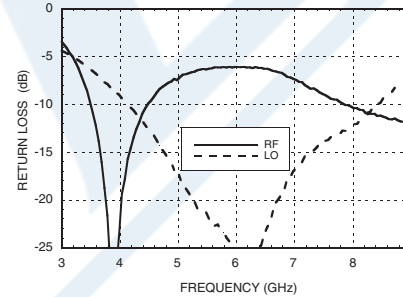
**Image Rejection vs. Temperature**



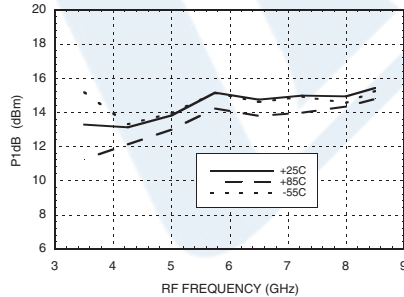
**Conversion Gain vs. LO Drive**



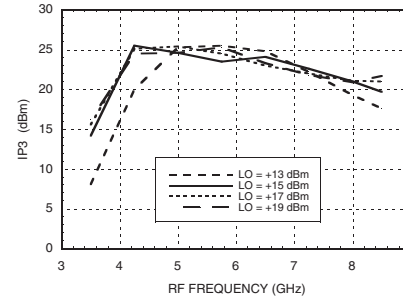
**Return Loss**



**Input P1dB vs. Temperature**



**Input IP3 vs. LO Drive**



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](#)

The information contained in this document is accurate to the best of our knowledge and representative of the part described herein. It may be necessary to make modifications to the part and/or the documentation of the part, in order to implement improvements. Pasternack reserves the right to make such changes as required. Unless otherwise stated, all specifications are nominal. Pasternack does not make any representation or warranty regarding the suitability of the part described herein for any particular purpose, and Pasternack does not assume any liability arising out of the use of any part or documentation.



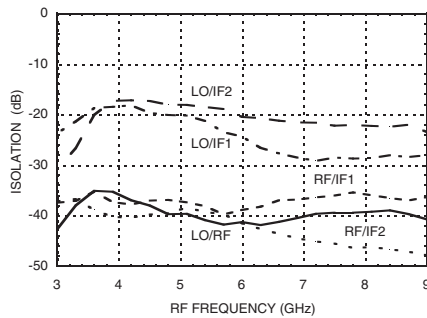


**IQ Mixer Operating From 4 GHz to 8.5 GHz With an IF Range From DC to 3.5 GHz And LO Power of +15 dBm, Field Replaceable SMA**

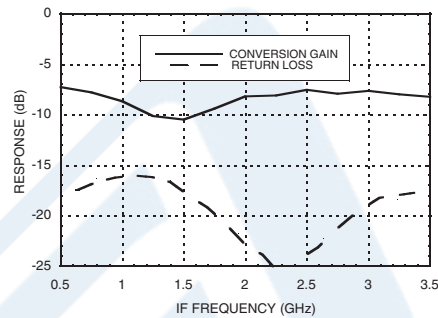
Mixers Technical Data Sheet

PE86X9000

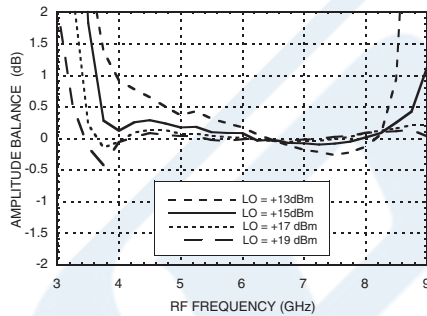
**Isolations**



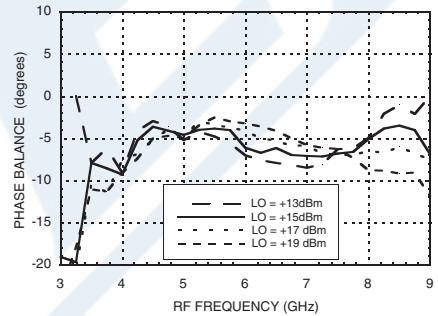
**IF Bandwidth\***



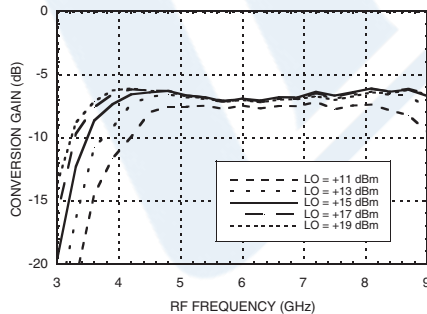
**Amplitude Balance vs. LO Drive**



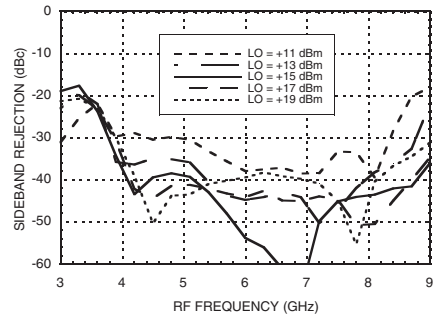
**Phase Balance vs. LO Drive**



**Upconverter Performance Conversion Gain vs. LO Drive\***



**Upconverter Performance Sideband Rejection vs. LO Drive\***



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](#)

The information contained in this document is accurate to the best of our knowledge and representative of the part described herein. It may be necessary to make modifications to the part and/or the documentation of the part, in order to implement improvements. Pasternack reserves the right to make such changes as required. Unless otherwise stated, all specifications are nominal. Pasternack does not make any representation or warranty regarding the suitability of the part described herein for any particular purpose, and Pasternack does not assume any liability arising out of the use of any part or documentation.



**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

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 from Pasternack Enterprises has same day shipment for domestic and International orders. Our RF, microwave and millimeter wave products maintain a 99% availability and are part of the broadest selection in the industry.

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](https://www.pasternack.com/50-ohm-sma-mixer-4-8.5-ghz-if-dc-3.5-ghz-pe86x9000-p.aspx)

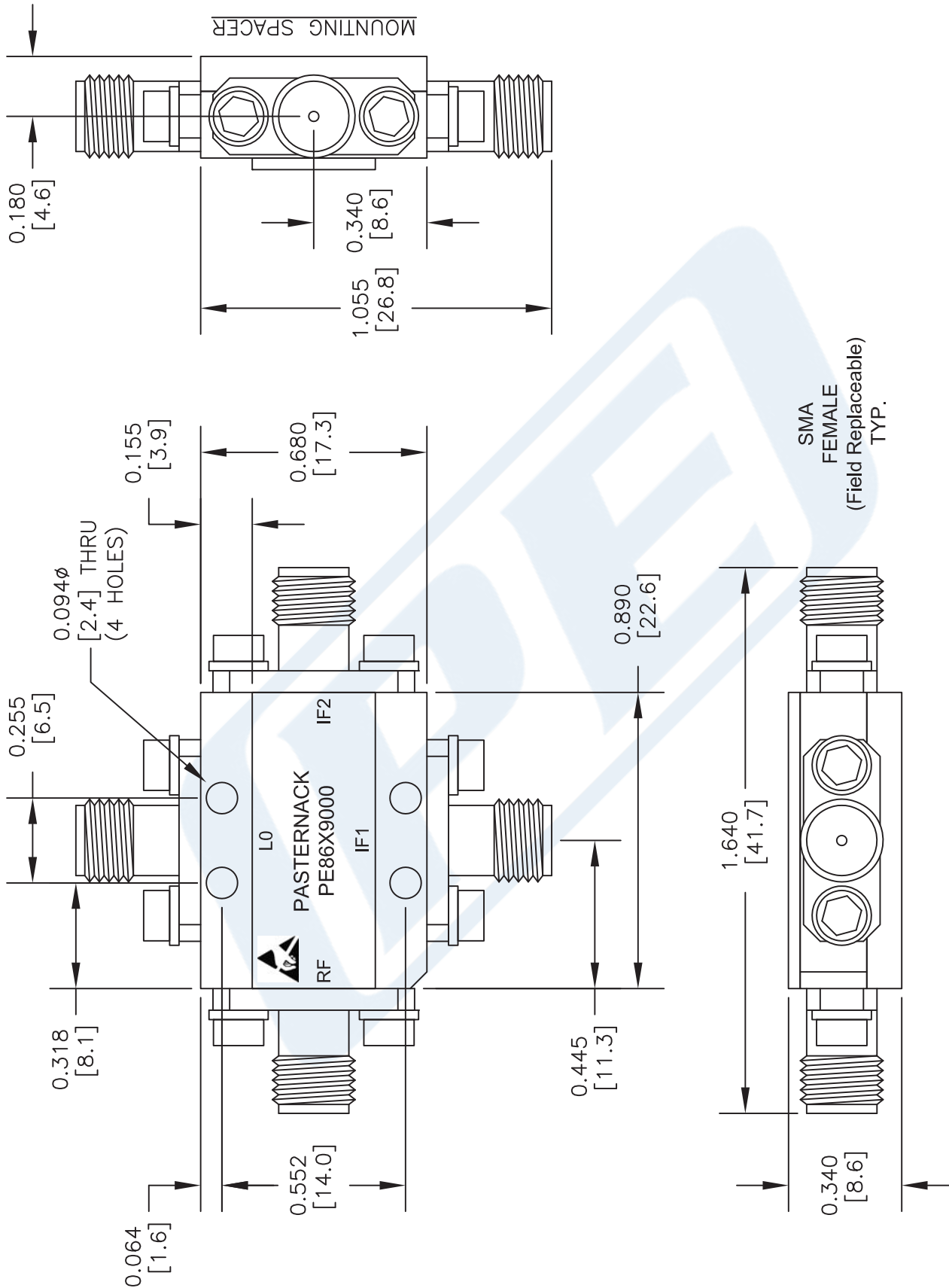
URL: <https://www.pasternack.com/50-ohm-sma-mixer-4-8.5-ghz-if-dc-3.5-ghz-pe86x9000-p.aspx>

The information contained in this document is accurate to the best of our knowledge and representative of the part described herein. It may be necessary to make modifications to the part and/or the documentation of the part, in order to implement improvements. Pasternack reserves the right to make such changes as required. Unless otherwise stated, all specifications are nominal. Pasternack does not make any representation or warranty regarding the suitability of the part described herein for any particular purpose, and Pasternack does not assume any liability arising out of the use of any part or documentation.

The information contained in this document is accurate to the best of our knowledge and representative of the part described herein. It may be necessary to make modifications to the part and/or the documentation of the part, in order to implement improvements. Pasternack reserves the right to make such changes as required. Unless otherwise stated, all specifications are nominal. Pasternack does not make any representation or warranty regarding the suitability of the part described herein for any particular purpose, and Pasternack does not assume any liability arising out of the use of any part or documentation.

# PE86X9000 CAD Drawing

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



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].

FSCM NO. 53919

CAD FILE 042716

SCALE N/A

SIZE A

2233

**PE PASTERNAK**  
 THE ENGINEER'S RF SOURCE

Pasternack Enterprises, Inc.  
 P.O. Box 16759 | Irvine | CA | 92623  
 Phone: (949) 261-1920 | Fax: (949) 261-7451  
 Website: www.pasternack.com | E-Mail: sales@pasternack.com