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# X3 Frequency Multiplier ZXF90-3-723-E+

50Ω Output 40 to 72 GHz 2.92 mm-Female to 1.85 mm-Male

## KEY FEATURES

- Wideband Output, 40 to 72 GHz
- Wide Input Power Range, +13 to +20 dBm
- Low Conversion Loss, 23 dB Typ.
- Good Fundamental and Harmonic Suppression
  - F1: 38 dBc Typ.
  - F2: 35 dBc Typ.
  - F4: 35 dBc Typ.

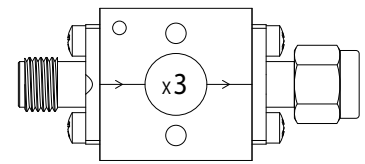


Generic photo used for illustration purposes only

## APPLICATIONS

- 5G-FR2 Millimeter Wave Testing
- Aerospace & Defense
- Q-band, V-band SATCOM
- Test and Measurement Equipment

## FUNCTIONAL DIAGRAM



## PRODUCT OVERVIEW

Mini-Circuits' ZXF90-3-723-E+ is a wideband frequency tripler utilizing MCLs' own GaAs HBT multiplier, CY3-723-DG+, converting input frequencies from 13.33 to 24 GHz into output frequencies from 40 to 72 GHz. Its wide output range makes this model suitable for broadband systems, as well as a wide variety of narrow-band applications. This multiplier is housed in a rugged, small form factor (0.7" x 0.7" x 0.37") connectorized housing, saving space in crowded layouts.

## ELECTRICAL SPECIFICATIONS<sup>1</sup> AT +25°C AND Z<sub>0</sub> = 50Ω, UNLESS NOTED OTHERWISE

Parameter	Input Frequency (GHz)	Output Frequency (GHz)	Min.	Typ.	Max.	Unit	
Multiplication Factor	-	-	3				
Frequency Range, Input (F1)	-	-	13.33	-	24	GHz	
Frequency Range, Output (F3)	-	-	40	-	72	GHz	
Input Power	-	-	+14	-	+20	dBm	
Conversion Loss (X3)	13.33 - 18	40 - 54	-	20.0	24.0	dB	
	18 - 20	54 - 60	-	22.0	26.0		
	20 - 22.33	60 - 67	-	24.0	28.5		
	22.33 - 24	67 - 72	-	27.0	32.5		
Harmonic Suppression <sup>2</sup>	F1	13.33 - 18	13.33 - 18	-	45.0	-	dBc
		18 - 20	18 - 20	-	42.0	-	
		20 - 22.33	20 - 22.33	-	35.0	-	
		22.33 - 24	22.33 - 24	-	30.0	-	
	F2	13.33 - 18	26.66 - 36	-	44.0	-	
		18 - 20	36 - 40	-	27.0	-	
		20 - 22.33	40 - 44.66	-	25.0	-	
		22.33 - 24	44.66 - 48	-	21.0	-	
	F4	13.33 - 18	53.32 - 72	-	40.0	-	
		18 - 20	72 - 80	-	38.0	-	
		20 - 22.33	80 - 89.32	-	45.0	-	
		22.33 - 24	89.32 - 96	-	31.0	-	

1. Measured with input power at +18 dBm.

2. Harmonics of input frequency below the power level of F3.





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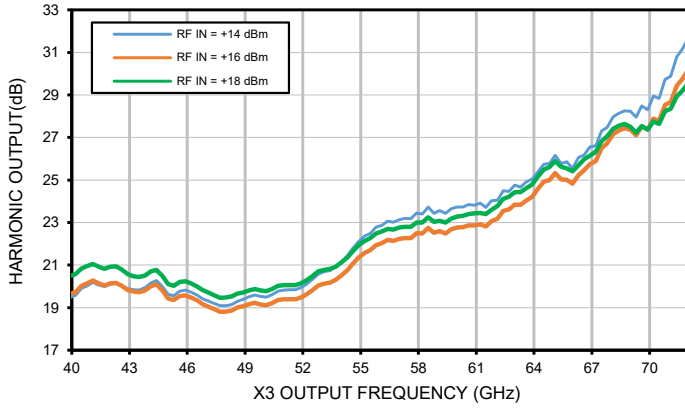
# X3 Frequency Multiplier ZXF90-3-723-E+



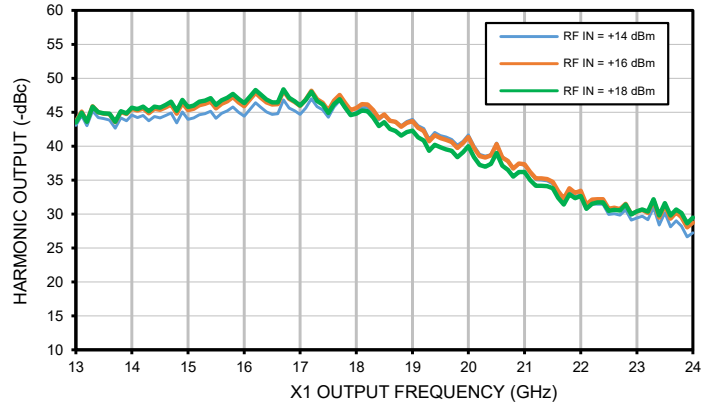
50Ω Output 40 to 72 GHz 2.92 mm-Female to 1.85 mm-Male

## TYPICAL PERFORMANCE CURVES

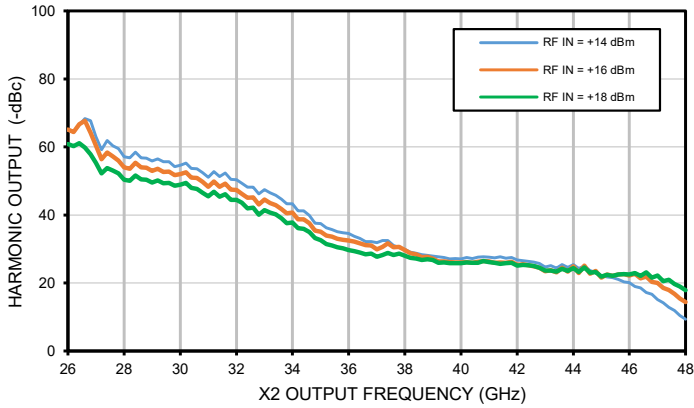
CONVERSION LOSS X3 OUTPUT



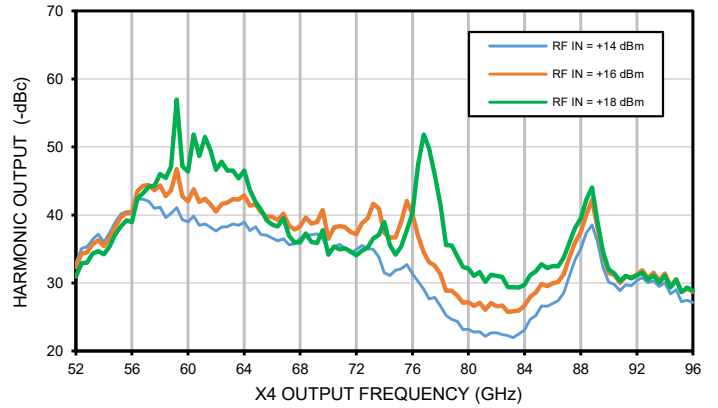
HARMONIC X1 OUTPUT



HARMONIC X2 OUTPUT



HARMONIC X4 OUTPUT





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# X3 Frequency Multiplier ZXF90-3-723-E+

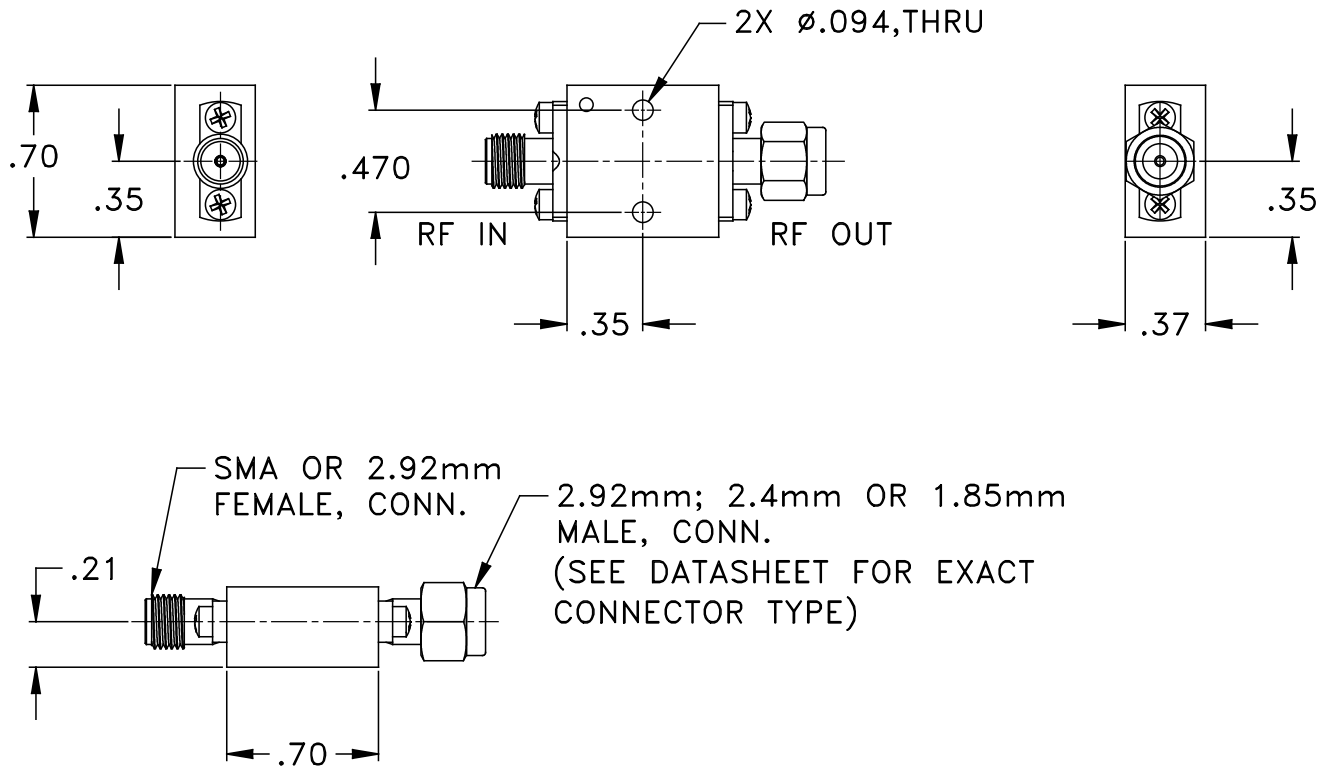
50Ω Output 40 to 72 GHz 2.92 mm-Female to 1.85 mm-Male

### ABSOLUTE MAXIMUM RATINGS<sup>3</sup>

Parameter	Ratings
Operating Temperature	-40°C to +85°C Baseplate
Storage Temperature	-40°C to +85°C
RF Input Power	+22 dBm

3. Permanent damage may occur if any of these limits are exceeded.

### CASE STYLE DRAWING



Weight: 14.0 grams

Dimensions are in inches [mm]. Tolerances: 2 Pl. + .03; 3 Pl. + .015 Inches





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# X3 Frequency Multiplier **ZXF90-3-723-E+**

50Ω Output 40 to 72 GHz 2.92 mm-Female to 1.85 mm-Male

## ADDITIONAL INFORMATION IS AVAILABLE ON OUR DASHBOARD

Performance Data & Graphs	Data
	Graphs
RoHS Status	Compliant
Environmental Ratings	ENV131
Export Information	EAR99

## ORDERING INFORMATION

Model No. Links	<a href="#">ZXF90-3-723-E+</a>
Product Marking	ZXF90-3-723-E+
Case Style	UK3641
Connector	2.92 mm-Female to 1.85 mm-Male

### NOTES

- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the standard terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at [www.minicircuits.com/terms/viewterm.html](http://www.minicircuits.com/terms/viewterm.html)

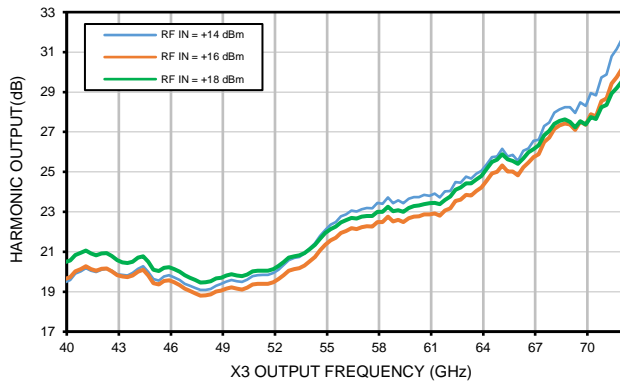


Typical Performance Data

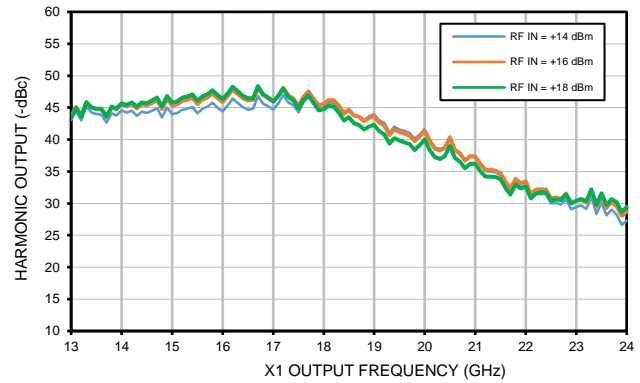
Input Freq (GHz)	X3 Conversion Loss (dB)				X1 Harmonic Output (-dBc)				X2 Harmonic Output (-dBc)				X4 Harmonic Output (-dBc)			
	Output Freq (GHz)	Input Power			Output Freq (GHz)	Input Power			Output Freq (GHz)	Input Power			Output Freq (GHz)	Input Power		
		+14 dBm	+16 dBm	+18 dBm		+14 dBm	+16 dBm	+18 dBm		+14 dBm	+16 dBm	+18 dBm		+14 dBm	+16 dBm	+18 dBm
13.33	40.00	19.48	19.64	20.48	13.33	45.18	45.87	45.80	26.67	68.33	67.70	59.84	53.33	36.38	35.66	34.33
13.67	41.00	20.02	20.14	20.95	13.67	43.87	44.72	44.80	27.33	59.16	56.42	52.19	54.67	37.39	36.59	35.35
14.00	42.00	20.10	20.15	20.93	14.00	44.55	45.52	45.69	28.00	57.17	53.95	50.32	56.00	40.48	40.32	38.93
14.33	43.00	19.88	19.83	20.58	14.33	43.74	44.86	45.14	28.67	56.82	53.96	50.46	57.33	42.03	44.39	44.15
14.67	44.00	19.94	19.81	20.51	14.67	44.51	45.72	46.10	29.33	56.53	53.56	50.18	58.67	39.64	42.80	45.42
15.00	45.00	19.63	19.43	20.11	15.00	43.95	45.30	45.76	30.00	54.64	52.00	48.94	60.00	38.99	42.00	46.36
15.33	46.00	19.82	19.58	20.23	15.33	44.81	46.23	46.73	30.67	53.53	50.83	47.71	61.33	38.71	42.37	51.47
15.67	47.00	19.40	19.16	19.83	15.67	44.82	46.26	46.75	31.33	52.79	49.84	46.85	62.67	38.22	41.58	47.82
16.00	48.00	19.09	18.82	19.48	16.00	44.43	45.88	46.35	32.00	50.34	47.32	44.42	64.00	38.93	42.87	46.52
16.33	49.00	19.39	19.06	19.71	16.33	45.70	47.14	47.57	32.67	48.20	45.12	42.13	65.33	37.13	40.47	40.82
16.67	50.00	19.53	19.15	19.81	16.67	44.79	46.20	46.46	33.33	46.48	43.52	40.66	66.67	36.19	39.26	38.30
17.00	51.00	19.83	19.40	20.05	17.00	44.69	45.95	45.98	34.00	43.32	40.65	37.80	68.00	36.53	38.32	36.00
17.33	52.00	19.95	19.48	20.14	17.33	45.82	46.91	46.68	34.67	39.88	37.55	34.93	69.33	37.23	38.97	35.87
17.67	53.00	20.58	20.05	20.71	17.67	45.77	46.69	46.18	35.33	36.18	33.94	31.49	70.67	35.30	38.17	35.36
18.00	54.00	21.16	20.51	21.12	18.00	45.00	45.60	44.76	36.00	34.54	32.48	29.69	72.00	34.87	37.20	34.08
18.33	55.00	22.10	21.36	21.94	18.33	44.97	45.28	44.20	36.67	32.18	31.09	28.48	73.33	34.95	41.67	36.57
18.67	56.00	22.78	21.94	22.48	18.67	43.71	43.76	42.57	37.33	32.44	30.63	28.27	74.67	31.11	36.64	35.59
19.00	57.00	23.14	22.24	22.76	19.00	43.96	43.67	42.30	38.00	29.92	29.66	28.01	76.00	31.36	40.07	40.29
19.33	58.00	23.45	22.50	23.00	19.33	41.04	40.71	39.33	38.67	28.33	27.59	26.74	77.33	27.67	33.05	49.75
19.67	59.00	23.44	22.51	23.03	19.67	41.36	40.94	39.55	39.33	27.75	26.33	25.94	78.67	25.22	28.87	35.59
20.00	60.00	23.73	22.76	23.28	20.00	41.64	41.33	39.99	40.00	27.12	26.01	25.86	80.00	23.18	27.21	32.14
20.33	61.00	23.81	22.88	23.43	20.33	38.55	38.31	36.95	40.67	27.58	26.22	25.97	81.33	22.16	26.06	30.18
20.67	62.00	24.03	23.06	23.60	20.67	38.37	38.32	37.11	41.33	27.39	25.98	25.96	82.67	22.42	26.68	30.88
21.00	63.00	24.76	23.85	24.43	21.00	37.20	37.36	36.18	42.00	26.72	25.26	25.14	84.00	23.11	26.69	29.74
21.33	64.00	25.05	24.22	24.80	21.33	35.01	35.25	34.18	42.67	26.09	24.93	24.95	85.33	26.62	29.84	32.75
21.67	65.00	25.78	25.00	25.61	21.67	32.98	33.37	32.40	43.33	25.07	23.77	23.68	86.67	27.42	30.17	32.42
22.00	66.00	25.54	24.83	25.40	22.00	32.88	33.42	32.64	44.00	25.46	24.86	24.37	88.00	35.00	37.50	39.46
22.33	67.00	26.56	25.75	26.13	22.33	31.45	32.19	31.73	44.67	23.60	22.67	23.02	89.33	36.16	38.28	39.08
22.67	68.00	27.47	26.72	27.06	22.67	30.07	30.91	30.61	45.33	21.78	22.54	22.36	90.67	29.78	31.18	31.38
23.00	69.00	28.24	27.37	27.50	23.00	29.43	30.38	30.42	46.00	20.15	22.21	22.53	92.00	30.38	31.24	31.12
23.33	70.00	28.30	27.37	27.38	23.33	31.00	32.03	32.18	46.67	17.20	21.86	23.08	93.33	30.29	31.51	31.10
23.67	71.00	29.73	28.54	28.24	23.67	28.10	29.29	29.77	47.33	14.15	18.54	20.58	94.67	28.38	29.50	29.34
24.00	72.00	31.67	30.18	29.55	24.00	27.26	28.74	29.49	48.00	9.34	14.39	17.87	96.00	27.12	28.73	28.88

Typical Performance Curves

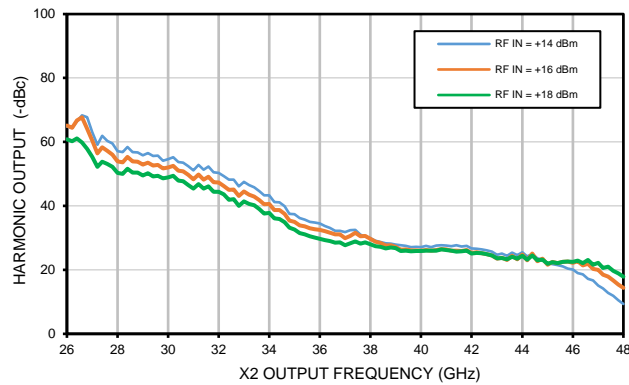
CONVERSION LOSS X3 OUTPUT



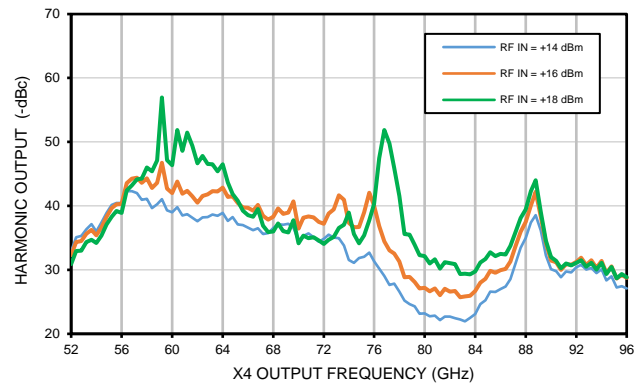
HARMONIC X1 OUTPUT

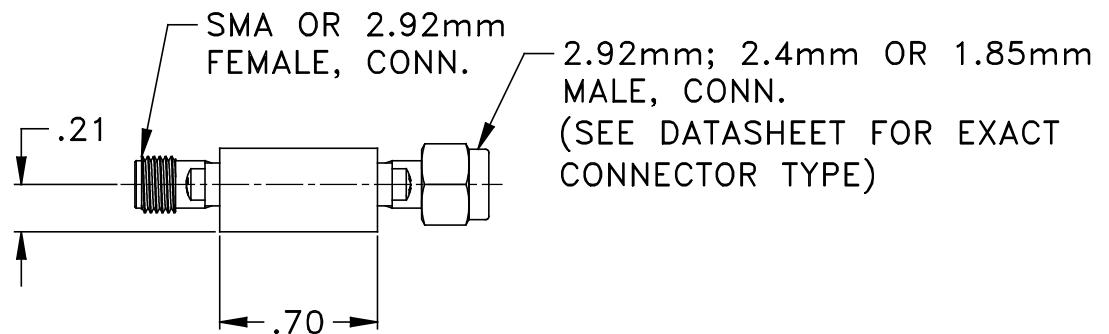
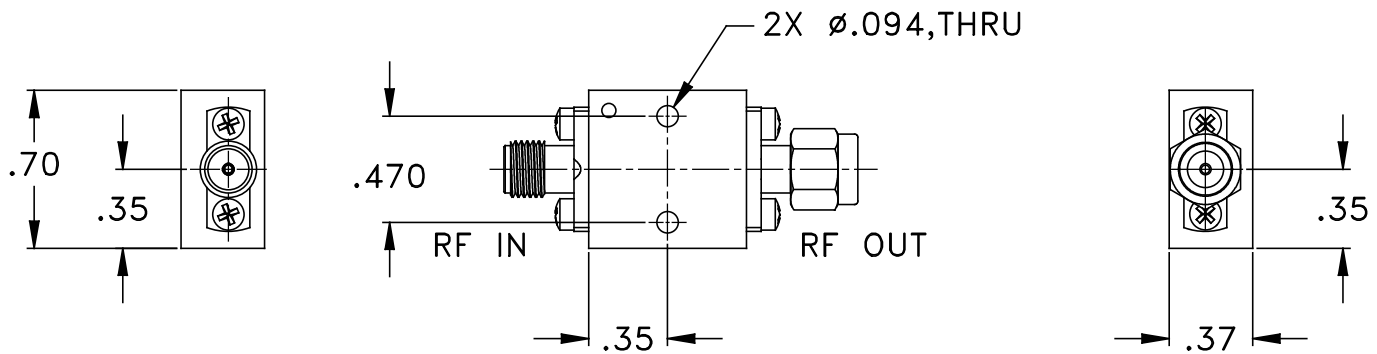


HARMONIC X2 OUTPUT



HARMONIC X4 OUTPUT





Weight: 14.0 grams

Dimensions are in inches [mm]. Tolerances: 2 Pl. + .03; 3 Pl. + .015 Inches

### Notes:

1. Case material: Brass
2. Case Finish: Gold Plated.
3. Refer to the individual Model Data Sheet for all Type of Connectors available.

**Mini-Circuits®**  
ISO 9001 ISO 14001 CERTIFIED

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RF/IF MICROWAVE COMPONENTS



All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

<b>Specification</b>	<b>Test/Inspection Condition</b>	<b>Reference/Spec</b>
Operating Temperature	-40° to 85° C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Thermal Shock	-55° to 100°C, 5 cycles	MIL-STD-202, Method 107, Condition B except over -55° to 100°C