

X3 Frequency Multiplier

RMK-3-93+

50Ω Output 5400 to 9000 MHz

The Big Deal

- Broadband tripler for 5.4-9 GHz signal production
- High rejection of F2 and F4 (-55 dBc typ)
- Low conversion loss, 15 dB typ
- Outstanding performance at a low price



CASE STYLE: TT1224

Product Overview

The RMK-3-93+ is a broadband frequency tripler offering excellent performance for C- to X-band signals. The aqueous washable and RoHS-compliant package features rugged, wire-welded construction, in a small 0.25" x 0.31" x 0.16" plastic case.

Key Features

Feature	Advantages
Broad bandwidth	Ideal for satellite up- and down-converters and line-of-sight communication links, as well as items operating in the 8.5-9.0 GHz radiolocation band
High rejection of F2 and F4	Proprietary internal circuitry achieves high harmonic suppression, keeping filtering requirements to a minimum
Low conversion loss	High output reduces external gain requirements after frequency tripling.
Low price	Practical, low cost solution for providing high frequency sources from lower frequency VCOs and synthesizers.

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/MCLStore/terms.jsp



50Ω Output 5400 to 9000 MHz



+RoHS Compliant

The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Input Power	17 dBm
Permanent damage may occur if any of these limits are exceeded	

INPUT	1
OUTPUT	4
GROUND	2,3,5,6

TOP VIEW

SIDE VIEW

BOTTOM VIEW

PCB Land Pattern

Suggested Layout,
Tolerance to be within ± 0.002

A	B	C	D	E	F	G	H
.25	.31	.16	.100	.040	.055	.060	.065
6.35	7.87	4.06	2.54	1.02	1.40	1.52	1.65
J	K	L	M	N	P	Q	wt.
.300	.060	.160	.025	.100	.110	.070	grams
7.62	1.52	4.06	0.64	2.54	2.79	1.78	0.16

Figure 1 is a mechanical drawing of the package outline for the 17X0000. The drawing shows a rectangular package with various dimensions and features. Key dimensions include: .065 TRACE WIDTH, 3 PL. (SEE NOTE BELOW); .037, 2 PL.; .030, TYP.; .040, 2 PL.; .020, 2 PL.; .060, 2 PL.; 2X .065; .020, 2 PL.; 4X .050; 17X #.020 PTH FOR GROUND; and PIN 6. The package outline is shown in blue, and the lead frame is shown in red.

NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" $\pm$.002"; COPPER: 1/2 OZ. EACH SIDE.
2. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
3. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

 DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

 DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

Notes

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- broadband
- high rejection F2 & F4, -55 dBc typ.
- low cost
- aqueous washable

- synthesizers
- local oscillators
- satellite up and down converters

MULTIPLICATION FACTOR	FREQUENCY (MHz)		INPUT POWER (dBm)		CONVERSION LOSS (dB)		*HARMONIC OUTPUT (dBc)					
							F1		F2		F4	
	F1 Input	F3 Output	Min.	Max.	Typ.	Max.	Typ.	Min.	Typ.	Min.	Typ.	Min.
3	1800-3000	5400-9000	7	11	15	19.5	6	-6	55	35	55	35

* Harmonics of input frequency below the power level of F3

INPUT RF= 7 dBm					INPUT RF= 11 dBm			
Input Frequency (MHz)	Conversion Loss (dB)	Harmonic Output Below F3 (-dBc)			Conversion Loss (dB)	Harmonic Output Below F3 (-dBc)		
		F1	F2	F4		F1	F2	F4
1800.00	16.94	5.94	64.33	62.56	15.79	9.86	73.68	61.49
1900.00	16.48	5.52	63.05	58.30	15.12	9.69	73.46	60.98
2000.00	15.62	5.58	65.59	58.27	14.78	9.29	72.77	61.61
2100.00	15.03	5.24	67.56	57.08	14.46	8.70	70.70	60.24
2200.00	14.88	4.66	65.40	54.92	14.37	8.01	67.50	60.03
2287.50	14.73	4.02	64.99	54.30	15.04	6.58	66.22	58.98
2325.00	14.68	3.86	66.04	54.86	15.30	6.15	66.85	58.85
2400.00	14.51	3.38	67.92	55.19	15.39	5.45	65.72	57.81
2450.00	14.72	2.95	67.05	54.79	15.36	5.22	64.01	57.96
2500.00	14.79	2.57	65.67	53.79	15.49	4.78	62.00	57.62
2550.00	14.53	2.48	66.05	53.40	15.30	4.62	60.87	57.76
2600.00	14.43	2.23	66.21	52.72	15.14	4.40	60.52	57.74
2650.00	14.42	1.93	68.53	51.96	14.83	4.38	62.14	59.76
2700.00	14.12	1.94	71.91	52.32	14.81	4.09	65.47	62.24
2750.00	13.82	1.89	67.73	52.40	14.49	4.08	68.87	63.23
2800.00	13.85	1.62	62.77	52.06	14.45	3.86	69.45	62.33
2850.00	14.05	1.18	59.98	51.75	14.68	3.39	67.86	60.15
2900.00	14.07	0.82	58.96	51.55	14.93	2.81	66.70	58.49
2955.00	14.33	0.35	57.62	50.67	15.08	2.45	66.24	57.64
3010.00	14.90	0.57	56.61	49.65	15.68	1.47	65.11	56.28

Output Frequency (MHz)	Conversion Loss (dB) for INPUT RF=7 dBm	Conversion Loss (dB) for INPUT RF=11 dBm
5400	16.8	15.5
5800	16.0	14.8
6200	15.2	14.2
6600	14.8	14.0
7000	14.5	14.8
7400	14.8	15.2
7800	14.5	15.0
8200	14.0	14.5
8600	14.2	14.8
9000	14.5	15.5

F1 Frequency (MHz)	INPUT RF=7 dBm (dBc)	INPUT RF=11 dBm (dBc)
1800	6.5	10.0
1900	5.8	9.5
2000	5.5	9.0
2100	5.2	8.5
2200	4.8	8.0
2300	4.2	7.0
2400	3.8	6.0
2500	3.2	5.0
2600	2.8	4.5
2700	2.5	4.2
2800	2.2	4.0
2900	1.8	3.5
3000	1.5	3.0

Graph of Harmonic Output (dBc) vs F2 Frequency (MHz) for two input RF levels: 7 dBm (solid blue line) and 11 dBm (dashed red line). The 11 dBm curve shows a significant peak at 5400 MHz, while the 7 dBm curve shows a smaller peak at the same frequency.

F4 Frequency (MHz)	INPUT RF=7 dBm (dBc)	INPUT RF=11 dBm (dBc)
7200	62	62
7600	58	61
8000	58	62
8400	58	61
8800	57	60
9200	55	60
9600	55	59
10000	54	58
10400	52	58
10800	52	63
11200	51	60
11600	51	59
12000	50	58



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