

# X3 Frequency Multiplier

RMK-3-31+

50Ω Output 27 to 36 MHz

## The Big Deal

- Low conversion loss, 14 dB
- Wide input power range, +12 to +17 dBm
- Excellent harmonic suppression: F2 & F4, 60 dBc



CASE STYLE: TT1224

## Product Overview

Mini-Circuits' RMK-3-31+ frequency multiplier provides a multiplication factor of 3 converting input frequencies from 9 to 12 MHz into output frequencies from 27 to 36 MHz, supporting applications including synthesizers, local oscillators, transceiver chains, satellite up and down converters and more. It provides an input power range from +12 to +17 dBm, low conversion loss, and good harmonic suppression. The multiplier comes housed in a miniature surface mount package (0.25 x 0.31 x 0.16") ideal for dense circuit board layouts.

## Key Features

Feature	Advantages
Low conversion loss, 14 dB typ.	With a low conversion loss, RMK-3-31+ produces higher output power, reducing the need for amplification.
Excellent harmonic suppression <ul style="list-style-type: none"><li>• F2, 60 dBc</li><li>• F4, 60 dBc</li></ul>	Reduces spurious signals and the need for additional filtering.
Wide input power range, +12 to +17 dBm	Wide input power signal range accommodates different input signal levels while still maintaining a low conversion loss.
Low cost	Provides an easy, cost-effective solution for generating high-frequency signals from a lower frequency signal source.
Small size	Measuring only 0.25 x 0.31 x 0.16", the RMK-3-31+ saves space in crowded PCB layouts.

### 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](http://www.minicircuits.com/MCLStore/terms.jsp)



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50Ω Output 27 to 36 MHz

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Generic photo used for illustration purposes only  
CASE STYLE: TT1224

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

Available Tape and Reel at no extra cost

Reel Size	Devices/Reel
7"	10, 20, 50, 100, 200
13"	500

## Maximum Ratings

Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Input Power	20 dBm

## Pin Connections

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

## Features

- broadband
- low conversion loss, 14 dB typ.
- high rejection F2, -60 dBc typ.; F4, -60 dBc typ.
- low cost
- aqueous washable

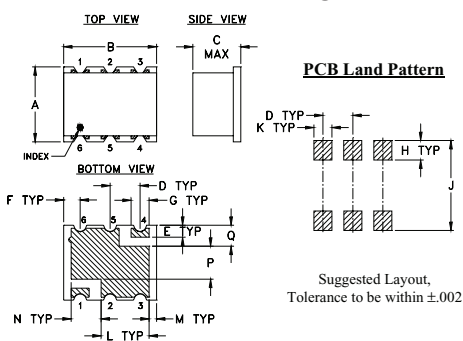
## Applications

- synthesizers
- local oscillators
- satellite up and down converters
- mobile radio

## Electrical Specifications at 25°C

Parameter	Min.	Typ.	Max.	Unit
Multiplier Factor		3		
Frequency Range, Input (F1)	9	—	12	MHz
Frequency Range, Output (F3)	27	—	36	MHz
Input Power	12	—	17	dBm
Conversion Loss	—	14	17	dB
Harmonic Output*	F1	-7	4	-dBc
	F2	40	60	
	F4	40	60	

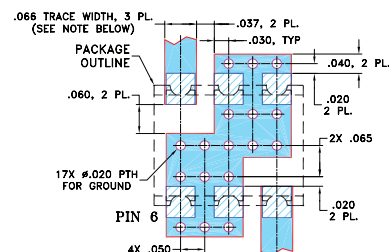
## Outline Drawing



## Outline Dimensions (inch)

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

## Demo Board MCL P/N: TB-393 Suggested PCB Layout (PL-258)



- NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.  
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.  
3. DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)  
4. DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

## Notes

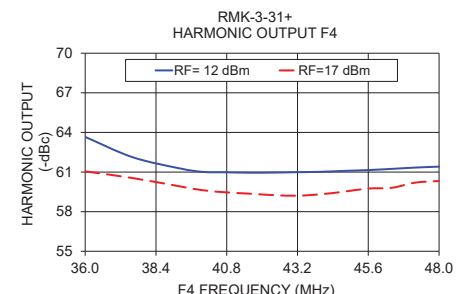
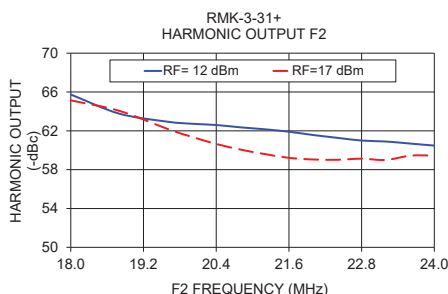
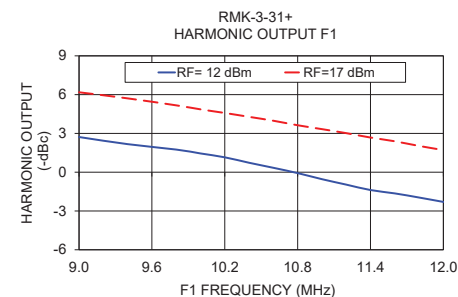
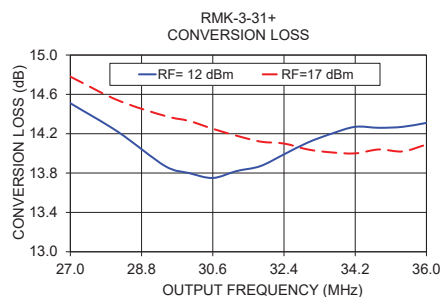
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## Typical Performance Data

Input Frequency (MHz)	INPUT RF= 12 dBm				INPUT RF= 17 dBm			
	Conversion Loss (dB)	Harmonic Output Below F3 (-dBc)			Conversion Loss (dB)	Harmonic Output Below F3 (-dBc)		
		F3	F1	F2		F4	F3	F1
9.00	14.51	2.72	65.74	63.66	14.78	6.18	65.14	61.05
9.40	14.22	2.17	63.77	62.13	14.54	5.71	64.06	60.55
9.80	13.87	1.75	62.94	61.28	14.38	5.17	62.19	59.92
10.00	13.80	1.45	62.73	61.01	14.33	4.86	61.38	59.62
10.40	13.82	0.73	62.36	60.95	14.18	4.28	60.07	59.36
10.80	13.99	0.07	61.91	60.99	14.10	3.63	59.22	59.21
11.00	14.11	-0.54	61.57	61.02	14.04	3.33	59.05	59.32
11.40	14.27	-1.38	61.00	61.15	14.00	2.68	59.13	59.75
11.80	14.27	-1.96	60.69	61.34	14.02	2.03	59.44	60.20
12.00	14.31	-2.30	60.48	61.41	14.09	1.71	59.46	60.32



REV. OR M161622  
RMK-3-31+  
ED-17030701/1  
WL/CP/AM  
170425  
Page 2 of 2