

High IP3

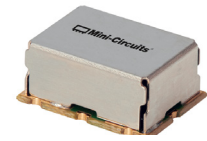
# Frequency Mixer

HJK-251H+

Level 17 (LO Power +17 dBm) 40 to 250 MHz

## The Big Deal

- Low conversion loss, 7.0 dB typ.
- High IP3, 32 dBm typ.
- Excellent L-R isolation, 50 dB typ.



CASE STYLE: TTT881

## Product Overview

Mini-Circuits' HJK-251H+ is a surface mount, level 17 FET-based frequency mixer with an RF frequency range from 40 to 250 MHz, LO frequency range from 10 to 220 MHz, and IF frequency range from 10 to 90 MHz. Its double-balanced FET configuration achieves an outstanding combination of low conversion loss, low noise figure and high IP3 performance without the need for a DC bias current, ideal for sensitive receiver applications including base stations, mobile radio, radar, and more. The mixer comes housed in a miniature, shielded 6-lead package (0.38 x 0.5 x 0.23"), saving space in tight PCB layouts.

## Key Features

Feature	Advantages
High IP3, +32 dBm	Minimizes third order intermodulation products and improves dynamic range in demanding environments where multiple carriers may be present.
Excellent P1dB compression, +20 dBm typ.	Whereas the 1-dB compression point of a diode-based mixer is typically 4 to 6 dB lower than the LO power level, the 1-dB compression point of HJK-251H+ FET-based mixer is +20 dBm higher than the LO signal power. This results in excellent linearity and high dynamic range.
High isolation: <ul style="list-style-type: none"><li>• L-R isolation, 50 dB</li><li>• L-I isolation, 45 dB</li></ul>	Preserves signal integrity from input to output by reducing undesirable signal responses that can degrade system performance.
Low conversion loss, 7 dB	Low conversion loss results in higher output IP3 and better overall system dynamic range.
Small size (0.38 x 0.5 x 0.23")	Saves PCB real estate and accommodates crowded 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.  
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## HJK-251H+



Generic photo used for illustration purposes only

CASE STYLE: TTT881

**+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

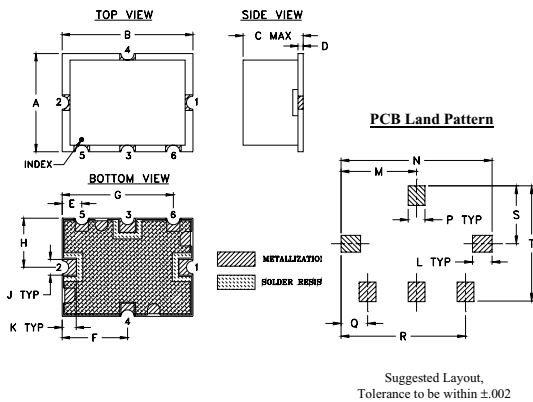
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
LO Power*	+19 dBm
RF Power	+20 dBm

Permanent damage may occur if any of these limits are exceeded.  
\* Over temperature

### Pad Connections

LO	2
RF	1
IF	3
GROUND	4,5,6

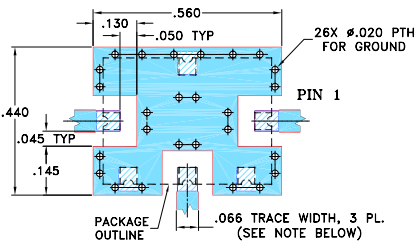
### Outline Drawing



### Outline Dimensions (inch)

A	B	C	D	E	F	G	H	J	K
.38	.50	.23	.020	.075	.250	.425	.187	.050	.050
9.65	12.70	5.84	0.51	1.91	6.35	10.80	4.75	1.27	1.27
L	M	N	P	Q	R	S	T	wt.	
.070	.270	.540	.060	.095	.445	.208	.415	grams	
1.78	6.86	13.72	1.52	2.41	11.30	5.28	10.54	0.8	

### Demo Board MCL P/N: TB-12 Suggested PCB Layout (PL-079)



**NOTE:**

- TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .030" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
  - THE USE OF SOLDER MASK OVER THE GROUND AREA UNDER THE UNIT AS SHOWN IS RECOMMENDED TO PREVENT POTENTIAL SHORTING. IF USER CHOOSES TO EXPOSE METAL UNDER THE ENTIRE UNIT GROUND PAD FOR IMPROVED GROUNDING, IT IS RECOMMENDED A SOLDER MASK DAM BE APPLIED AROUND EACH GROUND PAD TO ENSURE FILLET AND CONNECTION AT GROUND PADS.
  - BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
- DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER), SEE NOTE 2.
- DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

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### Features

- high IP3, 32 dBm typ.
- excellent L-R isolation, 50 dB typ.;
- L-I isolation, 45 dB typ.

### Applications

- base stations
- amateur radio
- aeronautical
- mobile radio
- radar
- emergency

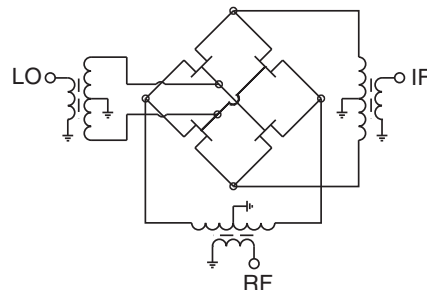
### Electrical Specifications at 25°C

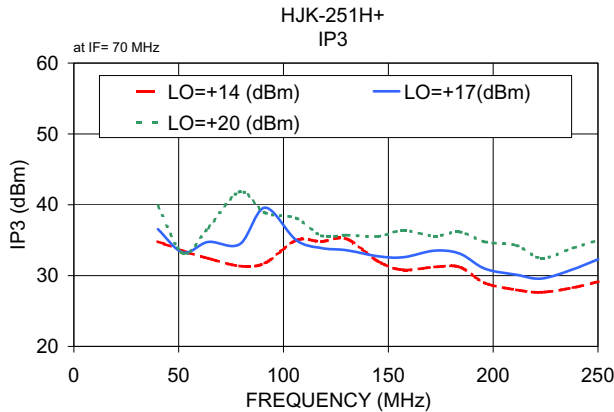
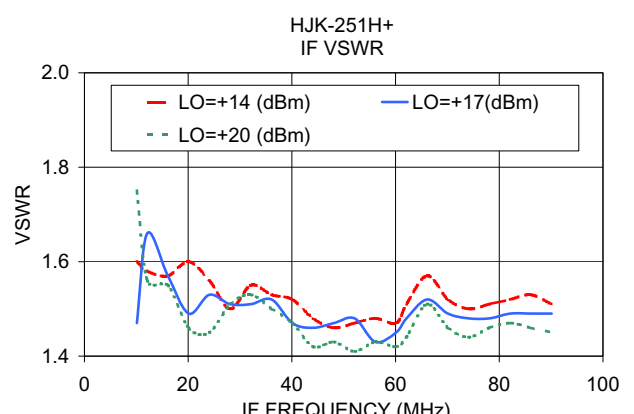
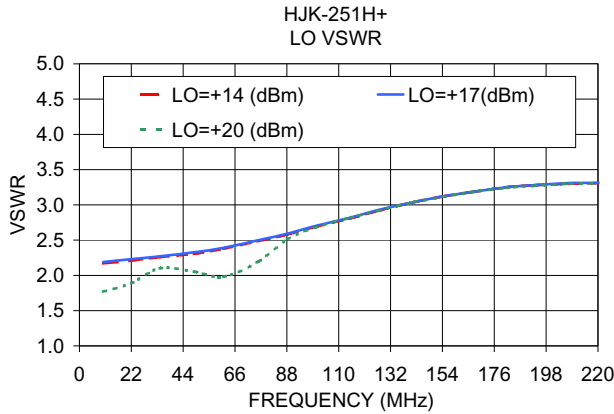
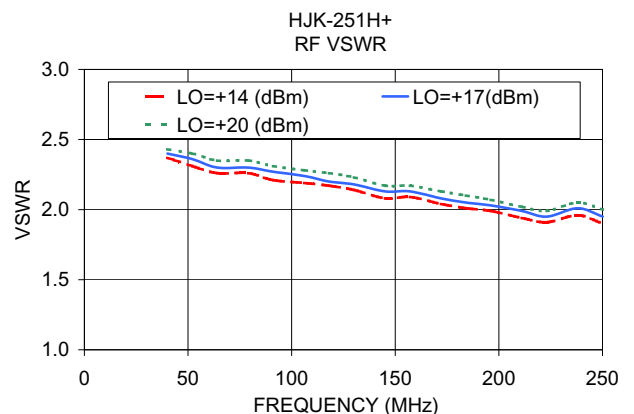
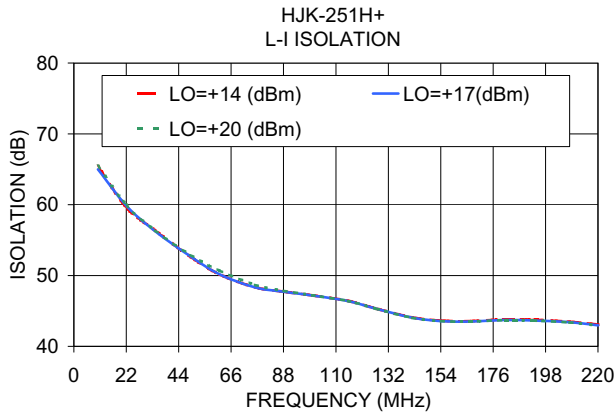
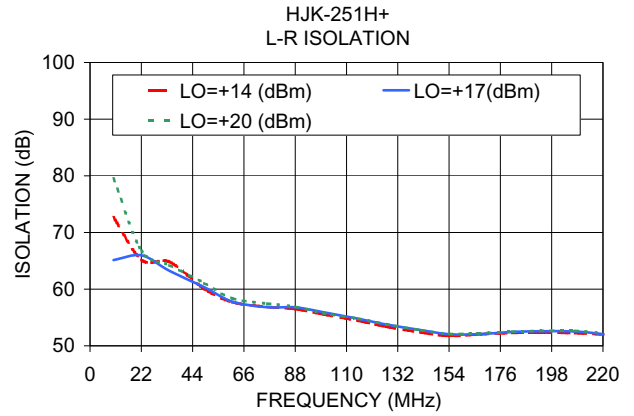
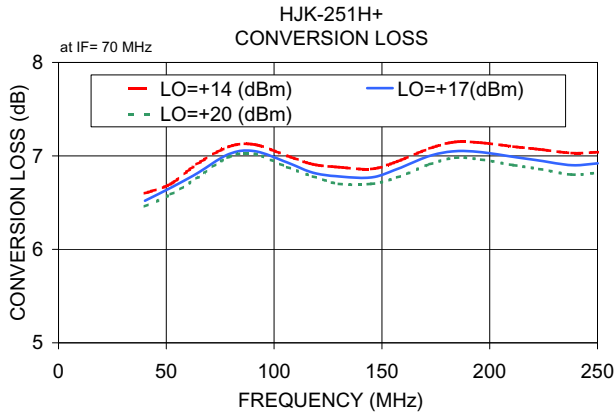
Parameter	Min.	Typ.	Max.	Unit
Frequency Range, RF	40	—	250	MHz
Frequency Range, LO	10	—	220	MHz
Frequency Range, IF	10	—	90	MHz
Conversion Loss	—	7.0	8.5	dB
LO to RF Isolation	36	50	—	dB
LO to IF Isolation	32	45	—	dB
IP3	—	32	—	dBm
RF Input Power at 1 dB Compression	—	+20	—	dBm
LO Power	—	+17	+20	dBm

### Typical Performance Data

Frequency		Conversion Loss (dB)	Isolation L-R	Isolation L-I	VSWR RF Port	VSWR LO Port	IP3 (dBm)
RF MHz	LO MHz	LO +17dBm	LO +17dBm	LO +17dBm	LO +17dBm	LO +17dBm	LO +17dBm
40.10	10.10	6.52	65.14	64.99	2.40	2.19	36.56
52.10	22.10	6.66	65.97	59.83	2.36	2.23	33.25
64.10	34.10	6.81	63.22	56.26	2.30	2.27	34.75
79.10	49.10	7.02	60.32	52.67	2.30	2.33	34.43
91.10	61.10	7.05	57.80	50.17	2.27	2.39	39.59
106.10	76.10	6.93	56.82	48.33	2.24	2.50	35.00
118.10	88.10	6.82	56.80	47.71	2.20	2.59	33.89
130.10	100.10	6.78	55.93	47.18	2.18	2.70	33.58
145.10	115.10	6.77	54.76	46.40	2.13	2.82	32.73
157.10	127.10	6.86	53.76	45.29	2.13	2.93	32.58
172.10	142.10	7.00	52.76	44.04	2.08	3.04	33.52
184.10	154.10	7.05	52.05	43.57	2.05	3.12	33.10
196.10	166.10	7.04	52.05	43.50	2.03	3.18	30.97
211.10	181.10	6.99	52.45	43.72	1.99	3.25	30.11
223.10	193.10	6.95	52.57	43.65	1.95	3.28	29.58
238.10	208.10	6.90	52.53	43.42	2.01	3.31	30.89
250.10	220.10	6.92	52.06	42.97	1.95	3.31	32.31

### Electrical Schematic





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