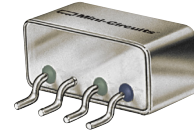


# Frequency Mixer

## TUF-3HSM+

Level 17 (LO Power +17 dBm) 0.15 to 400 MHz



CASE STYLE: NNN150

### Maximum Ratings

Operating Temperature	-55°C to 100°C
Storage Temperature	-55°C to 100°C
RF Power	200mW
IF Current	40mA
Permanent damage may occur if any of these limits are exceeded.	

### Pin Connections

LO	4
RF	1
IF	2
GROUND	3
CASE GROUND	3

### Features

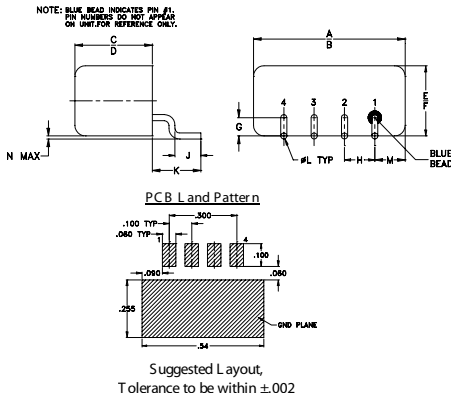
- low conversion loss, 5.0 dB typ.
- good IP3, 22 dBm typ.
- excellent L-R isolation, 50 dB typ.; L-I, 45 dB typ.
- rugged welded construction

### Applications

- HF/VHF
- defense & federal communications

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

### Outline Drawing



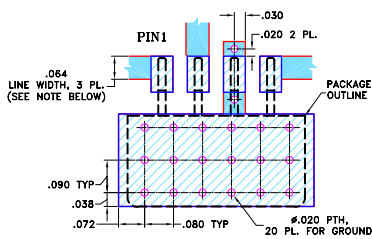
### Outline Dimensions (inch/mm)

A	B	C	D	E	F	G
.50	.48	.255	.240	.23	.21	.06
12.70	12.19	6.48	6.10	5.84	5.33	1.52

H	J	K	L	M	N	wt
.100	.09	.16	.020	.09	.005	grams
2.54	2.29	4.06	0.51	2.29	0.13	1.9

### Demo Board MCL PIN: TB-201 Suggested PCB Layout (PL-081)



- NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS 0.030" ± 0.002"; 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.
- DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)
  - DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

#### Notes

- 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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### Electrical Specifications

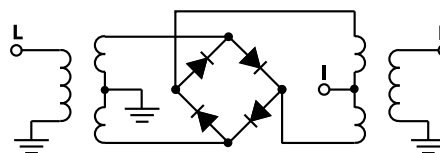
FREQUENCY (MHz)		CONVERSION LOSS (dB)				LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)			IP3 @ CENTER BAND (dBm)						
LO/RF	IF	Mid-Band		Total	L	M	U	L	M	U								
$f_L$ - $f_U$	$\bar{X}$	$\sigma$	Max.	Range Max.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.							
0.15-400	DC-400	5.00	0.33	7.0	8.0	60	50	50	35	40	30	60	40	45	25	35	20	22

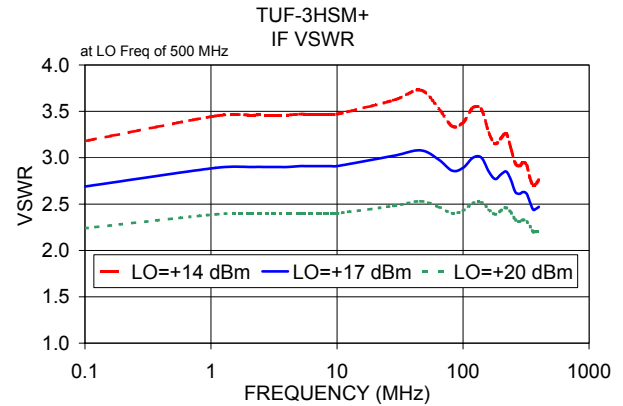
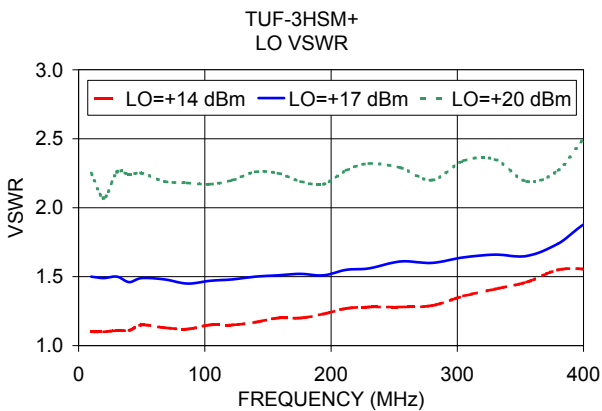
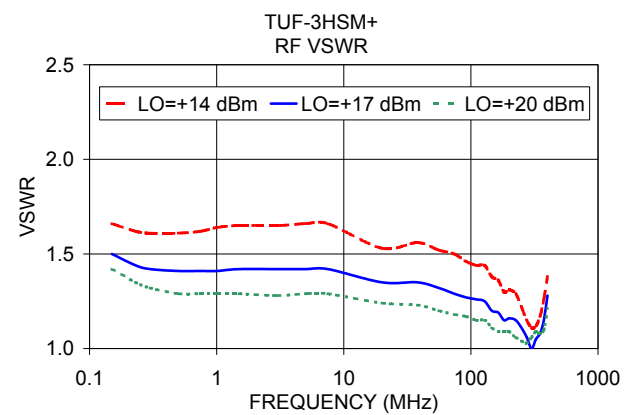
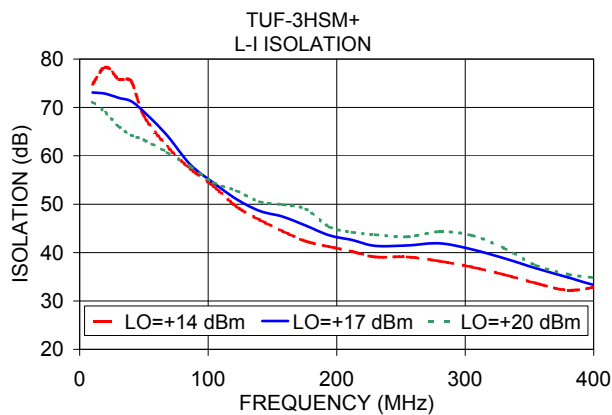
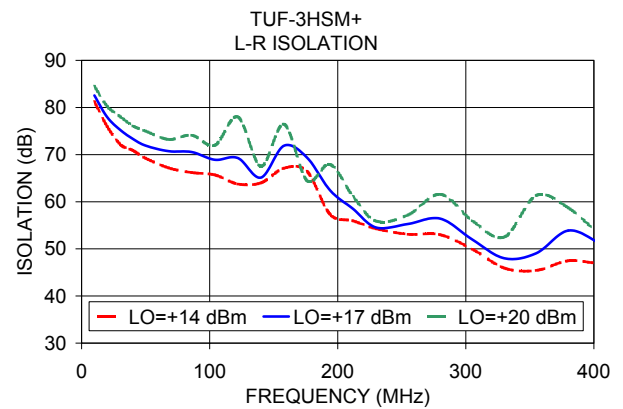
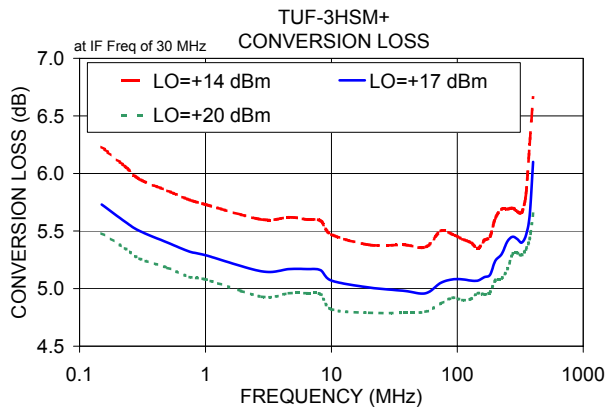
1 dB COMP.: +14 dBm typ. L = low range [ $f_L$  to  $10 f_L$ ] M = mid range [ $10 f_L$  to  $f_U/2$ ] U = upper range [ $f_U/2$  to  $f_U$ ]  
 $E = [IP3 (dBm) - LO Power (dBm)]/10$   
 $m = \text{mid band } [2f_L \text{ to } f_U/2]$

### Typical Performance Data

Frequency (MHz)	Conversion Loss (dB)	VSWR RF Port (:1)	Frequency (MHz)	Isolation L-R (dB)	Isolation L-I (dB)	VSWR LO Port (:1)
RF	LO	LO +17dBm	LO	LO +17dBm	LO +17dBm	LO +17dBm
0.15	30.15	5.73	10.00	82.56	73.10	1.50
0.30	30.30	5.50	20.00	77.94	72.84	1.49
0.50	30.50	5.40	40.00	73.33	71.28	1.46
0.75	30.75	5.32	50.00	71.91	69.09	1.49
1.00	31.00	5.29	68.00	70.74	64.21	1.48
2.80	32.80	5.15	86.00	70.55	58.19	1.45
10.00	40.00	5.07	104.00	68.91	54.46	1.47
20.00	50.00	5.01	122.00	69.27	51.05	1.48
38.00	68.00	4.98	140.00	65.14	48.62	1.50
56.00	86.00	4.96	176.00	69.38	45.57	1.52
110.00	140.00	5.08	212.00	58.50	42.60	1.55
128.00	158.00	5.07	230.00	54.52	41.38	1.56
164.00	194.00	5.10	255.00	55.28	41.47	1.61
200.00	230.00	5.24	280.00	56.41	41.92	1.60
250.00	280.00	5.41	305.00	51.98	40.69	1.64
300.00	330.00	5.43	330.00	48.01	38.86	1.66
325.00	355.00	5.40	355.00	49.07	36.77	1.65
350.00	380.00	5.46	380.00	53.89	34.86	1.74
375.00	405.00	5.63	405.00	51.11	33.11	1.90
400.00	430.00	6.10	430.00	47.28	33.20	1.89

### Electrical Schematic





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