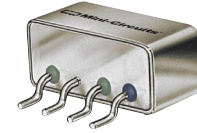


# Surface Mount High Reliability Mixer

## TUF-R3LHSM+

Level 10 (LO Power +10 dBm) 0.3 to 400 MHz



CASE STYLE: NNN150

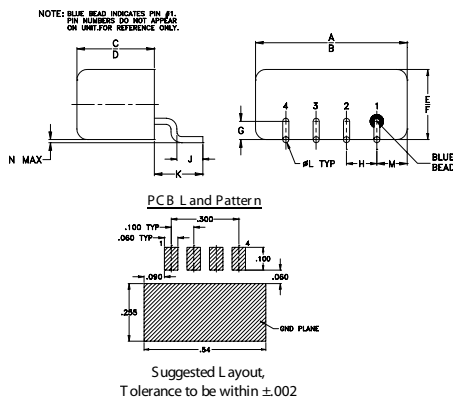
### Maximum Ratings

Operating Temperature	-55°C to 100°C
Storage Temperature	-55°C to 100°C
RF Power	50mW
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

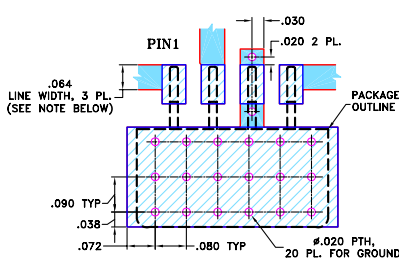
### Outline Drawing



### 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

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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)

### Features

- hermetically sealed ceramic quad
- low conversion loss, 5.2 dB typ.
- good IP3, 15 dBm typ.
- excellent isolation, 46 dB typ; L-R, L-I
- rugged welded construction
- shielded metal case

### Applications

- HF/VHF
- defense & federal communications

### Electrical Specifications

FREQUENCY (MHz)	CONVERSION LOSS (dB)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)			IP3 at center band (dBm)										
		L	M	U	L	M	U											
LO/RF $f_L$ - $f_U$	Mid-Band $m$ $\bar{X}$ $\sigma$ Max. Total Range Max.	Typ. Min.	Typ. Min.	Typ. Min.	Typ. Min.	Typ. Min.	Typ. Min.	Typ.										
0.3-400	DC-400	5.2	0.05	7.0	8.0	62	48	46	30	42	27	62	48	46	30	35	23	15

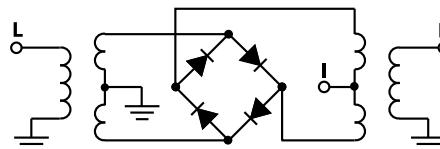
1 dB COMP: +5 dBm typ.

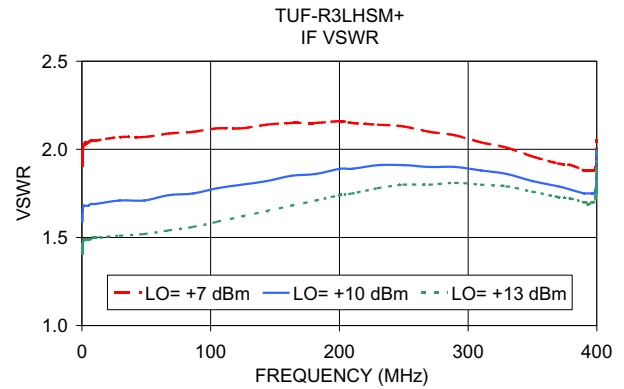
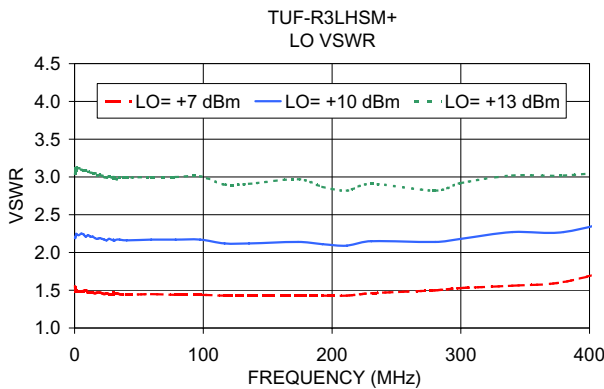
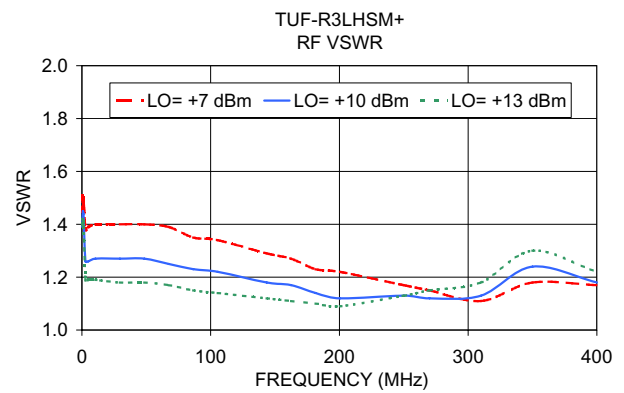
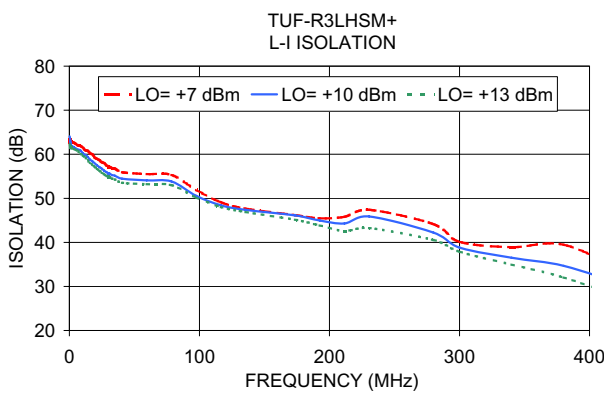
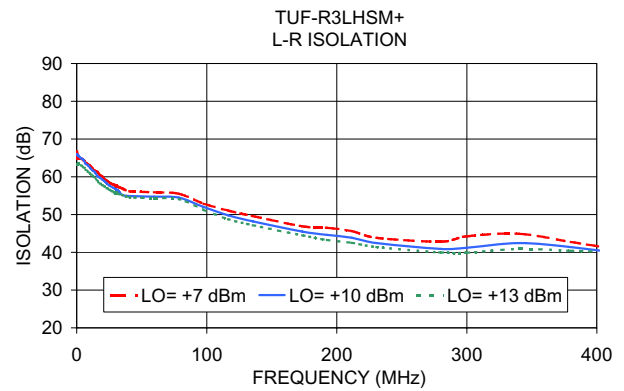
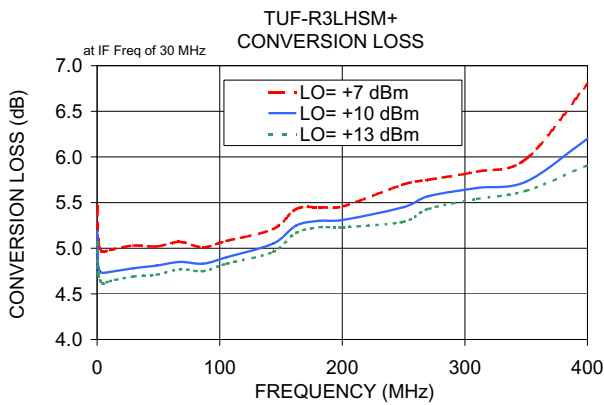
L = low range [ $f_L$  to  $10 f_L$ ] M = mid range [ $10 f_L$  to  $f_U/2$ ] U = upper range [ $f_U/2$  to  $f_U$ ]  
m = mid band [ $2 f_L$  to  $f_U/2$ ]

### Typical Performance Data

Frequency (MHz)	Conversion Loss (dB)	Isolation L-R (dB)	Isolation L-I (dB)	VSWR RF Port (:1)	VSWR LO Port (:1)	
						LO +10dBm
RF	LO	LO +10dBm	LO +10dBm	LO +10dBm	LO +10dBm	
0.21	30.21	5.19	56.65	55.61	1.39	2.17
0.71	30.71	4.83	56.54	55.59	1.45	2.16
1.21	31.21	4.79	56.55	55.57	1.44	2.16
2.71	32.71	4.74	56.07	55.27	1.26	2.17
5.00	35.00	4.73	55.18	55.13	1.26	2.17
10.50	40.50	4.74	54.89	54.46	1.27	2.16
29.50	59.50	4.78	54.74	54.07	1.27	2.17
48.50	78.50	4.81	54.49	53.83	1.27	2.17
67.50	97.50	4.85	52.02	50.57	1.25	2.17
86.50	116.50	4.83	49.80	48.43	1.23	2.12
105.50	135.50	4.90	48.21	47.38	1.22	2.12
143.50	173.50	5.05	45.49	46.13	1.18	2.14
162.50	192.50	5.25	44.62	44.97	1.17	2.11
181.50	211.50	5.30	43.86	44.28	1.14	2.09
200.50	230.50	5.31	42.46	45.88	1.12	2.15
250.00	280.00	5.45	40.90	42.21	1.13	2.14
270.00	300.00	5.57	41.21	38.82	1.12	2.18
310.00	340.00	5.66	42.44	36.51	1.13	2.27
350.00	380.00	5.73	41.37	34.67	1.24	2.27
400.00	430.00	6.20	39.23	30.01	1.18	2.47

### Electrical Schematic





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