

# Surface Mount Frequency Mixer

## TUF-2MHSM+

Level 13 (LO Power +13 dBm) 50 to 1000 MHz



CASE STYLE: NNN150  
PRICE: \$11.45 ea. QTY (1-9)

+ RoHS compliant in accordance with EU Directive (2002/95/EC)

The +Suffix has been added in order to identify RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications.

### 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, 6.0 dB typ.
- high L-R & L-I isolation, 47 dB typ.
- wideband, 50 to 1000 MHz
- rugged welded construction

### Applications

- VHF/UHF
- cellular
- ISM/GSM

### Electrical Specifications

FREQUENCY (MHz)	CONVERSION LOSS (dB)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)			IP3 @ CENTER BAND (dBm)						
		L	M	U	L	M	U							
50-1000	DC-1000	58	40	47	30	37	25	55	35	47	20	32	18	19

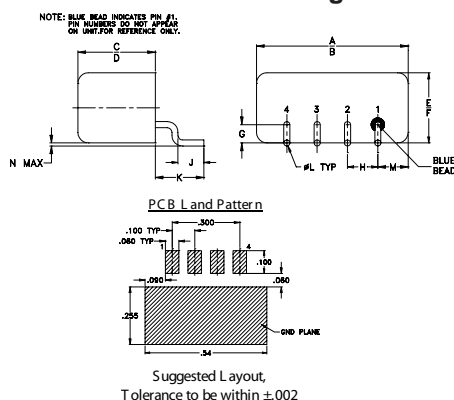
1 dB COMP.: +9 dBm typ.

L = 50-100 MHz M = 100-500 MHz U = upper range [ $f_c/2$  to  $f_u$ ]  
m = mid band [ $2f_l$  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)
50.00	80.00	5.81	57.10	1.03	2.51
100.00	70.00	5.85	51.37	1.05	2.39
129.17	99.17	5.79	49.27	1.07	2.41
200.00	170.00	5.74	46.10	1.10	2.28
208.33	178.33	5.73	45.84	1.13	2.36
287.50	257.50	5.70	43.58	1.17	2.26
340.28	310.28	5.67	42.34	1.19	2.29
366.67	336.67	5.69	41.82	1.21	2.28
445.83	415.83	5.72	40.63	1.26	2.29
498.61	468.61	5.75	39.34	1.28	2.29
500.00	470.00	5.75	39.33	1.29	2.28
551.39	521.39	5.86	38.49	1.33	2.32
630.56	600.56	5.90	38.05	1.38	2.35
683.33	653.33	6.06	38.00	1.41	2.33
709.72	679.72	6.12	38.21	1.43	2.30
788.89	758.89	6.33	38.31	1.49	2.44
868.06	838.06	6.58	37.78	1.53	2.37
947.22	917.22	6.88	37.88	1.60	2.48
973.61	943.61	6.98	37.84	1.62	2.49
1000.00	970.00	7.05	37.64	1.64	2.45

### Outline Drawing



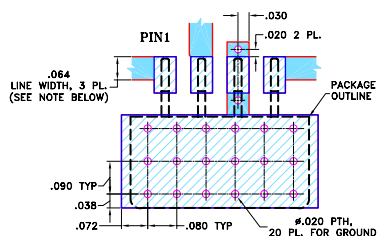
### Outline Dimensions (inch/mm)

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

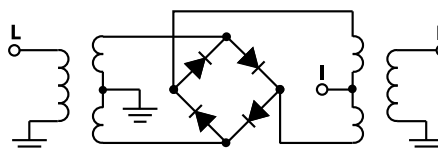
H	J	K	L	M	N	wt
.100	.09	.16	.020	.09	.005	grams
2.54	2.29	4.06	0.51	2.29	0.13	1.9

### 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.  
3. DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)  
4. DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

### Electrical Schematic



**Mini-Circuits**  
ISO 9001 ISO 14001 AS 9100 CERTIFIED

For detailed performance specs & shopping online see web site

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IF/RF MICROWAVE COMPONENTS

Notes: 1. Performance and quality attributes and conditions not expressly stated in this specification sheet are intended to be excluded and do not form a part of this specification sheet. 2. Electrical specifications and performance data contained herein are based on Mini-Circuit's applicable established test performance criteria and measurement instructions. 3. The parts covered by this specification sheet 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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