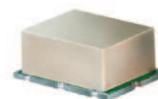


# Surface Mount Frequency Mixer

Level 7 (LO Power +7 dBm) 5 to 1200 MHz

**SYM-12+  
SYM-12**



## Maximum Ratings

|                                                                 |                |
|-----------------------------------------------------------------|----------------|
| Operating Temperature                                           | -40°C to 85°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     | 2     |
| RF     | 1     |
| IF     | 3     |
| GROUND | 4,5,6 |

## Features

- low conversion loss, 6.5 dB typ.
- excellent L-R isolation, 50 dB typ.; L-I, 46 dB typ.
- IF response to DC

## Applications

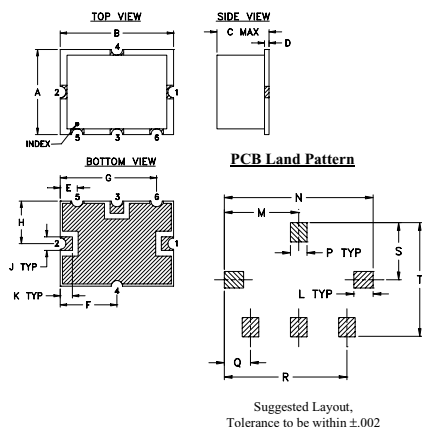
- cellular
- UHF TV
- ISM/GPS

CASE STYLE: TTT167  
PRICE: \$9.45 ea. QTY (1-9)

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

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

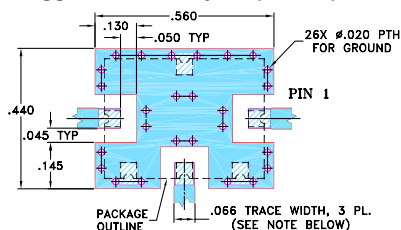
## Outline Drawing



## Outline Dimensions (inch mm)

| A    | B     | C     | D    | E    | F     | G     | 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: 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. GROUND PAD SHALL BE FREE OF SOLDER MASK IF REQUIRED FOR SOLDERING.
3. 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

## Electrical Specifications

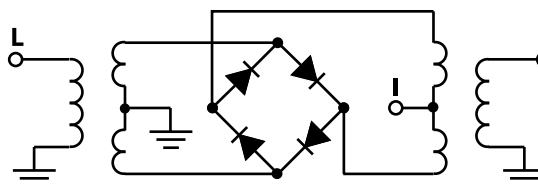
| FREQUENCY<br>(MHz) |         | CONVERSION LOSS<br>(dB) |          |      |                        | LO-RF ISOLATION<br>(dB) |      |      |      |      |    | LO-IF ISOLATION<br>(dB) |      |      |      |    |    | IP3<br>at center<br>band<br>(dBm) |
|--------------------|---------|-------------------------|----------|------|------------------------|-------------------------|------|------|------|------|----|-------------------------|------|------|------|----|----|-----------------------------------|
| LO/RF              | IF      | Mid-Band                |          |      | Total<br>Range<br>Max. | L                       | M    |      | U    |      | L  | M                       |      | U    |      |    |    |                                   |
|                    |         | $\overline{X}$          | $\sigma$ | Max. |                        |                         | Typ. | Min. | Typ. | Min. |    | Typ.                    | Min. | Typ. | Min. |    |    |                                   |
|                    |         | $f_L$ - $f_U$           |          |      |                        |                         |      |      |      |      |    |                         |      |      |      |    |    |                                   |
| 5-1200             | DC-1000 | 6.5                     | .30      | 8.0  | 9.0                    | 68                      | 45   | 50   | 30   | 37   | 25 | 56                      | 40   | 46   | 25   | 29 | 18 | 16                                |

1 dB COMP.: +1 dBm typ.

## Typical Performance Data

| Frequency (MHz) |         | Conversion Loss (dB) | Isolation L-R (dB) | Isolation L-I (dB) | VSWR RF Port (:1) | VSWR LO Port (:1) |
|-----------------|---------|----------------------|--------------------|--------------------|-------------------|-------------------|
| RF              | LO      | LO +7dBm             | LO +7dBm           | LO +7dBm           | LO +7dBm          | LO +7dBm          |
| 5.00            | 35.00   | 6.57                 | 72.28              | 69.79              | 1.43              | 3.00              |
| 10.10           | 40.10   | 6.37                 | 71.75              | 68.24              | 1.19              | 2.56              |
| 50.00           | 80.00   | 6.49                 | 63.00              | 60.09              | 1.07              | 2.42              |
| 102.45          | 72.45   | 6.54                 | 68.06              | 64.89              | 1.01              | 2.36              |
| 143.30          | 113.30  | 6.62                 | 59.96              | 55.79              | 1.01              | 2.32              |
| 224.15          | 194.15  | 6.70                 | 55.72              | 50.78              | 1.03              | 2.25              |
| 280.35          | 250.35  | 6.74                 | 53.25              | 48.69              | 1.02              | 2.36              |
| 350.63          | 320.63  | 6.80                 | 51.05              | 46.92              | 1.04              | 2.32              |
| 438.53          | 408.53  | 7.05                 | 47.81              | 45.14              | 1.11              | 2.33              |
| 548.47          | 518.47  | 6.96                 | 46.31              | 42.00              | 1.20              | 2.34              |
| 600.00          | 570.00  | 7.01                 | 45.68              | 39.34              | 1.27              | 2.33              |
| 685.97          | 655.97  | 7.10                 | 43.02              | 37.59              | 1.45              | 2.37              |
| 767.15          | 737.15  | 7.00                 | 40.88              | 35.91              | 1.64              | 2.38              |
| 857.93          | 827.93  | 7.07                 | 40.26              | 34.32              | 1.87              | 2.41              |
| 900.00          | 870.00  | 7.11                 | 40.45              | 33.02              | 2.16              | 2.37              |
| 1000.00         | 970.00  | 7.29                 | 40.41              | 30.95              | 2.48              | 2.34              |
| 1100.00         | 1070.00 | 7.71                 | 40.52              | 29.45              | 2.78              | 2.31              |
| 1150.00         | 1120.00 | 8.07                 | 40.56              | 28.53              | 3.06              | 2.35              |
| 1170.00         | 1140.00 | 8.18                 | 40.56              | 28.47              | 3.35              | 2.38              |
| 1200.00         | 1170.00 | 8.39                 | 40.43              | 28.40              | 3.50              | 2.39              |

## Electrical Schematic



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

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IF/RF MICROWAVE COMPONENTS

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