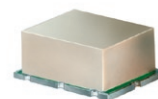


# Surface Mount Frequency Mixer

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.

## Electrical Specifications

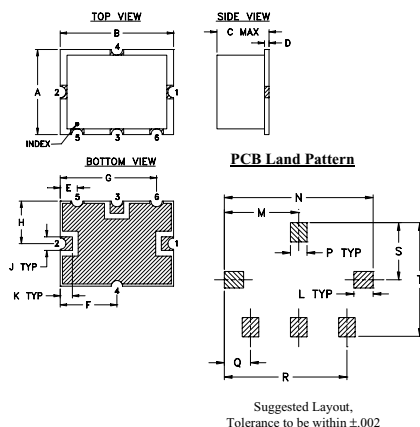
| FREQUENCY<br>(MHz)     |         | CONVERSION LOSS<br>(dB) |          |      |                        | LO-RF ISOLATION<br>(dB) |      |      |      |      |    | LO-IF ISOLATION<br>(dB) |      |      |      |    |    | IP3<br>at center<br>band<br>(dBm) |
|------------------------|---------|-------------------------|----------|------|------------------------|-------------------------|------|------|------|------|----|-------------------------|------|------|------|----|----|-----------------------------------|
| LO/RF<br>$f_L$ - $f_U$ | IF      | Mid-Band<br>$m$         |          |      | Total<br>Range<br>Max. | L                       | M    |      | U    |      | L  | M                       |      | U    |      |    |    |                                   |
|                        |         | $\overline{X}$          | $\sigma$ | Max. |                        |                         | Typ. | Min. | Typ. | Min. |    | Typ.                    | Min. | Typ. | Min. |    |    |                                   |
|                        |         |                         |          |      |                        |                         |      |      |      |      |    |                         |      |      |      |    |    |                                   |
| 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<br>(MHz) |         | Conversion<br>Loss<br>(dB) | Isolation<br>L-R<br>(dB) | Isolation<br>L-I<br>(dB) | VSWR<br>RF Port<br>(:1) | VSWR<br>LO Port<br>(:1) |
|--------------------|---------|----------------------------|--------------------------|--------------------------|-------------------------|-------------------------|
| RF                 | LO      | LO<br>+7dBm                | LO<br>+7dBm              | LO<br>+7dBm              | LO<br>+7dBm             | LO<br>+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                    |

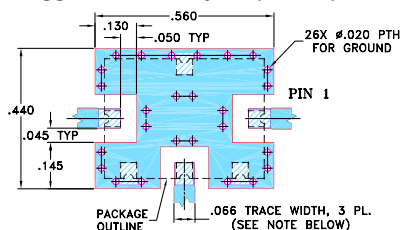
## Outline Drawing



## Outline Dimensions (inch mm)

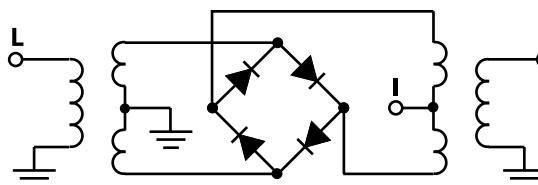
| A    | B     | C     | D    | E    | F     | G     | H     | J     | K    |
|------|-------|-------|------|------|-------|-------|-------|-------|------|
| .38  | .50   | .23   | .020 | .075 | .250  | .425  | .187  | .050  | .050 |
| 9.65 | 12.70 | 5.84  | 0.51 | 1.91 | 6.35  | 10.80 | 4.75  | 1.27  | 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.
4. DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER), SEE NOTE 2.
5. 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

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 The Design Engineers Search Engine **Mini-Circuits** Provides ACTUAL Data Instantly at [minicircuits.com](http://minicircuits.com)

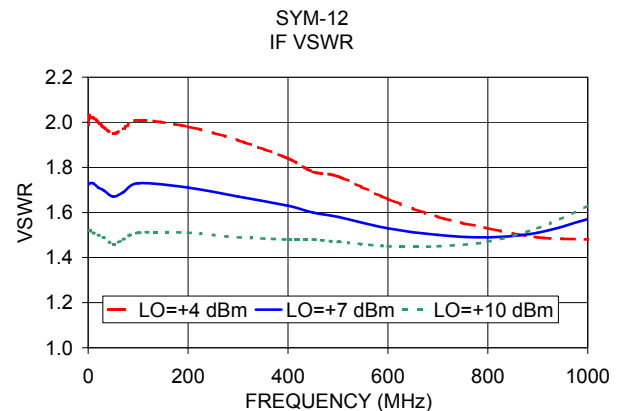
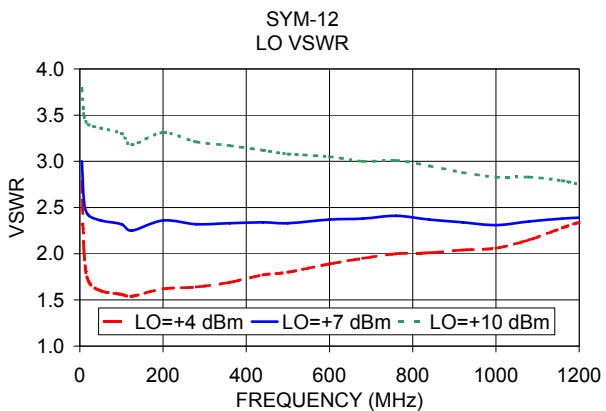
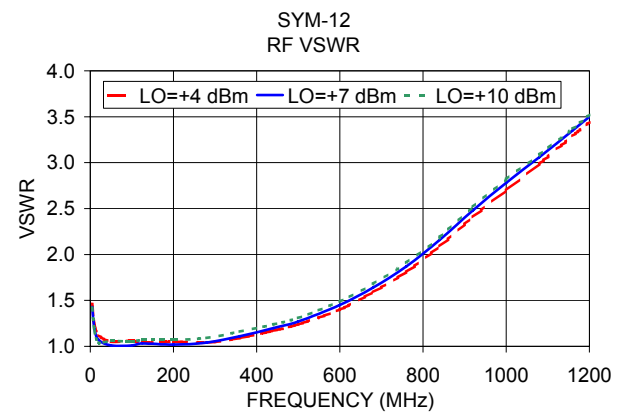
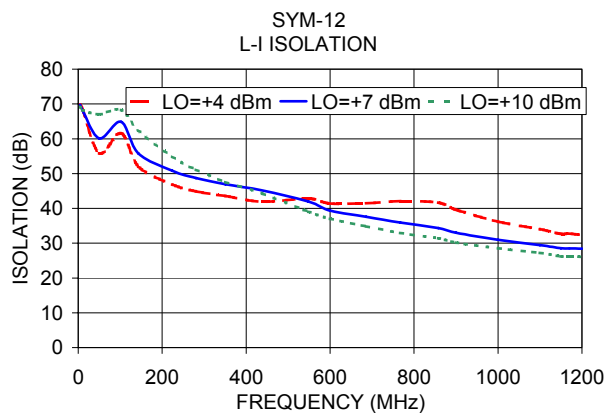
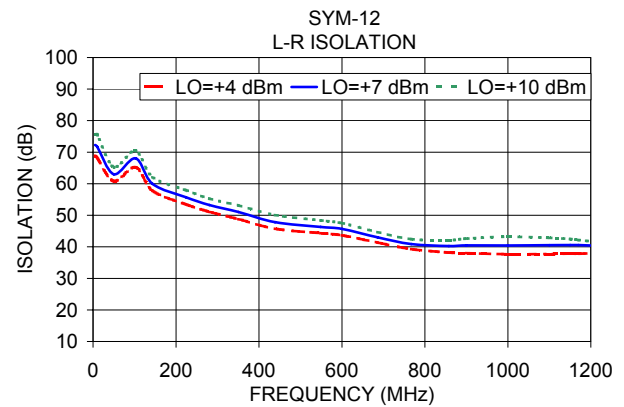
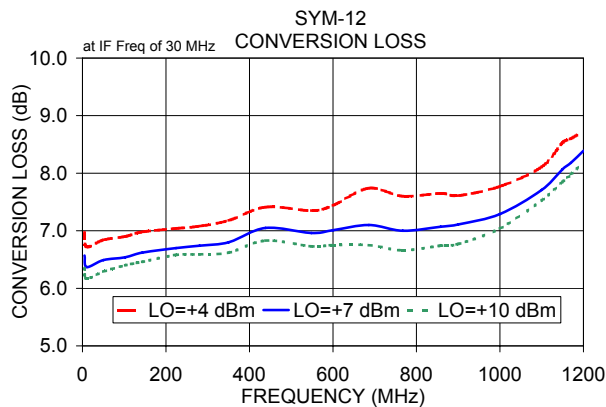
IF/RF MICROWAVE COMPONENTS

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-Circuits' 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).

REV. B  
M112207  
SYM-12  
DJ/TD/AM  
091006  
Page 1 of 2

# Performance Charts

**SYM-12+**  
**SYM-12**



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

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 The Design Engineers Search Engine  Provides ACTUAL Data Instantly at [minicircuits.com](http://minicircuits.com)

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).

For detailed performance specs  
& shopping online see web site