

# Frequency Mixer

RMS-2LH+

Level 10 (LO Power +10 dBm) 5 to 1000 MHz

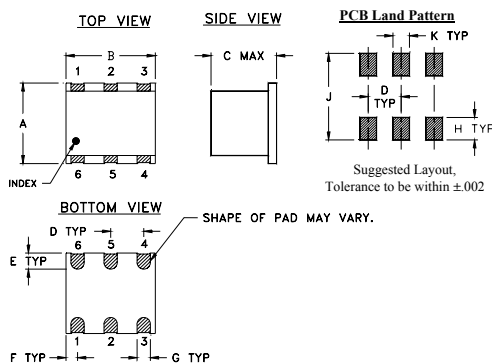
## Maximum Ratings

|                                                                 |                |
|-----------------------------------------------------------------|----------------|
| 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     | 1     |
| RF     | 4     |
| IF     | 5     |
| GROUND | 2,3,6 |

## Outline Drawing



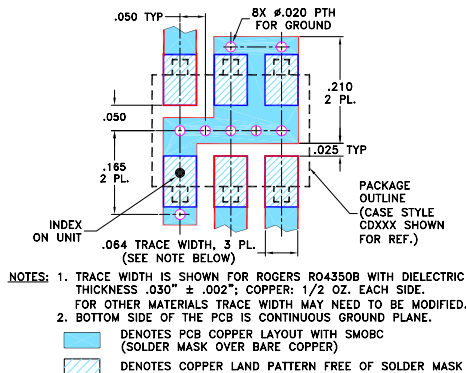
## Outline Dimensions (inch/mm)

| A    | B    | C    | D    | E    | F    |
|------|------|------|------|------|------|
| .250 | .31  | .20  | .100 | .050 | .055 |
| 6.35 | 7.87 | 5.08 | 2.54 | 1.27 | 1.40 |

| G    | H    | J    | K    | wt    |
|------|------|------|------|-------|
| .040 | .070 | .270 | .050 | grams |
| 1.02 | 1.78 | 6.86 | 1.27 | 0.50  |

## Demo Board MCL P/N: TB-03 Suggested PCB Layout (PL-052)



## Notes

- A. 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.  
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

- excellent L-R isolation, 39 dB typ.
- conversion loss, 6.44 dB typ.
- small size, 0.25"x0.31"x0.2"

## Applications

- HF & VHF communications
- intermediate frequency for down converters



Generic photo used for illustration purposes only

CASE STYLE: TT240

## +RoHS Compliant

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

## Electrical Specifications

| FREQUENCY (MHz) | CONVERSION LOSS (dB)                     | LO-RF ISOLATION (dB)                | LO-IF ISOLATION (dB)                | IP3 at center band (dBm) |
|-----------------|------------------------------------------|-------------------------------------|-------------------------------------|--------------------------|
| LO/RF IF        |                                          |                                     |                                     |                          |
| $f_L$ - $f_U$   | $\bar{X}$ $\sigma$ Max. Total Range Max. | L M U Typ. Min. Typ. Min. Typ. Min. | L M U Typ. Min. Typ. Min. Typ. Min. | Typ.                     |
| 5-1000 DC-1000  | 6.44 0.10 8.0 9.5                        | 58 40 39 20 22 16                   | 52 30 30 17 18 11                   | 18                       |

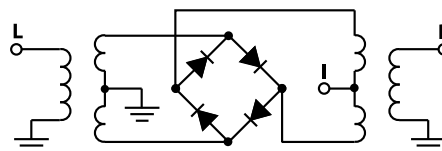
1 dB COMP: +5 dBm typ.  
For phase detection, DC output positive with in-phase RF & LO.

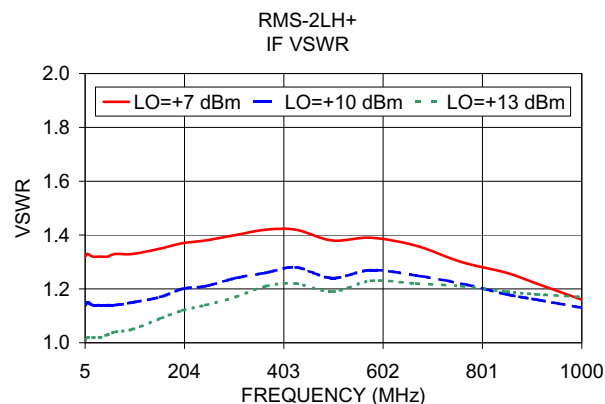
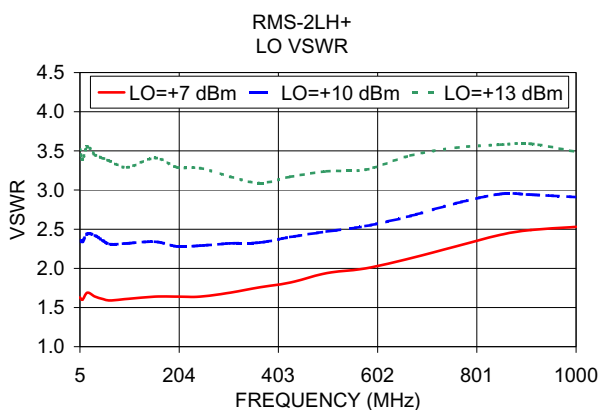
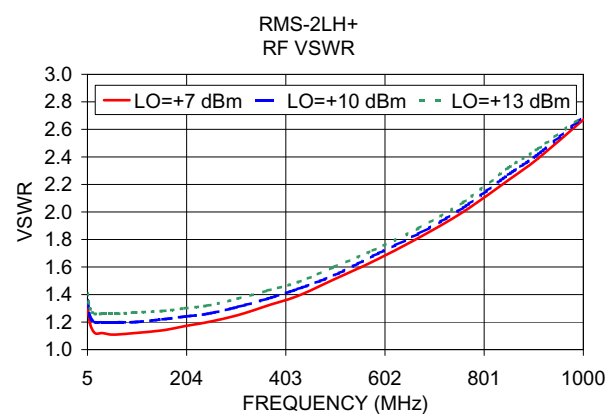
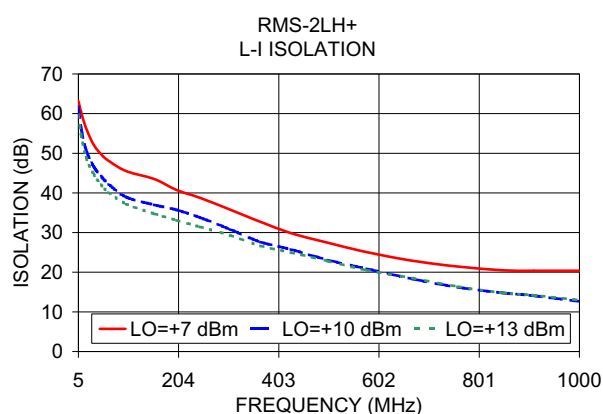
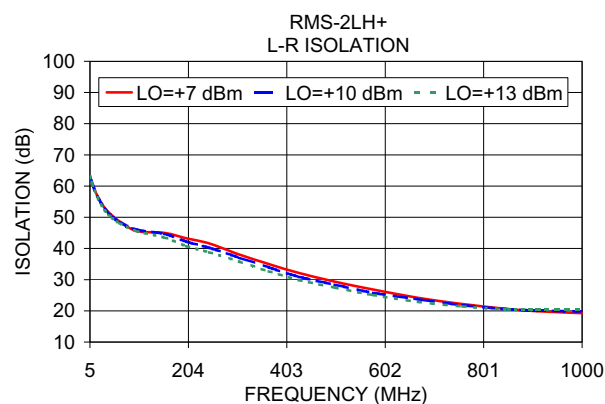
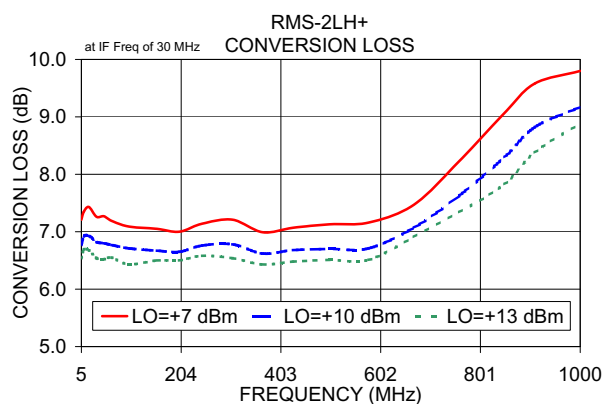
L = low range [ $f_L$  to  $10 f_L$ ]  
M = mid range [ $10 f_L$  to  $f_U/2$ ]  
U = upper range [ $f_U/2$  to  $f_U$ ]

## 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 +10dBm            | LO +10dBm          | LO +10dBm          | LO +10dBm         | LO +10dBm         |
| 5.00            | 35.00  | 6.77                 | 63.03              | 59.74              | 1.36              | 2.36              |
| 10.00           | 40.00  | 6.92                 | 60.63              | 54.85              | 1.24              | 2.34              |
| 20.00           | 50.00  | 6.93                 | 56.56              | 48.96              | 1.20              | 2.44              |
| 35.15           | 65.15  | 6.82                 | 52.70              | 44.78              | 1.20              | 2.42              |
| 50.00           | 80.00  | 6.80                 | 50.21              | 42.03              | 1.20              | 2.36              |
| 65.30           | 95.30  | 6.77                 | 48.42              | 40.14              | 1.20              | 2.31              |
| 100.00          | 70.00  | 6.71                 | 46.01              | 37.18              | 1.20              | 2.32              |
| 155.76          | 125.76 | 6.67                 | 44.69              | 34.75              | 1.22              | 2.34              |
| 200.00          | 170.00 | 6.65                 | 42.20              | 33.10              | 1.24              | 2.28              |
| 246.21          | 216.21 | 6.76                 | 40.22              | 31.46              | 1.26              | 2.29              |
| 306.52          | 276.52 | 6.78                 | 37.07              | 29.28              | 1.31              | 2.32              |
| 366.82          | 336.82 | 6.62                 | 33.94              | 26.64              | 1.37              | 2.33              |
| 427.12          | 397.12 | 6.68                 | 30.94              | 24.95              | 1.44              | 2.40              |
| 500.00          | 470.00 | 6.70                 | 28.40              | 22.81              | 1.54              | 2.47              |
| 577.88          | 547.88 | 6.71                 | 25.77              | 20.52              | 1.68              | 2.54              |
| 668.33          | 638.33 | 7.07                 | 23.71              | 18.54              | 1.84              | 2.67              |
| 758.79          | 728.79 | 7.63                 | 21.83              | 16.38              | 2.03              | 2.83              |
| 849.24          | 819.24 | 8.30                 | 20.52              | 14.77              | 2.27              | 2.95              |
| 909.54          | 879.54 | 8.82                 | 20.13              | 14.18              | 2.42              | 2.94              |
| 1000.00         | 970.00 | 9.17                 | 19.83              | 12.95              | 2.69              | 2.91              |

## Electrical Schematic





## Notes

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# Frequency Mixer

# RMS-2LH+

## Typical Performance Data

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>IF FIXED<br>@IF(OUT)=30MHz<br>(dB) |       |       | RF<br>(IN)<br>(MHz) | LO<br>(MHz) | IP3 INPUT<br>(dBm) |       |       | RF<br>(IN)<br>(MHz) | LO<br>(MHz) | COMPRESSION<br>@RF IN=+5dBm<br>(dB) |      |      |
|---------------------|-------------|-------------------------------------------------------|-------|-------|---------------------|-------------|--------------------|-------|-------|---------------------|-------------|-------------------------------------|------|------|
|                     |             | @LO (dBm)                                             |       |       |                     |             | @LO (dBm)          |       |       |                     |             | @LO (dBm)                           |      |      |
|                     |             |                                                       |       |       |                     |             |                    |       |       |                     |             |                                     |      |      |
| +7                  | +10         | +13                                                   | +7    | +10   | +13                 | +7          | +10                | +13   | +7    | +10                 | +13         |                                     |      |      |
| 5.0                 | 35.0        | 7.21                                                  | 6.77  | 6.54  | 10.1                | 40.1        | 19.34              | 22.40 | 24.96 | 10.1                | 40.1        | 0.52                                | 0.29 | 0.14 |
| 10.0                | 40.0        | 7.35                                                  | 6.92  | 6.69  | 50.8                | 80.8        | 19.03              | 21.36 | 27.85 | 50.8                | 80.8        | 0.58                                | 0.32 | 0.18 |
| 50.8                | 80.8        | 7.55                                                  | 7.01  | 6.80  | 91.5                | 121.5       | 19.07              | 22.27 | 19.65 | 91.5                | 121.5       | 0.40                                | 0.27 | 0.16 |
| 91.5                | 121.5       | 7.48                                                  | 6.99  | 6.76  | 132.3               | 162.3       | 19.89              | 19.17 | 22.94 | 132.3               | 162.3       | 0.55                                | 0.30 | 0.15 |
| 132.3               | 162.3       | 7.36                                                  | 6.93  | 6.77  | 173.0               | 203.0       | 18.33              | 19.35 | 21.88 | 173.0               | 203.0       | 0.48                                | 0.27 | 0.15 |
| 173.0               | 203.0       | 7.40                                                  | 6.98  | 6.80  | 213.7               | 243.7       | 17.53              | 18.58 | 21.64 | 213.7               | 243.7       | 0.46                                | 0.26 | 0.15 |
| 213.7               | 243.7       | 7.36                                                  | 6.97  | 6.81  | 254.4               | 284.4       | 18.27              | 21.36 | 20.33 | 254.4               | 284.4       | 0.51                                | 0.27 | 0.15 |
| 254.4               | 284.4       | 7.35                                                  | 7.03  | 6.87  | 295.2               | 325.2       | 17.74              | 19.67 | 20.63 | 295.2               | 325.2       | 0.48                                | 0.28 | 0.15 |
| 295.2               | 325.2       | 7.38                                                  | 7.04  | 6.87  | 335.9               | 365.9       | 17.39              | 20.12 | 22.58 | 335.9               | 365.9       | 0.48                                | 0.26 | 0.17 |
| 335.9               | 365.9       | 7.46                                                  | 7.12  | 6.94  | 376.6               | 406.6       | 18.33              | 20.09 | 21.40 | 376.6               | 406.6       | 0.48                                | 0.26 | 0.15 |
| 376.6               | 406.6       | 7.51                                                  | 7.15  | 6.97  | 417.3               | 447.3       | 18.14              | 20.18 | 20.38 | 417.3               | 447.3       | 0.48                                | 0.30 | 0.20 |
| 417.3               | 447.3       | 7.55                                                  | 7.20  | 6.99  | 458.1               | 488.1       | 17.17              | 18.11 | 19.90 | 458.1               | 488.1       | 0.48                                | 0.28 | 0.20 |
| 458.1               | 488.1       | 7.62                                                  | 7.27  | 7.05  | 498.8               | 528.8       | 18.20              | 19.32 | 19.19 | 498.8               | 528.8       | 0.51                                | 0.30 | 0.21 |
| 498.8               | 528.8       | 7.61                                                  | 7.26  | 7.06  | 539.5               | 569.5       | 18.34              | 20.29 | 21.56 | 539.5               | 569.5       | 0.56                                | 0.36 | 0.26 |
| 539.5               | 569.5       | 7.74                                                  | 7.33  | 7.10  | 580.2               | 610.2       | 17.92              | 21.32 | 22.32 | 580.2               | 610.2       | 0.54                                | 0.40 | 0.30 |
| 580.2               | 610.2       | 7.79                                                  | 7.34  | 7.08  | 620.9               | 650.9       | 16.23              | 18.67 | 22.65 | 620.9               | 650.9       | 0.57                                | 0.41 | 0.33 |
| 620.9               | 650.9       | 7.90                                                  | 7.46  | 7.16  | 661.7               | 691.7       | 15.17              | 16.49 | 18.67 | 661.7               | 691.7       | 0.62                                | 0.42 | 0.34 |
| 661.7               | 691.7       | 7.98                                                  | 7.57  | 7.25  | 702.4               | 732.4       | 15.22              | 16.09 | 17.71 | 702.4               | 732.4       | 0.73                                | 0.49 | 0.37 |
| 702.4               | 732.4       | 8.01                                                  | 7.60  | 7.33  | 743.1               | 773.1       | 15.44              | 15.58 | 16.75 | 743.1               | 773.1       | 0.75                                | 0.50 | 0.38 |
| 743.1               | 773.1       | 8.10                                                  | 7.69  | 7.40  | 783.8               | 813.8       | 16.24              | 16.34 | 19.20 | 783.8               | 813.8       | 0.85                                | 0.61 | 0.48 |
| 783.8               | 813.8       | 8.10                                                  | 7.61  | 7.31  | 824.6               | 854.6       | 18.03              | 17.80 | 21.21 | 824.6               | 854.6       | 0.91                                | 0.68 | 0.54 |
| 824.6               | 854.6       | 8.18                                                  | 7.60  | 7.29  | 865.3               | 895.3       | 18.34              | 20.88 | 25.44 | 865.3               | 895.3       | 0.92                                | 0.74 | 0.58 |
| 865.3               | 895.3       | 8.28                                                  | 7.60  | 7.25  | 906.0               | 936.0       | 15.67              | 21.00 | 26.35 | 906.0               | 936.0       | 0.92                                | 0.82 | 0.65 |
| 906.0               | 936.0       | 8.48                                                  | 7.68  | 7.28  | 946.7               | 976.7       | 13.43              | 21.68 | 28.59 | 946.7               | 976.7       | 0.79                                | 0.79 | 0.68 |
| 946.7               | 976.7       | 8.75                                                  | 7.86  | 7.36  | 987.4               | 1017.4      | 12.80              | 18.97 | 26.51 | 987.4               | 1017.4      | 0.75                                | 0.76 | 0.71 |
| 987.4               | 1017.4      | 8.93                                                  | 8.03  | 7.47  | 1028.2              | 1058.2      | 12.53              | 17.40 | 27.92 | 1028.2              | 1058.2      | 0.62                                | 0.65 | 0.66 |
| 1028.2              | 1058.2      | 9.15                                                  | 8.29  | 7.66  | 1068.9              | 1098.9      | 12.81              | 17.03 | 21.43 | 1068.9              | 1098.9      | 0.57                                | 0.60 | 0.63 |
| 1068.9              | 1098.9      | 9.27                                                  | 8.50  | 7.87  | 1109.6              | 1139.6      | 13.26              | 17.35 | 20.22 | 1109.6              | 1139.6      | 0.58                                | 0.55 | 0.59 |
| 1150.3              | 1180.3      | 9.45                                                  | 8.86  | 8.29  | 1150.3              | 1180.3      | 14.02              | 17.12 | 19.96 | 1150.3              | 1180.3      | 0.56                                | 0.48 | 0.53 |
| 1191.1              | 1221.1      | 9.50                                                  | 8.95  | 8.51  | 1191.1              | 1221.1      | 15.37              | 18.91 | 21.02 | 1191.1              | 1221.1      | 0.62                                | 0.48 | 0.48 |
| 1231.8              | 1261.8      | 9.47                                                  | 8.97  | 8.60  | 1231.8              | 1261.8      | 19.65              | 30.52 | 23.15 | 1231.8              | 1261.8      | 0.65                                | 0.51 | 0.45 |
| 1292.9              | 1322.9      | 9.45                                                  | 9.00  | 8.73  | 1292.9              | 1322.9      | 17.17              | 19.61 | 20.45 | 1292.9              | 1322.9      | 0.83                                | 0.59 | 0.45 |
| 1333.6              | 1363.6      | 9.44                                                  | 9.02  | 8.77  | 1333.6              | 1363.6      | 14.89              | 17.41 | 19.88 | 1333.6              | 1363.6      | 0.88                                | 0.63 | 0.49 |
| 1394.7              | 1424.7      | 9.51                                                  | 9.16  | 8.95  | 1394.7              | 1424.7      | 13.91              | 17.60 | 19.27 | 1394.7              | 1424.7      | 0.95                                | 0.62 | 0.50 |
| 1435.4              | 1465.4      | 9.54                                                  | 9.25  | 9.08  | 1435.4              | 1465.4      | 14.24              | 17.84 | 18.73 | 1435.4              | 1465.4      | 0.91                                | 0.58 | 0.48 |
| 1496.5              | 1526.5      | 9.68                                                  | 9.40  | 9.24  | 1496.5              | 1526.5      | 14.66              | 18.79 | 17.98 | 1496.5              | 1526.5      | 0.97                                | 0.56 | 0.49 |
| 1537.2              | 1567.2      | 9.81                                                  | 9.55  | 9.43  | 1537.2              | 1567.2      | 15.06              | 17.14 | 18.69 | 1537.2              | 1567.2      | 0.97                                | 0.54 | 0.47 |
| 1598.3              | 1628.3      | 10.16                                                 | 9.87  | 9.80  | 1598.3              | 1628.3      | 14.46              | 17.05 | 18.63 | 1598.3              | 1628.3      | 0.95                                | 0.52 | 0.43 |
| 1639.0              | 1669.0      | 10.46                                                 | 10.14 | 10.10 | 1639.0              | 1669.0      | 14.06              | 15.52 | 16.55 | 1639.0              | 1669.0      | 0.94                                | 0.51 | 0.40 |
| 1700.1              | 1730.1      | 10.94                                                 | 10.58 | 10.48 | 1700.1              | 1730.1      | 12.22              | 13.47 | 15.84 | 1700.1              | 1730.1      | 1.05                                | 0.56 | 0.45 |

# Frequency Mixer

**RMS-2LH+**

## Typical Performance Data

| IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=500.1MHz<br>(dB) | IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=10.1MHz<br>(dB) | IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=1000.1MHz<br>(dB) |
|----------------------|-------------|-----------------------------------------------------------------|----------------------|-------------|----------------------------------------------------------------|----------------------|-------------|------------------------------------------------------------------|
|                      |             | @LO (dBm)                                                       |                      |             | @LO (dBm)                                                      |                      |             | @LO (dBm)                                                        |
|                      |             | +10                                                             |                      |             | +10                                                            |                      |             | +10                                                              |
| 490.0                | 10.1        | 7.34                                                            | 10.0                 | 20.1        | 6.95                                                           | 990.0                | 10.1        | 8.05                                                             |
| 477.7                | 22.4        | 7.28                                                            | 30.0                 | 40.1        | 6.79                                                           | 970.0                | 30.1        | 7.99                                                             |
| 465.4                | 34.7        | 7.24                                                            | 50.0                 | 60.1        | 6.90                                                           | 950.0                | 50.1        | 7.94                                                             |
| 453.1                | 47.0        | 7.27                                                            | 70.0                 | 80.1        | 6.91                                                           | 930.0                | 70.1        | 7.97                                                             |
| 440.8                | 59.3        | 7.30                                                            | 90.0                 | 100.1       | 6.91                                                           | 910.0                | 90.1        | 8.00                                                             |
| 428.5                | 71.6        | 7.26                                                            | 110.0                | 120.1       | 6.91                                                           | 890.0                | 110.1       | 7.91                                                             |
| 416.2                | 83.9        | 7.24                                                            | 130.0                | 140.1       | 6.87                                                           | 870.0                | 130.1       | 7.84                                                             |
| 403.8                | 96.3        | 7.21                                                            | 150.0                | 160.1       | 6.91                                                           | 850.0                | 150.1       | 7.85                                                             |
| 391.5                | 108.6       | 7.18                                                            | 170.0                | 180.1       | 6.96                                                           | 830.0                | 170.1       | 7.86                                                             |
| 379.2                | 120.9       | 7.17                                                            | 190.0                | 200.1       | 6.98                                                           | 810.0                | 190.1       | 7.81                                                             |
| 366.9                | 133.2       | 7.07                                                            | 210.0                | 220.1       | 6.94                                                           | 790.0                | 210.1       | 7.79                                                             |
| 354.6                | 145.5       | 7.06                                                            | 230.0                | 240.1       | 6.95                                                           | 770.0                | 230.1       | 7.78                                                             |
| 342.3                | 157.8       | 7.09                                                            | 250.0                | 260.1       | 7.02                                                           | 750.0                | 250.1       | 7.71                                                             |
| 330.0                | 170.1       | 7.11                                                            | 270.0                | 280.1       | 7.05                                                           | 730.0                | 270.1       | 7.78                                                             |
| 317.7                | 182.4       | 7.10                                                            | 290.0                | 300.1       | 7.04                                                           | 710.0                | 290.1       | 7.77                                                             |
| 305.4                | 194.7       | 7.08                                                            | 310.0                | 320.1       | 7.05                                                           | 690.0                | 310.1       | 7.72                                                             |
| 293.1                | 207.0       | 7.06                                                            | 330.0                | 340.1       | 7.11                                                           | 670.0                | 330.1       | 7.69                                                             |
| 280.8                | 219.3       | 7.05                                                            | 350.0                | 360.1       | 7.09                                                           | 650.0                | 350.1       | 7.72                                                             |
| 268.5                | 231.6       | 7.06                                                            | 370.0                | 380.1       | 7.18                                                           | 630.0                | 370.1       | 7.73                                                             |
| 256.2                | 243.9       | 7.07                                                            | 390.0                | 400.1       | 7.20                                                           | 610.0                | 390.1       | 7.69                                                             |
| 243.8                | 256.3       | 7.08                                                            | 430.0                | 440.1       | 7.21                                                           | 570.0                | 430.1       | 7.68                                                             |
| 231.5                | 268.6       | 7.09                                                            | 450.0                | 460.1       | 7.27                                                           | 550.0                | 450.1       | 7.68                                                             |
| 219.2                | 280.9       | 7.09                                                            | 490.0                | 500.1       | 7.29                                                           | 510.0                | 490.1       | 7.69                                                             |
| 206.9                | 293.2       | 7.11                                                            | 510.0                | 520.1       | 7.31                                                           | 490.0                | 510.1       | 7.68                                                             |
| 194.6                | 305.5       | 7.11                                                            | 550.0                | 560.1       | 7.35                                                           | 450.0                | 550.1       | 7.71                                                             |
| 182.3                | 317.8       | 7.08                                                            | 570.0                | 580.1       | 7.41                                                           | 430.0                | 570.1       | 7.71                                                             |
| 170.0                | 330.1       | 7.08                                                            | 610.0                | 620.1       | 7.42                                                           | 390.0                | 610.1       | 7.68                                                             |
| 157.7                | 342.4       | 7.11                                                            | 630.0                | 640.1       | 7.48                                                           | 370.0                | 630.1       | 7.69                                                             |
| 145.4                | 354.7       | 7.12                                                            | 670.0                | 680.1       | 7.60                                                           | 330.0                | 670.1       | 7.75                                                             |
| 133.1                | 367.0       | 7.16                                                            | 690.0                | 700.1       | 7.57                                                           | 310.0                | 690.1       | 7.80                                                             |
| 120.8                | 379.3       | 7.16                                                            | 730.0                | 740.1       | 7.63                                                           | 270.0                | 730.1       | 7.82                                                             |
| 108.5                | 391.6       | 7.13                                                            | 750.0                | 760.1       | 7.64                                                           | 250.0                | 750.1       | 7.84                                                             |
| 96.2                 | 403.9       | 7.15                                                            | 790.0                | 800.1       | 7.56                                                           | 210.0                | 790.1       | 7.79                                                             |
| 83.8                 | 416.3       | 7.16                                                            | 810.0                | 820.1       | 7.53                                                           | 190.0                | 810.1       | 7.76                                                             |
| 71.5                 | 428.6       | 7.16                                                            | 850.0                | 860.1       | 7.54                                                           | 150.0                | 850.1       | 7.73                                                             |
| 59.2                 | 440.9       | 7.18                                                            | 870.0                | 880.1       | 7.54                                                           | 130.0                | 870.1       | 7.72                                                             |
| 46.9                 | 453.2       | 7.18                                                            | 910.0                | 920.1       | 7.59                                                           | 90.0                 | 910.1       | 7.70                                                             |
| 34.6                 | 465.5       | 7.23                                                            | 930.0                | 940.1       | 7.66                                                           | 70.0                 | 930.1       | 7.71                                                             |
| 22.3                 | 477.8       | 7.27                                                            | 970.0                | 980.1       | 7.78                                                           | 30.0                 | 970.1       | 7.89                                                             |
| 10.0                 | 490.1       | 7.40                                                            | 990.0                | 1000.1      | 7.82                                                           | 10.0                 | 990.1       | 8.00                                                             |

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# Frequency Mixer

RMS-2LH+

## Typical Performance Data

| LO<br>(MHz) | LO-RF ISOLATION<br>(dB) |       |       | LO-IF ISOLATION<br>(dB) |       |       |
|-------------|-------------------------|-------|-------|-------------------------|-------|-------|
|             | @LO (dBm)               |       |       | @LO (dBm)               |       |       |
|             | +7                      | +10   | +13   | +7                      | +10   | +13   |
| 5.0         | 62.90                   | 63.03 | 63.17 | 61.70                   | 59.74 | 58.59 |
| 10.0        | 60.72                   | 60.63 | 60.56 | 56.64                   | 54.85 | 53.02 |
| 50.8        | 58.56                   | 58.41 | 58.36 | 54.51                   | 51.99 | 51.10 |
| 91.5        | 53.46                   | 53.39 | 53.51 | 48.68                   | 47.38 | 46.57 |
| 132.3       | 49.95                   | 50.14 | 50.33 | 45.33                   | 44.29 | 43.72 |
| 173.0       | 47.73                   | 47.91 | 48.20 | 43.50                   | 42.46 | 41.92 |
| 213.7       | 46.07                   | 46.26 | 46.41 | 41.67                   | 41.17 | 40.38 |
| 254.4       | 44.56                   | 44.97 | 45.21 | 41.09                   | 40.20 | 39.22 |
| 295.2       | 43.36                   | 43.92 | 44.20 | 39.95                   | 39.18 | 38.30 |
| 335.9       | 42.26                   | 42.72 | 43.09 | 39.04                   | 38.15 | 37.17 |
| 376.6       | 41.15                   | 41.66 | 42.01 | 38.79                   | 37.35 | 36.19 |
| 417.3       | 40.51                   | 41.01 | 41.33 | 37.50                   | 36.17 | 35.13 |
| 458.1       | 39.73                   | 40.22 | 40.57 | 36.64                   | 35.12 | 33.89 |
| 498.8       | 38.79                   | 39.29 | 39.66 | 35.59                   | 34.38 | 33.32 |
| 539.5       | 37.75                   | 38.24 | 38.50 | 33.91                   | 32.92 | 32.29 |
| 580.2       | 36.86                   | 37.34 | 37.72 | 33.05                   | 31.80 | 31.14 |
| 620.9       | 36.20                   | 36.84 | 37.30 | 31.95                   | 30.66 | 29.76 |
| 661.7       | 35.60                   | 36.18 | 36.68 | 31.22                   | 30.20 | 29.20 |
| 702.4       | 35.13                   | 35.69 | 36.08 | 30.04                   | 29.39 | 28.60 |
| 743.1       | 34.55                   | 34.90 | 35.26 | 28.95                   | 28.42 | 27.93 |
| 783.8       | 34.07                   | 34.36 | 34.55 | 27.78                   | 27.40 | 26.90 |
| 824.6       | 33.84                   | 33.99 | 34.08 | 26.53                   | 26.21 | 25.75 |
| 865.3       | 33.33                   | 33.43 | 33.40 | 25.59                   | 25.20 | 24.77 |
| 906.0       | 32.89                   | 32.80 | 32.56 | 24.48                   | 23.99 | 23.63 |
| 946.7       | 32.30                   | 32.25 | 31.99 | 23.83                   | 23.38 | 23.00 |
| 987.4       | 31.93                   | 31.98 | 31.79 | 23.06                   | 22.68 | 22.23 |
| 1028.2      | 31.32                   | 31.53 | 31.54 | 22.04                   | 21.70 | 21.30 |
| 1068.9      | 30.95                   | 31.37 | 31.57 | 21.41                   | 21.27 | 20.90 |
| 1150.3      | 30.37                   | 31.04 | 31.72 | 19.84                   | 19.98 | 19.82 |
| 1191.1      | 30.27                   | 31.12 | 32.09 | 19.09                   | 19.33 | 19.30 |
| 1231.8      | 29.95                   | 30.97 | 32.10 | 18.52                   | 18.85 | 18.69 |
| 1292.9      | 30.14                   | 31.61 | 33.16 | 17.51                   | 17.94 | 17.89 |
| 1333.6      | 30.59                   | 32.42 | 34.13 | 16.70                   | 17.19 | 16.96 |
| 1394.7      | 31.59                   | 34.02 | 35.87 | 15.68                   | 16.22 | 15.99 |
| 1435.4      | 32.74                   | 35.98 | 37.76 | 15.02                   | 15.60 | 15.42 |
| 1496.5      | 35.48                   | 40.94 | 39.73 | 14.08                   | 14.60 | 14.46 |
| 1537.2      | 38.15                   | 46.46 | 38.68 | 13.59                   | 14.07 | 14.01 |
| 1598.3      | 40.44                   | 43.17 | 35.06 | 12.69                   | 13.30 | 13.25 |
| 1639.0      | 40.04                   | 36.61 | 31.81 | 12.11                   | 12.68 | 12.62 |
| 1700.1      | 34.83                   | 32.12 | 28.86 | 11.60                   | 12.09 | 12.09 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | RF-IF ISOLATION<br>(dB) |       |       |
|---------------------|-------------|-------------------------|-------|-------|
|                     |             | @LO (dBm)               |       |       |
|                     |             | +7                      | +10   | +13   |
| 10.1                | 40.1        | 48.07                   | 44.03 | 47.92 |
| 50.8                | 80.8        | 36.78                   | 36.84 | 36.97 |
| 91.5                | 121.5       | 32.16                   | 32.10 | 32.12 |
| 132.3               | 162.3       | 29.59                   | 29.65 | 29.69 |
| 173.0               | 203.0       | 27.65                   | 27.70 | 27.80 |
| 213.7               | 243.7       | 26.40                   | 26.48 | 26.56 |
| 254.4               | 284.4       | 25.30                   | 25.50 | 25.63 |
| 295.2               | 325.2       | 24.66                   | 24.81 | 25.05 |
| 335.9               | 365.9       | 24.13                   | 24.40 | 24.51 |
| 376.6               | 406.6       | 23.79                   | 24.12 | 24.23 |
| 417.3               | 447.3       | 23.40                   | 23.79 | 24.04 |
| 458.1               | 488.1       | 23.25                   | 23.60 | 23.85 |
| 498.8               | 528.8       | 23.11                   | 23.52 | 23.87 |
| 539.5               | 569.5       | 22.97                   | 23.43 | 23.79 |
| 580.2               | 610.2       | 22.98                   | 23.61 | 23.96 |
| 620.9               | 650.9       | 22.77                   | 23.44 | 24.03 |
| 661.7               | 691.7       | 22.06                   | 22.71 | 23.28 |
| 702.4               | 732.4       | 21.11                   | 21.60 | 21.97 |
| 743.1               | 773.1       | 19.96                   | 20.22 | 20.43 |
| 783.8               | 813.8       | 18.89                   | 18.88 | 18.93 |
| 824.6               | 854.6       | 17.85                   | 17.67 | 17.66 |
| 865.3               | 895.3       | 16.85                   | 16.67 | 16.55 |
| 906.0               | 936.0       | 16.03                   | 15.89 | 15.78 |
| 946.7               | 976.7       | 15.38                   | 15.31 | 15.25 |
| 987.4               | 1017.4      | 14.86                   | 14.86 | 14.91 |
| 1028.2              | 1058.2      | 14.42                   | 14.45 | 14.59 |
| 1068.9              | 1098.9      | 13.99                   | 14.11 | 14.23 |
| 1109.6              | 1139.6      | 13.66                   | 13.87 | 14.02 |
| 1150.3              | 1180.3      | 13.40                   | 13.67 | 13.90 |
| 1191.1              | 1221.1      | 13.15                   | 13.47 | 13.81 |
| 1231.8              | 1261.8      | 13.01                   | 13.39 | 13.69 |
| 1292.9              | 1322.9      | 12.74                   | 13.16 | 13.42 |
| 1333.6              | 1363.6      | 12.61                   | 12.91 | 13.16 |
| 1394.7              | 1424.7      | 12.11                   | 12.30 | 12.39 |
| 1435.4              | 1465.4      | 11.78                   | 11.93 | 11.98 |
| 1496.5              | 1526.5      | 11.38                   | 11.40 | 11.32 |
| 1537.2              | 1567.2      | 10.91                   | 10.93 | 10.80 |
| 1598.3              | 1628.3      | 10.12                   | 10.09 | 9.89  |
| 1639.0              | 1669.0      | 9.58                    | 9.48  | 9.31  |
| 1700.1              | 1730.1      | 8.84                    | 8.66  | 8.46  |

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# Frequency Mixer

# RMS-2LH+

## Typical Performance Data

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | RF VSWR<br>(:1) |      |      | LO<br>(MHz) | LO VSWR<br>(:1) |      |      | IF<br>(OUT)<br>(MHz) | IF VSWR<br>@LO=1000.1MHz<br>(:1) |      |      |
|---------------------|-------------|-----------------|------|------|-------------|-----------------|------|------|----------------------|----------------------------------|------|------|
|                     |             | @LO (dBm)       |      |      |             | @LO (dBm)       |      |      |                      | @LO (dBm)                        |      |      |
|                     |             | +7              | +10  | +13  |             | +7              | +10  | +13  |                      | +7                               | +10  | +13  |
| 5.0                 | 35.0        | 1.33            | 1.36 | 1.41 | 5.0         | 1.63            | 2.36 | 3.52 | 5.0                  | 1.32                             | 1.14 | 1.01 |
| 10.0                | 40.0        | 1.19            | 1.24 | 1.30 | 10.0        | 1.60            | 2.34 | 3.39 | 10.0                 | 1.33                             | 1.15 | 1.02 |
| 50.8                | 80.8        | 1.17            | 1.26 | 1.33 | 50.8        | 1.70            | 2.47 | 3.43 | 30.2                 | 2.20                             | 1.66 | 1.37 |
| 91.5                | 121.5       | 1.18            | 1.27 | 1.34 | 91.5        | 1.62            | 2.28 | 3.11 | 50.4                 | 2.05                             | 1.59 | 1.31 |
| 132.3               | 162.3       | 1.20            | 1.29 | 1.35 | 132.3       | 1.68            | 2.42 | 3.35 | 70.6                 | 2.08                             | 1.59 | 1.31 |
| 173.0               | 203.0       | 1.20            | 1.29 | 1.35 | 173.0       | 1.63            | 2.30 | 3.16 | 90.8                 | 2.13                             | 1.62 | 1.34 |
| 213.7               | 243.7       | 1.21            | 1.30 | 1.36 | 213.7       | 1.67            | 2.39 | 3.27 | 111.0                | 2.17                             | 1.64 | 1.36 |
| 254.4               | 284.4       | 1.23            | 1.30 | 1.35 | 254.4       | 1.68            | 2.40 | 3.28 | 131.2                | 2.15                             | 1.64 | 1.36 |
| 295.2               | 325.2       | 1.23            | 1.31 | 1.36 | 295.2       | 1.68            | 2.38 | 3.24 | 151.4                | 2.08                             | 1.60 | 1.32 |
| 335.9               | 365.9       | 1.24            | 1.31 | 1.36 | 335.9       | 1.75            | 2.49 | 3.39 | 171.6                | 2.03                             | 1.57 | 1.30 |
| 376.6               | 406.6       | 1.25            | 1.32 | 1.37 | 376.6       | 1.73            | 2.44 | 3.30 | 191.8                | 2.04                             | 1.57 | 1.30 |
| 417.3               | 447.3       | 1.26            | 1.33 | 1.39 | 417.3       | 1.81            | 2.56 | 3.45 | 212.0                | 2.04                             | 1.58 | 1.31 |
| 458.1               | 488.1       | 1.27            | 1.34 | 1.40 | 458.1       | 1.84            | 2.57 | 3.44 | 232.2                | 2.04                             | 1.58 | 1.31 |
| 498.8               | 528.8       | 1.30            | 1.37 | 1.42 | 498.8       | 1.88            | 2.62 | 3.51 | 252.4                | 2.04                             | 1.58 | 1.32 |
| 539.5               | 569.5       | 1.31            | 1.39 | 1.44 | 539.5       | 1.95            | 2.70 | 3.58 | 272.7                | 2.05                             | 1.59 | 1.33 |
| 580.2               | 610.2       | 1.33            | 1.41 | 1.47 | 580.2       | 1.99            | 2.72 | 3.59 | 292.9                | 2.02                             | 1.57 | 1.30 |
| 620.9               | 650.9       | 1.35            | 1.43 | 1.49 | 620.9       | 2.08            | 2.84 | 3.73 | 313.1                | 1.95                             | 1.52 | 1.27 |
| 661.7               | 691.7       | 1.37            | 1.44 | 1.50 | 661.7       | 2.11            | 2.86 | 3.74 | 333.3                | 1.91                             | 1.50 | 1.25 |
| 702.4               | 732.4       | 1.40            | 1.47 | 1.53 | 702.4       | 2.19            | 2.96 | 3.85 | 353.5                | 1.93                             | 1.52 | 1.27 |
| 743.1               | 773.1       | 1.43            | 1.50 | 1.55 | 743.1       | 2.25            | 3.00 | 3.87 | 373.7                | 1.93                             | 1.52 | 1.28 |
| 783.8               | 813.8       | 1.47            | 1.54 | 1.60 | 783.8       | 2.31            | 3.05 | 3.90 | 393.9                | 1.92                             | 1.51 | 1.26 |
| 824.6               | 854.6       | 1.52            | 1.60 | 1.66 | 824.6       | 2.40            | 3.13 | 3.98 | 434.3                | 1.81                             | 1.44 | 1.22 |
| 865.3               | 895.3       | 1.57            | 1.65 | 1.71 | 865.3       | 2.47            | 3.18 | 4.01 | 454.5                | 1.81                             | 1.45 | 1.24 |
| 906.0               | 936.0       | 1.62            | 1.70 | 1.77 | 906.0       | 2.58            | 3.30 | 4.14 | 494.9                | 1.88                             | 1.50 | 1.28 |
| 946.7               | 976.7       | 1.70            | 1.77 | 1.83 | 946.7       | 2.68            | 3.41 | 4.23 | 515.1                | 1.82                             | 1.45 | 1.24 |
| 987.4               | 1017.4      | 1.80            | 1.86 | 1.92 | 987.4       | 2.77            | 3.51 | 4.33 | 555.5                | 1.77                             | 1.43 | 1.25 |
| 1028.2              | 1058.2      | 1.93            | 1.98 | 2.03 | 1028.2      | 2.86            | 3.62 | 4.44 | 575.7                | 1.82                             | 1.47 | 1.29 |
| 1068.9              | 1098.9      | 2.08            | 2.12 | 2.16 | 1068.9      | 2.93            | 3.68 | 4.51 | 616.1                | 1.81                             | 1.46 | 1.27 |
| 1109.6              | 1139.6      | 2.24            | 2.28 | 2.32 | 1109.6      | 2.97            | 3.71 | 4.53 | 636.3                | 1.74                             | 1.42 | 1.24 |
| 1150.3              | 1180.3      | 2.40            | 2.45 | 2.49 | 1150.3      | 3.06            | 3.79 | 4.61 | 676.7                | 1.72                             | 1.42 | 1.27 |
| 1191.1              | 1221.1      | 2.56            | 2.61 | 2.66 | 1191.1      | 3.09            | 3.79 | 4.57 | 696.9                | 1.76                             | 1.44 | 1.29 |
| 1231.8              | 1261.8      | 2.71            | 2.78 | 2.83 | 1231.8      | 3.15            | 3.83 | 4.61 | 737.3                | 1.69                             | 1.39 | 1.25 |
| 1292.9              | 1322.9      | 2.96            | 3.04 | 3.09 | 1292.9      | 3.20            | 3.83 | 4.55 | 757.6                | 1.66                             | 1.38 | 1.24 |
| 1333.6              | 1363.6      | 3.12            | 3.19 | 3.24 | 1333.6      | 3.26            | 3.87 | 4.55 | 798.0                | 1.63                             | 1.37 | 1.26 |
| 1394.7              | 1424.7      | 3.27            | 3.34 | 3.38 | 1394.7      | 3.31            | 3.85 | 4.47 | 818.2                | 1.64                             | 1.37 | 1.27 |
| 1435.4              | 1465.4      | 3.42            | 3.49 | 3.54 | 1435.4      | 3.40            | 3.90 | 4.52 | 858.6                | 1.61                             | 1.35 | 1.25 |
| 1496.5              | 1526.5      | 3.56            | 3.61 | 3.65 | 1496.5      | 3.48            | 3.91 | 4.46 | 878.8                | 1.57                             | 1.32 | 1.23 |
| 1537.2              | 1567.2      | 3.62            | 3.67 | 3.69 | 1537.2      | 3.60            | 4.01 | 4.54 | 919.2                | 1.53                             | 1.31 | 1.26 |
| 1598.3              | 1628.3      | 3.62            | 3.65 | 3.67 | 1598.3      | 3.71            | 4.04 | 4.52 | 939.4                | 1.54                             | 1.33 | 1.27 |
| 1639.0              | 1669.0      | 3.67            | 3.67 | 3.70 | 1639.0      | 3.82            | 4.14 | 4.55 | 979.8                | 1.52                             | 1.30 | 1.24 |
| 1700.1              | 1730.1      | 3.70            | 3.69 | 3.69 | 1700.1      | 3.90            | 4.15 | 4.53 | 1000.0               | 1.41                             | 1.47 | 1.66 |

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## Harmonics Tables

RF HARMONICS ORDER

|    | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|----|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0  | -      | -      | 14  | 31  | 19  | 40  | 28  | 54  | 31  | 45  | 46  | 54  |
| 1  | -      | 16     | +0  | 29  | 13  | 36  | 26  | 49  | 40  | 43  | 49  | 47  |
| 2  | 93     | 60     | 38  | 55  | 38  | 66  | 39  | 60  | 56  | 59  | 48  | 66  |
| 3  | >100   | 58     | 50  | 60  | 49  | 56  | 42  | 61  | 57  | 61  | 51  | 63  |
| 4  | >100   | 71     | 60  | 69  | 59  | 68  | 63  | 69  | 59  | 75  | 74  | 67  |
| 5  | >100   | 88     | 71  | 67  | 59  | 66  | 56  | 64  | 55  | 70  | 62  | 77  |
| 6  | >100   | 91     | 83  | 91  | 88  | 80  | 78  | 77  | 71  | 75  | 69  | 81  |
| 7  | >100   | 81     | 89  | 91  | 80  | 84  | 83  | 82  | >93 | 81  | 80  | 85  |
| 8  | >100   | >93    | >93 | >93 | >93 | 91  | 91  | 86  | 85  | 88  | 86  | 85  |
| 9  | >100   | >93    | >93 | >93 | >93 | >93 | 89  | 90  | 87  | >93 | 88  | 91  |
| 10 | >100   | >93    | >93 | >93 | >93 | >93 | >93 | >93 | >93 | 92  | >93 | >93 |
|    | RF CAL | 0      | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |

### LO HARMONICS ORDER

Test conditions:

RF IN: 500.1 MHz; 0.00 dBm.

LO IN: 530.01 MHz; +10.00 dBm

IF OUT: 29.91 MHz; -7.45 dBm

RF HARMONICS ORDER

|    | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|----|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0  | -      | -      | 5   | 20  | 7   | 28  | 17  | 41  | 19  | 35  | 31  | 45  |
| 1  | -      | 16     | +0  | 29  | 13  | 34  | 26  | 44  | 44  | 40  | 43  | 43  |
| 2  | >100   | 67     | 45  | 60  | 45  | 69  | 46  | 65  | 62  | 60  | 56  | 71  |
| 3  | >100   | 70     | 64  | 69  | 61  | 67  | 57  | 73  | 65  | 77  | 63  | 81  |
| 4  | >100   | >82    | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 |
| 5  | >100   | >82    | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 |
| 6  | >100   | >82    | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 |
| 7  | >100   | >82    | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 |
| 8  | >100   | >82    | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 |
| 9  | >100   | >82    | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 |
| 10 | >100   | >82    | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 |
|    | RF CAL | 0      | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |

### LO HARMONICS ORDER

Test conditions:

RF IN: 500.1 MHz; -10.00 dBm.

LO IN: 530.01 MHz; +10.00 dBm

IF OUT: 29.91 MHz; -17.78 dBm

Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.

2. + entry denotes harmonics are in (dBc) above IF OUTPUT.

3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

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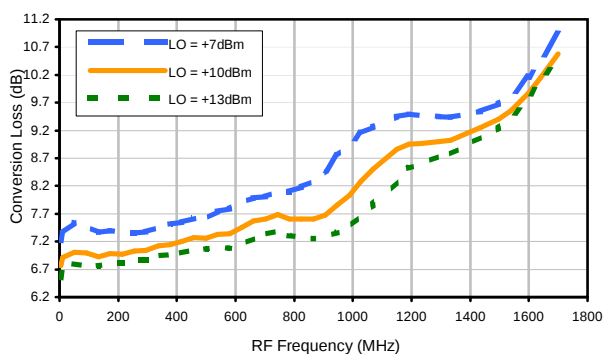


# Frequency Mixer

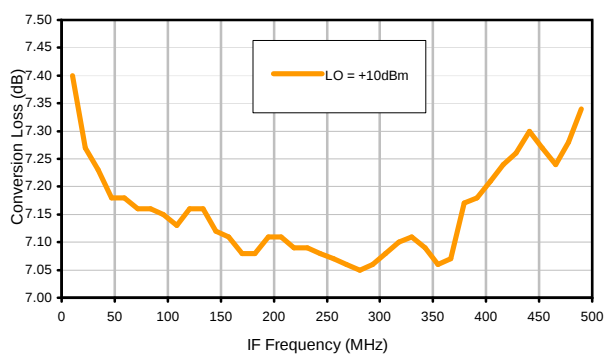
RMS-2LH+

## Typical Performance Curves

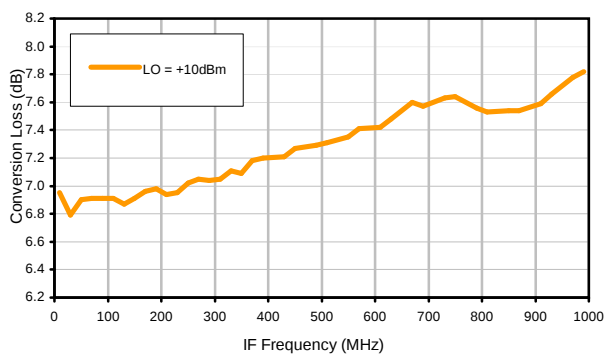
Conversion Loss @ IF=30MHz



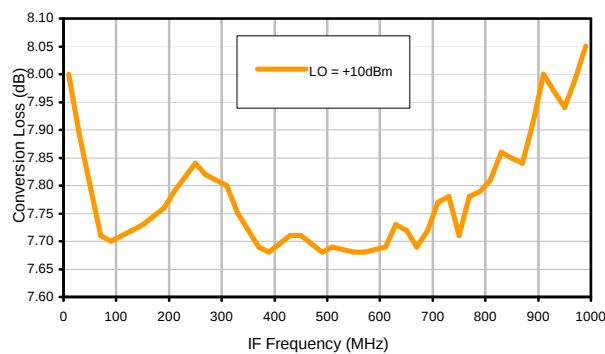
Conversion Loss vs. IF @ RF=500.1MHz



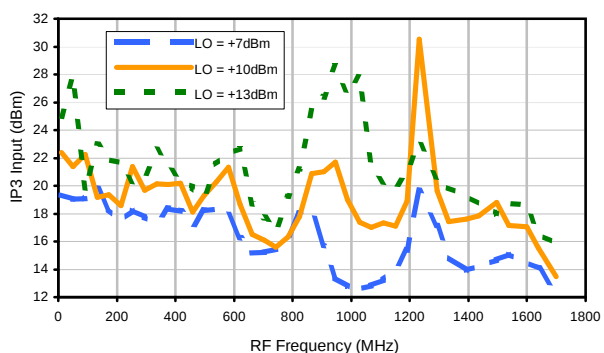
Conversion Loss vs. IF @ RF=10.1MHz



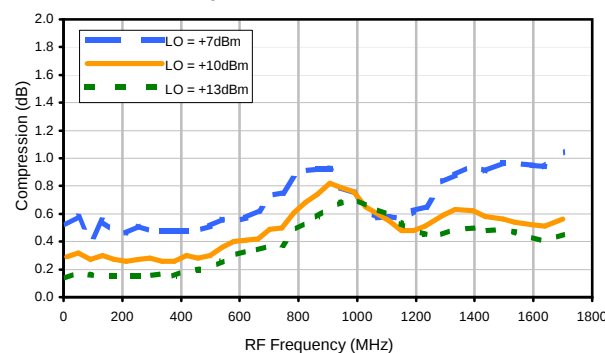
Conversion Loss vs. IF @ RF=1000.1MHz



IP3 Input



Compression @ RF IN=+5dBm



REV. X2  
RMS-2LH+  
100818  
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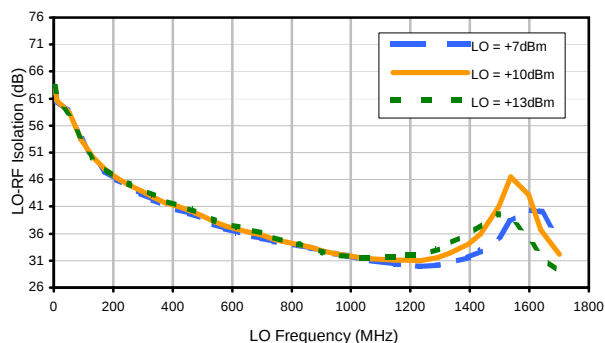


# Frequency Mixer

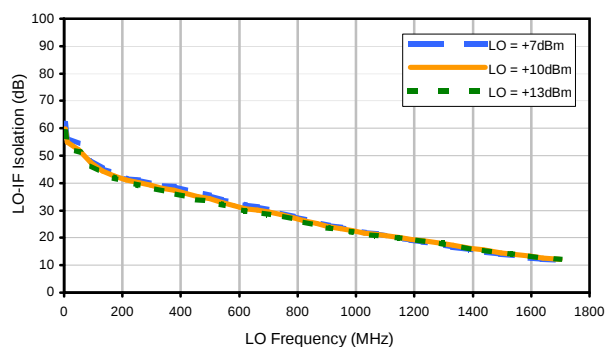
RMS-2LH+

## Typical Performance Curves

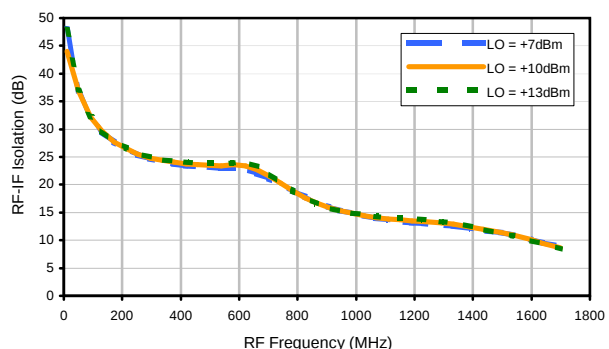
LO-RF Isolation



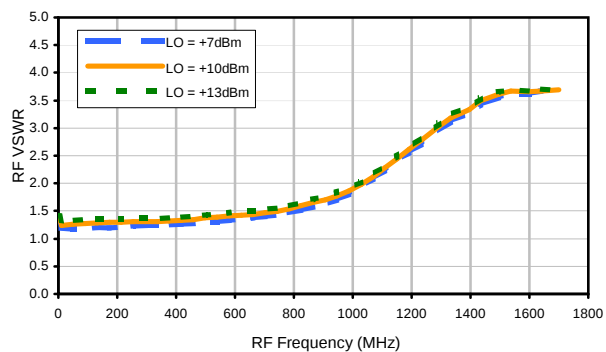
LO-IF Isolation



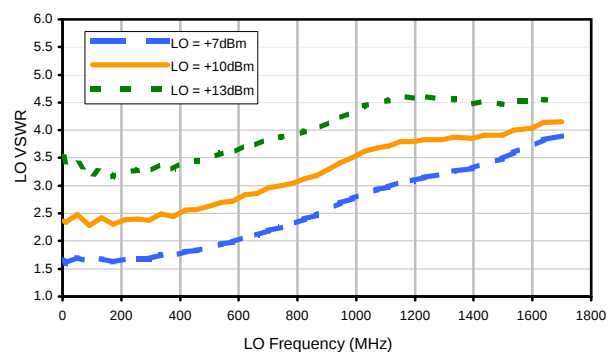
RF-IF Isolation



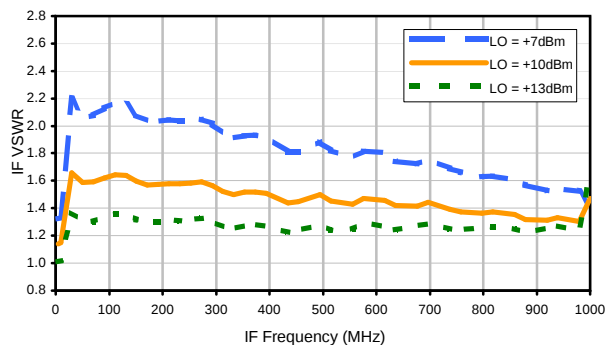
RF VSWR



LO VSWR



IF VSWR



REV. X2  
RMS-2LH+  
100818  
Page 2 of 3



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## Harmonics Tables

RF HARMONICS ORDER

|    | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|----|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0  | -      | -      | 14  | 31  | 19  | 40  | 28  | 54  | 31  | 45  | 46  | 54  |
| 1  | -      | 16     | +0  | 29  | 13  | 36  | 26  | 49  | 40  | 43  | 49  | 47  |
| 2  | 93     | 60     | 38  | 55  | 38  | 66  | 39  | 60  | 56  | 59  | 48  | 66  |
| 3  | >100   | 58     | 50  | 60  | 49  | 56  | 42  | 61  | 57  | 61  | 51  | 63  |
| 4  | >100   | 71     | 60  | 69  | 59  | 68  | 63  | 69  | 59  | 75  | 74  | 67  |
| 5  | >100   | 88     | 71  | 67  | 59  | 66  | 56  | 64  | 55  | 70  | 62  | 77  |
| 6  | >100   | 91     | 83  | 91  | 88  | 80  | 78  | 77  | 71  | 75  | 69  | 81  |
| 7  | >100   | 81     | 89  | 91  | 80  | 84  | 83  | 82  | >93 | 81  | 80  | 85  |
| 8  | >100   | >93    | >93 | >93 | >93 | 91  | 91  | 86  | 85  | 88  | 86  | 85  |
| 9  | >100   | >93    | >93 | >93 | >93 | >93 | 89  | 90  | 87  | >93 | 88  | 91  |
| 10 | >100   | >93    | >93 | >93 | >93 | >93 | >93 | >93 | >93 | 92  | >93 | >93 |
|    | RF CAL | 0      | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |

### LO HARMONICS ORDER

Test conditions:

RF IN: 500.1 MHz; 0.00 dBm.

LO IN: 530.01 MHz; +10.00 dBm

IF OUT: 29.91 MHz; -7.45 dBm

RF HARMONICS ORDER

|    | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|----|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0  | -      | -      | 5   | 20  | 7   | 28  | 17  | 41  | 19  | 35  | 31  | 45  |
| 1  | -      | 16     | +0  | 29  | 13  | 34  | 26  | 44  | 44  | 40  | 43  | 43  |
| 2  | >100   | 67     | 45  | 60  | 45  | 69  | 46  | 65  | 62  | 60  | 56  | 71  |
| 3  | >100   | 70     | 64  | 69  | 61  | 67  | 57  | 73  | 65  | 77  | 63  | 81  |
| 4  | >100   | >82    | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 |
| 5  | >100   | >82    | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 |
| 6  | >100   | >82    | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 |
| 7  | >100   | >82    | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 |
| 8  | >100   | >82    | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 |
| 9  | >100   | >82    | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 |
| 10 | >100   | >82    | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 | >82 |
|    | RF CAL | 0      | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |

### LO HARMONICS ORDER

Test conditions:

RF IN: 500.1 MHz; -10.00 dBm.

LO IN: 530.01 MHz; +10.00 dBm

IF OUT: 29.91 MHz; -17.78 dBm

Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.

2. + entry denotes harmonics are in (dBc) above IF OUTPUT.

3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

REV. X2

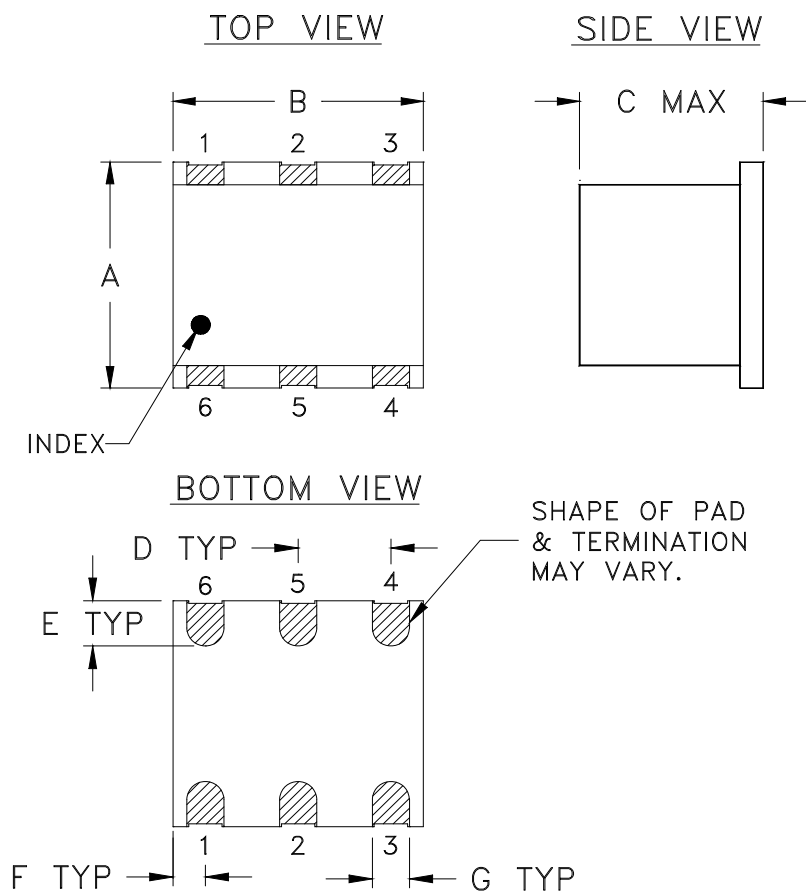
RMS-2LH+

100818

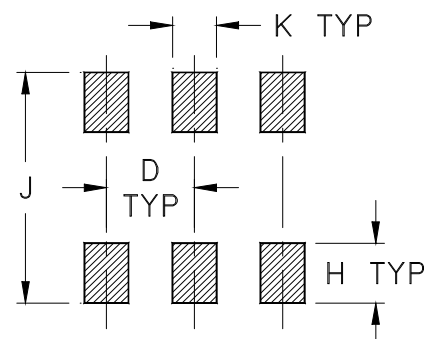
Page 3 of 3



### Outline Dimensions



### PCB Land Pattern



Suggested Layout,  
Tolerance to be within  $\pm .002$

| CASE # | A              | B             | C             | D              | E              | F              | G              | H              | J              | K              | WT. GRAM |
|--------|----------------|---------------|---------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------|
| TT240  | .250<br>(6.35) | .31<br>(7.87) | .20<br>(5.08) | .100<br>(2.54) | .050<br>(1.27) | .055<br>(1.40) | .040<br>(1.02) | .070<br>(1.78) | .270<br>(6.86) | .050<br>(1.27) | .50      |

Dimensions are in inches (mm). Tolerances: 2Pl.  $\pm .01$ ; 3 Pl.  $\pm .005$

### Notes:

- Case material: Ceramic.
- Termination finish:
  - For RoHS Case Styles: 2-10 $\mu$  inch (.05-.25 microns) Gold plate over 100-300  $\mu$  inch (2.54-7.62 microns) Nickel plate. All models, (+) suffix.
  - For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.



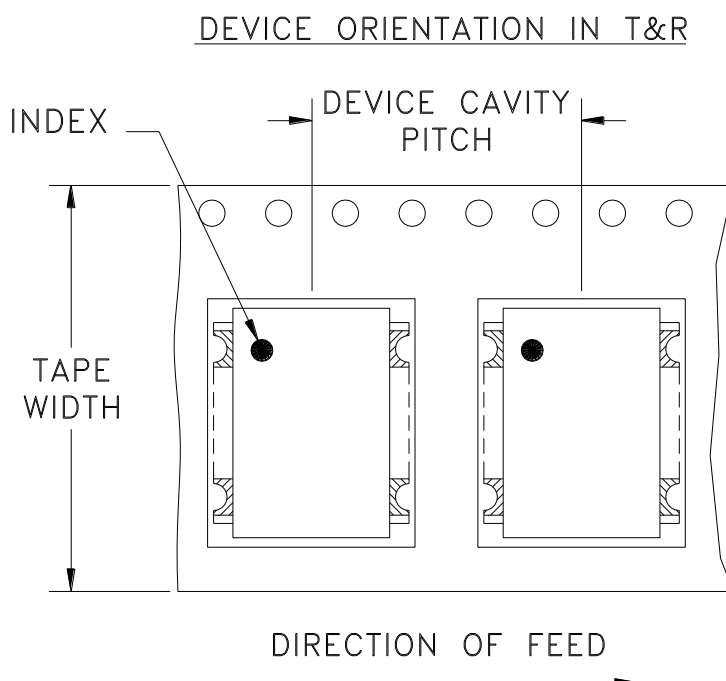
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The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)

RF/IF MICROWAVE COMPONENTS

# Tape & Reel Packaging TR-F2



| Tape Width, mm | Device Cavity Pitch, mm | Reel Size, inches | Devices per Reel<br>See note |
|----------------|-------------------------|-------------------|------------------------------|
| 16             | 12                      | 7                 | 10                           |
|                |                         |                   | 20                           |
|                |                         |                   | 50                           |
|                |                         |                   | 100                          |
|                |                         |                   | 200                          |
|                |                         | 13                | 500                          |

Note: Please consult individual model data sheet to determine device per reel availability

Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

Go to: [www.minicircuits.com/pages/pdfs/tape.pdf](http://www.minicircuits.com/pages/pdfs/tape.pdf)



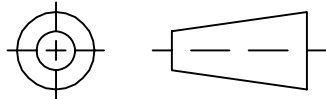
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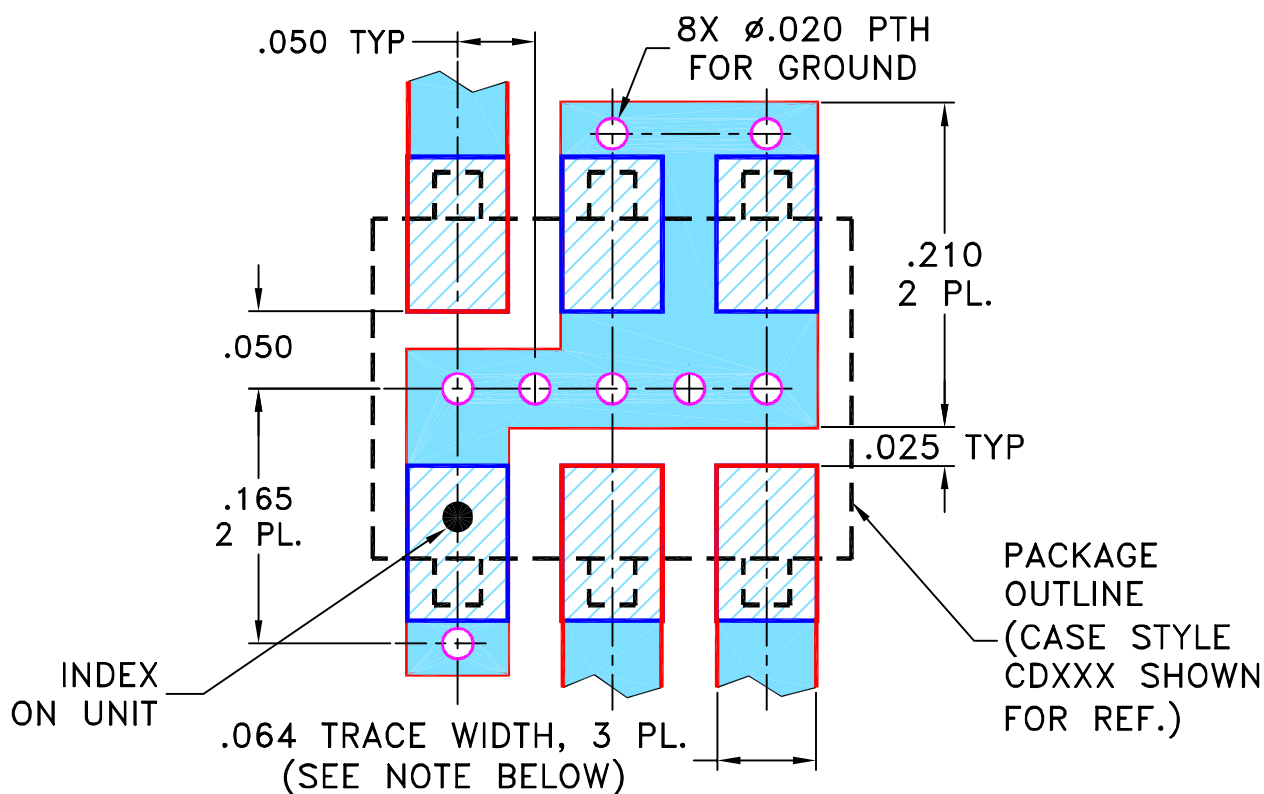
## THIRD ANGLE PROJECTION



## REVISIONS

| REV | ECN No. | DESCRIPTION                                          | DATE     | DR  | AUTH |
|-----|---------|------------------------------------------------------|----------|-----|------|
| A   | M101143 | ADDED "gk" PIN CONNECTION, TT100 CASE STYLE & NOTE 2 | 10/10/05 | MMG | DJ   |
| B   | M102713 | ADDED "...WITH SMOBC"                                | 01/17/06 | MMG | IL   |
| C   | M108637 | REMOVED "PIN 1", ADDED INDEX ON UNIT                 | 12/01/06 | MYG | FL   |

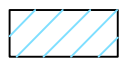
**SUGGESTED MOUNTING CONFIGURATION**  
**FOR BH292, CD541/542/636/637, TT100/240 CASE**  
**STYLES, "gk", "ht", "hu", "nd", "w" PIN CONNECTIONS**



- NOTES:** 1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .030"  $\pm$  .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

UNLESS OTHERWISE SPECIFIED

INITIALS

DATE

DIMENSIONS ARE IN INCHES

TOLERANCES ON:

2 PL DECIMALS  $\pm$ 3 PL DECIMALS  $\pm$  .005ANGLES  $\pm$ FRACTIONS  $\pm$ 

DRAWN

MMG

07/17/02

CHECKED

WL

08/02/02

APPROVED

DJ

08/05/02



**Mini-Circuits®**

13 Neptune Avenue  
 Brooklyn NY 11235

PL, gk/ht/hu/nd/w, BH292,  
 CD541/542/636/637, TT100/240, TB-03

SIZE

A

CODE IDENT

15542

DRAWING NO:

98-PL-052

REV:

C

FILE:

98PL052

SCALE:

8:1

SHEET:

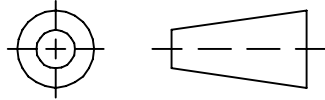
1 OF 1

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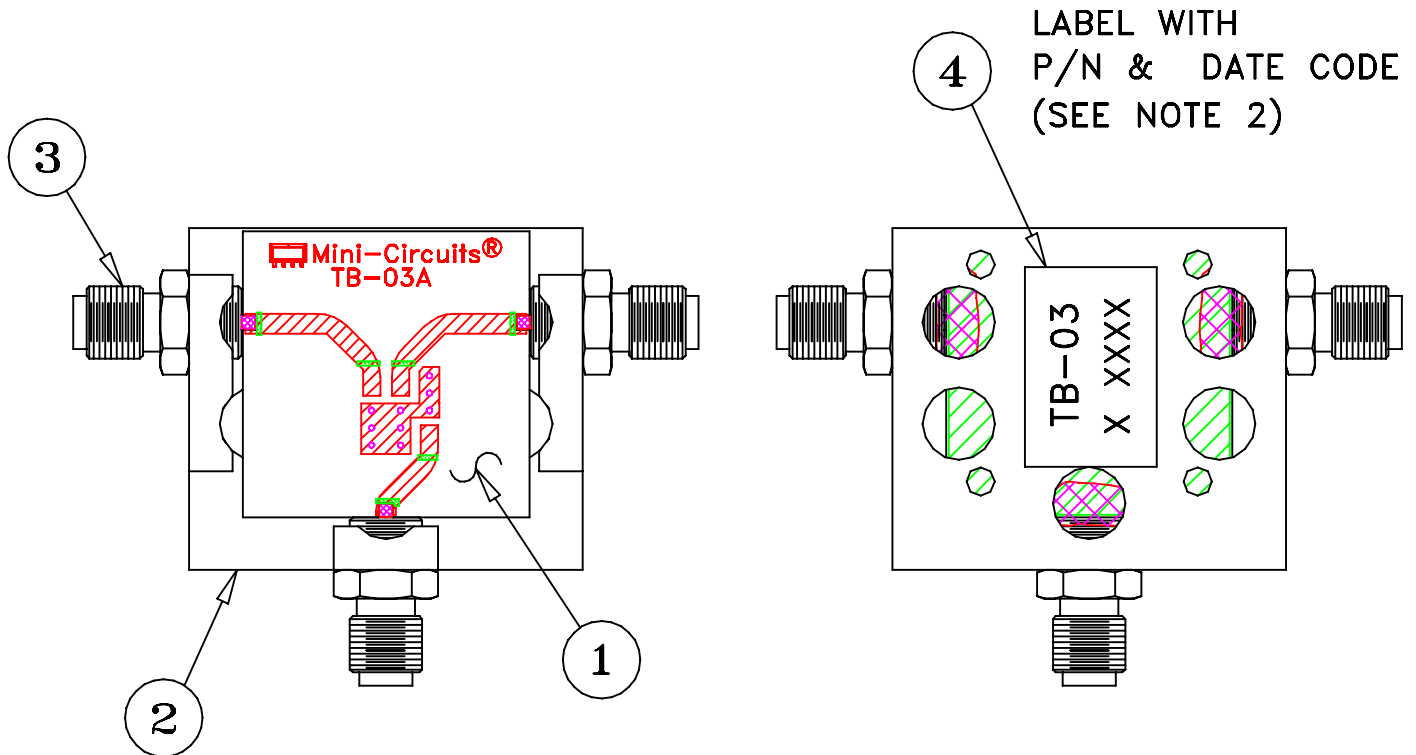
ASHEETA1.DWG REV:A DATE:01/12/95

## THIRD ANGLE PROJECTION



## REVISIONS

| REV | ECN No. | DESCRIPTION               | DATE  | DR | AUTH |
|-----|---------|---------------------------|-------|----|------|
| E   | M119737 | UPDATED PCB               | 10.08 | MF | AD   |
| F   | M127659 | UPDATED CARR              | 06.10 | SW | SG   |
| G   | M127846 | UPDATED SCHEMATIC DIAGRAM | 06.10 | SW | SG   |
| H   | M131840 | UPDATED DWG               | 05.11 | MF | AD   |

**NOTES:**

1. REFER TO -09 PAGE FOR ITEM DESCRIPTIONS.  
DESIGNATION NUMBERS ON -20 PAGE CORRESPOND TO THE NUMBERS ON -09 PAGE.
2. FOR TEXT HEIGHT & STYLE ON THE LABEL REFER TO: D3-G209.

UNLESS OTHERWISE SPECIFIED

INITIALS

DATE

DIMENSIONS ARE IN INCHES

DRAWN

S.WOLYNSKI

08.29.99

TOLERANCES ON:

CHECKED

SG

07.06.99

2 PL DECIMALS ±

APPROVED

MG

07.10.99

3 PL DECIMALS ±

ANGLES ±

FRACTIONS ±

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Brooklyn NY 11235

TB,ADE,CD542/636,06MX01,50

 SIZE  
A

 CODE IDENT  
15542

 DRAWING NO:  
TB-03-20

 REV:  
H

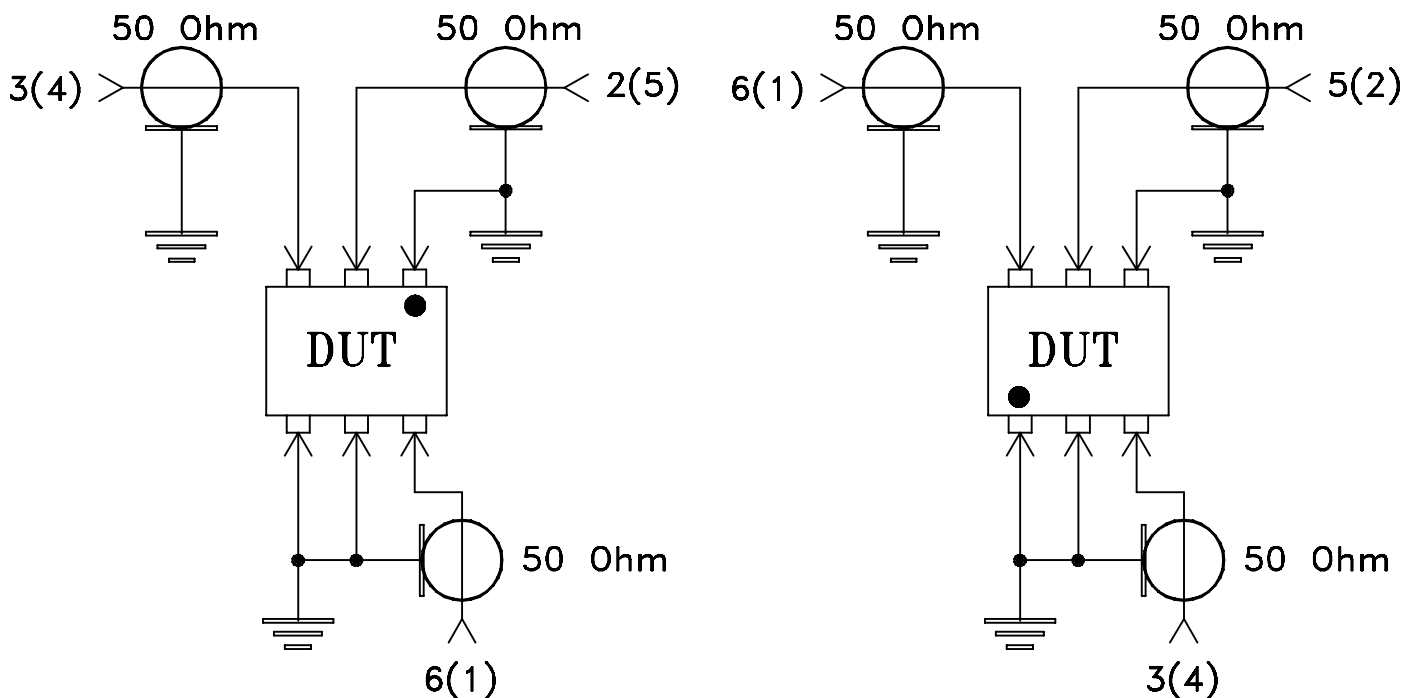
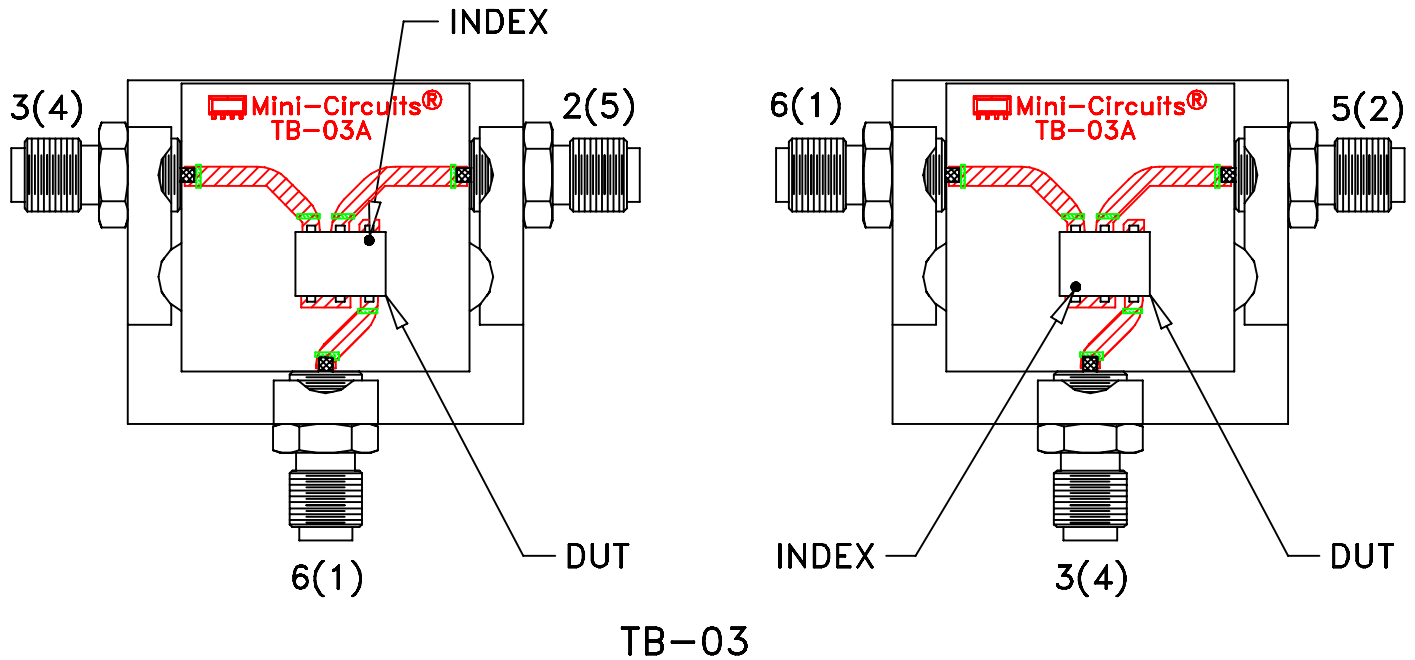
FILE: WTB-03

SCALE: 1.5:1

SHEET: 1 OF 2

# Evaluation Board and Circuit

For Pin Connections and DUT Orientation Refer to  
Data Sheet of the DUT



Schematic Diagram

## Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: Rogers R04350 or equivalent,  
Dielectric Constant=3.5, Thickness=.030 inch.

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| Specification                  | Test/Inspection Condition                                                                                                                                       | Reference/Spec                                                                                       |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| Operating Temperature          | -40° to 85°C<br>Ambient Environment                                                                                                                             | Individual Model Data Sheet                                                                          |
| Storage Temperature            | -55° to 100° C<br>Ambient Environment                                                                                                                           | Individual Model Data Sheet                                                                          |
| Humidity                       | 90 to 95% RH, 240 hours, 50°C                                                                                                                                   | MIL-STD-202, Method 103, Condition A, Except 50°C and end-point electrical test done within 12 hours |
| Thermal Shock                  | -55° to 100°C, 100 cycles                                                                                                                                       | MIL-STD-202, Method 107, Condition A-3, except +100°C                                                |
| Solder Reflow Heat             | Sn-Pb Eutetic Process: 225°C peak<br>Pb-Free Process 245° - 250°C peak                                                                                          | J-STD-020, Table 4-1, 4-2 and 5-2, Figure 5-1                                                        |
| Solderability                  | 10X Magnification                                                                                                                                               | J-STD-002, 95% Coverage                                                                              |
| Vibration (High Frequency)     | 20g peak, 10-2000 Hz, 12 times in each of three perpendicular directions (total 36)                                                                             | MIL-STD-202, Method 204, Condition D                                                                 |
| Mechanical Shock               | 50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes                                                                                               | MIL-STD-202, Method 213, Condition A                                                                 |
| Marking Resistance to Solvents | Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C;<br>distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C | MIL-STD-202, Method 215                                                                              |