

# Frequency Mixer

## RMS-5L+

### Level 3 (LO Power +3 dBm) 400 to 1400 MHz

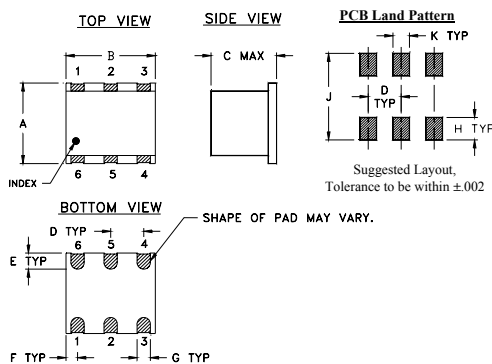
#### Maximum Ratings

|                                                                 |                |
|-----------------------------------------------------------------|----------------|
| 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 |

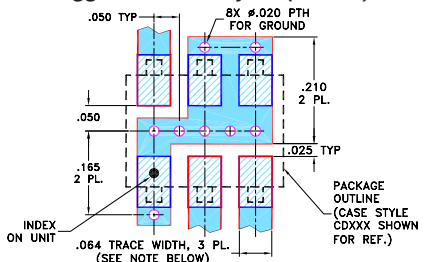
#### Outline Drawing



#### 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:
- 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.
  - BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
  - DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)
    - DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

#### Notes

- 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.
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#### Features

- good conversion loss, 7.0 dB typ.
- small size, 0.25"x0.31"x0.2"
- wide bandwidth, 400-1400 MHz

#### Applications

- cellular
- ISM/GSM
- satellite distribution



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        | $\bar{X}$ $\sigma$ Max. | Typ. Min.            | Typ. Min.            | Typ.                     |
| $f_L - f_U$     |                         |                      |                      |                          |
| 400-1400 DC-800 | 7.0 0.2 9.8             | 22 14                | 22 6                 | 9                        |

1 dB COMP.: -3 dBm typ.

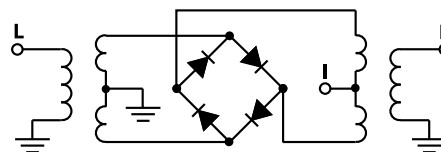
For phase detection, DC output positive with in-phase RF &amp; LO.

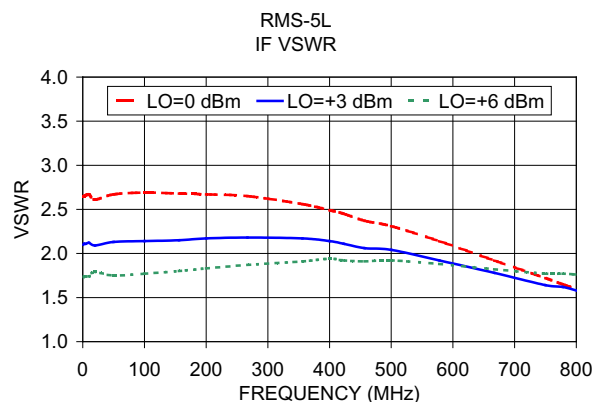
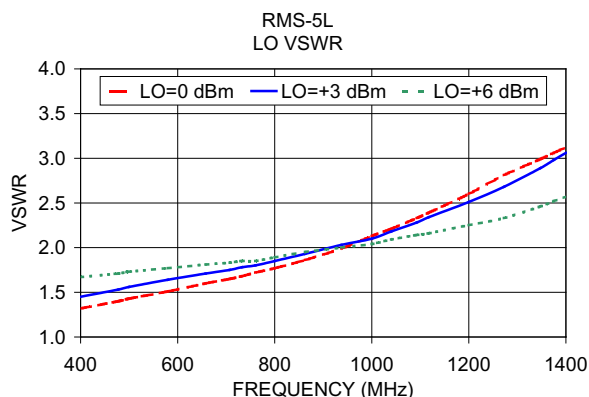
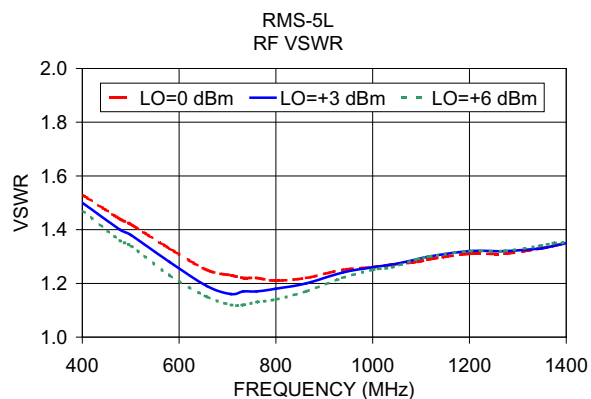
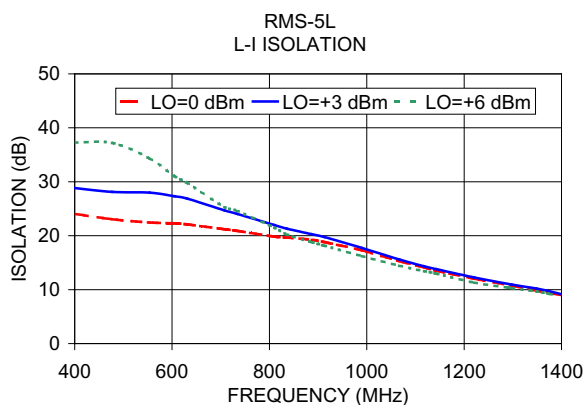
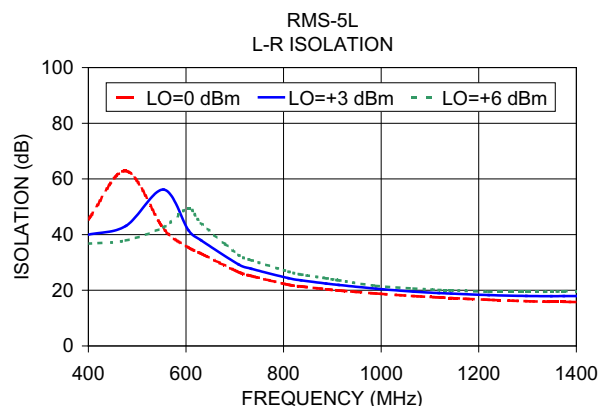
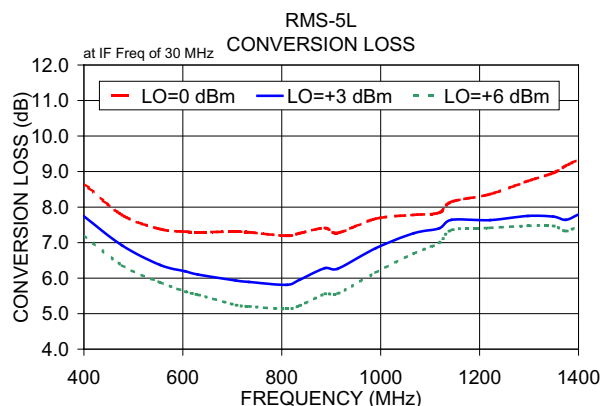
L = low range [ $f_L$  to  $10 f_L$ ]m = mid band [ $2 f_L$  to  $f_U/2$ ]M = mid range [ $10 f_L$  to  $f_U/2$ ]U = upper range [ $f_U/2$  to  $f_U$ ]

#### 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 +3dBm             | LO +3dBm           | LO +3dBm           | LO +3dBm          | LO +3dBm          |
| 400.00          | 430.00               | 7.74               | 39.94              | 28.82             | 1.45              |
| 476.92          | 506.92               | 6.92               | 43.12              | 28.11             | 1.53              |
| 553.85          | 583.85               | 6.37               | 56.16              | 27.98             | 1.56              |
| 605.13          | 635.13               | 6.19               | 41.52              | 27.30             | 1.64              |
| 630.77          | 660.77               | 6.10               | 37.96              | 26.89             | 1.71              |
| 707.69          | 737.69               | 5.93               | 29.29              | 24.68             | 1.75              |
| 733.33          | 763.33               | 5.89               | 27.74              | 24.04             | 1.78              |
| 810.26          | 840.26               | 5.81               | 24.32              | 21.96             | 1.80              |
| 835.90          | 865.90               | 5.95               | 23.55              | 21.29             | 1.85              |
| 887.18          | 917.18               | 6.28               | 22.39              | 20.26             | 1.93              |
| 912.82          | 942.82               | 6.26               | 21.89              | 19.74             | 2.03              |
| 989.74          | 959.74               | 6.84               | 20.56              | 17.73             | 2.10              |
| 1066.67         | 1036.67              | 7.26               | 19.47              | 15.58             | 2.18              |
| 1117.95         | 1087.95              | 7.40               | 18.97              | 14.31             | 2.28              |
| 1143.59         | 1113.59              | 7.64               | 18.77              | 13.78             | 2.34              |
| 1220.51         | 1190.51              | 7.63               | 18.25              | 12.26             | 2.51              |
| 1297.44         | 1267.44              | 7.75               | 17.96              | 10.95             | 2.68              |
| 1348.72         | 1318.72              | 7.73               | 17.87              | 10.20             | 2.89              |
| 1374.36         | 1344.36              | 7.64               | 17.90              | 9.72              | 2.98              |
| 1400.00         | 1370.00              | 7.79               | 17.92              | 9.13              | 3.06              |

#### Electrical Schematic





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# Frequency Mixer

# RMS-5L+

## Typical Performance Data

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>IF FIXED<br>@IF(OUT)=30MHz<br>(dB) |      |      |
|---------------------|-------------|-------------------------------------------------------|------|------|
|                     |             | @LO (dBm)                                             |      |      |
|                     |             | 0                                                     | +3   | +6   |
| 400.1               | 430.1       | 8.43                                                  | 7.40 | 6.89 |
| 440.1               | 470.1       | 8.00                                                  | 7.00 | 6.48 |
| 480.1               | 510.1       | 7.81                                                  | 6.83 | 6.31 |
| 520.1               | 550.1       | 7.53                                                  | 6.58 | 6.05 |
| 560.1               | 590.1       | 7.38                                                  | 6.45 | 5.95 |
| 600.1               | 630.1       | 7.19                                                  | 6.26 | 5.76 |
| 640.1               | 670.1       | 7.13                                                  | 6.16 | 5.66 |
| 680.1               | 710.1       | 7.03                                                  | 6.02 | 5.50 |
| 720.1               | 750.1       | 6.98                                                  | 5.95 | 5.40 |
| 760.1               | 790.1       | 6.99                                                  | 5.91 | 5.34 |
| 800.1               | 830.1       | 7.01                                                  | 5.90 | 5.31 |
| 840.1               | 870.1       | 7.15                                                  | 6.00 | 5.35 |
| 880.1               | 910.1       | 7.29                                                  | 6.15 | 5.42 |
| 920.1               | 950.1       | 7.47                                                  | 6.31 | 5.55 |
| 960.1               | 990.1       | 7.70                                                  | 6.53 | 5.73 |
| 1000.1              | 1030.1      | 7.87                                                  | 6.70 | 5.88 |
| 1040.1              | 1070.1      | 8.17                                                  | 7.03 | 6.18 |
| 1080.1              | 1110.1      | 8.41                                                  | 7.31 | 6.47 |
| 1120.1              | 1150.1      | 8.57                                                  | 7.63 | 6.85 |
| 1160.1              | 1190.1      | 8.65                                                  | 7.80 | 7.10 |
| 1200.1              | 1230.1      | 8.63                                                  | 7.87 | 7.30 |
| 1240.1              | 1270.1      | 8.63                                                  | 7.92 | 7.41 |
| 1280.1              | 1310.1      | 8.63                                                  | 7.90 | 7.48 |
| 1320.1              | 1350.1      | 8.69                                                  | 7.88 | 7.50 |
| 1360.1              | 1390.1      | 8.72                                                  | 7.87 | 7.53 |
| 1400.1              | 1430.1      | 8.75                                                  | 7.83 | 7.51 |
| 1440.1              | 1470.1      | 8.82                                                  | 7.84 | 7.51 |
| 1480.1              | 1510.1      | 8.91                                                  | 7.83 | 7.50 |
| 1520.1              | 1550.1      | 9.06                                                  | 7.86 | 7.46 |
| 1560.1              | 1590.1      | 9.24                                                  | 7.89 | 7.44 |
| 1600.1              | 1630.1      | 9.43                                                  | 7.98 | 7.51 |
| 1640.1              | 1670.1      | 9.60                                                  | 8.05 | 7.47 |
| 1680.1              | 1710.1      | 9.86                                                  | 8.21 | 7.66 |
| 1720.1              | 1750.1      | 10.10                                                 | 8.38 | 7.84 |
| 1760.1              | 1790.1      | 10.61                                                 | 8.70 | 8.14 |
| 1780.1              | 1810.1      | 11.04                                                 | 8.96 | 8.33 |
| 1820.1              | 1850.1      | 11.56                                                 | 9.27 | 8.58 |
| 1840.1              | 1870.1      | 11.89                                                 | 9.46 | 8.72 |
| 1880.1              | 1910.1      | 12.68                                                 | 9.90 | 8.88 |
| 1900.1              | 1930.1      | 12.75                                                 | 9.95 | 8.94 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | IP3 INPUT<br>(dBm) |       |       |
|---------------------|-------------|--------------------|-------|-------|
|                     |             | @LO (dBm)          |       |       |
|                     |             | 0                  | +3    | +6    |
| 400.1               | 430.1       | 9.93               | 14.07 | 15.86 |
| 440.1               | 470.1       | 11.15              | 17.16 | 18.34 |
| 480.1               | 510.1       | 7.91               | 12.47 | 15.91 |
| 520.1               | 550.1       | 8.65               | 14.11 | 14.23 |
| 560.1               | 590.1       | 8.22               | 13.63 | 12.36 |
| 600.1               | 630.1       | 7.26               | 14.47 | 11.68 |
| 640.1               | 670.1       | 8.61               | 14.97 | 9.87  |
| 680.1               | 710.1       | 8.15               | 14.02 | 9.25  |
| 720.1               | 750.1       | 7.21               | 13.73 | 10.72 |
| 760.1               | 790.1       | 7.69               | 15.15 | 10.01 |
| 800.1               | 830.1       | 7.17               | 12.26 | 9.37  |
| 840.1               | 870.1       | 6.52               | 10.94 | 10.76 |
| 880.1               | 910.1       | 7.24               | 10.10 | 10.36 |
| 920.1               | 950.1       | 7.82               | 8.77  | 10.10 |
| 960.1               | 990.1       | 10.22              | 10.81 | 10.36 |
| 1000.1              | 1030.1      | 10.65              | 16.43 | 10.94 |
| 1040.1              | 1070.1      | 8.59               | 13.19 | 15.45 |
| 1080.1              | 1110.1      | 5.69               | 9.02  | 14.03 |
| 1120.1              | 1150.1      | 5.17               | 7.07  | 11.87 |
| 1160.1              | 1190.1      | 4.74               | 5.72  | 8.26  |
| 1200.1              | 1230.1      | 4.73               | 5.03  | 6.92  |
| 1240.1              | 1270.1      | 4.93               | 5.19  | 8.04  |
| 1280.1              | 1310.1      | 5.32               | 5.70  | 7.52  |
| 1320.1              | 1350.1      | 6.59               | 5.66  | 6.77  |
| 1360.1              | 1390.1      | 5.92               | 5.96  | 7.24  |
| 1400.1              | 1430.1      | 6.02               | 6.64  | 6.56  |
| 1440.1              | 1470.1      | 5.66               | 5.98  | 6.52  |
| 1480.1              | 1510.1      | 5.51               | 6.59  | 6.55  |
| 1520.1              | 1550.1      | 5.28               | 5.99  | 6.86  |
| 1560.1              | 1590.1      | 4.90               | 6.05  | 6.43  |
| 1600.1              | 1630.1      | 4.16               | 5.45  | 6.07  |
| 1640.1              | 1670.1      | 4.28               | 5.78  | 6.30  |
| 1680.1              | 1710.1      | 3.90               | 4.50  | 5.46  |
| 1720.1              | 1750.1      | 3.46               | 3.92  | 4.19  |
| 1760.1              | 1790.1      | 3.23               | 3.71  | 3.73  |
| 1780.1              | 1810.1      | 2.82               | 2.66  | 3.25  |
| 1820.1              | 1850.1      | 2.78               | 2.53  | 3.89  |
| 1840.1              | 1870.1      | 2.72               | 2.61  | 5.27  |
| 1880.1              | 1910.1      | 3.89               | 2.74  | 5.74  |
| 1900.1              | 1930.1      | 4.23               | 2.85  | 6.36  |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | COMPRESSION<br>@RF IN=-3dBm<br>(dB) |      |      |
|---------------------|-------------|-------------------------------------|------|------|
|                     |             | @LO (dBm)                           |      |      |
|                     |             | 0                                   | +3   | +6   |
| 400.1               | 430.1       | 0.22                                | 0.11 | 0.08 |
| 440.1               | 470.1       | 0.22                                | 0.08 | 0.10 |
| 480.1               | 510.1       | 0.28                                | 0.12 | 0.09 |
| 520.1               | 550.1       | 0.40                                | 0.16 | 0.19 |
| 560.1               | 590.1       | 0.43                                | 0.22 | 0.21 |
| 600.1               | 630.1       | 0.55                                | 0.33 | 0.32 |
| 640.1               | 670.1       | 0.74                                | 0.47 | 0.38 |
| 680.1               | 710.1       | 0.80                                | 0.54 | 0.44 |
| 720.1               | 750.1       | 0.82                                | 0.51 | 0.43 |
| 760.1               | 790.1       | 0.92                                | 0.60 | 0.47 |
| 800.1               | 830.1       | 0.94                                | 0.68 | 0.52 |
| 840.1               | 870.1       | 1.03                                | 0.77 | 0.57 |
| 880.1               | 910.1       | 0.99                                | 0.77 | 0.64 |
| 920.1               | 950.1       | 1.06                                | 0.81 | 0.72 |
| 960.1               | 990.1       | 0.94                                | 0.78 | 0.75 |
| 1000.1              | 1030.1      | 0.85                                | 0.74 | 0.81 |
| 1040.1              | 1070.1      | 0.66                                | 0.62 | 0.65 |
| 1080.1              | 1110.1      | 0.55                                | 0.51 | 0.56 |
| 1120.1              | 1150.1      | 0.49                                | 0.32 | 0.38 |
| 1160.1              | 1190.1      | 0.51                                | 0.27 | 0.26 |
| 1200.1              | 1230.1      | 0.57                                | 0.20 | 0.19 |
| 1240.1              | 1270.1      | 0.62                                | 0.27 | 0.19 |
| 1280.1              | 1310.1      | 0.69                                | 0.29 | 0.19 |
| 1320.1              | 1350.1      | 0.70                                | 0.37 | 0.26 |
| 1360.1              | 1390.1      | 0.81                                | 0.39 | 0.25 |
| 1400.1              | 1430.1      | 0.85                                | 0.56 | 0.27 |
| 1440.1              | 1470.1      | 0.91                                | 0.57 | 0.36 |
| 1480.1              | 1510.1      | 1.03                                | 0.66 | 0.44 |
| 1520.1              | 1550.1      | 1.03                                | 0.71 | 0.46 |
| 1560.1              | 1590.1      | 1.10                                | 0.80 | 0.51 |
| 1600.1              | 1630.1      | 1.11                                | 0.88 | 0.56 |
| 1640.1              | 1670.1      | 1.13                                | 0.89 | 0.60 |
| 1680.1              | 1710.1      | 1.13                                | 0.96 | 0.74 |
| 1720.1              | 1750.1      | 1.12                                | 0.90 | 0.70 |
| 1760.1              | 1790.1      | 1.06                                | 0.95 | 0.69 |
| 1780.1              | 1810.1      | 1.03                                | 1.00 | 0.69 |
| 1820.1              | 1850.1      | 0.91                                | 0.91 | 0.60 |
| 1840.1              | 1870.1      | 0.91                                | 0.96 | 0.57 |
| 1880.1              | 1910.1      | 0.63                                | 0.98 | 0.64 |
| 1900.1              | 1930.1      | 0.53                                | 0.91 | 0.57 |

REV. X2

RMS-5L+

100818

Page 1 of 5



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS 9100 CERTIFIED • RoHS compliant

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661



The Design Engineers Search Engine finds the model you need, instantly • For detailed performance specs & shopping online see



## Typical Performance Data

| IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=900.1MHz<br>(dB) | IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=400.1MHz<br>(dB) | IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=1400.1MHz<br>(dB) |
|----------------------|-------------|-----------------------------------------------------------------|----------------------|-------------|-----------------------------------------------------------------|----------------------|-------------|------------------------------------------------------------------|
|                      |             | @LO (dBm)                                                       |                      |             | @LO (dBm)                                                       |                      |             | @LO (dBm)                                                        |
|                      |             | +3                                                              |                      |             | +3                                                              |                      |             | +3                                                               |
| 500.0                | 400.1       | 5.05                                                            | 10.0                 | 410.1       | 7.19                                                            | 800.0                | 600.1       | 7.72                                                             |
| 480.4                | 419.7       | 4.98                                                            | 29.8                 | 429.9       | 7.39                                                            | 780.3                | 619.9       | 7.66                                                             |
| 460.8                | 439.3       | 4.96                                                            | 49.5                 | 449.6       | 7.51                                                            | 760.5                | 639.6       | 7.53                                                             |
| 441.2                | 458.9       | 4.99                                                            | 69.3                 | 469.4       | 7.61                                                            | 740.7                | 659.4       | 7.51                                                             |
| 421.6                | 478.5       | 4.98                                                            | 89.0                 | 489.1       | 7.68                                                            | 721.0                | 679.1       | 7.46                                                             |
| 402.0                | 498.1       | 4.95                                                            | 108.8                | 508.9       | 7.74                                                            | 701.3                | 698.9       | 7.44                                                             |
| 382.4                | 517.7       | 4.98                                                            | 128.5                | 528.6       | 7.83                                                            | 681.5                | 718.6       | 7.45                                                             |
| 362.8                | 537.3       | 5.06                                                            | 148.3                | 548.4       | 7.89                                                            | 661.7                | 738.4       | 7.43                                                             |
| 343.2                | 556.9       | 5.13                                                            | 168.0                | 568.1       | 7.93                                                            | 642.0                | 758.1       | 7.48                                                             |
| 323.6                | 576.5       | 5.19                                                            | 187.8                | 587.9       | 7.95                                                            | 622.3                | 777.9       | 7.49                                                             |
| 304.0                | 596.1       | 5.27                                                            | 207.5                | 607.6       | 7.93                                                            | 602.5                | 797.6       | 7.56                                                             |
| 284.4                | 615.7       | 5.34                                                            | 227.3                | 627.4       | 7.94                                                            | 582.7                | 817.4       | 7.55                                                             |
| 264.8                | 635.3       | 5.44                                                            | 247.0                | 647.1       | 7.97                                                            | 563.0                | 837.1       | 7.62                                                             |
| 245.2                | 654.9       | 5.52                                                            | 266.8                | 666.9       | 8.00                                                            | 543.3                | 856.9       | 7.77                                                             |
| 225.6                | 674.5       | 5.64                                                            | 286.5                | 686.6       | 7.92                                                            | 523.5                | 876.6       | 7.85                                                             |
| 206.0                | 694.1       | 5.67                                                            | 306.3                | 706.4       | 7.95                                                            | 503.8                | 896.4       | 8.05                                                             |
| 166.8                | 733.3       | 5.83                                                            | 326.0                | 726.1       | 7.91                                                            | 484.0                | 916.1       | 8.11                                                             |
| 147.2                | 752.9       | 5.94                                                            | 345.8                | 745.9       | 7.95                                                            | 464.3                | 935.9       | 8.26                                                             |
| 108.0                | 792.1       | 5.98                                                            | 365.5                | 765.6       | 7.96                                                            | 444.5                | 955.6       | 8.41                                                             |
| 88.4                 | 811.7       | 6.01                                                            | 385.3                | 785.4       | 7.87                                                            | 424.8                | 975.4       | 8.53                                                             |
| 49.2                 | 850.9       | 6.12                                                            | 405.0                | 805.1       | 7.93                                                            | 405.0                | 995.1       | 8.51                                                             |
| 29.6                 | 870.5       | 6.15                                                            | 424.8                | 824.9       | 7.98                                                            | 385.3                | 1014.9      | 8.55                                                             |
| 10.0                 | 910.1       | 6.13                                                            | 444.5                | 844.6       | 7.96                                                            | 365.5                | 1034.6      | 8.65                                                             |
| 29.6                 | 929.7       | 6.14                                                            | 464.3                | 864.4       | 7.93                                                            | 345.8                | 1054.4      | 8.62                                                             |
| 68.8                 | 968.9       | 6.13                                                            | 484.0                | 884.1       | 7.97                                                            | 326.0                | 1074.1      | 8.60                                                             |
| 88.4                 | 988.5       | 6.15                                                            | 503.8                | 903.9       | 7.98                                                            | 306.3                | 1093.9      | 8.54                                                             |
| 127.6                | 1027.7      | 6.16                                                            | 523.5                | 923.6       | 7.93                                                            | 286.5                | 1113.6      | 8.44                                                             |
| 147.2                | 1047.3      | 6.27                                                            | 543.3                | 943.4       | 8.06                                                            | 266.8                | 1133.4      | 8.41                                                             |
| 186.4                | 1086.5      | 6.36                                                            | 563.0                | 963.1       | 8.07                                                            | 247.0                | 1153.1      | 8.30                                                             |
| 206.0                | 1106.1      | 6.41                                                            | 582.8                | 982.9       | 8.15                                                            | 227.2                | 1172.9      | 8.23                                                             |
| 245.2                | 1145.3      | 6.49                                                            | 602.5                | 1002.6      | 8.20                                                            | 207.5                | 1192.6      | 8.13                                                             |
| 264.8                | 1164.9      | 6.50                                                            | 622.3                | 1022.4      | 8.26                                                            | 187.8                | 1212.4      | 8.12                                                             |
| 304.0                | 1204.1      | 6.55                                                            | 642.0                | 1042.1      | 8.30                                                            | 168.0                | 1232.1      | 8.04                                                             |
| 323.6                | 1223.7      | 6.63                                                            | 661.8                | 1061.9      | 8.30                                                            | 148.3                | 1251.9      | 7.97                                                             |
| 362.8                | 1262.9      | 6.77                                                            | 681.5                | 1081.6      | 8.38                                                            | 128.5                | 1271.6      | 8.02                                                             |
| 382.4                | 1282.5      | 6.80                                                            | 701.3                | 1101.4      | 8.35                                                            | 108.8                | 1291.4      | 7.94                                                             |
| 421.6                | 1321.7      | 6.89                                                            | 721.0                | 1121.1      | 8.38                                                            | 89.0                 | 1311.1      | 7.96                                                             |
| 441.2                | 1341.3      | 6.92                                                            | 740.8                | 1140.9      | 8.37                                                            | 69.2                 | 1330.9      | 7.92                                                             |
| 480.4                | 1380.5      | 6.83                                                            | 780.2                | 1180.4      | 8.39                                                            | 29.8                 | 1370.4      | 7.91                                                             |
| 500.0                | 1400.1      | 6.83                                                            | 800.0                | 1200.1      | 8.33                                                            | 10.0                 | 1390.1      | 7.80                                                             |

## Typical Performance Data

| LO<br>(MHz) | LO-RF ISOLATION<br>(dB) |       |       | LO-IF ISOLATION<br>(dB) |       |       |
|-------------|-------------------------|-------|-------|-------------------------|-------|-------|
|             | @LO (dBm)               |       |       | @LO (dBm)               |       |       |
|             | 0                       | +3    | +6    | 0                       | +3    | +6    |
| 400.1       | 27.94                   | 27.20 | 26.50 | 28.68                   | 32.28 | 31.88 |
| 440.1       | 27.53                   | 26.78 | 26.05 | 28.26                   | 32.00 | 31.12 |
| 480.1       | 27.84                   | 27.09 | 26.37 | 28.22                   | 32.22 | 30.82 |
| 520.1       | 28.55                   | 27.76 | 27.03 | 27.88                   | 32.37 | 30.34 |
| 560.1       | 28.85                   | 28.06 | 27.28 | 27.90                   | 32.47 | 29.30 |
| 600.1       | 29.26                   | 28.46 | 27.63 | 28.13                   | 32.43 | 28.20 |
| 640.1       | 30.13                   | 29.36 | 28.51 | 28.59                   | 31.59 | 26.56 |
| 680.1       | 31.60                   | 30.96 | 30.07 | 28.80                   | 31.27 | 25.89 |
| 720.1       | 32.86                   | 32.38 | 31.29 | 29.47                   | 30.69 | 25.02 |
| 760.1       | 33.95                   | 33.91 | 32.55 | 30.76                   | 30.26 | 24.34 |
| 800.1       | 35.67                   | 36.58 | 34.56 | 32.88                   | 28.84 | 23.18 |
| 840.1       | 37.14                   | 40.60 | 37.31 | 35.10                   | 27.16 | 22.02 |
| 880.1       | 36.80                   | 45.35 | 41.96 | 36.12                   | 25.65 | 21.18 |
| 920.1       | 35.29                   | 44.56 | 46.09 | 32.61                   | 23.18 | 19.40 |
| 960.1       | 33.36                   | 38.85 | 41.40 | 29.94                   | 21.74 | 18.26 |
| 1000.1      | 31.38                   | 35.11 | 37.11 | 27.80                   | 20.61 | 17.33 |
| 1040.1      | 29.39                   | 32.14 | 33.76 | 25.83                   | 19.56 | 16.50 |
| 1080.1      | 27.82                   | 29.95 | 31.25 | 24.37                   | 18.83 | 15.99 |
| 1120.1      | 26.90                   | 28.67 | 29.72 | 22.69                   | 17.90 | 15.32 |
| 1160.1      | 25.89                   | 27.39 | 28.34 | 21.93                   | 17.48 | 14.94 |
| 1200.1      | 25.01                   | 26.33 | 27.21 | 21.02                   | 16.91 | 14.44 |
| 1240.1      | 24.31                   | 25.49 | 26.38 | 20.03                   | 16.34 | 13.99 |
| 1280.1      | 23.74                   | 24.84 | 25.75 | 18.89                   | 15.66 | 13.45 |
| 1320.1      | 23.25                   | 24.34 | 25.23 | 17.80                   | 14.93 | 12.89 |
| 1360.1      | 22.91                   | 24.10 | 25.04 | 16.91                   | 14.40 | 12.54 |
| 1400.1      | 22.55                   | 23.82 | 24.82 | 15.86                   | 13.65 | 11.93 |
| 1440.1      | 22.34                   | 23.74 | 24.84 | 14.95                   | 13.03 | 11.47 |
| 1480.1      | 21.97                   | 23.55 | 24.80 | 14.16                   | 12.45 | 11.05 |
| 1520.1      | 21.81                   | 23.56 | 24.98 | 13.47                   | 11.98 | 10.68 |
| 1560.1      | 21.66                   | 23.57 | 25.16 | 12.72                   | 11.43 | 10.24 |
| 1600.1      | 21.16                   | 23.27 | 25.08 | 12.27                   | 11.18 | 10.11 |
| 1640.1      | 20.63                   | 22.89 | 24.87 | 11.67                   | 10.78 | 9.79  |
| 1680.1      | 20.50                   | 22.81 | 24.86 | 11.15                   | 10.50 | 9.64  |
| 1720.1      | 19.78                   | 22.04 | 24.09 | 10.69                   | 10.26 | 9.51  |
| 1760.1      | 19.00                   | 21.09 | 23.07 | 10.16                   | 9.92  | 9.27  |
| 1780.1      | 18.93                   | 20.97 | 22.94 | 9.85                    | 9.71  | 9.11  |
| 1820.1      | 18.16                   | 20.08 | 22.08 | 9.17                    | 9.19  | 8.68  |
| 1840.1      | 18.34                   | 20.23 | 22.25 | 8.87                    | 8.93  | 8.46  |
| 1880.1      | 17.64                   | 19.48 | 21.52 | 8.06                    | 8.21  | 7.86  |
| 1900.1      | 17.59                   | 19.38 | 21.39 | 7.67                    | 7.87  | 7.63  |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | RF-IF ISOLATION<br>(dB) |       |       |
|---------------------|-------------|-------------------------|-------|-------|
|                     |             | @LO (dBm)               |       |       |
|                     |             | 0                       | +3    | +6    |
| 400.1               | 430.1       | 17.71                   | 16.65 | 16.07 |
| 440.1               | 470.1       | 17.28                   | 16.22 | 15.72 |
| 480.1               | 510.1       | 16.85                   | 15.83 | 15.39 |
| 520.1               | 550.1       | 16.84                   | 15.75 | 15.28 |
| 560.1               | 590.1       | 17.19                   | 16.01 | 15.40 |
| 600.1               | 630.1       | 17.82                   | 16.68 | 15.96 |
| 640.1               | 670.1       | 18.75                   | 17.80 | 17.17 |
| 680.1               | 710.1       | 19.79                   | 19.03 | 18.46 |
| 720.1               | 750.1       | 20.90                   | 20.22 | 19.61 |
| 760.1               | 790.1       | 21.82                   | 20.89 | 20.13 |
| 800.1               | 830.1       | 22.74                   | 21.07 | 19.97 |
| 840.1               | 870.1       | 23.90                   | 21.41 | 19.78 |
| 880.1               | 910.1       | 24.38                   | 21.82 | 19.63 |
| 920.1               | 950.1       | 23.37                   | 21.84 | 19.85 |
| 960.1               | 990.1       | 21.31                   | 20.78 | 19.59 |
| 1000.1              | 1030.1      | 19.14                   | 19.04 | 18.55 |
| 1040.1              | 1070.1      | 17.55                   | 17.61 | 17.56 |
| 1080.1              | 1110.1      | 16.31                   | 16.38 | 16.47 |
| 1120.1              | 1150.1      | 15.34                   | 15.36 | 15.49 |
| 1160.1              | 1190.1      | 14.58                   | 14.63 | 14.84 |
| 1200.1              | 1230.1      | 13.99                   | 14.15 | 14.45 |
| 1240.1              | 1270.1      | 13.55                   | 13.81 | 14.22 |
| 1280.1              | 1310.1      | 13.25                   | 13.58 | 14.08 |
| 1320.1              | 1350.1      | 13.10                   | 13.50 | 14.04 |
| 1360.1              | 1390.1      | 13.09                   | 13.55 | 14.13 |
| 1400.1              | 1430.1      | 13.14                   | 13.68 | 14.28 |
| 1440.1              | 1470.1      | 13.29                   | 13.92 | 14.55 |
| 1480.1              | 1510.1      | 13.41                   | 14.15 | 14.82 |
| 1520.1              | 1550.1      | 13.57                   | 14.45 | 15.21 |
| 1560.1              | 1590.1      | 13.71                   | 14.78 | 15.66 |
| 1600.1              | 1630.1      | 13.85                   | 15.09 | 16.16 |
| 1640.1              | 1670.1      | 13.88                   | 15.34 | 16.60 |
| 1680.1              | 1710.1      | 13.75                   | 15.44 | 16.89 |
| 1720.1              | 1750.1      | 13.56                   | 15.43 | 16.97 |
| 1760.1              | 1790.1      | 13.24                   | 15.22 | 16.88 |
| 1780.1              | 1810.1      | 13.06                   | 15.14 | 16.95 |
| 1820.1              | 1850.1      | 12.94                   | 15.16 | 17.19 |
| 1840.1              | 1870.1      | 12.97                   | 15.26 | 17.47 |
| 1880.1              | 1910.1      | 12.95                   | 15.37 | 17.79 |
| 1900.1              | 1930.1      | 13.27                   | 15.77 | 18.28 |

# Frequency Mixer

**RMS-5L+**

## 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=1400.1MHz<br>(:1) |      |      |
|---------------------|-------------|-----------------|------|------|-------------|-----------------|------|------|----------------------|----------------------------------|------|------|
|                     |             | @LO (dBm)       |      |      |             | @LO (dBm)       |      |      |                      | @LO (dBm)                        |      |      |
|                     |             | 0               | +3   | +6   |             | 0               | +3   | +6   |                      | 0                                | +3   | +6   |
| 400.1               | 430.1       | 4.01            | 3.57 | 3.39 | 400.1       | 1.26            | 1.66 | 2.28 | 10.0                 | 2.07                             | 1.75 | 1.48 |
| 440.1               | 470.1       | 3.33            | 2.99 | 2.86 | 440.1       | 1.27            | 1.70 | 2.32 | 29.8                 | 1.88                             | 1.46 | 1.18 |
| 480.1               | 510.1       | 2.85            | 2.57 | 2.46 | 480.1       | 1.30            | 1.72 | 2.34 | 49.5                 | 1.81                             | 1.41 | 1.15 |
| 520.1               | 550.1       | 2.48            | 2.23 | 2.14 | 520.1       | 1.30            | 1.74 | 2.37 | 69.3                 | 1.79                             | 1.37 | 1.11 |
| 560.1               | 590.1       | 2.16            | 1.95 | 1.87 | 560.1       | 1.32            | 1.78 | 2.40 | 89.0                 | 1.78                             | 1.44 | 1.13 |
| 600.1               | 630.1       | 1.95            | 1.75 | 1.66 | 600.1       | 1.35            | 1.82 | 2.44 | 108.8                | 1.84                             | 1.45 | 1.13 |
| 640.1               | 670.1       | 1.75            | 1.55 | 1.46 | 640.1       | 1.39            | 1.88 | 2.50 | 128.5                | 1.83                             | 1.44 | 1.13 |
| 680.1               | 710.1       | 1.64            | 1.42 | 1.31 | 680.1       | 1.41            | 1.88 | 2.49 | 148.3                | 1.80                             | 1.42 | 1.14 |
| 720.1               | 750.1       | 1.55            | 1.31 | 1.19 | 720.1       | 1.44            | 1.92 | 2.52 | 168.0                | 1.80                             | 1.41 | 1.14 |
| 760.1               | 790.1       | 1.58            | 1.31 | 1.14 | 760.1       | 1.46            | 1.94 | 2.53 | 187.8                | 1.85                             | 1.44 | 1.16 |
| 800.1               | 830.1       | 1.63            | 1.35 | 1.18 | 800.1       | 1.51            | 1.98 | 2.57 | 207.5                | 1.84                             | 1.45 | 1.16 |
| 840.1               | 870.1       | 1.81            | 1.51 | 1.33 | 840.1       | 1.55            | 2.03 | 2.61 | 227.3                | 1.83                             | 1.43 | 1.15 |
| 880.1               | 910.1       | 2.00            | 1.69 | 1.48 | 880.1       | 1.58            | 2.06 | 2.62 | 247.0                | 1.84                             | 1.43 | 1.14 |
| 920.1               | 950.1       | 2.26            | 1.94 | 1.72 | 920.1       | 1.64            | 2.13 | 2.70 | 266.8                | 1.81                             | 1.41 | 1.12 |
| 960.1               | 990.1       | 2.52            | 2.20 | 1.96 | 960.1       | 1.68            | 2.15 | 2.70 | 286.5                | 1.80                             | 1.40 | 1.12 |
| 1000.1              | 1030.1      | 2.76            | 2.44 | 2.19 | 1000.1      | 1.71            | 2.19 | 2.72 | 306.3                | 1.80                             | 1.39 | 1.12 |
| 1040.1              | 1070.1      | 3.07            | 2.75 | 2.48 | 1040.1      | 1.75            | 2.22 | 2.74 | 326.0                | 1.80                             | 1.39 | 1.11 |
| 1080.1              | 1110.1      | 3.27            | 2.99 | 2.73 | 1080.1      | 1.77            | 2.23 | 2.73 | 345.8                | 1.77                             | 1.37 | 1.10 |
| 1120.1              | 1150.1      | 3.51            | 3.27 | 3.04 | 1120.1      | 1.85            | 2.30 | 2.81 | 365.5                | 1.77                             | 1.37 | 1.09 |
| 1160.1              | 1190.1      | 3.58            | 3.43 | 3.27 | 1160.1      | 1.88            | 2.32 | 2.81 | 385.3                | 1.76                             | 1.35 | 1.08 |
| 1200.1              | 1230.1      | 3.62            | 3.52 | 3.44 | 1200.1      | 1.93            | 2.36 | 2.85 | 405.0                | 1.75                             | 1.35 | 1.07 |
| 1240.1              | 1270.1      | 3.61            | 3.54 | 3.53 | 1240.1      | 2.00            | 2.43 | 2.90 | 424.8                | 1.74                             | 1.34 | 1.07 |
| 1280.1              | 1310.1      | 3.67            | 3.58 | 3.60 | 1280.1      | 2.04            | 2.45 | 2.90 | 444.5                | 1.73                             | 1.32 | 1.07 |
| 1320.1              | 1350.1      | 3.65            | 3.53 | 3.55 | 1320.1      | 2.10            | 2.48 | 2.92 | 464.3                | 1.73                             | 1.32 | 1.06 |
| 1360.1              | 1390.1      | 3.70            | 3.55 | 3.57 | 1360.1      | 2.15            | 2.50 | 2.91 | 484.0                | 1.72                             | 1.31 | 1.05 |
| 1400.1              | 1430.1      | 3.65            | 3.47 | 3.48 | 1400.1      | 2.20            | 2.52 | 2.91 | 503.8                | 1.70                             | 1.29 | 1.04 |
| 1440.1              | 1470.1      | 3.70            | 3.48 | 3.46 | 1440.1      | 2.26            | 2.57 | 2.93 | 523.5                | 1.69                             | 1.28 | 1.04 |
| 1480.1              | 1510.1      | 3.67            | 3.41 | 3.35 | 1480.1      | 2.32            | 2.59 | 2.93 | 543.3                | 1.68                             | 1.27 | 1.05 |
| 1520.1              | 1550.1      | 3.79            | 3.45 | 3.33 | 1520.1      | 2.38            | 2.63 | 2.94 | 563.0                | 1.66                             | 1.26 | 1.05 |
| 1560.1              | 1590.1      | 3.73            | 3.33 | 3.15 | 1560.1      | 2.43            | 2.64 | 2.92 | 582.8                | 1.64                             | 1.26 | 1.06 |
| 1600.1              | 1630.1      | 3.78            | 3.30 | 3.08 | 1600.1      | 2.49            | 2.66 | 2.92 | 602.5                | 1.62                             | 1.24 | 1.08 |
| 1640.1              | 1670.1      | 3.74            | 3.20 | 2.92 | 1640.1      | 2.54            | 2.67 | 2.90 | 622.3                | 1.62                             | 1.23 | 1.09 |
| 1680.1              | 1710.1      | 3.84            | 3.25 | 2.91 | 1680.1      | 2.57            | 2.68 | 2.88 | 642.0                | 1.60                             | 1.23 | 1.11 |
| 1720.1              | 1750.1      | 3.88            | 3.26 | 2.87 | 1720.1      | 2.64            | 2.71 | 2.89 | 661.8                | 1.60                             | 1.23 | 1.12 |
| 1760.1              | 1790.1      | 3.94            | 3.32 | 2.89 | 1760.1      | 2.67            | 2.72 | 2.88 | 681.5                | 1.59                             | 1.21 | 1.13 |
| 1780.1              | 1810.1      | 4.14            | 3.45 | 2.97 | 1780.1      | 2.68            | 2.71 | 2.87 | 701.3                | 1.57                             | 1.21 | 1.14 |
| 1820.1              | 1850.1      | 4.11            | 3.42 | 2.92 | 1820.1      | 2.73            | 2.75 | 2.90 | 721.0                | 1.53                             | 1.20 | 1.17 |
| 1840.1              | 1870.1      | 4.12            | 3.42 | 2.91 | 1840.1      | 2.76            | 2.76 | 2.89 | 740.8                | 1.53                             | 1.20 | 1.20 |
| 1880.1              | 1910.1      | 4.56            | 3.71 | 3.11 | 1880.1      | 2.74            | 2.75 | 2.85 | 780.3                | 1.50                             | 1.19 | 1.22 |
| 1900.1              | 1930.1      | 4.44            | 3.60 | 3.01 | 1900.1      | 2.78            | 2.77 | 2.86 | 800.0                | 1.47                             | 1.18 | 1.24 |

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## Harmonics Tables

RF HARMONICS ORDER

|        | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |    |     |
|--------|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|----|-----|
| 0      | -      | -      | +5  | 4   | 11  | 21  | 22  | 39  | 40  | 54  | 50 | 60  |
| 1      | -      | 15     | +0  | 25  | 19  | 38  | 39  | 43  | 51  | 55  | 70 | 67  |
| 2      | 112    | 43     | 33  | 48  | 35  | 47  | 55  | 57  | 72  | 70  | 71 | 85  |
| 3      | 117    | 76     | 59  | 61  | 59  | 65  | 66  | 73  | 83  | 73  | 89 | 84  |
| 4      | 116    | 91     | 94  | 83  | 78  | 77  | 74  | 88  | 87  | 87  | 93 | 91  |
| 5      | 115    | 96     | 95  | 102 | 85  | 90  | 77  | 91  | 92  | 110 | 97 | 99  |
| 6      | 109    | 105    | 111 | 94  | 100 | 89  | 90  | 77  | 84  | 90  | 95 | 100 |
| 7      | 108    | 100    | 99  | 100 | 97  | 97  | 105 | 89  | 92  | 83  | 92 | 100 |
| 8      | 120    | 97     | 99  | 108 | 98  | 98  | 99  | 103 | 92  | 85  | 86 | 103 |
| 9      | 109    | 98     | 102 | 95  | 112 | 102 | 99  | 100 | 94  | 88  | 95 | 94  |
| 10     | 124    | 94     | 102 | 92  | 106 | 107 | 94  | 106 | 100 | 102 | 88 | 86  |
| RF CAL | 0      | 1      | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10 |     |

### LO HARMONICS ORDER

Test conditions:

RF IN: 900.1 MHz; -18.00 dBm.  
LO IN: 930.01 MHz; +3.00 dBm  
IF OUT: 29.91 MHz; -24.36 dBm

RF HARMONICS ORDER

|        | (-dBm) | (-dBc) |     |     |     |     |     |     |     |    |    |    |
|--------|--------|--------|-----|-----|-----|-----|-----|-----|-----|----|----|----|
| 0      | -      | -      | 4   | 16  | 22  | 35  | 33  | 52  | 53  | 64 | 66 | 73 |
| 1      | -      | 15     | +0  | 26  | 21  | 41  | 43  | 54  | 56  | 68 | 72 | 77 |
| 2      | 99     | 33     | 25  | 38  | 26  | 38  | 49  | 50  | 64  | 71 | 72 | 85 |
| 3      | 116    | 54     | 41  | 40  | 43  | 59  | 48  | 58  | 61  | 59 | 75 | 73 |
| 4      | 111    | 58     | 65  | 61  | 63  | 53  | 60  | 56  | 66  | 68 | 83 | 83 |
| 5      | 110    | 69     | 67  | 73  | 57  | 55  | 58  | 59  | 69  | 68 | 86 | 72 |
| 6      | 107    | 88     | 79  | 69  | 86  | 75  | 61  | 65  | 67  | 68 | 81 | 80 |
| 7      | 122    | 101    | 89  | 86  | 82  | 97  | 73  | 73  | 69  | 74 | 82 | 80 |
| 8      | 105    | 103    | 111 | 99  | 94  | 84  | 93  | 89  | 75  | 76 | 81 | 81 |
| 9      | 113    | 109    | 103 | 124 | 98  | 94  | 87  | 97  | 88  | 82 | 81 | 89 |
| 10     | 107    | 113    | 108 | 109 | 110 | 106 | 108 | 108 | 111 | 97 | 94 | 87 |
| RF CAL | 0      | 1      | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9  | 10 |    |

### LO HARMONICS ORDER

Test conditions:

RF IN: 900.1 MHz; -8.00 dBm.  
LO IN: 930.01 MHz; +3.00 dBm  
IF OUT: 29.91 MHz; -14.49 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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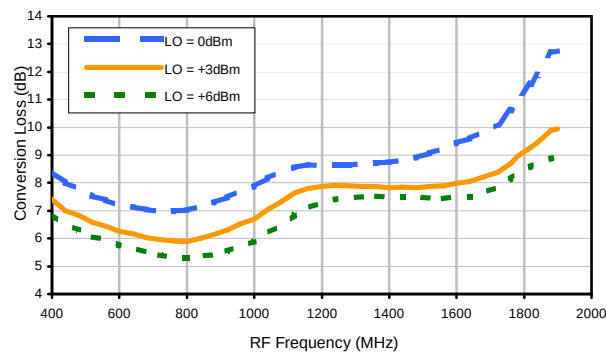
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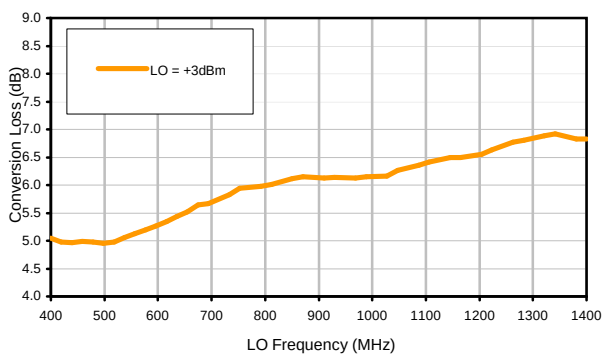


## Typical Performance Curves

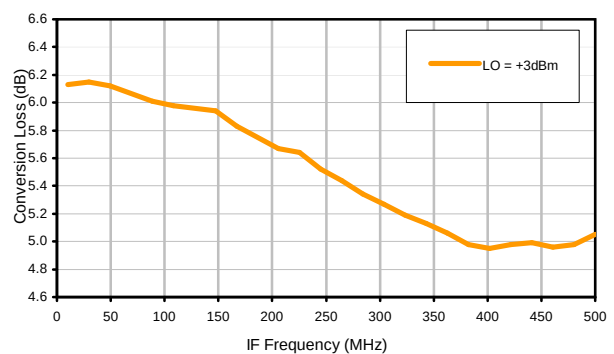
Conversion Loss @ IF=30MHz



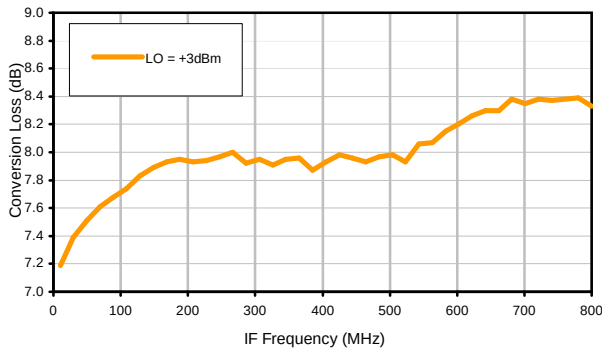
Conversion Loss vs. LO @ RF=900.1MHz



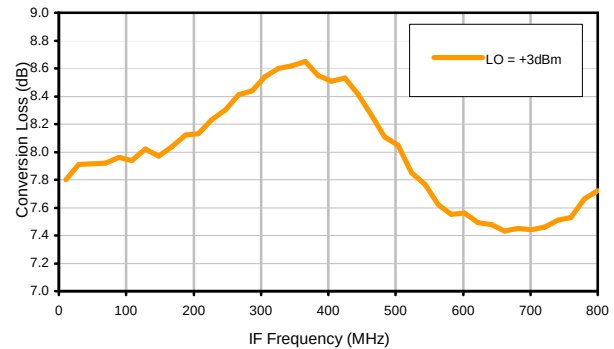
Conversion Loss vs. IF @ RF=900.1MHz



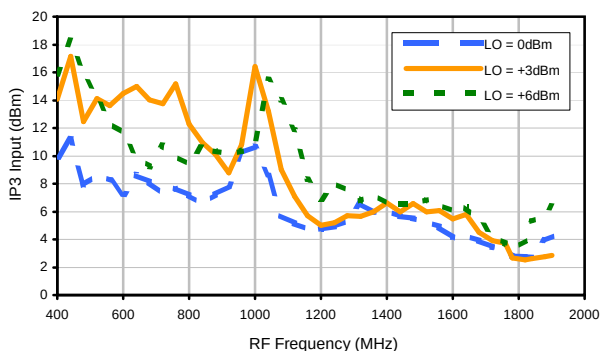
Conversion Loss vs. IF @ RF=400.1MHz



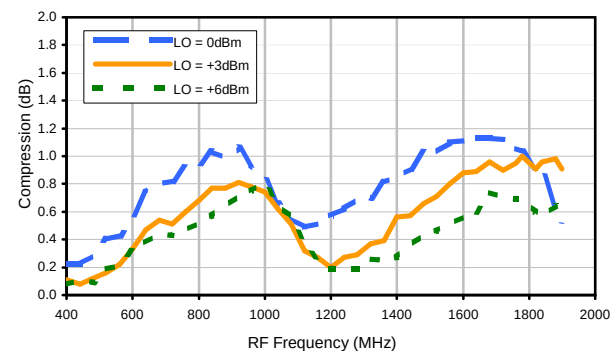
Conversion Loss vs. IF @ RF=1400.1MHz



IP3 Input



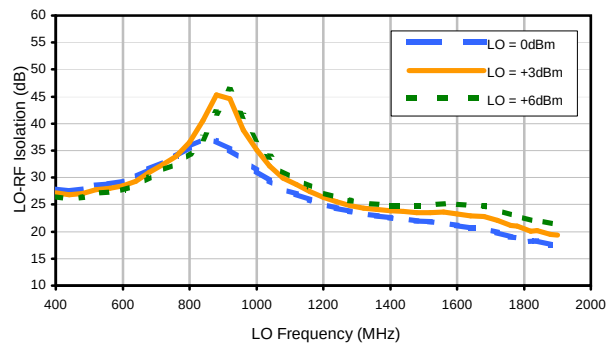
Compression @ RF IN=-3dBm



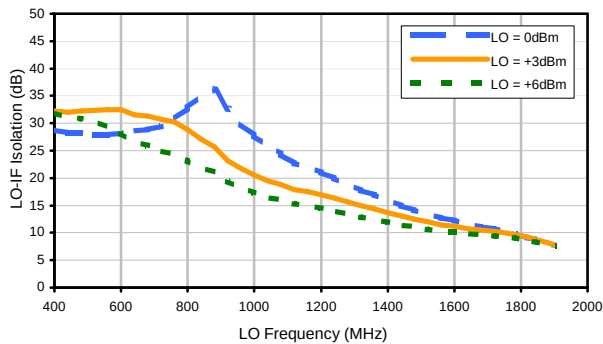


## Typical Performance Curves

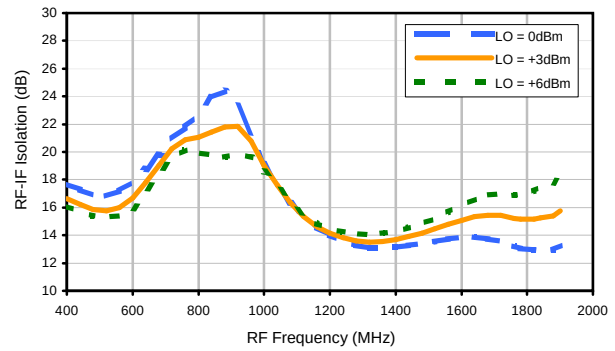
LO-RF Isolation



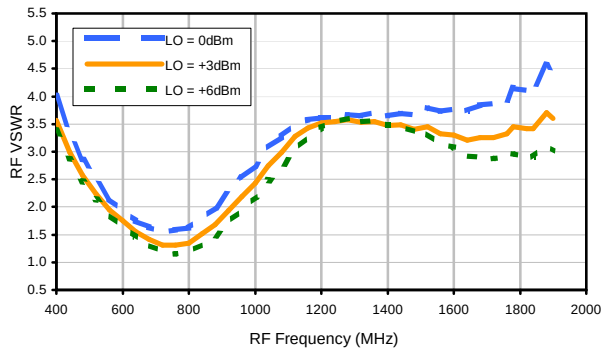
LO-IF Isolation



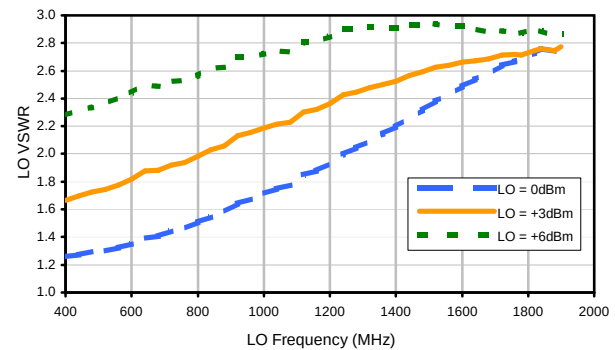
RF-IF Isolation



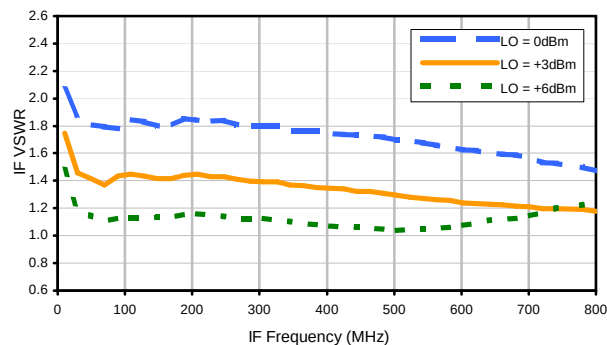
RF VSWR



LO VSWR



IF VSWR



REV. X2

RMS-5L+

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## Harmonics Tables

RF HARMONICS ORDER

|        | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |    |     |
|--------|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|----|-----|
| 0      | -      | -      | +5  | 4   | 11  | 21  | 22  | 39  | 40  | 54  | 50 | 60  |
| 1      | -      | 15     | +0  | 25  | 19  | 38  | 39  | 43  | 51  | 55  | 70 | 67  |
| 2      | 112    | 43     | 33  | 48  | 35  | 47  | 55  | 57  | 72  | 70  | 71 | 85  |
| 3      | 117    | 76     | 59  | 61  | 59  | 65  | 66  | 73  | 83  | 73  | 89 | 84  |
| 4      | 116    | 91     | 94  | 83  | 78  | 77  | 74  | 88  | 87  | 87  | 93 | 91  |
| 5      | 115    | 96     | 95  | 102 | 85  | 90  | 77  | 91  | 92  | 110 | 97 | 99  |
| 6      | 109    | 105    | 111 | 94  | 100 | 89  | 90  | 77  | 84  | 90  | 95 | 100 |
| 7      | 108    | 100    | 99  | 100 | 97  | 97  | 105 | 89  | 92  | 83  | 92 | 100 |
| 8      | 120    | 97     | 99  | 108 | 98  | 98  | 99  | 103 | 92  | 85  | 86 | 103 |
| 9      | 109    | 98     | 102 | 95  | 112 | 102 | 99  | 100 | 94  | 88  | 95 | 94  |
| 10     | 124    | 94     | 102 | 92  | 106 | 107 | 94  | 106 | 100 | 102 | 88 | 86  |
| RF CAL | 0      | 1      | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10 |     |

### LO HARMONICS ORDER

Test conditions:

RF IN: 900.1 MHz; -18.00 dBm.  
LO IN: 930.01 MHz; +3.00 dBm  
IF OUT: 29.91 MHz; -24.36 dBm

RF HARMONICS ORDER

|        | (-dBm) | (-dBc) |     |     |     |     |     |     |     |    |    |    |
|--------|--------|--------|-----|-----|-----|-----|-----|-----|-----|----|----|----|
| 0      | -      | -      | 4   | 16  | 22  | 35  | 33  | 52  | 53  | 64 | 66 | 73 |
| 1      | -      | 15     | +0  | 26  | 21  | 41  | 43  | 54  | 56  | 68 | 72 | 77 |
| 2      | 99     | 33     | 25  | 38  | 26  | 38  | 49  | 50  | 64  | 71 | 72 | 85 |
| 3      | 116    | 54     | 41  | 40  | 43  | 59  | 48  | 58  | 61  | 59 | 75 | 73 |
| 4      | 111    | 58     | 65  | 61  | 63  | 53  | 60  | 56  | 66  | 68 | 83 | 83 |
| 5      | 110    | 69     | 67  | 73  | 57  | 55  | 58  | 59  | 69  | 68 | 86 | 72 |
| 6      | 107    | 88     | 79  | 69  | 86  | 75  | 61  | 65  | 67  | 68 | 81 | 80 |
| 7      | 122    | 101    | 89  | 86  | 82  | 97  | 73  | 73  | 69  | 74 | 82 | 80 |
| 8      | 105    | 103    | 111 | 99  | 94  | 84  | 93  | 89  | 75  | 76 | 81 | 81 |
| 9      | 113    | 109    | 103 | 124 | 98  | 94  | 87  | 97  | 88  | 82 | 81 | 89 |
| 10     | 107    | 113    | 108 | 109 | 110 | 106 | 108 | 108 | 111 | 97 | 94 | 87 |
| RF CAL | 0      | 1      | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9  | 10 |    |

### LO HARMONICS ORDER

Test conditions:

RF IN: 900.1 MHz; -8.00 dBm.  
LO IN: 930.01 MHz; +3.00 dBm  
IF OUT: 29.91 MHz; -14.49 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-5L+

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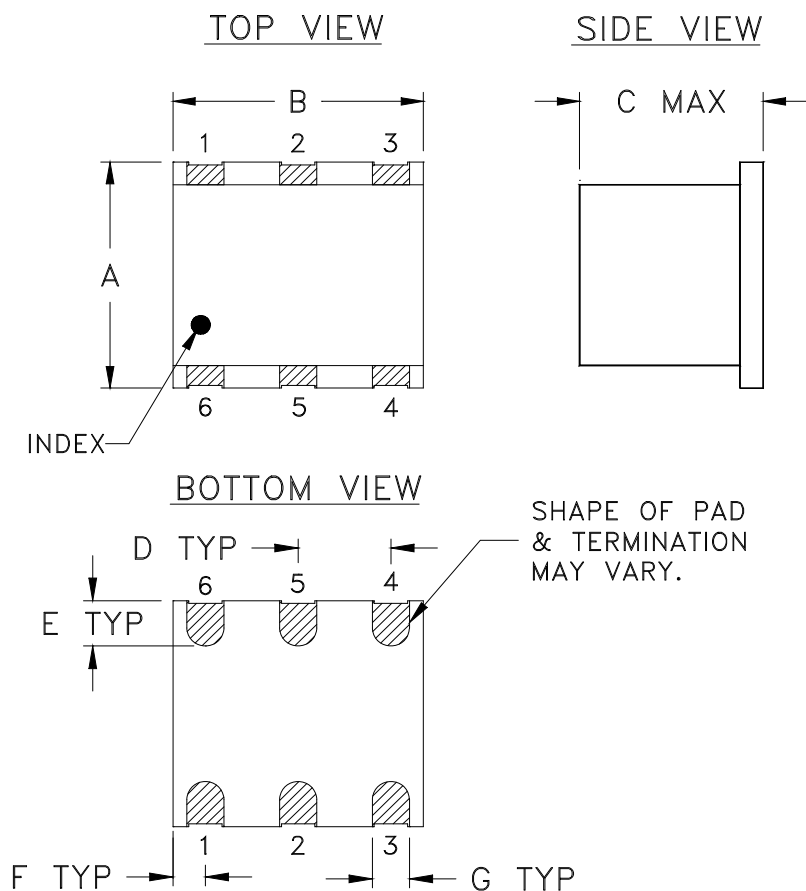
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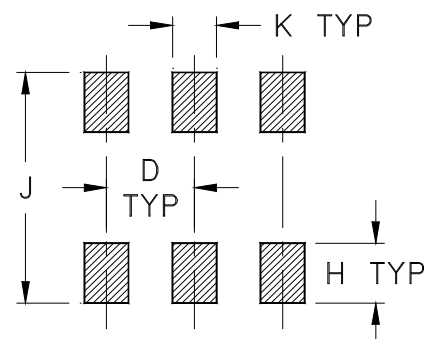
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### Outline Dimensions



### PCB Land Pattern



| 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.



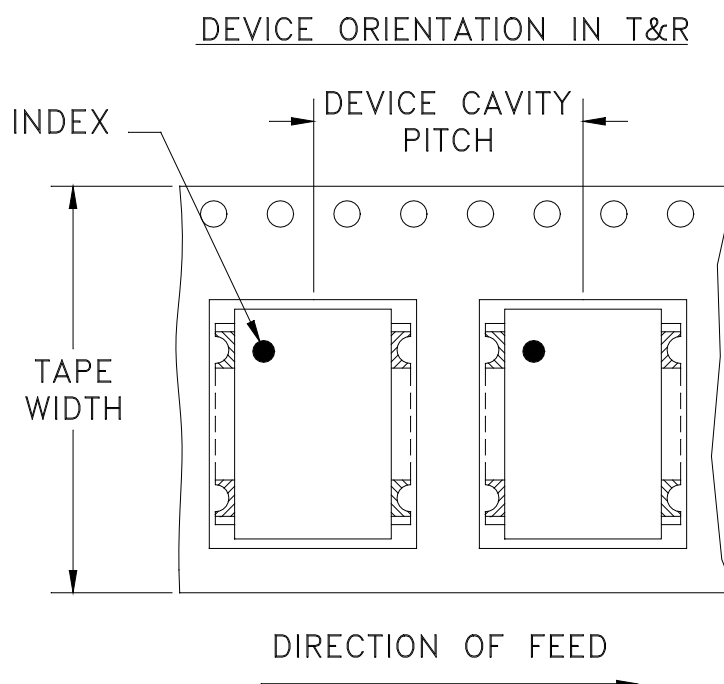
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RF/IF MICROWAVE COMPONENTS

# *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                          |
|                |                         |                   | 1000                         |

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)



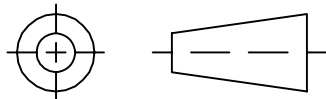
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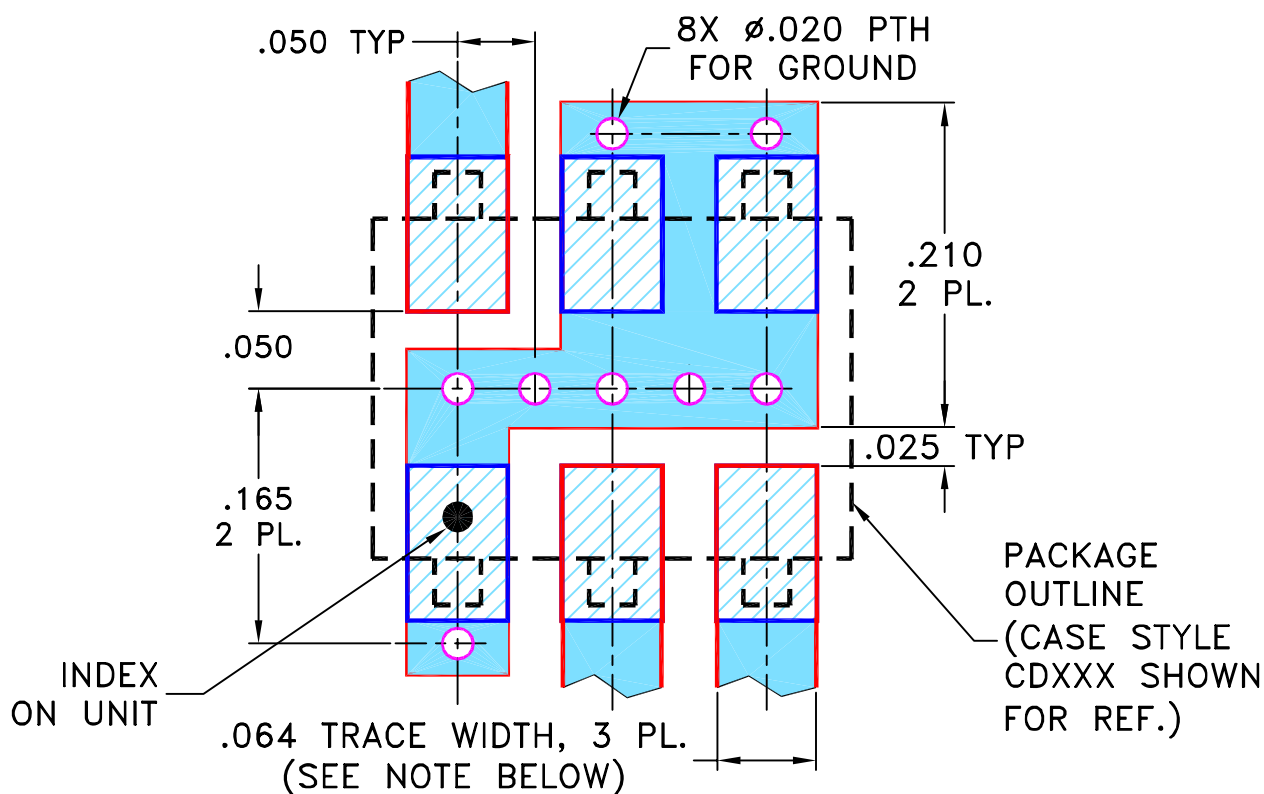
## THIRD ANGLE PROJECTION



## 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   |

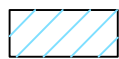
**SUGGESTED MOUNTING CONFIGURATION**  
**FOR BH292, CD541/542/636/637, TT100/240 CASE**  
**STYLES, "gk", "ht", "hu", "nd", "w" PIN CONNECTIONS**



- 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



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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

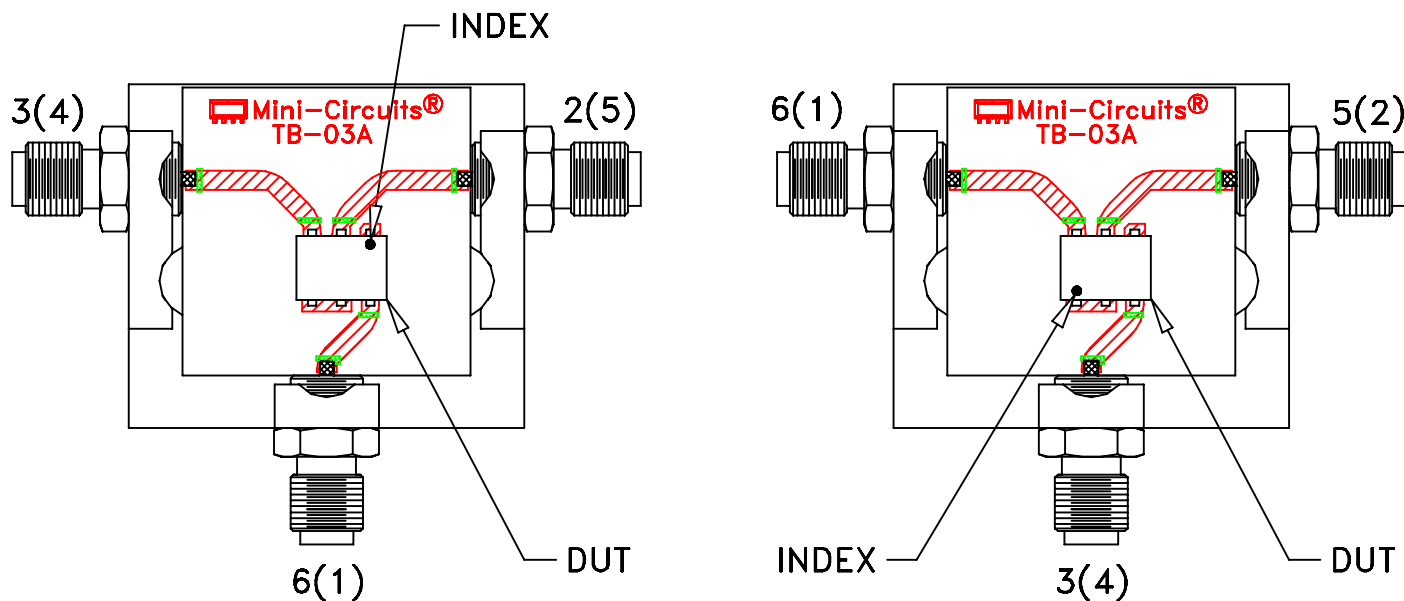
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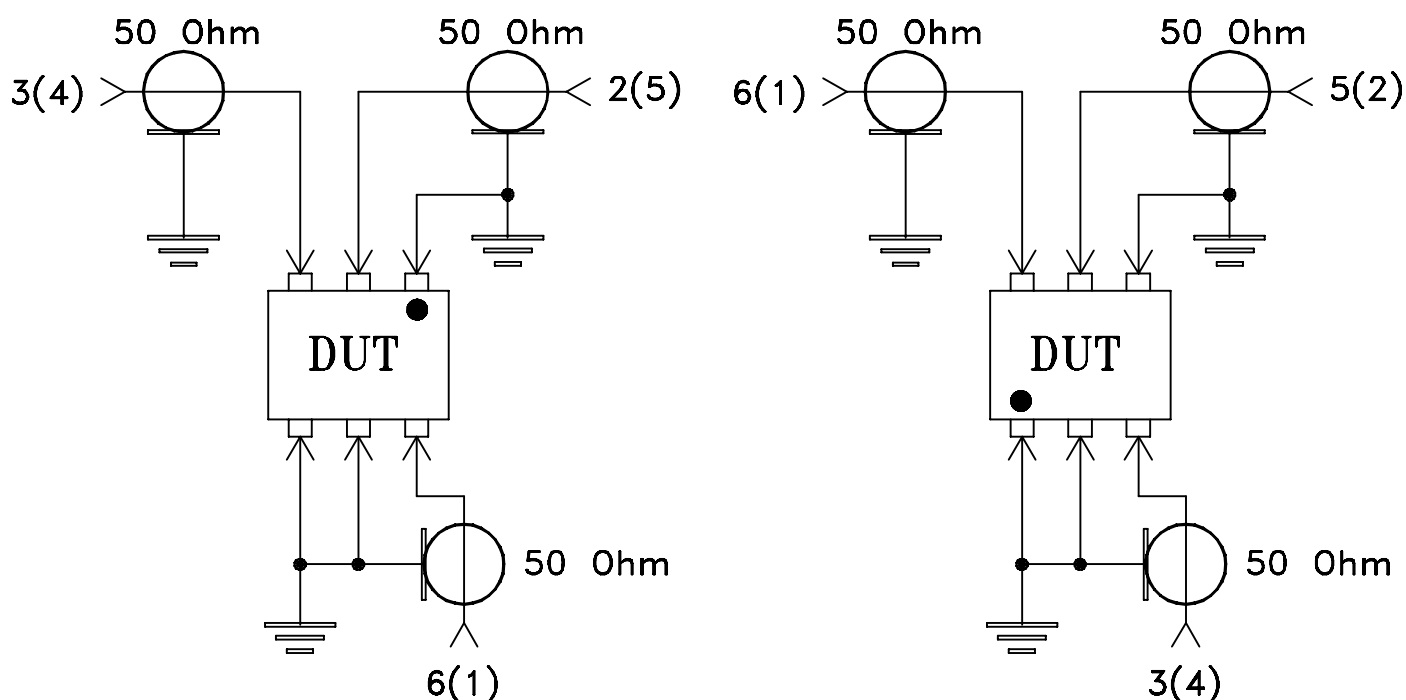
ASHEETA1.DWG REV:A DATE:01/12/95

# Evaluation Board and Circuit

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



TB-03



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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All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

| 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                                                                              |