

# Surface Mount Frequency Mixer

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

JMS-2W+  
JMS-2W



CASE STYLE: BH292

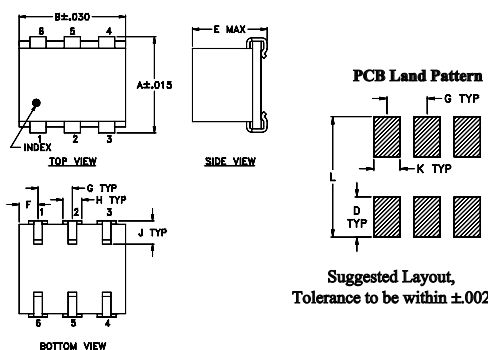
## Maximum Ratings

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

## Outline Drawing



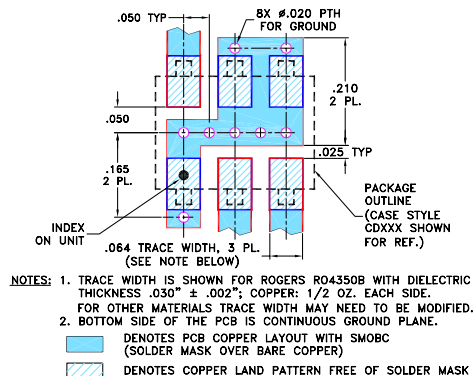
## Outline Dimensions (inch)

| A    | B    | C  | D    | E    | F    | G    |
|------|------|----|------|------|------|------|
| .280 | .310 | -- | .100 | .225 | .055 | .100 |
| 7.11 | 7.87 | -- | 2.54 | 5.72 | 1.40 | 2.54 |

| H    | J    | K    | L    | wt    |
|------|------|------|------|-------|
| .047 | .065 | .065 | .300 | grams |
| 1.19 | 1.65 | 1.65 | 7.62 | 0.45  |

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



### Notes

- 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.
- 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

- excellent L-R isolation and L-I isolation, up to 60 dB typ.
- miniature surface mount
- J-leads for strain relief and excellent solderability

## Applications

- up & down converters for receivers & transmitters
- UHF TV
- cellular/ISM/GSM

## Electrical Specifications

| FREQUENCY<br>(MHz) |        | CONVERSION LOSS<br>(dB) |          |      |                        | LO-RF ISOLATION<br>(dB) |      |      |      |      |      | LO-IF ISOLATION<br>(dB) |      |      |      |      |      | IP3<br>at center<br>band<br>(dBm) |
|--------------------|--------|-------------------------|----------|------|------------------------|-------------------------|------|------|------|------|------|-------------------------|------|------|------|------|------|-----------------------------------|
| LO/RF              | IF     | Mid-Band<br>m           |          |      | Total<br>Range<br>Max. | L                       |      | M    |      | U    |      | L                       |      | M    |      | U    |      |                                   |
|                    |        | $\bar{X}$               | $\sigma$ | Max. |                        | Typ.                    | Min. | Typ. | Min. | Typ. | Min. | Typ.                    | Min. | Typ. | Min. | Typ. | Min. |                                   |
|                    |        | $f_L$ - $f_U$           |          |      |                        |                         |      |      |      |      |      |                         |      |      |      |      |      |                                   |
| 5-1200             | DC-500 | 6.8                     | .10      | 8.0  | 9.0                    | 60                      | 40   | 60   | 30   | 37   | 20   | 60                      | 40   | 48   | 20   | 31   | 15   | 17                                |

1 dB COMP.: +1 dBm typ.  
Phase detection, positive polarity

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

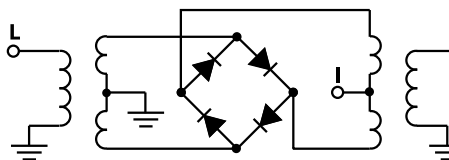
M = mid range [ $10f_L$  to  $f_U/2$ ]

U = upper range [ $f_U/2$  to  $f_U$ ]

## Typical Performance Data

| Frequency<br>(MHz) |         | Conversion<br>Loss<br>(dB) | Isolation<br>L-R<br>(dB) | Isolation<br>L-I<br>(dB) | VSWR<br>RF Port<br>(:1) | VSWR<br>LO Port<br>(:1) |
|--------------------|---------|----------------------------|--------------------------|--------------------------|-------------------------|-------------------------|
| RF                 | LO      | LO<br>+7dBm                | LO<br>+7dBm              | LO<br>+7dBm              | LO<br>+7dBm             | LO<br>+7dBm             |
| 5.00               | 35.00   | 6.50                       | 62.55                    | 59.95                    | 1.46                    | 1.69                    |
| 10.00              | 40.00   | 6.43                       | 62.08                    | 59.28                    | 1.44                    | 1.67                    |
| 15.30              | 45.30   | 6.43                       | 62.44                    | 58.34                    | 1.43                    | 1.69                    |
| 29.94              | 59.94   | 6.49                       | 62.14                    | 56.11                    | 1.40                    | 1.68                    |
| 50.00              | 80.00   | 6.45                       | 62.11                    | 53.65                    | 1.39                    | 1.67                    |
| 81.92              | 111.92  | 6.52                       | 62.44                    | 50.79                    | 1.44                    | 1.64                    |
| 102.45             | 132.45  | 6.47                       | 62.71                    | 49.36                    | 1.45                    | 1.63                    |
| 160.26             | 130.26  | 6.44                       | 65.46                    | 46.82                    | 1.44                    | 1.64                    |
| 200.43             | 170.43  | 6.34                       | 65.54                    | 45.89                    | 1.46                    | 1.69                    |
| 350.63             | 320.63  | 6.30                       | 53.86                    | 42.07                    | 1.46                    | 1.79                    |
| 438.53             | 408.53  | 6.29                       | 49.13                    | 40.13                    | 1.45                    | 1.90                    |
| 548.47             | 518.47  | 6.28                       | 44.85                    | 37.77                    | 1.42                    | 2.05                    |
| 600.00             | 570.00  | 6.34                       | 43.57                    | 36.59                    | 1.40                    | 2.15                    |
| 613.38             | 583.38  | 6.32                       | 43.25                    | 36.40                    | 1.38                    | 2.16                    |
| 685.97             | 655.97  | 6.45                       | 41.28                    | 34.97                    | 1.33                    | 2.29                    |
| 767.15             | 737.15  | 6.66                       | 40.04                    | 33.20                    | 1.24                    | 2.44                    |
| 959.47             | 929.47  | 7.03                       | 37.35                    | 31.24                    | 1.04                    | 2.85                    |
| 1073.01            | 1043.01 | 7.10                       | 36.16                    | 30.62                    | 1.32                    | 3.17                    |
| 1120.00            | 1090.00 | 7.17                       | 36.10                    | 30.60                    | 1.47                    | 3.18                    |
| 1200.00            | 1170.00 | 7.25                       | 35.69                    | 30.56                    | 1.62                    | 3.41                    |

## Electrical Schematic

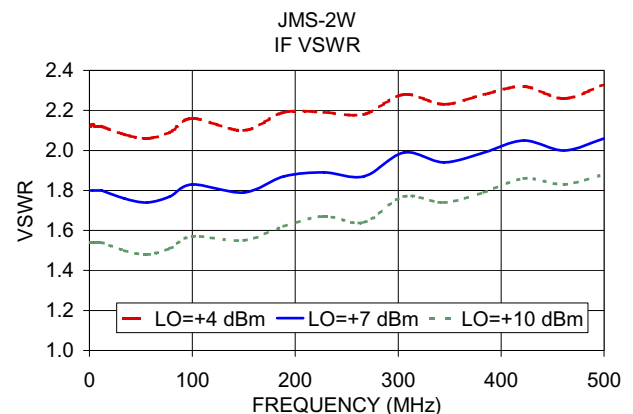
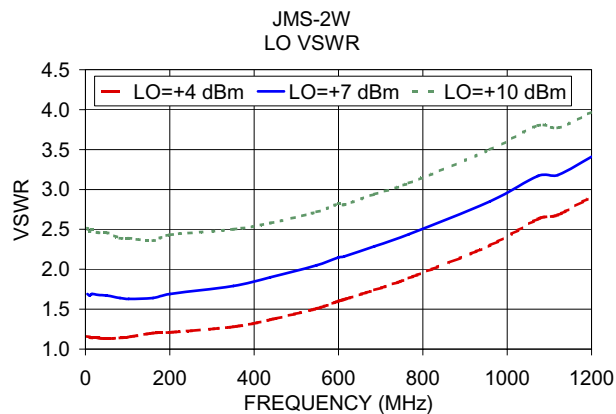
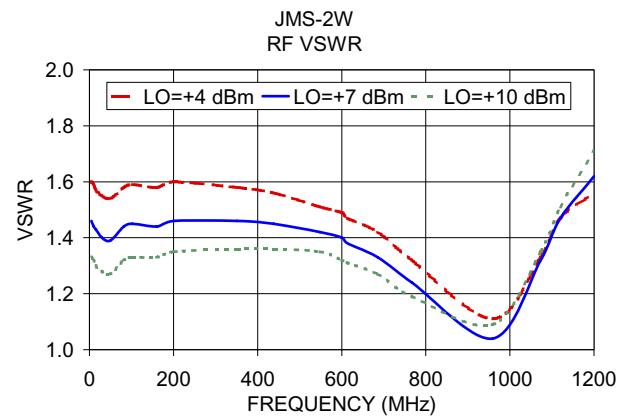
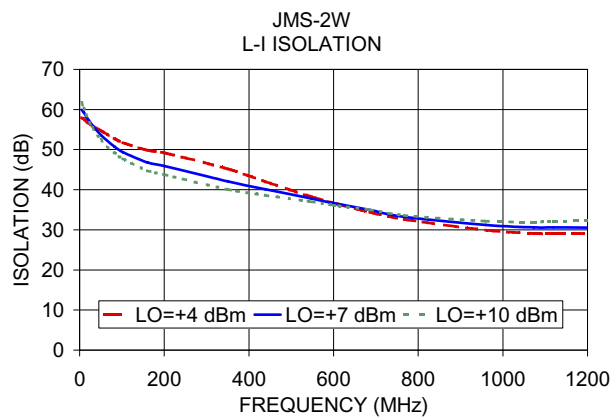
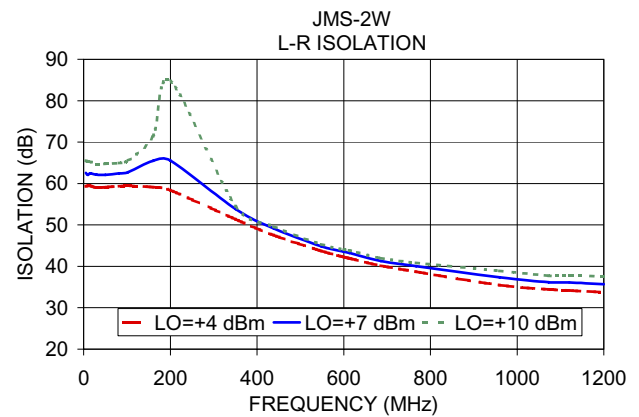
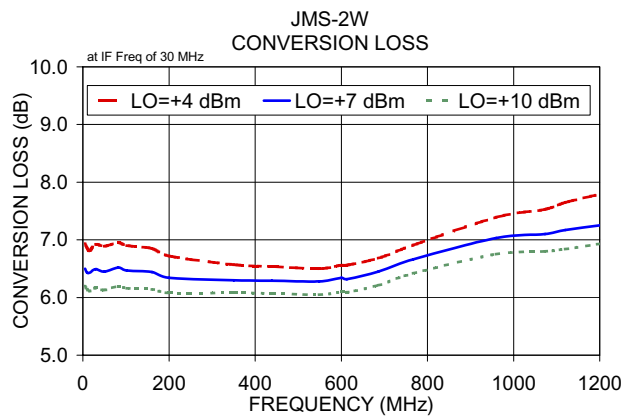


**Mini-Circuits**

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REV. C  
M151107  
JMS-2W  
ED-2834/10  
DJ/CP/AM  
150814  
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## Performance Charts



### Notes

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# Frequency Mixer

JMS-2W+

## Typical Performance Data

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>IF FIXED<br>@IF(OUT)=30MHz<br>(dB) |      |      |
|---------------------|-------------|-------------------------------------------------------|------|------|
|                     |             | @LO (dBm)                                             |      |      |
|                     |             | +4                                                    | +7   | +10  |
| 5.0                 | 35.0        | 6.93                                                  | 6.50 | 6.19 |
| 10.0                | 40.0        | 6.86                                                  | 6.43 | 6.14 |
| 50.4                | 80.4        | 7.27                                                  | 6.76 | 6.53 |
| 90.6                | 120.6       | 7.22                                                  | 6.77 | 6.50 |
| 130.9               | 160.9       | 7.26                                                  | 6.77 | 6.54 |
| 171.1               | 201.1       | 7.18                                                  | 6.71 | 6.50 |
| 211.4               | 241.4       | 7.11                                                  | 6.67 | 6.51 |
| 251.6               | 281.6       | 7.05                                                  | 6.64 | 6.44 |
| 291.9               | 321.9       | 7.04                                                  | 6.67 | 6.45 |
| 332.1               | 362.1       | 7.01                                                  | 6.63 | 6.48 |
| 372.4               | 402.4       | 6.99                                                  | 6.62 | 6.48 |
| 412.6               | 442.6       | 6.92                                                  | 6.58 | 6.44 |
| 452.9               | 482.9       | 6.96                                                  | 6.61 | 6.42 |
| 493.1               | 523.1       | 6.92                                                  | 6.59 | 6.44 |
| 533.4               | 563.4       | 6.94                                                  | 6.58 | 6.40 |
| 573.6               | 603.6       | 6.90                                                  | 6.55 | 6.38 |
| 613.9               | 643.9       | 6.97                                                  | 6.62 | 6.46 |
| 654.2               | 684.2       | 6.96                                                  | 6.64 | 6.48 |
| 694.4               | 724.4       | 7.03                                                  | 6.69 | 6.50 |
| 734.7               | 764.7       | 7.11                                                  | 6.78 | 6.62 |
| 774.9               | 804.9       | 7.20                                                  | 6.87 | 6.68 |
| 815.2               | 845.2       | 7.34                                                  | 6.99 | 6.79 |
| 855.4               | 885.4       | 7.37                                                  | 7.03 | 6.81 |
| 895.7               | 925.7       | 7.50                                                  | 7.15 | 6.95 |
| 935.9               | 965.9       | 7.58                                                  | 7.26 | 7.01 |
| 976.2               | 1006.2      | 7.66                                                  | 7.29 | 7.06 |
| 1016.4              | 1046.4      | 7.74                                                  | 7.38 | 7.12 |
| 1056.7              | 1086.7      | 7.82                                                  | 7.41 | 7.16 |
| 1096.9              | 1126.9      | 7.96                                                  | 7.49 | 7.26 |
| 1137.2              | 1167.2      | 8.08                                                  | 7.61 | 7.34 |
| 1177.4              | 1207.4      | 8.22                                                  | 7.70 | 7.40 |
| 1217.7              | 1247.7      | 8.43                                                  | 7.86 | 7.55 |
| 1257.9              | 1287.9      | 8.65                                                  | 8.09 | 7.73 |
| 1298.2              | 1328.2      | 8.87                                                  | 8.31 | 7.93 |
| 1338.5              | 1368.5      | 9.07                                                  | 8.53 | 8.14 |
| 1378.7              | 1408.7      | 9.33                                                  | 8.78 | 8.40 |
| 1419.0              | 1449.0      | 9.59                                                  | 9.04 | 8.64 |
| 1459.2              | 1489.2      | 9.82                                                  | 9.22 | 8.89 |
| 1499.5              | 1529.5      | 9.93                                                  | 9.50 | 9.12 |
| 1539.7              | 1569.7      | 10.48                                                 | 9.94 | 9.57 |
| 1600.1              | 1630.1      |                                                       |      |      |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | IP3 INPUT<br>(dBm) |       |       |
|---------------------|-------------|--------------------|-------|-------|
|                     |             | @LO (dBm)          |       |       |
|                     |             | +4                 | +7    | +10   |
| 10.1                | 40.1        | 15.17              | 18.17 | 20.76 |
| 50.4                | 80.4        | 15.81              | 17.83 | 18.48 |
| 90.6                | 120.6       | 15.10              | 18.11 | 17.54 |
| 130.9               | 160.9       | 14.50              | 15.99 | 20.67 |
| 171.1               | 201.1       | 14.62              | 16.52 | 22.95 |
| 211.4               | 241.4       | 14.47              | 18.03 | 19.89 |
| 251.6               | 281.6       | 15.51              | 19.89 | 17.16 |
| 291.9               | 321.9       | 16.15              | 16.84 | 16.99 |
| 332.1               | 362.1       | 17.31              | 16.04 | 16.22 |
| 372.4               | 402.4       | 16.45              | 15.73 | 15.93 |
| 412.6               | 442.6       | 17.88              | 17.16 | 17.11 |
| 452.9               | 482.9       | 16.07              | 14.80 | 14.79 |
| 493.1               | 523.1       | 16.21              | 15.66 | 15.72 |
| 533.4               | 563.4       | 14.90              | 15.02 | 15.53 |
| 573.6               | 603.6       | 14.27              | 14.21 | 15.28 |
| 613.9               | 643.9       | 13.06              | 14.53 | 14.19 |
| 654.2               | 684.2       | 14.09              | 14.29 | 13.99 |
| 694.4               | 724.4       | 13.85              | 13.49 | 14.34 |
| 734.7               | 764.7       | 13.89              | 13.41 | 14.68 |
| 774.9               | 804.9       | 14.79              | 15.13 | 14.82 |
| 815.2               | 845.2       | 17.77              | 17.82 | 15.30 |
| 855.4               | 885.4       | 19.64              | 18.25 | 17.45 |
| 895.7               | 925.7       | 17.10              | 17.08 | 16.48 |
| 935.9               | 965.9       | 17.02              | 15.14 | 16.03 |
| 976.2               | 1006.2      | 16.89              | 14.57 | 14.85 |
| 1016.4              | 1046.4      | 15.01              | 14.35 | 14.61 |
| 1056.7              | 1086.7      | 13.52              | 13.28 | 13.94 |
| 1096.9              | 1126.9      | 13.17              | 12.80 | 13.64 |
| 1137.2              | 1167.2      | 13.52              | 12.24 | 12.56 |
| 1177.4              | 1207.4      | 12.75              | 11.58 | 12.28 |
| 1217.7              | 1247.7      | 12.48              | 11.80 | 12.58 |
| 1257.9              | 1287.9      | 11.99              | 11.99 | 13.19 |
| 1298.2              | 1328.2      | 11.01              | 11.63 | 12.37 |
| 1338.5              | 1368.5      | 10.87              | 11.22 | 11.70 |
| 1378.7              | 1408.7      | 10.53              | 11.38 | 12.43 |
| 1419.0              | 1449.0      | 9.78               | 12.28 | 12.98 |
| 1459.2              | 1489.2      | 9.46               | 11.36 | 12.43 |
| 1499.5              | 1529.5      | 9.92               | 10.38 | 12.60 |
| 1539.7              | 1569.7      | 9.18               | 10.46 | 11.95 |
| 1600.1              | 1630.1      | 9.32               | 9.79  | 11.05 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | COMPRESSION<br>@RF IN=+1dBm<br>(dB) |      |      |
|---------------------|-------------|-------------------------------------|------|------|
|                     |             | @LO (dBm)                           |      |      |
|                     |             | +4                                  | +7   | +10  |
| 10.1                | 40.1        | 0.71                                | 0.35 | 0.36 |
| 50.4                | 80.4        | 0.66                                | 0.51 | 0.30 |
| 90.6                | 120.6       | 0.73                                | 0.53 | 0.27 |
| 130.9               | 160.9       | 0.74                                | 0.56 | 0.44 |
| 171.1               | 201.1       | 0.68                                | 0.49 | 0.35 |
| 211.4               | 241.4       | 0.71                                | 0.53 | 0.36 |
| 251.6               | 281.6       | 0.73                                | 0.57 | 0.42 |
| 291.9               | 321.9       | 0.76                                | 0.63 | 0.41 |
| 332.1               | 362.1       | 0.85                                | 0.58 | 0.38 |
| 372.4               | 402.4       | 0.85                                | 0.58 | 0.33 |
| 412.6               | 442.6       | 0.76                                | 0.54 | 0.46 |
| 452.9               | 482.9       | 0.78                                | 0.53 | 0.35 |
| 493.1               | 523.1       | 0.92                                | 0.70 | 0.44 |
| 533.4               | 563.4       | 0.77                                | 0.55 | 0.35 |
| 573.6               | 603.6       | 0.84                                | 0.62 | 0.39 |
| 613.9               | 643.9       | 0.85                                | 0.55 | 0.41 |
| 654.2               | 684.2       | 0.92                                | 0.67 | 0.47 |
| 694.4               | 724.4       | 0.89                                | 0.70 | 0.49 |
| 734.7               | 764.7       | 0.95                                | 0.65 | 0.51 |
| 774.9               | 804.9       | 0.99                                | 0.71 | 0.44 |
| 815.2               | 845.2       | 1.07                                | 0.85 | 0.59 |
| 855.4               | 885.4       | 1.10                                | 0.91 | 0.61 |
| 895.7               | 925.7       | 1.06                                | 0.75 | 0.52 |
| 935.9               | 965.9       | 1.18                                | 0.83 | 0.72 |
| 976.2               | 1006.2      | 1.18                                | 0.97 | 0.73 |
| 1016.4              | 1046.4      | 1.29                                | 0.89 | 0.76 |
| 1056.7              | 1086.7      | 1.20                                | 0.96 | 0.67 |
| 1096.9              | 1126.9      | 1.19                                | 1.02 | 0.72 |
| 1137.2              | 1167.2      | 1.19                                | 0.99 | 0.78 |
| 1177.4              | 1207.4      | 1.23                                | 0.98 | 0.80 |
| 1217.7              | 1247.7      | 1.16                                | 1.03 | 0.75 |
| 1257.9              | 1287.9      | 1.23                                | 1.04 | 0.76 |
| 1298.2              | 1328.2      | 1.15                                | 1.03 | 0.87 |
| 1338.5              | 1368.5      | 1.13                                | 0.98 | 0.77 |
| 1378.7              | 1408.7      | 0.88                                | 0.83 | 0.76 |
| 1419.0              | 1449.0      | 0.93                                | 0.74 | 0.51 |
| 1459.2              | 1489.2      | 0.76                                | 0.63 | 0.46 |
| 1499.5              | 1529.5      | 0.65                                | 0.65 | 0.31 |
| 1539.7              | 1569.7      | 0.59                                | 0.31 | 0.39 |
| 1600.1              | 1630.1      | 0.45                                | 0.25 | 0.28 |

REV. X2

JMS-2W+

100817

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

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



# Frequency Mixer

**JMS-2W+**

## Typical Performance Data

| IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=600.1MHz<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)=1200.1MHz<br>(dB) |
|----------------------|-------------|-----------------------------------------------------------------|----------------------|-------------|----------------------------------------------------------------|----------------------|-------------|------------------------------------------------------------------|
|                      |             | @LO (dBm)                                                       |                      |             | @LO (dBm)                                                      |                      |             | @LO (dBm)                                                        |
|                      |             | +7                                                              |                      |             | +7                                                             |                      |             | +7                                                               |
| 500.0                | 100.1       | 6.65                                                            | 10.0                 | 20.1        | 6.57                                                           | 500.0                | 700.1       | 7.57                                                             |
| 487.8                | 112.4       | 6.64                                                            | 22.6                 | 32.7        | 6.43                                                           | 487.4                | 712.7       | 7.56                                                             |
| 475.5                | 124.6       | 6.61                                                            | 35.1                 | 45.2        | 6.43                                                           | 474.9                | 725.2       | 7.55                                                             |
| 463.3                | 136.9       | 6.57                                                            | 47.7                 | 57.8        | 6.46                                                           | 462.3                | 737.8       | 7.54                                                             |
| 451.0                | 149.1       | 6.58                                                            | 60.3                 | 70.4        | 6.45                                                           | 449.7                | 750.4       | 7.55                                                             |
| 438.8                | 161.4       | 6.56                                                            | 72.8                 | 82.9        | 6.48                                                           | 437.2                | 762.9       | 7.58                                                             |
| 426.5                | 173.6       | 6.55                                                            | 85.4                 | 95.5        | 6.45                                                           | 424.6                | 775.5       | 7.58                                                             |
| 414.3                | 185.9       | 6.54                                                            | 97.9                 | 108.0       | 6.48                                                           | 412.1                | 788.0       | 7.56                                                             |
| 402.0                | 198.1       | 6.51                                                            | 110.5                | 120.6       | 6.50                                                           | 399.5                | 800.6       | 7.54                                                             |
| 389.8                | 210.4       | 6.50                                                            | 123.1                | 133.2       | 6.51                                                           | 386.9                | 813.2       | 7.54                                                             |
| 377.5                | 222.6       | 6.47                                                            | 135.6                | 145.7       | 6.50                                                           | 374.4                | 825.7       | 7.54                                                             |
| 365.3                | 234.9       | 6.46                                                            | 148.2                | 158.3       | 6.54                                                           | 361.8                | 838.3       | 7.57                                                             |
| 353.0                | 247.1       | 6.47                                                            | 160.8                | 170.9       | 6.50                                                           | 349.2                | 850.9       | 7.58                                                             |
| 340.8                | 259.4       | 6.47                                                            | 173.3                | 183.4       | 6.55                                                           | 336.7                | 863.4       | 7.58                                                             |
| 328.5                | 271.6       | 6.47                                                            | 185.9                | 196.0       | 6.55                                                           | 324.1                | 876.0       | 7.57                                                             |
| 316.3                | 283.9       | 6.45                                                            | 198.5                | 208.6       | 6.53                                                           | 311.5                | 888.6       | 7.58                                                             |
| 304.0                | 296.1       | 6.44                                                            | 211.0                | 221.1       | 6.57                                                           | 299.0                | 901.1       | 7.58                                                             |
| 291.8                | 308.4       | 6.44                                                            | 223.6                | 233.7       | 6.53                                                           | 286.4                | 913.7       | 7.55                                                             |
| 279.5                | 320.6       | 6.44                                                            | 236.2                | 246.3       | 6.59                                                           | 273.8                | 926.3       | 7.55                                                             |
| 267.3                | 332.9       | 6.44                                                            | 248.7                | 258.8       | 6.57                                                           | 261.3                | 938.8       | 7.58                                                             |
| 255.0                | 345.1       | 6.45                                                            | 261.3                | 271.4       | 6.58                                                           | 248.7                | 951.4       | 7.58                                                             |
| 242.8                | 357.4       | 6.43                                                            | 273.8                | 283.9       | 6.62                                                           | 236.2                | 963.9       | 7.56                                                             |
| 230.5                | 369.6       | 6.44                                                            | 286.4                | 296.5       | 6.64                                                           | 223.6                | 976.5       | 7.57                                                             |
| 218.3                | 381.9       | 6.46                                                            | 299.0                | 309.1       | 6.63                                                           | 211.0                | 989.1       | 7.57                                                             |
| 206.0                | 394.1       | 6.46                                                            | 311.5                | 321.6       | 6.65                                                           | 198.5                | 1001.6      | 7.56                                                             |
| 193.8                | 406.4       | 6.46                                                            | 324.1                | 334.2       | 6.69                                                           | 185.9                | 1014.2      | 7.54                                                             |
| 181.5                | 418.6       | 6.46                                                            | 336.7                | 346.8       | 6.67                                                           | 173.3                | 1026.8      | 7.57                                                             |
| 169.3                | 430.9       | 6.46                                                            | 349.2                | 359.3       | 6.68                                                           | 160.8                | 1039.3      | 7.59                                                             |
| 157.0                | 443.1       | 6.48                                                            | 361.8                | 371.9       | 6.69                                                           | 148.2                | 1051.9      | 7.58                                                             |
| 144.8                | 455.4       | 6.48                                                            | 374.4                | 384.5       | 6.75                                                           | 135.6                | 1064.5      | 7.57                                                             |
| 132.5                | 467.6       | 6.49                                                            | 386.9                | 397.0       | 6.79                                                           | 123.1                | 1077.0      | 7.57                                                             |
| 120.3                | 479.9       | 6.49                                                            | 399.5                | 409.6       | 6.78                                                           | 110.5                | 1089.6      | 7.55                                                             |
| 108.0                | 492.1       | 6.49                                                            | 412.1                | 422.2       | 6.77                                                           | 97.9                 | 1102.2      | 7.54                                                             |
| 95.8                 | 504.4       | 6.49                                                            | 424.6                | 434.7       | 6.78                                                           | 85.4                 | 1114.7      | 7.56                                                             |
| 83.5                 | 516.6       | 6.50                                                            | 437.2                | 447.3       | 6.78                                                           | 72.8                 | 1127.3      | 7.56                                                             |
| 71.3                 | 528.9       | 6.50                                                            | 449.7                | 459.8       | 6.79                                                           | 60.3                 | 1139.8      | 7.57                                                             |
| 59.0                 | 541.1       | 6.51                                                            | 462.3                | 472.4       | 6.84                                                           | 47.7                 | 1152.4      | 7.56                                                             |
| 46.8                 | 553.4       | 6.52                                                            | 474.9                | 485.0       | 6.86                                                           | 35.1                 | 1165.0      | 7.61                                                             |
| 22.3                 | 577.9       | 6.52                                                            | 487.4                | 497.5       | 6.81                                                           | 22.6                 | 1177.5      | 7.62                                                             |
| 10.0                 | 590.1       | 6.73                                                            | 500.0                | 510.1       | 6.86                                                           | 10.0                 | 1190.1      | 7.77                                                             |

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## Typical Performance Data

| LO<br>(MHz) | LO-RF ISOLATION<br>(dB) |       |       | LO-IF ISOLATION<br>(dB) |       |       |
|-------------|-------------------------|-------|-------|-------------------------|-------|-------|
|             | @LO (dBm)               |       |       | @LO (dBm)               |       |       |
|             | +4                      | +7    | +10   | +4                      | +7    | +10   |
| 5.0         | 59.28                   | 62.55 | 65.54 | 57.98                   | 59.95 | 61.74 |
| 10.0        | 59.42                   | 62.08 | 65.34 | 57.62                   | 59.28 | 60.34 |
| 50.4        | 72.06                   | 70.02 | 68.24 | 55.32                   | 54.65 | 53.48 |
| 90.6        | 70.76                   | 69.90 | 67.61 | 54.35                   | 52.80 | 51.41 |
| 130.9       | 69.31                   | 69.64 | 69.12 | 54.14                   | 51.65 | 49.92 |
| 171.1       | 65.51                   | 70.37 | 71.72 | 54.36                   | 50.72 | 48.72 |
| 211.4       | 62.11                   | 67.85 | 81.11 | 54.37                   | 50.34 | 47.91 |
| 251.6       | 59.12                   | 64.69 | 74.75 | 54.59                   | 49.78 | 47.05 |
| 291.9       | 56.79                   | 61.34 | 66.91 | 54.01                   | 49.22 | 46.46 |
| 332.1       | 54.74                   | 58.54 | 62.46 | 52.15                   | 48.18 | 45.59 |
| 372.4       | 52.94                   | 56.27 | 59.13 | 49.88                   | 46.95 | 44.65 |
| 412.6       | 51.27                   | 54.00 | 56.29 | 47.80                   | 45.87 | 43.98 |
| 452.9       | 49.84                   | 52.16 | 54.13 | 45.58                   | 44.52 | 43.06 |
| 493.1       | 48.36                   | 50.37 | 52.06 | 43.84                   | 43.34 | 42.34 |
| 533.4       | 47.18                   | 49.05 | 50.76 | 41.93                   | 41.94 | 41.26 |
| 573.6       | 46.10                   | 47.81 | 49.27 | 40.29                   | 40.63 | 40.50 |
| 654.2       | 44.32                   | 46.10 | 47.59 | 37.69                   | 38.25 | 38.23 |
| 694.4       | 43.40                   | 45.07 | 46.59 | 36.61                   | 37.38 | 37.53 |
| 734.7       | 42.52                   | 44.07 | 45.49 | 35.42                   | 36.37 | 36.90 |
| 774.9       | 41.73                   | 43.21 | 44.47 | 34.65                   | 35.58 | 36.35 |
| 815.2       | 41.15                   | 42.70 | 43.93 | 33.85                   | 34.68 | 35.38 |
| 855.4       | 40.63                   | 42.42 | 43.88 | 33.15                   | 33.96 | 34.58 |
| 895.7       | 39.99                   | 41.86 | 43.48 | 32.58                   | 33.35 | 33.86 |
| 935.9       | 39.61                   | 41.56 | 43.30 | 32.05                   | 32.91 | 33.39 |
| 976.2       | 39.01                   | 40.91 | 42.69 | 31.49                   | 32.54 | 33.15 |
| 1016.4      | 38.60                   | 40.43 | 42.18 | 30.99                   | 32.16 | 32.97 |
| 1056.7      | 38.24                   | 39.92 | 41.58 | 30.49                   | 31.67 | 32.63 |
| 1096.9      | 37.86                   | 39.43 | 40.97 | 29.97                   | 31.08 | 32.05 |
| 1137.2      | 37.86                   | 39.40 | 40.82 | 29.59                   | 30.64 | 31.60 |
| 1177.4      | 38.08                   | 39.74 | 41.02 | 29.30                   | 30.29 | 31.23 |
| 1217.7      | 38.16                   | 40.01 | 41.24 | 28.96                   | 29.90 | 30.81 |
| 1257.9      | 38.26                   | 40.12 | 41.33 | 28.80                   | 29.69 | 30.56 |
| 1298.2      | 38.24                   | 40.07 | 41.31 | 28.66                   | 29.51 | 30.34 |
| 1338.5      | 38.19                   | 39.87 | 41.09 | 28.38                   | 29.19 | 29.95 |
| 1378.7      | 38.19                   | 39.65 | 40.67 | 28.38                   | 29.16 | 29.83 |
| 1419.0      | 38.21                   | 39.40 | 40.19 | 28.29                   | 29.05 | 29.69 |
| 1459.2      | 38.10                   | 38.99 | 39.47 | 28.21                   | 29.00 | 29.64 |
| 1499.5      | 38.04                   | 38.62 | 38.80 | 28.22                   | 29.14 | 29.82 |
| 1539.7      | 38.25                   | 38.59 | 38.56 | 28.21                   | 29.29 | 30.09 |
| 1600.1      | 38.65                   | 38.75 | 38.57 | 27.90                   | 29.04 | 29.92 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | RF-IF ISOLATION<br>(dB) |       |       |
|---------------------|-------------|-------------------------|-------|-------|
|                     |             | @LO (dBm)               |       |       |
|                     |             | +4                      | +7    | +10   |
| 10.1                | 40.1        | 39.79                   | 46.84 | 43.91 |
| 50.4                | 80.4        | 35.98                   | 35.71 | 35.41 |
| 90.6                | 120.6       | 31.23                   | 30.78 | 30.78 |
| 130.9               | 160.9       | 28.48                   | 28.27 | 28.04 |
| 171.1               | 201.1       | 26.57                   | 26.39 | 26.22 |
| 211.4               | 241.4       | 25.24                   | 25.08 | 24.95 |
| 251.6               | 281.6       | 24.39                   | 24.25 | 24.16 |
| 291.9               | 321.9       | 23.80                   | 23.67 | 23.59 |
| 332.1               | 362.1       | 23.41                   | 23.32 | 23.22 |
| 372.4               | 402.4       | 23.13                   | 23.08 | 23.03 |
| 412.6               | 442.6       | 22.99                   | 23.05 | 23.04 |
| 452.9               | 482.9       | 22.84                   | 22.94 | 22.98 |
| 493.1               | 523.1       | 22.49                   | 22.60 | 22.65 |
| 533.4               | 563.4       | 22.01                   | 22.10 | 22.14 |
| 573.6               | 603.6       | 21.33                   | 21.44 | 21.48 |
| 613.9               | 643.9       | 20.43                   | 20.60 | 20.72 |
| 654.2               | 684.2       | 19.33                   | 19.53 | 19.71 |
| 694.4               | 724.4       | 18.09                   | 18.28 | 18.44 |
| 734.7               | 764.7       | 16.89                   | 17.04 | 17.18 |
| 774.9               | 804.9       | 15.82                   | 15.93 | 16.04 |
| 815.2               | 845.2       | 14.84                   | 14.93 | 15.02 |
| 855.4               | 885.4       | 14.02                   | 14.07 | 14.16 |
| 895.7               | 925.7       | 13.32                   | 13.35 | 13.43 |
| 935.9               | 965.9       | 12.74                   | 12.76 | 12.83 |
| 976.2               | 1006.2      | 12.25                   | 12.25 | 12.32 |
| 1016.4              | 1046.4      | 11.89                   | 11.89 | 11.94 |
| 1056.7              | 1086.7      | 11.63                   | 11.67 | 11.72 |
| 1096.9              | 1126.9      | 11.46                   | 11.54 | 11.62 |
| 1137.2              | 1167.2      | 11.30                   | 11.44 | 11.56 |
| 1177.4              | 1207.4      | 11.19                   | 11.41 | 11.57 |
| 1217.7              | 1247.7      | 11.15                   | 11.42 | 11.65 |
| 1257.9              | 1287.9      | 11.13                   | 11.43 | 11.72 |
| 1298.2              | 1328.2      | 11.22                   | 11.53 | 11.87 |
| 1338.5              | 1368.5      | 11.30                   | 11.60 | 11.94 |
| 1378.7              | 1408.7      | 11.42                   | 11.69 | 12.00 |
| 1419.0              | 1449.0      | 11.56                   | 11.78 | 12.00 |
| 1459.2              | 1489.2      | 11.68                   | 11.85 | 11.98 |
| 1499.5              | 1529.5      | 11.86                   | 12.01 | 12.07 |
| 1539.7              | 1569.7      | 11.99                   | 12.14 | 12.16 |
| 1600.1              | 1630.1      | 11.97                   | 12.13 | 12.17 |

# Frequency Mixer

**JMS-2W+**

## 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=1200.1MHz<br>(:1) |      |      |
|---------------------|-------------|-----------------|------|------|-------------|-----------------|------|------|----------------------|----------------------------------|------|------|
|                     |             | @LO (dBm)       |      |      |             | @LO (dBm)       |      |      |                      | @LO (dBm)                        |      |      |
|                     |             | +4              | +7   | +10  |             | +4              | +7   | +10  |                      | +4                               | +7   | +10  |
| 5.0                 | 35.0        | 1.60            | 1.46 | 1.33 | 5.0         | 1.16            | 1.69 | 2.51 | 1.0                  | 2.12                             | 1.80 | 1.54 |
| 10.0                | 40.0        | 1.59            | 1.44 | 1.32 | 10.0        | 1.15            | 1.67 | 2.48 | 3.3                  | 2.13                             | 1.80 | 1.54 |
| 50.4                | 80.4        | 1.43            | 1.32 | 1.27 | 50.4        | 1.20            | 1.74 | 2.48 | 5.5                  | 2.12                             | 1.80 | 1.54 |
| 90.6                | 120.6       | 1.51            | 1.40 | 1.34 | 90.6        | 1.18            | 1.73 | 2.45 | 7.8                  | 2.12                             | 1.80 | 1.54 |
| 130.9               | 160.9       | 1.45            | 1.35 | 1.28 | 130.9       | 1.18            | 1.72 | 2.42 | 10.0                 | 2.12                             | 1.80 | 1.54 |
| 171.1               | 201.1       | 1.50            | 1.40 | 1.34 | 171.1       | 1.20            | 1.73 | 2.42 | 22.4                 | 1.91                             | 1.64 | 1.48 |
| 211.4               | 241.4       | 1.43            | 1.33 | 1.29 | 211.4       | 1.21            | 1.72 | 2.39 | 34.6                 | 1.78                             | 1.56 | 1.40 |
| 251.6               | 281.6       | 1.42            | 1.33 | 1.27 | 251.6       | 1.22            | 1.74 | 2.42 | 46.9                 | 1.75                             | 1.51 | 1.35 |
| 291.9               | 321.9       | 1.40            | 1.32 | 1.27 | 291.9       | 1.23            | 1.74 | 2.41 | 59.1                 | 1.70                             | 1.47 | 1.33 |
| 332.1               | 362.1       | 1.36            | 1.29 | 1.25 | 332.1       | 1.25            | 1.78 | 2.47 | 71.4                 | 1.71                             | 1.46 | 1.34 |
| 372.4               | 402.4       | 1.33            | 1.27 | 1.23 | 372.4       | 1.26            | 1.81 | 2.52 | 83.6                 | 1.72                             | 1.49 | 1.36 |
| 412.6               | 442.6       | 1.29            | 1.24 | 1.21 | 412.6       | 1.27            | 1.81 | 2.51 | 95.9                 | 1.77                             | 1.53 | 1.41 |
| 452.9               | 482.9       | 1.27            | 1.23 | 1.21 | 452.9       | 1.30            | 1.86 | 2.58 | 120.4                | 1.80                             | 1.57 | 1.43 |
| 493.1               | 523.1       | 1.23            | 1.19 | 1.17 | 493.1       | 1.30            | 1.85 | 2.53 | 132.6                | 1.78                             | 1.55 | 1.42 |
| 533.4               | 563.4       | 1.22            | 1.20 | 1.19 | 533.4       | 1.31            | 1.87 | 2.57 | 144.9                | 1.75                             | 1.52 | 1.39 |
| 573.6               | 603.6       | 1.18            | 1.17 | 1.17 | 573.6       | 1.33            | 1.88 | 2.56 | 157.1                | 1.72                             | 1.50 | 1.38 |
| 613.9               | 643.9       | 1.17            | 1.18 | 1.21 | 613.9       | 1.36            | 1.92 | 2.62 | 169.4                | 1.71                             | 1.50 | 1.39 |
| 654.2               | 684.2       | 1.14            | 1.18 | 1.21 | 654.2       | 1.40            | 1.97 | 2.68 | 181.6                | 1.72                             | 1.52 | 1.41 |
| 694.4               | 724.4       | 1.17            | 1.21 | 1.26 | 694.4       | 1.43            | 2.00 | 2.71 | 193.9                | 1.77                             | 1.56 | 1.46 |
| 734.7               | 764.7       | 1.17            | 1.24 | 1.29 | 734.7       | 1.47            | 2.06 | 2.78 | 206.1                | 1.81                             | 1.60 | 1.50 |
| 774.9               | 804.9       | 1.19            | 1.27 | 1.33 | 774.9       | 1.49            | 2.07 | 2.77 | 218.4                | 1.83                             | 1.61 | 1.50 |
| 815.2               | 845.2       | 1.23            | 1.31 | 1.38 | 815.2       | 1.52            | 2.10 | 2.80 | 230.6                | 1.81                             | 1.59 | 1.48 |
| 855.4               | 885.4       | 1.23            | 1.31 | 1.37 | 855.4       | 1.55            | 2.12 | 2.82 | 242.9                | 1.76                             | 1.55 | 1.44 |
| 895.7               | 925.7       | 1.30            | 1.37 | 1.44 | 895.7       | 1.58            | 2.15 | 2.83 | 255.1                | 1.71                             | 1.52 | 1.42 |
| 935.9               | 965.9       | 1.29            | 1.36 | 1.41 | 935.9       | 1.64            | 2.23 | 2.94 | 267.4                | 1.70                             | 1.52 | 1.43 |
| 976.2               | 1006.2      | 1.35            | 1.43 | 1.48 | 976.2       | 1.67            | 2.25 | 2.93 | 279.6                | 1.72                             | 1.55 | 1.47 |
| 1016.4              | 1046.4      | 1.38            | 1.45 | 1.50 | 1016.4      | 1.73            | 2.32 | 3.03 | 291.9                | 1.75                             | 1.58 | 1.50 |
| 1056.7              | 1086.7      | 1.45            | 1.52 | 1.58 | 1056.7      | 1.76            | 2.34 | 3.04 | 304.1                | 1.77                             | 1.59 | 1.52 |
| 1096.9              | 1126.9      | 1.53            | 1.60 | 1.66 | 1096.9      | 1.78            | 2.35 | 3.03 | 316.4                | 1.77                             | 1.59 | 1.52 |
| 1137.2              | 1167.2      | 1.75            | 1.80 | 1.85 | 1137.2      | 1.84            | 2.41 | 3.10 | 340.9                | 1.72                             | 1.55 | 1.48 |
| 1177.4              | 1207.4      | 1.73            | 1.80 | 1.87 | 1177.4      | 1.86            | 2.41 | 3.08 | 353.1                | 1.68                             | 1.53 | 1.48 |
| 1217.7              | 1247.7      | 1.86            | 1.92 | 1.99 | 1217.7      | 1.91            | 2.47 | 3.14 | 365.4                | 1.68                             | 1.55 | 1.50 |
| 1257.9              | 1287.9      | 1.99            | 2.03 | 2.09 | 1257.9      | 2.00            | 2.56 | 3.22 | 377.6                | 1.71                             | 1.58 | 1.55 |
| 1298.2              | 1328.2      | 2.13            | 2.16 | 2.22 | 1298.2      | 2.01            | 2.57 | 3.23 | 389.9                | 1.75                             | 1.62 | 1.59 |
| 1338.5              | 1368.5      | 2.28            | 2.30 | 2.34 | 1338.5      | 2.09            | 2.67 | 3.34 | 402.1                | 1.79                             | 1.66 | 1.62 |
| 1378.7              | 1408.7      | 2.44            | 2.45 | 2.48 | 1378.7      | 2.12            | 2.68 | 3.35 | 414.4                | 1.79                             | 1.65 | 1.61 |
| 1419.0              | 1449.0      | 2.66            | 2.66 | 2.67 | 1419.0      | 2.16            | 2.72 | 3.40 | 438.9                | 1.72                             | 1.59 | 1.56 |
| 1459.2              | 1489.2      | 2.82            | 2.81 | 2.79 | 1459.2      | 2.19            | 2.74 | 3.40 | 451.1                | 1.69                             | 1.58 | 1.56 |
| 1499.5              | 1529.5      | 3.10            | 3.09 | 3.04 | 1499.5      | 2.21            | 2.75 | 3.39 | 463.4                | 1.69                             | 1.59 | 1.59 |
| 1539.7              | 1569.7      | 3.24            | 3.23 | 3.16 | 1539.7      | 2.27            | 2.80 | 3.45 | 487.9                | 1.77                             | 1.69 | 1.69 |
| 1600.1              | 1630.1      | 3.60            | 3.60 | 3.52 | 1600.1      | 2.35            | 2.87 | 3.50 | 500.1                | 1.80                             | 1.71 | 1.70 |

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## Harmonics Tables

RF HARMONICS ORDER

|        | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|--------|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0      | -      | -      | 11  | 27  | 18  | 31  | 46  | 38  | 22  | 38  | 27  | 48  |
| 1      | -      | 14     | 0   | 34  | 12  | 27  | 23  | 48  | 48  | 44  | 49  | 35  |
| 2      | 112    | 70     | 59  | 64  | 59  | 71  | 58  | 67  | 75  | 75  | 57  | 70  |
| 3      | 119    | 76     | 70  | 74  | 67  | 74  | 70  | 71  | 79  | 82  | 84  | 80  |
| 4      | 112    | 104    | 96  | 100 | 97  | 89  | 94  | 105 | 94  | 101 | 105 | 113 |
| 5      | 130    | 101    | 103 | 98  | 108 | 101 | 89  | 100 | 99  | 102 | 100 | 117 |
| 6      | 116    | 114    | 101 | 102 | 100 | 106 | 102 | 90  | 107 | 116 | 109 | 99  |
| 7      | 121    | 98     | 102 | 102 | 102 | 105 | 119 | 92  | 86  | 96  | 102 | 105 |
| 8      | 118    | 102    | 106 | 101 | 107 | 107 | 102 | 114 | 100 | 88  | 104 | 108 |
| 9      | 116    | 111    | 102 | 107 | 109 | 109 | 100 | 101 | 105 | 91  | 98  | 103 |
| 10     | 118    | 108    | 111 | 102 | 109 | 107 | 112 | 99  | 102 | 102 | 97  | 94  |
| RF CAL | 0      | 1      | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |     |

### LO HARMONICS ORDER

Test conditions:

RF IN: 600.1 MHz; -14.00 dBm.

LO IN: 630.01 MHz; +7.00 dBm

IF OUT: 29.91 MHz; -20.70 dBm

RF HARMONICS ORDER

|        | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |    |
|--------|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|
| 0      | -      | -      | 21  | 37  | 28  | 43  | 53  | 50  | 35  | 49  | 42  | 62 |
| 1      | -      | 14     | 0   | 33  | 12  | 28  | 24  | 53  | 47  | 48  | 51  | 40 |
| 2      | 93     | 65     | 50  | 55  | 49  | 77  | 52  | 61  | 66  | 65  | 51  | 65 |
| 3      | 112    | 56     | 48  | 54  | 45  | 59  | 50  | 49  | 51  | 65  | 71  | 61 |
| 4      | 125    | 78     | 78  | 69  | 71  | 70  | 74  | 70  | 64  | 71  | 80  | 88 |
| 5      | 116    | 83     | 77  | 74  | 61  | 75  | 59  | 75  | 60  | 73  | 65  | 81 |
| 6      | 111    | 108    | 97  | 86  | 90  | 81  | 80  | 82  | 80  | 99  | 82  | 87 |
| 7      | 126    | 92     | 105 | 91  | 80  | 79  | 77  | 87  | 76  | 89  | 83  | 87 |
| 8      | 126    | 133    | 104 | 120 | 112 | 102 | 107 | 105 | 110 | 93  | 101 | 94 |
| 9      | 113    | 104    | 110 | 113 | 109 | 112 | 102 | 98  | 97  | 113 | 90  | 99 |
| 10     | 105    | 110    | 114 | 120 | 115 | 115 | 112 | 107 | 114 | 101 | 101 | 99 |
| RF CAL | 0      | 1      | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |    |

### LO HARMONICS ORDER

Test conditions:

RF IN: 600.1 MHz; -4.00 dBm.

LO IN: 630.01 MHz; +7.00 dBm

IF OUT: 29.91 MHz; -10.69 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

JMS-2W+

100817

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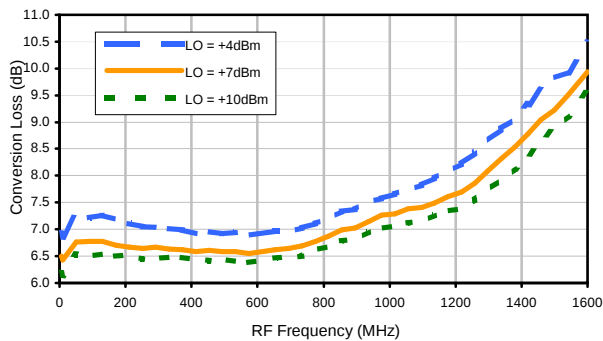


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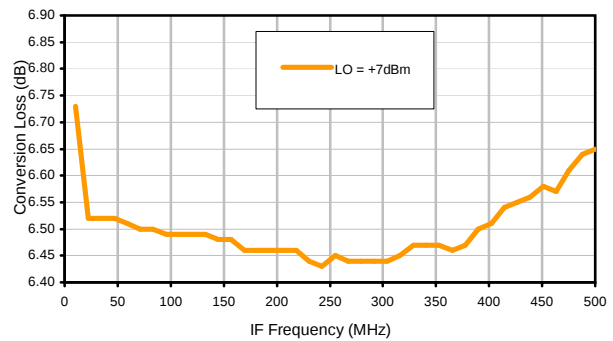


## Typical Performance Curves

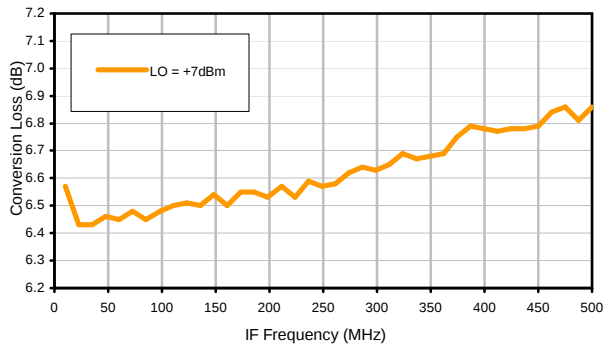
Conversion Loss @ IF=30MHz



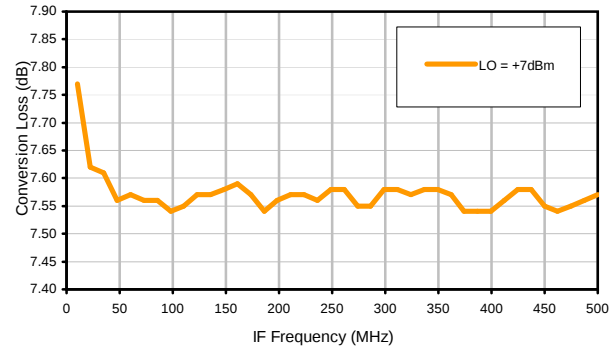
Conversion Loss vs. IF @ RF=600.1MHz



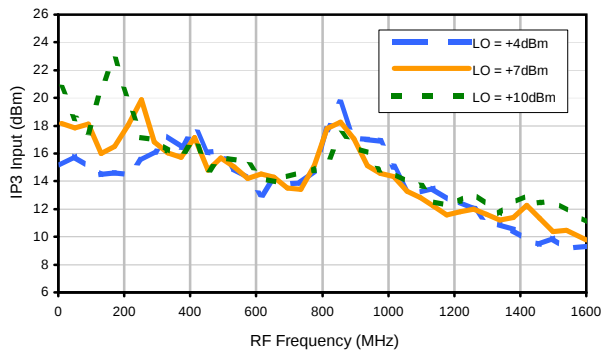
Conversion Loss vs. IF @ RF=10.1MHz



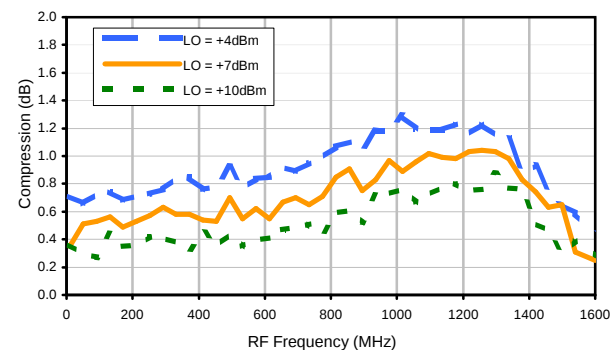
Conversion Loss vs. IF @ RF=1200.1MHz



IP3 Input

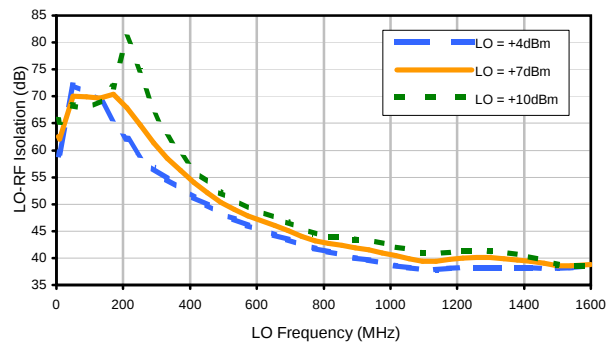


Compression @ RF IN=+1dBm

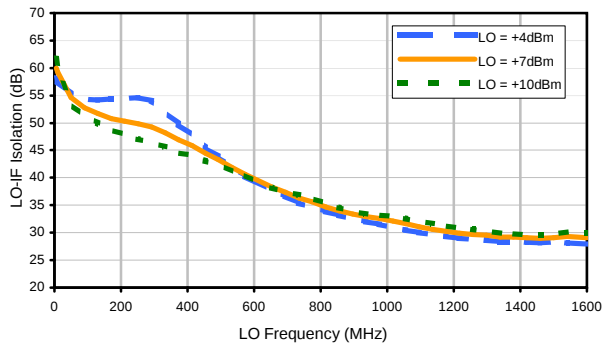


## Typical Performance Curves

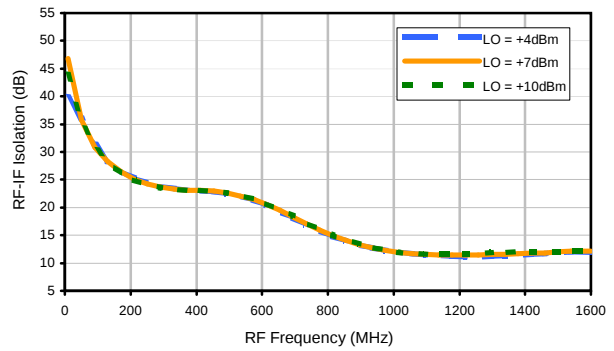
LO-RF Isolation



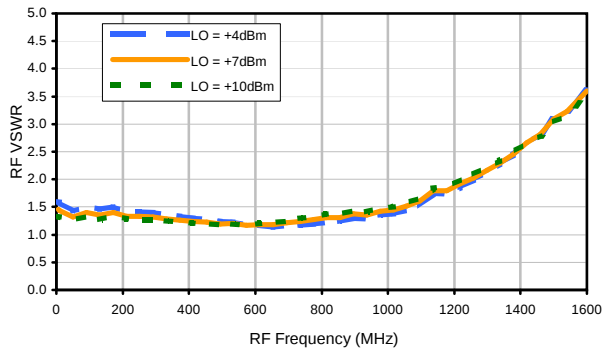
LO-IF Isolation



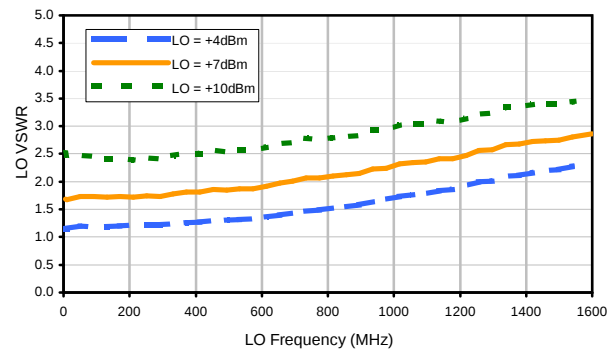
RF-IF Isolation



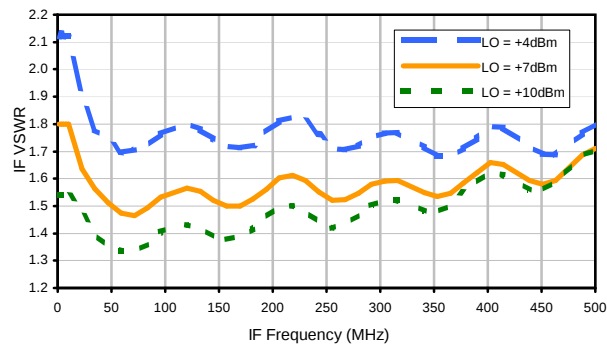
RF VSWR



LO VSWR



IF VSWR



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## Harmonics Tables

RF HARMONICS ORDER

|        | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|--------|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0      | -      | -      | 11  | 27  | 18  | 31  | 46  | 38  | 22  | 38  | 27  | 48  |
| 1      | -      | 14     | 0   | 34  | 12  | 27  | 23  | 48  | 48  | 44  | 49  | 35  |
| 2      | 112    | 70     | 59  | 64  | 59  | 71  | 58  | 67  | 75  | 75  | 57  | 70  |
| 3      | 119    | 76     | 70  | 74  | 67  | 74  | 70  | 71  | 79  | 82  | 84  | 80  |
| 4      | 112    | 104    | 96  | 100 | 97  | 89  | 94  | 105 | 94  | 101 | 105 | 113 |
| 5      | 130    | 101    | 103 | 98  | 108 | 101 | 89  | 100 | 99  | 102 | 100 | 117 |
| 6      | 116    | 114    | 101 | 102 | 100 | 106 | 102 | 90  | 107 | 116 | 109 | 99  |
| 7      | 121    | 98     | 102 | 102 | 102 | 105 | 119 | 92  | 86  | 96  | 102 | 105 |
| 8      | 118    | 102    | 106 | 101 | 107 | 107 | 102 | 114 | 100 | 88  | 104 | 108 |
| 9      | 116    | 111    | 102 | 107 | 109 | 109 | 100 | 101 | 105 | 91  | 98  | 103 |
| 10     | 118    | 108    | 111 | 102 | 109 | 107 | 112 | 99  | 102 | 102 | 97  | 94  |
| RF CAL | 0      | 1      | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |     |

### LO HARMONICS ORDER

Test conditions:

RF IN: 600.1 MHz; -14.00 dBm.

LO IN: 630.01 MHz; +7.00 dBm

IF OUT: 29.91 MHz; -20.70 dBm

RF HARMONICS ORDER

|        | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |    |
|--------|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|
| 0      | -      | -      | 21  | 37  | 28  | 43  | 53  | 50  | 35  | 49  | 42  | 62 |
| 1      | -      | 14     | 0   | 33  | 12  | 28  | 24  | 53  | 47  | 48  | 51  | 40 |
| 2      | 93     | 65     | 50  | 55  | 49  | 77  | 52  | 61  | 66  | 65  | 51  | 65 |
| 3      | 112    | 56     | 48  | 54  | 45  | 59  | 50  | 49  | 51  | 65  | 71  | 61 |
| 4      | 125    | 78     | 78  | 69  | 71  | 70  | 74  | 70  | 64  | 71  | 80  | 88 |
| 5      | 116    | 83     | 77  | 74  | 61  | 75  | 59  | 75  | 60  | 73  | 65  | 81 |
| 6      | 111    | 108    | 97  | 86  | 90  | 81  | 80  | 82  | 80  | 99  | 82  | 87 |
| 7      | 126    | 92     | 105 | 91  | 80  | 79  | 77  | 87  | 76  | 89  | 83  | 87 |
| 8      | 126    | 133    | 104 | 120 | 112 | 102 | 107 | 105 | 110 | 93  | 101 | 94 |
| 9      | 113    | 104    | 110 | 113 | 109 | 112 | 102 | 98  | 97  | 113 | 90  | 99 |
| 10     | 105    | 110    | 114 | 120 | 115 | 115 | 112 | 107 | 114 | 101 | 101 | 99 |
| RF CAL | 0      | 1      | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |    |

### LO HARMONICS ORDER

Test conditions:

RF IN: 600.1 MHz; -4.00 dBm.

LO IN: 630.01 MHz; +7.00 dBm

IF OUT: 29.91 MHz; -10.69 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

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Page 3 of 3



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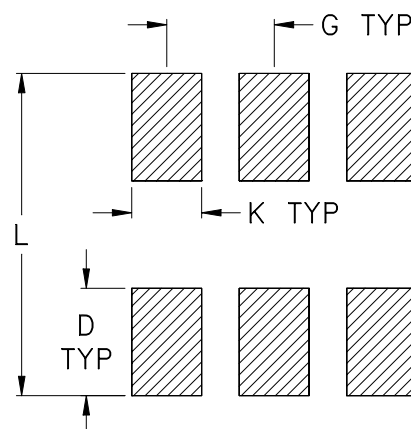
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### Outline Dimensions



### PCB Land Pattern



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

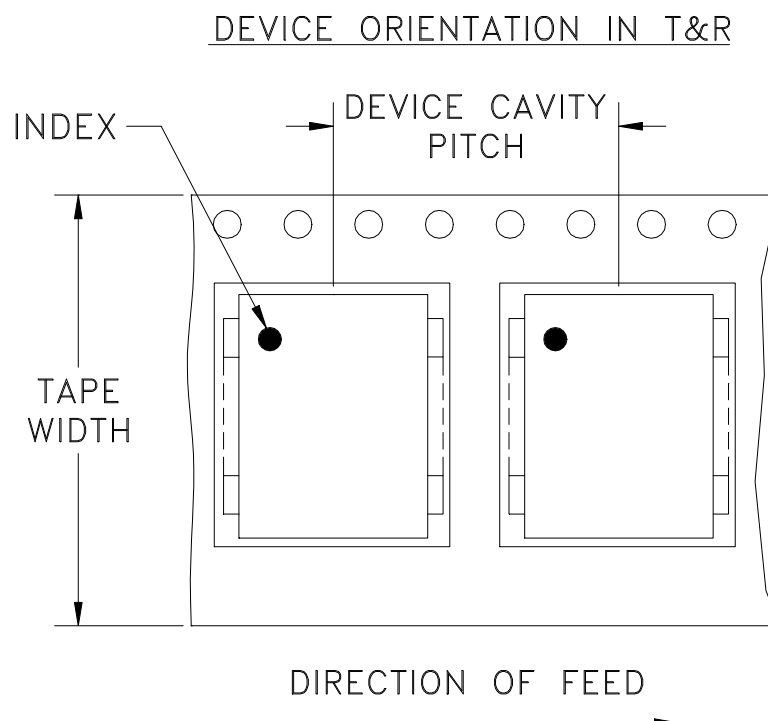
| CASE # | A              | B              | C      | D              | E              | F              | G              | H              | J              | K              | L              | WT. GRAM |
|--------|----------------|----------------|--------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------|
| BH292  | .280<br>(7.11) | .310<br>(7.87) | -<br>- | .100<br>(2.54) | .225<br>(5.72) | .055<br>(1.40) | .100<br>(2.54) | .047<br>(1.19) | .065<br>(1.65) | .065<br>(1.65) | .300<br>(7.62) | .45      |

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

#### Notes:

- Case material: Ceramic.
- Termination finish:  
For RoHS Case Styles: Tin plate over Nickel plate. All models, (+) suffix.  
For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.

# Tape & Reel Packaging TR-F24



| Tape Width,<br>mm | Device Cavity<br>Pitch, mm | Reel Size,<br>inches | Devices per Reel |
|-------------------|----------------------------|----------------------|------------------|
| 16                | 12                         | 13                   | 500              |

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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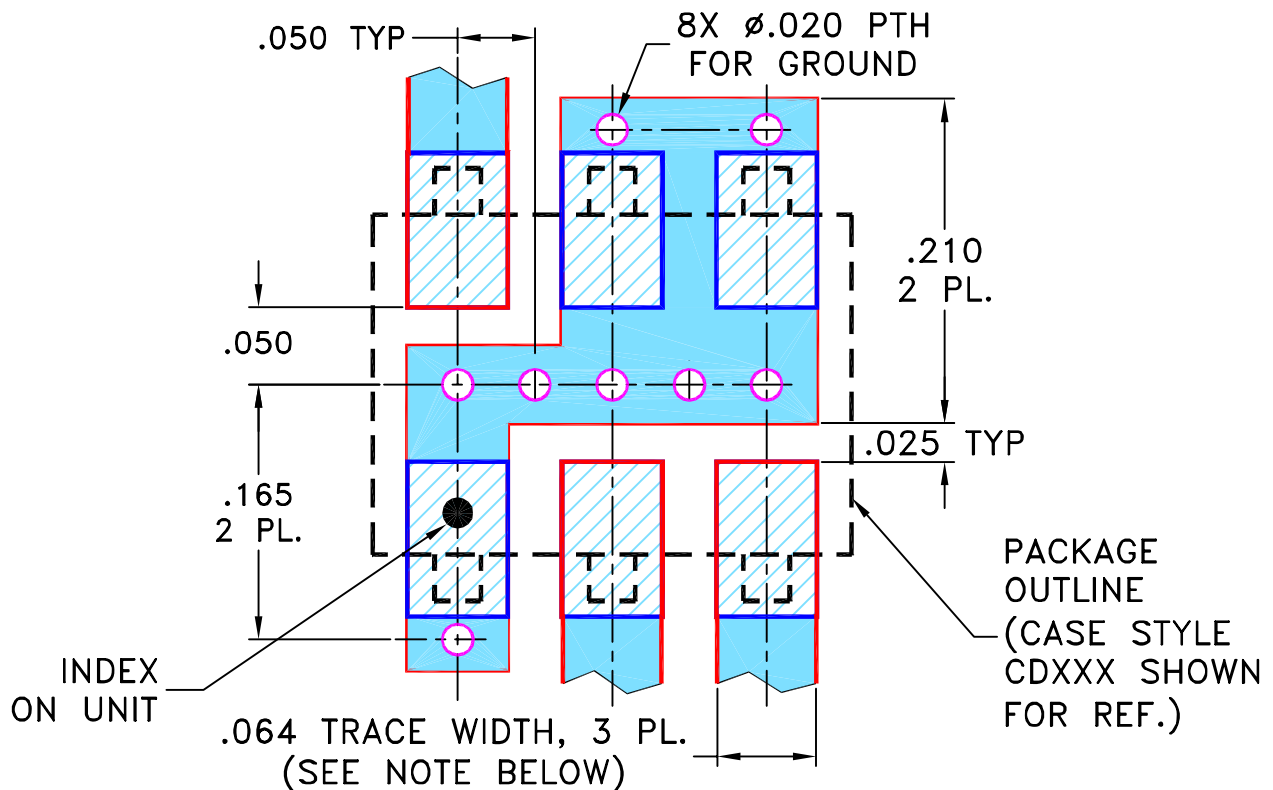
## THIRD ANGLE PROJECTION



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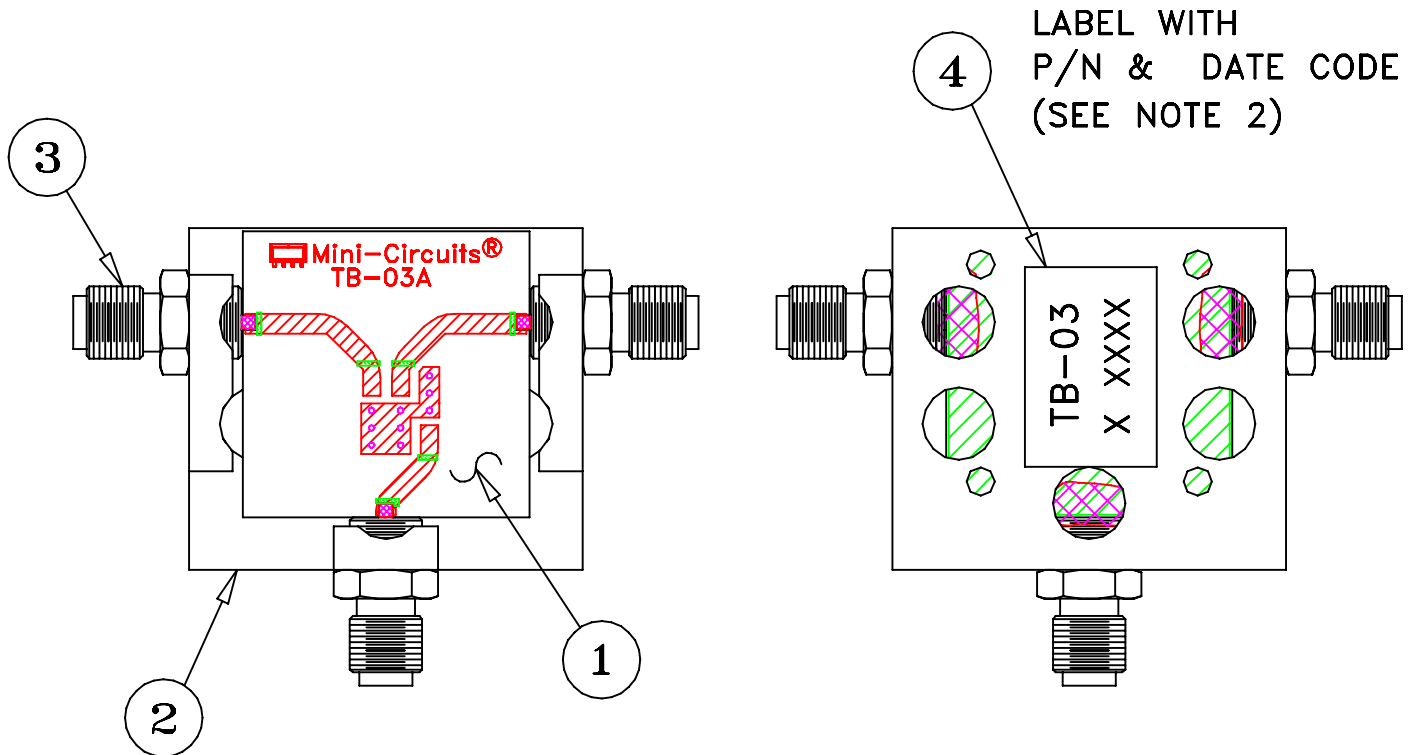
ASHEETA1.DWG REV:A DATE:01/12/95

## 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

06.29.99

TOLERANCES ON:

CHECKED

SG

07.06.99

2 PL DECIMALS ±

APPROVED

MG

07.10.99

3 PL DECIMALS ±

ANGLES ±

FRACTIONS ±

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


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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:

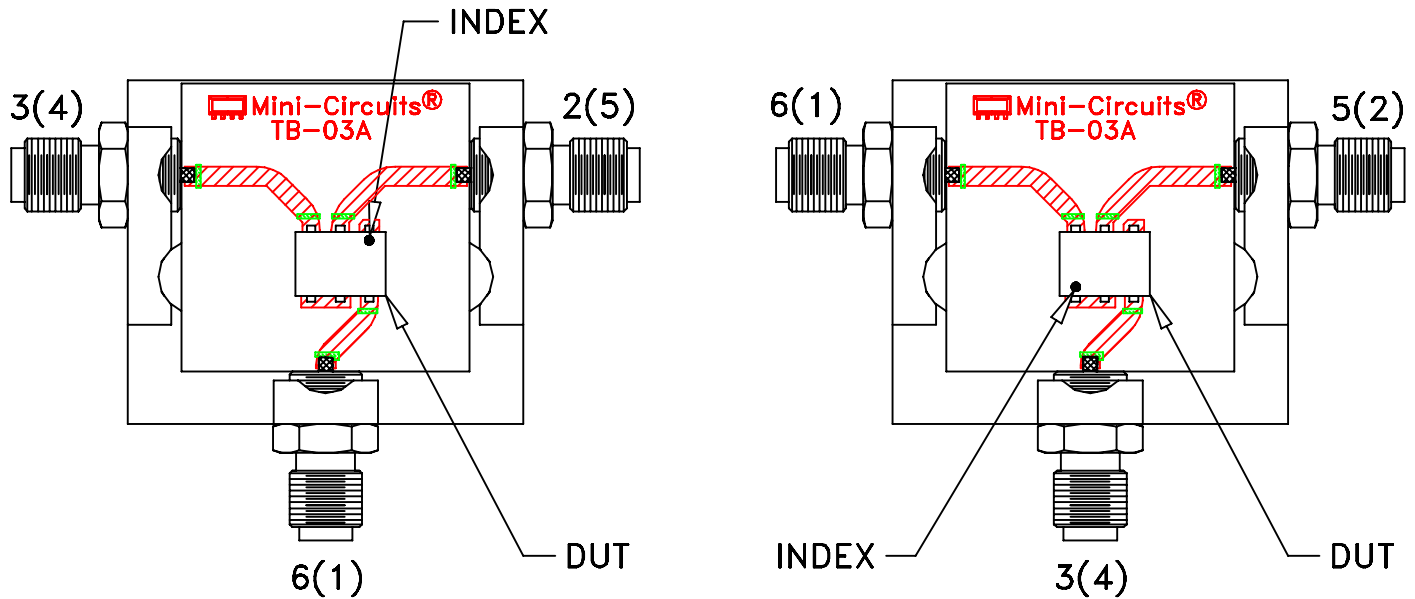
1.5:1

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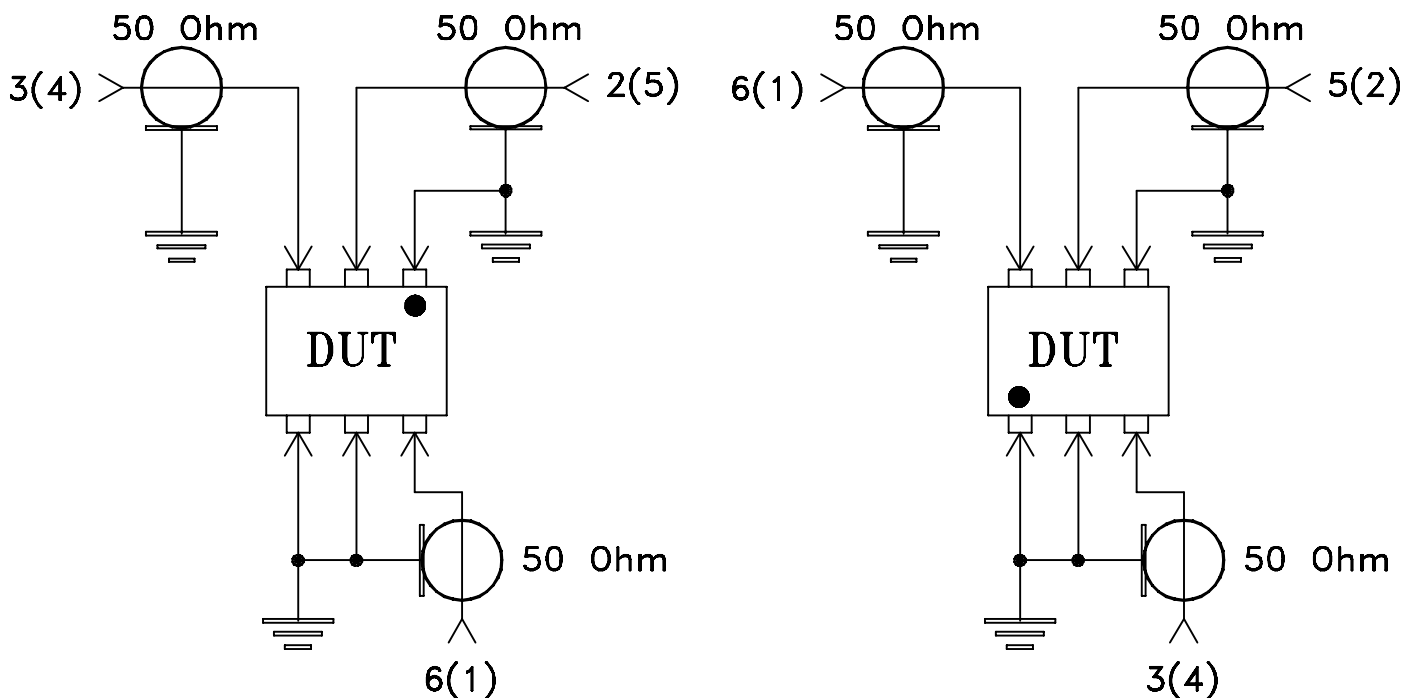
1 OF 2

# 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                                                                              |