

# Surface Mount Frequency Mixer

Level 17 (LO Power +17 dBm) 0.5 to 500 MHz

## ADE-1H+

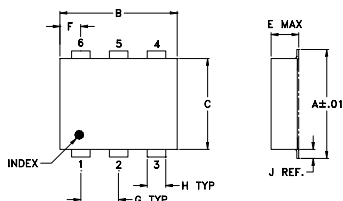
### Maximum Ratings

|                                                                 |                |
|-----------------------------------------------------------------|----------------|
| Operating Temperature                                           | -40°C to 85°C  |
| Storage Temperature                                             | -55°C to 100°C |
| RF Power                                                        | 200mW          |
| IF Current                                                      | 40mA           |
| Permanent damage may occur if any of these limits are exceeded. |                |

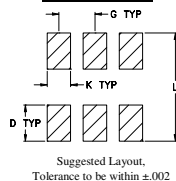
### Pin Connections

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

### Outline Drawing



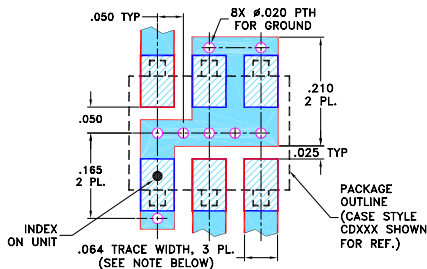
#### PCB Land Pattern



### Outline Dimensions (inch/mm)

| A    | B    | C    | D    | E     | F    | G    |
|------|------|------|------|-------|------|------|
| .272 | .310 | .220 | .100 | .162  | .055 | .100 |
| 6.91 | 7.87 | 5.59 | 2.54 | 4.11  | 1.40 | 2.54 |
| H    | J    | K    | L    | wt    |      |      |
| .030 | .026 | .065 | .300 | grams |      |      |
| 0.76 | 0.66 | 1.65 | 7.62 | 0.25  |      |      |

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



- NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.  
2. 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

- low conversion loss, 5.3 dB typ.
- excellent L-R isolation, 52 dB typ.
- excellent IP3, 23 dBm typ.
- aqueous washable
- protected by U.S. Patent 6,133,525

### Applications

- VHF/UHF receivers



Generic photo used for illustration purposes only

CASE STYLE: CD636

**+RoHS Compliant**

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



Available Tape and Reel  
at no extra cost

| Reel Size | Devices/Reel     |
|-----------|------------------|
| 7"        | 20, 50, 100, 200 |
| 13"       | 500, 1000        |

### Electrical Specifications

| FREQUENCY<br>(MHz)                          |        | CONVERSION LOSS<br>(dB) |          |      |                        | LO-RF ISOLATION<br>(dB) |      |      |      |      |    | LO-IF ISOLATION<br>(dB) |      |      |      |    |    | IP3<br>at center<br>band<br>(dBm) |
|---------------------------------------------|--------|-------------------------|----------|------|------------------------|-------------------------|------|------|------|------|----|-------------------------|------|------|------|----|----|-----------------------------------|
| LO/RF<br><br>f <sub>L</sub> -f <sub>U</sub> | IF     | Mid-Band<br>m           |          |      | Total<br>Range<br>Max. | L                       | M    |      | U    |      | L  | M                       |      | U    |      |    |    |                                   |
|                                             |        | $\overline{X}$          | $\sigma$ | Max. |                        |                         | Typ. | Min. | Typ. | Min. |    | Typ.                    | Min. | Typ. | Min. |    |    |                                   |
|                                             |        |                         |          |      |                        |                         |      |      |      |      |    |                         |      |      |      |    |    |                                   |
| 0.5-500                                     | DC-500 | 5.3                     | 0.2      | 6.8  | 8.0                    | 65                      | 50   | 52   | 35   | 40   | 26 | 53                      | 40   | 42   | 25   | 32 | 20 | 23                                |

1 dB COMP.: +14 dBm typ.

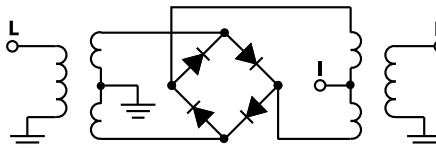
L = low range [ $f_L$  to  $10 f_L$ ]  
m = mid band [ $2 f_L$  to  $f_U/2$ ]

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 +17dBm            | LO +17dBm          | LO +17dBm          | LO +17dBm         | LO +17dBm         |
| 0.50            | 30.50  | 5.92                 | 65.80              | 53.70              | 1.65              | 1.54              |
| 1.00            | 31.00  | 5.41                 | 65.80              | 53.40              | 1.43              | 1.54              |
| 2.00            | 32.00  | 5.22                 | 65.70              | 52.70              | 1.34              | 1.55              |
| 5.00            | 35.00  | 4.88                 | 64.90              | 51.90              | 1.32              | 1.55              |
| 10.00           | 40.00  | 4.71                 | 63.50              | 50.80              | 1.30              | 1.54              |
| 50.00           | 80.00  | 4.81                 | 55.90              | 43.90              | 1.21              | 1.63              |
| 58.92           | 88.92  | 4.80                 | 55.70              | 42.90              | 1.22              | 1.59              |
| 100.00          | 130.00 | 4.81                 | 53.30              | 39.50              | 1.21              | 1.54              |
| 117.74          | 147.74 | 4.78                 | 52.70              | 39.00              | 1.19              | 1.65              |
| 176.55          | 206.55 | 4.88                 | 57.10              | 36.20              | 1.23              | 1.59              |
| 200.00          | 230.00 | 5.04                 | 55.70              | 35.90              | 1.22              | 1.70              |
| 235.37          | 265.37 | 5.04                 | 55.80              | 35.10              | 1.20              | 1.70              |
| 250.00          | 280.00 | 5.16                 | 56.50              | 34.80              | 1.17              | 1.67              |
| 300.00          | 330.00 | 5.34                 | 51.00              | 33.80              | 1.14              | 1.88              |
| 353.01          | 383.01 | 5.44                 | 42.30              | 32.30              | 1.13              | 1.80              |
| 400.00          | 430.00 | 5.46                 | 39.60              | 29.70              | 1.12              | 2.08              |
| 411.82          | 441.82 | 5.44                 | 39.80              | 29.30              | 1.12              | 2.03              |
| 450.00          | 480.00 | 5.78                 | 40.00              | 29.40              | 1.15              | 2.06              |
| 470.00          | 500.00 | 5.96                 | 39.50              | 30.70              | 1.19              | 2.23              |
| 500.00          | 530.00 | 6.47                 | 38.60              | 31.70              | 1.27              | 2.20              |

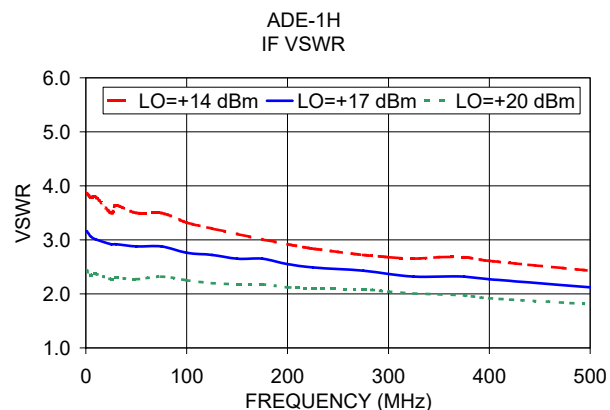
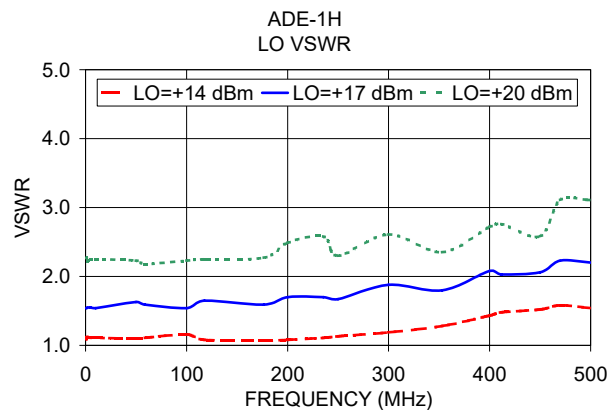
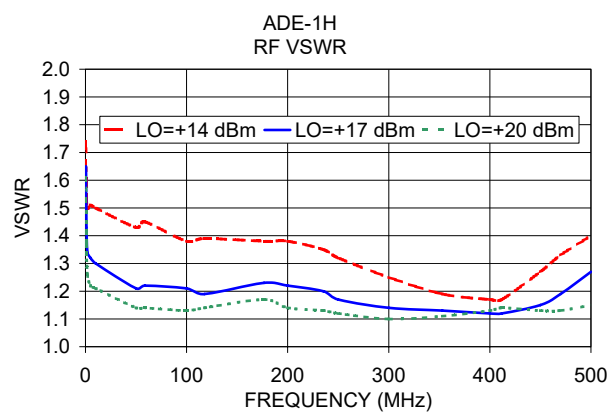
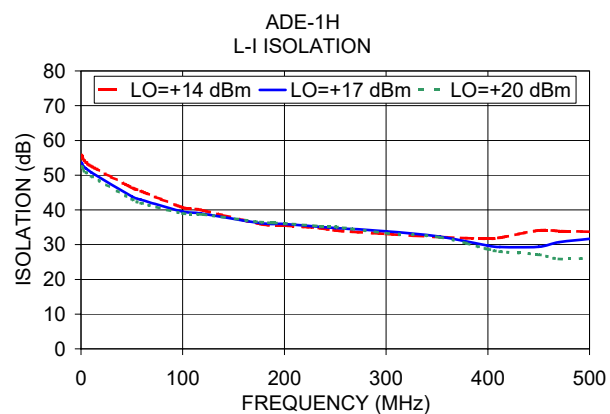
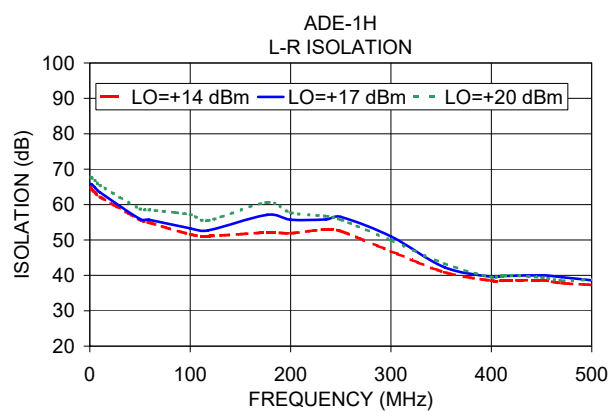
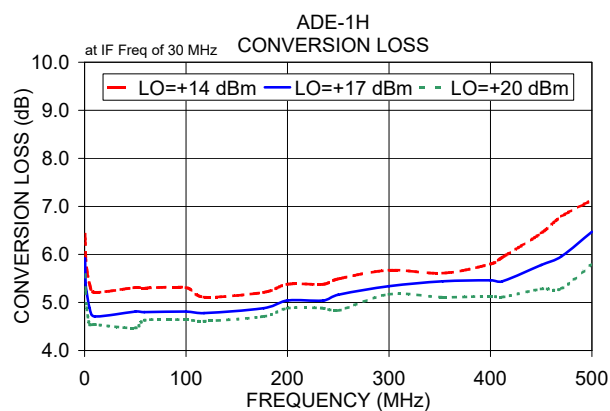
### Electrical Schematic



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Page 1 of 2



## Notes

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# Frequency Mixer

# ADE-1H+

## Typical Performance Data

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>IF FIXED<br>@IF(OUT)=30MHz<br>(dB) |       |       |
|---------------------|-------------|-------------------------------------------------------|-------|-------|
|                     |             | @LO (dBm)                                             |       |       |
|                     |             | +14                                                   | +17   | +20   |
| 0.5                 | 30.5        | 6.42                                                  | 5.92  | 5.58  |
| 1.0                 | 31.0        | 6.04                                                  | 5.41  | 5.24  |
| 2.0                 | 32.0        | 5.72                                                  | 5.22  | 4.89  |
| 5.0                 | 35.0        | 5.38                                                  | 4.88  | 4.54  |
| 10.0                | 40.0        | 5.21                                                  | 4.71  | 4.54  |
| 50.5                | 80.5        | 5.65                                                  | 5.26  | 5.04  |
| 70.7                | 100.7       | 5.66                                                  | 5.25  | 5.05  |
| 90.9                | 120.9       | 5.79                                                  | 5.29  | 5.08  |
| 111.1               | 141.1       | 5.70                                                  | 5.27  | 5.10  |
| 151.5               | 181.5       | 5.73                                                  | 5.37  | 5.18  |
| 171.7               | 201.7       | 5.73                                                  | 5.39  | 5.23  |
| 191.9               | 221.9       | 5.72                                                  | 5.39  | 5.23  |
| 212.1               | 242.1       | 5.76                                                  | 5.42  | 5.25  |
| 232.3               | 262.3       | 5.79                                                  | 5.47  | 5.30  |
| 252.5               | 282.5       | 5.88                                                  | 5.54  | 5.34  |
| 272.8               | 302.8       | 6.01                                                  | 5.66  | 5.40  |
| 293.0               | 323.0       | 6.03                                                  | 5.69  | 5.44  |
| 333.4               | 363.4       | 6.08                                                  | 5.77  | 5.55  |
| 353.6               | 383.6       | 6.10                                                  | 5.77  | 5.55  |
| 373.8               | 403.8       | 6.21                                                  | 5.81  | 5.56  |
| 394.0               | 424.0       | 6.32                                                  | 5.85  | 5.58  |
| 434.4               | 464.4       | 6.72                                                  | 6.09  | 5.67  |
| 454.6               | 484.6       | 6.97                                                  | 6.31  | 5.80  |
| 495.0               | 525.0       | 7.27                                                  | 6.65  | 5.99  |
| 515.2               | 545.2       | 7.56                                                  | 6.89  | 6.19  |
| 555.6               | 585.6       | 7.92                                                  | 7.13  | 6.31  |
| 575.8               | 605.8       | 8.13                                                  | 7.25  | 6.37  |
| 636.4               | 666.4       | 8.31                                                  | 7.29  | 6.52  |
| 676.8               | 706.8       | 8.21                                                  | 7.24  | 6.54  |
| 697.0               | 727.0       | 8.26                                                  | 7.28  | 6.66  |
| 737.4               | 767.4       | 8.43                                                  | 7.48  | 6.95  |
| 757.7               | 787.7       | 8.49                                                  | 7.57  | 7.08  |
| 798.1               | 828.1       | 8.67                                                  | 7.84  | 7.45  |
| 858.7               | 888.7       | 9.01                                                  | 8.35  | 8.12  |
| 878.9               | 908.9       | 9.25                                                  | 8.61  | 8.45  |
| 919.3               | 949.3       | 9.98                                                  | 9.21  | 9.06  |
| 939.5               | 969.5       | 10.51                                                 | 9.49  | 9.31  |
| 979.9               | 1009.9      | 11.56                                                 | 10.20 | 9.95  |
| 1000.1              | 1030.1      | 12.15                                                 | 10.59 | 10.27 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | IP3 INPUT<br>(dBm) |       |       |
|---------------------|-------------|--------------------|-------|-------|
|                     |             | @LO (dBm)          |       |       |
|                     |             | +14                | +17   | +20   |
| 10.1                | 40.1        | 30.31              | 34.08 | 34.39 |
| 30.3                | 60.3        | 26.57              | 31.00 | 33.48 |
| 50.5                | 80.5        | 29.61              | 31.20 | 33.91 |
| 70.7                | 100.7       | 30.01              | 31.54 | 33.68 |
| 90.9                | 120.9       | 25.66              | 30.60 | 30.33 |
| 111.1               | 141.1       | 32.43              | 31.33 | 27.06 |
| 151.5               | 181.5       | 27.21              | 27.91 | 24.84 |
| 171.7               | 201.7       | 29.24              | 26.22 | 24.56 |
| 191.9               | 221.9       | 27.50              | 24.57 | 24.05 |
| 212.1               | 242.1       | 26.22              | 22.87 | 22.58 |
| 232.3               | 262.3       | 25.48              | 22.73 | 22.64 |
| 252.5               | 282.5       | 23.90              | 22.61 | 23.07 |
| 272.8               | 302.8       | 23.22              | 22.33 | 23.27 |
| 293.0               | 323.0       | 23.15              | 22.30 | 23.67 |
| 313.2               | 343.2       | 23.50              | 22.59 | 23.61 |
| 333.4               | 363.4       | 23.14              | 22.42 | 23.38 |
| 353.6               | 383.6       | 24.49              | 23.08 | 24.37 |
| 373.8               | 403.8       | 23.56              | 22.55 | 23.72 |
| 394.0               | 424.0       | 21.61              | 21.91 | 22.97 |
| 434.4               | 464.4       | 17.00              | 19.54 | 22.43 |
| 454.6               | 484.6       | 16.01              | 18.13 | 22.02 |
| 495.0               | 525.0       | 15.23              | 16.94 | 20.77 |
| 515.2               | 545.2       | 14.75              | 16.50 | 20.11 |
| 555.6               | 585.6       | 15.14              | 17.28 | 21.01 |
| 575.8               | 605.8       | 15.16              | 17.31 | 21.04 |
| 616.2               | 646.2       | 15.65              | 17.96 | 22.23 |
| 636.4               | 666.4       | 16.39              | 18.60 | 22.67 |
| 676.8               | 706.8       | 18.27              | 20.19 | 25.42 |
| 697.0               | 727.0       | 19.68              | 20.33 | 23.35 |
| 737.4               | 767.4       | 22.26              | 20.44 | 22.40 |
| 757.7               | 787.7       | 22.58              | 20.56 | 21.91 |
| 798.1               | 828.1       | 21.08              | 20.28 | 20.90 |
| 818.3               | 848.3       | 19.94              | 19.90 | 20.13 |
| 858.7               | 888.7       | 19.50              | 21.04 | 21.71 |
| 878.9               | 908.9       | 18.81              | 22.04 | 22.88 |
| 919.3               | 949.3       | 18.22              | 24.01 | 26.83 |
| 939.5               | 969.5       | 18.23              | 23.79 | 25.91 |
| 979.9               | 1009.9      | 18.72              | 24.02 | 27.45 |
| 1000.1              | 1030.1      | 18.50              | 24.16 | 26.92 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | COMPRESSION<br>@RF IN=+14dBm<br>(dB) |      |      |
|---------------------|-------------|--------------------------------------|------|------|
|                     |             | @LO (dBm)                            |      |      |
|                     |             | +14                                  | +17  | +20  |
| 10.1                | 40.1        | 1.11                                 | 0.67 | 0.44 |
| 30.3                | 60.3        | 0.88                                 | 0.63 | 0.47 |
| 50.5                | 80.5        | 1.00                                 | 0.69 | 0.44 |
| 70.7                | 100.7       | 1.03                                 | 0.63 | 0.43 |
| 90.9                | 120.9       | 0.96                                 | 0.61 | 0.39 |
| 111.1               | 141.1       | 1.02                                 | 0.58 | 0.36 |
| 151.5               | 181.5       | 1.01                                 | 0.57 | 0.37 |
| 171.7               | 201.7       | 0.94                                 | 0.52 | 0.34 |
| 191.9               | 221.9       | 0.97                                 | 0.49 | 0.35 |
| 212.1               | 242.1       | 0.95                                 | 0.52 | 0.37 |
| 232.3               | 262.3       | 0.95                                 | 0.51 | 0.36 |
| 252.5               | 282.5       | 0.89                                 | 0.48 | 0.33 |
| 272.8               | 302.8       | 0.79                                 | 0.44 | 0.35 |
| 293.0               | 323.0       | 0.90                                 | 0.48 | 0.37 |
| 313.2               | 343.2       | 0.99                                 | 0.50 | 0.39 |
| 333.4               | 363.4       | 1.19                                 | 0.62 | 0.48 |
| 353.6               | 383.6       | 1.27                                 | 0.71 | 0.55 |
| 373.8               | 403.8       | 1.40                                 | 0.81 | 0.61 |
| 394.0               | 424.0       | 1.45                                 | 0.94 | 0.71 |
| 434.4               | 464.4       | 1.52                                 | 1.21 | 0.89 |
| 454.6               | 484.6       | 1.44                                 | 1.17 | 0.95 |
| 495.0               | 525.0       | 1.38                                 | 1.16 | 1.08 |
| 515.2               | 545.2       | 1.33                                 | 1.12 | 1.12 |
| 555.6               | 585.6       | 1.14                                 | 1.08 | 1.16 |
| 575.8               | 605.8       | 1.02                                 | 1.06 | 1.17 |
| 616.2               | 646.2       | 1.08                                 | 1.18 | 1.24 |
| 636.4               | 666.4       | 1.07                                 | 1.16 | 1.19 |
| 676.8               | 706.8       | 1.15                                 | 1.18 | 1.16 |
| 697.0               | 727.0       | 1.24                                 | 1.23 | 1.14 |
| 737.4               | 767.4       | 1.32                                 | 1.23 | 1.09 |
| 757.7               | 787.7       | 1.37                                 | 1.23 | 1.08 |
| 798.1               | 828.1       | 1.48                                 | 1.17 | 0.98 |
| 818.3               | 848.3       | 1.56                                 | 1.12 | 0.90 |
| 858.7               | 888.7       | 1.66                                 | 0.98 | 0.71 |
| 878.9               | 908.9       | 1.77                                 | 0.96 | 0.63 |
| 919.3               | 949.3       | 1.73                                 | 0.95 | 0.59 |
| 939.5               | 969.5       | 1.67                                 | 0.96 | 0.63 |
| 979.9               | 1009.9      | 1.67                                 | 1.04 | 0.69 |
| 1000.1              | 1030.1      | 1.90                                 | 1.14 | 0.78 |

REV. X2  
ADE-1H+  
100817  
Page 1 of 5



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



# Frequency Mixer

ADE-1H+

## Typical Performance Data

| IF<br>(OUT)<br>(MHz) | LO<br>(MHz) | CONVERSION LOSS<br>VS. IF FREQUENCY<br>@RF(IN)=250.1MHz<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)=500.1MHz<br>(dB) |
|----------------------|-------------|-----------------------------------------------------------------|----------------------|-------------|----------------------------------------------------------------|----------------------|-------------|-----------------------------------------------------------------|
|                      |             | @LO (dBm)                                                       |                      |             | @LO (dBm)                                                      |                      |             | @LO (dBm)                                                       |
|                      |             | +17                                                             |                      |             | +17                                                            |                      |             | +17                                                             |
| 240.0                | 10.1        | 5.57                                                            | 10.0                 | 20.1        | 5.08                                                           | 490.0                | 10.1        | 6.24                                                            |
| 234.1                | 16.0        | 5.56                                                            | 22.3                 | 32.4        | 5.15                                                           | 477.7                | 22.4        | 6.12                                                            |
| 228.2                | 21.9        | 5.45                                                            | 34.6                 | 44.7        | 5.19                                                           | 465.4                | 34.7        | 6.06                                                            |
| 222.3                | 27.8        | 5.49                                                            | 46.9                 | 57.0        | 5.16                                                           | 453.1                | 47.0        | 6.06                                                            |
| 216.4                | 33.7        | 5.44                                                            | 59.2                 | 69.3        | 5.13                                                           | 440.8                | 59.3        | 6.07                                                            |
| 210.5                | 39.6        | 5.40                                                            | 71.5                 | 81.6        | 5.21                                                           | 428.5                | 71.6        | 5.94                                                            |
| 204.6                | 45.5        | 5.47                                                            | 83.8                 | 93.9        | 5.23                                                           | 416.2                | 83.9        | 5.89                                                            |
| 198.7                | 51.4        | 5.37                                                            | 96.2                 | 106.3       | 5.24                                                           | 403.8                | 96.3        | 5.82                                                            |
| 192.8                | 57.3        | 5.37                                                            | 108.5                | 118.6       | 5.25                                                           | 391.5                | 108.6       | 5.78                                                            |
| 186.9                | 63.2        | 5.35                                                            | 120.8                | 130.9       | 5.21                                                           | 379.2                | 120.9       | 5.81                                                            |
| 181.0                | 69.1        | 5.31                                                            | 133.1                | 143.2       | 5.23                                                           | 366.9                | 133.2       | 5.83                                                            |
| 175.1                | 75.0        | 5.38                                                            | 145.4                | 155.5       | 5.31                                                           | 354.6                | 145.5       | 5.80                                                            |
| 169.2                | 80.9        | 5.31                                                            | 157.7                | 167.8       | 5.37                                                           | 342.3                | 157.8       | 5.81                                                            |
| 163.3                | 86.8        | 5.28                                                            | 170.0                | 180.1       | 5.38                                                           | 330.0                | 170.1       | 5.83                                                            |
| 157.4                | 92.7        | 5.31                                                            | 182.3                | 192.4       | 5.37                                                           | 317.7                | 182.4       | 5.86                                                            |
| 151.5                | 98.6        | 5.24                                                            | 194.6                | 204.7       | 5.36                                                           | 305.4                | 194.7       | 5.89                                                            |
| 145.6                | 104.5       | 5.27                                                            | 206.9                | 217.0       | 5.39                                                           | 293.1                | 207.0       | 5.88                                                            |
| 139.7                | 110.4       | 5.26                                                            | 219.2                | 229.3       | 5.43                                                           | 280.8                | 219.3       | 5.89                                                            |
| 133.8                | 116.3       | 5.23                                                            | 231.5                | 241.6       | 5.43                                                           | 268.5                | 231.6       | 5.96                                                            |
| 127.9                | 122.2       | 5.22                                                            | 243.8                | 253.9       | 5.43                                                           | 256.2                | 243.9       | 5.98                                                            |
| 122.1                | 128.0       | 5.20                                                            | 256.2                | 266.3       | 5.48                                                           | 243.8                | 256.3       | 6.04                                                            |
| 116.2                | 133.9       | 5.23                                                            | 268.5                | 278.6       | 5.47                                                           | 231.5                | 268.6       | 6.06                                                            |
| 110.3                | 139.8       | 5.26                                                            | 280.8                | 290.9       | 5.53                                                           | 219.2                | 280.9       | 6.03                                                            |
| 104.4                | 145.7       | 5.25                                                            | 293.1                | 303.2       | 5.58                                                           | 206.9                | 293.2       | 6.04                                                            |
| 98.5                 | 151.6       | 5.27                                                            | 305.4                | 315.5       | 5.60                                                           | 194.6                | 305.5       | 6.04                                                            |
| 92.6                 | 157.5       | 5.26                                                            | 317.7                | 327.8       | 5.68                                                           | 182.3                | 317.8       | 6.04                                                            |
| 86.7                 | 163.4       | 5.28                                                            | 330.0                | 340.1       | 5.69                                                           | 170.0                | 330.1       | 6.07                                                            |
| 80.8                 | 169.3       | 5.30                                                            | 342.3                | 352.4       | 5.69                                                           | 157.7                | 342.4       | 6.07                                                            |
| 74.9                 | 175.2       | 5.30                                                            | 354.6                | 364.7       | 5.75                                                           | 145.4                | 354.7       | 6.11                                                            |
| 69.0                 | 181.1       | 5.31                                                            | 366.9                | 377.0       | 5.77                                                           | 133.1                | 367.0       | 6.15                                                            |
| 63.1                 | 187.0       | 5.29                                                            | 379.2                | 389.3       | 5.75                                                           | 120.8                | 379.3       | 6.12                                                            |
| 57.2                 | 192.9       | 5.29                                                            | 391.5                | 401.6       | 5.68                                                           | 108.5                | 391.6       | 6.13                                                            |
| 51.3                 | 198.8       | 5.32                                                            | 403.8                | 413.9       | 5.59                                                           | 96.2                 | 403.9       | 6.17                                                            |
| 45.4                 | 204.7       | 5.35                                                            | 416.2                | 426.3       | 5.58                                                           | 83.8                 | 416.3       | 6.15                                                            |
| 39.5                 | 210.6       | 5.38                                                            | 428.5                | 438.6       | 5.61                                                           | 71.5                 | 428.6       | 6.15                                                            |
| 33.6                 | 216.5       | 5.38                                                            | 440.8                | 450.9       | 5.65                                                           | 59.2                 | 440.9       | 6.19                                                            |
| 27.7                 | 222.4       | 5.39                                                            | 453.1                | 463.2       | 5.68                                                           | 46.9                 | 453.2       | 6.24                                                            |
| 21.8                 | 228.3       | 5.41                                                            | 465.4                | 475.5       | 5.66                                                           | 34.6                 | 465.5       | 6.34                                                            |
| 15.9                 | 234.2       | 5.41                                                            | 477.7                | 487.8       | 5.64                                                           | 22.3                 | 477.8       | 6.43                                                            |
| 10.0                 | 240.1       | 5.33                                                            | 490.0                | 500.1       | 5.66                                                           | 10.0                 | 490.1       | 6.39                                                            |

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Page 2 of 5



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## Typical Performance Data

| LO<br>(MHz) | LO-RF ISOLATION<br>(dB) |       |       | LO-IF ISOLATION<br>(dB) |       |       |
|-------------|-------------------------|-------|-------|-------------------------|-------|-------|
|             | @LO (dBm)               |       |       | @LO (dBm)               |       |       |
|             | +14                     | +17   | +20   | +14                     | +17   | +20   |
| 0.5         | 64.9                    | 65.8  | 67.7  | 55.8                    | 53.7  | 52.5  |
| 1.0         | 64.6                    | 65.8  | 67.6  | 55.5                    | 53.4  | 52.3  |
| 2.0         | 64.3                    | 65.7  | 67.6  | 54.6                    | 52.7  | 51.6  |
| 5.0         | 63.5                    | 64.9  | 66.8  | 53.7                    | 51.9  | 50.8  |
| 10.0        | 62.2                    | 63.5  | 65.5  | 52.6                    | 50.8  | 49.7  |
| 50.5        | 57.57                   | 59.75 | 61.64 | 50.08                   | 48.08 | 46.97 |
| 70.7        | 54.74                   | 56.79 | 59.19 | 46.89                   | 45.21 | 43.77 |
| 90.9        | 52.83                   | 54.92 | 57.38 | 44.27                   | 42.75 | 41.63 |
| 111.1       | 51.13                   | 54.34 | 57.22 | 42.53                   | 40.68 | 39.98 |
| 151.5       | 49.33                   | 52.68 | 55.54 | 39.43                   | 38.12 | 37.86 |
| 171.7       | 48.97                   | 52.44 | 55.37 | 37.89                   | 37.20 | 37.14 |
| 191.9       | 47.79                   | 51.23 | 54.58 | 36.94                   | 36.61 | 36.52 |
| 212.1       | 47.35                   | 50.39 | 52.76 | 36.11                   | 35.86 | 35.87 |
| 232.3       | 47.16                   | 50.51 | 53.04 | 35.89                   | 35.86 | 35.55 |
| 252.5       | 46.82                   | 50.30 | 52.64 | 35.79                   | 35.82 | 35.42 |
| 272.8       | 46.71                   | 49.66 | 51.13 | 34.38                   | 34.63 | 34.60 |
| 293.0       | 45.22                   | 48.17 | 49.30 | 34.75                   | 34.72 | 34.27 |
| 333.4       | 42.19                   | 44.73 | 46.11 | 33.33                   | 33.16 | 32.60 |
| 353.6       | 40.58                   | 42.54 | 43.71 | 33.80                   | 33.19 | 32.25 |
| 373.8       | 39.61                   | 41.57 | 42.84 | 33.53                   | 32.60 | 31.59 |
| 394.0       | 38.61                   | 39.85 | 40.08 | 32.74                   | 31.60 | 30.50 |
| 434.4       | 38.02                   | 39.20 | 39.28 | 33.35                   | 30.16 | 28.40 |
| 454.6       | 37.21                   | 38.51 | 38.69 | 33.49                   | 29.60 | 27.61 |
| 495.0       | 36.36                   | 37.83 | 37.94 | 34.39                   | 29.49 | 25.91 |
| 515.2       | 35.83                   | 37.45 | 38.08 | 34.31                   | 29.96 | 25.78 |
| 555.6       | 35.08                   | 36.32 | 37.07 | 34.11                   | 30.56 | 26.11 |
| 575.8       | 34.57                   | 35.30 | 35.23 | 33.86                   | 30.24 | 25.66 |
| 636.4       | 34.25                   | 35.30 | 36.42 | 34.37                   | 29.33 | 24.62 |
| 676.8       | 34.52                   | 35.64 | 36.23 | 34.10                   | 29.04 | 23.94 |
| 697.0       | 35.02                   | 35.16 | 34.54 | 32.24                   | 27.92 | 23.04 |
| 737.4       | 36.46                   | 35.91 | 34.13 | 28.69                   | 26.61 | 21.97 |
| 757.7       | 36.98                   | 36.35 | 34.33 | 26.64                   | 25.21 | 21.26 |
| 798.1       | 41.87                   | 36.23 | 31.81 | 23.22                   | 22.92 | 19.77 |
| 858.7       | 39.21                   | 32.46 | 27.79 | 18.85                   | 20.11 | 18.38 |
| 878.9       | 33.89                   | 30.19 | 25.91 | 17.59                   | 19.25 | 17.82 |
| 919.3       | 28.18                   | 26.99 | 24.01 | 15.45                   | 17.57 | 17.13 |
| 939.5       | 26.39                   | 26.22 | 23.77 | 14.63                   | 16.91 | 16.91 |
| 979.9       | 24.02                   | 23.82 | 21.99 | 13.65                   | 15.65 | 16.24 |
| 1000.1      | 23.01                   | 22.83 | 21.15 | 13.28                   | 15.11 | 15.92 |

| RF<br>(IN)<br>(MHz) | LO<br>(MHz) | RF-IF ISOLATION<br>(dB) |       |       |
|---------------------|-------------|-------------------------|-------|-------|
|                     |             | @LO (dBm)               |       |       |
|                     |             | +14                     | +17   | +20   |
| 10.1                | 40.1        | 44.72                   | 44.66 | 43.30 |
| 30.3                | 60.3        | 35.84                   | 35.38 | 35.13 |
| 50.5                | 80.5        | 31.56                   | 31.76 | 31.65 |
| 70.7                | 100.7       | 29.11                   | 29.16 | 29.40 |
| 90.9                | 120.9       | 27.36                   | 27.66 | 27.82 |
| 111.1               | 141.1       | 26.11                   | 26.53 | 26.61 |
| 151.5               | 181.5       | 24.57                   | 24.89 | 25.11 |
| 171.7               | 201.7       | 24.24                   | 24.64 | 24.91 |
| 191.9               | 221.9       | 23.93                   | 24.44 | 24.79 |
| 212.1               | 242.1       | 23.45                   | 24.11 | 24.46 |
| 232.3               | 262.3       | 23.49                   | 24.05 | 24.48 |
| 252.5               | 282.5       | 23.51                   | 24.05 | 24.46 |
| 272.8               | 302.8       | 23.56                   | 24.21 | 24.64 |
| 293.0               | 323.0       | 23.97                   | 24.76 | 25.29 |
| 313.2               | 343.2       | 23.97                   | 24.75 | 25.39 |
| 333.4               | 363.4       | 23.89                   | 24.69 | 25.47 |
| 353.6               | 383.6       | 23.03                   | 23.73 | 24.40 |
| 373.8               | 403.8       | 22.00                   | 22.63 | 23.22 |
| 394.0               | 424.0       | 21.00                   | 21.43 | 21.91 |
| 434.4               | 464.4       | 19.15                   | 19.30 | 19.47 |
| 454.6               | 484.6       | 18.57                   | 18.76 | 18.94 |
| 495.0               | 525.0       | 17.95                   | 18.02 | 18.32 |
| 515.2               | 545.2       | 17.92                   | 17.82 | 18.08 |
| 555.6               | 585.6       | 18.01                   | 17.87 | 18.22 |
| 575.8               | 605.8       | 18.13                   | 18.01 | 18.32 |
| 616.2               | 646.2       | 17.90                   | 17.68 | 17.40 |
| 636.4               | 666.4       | 17.47                   | 17.23 | 16.75 |
| 676.8               | 706.8       | 15.95                   | 15.46 | 14.90 |
| 697.0               | 727.0       | 15.03                   | 14.63 | 14.22 |
| 737.4               | 767.4       | 13.27                   | 13.08 | 12.78 |
| 757.7               | 787.7       | 12.45                   | 12.31 | 12.00 |
| 798.1               | 828.1       | 11.03                   | 10.89 | 10.63 |
| 818.3               | 848.3       | 10.40                   | 10.26 | 10.05 |
| 858.7               | 888.7       | 9.12                    | 8.92  | 8.61  |
| 878.9               | 908.9       | 8.55                    | 8.43  | 8.11  |
| 919.3               | 949.3       | 7.39                    | 7.32  | 7.04  |
| 939.5               | 969.5       | 6.89                    | 6.77  | 6.51  |
| 979.9               | 1009.9      | 6.20                    | 5.91  | 5.72  |
| 1000.1              | 1030.1      | 5.90                    | 5.53  | 5.40  |

# Frequency Mixer

# ADE-1H+

## 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=500.1MHz<br>(:1) |      |      |
|---------------------|-------------|-----------------|------|------|-------------|-----------------|------|------|----------------------|---------------------------------|------|------|
|                     |             | @LO (dBm)       |      |      |             | @LO (dBm)       |      |      |                      | @LO (dBm)                       |      |      |
|                     |             | +14             | +17  | +20  |             | +14             | +17  | +20  |                      | +14                             | +17  | +20  |
| 0.5                 | 30.5        | 1.74            | 1.65 | 1.61 | 0.5         | 1.09            | 1.54 | 2.27 | 1.0                  | 3.86                            | 3.16 | 2.43 |
| 1.0                 | 31.0        | 1.54            | 1.43 | 1.37 | 1.0         | 1.10            | 1.54 | 2.27 | 5.0                  | 3.79                            | 3.06 | 2.35 |
| 2.0                 | 32.0        | 1.50            | 1.34 | 1.26 | 2.0         | 1.12            | 1.55 | 2.23 | 10.0                 | 3.79                            | 3.01 | 2.37 |
| 5.0                 | 35.0        | 1.51            | 1.32 | 1.22 | 5.0         | 1.11            | 1.55 | 2.25 | 22.6                 | 3.14                            | 2.41 | 1.83 |
| 10.0                | 40.0        | 1.50            | 1.30 | 1.21 | 10.0        | 1.11            | 1.54 | 2.25 | 35.1                 | 3.06                            | 2.35 | 1.79 |
| 50.5                | 80.5        | 1.49            | 1.29 | 1.18 | 50.5        | 1.13            | 1.49 | 2.28 | 47.7                 | 3.07                            | 2.37 | 1.80 |
| 70.7                | 100.7       | 1.45            | 1.28 | 1.17 | 70.7        | 1.12            | 1.44 | 2.14 | 60.3                 | 3.07                            | 2.39 | 1.82 |
| 90.9                | 120.9       | 1.49            | 1.28 | 1.16 | 90.9        | 1.11            | 1.43 | 2.10 | 72.8                 | 3.08                            | 2.39 | 1.83 |
| 111.1               | 141.1       | 1.43            | 1.24 | 1.13 | 111.1       | 1.12            | 1.45 | 2.18 | 85.4                 | 3.08                            | 2.39 | 1.83 |
| 151.5               | 181.5       | 1.43            | 1.25 | 1.14 | 151.5       | 1.11            | 1.49 | 2.22 | 97.9                 | 3.06                            | 2.39 | 1.83 |
| 171.7               | 201.7       | 1.38            | 1.21 | 1.12 | 171.7       | 1.11            | 1.46 | 2.15 | 110.5                | 3.06                            | 2.40 | 1.84 |
| 191.9               | 221.9       | 1.34            | 1.18 | 1.10 | 191.9       | 1.14            | 1.48 | 2.17 | 123.1                | 3.07                            | 2.41 | 1.85 |
| 212.1               | 242.1       | 1.35            | 1.19 | 1.11 | 212.1       | 1.13            | 1.53 | 2.25 | 135.6                | 3.08                            | 2.40 | 1.85 |
| 232.3               | 262.3       | 1.31            | 1.17 | 1.10 | 232.3       | 1.13            | 1.56 | 2.29 | 148.2                | 3.01                            | 2.37 | 1.84 |
| 252.5               | 282.5       | 1.29            | 1.16 | 1.09 | 252.5       | 1.17            | 1.56 | 2.26 | 160.8                | 2.95                            | 2.33 | 1.83 |
| 272.8               | 302.8       | 1.29            | 1.16 | 1.08 | 272.8       | 1.18            | 1.56 | 2.23 | 173.3                | 2.95                            | 2.33 | 1.82 |
| 293.0               | 323.0       | 1.25            | 1.12 | 1.06 | 293.0       | 1.19            | 1.59 | 2.27 | 185.9                | 2.96                            | 2.34 | 1.83 |
| 333.4               | 363.4       | 1.18            | 1.08 | 1.05 | 333.4       | 1.23            | 1.67 | 2.39 | 198.5                | 2.95                            | 2.34 | 1.85 |
| 353.6               | 383.6       | 1.16            | 1.07 | 1.08 | 353.6       | 1.26            | 1.67 | 2.35 | 211.0                | 2.95                            | 2.35 | 1.86 |
| 373.8               | 403.8       | 1.16            | 1.07 | 1.09 | 373.8       | 1.30            | 1.68 | 2.34 | 223.6                | 2.95                            | 2.35 | 1.86 |
| 394.0               | 424.0       | 1.16            | 1.09 | 1.11 | 394.0       | 1.35            | 1.72 | 2.39 | 236.2                | 2.93                            | 2.33 | 1.85 |
| 434.4               | 464.4       | 1.24            | 1.11 | 1.09 | 434.4       | 1.45            | 1.83 | 2.48 | 248.7                | 2.90                            | 2.32 | 1.85 |
| 454.6               | 484.6       | 1.28            | 1.14 | 1.07 | 454.6       | 1.47            | 1.87 | 2.49 | 273.8                | 2.89                            | 2.30 | 1.84 |
| 495.0               | 525.0       | 1.33            | 1.19 | 1.08 | 495.0       | 1.48            | 1.96 | 2.62 | 286.4                | 2.82                            | 2.27 | 1.82 |
| 515.2               | 545.2       | 1.39            | 1.25 | 1.14 | 515.2       | 1.50            | 2.01 | 2.69 | 299.0                | 2.76                            | 2.22 | 1.80 |
| 555.6               | 585.6       | 1.49            | 1.36 | 1.24 | 555.6       | 1.53            | 2.02 | 2.70 | 311.5                | 2.74                            | 2.19 | 1.77 |
| 575.8               | 605.8       | 1.57            | 1.43 | 1.30 | 575.8       | 1.56            | 2.05 | 2.73 | 324.1                | 2.73                            | 2.19 | 1.78 |
| 616.2               | 646.2       | 1.70            | 1.54 | 1.44 | 616.2       | 1.62            | 2.11 | 2.81 | 336.7                | 2.72                            | 2.20 | 1.79 |
| 636.4               | 666.4       | 1.74            | 1.60 | 1.51 | 636.4       | 1.65            | 2.11 | 2.79 | 349.2                | 2.74                            | 2.20 | 1.79 |
| 676.8               | 706.8       | 1.87            | 1.75 | 1.70 | 676.8       | 1.71            | 2.16 | 2.83 | 361.8                | 2.72                            | 2.18 | 1.77 |
| 697.0               | 727.0       | 1.97            | 1.86 | 1.83 | 697.0       | 1.76            | 2.20 | 2.87 | 374.4                | 2.67                            | 2.15 | 1.76 |
| 737.4               | 767.4       | 2.20            | 2.11 | 2.07 | 737.4       | 1.85            | 2.24 | 2.88 | 386.9                | 2.63                            | 2.12 | 1.74 |
| 757.7               | 787.7       | 2.29            | 2.20 | 2.15 | 757.7       | 1.91            | 2.27 | 2.91 | 399.5                | 2.64                            | 2.10 | 1.72 |
| 798.1               | 828.1       | 2.42            | 2.32 | 2.27 | 798.1       | 2.08            | 2.41 | 3.03 | 412.1                | 2.63                            | 2.11 | 1.73 |
| 818.3               | 848.3       | 2.48            | 2.37 | 2.32 | 818.3       | 2.20            | 2.48 | 3.07 | 424.6                | 2.57                            | 2.08 | 1.71 |
| 858.7               | 888.7       | 2.56            | 2.43 | 2.37 | 858.7       | 2.48            | 2.67 | 3.19 | 437.2                | 2.55                            | 2.05 | 1.69 |
| 878.9               | 908.9       | 2.59            | 2.46 | 2.40 | 878.9       | 2.65            | 2.78 | 3.26 | 449.7                | 2.58                            | 2.05 | 1.69 |
| 919.3               | 949.3       | 2.71            | 2.52 | 2.46 | 919.3       | 2.97            | 2.99 | 3.38 | 462.3                | 2.58                            | 2.08 | 1.71 |
| 939.5               | 969.5       | 2.72            | 2.50 | 2.42 | 939.5       | 3.12            | 3.08 | 3.43 | 474.9                | 2.58                            | 2.07 | 1.71 |
| 979.9               | 1009.9      | 2.80            | 2.50 | 2.41 | 979.9       | 3.27            | 3.24 | 3.52 | 487.4                | 2.60                            | 2.07 | 1.70 |
| 1000.1              | 1030.1      | 2.83            | 2.49 | 2.39 | 1000.1      | 3.27            | 3.26 | 3.53 | 500.0                | 2.46                            | 2.08 | 1.87 |

REV. X2

ADE-1H+

100817

Page 4 of 5



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## Harmonics Tables

RF HARMONICS ORDER

|    | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|----|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0  | -      | -      | 11  | 39  | 14  | 33  | 16  | 34  | 24  | 49  | 38  | 53  |
| 1  | -      | 18     | +0  | 27  | 13  | 29  | 26  | 34  | 34  | 51  | 32  | 45  |
| 2  | 98     | 67     | 49  | 66  | 49  | 67  | 45  | 65  | 52  | 63  | 56  | 73  |
| 3  | >100   | 64     | 53  | 69  | 52  | 66  | 48  | 84  | 53  | 80  | 56  | 68  |
| 4  | >100   | 86     | 75  | 80  | 72  | 75  | 67  | 76  | 66  | 79  | 76  | 83  |
| 5  | >100   | 92     | 86  | 84  | 80  | 80  | 75  | 79  | 72  | 80  | 79  | 86  |
| 6  | >100   | >93    | 91  | >93 | 85  | 93  | 83  | 93  | 87  | 91  | 89  | >93 |
| 7  | >100   | >93    | >93 | >93 | >93 | >93 | >93 | 86  | 91  | >93 | >93 | >93 |
| 8  | >100   | >93    | >93 | >93 | >93 | >93 | >93 | >93 | 81  | >93 | >93 | >93 |
| 9  | >100   | >93    | >93 | >93 | >93 | >93 | >93 | >93 | 93  | 77  | >93 | >93 |
| 10 | >100   | >93    | >93 | >93 | >93 | >93 | >93 | >93 | >93 | >93 | 80  | 90  |
|    | RF CAL | 0      | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |

### LO HARMONICS ORDER

Test conditions: RF IN: 250.1 MHz; -1.00 dBm.  
LO IN: 280.01 MHz; +17.00 dBm  
IF OUT: 29.91 MHz; -6.92 dBm

RF HARMONICS ORDER

|    | (-dBm) | (-dBc) |     |     |    |     |    |    |    |    |    |    |
|----|--------|--------|-----|-----|----|-----|----|----|----|----|----|----|
| 0  | -      | -      | 20  | 50  | 26 | 45  | 30 | 47 | 39 | 68 | 47 | 73 |
| 1  | -      | 19     | +0  | 28  | 13 | 34  | 25 | 38 | 39 | 52 | 44 | 62 |
| 2  | 79     | 61     | 41  | 58  | 43 | 59  | 40 | 56 | 44 | 57 | 49 | 65 |
| 3  | >100   | 44     | 40  | 48  | 46 | 51  | 39 | 45 | 55 | 51 | 47 | 63 |
| 4  | >100   | 73     | 64  | 72  | 65 | 70  | 61 | 82 | 57 | 69 | 63 | 66 |
| 5  | >100   | 83     | 59  | 64  | 50 | 70  | 47 | 57 | 45 | 62 | 54 | 69 |
| 6  | >100   | 78     | 77  | 83  | 68 | 87  | 72 | 74 | 65 | 74 | 63 | 75 |
| 7  | >100   | 78     | 76  | 76  | 61 | 72  | 62 | 76 | 61 | 67 | 58 | 69 |
| 8  | >100   | 88     | 80  | 101 | 82 | 83  | 71 | 85 | 69 | 77 | 69 | 80 |
| 9  | >100   | 94     | 92  | 102 | 82 | 86  | 70 | 77 | 68 | 76 | 67 | 73 |
| 10 | >100   | 99     | 102 | 101 | 95 | 103 | 90 | 84 | 78 | 84 | 78 | 81 |
|    | RF CAL | 0      | 1   | 2   | 3  | 4   | 5  | 6  | 7  | 8  | 9  | 10 |

### LO HARMONICS ORDER

Test conditions: RF IN: 250.1 MHz; 9.00 dBm.  
LO IN: 280.01 MHz; +17.00 dBm  
IF OUT: 29.91 MHz; 3.12 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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100817  
Page 5 of 5



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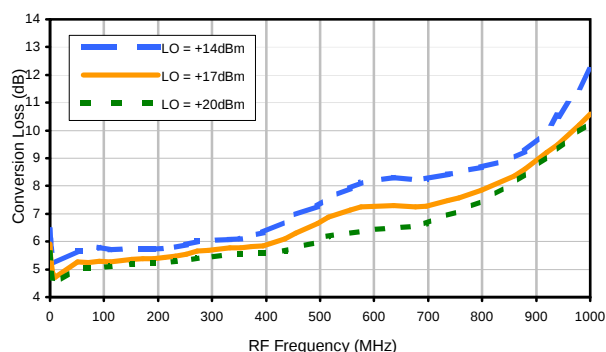
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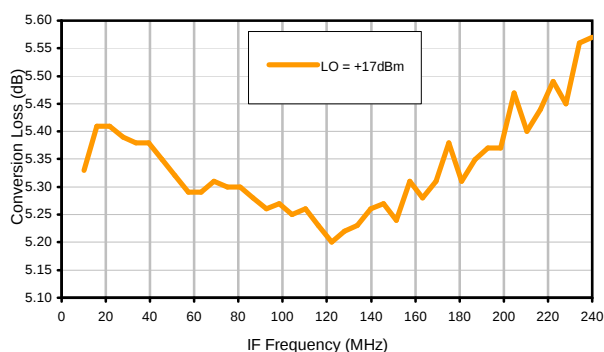


## Typical Performance Curves

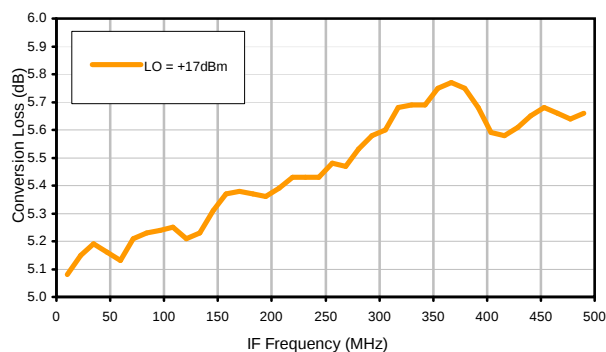
Conversion Loss @ IF=30MHz



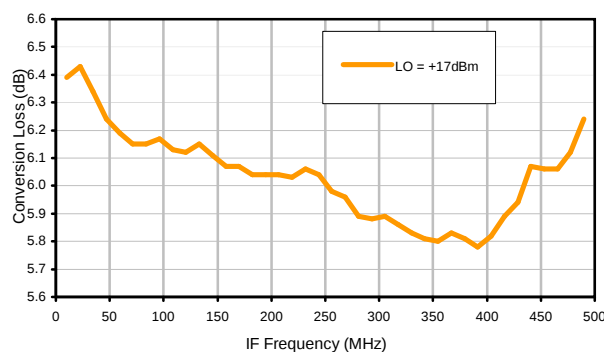
Conversion Loss vs. IF @ RF=250.1MHz



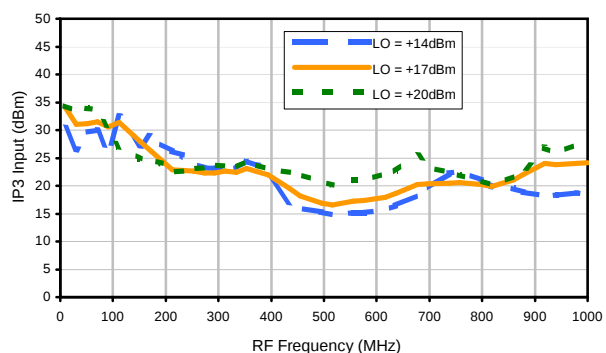
Conversion Loss vs. IF @ RF=10.1MHz



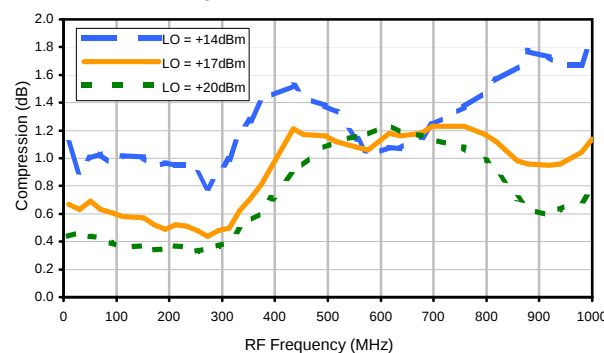
Conversion Loss vs. IF @ RF=500.1MHz



IP3 Input

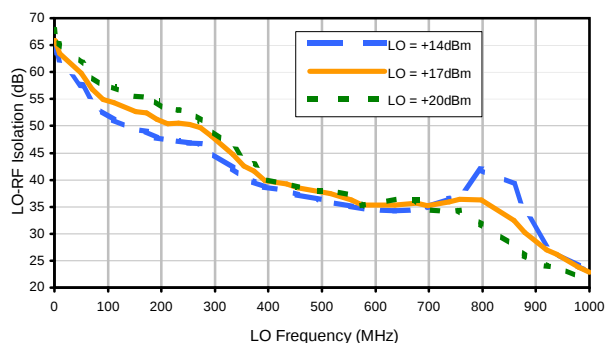


Compression @ RF IN=+14dBm

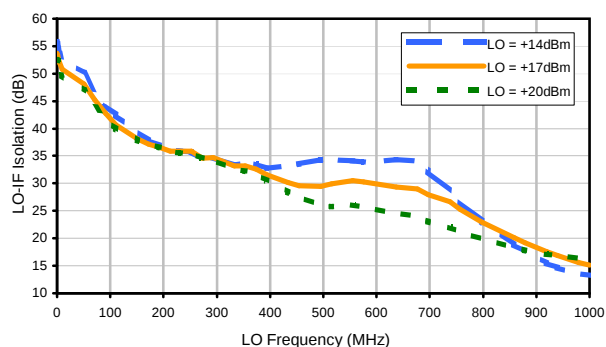


## Typical Performance Curves

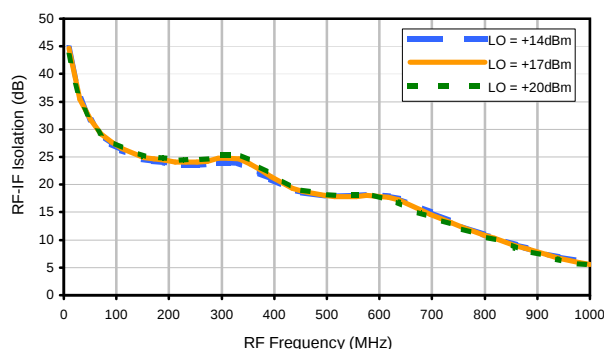
LO-RF Isolation



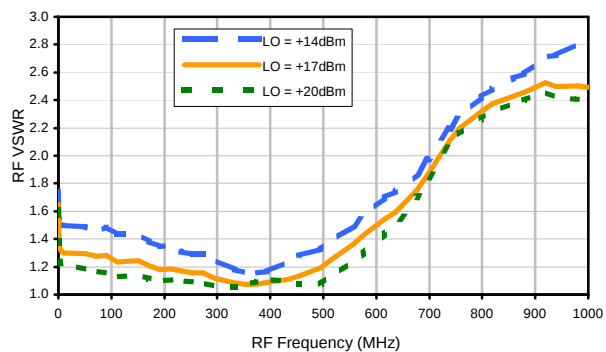
LO-IF Isolation



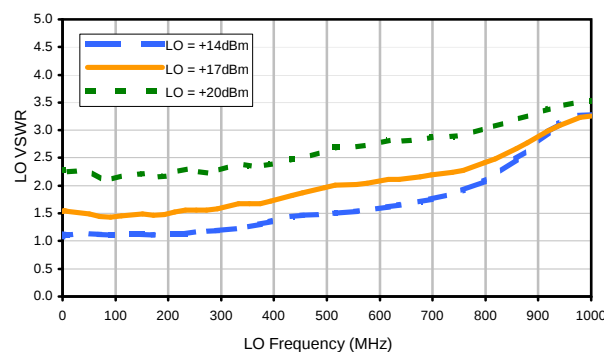
RF-IF Isolation



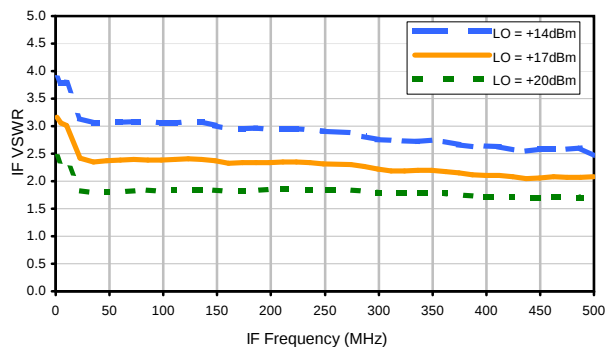
RF VSWR



LO VSWR



IF VSWR



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Page 2 of 3



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## Harmonics Tables

RF HARMONICS ORDER

|    | (-dBm) | (-dBc) |     |     |     |     |     |     |     |     |     |     |
|----|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0  | -      | -      | 11  | 39  | 14  | 33  | 16  | 34  | 24  | 49  | 38  | 53  |
| 1  | -      | 18     | +0  | 27  | 13  | 29  | 26  | 34  | 34  | 51  | 32  | 45  |
| 2  | 98     | 67     | 49  | 66  | 49  | 67  | 45  | 65  | 52  | 63  | 56  | 73  |
| 3  | >100   | 64     | 53  | 69  | 52  | 66  | 48  | 84  | 53  | 80  | 56  | 68  |
| 4  | >100   | 86     | 75  | 80  | 72  | 75  | 67  | 76  | 66  | 79  | 76  | 83  |
| 5  | >100   | 92     | 86  | 84  | 80  | 80  | 75  | 79  | 72  | 80  | 79  | 86  |
| 6  | >100   | >93    | 91  | >93 | 85  | 93  | 83  | 93  | 87  | 91  | 89  | >93 |
| 7  | >100   | >93    | >93 | >93 | >93 | >93 | >93 | 86  | 91  | >93 | >93 | >93 |
| 8  | >100   | >93    | >93 | >93 | >93 | >93 | >93 | >93 | 81  | >93 | >93 | >93 |
| 9  | >100   | >93    | >93 | >93 | >93 | >93 | >93 | >93 | 93  | 77  | >93 | >93 |
| 10 | >100   | >93    | >93 | >93 | >93 | >93 | >93 | >93 | >93 | >93 | 80  | 90  |
|    | RF CAL | 0      | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |

### LO HARMONICS ORDER

Test conditions: RF IN: 250.1 MHz; -1.00 dBm.  
LO IN: 280.01 MHz; +17.00 dBm  
IF OUT: 29.91 MHz; -6.92 dBm

RF HARMONICS ORDER

|    | (-dBm) | (-dBc) |     |     |    |     |    |    |    |    |    |    |
|----|--------|--------|-----|-----|----|-----|----|----|----|----|----|----|
| 0  | -      | -      | 20  | 50  | 26 | 45  | 30 | 47 | 39 | 68 | 47 | 73 |
| 1  | -      | 19     | +0  | 28  | 13 | 34  | 25 | 38 | 39 | 52 | 44 | 62 |
| 2  | 79     | 61     | 41  | 58  | 43 | 59  | 40 | 56 | 44 | 57 | 49 | 65 |
| 3  | >100   | 44     | 40  | 48  | 46 | 51  | 39 | 45 | 55 | 51 | 47 | 63 |
| 4  | >100   | 73     | 64  | 72  | 65 | 70  | 61 | 82 | 57 | 69 | 63 | 66 |
| 5  | >100   | 83     | 59  | 64  | 50 | 70  | 47 | 57 | 45 | 62 | 54 | 69 |
| 6  | >100   | 78     | 77  | 83  | 68 | 87  | 72 | 74 | 65 | 74 | 63 | 75 |
| 7  | >100   | 78     | 76  | 76  | 61 | 72  | 62 | 76 | 61 | 67 | 58 | 69 |
| 8  | >100   | 88     | 80  | 101 | 82 | 83  | 71 | 85 | 69 | 77 | 69 | 80 |
| 9  | >100   | 94     | 92  | 102 | 82 | 86  | 70 | 77 | 68 | 76 | 67 | 73 |
| 10 | >100   | 99     | 102 | 101 | 95 | 103 | 90 | 84 | 78 | 84 | 78 | 81 |
|    | RF CAL | 0      | 1   | 2   | 3  | 4   | 5  | 6  | 7  | 8  | 9  | 10 |

### LO HARMONICS ORDER

Test conditions: RF IN: 250.1 MHz; 9.00 dBm.  
LO IN: 280.01 MHz; +17.00 dBm  
IF OUT: 29.91 MHz; 3.12 dBm

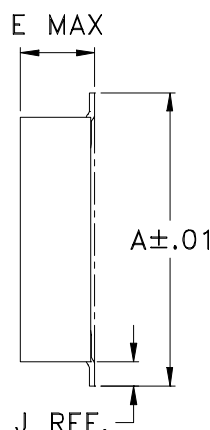
- Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.  
2. + entry denotes harmonics are in (dBc) above IF OUTPUT.  
3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

REV. X2  
ADE-1H+  
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Page 3 of 3

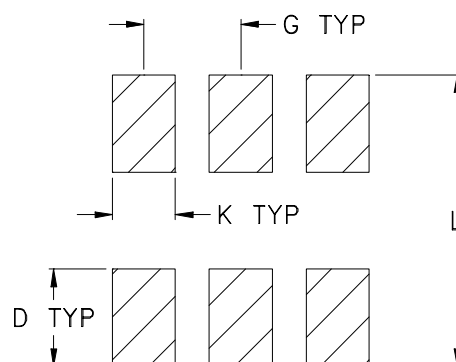


CD541  
CD542  
CD636  
CD637

## 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,<br>GRAM |
|-------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-------------|
| CD541 |                |                |                |                | .082<br>(2.08) |                |                |                |                |                |                | .15         |
| CD542 | .272<br>(6.91) | .310<br>(7.87) | .220<br>(5.58) | .100<br>(2.54) | .112<br>(2.84) | .055<br>(1.40) | .100<br>(2.54) | .030<br>(0.76) | .026<br>(0.66) | .065<br>(1.65) | .300<br>(7.62) | .20         |
| CD636 |                |                |                |                | .162<br>(4.11) |                |                |                |                |                |                | .25         |
| CD637 |                |                |                |                | .206<br>(5.23) |                |                |                |                |                |                | .40         |

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

### Notes:

- Case material: Plastic.
- 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.



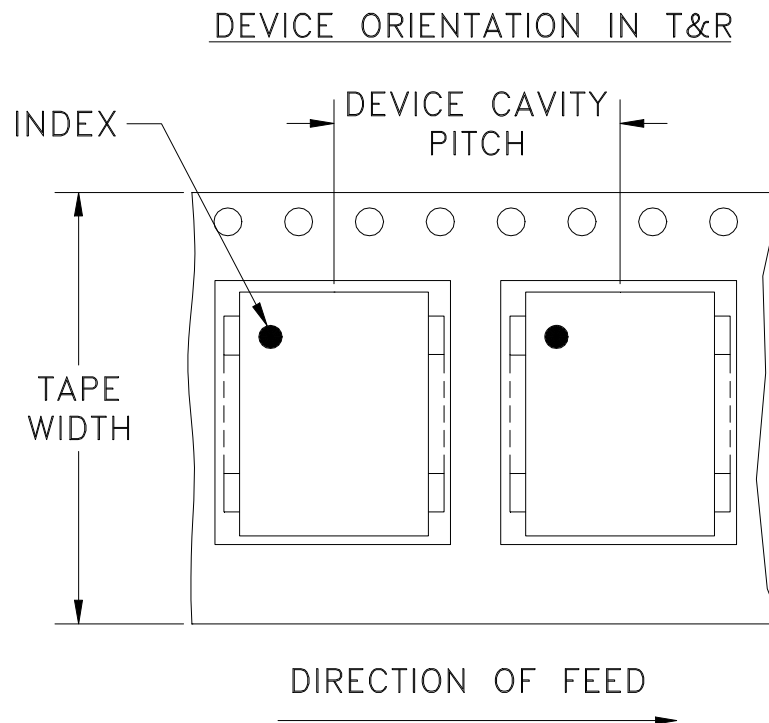
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# Tape & Reel Packaging TR-F34



| Tape Width,<br>mm | Device Cavity<br>Pitch, mm | Reel Size,<br>inches | Devices per Reel<br>see note                |      |
|-------------------|----------------------------|----------------------|---------------------------------------------|------|
| 16                | 12                         | 7                    | Small<br>quantity<br>standard<br>(see note) | 20   |
|                   |                            |                      |                                             | 50   |
|                   |                            |                      |                                             | 100  |
|                   |                            |                      |                                             | 200  |
|                   |                            | 13                   | Standard                                    | 500  |
|                   |                            |                      |                                             | 1000 |

Note: Availability of small reel quantity varies by model.  
Refer to pricing and availability on individual model dashboard.

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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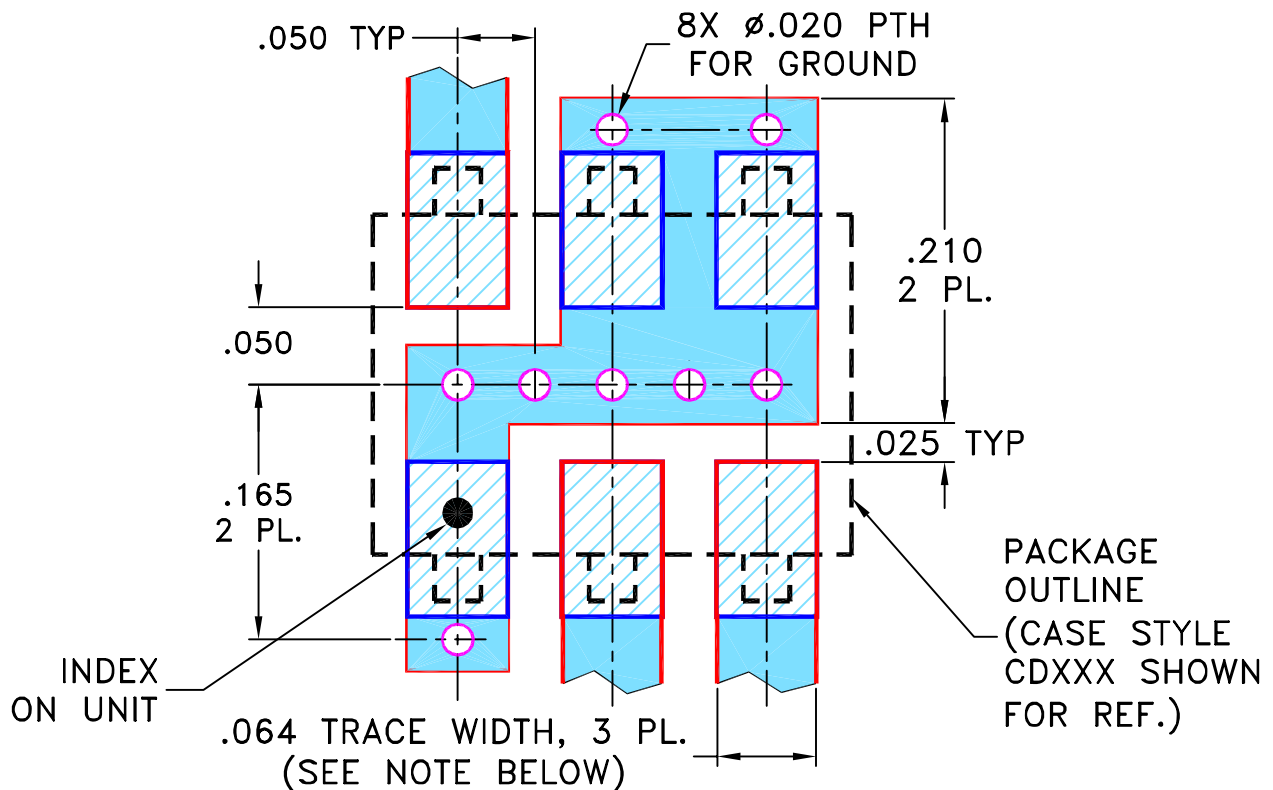
## THIRD ANGLE PROJECTION



## 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

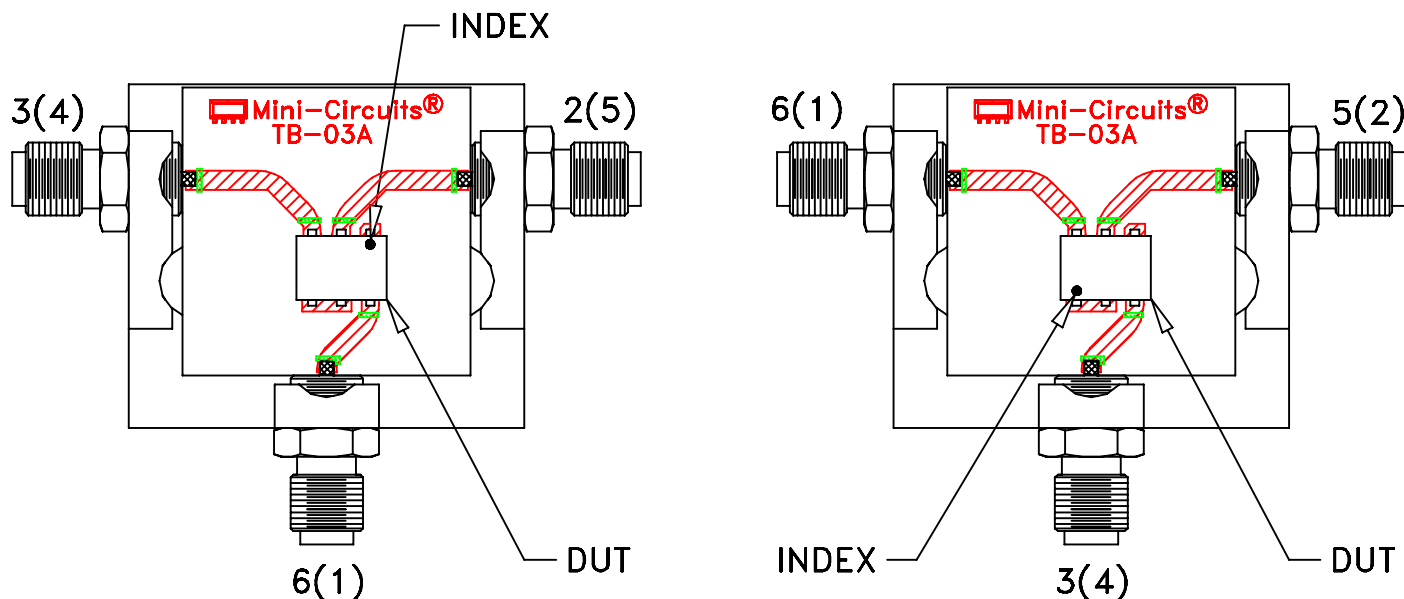
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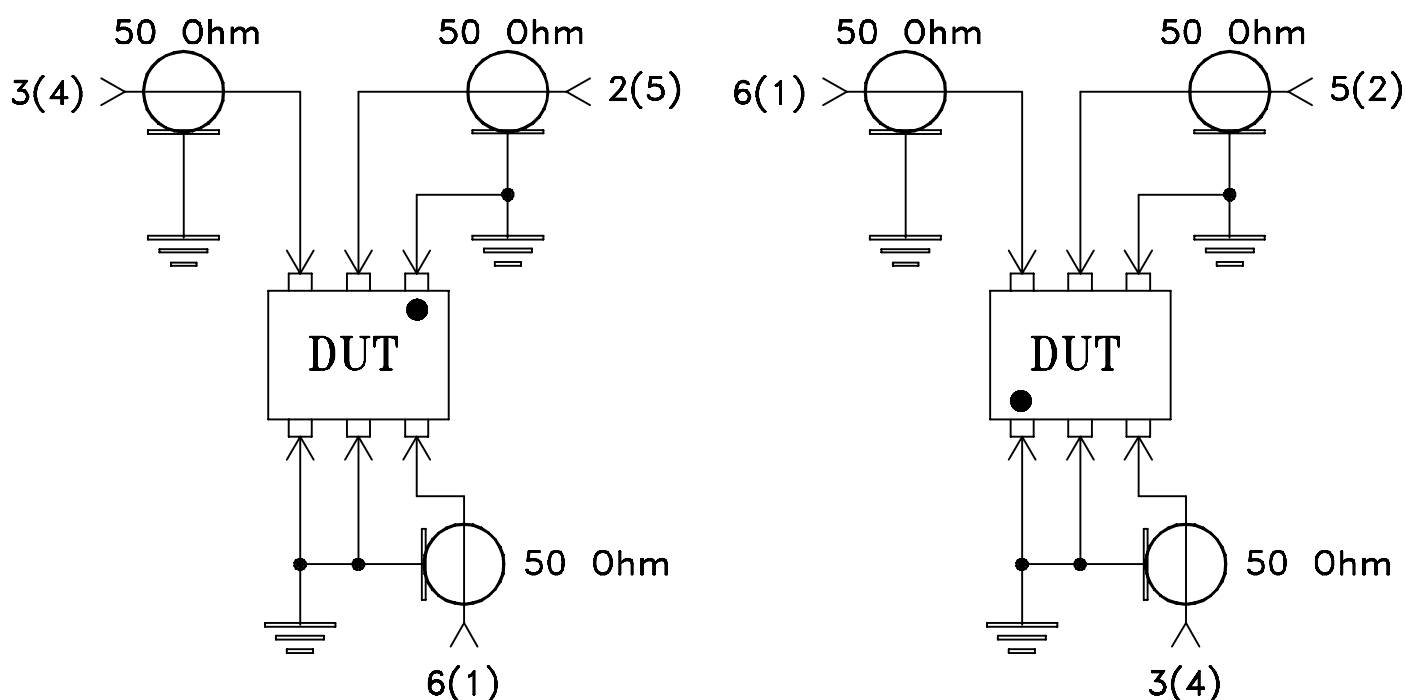
ASHEETA1.DWG REV:A DATE:01/12/95

# 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                                                                              |