

# X2 Frequency Multiplier

50Ω Output 1200 to 4400 MHz

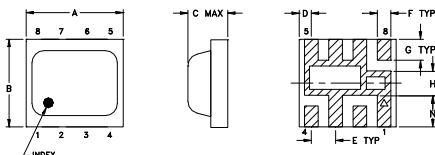
## Maximum Ratings

|                                                                 |                |
|-----------------------------------------------------------------|----------------|
| Operating Temperature                                           | -40°C to 85°C  |
| Storage Temperature                                             | -55°C to 100°C |
| RF Input, 25°C                                                  | 100 mW         |
| Permanent damage may occur if any of these limits are exceeded. |                |

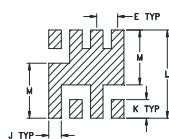
## Pin Connections

|                    |           |
|--------------------|-----------|
| INPUT              | 4         |
| OUTPUT             | 8         |
| 50Ω TERMINATE EXT. | 2         |
| GROUND             | 1,3,5,6,7 |

## Outline Drawing



PCB Metal Land Pattern

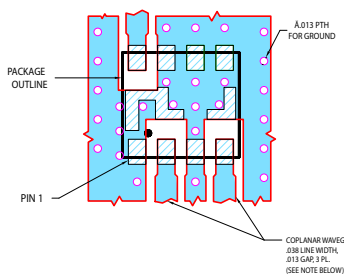


Suggested Layout,  
Tolerance to be within .002

## Outline Dimensions ( inch )

| A    | B    | C      | D    | E    | F     | G     |
|------|------|--------|------|------|-------|-------|
| .200 | .180 | .087   | .025 | .050 | .028  | .043  |
| 5.08 | 4.57 | 2.2098 | 0.64 | 1.27 | 0.71  | 1.09  |
| H    | J    | K      | L    | M    | N     | wt    |
| .050 | .030 | .043   | .204 | .127 | 0.065 | grams |
| 1.27 | 0.76 | 1.09   | 5.18 | 3.23 | 1.65  | 0.08  |

## Demo Board MCL P/N: TB-473+ Suggested PCB Layout (PL-287)



- NOTES:
1. TRACE WIDTH AND GAP ARE SHOWN FOR ROGERS RO4358 WITH DIELECTRIC THICKNESS .002" ± .0015". COPPER: 1/2 OZ. EACH SIDE.  
FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
  2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
- DENOTES PCB PACKAGE LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER).
- DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

## Features

- low conversion loss, 11.0 dB typ.
- high fundamental & harmonic suppression, F1, 24 dBc typ.; F3, 30 dBc typ.; F4, 20 dBc typ.
- LTCC design
- low profile, 0.085"
- aqueous washable

## Applications

- synthesizers
- local oscillators

## Electrical Specifications

| MULTIPLICATION<br>FACTOR | FREQUENCY<br>(MHz) |           | INPUT<br>POWER<br>(dBm) |      | CONVERSION<br>LOSS<br>(dB) |      | *HARMONIC OUTPUT<br>(dBc) |      |      |      |      |      |
|--------------------------|--------------------|-----------|-------------------------|------|----------------------------|------|---------------------------|------|------|------|------|------|
|                          | F1                 | F2        |                         |      |                            |      | F1                        |      | F3   |      | F4   |      |
|                          | Input              | Output    | Min.                    | Max. | Typ.                       | Max. | Typ.                      | Min. | Typ. | Min. | Typ. | Min. |
| 2                        | 600-1200           | 1200-2400 | 7                       | 13   | 11                         | 14   | 26                        | 18   | 35   | 22   | 16   | 11   |
|                          | 1200-2200          | 2400-4400 | 10                      | 15   | 11                         | 14.5 | 18                        | 11   | 36   | 22   | 25   | 14   |

\* Harmonics of input frequency below the power level of F2

## Typical Performance Data

| Input Frequency (MHz) | INPUT RF= 7dBm       |                                 |       |       | INPUT RF= 13dBm      |                                 |       |       |
|-----------------------|----------------------|---------------------------------|-------|-------|----------------------|---------------------------------|-------|-------|
|                       | Conversion Loss (dB) | Harmonic Output Below F2 (-dBc) |       |       | Conversion Loss (dB) | Harmonic Output Below F2 (-dBc) |       |       |
|                       |                      | F1                              | F3    | F4    |                      | F1                              | F3    | F4    |
| 600.00                | 11.07                | 37.78                           | 38.89 | 19.27 | 11.42                | 36.83                           | 37.22 | 17.78 |
| 700.00                | 10.62                | 35.69                           | 33.05 | 20.55 | 11.38                | 30.55                           | 43.10 | 15.17 |
| 725.00                | 10.96                | 33.61                           | 32.98 | 18.42 | 11.82                | 29.27                           | 46.76 | 14.44 |
| 750.00                | 10.81                | 31.77                           | 34.21 | 16.56 | 11.53                | 28.24                           | 54.28 | 13.86 |
| 775.00                | 11.11                | 30.55                           | 34.97 | 15.48 | 11.73                | 27.98                           | 51.80 | 13.59 |
| 800.00                | 10.80                | 29.63                           | 36.19 | 14.47 | 11.25                | 27.69                           | 48.85 | 13.72 |
| 825.00                | 10.56                | 29.39                           | 36.48 | 14.11 | 11.05                | 27.58                           | 45.69 | 14.42 |
| 850.00                | 10.45                | 29.55                           | 36.57 | 14.68 | 11.26                | 27.56                           | 44.52 | 15.79 |
| 875.00                | 10.06                | 29.91                           | 37.08 | 15.22 | 11.19                | 27.21                           | 43.53 | 17.71 |
| 900.00                | 10.20                | 29.93                           | 37.43 | 15.88 | 11.71                | 26.98                           | 44.51 | 18.04 |
| 950.00                | 10.39                | 29.32                           | 37.16 | 16.42 | 11.85                | 25.83                           | 41.50 | 19.39 |
| 1000.00               | 10.82                | 28.26                           | 33.82 | 16.84 | 12.03                | 24.49                           | 42.41 | 17.55 |
| 1100.00               | 11.80                | 27.05                           | 29.27 | 19.07 | 11.45                | 23.40                           | 42.59 | 25.36 |
| 1150.00               | 11.86                | 27.42                           | 28.19 | 20.03 | 11.17                | 22.65                           | 36.52 | 23.32 |
| 1200.00               | 12.57                | 26.52                           | 29.22 | 20.14 | 11.57                | 22.07                           | 34.21 | 19.68 |

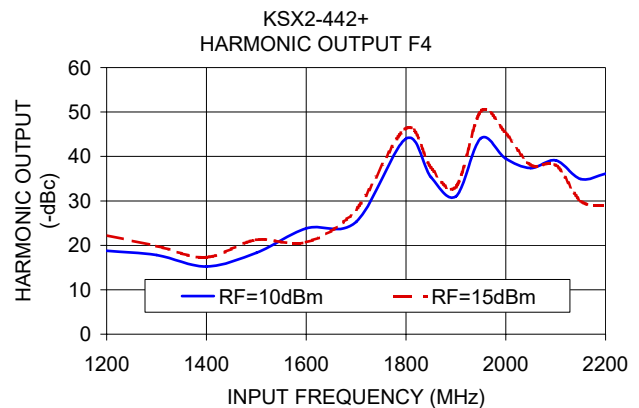
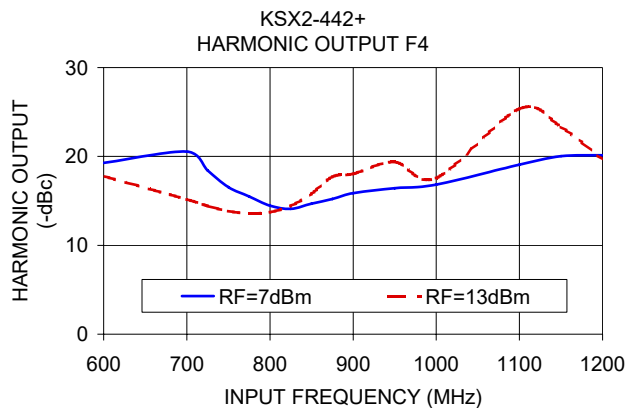
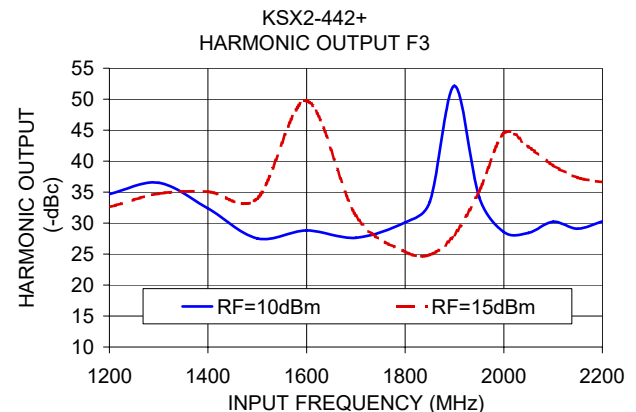
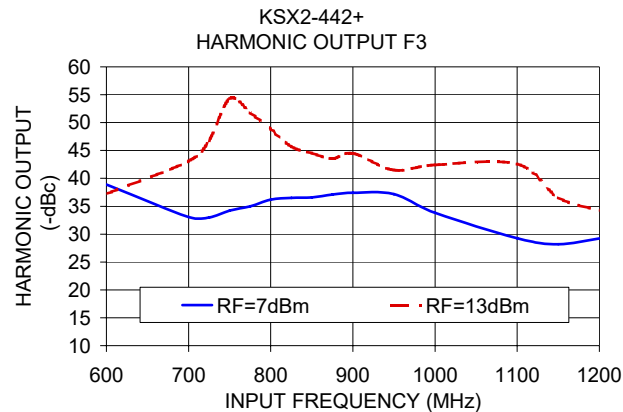
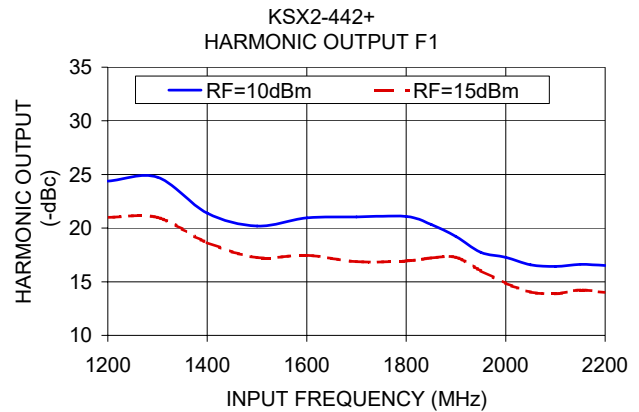
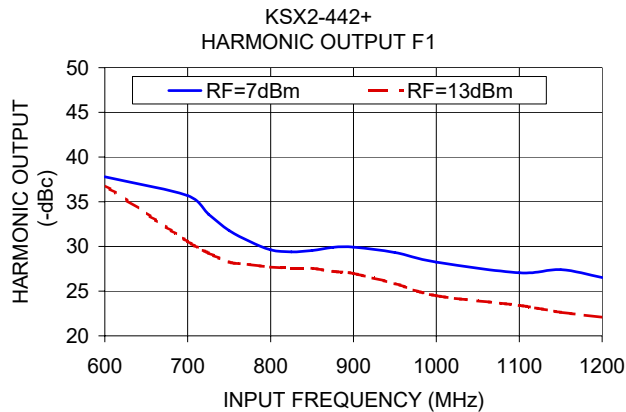
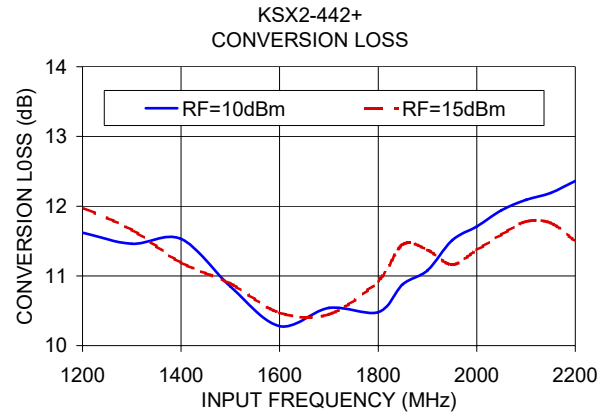
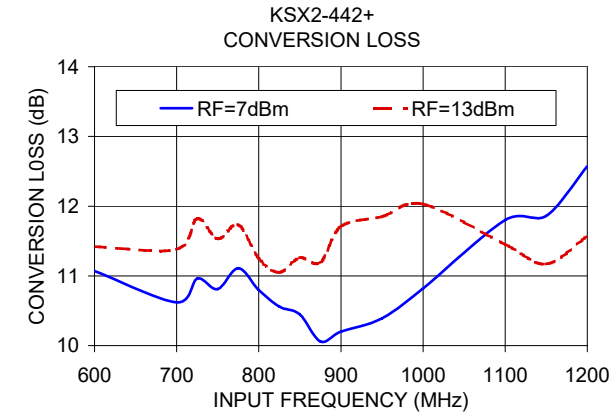
| Input Frequency (MHz) | INPUT RF= 10dBm      |                                 |       |       | INPUT RF= 15dBm      |                                 |       |       |
|-----------------------|----------------------|---------------------------------|-------|-------|----------------------|---------------------------------|-------|-------|
|                       | Conversion Loss (dB) | Harmonic Output Below F2 (-dBc) |       |       | Conversion Loss (dB) | Harmonic Output Below F2 (-dBc) |       |       |
|                       |                      | F1                              | F3    | F4    |                      | F1                              | F3    | F4    |
| 1200.00               | 11.62                | 24.39                           | 34.69 | 18.76 | 11.98                | 20.99                           | 32.59 | 22.26 |
| 1300.00               | 11.46                | 24.74                           | 36.51 | 17.80 | 11.66                | 20.99                           | 34.74 | 19.84 |
| 1400.00               | 11.53                | 21.40                           | 32.39 | 15.23 | 11.19                | 18.65                           | 35.06 | 17.29 |
| 1500.00               | 10.85                | 20.20                           | 27.53 | 18.33 | 10.89                | 17.25                           | 34.00 | 21.23 |
| 1600.00               | 10.28                | 20.96                           | 28.80 | 23.83 | 10.47                | 17.46                           | 49.70 | 20.69 |
| 1700.00               | 10.54                | 21.05                           | 27.62 | 25.30 | 10.45                | 16.88                           | 31.19 | 28.07 |
| 1800.00               | 10.48                | 21.09                           | 30.11 | 44.00 | 10.93                | 16.93                           | 25.40 | 46.31 |
| 1850.00               | 10.88                | 20.35                           | 33.46 | 35.37 | 11.45                | 17.22                           | 24.89 | 37.47 |
| 1900.00               | 11.08                | 19.22                           | 52.15 | 31.03 | 11.37                | 17.27                           | 28.09 | 33.16 |
| 1950.00               | 11.51                | 17.74                           | 34.22 | 44.11 | 11.16                | 16.02                           | 35.11 | 50.14 |
| 2000.00               | 11.71                | 17.28                           | 28.56 | 39.52 | 11.37                | 14.87                           | 44.49 | 45.20 |
| 2050.00               | 11.94                | 16.57                           | 28.40 | 37.40 | 11.59                | 14.04                           | 42.35 | 38.11 |
| 2100.00               | 12.09                | 16.42                           | 30.20 | 39.12 | 11.78                | 13.87                           | 39.30 | 38.07 |
| 2150.00               | 12.19                | 16.62                           | 29.11 | 34.90 | 11.76                | 14.22                           | 37.34 | 29.99 |
| 2200.00               | 12.36                | 16.51                           | 30.27 | 36.11 | 11.50                | 14.00                           | 36.61 | 29.03 |

Generic photo used for illustration purposes only

CASE STYLE: HV1195

+RoHS Compliant

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



## 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.
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# Frequency Multiplier (Doubler)

**KSX2-442+**

## Typical Performance Data

| Frequency (MHz) |           |           |           | RF IN = 7dBm            |                            |           |           |
|-----------------|-----------|-----------|-----------|-------------------------|----------------------------|-----------|-----------|
|                 |           |           |           | Conversion Loss<br>(dB) | Harmonic Output*<br>(-dBc) |           |           |
| X1 Output       | X2 Output | X3 Output | X4 Output | X2 Output               | X1 Output                  | X3 Output | X4 Output |
| 600.00          | 1200.00   | 1800.00   | 2400.00   | 11.07                   | 37.78                      | 38.89     | 19.27     |
| 700.00          | 1400.00   | 2100.00   | 2800.00   | 10.62                   | 35.69                      | 33.05     | 20.55     |
| 725.00          | 1450.00   | 2175.00   | 2900.00   | 10.96                   | 33.61                      | 32.98     | 18.42     |
| 750.00          | 1500.00   | 2250.00   | 3000.00   | 10.81                   | 31.77                      | 34.21     | 16.56     |
| 775.00          | 1550.00   | 2325.00   | 3100.00   | 11.11                   | 30.55                      | 34.97     | 15.48     |
| 800.00          | 1600.00   | 2400.00   | 3200.00   | 10.80                   | 29.63                      | 36.19     | 14.47     |
| 825.00          | 1650.00   | 2475.00   | 3300.00   | 10.56                   | 29.39                      | 36.48     | 14.11     |
| 850.00          | 1700.00   | 2550.00   | 3400.00   | 10.45                   | 29.55                      | 36.57     | 14.68     |
| 875.00          | 1750.00   | 2625.00   | 3500.00   | 10.06                   | 29.91                      | 37.08     | 15.22     |
| 900.00          | 1800.00   | 2700.00   | 3600.00   | 10.20                   | 29.93                      | 37.43     | 15.88     |
| 950.00          | 1900.00   | 2850.00   | 3800.00   | 10.39                   | 29.32                      | 37.16     | 16.42     |
| 1000.00         | 2000.00   | 3000.00   | 4000.00   | 10.82                   | 28.26                      | 33.82     | 16.84     |
| 1100.00         | 2200.00   | 3300.00   | 4400.00   | 11.80                   | 27.05                      | 29.27     | 19.07     |
| 1150.00         | 2300.00   | 3450.00   | 4600.00   | 11.86                   | 27.42                      | 28.19     | 20.03     |
| 1200.00         | 2400.00   | 3600.00   | 4800.00   | 12.57                   | 26.52                      | 29.22     | 20.14     |

\*Harmonic Output below power level of X2 Output.

| Frequency (MHz) |           |           |           | RF IN = 13dBm           |                            |           |           |
|-----------------|-----------|-----------|-----------|-------------------------|----------------------------|-----------|-----------|
|                 |           |           |           | Conversion Loss<br>(dB) | Harmonic Output*<br>(-dBc) |           |           |
| X1 Output       | X2 Output | X3 Output | X4 Output | X2 Output               | X1 Output                  | X3 Output | X4 Output |
| 600.00          | 1200.00   | 1800.00   | 2400.00   | 11.42                   | 36.83                      | 37.22     | 17.78     |
| 700.00          | 1400.00   | 2100.00   | 2800.00   | 11.38                   | 30.55                      | 43.10     | 15.17     |
| 725.00          | 1450.00   | 2175.00   | 2900.00   | 11.82                   | 29.27                      | 46.76     | 14.44     |
| 750.00          | 1500.00   | 2250.00   | 3000.00   | 11.53                   | 28.24                      | 54.28     | 13.86     |
| 775.00          | 1550.00   | 2325.00   | 3100.00   | 11.73                   | 27.98                      | 51.80     | 13.59     |
| 800.00          | 1600.00   | 2400.00   | 3200.00   | 11.25                   | 27.69                      | 48.85     | 13.72     |
| 825.00          | 1650.00   | 2475.00   | 3300.00   | 11.05                   | 27.58                      | 45.69     | 14.42     |
| 850.00          | 1700.00   | 2550.00   | 3400.00   | 11.26                   | 27.56                      | 44.52     | 15.79     |
| 875.00          | 1750.00   | 2625.00   | 3500.00   | 11.19                   | 27.21                      | 43.53     | 17.71     |
| 900.00          | 1800.00   | 2700.00   | 3600.00   | 11.71                   | 26.98                      | 44.51     | 18.04     |
| 950.00          | 1900.00   | 2850.00   | 3800.00   | 11.85                   | 25.83                      | 41.50     | 19.39     |
| 1000.00         | 2000.00   | 3000.00   | 4000.00   | 12.03                   | 24.49                      | 42.41     | 17.55     |
| 1100.00         | 2200.00   | 3300.00   | 4400.00   | 11.45                   | 23.40                      | 42.59     | 25.36     |
| 1150.00         | 2300.00   | 3450.00   | 4600.00   | 11.17                   | 22.65                      | 36.52     | 23.32     |
| 1200.00         | 2400.00   | 3600.00   | 4800.00   | 11.57                   | 22.07                      | 34.21     | 19.68     |

\*Harmonic Output below power level of X2 Output.



# Frequency Multiplier (Doubler)

**KSX2-442+**

## Typical Performance Data

| Frequency (MHz) |           |           |           | RF IN = 10dBm           |                            |           |           |
|-----------------|-----------|-----------|-----------|-------------------------|----------------------------|-----------|-----------|
|                 |           |           |           | Conversion Loss<br>(dB) | Harmonic Output*<br>(-dBc) |           |           |
| X1 Output       | X2 Output | X3 Output | X4 Output | X2 Output               | X1 Output                  | X3 Output | X4 Output |
| 1200.00         | 2400.00   | 3600.00   | 4800.00   | 11.62                   | 24.39                      | 34.69     | 18.76     |
| 1300.00         | 2600.00   | 3900.00   | 5200.00   | 11.46                   | 24.74                      | 36.51     | 17.80     |
| 1400.00         | 2800.00   | 4200.00   | 5600.00   | 11.53                   | 21.40                      | 32.39     | 15.23     |
| 1500.00         | 3000.00   | 4500.00   | 6000.00   | 10.85                   | 20.20                      | 27.53     | 18.33     |
| 1600.00         | 3200.00   | 4800.00   | 6400.00   | 10.28                   | 20.96                      | 28.80     | 23.83     |
| 1700.00         | 3400.00   | 5100.00   | 6800.00   | 10.54                   | 21.05                      | 27.62     | 25.30     |
| 1800.00         | 3600.00   | 5400.00   | 7200.00   | 10.48                   | 21.09                      | 30.11     | 44.00     |
| 1850.00         | 3700.00   | 5550.00   | 7400.00   | 10.88                   | 20.35                      | 33.46     | 35.37     |
| 1900.00         | 3800.00   | 5700.00   | 7600.00   | 11.08                   | 19.22                      | 52.15     | 31.03     |
| 1950.00         | 3900.00   | 5850.00   | 7800.00   | 11.51                   | 17.74                      | 34.22     | 44.11     |
| 2000.00         | 4000.00   | 6000.00   | 8000.00   | 11.71                   | 17.28                      | 28.56     | 39.52     |
| 2050.00         | 4100.00   | 6150.00   | 8200.00   | 11.94                   | 16.57                      | 28.40     | 37.40     |
| 2100.00         | 4200.00   | 6300.00   | 8400.00   | 12.09                   | 16.42                      | 30.20     | 39.12     |
| 2150.00         | 4300.00   | 6450.00   | 8600.00   | 12.19                   | 16.62                      | 29.11     | 34.90     |
| 2200.00         | 4400.00   | 6600.00   | 8800.00   | 12.36                   | 16.51                      | 30.27     | 36.11     |

\*Harmonic Output below power level of X2 Output.

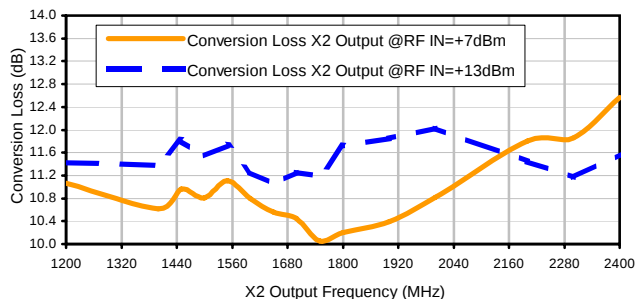
| Frequency (MHz) |           |           |           | RF IN = 15dBm           |                            |           |           |
|-----------------|-----------|-----------|-----------|-------------------------|----------------------------|-----------|-----------|
|                 |           |           |           | Conversion Loss<br>(dB) | Harmonic Output*<br>(-dBc) |           |           |
| X1 Output       | X2 Output | X3 Output | X4 Output | X2 Output               | X1 Output                  | X3 Output | X4 Output |
| 1200.00         | 2400.00   | 3600.00   | 4800.00   | 11.98                   | 20.99                      | 32.59     | 22.26     |
| 1300.00         | 2600.00   | 3900.00   | 5200.00   | 11.66                   | 20.99                      | 34.74     | 19.84     |
| 1400.00         | 2800.00   | 4200.00   | 5600.00   | 11.19                   | 18.65                      | 35.06     | 17.29     |
| 1500.00         | 3000.00   | 4500.00   | 6000.00   | 10.89                   | 17.25                      | 34.00     | 21.23     |
| 1600.00         | 3200.00   | 4800.00   | 6400.00   | 10.47                   | 17.46                      | 49.70     | 20.69     |
| 1700.00         | 3400.00   | 5100.00   | 6800.00   | 10.45                   | 16.88                      | 31.19     | 28.07     |
| 1800.00         | 3600.00   | 5400.00   | 7200.00   | 10.93                   | 16.93                      | 25.40     | 46.31     |
| 1850.00         | 3700.00   | 5550.00   | 7400.00   | 11.45                   | 17.22                      | 24.89     | 37.47     |
| 1900.00         | 3800.00   | 5700.00   | 7600.00   | 11.37                   | 17.27                      | 28.09     | 33.16     |
| 1950.00         | 3900.00   | 5850.00   | 7800.00   | 11.16                   | 16.02                      | 35.11     | 50.14     |
| 2000.00         | 4000.00   | 6000.00   | 8000.00   | 11.37                   | 14.87                      | 44.49     | 45.20     |
| 2050.00         | 4100.00   | 6150.00   | 8200.00   | 11.59                   | 14.04                      | 42.35     | 38.11     |
| 2100.00         | 4200.00   | 6300.00   | 8400.00   | 11.78                   | 13.87                      | 39.30     | 38.07     |
| 2150.00         | 4300.00   | 6450.00   | 8600.00   | 11.76                   | 14.22                      | 37.34     | 29.99     |
| 2200.00         | 4400.00   | 6600.00   | 8800.00   | 11.50                   | 14.00                      | 36.61     | 29.03     |

\*Harmonic Output below power level of X2 Output.

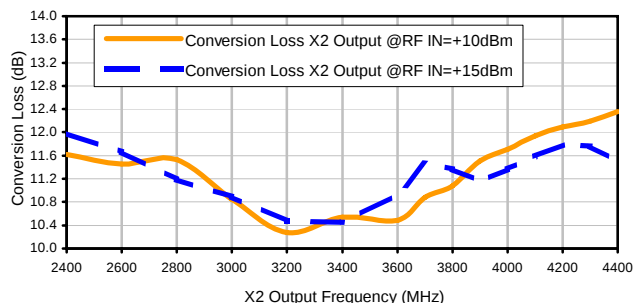


## Typical Performance Curves

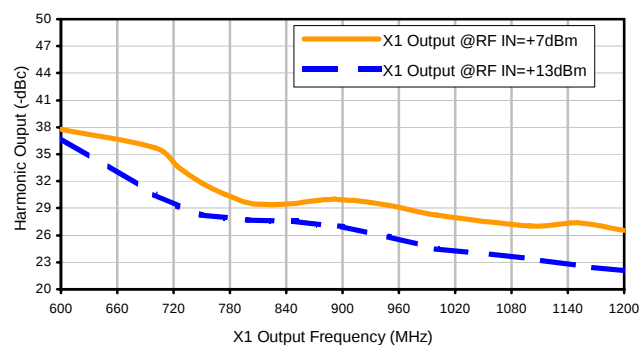
Conversion Loss X2 Output



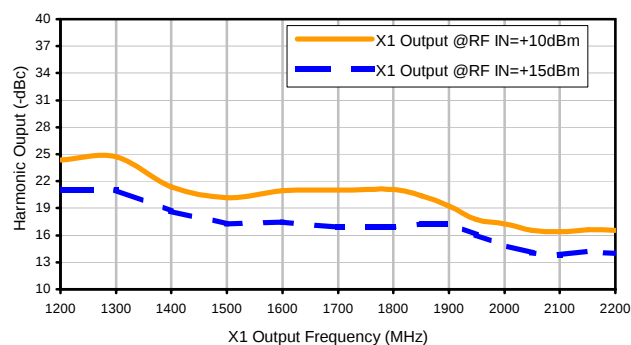
Conversion Loss X2 Output



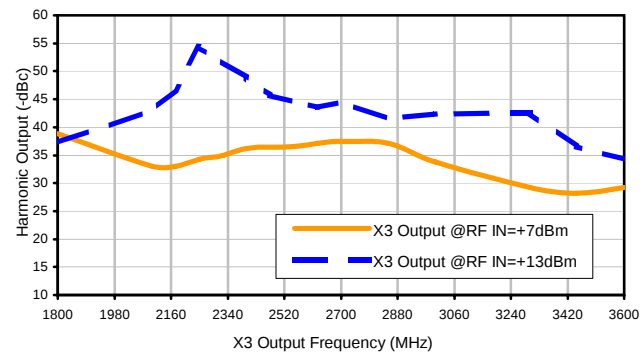
Harmonic X1 Output



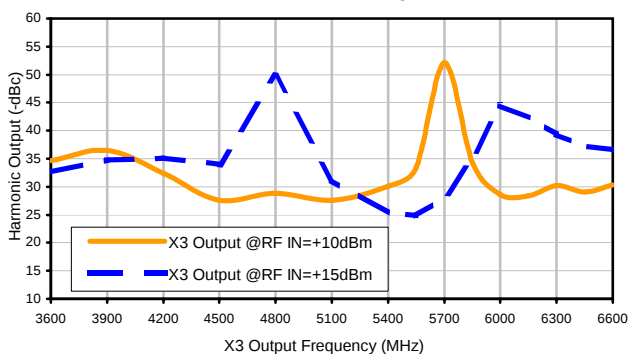
Harmonic X1 Output



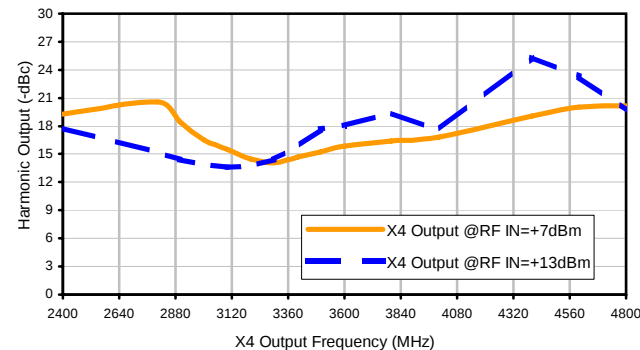
Harmonic X3 Output



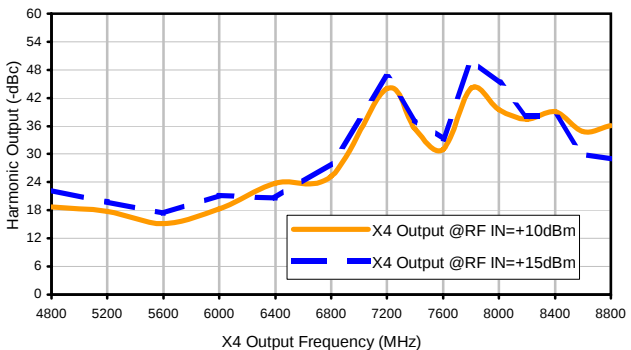
Harmonic X3 Output



Harmonic X4 Output

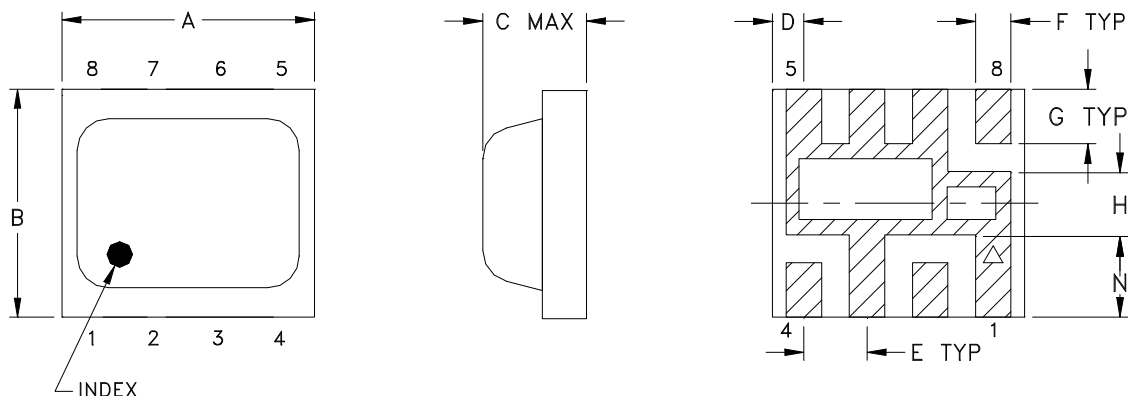


Harmonic X4 Output

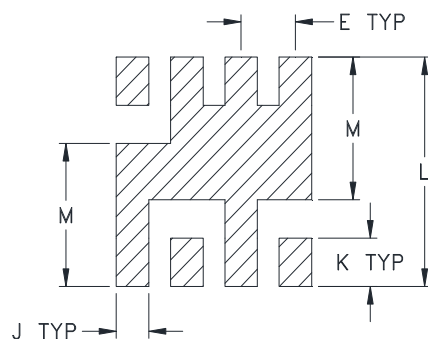


## Outline Dimensions

HV1195



## PCB Metal Land Pattern



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

| CASE#  | A               | B               | C               | D               | E               | F               | G               | H               | J               | K               | L               | M               | N               |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| HV1195 | 0.200<br>(5.08) | 0.180<br>(4.57) | 0.087<br>(2.21) | 0.025<br>(0.64) | 0.050<br>(1.27) | 0.028<br>(0.71) | 0.043<br>(1.09) | 0.050<br>(1.27) | 0.030<br>(0.76) | 0.043<br>(1.09) | 0.204<br>(5.18) | 0.127<br>(3.23) | 0.065<br>(1.65) |

| CASE#  | WT, GRAM |
|--------|----------|
| HV1195 | .08      |

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

### Notes:

1. Case material: Plastic encapsulation on Ceramic base.
2. Termination finish: Palladium Silver.



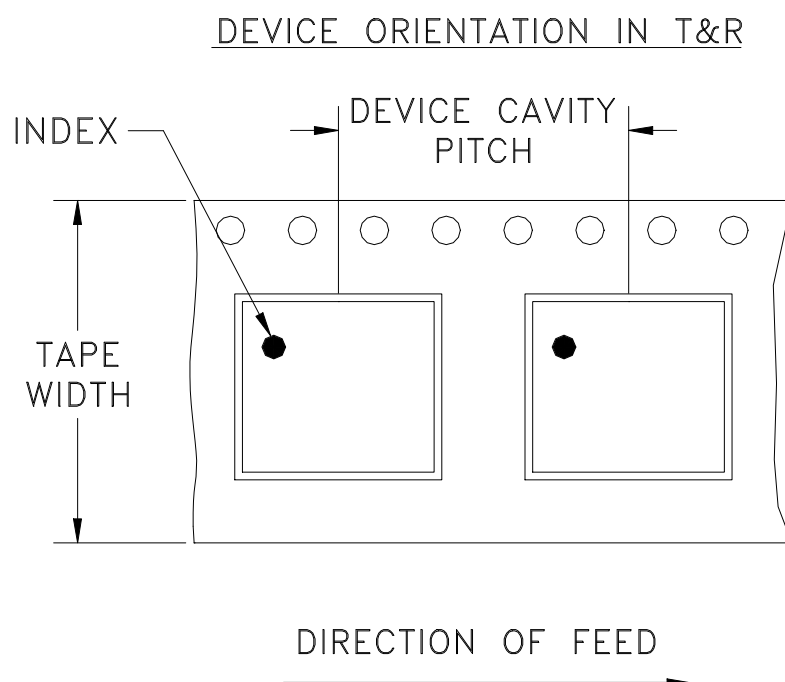
P.O. Box 350186, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



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

RF/IF MICROWAVE COMPONENTS

# Tape & Reel Packaging TR-F82



| Tape Width,<br>mm | Device Cavity<br>Pitch, mm | Reel Size,<br>inches | Devices per Reel |
|-------------------|----------------------------|----------------------|------------------|
| 12                | 8                          | 7                    | 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)

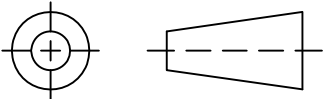


INTERNET <http://www.minicircuits.com>

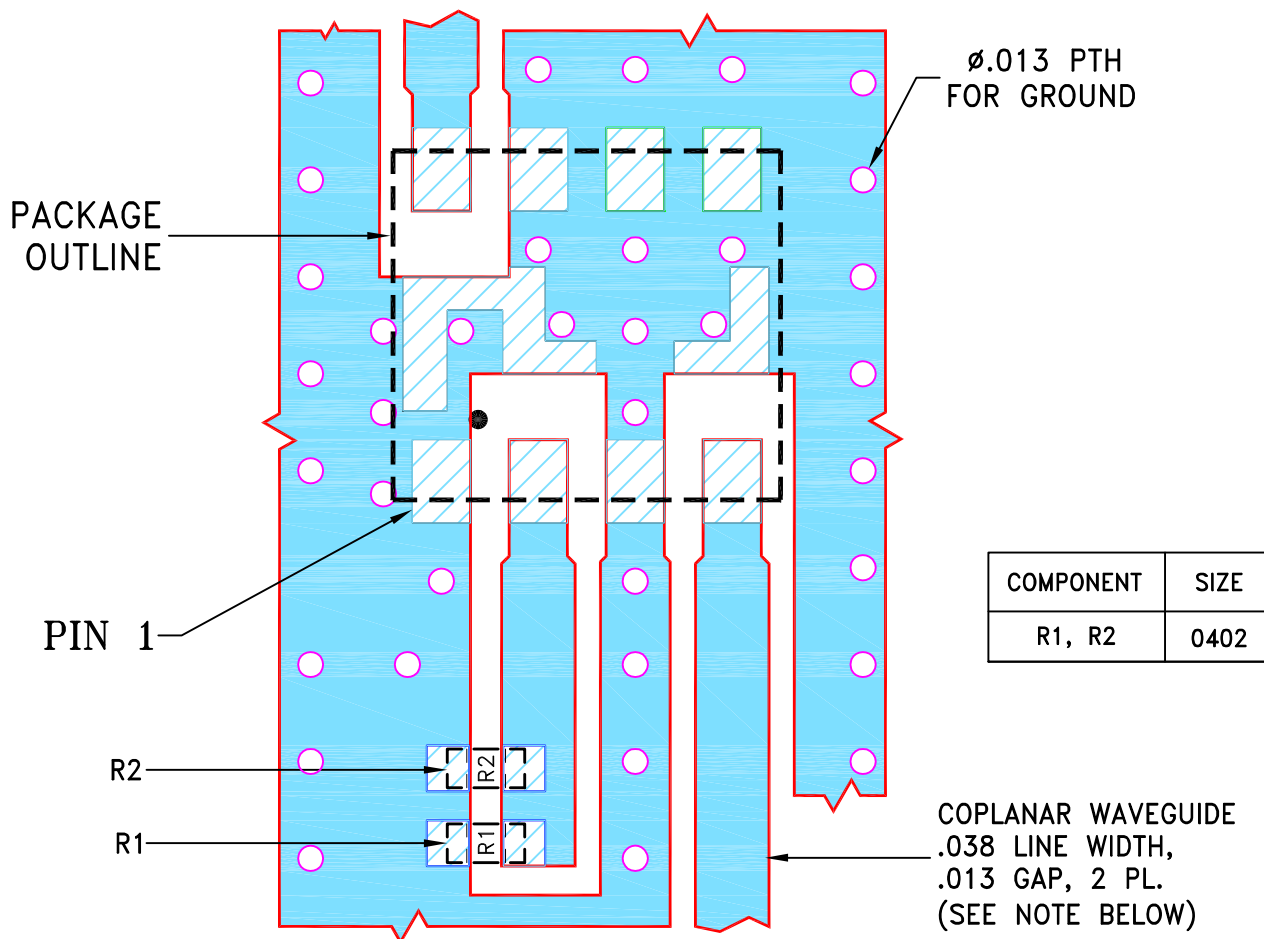
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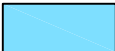
| THIRD ANGLE PROJECTION                                                           |     | REVISIONS  |                     |          |     |      |
|----------------------------------------------------------------------------------|-----|------------|---------------------|----------|-----|------|
|  | REV | ECN No.    | DESCRIPTION         | DATE     | DR  | AUTH |
|                                                                                  | OR  | M116926    | NEW RELEASE         | 04/10/08 | MMG | DJ   |
|                                                                                  | A   | ECO-000060 | MODIFIED CASE STYLE | 10/16/19 | ITG | RB   |
|                                                                                  |     |            |                     |          |     |      |

**SUGGESTED MOUNTING CONFIGURATION FOR  
HV1195 CASE STYLE, "08FM01" PIN CONNECTION**

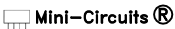


**NOTES:**

1. TRACE WIDTH AND GAP ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .020"±.0015"; COPPER: 1/2 OZ. EACH SIDE.  
FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
2. CHIP COMPONENT FOOT PRINTS SHOWN FOR REFERENCE. FOR COMPONENT VALUES REFER TO TB-473+.
3. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

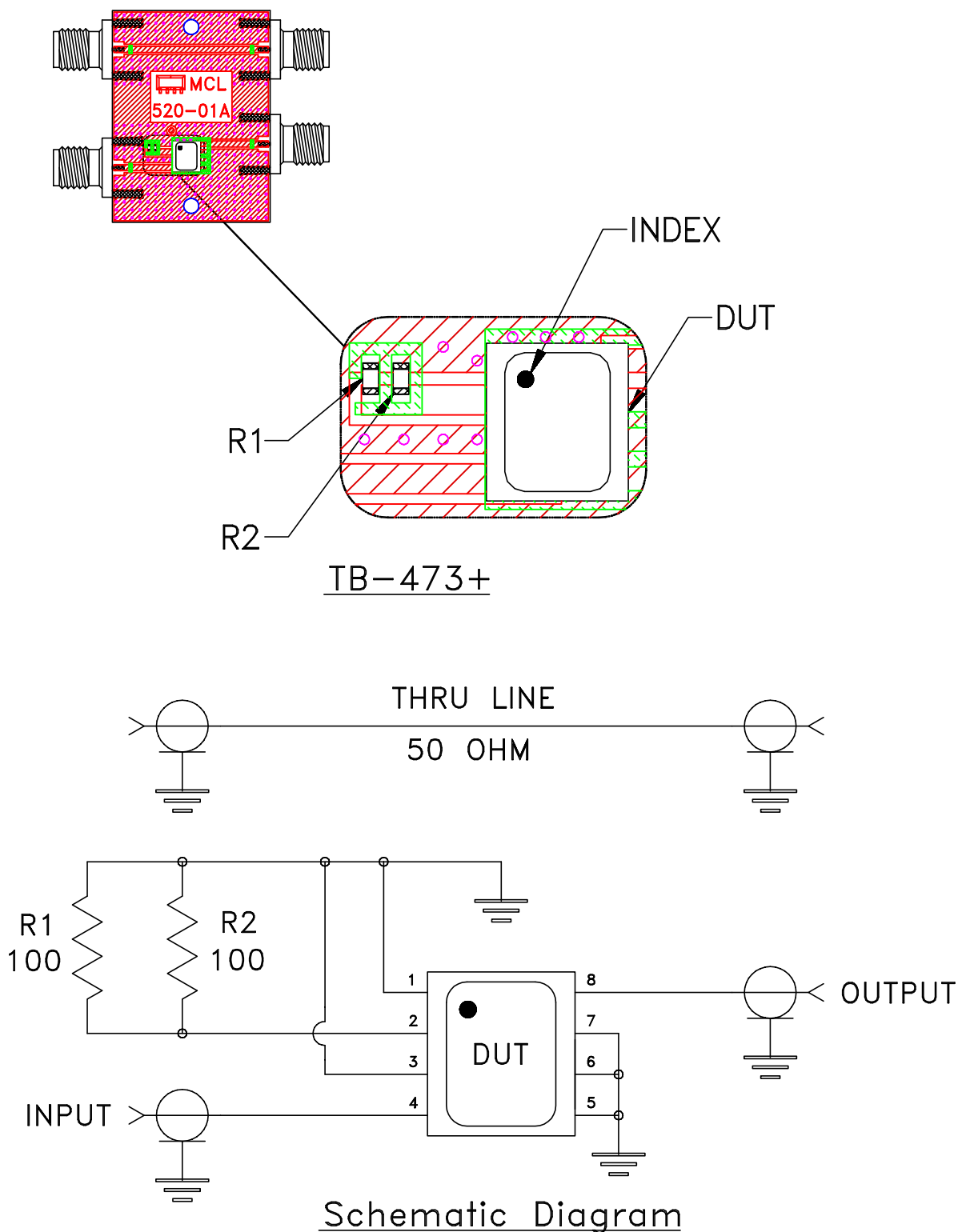
 DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER).

 DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

| UNLESS OTHERWISE SPECIFIED                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |          | INITIALS | DATE       |  <b>Mini-Circuits®</b> 13 Neptune Avenue<br>Brooklyn NY 11235 |      |               |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------|------------|--------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------|
| DIMENSIONS ARE IN INCHES<br>TOLERANCES ON:<br>2 PL DECIMALS ±<br>3 PL DECIMALS ± .005<br>ANGLES ±<br>FRACTIONS ±                                                                                                                                                                                                                                                                                                                                                                                                  | DRAWN    | MMG      | 04/03/08   |                                                                                                                                                  |      |               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | CHECKED  | AV       | 04/10/08   |                                                                                                                                                  |      |               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | APPROVED | DJ       | 04/10/08   |                                                                                                                                                  |      |               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |          |          |            |                                                                                                                                                  |      |               |
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|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |          | SIZE     | CODE IDENT | DRAWING NO:                                                                                                                                      | REV: |               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |          | A        | 15542      | 98-PL-287                                                                                                                                        | A    |               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |          | FILE:    | 98PL287    | SCALE:                                                                                                                                           | 10:1 | SHEET: 1 OF 1 |
| ASHEETA1.DWG REV:A DATE:01/12/95                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |          |          |            |                                                                                                                                                  |      |               |

# Evaluation Board and Circuit

For Pin Connections refer to Data Sheet of the DUT



## Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: R04350 or equivalent,  
Dielectric Constant=3.5, Thickness=.020 inch.

 **Mini-Circuits®**



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>Case Temperature                                                                                                                               | Individual Model Data Sheet                           |
| Storage Temperature            | -55° to 100° C<br>Ambient Environment                                                                                                                           | Individual Model Data Sheet                           |
| Autoclave                      | 15 psig, 100% RH, 121°C, 96 hours                                                                                                                               | JESD22-A102-C, Condition C                            |
| Thermal Shock                  | -55° to 100°C, 100 cycles                                                                                                                                       | MIL-STD-202, Method 107, Condition A-3, except +100°C |
| Solder Reflow Heat             | Sn-Pb Eutectic Process: 225°C peak<br>Pb-Free Process: 250°C peak                                                                                               | J-STD-020, Table 4-1, 4-2 and 5-2; Figure 5-1         |
| Solderability                  | 10X Magnification                                                                                                                                               | J-STD-002, Para 4.2.5, Test S, 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                               |