

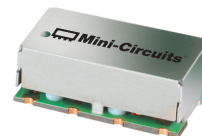
# Surface Mount Bandpass Filter

## SXBP-72+

50Ω 68 to 76 MHz

### The Big Deal

- Narrow bandwidth
- Wide stopband rejection
- Miniature shielded package



Generic photo used for illustration purposes only  
CASE STYLE: HF1139

### Product Overview

The SXBP-72+ is a 50Ω bandpass filter fabricated using SMT technology. This bandpass filter covers from 68-76 MHz. This filter is built with high Q capacitors and wire welded inductors for high reliability. This filter is developed for avionics and air traffic control. It has repeatable performance across lots and consistent performance across temperature.

### Key Features

| Feature            | Advantages                                                                                           |
|--------------------|------------------------------------------------------------------------------------------------------|
| Low insertion loss | Can be used in high performance applications such as avionics and air traffic control.               |
| Good rejection     | This enables the filter to attenuate spurious signals and reject harmonics for broad frequency band. |
| Shielded case      | Reduced interference with and from the surrounding components.                                       |

#### Notes

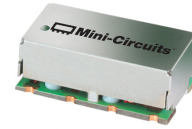
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50Ω 68-76 MHz

SXBP-72+



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CASE STYLE: HF1139

## Features

- Narrow bandwidth
- Wide stopband rejection
- Miniature shielded package

## Applications

- Avionics and air traffic control
- Harmonic rejection
- IF signal processing

## Electrical Specifications at 25°C

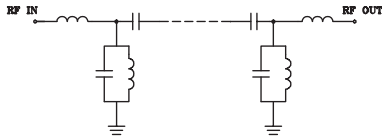
| Parameter        | F#               | Frequency (MHz) | Min. | Typ. | Max. | Unit |
|------------------|------------------|-----------------|------|------|------|------|
| Pass Band        | Center Frequency | —               | —    | 72   | —    | MHz  |
|                  | Insertion Loss   | F1-F2           | —    | 3.3  | 5.5  | dB   |
|                  | VSWR             | F1-F2           | —    | 1.5  | 2.1  | :1   |
| Stop Band, Lower | Insertion Loss   | DC-F3           | 20   | 30   | —    | dB   |
|                  | VSWR             | DC-F3           | —    | 20   | —    | :1   |
| Stop Band, Upper | Insertion Loss   | F4-F5           | 20   | 27   | —    | dB   |
|                  | VSWR             | F4-F5           | —    | 20   | —    | :1   |

## Maximum Ratings

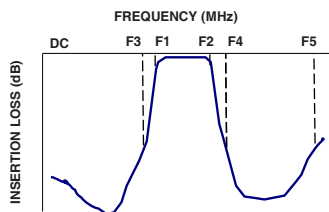
|                       |                |
|-----------------------|----------------|
| Operating Temperature | -40°C to 85°C  |
| Storage Temperature   | -55°C to 100°C |
| RF Power Input        | 100 mW         |

Permanent damage may occur if any of these limits are exceeded.

## Functional Schematic



## Typical Frequency Response

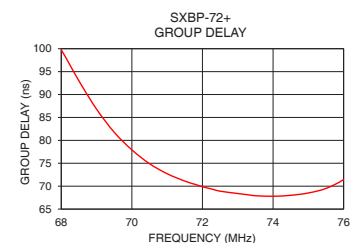
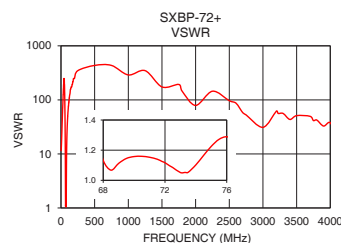
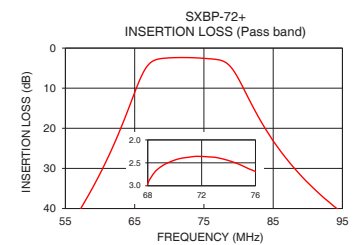
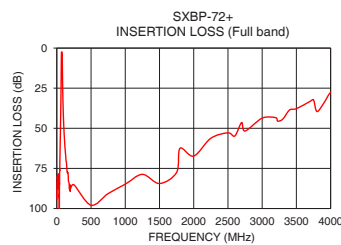


## Typical Performance Data at 25°C

| Frequency (MHz) | Insertion Loss (dB) | VSWR (:1) | Frequency (MHz) | Group Delay (nsec) |
|-----------------|---------------------|-----------|-----------------|--------------------|
| 1               | 94.38               | 11.46     | 68.0            | 99.74              |
| 30              | 87.51               | 102.19    | 68.5            | 92.99              |
| 50              | 58.12               | 217.15    | 69.0            | 86.81              |
| 57              | 40.63               | 91.43     | 69.5            | 81.77              |
| 60              | 31.32               | 45.72     | 70.0            | 77.93              |
| 63              | 19.97               | 18.11     | 70.5            | 74.91              |
| 65              | 11.09               | 6.78      | 71.0            | 72.72              |
| 68              | 2.95                | 1.13      | 71.5            | 71.11              |
| 72              | 2.36                | 1.12      | 71.8            | 70.38              |
| 76              | 2.69                | 1.29      | 72.0            | 69.89              |
| 78              | 3.44                | 1.14      | 72.3            | 69.30              |
| 80              | 7.69                | 3.18      | 72.5            | 68.91              |
| 82              | 14.39               | 7.22      | 73.0            | 68.40              |
| 87              | 27.77               | 18.70     | 73.3            | 68.11              |
| 89              | 31.77               | 23.49     | 73.5            | 67.92              |
| 95              | 41.06               | 37.77     | 74.0            | 67.80              |
| 500             | 97.94               | 434.30    | 74.5            | 68.01              |
| 1000            | 84.85               | 289.53    | 75.0            | 68.52              |
| 2500            | 52.82               | 96.51     | 75.5            | 69.51              |
| 4000            | 27.66               | 37.77     | 76.0            | 71.45              |

## +RoHS Compliant

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



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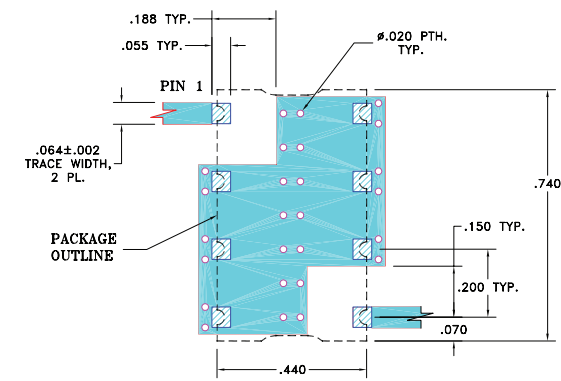
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REV. C  
ECO-005139  
SXBP-72+  
EDU1559  
URJ  
201202  
Page 2 of 3

Pad Connections

|        |             |
|--------|-------------|
| INPUT  | 1           |
| OUTPUT | 8           |
| GROUND | 2,3,4,5,6,7 |

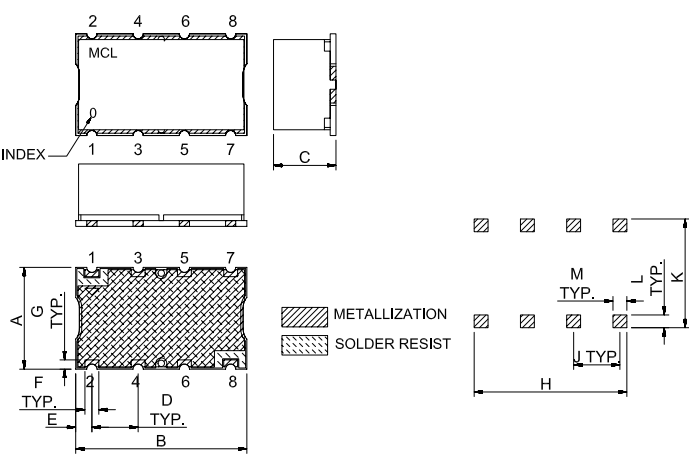
Demo Board MCL P/N: TB-368+  
Suggested PCB Layout (PL-230)



- NOTE:
- TRACE WIDTH IS SHOWN FOR FR4 WITH DIELECTRIC THICKNESS: .025"±.002". COPPER: 1/2 OZ. EACH SIDE.  
FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
  - BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

- DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)
- DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

Outline Drawing



Outline Dimensions ( inch )

| A     | B     | C     | D    | E    | F    | G     |
|-------|-------|-------|------|------|------|-------|
| .44   | .74   | .27   | .200 | .07  | .060 | .040  |
| 11.18 | 18.80 | 6.86  | 5.08 | 1.78 | 1.52 | 1.02  |
| H     | J     | K     | L    | M    |      | wt    |
| .660  | .200  | .470  | .055 | .060 |      | grams |
| 16.76 | 5.08  | 11.94 | 1.40 | 1.52 |      | 3.0   |

Note: Please refer to case style drawing for details

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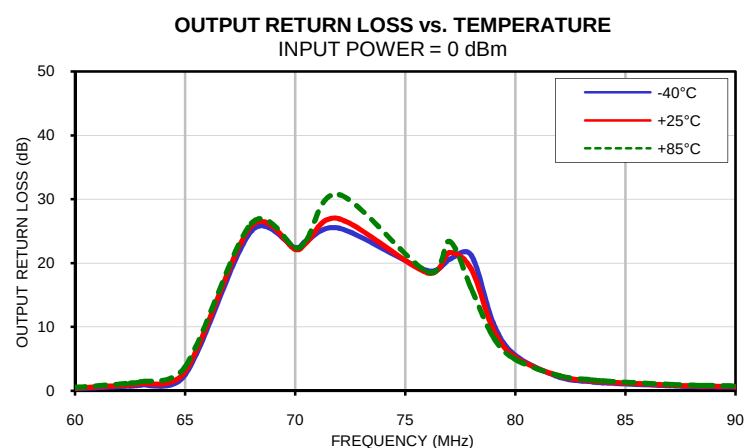
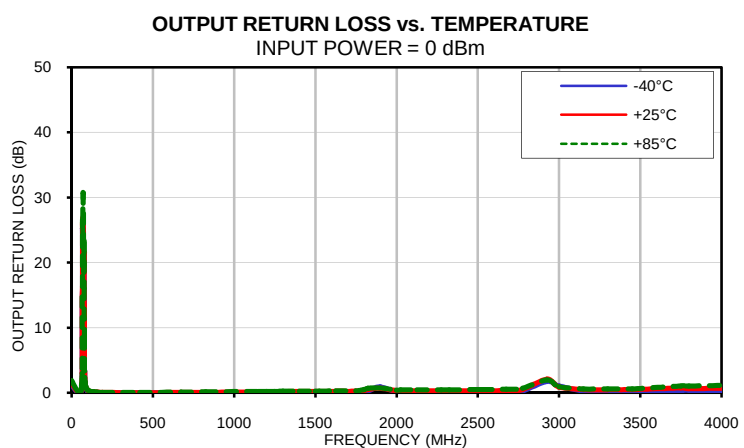
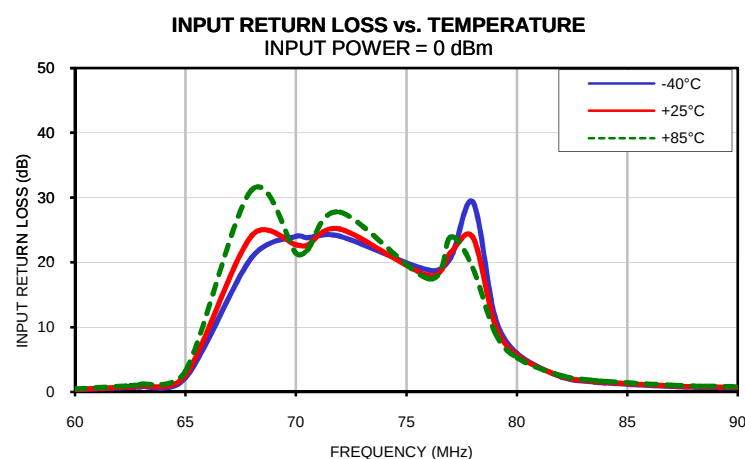
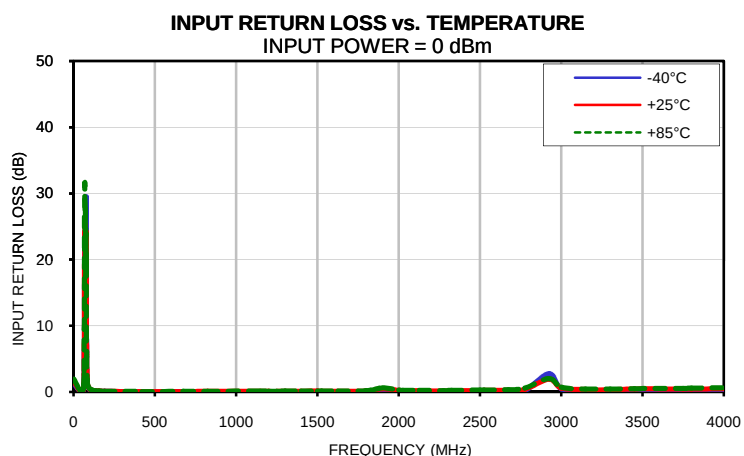
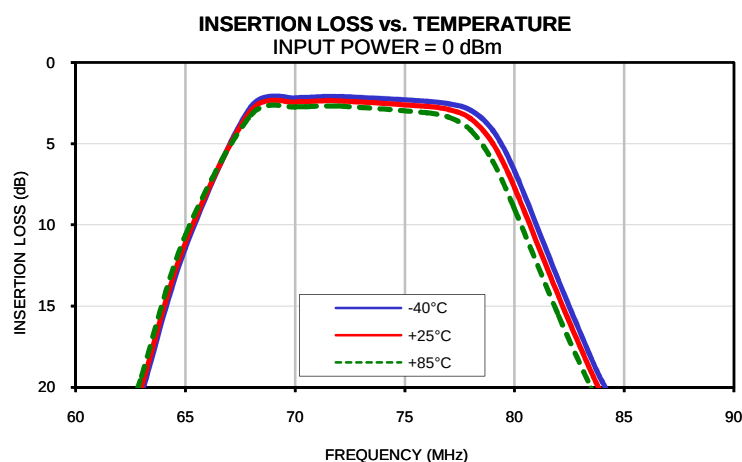
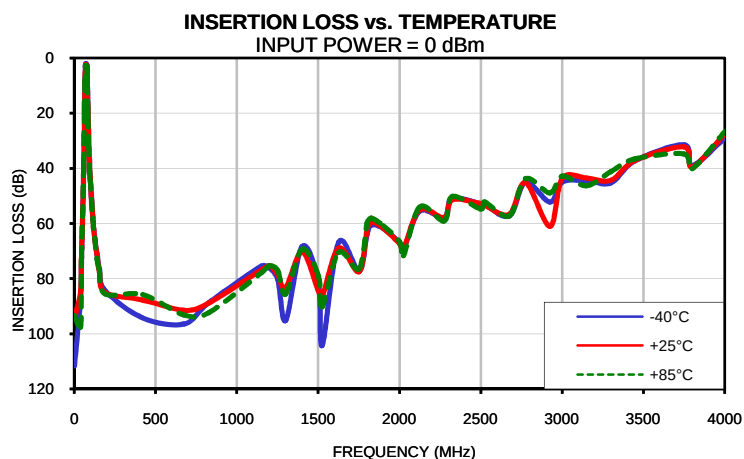
## Typical Performance Data

| FREQ.  | INSERTION LOSS |        |        | INPUT RETURN LOSS |        |        | OUTPUT RETURN LOSS |        |        |
|--------|----------------|--------|--------|-------------------|--------|--------|--------------------|--------|--------|
| (MHz)  | (dB)           |        |        | (dB)              |        |        | (dB)               |        |        |
|        | @-40°C         | @+25°C | @+85°C | @-40°C            | @+25°C | @+85°C | @-40°C             | @+25°C | @+85°C |
| 1.0    | 111.68         | 94.38  | 93.30  | 1.17              | 1.52   | 1.92   | 1.15               | 1.49   | 1.88   |
| 39.0   | 87.12          | 84.34  | 97.70  | 0.08              | 0.09   | 0.11   | 0.07               | 0.09   | 0.10   |
| 44.0   | 72.41          | 72.13  | 72.45  | 0.06              | 0.07   | 0.08   | 0.06               | 0.07   | 0.09   |
| 57.5   | 39.57          | 39.17  | 38.60  | 0.18              | 0.21   | 0.26   | 0.20               | 0.25   | 0.32   |
| 60.0   | 31.74          | 31.32  | 30.69  | 0.31              | 0.38   | 0.46   | 0.37               | 0.46   | 0.57   |
| 62.5   | 22.52          | 22.05  | 21.38  | 0.66              | 0.80   | 0.99   | 0.78               | 0.96   | 1.21   |
| 63.0   | 20.44          | 19.97  | 19.32  | 0.79              | 0.96   | 1.19   | 0.93               | 1.15   | 1.44   |
| 65.0   | 11.42          | 11.09  | 10.61  | 2.14              | 2.58   | 3.22   | 2.52               | 3.03   | 3.75   |
| 68.0   | 2.72           | 2.95   | 3.23   | 20.72             | 24.11  | 31.15  | 25.00              | 25.77  | 26.19  |
| 70.0   | 2.18           | 2.44   | 2.74   | 24.02             | 22.72  | 21.44  | 22.39              | 22.14  | 22.38  |
| 70.5   | 2.14           | 2.40   | 2.71   | 23.78             | 22.64  | 21.85  | 23.50              | 23.18  | 23.57  |
| 72.0   | 2.09           | 2.36   | 2.68   | 24.02             | 25.16  | 27.74  | 25.44              | 26.91  | 30.70  |
| 76.0   | 2.37           | 2.69   | 3.08   | 18.79             | 17.98  | 17.49  | 18.82              | 18.48  | 18.63  |
| 77.0   | 2.53           | 2.89   | 3.36   | 20.72             | 21.52  | 23.91  | 20.59              | 21.62  | 23.37  |
| 78.0   | 2.93           | 3.44   | 4.16   | 29.32             | 23.89  | 19.13  | 21.24              | 19.09  | 16.05  |
| 79.0   | 4.16           | 4.97   | 6.07   | 11.67             | 10.50  | 9.23   | 10.64              | 9.60   | 8.42   |
| 80.0   | 6.65           | 7.69   | 9.00   | 5.97              | 5.65   | 5.28   | 5.54               | 5.25   | 4.92   |
| 82.0   | 13.41          | 14.39  | 15.58  | 2.32              | 2.42   | 2.50   | 2.17               | 2.29   | 2.38   |
| 83.5   | 18.20          | 19.05  | 20.04  | 1.52              | 1.64   | 1.76   | 1.42               | 1.56   | 1.70   |
| 84.0   | 19.66          | 20.46  | 21.37  | 1.36              | 1.48   | 1.60   | 1.27               | 1.41   | 1.56   |
| 87.0   | 27.19          | 27.77  | 28.47  | 0.83              | 0.93   | 1.03   | 0.79               | 0.91   | 1.03   |
| 88.5   | 30.30          | 30.82  | 31.42  | 0.69              | 0.79   | 0.87   | 0.66               | 0.78   | 0.88   |
| 97.0   | 43.29          | 43.55  | 43.87  | 0.36              | 0.41   | 0.46   | 0.34               | 0.41   | 0.48   |
| 113.0  | 57.78          | 57.64  | 58.03  | 0.18              | 0.22   | 0.25   | 0.17               | 0.22   | 0.27   |
| 126.0  | 64.96          | 65.48  | 65.20  | 0.13              | 0.15   | 0.18   | 0.12               | 0.16   | 0.19   |
| 140.0  | 71.07          | 70.93  | 72.88  | 0.10              | 0.11   | 0.14   | 0.08               | 0.12   | 0.15   |
| 155.0  | 76.48          | 77.79  | 77.05  | 0.07              | 0.10   | 0.11   | 0.06               | 0.10   | 0.11   |
| 190.0  | 84.34          | 85.10  | 85.54  | 0.05              | 0.07   | 0.08   | 0.04               | 0.07   | 0.09   |
| 420.0  | 94.27          | 87.74  | 85.78  | 0.00              | 0.04   | 0.05   | 0.01               | 0.04   | 0.09   |
| 675.0  | 96.48          | 91.48  | 93.16  | 0.02              | 0.04   | 0.06   | 0.01               | 0.07   | 0.12   |
| 825.0  | 88.82          | 88.93  | 92.43  | 0.02              | 0.05   | 0.07   | 0.00               | 0.09   | 0.15   |
| 1150.0 | 75.49          | 76.88  | 77.86  | 0.01              | 0.07   | 0.10   | 0.03               | 0.15   | 0.20   |
| 1200.0 | 76.14          | 75.33  | 75.30  | 0.01              | 0.07   | 0.09   | 0.04               | 0.17   | 0.23   |
| 1250.0 | 80.24          | 78.71  | 77.04  | 0.03              | 0.05   | 0.09   | 0.04               | 0.15   | 0.21   |
| 1300.0 | 95.17          | 83.17  | 85.58  | 0.01              | 0.08   | 0.11   | 0.07               | 0.19   | 0.26   |
| 1400.0 | 68.38          | 70.27  | 69.29  | 0.00              | 0.09   | 0.12   | 0.07               | 0.20   | 0.26   |
| 1500.0 | 81.16          | 84.43  | 78.76  | 0.00              | 0.10   | 0.13   | 0.09               | 0.23   | 0.29   |
| 1525.0 | 104.18         | 86.59  | 90.29  | 0.02              | 0.08   | 0.11   | 0.08               | 0.22   | 0.28   |
| 1625.0 | 66.89          | 68.90  | 70.50  | 0.01              | 0.09   | 0.12   | 0.09               | 0.24   | 0.31   |
| 1750.0 | 77.32          | 77.54  | 76.47  | 0.02              | 0.09   | 0.14   | 0.10               | 0.25   | 0.34   |
| 1800.0 | 63.97          | 62.45  | 59.97  | 0.02              | 0.12   | 0.17   | 0.18               | 0.37   | 0.53   |
| 1825.0 | 60.61          | 59.38  | 58.05  | 0.02              | 0.14   | 0.20   | 0.26               | 0.53   | 0.73   |
| 1900.0 | 61.75          | 61.77  | 60.78  | 0.21              | 0.46   | 0.57   | 0.92               | 0.71   | 0.76   |
| 2000.0 | 66.99          | 67.32  | 66.63  | 0.14              | 0.22   | 0.27   | 0.14               | 0.30   | 0.42   |
| 2025.0 | 69.27          | 69.19  | 71.79  | 0.06              | 0.16   | 0.21   | 0.14               | 0.31   | 0.44   |
| 2125.0 | 55.49          | 55.05  | 54.01  | 0.03              | 0.15   | 0.20   | 0.14               | 0.31   | 0.46   |
| 2275.0 | 57.88          | 57.92  | 59.14  | 0.00              | 0.13   | 0.19   | 0.15               | 0.31   | 0.45   |
| 2325.0 | 50.85          | 51.38  | 50.16  | 0.05              | 0.17   | 0.22   | 0.14               | 0.31   | 0.48   |
| 2500.0 | 52.90          | 52.82  | 54.78  | 0.05              | 0.18   | 0.25   | 0.17               | 0.33   | 0.49   |
| 2525.0 | 53.21          | 53.37  | 52.20  | 0.08              | 0.20   | 0.28   | 0.16               | 0.34   | 0.51   |
| 2675.0 | 57.22          | 56.63  | 57.23  | 0.06              | 0.21   | 0.31   | 0.20               | 0.38   | 0.54   |
| 2775.0 | 45.07          | 45.19  | 43.82  | 0.16              | 0.38   | 0.54   | 0.31               | 0.53   | 0.70   |
| 2925.0 | 52.29          | 61.02  | 48.91  | 2.72              | 1.93   | 1.99   | 1.76               | 2.11   | 1.97   |
| 3000.0 | 45.10          | 43.67  | 42.86  | 0.48              | 0.56   | 0.69   | 1.04               | 0.92   | 0.98   |
| 3150.0 | 44.53          | 43.52  | 46.33  | 0.19              | 0.32   | 0.42   | 0.31               | 0.51   | 0.61   |
| 3300.0 | 45.31          | 44.34  | 41.20  | 0.14              | 0.31   | 0.42   | 0.25               | 0.49   | 0.63   |
| 3450.0 | 37.23          | 37.13  | 36.55  | 0.29              | 0.43   | 0.48   | 0.24               | 0.50   | 0.63   |
| 3750.0 | 31.48          | 32.23  | 34.82  | 0.22              | 0.42   | 0.49   | 0.37               | 0.74   | 1.05   |
| 3800.0 | 39.00          | 39.56  | 40.23  | 0.23              | 0.41   | 0.56   | 0.39               | 0.68   | 1.04   |
| 4000.0 | 29.11          | 27.66  | 26.78  | 0.26              | 0.46   | 0.59   | 0.34               | 0.71   | 1.15   |

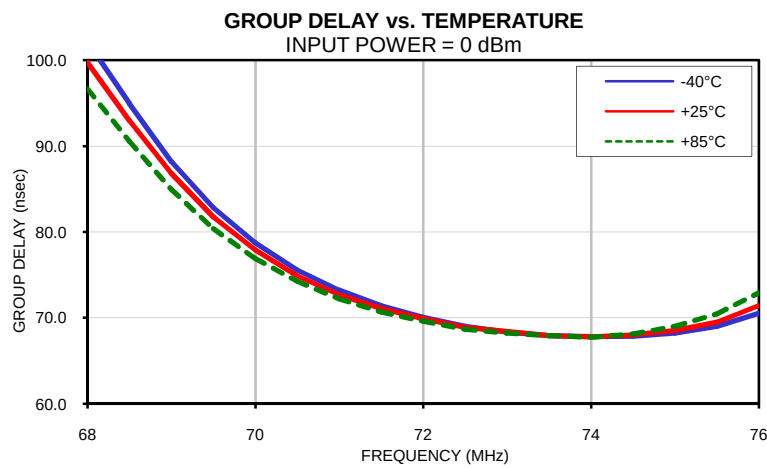
## Typical Performance Data

| FREQ. | GROUP DELAY |        |        |
|-------|-------------|--------|--------|
| (MHz) | (nsec)      |        |        |
|       | @-40°C      | @+25°C | @+85°C |
| 68.0  | 102.14      | 99.74  | 96.68  |
| 68.5  | 94.96       | 92.99  | 90.56  |
| 69.0  | 88.20       | 86.81  | 84.97  |
| 69.5  | 82.84       | 81.77  | 80.37  |
| 70.0  | 78.73       | 77.93  | 76.90  |
| 70.5  | 75.57       | 74.91  | 74.27  |
| 71.0  | 73.24       | 72.72  | 72.21  |
| 71.5  | 71.40       | 71.11  | 70.69  |
| 72.0  | 70.04       | 69.89  | 69.62  |
| 72.5  | 69.01       | 68.91  | 68.69  |
| 73.0  | 68.36       | 68.40  | 68.22  |
| 73.5  | 67.93       | 67.92  | 67.94  |
| 74.0  | 67.81       | 67.80  | 67.75  |
| 74.5  | 67.84       | 68.01  | 68.12  |
| 75.0  | 68.22       | 68.52  | 69.03  |
| 75.5  | 69.03       | 69.51  | 70.47  |
| 76.0  | 70.53       | 71.45  | 72.92  |

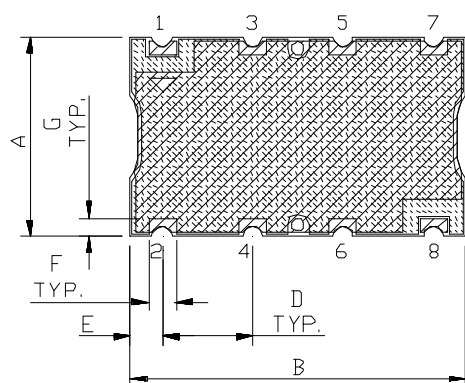
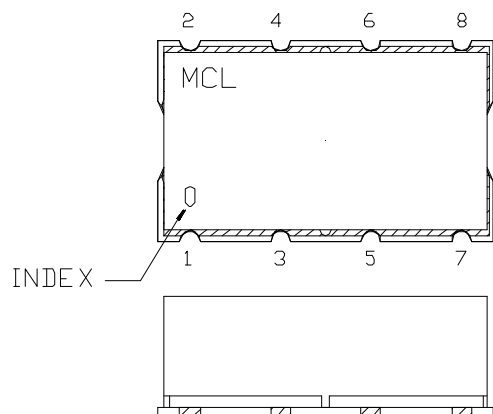
## Typical Performance Curves



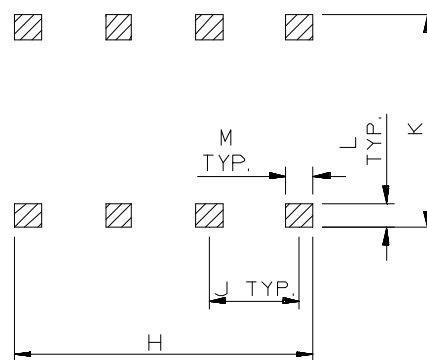
## Typical Performance Curves



### Outline Dimensions



### PCB Land Pattern



| CASE # | A              | B              | C             | D              | E             | F              | G              | H               | J              | K               | L              | M              | WT. GRAMS |
|--------|----------------|----------------|---------------|----------------|---------------|----------------|----------------|-----------------|----------------|-----------------|----------------|----------------|-----------|
| HF1139 | .44<br>(11.18) | .74<br>(18.80) | .27<br>(6.86) | .200<br>(5.08) | .07<br>(1.78) | .060<br>(1.52) | .040<br>(1.02) | .660<br>(16.76) | .200<br>(5.08) | .470<br>(11.94) | .055<br>(1.40) | .060<br>(1.52) | 3.0       |

Dimensions are in inches (mm). Tolerances: 2 Pl.  $\pm 0.015$ "; 3 Pl.  $\pm 0.01$ "

#### Notes:

- Case material: Nickel-Silver alloy.
- Base: Printed wiring laminate.
- Termination finish:
  - For RoHS Case Styles: 2-5  $\mu$  inch (.05-.13 microns) Gold over 120-240  $\mu$  inch (3.05-6.10 microns) Nickel plate.
  - For RoHS-5 Case Styles: Tin-Lead plate.



P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site

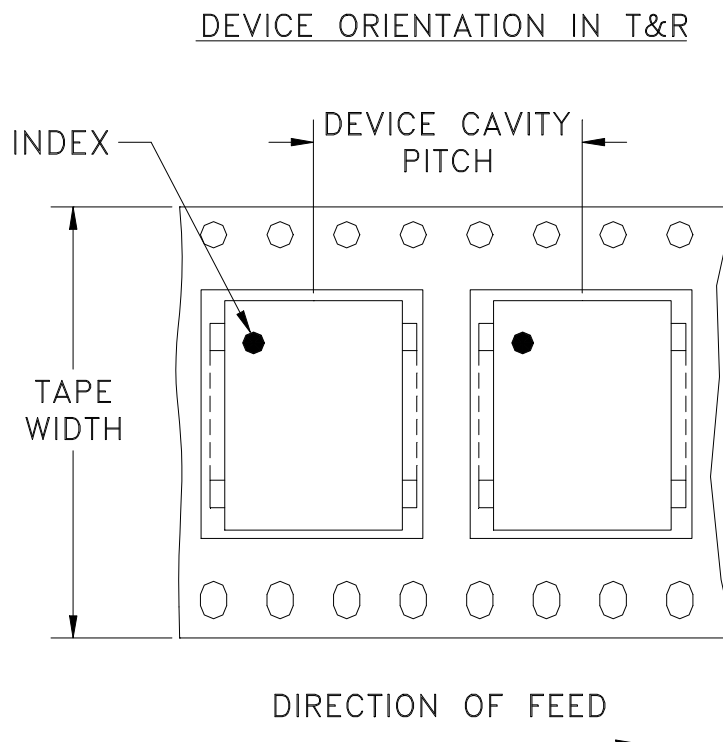


The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)

RF/IF MICROWAVE COMPONENTS



# Tape & Reel Packaging TR-F5



| Tape Width,<br>mm | Device Cavity<br>Pitch, mm | Reel Size,<br>inches | Devices per Reel |
|-------------------|----------------------------|----------------------|------------------|
| 32                | 16                         | 13                   | 500              |

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

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



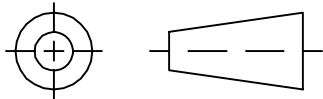
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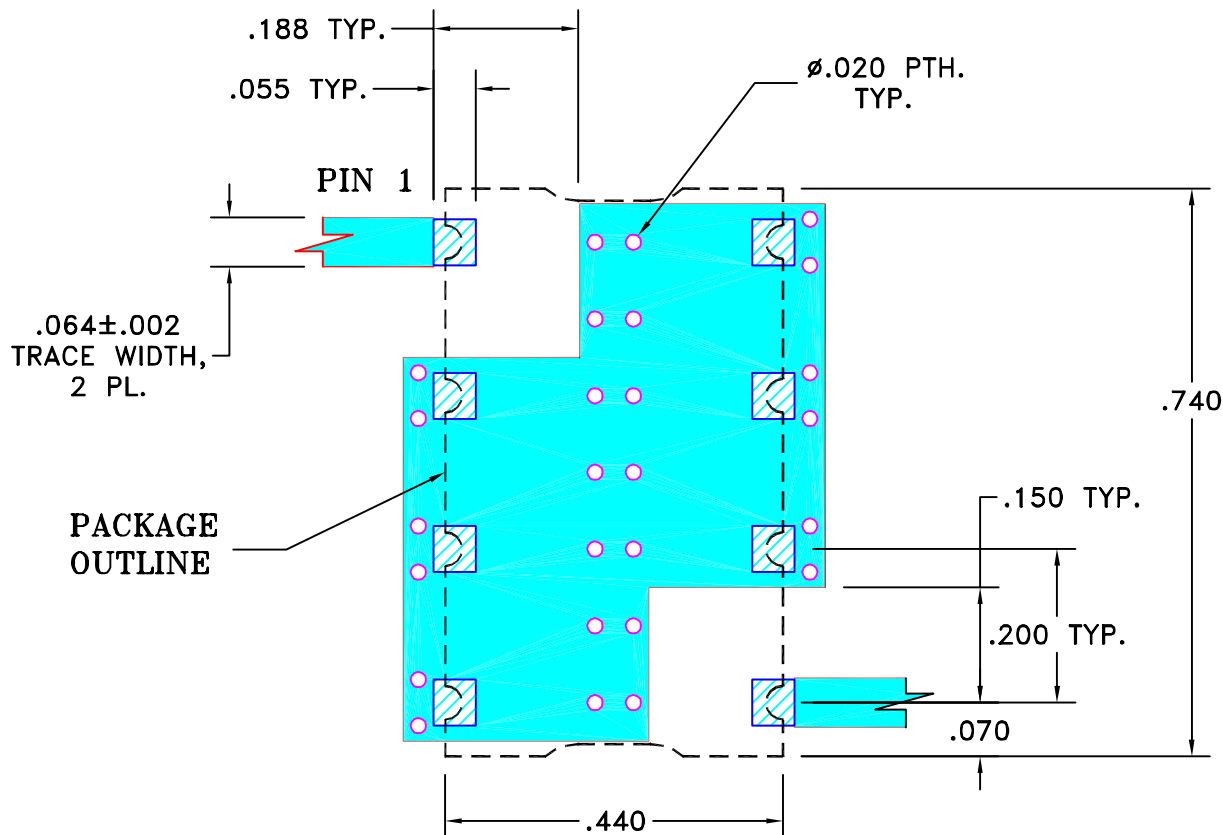
## THIRD ANGLE PROJECTION



## REVISIONS

| REV | ECN No. | DESCRIPTION              | DATE  | DR | AUTH |
|-----|---------|--------------------------|-------|----|------|
| OR  | M101757 | NEW RELEASE (FROM RAVON) | 11/05 | DK | HH   |
| OR  | R62293  | NEW RELEASE (FROM RAVON) | 11/05 | DK | HH   |
|     |         |                          |       |    |      |
|     |         |                          |       |    |      |

**SUGGESTED MOUNTING CONFIGURATION**  
**FOR HF1139 CASE STYLE, cr PIN CONNECTION, 50 OHM.**



## NOTE:

- TRACE WIDTH IS SHOWN FOR FR4 WITH DIELECTRIC THICKNESS: .025" ± .002". COPPER: 1/2 OZ. EACH SIDE.  
FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
- BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.



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



DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

UNLESS OTHERWISE SPECIFIED

INITIALS

DATE

DIMENSIONS ARE IN INCHES

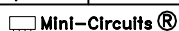
TOLERANCES ON:

2 PL DECIMALS ± .005

3 PL DECIMALS ±

ANGLES ±

FRACTIONS ±



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



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PL, cr, HF1139, SCLF, TB-368

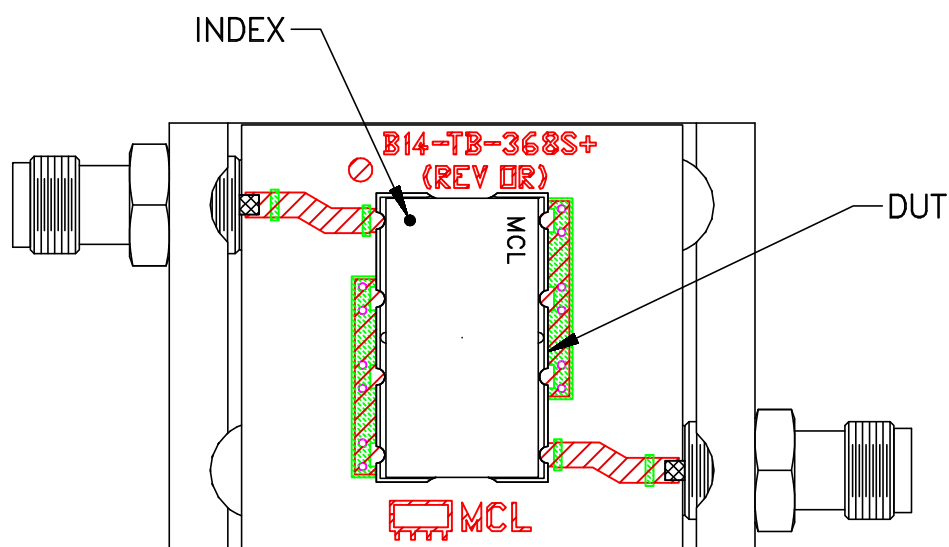
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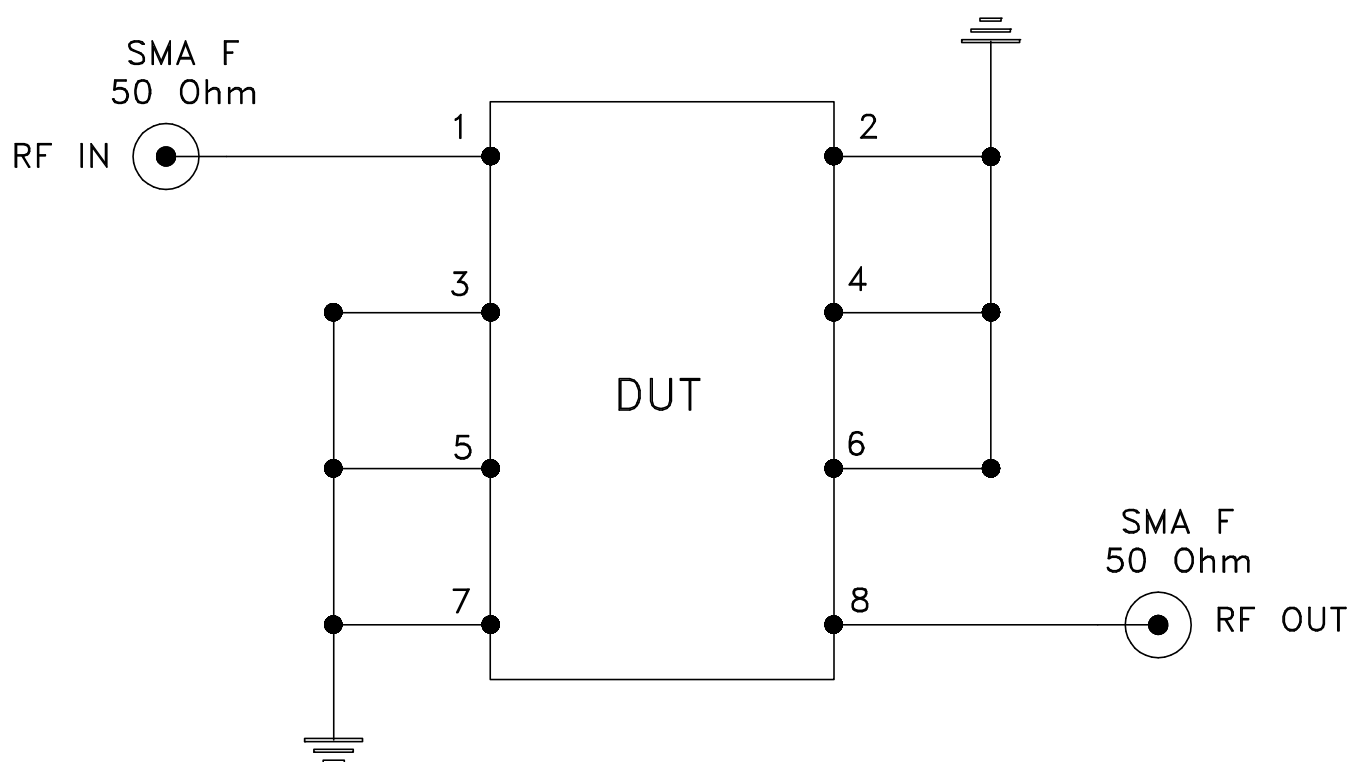
SCALE: 4:1

SHEET: 1 OF 1

# Evaluation Board and Circuit



TB-368



Schematic Diagram

## Notes:

1. SMA Female connectors.
2. PCB Material: ROGERS R04350B or equivalent,  
Dielectric Constant=3.5, Thickness=.030 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>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                                                                              |