



Mini-Circuits

LUMPED LC SURFACE MOUNT

# Diplexer

**RDP-6500+**

50Ω DC to 6500 MHz (DC-100, 1400-6500 MHz)

## KEY FEATURES

- Low Insertion Loss, 1.5 dB Typ.
- Good Stopband Rejection, 40 dB Typ.
- Miniature Shielded Package

## APPLICATIONS

- Military Radio Communication
- Transmitter and Receiver
- Wireless Communication Systems

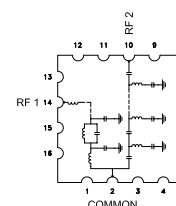
## PRODUCT OVERVIEW

RDP-6500+ is a lowpass + highpass diplexer. Lowpass port is designed for DC to 100 MHz and highpass port is designed for 1400 to 6500 MHz. The low pass channel offers a very good rejection and the high pass channel works for a broad frequency band until 6500 MHz offering low insertion loss. This diplexer can be used in military radio communication systems.



Generic photo used for illustration purposes only

## FUNCTIONAL DIAGRAM



## ELECTRICAL SPECIFICATIONS<sup>1,2</sup> AT +25°C

| Parameter           |                        | Function (Port)        | Frequency (MHz) | Min. | Typ. | Max. | Unit |
|---------------------|------------------------|------------------------|-----------------|------|------|------|------|
| Pass Band           | Insertion Loss         | Low Pass (RF COM-RF1)  | DC - 100        | —    | 0.5  | 1    | dB   |
|                     |                        | High Pass (RF COM-RF2) | 1400 - 3500     | —    | 0.3  | 1    |      |
|                     |                        |                        | 3500 - 4400     | —    | 0.5  | 1.2  |      |
|                     |                        |                        | 4400 - 6500     | —    | 1.5  | 3    |      |
|                     | Return Loss            | Low Pass (RF1)         | DC - 100        | 14   | 21   | —    | dB   |
|                     |                        | High Pass (RF2)        | 1400-3000       | 14   | 20   | —    |      |
|                     |                        |                        | 3000-4400       | 10   | 17   | —    |      |
|                     |                        |                        | 4400-6500       | —    | 8    | —    |      |
|                     |                        | Common (COM)           | DC-100          | 14   | 21   | —    |      |
|                     |                        |                        | 1400 - 3000     | 14   | 20   | —    |      |
|                     |                        |                        | 3000 - 4400     | 10   | 17   | —    |      |
|                     |                        |                        | 4400 - 6500     | —    | 8    | —    |      |
| Stop Band Rejection | Low Pass (RF COM-RF1)  |                        | 1400 - 2500     | 50   | 60   | —    | dB   |
|                     |                        |                        | 2500 - 4400     | 30   | 43   | —    |      |
|                     |                        |                        | 4400 - 6500     | 20   | 28   | —    |      |
|                     | High Pass (RF COM-RF2) |                        | DC-100          | 60   | 75   | —    |      |

1. Tested in Evaluation Board P/N TB-RDP-6500+.

2. Bi-Directional. See S-Parameters for actual performance.

## ABSOLUTE MAXIMUM RATINGS<sup>3</sup>

|                       |                 |
|-----------------------|-----------------|
| Operating Temperature | -40°C to +85°C  |
| Storage Temperature   | -55°C to +100°C |
| Input Power (RF COM)  | 1.5 W           |
| Input Power (RF1)     | 1.5 W           |
| Input Power (RF2)     | 1.5 W           |

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

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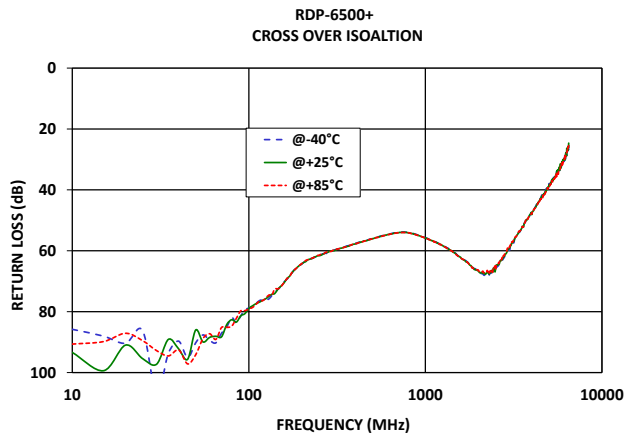
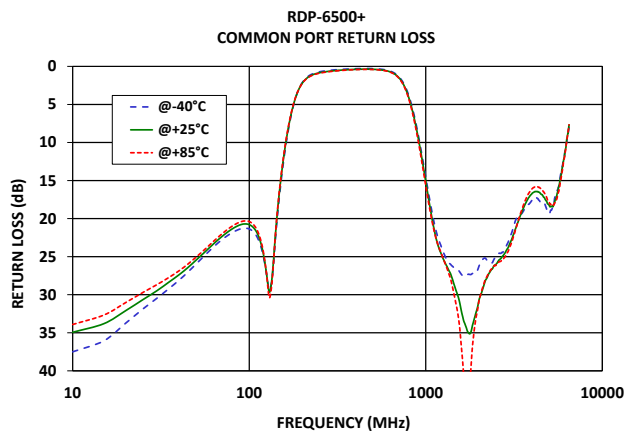
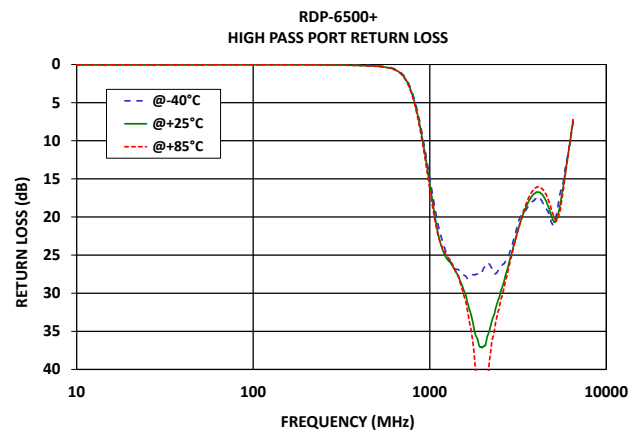
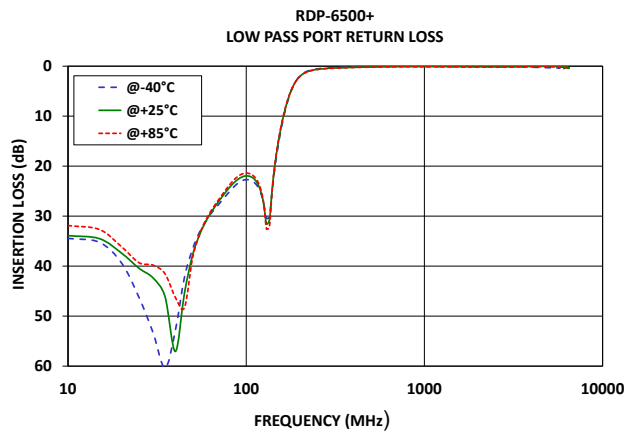
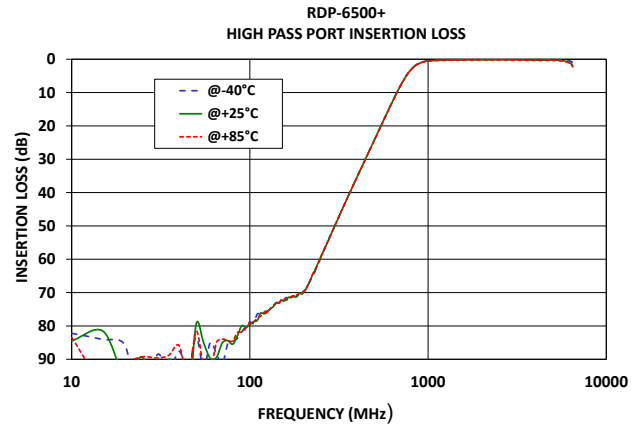
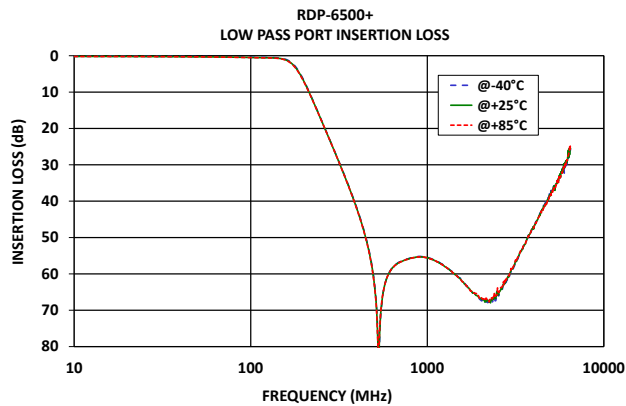
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REV. A  
ECO-026123  
RDP-6500+  
EDU3099  
URJ  
250619

PAGE 1 OF 4



## TYPICAL PERFORMANCE GRAPHS





## FUNCTIONAL DIAGRAM

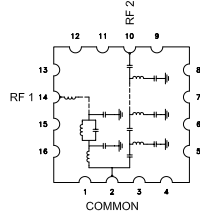
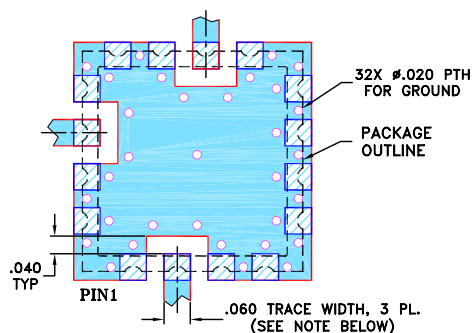


Figure 1. RDP-6500+ Functional Diagram

## PAD DESCRIPTION

| Port             | Pad Number        | Description                                                                        |
|------------------|-------------------|------------------------------------------------------------------------------------|
| COMMON           | 2                 | Connects to Common Port                                                            |
| RF1 <sup>2</sup> | 14                | Connects to Low Pass Port                                                          |
| RF2 <sup>2</sup> | 10                | Connects to High Pass Port                                                         |
| GROUND           | 1,3-9,11-13,15,16 | Connects to Ground on PCB,<br>(See drawing PL-012)                                 |
| NC               | —                 | No connection, not used internally.<br>See drawing PL-012 for connection<br>to PCB |

## SUGGESTED PCB LAYOUT (PL-012)

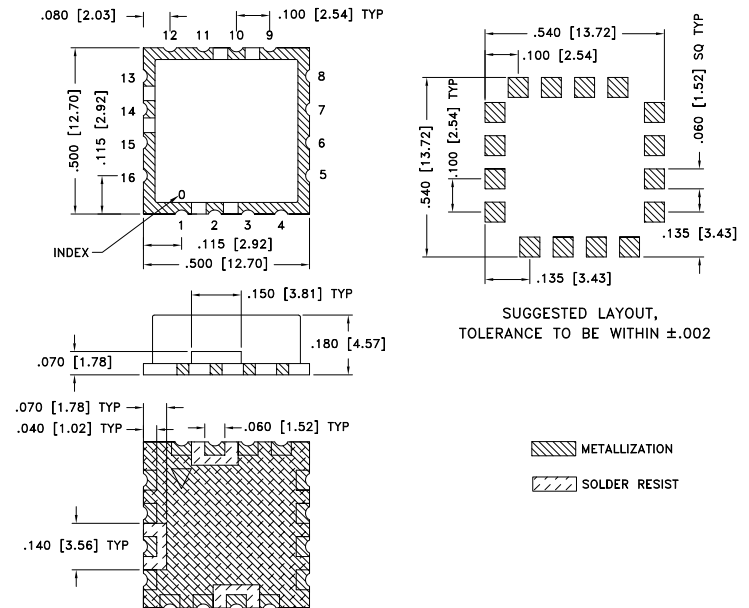


- NOTES: 1. TRACE WIDTH IS SHOWN FOR FR4 WITH DIELECTRIC THICKNESS .030" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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

Figure 2. Suggested PCB Layout PL-012

## CASE STYLE DRAWING



Weight: 1.2 gram

Dimensions are in inches (mm). Tolerances: 2Pl. ± .03; 3Pl. ± .015

## PRODUCT MARKING\*: RDP-6500

\*Marking may contain other features or characters for internal lot control.



LUMPED LC SURFACE MOUNT

# Diplexer

**RDP-6500+**

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50Ω DC to 6500 MHz (DC-100, 1400-6500 MHz)

ADDITIONAL DETAILED INFORMATION IS AVAILABLE ON OUR DASH BOARD.

[CLICK HERE](#)

|                                 |                                                                                           |
|---------------------------------|-------------------------------------------------------------------------------------------|
| Performance Data & Graphs       | Data<br>Graphs<br>S-Parameter (S3P Files) Data Set (.zip file) De-embedded to device pads |
| Case Style                      | CK605 Lead Finish: Gold over Nickel Plate                                                 |
| RoHS Status                     | Compliant                                                                                 |
| Tape and Reel                   | TR-F37                                                                                    |
| Suggested Layout for PCB Design | PL-012                                                                                    |
| Evaluation Board                | TB-RDP-6500+<br>Gerber File                                                               |
| Environmental Rating            | ENV02T1                                                                                   |

## NOTES

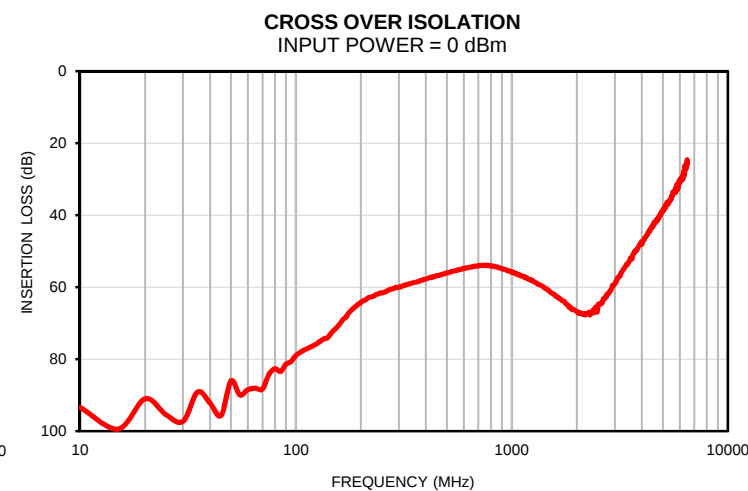
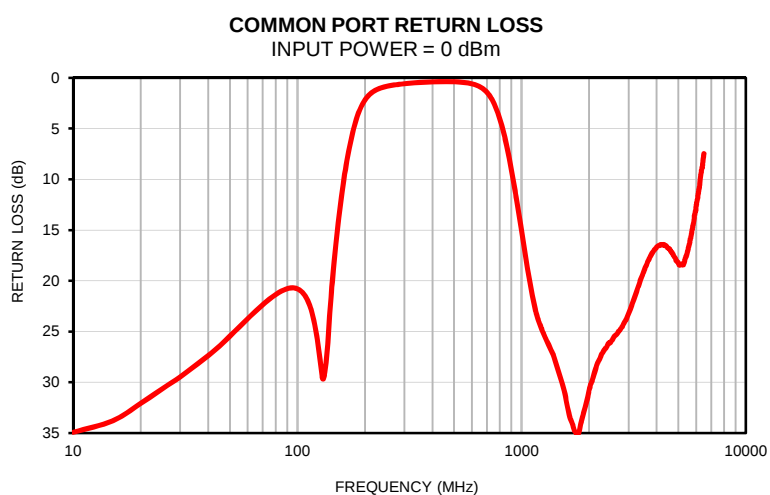
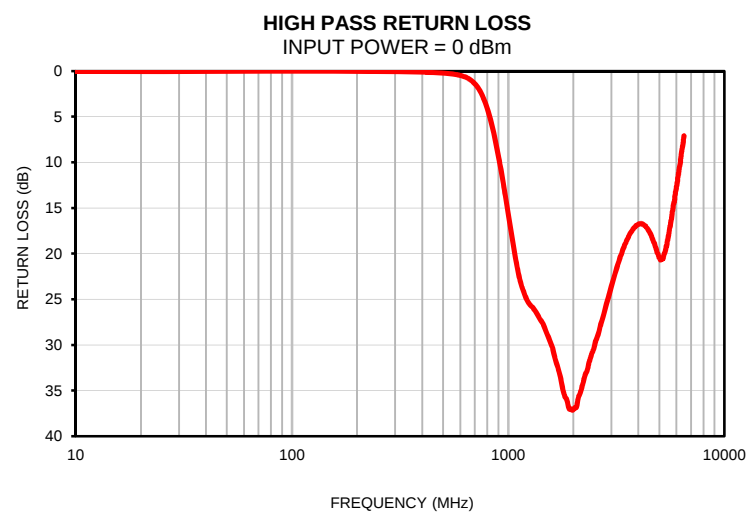
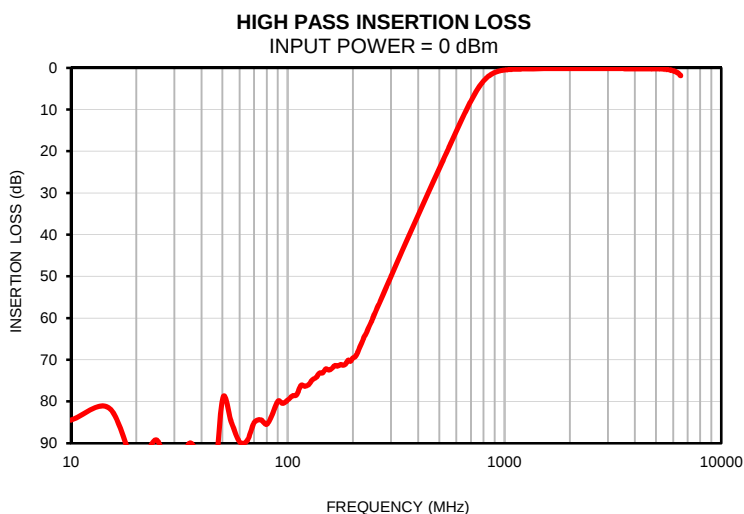
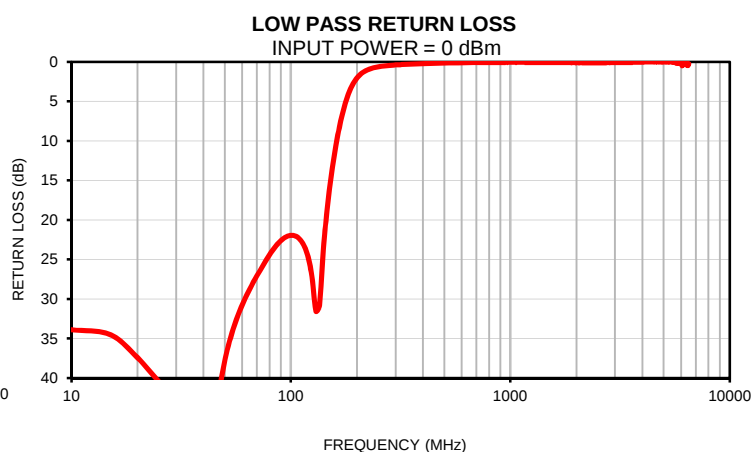
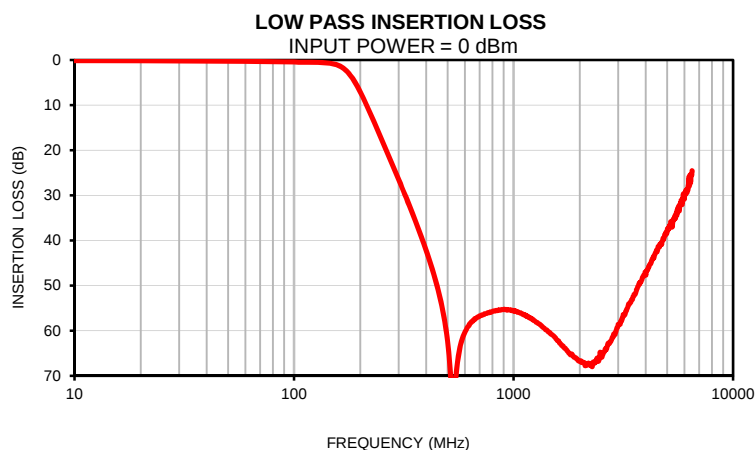
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## Typical Performance Data

| FREQUENCY<br>(MHz) | INSERTION<br>LOSS<br>(dB) |               | Cross over<br>isolation<br>(dB)<br>(between LPF<br>and HPF) | RETURN<br>LOSS<br>(dB) |              |               |
|--------------------|---------------------------|---------------|-------------------------------------------------------------|------------------------|--------------|---------------|
|                    | Lowpass port              | Highpass port |                                                             | Common port            | Lowpass port | Highpass port |
| 10                 | 0.19                      | 84.48         | 93.39                                                       | 34.93                  | 33.90        | 0.04          |
| 20                 | 0.21                      | 95.39         | 90.99                                                       | 32.08                  | 37.41        | 0.04          |
| 30                 | 0.23                      | 103.10        | 97.28                                                       | 29.48                  | 42.36        | 0.03          |
| 40                 | 0.26                      | 96.04         | 92.20                                                       | 27.39                  | 57.06        | 0.03          |
| 50                 | 0.29                      | 79.37         | 86.02                                                       | 25.45                  | 37.78        | 0.03          |
| 60                 | 0.32                      | 89.72         | 88.44                                                       | 23.74                  | 30.75        | 0.03          |
| 70                 | 0.36                      | 85.10         | 88.28                                                       | 22.36                  | 27.07        | 0.03          |
| 80                 | 0.40                      | 85.49         | 82.64                                                       | 21.36                  | 24.39        | 0.03          |
| 90                 | 0.44                      | 79.95         | 81.37                                                       | 20.78                  | 22.61        | 0.02          |
| 100                | 0.48                      | 79.70         | 78.93                                                       | 20.79                  | 21.95        | 0.02          |
| 150                | 0.84                      | 72.20         | 71.91                                                       | 15.42                  | 16.04        | 0.02          |
| 160                | 1.27                      | 72.09         | 70.13                                                       | 10.49                  | 10.76        | 0.03          |
| 170                | 2.07                      | 71.53         | 68.41                                                       | 7.01                   | 7.10         | 0.03          |
| 180                | 3.34                      | 71.30         | 66.49                                                       | 4.64                   | 4.62         | 0.03          |
| 190                | 5.04                      | 70.11         | 65.20                                                       | 3.12                   | 3.02         | 0.03          |
| 200                | 7.03                      | 69.58         | 64.25                                                       | 2.19                   | 2.05         | 0.03          |
| 210                | 9.15                      | 68.30         | 63.55                                                       | 1.63                   | 1.46         | 0.03          |
| 220                | 11.31                     | 65.89         | 62.80                                                       | 1.29                   | 1.11         | 0.04          |
| 250                | 17.51                     | 59.28         | 61.61                                                       | 0.84                   | 0.63         | 0.05          |
| 265                | 20.39                     | 56.45         | 61.01                                                       | 0.73                   | 0.53         | 0.05          |
| 275                | 22.23                     | 54.52         | 60.55                                                       | 0.68                   | 0.48         | 0.06          |
| 300                | 26.59                     | 49.88         | 59.96                                                       | 0.58                   | 0.40         | 0.06          |
| 325                | 30.69                     | 45.80         | 59.35                                                       | 0.51                   | 0.34         | 0.08          |
| 350                | 34.61                     | 42.03         | 58.78                                                       | 0.46                   | 0.30         | 0.09          |
| 400                | 42.21                     | 35.29         | 57.76                                                       | 0.39                   | 0.24         | 0.13          |
| 440                | 48.65                     | 30.53         | 57.01                                                       | 0.37                   | 0.20         | 0.16          |
| 475                | 55.40                     | 26.72         | 56.47                                                       | 0.37                   | 0.18         | 0.19          |
| 500                | 62.26                     | 24.18         | 56.02                                                       | 0.38                   | 0.16         | 0.23          |
| 540                | 74.34                     | 20.37         | 55.53                                                       | 0.43                   | 0.14         | 0.30          |
| 600                | 60.31                     | 15.18         | 54.85                                                       | 0.58                   | 0.12         | 0.48          |
| 700                | 56.74                     | 7.96          | 54.04                                                       | 1.43                   | 0.10         | 1.38          |
| 750                | 56.20                     | 5.21          | 53.96                                                       | 2.44                   | 0.09         | 2.42          |
| 1000               | 55.58                     | 0.54          | 55.84                                                       | 15.15                  | 0.07         | 15.62         |
| 1200               | 57.26                     | 0.30          | 57.81                                                       | 24.18                  | 0.08         | 24.69         |
| 1400               | 59.78                     | 0.23          | 59.92                                                       | 27.63                  | 0.08         | 27.15         |
| 1600               | 62.24                     | 0.20          | 62.56                                                       | 32.42                  | 0.10         | 30.23         |
| 1800               | 65.14                     | 0.18          | 64.81                                                       | 34.94                  | 0.11         | 35.14         |
| 2000               | 66.79                     | 0.17          | 66.80                                                       | 30.76                  | 0.12         | 37.05         |
| 2200               | 67.19                     | 0.16          | 67.60                                                       | 27.95                  | 0.12         | 34.47         |
| 2500               | 65.31                     | 0.16          | 65.69                                                       | 26.02                  | 0.12         | 30.24         |
| 2600               | 64.49                     | 0.16          | 64.34                                                       | 25.44                  | 0.12         | 28.90         |
| 2800               | 61.89                     | 0.16          | 61.81                                                       | 24.57                  | 0.11         | 26.16         |
| 3000               | 58.56                     | 0.17          | 59.05                                                       | 23.21                  | 0.11         | 23.58         |
| 3200               | 56.55                     | 0.19          | 56.04                                                       | 21.54                  | 0.10         | 21.31         |
| 3500               | 52.50                     | 0.22          | 52.74                                                       | 19.13                  | 0.08         | 18.81         |
| 3600               | 51.64                     | 0.23          | 52.11                                                       | 18.44                  | 0.08         | 18.15         |
| 3800               | 49.14                     | 0.25          | 49.54                                                       | 17.35                  | 0.06         | 17.22         |
| 4000               | 47.70                     | 0.26          | 48.13                                                       | 16.68                  | 0.04         | 16.78         |
| 4200               | 45.21                     | 0.26          | 45.79                                                       | 16.47                  | 0.03         | 16.79         |
| 4400               | 43.12                     | 0.26          | 43.76                                                       | 16.55                  | 0.02         | 17.24         |
| 4500               | 42.45                     | 0.26          | 43.11                                                       | 16.79                  | 0.01         | 17.63         |
| 4600               | 41.51                     | 0.25          | 42.23                                                       | 16.98                  | 0.02         | 18.09         |
| 4700               | 40.71                     | 0.25          | 41.25                                                       | 17.27                  | 0.01         | 18.69         |
| 4800               | 39.55                     | 0.25          | 40.36                                                       | 17.64                  | 0.00         | 19.29         |
| 5000               | 38.05                     | 0.24          | 39.01                                                       | 18.27                  | 0.00         | 20.41         |
| 5200               | 35.90                     | 0.27          | 36.80                                                       | 18.39                  | 0.01         | 20.55         |
| 5400               | 35.23                     | 0.31          | 35.92                                                       | 17.59                  | 0.03         | 19.19         |
| 5600               | 32.93                     | 0.40          | 33.80                                                       | 16.39                  | 0.02         | 17.07         |
| 5800               | 31.14                     | 0.49          | 31.66                                                       | 14.59                  | 0.11         | 14.77         |
| 6500               | 24.57                     | 1.90          | 25.60                                                       | 7.48                   | 0.26         | 7.09          |

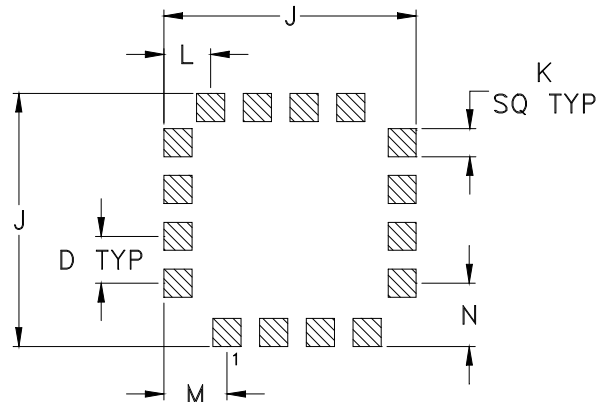
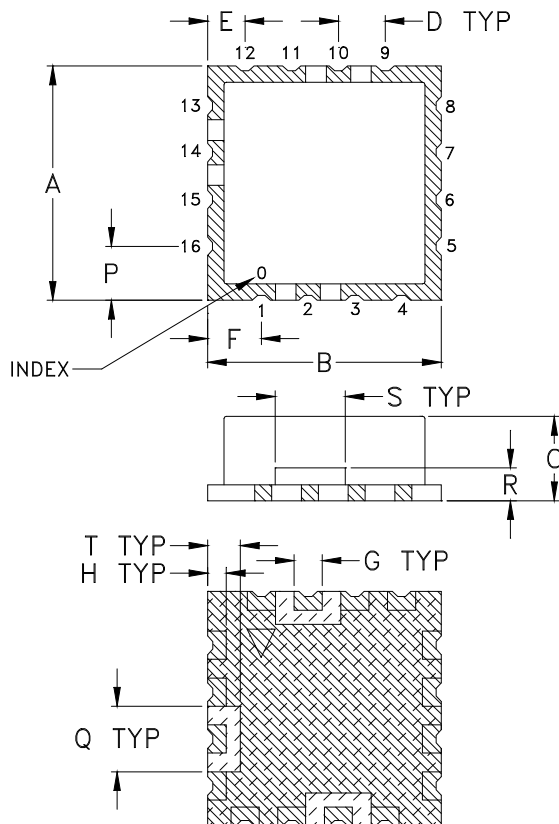
## Typical Performance Curves



## Outline Dimensions

CK605

## PCB Land Pattern



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

| CASE # | A               | B               | C              | D              | E              | F              | G              | H              | J               | K              |
|--------|-----------------|-----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|----------------|
| CK605  | .500<br>(12.70) | .500<br>(12.70) | .180<br>(4.57) | .100<br>(2.54) | .080<br>(2.03) | .115<br>(2.92) | .060<br>(1.52) | .040<br>(1.02) | .540<br>(13.72) | .060<br>(1.52) |

| CASE # | L              | M              | N              | P              | Q              | R              | S              | T              | WT. GRAM            |
|--------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
| CK605  | .100<br>(2.54) | .135<br>(3.43) | .135<br>(3.43) | .115<br>(2.92) | .140<br>(3.56) | .070<br>(1.78) | .150<br>(3.81) | .070<br>(1.78) | 1.2<br>+0.5<br>-0.0 |

Dimensions are in inches (mm). Tolerances: 2 Pl.  $\pm .03$ ; 3Pl.  $\pm .015$

### Notes:

- Case material: Nickel-Silver alloy.
- Base: Printed wiring laminate.
- Termination finish:  
For RoHS Case Styles: 3-5  $\mu$  inch (.08-.13 microns) Gold over 120-240  $\mu$  inch (3.05-6.10 microns) Nickel plate.  
All models, (+) suffix.



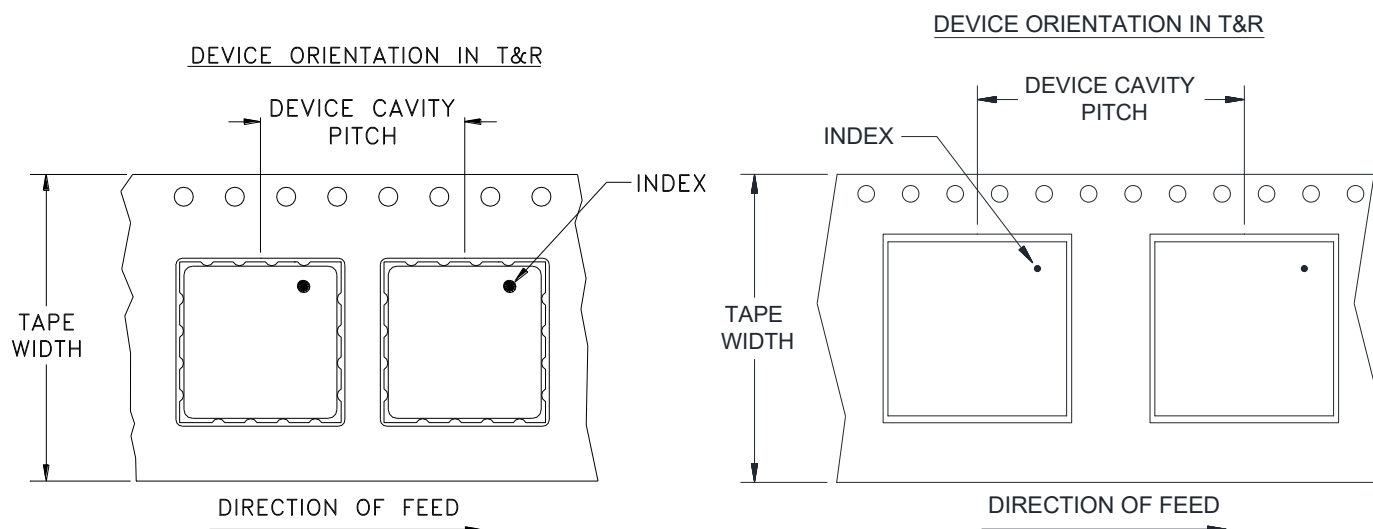
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



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-F37



| Tape Width, mm | Device Cavity Pitch, mm | Reel Size, inches | Devices per Reel                    |     |
|----------------|-------------------------|-------------------|-------------------------------------|-----|
| 24             | 16                      | 7                 | Small quantity standards (see note) | 10  |
|                |                         |                   |                                     | 20  |
|                |                         |                   |                                     | 50  |
|                |                         |                   |                                     | 100 |
|                |                         | 13                | Standard                            | 200 |
|                |                         |                   |                                     | 500 |

Note: Please consult individual model data sheet to determine device per reel availability.

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)



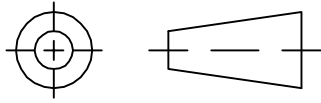
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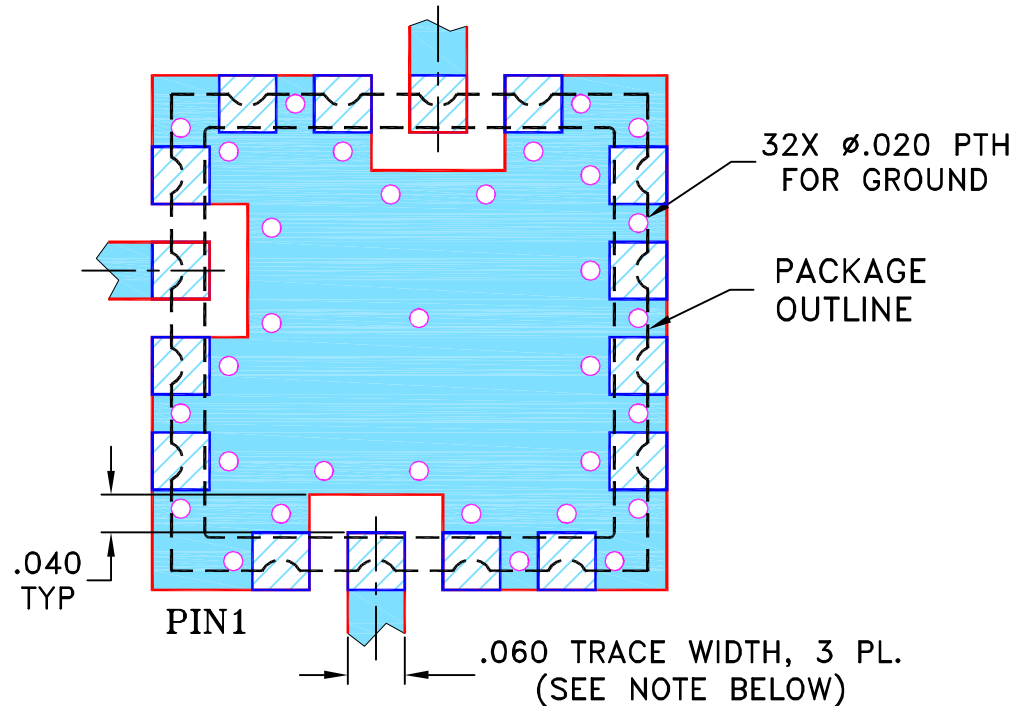
## THIRD ANGLE PROJECTION



## REVISIONS

| REV | ECN No. | DESCRIPTION               | DATE     | DR  | AUTH |
|-----|---------|---------------------------|----------|-----|------|
| E   | M105563 | ADDED "rl" PIN CONNECTION | 06/02/06 | MMG | DJ   |
| F   | M105640 | CORRECTED NOTE 2          | 06/08/06 | MMG | MM   |
| G   | M124395 | ADDED "RAMP"              | 09/09    | EM  | HH   |
| G   | R77589  | ADDED "RAMP"              | 09/09    | EM  | HH   |

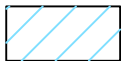
SUGGESTED MOUNTING CONFIGURATION FOR  
CK605 CASE STYLE, "kg/rl/16AM01" PIN CONNECTION

NOTES:

1. TRACE WIDTH IS SHOWN FOR FR4 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 BOTTOM 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

AV

08/07/00

CHECKED

SK

08/08/00

APPROVED

DB

08/08/00

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



Mini-Circuits®

 13 Neptune Avenue  
 Brooklyn NY 11235

PL,kg/rl/16AM01,CK605,ROS/LAVI/RAMP

 SIZE  
 A

 CODE IDENT  
 15542

 DRAWING NO:  
 98-PL-012

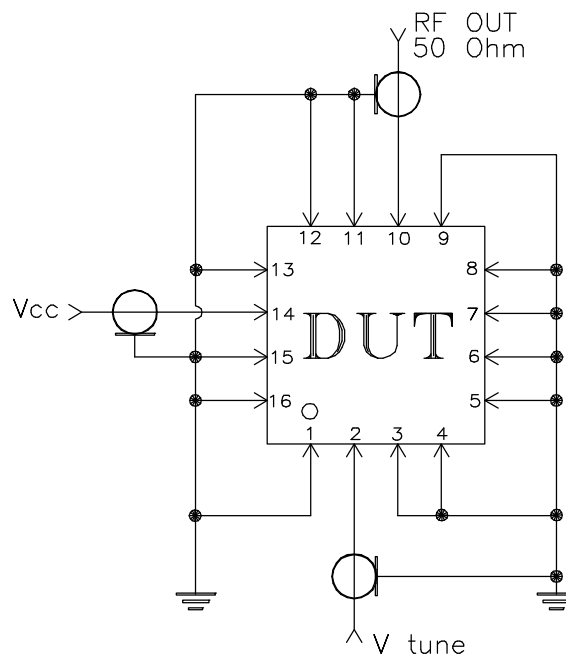
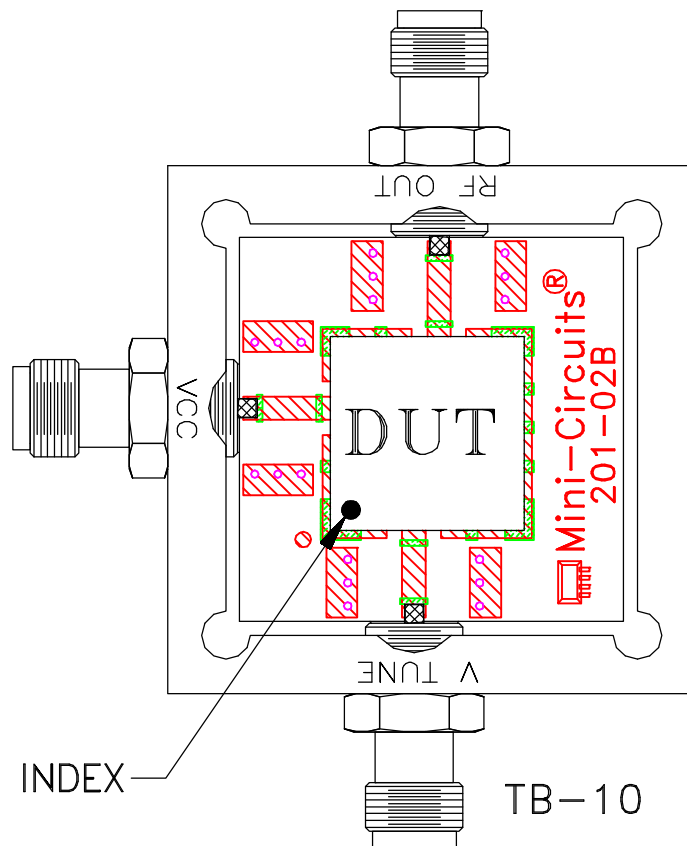
 REV:  
 G

FILE: 98PL012

SCALE: 5:1

SHEET: 1 OF 1

# Evaluation Board and Circuit



Schematic Diagram

## Notes:

1. SMA Female connectors.
2. PCB Material: Rogers R04350 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                                                                              |