

# LTCC Coupler

50Ω 2400 to 2500 MHz 10dB Coupling

## CPJC-10-252R+



Generic photo used for illustration purposes only

CASE STYLE: JC0603C

**+RoHS Compliant**

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

**Available Tape and Reel at no extra cost**

| Reel Size | Devices/Reel                      |
|-----------|-----------------------------------|
| 7"        | 20, 50, 100, 200, 500, 1000, 4000 |

### Maximum Ratings

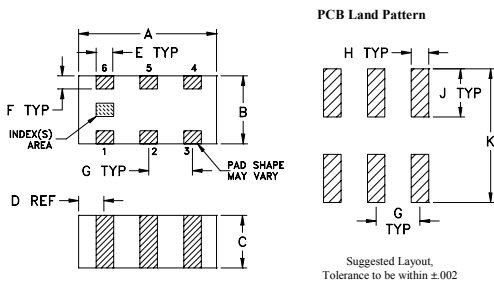
|                       |               |
|-----------------------|---------------|
| Operating Temperature | -40°C to 85°C |
| Storage Temperature*  | -40°C to 85°C |

\*Refer to product storage temperature after installation.  
Suggestion for T&R unused product storage condition: +5--+35°C, Humidity 45-75%RH, 12 Month max.  
Permanent damage may occur if any of these limits are exceeded.

### Pad Connections

|             |   |
|-------------|---|
| Input       | 1 |
| GND         | 2 |
| Coupled     | 3 |
| Termination | 4 |
| GND         | 5 |
| Output      | 6 |

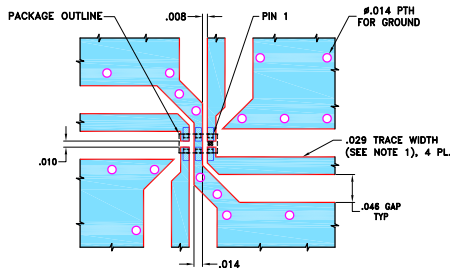
### Outline Drawing



### Outline Dimensions (inch/mm)

| A    | B    | C    | D    | E     | F    |
|------|------|------|------|-------|------|
| .063 | .031 | .024 | .012 | .008  | .006 |
| 1.60 | 0.79 | 0.61 | 0.30 | 0.20  | 0.15 |
| G    | H    | J    | K    | wt    |      |
| .020 | .010 | .022 | .053 | grams |      |
| 0.51 | 0.25 | 0.56 | 1.35 | 0.005 |      |

### Evaluation Board MCL P/N: TB-1031-10+ Suggested PCB Layout (PL-572)



- NOTES:**
- TRACE WIDTH & GAP ARE SHOWN FOR FR4, GRADE IT-180TC (ITEQ CORP.) WITH DIELECTRIC THICKNESS .016±.0015. COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH & GAP MAY NEED TO BE MODIFIED.
  - BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
  - REFER TO MODEL DATASHEET FOR PIN OUTS.
- DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER).  
■ DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

### Notes

- Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- The parts covered by this specification document are subject to Mini-Circuit's standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuit's website at [www.minicircuits.com/WCLStore/terms.jsp](http://www.minicircuits.com/WCLStore/terms.jsp)

### Features

- miniature size 0603
- low cost
- aqueous washable

### Applications

- ISM Band
- WLAN
- Bluetooth
- Zigbee

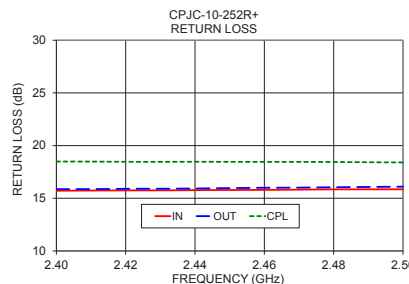
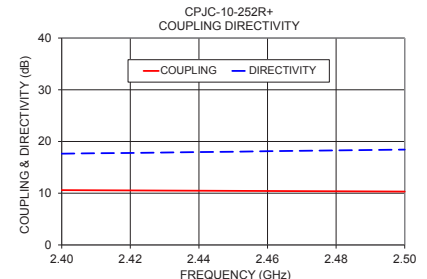
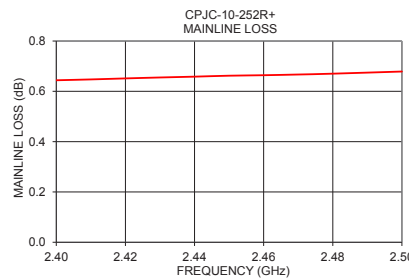
### Electrical Specifications at 25°C

| Parameter                      | Frequency (MHz) | Min. | Typ.   | Max. | Unit |
|--------------------------------|-----------------|------|--------|------|------|
| <b>Frequency Range</b>         |                 | 2400 |        | 2500 | MHz  |
| <b>Mainline Loss</b>           | 2400 - 2500     | —    | 0.65   | 1.0  | dB   |
| <b>Coupling</b>                | 2400 - 2500     | —    | 10±1.0 | —    | dB   |
| <b>Directivity</b>             | 2400 - 2500     | 11   | 19     | —    | dB   |
| <b>Return Loss (Input)</b>     | 2400 - 2500     | 10.8 | 17     | —    | dB   |
| <b>Return Loss (Output)</b>    | 2400 - 2500     | 10.8 | 17     | —    | dB   |
| <b>Input Power<sup>1</sup></b> | 2400 - 2500     | —    | —      | 2    | W    |

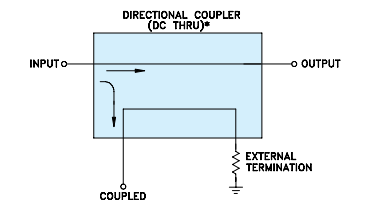
1. Derate linearly to 1W at 85°C.

### Typical Performance Data

| Frequency (GHz) | Mainline Loss (dB) In-Out | Coupling (dB) In-Cpl | Directivity (dB) | Return Loss (dB) |       |       |
|-----------------|---------------------------|----------------------|------------------|------------------|-------|-------|
|                 |                           |                      |                  | In               | Out   | Cpl   |
| 2.40            | 0.64                      | 10.60                | 17.64            | 15.72            | 15.87 | 18.49 |
| 2.41            | 0.65                      | 10.57                | 17.73            | 15.74            | 15.87 | 18.48 |
| 2.42            | 0.65                      | 10.54                | 17.78            | 15.75            | 15.90 | 18.46 |
| 2.43            | 0.66                      | 10.51                | 17.87            | 15.75            | 15.91 | 18.46 |
| 2.44            | 0.66                      | 10.49                | 17.96            | 15.77            | 15.93 | 18.47 |
| 2.45            | 0.66                      | 10.46                | 18.02            | 15.79            | 15.97 | 18.46 |
| 2.46            | 0.66                      | 10.43                | 18.13            | 15.80            | 16.00 | 18.45 |
| 2.47            | 0.67                      | 10.40                | 18.20            | 15.82            | 16.01 | 18.45 |
| 2.48            | 0.67                      | 10.38                | 18.28            | 15.84            | 16.05 | 18.44 |
| 2.49            | 0.68                      | 10.35                | 18.36            | 15.84            | 16.07 | 18.43 |
| 2.50            | 0.68                      | 10.32                | 18.43            | 15.85            | 16.10 | 18.40 |



### Electrical Schematic



\* ELECTRICAL SCHEMATIC FOR DIRECTIONAL COUPLERS REQUIRING EXTERNAL TERMINATION THAT IS DESIGNED WITHOUT INTERNAL TRANSFORMERS.



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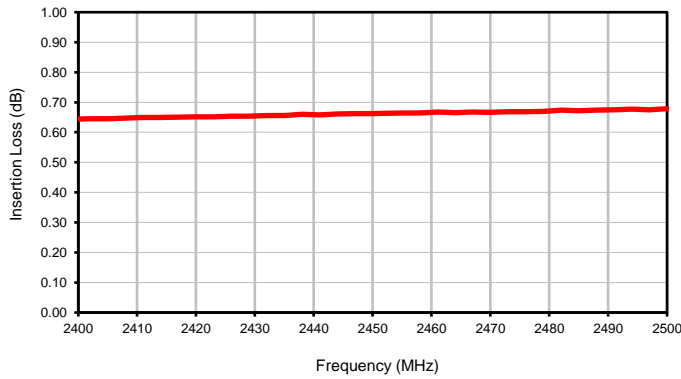
REV. A  
ECO-005220  
CPJC-6-252R+  
SL/CP/AM  
201203  
Page 1 of 1

## Typical Performance Data

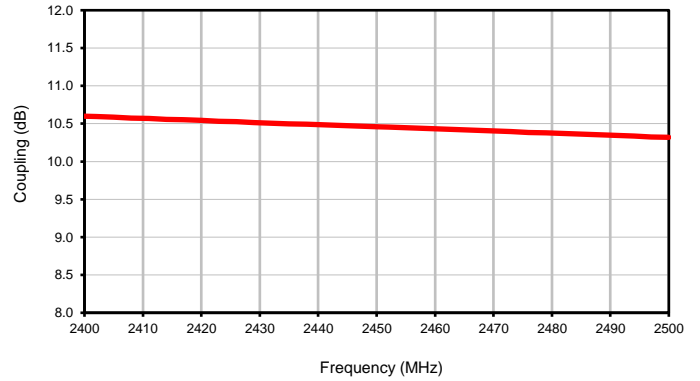
| FREQ.<br>(MHz) | INSERTION LOSS<br>(dB) | COUPLING<br>(dB) | DIRECTIVITY<br>(dB) | RETURN LOSS |       |       |
|----------------|------------------------|------------------|---------------------|-------------|-------|-------|
|                |                        |                  |                     | IN          | OUT   | CPL   |
| 2400           | 0.64                   | 10.60            | 17.64               | 15.72       | 15.87 | 18.49 |
| 2402           | 0.65                   | 10.59            | 17.66               | 15.72       | 15.85 | 18.49 |
| 2405           | 0.65                   | 10.59            | 17.67               | 15.74       | 15.87 | 18.48 |
| 2408           | 0.65                   | 10.57            | 17.70               | 15.73       | 15.87 | 18.48 |
| 2411           | 0.65                   | 10.57            | 17.72               | 15.73       | 15.87 | 18.48 |
| 2414           | 0.65                   | 10.56            | 17.73               | 15.74       | 15.88 | 18.46 |
| 2417           | 0.65                   | 10.55            | 17.75               | 15.74       | 15.89 | 18.47 |
| 2420           | 0.65                   | 10.54            | 17.78               | 15.75       | 15.90 | 18.46 |
| 2423           | 0.65                   | 10.53            | 17.80               | 15.76       | 15.90 | 18.47 |
| 2426           | 0.65                   | 10.53            | 17.83               | 15.76       | 15.90 | 18.47 |
| 2429           | 0.65                   | 10.51            | 17.88               | 15.75       | 15.90 | 18.48 |
| 2432           | 0.66                   | 10.51            | 17.88               | 15.77       | 15.90 | 18.46 |
| 2435           | 0.66                   | 10.50            | 17.91               | 15.77       | 15.92 | 18.46 |
| 2438           | 0.66                   | 10.49            | 17.93               | 15.77       | 15.94 | 18.47 |
| 2441           | 0.66                   | 10.48            | 17.95               | 15.79       | 15.94 | 18.45 |
| 2444           | 0.66                   | 10.48            | 18.00               | 15.78       | 15.95 | 18.46 |
| 2447           | 0.66                   | 10.47            | 18.02               | 15.79       | 15.95 | 18.48 |
| 2450           | 0.66                   | 10.46            | 18.02               | 15.79       | 15.97 | 18.46 |
| 2452           | 0.66                   | 10.45            | 18.04               | 15.79       | 15.98 | 18.46 |
| 2455           | 0.66                   | 10.45            | 18.08               | 15.79       | 15.99 | 18.44 |
| 2458           | 0.66                   | 10.44            | 18.11               | 15.79       | 16.00 | 18.45 |
| 2461           | 0.67                   | 10.43            | 18.11               | 15.80       | 16.01 | 18.45 |
| 2464           | 0.67                   | 10.42            | 18.16               | 15.81       | 16.01 | 18.47 |
| 2467           | 0.67                   | 10.41            | 18.16               | 15.82       | 16.02 | 18.44 |
| 2470           | 0.67                   | 10.40            | 18.20               | 15.82       | 16.01 | 18.45 |
| 2473           | 0.67                   | 10.40            | 18.23               | 15.82       | 16.04 | 18.44 |
| 2476           | 0.67                   | 10.39            | 18.24               | 15.83       | 16.04 | 18.44 |
| 2479           | 0.67                   | 10.38            | 18.29               | 15.84       | 16.06 | 18.44 |
| 2482           | 0.67                   | 10.37            | 18.31               | 15.83       | 16.05 | 18.44 |
| 2485           | 0.67                   | 10.36            | 18.32               | 15.86       | 16.06 | 18.43 |
| 2488           | 0.67                   | 10.35            | 18.35               | 15.85       | 16.08 | 18.44 |
| 2491           | 0.67                   | 10.34            | 18.38               | 15.85       | 16.07 | 18.42 |
| 2494           | 0.68                   | 10.34            | 18.40               | 15.84       | 16.09 | 18.42 |
| 2497           | 0.68                   | 10.32            | 18.43               | 15.85       | 16.09 | 18.41 |
| 2500           | 0.68                   | 10.32            | 18.43               | 15.85       | 16.10 | 18.40 |

## Typical Performance Curves

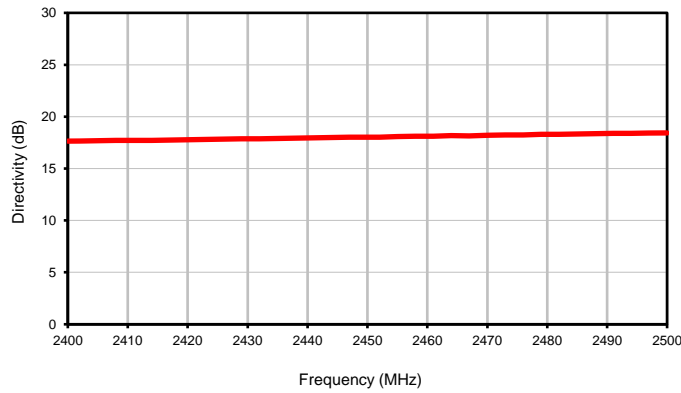
### Insertion Loss



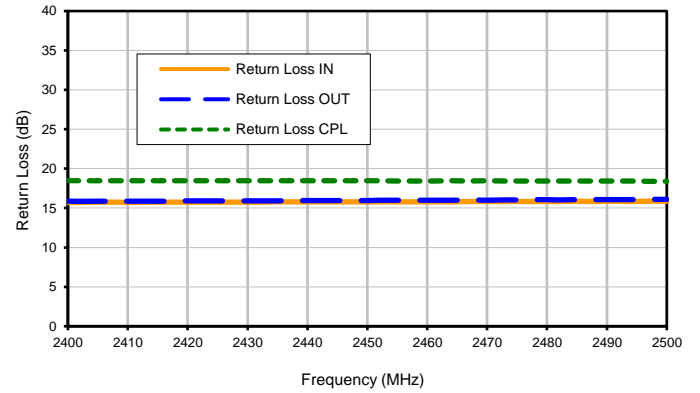
### Coupling



### Directivity

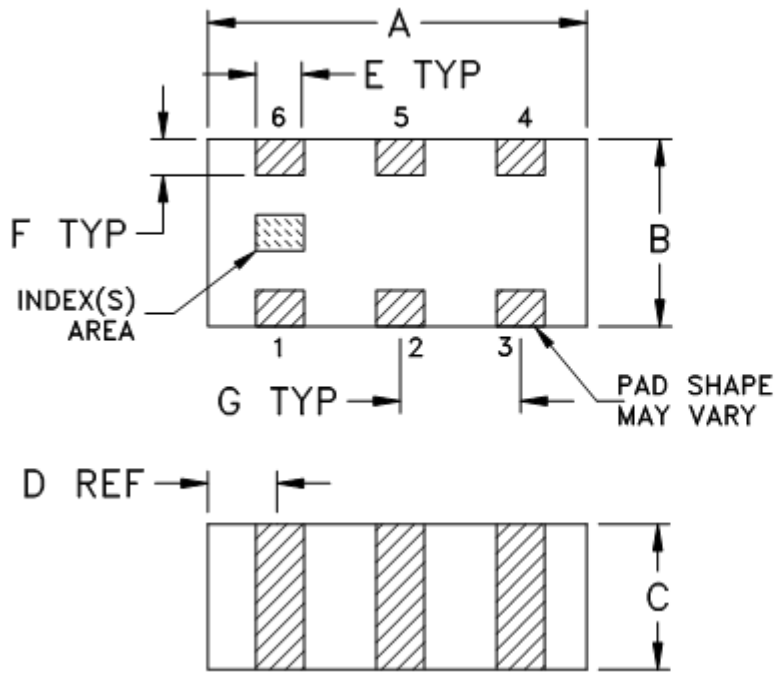


### Return Loss

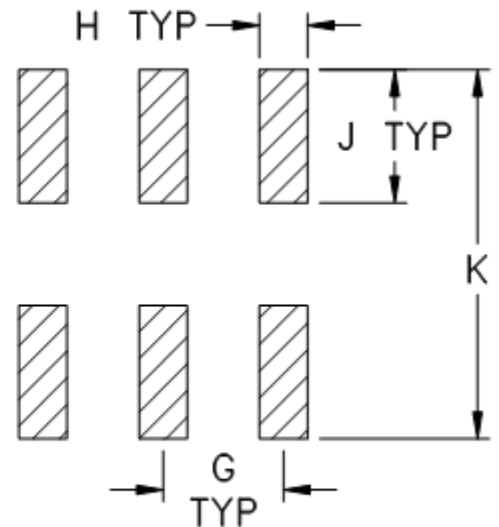


## Outline Dimensions

JC0603C



## PCB Land Pattern



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

| CASE #  | A              | B              | C              | D              | E              | F              | G              | H              | J              | K               | WT. GRAM |
|---------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|----------|
| JC0603C | .063<br>(1.60) | .031<br>(0.80) | .024<br>(0.60) | .012<br>(0.30) | .008<br>(0.20) | .006<br>(0.15) | .020<br>(0.50) | .010<br>(0.25) | .022<br>(0.55) | 0.053<br>(1.35) | .005     |

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

### Notes:

- Open style, ceramic base.
- Termination finish:  
For RoHS Case Styles: Tin plate over Nickel plate. All models, (+) suffix.



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RF/IF MICROWAVE COMPONENTS

# Tape & Reel Packaging TR-F114

## DEVICE ORIENTATION IN T&R

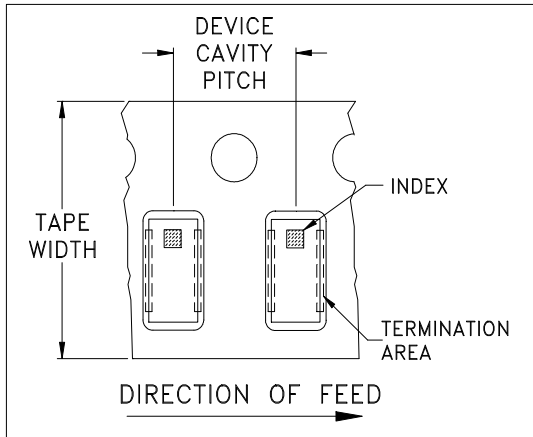


ILLUSTRATION 1

| Applicable Case Styles |           |
|------------------------|-----------|
| GE0805C                | JC0603C   |
| GE0805C-1              | JC0603C-4 |
| GE0805C-1AP            | JC0603C-6 |
| GE0805C-7              |           |
| GE0805C-9              |           |
| GE0805C-10             |           |
| GE0805C-11             |           |
| GE0805C-12             |           |

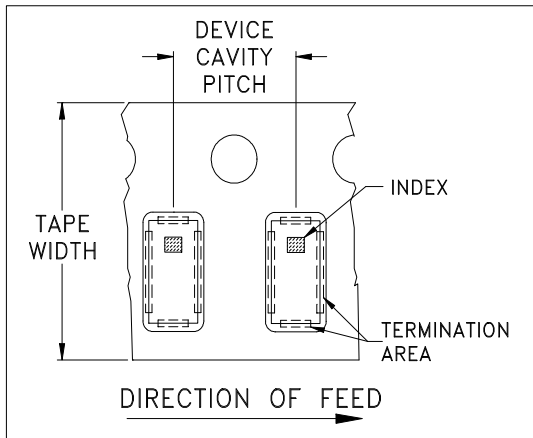


ILLUSTRATION 2

| Applicable Case Styles |           |
|------------------------|-----------|
| GE0805C-2              | JC0603C-1 |
| GE0805C-3              | JC0603C-2 |
| GE0805C-4              | JC0603C-3 |
| GE0805C-5              | JC0603C-5 |
| GE0805C-6              | JC0603C-7 |
| GE0805C-8              | JV1210C-1 |
| GE0805C-15             |           |

| Tape Width, mm | Device Cavity Pitch, mm | Reel Size, inches | Devices per Reel                    |      |
|----------------|-------------------------|-------------------|-------------------------------------|------|
| 8              | 4                       | 7                 | Small quantity standards (see note) | 20   |
|                |                         |                   |                                     | 50   |
|                |                         |                   |                                     | 100  |
|                |                         |                   |                                     | 200  |
|                |                         |                   |                                     | 500  |
|                |                         |                   |                                     | 1000 |
|                |                         |                   | Standard                            | 4000 |

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)



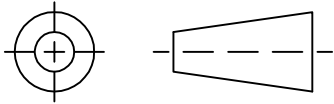
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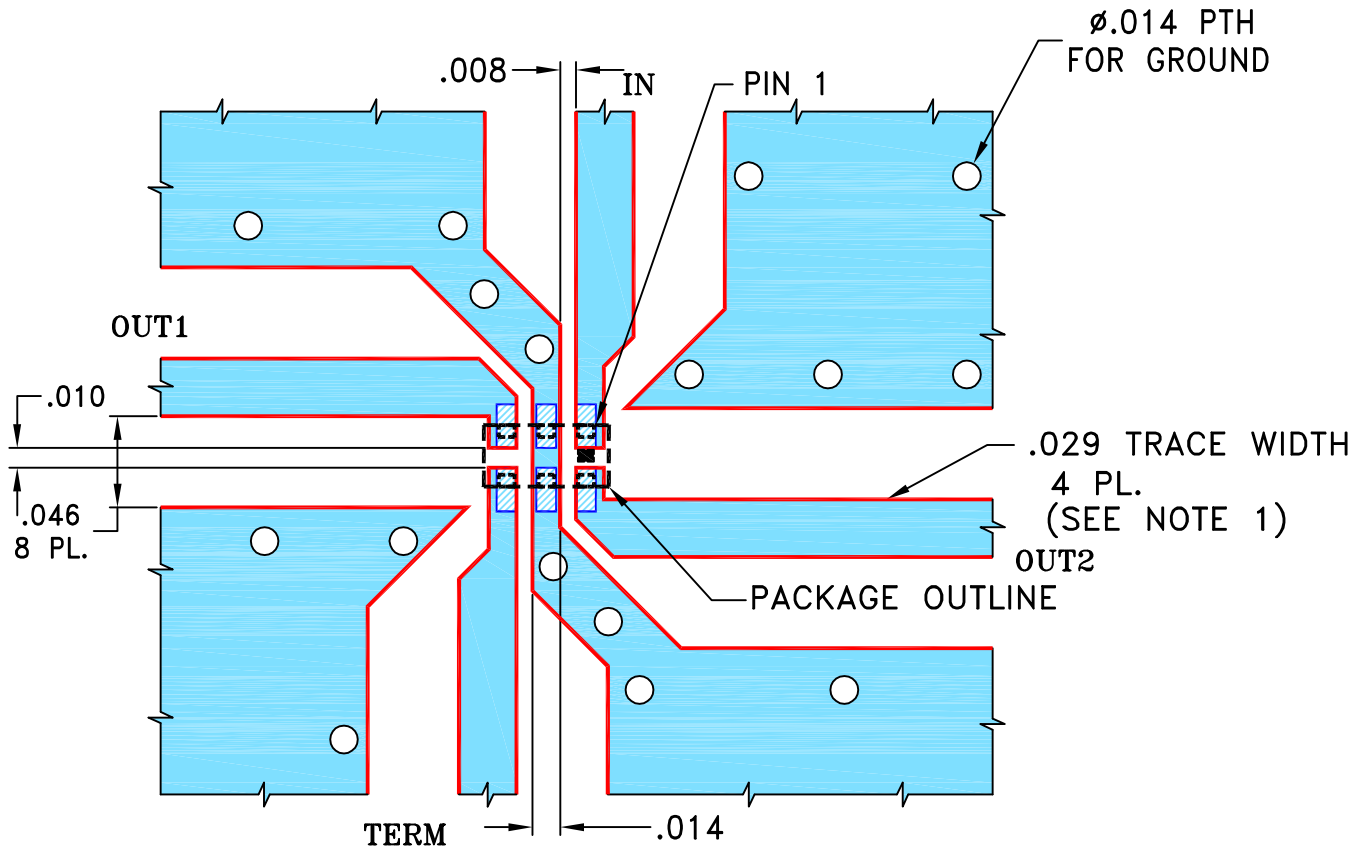
THIRD ANGLE PROJECTION



REVISIONS

| REV | ECN No. | DESCRIPTION | DATE     | DR | AUTH |
|-----|---------|-------------|----------|----|------|
| OR  | M168200 | NEW RELEASE | 05/31/18 | NP | SL   |
|     |         |             |          |    |      |
|     |         |             |          |    |      |

SUGGESTED MOUNTING CONFIGURATION  
FOR JC0603C CASE STYLE, "06DC12" PIN CODE



**NOTES:**

1. TRACE WIDTH IS SHOWN FOR FR4, GRADE IT-180TC (ITEQ CORP.) WITH DIELECTRIC THICKNESS  $.016 \pm .0015$ . COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH & GAP MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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

| UNLESS OTHERWISE SPECIFIED | INITIALS | DATE     |
|----------------------------|----------|----------|
| DRAWN                      | NP       | 05/30/18 |
| CHECKED                    | GF       | 05/30/18 |
| APPROVED                   | SL       | 05/31/18 |

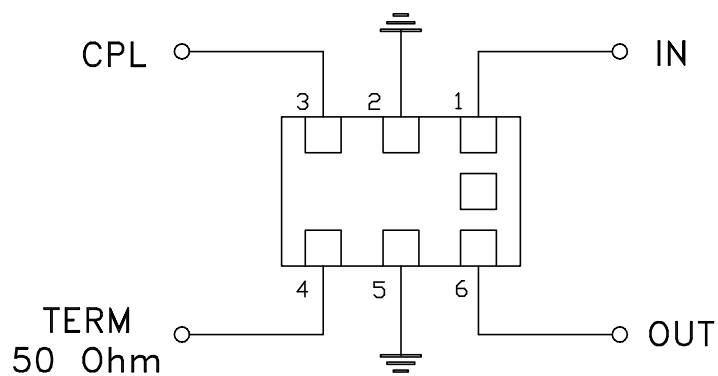
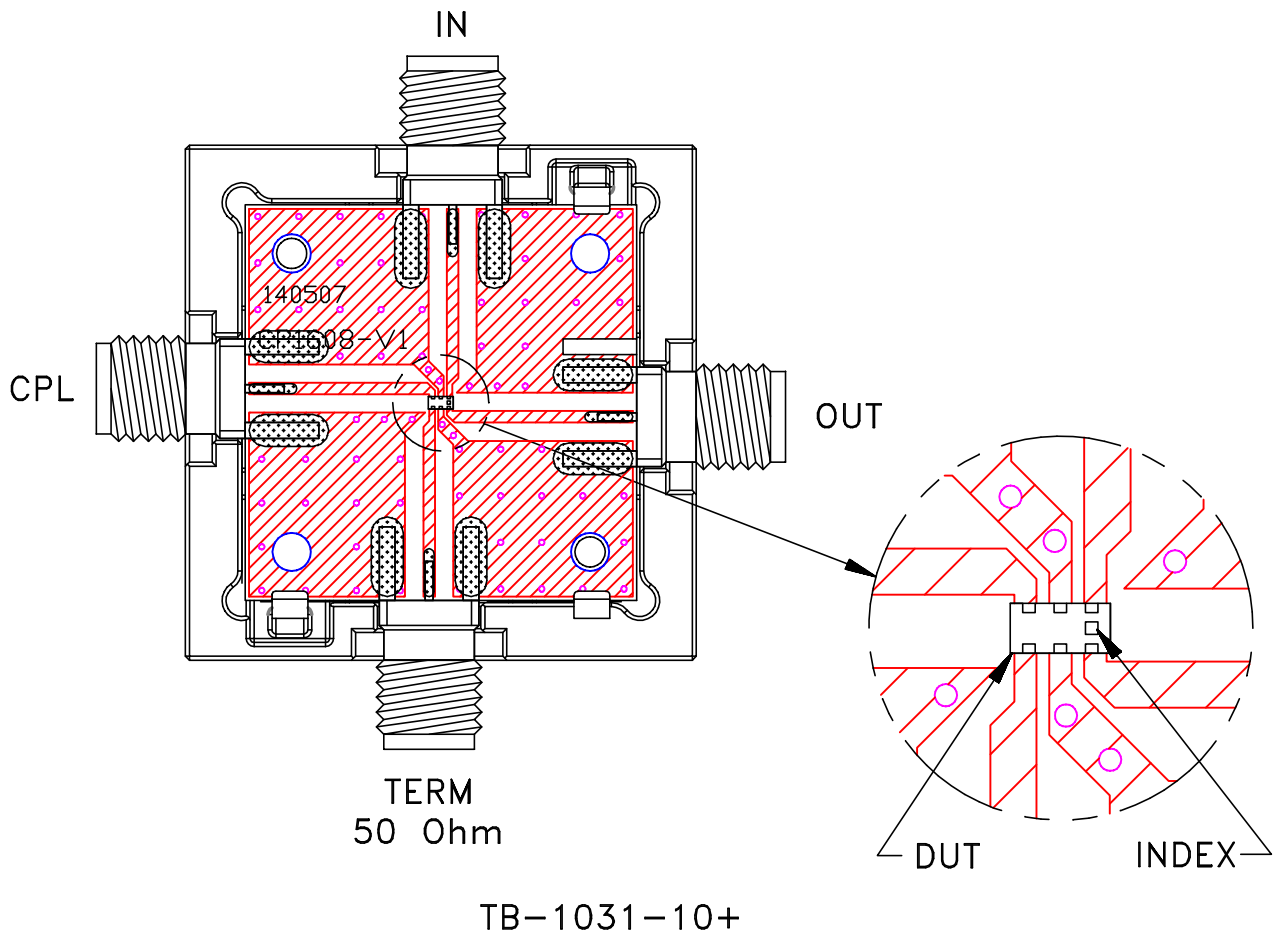
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PL, 06DC12, JC0603C, TB-1031+

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| SIZE  | CODE IDENT | DRAWING NO: | REV:          |
|-------|------------|-------------|---------------|
| A     | 15542      | 98-PL-572   | OR            |
| FILE: | 98PL572    | SCALE: 10:1 | SHEET: 1 OF 1 |


# Evaluation Board and Circuit



Schematic Diagram

## Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: FR4 or equivalent,  
Dielectric Constant=4.5, Thickness=.016 inch.

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| Specification         | Test/Inspection Condition   | Reference/Spec   |
|-----------------------|---|--|
| Operating Temperature | -40° to 85° C<br>Ambient Environment  | Individual Model Data Sheet  |
| Storage Temperature   | -40° to 85° C<br>Ambient Environment  | Individual Model Data Sheet  |
| Thermal Shock         | -40° to 125°C, 100 cycles   | MIL-STD-202 Method 107, Condition A-3 except -40°C instead of -55° C and +125° C instead of -85° C |
| Solder Reflow Heat    | Pb-Free Process 245° -250°C peak,   | J-STD-020, 4-2 and 5-2,Figure 5-1  |
| Solderability         | 10X Magnification   | J-STD-002, Para 4.2.5, Test S, 95% Coverage  |
| Shelf Life            | Shelf life is 12 months when kept in sealed bags. Unused parts are to be resealed to preseve shelf life for proper solderability. |  |