



MMIC SURFACE MOUNT

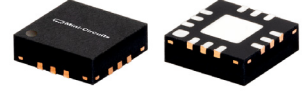
Power Splitter/Combiner

GP2S1+

2 Way-0° 50Ω 500 to 2500 MHz

FEATURES

- Very wide bandwidth, 500 to 2500 MHz
- Excellent isolation, 20 dB typ.
- Excellent amplitude unbalance, 0.02 dB typ.
- Excellent phase unbalance, 0.9 deg. typ.
- Small size, 0.118"x0.118"x0.035"
- High ESD level
- Aqueous washable



Generic photo used for illustration purposes only

CASE STYLE: DQ1225

+RoHS Compliant

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

APPLICATIONS

- Cellular
- GPS
- Radar
- WCDMA
- GSM
- Korea PCS

ELECTRICAL SPECIFICATIONS

| Parameter | Frequency (MHz) | Min. | Typ. | Max. | Units |
|--------------------------------|-----------------|------|------|------|-------|
| Frequency Range | | 500 | | 2500 | MHz |
| Insertion Loss* (above 3.0 dB) | 500-2500 | | 0.9 | 1.8 | dB |
| Isolation | 500-2500 | 9 | 20 | | dB |
| Amplitude Unbalance | 500-2500 | — | — | 0.2 | dB |
| Phase Unbalance | 500-2500 | — | — | 5.0 | deg. |
| VSWR (Port S) | 500-2500 | — | 1.3 | — | :1 |
| VSWR (Ports 1,2) | 500-2500 | — | 1.2 | — | |

* De-embedded from demo board loss.

MAXIMUM RATINGS

| Parameter | Ratings |
|-----------------------------|----------------|
| Operating temperature | -40°C to 85°C |
| Storage temperature | -65°C to 150°C |
| Power Input (as a splitter) | 1.5W max. |
| Internal Dissipation | 0.75W max. |

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

ELECTRICAL SCHEMATIC

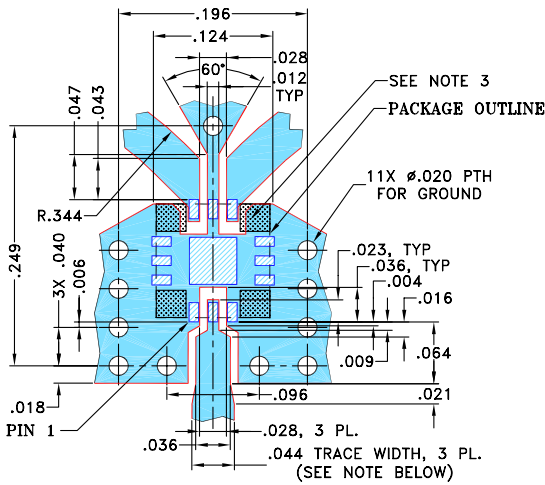




PAD CONNECTIONS

| | |
|----------|------------------------------|
| SUM PORT | 2 |
| PORT 1 | 7 |
| PORT 2 | 9 |
| GROUND | 1,3,4,5,6,8,10,11,12, paddle |

DEMO BOARD MCL P/N: TB-453-GP2S1+ SUGGESTED PCB LAYOUT (PL-282)

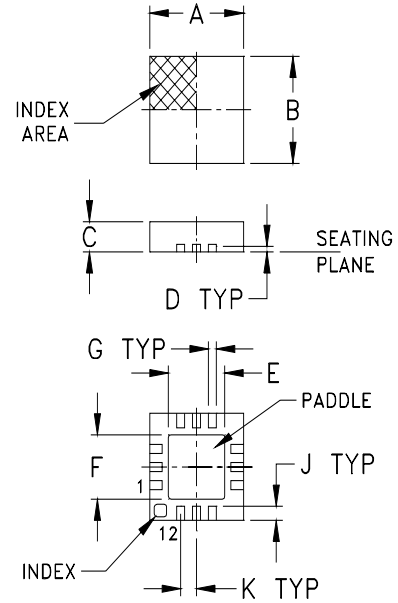


NOTES:

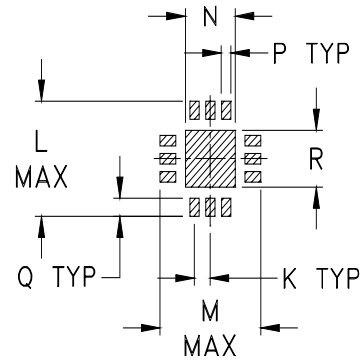
1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .020" ± .0015"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
3. SIGNAL TRACES ARE NOT ALLOWED INSIDE HATCHED AREAS (APPROX. .030 X .030) AT 4 PLACES AS SHOWN.

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

OUTLINE DRAWING

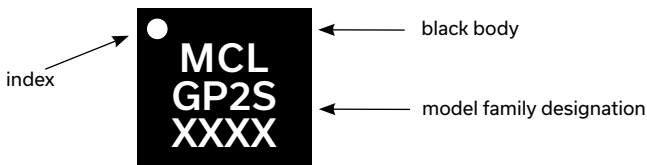


PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002

PRODUCT MARKING



Marking may contain other features or characters for internal lot control

OUTLINE DIMENSIONS (Inch mm)

| | | | | | | | | |
|------|------|------|------|------|------|------|-----|-------|
| A | B | C | D | E | F | G | H | J |
| .118 | .118 | .035 | .008 | .057 | .057 | .009 | --- | .016 |
| 3.00 | 3.00 | 0.89 | 0.20 | 1.45 | 1.45 | 0.23 | --- | 0.41 |
| K | L | M | N | P | Q | R | | wt |
| .020 | .127 | .127 | .049 | .010 | .020 | .049 | | grams |
| 0.51 | 3.23 | 3.23 | 1.24 | 0.25 | 0.51 | 1.24 | | 0.02 |

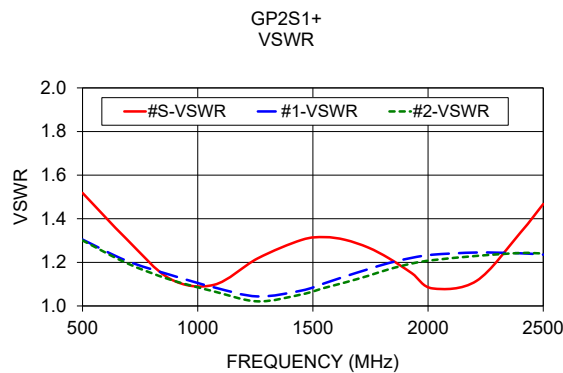
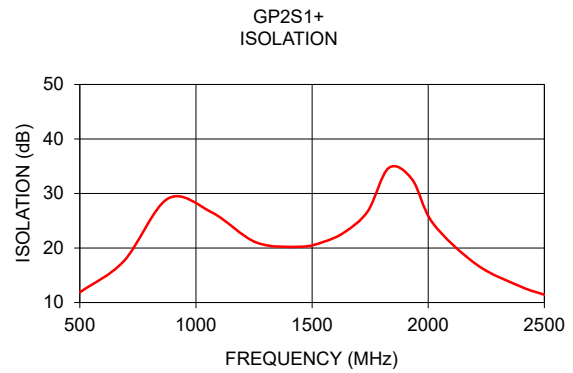
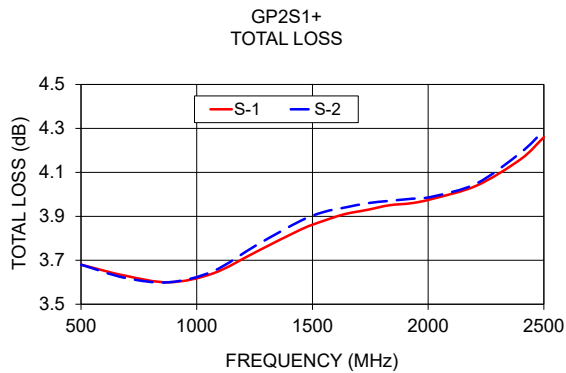
TAPE & REEL INFORMATION: F66



TYPICAL PERFORMANCE DATA AND CHARTS

| Frequency (MHz) | Total Loss ¹ (dB) | | Amplitude Unbalance (dB) | Isolation (dB) | Phase Unbalance (deg.) | VSWR S | VSWR 1 | VSWR 2 |
|-----------------|------------------------------|------|--------------------------|----------------|------------------------|--------|--------|--------|
| | S-1 | S-2 | | | | | | |
| 500.00 | 3.68 | 3.68 | 0.01 | 11.86 | 0.42 | 1.52 | 1.30 | 1.30 |
| 690.00 | 3.63 | 3.62 | 0.01 | 17.62 | 0.47 | 1.31 | 1.21 | 1.20 |
| 880.00 | 3.60 | 3.60 | 0.00 | 29.08 | 0.52 | 1.12 | 1.14 | 1.12 |
| 1070.00 | 3.64 | 3.65 | 0.01 | 26.49 | 0.66 | 1.10 | 1.09 | 1.07 |
| 1260.00 | 3.74 | 3.77 | 0.04 | 21.01 | 0.78 | 1.22 | 1.04 | 1.02 |
| 1450.00 | 3.84 | 3.88 | 0.04 | 20.24 | 0.87 | 1.30 | 1.07 | 1.05 |
| 1550.00 | 3.88 | 3.92 | 0.04 | 21.14 | 0.91 | 1.32 | 1.10 | 1.08 |
| 1640.00 | 3.91 | 3.94 | 0.03 | 22.91 | 0.97 | 1.30 | 1.14 | 1.11 |
| 1740.00 | 3.93 | 3.96 | 0.03 | 26.76 | 1.05 | 1.27 | 1.17 | 1.14 |
| 1830.00 | 3.95 | 3.97 | 0.02 | 34.69 | 1.16 | 1.22 | 1.20 | 1.17 |
| 1930.00 | 3.96 | 3.98 | 0.02 | 32.63 | 1.28 | 1.15 | 1.22 | 1.19 |
| 2020.00 | 3.98 | 3.99 | 0.01 | 24.55 | 1.41 | 1.08 | 1.24 | 1.21 |
| 2210.00 | 4.04 | 4.05 | 0.02 | 16.91 | 1.65 | 1.11 | 1.25 | 1.23 |
| 2400.00 | 4.16 | 4.19 | 0.03 | 12.90 | 1.80 | 1.34 | 1.24 | 1.24 |
| 2500.00 | 4.26 | 4.29 | 0.03 | 11.43 | 1.89 | 1.47 | 1.24 | 1.24 |

1. Total Loss = Insertion Loss + 3dB splitter loss.



ESD RATING

Human Body Model (HBM): Class 1A (250 to < 500V) in accordance with ANSI/ESD STM 5.1 - 2001

Machine Model (MM): Class M2 (100V to < 250V) in accordance with ANSI/ESD STM 5.2 - 1999

NOTES

- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- C. The parts covered by this specification document are subject to Mini-Circuits 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-Circuits' website at www.minicircuits.com/terms/viewterm.html



2 Way-0° Power Splitter/Combiner

GP2S1+

Typical Performance Data

| FREQUENCY (MHz) | TOTAL LOSS ¹ (dB) | | AMPLITUDE UNBALANCE (dB) | ISOLATION (dB) 1-2 | PHASE UNBALANCE (deg.) | FREQUENCY (MHz) | VSWR (:1) | | |
|--------------------|---------------------------------|------|--------------------------------|--------------------------|------------------------------|--------------------|--------------|------|------|
| | S-1 | S-2 | | | | | S | 1 | 2 |
| 500.0 | 3.68 | 3.68 | 0.01 | 11.86 | 0.42 | 500.00 | 1.52 | 1.30 | 1.30 |
| 510.0 | 3.67 | 3.68 | 0.01 | 12.11 | 0.42 | 510.00 | 1.51 | 1.30 | 1.29 |
| 600.0 | 3.65 | 3.65 | 0.00 | 14.57 | 0.45 | 600.00 | 1.41 | 1.25 | 1.24 |
| 690.0 | 3.63 | 3.62 | 0.01 | 17.62 | 0.47 | 690.00 | 1.31 | 1.21 | 1.20 |
| 790.0 | 3.61 | 3.61 | 0.00 | 22.30 | 0.49 | 790.00 | 1.21 | 1.17 | 1.16 |
| 880.0 | 3.60 | 3.60 | 0.00 | 29.08 | 0.52 | 880.00 | 1.12 | 1.14 | 1.12 |
| 980.0 | 3.61 | 3.62 | 0.01 | 33.32 | 0.57 | 980.00 | 1.07 | 1.11 | 1.09 |
| 1070.0 | 3.64 | 3.65 | 0.01 | 26.49 | 0.66 | 1070.00 | 1.10 | 1.09 | 1.07 |
| 1170.0 | 3.69 | 3.72 | 0.02 | 22.70 | 0.72 | 1170.00 | 1.16 | 1.06 | 1.04 |
| 1260.0 | 3.74 | 3.77 | 0.04 | 21.01 | 0.78 | 1260.00 | 1.22 | 1.04 | 1.02 |
| 1360.0 | 3.79 | 3.83 | 0.04 | 20.20 | 0.83 | 1360.00 | 1.27 | 1.05 | 1.03 |
| 1450.0 | 3.84 | 3.88 | 0.04 | 20.24 | 0.87 | 1450.00 | 1.30 | 1.07 | 1.05 |
| 1550.0 | 3.88 | 3.92 | 0.04 | 21.14 | 0.91 | 1550.00 | 1.32 | 1.10 | 1.08 |
| 1640.0 | 3.91 | 3.94 | 0.03 | 22.91 | 0.97 | 1640.00 | 1.30 | 1.14 | 1.11 |
| 1740.0 | 3.93 | 3.96 | 0.03 | 26.76 | 1.05 | 1740.00 | 1.27 | 1.17 | 1.14 |
| 1830.0 | 3.95 | 3.97 | 0.02 | 34.69 | 1.16 | 1830.00 | 1.22 | 1.20 | 1.17 |
| 1930.0 | 3.96 | 3.98 | 0.02 | 32.63 | 1.28 | 1930.00 | 1.15 | 1.22 | 1.19 |
| 2020.0 | 3.98 | 3.99 | 0.01 | 24.55 | 1.41 | 2020.00 | 1.08 | 1.24 | 1.21 |
| 2120.0 | 4.00 | 4.01 | 0.01 | 19.78 | 1.57 | 2120.00 | 1.04 | 1.24 | 1.22 |
| 2210.0 | 4.04 | 4.05 | 0.02 | 16.91 | 1.65 | 2210.00 | 1.11 | 1.25 | 1.23 |
| 2310.0 | 4.10 | 4.11 | 0.02 | 14.55 | 1.76 | 2310.00 | 1.23 | 1.25 | 1.24 |
| 2400.0 | 4.16 | 4.19 | 0.03 | 12.90 | 1.80 | 2400.00 | 1.34 | 1.24 | 1.24 |
| 2500.0 | 4.26 | 4.29 | 0.03 | 11.43 | 1.89 | 2500.00 | 1.47 | 1.24 | 1.24 |

¹Total Loss = Insertion Loss + 3dB Splitter Loss



REV. X2

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 www.minicircuits.com



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IF/RF MICROWAVE COMPONENTS

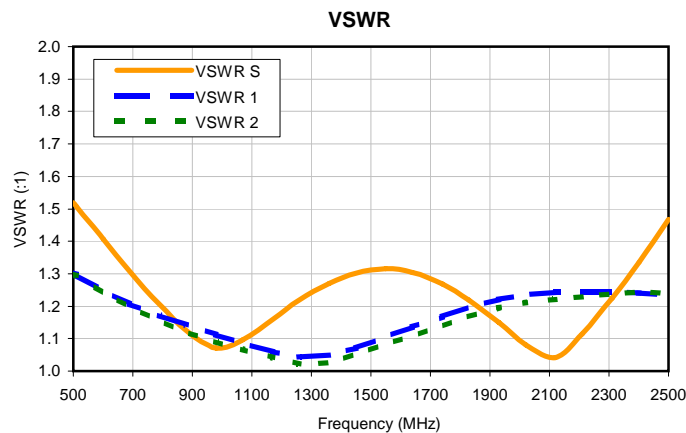
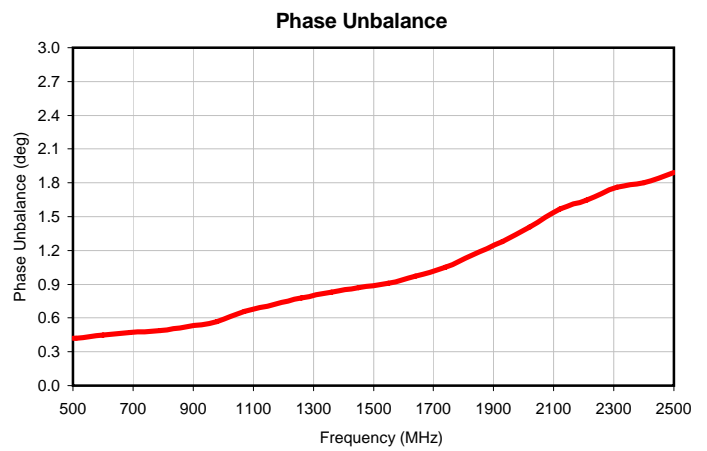
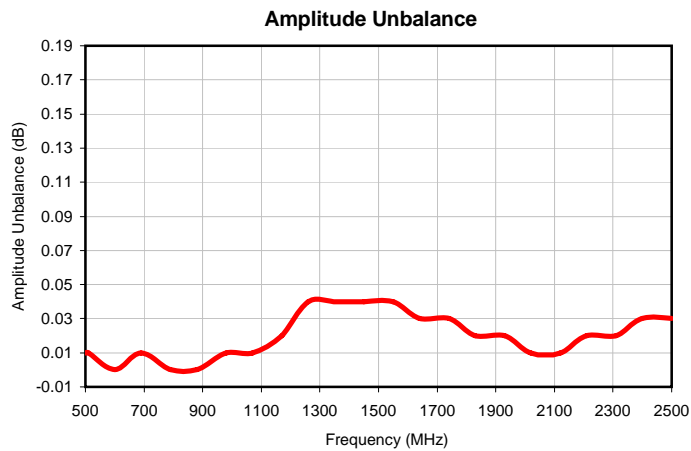
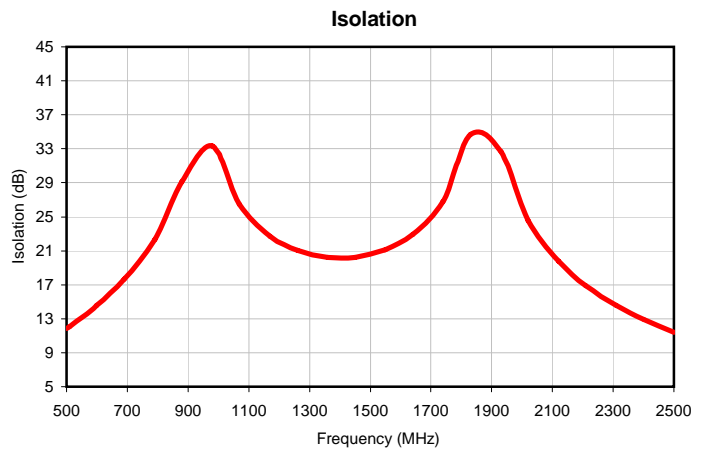
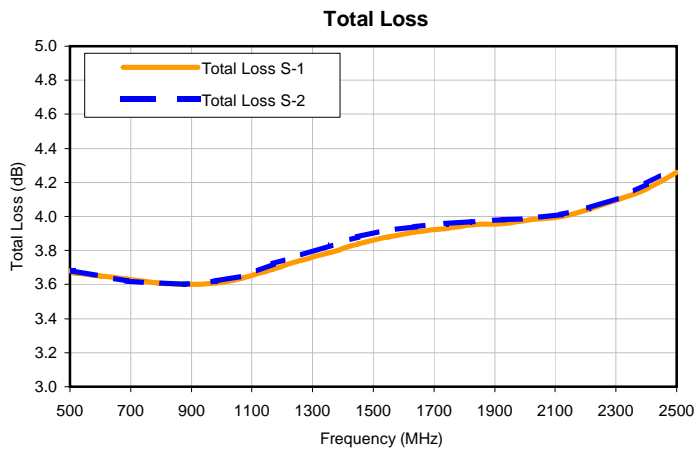
6/21/2010

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2 Way-0° Power Splitter/Combiner

GP2S1+

Typical Performance Curves



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IF/RF MICROWAVE COMPONENTS



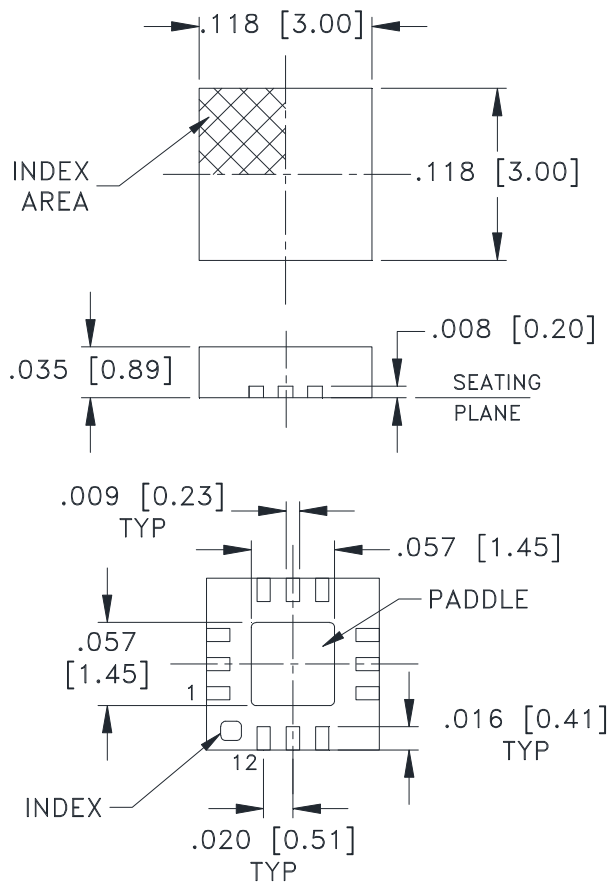
REV. X2

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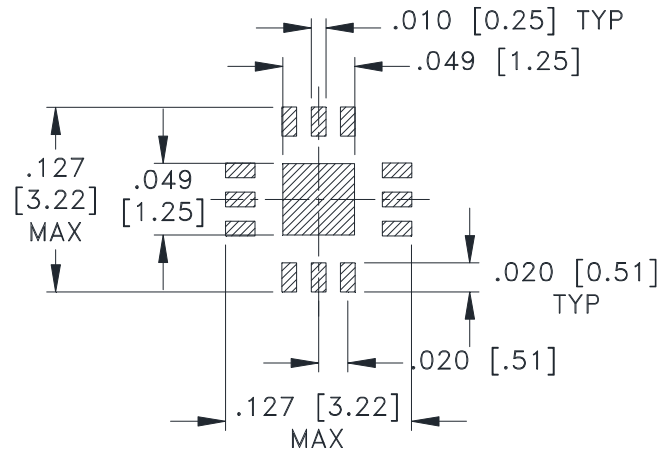
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Outline Dimensions



PCB Land Pattern



SUGGESTED LAYOUT,
TOLERANCE TO BE WITHIN $\pm .002$

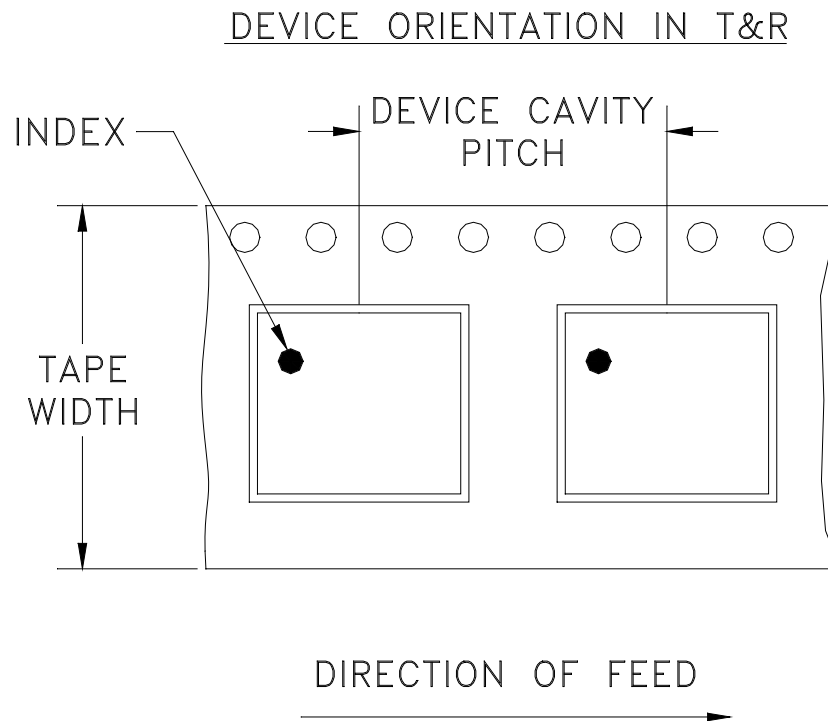
Weight: .02 Grams

Dimensions are in inches (mm). Tolerances: 2Pl. $\pm .01$; 3 Pl. $\pm .004$

Notes:

1. Case material: Plastic.
2. Termination finish:
 - For RoHS Case Styles: Tin-Silver alloy plate over Nickel barrier or Matte-Tin. All models, (+) suffix. See Data sheet.
 - For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.

Tape & Reel Packaging TR-F66



| Tape Width, mm | Device Cavity Pitch, mm | Reel Size, inches | Devices per Reel see note | |
|----------------|-------------------------|-------------------|------------------------------|------------------|
| 8 | 4 | 7 | Small quantity standard | 20 |
| | | | | 50 |
| | | | | 100 |
| | | | | 200 |
| | | | | 500 |
| | | 7 | Standard | 1000, 2000, 3000 |

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

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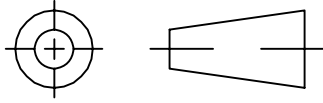
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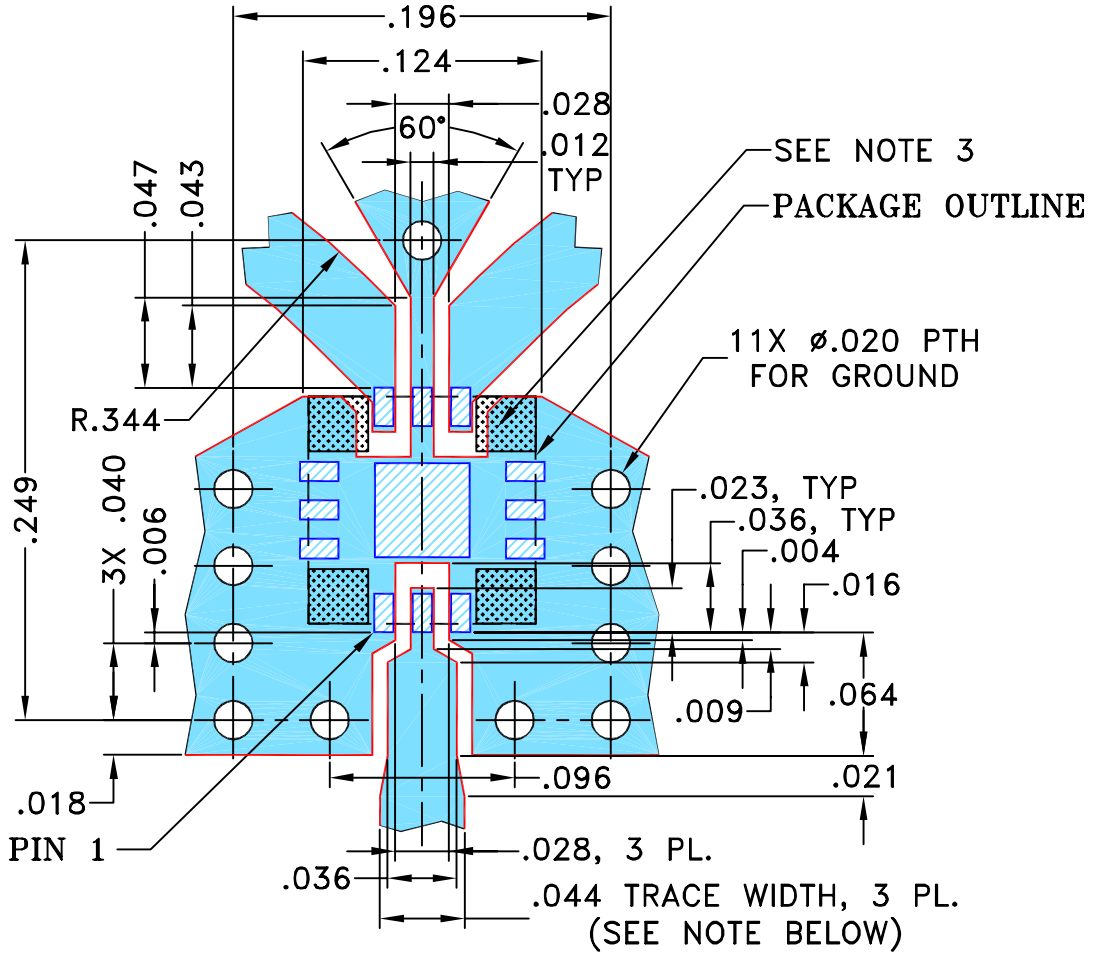
THIRD ANGLE PROJECTION



REVISIONS

| REV | ECN No. | DESCRIPTION | DATE | DR | AUTH |
|-----|---------|-------------|----------|----|------|
| OR | M114550 | NEW RELEASE | 11/15/07 | AV | WP |
| | | | | | |
| | | | | | |

SUGGESTED MOUNTING CONFIGURATION FOR DQ1225 CASE STYLE, "12SP02" PIN CODE



NOTES:

1. TRACE WIDTH IS 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. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
3. SIGNAL TRACES ARE NOT ALLOWED INSIDE HATCHED AREAS (APPROX. .030 X .030) AT 4 PLACES AS SHOWN.



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 | AV | 11/13/07 |
| CHECKED | MMG | 11/15/07 |
| APPROVED | WP | 11/15/07 |



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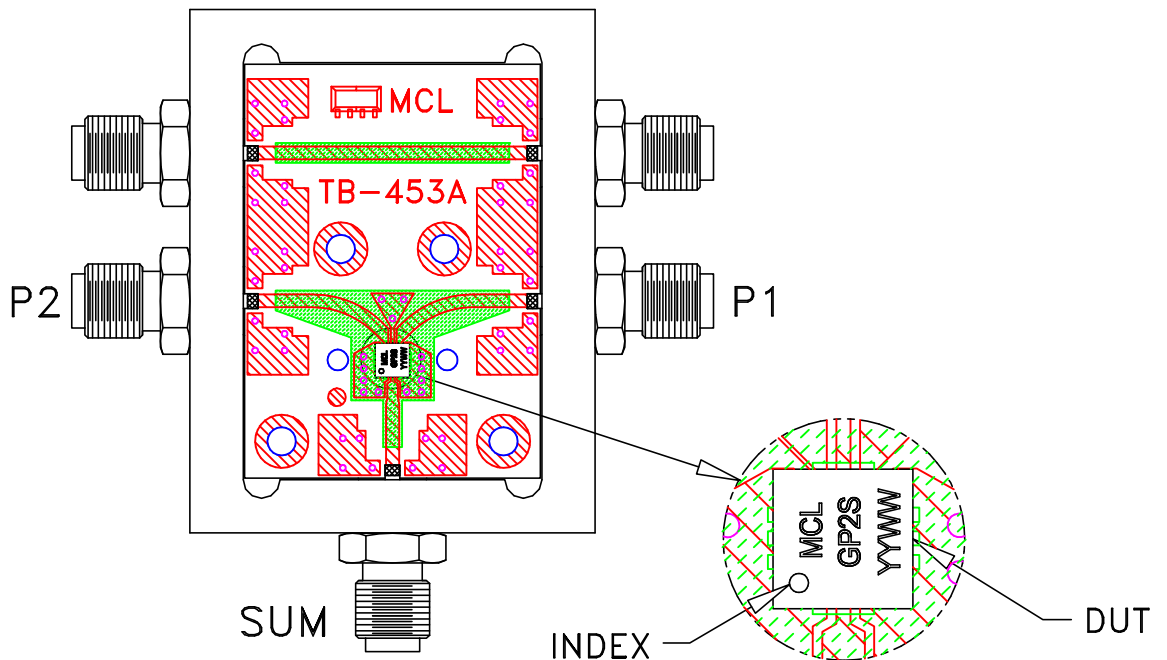
13 Neptune Avenue
Brooklyn NY 11235

PL, 12SP02, DQ1225, GP2, TB-453+

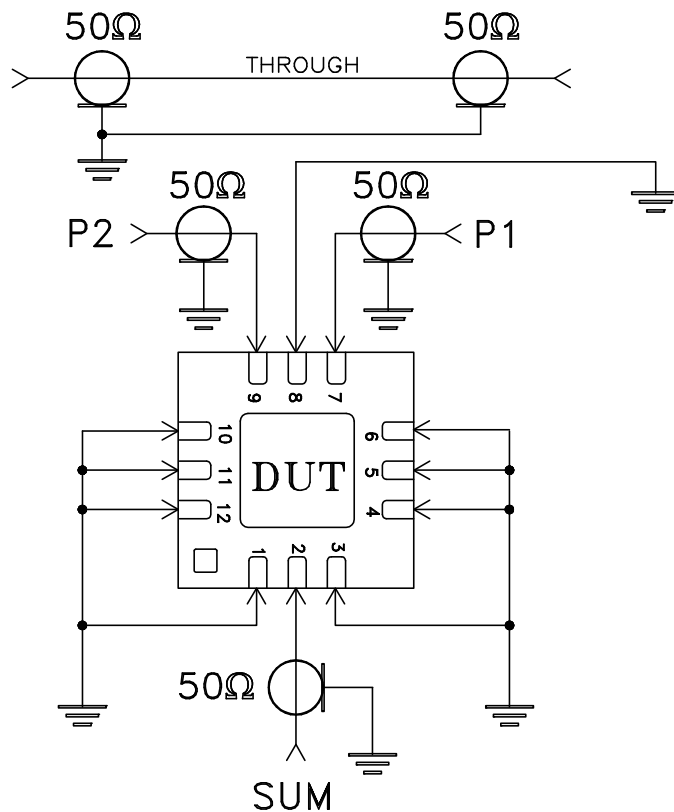
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| SIZE | CODE IDENT | DRAWING NO: | REV: |
|--------|------------|-------------|------|
| A | 15542 | 98-PL-282 | OR |
| FILE: | 98PL282 | SCALE: | 10:1 |
| SHEET: | 1 | OF | 1 |

Evaluation Board and Circuit




TB-453-GP2S1+



Notes:

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

Schematic Diagram

 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 Ambient Environment | Individual Model Data Sheet |
| Storage Temperature | -65° to 150° C Ambient Environment | Individual Model Data Sheet |
| Autoclave | 15 psig, 100% RH, 121°C, 96 hours | JESD22-A102-C, Condition C |
| Temperature Cycling | -65° to 150°C, 100 cycles | JESD22-A104 |
| Temperature Humidity | 85°C/ 85% RH, 168 hours | JESD22-113 |
| Solder Reflow Heat | Sn-Pb Eutetic Process: 240°C peak Pb-Free Process: 260°C peak | J-STD-020, Table 4-1, 4-2 and 5-2; Figure 5-1 |
| Moisture Sensitivity: Level 1 | Bake at 125°C for 24 hours Soak at 85°C/85% RH for 168 hours, Reflow 3 cycles at 240°C peak (Non-RoHS) or 260°C (RoHS) | J-STD-020 |
| Solderability | 10X magnification, 95% coverage | JESD22-B102, Method 1: Dip and Look Test |
| Mechanical Shock | 50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes | MIL-STD-202, Method 213, Condition A |
| 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 |