

top hat®

# Surface Mount Power Splitter/Combiner

2 Way-0° 50Ω 1000 to 3000 MHz

## TCP-2-33X+

### Features

- low insertion, 0.8 dB typ.
- excellent amplitude unbalance, 0.3 dB typ.
- very good phase unbalance, 1.0 deg. typ.
- external resistor required
- aqueous washable
- leads for excellent solderability
- low cost

### Applications

- cellular
- PCN
- GPS



Generic photo used for illustration purposes only

CASE STYLE: DB1627

**+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 |
| 13"                                      | 1000, 2000            |

### Electrical Specifications at 25°C

| Parameter                   | Frequency (MHz) | Min. | Typ. | Max. | Unit   |
|-----------------------------|-----------------|------|------|------|--------|
| Frequency Range             |                 | 1000 |      | 3000 | MHz    |
| Insertion Loss Above 3.0 dB | 1000 - 3000     | —    | 0.8  | 1.9  | dB     |
| Isolation                   | 1000 - 3000     | 15   | 18   | —    | dB     |
| Phase Unbalance             | 1000 - 3000     | —    | —    | 5    | Degree |
| Amplitude Unbalance         | 1000 - 3000     | —    | —    | 0.9  | dB     |

### Maximum Ratings

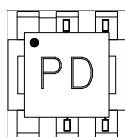
| Parameter                   | Ratings        |
|-----------------------------|----------------|
| Operating Temperature       | -40°C to 85°C  |
| Storage Temperature         | -55°C to 100°C |
| Power Input (as a splitter) | 0.5W max.      |

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

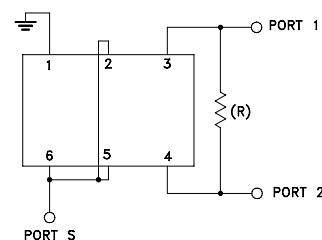
### Pin Connections

| Function           | Pin Number |
|--------------------|------------|
| SUM PORT           | 2,5,6      |
| PORT 1             | 3          |
| PORT 2             | 4          |
| GROUND             | 1          |
| EXT. RESISTOR 200Ω | 3,4        |

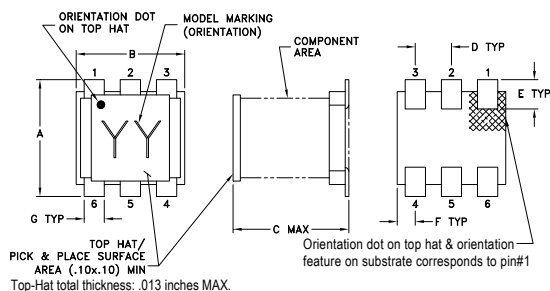
### Product Marking



### Electrical Schematic



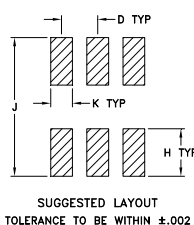
## Outline Drawing



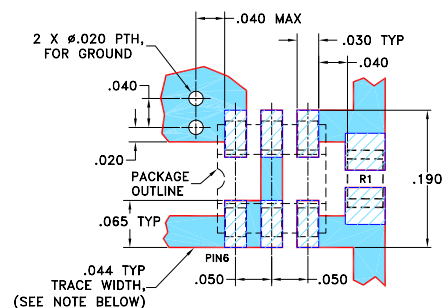
## Outline Dimensions (inch)

| A    | B    | C    | D    | E    | F     |
|------|------|------|------|------|-------|
| .160 | .150 | .160 | .050 | .040 | .025  |
| 4.06 | 3.81 | 4.06 | 1.27 | 1.02 | 0.64  |
| G    | H    | J    | K    |      | wt    |
| .028 | .065 | .190 | .030 |      | grams |
| 0.71 | 1.65 | 4.83 | 0.76 |      | 0.15  |

## PCB Land Pattern



Demo Board MCL P/N: TB-464+  
Suggested PCB Layout (PL-357)



RESISTOR R1: 200 ± 1% Ohm, 0805 SIZE

NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS 0.020" ± 0.0015"; 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.

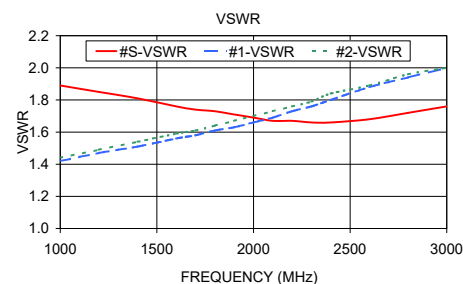
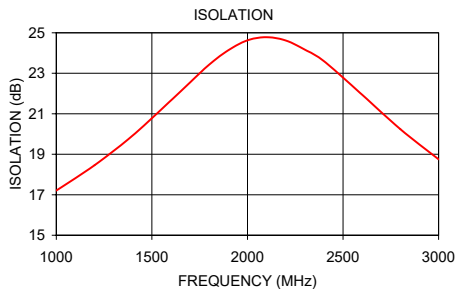
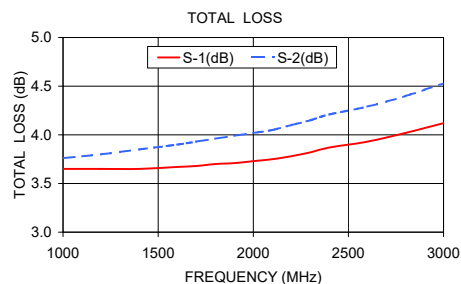
DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

## Typical Performance Data

| Frequency (MHz) | Total Loss <sup>1</sup> (dB) |      | Amplitude Unbalance (dB) | Isolation (dB) | Phase Unbalance (deg.) | VSWR S | VSWR 1 | VSWR 2 |
|-----------------|------------------------------|------|--------------------------|----------------|------------------------|--------|--------|--------|
|                 | S-1                          | S-2  |                          |                |                        |        |        |        |
| 1000.00         | 3.65                         | 3.76 | 0.11                     | 17.21          | 0.35                   | 1.89   | 1.42   | 1.44   |
| 1200.00         | 3.65                         | 3.80 | 0.15                     | 18.46          | 0.37                   | 1.85   | 1.47   | 1.49   |
| 1400.00         | 3.65                         | 3.85 | 0.20                     | 19.93          | 0.41                   | 1.81   | 1.51   | 1.54   |
| 1600.00         | 3.67                         | 3.90 | 0.23                     | 21.66          | 0.50                   | 1.76   | 1.56   | 1.59   |
| 1700.00         | 3.68                         | 3.93 | 0.25                     | 22.55          | 0.53                   | 1.74   | 1.58   | 1.61   |
| 1800.00         | 3.70                         | 3.96 | 0.26                     | 23.43          | 0.59                   | 1.73   | 1.61   | 1.64   |
| 1900.00         | 3.71                         | 3.99 | 0.28                     | 24.14          | 0.65                   | 1.71   | 1.63   | 1.67   |
| 2000.00         | 3.73                         | 4.02 | 0.29                     | 24.63          | 0.74                   | 1.69   | 1.66   | 1.70   |
| 2100.00         | 3.75                         | 4.05 | 0.30                     | 24.78          | 0.82                   | 1.67   | 1.69   | 1.73   |
| 2200.00         | 3.78                         | 4.10 | 0.31                     | 24.62          | 0.91                   | 1.67   | 1.73   | 1.76   |
| 2300.00         | 3.82                         | 4.15 | 0.32                     | 24.17          | 0.97                   | 1.66   | 1.76   | 1.79   |
| 2400.00         | 3.87                         | 4.21 | 0.34                     | 23.60          | 1.16                   | 1.66   | 1.80   | 1.84   |
| 2600.00         | 3.93                         | 4.29 | 0.35                     | 21.94          | 1.27                   | 1.68   | 1.88   | 1.89   |
| 2800.00         | 4.02                         | 4.40 | 0.38                     | 20.24          | 1.45                   | 1.72   | 1.94   | 1.96   |
| 3000.00         | 4.12                         | 4.53 | 0.41                     | 18.75          | 1.73                   | 1.76   | 2.00   | 2.00   |

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



## Additional 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-Circuits' applicable established test performance criteria and measurement instructions.  
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