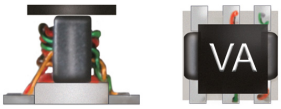
*Surface Mount* top hat®

# Power Splitter/Combiner TCP-2-182-75X+

2 Way-0° 75Ω 10 to 1800 MHz

## The Big Deal

- Wideband, 10 to 1800 MHz
- Downstream optimized
- Good power handling, 0.5W as a splitter
- Low insertion loss, 0.8 dB
- Low unbalance, 0.25 dB
- High isolation, 26 dB
- Excellent VSWR, 1.20:1




CASE STYLE: DB1627

## Product Overview

Mini-Circuits' TCP-2-182-75X+ is a 75Ω 2-way 0˚ surface-mount power splitter/combiner covering the 50 to 1800 MHz frequency range, supporting bandwidth requirements for DOCSIS® 3.1 systems and equipment, as well as other broadband applications. This model can handle up to 0.5W RF input power as a splitter, and provides low insertion loss and low phase and amplitude unbalance. It features core and wire construction mounted on a 6-lead plastic base (0.16 x 0.15 x 0.16") with Mini-Circuits' TopHat® feature to improve speed and accuracy of pick and place assembly. This design requires external capacitors and resistors for impedance matching and cycling isolation between the output signals (refer to electrical schematic).

## Key Features

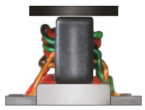
| Feature | Advantages |
|---|---|
| Wideband, 10 to 1800 MHz | Optimized for low insertion loss at the high end of the downstream band, this device is suitable for many broadband applications including DOCSIS® 3.1 systems and equipment, VHF/UHF, CATV, cellular, and more. |
| Low insertion loss, 0.8 dB | The combination of 0.5W power handling and low insertion loss makes it a suitable candidate for distributing signals while maintaining signal power. |
| Good isolation, 26 dB | Minimizes interference between ports |
| Low unbalance:<br>• 0.15 dB amplitude unbalance<br>• 2.0˚ phase unbalance | This model produces nearly equal output signals, making it ideal for use in parallel path /multichannel systems. |
| Top Hat® Feature | Improves speed and accuracy of pick and place assembly and provides clear device marking for visual inspection. |

top hat®

# Surface Mount Power Splitter/Combiner

# TCP-2-182-75X+

## 2 Way-0° 75Ω 10 to 1800 MHz




CASE STYLE: DB1627

### Features

- usable down to 5 MHz frequency
- low insertion, 0.8 dB typ.
- optimized for the upper end of the downstream band
- excellent amplitude unbalance, 0.15 dB typ.
- very good phase unbalance, 2.0 deg. typ.
- external resistor & capacitor required
- aqueous washable
- low cost

### Applications

- DOCSIS® 3.1 Systems
- VHF/UHF
- CATV

***+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** | | 10 | | 1800 | MHz |
| **Insertion Loss Above 3.0 dB** | 10-1800 | — | 1.7 | 2.9 | dB |
| | 50-1000 | — | 0.5 | 0.9 | |
| | 1000-1250 | — | 0.7 | 1.2 | |
| | 1250-1500 | — | 0.9 | 1.5 | |
| **Isolation** | 10-1800 | 13 | 25 | — | dB |
| | 50-1000 | 20 | 26 | — | |
| | 1000-1250 | 20 | 30 | — | |
| | 1250-1500 | 17 | 26 | — | |
| **Phase Unbalance** | 10-1800 | — | 3.0 | 9.0 | Degree |
| | 50-1000 | — | 1.5 | 5.0 | |
| | 1000-1250 | — | 2.0 | 6.0 | |
| | 1250-1500 | — | 2.0 | 7.0 | |
| **Amplitude Unbalance** | 10-1800 | — | 0.5 | 1.2 | dB |
| | 50-1000 | — | 0.2 | 0.7 | |
| | 1000-1250 | — | 0.1 | 0.6 | |
| | 1250-1500 | — | 0.2 | 0.7 | |
| **VSWR (Port S)** | 10-1800 | — | 1.3 | 1.6 | :1 |
| | 50-1000 | — | 1.15 | 1.3 | |
| | 1000-1250 | — | 1.15 | 1.3 | |
| | 1250-1500 | — | 1.25 | 1.35 | |
| **VSWR (Port 1-2)** | 10-1800 | — | 1.5 | 2.0 | :1 |
| | 50-1000 | — | 1.20 | 1.4 | |
| | 1000-1250 | — | 1.2 | 1.3 | |
| | 1250-1500 | — | 1.25 | 1.40 | |
| **Power Input (as a splitter)** | 10-1800 | — | — | 0.5 | Watt |
| | 50-1250 | — | — | 1.0 | |

### Maximum Ratings

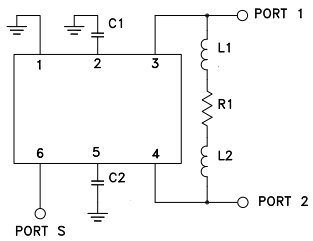
| Parameter | Ratings |
|---|---|
| Operating Temperature | -40°C to 85°C |
| Storage Temperature | -55°C to 100°C |

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

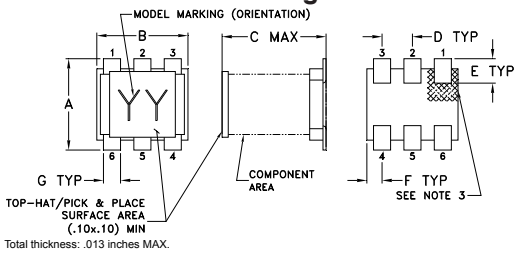
### Pin Connections

| Function | Pin Number |
|---|---|
| SUM PORT | 6 |
| PORT 1 | 3 |
| PORT 2 | 4 |
| GROUND | 1 |
| EXT. CAPACITOR 0.7 pF | 2 to GND |
| EXT. CAPACITOR 0.7 pF | 5 to GND |
| EXT. COMPONENTS (INDUCTOR 2.7 nH, RESISTOR 150Ω, INDUCTOR 2.7 nH IN SERIES) | 3,4 |

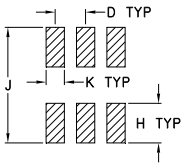
### Electrical Schematic



## Outline Drawing




PCB Land Pattern



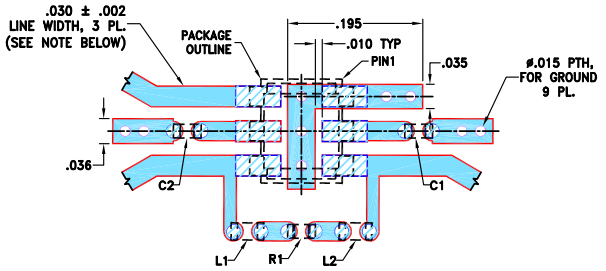

Suggested Layout,
Tolerance to be within .002

## Outline Dimensions (inch / mm)

| 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 |

## *Demo Board MCL P/N: TB-908+*
## *Suggested PCB Layout (PL-457)*




| COMPONENT | SIZE |
|---|---|
| L1, L2 | 0402 |
| C1,C2 | 0402 |
| R1 | 0402 |

**NOTES:**
1. TRACE WIDTH PARAMETERS ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030"±.002". 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.

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

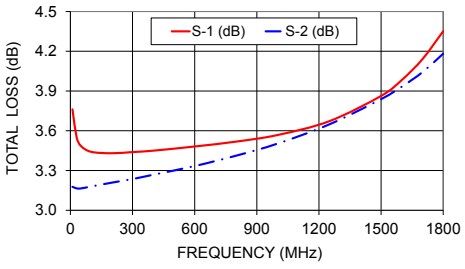
DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

## Typical Performance Data

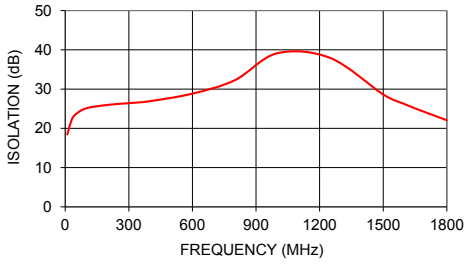
| Frequency (MHz) | Total Loss[1] (dB) | | Amplitude Unbalance (dB) | Isolation (dB) | Phase Unbalance (deg.) | VSWR S | VSWR 1 | VSWR 2 |
|---|---|---|---|---|---|---|---|---|
| | S-1 | S-2 | | | | | | |
| 5 | 3.93 | 3.16 | 0.76 | 16.08 | 3.47 | 1.18 | 1.86 | 1.49 |
| 10 | 3.76 | 3.18 | 0.58 | 18.46 | 2.56 | 1.11 | 1.58 | 1.35 |
| 30 | 3.55 | 3.17 | 0.39 | 22.11 | 1.53 | 1.05 | 1.34 | 1.21 |
| 50 | 3.49 | 3.16 | 0.32 | 23.61 | 1.12 | 1.03 | 1.27 | 1.17 |
| 100 | 3.44 | 3.18 | 0.26 | 25.12 | 0.60 | 1.01 | 1.21 | 1.14 |
| 200 | 3.43 | 3.21 | 0.22 | 25.97 | 0.01 | 1.03 | 1.17 | 1.12 |
| 300 | 3.44 | 3.24 | 0.20 | 26.42 | 0.39 | 1.06 | 1.15 | 1.12 |
| 400 | 3.45 | 3.27 | 0.18 | 26.93 | 0.67 | 1.09 | 1.13 | 1.12 |
| 600 | 3.48 | 3.33 | 0.15 | 28.85 | 1.16 | 1.15 | 1.11 | 1.14 |
| 800 | 3.52 | 3.41 | 0.11 | 32.26 | 1.60 | 1.19 | 1.10 | 1.17 |
| 1000 | 3.57 | 3.50 | 0.06 | 39.14 | 1.94 | 1.22 | 1.12 | 1.19 |
| 1250 | 3.67 | 3.65 | 0.02 | 37.94 | 2.29 | 1.20 | 1.17 | 1.21 |
| 1500 | 3.86 | 3.84 | 0.02 | 28.63 | 2.59 | 1.17 | 1.23 | 1.21 |
| 1600 | 3.98 | 3.93 | 0.05 | 26.18 | 2.77 | 1.15 | 1.26 | 1.21 |
| 1700 | 4.14 | 4.04 | 0.10 | 24.07 | 2.99 | 1.13 | 1.29 | 1.21 |
| 1800 | 4.35 | 4.18 | 0.17 | 22.08 | 3.38 | 1.12 | 1.32 | 1.21 |

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

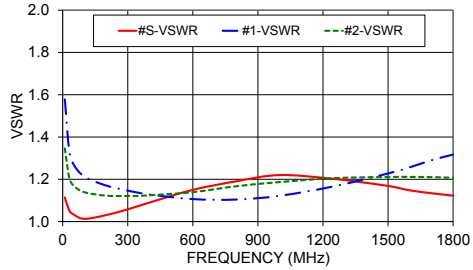
TCP-2-182-75X+
TOTAL LOSS




TCP-2-182-75X+
ISOLATION




TCP-2-182-75X+
VSWR




## 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-Circuit's applicable established test performance criteria and measurement instructions.
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