



(SIW) SURFACE MOUNT

# Bandpass Filter

## WSBP-26G+

50Ω 25 to 27 GHz

### KEY FEATURES

- Low Midband Insertion loss 1.7dB typ.
- High Rejection 56 dB typ.
- Shielded Construction.

### APPLICATIONS

- n258
- 5G Telecommunication.

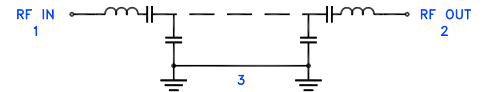


Generic photo used for illustration purposes only

### PRODUCT OVERVIEW

Mini-Circuits' Model-WSBP-26G+ is a SIW (Substrate Integrated Waveguide) filter that offer a good insertion loss and high rejection, realized in a soft substrate using tight tolerance that can guarantee a enhanced Q and repeatable performance. Band pass surface mount SIW design can be realized with this technology. Using SIW, we can guarantee repeatability on large batches of filters.

### FUNCTIONAL DIAGRAM



### ELECTRICAL SPECIFICATIONS<sup>1,2,3</sup> AT +25°C

| Parameter        |                               | F#    | Frequency (GHz) | Min. | Typ. | Max. | Units |
|------------------|-------------------------------|-------|-----------------|------|------|------|-------|
| Passband         | Center Frequency <sup>4</sup> | Fc    | 26              | —    | 1.7  | 2.2  | GHz   |
|                  | Insertion Loss                | F1-F2 | 25 - 27         | —    | 2.3  | 3    | dB    |
|                  | Return Loss                   | F1-F2 | 25 - 27         | —    | 12   | —    | dB    |
| Stop Band, Lower | Rejection                     | DC-F3 | DC - 9          | 45   | 56   | —    | dB    |
|                  |                               | F3-F4 | 9 - 21          | 30   | 41   | —    |       |
|                  |                               | F4-F5 | 21 - 23         | 20   | 42   | —    |       |
| Stop Band, Upper | Rejection                     | F6-F7 | 31 - 32         | 25   | 35   | —    | dB    |

1. Tested in Evaluation Board P/N TB-WSBP-26G+.

2. This filter is bi-directional RF1 and RF2 ports may be interchanged, see S-Parameters for actual performance.

3. This component should not be used as a DC-block. In applications where DC voltage and/or current is present at either the input or output ports, external DC blocking capacitors are required.

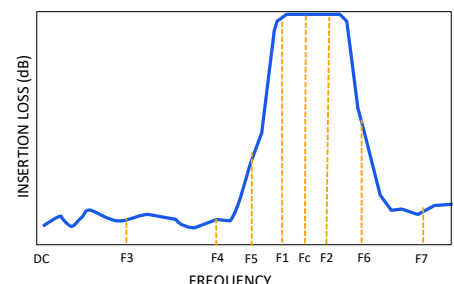
4. Typical variation  $\pm 2\%$

### ABSOLUTE MAXIMUM RATINGS<sup>5</sup>

| Parameter             | Ratings           |
|-----------------------|-------------------|
| Operating Temperature | -40 °C to +85 °C  |
| Storage Temperature   | -55 °C to +100 °C |
| Input Power           | 1W Max. @25 °C    |

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

### TYPICAL FREQUENCY RESPONSE AT +25°C



REV. OR  
ECO-020324  
WSBP-26G+  
EDU4190  
URJ  
231219





(SIW) SURFACE MOUNT

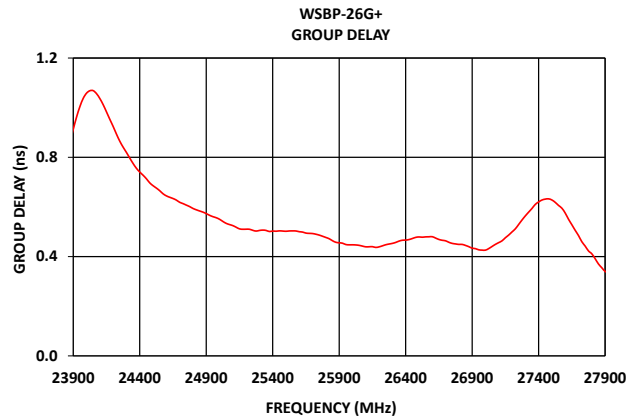
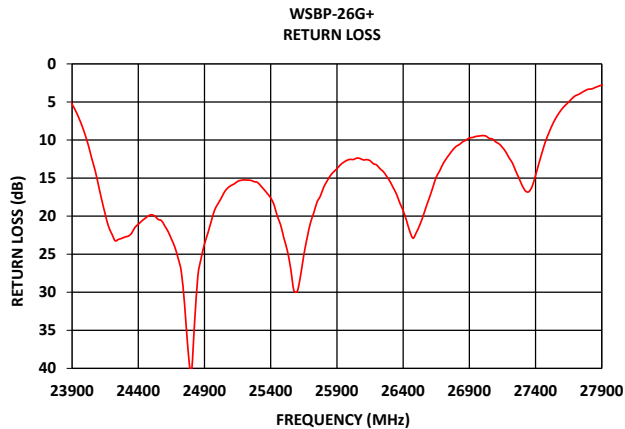
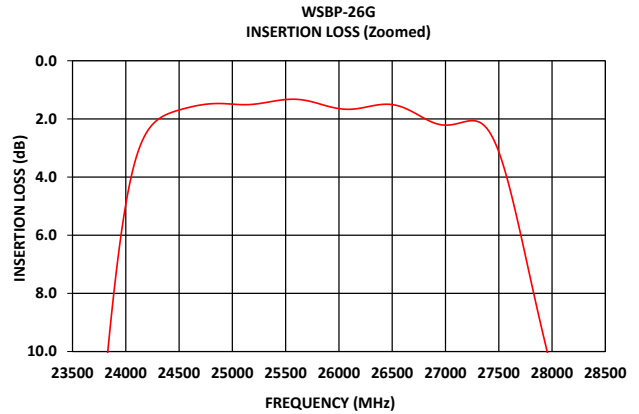
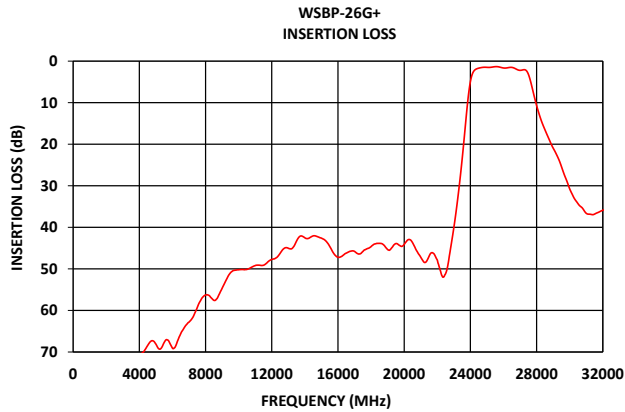
# Bandpass Filter

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Mini-Circuits

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## TYPICAL PERFORMANCE GRAPHS AT +25°C





Mini-Circuits

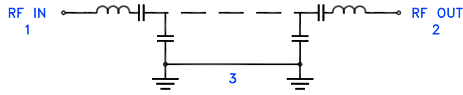
(SIW) SURFACE MOUNT

## Bandpass Filter

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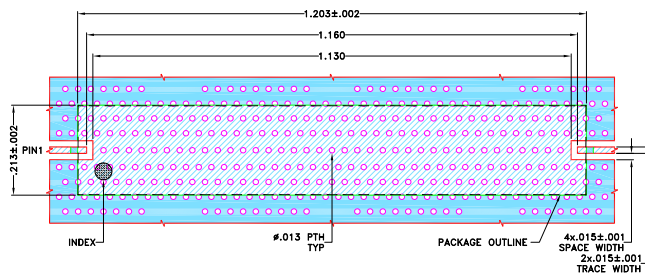
## FUNCTIONAL DIAGRAM



## PAD DESCRIPTION

| Function         | Pad Number | Description                                        |
|------------------|------------|----------------------------------------------------|
| RF1 <sup>2</sup> | 1          | Connects to RF Input Port                          |
| RF2 <sup>2</sup> | 2          | Connects to RF Output Port                         |
| GROUND           | 3          | Connects to Ground on PCB,<br>(See drawing PL-693) |

## SUGGESTED PCB LAYOUT (PL-693)

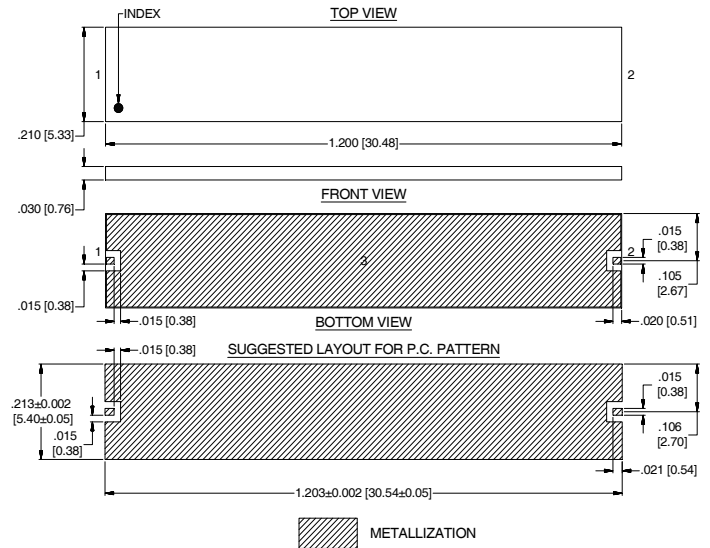


## NOTES:

1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS (RO4350B) WITH DIELECTRIC THICKNESS .0066±.0007; 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 PATTERN WITH SMOBC (SOLDER MASK OVER BARE COPPER)  
 DENOTES PCB COPPER PATTERN FREE OF SOLDERMASK

Figure 2. Suggested PCB Layout PL-693

## CASE STYLE DRAWING



Weight: 0.35 grams.

Dimensions are in inches (mm).

Tolerances: 2Pl. ± .01; 3Pl. ± .005



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ADDITIONAL DETAILED INFORMATION IS AVAILABLE ON OUR DASH BOARD.

[CLICK HERE](#)

|                                 |                                                                         |
|---------------------------------|-------------------------------------------------------------------------|
| Performance Data and Graphs     | Data                                                                    |
|                                 | Graphs                                                                  |
|                                 | S-Parameter (S2P Files) Data Set (.zip file) De-embedded to device pads |
| Case Style                      | YR3342 Lead Finish: Gold over Nickel Plate                              |
| RoHs Status                     | Compliant                                                               |
| Tape and Reel                   | TR-F007                                                                 |
| Suggested Layout for PCB Design | PL-693                                                                  |
| Evaluation Board                | TB-WSBP-26G+                                                            |
|                                 | Gerber File                                                             |
| Environmental Rating            | ENV54                                                                   |

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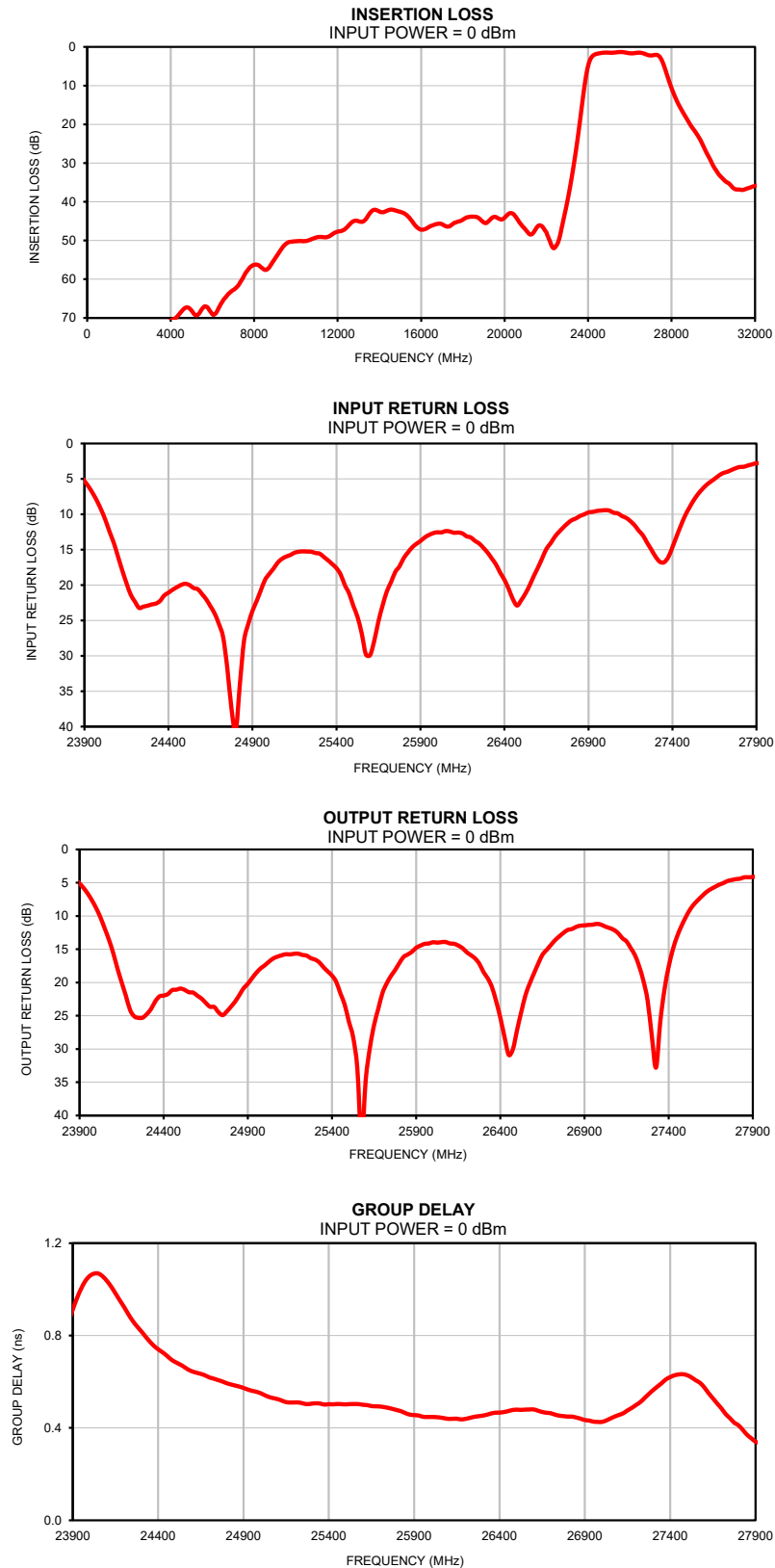


**SIW Bandpass Filter****WSBP-26G+****Typical Performance Data**

| FREQ. | Insertion Loss | Input Return Loss | Output Return Loss |
|-------|----------------|-------------------|--------------------|
| (MHz) | (dB)           | (dB)              | (dB)               |
| 10    | 105.24         | 0.08              | 0.11               |
| 20    | 105.34         | 0.08              | 0.11               |
| 40    | 105.65         | 0.09              | 0.13               |
| 100   | 106.12         | 0.11              | 0.15               |
| 150   | 106.51         | 0.13              | 0.16               |
| 200   | 106.85         | 0.15              | 0.18               |
| 300   | 107.32         | 0.18              | 0.21               |
| 400   | 107.15         | 0.22              | 0.25               |
| 500   | 105.90         | 0.26              | 0.28               |
| 600   | 103.73         | 0.29              | 0.31               |
| 700   | 100.84         | 0.31              | 0.33               |
| 800   | 98.15          | 0.33              | 0.35               |
| 900   | 95.90          | 0.35              | 0.37               |
| 1000  | 94.33          | 0.36              | 0.39               |
| 1500  | 88.28          | 0.39              | 0.42               |
| 2000  | 84.34          | 0.39              | 0.42               |
| 2500  | 80.52          | 0.37              | 0.40               |
| 3000  | 78.38          | 0.33              | 0.36               |
| 3500  | 74.86          | 0.32              | 0.35               |
| 4000  | 70.67          | 0.33              | 0.36               |
| 5000  | 68.10          | 0.41              | 0.46               |
| 6000  | 69.07          | 0.52              | 0.57               |
| 6500  | 65.59          | 0.57              | 0.62               |
| 7400  | 60.22          | 0.58              | 0.66               |
| 7500  | 59.28          | 0.58              | 0.67               |
| 8000  | 56.29          | 0.63              | 0.73               |
| 8500  | 57.56          | 0.68              | 0.79               |
| 9000  | 54.67          | 0.73              | 0.84               |
| 10000 | 50.22          | 0.83              | 0.93               |
| 11000 | 49.21          | 0.91              | 1.02               |
| 12000 | 47.72          | 1.02              | 1.13               |
| 13000 | 45.02          | 1.14              | 1.24               |
| 14000 | 42.52          | 1.20              | 1.32               |
| 15000 | 42.59          | 1.25              | 1.39               |
| 16000 | 47.20          | 1.26              | 1.36               |
| 17000 | 45.78          | 1.34              | 1.43               |
| 18000 | 44.63          | 1.41              | 1.54               |
| 19000 | 45.35          | 1.49              | 1.71               |
| 20000 | 44.12          | 1.60              | 1.83               |
| 20500 | 43.65          | 1.72              | 1.93               |
| 21000 | 47.18          | 1.88              | 2.12               |
| 21500 | 46.99          | 2.09              | 2.28               |
| 22000 | 47.87          | 2.18              | 2.32               |
| 22500 | 51.14          | 2.12              | 2.17               |
| 23000 | 40.07          | 1.77              | 1.97               |
| 23500 | 23.66          | 1.91              | 2.09               |
| 24000 | 4.94           | 9.39              | 8.90               |
| 24500 | 1.69           | 19.82             | 20.92              |
| 25000 | 1.49           | 18.43             | 17.42              |
| 25500 | 1.33           | 22.92             | 25.88              |
| 26000 | 1.65           | 12.54             | 13.94              |
| 26500 | 1.51           | 22.14             | 27.07              |
| 27000 | 2.21           | 9.42              | 11.32              |
| 27500 | 3.13           | 9.09              | 10.26              |
| 28000 | 10.67          | 2.63              | 3.88               |
| 28500 | 16.48          | 2.73              | 3.89               |
| 29000 | 20.93          | 3.08              | 3.55               |
| 30000 | 30.75          | 2.35              | 2.43               |
| 31000 | 36.63          | 1.72              | 2.25               |
| 32000 | 35.88          | 1.61              | 2.48               |

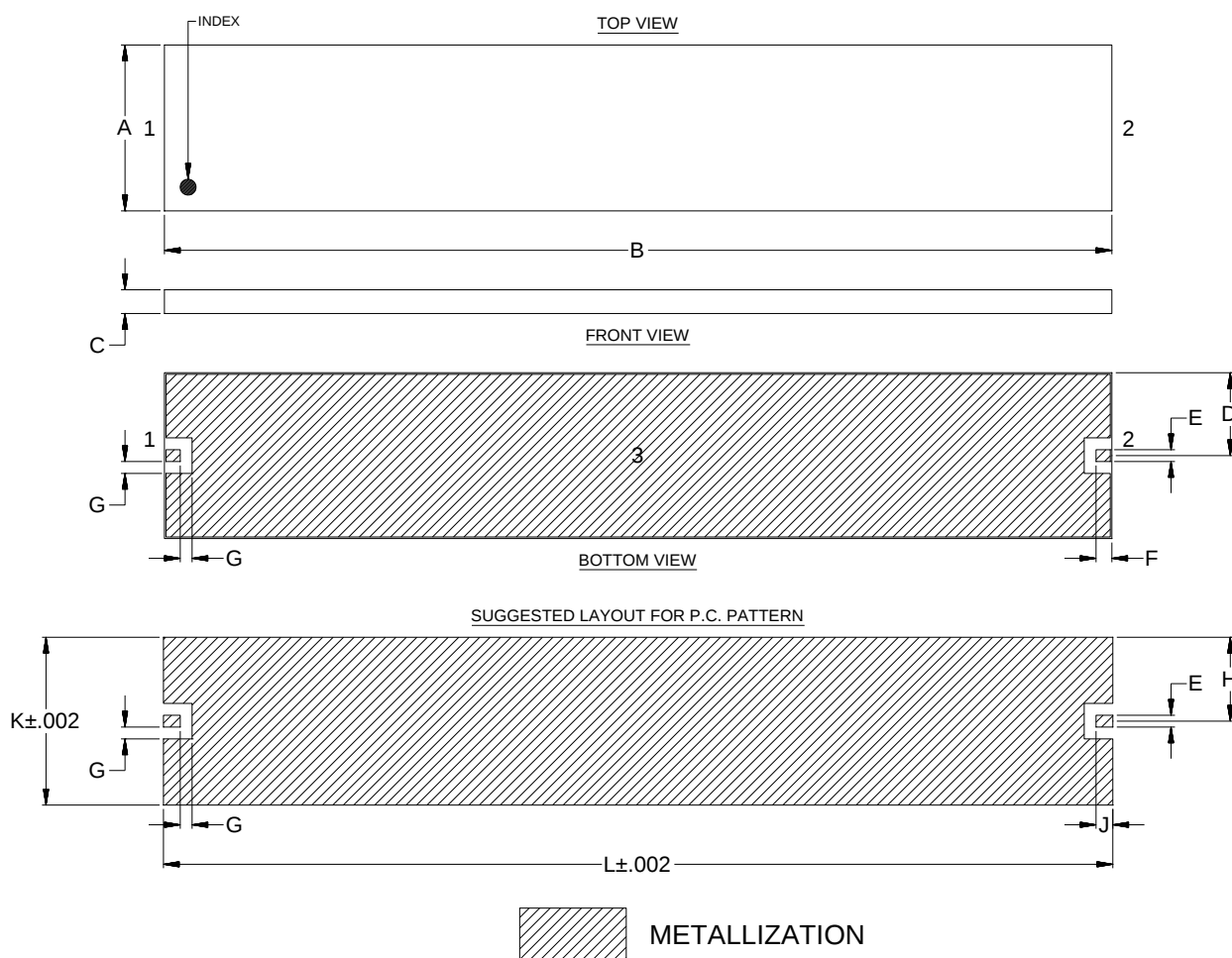
| FREQ. | Group Delay |
|-------|-------------|
| (MHz) | (ns)        |
| 25000 | 0.55        |
| 25050 | 0.53        |
| 25100 | 0.52        |
| 25150 | 0.51        |
| 25200 | 0.51        |
| 25250 | 0.51        |
| 25300 | 0.51        |
| 25350 | 0.51        |
| 25400 | 0.50        |
| 25450 | 0.50        |
| 25500 | 0.50        |
| 25550 | 0.50        |
| 25600 | 0.50        |
| 25650 | 0.49        |
| 25700 | 0.49        |
| 25750 | 0.49        |
| 25750 | 0.49        |
| 25800 | 0.48        |
| 25850 | 0.46        |
| 25900 | 0.46        |
| 25950 | 0.45        |
| 26000 | 0.45        |
| 26050 | 0.45        |
| 26100 | 0.44        |
| 26150 | 0.44        |
| 26200 | 0.44        |
| 26250 | 0.45        |
| 26300 | 0.45        |
| 26350 | 0.46        |
| 26400 | 0.47        |
| 26450 | 0.47        |
| 26500 | 0.48        |
| 26550 | 0.48        |
| 26600 | 0.48        |
| 26650 | 0.47        |
| 26700 | 0.46        |
| 26750 | 0.45        |
| 26800 | 0.45        |
| 26850 | 0.45        |
| 26900 | 0.43        |
| 26950 | 0.43        |
| 27000 | 0.43        |

## Typical Performance Curves



## Outline Dimensions

YR3342



| CASE#  | A              | B                | C              | D              | E              | F              | G              | H              | J              | K              | L                | WT.GRAM |
|--------|----------------|------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|------------------|---------|
| YR3342 | .210<br>(5.33) | 1.200<br>(30.48) | .030<br>(0.76) | .105<br>(2.67) | .015<br>(0.38) | .020<br>(0.51) | .015<br>(0.38) | .106<br>(2.70) | .021<br>(0.54) | .213<br>(5.40) | 1.203<br>(30.54) | 0.35    |

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

### Notes:

1. Base: Printed wiring laminate.
2. Termination finish:  
For RoHS Case Styles: 3-5 $\mu$  inch gold over 120-240 $\mu$  inch nickel plate.



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

|     |            |             |        |     |      |
|-----|------------|-------------|--------|-----|------|
| REV | ECN No.    | DESCRIPTION | DATE   | DR  | AUTH |
| OR  | NPO-003185 | NEW RELEASE | FEB 23 | DDR | VC   |
|     |            |             |        |     |      |
|     |            |             |        |     |      |

[illegible]

 DENOTES PCB COPPER PATTERN WITH SMOBC (SOLDER MASK OVER BARE COPPER)  
 DENOTES PCB COPPER PATTERN FREE OF SOLDERMASK

| UNLESS OTHERWISE SPECIFIED | INITIALS |     | DATE      |
|----------------------------|----------|-----|-----------|
| DIMENSIONS ARE IN INCHES   | DRAWN    | DDR | 15 FEB 23 |
| TOLERANCES ON:             | CHECKED  | MD  | 15 FEB 23 |
| 2 PL DECIMALS ±            | APPROVED | PTB | 15 FEB 23 |
| 3 PL DECIMALS ± .005       |          |     |           |
| ANGLES ±                   |          |     |           |
| FRACTIONS ±                |          |     |           |

# Mini-Circuits®

13 Neptune Avenue  
Brooklyn NY 11235

PL DWG YR3342 C.S 50 OHM WSBP

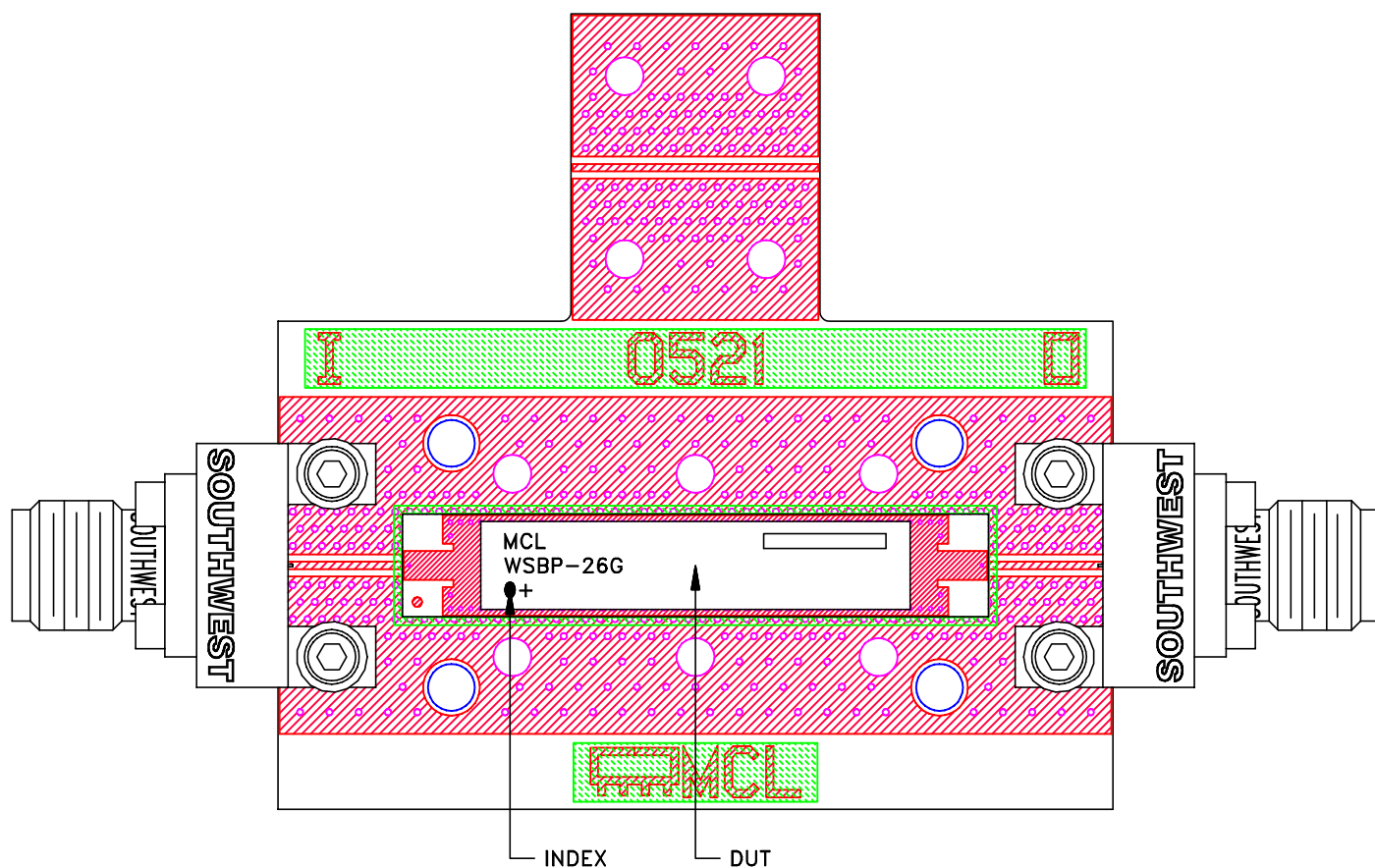
|                 |                     |                          |               |            |
|-----------------|---------------------|--------------------------|---------------|------------|
| SIZE<br>A       | CODE IDENT<br>15542 | DRAWING NO:<br>98-PL-693 |               | REV:<br>OR |
| FILE: 98-PL-693 |                     | SCALE: 5:1               | SHEET: 1 OF 1 |            |

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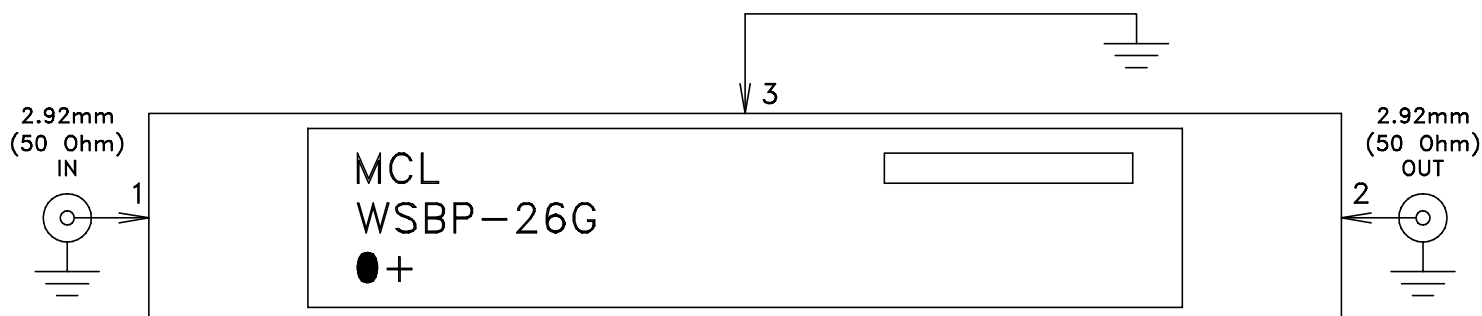
ASHEETA1.DWG REV:A DATE:01/12/95

## Evaluation Board and Circuit

TB-WSBP-26G+



### Schematic diagram



Notes:

1. PCB Material: ROGERS (R04350B) OR Equivalent, Dielectric Constant= $3.48 \pm 0.05$   
Dielectric Thickness:  $.0066 \pm .0007$   
2. 50 Ohm 2.92mm Female Connectors.

 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, 96 hours, 40°C                                      | MIL-STD-202, Method 103B, Condition B, Except 50°C    |
| Thermal Shock              | -55° to 100°C, 100 cycles                                         | MIL-STD-202, Method 107, Condition A-3, except +100°C |
| Solder Reflow Heat         | Sn-Pb Eutectic Process: 225°C peak<br>Pb-Free Process, 245°C peak | J-STD-020, Table 4-1, 4-2 and 5-2, Figure 5-1         |
| Solderability              | 10X Magnification                                                 | J-STD-002, Para 4.2.5, Test S, 95% Coverage           |
| Vibration (High Frequency) | 20g peak, 10-2000 Hz, 4 times in each of three axes (total 12)    | 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                  |