

# +12 to +30dBm Limiter

50Ω Broadband 30 to 3000 MHz

## VLM-33-S+



### Maximum Ratings

|                       |                |
|-----------------------|----------------|
| Operating Temperature | -55°C to 100°C |
| Storage Temperature   | -55°C to 100°C |
| RF Input Power        | 2W             |

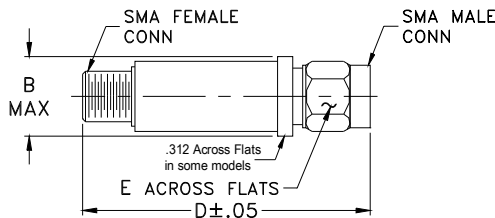
Permanent damage may occur if any of these limits are exceeded.

### Coaxial Connections\*

|        |            |
|--------|------------|
| INPUT  | SMA FEMALE |
| OUTPUT | SMA MALE   |

\*Suggested Connections. For reverse connections, consult Mini-Circuits.

### Outline Drawing



### Outline Dimensions (inch/mm)

| B     | D     | E    | wt    |
|-------|-------|------|-------|
| .410  | 1.43  | .312 | grams |
| 10.41 | 36.32 | 7.92 | 10.0  |

### Features

- wideband, 30 to 3000 MHz
- low insertion loss 0.23 dB typ.
- fast recovery time, 10nsec typ.
- excellent VSWR 1.05:1 typ.
- low leakage power, 11.5 dBm typ.

### Applications

- protects low noise amplifiers and other devices from ESD or input power damage
- military, hi-rel applications

CASE STYLE: FF704

| Connectors | Model     |
|------------|-----------|
| SMA        | VLM-33-S+ |

### +RoHS Compliant

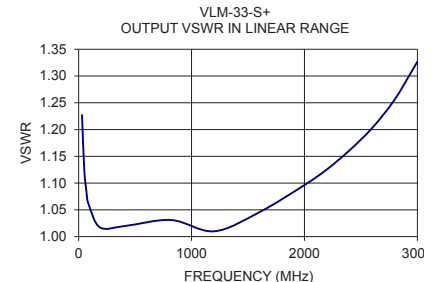
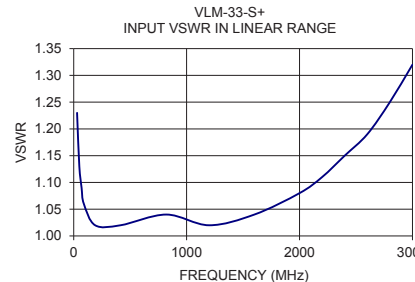
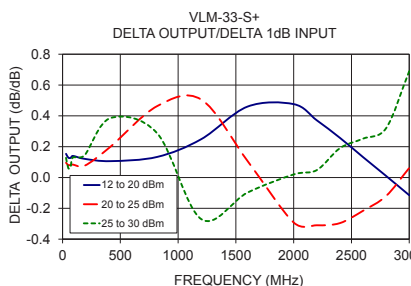
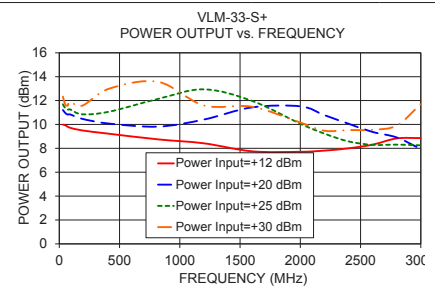
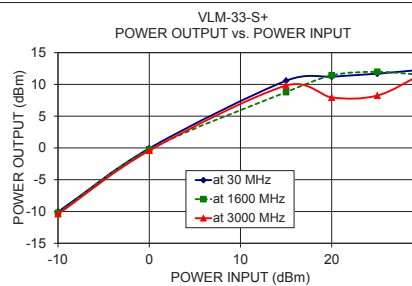
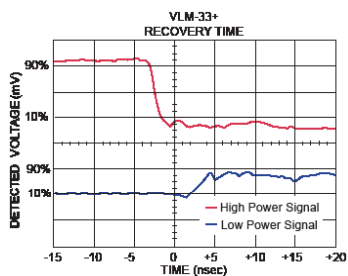
The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

### Electrical Specifications

| Parameter                                   | Condition                                                                           | Min.        | Typ.              | Max.        | Units |
|---------------------------------------------|-------------------------------------------------------------------------------------|-------------|-------------------|-------------|-------|
| Frequency Range                             |                                                                                     | 30          |                   | 3000        | MHz   |
| Insertion Loss in Linear Range              | <+5 dBm Input                                                                       | —           | 0.23              | 0.7         | dB    |
| VSWR                                        | <+5 dBm Input                                                                       |             | 1.05              | 1.5         | :1    |
| Input Power Limiting Range                  |                                                                                     | +12         | —                 | +30         | dBm   |
| Output Power                                | In limiting range                                                                   | —           | +11.5             | —           | dBm   |
| Recovery Time                               | 1 watt pulse 50 $\mu$ sec pw 1kHz duty cycle recovery to within 90% of final value. | —           | 10                | —           | nsec  |
| Response Time                               | -30 to +30 dBm input 50 $\mu$ sec, BW 1 kHz duty cycle                              | —           | 2                 | —           | nsec  |
| Limiting $\Delta$ Output/1dB $\Delta$ Input | Input Power Range (dBm)<br>12 to 20<br>20 to 25<br>25 to 30                         | —<br>—<br>— | 0.2<br>0.2<br>0.2 | —<br>—<br>— | dB/dB |

### Typical Performance Data

| Freq. (MHz) | I. Loss in Linear Range (dB) | VSWR in Linear Range (:1) | Power Output (dBm) |              |               |              | $\Delta$ Output 1dB $\Delta$ Input |                      |                      |
|-------------|------------------------------|---------------------------|--------------------|--------------|---------------|--------------|------------------------------------|----------------------|----------------------|
|             |                              |                           | +12dBm Input       | +20dBm Input | +25 dBm Input | +30dBm Input | +12 to +20dBm Input                | +20 to +25 dBm Input | +25 to +30 dBm Input |
| 30.00       | 0.06                         | 1.23                      | 9.98               | 11.21        | 11.69         | 12.33        | 0.15                               | 0.10                 | 0.13                 |
| 50.00       | 0.04                         | 1.13                      | 9.93               | 10.96        | 11.36         | 11.66        | 0.13                               | 0.08                 | 0.06                 |
| 70.00       | 0.04                         | 1.09                      | 9.81               | 10.83        | 11.24         | 11.58        | 0.13                               | 0.08                 | 0.07                 |
| 90.00       | 0.04                         | 1.06                      | 9.72               | 10.84        | 11.26         | 11.91        | 0.14                               | 0.08                 | 0.13                 |
| 190.00      | 0.06                         | 1.02                      | 9.50               | 10.47        | 10.85         | 11.57        | 0.12                               | 0.08                 | 0.14                 |
| 415.00      | 0.10                         | 1.02                      | 9.22               | 10.07        | 11.07         | 13.00        | 0.11                               | 0.20                 | 0.39                 |
| 820.00      | 0.21                         | 1.04                      | 8.75               | 9.82         | 12.14         | 13.57        | 0.13                               | 0.46                 | 0.29                 |
| 1200.00     | 0.19                         | 1.02                      | 8.42               | 10.41        | 12.94         | 11.59        | 0.25                               | 0.51                 | -0.27                |
| 1600.00     | 0.23                         | 1.04                      | 7.75               | 11.43        | 11.97         | 11.48        | 0.46                               | 0.11                 | -0.10                |
| 2000.00     | 0.26                         | 1.08                      | 7.71               | 11.52        | 10.06         | 10.16        | 0.48                               | -0.29                | 0.02                 |
| 2200.00     | 0.28                         | 1.11                      | 7.81               | 10.78        | 9.23          | 9.47         | 0.37                               | -0.31                | 0.05                 |
| 2400.00     | 0.30                         | 1.15                      | 8.00               | 10.06        | 8.58          | 9.53         | 0.26                               | -0.30                | 0.19                 |
| 2600.00     | 0.32                         | 1.19                      | 8.31               | 9.37         | 8.29          | 9.55         | 0.13                               | -0.22                | 0.25                 |
| 2800.00     | 0.35                         | 1.25                      | 8.83               | 8.91         | 8.31          | 9.91         | 0.01                               | -0.12                | 0.32                 |
| 3000.00     | 0.40                         | 1.32                      | 8.86               | 7.94         | 8.25          | 11.70        | -0.12                              | 0.06                 | 0.69                 |



### 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.
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VLM-33-S+  
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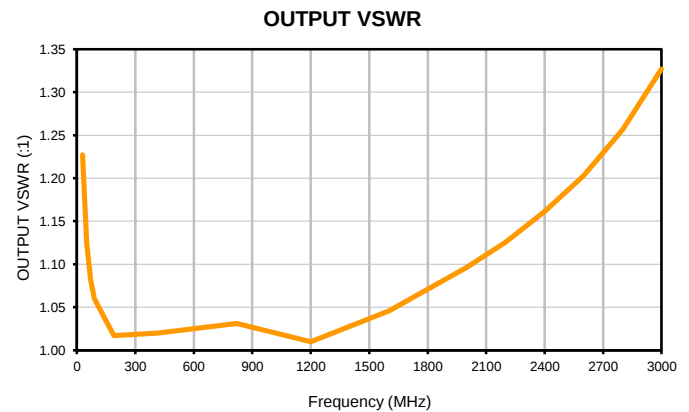
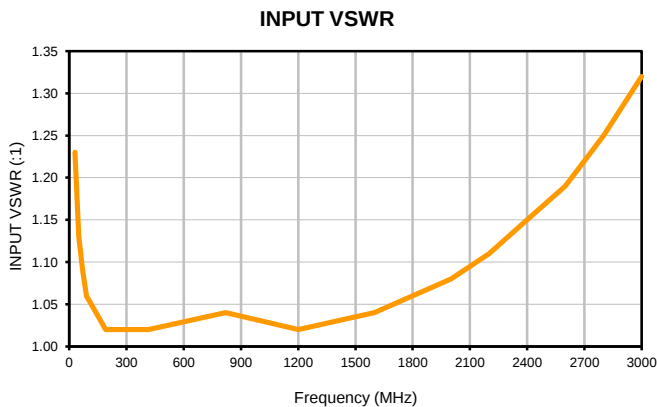
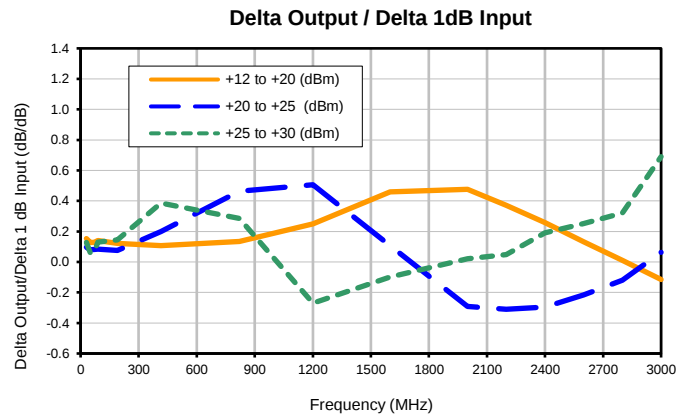
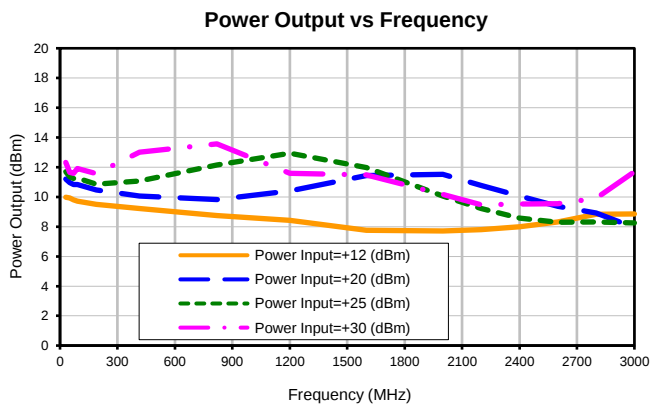
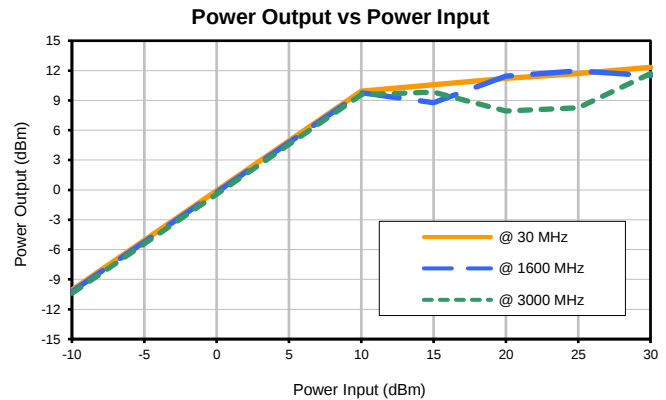
## Typical Performance Data

| FREQUENCY | LOW INPUT POWER |       |        | POWER OUTPUT (dBm) |         |         |         | DELTA OUTPUT/1dB DELTA INPUT (dB/dB) |                |                |
|-----------|-----------------|-------|--------|--------------------|---------|---------|---------|--------------------------------------|----------------|----------------|
|           | INSERTION LOSS  | VSWR  |        |                    |         |         |         |                                      |                |                |
| (MHz)     | (dB)            | INPUT | OUTPUT | +12 dBm            | +20 dBm | +25 dBm | +30 dBm | +12 to +20 dBm                       | +20 to +25 dBm | +25 to +30 dBm |
|           |                 | (:1)  |        | INPUT              | INPUT   | INPUT   | INPUT   | INPUT                                | INPUT          | INPUT          |
| 30        | 0.06            | 1.23  | 1.23   | 9.98               | 11.21   | 11.69   | 12.33   | 0.15                                 | 0.10           | 0.13           |
| 50        | 0.04            | 1.13  | 1.12   | 9.93               | 10.96   | 11.36   | 11.66   | 0.13                                 | 0.08           | 0.06           |
| 70        | 0.04            | 1.09  | 1.08   | 9.81               | 10.83   | 11.24   | 11.58   | 0.13                                 | 0.08           | 0.07           |
| 90        | 0.04            | 1.06  | 1.06   | 9.72               | 10.84   | 11.26   | 11.91   | 0.14                                 | 0.08           | 0.13           |
| 190       | 0.06            | 1.02  | 1.02   | 9.50               | 10.47   | 10.85   | 11.57   | 0.12                                 | 0.08           | 0.14           |
| 415       | 0.10            | 1.02  | 1.02   | 9.22               | 10.07   | 11.07   | 13.00   | 0.11                                 | 0.20           | 0.39           |
| 820       | 0.21            | 1.04  | 1.03   | 8.75               | 9.82    | 12.14   | 13.57   | 0.13                                 | 0.46           | 0.29           |
| 1200      | 0.19            | 1.02  | 1.01   | 8.42               | 10.41   | 12.94   | 11.59   | 0.25                                 | 0.51           | -0.27          |
| 1600      | 0.23            | 1.04  | 1.05   | 7.75               | 11.43   | 11.97   | 11.48   | 0.46                                 | 0.11           | -0.10          |
| 2000      | 0.26            | 1.08  | 1.10   | 7.71               | 11.52   | 10.06   | 10.16   | 0.48                                 | -0.29          | 0.02           |
| 2200      | 0.28            | 1.11  | 1.13   | 7.81               | 10.78   | 9.23    | 9.47    | 0.37                                 | -0.31          | 0.05           |
| 2400      | 0.30            | 1.15  | 1.16   | 8.00               | 10.06   | 8.58    | 9.53    | 0.26                                 | -0.30          | 0.19           |
| 2600      | 0.32            | 1.19  | 1.20   | 8.31               | 9.37    | 8.29    | 9.55    | 0.13                                 | -0.22          | 0.25           |
| 2800      | 0.35            | 1.25  | 1.26   | 8.83               | 8.91    | 8.31    | 9.91    | 0.01                                 | -0.12          | 0.32           |
| 3000      | 0.40            | 1.32  | 1.33   | 8.86               | 7.94    | 8.25    | 11.70   | -0.12                                | 0.06           | 0.69           |

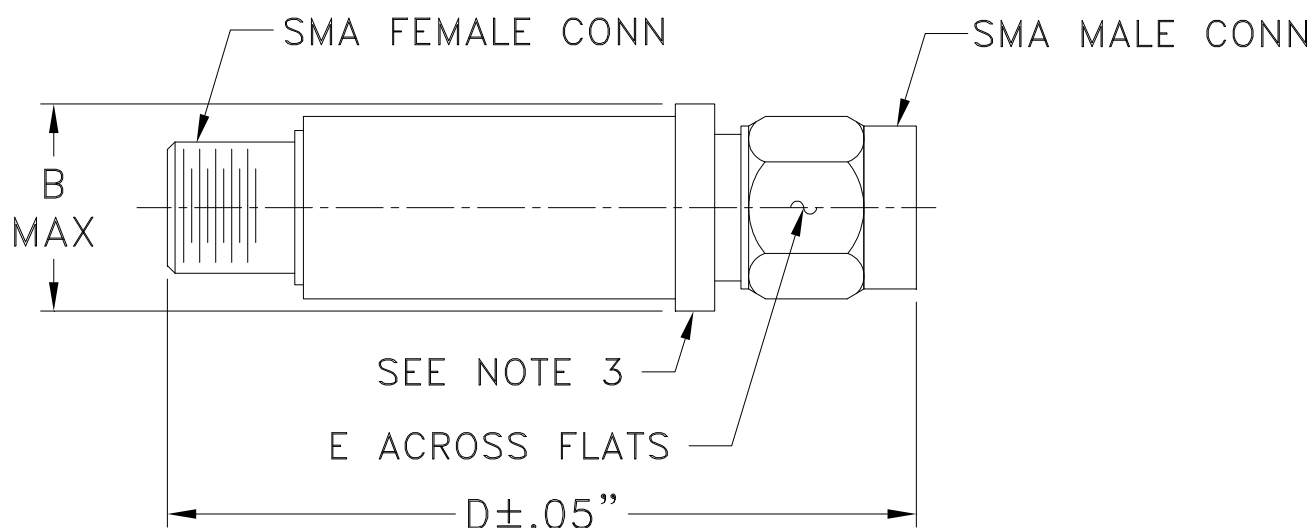
## Typical Performance Data

| POWER INPUT | POWER OUTPUT | POWER INPUT | POWER OUTPUT | POWER INPUT | POWER OUTPUT |
|-------------|--------------|-------------|--------------|-------------|--------------|
| @ 30 MHz    |              | @ 1600 MHz  |              | @ 3000 MHz  |              |
| (dBm)       |              | (dBm)       |              | (dBm)       |              |
| -10.0       | -10.06       | -10.0       | -10.23       | -10.0       | -10.4        |
| 0.0         | -0.07        | 0.0         | -0.25        | 0.0         | -0.43        |
| 10.0        | 9.94         | 10.0        | 9.76         | 10.0        | 9.59         |
| 15.0        | 10.58        | 15.0        | 8.78         | 15.0        | 9.82         |
| 20.0        | 11.21        | 20.0        | 11.43        | 20.0        | 7.94         |
| 25.0        | 11.69        | 25.0        | 11.97        | 25.0        | 8.25         |
| 30.0        | 12.33        | 30.0        | 11.48        | 30.0        | 11.70        |

## Typical Performance Curves



### Outline Dimensions



| CASE #. | A  | B               | C  | D               | E              | WT GRAMS |
|---------|----|-----------------|----|-----------------|----------------|----------|
| FF704   | -- | .410<br>(10.41) | -- | 1.43<br>(36.32) | .312<br>(7.92) | 10.0     |

Dimensions are in inches (mm). Tolerances: 2Pl. ± .04; 3Pl. ± .030

#### Notes:

1. Case material: Stainless steel.
2. Case finish: Gold plated.
3. Round Flange may have .312 Across Flats in some models.



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RF/IF MICROWAVE COMPONENTS



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      | -55° to 100°C<br>Ambient Environment                                                   | Individual Model Data Sheet          |
| Storage Temperature        | -55° to 100° C<br>Ambient Environment                                                  | Individual Model Data Sheet          |
| Barometric Pressure        | 100,000 Feet                                                                           | MIL-STD-202, Method 105, Condition D |
| Humidity                   | 90% RH, 65°C<br>Units may require bake-out after humidity to restore full performance. | MIL-STD-202, Method 103              |
| Thermal Shock              | -65° to 125°C, 5 cycles                                                                | MIL-STD-202, Method 107, Condition B |
| 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 |
| Mechanical Shock           | 100g, 6ms sawtooth, 3 shocks each direction 3 axes (total 18)                          | MIL-STD-202, Method 213, Condition I |