

# Limiter

## RLM-33+

50Ω Broadband 30 to 3000 MHz

### The Big Deal

- Wide Frequency range 30 to 3000 MHz
- Excellent limiting beyond +12 dBm input power
- Very quick recovery time, 10 nsec
- Low insertion loss, 0.23 dB



CASE STYLE: TT1224

### Product Overview

The RLM-33+ is packaged in a miniature size (0.25 X 0.3 in.) and protects against ESD and input power surges over a frequency range 30 to 3000 MHz. Construction is on a micro strip low loss dielectric material and cased into Mini-Circuits high volume, low cost “R” package for cost efficiencies.

The RLM-33+ limiter provides excellent protection of low noise amplifiers in hostile environments where unwanted signals prevail such as in manufacturing sites, train tunnels, etc.

### Key Features

Feature	Advantages
Limiting abilities from +12 to +30 dBm	Protects against strong undesired signals and prevents burn out of amplifiers
Frequency coverage 30 to 3000 MHz	Protects against many different types of unwanted signals including ESD
Surface mount package, miniature size	Allows convenient placement in amplifiers incorporating this protective device
Low insertion loss and VSWR	Provides minimal degradation to amplifier performance, especially for low noise amplifiers where input loss is critical
Low Cost	A practical solution to incorporate into amplifier design with a minimal affect on cost

#### 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/MCLStore/terms.jsp](http://www.minicircuits.com/MCLStore/terms.jsp)



+12 to +30 dBm

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### Maximum Ratings

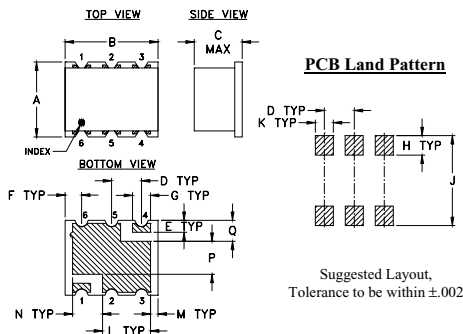
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Input Power	2W

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

### Pin Connections

INPUT	1
OUTPUT	4
GROUND	2,3,5,6

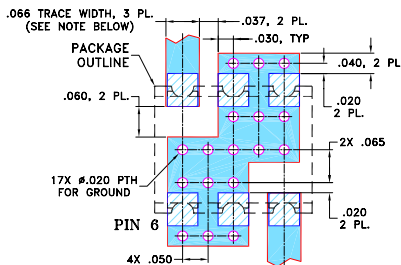
### Outline Drawing



### Outline Dimensions (inch/mm)

A	B	C	D	E	F	G	H
.25	.31	.16	.100	.040	.055	.060	.065
6.35	7.87	4.06	2.54	1.02	1.40	1.52	1.65
J	K	L	M	N	P	Q	wt.
.300	.060	.160	.025	.100	.110	.070	grams
7.62	1.52	4.06	0.64	2.54	2.79	1.78	0.16

### Demo Board MCL P/N: TB-393 Suggested PCB Layout (PL-258)



- NOTES:
- TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
  - 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

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### 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 output power, 11.5 dBm typ.

### Applications

- military, hi-rel applications
- stabilizing generator outputs
- reducing amplitude variations
- protects low noise amplifiers and other devices from ESD or input power damage



Generic photo used for illustration purposes only

CASE STYLE: TT1224

### +RoHS Compliant

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

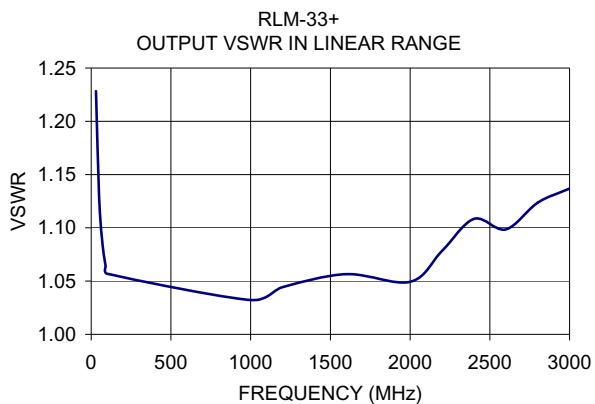
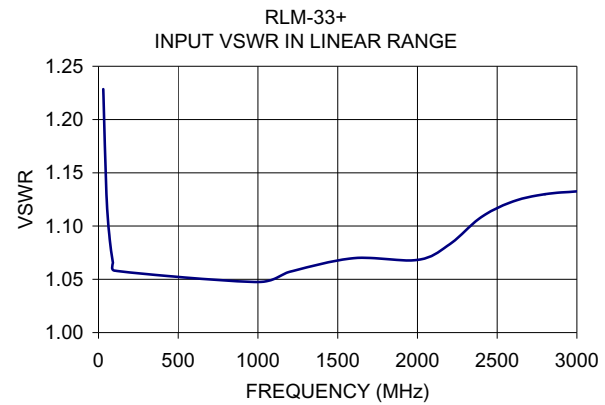
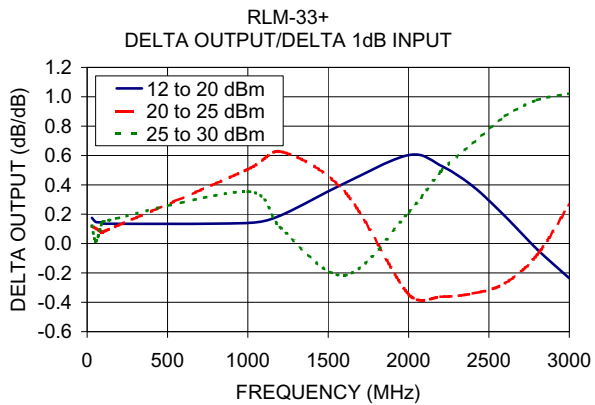
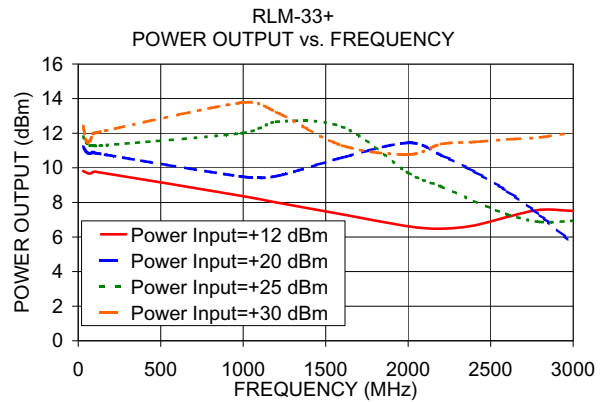
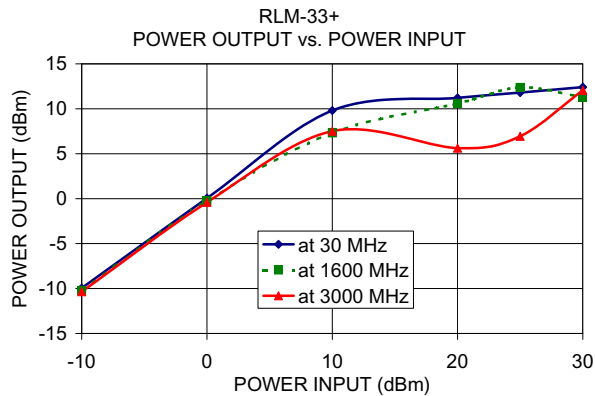
### Electrical Specifications

Parameter	Condition	Min.	Typ.	Max.	Units
Frequency Range		30		3000	MHz
<b>Linear Range</b>					
Max Input Power	less than 0.1 dB compression	—	—	5	dBm
Insertion Loss	less than +5 dBm input power	—	0.23	0.7	dB
VSWR	less than +5 dBm input power	—	1.05	1.5	:1
<b>Limiting Range</b>					
Input Power	>1dB compression filtered signal frequency	+12	—	+30	dBm
Output Power		—	+11.5	—	dBm
Δ Output/ Δ 1dB Input	Input Power Range (dBm)				
	12 to 20	—	0.2	—	
	20 to 25	—	0.2	—	dB/dB
	25 to 30	—	0.2	—	
Recovery Time	1 watt pulse 50 μsec pw 1kHz duty cycle recovery to within 90% of final value.	—	10	—	nsec
Response Time	-30 to +30 dBm input 50 μsec PW 1 kHz duty cycle	—	2	—	nsec

### Typical Performance Data

Freq. (MHz)	I. Loss (dB) in Linear Range at -10 dBm	VSWR (:1) in Linear Range at -10 dBm	Power Output (dBm)				Δ Output / Δ 1dB Input		
			+12 dBm Input	+20 dBm Input	+25 dBm Input	+30 dBm Input	+12 to +20 dBm Input	+20 to +25 dBm Input	+25 to +30 dBm Input
30.00	0.08	1.23	9.81	11.21	11.80	12.41	0.18	0.12	0.12
50.00	0.06	1.13	9.72	10.92	11.45	11.53	0.15	0.11	0.02
70.00	0.06	1.09	9.66	10.82	11.28	11.54	0.15	0.09	0.05
90.00	0.06	1.07	9.75	10.90	11.29	11.98	0.14	0.08	0.14
100.00	0.06	1.06	9.78	10.86	11.26	12.01	0.14	0.08	0.15
1000.00	0.22	1.05	8.36	9.48	12.01	13.78	0.14	0.51	0.35
1200.00	0.23	1.06	8.00	9.52	12.66	13.22	0.19	0.63	0.11
1600.00	0.29	1.07	7.31	10.59	12.37	11.29	0.41	0.36	-0.22
2000.00	0.32	1.07	6.62	11.44	9.71	10.77	0.60	-0.35	0.21
2200.00	0.34	1.08	6.48	10.73	8.92	11.37	0.53	-0.36	0.49
2400.00	0.39	1.11	6.66	9.78	8.08	11.49	0.39	-0.34	0.68
2600.00	0.40	1.12	7.16	8.65	7.30	11.64	0.19	-0.27	0.87
2800.00	0.41	1.13	7.57	7.25	6.87	11.76	-0.04	-0.08	0.98
3000.00	0.43	1.13	7.51	5.62	6.94	12.05	-0.24	0.26	1.02





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