



**High Performance Limiters and Limiting Amplifiers**  
Typical and Guaranteed Specifications—50 Ω System



Model	Frequency Range MHz	Small Signal Gain dB			Gain Flatness ±dB		Noise Figure dB		Power Output At 1dB Compression dBm			Output Limiting Level +20 dBm Input			SWR In/Out		D.C.	
		Typ.	Min. 0/50C	Min. -55/85C	Max. 0/50C	Max. -55/85C	Max. 0/50C	Max. -55/85C	Min. Typ	Min. 0/50C	Min. -55/85C	Typ	Max. 0/50C	Max. -55/85C	Max. 0/50C	Max. -55/85C	Volts Nom.	mA Typ.
<b>Limiting Amplifiers • Available in TO-8, SMA, and Surface Mount Packages</b>																		
LA507	50-500	13.0	12.5	11.5	0.5	0.7	6.5	7.0	12.0	11.0	9.0	16.2	17.2	18.0	1.7	1.9	15	51
LA1017	10-1000	12.5	11.5	11.0	0.5	0.7	6.7	7.2	13.5	12.5	12.0	15.5	16.5	17.0	1.7	1.8	15	45

Model	Frequency Range MHz	Insertion Loss dB			Maximum Limiting Output Level +20 dBm Input						SWR In/Out		Bias Voltage
		Typ.	Min. 0/50C	Min. -55/85C	20V Typ.	20V Max.	15V Typ.	15V Max.	10V Typ	10V Max.	Max. 0/50C	Max. -55/85C	
<b>Limiters • Available in TO-8, SMA, and Surface Mount Packages</b>													
LC1501	50-1500	2.7	3.5	4.0	+2.0	+3.0	+1.0	+2.0	-1.0	0.0	2.0	2.0	5 to 20
LC1502	5-1500	2.7	3.5	4.0	+2.0	+3.0	+1.0	+2.0	-1.0	0.0	2.0	2.0	5 to 20
LC2034	500-2400	2.5	3.5	4.0	+2.2	+3.2	+1.0	+2.0	-1.0	—	2.0/2.2	2.0/2.2	5 to 20
LC3005	5-3000	0.6	1.0	1.5	—	—	—	—	+15.0 <sup>A</sup>	+16.0 <sup>A</sup>	1.5	1.7	—
LS6001	1000-6000	2.5	3.2	3.75	+4.8	+5.2	+2.5	+3.0	—	—	2.0	2.1	15 to 20

Model	Frequency Range (MHz)	Input Power Limited Range (dBm) Min.	Saturated Output Power (dBm) Min.	Output Power Flatness (dBm) Max.	Noise Figure (dBm) Max.	Operating Bias (VDC)	Case Type
<b>IF/RF Limiting Amplifiers • Guaranteed Specifications at 0° to 50°C Case Temperature</b>							
UTL or PSL-502	5-500	-3 to +7	-4.0	±0.5	11	+15, -15	TO-8F or SM-45
UTL or PSL-503	5-500	-5 to +7	-4.0	±1.0	10	+15	TO-8U or SM-45
UDL-503	5-500	-30 to +10	-2.0	±1.0	10	+15	DIP

Model	Frequency Range (MHz)	Input Power Limited Range (dBm) Min.	Saturated Output Power (dBm) Max.	Insertion Loss (dBm) Max.	Operating Bias (VDC) Nominal	Case Type
<b>Voltage Controlled Limiters • Guaranteed Specifications at 25°C Case Temperature</b>						
UTL or PSL-1001	50-1000	0 to +20	-5 to +21	3.71	+5 to +20	TO-8U or SM-45
UTL or PSL-1002	5-1000	0 to +20	-5 to +21	3.71	+5 to +20	TO-8U or SM-45

Current data sheets available on website. <sup>A</sup> LC3005 performance at 0 Volts, +28 dBm input level.

# LA507

## 50 TO 500 MHz TO-8 LIMITING AMPLIFIER

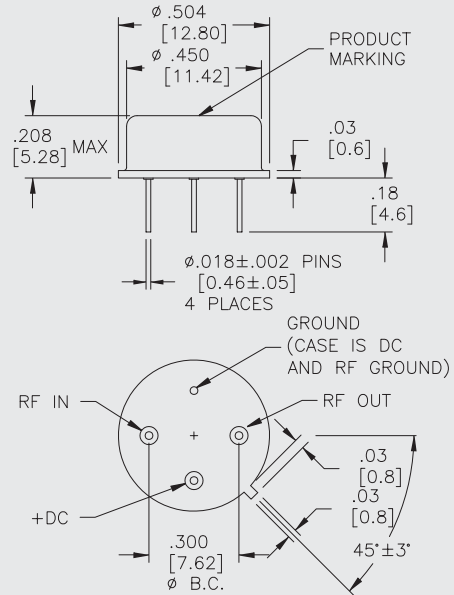
**Typical Values**

<b>High Output Level</b> .....	<b>+12.0 dBm</b>
<b>High Third Order I.P.</b> .....	<b>+29 dBm</b>
<b>Fast Pulse Recovery Time</b> .....	<b>&lt; 50 ns</b>
<b>Low SWR</b> .....	<b>1.3:1</b>
<b>Symmetrical Clipping; High Even-Order Suppression</b>	
<b>High Performance Thin Film</b>	

**LA507**

### LA507

**TO-8 Package for Limiting Amplifiers**



## SPECIFICATIONS\*

Parameter	Typical	Guaranteed	
		0 to 50 °C	-55 to +85 °C
Frequency (Min.)	10-300 MHz	10-200 MHz	10-200 MHz
Small Signal Gain (Min.)	13.0 dB	12.5 dB	11.5 dB
Gain Flatness (Max.)	< ±0.2 dB	±0.5 dB	±0.7 dB
Noise Figure (Max.)	5.5 dB	6.5 dB	7.0 dB
SWR (Max.) Input/Output	< 1.3:1	1.7:1	1.9:1
Output Limiting Level (Max.) P <sub>in</sub> = +20 dBm	+16.2 dBm	+17.2 dBm	+18.0 dBm
Power Output (Min.) @ 1dB comp.	+12.0 dBm	+11.0 dBm	+9.0 dBm
DC Current (Max.)	51 mA	54 mA	56 mA

\* Measured in a 50-ohm system at +15 Vdc unless otherwise specified.

## INTERMODULATION PERFORMANCE

(Typical @ 25 °C) Linear Region Only

<b>Second Order Harmonic Intercept Point</b> .....	<b>+48 dBm</b>
<b>Second Order Two Tone Intercept Point</b> .....	<b>+42 dBm</b>
<b>Third Order Two Tone Intercept Point</b> .....	<b>+29 dBm</b>

**LA507**

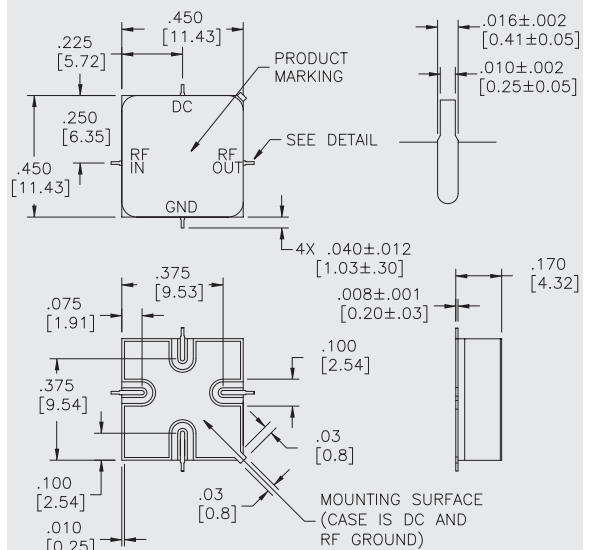
## ABSOLUTE MAXIMUM RATINGS

<b>Storage Temperature</b> .....	<b>-62 to +125 °C</b>
<b>Maximum Case Temperature</b> .....	<b>+125 °C</b>
<b>Maximum DC Voltage</b> .....	<b>+17 Volts</b>
<b>Maximum Continuous RF Input Power</b> .....	<b>+23 dBm</b>
<b>Maximum Short Term Input Power (1 Minute Max.)</b> .....	<b>400 Milliwatts</b>
<b>Maximum Peak Power (3 μsec Max.)</b> .....	<b>1 Watt</b>
<b>Burn-in Temperature</b> .....	<b>+100 °C</b>
<b>Thermal Resistance<sup>1</sup> (θ<sub>jc</sub>)</b> .....	<b>+47 °C/Watt</b>
<b>Junction Temperature Rise Above Case (T<sub>jc</sub>)</b> .....	<b>+38.3 °C</b>

<sup>1</sup> Thermal resistance is based on total power dissipation.

### LAS507

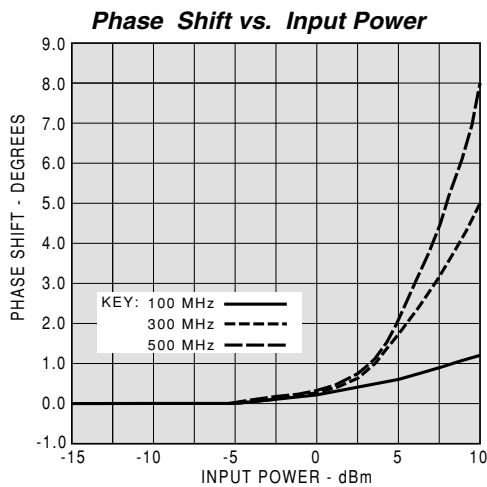
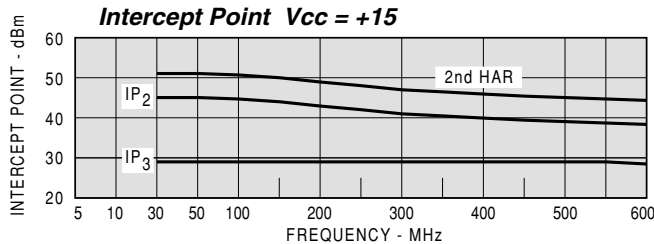
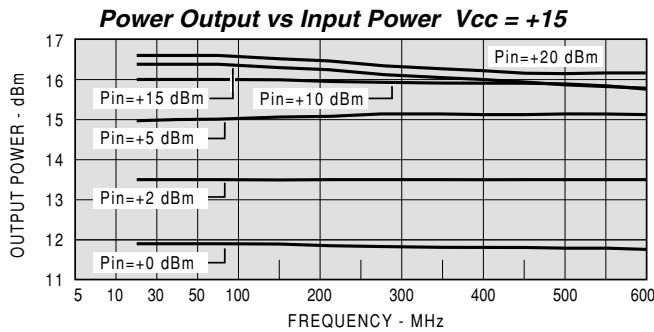
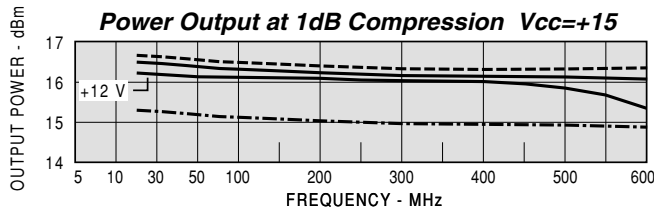
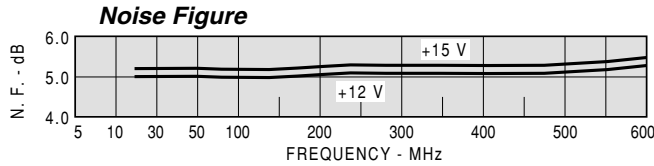
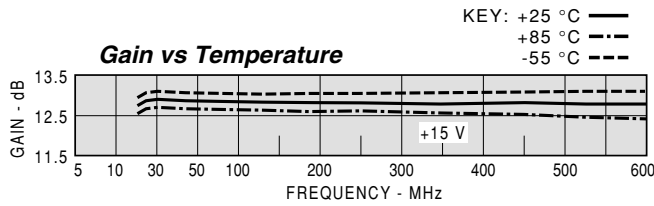
**SMT0-8 Package for Limiting Amplifiers**



DIMENSIONS ARE IN INCHES [MILLIMETERS]

**TYPICAL PERFORMANCE**

**TYPICAL AUTOMATIC TEST DATA**



MODEL: LA507 Vcc = +15V Icc = 52.81 mA

FREQ MHZ	VSWR IN	VSWR OUT	GAIN DB	GROUP DELAY NSEC	REV/ISO DB
20	2.11	1.45	12.3		-21.2
50	1.47	1.19	12.7		-20.4
100	1.36	1.15	12.7	0.882	-20.3
200	1.38	1.18	12.6	0.656	-20.3
300	1.43	1.21	12.6	0.602	-20.3
400	1.48	1.22	12.6	0.607	-20.2
500	1.47	1.22	12.7	0.603	-20.1
600	1.44	1.22	12.8	0.626	-19.9

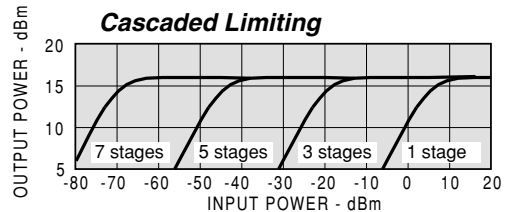
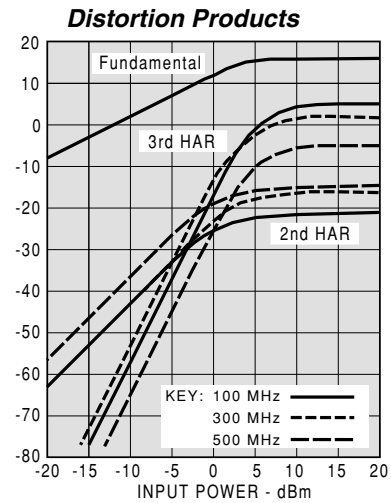
MODEL: LA507 Vcc = +15V Icc = 52.81 mA

LINEAR S-PARAMETERS

FREQ.	S11		S21		S12		S22	
MHZ	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
20	0.36	-57.3	4.13	-158.2	0.088	17	0.18	112.5
50	0.19	-60.7	4.31	-179.6	0.096	3	0.09	77.3
100	0.15	-64.1	4.31	165.1	0.096	-4	0.07	58.7
200	0.16	-83.8	4.29	142.8	0.096	-13	0.08	40.5
300	0.18	-103.8	4.26	122.6	0.097	-21	0.09	21.5
400	0.19	-121.0	4.28	102.4	0.097	-30	0.10	-3.1
500	0.19	-134.2	4.29	81.7	0.099	-38	0.10	-34.5
600	0.18	-145.8	4.35	60.6	0.101	-46	0.10	-78.6

MODEL: LA507/LA507/LA507 Vcc = +15V Icc = 157.28 mA

FREQ MHZ	VSWR IN	VSWR OUT	GAIN DB	GROUP DELAY NSEC	REV/ISO DB
20	1.70	1.64	38.7		-64.3
50	1.35	1.23	38.9		-62.4
100	1.27	1.16	38.8	2.918	-62.3
200	1.29	1.16	38.8	2.192	-59.8
300	1.45	1.23	38.5	2.045	-64.0
400	1.72	1.35	38.2	1.994	-60.9
500	1.91	1.44	38.1	1.939	-59.6
600	1.87	1.49	38.4	1.974	-60.5



# LA1017 10 TO 1000 MHz TO-8 LIMITING AMPLIFIER

**Typical Values**

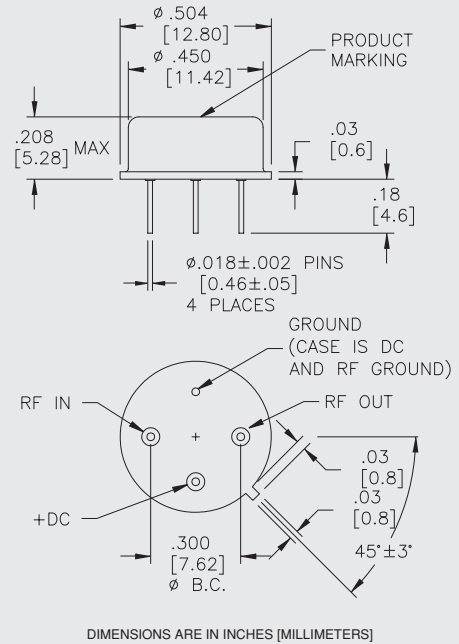
<b>High Output Level</b> .....	<b>+13.5 dBm</b>
<b>High Third Order I.P.</b> .....	<b>+28 dBm</b>
<b>Fast Pulse Recovery Time</b> .....	<b>&lt; 50 nsec</b>
<b>Symmetrical Clipping; High Even-Order Suppression</b>	
<b>High Performance Thin Film</b>	
<b>Standard Size TO-8 Package</b>	

**LA1017**

**+13.5 dBm**  
**+28 dBm**  
**< 50 nsec**

## LA1017

**TO-8 Package for Limiting Amplifiers**



## SPECIFICATIONS\*

Parameter	Typical	Guaranteed	
		0 to 50 °C	-55 to +85 °C
Frequency (Min.)	10-1000 MHz	10-1000 MHz	10-1000 MHz
Small Signal Gain (Min.)	12.5 dB	11.5 dB	11.0 dB
Gain Flatness (Max.)	< ±0.3 dB	±0.5 dB	±0.7 dB
Noise Figure (Max.)	5.5 dB	6.7 dB	7.2 dB
SWR (Max.) Input/Output	1.5:1	1.7:1	1.8:1
Output Limiting Level (Max.) P <sub>in</sub> = +20 dBm	+15.5 <sup>^</sup> dBm	+16.5 <sup>^</sup> dBm	+17.0 <sup>^</sup> dBm
Power Output (Min.) @ 1dB comp.	+13.5 dBm	+12.5 dBm	+12.0 dBm
DC Current (Max.)	45 mA	48 mA	52 mA

\* Measured in a 50-ohm system at +15 Vdc unless otherwise specified.  
^ 2.0 dBm higher above 800 MHz.

## INTERMODULATION PERFORMANCE

Typical @ 25 °C Linear Region Only

<b>Second Order Harmonic Intercept Point</b> .....	<b>+48 dBm</b>
<b>Second Order Two Tone Intercept Point</b> .....	<b>+42 dBm</b>
<b>Third Order Two Tone Intercept Point</b> .....	<b>+28 dBm</b>

**LA1017**

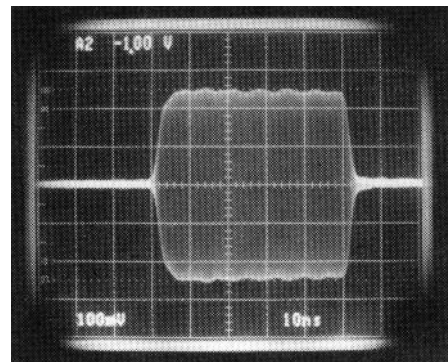
## ABSOLUTE MAXIMUM RATINGS

<b>Storage Temperature</b> .....	<b>-62 to +125 °C</b>
<b>Maximum Case Temperature</b> .....	<b>+125 °C</b>
<b>Maximum DC Voltage</b> .....	<b>+17 Volts</b>
<b>Maximum Continuous RF Input Power</b> .....	<b>+23 dBm</b>
<b>Maximum Short Term Input Power (1 Minute Max.)</b> .....	<b>400 Milliwatts</b>
<b>Maximum Peak Power (3 μsec Max.)</b> .....	<b>1 Watt</b>
<b>Burn-in Temperature</b> .....	<b>+100 °C</b>
<b>Thermal Resistance<sup>1</sup> (θ<sub>jc</sub>)</b> .....	<b>+46 °C/Watt</b>
<b>Junction Temperature Rise Above Case (T<sub>jc</sub>)</b> .....	<b>+32.3 °C</b>

<sup>1</sup> Thermal resistance is based on total power dissipation.

## RESPONSE TIME

Typical Response Time at 25 °C



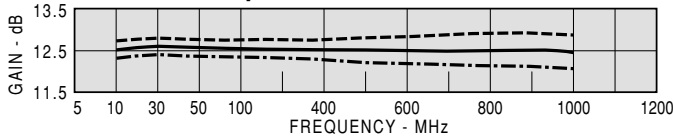
Frequency = 140 MHz

**TYPICAL PERFORMANCE**

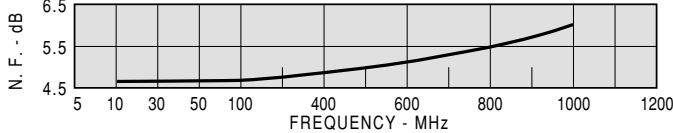
**Typical Performance**

KEY: +25 °C —  
+85 °C - -  
-55 °C - - -

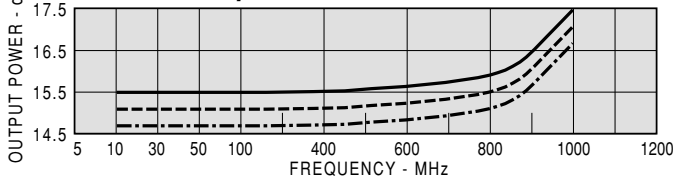
**Gain vs Temperature**



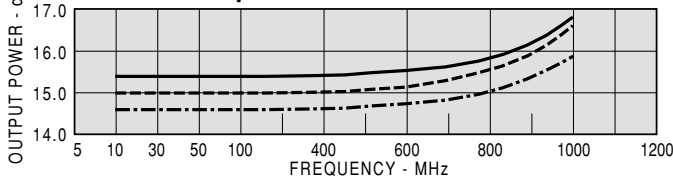
**Noise Figure Vcc = 15 & 12**



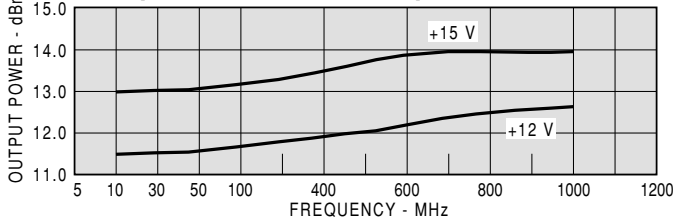
**Limited Output Vcc = 15 Power In = +20 dBm**



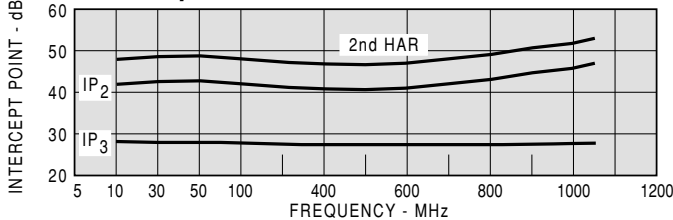
**Limited Output Vcc = 12 Power In = +20 dBm**



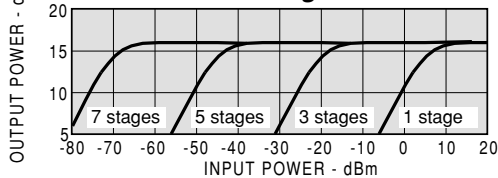
**Output Power @ 1 dB Compression**



**Intercept Point Vcc = 15**



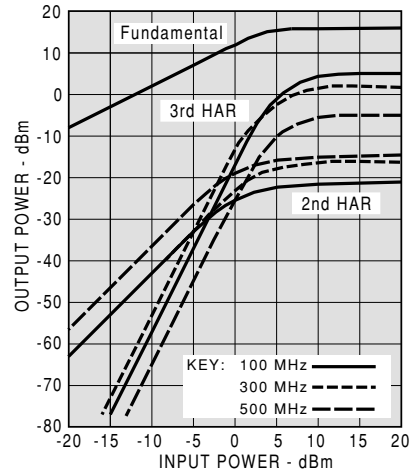
**Cascaded Limiting**



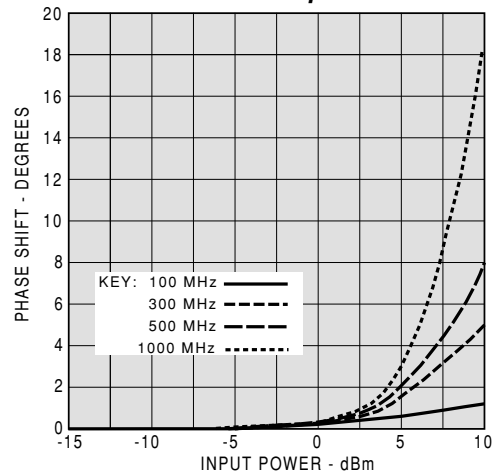
**TYPICAL AUTOMATIC TEST DATA**

MODEL: LA1017			Vcc = +15V		Icc = 44.73 mA	
FREQ MHZ	VSWR IN	VSWR OUT	GAIN DB	GROUP DELAY NSEC	REV/ISO DB	
10	1.48	1.48	12.5		-19.8	
20	1.22	1.31	12.5		-19.5	
50	1.10	1.24	12.6	0.971	-19.4	
100	1.10	1.23	12.6	0.625	-19.4	
200	1.14	1.24	12.5	0.532	-19.5	
300	1.20	1.27	12.5	0.538	-19.5	
400	1.25	1.29	12.5	0.526	-19.6	
500	1.27	1.29	12.5	0.526	-19.6	
600	1.28	1.27	12.5	0.545	-19.5	
700	1.31	1.23	12.6	0.547	-19.5	
800	1.34	1.20	12.6	0.578	-19.4	
900	1.39	1.22	12.7	0.599	-19.5	
1000	1.47	1.33	12.5	0.626	-19.5	
1100	1.61	1.52	12.2	0.654	-19.5	

**Distortion Products**



**Phase Shift vs. Input Power**



# LC1502

## 5.0 TO 1500 MHz TO-8 LIMITER

<b>Typical Values</b>	<b>LC1502</b>
Voltage Variable Limiting Level .....	-13 to 0 dB
Low Insertion Loss .....	<2.0 dB
<b>Balanced Circuit:</b>	
High Even Order Suppression .....	>50 dB at +10 dBm Input
Fast Recovery Time .....	< 50 ns
High Performance Thin Film	
Standard Size TO-8 Package	

### SPECIFICATIONS\*

Parameter	Typical	Guaranteed	
		0 to 50 °C	-55 to +85 °C
<b>Frequency (Min.)</b>	<b>5-1600 MHz</b>	<b>5-1500 MHz</b>	<b>5-1500 MHz</b>
<b>Frequency Variation</b>	<0.1 dB/100 MHz	0.2 dB/100 MHz	0.3 dB/100 MHz
<b>Insertion Loss</b>	To 1000 MHz 1.9 dB To 1500 MHz 2.7 dB	2.5 dB 3.5 dB	3.0 dB 4.0 dB
<b>Input SWR (Max.)</b> (P <sub>IN</sub> <+20 dBm)	To 1000 MHz 1.4:1 To 1500 MHz 1.6:1	1.8:1 2.0:1	2.0:1 2.0:1
<b>Output SWR (Max.)</b> (P <sub>IN</sub> <-10 dBm)	To 1000 MHz 1.4:1 To 1500 MHz 1.6:1	1.8:1 2.0:1	2.0:1 2.0:1
<b>Flatness vs. Freq. (Max)</b> (P <sub>IN</sub> <+20 dBm)	To 500 MHz <±0.1 dB To 1000 MHz <±0.2 dB To 1500 MHz <±0.5 dB	<±0.3 dB <±0.5 dB <±1.1 dB	<±0.6 dB <±1.0 dB <±1.5 dB
<b>Bias Current (Max.)</b>	+20 Vdc 9.5 mA +15 Vdc 7.0 mA +10 Vdc 4.7 mA +5 Vdc 2.2 mA	11.5 mA 9.0 mA 6.0 mA 3.5 mA	12.5 mA 10.0 mA 8.0 mA 5.0 mA

LIMITING AND INSERTION LOSS CHARACTERISTICS (25 °C)								
Bias Voltage	Output level at Limiting Threshold (1 dB Compression)		Maximum Output Limiting Level (+20 dBm Input)		Insertion Loss (500 MHz)		Insertion Loss (1000 MHz)	
	Typ.	Max.	Typ.	Max.	Typ.	Max.	Typ.	Max.
+20 volts	-2.0 dBm	0.0 dBm	+2.0 dBm	+3.0 dBm	1.7 dB	2.0 dB	1.8 dB	2.2 dB
+15 volts	-2.5 dBm	-1.0 dBm	+1.0 dBm	+2.0 dBm	1.9 dB	2.2 dB	2.0 dB	2.4 dB
+10 volts	-4.0 dBm	-3.0 dBm	-1.0 dBm	0.0 dBm	2.3 dB	2.8 dB	2.5 dB	3.0 dB
+ 5 volts	-9.0 dBm	—	-7.0 dBm	—	3.1 dB	—	3.3 dB	—

\* Measured in a 50-ohm system at +15 Vdc bias unless otherwise specified.

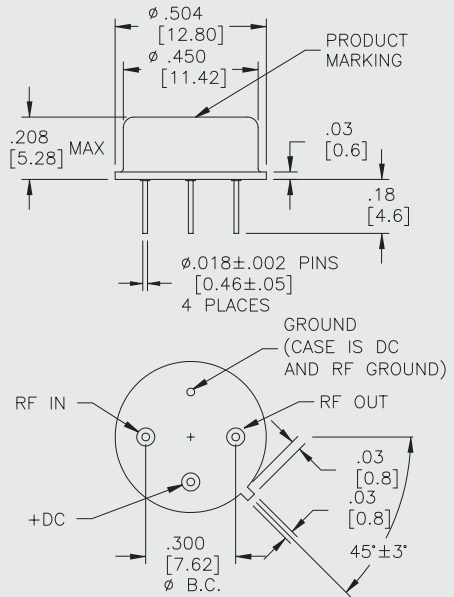
### ABSOLUTE MAXIMUM RATINGS

Ambient Operation Temperature .....	-55°C to 110°C
Storage Temperature .....	-62° to 150 °C
Maximum Case Temperature .....	125 °C
Maximum DC Voltage .....	+25 Volts
Maximum Continuous RF Input Power .....	200 Milliwatts
Maximum Peak Power (3 μsec Max.) .....	1 Watt
Burn-in Temperature .....	125°C
Thermal Resistance <sup>1</sup> (θ <sub>jc</sub> ) .....	2.1 °C/Watt
Junction Temperature Rise Above Case (T <sub>jc</sub> ) .....	0.2 °C

<sup>1</sup> Thermal resistance is based on total power dissipation.

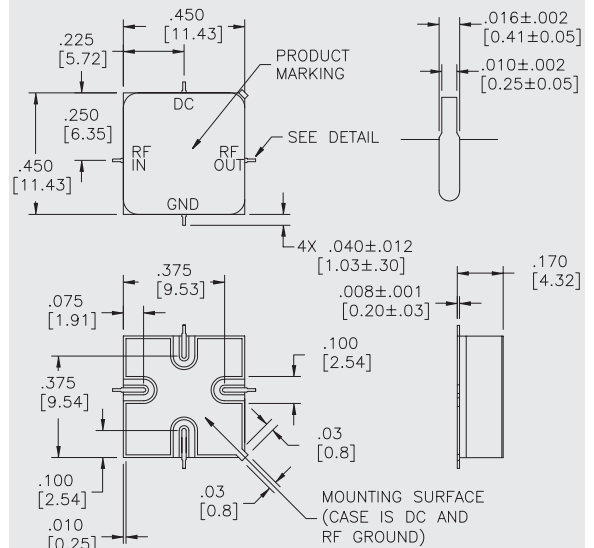
### LC1502

#### TO-8 Package for Limiters



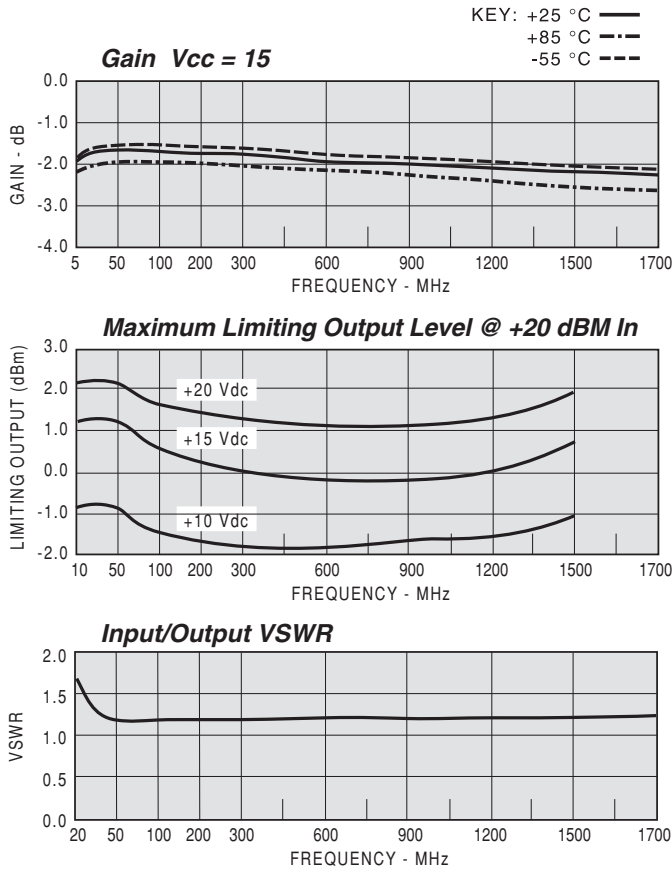
### LS1502

#### SMT0-8 Package for Limiters



DIMENSIONS ARE IN INCHES [MILLIMETERS]

**TYPICAL PERFORMANCE**



**TYPICAL AUTOMATIC TEST DATA**

Model: LC1502		Vcc=+15V					Icc=8.02	
FREQ	SWR	SWR	GAIN	PHASE	DELAY	REV/ISO		
MHZ	IN	OUT	DB	DEG	NSEC	DB		
5	1.68	1.68	-1.93	15		-1.90		
50	1.17	1.17	-1.64	-2		-1.60		
100	1.16	1.16	-1.66	-7	0.25	-1.70		
200	1.17	1.17	-1.70	-14	0.21	-1.70		
300	1.17	1.17	-1.74	-22	0.20	-1.70		
400	1.17	1.18	-1.80	-29	0.20	-1.80		
500	1.16	1.18	-1.87	-36	0.20	-1.90		
600	1.16	1.18	-1.93	-43	0.19	-1.90		
700	1.16	1.18	-1.94	-49	0.19	-1.90		
800	1.15	1.18	-1.95	-56	0.19	-1.90		
900	1.15	1.18	-1.96	-63	0.19	-2.00		
1000	1.14	1.18	-1.97	-71	0.20	-2.00		
1100	1.13	1.18	-1.99	-78	0.20	-2.00		
1200	1.13	1.18	-2.02	-85	0.20	-2.00		
1300	1.13	1.18	-2.05	-92	0.20	-2.00		
1400	1.13	1.19	-2.10	-99	0.19	-2.10		
1500	1.14	1.2	-2.13	-107	0.20	-2.10		
1600	1.15	1.2	-2.18	-114	0.20	-2.20		
1700	1.16	1.21	-2.19	-121	0.21	-2.20		

Model: LC1502		LINEAR S-PARAMETERS								Icc=8.02	
FREQ.		S11		S21		S12		S22			
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	
5	0.25	-59.1	0.80	15.3	0.800	15.2	0.25	-59.3	0.25	-59.3	
50	0.08	-18.3	0.83	-2.2	0.828	-2.2	0.08	-18.5	0.08	-18.5	
100	0.08	-12.7	0.83	-6.7	0.826	-6.7	0.08	-12.5	0.08	-12.5	
200	0.08	-13.7	0.82	-14.3	0.822	-14.3	0.08	-13.7	0.08	-13.7	
300	0.08	-18.7	0.82	-21.6	0.818	-21.6	0.08	-19.2	0.08	-19.2	
400	0.08	-24.5	0.81	-28.8	0.812	-28.8	0.08	-26.1	0.08	-26.1	
500	0.08	-33.3	0.81	-35.8	0.806	-35.8	0.08	-35.3	0.08	-35.3	
600	0.08	-42.2	0.80	-42.6	0.800	-42.6	0.08	-47.2	0.08	-47.2	
700	0.07	-51.2	0.80	-49.4	0.799	-49.4	0.08	-59.4	0.08	-59.4	
800	0.07	-64.1	0.80	-56.3	0.800	-56.3	0.08	-68.5	0.08	-68.5	
900	0.07	-76.7	0.80	-63.3	0.799	-63.3	0.08	-79.7	0.08	-79.7	
1000	0.06	-88.6	0.80	-70.5	0.797	-70.5	0.08	-89.7	0.08	-89.7	
1100	0.06	-104.2	0.79	-77.7	0.794	-77.7	0.08	-100.8	0.08	-100.8	
1200	0.06	-119.4	0.79	-84.8	0.793	-84.9	0.08	-111.4	0.08	-111.4	
1300	0.06	-132.0	0.79	-92.2	0.790	-92.2	0.08	-122.7	0.08	-122.7	
1400	0.06	-148.7	0.78	-99.2	0.786	-99.3	0.09	-133.3	0.09	-133.3	
1500	0.07	-163.0	0.78	-106.6	0.782	-106.7	0.09	-144.0	0.09	-144.0	
1600	0.07	-176.2	0.78	-113.8	0.778	-113.8	0.09	-154.7	0.09	-154.7	
1700	0.07	170.6	0.78	-121.2	0.776	-121.2	0.09	-164.2	0.09	-164.2	

Model: LC1502		Vcc=+12V					Icc=6.37	
FREQ	SWR	SWR	GAIN	PHASE	DELAY	REV/ISO		
MHZ	IN	OUT	DB	DEG	NSEC	DB		
5	1.68	1.68	-2.07	15		-1.80		
50	1.20	1.2	-1.79	-2		-1.80		
100	1.20	1.2	-1.81	-7	0.25	-1.80		
200	1.20	1.2	-1.85	-14	0.21	-1.80		
300	1.20	1.21	-1.89	-22	0.20	-1.90		
400	1.20	1.21	-1.95	-29	0.20	-2.00		
500	1.20	1.21	-2.01	-36	0.20	-2.00		
600	1.20	1.22	-2.07	-43	0.19	-2.10		
700	1.19	1.22	-2.09	-49	0.19	-2.10		
800	1.18	1.21	-2.09	-56	0.19	-2.10		
900	1.18	1.21	-2.11	-63	0.20	-2.10		
1000	1.17	1.21	-2.11	-71	0.20	-2.10		
1100	1.16	1.21	-2.14	-78	0.20	-2.10		
1200	1.16	1.21	-2.17	-85	0.20	-2.20		
1300	1.15	1.21	-2.20	-92	0.21	-2.20		
1400	1.15	1.22	-2.26	-99	0.20	-2.20		
1500	1.16	1.22	-2.28	-107	0.21	-2.30		
1600	1.16	1.23	-2.34	-114	0.20	-2.30		
1700	1.17	1.23	-2.35	-121	0.20	-2.40		

Model: LC1502		LINEAR S-PARAMETERS								Icc=6.37	
FREQ		S11		S21		S12		S22			
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	
5	0.26	-56.1	0.79	15.0	0.788	15	0.25	-56.1	0.25	-56.1	
50	0.09	-15.8	0.81	-2.2	0.813	-2.2	0.09	-15.9	0.09	-15.9	
100	0.09	-11.6	0.81	-6.6	0.811	-6.7	0.09	-11.6	0.09	-11.6	
200	0.09	-13.4	0.81	-14.3	0.808	-14.3	0.09	-14.0	0.09	-14.0	
300	0.09	-18.9	0.80	-21.6	0.804	-21.6	0.09	-19.5	0.09	-19.5	
400	0.09	-25.2	0.80	-28.8	0.799	-28.8	0.10	-26.7	0.10	-26.7	
500	0.09	-33.6	0.79	-35.8	0.793	-35.8	0.10	-35.3	0.10	-35.3	
600	0.09	-41.8	0.79	-42.7	0.787	-42.6	0.10	-46.0	0.10	-46.0	
700	0.09	-50.9	0.79	-49.4	0.786	-49.4	0.10	-57.6	0.10	-57.6	
800	0.08	-63.1	0.79	-56.3	0.786	-56.4	0.10	-66.8	0.10	-66.8	
900	0.08	-74.5	0.78	-63.4	0.785	-63.4	0.09	-77.3	0.09	-77.3	
1000	0.08	-85.3	0.78	-70.6	0.784	-70.6	0.09	-86.5	0.09	-86.5	
1100	0.07	-99.4	0.78	-77.7	0.781	-77.7	0.09	-96.9	0.09	-96.9	
1200	0.07	-113.3	0.78	-84.9	0.780	-84.9	0.10	-107.4	0.10	-107.4	
1300	0.07	-125.0	0.78	-92.3	0.776	-92.3	0.10	-118.3	0.10	-118.3	
1400	0.07	-140.6	0.77	-99.3	0.773	-99.4	0.10	-128.5	0.10	-128.5	
1500	0.07	-154.4	0.77	-106.7	0.769	-106.7	0.10	-138.8	0.10	-138.8	
1600	0.08	-167.8	0.76	-113.9	0.765	-113.9	0.10	-149.2	0.10	-149.2	
1700	0.08	178.3	0.76	-121.2	0.763	-121.3	0.10	-158.6	0.10	-158.6	