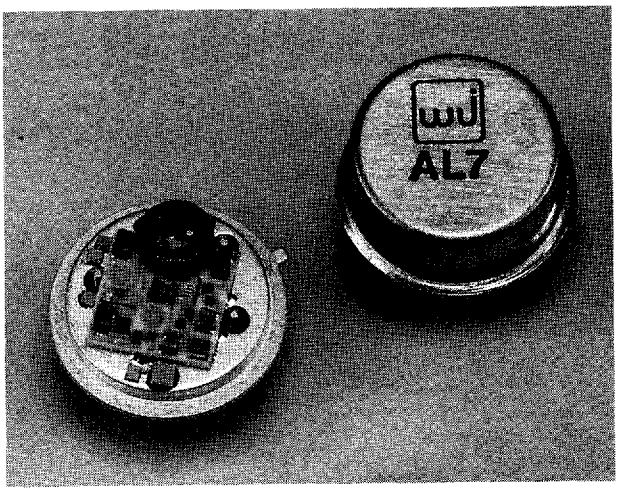
WJ-AL7 / SMAL7



50 to 500 MHz
TO-8 CASCADABLE
LIMITING AMPLIFIER

- ◆ AVAILABLE IN SURFACE MOUNT
- ◆ SYMMETRICAL CLIPPING: GOOD EVEN-ORDER SUPPRESSION
- ◆ HIGH GAIN: 13 dB (TYP.)
- ◆ LOW VSWR: < 1.5:1 (TYP.)
- ◆ FAST PULSE RECOVERY TIME: < 50 NSEC

Specifications*

Characteristics	Typical	Guaranteed 0° to 50°C	Guaranteed -54° to +85°C
Frequency (Min.)	20-550 MHz	50-500 MHz	50-500 MHz
Small Signal Gain (Min.)	13.0 dB	12.0 dB	11.0 dB
Gain Flatness (Max.)	±0.2 dB	±0.5 dB	±0.7 dB
Noise Figure (Max.)[3]			
50-300 MHz	5.0 dB	6.0 dB	6.5 dB
300-500 MHz	5.5 dB	6.5 dB	7.0 dB
Power Output at 1 dB Compression (Min.)			
50-500 MHz	-1.5 dBm	-5.0 dBm	-7.0 dBm
Output Limiting Level (Max.)			
Pin = +10 dBm	+0.5 dBm	+1.5 dBm	+2.5 dBm
VSWR			
Input	1.1:1	1.7:1	1.7:1
Output	< 1.5:1	2.0:1	2.0:1
DC Current at 15 Volts (Max.)	54 mA	57 mA	59 mA

* Measured in a 50-ohm system at +15 Vdc Nominal.

Notes:
1. WJ-CAL7 is a standard WJ-AL7 installed in a miniature SMA connector housing and guaranteed over 0°C to 50°C temperature range.
2. Third-Order I.P. (linear region) +20 dBm (Typ.)
3. Linear Region

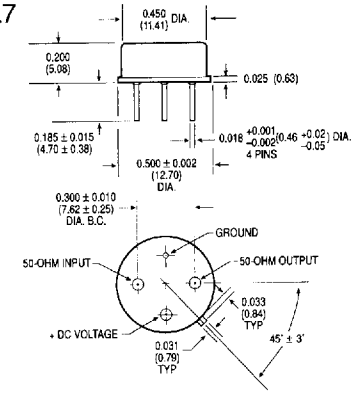
Absolute Maximum Ratings

Storage Temperature	-62°C to +125°C
Maximum Case Temperature	125°C
Maximum DC Voltage	+17 Volts
Maximum Continuous RF Input Power	+13 dBm
Maximum Short Term RF Input Power (1 Minute Max.)	50 Milliwatts
Maximum Peak Power	0.5 Watt (3 µsec Max.)
"S" Series Burn-In Temperature (Case)	125°C

Weight approximately 2.0 grams (0.07 oz.)

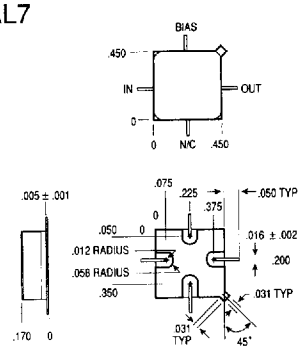
Outline Drawings

AL7



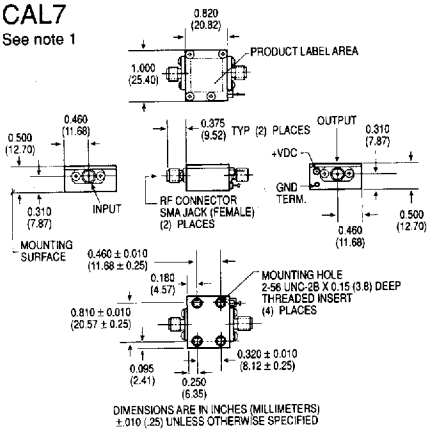
DIMENSIONS ARE IN INCHES (MILLIMETERS)
±.005 (.13) UNLESS OTHERWISE SPECIFIED

SMAL7



DIMENSIONS ARE IN INCHES (MILLIMETERS)
±.010 (.25) UNLESS OTHERWISE SPECIFIED

CAL7
See note 1



DIMENSIONS ARE IN INCHES (MILLIMETERS)
±.010 (.25) UNLESS OTHERWISE SPECIFIED

Typical Performance at 25°C

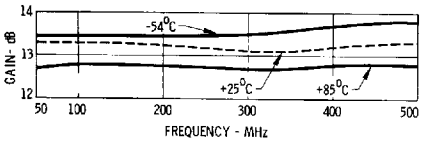
The model WJ-AL7 incorporates a balanced-bridge Schottky diode output limiter using thin-film assembly techniques integrated with a medium-level input 20-500 MHz, 14 dB gain amplifier. The balanced-bridge yields symmetrical clipping of the signal which reduces even-order harmonic distortion. Its functional schematic is shown in Figure 1. Diodes D1 through D4 are used to provide the primary limiting, while diodes D5 through D8 provide hard limiting.

The WJ-AL7 is vertually identical to the WJ-LA7 except that the amplifer is placed in front of the limiter as opposed to the limiter in front of the amplifier. The pulse-recovery time is therefore the same. (Under 50 nsec for a single unit).

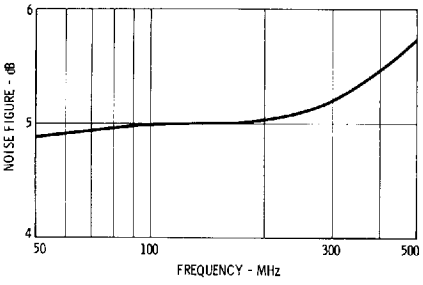
Reversing the positions results in an improved input noise figure and a reduced output power level.

The units are designed for cascaded operation with each additional stage offering approximatley 12 dB of increased limiting range.

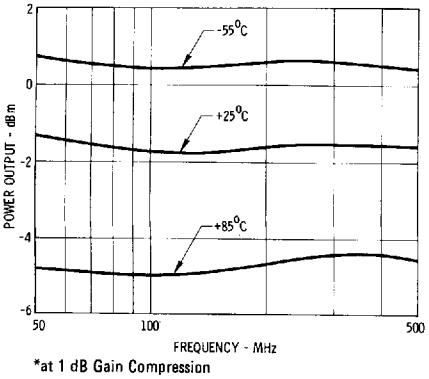
Gain (Linear)



Noise Figure

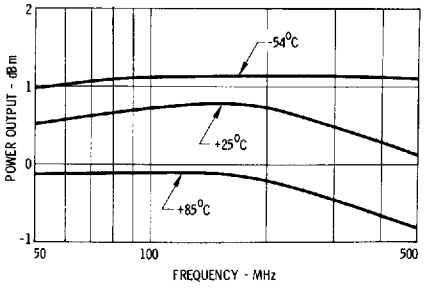


Power Output*

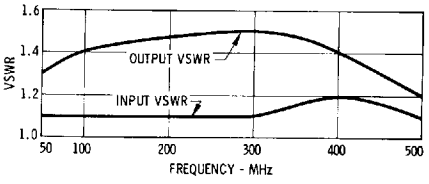


*at 1 dB Gain Compression

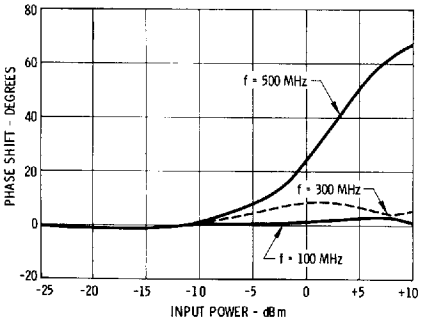
Power Output in Saturation



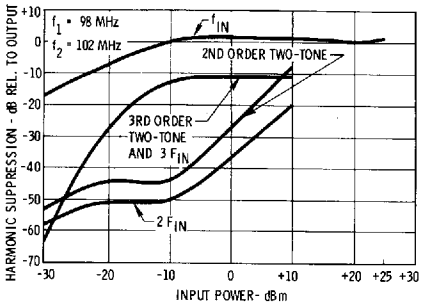
VSWR



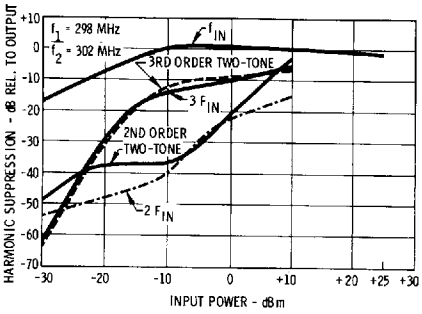
Phase Shift



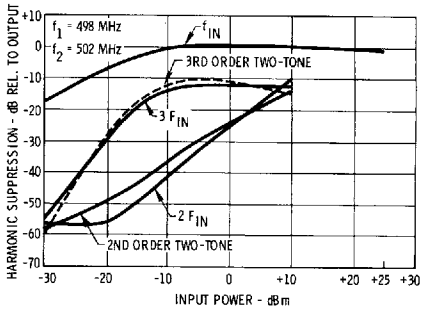
Harmonic Suppression (Curve A)



Harmonic Suppression (Curve B)



Harmonic Suppression (Curve C)



Typical Automatic Test Data

V_{CC} = 15.0 V

Frequency MHz	VSWR IN	VSWR OUT	GAIN DB
2.0	3.1	3.1	12.7
5.0	1.2	2.1	13.2
10.0	1.1	1.6	13.7
50.0	1.1	1.4	13.9
100.0	1.1	1.4	13.8
200.0	1.2	1.4	13.7
300.0	1.3	1.4	13.6
400.0	1.3	1.5	13.8
500.0	1.4	1.4	13.9
600.0	1.8	1.4	13.9
700.0	3.2	1.4	13.1

Thermal Data: V_{CC} = 15 Vdc

Thermal Resistance θ_{jc} ..... 45°C/W
Transistor Power Dissipation P_d ..... 0.560 W
Junction Temperature Rise Above Case T_{jc} ... 25.2°C

Linear S-Parameters

Frequency	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
2.0	.507	-101	4.309	-91	.085	31	.516	-36
5.0	.108	-84	4.560	-144	.084	8	.359	-41
10.0	.066	-63	4.815	-163	.083	3	.240	-38
50.0	.044	-54	4.948	170	.084	-4	.172	-28
100.0	.051	-74	4.879	153	.084	-9	.169	-41
200.0	.092	-121	4.839	124	.088	-20	.172	-74
300.0	.114	-162	4.789	96	.094	-33	.181	-108
400.0	.125	152	4.898	66	.101	-48	.190	-146
500.0	.166	99	4.935	35	.110	-67	.181	172
600.0	.286	37	4.930	-1	.116	-90	.149	110
700.0	.526	-16	4.529	-41	.111	-119	.160	11