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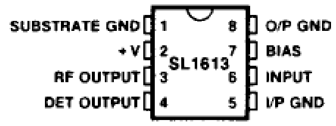
SL1613

WIDEBAND LOG IF STRIP AMPLIFIER

The SL1613 is a bipolar monolithic integrated circuit wideband amplifier intended for use in successive detection logarithmic IF strips, operating at centre frequencies between 10MHz and 60MHz. The device provides amplification, limiting and rectification, is suitable for direct coupling and incorporates supply line decoupling. The mid-band voltage gain of the SL1613 is typically 12dB.



DP8
MP8

Fig.1 Pin connections (top)

FEATURES

- Well Defined Gain
- 4.5dB Noise Figure
- High I/P impedance
- Low O/P impedance
- 150MHz Bandwidth
- On-Chip Supply Decoupling
- Low External Component Count

ABSOLUTE MAXIMUM RATINGS

Storage temperature range	-55°C to +150°C
Operating temperature range	-30°C to +85°C
Thermal resistance	
Chip-to-ambient	
SL1613 DP	111°C/W
SL1613 MP	163°C/W
Chip-to-case	
SL1613 DP	71°C/W
SL1613MP	57°C/W
Maximum instantaneous voltage	
at video output	+12V
Supply voltage	9V

APPLICATIONS

- Logarithmic IF Strips with Gains up to 108dB and Linearity Better than 2dB
- Low Cost Radar
- Radio Telephone Filed Strength Meters

ORDERING INFORMATION

SL1613 C DP
SL1613 C MP

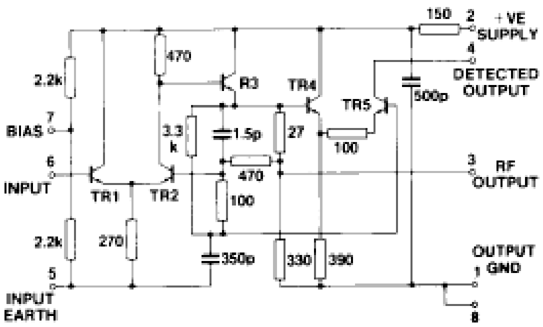


Fig.2 Circuit diagram

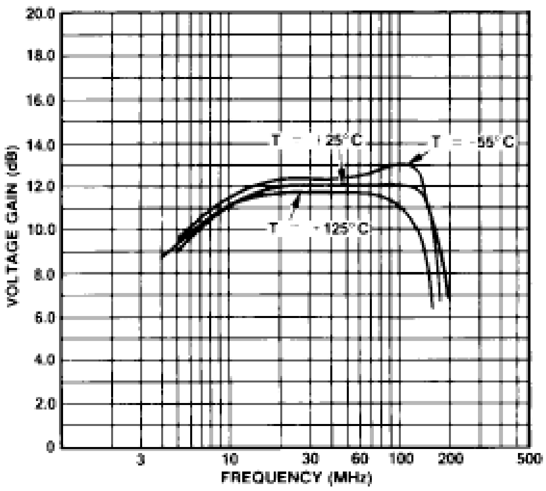


Fig.3 Voltage gain v. frequency

ELECTRICAL CHARACTERISTICS

These characteristics are guaranteed over the following condiotns (unless otherwise stated)

TA = +22°C ±2°C
Supply voltage = +6V
DC connection between input and bias pins

Characteristic	Value			Units	Conditions
	Min.	Typ.	Max.		
Voltage gain	10	12	14	dB	f = 30MHz, R_S = 10Ω, C_L = 8pF
Upper cut-off frequency (Fig. 3)		150		MHz	R_S = 10Ω, C_L = 8pF
Lower cut-off frequency (Fig. 3)		5		MHz	R_S = 10Ω, C_L = 8pF
Propagation delay		2		ns	
Max. rectified video output current (Fig. 4 and 5)	0.8	1	1.4	mA	f = 60MHz, V_{IN} = 500mV rms
Variation of gain supply voltage		0.7		dB/V	
Variation of maximum rectified output current with supply voltage		25		%/V	
Maximum input signal before overload		1.9		V rms	See Note 1
Noise figure (Fig. 6)		4.5		dB	f = 60MHz, R_S = 450Ω
Maximum RF output voltage		1.2		Vp-p	
Supply current		1.5	20	mA	

Note 1. Overload occurs when the input signal reaches a level sufficent to forward bias the base-collector junction of TR1 on peaks

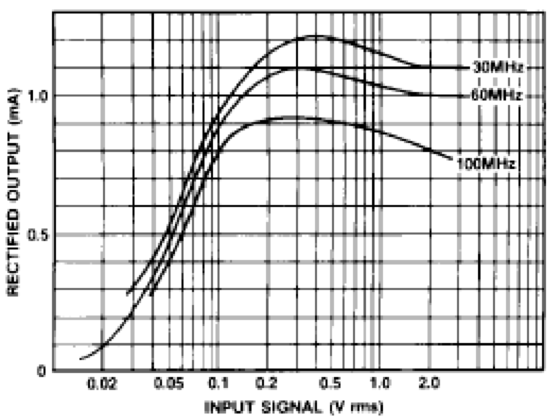


Fig.4 Rectified output current v. input signal

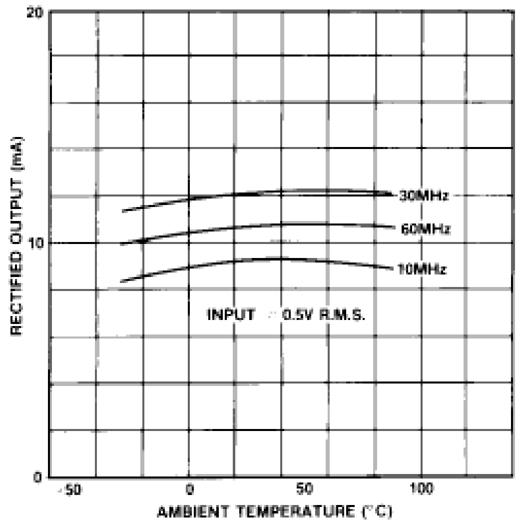


Fig.5 Maximum rectified output current v. temperature

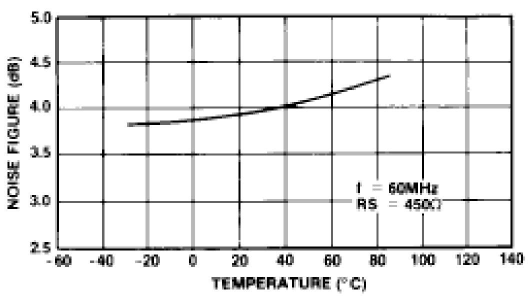


Fig.6 Typical figure v. temperature

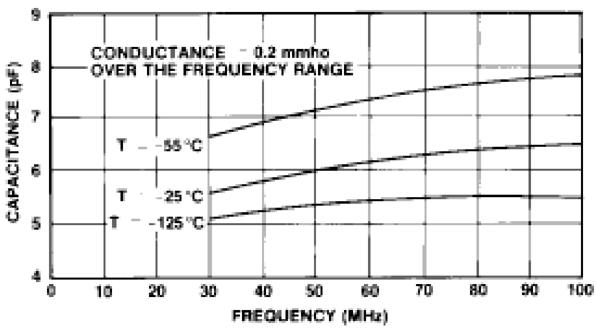


Fig.7 Input admittance with open circuit output

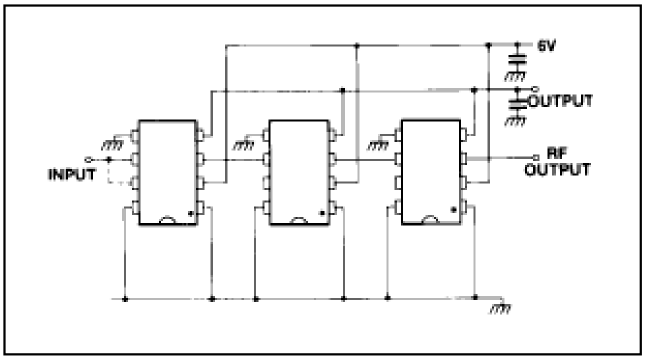


Fig.8 Direct coupled amplifiers

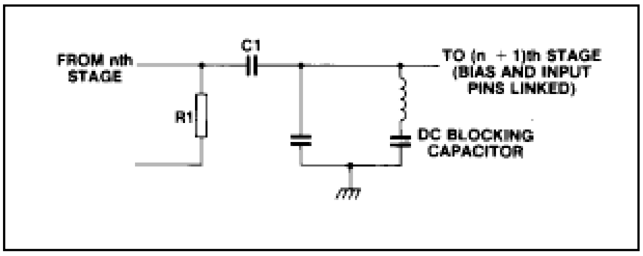


Fig.9 Suitable interstage tuned circuit

OPERATING NOTES

The amplifiers are intended for use directly coupled, as shown in Fig. 8.

The seventh stage in an untuned cascade will be giving virtually full output on noise.

Noise may be reduced by inserting a single tuned circuit in the chain. As there is a large mismatch between stages a simple parallel or series circuit cannot be used. This choice of network is also controlled by the need to avoid distorting the logarithmic law: the network must give unity voltage transfer at resonance. A suitable network is shown in Fig. 9. The value of C1 must be chosen so that at resonance its admittance equals the total loss conductance across the tuned circuit. Resistor R1 may be introduced to improve the symmetry of filter response, providing other values are adjusted for unity gain at resonance.

A single capacitor may not be suitable for decoupling the output line if many stages and fast rise times are required.
Values of supply line decoupling capacitor required for untuned cascades are given below. Smaller values can be used in high frequency tuned cascades.

The amplifiers have been provided with two ground leads to avoid the introduction of common ground lead inductance between input and output circuits. The equipment designer should take care to avoid the subsequent introduction of such inductance.

	Number of stages			
	6 or more	**5**	**4**	**3**
Minimum capacitance	30nF	10nF	3nF	lnF

The on-chip 500pF supply decoupling capacitor has a resistance of, typically 10Ω. It is a junction type having a low breakdown voltage and consequently the positive supply current will increase rapidly if the supply voltage exceeds 7.5V. (See Absolute Maximum Ratings).

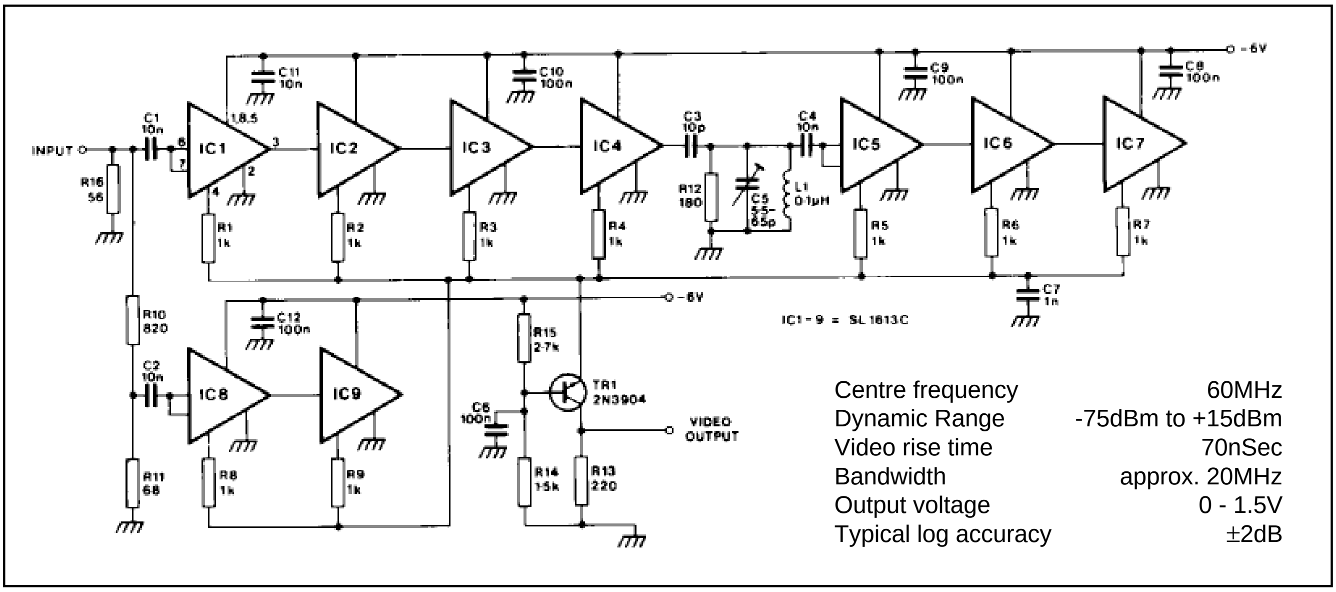


Fig.10 Circuit diagram of low strip

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