

# SL1613C

## WIDEBAND LOG IF STRIP AMPLIFIER

The SL1613C is a bipolar monolithic integrated circuit wideband amplifier intended primarily for use in successive detection logarithmic IF strips, operating at centre frequencies between 10MHz and 60MHz. The devices provide amplification, limiting and rectification, are suitable for direct coupling and incorporate supply line decoupling. The mid-band voltage gain of the SL1613C is typically 12dB.

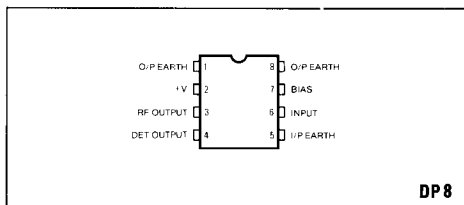


Fig. 1 Pin connections (top)

### 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 +125°C
Operating temperature range	-30°C to +85°C
Maximum instantaneous voltage at video output	+12V
Supply voltage	9V

### APPLICATIONS

- Logarithmic IF Strips with Gains up to 108dB and Linearity Better than 2dB

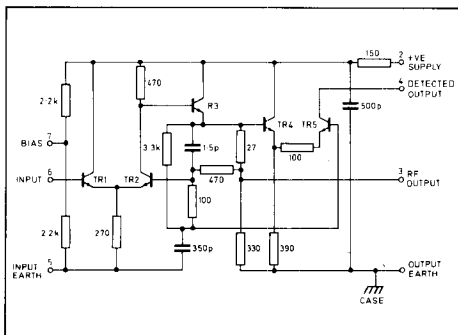


Fig. 2 Circuit diagram

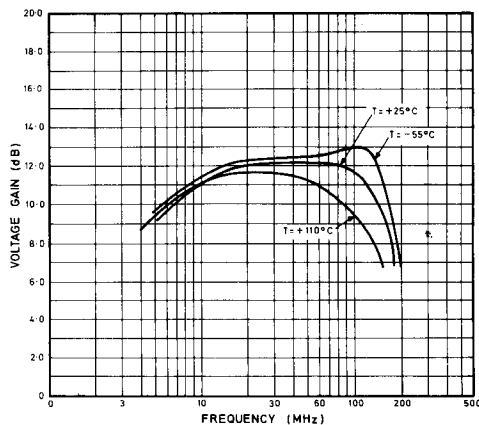


Fig. 3 Voltage gain v. frequency

ELECTRICAL CHARACTERISTICS

Test conditions (unless otherwise stated):

$T_A = +22^\circ\text{C} \pm 2^\circ\text{C}$   
 Supply voltage = +6V  
 DC connection between input and bias pins

Characteristic	Value			Units	Conditions
	Min.	Typ.	Max.		
Voltage gain	10	12	14	dB	$f=30\text{MHz}, R_S=10\Omega, C_L=8\text{pF}$
Upper cut-off frequency (Fig. 3)		150		MHz	
Lower cut-off frequency (Fig. 3)		5		MHz	$R_S=10\Omega, C_L=8\text{pF}$
Propagation delay		2		ns	
Max. rectified video output current (Figs. 4 and 5)	0.8	1	1.3	mA	$f=60\text{MHz}, V_{in}=500\text{mV rms}$
Variation of gain with 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	
Maximum RF output voltage		1.2		Vp-p	$f=60\text{MHz}, R_S=450\Omega$
Supply current		15	20	mA	

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

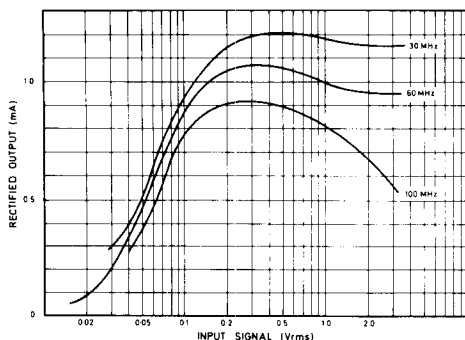


Fig. 4 Rectified output current v. input signal

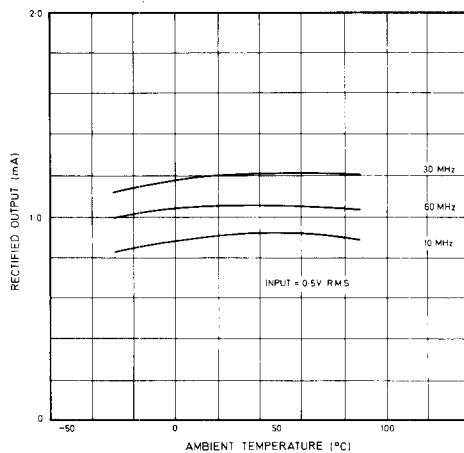


Fig. 5 Maximum rectified output current v. temperature

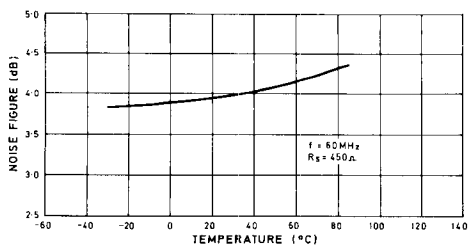


Fig. 6 Typical noise figure v. temperature

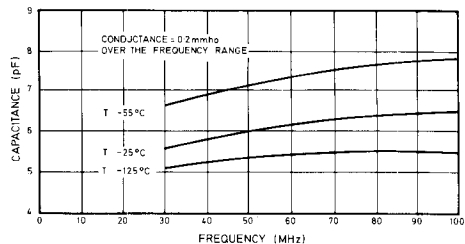


Fig. 7 Input admittance with open circuit output

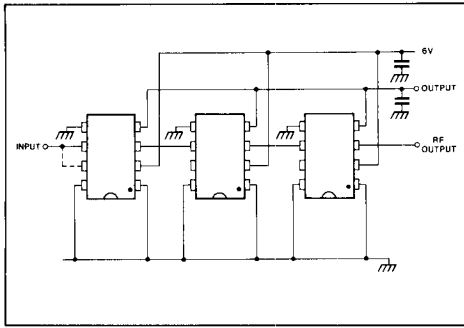


Fig. 8 Direct coupled amplifiers

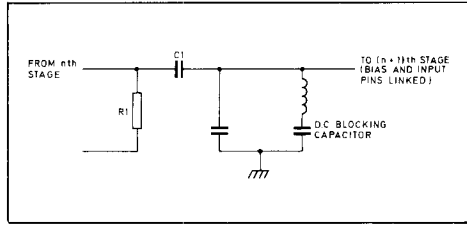


Fig. 9 Suitable interstage tuned circuit

**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 shunt or series circuit cannot be used. The 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.

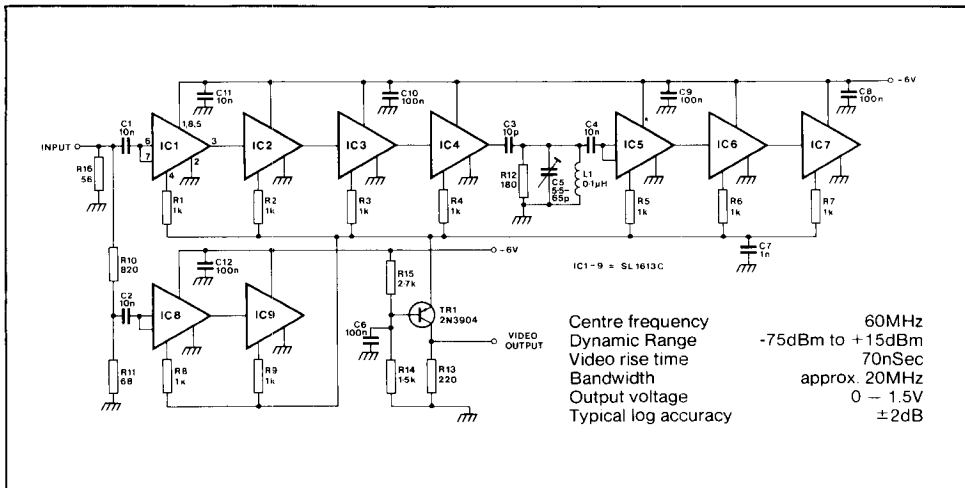
A simple capacitor may not be suitable for decoupling the output line if many stages and fast rise times are required.

Values of positive 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 earth leads to avoid the introduction of common earth 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	1nF

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



Centre frequency 60MHz  
 Dynamic Range -75dBm to +15dBm  
 Video rise time 70nSec  
 Bandwidth approx. 20MHz  
 Output voltage 0 - 1.5V  
 Typical log accuracy ±2dB

Fig. 10 Circuit diagram of low cost strip