

410 263

**GEC PLESSEY**  
SEMICONDUCTORS

**SL560**  
300MHz LOW NOISE AMPLIFIER

This monolithic integrated circuit contains three very high performance transistors and associated biasing components in an eight-lead TO-5 package forming a 300MHz low noise amplifier. The configuration employed permits maximum flexibility with minimum use of external components. The SL560C is a general purpose low noise, high frequency gain block.

The device is also available as the SL560AC which has guaranteed operation over the full Military Temperature Range and is screened to MIL-STD-883C Class B. Data is available separately.

**FEATURES**

- Gain up to 40dB
- Noise Figure less than 2dB (Rs 200 ohm)
- Bandwidth 300MHz
- Supply Voltage 2-15V (Depending on Configuration)
- Low Power Consumption

**APPLICATIONS**

- Radar IF Preamplifiers
- Intra-Red Systems Head Amplifiers
- Amplifiers in Noise Measurement Systems
- Low Power Wideband Amplifiers
- Instrumentation Preamplifiers
- 50 ohm Line Drivers
- Wideband Power Amplifiers
- Wide Dynamic Range IF Amplifiers
- Aerial Preamplifiers for VHF TV and FM Radio

**ABSOLUTE MAXIMUM RATINGS**

Supply voltage (Pin 4)	+15V
Storage temperature	-55°C to 150°C (CM) -55°C to 125°C (DP)
Junction temperature	150°C (CM) 125°C (DP)
Thermal resistance	
Junction-case	60°C/W (CM)
Junction ambient	220°C/W (CM) 230°C/W (DP)
Maximum power dissipation	See Fig 15
Operating temperature range	-55°C to -125°C (CM) -55°C to +100°C (DP) at 100mW
	at 100mW

**ORDERING INFORMATION**

SL560 AC CM  
SL560 C CM  
SL560 C DP

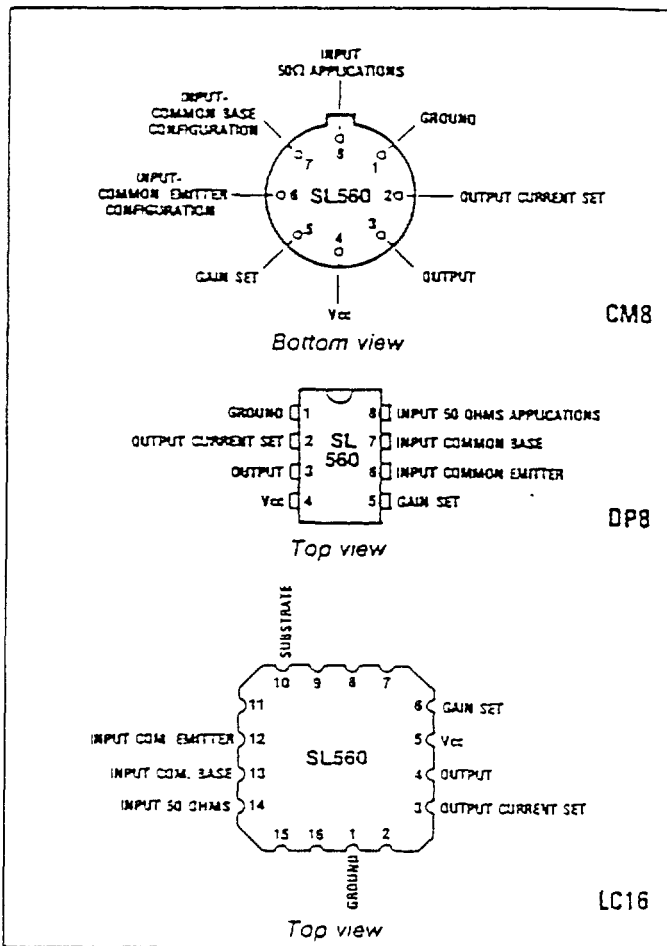


Fig 1 Pin connections

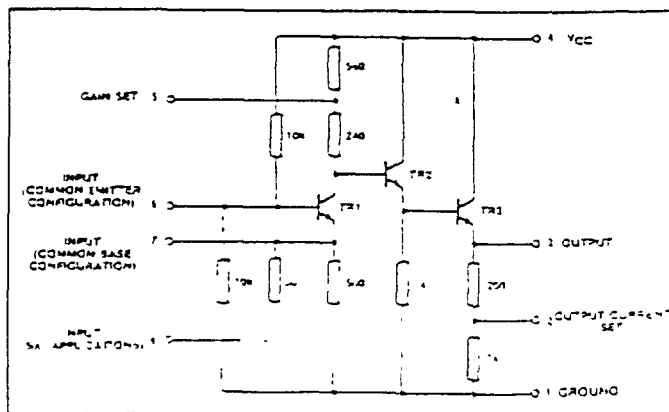


Fig 2 SL560C circuit diagram

SL560 C LC  
SL560 CB CM  
SL560 C E 55C N A C

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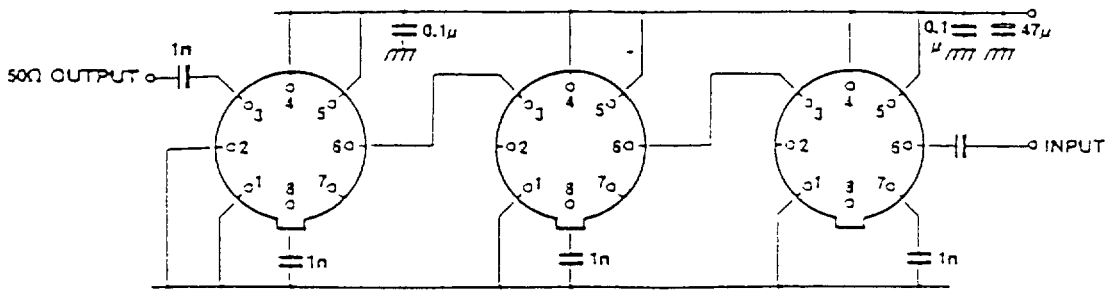


Fig.12 Three-stage directly-coupled high gain low noise amplifier

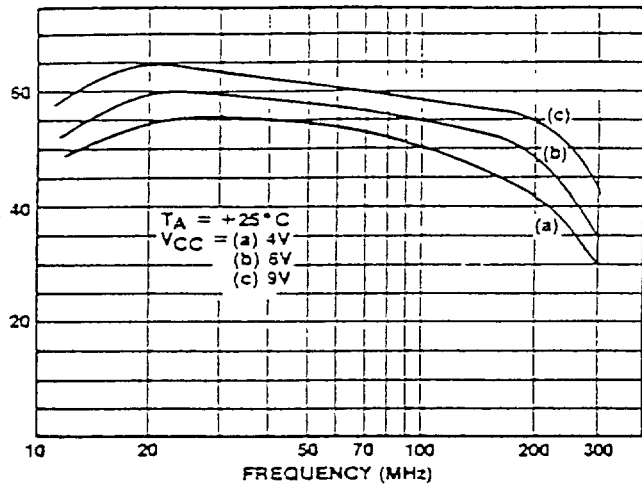


Fig.13 Frequency response of circuit shown in Fig.12 (typical)

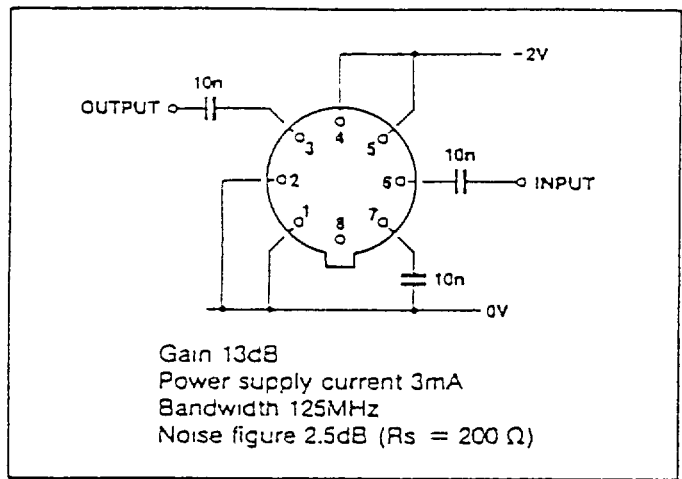


Fig.14 Low power consumption amplifier

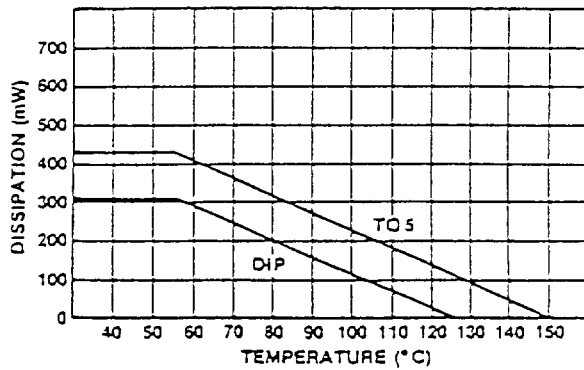


Fig.15 Ambient operating temperature v degrees centigrade (typical)

TYPICAL APPLICATIONS

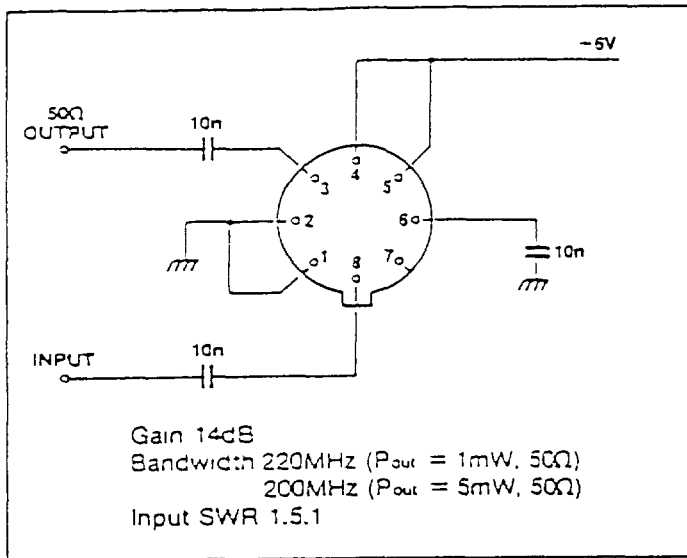


Fig.6 50Ω line driver The response of this configuration is shown in Fig.4.

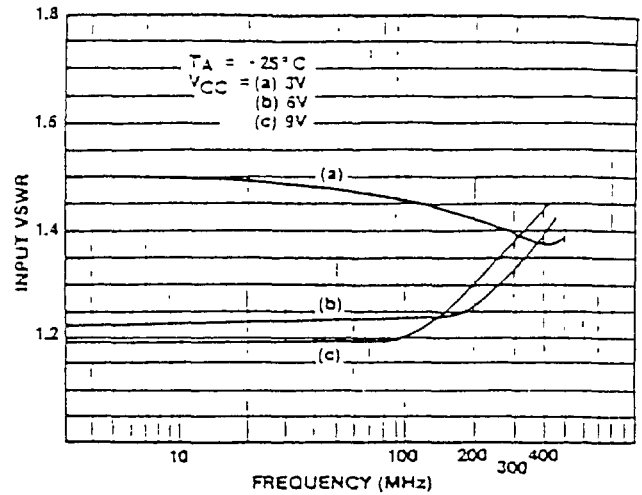


Fig.7 Input standing wave ratio plot of circuit shown in Fig 6 (typical)

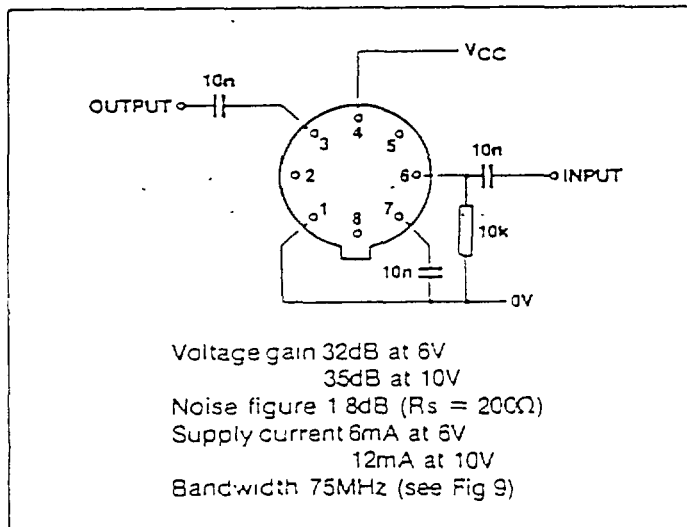


Fig 8 Low noise preamplifier

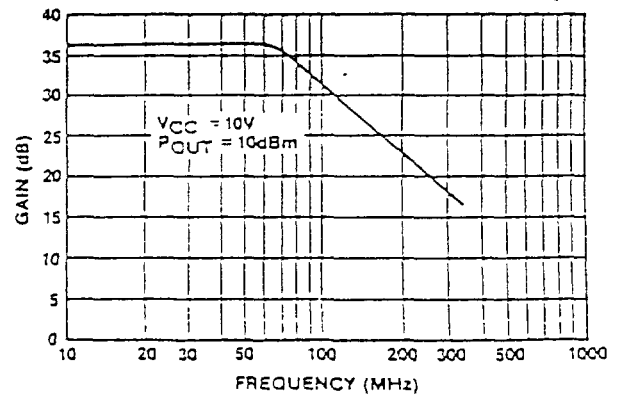


Fig 9 Frequency response of circuit shown in Fig 8 (typical)

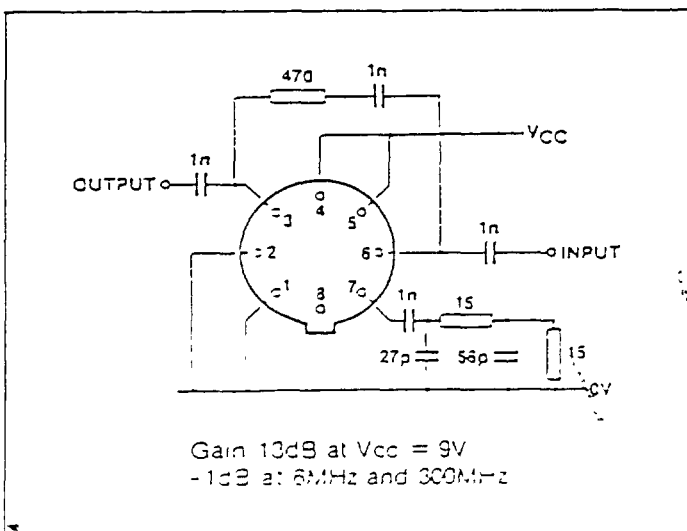


Fig 10 50Ω line driver with matching network

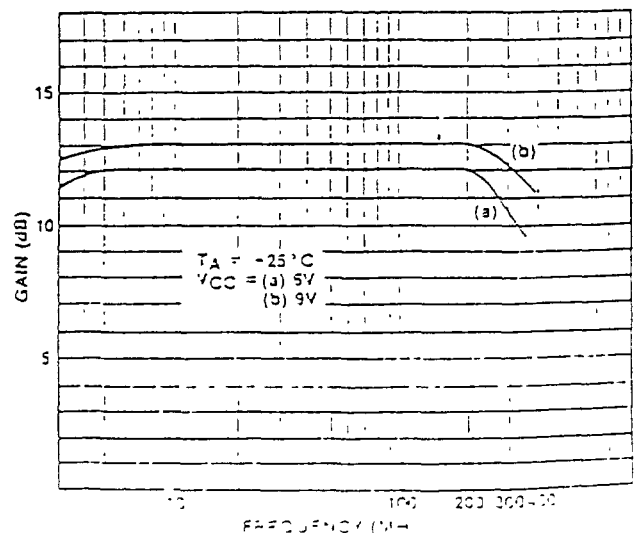


Fig 11 Frequency response of circuit shown in Fig 10 (typical)

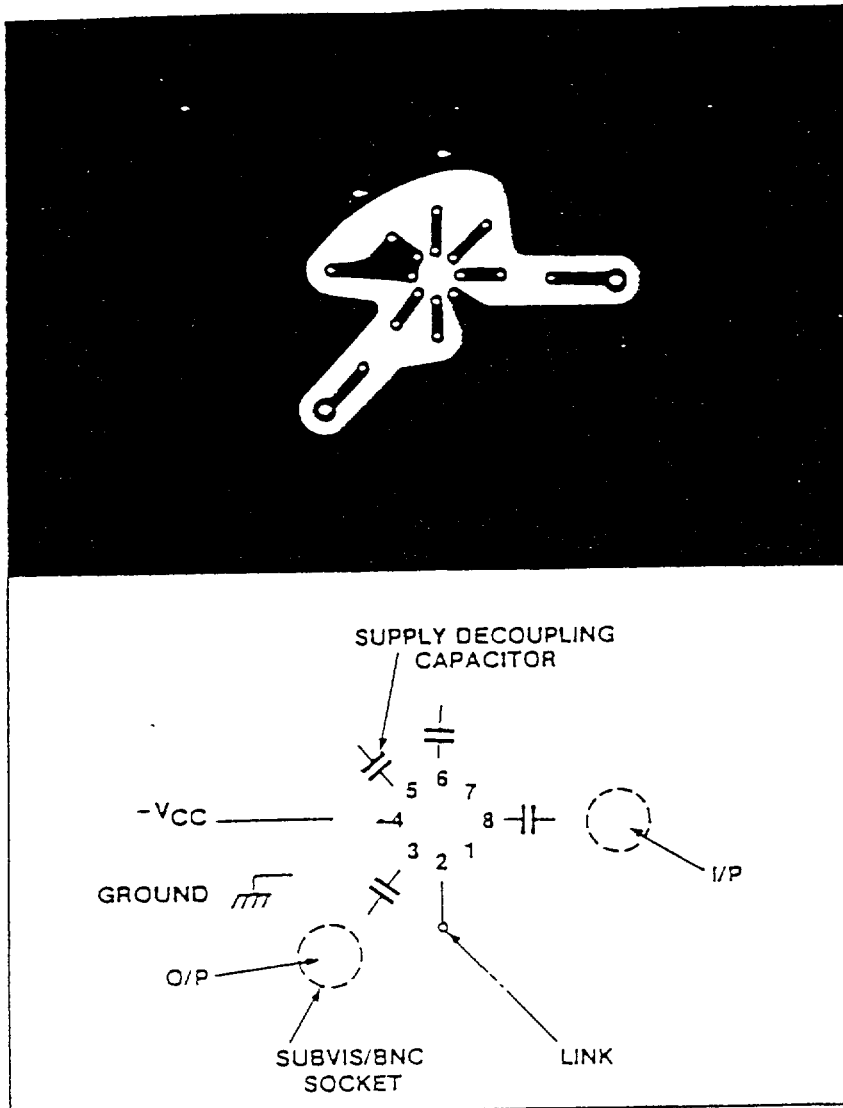


Fig 3 PC layout for 50Ω line driver (see Fig.5)

**ELECTRICAL CHARACTERISTICS**

Test conditions (unless otherwise stated):

Frequency = 30MHz; Vcc = 6V; Rs = RL = 50Ω; T<sub>amb</sub> = 25°C; Test Circuit: Fig.6

Characteristic	Value			Units	Conditions
	Min.	Typ.	Max.		
Small signal voltage gain	11	14	17	dB	10MHz - 220MHz  Vcc 6V Vcc = 9V } See Fig 5 Rs = 200Ω Rs = 50Ω
Gain flatness		±1.5		dB	
Upper cut-off frequency		250		MHz	
Output swing	±5	±7		dBm	
		±11		dBm	
Noise figure (common emitter)		1.8		dB	
Supply current		3.5	30	dB	
		20		mA	

**CIRCUIT DESCRIPTION**

Three high performance transistors of identical geometry are employed. Advanced design and processing techniques enable these devices to combine a low base resistance (R<sub>bb'</sub>) of 17Ω (for low noise operation) with a small physical size - giving a transition frequency, f<sub>t</sub>, in excess of 1GHz.

The input transistor (TR1) is normally operated in common base, giving a well defined low input impedance. The full voltage gain is produced by this transistor and the output voltage produced at its collector is buffered by the two emitter followers (TR2 and TR3). To obtain maximum bandwidth the capacitance at the collector of TR1 must be minimised. Hence to avoid bonding pad and can capacitances, this point is not brought out of the package. The collector load resistance of TR1 is split, the tapping being accessible via pin 5. If required, an external roll-off capacitor can be fixed to this point.

The large number of circuit nodes accessible from the outside of the package affords great flexibility, enabling the

operating currents and circuit configuration to be optimised for any application. In particular, the input transistor (TR1) can be operated in common emitter mode by decoupling pin 7 and using 6 as the input. In this configuration, a 2dB noise figure (Rs = 200Ω) can be achieved. This configuration can give a gain of 35dB with a bandwidth of 75MHz (see Figs. 8 and 9) or, using feedback 14dB with a bandwidth of 300MHz (see Figs. 10 and 11).

Because the transistors used in the SL560C exhibit a high value of f<sub>t</sub>, care must be taken to avoid high frequency instability. Capacitors of small physical size should be used, the leads of which must be as short as possible to avoid oscillation brought about by stray inductance. The use of a ground plane is recommended.

Further applications information is available in the 'Broadband Amplifier Applications' booklet.

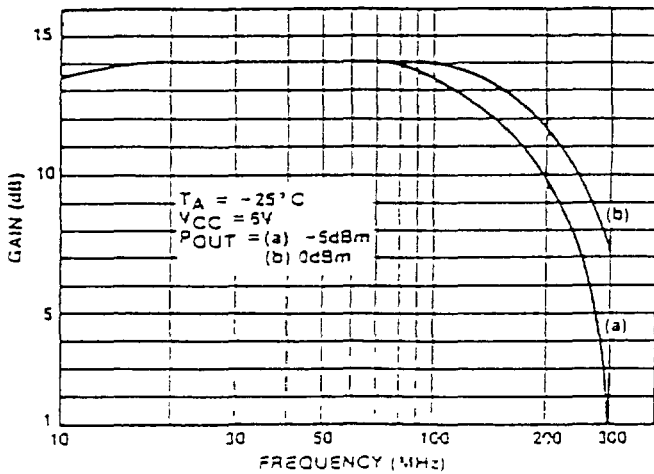


Fig 4 Frequency response at a gain of 10 dB, for POUT = -5 dBm (a) and 0 dBm (b).

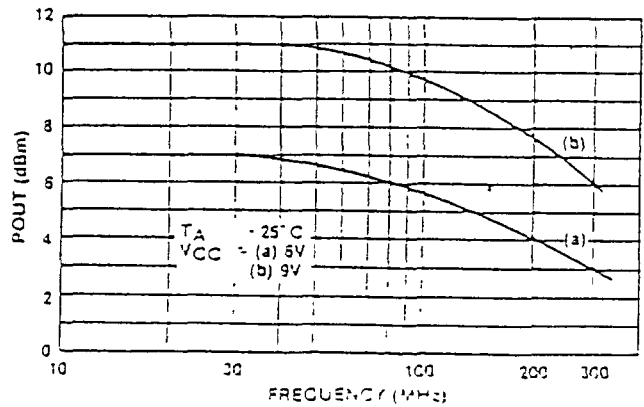


Fig 5 Frequency response at a gain of 10 dB, for POUT = 10 dBm, for VCC = 5V (a) and 9V (b).