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ADVANCE INFORMATION

DS3606 - 2.0

SL521

150MHz WIDEBAND LOG AMPLIFIER

The SL521A, B and C are bipolar monolithic Integrated circuit wideband amplifiers, intended primarily for use in successive detection logarithmic IF strips, operating at centre frequencies between 10MHz and 100MHz The devices provide amplification, limiting and rectification, are suitable for direct coupling and incorporate supply line decoupling The mid-band voltage gain of the SL521 is typically12dB(4times) The SL521A, B and C differ mainly in the tolerance of voltage gain and upper cut-off frequency

The device is also available as the 5962-90792 which has guaranteed operation over the full Military Temperature Range and is screened to MIL-STD-883 Class B. Data is available separately

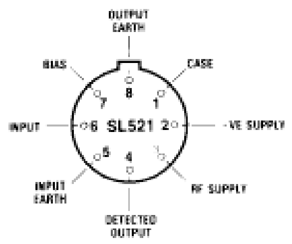

Fig.1 Pin connections - bottom view

FEATURES

- Wide Defined Gain
- 4dB Noise Figure
- Hlgh I/P impedance
- Low O/Pi mpedance
- 165MHz Bandwidth
- On Chip Supply Decoupling
- Low External Component Count

ABSOLUTE MAXIMUM RATINGS
(Non-simultaneous)

Storage temperature range	-65°C to +150°C
Operating temperature range	-55°C to +125°C
Chip operating temperature	+175°C
Chip-to-ambient thermal resistance	225°C/W
Chip-to-case thermal resistance	65°C/W
Maximum instantaneous voltage at Video output	+12V
Supply voltage	+9V

ORDERING INFORMATION

SL521 A CM **5962-90792 (SMD)**
SL521 B CM
SL521 C CM

APPLICATIONS

- Logarithmic IF Strips wlth Gains up to 108dB and Linearity better than 1dB

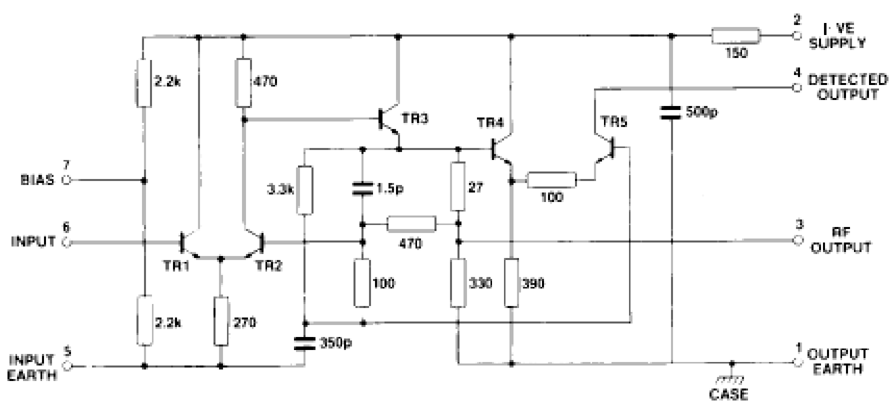

Fig.2 Circuit diagram SL521

ELECTRICAL CHARACTERISTICS

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

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

Characteristic	Circuits	Value			Units	Conditions
		Min.	Typ.	Max.		
Voltage gain, f = 30MHz	A	11.5		12.5	dB	10 ohms source, 8pF load
	B	11 .3		1 2.7	dB	
	C	11.0		13.0	dB	
Voltage gain, f = 60MHz	A	11.3		12.7	dB	
	B	11.0		13.0	dB	
	C	10.7		13.3	dB	
Upper cut-off frequency (Fig. 3)	A	150	170		MHz	
	B	140	170		MHz	10 ohms source, 8pF load
	C	130	170		MHz	
Lower cut-off frequency (Fig. 3)	A B C		5	7	MHz	10 ohms source, 8pF load
Propagation delay	A B C		2		ns	
Maximum rectified video output current (Fig. 4 and 5)	A	1.00		1.10	mA	f = 60MHz, 0.5V rms input
	B	0.95		1.15	mA	
	C	0.90		1.20	mA	
Variation of gain with supply voltage	A B C		0.7		db/V	
Variation of maximum rectified output current with supply voltage	A B C		25		%/V	
Maximum input signal before overload	A B C	1.8	1.9		V rms	See note below
Noise figure (Fig. 6)			4	5.25	dB	f = 60MHz, Rs = 450 ohms
Supply current	A	12.5	15.0	18.0	mA	
	B	12.5	15.0	18.0	mA	
	C	11.5	15.0	19.0	mA	
Maxiumum RF output voltage			1.2		Vp-p	

Note: Overload occurs when the input signal reaches a level sufficient to forward bias the base-collector junction to TR2 on peaks.

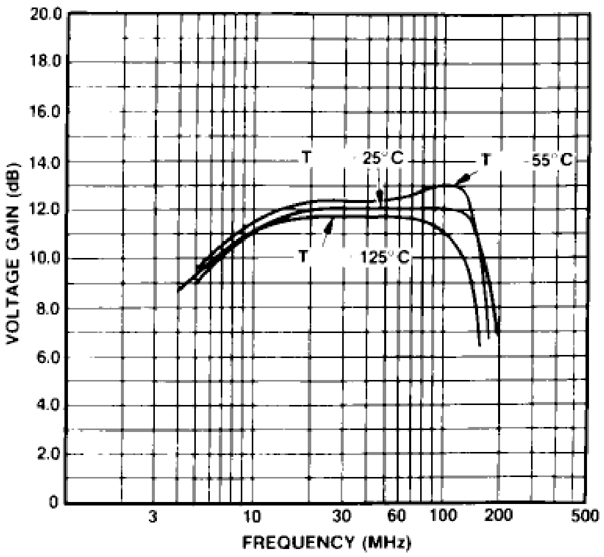

Fig.3 Voltage gain v. frequency (typical)

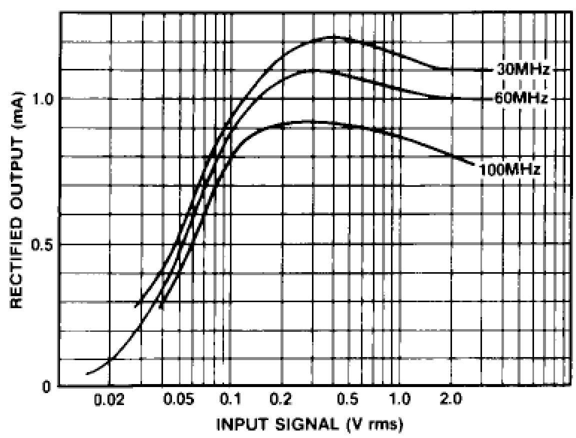

Fig.4 Rectified output current v. input signal (typical)

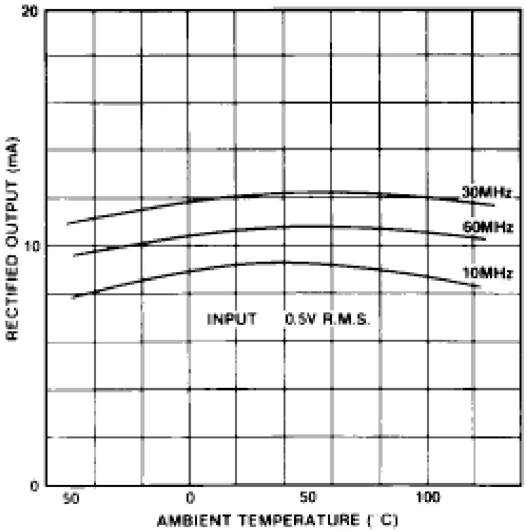

Fig.5 Maximum rectified output current v. temperature (typical)

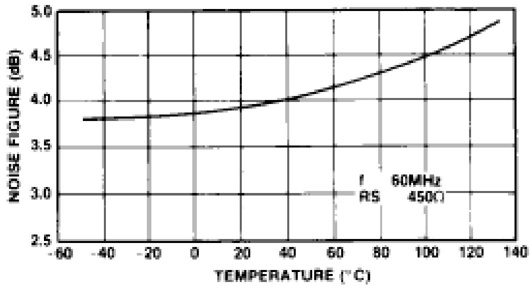

Fig.6 Noise figure v. temperature (typical)

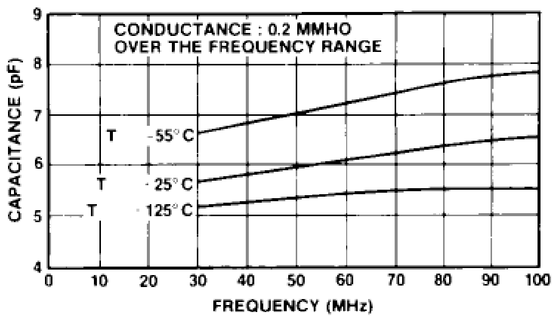

Fig.7 Input admittance with open-circuit output (typical)

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 galn at resonance.

A simple capacitor may not be suitable for decoupling the output line if many stages and fast rise times are required. Alternative arrangements may be derived, based on the parasitic parameters given.

Values of positive supply line decoupling capacitor requlred for untuned cascades are given below. Smaller values can be used in high frequency tuned cascades.

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

The amplifiers have been provided with two earth 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.

The 500pF supply decoupling capacitor has a resistance of, typically, 1 0Q. 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).

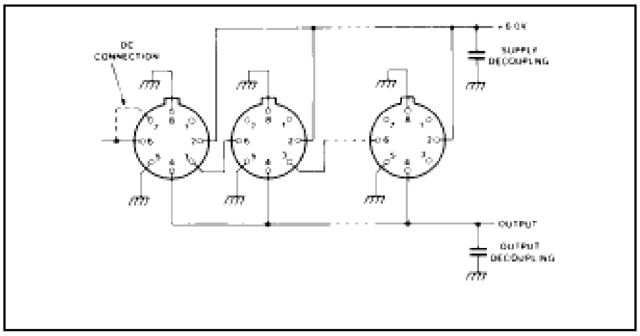

Fig.8 Direct Coupled amplifiers

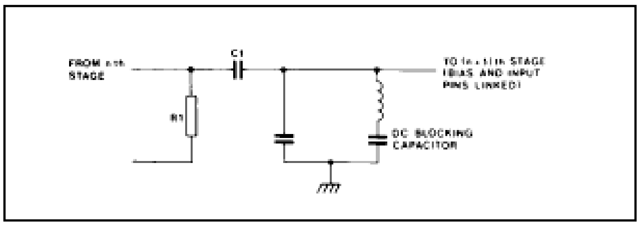

Fig.9 Suitable interstagetuned circuit

Parasitic Feedback Parameters (Approximate)

The quotation of these parameters does not indicate that elaborate decoupling arrangements are required, the amplifier has been designed specifically to avoid this requirement. The parameters have been given so that the necessity or otherwise of further decoupling, may become a matter of calculation rather than guesswork.

$$\frac{\tilde{I}_4}{V_6} = \frac{\text{RF current component from pin 4}}{\text{Voltage at pin 6}} = 20 \text{ mmhos}$$

(This figure allows for detector being forward biased by noise signals).

$$\frac{V_4}{V_6} = \frac{\text{Effective voltage induced at pin 6}}{\text{Voltage at pin 4}} = 0.003$$

$$\frac{I_2}{V_6} = \frac{\text{Current from pin 2}}{\text{Voltage at pin 6}} = 6 \text{ mmhos (f = 10MHz)}$$

$$\left[\frac{V_6}{V_2}\right]_a = \frac{\text{Voltage induced at pin 6}}{\text{Voltage at pin 2}} = 0.03 \text{ (f = 10MHz)}$$

Voltage at pin 2
(pin joined to pin 7 and
fed from 300Ω source)

$$\left[\frac{V_6}{V_2}\right]_b = \frac{\text{Voltage induced at pin 6}}{\text{Voltage at pin 2}} = 0.01 \text{ (f = 10MHz)}$$

Voltage at pin 2
(pin 7 decoupled)

$\frac{I_2}{V_6}$ $\left[\frac{V_6}{V_2}\right]_a$ $\left[\frac{V_6}{V_2}\right]_b$ decrease with frequency above 10MHz at 6dB/octave

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