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SL1615

WIDEBAND LOG IF STRIP AMPLIFIER

The SL1615 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 SL1615 is typically 12dB.

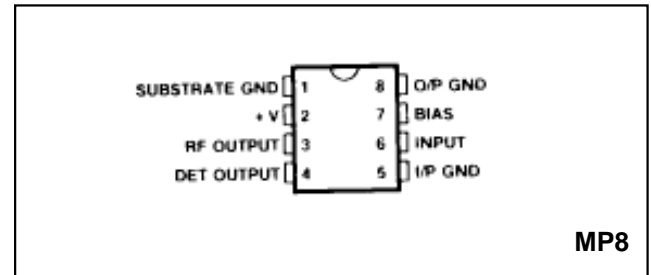


Fig.1 Pin connections - top view

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

APPLICATIONS

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

ABSOLUTE MAXIMUM RATINGS

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

ORDERING INFORMATION

SL1615 NA MP

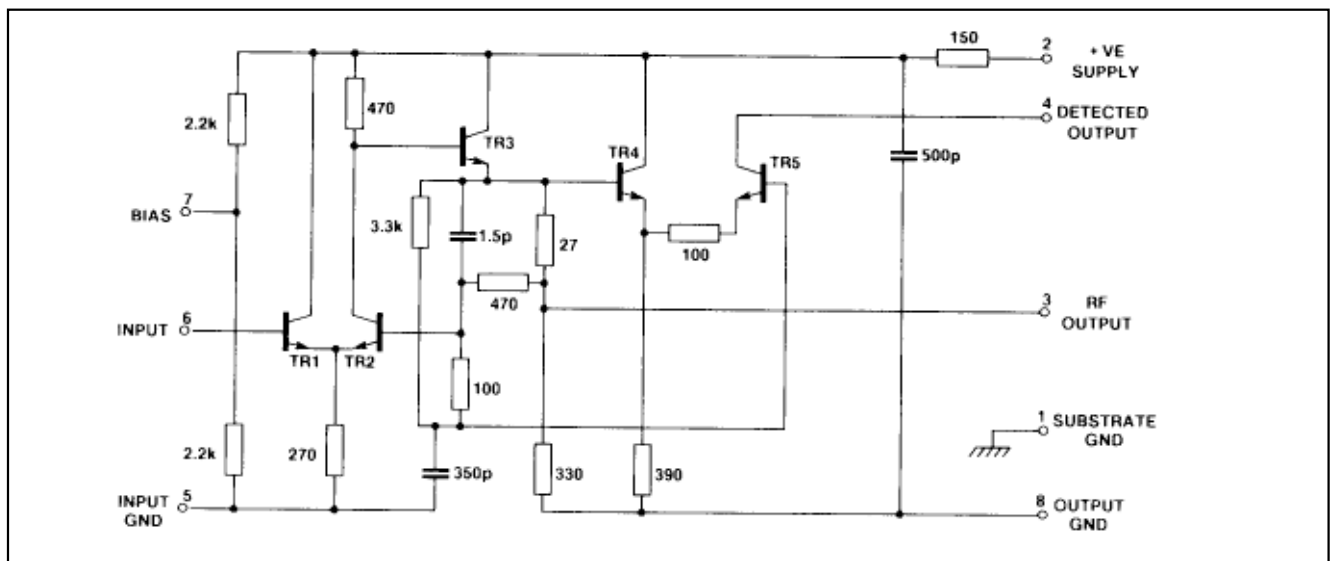


Fig.2 Circuit diagram

SL1615

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 | Value | | | Units | Conditions |
|---|-------|------|------|-------|---------------------------|
| | Min. | Typ. | Max. | | |
| Voltage Gain, f = 30MHz | 10 | | 14 | dB | 10Ω Source, 8pF Load |
| Voltage Gain, f = 60MHz | 10.7 | | 13.3 | dB | 10Ω Source, 8pF Load |
| Upper Cut-off frequency (Fig.3) | 130 | 170 | | MHz | 10Ω Source, 8pF Load |
| Lower Cut-off frequency (Fig.3) | | 5 | | MHz | 10Ω Source, 8pF Load |
| Propagation Delay | | 2 | | ns | |
| Maximum rectified Video Output Current (Fig.4 and 5) | 0.80 | | 1.40 | mA | f = 60MHz, 0.5V rms Input |
| 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 | 1.8 | 1.9 | | V/rms | See Note below |
| Noise Figure (Fig.6) | | 4 | | dB | f = 60MHz, Rs = 450Ω |
| Supply Current | 11.5 | | 20 | mA | |
| Maximum 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 of TR1 on peaks

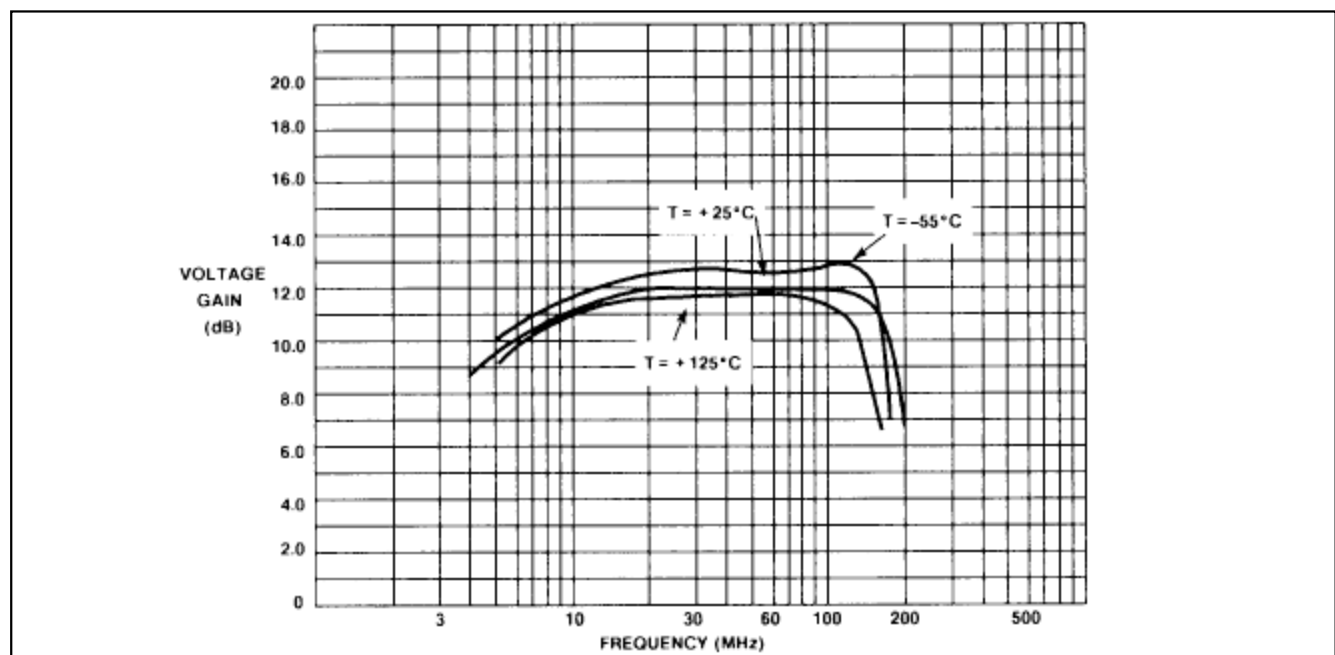


Fig.3 Voltage gain v. frequency

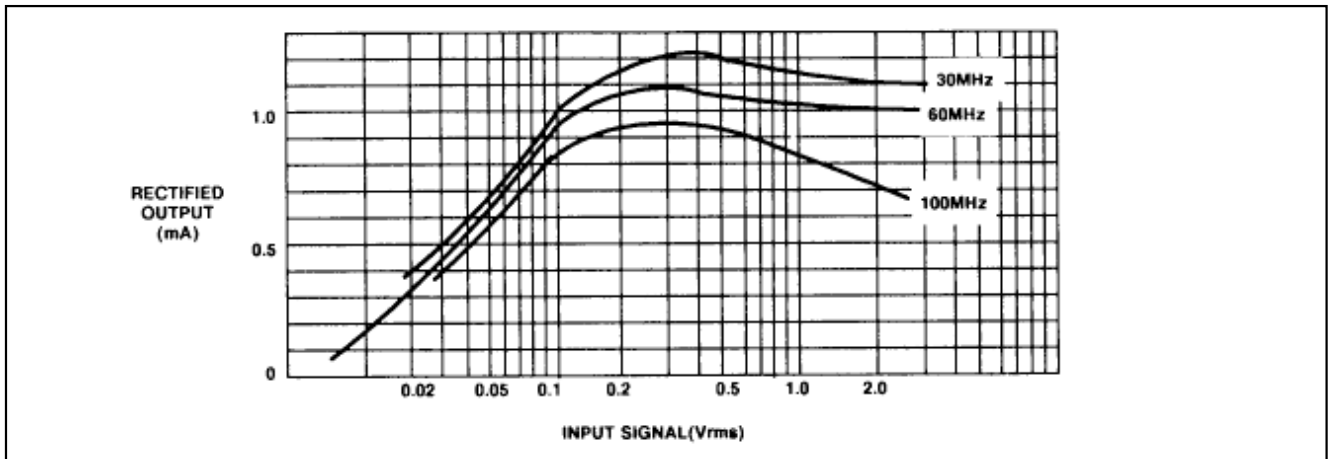


Fig.4 Rectified Output Current v. Input Signal

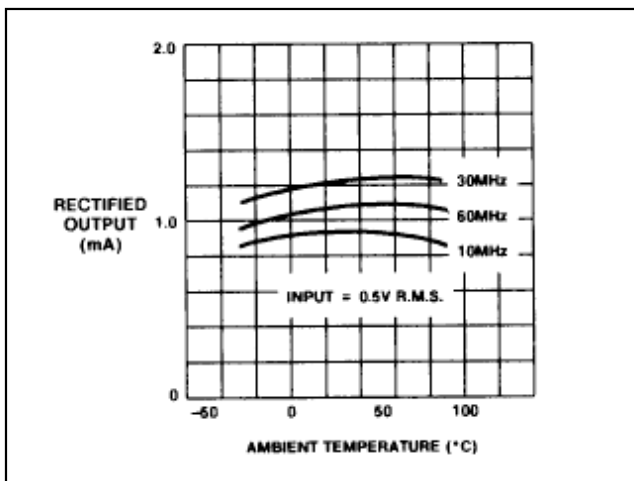


Fig.5 Maximum Rectified Output Current v. Temperature

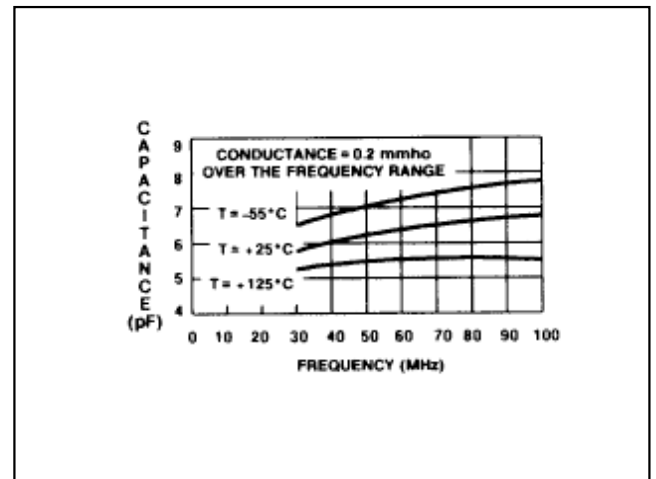


Fig.7 Input Admittance with Open Circuit Output

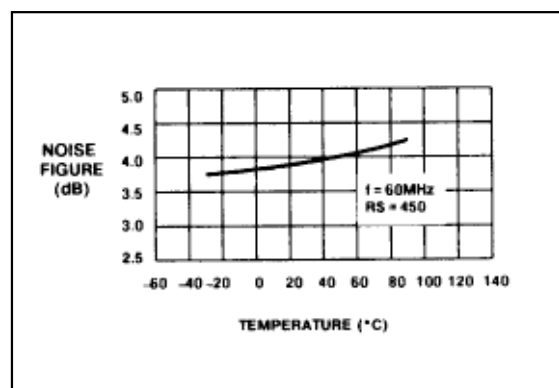


Fig.6 Typical Noise Figure v. Temperature

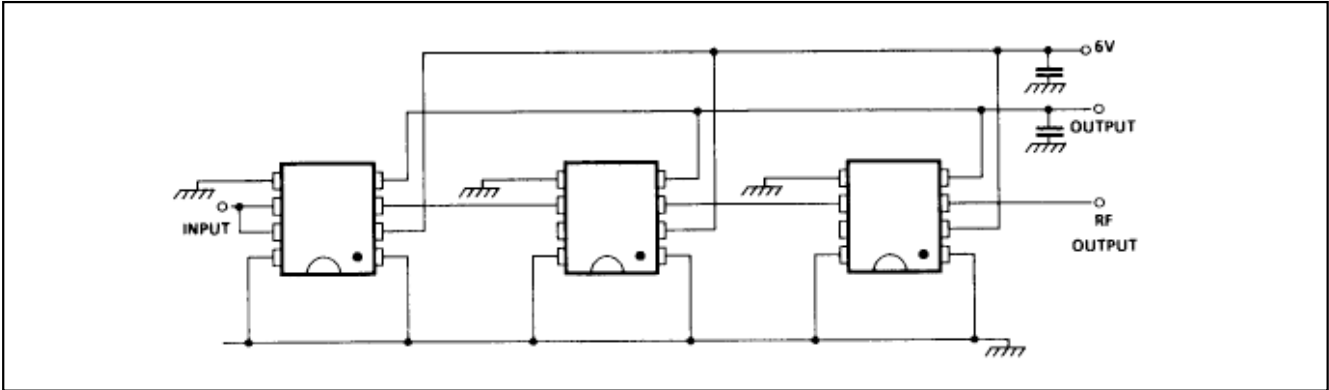


Fig.8 Direct coupled amplifiers

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 C3 must be chosen so that at resonance its admittance equals the total loss conductance across the tuned circuit. Resistor R12 may be introduced to improve the symmetry of filter response, providing other values are adjusted for unity gain at resonance.

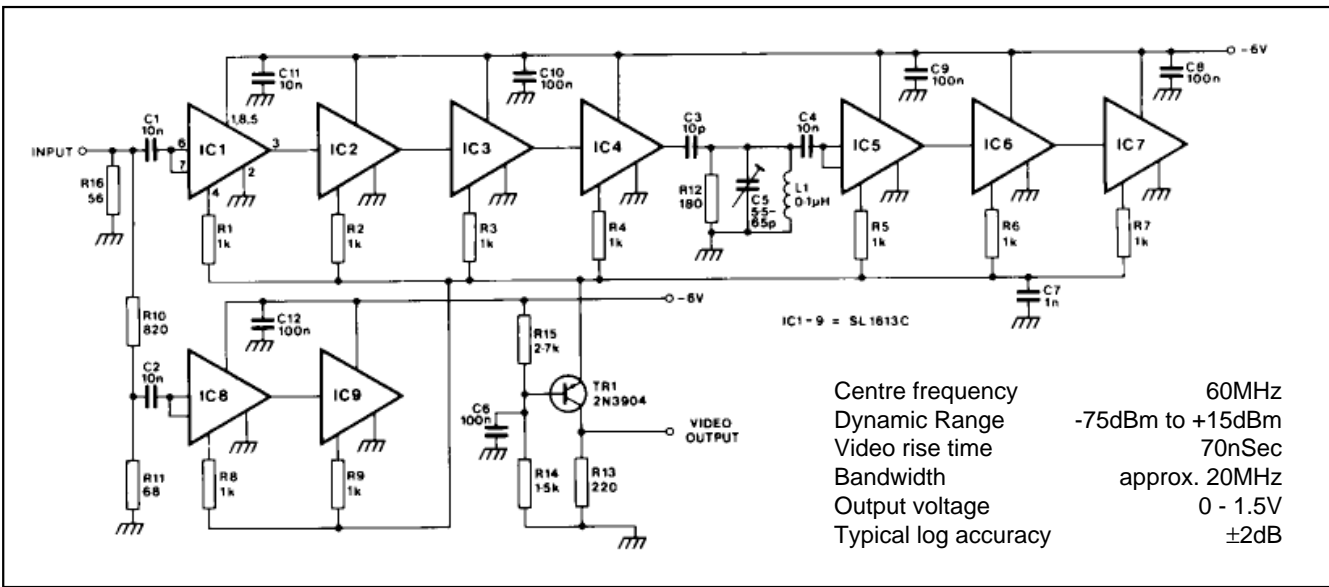
A single capacitor may not be suitable for decoupling the output line if many stages and fast rise times are required.

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 | 1nF |

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).



| | |
|----------------------|------------------|
| 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.9 Circuit diagram of low strip



HEADQUARTERS OPERATIONS

GEC PLESSEY SEMICONDUCTORS

Cheney Manor, Swindon,
Wiltshire SN2 2QW, United Kingdom.
Tel: (0793) 518000
Fax: (0793) 518411

GEC PLESSEY SEMICONDUCTORS

P.O. Box 660017
1500 Green Hills Road,
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United States of America.
Tel: (408) 438 2900
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