PLESSEY Semiconductors

SL1621C

AGC GENERATOR

The SL1621C is an AGC generator designed specifically for use in SSB receivers in conjunction with the SL1610C, SL1611C and SL1612CRF and IF amplifiers. In common with other advanced systems it generates a suitable AGC voltage directly from the detected audio waveform, provides a 'hold' period to maintain the AGC level during pauses in speech, and is immune to noise interference. In addition it will smoothly follow the fading signals characteristic of HF communication.

When used in a receiver comprising one SL1610C and one SL1612C amplifier and a suitable detector, the SL1621C will maintain the output within a 4dB range for a 110dB range of receiver input signal.

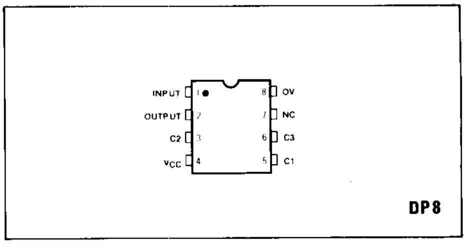

Fig. 1 Pin connections (top view)

FEATURES

- All Time Constants Set Externally
- Easy Interfacing
- Compatible with SL1610/1611/1612

APPLICATIONS

- SSB Receivers
- Test Equipment

QUICK REFERENCE DATA

- Supply voltage: 6V
- Supply current: 3mA

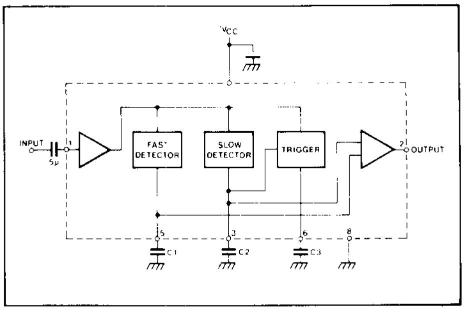

Fig. 2 Block diagram

ELECTRICAL CHARACTERISTICS

Test conditions (unless otherwise stated):
Supply voltage V_{CC} = 6V
Ambient temperature: −30°C to +85°C
Test frequency: 1kHz
Test circuit as Fig. 2

ABSOLUTE MAXIMUM RATINGS

Supply voltage: 12V
Storage temperature: −55°C to +125°C

Characteristic	Value			Units	Conditions
	Min.	Typ.	Max.		
Supply current		3.1	5	mA	No signal
Cut-off frequency (−3dB)		6		kHz	
Input for 2.2V DC output		7		mVrms	
Input for 4.6V DC output		11		mVrms	
Maximum output voltage	4.5			V	
AC ripple on output		12		mV pk-pk	1kHz, output open circuit
Input resistance		500		Ω	
Output resistance		70		Ω	
'Fast' rise time t_1		20		ms	0 to 50% full output
'Fast' decay time t_2		200		ms	100% to 36% full output
'Slow' rise time t_3		200		ms	Time to output transition point
Hold collapse time t_4		100		ms	90% to 10% full output
Hold time t_5		1.0		s	

APPLICATION NOTES

The SL1621C consists of an input AF amplifier coupled to a DC output amplifier by means of two detectors having short and long rise and fall times respectively. The time constants of these detectors are set externally by capacitors on pins 5 (C_1) and 3 (C_2).

The detected audio signal at the input will rapidly establish an AGC level via the 'fast' detector time in t_1 (see Fig. 3). Meanwhile the long time constant detector output will rise and after t_3 will control the output because this detector is more sensitive.

Input signals greater than approximately 4mV rms will actuate a trigger circuit whose output pulses provide a discharge current for C_2.

By this means the voltage on C_2 can decay at a maximum rate, which corresponds to a rise in receiver gain of 20dB/s. Therefore the AGC system will smoothly follow signals which are fading at this rate or slower. However should the receiver input signals fade faster than this, or disappear completely as during pauses in speech, then the input to the AGC generator will drop below the 4mV rms threshold and the trigger will cease to operate. As C_2 then has no discharge path, it will hold its charge (and hence the output AGC level) at the last attained value. The output of the short time constant detector will drop to zero in time t_2 after the disappearance of the signal.

The trigger pulses also charge C_3. When the trigger pulses cease, C_3 discharges and after t_5 C_2 is discharged rapidly (in time t_4) and so full receiver gain is restored. The hold time, t_5 is approximately one second with $C_3 = 100\mu F$. If signals reappear during t_5, then C_3 will recharge and normal operation will continue. The C_3 recharge time is made long enough to prevent prolongation of the hold time by noise pulses.

Fig. 3 shows how a noise burst superimposed on speech will initiate rapid AGC action via the short time constant detector while the long time constant detector effectively remembers the pre-noise AGC level.

The various time constants quoted are for $C_1 = 50\mu F$ and $C_2 = C_3 = 100\mu F$. These time constants may be altered by varying the appropriate capacitors. C_1 controls t_1, t_2; C_2 controls t_3, t_4; C_3 controls t_5.

The supply must either have a source resistance of less than 2Ω at LF or be decoupled by at least 500µF so that it is not affected by the current surge resulting from a sudden input on pin 1.

In a receiver for both AM and SSB using an SL1623C detector/carrier AGC generator, the AGC outputs of the SL1621C and SL1623C may be connected together provided that no audio reaches the SL1621C input while the SL1623C is controlling the system.

AGC lines may require some RF decoupling but the total capacitance on the output should not exceed 15000pF or the impulse suppression will suffer.

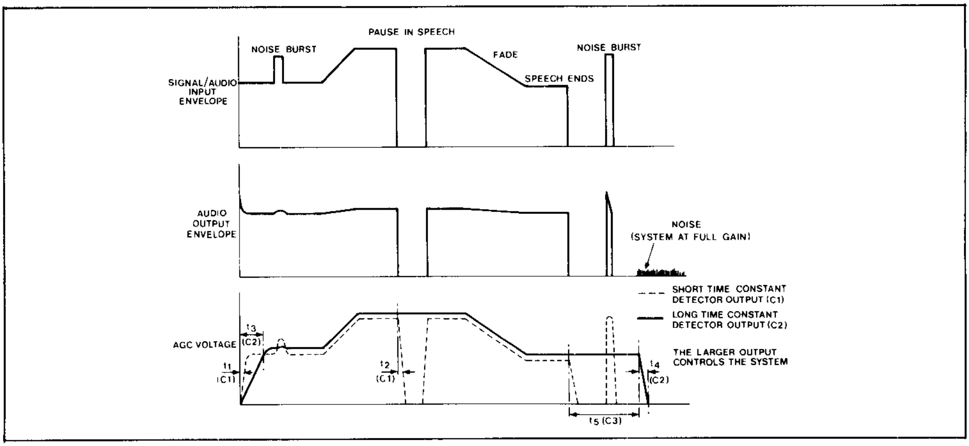

Fig. 3 Dynamic response of a system controlled by SL1621C AGC generator

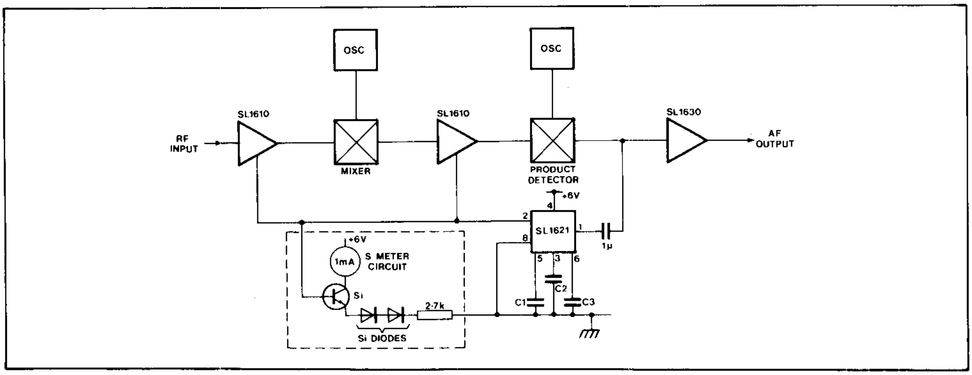

Fig. 4 SL1621C used to control SSB receiver

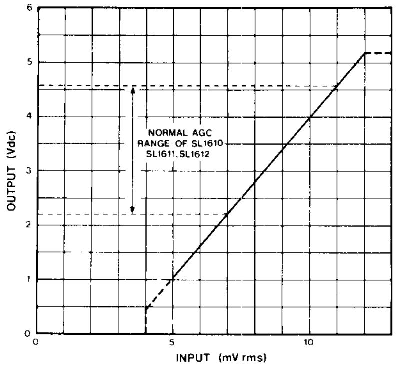

Fig. 5 Transfer characteristic of SL1621C (typical)