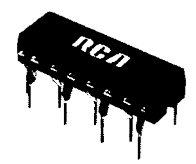


16-Lead Staggered Quad-in-Line Plastic Package

H-1885

TV Synchronous Demodulators

For Color and Black-and-White TV Systems

Features:

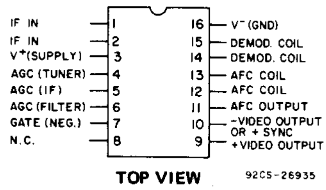
- **Synchronous detector with single tuned coil**
- **Provides rf and if agc (forward)**
- **Tuner afc available with single quadrature coil**
- **Dual-polarity noise inverters**
- **Video amplifier**
- **Positive- and negative-polarity buffered video**
- **Differential if input**
- **Optional use of gating pulse**
- **Low-voltage, single-polarity power supply**

The RCA-CA270AW, CA270BW, and CA-270CW are integrated circuits which perform the functions of synchronous detection of the TV if, video amplification and buffering, and noise inversion on dual-polarity waveforms. These devices also offer agc and afc facilities for use with n-p-n transistor if amplifiers and tuners. Both positive and negative polarities of video output are available. This feature provides great flexibility by permitting the designer to use either output for deriving the video and sound channels.

The RCA-CA270 series is pin-compatible and electrically similar to the industry series TCA270, but incorporates several improved features. In particular, improved white noise inversion and sync inversion systems force overshoots in the video waveform to be returned to accurately defined potentials. This design effectively removes dependence on both the degree of overshoot and temperature variations. In addition, reduced current consumption assures lower over-all power dissipation, thereby improving reliability.

The three types are electrically identical in most parameters. The CA270B has the most stringent limits on white level, video inversion, and afc dc offset. The CA270C has the least stringent limits on white level and video inversion, and no afc limits.

The CA270 series is supplied in a 16-lead staggered quad-in-line plastic package ("W" suffix).



Terminal assignment.

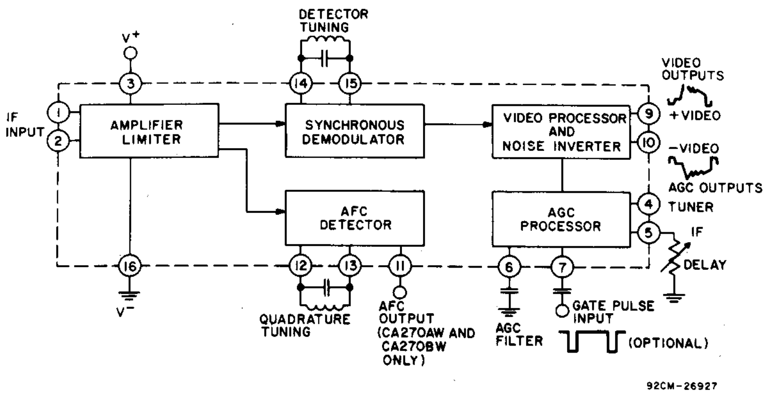


Fig. 1—Functional block diagram of CA270AW, CA270BW, and CA270CW TV synchronous demodulator.

CA270

MAXIMUM RATINGS,
Absolute-Maximum Values at T_A=25°C:

DC SUPPLY VOLTAGE (Between Terminals 3 and 16 for 10 s max., with current limited to 100 mA) .... 18 V

DEVICE DISSIPATION:
Up to T_A = 55°C .... 750 mW
Above T_A = 55°C ... derate linearly 7.9 mW/°C

OPERATING TEMPERATURE RANGE .... −40 to +55°C

STORAGE TEMPERATURE RANGE .... −65 to +150°C

LEAD TEMPERATURE (During Soldering)
At distance 1/16" ± 1/32" (1.59 ± 0.79 mm) from case for 10 s max. .... +265°C

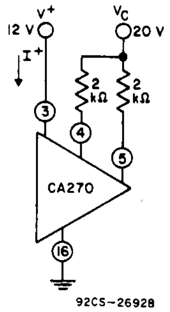


Fig. 2—Supply-current test circuit.

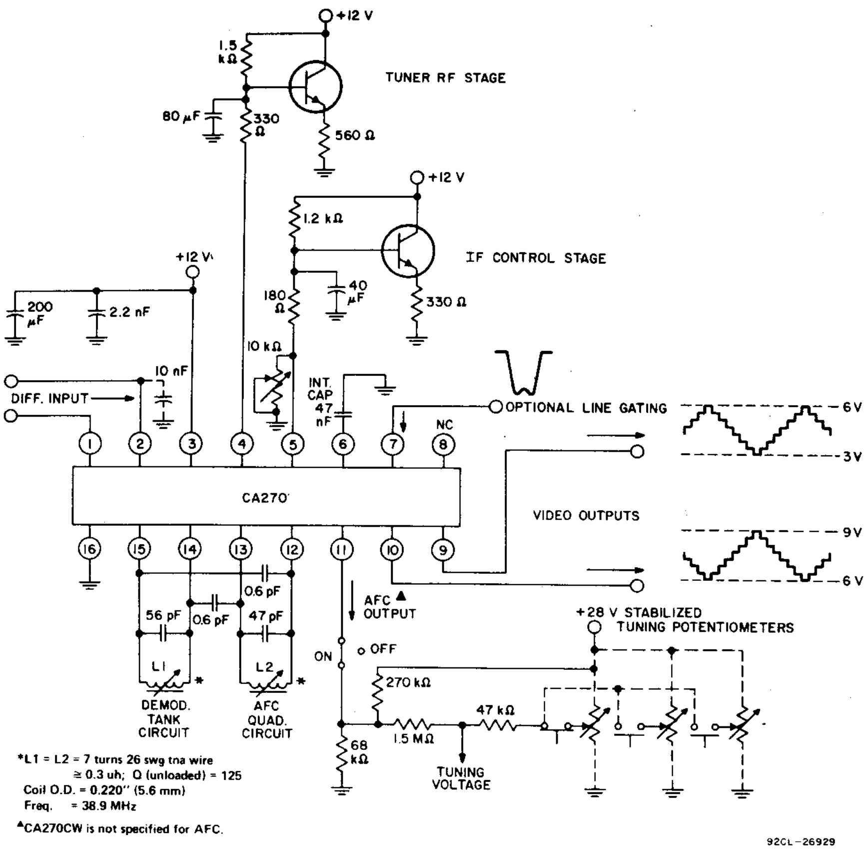


Fig. 3—Typical application circuit for CA270AW and CA270BW.

ELECTRICAL CHARACTERISTICS at T_A = 25°C, Supply Voltage (V^+) = 12 V, and Referenced to Test Circuit (Fig. 4).

CHARACTERISTIC	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
Supply Voltage, V^+	V^+=12 V		10.2	12	13.8	V
Supply Current, I^+ (See Fig. 2)	V^+=12 V		22	40	56	mA
Video Characteristics:						
DC Output Voltage, Term.9 (See Fig. 5)	Zero Signal	CA270AW	5.7	6	6.3	V
		CA270BW	5.8	6	6.2	
		CA270CW	5.5	6	6.5	
DC Output Voltage, Term.10 (See Fig. 5)	Zero Signal	CA270AW	5.6	6	6.4	V
		CA270BW	5.7	6	6.3	
		CA270CW	5.5	6	6.5	
Sync Tip Output Voltage, Term.9	Output=AGC threshold (non-gated)		–	3	–	V
AC Input Voltage, Terms.1,2	Input for output= AGC threshold		50	70	100	mV
Input Res.,Term.1			–	3.3	–	KΩ
Input Res., Term.2			–	3.3	–	KΩ
Video Bandwidth, Term.9	At output = –3 dB		–	5	–	MHz
Differential Gain	See Note 1		–	–	10	%
Differential Phase	See Note 1		–	–	10	deg
Intermod. Products:						
Beat Freq.,1.6 MHz	See Note 1 (95% sat. blue colour bar)		–	–	–60	dB
Beat Freq.,2.8 MHz			–	–	–67	dB
Rejection at Carrier Freq., Terms.9,10,11	F=Video Carrier;V_{IN} for Term.9(dc)=3.7V		–40	–	–	dB
Rejection,Twice Carrier Freq.,Terms.9,10,11	F=2X Video Carrier; V_{IN} for Term.9(dc) =3.7 V		–40	–	–	dB
AGC Characteristics:						
Sat.Voltage, Term.4	Zero Sig.; I_4 = 10 mA		–	–	0.3	V
Sat. Voltage, Term.5	Zero Sig.; I_5 = 10 mA		0.7	–	1.2	V
Breakdown Voltage, Terms. 4,5	I_4 or I_5=1 mA (sink)		14	–	–	V
Control Current, Terms. 4,5			10	–	–	mA
Current Ratio I_4/I_5	I_5 = 1 mA		6	–	–	
Input Signal Increase with resp. to AGC Threshold (See Fig.7)	AGC from threshold to max.		–	–	0.5	dB
AGC Gating Pulse Input, Term. 7 (optional)	Pulse voltage=$V^+$to 0; See Note 2		2	–	V^+	V
Input Res.,Term.7			–	1.8	–	KΩ
AFC Characteristics: (See Fig. 6)						
Output Voltage, Term. 11	f = f_o ± 0.2 MHz	CA270AW	10	–	–	V_{p-p}
		CA270BW	10	–	–	
		CA270CW	–	–	–	
Output Voltage, Term. 11	f = f_o ± 1.2 MHz	CA270AW	10	–	–	V_{p-p}
		CA270BW	10	–	–	
		CA270CW	–	–	–	
DC Offset Voltage, Term. 11	Zero Sig.; measured across R_L = 50 KΩ to +6 V	CA270AW	–1.7	–	1.7	V
		CA270BW	–1	–	1	
		CA270CW	–	–	–	

Note 1: CCIR modulation system, peak white = 10% carrier. Note 2: Maximum pulse amplitude must never exceed the supply voltage (V^+).

ELECTRICAL CHARACTERISTICS at T_A = 25°C, Supply Voltage (V^+) = 12 V, (Cont'd) and Referenced to Test Circuit (Fig. 4).

CHARACTERISTIC	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
Noise Inverter Characteristics: Inversion Threshold, Term. 9	Positive noise pulses		–	6.6	–	V
Inversion Threshold, Term. 9	Negative noise pulses		–	2.2	–	V
Noise Inversion Sensitivity, Term. 9	Signal inversion threshold for complete inversion		–	10	–	mV
Video Inversion Characteristics: Video Inversion, Term. 9 (at low carrier levels)	Carrier increase from 0 to 5 mV (appx.8% carrier)	CA270AW	–	–	0.2	V
		CA270BW	–	–	0.1	V
		CA270CW	–	–	0.3	V

APPLICATIONS

The diagram shown in Fig. 3 is typical of the type of circuit used in a practical application of the CA270 series devices.

Video Detector

The if input signal may be applied push-pull to terminals 1 and 2, or single-ended to either terminal 1 as shown, or to terminal 2. These input terminals are internally biased.

The detector tank circuit can be tuned by applying a 50 mV cw signal of video if frequency to the input and adjusting the inductor L1 for maximum differential output between terminals 9 and 10. The input signal is then reduced to 25 mV and L1 is re-adjusted for maximum output.

AFC Detector

The afc quadrature tank circuit should be tuned only after the detector adjustment has been made. Using the same input signal, inductor L2 should be adjusted for 6 V dc output at terminal 11. The 0.5-pF quadrature phase-shift coupling capacitors can affect symmetry and actual values will depend on the layout used. When L1 and L2 are properly tuned, the output swing at terminal 11 will be 10 volts minimum for frequencies of ±0.2 MHz to ±1.2 MHz about the if carrier frequency.

AGC Detector

The agc threshold, corresponding to sync tip level, is approximately 3 volts at terminal 9. Full agc potential will be developed if the input signal increases by 0.5 dB maximum with respect to the threshold value. The agc control at terminal 4 is intended for tuner control. The agc control at terminal 5 is for forward agc control of n-p-n transistors in the if amplifier. When sinking 10 mA, the zero-signal agc voltage at terminal 4 is 0.3 volt maximum; at terminal 5, it is 1.2 volts maximum.

The design of the device is such that the sink current at terminal 4 is a minimum of 6 times that at terminal 5. The rf agc sink current begins to decrease when the if sink current is about one-sixth of that required to saturate the rf agc output at terminal 4. The rf agc delay may be adjusted by means of a variable resistor between terminal 5 and ground. This adjustment modifies the if system gain, thus affecting the rf delay threshold. At maximum gain the current into terminal 5 is large compared to the current in the variable resistor and adjustment is ineffective. As the signal increases and rf agc is applied, the terminal 5 sink current approaches zero and the if agc is determined by the value of the variable resistor.

A horizontal gating pulse may be applied to terminal 7 to gate the agc detector. The agc threshold (sync tip) decreases approximately 0.3 volt at terminal 9 when gating is used. The gating pulses must be negative-going with a recommended minimum amplitude of 3 volts. They may be ac or dc coupled, but the maximum peak value must not exceed the dc supply voltage at terminal 3. If dc coupling is used, the potential during flyback should be less than 0.5 volt and during scan, greater than 1.5 volts.

Noise Inverter

Noise pulses in excess of 6.6 volts at terminal 9, which would result in "white spots", are processed in the device by inverting and clamping them to near black level (approx. 3.6 V). Noise pulses at levels of less than 2.2 volts at terminal 9 which would result in sync noise interference, are inverted and returned to black level.

Complete inversion occurs for signals 10 mV above the inversion threshold.

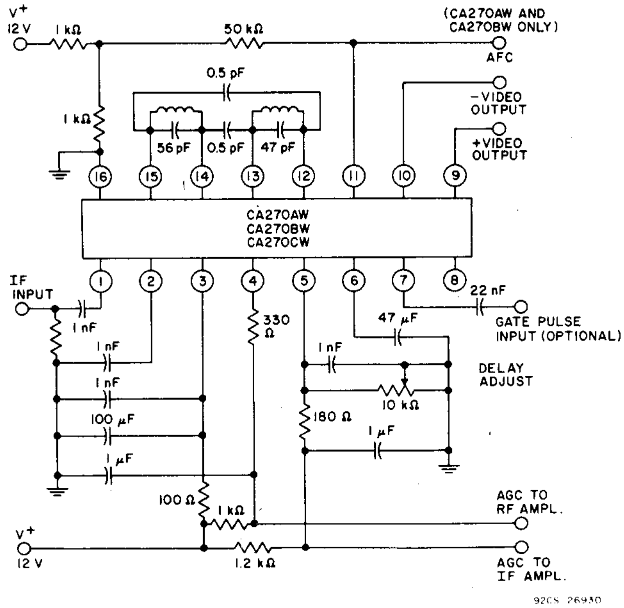


Fig. 4–Test circuit for CA270AW, CA270BW, and CA270CW.

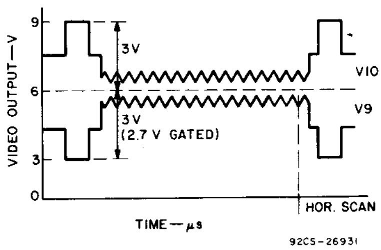


Fig. 5–Typical waveforms for video outputs.

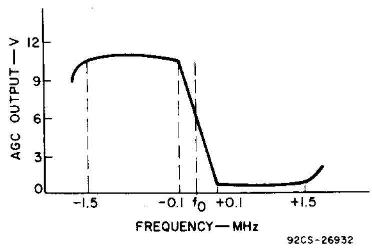


Fig. 6–Typical AFC characteristic.

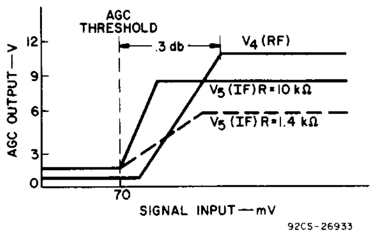


Fig. 7–Typical AGC characteristics.

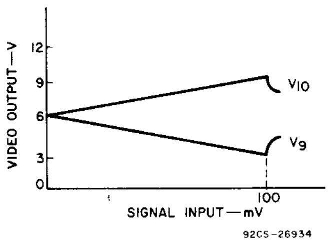


Fig. 8–Typical transfer characteristics.