MC1330P

VIDEO DETECTOR

MONOLITHIC LOW-LEVEL VIDEO DETECTOR

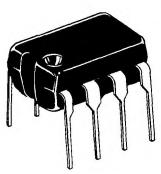
. . . an integrated circuit featuring very linear video characteristics, wide bandwidth. Designed for color and monochrome television receivers, replacing the third IF, detector, video buffer and the AFC buffer.

- Conversion Gain – 34 dB typ
- Video Frequency Response @ 6.0 MHz < 1.0 dB
- Input of 36 mV Produces 3.0 Vp-p Output
- High Video Output – 7.7 Vp-p
- Fully Balanced Detector
- High Rejection of IF Carrier
- Low Radiation of Spurious Frequencies

LOW-LEVEL VIDEO DETECTOR

MONOLITHIC SILICON

INTEGRATED CIRCUIT



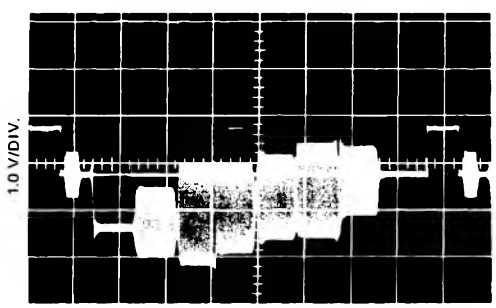
PLASTIC PACKAGE
CASE 626

MAXIMUM RATINGS (T_A = +25°C unless otherwise noted)

Rating	Value	Unit
Power Supply Voltage	+24	Vdc
Supply Current	26	mAdc
Input Voltage	1.0	V(rms)
Power Dissipation (Package Limitation) T_A = +25°C Derate above T_A = +25°C	 625 5.0	 mW mW/°C
Operating Temperature Range (Ambient)	0 to +75	°C
Storage Temperature Range	-65 to +150	°C

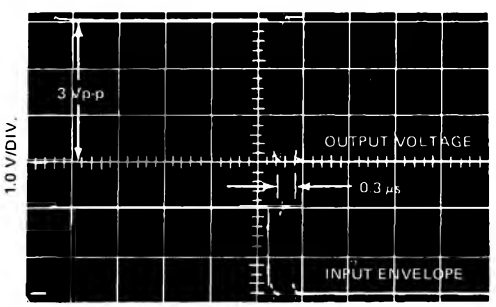
Maximum Ratings as defined in MIL-S-19500, Appendix A.

FIGURE 1 – DETECTED COLOR BARS



7.5 μs/DIV.

FIGURE 2 – PULSE RESPONSE



1.0 μs/DIV.

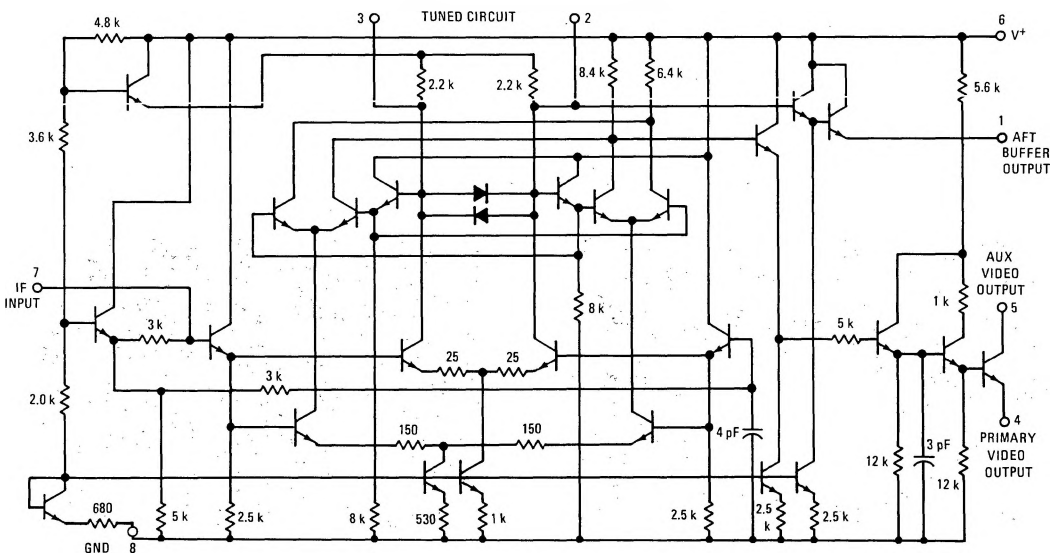
See Packaging Information Section for outline dimensions.

ELECTRICAL CHARACTERISTICS (V^+ = 20 Vdc, Q = 30, f_C = 45 MHz, T_A = +25°C unless otherwise noted.)

Characteristic	Pin	Min	Typ	Max	Unit
Supply Voltage Range	6	12	20	24	Vdc
Supply Current	5,6	–	15	–	mA
Zero Signal dc Output Voltage	4	6.8	7.7	8.3	Vdc
Maximum Signal dc Output Voltage	4	–	0	–	Vdc
Input Signal Voltage for 3.0 Vp-p Video Output (90% Modulation)	7	–	36	–	mV(rms)
Maximum Output Voltage Swing	4	–	7.7	–	Vp-p
Carrier Rejection at Output	4	42	60	–	dB
Carrier Output Voltage (at 3.0 Vp-p output) $f_{out} = f_C$ $f_{out} = 2f_C$		 – –	 1.0 3.0	 – –	mV(rms)
3.0 dB Bandwidth of IF Carrier	7	–	80	–	MHz
3.0 dB Bandwidth of Video Output	4	–	12.3	–	MHz
Input Resistance Input Capacitance	7	– –	3.5 3.0	– –	kilohms pF
Output Resistance	4	–	180	–	ohms
Internal Resistance Internal Capacitance } (across tuned circuit)	2,3	– –	4.4 1.0	– –	kilohms pF
AFT Buffer Output at Carrier Frequency ①	1	–	350	–	mVp-p
AFT Buffer dc Level	1	–	6.5	–	Vdc

① Measured with 10 times probe.

FIGURE 3 – CIRCUIT SCHEMATIC



TYPICAL CHARACTERISTICS
(T_A = +25°C unless otherwise noted)

FIGURE 4 – TEST CIRCUIT

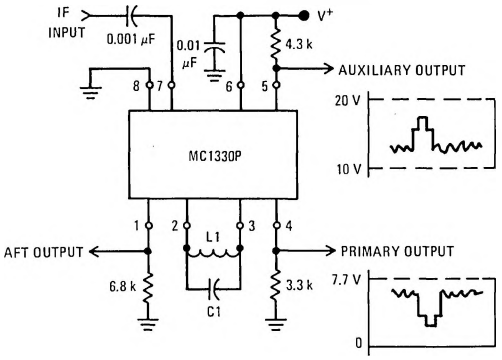


FIGURE 5 – OUTPUT VOLTAGE

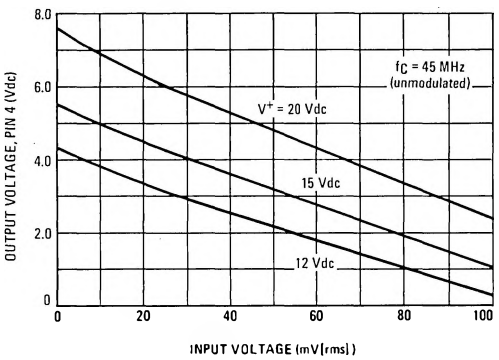


FIGURE 6 – OUTPUT VOLTAGE

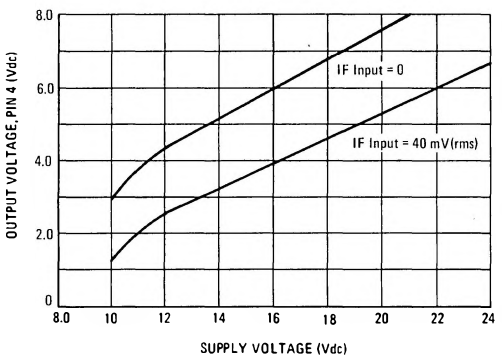


FIGURE 7 – DETECTOR LINEARITY

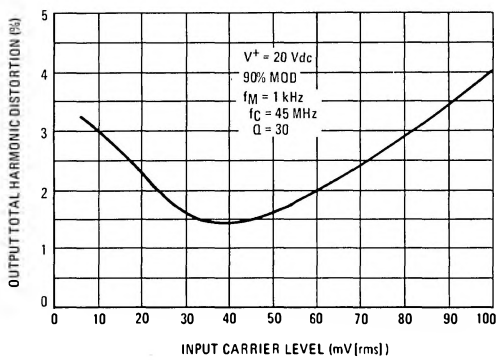


FIGURE 8 – VIDEO FREQUENCY RESPONSE

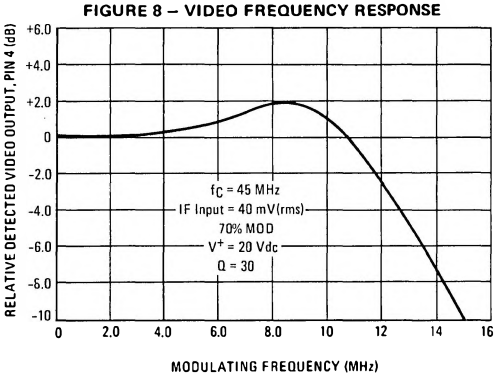
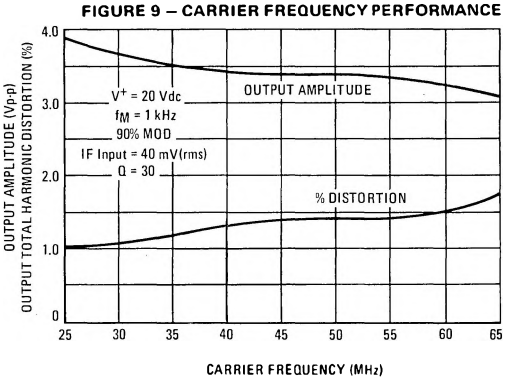
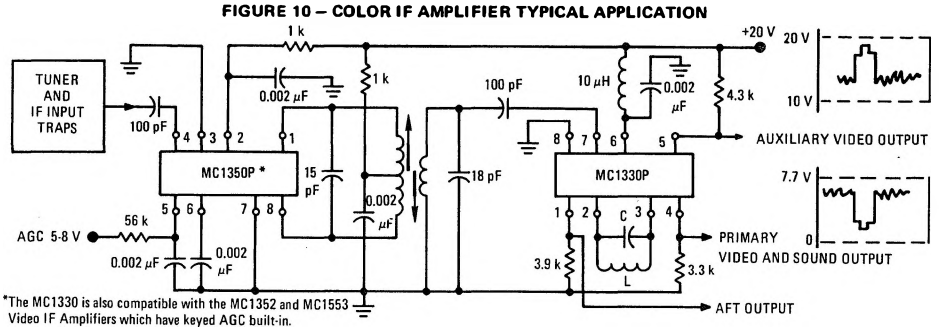


FIGURE 9 – CARRIER FREQUENCY PERFORMANCE



APPLICATIONS INFORMATION

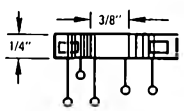
FIGURE 10 – COLOR IF AMPLIFIER TYPICAL APPLICATION



TV-IF Amplifier Information

A very compact high performance IF amplifier constructed as shown in Figure 11minimizes the number of overall components and alignment adjustments. It can be readily combined with normal tuners and input tuning-trapping circuitry to provide the performance demanded of high quality receivers. This configuration will provide approximately 84 dB voltage gain and can accomodate the usual low impedance input network or, if desired, can take advantage of an impedance step-up from tuner to MC1350P input ($Z_{in} \approx 7.0$ kilohms). The burden of selectivity, formerly found between the third IF and detector, must now be placed at the interstage. The nominal 3 volt peak-to-peak output can be varied from 0 to 7.0 V with excellent linearity and freedom from spurious output products.

FIGURE 11 – TRANSFORMER



Primary Winding: 8 turns of AWG #26 close wound, CT
Secondary Winding: 6 turns of AWG #26 close wound, CT
Core: Arnold Type TH slugs or equiv.

Alignment is most easily accomplished with an AM generator, set at a carrier frequency of 45.75 MHz, modulated with a video frequency sweep. This provides the proper realistic conditions necessary to operate the low-level detector (LLD). The detector tank is first adjusted for maximum detected dc (with a CW input), next, the video sweep modulation is applied and the interstage and input circuits aligned, step by step, as in a standard IF amplifier.

Note: A normal IF sweep generator, essentially an FM generator, will not serve properly without modification. The LLD tank attempts to "follow" the sweep input frequency, and results in variations of switching amplitude in the detector. Hence, the apparent overall response becomes modified by the response of the LLD tank, which a real signal doesn't do.

This effect can be prevented by resistively adding a 45.75 MHz CW signal to the output of the sweep generator approximately 3 dB greater than the sweep amplitude.

MC1330P General Information

The MC1330P offers the designer a new approach to an old problem. Now linear detection can be performed at much lower power signal levels than possible with a detector diode.

Offering a number of distinct advantages, its easy implementation should meet with ready acceptance for television designs. Some specific features and information on systems design with this device are given below:

1. The device provides excellent linearity of output versus input, as shown in Figure 6. This graph also shows that video peak-to-peak amplitude (ac) does not change with supply voltage variation. (Slopes are parallel. Visualize a given variation of input CW and use the figure as a transfer function.)
2. The dc output level does change linearly with supply voltage. This can be accommodated by regulating the supply or by referencing the subsequent video amplifier to the same power supply.
3. The choice of Q for the tuned circuit of pins 2 and 3 is not critical. The higher the Q, the better the rejection of 920 kHz products but the more critical the tuning accuracy required. Values of Q from 20 to 50 are recommended. (Note the internal resistance.)
4. A video output with positive-going sync is available at pin 5 if required. This signal has a higher output impedance than pin 4 so it must be handled with greater care. If not used, pin 5 may be connected directly to the supply voltage (pin 6).
5. An AFT output (pin 1) provides 350 mV of clipped carrier output, sufficient voltage to drive an AFT ratio detector, with only one additional stage.