# MC1352

## ORDERING INFORMATION

| Device | Temperature Range | Package |
|---|---|---|
| MC1352P | 0°C to +70°C | Plastic DIP |

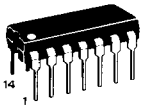
## TV VIDEO IF AMPLIFIER WITH AGC AND KEYER CIRCUIT

. . . a monolithic IF amplifier with a complete gated wide-range AGC system for use as the 1st and 2nd IF stages and AGC keyer and amplifier in color or monochrome TV receivers.

- Power Gain at 45 MHz, 52 dB typ
- Extremely Low Reverse-Transfer Admittance – << 1.0 μmho typ
- Nearly Constant Input and Output Admittance Over AGC Range
- Single-Polarity Power-Supply Operation
- High-Gain Gated AGC System for Either Positive or Negative-Going Video Signals
- Control Signal Available for Delayed AGC of Tuner

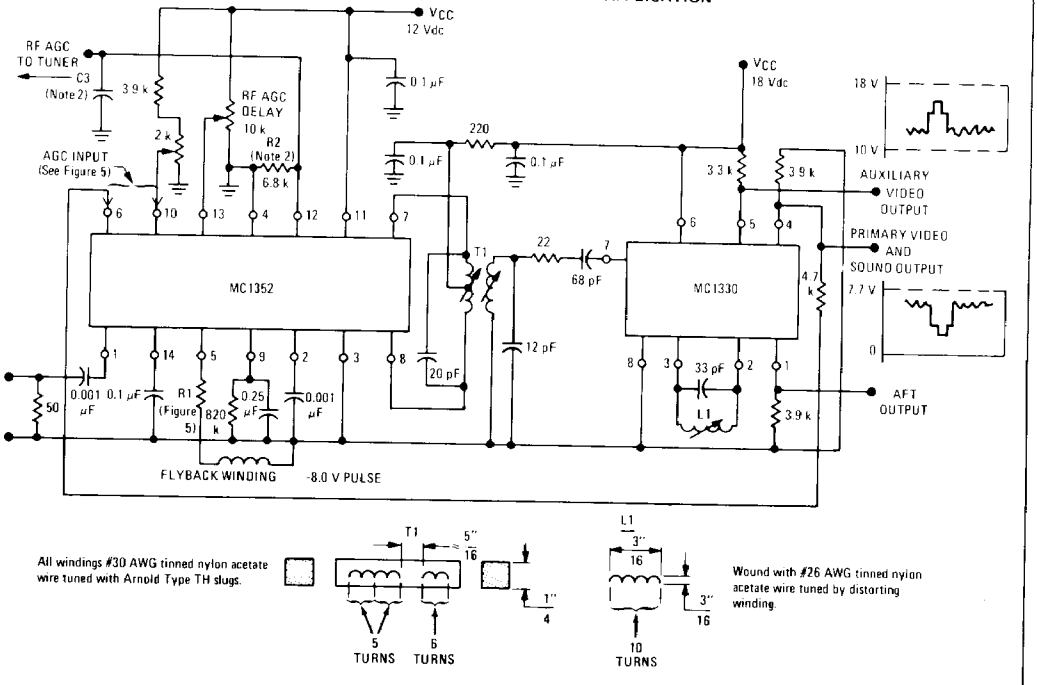
**TV VIDEO IF AMPLIFIER WITH AGC AND KEYER CIRCUIT**

**SILICON MONOLITHIC INTEGRATED CIRCUIT**




**P SUFFIX**
PLASTIC PACKAGE
CASE 646-05

FIGURE 1 – TYPICAL VIDEO IF AMPLIFIER APPLICATION



**MAXIMUM RATINGS** (Voltages referenced to Pin 4, ground; $T_A$ = +25°C unless otherwise noted)

| Rating | Value | Unit |
|---|---|---|
| Power Supply (Pin 11) | +18 | Vdc |
| Output Supply (Pins 7 and 8) | +18 | Vdc |
| Signal Input Voltage (Pin 1 or 2, other pin ac grounded) | 10 | $V_{p-p}$ |
| AGC Input Voltage (Pin 6 or 10, other pin ac grounded) | +6.0 | Vdc |
| Gating Voltage, Pin 5 | +10, -20 | Vdc |
| Power Dissipation<br>Derate above $T_A$ = +25°C | 625<br>5.0 | mW<br>mW/°C |
| Operating Temperature Range | 0 to +70 | °C |
| Storage Temperature Range | -55 to +150 | °C |

**ELECTRICAL CHARACTERISTICS** ($V_{CC}$ = +12 Vdc, Voltages referenced to pin 4, ground, $T_A$ = +25°C unless otherwise noted.)

| Characteristic | Min | Typ | Max | Unit |
|---|---|---|---|---|
| AGC Range | | 75 | – | dB |
| Power Gain<br>f = 35 MHz or 45 MHz<br>f = 58 MHz | –<br>– | 52<br>50 | –<br>– | dB |
| Maximum Differential Output Voltage Swing<br>0 dB AGC<br>-30 dB AGC | – | 16.8<br>8.4 | – | $V_{p-p}$ |
| Voltage Range for RF-AGC at Pin 12<br>Maximum<br>Minimum | – | 7.0<br>0.2 | –<br>– | Vdc |
| IF Gain Change Over RF-AGC Range | – | 10 | – | dB |
| Output Stage Current ($I_7 + I_8$) | | 5.7 | – | mAdc |
| Total Supply Current ($I_7 + I_8 + I_{11}$) | | 27 | 35 | mAdc |
| Total Power Dissipation | – | 325 | 370 | mW |

**DESIGN PARAMETERS, TYPICAL VALUES** ($V_{CC}$ = 12 Vdc, $T_A$ = +25°C unless otherwise noted.)

| Parameters | Symbol | f = 35 MHz | f = 45 MHz | f = 58 MHz | Unit |
|---|---|---|---|---|---|
| Single-Ended Input Admittance | $g_{11}$<br>$b_{11}$ | 0.55<br>2.25 | 0.70<br>2.80 | 1.1<br>3.75 | mmhos |
| Input Admittance Variations with AGC (0 to 60 dB) | $\Delta g_{11}$<br>$\Delta b_{11}$ | 50<br>0 | 60<br>0 | –<br>– | μmhos |
| Differential Output Admittance | $g_{22}$<br>$b_{22}$ | 20<br>430 | 40<br>570 | 75<br>780 | μmhos |
| Output Admittance Variations with AGC (0 to 60 dB) | $\Delta g_{22}$<br>$\Delta b_{22}$ | 3.0<br>80 | 4.0<br>100 | – | μmhos |
| Reverse Transfer Admittance | $\lvert y_{12} \rvert$ | <<1.0 | <<1.0 | <<1.0 | μmho |
| Forward Transfer Admittance<br>Magnitude<br>Angle (0 dB AGC)<br>Angle (-30 dB AGC) | $\lvert y_{12} \rvert$<br>$\angle y_{21}$<br>$\angle y_{21}$ | 260<br>-73<br>-52 | 240<br>-100<br>-72 | 210<br>-135<br>-96 | mmhos<br>degrees |
| Single-Ended Input Capacitance | – | 9.5 | 10 | 10.5 | pF |
| Differential Output Capacitance | – | 2.0 | 2.0 | 2.5 | pF |

FIGURE 2 – CIRCUIT SCHEMATIC
KEYER AND AGC AMPLIFIER

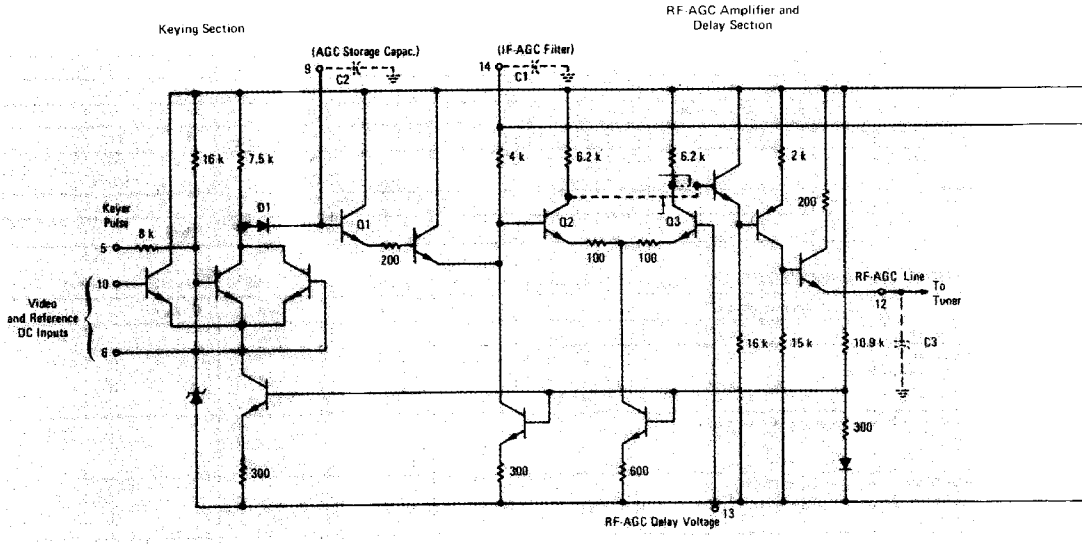
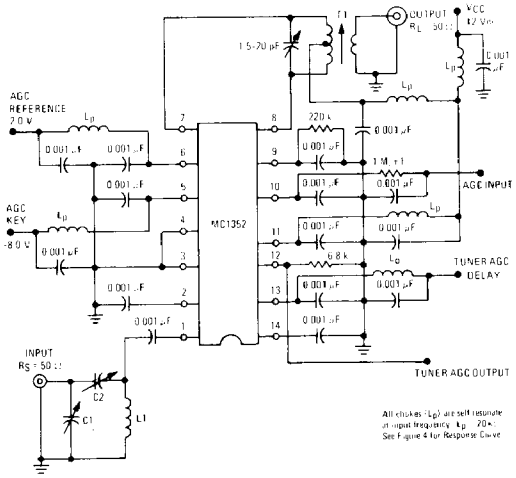



FIGURE 3 – POWER GAIN, AGC AND NOISE TEST CIRCUIT




All chokes (Lp) are self resonate at input frequency. Lp ± 20%. See Figure 4 for Response Curve.

| | 35 and 45 MHz | | | 58 MHz | | |
|---|---|---|---|---|---|---|
| L1 | 0.4 µH | Q | 100 | 0.2 µH | Q | 100 |
| T1 | 1.3-3.4 µH | Q | 100 @ 2 µH | 1.2-3.8 µH | Q | 100 @ 2 µH |
| C1 | 48-100 pF | | | 40-80 pF | | |
| C2 | 8-60 pF | | | 12-45 pF | | |

L1 and T1 = #26 AWG Tinned Nylon Acetate Wire

L1 @ 35 or 45 MHz = 7 1/4 Turns on a 1/4" coil form
@ 58 MHz = 6 Turns on a 1/4" coil form
T1 Primary Winding = 18 Turns on a 1/4" coil form
Secondary Winding = 2 Turns Wound Evenly over Primary Winding for 35 or 45 MHz and 1 Turn for 58 MHz
Slug = Arnold TH Material 1/2" long

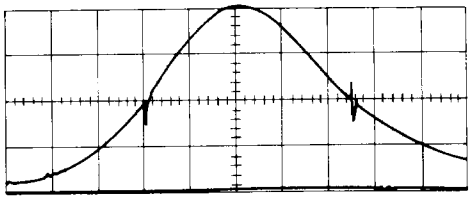
## GENERAL OPERATING INFORMATION

The MC1352, consists of an AGC section and an IF signal amplifier (Figure 2) subdivided into different functions as indicated by the illustration.

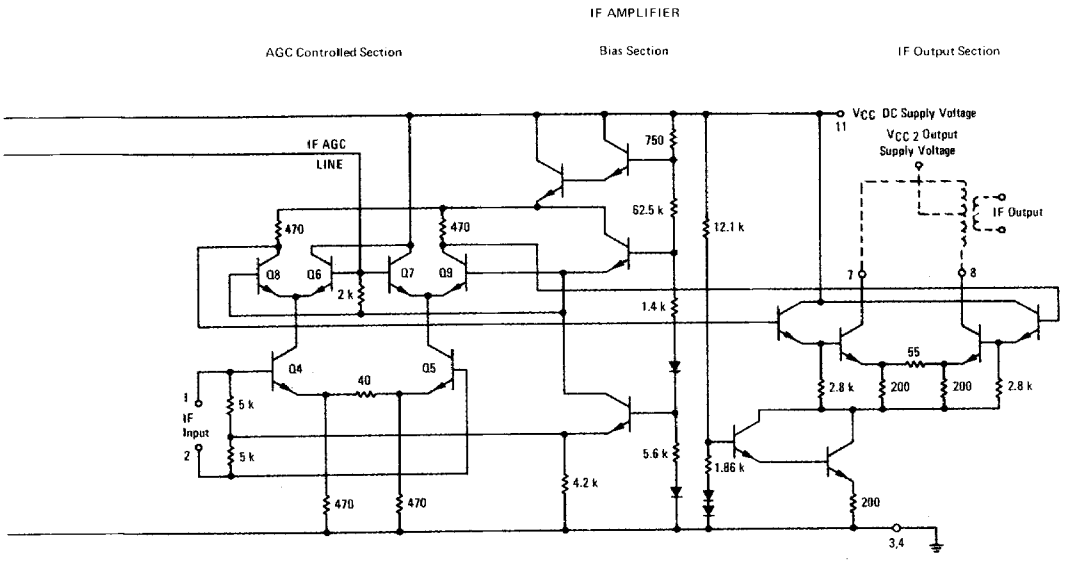
A gating pulse, a reference level, and a composite video signal are required for proper operation of the AGC section. Either positive or negative-going video may be used; necessary connections and signal levels are shown in Figure 1. The essential difference is that the video is fed into Pin 10 and AGC reference level is applied to Pin 6 for a video signal with positive-going sync while the input connections are reversed for negative-going sync.

The action of the gating section is such that the proper voltage, $V_C$,

FIGURE 4 – TEST CIRCUIT RESPONSE CURVE
(45 and 58 MHz)



Scale: 1 MHz/cm




is maintained across the external capacitor, C2, for a particular video level and dc reference setting. The voltage $V_C$, is the result of the charge delivered through D1 and the charge drained by Q1. The charge delivered occurs during the time of the gating pulse, and its magnitude is determined by the amplitude of the video signal relative to the dc reference level. The voltage $V_C$ is delivered via the IF-AGC amplifier and applied to the variable gain stage of the IF signal amplifier and is also applied to the RF-AGC amplifier, where it is compared to the fixed RF-AGC delay voltage reference by the differential amplifier, Q2 and Q3. The following stages amplify the output signal of Q2 and shift the dc levels causing the RF-AGC voltage to vary.

The input amplifiers (Q4 and Q5) operate at constant emitter currents so that input impedance remains independent of AGC action. Input signals may be applied single-ended or differentially (for ac). Terminals 1 and 2 may be driven from a transformer, but a dc path from either terminal to ground is not permitted.

AGC action occurs as a result of an increasing voltage on the base of Q6 and Q7 causing those transistors to conduct more heavily thereby shunting signal current from the interstage amplifiers Q8 and Q9. The output amplifiers are fed from an active current source to maintain constant quiescent bias thereby holding output admittance nearly constant.

**NOTES:**

1. The 12-V supply must have a low ac impedance to prevent low-frequency instability in the RF-AGC loop. This can be achieved by a 12-V zener diode and a large decoupling capacitor. (5 μF).
2. Choices of C1, C2 and C3 depend somewhat on the set designers' preference concerning AGC stability versus AGC recovery speed. Typical values are C1 = 0.1 μF, C2 = 0.25 μF, C3 = 10 μF.
3. To set a fixed IF-AGC operating point (e.g., for receiver alignment) connect a 22 kΩ resistor from pin 9 to pin 11 to give minimum gain, then bias pin 14 to give the correct operating point using a 200 kΩ variable resistor to ground.
4. Although the unit will normally be operating with a very high power gain, the pin configuration has been carefully chosen so that shielding between input and output terminals will not normally be necessary even when a standard socket is used.

**FIGURE 5 – TYPICAL AGC APPLICATION CHART**

| Video Polarity | Pin 6 Voltage | Pin 10 Voltage | Pin 5 R1 (Ω) |
|---|---|---|---|
| Negative-Going Sync. | 5.5<br>2.0<br>0 | Adj. 1.0–4.0 Vdc<br>Nom 2.0 V | 0 |
| Positive-Going Sync. | Adj. 1.0–8.0 Vdc<br>Nom 4.5 V | 4.5<br>0 | 3.9 k |

## TYPICAL CHARACTERISTICS

($V_{CC}$ = +12 Vdc, $T_A$ = +25°C unless otherwise noted.)

FIGURE 6 – SINGLE-ENDED INPUT ADMITTANCE

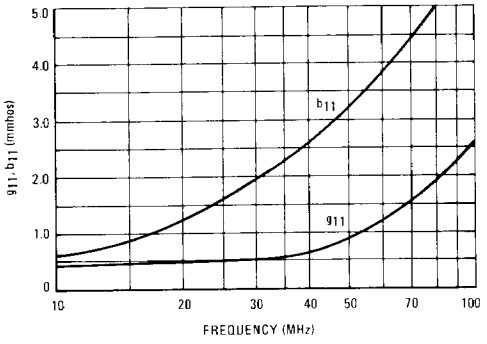



FIGURE 7 – DIFFERENTIAL OUTPUT ADMITTANCE

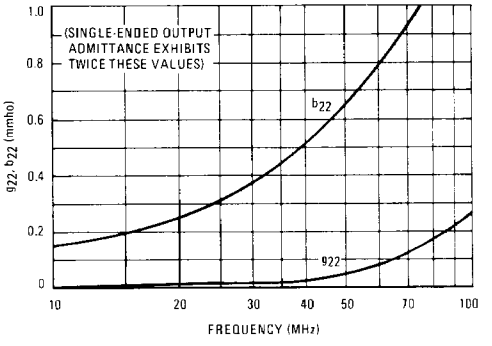



FIGURE 8 – FORWARD TRANSFER ADMITTANCE

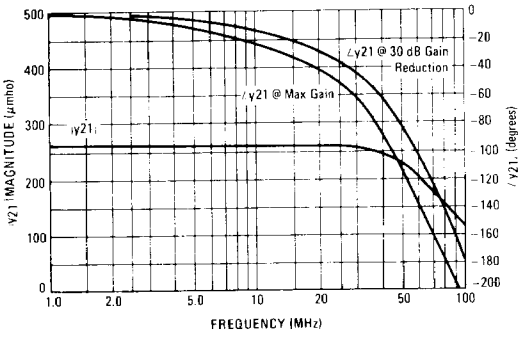



FIGURE 9 – DIFFERENTIAL OUTPUT VOLTAGE

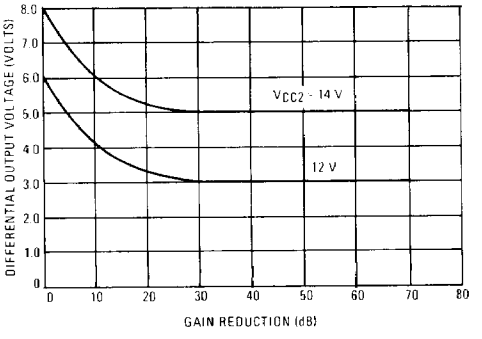



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FIGURE 10 – AGC CHARACTERISTICS

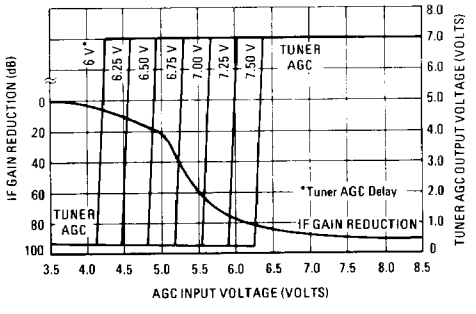


FIGURE 11 – TYPICAL NOISE FIGURE