

MC1510G MC1410G

HIGH-FREQUENCY CIRCUITS

MONOLITHIC WIDEBAND VIDEO AMPLIFIER

... designed for use as a high-frequency differential amplifier with operating characteristics that provide a flat frequency response from dc to 40 MHz.

- High Gain Characteristics
 $A_V = 93$ typ
- Wide Bandwidth — dc to 40 MHz typ
- Large Output Voltage Swing
4.5 V p-p typical @ ± 6.0 V Supply
- Low Output Distortion
THD $\leq 1.5\%$ typ

VIDEO AMPLIFIER INTEGRATED CIRCUIT

METAL PACKAGE
CASE 601
TO-99

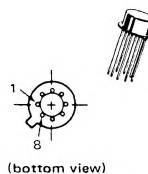


FIGURE 1 — VOLTAGE GAIN versus FREQUENCY

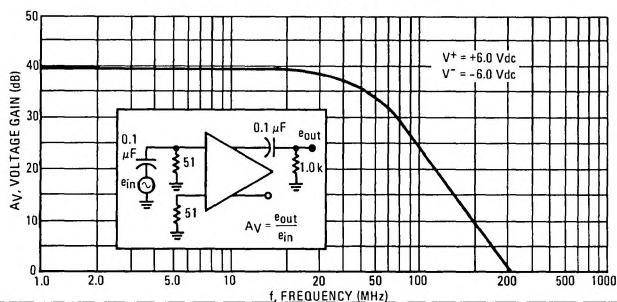
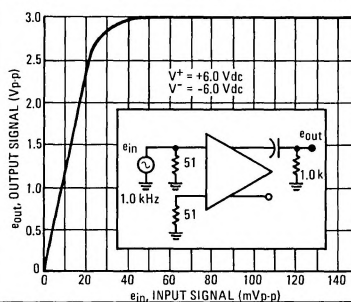
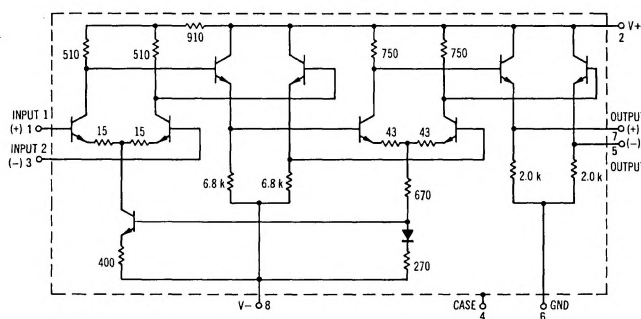


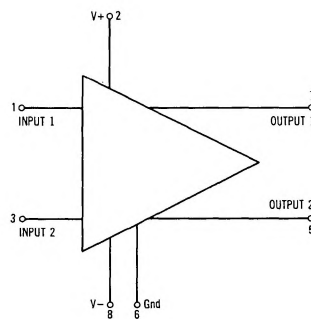
FIGURE 2 — LIMITING CHARACTERISTICS



CIRCUIT SCHEMATIC



EQUIVALENT CIRCUIT



MC1510G, MC1410G (continued)

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

Rating	Symbol	Value	Unit
Power Supply Voltage	V ⁺	+8.0	Vdc
	V ⁻	-8.0	Vdc
Differential Input Signal	V _{in}	±5.0	Volts
Common Mode Input Swing	CMV _{in}	±6.0	Volts
Load Current	I _L	10	mA
Output Short Circuit Duration	t _s	5.0	s
Power Dissipation (Package Limitation)	P _D	680	mW
Metal Can Derate above T _A = +25°C		4.6	mW/°C
Operating Temperature Range	T _A	0 to +75	°C
MC1410 MC1510		-55 to +125	
Storage Temperature Range	T _{stg}	-65 to +150	°C

ELECTRICAL CHARACTERISTICS (V⁺ = +6 Vdc, V⁻ = -6 Vdc, R_L = 5.0 kohms, T_A = +25°C unless otherwise noted)

Characteristic	Symbol	MC1510			MC1410			Unit
		Min	Typ	Max	Min	Typ	Max	
Single Ended Voltage Gain	A _{V(se)}	75	93	110	60	90	120	V/V
Output Impedance (f = 20 kHz)	Z _{out}	—	35	—	—	35	—	Ω
Input Impedance (f = 20 kHz)	Z _{in}	—	6.0	—	—	6.0	—	kΩ
Bandwidth (-3.0 dB)	BW	—	40	—	—	40	—	MHz
Output Voltage Swing (f = 100 kHz)	V _{out}	—	4.5	—	—	4.5	—	V _{p-p}
Single Ended Output Distortion (e _{in} < 0.2% Distortion)	THD	—	1.5	5.0	—	2.0	—	%
Input Common Mode Voltage Swing	CMV _{in}	—	±1.0	—	—	±1.0	—	V _{peak}
Common Mode Voltage Gain (e _{in} = 0.3 V rms, f = 100 kHz)	AVCM	-30	-45	—	-20	-40	—	dB
Common Mode Rejection Ratio	CM _{rej}	—	85	—	—	85	—	
Input Bias Current $\left(I_b = \frac{I_1 + I_2}{2} \right) \text{ Differential Output} = 0$	I _b	—	20	80	—	50	100	μA
Input Offset Current (I _{io} = I ₁ - I ₂)	I _{io}	—	3.0	20	—	5.0	30	μA
Output Offset Voltage Differential Mode (V _{in} = 0)	V _{out(DM)}	—	0.5	1.3	—	0.5	2.0	Vdc
Common Mode (Differential Output = 0)	V _{out(CM)}	2.6	3.1	3.5	2.0	3.0	4.0	
Step Response	t _f	—	9.0	12	—	10	15	ns
	t _{pd}	—	9.0	—	—	9.0	—	
	t _r	—	9.0	12	—	10	15	
Average Temperature Coefficient of Input Offset Voltage (R _S = 50 Ω, T _A = T _{low} * to T _{high} **)	TCV _{io}	—	±3.0	—	—	±3.0	—	μV/°C
		—	±6.0	—	—	±6.0	—	
DC Power Dissipation (Power Supply = ±6.0 V)	P _D	—	150	220	—	165	220	mW
Equivalent Average Input Noise Voltage (f = 10Hz to 500 kHz) (R _S = 0)	V _n	—	5.0	—	—	5.0	—	μV

*T_{low} = 0°C for MC1410
or -55°C for MC1510

**T_{high} = +75°C for MC1410 or
+125°C for MC1510

TYPICAL CHARACTERISTICS

($V^+ = +6.0$ Vdc, $V^- = -6.0$ Vdc, $T_A = +25^\circ\text{C}$ unless otherwise noted)

FIGURE 3
POWER DISSIPATION versus SUPPLY VOLTAGE

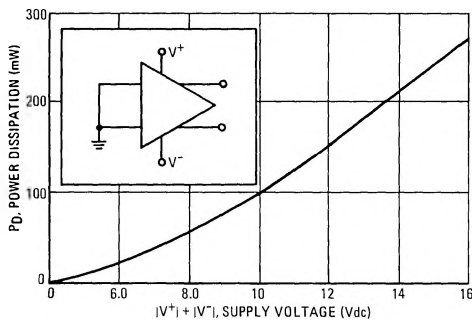


FIGURE 4
VOLTAGE GAIN versus SUPPLY VOLTAGE

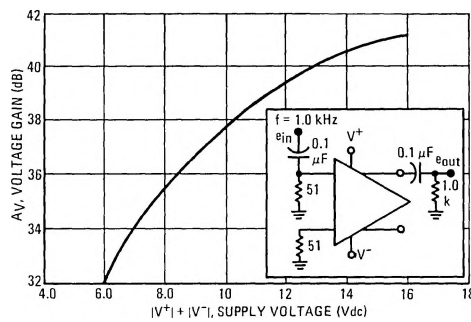


FIGURE 5
VOLTAGE GAIN versus TEMPERATURE

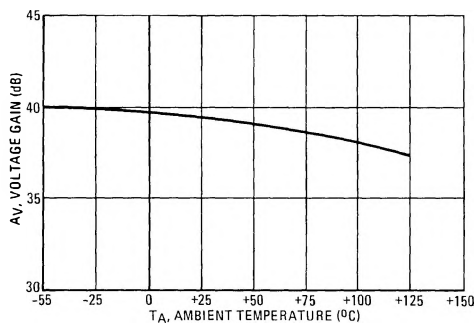


FIGURE 6
DC OUTPUT VOLTAGE versus TEMPERATURE

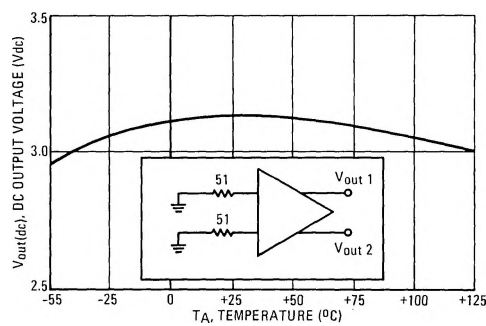


FIGURE 7
INPUT BIAS CURRENT versus TEMPERATURE

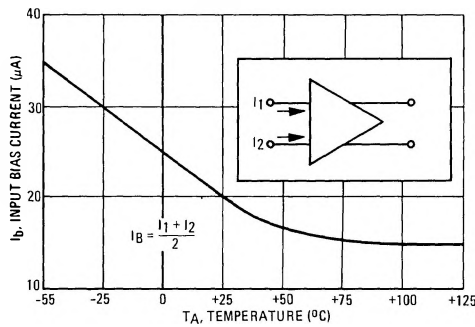
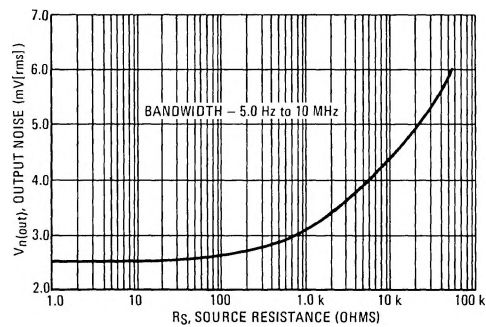


FIGURE 8
OUTPUT NOISE VOLTAGE versus SOURCE IMPEDANCE



TYPICAL APPLICATIONS

FIGURE 9
ENVELOPE DETECTOR

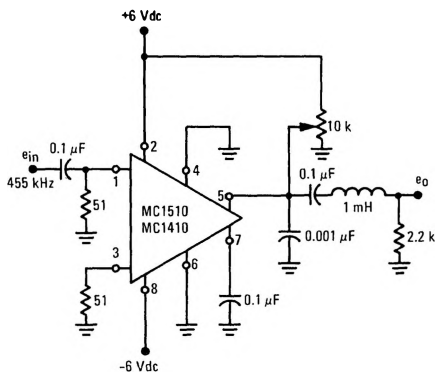


FIGURE 10
TWO STAGE VIDEO AMPLIFIER WITH ADJUSTABLE GAIN

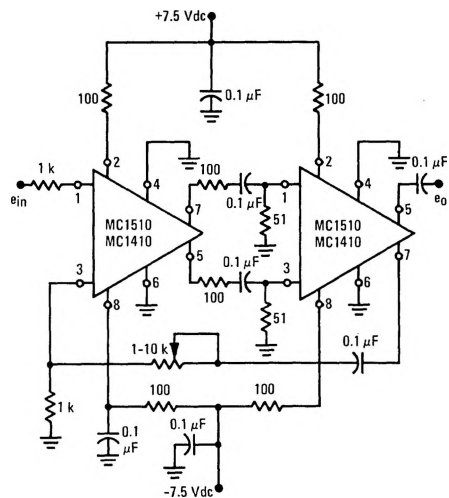


FIGURE 11
SINGLE STAGE WIDEBAND AMPLIFIER

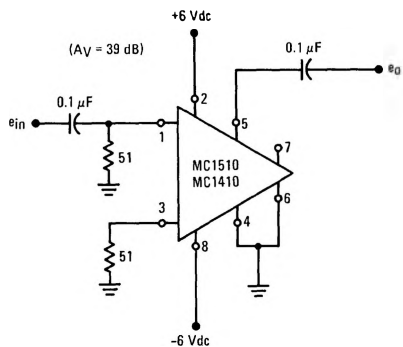


FIGURE 12
WEIN BRIDGE OSCILLATOR

