MFC6010

FM LIMITING IF AMPLIFIER

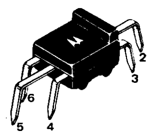
. . . a monolithic silicon integrated circuit designed especially for 10.7 MHz IF applications.

Highlights Include:

- High Stable Gain @ 10.7 MHz (40 dB typ)
- Low Feedback Capacitance ($|y_{12}|$ = 0.01 mmho typ)
- Non-Saturating Limiting (With Suitable Load)
- Compatible With CA3053 and µA703 (See Figures 7 and 8)

FM IF AMPLIFIER

Silicon Monolithic Functional Circuit



CASE 643A

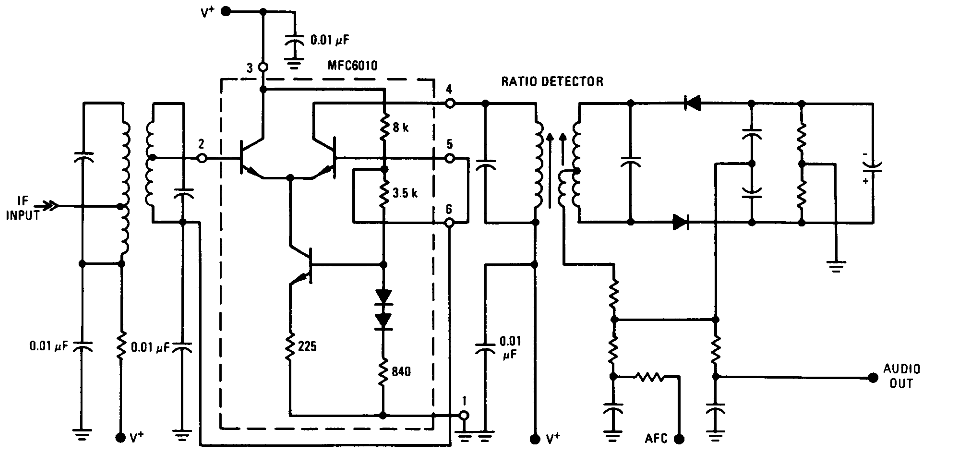
PLASTIC PACKAGE

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

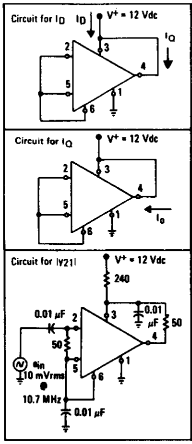
Rating	Symbol	Value	Unit
Power Supply Voltage	V^+	20	Vdc
Output Collector Voltage	V_4	20	Vdc
Input Voltage*	V_2, V_5	±5.0	Volts
Power Dissipation @ T_A = 25°C (Package Limitation)	P_D	1.0	Watt
Derate above 25°C	$1/\theta_{JA}$	10	mW/°C
Operating Temperature Range	T_A	-10 to +75	°C

*Differential Voltage Swing.

FIGURE 1 – Typical Application (10.7 MHz Limiting Amplifier)

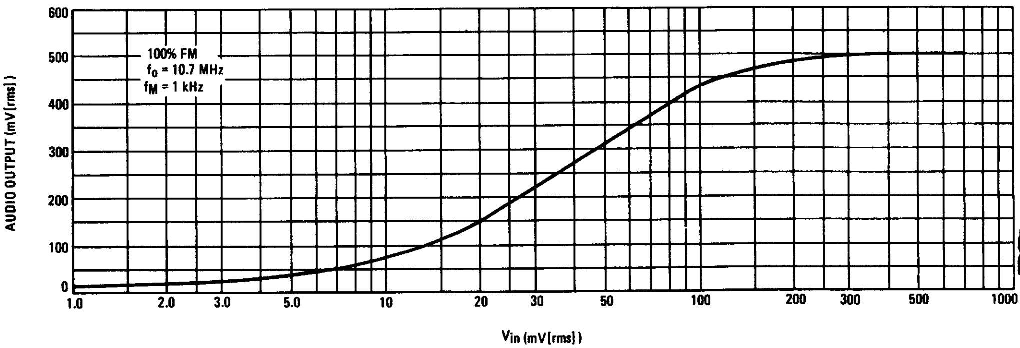


ELECTRICAL CHARACTERISTICS (V^+ = 12 Volts, f = 10.7 MHz, T_A = +25°C, unless otherwise noted.)



Characteristic	Symbol	Min	Typ	Max	Unit
Total Current Drain	I_D	–	–	10	mA
Output Quiescent Current	I_Q	1.75	3.2	5.0	mA
Output Saturation Voltage	V(sat)	–	3.5	–	Volts
Forward Transadmittance	$\|y_{21}\|$	25	–	–	mmhos
Reverse Transadmittance	$\|y_{12}\|$	–	0.01	–	mmho
Input Capacitance	C_{in}	–	6.0	–	pF
Input Conductance	G_{in}	–	0.4	–	mmho
Output Capacitance	C_{out}	–	2.5	–	pF
Output Conductance	G_{out}	–	35	–	µmhos
Noise Figure (R_S = 750 Ω)	N_F	–	7.0	–	dB
Maximum Stable Gain (Stern Factor = 3)	A_V	–	40	–	dB
Input Voltage (3.0 dB Limiting)	e_{in}	–	60	–	mV

FIGURE 2 – LIMITING CHARACTERISTICS



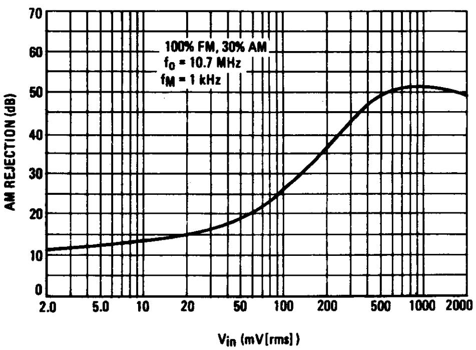
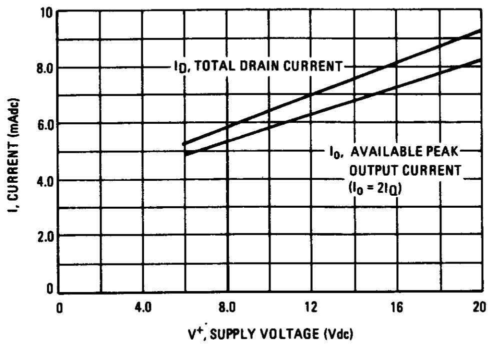
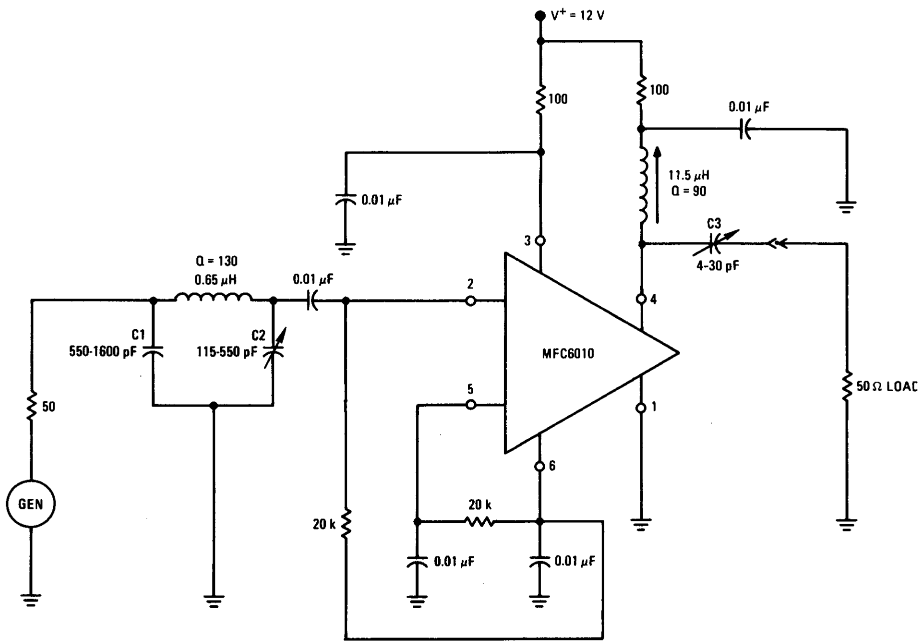


FIGURE 4 – CURRENT DRAIN AND OUTPUT CURRENT



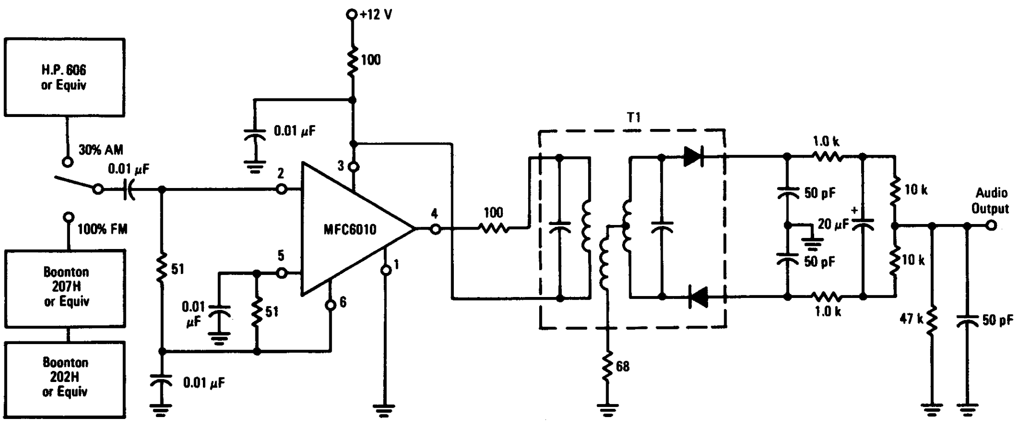
TEST CIRCUITS

FIGURE 5 – POWER-GAIN TEST CIRCUIT



Note: C1 (1000 pF nom), C2 (420 pF nom), C3 (20 pF nom) adjusted for maximum power gain.

FIGURE 6 – LIMITING AND AM REJECTION TEST CIRCUIT



T1 – Ratio Detector Primary Impedance ≈ 1.5 kΩ

APPLICATIONS INFORMATION

Because of the low reverse transfer admittance of the MFC6010, stability will be dependent mainly upon circuit layout. With careful design, very high gain (in the order of 40 dB) may be achieved at 10.7 MHz. The bias and supply currents may be varied from their normal values (shown in Figure 4) by shunting additional resistance from pin 6 to ground or to the supply line.

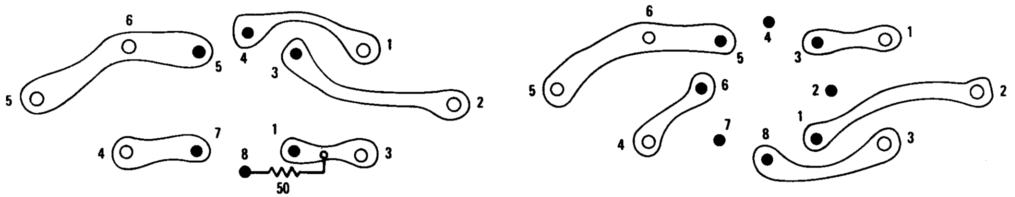
Although less gain may be realized when using the MFC6010 as a limiter, it is recommended that it be operated in a non-saturated mode. This mode of operation results in a high output impedance at limiting. Therefore the operation of the demodulator circuit is not subject to variable loading of the limiter output.

In order to avoid driving the amplifier transistor components of the MFC6010 into saturation, the load resistance must be chosen to ensure that current limiting occurs before the collector voltage drops to a value low enough to forward bias the collector-base junction. In a transformer coupled circuit, the maximum allowable load can be derived from

$$R_L = \frac{2\,(V^+ - V_5)}{I_o}$$

where values for I_o may be determined from Figure 4 (providing the bias currents have not been altered from their normal values).

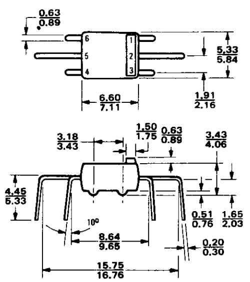
In order to avoid degradation of AM rejection, the input signal should not exceed one volt (rms).



○ Motorola terminal and pin number position ● μA703 or CA3053 terminal and pin number position

*Foil patterns shown are intended to show pin-for-pin interconnection. Any change in the number of components is dictated by the requirements of the individual design.

OUTLINE DIMENSIONS



CASE 643A
PLASTIC PACKAGE

Dimensions in millimeters

MFC6020

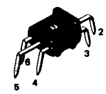
Advance Information

DUAL TOGGLE FLIP-FLOP

- Wide Operating Voltage Range – 4.0 to 16 Volts
- Regulated Supply Not Required
- Compatible with TTL and DTL
- Economical 6-Lead Plastic Package

DUAL TOGGLE FLIP-FLOP

Silicon Monolithic Functional Circuit

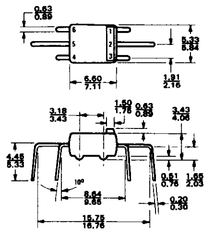


CASE 643A
PLASTIC PACKAGE

MAXIMUM RATINGS

Rating	Symbol	Value	Volts
Power Supply Voltage	V_{CC}	19	Vdc
Output Sinking Current	I_{sink}	10	mA
Negative Input Voltage	V_{in}	0.5	Vdc
Power Dissipation @ T_A = 25°C Derate above 25°C	P_D $1/\theta_{JA}$	1.0 10	Watt mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-40 to +125	°C
Operating Temperature Range	T_A	-10 to +75	°C

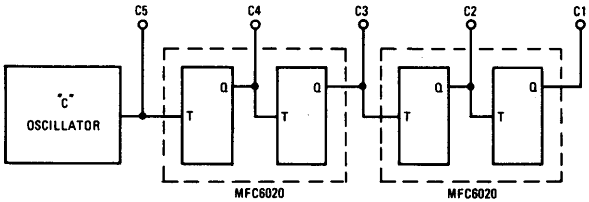
OUTLINE DIMENSIONS



CASE 643A
PLASTIC PACKAGE

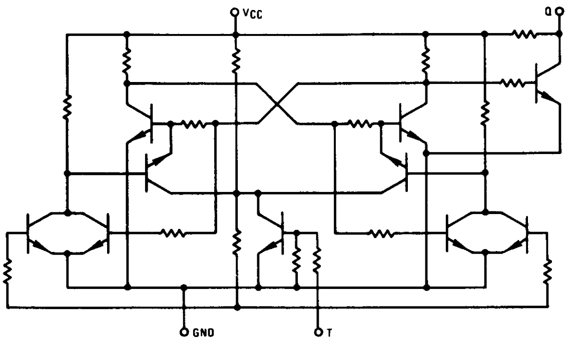
Dimensions in millimeters

TYPICAL APPLICATION – ELECTRONIC ORGAN DIVIDER

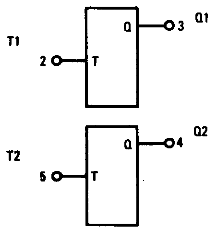


C4 = 261 Hz

FIGURE 1 – CIRCUIT SCHEMATIC (One Half of Circuit Shown)



BLOCK DIAGRAM

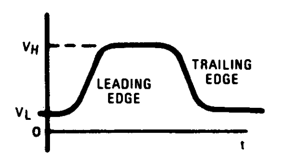


V_{CC} = Pin 6
GND = Pin 1

ELECTRICAL CHARACTERISTICS (V_{CC} = 12 Vdc, V_{in} = 4.0 V, Square Pulse, f = 10 kHz, 50% Duty Cycle, t_f = 1.0 V/µs (Min), T_A = 25°C unless otherwise noted)

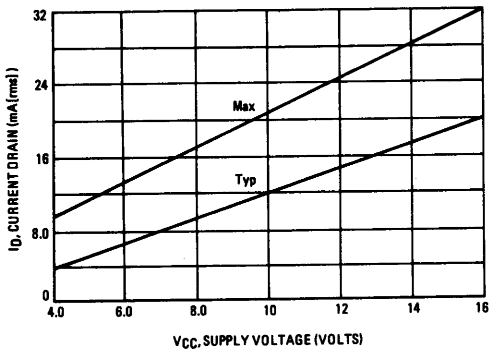
Characteristic	Symbol	Min	Typ	Max	Unit
Operating Power Supply Voltage	V_{CC}	4.0	–	16	Vdc
Toggle Frequency	f_{Tog}	–	3.0	–	MHz
Output Voltage (High) (V_{CC} = 4.0 Vdc) (V_{CC} = 16 Vdc)	V_{OH}	 3.5 15.5	 – –	 – –	Vdc
Output Voltage (Low) (V_{CC} = 4.0 Vdc) (V_{CC} = 16 Vdc)	V_{OL}	 – –	 – –	 0.5 1.0	Vdc
Operating Drain Current	I_D	–	–	32	mAdc
Output Sinking Current ($V_o \leq$ 1.0 Vdc)	I_{sink}	–	2.0	–	mAdc
Rise Time	t_r	–	250	–	ns
Storage Time	t_s	–	350	–	ns
Fall Time	t_f	–	60	–	ns
Cross Talk (V_{in} = 15 V, Square Pulse, V_{CC} = 16 Vdc) T1 to Q2 T2 to Q1	V_o	 – –	 – –	 15 15	mV
Input Resistance	R_{in}	10	–	–	kΩ
Output Resistance (Output High)	R_{OH}	–	–	2.8	kΩ

INPUT PULSE REQUIREMENTS



Characteristic	Symbol	Min	Max	Unit
Pulse Magnitude	V_H	+4.0	–	Volts
Zero Level	V_L	–	+1.0	Volts
Leading Edge	No Requirement			
Trailing Edge	$\frac{dv}{dt}$	-1.0	–	Volts/µs

FIGURE 2 – RMS CURRENT DRAIN versus SUPPLY VOLTAGE



MFC6030 A

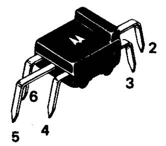
Advance Information

VOLTAGE REGULATOR

- Excellent Line and Load Regulation
- Current-Limit Feature Available
- Economical Six Lead Package
- Industrial Quality

VOLTAGE REGULATOR

Silicon Monolithic Functional Circuit

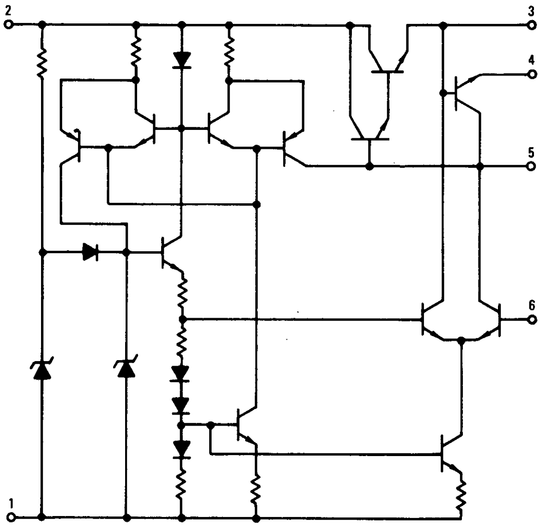


CASE 643 A
PLASTIC PACKAGE

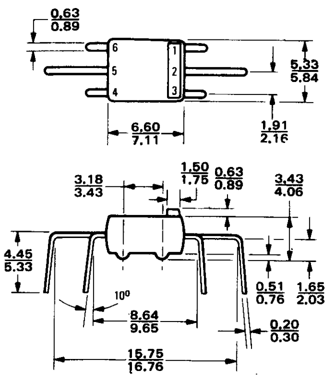
MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Input Voltage	V^{+}	38	Volts
Maximum Load Current	$I_{L(max)}$	200	mA
Power Dissipation Derate above $T_A = +25^{\circ}C$	P_D	1.0 10	Watt mW/°C
Operating Temperature Range	T_A	-10 to +75	°C

CIRCUIT SCHEMATIC



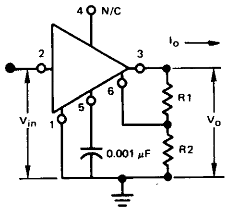
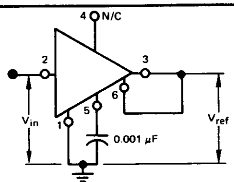
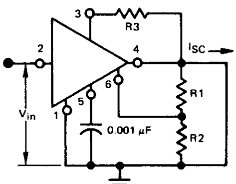
OUTLINE DIMENSIONS



CASE 643A
PLASTIC PACKAGE

Dimensions in millimeters

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

Circuit	Characteristic	Symbol	Min	Typ	Max	Unit
	Load Regulation V_{in} = 30 Volts, Pin 2 V_o, Pin 3 ΔI_o = 50 to 100 mA $\frac{(V_{o1} - V_{o2})}{V_{o1}} \times 100 = \%V_o$	Reg_{load}	–	–	0.2	%
	Line Regulation V_{in1} = 12 Volts, Pin 2 V_{in2} = 30 Volts, Pin 2 V_o = 7.5 Volts, Pin 3 $\frac{\Delta V_o \times 100}{\Delta V_{in} \times V_o} = \%V_o/\Delta V_{in}$	Reg_{line}	–	–	0.03	%/Volt
$\frac{V_o}{R1 + R2}$ = 2.0 mA min $\frac{V_o}{V_{ref}} = \frac{R1 + R2}{R2}$	Temperature Coefficient V_{in} = 30 Volts, Pin 2 I_o = 10 mA V_o = 10 Volts, Pin 3 ΔT_A = 0°C to 50°C $\frac{V_{o1} - V_{o2}}{T_{A1} - T_{A2}} = TC$	TC	-3.0	–	+3.0	mV/°C
	Input Voltage Range	V_{in}	9.0	–	35	Vdc
	Input-Output Voltage Differential	$V_{in} - V_o$	3.0	–	–	Vdc
	Reference Voltage V_{in} = 10 Volts, Pin 2 V_{ref} Pins 3,6	V_{ref}	3.8	–	4.8	Vdc
	Short-Circuit Current $I_{SC} = \frac{0.7}{R3}$	I_{SC}	–	±5.0	–	$\%/I_{SC}$
	R3 Usable Range	R3	3.5	–	6.8 k	ohms

MFC6040

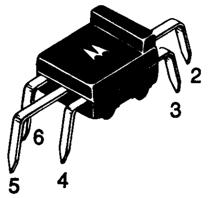
Advance Information

ELECTRONIC ATTENUATOR

- Designed for use in:
  - DC Operated Volume Control
  - Compression and Expansion Amplifier Applications
- Controlled by DC Voltage or External Variable Resistor
- Economical 6-Lead Plastic Package

ELECTRONIC ATTENUATOR

Silicon Monolithic Functional Circuit



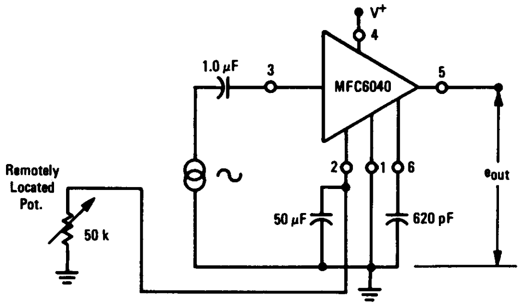
CASE 643A

PLASTIC PACKAGE

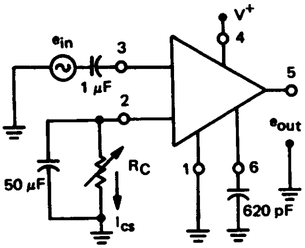
MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Power Supply Voltage	V^+	21	Vdc
Power Dissipation @ T_A = 25°C (Package Limitation)	P_D	1.0	Watt
Derate above T_A = 25°C	$1/\theta_{JA}$	10	mW/°C
Operating Temperature Range	T_A	0 to +75	°C

FIGURE 1 – TYPICAL DC "REMOTE" VOLUME CONTROL

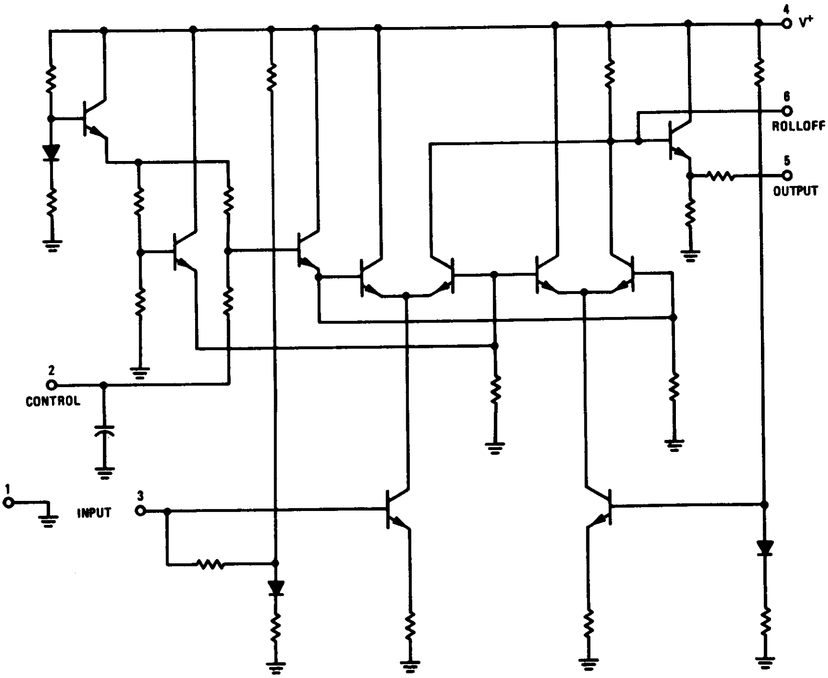


ELECTRICAL CHARACTERISTICS (e_{in} = 100 mV, f = 1.0 kHz, R1 = 0, V^+ = 16 Vdc, T_A = 25°C unless otherwise noted)



Characteristic	Symbol	Min	Typ	Max	Unit
Operating Power Supply Voltage	V^+	9.0	–	18	Vdc
Control Terminal Sink Current (e_{in} = 0)	I_{cs}	–	–	2.0	mAdc
Maximum Input Voltage	e_{in}	–	–	0.5	V(rms)
Voltage Gain	A_V	11	13	–	dB
Attenuation Range (R_C = 33 k ohms)		70	90	–	dB
Total Harmonic Distortion (e_{in} = 100 mV, e_o = 100 mV)	THD	–	0.6	1.0	%

FIGURE 2 — CIRCUIT SCHEMATIC



TYPICAL ELECTRICAL CHARACTERISTICS

(V^+ = 16 Vdc, T_A = 25°C unless otherwise noted)

FIGURE 3 – ATTENUATION versus DC CONTROL VOLTAGE

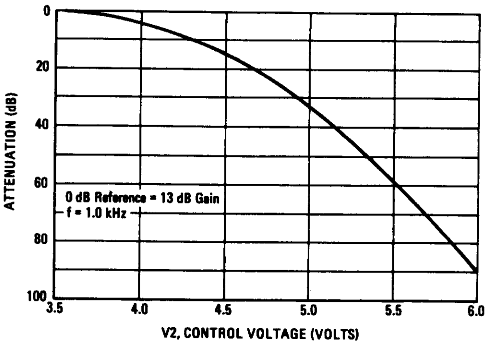


FIGURE 4 – ATTENUATION versus CONTROL RESISTOR

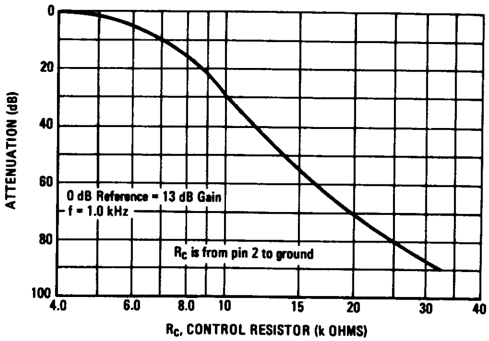


FIGURE 5 – FREQUENCY RESPONSE

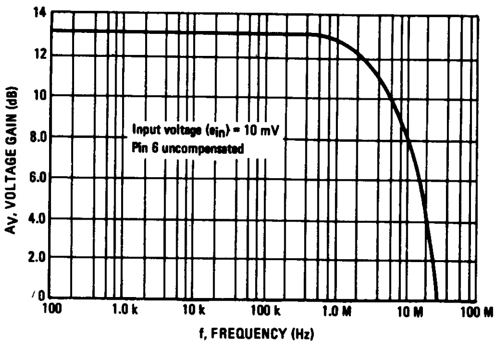


FIGURE 6 – OUTPUT VOLTAGE SWING

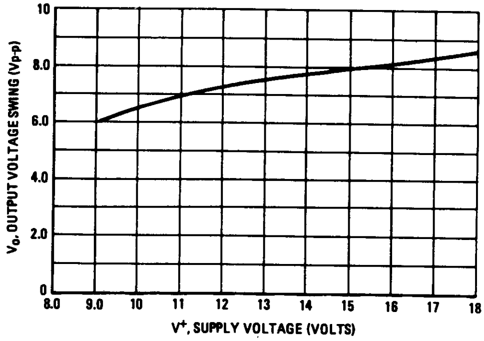


FIGURE 7 – TOTAL HARMONIC DISTORTION