# MFC4010A

## WIDE-BAND AMPLIFIER

. . . designed for FM/IF and low-level audio applications.

- High Audio Gain – 60 dB minimum
- Useful as a Microphone Amplifier and in Tape Recorders and Cassettes
- Excellent Performance as a 10.7 MHz FM/IF Amplifier
- High Transconductance ($g_m$) Ideally Suited to Low Impedance Ceramic Filters

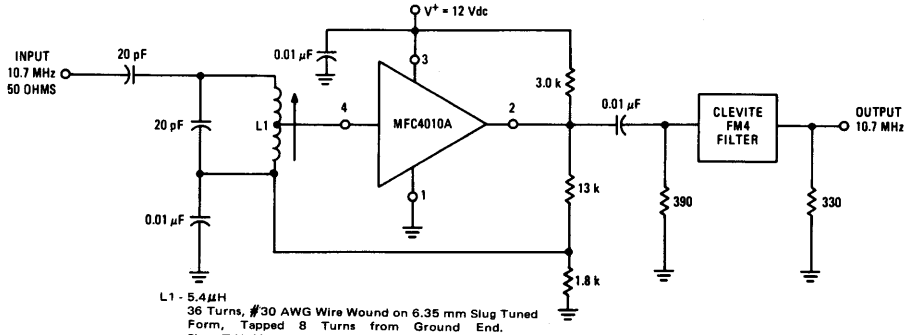
## WIDE-BAND AMPLIFIER

**Silicon Monolithic Functional Circuit**


PLASTIC PACKAGE
CASE 206A

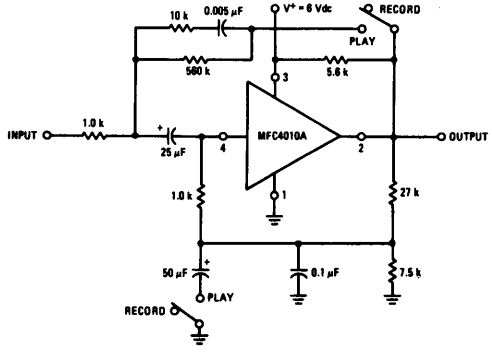
## TYPICAL APPLICATIONS

FIGURE 1 – FM/IF AMPLIFIER




L1 - 5.4μH
36 Turns, #30 AWG Wire Wound on 6.35 mm Slug Tuned Form, Tapped 8 Turns from Ground End.
Slug: T.H. Material 6.35 mm Dia., 12.70 mm Length.

FIGURE 2 – RECORD/PLAY PREAMPLIFIER FOR CASSETTE AND PORTABLE TAPE RECORDERS



## MFC 4010 A (continued)

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

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Power Supply Voltage | $V^+$ | 18 | Vdc |
| Power Dissipation @ $T_A$ = 25°C (Package Limitation) | $P_D$ | 0.5 | Watt |
| Derate above 25°C | | 5.0 | mW/°C |
| Operating Temperature Range | $T_A$ | -10 to +75 | °C |

**ELECTRICAL CHARACTERISTICS** ($V^+$ = 6.0 Vdc, $T_A$ = 25°C unless otherwise noted)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Open Loop Voltage Gain (Figure 3) (f = 1.0 kHz) | $A_{VOL}$ | 60 | 68 | – | dB |
| h Parameters (1) (f = 1.0 kHz) | $h_{11}$ | – | 1.0 | – | k ohms |
| | $h_{12}$ | – | $10^{-6}$ | – | – |
| | $h_{21}$ | – | 1000 | – | – |
| | $h_{22}$ | – | $10^{-5}$ | – | mhos |
| Output Noise Voltage (Figure 3) (BW = 20 Hz to 20 kHz, $R_S$ = 1.0 k ohms) | $e_{n(out)}$ | – | 3.0 | – | mV(rms) |
| Current Drain | $I_D$ | – | 3.0 | – | mA |

**HIGH FREQUENCY CHARACTERISTICS** ($V^+$ = 12 Vdc, f = 10.7 MHz, $T_A$ = 25°C unless otherwise noted)

| | | | | | |
|---|---|---|---|---|---|
| Power Gain (Figure 1) ($e_{in}$ = 0.1 mVrms) | – | – | 42 | – | dB |
| Noise Figure (Figure 1) ($R_S \approx$ 740 Ohms) | NF | – | 6.0 | – | dB |
| y Parameters(1) (f = 10.7 MHz, $I_2$ = 2.0 mA) | $Y_{11}$ | – | 1.3 + j1.5 | – | mmhos |
| | $Y_{12}$ | – | -3.4 + j8.1 | – | μmhos |
| | $Y_{21}$ | – | -0.33 + j0.68 | – | mhos |
| | $Y_{22}$ | – | 120 + j0 | – | μmhos |

(1) Device only, without external passive components.

FIGURE 3 – AUDIO TEST CIRCUIT

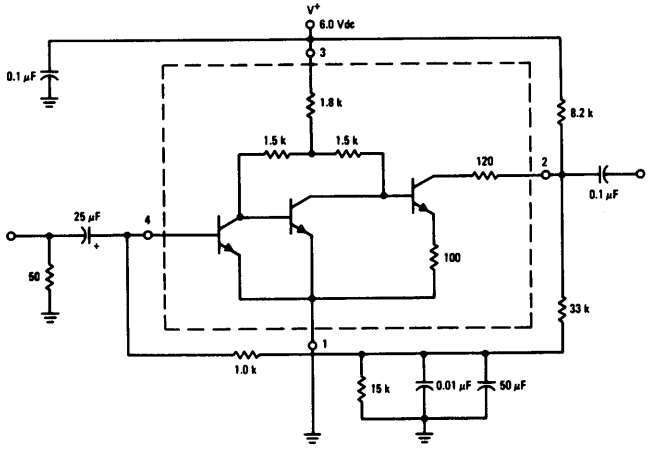
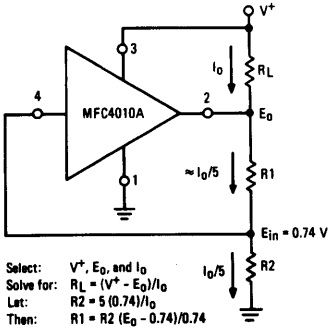



FIGURE 4 – BIASING RECOMMENDATIONS



## AUDIO PERFORMANCE CHARACTERISTICS
**(for Test Circuit Figure 3)**

FIGURE 5 – VOLTAGE GAIN versus FREQUENCY

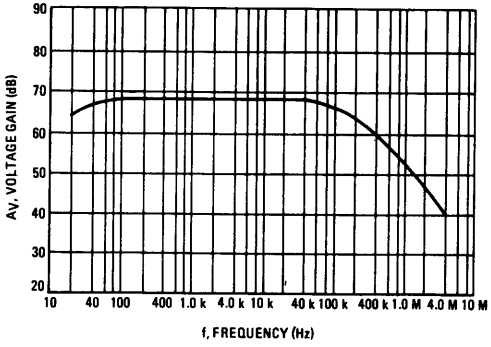
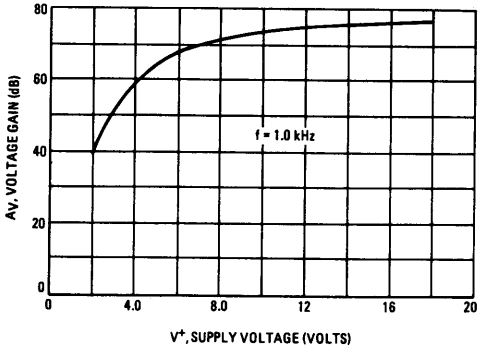
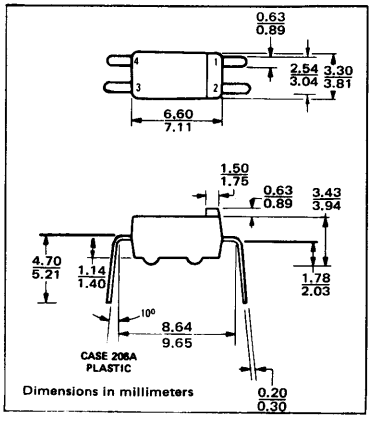



FIGURE 6 – VOLTAGE GAIN versus POWER SUPPLY




## OUTLINE DIMENSIONS




## *TAPE PREAMPLIFIER PERFORMANCE
**(for Circuit Figure 2)**

FIGURE 7 – RECORD VOLTAGE GAIN versus FREQUENCY

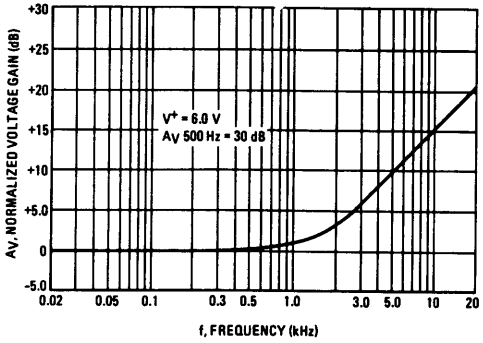
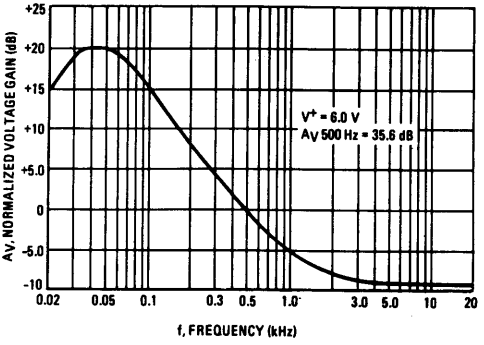



FIGURE 8 – PLAYBACK VOLTAGE GAIN versus FREQUENCY




Note:

The record/playback characteristics shown in Figures 8 and 9 were taken with the preamplifier driven by a 50 ohm source. The curves are typical of a desired response for the preamplifier; however, every type of tape recording and playback head is different and this circuit will not necessarily satisfy all requirements. No particular tape head was used as a basis for circuit design. The circuit is only an example showing the equalization network configuration.

The ideal preamplifier will have an input impedance approximately 10 times the highest impedance of the tape head and every preamplifier circuit must be designed using a test tape to verify the response of the design.

## 10.7 MHz y PARAMETERS

FIGURE 9 – INPUT ADMITTANCE

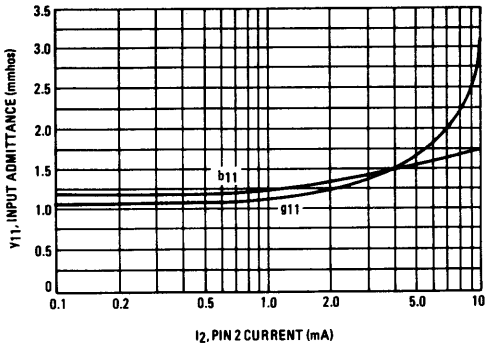



FIGURE 10 – REVERSE TRANSFER ADMITTANCE

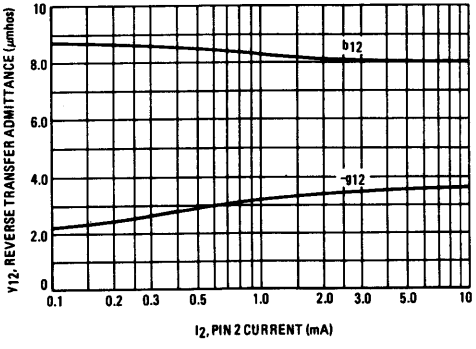



FIGURE 11 – FORWARD TRANSFER ADMITTANCE

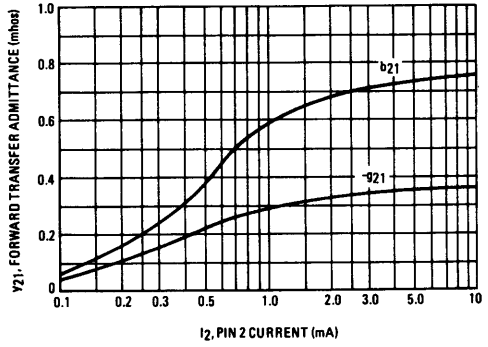
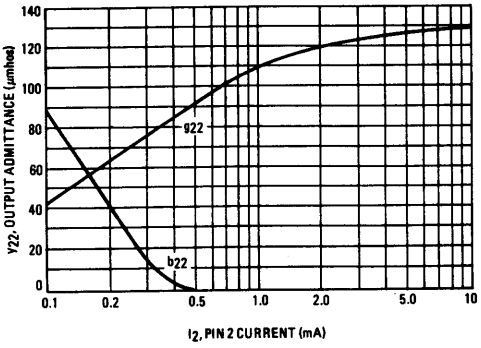



FIGURE 12 – OUTPUT ADMITTANCE




## 10.7 MHz PERFORMANCE
**(Circuit of Figure 1)**

FIGURE 13 – POWER GAIN versus SUPPLY VOLTAGE

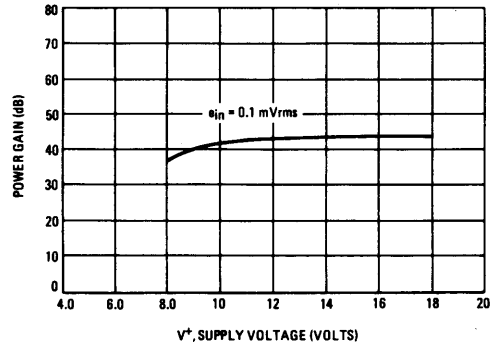
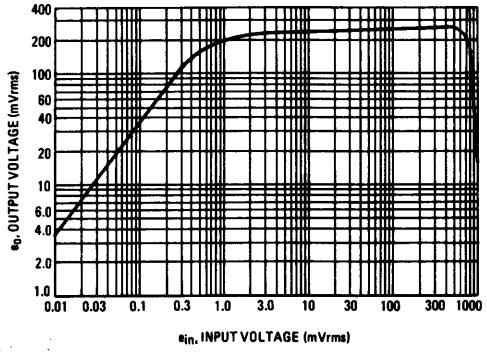



FIGURE 14 – VOLTAGE TRANSFER CHARACTERISTIC



# MFC4040

## Advance Information

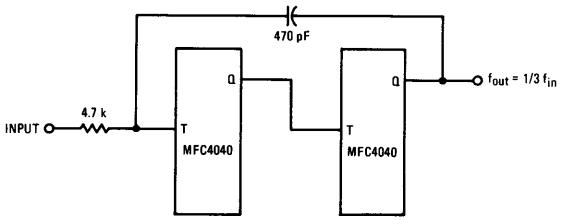
### SINGLE TOGGLE FLIP-FLOP

- Wide Operating Voltage Range – 4.0 to 16 Volts
- Regulated Supply Not Required
- Compatible with TTL and DTL
- Economical 4-Lead Plastic Package

**MAXIMUM RATINGS**

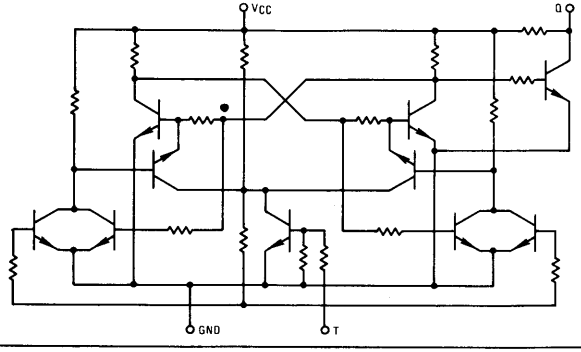
| Rating | Symbol | Value | Volts |
|---|---|---|---|
| Power Supply Voltage | $V_{CC}$ | 19 | Vdc |
| Output Sinking Current | $I_{sink}$ | 10 | mA |
| Negative Input Voltage | $V_{in}$ | 0.5 | Vdc |
| Power Dissipation @ $T_A$ = 25°C<br>Derate above 25°C | $P_D$<br>$1/\theta_{JA}$ | 1.0<br>10 | Watt<br>mW/°C |
| Operating Temperature Range | $T_A$ | -10 to +75 | °C |

**TYPICAL APPLICATION**



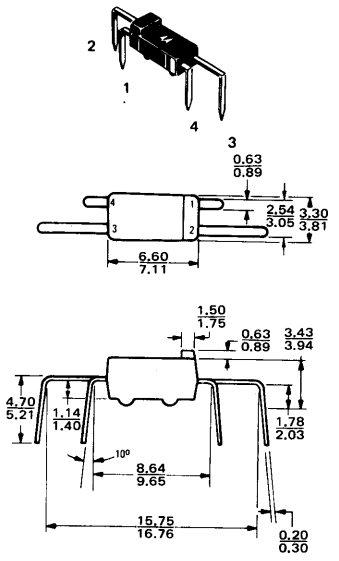

Divide-by-3 Circuit

**FIGURE 1 – CIRCUIT SCHEMATIC**




### SINGLE TOGGLE FLIP-FLOP

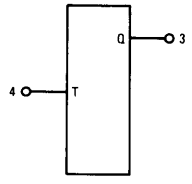
**Single Monolithic Functional Circuit**




CASE 206A
PLASTIC

Dimensions in millimeters

**BLOCK DIAGRAM**

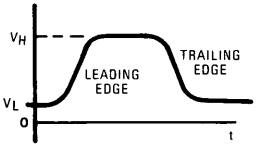



$V_{CC}$ = Pin 2
GND = Pin 1

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

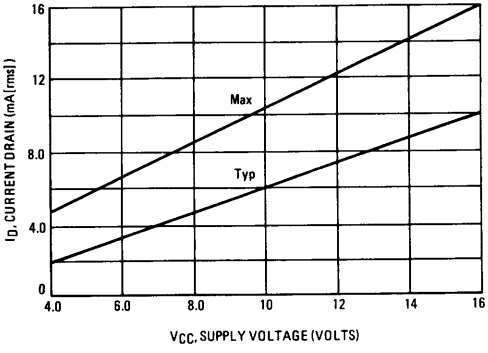
| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Operating Power Supply Voltage | $V_{CC}$ | 4.0 | – | 16 | Vdc |
| Toggle Frequency | $f_{Tog}$ | – | 3.0 | – | MHz |
| Output Voltage (High)<br>($V_{CC}$ = 4.0 Vdc)<br>($V_{CC}$ = 16 Vdc) | $V_{OH}$ | <br>3.5<br>15.5 | <br>–<br>– | <br>–<br>– | Vdc |
| Output Voltage (Low)<br>($V_{CC}$ = 4.0 Vdc)<br>($V_{CC}$ = 16 Vdc) | $V_{OL}$ | <br>–<br>– | <br>–<br>– | <br>0.5<br>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 |
| 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 | – | $\frac{\text{Volts}}{\mu s}$ |

**FIGURE 2 – RMS CURRENT DRAIN**



# MFC4060 A

## Advance Information

### VOLTAGE REGULATOR

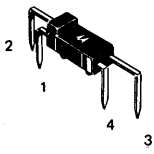
- Excellent Line and Load Regulation
- Economical Four Lead Package
- Industrial Quality Regulator

### VOLTAGE REGULATOR

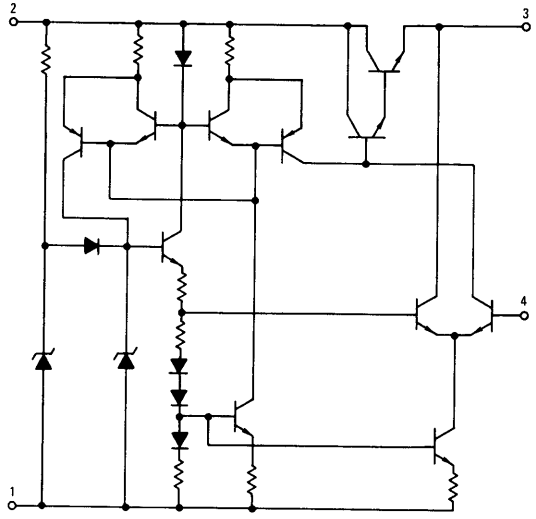
**Silicon Monolithic**
**Functional Circuit**

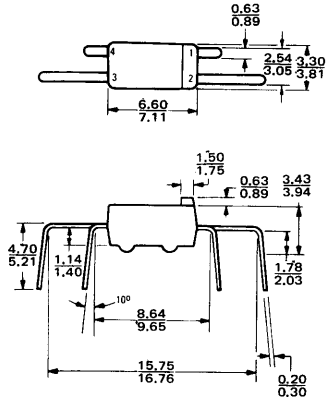
**MAXIMUM RATINGS**

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Input Voltage | $V^+$ | 38 | Volts |
| Maximum Load Current | $I_L$ (max) | 200 | mA |
| Power Dissipation<br>Derate above $T_A$ = +25°C | $P_D$ | 1.0<br>10 | Watt<br>mW/°C |
| Operating Temperature Range | $T_A$ | -10 to +75 | °C |



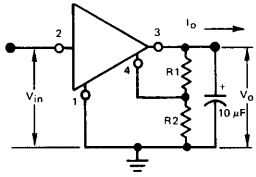
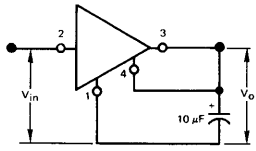

**CIRCUIT SCHEMATIC**




CASE 206A
PLASTIC
Dimensions in millimeters

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

| Circuit | Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
|  $\frac{V_o}{R1+R2}$ = 2.0 mA min $\frac{V_o}{V_{ref}} = \frac{R1+R2}{R2}$ | Load Regulation<br>$V_{in}$ = 30 Volts, Pin 2<br>$V_o$, Pin 3<br>$\Delta I_o$ = 50 to 100 mA<br>$\frac{(V_{o1}-V_{o2})}{V_{o1}} \times 100 = \%V_o$ | $Reg_{load}$ | – | – | 0.2 | % |
| | Line Regulation<br>$V_{in1}$ = 12 Volts, Pin 2<br>$V_{in2}$ = 30 Volts, Pin 2<br>$V_o$ = 7.5 Volts, Pin 3<br>$\frac{\Delta V_o \times 100}{\Delta V_{in} \times V_o} = \%V_o/V_{in}$ | $Reg_{line}$ | – | – | 0.03 | %/V |
| | Temperature Coefficient<br>$V_{in}$ = 30 Volts, Pin 2<br>$I_o$ = 10 mA<br>$V_o$ = 10 Volts, Pin 3<br>$\Delta T_A$ = 0°C to 50°C<br>$\frac{V_{o1}-V_{o2}}{T_{A1}-T_{A2}} = TC$ | 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<br>$V_{in}$ = 10 Volts, Pin 2<br>$V_{ref}$ Pin 3 / Pin 4 | $V_{ref}$ | 3.8 | – | 4.8 | Vdc |