# MFC4010A

# HIGH FREQUENCY CIRCUIT

#### 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<sub>m</sub>) Ideally Suited to Low Impedance Ceramic Filters



#### TYPICAL APPLICATIONS



See Packaging Information Section for outline dimensions.

# MAXIMUM RATINGS (T<sub>A</sub> = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Power Supply Voltage	v+	18	Vdc
Power Dissipation @ T <sub>A</sub> = 25 <sup>o</sup> C (Package Limitation) Derate above 25 <sup>o</sup> C	PD	0.5 5.0	Watt mW/ <sup>O</sup> C
Operating Temperature Range	TA	-10 to +75	°C

### ELECTRICAL CHARACTERISTICS (V<sup>+</sup> = 6.0 Vdc, T<sub>A</sub> = 25<sup>o</sup>C unless otherwise noted)

Characteristic	Symbol	Min	Тур	Max	Unit
Open Loop Voltage Gain (Figure 3) (f = 1.0 kHz)	Avol	60	68	-	dB
h Parameters (1) (f = 1.0 kHz)	h11	- 1	1.0	-	k ohms
	h12	-	10 <sup>-6</sup>	-	-
	<sup>h</sup> 21	-	1000	-	-
	h <sub>22</sub>	-	10 <sup>-5</sup>	-	mhos
Output Noise Voltage (Figure 3) (BW = 20 Hz to 20 kHz, R <sub>S</sub> = 1.0 k ohms)	en(out)	-	3.0	-	mV(rms)
Current Drain	<sup>i</sup> D	-	3.0	-	mA

# HIGH FREQUENCY CHARACTERISTICS (V<sup>+</sup> = 12 Vdc, f = 10.7 MHz, T<sub>A</sub> = $25^{o}$ C unless otherwise noted)

Power Gain (Figure 1) (e <sub>in</sub> = 0.1 mVrms)	_	-	42	-	dB
Noise Figure (Figure 1) (R <sub>S</sub> ≈740 Ohms)	NF	-	6.0	-	dB
y Parameters(1) (f = 10.7 MHz, I <sub>2</sub> = 2.0 mA)	911 912 921 922	 	1.3 + j1.5 -3.4 + j8.1 -0.33 + j0.68 120 + j0	- - -	mmhos μmhos mhos μmhos

(1)Device only, without external passive components.



# FIGURE 4 – BIASING RECOMMENDATIONS $\Psi^{V^+}$





FIGURE 6 - VOLTAGE GAIN versus POWER SUPPLY



#### 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 12 - OUTPUT ADMITTANCE



**10.7 MHz PERFORMANCE** 

FIGURE 13 - POWER GAIN versus SUPPLY VOLTAGE 80 70 60 POWER GAIN (dB) ein = 0.1 mVrms 50 40 30 20 10 0 4.0 6.0 8.0 10 12 16 18 14 20 V+, SUPPLY VOLTAGE (VOLTS)

(Circuit of Figure 1)

FIGURE 14 - VOLTAGE TRANSFER CHARACTERISTIC 400 200 100 eo, OUTPUT VOLTAGE (mVrms) 60 40 20 10 6.0 4.0 Ш 2.0 1.0 0.01 0.03 0.1 1.0 3.0 10 100 30 300 1000 ein, INPUT VOLTAGE (mVrms)