MCH2870MR
MCH2870CR

POWER OPERATIONAL AMPLIFIER

. . . designed as a high-gain internally-compensated hybrid power operational amplifier that can deliver load currents up to ±300 mAdc typ. This device is ideally suited for driving low impedance loads. Typical applications include buffer, line driver and servo/synchro amplifier or power amplifier with operating characteristics as a function of the external feedback components.

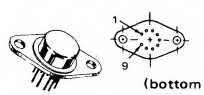
Output current is internally limited to 100 mA (typ) with an option of 200 mA (by shorting pins 2 and 4). With the addition of two external resistors, current can be limited to any value between 100 mA and 300 mA.

The MCH2870MR is specified over the military temperature range (-55°C to +125°C) and the MCH2870CR over the commercial temperature range (0°C to +75°C).

- High Current Capability to ±300 mA typ
- Internally Compensated
- High Open-Loop Voltage Gain – 200,000 typ
- Low Open Loop Output Impedance – 10 Ohms typ
- Offset Voltage Null Capability

POWER OPERATIONAL AMPLIFIER INTEGRATED CIRCUIT

SILICON EPITAXIAL PASSIVATED



CASE 614
METAL PACKAGE

TYPICAL APPLICATIONS

FIGURE 1 – POWER OPERATIONAL AMPLIFIER

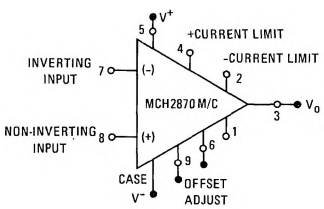


FIGURE 2 – VOLTAGE OFFSET NULL CIRCUIT

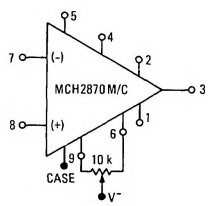


FIGURE 3 – TYPICAL INVERTING AMPLIFIER

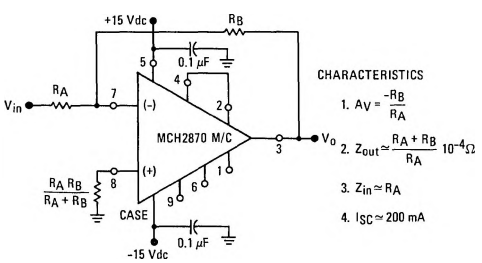
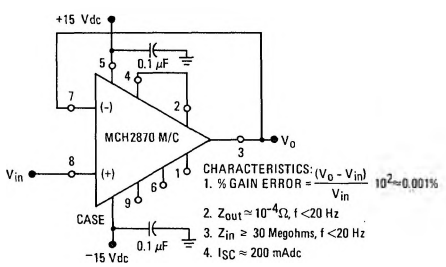


FIGURE 4 – UNITY GAIN VOLTAGE FOLLOWER



See Packaging Information Section for outline dimensions.

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

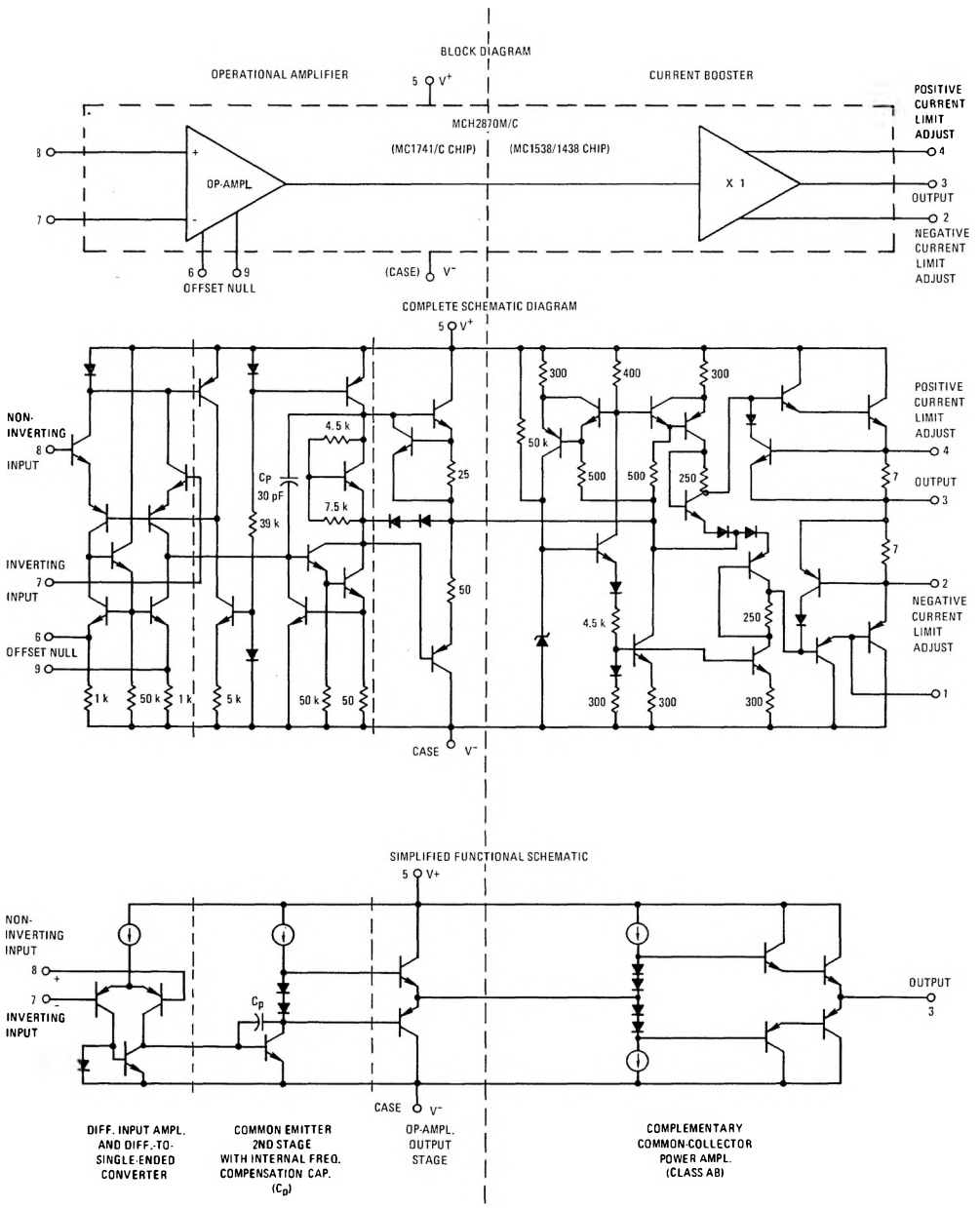
Rating	Symbol	MCH2870MR	MCH2870CR	Unit
Power Supply Voltage	V^+ V^-	+22 -22	+18 -18	Vdc
Differential Input Signal	V_{in}	±30		Volts
Common-Mode Input Swing	CMV_{in}	±15		Volts
Output Short Circuit Duration	t_S	Continuous		
Power Dissipation and Thermal Characteristics T_A = +25°C Derate above T_A = +25°C Thermal Resistance, Junction to Air	 P_D $1/\theta_{JA}$ θ_{JA}	 2.4 16 62		 Watts mW/°C °C/W
T_C = +25°C Derate above T_C = +25°C Thermal Resistance, Junction to Case	P_D $1/\theta_{JC}$ θ_{JC}	9.0 60 16.7		Watts mW/°C °C/W
Operating Temperature Range	T_A	-55 to +125	0 to +75	°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +175		°C

ELECTRICAL CHARACTERISTICS (V^+ = +15 Vdc, V^- = -15 Vdc, T_C = +25°C unless otherwise noted)

		MCH2870MR			MCH2870CR			
Characteristics	Symbol	Min	Typ	Max	Min	Typ	Max	Unit
Input Bias Current T_C = +25°C T_C = T_{low} to T_{high} (See Note 1)	I_b	 – –	 0.2 –	 0.5 1.5	 – –	 0.2 –	 0.5 0.8	µAdc
Input Offset Current T_C = +25°C T_C = T_{low} to T_{high}	$\|I_{io}\|$	 – –	 0.03 –	 0.2 0.5	 – –	 0.03 –	 0.2 0.3	µAdc
Input Offset Voltage ($R_S \leq 10$ kΩ) T_C = +25°C T_C = T_{low} to T_{high}	$\|V_{io}\|$	 – –	 1.0 –	 5.0 6.0	 – –	 2.0 –	 6.0 7.5	mVdc
Differential Input Impedance (Open-Loop, f = 20 Hz) Parallel Input Resistance Parallel Input Capacitance	 R_p C_p	 0.3 –	 1.0 6.0	 – –	 0.3 –	 1.0 6.0	 – –	 Megohm pF
Common-Mode Input Impedance (f = 20 Hz)	Z_{in}	–	200	–	–	200	–	Megohms
Common-Mode Input Voltage Swing	CMV_{in}	±12	±13	–	±12	±13	–	V_{pk}
Equivalent Input Noise Voltage A_V = 100, R_s = 10 k ohms, f = 1.0 kHz, BW = 1.0 Hz	e_n	 –	 45	 –	 –	 45	 –	$nV/(Hz)^{1/2}$
Common-Mode Rejection Ratio (f = 100 Hz)	CM_{rej}	70	90	–	70	90	–	dB
DC Open-Loop Voltage Gain, (V_{out}=±10 V, R_L=300 ohms) T_C = +25°C T_C = T_{low} to T_{high}	A_{VOL}	 50,000 25,000	 200,000 –	 – –	 20,000 15,000	 100,000 –	 – –	V/V
Power Bandwidth A_V = 1, R_L = 300 ohms, THD ≤ 5%, V_{out} = 20 Vp-p	P_{BW}	 –	 12	 –	 –	 12	 –	kHz
Unity Gain Crossover Frequency (open-loop)		–	1.1	–	–	1.1	–	MHz
Phase Margin (closed loop, unity gain)		–	65	–	–	65	–	degrees
Gain Margin (closed loop, unity gain)		–	11	–	–	11	–	dB
Slew Rate (Unity Gain)	dV_{out}/dt	–	0.8	–	–	0.8	–	V/µs
Output Impedance (open loop f = 20 Hz)	Z_{out}	–	10	–	–	10	–	ohms
Short-Circuit Output Current (See Figure 6) R1 = R2 = ∞ Pins 2 and 4 shorted Adjustable Range	I_{SC}	 75 – –	 100 200 100-300	 125 – –	 65 – –	 100 200 100-300	 140 – –	mAdc
Output Voltage Swing R_L = 300 ohms R_L = 300 ohm (T_C = T_{low} to T_{high})	V_{out}	 ±12 ±10	 ±13 –	 – –	 ±11 ±10	 ±12 –	 – –	Vpk
Power Supply Sensitivity (dc) V^- = constant, $R_s \leq 10$ k ohms V^+ = constant, $R_s \leq 10$ k ohms	 S+ S-	 – –	 30 30	 150 150	 – –	 30 30	 200 200	µV/V
Power Supply Current	I_D^+ I_D^-	– –	7.7 7.7	13 13	– –	7.7 7.7	16.5 16.5	mAdc
DC Quiescent Power Dissipation V_{in} = 0	P_D	–	225	390	–	225	500	mW

Note 1: T_{low}: 0°C for MCH2870CR
-55°C for MCH2870MR
T_{high}: +75°C for MCH2870CR
+125°C for MCH2870MR

FIGURE 5 – MCH2870M/C DEVICE CONFIGURATION



TYPICAL CHARACTERISTICS

(V^+ = +15 Vdc, V^- = -15 Vdc, T_A = +25°C unless otherwise noted)

FIGURE 6 – SHORT-CIRCUIT CURRENT versus R1 OR R2 (100 mA TO 300 mA)

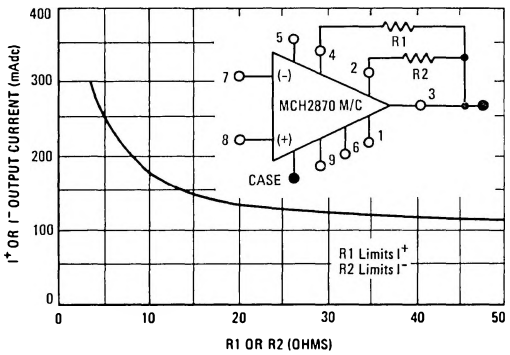


FIGURE 7 – DC SAFE OPERATING AREA

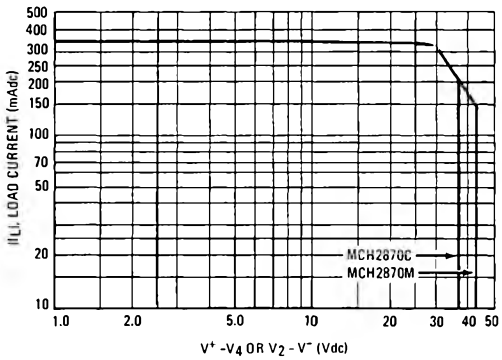


FIGURE 8 – POWER BANDWIDTH (LARGE SIGNAL SWING versus FREQUENCY)

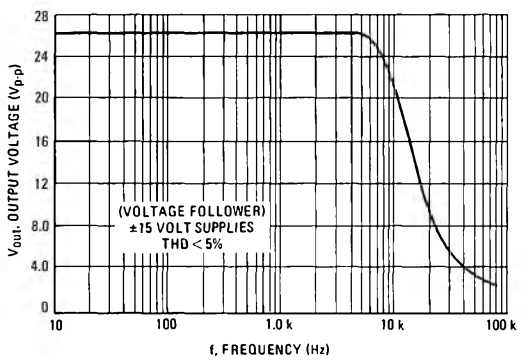


FIGURE 9 – OPEN LOOP FREQUENCY RESPONSE

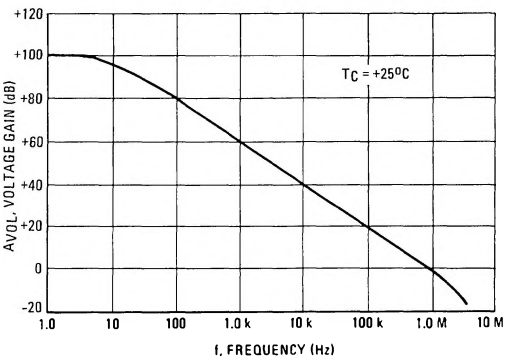


FIGURE 10 – OUTPUT NOISE versus SOURCE RESISTANCE

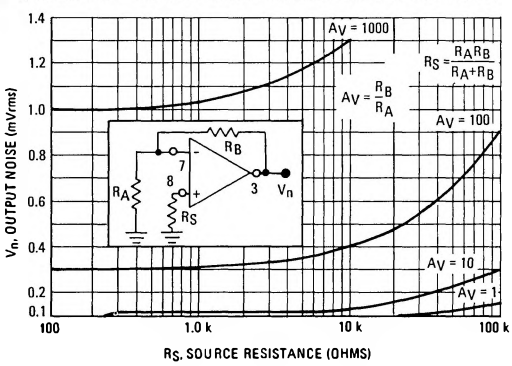
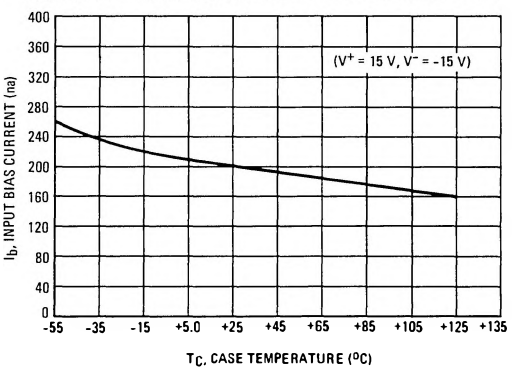


FIGURE 11 – INPUT BIAS CURRENT versus TEMPERATURE



TYPICAL CHARACTERISTICS (continued)

FIGURE 12 – OUTPUT VOLTAGE SWING versus LOAD RESISTANCE

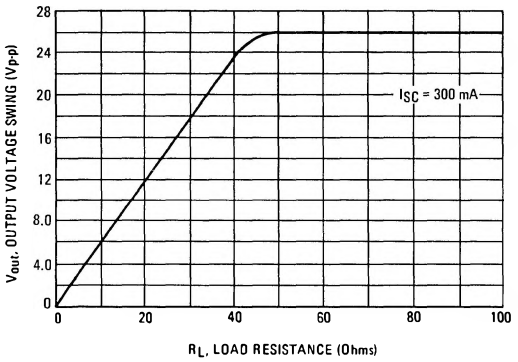
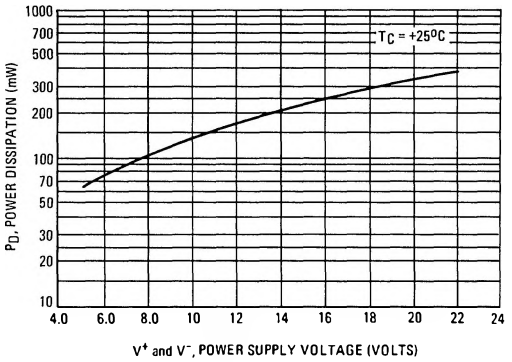


FIGURE 13 – POWER DISSIPATION versus POWER SUPPLY VOLTAGE



TYPICAL APPLICATIONS

FIGURE 14 – PROGRAMMABLE VOLTAGE SOURCE

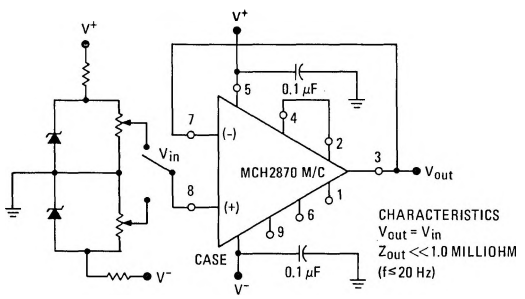


FIGURE 15 – CONSTANT CURRENT SOURCE OR TRANSCONDUCTANCE AMPLIFIER

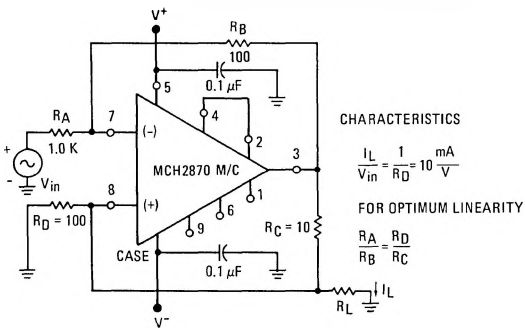


FIGURE 16 – POWER SUPPLY SPLITTER

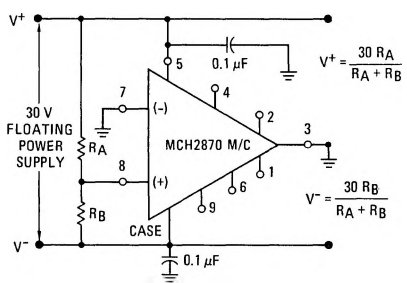
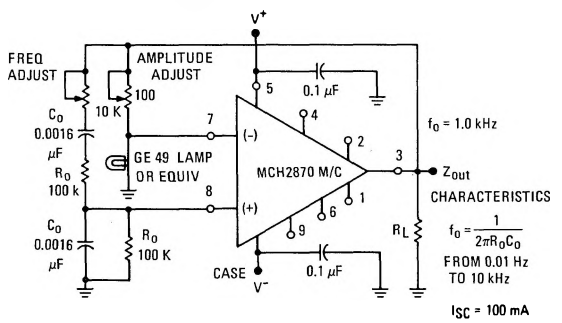


FIGURE 17 – WIEN BRIDGE OSCILLATOR



TYPICAL APPLICATIONS (continued)

FIGURE 18 – EXTERNAL CURRENT BOOSTING