MC1558
MC1458
MC1458C

OPERATIONAL AMPLIFIERS

DUAL MC1741
INTERNALLY COMPENSATED, HIGH PERFORMANCE MONOLITHIC OPERATIONAL AMPLIFIER

. . . designed for use as a summing amplifier, integrator, or amplifier with operating characteristics as a function of the external feedback components.

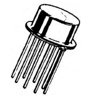
- No Frequency Compensation Required
- Short-Circuit Protection
- Wide Common-Mode and Differential Voltage Ranges
- Low-Power Consumption
- No Latch Up

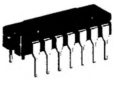
(DUAL MC1741)

DUAL OPERATIONAL AMPLIFIER

MONOLITHIC SILICON INTEGRATED CIRCUIT

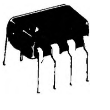
G SUFFIX
METAL PACKAGE
CASE 601
TO-99



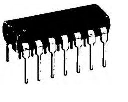


L SUFFIX
CERAMIC PACKAGE
CASE 632
TO-116

P1 SUFFIX
PLASTIC PACKAGE
CASE 626
MC1458,C (only)



P2 SUFFIX
PLASTIC PACKAGE
CASE 605
MC1458,C (only)

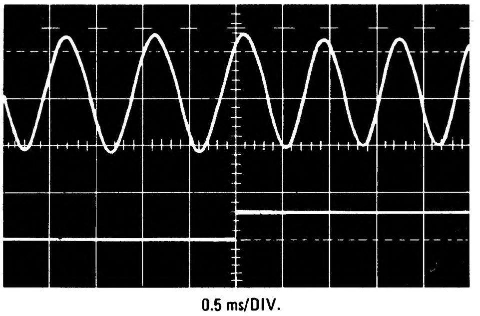


PIN CONNECTIONS

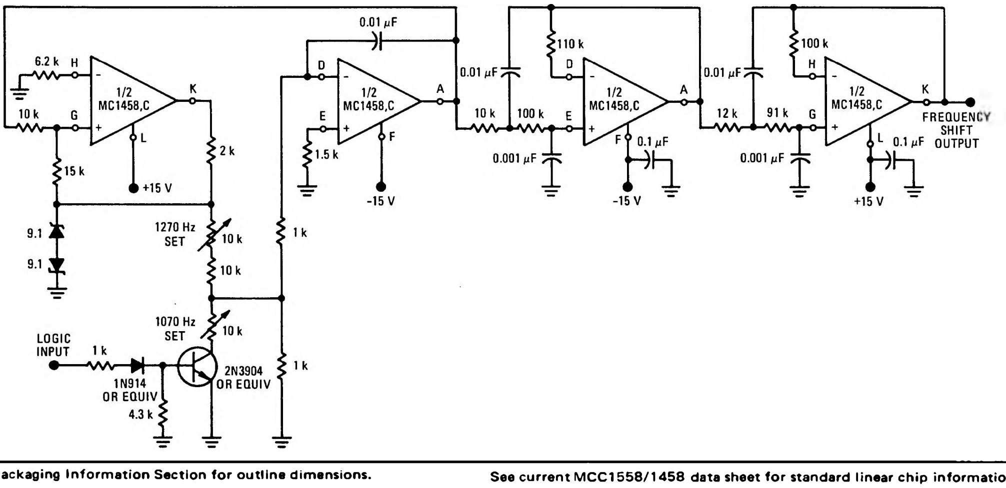
Schematic	A	B	C	D	E	F	G	H	I	J	K	L
G & P1 Packages	1	–	–	2	3	4	5	6	–	–	7	8
L & P2 Packages	2	3	4	5	6	7	8	9	10	11	12	14

FIGURE 1 – TYPICAL FREQUENCY-SHIFT KEYER TONE GENERATOR

5.0 V/DIV.



0.5 ms/DIV.



See Packaging Information Section for outline dimensions.

See current MCC1558/1458 data sheet for standard linear chip information.

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

Rating	Symbol	MC1558	MC1458,C	Unit
Power Supply Voltage	V^+ V^-	+22 -22	+18 -18	Vdc
Differential Input Signal ①	V_{in}	±30		Volts
Common-Mode Input Swing ②	CMV_{in}	±15		Volts
Output Short Circuit Duration	t_S	Continuous		
Power Dissipation (Package Limitation)	P_D			
Metal Can		680		mW
Derate above T_A = +25°C		4.6		mW/°C
Plastic Dual In-Line Packages		625		mW
Derate above T_A = +25°C		5.0		mW/°C
Ceramic Dual In-Line Package		750		mW/°C
Derate above T_A = +25°C		6.0		mW/°C
Operating Temperature Range	T_A	-55 to +125	0 to +75	°C
Storage Temperature Range	T_{stg}	-65 to +150	-65 to +150	°C

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

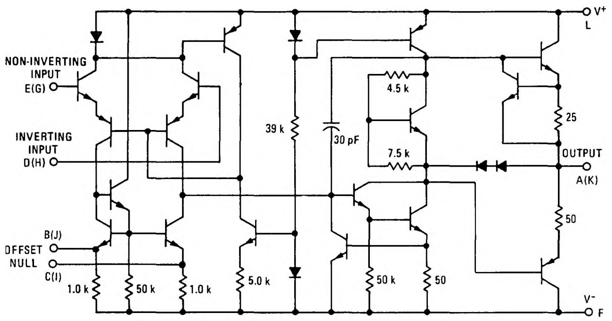
Characteristics	Symbol	MC1558			MC1458			MC1458C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
Input Bias Current	I_b										µAdc
T_A = +25°C		–	0.2	0.5	–	0.2	0.5	–	0.2	0.7	
T_A = T_{low} to T_{high} ③		–	–	1.5	–	–	0.8	–	–	1.0	
Input Offset Current	$\|I_{io}\|$										µAdc
T_A = +25°C		–	0.03	0.2	–	0.03	0.2	–	0.03	0.3	
T_A = T_{low} to T_{high}		–	–	0.5	–	–	0.3	–	–	0.4	
Input Offset Voltage ($R_S \leq$ 10 k Ω)	$\|V_{io}\|$										mVdc
T_A = +25°C		–	1.0	5.0	–	2.0	6.0	–	2.0	10	
T_A = T_{low} to T_{high}		–	–	6.0	–	–	7.5	–	–	12	
Differential Input Impedance (Open-Loop, f = 20 Hz)											
Parallel Input Resistance	R_p	0.3	1.0	–	0.3	1.0	–	–	1.0	–	Megohm
Parallel Input Capacitance	C_p	–	6.0	–	–	6.0	–	–	6.0	–	pF
Common-Mode Input Impedance (f = 20 Hz)	$Z_{(in)}$	–	200	–	–	200		–	200		Megohms
Common-Mode Input Voltage Swing	CMV_{in}	±12	±13	–	±12	±13	–	±11	±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	–	–	45	–	nV/(Hz)½
Common-Mode Rejection Ratio (f = 100 Hz)	CM_{rej}	70	90	–	70	90	–	60	90	–	dB
Open-Loop Voltage Gain	A_{VOL}										V/V
T_A = +25°C (V_o = ±10 V, R_L = 2.0 k ohms)		50,000	200,000	–	20,000	100,000	–	–	–	–	
T_A = T_{low} to T_{high} (V_o = ±10 V, R_L = 2.0 k ohms)		25,000	–	–	15,000	–	–	–	–	–	
T_A = +25°C (V_o = ±10 V, R_L = 10 k ohms)		–	–	–	–	–	–	20,000	100,000	–	
T_A = T_{low} to T_{high} (V_o = ±10 V, R_L = 10 k ohms)		–	–	–	–	–	–	15,000	–	–	
Power Bandwidth (A_V = 1, R_L = 2.0 k ohms, THD≤5%, V_o = 20 V p-p)	P_{BW}	–	14	–	–	14	–	–	14	–	kHz
Unity Gain Crossover Frequency (open-loop)	f_c	–	1.1	–	–	1.1	–	–	1.1	–	MHz
Phase Margin (open-loop, unity gain)		–	65	–	–	65	–	–	65	–	degrees
Gain Margin		–	11	–	–	11	–	–	11	–	dB
Slew Rate (Unity Gain)	dV_{out}/dt	–	0.8	–	–	0.8	–	–	0.8	–	V/µs
Output Impedance (f = 20 Hz)	Z_{out}	–	75	–	–	75	–	–	75	–	ohms
Short-Circuit Output Current	I_{SC}	–	20	–	–	20	–	–	20	–	mAdc
Output Voltage Swing (R_L = 10 k ohms)	V_o	±12	±14	–	±12	±14	–	±11	±14	–	Vpk
R_L = 2 k ohms (T_A = T_{low} to t_{high})		±10	±13	–	±10	±13	–	±9.0	±13	–	
Average Temperature Coefficient of Input Offset Voltage (R_S = 50 ohms, T_A = T_{low} to T_{high})	$\|TCV_{io}\|$	–	15	–	–	15	–	–	15	–	µV/°C
Power Supply Sensitivity											µV/V
V^- = constant, $R_s \leq$ 10 k ohms	S+	–	30	150	–	30	150	–	30	–	
V^+ = constant, $R_s \leq$ 10 k ohms	S-	–	30	150	–	30	150	–	30	–	
Power Supply Current	I_D^+	–	2.3	5.0	–	2.3	5.6	–	2.3	8.0	mAdc
	I_D^-	–	2.3	5.0	–	2.3	5.6	–	2.3	8.0	
DC Quiescent Power Dissipation (V_o = 0)	P_D	–	70	150	–	70	170	–	70	240	mW

① For supply voltages of less than ±15 V, the maximum differential input voltage is equal to $\pm(V^+ + |V^-|)$.

② For supply voltages of less than ±15 V, the maximum input voltage is equal to the supply voltage $(+V^+, -|V^-|)$.

③ T_{low}: 0°C for MC1458,C
-55°C for MC1558
T_{high}: +75°C for MC1458,C
+125°C for MC1558

FIGURE 2 – CIRCUIT SCHEMATIC

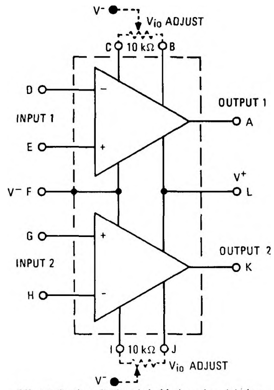


The letters without parenthesis represent the pin numbers for 1/2 of the dual circuit, letters in parenthesis represent the pin numbers for the other half.

PIN CONNECTIONS

Schematic	A	B	C	D	E	F	G	H	I	J	K	L
G & P1 Packages	1	–	–	2	3	4	5	6	–	–	7	8
L & P2 Packages	2	3	4	5	6	7	8	9	10	11	12	14

FIGURE 3 – EQUIVALENT CIRCUIT WITH OFFSET ADJUST



Offset Adjust is available only in 14-pin packaged devices.

TYPICAL CHARACTERISTICS

($V^+ = +15$ Vdc, $V^- = -15$ Vdc, $T_A = +25^oC$ unless otherwise noted.)

FIGURE 4 – OPEN-LOOP VOLTAGE GAIN versus POWER-SUPPLY VOLTAGE

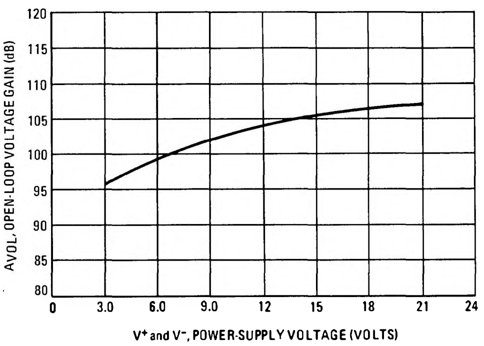


FIGURE 5 – OPEN-LOOP FREQUENCY RESPONSE

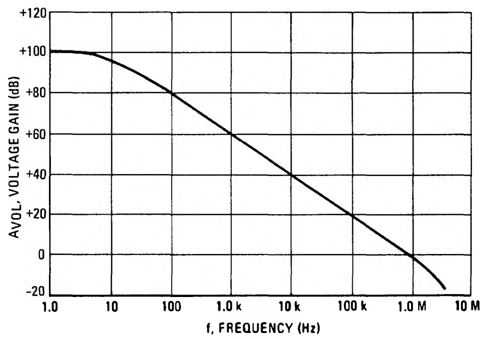


FIGURE 6 – POWER BANDWIDTH (LARGE SIGNAL SWING versus FREQUENCY)

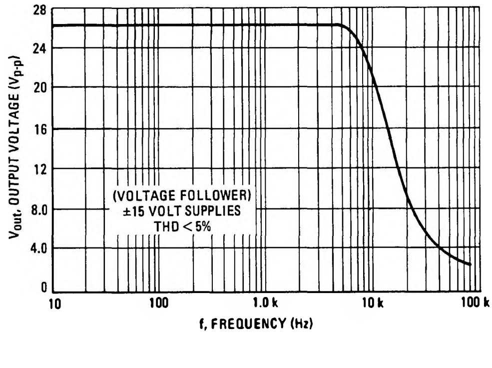
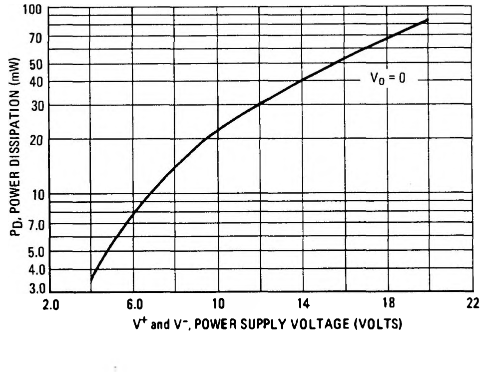


FIGURE 7 – POWER DISSIPATION versus POWER SUPPLY VOLTAGE



TYPICAL CHARACTERISTICS (continued)

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

FIGURE 8 – OUTPUT VOLTAGE SWING versus LOAD RESISTANCE

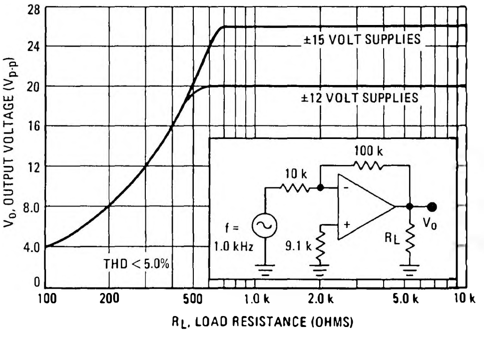


FIGURE 9 – OUTPUT NOISE versus SOURCE RESISTANCE

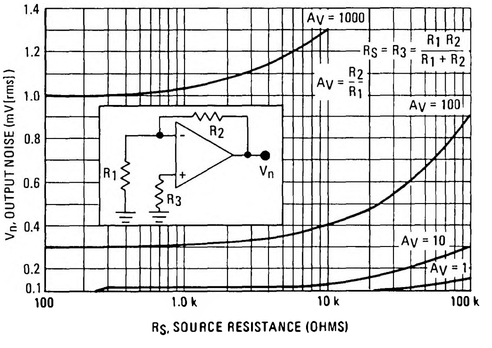


FIGURE 10 – HIGH-IMPEDANCE, HIGH-GAIN INVERTING AMPLIFIER