

OPERATIONAL AMPLIFIERS

MC1558 MC1458 MC1458C

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)



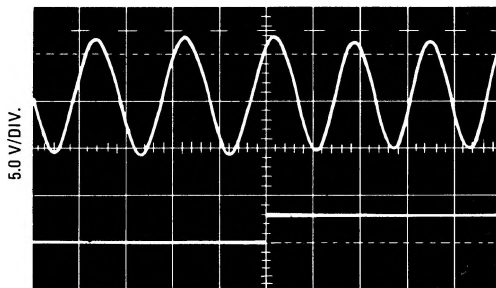
P2 SUFFIX
PLASTIC PACKAGE
CASE 605
MC1458,C (only)



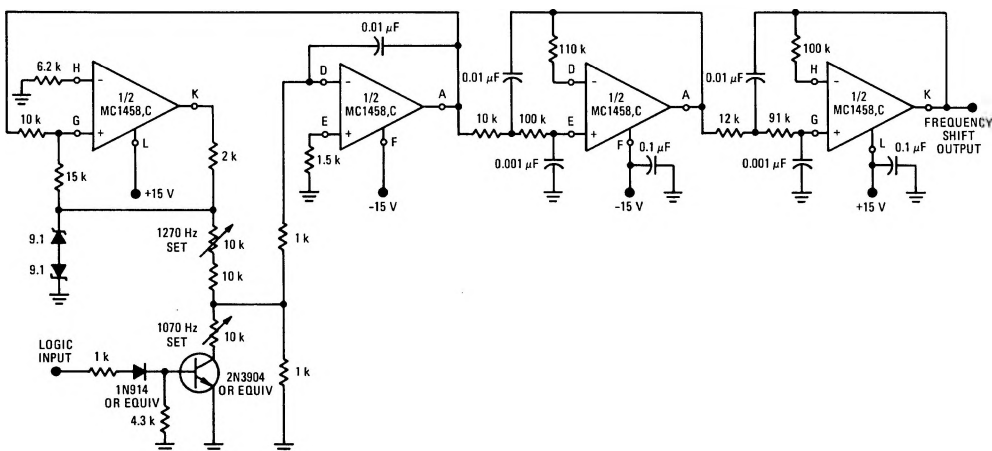
PIN CONNECTIONS

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



0.5 ms/DIV.



MC1558, MC1458, MC1458C(continued)

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 T _A = +25°C T _A = T _{low} to T _{high} ③	I _b	—	0.2	0.5	—	0.2	0.5	—	0.2	0.7	μAdc
Input Offset Current T _A = +25°C T _A = T _{low} to T _{high}	I _{io}	—	0.03	0.2	—	0.03	0.2	—	0.03	0.3	μAdc
Input Offset Voltage (R _S ≤ 10 k Ω) T _A = +25°C T _A = T _{low} to T _{high}	V _{io}	—	1.0	5.0	—	2.0	6.0	—	2.0	10	mVdc
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) ^{1/2}
Common-Mode Rejection Ratio (f = 100 Hz)	CM _{rej}	70	90	—	70	90	—	60	90	—	dB
Open-Loop Voltage Gain T _A = +25°C T _A = T _{low} to T _{high} } (V _O = ±10 V, R _L = 2.0 k ohms) T _A = +25°C T _A = T _{low} to T _{high} } (V _O = ±10 V, R _L = 10 k ohms)	A _{VOL}	50,000 25,000	200,000	— —	20,000 15,000	100,000	— —	— —	— —	— —	V/V
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) R _L = 2 k ohms (T _A = T _{low} to T _{high})	V _O	±12 ±10	±14 ±13	— —	±12 ±10	±14 ±13	— —	±11 ±9.0	±14 ±13	— —	V _{pk}
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 V ⁻ = constant, R _S ≤ 10 k ohms V ⁺ = constant, R _S ≤ 10 k ohms	S ⁺ S ⁻	— —	30 30	150 150	— —	30 30	150 150	— —	30 30	— —	μV/V
Power Supply Current	I _D ⁺ I _D ⁻	— —	2.3 2.3	5.0 5.0	— —	2.3 2.3	5.6 5.6	— —	2.3 2.3	8.0 8.0	mAdc
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 ±(V⁺ + |V⁻|).

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

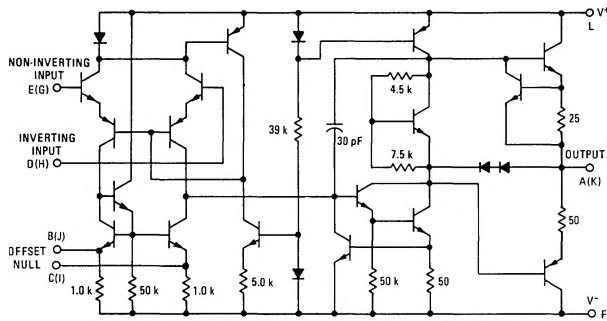
③ T_{low}: 0°C for MC1458,C

-55°C for MC1558

T_{high}: +75°C for MC1458,C

+125°C for MC1558

FIGURE 2 – CIRCUIT SCHEMATIC

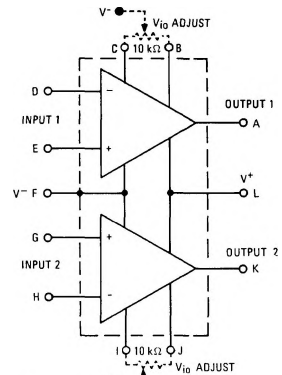


The letters without parenthesis represent the pin numbers for 1/2 of the dual circuit, letters in parenthesis represent the pin numbers for the other half.

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, $T_A = +25^\circ\text{C}$ unless otherwise noted.)

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

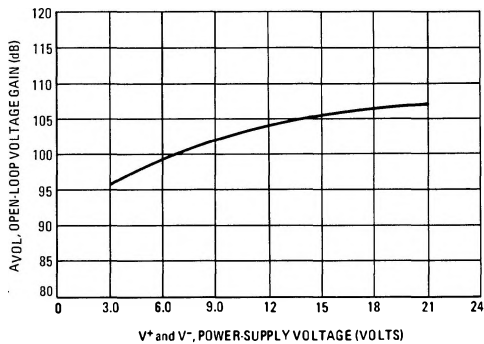


FIGURE 5 – OPEN-LOOP FREQUENCY RESPONSE

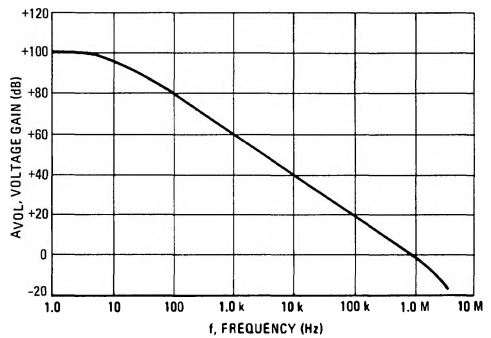


FIGURE 6 – POWER BANDWIDTH
(LARGE SIGNAL SWING versus FREQUENCY)

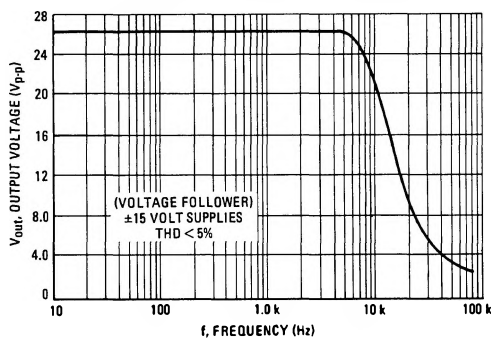
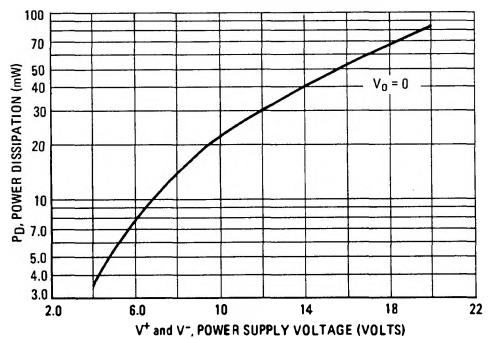


FIGURE 7 – POWER DISSIPATION
versus POWER SUPPLY VOLTAGE



MC1558, MC1458, MC1458C (continued)

TYPICAL CHARACTERISTICS (continued)

($V^+ = +15$ Vdc, $V^- = -15$ Vdc, $T_A = +25^\circ\text{C}$ unless otherwise noted.)

FIGURE 8 – OUTPUT VOLTAGE SWING versus LOAD RESISTANCE

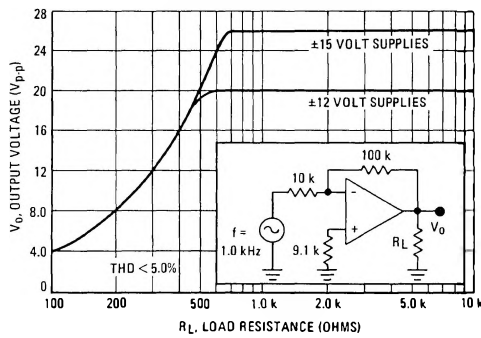


FIGURE 9 – OUTPUT NOISE versus SOURCE RESISTANCE

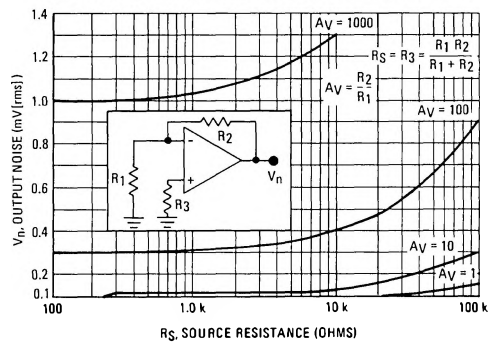


FIGURE 10 – HIGH-IMPEDANCE, HIGH-GAIN INVERTING AMPLIFIER

