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.

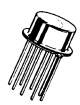
- No Frequency Compensation Required
- Short-Circuit Protection
- Wide Common-Mode and Differential Voltage Ranges
- Low-Power Consumption
- No Latch Up

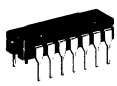
(DUAL MC1741)

DUAL OPERATIONAL AMPLIFIER

MONOLITHIC SILICON INTEGRATED CIRCUIT

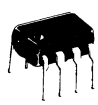
G SUFFIX
METAL PACKAGE
CASE 601
TO-99



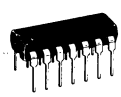


L SUFFIX
CERAMIC PACKAGE
CASE 632
TO-116

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



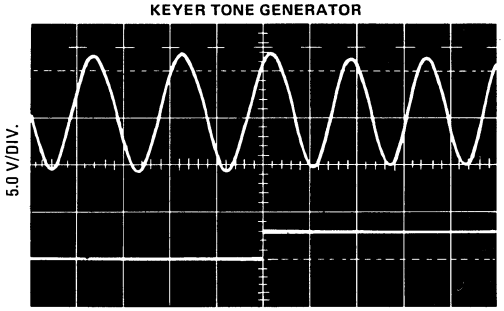
P2 SUFFIX
PLASTIC PACKAGE
CASE 605
MC1458,C (only)

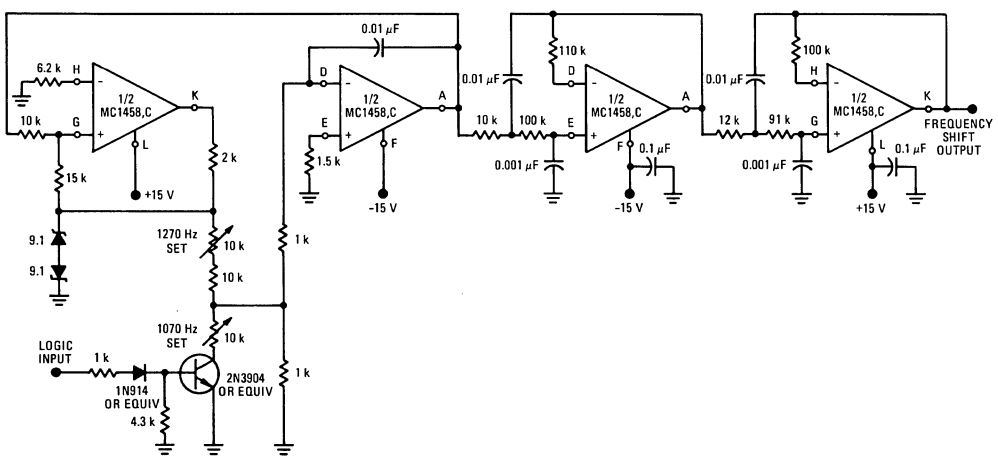


PIN CONNECTIONS

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





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)

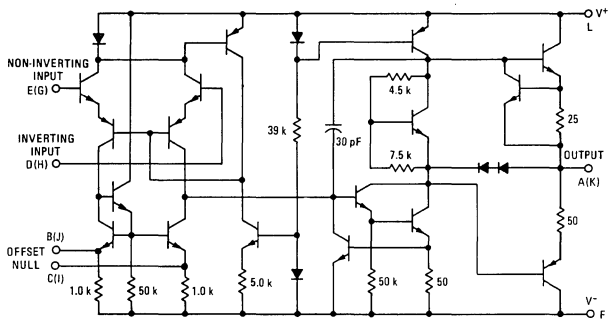
Characteristics	Symbol	MC1558			MC1458			MC1458C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
Input Bias Current	I_b										µAdc
T_A = +25°C		–	0.2	0.5	–	0.2	0.5	–	0.2	0.7	
T_A = T_{low} to T_{high} ③		–	–	1.5	–	–	0.8	–	–	1.0	
Input Offset Current	$\|I_{io}\|$										µAdc
T_A = +25°C		–	0.03	0.2	–	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	e_n										nV/(Hz)½
(A_V = 100, R_s = 10 k ohms, f = 1.0 kHz, BW = 1.0 Hz)		–	45	–	–	45	–	–	45	–	
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} }		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} }		–	–	–	–	–	–	15,000	–	–	
Power Bandwidth	P_{BW}	–	14	–	–	14	–	–	14	–	kHz
(A_V = 1, R_L = 2.0 k ohms, THD≤5%, V_o = 20 V p-p)											
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	$\|TCV_{io}\|$	–	15	–	–	15	–	–	15	–	µV/°C
(R_S = 50 ohms, T_A = T_{low} to T_{high})											
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	P_D										mW
(V_o = 0)		–	70	150	–	70	170	–	70	240	

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

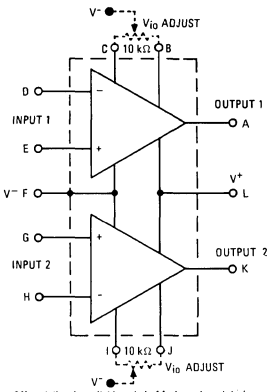


The letters without parenthesis represent the pin numbers for 1/2 of the dual circuit, letters in parenthesis represent the pin numbers for the other half.

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°C unless otherwise noted.)

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

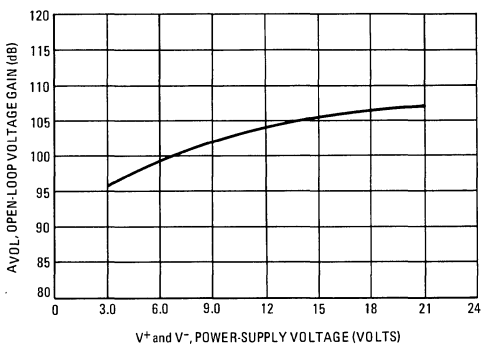


FIGURE 5 – OPEN-LOOP FREQUENCY RESPONSE

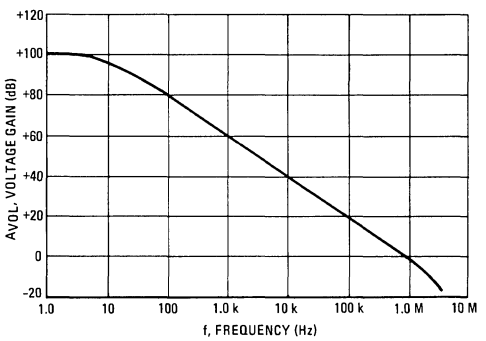


FIGURE 6 – POWER BANDWIDTH (LARGE SIGNAL SWING versus FREQUENCY)

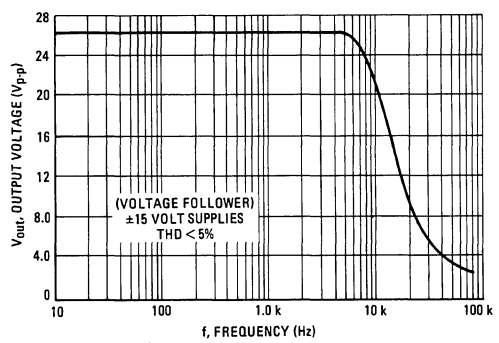
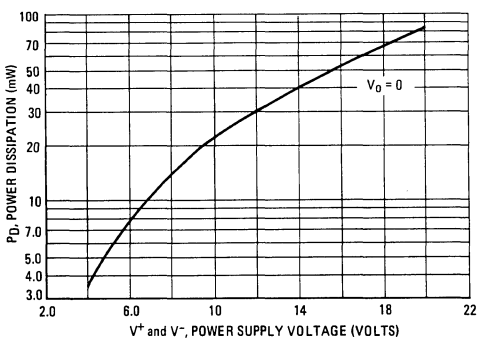


FIGURE 7 – POWER DISSIPATION versus POWER SUPPLY VOLTAGE



TYPICAL CHARACTERISTICS (continued)

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

FIGURE 8 – OUTPUT VOLTAGE SWING versus LOAD RESISTANCE

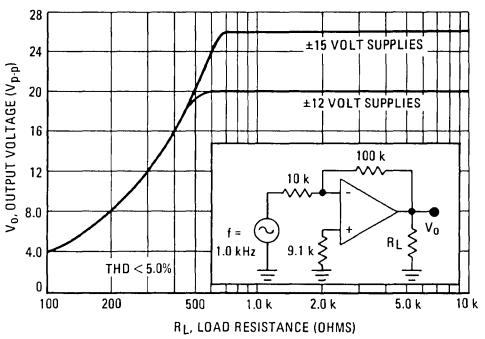


FIGURE 9 – OUTPUT NOISE versus SOURCE RESISTANCE

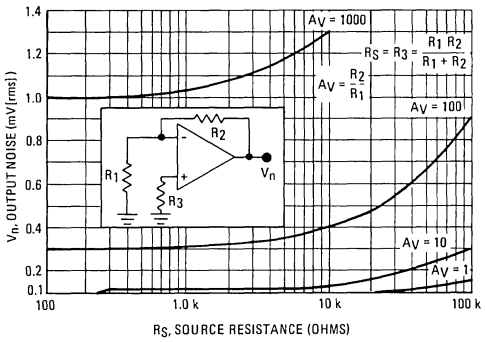
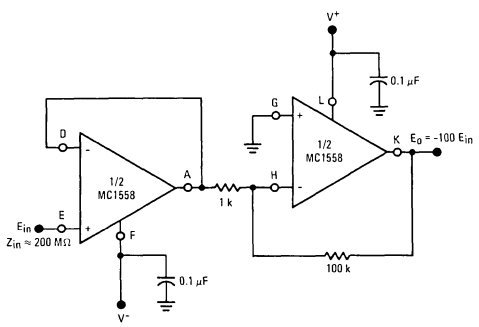


FIGURE 10 – HIGH-IMPEDANCE, HIGH-GAIN INVERTING AMPLIFIER



6

MCC1558
MCC1458

Advance Information

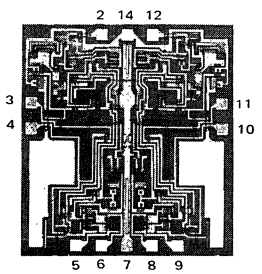
DUAL MC1741
INTERNALLY COMPENSATED, HIGH PERFORMANCE MONOLITHIC OPERATIONAL AMPLIFIER CHIP

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

The MCC1558 and MCC1458 employ phosphorsilicate passivation that protects the entire die surface area, including metalization interconnects. All dice have a minimum gold-backed thickness of 4000 Angstroms. The interconnecting metalization and bonding pads are of evaporated aluminum.

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

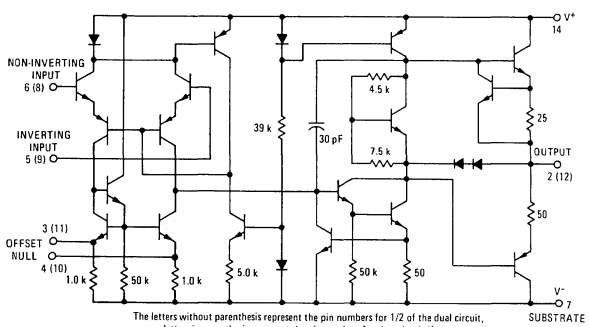
(DUAL MC1741)
DUAL OPERATIONAL AMPLIFIER CHIP INTEGRATED CIRCUIT
MONOLITHIC SILICON



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

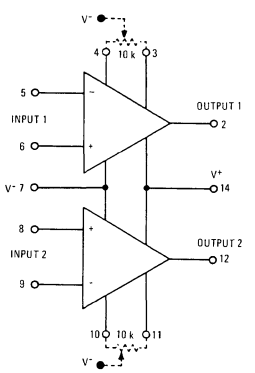
Rating	Symbol	MCC1558	MCC1458	Unit
Power Supply Voltage	V^+ V^-	+22 -22	+18 -18	Vdc
Differential Input Signal	V_{in}	±30		Volts
Common-Mode Input Swing	CMV_{in}	±15		Volts
Output Short Circuit Duration	t_S	Continuous		
Operating Temperature Range	T_A	-55 to +125		°C
Junction Temperature Range	T_J	-65 to +150		°C

FIGURE 1 – 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.

FIGURE 2 – OFFSET ADJUST



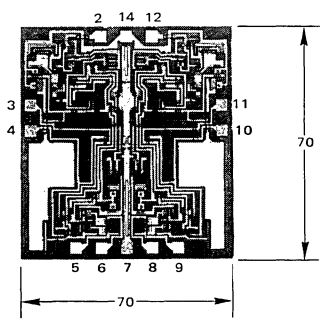
This is advance information on a new introduction and specifications are subject to change without notice.

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

Characteristic	Symbol	MCC1558			MCC1458			Unit
		Min	Typ	Max	Min	Typ	Max	
Input Bias Current	I_b	–	0.2	0.5	–	0.2	0.5	μAdc
Input Offset Current	$\|I_{io}\|$	–	0.03	0.2	–	0.03	0.2	μAdc
Input Offset Voltage ($R_S \leq 10$ k ohms)	$\|V_{io}\|$	–	1.0	5.0	–	2.0	6.0	mVdc
Differential Input Impedance (Open-Loop, f = 20 Hz)								
Parallel Input Resistance	R_p	–	1.0	–	–	1.0	–	Megohm
Parallel Input Capacitance	C_p	–	6.0	–	–	6.0	–	pF
Common-Mode Input Impedance (f = 20 Hz)	$Z_{(in)}$	–	200	–	–	200	–	Megohms
Common-Mode Input Voltage Swing	CMV_{in}	–	±13	–	–	±13	–	V_{pk}
Common-Mode Rejection Ratio (f = 100 Hz)	CM_{rej}	–	90	–	–	90	–	dB
Open-Loop Voltage Gain (V_o = ±10 V, R_L = 2.0 k ohms)	A_{VOL}	50,000	200,000	–	20,000	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	–	kHz
Unity Gain Crossover Frequency (open-loop)		–	1.1	–	–	1.1	–	MHz
Phase Margin (open-loop, unity gain)		–	65	–	–	65	–	degrees
Gain Margin		–	11	–	–	11	–	dB
Slew Rate (Unity Gain)	dV_{out}/dt	–	0.8	–	–	0.8	–	V/μs
Output Impedance (f = 20 Hz)	Z_{out}	–	75	–	–	75	–	ohms
Short-Circuit Output Current	I_{SC}	–	20	–	–	20	–	mAdc
Output Voltage Swing (R_L = 10 k ohms)	V_o	±12	±14	–	±12	±14	–	V_{pk}
Power Supply Sensitivity								μV/V
V^- = constant, $R_S \leq 10$ k ohms	S^+	–	30	150	–	30	150	
V^+ = constant, $R_S \leq 10$ k ohms	S^-	–	30	150	–	30	150	
Power Supply Current	I_D^+	–	2.3	5.0	–	2.3	5.6	mAdc
	I_D^-	–	2.3	5.0	–	2.3	5.6	
DC Quiescent Power Dissipation (V_o = 0)	P_D	–	70	150	–	70	170	mW

See current MC1558/MC1458 data sheet for additional information.

MCC1558/MCC1458 BONDING DIAGRAM



All dimensions are nominal and in mils (10^{-3} inches).
Die Dimensions
Thickness = 8.0
Bonding Pads = 4.0 x 4.0

PACKAGING AND HANDLING

The MCC1558/MCC1458 dual operational amplifiers are now available as a single monolithic die or encapsulated in a variety of hermetic and plastic packages. The phosphorsilicate passivation protects the metalization and active area of the die but care must be exercised when removing the dice from the shipping carrier to avoid scratching the bonding pads. A vacuum pickup is useful for the handling of dice. Tweezers are not recommended for this purpose.

The non-spill type shipping carrier consists of a compartmentalized tray and fitted cover. Die are placed in the carrier with geometry side up.