

MC1712 MC1712C

OPERATIONAL AMPLIFIERS

MONOLITHIC WIDEBAND DC AMPLIFIER

... designed for use as an operational amplifier utilizing operating characteristics as a function of the external feedback components.

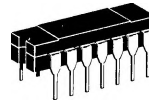
- Open Loop Gain $A_{VOL} = 3600$ typical
- Low Temperature Drift $-\pm 2.5 \mu V/^{\circ}C$
- Output Voltage Swing $-\pm 5.3 V$ typical @ $+12 V$ and $-6 V$ Supplies
- Low Output Impedance $-Z_{out} = 200$ ohms typical

WIDEBAND DC AMPLIFIER INTEGRATED CIRCUIT MONOLITHIC SILICON EPITAXIAL PASSIVATED



G SUFFIX
METAL PACKAGE
CASE 601
TO-99

F SUFFIX
CERAMIC PACKAGE
CASE 606
TO-91



L SUFFIX
CERAMIC PACKAGE
CASE 632
TO-116

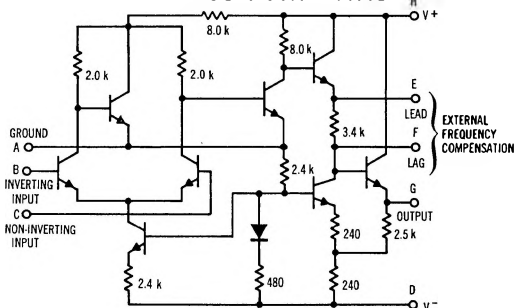
MAXIMUM RATINGS ($T_A = +25^{\circ}C$ unless otherwise noted)

Rating	Symbol	Value	Unit
Power Supply Voltage (Total between V^+ and V^- terminals)	$ V^+ + V^- $	21	Vdc
Differential Input Signal	V_{in}	± 5.0	Volts
Common Mode Input Swing	CMV_{in}	$+1.5$ -6.0	Volts
Peak Load Current	I_L	50	mA
Power Dissipation (Package Limitation)	P_D		
Metal Package		680	mW
Derate above $T_A = +25^{\circ}C$		4.6	mW/ $^{\circ}C$
Flat Ceramic Package		500	mW
Derate above $T_A = +25^{\circ}C$		3.3	mW/ $^{\circ}C$
Dual In-Line Ceramic Package		625	mW
Derate above $T_A = +25^{\circ}C$		5.0	mW/ $^{\circ}C$
Operating Temperature Range MC1712 MC1712C	T_A	-55 to $+125$ 0 to $+75$	$^{\circ}C$
Storage Temperature Range	T_{stg}	-65 to $+150$	$^{\circ}C$

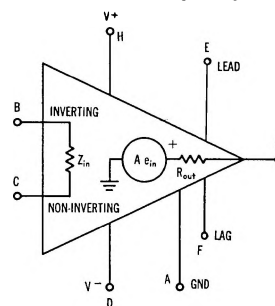
PIN CONNECTIONS

Schematic	A	B	C	D	E	F	G	H
"G" Package	1	2	3	4	5	6	7	8
"F" Package	2	3	4	5	6	7	8	10
"L" Package	3	4	5	6	9	10	12	13

CIRCUIT SCHEMATIC



EQUIVALENT CIRCUIT



MC1712, MC1712C (continued)

ELECTRICAL CHARACTERISTICS (T_A = +25°C unless otherwise noted)

Characteristic	Symbol	MC1712			MC1712C			Unit
		Min	Typ	Max	Min	Typ	Max	
Open-Loop Voltage Gain (R _L = 100 kΩ) (V ⁺ = 6.0 Vdc, V ⁻ = -3.0 Vdc, V _O = ±2.5 V) (V ⁺ = 12 Vdc, V ⁻ = -6.0 Vdc, V _O = ±5.0 V) (V ⁺ = 12 Vdc, V ⁻ = -6.0 Vdc, V _O = ±5.0 Vdc, T _A = T _{low} ①, T _{high} ①) (V ⁺ = 6.0 Vdc, V ⁻ = -3.0 Vdc, V _O = ±2.5 V, T _A = T _{low} to T _{high})	A _{VOL}	600 2500 2000 500	900 3600 - -	1500 6000 7000 1750	500 2000 1500 400	800 3400 - -	1500 6000 7000 1750	V/V
Output Impedance (V ⁺ = 6.0 Vdc, V ⁻ = -3.0 Vdc, f = 20 Hz) (V ⁺ = 12 Vdc, V ⁻ = -6.0 Vdc, f = 20 Hz)	Z _{out}	- -	300 200	700 500	- -	300 200	800 600	ohms
Input Impedance (V ⁺ = 6.0 Vdc, V ⁻ = -3.0 Vdc, f = 20 Hz) (V ⁺ = 6.0 Vdc, V ⁻ = -3.0 Vdc, f = 20 Hz, T _A = T _{low} , T _{high}) (V ⁺ = 12 Vdc, V ⁻ = -6.0 Vdc, f = 20 Hz) (V ⁺ = 12 Vdc, V ⁻ = -6.0 Vdc, f = 20 Hz, T _A = T _{low} , T _{high})	Z _{in}	22 8.0 16 6.0	70 - 40 -	- - - -	16 10 - -	55 32 - -	- - - -	k ohms
Output Voltage Swing (V ⁺ = 6.0 Vdc, V ⁻ = -3.0 Vdc, R _L = 100 kΩ) (V ⁺ = 12 Vdc, V ⁻ = -6.0 Vdc, R _L = 100 kΩ) (V ⁺ = 6.0 Vdc, V ⁻ = -3.0 Vdc, R _L = 10 kΩ) (V ⁺ = 12 Vdc, V ⁻ = -6.0 Vdc, R _L = 10 kΩ)	V _O	±2.5 ±5.0 ±1.5 ±3.5	±2.7 ±5.3 ±2.0 ±4.0	- - - -	±2.5 ±5.0 ±1.5 ±3.5	±2.7 ±5.3 ±2.0 ±4.0	- - - -	V _{peak}
Input Common-Mode Voltage Swing (V ⁺ = 6.0 Vdc, V ⁻ = -3.0 Vdc) (V ⁺ = 12 Vdc, V ⁻ = -6.0 Vdc)	CMV _{in}	+0.5 -1.5 +0.5 -4.0	- - - -	- - - -	+0.5 -1.5 +0.5 -4.0	- - - -	- - - -	V _{peak}
Common-Mode Rejection Ratio (V ⁺ = 6.0 Vdc, V ⁻ = -3.0 Vdc, f ≤ 1.0 kHz) (V ⁺ = 12 Vdc, V ⁻ = -6.0 Vdc, f ≤ 1.0 kHz)	CM _{rej}	80 80	100 100	- -	70 70	95 95	- -	dB
Input Bias Current T _A = +25°C (V ⁺ = 6.0 Vdc, V ⁻ = -3.0 Vdc) (V ⁺ = 12 Vdc, V ⁻ = -6.0 Vdc) I _b = $\frac{I_1 + I_2}{2}$, T _A = T _{low} (V ⁺ = 6.0 Vdc, V ⁻ = -3.0 Vdc) (V ⁺ = 12 Vdc, V ⁻ = -6.0 Vdc)	I _b	- - - -	1.2 2.0 2.5 4.0	3.5 5.0 7.5 10	- - - -	1.5 2.5 2.5 4.0	5.0 7.5 8.0 12	μA
Input Offset Current (I _{io} = I ₁ - I ₂) (V ⁺ = 6.0 Vdc, V ⁻ = -3.0 Vdc) (V ⁺ = 6.0 Vdc, V ⁻ = -3.0 Vdc, T _A = T _{low} to T _{high}) (V ⁺ = 12 Vdc, V ⁻ = -6.0 Vdc) (V ⁺ = 12 Vdc, V ⁻ = -6.0 Vdc, T _A = T _{low} to T _{high})	I _{io}	- - - -	0.1 - 0.2 -	0.5 1.5 0.5 1.5	- - - -	0.3 - 0.5 -	2.0 2.5 2.0 2.5	μA
Input Offset Voltage (R _S = 2.0 kΩ) (V ⁺ = 6.0 Vdc, V ⁻ = -3.0 Vdc) (V ⁺ = 6.0 Vdc, V ⁻ = -3.0 Vdc, T _A = T _{low} , T _{high}) (V ⁺ = 12 Vdc, V ⁻ = -6.0 Vdc) (V ⁺ = 12 Vdc, V ⁻ = -6.0 Vdc, T _A = T _{low} , T _{high})	V _{io}	- - - -	1.3 - 1.1 -	3.0 4.0 2.0 3.0	- - - -	1.7 - 1.5 -	6.0 7.5 5.0 6.5	mV
Step Response (V ⁺ = 12 Vdc, V ⁻ = -6.0 Vdc) { Gain = 100, V _{in} = 1.0 mV, R ₁ = 1.0 kΩ, R ₂ = 100 kΩ, C ₂ = 50 pF, R ₃ = ∞, C ₁ = open (V ⁺ = 12 Vdc, V ⁻ = -6.0 Vdc) { Gain = 1.0, V _{in} = 10 mV, R ₁ = 10 kΩ, R ₂ = 10 kΩ, C ₁ = 0.01 μF, R ₃ = 20 Ω, C ₂ = open }	V _{os} t _f t _{pd} dV _{out} /dt ② V _{os} t _f t _{pd} dV _{out} /dt ②	- - - - - - - -	20 10 10 12 10 25 16 1.5	40 30 - - 50 120 - -	- - - - - - - -	20 10 10 12 10 25 16 1.5	40 30 - - 50 120 - -	% ns ns V/μs % ns ns V/μs
Average Temperature Coefficient of Input Offset Voltage (R _S = 50 Ω) (T _A = +25°C to T _{high}) (T _A = T _{low} to +25°C) (T _A = T _{low} , T _{high})	TC _{Vio}	- - -	2.5 2.0 -	- - -	- - -	- - 5.0	- - -	μV/°C
Average Temperature Coefficient Input Offset Current (T _A = +25°C to T _{high}) (T _A = T _{low} to +25°C)	TC _{Iio}	- -	0.05 1.5	- -	- -	4.0 6.0	- -	nA/°C
DC Power Dissipation (V _{out} = 0, V ⁺ = 6.0 Vdc, V ⁻ = -3.0 Vdc) (V _{out} = 0, V ⁺ = 12 Vdc, V ⁻ = -6.0 Vdc)	P _D	- -	17 70	30 120	- -	17 70	30 120	mW
Positive Supply Sensitivity (V ⁻ constant = -6.0 Vdc, V ⁺ = 12 Vdc to 6.0 Vdc)	S ⁺	-	60	200	-	60	300	μV/V
Negative Supply Sensitivity (V ⁺ constant = 12 Vdc, V ⁻ = -6.0 Vdc to -3.0 Vdc)	S ⁻	-	60	200	-	60	300	μV/V

① T_{low} = 0°C for MC1712C, T_{high} = +75°C for MC1712C
-55°C for MC1712 +125°C for MC1712

② dV_{out}/dt = Slew Rate

MC1712, MC1712C (continued)

TYPICAL OUTPUT CHARACTERISTICS
($V^+ = 12\text{ Vdc}$, $V^- = -6.0\text{ Vdc}$, $T_A = +25^\circ\text{C}$)

FIGURE 1 — OPEN LOOP GAIN versus POWER SUPPLY VARIATIONS

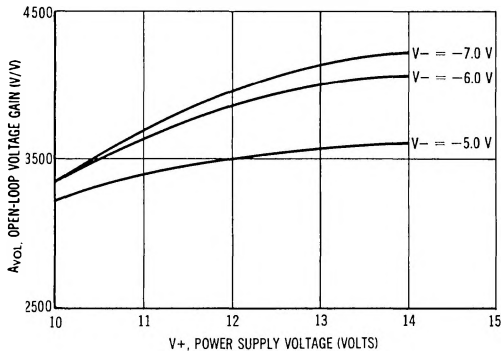


FIGURE 2 — OPEN LOOP VOLTAGE GAIN versus FREQUENCY

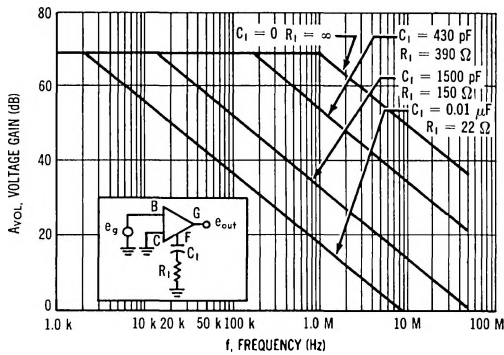


FIGURE 3 — VOLTAGE GAIN versus FREQUENCY

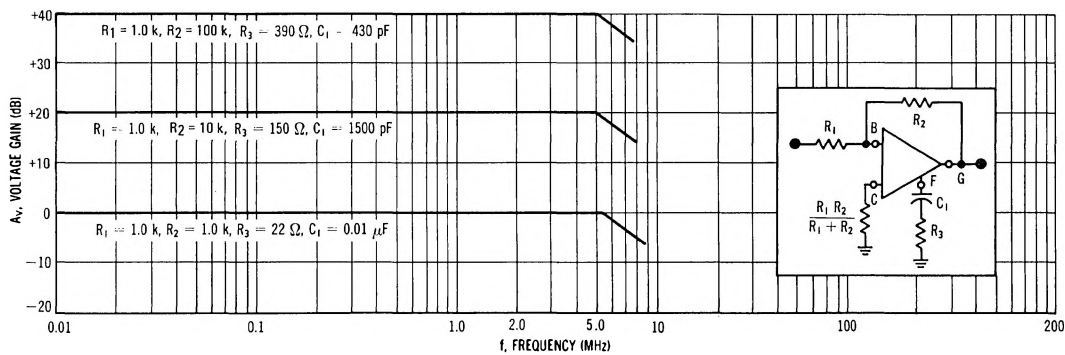


FIGURE 4 — MAXIMUM OUTPUT SWING versus FREQUENCY

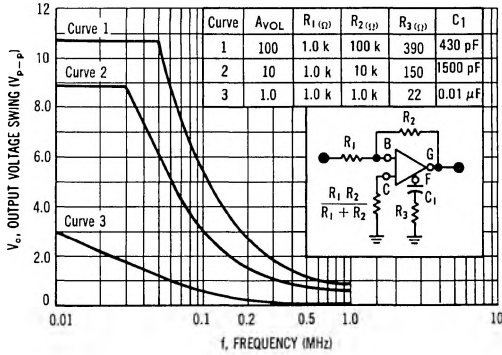
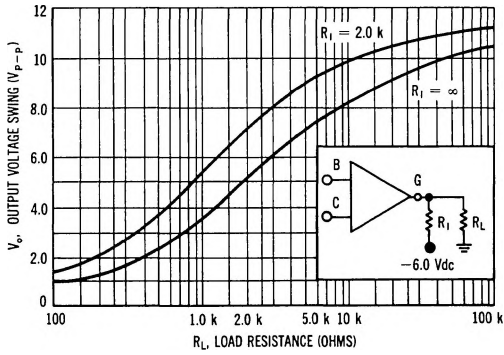


FIGURE 5 — OUTPUT VOLTAGE SWING versus LOAD RESISTANCE



TYPICAL CHARACTERISTICS(continued)

FIGURE 6 – INPUT BIAS CURRENT
versus TEMPERATURE

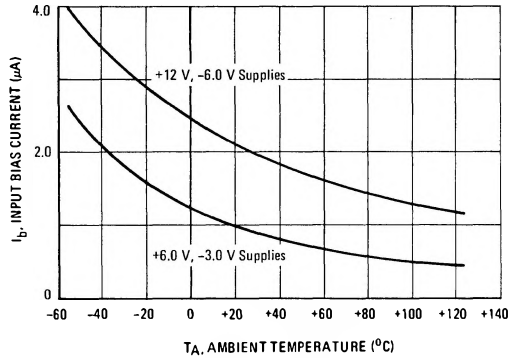


FIGURE 7 – INPUT OFFSET CURRENT
versus TEMPERATURE

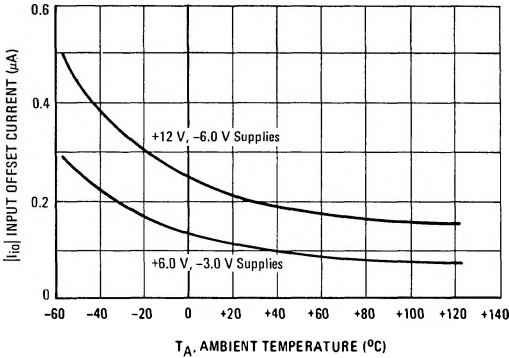


FIGURE 8 – INPUT OFFSET VOLTAGE
versus TEMPERATURE

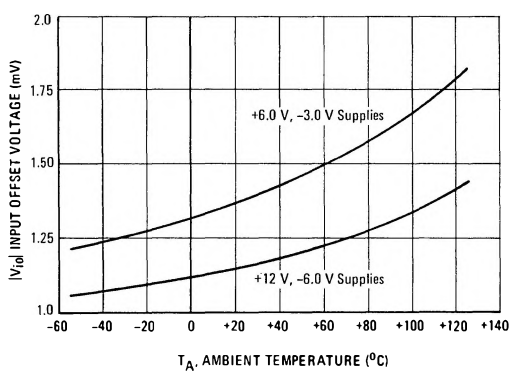


FIGURE 9 – OUTPUT NOISE VOLTAGE
versus SOURCE IMPEDANCE

