



MOTOROLA

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MC1436, C

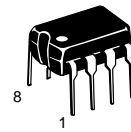
High Voltage, Internally Compensated Operational Amplifiers

The MC1436, C was designed for use as a summing amplifier, integrator, or amplifier with operating characteristics as a function of the external feedback components.

- Output Voltage Swing: $\pm 22 V_{pk(min)}$ ($V_{CC} = +28 V, V_{EE} = -28 V$)
- Fast Slew Rate: $2.0 V/\mu s$ Typ
- Internally Compensated
- Offset Voltage Null Capability
- Input Overvoltage Protection
- A_{VOL} : 500,000 Typ
- Characteristics Independent of Power Supply Voltages: ($\pm 5.0 V_{dc}$ to $\pm 36 V_{dc}$)

OPERATIONAL AMPLIFIERS

SEMICONDUCTOR TECHNICAL DATA



P1 SUFFIX
PLASTIC PACKAGE
CASE 626



D SUFFIX
PLASTIC PACKAGE
CASE 751
(SO-8)

Figure 1. Differential Amplifier with $\pm 20 V$ Common Mode Input Voltage Range

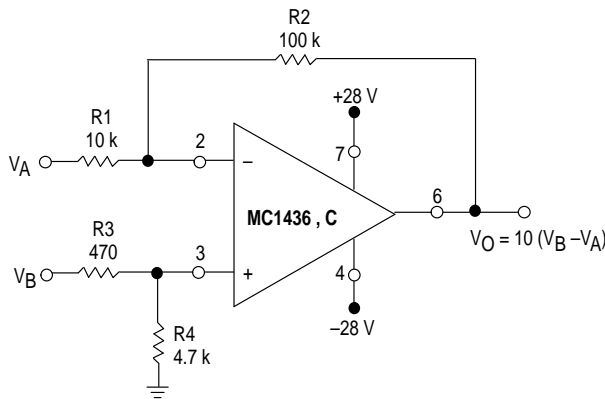
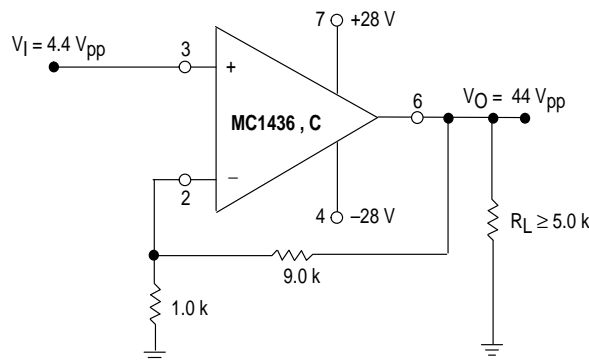
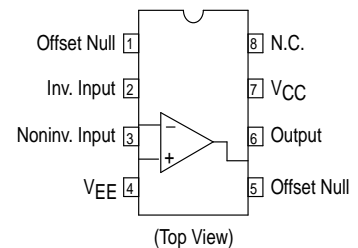


Figure 2. Typical Noninverting X10 Voltage Amplifier



PIN CONNECTIONS



ORDERING INFORMATION

Device	Operating Temperature Range	Package
MC1436CD,D	$T_A = 0^\circ$ to $+70^\circ C$	SO-8
MC1436CP1,P1		Plastic DIP

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

Rating	Symbol	MC1436	MC1436C	Unit
Power Supply Voltage	V _{CC} V _{EE}	+34 -34	+30 -30	Vdc
Input Differential Voltage Range	V _{IDR}	Note 2		V
Input Common Mode Voltage Range	V _{ICR}	Note 2		V
Output Short Circuit Duration (V _{CC} = V _{EE} = 28 Vdc, V _O = 0)	t _{SC}	5.0		sec
Power Dissipation (Package Limitation) Derate above T _A = +25°C	P _D	680 4.6		mW mW/°C
Operating Ambient Temperature Range	T _A	0 to +70		°C
Storage Temperature Range	T _{stg}	-65 to +150		°C

ELECTRICAL CHARACTERISTICS (V_{CC} = +28 V, V_{EE} = -28 V, T_A = 25°C, unless otherwise noted.)

Characteristic	Symbol	MC1436			MC1436C			Unit
		Min	Typ	Max	Min	Typ	Max	
Input Bias Current T _A = +25°C T _A = T _{low} to T _{high} (See Note 1)	I _{IB}	- -	15 -	40 55	- -	25 -	90 -	nAdc
Input Offset Current T _A = +25°C T _A = +25°C to T _{high} T _A = T _{low} to +25°C	I _{IO}	- - -	5.0 - -	10 14 14	- - -	10 - -	25 - -	nAdc
Input Offset Voltage T _A = +25°C T _A = T _{low} to T _{high}	V _{IO}	- -	5.0 -	10 14	- -	5.0 -	12 -	mVdc
Differential Input Impedance (Open loop, f ≤ 5.0 Hz) Parallel Input Resistance Parallel Input Capacitance	r _p C _p	- -	10 2.0	- -	- -	10 2.0	- -	MΩ pF
Common Mode Input Impedance (f ≤ 5.0 Hz)	z _{ic}	-	250	-	-	250	-	MΩ
Input Common Mode Voltage Range	V _{ICR}	±22	±25	-	±18	±20	-	Vpk
Equivalent Input Noise Voltage (A _v = 100, R _S = 10 kΩ, f = 1.0 kHz, BW = 1.0 Hz)	e _n	-	50	-	-	50	-	nV/(Hz) ^{1/2}
Common Mode Rejection (DC)	CMR	70	110	-	50	90	-	dB
Large Signal DC Open Loop Voltage Gain (V _O = ±10 V, R _L = 100 kΩ) T _A = +25°C T _A = T _{low} to T _{high} (V _O = ±10 V, R _L = 10 kΩ, T _A = +25°C)	A _{VOL}	70,000 50,000 -	500,000 - 200,000	- - -	50,000 - -	500,000 - 200,000	- - -	V/V
Power Bandwidth (Voltage Follower) (A _v = 1, R _L = 5.0 kΩ, THD ≤ 5%, V _O = 40 V _{pp})	BW _p	-	23	-	-	23	-	kHz
Unity Gain Crossover Frequency (Open loop)	f _c	-	1.0	-	-	1.0	-	MHz
Phase Margin (Open loop, Unity Gain)	φ _m	-	50	-	-	50	-	Degrees
Gain Margin	A _M	-	18	-	-	18	-	dB
Slew Rate (Unity Gain)	SR	-	2.0	-	-	2.0	-	V/μs
Output Impedance (f ≤ 5.0 Hz)	z _O	-	1.0	-	-	1.0	-	kΩ
Short Circuit Output Current	I _{SC}	-	±17	-	-	±19	-	mAdc

NOTES: 1. T_{low} = 0°C for MC1436,C T_{high} = +70°C for MC1436,C
2. Either or both input voltages must not exceed the magnitude of V_{CC} or V_{EE} + 3.0 V.

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ELECTRICAL CHARACTERISTICS ($V_{CC} = +28\text{ V}$, $V_{EE} = -28\text{ V}$, $T_A = 25^\circ\text{C}$, unless otherwise noted.)

Characteristic	Symbol	MC1436			MC1436C			Unit
		Min	Typ	Max	Min	Typ	Max	
Output Voltage Range ($R_L = 5.0\text{ k}\Omega$) $V_{CC} = +28\text{ Vdc}$, $V_{EE} = -28\text{ Vdc}$ $V_{CC} = +36\text{ Vdc}$, $V_{EE} = -36\text{ Vdc}$	V_O	± 20	± 22	–	± 20	± 22	–	V_{pk}
Power Supply Rejection $V_{EE} = \text{Constant}$, $R_S \leq 10\text{ k}\Omega$ $V_{CC} = \text{Constant}$, $R_S \leq 10\text{ k}\Omega$	PSR + PSR –	–	35	200	–	50	–	$\mu\text{V/V}$
Power Supply Current (See Note 2)	I_{CC} I_{EE}	–	2.6	5.0	–	2.6	5.0	mAdc
DC Quiescent Power Consumption ($V_O = 0$)	P_C	–	146	280	–	146	280	mW

NOTES: 2. $V_{CC} = V_{EE} = 5.0\text{ Vdc}$ to 30 Vdc for MC1436
 $V_{CC} = V_{EE} = 5.0\text{ Vdc}$ to 28 Vdc for MC1436C

Figure 3. Low-Drift Sample and Hold

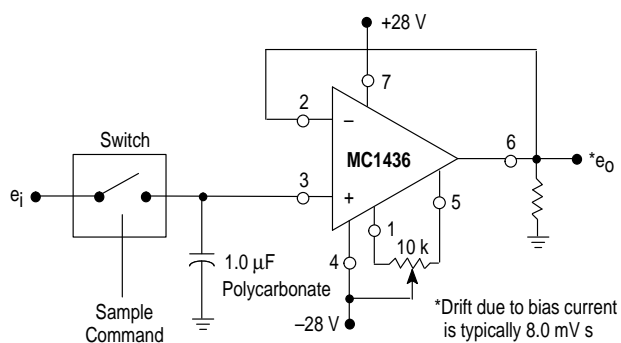


Figure 4. Power Bandwidth

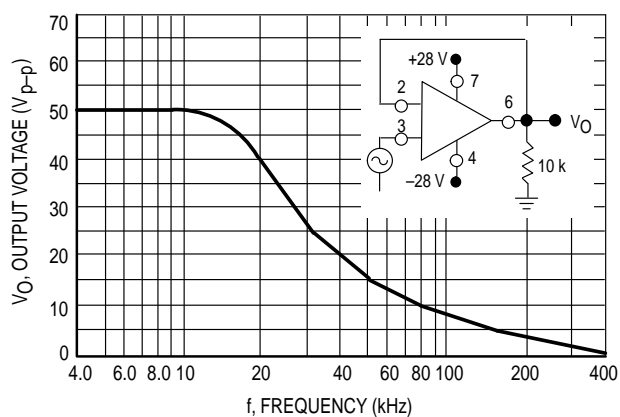


Figure 5. Peak Output Voltage Swing versus Power Supply Voltage

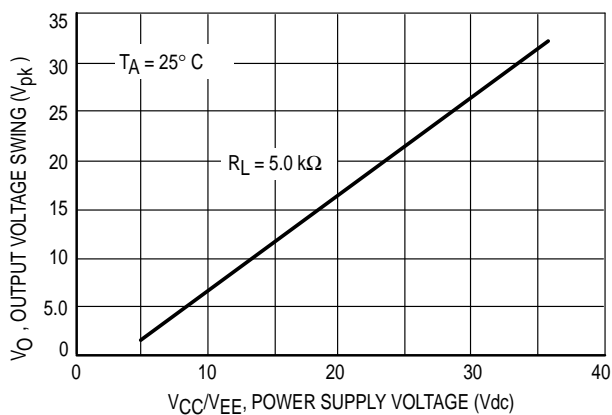
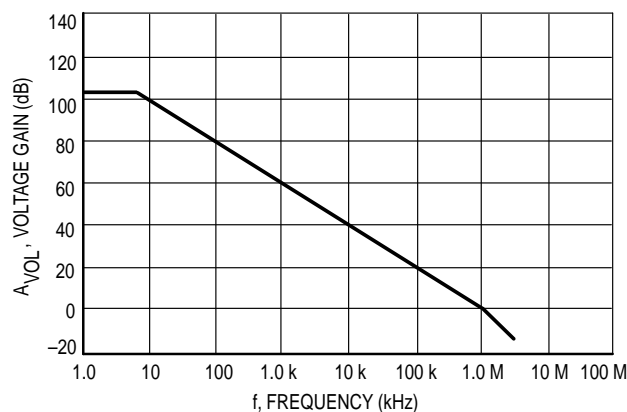


Figure 6. Open Loop Frequency Response



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Figure 7. Output Short Circuit Current versus Temperature

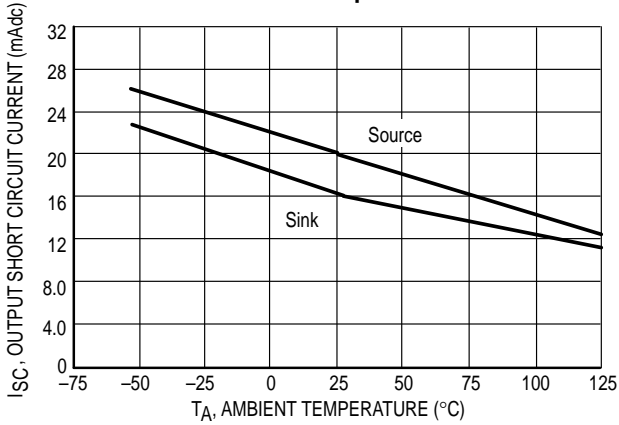


Figure 8. Input Bias Current versus Temperature

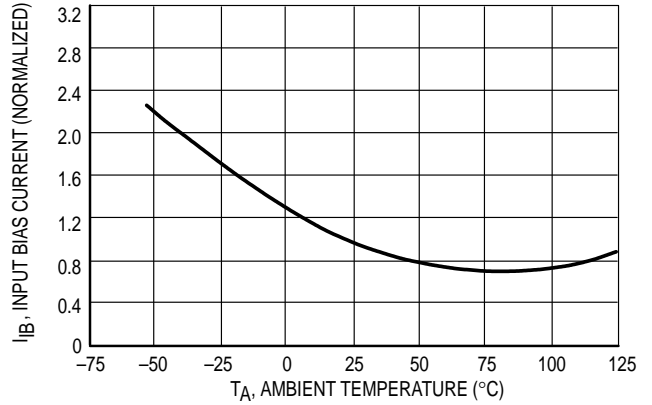


Figure 9. Inverting Feedback Model

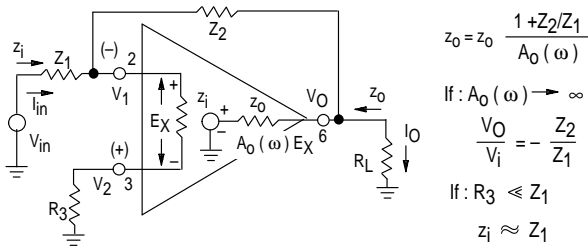


Figure 10. Noninverting Feedback Model

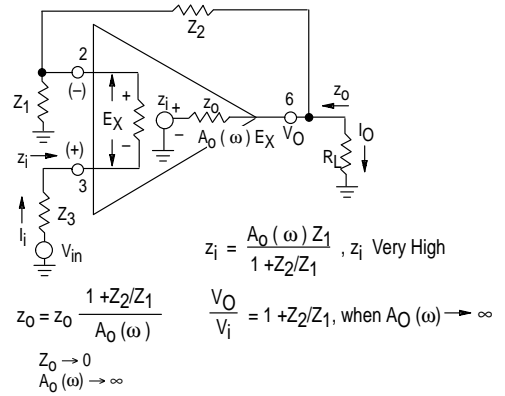
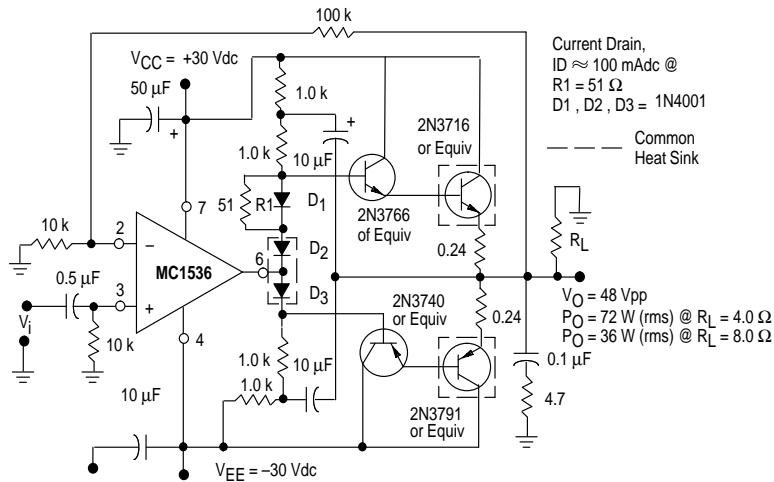


Figure 11. Audio Amplifier



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Figure 12. Voltage Controlled Current Source or Transconductance Amplifier with 0 V to 40 V Compliance

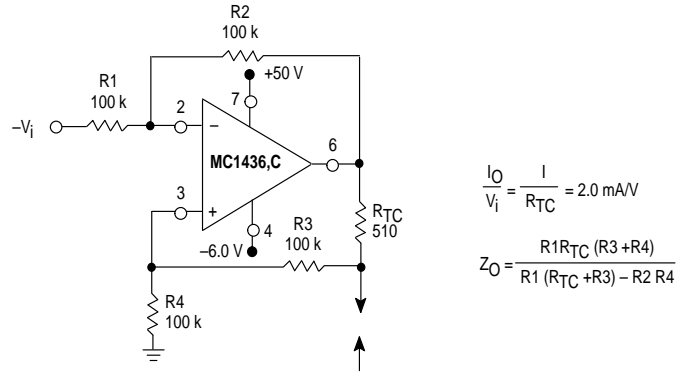


Figure 13. Representative Schematic Diagram

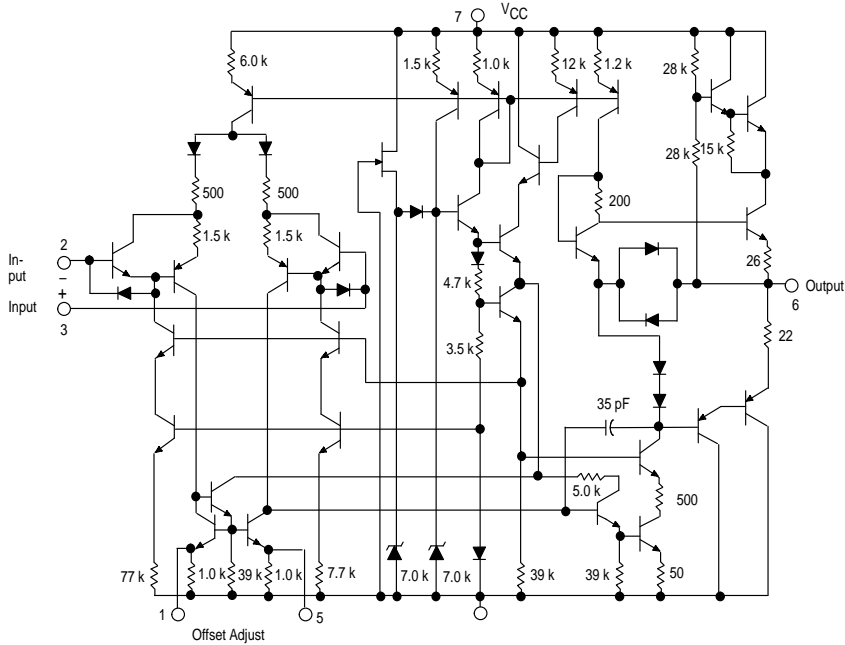
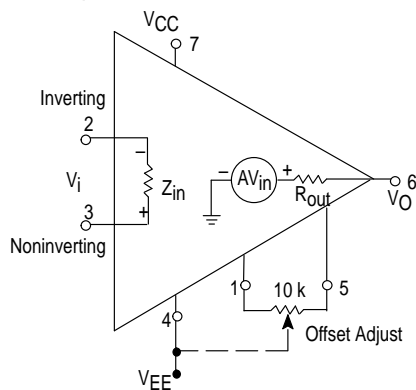


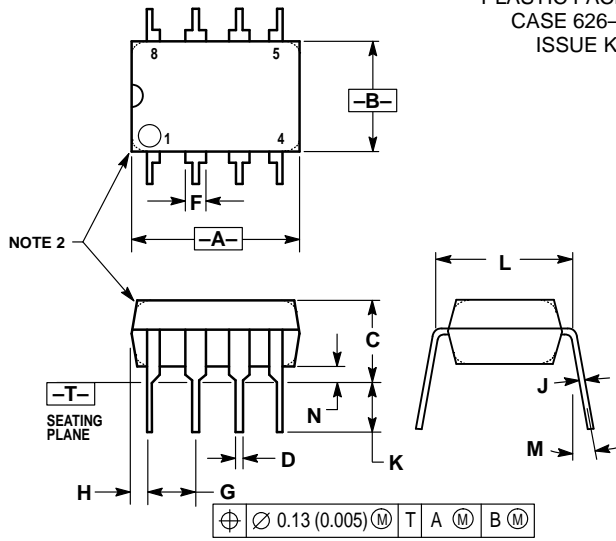
Figure 14. Equivalent Circuit



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OUTLINE DIMENSIONS

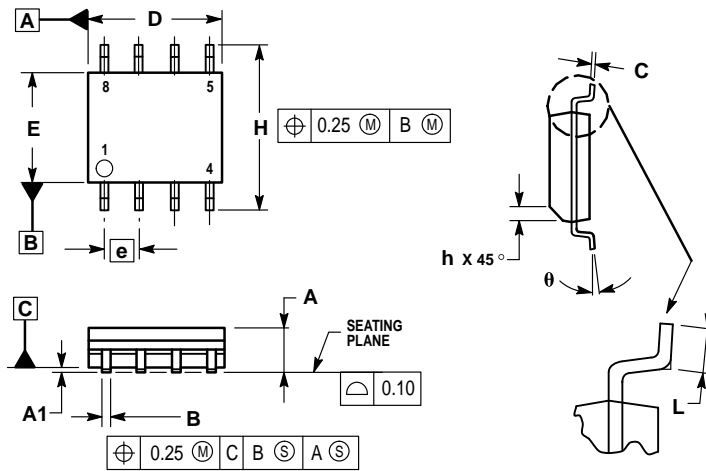
P1 SUFFIX PLASTIC PACKAGE CASE 626-05 ISSUE K



- NOTES:
1. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
 2. PACKAGE CONTOUR OPTIONAL (ROUND OR SQUARE CORNERS).
 3. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.40	10.16	0.370	0.400
B	6.10	6.60	0.240	0.260
C	3.94	4.45	0.155	0.175
D	0.38	0.51	0.015	0.020
F	1.02	1.78	0.040	0.070
G	2.54 BSC		0.100 BSC	
H	0.76	1.27	0.030	0.050
J	0.20	0.30	0.008	0.012
K	2.92	3.43	0.115	0.135
L	7.62 BSC		0.300 BSC	
M	—		10°	
N	0.76	1.01	0.030	0.040


D SUFFIX PLASTIC PACKAGE CASE 751-05 (SO-8) ISSUE R



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
 2. DIMENSIONS ARE IN MILLIMETERS.
 3. DIMENSION D AND E DO NOT INCLUDE MOLD PROTRUSION.
 4. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
 5. DIMENSION B DOES NOT INCLUDE MOLD PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 TOTAL IN EXCESS OF THE B DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS	
	MIN	MAX
A	1.35	1.75
A1	0.10	0.25
B	0.35	0.49
C	0.18	0.25
D	4.80	5.00
E	3.80	4.00
e	1.27 BSC	
H	5.80	6.20
h	0.25	0.50
L	0.40	1.25
θ	0° - 7°	

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