

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 $\pm 36 V_{dc}$)

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

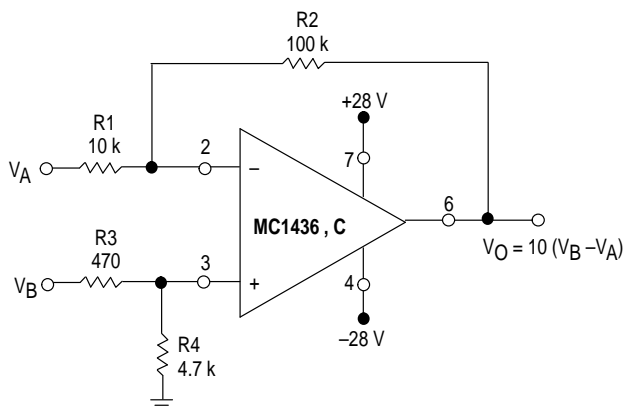
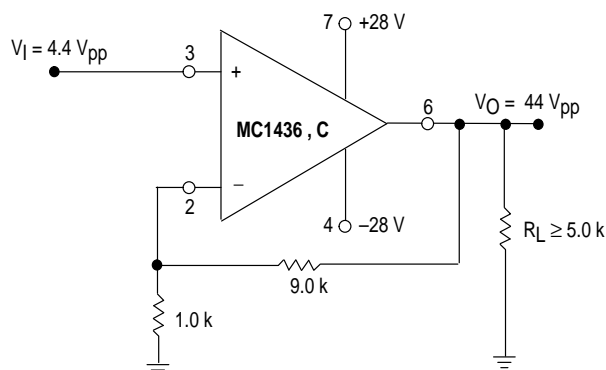


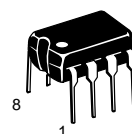
Figure 2. Typical Noninverting X10 Voltage Amplifier



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OPERATIONAL AMPLIFIERS

SEMICONDUCTOR TECHNICAL DATA

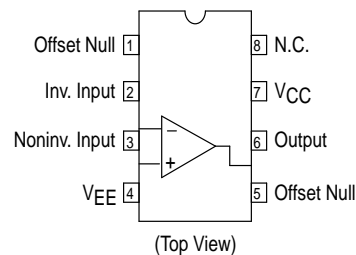


P1 SUFFIX
PLASTIC PACKAGE
CASE 626



D SUFFIX
PLASTIC PACKAGE
CASE 751
(SO-8)

PIN CONNECTIONS



ORDERING INFORMATION

Device	Operating Temperature Range	Package
MC1436CD,D	$T_A = 0^\circ \text{ to } +70^\circ \text{C}$	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	r _p	-	10	-	-	10	-	MΩ
Parallel Input Capacitance	C _p	-	2.0	-	-	2.0	-	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 35	200 200	— —	50 50	— —	$\mu\text{V/V}$
Power Supply Current (See Note 2)	I_{CC} I_{EE}	— —	2.6 2.6	5.0 5.0	— —	2.6 2.6	5.0 5.0	mA_{dc}
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

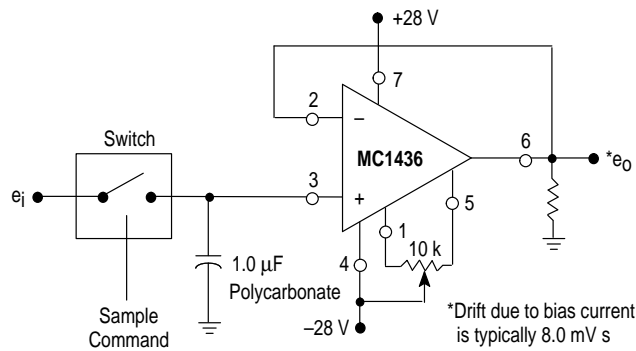


Figure 4. Power Bandwidth

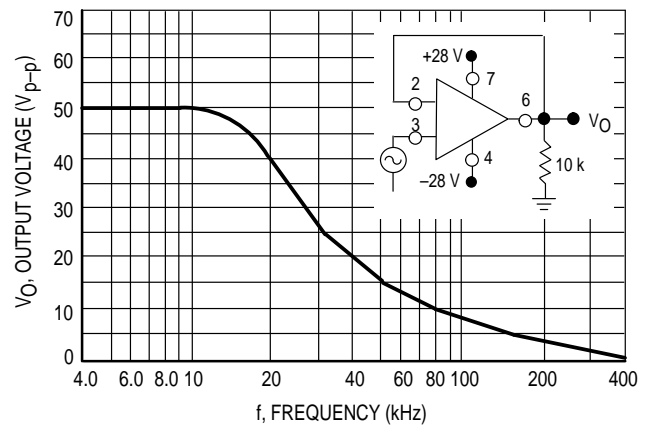


Figure 5. Peak Output Voltage Swing versus Power Supply Voltage

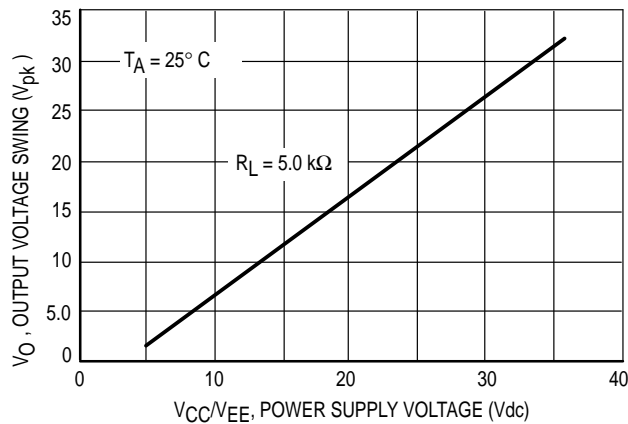


Figure 6. Open Loop Frequency Response

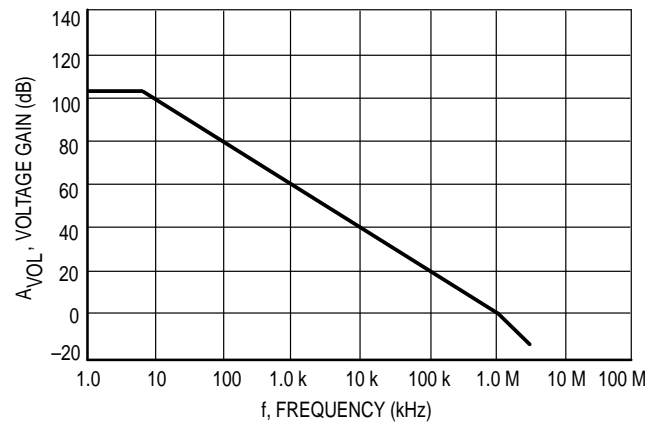


Figure 7. Output Short Circuit Current versus Temperature

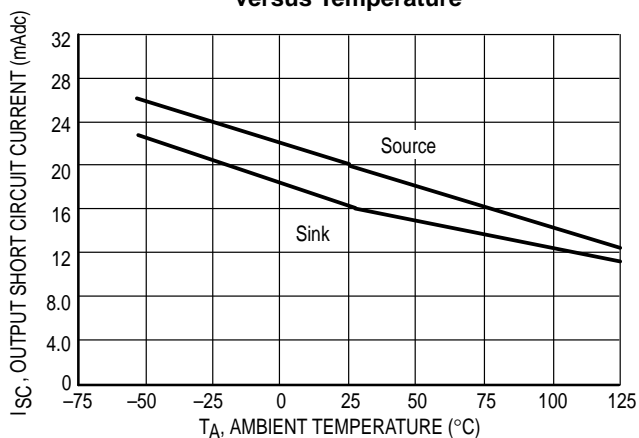


Figure 8. Input Bias Current versus Temperature

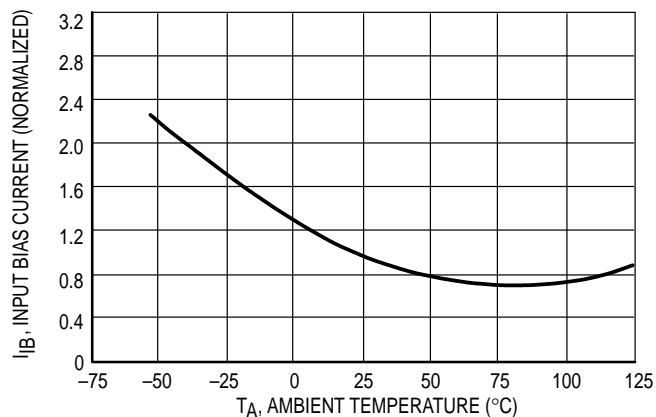


Figure 9. Inverting Feedback Model

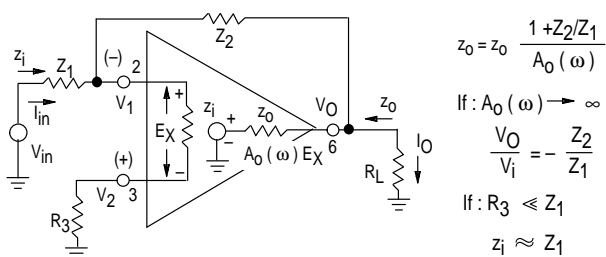


Figure 10. Noninverting Feedback Model

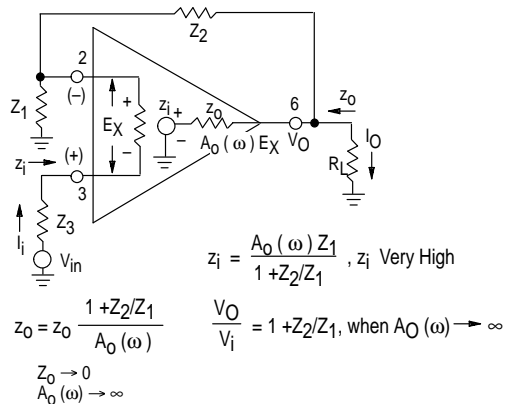
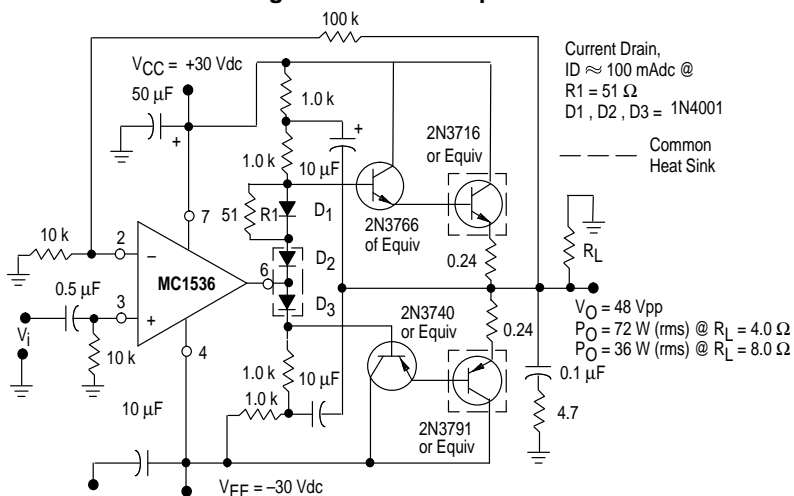


Figure 11. Audio Amplifier



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

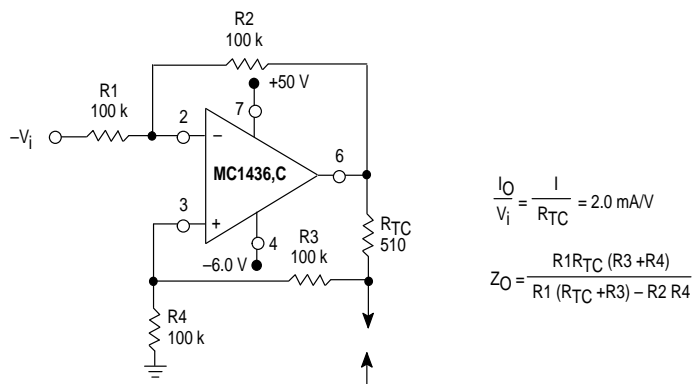


Figure 13. Representative Schematic Diagram

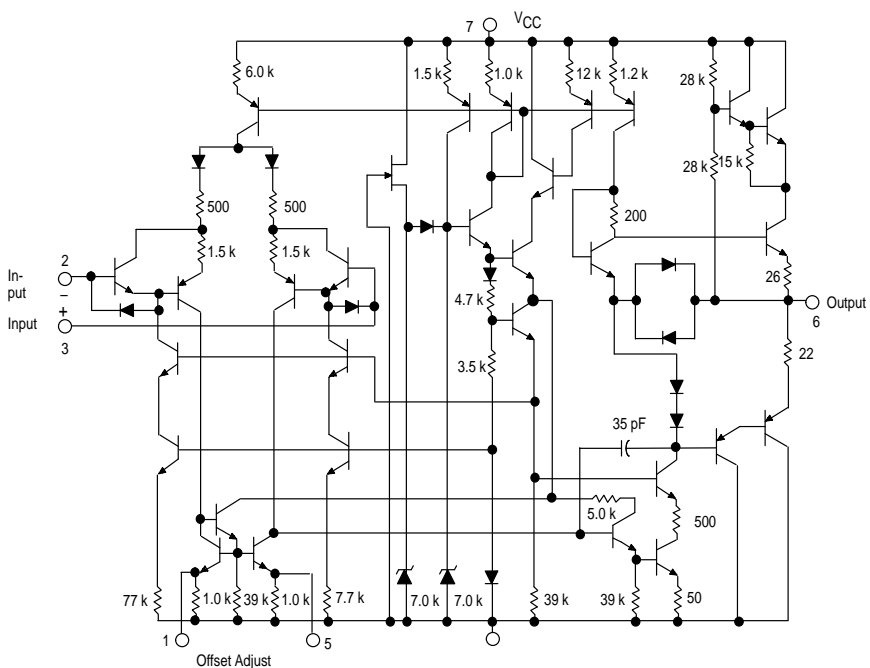
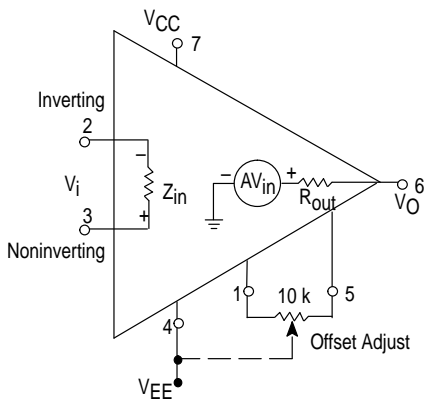


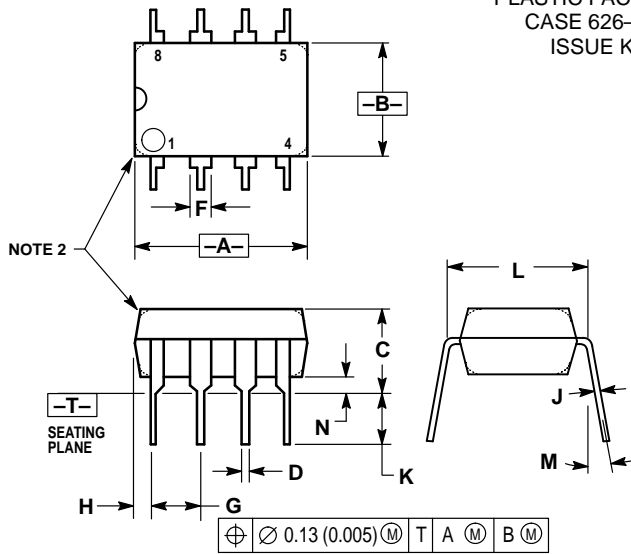
Figure 14. Equivalent Circuit



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OUTLINE DIMENSIONS

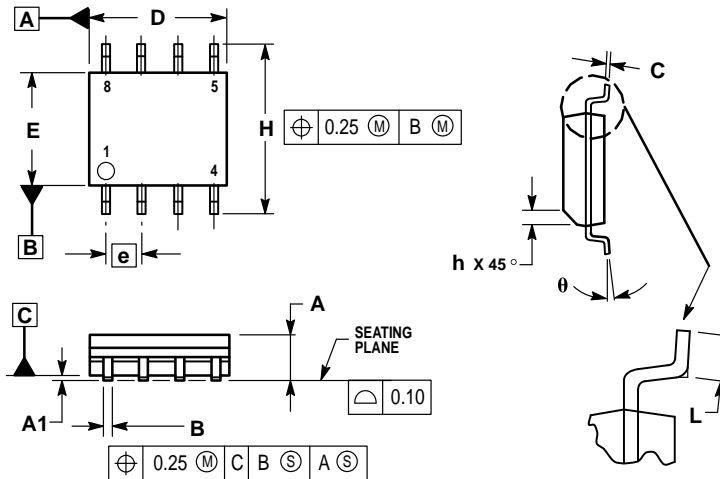
P1 SUFFIX PLASTIC PACKAGE CASE 626-05 ISSUE K



- 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°		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°	

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MC1436/D

