MC10H116

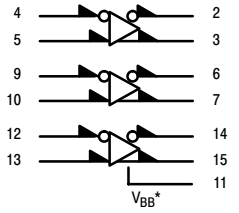
Triple Line Receiver

Description

The MC10H116 is a triple differential amplifier designed for use in sensing differential signals over long lines and is a functional/pinout duplication of the MC10116, with 100% improvement in propagation delay and no increase in power supply current. For termination information see AND8020.

Features

- Propagation Delay, 1.0 ns Typical
- Power Dissipation 85 mW Typ/Pkg (same as MECL 10K™)
- Improved Noise Margin 150 mV (Over Operating Voltage and Temperature Range)
- Voltage Compensated
- MECL 10K Compatible
- Pb−Free Packages are Available*



V_{CC1} = Pin 1
V_{CC2} = Pin 16
V_{EE} = Pin 8

When input pin with bubble goes positive it's respective output pin with bubble goes positive.

*V_{BB} to be used to supply bias to the MC10H116 only and bypassed (when used) with 0.01 μF to 0.1 μF capacitor to ground (0 V). V_{BB} can source < 1.0 mA.

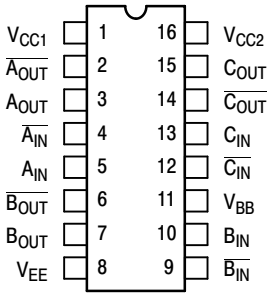
The MC10H116 is designed to be used in sensing differential signals over long lines. The bias supply (V_{BB}) is made available to make the device useful as a Schmitt trigger, or in other applications where a stable reference voltage is necessary.

Active current sources provide these receivers with excellent common−mode noise rejection. If any amplifier in a package is not used, one input of that amplifier must be connected to V_{BB} to prevent unbalancing the current−source bias network.

The MC10H116 does not have internal−input pull− down resistors. This provides high impedance to the amplifier input and facilitates differential connections.

Applications:
- Low Level Receiver
- Schmitt Trigger
- Voltage Level Interface

Figure 1. Logic Diagram



Pin assignment is for Dual−in−Line Package.
For PLCC pin assignment, see TND309, the Pin Conversion Tables, page 9.

Figure 2. Dip Pin Assignment

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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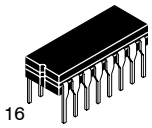
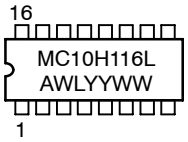
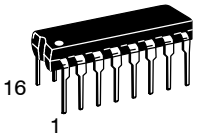
MARKING DIAGRAMS*

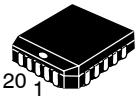


CDIP−16
L SUFFIX
CASE 620A

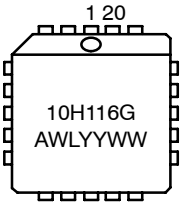


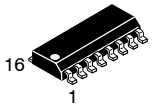


PDIP−16
P SUFFIX
CASE 648

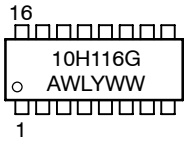


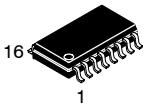
PLCC−20
FN SUFFIX
CASE 775



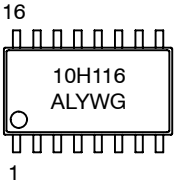


SO−16
D SUFFIX
CASE 751B





SOEIAJ−16
M, MEL SUFFIX
CASE 966



A = Assembly Location
WL = Wafer Lot
YY = Year
WW = Work Week

*For additional marking information, refer to Application Note AND8002/D.

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 3 of this data sheet.

Table 1. MAXIMUM RATINGS

Symbol	Characteristic	Rating	Unit
V_{EE}	Power Supply (V_{CC} = 0)	−8.0 to 0	Vdc
V_I	Input Voltage (V_{CC} = 0)	0 to V_{EE}	Vdc
I_{out}	Output Current – Continuous – Surge	50 100	mA
T_A	Operating Temperature Range	0 to +75	°C
T_{stg}	Storage Temperature Range – Plastic – Ceramic	−55 to +150 −55 to +165	°C °C

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

Table 2. ELECTRICAL CHARACTERISTICS (V_{EE} = −5.2 V ±5%) (Note 2)

		0°		25°		75°		
Symbol	Characteristic	Min	Max	Min	Max	Min	Max	Unit
I_E	Power Supply Current	–	23	–	21	–	23	mA
I_{inH}	Input Current High	–	150	–	95	–	95	μA
I_{CBO}	Input Leakage Current	–	1.5	–	1.0	–	1.0	μA
V_{BB}	Reference Voltage	−1.38	−1.27	−1.35	−1.25	−1.31	−1.19	Vdc
V_{OH}	High Output Voltage	−1.02	−0.84	−0.98	−0.81	−0.92	−0.735	Vdc
V_{OL}	Low Output Voltage	−1.95	−1.63	−1.95	−1.63	−1.95	−1.60	Vdc
V_{IH}	High Input Voltage (Note 1)	−1.17	−0.84	−1.13	−0.81	−1.07	−0.735	Vdc
V_{IL}	Low Input Voltage (Note 1)	−1.95	−1.48	−1.95	−1.48	−1.95	−1.45	Vdc
V_{CMR}	Common Mode Range (Note 4)	–	–	−2.85 to −0.8		–	–	Vdc
V_{PP}	Input Sensitivity (Note 3)	–	–	150 typ		–	–	mV_{PP}

1. When V_{BB} is used as the reference voltage.
2. Each MECL 10H™ series circuit has been designed to meet the specifications shown in the test table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 linear fpm is maintained. Outputs are terminated through a 50−ohm resistor to −2.0 V.
3. Differential input not to exceed 1.0 Vdc.
4. 150 mV_{p-p} differential input required to obtain full logic swing on output.

Table 3. AC CHARACTERISTICS

		0°		25°		75°		
Symbol	Characteristic	Min	Max	Min	Max	Min	Max	Unit
t_{pd}	Propagation Delay	0.4	1.3	0.4	1.3	0.45	1.45	ns
t_r	Rise Time	0.5	1.5	0.5	1.6	0.5	1.7	ns
t_f	Fall Time	0.5	1.5	0.5	1.6	0.5	1.7	ns

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfpm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

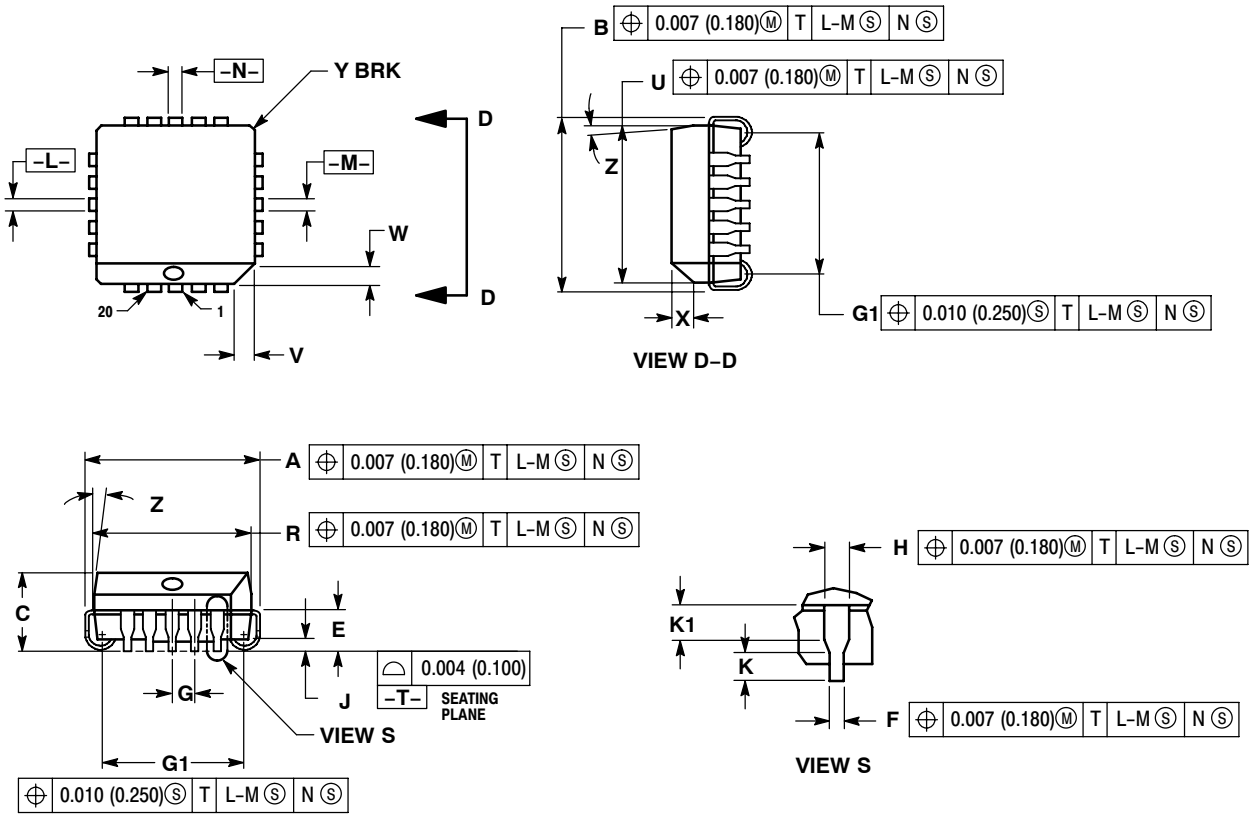
ORDERING INFORMATION

Device	Package	Shipping†
MC10H116D	SO−16	48 Units / Rail
MC10H116DG	SO−16 (Pb−Free)	48 Units / Rail
MC10H116DR2	SO−16	2500 / Tape & Reel
MC10H116DR2G	SO−16 (Pb−Free)	2500 / Tape & Reel
MC10H116FN	PLCC−20	46 Units / Rail
MC10H116FNG	PLCC−20 (Pb−Free)	46 Units/Rail
MC10H116FNR2	PLCC−20	500 / Tape & Reel
MC10H116FNR2G	PLCC−20 (Pb−Free)	500 / Tape & Reel
MC10H116L	CD1P−16	25 Units / Rail
MC10H116M	SOEIAJ−16	50 Units / Rail
MC10H116MG	SOEIAJ−16 (Pb−Free)	50 Units / Rail
MC10H116MEL	SOEIAJ−16	2000 / Tape & Reel
MC10H116MELG	SOEIAJ−16 (Pb−Free)	2000 / Tape & Reel
MC10H116P	PD1P−16	25 Units / Rail
MC10H116PG	PD1P−16 (Pb−Free)	25 Units / Rail

†For information on tape and reel specifications,including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

PACKAGE DIMENSIONS

20 LEAD PLLC
CASE 775−02
ISSUE E

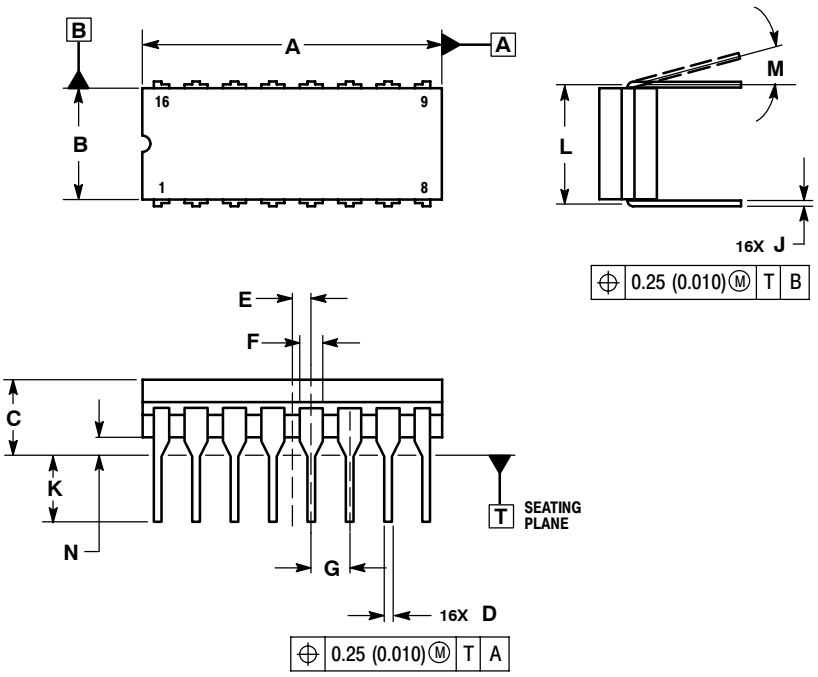


NOTES:
1. DIMENSIONS AND TOLERANCING PER ANSI Y14.5M, 1982.
2. DIMENSIONS IN INCHES.
3. DATUMS –L–, –M–, AND –N– DETERMINED WHERE TOP OF LEAD SHOULDER EXITS PLASTIC BODY AT MOLD PARTING LINE.
4. DIMENSION G1, TRUE POSITION TO BE MEASURED AT DATUM –T–, SEATING PLANE.
5. DIMENSIONS R AND U DO NOT INCLUDE MOLD FLASH. ALLOWABLE MOLD FLASH IS 0.010 (0.250) PER SIDE.
6. DIMENSIONS IN THE PACKAGE TOP MAY BE SMALLER THAN THE PACKAGE BOTTOM BY UP TO 0.012 (0.300). DIMENSIONS R AND U ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY EXCLUSIVE OF MOLD FLASH, TIE BAR BURRS, GATE BURRS AND INTERLEAD FLASH, BUT INCLUDING ANY MISMATCH BETWEEN THE TOP AND BOTTOM OF THE PLASTIC BODY.
7. DIMENSION H DOES NOT INCLUDE DAMBAR PROTRUSION OR INTRUSION. THE DAMBAR PROTRUSION(S) SHALL NOT CAUSE THE H DIMENSION TO BE GREATER THAN 0.037 (0.940). THE DAMBAR INTRUSION(S) SHALL NOT CAUSE THE H DIMENSION TO BE SMALLER THAN 0.025 (0.635).

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.385	0.395	9.78	10.03
B	0.385	0.395	9.78	10.03
C	0.165	0.180	4.20	4.57
E	0.090	0.110	2.29	2.79
F	0.013	0.019	0.33	0.48
G	0.050 BSC		1.27 BSC	
H	0.026	0.032	0.66	0.81
J	0.020	---	0.51	---
K	0.025	---	0.64	---
R	0.350	0.356	8.89	9.04
U	0.350	0.356	8.89	9.04
V	0.042	0.048	1.07	1.21
W	0.042	0.048	1.07	1.21
X	0.042	0.056	1.07	1.42
Y	---	0.020	---	0.50
Z	2 °	10 °	2 °	10 °
G1	0.310	0.330	7.88	8.38
K1	0.040	---	1.02	---

PACKAGE DIMENSIONS

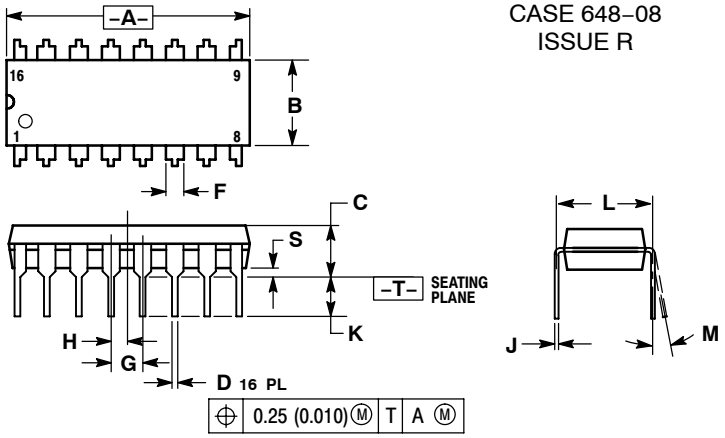
CDIP–16
L SUFFIX
CERAMIC DIP PACKAGE
CASE 620A–01
ISSUE O



NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
4. DIMENSION F MAY NARROW TO 0.76 (0.030) WHERE THE LEAD ENTERS THE CERAMIC BODY.
5 THIS DRAWING REPLACES OBSOLETE CASE OUTLINE 620–10.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.750	0.785	19.05	19.93
B	0.240	0.295	6.10	7.49
C	---	0.200	---	5.08
D	0.015	0.020	0.39	0.50
E	0.050 BSC		1.27 BSC	
F	0.055	0.065	1.40	1.65
G	0.100 BSC		2.54 BSC	
H	0.008	0.015	0.21	0.38
K	0.125	0.170	3.18	4.31
L	0.300 BSC		7.62 BSC	
M	0 °	15 °	0 °	15 °
N	0.020	0.040	0.51	1.01

PDIP–16
P SUFFIX
PLASTIC DIP PACKAGE
CASE 648–08
ISSUE R

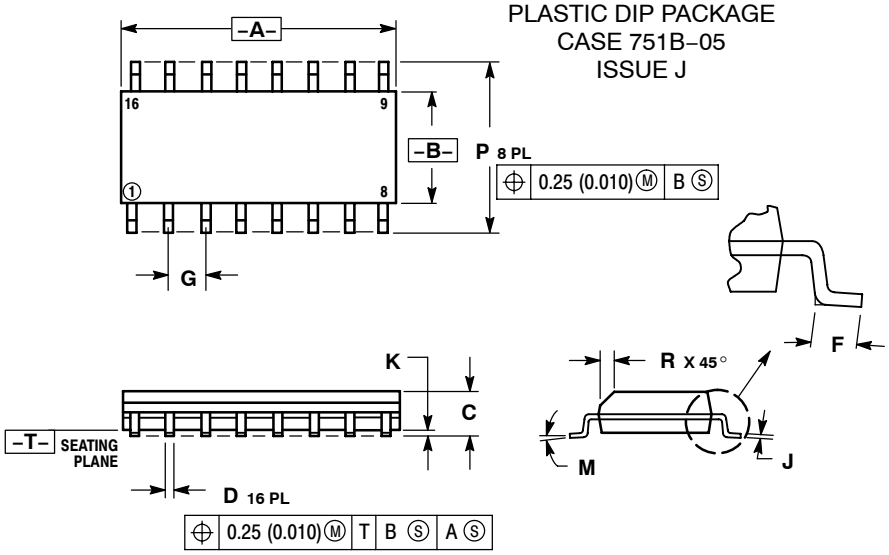


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
5. ROUNDED CORNERS OPTIONAL.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.740	0.770	18.80	19.55
B	0.250	0.270	6.35	6.85
C	0.145	0.175	3.69	4.44
D	0.015	0.021	0.39	0.53
F	0.040	0.70	1.02	1.77
G	0.100 BSC		2.54 BSC	
H	0.050 BSC		1.27 BSC	
J	0.008	0.015	0.21	0.38
K	0.110	0.130	2.80	3.30
L	0.295	0.305	7.50	7.74
M	0 °	10 °	0 °	10 °
S	0.020	0.040	0.51	1.01

PACKAGE DIMENSIONS

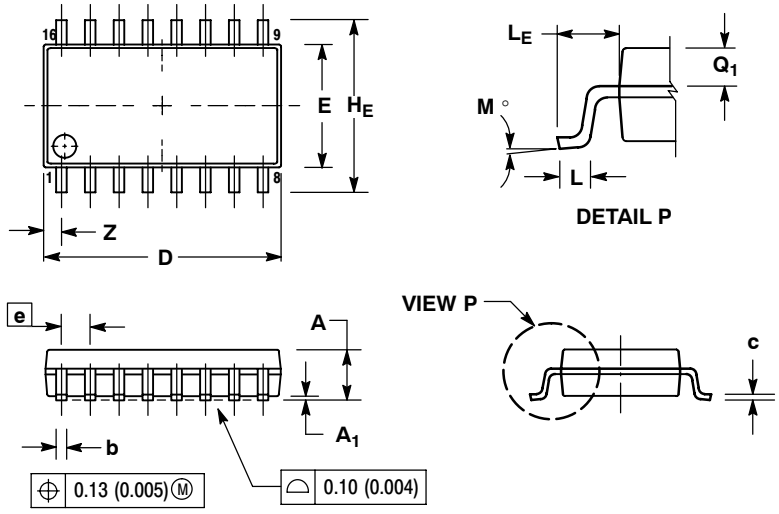
SO–16
D SUFFIX
PLASTIC DIP PACKAGE
CASE 751B–05
ISSUE J



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	9.80	10.00	0.386	0.393
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27 BSC		0.050 BSC	
J	0.19	0.25	0.008	0.009
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019

SOEIAJ–16
CASE 966–01
ISSUE A



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS AND ARE MEASURED AT THE PARTING LINE. MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
5. THE LEAD WIDTH DIMENSION (b) DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE LEAD WIDTH DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT. MINIMUM SPACE BETWEEN PROTRUSIONS AND ADJACENT LEAD TO BE 0.46 (0.018).

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	---	2.05	---	0.081
A_1	0.05	0.20	0.002	0.008
b	0.35	0.50	0.014	0.020
c	0.10	0.20	0.007	0.011
D	9.90	10.50	0.390	0.413
E	5.10	5.45	0.201	0.215
e	1.27 BSC		0.050 BSC	
H_E	7.40	8.20	0.291	0.323
L	0.50	0.85	0.020	0.033
L_E	1.10	1.50	0.043	0.059
M	0°	10°	0°	10°
Q_1	0.70	0.90	0.028	0.035
Z	---	0.78	---	0.031

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PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
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MC10H116/D