

# MC14099B

## 8-Bit Addressable Latches

The MC14099B is an 8-bit addressable latch. Data is entered in serial form when the appropriate latch is addressed (via address pins A0, A1, A2) and write disable is in the low state. For the MC14099B the input is a unidirectional write only port.

The data is presented in parallel at the output of the eight latches independently of the state of Write Disable, Write/Read or Chip Enable.

A Master Reset capability is available on both parts.

- Serial Data Input
- Parallel Output
- Master Reset
- Supply Voltage Range = 3.0 Vdc to 18 Vdc
- Capable of Driving Two Low-power TTL Loads or One Low-Power Schottky TTL Load over the Rated Temperature Range
- MC14099B pin for pin compatible with CD4099B

### MAXIMUM RATINGS (Voltages Referenced to $V_{SS}$ ) (Note 2.)

Symbol	Parameter	Value	Unit
$V_{DD}$	DC Supply Voltage Range	-0.5 to +18.0	V
$V_{in}, V_{out}$	Input or Output Voltage Range (DC or Transient)	-0.5 to $V_{DD} + 0.5$	V
$I_{in}, I_{out}$	Input or Output Current (DC or Transient) per Pin	$\pm 10$	mA
$P_D$	Power Dissipation, per Package (Note 3.)	500	mW
$T_A$	Ambient Temperature Range	-55 to +125	$^{\circ}C$
$T_{stg}$	Storage Temperature Range	-65 to +150	$^{\circ}C$
$T_L$	Lead Temperature (8-Second Soldering)	260	$^{\circ}C$

2. Maximum Ratings are those values beyond which damage to the device may occur.

3. Temperature Derating:  
Plastic "P and D/DW" Packages: -7.0 mW/ $^{\circ}C$  From 65 $^{\circ}C$  To 125 $^{\circ}C$

This device contains protection circuitry to guard against damage due to high static voltages or electric fields. However, precautions must be taken to avoid applications of any voltage higher than maximum rated voltages to this high-impedance circuit. For proper operation,  $V_{in}$  and  $V_{out}$  should be constrained to the range  $V_{SS} \leq (V_{in} \text{ or } V_{out}) \leq V_{DD}$ .

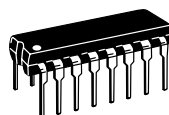
Unused inputs must always be tied to an appropriate logic voltage level (e.g., either  $V_{SS}$  or  $V_{DD}$ ). Unused outputs must be left open.



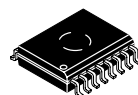
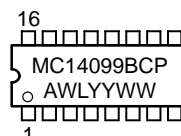
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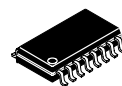
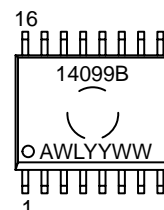
### MARKING DIAGRAMS



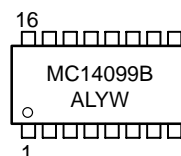
PDIP-16  
P SUFFIX  
CASE 648



SOIC-16  
DW SUFFIX  
CASE 751G



SOEIAJ-16  
F SUFFIX  
CASE 966



A = Assembly Location  
WL, L = Wafer Lot  
YY, Y = Year  
WW, W = Work Week

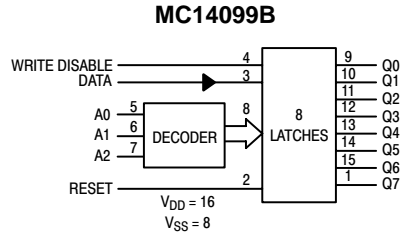
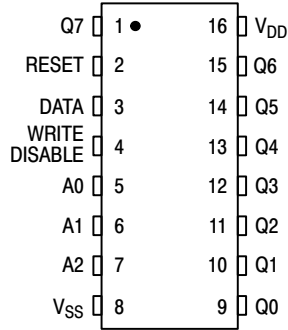
### ORDERING INFORMATION

Device	Package	Shipping
MC14099BCP	PDIP-16	2000/Box
MC14099BDW	SOIC-16	2350/Box
MC14099BDWR2	SOIC-16	1000/Tape & Reel
MC14099BF	SOEIAJ-16	See Note 1.
MC14099BFEL	SOEIAJ-16	See Note 1.

1. For ordering information on the EIAJ version of the SOIC packages, please contact your local ON Semiconductor representative.

# MC14099B

## PIN ASSIGNMENT



## ELECTRICAL CHARACTERISTICS (Voltages Referenced to V<sub>SS</sub>)

Characteristic	Symbol	V <sub>DD</sub> Vdc	- 55°C		25°C			125°C		Unit	
			Min	Max	Min	Typ <sup>(4)</sup>	Max	Min	Max		
Output Voltage V <sub>in</sub> = V <sub>DD</sub> or 0	"0" Level	V <sub>OL</sub>	5.0	—	0.05	—	0	0.05	—	0.05	Vdc
		10	—	0.05	—	0	0.05	—	0.05		
		15	—	0.05	—	0	0.05	—	0.05		
	"1" Level	V <sub>OH</sub>	5.0	4.95	—	4.95	5.0	—	4.95	—	
		10	9.95	—	9.95	10	—	9.95	—		
		15	14.95	—	14.95	15	—	14.95	—		
Input Voltage	"0" Level (V <sub>O</sub> = 4.5 or 0.5 Vdc) (V <sub>O</sub> = 9.0 or 1.0 Vdc) (V <sub>O</sub> = 13.5 or 1.5 Vdc)	V <sub>IL</sub>	5.0	—	1.5	—	2.25	1.5	—	1.5	Vdc
		10	—	3.0	—	4.50	3.0	—	3.0		
		15	—	4.0	—	6.75	4.0	—	4.0		
	"1" Level (V <sub>O</sub> = 0.5 or 4.5 Vdc) (V <sub>O</sub> = 1.0 or 9.0 Vdc) (V <sub>O</sub> = 1.5 or 13.5 Vdc)	V <sub>IH</sub>	5.0	3.5	—	3.5	2.75	—	3.5	—	
		10	7.0	—	7.0	5.50	—	7.0	—		
		15	11	—	11	8.25	—	11	—		
Output Drive Current	Source (V <sub>OH</sub> = 2.5 Vdc) (V <sub>OH</sub> = 4.6 Vdc) (V <sub>OH</sub> = 9.5 Vdc) (V <sub>OH</sub> = 13.5 Vdc)	I <sub>OH</sub>	5.0	- 3.0	—	- 2.4	- 4.2	—	- 1.7	—	mAdc
		5.0	- 0.64	—	- 0.51	- 0.88	—	- 0.36	—		
		10	- 1.6	—	- 1.3	- 2.25	—	- 0.9	—		
		15	- 4.2	—	- 3.4	- 8.8	—	- 2.4	—		
	Sink (V <sub>OL</sub> = 0.4 Vdc) (V <sub>OL</sub> = 0.5 Vdc) (V <sub>OL</sub> = 1.5 Vdc)	I <sub>OL</sub>	5.0	0.64	—	0.51	0.88	—	0.36	—	
		10	1.6	—	1.3	2.25	—	0.9	—		
15	4.2	—	3.4	8.8	—	2.4	—				
Input Current	I <sub>in</sub>	15	—	± 0.1	—	± 0.00001	± 0.1	—	± 1.0	μAdc	
Input Capacitance (V <sub>in</sub> = 0)	C <sub>in</sub>	—	—	—	—	5.0	7.5	—	—	pF	
Input Capacitance MC14599B — Data (pin 3) (V <sub>in</sub> = 0)	C <sub>in</sub>	—	—	—	—	15	22.5	—	—	pF	
Quiescent Current (Per Package)	I <sub>DD</sub>	5.0	—	5.0	—	0.005	5.0	—	150	μAdc	
		10	—	10	—	0.010	10	—	300		
		15	—	20	—	0.015	20	—	600		
Total Supply Current <sup>(5)</sup> <sup>(6)</sup> (Dynamic plus Quiescent, Per Package) (C <sub>L</sub> = 50 pF on all outputs, all buffers switching)	I <sub>T</sub>	5.0	I <sub>T</sub> = (1.5 μA/kHz) f + I <sub>DD</sub>							μAdc	
		10	I <sub>T</sub> = (3.0 μA/kHz) f + I <sub>DD</sub>								
		15	I <sub>T</sub> = (4.5 μA/kHz) f + I <sub>DD</sub>								

4. Data labelled "Typ" is not to be used for design purposes but is intended as an indication of the IC's potential performance.

5. The formulas given are for the typical characteristics only at 25°C.

6. To calculate total supply current at loads other than 50 pF:

$$I_T(C_L) = I_T(50 \text{ pF}) + (C_L - 50) \text{ Vfk}$$

where: I<sub>T</sub> is in μA (per package), C<sub>L</sub> in pF, V = (V<sub>DD</sub> - V<sub>SS</sub>) in volts, f in kHz is input frequency, and k = 0.004.

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## SWITCHING CHARACTERISTICS (7.) ( $C_L = 50 \text{ pF}$ , $T_A = 25^\circ\text{C}$ )

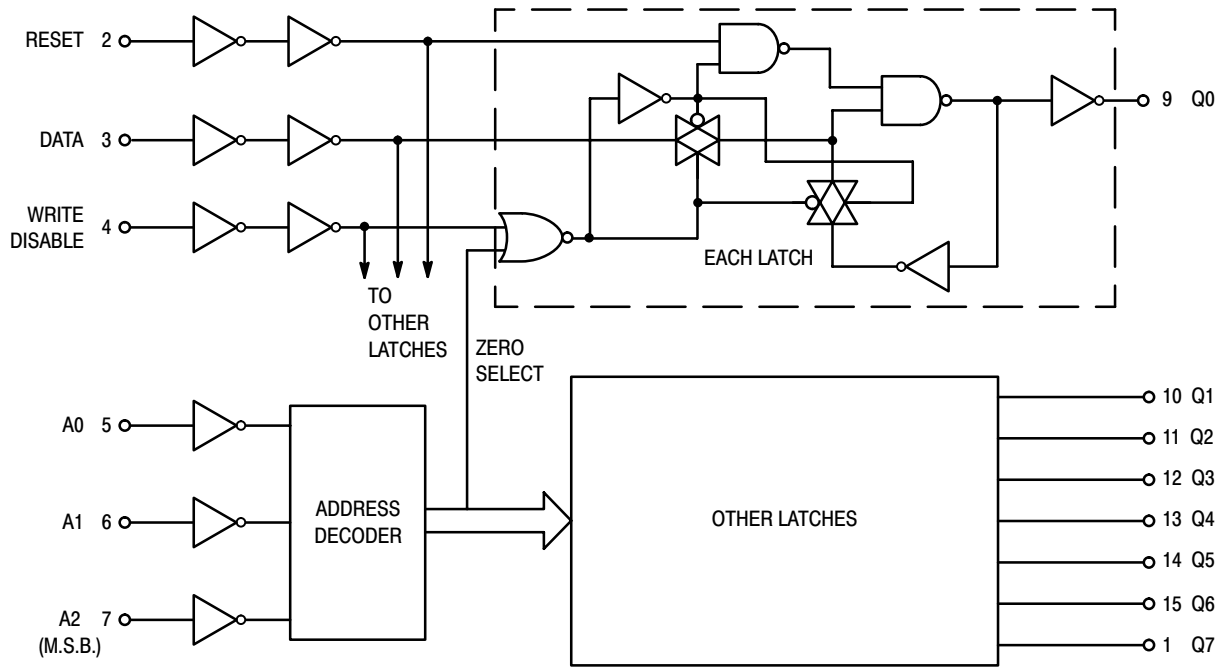
Characteristic	Symbol	$V_{DD}$ Vdc	Min	Typ (8.)	Max	Unit
Output Rise and Fall Time $t_{TLH}$ , $t_{THL} = (1.35 \text{ ns/pF}) C_L + 32 \text{ ns}$ $t_{TLH}$ , $t_{THL} = (0.6 \text{ ns/pF}) C_L + 20 \text{ ns}$ $t_{TLH}$ , $t_{THL} = (0.4 \text{ ns/pF}) C_L + 20 \text{ ns}$	$t_{TLH}$ , $t_{THL}$	5.0 10 15	— — —	100 50 40	200 100 80	ns
Propagation Delay Time Data to Output Q	$t_{PHL}$ , $t_{PLH}$	5.0 10 15	— — —	200 75 50	400 150 100	ns
Write Disable to Output Q		5.0 10 15	— — —	200 80 60	400 160 120	ns
Reset to Output Q		5.0 10 15	— — —	175 80 65	350 160 130	ns
CE to Output Q (MC14599B only)		5.0 10 15	— — —	225 100 75	450 200 150	ns
Propagation Delay Time, MC14599B only Chip Enable, Write/Read to Data	$t_{PHL}$ , $t_{PLH}$	5.0 10 15	— — —	200 80 65	400 160 130	ns
Address to Data		5.0 10 15	— — —	200 90 75	400 180 150	ns
Pulse Widths Reset	$t_{w(H)}$ $t_{w(L)}$	5.0 10 15	150 75 50	75 40 25	— — —	ns
Write Disable		5.0 10 15	320 160 120	160 80 60	— — —	ns
Set Up Time Data to Write Disable	$t_{su}$	5.0 10 15	100 50 35	50 25 20	— — —	ns
Hold Time Write Disable to Data	$t_h$	5.0 10 15	150 75 50	75 40 25	— — —	ns
Set Up Time Address to Write Disable	$t_{su}$	5.0 10 15	100 80 40	45 30 10	— — —	ns
Removal Time Write Disable to Address	$t_{rem}$	5.0 10 15	0 0 0	-80 -40 -40	— — —	ns

7. The formulas given are for the typical characteristics only at  $25^\circ\text{C}$ .

8. Data labelled "Typ" is not to be used for design purposes but is intended as an indication of the IC's potential performance.

# MC14099B

## MC14099B FUNCTION DIAGRAM



### TRUTH TABLE

Write Disable	Reset	Addressed Latch	Unaddressed Latches
0	0	Data	$Q_n^*$
0	1	Data	Reset †
1	0	$Q_n^*$	$Q_n^*$
1	1	Reset	Reset

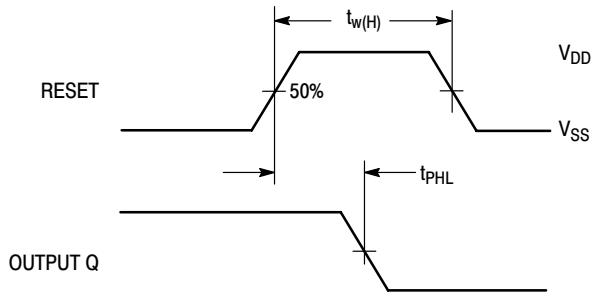
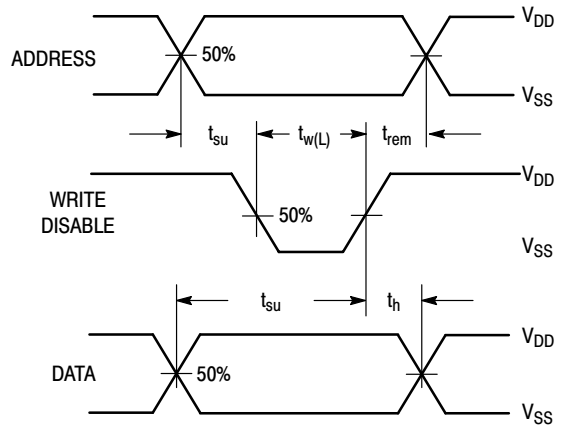
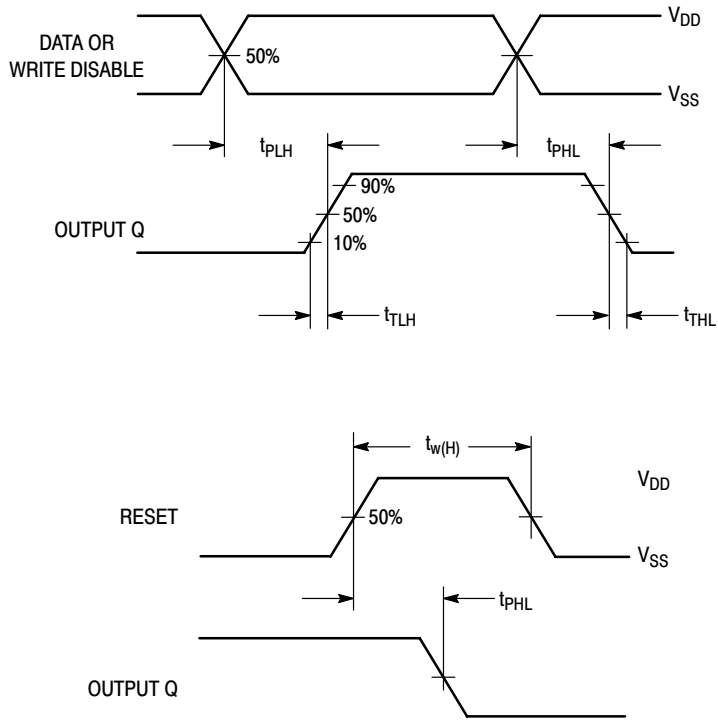
\* $Q_n$  is previous state of latch.

†Reset to zero state.

**CAUTION:** To avoid unintentional data changes in the latches, Write Disable must be active (high) during transitions on the address inputs A0, A1, and A2.

# MC14099B

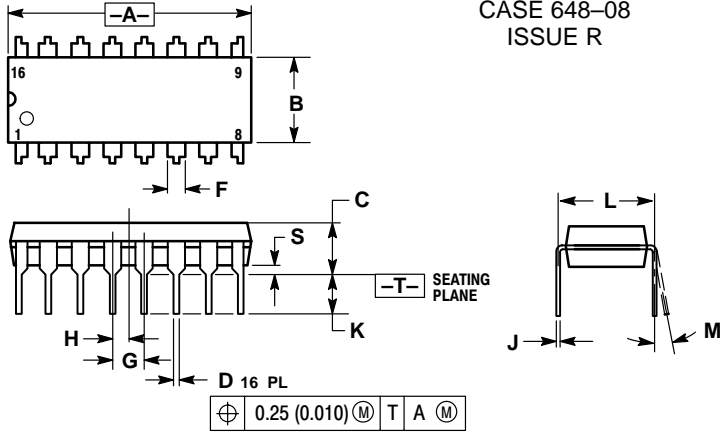
## SWITCHING WAVEFORMS



# MC14099B

## PACKAGE DIMENSIONS

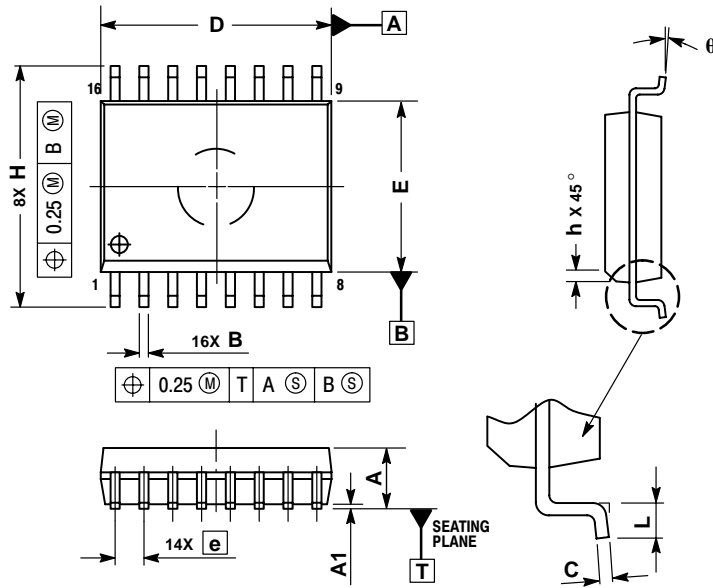
### PDIP-16 P SUFFIX PLASTIC DIP PACKAGE CASE 648-08 ISSUE R



- 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.

DIM	INCHES		MILLIMETERS	
	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

### SOIC-16 DW SUFFIX PLASTIC SOIC PACKAGE CASE 751G-03 ISSUE B



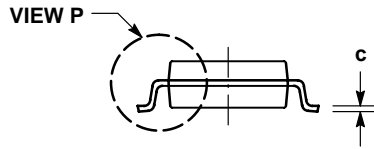
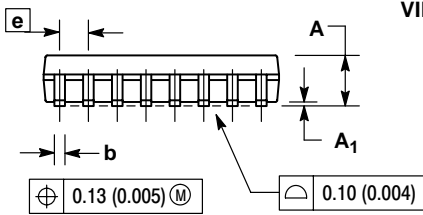
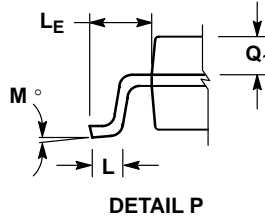
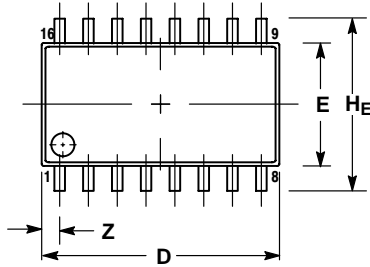
- NOTES:
1. DIMENSIONS ARE IN MILLIMETERS.
  2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
  3. DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSION.
  4. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
  5. DIMENSION B DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF THE B DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS	
	MIN	MAX
A	2.35	2.65
A1	0.10	0.25
B	0.35	0.49
C	0.23	0.32
D	10.15	10.45
E	7.40	7.60
e	1.27 BSC	
H	10.05	10.55
h	0.25	0.75
L	0.50	0.90
theta	0°	7°

# MC14099B

## PACKAGE DIMENSIONS

**SOEIAJ-16**  
**F SUFFIX**  
 PLASTIC EIAJ SOIC PACKAGE  
 CASE 966-01  
 ISSUE O



**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).

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	---	2.05	---	0.081
A <sub>1</sub>	0.05	0.20	0.002	0.008
b	0.35	0.50	0.014	0.020
c	0.18	0.27	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	
HE	7.40	8.20	0.291	0.323
L	0.50	0.85	0.020	0.033
LE	1.10	1.50	0.043	0.059
M	0°	10°	0°	10°
Q <sub>1</sub>	0.70	0.90	0.028	0.035
Z	---	0.78	---	0.031

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