

MC74AC573, MC74ACT573

TRUTH TABLE

Inputs			Outputs
OE	LE	D _n	O _n
L	H	H	H
L	H	L	L
L	L	X	O ₀
H	X	X	Z

H = HIGH Voltage Level

L = LOW Voltage Level

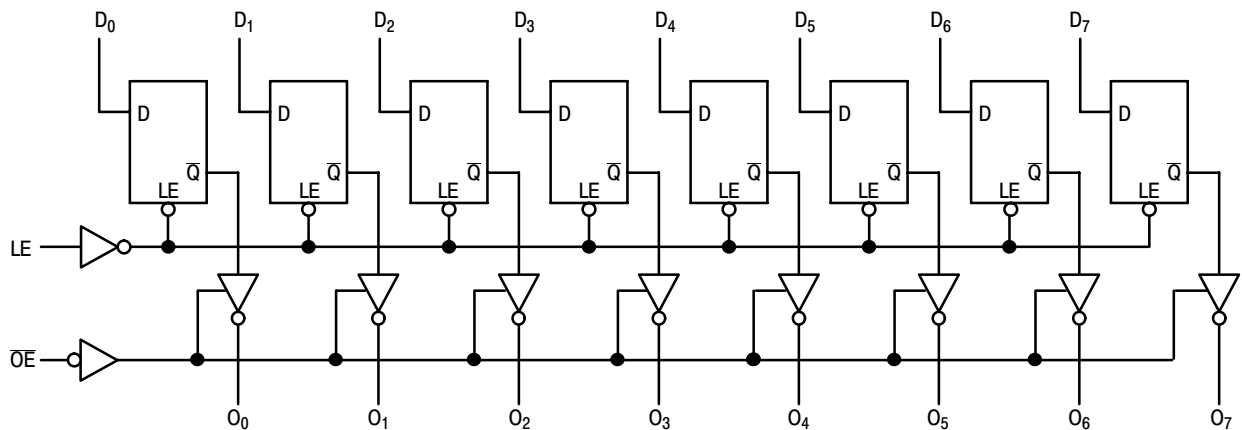
Z = High Impedance

X = Immaterial

O₀ = Previous O₀ before LOW-to-HIGH Transition of Clock

Functional Description

The MC74AC573/74ACT574 contains eight D-type latches with 3-state output buffers. When the Latch Enable (LE) input is HIGH, data on the D_n inputs enters the latches. In this condition the latches are transparent, i.e., a latch output will change state each time its D input changes. When LE is LOW the latches store the information that was present on the D inputs a setup time preceding the HIGH-to-LOW transition of LE. The 3-state buffers are controlled by the Output Enable ($\overline{OE}$) input. When $\overline{OE}$ is LOW, the buffers are enabled. When $\overline{OE}$ is HIGH the buffers are in the high impedance mode but this does not interfere with entering new data into the latches.



NOTE: That this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

Figure 3. Logic Diagram

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MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	DC Supply Voltage (Referenced to GND)	-0.5 to +7.0	V
V_{IN}	DC Input Voltage (Referenced to GND)	-0.5 to V_{CC} +0.5	V
V_{OUT}	DC Output Voltage (Referenced to GND)	-0.5 to V_{CC} +0.5	V
I_{IN}	DC Input Current, per Pin	± 20	mA
I_{OUT}	DC Output Sink/Source Current, per Pin	± 50	mA
I_{CC}	DC V_{CC} or GND Current per Output Pin	± 50	mA
T_{stg}	Storage Temperature	-65 to +150	°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.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter		Min	Typ	Max	Unit
V_{CC}	Supply Voltage	'AC	2.0	5.0	6.0	V
		'ACT	4.5	5.0	5.5	
V_{IN}, V_{OUT}	DC Input Voltage, Output Voltage (Ref. to GND)		0	-	V_{CC}	V
t_r, t_f	Input Rise and Fall Time (Note 1) 'AC Devices except Schmitt Inputs	V_{CC} @ 3.0 V	-	150	-	ns/V
		V_{CC} @ 4.5 V	-	40	-	
		V_{CC} @ 5.5 V	-	25	-	
t_r, t_f	Input Rise and Fall Time (Note 2) 'ACT Devices except Schmitt Inputs	V_{CC} @ 4.5 V	-	10	-	ns/V
		V_{CC} @ 5.5 V	-	8.0	-	
T_J	Junction Temperature (PDIP)		-	-	140	°C
T_A	Operating Ambient Temperature Range		-40	25	85	°C
I_{OH}	Output Current - High		-	-	-24	mA
I_{OL}	Output Current - Low		-	-	24	mA

1. V_{IN} from 30% to 70% V_{CC} ; see individual Data Sheets for devices that differ from the typical input rise and fall times.
2. V_{IN} from 0.8 V to 2.0 V; see individual Data Sheets for devices that differ from the typical input rise and fall times.

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DC CHARACTERISTICS

Symbol	Parameter	V _{CC} (V)	74AC		74AC	Unit	Conditions
			T _A = +25°C		T _A = −40°C to +85°C		
			Typ	Guaranteed Limits			
V _{IH}	Minimum High Level Input Voltage	3.0	1.5	2.1	2.1	V	V _{OUT} = 0.1 V or V _{CC} − 0.1 V
		4.5	2.25	3.15	3.15		
		5.5	2.75	3.85	3.85		
V _{IL}	Maximum Low Level Input Voltage	3.0	1.5	0.9	0.9	V	V _{OUT} = 0.1 V or V _{CC} − 0.1 V
		4.5	2.25	1.35	1.35		
		5.5	2.75	1.65	1.65		
V _{OH}	Minimum High Level Output Voltage	3.0	2.99	2.9	2.9	V	I _{OUT} = −50 μA
		4.5	4.49	4.4	4.4		
		5.5	5.49	5.4	5.4		
		3.0	−	2.56	2.46	V	*V _{IN} = V _{IL} or V _{IH} −12 mA I _{OH} −24 mA −24 mA
		4.5	−	3.86	3.76		
		5.5	−	4.86	4.76		
V _{OL}	Maximum Low Level Output Voltage	3.0	0.002	0.1	0.1	V	I _{OUT} = 50 μA
		4.5	0.001	0.1	0.1		
		5.5	0.001	0.1	0.1		
		3.0	−	0.36	0.44	V	*V _{IN} = V _{IL} or V _{IH} 12 mA I _{OL} 24 mA 24 mA
		4.5	−	0.36	0.44		
		5.5	−	0.36	0.44		
I _{IN}	Maximum Input Leakage Current	5.5	−	±0.1	±1.0	μA	V _I = V _{CC} , GND
I _{OZ}	Maximum 3-State Current	5.5	−	±0.5	±5.0	μA	V _I (OE) = V _{IL} , V _{IH} V _I = V _{CC} , GND V _O = V _{CC} , GND
I _{OLD}	†Minimum Dynamic Output Current	5.5	−	−	75	mA	V _{OLD} = 1.65 V Max
I _{OHD}		5.5	−	−	−75	mA	V _{OHD} = 3.85 V Min
I _{CC}	Maximum Quiescent Supply Current	5.5	−	8.0	80	μA	V _{IN} = V _{CC} or GND

NOTE: I_{IN} and I_{CC} @ 3.0 V are guaranteed to be less than or equal to the respective limit @ 5.5 V V_{CC}.

*All outputs loaded; thresholds on input associated with output under test.

†Maximum test duration 2.0 ms, one output loaded at a time.

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AC CHARACTERISTICS (For Figures and Waveforms – See Section 3)

Symbol	Parameter	V _{CC} * (V)	74AC			74AC		Unit	Fig. No.
			T _A = +25°C C _L = 50 pF			T _A = –40°C to +85°C C _L = 50 pF			
			Min	Typ	Max	Min	Max		
t _{PLH}	Propagation Delay D _n to O _n	3.3 5.0	2.5 2.5	– –	13.0 10.0	2.0 2.0	15.0 11.5	ns	3–5
t _{PHL}	Propagation Delay D _n to O _n	3.3 5.0	2.5 2.5	– –	12.0 9.5	2.0 2.0	14.0 11.0	ns	3–5
t _{PLH}	Propagation Delay LE to O _n	3.3 5.0	2.5 2.5	– –	13.0 9.5	2.0 2.0	15.0 11.0	ns	3–6
t _{PHL}	Propagation Delay LE to O _n	3.3 5.0	2.5 2.5	– –	12.0 8.5	2.0 2.0	14.0 10.0	ns	3–6
t _{PZH}	Output Enable Time	3.3 5.0	2.5 2.5	– –	11.0 9.0	2.0 2.0	12.0 10.0	ns	3–7
t _{PZL}	Output Enable Time	3.3 5.0	2.5 2.5	– –	11.0 8.5	2.0 2.0	12.5 9.5	ns	3–8
t _{PHZ}	Output Disable Time	3.3 5.0	2.5 2.5	– –	12.5 11.0	2.0 2.0	13.5 12.0	ns	3–7
t _{PLZ}	Output Disable Time	3.3 5.0	2.5 2.5	– –	9.5 8.0	2.0 2.0	10.5 9.0	ns	3–8

*Voltage Range 3.3 V is 3.3 V ±0.3 V.
Voltage Range 5.0 V is 5.0 V ±0.5 V.

AC OPERATING REQUIREMENTS

Symbol	Parameter	V _{CC} * (V)	74AC		74AC	Unit	Fig. No.
			T _A = +25°C C _L = 50 pF		T _A = -40°C to +85°C C _L = 50 pF		
			Typ	Guaranteed Minimum			
t _s	Setup Time, HIGH or LOW D _n to LE	3.3	–	3.5	4.0	ns	3–9
		5.0	–	3.0	3.5		
t _h	Hold Time, HIGH or LOW D _n to LE	3.3	–	2.0	2.0	ns	3–9
		5.0	–	2.0	2.0		
t _w	LE Pulse Width, HIGH	3.3	–	6.0	7.0	ns	3–6
		5.0	–	4.0	5.0		

*Voltage Range 3.3 V is 3.3 V ±0.3 V.
Voltage Range 5.0 V is 5.0 V ±0.5 V.

MC74AC573, MC74ACT573

DC CHARACTERISTICS

Symbol	Parameter	V _{CC} (V)	74ACT		74ACT	Unit	Conditions
			T _A = +25°C		T _A = -40°C to +85°C		
			Typ	Guaranteed Limits			
V _{IH}	Minimum High Level Input Voltage	4.5 5.5	1.5 1.5	2.0 2.0	2.0 2.0	V	V _{OUT} = 0.1 V or V _{CC} - 0.1 V
V _{IL}	Maximum Low Level Input Voltage	4.5 5.5	1.5 1.5	0.8 0.8	0.8 0.8	V	V _{OUT} = 0.1 V or V _{CC} - 0.1 V
V _{OH}	Minimum High Level Output Voltage	4.5 5.5	4.49 5.49	4.4 5.4	4.4 5.4	V	I _{OUT} = -50 μA
		4.5 5.5	- -	3.86 4.86	3.76 4.76	V	*V _{IN} = V _{IL} or V _{IH} -24 mA I _{OH} -24 mA
V _{OL}	Maximum Low Level Output Voltage	4.5 5.5	0.001 0.001	0.1 0.1	0.1 0.1	V	I _{OUT} = 50 μA
		4.5 5.5	- -	0.36 0.36	0.44 0.44	V	*V _{IN} = V _{IL} or V _{IH} 24 mA I _{OL} 24 mA
I _{IN}	Maximum Input Leakage Current	5.5	-	±0.1	±1.0	μA	V _I = V _{CC} , GND
ΔI _{CCT}	Additional Max. I _{CC} /Input	5.5	0.6	-	1.5	mA	V _I = V _{CC} - 2.1 V
I _{OZ}	Maximum 3-State Current	5.5	-	±0.5	±5.0	μA	V _I (OE) = V _{IL} , V _{IH} V _I = V _{CC} , GND V _O = V _{CC} , GND
I _{OLD}	†Minimum Dynamic Output Current	5.5	-	-	75	mA	V _{OLD} = 1.65 V Max
I _{OHD}		5.5	-	-	-75	mA	V _{OHD} = 3.85 V Min
I _{CC}	Maximum Quiescent Supply Current	5.5	-	8.0	80	μA	V _{IN} = V _{CC} or GND

*All outputs loaded; thresholds on input associated with output under test.

†Maximum test duration 2.0 ms, one output loaded at a time.

AC CHARACTERISTICS (For Figures and Waveforms – See Section 3)

Symbol	Parameter	V _{CC} * (V)	74ACT			74ACT		Unit	Fig. No.
			T _A = +25°C C _L = 50 pF			T _A = -40°C to +85°C C _L = 50 pF			
			Min	Typ	Max	Min	Max		
t _{PLH}	Propagation Delay D _n to O _n	5.0	2.5	–	10.5	2.0	12	ns	3–5
t _{PHL}	Propagation Delay D _n to O _n	5.0	2.5	–	10.5	2.0	12	ns	3–5
t _{PLH}	Propagation Delay LE to O _n	5.0	3.0	–	10.5	2.5	12	ns	3–6
t _{PHL}	Propagation Delay LE to O _n	5.0	2.5	–	9.5	2.0	10.5	ns	3–6
t _{PZH}	Output Enable Time	5.0	2.0	–	10	1.5	11	ns	3–7
t _{PZL}	Output Enable Time	5.0	1.5	–	9.5	1.5	10.5	ns	3–8
t _{PHZ}	Output Disable Time	5.0	2.5	–	11	1.5	12.5	ns	3–7
t _{PLZ}	Output Disable Time	5.0	1.5	–	8.5	1.0	9.5	ns	3–8

*Voltage Range 5.0 V is 5.0 V ±0.5 V.

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AC OPERATING REQUIREMENTS

Symbol	Parameter	V _{CC} * (V)	74ACT		74ACT	Unit	Fig. No.
			T _A = +25°C C _L = 50 pF		T _A = -40°C to +85°C C _L = 50 pF		
			Typ	Guaranteed Minimum			
t _s	Setup Time, HIGH or LOW D _n to LE	5.0	–	3.0	3.5	ns	3–9
t _h	Hold Time, HIGH or LOW D _n to LE	5.0	–	0	0	ns	3–9
t _w	LE Pulse Width, HIGH	5.0	–	3.5	4.0	ns	3–6

*Voltage Range 5.0 V is 5.0 V ±0.5 V.

CAPACITANCE

Symbol	Parameter	Value Typ	Unit	Test Conditions
C _{IN}	Input Capacitance	5.0	pF	V _{CC} = 5.0 V
C _{PD}	Power Dissipation Capacitance	25	pF	V _{CC} = 5.0 V

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ORDERING INFORMATION

Device	Package	Shipping [†]
MC74AC573N	PDIP-20	18 Units / Rail
MC74AC573NG	PDIP-20 (Pb-Free)	18 Units / Rail
MC74AC573DW	SOIC-20	38 Units / Rail
MC74AC573DWG	SOIC-20 (Pb-Free)	38 Units / Rail
MC74AC573DWR2	SOIC-20	1000 Units / Tape & Reel
MC74AC573DWR2G	SOIC-20 (Pb-Free)	1000 Units / Tape & Reel
MC74AC573DTR2	TSSOP-20*	2500 Units / Tape & Reel
MC74AC573DTR2G	TSSOP-20*	2500 Units / Tape & Reel
MC74AC573MEL	SOEIAJ-20	2000 Units / Tape & Reel
MC74AC573MELG	SOEIAJ-20 (Pb-Free)	2000 Units / Tape & Reel
MC74ACT573N	PDIP-20	18 Units / Rail
MC74ACT573NG	PDIP-20 (Pb-Free)	18 Units / Rail
MC74ACT573DW	SOIC-20	38 Units / Rail
MC74ACT573DWG	SOIC-20 (Pb-Free)	38 Units / Rail
MC74ACT573DWR2	SOIC-20	1000 Units / Tape & Reel
MC74ACT573DWR2G	SOIC-20 (Pb-Free)	1000 Units / Tape & Reel
MC74ACT573DTR2	TSSOP-20*	2500 Units / Tape & Reel
MC74ACT573DTR2G	TSSOP-20*	2500 Units / Tape & Reel

[†]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.

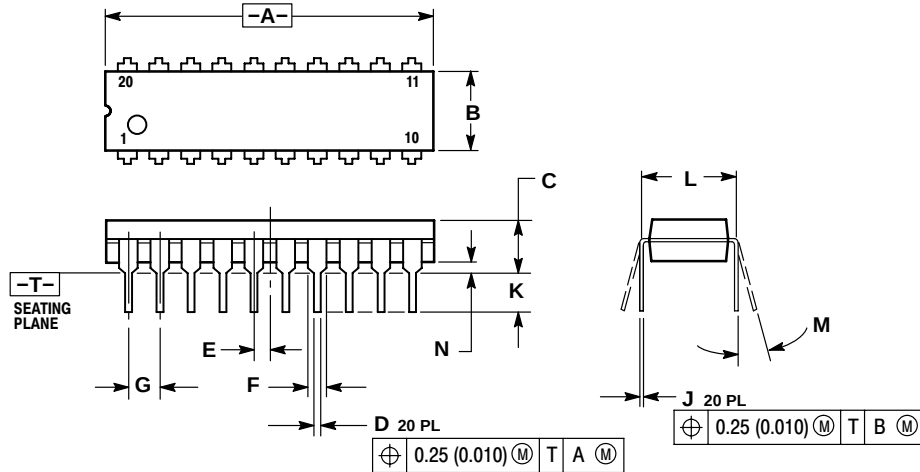
*This package is inherently Pb-Free.

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PACKAGE DIMENSIONS

PDIP-20 N SUFFIX

20 PIN PLASTIC DIP PACKAGE
CASE 738-03
ISSUE E

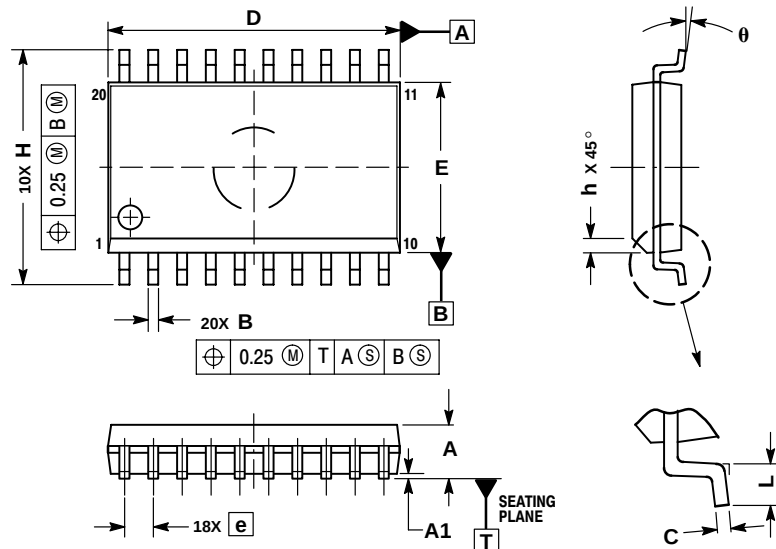


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
 4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	1.010	1.070	25.66	27.17
B	0.240	0.260	6.10	6.60
C	0.150	0.180	3.81	4.57
D	0.015	0.022	0.39	0.55
E	0.050 BSC		1.27 BSC	
F	0.050	0.070	1.27	1.77
G	0.100 BSC		2.54 BSC	
J	0.008	0.015	0.21	0.38
K	0.110	0.140	2.80	3.55
L	0.300 BSC		7.62 BSC	
M	0°	15°	0°	15°
N	0.020	0.040	0.51	1.01

SO-20 DW SUFFIX

20 PIN PLASTIC SOIC PACKAGE
CASE 751D-05
ISSUE G



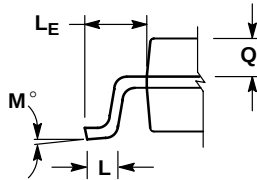
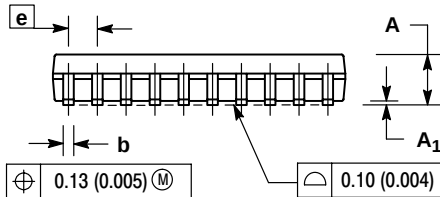
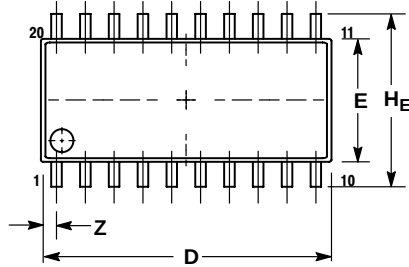
- NOTES:
1. DIMENSIONS ARE IN MILLIMETERS.
 2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
 3. DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSION.
 4. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
 5. DIMENSION B DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF 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	12.65	12.95
E	7.40	7.60
e	1.27 BSC	
H	10.05	10.55
h	0.25	0.75
L	0.50	0.90
θ	0°	7°

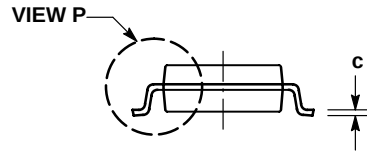
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PACKAGE DIMENSIONS

SOEIAJ-20
M SUFFIX
20 PIN PLASTIC EIAJ PACKAGE
CASE 967-01
ISSUE O



DETAIL P



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 ₁	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	12.35	12.80	0.486	0.504
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	---	0.81	---	0.032

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