MC74LCX07

Low-Voltage CMOS Hex Buffer with Open Drain Outputs

With 5 V−Tolerant Inputs

The MC74LCX07 is a high performance hex buffer operating from a 2.3 to 3.6 V supply. High impedance TTL compatible inputs significantly reduce current loading to input drivers. These LCX devices have open drain outputs which provide the ability to set output levels, or do active−HIGH AND or active−LOW OR functions. A V_I specification of 5.5 V allows MC74LCX07 inputs to be safely driven from 5.0 V devices.

Features

- Designed for 2.3 to 3.6 V V_{CC} Operation
- 5.0 V Tolerant Inputs/Outputs
- LVTTL Compatible
- LVCMOS Compatible
- 24 mA Output Sink Capability
- Near Zero Static Supply Current (10 μA) Substantially Reduces System Power Requirements
- Latchup Performance Exceeds 500 mA
- Wired−OR, Wired−AND
- Output Level Can Be Set Externally Without Affecting Speed of Device
- ESD Performance: Human Body Model >1500 V; Machine Model >200 V
- These Devices are Pb−Free and are RoHS Compliant

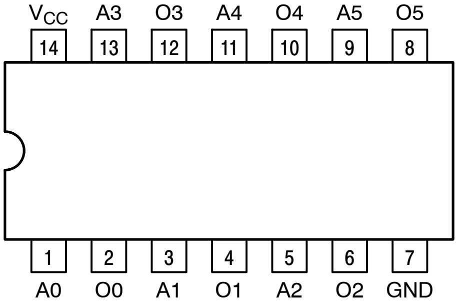

Figure 1. Pinout: 14−Lead (Top View)

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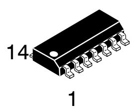
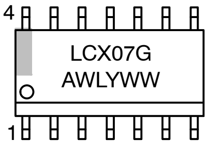
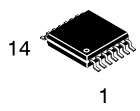
MARKING DIAGRAMS

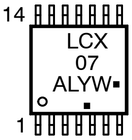


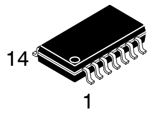
SOIC−14
D SUFFIX
CASE 751A



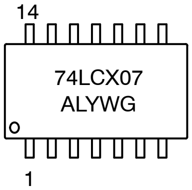


TSSOP−14
DT SUFFIX
CASE 948G





SOEIAJ−14
M SUFFIX
CASE 965



A = Assembly Location
L, WL = Wafer Lot
Y, YY = Year
W, WW = Work Week
G = Pb−Free Package
▪ = Pb−Free Package
(Note: Microdot may be in either location)

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

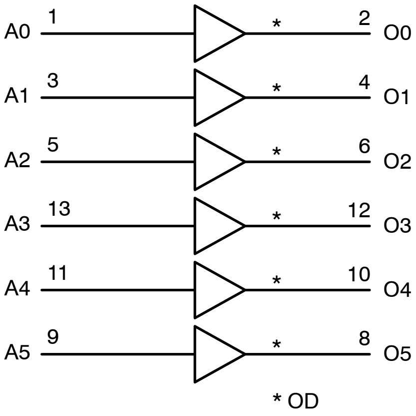


Figure 2. Logic Diagram

PIN NAMES

Pins	Function
An On	Data Inputs Outputs

TRUTH TABLE

An	On
L H	L Z

MAXIMUM RATINGS

Symbol	Parameter	Value	Condition	Unit
V_{CC}	DC Supply Voltage	–0.5 to +7.0		V
V_I	DC Input Voltage	$-0.5 \le V_I \le +7.0$		V
V_O	DC Output Voltage	$-0.5 \le V_O \le +7.0$	Output in HIGH or LOW State (Note 1)	V
I_{IK}	DC Input Diode Current	–50	$V_I < GND$	mA
I_{OK}	DC Output Diode Current	–50	$V_O < GND$	mA
		+50	$V_O > V_{CC}$	mA
I_O	DC Output/Sink Current	+50		mA
I_{CC}	DC Supply Current Per Supply Pin	± 100		mA
I_{GND}	DC Ground Current Per Ground Pin	± 100		mA
T_{STG}	Storage Temperature Range	–65 to +150		°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. I_O absolute maximum rating must be observed.

ORDERING INFORMATION

Device	Package	Shipping†
MC74LCX07DG	SOIC–14 (Pb–Free)	55 Units / Rail
MC74LCX07DR2G	SOIC–14 (Pb–Free)	2500 Tape & Reel
MC74LCX07DTG	TSSOP–14*	96 Units / Rail
MC74LCX07DTR2G	TSSOP–14*	2500 Tape & Reel
MC74LCX07MG	SOEIAJ–14 (Pb–Free)	50 Units / Rail
MC74LCX07MELG	SOEIAJ–14 (Pb–Free)	2000 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.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter		Min	Typ	Max	Unit
V_{CC}	Supply Voltage	Operating Data Retention Only	2.0 1.5	2.3 to 3.3	5.5 5.5	V
V_I	Input Voltage		0		5.5	V
V_O	Output Voltage	(HIGH or LOW State)	0		5.5	V
I_{OH}	HIGH Level Output Current	V_{CC}= 3.0 V–3.6 V V_{CC}= 2.7 V–3.0 V V_{CC}= 2.3 V–2.7 V			–24 –12 –8	mA
I_{OL}	LOW Level Output Current	V_{CC} = 3.0 V–3.6 V V_{CC} = 2.7 V–3.0 V V_{CC} = 2.3 V–2.7 V			+24 +12 +8	mA
T_A	Operating Free–Air Temperature		–40		+85	°C
$\Delta t/\Delta V$	Input Transition Rise or Fall Rate, V_{IN} from 0.8 V to 2.0 V, V_{CC} = 3.0 V		0		10	ns/V

DC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic	Condition	T_A = –40°C to +85°C		Unit
			Min	Max	
V_{IH}	HIGH Level Input Voltage (Note 2)	2.3 V $\le V_{CC} \le$ 2.7 V	1.7		V
		2.7 V $\le V_{CC} \le$ 3.6 V	2.0		
		4.5 V $\le V_{CC} \le$ 5.25 V	3.125		
V_{IL}	LOW Level Input Voltage (Note 2)	2.3 V $\le V_{CC} \le$ 2.7 V		0.7	V
		2.7 V $\le V_{CC} \le$ 3.6 V		0.8	
		4.5 V $\le V_{CC} \le$ 5.25 V		0.8	
V_{OL}	LOW Level Output Voltage	2.3 V $\le V_{CC} \le$ 3.6 V; I_{OL} = 100 μA		0.2	V
		V_{CC} = 2.3 V; I_{OL}= 8 mA		0.3	
		V_{CC} = 2.7 V; I_{OL}= 12 mA		0.4	
		V_{CC} = 3.0 V; I_{OL} = 16 mA		0.4	
		V_{CC} = 3.0 V; I_{OL} = 24 mA		0.55	
I_I	Maximum Input Leakage Current	2.3 V $\le V_{CC} \le$ 3.6 V, 0 V $\le V_I \le$ 5.5 V		± 5	μA
I_{OFF}	Power–Off Leakage Current	V_{CC} = 0V, V_O or V_I = 5.5V		10	μA
I_{CC}	Maximum Quiescent Supply Current	2.3 V $\le V_{CC} \le$ 3.6 V, V_I= V_{CC} or GND 2.3 V $\le V_{CC} \le$ 3.6 V, 3.6 V $\le V_I \le$ 5.5 V V_{CC} = 5.25 V, V_I = 3.125 V		10 ± 10 60	μA μA mA
ΔI_{CC}	Increase in I_{CC} per Input	2.3 V $\le V_{CC} \le$ 3.6 V 4.5 V $\le V_{CC} \le$ 5.5 V V_{CC} = 5.25 V, one input at 3.125 V, other inputs at V_{CC} or GND		500 1.0 10	μA mA mA

2. These values of V_I are used to test DC electrical characteristics only.

AC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Limits						Unit
		T_A= –40°C to +85°C						
		V_{CC} = 3.3 V ± 0.3 V		V_{CC}= 2.7 V		V_{CC} = 2.5 V ± 0.2 V		
		C_L= 50 pF		C_L= 50 pF		C_L= 30 pF		
		Min	Max	Min	Max	Min	Max	
t_{PLZ} t_{PZL}	Propagation Delay Input to Output	0.5 0.5	3.0 3.0	0.8 0.8	3.7 3.7	0.8 0.8	3.8 3.8	ns ns

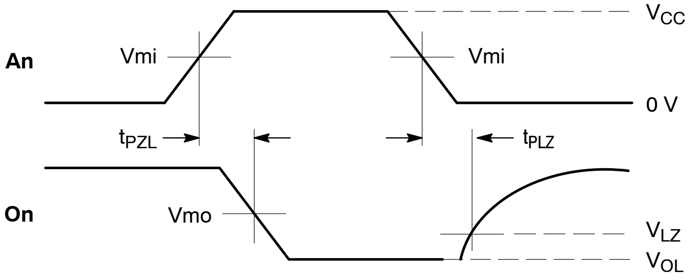
DYNAMIC SWITCHING CHARACTERISTICS

Symbol	Characteristic	Condition	T_A = +25°C Min	 Typ	 Max	Unit
V_{OLP}	Dynamic LOW Peak Voltage (Note 3)	V_{CC} = 3.3 V, C_L = 50 pF, V_{IH} = 3.3 V, V_{IL} = 0 V V_{CC} = 2.5 V, C_L = 30 pF, V_{IH} =2.5 V, V_{IL} = 0 V		0.9 0.7		V
V_{OLV}	Dynamic LOW Valley Voltage (Note 3)	V_{CC} = 3.3 V, C_L = 50 pF, V_{IH} = 3.3 V, V_{IL} = 0 V V_{CC} = 2.5 V, C_L = 30 pF, V_{IH} = 2.5 V, V_{IL} = 0 V		−0.8 −0.6		V

3. Number of outputs defined as “n”. Measured with “n−1” outputs switching from HIGH−to−LOW or LOW−to−HIGH. The remaining output is measured in the LOW state.

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Condition	Typical	Unit
C_{IN}	Input Capacitance	V_{CC} = 3.3 V, V_I = 0 V or V_{CC}	7	pF
C_{OUT}	Output Capacitance	V_{CC} = 3.3 V, V_I = 0 V or V_{CC}	8	pF
C_{PD}	Power Dissipation Capacitance	10 MHz, V_{CC} = 3.3 V, V_I = 0 V or V_{CC}	25	pF

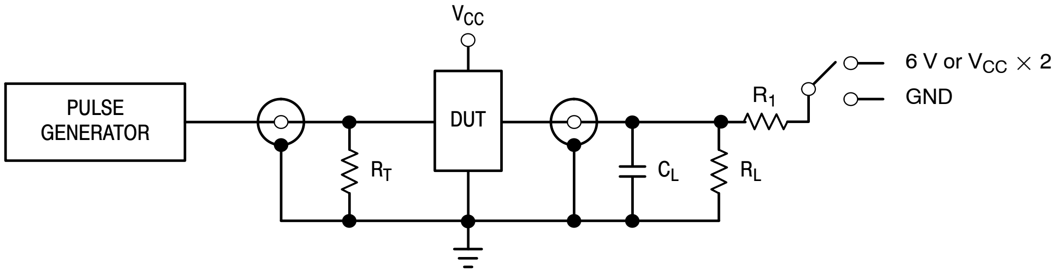


PROPAGATION DELAYS

t_R = t_F = 2.5 ns, 10% to 90%; f = 1MHz; t_W = 500 ns

Symbol	V_{CC} 3.3 V ± 0.3 V	 2.7 V	 2.5 V ± 0.2 V
Vmi	1.5 V	1.5 V	V_{CC}/2
Vmo	1.5 V	1.5 V	V_{CC}/2
V_{LZ}	V_{OL} + 0.3 V	V_{OL} + 0.3 V	V_{OL} + 015 V

Figure 3. AC Waveforms



TEST	SWITCH
t_{PZL}, t_{PLZ}	6 V
Open Collector/Drain t_{PLH} and t_{PHL}	6 V
t_{PZH}, t_{PHZ}	GND

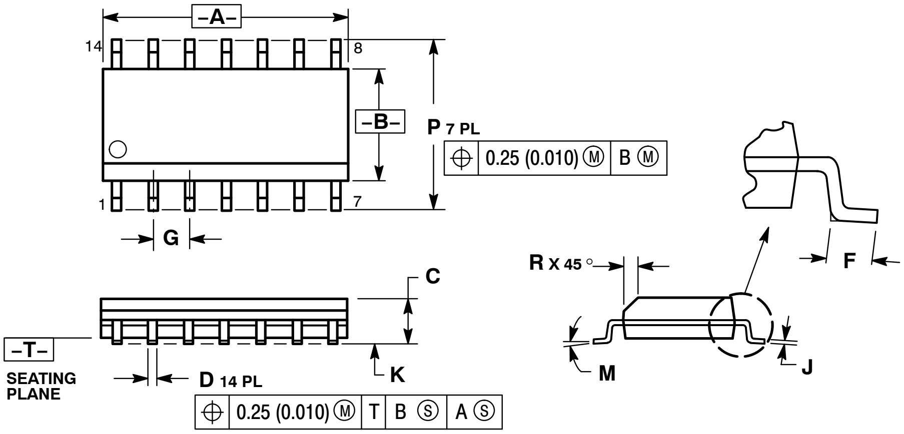
C_L = 50 pF at V_{CC} = 3.3 ±0.3 V or equivalent (includes jig and probe capacitance)
C_L = 30 pF at V_{CC} = 2.5 ±0.2 V or equivalent (includes jig and probe capacitance)
R_L = R_1 = 500 Ω or equivalent
R_T = Z_{OUT} of pulse generator (typically 50 Ω)

Figure 4. Test Circuit

PACKAGE DIMENSIONS

SOIC−14

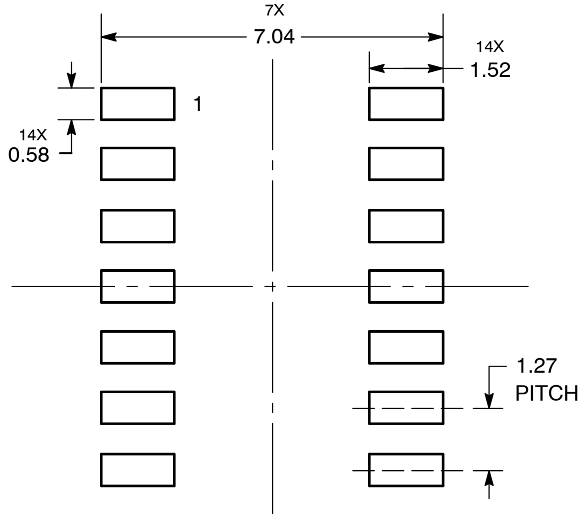
CASE 751A−03
ISSUE J



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	8.55	8.75	0.337	0.344
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	0.228	0.244
R	0.25	0.50	0.010	0.019

SOLDERING FOOTPRINT*

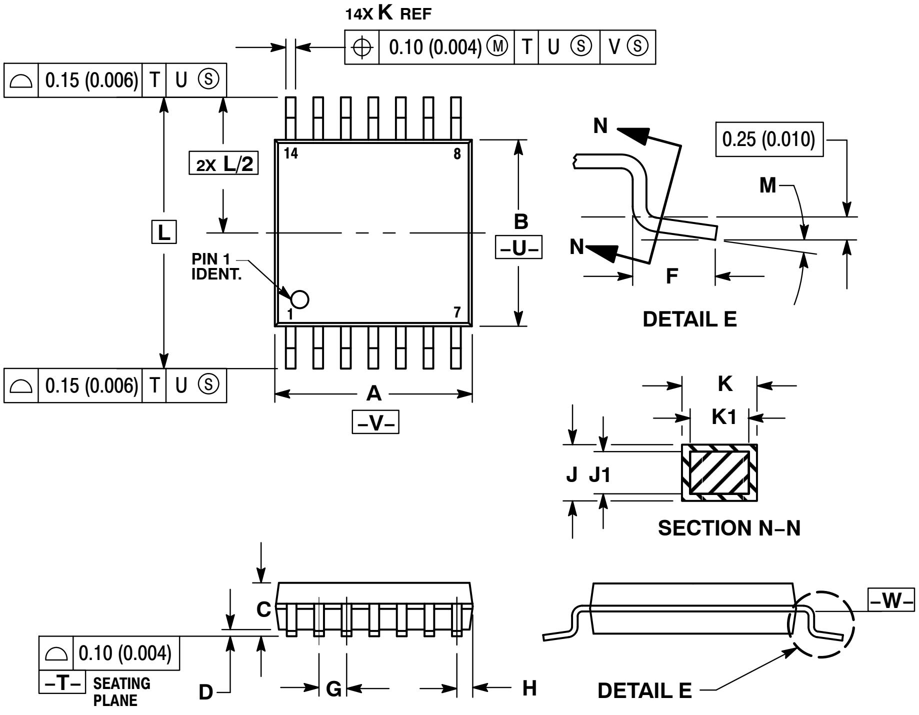


DIMENSIONS: MILLIMETERS

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

PACKAGE DIMENSIONS

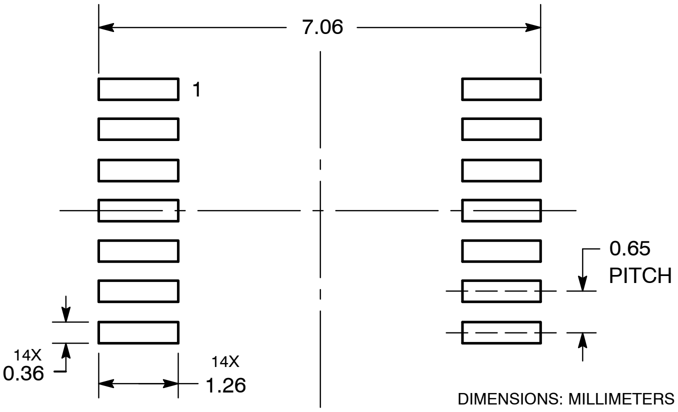
TSSOP−14
CASE 948G−01
ISSUE B



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
5. DIMENSION K DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE K DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
7. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE −W−.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	4.90	5.10	0.193	0.200
B	4.30	4.50	0.169	0.177
C	---	1.20	---	0.047
D	0.05	0.15	0.002	0.006
F	0.50	0.75	0.020	0.030
G	0.65 BSC		0.026 BSC	
H	0.50	0.60	0.020	0.024
J	0.09	0.20	0.004	0.008
J1	0.09	0.16	0.004	0.006
K	0.19	0.30	0.007	0.012
K1	0.19	0.25	0.007	0.010
L	6.40 BSC		0.252 BSC	
M	0°	8°	0°	8°

SOLDERING FOOTPRINT*

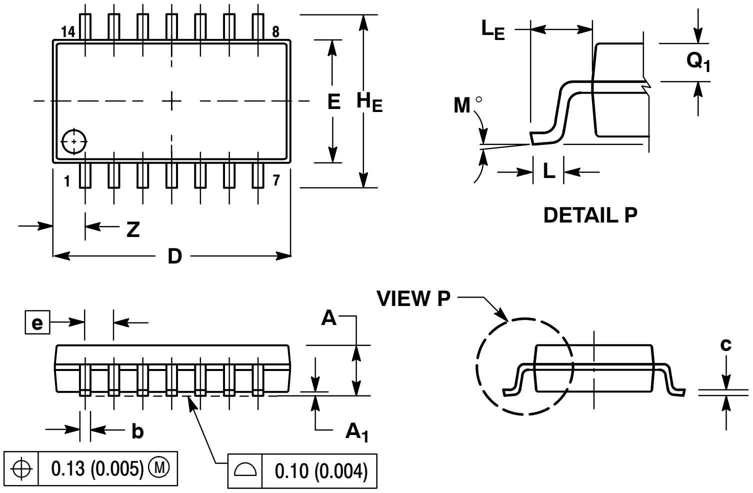


*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

PACKAGE DIMENSIONS

SOEIAJ−14

CASE 965−01
ISSUE B



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	0.004	0.008
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	---	1.42	---	0.056

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