

SN74LS640, SN74LS641, SN74LS642, SN74LS645

CONNECTION DIAGRAMS DIP (TOP VIEW)

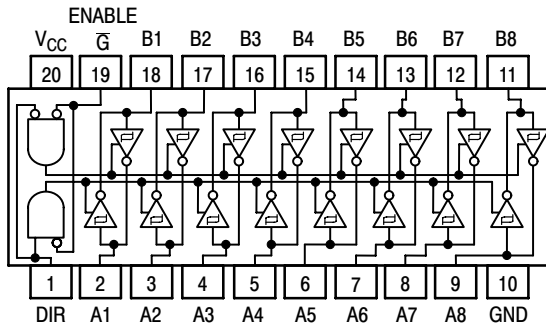


Figure 1. SN74LS640
SN74LS642

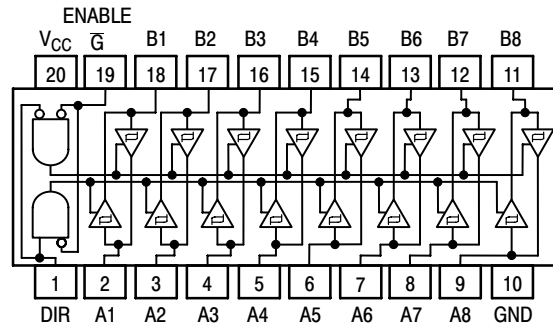


Figure 2. SN74LS641
SN74LS645

OBsolete
THIS DEVICE IS OBSOLETE
PLEASE CONTACT YOUR ON SEMICONDUCTOR
REPRESENTATIVE FOR INFORMATION

SN74LS640, SN74LS641, SN74LS642, SN74LS645

SN74LS640 • SN74LS645

DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE (unless otherwise specified)

Symbol	Parameter	Limits			Unit	Test Conditions
		Min	Typ	Max		
V_{IH}	Input HIGH Voltage	2.0			V	Guaranteed Input HIGH Voltage for All Inputs
V_{IL}	Input LOW Voltage			0.6	V	Guaranteed Input LOW Voltage for All Inputs
V_{IK}	Input Clamp Diode Voltage		-0.65	-1.5	V	$V_{CC} = \text{MIN}$, $I_{IN} = -18 \text{ mA}$
V_{OH}	Output HIGH Voltage	2.4	3.4		V	$V_{CC} = \text{MIN}$, $I_{OH} = 3.0 \text{ mA}$
		2.0			V	$V_{CC} = \text{MIN}$, $I_{OH} = \text{MAX}$
V_{OL}	Output LOW Voltage		0.25	0.4	V	$I_{OL} = 12 \text{ mA}$
			0.35	0.5	V	$I_{OL} = 24 \text{ mA}$
I_{OZH}	Output Off Current HIGH			20	μA	$V_{CC} = \text{MAX}$, $V_{OUT} = 2.7 \text{ V}$
I_{OZL}	Output Off Current LOW			-400	μA	$V_{CC} = \text{MAX}$, $V_{OUT} = 0.4 \text{ V}$
I_{IH}	Input HIGH Current	A or B, DIR or $\bar{G}$		20	μA	$V_{CC} = \text{MAX}$, $V_{IN} = 2.7 \text{ V}$
		DIR or $\bar{G}$		0.1	mA	$V_{CC} = \text{MAX}$, $V_{IN} = 7.0 \text{ V}$
		A or B		0.1	mA	$V_{CC} = \text{MAX}$, $V_{IN} = 5.5 \text{ V}$
I_{IL}	Input LOW Current			-0.4	mA	$V_{CC} = \text{MAX}$, $V_{IN} = 0.4 \text{ V}$
I_{OS}	Output Short Circuit Current (Note 1)	-40		-225	mA	$V_{CC} = \text{MAX}$
I_{CC}	Power Supply Current					
	Total Output HIGH			70	mA	$V_{CC} = \text{MAX}$
	Total, Output LOW			90	mA	
	Total at HIGH Z			95		

1. Not more than one output should be shorted at a time, nor for more than 1 second.

AC CHARACTERISTICS ($T_A = 25^\circ\text{C}$, $V_{CC} = 5.0 \text{ V}$)

Symbol	Parameter	Limits						Unit	Test Conditions
		LS640			LS645				
		Min	Typ	Max	Min	Typ	Max		
t _{PLH}	Propagation Delay A to B		6.0	10		8.0	15	ns	C _L = 45 pF, R _L = 667 Ω
t _{PHL}			8.0	15		11	15		
t _{PLH}	Propagation Delay B to A		6.0	10		8.0	15		
t _{PHL}			8.0	15		11	15		
t _{PZL}	Output Enable Time G̅, DIR to A		31	40		31	40	ns	
t _{PZH}			23	40		26	40		
t _{PZL}	Output Enable Time G̅, DIR to B		31	40		31	40	ns	
t _{PZH}			23	40		26	40		
t _{PLZ}	Output Disable Time G̅, DIR to A		15	25		15	25	ns	C _L = 5.0 pF
t _{PHZ}			15	25		15	25		
t _{PLZ}	Output Disable Time G̅, DIR to B		15	25		15	25	ns	
t _{PHZ}			15	25		15	25		

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DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE (unless otherwise specified)

Symbol	Parameter	Limits			Unit	Test Conditions
		Min	Typ	Max		
V_{IH}	Input HIGH Voltage	2.0			V	Guaranteed Input HIGH Voltage for All Inputs
V_{IL}	Input LOW Voltage			0.6	V	Guaranteed Input LOW Voltage for All Inputs
V_{IK}	Input Clamp Diode Voltage		-0.65	-1.5	V	$V_{CC} = \text{MIN}$, $I_{IN} = -18 \text{ mA}$
I_{OH}	Output HIGH Current			100	μA	$V_{CC} = \text{MIN}$, $V_{OH} = \text{MAX}$
V_{OL}	Output LOW Voltage		0.25	0.4	V	$I_{OL} = 12 \text{ mA}$
			0.35	0.5	V	$I_{OL} = 24 \text{ mA}$
I_{IH}	Input HIGH Current			20	μA	$V_{CC} = \text{MAX}$, $V_{IN} = 2.7 \text{ V}$
				-0.1	mA	$V_{CC} = \text{MAX}$, $V_{IN} = 7.0 \text{ V}$
I_{IL}	Input LOW Current			-0.4	mA	$V_{CC} = \text{MAX}$, $V_{IN} = 0.4 \text{ V}$
I_{CC}	Power Supply Current Total, Output HIGH			70	mA	$V_{CC} = \text{MAX}$
	Total, Output LOW			90		
	Total at HIGH Z			95		

AC CHARACTERISTICS ($T_A = 25^\circ\text{C}$, $V_{CC} = 5.0 \text{ V}$)

Symbol	Parameter	Limits						Unit	Test Conditions
		LS641			LS642				
		Min	Typ	Max	Min	Typ	Max		
t _{PLH} t _{PHL}	Propagation Delay, A to B		17 16	25 25		19 14	25 25	ns	C _L = 45 pF, R _L = 667 Ω
t _{PLH} t _{PHL}	Propagation Delay, B to A		17 16	25 25		19 14	25 25	ns	
t _{PLH} t _{PHL}	Propagation Delay, G̅, DIR to A		23 34	40 50		26 43	40 60	ns	
t _{PLH} t _{PHL}	Propagation Delay, G̅, DIR to B		25 37	40 50		28 39	40 60	ns	

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DEVICE ORDERING INFORMATION

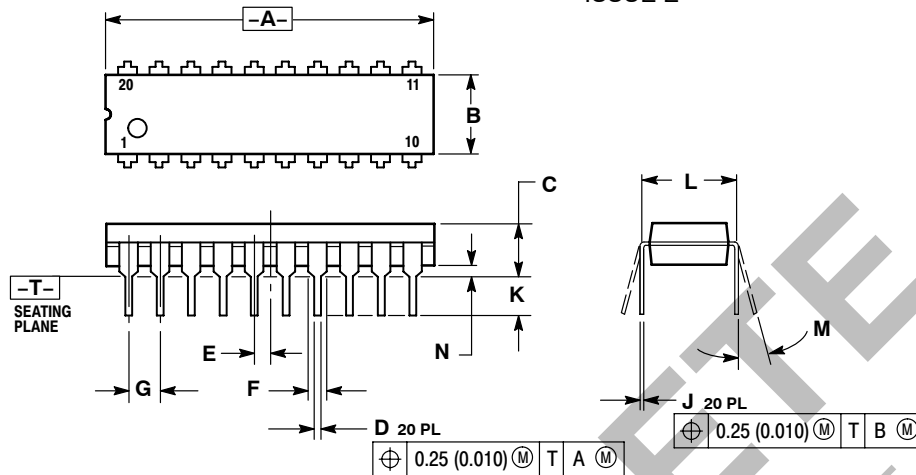
Device Order Number	Package Type	Tape and Reel Size
SN74LS640N	PDIP-20	1440 Units/Box
SN74LS640DW	SOIC-WIDE	2500/Tape and Reel
SN74LS640DWR2	SOIC-WIDE	2500/Tape and Reel
SN74LS640M	SOEIAJ-20	See Note 2
SN74LS640MEL	SOEIAJ-20	See Note 2
SN74LS641N	PDIP-20	1440 Units/Box
SN74LS641DW	SOIC-WIDE	2500/Tape and Reel
SN74LS641DWR2	SOIC-WIDE	2500/Tape and Reel
SN74LS641M	SOEIAJ-20	See Note 2
SN74LS641MEL	SOEIAJ-20	See Note 2
SN74LS642N	PDIP-20	1440 Units/Box
SN74LS642DW	SOIC-WIDE	2500/Tape and Reel
SN74LS642DWR2	SOIC-WIDE	2500/Tape and Reel
SN74LS642M	SOEIAJ-20	See Note 2
SN74LS642MEL	SOEIAJ-20	See Note 2
SN74LS645N	PDIP-20	1440 Units/Box

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

SN74LS640, SN74LS641, SN74LS642, SN74LS645

PACKAGE DIMENSIONS

N SUFFIX
PLASTIC PACKAGE
CASE 738-03
ISSUE E



NOTES:

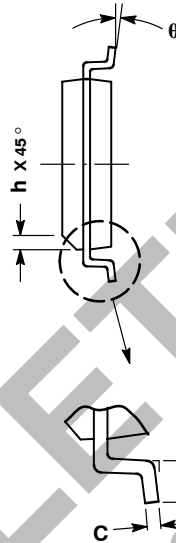
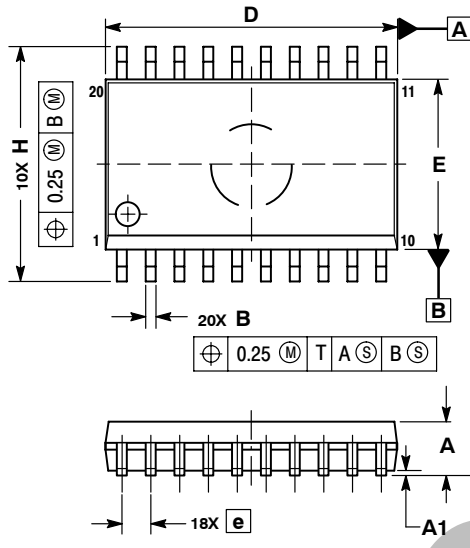
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.

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

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PACKAGE DIMENSIONS

D SUFFIX
PLASTIC SOIC PACKAGE
CASE 751D-05
ISSUE F



NOTES:

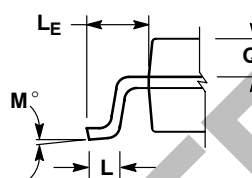
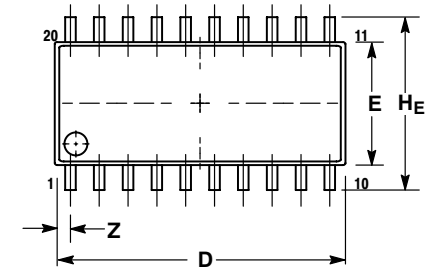
1. DIMENSIONS ARE IN MILLIMETERS.
2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
5. DIMENSION B DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF B DIMENSION 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
theta	0°	7°

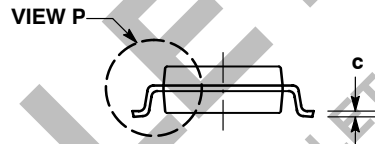
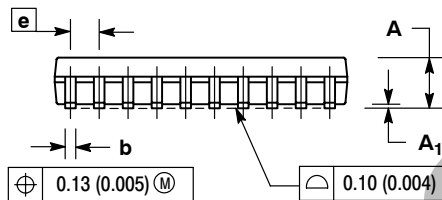
SN74LS640, SN74LS641, SN74LS642, SN74LS645

PACKAGE DIMENSIONS

M SUFFIX
SOEIAJ 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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