

SN74LS640 SN74LS641 SN74LS642 SN74LS645

Octal Bus Transceivers

These octal bus transceivers are designed for asynchronous two-way communication between data buses. Control function implementation minimizes external timing requirements. These circuits allow data transmission from the A bus to B or from the B bus to A bus depending upon the logic level of the direction control (DIR) input. Enable input (\bar{G}) can disable the device so that the buses are effectively isolated.

DEVICE	OUTPUT	LOGIC
LS640	3-State	Inverting
LS641	Open-Collector	True
LS642	Open-Collector	Inverting
LS645	3-State	True

FUNCTION TABLE

CONTROL INPUTS		OPERATION	
\bar{G}	DIR	LS640 LS642	LS641 LS645
L	L	\bar{B} data to A bus	B data to A bus
L	H	\bar{A} data to B bus	A data to B bus
H	X	Isolation	Isolation

H = HIGH Level, L = LOW Level, X = Irrelevant

GUARANTEED OPERATING RANGES (SN74LS640, SN74LS645)

Symbol	Parameter	Min	Typ	Max	Unit
V_{CC}	Supply Voltage	4.75	5.0	5.25	V
T_A	Operating Ambient Temperature Range	0	25	70	°C
I_{OH}	Output Current – High			-3.0	mA
				-15	mA
I_{OL}	Output Current – Low			24	mA

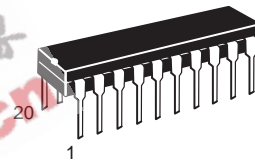
GUARANTEED OPERATING RANGES (SN74LS641, SN74LS642)

Symbol	Parameter	Min	Typ	Max	Unit
V_{CC}	Supply Voltage	4.75	5.0	5.25	V
T_A	Operating Ambient Temperature Range	0	25	70	°C
V_{OH}	Output Voltage – High			5.5	V
I_{OL}	Output Current – Low			24	mA

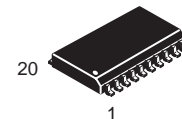


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PLASTIC
N SUFFIX
CASE 738



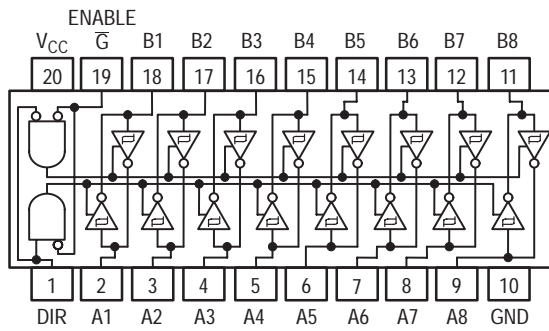
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DW SUFFIX
CASE 751D

ORDERING INFORMATION

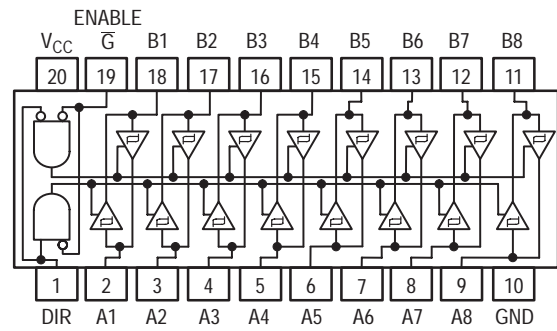
Device	Package	Shipping
SN74LS640N	16 Pin DIP	1440 Units/Box
SN74LS640DW	16 Pin	2500/Tape & Reel
SN74LS641N	16 Pin DIP	1440 Units/Box
SN74LS641DW	16 Pin	2500/Tape & Reel
SN74LS642N	16 Pin DIP	1440 Units/Box
SN74LS642DW	16 Pin	2500/Tape & Reel
SN74LS645N	16 Pin DIP	1440 Units/Box
SN74LS645DW	16 Pin	2500/Tape & Reel

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CONNECTION DIAGRAMS DIP (TOP VIEW)



SN74LS640
SN74LS642



SN74LS641
SN74LS645



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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} = MIN, I _{IN} = -18 mA
V _{OH}	Output HIGH Voltage	2.4	3.4		V	V _{CC} = MIN, I _{OH} = 3.0 mA
		2.0			V	V _{CC} = MIN, I _{OH} = MAX
V _{OL}	Output LOW Voltage		0.25	0.4	V	I _{OL} = 12 mA
			0.35	0.5	V	I _{OL} = 24 mA
I _{OZH}	Output Off Current HIGH			20	μA	V _{CC} = MAX, V _{OUT} = 2.7 V
I _{OZL}	Output Off Current LOW			-400	μA	V _{CC} = MAX, V _{OUT} = 0.4 V
I _{IH}	Input HIGH Current	A or B, DIR or \bar{G}		20	μA	V _{CC} = MAX, V _{IN} = 2.7 V
		DIR or \bar{G}		0.1	mA	V _{CC} = MAX, V _{IN} = 7.0 V
		A or B		0.1	mA	V _{CC} = MAX, V _{IN} = 5.5 V
I _{IL}	Input LOW Current			-0.4	mA	V _{CC} = MAX, V _{IN} = 0.4 V
I _{OS}	Output Short Circuit Current (Note 1)	-40		-225	mA	V _{CC} = MAX
I _{CC}	Power Supply Current					
	Total Output HIGH			70	mA	V _{CC} = MAX
	Total, Output LOW			90		
Total at HIGH Z			95			

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

AC CHARACTERISTICS (T_A = 25°C, V_{CC} = 5.0 V)

Symbol	Parameter	Limits						Unit	Test Conditions
		LS640			LS645				
		Min	Typ	Max	Min	Typ	Max		
t _{PLH} t _{PHL}	Propagation Delay A to B		6.0 8.0	10 15		8.0 11	15 15	ns	C _L = 45 pF, R _L = 667 Ω
t _{PLH} t _{PHL}	Propagation Delay B to A		6.0 8.0	10 15		8.0 11	15 15	ns	
t _{pZL} t _{pZH}	Output Enable Time \bar{G} , DIR to A		31 23	40 40		31 26	40 40	ns	
t _{pZL} t _{pZH}	Output Enable Time \bar{G} , DIR to B		31 23	40 40		31 26	40 40	ns	
t _{pLZ} t _{pHZ}	Output Disable Time \bar{G} , DIR to A		15 15	25 25		15 15	25 25	ns	
t _{pLZ} t _{pHZ}	Output Disable Time \bar{G} , DIR to B		15 15	25 25		15 15	25 25	ns	

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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		

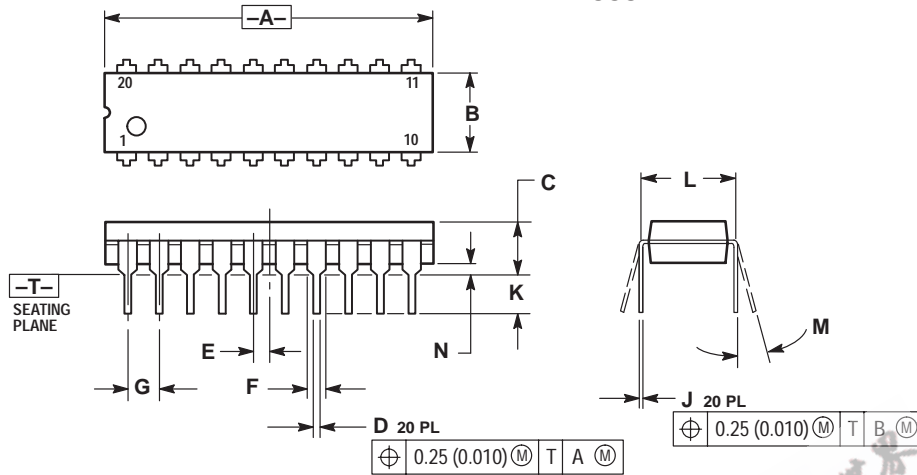
AC CHARACTERISTICS ($T_A = 25^\circ\text{C}$, $V_{CC} = 5.0 \text{ V}$)

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	$C_L = 45 \text{ pF}$, $R_L = 667 \Omega$
t_{PLH} t_{PHL}	Propagation Delay, B to A		17 16	25 25		19 14	25 25	ns	
t_{PLH} t_{PHL}	Propagation Delay, \bar{G} , DIR to A		23 34	40 50		26 43	40 60	ns	
t_{PLH} t_{PHL}	Propagation Delay, \bar{G} , DIR to B		25 37	40 50		28 39	40 60	ns	

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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.

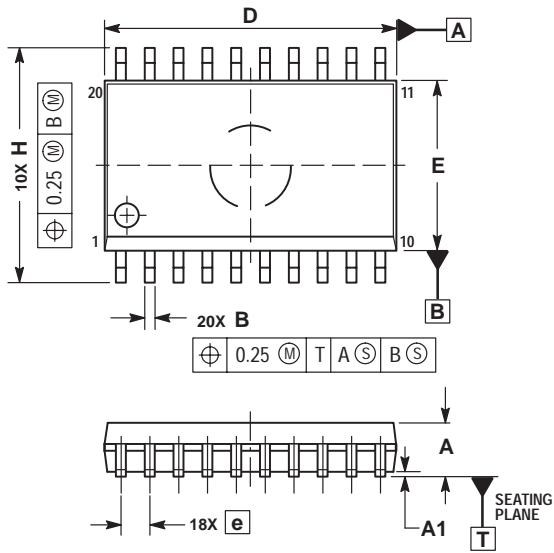
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	1.010	1.070	25.66	27.17
B	0.240	0.260	6.10	6.60
C	0.150	0.180	3.81	4.57
D	0.015	0.022	0.39	0.55
E	0.050 BSC		1.27 BSC	
F	0.050	0.070	1.27	1.77
G	0.100 BSC		2.54 BSC	
J	0.008	0.015	0.21	0.38
K	0.110	0.140	2.80	3.55
L	0.300 BSC		7.62 BSC	
M	0°	15°	0°	15°
N	0.020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



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PACKAGE DIMENSIONS

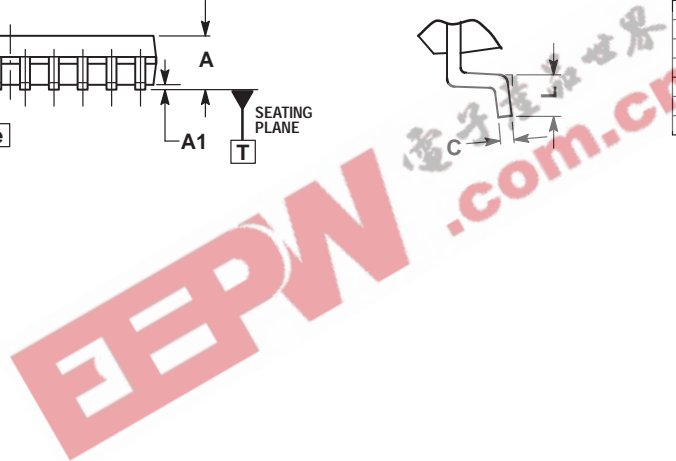
D SUFFIX
 PLASTIC SOIC PACKAGE
 CASE 751D-05
 ISSUE F



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°




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Notes

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