



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 (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

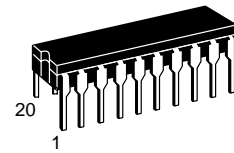
FUNCTION TABLE

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

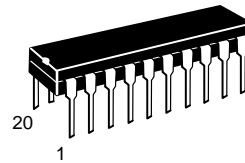
H = HIGH Level, L = LOW Level, X = Irrelevant

SN54/74LS640
SN54/74LS641
SN54/74LS642
SN54/74LS645

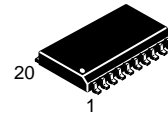
OCTAL BUS TRANSCEIVERS
LOW POWER SCHOTTKY



J SUFFIX
CERAMIC
CASE 732-03



N SUFFIX
PLASTIC
CASE 738-03

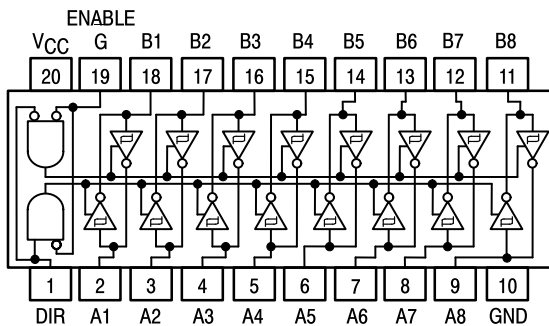


DW SUFFIX
SOIC
CASE 751D-03

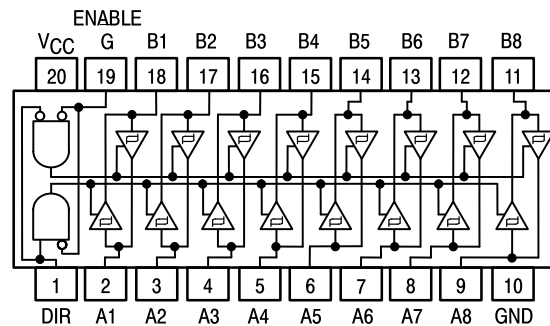
ORDERING INFORMATION

SN54LSXXXJ Ceramic
 SN74LSXXXN Plastic
 SN74LSXXXDW SOIC

CONNECTION DIAGRAMS DIP (TOP VIEW)



SN54/74LS640
SN54/74LS642



SN54/74LS641
SN54/74LS645

SN54/74LS640 • SN54/74LS645

GUARANTEED OPERATING RANGES

Symbol	Parameter		Min	Typ	Max	Unit
V _{CC}	Supply Voltage	54 74	4.5 4.75	5.0 5.0	5.5 5.25	V
T _A	Operating Ambient Temperature Range	54 74	-55 0	25 25	125 70	°C
I _{OH}	Output Current — High	54, 74			-3.0	mA
		54 74			-12 -15	mA
I _{OL}	Output Current — Low	54			12	mA
		74			24	mA

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	54		0.5	V	Guaranteed Input LOW Voltage for All Inputs	
		74		0.6			
V _{IK}	Input Clamp Diode Voltage		-0.65	-1.5	V	V _{CC} = MIN, I _{IN} = -18 mA	
V _{OH}	Output HIGH Voltage	54, 74	2.4	3.4	V	V _{CC} = MIN, I _{OH} = 3.0 mA	
		54, 74	2.0		V	V _{CC} = MIN, I _{OH} = MAX	
V _{OL}	Output LOW Voltage	54, 74		0.25	0.4	I _{OL} = 12 mA	V _{CC} = V _{CC} MIN, V _{IN} = V _{IL} or V _{IH} per Truth Table
		74		0.35	0.5	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 G			20	μA	V _{CC} = MAX, V _{IN} = 2.7 V
		DIR or 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 Total, Output LOW Total at HIGH Z			70	mA	V _{CC} = MAX	
				90			
				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				
t _{PZL} t _{PZH}	Output Enable Time G, DIR to A		31 23	40 40		31 26	40 40				
t _{PZL} t _{PZH}	Output Enable Time G, DIR to B		31 23	40 40		31 26	40 40				
t _{PLZ} t _{PHZ}	Output Disable Time G, DIR to A		15 15	25 25		15 15	25 25			ns	C _L = 5.0 pF
t _{PLZ} t _{PHZ}	Output Disable Time G, DIR to B		15 15	25 25		15 15	25 25				

SN54/74LS641 • SN54/74LS642

GUARANTEED OPERATING RANGES

Symbol	Parameter		Min	Typ	Max	Unit
V _{CC}	Supply Voltage	54 74	4.5 4.75	5.0 5.0	5.5 5.25	V
T _A	Operating Ambient Temperature Range	54 74	-55 0	25 25	125 70	°C
V _{OH}	Output Current — High	54, 74			5.5	V
I _{OL}	Output Current — Low	54 74			12 24	mA

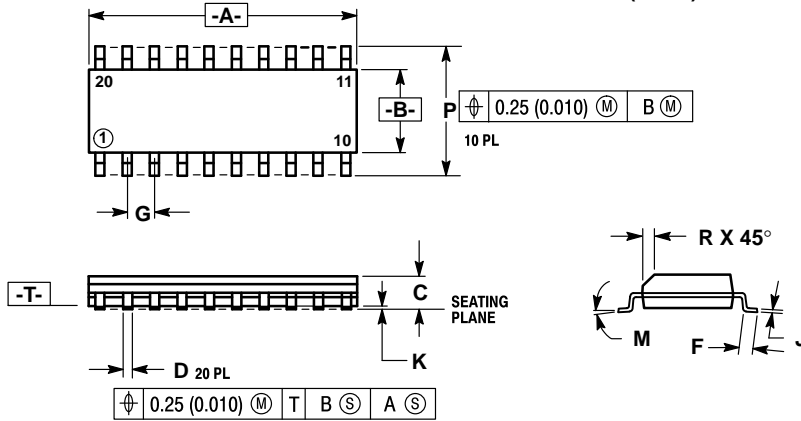
DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE (unless otherwise specified)

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	54		0.5	V	Guaranteed Input LOW Voltage for All Inputs
		74		0.6		
V _{IK}	Input Clamp Diode Voltage		-0.65	-1.5	V	V _{CC} = MIN, I _{IN} = -18 mA
I _{OH}	Output HIGH Current	54, 74		100	μA	V _{CC} = MIN, V _{OH} = MAX
V _{OL}	Output LOW Voltage	54, 74	0.25	0.4	V	I _{OL} = 12 mA
		74	0.35	0.5	V	I _{OL} = 24 mA
I _{IH}	Input HIGH Current			20	μA	V _{CC} = MAX, V _{IN} = 2.7 V
				-0.1	mA	V _{CC} = MAX, V _{IN} = 7.0 V
I _{IL}	Input LOW Current			-0.4	mA	V _{CC} = MAX, V _{IN} = 0.4 V
I _{CC}	Power Supply Current Total, Output HIGH			70	mA	V _{CC} = MAX
	Total, Output LOW			90		
	Total at HIGH Z			95		

AC CHARACTERISTICS (T_A = 25°C, V_{CC} = 5.0 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		
t _{PLH} t _{PHL}	Propagation Delay, G, DIR to A		23 34	40 50		26 43	40 60		
t _{PLH} t _{PHL}	Propagation Delay, G, DIR to B		25 37	40 50		28 39	40 60		

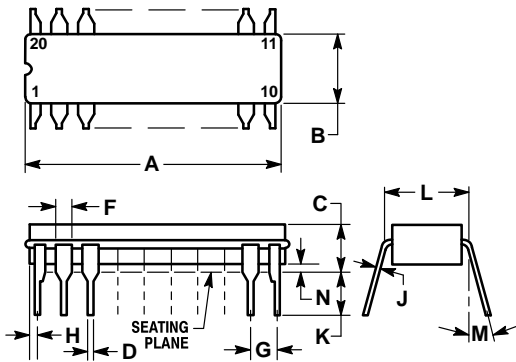
**Case 751D-03 DW Suffix
20-Pin Plastic
SO-20 (WIDE)**



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: MILLIMETER.
 3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
 4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
 5. 751D-01, AND -02 OBSOLETE, NEW STANDARD 751D-03.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	12.65	12.95	0.499	0.510
B	7.40	7.60	0.292	0.299
C	2.35	2.65	0.093	0.104
D	0.35	0.49	0.014	0.019
F	0.50	0.90	0.020	0.035
G	1.27 BSC		0.050 BSC	
J	0.25	0.32	0.010	0.012
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	10.05	10.55	0.395	0.415
R	0.25	0.75	0.010	0.029

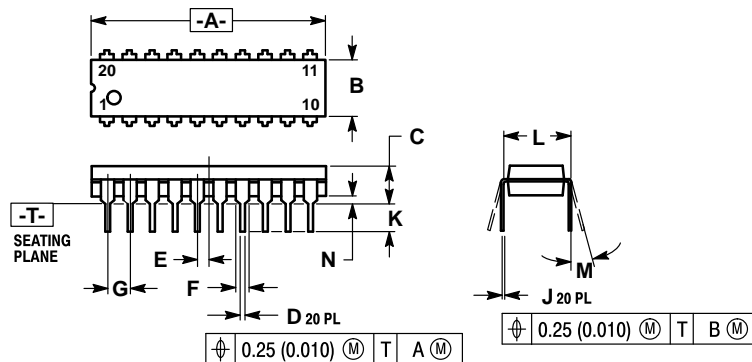
**Case 732-03 J Suffix
20-Pin Ceramic Dual In-Line**



- NOTES:
1. LEADS WITHIN 0.25 mm (0.010) DIA., TRUE POSITION AT SEATING PLANE, AT MAXIMUM MATERIAL CONDITION.
 2. DIM L TO CENTER OF LEADS WHEN FORMED PARALLEL.
 3. DIM A AND B INCLUDES MENISCUS.


DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	23.88	25.15	0.940	0.990
B	6.60	7.49	0.260	0.295
C	3.81	5.08	0.150	0.200
D	0.38	0.56	0.015	0.022
F	1.40	1.65	0.055	0.065
G	2.54 BSC		0.100 BSC	
H	0.51	1.27	0.020	0.050
J	0.20	0.30	0.008	0.012
K	3.18	4.06	0.125	0.160
L	7.62 BSC		0.300 BSC	
M	0°	15°	0°	15°
N	0.25	1.02	0.010	0.040

**Case 738-03 N Suffix
20-Pin Plastic**



- 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.
 5. 738-02 OBSOLETE, NEW STANDARD 738-03.

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

Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters can and do vary in different applications. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part. Motorola and  are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

Literature Distribution Centers:

USA: Motorola Literature Distribution; P.O. Box 20912; Phoenix, Arizona 85036.

EUROPE: Motorola Ltd.; European Literature Centre; 88 Tanners Drive, Blakelands, Milton Keynes, MK14 5BE, England.

JAPAN: Nippon Motorola Ltd.; 4-32-1, Nishi-Gotanda, Shinagawa-ku, Tokyo 141, Japan.

ASIA PACIFIC: Motorola Semiconductors H.K. Ltd.; Silicon Harbour Center, No. 2 Dai King Street, Tai Po Industrial Estate, Tai Po, N.T., Hong Kong.

SYMBOL	SW1	SW2
tpZH	Open	Closed
tpZL	Closed	Open
tpLZ	Closed	Closed

