



# 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

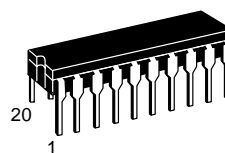
CONTROL INPUTS		OPERATION	
		LS640 LS642	LS641 LS645
G	DIR		
L	L	B data to A bus	B data to A bus
L	H	A data to B bus	A data to B bus
H	X	Isolation	Isolation

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

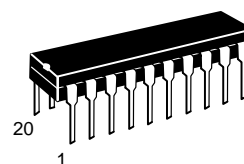
**SN54/74LS640**  
**SN54/74LS641**  
**SN54/74LS642**  
**SN54/74LS645**

## OCTAL BUS TRANSCEIVERS

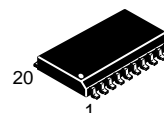
### LOW POWER SCHOTTKY



**J SUFFIX**  
 CERAMIC  
 CASE 732-03



**N SUFFIX**  
 PLASTIC  
 CASE 738-03

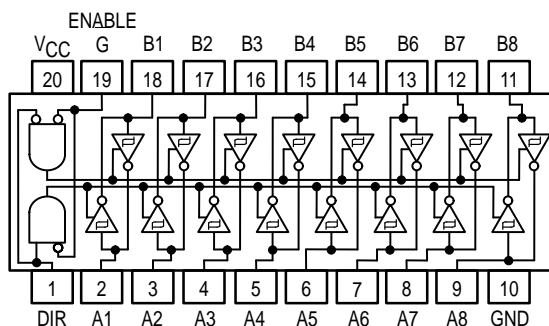


**DW SUFFIX**  
 SOIC  
 CASE 751D-03

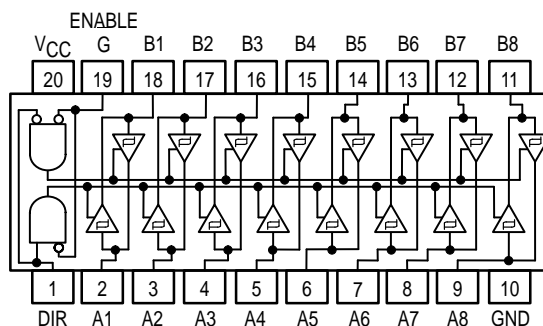
### ORDERING INFORMATION

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 <sub>CC</sub>	Supply Voltage	54 74	4.5 4.75	5.0 5.0	5.5 5.25	V
T <sub>A</sub>	Operating Ambient Temperature Range	54 74	−55 0	25 25	125 70	°C
I <sub>OH</sub>	Output Current — High	54, 74			−3.0	mA
		54 74			−12 −15	mA
I <sub>OL</sub>	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 <sub>IH</sub>	Input HIGH Voltage		2.0			V	Guaranteed Input HIGH Voltage for All Inputs
V <sub>IL</sub>	Input LOW Voltage	54			0.5	V	Guaranteed Input LOW Voltage for All Inputs
		74			0.6		
V <sub>IK</sub>	Input Clamp Diode Voltage			−0.65	−1.5	V	V <sub>CC</sub> = MIN, I <sub>IN</sub> = −18 mA
V <sub>OH</sub>	Output HIGH Voltage	54, 74	2.4	3.4		V	V <sub>CC</sub> = MIN, I <sub>OH</sub> = 3.0 mA
		54, 74	2.0			V	V <sub>CC</sub> = MIN, I <sub>OH</sub> = MAX
V <sub>OL</sub>	Output LOW Voltage	54, 74		0.25	0.4	V	I <sub>OL</sub> = 12 mA
		74		0.35	0.5	V	I <sub>OL</sub> = 24 mA
							V <sub>CC</sub> = V <sub>CC</sub> MIN, V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> per Truth Table
I <sub>OZH</sub>	Output Off Current HIGH				20	μA	V <sub>CC</sub> = MAX, V <sub>OUT</sub> = 2.7 V
I <sub>OZL</sub>	Output Off Current LOW				−400	μA	V <sub>CC</sub> = MAX, V <sub>OUT</sub> = 0.4 V
I <sub>IH</sub>	Input HIGH Current	A or B, DIR or G			20	μA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 2.7 V
		DIR or G			0.1	mA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 7.0 V
		A or B			0.1	mA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 5.5 V
I <sub>IL</sub>	Input LOW Current				−0.4	mA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 0.4 V
I <sub>OS</sub>	Output Short Circuit Current (Note 1)		−40		−225	mA	V <sub>CC</sub> = MAX
I <sub>CC</sub>	Power Supply Current				70	mA	V <sub>CC</sub> = MAX
	Total Output HIGH				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<sub>A</sub> = 25°C, V<sub>CC</sub> = 5.0 V)

Symbol	Parameter	Limits						Unit	Test Conditions
		LS640			LS645				
		Min	Typ	Max	Min	Typ	Max		
tPLH tPHL	Propagation Delay A to B		6.0 8.0	10 15		8.0 11	15 15	ns	C <sub>L</sub> = 45 pF, R <sub>L</sub> = 667 Ω
tPLH tPHL	Propagation Delay B to A		6.0 8.0	10 15		8.0 11	15 15	ns	
tpZL tpZH	Output Enable Time G, DIR to A		31 23	40 40		31 26	40 40	ns	
tpZL tpZH	Output Enable Time G, DIR to B		31 23	40 40		31 26	40 40	ns	
tPLZ tPHZ	Output Disable Time G, DIR to A		15 15	25 25		15 15	25 25	ns	C <sub>L</sub> = 5.0 pF
tPLZ tPHZ	Output Disable Time G, DIR to B		15 15	25 25		15 15	25 25	ns	

# SN54/74LS641 • SN54/74LS642

## GUARANTEED OPERATING RANGES

Symbol	Parameter		Min	Typ	Max	Unit
V <sub>CC</sub>	Supply Voltage	54 74	4.5 4.75	5.0 5.0	5.5 5.25	V
T <sub>A</sub>	Operating Ambient Temperature Range	54 74	−55 0	25 25	125 70	°C
V <sub>OH</sub>	Output Current — High	54, 74			5.5	V
I <sub>OL</sub>	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 <sub>IH</sub>	Input HIGH Voltage		2.0			V	Guaranteed Input HIGH Voltage for All Inputs
V <sub>IL</sub>	Input LOW Voltage	54			0.5	V	Guaranteed Input LOW Voltage for All Inputs
		74			0.6		
V <sub>IK</sub>	Input Clamp Diode Voltage			−0.65	−1.5	V	V <sub>CC</sub> = MIN, I <sub>IN</sub> = −18 mA
I <sub>OH</sub>	Output HIGH Current	54, 74			100	μA	V <sub>CC</sub> = MIN, V <sub>OH</sub> = MAX
V <sub>OL</sub>	Output LOW Voltage	54, 74		0.25	0.4	V	I <sub>OL</sub> = 12 mA
		74		0.35	0.5	V	I <sub>OL</sub> = 24 mA
I <sub>IH</sub>	Input HIGH Current				20	μA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 2.7 V
					−0.1	mA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 7.0 V
I <sub>IL</sub>	Input LOW Current				−0.4	mA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 0.4 V
I <sub>CC</sub>	Power Supply Current Total, Output HIGH				70	mA	V <sub>CC</sub> = MAX
	Total, Output LOW				90		
	Total at HIGH Z				95		

## AC CHARACTERISTICS (T<sub>A</sub> = 25°C, V<sub>CC</sub> = 5.0 V)

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