

**MOTOROLA**

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.

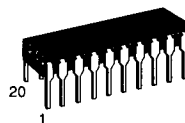
DEVICE	OUTPUT	LOGIC
LS640	3-State	Inverting
LS641	Open-Collector	True
LS642	Open-Collector	Inverting
LS645	3-State	True

FUNCTION TABLE

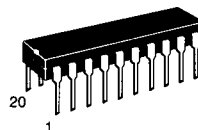
CONTROL INPUTS		OPERATION	
$\bar{G}$	DIR	LS640 LS642	LS641 LS645
L	L	$\bar{B}$ data to A bus	B data to A bus
L	H	$\bar{A}$ data to B bus	A data to B bus
H	X	Isolation	Isolation

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

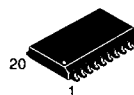
SN54/74LS640
SN54/74LS641
SN54/74LS642
SN54/74LS645

OCTAL BUS TRANSCEIVERS**LOW POWER SCHOTTKY**

J SUFFIX
 CERAMIC
 CASE 732-03



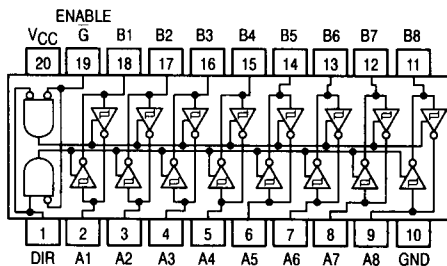
N SUFFIX
 PLASTIC
 CASE 738-03



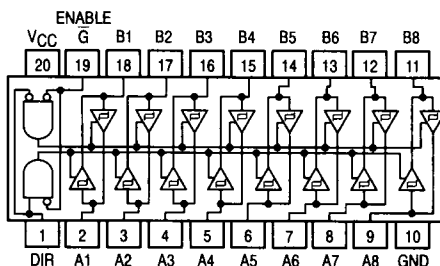
DW SUFFIX
 SOIC
 CASE 751D-03

ORDERING INFORMATION

SN54LSXXXJ Ceramic
 SN74LSXXXN Plastic
 SN74LSXXXDW SOIC

5**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 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
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	V	I _{OL} = 12 mA
		74		0.35	V	I _{OL} = 24 mA
						V _{CC} = V _{CC} MIN, V _{IN} = V _{IL} or V _{IH} per Truth Table
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				mA	V _{CC} = MAX
	Total Output HIGH			70		
	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}	Propagation Delay A to B		6.0	10		8.0	15	ns	C _L = 45 pF, R _L = 667 Ω
t _{PHL}	Propagation Delay B to A		8.0	15		11	15	ns	
t _{PZL}	Output Enable Time G, DIR to A		31	40		31	40	ns	
t _{PZH}	Output Enable Time G, DIR to B		23	40		26	40	ns	
t _{PLZ}	Output Disable Time G, DIR to A		15	25		15	25	ns	C _L = 5.0 pF
t _{PHZ}	Output Disable Time G, DIR to B		15	25		15	25	ns	
t _{PLZ}	Output Disable Time G, DIR to B		15	25		15	25	ns	

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		

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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	ns	
t _{PLH} t _{PHL}	Propagation Delay, G, DIR to A		23 34	40 50		26 43	40 60	ns	
t _{PLH} t _{PHL}	Propagation Delay, G, DIR to B		25 37	40 50		28 39	40 60	ns	