



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

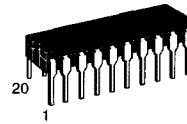
| CONTROL INPUTS | | OPERATION | |
|----------------|-----|-------------------------|-----------------|
| G | DIR | LS640 LS642 | LS641 LS645 |
| L | L | \bar{B} data to A bus | B data to A bus |
| L | H | A data to B bus | A data to B bus |
| H | X | Isolation | Isolation |

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

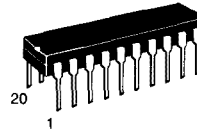
SN54/74LS640
SN54/74LS641
SN54/74LS642
SN54/74LS645

OCTAL BUS TRANSCEIVERS

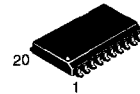
LOW POWER SCHOTTKY



J SUFFIX
 CERAMIC
 CASE 732-03



N SUFFIX
 PLASTIC
 CASE 738-03



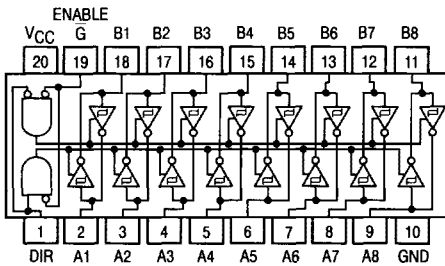
DW SUFFIX
 SOIC
 CASE 751D-03

ORDERING INFORMATION

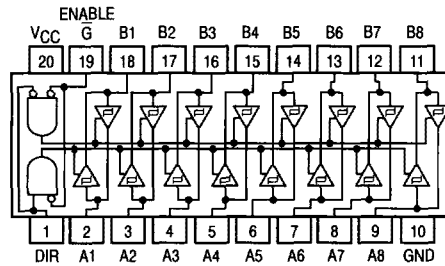
SN54LSXXXJ Ceramic
 SN74LSXXXN Plastic
 SN74LSXXXDW SOIC

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CONNECTION DIAGRAMS DIP (TOP VIEW)



SN54/74LS640
SN54/74LS642



SN54/74LS641
SN54/74LS645

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GUARANTEED OPERATING RANGES

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

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 _{IJN} = -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 | V | I _{OL} = 12 mA V _{CC} = V _{CC} MIN, V _{IN} = V _{IL} or V _{IH} per Truth Table |
| | | 74 | | 0.35 | 0.5 | V | |
| 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} = 7.0 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} | 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 G, DIR to A | | 31 | 40 | | 31 | 40 | | |
| t _{PZH} | | | 23 | 40 | | 26 | 40 | | |
| t _{PZL} | Output Enable Time G, DIR to B | | 31 | 40 | | 31 | 40 | | |
| t _{PZH} | | | 23 | 40 | | 26 | 40 | | |
| t _{PLZ} | Output Disable Time G, DIR to A | | 15 | 25 | | 15 | 25 | ns | C _L = 5.0 pF |
| t _{PHZ} | | | 15 | 25 | | 15 | 25 | | |
| t _{PLZ} | Output Disable Time G, DIR to B | | 15 | 25 | | 15 | 25 | | |
| t _{PHZ} | | | 15 | 25 | | 15 | 25 | | |

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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 | |