

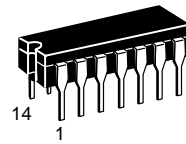
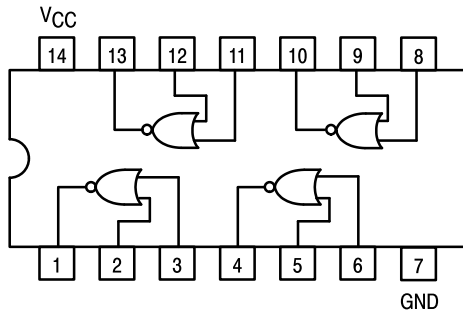


MOTOROLA

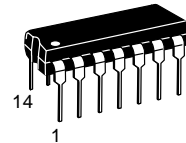
QUAD 2-INPUT NOR BUFFER

SN54/74LS28

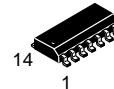
**QUAD 2-INPUT NOR BUFFER
LOW POWER SCHOTTKY**



**J SUFFIX
CERAMIC
CASE 632-08**



**N SUFFIX
PLASTIC
CASE 646-06**



**D SUFFIX
SOIC
CASE 751A-02**

ORDERING INFORMATION

| | |
|-----------|---------|
| SN54LSXXJ | Ceramic |
| SN74LSXXN | Plastic |
| SN74LSXXD | SOIC |

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 | | | -1.2 | mA |
| I _{OL} | Output Current — Low | 54 74 | | | 12 24 | mA |

SN54/74LS28

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 | | 0.7 | V | Guaranteed Input LOW Voltage for All Inputs | |
| | | 74 | | 0.8 | | | |
| V_{IK} | Input Clamp Diode Voltage | | -0.65 | -1.5 | V | $V_{CC} = \text{MIN}$, $I_{IN} = -18 \text{ mA}$ | |
| V_{OH} | Output HIGH Voltage | 54 | 2.5 | 3.5 | V | $V_{CC} = \text{MIN}$, $I_{OH} = \text{MAX}$, $V_{IN} = V_{IH}$ or V_{IL} per Truth Table | |
| | | 74 | 2.7 | 3.5 | V | | |
| V_{OL} | Output LOW Voltage | 54, 74 | | 0.25 | 0.4 | V | $I_{OL} = 12 \text{ mA}$ $V_{CC} = V_{CC} \text{ MIN}$, $V_{IN} = V_{IL}$ or V_{IH} per Truth Table |
| | | 74 | | 0.35 | 0.5 | V | |
| 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_{OS} | Short Circuit Current (Note 1) | -30 | | -130 | mA | $V_{CC} = \text{MAX}$ | |
| I_{CC} | Power Supply Current Total, Output HIGH | | | 3.6 | mA | $V_{CC} = \text{MAX}$ | |
| | Total, Output LOW | | | 13.8 | | | |

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

AC CHARACTERISTICS ($T_A = 25^\circ\text{C}$)

| Symbol | Parameter | Limits | | | Unit | Test Conditions |
|-----------|-------------------|--------|-----|-----|------|--|
| | | Min | Typ | Max | | |
| t_{PLH} | Propagation Delay | | 12 | 24 | ns | $V_{CC} = 5.0 \text{ V}$ $C_L = 45 \text{ pF}$, $R_L = 667 \Omega$ |
| t_{PHL} | Propagation Delay | | 12 | 24 | ns | |

**Case 751A-02 D Suffix
14-Pin Plastic
SO-14**



- NOTES:
1. DIMENSIONS "A" AND "B" ARE DATUMS AND "T" IS A DATUM SURFACE.
 2. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 3. CONTROLLING DIMENSION: MILLIMETER.
 4. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
 5. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
 6. 751A-01 IS OBSOLETE, NEW STANDARD 751A-02.

| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|------|-----------|-------|
| | MIN | MAX | MIN | MAX |
| A | 8.55 | 8.75 | 0.337 | 0.344 |
| B | 3.80 | 4.00 | 0.150 | 0.157 |
| C | 1.35 | 1.75 | 0.054 | 0.068 |
| D | 0.35 | 0.49 | 0.014 | 0.019 |
| F | 0.40 | 1.25 | 0.016 | 0.049 |
| G | 1.27 BSC | | 0.050 BSC | |
| J | 0.19 | 0.25 | 0.008 | 0.009 |
| K | 0.10 | 0.25 | 0.004 | 0.009 |
| M | 0° | 7° | 0° | 7° |
| P | 5.80 | 6.20 | 0.229 | 0.244 |
| R | 0.25 | 0.50 | 0.010 | 0.019 |

**Case 632-08 J Suffix
14-Pin Ceramic Dual In-Line**



- 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. DIM F MAY NARROW TO 0.76 (0.030) WHERE THE LEAD ENTERS THE CERAMIC BODY.
 5. 632-01 THRU -07 OBSOLETE, NEW STANDARD 632-08.

| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|-------|-----------|-------|
| | MIN | MAX | MIN | MAX |
| A | 19.05 | 19.94 | 0.750 | 0.785 |
| B | 6.23 | 7.11 | 0.245 | 0.280 |
| C | 3.94 | 5.08 | 0.155 | 0.200 |
| D | 0.39 | 0.50 | 0.015 | 0.020 |
| F | 1.40 | 1.65 | 0.055 | 0.065 |
| G | 2.54 BSC | | 0.100 BSC | |
| J | 0.21 | 0.38 | 0.008 | 0.015 |
| K | 3.18 | 4.31 | 0.125 | 0.170 |
| L | 7.62 BSC | | 0.300 BSC | |
| M | 0° | 15° | 0° | 15° |
| N | 0.51 | 1.01 | 0.020 | 0.040 |

**Case 646-06 N Suffix
14-Pin Plastic**



- NOTES:
1. LEADS WITHIN 0.13 mm (0.005) RADIUS OF TRUE POSITION AT SEATING PLANE AT MAXIMUM MATERIAL CONDITION.
 2. DIMENSION "L" TO CENTER OF LEADS WHEN FORMED PARALLEL.
 3. DIMENSION "B" DOES NOT INCLUDE MOLD FLASH.
 4. ROUNDED CORNERS OPTIONAL.
 5. 646-05 OBSOLETE, NEW STANDARD 646-06.

| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|-------|-----------|-------|
| | MIN | MAX | MIN | MAX |
| A | 18.16 | 19.56 | 0.715 | 0.770 |
| B | 6.10 | 6.60 | 0.240 | 0.260 |
| C | 3.69 | 4.69 | 0.145 | 0.185 |
| D | 0.38 | 0.53 | 0.015 | 0.021 |
| F | 1.02 | 1.78 | 0.040 | 0.070 |
| G | 2.54 BSC | | 0.100 BSC | |
| H | 1.32 | 2.41 | 0.052 | 0.095 |
| J | 0.20 | 0.38 | 0.008 | 0.015 |
| K | 2.92 | 3.43 | 0.115 | 0.135 |
| L | 7.62 BSC | | 0.300 BSC | |
| M | 0° | 10° | 0° | 10° |
| N | 0.39 | 1.01 | 0.015 | 0.039 |

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