

NLAST4051

Analog Multiplexer/ Demultiplexer

TTL Compatible, Single-Pole, 8-Position Plus Common Off

The NLAST4051 is an improved version of the MC14051 and MC74HC4051 fabricated in sub-micron Silicon Gate CMOS technology for lower $R_{DS(on)}$ resistance and improved linearity with low current. This device may be operated either with a single supply or dual supply up to ± 3 V to pass a 6 V_{PP} signal without coupling capacitors.

When operating in single supply mode, it is only necessary to tie V_{EE} , pin 7 to ground. For dual supply operation, V_{EE} is tied to a negative voltage, not to exceed maximum ratings. Translation is provided in the device, the Address and Inhibit are standard TTL level compatible. For CMOS compatibility see NLAS4051. Pin for pin compatible with all industry standard versions of '4051.'

Features

- Improved $R_{DS(on)}$ Specifications
- Pin for Pin Replacement for MAX4051 and MAX4051A
 - One Half the Resistance Operating at 5.0 V
- Single or Dual Supply Operation
 - Single 3.0 – 5.0 V Operation, or Dual ± 3 V Operation
 - With V_{CC} of 3.0 to 3.3 V, Device Can Interface with 1.8 V Logic, No Translators Needed
 - Address and Inhibit Logic are Over-Voltage Tolerant and May Be Driven Up +6 V Regardless of V_{CC}
- Address and Inhibit Pins Standard TTL Compatible
 - Greatly Improved Noise Margin Over MAX4051 and MAX4051A
 - True TTL Compatibility $V_{IL} = 0.8$ V, $V_{IH} = 2.0$ V
- Improved Linearity Over Standard HC4051 Devices
- Popular SOIC, and Space Saving TSSOP, and QSOP 16 Pin Packages
- Pb-Free Packages are Available*



Figure 1. Pin Connection
(Top View)

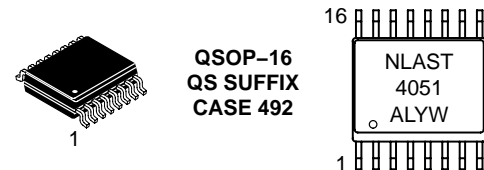
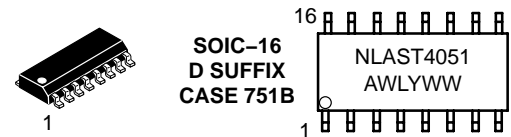
*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



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MARKING DIAGRAMS



A = Assembly Location
 WL, L = Wafer Lot
 Y = Year
 WW, W = Work Week
 ■ = Pb-Free Package
 (Note: Microdot may be in either location)

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 10 of this data sheet.

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TRUTH TABLE

| Inhibit | Address | | | ON SWITCHES* |
|---------|-----------------|-----------------|-----------------|---------------------|
| | C | B | A | |
| 1 | X don't care | X don't care | X don't care | All switches open |
| 0 | 0 | 0 | 0 | COM-NO ₀ |
| 0 | 0 | 0 | 1 | COM-NO ₁ |
| 0 | 0 | 1 | 0 | COM-NO ₂ |
| 0 | 0 | 1 | 1 | COM-NO ₃ |
| 0 | 1 | 0 | 0 | COM-NO ₄ |
| 0 | 1 | 0 | 1 | COM-NO ₅ |
| 0 | 1 | 1 | 0 | COM-NO ₆ |
| 0 | 1 | 1 | 1 | COM-NO ₇ |

*NO and COM pins are identical and interchangeable. Either may be considered an input or output; signals pass equally well in either direction.

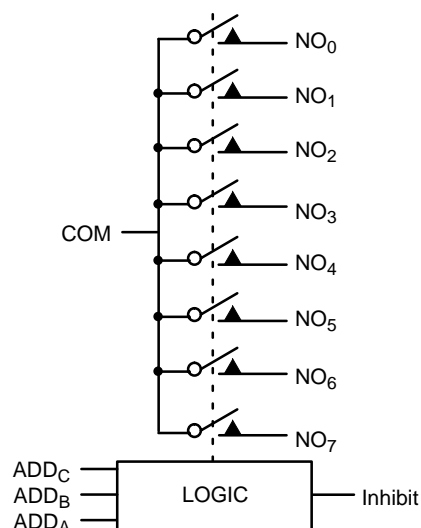


Figure 2. Logic Diagram

MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|----------------------|------------------------------------------------------------------------------------------------------|----------------------------------------------|------|
| V _{EE} | Negative DC Supply Voltage (Referenced to GND) | -7.0 to +0.5 | V |
| V _{CC} | Positive DC Supply Voltage (Note 1) (Referenced to GND) (Referenced to V _{EE}) | -0.5 to +7.0 -0.5 to +7.0 | V |
| V _{IS} | Analog Input Voltage | V _{EE} -0.5 to V _{CC} +0.5 | V |
| V _{IN} | Digital Input Voltage (Referenced to GND) | -0.5 to 7.0 | V |
| I | DC Current, Into or Out of Any Pin | ±50 | mA |
| T _{STG} | Storage Temperature Range | -65 to +150 | °C |
| T _L | Lead Temperature, 1 mm from Case for 10 Seconds | 260 | °C |
| T _J | Junction Temperature under Bias | +150 | °C |
| θ _{JA} | Thermal Resistance | SOIC 143 TSSOP 164 QSOP 164 | °C/W |
| P _D | Power Dissipation in Still Air | SOIC 500 TSSOP 450 QSOP 450 | mW |
| MSL | Moisture Sensitivity | Level 1 | |
| F _R | Flammability Rating Oxygen Index: 30% – 35% | UL 94 V-0 @ 0.125 in | |
| V _{ESD} | ESD Withstand Voltage Human Body Model (Note 2) Machine Model (Note 3) Charged Device Model (Note 4) | > 2000 > 200 > 1000 | V |
| I _{LATCHUP} | Latchup Performance Above V _{CC} and Below GND at 125°C (Note 5) | ±300 | mA |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. The absolute value of V_{CC} ± |V_{EE}| ≤ 7.0.
2. Tested to EIA/JESD22-A114-A.
3. Tested to EIA/JESD22-A115-A.
4. Tested to JESD22-C101-A.
5. Tested to EIA/JESD78.

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RECOMMENDED OPERATING CONDITIONS

| Symbol | Parameter | Min | Max | Unit |
|------------|--------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|----------------|------|
| V_{EE} | Negative DC Supply Voltage (Referenced to GND) | -5.5 | GND | V |
| V_{CC} | Positive DC Supply Voltage (Referenced to GND) (Referenced to V_{EE}) | 2.5 2.5 | 5.5 6.6 | V |
| V_{IS} | Analog Input Voltage | V_{EE} | V_{CC} | V |
| V_{IN} | Digital Input Voltage (Note 6) (Referenced to GND) | 0 | 5.5 | V |
| T_A | Operating Temperature Range, All Package Types | -55 | 125 | °C |
| t_r, t_f | Input Rise/Fall Time (Channel Select or Enable Inputs) | $V_{CC} = 3.0 \text{ V} \pm 0.3 \text{ V}$ $V_{CC} = 5.0 \text{ V} \pm 0.5 \text{ V}$ | 0 100 20 | ns/V |

6. Unused digital inputs may not be left open. All digital inputs must be tied to a high–logic voltage level or a low–logic input voltage level.

DC CHARACTERISTICS – Digital Section (Voltages Referenced to GND)

| Symbol | Parameter | Condition | V_{CC} V | Guaranteed Limit | | | Unit |
|----------|----------------------------------------------------------------|----------------------------------------------------|---------------|------------------|--------|---------|------|
| | | | | -55 to 25°C | ≤ 85°C | ≤ 125°C | |
| V_{IH} | Minimum High–Level Input Voltage, Address or Inhibit Inputs | | 3.0 | 1.6 | 1.6 | 1.6 | V |
| | | | 4.5 | 2.0 | 2.0 | 2.0 | |
| | | | 5.5 | 2.0 | 2.0 | 2.0 | |
| V_{IL} | Maximum Low–Level Input Voltage, Address or Inhibit Inputs | | 3.0 | 0.5 | 0.5 | 0.5 | V |
| | | | 4.5 | 0.8 | 0.8 | 0.8 | |
| | | | 5.5 | 0.8 | 0.8 | 0.8 | |
| I_{IN} | Maximum Input Leakage Current, Address or Inhibit Inputs | $V_{IN} = 6.0$ or GND | 0 V to 6.0 V | ±0.1 | ±1.0 | ±1.0 | µA |
| I_{CC} | Maximum Quiescent Supply Current (per Package) | Address or Inhibit and $V_{IS} = V_{CC}$ or GND | 6.0 | 4.0 | 40 | 80 | µA |

DC ELECTRICAL CHARACTERISTICS – Analog Section

| Symbol | Parameter | Test Conditions | V_{CC} V | V_{EE} V | Guaranteed Limit | | | Unit |
|--------------------------------|-----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|---------------|---------------|------------------|--------|---------|------|
| | | | | | -55 to 25°C | ≤ 85°C | ≤ 125°C | |
| R_{ON} | Maximum “ON” Resistance | $V_{IN} = V_{IL}$ or V_{IH} $V_{IS} = (V_{EE}$ to $V_{CC})$ $ I_S = 10 \text{ mA}$ (Figures 4 thru 9) | 3.0 | 0 | 86 | 108 | 120 | Ω |
| | | | 4.5 | 0 | 37 | 46 | 55 | |
| | | | 3.0 | -3.0 | 26 | 33 | 37 | |
| ΔR_{ON} | Maximum Difference in “ON” Resistance Between Any Two Channels in the Same Pack- age | $V_{IN} = V_{IL}$ or V_{IH} , $ I_S = 10 \text{ mA}$, $V_{IS} = 2.0 \text{ V}$ $V_{IS} = 3.0 \text{ V}$ $V_{IS} = 2.0 \text{ V}$ | 3.0 | 0 | 15 | 20 | 20 | Ω |
| | | | 4.5 | 0 | 13 | 18 | 18 | |
| | | | 3.0 | -3.0 | 10 | 15 | 15 | |
| $R_{flat(ON)}$ | ON Resistance Flatness | $V_{COM} = 1, 2, 3.5 \text{ V}$ $V_{COM} = 2, 0, 2 \text{ V}$ | 4.5 3.0 | 3.0 | 4 2 | 4 2 | 5 3 | Ω |
| $I_{NC(OFF)}$ $I_{NO(OFF)}$ | Maximum Off–Channel Leakage Current | Switch Off $V_{IN} = V_{IL}$ or V_{IH} $V_{IO} = V_{CC} - 1.0 \text{ V}$ or $V_{EE} + 1.0 \text{ V}$ (Figure 17) | 6.0 | 0 | 0.1 | 5.0 | 100 | nA |
| | | | 3.0 | -3.0 | 0.1 | 5.0 | 100 | |
| $I_{COM(ON)}$ | Maximum On–Channel Leakage Current, Channel–to–Channel | Switch On $V_{IO} = V_{CC} - 1.0 \text{ V}$ or $V_{EE} + 1.0 \text{ V}$ (Figure 17) | 6.0 | 0 | 0.1 | 5.0 | 100 | nA |
| | | | 3.0 | -3.0 | 0.1 | 5.0 | 100 | |

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AC CHARACTERISTICS (Input $t_r = t_f = 3$ ns)

| Symbol | Parameter | Test Conditions | V _{CC} V | V _{EE} V | Guaranteed Limit | | | | Unit |
|------------------|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------|------------------|------|--------|---------|------|
| | | | | | -55 to 25°C | | ≤ 85°C | ≤ 125°C | |
| | | | | | Min | Typ* | | | |
| t _{BMM} | Minimum Break-Before-Make Time | V _{IN} = V _{IL} or V _{IH} V _{IS} = V _{CC} R _L = 300 Ω, C _L = 35 pF (Figure 19) | 3.0 | 0.0 | 1.0 | 6.5 | - | - | ns |
| | | | 4.5 | 0.0 | 1.0 | 5.0 | - | - | |
| | | | 3.0 | -3.0 | 1.0 | 3.5 | - | - | |

*Typical Characteristics are at 25°C.

AC CHARACTERISTICS (C_L = 35 pF, Input $t_r = t_f = 3$ ns)

| Symbol | Parameter | V _{CC} V | V _{EE} V | Guaranteed Limit | | | | | | Unit | |
|--------------------|---------------------------------------------------------------------------------------------|----------------------|----------------------|------------------|-----|-----|--------|-----|---------|------|-----|
| | | | | -55 to 25°C | | | ≤ 85°C | | ≤ 125°C | | |
| | | | | Min | Typ | Max | Min | Max | Min | | Max |
| t _{TRANS} | Transition Time (Address Selection Time) (Figure 18) | 2.5 | 0 | | | 40 | | 45 | | 50 | ns |
| | | 3.0 | 0 | | | 28 | | 30 | | 35 | |
| | | 4.5 | 0 | | | 23 | | 25 | | 30 | |
| | | 3.0 | -3.0 | | | 23 | | 25 | | 28 | |
| t _{ON} | Turn-on Time (Figures 14, 15, 20, and 21) Enable to N _O or N _C | 2.5 | 0 | | | 40 | | 45 | | 50 | ns |
| | | 3.0 | 0 | | | 28 | | 30 | | 35 | |
| | | 4.5 | 0 | | | 23 | | 25 | | 30 | |
| | | 3.0 | -3.0 | | | 23 | | 25 | | 28 | |
| t _{OFF} | Turn-off Time (Figures 14, 15, 20, and 21) Enable to N _O or N _C | 2.5 | 0 | | | 40 | | 45 | | 50 | ns |
| | | 3.0 | 0 | | | 28 | | 30 | | 35 | |
| | | 4.5 | 0 | | | 23 | | 25 | | 30 | |
| | | 3.0 | -3.0 | | | 23 | | 25 | | 28 | |

| | | Typical @ 25°C, V _{CC} = 5.0 V | | |
|------------------------------------|------------------------------------------|-----------------------------------------|--|----|
| C _{IN} | Maximum Input Capacitance, Select Inputs | 8 | | pF |
| C _{NO} or C _{NC} | Analog I/O | 10 | | |
| C _{COM} | Common I/O | 10 | | |
| C _(ON) | Feedthrough | 1.0 | | |

ADDITIONAL APPLICATION CHARACTERISTICS (GND = 0 V)

| Symbol | Parameter | Condition | V _{CC} V | V _{EE} V | Typ | Unit |
|------------------|------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------|------|------|
| | | | | | 25°C | |
| BW | Maximum On-Channel Bandwidth or Minimum Frequency Response | V _{IS} = 1/2 (V _{CC} - V _{EE}) Source Amplitude = 0 dBm (Figures 10 and 22) | 3.0 | 0.0 | 80 | MHz |
| | | | 4.5 | 0.0 | 90 | |
| | | | 6.0 | 0.0 | 95 | |
| | | | 3.0 | -3.0 | 95 | |
| V _{ISO} | Off-Channel Feedthrough Isolation | f = 100 kHz; V _{IS} = 1/2 (V _{CC} - V _{EE}) Source = 0 dBm (Figures 12 and 22) | 3.0 | 0.0 | -93 | dB |
| | | | 4.5 | 0.0 | -93 | |
| | | | 6.0 | 0.0 | -93 | |
| | | | 3.0 | -3.0 | -93 | |
| V _{ONL} | Maximum Feedthrough On Loss | V _{IS} = 1/2 (V _{CC} - V _{EE}) Source = 0 dBm (Figures 10 and 22) | 3.0 | 0.0 | -2 | dB |
| | | | 4.5 | 0.0 | -2 | |
| | | | 6.0 | 0.0 | -2 | |
| | | | 3.0 | -3.0 | -2 | |
| Q | Charge Injection | V _{IN} = V _{CC} to V _{EE} , f _{IS} = 1 kHz, t _r = t _f = 3 ns R _{IS} = 0 Ω, C _L = 1000 pF, Q = C _L * ΔV _{OUT} (Figures 16 and 23) | 5.0 | 0.0 | 9.0 | pC |
| | | | 3.0 | -3.0 | 12 | |
| THD | Total Harmonic Distortion THD + Noise | f _{IS} = 1 MHz, R _L = 10 KΩ, C _L = 50 pF, V _{IS} = 5.0 V _{PP} sine wave V _{IS} = 6.0 V _{PP} sine wave (Figure 13) | 6.0 | 0.0 | 0.10 | % |
| | | | 3.0 | -3.0 | 0.05 | |

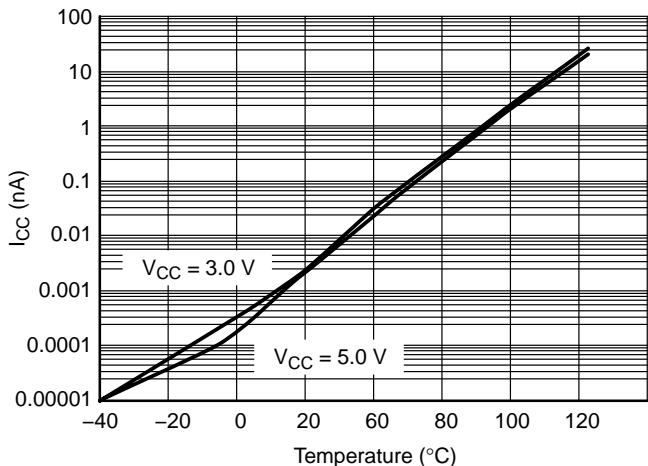


Figure 3. I_{CC} versus Temp, $V_{CC} = 3\text{ V}$ and 5 V

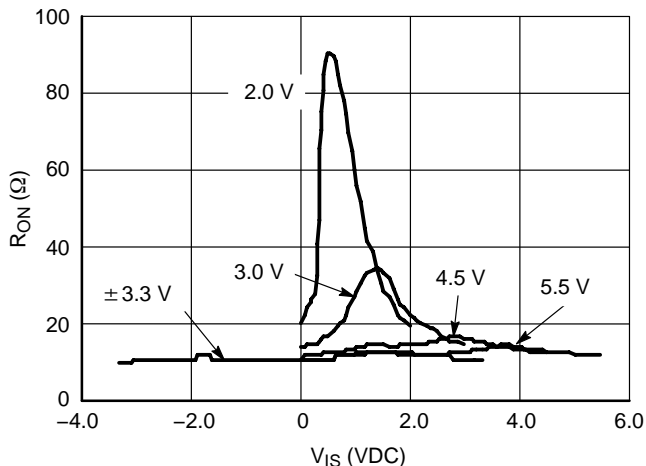


Figure 4. R_{ON} versus V_{CC} , Temp = 25°C

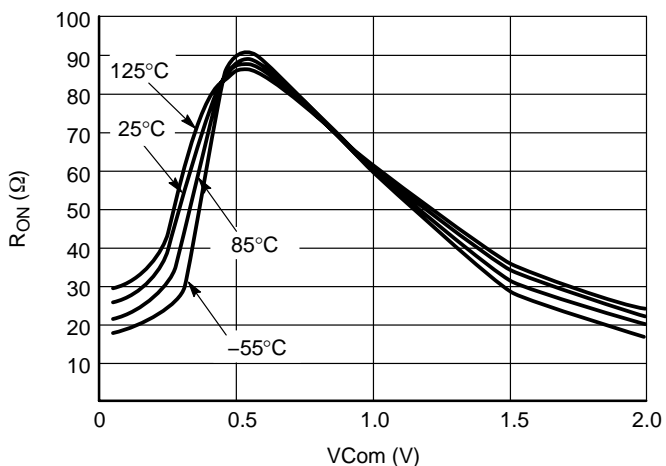


Figure 5. Typical On Resistance
 $V_{CC} = 2.0\text{ V}$, $V_{EE} = 0\text{ V}$

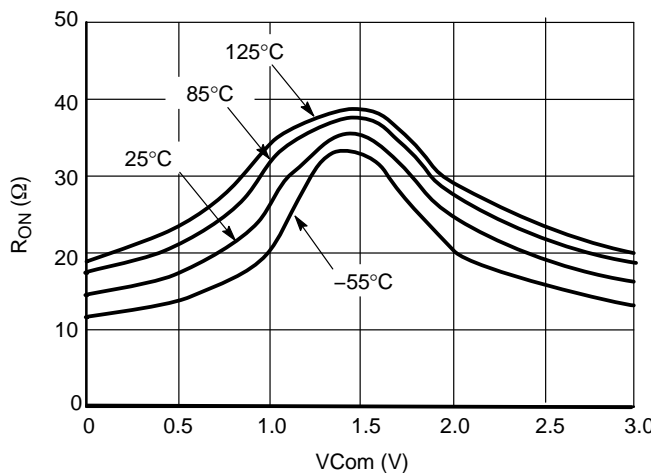


Figure 6. Typical On Resistance
 $V_{CC} = 3.0\text{ V}$, $V_{EE} = 0\text{ V}$

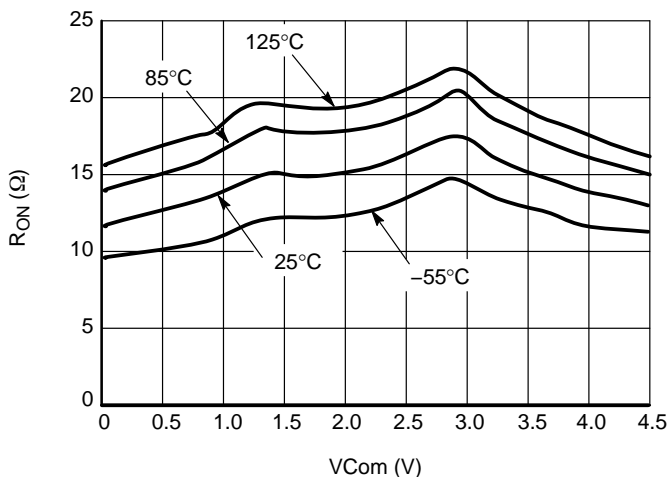


Figure 7. Typical On Resistance
 $V_{CC} = 4.5\text{ V}$, $V_{EE} = 0\text{ V}$

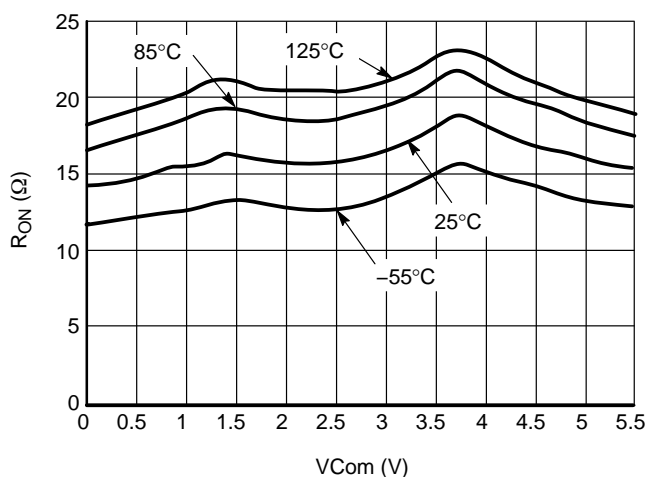


Figure 8. Typical On Resistance
 $V_{CC} = 5.5\text{ V}$, $V_{EE} = 0\text{ V}$

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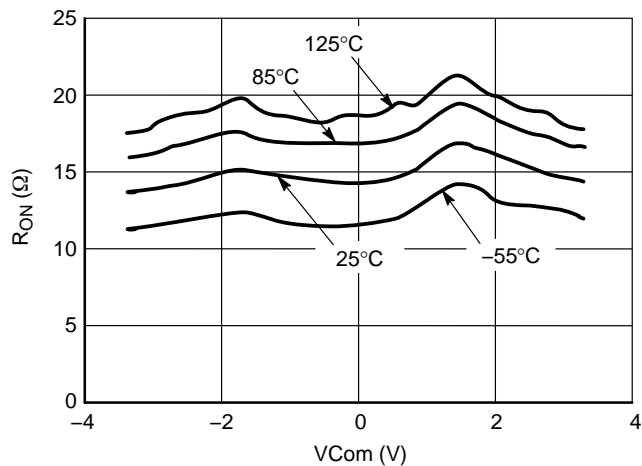


Figure 9. Typical On Resistance
 $V_{CC} = 3.3 \text{ V}, V_{EE} = -3.3 \text{ V}$

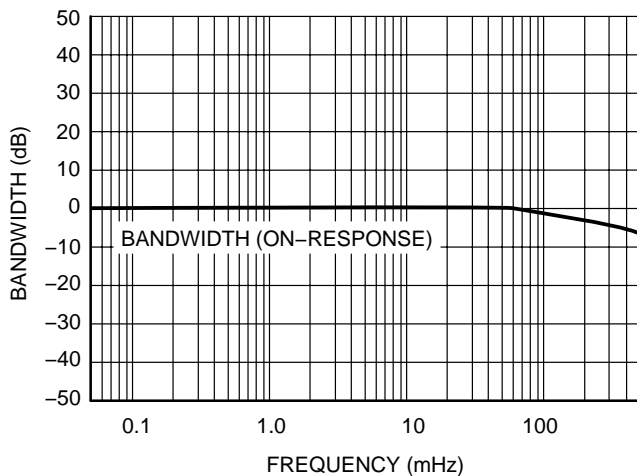


Figure 10. Bandwidth

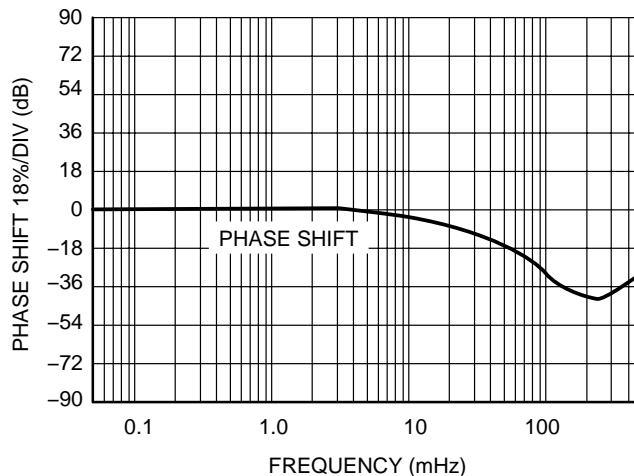


Figure 11. Phase Shift

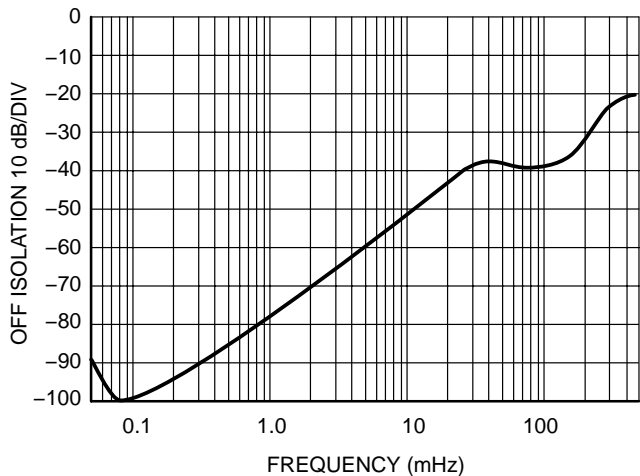


Figure 12. Off Isolation

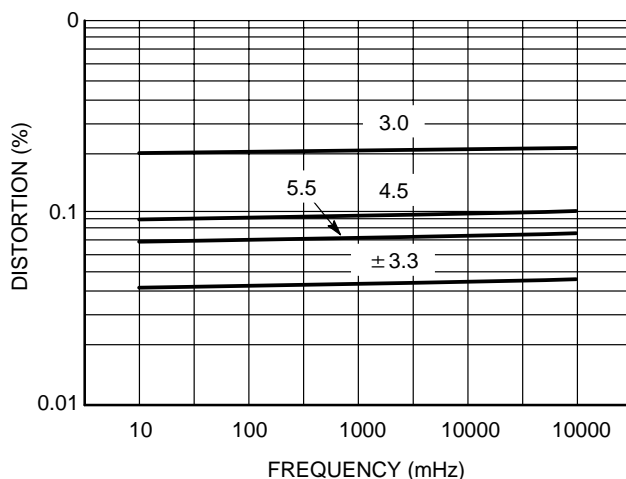


Figure 13. Total Harmonic Distortion

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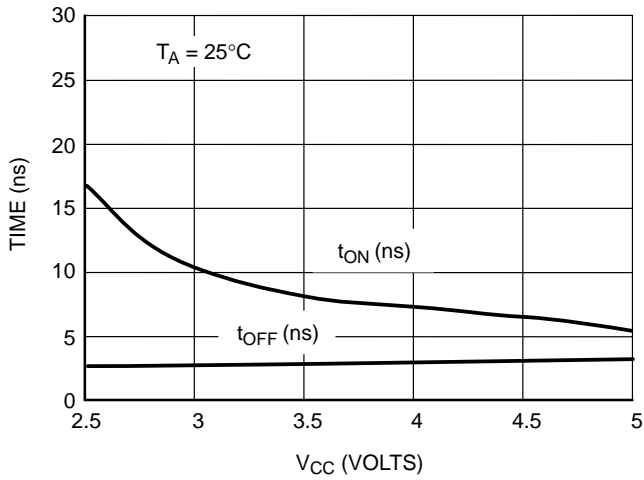


Figure 14. t_{ON} and t_{OFF} versus V_{CC}

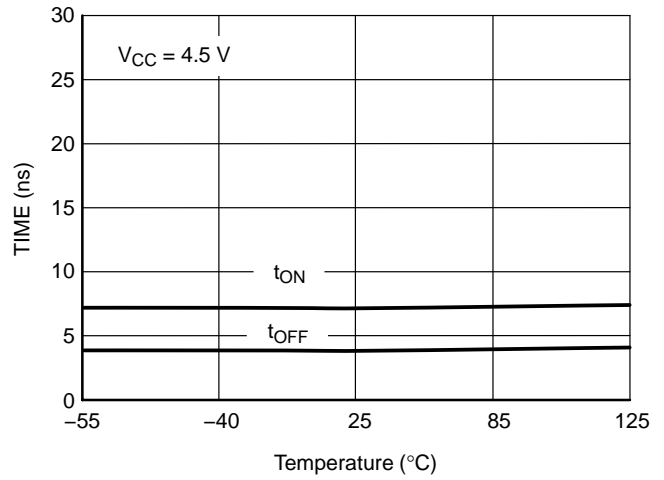


Figure 15. t_{ON} and t_{OFF} versus Temp

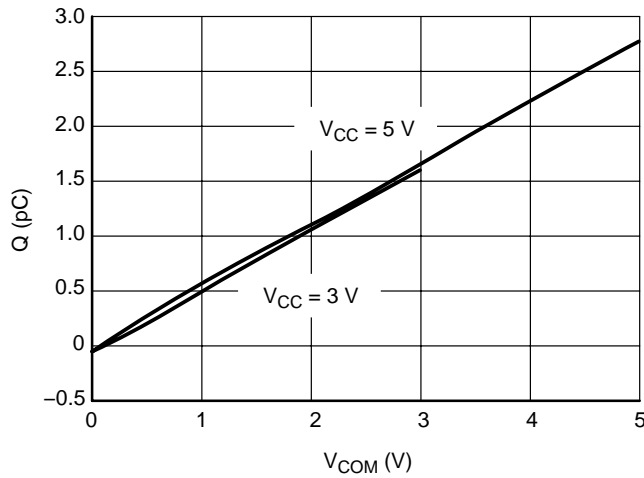


Figure 16. Charge Injection versus COM Voltage

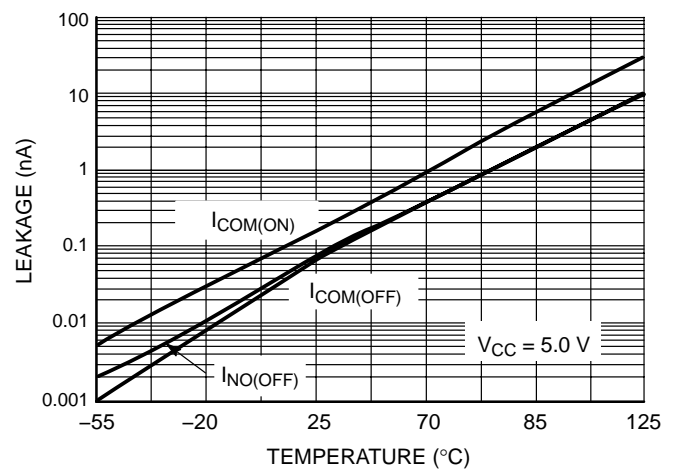


Figure 17. Switch Leakage versus Temperature

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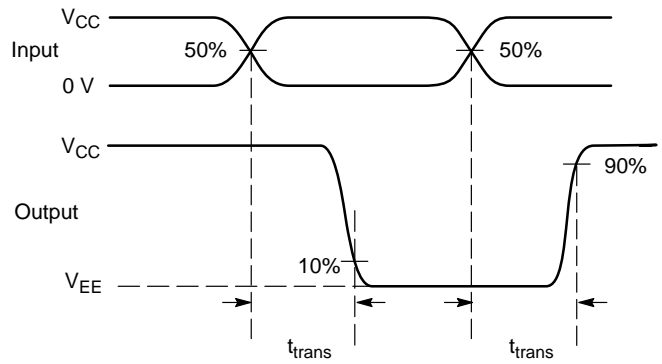
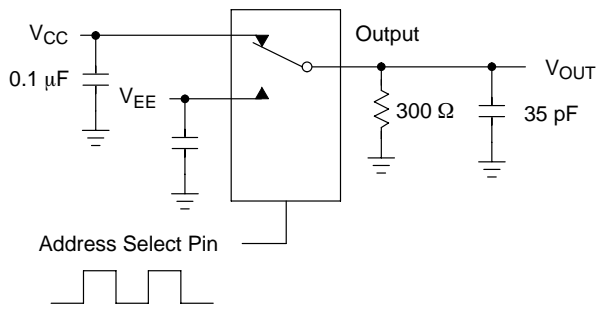


Figure 18. Channel Selection Propagation Delay

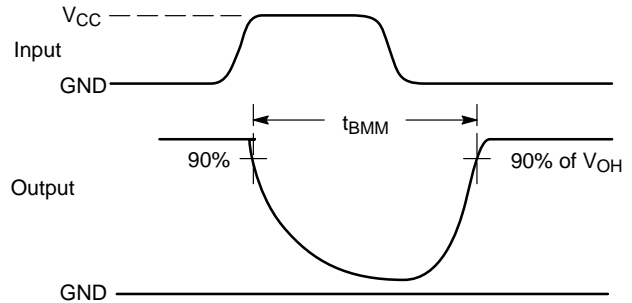
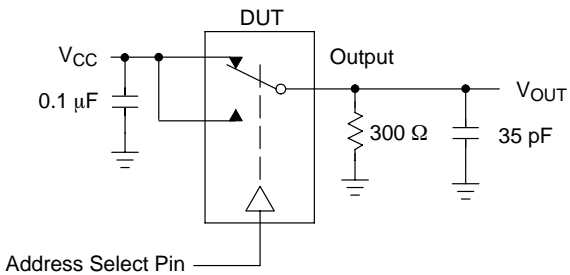


Figure 19. t_{BMM} (Time Break-Before-Make)

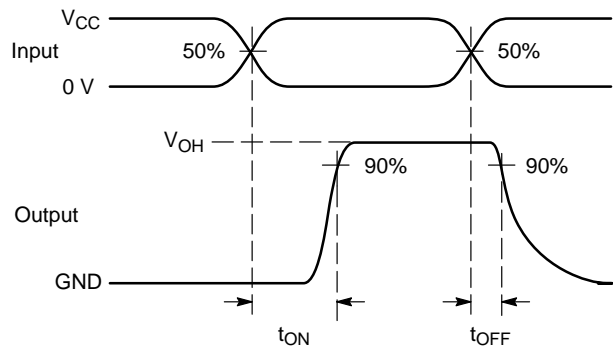
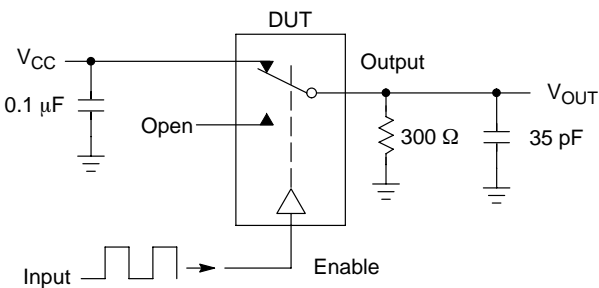


Figure 20. $t_{\text{ON}}/t_{\text{OFF}}$

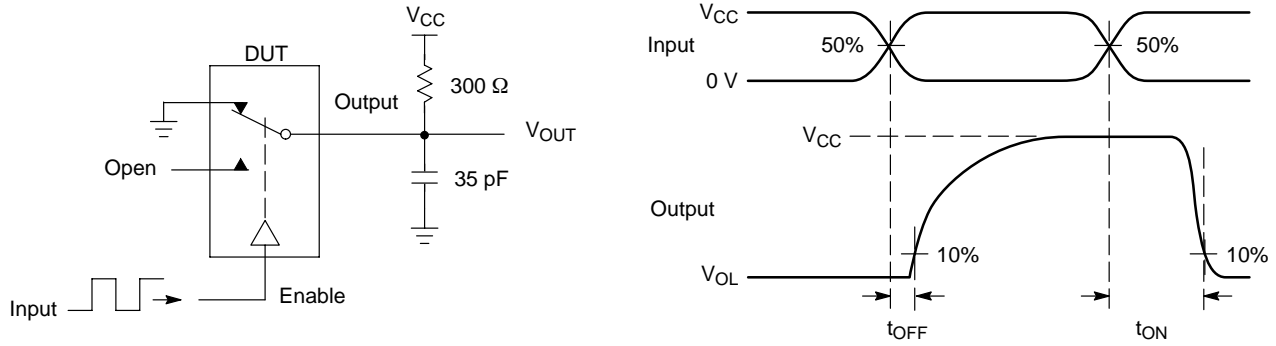
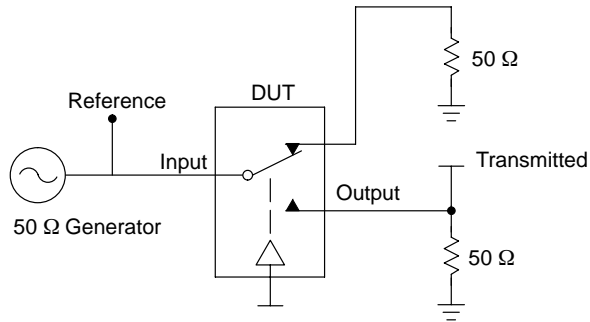


Figure 21. t_{ON}/t_{OFF}



Channel switch Address and Inhibit/s test socket is normalized. Off isolation is measured across an off channel. On loss is the bandwidth of an On switch. V_{ISO} , Bandwidth and V_{ONL} are independent of the input signal direction.

$$V_{ISO} = \text{Off Channel Isolation} = 20 \text{ Log} \left(\frac{V_{OUT}}{V_{IN}} \right) \text{ for } V_{IN} \text{ at } 100 \text{ kHz}$$

$$V_{ONL} = \text{On Channel Loss} = 20 \text{ Log} \left(\frac{V_{OUT}}{V_{IN}} \right) \text{ for } V_{IN} \text{ at } 100 \text{ kHz to } 50 \text{ MHz}$$

Bandwidth (BW) = the frequency 3 dB below V_{ONL}

Figure 22. Off Channel Isolation/On Channel Loss (BW)/Crosstalk (On Channel to Off Channel)/ V_{ONL}

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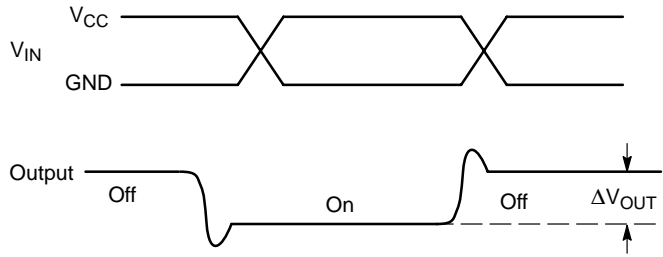
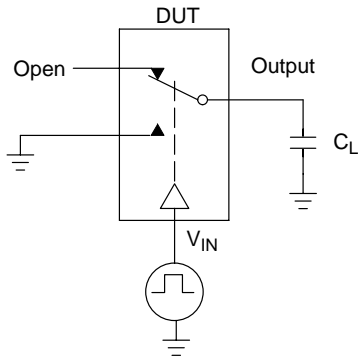


Figure 23. Charge Injection: (Q)

TYPICAL OPERATION

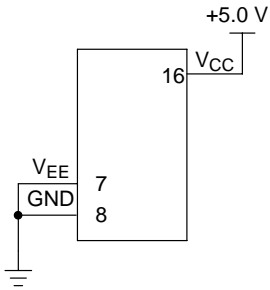


Figure 24. 5.0 Volts Single Supply
 $V_{CC} = 5.0\text{ V}$, $V_{EE} = 0$

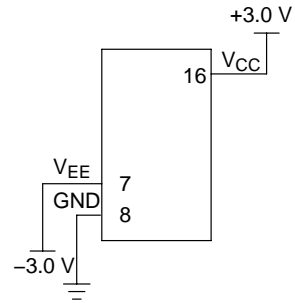


Figure 25. Dual Supply
 $V_{CC} = 3.0\text{ V}$, $V_{EE} = -3.0\text{ V}$

ORDERING INFORMATION

| Device | Package | Shipping† |
|----------------|-----------|------------------|
| NLAST4051DR2 | SOIC-16 | 48 Units / Rail |
| NLAST4051DT | TSSOP-16* | 96 Units / Rail |
| NLAST4051DTR2 | TSSOP-16* | 2500 Tape & Reel |
| NLAST4051DTR2G | TSSOP-16* | 2500 Tape & Reel |
| NLAST4051QSR | SOEIAJ-16 | 2000 Tape & Reel |

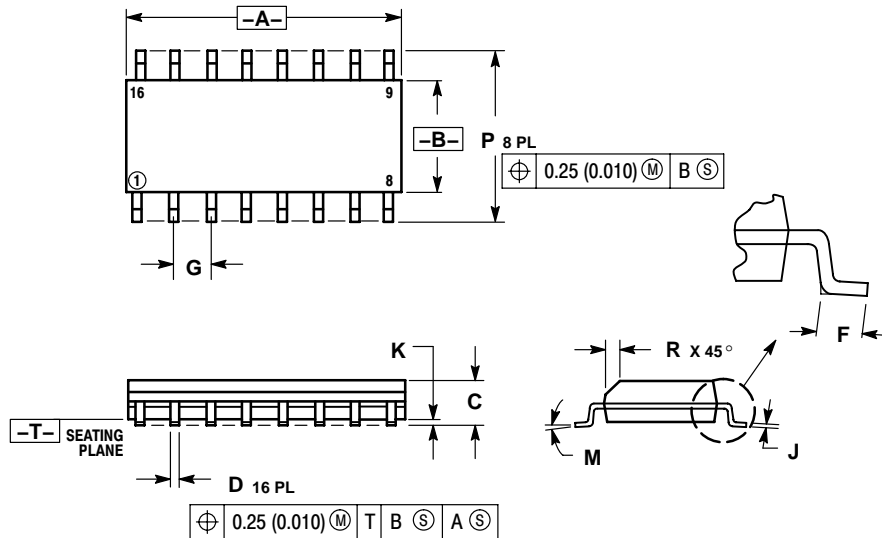
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

*This package is inherently Pb-Free.

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PACKAGE DIMENSIONS

SOIC-16
D SUFFIX
CASE 751B-05
ISSUE J

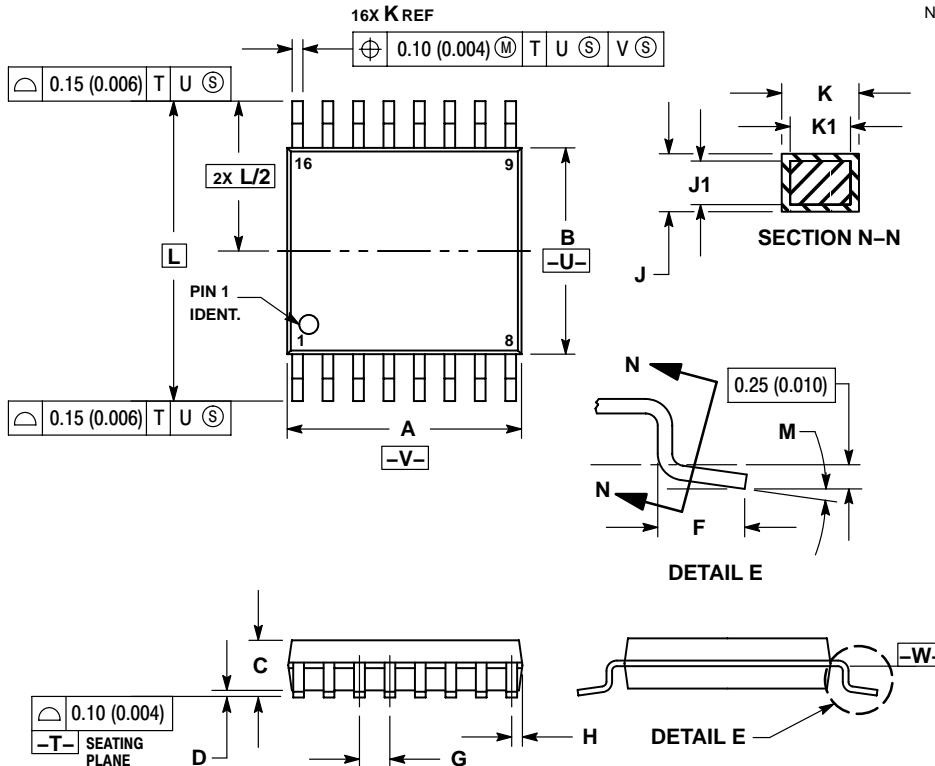


NOTES:

- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- CONTROLLING DIMENSION: MILLIMETER.
- DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
- MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
- DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|-------|-----------|-------|
| | MIN | MAX | MIN | MAX |
| A | 9.80 | 10.00 | 0.386 | 0.393 |
| 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 |

TSSOP-16
DT SUFFIX
CASE 948F-01
ISSUE A



NOTES:

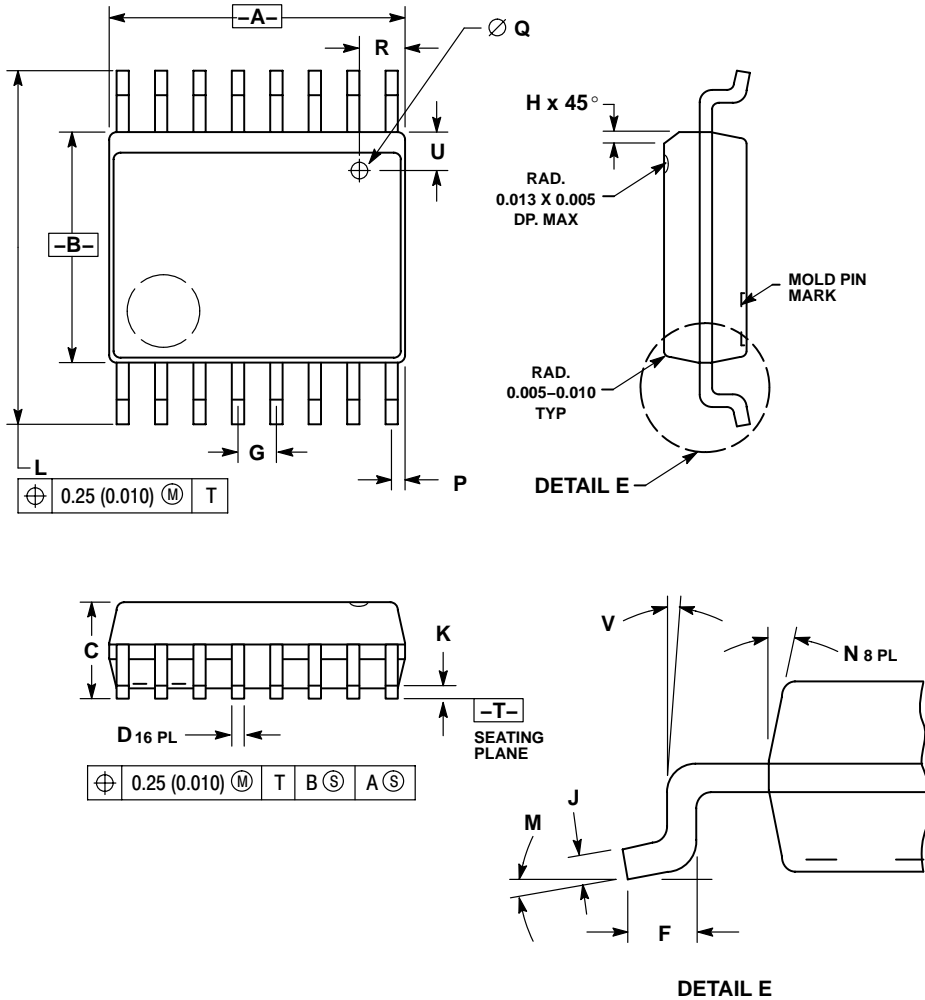
- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- CONTROLLING DIMENSION: MILLIMETER.
- DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
- DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
- DIMENSION K DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE K DIMENSION AT MAXIMUM MATERIAL CONDITION.
- TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
- DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE -W-.

| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|------|-----------|-------|
| | MIN | MAX | MIN | MAX |
| A | 4.90 | 5.10 | 0.193 | 0.200 |
| B | 4.30 | 4.50 | 0.169 | 0.177 |
| C | — | 1.20 | — | 0.047 |
| D | 0.05 | 0.15 | 0.002 | 0.006 |
| F | 0.50 | 0.75 | 0.020 | 0.030 |
| G | 0.65 BSC | | 0.026 BSC | |
| H | 0.18 | 0.28 | 0.007 | 0.011 |
| J | 0.09 | 0.20 | 0.004 | 0.008 |
| J1 | 0.09 | 0.16 | 0.004 | 0.006 |
| K | 0.19 | 0.30 | 0.007 | 0.012 |
| K1 | 0.19 | 0.25 | 0.007 | 0.010 |
| L | 6.40 BSC | | 0.252 BSC | |
| M | 0° | 8° | 0° | 8° |

NLAST4051

PACKAGE DIMENSIONS

QSOP-16
QS SUFFIX
CASE 492-01
ISSUE O



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. THE BOTTOM PACKAGE SHALL BE BIGGER THAN THE TOP PACKAGE BY 4 MILS (NOTE: LEAD SIDE ONLY). BOTTOM PACKAGE DIMENSION SHALL FOLLOW THE DIMENSION STATED IN THIS DRAWING.
4. PLASTIC DIMENSIONS DOES NOT INCLUDE MOLD FLASH OR PROTRUSIONS. MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED 6 MILS PER SIDE.
5. BOTTOM EJECTOR PIN WILL INCLUDE THE COUNTRY OF ORIGIN (COO) AND MOLD CAVITY I.D.

| | | INCHES | | MILLIMETERS | |
|-----|--|-----------|--------|-------------|-------|
| DIM | | MIN | MAX | MIN | MAX |
| A | | 0.189 | 0.196 | 4.80 | 4.98 |
| B | | 0.150 | 0.157 | 3.81 | 3.99 |
| C | | 0.061 | 0.068 | 1.55 | 1.73 |
| D | | 0.008 | 0.012 | 0.20 | 0.31 |
| F | | 0.016 | 0.035 | 0.41 | 0.89 |
| G | | 0.025 BSC | | 0.64 BSC | |
| H | | 0.008 | 0.018 | 0.20 | 0.46 |
| J | | 0.0098 | 0.0075 | 0.249 | 0.191 |
| K | | 0.004 | 0.010 | 0.10 | 0.25 |
| L | | 0.230 | 0.244 | 5.84 | 6.20 |
| M | | 0° | 8° | 0° | 8° |
| N | | 0° | 7° | 0° | 7° |
| P | | 0.007 | 0.011 | 0.18 | 0.28 |
| Q | | 0.020 DIA | | 0.51 DIA | |
| R | | 0.025 | 0.035 | 0.64 | 0.89 |
| U | | 0.025 | 0.035 | 0.64 | 0.89 |
| V | | 0° | 8° | 0° | 8° |

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