

# NL17SG373

## Low-Power D-Type Transparent Latch with 3-State Output

The NL17SG373 MiniGate™ is an advanced high-speed CMOS D-Type Transparent Latch with 3-State Output in ultra-small footprint.

The NL17SG373 input structures provide protection when voltages up to 5.5 V are applied, regardless of the supply voltage.

This device is fully specified for partial power-down applications using I<sub>OFF</sub>. The I<sub>OFF</sub> circuitry disables the output, preventing the damaging backflow current through the device when it is powered down.

### Features

- Wide Operating V<sub>CC</sub> Range: 0.9 V to 3.6 V
- High Speed: t<sub>PD</sub> = 2.4 ns (Typ) @ V<sub>CC</sub> = 3.0 V, C<sub>L</sub> = 15 pF
- Low Power Dissipation: I<sub>CC</sub> = 0.5 μA (Max) at T<sub>A</sub> = 25°C
- 5.5 V Overvoltage Tolerant (OVT) Input Pins
- Ultra-Small Packages
- These Devices are Pb-Free and are RoHS Compliant

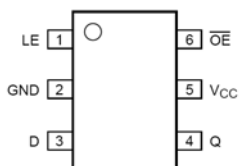


Figure 1. SC88 (Top View)

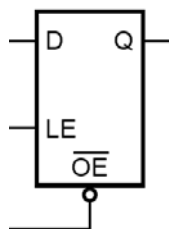


Figure 2. Logic Symbol



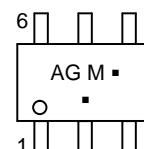
ON Semiconductor®

[www.onsemi.com](http://www.onsemi.com)

### MARKING DIAGRAMS



SC-88  
DF SUFFIX  
CASE 419B



AG = Device Code  
M = Date Code\*  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

\*Date Code orientation and/or position may vary depending upon manufacturing location.

### PIN ASSIGNMENT

| Pin | Function        |
|-----|-----------------|
| 1   | LE              |
| 2   | GND             |
| 3   | D               |
| 4   | Q               |
| 5   | V <sub>CC</sub> |
| 6   | OE              |

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 9 of this data sheet.

# NL17SG373

## FUNCTION TABLE

| Input           |    |   | Internal Latch | Output | Operating Mode                    |
|-----------------|----|---|----------------|--------|-----------------------------------|
| $\overline{OE}$ | LE | D |                | Q      |                                   |
| L               | H  | L | L              | L      | Enable and Read Register          |
| L               | H  | H | H              | H      | (Transparent Mode)                |
| L               | L  | X | L              | L      | Latch and Read Register           |
| L               | L  | X | H              | H      |                                   |
| H               | X  | X | X              | Z      | Latch Register and Disable Output |

## MAXIMUM RATINGS

| Symbol        | Parameter  | Value                  | Unit        |
|---------------|--|------------------------|-------------|
| $V_{CC}$      | DC Supply Voltage  | -0.5 to +5.5           | V           |
| $V_{IN}$      | DC Input Voltage   | -0.5 to +5.5           | V           |
| $V_{OUT}$     | DC Output Voltage  | -0.5 to $V_{CC} + 0.5$ | V           |
| $I_{IK}$      | DC Input Diode Current $V_{IN} < GND$  | -50                    | mA          |
| $I_{OK}$      | DC Output Diode Current $V_{OUT} < GND, V_{OUT} > V_{CC}$                    | $\pm 50$               | mA          |
| $I_O$         | DC Output Source/Sink Current  | $\pm 20$               | mA          |
| $I_{CC}$      | DC Supply Current Per Supply Pin   | $\pm 50$               | mA          |
| $I_{GND}$     | DC Ground Current per Ground Pin   | $\pm 50$               | mA          |
| $T_{STG}$     | Storage Temperature Range  | -65 to +150            | $^{\circ}C$ |
| $T_L$         | Lead Temperature, 1 mm from Case for 10 Seconds                              | 260                    | $^{\circ}C$ |
| $T_J$         | Junction Temperature Under Bias  | 150                    | $^{\circ}C$ |
| MSL           | Moisture Sensitivity   | Level 1                |             |
| $F_R$         | Flammability Rating Oxygen Index: 28 to 34                                   | UL 94 V-0 @ 0.125 in   |             |
| $V_{ESD}$     | ESD Withstand Voltage Human Body Mode (Note 2)<br>Machine Model (Note 3)     | > 3000<br>> 200        | V           |
| $I_{LATCHUP}$ | Latchup Performance Above $V_{CC}$ and Below GND at 125 $^{\circ}C$ (Note 4) | $\pm 100$              | mA          |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Measured with minimum pad spacing on an FR4 board, using 10 mm-by-1 inch, 2 ounce copper trace no air flow.
2. Tested to EIA / JESD22-A114-A.
3. Tested to EIA / JESD22-A115-A.
4. Tested to EIA / JESD78.

## RECOMMENDED OPERATING CONDITIONS

| Symbol                | Parameter   | Min | Max      | Unit        |
|-----------------------|---|-----|----------|-------------|
| $V_{CC}$              | Positive DC Supply Voltage                                    | 0.9 | 3.6      | V           |
| $V_{IN}$              | Digital Input Voltage   | 0   | 3.6      | V           |
| $V_{OUT}$             | Output Voltage Active Mode                                    | 0   | $V_{CC}$ | V           |
| $T_A$                 | Operating Free-Air Temperature                                | -55 | +125     | $^{\circ}C$ |
| $\Delta t / \Delta V$ | Input Transition Rise or Fall Rate $V_{CC} = 3.3 V \pm 0.3 V$ | 0   | 10       | nS/V        |

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

# NL17SG373

## DC ELECTRICAL CHARACTERISTICS

| Symbol          | Parameter                      | Conditions  | V <sub>CC</sub> (V)       | T <sub>A</sub> = 25°C  |                        |                        | T <sub>A</sub> = -55°C to +125°C |                        | Unit |
|-----------------|--------------------------------|---|---------------------------|------------------------|------------------------|------------------------|----------------------------------|------------------------|------|
|                 |                                |   |                           | Min                    | Typ                    | Max                    | Min                              | Max                    |      |
| V <sub>IH</sub> | High-Level Input Voltage       |   | 0.9                       | V <sub>CC</sub>        |                        |                        | V <sub>CC</sub>                  |                        | V    |
|                 |                                |   | 1.1 to 1.3                | 0.7 x V <sub>CC</sub>  |                        |                        | 0.7 x V <sub>CC</sub>            |                        |      |
|                 |                                |   | 1.4 to 1.6                | 0.65 x V <sub>CC</sub> |                        |                        | 0.65 x V <sub>CC</sub>           |                        |      |
|                 |                                |   | 1.65 to 1.95              | 0.65 x V <sub>CC</sub> |                        |                        | 0.65 x V <sub>CC</sub>           |                        |      |
|                 |                                |   | 2.3 to 2.7                | 1.7                    |                        |                        | 1.7                              |                        |      |
|                 |                                |   | 3.0 to 3.6                | 2.0                    |                        |                        | 2.0                              |                        |      |
| V <sub>IL</sub> | Low-Level Input Voltage        |   | 0.9                       |                        |                        | GND                    |                                  | GND                    | V    |
|                 |                                |   | 1.1 to 1.3                |                        |                        | 0.3 x V <sub>CC</sub>  |                                  | 0.3 x V <sub>CC</sub>  |      |
|                 |                                |   | 1.4 to 1.6                |                        |                        | 0.35 x V <sub>CC</sub> |                                  | 0.35 x V <sub>CC</sub> |      |
|                 |                                |   | 1.65 to 1.95              |                        |                        | 0.35 x V <sub>CC</sub> |                                  | 0.35 x V <sub>CC</sub> |      |
|                 |                                |   | 2.3 to 2.7                |                        |                        | 0.7                    |                                  | 0.7                    |      |
|                 |                                |   | 3.0 to 3.6                |                        |                        | 0.8                    |                                  | 0.8                    |      |
| V <sub>OH</sub> | High-Level Output Voltage      | V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                    | I <sub>OH</sub> = -20 μA  | 0.9                    | 0.75                   |                        | 0.75                             |                        | V    |
|                 |                                |   | I <sub>OH</sub> = -0.3 mA | 1.1 to 1.3             | 0.75 x V <sub>CC</sub> |                        | 0.75 x V <sub>CC</sub>           |                        |      |
|                 |                                |   | I <sub>OH</sub> = -1.7 mA | 1.4 to 1.6             | 0.75 x V <sub>CC</sub> |                        | 0.75 x V <sub>CC</sub>           |                        |      |
|                 |                                |   | I <sub>OH</sub> = -3.0 mA | 1.65 to 1.95           | V <sub>CC</sub> - 0.45 |                        | V <sub>CC</sub> - 0.45           |                        |      |
|                 |                                |   | I <sub>OH</sub> = -4.0 mA | 2.3 to 2.7             | 2.0                    |                        | 2.0                              |                        |      |
|                 |                                |   | I <sub>OH</sub> = -8.0 mA | 3.0 to 3.6             | 2.48                   |                        | 2.48                             |                        |      |
| V <sub>OL</sub> | Low-Level Output Voltage       | V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                    | I <sub>OL</sub> = 20 μA   | 0.9                    |                        | 0.1                    |                                  | 0.1                    | V    |
|                 |                                |   | I <sub>OL</sub> = 0.3 mA  | 1.1 to 1.3             |                        | 0.25 x V <sub>CC</sub> |                                  | 0.25 x V <sub>CC</sub> |      |
|                 |                                |   | I <sub>OL</sub> = 1.7 mA  | 1.4 to 1.6             |                        | 0.25 x V <sub>CC</sub> |                                  | 0.25 x V <sub>CC</sub> |      |
|                 |                                |   | I <sub>OL</sub> = 3.0 mA  | 1.65 to 1.95           |                        | 0.45                   |                                  | 0.45                   |      |
|                 |                                |   | I <sub>OL</sub> = 4.0 mA  | 2.3 to 2.7             |                        | 0.4                    |                                  | 0.4                    |      |
|                 |                                |   | I <sub>OL</sub> = 8.0 mA  | 3.0 to 3.6             |                        | 0.4                    |                                  | 0.4                    |      |
| I <sub>IN</sub> | Input Leakage Current          | 0 ≤ V <sub>IN</sub> ≤ 3.6 V   | 0 to 3.6                  |                        |                        | ±0.1                   |                                  | ±0.5                   | μA   |
| I <sub>CC</sub> | Quiescent Supply Current       | V <sub>IN</sub> = V <sub>CC</sub> or GND  | 3.6                       |                        |                        | 0.5                    |                                  | 10                     | μA   |
| I <sub>OZ</sub> | 3-State Output Leakage Current | V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> ;<br>V <sub>OUT</sub> = 0 to 3.6 V | 0.9 to 3.6                |                        |                        | 0.1                    |                                  | 1                      | μA   |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

# NL17SG373

## AC ELECTRICAL CHARACTERISTICS (Input $t_r = t_f = 3.0$ ns)

| Symbol                   | Parameter                     | Test Condition                         | $V_{CC}$ (V) | $T_A = 25^\circ\text{C}$ |      |      | $T_A = -55^\circ\text{C to } +125^\circ\text{C}$ |      | Unit |
|--------------------------|-------------------------------|--|--------------|--------------------------|------|------|--|------|------|
|                          |                               |  |              | Min                      | Typ  | Max  | Min  | Max  |      |
|                          |                               |  |              |                          |      |      |  |      |      |
| $t_{PLH}$ ,<br>$t_{PHL}$ | Propagation Delay,<br>D to Q  | $C_L = 10$ pF,<br>$R_L = 1$ M $\Omega$ | 0.9          | –                        | 15.3 | –    | –  | –    | ns   |
|                          |                               |  | 1.1 to 1.3   | –                        | 6.3  | 12.3 | 1.0  | 14.4 |      |
|                          |                               |  | 1.4 to 1.6   | –                        | 4.4  | 8.1  | 1.0  | 9.4  |      |
|                          |                               |  | 1.65 to 1.95 | –                        | 3.6  | 6.2  | 0.5  | 6.7  |      |
|                          |                               |  | 2.3 to 2.7   | –                        | 2.6  | 3.9  | 0.5  | 4.4  |      |
|                          |                               |  | 3.0 to 3.6   | –                        | 2.1  | 3.1  | 0.5  | 3.7  |      |
|                          |                               | $C_L = 15$ pF,<br>$R_L = 1$ M $\Omega$ | 0.9          | –                        | 17.7 | –    | –  | –    | ns   |
|                          |                               |  | 1.1 to 1.3   | –                        | 7.1  | 13.6 | 1.0  | 15.6 |      |
|                          |                               |  | 1.4 to 1.6   | –                        | 5.0  | 9.2  | 1.0  | 10.4 |      |
|                          |                               |  | 1.65 to 1.95 | –                        | 4.1  | 6.9  | 1.0  | 7.1  |      |
|                          |                               |  | 2.3 to 2.7   | –                        | 2.9  | 4.4  | 0.5  | 5.0  |      |
|                          |                               |  | 3.0 to 3.6   | –                        | 2.4  | 3.4  | 0.5  | 3.9  |      |
|                          |                               | $C_L = 30$ pF,<br>$R_L = 1$ M $\Omega$ | 0.9          | –                        | 29   | –    | –  | –    | ns   |
|                          |                               |  | 1.1 to 1.3   | –                        | 9.3  | 17.3 | 1.0  | 21.2 |      |
|                          |                               |  | 1.4 to 1.6   | –                        | 6.4  | 11.6 | 1.0  | 12.6 |      |
|                          |                               |  | 1.65 to 1.95 | –                        | 5.3  | 9.1  | 1.0  | 9.6  |      |
|                          |                               |  | 2.3 to 2.7   | –                        | 4    | 5.7  | 1.0  | 6.1  |      |
|                          |                               |  | 3.0 to 3.6   | –                        | 3.3  | 4.4  | 1.0  | 4.8  |      |
| $t_{PLH}$ ,<br>$t_{PHL}$ | Propagation Delay,<br>LE to Q | $C_L = 10$ pF,<br>$R_L = 1$ M $\Omega$ | 0.9          | –                        | 15.3 | –    | –  | –    | ns   |
|                          |                               |  | 1.1 to 1.3   | –                        | 6.3  | 12.3 | 1.0  | 14.4 |      |
|                          |                               |  | 1.4 to 1.6   | –                        | 4.4  | 8.1  | 1.0  | 9.4  |      |
|                          |                               |  | 1.65 to 1.95 | –                        | 3.6  | 6.2  | 0.5  | 6.7  |      |
|                          |                               |  | 2.3 to 2.7   | –                        | 2.6  | 3.9  | 0.5  | 4.4  |      |
|                          |                               |  | 3.0 to 3.6   | –                        | 2.1  | 3.1  | 0.5  | 3.7  |      |
|                          |                               | $C_L = 15$ pF,<br>$R_L = 1$ M $\Omega$ | 0.9          | –                        | 17.7 | –    | –  | –    | ns   |
|                          |                               |  | 1.1 to 1.3   | –                        | 7.1  | 13.6 | 1.0  | 15.6 |      |
|                          |                               |  | 1.4 to 1.6   | –                        | 5.0  | 9.2  | 1.0  | 10.4 |      |
|                          |                               |  | 1.65 to 1.95 | –                        | 4.1  | 6.9  | 1.0  | 7.1  |      |
|                          |                               |  | 2.3 to 2.7   | –                        | 2.9  | 4.4  | 0.5  | 5.0  |      |
|                          |                               |  | 3.0 to 3.6   | –                        | 2.4  | 3.4  | 0.5  | 3.9  |      |
|                          |                               | $C_L = 30$ pF,<br>$R_L = 1$ M $\Omega$ | 0.9          | –                        | 29   | –    | –  | –    | ns   |
|                          |                               |  | 1.1 to 1.3   | –                        | 9.3  | 17.3 | 1.0  | 21.2 |      |
|                          |                               |  | 1.4 to 1.6   | –                        | 6.4  | 11.6 | 1.0  | 12.6 |      |
|                          |                               |  | 1.65 to 1.95 | –                        | 5.3  | 9.1  | 1.0  | 9.6  |      |
|                          |                               |  | 2.3 to 2.7   | –                        | 4    | 5.7  | 1.0  | 6.1  |      |
|                          |                               |  | 3.0 to 3.6   | –                        | 3.3  | 4.4  | 1.0  | 4.8  |      |

# NL17SG373

## AC ELECTRICAL CHARACTERISTICS (Input $t_r = t_f = 3.0$ ns)

| Symbol                   | Parameter                       | Test Condition                         | $V_{CC}$ (V) | $T_A = 25^\circ\text{C}$ |      |      | $T_A = -55^\circ\text{C to } +125^\circ\text{C}$ |      | Unit |
|--------------------------|---------------------------------|--|--------------|--------------------------|------|------|--|------|------|
|                          |                                 |  |              | Min                      | Typ  | Max  | Min  | Max  |      |
|                          |                                 |  |              |                          |      |      |  |      |      |
| $t_{pZH}$ ,<br>$t_{pZL}$ | Output Enable<br>Time, OE to Q  | $C_L = 10$ pF,<br>$R_L = 5$ k $\Omega$ | 0.9          | -                        | 18.9 | -    | -  | -    | ns   |
|                          |                                 |  | 1.1 to 1.3   | -                        | 6.0  | 10.2 | 1  | 10.6 |      |
|                          |                                 |  | 1.4 to 1.6   | -                        | 4.5  | 6.5  | 1  | 7.0  |      |
|                          |                                 |  | 1.65 to 1.95 | -                        | 3.9  | 5.4  | 1  | 5.8  |      |
|                          |                                 |  | 2.3 to 2.7   | -                        | 2.5  | 3.5  | 1  | 3.8  |      |
|                          |                                 |  | 3.0 to 3.6   | -                        | 2.1  | 2.7  | 1  | 3    |      |
|                          |                                 | $C_L = 15$ pF,<br>$R_L = 5$ k $\Omega$ | 0.9          | -                        | 22   | -    | -  | -    | ns   |
|                          |                                 |  | 1.1 to 1.3   | -                        | 6.8  | 11.6 | 1  | 12.1 |      |
|                          |                                 |  | 1.4 to 1.6   | -                        | 5.1  | 7.2  | 1  | 7.9  |      |
|                          |                                 |  | 1.65 to 1.95 | -                        | 4.4  | 6.1  | 1  | 6.5  |      |
|                          |                                 |  | 2.3 to 2.7   | -                        | 2.9  | 3.9  | 1  | 4.2  |      |
|                          |                                 |  | 3.0 to 3.6   | -                        | 2.3  | 3    | 1  | 3.3  |      |
|                          |                                 | $C_L = 30$ pF,<br>$R_L = 5$ k $\Omega$ | 0.9          | -                        | 31.8 | -    | -  | -    | ns   |
|                          |                                 |  | 1.1 to 1.3   | -                        | 9.1  | 15.7 | 1  | 16.2 |      |
|                          |                                 |  | 1.4 to 1.6   | -                        | 6.7  | 9.5  | 1  | 10.5 |      |
|                          |                                 |  | 1.65 to 1.95 | -                        | 5.7  | 7.9  | 1  | 8.6  |      |
|                          |                                 |  | 2.3 to 2.7   | -                        | 3.8  | 5    | 1  | 5.5  |      |
|                          |                                 |  | 3.0 to 3.6   | -                        | 2.9  | 3.8  | 1  | 4.2  |      |
| $t_{pHZ}$ ,<br>$t_{pLZ}$ | Output Disable<br>Time, OE to Q | $C_L = 10$ pF,<br>$R_L = 5$ k $\Omega$ | 0.9          | -                        | 11.3 | -    | -  | -    | ns   |
|                          |                                 |  | 1.1 to 1.3   | -                        | 5.3  | 8.3  | 1  | 8.4  |      |
|                          |                                 |  | 1.4 to 1.6   | -                        | 4.1  | 5.8  | 1  | 6.1  |      |
|                          |                                 |  | 1.65 to 1.95 | -                        | 4.2  | 5.7  | 1  | 5.9  |      |
|                          |                                 |  | 2.3 to 2.7   | -                        | 3.0  | 4    | 1  | 4.2  |      |
|                          |                                 |  | 3.0 to 3.6   | -                        | 3.4  | 4.7  | 1  | 5    |      |
|                          |                                 | $C_L = 15$ pF,<br>$R_L = 5$ k $\Omega$ | 0.9          | -                        | 11   | -    | -  | -    | ns   |
|                          |                                 |  | 1.1 to 1.3   | -                        | 5.8  | 8.2  | 1  | 11   |      |
|                          |                                 |  | 1.4 to 1.6   | -                        | 3.9  | 5.9  | 1  | 8    |      |
|                          |                                 |  | 1.65 to 1.95 | -                        | 4.5  | 6.6  | 1  | 7.4  |      |
|                          |                                 |  | 2.3 to 2.7   | -                        | 3.2  | 4.3  | 1  | 5.1  |      |
|                          |                                 |  | 3.0 to 3.6   | -                        | 4.8  | 6.2  | 1  | 6.7  |      |
|                          |                                 | $C_L = 30$ pF,<br>$R_L = 5$ k $\Omega$ | 0.9          | -                        | 17.7 | -    | -  | -    | ns   |
|                          |                                 |  | 1.1 to 1.3   | -                        | 9.9  | 15.7 | 1  | 16   |      |
|                          |                                 |  | 1.4 to 1.6   | -                        | 7.7  | 10.8 | 1  | 11.6 |      |
|                          |                                 |  | 1.65 to 1.95 | -                        | 6    | 12.9 | 1  | 12.9 |      |
|                          |                                 |  | 2.3 to 2.7   | -                        | 5    | 9.1  | 1  | 9.5  |      |
|                          |                                 |  | 3.0 to 3.6   | -                        | 4    | 12.5 | 1  | 13   |      |

# NL17SG373

## AC ELECTRICAL CHARACTERISTICS (Input $t_r = t_f = 3.0$ ns)

| Symbol          | Parameter                              | Test Condition   | V <sub>CC</sub> (V) | T <sub>A</sub> = 25 °C |     |     | T <sub>A</sub> = -55°C to +125°C |     | Unit |
|-----------------|--|--|---------------------|------------------------|-----|-----|----------------------------------|-----|------|
|                 |  |  |                     | Min                    | Typ | Max | Min                              | Max |      |
| C <sub>IN</sub> | Input Capacitance                      |  | 0 to 3.6            |                        | 1.5 | -   | -                                | -   | pF   |
| C <sub>O</sub>  | Output Capacitance                     | V <sub>O</sub> = GND                                   | 0                   |                        | 3   | -   | -                                | -   | pF   |
| C <sub>PD</sub> | Power dissipation Capacitance (Note 5) | f = 10 MHz;<br>V <sub>I</sub> = GND to V <sub>CC</sub> | 0.9                 | -                      | 1.6 | -   | -                                | -   | pF   |
|                 |  |  | 1.1 to 1.3          | -                      | 1.7 | -   | -                                | -   |      |
|                 |  |  | 1.4 to 1.6          | -                      | 1.8 | -   | -                                | -   |      |
|                 |  |  | 1.65 to 1.95        | -                      | 1.9 | -   | -                                | -   |      |
|                 |  |  | 2.3 to 2.7          | -                      | 2.2 | -   | -                                | -   |      |
|                 |  |  | 3.0 to 3.6          | -                      | 2.7 | -   | -                                | -   |      |

5. C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is calculated from the dynamic operating current consumption without load. Average operating current can be obtained by the equation  $I_{CC(OPR)} = C_{PD} \cdot V_{CC} \cdot f_{in} + I_{CC}$ . C<sub>PD</sub> is used to determine the no-load dynamic power consumption:  $P_D = C_{PD} \cdot V_{CC}^2 \cdot f_{in} + I_{CC} \cdot V_{CC}$ .

## TIMING REQUIREMENTS (Input $t_r = t_f = 3.0$ ns; C<sub>L</sub> = 5 pF, 10 pF, 15 pF and 20 pF)

| Symbol          | Parameter            | Test Condition | V <sub>CC</sub> (V) | T <sub>A</sub> = 25 °C |      |     | T <sub>A</sub> = -55°C to +125°C |     | Unit |
|-----------------|----------------------|----------------|---------------------|------------------------|------|-----|----------------------------------|-----|------|
|                 |                      |                |                     | Min                    | Typ  | Max | Min                              | Max |      |
| t <sub>w</sub>  | Pulse Width, LE      | High           | 0.9                 | -                      | 4.0  | -   | -                                | -   | ns   |
|                 |                      |                | 1.1 to 1.3          | -                      | 0.7  | -   | 2.1                              | -   |      |
|                 |                      |                | 1.4 to 1.6          | -                      | 0.5  | -   | 1.3                              | -   |      |
|                 |                      |                | 1.65 to 1.95        | -                      | 0.4  | -   | 1.0                              | -   |      |
|                 |                      |                | 2.3 to 2.7          | -                      | 0.3  | -   | 0.8                              | -   |      |
|                 |                      |                | 3.0 to 3.6          | -                      | 0.2  | -   | 0.8                              | -   |      |
| t <sub>SU</sub> | Set-Up Time, D to LE | High or Low    | 0.9                 | -                      | 2.1  | -   | -                                | -   | ns   |
|                 |                      |                | 1.1 to 1.3          | -                      | 0.5  | -   | 2.7                              | -   |      |
|                 |                      |                | 1.4 to 1.6          | -                      | 0.3  | -   | 1.5                              | -   |      |
|                 |                      |                | 1.65 to 1.95        | -                      | 0.3  | -   | 1.2                              | -   |      |
|                 |                      |                | 2.3 to 2.7          | -                      | 0.2  | -   | 0.9                              | -   |      |
|                 |                      |                | 3.0 to 3.6          | -                      | 0.2  | -   | 0.7                              | -   |      |
| t <sub>H</sub>  | Hold Time D to LE    | High or Low    | 0.9                 | -                      | -2.8 | -   | -                                | -   | ns   |
|                 |                      |                | 1.1 to 1.3          | -                      | -0.7 | -   | -0.1                             | -   |      |
|                 |                      |                | 1.4 to 1.6          | -                      | -0.4 | -   | -0.1                             | -   |      |
|                 |                      |                | 1.65 to 1.95        | -                      | -0.4 | -   | 0                                | -   |      |
|                 |                      |                | 2.3 to 2.7          | -                      | -0.3 | -   | 0.2                              | -   |      |
|                 |                      |                | 3.0 to 3.6          | -                      | -0.4 | -   | 0.3                              | -   |      |

# NL17SG373

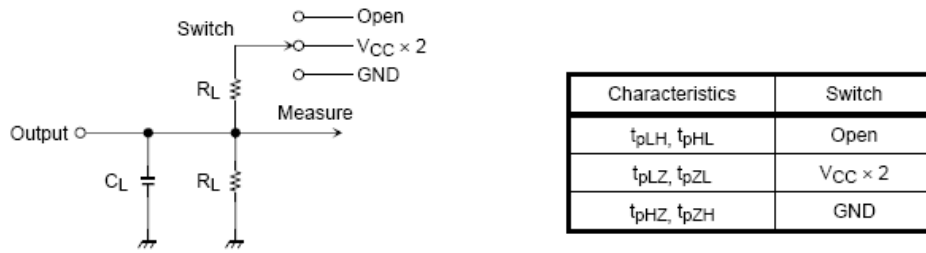
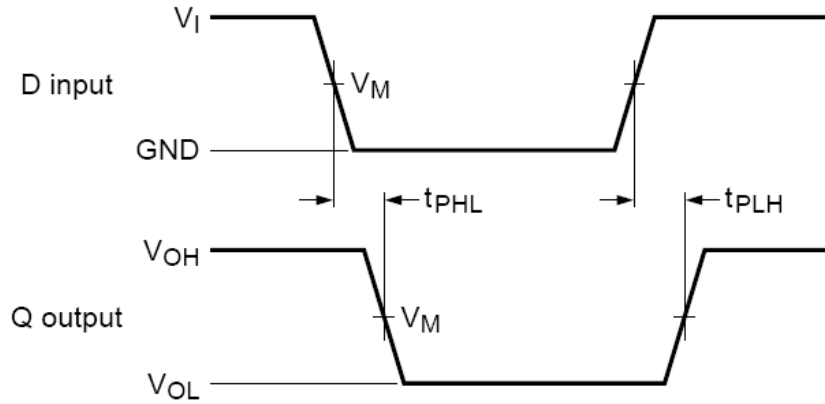
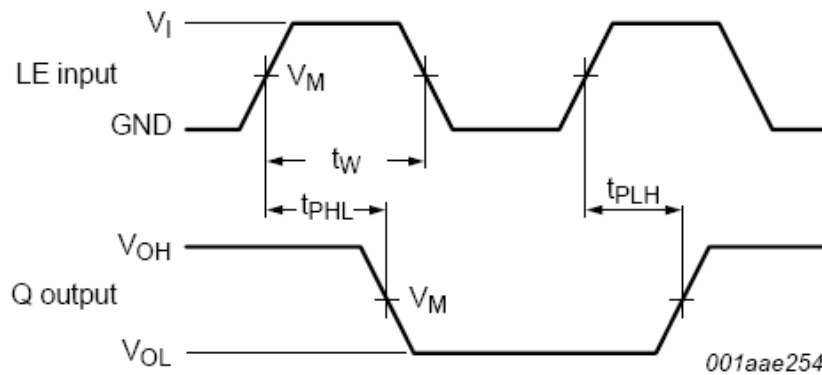


Figure 3. Test Circuit



Logic levels:  $V_{OL}$  and  $V_{OH}$  are typical output voltage levels that occur with the output load.

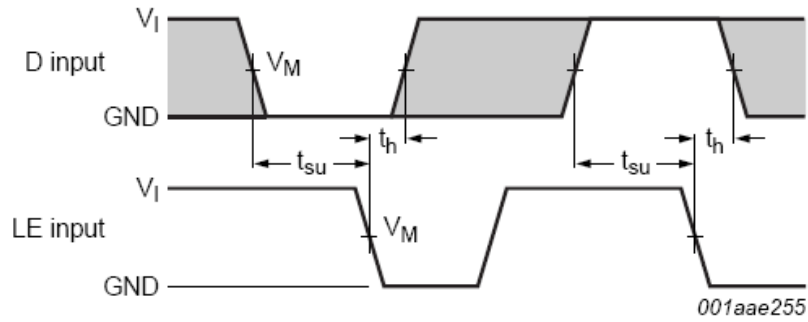
Figure 4.  $t_{pLH}$ ,  $t_{pHL}$  Waveforms (D to Q)



Logic levels:  $V_{OL}$  and  $V_{OH}$  are typical output voltage levels that occur with the output load.

Figure 5.  $t_{pLH}$ ,  $t_{pHL}$ ,  $t_w$  Waveforms (LE to Q)

# NL17SG373

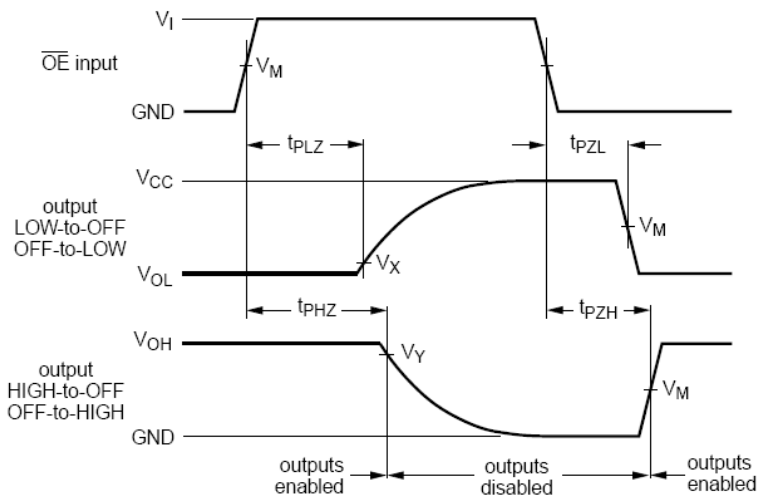


Logic levels:  $V_{OL}$  and  $V_{OH}$  are typical output voltage levels that occur with the output load.

**Figure 6.  $t_{SU}$ ,  $t_H$  Waveforms (D to LE)**

## MEASUREMENT POINTS FOR FIGURES 4, 5 AND 6

| Supply Voltage | Input               |          |               | Output              |
|----------------|---------------------|----------|---------------|---------------------|
| $V_{CC}$       | $V_M$               | $V_I$    | $t_r = t_f$   | $V_M$               |
| 0.9 V to 3.6 V | $0.5 \times V_{CC}$ | $V_{CC}$ | $\leq 3.0$ ns | $0.5 \times V_{CC}$ |



Logic levels:  $V_{OL}$  and  $V_{OH}$  are typical output voltage levels that occur with the output load.

**Figure 7.  $t_{PLZ}$ ,  $t_{PHZ}$ ,  $t_{PZH}$ ,  $t_{PZL}$  Waveforms ( $\overline{OE}$  to Q)**

## MEASUREMENT POINTS FOR FIGURE 7

| Supply Voltage   | Input               |          |               | Output              |                   |                   |
|------------------|---------------------|----------|---------------|---------------------|-------------------|-------------------|
| $V_{CC}$         | $V_M$               | $V_I$    | $t_r = t_f$   | $V_M$               | $V_X$             | $V_Y$             |
| 0.9 V            | $0.5 \times V_{CC}$ | $V_{CC}$ | $\leq 3.0$ ns | $0.5 \times V_{CC}$ | $V_{OL} + 0.1$ V  | $V_{OH} - 0.1$ V  |
| 1.1 V to 1.3 V   | $0.5 \times V_{CC}$ | $V_{CC}$ | $\leq 3.0$ ns | $0.5 \times V_{CC}$ | $V_{OL} + 0.1$ V  | $V_{OH} - 0.1$ V  |
| 1.4 V to 1.6 V   | $0.5 \times V_{CC}$ | $V_{CC}$ | $\leq 3.0$ ns | $0.5 \times V_{CC}$ | $V_{OL} + 0.1$ V  | $V_{OH} - 0.1$ V  |
| 1.65 V to 1.95 V | $0.5 \times V_{CC}$ | $V_{CC}$ | $\leq 3.0$ ns | $0.5 \times V_{CC}$ | $V_{OL} + 0.15$ V | $V_{OH} - 0.15$ V |
| 2.3 V to 2.7 V   | $0.5 \times V_{CC}$ | $V_{CC}$ | $\leq 3.0$ ns | $0.5 \times V_{CC}$ | $V_{OL} + 0.15$ V | $V_{OH} - 0.15$ V |
| 3.0 V to 3.6 V   | $0.5 \times V_{CC}$ | $V_{CC}$ | $\leq 3.0$ ns | $0.5 \times V_{CC}$ | $V_{OL} + 0.3$ V  | $V_{OH} - 0.3$ V  |



# NL17SG373

## ORDERING INFORMATION

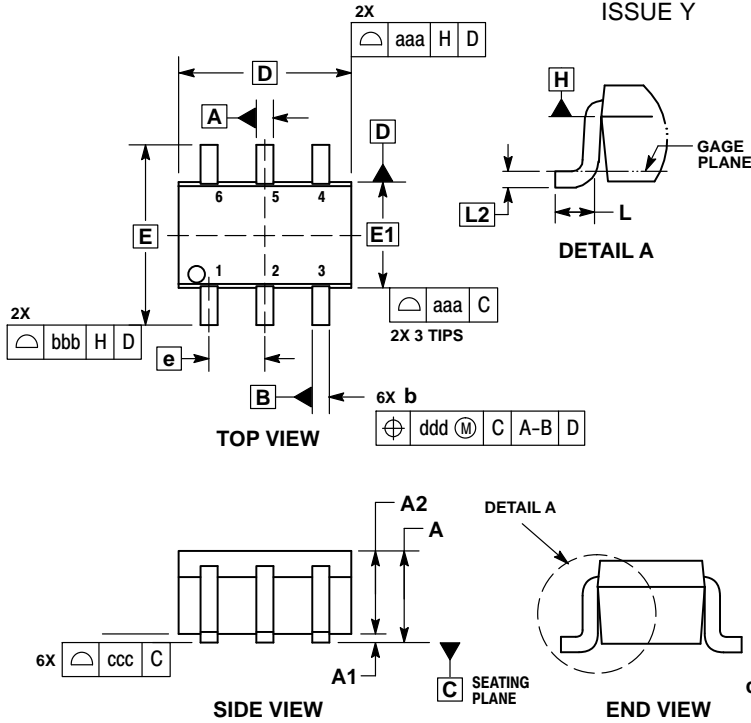
| Device         | Package                                | Shipping†          |
|----------------|--|--------------------|
| NL17SG373DFT2G | SC-88 / SOT-363 / SC-70-6<br>(Pb-Free) | 3000 / Tape & Reel |

†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.

# NL17SG373

## PACKAGE DIMENSIONS

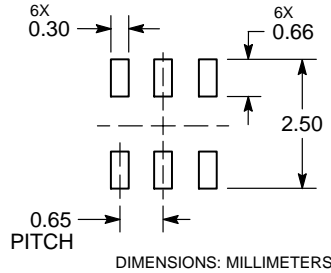
SC-88/SC70-6/SOT-363  
CASE 419B-02  
ISSUE Y



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
  2. CONTROLLING DIMENSION: MILLIMETERS.
  3. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.20 PER END.
  4. DIMENSIONS D AND E1 AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY AND DATUM H.
  5. DATUMS A AND B ARE DETERMINED AT DATUM H.
  6. DIMENSIONS b AND c APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN 0.08 AND 0.15 FROM THE TIP.
  7. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 TOTAL IN EXCESS OF DIMENSION b AT MAXIMUM MATERIAL CONDITION. THE DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OF THE FOOT.

| DIM | MILLIMETERS |      |      | INCHES    |       |       |
|-----|-------------|------|------|-----------|-------|-------|
|     | MIN         | NOM  | MAX  | MIN       | NOM   | MAX   |
| A   | ---         | ---  | 1.10 | ---       | ---   | 0.043 |
| A1  | 0.00        | ---  | 0.10 | 0.000     | ---   | 0.004 |
| A2  | 0.70        | 0.90 | 1.00 | 0.027     | 0.035 | 0.039 |
| b   | 0.15        | 0.20 | 0.25 | 0.006     | 0.008 | 0.010 |
| C   | 0.08        | 0.15 | 0.22 | 0.003     | 0.006 | 0.009 |
| D   | 1.80        | 2.00 | 2.20 | 0.070     | 0.078 | 0.086 |
| E   | 2.00        | 2.10 | 2.20 | 0.078     | 0.082 | 0.086 |
| E1  | 1.15        | 1.25 | 1.35 | 0.045     | 0.049 | 0.053 |
| e   | 0.65 BSC    |      |      | 0.026 BSC |       |       |
| L   | 0.26        | 0.36 | 0.46 | 0.010     | 0.014 | 0.018 |
| L2  | 0.15 BSC    |      |      | 0.006 BSC |       |       |
| aaa | 0.15        |      |      | 0.006     |       |       |
| bbb | 0.30        |      |      | 0.012     |       |       |
| ccc | 0.10        |      |      | 0.004     |       |       |
| ddd | 0.10        |      |      | 0.004     |       |       |

### RECOMMENDED SOLDERING FOOTPRINT\*



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

MiniGate is a trademark of Semiconductor Components Industries, LLC (SCILLC).

ON Semiconductor and are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marketing.pdf](http://www.onsemi.com/site/pdf/Patent-Marketing.pdf). ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

### PUBLICATION ORDERING INFORMATION

**LITERATURE FULFILLMENT:**  
Literature Distribution Center for ON Semiconductor  
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA  
**Phone:** 303-675-2175 or 800-344-3860 Toll Free USA/Canada  
**Fax:** 303-675-2176 or 800-344-3867 Toll Free USA/Canada  
**Email:** [orderlit@onsemi.com](mailto:orderlit@onsemi.com)

**N. American Technical Support:** 800-282-9855 Toll Free  
USA/Canada  
**Europe, Middle East and Africa Technical Support:**  
Phone: 421 33 790 2910

**ON Semiconductor Website:** [www.onsemi.com](http://www.onsemi.com)  
**Order Literature:** <http://www.onsemi.com/orderlit>

For additional information, please contact your local Sales Representative