



## 74ACT373

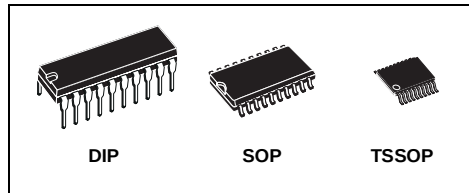
### OCTAL D-TYPE LATCH WITH 3 STATE OUTPUTS (NON INVERTED)

- HIGH SPEED:  $t_{PD} = 6\text{ns}$  (TYP.) at  $V_{CC} = 5\text{V}$
- LOW POWER DISSIPATION:  
 $I_{CC} = 4\mu\text{A}$  (MAX.) at  $T_A = 25^\circ\text{C}$
- COMPATIBLE WITH TTL OUTPUTS  
 $V_{IH} = 2\text{V}$  (MIN.),  $V_{IL} = 0.8\text{V}$  (MAX.)
- $50\Omega$  TRANSMISSION LINE DRIVING CAPABILITY
- SYMMETRICAL OUTPUT IMPEDANCE:  
 $|I_{OH}| = I_{OL} = 24\text{mA}$  (MIN)
- BALANCED PROPAGATION DELAYS:  
 $t_{PLH} \equiv t_{PHL}$
- OPERATING VOLTAGE RANGE:  
 $V_{CC}$  (OPR) = 4.5V to 5.5V
- PIN AND FUNCTION COMPATIBLE WITH 74 SERIES 373
- IMPROVED LATCH-UP IMMUNITY

#### DESCRIPTION

The 74ACT373 is a high-speed CMOS OCTAL D-TYPE LATCH with 3 STATE OUTPUT NON INVERTING fabricated with sub-micron silicon gate and double-layer metal wiring C<sup>2</sup>MOS technology.

These 8 bit D-Type latch are controlled by a latch enable input (LE) and an output enable input ( $\overline{OE}$ ). When the (LE) input is high, the Q outputs follow the data (D) inputs. When the (LE) is taken low, the Q outputs will be latched at the logic levels set



#### ORDER CODES

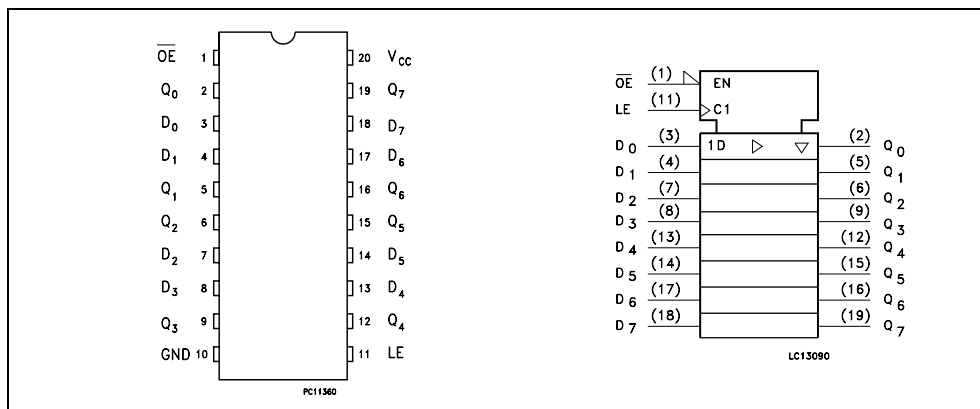
| PACKAGE | TUBE      | T & R       |
|---------|-----------|-------------|
| DIP     | 74ACT373B |             |
| SOP     | 74ACT373M | 74ACT373MTR |
| TSSOP   |           | 74ACT373TTR |

up at the D inputs. When the ( $\overline{OE}$ ) input is low, the 8 outputs will be in a normal logic state (high or low logic level); when the ( $\overline{OE}$ ) input is high, the outputs will be in a high impedance state.

This device is designed to interface directly High Speed CMOS systems with TTL and NMOS components.

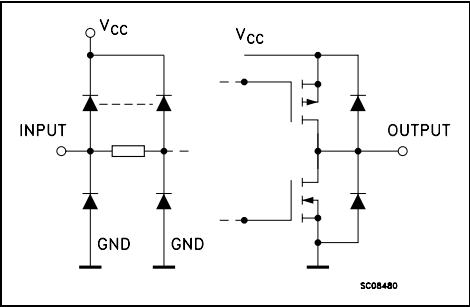
All inputs and outputs are equipped with protection circuits against static discharge, giving them 2KV ESD immunity and transient excess voltage.

#### PIN CONNECTION AND IEC LOGIC SYMBOLS



74ACT373

INPUT AND OUTPUT EQUIVALENT CIRCUIT



PIN DESCRIPTION

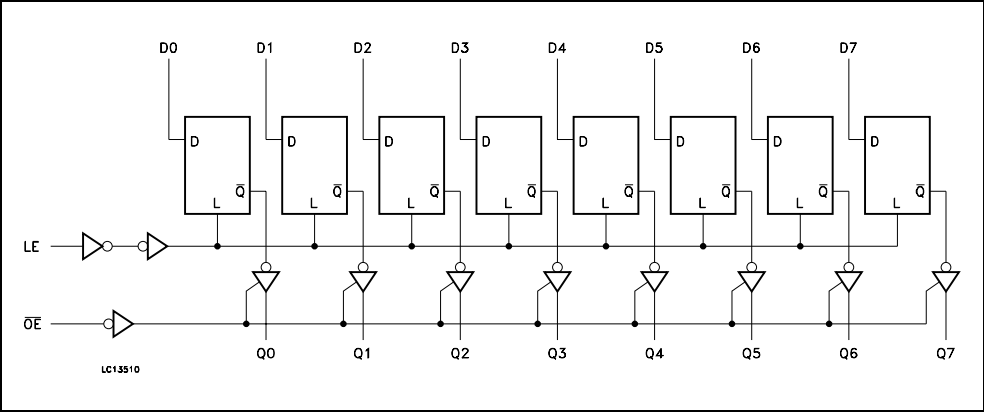
| PIN No                     | SYMBOL          | NAME AND FUNCTION                        |
|----------------------------|-----------------|------------------------------------------|
| 1                          | OE              | 3 state Output Enable Input (Active LOW) |
| 2, 5, 6, 9, 12, 15, 16, 19 | Q0 to Q7        | 3-State Outputs                          |
| 3, 4, 7, 8, 13, 14, 17, 18 | D0 to D7        | Data Inputs                              |
| 11                         | LE              | Latch Enable Input                       |
| 10                         | GND             | Ground (0V)                              |
| 20                         | V <sub>CC</sub> | Positive Supply Voltage                  |

TRUTH TABLE

| INPUTS |    |   | OUTPUT    |
|--------|----|---|-----------|
| OE     | LE | D | Q         |
| H      | X  | X | Z         |
| L      | L  | X | NO CHANGE |
| L      | H  | L | L         |
| L      | H  | H | H         |

X : Don't care  
Z : High Impedance  
NOTE: Outputs are latched at the time when the input is taken LOW logic level

LOGIC DIAGRAM



This logic diagram has not be used to estimate propagation delays

**ABSOLUTE MAXIMUM RATINGS**

| Symbol                | Parameter                     | Value                  | Unit |
|-----------------------|-------------------------------|------------------------|------|
| $V_{CC}$              | Supply Voltage                | -0.5 to +7             | V    |
| $V_I$                 | DC Input Voltage              | -0.5 to $V_{CC} + 0.5$ | V    |
| $V_O$                 | DC Output Voltage             | -0.5 to $V_{CC} + 0.5$ | V    |
| $I_{IK}$              | DC Input Diode Current        | $\pm 20$               | mA   |
| $I_{OK}$              | DC Output Diode Current       | $\pm 20$               | mA   |
| $I_O$                 | DC Output Current             | $\pm 50$               | mA   |
| $I_{CC}$ or $I_{GND}$ | DC $V_{CC}$ or Ground Current | $\pm 400$              | mA   |
| $T_{stg}$             | Storage Temperature           | -65 to +150            | °C   |
| $T_L$                 | Lead Temperature (10 sec)     | 300                    | °C   |

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied.

**RECOMMENDED OPERATING CONDITIONS**

| Symbol   | Parameter                                                | Value         | Unit |
|----------|----------------------------------------------------------|---------------|------|
| $V_{CC}$ | Supply Voltage                                           | 4.5 to 5.5    | V    |
| $V_I$    | Input Voltage                                            | 0 to $V_{CC}$ | V    |
| $V_O$    | Output Voltage                                           | 0 to $V_{CC}$ | V    |
| $T_{op}$ | Operating Temperature                                    | -55 to 125    | °C   |
| dt/dv    | Input Rise and Fall Time $V_{CC} = 4.5$ to 5.5V (note 1) | 8             | ns/V |

1)  $V_{IN}$  from 0.8V to 2.0V

## 74ACT373

### DC SPECIFICATIONS

| Symbol           | Parameter                                   | Test Condition         |                                                                                                | Value                 |       |       |             |      |              | Unit |      |
|------------------|---------------------------------------------|------------------------|------------------------------------------------------------------------------------------------|-----------------------|-------|-------|-------------|------|--------------|------|------|
|                  |                                             | V <sub>CC</sub><br>(V) |                                                                                                | T <sub>A</sub> = 25°C |       |       | -40 to 85°C |      | -55 to 125°C |      |      |
|                  |                                             |                        |                                                                                                | Min.                  | Typ.  | Max.  | Min.        | Max. | Min.         |      | Max. |
| V <sub>IH</sub>  | High Level Input Voltage                    | 4.5                    | V <sub>O</sub> = 0.1 V or<br>V <sub>CC</sub> -0.1V                                             | 2.0                   | 1.5   |       | 2.0         |      | 2.0          |      | V    |
|                  |                                             | 5.5                    |                                                                                                | 2.0                   | 1.5   |       | 2.0         |      | 2.0          |      |      |
| V <sub>IL</sub>  | Low Level Input Voltage                     | 4.5                    | V <sub>O</sub> = 0.1 V or<br>V <sub>CC</sub> -0.1V                                             |                       | 1.5   | 0.8   |             | 0.8  |              | 0.8  | V    |
|                  |                                             | 5.5                    |                                                                                                |                       | 1.5   | 0.8   |             | 0.8  |              | 0.8  |      |
| V <sub>OH</sub>  | High Level Output Voltage                   | 4.5                    | I <sub>O</sub> =-50 µA                                                                         | 4.4                   | 4.49  |       | 4.4         |      | 4.4          |      | V    |
|                  |                                             | 5.5                    | I <sub>O</sub> =-50 µA                                                                         | 5.4                   | 5.49  |       | 5.4         |      | 5.4          |      |      |
|                  |                                             | 4.5                    | I <sub>O</sub> =-24 mA                                                                         | 3.86                  |       |       | 3.76        |      | 3.7          |      |      |
|                  |                                             | 5.5                    | I <sub>O</sub> =-24 mA                                                                         | 4.86                  |       |       | 4.76        |      | 4.7          |      |      |
| V <sub>OL</sub>  | Low Level Output Voltage                    | 4.5                    | I <sub>O</sub> =50 µA                                                                          |                       | 0.001 | 0.1   |             | 0.1  |              | 0.1  | V    |
|                  |                                             | 5.5                    | I <sub>O</sub> =50 µA                                                                          |                       | 0.001 | 0.1   |             | 0.1  |              | 0.1  |      |
|                  |                                             | 4.5                    | I <sub>O</sub> =24 mA                                                                          |                       |       | 0.36  |             | 0.44 |              | 0.5  |      |
|                  |                                             | 5.5                    | I <sub>O</sub> =24 mA                                                                          |                       |       | 0.36  |             | 0.44 |              | 0.5  |      |
| I <sub>I</sub>   | Input Leakage Cur-<br>rent                  | 5.5                    | V <sub>I</sub> = V <sub>CC</sub> or GND                                                        |                       |       | ± 0.1 |             | ± 1  |              | ± 1  | µA   |
| I <sub>OZ</sub>  | High Impedance<br>Output Leakege<br>Current | 5.5                    | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub><br>V <sub>O</sub> = V <sub>CC</sub> or GND |                       |       | ± 0.5 |             | ± 5  |              | ± 5  | µA   |
| I <sub>CCT</sub> | Max I <sub>CC</sub> /Input                  | 5.5                    | V <sub>I</sub> = V <sub>CC</sub> - 2.1V                                                        |                       | 0.6   |       |             | 1.5  |              | 1.6  | mA   |
| I <sub>CC</sub>  | Quiescent Supply<br>Current                 | 5.5                    | V <sub>I</sub> = V <sub>CC</sub> or GND                                                        |                       |       | 4     |             | 40   |              | 80   | µA   |
| I <sub>OLD</sub> | Dynamic Output<br>Current (note 1, 2)       | 5.5                    | V <sub>OLD</sub> = 1.65 V max                                                                  |                       |       |       |             | 75   |              | 50   | mA   |
| I <sub>OHD</sub> |                                             |                        | V <sub>OHD</sub> = 3.85 V min                                                                  |                       |       |       |             | -75  |              | -50  | mA   |

1) Maximum test duration 2ms, one output loaded at time

2) Incident wave switching is guaranteed on transmission lines with impedances as low as 50Ω

### AC ELECTRICAL CHARACTERISTICS (C<sub>L</sub> = 50 pF, R<sub>L</sub> = 500 Ω, Input t<sub>r</sub> = t<sub>f</sub> = 3ns)

| Symbol                            | Parameter                       | Test Condition         |  | Value                 |      |      |             |      |              | Unit |      |
|-----------------------------------|---------------------------------|------------------------|--|-----------------------|------|------|-------------|------|--------------|------|------|
|                                   |                                 | V <sub>CC</sub><br>(V) |  | T <sub>A</sub> = 25°C |      |      | -40 to 85°C |      | -55 to 125°C |      |      |
|                                   |                                 |                        |  | Min.                  | Typ. | Max. | Min.        | Max. | Min.         |      | Max. |
| t <sub>PLH</sub> t <sub>PHL</sub> | Propagation Delay Time LE to Q  | 5.0 <sup>(*)</sup>     |  |                       | 5.5  | 10.0 |             | 11.5 |              | 11.5 | ns   |
| t <sub>PLH</sub> t <sub>PHL</sub> | Propagation Delay Time D to Q   | 5.0 <sup>(*)</sup>     |  |                       | 6.0  | 10.0 |             | 11.5 |              | 11.5 | ns   |
| t <sub>PZL</sub> t <sub>PZH</sub> | Output Enable Time              | 5.0 <sup>(*)</sup>     |  |                       | 6.0  | 9.5  |             | 10.5 |              | 10.5 | ns   |
| t <sub>PLZ</sub> t <sub>PHZ</sub> | Output Disable Time             | 5.0 <sup>(*)</sup>     |  |                       | 7.0  | 11.0 |             | 12.5 |              | 12.5 | ns   |
| t <sub>W</sub>                    | LE Minimum Pulse Width, HIGH    | 5.0 <sup>(*)</sup>     |  |                       | 1.3  | 7.0  |             | 8.0  |              | 8.0  | ns   |
| t <sub>s</sub>                    | Setup Time D to LE, HIGH or LOW | 5.0 <sup>(*)</sup>     |  |                       | -0.5 | 7.0  |             | 8.0  |              | 8.0  | ns   |
| t <sub>h</sub>                    | Hold Time D to LE, HIGH or LOW  | 5.0 <sup>(*)</sup>     |  |                       | 0.5  | 0.0  |             | 1.0  |              | 1.0  | ns   |

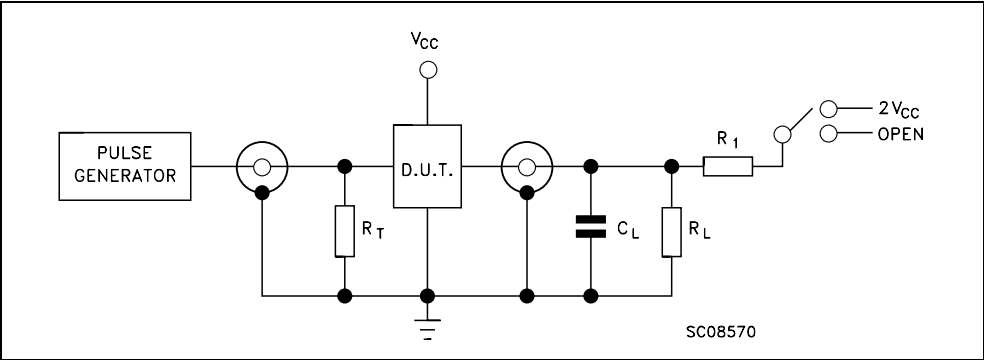
(\*) Voltage range is 5.0V ± 0.5V

CAPACITIVE CHARACTERISTICS

| Symbol           | Parameter                              | Test Condition         |                         | Value                 |      |      |             |      |              | Unit |      |
|------------------|----------------------------------------|------------------------|-------------------------|-----------------------|------|------|-------------|------|--------------|------|------|
|                  |                                        | V <sub>CC</sub><br>(V) |                         | T <sub>A</sub> = 25°C |      |      | -40 to 85°C |      | -55 to 125°C |      |      |
|                  |                                        |                        |                         | Min.                  | Typ. | Max. | Min.        | Max. | Min.         |      | Max. |
| C <sub>IN</sub>  | Input Capacitance                      | 5.0                    |                         |                       | 4    |      |             |      |              |      | pF   |
| C <sub>OUT</sub> | Output Capacitance                     | 5.0                    |                         |                       | 8    |      |             |      |              |      | pF   |
| C <sub>PD</sub>  | Power Dissipation Capacitance (note 1) | 5.0                    | f <sub>IN</sub> = 10MHz |                       | 25   |      |             |      |              |      | pF   |

1) C<sub>PD</sub> is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to Test Circuit). Average operating current can be obtained by the following equation. I<sub>CC(oper)</sub> = C<sub>PD</sub> × V<sub>CC</sub> × f<sub>IN</sub> + I<sub>CC/n</sub> (per circuit)

TEST CIRCUIT

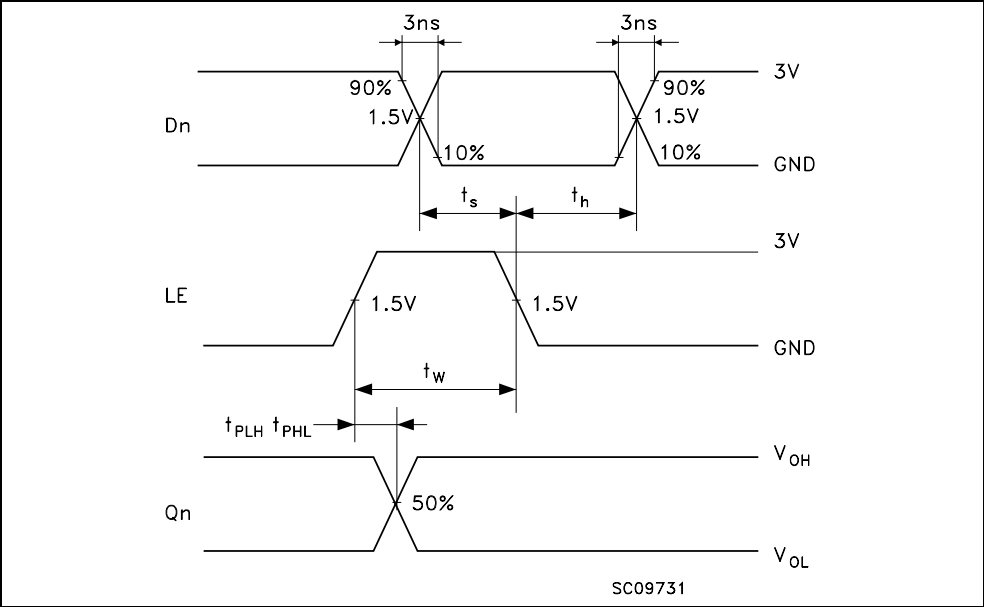


| TEST                                | SWITCH           |
|-------------------------------------|------------------|
| t <sub>PLH</sub> , t <sub>PHL</sub> | Open             |
| t <sub>PZL</sub> , t <sub>PLZ</sub> | 2V <sub>CC</sub> |
| t <sub>PZH</sub> , t <sub>PHZ</sub> | Open             |

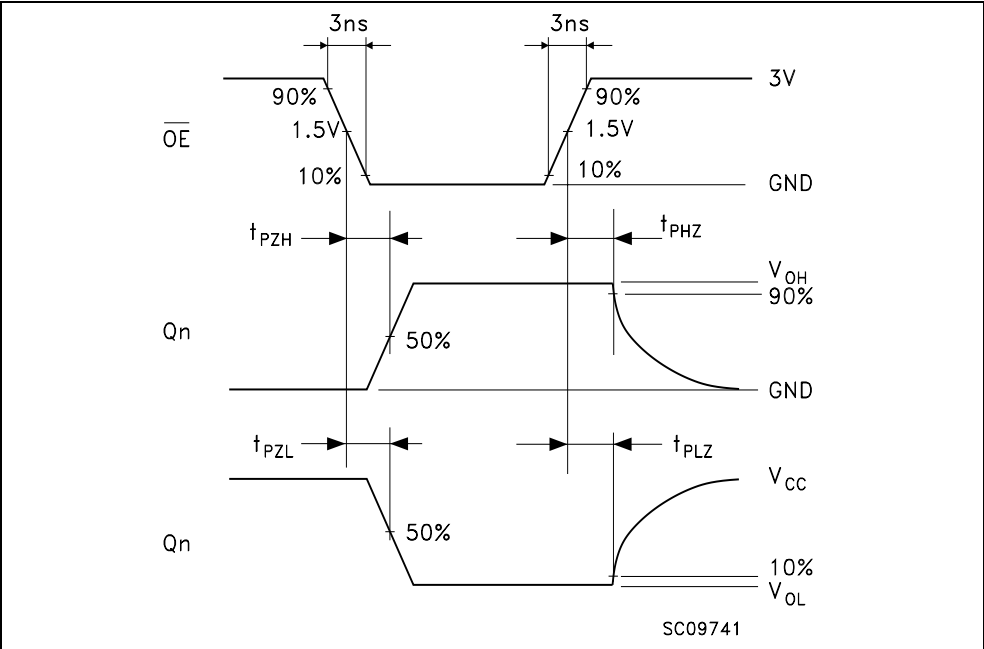
C<sub>L</sub> = 50pF or equivalent (includes jig and probe capacitance)  
R<sub>L</sub> = R<sub>1</sub> = 500Ω or equivalent  
R<sub>T</sub> = Z<sub>OUT</sub> of pulse generator (typically 50Ω)

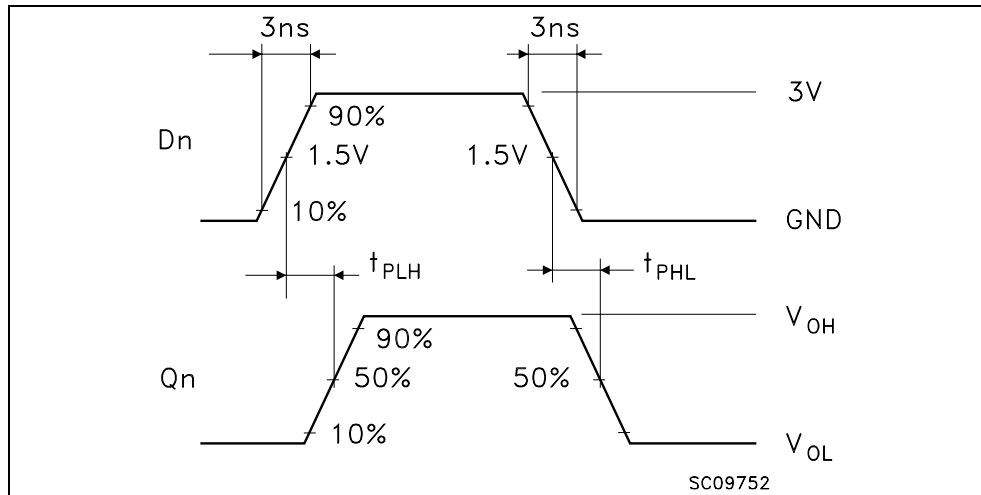
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WAVEFORM 1: PROPAGATION DELAYS, LE MINIMUM PULSE WIDTH, Dn TO LE SETUP AND HOLD TIMES (f=1MHz; 50% duty cycle)



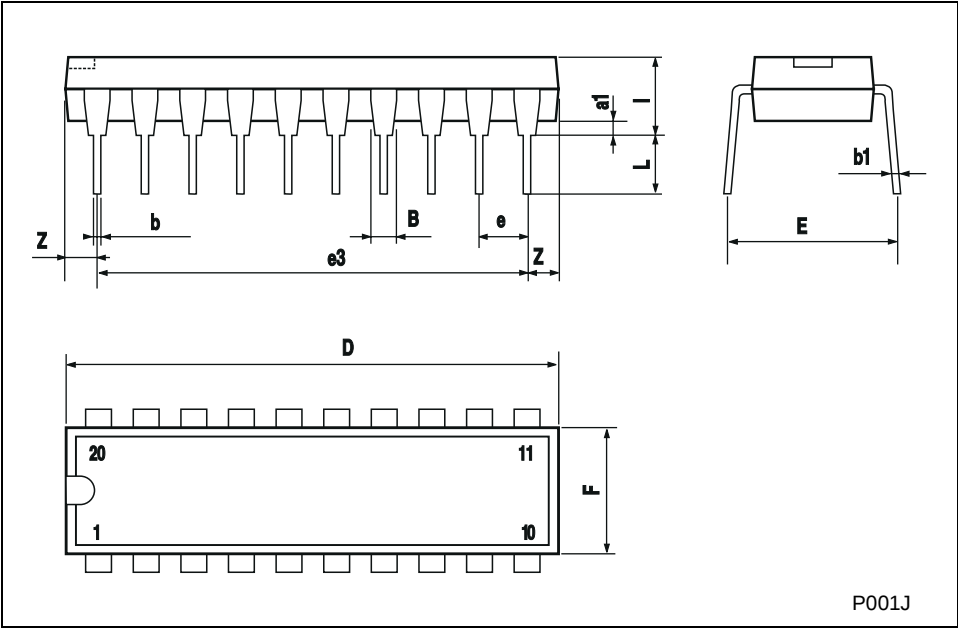
WAVEFORM 2: OUTPUT ENABLE AND DISABLE TIMES (f=1MHz; 50% duty cycle)



**WAVEFORM 3: PROPAGATION DELAYS TIME** ( $f=1\text{MHz}$ ; 50% duty cycle)

Plastic DIP-20 (0.25) MECHANICAL DATA

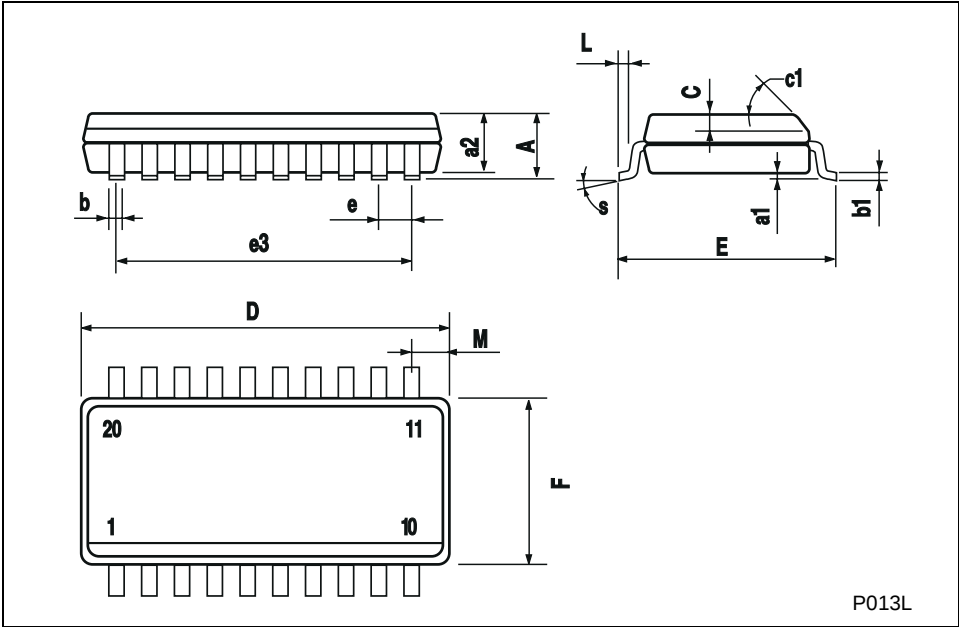
| DIM. | mm    |       |      | inch  |       |       |
|------|-------|-------|------|-------|-------|-------|
|      | MIN.  | TYP.  | MAX. | MIN.  | TYP.  | MAX.  |
| a1   | 0.254 |       |      | 0.010 |       |       |
| B    | 1.39  |       | 1.65 | 0.055 |       | 0.065 |
| b    |       | 0.45  |      |       | 0.018 |       |
| b1   |       | 0.25  |      |       | 0.010 |       |
| D    |       |       | 25.4 |       |       | 1.000 |
| E    |       | 8.5   |      |       | 0.335 |       |
| e    |       | 2.54  |      |       | 0.100 |       |
| e3   |       | 22.86 |      |       | 0.900 |       |
| F    |       |       | 7.1  |       |       | 0.280 |
| I    |       |       | 3.93 |       |       | 0.155 |
| L    |       | 3.3   |      |       | 0.130 |       |
| Z    |       |       | 1.34 |       |       | 0.053 |



P001J

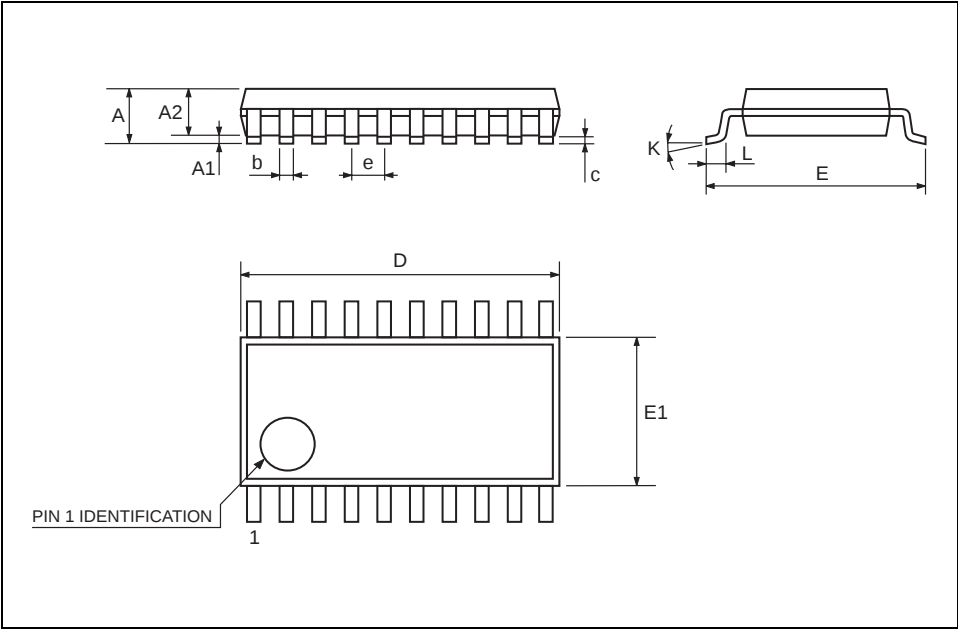
SO-20 MECHANICAL DATA

| DIM. | mm        |       |       | inch  |       |       |
|------|-----------|-------|-------|-------|-------|-------|
|      | MIN.      | TYP.  | MAX.  | MIN.  | TYP.  | MAX.  |
| A    |           |       | 2.65  |       |       | 0.104 |
| a1   | 0.10      |       | 0.20  | 0.004 |       | 0.007 |
| a2   |           |       | 2.45  |       |       | 0.096 |
| b    | 0.35      |       | 0.49  | 0.013 |       | 0.019 |
| b1   | 0.23      |       | 0.32  | 0.009 |       | 0.012 |
| C    |           | 0.50  |       |       | 0.020 |       |
| c1   | 45 (typ.) |       |       |       |       |       |
| D    | 12.60     |       | 13.00 | 0.496 |       | 0.512 |
| E    | 10.00     |       | 10.65 | 0.393 |       | 0.419 |
| e    |           | 1.27  |       |       | 0.050 |       |
| e3   |           | 11.43 |       |       | 0.450 |       |
| F    | 7.40      |       | 7.60  | 0.291 |       | 0.299 |
| L    | 0.50      |       | 1.27  | 0.19  |       | 0.050 |
| M    |           |       | 0.75  |       |       | 0.029 |
| S    | 8 (max.)  |       |       |       |       |       |



TSSOP20 MECHANICAL DATA

| DIM. | mm   |          |      | inch   |            |        |
|------|------|----------|------|--------|------------|--------|
|      | MIN. | TYP.     | MAX. | MIN.   | TYP.       | MAX.   |
| A    |      |          | 1.1  |        |            | 0.433  |
| A1   | 0.05 | 0.10     | 0.15 | 0.002  | 0.004      | 0.006  |
| A2   | 0.85 | 0.9      | 0.95 | 0.335  | 0.354      | 0.374  |
| b    | 0.19 |          | 0.30 | 0.0075 |            | 0.0118 |
| c    | 0.09 |          | 0.2  | 0.0035 |            | 0.0079 |
| D    | 6.4  | 6.5      | 6.6  | 0.252  | 0.256      | 0.260  |
| E    | 6.25 | 6.4      | 6.5  | 0.246  | 0.252      | 0.256  |
| E1   | 4.3  | 4.4      | 4.48 | 0.169  | 0.173      | 0.176  |
| e    |      | 0.65 BSC |      |        | 0.0256 BSC |        |
| K    | 0°   | 4°       | 8°   | 0°     | 4°         | 8°     |
| L    | 0.50 | 0.60     | 0.70 | 0.020  | 0.024      | 0.028  |



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