



74ACT1284

HIGH SPEED IEEE1284 TRANSCEIVER

- **HIGH SPEED:**
 $T_{PD} = 6.5 \text{ ns}$ (Max. 85°C) at $V_{CC} = 4.5\text{V}$
- **LOW POWER DISSIPATION:**
 $I_{CC} = 80 \mu\text{A}$ (MAX.) at $V_{CC} = 5.5\text{V}$ $T = 85^{\circ}\text{C}$
- **TTL COMPATIBLE INPUTS**
 $V_{IH} = 2\text{V}$ (Min.) $V_{IL} = 0.8\text{V}$ (Max.)
- **OPERATING VOLTAGE RANGE:**
 V_{CC} (OPR.) = 4.5V to 5.5V
- A Port have standard 4mA totem pole output
- B Port high drive source/sink capability of 14mA
- Support IEEE Std 1284-I (level 1 type) and IEEE Std 1284-II (level 2 type) for bidirectional parallel communications between personal computer and printing peripherals.

DESCRIPTION

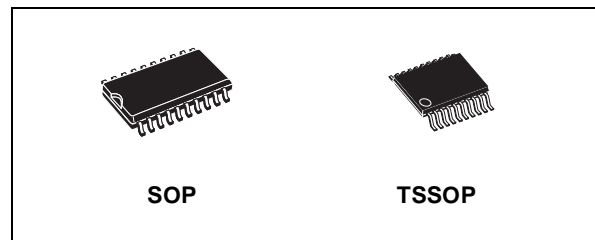
The 74ACT1284 contains four high-speed non-inverting bidirectional buffers and three non-inverting buffers with open drain outputs fabricated in silicon gate C²MOS technology.

It's intended to provide a standard signaling method for a bidirection parallel peripheral in an Extended Capabilities Port mode (ECP).

The HD (active High) input pin enables the B ports to switch from Open Drain to a high drive totem pole output, capable of sourcing 14mA on all seven buffers. The DIR input determines the direction of data flow on the bidirectional buffers.

DIR (active High) enables data flow from A Port to B Port. DIR (active Low) enables data flow from B Port to A Port.

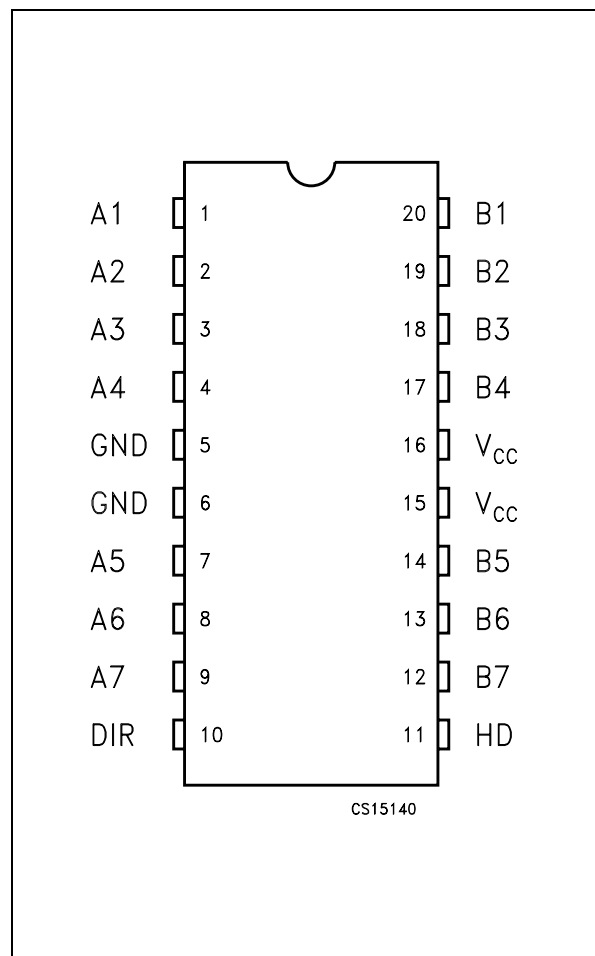
ESD protection is greater than 2000V per Method 3015.7 of MIL-STD-883B. It's available in the commercial temperature ranges.



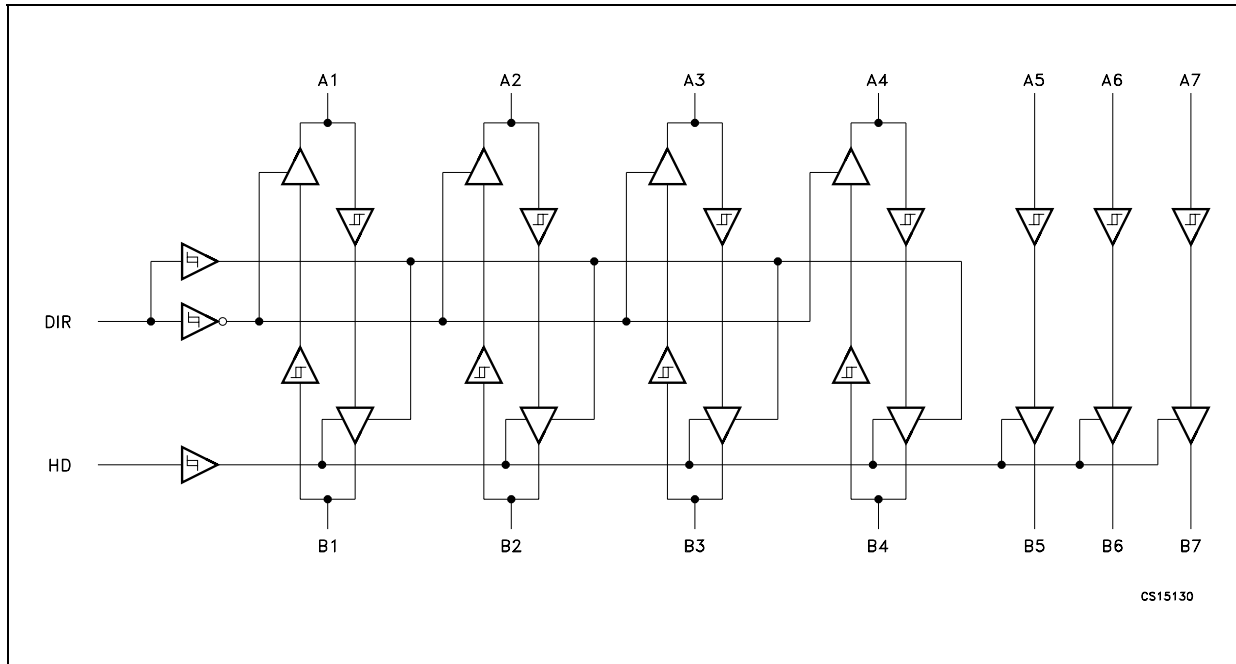
ORDER CODES

| PACKAGE | TUBE | T & R |
|---------|------------|--------------|
| SOP | 74ACT1284M | 74ACT1284MTR |
| TSSOP | | 74ACT1284TTR |

PIN CONNECTION



LOGIC DIAGRAM



PIN DESCRIPTION

| PIN N. | SYMBOL | NAME AND FUNCTION |
|---------|-----------------|-------------------------|
| 1 - 4 | A1 - A4 | Side A Input or Output |
| 5, 6 | GND | Ground |
| 7 - 9 | A5 - A7 | Side A Input |
| 10 | DIR | Direction Control Input |
| 11 | HD | High Drive Enable Input |
| 12 - 14 | B5 - B7 | Side B Output |
| 15, 16 | V _{CC} | Power Supply |

TRUTH TABLE

| INPUT | | FUNCTION | OUTPUTS |
|-------|----|--|--------------------|
| DIR | HD | | |
| L | L | B1 - B4 Data to A1 - A4 A5 - A7 Data to B5 - B7 | B5 - B7 Open Drain |
| L | H | | B5 - B7 Totem Pole |
| H | L | A1 - A7 Data to B1 - B7 | B1 - B7 Open Drain |
| H | H | | B1 - B7 Totem Pole |

ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|-----------------------|-------------------------------|-------------------------|------|
| V_{CC} | Supply Voltage | -0.5 to +7 | V |
| V_{IA} | DC Input Voltage A Side | -0.5 to $V_{CC} + 0.5$ | V |
| V_{IB} | DC Input Voltage B Side | -2 to +7 ⁽¹⁾ | V |
| V_{OA} | DC Output Voltage A Side | -0.5 to $V_{CC} + 0.5$ | V |
| V_{OB} | DC Output Voltage B Side | -2 to +7 ⁽¹⁾ | V |
| I_{IK} | DC Input Diode Current | ± 20 | mA |
| I_{OK} | DC Output Diode Current | ± 50 | mA |
| I_O | DC Output Current | ± 50 | mA |
| I_{CC} or I_{GND} | DC V_{CC} or Ground Current | ± 200 | 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.

(1) The AC input voltage pulse width is limited to 20ns if the input voltage goes more negative than -0.5V.

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 HD = LOW | 0 to 5.5 | V |
| T_{op} | Operating Temperature | -40 to 85 | °C |

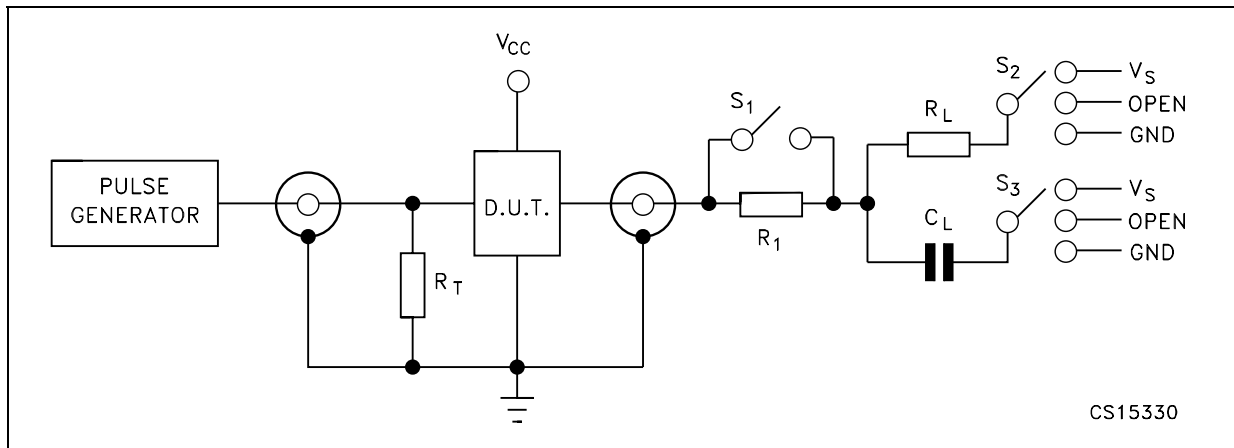
DC ELECTRICAL CHARACTERISTICS

| Symbol | Parameter | Test Condition | | Value | | | | | Unit |
|------------------|--------------------------------------|------------------------|--|-----------------------|------|-------|-------------|------|------|
| | | V _{CC} (V) | | T _A = 25°C | | | -40 to 85°C | | |
| | | | | Min. | Typ. | Max. | Min. | Max. | |
| V _{IH} | High Level Input Voltage | 4.5 to 5.5 | | 2.0 | | | 2.0 | | V |
| V _{IL} | Low Level Input Voltage | 4.5 to 5.5 | | | | 0.8 | | 0.8 | V |
| V _{OHB} | High Level Output Voltage B Port | 4.5 | I _{OH} = -14mA | 3.86 | | | 3.76 | | V |
| V _{OHA} | High Level Output Voltage A Port | 4.5 | I _O = -50μA | 4.4 | | | 4.4 | | V |
| | | | I _O = -4mA | 3.86 | | | 3.76 | | |
| V _{OLB} | Low Level Output Voltage B Port | 4.5 | I _{OH} = 14mA | | | 0.4 | | 0.4 | V |
| V _{OLA} | Low Level Output Voltage A Port | 4.5 | I _O = 50μA | | | 0.1 | | 0.1 | V |
| | | | I _O = 4mA | | | 0.36 | | 0.44 | |
| I _I | Input Current | 5.5 | V _I = V _{CC} or GND (DIR, A5, A6, A7, HD) | | | ± 0.1 | | ± 1 | μA |
| I _{CCT} | Max I _{CC} /Input | 5.5 | V _I = V _{CC} - 2.1V | | 0.6 | | | 1.5 | mA |
| I _{CC} | Quiescent Supply Current | 5.5 | V _I = V _{CC} or GND | | | 8 | | 80 | μA |
| I _{OZ} | Output Leakage Current | 5.5 | V _O = V _{CC} or GND | | | ± 0.5 | | ± 5 | μA |
| I _{OFF} | B Side Power Down Leakage Current | 0 | V _O = 5.25V | | | 4 | | 40 | μA |
| V _{HYS} | Input Hysteresis | 5.0 | V _T ⁺ = V _T | | 0.4 | | 0.35 | | V |
| Z _O | Output Impedance B Port | 5.0 | V _B = V _{OH} | 8 | | | | 24 | Ω |

AC ELECTRICAL CHARACTERISTICS (f = 1MHz, t_r = t_f = 2.5ns)

| Symbol | Parameter | Test Condition | | Value | | | | | Unit |
|---------------------------------|--|------------------------|---|-----------------------|------|------|-------------|------|------|
| | | V _{CC} (V) | | T _A = 25°C | | | -40 to 85°C | | |
| | | | | Min. | Typ. | Max. | Min. | Max. | |
| t _{PLH} | Propagation Delay Time A1 - A7 to B1 - B7 | 4.5 to 5.5 | R _L =500Ω, C _L =50pF (fig. 1-2) | 1 | | 5.6 | 1 | 6.5 | ns |
| t _{PHL} | | | | 1 | | 5.6 | 1 | 6.5 | |
| t _{PLH} | Propagation Delay Time B1 - B4 to A1 - A4 | 4.5 to 5.5 | R _L =500Ω, C _L =50pF (fig. 3) | 1 | | 7.5 | 1 | 8.5 | ns |
| t _{PHL} | | | | 1 | | 7.5 | 1 | 8.5 | |
| t _{EN} | Enable Delay Time HD to B1 - B7 | 4.5 to 5.5 | R _S =33Ω, R _L =62Ω C _L =50pF (fig. 2) | 1 | | 7.5 | 1 | 8.5 | ns |
| t _{DIS} | Disable Delay Time HD to B1 - B7 | | | 1 | | 7.5 | 1 | 8.5 | ns |
| t _r , t _f | t _{rise} , t _{fall} B1 - B7 Open Drain | 4.5 to 5.5 | R _{PULL_UP} =500Ω C _L =50pF (fig. 4) | | | 120 | | 120 | ns |
| C _I | Control Input Capacitance (HD, DIR, A5 - A7) | Open | | | 4 | | | | pF |
| C _{I/O} | I/O Pin Capacitance | 5.0 | | | 12 | | | | pF |

TEST CIRCUIT



| TEST | S1 | S2 | S2 |
|---|--------|----------|----------|
| t_{PHL} (A1-A7 to B1-B7) $R_L = 62\Omega$, $R_1 = 33\Omega$ (see waveform 1) | OPEN | V_{CC} | V_{CC} |
| t_{PLH} (A1-A7 to B1-B7) $R_L = 62\Omega$ (see waveform 1) | CLOSED | GND | GND |
| t_{PHL} , t_{PLH} (B1-B4 to A1-A4) $R_L = 500\Omega$ (see waveform 2) | CLOSED | GND | GND |
| t_r , t_f (A1-A7 to B1-B7) $R_L = 500\Omega$ (see waveform 1) | CLOSED | V_{CC} | V_{CC} |
| t_{EN} (HD to B1-B7) $R_L = 62\Omega$, $R_1 = 33\Omega$ (see waveform 3) | OPEN | GND | GND |
| t_{DIS} (HD to B1-B7) $R_L = 62\Omega$ (see waveform 3) | CLOSED | GND | GND |

$C_L = 50$ pF or equivalent (includes jig and probe capacitance)
 $R_T = Z_{OUT}$ of pulse generator (typically 50Ω)

Figure 1 : Propagation Delay Time

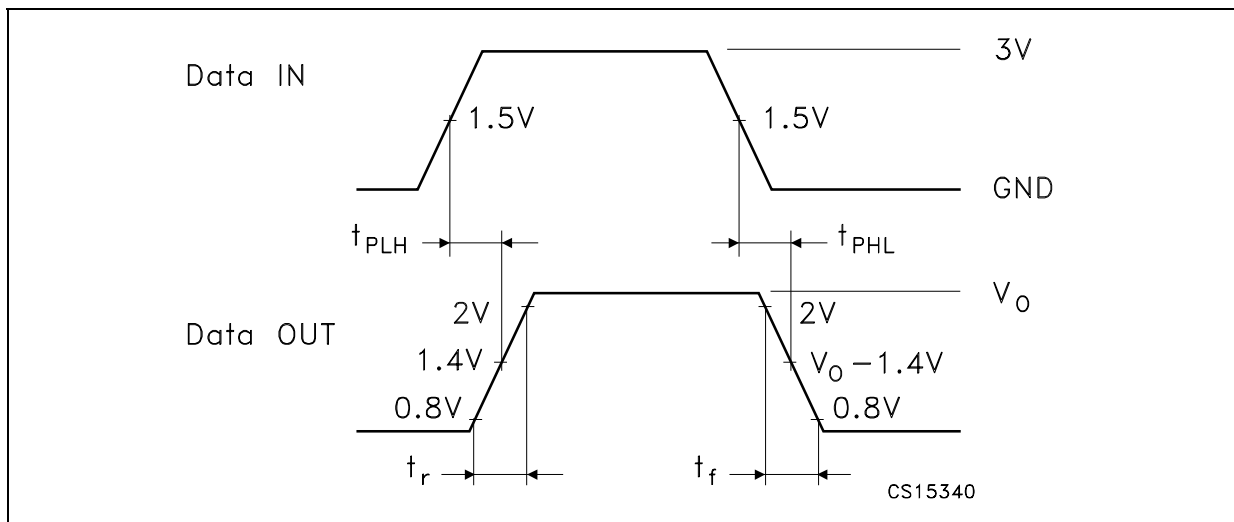
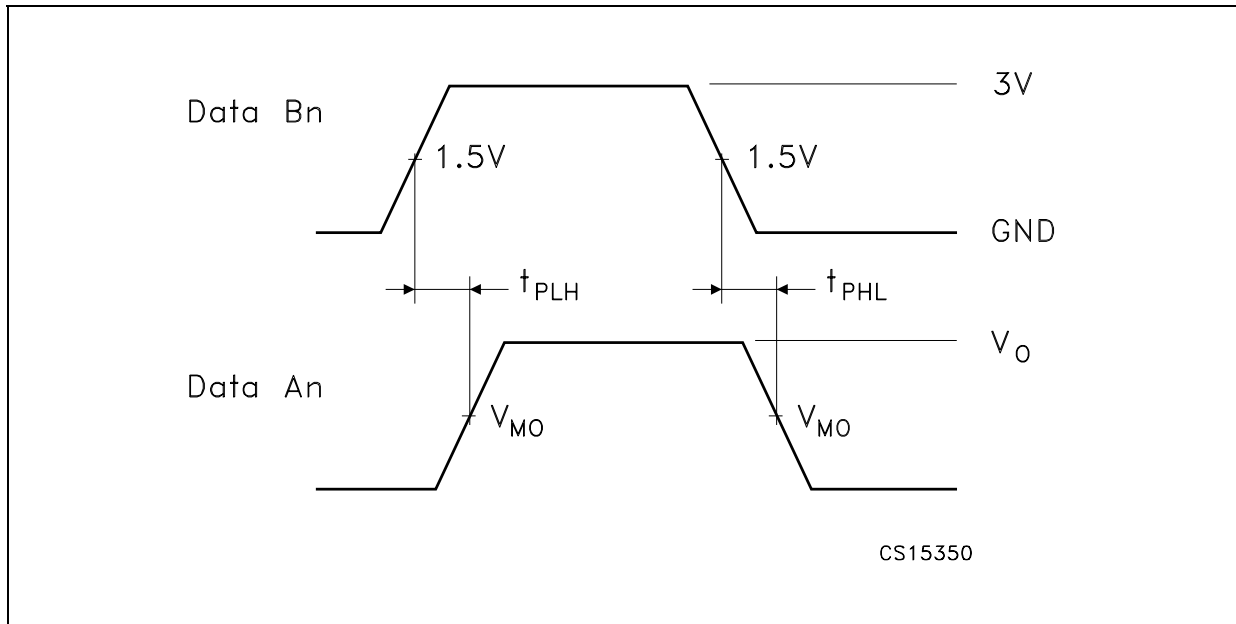
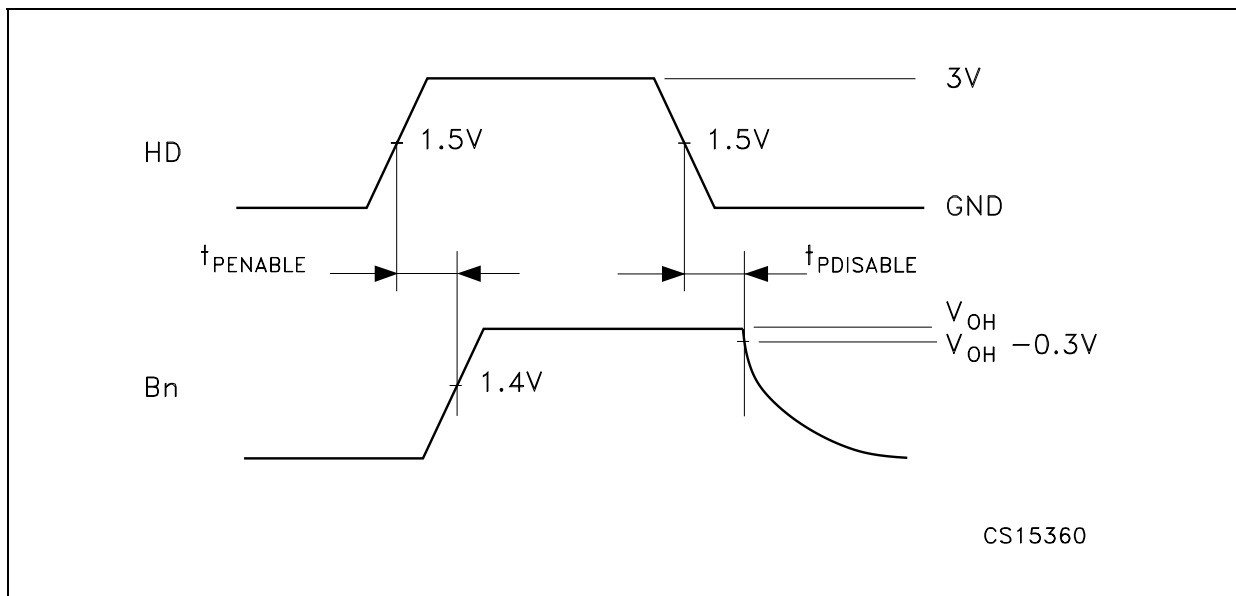


Figure 2 : Propagation Delay Time



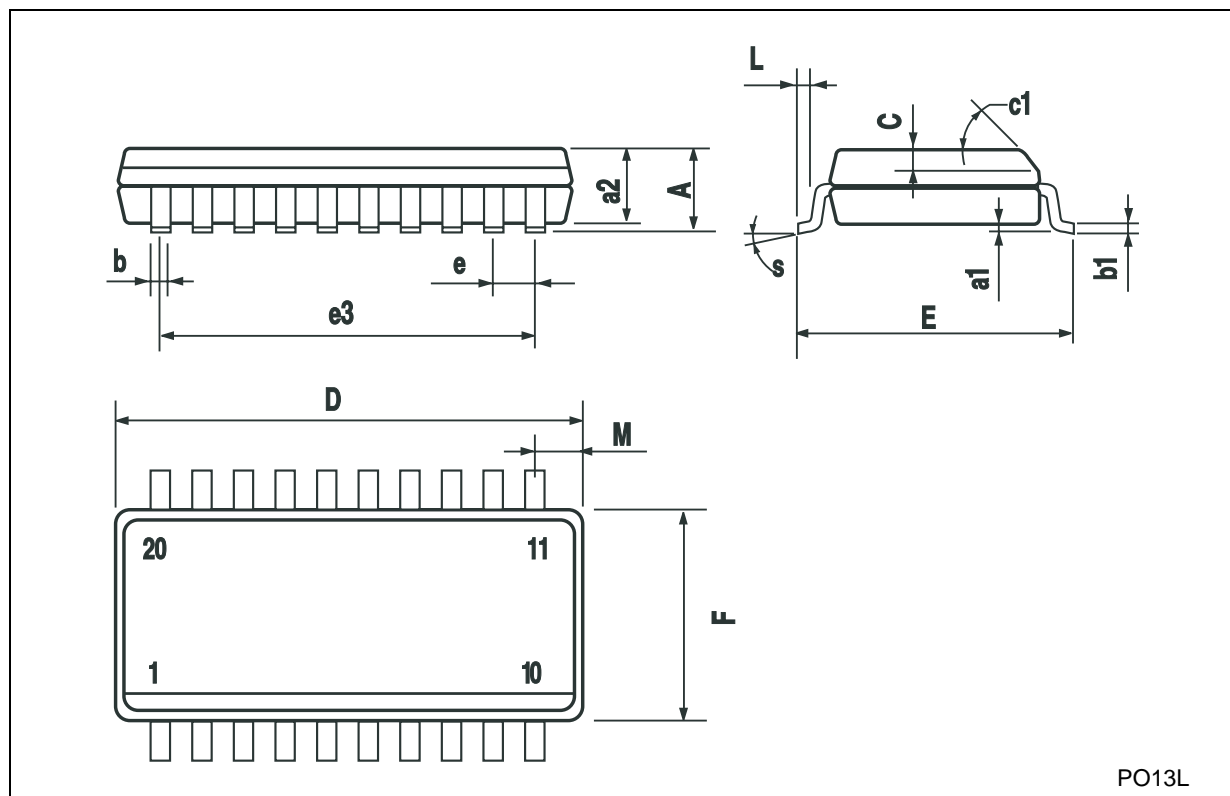
$V_{MO} = 50\%V_{CC}$

Figure 3 : Enable and Disable Time



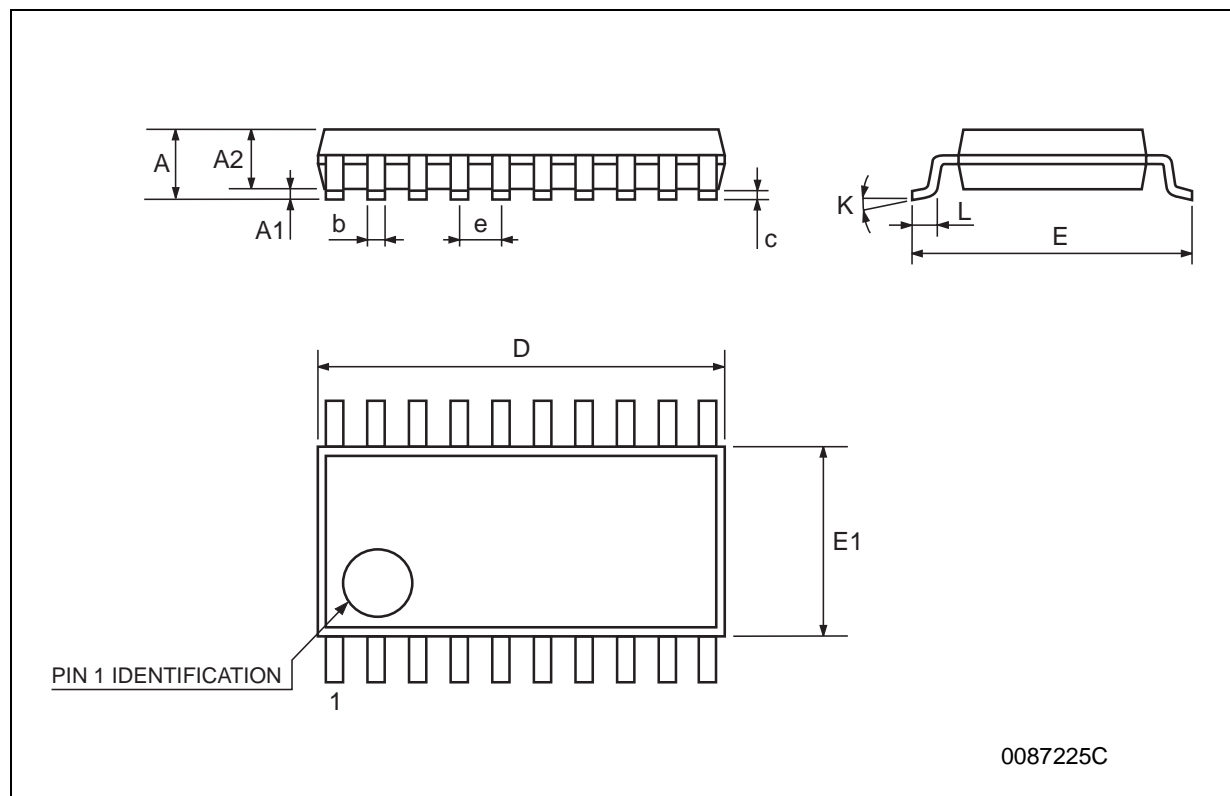
SO-20 MECHANICAL DATA

| DIM. | mm. | | | inch | | |
|------|------------|-------|-------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | | | 2.65 | | | 0.104 |
| a1 | 0.1 | | 0.2 | 0.004 | | 0.008 |
| a2 | | | 2.45 | | | 0.096 |
| b | 0.35 | | 0.49 | 0.014 | | 0.019 |
| b1 | 0.23 | | 0.32 | 0.009 | | 0.012 |
| C | | 0.5 | | | 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 | | 0.300 |
| L | 0.50 | | 1.27 | 0.020 | | 0.050 |
| M | | | 0.75 | | | 0.029 |
| S | 8° (max.) | | | | | |



TSSOP20 MECHANICAL DATA

| DIM. | mm. | | | inch | | |
|------|------|----------|------|-------|------------|--------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | | | 1.2 | | | 0.047 |
| A1 | 0.05 | | 0.15 | 0.002 | 0.004 | 0.006 |
| A2 | 0.8 | 1 | 1.05 | 0.031 | 0.039 | 0.041 |
| b | 0.19 | | 0.30 | 0.007 | | 0.012 |
| c | 0.09 | | 0.20 | 0.004 | | 0.0079 |
| D | 6.4 | 6.5 | 6.6 | 0.252 | 0.256 | 0.260 |
| E | 6.2 | 6.4 | 6.6 | 0.244 | 0.252 | 0.260 |
| E1 | 4.3 | 4.4 | 4.48 | 0.169 | 0.173 | 0.176 |
| e | | 0.65 BSC | | | 0.0256 BSC | |
| K | 0° | | 8° | 0° | | 8° |
| L | 0.45 | 0.60 | 0.75 | 0.018 | 0.024 | 0.030 |



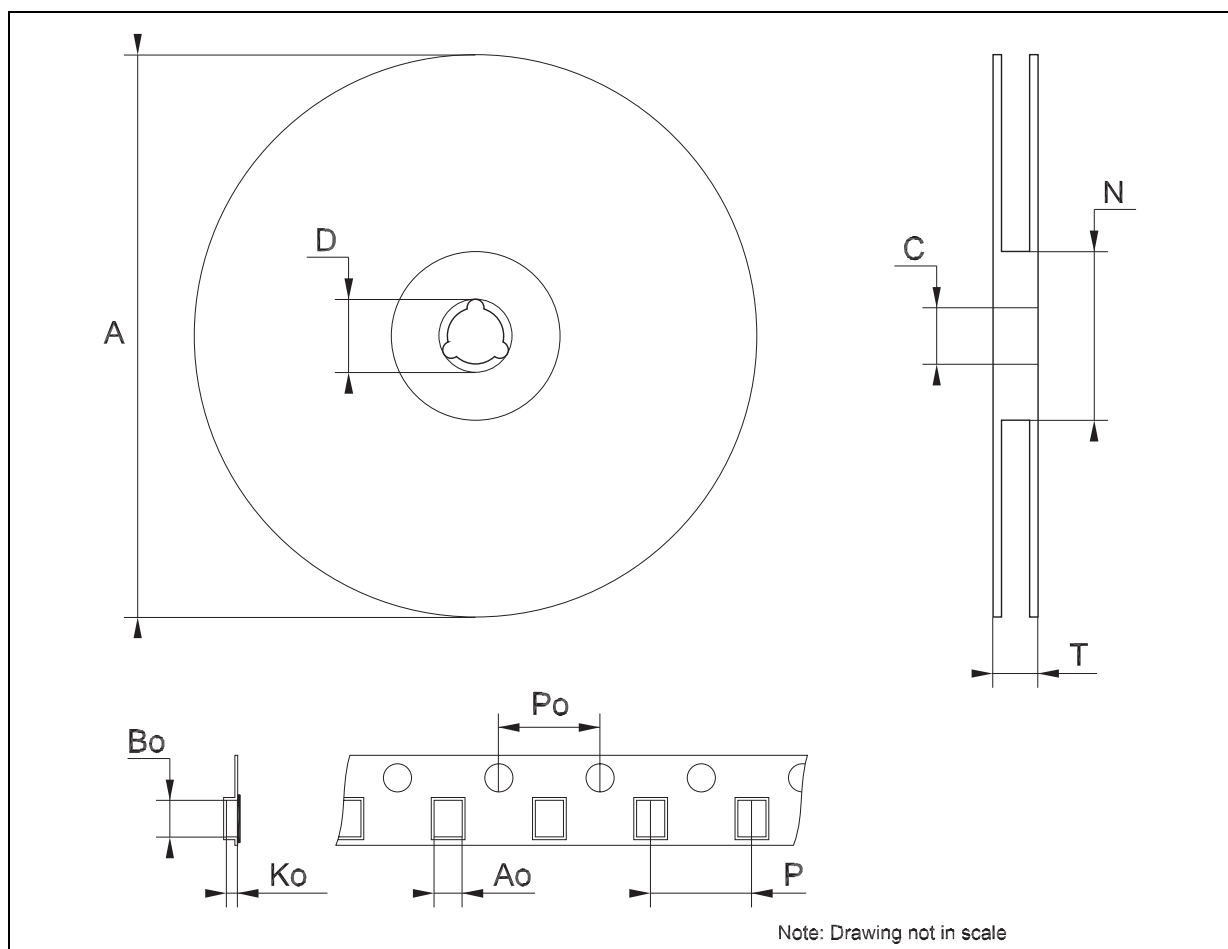
Tape & Reel SO-20 MECHANICAL DATA

| DIM. | mm. | | | inch | | |
|------|------|-----|------|-------|------|--------|
| | MIN. | TYP | MAX. | MIN. | TYP. | MAX. |
| A | | | 330 | | | 12.992 |
| C | 12.8 | | 13.2 | 0.504 | | 0.519 |
| D | 20.2 | | | 0.795 | | |
| N | 60 | | | 2.362 | | |
| T | | | 30.4 | | | 1.197 |
| Ao | 10.8 | | 11 | 0.425 | | 0.433 |
| Bo | 13.2 | | 13.4 | 0.520 | | 0.528 |
| Ko | 3.1 | | 3.3 | 0.122 | | 0.130 |
| Po | 3.9 | | 4.1 | 0.153 | | 0.161 |
| P | 11.9 | | 12.1 | 0.468 | | 0.476 |



Tape & Reel TSSOP20 MECHANICAL DATA

| DIM. | mm. | | | inch | | |
|------|------|-----|------|-------|------|--------|
| | MIN. | TYP | MAX. | MIN. | TYP. | MAX. |
| A | | | 330 | | | 12.992 |
| C | 12.8 | | 13.2 | 0.504 | | 0.519 |
| D | 20.2 | | | 0.795 | | |
| N | 60 | | | 2.362 | | |
| T | | | 22.4 | | | 0.882 |
| Ao | 6.8 | | 7 | 0.268 | | 0.276 |
| Bo | 6.9 | | 7.1 | 0.272 | | 0.280 |
| Ko | 1.7 | | 1.9 | 0.067 | | 0.075 |
| Po | 3.9 | | 4.1 | 0.153 | | 0.161 |
| P | 11.9 | | 12.1 | 0.468 | | 0.476 |



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