



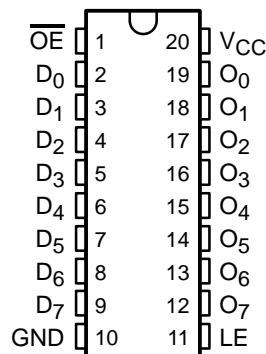
**THE DATASHEET OF
CY74FCT573ATSOCT**



CY54FCT573T, CY74FCT573T
8-BIT LATCHES
WITH 3-STATE OUTPUTS
 SCCS068 – OCTOBER 2001

- **Function and Pinout Compatible With FCT and F Logic**
- **Reduced V_{OH} (Typically = 3.3 V) Versions of Equivalent FCT Functions**
- **Edge-Rate Control Circuitry for Significantly Improved Noise Characteristics**
- **I_{off} Supports Partial-Power-Down Mode Operation**
- **ESD Protection Exceeds JESD 22**
 - 2000-V Human-Body Model (A114-A)
 - 200-V Machine Model (A115-A)
 - 1000-V Charged-Device Model (C101)
- **Matched Rise and Fall Times**
- **Fully Compatible With TTL Input and Output Logic Levels**
- **3-State Outputs**
- **CY54FCT573T**
 - 32-mA Output Sink Current
 - 12-mA Output Source Current
- **CY74FCT573T**
 - 64-mA Output Sink Current
 - 32-mA Output Source Current

CY54FCT573T . . . D PACKAGE
 CY74FCT573T . . . P, Q, OR SO PACKAGE
 (TOP VIEW)



description

The 'FCT573T devices consist of eight latches with 3-state outputs for bus-organized applications. When the latch-enable (LE) input is high, the flip-flops appear transparent to the data. Data that meets the required setup times are latched when LE transitions from high to low. Data appears on the bus when the output-enable (\overline{OE}) input is low. When \overline{OE} is high, the bus output is in the high-impedance state. In this mode, data can be entered into the latches. The 'FCT573T devices are identical to the 'FCT373T devices, except for the flow-through pinout of the 'FCT573T, which simplifies board design.

These devices are fully specified for partial-power-down applications using I_{off} . The I_{off} circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.



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PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.



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 On products compliant to MIL-PRF-38535, all parameters are tested unless otherwise noted. On all other products, production processing does not necessarily include testing of all parameters.

CY54FCT573T, CY74FCT573T
8-BIT LATCHES
WITH 3-STATE OUTPUTS

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ORDERING INFORMATION

| TA | PACKAGE† | | SPEED (ns) | ORDERABLE PART NUMBER | TOP-SIDE MARKING |
|----------------|---------------|---------------|-----------------|-----------------------|------------------|
| -40°C to 85°C | QSOP – Q | Tape and reel | 4.7 | CY74FCT573CTQCT | FCT573C |
| | SOIC – SO | Tube | 4.7 | CY74FCT573CTSOC | FCT573C |
| | | Tape and reel | 4.7 | CY74FCT573CTSOCT | |
| | DIP – P | Tube | 5.2 | CY74FCT573ATPC | CY74FCT573ATPC |
| | QSOP – Q | Tape and reel | 5.2 | CY74FCT573ATQCT | FCT573A |
| | SOIC – SO | Tube | 5.2 | CY74FCT573ATSOC | FCT573A |
| | | Tape and reel | 5.2 | CY74FCT573ATSOCT | |
| | QSOP – Q | Tape and reel | 8 | CY74FCT573TQCT | FCT573 |
| SOIC – SO | Tube | 8 | CY74FCT573TSOC | FCT573 | |
| | Tape and reel | 8 | CY74FCT573TSOCT | | |
| -55°C to 125°C | CDIP – D | Tube | 8.5 | CY54FCT573ATLMB | |

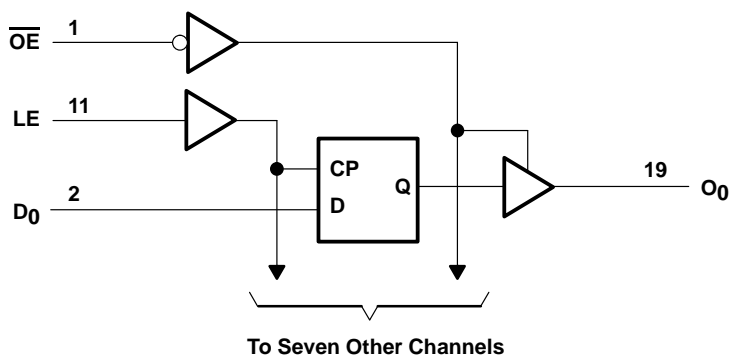
† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.

FUNCTION TABLE

| INPUTS | | | OUTPUT |
|-----------------|----|---|----------------|
| \overline{OE} | LE | D | O |
| L | H | H | H |
| L | H | L | L |
| L | L | X | Q ₀ |
| H | X | X | Z |

H = High logic level, L = Low logic level,
X = Don't care, Z = High-impedance state,
Q_n = Previous state of flip flops (Q_{n-1})

logic diagram (positive logic)



CY54FCT573T, CY74FCT573T

8-BIT LATCHES

WITH 3-STATE OUTPUTS

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electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

| PARAMETER | TEST CONDITIONS | CY54FCT573T | | | CY74FCT573T | | | UNIT |
|--------------------|--|--------------------------|------|------|-------------|------|------|--------|
| | | MIN | TYP† | MAX | MIN | TYP† | MAX | |
| V _{IK} | V _{CC} = 4.5 V, I _{IN} = -18 mA | -0.7 | -1.2 | | | | | V |
| | V _{CC} = 4.75 V, I _{IN} = -18 mA | | | | -0.7 | -1.2 | | |
| V _{OH} | V _{CC} = 4.5 V, I _{OH} = -12 mA | 2.4 | 3.3 | | | | | V |
| | V _{CC} = 4.75 V | I _{OH} = -32 mA | | | 2 | | | |
| | | I _{OH} = -15 mA | | | 2.4 | 3.3 | | |
| V _{OL} | V _{CC} = 4.5 V, I _{OL} = 32 mA | 0.3 | 0.55 | | | | | V |
| | V _{CC} = 4.75 V, I _{OL} = 64 mA | | | | 0.3 | 0.55 | | |
| V _{hys} | All inputs | 0.2 | | | 0.2 | | | V |
| I _I | V _{CC} = 5.5 V, V _{IN} = V _{CC} | | | 5 | | | | μA |
| | V _{CC} = 5.25 V, V _{IN} = V _{CC} | | | | | 5 | | |
| I _{IH} | V _{CC} = 5.5 V, V _{IN} = 2.7 V | | | ±1 | | | | μA |
| | V _{CC} = 5.25 V, V _{IN} = 2.7 V | | | | | ±1 | | |
| I _{IL} | V _{CC} = 5.5 V, V _{IN} = 0.5 V | | | ±1 | | | | μA |
| | V _{CC} = 5.25 V, V _{IN} = 0.5 V | | | | | ±1 | | |
| I _{OZH} | V _{CC} = 5.5 V, V _{OUT} = 2.7 V | | | 10 | | | | μA |
| | V _{CC} = 5.25 V, V _{OUT} = 2.7 V | | | | | 10 | | |
| I _{OZL} | V _{CC} = 5.5 V, V _{OUT} = 0.5 V | | | -10 | | | | μA |
| | V _{CC} = 5.25 V, V _{OUT} = 0.5 V | | | | | -10 | | |
| I _{OS} ‡ | V _{CC} = 5.5 V, V _{OUT} = 0 V | -60 | -120 | -225 | | | | mA |
| | V _{CC} = 5.25 V, V _{OUT} = 0 V | | | | -60 | -120 | -225 | |
| I _{off} | V _{CC} = 0 V, V _{OUT} = 4.5 V | | | ±1 | | | ±1 | μA |
| I _{CC} | V _{CC} = 5.5 V, V _{IN} ≤ 0.2 V, V _{IN} ≥ V _{CC} - 0.2 V | 0.1 | 0.2 | | | | | mA |
| | V _{CC} = 5.25 V, V _{IN} ≤ 0.2 V, V _{IN} ≥ V _{CC} - 0.2 V | | | | 0.1 | 0.2 | | |
| ΔI _{CC} | V _{CC} = 5.5 V, V _{IN} = 3.4 V§, f ₁ = 0, Outputs open | 0.5 | 2 | | | | | mA |
| | V _{CC} = 5.25 V, V _{IN} = 3.4 V§, f ₁ = 0, Outputs open | | | | 0.5 | 2 | | |
| I _{CCD} ¶ | V _{CC} = 5.5 V, Outputs open, One input switching at 50% duty cycle, \overline{OE} = GND, V _{IN} ≤ 0.2 V or V _{IN} ≥ V _{CC} - 0.2 V | 0.06 | 0.12 | | | | | mA/MHz |
| | V _{CC} = 5.25 V, Outputs open, One input switching at 50% duty cycle, \overline{OE} = GND, V _{IN} ≤ 0.2 V or V _{IN} ≥ V _{CC} - 0.2 V | | | | 0.06 | 0.12 | | |

† Typical values are at V_{CC} = 5 V, T_A = 25°C.

‡ Not more than one output should be shorted at a time. Duration of short should not exceed one second. The use of high-speed test apparatus and/or sample-and-hold techniques are preferable to minimize internal chip heating and more accurately reflect operational values. Otherwise, prolonged shorting of a high output can raise the chip temperature well above normal and cause invalid readings in other parametric tests. In any sequence of parameter tests, I_{OS} tests should be performed last.

§ Per TTL-driven input (V_{IN} = 3.4 V); all other inputs at V_{CC} or GND

¶ This parameter is derived for use in total power-supply calculations.



electrical characteristics over recommended operating free-air temperature range (unless otherwise noted) (continued)

| PARAMETER | TEST CONDITIONS | | | CY54FCT573T | | CY74FCT573T | | UNIT |
|------------------|---|--|---|-------------|------|-------------|------|------|
| | | | | MIN | TYP† | MAX | MIN | |
| I _C # | V _{CC} = 5.5 V, Outputs open, OE = GND, LE = V _{CC} | One bit switching at f ₁ = 10 MHz at 50% duty cycle | V _{IN} ≤ 0.2 V or V _{IN} ≥ V _{CC} - 0.2 V | 0.7 | 1.4 | | | mA |
| | | | V _{IN} = 3.4 V or GND | 1 | 2.4 | | | |
| | | Eight bits switching at f ₁ = 2.5 MHz at 50% duty cycle | V _{IN} ≤ 0.2 V or V _{IN} ≥ V _{CC} - 0.2 V | 1.3 | 2.6 | | | |
| | | | V _{IN} = 3.4 V or GND | 3.3 | 10.6 | | | |
| | V _{CC} = 5.25 V, Outputs open, OE = GND, LE = V _{CC} | One bit switching at f ₁ = 10 MHz at 50% duty cycle | V _{IN} ≤ 0.2 V or V _{IN} ≥ V _{CC} - 0.2 V | | | 0.7 | 1.4 | |
| | | | V _{IN} = 3.4 V or GND | | | 1 | 2.4 | |
| | | Eight bits switching at f ₁ = 2.5 MHz at 50% duty cycle | V _{IN} ≤ 0.2 V or V _{IN} ≥ V _{CC} - 0.2 V | | | 1.3 | 2.6 | |
| | | | V _{IN} = 3.4 V or GND | | | 3.3 | 10.6 | |
| C _i | | | | 6 | 10 | 6 | 10 | pF |
| C _o | | | | 8 | 12 | 8 | 12 | pF |

† Typical values are at V_{CC} = 5 V, T_A = 25°C.

I_C = I_{CC} + ΔI_{CC} × D_H × N_T + I_{CCD} (f₀/2 + f₁ × N₁)

Where:

I_C = Total supply current

I_{CC} = Power-supply current with CMOS input levels

ΔI_{CC} = Power-supply current for a TTL high input (V_{IN} = 3.4 V)

D_H = Duty cycle for TTL inputs high

N_T = Number of TTL inputs at D_H

I_{CCD} = Dynamic current caused by an input transition pair (HLH or LHL)

f₀ = Clock frequency for registered devices, otherwise zero

f₁ = Input signal frequency

N₁ = Number of inputs changing at f₁

All currents are in milliamperes and all frequencies are in megahertz.

|| Values for these conditions are examples of the I_{CC} formula.

timing requirements over recommended operating free-air temperature range (unless otherwise noted) (see Figure 1)

| | | CY54FCT573T | | CY54FCT573AT | | UNIT |
|-----------------|-----------------------------|-------------|-----|--------------|-----|------|
| | | MIN | MAX | MIN | MAX | |
| t _w | Pulse duration, LE high | 6 | | 6 | | ns |
| t _{su} | Setup time, data before LE↑ | 2 | | 2 | | ns |
| t _h | Hold time, data after LE↑ | 1.5 | | 1.5 | | ns |

timing requirements over recommended operating free-air temperature range (unless otherwise noted) (see Figure 1)

| | | CY74FCT573T | | CY74FCT573AT | | CY74FCT573CT | | UNIT |
|-----------------|-----------------------------|-------------|-----|--------------|-----|--------------|-----|------|
| | | MIN | MAX | MIN | MAX | MIN | MAX | |
| t _w | Pulse duration, LE high | 6 | | 5 | | 5 | | ns |
| t _{su} | Setup time, data before LE↑ | 2 | | 2 | | 2 | | ns |
| t _h | Hold time, data after LE↑ | 1.5 | | 1.5 | | 1.5 | | ns |

CY54FCT573T, CY74FCT573T

8-BIT LATCHES

WITH 3-STATE OUTPUTS

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switching characteristics over operating free-air temperature range (see Figure 1)

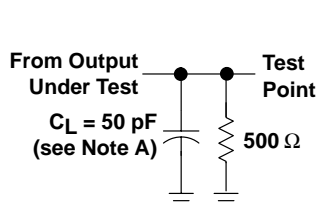
| PARAMETER | FROM (INPUT) | TO (OUTPUT) | CY54FCT573AT | | UNIT |
|------------------|-----------------|-------------|--------------|-----|------|
| | | | MIN | MAX | |
| t _{PLH} | D | O | 1.5 | 5.6 | ns |
| t _{PHL} | | | 1.5 | 5.6 | |
| t _{PLH} | LE | O | 2 | 9.8 | ns |
| t _{PHL} | | | 2 | 9.8 | |
| t _{PZH} | \overline{OE} | O | 1.5 | 7.5 | ns |
| t _{PZL} | | | 1.5 | 7.5 | |
| t _{PHZ} | \overline{OE} | O | 1.5 | 6.5 | ns |
| t _{PLZ} | | | 1.5 | 6.5 | |

switching characteristics over operating free-air temperature range (see Figure 1)

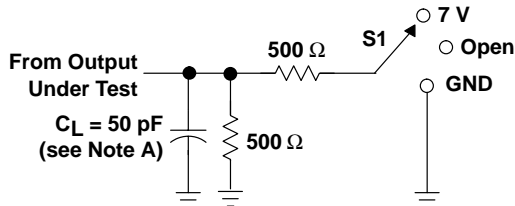
| PARAMETER | FROM (INPUT) | TO (OUTPUT) | CY74FCT573T | | CY74FCT573AT | | CY74FCT573CT | | UNIT |
|------------------|-----------------|-------------|-------------|-----|--------------|-----|--------------|-----|------|
| | | | MIN | MAX | MIN | MAX | MIN | MAX | |
| t _{PLH} | D | O | 1.5 | 8 | 1.5 | 5.2 | 1.5 | 4.7 | ns |
| t _{PHL} | | | 1.5 | 8 | 1.5 | 5.2 | 1.5 | 4.7 | |
| t _{PLH} | LE | O | 2 | 13 | 2 | 8.5 | 2 | 5.5 | ns |
| t _{PHL} | | | 2 | 13 | 2 | 8.5 | 2 | 5.5 | |
| t _{PZH} | \overline{OE} | O | 1.5 | 12 | 1.5 | 6.5 | 1.5 | 5.5 | ns |
| t _{PZL} | | | 1.5 | 12 | 1.5 | 6.5 | 1.5 | 5.5 | |
| t _{PHZ} | \overline{OE} | O | 1.5 | 7.5 | 1.5 | 5.5 | 1.5 | 5 | ns |
| t _{PLZ} | | | 1.5 | 7.5 | 1.5 | 5.5 | 1.5 | 5 | |



PARAMETER MEASUREMENT INFORMATION

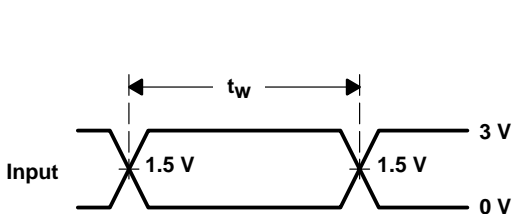


LOAD CIRCUIT FOR
 TOTEM-POLE OUTPUTS

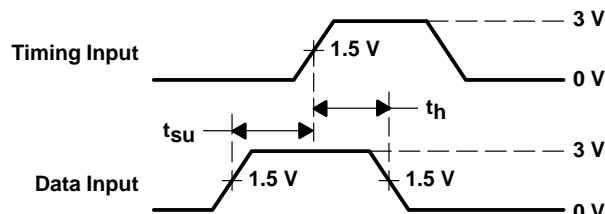


LOAD CIRCUIT FOR
 3-STATE OUTPUTS

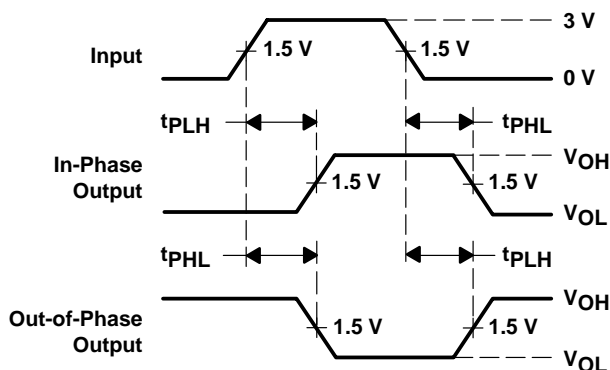
| TEST | S1 |
|-------------------|------|
| t_{PLH}/t_{PHL} | Open |
| t_{PLZ}/t_{PZL} | 7 V |
| t_{PHZ}/t_{PZH} | Open |



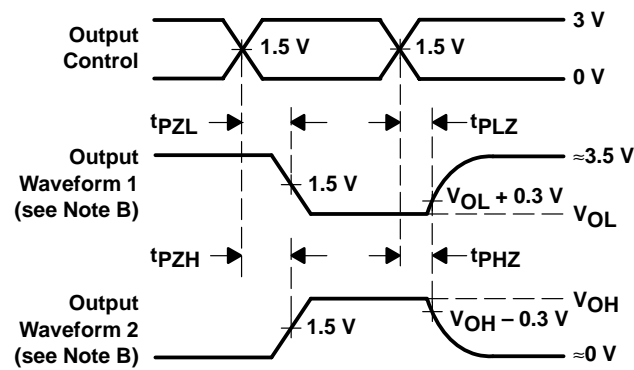
VOLTAGE WAVEFORMS
 PULSE DURATION



VOLTAGE WAVEFORMS
 SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS
 PROPAGATION DELAY TIMES
 INVERTING AND NONINVERTING OUTPUTS



VOLTAGE WAVEFORMS
 ENABLE AND DISABLE TIMES
 LOW- AND HIGH-LEVEL ENABLING

- NOTES: A. C_L includes probe and jig capacitance.
 B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
 C. The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

PACKAGING INFORMATION

| Orderable Device | Status (1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan (2) | Lead/Ball Finish (6) | MSL Peak Temp (3) | Op Temp (°C) | Device Marking (4/5) | Samples |
|-------------------|---------------|--------------|-----------------|------|-------------|----------------------------|-------------------------|----------------------|--------------|--|-------------------------|
| 5962-9223801MRA | ACTIVE | CDIP | J | 20 | 1 | TBD | A42 | N / A for Pkg Type | -55 to 125 | 5962-9223801MR A | Samples |
| 5962-9223802M2A | ACTIVE | LCCC | FK | 20 | 1 | TBD | POST-PLATE | N / A for Pkg Type | -55 to 125 | 5962- 9223802M2A CY54FCT 573ATLMB | Samples |
| CY54FCT573ATLMB | ACTIVE | LCCC | FK | 20 | 1 | TBD | POST-PLATE | N / A for Pkg Type | -55 to 125 | 5962- 9223802M2A CY54FCT 573ATLMB | Samples |
| CY74FCT573ATPC | ACTIVE | PDIP | N | 20 | 20 | Pb-Free (RoHS) | CU NIPDAU | N / A for Pkg Type | -40 to 85 | CY74FCT573ATPC | Samples |
| CY74FCT573ATQCT | ACTIVE | SSOP | DBQ | 20 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR | -40 to 85 | FCT573A | Samples |
| CY74FCT573ATSOC | ACTIVE | SOIC | DW | 20 | 25 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 85 | FCT573A | Samples |
| CY74FCT573ATSOCT | ACTIVE | SOIC | DW | 20 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 85 | FCT573A | Samples |
| CY74FCT573CTQCT | ACTIVE | SSOP | DBQ | 20 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR | -40 to 85 | FCT573C | Samples |
| CY74FCT573CTQCTG4 | ACTIVE | SSOP | DBQ | 20 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR | -40 to 85 | FCT573C | Samples |
| CY74FCT573CTSOC | ACTIVE | SOIC | DW | 20 | 25 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 85 | FCT573C | Samples |
| CY74FCT573CTSOCG4 | ACTIVE | SOIC | DW | 20 | 25 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 85 | FCT573C | Samples |
| CY74FCT573TQCT | ACTIVE | SSOP | DBQ | 20 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-2-260C-1 YEAR | -40 to 85 | FCT573 | Samples |
| CY74FCT573TSOC | ACTIVE | SOIC | DW | 20 | 25 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | -40 to 85 | FCT573 | Samples |

(1) The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of ≤ 1000 ppm threshold. Antimony trioxide based flame retardants must also meet the ≤ 1000 ppm threshold requirement.

(3) **MSL, Peak Temp.** - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) **Lead/Ball Finish** - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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TAPE AND REEL INFORMATION



QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|------------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| CY74FCT573ATQCT | SSOP | DBQ | 20 | 2500 | 330.0 | 16.4 | 6.5 | 9.0 | 2.1 | 8.0 | 16.0 | Q1 |
| CY74FCT573ATSOCT | SOIC | DW | 20 | 2000 | 330.0 | 24.4 | 10.8 | 13.3 | 2.7 | 12.0 | 24.0 | Q1 |
| CY74FCT573CTQCT | SSOP | DBQ | 20 | 2500 | 330.0 | 16.4 | 6.5 | 9.0 | 2.1 | 8.0 | 16.0 | Q1 |
| CY74FCT573TQCT | SSOP | DBQ | 20 | 2500 | 330.0 | 16.4 | 6.5 | 9.0 | 2.1 | 8.0 | 16.0 | Q1 |

TAPE AND REEL BOX DIMENSIONS


*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Length (mm) | Width (mm) | Height (mm) |
|------------------|--------------|-----------------|------|------|-------------|------------|-------------|
| CY74FCT573ATQCT | SSOP | DBQ | 20 | 2500 | 367.0 | 367.0 | 38.0 |
| CY74FCT573ATSOCT | SOIC | DW | 20 | 2000 | 367.0 | 367.0 | 45.0 |
| CY74FCT573CTQCT | SSOP | DBQ | 20 | 2500 | 367.0 | 367.0 | 38.0 |
| CY74FCT573TQCT | SSOP | DBQ | 20 | 2500 | 367.0 | 367.0 | 38.0 |

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