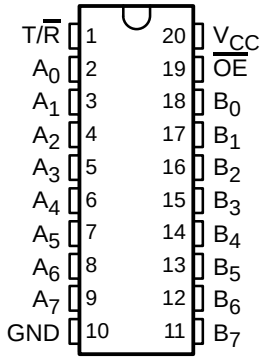
- **Function and Pinout Compatible With FCT and F Logic**
- **25-Ω Output Series Resistors to Reduce Transmission-Line Reflection Noise**
- **Edge-Rate Control Circuitry for Significantly Improved Noise Characteristics**
- **$I_{off}$ Supports Partial-Power-Down Mode Operation**
- **Fully Compatible With TTL Input and Output Logic Levels**
- **ESD Protection Exceeds JESD 22**
  - **2000-V Human-Body Model (A114-A)**
  - **200-V Machine Model (A115-A)**
  - **1000-V Charged-Device Model (C101)**
- **12-mA Output Sink Current 15-mA Output Source Current**
- **3-State Outputs**

**P, Q, OR SO PACKAGE**
**(TOP VIEW)**




## description

The CY74FCT2245T contains eight noninverting, bidirectional buffers with 3-state outputs intended for bus-oriented applications. On-chip termination resistors at the outputs reduce system noise caused by reflections. For this reason, the CY74FCT2245T can replace the CY74FCT245T in an existing design. The CY74FCT2245T current-sinking capability is 12 mA at the A and B ports.

The transmit/receive (T/R) input determines the direction of data flow through the bidirectional transceiver. Transmit (active high) enables data from A ports to B ports; receive (active low) enables data from B ports to A ports. The output-enable ($\overline{OE}$) input, when high, disables both the A and B ports by putting them in the high-impedance state.

This device is 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.

**ORDERING INFORMATION**

| $T_A$ | PACKAGE† | | SPEED (ns) | ORDERABLE PART NUMBER | TOP-SIDE MARKING |
|---|---|---|---|---|---|
| –40°C to 85°C | QSOP – Q | Tape and reel | 4.1 | CY74FCT2245CTQCT | FCT2245 |
| | SOIC – SO | Tube | 4.1 | CY74FCT2245CTSOC | FCT2245 |
| | | Tape and reel | 4.1 | CY74FCT2245CTSOCT | |
| | DIP – P | Tube | 4.6 | CY74FCT2245ATPC | 74FCT2245ATPC |
| | QSOP – Q | Tape and reel | 4.6 | CY74FCT2245ATQCT | FCT2245A |
| | SOIC – SO | Tube | 4.6 | CY74FCT2245ATSOC | FCT2245A |
| | | Tape and reel | 4.6 | CY74FCT2245ATSOCT | |
| | QSOP – Q | Tape and reel | 7.0 | CY74FCT2245TQCT | FCT2245 |
| | SOIC – SO | Tube | 7.0 | CY74FCT2245TSOC | FCT2245 |
| | | Tape and reel | 7.0 | CY74FCT2245TSOCT | |

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


Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

**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.**

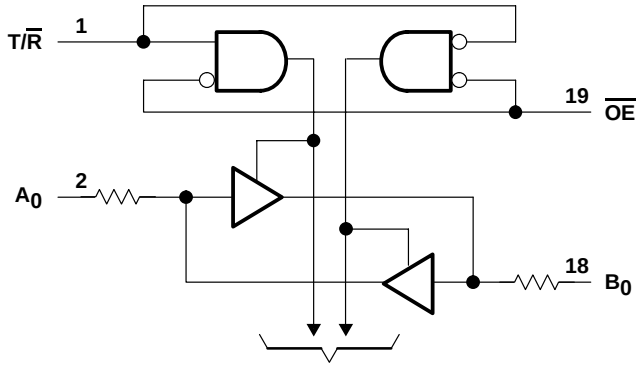
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**FUNCTION TABLE**

| INPUTS | | OUTPUT |
|---|---|---|
| $\overline{OE}$ | T/$\overline{R}$ | |
| L | L | Bus B data to bus A |
| L | H | Bus A data to bus B |
| H | X | Z |

H = High logic level, L = Low logic level,
X = Don't care, Z = High-impedance state

## logic diagram (positive logic)




## absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

Supply voltage range to ground potential . . . . . –0.5 V to 7 V
DC input voltage range . . . . . –0.5 V to 7 V
DC output voltage range . . . . . –0.5 V to 7 V
DC output current (maximum sink current/pin) . . . . . 120 mA
Package thermal impedance, $\theta_{JA}$ (see Note 1): P package . . . . . 69°C/W
Q package . . . . . 68°C/W
SO package . . . . . 58°C/W
Ambient temperature range with power applied, $T_A$ . . . . . –65°C to 135°C
Storage temperature range, $T_{stg}$ . . . . . –65°C to 150°C

† Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTE 1: The package thermal impedance is calculated in accordance with JESD 51-7.

## recommended operating conditions (see Note 2)

| | | MIN | NOM | MAX | UNIT |
|---|---|---|---|---|---|
| $V_{CC}$ | Supply voltage | 4.75 | 5 | 5.25 | V |
| $V_{IH}$ | High-level input voltage | 2 | | | V |
| $V_{IL}$ | Low-level input voltage | | | 0.8 | V |
| $I_{OH}$ | High-level output current | | | –15 | mA |
| $I_{OL}$ | Low-level output current | | | 12 | mA |
| $T_A$ | Operating free-air temperature | –40 | | 85 | °C |

NOTE 2: All unused inputs of the device must be held at $V_{CC}$ or GND to ensure proper device operation.

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

| PARAMETER | TEST CONDITIONS | | | MIN | TYP† | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| $V_{IK}$ | $V_{CC}$ = 4.75, | $I_{IN}$ = –18 mA | | | –0.7 | –1.2 | V |
| $V_{OH}$ | $V_{CC}$ = 4.75, | $I_{OH}$ = –15 mA | | 2.4 | 3.3 | | V |
| $V_{OL}$ | $V_{CC}$ = 4.75, | $I_{OL}$ = 12 mA | | | 0.3 | 0.55 | V |
| $R_{out}$ | $V_{CC}$ = 4.75, | $I_{OL}$ = 12 mA | | 20 | 25 | 40 | Ω |
| $V_{hys}$ | All inputs | | | | 0.2 | | V |
| $I_I$ | $V_{CC}$ = 5.25 V, | $V_{IN}$ = $V_{CC}$ | | | | 5 | µA |
| $I_{IH}$ | $V_{CC}$ = 5.25 V, | $V_{IN}$ = 2.7 V | | | | ±1 | µA |
| $I_{IL}$ | $V_{CC}$ = 5.25 V, | $V_{IN}$ = 0.5 V | | | | ±1 | µA |
| $I_{OZH}$ | $V_{CC}$ = 5.25 V, | $V_{OUT}$ = 2.7 V | | | | 10 | µA |
| $I_{OZL}$ | $V_{CC}$ = 5.25 V, | $V_{OUT}$ = 0.5 V | | | | –10 | µA |
| $I_{OS}$‡ | $V_{CC}$ = 5.25 V, | $V_{OUT}$ = 0 V | | –60 | –120 | –225 | mA |
| $I_{off}$ | $V_{CC}$ = 0 V, | $V_{OUT}$ = 4.5 V | | | | ±1 | µA |
| $I_{CC}$ | $V_{CC}$ = 5.25 V, | $V_{IN}$ ≤ 0.2 V, | $V_{IN}$ ≥ $V_{CC}$ – 0.2 V | | 0.1 | 0.2 | mA |
| $\Delta I_{CC}$ | $V_{CC}$ = 5.25 V, $V_{IN}$ = 3.4 V§, $f_1$ = 0, Outputs open | | | | 0.5 | 2 | mA |
| $I_{CCD}$¶ | $V_{CC}$ = 5.25 V, One input switching at 50% duty cycle, Outputs open, $\overline{T/R}$ = $\overline{OE}$ = GND, $V_{IN}$ ≤ 0.2 V or $V_{IN}$ ≥ $V_{CC}$ – 0.2 V | | | | 0.06 | 0.12 | mA/ MHz |
| $I_C$# | $V_{CC}$ = 5.25 V, Outputs open, $\overline{T/R}$ = $\overline{OE}$ = GND | One input 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‖ | |
| $C_i$ | | | | | 5 | 10 | pF |
| $C_o$ | | | | | 9 | 12 | pF |

† 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.

# $I_C = I_{CC} + \Delta I_{CC} \times D_H \times N_T + I_{CCD} (f_0/2 + f_1 \times N_1)$

Where:

$I_C$ = Total supply current
$I_{CC}$ = Power-supply current with CMOS input levels
$\Delta I_{CC}$ = 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)
$f_0$ = Clock frequency for registered devices, otherwise zero
$f_1$ = Input signal frequency
$N_1$ = Number of inputs changing at $f_1$

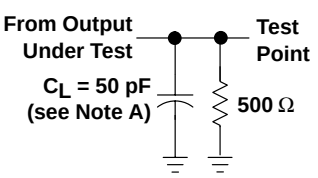
All currents are in milliamperes and all frequencies are in megahertz.

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

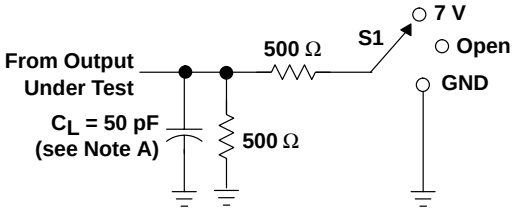
## switching characteristics over operating free-air temperature range (see Figure 1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | CY74FCT2245T | | CY74FCT2245AT | | CY74FCT2245CT | | UNIT |
|---|---|---|---|---|---|---|---|---|---|
| | | | MIN | MAX | MIN | MAX | MIN | MAX | |
| $t_{PLH}$ | $A_n$ or $B_n$ | $B_n$ or $A_n$ | 1.5 | 7 | 1.5 | 4.6 | 1.5 | 4.1 | ns |
| $t_{PHL}$ | | | 1.5 | 7 | 1.5 | 4.6 | 1.5 | 4.1 | |
| $t_{PZH}$ | $\overline{OE}$ | A or B | 1.5 | 9.5 | 1.5 | 6.2 | 1.5 | 5.8 | ns |
| $t_{PZL}$ | | | 1.5 | 9.5 | 1.5 | 6.2 | 1.5 | 5.8 | |
| $t_{PHZ}$ | $\overline{OE}$ | A or B | 1.5 | 7.5 | 1.5 | 5 | 1.5 | 4.5 | ns |
| $t_{PLZ}$ | | | 1.5 | 7.5 | 1.5 | 5 | 1.5 | 4.5 | |

## PARAMETER MEASUREMENT INFORMATION

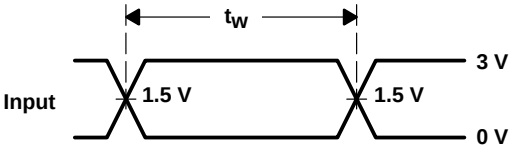



LOAD CIRCUIT FOR
TOTEM-POLE OUTPUTS

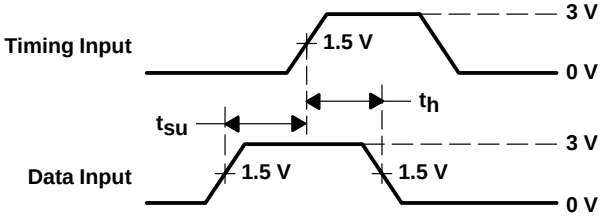



LOAD CIRCUIT FOR
3-STATE OUTPUTS

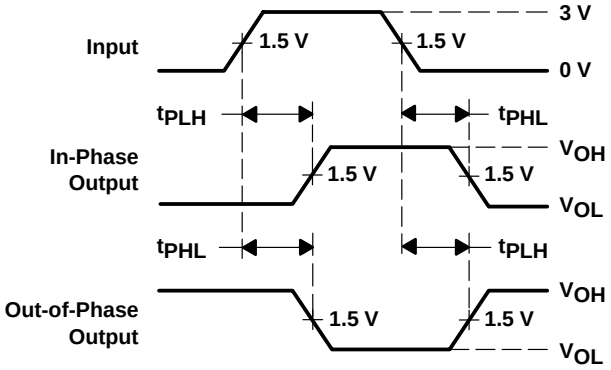
| TEST | S1 |
|---|---|
| $t_{PLH}/t_{PHL}$ | Open |
| $t_{PLZ}/t_{PZL}$ | 7 V |
| $t_{PHZ}/t_{PZH}$ | Open |



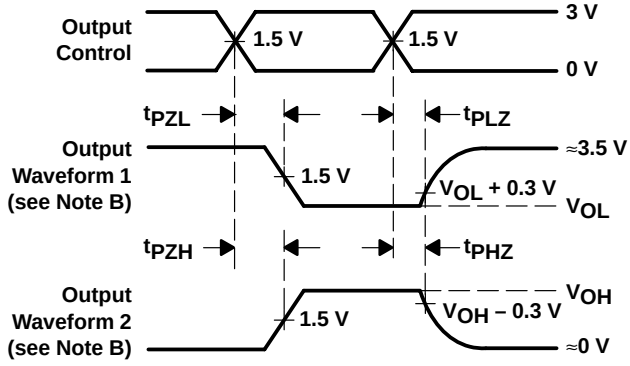

VOLTAGE WAVEFORMS
PULSE DURATION




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 part number | Status (1) | Material type (2) | Package \| Pins | Package qty \| Carrier | RoHS (3) | Lead finish/ Ball material (4) | MSL rating/ Peak reflow (5) | Op temp (°C) | Part marking (6) |
|---|---|---|---|---|---|---|---|---|---|
| CY74FCT2245ATPC | Active | Production | PDIP (N) \| 20 | 20 \| TUBE | Yes | NIPDAU | N/A for Pkg Type | -40 to 85 | 74FCT2245ATPC |
| CY74FCT2245ATPC.B | Active | Production | PDIP (N) \| 20 | 20 \| TUBE | Yes | NIPDAU | N/A for Pkg Type | -40 to 85 | 74FCT2245ATPC |
| CY74FCT2245ATPWR | Active | Production | TSSOP (PW) \| 20 | 2000 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | FR245AT |
| CY74FCT2245ATPWR.B | Active | Production | TSSOP (PW) \| 20 | 2000 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | FR245AT |
| CY74FCT2245ATQCT | Active | Production | SSOP (DBQ) \| 20 | 2500 \| LARGE T&R | Yes | NIPDAU | Level-2-260C-1 YEAR | -40 to 85 | FCT2245A |
| CY74FCT2245ATQCT.B | Active | Production | SSOP (DBQ) \| 20 | 2500 \| LARGE T&R | Yes | NIPDAU | Level-2-260C-1 YEAR | -40 to 85 | FCT2245A |
| CY74FCT2245ATSOC | Active | Production | SOIC (DW) \| 20 | 25 \| TUBE | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | FCT2245A |
| CY74FCT2245ATSOC.B | Active | Production | SOIC (DW) \| 20 | 25 \| TUBE | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | FCT2245A |
| CY74FCT2245ATSOCT | Active | Production | SOIC (DW) \| 20 | 2000 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | FCT2245A |
| CY74FCT2245ATSOCT.B | Active | Production | SOIC (DW) \| 20 | 2000 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | FCT2245A |
| CY74FCT2245CTQCT | Active | Production | SSOP (DBQ) \| 20 | 2500 \| LARGE T&R | Yes | NIPDAU | Level-2-260C-1 YEAR | -40 to 85 | FCT2245C |
| CY74FCT2245CTQCT.B | Active | Production | SSOP (DBQ) \| 20 | 2500 \| LARGE T&R | Yes | NIPDAU | Level-2-260C-1 YEAR | -40 to 85 | FCT2245C |
| CY74FCT2245CTSOCT | Active | Production | SOIC (DW) \| 20 | 2000 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | FCT2245C |
| CY74FCT2245CTSOCT.B | Active | Production | SOIC (DW) \| 20 | 2000 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | FCT2245C |
| CY74FCT2245TQCT | Active | Production | SSOP (DBQ) \| 20 | 2500 \| LARGE T&R | Yes | NIPDAU | Level-2-260C-1 YEAR | -40 to 85 | FCT2245 |
| CY74FCT2245TQCT.B | Active | Production | SSOP (DBQ) \| 20 | 2500 \| LARGE T&R | Yes | NIPDAU | Level-2-260C-1 YEAR | -40 to 85 | FCT2245 |
| CY74FCT2245TSOC | Active | Production | SOIC (DW) \| 20 | 25 \| TUBE | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | FCT2245 |
| CY74FCT2245TSOC.B | Active | Production | SOIC (DW) \| 20 | 25 \| TUBE | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | FCT2245 |
| CY74FCT2245TSOCT | Active | Production | SOIC (DW) \| 20 | 2000 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | FCT2245 |
| CY74FCT2245TSOCT.B | Active | Production | SOIC (DW) \| 20 | 2000 \| LARGE T&R | Yes | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | FCT2245 |

(1) **Status:** For more details on status, see our product life cycle.

(2) **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

(3) **RoHS values:** Yes, No, RoHS Exempt. See the TI RoHS Statement for additional information and value definition.

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

**(5) MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

**(6) Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

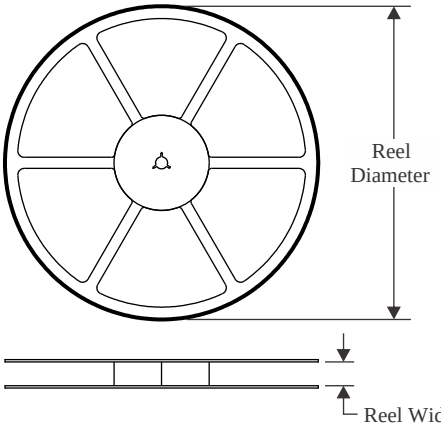
Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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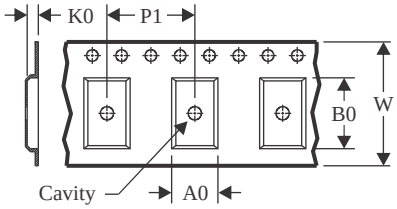
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## TAPE AND REEL INFORMATION

**REEL DIMENSIONS**

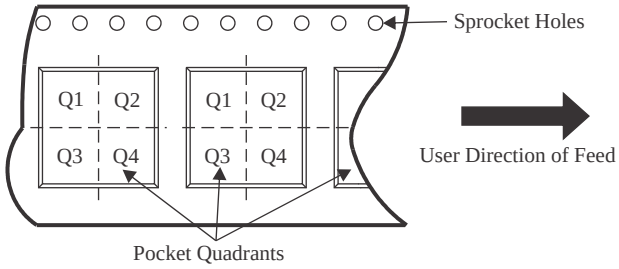



**TAPE DIMENSIONS**




| | |
|---|---|
| A0 | Dimension designed to accommodate the component width |
| B0 | Dimension designed to accommodate the component length |
| K0 | Dimension designed to accommodate the component thickness |
| W | Overall width of the carrier tape |
| P1 | Pitch between successive cavity centers |

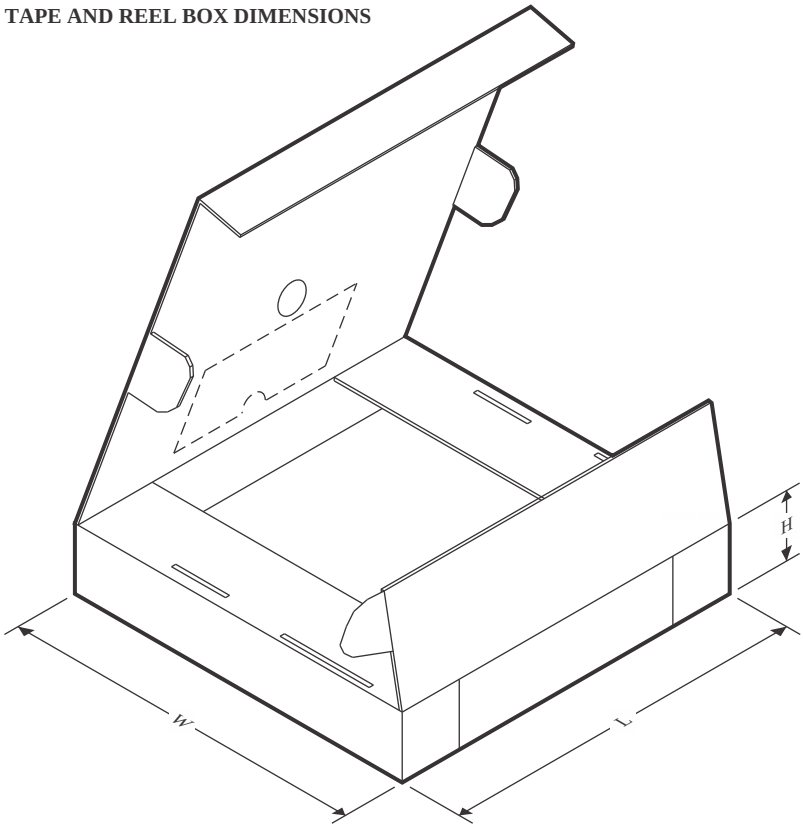
**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**




*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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CY74FCT2245ATPWR | TSSOP | PW | 20 | 2000 | 330.0 | 16.4 | 6.95 | 7.0 | 1.4 | 8.0 | 16.0 | Q1 |
| CY74FCT2245ATQCT | SSOP | DBQ | 20 | 2500 | 330.0 | 16.4 | 6.5 | 9.0 | 2.1 | 8.0 | 16.0 | Q1 |
| CY74FCT2245ATSOCT | SOIC | DW | 20 | 2000 | 330.0 | 24.4 | 10.8 | 13.3 | 2.7 | 12.0 | 24.0 | Q1 |
| CY74FCT2245CTQCT | SSOP | DBQ | 20 | 2500 | 330.0 | 16.4 | 6.5 | 9.0 | 2.1 | 8.0 | 16.0 | Q1 |
| CY74FCT2245CTSOCT | SOIC | DW | 20 | 2000 | 330.0 | 24.4 | 10.8 | 13.3 | 2.7 | 12.0 | 24.0 | Q1 |
| CY74FCT2245TQCT | SSOP | DBQ | 20 | 2500 | 330.0 | 16.4 | 6.5 | 9.0 | 2.1 | 8.0 | 16.0 | Q1 |
| CY74FCT2245TSOCT | SOIC | DW | 20 | 2000 | 330.0 | 24.4 | 10.8 | 13.3 | 2.7 | 12.0 | 24.0 | Q1 |

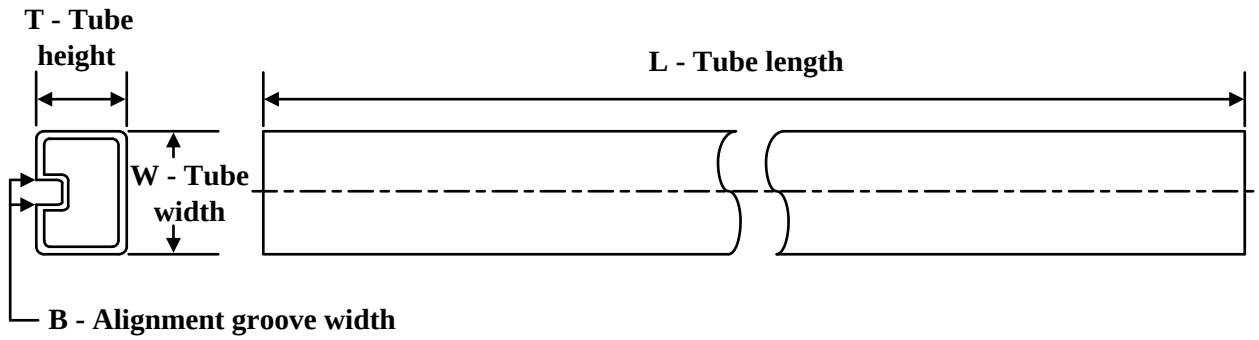
TAPE AND REEL BOX DIMENSIONS




*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Length (mm) | Width (mm) | Height (mm) |
|---|---|---|---|---|---|---|---|
| CY74FCT2245ATPWR | TSSOP | PW | 20 | 2000 | 353.0 | 353.0 | 32.0 |
| CY74FCT2245ATQCT | SSOP | DBQ | 20 | 2500 | 353.0 | 353.0 | 32.0 |
| CY74FCT2245ATSOCT | SOIC | DW | 20 | 2000 | 356.0 | 356.0 | 45.0 |
| CY74FCT2245CTQCT | SSOP | DBQ | 20 | 2500 | 353.0 | 353.0 | 32.0 |
| CY74FCT2245CTSOCT | SOIC | DW | 20 | 2000 | 356.0 | 356.0 | 45.0 |
| CY74FCT2245TQCT | SSOP | DBQ | 20 | 2500 | 353.0 | 353.0 | 32.0 |
| CY74FCT2245TSOCT | SOIC | DW | 20 | 2000 | 356.0 | 356.0 | 45.0 |

## TUBE



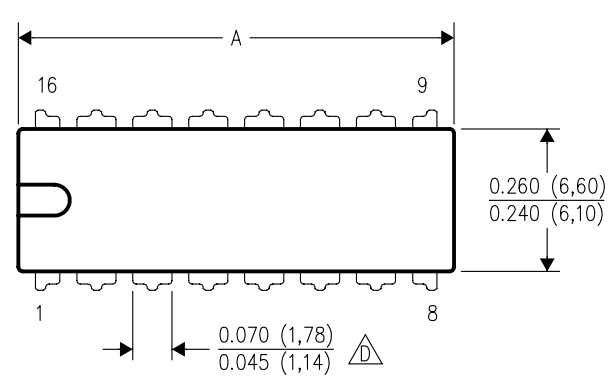

*All dimensions are nominal

| Device | Package Name | Package Type | Pins | SPQ | L (mm) | W (mm) | T (µm) | B (mm) |
|---|---|---|---|---|---|---|---|---|
| CY74FCT2245ATPC | N | PDIP | 20 | 20 | 506 | 13.97 | 11230 | 4.32 |
| CY74FCT2245ATPC.B | N | PDIP | 20 | 20 | 506 | 13.97 | 11230 | 4.32 |
| CY74FCT2245ATSOC | DW | SOIC | 20 | 25 | 507 | 12.83 | 5080 | 6.6 |
| CY74FCT2245ATSOC.B | DW | SOIC | 20 | 25 | 507 | 12.83 | 5080 | 6.6 |
| CY74FCT2245TSOC | DW | SOIC | 20 | 25 | 507 | 12.83 | 5080 | 6.6 |
| CY74FCT2245TSOC.B | DW | SOIC | 20 | 25 | 507 | 12.83 | 5080 | 6.6 |

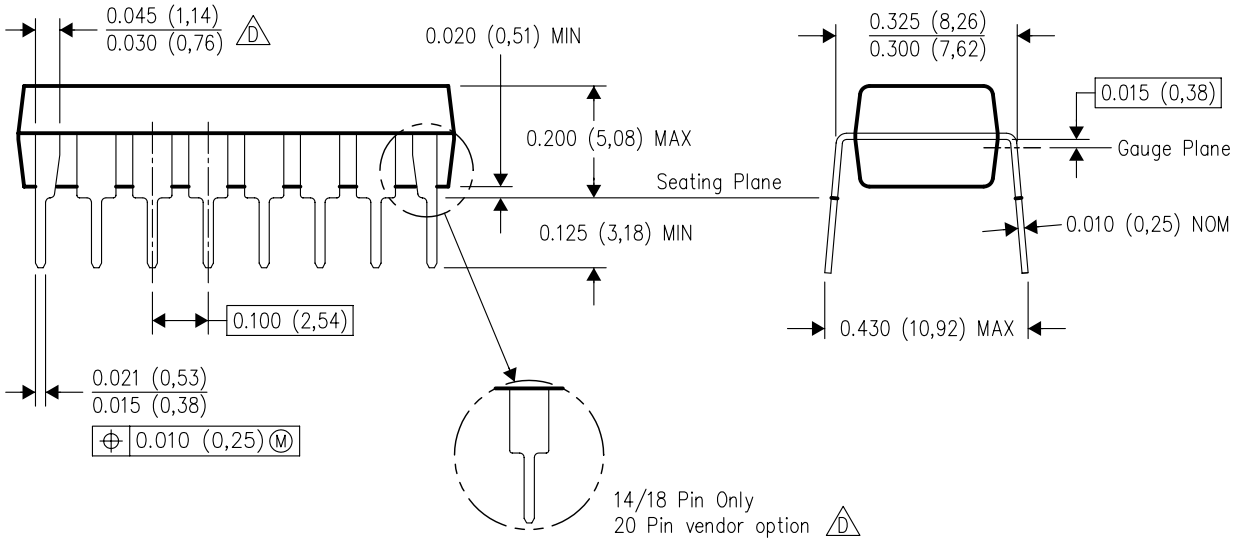
## N (R–PDIP–T**)

## PLASTIC DUAL–IN–LINE PACKAGE

16 PINS SHOWN




| DIM \ PINS ** | 14 | 16 | 18 | 20 |
|---|---|---|---|---|
| A MAX | 0.775 (19,69) | 0.775 (19,69) | 0.920 (23,37) | 1.060 (26,92) |
| A MIN | 0.745 (18,92) | 0.745 (18,92) | 0.850 (21,59) | 0.940 (23,88) |
| MS–001 VARIATION (C) | AA | BB | AC | AD |




4040049/E 12/2002

NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Falls within JEDEC MS–001, except 18 and 20 pin minimum body length (Dim A).
D. The 20 pin end lead shoulder width is a vendor option, either half or full width.

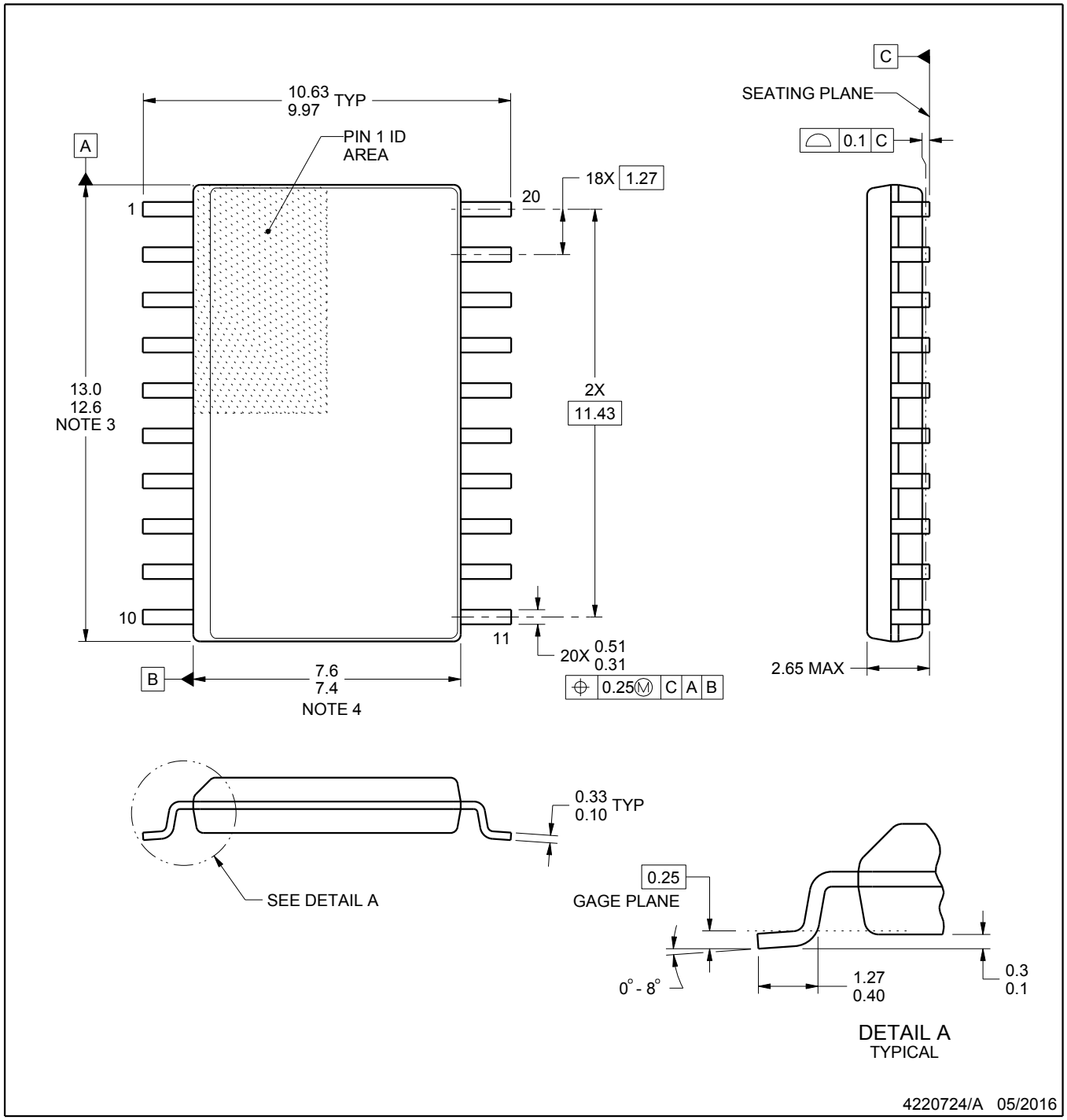


# PACKAGE OUTLINE

## DW0020A

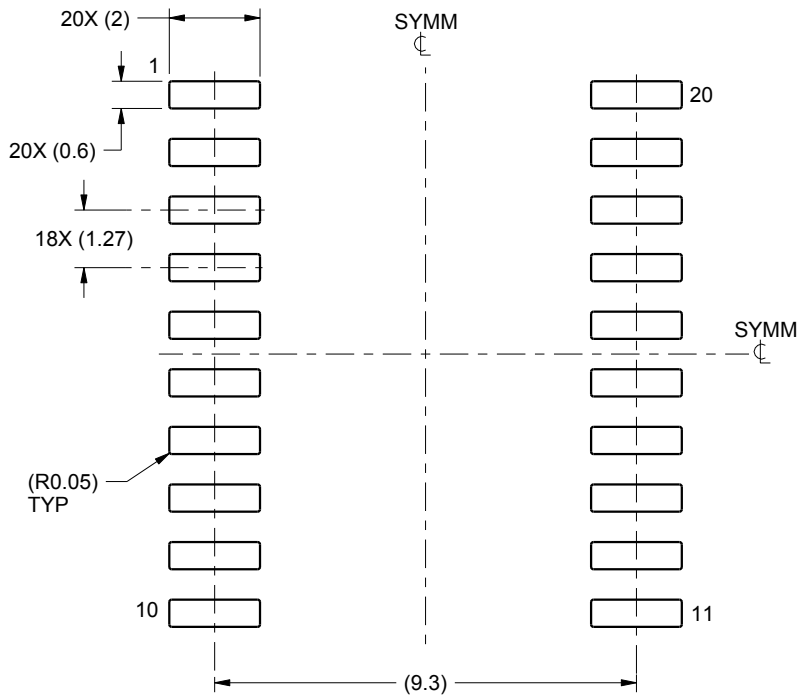
## SOIC - 2.65 mm max height

SOIC

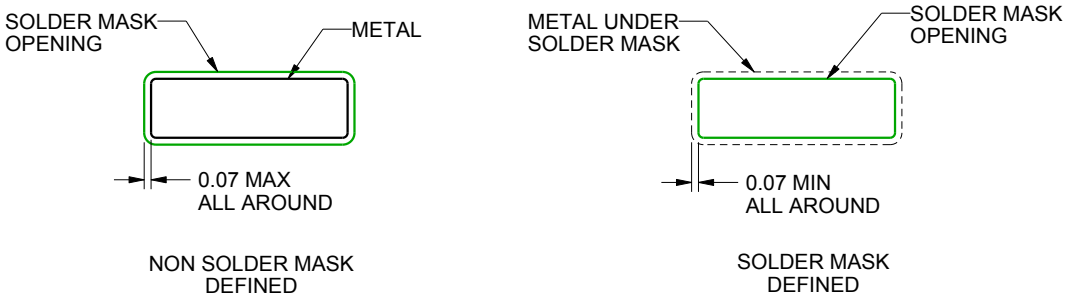



NOTES:

1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.43 mm per side.
5. Reference JEDEC registration MS-013.




LAND PATTERN EXAMPLE
SCALE:6X

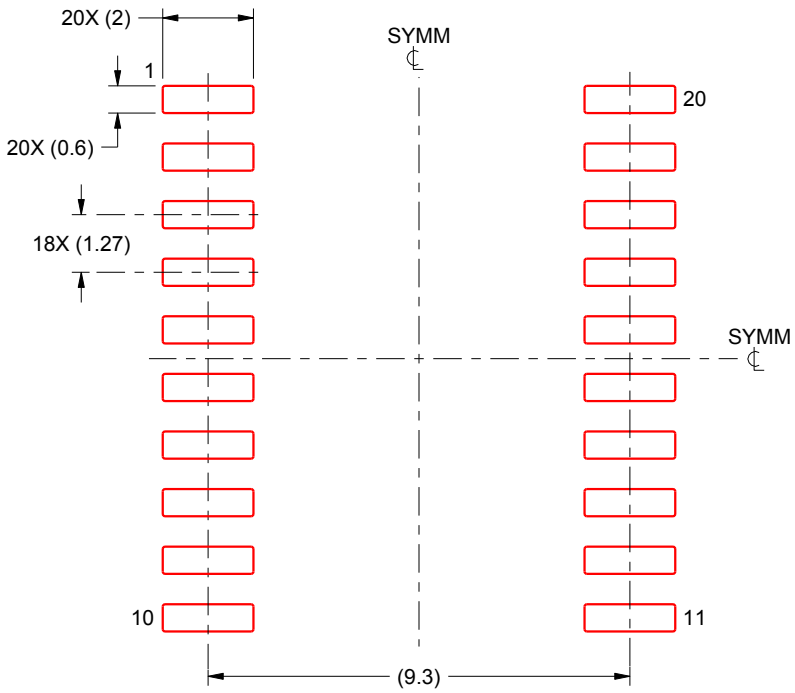



SOLDER MASK DETAILS

4220724/A 05/2016

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.




SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE:6X

4220724/A 05/2016

NOTES: (continued)

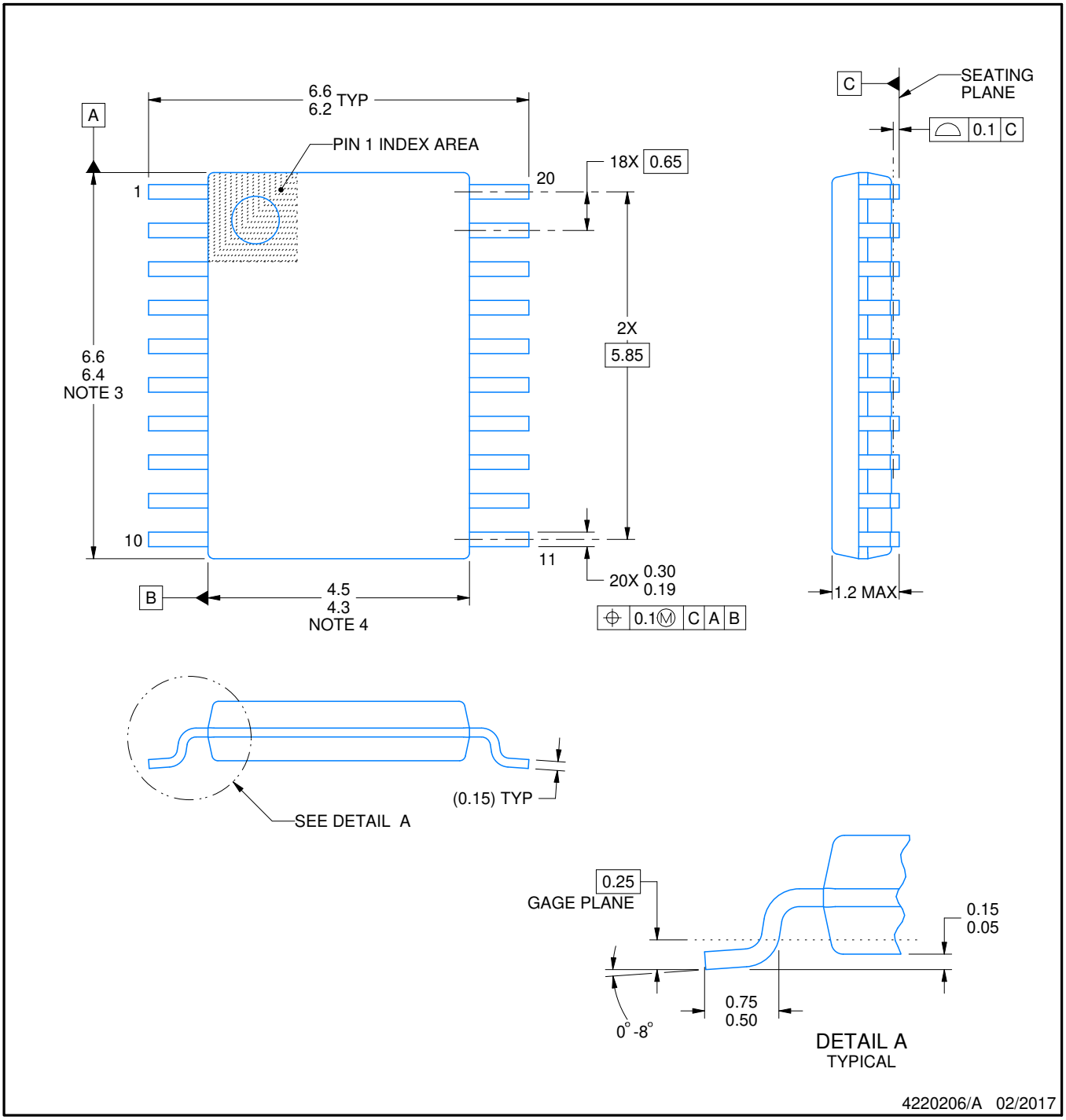
8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

# PACKAGE OUTLINE

## PW0020A

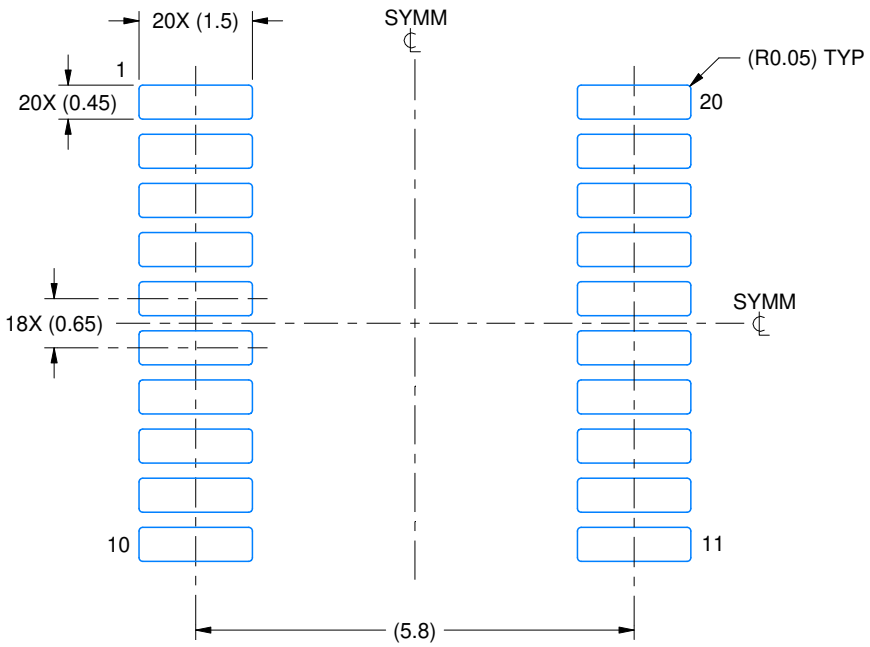
## TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE




NOTES:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
5. Reference JEDEC registration MO-153.




LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X

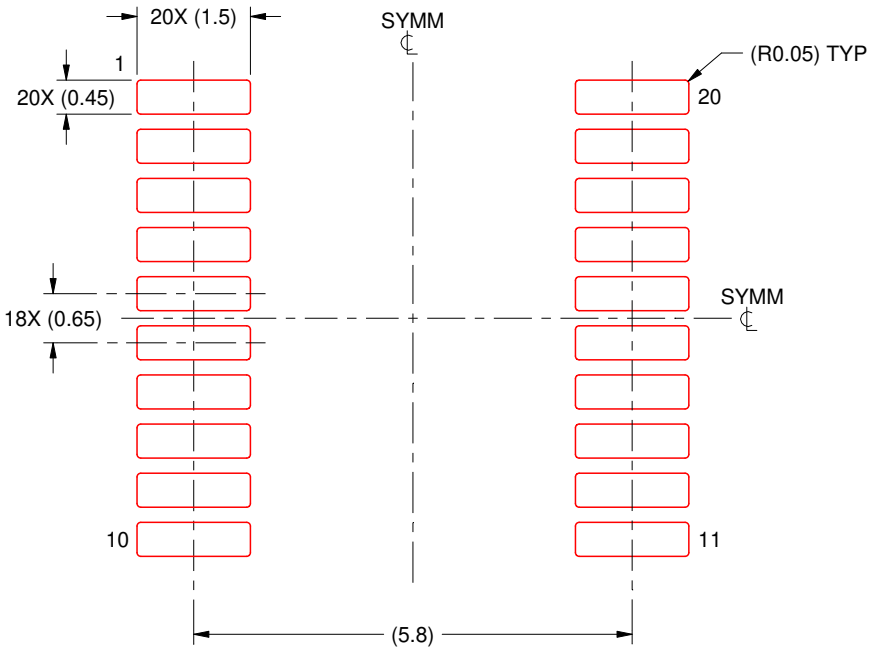



SOLDER MASK DETAILS

4220206/A 02/2017

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.



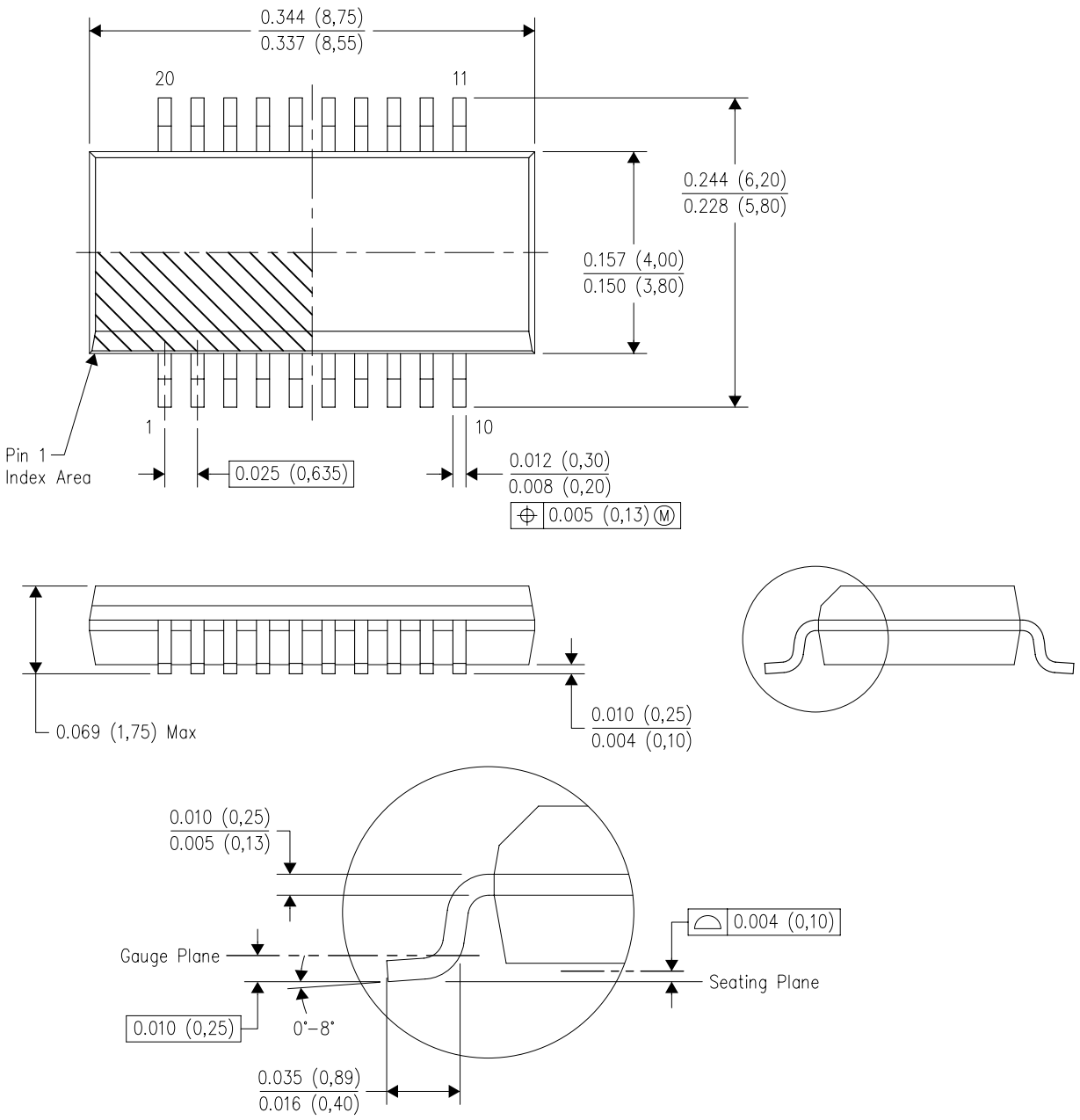

SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE: 10X

4220206/A 02/2017

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

DBQ (R–PDSO–G20) PLASTIC SMALL–OUTLINE PACKAGE




NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15) per side.
D. Falls within JEDEC MO–137 variation AD.

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Last updated 10/2025