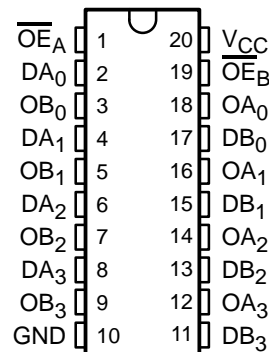


CY54FCT244T, CY74FCT244T 8-BIT BUFFERS/LINE DRIVERS WITH 3-STATE OUTPUTS

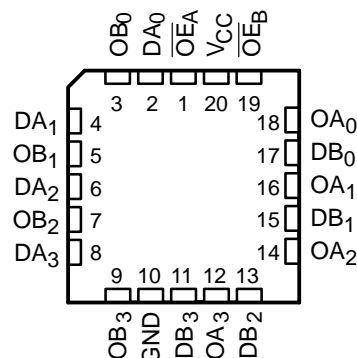
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- Function, Pinout, and Drive Compatible With FCT and F Logic
- Reduced V_{OH} (Typically = 3.3 V) Versions of Equivalent FCT Functions
- Edge-Rate Control Circuitry for Significantly Improved Noise Characteristics
- I_{off} Supports Partial-Power-Down 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
- CY54FCT244T
 - 48-mA Output Sink Current
 - 12-mA Output Source Current
- CY74FCT244T
 - 64-mA Output Sink Current
 - 32-mA Output Source Current
- 3-State Outputs

CY54FCT244T . . . D PACKAGE
CY74FCT244T . . . P, Q, OR SO PACKAGE
(TOP VIEW)



CY54FCT244T . . . L PACKAGE
(TOP VIEW)



description

The 'FCT244T devices are octal buffers and line drivers designed to be employed as memory address drivers, clock drivers, and bus-oriented transmitters/receivers. These devices provide speed and drive capabilities equivalent to their fastest bipolar logic counterparts, while reducing power consumption. The input and output voltage levels allow direct interface with TTL, NMOS, and CMOS devices without external components.

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.



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.

**TEXAS
INSTRUMENTS**

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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.

CY54FCT244T, CY74FCT244T
8-BIT BUFFERS/LINE DRIVERS
WITH 3-STATE OUTPUTS

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ORDERING INFORMATION

| T _A | PACKAGE† | | SPEED (ns) | ORDERABLE PART NUMBER | TOP-SIDE MARKING |
|----------------|----------------|---------------|------------|-----------------------|------------------|
| 0°C to 70°C | QSOP – Q | Tape and reel | 3.6 | CY74FCT244DTQCT | FCT244D |
| | SOIC – SO | Tube | 3.6 | CY74FCT244DTSOC | FCT244D |
| | | Tape and reel | 3.6 | CY74FCT244DTSOCT | |
| –40°C to 85°C | SOIC – SO | Tube | 4.1 | CY74FCT244CTSOC | FCT244C |
| | | Tape and reel | 4.1 | CY74FCT244CTSOCT | |
| | QSOP – Q | Tape and reel | 4.1 | CY74FCT244CTQCT | FCT244C |
| | DIP – P | Tube | 4.6 | CY74FCT244ATPC | CY74FCT244ATPC |
| | SOIC – SO | Tube | 4.6 | CY74FCT244ATSOC | FCT244A |
| | | Tape and reel | 4.6 | CY74FCT244ATSOCT | |
| | QSOP – Q | Tape and reel | 4.6 | CY74FCT244ATQCT | FCT244A |
| | SOIC – SO | Tube | 6.5 | CY74FCT244TSOC | FCT244 |
| | | Tape and reel | 6.5 | CY74FCT244TSOCT | |
| | QSOP – Q | Tape and reel | 6.5 | CY74FCT244TQCT | FCT244 |
| | –55°C to 125°C | CDIP – D | Tube | 4.6 | CY54FCT244CTDMB |
| LCC – L | | Tube | 4.6 | CY54FCT244CTLMB | |
| CDIP – D | | Tube | 5.1 | CY54FCT244ATDMB | |
| LCC – L | | Tube | 5.1 | CY54FCT244ATLMB | |
| CDIP – D | | Tube | 7 | CY54FCT244TDMB | |
| LCC – L | | Tube | 7 | CY54FCT244TLMB | |

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

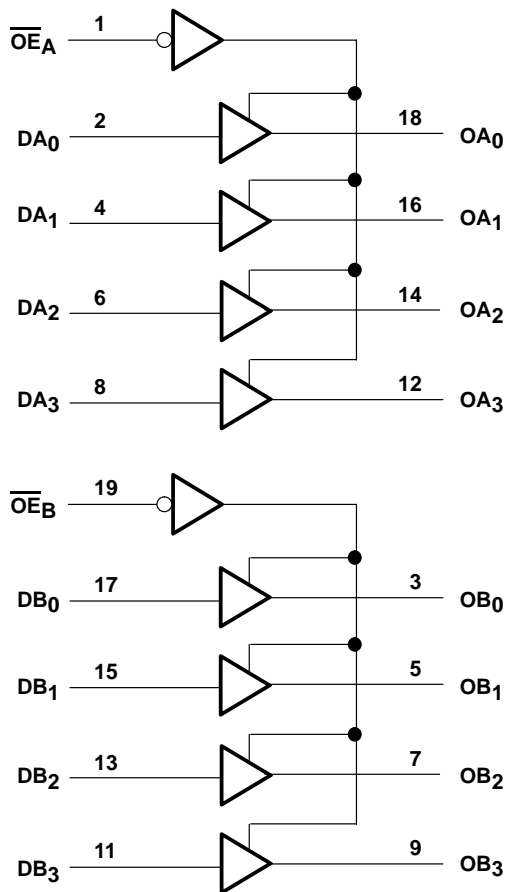
FUNCTION TABLE

| INPUTS | | | OUTPUT |
|-------------------|-------------------|---|--------|
| \overline{OE}_A | \overline{OE}_B | D | O |
| L | L | L | L |
| L | L | H | H |
| H | 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 rating 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, θ_{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.

CY54FCT244T, CY74FCT244T
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recommended operating conditions (see Note 2)

| | CY54FCT244T | | | CY74FCT244DT | | | CY74FCT244T | | | UNIT | | | |
|---|-------------|-----|-----|--------------|-----|------|-------------|-----|------|------|-----|----|----|
| | MIN | NOM | MAX | MIN | NOM | MAX | MIN | NOM | MAX | | | | |
| V _{CC} Supply voltage | 4.5 | 5 | 5.5 | 4.75 | 5 | 5.25 | 4.75 | 5 | 5.25 | V | | | |
| V _{IH} High-level input voltage | 2 | | | 2 | | | 2 | | | V | | | |
| V _{IL} Low-level input voltage | 0.8 | | | 0.8 | | | 0.8 | | | V | | | |
| I _{OH} High-level output current | -12 | | | -32 | | | -32 | | | mA | | | |
| I _{OL} Low-level output current | 48 | | | 64 | | | 64 | | | mA | | | |
| T _A Operating free-air temperature | -55 | | | 125 | | | 0 | | | 70 | -40 | 85 | °C |

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



CY54FCT244T, CY74FCT244T
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electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

| PARAMETER | TEST CONDITIONS | CY54FCT244T | | CY74FCT244T | | UNIT | |
|--------------------|--|--------------------------|------|-------------|------|------|------------|
| | | MIN | TYP† | MAX | MIN | | TYP† |
| 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 | | | | 2 | | |
| | | I _{OH} = -32 mA | | | | 2.4 | |
| V _{OL} | V _{CC} = 4.5 V, I _{OL} = 48 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 | |
| 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, One input switching at 50% duty cycle, Outputs open, $\overline{OE}_A = \overline{OE}_B = \text{GND}$, V _{IN} ≤ 0.2 V or V _{IN} ≥ V _{CC} - 0.2 V | | 0.06 | 0.12 | | | mA/ MHz |
| | V _{CC} = 5.25 V, One input switching at 50% duty cycle, Outputs open, $\overline{OE}_A = \overline{OE}_B = \text{GND}$, 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.



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

| PARAMETER | TEST CONDITIONS | | CY54FCT244T | | CY74FCT244T | | UNIT | |
|------------------|---|---|---|------|-------------|-----|------|------|
| | | | MIN | TYP† | MAX | MIN | | TYP† |
| I _C # | V _{CC} = 5.5 V, Outputs open, OE _A = OE _B = GND | 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 _A = OE _B = GND | 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 | | | | 5 | 10 | 5 | 10 | pF |
| C _o | | | | 9 | 12 | 9 | 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.



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

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | CY54FCT244T | | CY54FCT244AT | | CY54FCT244CT | | UNIT |
|------------------|-----------------|-------------|-------------|-----|--------------|-----|--------------|-----|------|
| | | | MIN | MAX | MIN | MAX | MIN | MAX | |
| t _{PLH} | D | O | 1.5 | 7 | 1.5 | 5.1 | 1.5 | 4.6 | ns |
| t _{PHL} | | | 1.5 | 7 | 1.5 | 5.1 | 1.5 | 4.6 | |
| t _{PZH} | \overline{OE} | O | 1.5 | 8.5 | 1.5 | 6.5 | 1.5 | 6.5 | ns |
| t _{PZL} | | | 1.5 | 8.5 | 1.5 | 6.5 | 1.5 | 6.5 | |
| t _{PHZ} | \overline{OE} | O | 1.5 | 7.5 | 1.5 | 5.9 | 1.5 | 5.7 | ns |
| t _{PLZ} | | | 1.5 | 7.5 | 1.5 | 5.9 | 1.5 | 5.7 | |

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

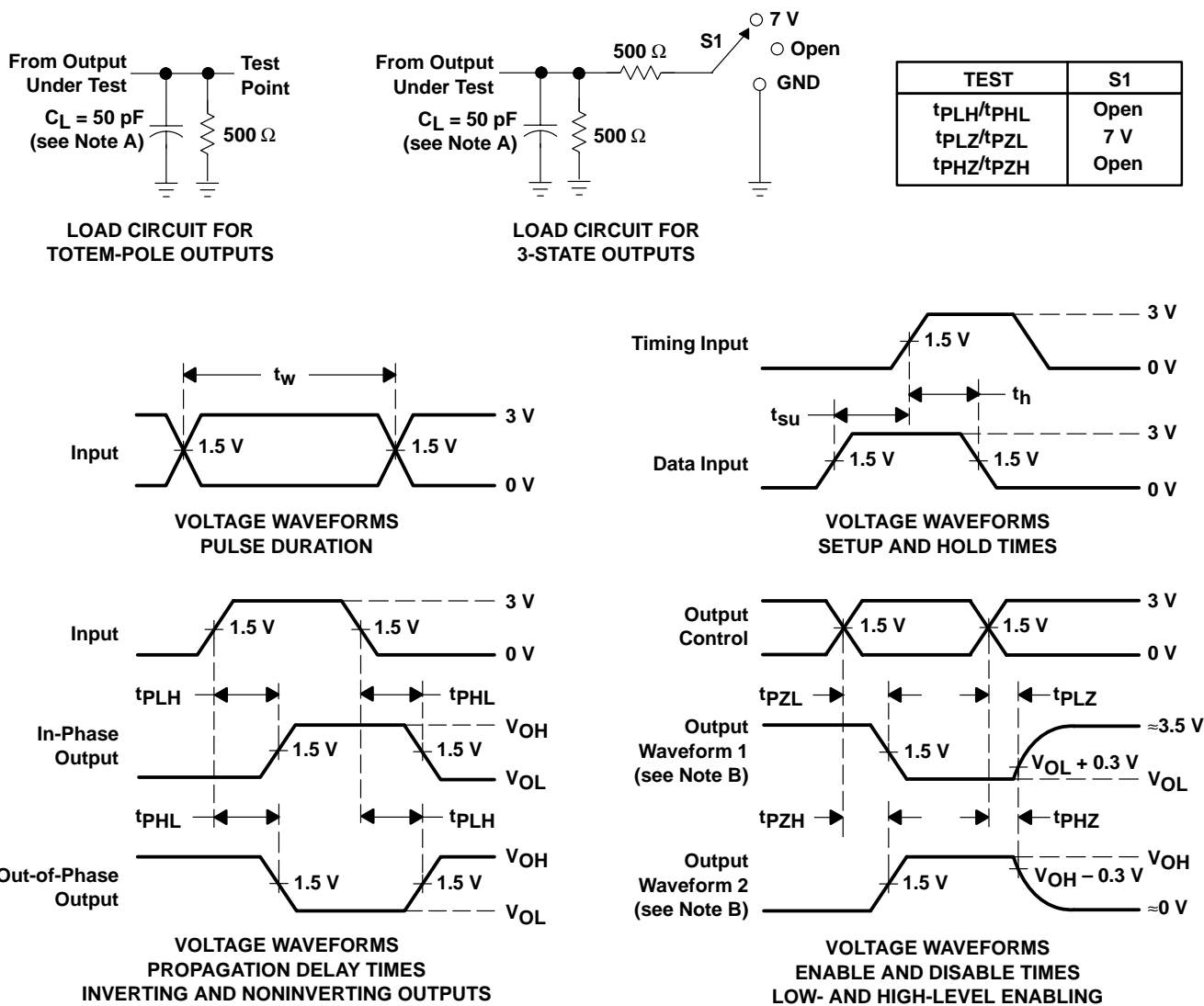
| PARAMETER | FROM (INPUT) | TO (OUTPUT) | CY74FCT244T | | CY74FCT244AT | | CY74FCT244CT | | CY74FCT244DT | | UNIT |
|------------------|-----------------|-------------|-------------|-----|--------------|-----|--------------|-----|--------------|-----|------|
| | | | MIN | MAX | MIN | MAX | MIN | MAX | MIN | MAX | |
| t _{PLH} | D | O | 1.5 | 6.5 | 1.5 | 4.6 | 1.5 | 4.1 | 1.5 | 3.6 | ns |
| t _{PHL} | | | 1.5 | 6.5 | 1.5 | 4.6 | 1.5 | 4.1 | 1.5 | 3.6 | |
| t _{PZH} | \overline{OE} | O | 1.5 | 8 | 1.5 | 6.2 | 1.5 | 5.8 | 1.5 | 4.8 | ns |
| t _{PZL} | | | 1.5 | 8 | 1.5 | 6.2 | 1.5 | 5.8 | 1.5 | 4.8 | |
| t _{PHZ} | \overline{OE} | O | 1.5 | 7 | 1.5 | 5.6 | 1.5 | 5.2 | 1.5 | 4 | ns |
| t _{PLZ} | | | 1.5 | 7 | 1.5 | 5.6 | 1.5 | 5.2 | 1.5 | 4 | |



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PARAMETER MEASUREMENT INFORMATION



- 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 finish/ Ball material (6) | MSL Peak Temp (3) | Op Temp (°C) | Device Marking (4/5) | Samples |
|------------------|---------------|--------------|-----------------|------|-------------|---------------------|--------------------------------------|----------------------|--------------|--|-------------------------|
| 5962-9220301M2A | ACTIVE | LCCC | FK | 20 | 1 | Non-RoHS & Green | SNPB | N / A for Pkg Type | -55 to 125 | 5962- 9220301M2A CY54FCT 244TLMB | Samples |
| 5962-9220301MRA | ACTIVE | CDIP | J | 20 | 1 | Non-RoHS & Green | SNPB | N / A for Pkg Type | -55 to 125 | 5962-9220301MR A CY54FCT244TDMB | Samples |
| 5962-9220301MSA | ACTIVE | CFP | W | 20 | 1 | Non-RoHS & Green | SNPB | N / A for Pkg Type | -55 to 125 | 5962-9220301MS A CY54FCT244TW | Samples |
| 5962-9220302M2A | ACTIVE | LCCC | FK | 20 | 1 | Non-RoHS & Green | SNPB | N / A for Pkg Type | -55 to 125 | 5962- 9220302M2A CY54FCT 244ATLMB | Samples |
| 5962-9220302MRA | ACTIVE | CDIP | J | 20 | 1 | Non-RoHS & Green | SNPB | N / A for Pkg Type | -55 to 125 | 5962-9220302MR A CY54FCT244ATDM B | Samples |
| 5962-9220302MSA | ACTIVE | CFP | W | 20 | 1 | Non-RoHS & Green | SNPB | N / A for Pkg Type | -55 to 125 | 5962-9220302MS A CY54FCT244ATW | Samples |
| 5962-9220303M2A | ACTIVE | LCCC | FK | 20 | 1 | Non-RoHS & Green | SNPB | N / A for Pkg Type | -55 to 125 | 5962- 9220303M2A | Samples |
| 5962-9220303MRA | ACTIVE | CDIP | J | 20 | 1 | Non-RoHS & Green | SNPB | N / A for Pkg Type | -55 to 125 | 5962-9220303MR A CY54FCT244CTDM B | Samples |
| CY54FCT244ATDMB | ACTIVE | CDIP | J | 20 | 1 | Non-RoHS & Green | SNPB | N / A for Pkg Type | -55 to 125 | 5962-9220302MR A CY54FCT244ATDM B | Samples |
| CY54FCT244ATLMB | ACTIVE | LCCC | FK | 20 | 1 | Non-RoHS & Green | SNPB | N / A for Pkg Type | -55 to 125 | 5962- 9220302M2A CY54FCT 244ATLMB | Samples |

| Orderable Device | Status (1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan (2) | Lead finish/ Ball material (6) | MSL Peak Temp (3) | Op Temp (°C) | Device Marking (4/5) | Samples |
|-------------------|---------------|--------------|-----------------|------|-------------|------------------|--------------------------------------|----------------------|--------------|--|-------------------------|
| CY54FCT244ATW | ACTIVE | CFP | W | 20 | 1 | Non-RoHS & Green | SNPB | N / A for Pkg Type | -55 to 125 | 5962-9220302MS A CY54FCT244ATW | Samples |
| CY54FCT244CTDMB | ACTIVE | CDIP | J | 20 | 1 | Non-RoHS & Green | SNPB | N / A for Pkg Type | -55 to 125 | 5962-9220303MR A CY54FCT244CTDM B | Samples |
| CY54FCT244TDMB | ACTIVE | CDIP | J | 20 | 1 | Non-RoHS & Green | SNPB | N / A for Pkg Type | -55 to 125 | 5962-9220301MR A CY54FCT244TDMB | Samples |
| CY54FCT244TLMB | ACTIVE | LCCC | FK | 20 | 1 | Non-RoHS & Green | SNPB | N / A for Pkg Type | -55 to 125 | 5962- 9220301M2A CY54FCT 244TLMB | Samples |
| CY54FCT244TW | ACTIVE | CFP | W | 20 | 1 | Non-RoHS & Green | SNPB | N / A for Pkg Type | -55 to 125 | 5962-9220301MS A CY54FCT244TW | Samples |
| CY74FCT244ATPC | ACTIVE | PDIP | N | 20 | 20 | RoHS & Non-Green | NIPDAU | N / A for Pkg Type | -40 to 85 | CY74FCT244ATPC | Samples |
| CY74FCT244ATQCT | ACTIVE | SSOP | DBQ | 20 | 2500 | RoHS & Green | NIPDAU | Level-2-260C-1 YEAR | -40 to 85 | FCT244A | Samples |
| CY74FCT244ATQCTE4 | ACTIVE | SSOP | DBQ | 20 | 2500 | RoHS & Green | NIPDAU | Level-2-260C-1 YEAR | -40 to 85 | FCT244A | Samples |
| CY74FCT244ATSOC | ACTIVE | SOIC | DW | 20 | 25 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | FCT244A | Samples |
| CY74FCT244ATSOCT | ACTIVE | SOIC | DW | 20 | 2000 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | FCT244A | Samples |
| CY74FCT244CTQCT | ACTIVE | SSOP | DBQ | 20 | 2500 | RoHS & Green | NIPDAU | Level-2-260C-1 YEAR | -40 to 85 | FCT244C | Samples |
| CY74FCT244CTSOC | ACTIVE | SOIC | DW | 20 | 25 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | FCT244C | Samples |
| CY74FCT244DTSOC | ACTIVE | SOIC | DW | 20 | 25 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | FCT244D | Samples |
| CY74FCT244DTSOCT | ACTIVE | SOIC | DW | 20 | 2000 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | FCT244D | Samples |
| CY74FCT244TQCT | ACTIVE | SSOP | DBQ | 20 | 2500 | RoHS & Green | NIPDAU | Level-2-260C-1 YEAR | -40 to 85 | FCT244 | Samples |
| CY74FCT244TSOC | ACTIVE | SOIC | DW | 20 | 25 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | FCT244 | Samples |

| Orderable Device | Status (1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan (2) | Lead finish/ Ball material (6) | MSL Peak Temp (3) | Op Temp (°C) | Device Marking (4/5) | Samples |
|------------------|---------------|--------------|-----------------|------|-------------|-----------------|--------------------------------------|----------------------|--------------|-------------------------|---------|
| CY74FCT244TSOCT | ACTIVE | SOIC | DW | 20 | 2000 | RoHS & Green | NIPDAU | Level-1-260C-UNLIM | -40 to 85 | FCT244 | 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 <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm 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 finish/Ball material - Orderable Devices 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.

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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 |
|------------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| CY74FCT244ATQCT | SSOP | DBQ | 20 | 2500 | 330.0 | 16.4 | 6.5 | 9.0 | 2.1 | 8.0 | 16.0 | Q1 |
| CY74FCT244ATSOCT | SOIC | DW | 20 | 2000 | 330.0 | 24.4 | 10.8 | 13.3 | 2.7 | 12.0 | 24.0 | Q1 |
| CY74FCT244CTQCT | SSOP | DBQ | 20 | 2500 | 330.0 | 16.4 | 6.5 | 9.0 | 2.1 | 8.0 | 16.0 | Q1 |
| CY74FCT244DTSOCT | SOIC | DW | 20 | 2000 | 330.0 | 24.4 | 10.8 | 13.3 | 2.7 | 12.0 | 24.0 | Q1 |
| CY74FCT244TQCT | SSOP | DBQ | 20 | 2500 | 330.0 | 16.4 | 6.5 | 9.0 | 2.1 | 8.0 | 16.0 | Q1 |
| CY74FCT244TSOCT | 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) |
|------------------|--------------|-----------------|------|------|-------------|------------|-------------|
| CY74FCT244ATQCT | SSOP | DBQ | 20 | 2500 | 356.0 | 356.0 | 35.0 |
| CY74FCT244ATSOCT | SOIC | DW | 20 | 2000 | 367.0 | 367.0 | 45.0 |
| CY74FCT244CTQCT | SSOP | DBQ | 20 | 2500 | 356.0 | 356.0 | 35.0 |
| CY74FCT244DTSOCT | SOIC | DW | 20 | 2000 | 367.0 | 367.0 | 45.0 |
| CY74FCT244TQCT | SSOP | DBQ | 20 | 2500 | 356.0 | 356.0 | 35.0 |
| CY74FCT244TSOCT | SOIC | DW | 20 | 2000 | 367.0 | 367.0 | 45.0 |

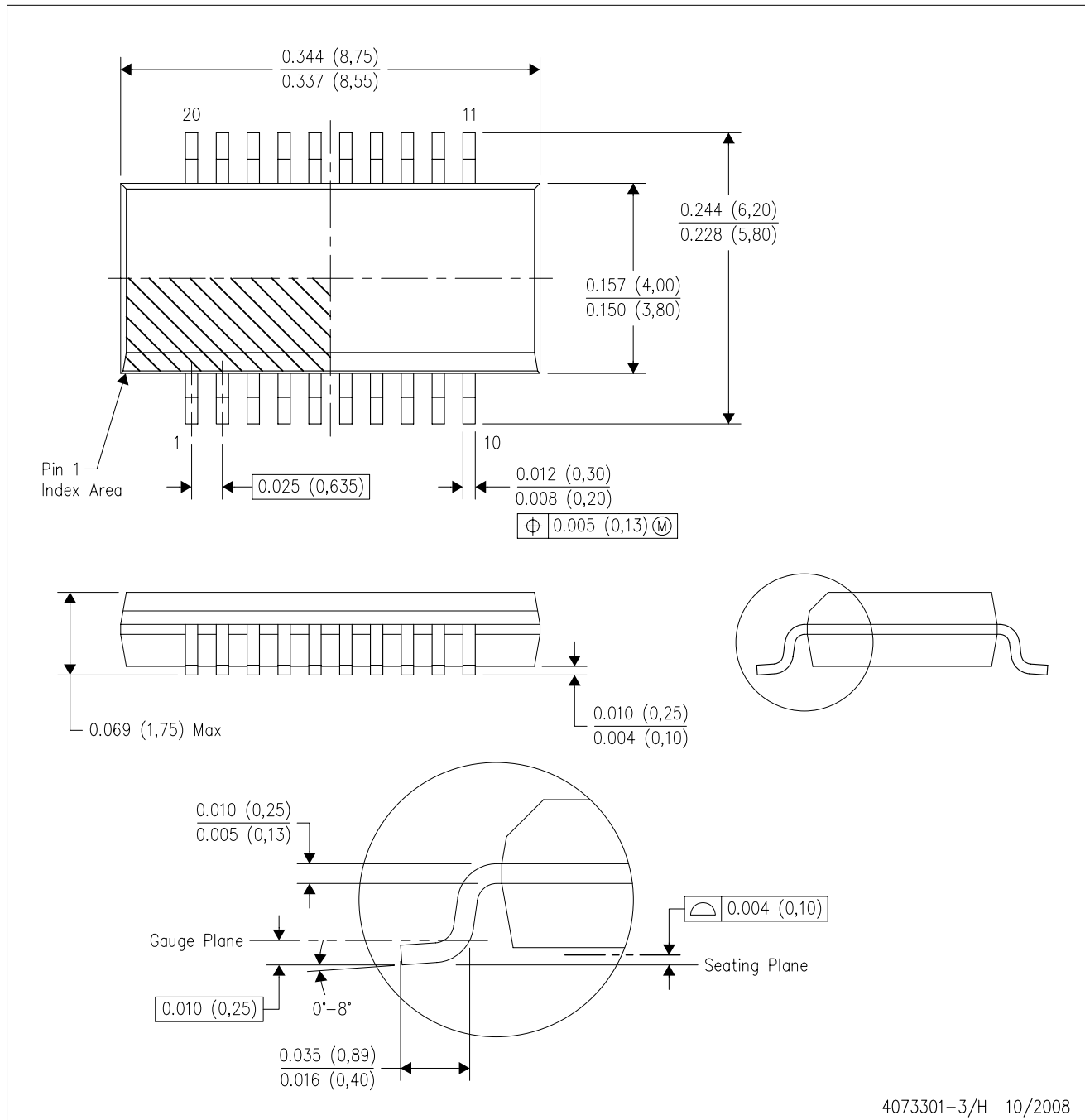
TUBE


*All dimensions are nominal

| Device | Package Name | Package Type | Pins | SPQ | L (mm) | W (mm) | T (μm) | B (mm) |
|-----------------|--------------|--------------|------|-----|--------|--------|--------|--------|
| 5962-9220301M2A | FK | LCCC | 20 | 1 | 506.98 | 12.06 | 2030 | NA |
| 5962-9220301MSA | W | CFP | 20 | 1 | 506.98 | 26.16 | 6220 | NA |
| 5962-9220302M2A | FK | LCCC | 20 | 1 | 506.98 | 12.06 | 2030 | NA |
| 5962-9220302MSA | W | CFP | 20 | 1 | 506.98 | 26.16 | 6220 | NA |
| 5962-9220303M2A | FK | LCCC | 20 | 1 | 506.98 | 12.06 | 2030 | NA |
| CY54FCT244ATLMB | FK | LCCC | 20 | 1 | 506.98 | 12.06 | 2030 | NA |
| CY54FCT244ATW | W | CFP | 20 | 1 | 506.98 | 26.16 | 6220 | NA |
| CY54FCT244TLMB | FK | LCCC | 20 | 1 | 506.98 | 12.06 | 2030 | NA |
| CY54FCT244TW | W | CFP | 20 | 1 | 506.98 | 26.16 | 6220 | NA |
| CY74FCT244ATPC | N | PDIP | 20 | 20 | 506 | 13.97 | 11230 | 4.32 |
| CY74FCT244ATSOC | DW | SOIC | 20 | 25 | 507 | 12.83 | 5080 | 6.6 |
| CY74FCT244CTSOC | DW | SOIC | 20 | 25 | 507 | 12.83 | 5080 | 6.6 |
| CY74FCT244DTSOC | DW | SOIC | 20 | 25 | 507 | 12.83 | 5080 | 6.6 |
| CY74FCT244TSOC | DW | SOIC | 20 | 25 | 507 | 12.83 | 5080 | 6.6 |

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.

J (R-GDIP-T**)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



| DIM \ PINS ** | 14 | 16 | 18 | 20 |
|---------------|------------------------|------------------------|------------------------|------------------------|
| A | 0.300 (7,62) BSC | 0.300 (7,62) BSC | 0.300 (7,62) BSC | 0.300 (7,62) BSC |
| B MAX | 0.785 (19,94) | .840 (21,34) | 0.960 (24,38) | 1.060 (26,92) |
| B MIN | — | — | — | — |
| C MAX | 0.300 (7,62) | 0.300 (7,62) | 0.310 (7,87) | 0.300 (7,62) |
| C MIN | 0.245 (6,22) | 0.245 (6,22) | 0.220 (5,59) | 0.245 (6,22) |



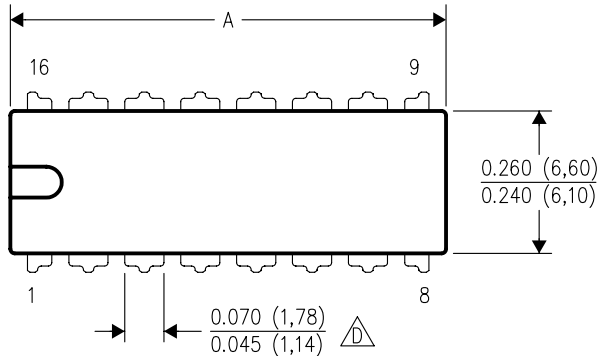
4040083/F 03/03

- NOTES:
- All linear dimensions are in inches (millimeters).
 - This drawing is subject to change without notice.
 - This package is hermetically sealed with a ceramic lid using glass frit.
 - Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
 - Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

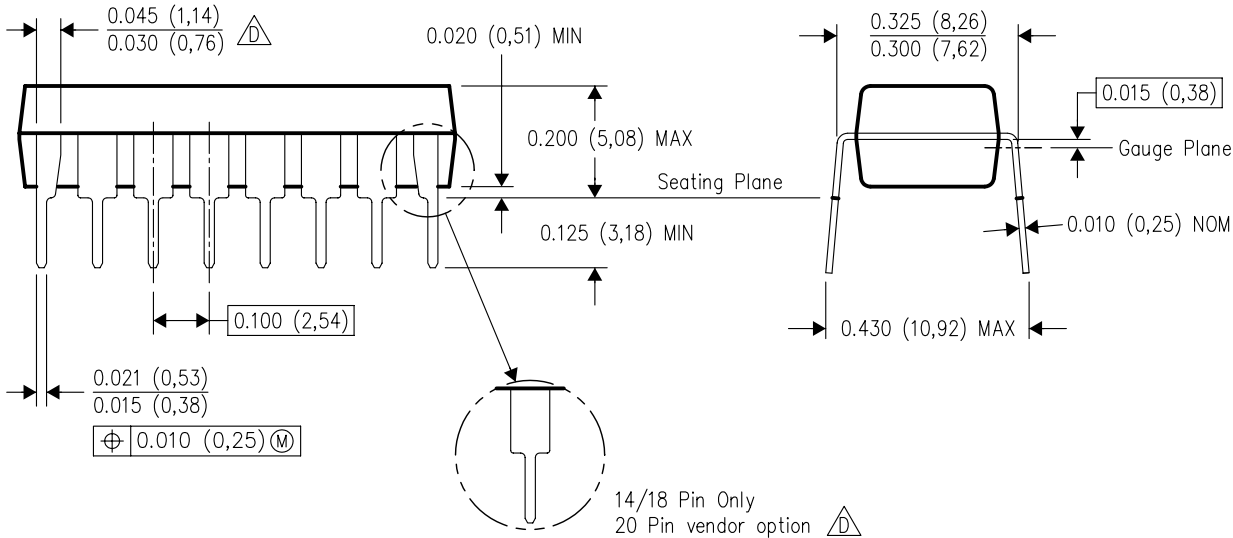
N (R-PDIP-T**)

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) |
| A MIN | 0.745 (18,92) | 0.745 (18,92) | 0.850 (21,59) | 0.940 (23,88) |
| MS-001 VARIATION | AA | BB | AC | AD |



- 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.

4040049/E 12/2002

DW0020A



PACKAGE OUTLINE

SOIC - 2.65 mm max height

SOIC



4220724/A 05/2016

NOTES:

- All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
- This drawing is subject to change without notice.
- 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.
- This dimension does not include interlead flash. Interlead flash shall not exceed 0.43 mm per side.
- Reference JEDEC registration MS-013.

EXAMPLE BOARD LAYOUT

DW0020A

SOIC - 2.65 mm max height

SOIC



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.

EXAMPLE STENCIL DESIGN

DW0020A

SOIC - 2.65 mm max height

SOIC



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.

W (R-GDFP-F20)

CERAMIC DUAL FLATPACK



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. This package can be hermetically sealed with a ceramic lid using glass frit.
 - D. Index point is provided on cap for terminal identification only.
 - E. Falls within Mil-Std 1835 GDFP2-F20

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