SCCS075 - OCTOBER 2001

- Function and Pinout Compatible With the Fastest Bipolar Logic
- 25-Ω Output Series Resistors Reduce Transmission-Line Reflection Noise
- Reduced V<sub>OH</sub> (Typically = 3.3 V) Version of Equivalent FCT Functions
- Edge-Rate Control Circuitry for Significantly Improved Noise Characteristics
- I<sub>off</sub> Supports Partial-Power-Down Mode Operation
- Matched Rise and Fall Times
- 3-State Outputs
- ESD Protection Exceeds JESD 22
  - 2000-V Human-Body Model (A114-A)
  - 200-V Machine Model (A115-A)
  - 1000-V Charged-Device Model (C101)
- Fully Compatible With TTL Input and Output Logic Levels
- 12-mA Output Sink Current
   15-mA Output Source Current

#### Q OR SO PACKAGE (TOP VIEW) 20 🛮 V<sub>CC</sub> OE [ $D_0 \square_2$ 19 O<sub>0</sub> D<sub>1</sub> [] 3 18 O<sub>1</sub> $D_2 \prod 4$ 17 ¶ O<sub>2</sub> $D_3 \, \square \, 5$ 16 O<sub>3</sub> $D_4 \prod 6$ 15**∏** O₄ D<sub>5</sub> [] 7 14 O<sub>5</sub> D<sub>6</sub> [] 8 13 O<sub>6</sub> D<sub>7</sub> [] 9 12 O<sub>7</sub> GND [] 10 11 **∏** LE

#### description

The CY74FCT2573T is an 8-bit, high-speed CMOS, TTL-compatible buffered latch with 3-state outputs that is ideal for driving high-capacitance loads, such as memory and address buffers. On-chip 25- $\Omega$  termination resistors at the outputs reduce system noise caused by reflections. The CY74FCT2573T can replace the CY74FCT573T to reduce noise in an existing design.

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.

This device is fully specified for partial-power-down applications using I<sub>off</sub>. The I<sub>off</sub> circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.

#### **ORDERING INFORMATION**

TA	PACI	KAGE†	SPEED (ns)	ORDERABLE PART NUMBER	TOP-SIDE MARKING	
	QSOP - Q	P – Q Tape and reel 4.7 CY74FCT2573CTQCT				
SOIC	SOIC - SO	Tube 4.7 CY74FCT2573CTSOC		FCT2573C		
-40°C to 85°C	3010 – 30	Tape and reel	4.7	CY74FCT2573CTSOCT	FC12573C	
-40 C 10 65 C	QSOP – Q	Tape and reel	5.2	CY74FCT2573ATQCT	FCT2573A	
	SOIC - SO	Tube	8	CY74FCT2573TSOC	FCT2573	
	3010 - 30	Tape and reel	8	CY74FCT2573TSOCT	FC125/3	

<sup>†</sup> 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.

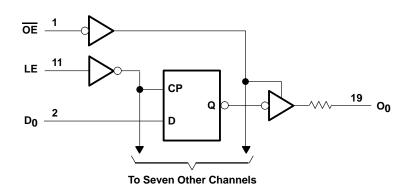


#### **FUNCTION TABLE**

	INPUTS		OUTPUT
OE	LE	D	0
L	Н	Н	Н
L	Н	L	L
L	L	Χ	Q <sub>0</sub>
Н	X	Χ	Z

H = High logic level, L = Low logic level, X = Don't care, Z = High-impedance state,  $Q_0$  = Previous state of flip flops  $(Q_{0-1})$ 

#### logic diagram



## 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	$\dots$ -0.5 V to 7 V
DC output voltage range	$\dots$ -0.5 V to 7 V
DC output current (maximum sink current/pin)	120 mA
Package thermal impedance, θ <sub>JA</sub> (see Note 1): Q package	68°C/W
SO package	58°C/W
Ambient temperature range with power applied, T <sub>A</sub>	. −65°C to 135°C
Storage temperature range, T <sub>stg</sub>	. $-65^{\circ}\text{C}$ to $150^{\circ}\text{C}$

<sup>†</sup> 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.

#### recommended operating conditions (see Note 2)

		MIN	NOM	MAX	UNIT
Vcc	Supply voltage	4.75	5	5.25	V
VIH	High-level input voltage	2			V
VIL	Low-level input voltage			0.8	V
ІОН	High-level output current			-15	mA
loL	Low-level output current			12	mA
TA	Operating free-air temperature	-40		85	°C

NOTE 2: All unused inputs of the device must be held at V<sub>CC</sub> or GND to ensure proper device operation.



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

SCCS075 - OCTOBER 2001

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

PARAMETER		TEST CONDITION	s	MIN	TYP†	MAX	UNIT
VIK	$V_{CC} = 4.75 V$ ,	$I_{IN} = -18 \text{ mA}$			-0.7	-1.2	V
Voн	$V_{CC} = 4.75 \text{ V},$	I <sub>OH</sub> = -15 mA		2.4	3.3		V
V <sub>OL</sub>	$V_{CC} = 4.75 \text{ V},$	I <sub>OL</sub> = 12 mA			0.3	0.55	V
ROUT	$V_{CC} = 4.75 \text{ V},$	$I_{OL} = 12 \text{ mA}$		20	28	40	Ω
$V_{hys}$	All inputs				0.2		V
lį	V <sub>CC</sub> = 5.25 V,	V <sub>IN</sub> = V <sub>CC</sub>				5	μΑ
lн	$V_{CC} = 5.25 \text{ V},$	$V_{IN} = 2.7 \text{ V}$				±1	μΑ
I <sub>Ι</sub> L	$V_{CC} = 5.25 \text{ V},$	$V_{IN} = 0.5 V$				±1	μΑ
lozh	$V_{CC} = 5.25 \text{ V},$	V <sub>OUT</sub> = 2.7 V				10	μΑ
lozL	$V_{CC} = 5.25 \text{ V},$	V <sub>OUT</sub> = 0.5 V				-10	μΑ
los <sup>‡</sup>	$V_{CC} = 5.25 \text{ V},$	VOUT = 0 V		-60	-120	-225	mA
l <sub>off</sub>	$V_{CC} = 0 V$ ,	V <sub>OUT</sub> = 4.5 V				±1	μΑ
lcc	$V_{CC} = 5.25 \text{ V},$	$V_{IN} \leq 0.2 V$ ,	$V_{IN} \ge V_{CC} - 0.2 \text{ V}$		0.1	0.2	mA
∆ICC	V <sub>CC</sub> = 5.25 V, V <sub>IN</sub>	= 3.4 V\$, f <sub>1</sub> = 0, Outputs op	oen		0.5	2	mA
<sup>I</sup> CCD <sup>¶</sup>	$\frac{V_{CC}}{OE}$ = 5.25 V, One $\frac{V_{CC}}{OE}$ = GND, $V_{IN} \le 0$	input switching at 50% duty $0.2 \text{ V or V}_{IN} \ge \text{V}_{CC} - 0.2 \text{ V}$	y cycle, Outputs open,		0.06	0.12	mA/ MHz
	V <sub>CC</sub> = 5.25 V,	One input switching at f <sub>1</sub> = 10 MHz	$V_{IN} \le 0.2 \text{ V or}$ $V_{IN} \ge V_{CC} - 0.2 \text{ V}$		0.7	1.4	
I <sub>C</sub> #	Outputs open,	at 50% duty cycle	$V_{IN} = 3.4 \text{ V or GND}$		1	2.4	mA
ıC.,	OE = GND, LE = V <sub>CC</sub>	Eight bits switching at f <sub>1</sub> = 2.5 MHz	$V_{IN} \le 0.2 \text{ V or}$ $V_{IN} \ge V_{CC} - 0.2 \text{ V}$		1.3	2.6	ША
		at 50% duty cycle	$V_{IN} = 3.4 \text{ V or GND}$		3.3	10.6	
C <sub>i</sub>					6	10	pF
Co					8	12	pF

<sup>†</sup> Typical values are at  $V_{CC} = 5 \text{ V}$ ,  $T_A = 25^{\circ}\text{C}$ .

I<sub>C</sub> = Total supply current

ICC = Power-supply current with CMOS input levels

 $\Delta I_{CC}$  = Power-supply current for a TTL high input ( $V_{IN} = 3.4 \text{ V}$ )

D<sub>H</sub> = Duty cycle for TTL inputs high N<sub>T</sub> = Number of TTL inputs at D<sub>H</sub>

I<sub>CCD</sub> = Dynamic current caused by an input transition pair (HLH or LHL)

f<sub>0</sub> = Clock frequency for registered devices, otherwise zero

f<sub>1</sub> = Input signal frequency

N<sub>1</sub> = Number of inputs changing at f<sub>1</sub>

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

 $\parallel$  Values for these conditions are examples of the I<sub>CC</sub> formula.



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<sub>OS</sub> tests should be performed last.

 $<sup>\</sup>$  Per TTL-driven input ( $V_{IN} = 3.4 \text{ V}$ ); all other inputs at  $V_{CC}$  or GND

 $<sup>\</sup>P$  This parameter is derived for use in total power-supply calculations.

<sup>#</sup>  $I_{C}$  =  $I_{CC}$  +  $\Delta I_{CC}$  ×  $D_H$  ×  $N_T$  +  $I_{CCD}$ ( $f_0/2 + f_1 \times N_1$ )
Where:

# CY74FCT2573T 8-BIT LATCH WITH 3-STATE OUTPUTS

SCCS075 - OCTOBER 2001

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

			CY74FCT	2573T	CY74FCT2	2573AT	CY74FCT2	2573CT	UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	UNIT
t <sub>W</sub>	Pulse duration, LE high		6		5		5		ns
t <sub>su</sub>	Setup time, D to LE	High to low	2		2		2		ns
t <sub>h</sub>	Hold time, D to LE	High to low	1.5		1.5		1.5		ns

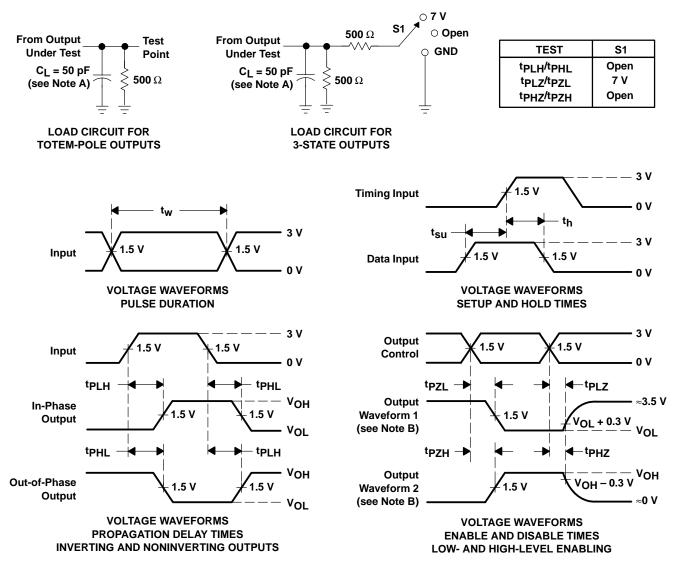
# switching characteristics over operating free-air temperature range (see Figure 1)

PARAMETER	FROM	то	CY74FC	Г2573Т	CY74FCT	2573AT	CY74FCT	2573CT	- UNIT
PARAMETER	(INPUT)	(OUTPUT)	MIN	MAX	MIN	MAX	MIN	MAX	UNIT
<sup>t</sup> PLH	D	0	1.5	8	1.5	5.2	1.5	4.7	ns
t <sub>PHL</sub>	В	U	1.5	8	1.5	5.2	1.5	4.7	
<sup>t</sup> PLH	LE	0	2	13	2	8.5	2	5.5	
<sup>t</sup> PHL	LL	0	2	13	2	8.5	2	5.5	115
<sup>t</sup> PZH	<u>OE</u>	0	1.5	11	1.5	6.5	1.5	5.5	ns
<sup>t</sup> PZL	OE	0	1.5	11	1.5	6.5	1.5	5.5	115
<sup>t</sup> PHZ	ŌĒ	0	1.5	7	1.5	5.5	1.5	5	ns
tPLZ	OE	0	1.5	7	1.5	5.5	1.5	5	115



SCCS075 - OCTOBER 2001

#### PARAMETER MEASUREMENT INFORMATION



NOTES: A. C<sub>L</sub> 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







24-Jan-2013

#### **PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan	Lead/Ball Finish	MSL Peak Temp	Op Temp (°C)	Top-Side Markings	Samples
74FCT2573CTSOCTE4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT2573C	Samples
74FCT2573CTSOCTG4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT2573C	Samples
CY74FCT2573ATQCT	ACTIVE	SSOP	DBQ	20	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	FCT2573A	Samples
CY74FCT2573ATQCTE4	ACTIVE	SSOP	DBQ	20	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	FCT2573A	Samples
CY74FCT2573ATQCTG4	ACTIVE	SSOP	DBQ	20	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	FCT2573A	Samples
CY74FCT2573CTQCT	ACTIVE	SSOP	DBQ	20	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	FCT2573C	Samples
CY74FCT2573CTQCTE4	ACTIVE	SSOP	DBQ	20	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	FCT2573C	Samples
CY74FCT2573CTQCTG4	ACTIVE	SSOP	DBQ	20	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	FCT2573C	Samples
CY74FCT2573CTSOC	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT2573C	Samples
CY74FCT2573CTSOCE4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT2573C	Samples
CY74FCT2573CTSOCG4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT2573C	Samples
CY74FCT2573CTSOCT	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT2573C	Samples
CY74FCT2573TSOC	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT2573	Samples
CY74FCT2573TSOCE4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT2573	Samples
CY74FCT2573TSOCG4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT2573	Samples
CY74FCT2573TSOCT	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT2573	Samples
CY74FCT2573TSOCTE4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT2573	Samples



## PACKAGE OPTION ADDENDUM

24-Jan-2013

Orderable Device	Status	Package Type	Package Drawing	Pins	Package Qty	Eco Plan	Lead/Ball Finish	MSL Peak Temp	Op Temp (°C)	Top-Side Markings	Samples
	(1)		Diawing			(2)		(3)		(4)	
CY74FCT2573TSOCTG4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT2573	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) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

**Pb-Free** (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

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

(4) Only one of markings shown within the brackets will appear on the physical device.

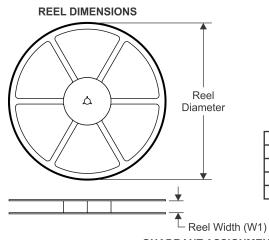
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# **PACKAGE MATERIALS INFORMATION**

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## TAPE AND REEL INFORMATION





	Dimension designed to accommodate the component width
	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

All dimensions are nominal												
Device	Package Type	Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
CY74FCT2573ATQCT	SSOP	DBQ	20	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
CY74FCT2573CTQCT	SSOP	DBQ	20	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
CY74FCT2573CTSOCT	SOIC	DW	20	2000	330.0	24.4	10.8	13.0	2.7	12.0	24.0	Q1
CY74FCT2573TSOCT	SOIC	DW	20	2000	330.0	24.4	10.8	13.0	2.7	12.0	24.0	Q1

www.ti.com 26-Jan-2013



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
CY74FCT2573ATQCT	SSOP	DBQ	20	2500	367.0	367.0	38.0
CY74FCT2573CTQCT	SSOP	DBQ	20	2500	367.0	367.0	38.0
CY74FCT2573CTSOCT	SOIC	DW	20	2000	367.0	367.0	45.0
CY74FCT2573TSOCT	SOIC	DW	20	2000	367.0	367.0	45.0

DW (R-PDSO-G20)

### PLASTIC SMALL OUTLINE



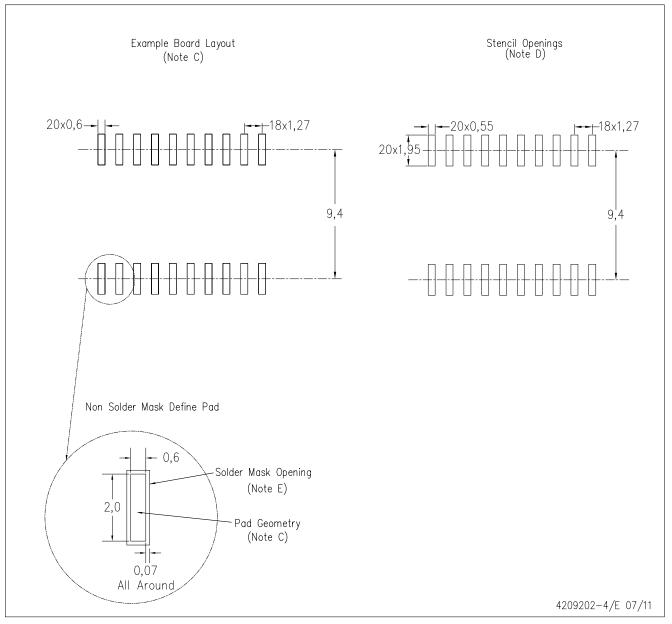
NOTES: A. All linear dimensions are in inches (millimeters). Dimensioning and tolerancing per ASME Y14.5M-1994.

- 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).
- D. Falls within JEDEC MS-013 variation AC.



DW (R-PDSO-G20)

PLASTIC SMALL OUTLINE



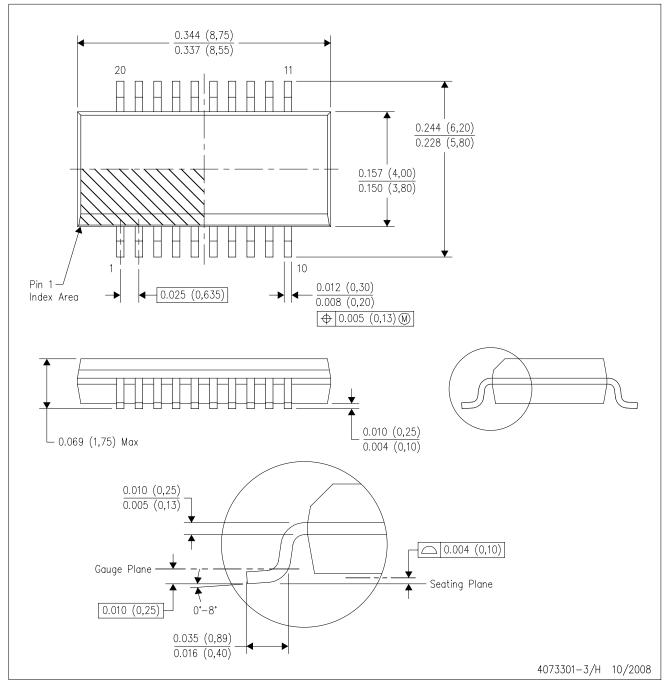
NOTES:

- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Refer to IPC7351 for alternate board design.
- D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC—7525
- E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.



DBQ (R-PDSO-G20)

# PLASTIC SMALL-OUTLINE PACKAGE



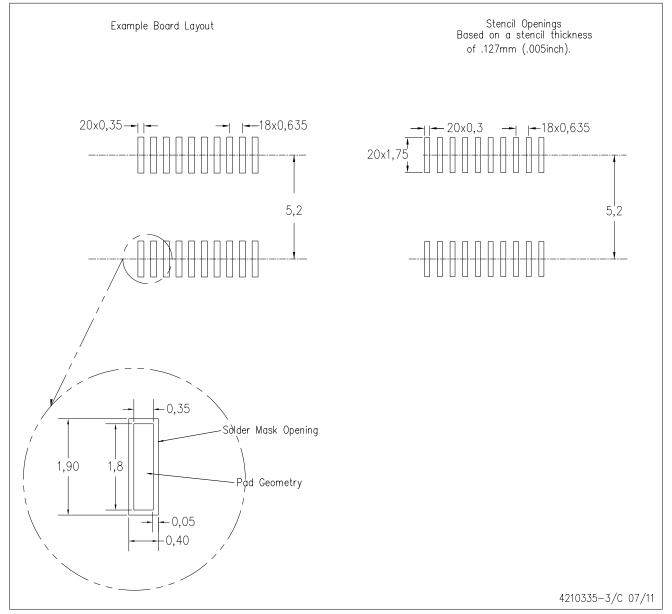
NOTES:

- 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.



# DBQ (R-PDSO-G20)

# PLASTIC SMALL OUTLINE PACKAGE



#### NOTES:

- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Customers should place a note on the circuit board fabrication drawing not to alter the center solder mask defined pad.
- D. Publication IPC-7351 is recommended for alternate designs.
- E. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Example stencil design based on a 50% volumetric metal load solder paste. Refer to IPC-7525 for other stencil recommendations.



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Only those TI components which TI has specifically designated as military grade or "enhanced plastic" are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have *not* been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

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