

SN54ABT377, SN74ABT377A OCTAL EDGE-TRIGGERED D-TYPE FLIP-FLOPS WITH CLOCK ENABLE

SCBS156E – FEBRUARY 1991 – REVISED JANUARY 1997

- State-of-the-Art **EPIC-IIIB™** BiCMOS Design Significantly Reduces Power Dissipation
- Latch-Up Performance Exceeds 500 mA Per JEDEC Standard JESD-17
- Typical V_{OLP} (Output Ground Bounce) < 1 V at $V_{CC} = 5$ V, $T_A = 25^\circ\text{C}$
- High-Drive Outputs (-32 -mA I_{OH} , 64 -mA I_{OL})
- ESD Protection Exceeds 2000 V Per MIL-STD-883, Method 3015; Exceeds 200 V Using Machine Model ($C = 200$ pF, $R = 0$)
- Package Options Include Plastic Small-Outline (DW), Shrink Small-Outline (DB), and Thin Shrink Small-Outline (PW) Packages, Ceramic Chip Carriers (FK), Plastic (N) and Ceramic (J) DIPs, and Ceramic Flat (W) Package

description

These 8-bit positive-edge-triggered D-type flip-flops with a clock (CLK) input are particularly suitable for implementing buffer and storage registers, shift registers, and pattern generators.

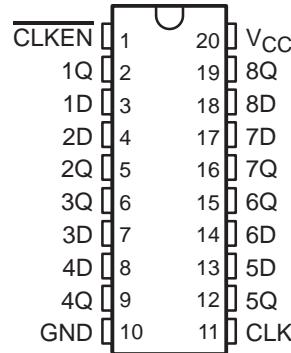
Data (D) input information that meets the setup time requirements is transferred to the Q outputs on the positive-going edge of the clock pulse if the common clock-enable (CLKEN) input is low. Clock triggering occurs at a particular voltage level and is not directly related to the transition time of the positive-going pulse. When the buffered clock (CLK) input is at either the high or low level, the D-input signal has no effect at the output. The circuits are designed to prevent false clocking by transitions at CLKEN.

The SN54ABT377 is characterized for operation over the full military temperature range of -55°C to 125°C . The SN74ABT377A is characterized for operation from -40°C to 85°C .

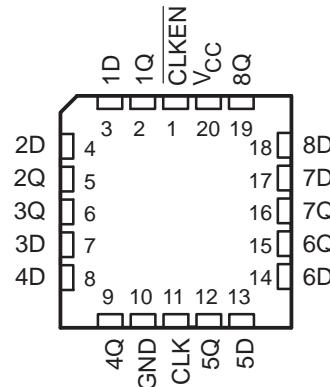
FUNCTION TABLE
(each flip-flop)

INPUTS			OUTPUT
CLKEN	CLK	D	Q
H	X	X	Q_0
L	↑	H	H
L	↑	L	L
X	H or L	X	Q_0

SN54ABT377 . . . J OR W PACKAGE
SN74ABT377A . . . DB, DW, N, OR PW PACKAGE
(TOP VIEW)



SN54ABT377 . . . FK PACKAGE
(TOP VIEW)



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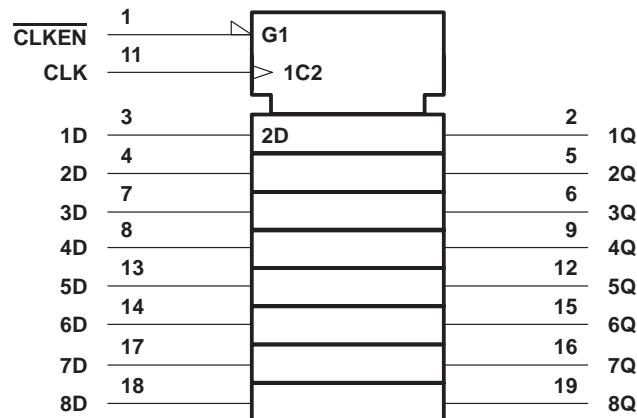
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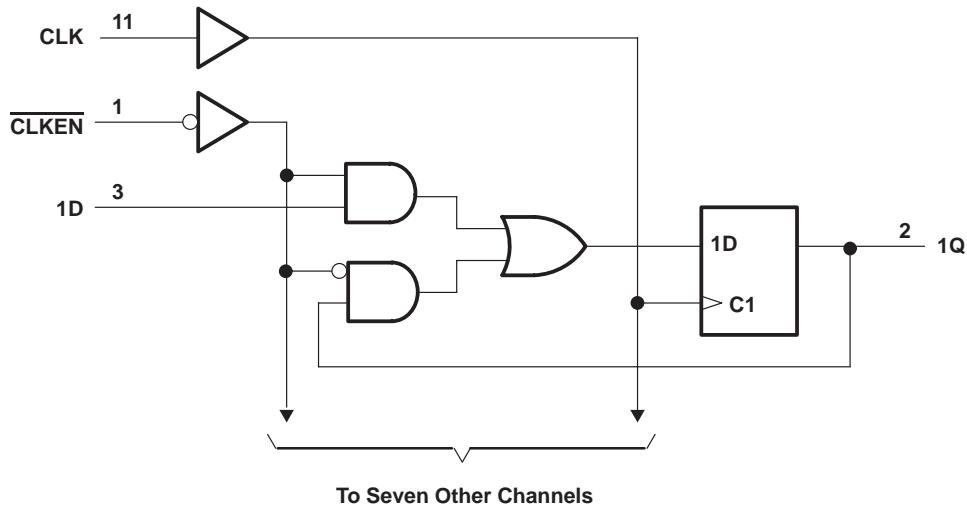
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logic symbol†



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

logic diagram (positive logic)



SN54ABT377, SN74ABT377A
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absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

Supply voltage range, V_{CC}	–0.5 V to 7 V	
Input voltage range, V_I (see Note 1)	–0.5 V to 7 V	
Voltage range applied to any output in the high or power-off state, V_O	–0.5 V to 5.5 V	
Current into any output in the low state, I_O : SN54ABT377	96 mA	
SN74ABT377A	128 mA	
Input clamp current, I_{IK} ($V_I < 0$)	–18 mA	
Output clamp current, I_{OK} ($V_O < 0$)	–50 mA	
Package thermal impedance, θ_{JA} (see Note 2): DB package	115°C/W	
DW package	97°C/W	
N package	67°C/W	
PW package	128°C/W	
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.

NOTES: 1. The input and output negative-voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
 2. The package thermal impedance is calculated in accordance with EIA/JEDEC Std JESD51, except for through-hole packages, which use a trace length of zero.

recommended operating conditions (see Note 3)

		SN54ABT377		SN74ABT377A		UNIT
		MIN	MAX	MIN	MAX	
V_{CC}	Supply voltage	4.5	5.5	4.5	5.5	V
V_{IH}	High-level input voltage	2		2		V
V_{IL}	Low-level input voltage		0.8		0.8	V
V_I	Input voltage	0	V_{CC}	0	V_{CC}	V
I_{OH}	High-level output current		–24		–32	mA
I_{OL}	Low-level output current		48		64	mA
$\Delta t/\Delta v$	Input transition rise or fall rate	Outputs enabled		5	5	ns/V
T_A	Operating free-air temperature	–55	125	–40	85	°C

NOTE 3: Unused inputs must be held high or low to prevent them from floating.

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

PARAMETER	TEST CONDITIONS	$T_A = 25^\circ\text{C}$			SN54ABT377		SN74ABT377A		UNIT	
		MIN	TYPT†	MAX	MIN	MAX	MIN	MAX		
V_{IK}	$V_{CC} = 4.5 \text{ V}$, $I_I = -18 \text{ mA}$			-1.2		-1.2		-1.2	V	
V_{OH}	$V_{CC} = 4.5 \text{ V}$, $I_{OH} = -3 \text{ mA}$	2.5			2.5		2.5		V	
	$V_{CC} = 5 \text{ V}$, $I_{OH} = -3 \text{ mA}$	3			3		3			
	$V_{CC} = 4.5 \text{ V}$	$I_{OH} = -24 \text{ mA}$	2		2					
		$I_{OH} = -32 \text{ mA}$	2*				2			
V_{OL}	$V_{CC} = 4.5 \text{ V}$	$I_{OL} = 48 \text{ mA}$		0.55		0.55			V	
		$I_{OL} = 64 \text{ mA}$		0.55*				0.55		
V_{hys}		100							mV	
I_I	$V_{CC} = 5.5 \text{ V}$, $V_I = V_{CC}$ or GND			± 1		± 1		± 1	μA	
I_{off}	$V_{CC} = 0$, V_I or $V_O \leq 4.5 \text{ V}$			± 100				± 100	μA	
I_{CEX}	$V_{CC} = 5.5 \text{ V}$, $V_O = 5.5 \text{ V}$	Outputs high		50		50		50	μA	
I_O^\ddagger	$V_{CC} = 5.5 \text{ V}$, $V_O = 2.5 \text{ V}$		-50	-100	-180	-50	-180	-50	-180	mA
I_{CC}	$V_{CC} = 5.5 \text{ V}$, $I_O = 0$, $V_I = V_{CC}$ or GND	Outputs high	1	250		250		250	μA	
		Outputs low	24	30		30		30	mA	
ΔI_{CC}^\S	$V_{CC} = 5.5 \text{ V}$, One input at 3.4 V, Other inputs at V_{CC} or GND			1.5		1.5		1.5	mA	
C_I	$V_I = 2.5 \text{ V}$ or 0.5 V		3.5						pF	

* On products compliant to MIL-PRF-38535, this parameter does not apply.

† All typical values are at $V_{CC} = 5 \text{ V}$.

‡ Not more than one output should be tested at a time, and the duration of the test should not exceed one second.

§ This is the increase in supply current for each input that is at the specified TTL voltage level rather than V_{CC} or GND.

timing requirements over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see Figure 1)

		SN54ABT377				UNIT	
		$V_{CC} = 5 \text{ V}$, $T_A = 25^\circ\text{C}$		MIN	MAX		
		MIN	MAX				
f_{clock}	Clock frequency	0	150	0	150	MHz	
t_w	Pulse duration	CLK high or low	3.3	3.3		ns	
t_{su}	Setup time before CLK^\uparrow	Data high or low	2	2.5		ns	
		CLKEN high or low	3	3			
t_h	Hold time after CLK^\uparrow	Data high or low	1.8‡	1.8‡		ns	
		CLKEN high or low	1.8‡	1.8‡			

‡ This data sheet limit may vary among suppliers.

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timing requirements over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see Figure 1)

			SN74ABT377A			UNIT	
			V _{CC} = 5 V, T _A = 25°C		MIN	MAX	
			MIN	MAX			
f _{clock}	Clock frequency		0	150	0	150	MHz
t _w	Pulse duration	CLK high or low	3.3	3.3			ns
t _{su}	Setup time before CLK↑	Data high or low	2	2.5			ns
		CLKEN high or low	3	3			
t _h	Hold time after CLK↑	Data high or low	1.8†	1.8†			ns
		CLKEN high or low	1.2†	1.2†			

† This data sheet limit may vary among suppliers.

switching characteristics over recommended ranges of supply voltage and operating free-air temperature, C_L = 50 pF (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	SN54ABT377			UNIT
			V _{CC} = 5 V, T _A = 25°C		MIN	MAX
			MIN	TYP	MAX	
f _{max}			150		150	MHz
t _{PLH}	CLK	Q	2.2	4.5	6	2.2
			3.1	5.3	6.8	7
t _{PHL}					2	7.6

switching characteristics over recommended ranges of supply voltage and operating free-air temperature, C_L = 50 pF (unless otherwise noted) (see Figure 1)

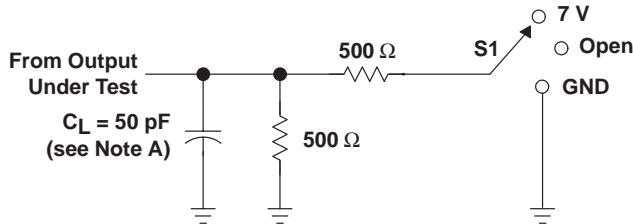
PARAMETER	FROM (INPUT)	TO (OUTPUT)	SN74ABT377A			UNIT
			V _{CC} = 5 V, T _A = 25°C		MIN	MAX
			MIN	TYP	MAX	
f _{max}			150		150	MHz
t _{PLH}	CLK	Q	2.2	4.5	6	2.2
			2.6†	5.3	6.8	6.5
t _{PHL}					2.6†	7.3

† This data sheet limit may vary among suppliers.

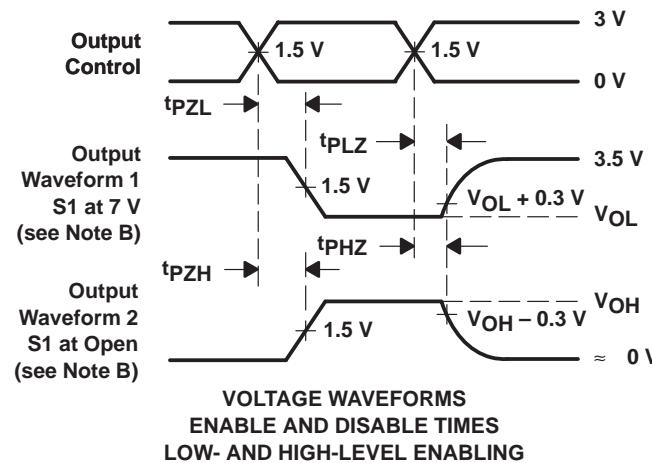
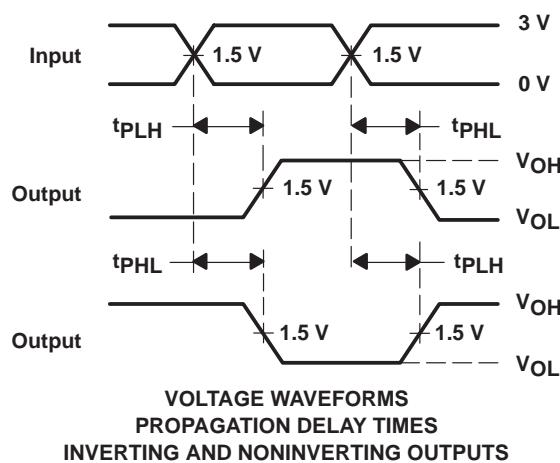
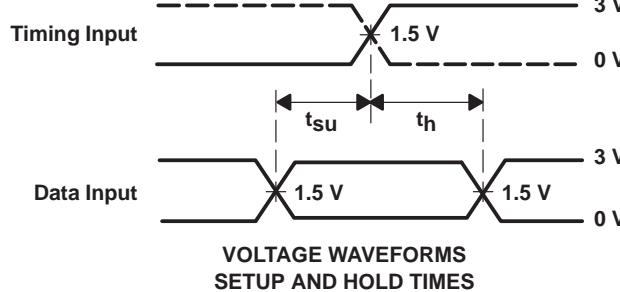
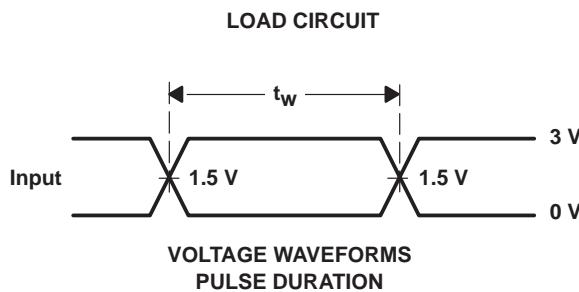
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PARAMETER MEASUREMENT INFORMATION



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



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. All input pulses are supplied by generators having the following characteristics: PRR $\leq 10 \text{ MHz}$, $Z_O = 50 \Omega$, $t_r \leq 2.5 \text{ ns}$, $t_f \leq 2.5 \text{ ns}$.
 D. The outputs are measured one at a time with one 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)
5962-9314801Q2A	Active	Production	LCCC (FK) 20	55 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9314801Q2A SNJ54ABT377FK
5962-9314801QRA	Active	Production	CDIP (J) 20	20 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9314801QR A SNJ54ABT377J
SN74ABT377ABR	Active	Production	SSOP (DB) 20	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AB377A
SN74ABT377ABR.B	Active	Production	SSOP (DB) 20	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AB377A
SN74ABT377ADW	Active	Production	SOIC (DW) 20	25 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ABT377A
SN74ABT377ADW.B	Active	Production	SOIC (DW) 20	25 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ABT377A
SN74ABT377ADWE4	Active	Production	SOIC (DW) 20	25 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ABT377A
SN74ABT377ADWR	Active	Production	SOIC (DW) 20	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ABT377A
SN74ABT377ADWR.B	Active	Production	SOIC (DW) 20	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ABT377A
SN74ABT377AN	Active	Production	PDIP (N) 20	20 TUBE	Yes	NIPDAU	N/A for Pkg Type	-40 to 85	SN74ABT377AN
SN74ABT377AN.B	Active	Production	PDIP (N) 20	20 TUBE	Yes	NIPDAU	N/A for Pkg Type	-40 to 85	SN74ABT377AN
SN74ABT377ANSR	Active	Production	SOP (NS) 20	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ABT377A
SN74ABT377ANSR.B	Active	Production	SOP (NS) 20	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ABT377A
SN74ABT377APW	Active	Production	TSSOP (PW) 20	70 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AB377A
SN74ABT377APW.B	Active	Production	TSSOP (PW) 20	70 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AB377A
SN74ABT377APWR	Active	Production	TSSOP (PW) 20	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AB377A
SN74ABT377APWR.B	Active	Production	TSSOP (PW) 20	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AB377A
SNJ54ABT377FK	Active	Production	LCCC (FK) 20	55 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9314801Q2A SNJ54ABT377FK
SNJ54ABT377J	Active	Production	CDIP (J) 20	20 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9314801QR A SNJ54ABT377J

⁽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.

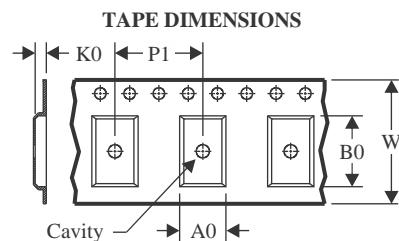
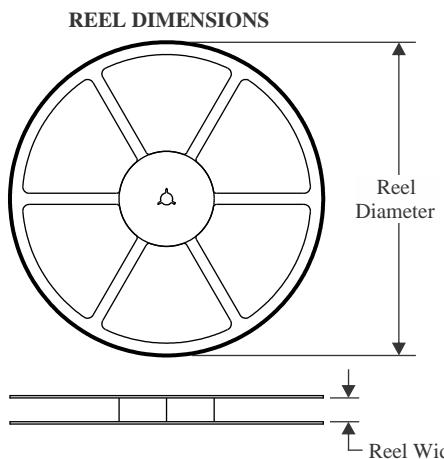
(5) MSL rating/Peak reflow: The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be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

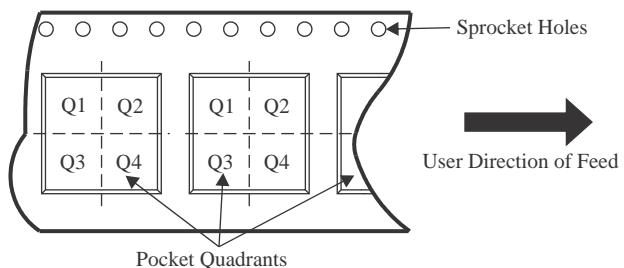
Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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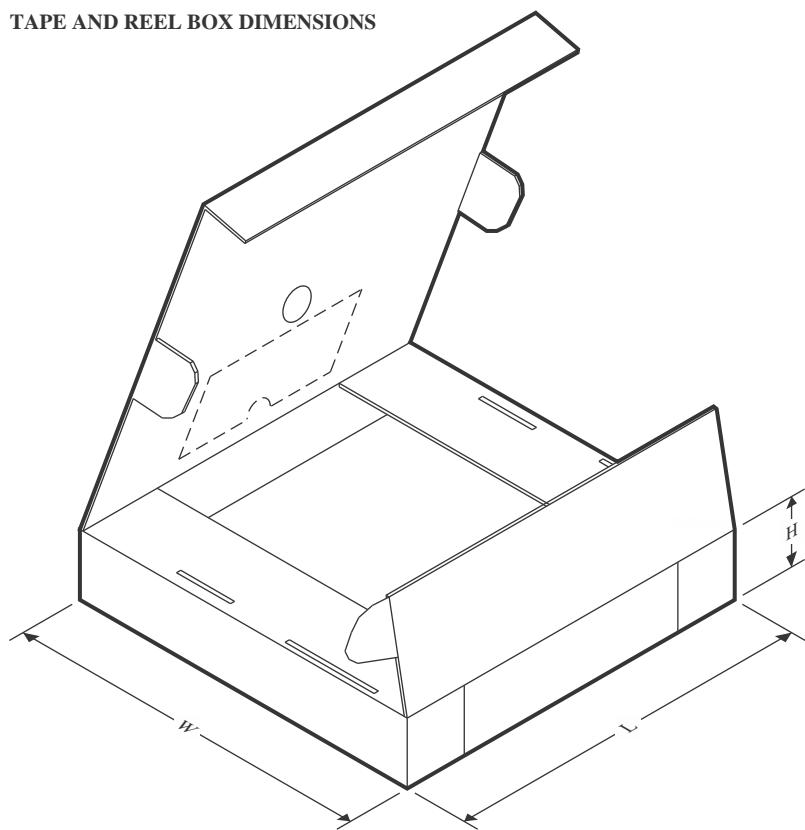
TAPE AND REEL INFORMATION


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


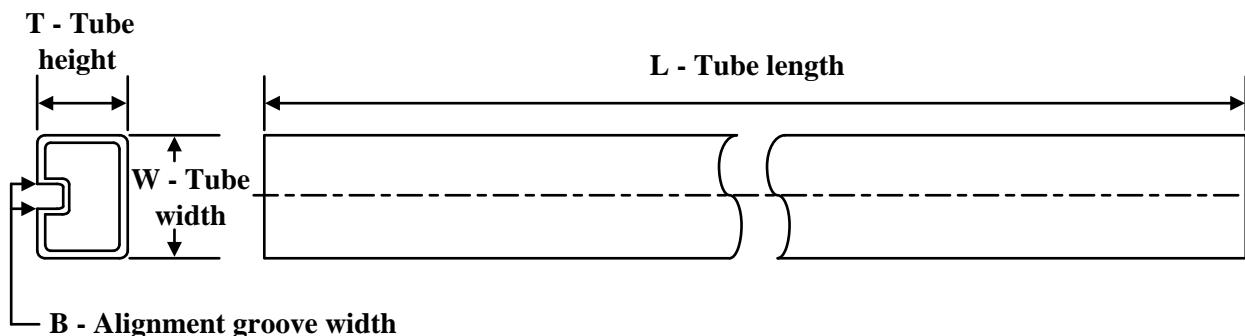
*All dimensions are nominal

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
SN74ABT377ABR	SSOP	DB	20	2000	330.0	16.4	8.2	7.5	2.5	12.0	16.0	Q1
SN74ABT377ADWR	SOIC	DW	20	2000	330.0	24.4	10.8	13.3	2.7	12.0	24.0	Q1
SN74ABT377ANSR	SOP	NS	20	2000	330.0	24.4	8.4	13.0	2.5	12.0	24.0	Q1
SN74ABT377APWR	TSSOP	PW	20	2000	330.0	16.4	6.95	7.0	1.4	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)
SN74ABT377ABR	SSOP	DB	20	2000	353.0	353.0	32.0
SN74ABT377ADWR	SOIC	DW	20	2000	356.0	356.0	45.0
SN74ABT377ANSR	SOP	NS	20	2000	356.0	356.0	45.0
SN74ABT377APWR	TSSOP	PW	20	2000	353.0	353.0	32.0

TUBE


*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μ m)	B (mm)
5962-9314801Q2A	FK	LCCC	20	55	506.98	12.06	2030	NA
SN74ABT377ADW	DW	SOIC	20	25	507	12.83	5080	6.6
SN74ABT377ADW.B	DW	SOIC	20	25	507	12.83	5080	6.6
SN74ABT377ADWE4	DW	SOIC	20	25	507	12.83	5080	6.6
SN74ABT377AN	N	PDIP	20	20	506	13.97	11230	4.32
SN74ABT377AN.B	N	PDIP	20	20	506	13.97	11230	4.32
SN74ABT377APW	PW	TSSOP	20	70	530	10.2	3600	3.5
SN74ABT377APW.B	PW	TSSOP	20	70	530	10.2	3600	3.5
SNJ54ABT377FK	FK	LCCC	20	55	506.98	12.06	2030	NA

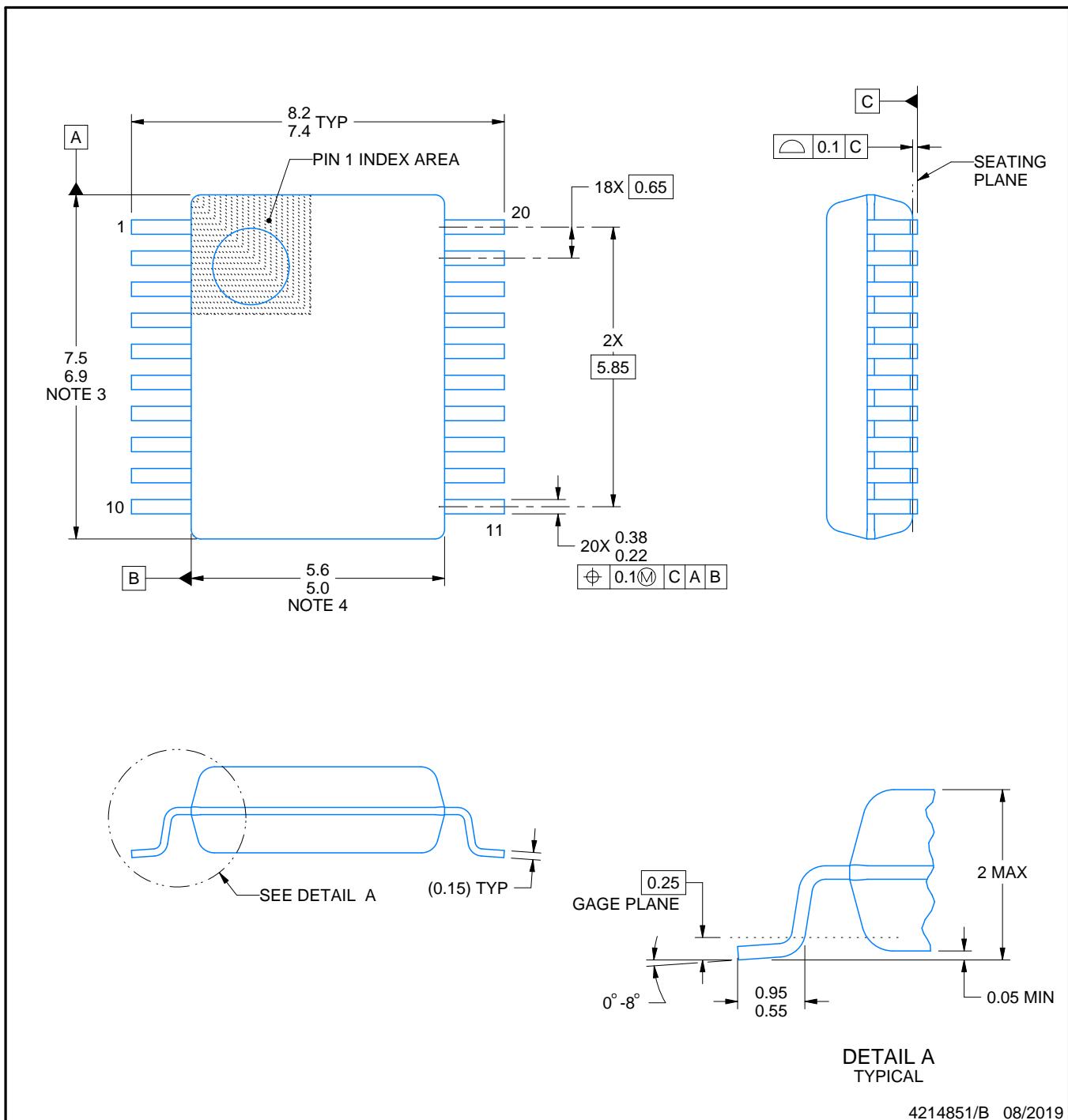
PACKAGE OUTLINE

DB0020A



SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



NOTES:

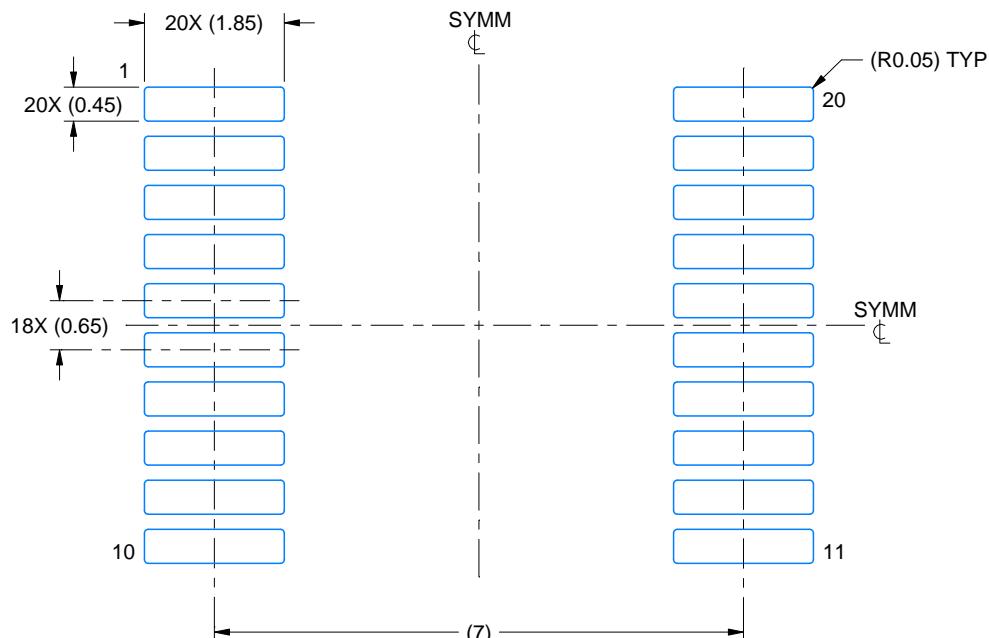
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or 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-150.

EXAMPLE BOARD LAYOUT

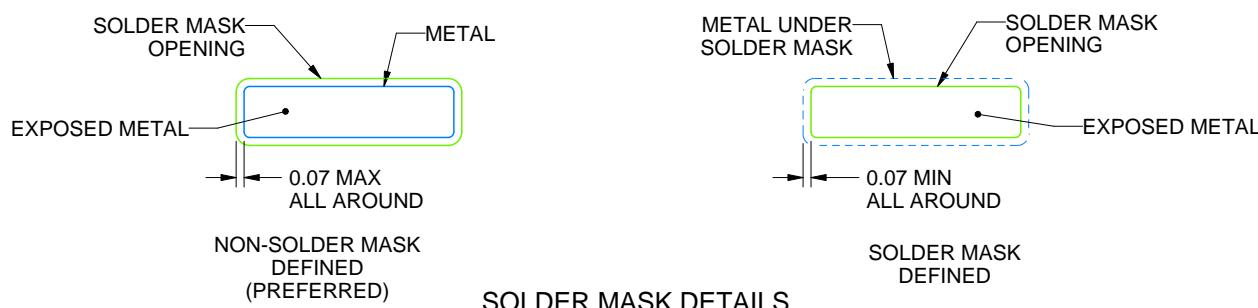
DB0020A

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X



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NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

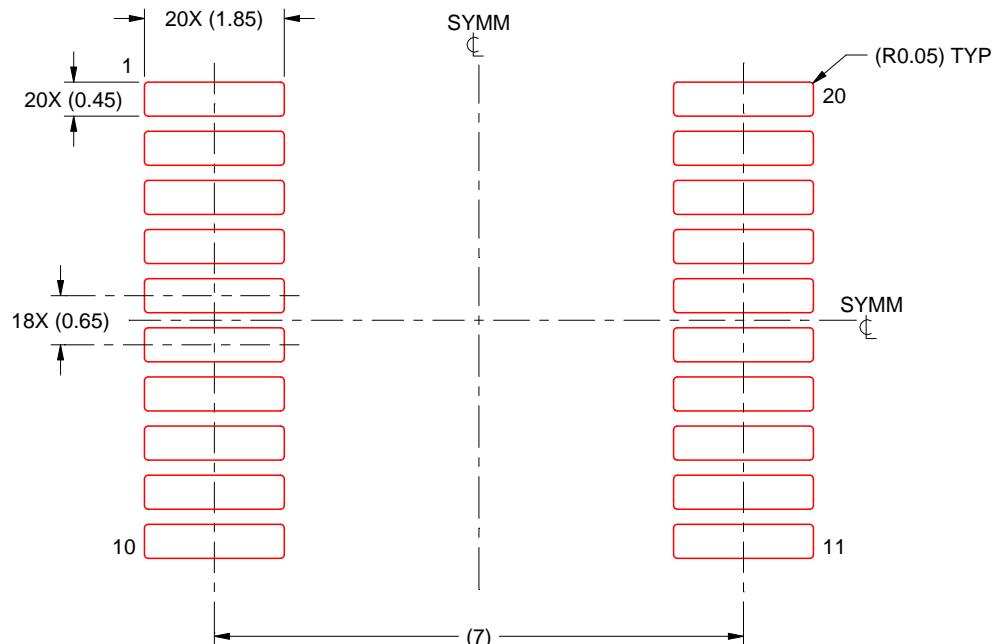
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

DB0020A

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



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

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NOTES: (continued)

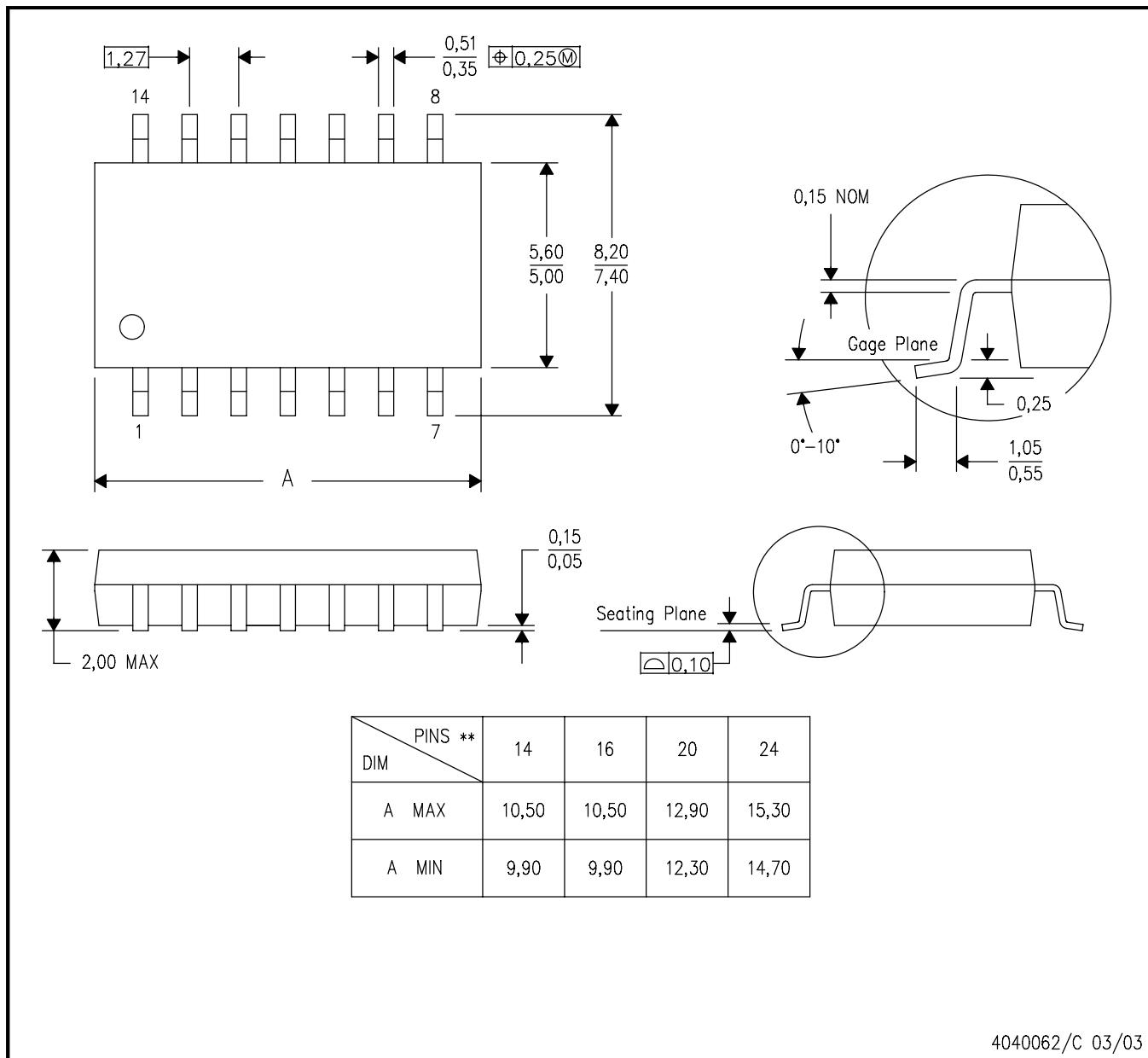
8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

MECHANICAL DATA

NS (R-PDSO-G)**

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



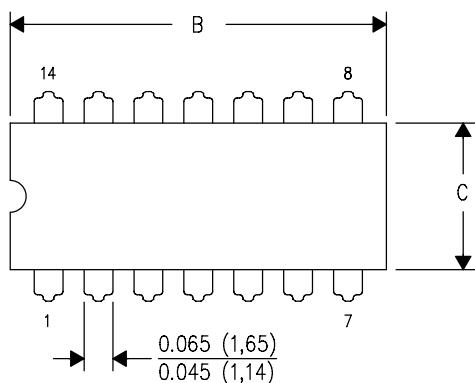
NOTES:

- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

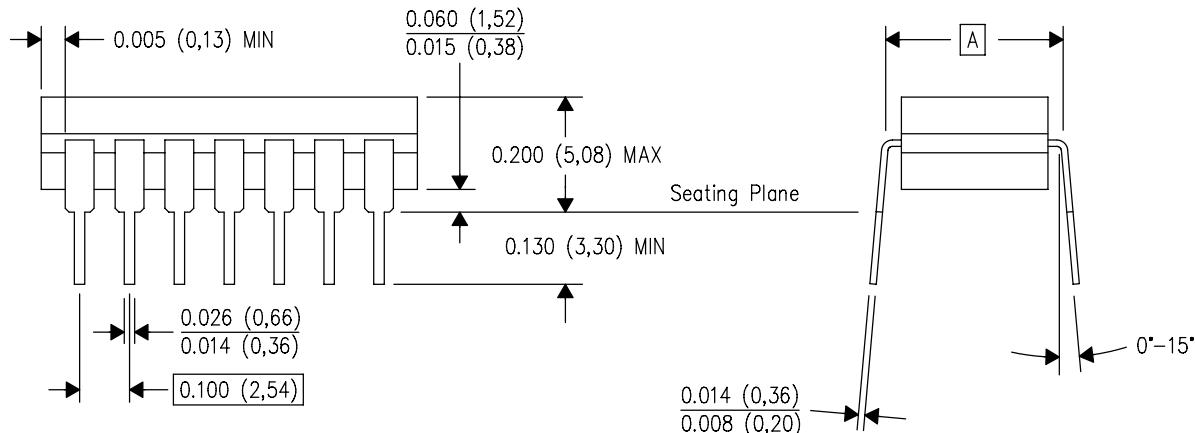
J (R-GDIP-T**)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



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

GENERIC PACKAGE VIEW

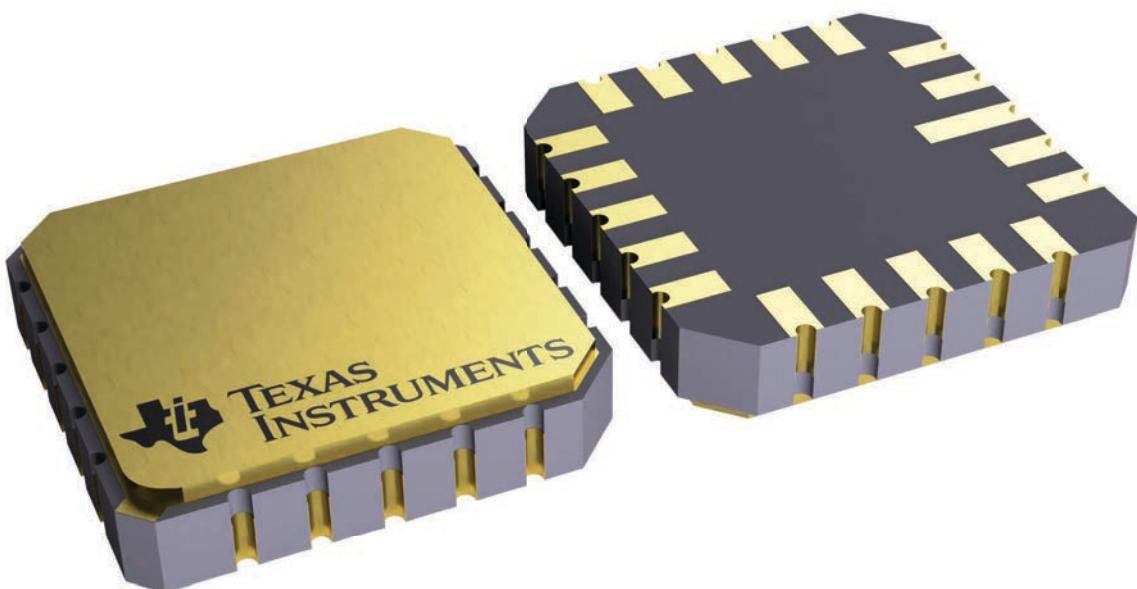
FK 20

LCCC - 2.03 mm max height

8.89 x 8.89, 1.27 mm pitch

LEADLESS CERAMIC CHIP CARRIER

This image is a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.

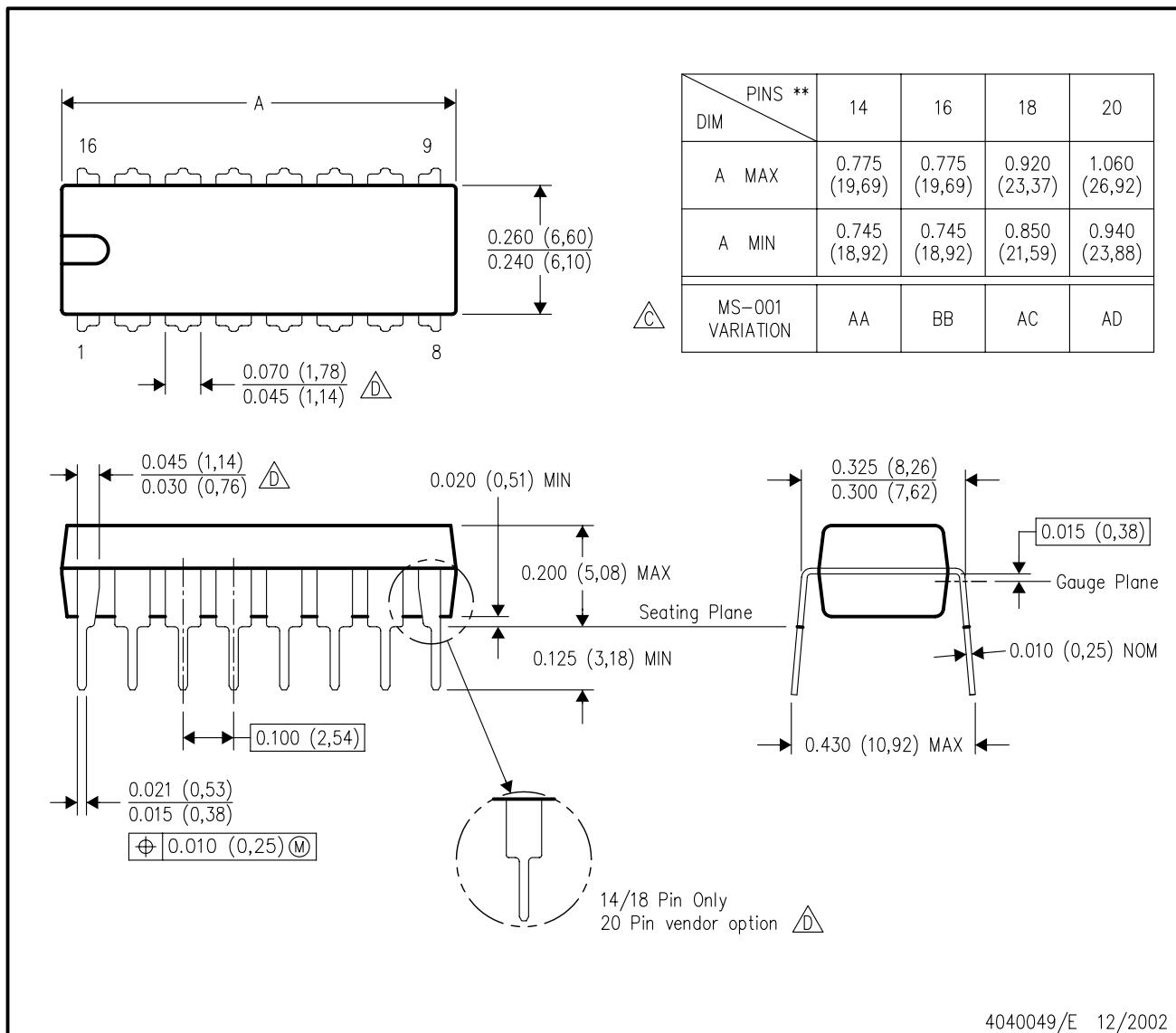


4229370VA\

N (R-PDIP-T**)

16 PINS SHOWN

PLASTIC DUAL-IN-LINE PACKAGE



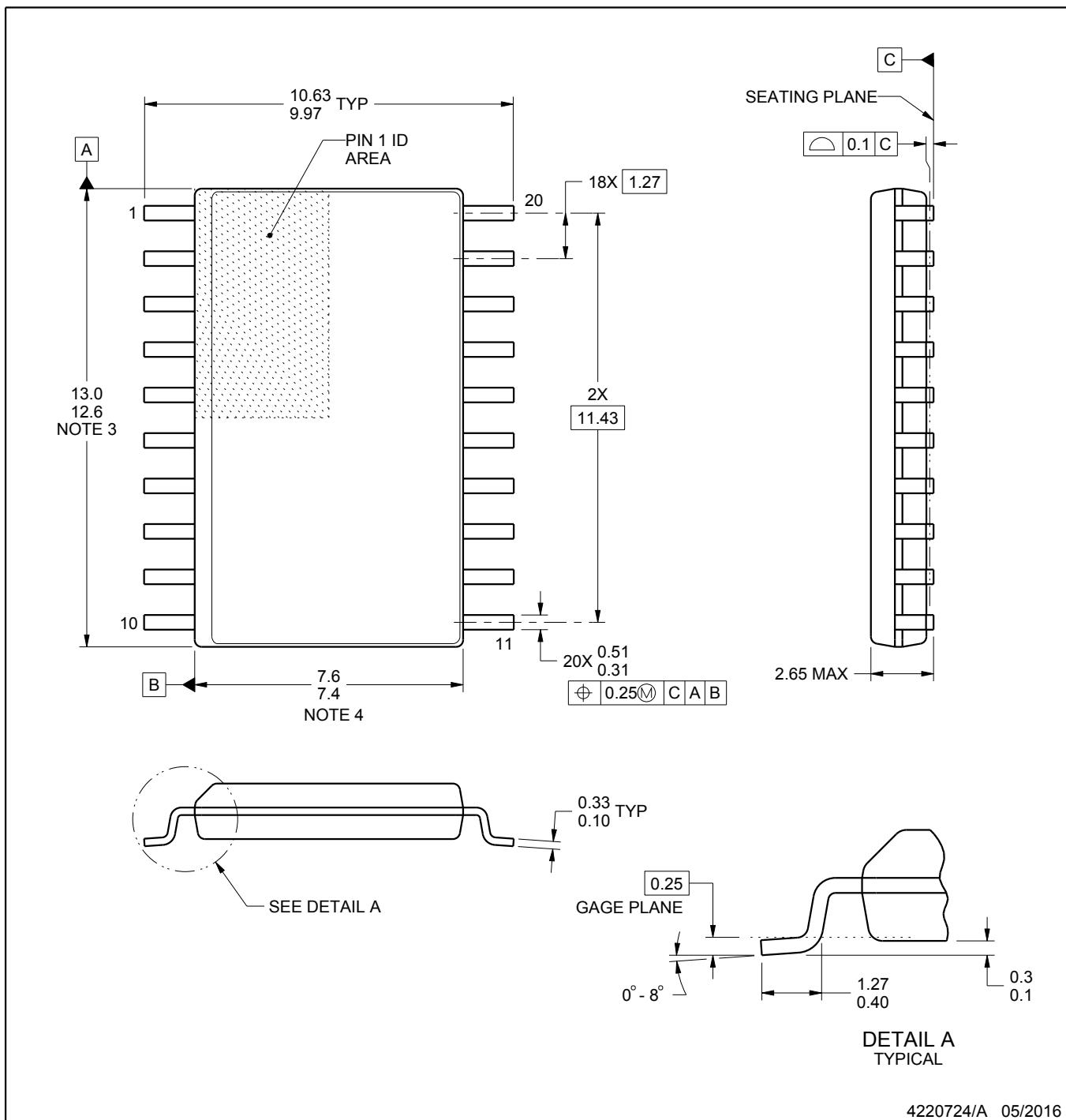
PACKAGE OUTLINE

DW0020A



SOIC - 2.65 mm max height

SOIC



NOTES:

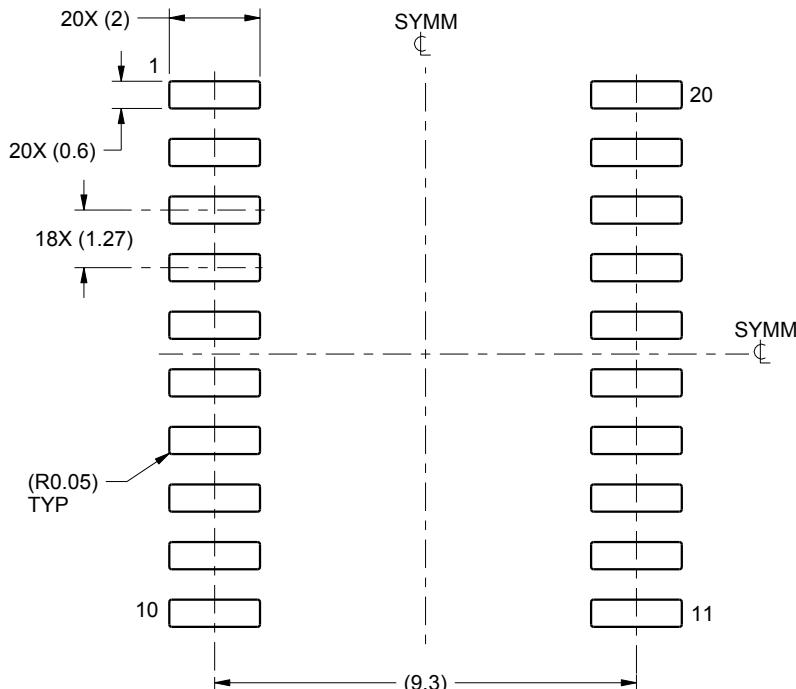
1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate 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.

EXAMPLE BOARD LAYOUT

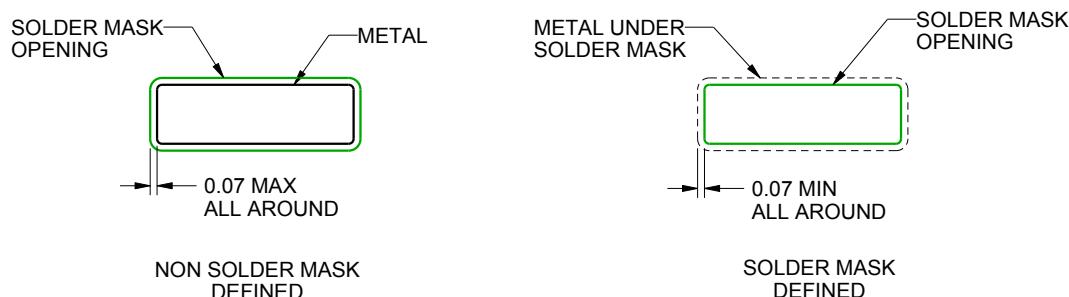
DW0020A

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.

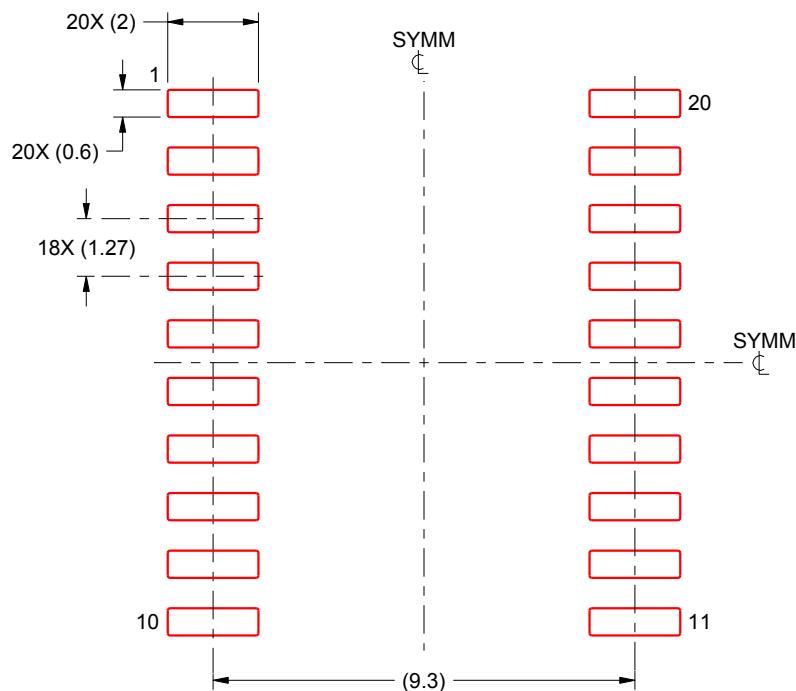
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

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.

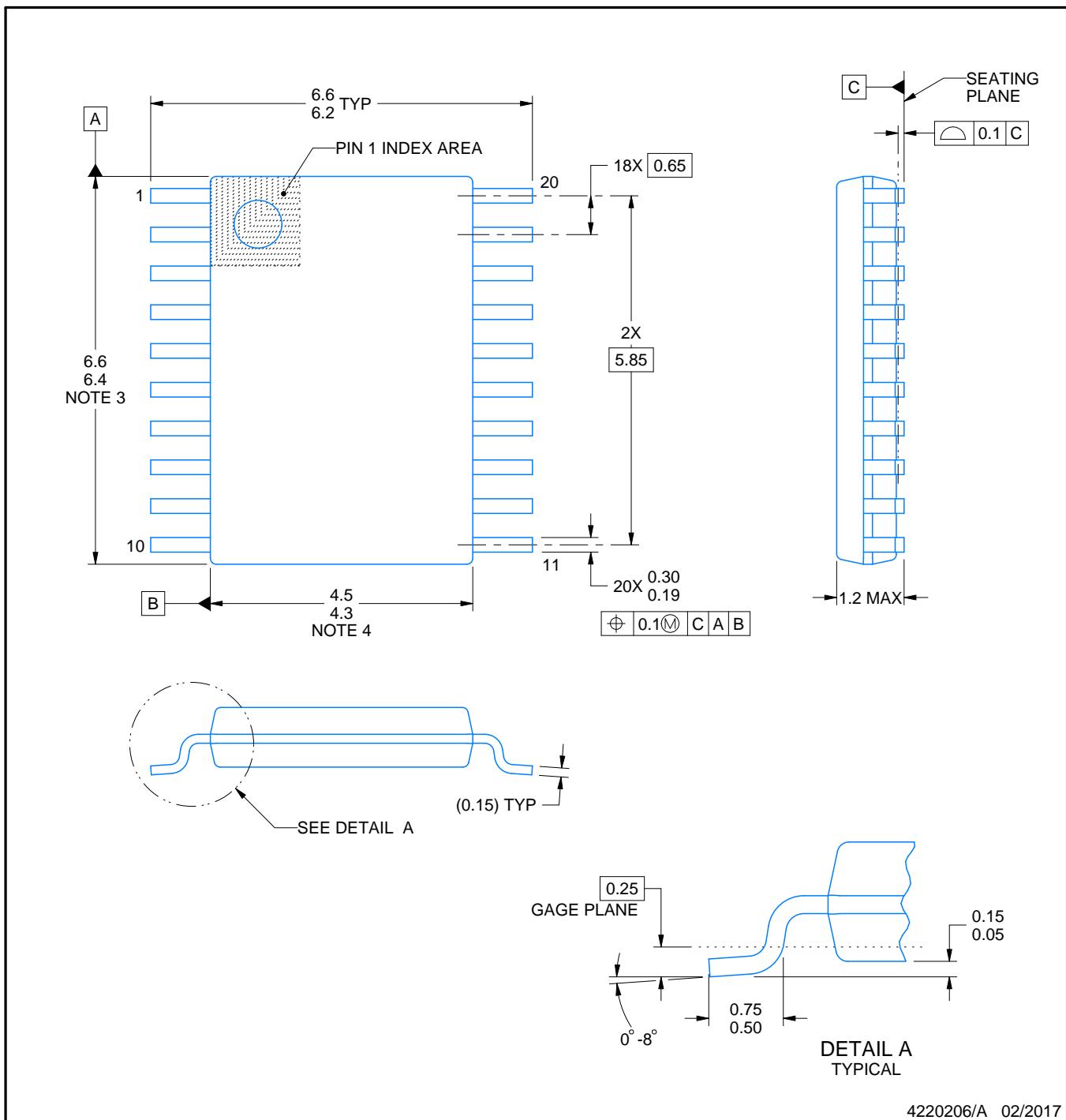
PACKAGE OUTLINE

PW0020A



TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



NOTES:

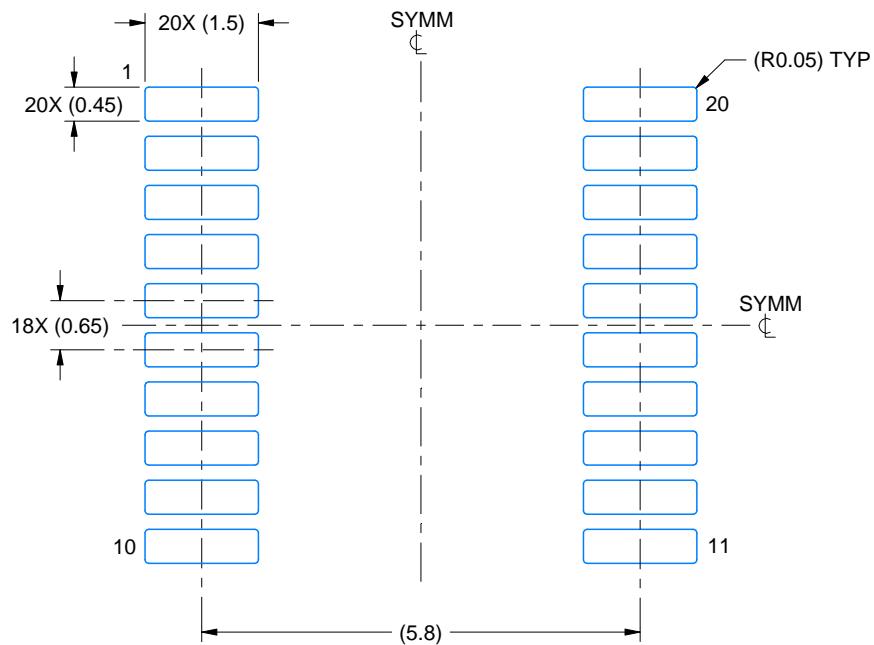
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or 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.

EXAMPLE BOARD LAYOUT

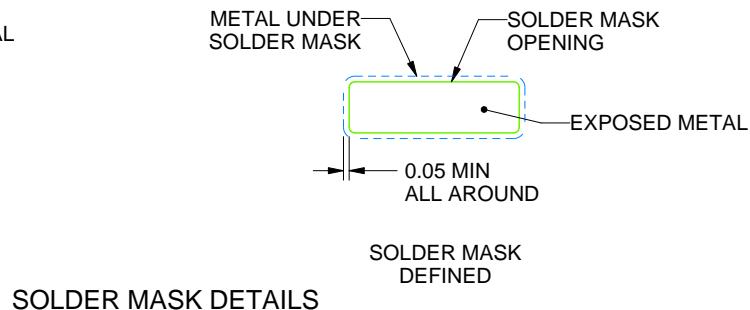
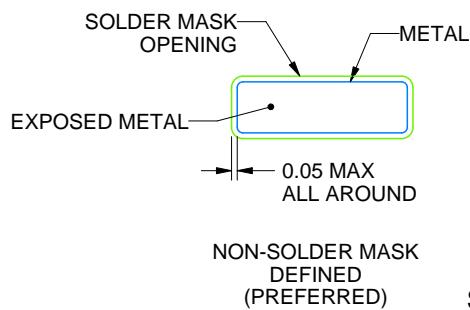
PW0020A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X



4220206/A 02/2017

NOTES: (continued)

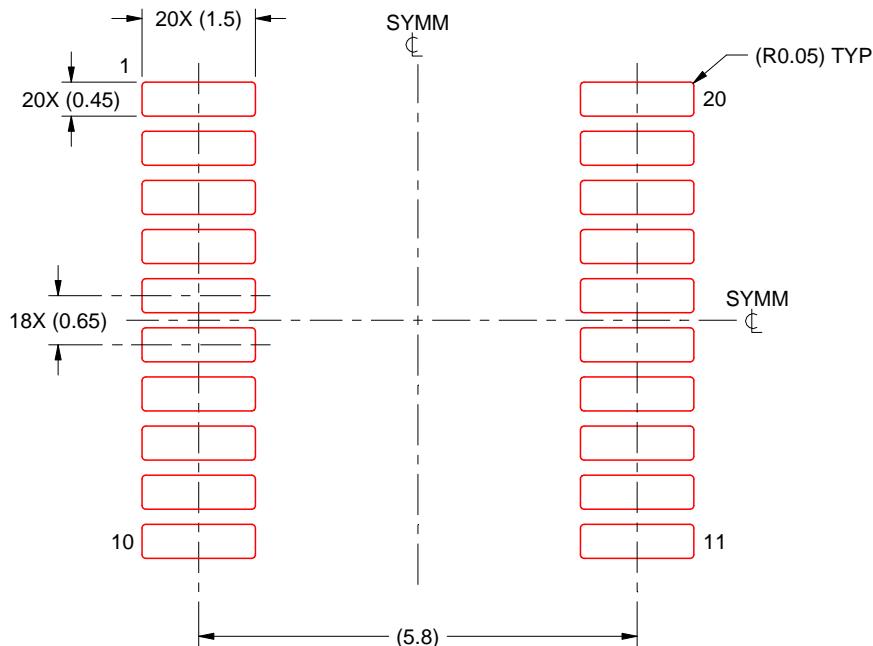
6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

PW0020A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



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.

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Last updated 10/2025