SCBS185B - FEBRUARY 1991 - REVISED JANUARY 1997

- State-of-the-Art *EPIC*-II*B*[™] 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°C
- High-Drive Outputs (–32-mA I_{OH}, 64-mA I_{OL})
- 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

The 'ABT273 are 8-bit positive-edge-triggered D-type flip-flops with a direct clear (CLR) input. They are particularly suitable for implementing buffer and storage registers, shift registers, and pattern generators.

Information at the data (D) inputs meeting the setup time requirements is transferred to the Q outputs on the positive-going edge of the clock pulse. Clock triggering occurs at a particular voltage level and is not directly related to the transition time of the positive-going pulse. When the clock (CLK) input is at either the high or low level, the D input signal has no effect at the output.

SN54ABT273 J OR W PACKAGE SN74ABT273 DB, DW, N, OR PW PACKAGE (TOP VIEW)											
CLR [1Q [1D [2D [2Q [3Q [4D [4Q [GND [1 2 3 4 5 6 7 8 9 10	20 19 18 17 16 15 14 13 12 11	V _{CC} 8Q 8D 7D 7Q 6Q 6D 5D 5Q CLK								
l											

SN54ABT273 . . . FK PACKAGE (TOP VIEW)

	1D CLR 80 80
2D	3 2 1 20 19 4 18 8D
2D 2Q 3Q 3D 4D	4 18 8D 5 17 7D 6 16 7Q 7 15 6Q
3Q	6 16 7Q 7 15 6Q
3D]7 15[6Q
4D	
	9 10 11 12 13
1	
	S C N C A A A A A A A A A A A A A A A A A

The SN54ABT273 is characterized for operation over the full military temperature range of -55° C to 125° C. The SN74ABT273 is characterized for operation from -40° C to 85° C.

	FUNCTION TABLE (each flip-flop)										
	INPUTS	OUTPUT									
CLR	CLK	D	Q								
L	Х	Х	L								
н	\uparrow	Н	н								
н	\uparrow	L	L								
н	H or L	Х	Q ₀								



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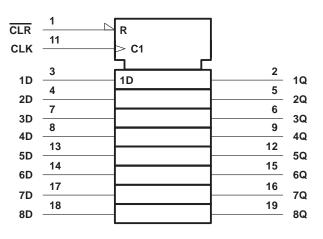
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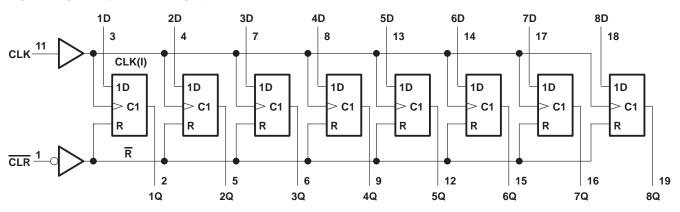
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logic symbol[†]



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

logic diagram (positive logic)



absolute maximum ratings over operating free-air temperature range (unless otherwise noted)[‡]

	0.5 V to 7 V 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, IO: SN54	ABT273
SN74	ABT273 128 mA
Input clamp current, I _{IK} (V _I < 0)	
Output clamp current, I_{OK} (V _O < 0)	
Package thermal impedance, θ_{JA} (see Note 2): D	PB package 115°C/W
	W package 97°C/W
Ν	I package 67°C/W
F	W package 128°C/W
Storage temperature range, T _{stg}	

[‡] 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.



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recommended operating conditions (see Note 3)

		SN54A	BT273	SN74A	BT273	UNIT
		MIN	MAX	MIN	MAX	UNIT
VCC	Supply voltage	4.5	5.5	4.5	5.5	V
VIH	High-level input voltage	2		2		V
VIL	Low-level input voltage		0.8		0.8	V
VI	Input voltage	0	VCC	0	VCC	V
ЮН	High-level output current		-24		-32	mA
IOL	Low-level output current		48		64	mA
$\Delta t/\Delta v$	Input transition rise or fall rate		10		10	ns/V
Т _А	Operating free-air temperature	-55	125	-40	85	°C

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

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

DADAMETED			1	A = 25°	C	SN54A	BT273	SN74ABT273		UNIT	
PARAMETER		TEST CONDITIO	MIN	түр†	MAX	MIN	MAX	MIN	MAX	UNIT	
VIK	V _{CC} = 4.5 V,	lı = -18 mA				-1.2		-1.2		-1.2	V
	V _{CC} = 4.5 V,	I _{OH} = -3 mA		2.5			2.5		2.5		
Vari	V _{CC} = 5 V,	I _{OH} = -3 mA	OH = −3 mA				3		3		V
VОН	VOH			2			2				v
V _{CC} = 4.5 V		I _{OH} = -32 mA	I _{OH} = -32 mA						2		
V_{OL} $V_{CC} = 4.5 V$		I _{OL} = 48 mA				0.55		0.55			V
VOL	VCC = 4.5 V	I _{OL} = 64 mA				0.55*				0.55	v
V _{hys}					100						mV
l	V _{CC} = 5.5 V,	$V_{I} = V_{CC} \text{ or } G$	ND			±1		±1		±1	μΑ
loff	$V_{CC} = 0,$	$V_I \text{ or } V_O \leq 4.5$	V			±100				±100	μΑ
ICEX	V _{CC} = 5.5 V,	V _O = 5.5 V	Outputs high			50		50		50	μΑ
IO‡	V _{CC} = 5.5 V,	V _O = 2.5 V		-50	-100	–200§	-50	–200§	-50	–200§	mA
las	V _{CC} = 5.5 V, I _C) = 0,	Outputs high		1	400§		400§		400§	μΑ
ICC	$V_{I} = V_{CC} \text{ or GND}$		Outputs low		24	30		30		30	mA
ΔI_{CC} ¶	V _{CC} = 5.5 V, O Other inputs at			1.5		1.5		1.5	mA		
Ci	VI = 2.5 V or 0.5	5 V			7						pF

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

[†] All typical values are at $V_{CC} = 5$ V.

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

§ This data sheet limit may vary among suppliers.

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



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

				V _{CC} = 5 V, T _A = 25°C		SN54ABT273		SN74ABT273	
			MIN	MAX	MIN	MAX	MIN	MAX	
fclock	Clock frequency		0	150	0	150	0	150	MHz
tw Pulse duration	Pulse duration	CLK high or low	3.3		3.3		3.3		20
t _w		CLR low	3.3		3.3		3.3		ns
		Data high	2		2		2		
t _{su}	Setup time before CLK↑	Data low	2.5		2.5		2.5		ns
		CLR high	2		2		2		
th	Hold time after CLK [↑]	Data high or low	1.2†		1.4†		1.2†		ns

[†] This data sheet limit may vary among suppliers.

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

PARAMETER	FROM (INPUT)	ТО (OUTPUT)	V _{CC} = T _A = 2	= 5 V, 25°C	SN54A	UNIT	
		(001101)	MIN	MAX	MIN	MAX	
fmax			150		150		MHz
tPLH		Q	2.5	6	2.5	7	
^t PHL	CLK	Q	3.3	6.8	3.3	7.5	ns
^t PHL	CLR	Q	2.5	7.5†	2.5	8.2	ns

[†] This data sheet limit may vary among suppliers.

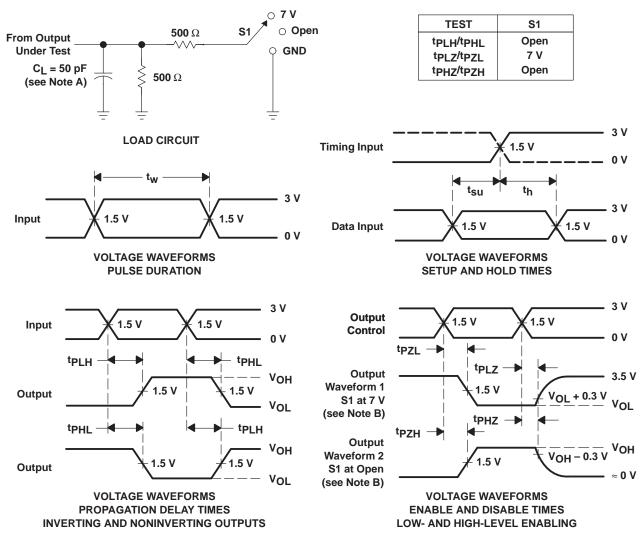
switching characteristics over recommended ranges of supply voltage and operating free-air temperature, $C_L = 50 \text{ pF}$ (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = T _A = 2	= 5 V, 25°C	SN74A	UNIT	
		(001101)	MIN	MAX	MIN	MAX	
fmax			150		150		MHz
tPLH	CLK	Q	2.5	6	2.5	6.5	ns
t _{PHL}	ULK	Q	3.3	6.8	3.3	7.3	115
^t PHL	CLR	Q	2.5	6.7†	2.5	7.4†	ns

[†] This data sheet limit may vary among suppliers.



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PARAMETER MEASUREMENT INFORMATION

NOTES: A. CL 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 ≤ 10 MHz, Z_Q = 50 Ω, t_r ≤ 2.5 ns, t_f ≤ 2.5 ns.
- C. All input pulses are supplied by generators having the rollowing characteristics: PRR \leq 10 MHz, 20 = 50 Ω, t_f \leq 2.5 ns, t_f \leq 2.5 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 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
5962-9321701Q2A	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962- 9321701Q2A SNJ54ABT 273FK	Samples
5962-9321701QRA	ACTIVE	CDIP	J	20	20	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-9321701QR A SNJ54ABT273J	Samples
5962-9321701QSA	ACTIVE	CFP	W	20	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-9321701QS A SNJ54ABT273W	Samples
SN74ABT273DBR	ACTIVE	SSOP	DB	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AB273	Samples
SN74ABT273DBRG4	ACTIVE	SSOP	DB	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AB273	Samples
SN74ABT273DW	ACTIVE	SOIC	DW	20	25	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ABT273	Samples
SN74ABT273DWR	ACTIVE	SOIC	DW	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ABT273	Samples
SN74ABT273DWRG4	ACTIVE	SOIC	DW	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ABT273	Samples
SN74ABT273N	ACTIVE	PDIP	N	20	20	RoHS & Green	NIPDAU	N / A for Pkg Type	-40 to 85	SN74ABT273N	Samples
SN74ABT273NSR	ACTIVE	SOP	NS	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ABT273	Samples
SN74ABT273PW	ACTIVE	TSSOP	PW	20	70	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AB273	Samples
SN74ABT273PWR	ACTIVE	TSSOP	PW	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AB273	Samples
SNJ54ABT273FK	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962- 9321701Q2A SNJ54ABT 273FK	Samples
SNJ54ABT273J	ACTIVE	CDIP	J	20	20	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-9321701QR A SNJ54ABT273J	Samples
SNJ54ABT273W	ACTIVE	CFP	W	20	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-9321701QS A SNJ54ABT273W	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 (CI) 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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OTHER QUALIFIED VERSIONS OF SN54ABT273, SN74ABT273 :

• Catalog : SN74ABT273

• Military : SN54ABT273

NOTE: Qualified Version Definitions:



- Catalog TI's standard catalog product
- Military QML certified for Military and Defense Applications



Texas

*All dimensions are nominal

STRUMENTS

TAPE AND REEL INFORMATION





QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



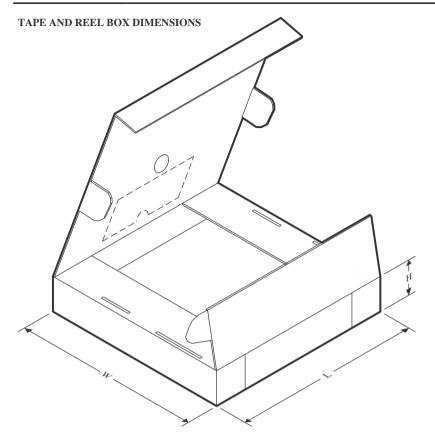
Device	Package Type	Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74ABT273DBR	SSOP	DB	20	2000	330.0	16.4	8.2	7.5	2.5	12.0	16.0	Q1
SN74ABT273DWR	SOIC	DW	20	2000	330.0	24.4	10.9	13.3	2.7	12.0	24.0	Q1
SN74ABT273NSR	SOP	NS	20	2000	330.0	24.4	8.4	13.0	2.5	12.0	24.0	Q1
SN74ABT273PWR	TSSOP	PW	20	2000	330.0	16.4	6.95	7.1	1.6	8.0	16.0	Q1



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PACKAGE MATERIALS INFORMATION

7-Dec-2024



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74ABT273DBR	SSOP	DB	20	2000	356.0	356.0	35.0
SN74ABT273DWR	SOIC	DW	20	2000	367.0	367.0	45.0
SN74ABT273NSR	SOP	NS	20	2000	367.0	367.0	45.0
SN74ABT273PWR	TSSOP	PW	20	2000	356.0	356.0	35.0

TEXAS INSTRUMENTS

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TUBE



- B - Alignment groove width

*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	Τ (μm)	B (mm)
5962-9321701Q2A	FK	LCCC	20	55	506.98	12.06	2030	NA
5962-9321701QSA	W	CFP	20	25	506.98	26.16	6220	NA
SN74ABT273DW	DW	SOIC	20	25	507	12.83	5080	6.6
SN74ABT273N	N	PDIP	20	20	506	13.97	11230	4.32
SN74ABT273PW	PW	TSSOP	20	70	530	10.2	3600	3.5
SNJ54ABT273FK	FK	LCCC	20	55	506.98	12.06	2030	NA
SNJ54ABT273W	W	CFP	20	25	506.98	26.16	6220	NA

W (R-GDFP-F20)

CERAMIC DUAL FLATPACK



- NOTES: A. All linear dimensions are in inches (millimeters).
 - This drawing is subject to change without notice. В.
 - 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



PW0020A



PACKAGE OUTLINE

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.



PW0020A

EXAMPLE BOARD LAYOUT

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



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.



PW0020A

EXAMPLE STENCIL DESIGN

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



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.



DB0020A



PACKAGE OUTLINE

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.



DB0020A

EXAMPLE BOARD LAYOUT

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



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.



DB0020A

EXAMPLE STENCIL DESIGN

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



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

PLASTIC SMALL-OUTLINE PACKAGE

0,51 0,35 ⊕0,25⊛ 1,27 8 14 0,15 NOM 5,60 8,20 5,00 7,40 \bigcirc Gage Plane ₽ 0,25 7 1 1,05 0,55 0°-10° Δ 0,15 0,05 Seating Plane — 2,00 MAX 0,10PINS ** 14 16 20 24 DIM 10,50 10,50 12,90 15,30 A MAX A MIN 9,90 9,90 12,30 14,70 4040062/C 03/03

NOTES: A. All linear dimensions are in millimeters.

NS (R-PDSO-G**)

14-PINS SHOWN

- 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



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.

FK 20

8.89 x 8.89, 1.27 mm pitch

GENERIC PACKAGE VIEW

LCCC - 2.03 mm max height

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.





N (R-PDIP-T**)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



NOTES:

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



DW0020A



PACKAGE OUTLINE

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.



DW0020A

EXAMPLE BOARD LAYOUT

SOIC - 2.65 mm max height

SOIC



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.



DW0020A

EXAMPLE STENCIL DESIGN

SOIC - 2.65 mm max height

SOIC



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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