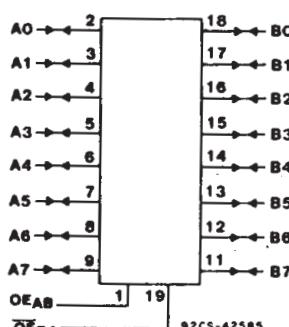




Data sheet acquired from Harris Semiconductor
SCHS286A - October 2003



FUNCTIONAL DIAGRAM

The RCA CD54/74AC623 and CD54/74ACT623 octal-bus transceivers use the RCA ADVANCED CMOS technology. They are non-inverting, 3-state, bidirectional transceiver-buffers that allow for two-way transmission from "A" bus to "B" bus or "B" bus to "A" bus, depending on the logic levels of the Output Enable (OE_{AB} , \overline{OE}_{BA}) inputs.

The dual Output Enable provision gives these devices the capability to store data by simultaneously enabling OE_{AB} and \overline{OE}_{BA} . Each output reinforces its input under these conditions, and when all other data sources to the bus lines are at high-impedance, both sets of bus lines will remain in their last states.

The CD74AC623 is supplied in 20-lead dual-in-line plastic packages (E suffix) and in 20-lead small-outline packages (M, M96, and NSR suffixes). The CD74ACT623 is supplied in 20-lead small-outline packages (M96 suffix). Both package types are operable over the following temperature ranges: Commercial (0 to 70°C); Industrial (-40 to +85°C); and Extended Industrial/Military (-55 to +125°C).

The CD54AC623 and CD54ACT623, available in chip form (H suffix), are operable over the -55 to +125°C temperature range.

Octal-Bus Transceiver, 3-State, Non-Inverting

Type Features:

- *Buffered inputs*
- *Typical propagation delay:*
4.5 ns @ $V_{cc} = 5$ V, $T_A = 25^\circ C$, $C_L = 50 \mu F$

Family Features:

- *Exceeds 2-kV ESD Protection - MIL-STD-883, Method 3015*
- *SCR-Latchup-resistant CMOS process and circuit design*
- *Speed of bipolar FAST*/AS/S with significantly reduced power consumption*
- *Balanced propagation delays*
- *AC types feature 1.5-V to 5.5-V operation and balanced noise immunity at 30% of the supply*
- $\pm 24\text{-mA output drive current}$
 - Fanout to 15 FAST* ICs
 - Drives 50-ohm transmission lines

*FAST is a Registered Trademark of Fairchild Semiconductor Corp.

TRUTH TABLE

OUTPUT ENABLE INPUTS		OPERATION
\overline{OE}_{BA}	OE_{AB}	
L	L	B DATA TO A BUS
H	H	A DATA TO B BUS
H	L	ISOLATION
L	H	B DATA TO A BUS, A DATA TO B BUS

H = High level, L = Low level

Note: To prevent excess currents in the High-Z (isolation) modes, all I/O terminals should be terminated with 10 k Ω to 1 M Ω resistors.

This data sheet is applicable to the CD74AC623 and CD54/74ACT623. The CD54AC623 was not acquired from Harris Semiconductor.

CD54/74AC623

CD54/74ACT623

MAXIMUM RATINGS, Absolute-Maximum Values:

DC SUPPLY-VOLTAGE (V _{cc})	-0.5 to 6 V
DC INPUT DIODE CURRENT, I _{IK} (for V _i < -0.5 V or V _i > V _{cc} + 0.5 V)	±20 mA
DC OUTPUT DIODE CURRENT, I _{OK} (for V _o < -0.5 V or V _o > V _{cc} + 0.5 V)	±50 mA
DC OUTPUT SOURCE OR SINK CURRENT per Output Pin, I _O (for V _o > -0.5 V or V _o < V _{cc} + 0.5 V)	±50 mA
DC V _{cc} or GROUND CURRENT (I _{cc} or I _{GND})	±100 mA*

POWER DISSIPATION PER PACKAGE (P_D):

For T _A = -55 to +100°C (PACKAGE TYPE E)	500 mW
For T _A = +100 to +125°C (PACKAGE TYPE E)	Derate Linearly at 8 mW/°C to 300 mW
For T _A = -55 to +70°C (PACKAGE TYPE M)	400 mW
For T _A = +70 to +125°C (PACKAGE TYPE M)	Derate Linearly at 6 mW/°C to 70 mW
OPERATING-TEMPERATURE RANGE (T _A)	-55 to +125°C
STORAGE TEMPERATURE (T _{stg})	-65 to +150°C

LEAD TEMPERATURE (DURING SOLDERING):

At distance 1/16 ± 1/32 in. (1.59 ± 0.79 mm) from case for 10 s maximum	+265°C
Unit inserted into PC board min. thickness 1/16 in. (1.59 mm) with solder contacting lead tips only	+300°C

*For up to 4 outputs per device; add ± 25 mA for each additional output.

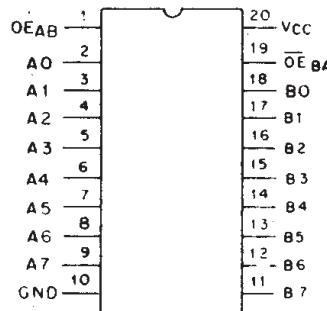
RECOMMENDED OPERATING CONDITIONS:

For maximum reliability, normal operating conditions should be selected so that operation is always within the following ranges:

CHARACTERISTIC	LIMITS		UNITS
	MIN.	MAX.	
Supply-Voltage Range, V _{cc} *: (For T _A = Full Package-Temperature Range)			
AC Types	1.5	5.5	V
ACT Types	4.5	5.5	V
DC Input or Output Voltage, V _i , V _o	0	V _{cc}	V
Operating Temperature, T _A	-55	+125	°C
Input Rise and Fall Slew Rate, dt/dv at 1.5 V to 3 V (AC Types)	0	50	ns/V
at 3.6 V to 5.5 V (AC Types)	0	20	ns/V
at 4.5 V to 5.5 V (ACT Types)	0	10	ns/V

*Unless otherwise specified, all voltages are referenced to ground.

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92CS 4258C

TERMINAL ASSIGNMENT

CD54/74AC623

CD54/74ACT623

STATIC ELECTRICAL CHARACTERISTICS: AC Series

CHARACTERISTICS	TEST CONDITIONS		V _{cc} (V)	AMBIENT TEMPERATURE (T _A) - °C						UNITS		
				+25		-40 to +85		-55 to +125				
	V _i (V)	I _o (mA)		MIN.	MAX.	MIN.	MAX.	MIN.	MAX.			
High-Level Input Voltage	V _{ih}			1.5	1.2	—	1.2	—	1.2	—		
				3	2.1	—	2.1	—	2.1	—		
				5.5	3.85	—	3.85	—	3.85	—		
Low-Level Input Voltage	V _{il}			1.5	—	0.3	—	0.3	—	0.3		
				3	—	0.9	—	0.9	—	0.9		
				5.5	—	1.65	—	1.65	—	1.65		
High-Level Output Voltage	V _{oh}	V _{ih} or V _{il} #, *		-0.05	1.5	1.4	—	1.4	—	1.4		
				-0.05	3	2.9	—	2.9	—	2.9		
				-0.05	4.5	4.4	—	4.4	—	4.4		
				-4	3	2.58	—	2.48	—	2.4		
				-24	4.5	3.94	—	3.8	—	3.7		
				-75	5.5	—	—	3.85	—	—		
				-50	5.5	—	—	—	3.85	—		
Low-Level Output Voltage	V _{ol}	V _{ih} or V _{il} #, *		0.05	1.5	—	0.1	—	0.1	—		
				0.05	3	—	0.1	—	0.1	—		
				0.05	4.5	—	0.1	—	0.1	—		
				12	3	—	0.36	—	0.44	—		
				24	4.5	—	0.36	—	0.44	—		
				75	5.5	—	—	—	1.65	—		
				50	5.5	—	—	—	—	1.65		
Input Leakage Current	I _i	V _{cc} or GND			5.5	—	±0.1	—	±1	—	±1	μA
3-State Leakage Current	I _{o2}	V _{ih} or V _{il} V _o = V _{cc} or GND			5.5	—	±0.5	—	±5	—	±10	μA
Quiescent Supply Current, MSI	I _{cc}	V _{cc} or GND	0	5.5	—	8	—	80	—	160	—	μA

#Test one output at a time for a 1-second maximum duration. Measurement is made by forcing current and measuring voltage to minimize power dissipation.

*Test verifies a minimum 50-ohm transmission-line-drive capability at +85°C, 75 ohms at +125°C.

STATIC ELECTRICAL CHARACTERISTICS: ACT Series

CHARACTERISTICS	TEST CONDITIONS	V _{CC} (V)	AMBIENT TEMPERATURE (T _A) - °C						UNITS		
			+25		-40 to +85		-55 to +125				
			MIN.	MAX.	MIN.	MAX.	MIN.	MAX.			
High-Level Input Voltage	V _{IH}		4.5 to 5.5	2	—	2	—	2	—	V	
Low-Level Input Voltage	V _{IL}		4.5 to 5.5	—	0.8	—	0.8	—	0.8	V	
High-Level Output Voltage	V _{OH}	V _{IH} or V _{IL} #, *	-0.05 -24 -75 -50	4.5 4.5 5.5 5.5	4.4 3.94 — —	4.4 3.8 3.85 —	— — — —	4.4 3.7 — 3.85	— — — —	V	
Low-Level Output Voltage	V _{OL}	V _{IH} or V _{IL} #, *	0.05 24 75 50	4.5 4.5 5.5 5.5	— — — —	0.1 0.36 — —	— 0.44 1.65 —	0.1 0.44 — —	0.1 0.5 — 1.65	V	
Input Leakage Current	I _I	V _{CC} or GND		5.5	—	±0.1	—	±1	—	±1	μA
3-State Leakage Current	I _{OZ}	V _{IH} or V _{IL} V _O = V _{CC} or GND		5.5	—	±0.5	—	±5	—	±10	μA
Quiescent Supply Current, MSI	I _{QC}	V _{CC} or GND	0	5.5	—	8	—	80	—	160	μA
Additional Quiescent Supply Current per Input Pin TTL Inputs High 1 Unit Load	ΔI _{QC}	V _{CC} -2.1		4.5 to 5.5	—	2.4	—	2.8	—	3	mA

#Test one output at a time for a 1-second maximum duration. Measurement is made by forcing current and measuring voltage to minimize power dissipation.

*Test verifies a minimum 50-ohm transmission-line-drive capability at +85°C, 75 ohms at +125°C.

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ACT INPUT LOADING TABLE

INPUT	UNIT LOAD*
A _n , B _n	0.83
OE _{BA}	0.64
OE _{AB}	0.15

*Unit load is ΔI_{QC} limit specified in Static Characteristics Chart, e.g., 2.4 mA max. @ 25°C.

Technical Data

CD54/74AC623

CD54/74ACT623

SWITCHING CHARACTERISTICS: AC Series; $t_r, t_i = 3$ ns, $C_L = 50$ pF

CHARACTERISTICS	SYMBOL	V_{CC} (V)	AMBIENT TEMPERATURE (T_A) - °C				UNITS		
			-40 to +85		-55 to +125				
			MIN.	MAX.	MIN.	MAX.			
Propagation Delays: Data to Output	t_{PLH} t_{PHL}	1.5 3.3* 5†	— 3.5 2.5	108 12.2 8.7	— 3.4 2.4	120 13.4 9.6	ns		
Output Disable to Output	t_{PLZ} t_{PHZ}	1.5 3.3 5	— 4.8 3.5	153 17.1 12.2	— 4.7 3.4	168 18.8 13.4	ns		
Output Enable to Output	t_{PZL} t_{PZH}	1.5 3.3 5	— 4.8 3.5	153 17.1 12.2	— 4.7 3.4	168 18.8 13.4	ns		
Power Dissipation Capacitance	$C_{PD\$}$	—	66 Typ.		66 Typ.		pF		
Min. (Valley) V_{OH} During Switching of Other Outputs (Output Under Test Not Switching)	V_{OHV} See Fig. 1	5	4 Typ. @ 25°C				V		
Max. (Peak) V_{OL} During Switching of Other Outputs (Output Under Test Not Switching)	V_{OLP} See Fig. 1	5	1 Typ. @ 25°C				V		
Input Capacitance	C_I	—	—	10	—	10	pF		
3-State Output Capacitance	C_O	—	—	15	—	15	pF		

SWITCHING CHARACTERISTICS: ACT Series; $t_r, t_i = 3$ ns, $C_L = 50$ pF

CHARACTERISTICS	SYMBOL	V_{CC} (V)	AMBIENT TEMPERATURE (T_A) - °C				UNITS		
			-40 to +85		-55 to +125				
			MIN.	MAX.	MIN.	MAX.			
Propagation Delays: Data to Output	t_{PLH} t_{PHL}	5†	2.7	9.6	2.7	10.6	ns		
Output Disable to Output	t_{PLZ} t_{PHZ}	5	3.7	13.1	3.6	14.4	ns		
Output Enable to Output	t_{PZH} t_{PZL}	5	3.7	13.1	3.6	14.4	ns		
Power Dissipation Capacitance	$C_{PD\$}$	—	66 Typ.		66 Typ.		pF		
Min. (Valley) V_{OH} During Switching of Other Outputs (Output Under Test Not Switching)	V_{OHV} See Fig. 1	5	4 Typ. @ 25°C				V		
Max. (Peak) V_{OL} During Switching of Other Outputs (Output Under Test Not Switching)	V_{OLP} See Fig. 1	5	1 Typ. @ 25°C				V		
Input Capacitance	C_I	—	—	10	—	10	pF		
3-State Output Capacitance	C_O	—	—	15	—	15	pF		

*3.3 V: min. is @ 3.6 V
max. is @ 3 V

†5 V: min. is @ 5.5 V
max. is @ 4.5 V

§ C_{PD} is used to determine the dynamic power consumption, per channel.

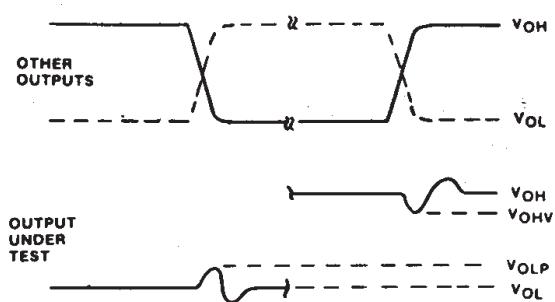
For AC series: $P_D = V_{CC}^2 f_i (C_{PD} + C_L)$

For ACT series: $P_D = V_{CC}^2 f_i (C_{PD} + C_L) + V_{CC} \Delta I_{CC}$ where f_i = input frequency
 C_L = output load capacitance
 V_{CC} = supply voltage.

CD54/74AC623

CD54/74ACT623

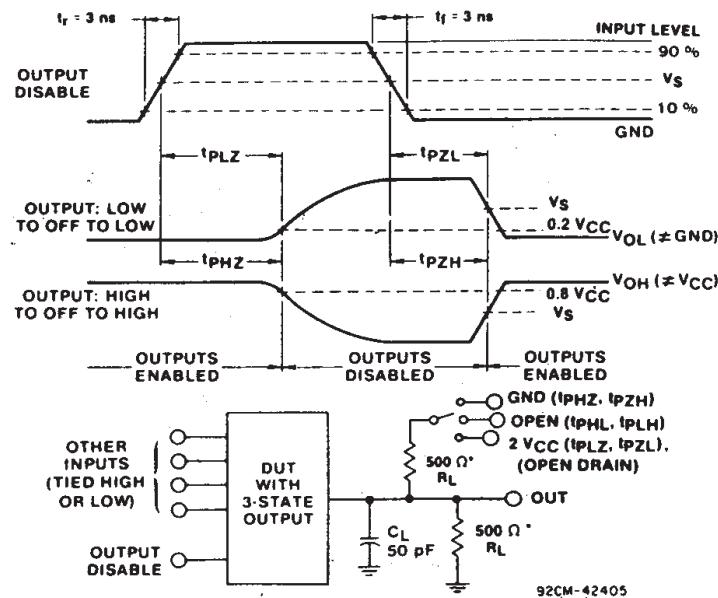
PARAMETER MEASUREMENT INFORMATION



NOTES:

1. V_{OHV} AND V_{OLP} ARE MEASURED WITH RESPECT TO A GROUND REFERENCE NEAR THE OUTPUT UNDER TEST.
2. INPUT PULSES HAVE THE FOLLOWING CHARACTERISTICS: $PRR \leq 1 \text{ MHz}$, $t_r = 3 \text{ ns}$, $t_f = 3 \text{ ns}$, $\text{SKEW } 1 \text{ ns}$.
3. R.F. FIXTURE WITH 700-MHz DESIGN RULES REQUIRED. IC SHOULD BE SOLDERED INTO TEST BOARD AND BYPASSED WITH $0.1 \mu\text{F}$ CAPACITOR. SCOPE AND PROBES REQUIRE 700-MHz BANDWIDTH.

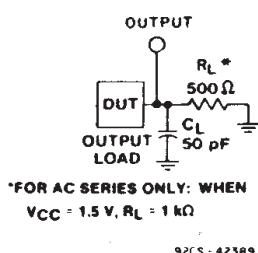
92CS-4240E

*FOR AC SERIES ONLY: WHEN $V_{CC} = 1.5 \text{ V}$, $R_L = 1 \text{ k}\Omega$

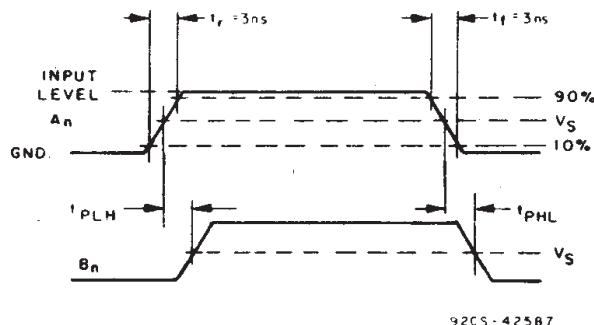
92CM-42405

Fig. 1 - Simultaneous switching transient waveforms.

Fig. 2 - Three-state propagation delay times and test circuit.

*FOR AC SERIES ONLY: WHEN $V_{CC} = 1.5 \text{ V}$, $R_L = 1 \text{ k}\Omega$

92CS-42389



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Fig. 3 - Propagation delay times and test circuit.

	CD54/74AC	CD54/74ACT
Input Level	V_{CC}	3 V
Input Switching Voltage, V_S	$0.5 V_{CC}$	1.5 V
Output Switching Voltage, V_S	$0.5 V_{CC}$	$0.5 V_{CC}$

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)
CD54ACT623F3A	Active	Production	CDIP (J) 20	20 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	CD54ACT623F3A
CD54ACT623F3A.A	Active	Production	CDIP (J) 20	20 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	CD54ACT623F3A
CD74AC623E	Active	Production	PDIP (N) 20	20 TUBE	Yes	NIPDAU	N/A for Pkg Type	-55 to 125	CD74AC623E
CD74AC623E.A	Active	Production	PDIP (N) 20	20 TUBE	Yes	NIPDAU	N/A for Pkg Type	-55 to 125	CD74AC623E
CD74AC623M	Active	Production	SOIC (DW) 20	25 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	AC623M
CD74AC623M.A	Active	Production	SOIC (DW) 20	25 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	AC623M
CD74ACT623M96	Active	Production	SOIC (DW) 20	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	ACT623M
CD74ACT623M96.A	Active	Production	SOIC (DW) 20	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	ACT623M

⁽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.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

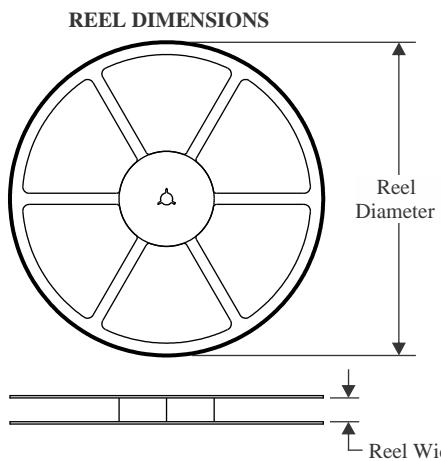
In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

OTHER QUALIFIED VERSIONS OF CD54ACT623, CD74ACT623 :

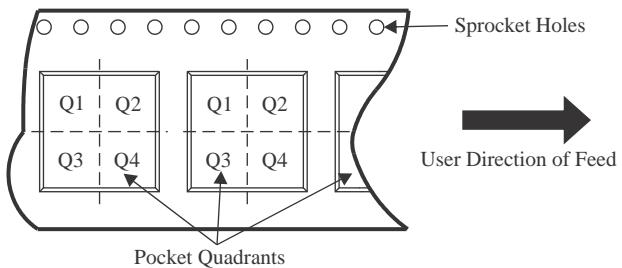
- Catalog : [CD74ACT623](#)
- Military : [CD54ACT623](#)

NOTE: Qualified Version Definitions:

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

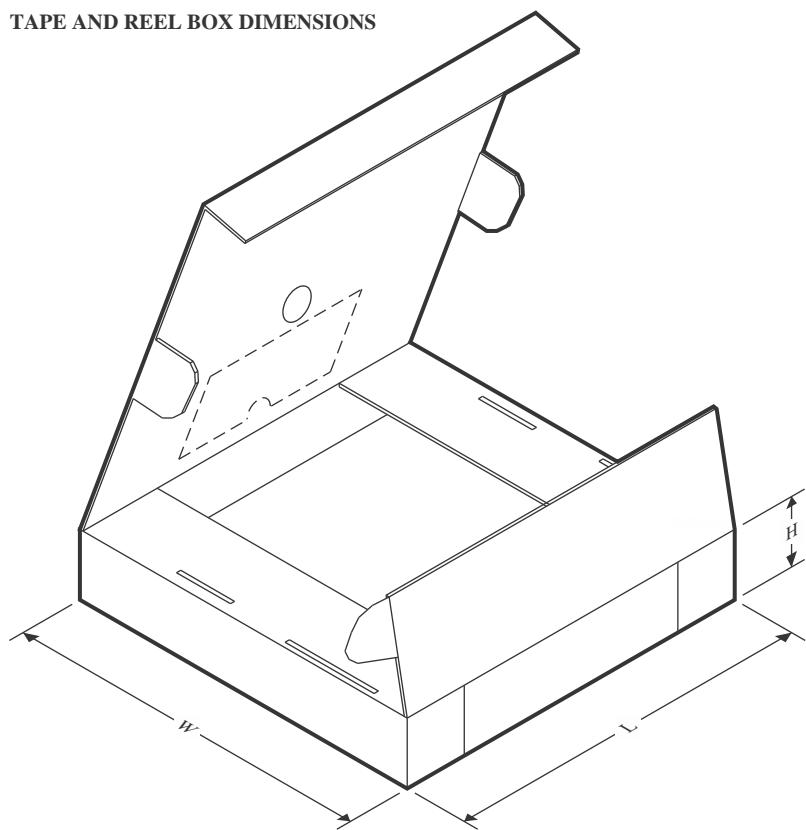
TAPE AND REEL INFORMATION


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


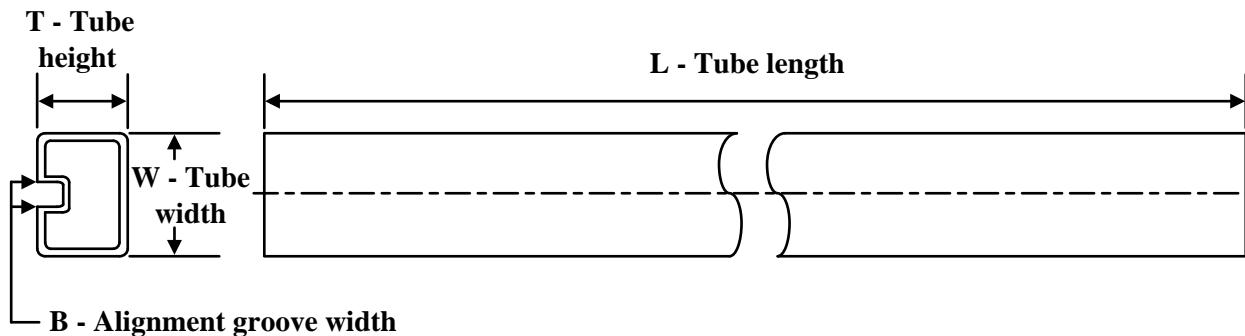
*All dimensions are nominal

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
CD74ACT623M96	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)
CD74ACT623M96	SOIC	DW	20	2000	356.0	356.0	45.0

TUBE


*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
CD74AC623E	N	PDIP	20	20	506	13.97	11230	4.32
CD74AC623E.A	N	PDIP	20	20	506	13.97	11230	4.32
CD74AC623M	DW	SOIC	20	25	507	12.83	5080	6.6
CD74AC623M.A	DW	SOIC	20	25	507	12.83	5080	6.6

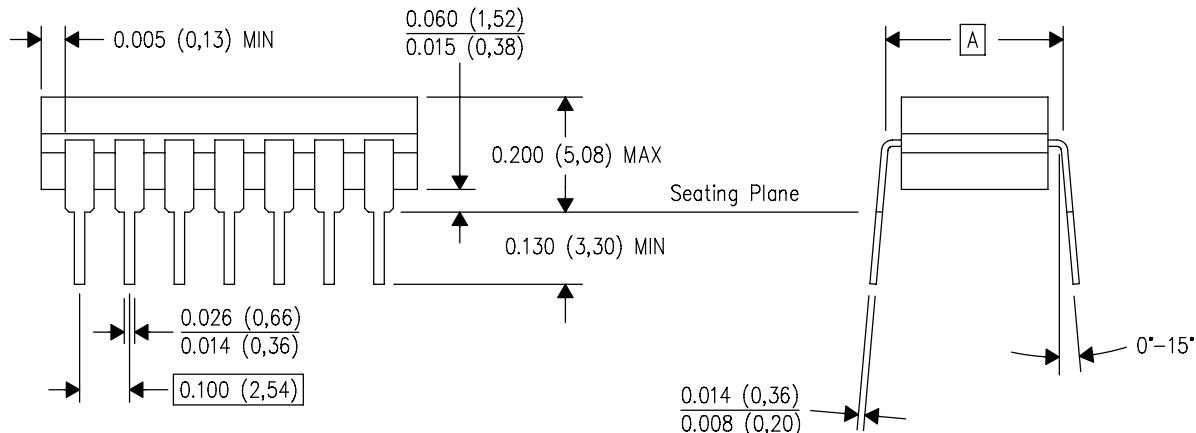
J (R-GDIP-T**)

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)



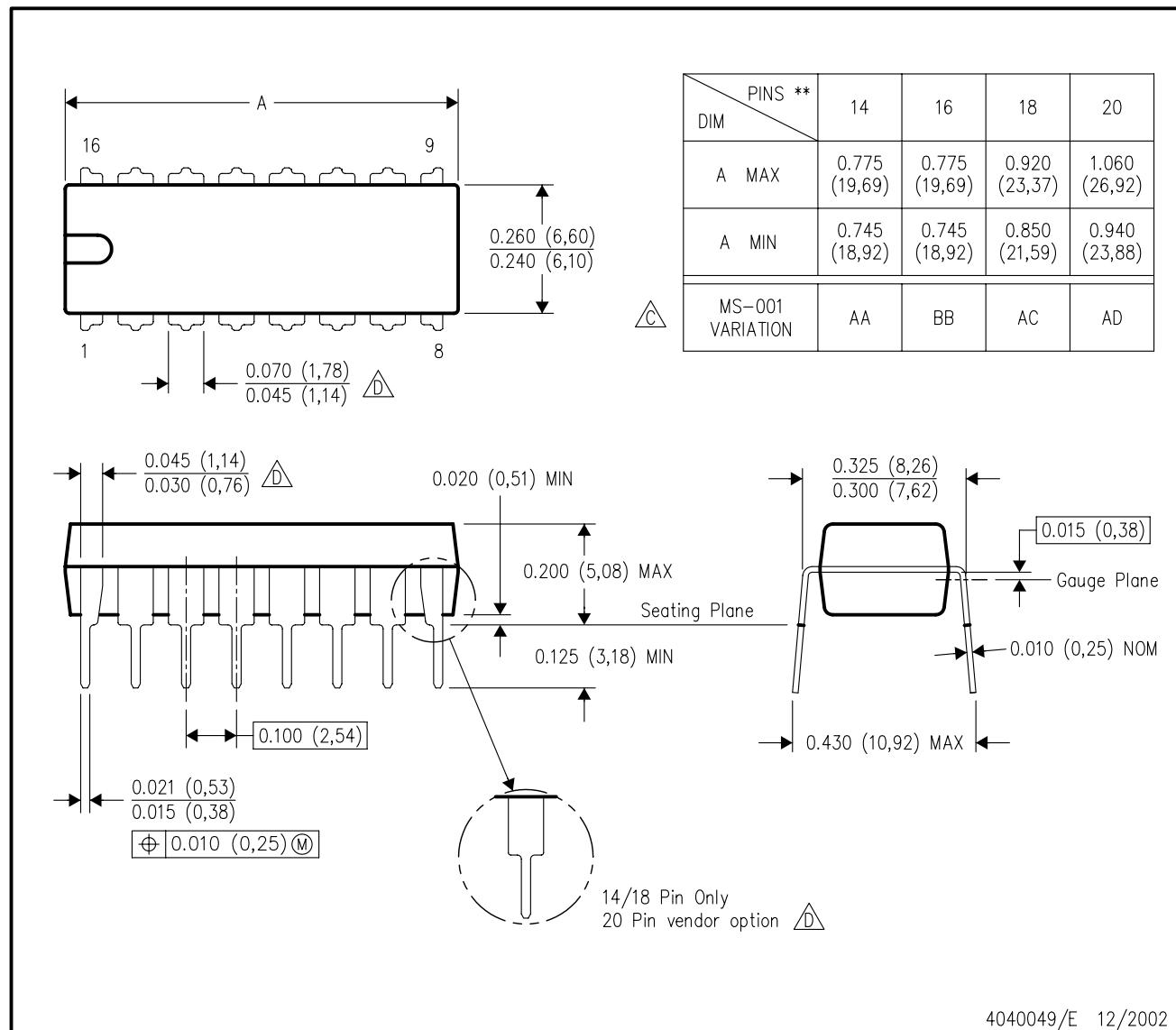
4040083/F 03/03

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.

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.

B. This drawing is subject to change without notice.

 Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).

 The 20 pin end lead shoulder width is a vendor option, either half or full width.

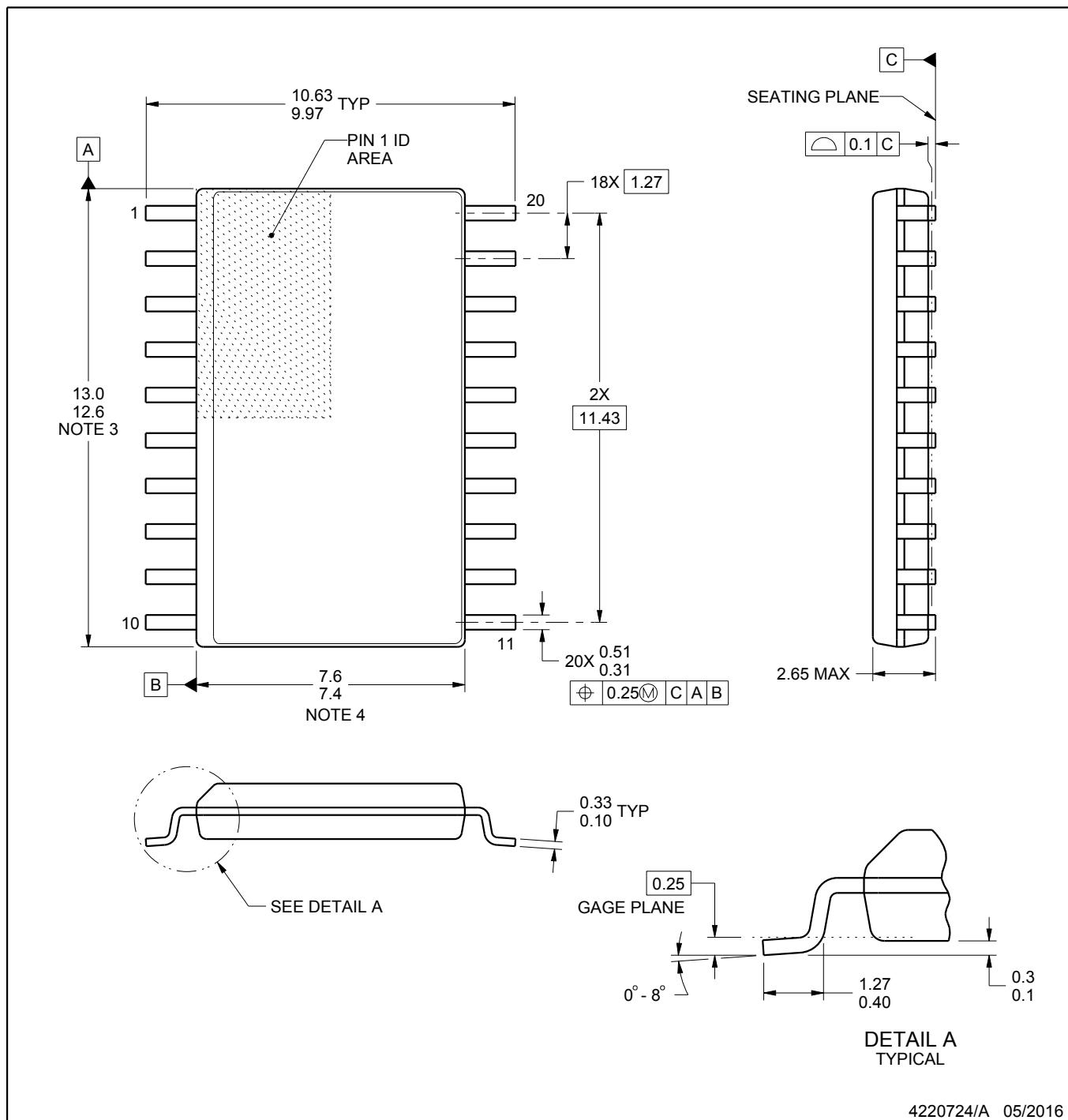


PACKAGE OUTLINE

DW0020A

SOIC - 2.65 mm max height

SOIC



NOTES:

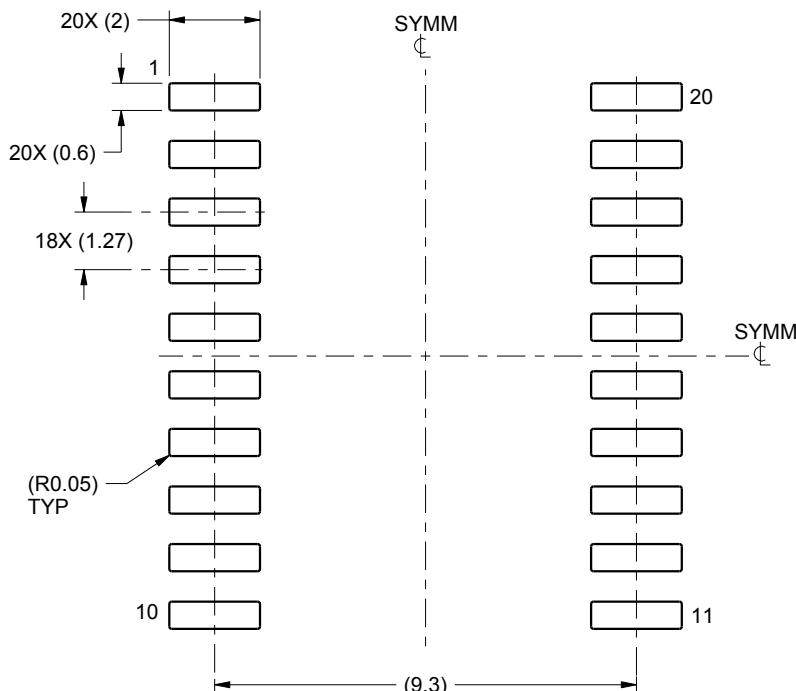
1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate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

EXAMPLE BOARD LAYOUT

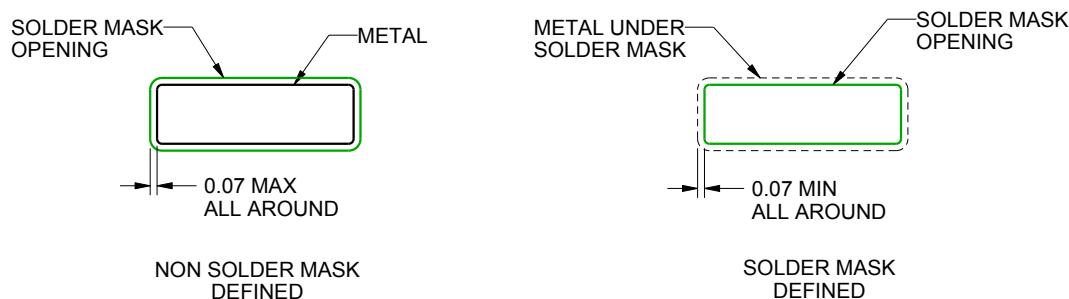
DW0020A

SOIC - 2.65 mm max height

SOIC



LAND PATTERN EXAMPLE
SCALE:6X



SOLDER MASK DETAILS

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NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

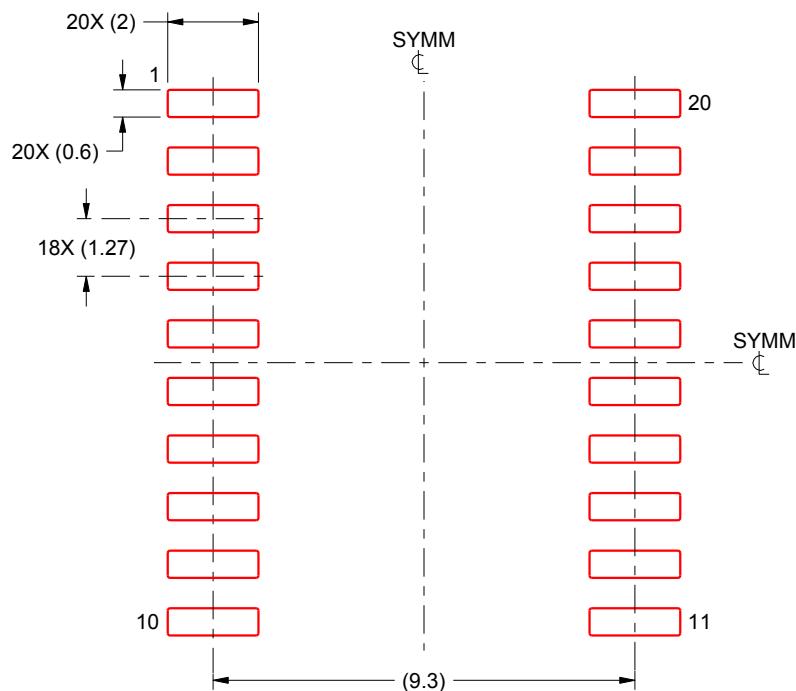
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

DW0020A

SOIC - 2.65 mm max height

SOIC



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

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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.

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Last updated 10/2025