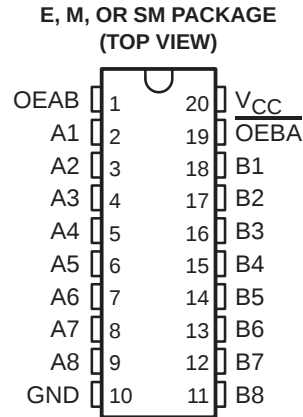


- BiCMOS Technology With Low Quiescent Power
- Buffered Inputs
- Noninverted Outputs
- Input/Output Isolation From V_{CC}
- Controlled Output Edge Rates
- 64-mA Output Sink Current
- Output Voltage Swing Limited to 3.7 V
- SCR Latch-Up-Resistant BiCMOS Process and Circuit Design
- Package Options Include Plastic Small-Outline (M) and Shrink Small-Outline (SM) Packages and Standard Plastic (E) DIP



description

The CD74FCT623 is an octal bus transceiver that uses a small-geometry BiCMOS technology. The output stage is a combination of bipolar and CMOS transistors that limits the output high level to two diode drops below V_{CC} . This resultant lowering of output swing (0 V to 3.7 V) reduces power-bus ringing [a source of electromagnetic interference (EMI)] and minimizes V_{CC} bounce and ground bounce and their effects during simultaneous output switching. The output configuration also enhances switching speed and is capable of sinking 64 mA.

This device is a noninverting, 3-state, bidirectional transceiver-buffer intended 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 ($\overline{OEAB}$, $\overline{OEBA}$) inputs.

The dual output-enable provision gives these devices the capability to store data by simultaneously enabling $\overline{OEAB}$ and $\overline{OEBA}$. 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 remain in their last states.

The CD74FCT623 is characterized for operation from 0°C to 70°C.

FUNCTION TABLE

INPUTS		OPERATION
$\overline{OEBA}$	$\overline{OEAB}$	
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

[†] To prevent excess current in the high-impedance (isolation) state, all I/O terminals should be terminated with 10-k Ω to 1-M Ω resistors.



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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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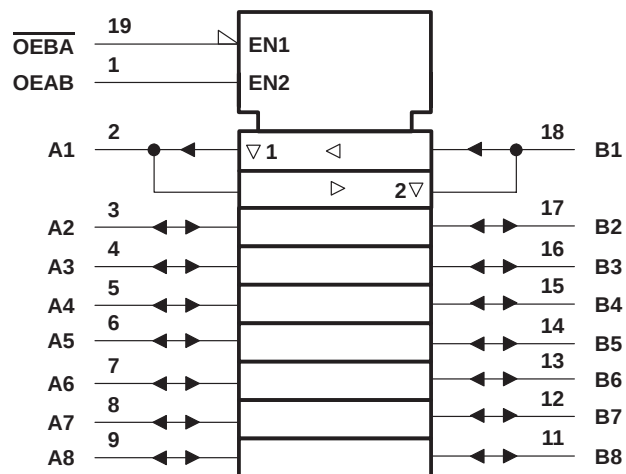
CD74FCT623

BiCMOS OCTAL BUS TRANSCEIVER

WITH 3-STATE OUTPUTS

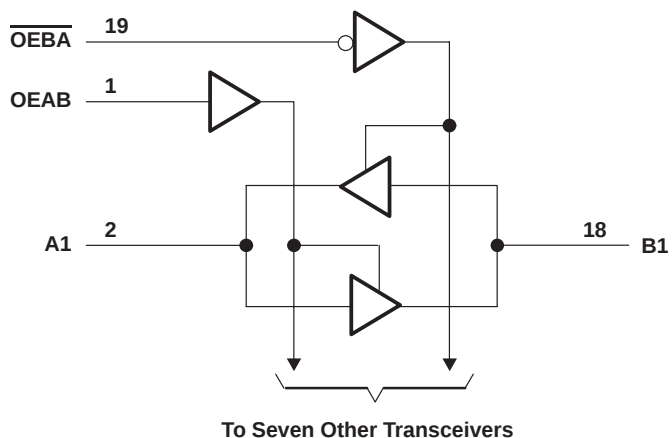
SCBS736 – JULY 2000

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)[†]

DC supply voltage range, V_{CC}	–0.5 V to 6 V
DC input clamp current, I_{IK} ($V_I < -0.5$ V)	–20 mA
DC output clamp current, I_{OK} ($V_O < -0.5$ V)	–50 mA
DC output sink current per output pin, I_{OL}	70 mA
DC output source current per output pin, I_{OH}	–30 mA
Continuous current through V_{CC} , I_{CC}	140 mA
Continuous current through GND	528 mA
Package thermal impedance, θ_{JA} (see Note 1): E package	69°C/W
M package	58°C/W
SM package	70°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.

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

recommended operating conditions (see Note 2)

	MIN	MAX	UNIT
V_{CC} Supply voltage	4.75	5.25	V
V_{IH} High-level input voltage	2		V
V_{IL} Low-level input voltage		0.8	V
V_I Input voltage	0	V_{CC}	V
V_O Output voltage	0	V_{CC}	V
I_{OH} High-level output current		–15	mA
I_{OL} Low-level output current		64	mA
$\Delta t/\Delta v$ Input transition rise or fall rate	0	10	ns/V
T_A Operating free-air temperature	0	70	°C

NOTE 2: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

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

PARAMETER	TEST CONDITIONS	V_{CC}	$T_A = 25^\circ\text{C}$		MIN	MAX	UNIT
			MIN	MAX			
V_{IK}	$I_I = -18$ mA	4.75 V	–1.2		–1.2		V
V_{OH}	$I_{OH} = -15$ mA	4.75 V	2.4		2.4		V
V_{OL}	$I_{OL} = 64$ mA	4.75 V		0.55		0.55	V
I_I	$V_I = V_{CC}$ or GND	5.25 V		± 0.1		± 1	μA
I_{OZ}	$V_O = V_{CC}$ or GND	5.25 V		± 0.5		± 10	μA
$I_{OS}^\ddagger$	$V_I = V_{CC}$ or GND, $V_O = 0$	5.25 V	–60		–60		mA
I_{CC}	$V_I = V_{CC}$ or GND, $I_O = 0$	5.25 V		8		80	μA
$\Delta I_{CC}^\S$	One input at 3.4 V, Other inputs at V_{CC} or GND	5.25 V		1.6		1.6	mA
C_i	$V_I = V_{CC}$ or GND			10		10	pF
C_O	$V_O = V_{CC}$ or GND			15		15	pF

[‡] Not more than one output should be tested at a time, and the duration of the test should not exceed 100 ms.

[§] This is the increase in supply current for each input at one of the specified TTL voltage levels rather than 0 V or V_{CC} .

CD74FCT623
BiCMOS OCTAL BUS TRANSCEIVER
WITH 3-STATE OUTPUTS

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switching characteristics over recommended operating conditions (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$T_A = 25^\circ\text{C}$	MIN	MAX	UNIT
			TYP			
t_{pd}	A or B	B or A	5.3	1.5	7	ns
t_{en}	$\overline{OEBA}$	A	7.1	1.5	9.5	ns
	OEAB	B	7.1	1.5	9.5	
t_{dis}	$\overline{OEBA}$	A	5.6	1.5	7.5	ns
	OEAB	B	5.6	1.5	7.5	

noise characteristics, $V_{CC} = 5\text{ V}$, $C_L = 50\text{ pF}$, $T_A = 25^\circ\text{C}$

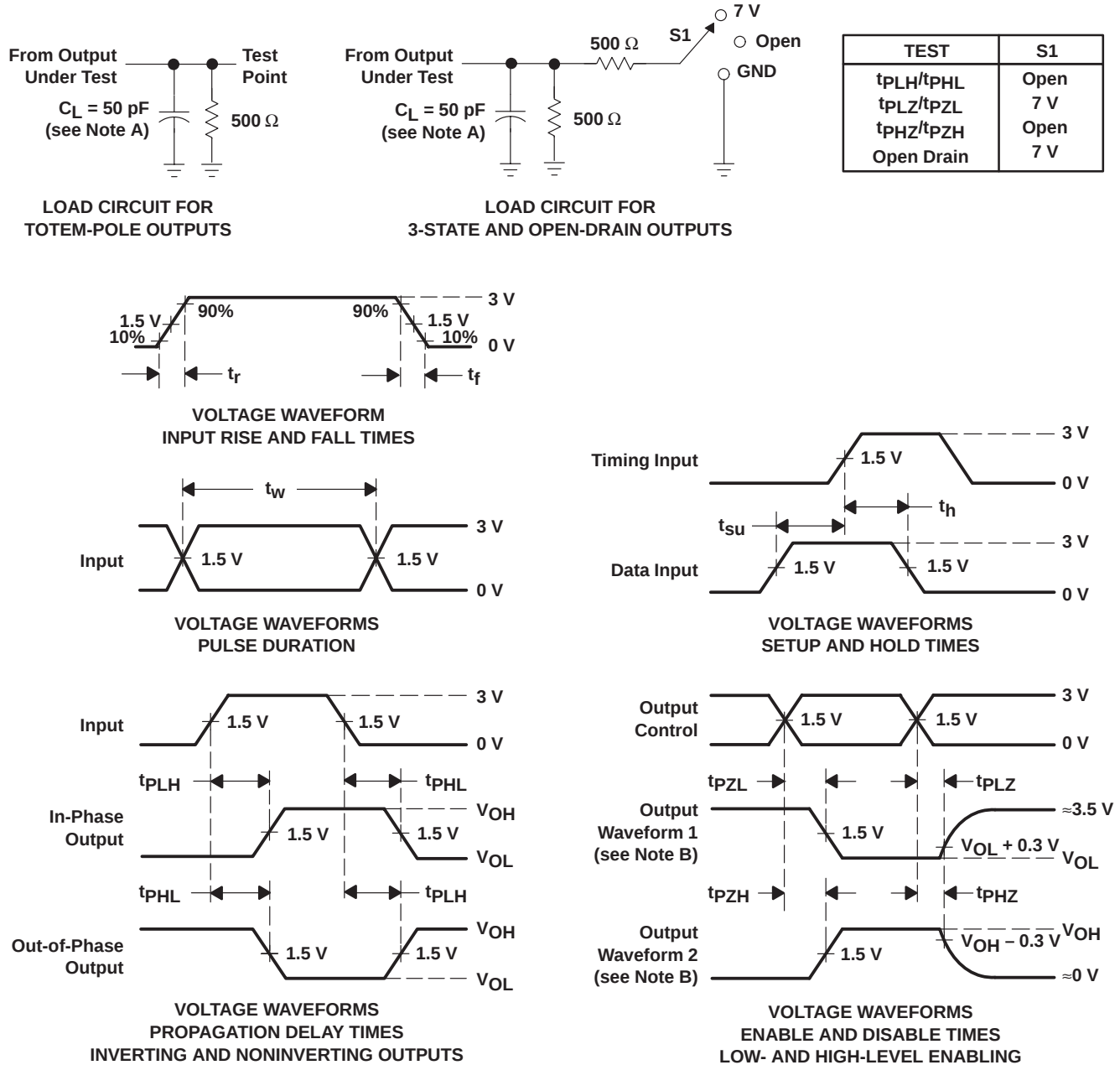
PARAMETER		MIN	TYP	MAX	UNIT
$V_{OL(P)}$	Quiet output, maximum dynamic V_{OL}		1		V
$V_{OH(V)}$	Quiet output, minimum dynamic V_{OH}		0.5		V
$V_{IH(D)}$	High-level dynamic input voltage	2			V
$V_{IL(D)}$	Low-level dynamic input voltage			0.8	V

operating characteristics, $T_A = 25^\circ\text{C}$

PARAMETER		TEST CONDITIONS	TYP	UNIT
C_{pd}	Power dissipation capacitance	No load, $f = 1\text{ MHz}$	48	pF



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. All input pulses are supplied by generators having the following characteristics: $PRR \leq 1 \text{ MHz}$, $Z_O = 50 \Omega$, t_r and $t_f = 2.5 \text{ ns}$.
- D. The outputs are measured one at a time with one input transition per measurement.
- E. t_{PLZ} and t_{PHZ} are the same as t_{dis} .
- F. t_{PZL} and t_{PZH} are the same as t_{en} .
- G. t_{PHL} and t_{PLH} are the same as t_{pd} .

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)
CD74FCT623M	Active	Production	SOIC (DW) 20	25 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	74FCT623M
CD74FCT623M.A	Active	Production	SOIC (DW) 20	25 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	74FCT623M

⁽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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TUBE



*All dimensions are nominal

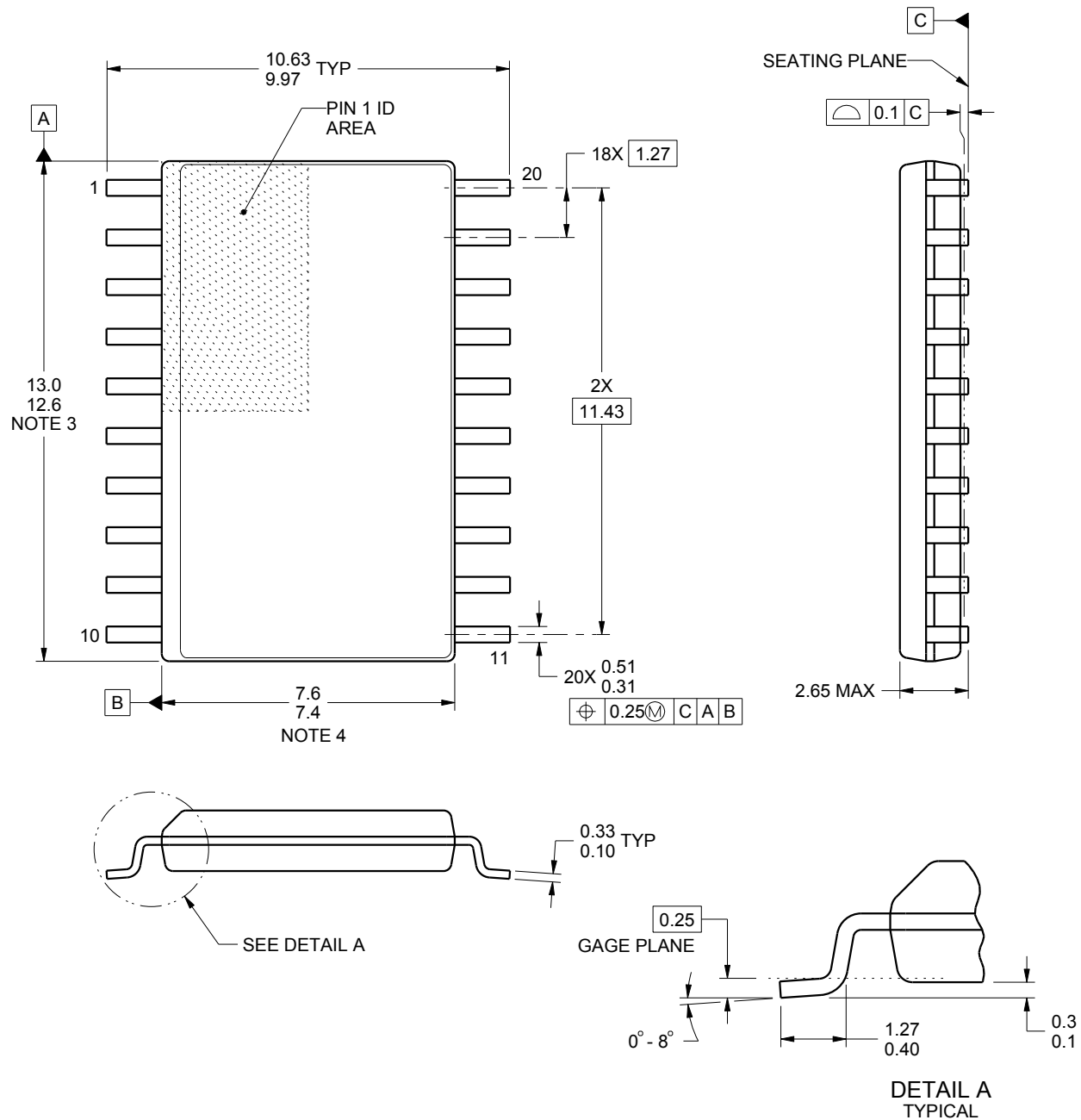
Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
CD74FCT623M	DW	SOIC	20	25	507	12.83	5080	6.6
CD74FCT623M.A	DW	SOIC	20	25	507	12.83	5080	6.6

DW0020A

PACKAGE OUTLINE

SOIC - 2.65 mm max height

SOIC



4220724/A 05/2016

NOTES:

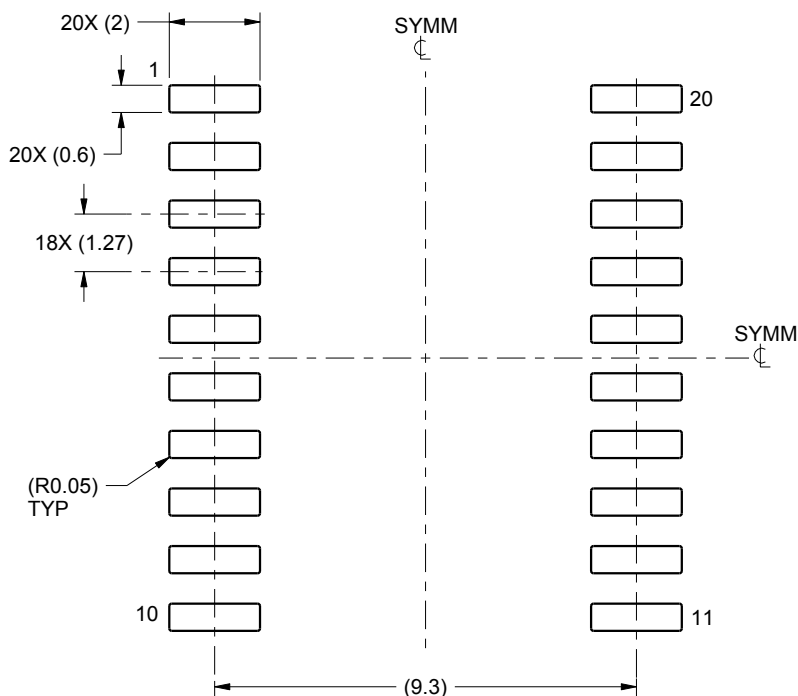
1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate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

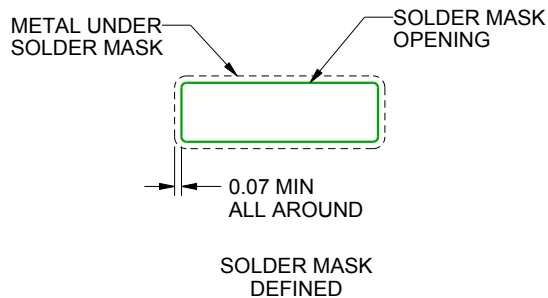
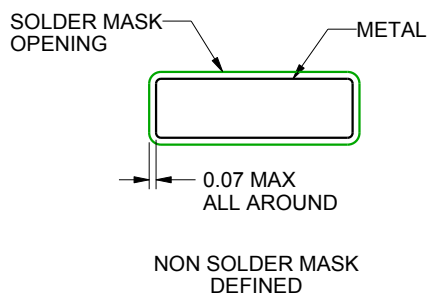
DW0020A

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.

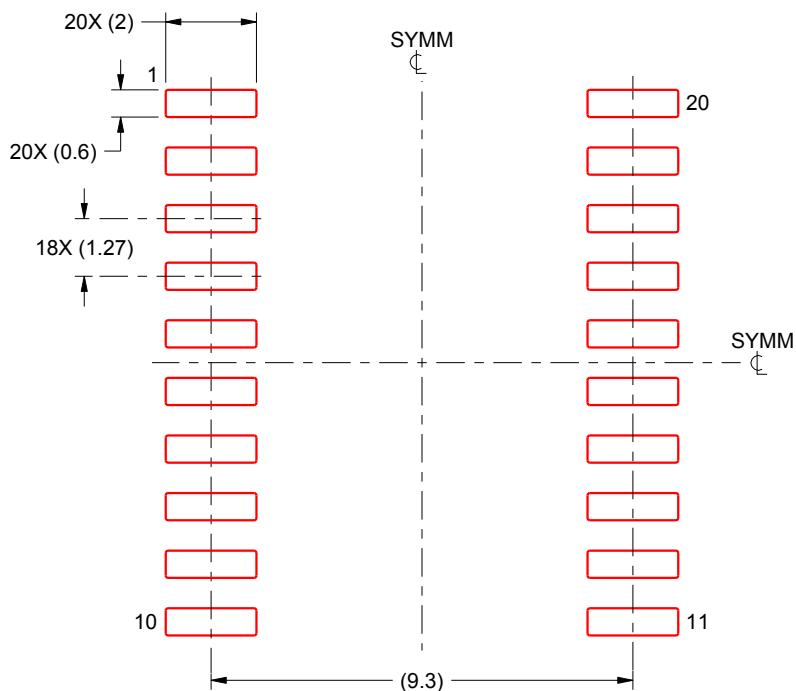
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

DW0020A

SOIC - 2.65 mm max height

SOIC



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

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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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