

SN54ALS244C, SN54AS244A, SN74ALS244C, SN74AS244A

OCTAL BUFFERS AND LINE DRIVERS

WITH 3-STATE OUTPUTS

SDAS142C – JULY 1987 – REVISED AUGUST 1995

- 3-State Outputs Drive Bus Lines or Buffer Memory Address Registers
- pnp Inputs Reduce dc Loading
- Package Options Include Plastic Small-Outline (DW) Packages, Ceramic Chip Carriers (FK), and Standard Plastic (N) and Ceramic (J) 300-mil DIPs

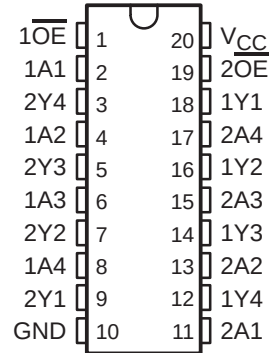
description

These octal buffers and line drivers are designed specifically to improve the performance and density of 3-state memory address drivers, clock drivers, and bus-oriented receivers and transmitters. With the 'ALS240A, 'ALS241C, 'AS240A, and 'AS241A, these devices provide the choice of selected combinations of inverting outputs, symmetrical active-low output-enable ($\overline{OE}$) inputs, and complementary OE and $\overline{OE}$ inputs.

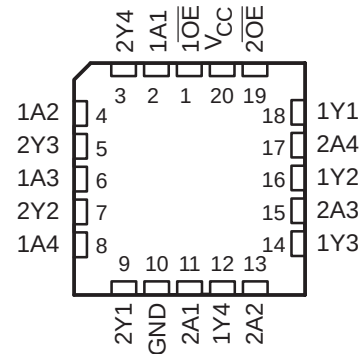
The -1 version of SN74ALS244C is identical to the standard version, except that the recommended maximum I_{OL} for the -1 version is 48 mA. There is no -1 version of the SN54ALS244C.

The SN54ALS244C and SN54AS244A are characterized for operation over the full military temperature range of -55°C to 125°C . The SN74ALS244C and SN74AS244A are characterized for operation from 0°C to 70°C .

SN54ALS244C, SN54AS244A . . . J PACKAGE
SN74ALS244C, SN74AS244A . . . DW OR N PACKAGE
(TOP VIEW)



SN54ALS244C, SN54AS244A . . . FK PACKAGE
(TOP VIEW)



FUNCTION TABLE
(each buffer)

INPUTS		OUTPUT Y
$\overline{OE}$	A	
L	H	H
L	L	L
H	X	Z

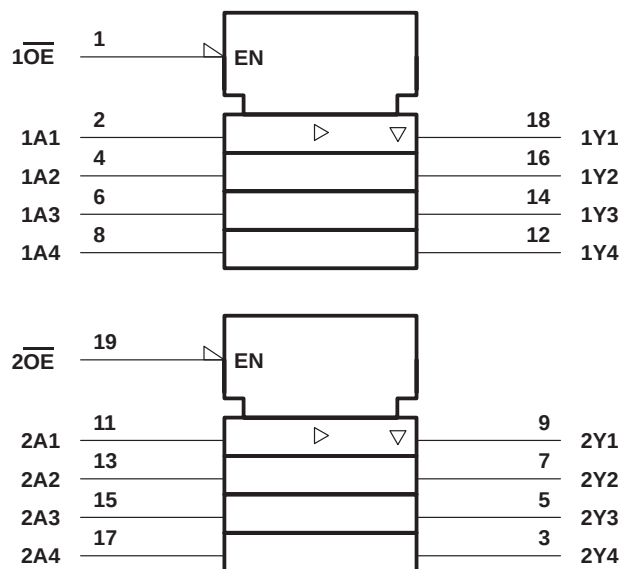
SN54ALS244C, SN54AS244A, SN74ALS244C, SN74AS244A

OCTAL BUFFERS AND LINE DRIVERS

WITH 3-STATE OUTPUTS

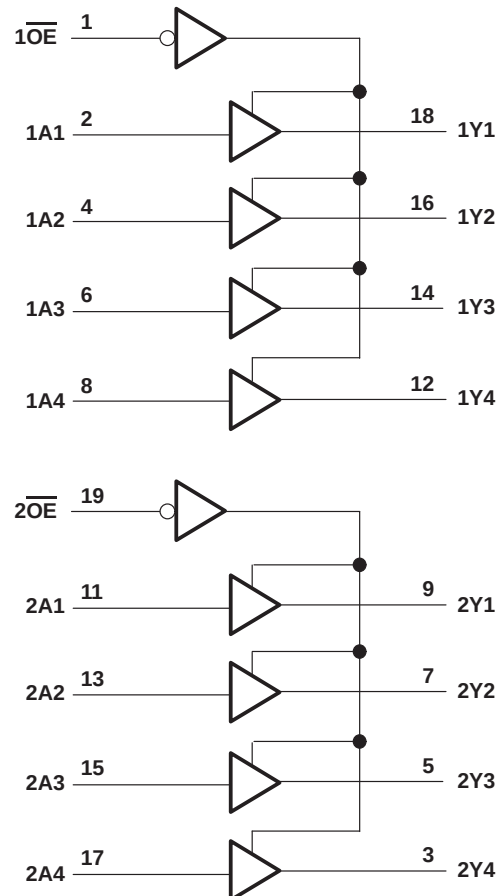
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logic symbol†



† 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)‡

Supply voltage, V_{CC}	7 V
Input voltage, V_I	7 V
Voltage applied to a disabled 3-state output	5.5 V
Operating free-air temperature range, T_A : SN54ALS244C	–55°C to 125°C
SN74ALS244C	0°C to 70°C
Storage temperature range	–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.

SN54ALS244C, SN54AS244A, SN74ALS244C, SN74AS244A

OCTAL BUFFERS AND LINE DRIVERS

WITH 3-STATE OUTPUTS

SDAS142C – JULY 1987 – REVISED AUGUST 1995

recommended operating conditions

		SN54ALS244C			SN74ALS244C			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5	5.5	4.5	5	5.5	V
V_{IH}	High-level input voltage	2			2			V
V_{IL}	Low-level input voltage			0.8 [†]			0.8	V
				0.7 [‡]				
I_{OH}	High-level output current			–12			–15	mA
I_{OL}	Low-level output current			12			24	mA
							48 [§]	
T_A	Operating free-air temperature	–55		125	0		70	°C

[†] Applies over temperature range –55°C to 70°C

[‡] Applies over temperature range 70°C to 125°C

[§] Applies only to the -1 version and only if V_{CC} is between 4.75 V and 5.25 V

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

PARAMETER	TEST CONDITIONS		SN54ALS244C			SN74ALS244C			UNIT
			MIN	TYP [¶]	MAX	MIN	TYP [¶]	MAX	
V _{IK}	V _{CC} = 4.5 V, I _I = −18 mA		−1.5			−1.5			V
V _{OH}	V _{CC} = 4.5 V to 5.5 V	I _{OH} = −0.4 mA	V _{CC} − 2			V _{CC} − 2			V
		I _{OH} = −3 mA	2.4	3.2		2.4	3.2		
	V _{CC} = 4.5 V	I _{OH} = −12 mA	2						
		I _{OH} = −15 mA				2			
V _{OL}	V _{CC} = 4.5 V	I _{OL} = 12 mA	0.25 0.4			0.25 0.4			V
		I _{OL} = 24 mA				0.35 0.5			
		I _{OL} = 48 mA (-1 version)				0.35 0.5			
I _{OZH}	V _{CC} = 5.5 V, V _O = 2.7 V	20			20			μA	
I _{OZL}	V _{CC} = 5.5 V, V _O = 0.4 V	−20			−20			μA	
I _I	V _{CC} = 5.5 V, V _I = 7 V	0.1			0.1			mA	
I _{IH}	V _{CC} = 5.5 V, V _I = 2.7 V	20			20			μA	
I _{IL}	V _{CC} = 5.5 V, V _I = 0.4 V	−0.1			−0.1			mA	
I _O [#]	V _{CC} = 5.5 V, V _O = 2.25 V	−20 −112			−30 −112			mA	
I _{CC}	V _{CC} = 5.5 V	Outputs high	9 18			9 17			mA
		Outputs low	15 25			15 24			
		Outputs disabled	17 29			17 27			

[¶] All typical values are at $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$.

[#] The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I_{OS} .

SN54ALS244C, SN54AS244A, SN74ALS244C, SN74AS244A

OCTAL BUFFERS AND LINE DRIVERS

WITH 3-STATE OUTPUTS

SDAS142C – JULY 1987 – REVISED AUGUST 1995

switching characteristics (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T _A = MIN to MAX [†]				UNIT
			SN54ALS244C		SN74ALS244C		
			MIN	MAX	MIN	MAX	
t _{PLH}	A	Y	1	16	2	10	ns
t _{PHL}			3	12	3	10	
t _{PZH}	$\overline{\text{OE}}$	Y	1	26	3	20	ns
t _{PZL}			1	24	3	20	
t _{PHZ}	$\overline{\text{OE}}$	Y	2	10	2	10	ns
t _{PLZ}			1	26	1	13	

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

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

Supply voltage, V _{CC}	7 V
Input voltage, V _I	7 V
Voltage applied to a disabled 3-state output	5.5 V
Operating free-air temperature range, T _A : SN54AS244A	–55°C to 125°C
SN74AS244A	0°C to 70°C
Storage temperature range	–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.

recommended operating conditions

		SN54AS244A			SN74AS244A			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V _{CC}	Supply voltage	4.5	5	5.5	4.5	5	5.5	V
V _{IH}	High-level input voltage	2			2			V
V _{IL}	Low-level input voltage			0.8			0.8	V
I _{OH}	High-level output current			–12			–15	mA
I _{OL}	Low-level output current			48			64	mA
T _A	Operating free-air temperature	–55		125	0		70	°C



SN54ALS244C, SN54AS244A, SN74ALS244C, SN74AS244A

OCTAL BUFFERS AND LINE DRIVERS

WITH 3-STATE OUTPUTS

SDAS142C – JULY 1987 – REVISED AUGUST 1995

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

PARAMETER		TEST CONDITIONS		SN54AS244A			SN74AS244A			UNIT
				MIN	TYP†	MAX	MIN	TYP†	MAX	
V _{IK}		V _{CC} = 4.5 V, I _I = −18 mA		−1.2			−1.2			V
V _{OH}		V _{CC} = 4.5 V to 5.5 V, I _{OH} = −2 mA		V _{CC} − 2			V _{CC} − 2			V
		V _{CC} = 4.5 V	I _{OH} = −3 mA	2.4	3.4	2.4	3.4			
			I _{OH} = −12 mA	2.4						
			I _{OH} = −15 mA			2.4				
V _{OL}		V _{CC} = 4.5 V		0.55			0.55			V
		I _{OL} = 64 mA								
I _{OZH}		V _{CC} = 5.5 V, V _O = 2.7 V		50			50			μA
I _{OZL}		V _{CC} = 5.5 V, V _O = 0.4 V		−50			−50			μA
I _I		V _{CC} = 5.5 V, V _I = 7 V		0.1			0.1			mA
I _{IH}		V _{CC} = 5.5 V, V _I = 2.7 V		20			20			μA
I _{IL}	$\overline{\text{OE}}$	V _{CC} = 5.5 V, V _I = 0.4 V		−0.5			−0.5			mA
	A			−1			−1			
I _O ‡		V _{CC} = 5.5 V, V _O = 2.25 V		−50 −150		−50 −150		mA		
I _{CC}		V _{CC} = 5.5 V		Outputs high		22	34	22	34	mA
		Outputs low		60	90	60	90			
		Outputs disabled		34	54	34	54			

[†] All typical values are at $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$.

[‡] The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I_{OS} .

switching characteristics (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R ₁ = 500 Ω, R ₂ = 500 Ω, T _A = MIN to MAX [§]				UNIT
			SN54AS244A		SN74AS244A		
			MIN	MAX	MIN	MAX	
t _{PLH}	A	Y	2	9	2	6.2	ns
t _{PHL}			1	7	1	6.2	
t _{PZH}	$\overline{OE}$	Y	1	10	1	9	ns
t _{PZL}			2	8	2	7.5	
t _{PHZ}	$\overline{OE}$	Y	1	6.5	1	6	ns
t _{PLZ}			1	10.5	1	9	

[§] For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

SN54ALS244C, SN54AS244A, SN74ALS244C, SN74AS244A

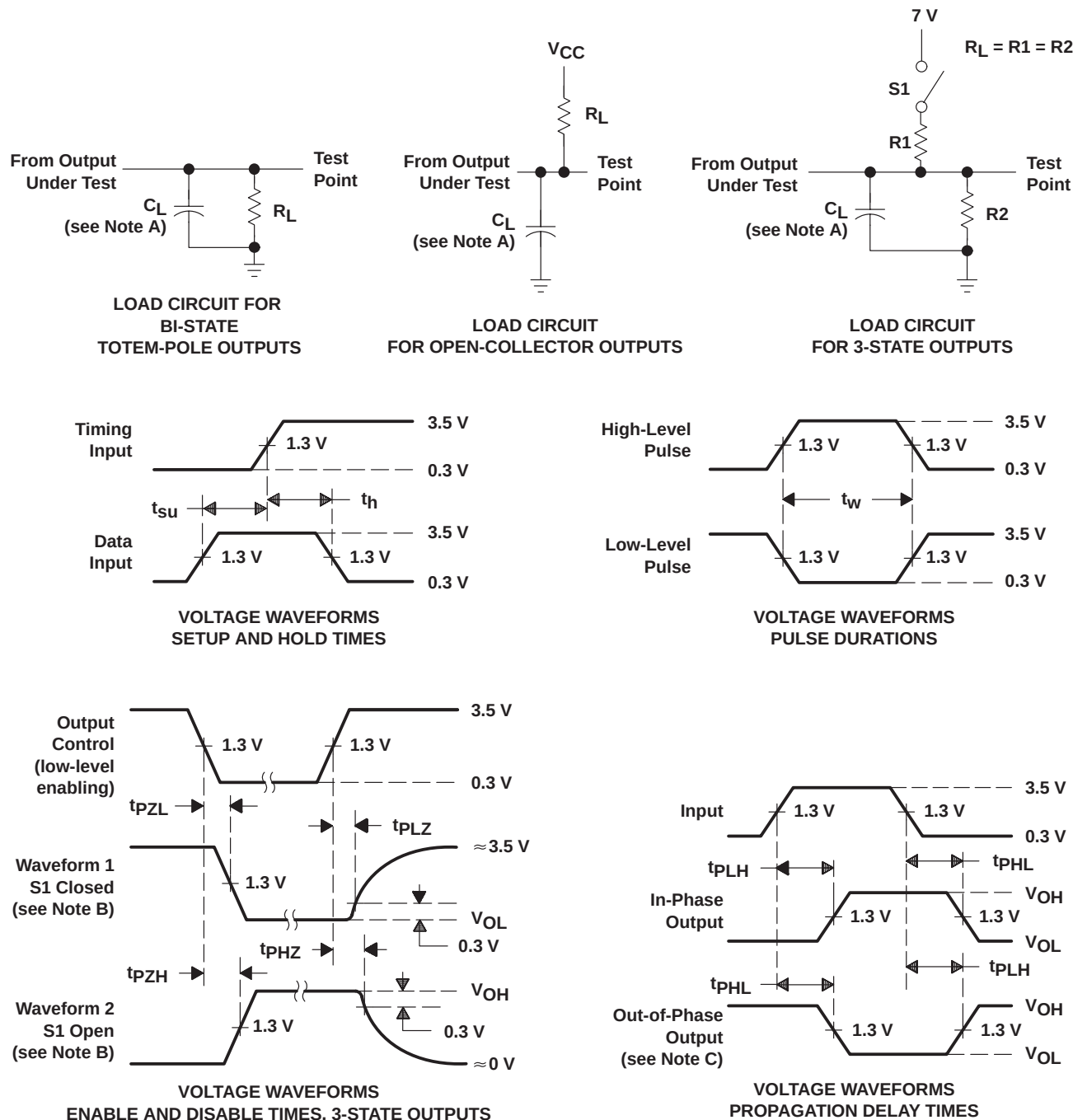
OCTAL BUFFERS AND LINE DRIVERS

WITH 3-STATE OUTPUTS

SDAS142C – JULY 1987 – REVISED AUGUST 1995

PARAMETER MEASUREMENT INFORMATION

SERIES 54ALS/74ALS AND 54AS/74AS DEVICES



- NOTES:
- C_L includes probe and jig capacitance.
 - 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.
 - When measuring propagation delay items of 3-state outputs, switch S1 is open.
 - All input pulses have the following characteristics: $PRR \leq 1$ MHz, $t_r = t_f = 2$ ns, duty cycle = 50%.
 - The outputs are measured one at a time with one transition per measurement.

Figure 1. Load Circuits 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)
5962-86839012A	Active	Production	LCCC (FK) 20	55 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962- 86839012A SNJ54ALS 244CFK
5962-8683901RA	Active	Production	CDIP (J) 20	20 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-8683901RA SNJ54ALS244CJ
5962-8683901SA	Active	Production	CFP (W) 20	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-8683901SA SNJ54ALS244CW
5962-8683901VRA	Active	Production	CDIP (J) 20	20 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-8683901VR A SNV54ALS244CJ
5962-8683901VRA.A	Active	Production	CDIP (J) 20	20 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-8683901VR A SNV54ALS244CJ
5962-8683901VSA	Active	Production	CFP (W) 20	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-8683901VS A SNV54ALS244CW
5962-8683901VSA.A	Active	Production	CFP (W) 20	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-8683901VS A SNV54ALS244CW
5962-9755901QRA	Active	Production	CDIP (J) 20	20 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9755901QR A SNJ54AS244AJ
JM38510/38303B2A	Active	Production	LCCC (FK) 20	55 TUBE	No	SNPB	N/A for Pkg Type	-	JM38510/ 38303B2A
JM38510/38303B2A.A	Active	Production	LCCC (FK) 20	55 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	JM38510/ 38303B2A
JM38510/38303BRA	Active	Production	CDIP (J) 20	20 TUBE	No	SNPB	N/A for Pkg Type	-	JM38510/ 38303BRA
JM38510/38303BRA.A	Active	Production	CDIP (J) 20	20 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	JM38510/ 38303BRA
M38510/38303B2A	Active	Production	LCCC (FK) 20	55 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	JM38510/ 38303B2A

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)
M38510/38303BRA	Active	Production	CDIP (J) 20	20 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	JM38510/ 38303BRA
SN54ALS244CJ	Active	Production	CDIP (J) 20	20 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	SN54ALS244CJ
SN54ALS244CJ.A	Active	Production	CDIP (J) 20	20 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	SN54ALS244CJ
SN54AS244AJ	Active	Production	CDIP (J) 20	20 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	SN54AS244AJ
SN54AS244AJ.A	Active	Production	CDIP (J) 20	20 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	SN54AS244AJ
SN74ALS244C-1DW	Obsolete	Production	SOIC (DW) 20	-	-	Call TI	Call TI	0 to 70	ALS244C-1
SN74ALS244C-1DWR	Active	Production	SOIC (DW) 20	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS244C-1
SN74ALS244C-1DWR.A	Active	Production	SOIC (DW) 20	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS244C-1
SN74ALS244C-1N	Active	Production	PDIP (N) 20	20 TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	SN74ALS244C-1N
SN74ALS244C-1N.A	Active	Production	PDIP (N) 20	20 TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	SN74ALS244C-1N
SN74ALS244C-1NSR	Active	Production	SOP (NS) 20	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS244C-1
SN74ALS244C-1NSR.A	Active	Production	SOP (NS) 20	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS244C-1
SN74ALS244CDBR	Active	Production	SSOP (DB) 20	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	G244C
SN74ALS244CDBR.A	Active	Production	SSOP (DB) 20	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	G244C
SN74ALS244CDW	Obsolete	Production	SOIC (DW) 20	-	-	Call TI	Call TI	0 to 70	ALS244C
SN74ALS244CDWR	Active	Production	SOIC (DW) 20	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS244C
SN74ALS244CDWR.A	Active	Production	SOIC (DW) 20	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS244C
SN74ALS244CN	Active	Production	PDIP (N) 20	20 TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	SN74ALS244CN
SN74ALS244CN.A	Active	Production	PDIP (N) 20	20 TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	SN74ALS244CN
SN74ALS244CNSR	Active	Production	SOP (NS) 20	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS244C
SN74ALS244CNSR.A	Active	Production	SOP (NS) 20	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	ALS244C
SN74AS244ADW	Obsolete	Production	SOIC (DW) 20	-	-	Call TI	Call TI	0 to 70	AS244A
SN74AS244ADWR	Active	Production	SOIC (DW) 20	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	AS244A
SN74AS244ADWR.A	Active	Production	SOIC (DW) 20	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	AS244A
SN74AS244AN	Active	Production	PDIP (N) 20	20 TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	SN74AS244AN
SN74AS244AN.A	Active	Production	PDIP (N) 20	20 TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	SN74AS244AN
SN74AS244ANE4	Active	Production	PDIP (N) 20	20 TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	SN74AS244AN
SN74AS244ANSR	Active	Production	SOP (NS) 20	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	74AS244A
SN74AS244ANSR.A	Active	Production	SOP (NS) 20	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	74AS244A

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)
SNJ54ALS244CFK	Active	Production	LCCC (FK) 20	55 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-86839012A SNJ54ALS 244CFK
SNJ54ALS244CFK.A	Active	Production	LCCC (FK) 20	55 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-86839012A SNJ54ALS 244CFK
SNJ54ALS244CJ	Active	Production	CDIP (J) 20	20 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-8683901RA SNJ54ALS244CJ
SNJ54ALS244CJ.A	Active	Production	CDIP (J) 20	20 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-8683901RA SNJ54ALS244CJ
SNJ54ALS244CW	Active	Production	CFP (W) 20	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-8683901SA SNJ54ALS244CW
SNJ54ALS244CW.A	Active	Production	CFP (W) 20	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-8683901SA SNJ54ALS244CW
SNJ54AS244AJ	Active	Production	CDIP (J) 20	20 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9755901QR A SNJ54AS244AJ
SNJ54AS244AJ.A	Active	Production	CDIP (J) 20	20 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-9755901QR A SNJ54AS244AJ

⁽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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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 SN54ALS244C, SN54ALS244C-SP, SN54AS244A, SN74ALS244C, SN74AS244A :

- Catalog : [SN74ALS244C](#), [SN54ALS244C](#), [SN74AS244A](#)
- Military : [SN54ALS244C](#), [SN54AS244A](#)
- Space : [SN54ALS244C-SP](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense Applications
- Space - Radiation tolerant, ceramic packaging and qualified for use in Space-based application

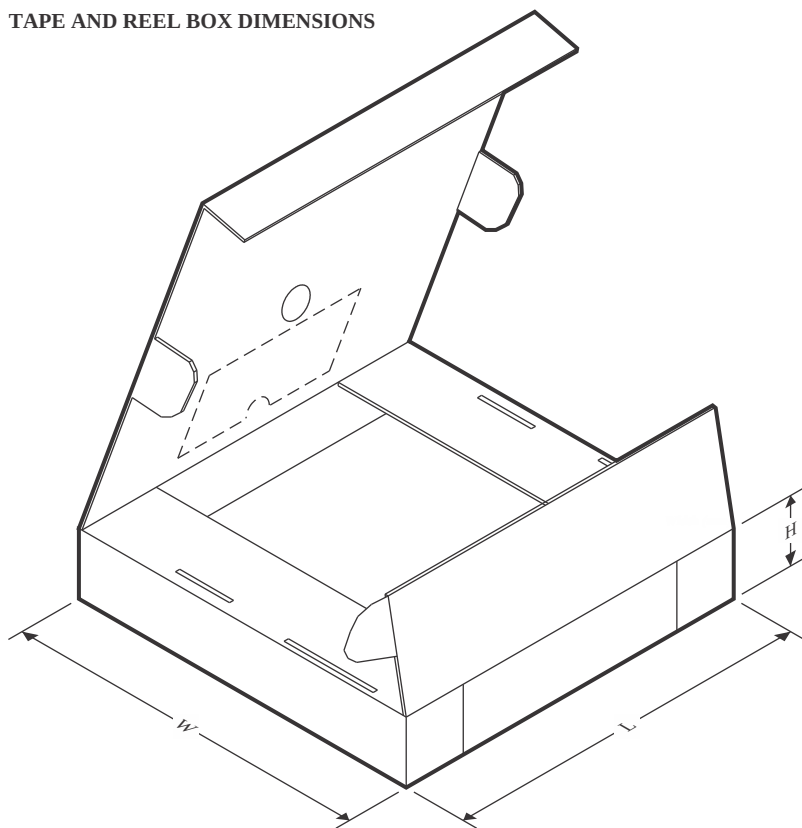
TAPE AND REEL INFORMATION



*All dimensions are nominal

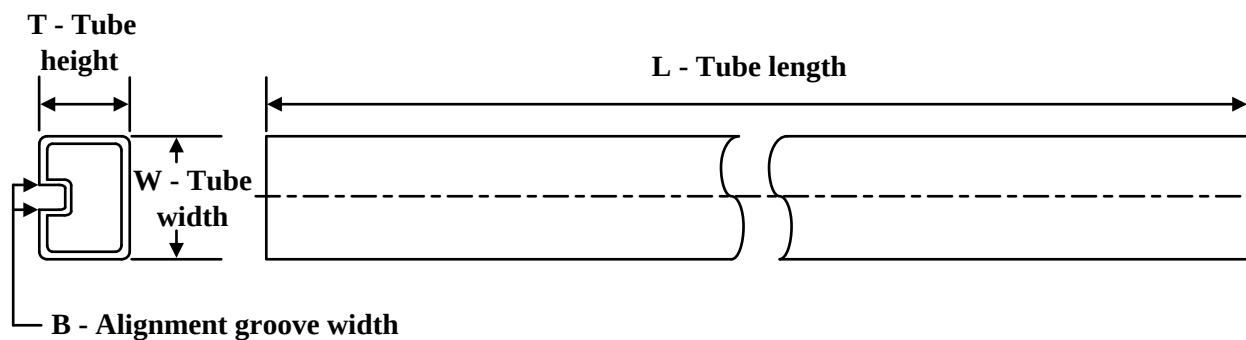
Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74ALS244C-1DWR	SOIC	DW	20	2000	330.0	24.4	10.8	13.3	2.7	12.0	24.0	Q1
SN74ALS244C-1NSR	SOP	NS	20	2000	330.0	24.4	8.4	13.0	2.5	12.0	24.0	Q1
SN74ALS244CDBR	SSOP	DB	20	2000	330.0	16.4	8.2	7.5	2.5	12.0	16.0	Q1
SN74ALS244CDWR	SOIC	DW	20	2000	330.0	24.4	10.8	13.3	2.7	12.0	24.0	Q1
SN74ALS244CNSR	SOP	NS	20	2000	330.0	24.4	8.4	13.0	2.5	12.0	24.0	Q1
SN74AS244ADWR	SOIC	DW	20	2000	330.0	24.4	10.8	13.3	2.7	12.0	24.0	Q1
SN74AS244ANSR	SOP	NS	20	2000	330.0	24.4	8.4	13.0	2.5	12.0	24.0	Q1

TAPE AND REEL BOX DIMENSIONS



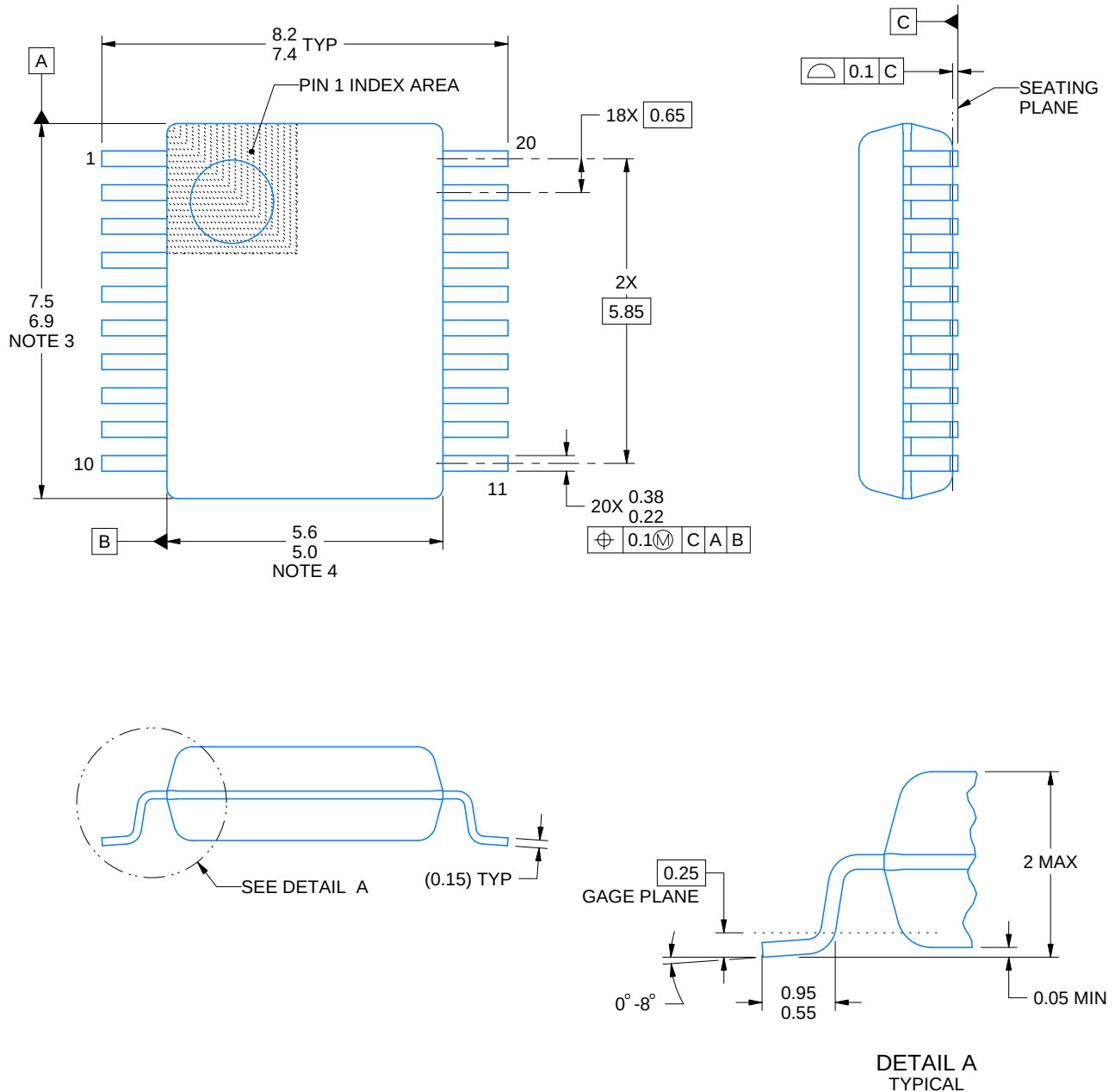
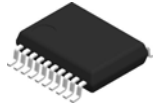
*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74ALS244C-1DWR	SOIC	DW	20	2000	356.0	356.0	45.0
SN74ALS244C-1NSR	SOP	NS	20	2000	356.0	356.0	45.0
SN74ALS244CDBR	SSOP	DB	20	2000	353.0	353.0	32.0
SN74ALS244CDWR	SOIC	DW	20	2000	356.0	356.0	45.0
SN74ALS244CNSR	SOP	NS	20	2000	356.0	356.0	45.0
SN74AS244ADWR	SOIC	DW	20	2000	356.0	356.0	45.0
SN74AS244ANSR	SOP	NS	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)
5962-86839012A	FK	LCCC	20	55	506.98	12.06	2030	NA
5962-8683901SA	W	CFP	20	25	506.98	26.16	6220	NA
5962-8683901VSA	W	CFP	20	25	506.98	26.16	6220	NA
5962-8683901VSA.A	W	CFP	20	25	506.98	26.16	6220	NA
JM38510/38303B2A	FK	LCCC	20	55	506.98	12.06	2030	NA
JM38510/38303B2A.A	FK	LCCC	20	55	506.98	12.06	2030	NA
M38510/38303B2A	FK	LCCC	20	55	506.98	12.06	2030	NA
SN74ALS244C-1N	N	PDIP	20	20	506	13.97	11230	4.32
SN74ALS244C-1N.A	N	PDIP	20	20	506	13.97	11230	4.32
SN74ALS244CN	N	PDIP	20	20	506	13.97	11230	4.32
SN74ALS244CN.A	N	PDIP	20	20	506	13.97	11230	4.32
SN74AS244AN	N	PDIP	20	20	506	13.97	11230	4.32
SN74AS244AN.A	N	PDIP	20	20	506	13.97	11230	4.32
SN74AS244ANE4	N	PDIP	20	20	506	13.97	11230	4.32
SNJ54ALS244CFK	FK	LCCC	20	55	506.98	12.06	2030	NA
SNJ54ALS244CFK.A	FK	LCCC	20	55	506.98	12.06	2030	NA
SNJ54ALS244CW	W	CFP	20	25	506.98	26.16	6220	NA
SNJ54ALS244CW.A	W	CFP	20	25	506.98	26.16	6220	NA



4214851/B 08/2019

NOTES:

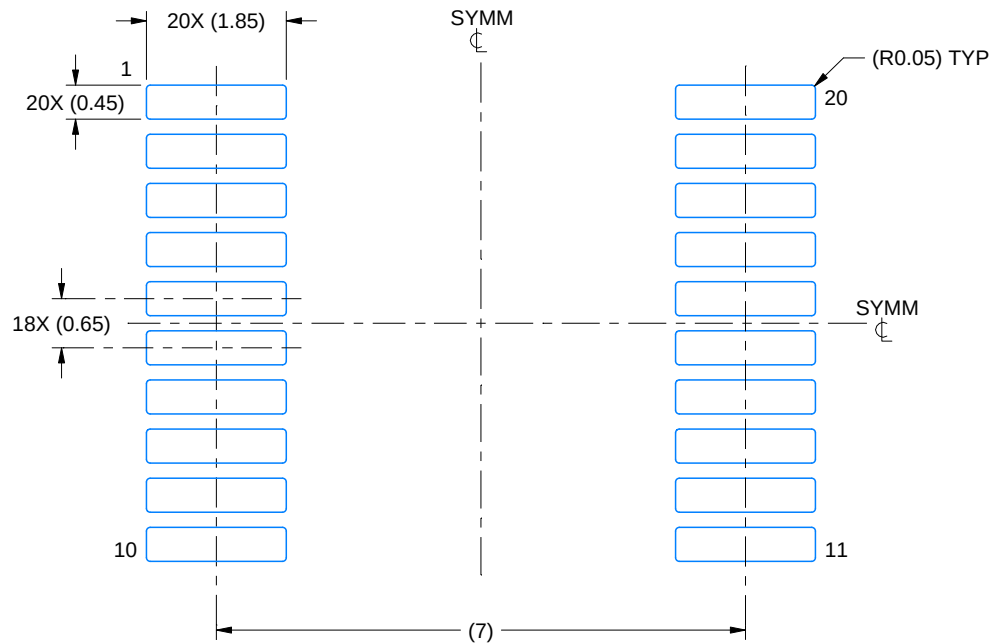
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or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

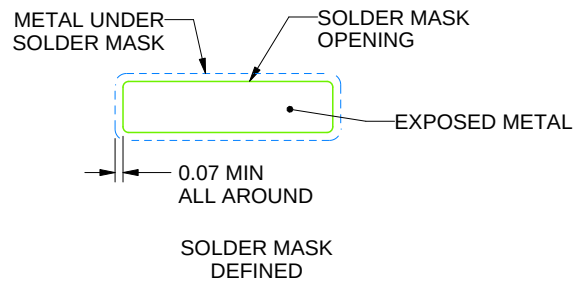
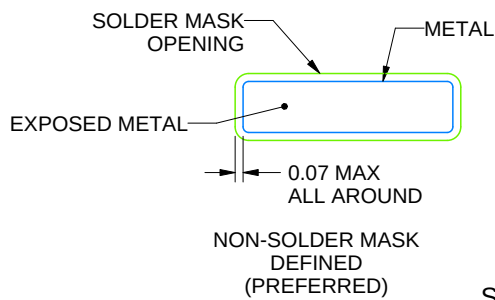
DB0020A

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X



SOLDER MASK DETAILS

4214851/B 08/2019

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

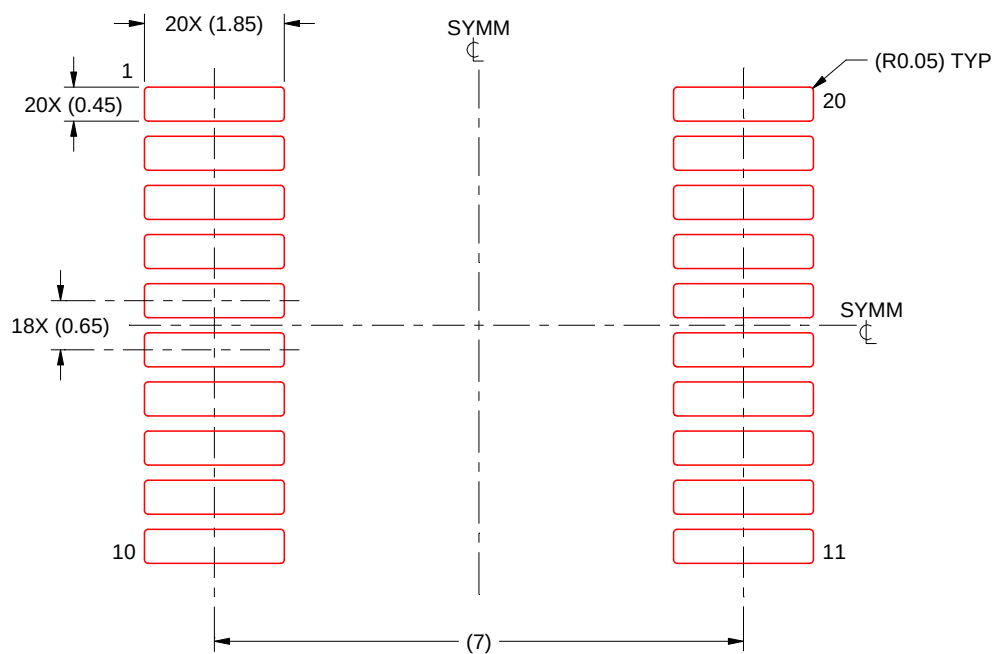
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

DB0020A

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



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

4214851/B 08/2019

NOTES: (continued)

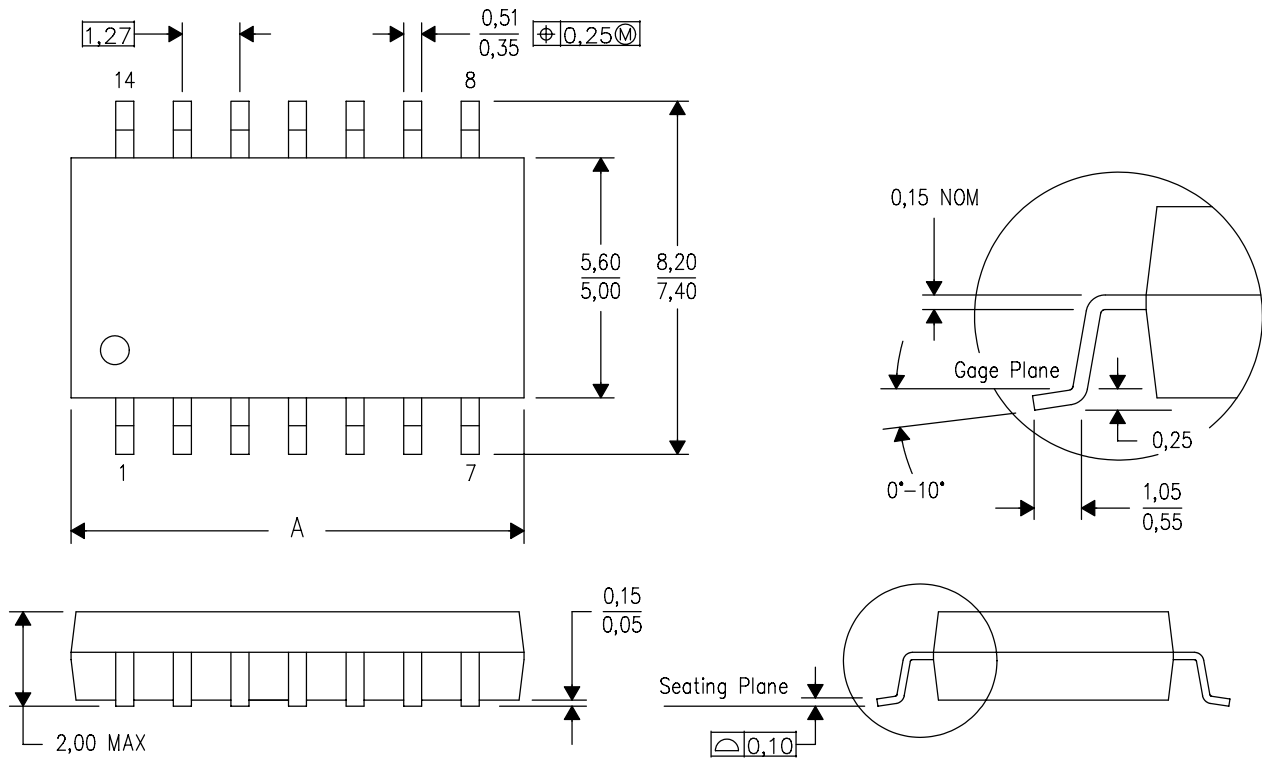
8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

MECHANICAL DATA

NS (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



DIM \ PINS **	14	16	20	24
A MAX	10,50	10,50	12,90	15,30
A MIN	9,90	9,90	12,30	14,70

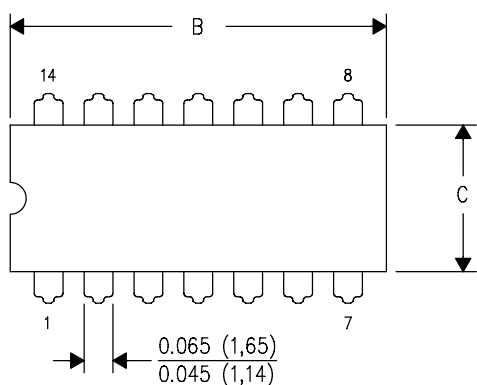
4040062/C 03/03

- 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.

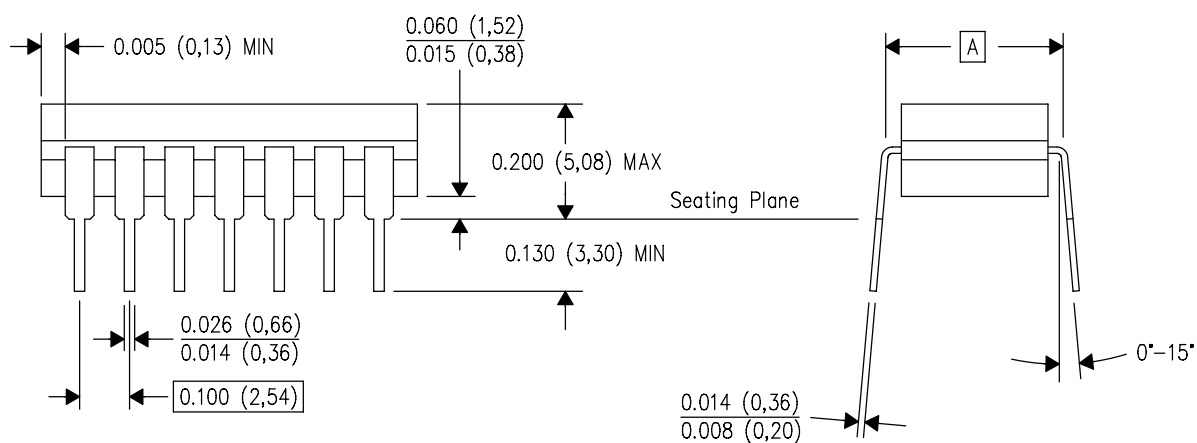
J (R-GDIP-T**)

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

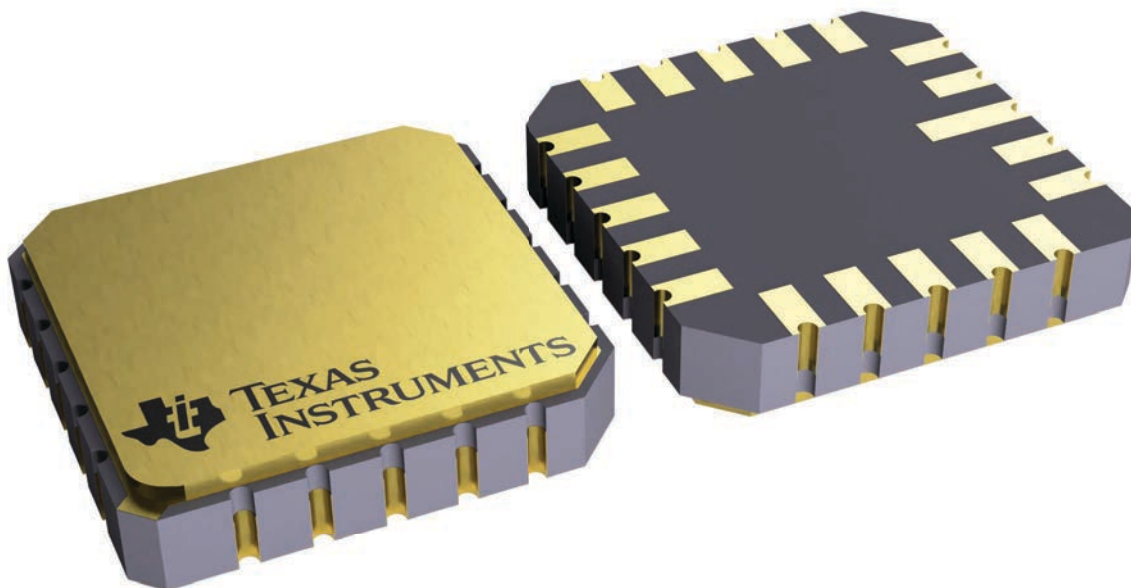
FK 20

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.

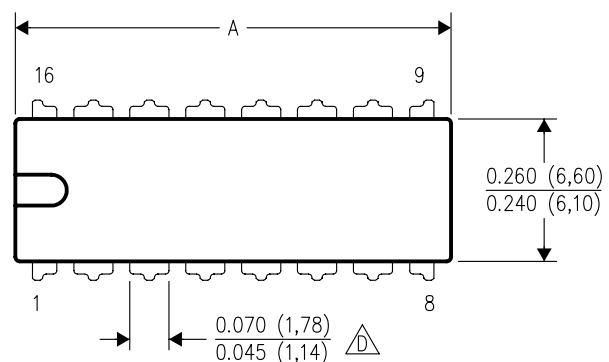


4229370VA\

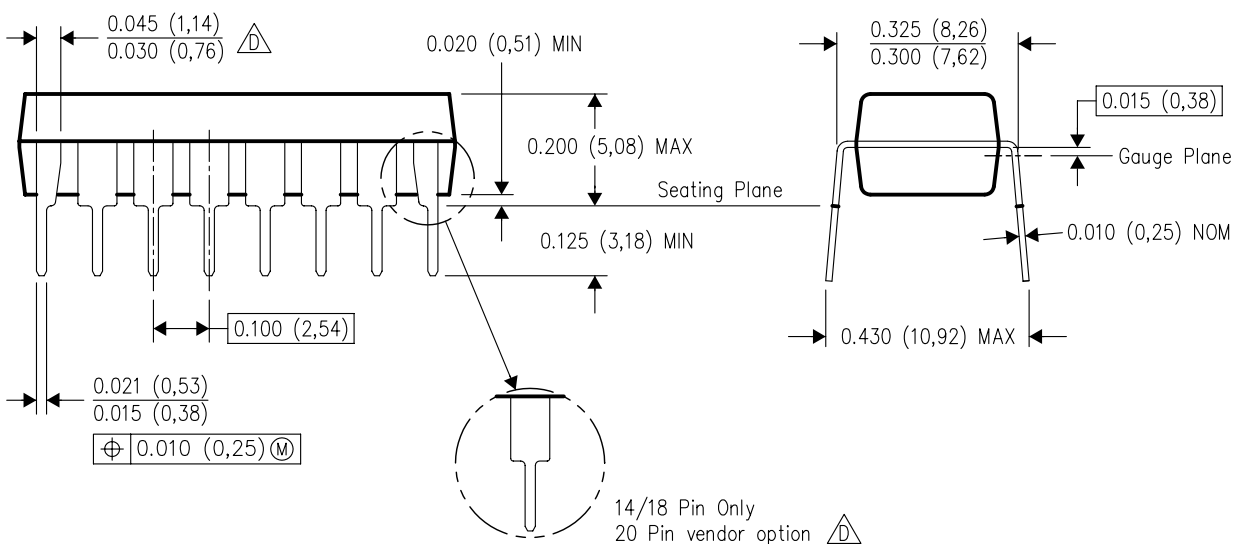
N (R-PDIP-T**)

16 PINS SHOWN

PLASTIC DUAL-IN-LINE PACKAGE



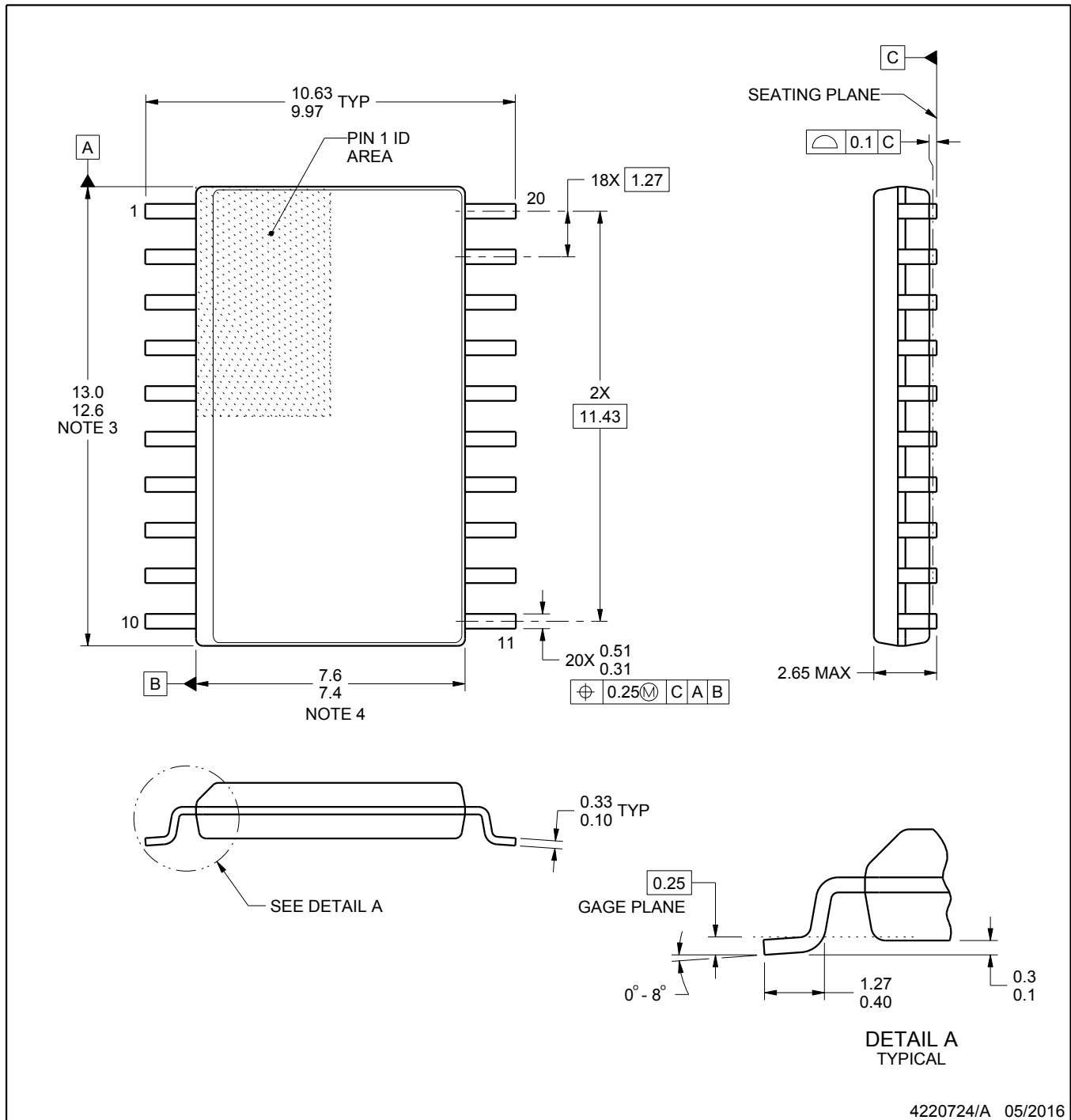
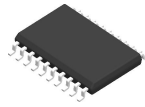
PINS ** DIM	14	16	18	20
A MAX	0.775 (19,69)	0.775 (19,69)	0.920 (23,37)	1.060 (26,92)
A MIN	0.745 (18,92)	0.745 (18,92)	0.850 (21,59)	0.940 (23,88)
MS-001 VARIATION	AA	BB	AC	AD



4040049/E 12/2002

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



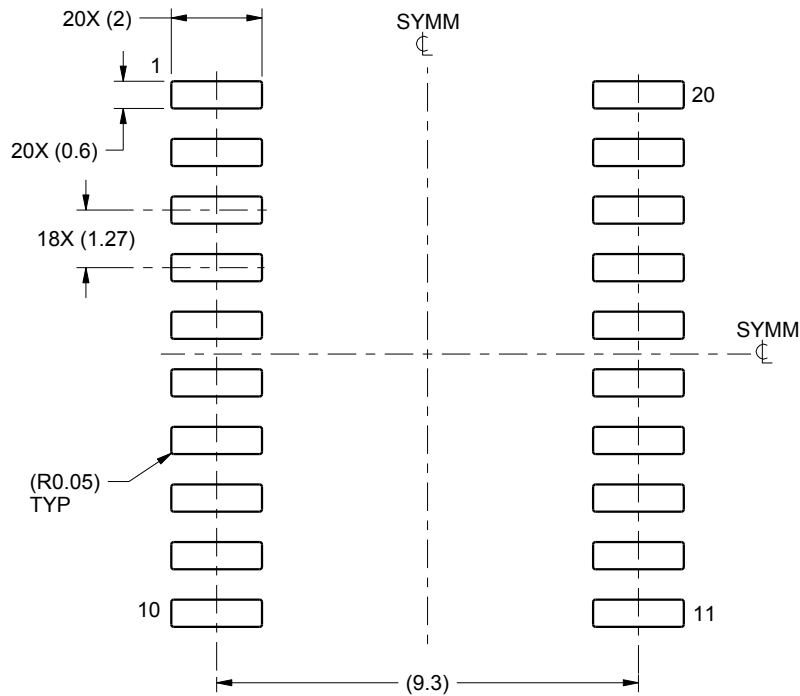
NOTES:

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.

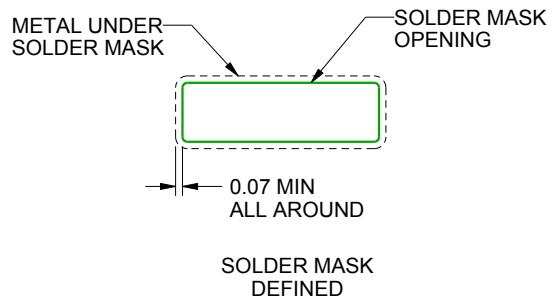
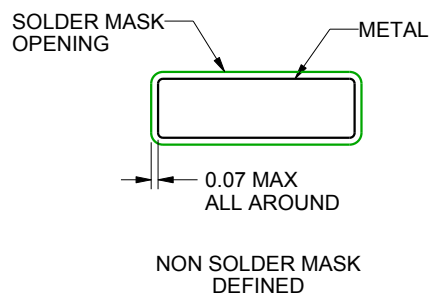
DW0020A

SOIC - 2.65 mm max height

SOIC



LAND PATTERN EXAMPLE
SCALE:6X



SOLDER MASK DETAILS

4220724/A 05/2016

NOTES: (continued)

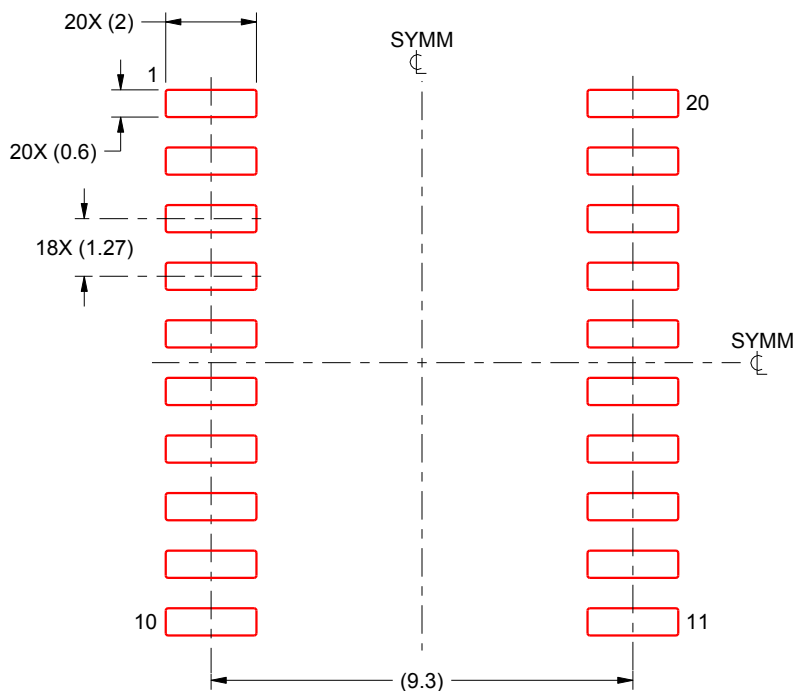
6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

DW0020A

SOIC - 2.65 mm max height

SOIC



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

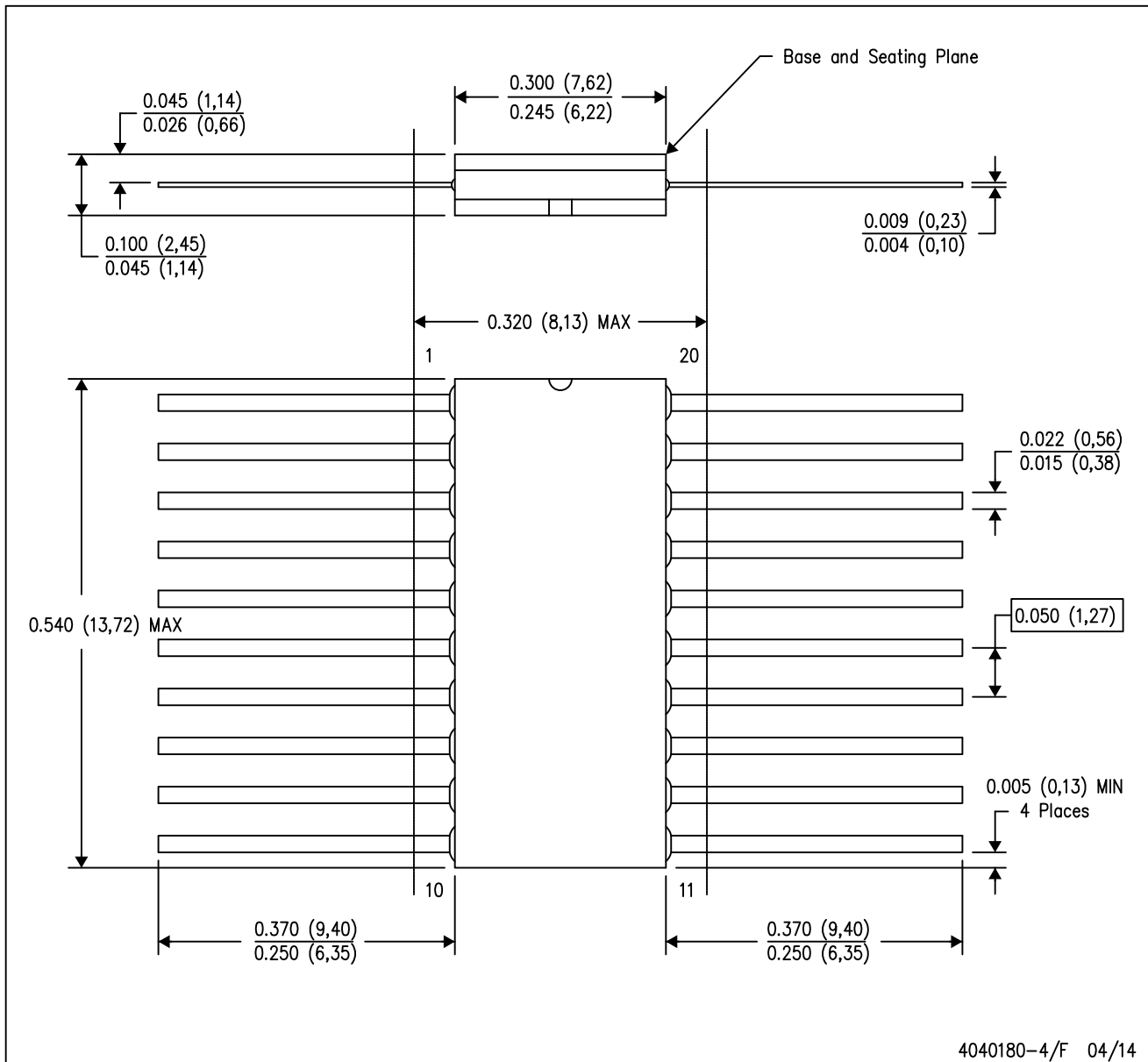
4220724/A 05/2016

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.

W (R-GDFP-F20)

CERAMIC DUAL FLATPACK



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

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Last updated 10/2025