

SN54BCT620A, SN74BCT620A OCTAL BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

SCBS001B – SEPTEMBER 1987 – REVISED NOVEMBER 1993

- State-of-the-Art BiCMOS Design Significantly Reduces I_{CCZ}
- P-N-P Inputs Reduce DC Loading
- ESD Protection Exceeds 2000 V Per MIL-STD-883C, Method 3015
- Package Options Include Plastic Small-Outline (DW) Packages, Ceramic Chip Carriers (FK) and Flatpacks (W), and Plastic and Ceramic 300-mil DIPs (J, N)

description

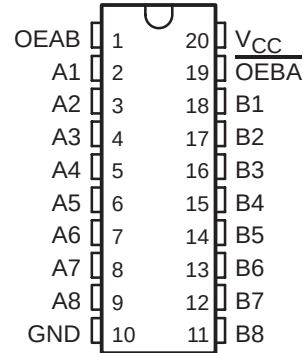
The 'BCT620A bus transceiver is designed for asynchronous communication between data buses. The control function implementation allows for maximum flexibility in timing. The 'BCT620A provides inverted data at its outputs.

These devices allow data transmission from the A bus to the B bus or from the B bus to the A bus depending upon the logic levels at the output-enable (OEAB and $\overline{OEBA}$) inputs.

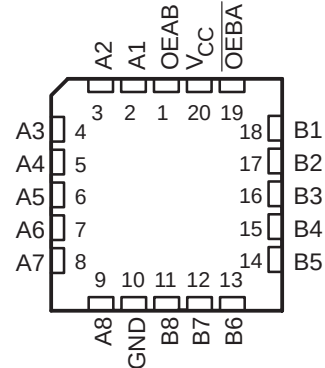
The output-enable inputs can be used to disable the device so that the buses are effectively isolated. The dual-enable configuration gives the transceivers the capability of storing data by simultaneously enabling OEAB and $\overline{OEBA}$. When both OEAB and $\overline{OEBA}$ are enabled and all other data sources to the two sets of bus lines are at high impedance, both sets of bus lines (16 in all) will remain at their last states. In this way, each output reinforces its input in this configuration.

The SN54BCT620A is characterized for operation over the full military temperature range of -55°C to 125°C . The SN74BCT620A is characterized for operation from 0°C to 70°C .

SN54BCT620A . . . J OR W PACKAGE
SN74BCT620A . . . DW OR N PACKAGE
(TOP VIEW)



SN54BCT620A . . . FK PACKAGE
(TOP VIEW)



FUNCTION TABLE

INPUTS		OPERATION
$\overline{OEBA}$	OEAB	
L	L	$\overline{B}$ data to A bus
L	H	$\overline{B}$ data to A bus, A data to B bus
H	L	Isolation
H	H	$\overline{A}$ data to B bus

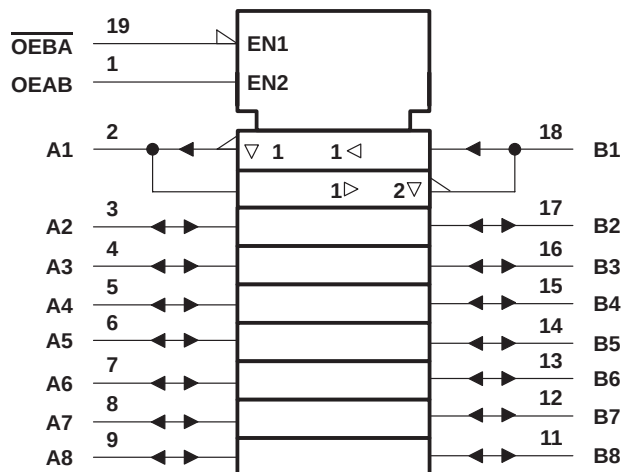
SN54BCT620A, SN74BCT620A

OCTAL BUS TRANSCEIVERS

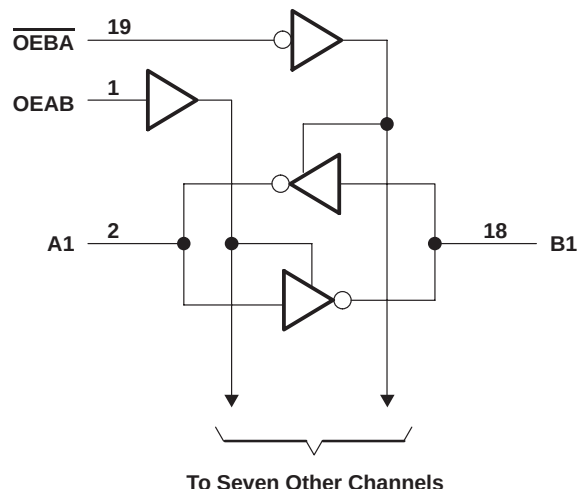
WITH 3-STATE OUTPUTS

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logic symbol†



logic diagram (positive logic)



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

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: Control inputs (see Note 1)	– 0.5 V to 7 V
I/O ports (see Note 1)	– 0.5 V to 5.5 V
Voltage range applied to any output in the disabled or power-off state, V_O	– 0.5 V to 5.5 V
Voltage range applied to any output in the high state, V_O	– 0.5 V to V_{CC}
Input clamp current, I_{IK}	–30 mA
Current into any output in the low state: SN54BCT620A	96 mA
SN74BCT620A	128 mA
Operating free-air temperature range: SN54BCT620A	– 55°C to 125°C
SN74BCT620A	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.

NOTE 1: The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

recommended operating conditions

			SN54BCT620A			SN74BCT620A			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 _{IK}	Input clamp current		−18			−18			mA
I _{OH}	High-level output current	A port	−3			−3			mA
		B port	−12			−15			
I _{OL}	Low-level output current	A port	20			24			mA
		B port	48			64			
T _A	Operating free-air temperature		−55	125		0	70		°C



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SN54BCT620A, SN74BCT620A

OCTAL BUS TRANSCEIVERS

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

PARAMETER		TEST CONDITIONS		SN54BCT620A			SN74BCT620A			UNIT
				MIN	TYP†	MAX	MIN	TYP†	MAX	
V_{IK}		$V_{CC} = 4.5\text{ V}$,	$I_I = -18\text{ mA}$			-1.2			-1.2	V
V_{OH}	A port	$V_{CC} = 4.5\text{ V}$	$I_{OH} = -1\text{ mA}$	2.5	3.4		2.5	3.4		V
			$I_{OH} = -3\text{ mA}$	2.4	3.3		2.4	3.3		
	B port	$V_{CC} = 4.5\text{ V}$	$I_{OH} = -3\text{ mA}$	2.4	3.3		2.4	3.3		
			$I_{OH} = -12\text{ mA}$	2	3.2					
			$I_{OH} = -15\text{ mA}$				2	3.1		
V_{OL}	A port	$V_{CC} = 4.5\text{ V}$	$I_{OL} = 20\text{ mA}$		0.3	0.5				V
			$I_{OL} = 24\text{ mA}$					0.35	0.5	
	B port	$V_{CC} = 4.5\text{ V}$	$I_{OL} = 48\text{ mA}$		0.38	0.55				
			$I_{OL} = 64\text{ mA}$					0.42	0.55	
I_I	A or B port	$V_{CC} = 5.5\text{ V}$,	$V_I = 5.5\text{ V}$			1			1	mA
	OEAB or OEBA					0.1			0.1	
$I_{IH}^\ddagger$	A or B port	$V_{CC} = 5.5\text{ V}$,	$V_I = 2.7\text{ V}$			70			70	μA
	OEAB or OEBA					20			20	
$I_{IL}^\ddagger$	A or B port	$V_{CC} = 5.5\text{ V}$,	$V_I = 0.5\text{ V}$			-0.65			-0.65	mA
	OEAB or OEBA					-0.6			-0.6	
$I_{OS}^\S$	A port	$V_{CC} = 5.5\text{ V}$,	$V_O = 0$			-60			-150	mA
	B port					-100			-225	
I_{CCL}	A to B	$V_{CC} = 5.5\text{ V}$			53	84		53	84	mA
I_{CCH}	A to B	$V_{CC} = 5.5\text{ V}$			23	37		23	37	mA
I_{CCZ}		$V_{CC} = 5.5\text{ V}$			4	10		4	10	mA
C_i	OEAB or OEBA	$V_{CC} = 5\text{ V}$,	$V_I = 2.5\text{ V or } 0.5\text{ V}$			5			5	pF
C_{io}	A to B	$V_{CC} = 5\text{ V}$,	$V_O = 2.5\text{ V or } 0.5\text{ V}$			9			9	pF
	B to A					12			12	

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

‡ For I/O ports, the parameters I_{IH} and I_{IL} include the off-state output current.

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



SN54BCT620A, SN74BCT620A

OCTAL BUS TRANSCEIVERS

WITH 3-STATE OUTPUTS

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switching characteristics (see Note 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 5 V, C _L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T _A = 25°C			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
			BCT620A			SN54BCT620A		SN74BCT620A		
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t _{PLH}	A	B	0.6	3.4	5.2	0.6	6.2	0.6	5.8	ns
t _{PHL}			0.1	1.9	3.4	0.1	3.7	0.1	3.6	
t _{PLH}	B	A	0.9	4.1	6	0.9	7.2	0.9	6.9	ns
t _{PHL}			0.1	2	3.7	0.1	4	0.1	3.9	
t _{PZH}	OEBA	A	3.5	7.2	9.2	3.5	10.9	3.5	10.6	ns
t _{PZL}			3.7	7.6	9.9	3.7	11.5	3.7	11.1	
t _{PHZ}	OEBA	A	3.1	5.3	8.6	3.1	10.8	3.1	10	ns
t _{PLZ}			1.3	4.4	6.9	1.3	8.3	1.3	7.8	
t _{PZH}	OEAB	B	2	5.3	6.7	2	7.9	2	7.4	ns
t _{PZL}			2.9	6.1	8.1	2.9	9.2	2.9	9	
t _{PHZ}	OEAB	B	2.1	5.2	7	2.1	8.5	2.1	8.1	ns
t _{PLZ}			0.1	3.7	5.3	0.1	6	0.1	5.9	

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

NOTE 2: Load circuits and voltage waveforms are shown in Section 1.

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
5962-9075001M2A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	5962- 9075001M2A SNJ54BCT 620AFK	Samples
5962-9075001MRA	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-9075001MR A SNJ54BCT620AJ	Samples
5962-9075001MRA	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-9075001MR A SNJ54BCT620AJ	Samples
SN74BCT620ADW	OBSOLETE	SOIC	DW	20		TBD	Call TI	Call TI	0 to 70		
SN74BCT620ADW	OBSOLETE	SOIC	DW	20		TBD	Call TI	Call TI	0 to 70		
SN74BCT620AN	OBSOLETE	PDIP	N	20		TBD	Call TI	Call TI	0 to 70		
SN74BCT620AN	OBSOLETE	PDIP	N	20		TBD	Call TI	Call TI	0 to 70		
SNJ54BCT620AFK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	5962- 9075001M2A SNJ54BCT 620AFK	Samples
SNJ54BCT620AFK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	5962- 9075001M2A SNJ54BCT 620AFK	Samples
SNJ54BCT620AJ	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-9075001MR A SNJ54BCT620AJ	Samples
SNJ54BCT620AJ	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-9075001MR A SNJ54BCT620AJ	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⁾ Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

⁽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/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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OTHER QUALIFIED VERSIONS OF SN54BCT620A, SN74BCT620A :

- Catalog: [SN74BCT620A](#)
- Military: [SN54BCT620A](#)

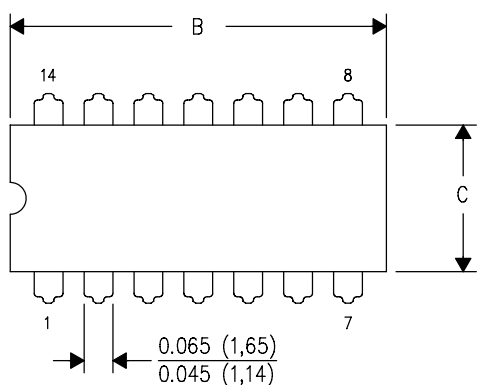
NOTE: Qualified Version Definitions:

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

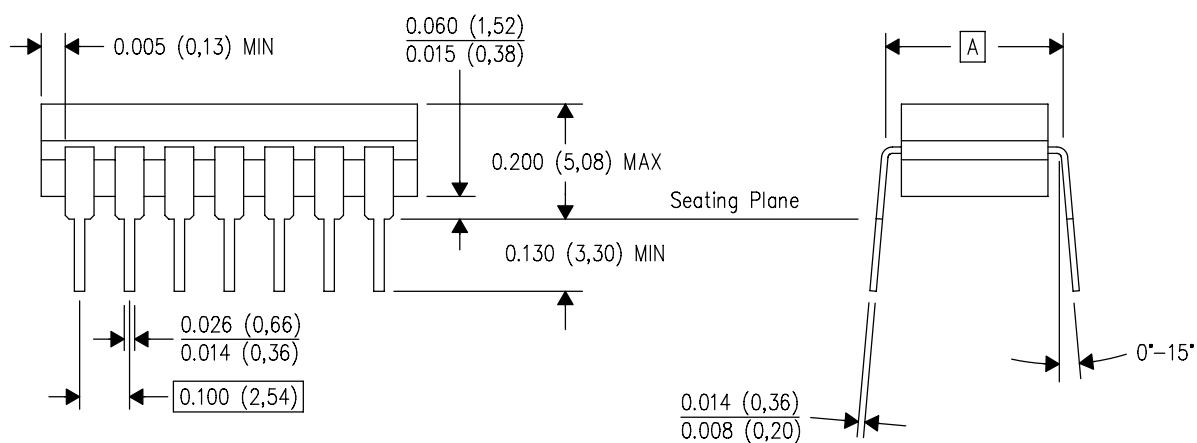
J (R-GDIP-T**)

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)



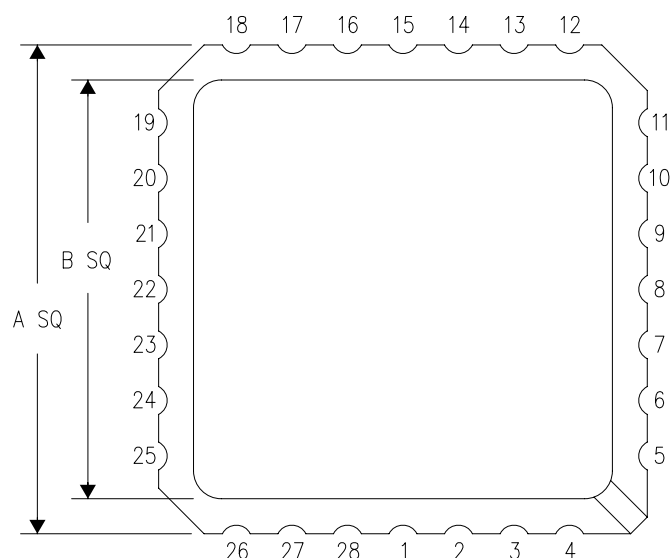
4040083/F 03/03

- 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.

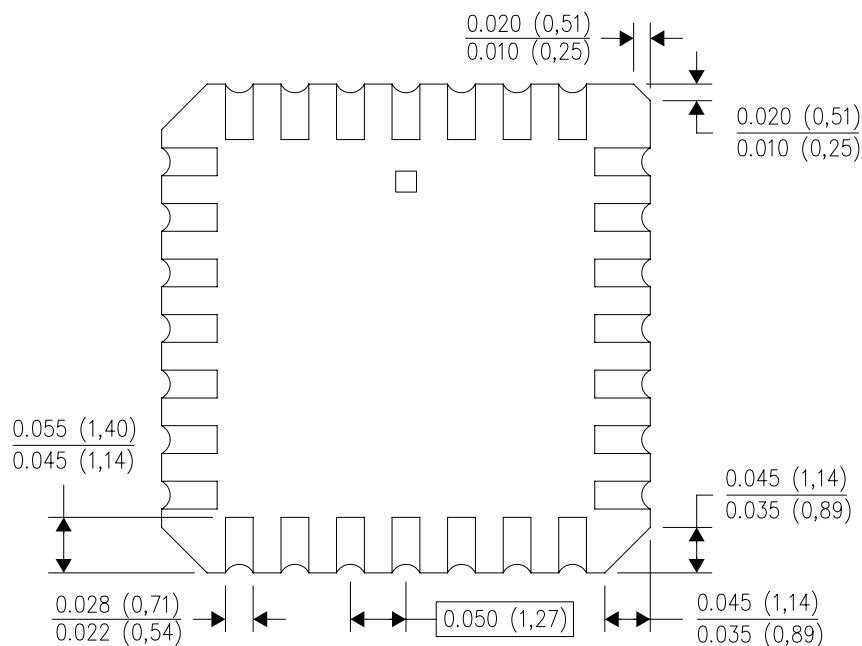
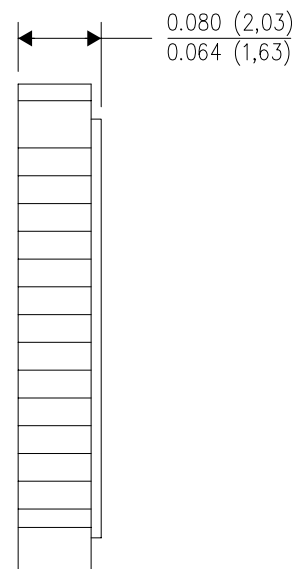
FK (S-CQCC-N**)

LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



NO. OF TERMINALS **	A		B	
	MIN	MAX	MIN	MAX
20	0.342 (8,69)	0.358 (9,09)	0.307 (7,80)	0.358 (9,09)
28	0.442 (11,23)	0.458 (11,63)	0.406 (10,31)	0.458 (11,63)
44	0.640 (16,26)	0.660 (16,76)	0.495 (12,58)	0.560 (14,22)
52	0.740 (18,78)	0.761 (19,32)	0.495 (12,58)	0.560 (14,22)
68	0.938 (23,83)	0.962 (24,43)	0.850 (21,6)	0.858 (21,8)
84	1.141 (28,99)	1.165 (29,59)	1.047 (26,6)	1.063 (27,0)



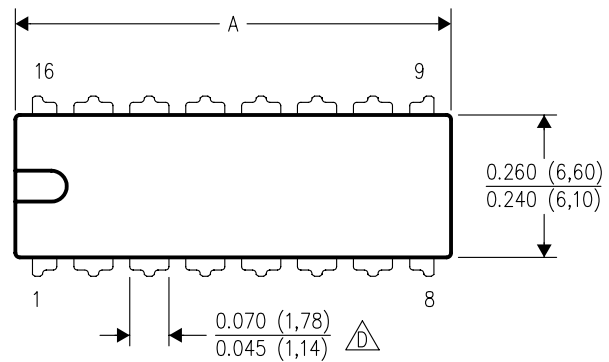
4040140/D 01/11

- NOTES:
- All linear dimensions are in inches (millimeters).
 - This drawing is subject to change without notice.
 - This package can be hermetically sealed with a metal lid.
 - Falls within JEDEC MS-004

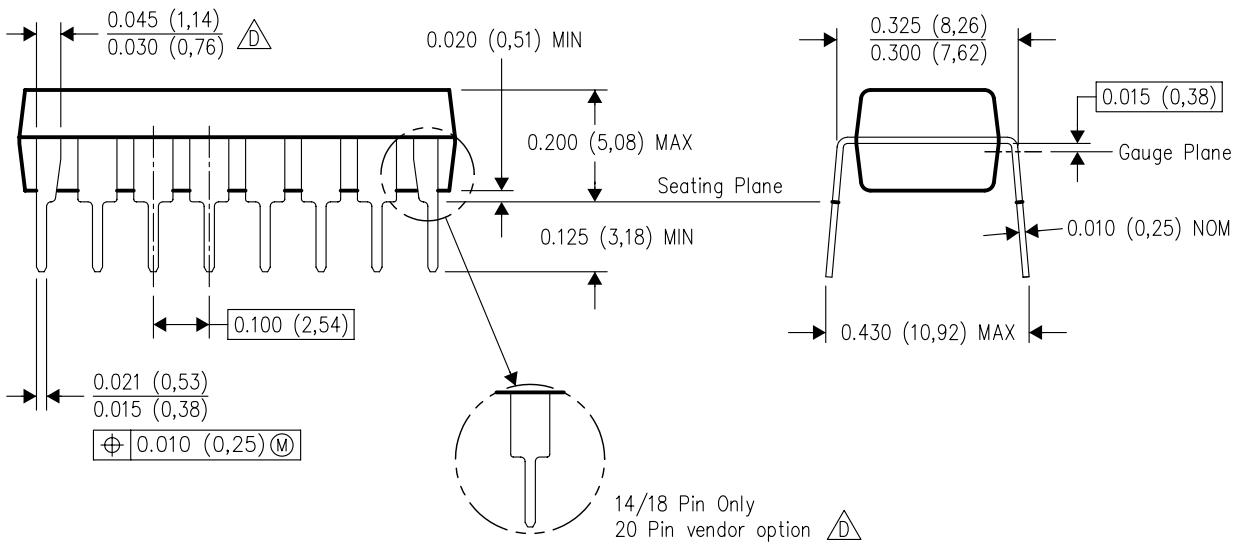
N (R-PDIP-T**)

16 PINS SHOWN

PLASTIC DUAL-IN-LINE PACKAGE



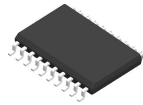
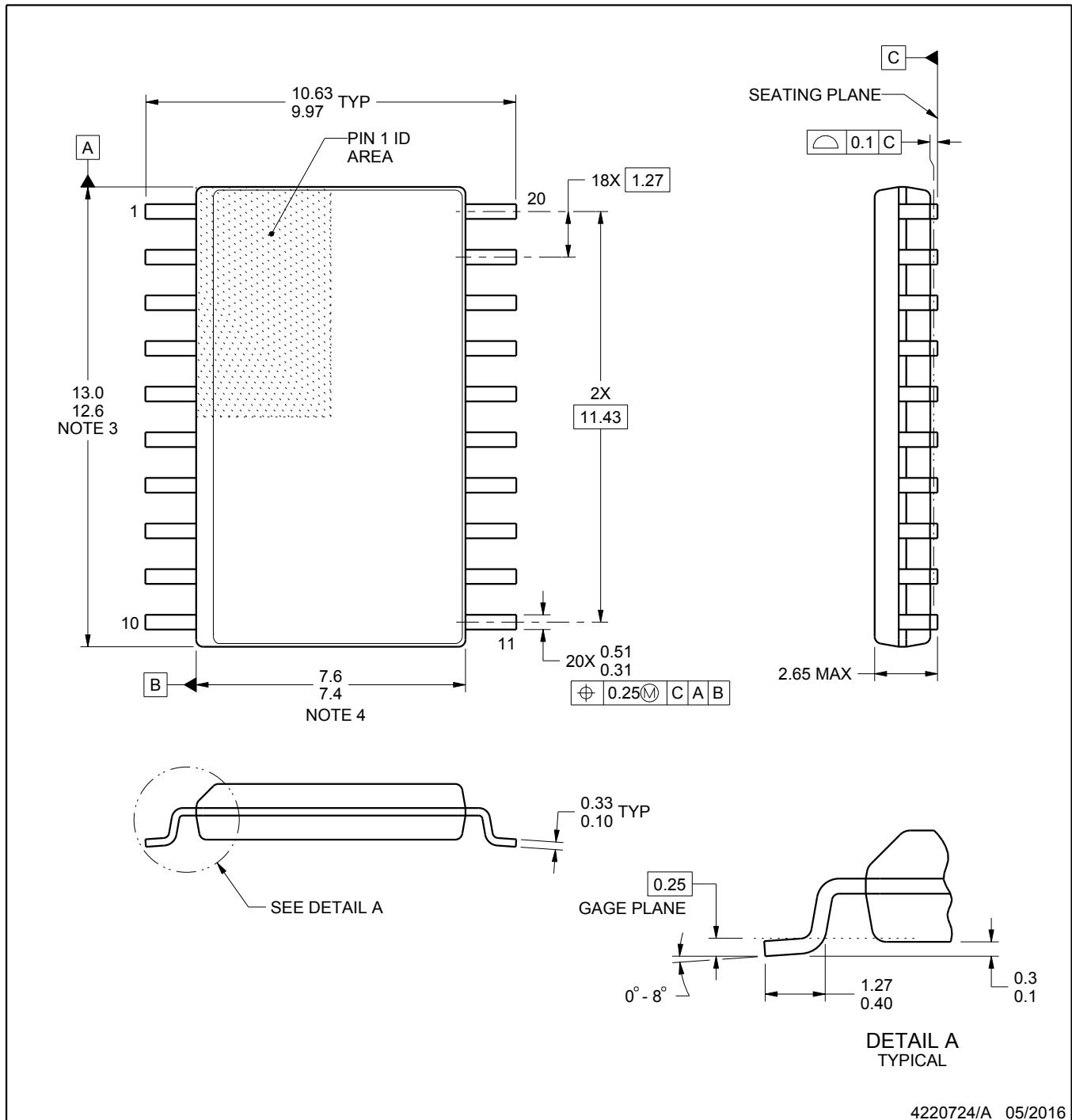
PINS **	14	16	18	20
DIM				
A MAX	0.775 (19,69)	0.775 (19,69)	0.920 (23,37)	1.060 (26,92)
A MIN	0.745 (18,92)	0.745 (18,92)	0.850 (21,59)	0.940 (23,88)
MS-001 VARIATION	AA	BB	AC	AD



14/18 Pin Only
20 Pin vendor option

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.



4220724/A 05/2016

NOTES:

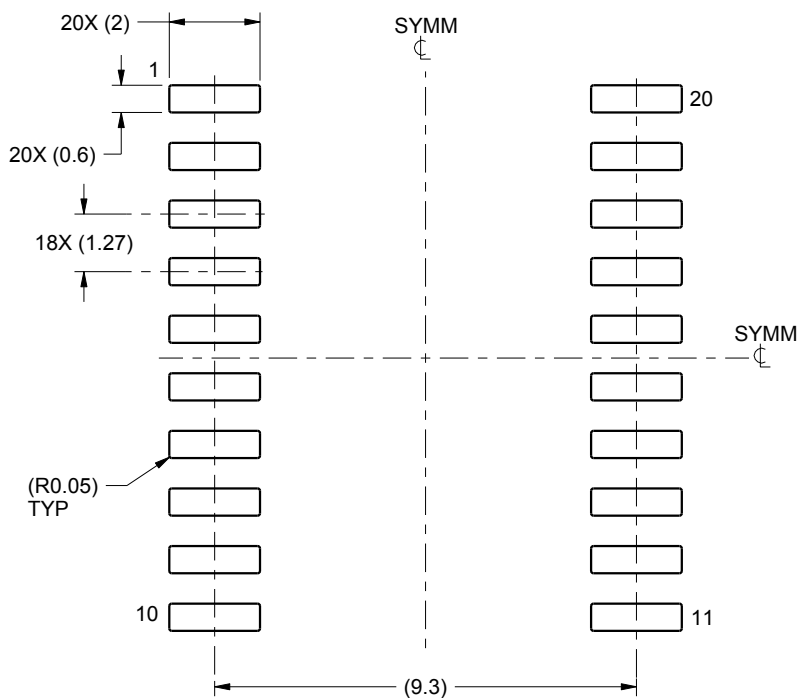
1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate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

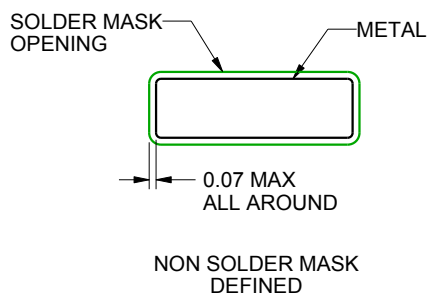
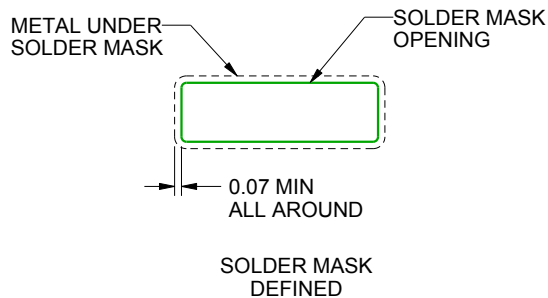
DW0020A

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.

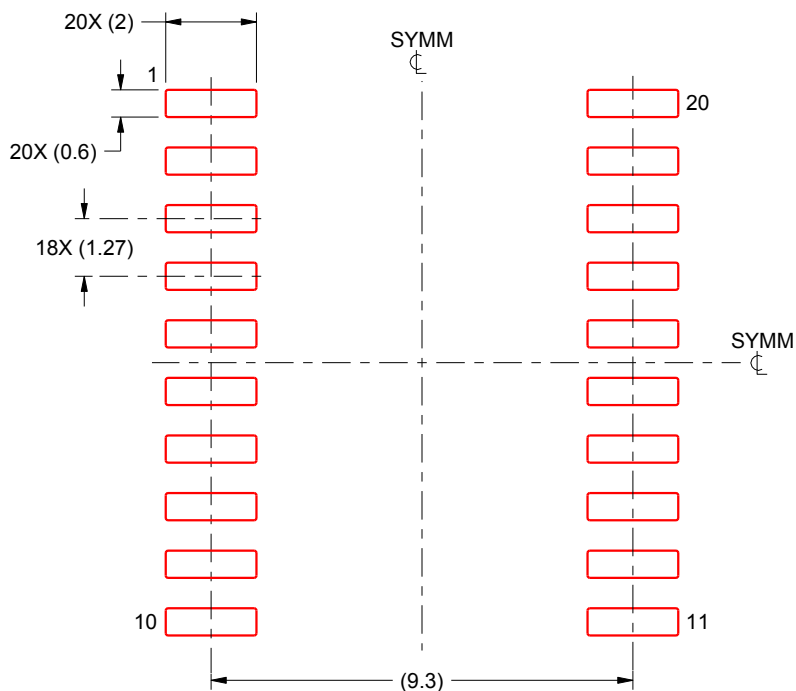
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

DW0020A

SOIC - 2.65 mm max height

SOIC



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

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.

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TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

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