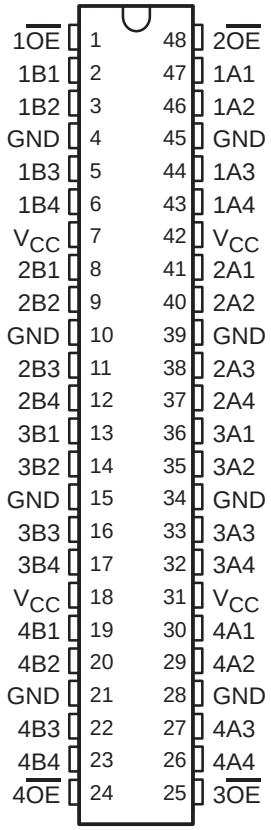
- **Members of Texas Instruments' Widebus™ Family**
- **Standard '16244-Type Pinout**
- **5-Ω Switch Connection Between Two Ports**
- **TTL-Compatible Input Levels**

description

The 'CBT16244 devices provide 16 bits of high-speed TTL-compatible bus switching in a standard '16244 device pinout. The low on-state resistance of the switch allows connections to be made with minimal propagation delay.

These devices are organized as four 4-bit low-impedance switches with separate output-enable ($\overline{OE}$) inputs. When $\overline{OE}$ is low, the switch is on, and data can flow from port A to port B, or vice versa. When $\overline{OE}$ is high, the switch is open, and the high-impedance state exists between the two ports.

SN54CBT16244 . . . WD PACKAGE
SN74CBT16244 . . . DGG, DGV, OR DL PACKAGE
(TOP VIEW)



ORDERING INFORMATION

T_A	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
–40°C to 85°C	SSOP – DL	Tube	SN74CBT16244DL	CBT16244
		Tape and reel	SN74CBT16244DLR	
	TSSOP – DGG	Tape and reel	SN74CBT16244DGGR	CBT16244
	TVSOP – DGV	Tape and reel	SN74CBT16244DGVR	CY244
–55°C to 125°C	CFP – WD	Tube	SNJ54CBT16244WD	SNJ54CBT16244WD

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.

FUNCTION TABLE
(each 4-bit bus switch)

INPUT $\overline{OE}$	OUTPUTS A, B
L	A port = B port
H	Disconnect



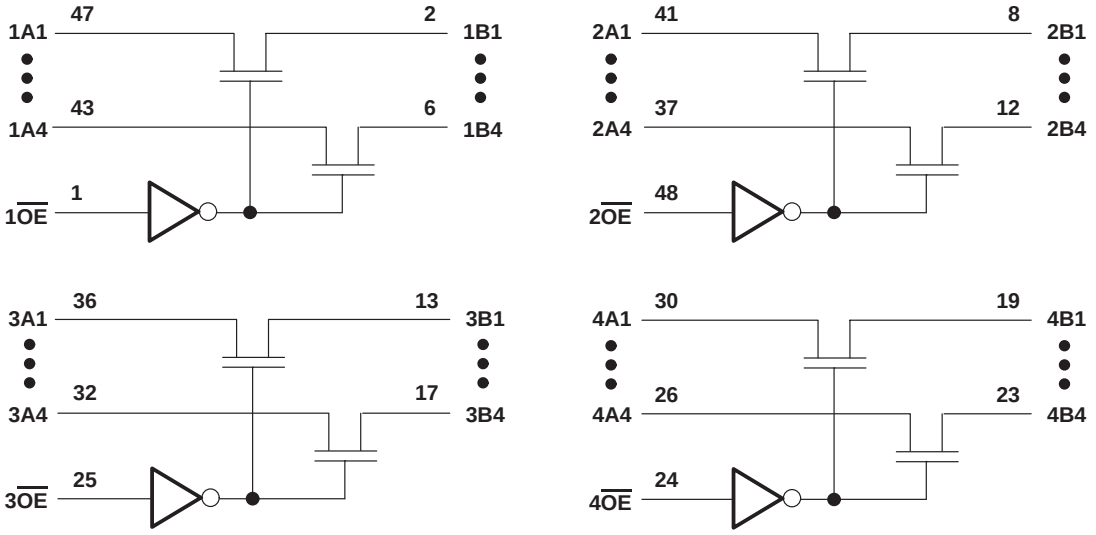
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On products compliant to MIL-PRF-38535, all parameters are tested unless otherwise noted. On all other products, production processing does not necessarily include testing of all parameters.

logic diagram (positive logic)



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, V_I (see Note 1) . . . . . –0.5 V to 7 V
Continuous channel current . . . . . 128 mA
Input clamp current, I_{IK} ($V_{I/O} < 0$) . . . . . –50 mA
Package thermal impedance, θ_{JA} (see Note 2): DGG package . . . . . 70°C/W
DGV package . . . . . 58°C/W
DL package . . . . . 63°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.

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 JESD 51-7.

recommended operating conditions (see Note 3)

		SN54CBT16244		SN74CBT16244		UNIT
		MIN	MAX	MIN	MAX	
V_{CC}	Supply voltage	4	5.5	4	5.5	V
V_{IH}	High-level control input voltage	2		2		V
V_{IL}	Low-level control input voltage		0.8		0.8	V
T_A	Operating free-air temperature	–55	125	–40	85	°C

NOTE 3: All unused control 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 free-air temperature range (unless otherwise noted)

PARAMETER		TEST CONDITIONS			SN54CBT16244			SN74CBT16244			UNIT
					MIN	TYP†	MAX	MIN	TYP†	MAX	
V_{IK}		V_{CC} = 4.5 V,	I_I = –18 mA				–1.2			–1.2	V
I_I		V_{CC} = 0	V_I = 5.5 V				10			10	μA
		V_{CC} = 5.5 V	V_I = 5.5 V or GND				±1			±1	
I_{CC}		V_{CC} = 5.5 V, V_I = V_{CC} or GND	I_O = 0,				3.2			3	μA
ΔI_{CC}‡	Control inputs	V_{CC} = 5.5 V, Other inputs at V_{CC} or GND	One input at 3.4 V,				2.5			2.5	mA
C_i	Control inputs	V_I = 3 V or 0				2.5			2.5		pF
$C_{io(OFF)}$		V_O = 3 V or 0,	$\overline{OE}$ = V_{CC}			4.5			4.5		pF
r_{on}§		V_{CC} = 4 V,	V_I = 2.4 V,	I_I = 15 mA			20			20	Ω
		V_{CC} = 4.5 V	V_I = 0,	I_I = 64 mA		5	10		5	7	
			V_I = 0,	I_I = 30 mA		5	10		5	7	
			V_I = 2.4 V,	I_I = 15 mA		8	14		8	12	

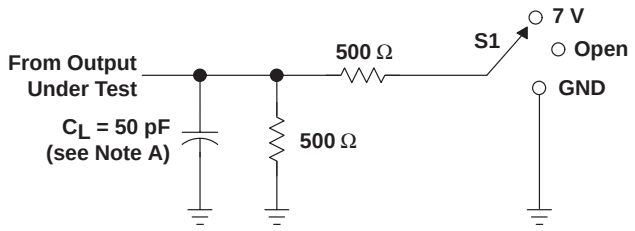
† All typical values are at V_{CC} = 5 V, T_A = 25°C.
‡ This is the increase in supply current for each input that is at the specified TTL voltage level rather than V_{CC} or GND.
§ Measured by the voltage drop between the A and B terminals at the indicated current through the switch. On-state resistance is determined by the lower of the voltages of the two (A or B) terminals.

switching characteristics over recommended operating free-air temperature range, C_L = 50 pF (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	SN54CBT16244				SN74CBT16244				UNIT
			V_{CC} = 4 V		V_{CC} = 5 V ± 0.5 V		V_{CC} = 4 V		V_{CC} = 5 V ± 0.5 V		
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
t_{pd}¶	A or B	B or A				0.8*		0.35		0.25	ns
t_{en}	$\overline{OE}$	A or B		10.3	1	9.2		5.5	1	5.1	ns
t_{dis}	$\overline{OE}$	A or B		9.7	1	8.2		5.2	1	5.4	ns

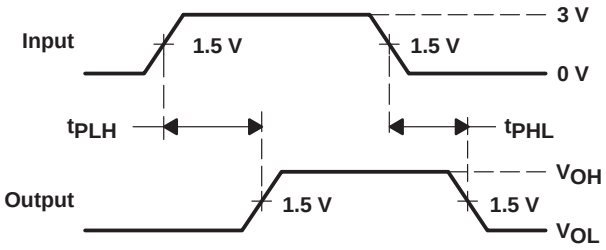
* On products compliant to MIL-PRF-38535, this parameter is not production tested.
¶ The propagation delay is the calculated RC time constant of the typical on-state resistance of the switch and the specified load capacitance, when driven by an ideal voltage source (zero output impedance).

PARAMETER MEASUREMENT INFORMATION

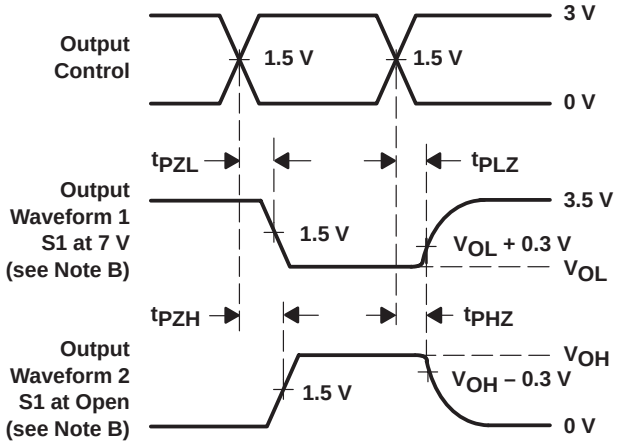


LOAD CIRCUIT

TEST	S1
t_{pd}	Open
t_{PLZ}/t_{PZL}	7 V
t_{PHZ}/t_{PZH}	Open



VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES



VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES

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 ≤ 10 MHz, Z_O = 50 Ω, t_r ≤ 2.5 ns, t_f ≤ 2.5 ns.
D. The outputs are measured one at a time with one 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_{PLH} and t_{PHL} 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)
SN74CBT16244DGGR	Active	Production	TSSOP (DGG) | 48	2000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	CBT16244
SN74CBT16244DGGR.A	Active	Production	TSSOP (DGG) | 48	2000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	CBT16244
SN74CBT16244DL	Active	Production	SSOP (DL) | 48	25 | TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	CBT16244
SN74CBT16244DL.A	Active	Production	SSOP (DL) | 48	25 | TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	CBT16244
SN74CBT16244DLR	Active	Production	SSOP (DL) | 48	1000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	CBT16244
SN74CBT16244DLR.A	Active	Production	SSOP (DL) | 48	1000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	CBT16244

(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.

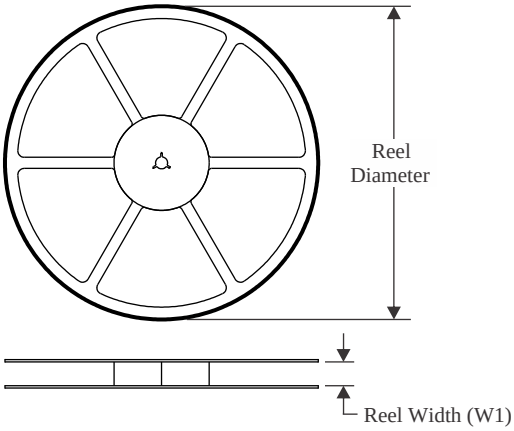
Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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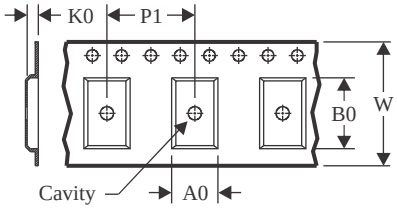
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TAPE AND REEL INFORMATION

REEL DIMENSIONS

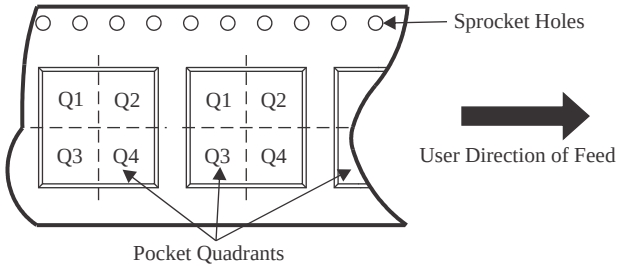


TAPE DIMENSIONS



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

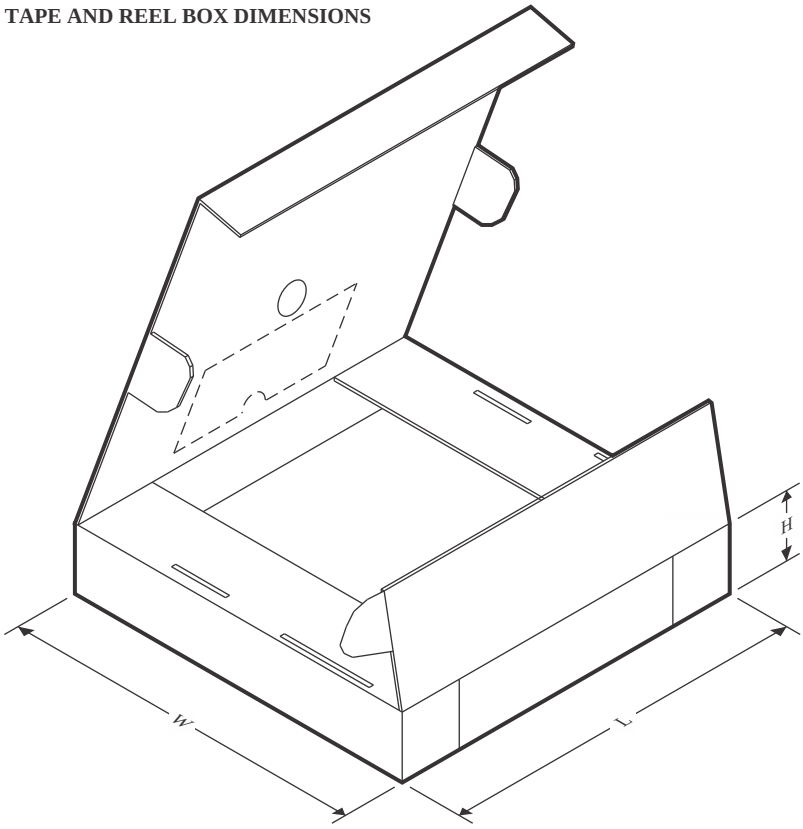
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
SN74CBT16244DGGR	TSSOP	DGG	48	2000	330.0	24.4	8.6	13.0	1.8	12.0	24.0	Q1
SN74CBT16244DLR	SSOP	DL	48	1000	330.0	32.4	11.35	16.2	3.1	16.0	32.0	Q1

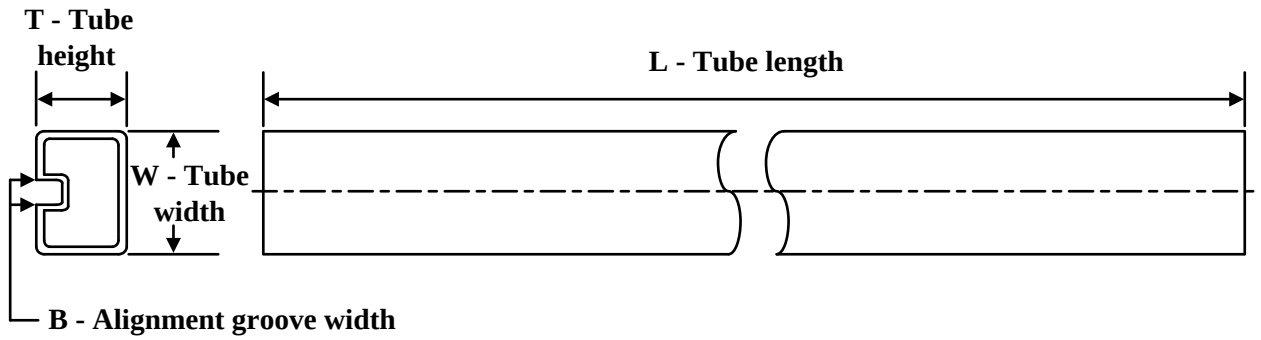
TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74CBT16244DGGR	TSSOP	DGG	48	2000	356.0	356.0	45.0
SN74CBT16244DLR	SSOP	DL	48	1000	356.0	356.0	53.0

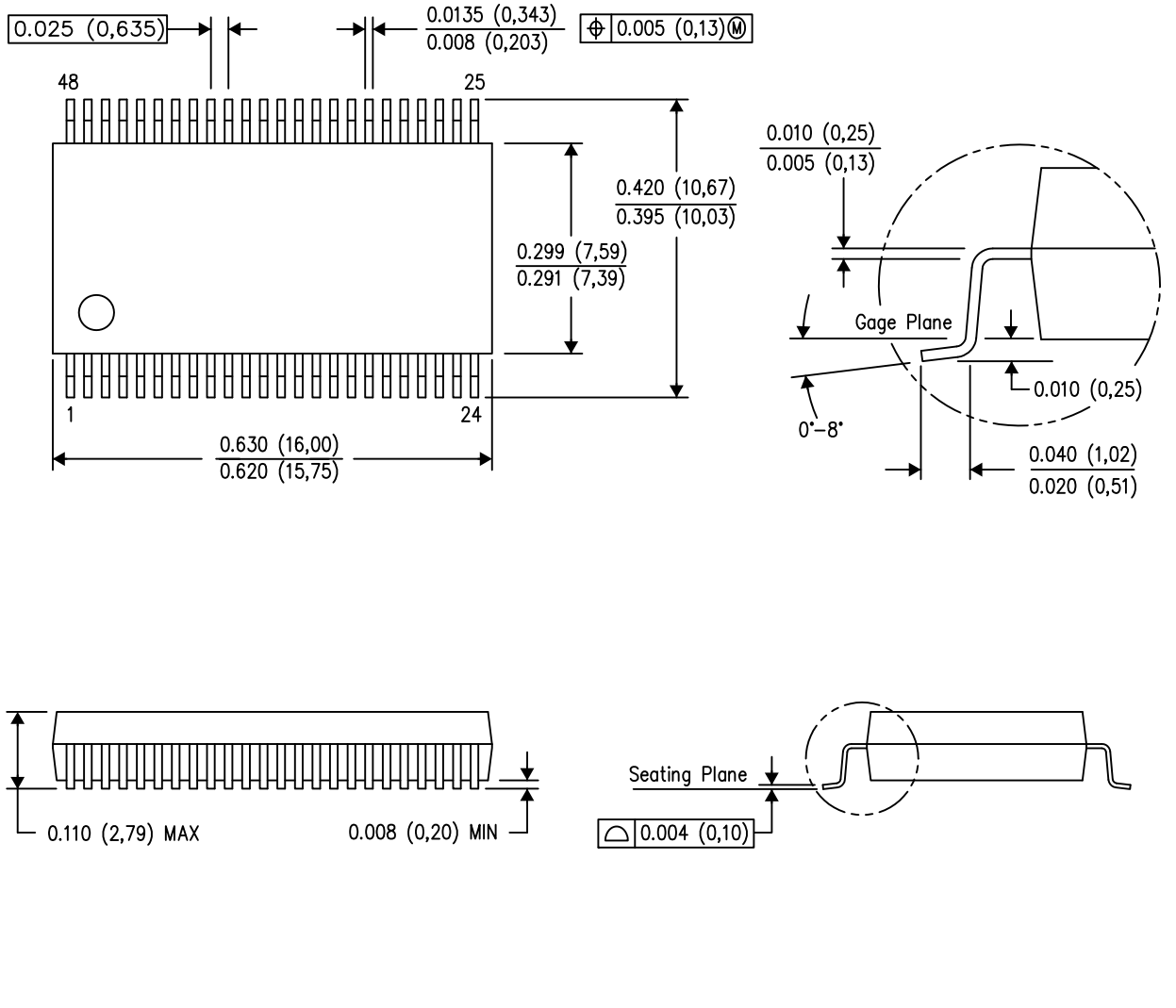
TUBE



*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (µm)	B (mm)
SN74CBT16244DL	DL	SSOP	48	25	473.7	14.24	5110	7.87
SN74CBT16244DL.A	DL	SSOP	48	25	473.7	14.24	5110	7.87

DL (R–PDSO–G48) PLASTIC SMALL–OUTLINE PACKAGE



NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
D. Falls within JEDEC MO–118

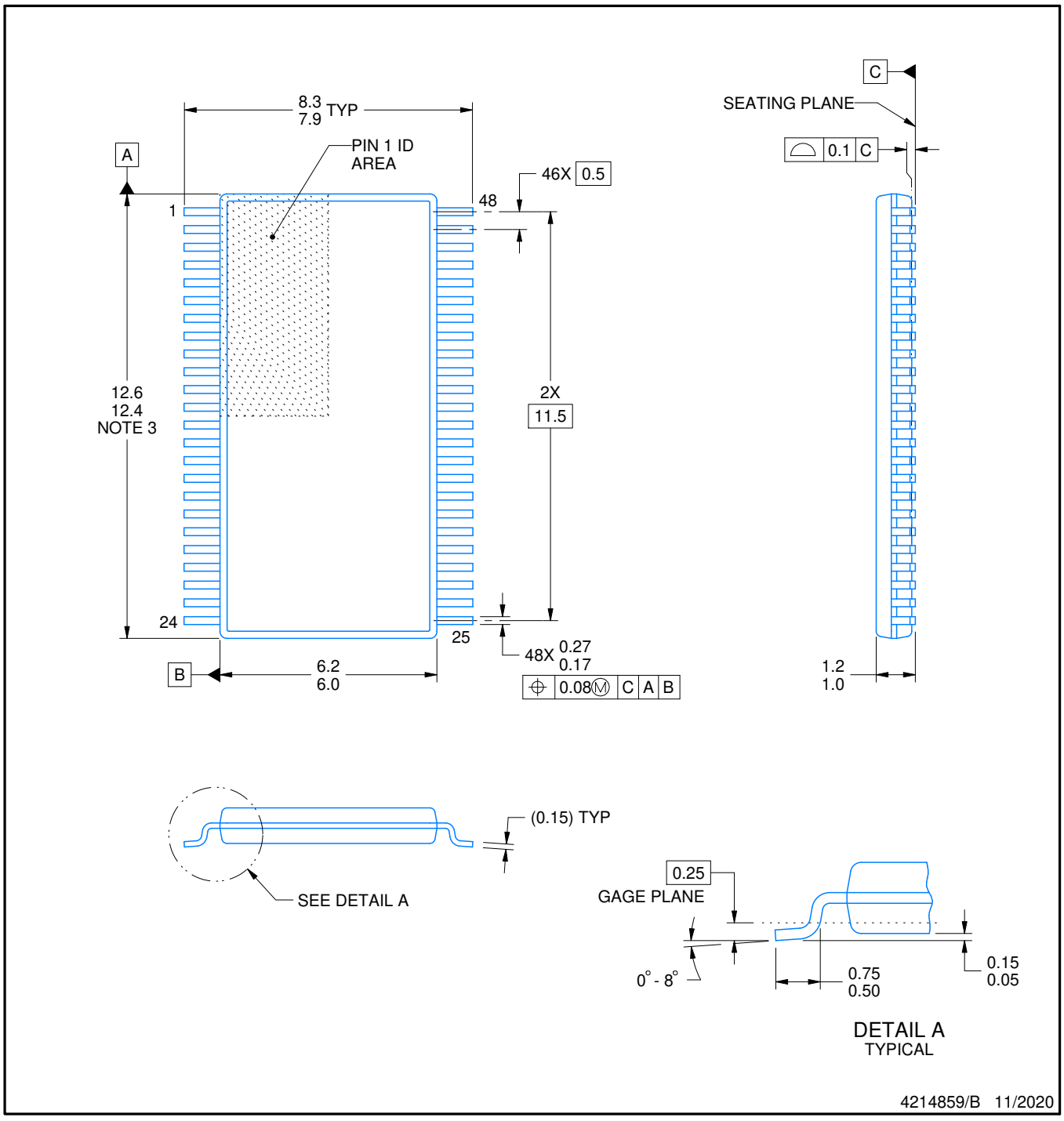
PowerPAD is a trademark of Texas Instruments.

PACKAGE OUTLINE

DGG0048A

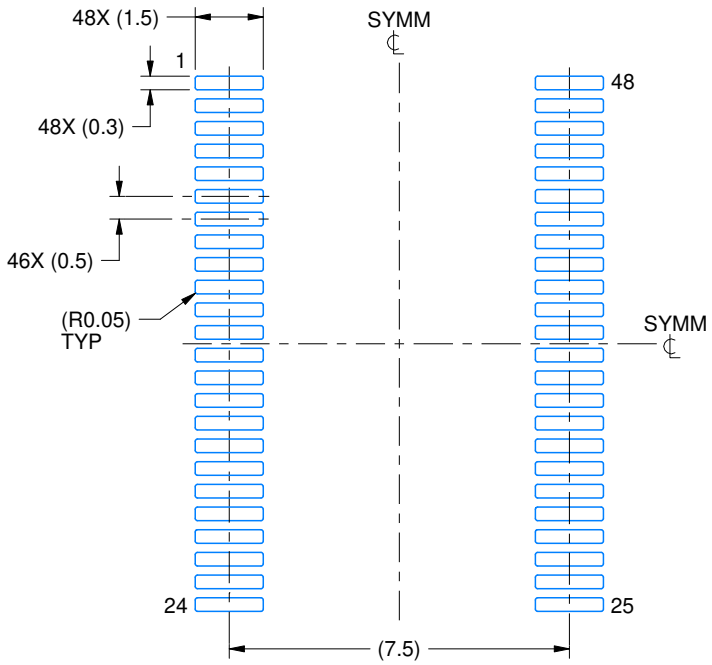
TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE

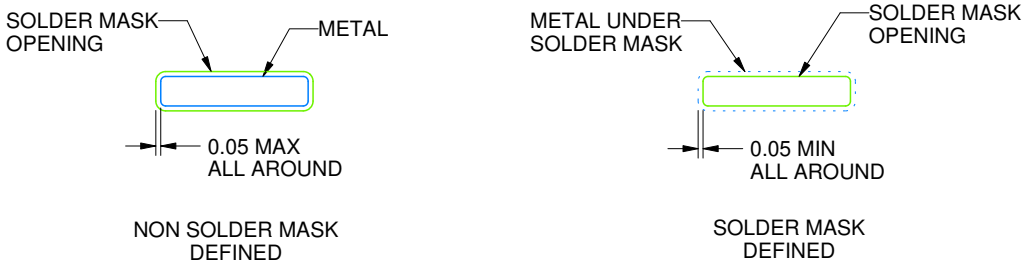


NOTES:

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. Reference JEDEC registration MO-153.



LAND PATTERN EXAMPLE
SCALE:6X

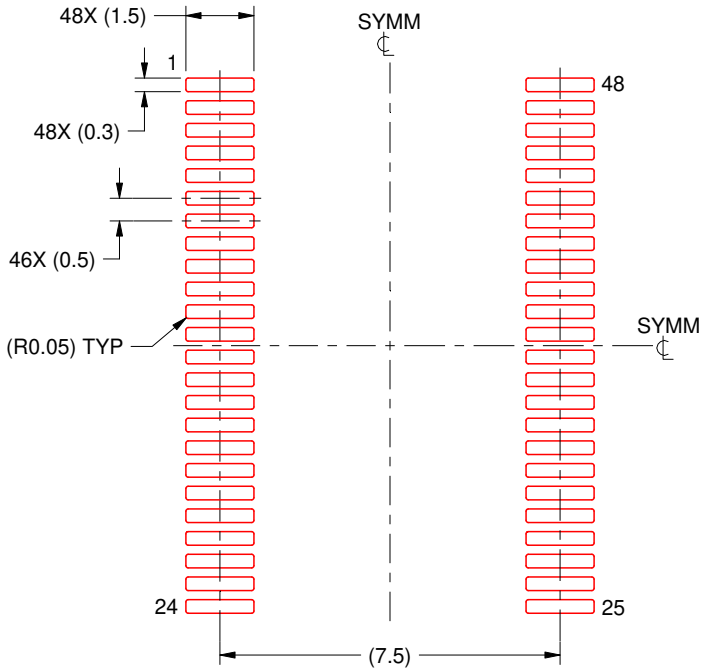


SOLDER MASK DETAILS

4214859/B 11/2020

NOTES: (continued)

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



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

4214859/B 11/2020

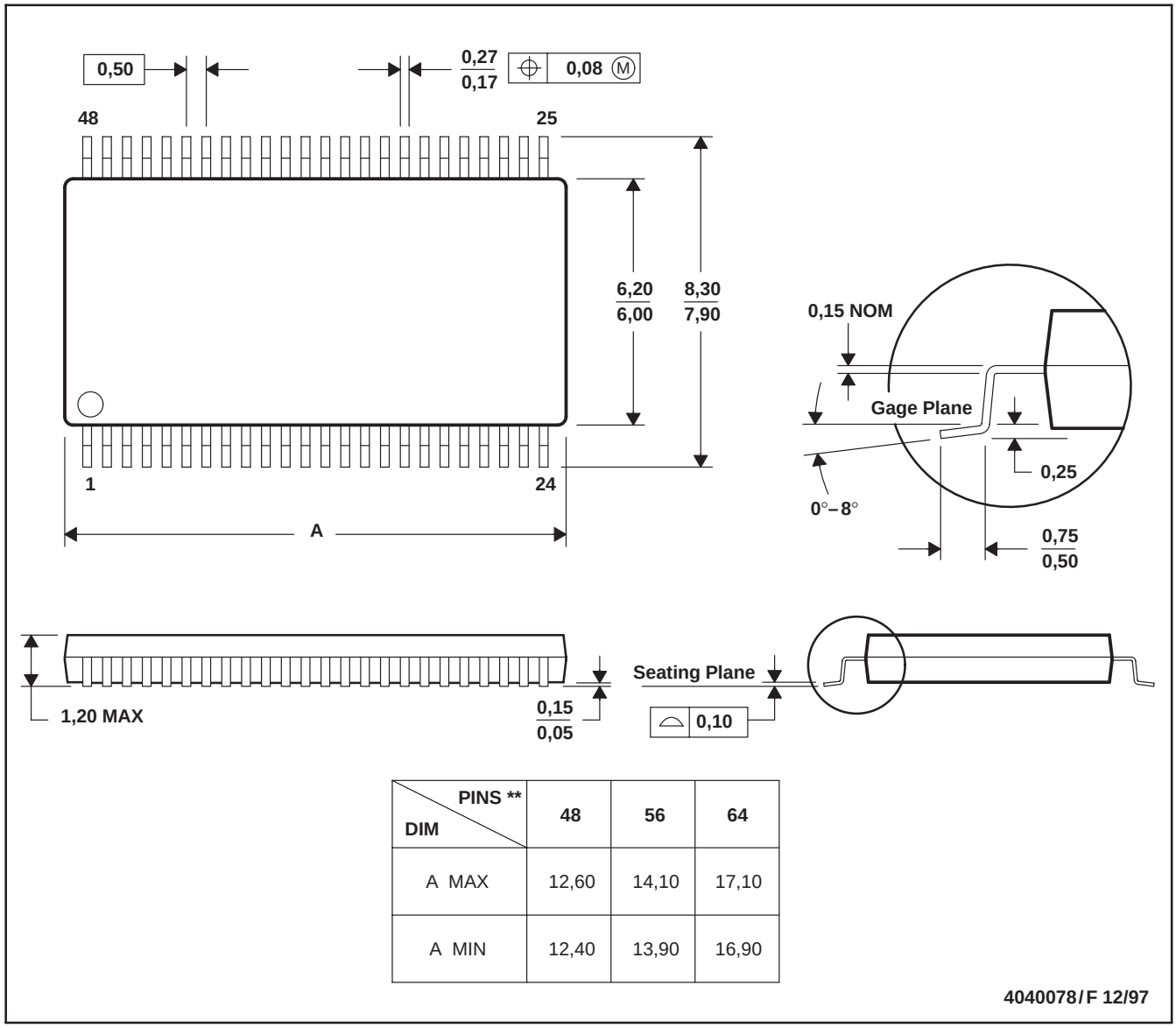
NOTES: (continued)

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

MTSS003D – JANUARY 1995 – REVISED JANUARY 1998

DGG (R-PDSO-G)** **PLASTIC SMALL-OUTLINE PACKAGE**

48 PINS SHOWN



DIM \ PINS **	48	56	64
A MAX	12,60	14,10	17,10
A MIN	12,40	13,90	16,90

NOTES: A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold protrusion not to exceed 0,15.
D. Falls within JEDEC MO-153

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