SN74AVC2T244 2 位单向电压电平转换器

1 特性

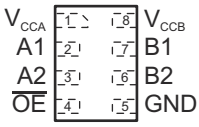
- 0.9V 至 3.6V 的宽运行 VCC 范围
- 低静态功耗，最大 ICC 为 6μA
- 输出使能特性使得用户能够禁用输出以降低功耗
- 电压为 3.0V 时，输出驱动电流为 ±24mA
- Ioff 支持局部断电模式运行
- 输入滞后可实现输入转换和输入上更好的开关噪声抗扰度
- 最大数据速率
  - 380Mbps（1.8V 至 3.3V 转换）
  - 200Mbps（低于 1.8V 至 3.3V 转换）
  - 200Mbps（转换至 2.5V 或 1.8V）
  - 150Mbps（转换至 1.5V）
  - 100Mbps（转换至 1.2V）
- 闩锁性能超过 100mA，符合 JESD 78 II 类规范的要求
- ESD 保护性能超过 JESD 22 规范要求
  - 5000V 人体放电模式 (A114-A)

2 应用

- 手机、智能手机、平板电脑、服务器

3 说明

这个 2 位单向转换器使用两个独立的可配置电源轨。A 端口设计用于跟踪 V_{CCA}。 VCCA 可支持从 0.9V 到 3.6V 范围内的任意电源电压。B 端口设计用于跟踪 VCCB。VCCB 支持从 0.9V 至 3.6V 范围内的任意电源电压，因此可实现 0.9V、1.2V、1.5V、1.8V、2.5V 和 3.6V 电压节点之间的低压转换。对于 SN74AVC2T244，当输出使能端 (OE) 输入为高电平时，所有输出均置于高阻抗状态。 SN74AVC2T244 设计成 OE 输入电路以 VCCA 为基准。该器件完全适合使用 Ioff 的局部断电应用。Ioff 电路禁用输出，从而可防止其断电时破坏性电流从该器件回流。



DQE 和 DQM 封装 8 引脚 X2SON（俯视图）

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4 Revision History

注：以前版本的页码可能与当前版本的页码不同

Changes from Revision B (September 2011) to Revision C (March 2021)	Page
• 更新了整个文档的表、图和交叉参考的编号格式	1
• 更新了数据表标题	1
• 删除了订购信息 表，请参阅数据表末尾的 POA	1

5 Pin Configuration and Functions

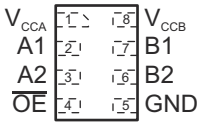


图 5-1. DQE and DQM Packages 8 Pin X2SON (Top View)

表 5-1. Pin Functions

PIN	FUNCTION
VCCA	Input Port DC Power Supply
VCCB	Output Port DC Power Supply
GND	Ground
An	Input Port
Bn	Output Port
OE	Output Enable

6 Specifications

6.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted) (1)

				MIN	MAX	UNIT
Voltage	DC Supply voltage, V_{CCA} V_{CCB}			–0.5	4.6	V
	DC Input voltage, V_I		A_n	–0.5	4.6	V
	Control Input, V_C		$\overline{OE}$	–0.5	4.6	V
	DC Output voltage, V_O, V_{CCA} = V_{CCB} = 0	(Power Down)	B_n	–0.5	4.6	V
		(Active Mode)	B_n	–0.5	4.6	
		3-State Mode	B_n	–0.5	4.6	
	DC Input Diode current, I_{IK}	V_I < GND			–20	mA
	DC Output Diode current, I_{OK}	V_O < GND			–50	mA
	DC Output Source/Sink current, I_O				±50	mA
	DC Supply current per supply pin, I_{CCA}, I_{CCB}				±100	mA
I_{GND}	DC Ground current per ground pin				±100	mA
T_{stg}	Storage temperature range			–65	150	°C

(1) 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.

6.2 Recommended Operating Conditions

				MIN	MAX	UNIT
V_{CCA}, V_{CCB}	Positive DC Supply voltage			0.9	3.6	V
V_I	Bus input voltage			GND	3.6	V
V_I	Input voltage			GND	3.6	V
V_C	Control input		$\overline{OE}$	GND	3.6	V
V_O	Bus output voltage	(Power Down Mode)	B_n	GND	3.6	V
		(Active Mode)	B_n	GND	V_{CCB}	V
		3-State Mode	B_n	GND	3.6	V
T_A	Operating free-air temperature			–40	85	°C
$\Delta t/\Delta v$	Input transition rise or fall rate V_I from 30% to 70% of V_{CC}; V_{CC} = 3.3 V ±0.3 V			0	10	nS

6.3 Electrical Characteristics

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

PARAMETER[1] [2]		TEST CONDITIONS	V_{CCA} (V)	V_{CCB} (V)	– 40°C to 85°C		UNIT
					MIN	MAX	
V_{IH}	Input HIGH Voltage (An, $\overline{OE}$)		2.7 – 3.6	0.9 – 3.6	2.0	–	V
			2.3 – 2.7		1.6	–	
			1.4 – 2.3		0.65 × V_{CCA}	–	
			0.9 – 1.4		0.9 × V_{CCA}	–	
V_{IL}	Input LOW voltage (An, $\overline{OE}$)		2.7 – 3.6	0.9 – 3.6	–	0.8	V
			2.3 – 2.7		–	0.7	
			1.4 – 2.3		–	0.35 × V_{CCA}	
			0.9 – 1.5		–	0.1 × V_{CCA}	
V_{OH}	Output HIGH voltage	I_{OH} = – 100 µA; V_I = V_H	0.9 – 3.6	0.9 – 3.6	V_{CCB} – 0.2	–	V
		I_{OH} = – 0.5 mA; V_I = V_H	0.9	0.9	0.75 × V_{CCB}	–	
		I_{OH} = – 2 mA; V_I = V_H	1.4	1.4	1.05	–	
		I_{OH} = – 6 mA; V_I = V_H	1.65	1.65	1.25	–	
			2.3	2.3	2.0	–	
		I_{OH} = – 12 mA; V_I = V_H	2.3	2.3	1.8	–	
			2.7	2.7	2.2	–	
		I_{OH} = – 18 mA; V_I = V_H	2.3	2.3	1.7	–	
			3.0	3.0	2.4	–	
		I_{OH} = – 24 mA; V_I = V_H	3.0	3.0	2.2	–	
V_{OL}	Output LOW voltage	I_{OH} = 100 µA; V_I = V_H	0.9 – 3.6	0.9 – 3.6	–	0.2	V
		I_{OH} = 0.5 mA; V_I = V_H	1.1	1.1	–	0.3	
		I_{OH} = 2 mA; V_I = V_H	1.4	1.4	–	0.35	
		I_{OH} = 6 mA; V_I = V_H	1.65	1.65	–	0.3	
		I_{OH} = 12 mA; V_I = V_H	2.3	2.3	–	0.4	
			2.7	2.7	–	0.4	
		I_{OH} = 18 mA; V_I = V_H	2.3	2.3	–	0.6	
			3.0	3.0	–	0.4	
		I_{OH} = 24 mA; V_I = V_H	3.0	3.0	–	0.55	
I_I	Input Leakage Current	V_I = V_{CCA} or GND	0.9 – 3.6	0.9 – 3.6	– 1.0	1.5	µA
I_{OFF}	Power-Off Leakage Current	$\overline{OE}$ = 0V	0	0.9 – 3.6	– 1.0	1.3	µA
			0.9 – 3.6	0	– 1.0	1.5	
I_{CCA}	Quiescent Supply Current	V_I = V_{CCA} or GND; I_O = 0	0.9 – 3.6	0.9 – 3.6	–	3.0	µA
I_{CCB}	Quiescent Supply Current	V_I = V_{CCA} or GND; I_O = 0	0.9 – 3.6	0.9 – 3.6	–	3.0	µA
I_{CCA} + I_{CCB}	Quiescent Supply Current	V_I = V_{CCA} or GND; I_O = 0	0.9 – 3.6	0.9 – 3.6	–	6.0	µA
ΔI_{CCA}	Increase in I_{CC} per Input Voltage, Other inputs at V_{CCA} or GND	V_I = V_{CCA} – 0.3 V; V_I = V_{CCA} or GND	3.6	3.6	–	5.0	µA

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

PARAMETER(1) (2)		TEST CONDITIONS	V_{CCA} (V)	V_{CCB} (V)	–40°C to 85°C		UNIT
					MIN	MAX	
ΔI_{CCB}	Increase in I_{CC} per Input Voltage, Other inputs at V_{CCA} or GND	$V_I = V_{CCA}$ – 0.3 V; $V_I = V_{CCA}$ or GND	3.6	3.6	–	5.0	µA
I_{OZ}	I/O Tri-State Output Leakage Current	TA = 25°C, $\overline{OE}$ = 0 V	0.9 – 3.6	0.9 – 3.6	–1.0	1.0	µA

(1) V_{CCO} is the V_{CC} associated with the output port.
(2) V_{CCI} is the V_{CC} associated with the input port.

6.4 AC Electrical Characteristics

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

	PARAMETER	V_{CCA} (V)	VCCB (V)	MIN	MAX	UNIT
t_{PLH}, t_{PHL}	Propagation Delay, A_n to B_n	0.9 – 3.6	0.9 – 3.6		20	nS
		1.2 – 3.6	1.2 – 3.6		7	
		1.8 – 3.6	1.8 – 3.6		3.5	
t_{PZH}, t_{PZL}	Output Enable, $\overline{OE}$ to B_n	0.9 – 3.6	0.9 – 3.6		23	nS
		1.2 – 3.6	1.2 – 3.6		6.5	
		1.8 – 3.6	1.8 – 3.6		4.1	
t_{PHZ}, t_{PLZ}	Output Disable, $\overline{OE}$ to B_n	0.9 – 3.6	0.9 – 3.6		17	nS
		1.2 – 3.6	1.2 – 3.6		7	
		1.8 – 3.6	1.8 – 3.6		4.3	
t_{OSHL}, t_{OSLH}	Output to Output Skew, Time	0.9 – 3.6	0.9 – 3.6		0.15	nS
		1.2 – 3.6	1.2 – 3.6		0.15	
		1.8 – 3.6	1.8 – 3.6		0.15	

表 6-1. Capacitance

(2)	PARAMETER	TEST CONDITIONS	TYP(1)	UNIT
C_{IN}	Control Pin Input Capacitance	$V_{CCA} = V_{CCB}$ = 3.3 V, V_I = 0 V or $V_{CCA/B}$	3.5	pF
$C_{I/O}$	I/O Pin Input capacitance	$V_{CCA} = V_{CCB}$ = 3.3 V, V_I = 0 V or $V_{CCA/B}$	5.0	pF
C_{PD}	Power Dissipation Capacitance	$V_{CCA} = V_{CCB}$ = 3.3 V, V_I = 0 V or $V_{CCA/B}$, f = 10 MHz	33	pF

(1) Typical values are at TA = +25°C.
(2) C_{PD} is defined as the value of the IC's equivalent capacitance from which the operating current can be calculated from: $I_{CC(operating)} \approx C_{PD} \times V_{CC} \times f_{IN} \times N_{SW}$ where $I_{CC} = I_{CCA} + I_{CCB}$ and N_{SW} = total number of outputs switching.

7 Device and Documentation Support

7.1 接收文档更新通知

要接收文档更新通知，请导航至 ti.com 上的器件产品文件夹。点击 *订阅更新* 进行注册，即可每周接收产品信息更改摘要。有关更改的详细信息，请查看任何已修订文档中包含的修订历史记录。

7.2 支持资源

TI E2E™ 支持论坛是工程师的重要参考资料，可直接从专家获得快速、经过验证的解答和设计帮助。搜索现有解答或提出自己的问题可获得所需的快速设计帮助。

链接的内容由各个贡献者“按原样”提供。这些内容并不构成 TI 技术规范，并且不一定反映 TI 的观点；请参阅 TI 的《使用条款》。

7.3 Trademarks

TI E2E™ is a trademark of Texas Instruments.
所有商标均为其各自所有者的财产。

7.4 静电放电警告

静电放电 (ESD) 会损坏这个集成电路。德州仪器 (TI) 建议通过适当的预防措施处理所有集成电路。如果不遵守正确的处理和安装程序，可能会损坏集成电路。

ESD 的损坏小至导致微小的性能降级，大至整个器件故障。精密的集成电路可能更容易受到损坏，这是因为非常细微的参数更改都可能会导致器件与其发布的规格不相符。

7.5 术语表

TI 术语表　　本术语表列出并解释了术语、首字母缩略词和定义。

8 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

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)
SN74AVC2T244DQER	Active	Production	X2SON (DQE) | 8	5000 | LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 85	VA
SN74AVC2T244DQER.B	Active	Production	X2SON (DQE) | 8	5000 | LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 85	VA
SN74AVC2T244DQMR	Active	Production	X2SON (DQM) | 8	3000 | LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 85	VA
SN74AVC2T244DQMR.B	Active	Production	X2SON (DQM) | 8	3000 | LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 85	VA

(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.

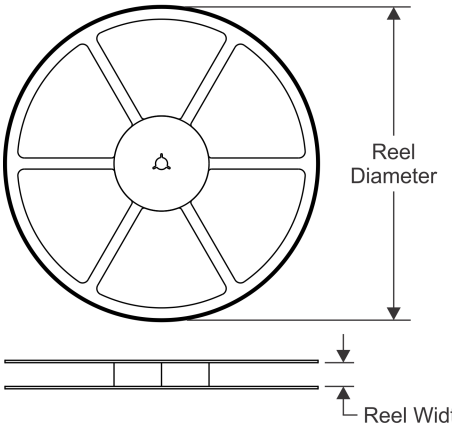
(5) **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will 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.

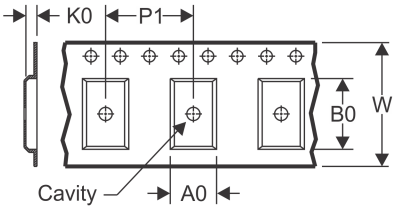
Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

TAPE AND REEL INFORMATION

REEL DIMENSIONS

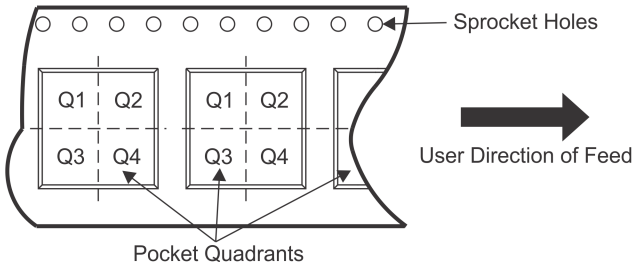


TAPE DIMENSIONS



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

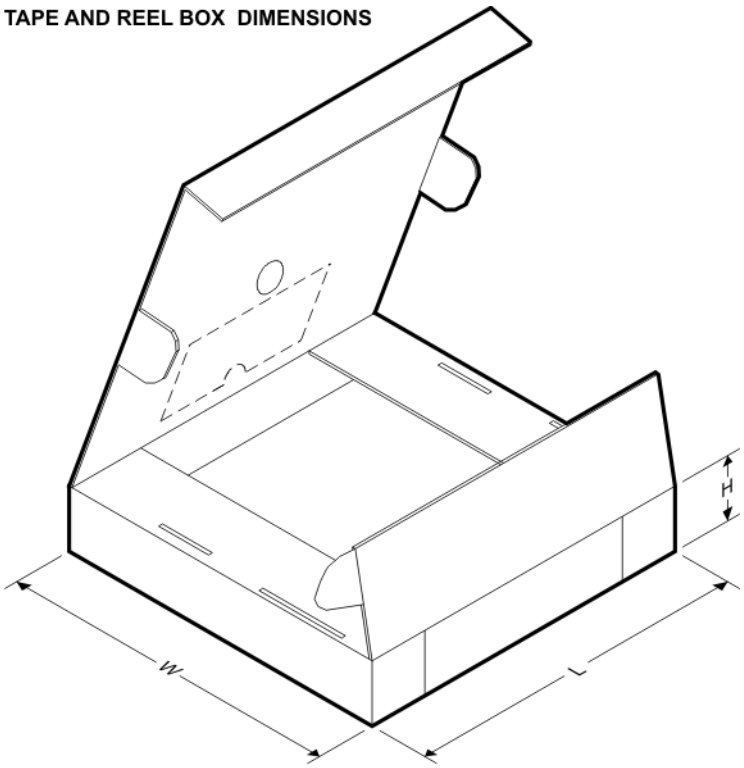
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
SN74AVC2T244DQER	X2SON	DQE	8	5000	180.0	8.4	1.2	1.6	0.55	4.0	8.0	Q1
SN74AVC2T244DQMR	X2SON	DQM	8	3000	180.0	8.4	1.57	2.21	0.59	4.0	8.0	Q1

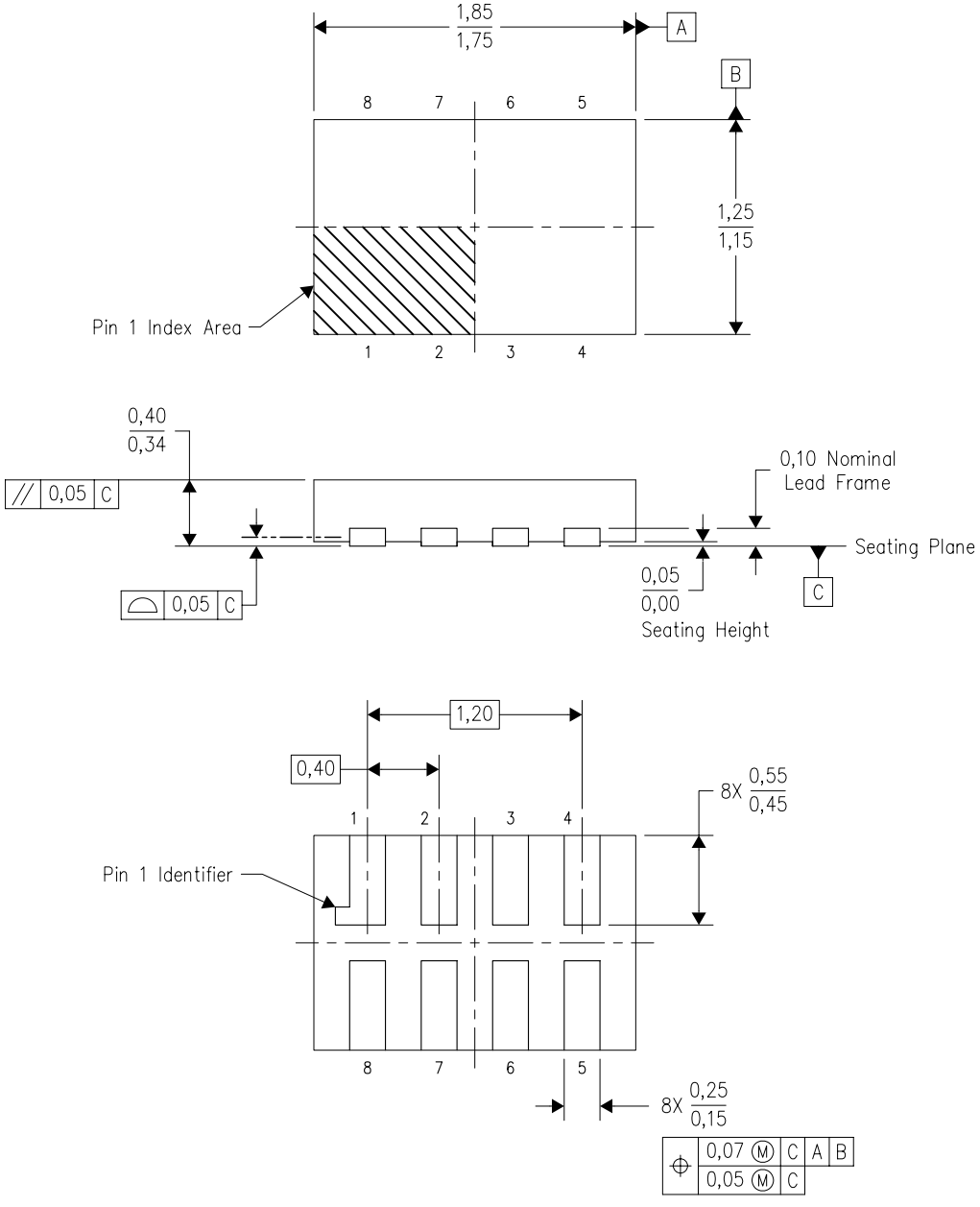
TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74AVC2T244DQER	X2SON	DQE	8	5000	202.0	201.0	28.0
SN74AVC2T244DQMR	X2SON	DQM	8	3000	202.0	201.0	28.0

DQM (R–PX2SON–N8) PLASTIC SMALL OUTLINE NO–LEAD

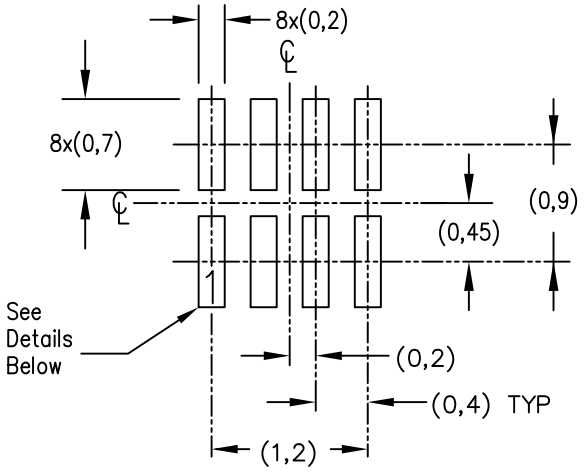


4210302/A 06/2009

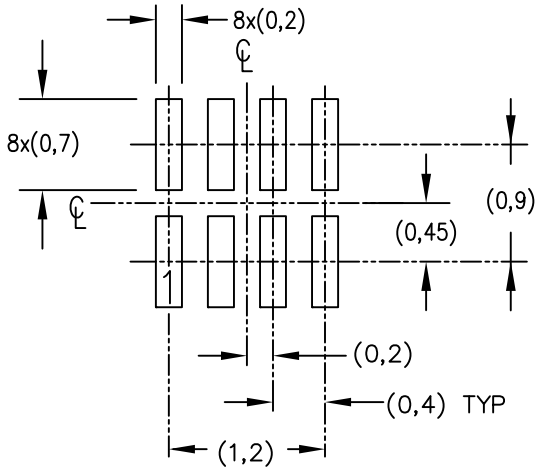
NOTES:
A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M–1994.
B. This drawing is subject to change without notice.
C. SON (Small Outline No–Lead) package configuration.

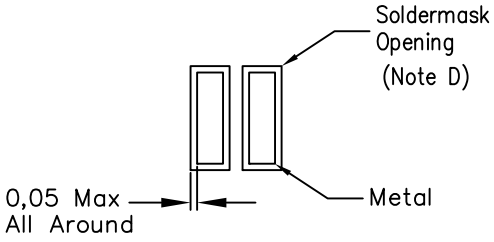
DQM (R–PX2SON–N8) PLASTIC SMALL OUTLINE NO–LEAD

Example Board Layout

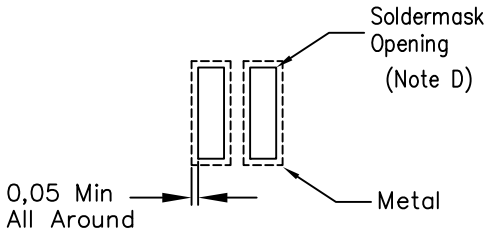


Example Stencil Design
0.1mm Thick Stencil
(Note C)





Non Solder Mask Defined Pad



Solder Mask Defined Pad

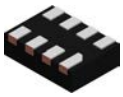
Solder Mask Details

4218746/A 07/13

NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC 7525 for stencil design considerations.
D. Customers should contact their board fabrication site for recommended solder mask tolerances.

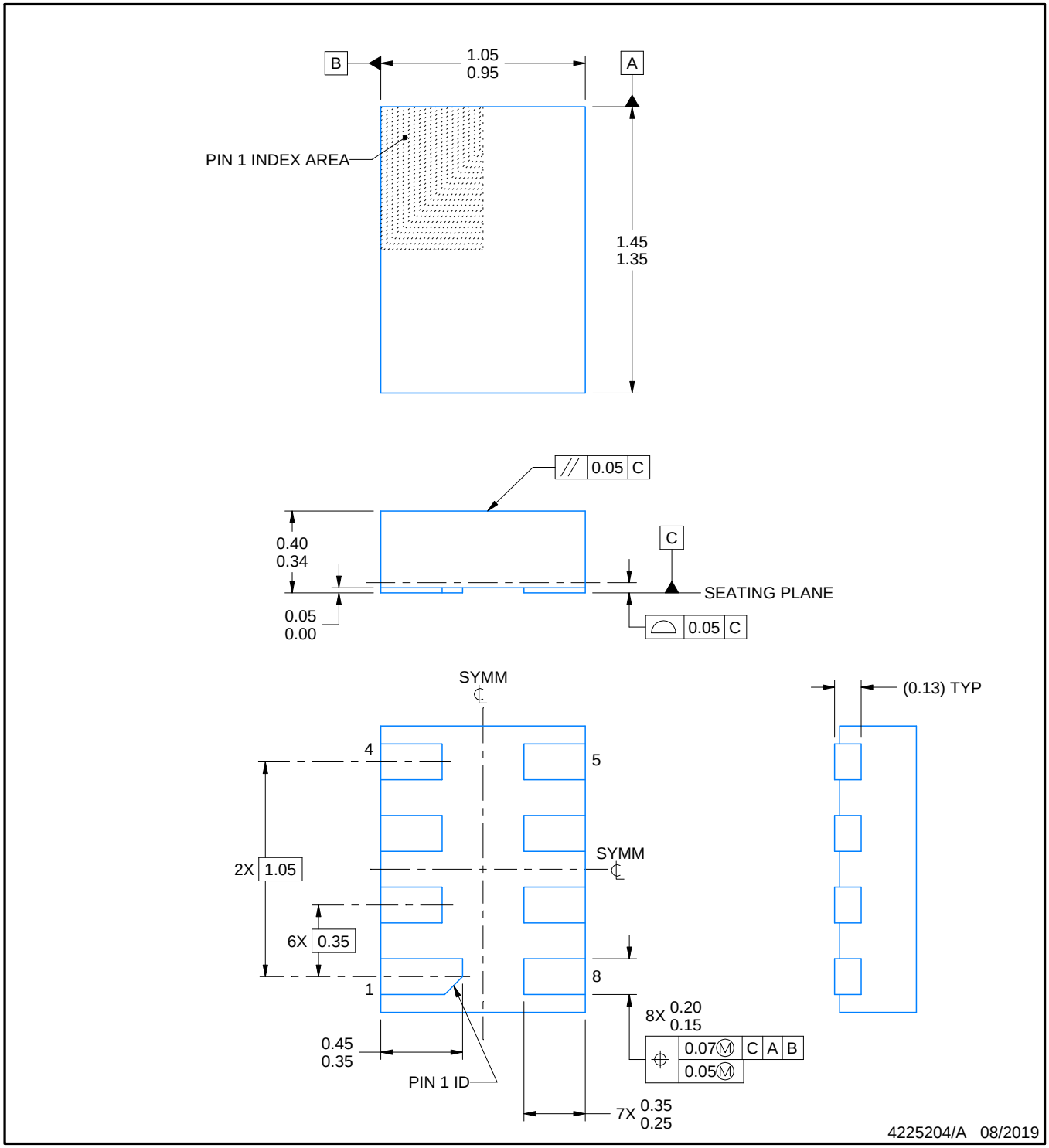
PACKAGE OUTLINE

DQE0008A



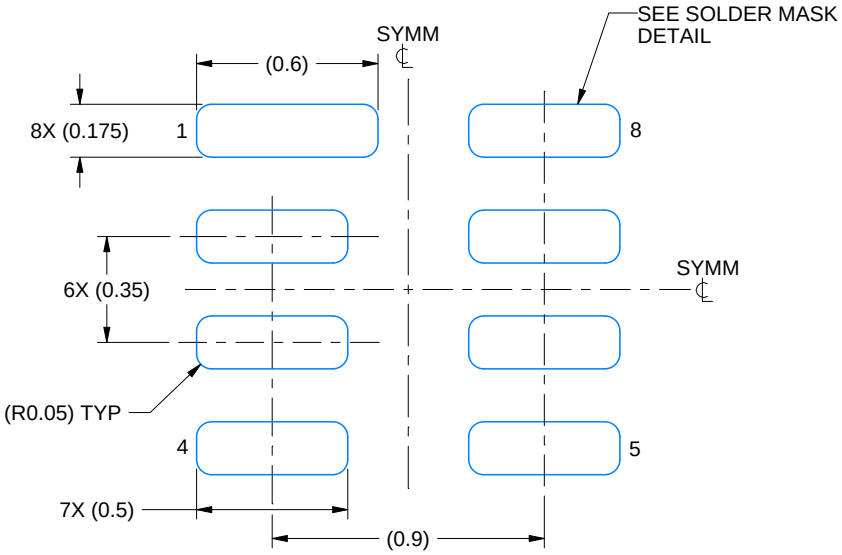
X2SON - 0.4 mm max height

PLASTIC SMALL OUTLINE - NO LEAD

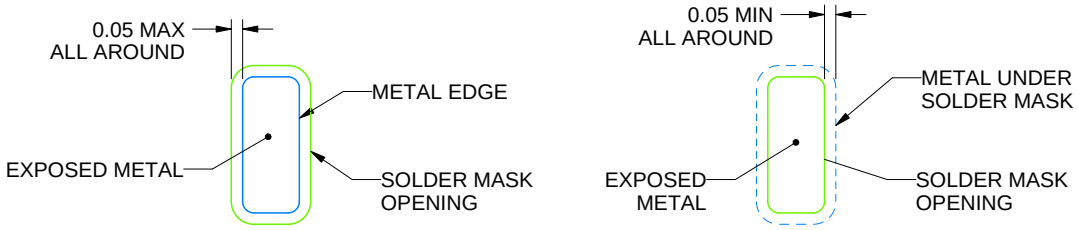


NOTES:

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 package complies to JEDEC MO-287 variation X2EAF.



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 40X



SOLDER MASK DETAILS

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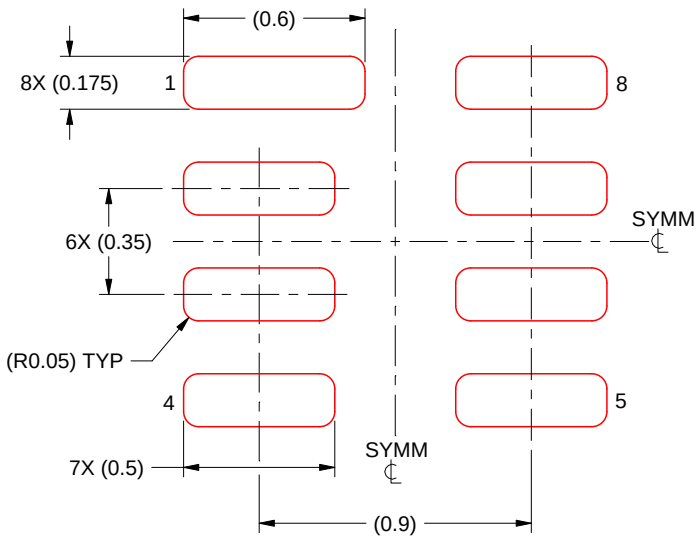
NOTES: (continued)

4. This package is designed to be soldered to a thermal pad on the board. For more information, see Texas Instruments literature number SLUA271 (www.ti.com/lit/slua271).



SOLDER PASTE EXAMPLE
BASED ON 0.075 MM THICK STENCIL
SCALE: 40X

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NOTES: (continued)

5. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.

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