

## 双通道高速差分线路驱动器

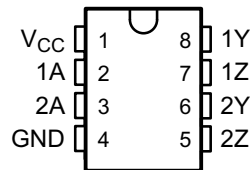
 查询样品: [uA9638C-EP](#)

### 特性

- 符合或者优于ANSI标准EIA/TIA-422-B
- 单一5V电源供电下运行
- 驱动负载低至50 Ω 高达15Mbps
- TTL- 和 CMOS-输入兼容性
- 输出短路保护
- 可与美国国家半导体公司 (National Semiconductor) 的™ DS9638 互换

支持国防, 航空航天, 和医疗应用

- 可控基线
- 一个组装/测试场所
- 一个制造场所
- 额定温度为-40°C 至 85°C
- 延长的产品生命周期
- 延长产品的变更通知周期
- 产品可追溯性

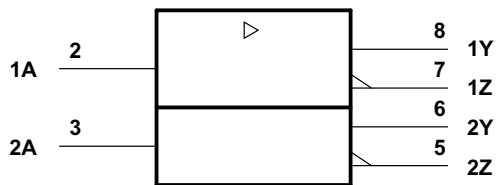
**D PACKAGE  
(TOP VIEW)**


### 说明

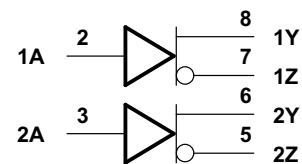
uA9638C是一款双通道高速差分线路驱动器, 设计满足ANSI标准EIA/TIA-422-B。此输入是TTL和CMOS兼容的并且具有输入钳位二极管。肖特基(Schottky)钳位二极管晶体管用于大大减少传播延迟时间。这个器件由一个单一5V电源供电并采用一个8引脚封装。

uA9638提供高速驱动低阻抗负载所需的电流。通常使用双绞线和差分接收器, 在设计正确的系统中, 基带数据速率传输可高达甚至超过14Mbps。uA9637A双线路接收器通常用作接收器。要在同样的引脚配置下获得更快的开关速度, 请见SN75ALS191。

uA9638C额定运行温度为-40°C 至 85°C。



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

**Figure 1. Logic Symbol**

**Figure 2. Logic Diagram**

### ORDERING INFORMATION<sup>(1)</sup>

T <sub>A</sub> = T <sub>J</sub>	PACKAGE		ORDERABLE PART NUMBER	TOP-SIDE MARKING	VID NUMBER
-40°C to 85°C	SOIC - D	Reel of 2500	UA9638CIDREP	9638I	V62/12606-10XE

(1) For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI web site at [www.ti.com](http://www.ti.com).



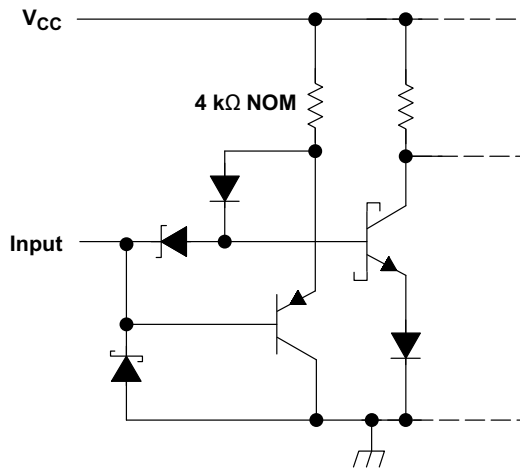
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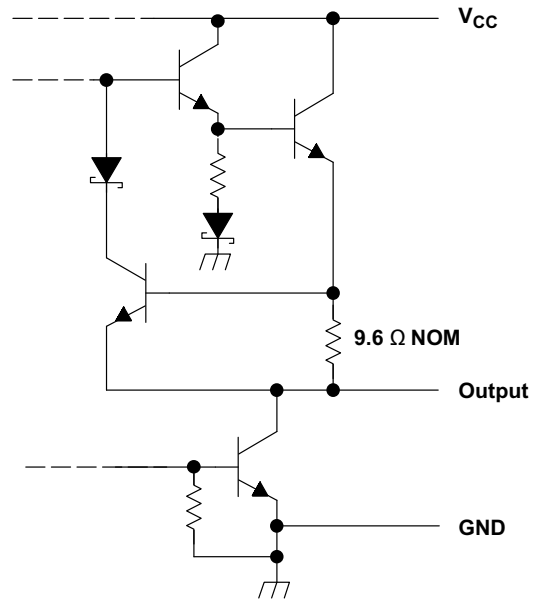
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English Data Sheet: [SLLSE44](#)

**SCHEMATICS OF INPUTS AND OUTPUTS**



**Figure 3. Equivalent of Each Input**



**Figure 4. Typical of All Inputs**

**ABSOLUTE MAXIMUM RATINGS <sup>(1)</sup>**

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

$V_{CC}$	Supply voltage range <sup>(2)</sup>	-0.5 V to 7 V
$V_I$	Input voltage range	-0.5 V to 7 V
	Continuous total power dissipation	See Dissipation Ratings Table
	Lead temperature 1,6 mm (1/16 inch) from 10 seconds	260°C
$T_A$	Operating free-air temperature range	-40°C to 85°C
$T_{stg}$	Storage temperature range	-65°C to 150°C

- (1) Voltage values except differential output voltages are with respect to network GND.
- (2) 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.

## THERMAL INFORMATION

THERMAL METRIC <sup>(1)</sup>		uA9638C		UNITS
		D		
		8 PINS		
$\theta_{JA}$	Junction-to-ambient thermal resistance <sup>(2)</sup>	114.3		°C/W
$\theta_{JC}$	Junction-to-case thermal resistance	59.1		
$\theta_{JB}$	Junction-to-board thermal resistance <sup>(3)</sup>	55.3		
$\psi_{JT}$	Junction-to-top characterization parameter <sup>(4)</sup>	12.7		
$\psi_{JB}$	Junction-to-board characterization parameter <sup>(5)</sup>	54.7		

- (1) 有关传统和新的热量的更多信息，请参阅 *IC* 封装热量应用报告 [SPRA953](#)。
- (2) 在 JESD51-2a 描述的环境中，按照 JESD51-7 的指定在一个 JEDEC 标准 high-K 测试电路板上进行仿真，从而获得自然对流条件下的结到外部热阻。
- (3) 按照 JESD51-8 中的说明，通过在配有用于控制 PCB 温度的环形冷板夹具的环境中进行仿真，以获得结到电路板热阻。
- (4) 结到顶部的表征参数 ( $\psi_{JT}$ ) 估算真实系统中器件的结温，并使用 JESD51-2a (第 6 章和第 7 章) 中描述的程序从得到  $\theta_{JA}$  的仿真数据中提取出该参数。
- (5) 结到电路板的表征参数 ( $\psi_{JB}$ ) 估算真实系统中器件的结温，并使用 JESD51-2a (第 6 章和第 7 章) 中描述的程序从得到  $\theta_{JA}$  的仿真数据中提取出该参数。

## DISSIPATION RATINGS

PACKAGE	POWER RATING $T_A = 25^\circ\text{C}$ (mW)	DERATING FACTOR $T_A > 70^\circ\text{C}$ (mW/°C)	POWER RATING $T_A = 85^\circ\text{C}$ (mW)
D	725	8.75	199

## RECOMMENDED OPERATING CONDITIONS

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

	MIN	NOM	MAX	UNIT
$V_{CC}$ Supply voltage	4.75	5	5.25	V
$V_{IH}$ High-level input voltage	2			V
$V_{IL}$ Low-level input voltage			0.8	V
$I_{OH}$ High-level output current			-50	mA
$I_{OL}$ Low-level output current			50	mA
$T_A$ Operating free-air temperature	-40		85	°C

## ELECTRICAL CHARACTERISTICS

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

PARAMETER	TEST CONDITIONS	MIN	TYP <sup>(1)</sup>	MAX	UNIT
$V_{IK}$ Input clamp voltage	$V_{CC} = 4.75\text{ V}$ , $I_I = -18\text{ mA}$		-1	-1.2	V
$V_{OH}$ High level output voltage	$V_{CC} = 4.75\text{ V}$ , $V_{IH} = 2\text{ V}$ , $V_{IL} = 0.8\text{ V}$		2.5	3.5	V
	$I_{OH} = -10\text{ mA}$ $I_{OH} = -40\text{ mA}$		2		
$V_{OL}$ Low level output voltage	$V_{CC} = 4.75\text{ V}$ , $V_{IH} = 2\text{ V}$ , $V_{IL} = 0.8\text{ V}$ , $I_{OL} = 40\text{ mA}$			0.5	V
$ V_{OD1} $ Magnitude of differential output voltage	$V_{CC} = 5.25\text{ V}$ , $I_O = 0\text{ A}$		1.25 x $V_{OD2}$		V
$ V_{OD2} $ Magnitude of differential output voltage	$V_{CC} = 4.75\text{ V}$ to $5.25\text{ V}$ , $R_L = 100\ \Omega$ , See <a href="#">Figure 5</a>		2		V
$\Delta V_{OD} $ Change in magnitude of differential output voltage <sup>(2)</sup>	$V_{CC} = 4.75\text{ V}$ to $5.25\text{ V}$ , $R_L = 100\ \Omega$ , See <a href="#">Figure 5</a>			±0.4	V
$V_{OC}$ Common-mode output voltage <sup>(3)</sup>	$V_{CC} = 4.75\text{ V}$ to $5.25\text{ V}$ , $R_L = 100\ \Omega$ , See <a href="#">Figure 5</a>			3	V

- (1) All typical values are at  $V_{CC} = 5\text{ V}$  and  $T_A = 25^\circ\text{C}$ .
- (2)  $\Delta|V_{OD}|$  and  $\Delta|V_{OC}|$  are the changes in magnitude of  $V_{OD}$  and  $V_{OC}$ , respectively, that occur when the input is changed from a high level to a low level or vice versa.
- (3) In Standard EIA-422-A,  $V_{OC}$ , which is the average of the two output voltages with respect to ground, is called output offset voltage,  $V_{OS}$ .

### ELECTRICAL CHARACTERISTICS (continued)

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

PARAMETER	TEST CONDITIONS	MIN	TYP <sup>(1)</sup>	MAX	UNIT
$\Delta V_{oc} $	Change in magnitude of common-mode output voltage <sup>(2)</sup> $V_{CC} = 4.75 \text{ V to } 5.25 \text{ V}, R_L = 100 \Omega$ , See <a href="#">Figure 5</a>			$\pm 0.4$	V
$I_O$	Output current with power off $V_{CC} = 0 \text{ V}$	$V_O = 6 \text{ V}$	0.1	100	$\mu\text{A}$
		$V_O = -0.25 \text{ V}$	-0.1	-100	
		$V_O = -0.25 \text{ V to } 6 \text{ V}$		$\pm 100$	
$I_I$	Input current $V_{CC} = 5.25 \text{ V}, V_I = 5.5 \text{ V}$			50	$\mu\text{A}$
$I_{IH}$	High-level input current $V_{CC} = 5.25 \text{ V}, V_I = 2.7 \text{ V}$			25	$\mu\text{A}$
$I_{IL}$	Low-level input current $V_{CC} = 5.25 \text{ V}, V_I = 0.5 \text{ V}$			-200	$\mu\text{A}$
$I_{OS}$	Short-circuit output current <sup>(4)</sup> $V_{CC} = 5.25 \text{ V}, V_O = 0 \text{ V}$	-50		-150	mA
$I_{CC}$	Supply current (both drivers) $V_{CC} = 5.25 \text{ V}, \text{ No load, All inputs at } 0 \text{ V}$		45	65	mA

(4) Only one output at a time should be shorted, and duration of the short circuit should not exceed one second.

### SWITCHING CHARACTERISTICS

$V_{CC} = 5 \text{ V}, T_A = 25^\circ\text{C}$  (unless otherwise noted)

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
$t_{d(OD)}$	Differential output delay time $C_L = 15 \text{ pF}, R_L = 100 \Omega$ , See <a href="#">Figure 6</a>		10		ns
$t_{t(OD)}$	Differential output transition time $C_L = 15 \text{ pF}, R_L = 100 \Omega$ , See <a href="#">Figure 6</a>		10		ns
$t_{sk(o)}$	Output skew See <a href="#">Figure 6</a>		1		ns

#### PARAMETER MEASUREMENT INFORMATION

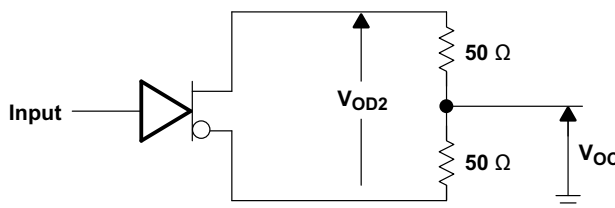
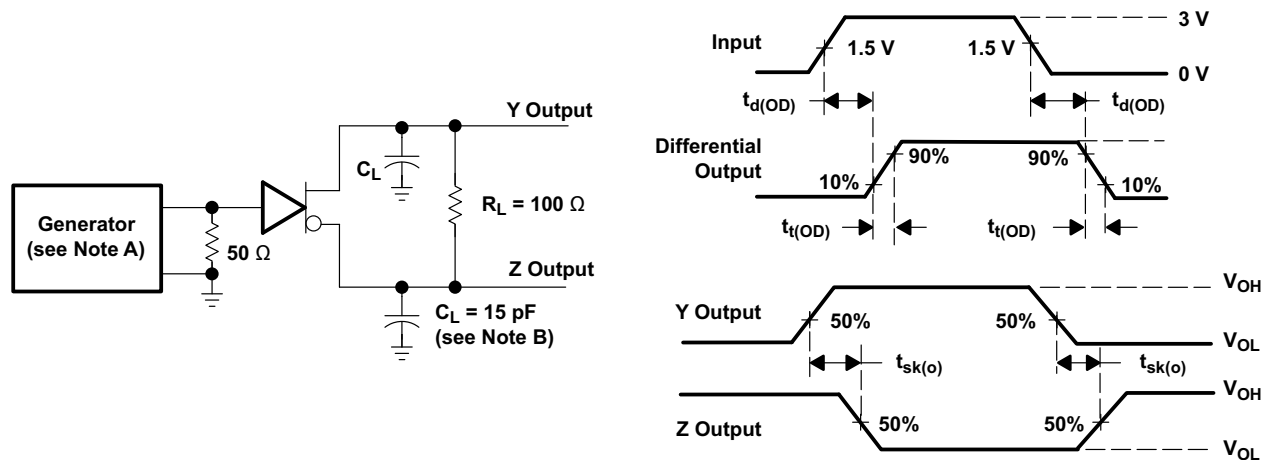


Figure 5. Differential and Common-Mode Output Voltages



#### TEST CIRCUIT

#### VOLTAGE WAVEFORMS

- A. The input pulse generator has the following characteristics:  $Z_O = 50 \Omega$ ,  $PRR \leq 500 \text{ kHz}$ ,  $t_w = 100 \text{ ns}$ ,  $t_r \leq 5 \text{ ns}$ .
- B.  $C_L$  includes probe and jig capacitance.

Figure 6. Test Circuit and Voltage Waveforms

**PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
UA9638CIDREP	ACTIVE	SOIC	D	8	2500	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-40 to 85	9638I	<a href="#">Samples</a>
V62/12606-01XE	ACTIVE	SOIC	D	8	2500	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-40 to 85	9638I	<a href="#">Samples</a>

(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) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

**RoHS Exempt:** TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

**Green:** TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(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 finish/Ball material - Orderable Devices 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.

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**TAPE AND REEL INFORMATION**

**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**

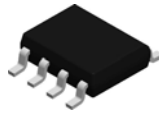

\*All dimensions are nominal

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
UA9638CIDREP	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1

**TAPE AND REEL BOX DIMENSIONS**


\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
UA9638CIDREP	SOIC	D	8	2500	340.5	336.1	25.0

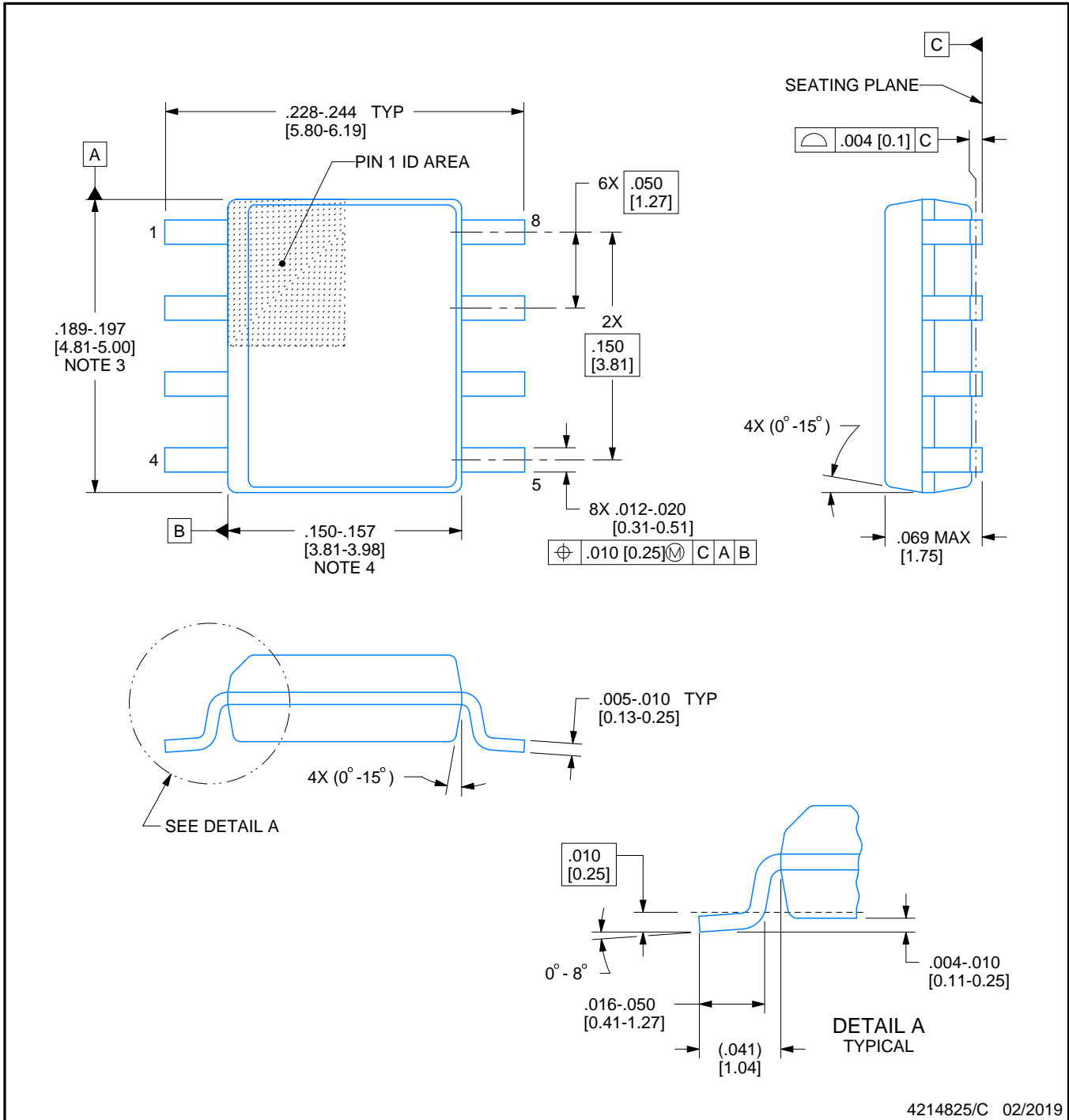


D0008A

# PACKAGE OUTLINE

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



4214825/C 02/2019

## NOTES:

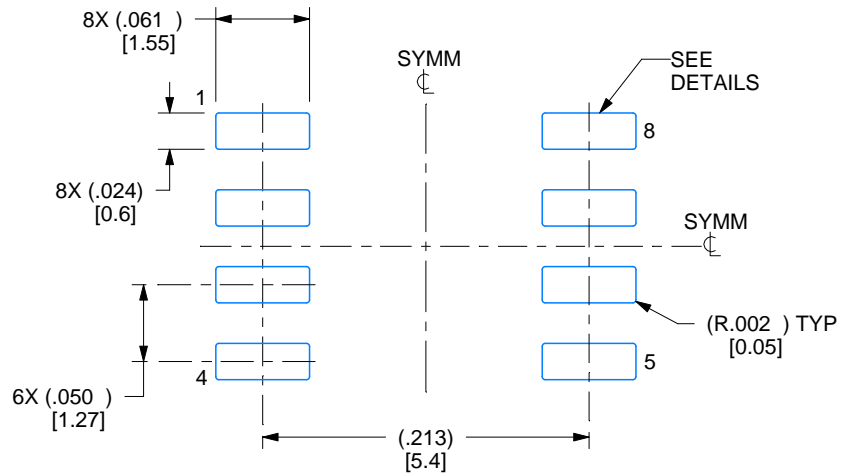
- Linear dimensions are in inches [millimeters]. Dimensions in parenthesis are for reference only. Controlling dimensions are in inches. Dimensioning and tolerancing per ASME Y14.5M.
- This drawing is subject to change without notice.
- This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed .006 [0.15] per side.
- This dimension does not include interlead flash.
- Reference JEDEC registration MS-012, variation AA.

# EXAMPLE BOARD LAYOUT

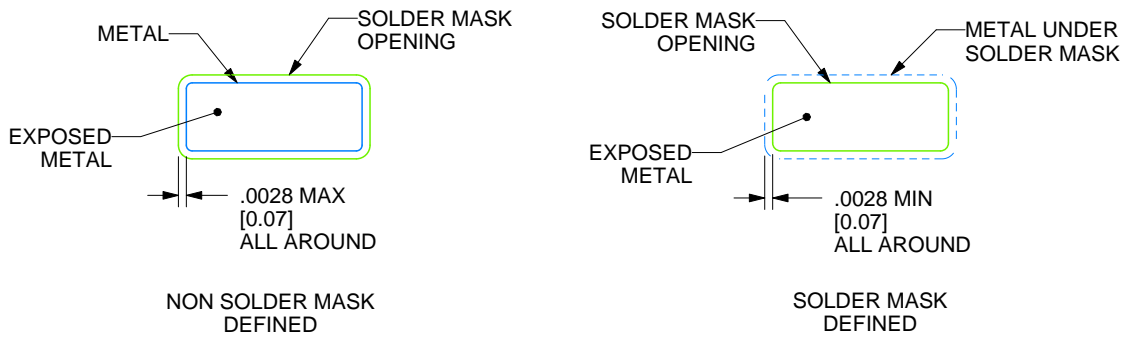
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SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE:8X



SOLDER MASK DETAILS

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NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

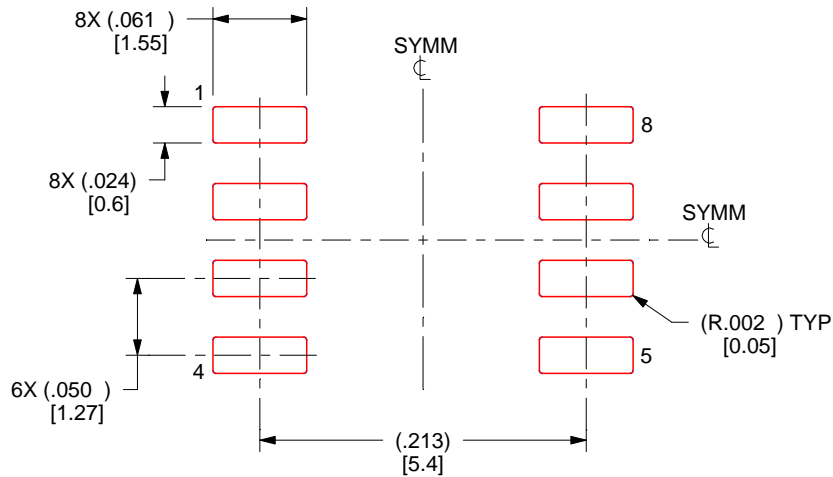
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

# EXAMPLE STENCIL DESIGN

D0008A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



SOLDER PASTE EXAMPLE  
BASED ON .005 INCH [0.125 MM] THICK STENCIL  
SCALE:8X

4214825/C 02/2019

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.

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