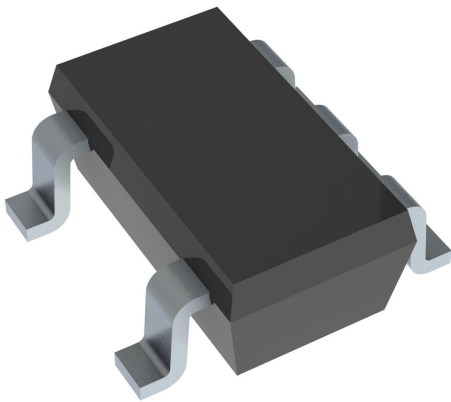


# DS90LV011ATMF/NOPB Datasheet

www.digi-electronics.com



DS90LV011ATMF/NOPB

<https://www.DiGi-Electronics.com>

DiGi Electronics Part Number	DS90LV011ATMF/NOPB-DG
Manufacturer	<a href="#">Texas Instruments</a>
Manufacturer Product Number	DS90LV011ATMF/NOPB
Description	IC DRIVER 1/0 SOT23-5
Detailed Description	1/0 Driver LVDS SOT-23-5



Tel: +00 852-30501935

RFQ Email: [Info@DiGi-Electronics.com](mailto:Info@DiGi-Electronics.com)

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## Purchase and inquiry

Manufacturer Product Number:

DS90LV011ATMF/NOPB

Series:

-

Type:

Driver

Number of Drivers/Receivers:

1/0

Data Rate:

400Mbps

Operating Temperature:

-40°C ~ 85°C

Package / Case:

SC-74A, SOT-753

Base Product Number:

DS90LV011

Manufacturer:

Texas Instruments

Product Status:

Active

Protocol:

LVDS

Duplex:

-

Voltage - Supply:

3V ~ 3.6V

Mounting Type:

Surface Mount

Supplier Device Package:

SOT-23-5

## Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Unaffected

HTSUS:

8542.39.0001

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

5A991B1

## DS90LV011A 3V LVDS Single High Speed Differential Driver

Check for Samples: [DS90LV011A](#)

### FEATURES

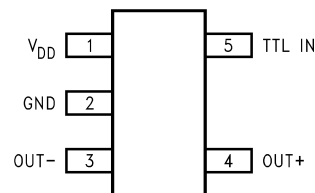
- Conforms to TIA/EIA-644-A Standard
- >400Mbps (200MHz) Switching Rates
- 700 ps (100 ps Typical) Maximum Differential Skew
- 1.5 ns Maximum Propagation Delay
- Single 3.3V Power Supply
- $\pm 350$  mV Differential Signaling
- Power Off Protection (Outputs in TRI-STATE)
- Pinout Simplifies PCB Layout
- Low Power Dissipation (23 mW @ 3.3V Typical)
- SOT-23 5-Lead Package
- SOT-23 Version Pin Compatible with SN65LVDS1
- Fabricated with Advanced CMOS Process Technology
- Industrial Temperature Operating Range
  - (–40°C to +85°C)

### DESCRIPTION

The DS90LV011A is a single LVDS driver device optimized for high data rate and low power applications. The DS90LV011A is a current mode driver allowing power dissipation to remain low even at high frequency. In addition, the short circuit fault current is also minimized. The device is designed to support data rates in excess of 400Mbps (200MHz) utilizing Low Voltage Differential Signaling (LVDS) technology.

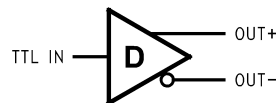
The device is in a 5-lead SOT-23 package. The LVDS outputs have been arranged for easy PCB layout. The differential driver outputs provide low EMI with its typical low output swing of 350 mV. The DS90LV011A can be paired with its companion single line receiver, the DS90LV012A, or with any of TI's LVDS receivers, to provide a high-speed LVDS interface.

### Connection Diagram



**Figure 1. Top View**  
See Package Number DBV (R-PDSO-G5)

### Functional Diagram



These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.



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**DS90LV011A**

SNLS140C – MAY 2002 – REVISED APRIL 2013

[www.ti.com](http://www.ti.com)**Absolute Maximum Ratings<sup>(1)</sup>**

Supply Voltage ( $V_{DD}$ )	-0.3V to +4V
LVC MOS input voltage (TTL IN)	-0.3V to +3.6V
LVDS output voltage ( $OUT_{\pm}$ )	-0.3V to +3.9V
LVDS output short circuit current	24mA
Maximum Package Power Dissipation @ +25°C	
DBV Package	902 mW
Derate DBV Package	7.22 mW/°C above +25°C
Thermal Resistance ( $\theta_{JA}$ )	138.5°C/Watt
Storage Temperature	-65°C to +150°C
Lead Temperature – Soldering	+260°C (4 sec.)
Maximum Junction Temperature	+150°C
ESD Ratings	
HBM (1.5 k $\Omega$ , 100 pF)	$\geq$ 9kV
EIAJ (0 $\Omega$ , 200 pF)	$\geq$ 900V
CDM (0 $\Omega$ , 0 pF)	$\geq$ 2000V
IEC direct (330 $\Omega$ , 150 pF)	$\geq$ 4kV

(1) "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be specified. They are not meant to imply that the devices should be operated at these limits. [Electrical Characteristics](#) specifies conditions of device operation.

**Recommended Operating Conditions**

	<b>Min</b>	<b>Typ</b>	<b>Max</b>	<b>Units</b>
Supply Voltage ( $V_{DD}$ )	3.0	3.3	3.6	V
Temperature ( $T_A$ )	-40	+25	+85	°C

## Electrical Characteristics

Over Supply Voltage and Operating Temperature ranges, unless otherwise specified. <sup>(1)(2)(3)</sup>

Symbol	Parameter	Conditions	Pin	Min	Typ	Max	Units
$ V_{OD} $	Output Differential Voltage	$R_L = 100\Omega$ (Figure 2 and Figure 3)	OUT+, OUT-	250	350	450	mV
$\Delta V_{OD}$	$V_{OD}$ Magnitude Change				3	35	mV
$V_{OS}$	Offset Voltage	$R_L = 100\Omega$ (Figure 2)		1.125	1.22	1.375	V
$\Delta V_{OS}$	Offset Magnitude Change			0	1	25	mV
$I_{OFF}$	Power-off Leakage	$V_{OUT} = 3.6V$ or GND, $V_{DD} = 0V$			$\pm 1$	$\pm 10$	$\mu A$
$I_{OS}$	Output Short Circuit Current <sup>(4)</sup>	$V_{OUT+}$ and $V_{OUT-} = 0V$			-6	-24	mA
$I_{OSD}$	Differential Output Short Circuit Current <sup>(4)</sup>	$V_{OD} = 0V$			-5	-12	mA
$C_{OUT}$	Output Capacitance				3		pF
$V_{IH}$	Input High Voltage		TTL IN	2.0		$V_{DD}$	V
$V_{IL}$	Input Low Voltage			GND		0.8	V
$I_{IH}$	Input High Current	$V_{IN} = 3.3V$ or 2.4V			$\pm 2$	$\pm 10$	$\mu A$
$I_{IL}$	Input Low Current	$V_{IN} = GND$ or 0.5V			$\pm 1$	$\pm 10$	$\mu A$
$V_{CL}$	Input Clamp Voltage	$I_{CL} = -18$ mA		-1.5	-0.6		V
$C_{IN}$	Input Capacitance				3		pF
$I_{DD}$	Power Supply Current	No Load	$V_{IN} = V_{DD}$ or GND	$V_{DD}$	5	8	mA
		$R_L = 100\Omega$			7	10	mA

- (1) Current into device pins is defined as positive. Current out of device pins is defined as negative. All voltages are referenced to ground except  $V_{OD}$ .
- (2) All typicals are given for:  $V_{DD} = +3.3V$  and  $T_A = +25^\circ C$ .
- (3) The DS90LV011A is a current mode device and only function with datasheet specification when a resistive load is applied to the drivers outputs.
- (4) Output short circuit current ( $I_{OS}$ ) is specified as magnitude only, minus sign indicates direction only.

## Switching Characteristics

Over Supply Voltage and Operating Temperature Ranges, unless otherwise specified. <sup>(1)(2)(3)(4)</sup>

Symbol	Parameter	Conditions	Min	Typ	Max	Units
$t_{PHLD}$	Differential Propagation Delay High to Low	$R_L = 100\Omega$ , $C_L = 15$ pF (Figure 4 and Figure 5)	0.3	1.0	1.5	ns
$t_{PLHD}$	Differential Propagation Delay Low to High		0.3	1.1	1.5	ns
$t_{SKD1}$	Differential Pulse Skew $ t_{PHLD} - t_{PLHD} $ <sup>(5)</sup>		0	0.1	0.7	ns
$t_{SKD3}$	Differential Part to Part Skew <sup>(6)</sup>		0	0.2	1.0	ns
$t_{SKD4}$	Differential Part to Part Skew <sup>(7)</sup>		0	0.4	1.2	ns
$t_{TLH}$	Transition Low to High Time		0.2	0.5	1.0	ns
$t_{THL}$	Transition High to Low Time		0.2	0.5	1.0	ns
$f_{MAX}$	Maximum Operating Frequency <sup>(8)</sup>		200	250		MHz

- (1) All typicals are given for:  $V_{DD} = +3.3V$  and  $T_A = +25^\circ C$ .
- (2) These parameters are specified by design. The limits are based on statistical analysis of the device performance over PVT (process, voltage, temperature) ranges.
- (3)  $C_L$  includes probe and fixture capacitance.
- (4) Generator waveform for all tests unless otherwise specified:  $f = 1$  MHz,  $Z_O = 50\Omega$ ,  $t_r \leq 1$  ns,  $t_f \leq 1$  ns (10%-90%).
- (5)  $t_{SKD1}$ ,  $|t_{PHLD} - t_{PLHD}|$ , is the magnitude difference in differential propagation delay time between the positive going edge and the negative going edge of the same channel.
- (6)  $t_{SKD3}$ , Differential Part to Part Skew, is defined as the difference between the minimum and maximum specified differential propagation delays. This specification applies to devices at the same  $V_{DD}$  and within  $5^\circ C$  of each other within the operating temperature range.
- (7)  $t_{SKD4}$ , part to part skew, is the differential channel to channel skew of any event between devices. This specification applies to devices over recommended operating temperature and voltage ranges, and across process distribution.  $t_{SKD4}$  is defined as  $|Max - Min|$  differential propagation delay.
- (8)  $f_{MAX}$  generator input conditions:  $t_r = t_f < 1$  ns (0% to 100%), 50% duty cycle, 0V to 3V. Output criteria: duty cycle = 45%/55%,  $V_{OD} > 250mV$ . The parameter is specified by design. The limit is based on the statistical analysis of the device over the PVT range by the transitions times ( $t_{TLH}$  and  $t_{THL}$ ).

## PARAMETER MEASUREMENT INFORMATION

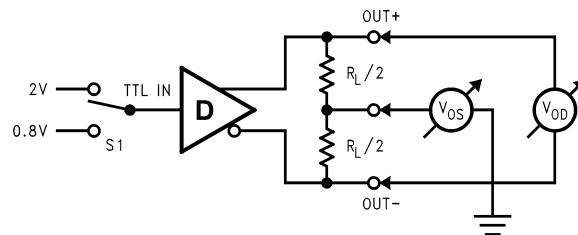


Figure 2. Differential Driver DC Test Circuit

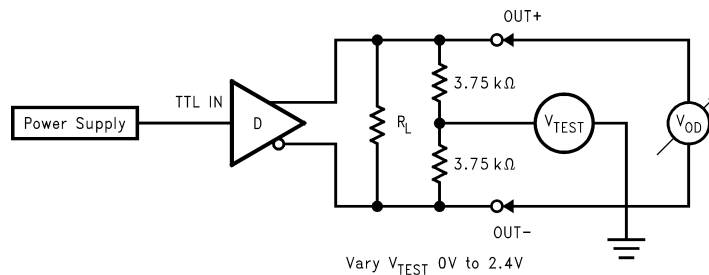


Figure 3. Differential Driver Full Load DC Test Circuit

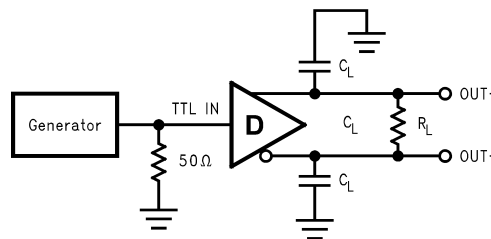


Figure 4. Differential Driver Propagation Delay and Transition Time Test Circuit

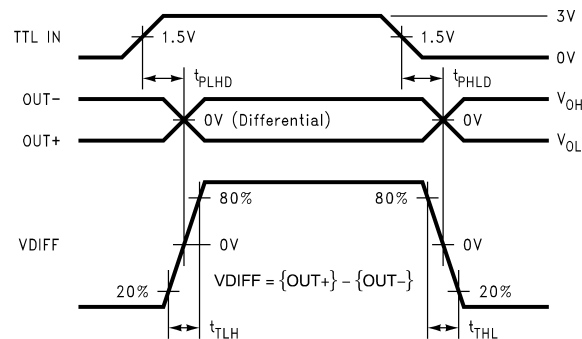


Figure 5. Differential Driver Propagation Delay and Transition Time Waveforms

## APPLICATION INFORMATION

**Table 1. Device Pin Descriptions**

Package Pin Number	Pin Name	Description
<b>SOT-23</b>		
5	TTL IN	LVTTTL/LVCMOS driver input pins
4	OUT+	Non-inverting driver output pin
3	OUT-	Inverting driver output pin
2	GND	Ground pin
1	V <sub>DD</sub>	Power supply pin, +3.3V ± 0.3V

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## REVISION HISTORY

Changes from Revision B (April 2013) to Revision C	Page
• Changed layout of National Data Sheet to TI format .....	<a href="#">5</a>

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**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)
<a href="#">DS90LV011ATMF/NOPB</a>	Active	Production	SOT-23 (DBV)   5	1000   SMALL T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	N01
DS90LV011ATMF/NOPB.A	Active	Production	SOT-23 (DBV)   5	1000   SMALL T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	N01
DS90LV011ATMF/NOPB.B	Active	Production	SOT-23 (DBV)   5	1000   SMALL T&R	-	Call TI	Call TI	-40 to 85	
DS90LV011ATMFX/NO.A	Active	Production	SOT-23 (DBV)   5	3000   LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	N01
DS90LV011ATMFX/NO.B	Active	Production	SOT-23 (DBV)   5	3000   LARGE T&R	-	Call TI	Call TI	-40 to 85	
<a href="#">DS90LV011ATMFX/NOPB</a>	Active	Production	SOT-23 (DBV)   5	3000   LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	N01

(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.

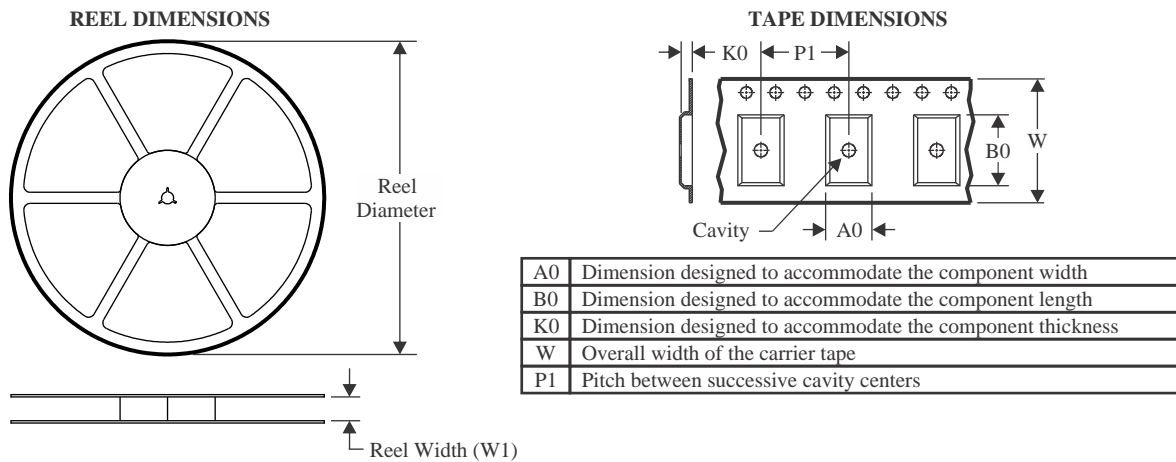
Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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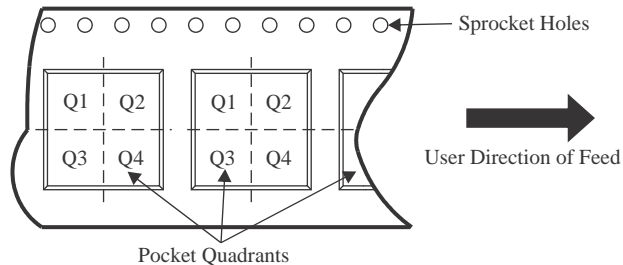
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## TAPE AND REEL INFORMATION



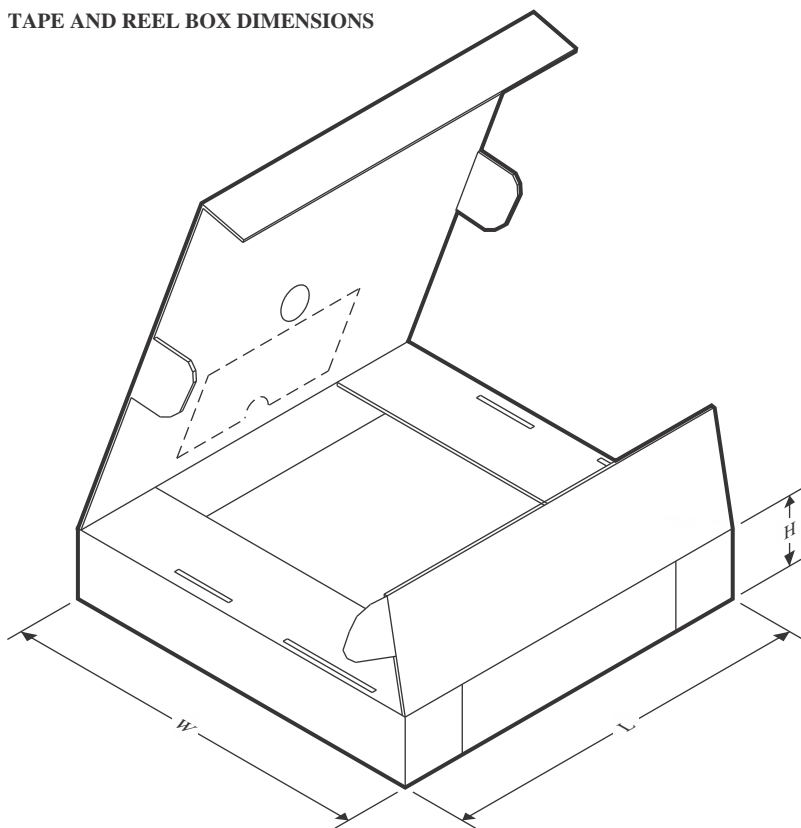
### QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



\*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
DS90LV011ATMF/NOPB	SOT-23	DBV	5	1000	180.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
DS90LV011ATMF/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
DS90LV011ATMFX/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
DS90LV011ATMFX/NOPB	SOT-23	DBV	5	3000	180.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3

## TAPE AND REEL BOX DIMENSIONS



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
DS90LV011ATMF/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
DS90LV011ATMF/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
DS90LV011ATMFX/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
DS90LV011ATMFX/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0

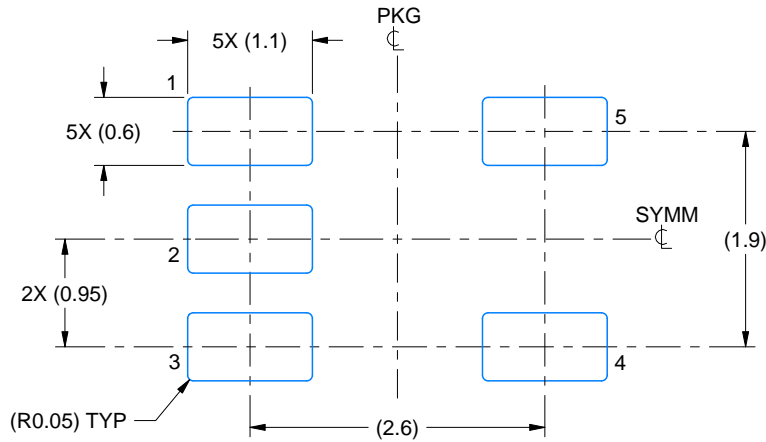


# EXAMPLE BOARD LAYOUT

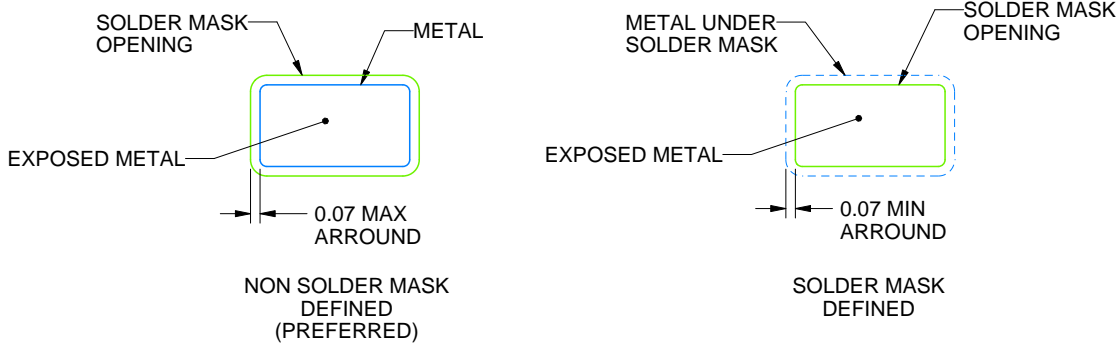
**DBV0005A**

**SOT-23 - 1.45 mm max height**

SMALL OUTLINE TRANSISTOR



**LAND PATTERN EXAMPLE**  
EXPOSED METAL SHOWN  
SCALE:15X



**SOLDER MASK DETAILS**

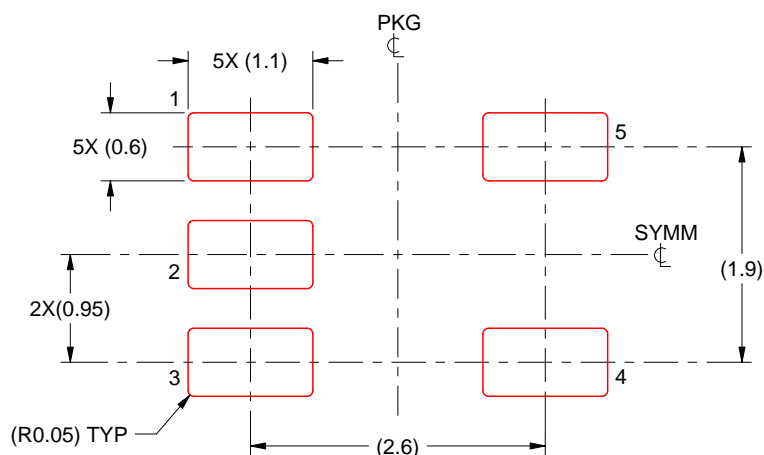
4214839/K 08/2024

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****DBV0005A****SOT-23 - 1.45 mm max height**

SMALL OUTLINE TRANSISTOR



**SOLDER PASTE EXAMPLE**  
 BASED ON 0.125 mm THICK STENCIL  
 SCALE:15X

4214839/K 08/2024

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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Last updated 10/2025

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