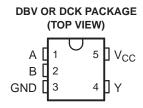




#### **FEATURES**

- Controlled Baseline
  - One Assembly/Test Site, One Fabrication Site
- Extended Temperature Performance of –55°C to 125°C
- Enhanced Diminishing Manufacturing Sources (DMS) Support
- Enhanced Product-Change Notification
- Qualification Pedigree (1)
- Supports 5-V V<sub>CC</sub> Operation
- Inputs Accept Voltages to 5.5 V
- Max t<sub>nd</sub> of 3.6 ns at 3.3 V
- Low Power Consumption, 10-μA Max I<sub>CC</sub>
- ±24-mA Output Drive at 3.3 V
- (1) Component qualification in accordance with JEDEC and industry standards to ensure reliable operation over an extended temperature range. This includes, but is not limited to, Highly Accelerated Stress Test (HAST) or biased 85/85, temperature cycle, autoclave or unbiased HAST, electromigration, bond intermetallic life, and mold compound life. Such qualification testing should not be viewed as justifying use of this component beyond specified performance and environmental limits.

- I<sub>off</sub> Supports Partial-Power-Down Mode Operation
- Latch-Up Performance Exceeds 100 mA Per JESD 78, Class II
- ESD Protection Exceeds JESD 22
  - 2000-V Human-Body Model (A114-A)
  - 200-V Machine Model (A115-A)
  - 1000-V Charged-Device Model (C101)



#### **DESCRIPTION/ORDERING INFORMATION**

The SN74LVC1G08 performs the Boolean function  $Y = A \bullet B$  or  $Y = \overline{A + B}$  in positive logic.

This device is fully specified for partial-power-down applications using I<sub>off</sub>. The I<sub>off</sub> circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.

### **ORDERING INFORMATION**

T <sub>A</sub>	PACKAGE <sup>(1)</sup>		ORDERABLE PART NUMBER	TOP-SIDE MARKING	
-40°C to 85°C	SOT (SC-70) - DCK	Reel of 3000	SN74LVC1G08IDCKREP	CEO	
FE9C to 10F9C	SOP (SOT-23) – DBV	Reel of 3000	SN74LVC1G08MDBVREP	C08O	
–55°C to 125°C	SOT (SC-70) - DCK	Reel of 3000	SN74LVC1G08MDCKREP	BUB	

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

#### **FUNCTION TABLE**

INP	UTS	OUTPUT
Α	В	Y
Н	Н	Н
L	Χ	L
X	L	L



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.



# **LOGIC DIAGRAM (POSITIVE LOGIC)**



# **Absolute Maximum Ratings**(1)

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

			MIN	MAX	UNIT
$V_{CC}$	Supply voltage range	-0.5	6.5	V	
VI	Input voltage range <sup>(2)</sup>		-0.5	6.5	V
Vo	Voltage range applied to any output in the high-imped	dance or power-off state <sup>(2)</sup>	-0.5	6.5	V
Vo	Voltage range applied to any output in the high or low	-0.5	V <sub>CC</sub> + 0.5	V	
I <sub>IK</sub>	Input clamp current	V <sub>I</sub> < 0		-50	mA
I <sub>OK</sub>	Output clamp current	V <sub>O</sub> < 0		-50	mA
Io	Continuous output current			±50	mA
	Continuous current through V <sub>CC</sub> or GND			±100	mA
0	Deckage thermal impedance (4)	DBV package		256	°C/W
$\theta_{JA}$	Package thermal impedance (4)	DCK package		252	C/VV
T <sub>stg</sub>	Storage temperature range	-65	150	°C	

<sup>(1)</sup> 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.

 <sup>(2)</sup> The input and output negative-voltage ratings may be exceeded if the input and output current ratings are observed.
 (3) The value of V<sub>CC</sub> is provided in the recommended operating conditions table.

<sup>(4)</sup> The package thermal impedance is calculated in accordance with JESD 51-7.



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# Recommended Operating Conditions<sup>(1)</sup>

			MIN	MAX	UNIT	
1/	Cupply voltage	Operating	1.65	5.5	V	
$V_{CC}$	Supply voltage	Data retention only	1.5		V	
		V <sub>CC</sub> = 1.65 V to 1.95 V	$0.65 \times V_{CC}$			
.,	High level inner college	V <sub>CC</sub> = 2.3 V to 2.7 V	1.7		V	
$V_{IH}$	High-level input voltage	$V_{CC} = 3 \text{ V to } 3.6 \text{ V}$	2		V	
		V <sub>CC</sub> = 4.5 V to 5.5 V	$0.7 \times V_{CC}$			
		V <sub>CC</sub> = 1.65 V to 1.95 V		$0.35 \times V_{CC}$		
\/	Low-level input voltage	$V_{CC}$ = 2.3 V to 2.7 V		0.7	V	
$V_{IL}$		V <sub>CC</sub> = 3 V to 3.6 V		0.8	V	
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$		$0.3 \times V_{CC}$		
VI	Input voltage		0	5.5	V	
Vo	Output voltage		0	V <sub>CC</sub>	V	
		V <sub>CC</sub> = 1.65 V		-4		
		V <sub>CC</sub> = 2.3 V		-8		
$I_{OH}$	High-level output current	V 2.V		-16	mA	
		V <sub>CC</sub> = 3 V		-24		
		V <sub>CC</sub> = 4.5 V		-32		
		V <sub>CC</sub> = 1.65 V		4		
		V <sub>CC</sub> = 2.3 V		8		
$I_{OL}$	Low-level output current	V <sub>CC</sub> = 3 V		16	mA	
		V <sub>CC</sub> = 3 V		24		
		V <sub>CC</sub> = 4.5 V		32		
		$V_{CC} = 1.8 \text{ V} \pm 0.15 \text{ V}, 2.5 \text{ V} \pm 0.2 \text{ V}$		20		
Δt/Δν	Input transition rise or fall rate	$V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$		10	ns/V	
		$V_{CC} = 5 \text{ V} \pm 0.5 \text{ V}$	5		<u> </u>	
т	Operating free air temperature	I temperature	-40	85	°C	
$T_A$	Operating free-air temperature	M temperature	-55	125	Ψ.	

<sup>(1)</sup> All unused inputs of the device must be held at V<sub>CC</sub> 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 for both I temp =  $-40^{\circ}$ C to  $85^{\circ}$ C and M temp =  $-55^{\circ}$ C to  $125^{\circ}$ C (unless otherwise noted)

PARAMETER	TEST CONDITIONS	V <sub>cc</sub>	MIN TYP(1) MAX	UNIT	
	$I_{OH} = -100 \mu A$	1.65 V to 5.5 V	V <sub>CC</sub> - 0.1		
	$I_{OH} = -4 \text{ mA}$	1.65 V	1.2		
V	$I_{OH} = -8 \text{ mA}$	2.3 V	2.3 V 1.9		
V <sub>OH</sub>	$I_{OH} = -16 \text{ mA}$	3 V	2.4	V	
	$I_{OH} = -24 \text{ mA}$	3 V	2.3		
	$I_{OH} = -32 \text{ mA}$	4.5 V	3.8		
	I <sub>OL</sub> = 100 μA	1.65 V to 5.5 V	0.	1	
	I <sub>OL</sub> = 4 mA	1.65 V	0.4	5	
\/	I <sub>OL</sub> = 8 mA	2.3 V	0.	3 V	
V <sub>OL</sub>	I <sub>OL</sub> = 16 mA	3 V	0.	4 V	
	I <sub>OL</sub> = 24 mA	3 V	0.5	5	
	I <sub>OL</sub> = 32 mA	4.5 V	0.5	5	
I <sub>I</sub> A or B inputs	V <sub>I</sub> = 5.5 V or GND	0 to 5.5 V	±	5 μΑ	
I <sub>off</sub>	$V_I$ or $V_O = 5.5 \text{ V}$	0	±1	) μΑ	
I <sub>CC</sub>	$V_I = 5.5 \text{ V or GND}, \qquad I_O = 0$	1.65 V to 5.5 V	1	) μΑ	
$\Delta I_{CC}$	One input at V <sub>CC</sub> – 0.6 V, Other inputs at V <sub>CC</sub> or GND	3 V to 5.5 V	50	) μΑ	
C <sub>i</sub>	V <sub>I</sub> = V <sub>CC</sub> or GND	3.3 V	4	pF	

<sup>(1)</sup> All typical values are at  $V_{CC} = 3.3 \text{ V}$ ,  $T_A = 25^{\circ}\text{C}$ .

# **Switching Characteristics**

over recommended operating free-air temperature range of I temp =  $-40^{\circ}$ C to  $85^{\circ}$ C,  $C_L = 15$  pF (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub> = ± 0.7		V <sub>CC</sub> = 2.5 V ± 0.2 V		V <sub>CC</sub> = 3.3 V ± 0.3 V		V <sub>CC</sub> = 5 V ± 0.5 V		UNIT
(INPOT)	(001F01)	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX		
t <sub>pd</sub>	A or B	Y	1.5	7.2	0.7	4.4	0.8	3.6	0.8	3.4	ns

#### **Switching Characteristics**

over recommended operating free-air temperature range of I temp =  $-40^{\circ}$ C to  $85^{\circ}$ C,  $C_L = 30$  pF or 50 pF (unless otherwise noted) (see Figure 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)		V <sub>CC</sub> = 1.8 V ± 0.15 V		V <sub>CC</sub> = 2.5 V ± 0.2 V		V <sub>CC</sub> = 3.3 V ± 0.3 V		V <sub>CC</sub> = 5 V ± 0.5 V	
	(INPUT) (OUTPUT)	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX		
t <sub>pd</sub>	A or B	Υ	2.4	8	1.1	5.5	1	4.5	1	4	ns

# **Switching Characteristics**

over recommended operating free-air temperature range of M temp =  $-55^{\circ}$ C to  $125^{\circ}$ C,  $C_L = 50$  pF (unless otherwise noted) (see Figure 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub> = ± 0.7	1.8 V 15 V	V <sub>CC</sub> = ± 0.	2.5 V 2 V	V <sub>CC</sub> = ± 0.		V <sub>CC</sub> = ± 0.5		UNIT
	(INFOT)	(001P01)	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
t <sub>pd</sub>	A or B	Y	2.4	11	1.1	7.5	1	6.5	1	5	ns



# SN74LVC1G08-EP SINGLE 2-INPUT POSITIVE-AND GATE

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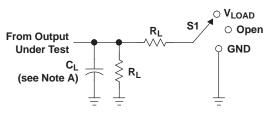
# **Operating Characteristics**

 $T_A = 25^{\circ}C$ 

	PARAMETER	TEST CONDITIONS	V <sub>CC</sub> = 1.8 V	$V_{CC} = 2.5 V$	$V_{CC} = 2.5 \text{ V}  V_{CC} = 3.3 \text{ V}$		UNIT	
	FARAWETER	TEST CONDITIONS	TYP	TYP	TYP	TYP	UNIT	
$C_{pd}$	Power dissipation capacitance	f = 10 MHz	21	24	26	31	pF	



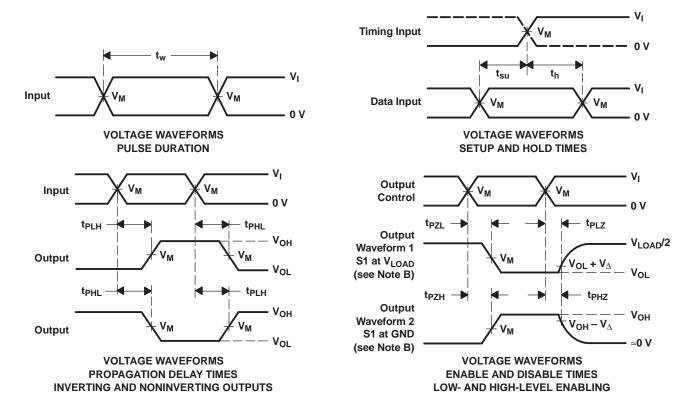
#### PARAMETER MEASUREMENT INFORMATION



TEST	S1
t <sub>PLH</sub> /t <sub>PHL</sub>	Open
t <sub>PLZ</sub> /t <sub>PZL</sub>	V <sub>LOAD</sub>
t <sub>PHZ</sub> /t <sub>PZH</sub>	GND

LOAD CIRCUIT

V	INF	PUTS	· ·	V	•		V
V <sub>CC</sub>	VI	t <sub>r</sub> /t <sub>f</sub>	V <sub>M</sub>	V <sub>LOAD</sub>	CL	R <sub>L</sub>	$V_{\!\scriptscriptstyle \Delta}$
1.8 V ± 0.15 V	V <sub>CC</sub>	≤2 ns	V <sub>CC</sub> /2	2×V <sub>CC</sub>	15 pF	<b>1 M</b> Ω	0.15 V
2.5 V $\pm$ 0.2 V	V <sub>CC</sub>	≤2 ns	V <sub>CC</sub> /2	2×V <sub>CC</sub>	15 pF	<b>1 M</b> Ω	0.15 V
3.3 V $\pm$ 0.3 V	3 V	≤2.5 ns	1.5 V	6 V	15 pF	<b>1 M</b> Ω	0.3 V
5 V ± 0.5 V	V <sub>CC</sub>	≤2.5 ns	V <sub>CC</sub> /2	2×V <sub>CC</sub>	15 pF	<b>1 M</b> Ω	0.3 V



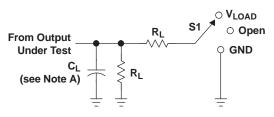
NOTES: A.  $C_L$  includes probe and jig capacitance.

- 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  $\leq$  10 MHz,  $Z_O = 50 \Omega$ .
- 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<sub>PZL</sub> and t<sub>PZH</sub> are the same as t<sub>en</sub>.
- G.  $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{pd}$ .
- H. All parameters and waveforms are not applicable to all devices.

Figure 1. Load Circuit and Voltage Waveforms



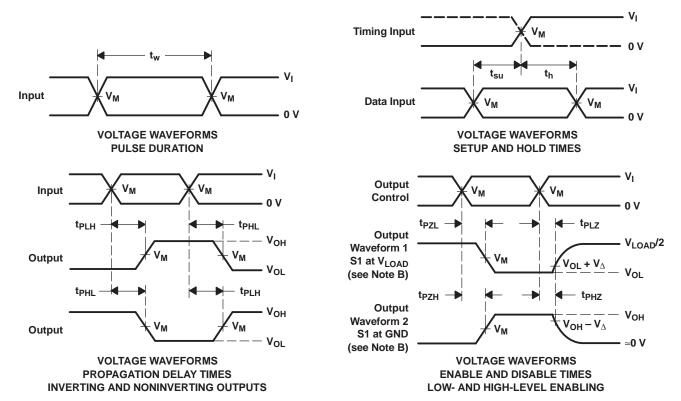
#### PARAMETER MEASUREMENT INFORMATION



TEST	S1
t <sub>PLH</sub> /t <sub>PHL</sub>	Open
t <sub>PLZ</sub> /t <sub>PZL</sub>	V <sub>LOAD</sub>
t <sub>PHZ</sub> /t <sub>PZH</sub>	GND

**LOAD CIRCUIT** 

V	INF	PUTS	· ·	V	•		V	
V <sub>CC</sub>	VI	t <sub>r</sub> /t <sub>f</sub>	V <sub>M</sub>	V <sub>LOAD</sub>	CL	R <sub>L</sub>	$V_{\!\scriptscriptstyle \Delta}$	
1.8 V ± 0.15 V	V <sub>CC</sub>	≤2 ns	V <sub>CC</sub> /2	2×V <sub>CC</sub>	30 pF	<b>1 k</b> Ω	0.15 V	
2.5 V $\pm$ 0.2 V	V <sub>CC</sub>	≤2 ns	V <sub>CC</sub> /2	2×V <sub>CC</sub>	30 pF	500 Ω	0.15 V	
3.3 V $\pm$ 0.3 V	3 V	≤2.5 ns	1.5 V	6 V	50 pF	500 Ω	0.3 V	
5 V ± 0.5 V	V <sub>CC</sub>	≤2.5 ns	V <sub>CC</sub> /2	2×V <sub>CC</sub>	50 pF	500 Ω	0.3 V	



- NOTES: A. C<sub>L</sub> 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  $\leq$  10 MHz,  $Z_O = 50 \Omega$ .
  - 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<sub>PZL</sub> and t<sub>PZH</sub> are the same as t<sub>en</sub>.
  - G.  $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{pd}$ .
  - H. All parameters and waveforms are not applicable to all devices.

Figure 2. Load Circuit and Voltage Waveforms





10-Dec-2020

#### PACKAGING INFORMATION

Orderable Device	Status	Package Type	Package Drawing	Pins	Package Qty	Eco Plan	Lead finish/ Ball material	MSL Peak Temp	Op Temp (°C)	Device Marking (4/5)	Samples
							(6)				
1P1G08MDBVREPG4	ACTIVE	SOT-23	DBV	5	3000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	C08O	Samples
SN74LVC1G08IDCKREP	ACTIVE	SC70	DCK	5	3000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	CEO	Samples
SN74LVC1G08MDBVREP	ACTIVE	SOT-23	DBV	5	3000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	C08O	Samples
SN74LVC1G08MDCKREP	ACTIVE	SC70	DCK	5	3000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	BUB	Samples
V62/04733-01XE	ACTIVE	SC70	DCK	5	3000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	CEO	Samples
V62/04733-02XE	ACTIVE	SC70	DCK	5	3000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	BUB	Samples
V62/04733-02YE	ACTIVE	SOT-23	DBV	5	3000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	C08O	Samples

<sup>(1)</sup> 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.

<sup>(3)</sup> MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

<sup>(4)</sup> There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

<sup>(5)</sup> 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.



### PACKAGE OPTION ADDENDUM

10-Dec-2020

(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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#### OTHER QUALIFIED VERSIONS OF SN74LVC1G08-EP:

Catalog: SN74LVC1G08

Automotive: SN74LVC1G08-Q1

NOTE: Qualified Version Definitions:

- Catalog TI's standard catalog product
- Automotive Q100 devices qualified for high-reliability automotive applications targeting zero defects

PACKAGE MATERIALS INFORMATION

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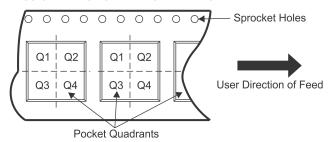
# TAPE AND REEL INFORMATION





	Dimension designed to accommodate the component width
	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 Device	Package Type	Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74LVC1G08IDCKREP	SC70	DCK	5	3000	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
SN74LVC1G08MDBVREP	SOT-23	DBV	5	3000	179.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
SN74LVC1G08MDCKREP	SC70	DCK	5	3000	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3

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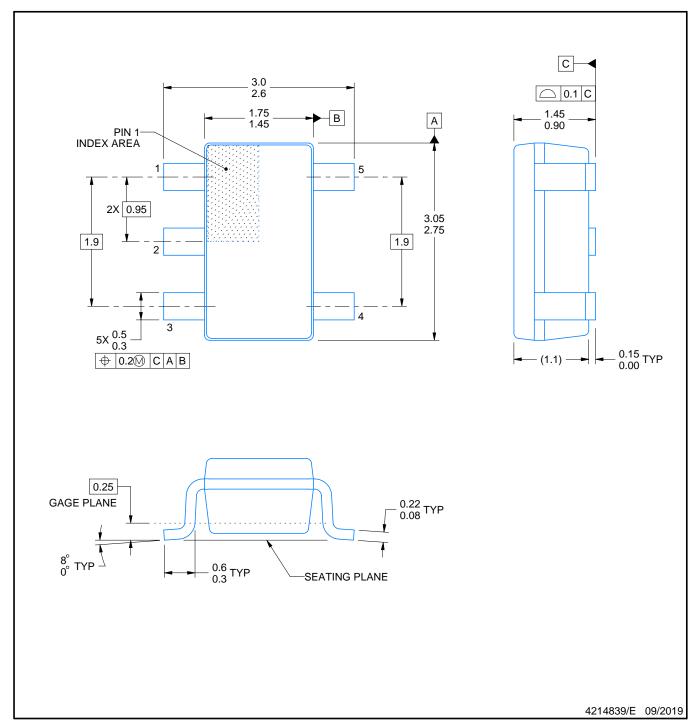


\*All dimensions are nominal

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Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)	
SN74LVC1G08IDCKREP	SC70	DCK	5	3000	200.0	183.0	25.0	
SN74LVC1G08MDBVREP	SOT-23	DBV	5	3000	200.0	183.0	25.0	
SN74LVC1G08MDCKREP	SC70	DCK	5	3000	200.0	183.0	25.0	



SMALL OUTLINE TRANSISTOR



#### 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. Reference JEDEC MO-178.

- 4. Body dimensions do not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.



SMALL OUTLINE TRANSISTOR



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.



SMALL OUTLINE TRANSISTOR



NOTES: (continued)



<sup>7.</sup> Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.

<sup>8.</sup> Board assembly site may have different recommendations for stencil design.

# DCK (R-PDSO-G5)

# PLASTIC SMALL-OUTLINE PACKAGE



NOTES: A. All linear dimensions are in millimeters.

- B. This drawing is subject to change without notice.
- C. Body dimensions do not include mold flash or protrusion. Mold flash and protrusion shall not exceed 0.15 per side.
- D. Falls within JEDEC MO-203 variation AA.



# DCK (R-PDSO-G5)

# PLASTIC SMALL OUTLINE



NOTES:

- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Customers should place a note on the circuit board fabrication drawing not to alter the center solder mask defined pad.
- D. Publication IPC-7351 is recommended for alternate designs.
- E. 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. Example stencil design based on a 50% volumetric metal load solder paste. Refer to IPC-7525 for other stencil recommendations.



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