### SN74LVC1G32-EP SINGLE 2-INPUT POSITIVE-OR GATE

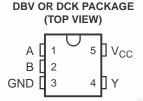
SCES458D-DECEMBER 2003-REVISED JUNE 2007

### 查询<sup>WWW</sup>扩始<sup>C</sup>C1G32\_EP"供应商

#### **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>pd</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

This single 2-input positive-OR gate is designed for 1.65-V to 5.5-V V<sub>CC</sub> operation.

The SN74LVC1G32 performs the Boolean function Y = A + B or  $Y = \overline{A} \bullet \overline{B}$  in positive logic.

This device is fully specified for partial power-down applications using  $I_{off}$ . The  $I_{off}$  circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.

#### ORDERING INFORMATION(1)

T <sub>A</sub>	PACKA	GE <sup>(2)</sup>	ORDERABLE PART NUMBER	TOP-SIDE MARKING <sup>(3)</sup>
-40°C to 85°C	SOT (SC-70) - DCK	Reel of 3000	SN74LVC1G32IDCKREP	CG0
-55°C to 125°C	SOT (SC-70) - DCK	Reel of 3000	SN74LVC1G32MDCKREP	ВУВ
-55°C 10 125°C	SOP (SOT-23) – DBV	Reel of 3000	SN74LVC1G32MDBVREP	SBGM

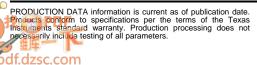
- (1) For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI website at www.ti.com.
- (2) Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.
- (3) The actual top-side making has one additional character that designates the wafer fab/assembly site.

#### **FUNCTION TABLE**

INP	JTS	OUTPUT
Α	В	Y
H C	X	Н
X	Н	Н
L	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
$V_{I}$	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 state (2)(3)			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		<b>-</b> 50	mA
Io	Continuous output current			±50	mA
	Continuous current through V <sub>CC</sub> or GND			±100	mA
0	Package thermal impedance <sup>(4)</sup> DBV package  DCK package			324.1	°C/W
$\theta_{JA}$				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.

<sup>(3)</sup> 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.



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

			MIN	MAX	UNIT
V	Cumply 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 × V <sub>CC</sub>		
\ /	High level innertications	V <sub>CC</sub> = 2.3 V to 2.7 V	1.7		V
$V_{IH}$	High-level input voltage	V <sub>CC</sub> = 3 V to 3.6 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		$0.35 \times V_{CC}$	
\ /	Lave lavel in put valtage	V <sub>CC</sub> = 2.3 V to 2.7 V		0.7	V
$V_{IL}$	Low-level input voltage	V <sub>CC</sub> = 3 V to 3.6 V		0.8	V
		V <sub>CC</sub> = 4.5 V to 5.5 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 V ± 0.15 V, 2.5 V ± 0.2 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	
		SN74LVC1G32IDCKREP	-40	85	
$T_A$	Operating free-air temperature	perating free-air temperature SN74LVC1G32MDCKREP		105	°C
		SN74LVC1G32MDBVREP	-55	125	

<sup>(1)</sup> All unused inputs of the device must be held at  $V_{CC}$  or GND to ensure proper device operation. See the TI application report, Implications of Slow or Floating CMOS Inputs, literature number SCBA004.

### SN74LVC1G32-EP SINGLE 2-INPUT POSITIVE-OR GATE

SCES468US DECEMBER 2003 REVISEOUUNE 2007



#### **Electrical Characteristics**

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

PARAMETER	TEST CONDITIONS	V <sub>CC</sub>	MIN TYP <sup>(1)</sup> MA	X 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	1.9	V
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
V	$I_{OL} = 8 \text{ mA}$	2.3 V	0	3 V
V <sub>OL</sub>	I <sub>OL</sub> = 16 mA	3 V	0	4
	$I_{OL} = 24 \text{ mA}$	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
l <sub>off</sub>	$V_1$ or $V_0 = 5.5$ V 0		±1	0 μΑ
Icc	$V_{I} = 5.5 \text{ V or GND}, I_{O} = 0$	1.65 V to 5.5 V	1	0 μΑ
$\Delta I_{CC}$	One input at $V_{CC}$ – 0.6 V, Other inputs at $V_{CC}$ or GND	input at V <sub>CC</sub> – 0.6 V, Other inputs at V <sub>CC</sub> or GND 3 V to 5.5 V 5		0 μΑ
C <sub>i</sub>	$V_I = V_{CC}$ 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,  $C_L = 15 \text{ pF}$  (unless otherwise noted) (see Figure 1)

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		$V_{CC}$ = 3.3 V $\pm$ 0.3 V		V <sub>CC</sub> = 5 V ± 0.5 V	
	(INFOT)	(001701)	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
t <sub>pd</sub>	A or B	Υ	1.9	7.2	0.8	4.4	0.9	3.6	8.0	3.4	ns

#### **Switching Characteristics**

over recommended operating free-air temperature range,  $C_L = 30 \text{ pF}$  or 50 pF (unless otherwise noted) (see Figure 2)

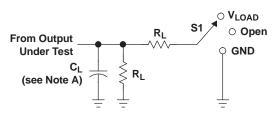
PARAMETER	FROM (INPUT)	TO (OUTPUT)		V <sub>CC</sub> = 1.8 V ± 0.15 V		V <sub>CC</sub> = 2.5 V ± 0.2 V		V <sub>CC</sub> = 3.3 V ± 0.3 V		V <sub>CC</sub> = 5 V ± 0.5 V	
	(INPOT)		MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
t <sub>pd</sub>	A or B	Y	2.8	8	1.2	6.5	1.1	5.7	1	4.5	ns

#### **Operating Characteristics**

 $T_A = 25^{\circ}C$ 

PARAMETER		TEST CONDITIONS	V <sub>CC</sub> = 1.8 V TYP	V <sub>CC</sub> = 2.5 V TYP	V <sub>CC</sub> = 3.3 V	V <sub>CC</sub> = 5 V TYP	UNIT
C <sub>pd</sub>	Power dissipation capacitance	f = 10 MHz	20	20	21	22	pF

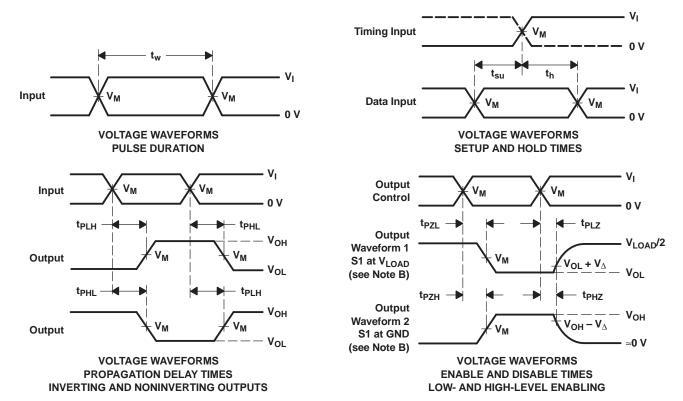
#### PARAMETER MEASUREMENT INFORMATION



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 <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>	≤ <b>2</b> 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 $\pm$ 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

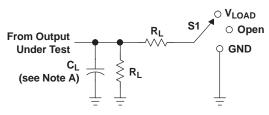


- NOTES: A. C<sub>L</sub> includes probe and jig capacitance.
  - B. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by 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 1. Load Circuit and Voltage Waveforms



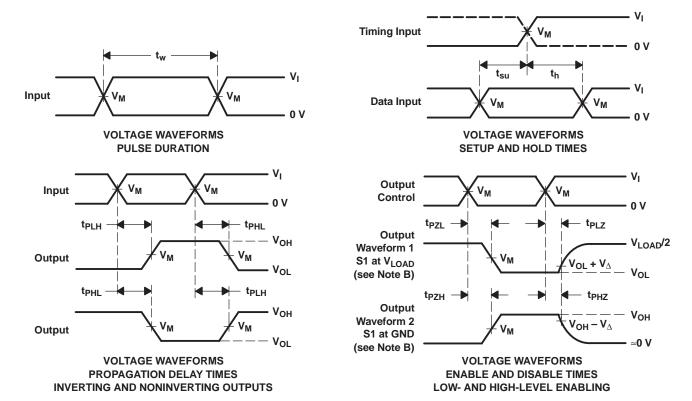
#### PARAMETER MEASUREMENT INFORMATION



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	INPUTS		W	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>	$V_{\Delta}$
1.8 V $\pm$ 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 $\pm$ 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.  $C_L$  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 2. Load Circuit and Voltage Waveforms



20-Mar-2009

#### PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
CLVC1G32MDCKREPG4	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVC1G32IDCKREP	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVC1G32MDBVREP	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVC1G32MDCKREP	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
V62/04734-01XE	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
V62/04734-02XE	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
V62/04734-02YE	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

<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) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

**Pb-Free** (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

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

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#### OTHER QUALIFIED VERSIONS OF SN74LVC1G32-EP:

Catalog: SN74LVC1G32

Automotive: SN74LVC1G32-Q1

NOTE: Qualified Version Definitions:

• Catalog - TI's standard catalog product



## **PACKAGE OPTION ADDENDUM**

**查询"SN74LVC1G32-EP"供应商** 

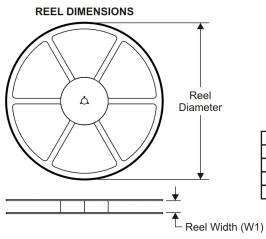
20-Mar-2009

• Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects



20-Jul-2010

#### TAPE AND REEL INFORMATION





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

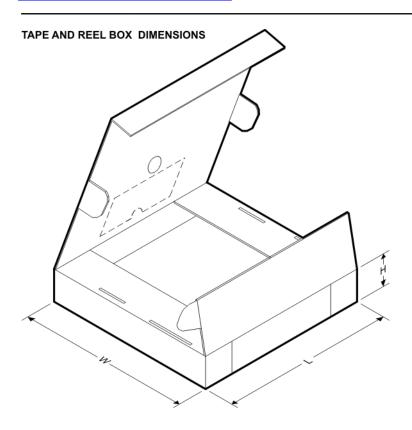
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



#### \*All dimensions are nominal

Device 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
SN74LVC1G32IDCKREP	SC70	DCK	5	3000	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
SN74LVC1G32MDBVREP	SOT-23	DBV	5	3000	179.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
SN74LVC1G32MDCKREP	SC70	DCK	5	3000	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3

20-Jul-2010

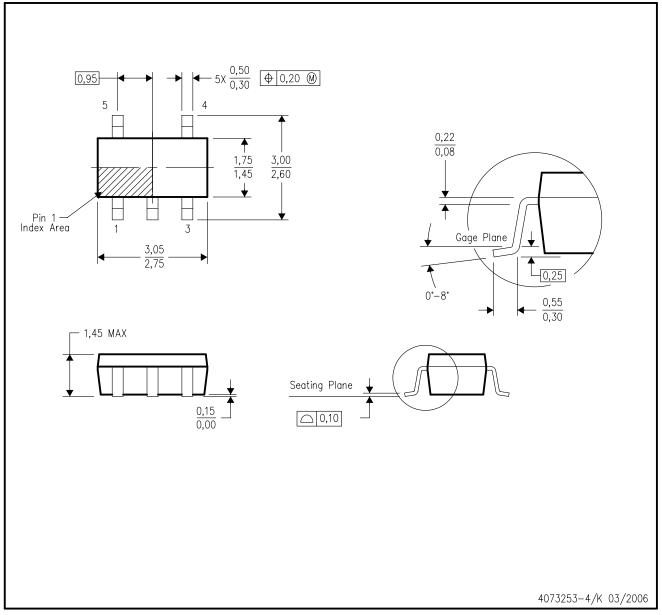


#### \*All dimensions are nominal

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Device Package Type		Package Drawing	Pins SPQ		Length (mm)	Width (mm)	Height (mm)	
SN74LVC1G32IDCKREP	SC70	DCK	5	3000	203.0	203.0	35.0	
SN74LVC1G32MDBVREP	SOT-23	DBV	5	3000	203.0	203.0	35.0	
SN74LVC1G32MDCKREP	SC70	DCK	5	3000	203.0	203.0	35.0	

# DBV (R-PDSO-G5)

## PLASTIC SMALL-OUTLINE PACKAGE



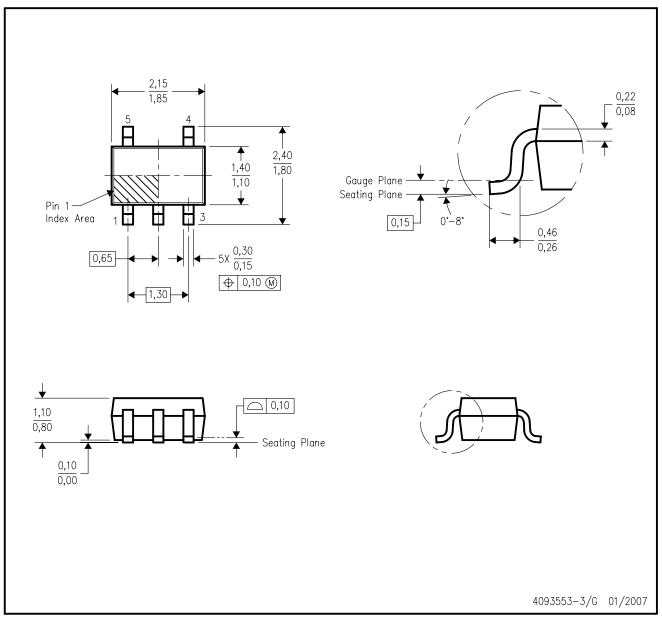
NOTES:

- 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-178 Variation AA.



# 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.



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