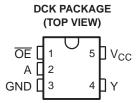
SCES455B-DECEMBER 2003-REVISED JUNE 2006



#### **FEATURES**

- **Controlled Baseline** 
  - One Assembly/Test Site, One Fabrication
- **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 3.7 ns 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.

- Low Power Consumption, 10-μA Max I<sub>CC</sub>
- ±24-mA Output Drive at 3.3 V
- 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 bus buffer gate is designed for 1.65-V to 5.5-V  $V_{\rm CC}$  operation.

The SN74LVC1G125 is a single line driver with a 3-state output. The output is disabled when the output-enable (OE) input is high.

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.

To ensure the high-impedance state during power up or power down,  $\overline{OE}$  should be tied to  $V_{CC}$  through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

#### 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		CLVC1G125IDCKREP	СМО	
-55°C to 125°C	SOT (SC-70) - DCK	Reel of 3000	CLVC1G125MDCKREP	СМО	

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

#### **FUNCTION TABLE**

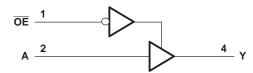
INPU	JTS	OUTPUT
ŌĒ	Α	Y
L	Н	Н
L	L	L
Н	Χ	Z



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<sup>(1)</sup>

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 (2)	Input voltage range (2)			
Vo	Voltage range applied to any output in the high-impeda	-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
$I_{OK}$	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	
$\theta_{JA}$	Package thermal impedance <sup>(4)</sup>		252	°C/W	
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.

SN74LVC1G125-EP



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

			MIN	MAX	UNIT	
\/	Cumply valtage	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 lavel input valtage	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		$0.35 \times V_{CC}$		
\/	Lavidaval innut valtana	V <sub>CC</sub> = 2.3 V to 2.7 V		0.7		
$V_{IL}$	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		$0.3 \times V_{CC}$		
V <sub>I</sub>	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 2V		-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 0V		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	
		$V_{CC} = 5 V \pm 0.5 V$		İ		
_	On a matter of the second of the second operations	,	-40	85	00	
$T_A$	Operating free-air temperature		-55	125	°C	

<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.

# SN74LVC1G125-EP SINGLE BUS BUFFER GATE WITH 3-STATE OUTPUT

SCES455B-DECEMBER 2003-REVISED JUNE 2006



#### **Electrical Characteristics**

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

DADAMETED	TEST COMPITIONS	V	-40°	C to 85°C		-55°	C to 125°C		UNIT	
PARAMETER	TEST CONDITIONS	V <sub>cc</sub>	MIN	TYP <sup>(1)</sup>	MAX	MIN	TYP <sup>(1)</sup>	MAX	UNII	
	$I_{OH} = -100 \mu A$	1.65 V to 5.5 V	V <sub>CC</sub> - 0.1			V <sub>CC</sub> - 0.1				
	$I_{OH} = -4 \text{ mA}$	1.65 V	1.2			1.2				
V	I <sub>OH</sub> = -8 mA	2.3 V	1.9			1.9			V	
V <sub>OH</sub>	I <sub>OH</sub> = -16 mA	3 V	2.4			2.4			V	
	$I_{OH} = -24 \text{ mA}$	3 V	2.3			2.3				
	I <sub>OH</sub> = -32 mA	4.5 V	3.8			3.8				
	$I_{OL} = 100 \mu A$	1.65 V to 5.5 V			0.1			0.1		
	$I_{OL} = 4 \text{ mA}$	1.65 V			0.45			0.45		
V	$I_{OL} = 8 \text{ mA}$	2.3 V			0.3			0.3	V	
V <sub>OL</sub>	I <sub>OL</sub> = 16 mA	3 V			0.4			0.4	V	
	I <sub>OL</sub> = 24 mA	3 V			0.55			0.60		
	I <sub>OL</sub> = 32 mA	4.5 V			0.55			0.60		
I <sub>I</sub> A or OE inputs	V <sub>I</sub> = 5.5 V or GND	0 V to 5.5 V			±5			±5	μΑ	
I <sub>off</sub>	$V_I$ or $V_O = 5.5 \text{ V}$	0			±10			±10	μΑ	
I <sub>OZ</sub>	V <sub>O</sub> = 0 to 5.5 V	3.6 V			10			10	μΑ	
I <sub>CC</sub>	$V_I = 5.5 \text{ V or GND},$ $I_O = 0$	1.65 V to 5.5 V			10			10	μΑ	
Δl <sub>CC</sub>	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			500			500	μΑ	
C <sub>i</sub>	$V_I = V_{CC}$ or GND	3.3 V		4			4		pF	

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

## **Switching Characteristics**

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub> = ± 0.1		V <sub>CC</sub> = ± 0.	2.5 V 2 V	V <sub>CC</sub> = ± 0.3		V <sub>CC</sub> = ± 0.5		UNIT
	(INPOT) (OOTPO	(001701)	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
t <sub>pd</sub>	A	Υ	1.9	6.9	0.7	4.6	0.6	3.7	0.5	3.4	ns

## **Switching Characteristics**

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

PARAMETER	FROM	TO (OUTPUT)		V <sub>CC</sub> = 1.8 V ± 0.15 V		$ m V_{CC}$ = 2.5 V $\pm$ 0.2 V		3.3 V 3 V	V <sub>CC</sub> = 5 V ± 0.5 V		UNIT
	(INPUT)	(OUTPUT)	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
t <sub>pd</sub>	A	Y	2.8	9	1.2	5.5	1	4.5	1	4	ns
t <sub>en</sub>	ŌĒ	Υ	3.3	10.1	1.5	6.6	1	5.3	1	5	ns
t <sub>dis</sub>	ŌĒ	Υ	1.3	9.2	1	5	1	5	1	4.2	ns



# SN74LVC1G125-EP SINGLE BUS BUFFER GATE WITH 3-STATE OUTPUT

## **Switching Characteristics**

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

PARAMETER FROM (INPUT)		TO (OUTPUT)	V <sub>CC</sub> = 3 ± 0.3	3.3 V V	V <sub>CC</sub> = 5 V ± 0.5 V		UNIT
	(INFOT)	(OUTFOT)	MIN	MAX	MIN	MAX	
$t_{pd}$	Α	Υ	1	4.9	1	4	ns
t <sub>en</sub>	ŌĒ	Υ	1	5.8	1	5	ns
t <sub>dis</sub>	ŌĒ	Υ	1	5	1	4.2	ns

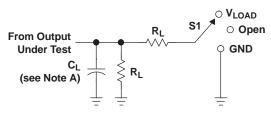
## **Operating Characteristics**

 $T_A = 25^{\circ}C$ 

	PARAMET	ER	TEST CONDITIONS	V <sub>CC</sub> = 1.8 V TYP			V <sub>CC</sub> = 5 V TYP	UNIT	
_	Power dissipation	Outputs enabled	f = 10 MHz	18	18	19	21	pF	
Cpc	capacitance	Outputs disabled	I = IU IVIMZ	2	2	2	4		



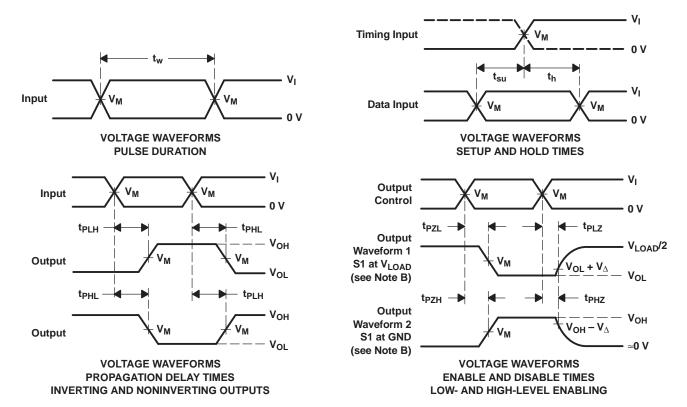
#### PARAMETER MEASUREMENT INFORMATION



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** 

.,	INI	PUTS	.,	.,		_	.,
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	1 ΜΩ	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 Μ</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 Μ</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

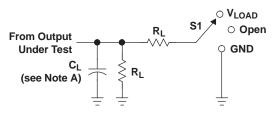


- NOTES: A.  $C_L$  includes probe and jig capacitance.
  - B. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output 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



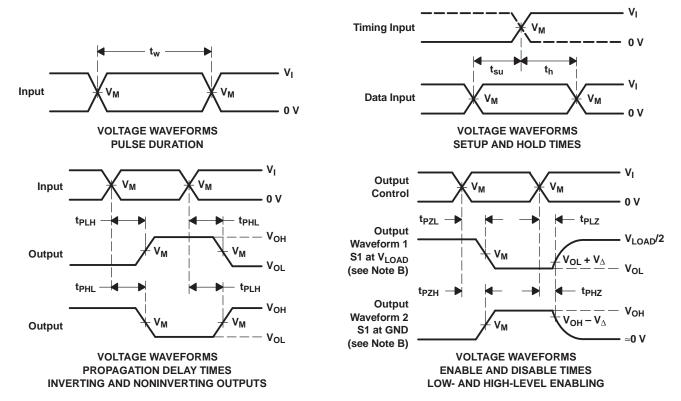
#### PARAMETER MEASUREMENT INFORMATION



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** 

.,	INPUTS		.,	.,			.,	
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 $\pm$ 0.15 V	V <sub>CC</sub>	≤ <b>2</b> 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





11-Apr-2013

#### PACKAGING INFORMATION

Orderable Device	Status	Package Type	_	Pins	_		Lead/Ball Finish		Op Temp (°C)	Top-Side Markings	Samples
	(1)		Drawing		Qty	(2)		(3)		(4)	
CLVC1G125IDCKREP	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	СМО	Samples
CLVC1G125MDCKREP	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	СМО	Samples
CLVC1G125MDCKREPG4	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	СМО	Samples
V62/04735-01XE	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	СМО	Samples
V62/04735-02XE	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	СМО	Samples

(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) 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)

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<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> Multiple Top-Side Markings will be inside parentheses. Only one Top-Side 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 Top-Side Marking for that device.



## **PACKAGE OPTION ADDENDUM**

11-Apr-2013

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

#### OTHER QUALIFIED VERSIONS OF SN74LVC1G125-EP:

Catalog: SN74LVC1G125

www.ti.com

Automotive: SN74LVC1G125-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

www.ti.com 26-Jan-2013

## 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	Package Type	Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
CLVC1G125IDCKREP	SC70	DCK	5	3000	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
CLVC1G125MDCKREP	SC70	DCK	5	3000	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3

www.ti.com 26-Jan-2013



#### \*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
CLVC1G125IDCKREP	SC70	DCK	5	3000	203.0	203.0	35.0
CLVC1G125MDCKREP	SC70	DCK	5	3000	203.0	203.0	35.0

# 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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