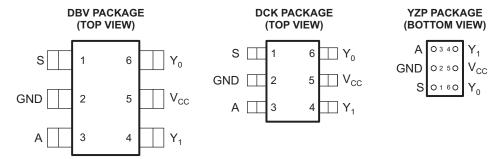
### SN74LVC1G18 1-OF-2 NONINVERTING DEMULTIPLEXER WITH 3-STATE DESELECTED OUTPUT

SCES406I-JULY 2002-REVISED JANUARY 2007

#### **FEATURES**

- Available in the Texas Instruments
  NanoFree™ Package
- Supports 5-V V<sub>CC</sub> Operation
- Inputs Accept Voltages to 5.5 V
- Max t<sub>nd</sub> of 3.4 ns at 3.3 V
- Low Power Consumption, 10-μA Max I<sub>CC</sub>
- ±24-mA Output Drive at 3.3 V
- Typical V<sub>OLP</sub> (Output Ground Bounce)
  <0.8 V at V<sub>CC</sub> = 3.3 V, T<sub>A</sub> = 25°C
- Typical V<sub>OHV</sub> (Output V<sub>OH</sub> Undershoot)
  >2 V at V<sub>CC</sub> = 3.3 V, T<sub>A</sub> = 25°C

- 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)



See mechanical drawings for dimensions.

#### DESCRIPTION/ORDERING INFORMATION

This noninverting demultiplexer is designed for 1.65-V to 5.5-V V<sub>CC</sub> operation.

The SN74LVC1G18 is a 1-of-2 noninverting demultiplexer with a 3-state output. This device buffers the data on input A and passes it to either output Y0 or Y1, depending on whether the state of the select (S) input is low or high, respectively.

#### **ORDERING INFORMATION**

T <sub>A</sub>	PACKAGE <sup>(1)</sup>		ORDERABLE PART NUMBER	TOP-SIDE MARKING (2)
	NanoFree™ – WCSP (DSBGA) 0.23-mm Large Bump – YZP (Pb-free)	Reel of 3000	SN74LVC1G18YZPR	CJ_
–40°C to 85°C	SOT (SOT-23) - DBV	Reel of 3000	SN74LVC1G18DBVR	C18_
	SOT (SC-70) - DCK	Reel of 3000	SN74LVC1G18DCKR	CJ_

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



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.

NanoFree is a trademark of Texas Instruments.

<sup>(2)</sup> DBV/DCK: The actual top-side marking has one additional character that designates the assembly/test site. YZP: The actual top-side marking has three preceding characters to denote year, month, and sequence code, and one following character to designate the assembly/test site. Pin 1 identifier indicates solder-bump composition (1 = SnPb, • = Pb-free).

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### **DESCRIPTION/ORDERING INFORMATION (CONTINUED)**

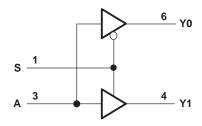
NanoFree™ package technology is a major breakthrough in IC packaging concepts, using the die as the package.

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.

#### **FUNCTION TABLE**

INP	UTS	OUTI	PUTS
S	Α	Y0	Y1
L	L	L	Z
L	Н	Н	Z
Н	L	Z	L
Н	Н	Z	Н

#### **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	
$V_{I}$	nput voltage range <sup>(2)</sup>			6.5	V	
Vo	Voltage range applied to any output in the high-impedance or power-off state (2)			6.5	V	
Vo	Voltage range applied to any output in the high or low state (2)(3)			$V_{CC} + 0.5$	V	
I <sub>IK</sub>	Input clamp current	V <sub>1</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 GNI			±100	mA	
		DBV package		165		
$\theta_{JA}$	Package thermal impedance (4)	DCK package		259		
		YZP package		123		
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 negative-voltage and output 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.

### SN74LVC1G18 1-OF-2 NONINVERTING DEMULTIPLEXER WITH 3-STATE DESELECTED OUTPUT

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

			MIN	MAX	UNIT
V	Cumply yellogo	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 court values	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		$0.35 \times V_{CC}$	
\ /	Low level input voltage	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		$0.3 \times V_{CC}$	
$V_{I}$	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	put current		-16	mA
	High-level output current	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 2V		16	mA
		V <sub>CC</sub> = 3 V		24	
		V <sub>CC</sub> = 4.5 V			
		$V_{CC}$ = 1.8 V ± 0.15 V, 2.5 V ± 0.2 V		20	
Δt/Δν	Input transition rise or fall rate	$V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$		ns/V	
		$V_{CC} = 5 \text{ V} \pm 0.5 \text{ V}$		5	
T <sub>A</sub>	Operating free-air temperature	1	-40	85	°C

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

### SN74LVC1G18 1-OF-2 NONINVERTING DEMULTIPLEXER WITH 3-STATE DESELECTED OUTPUT

SCES406I-JULY 2002-REVISED JANUARY 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> MAX	UNIT	
	$I_{OH} = -100 \mu\text{A}$	1.65 V to 5.5 V	$V_{CC} - 0.1$			
	$I_{OH} = -4 \text{ mA}$	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			
	$I_{OL} = 100 \mu A$	1.65 V to 5.5 V		0.1		
	I <sub>OL</sub> = 4 mA	1.65 V		0.45		
V	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		0.55		
	I <sub>OL</sub> = 32 mA	4.5 V		0.55		
I <sub>I</sub>	V <sub>I</sub> = 5.5 V or GND	0 to 5.5 V		±5	μΑ	
I <sub>off</sub>	$V_1$ or $V_0 = 5.5 \text{ V}$	0		±10	μΑ	
I <sub>OZ</sub>	$V_0 = 0 \text{ to } 5.5 \text{ V}$	3.6 V		10	μΑ	
I <sub>CC</sub>	$V_I = 5.5 \text{ V or GND}, \qquad I_O = 0$	1.65 V to 5.5 V		10	μΑ	
$\Delta I_{CC}$	One input at $V_{CC} - 0.6 \text{ V}$ , Other inputs at $V_{CC}$ or GND	3 V to 5.5 V		500	μΑ	
C <sub>I</sub>	$V_I = V_{CC}$ or GND	3.3 V		4	pF	
Co	$V_O = V_{CC}$ or GND	3.3 V		6	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,  $C_L = 15 \text{ pF}$  (unless otherwise noted) (see Figure 1)

PARAMETER FROM (INPUT)		TO (OUTBUT)		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		= 5 V 5 V	UNIT
	(INPUT) (OUTPUT)	(001701)	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
t <sub>pd</sub>	A	Υ	2.3	8.4	1.1	4.2	1.1	3.4	0.8	2.7	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> = ± 0.7	1.8 V 15 V	V <sub>CC</sub> = ± 0.	2.5 V 2 V	V <sub>CC</sub> = ± 0.	3.3 V 3 V	V <sub>CC</sub> = ± 0.		UNIT
	(INFOT)	(OUTPUT)	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
t <sub>pd</sub>	Α	Υ	3.5	9.3	1.7	5	1.5	4.2	0.7	3.2	ns
t <sub>en</sub>	S	Υ	3.6	10.2	1.7	5.6	1.5	4.6	0.9	3.4	ns
t <sub>dis</sub>	S	Y	1.9	12.7	1	5.3	1.1	4.9	0.5	3.3	ns

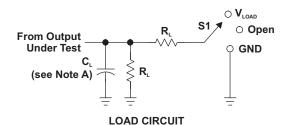
### **Operating Characteristics**

 $T_A = 25^{\circ}C$ 

PARAMETER		TEST	V <sub>CC</sub> = 1.8 V	V <sub>CC</sub> = 2.5 V	V <sub>CC</sub> = 3.3 V	V <sub>CC</sub> = 5 V	UNIT
	FARAMETER	CONDITIONS	TYP	TYP	TYP	TYP	ONII
$C_{pd}$	Power dissipation capacitance	f = 10 MHz	17	17	18	21	pF

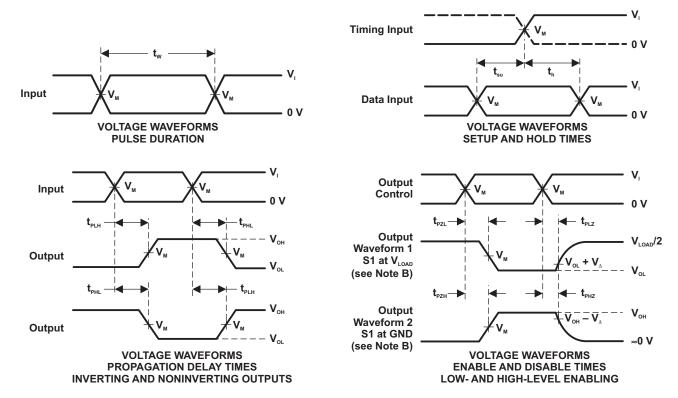


#### PARAMETER MEASUREMENT INFORMATION



TEST	S1
t <sub>PLH</sub> /t <sub>PHL</sub>	Open
$t_{PLZ}/t_{PZL}$	V <sub>LOAD</sub>
$t_{_{PHZ}}/t_{_{PZH}}$	GND

	INI	PUTS	V	V		Б	V
V <sub>cc</sub>	V,	t,/t,	V <sub>M</sub>	V <sub>LOAD</sub>	C <sub>∟</sub>	R <sub>⊾</sub>	V <sub>A</sub>
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 ± 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 ± 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



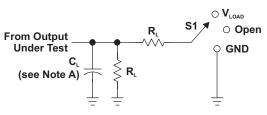
NOTES: A. C, includes probe and jig capacitance.

- 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,  $Z_0 = 50 \Omega$ .
- D. The outputs are measured one at a time, with one transition per measurement.
- E.  $t_{\text{\tiny PLZ}}$  and  $\overset{\cdot}{t}_{\text{\tiny PHZ}}$  are the same as  $t_{\text{\tiny dis}}.$
- F.  $t_{PZL}$  and  $t_{PZH}$  are the same as  $t_{en}$ .
- G.  $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{od}$ .
- H. All parameters and waveforms are not applicable to all devices.

Figure 1. Load Circuit and Voltage Waveforms



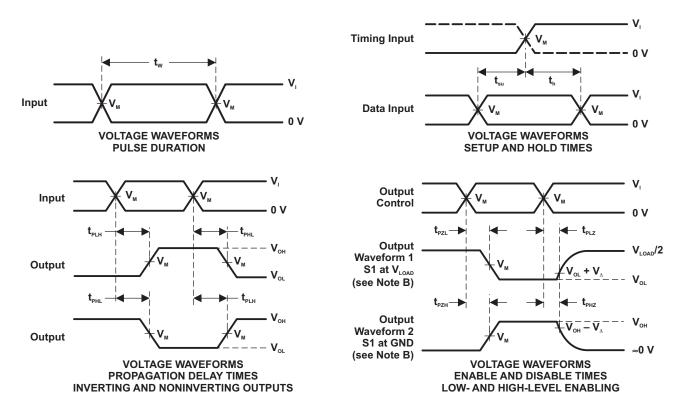
#### PARAMETER MEASUREMENT INFORMATION



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

.,	INF	PUTS	V	V		Б	V
V <sub>cc</sub>	V,	t,/t,	V <sub>M</sub>	V <sub>LOAD</sub>	C <sub>L</sub>	R <sub>L</sub>	V <sub>Δ</sub>
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 ± 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 ± 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.  $C_L$  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<sub>o</sub> = 50  $\Omega$ .
- D. The outputs are measured one at a time, with one transition per measurement.
- E.  $t_{\text{PLZ}}$  and  $\dot{t}_{\text{PHZ}}$  are the same as  $t_{\text{dis}}$ .
- F.  $t_{PZL}$  and  $t_{PZH}$  are the same as  $t_{en}$ .
- 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





.com 29-May-2007

#### PACKAGING INFORMATION

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
SN74LVC1G18DBVR	ACTIVE	SOT-23	DBV	6	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVC1G18DBVRE4	ACTIVE	SOT-23	DBV	6	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVC1G18DBVRG4	ACTIVE	SOT-23	DBV	6	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVC1G18DCKR	ACTIVE	SC70	DCK	6	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVC1G18DCKRE4	ACTIVE	SC70	DCK	6	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVC1G18DCKRG4	ACTIVE	SC70	DCK	6	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LVC1G18YZPR	ACTIVE	WCSP	YZP	6	3000	Green (RoHS & no Sb/Br)	SNAGCU	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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#### 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
		Overall width of the carrier tape
Γ	P1	Pitch between successive cavity centers

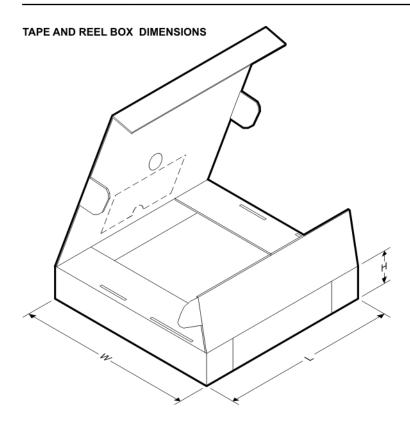
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



#### \*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
SN74LVC1G18DBVR	SOT-23	DBV	6	3000	180.0	9.2	3.23	3.17	1.37	4.0	8.0	Q3
SN74LVC1G18DCKR	SC70	DCK	6	3000	180.0	9.2	2.24	2.34	1.22	4.0	8.0	Q3
SN74LVC1G18DCKR	SC70	DCK	6	3000	180.0	9.2	2.24	2.34	1.22	4.0	8.0	Q3





\*All dimensions are nominal

7 til dillionolorio aro nominal							
Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74LVC1G18DBVR	SOT-23	DBV	6	3000	202.0	201.0	28.0
SN74LVC1G18DCKR	SC70	DCK	6	3000	202.0	201.0	28.0
SN74LVC1G18DCKR	SC70	DCK	6	3000	205.0	200.0	33.0

# DBV (R-PDSO-G6)

### PLASTIC SMALL-OUTLINE PACKAGE



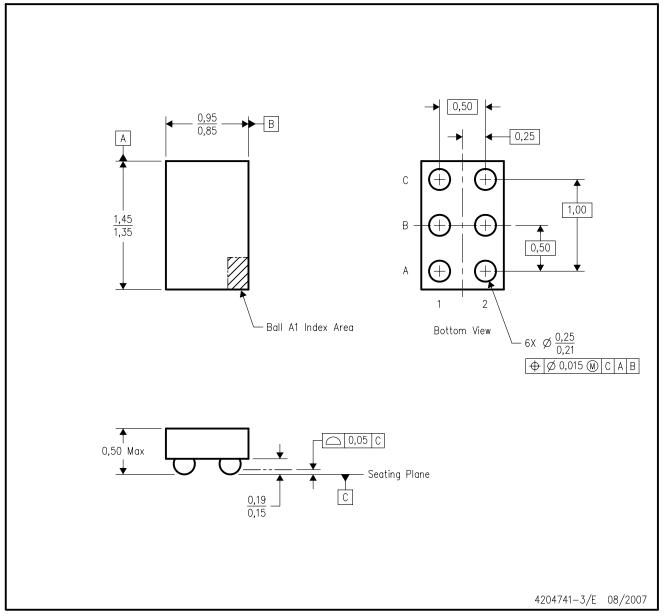
NOTES:

- 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. Leads 1,2,3 may be wider than leads 4,5,6 for package orientation.
- Falls within JEDEC MO-178 Variation AB, except minimum lead width.



# YZP (R-XBGA-N6)

### DIE-SIZE BALL GRID ARRAY



NOTES: A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.

- B. This drawing is subject to change without notice.
- C. NanoFree  $^{\text{TM}}$  package configuration.
- D. This package is lead-free. Refer to the 6 YEP package (drawing 4204725) for tin-lead (SnPb).

NanoFree is a trademark of Texas Instruments.



# DCK (R-PDSO-G6)

## 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 AB.



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