

FEATURES

- Available in the Texas Instruments NanoFree™ Package
- Operates at 0.8 V to 2.7 V
- Sub-1-V Operable
- Max t_{pd} of 0.5 ns at 1.8 V
- Low Power Consumption, 10 μA at 2.7 V
- High On-Off Output Voltage Ratio
- High Degree of Linearity
- Latch-Up Performance Exceeds 100 mA Per JESD 78, Class II
- ESD Performance Tested Per JESD 22
 - 2000-V Human-Body Model (A114-B, Class II)
 - 200-V Machine Model (A115-A)
 - 1000-V Charged-Device Model (C101)

DESCRIPTION/ORDERING INFORMATION

This dual analog switch is operational at 0.8-V to 2.7-V V_{CC} , but is designed specifically for 1.1-V to 2.7-V V_{CC} operation.

The SN74AUC2G66 can handle both analog and digital signals. It permits signals with amplitudes of up to 2.7-V (peak) to be transmitted in either direction.

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

Applications include signal gating, chopping, modulation or demodulation (modem), and signal multiplexing for analog-to-digital and digital-to-analog conversion systems.

ORDERING INFORMATION

T _A	PACKAGE ⁽¹⁾		ORDERABLE PART NUMBER	TOP-SIDE MARKING ⁽²⁾
1000 1 0500	NanoFree™ – WCSP (DSBGA) 0.23-mm Large Bump – YZP (Pb-free)	Reel of 3000	SN74AUC2G66YZPR	U6_
–40°C to 85°C	SSOP – DCT	Reel of 3000	SN74AUC2G66DCTR	U66
	VSSOP – DCU	Reel of 3000	SN74AUC2G66DCUR	U66_

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

(2) DCT: The actual top-side marking has three additional characters that designate the year, month, and assembly/test site. DCU: 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).

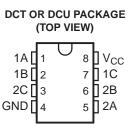
FUNCTION TABLE

CONTROL INPUT (C)	SWITCH
L	OFF
Н	ON



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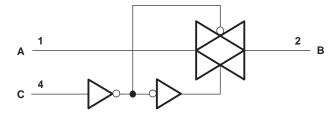
NanoFree is a trademark of Texas Instruments.



YZP PACKAGE (BOTTOM VIEW)

GND	04	50	2A
2C	03	60 70	2B
1B	02	70	1C
1A	01	80	V _{CC}

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 ⁽²⁾		-0.5	3.6	V
VI	Input voltage range ⁽²⁾⁽³⁾		-0.5	3.6	V
V _{I/O}	Switch I/O voltage range (2)(3)		-0.5	$V_{CC} + 0.5$	V
I _{IK}	Control input clamp current	V ₁ < 0		-50	mA
I _{IOK}	I/O port diode current	$V_{I/O}$ < 0 or $V_{I/O}$ > V_{CC}		±50	mA
I _T	On-state switch current	$V_{I/O} = 0$ to V_{CC}		±50	mA
	Continuous current through V_{CC} or GND			±100	mA
		DCT package		220	
θ_{JA}	Package thermal impedance ⁽⁴⁾	DCU package		227	°C/W
		YZP package		102	
T _{stg}	Storage temperature range	torage temperature range			

(1) 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.

(2) All voltages are with respect to ground unless otherwise specified.

(3) The input negative-voltage and output voltage ratings may be exceeded if the input and output current ratings are observed.
(4) The package thermal impedance is calculated in accordance with JESD 51-7.

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Recommended Operating Conditions⁽¹⁾

			MIN	MAX	UNIT		
V_{CC}	Supply voltage		0.8	2.7	V		
		$V_{CC} = 0.8 V$	V _{CC}				
V_{IH}	High-level input voltage	$V_{CC} = 1.1 \text{ V to } 1.95 \text{ V}$	$0.65 \times V_{CC}$		V		
		V_{CC} = 2.3 V to 2.7 V	1.7				
		$V_{CC} = 0.8 V$		0			
V _{IL}	Low-level input voltage	$V_{CC} = 1.1 \text{ V to } 1.95 \text{ V}$		$0.35 imes V_{CC}$	C V		
		V_{CC} = 2.3 V to 2.7 V		0.7			
V _{I/O}	I/O port voltage		0	V _{CC}	V		
VI	Control input voltage		0	3.6	V		
		$V_{CC} = 0.8 \text{ V to } 1.65 \text{ V}^{(2)}$		20			
$\Delta t/\Delta v$	Input transition rise or fall rate	$V_{CC} = 1.65 \text{ V to } 2.3 \text{ V}^{(3)}$		20	ns/V		
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}^{(3)}$		20			
T _A	Operating free-air temperature		-40	85	°C		

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.
The data was taken at C_L = 15 pF, R_L = 2 kΩ (see Figure 1).
The data was taken at C_L = 30 pF, R_L = 500 Ω (see Figure 1).

Electrical Characteristics

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

	PARAMETER	TEST CONDITIO	NS	V _{cc}	MIN TYP ⁽¹⁾	MAX	UNIT
		$V_1 = V_{CC}$ or GND,	$1 - 4 m \Lambda$	1.1 V	17	40	
r _{on}	On-state switch resistance	$V_{\rm C} = V_{\rm IH}$	I _S = 4 mA	1.65 V	7	20	Ω
		(see Figure 1 and Figure 2)	$I_S = 8 \text{ mA}$	2.3 V	4	15	
		$V_{I} = V_{CC}$ to GND,	1 4 m 4	1.1 V	131	180	
r _{on(p)}	Peak on resistance	$V_{\rm C} = V_{\rm IH}$	I _S = 4 mA	1.65 V	32	80	Ω
		(see Figure 1 and Figure 2)	I _S = 8 mA	2.3 V	15	20	
	Difference of	$V_1 = V_{CC}$ to GND,	1 4 4	1.1 V		3	
Δr_{on}	on-state resistance between switches	$V_{\rm C} = V_{\rm IH}$	$I_{S} = 4 \text{ mA}$	1.65 V		1	Ω
		(see Figure 1 and Figure 2)	$I_{S} = 8 \text{ mA}$	2.3 V		1	
		$V_I = V_{CC}$ and $V_O = GND$, or				±1	
I _{S(off)}	Off-state switch leakage current	$V_I = GND$ and $V_O = V_{CC}$, $V_C = V_{IL}$ (see Figure 3)		2.7 V		±0.1 ⁽²⁾	μA
	On state switch lookage surrant	$V_{I} = V_{CC}$ or GND, $V_{C} = V_{IH}$, V	/ _O = Open	2.7 V	1		۸
I _{S(on)}	On-state switch leakage current	(see Figure 4)		2.7 V		±0.1 ⁽²⁾	μA
I _I	Control input current	$V_{I} = V_{CC}$ or GND		0 to 2.7 V		±5	μA
I _{CC}	Supply current	$V_{I} = V_{CC}$ or GND,	$I_{O} = 0$	0.8 V to 2.7 V		10	μA
C _{ic}	Control input capacitance			2.5 V	2.5		pF
C _{io(off)}	Switch input/output capacitance			2.5 V	3		pF
C _{io(on)}	Switch input/output capacitance			2.5 V	7		pF

(1) $t_a = 25^{\circ}C$ (2) The data was taken at $C_L = 15$ pF, $R_L = 2$ k Ω (see Figure 1).

Switching Characteristics

over recommended operating free-air temperature range, $C_L = 15 \text{ pF}$ (unless otherwise noted) (see Figure 5)

F	PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 0.8 V	V _{CC} = ± 0.7		V _{CC} = ± 0.1			_C = 1.8 0.15 \		V _{CC} = 2 ± 0.2		UNIT
		(INFOT)	(001-01)	TYP	MIN	MAX	MIN	MAX	MIN	TYP	MAX	MIN	MAX	
	t _{pd} ⁽¹⁾	A or B	B or A	1		0.6		0.5			0.5		0.4	ns
	t _{en}	С	A or B	5	0.5	3	0.5	2.1	0.5	0.9	1.6	0.5	1.4	ns
	t _{dis}	С	A or B	5.3	0.5	4	0.5	3	0.5	2.6	3.3	0.5	2.7	ns

(1) The propagation delay is the calculated RC time constant of the typical on-state resistance of the switch and the specified load capacitance when driven by an ideal voltage source (zero output impedance).

Switching Characteristics

over recommended operating free-air temperature range, $C_L = 30 \text{ pF}$ (unless otherwise noted) (see Figure 5)

PARAMETER	FROM (INPUT)	TO (OUTPUT)		c = 1.8 0.15 \		V _{CC} = 2 ± 0.2	UNIT	
	(INFOT)	(001F01)	MIN	TYP	MAX	MIN	MAX	
t _{pd} ⁽¹⁾	A or B	B or A			0.7		0.7	ns
t _{en}	С	A or B	0.5	1.6	2.7	0.5	2.3	ns
t _{dis}	С	A or B	0.5	2.7	3.4	0.5	2	ns

(1) The propagation delay is the calculated RC time constant of the typical on-state resistance of the switch and the specified load capacitance when driven by an ideal voltage source (zero output impedance).

Analog Switch Characteristics

 $T_A = 25^{\circ}C$

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	V _{cc}	ТҮР	UNIT
				0.8 V	101	
			$C_{L} = 50 \text{ pF}, R_{L} = 600 \Omega,$	1.1 V	150	
			f _{in} = sine wave	1.4 V	175	
			(see Figure 6)	1.65 V	250	
Frequency response	A or B	D or A		2.3 V	400	N 41 I-
(switch ON)	A or B	B or A		0.8 V	450	MHz
			$C_{L} = 5 \text{ pF}, R_{L} = 50 \Omega,$	1.1 V	>500	
			f _{in} = sine wave	1.4 V	>500	
			(see Figure 6)	1.65 V	>500	
				2.3 V	>500	
				0.8 V	-60	
			$C_{L} = 50 \text{ pF}, R_{L} = 600 \Omega,$	1.1 V	-60	
			f _{in} = 1 MHz (sine wave)	1.4 V	-60	
			(see Figure 7)	1.65 V	-60	
Crosstalk	A an D	D er A		2.3 V	-60	
(between switches)	A or B	B or A		0.8 V	-65	dB
			$C_{L} = 5 \text{ pF}, R_{L} = 50 \Omega,$	1.1 V	-65	
			f _{in} = 1 MHz (sine wave)	1.4 V	-65	
			(see Figure 7)	1.65 V	-65	
				2.3 V	-65	

Analog Switch Characteristics (continued)

 $T_A = 25^{\circ}C$

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	v _{cc}	ТҮР	UNIT
				0.8 V	9	
Crosstalk			$C_{L} = 50 \text{ pF}, R_{L} = 600 \Omega,$	1.1 V	14	
(control input to signal	С	A or B	f _{in} = 1 MHz (square wave)	1.4 V	15	mV
output)			(see Figure 8)	1.65 V	16	
				2.3 V	20	
				0.8 V	-50	
			$C_{L} = 50 \text{ pF}, R_{L} = 600 \Omega,$	1.1 V	-50	
Feedthrough attenuation (switch OFF)			f _{in} = 1 MHz (sine wave)	1.4 V	-50	
			(see Figure 9)	1.65 V	-50	dB
	A or B	B or A		2.3 V	-50	
				0.8 V	-60	
			$C_{L} = 5 \text{ pF}, R_{L} = 50 \Omega,$	1.1 V	-60	
			f _{in} = 1 MHz (sine wave)	1.4 V	-60	
			(see Figure 9)	1.65 V	-60	
				2.3 V	-60	
				0.8 V	7	
			$C_{L} = 50 \text{ pF}, R_{L} = 10 \text{ k}\Omega,$	1.1 V	0.256	
	A or B	B or A	f _{in} = 1 kHz (sine wave)	1.4 V	0.04	
			(see Figure 10)	1.65 V	0.03	
Cine wave distortion				2.3 V	0.01	0/
Sine-wave distortion				0.8 V	3.7	%
			$C_{L} = 50 \text{ pF}, R_{L} = 10 \text{ k}\Omega,$	1.1 V	0.4	
	A or B	B or A	f _{in} = 10 kHz (sine wave)	1.4 V	0.04	•
			(see Figure 10)	1.65 V	0.02	
				2.3 V	0.02	

Operating Characteristics

 $T_A = 25^{\circ}C$

	PARAMETER	TEST CONDITIONS	V _{CC} = 0.8 V TYP	V _{CC} = 1.2 V TYP	V _{CC} = 1.5 V TYP	V _{CC} = 1.8 V TYP	V _{CC} = 2.5 V TYP	UNIT
C _{pd}	Power dissipation capacitance	f = 10 MHz	2.5	2.5	2.5	2.5	2.5	pF

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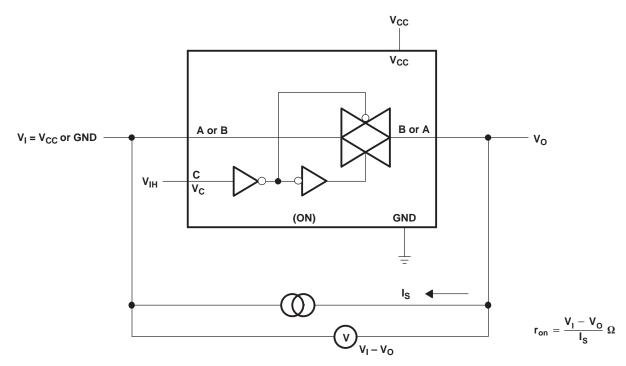
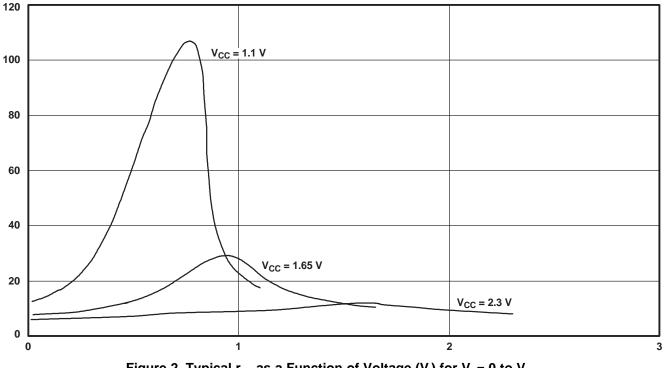


Figure 1. On-State Resistance Test Circuit





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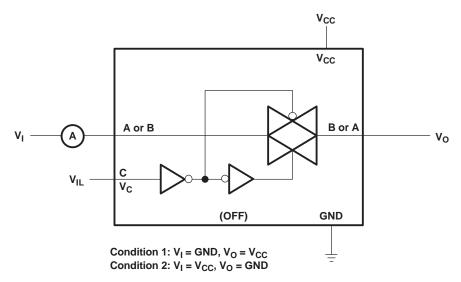


Figure 3. Off-State Switch Leakage-Current Test Circuit

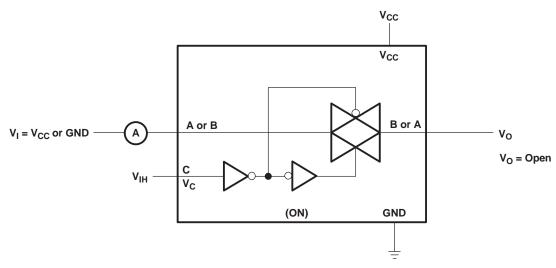


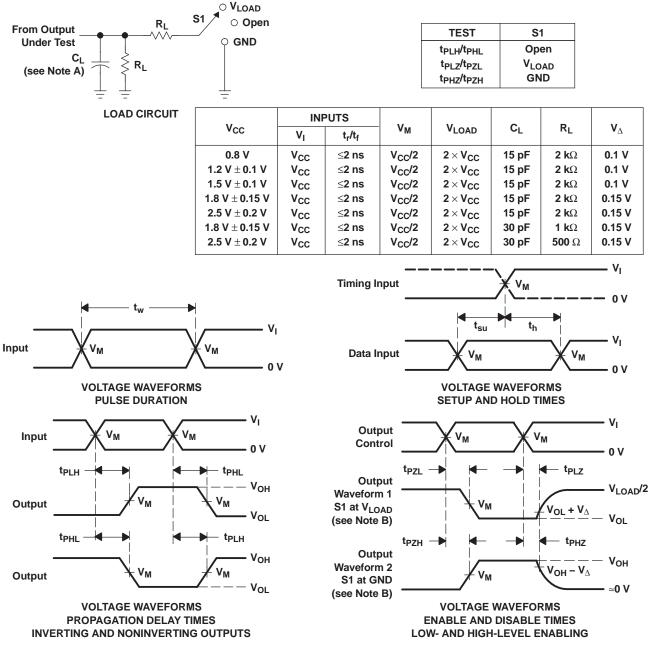
Figure 4. On-State Leakage-Current Test Circuit

SN74AUC2G66 DUAL BILATERAL ANALOG SWITCH





PARAMETER MEASUREMENT INFORMATION



- 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, Z₀ = 50 Ω , slew rate \geq 1 V/ns.
 - 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_{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 5. Load Circuit and Voltage Waveforms

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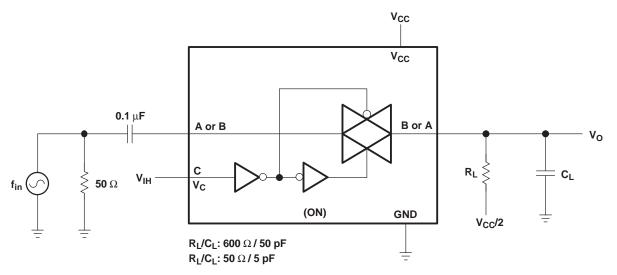


Figure 6. Frequency Response (Switch ON)

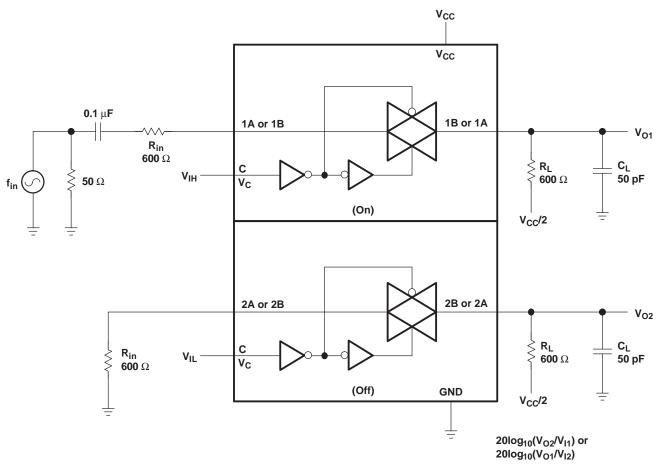
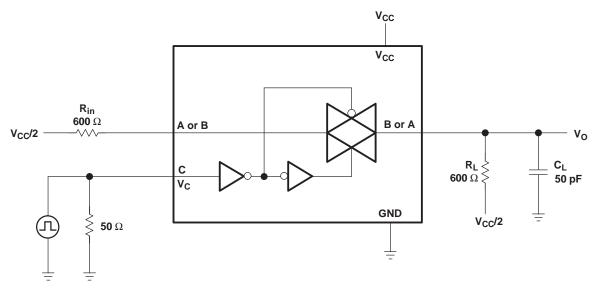


Figure 7. Crosstalk (Between Switches)





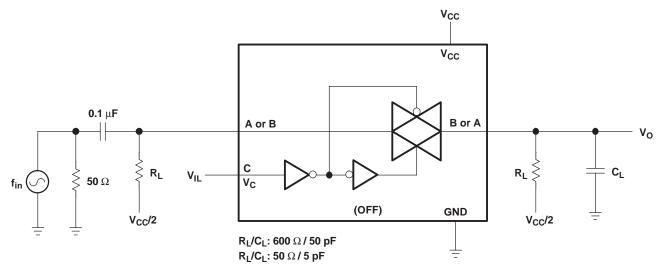
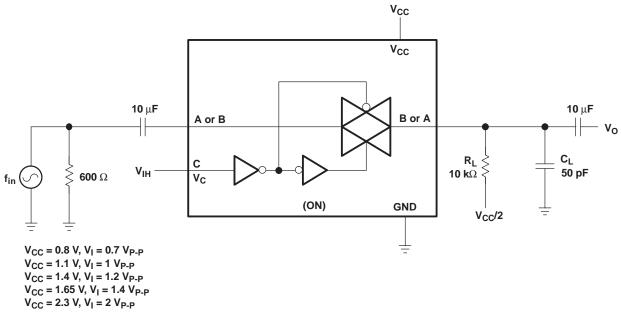
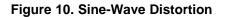


Figure 9. Feedthrough, Switch Off

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PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
SN74AUC2G66DCTR	ACTIVE	SM8	DCT	8	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	U66 (R ~ Z)	Samples
SN74AUC2G66DCUR	ACTIVE	VSSOP	DCU	8	3000	Green (RoHS & no Sb/Br)	CU NIPDAU CU SN	Level-1-260C-UNLIM	-40 to 85	(66 ~ U66Q ~ U66R) (UR ~ UZ)	Samples
SN74AUC2G66DCURE4	ACTIVE	VSSOP	DCU	8	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	U66R	Samples
SN74AUC2G66DCURG4	ACTIVE	VSSOP	DCU	8	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	U66R	Samples
SN74AUC2G66YZPR	ACTIVE	DSBGA	YZP	8	3000	Green (RoHS & no Sb/Br)	SNAGCU	Level-1-260C-UNLIM	-40 to 85	U6N	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⁾ 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 (CI) 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.

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

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

⁽⁵⁾ 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.

⁽⁶⁾ Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.



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20-Jun-2017

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PACKAGE MATERIALS INFORMATION

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TAPE AND REEL INFORMATION





QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



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
SN74AUC2G66DCTR	SM8	DCT	8	3000	180.0	13.0	3.35	4.5	1.55	4.0	12.0	Q3
SN74AUC2G66DCUR	VSSOP	DCU	8	3000	180.0	8.4	2.25	3.35	1.05	4.0	8.0	Q3
SN74AUC2G66DCUR	VSSOP	DCU	8	3000	180.0	9.0	2.05	3.3	1.0	4.0	8.0	Q3
SN74AUC2G66DCURG4	VSSOP	DCU	8	3000	180.0	8.4	2.25	3.35	1.05	4.0	8.0	Q3
SN74AUC2G66YZPR	DSBGA	YZP	8	3000	178.0	9.2	1.02	2.02	0.63	4.0	8.0	Q1

TEXAS INSTRUMENTS

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PACKAGE MATERIALS INFORMATION

23-Nov-2017



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74AUC2G66DCTR	SM8	DCT	8	3000	182.0	182.0	20.0
SN74AUC2G66DCUR	VSSOP	DCU	8	3000	202.0	201.0	28.0
SN74AUC2G66DCUR	VSSOP	DCU	8	3000	182.0	182.0	20.0
SN74AUC2G66DCURG4	VSSOP	DCU	8	3000	202.0	201.0	28.0
SN74AUC2G66YZPR	DSBGA	YZP	8	3000	220.0	220.0	35.0

MECHANICAL DATA

MPDS049B - MAY 1999 - REVISED OCTOBER 2002

DCT (R-PDSO-G8)

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

D. Falls within JEDEC MO-187 variation DA.



DCT (R-PDSO-G8) PLASTIC SMALL OUTLINE Example Board Layout Example Stencil Design (Note C,E) (Note D) - 6x0,65 - 6x0,65 8x0,25-8x1,55 3,40 3,40 Non Solder Mask Defined Pad Example Pad Geometry -0,30 (Note C) 1,60 Example -0,07 Non-solder Mask Opening All Around (Note E) 4212201/A 10/11

NOTES: A. All linear dimensions are in millimeters.

- B. This drawing is subject to change without notice.
- C. Publication IPC-7351 is recommended for alternate designs.
- D. 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. Refer to IPC-7525.
- E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.



YZP0008



PACKAGE OUTLINE

DSBGA - 0.5 mm max height

DIE SIZE BALL GRID ARRAY



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.



YZP0008

EXAMPLE BOARD LAYOUT

DSBGA - 0.5 mm max height

DIE SIZE BALL GRID ARRAY



NOTES: (continued)

3. Final dimensions may vary due to manufacturing tolerance considerations and also routing constraints. For more information, see Texas Instruments literature number SNVA009 (www.ti.com/lit/snva009).



YZP0008

EXAMPLE STENCIL DESIGN

DSBGA - 0.5 mm max height

DIE SIZE BALL GRID ARRAY



NOTES: (continued)

4. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release.



DCU (R-PDSO-G8)

PLASTIC SMALL-OUTLINE PACKAGE (DIE DOWN)



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-187 variation CA.





- NOTES: A. All linear dimensions are in millimeters. В. This drawing is subject to change without notice.
 - C. Publication IPC-7351 is recommended for alternate designs.
 - D. 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. Refer to IPC-7525 for other stencil recommendations.
 - E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.



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