# SN54AHCT139, SN74AHCT139 DUAL 2-LINE TO 4-LINE DECODERS/DEMULTIPLEXERS

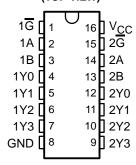
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- Inputs Are TTL-Voltage Compatible
- Designed Specifically for High-Speed Memory Decoders and Data-Transmission Systems
- Incorporate Two Enable Inputs to Simplify Cascading and/or Data Reception
- Latch-Up Performance Exceeds 250 mA Per JESD 17
- ESD Protection Exceeds JESD 22
  - 2000-V Human-Body Model (A114-A)
  - 200-V Machine Model (A115-A)
  - 1000-V Charged-Device Model (C101)

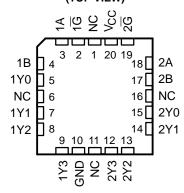
### description/ordering information

The 'AHCT139 devices are dual 2-line to 4-line decoders/demultiplexers designed for 4.5-V to 5.5-V V<sub>CC</sub> operation. These devices are designed to be used in high-performance memory-decoding or data-routing applications requiring very short propagation delay times. In high-performance memory systems, these decoders can be used to minimize the effects of system decoding. When used with high-speed memories utilizing a fast enable circuit, the delay times of these decoders and the enable time of the memory usually are less than the typical access time of the memory. This means that the effective system delay introduced by the decoders is negligible.

#### SN54AHCT139 . . . J OR W PACKAGE SN74AHCT139 . . . D, DB, DGV, N, NS, OR PW PACKAGE (TOP VIEW)



# SN54AHCT139 . . . FK PACKAGE (TOP VIEW)



NC - No internal connection

#### ORDERING INFORMATION

TA	PACKA	GEŤ	ORDERABLE PART NUMBER	TOP-SIDE Marking
	PDIP – N	Tube	SN74AHCT139N	SN74AHCT139N
-40°C to 85°C	SOIC - D	Tube	SN74AHCT139D	AHCT139
	3010-15	Tape and reel	SN74AHCT139DR	A1101139
	SOP – NS	Tape and reel	SN74AHCT139NSR	AHCT139
-40 0 10 03 0	SSOP – DB	Tape and reel	SN74AHCT139DBR	HB139
	TSSOP – PW	Tube	SN74AHCT139PW	HB139
	1330F - FW	Tape and reel	SN74AHCT139PWR	пртээ
	TVSOP – DGV	Tape and reel	SN74AHCT139DGVR	HB139
	CDIP – J	Tube	SNJ54AHCT139J	SNJ54AHCT139J
–55°C to 125°C	CFP – W	Tube	SNJ54AHCT139W	SNJ54AHCT139W
	LCCC – FK	Tube	SNJ54AHCT13FK	SNJ54AHCT139FK

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



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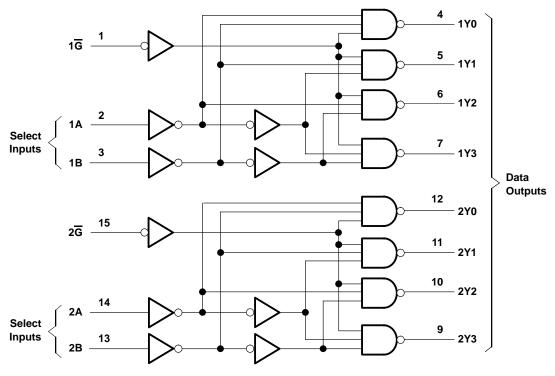
## description/ordering information (continued)

The active-low enable  $(\overline{G})$  input can be used as a data line in demultiplexing applications. These decoders/demultiplexers feature fully buffered inputs, each of which represents only one normalized load to its driving circuit.

FUNCTION TABLE (each decoder/demultiplexer)

	INPUTS			OUT	DUTE					
<u>G</u>	SEL	ECT		OUTPUTS						
G	ВА		Y0	Y1	Y2	Y3				
Н	Х	Х	Н	Н	Н	Н				
L	L	L	L	Н	Н	Н				
L	L	Н	Н	L	Н	Н				
L	Н	L	Н	Н	L	Н				
L	Н	Н	Н	Н	Н	L				

## logic diagram (positive logic)



Pin numbers shown are for the D, DB, DGV, J, N, NS, PW, and W packages.

# SN54AHCT139, SN74AHCT139 DUAL 2-LINE TO 4-LINE DECODERS/DEMULTIPLEXERS

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# absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

Supply voltage range, V <sub>CC</sub>		–0.5 V to 7 V
Input voltage range, V <sub>I</sub> (see Note 1)		0.5 V to 7 V
Output voltage range, VO (see Note 1)		. $-0.5$ V to V <sub>CC</sub> + $0.5$ V
Input clamp current, $I_{IK}$ ( $V_I < 0$ )		–20 mA
Output clamp current, IOK (VO < 0 or VO > VCO	c)	±20 mA
Continuous output current, $I_O(V_O = 0 \text{ to } V_{CC})$	······	±25 mA
Continuous current through V <sub>CC</sub> or GND		±75 mA
Package thermal impedance, $\theta_{JA}$ (see Note 2):	D package	73°C/W
•	DB package	82°C/W
	DGV package	120°C/W
	N package	67°C/W
	NS package	64°C/W
	PW package	108°C/W
Storage temperature range, T <sub>stg</sub>		–65°C to 150°C

<sup>†</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.

NOTES: 1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

2. The package thermal impedance is calculated in accordance with JESD 51-7.

### recommended operating conditions (see Note 3)

		SN54AH	CT139	SN74AH	CT139	UNIT
		MIN	MAX	MIN	MAX	UNIT
VCC	Supply voltage	4.5	5.5	4.5	5.5	V
VIH	High-level input voltage	2	3	2		V
VIL	Low-level input voltage		0.8		0.8	V
٧I	Input voltage	0	5.5	0	5.5	V
٧o	Output voltage	0	Vcc	0	VCC	V
IOH	High-level output current	27/	-8		-8	mA
l <sub>OL</sub>	Low-level output current	70 <sub>2</sub>	8		8	mA
Δt/Δν	Input transition rise or fall rate	Q	20		20	ns/V
TA	Operating free-air temperature	<b>–</b> 55	125	-40	85	°C

NOTE 3: 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.

# SN54AHCT139, SN74AHCT139 DUAL 2-LINE TO 4-LINE DECODERS/DEMULTIPLEXERS

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

PARAMETER	TEST CONDITIONS	Voc	T,	չ = 25°C	;	SN54AH	CT139	SN74AH	CT139	UNIT
PARAWETER	TEST CONDITIONS	vcc	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT
Vou	I <sub>OH</sub> = -50 μA	4.5 V	4.4	4.5		4.4		4.4		٧
VOH	I <sub>OH</sub> = -8 mA	4.5 V	3.94			3.8	, A	3.8		V
Vol	I <sub>OL</sub> = 50 μA	4.5 V			0.1		0.1		0.1	V
VOL	I <sub>OL</sub> = 8 mA	4.5 V			0.36	Ž,	0.44		0.44	V
lį	$V_I = 5.5 \text{ V or GND}$	0 V to 5.5 V			±0.1	6	±1*		±1	μΑ
Icc	$V_I = V_{CC}$ or GND, $I_O = 0$	5.5 V			2	) <sub>2</sub> C	20		20	μΑ
ΔI <sub>CC</sub> †	One input at 3.4 V, Other inputs at V <sub>CC</sub> or GND	5.5 V			1.35	PAO	1.5		1.5	mA
C <sub>i</sub>	V <sub>I</sub> = V <sub>CC</sub> or GND	5 V		2	10				10	pF

<sup>\*</sup>On products compliant to MIL-PRF-38535, this parameter is not production tested at  $V_{CC} = 0 \text{ V}$ .

# switching characteristics over recommended operating free-air temperature range, $V_{CC}$ = 5 V $\pm$ 0.5 V (unless otherwise noted) (see Figure 1)

	_												
PARAMETER	FROM	то	LOAD	T,	գ = 25°C	;	SN54AH	ICT139	SN74AH	CT139	UNIT		
PARAMETER	(INPUT)	(OUTPUT)	CAPACITANCE	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT		
t <sub>PLH</sub>	A or B	Y	C <sub>I</sub> = 15 pF		5**	7.2**	1**	8.5**	1	8.5	ns		
<sup>t</sup> PHL	AOIB	'	CL = 15 pr	OL = 13 pr	OL = 13 bi		5**	7.2**	1**	8.5**	1	8.5	110
<sup>t</sup> PLH	G	Y	C <sub>I</sub> = 15 pF		4.4**	6.3**	1**	7.5**	1	7.5	ns		
t <sub>PHL</sub>	G	'	C[ = 13 pr		4.4**	6.3**	1** 4	7.5**	1	7.5	115		
<sup>t</sup> PLH	A or B	Y	C <sub>L</sub> = 50 pF		6.5	9.2	1)	10.5	1	10.5	ns		
<sup>t</sup> PHL	AOIB	'	CL = 30 pr		6.5	9.2	Ž Q 1	10.5	1	10.5	115		
t <sub>PLH</sub>	G	V	C: - 50 pE		5.9	8.3	Ø 1	9.5	1	9.5	nc		
<sup>t</sup> PHL	G	1	C <sub>L</sub> = 50 pF		5.9	8.3	1	9.5	1	9.5	ns		

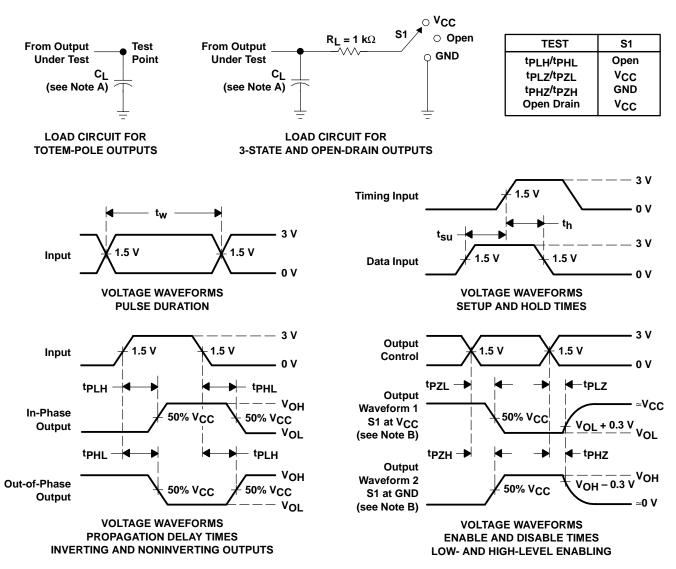
<sup>\*\*</sup> On products compliant to MIL-PRF-38535, this parameter is not production tested.

# operating characteristics, $V_{CC} = 5 \text{ V}$ , $T_A = 25^{\circ}\text{C}$

PARAMETER	TEST CONDITIONS	TYP	UNIT
C <sub>pd</sub> Power dissipation capacitance	No load, f = 1 MHz	13	pF

<sup>†</sup> This is the increase in supply current for each input at one of the specified TTL voltage levels rather than 0 V or VCC.

#### 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  $\leq$  1 MHz,  $Z_Q = 50 \Omega$ ,  $t_f \leq$  3 ns,  $t_f \leq$  3 ns.
- D. The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms







24-Jan-2013

### **PACKAGING INFORMATION**

Orderable Device	Status	Package Type	Package Drawing	Pins	Package Qty	Eco Plan	Lead/Ball Finish	MSL Peak Temp	Op Temp (°C)	Top-Side Markings	Samples
SN74AHCT139D	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AHCT139	Samples
SN74AHCT139DBLE	OBSOLETE	SSOP	DB	16		TBD	Call TI	Call TI	-40 to 85		
SN74AHCT139DBR	ACTIVE	SSOP	DB	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB139	Samples
SN74AHCT139DBRE4	ACTIVE	SSOP	DB	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB139	Samples
SN74AHCT139DBRG4	ACTIVE	SSOP	DB	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB139	Samples
SN74AHCT139DE4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AHCT139	Samples
SN74AHCT139DG4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AHCT139	Samples
SN74AHCT139DGVR	ACTIVE	TVSOP	DGV	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB139	Samples
SN74AHCT139DGVRE4	ACTIVE	TVSOP	DGV	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB139	Samples
SN74AHCT139DGVRG4	ACTIVE	TVSOP	DGV	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB139	Samples
SN74AHCT139DR	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AHCT139	Samples
SN74AHCT139DRE4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AHCT139	Samples
SN74AHCT139DRG4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AHCT139	Samples
SN74AHCT139N	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	-40 to 85	SN74AHCT139N	Samples
SN74AHCT139NE4	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	-40 to 85	SN74AHCT139N	Samples
SN74AHCT139PW	ACTIVE	TSSOP	PW	16	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB139	Samples
SN74AHCT139PWE4	ACTIVE	TSSOP	PW	16	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB139	Samples



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# PACKAGE OPTION ADDENDUM

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Orderable Device	Status	Package Type	Package Drawing	Pins	Package Qty	Eco Plan	Lead/Ball Finish	MSL Peak Temp	Op Temp (°C)	Top-Side Markings	Samples
SN74AHCT139PWG4	ACTIVE	TSSOP	PW	16	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB139	Samples
SN74AHCT139PWLE	OBSOLETE	TSSOP	PW	16		TBD	Call TI	Call TI	-40 to 85		
SN74AHCT139PWR	ACTIVE	TSSOP	PW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB139	Samples
SN74AHCT139PWRE4	ACTIVE	TSSOP	PW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB139	Samples
SN74AHCT139PWRG4	ACTIVE	TSSOP	PW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB139	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)

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

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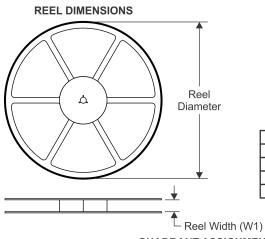
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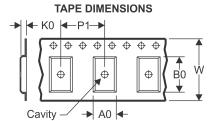
<sup>(4)</sup> Only one of markings shown within the brackets will appear on the physical device.

# PACKAGE MATERIALS INFORMATION

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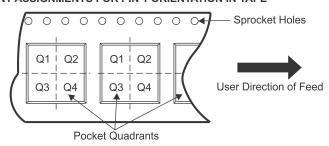
# TAPE AND REEL INFORMATION





Α0	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

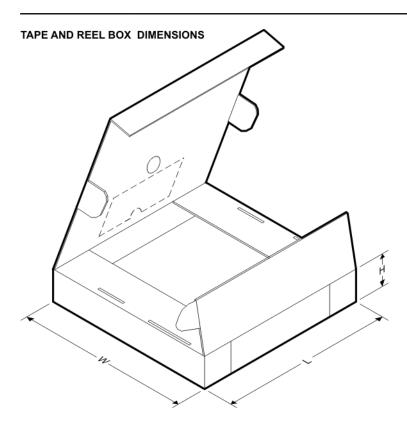


#### \*All dimensions are nominal

All differsions are norminal												
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
SN74AHCT139DBR	SSOP	DB	16	2000	330.0	16.4	8.2	6.6	2.5	12.0	16.0	Q1
SN74AHCT139DGVR	TVSOP	DGV	16	2000	330.0	12.4	6.8	4.0	1.6	8.0	12.0	Q1
SN74AHCT139DR	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
SN74AHCT139PWR	TSSOP	PW	16	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1

**PACKAGE MATERIALS INFORMATION** 

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\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74AHCT139DBR	SSOP	DB	16	2000	367.0	367.0	38.0
SN74AHCT139DGVR	TVSOP	DGV	16	2000	367.0	367.0	35.0
SN74AHCT139DR	SOIC	D	16	2500	333.2	345.9	28.6
SN74AHCT139PWR	TSSOP	PW	16	2000	367.0	367.0	35.0

# N (R-PDIP-T\*\*)

# PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
- The 20 pin end lead shoulder width is a vendor option, either half or full width.



## DGV (R-PDSO-G\*\*)

### **24 PINS SHOWN**

### **PLASTIC SMALL-OUTLINE**



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, not to exceed 0,15 per side.

D. Falls within JEDEC: 24/48 Pins – MO-153 14/16/20/56 Pins – MO-194



# D (R-PDS0-G16)

## PLASTIC SMALL OUTLINE



- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
- Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
- E. Reference JEDEC MS-012 variation AC.



PW (R-PDSO-G16)

# PLASTIC SMALL OUTLINE

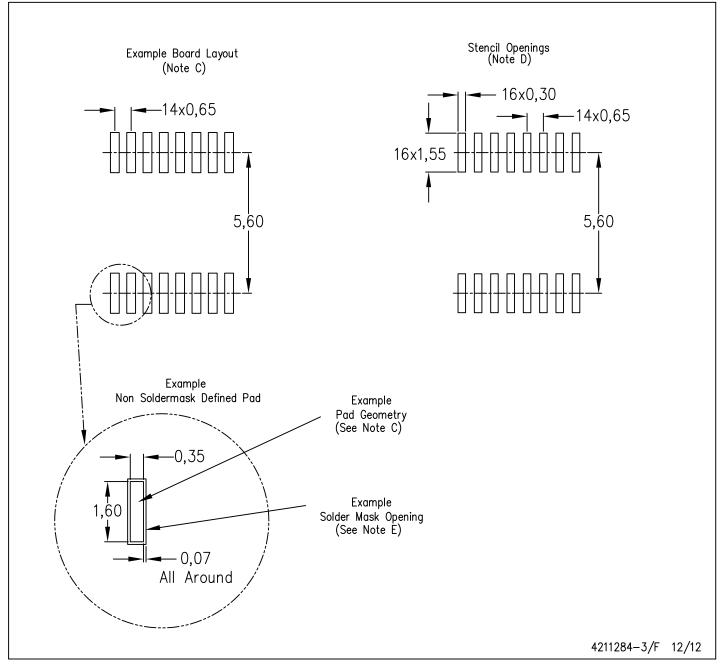


- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M—1994.
- B. This drawing is subject to change without notice.
- Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0,15 each side.
- Body width does not include interlead flash. Interlead flash shall not exceed 0,25 each side.
- E. Falls within JEDEC MO-153



# PW (R-PDSO-G16)

# PLASTIC SMALL OUTLINE



- 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 for other stencil recommendations.
- E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.



## DB (R-PDSO-G\*\*)

## PLASTIC SMALL-OUTLINE

### **28 PINS SHOWN**



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 not to exceed 0,15.

D. Falls within JEDEC MO-150

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Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

### Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов:
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001:
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

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- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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