

Data sheet acquired from Harris Semiconductor SCHS118C

CD54HC08, CD74HC08, CD54HCT08

High-Speed CMOS Logic Quad 2-Input AND Gate

August 1997 - Revised July 2004

Features

- · Buffered Inputs
- Typical Propagation Delay: 7ns at V_{CC} = 5V,
 C_L = 15pF, T_A = 25°C
- Fanout (Over Temperature Range)
- Wide Operating Temperature Range ... -55°C to 125°C
- Balanced Propagation Delay and Transition Times
- Significant Power Reduction Compared to LSTTL Logic ICs
- HC Types
 - 2V to 6V Operation
 - High Noise Immunity: N_{IL} = 30%, N_{IH} = 30% of V_{CC} at V_{CC} = 5V
- HCT Types
 - 4.5V to 5.5V Operation
 - Direct LSTTL Input Logic Compatibility,
 V_{IL}= 0.8V (Max), V_{IH} = 2V (Min)
- CMOS Input Compatibility, $I_I \le 1\mu A$ at V_{OL} , V_{OH}

Description

The CD54HC08, CD54HCT08, CD74HC08, and CD74HCT08 logic gates utilize silicon gate CMOS technology to achieve operating speeds similar to LSTTL gates with the low power consumption of standard CMOS integrated circuits. All devices have the ability to drive 10 LSTTL loads. The 74HCT logic family is functionally pin compatible with the standard 74LS logic family.

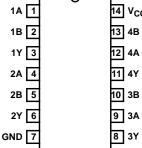
Ordering Information

PART NUMBER	TEMP. RANGE (°C)	PACKAGE
CD54HC08F3A	-55 to 125	14 Ld CERDIP
CD54HCT08F3A	-55 to 125	14 Ld CERDIP
CD74HC08E	-55 to 125	14 Ld PDIP
CD74HC08M	-55 to 125	14 Ld SOIC
CD74HC08MT	-55 to 125	14 Ld SOIC
CD74HC08M96	-55 to 125	14 Ld SOIC
CD74HC08PW	-55 to 125	14 Ld TSSOP
CD74HC08PWR	-55 to 125	14 Ld TSSOP
CD74HCT08E	-55 to 125	14 Ld PDIP
CD74HCT08M	-55 to 125	14 Ld SOIC
CD74HCT08MT	-55 to 125	14 Ld SOIC
CD74HCT08M96	-55 to 125	14 Ld SOIC

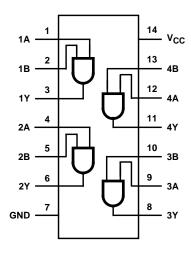
NOTE: When ordering, use the entire part number. The suffix 96 denotes tape and reel. The suffix T denotes a small-quantity reel of 250.

Pinout

CD54HC08, CD54HCT08, (CERDIP) CD74HC08 (PDIP, SOIC, TSSOP) CD74HCT08 (PDIP, SOIC) TOP VIEW



Functional Diagram



TRUTH TABLE

INP	OUTPUT	
nA	nB	nY
L	L	L
L	Н	L
Н	L	L
Н	Н	Н

H = High Voltage Level, L = Low Voltage Level

HC Logic Symbol	HCT Logic Symbol
nA nB nY	nA ny

CD54HC08, CD74HC08, CD54HCT08, CD74HCT08

Absolute Maximum Ratings

Thermal Information

Thermal Resistance (Typical, Note 1) E (PDIP) Package	θ _{JA} (°C/W)
M (SOIC) Package	
PW (TSSOP) Package	113
Maximum Junction Temperature (Hermetic Package or Die	e) 175 ⁰ C
Maximum Junction Temperature (Plastic Package)	150 ⁰ C
Maximum Storage Temperature Range65	^o C to 150 ^o C
Maximum Lead Temperature (Soldering 10s)	300°C
(SOIC - Lead Tips Only)	

Operating Conditions

Temperature Range (T _A)55°C to 125°C
Supply Voltage Range, V _{CC}
HC Types2V to 6V
HCT Types
DC Input or Output Voltage, V _I , V _O
Input Rise and Fall Time
2V
4.5V 500ns (Max)
6V

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

NOTE:

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

DC Electrical Specifications

		TEST CONDITIONS			25°C			-40°C T	O 85°C	-55°C TO 125°C		
PARAMETER	SYMBOL	V _I (V)	I _O (mA)	V _{CC} (V)	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNITS
HC TYPES												
High Level Input	V _{IH}	-	-	2	1.5	-	-	1.5	-	1.5	-	V
Voltage				4.5	3.15	-	-	3.15	-	3.15	-	V
				6	4.2	-	-	4.2	-	4.2	-	٧
Low Level Input	V _{IL}	-	-	2	-	-	0.5	-	0.5	-	0.5	٧
Voltage				4.5	-	-	1.35	-	1.35	-	1.35	٧
				6	-	-	1.8	-	1.8	-	1.8	٧
High Level Output	V _{OH}	V _{IH} or	-0.02	2	1.9	-	-	1.9	-	1.9	-	V
Voltage CMOS Loads		V _{IL}	-0.02	4.5	4.4	-	-	4.4	-	4.4	-	V
			-0.02	6	5.9	-	-	5.9	-	5.9	-	٧
High Level Output				-	-	-	-	-	-	-	-	-
Voltage TTL Loads			-4	4.5	3.98	-	-	3.84	-	3.7	-	V
			-5.2	6	5.48	-	-	5.34	-	5.2	-	V
Low Level Output	V _{OL}	V _{IH} or	0.02	2	-	-	0.1	-	0.1	-	0.1	V
Voltage CMOS Loads		V _{IL}	0.02	4.5	-	-	0.1	-	0.1	-	0.1	V
			0.02	6	-	-	0.1	-	0.1	-	0.1	V
Low Level Output			-	-	-	-	-	-	-	-	-	V
Voltage TTL Loads			4	4.5	-	-	0.26	-	0.33	-	0.4	V
			5.2	6	-	-	0.26	-	0.33	-	0.4	V
Input Leakage Current	lı	V _{CC} or GND	-	6	-	-	±0.1	-	±1	-	±1	μΑ

CD54HC08, CD74HC08, CD54HCT08, CD74HCT08

DC Electrical Specifications (Continued)

			ST ITIONS			25°C		-40°C T	O 85°C	-55°C T	O 125°C	
PARAMETER	SYMBOL	V _I (V)	I _O (mA)	V _{CC} (V)	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNITS
Quiescent Device Current	Icc	V _{CC} or GND	0	6	-	-	2	-	20	-	40	μА
HCT TYPES												
High Level Input Voltage	V _{IH}	-	-	4.5 to 5.5	2	-	-	2	-	2	-	V
Low Level Input Voltage	V _{IL}	-	-	4.5 to 5.5	-	-	0.8	-	0.8	-	0.8	V
High Level Output Voltage CMOS Loads	V _{OH}	V _{IH} or V _{IL}	-0.02	4.5	4.4	-	-	4.4	-	4.4	-	V
High Level Output Voltage TTL Loads			-4	4.5	3.98	-	-	3.84	-	3.7	-	V
Low Level Output Voltage CMOS Loads	V _{OL}	V _{IH} or V _{IL}	0.02	4.5	-	-	0.1	-	0.1	-	0.1	V
Low Level Output Voltage TTL Loads			4	4.5	-	-	0.26	-	0.33	-	0.4	V
Input Leakage Current	II	V _{CC} and GND	0	5.5	-		±0.1	-	±1	-	±1	μА
Quiescent Device Current	Icc	V _{CC} or GND	0	5.5	-	-	2	-	20	-	40	μА
Additional Quiescent Device Current Per Input Pin: 1 Unit Load	ΔI _{CC} (Note 2)	V _{CC} - 2.1	-	4.5 to 5.5	-	100	360	-	450	-	490	μА

NOTE:

HCT Input Loading Table

INPUT	UNIT LOADS
All	0.6

NOTE: Unit Load is ΔI_{CC} limit specified in DC Electrical Specifications table, e.g. 360 μ A max at 25 o C.

Switching Specifications Input t_r , t_f = 6ns

	TEST V _{CC} 25°C			-40°C T	O 85°C	-55°C TO 125°C					
PARAMETER	SYMBOL	CONDITIONS	(V)	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNITS
HC TYPES							-				
Propagation Delay,	t _{PLH} , t _{PHL}	C _L = 50pF	2	-	-	90	-	115	-	135	ns
Input to Output (Figure 1)			4.5	-	-	18	-	23	-	27	ns
			6	-	-	15	-	20	-	23	ns
Propagation Delay, Data Input to Output Y	t _{PLH} , t _{PHL}	C _L = 15pF	5	-	7	-	-	-	-	-	ns

^{2.} For dual-supply systems theoretical worst case ($V_I = 2.4V$, $V_{CC} = 5.5V$) specification is 1.8mA.

Switching Specifications Input t_r , $t_f = 6ns$ (Continued)

		TEST	v _{cc}		25°C		-40°C T	O 85°C	-55°C T	O 125°C	
PARAMETER	SYMBOL	CONDITIONS	(V)	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNITS
Transition Times (Figure 1)	t _{TLH} , t _{THL}	C _L = 50pF	2	-	-	75	-	95	-	110	ns
			4.5	-	-	15	-	19	-	22	ns
			6	-	-	13	-	16	-	19	ns
Input Capacitance	CI	-	-	-	-	10	-	10	-	10	pF
Power Dissipation Capacitance (Notes 3, 4)	C _{PD}	-	5	-	37	-	-	-	-	-	pF
HCT TYPES											
Propagation Delay, Input to Output Y (Figure 2)	t _{PLH} , t _{PHL}	C _L = 50pF	4.5	-	-	25	-	31	-	38	ns
Propagation Delay, Data Input to Output Y	t _{PLH} , t _{PHL}	C _L = 15pF	5	-	10	-	-	-	-	-	ns
Transition Times (Figure 2)	t _{TLH} , t _{THL}	C _L = 50pF	4.5	-	-	15	-	19	-	22	ns
Input Capacitance	C _I	C _L = 50pF	-	-	-	10	-	10	-	10	pF
Power Dissipation Capacitance (Notes 3, 4)	C _{PD}	-	5	-	51	ı	-	-	-	-	pF

NOTES:

- 3. C_{PD} is used to determine the dynamic power consumption, per gate.
- 4. $P_D = V_{CC}^2 f_i (C_{PD} + C_L)$ where f_i = input frequency, C_L = output load capacitance, V_{CC} = supply voltage.

Test Circuits and Waveforms

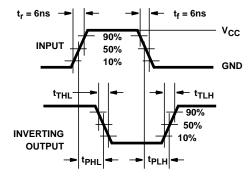


FIGURE 3. HC AND HCU TRANSITION TIMES AND PROPAGA-TION DELAY TIMES, COMBINATION LOGIC

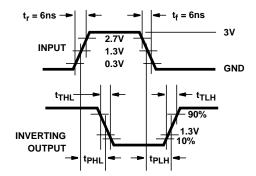


FIGURE 4. HCT TRANSITION TIMES AND PROPAGATION DELAY TIMES, COMBINATION LOGIC

5-Sep-2011

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/ Ball Finish	MSL Peak Temp ⁽³⁾	Samples (Requires Login
5962-8688301CA	ACTIVE	CDIP	J	14	1	TBD	Call TI	Call TI	
CD54HC08F	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	
CD54HC08F3A	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	
CD54HCT08F	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	
CD54HCT08F3A	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	
CD74HC08E	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
CD74HC08EE4	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
CD74HC08M	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
CD74HC08M96	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
CD74HC08M96E4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
CD74HC08M96G4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
CD74HC08ME4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
CD74HC08MG4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
CD74HC08MT	ACTIVE	SOIC	D	14	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
CD74HC08MTE4	ACTIVE	SOIC	D	14	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
CD74HC08MTG4	ACTIVE	SOIC	D	14	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
CD74HC08PW	ACTIVE	TSSOP	PW	14	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
CD74HC08PWE4	ACTIVE	TSSOP	PW	14	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
CD74HC08PWG4	ACTIVE	TSSOP	PW	14	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
CD74HC08PWR	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	





5-Sep-2011

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/ Ball Finish	MSL Peak Temp ⁽³⁾	Samples (Requires Login)
CD74HC08PWRE4	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
CD74HC08PWRG4	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
CD74HCT08E	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
CD74HCT08EE4	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
CD74HCT08M	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
CD74HCT08M96	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
CD74HCT08M96E4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
CD74HCT08M96G4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
CD74HCT08ME4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
CD74HCT08MG4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
CD74HCT08MT	ACTIVE	SOIC	D	14	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
CD74HCT08MTE4	ACTIVE	SOIC	D	14	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
CD74HCT08MTG4	ACTIVE	SOIC	D	14	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	

⁽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.

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.

⁽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.





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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 CD54HC08, CD54HCT08, CD74HC08, CD74HCT08:

Catalog: CD74HC08, CD74HCT08

Automotive: CD74HC08-Q1, CD74HC08-Q1

● Enhanced Product: CD74HC08-EP, CD74HC08-EP

Military: CD54HC08, CD54HCT08

NOTE: Qualified Version Definitions:

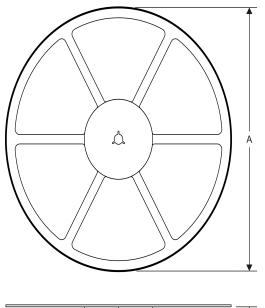
- Catalog TI's standard catalog product
- Automotive Q100 devices qualified for high-reliability automotive applications targeting zero defects
- Enhanced Product Supports Defense, Aerospace and Medical Applications
- Military QML certified for Military and Defense Applications

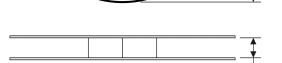
PACKAGE MATERIALS INFORMATION

14-Jul-2012 www.ti.com

TAPE AND REEL INFORMATION

REEL DIMENSIONS





TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
В0	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

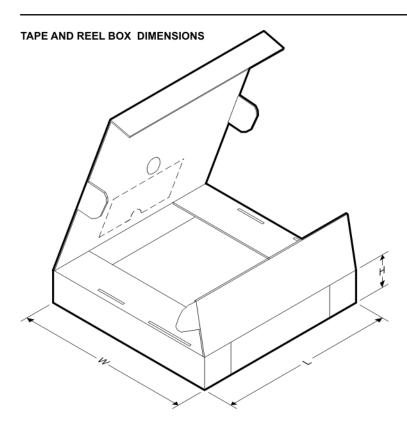
TAPE AND REEL INFORMATION

*All dimensions are nominal

Device		Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
CD74HC08M96	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
CD74HC08MT	SOIC	D	14	250	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
CD74HC08PWR	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
CD74HCT08M96	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
CD74HCT08MT	SOIC	D	14	250	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1

PACKAGE MATERIALS INFORMATION

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*All dimensions are nominal

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Device	Package Type	Package Drawing	Pins SPQ		Length (mm)	Width (mm)	Height (mm)		
CD74HC08M96	SOIC	D	14	2500	367.0	367.0	38.0		
CD74HC08MT	SOIC	D	14	250	367.0	367.0	38.0		
CD74HC08PWR	TSSOP	PW	14	2000	367.0	367.0	35.0		
CD74HCT08M96	SOIC	D	14	2500	367.0	367.0	38.0		
CD74HCT08MT	SOIC	D	14	250	367.0	367.0	38.0		

14 LEADS SHOWN



- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- C. This package is hermetically sealed with a ceramic lid using glass frit.
- D. Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
- E. Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

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.



D (R-PDSO-G14)

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 AB.



D (R-PDSO-G14)

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.



PW (R-PDSO-G14)

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.
 - Sody 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-G14)

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.



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