Http://www.100y.com.tw

SDLS131 - APRIL 1985 - REVISED MARCH 1988

10 3B

**3A** 

9

8 3Y

- Package Options Include Plastic "Small Outline" Packages, Ceramic Chip Carriers and Flat Packages, and Plastic and Ceramic DIPs
- Dependable Texas Instruments Quality and Reliability

### description

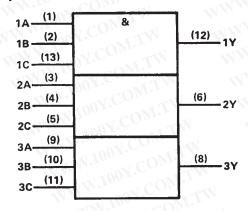
These devices contain three independent 3-input AND gates.

The SN54LS11 and SN54S11 are characterized for operation over the full military temperature range of  $-55\,^{\circ}\text{C}$  to 125  $^{\circ}\text{C}$ . The SN74LS11 and SN74S11 are characterized for operation from 0  $^{\circ}\text{C}$  to 70  $^{\circ}\text{C}$ .

### **FUNCTION TABLE (each gate)**

All	VPUT	s	ОИТРИТ
A	В	С	Y
Н	H	Ñн	H
L	X	×	LWY
X	VL.	X	L
X	X	11	L
		- 1	

# logic symbol†



<sup>&</sup>lt;sup>†</sup>This symbol is in accordance with ANSI/IEEE Std. 91-1984 and IEC Publication 617-12.

Pin numbers shown are for D, J, N, and W packages.

#### 

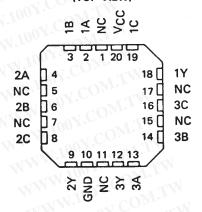
2C 5

2Y

**GND** 

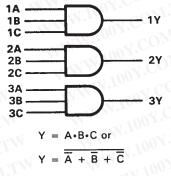
□6

SN54LS11, SN54S11 . . . FK PACKAGE (TOP VIEW)



NC-No internal connection

# logic diagram (positive logic)

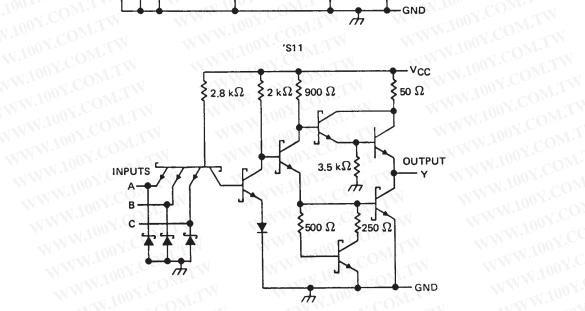


SDLS131 - APRIL 1985 - REVISED MARCH 1988

schematics (each gate)

特力材料886-3-5753170 胜特力电子(上海) 86-21-34970699 胜特力电子(深圳) 86-755-83298787 Http://www. 100y. com. tw

'LS11 ξ 120 Ω 20 kΩ { €10 kΩ 8 kΩ INPUTS С  $5 k\Omega$ OUTPUT 1047. 100Y.COM.TW **\$3 kΩ 3** 1.5 kΩ -GND V.100Y.COM.TW WWW.100Y.COM.TW WWW.100Y.COM.TW ħ



Resistor values shown are nominal.

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

Supply voltage, VCC (see Note 1)	7 V
Input voltage: 'S11	
'LS11	
Operating free-air temperature range: SN54'	
SN74'	0°C to 70°C
Storage temperature range	
E 1: Voltage values are with respect to network ground terminal.	

WWW.100Y.COM.TW

100Y.COM.TW

NOTE 1: Voltage values are with respect to network ground terminal.



### recommended operating conditions

TW	MMW. ON'COM TAI M	NA.	SN54LS1	1	S	N74LS1	1	UNIT
1	WW.In COM.	MIN	NOM	MAX	MIN	NOM	MAX	CIVIT
Vcc	Supply voltage	4.5	5	5.5	4.75	5	5.25	٧
VIH	High-level input voltage	.102	1 CO	V.	2			٧
VIL	Low-level input voltage	W.100	7 C(	0.7			0.8	٧
ЮН	High-level output current	W.10	01.	- 0.4	N T		0.4	mA
IOL	Low-level output current	WY TON	001.	4	LM.		8	mA
TA	Operating free-air temperature	- 55	1007.	125	0		70	°c

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

COM-	-31		COMP	WW	SN54LS	11	S	N74LS1	1	
PARAMETER	In	TEST CONDI	TIONS T	MIN	TYP#	MAX	MIN	TYP ‡	MAX	UNIT
VIK	V <sub>CC</sub> = MIN,	I <sub>I</sub> = - 18 mA	OY. COM.TW	- N	MW.	- 1.5	COM	1.4	- 1.5	V
Voн	VCC = MIN,	V <sub>IH</sub> = 2 V,	I <sub>OH</sub> = - 0.4 mA	2.5	3.4	700 1.	2.7	3.4	1	٧
1100Y.CO	V <sub>CC</sub> = MIN,	VIL = MAX,	I <sub>OL</sub> = 4 mA		0.25	0.4		0.25	0.4	V
VoL	VCC = MIN,	VIL = MAX,	IOL = 8 mA		MAIN	×× 100	7.0	0.35	0.5	V
Wir any	V <sub>CC</sub> = MAX,	V <sub>I</sub> = 7 V	1100Y.CO	N	WW	0.1	OYIC	.ov.	0.1	mA
Чн	V <sub>CC</sub> = MAX,	V <sub>1</sub> = 2.7 V	W. TOOX.CO.	WI	W	20	001.		20	μΑ
WIL .	V <sub>CC</sub> = MAX,	V <sub>1</sub> = 0.4 V	NW. CON	TW	1	- 0.4	1001	Cor	- 0.4	mA
I <sub>OS</sub> §	V <sub>CC</sub> = MAX	N XX	MM. IONY.COM	- 20	4	- 100	- 20	Y.CO.	- 100	mA
Іссн	V <sub>CC</sub> = MAX,	V <sub>1</sub> = 4.5 V	NAMA .TO CO.	Nr.	1.8	3.6	1.10	1.8	3.6	MA.
I <sub>CCL</sub>	V <sub>CC</sub> = MAX,	V <sub>1</sub> = 0 V	MAN TOO ST CO	DIA	3.3	6.6	M'ra	3.3	6.6	mA

<sup>†</sup> For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions. ‡ All typical values are at V<sub>CC</sub> = 5 V T<sub>A</sub> = 25<sup>O</sup>C

### switching characteristics, VCC = 5 V, TA = 25°C (see note 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CO	NDITIONS	MIN TY	MAX	UNIT
tPLH .	A, B or C	OWN	B210 100	Y.CO	MM	15	ns
tPHL.	A, B of C	COMP	$R_L = 2 k\Omega$ ,	C <sub>L</sub> = 15 pF	10	20	ns

WWW.100Y.COM.TW



WWW.100Y.COM.TW

100Y.COM.TW

<sup>‡</sup> All typical values are at  $V_{CC} = 5 \text{ V}$ ,  $T_A = 25^{\circ}\text{C}$ .

<sup>§</sup> Not more than one output should be shorted at a time, and the duration of the short-circuit should not exceed one second.

SDLS131 - APRIL 1985 - REVISED MARCH 1988

勝 特 力 材 料 886-3-5753170 胜特力电子(上海) 86-21-34970699 胜特力电子(深圳) 86-755-83298787 Http://www. 100y. com. tw

### recommended operating conditions

	WWW. OV. COM WY	14.	SN54S11			SN74S11		UNIT
Mo	TW. TOO COM.	MIN	NOM	MAX	MIN	NOM	MAX	UNIT
Vcc	Supply voltage	4.5	5	5.5	4.75	5	5.25	٧
V <sub>IH</sub>	High-level input voltage	2	1001.	COM	2			٧
VIL	Low-level input voltage		1.700	0.8	V.I.A.	- 1	0.8	٧
ЮН	High-level output current	N	N 100	-1	MI		-1	mA
IOL	Low-level output current	WW	× 10	20	MI		20	mA
TA	Operating free-air temperature	- 55	1	125	0	TW	70	°c

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

100x.	MIT	7507 0011017	On a COMIT		SN54S1	1.700.	- c0	SN74S1		UNIT
PARAMETER		TEST CONDITI	ONS T	MIN	TYP ‡	MAX	MIN	TYP ‡	MAX	ONT
VIK	V <sub>CC</sub> = MIN,	I <sub>1</sub> = - 18 mA	100Y.CO	N	MM	- 1.2	O.Y.C.	-N.I	-1.2	٧
Voн	V <sub>CC</sub> = MIN,	V <sub>IH</sub> = 2 V,	I <sub>OH</sub> = - 1 mA	2.5	3.4	1111	2.7	3.4	TW	٧
V <sub>OL</sub>	V <sub>CC</sub> = MIN,	V <sub>1L</sub> = 0.8 V,	IOL = 20 mA	CN.	1/1	0.5	Y OOL	$CO_{\lambda}$	0.5	٧
MIN.100	V <sub>CC</sub> = MAX,	V <sub>I</sub> = 5.5 V	M. To. COM.	- IXN		1	700	$^{\Lambda \cdot CO_D}$	1	mA
lih V.10	V <sub>CC</sub> = MAX,	V <sub>I</sub> = 2.7 V	MM.Ing CON	I. Tank		50	1.Tag	V.CO	50	μА
111 110	V <sub>CC</sub> = MAX,	V <sub>1</sub> = 0.5 V	WW.IOO	Wil		- 2	M.In	V C	- 2	mA
IOS §	V <sub>CC</sub> = MAX		N.1007	-40	cī.	- 100	- 40	JU ≥.	- 100	mA
Іссн	V <sub>CC</sub> = MAX,	V <sub>I</sub> = 4.5 V	W. 100x	OWIN	13.5	24	ww.	13.5	24	mA
ICCL	V <sub>CC</sub> = MAX,	V <sub>I</sub> = 0 V	M. 1007.	T.M.T	24	42	-137	24	42	mA

<sup>†</sup> For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

# switching characteristics, VCC = 5 V, TA = 25°C (see note 2)

<sup>t</sup> PLH	(INPUT)	(OUTPUT)	WWW.	DOT.CON.TAI	4.5	1.17	ns
tPHL	A, B or C	Y.COM.TY	$R_L = 280 \Omega$ ,	C <sub>L</sub> = 15 pF	5	7.5	ns
<sup>t</sup> PLH	7, 5010	OY.COM.TV	B. = 290 O	C <sub>L</sub> = 50 pF	6	MINI.	ns
t <sub>PHL</sub>	WWW	noy.Com.T	$R_L = 280 \Omega$ ,	CL-50 PF	7.5		ns



<sup>‡</sup> All typical values are at  $V_{CC} = 5 \text{ V}$ ,  $T_A = 25^{\circ}\text{C}$ .

<sup>§</sup> Not more than one output should be shorted at a time, and the duration of the short-circuit should not exceed one second.

# PACKAGE OPTION ADDENDUM



勝 特 力 材 料 886-3-5753170 胜特力电子(上海) 86-21-34970699 胜特力电子(深圳) 86-755-83298787 Http://www.100y.com.tw

7-Jun-2010

### **PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/ Ball Finish	MSL Peak Temp <sup>(3)</sup>	Samples (Requires Login)
JM38510/08001BCA	ACTIVE	CDIP	J	14	COMA	TBD	A42	N / A for Pkg Type	Purchase Samples
JM38510/08001BDA	ACTIVE	CFP	W	14	MITH	TBD	A42	N / A for Pkg Type	Purchase Samples
JM38510/31001B2A	ACTIVE	LCCC	FK	20	LCU 1 TW	TBD	POST-PLATE	N / A for Pkg Type	Purchase Samples
JM38510/31001BCA	ACTIVE	CDIP	J	14	V COT	TBD	A42	N / A for Pkg Type	Purchase Samples
JM38510/31001BDA	ACTIVE	CFP	W	14	(1)	TBD	A42	N / A for Pkg Type	Purchase Samples
SN54LS11J	ACTIVE	CDIP	J	14	10M.T	TBD	A42	N / A for Pkg Type	Purchase Samples
SN54S11J	ACTIVE	CDIP	J W	14	100Y-1	TBD	A42	N / A for Pkg Type	Purchase Samples
SN74LS11D	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Purchase Samples
SN74LS11DE4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Purchase Samples
SN74LS11DG4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Purchase Samples
SN74LS11DR	ACTIVE	SOIC	TVD	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Purchase Samples
SN74LS11DRE4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Purchase Samples
SN74LS11DRG4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Purchase Samples
SN74LS11J	OBSOLETE	CDIP	JIN	14	W 11	TBD	Call TI	Call TI	Samples Not Availabl
SN74LS11N	ACTIVE	PDIP	N	N 14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	Purchase Samples
SN74LS11N3	OBSOLETE	PDIP	CCN	14	WWW.	TBD	Call TI	Call TI	Samples Not Availab
SN74LS11NE4	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	Purchase Samples
SN74LS11NSR	ACTIVE	so	NS	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Purchase Samples
SN74LS11NSRE4	ACTIVE	so	NS	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Purchase Samples
SN74LS11NSRG4	ACTIVE	SO	NS	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Purchase Samples
SN74S11D	OBSOLETE	SOIC	D	14	- XI	TBD	Call TI	Call TI	Samples Not Availabl
SN74S11N	OBSOLETE	PDIP	NOX.	14	III	TBD	Call TI	Call TI	Samples Not Availabl
SN74S11N3	OBSOLETE	PDIP	Nooy	14	WEI	TBD	Call TI	Call TI	Samples Not Available



### PACKAGE OPTION ADDENDUM

7-Jun-2010

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>	Samples (Requires Login)
SNJ54LS11FK	ACTIVE	√ LCCC √	FK	20	111	TBD	POST-PLATE	N / A for Pkg Type	Purchase Samples
SNJ54LS11J	ACTIVE	CDIP	J	14	1cW	TBD	A42	N / A for Pkg Type	Purchase Samples
SNJ54LS11W	ACTIVE	CFP	W	14	$CO^{N_1}$	TBD	A42	N / A for Pkg Type	Purchase Samples
SNJ54S11FK	ACTIVE	LCCC	FK	20	COM	TBD	POST-PLATE	N / A for Pkg Type	Purchase Samples
SNJ54S11J	ACTIVE	CDIP	IJ	14	M.T.W	TBD	A42	N / A for Pkg Type	Purchase Samples
SNJ54S11W	ACTIVE	CFP	W	14	1.001	TBD	A42	N / A for Pkg Type	Purchase Samples

<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.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

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 SN54LS11, SN54S11, SN74LS11, SN74LS11;

Catalog: SN74LS11, SN74S11



WWW.100Y.COM.TW

HOOY, COM, TW



7-Jun-2010

WWW.100X.COM.

Military: SN54LS11, SN54S11

NOTE: Qualified Version Definitions:

Catalog - TI's standard catalog product

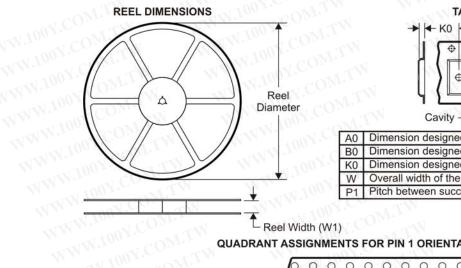
• Military - QML certified for Military and Defense Applications WWW.100Y.COM.

特力材料886-3-5753170 胜特力电子(上海) 86-21-34970699 胜特力电子(深圳) 86-755-83298787 Http://www.100y.com.tw WWW.100Y.COM.TW

WWW.100Y.CO1



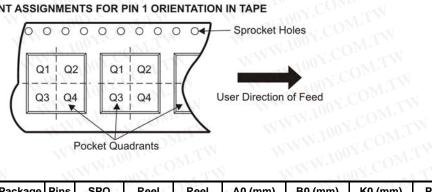
### TAPE AND REEL INFORMATION



### TAPE DIMENSIONS → K0 ← P1→ Ф 0 0 $\Phi \Phi \Phi \Phi$ 0 0 0 0 B<sub>0</sub> → A0 ←

	Dimension designed to accommodate the component width
B0	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



# W.100Y.COM.TW \*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 Quadran
SN74LS11DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
N74LS11NSR	SO	NS	14	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1

勝 特 力 材 料 886-3-5753170 胜特力电子(上海) 86-21-34970699 胜特力电子(深圳) 86-755-83298787 Http://www. 100y. com. tw

WWW.100Y.COM.TW

WWW.100Y.COM.TW

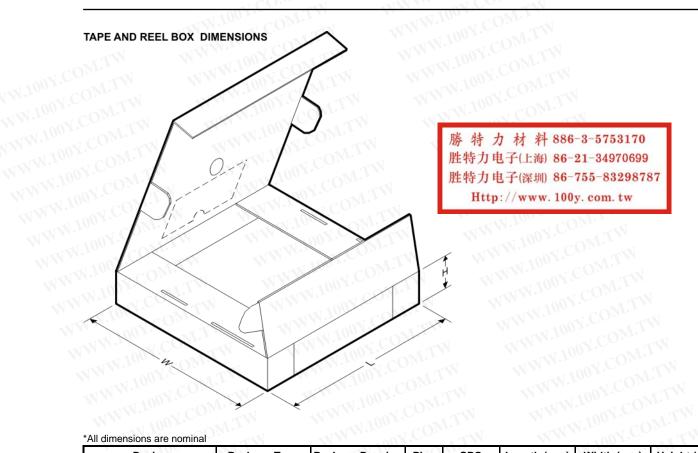
100Y.COM.TW

WWW.100X

WWW.100Y.COM.T

WWW.100Y.COM.TW





### \*All dimensions are nominal

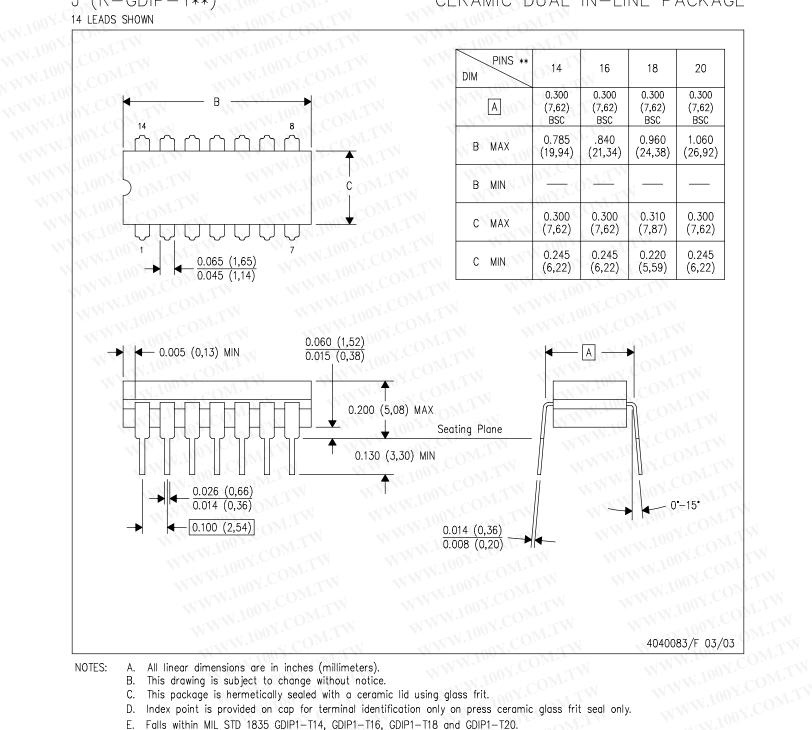
Device		Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm
SN74LS11DF	3	SOIC	D	14	2500	346.0	346.0	33.0
SN74LS11NS	R	SO	NS	14	2000	346.0	346.0	33.0

WWW.100Y.COM.TW

WWW.100Y.C

# J (R-GDIP-T\*\*)

### CERAMIC DUAL IN-LINE PACKAGE



NOTES:

- All linear dimensions are in inches (millimeters).
- В.
- This package is hermetically sealed with a ceramic lid using glass frit.

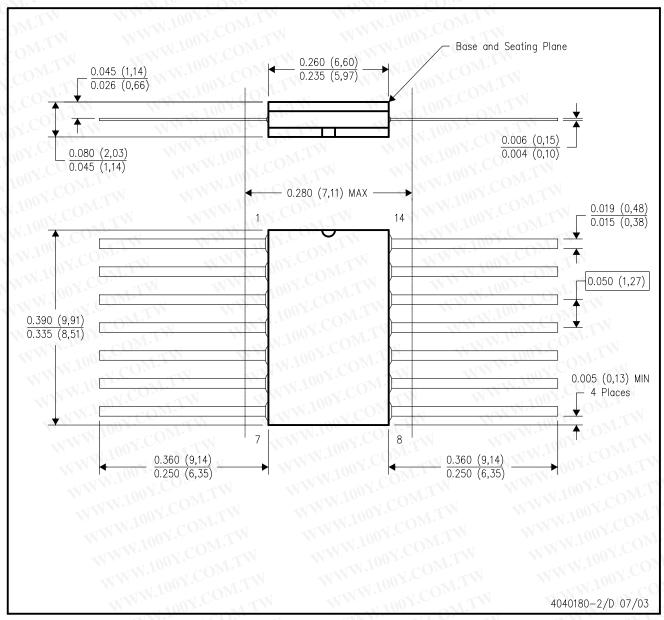
  Index point is provided on can for terminal identification. Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
- Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20. WWW.100Y.COM.TW

勝 特 力 材 料 886-3-5753170 胜特力电子(上海) 86-21-34970699 胜特力电子(深圳) 86-755-83298787

Http://www.100y.com.tw

# W (R-GDFP-F14)

# CERAMIC DUAL FLATPACK



NOTES: A. All linear dimensions are in inches (millimeters).

- B. This drawing is subject to change without notice.
- C. This package can be hermetically sealed with a ceramic lid using glass frit.
- D. Index point is provided on cap for terminal identification only.
- E. Falls within MIL STD 1835 GDFP1—F14 and JEDEC MO—092AB



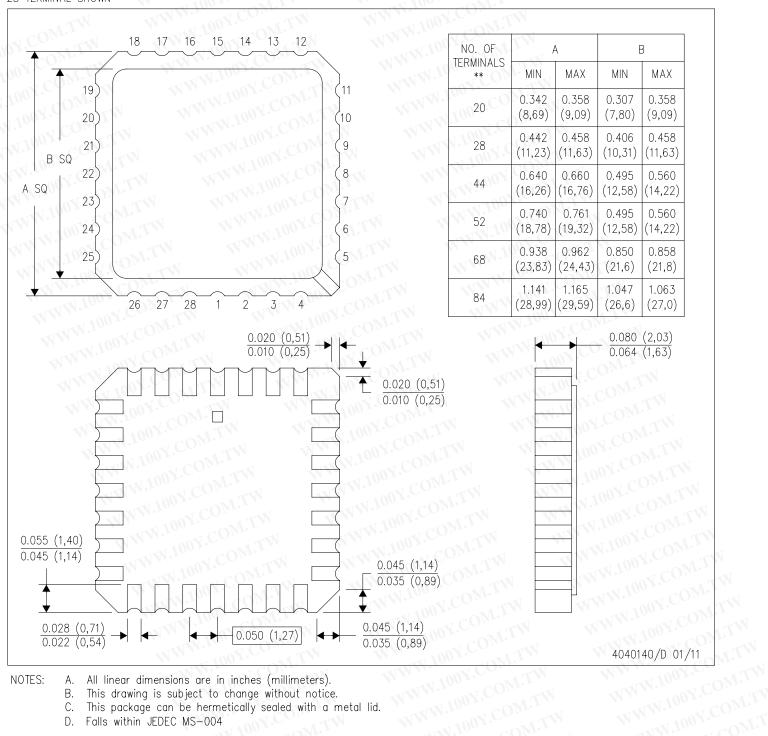
勝 特 力 材 料 886-3-5753170 胜特力电子(上海) 86-21-34970699 胜特力电子(深圳) 86-755-83298787

Http://www.100y.com.tw

FK (S-CQCC-N\*\*)

LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



NOTES:

- All linear dimensions are in inches (millimeters).
- This drawing is subject to change without notice.
- This package can be hermetically sealed with a metal lid.
- WWW.100Y.COM.T D. Falls within JEDEC MS-004



WWW.100Y.COM.TW

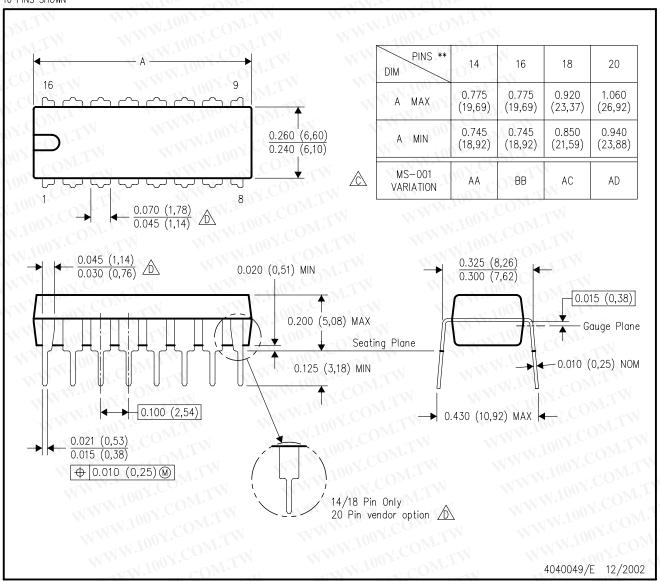
勝 特 力 材 料 886-3-5753170 胜特力电子(上海) 86-21-34970699 胜特力电子(深圳) 86-755-83298787

Http://www.100y.com.tw

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

## PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



NOTES:

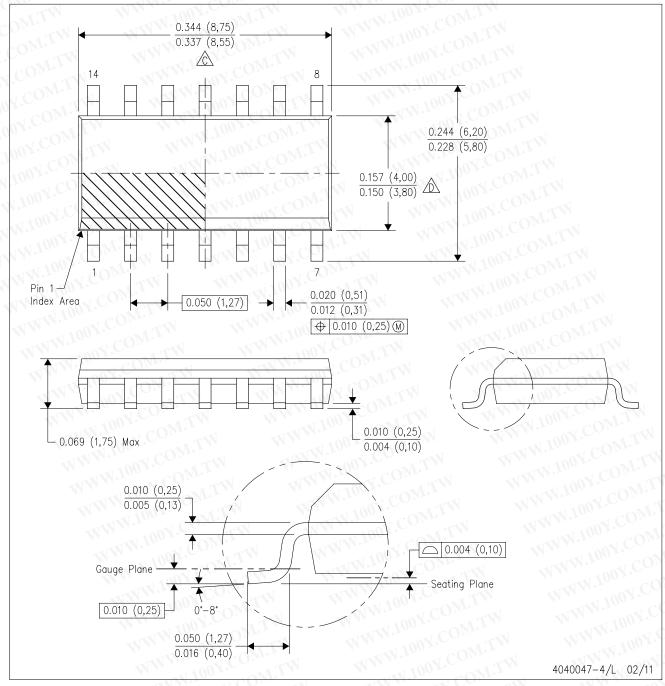
- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
- The 20 pin end lead shoulder width is a vendor option, either half or full width.



NW.100Y.COM.TW

# D (R-PDSO-G14)

# PLASTIC SMALL OUTLINE



NOTES:

- 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.

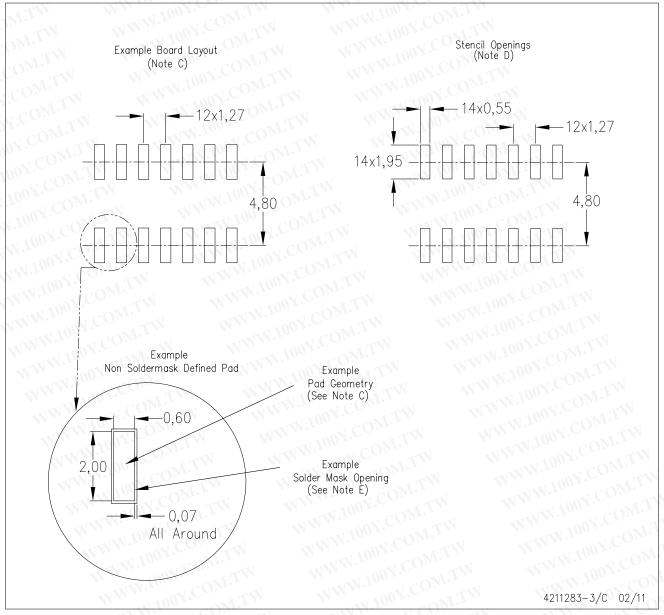
  Body width does not include interlead flash. Interlead flash shall interlead flash shall interlead flash.
- E. Reference JEDEC MS-012 variation AB.



Http://www.100y.com.tw

D (R-PDSO-G14)

### PLASTIC SMALL OUTLINE



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

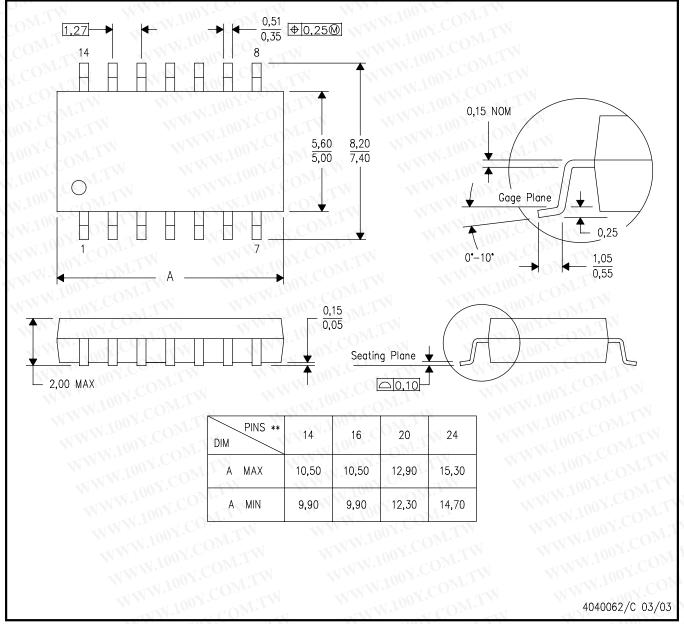


### **MECHANICAL DATA**

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

# 14-PINS SHOWN

### PLASTIC SMALL-OUTLINE PACKAGE



NOTES: All linear dimensions are in millimeters. Α.

This drawing is subject to change without notice.

Body dimensions do not include mold flash or protrusion, not to exceed 0,15.



WWW.100Y.COM.TW

100Y.COM.TW

### IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products		Applications	
Audio	www.ti.com/audio	Communications and Telecom	www.ti.com/communications
Amplifiers	amplifier.ti.com	Computers and Peripherals	www.ti.com/computers
Data Converters	dataconverter.ti.com	Consumer Electronics	www.ti.com/consumer-apps
DLP® Products	www.dlp.com	Energy and Lighting	www.ti.com/energy
DSP	dsp.ti.com	Industrial	www.ti.com/industrial
Clocks and Timers	www.ti.com/clocks	Medical	www.ti.com/medical
Interface	interface.ti.com	Security	www.ti.com/security
Logic	logic.ti.com	Space, Avionics and Defense	www.ti.com/space-avionics-defense
Power Mgmt	power.ti.com	Transportation and Automotive	www.ti.com/automotive
Microcontrollers	microcontroller.ti.com	Video and Imaging	www.ti.com/video
RFID	www.ti-rfid.com	Wireless	www.ti.com/wireless-apps
RF/IF and ZigBee® Solutions	www.ti.com/lprf		

TI E2E Community Home Page <u>e2e.ti.com</u>

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265 Copyright © 2011, Texas Instruments Incorporated