

SN55113, SN75113 DUAL DIFFERENTIAL LINE DRIVERS

SLLS070C – SEPTEMBER 1973 – REVISED MARCH 1997

- Choice of Open-Collector, Open-Emitter, or 3-State Outputs
- High-Impedance Output State for Party-Line Applications
- Single-Ended or Differential AND/NAND Outputs
- Single 5-V Supply
- Dual Channel Operation
- Compatible With TTL
- Short-Circuit Protection
- High-Current Outputs
- Common and Individual Output Controls
- Clamp Diodes at Inputs and Outputs
- Easily Adaptable to SN55114 and SN75114 Applications
- Designed for Use With SN55115 and SN75115

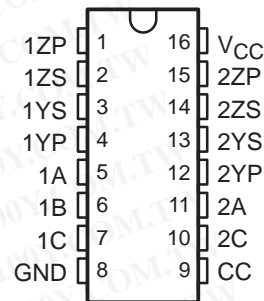
description

The SN55113 and SN75113 dual differential line drivers with 3-state outputs are designed to provide all the features of the SN55114 and SN75114 line drivers with the added feature of driver output controls. Individual controls are provided for each output pair, as well as a common control for both output pairs. If any output is low, the associated output is in a high-impedance state and the output can neither drive nor load the bus. This permits many devices to be connected together on the same transmission line for party-line applications.

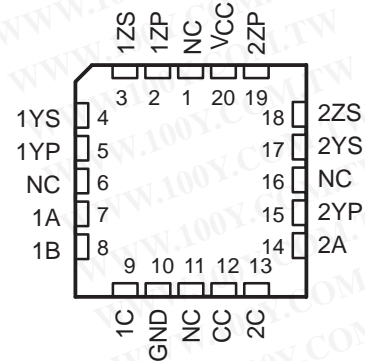
The output stages are similar to TTL totem-pole outputs, but with the sink outputs, YS and ZS, and the corresponding active pullup terminals, YP and ZP, available on adjacent package pins.

The SN55113 is characterized for operation over the full military temperature range of -55°C to 125°C . The SN75113 is characterized for operation over the temperature range of 0°C to 70°C .

SN55113 . . . J OR W PACKAGE
SN75113 . . . N PACKAGE
(TOP VIEW)



SN55113 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

勝特力材料 886-3-5753170
勝特力电子(上海) 86-21-54151736
勝特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)



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.

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

 **TEXAS
INSTRUMENTS**

POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

Copyright © 1997, Texas Instruments Incorporated

SN55113, SN75113 DUAL DIFFERENTIAL LINE DRIVERS

SLLS070C – SEPTEMBER 1973 – REVISED MARCH 1997

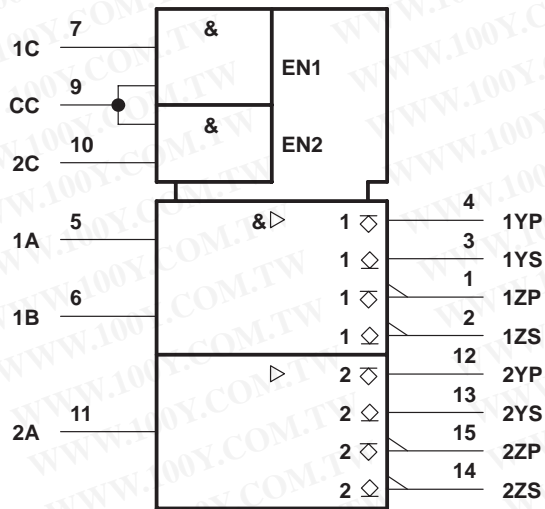
FUNCTION TABLE

OUTPUT C	INPUTS		OUTPUTS		
	CONTROL CC	DATA		AND Y	NAND Z
		A	B†		
L	X	X	X	Z	Z
X	L	X	X	Z	Z
H	H	L	X	L	H
H	H	X	L	L	H
H	H	H	H	H	L

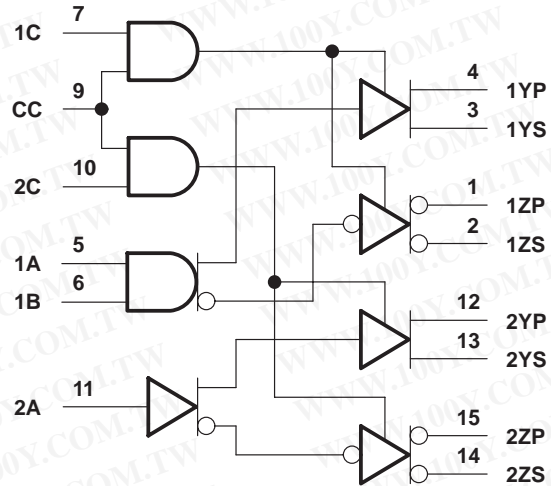
H = high level, L = low level, X = irrelevant,
Z = high impedance (off)

† B input and 4th line of function table are applicable only to driver number 1.

logic symbol‡



logic diagram (positive logic)

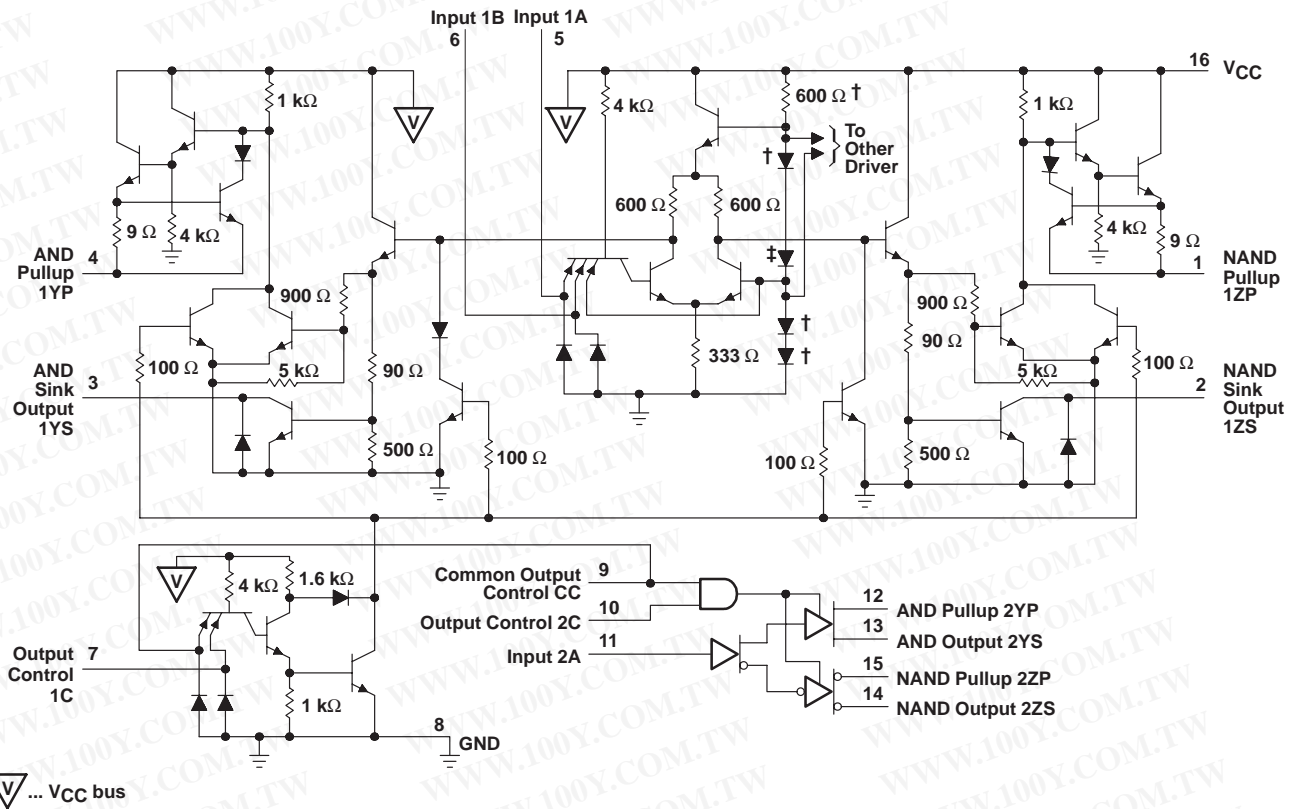


‡ This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

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

勝特力材料 886-3-5753170
 胜特力电子(上海) 86-21-54151736
 胜特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)

schematic



† These components are common to both drivers. Resistor values shown are nominal and in ohms.

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

- Supply voltage, V_{CC} (see Note 1) 7 V
- Input voltage, V_I 5.5 V
- Off-state voltage applied to open-collector outputs 12 V
- Continuous total power dissipation (see Note 2) See Dissipation Rating Table
- Operating free-air temperature range, T_A : SN55113 -55°C to 125°C
- SN75113 0°C to 70°C
- Storage temperature range, T_{stg} -65°C to 150°C
- Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds: N package 260°C
- Case temperature for 60 seconds: FK package 260°C
- Lead temperature 1,6 mm (1/16 inch) from case for 60 seconds: J or W package 300°C

‡ 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.

DISSIPATION RATING TABLE

PACKAGE	$T_A \leq 25^\circ\text{C}$ POWER RATING	DERATING FACTOR ABOVE $T_A = 25^\circ\text{C}$	$T_A = 70^\circ\text{C}$ POWER RATING	$T_A = 125^\circ\text{C}$ POWER RATING
FK	1375 mW	11.0 mW/ $^\circ\text{C}$	880 mW	275 mW
J	1375 mW	11.0 mW/ $^\circ\text{C}$	880 mW	275 mW
N	1150 mW	9.2 mW/ $^\circ\text{C}$	736 mW	N/A
W	1000 mW	8.0 mW/ $^\circ\text{C}$	640 mW	200 mW

SN55113, SN75113 DUAL DIFFERENTIAL LINE DRIVERS

SLLS070C – SEPTEMBER 1973 – REVISED MARCH 1997

recommended operating conditions

	SN55113			SN75113			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
Supply voltage, V_{CC}	4.5	5	5.5	4.75	5	5.25	V
High-level input voltage, V_{IH}	2			2			V
Low-level input voltage, V_{IL}			0.8			0.8	V
High-level output current, I_{OH}			-40			-40	mA
Low-level output current, I_{OL}			40			40	mA
Operating free-air temperature, T_A	-55		125	0		70	°C

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

PARAMETER		TEST CONDITIONS†		SN55113			SN75113			UNIT	
				MIN	TYP‡	MAX	MIN	TYP‡	MAX		
V_{IK}	Input clamp voltage	$V_{CC} = \text{MIN}$, $I_I = -12 \text{ mA}$		-0.9		-1.5	-0.9		-1.5	V	
V_{OH}	High-level output voltage	$V_{CC} = \text{MIN}$, $V_{IL} = 0.8 \text{ V}$	$V_{IH} = 2 \text{ V}$, $I_{OH} = -10 \text{ mA}$	2.4	3.4		2.4	3.4		V	
				2	3.0		2	3.0			
V_{OL}	Low-level output voltage	$V_{CC} = \text{MIN}$, $I_{OL} = 40 \text{ mA}$	$V_{IH} = 2 \text{ V}$, $V_{IL} = 0.8 \text{ V}$	0.23		0.4	0.23		0.4	V	
V_{OK}	Output clamp voltage	$V_{CC} = \text{MAX}$, $I_O = -40 \text{ mA}$		-1.1		-1.5	-1.1		-1.5	V	
$I_{O(\text{off})}$	Off-state open-collector output current	$V_{CC} = \text{MAX}$	$V_{OH} = 12 \text{ V}$	$T_A = 25^\circ\text{C}$		1	10			μA	
				$T_A = 125^\circ\text{C}$			200				
			$V_{OH} = 5.25 \text{ V}$	$T_A = 25^\circ\text{C}$				1	10		
				$T_A = 70^\circ\text{C}$					20		
I_{OZ}	Off-state (high-impedance-state) output current	$V_{CC} = \text{MAX}$, Output controls at 0.8 V	$T_A = \text{MAX}$	$T_A = 25^\circ\text{C}$, $V_O = 0 \text{ to } V_{CC}$		± 10		± 10		μA	
				$V_O = 0$		-150		-20			
				$V_O = 0.4 \text{ V}$		± 80		± 20			
				$V_O = 2.4 \text{ V}$		± 80		± 20			
				$V_O = V_{CC}$		80		20			
I_I	Input current at maximum input voltage	A, B, C	$V_{CC} = \text{MAX}$, $V_I = 5.5 \text{ V}$	1			1			mA	
		CC		2			2				
I_{IH}	High-level input current	A, B, C	$V_{CC} = \text{MAX}$, $V_I = 2.4 \text{ V}$	40			40			μA	
		CC		80			80				
I_{IL}	Low-level input current	A, B, C	$V_{CC} = \text{MAX}$, $V_I = 0.4 \text{ V}$	-1.6			-1.6			mA	
		CC		-3.2			-3.2				
I_{OS}	Short-circuit output current§	$V_{CC} = \text{MAX}$, $V_O = 0$, $T_A = 25^\circ\text{C}$		-40	-90	-120	-40	-90	-120	mA	
I_{CC}	Supply current (both drivers)	All inputs at 0 V, No load, $T_A = 25^\circ\text{C}$		$V_{CC} = \text{MAX}$		47	65	47	65	mA	
				$V_{CC} = 7 \text{ V}$		65	85	65	85		

† All parameters with the exception of off-state open-collector output current are measured with the active pullup connected to the sink output. For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

‡ All typical values are at $T_A = 25^\circ\text{C}$ and $V_{CC} = 5 \text{ V}$, with the exception of V_{CC} at 7 V.

§ Only one output should be shorted at a time, and duration of the short-circuit should not exceed one second.

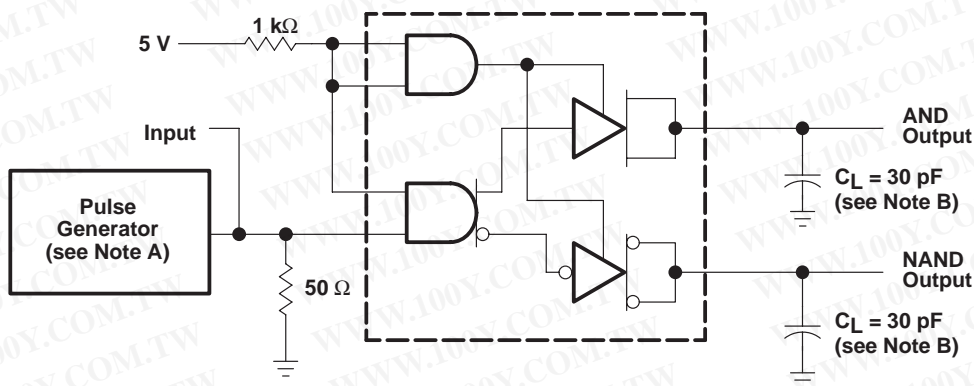
勝特力材料 886-3-5753170
 勝特力电子(上海) 86-21-54151736
 勝特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)



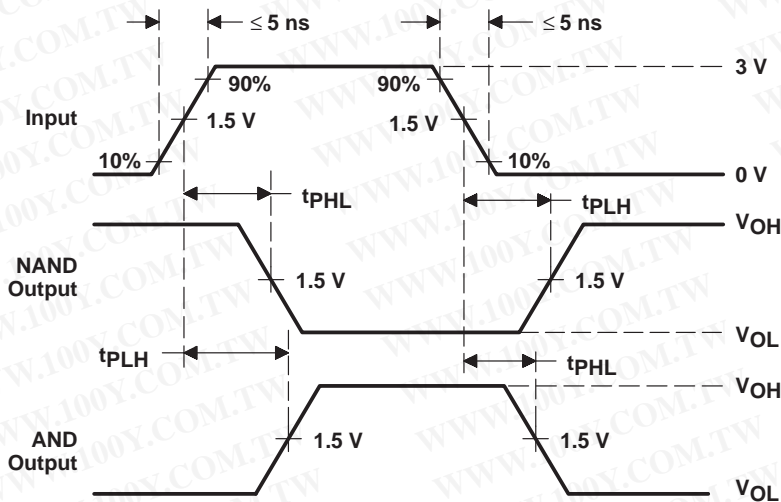
switching characteristics, $V_{CC} = 5\text{ V}$, $C_L = 30\text{ pF}$, $T_A = 25^\circ\text{C}$

PARAMETER	TEST CONDITIONS	SN55113			SN75113			UNIT
		MIN	TYP	MAX	MIN	TYP	MAX	
t_{PLH} Propagation delay time, low-to-high level output	See Figure 1		13	20		13	30	ns
t_{PHL} Propagation delay time, high-to-low-level output			12	20		12	30	ns
t_{PZH} Output enable time to high level	$R_L = 180\ \Omega$, See Figure 2		7	15		7	20	ns
t_{PZL} Output enable time to low level	$R_L = 250\ \Omega$, See Figure 3		14	30		14	40	ns
t_{PHZ} Output disable time from high level	$R_L = 180\ \Omega$, See Figure 2		10	20		10	30	ns
t_{PLZ} Output disable time from low level	$R_L = 250\ \Omega$, See Figure 3		17	35		17	35	ns

PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT



VOLTAGE WAVEFORMS

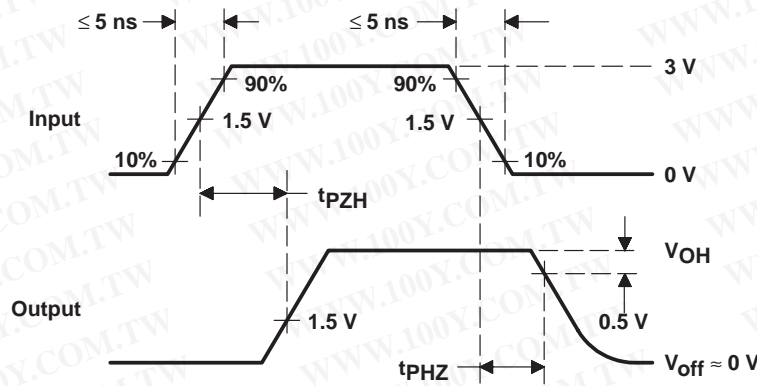
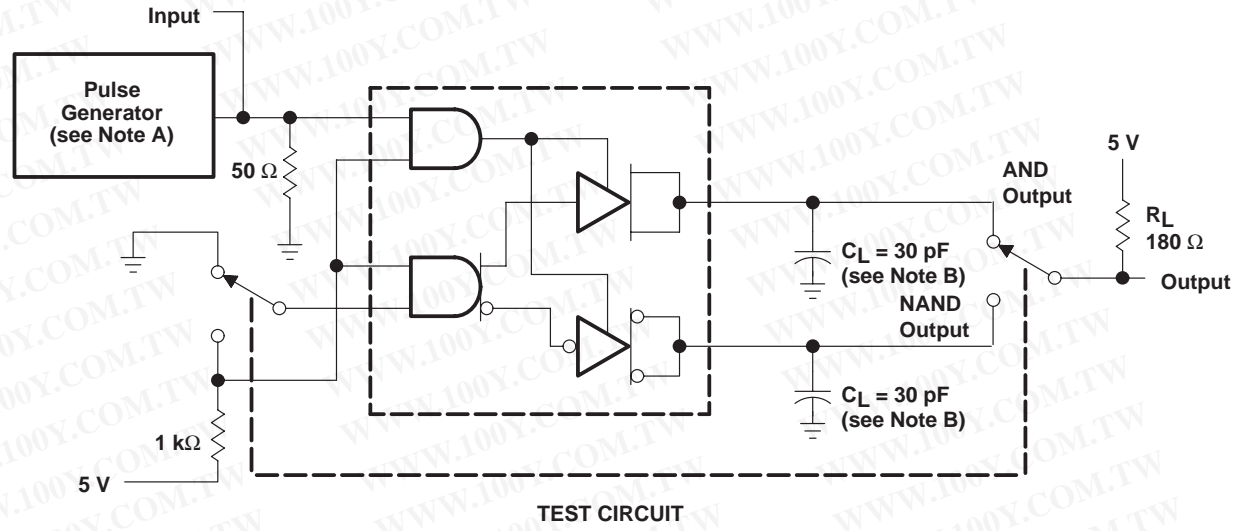
- NOTES: A. The pulse generator has the following characteristics: $Z_O = 50\ \Omega$, $PRR \leq 500\text{ kHz}$, $t_w = 100\text{ ns}$.
 B. C_L includes probe and jig capacitance.

Figure 1. Test Circuit and Voltage Waveforms t_{PLH} and t_{PHL}

SN55113, SN75113 DUAL DIFFERENTIAL LINE DRIVERS

SLLS070C – SEPTEMBER 1973 – REVISED MARCH 1997

PARAMETER MEASUREMENT INFORMATION



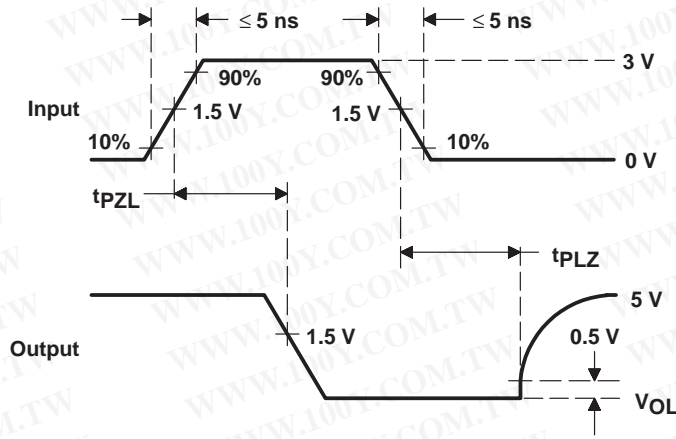
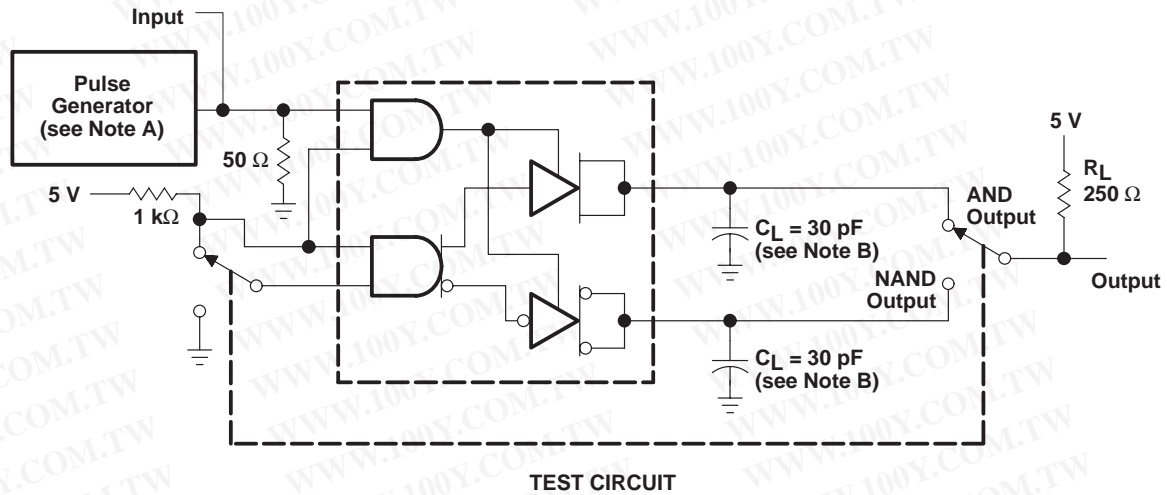
VOLTAGE WAVEFORMS

- NOTES: A. The pulse generator has the following characteristics: $Z_O = 50\ \Omega$, $PRR \leq 500\text{ kHz}$, $t_w = 100\text{ ns}$.
B. C_L includes probe and jig capacitance.

Figure 2. Test Circuit and Voltage Waveforms t_{pZH} and t_{pHZ}

勝特力材料 886-3-5753170
 勝特力电子(上海) 86-21-54151736
 勝特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)

PARAMETER MEASUREMENT INFORMATION



VOLTAGE WAVEFORMS

- NOTES: A. The pulse generator has the following characteristics: $Z_O = 50\ \Omega$, $PRR \leq 500\text{ kHz}$, $t_W = 100\text{ ns}$.
B. C_L includes probe and jig capacitance.

Figure 3. Test Circuit and Voltage Waveforms, t_{PZL} and t_{PLZ}

勝特力材料 886-3-5753170
勝特力电子(上海) 86-21-54151736
勝特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)

TYPICAL CHARACTERISTICS†

OUTPUT VOLTAGE
 vs
 DATA INPUT VOLTAGE

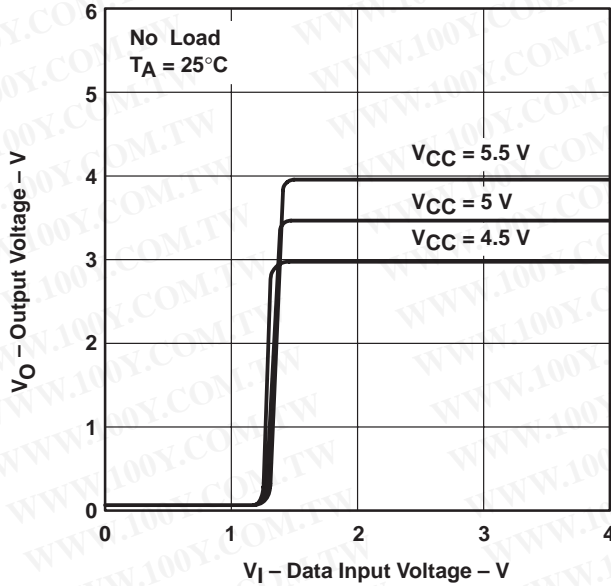


Figure 4

OUTPUT VOLTAGE
 vs
 DATA INPUT VOLTAGE

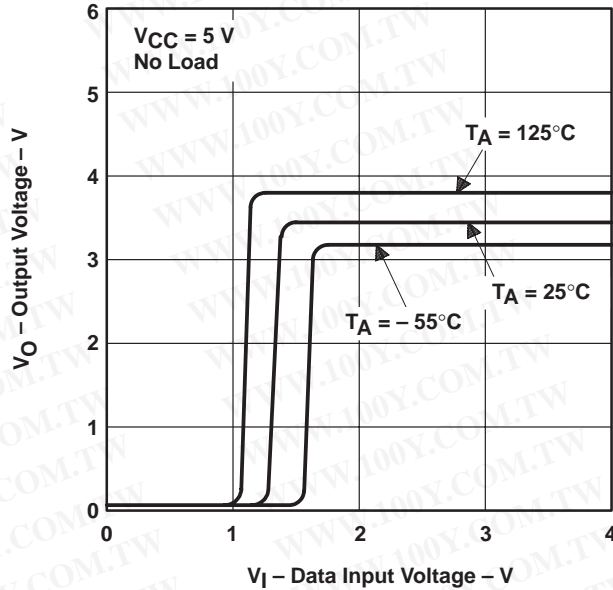


Figure 5

OUTPUT VOLTAGE
 vs
 INPUT VOLTAGE (OUTPUT CONTROL)

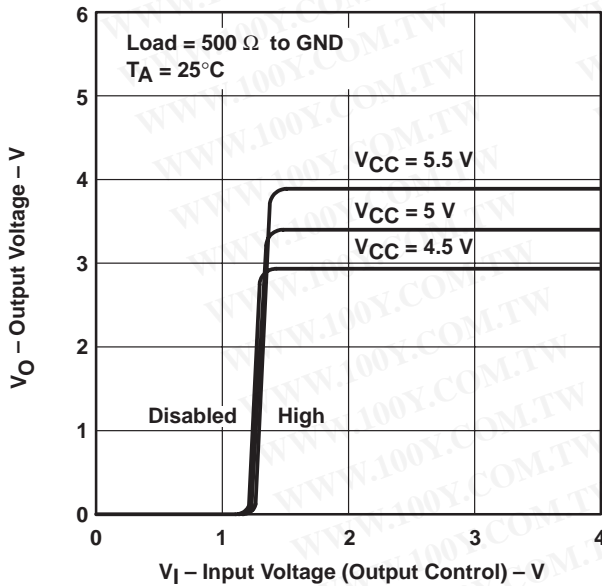


Figure 6

OUTPUT VOLTAGE
 vs
 INPUT VOLTAGE (OUTPUT CONTROL)

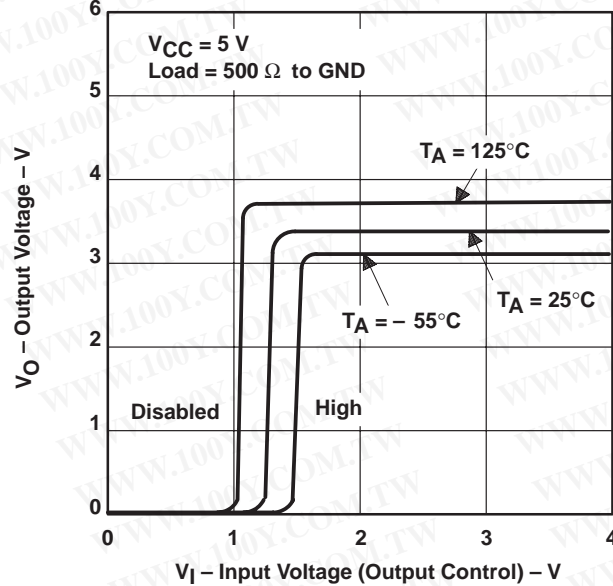


Figure 7

† Data for temperatures below 0°C and above 70°C and for supply voltages below 4.75 V and above 5.25 V are applicable to SN55113 circuits only. These parameters were measured with the active pullup connected to the sink output.

TYPICAL CHARACTERISTICS†

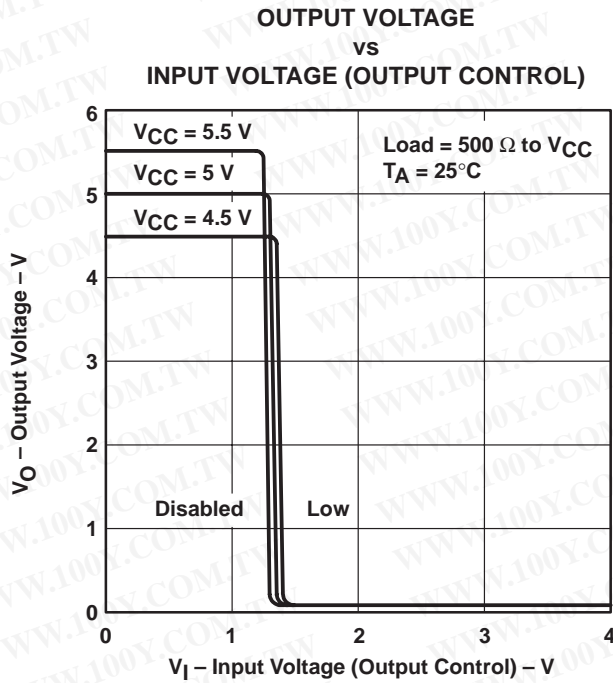


Figure 8

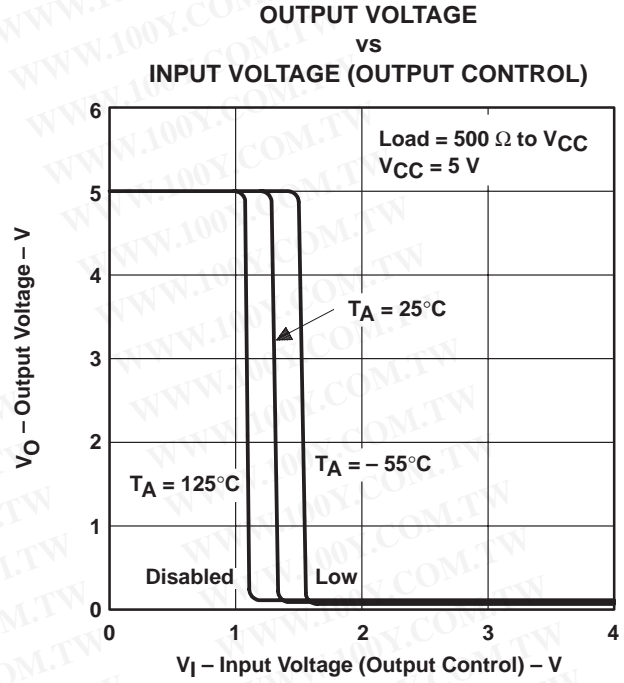


Figure 9

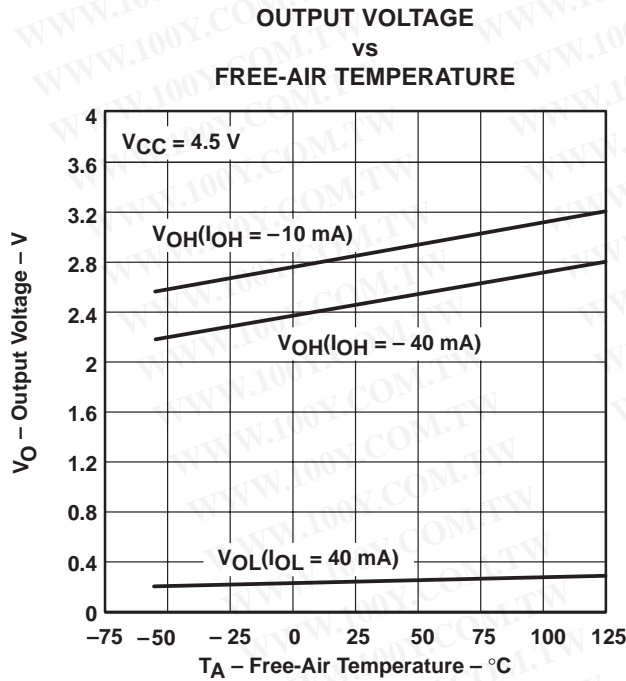


Figure 10

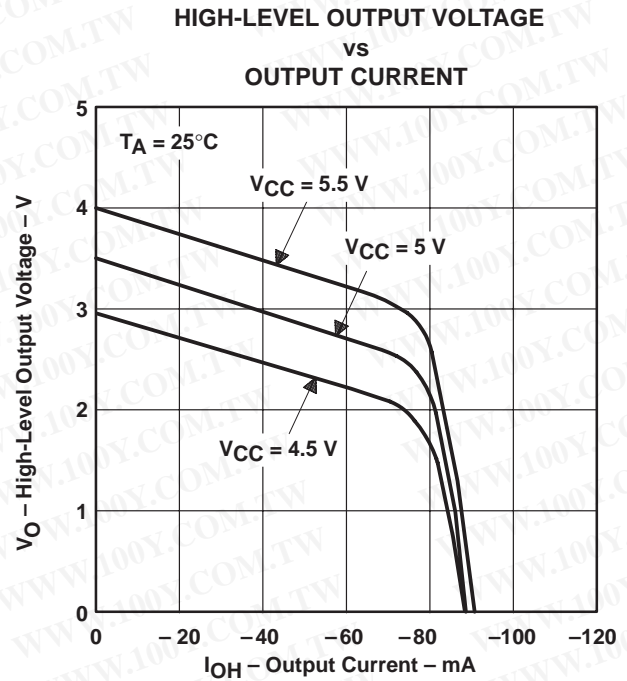


Figure 11

† Data for temperatures below 0°C and above 70°C and for supply voltages below 4.75 V and above 5.25 V are applicable to SN55113 circuits only. These parameters were measured with the active pullup connected to the sink output.

勝特力材料 886-3-5753170
 勝特力电子(上海) 86-21-54151736
 勝特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)

TYPICAL CHARACTERISTICS†

LOW-LEVEL OUTPUT VOLTAGE
 vs
 OUTPUT CURRENT

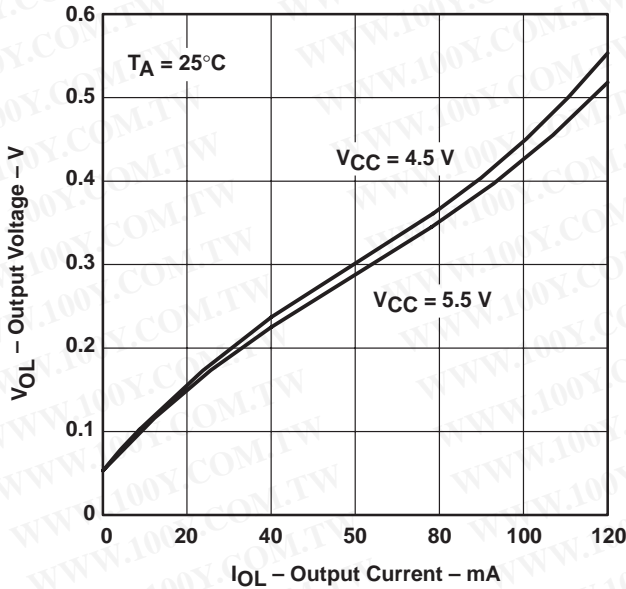


Figure 12

SUPPLY CURRENT
 (BOTH DRIVERS)
 vs
 SUPPLY VOLTAGE

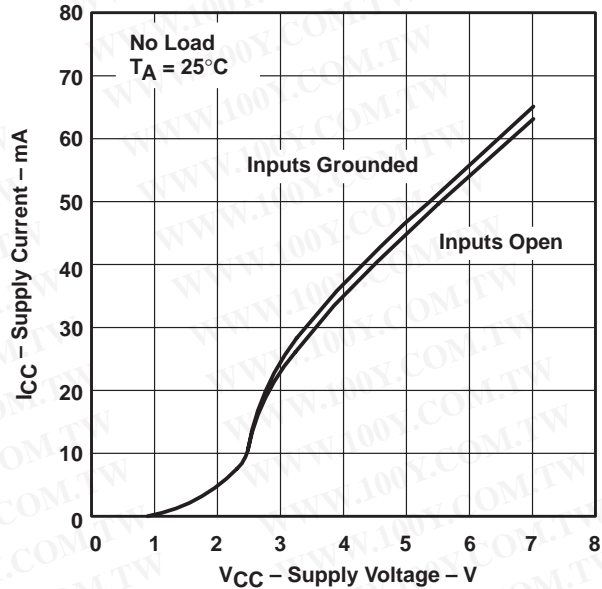


Figure 13

SUPPLY CURRENT
 (BOTH DRIVERS)
 vs
 OUTPUT CURRENT

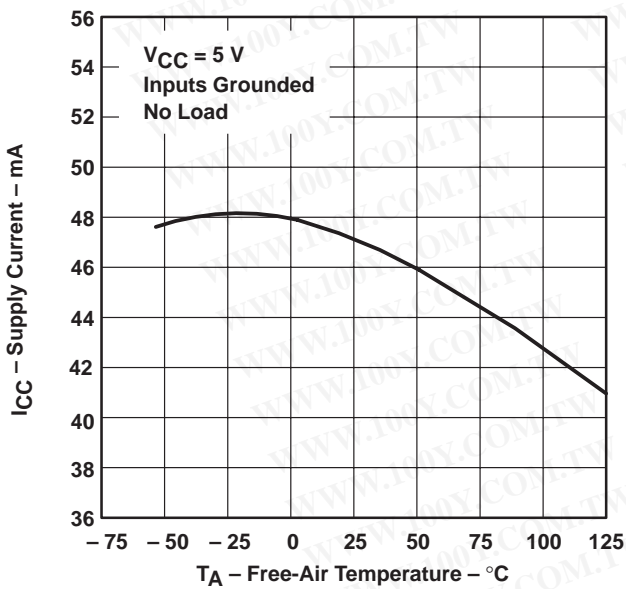


Figure 14

SUPPLY CURRENT
 (BOTH DRIVERS)
 vs
 SUPPLY VOLTAGE

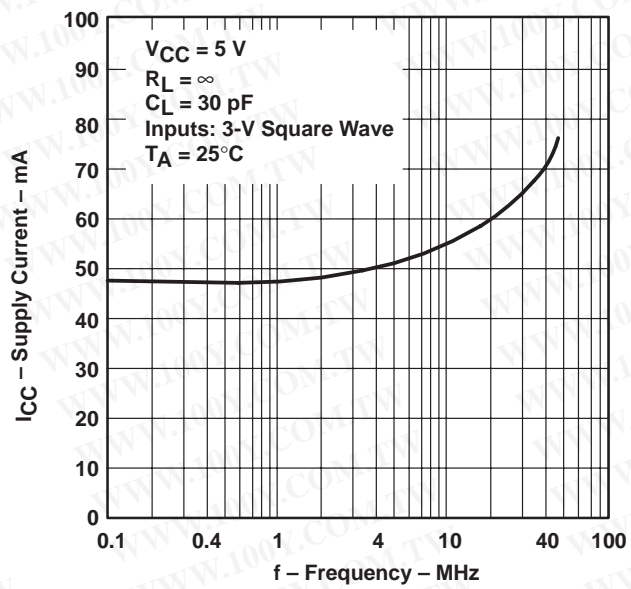


Figure 15

† Data for temperatures below 0°C and above 70°C and for supply voltages below 4.75 V and above 5.25 V are applicable to SN55113 circuits only. These parameters were measured with the active pullup connected to the sink output.

TYPICAL CHARACTERISTICS†

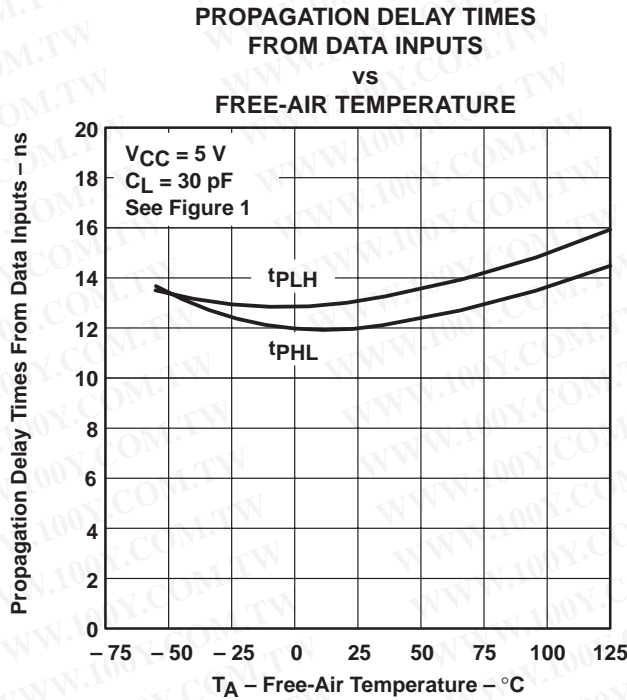


Figure 16

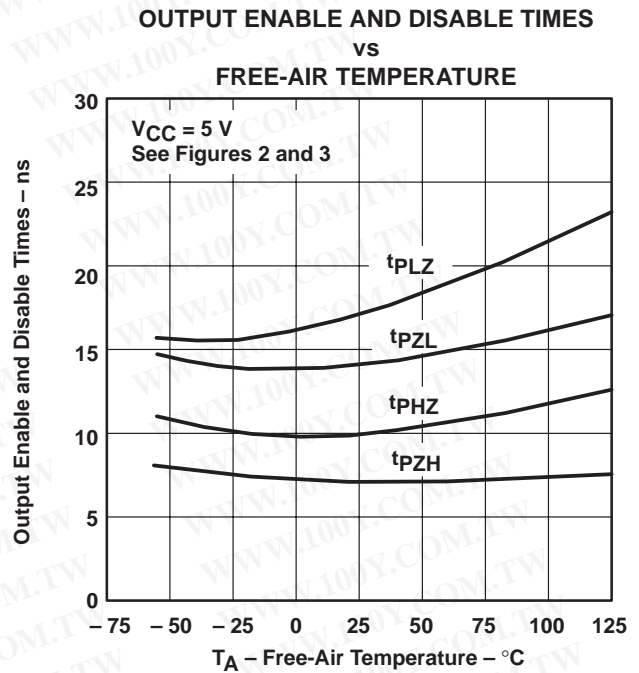
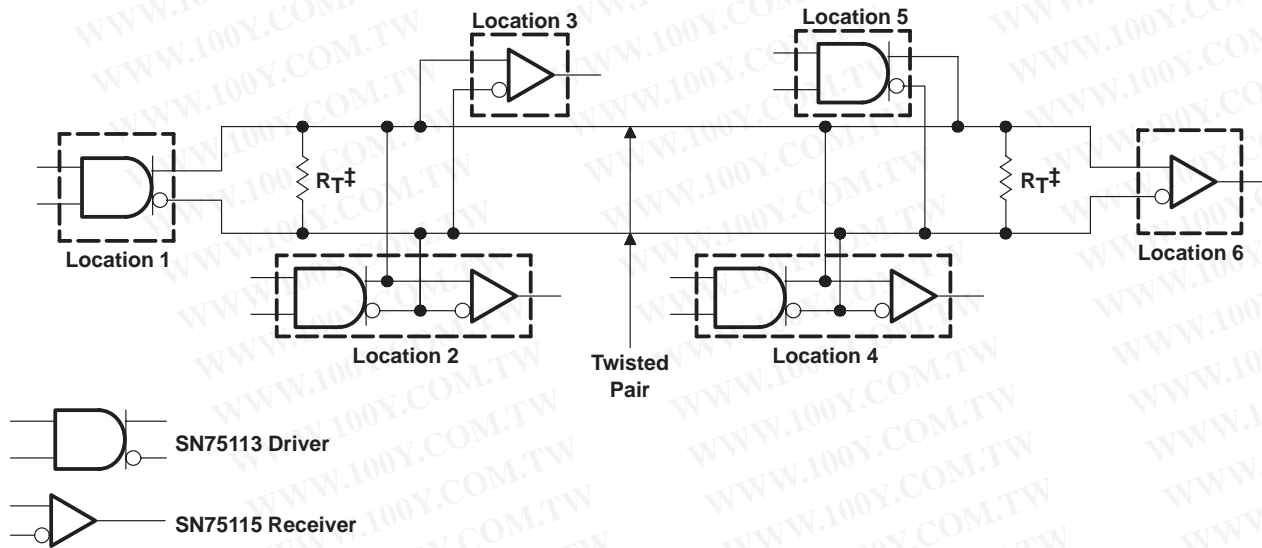


Figure 17

† Data for temperatures below 0°C and above 70°C and for supply voltages below 4.75 V and above 5.25 V are applicable to SN55113 circuits only. These parameters were measured with the active pullup connected to the sink output.

APPLICATION INFORMATION



‡ R_T = Z_O. A capacitor may be connected in series with R_T to reduce power dissipation.

Figure 18. Basic Party-Line or Data-Bus Differential Data Transmission

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
5962-88744012A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type
5962-8874401EA	ACTIVE	CDIP	J	16	1	TBD	A42 SNPB	N / A for Pkg Type
5962-8874401FA	ACTIVE	CFP	W	16	1	TBD	A42 SNPB	N / A for Pkg Type
JM38510/10405BEA	ACTIVE	CDIP	J	16	1	TBD	A42 SNPB	N / A for Pkg Type
SN55113J	ACTIVE	CDIP	J	16	1	TBD	A42 SNPB	N / A for Pkg Type
SN75113D	OBSOLETE	SOIC	D	16		TBD	Call TI	Call TI
SN75113DR	OBSOLETE	SOIC	D	16		TBD	Call TI	Call TI
SN75113N	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN75113NE4	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN75113NSR	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75113NSRE4	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75113NSRG4	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SNJ55113FK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type
SNJ55113J	ACTIVE	CDIP	J	16	1	TBD	A42 SNPB	N / A for Pkg Type
SNJ55113W	ACTIVE	CFP	W	16	1	TBD	A42 SNPB	N / A for Pkg Type

⁽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.

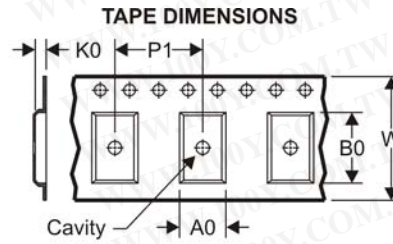
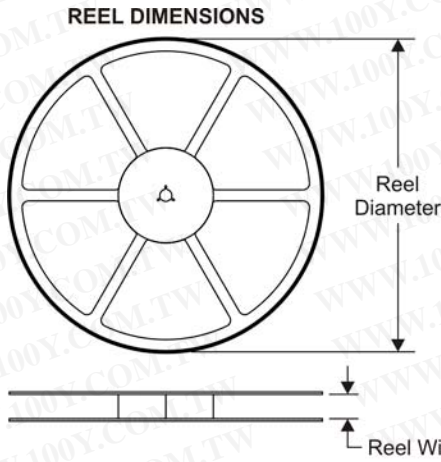
Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. 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.

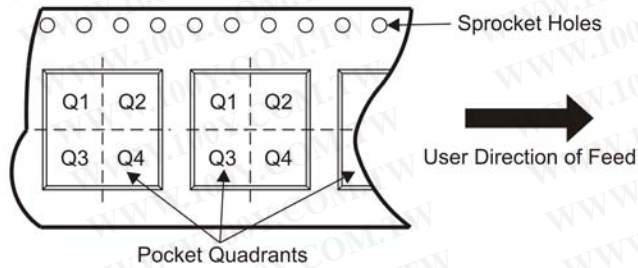
勝特力材料 886-3-5753170
勝特力电子(上海) 86-21-54151736
勝特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)

TAPE AND REEL INFORMATION



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

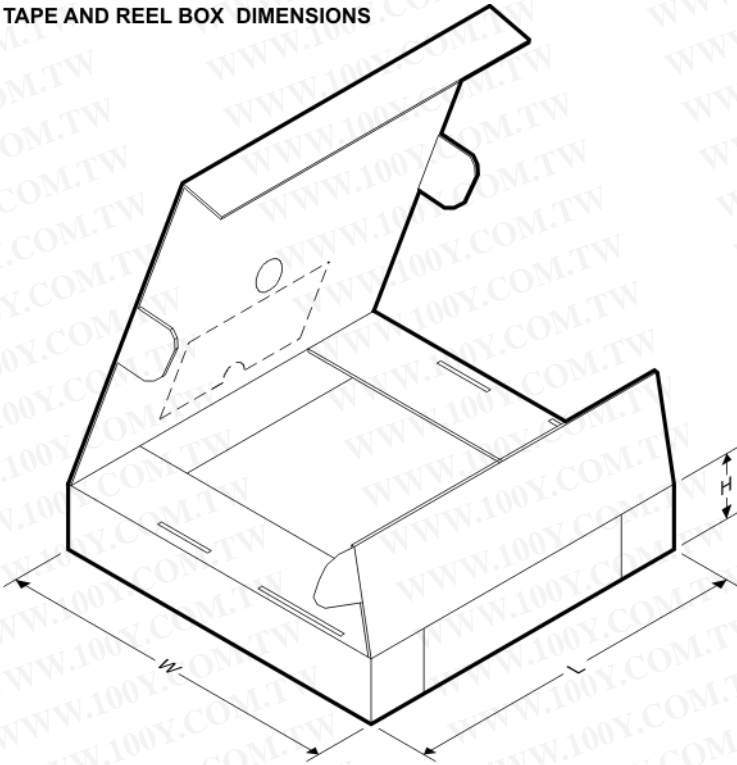


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN75113NSR	SO	NS	16	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) 86-21-54151736
 胜特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

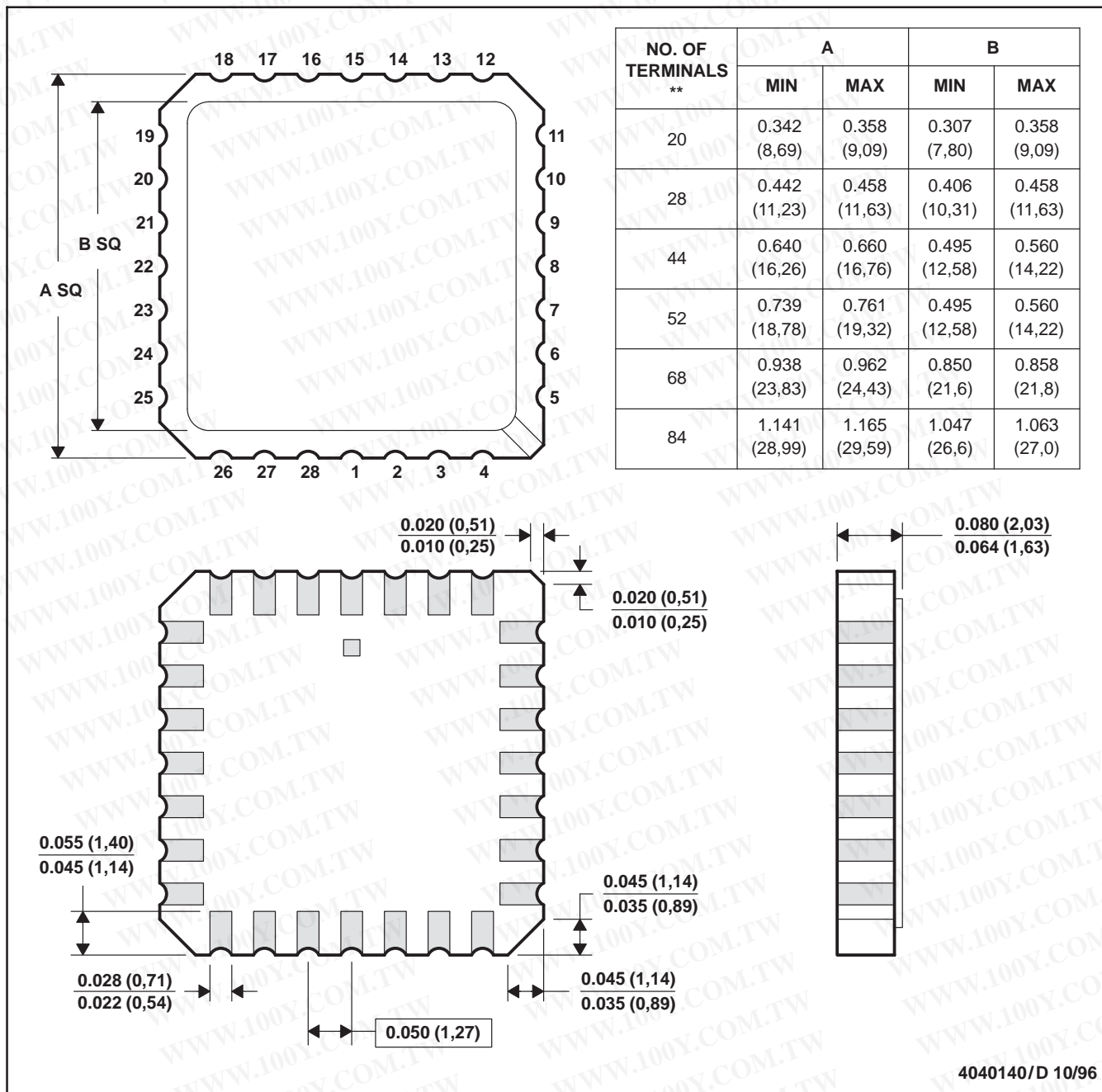
Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN75113NSR	SO	NS	16	2000	346.0	346.0	33.0

勝特力材料 886-3-5753170
 勝特力电子(上海) 86-21-54151736
 勝特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)

FK (S-CQCC-N**)

LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



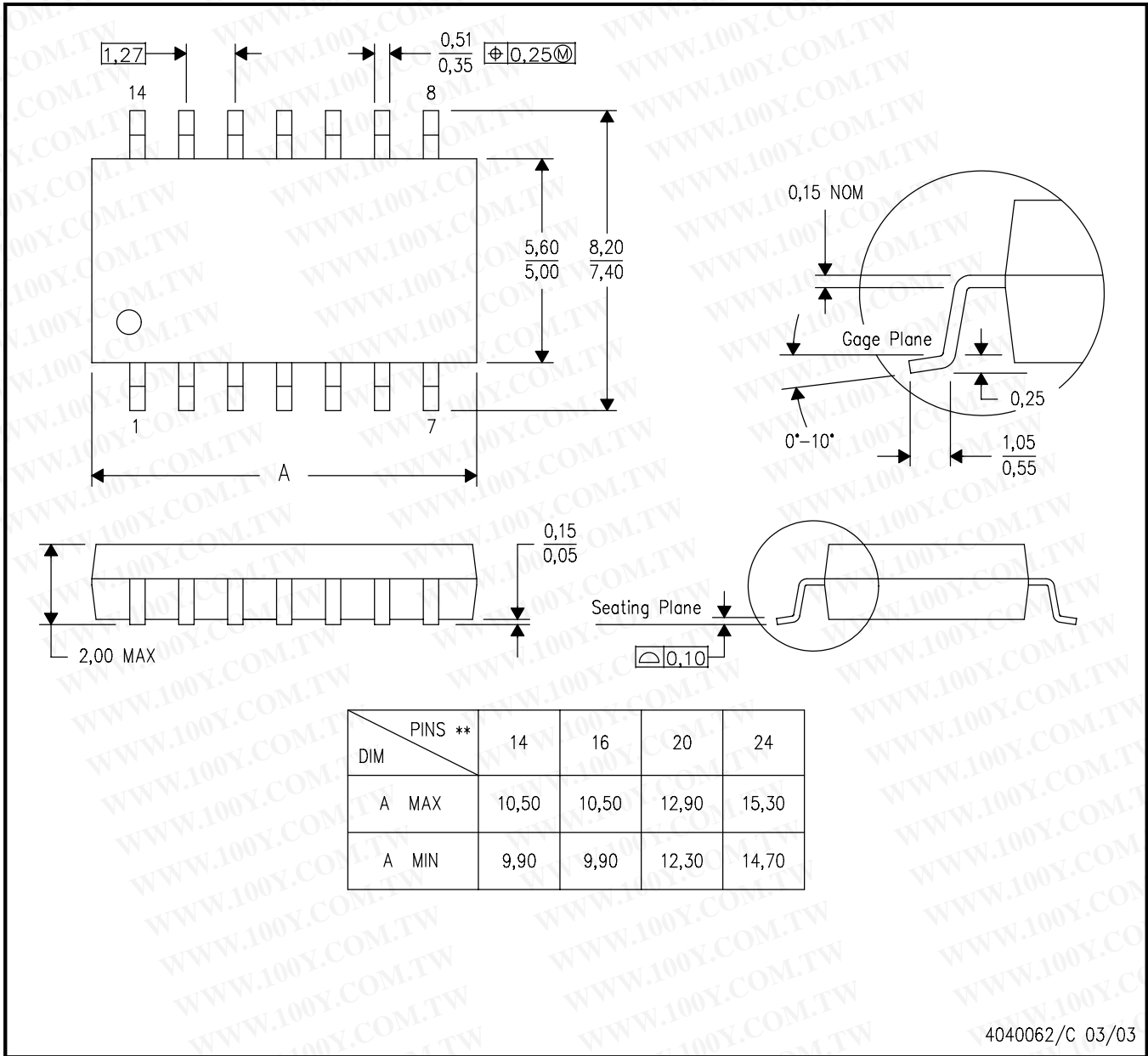
- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. This package can be hermetically sealed with a metal lid.
 - D. The terminals are gold plated.
 - E. Falls within JEDEC MS-004

勝特力材料 886-3-5753170
 勝特力电子(上海) 86-21-54151736
 勝特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)

MECHANICAL DATA

NS (R-PDSO-G**)
14-PINS SHOWN

PLASTIC SMALL-OUTLINE PACKAGE



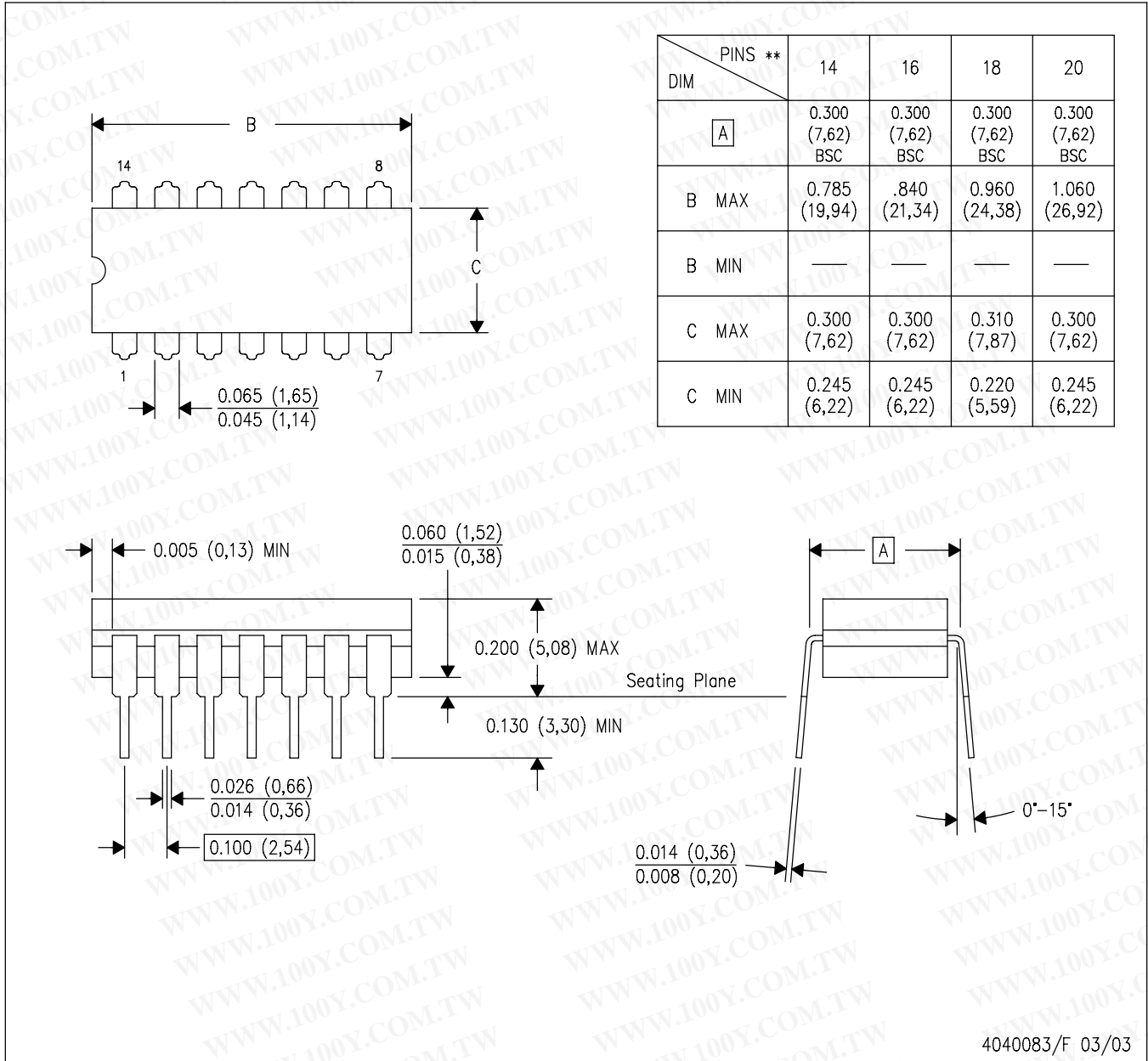
- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

勝特力材料 886-3-5753170
 勝特力电子(上海) 86-21-54151736
 勝特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)

J (R-GDIP-T**)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE

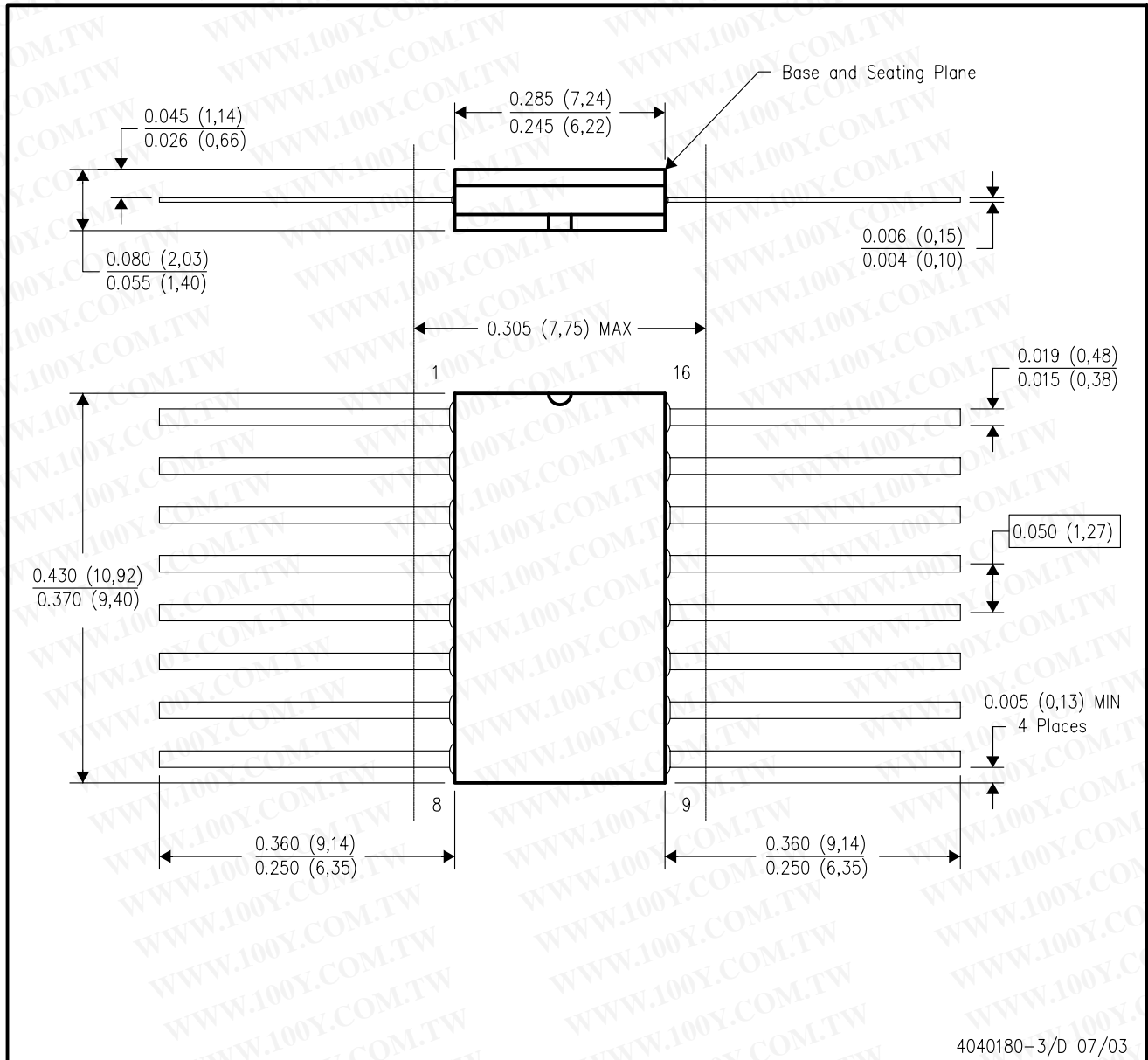


- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. This package is hermetically sealed with a ceramic lid using glass frit.
 - D. Index point is provided on cap for terminal identification only on press ceramic glass frit seal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

勝特力材料 886-3-5753170
勝特力电子(上海) 86-21-54151736
勝特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)

W (R-GDFP-F16)

CERAMIC DUAL FLATPACK

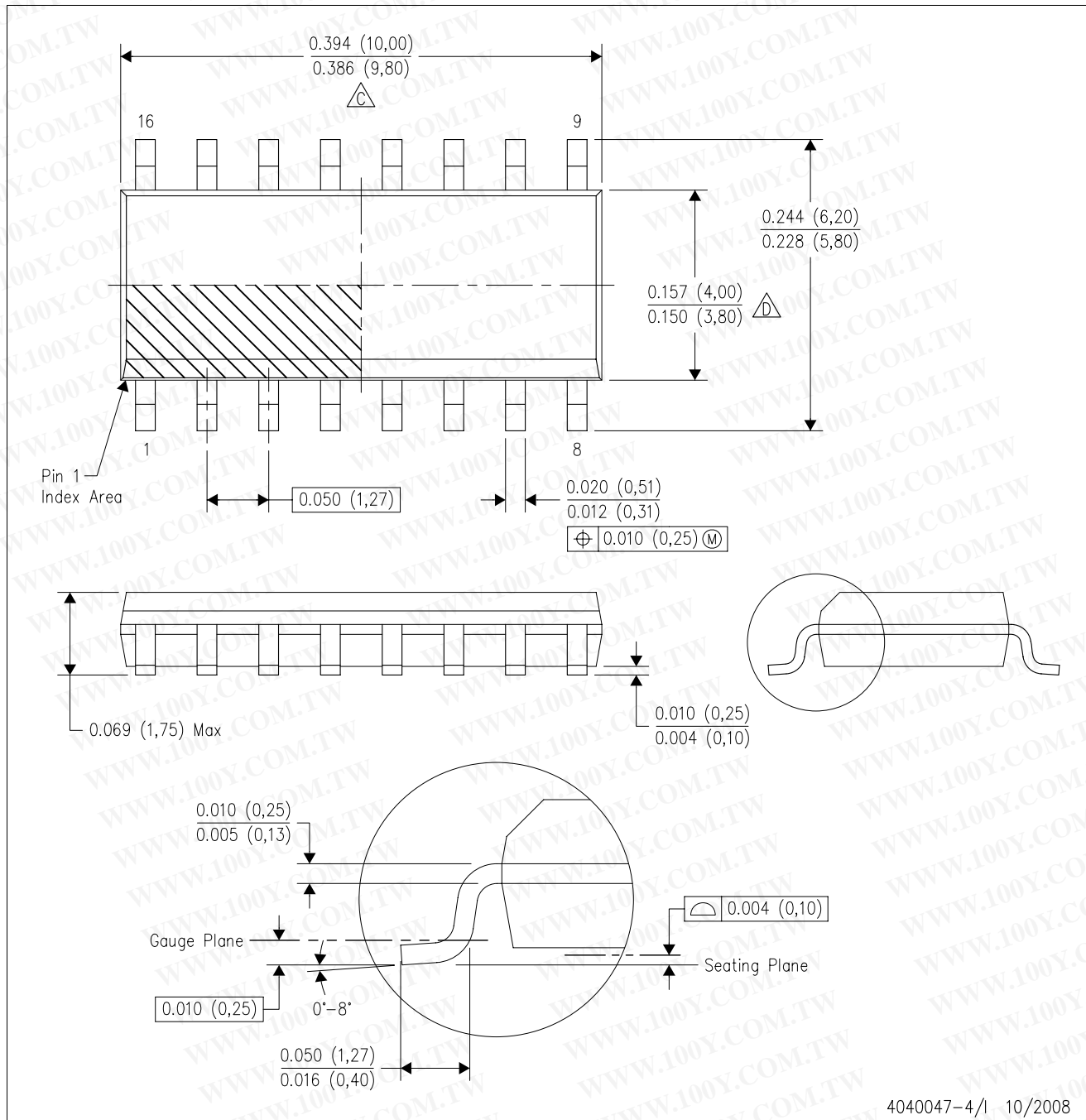


- NOTES:
- All linear dimensions are in inches (millimeters).
 - This drawing is subject to change without notice.
 - This package can be hermetically sealed with a ceramic lid using glass frit.
 - Index point is provided on cap for terminal identification only.
 - Falls within MIL STD 1835 GDFP1-F16 and JEDEC MO-092AC

勝特力材料 886-3-5753170
勝特力电子(上海) 86-21-54151736
勝特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)

D (R-PDSO-G16)

PLASTIC SMALL-OUTLINE PACKAGE

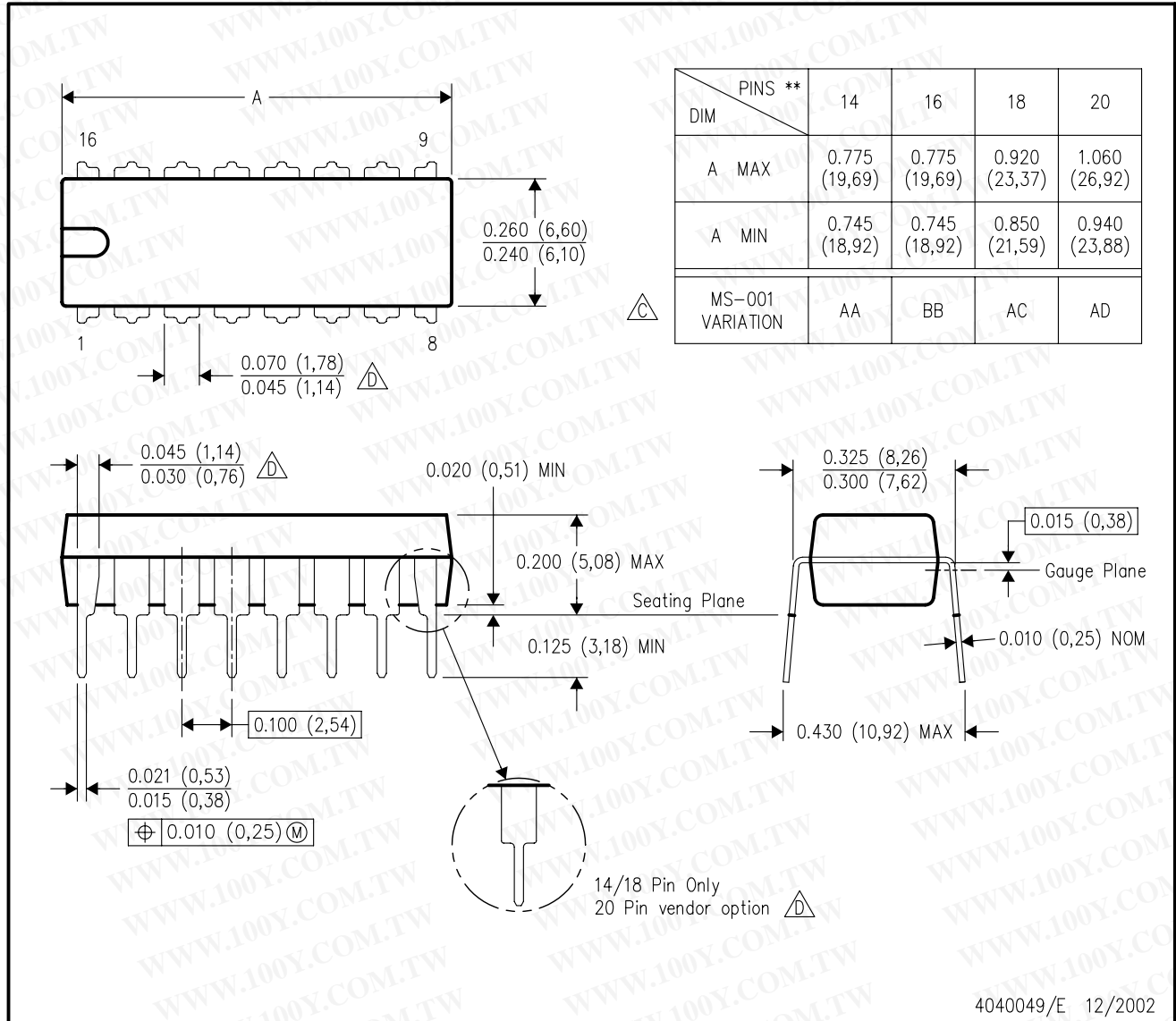


- NOTES:
- All linear dimensions are in inches (millimeters).
 - This drawing is subject to change without notice.
 - Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed .006 (0,15) per end.
 - Body width does not include interlead flash. Interlead flash shall not exceed .017 (0,43) per side.
 - Reference JEDEC MS-012 variation AC.

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.

勝特力材料 886-3-5753170
勝特力电子(上海) 86-21-54151736
勝特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.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

Amplifiers	amplifier.ti.com
Data Converters	dataconverter.ti.com
DSP	dsp.ti.com
Clocks and Timers	www.ti.com/clocks
Interface	interface.ti.com
Logic	logic.ti.com
Power Mgmt	power.ti.com
Microcontrollers	microcontroller.ti.com
RFID	www.ti.com/rfid.com
RF/IF and ZigBee® Solutions	www.ti.com/lprf

Applications

Audio	www.ti.com/audio
Automotive	www.ti.com/automotive
Broadband	www.ti.com/broadband
Digital Control	www.ti.com/digitalcontrol
Medical	www.ti.com/medical
Military	www.ti.com/military
Optical Networking	www.ti.com/opticalnetwork
Security	www.ti.com/security
Telephony	www.ti.com/telephony
Video & Imaging	www.ti.com/video
Wireless	www.ti.com/wireless

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2008, Texas Instruments Incorporated

勝特力材料 886-3-5753170
勝特力电子(上海) 86-21-54151736
勝特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)