INTEGRATED CIRCUITS

DATA SHEET

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

74LVC04AHex inverter

Product specification
Supersedes data of 1997 Mar 28
IC24 Data Handbook

1997 Jun 30





Hex inverter **74LVC04A**

FEATURES

- Wide supply range of 1.2V to 3.6V
- Complies with JEDEC standard no. 8-1A
- Inputs accept voltages up to 5.5V
- CMOS low power consumption
- Direct interface with TTL levels
- 5-volt tolerant inputs, for interfacing with 5-volt logic

DESCRIPTION

The 74LVC04A is a high-performance, low-power, low-voltage, Si-gate CMOS device and superior to most advanced CMOS compatible TTL families.

Inputs can be driven from either 3.3 V or 5 V devices. This feature allows the use of these devices as translators in a mixed 3.3 V/5 V environment.

The 74LVC04A provides six inverting buffers.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	TYPICAL	UNIT
t _{PHL} /t _{PLH}	Propagation delay nA to nY	$C_L = 50 \text{ pF};$ $V_{CC} = 3.3 \text{ V}$	2.5	ns
Cı	Input capacitance	MMM. ON.CO.	5.0	pF
C _{PD}	Power dissipation capacitance per gate	Notes 1 and 2	25	pF

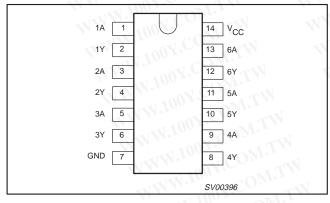
NOTES:

- 1. C_{PD} is used to determine the dynamic power dissipation (P $_{\!D}$ in $\mu W)$ $P_D = C_{PD} \times V_{CC}^2 \times f_i + \sum (C_L \times V_{CC}^2 \times f_o)$ where: f_i = input frequency in MHz; C_L = output load capacity in pF; f_0 = output frequency in MHz; V_{CC} = supply voltage in V; $\sum (C_L \times V_{CC}^2 \times f_0)$ = sum of the outputs.
- The condition is V_I = GND to V_{CC}.

ORDERING INFORMATION

$\sum_{c} (C_L \times V_{CC}^2 \times f_0) = \text{sum of the}$ 2. The condition is $V_I = GND$ to V_{CC} .	outputs.			
PACKAGES	TEMPERATURE RANGE	OUTSIDE NORTH AMERICA	NORTH AMERICA	DWG NUMBER
14-Pin Plastic SO	-40°C to +85°C	74LVC04A D	74LVC04A D	SOT108-1
14-Pin Plastic SSOP Type II	-40°C to +85°C	74LVC04A DB	74LVC04A DB	SOT337-1
14-Pin Plastic TSSOP Type I	-40°C to +85°C	74LVC04A PW	74LVC04APW DH	SOT402-1

PIN CONFIGURATION



PIN DESCRIPTION

PIN NUMBER	SYMBOL	NAME AND FUNCTION
1, 3, 5, 9, 11, 13	1A to 6A	Data inputs
2, 4, 6, 8, 10, 12	1Y to 6Y	Data outputs
7	GND	Ground (0 V)
14	V _{CC}	Positive supply voltage

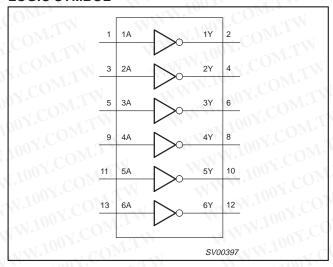
勝 特 力 材 料 886-3-5753170 胜特力电子(上海) 86-21-54151736 胜特力电子(深圳) 86-755-83298787 Http://www. 100y. com. tw

WWW.100Y.COM.

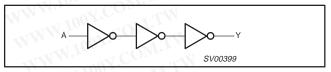
WWW.100Y.COM.

WWW.100X IW.100Y.COM.T 74LVC04A Hex inverter

LOGIC SYMBOL



LOGIC DIAGRAM (ONE GATE)



FUNCTION TABLE

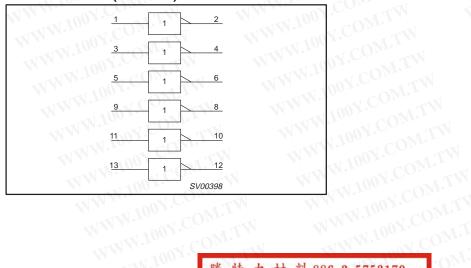
INPUTS	OUTPUTS
nA	nY
MIEW. OOY.	H W
HNW. I	CONT.

NOTES:

WWW.100Y.COM.TW H = HIGH voltage level WWW.100Y.COM.TW L = LOW voltage level

WW.100Y.COM.TW

LOGIC SYMBOL (IEEE/IEC)



WWW.100Y.COM.TW 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 WWW.100Y.COM.TW

WWW.100Y.COM.TW WWW.100Y.COM.TW THE TOOY.COM.TW 1997 Jun 30

WWW.100Y.COM

74LVC04A Hex inverter

RECOMMENDED OPERATING CONDITIONS

OVMDOL	MANN'IL COMP.	CONDITIONS	CONTAL	MITS	
SYMBOL	PARAMETER	CONDITIONS	MIN	MAX	UNIT
V _{CC}	DC supply voltage (for max. speed performance)	TWW.IO.	2.7	3.6	V
V _{CC}	DC supply voltage (for low-voltage applications)	W.W.10	1.2	3.6	V
VI	DC Input voltage range	N N TIN.	0	5.5	V
Vo	DC output voltage range	M. M.	00 0	V _{CC}	V
T _{amb}	Operating ambient temperature range in free-air	TW WWW	-40	+85	°C
t _r , t _f	Input rise and fall times	$V_{CC} = 1.2 \text{ to } 2.7 \text{V}$ $V_{CC} = 2.7 \text{ to } 3.6 \text{V}$	N 10 0 V C	20 10	ns/V

ABSOLUTE MAXIMUM RATINGS¹

SYMBOL	PARAMETER	CONDITIONS	RATING	UNIT
Vcc	DC supply voltage	CONT.	-0.5 to +6.5	V
I _{IK}	DC input diode current	V ₁ < 0	-50	_≪ mA
VI	DC input voltage	Note 2	-0.5 to +5.5	V
lok	DC output diode current	$V_{O} > V_{CC}$ or $V_{O} < 0$	±50	mA
Vo	DC output voltage	Note 2	V _{CC} + 0.5	V
lo	DC output source or sink current	$V_O = 0$ to V_{CC}	±50	mA
I _{GND} , I _{CC}	DC V _{CC} or GND current	M. Ing. COM.	±100	mA
T _{stg}	Storage temperature range	W.100 x. COW. I.	-65 to +150	√ °C
P _{TOT}	Power dissipation per package – plastic mini-pack (SO) – plastic shrink mini-pack (SSOP and TSSOP)	above +70°C derate linearly with 8 mW/K above +60°C derate linearly with 5.5 mW/K	500 500	mW

NOTES:

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 WWW.100Y.COM.TW

WWW.100Y.COM.TV WWW.100Y.COM.T 100Y.CO.4 1997 Jun 30

^{1.} Stresses beyond those listed 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.

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

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

74LVC04A

DC CHARACTERISTICS

Over recommended operating conditions voltages are referenced to GND (ground = 0V)

T.Mo.	W. 100x.	WI.TW. 100 1.	M	IMITS		
SYMBOL	PARAMETER	TEST CONDITIONS	Temp = -	·40°C to	+85°C	וואט 🖥
	TW WWW. 100Y.	CONTEM WWW. 100X.C	MIN	TYP ¹	MAX	1
A.COM	LHCLI level lenut veltege	V _{CC} = 1.2V	V _{CC}			
V _{IH}	HIGH level Input voltage	V _{CC} = 2.7 to 3.6V	2.0	N		7 °
w c0	LOW layed langer yellows	V _{CC} = 1.2V	A.COM.	W	GND	\ \
VIL	LOW level Input voltage	V _{CC} = 2.7 to 3.6V	COM.		0.8	1 '
1007.	ON.TH WY	$V_{CC} = 2.7V$; $V_I = V_{IH}$ or V_{IL} ; $I_O = -12mA$	V _{CC} -0.5	1		
100Y.	LUCI Haval autout valtage	$V_{CC} = 3.0V; V_I = V_{IH} \text{ or } V_{IL}; I_O = -100\mu\text{A}$	V _{CC} -0.2	V _{CC}] ,
V _{OH}	HIGH level output voltage	$V_{CC} = 3.0V; V_I = V_{IH} \text{ or } V_{IL}; I_O = -18\text{mA}$	V _{CC} -0.6	M.T.W		1 °
	COM. WAL	$V_{CC} = 3.0V$; $V_I = V_{IH}$ or V_{IL} ; $I_O = -24$ mA	V _{CC} -0.8	MIT		1
Miros	V.COM. WW	$V_{CC} = 2.7V$; $V_I = V_{IH}$ or V_{IL} ; $I_O = 12mA$	" CI	D2"	0.40	
V _{OL}	LOW level output voltage	$V_{CC} = 3.0V; V_I = V_{IH} \text{ or } V_{IL}; I_O = 100 \mu A$	M. T. CON.	OMr.	0.20	1 v
	M. CONTIN	$V_{CC} = 3.0V$; $V_I = V_{IH}$ or V_{IL} ; $I_O = 24$ mA	MANTON	CO_{M_I}	0.55	1
N IL	Input leakage current	V _{CC} = 3.6V; V _I = 5.5V or GND	W.100	±0.1	±5	μΑ
I _{CC}	Quiescent supply current	$V_{CC} = 3.6V; V_{I} = V_{CC} \text{ or GND}; I_{O} = 0$	W.100	0.1	10	μΑ
ΔI_{CC}	Additional quiescent supply current per input pin	$V_{CC} = 2.7V$ to 3.6V; $V_I = V_{CC} - 0.6V$; $I_O = 0$	N 10	5	500	μА

AC CHARACTERISTICS

GND = 0 V; $t_r = t_f \le 2.5 \text{ ns}$; $C_L = 50 \text{ pF}$

	1001	W.T.	1	TW 10	CC	LIMI	TS	-41	W.Too	O_{Mr} .
SYMBOL	PARAMETER	WAVEFORM	V _{CC}	= 3.3V ±	0.3V	TIL	V _{CC} = 2.7\	V ///	V _{CC} = 1.2V	UNIT
	TWW.In	ONI.	MIN TYP ¹ MAX MIN		TYP	P MAX TYP		COR		
t _{PHL} / t _{PLH}	Propagation delay nA to nY	COM-1	1.5	2.5	4.5	1.5	3.2	5.5	16.0	Cns

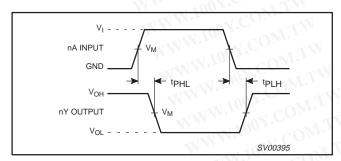
NOTE:

AC WAVEFORMS

 V_M = 1.5 V at $V_{CC} \ge 2.7$ V

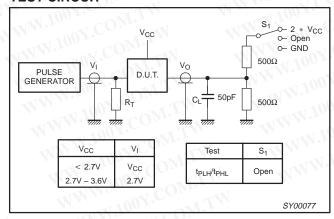
 $V_M = 0.5 \cdot V_{CC}$ at $V_{CC} < 2.7 \text{ V}$

V_{OL} and V_{OH} are the typical output voltage drop that occur with the output load.



Waveform 1. Input (nA) to output (nY) propagation delays.

TEST CIRCUIT



Waveform 2. Load circuitry for switching times.

100X.COM 1997 Jun 30

^{1.} All typical values are at V_{CC} = 3.3V and T_{amb} = 25°C.

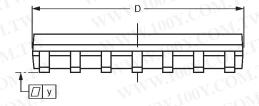
^{1.} These typical values are at V_{CC} = 3.3V and T_{amb} = 25°C.

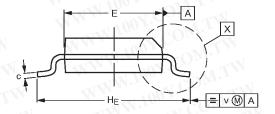
Hex inverter 74LVC04A

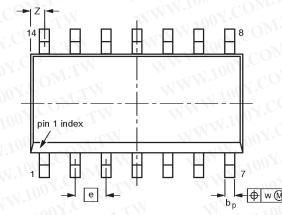
SO14: plastic small outline package; 14 leads; body width 3.9 mm

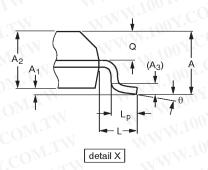
SOT108-1

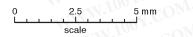












DIMENSIONS (inch dimensions are derived from the original mm dimensions)

A max.	Α1	A ₂	A ₃	bp	c	D ⁽¹⁾	E ⁽¹⁾	е	HE	750	Lp	Q	V	w	у	Z ⁽¹⁾	θ
1.75	0.25 0.10	1.45 1.25	0.25	0.49 0.36	0.25 0.19	8.75 8.55	4.0	1.27	6.2 5.8	1.05	1.0 0.4	0.7 0.6	0.25	0.25	0.1	0.7 0.3	8°
กกผิน			0.01			0.35 0.34	0.16 0.15	0.050	0.24 0.23	0.041			0.01	0.01	0.004	0.028 0.012	0°
	1.75	nax. A1 1.75 0.25 0.10 0.0098	max. A1 A2 1.75 0.25 1.45 0.10 1.25	nax. A1 A2 A3 1.75 0.25 0.10 1.45 1.25 0.25 0.098 0.057 0.01	max. A1 A2 A3 bp 1.75 0.25 1.45 0.25 0.49 0.10 1.25 0.25 0.36 0.009 0.0098 0.057 0.01 0.019	max. A1 A2 A3 bp c 1.75 0.25 1.45 0.25 0.49 0.25 0.10 1.25 0.25 0.36 0.19 0.069 0.0098 0.057 0.01 0.019 0.0098	nax. A1 A2 A3 bp c D(1) 1.75 0.25 1.45 0.25 0.49 0.25 8.75 0.00 1.25 0.25 0.36 0.19 8.55 0.009 0.0098 0.057 0.01 0.019 0.0098 0.35	max. A1 A2 A3 bp c D(1) E(1) 1.75 0.25 1.45 0.25 0.49 0.25 8.75 4.0 1.069 0.0098 0.057 0.01 0.019 0.0098 0.35 0.16	max. A1 A2 A3 bp c D00 E00 e 1.75 0.25 1.45 0.25 0.49 0.25 8.75 4.0 1.27 1.069 0.0098 0.057 0.01 0.019 0.0098 0.35 0.16 0.050	max. A1 A2 A3 bp c D(1) E(1) e HE 1.75 0.25 1.45 0.25 0.49 0.25 8.75 4.0 1.27 6.2 1.069 0.0098 0.057 0.01 0.019 0.0098 0.35 0.16 0.050 0.24	max. A1 A2 A3 bp C D(1) E(1) e HE L 1.75 0.25 1.45 0.25 0.49 0.25 8.75 4.0 1.27 6.2 5.8 1.05 1.05 0.0098 0.057 0.01 0.019 0.0098 0.35 0.16 0.050 0.24 0.041	max. A1 A2 A3 bp c D(1) E(1) e HE L Lp 1.75 0.25 1.45 0.25 0.49 0.25 8.75 4.0 1.27 6.2 1.05 1.0 0.4 1.069 0.0098 0.057 0.01 0.019 0.0098 0.35 0.16 0.050 0.24 0.041 0.039	max. A1 A2 A3 bp c D(1) E(1) e HE L Lp Q 1.75 0.25 1.45 0.25 0.49 0.25 8.75 4.0 1.27 6.2 1.05 1.0 0.7 0.4 0.6 1.069 0.0098 0.057 0.01 0.019 0.0098 0.35 0.16 0.050 0.24 0.041 0.039 0.028	max. A1 A2 A3 bp c D(7) E(7) e HE L Lp Q V 1.75 0.25 1.45 0.25 0.49 0.25 8.75 4.0 1.27 6.2 1.05 1.0 0.7 0.6 0.25 0.069 0.0098 0.057 0.01 0.019 0.0098 0.35 0.16 0.050 0.24 0.041 0.039 0.028 0.01	max. A1 A2 A3 bp c D(1) E(1) e HE L Lp Q V W 1.75 0.25 1.45 0.25 0.49 0.25 8.75 4.0 1.27 6.2 1.05 1.0 0.7 0.25 0.25 0.25 0.36 0.19 8.55 3.8 1.27 5.8 1.05 0.4 0.6 0.25 0.25 0.25 1.069 0.0098 0.057 0.01 0.019 0.0098 0.35 0.16 0.050 0.24 0.041 0.039 0.028 0.01 0.01	max. A1 A2 A3 bp c D(1) E(1) e HE L Lp Q V W Y 1.75 0.25 1.45 0.25 0.49 0.25 8.75 4.0 1.27 6.2 1.05 1.0 0.7 0.25 0.25 0.1 1.05 0.00 1.05 0.04 0.6 0.25 0.25 0.1 1.06 0.0098 0.057 0.01 0.019 0.0098 0.35 0.16 0.050 0.24 0.04 0.039 0.028 0.01 0.01 0.004	max. A1 A2 A3 bp c D(1) E(1) e HE L Lp Q V W y Z(1) 1.75 0.25 1.45 0.25 0.49 0.25 8.75 4.0 1.27 6.2 1.05 1.0 0.7 0.25 0.25 0.1 0.7 0.3 1.069 0.0098 0.057 0.01 0.019 0.0098 0.35 0.16 0.050 0.24 0.041 0.039 0.028 0.01 0.01 0.004 0.028

OUTLINE	WW	REFERE	NCES		EUROPEAN	IOOUE DATE
VERSION	IEC	JEDEC	EIAJ	TANNI. I	PROJECTION	ISSUE DATE
SOT108-1	076E06\$	MS-012AB	VII	MMM'II		91-08-13 95-01-23
		MAN JOAN CO	W.	WWW.	TO COMP.	

100Y.CO% 1997 Jun 30

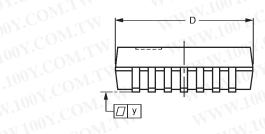
Hex inverter

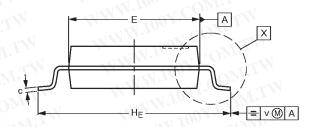
勝 特 力 材 料 886-3-5753170 胜特力电子(上海) 86-21-54151736 胜特力电子(深圳) 86-755-83298787 Http://www. 100y. com. tw

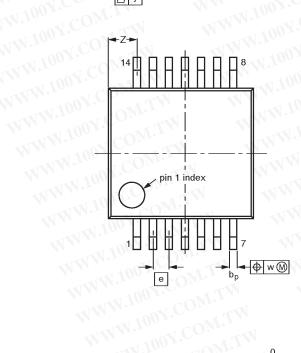
74LVC04A

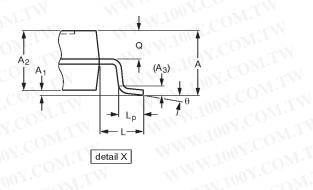
SSOP14: plastic shrink small outline package; 14 leads; body width 5.3 mm

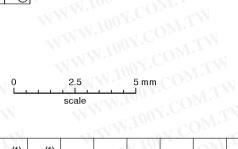
SOT337-1











DIMENSIONS (mm are the original dimensions)

TINI	A max.	Α1	A ₂	A ₃	b _p	c	D ⁽¹⁾	E ⁽¹⁾	е	HE	1.50	Lp	Q	٧	w	у	Z ⁽¹⁾	θ
mm	2.0	0.21 0.05	1.80 1.65	0.25	0.38 0.25	0.20 0.09	6.4 6.0	5.4 5.2	0.65	7.9 7.6	1.25	1.03 0.63	0.9 0.7	0.2	0.13	0.1	1.4 0.9	8° 0°

OUTLINE		REFERE	NCES		EUROPEAN	IOOUE DATE
VERSION	IEC	JEDEC	EIAJ	TWW.Io.	PROJECTION	ISSUE DATE
SOT337-1	- N	MO-150AB	VII	MMM.10		95-02-04 96-01-18
		WW.100 Z CC	W.r.	I.WWW.	ON COM	

WWW.100Y.CO THE TONY, CONT. TW 1997 Jun 30

Hex inverter

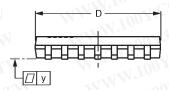
特力材料886-3-5753170 胜特力电子(上海) 86-21-54151736 胜特力电子(深圳) 86-755-83298787

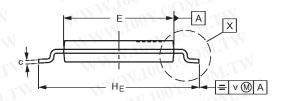
Http://www. 100y. com. tw

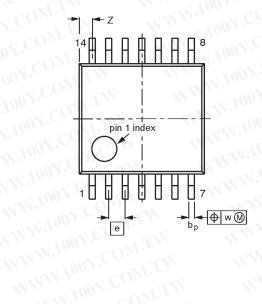
74LVC04A

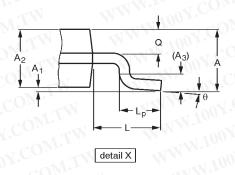
TSSOP14: plastic thin shrink small outline package; 14 leads; body width 4.4 mm

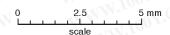
SOT402-1











DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A ₁	A ₂	A ₃	bр	C	D (1)	E (2)	е	HE	150	Lp	Q	v	w	у	Z (1)	θ
mm	1.10	0.15 0.05	0.95 0.80	0.25	0.30 0.19	0.2 0.1	5.1 4.9	4.5 4.3	0.65	6.6 6.2	1.0	0.75 0.50	0.4 0.3	0.2	0.13	0.1	0.72 0.38	8° 0°
Notes 1. Plastic 2. Plastic										W	MA	100°	y.Cu	OM.	TW		W	WW

- 1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
- 2. Plastic interlead protrusions of 0.25 mm maximum per side are not included.

OUTLINE		REFERE	EUROPEAN	ICCUE DATE			
VERSION	IEC	JEDEC	EIAJ	WWW.I	PROJECTION	ISSUE DATE	
SOT402-1	W	MO-153	M.I.	MMM.In		94-07-12 95-04-04	
	41	IWW.Too.Y.C	OM	WWW	.100		

TATEN 1007.COM. 1997 Jun 30

Hex inverter 74LVC04A

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

DEFINITIONS							
Data Sheet Identification	Product Status	Definition					
Objective Specification	Formative or in Design	This data sheet contains the design target or goal specifications for product development. Specifications may change in any manner without notice.					
Preliminary Specification	Preproduction Product	This data sheet contains preliminary data, and supplementary data will be published at a later date. Phi Semiconductors reserves the right to make changes at any time without notice in order to improve des and supply the best possible product.					
Product Specification	Full Production	This data sheet contains Final Specifications. Philips Semiconductors reserves the right to make changes at any time without notice, in order to improve design and supply the best possible product.					

Philips Semiconductors and Philips Electronics North America Corporation reserve the right to make changes, without notice, in the products, including circuits, standard cells, and/or software, described or contained herein in order to improve design and/or performance. Philips Semiconductors assumes no responsibility or liability for the use of any of these products, conveys no license or title under any patent, copyright, or mask work right to these products, and makes no representations or warranties that these products are free from patent, copyright, or mask work right infringement, unless otherwise specified. Applications that are described herein for any of these products are for illustrative purposes only. Philips Semiconductors makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

LIFE SUPPORT APPLICATIONS

Philips Semiconductors and Philips Electronics North America Corporation Products are not designed for use in life support appliances, devices, or systems where malfunction of a Philips Semiconductors and Philips Electronics North America Corporation Product can reasonably be expected to result in a personal injury. Philips Semiconductors and Philips Electronics North America Corporation customers using or selling Philips Semiconductors and Philips Electronics North America Corporation Products for use in such applications do so at their own risk and agree to fully indemnify Philips Semiconductors and Philips Electronics North America Corporation for any damages resulting from such improper use or sale.

Philips Semiconductors 811 East Arques Avenue P.O. Box 3409 Sunnyvale, California 94088–3409 Telephone 800-234-7381 © Copyright Philips Electronics North America Corporation 1997 All rights reserved. Printed in U.S.A.

print code Date of release: 05-96

Document order number: 9397-750-04478

Let's make things better.

Philips Semiconductors



