DATA SHEET

74F656A
Octal buffer/driver with parity, non-inverting (3-State)

Product specification
Supersedes data of 1991 Jul 17
IC15 Data Handbook

2000 Jun 30

Philips
Semiconductors

PHILIPS

Octal buffer/driver with parity, non-inverting (3-State) 74F656A

FEATURES

- Significantly improved AC performance over 74F656
- High impedance NPN base input for reduced loading (40µA in High and Low states)
- Ideal in applications where high output drive and light bus loading are required (I_{IL} is 40µA vs. FAST std of 600µA)
- 74F656A combines 74F244 and 74F280A functions in one package
- Non-inverting
- 3-State outputs sink 64mA and source 15mA
- 24-pin plastic Slim DIP (300mil) package
- Inputs on one side and outputs on the other side simplifies PC board layout
- Combined functions reduce part count and enhance system performance
- Industrial temperature range available (–40°C to +85°C)

DESCRIPTION

The 74F656A is an octal buffer and line driver with parity generation/checking designed to be employed as memory address drivers, clock drivers and bus-oriented transmitters/receivers. These parts include parity generator/checker to improve PC board density.

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
74F656A	6.5ns	64mA

ORDERING INFORMATION

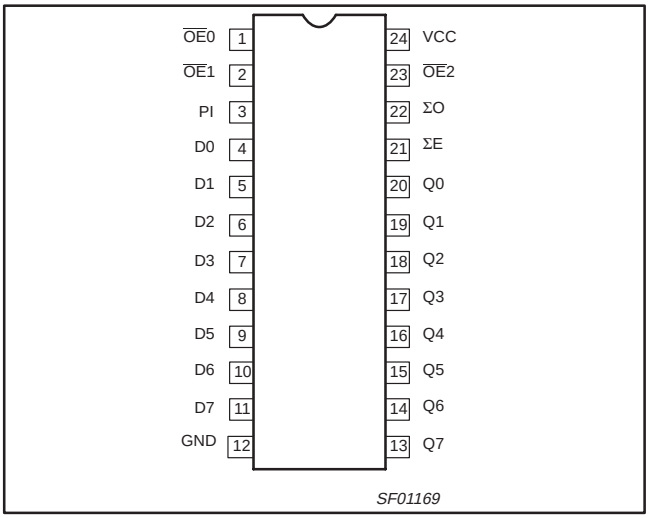
DESCRIPTION	COMMERCIAL RANGE V_{CC} = 5V ±10%, T_{amb} = 0°C to +70°C	INDUSTRIAL RANGE V_{CC} = 5V ±10%, T_{amb} = –40°C to +85°C	PKG DWG #
24-pin Plastic Slim DIP (300mil)	N74F656AN	I74F656AN	SOT222-1
24-pin Plastic SOL	N74F656AD	I74F656AD	SOT137-1

INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

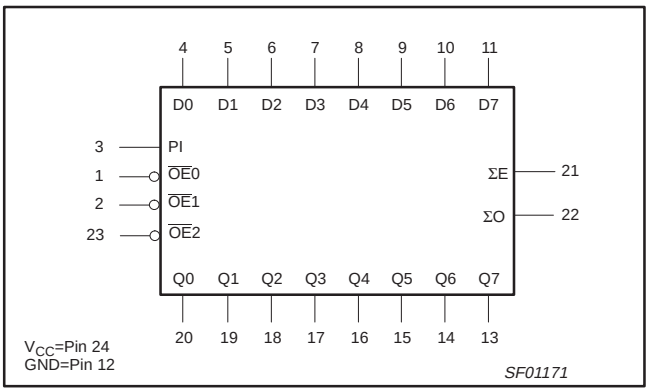
PINS	DESCRIPTION	74F(U.L.) HIGH/LOW	LOAD VALUE HIGH/LOW
D0–D7	Data inputs	2.0/0.066	40µA/40µA
PI	Parity input	1.0/0.033	20µA/20µA
$\overline{OE}$0, $\overline{OE}$1, $\overline{OE}$2	Output Enable Inputs (active Low)	1.0/0.033	20µA/20µA
ΣE, ΣO	Parity outputs	750/106.7	15mA/64mA
Q0–Q7	Data outputs	750/106.7	15mA/64mA

NOTE: One (1.0) FAST Unit Load (U.L.) is defined as: 20µA in the High state and 0.6mA in the Low state.

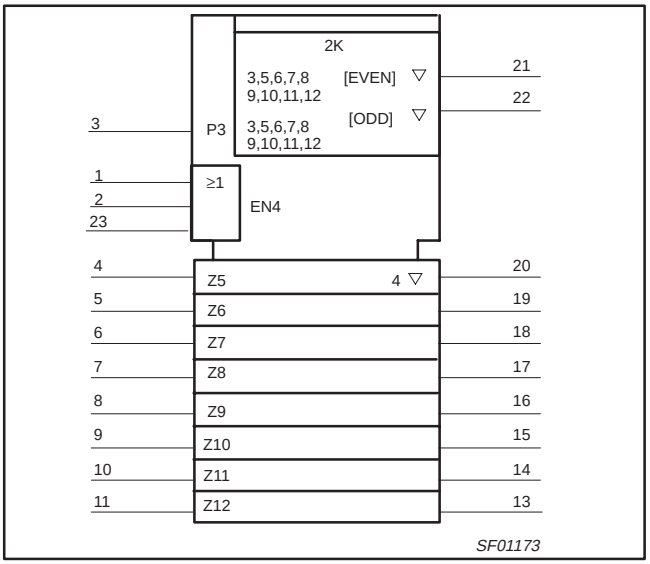
PIN CONFIGURATION



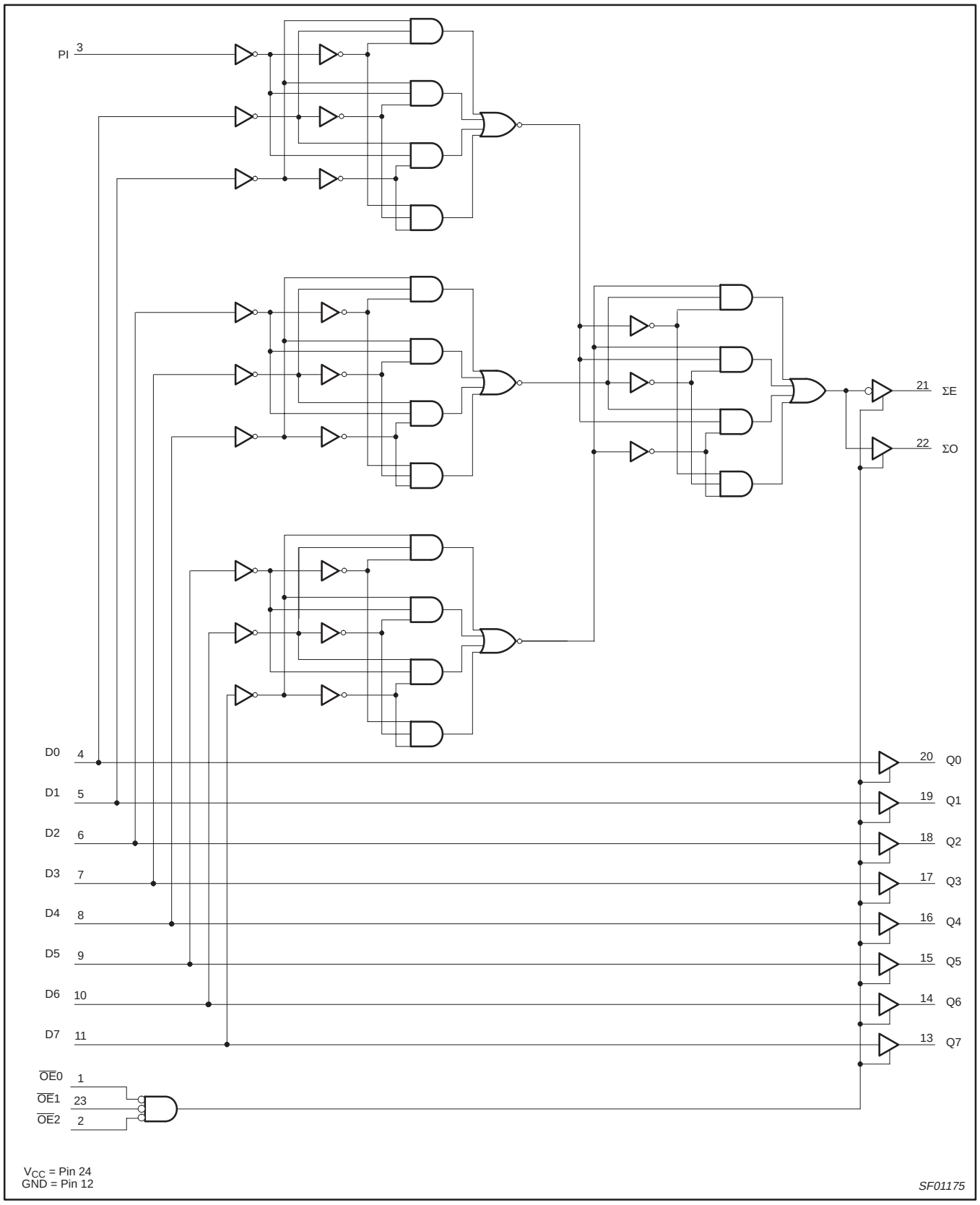
LOGIC SYMBOL



LOGIC SYMBOL (IEEE/IEC)



LOGIC DIAGRAM



FUNCTION TABLE

INPUTS				OUTPUTS
$\overline{OE}0$	$\overline{OE}1$	$\overline{OE}2$	Dn	Qn
L	L	L	L	L
L	L	L	H	H
H	X	X	X	Z
X	H	X	X	Z
X	X	H	X	Z

H = High voltage level
L = Low voltage level
X = Don't care
Z = High impedance "off" state

FUNCTION TABLE for PARITY OUTPUTS

INPUTS	PARITY OUTPUTS	
Number of inputs, High (PI, D0–D7)	ΣE	Σ0
Even - 0, 2, 4, 6, 8	H	L
Odd - 1, 3, 5, 7, 9	L	H
Any $\overline{OE}$n = High	Z	Z

H = High voltage level
L = Low voltage level
Z = High impedance "off" state

ABSOLUTE MAXIMUM RATINGS

(Operation beyond the limits set forth in this table may impair the useful life of the device.
Unless otherwise noted these limits are over the operating free-air temperature range.)

SYMBOL	PARAMETER		RATING	UNIT
V_{CC}	Supply voltage		–0.5 to +7.0	V
V_{IN}	Input voltage		–0.5 to +7.0	V
I_{IN}	Input current		–30 to +5	mA
V_{OUT}	Voltage applied to output in High output state		–0.5 to +V_{CC}	V
I_{OUT}	Current applied to output in Low output state		128	mA
T_{amb}	Operating free-air temperature range	Commercial range	0 to +70	°C
		Industrial range	–40 to +85	°C
T_{stg}	Storage temperature range		–65 to +150	°C

RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER		LIMITS			UNIT
			MIN	NOM	MAX	
V_{CC}	Supply voltage		4.5	5.0	5.5	V
V_{IH}	High-level input voltage		2.0			V
V_{IL}	Low-level input voltage				0.8	V
I_{IK}	Input clamp current				–18	mA
I_{OH}	High-level output current				–15	mA
I_{OL}	Low-level output current				64	mA
T_{amb}	Operating free-air temperature range	Commercial range	0		70	°C
		Industrial range	–40		85	°C

DC ELECTRICAL CHARACTERISTICS

(Over recommended operating free-air temperature range unless otherwise noted.)

SYMBOL	PARAMETER			TEST CONDITIONS[1]			LIMITS			UNIT
							MIN	TYP[2]	MAX	
V_{OH}	High-level output voltage			V_{CC} = MIN, V_{IL} = MAX, V_{IH} = MIN	I_{OH} = –3mA	±10%V_{CC}	2.4			V
						±5%V_{CC}	2.7	3.3		V
					I_{OH} = –15mA	±10%V_{CC}	2.0			V
V_{OL}	Low-level output voltage			V_{CC} = MIN, V_{IL} = MAX, V_{IH} = MIN	I_{OL} = 64mA	±10%V_{CC}			0.55	V
						±5%V_{CC}		0.42	0.55	V
V_{IK}	Input clamp voltage			V_{CC} = MIN, I_I = I_{IK}				–0.73	–1.2	V
I_I	Input current at maximum input voltage			V_{CC} = 0.0, V_I = 7.0V					100	µA
I_{IH}	High-level input current	Commercial range	Dn	V_{CC} = MAX, V_I = 2.7V					40	µA
			PI, $\overline{OE}$n						20	µA
		Industrial range	Dn						80	µA
			PI, $\overline{OE}$n						40	µA
I_{IL}	Low-level input current		Dn	V_{CC} = MAX, V_I = 0.5V					–40	µA
			PI, $\overline{OE}$n						–20	µA
I_{OZH}	Off-state current High-level voltage applied			V_{CC} = MAX, V_O = 2.7V					50	µA
I_{OZL}	Off-state current Low-level voltage applied			V_{CC} = MAX, V_O = 0.5V					–50	µA
I_{OS}	Short-circuit output current[3]			V_{CC} = MAX			–100		–225	mA
I_{CC}	Supply current (total)		I_{CCH}	V_{CC} = MAX				50	80	mA
			I_{CCL}					78	110	mA
			I_{CCZ}					83	90	mA

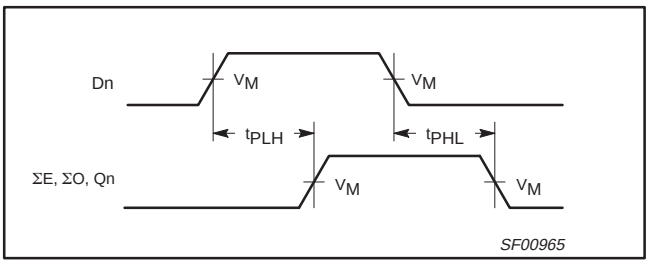
NOTES:

1. For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable type.
2. All typical values are at V_{CC} = 5V, T_{amb} = 25°C.
3. Not more than one output should be shorted at a time. For testing I_{OS}, the use of high-speed test apparatus and/or sample-and-hold techniques are preferable in order to minimize internal heating and more accurately reflect operational values. Otherwise, prolonged shorting of a High output may raise the chip temperature well above normal and thereby cause invalid readings in other parameter tests. In any sequence of parameter tests, I_{OS} tests should be performed last.

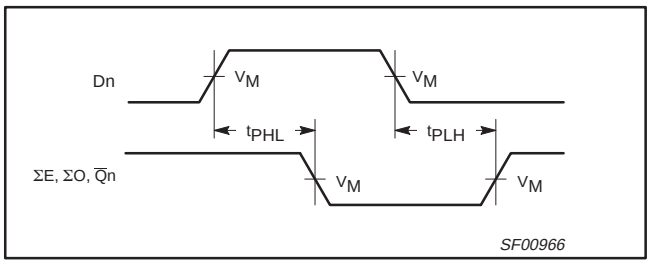
AC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS							UNIT
			T_{amb} = +25°C, V_{CC} = +5.0V C_L = 50pF, R_L = 500Ω			T_{amb} = 0°C to +70°C V_{CC} = +5.0V ± 10% C_L = 50pF, R_L = 500Ω		T_{amb} = –40°C to +85°C V_{CC} = +5.0V ± 10% C_L = 50pF, R_L = 500Ω		
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH} t_{PHL}	Propagation delay Dn to Qn	Waveform 1	2.0 2.5	4.0 5.5	6.5 7.0	2.0 2.5	7.0 7.5	2.0 2.5	8.0 9.0	ns ns
t_{PLH} t_{PHL}	Propagation delay Dn to ΣE, ΣO	Waveform 1, 2	5.5 5.5	10.0 11.0	13.0 14.5	5.5 5.5	14.0 16.5	4.5 5.5	16.5 18.0	ns ns
t_{PZH} t_{PZL}	Output enable time to High or Low level	Waveform 3 Waveform 4	3.5 4.0	7.0 8.0	10.5 11.0	3.5 4.5	11.5 12.0	3.0 4.0	13.0 13.5	ns ns
t_{PHZ} t_{PLZ}	Output disable time from High or Low level	Waveform 3 Waveform 4	1.5 2.0	4.5 5.0	8.0 8.0	1.5 2.0	9.0 9.0	1.5 1.5	10.0 10.0	ns ns

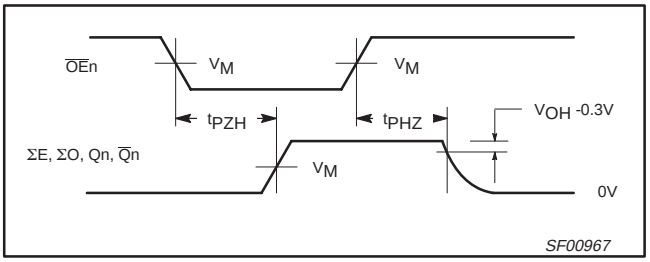
AC WAVEFORMS



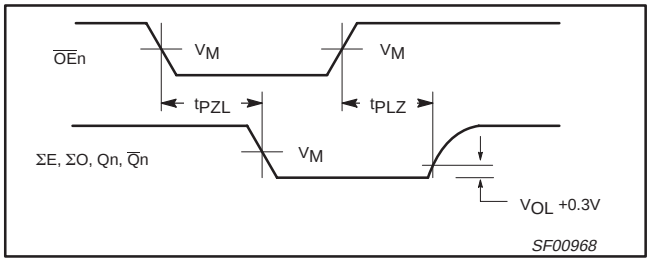
Waveform 1. Propagation Delay, Non-Inverting Outputs



Waveform 2. Propagation Delay, Inverting Outputs

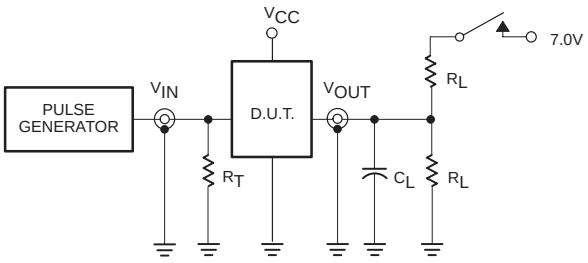


Waveform 3. 3-State Output Enable Time to High Level and Output Disable Time from High Level

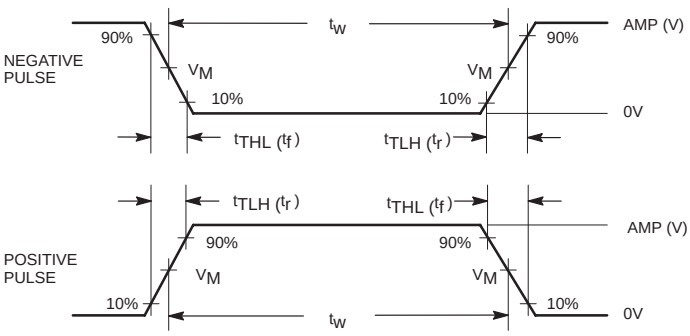


Waveform 4. 3-State Output Enable Time to Low Level and Output Disable Time from Low Level

TEST CIRCUIT AND WAVEFORM



Test Circuit for 3-State Outputs



Input Pulse Definition

SWITCH POSITION

TEST	SWITCH
t_{PLZ}	closed
t_{PZL}	closed
All other	open

DEFINITIONS:

R_L = Load resistor; see AC electrical characteristics for value.

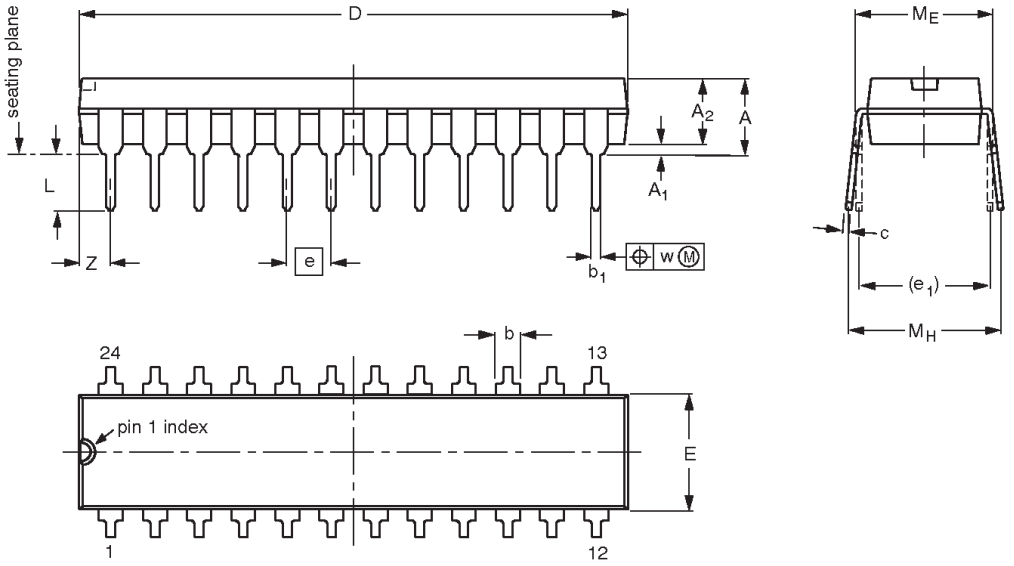
C_L = Load capacitance includes jig and probe capacitance; see AC electrical characteristics for value.

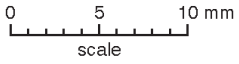
R_T = Termination resistance should be equal to Z_{OUT} of pulse generators.

family	INPUT PULSE REQUIREMENTS					
	amplitude	V_M	rep. rate	t_W	t_{TLH}	t_{THL}
74F	3.0V	1.5V	1MHz	500ns	2.5ns	2.5ns

SF00777

DIP24: plastic dual in-line package; 24 leads (300 mil) **SOT222-1**





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

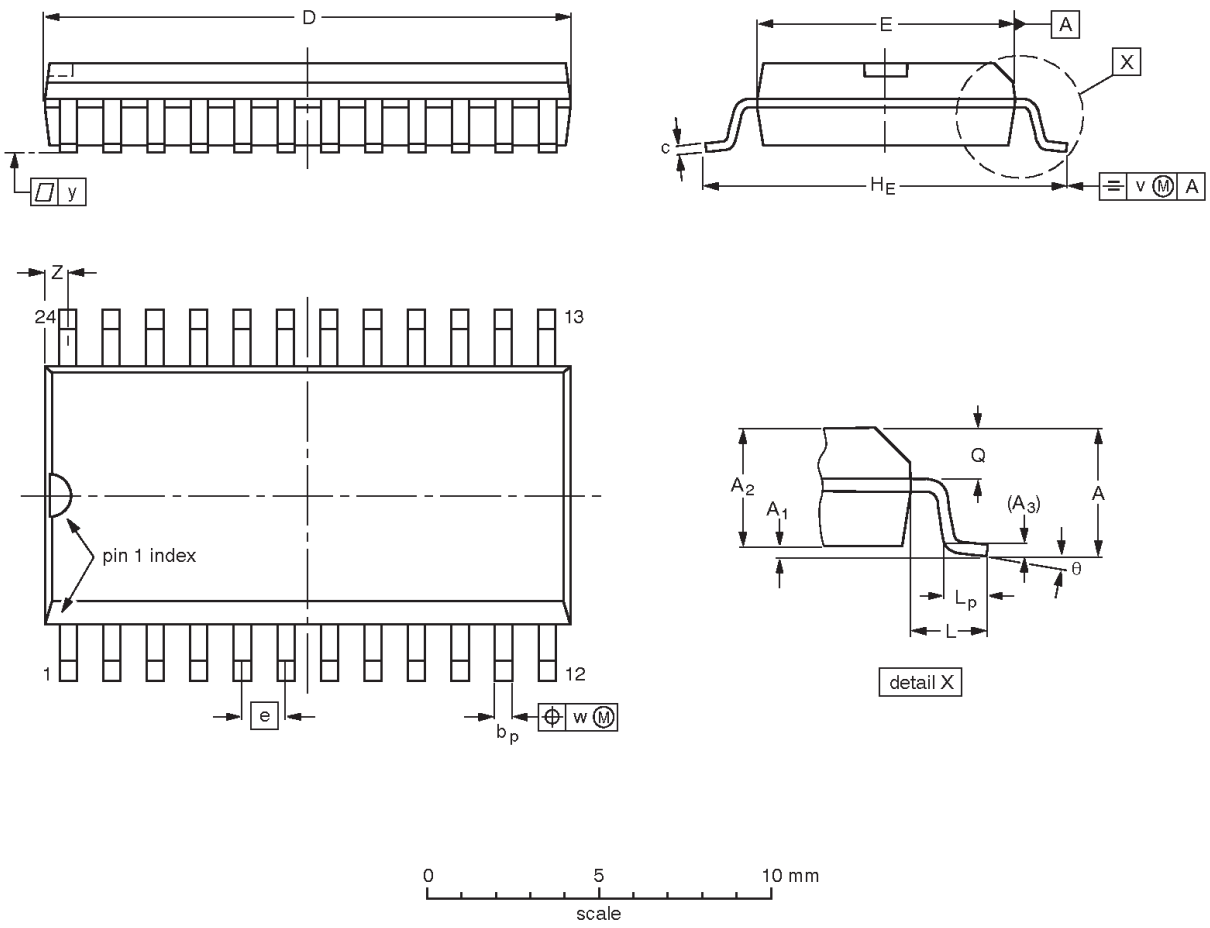
UNIT	A max.	A_1 min.	A_2 max.	b	b_1	c	D (1)	E (1)	e	e_1	L	M_E	M_H	w	Z (1) max.
mm	4.70	0.38	3.94	1.63 1.14	0.56 0.43	0.36 0.25	31.9 31.5	6.73 6.48	2.54	7.62	3.51 3.05	8.13 7.62	10.03 7.62	0.25	2.05
inches	0.185	0.015	0.155	0.064 0.045	0.022 0.017	0.014 0.010	1.256 1.240	0.265 0.255	0.100	0.300	0.138 0.120	0.32 0.30	0.395 0.300	0.01	0.081

Note

1. Plastic or metal protrusions of 0.01 inches maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT222-1		MS-001AF				95-03-11

SO24: plastic small outline package; 24 leads; body width 7.5 mm **SOT137-1**



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

UNIT	A max.	A_1	A_2	A_3	b_p	c	$D^{(1)}$	$E^{(1)}$	e	H_E	L	L_p	Q	v	w	y	$Z^{(1)}$	θ
mm	2.65	0.30 0.10	2.45 2.25	0.25	0.49 0.36	0.32 0.23	15.6 15.2	7.6 7.4	1.27	10.65 10.00	1.4	1.1 0.4	1.1 1.0	0.25	0.25	0.1	0.9 0.4	8^o 0^o
inches	0.10	0.012 0.004	0.096 0.089	0.01	0.019 0.014	0.013 0.009	0.61 0.60	0.30 0.29	0.050	0.419 0.394	0.055	0.043 0.016	0.043 0.039	0.01	0.01	0.004	0.035 0.016	

Note

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT137-1	075E05	MS-013AD				~~95-01-24~~ 97-05-22

Data sheet status

Data sheet status	Product status	Definition [1]
Objective specification	Development	This data sheet contains the design target or goal specifications for product development. Specification may change in any manner without notice.
Preliminary specification	Qualification	This data sheet contains preliminary data, and supplementary data will be published at a later date. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.
Product specification	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.

[1] Please consult the most recently issued datasheet before initiating or completing a design.

Definitions

Short-form specification — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

Application information — Applications that are described herein for any of these products are for illustrative purposes only. Philips Semiconductors make no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Disclaimers

Life support — These products are not designed for use in life support appliances, devices or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips Semiconductors customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips Semiconductors for any damages resulting from such application.

Right to make changes — Philips Semiconductors reserves 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.

Philips Semiconductors
811 East Arques Avenue
P.O. Box 3409
Sunnyvale, California 94088–3409
Telephone 800-234-7381

Date of release: 06-00

Document order number: 9397-750 07278

Let's make things better.

Philips Semiconductors

PHILIPS

littlediode
COMPONENTS FOR ALL

Littlediode supplies new, hard to find or obsolete electronic components and semiconductors all over the world.

With over two million different components listed you are sure to find the part you need.

Feel free to visit us today at our online store:

LittleDiode.com

Looking forward to providing you with the best possible service.