

# DATA SHEET

**74F245**

Octal transceiver (3-State)

Product specification

1994 Nov 15

IC15 Data Handbook

**Philips Semiconductors**



**PHILIPS**

# Octal transceiver (3-State)

# 74F245

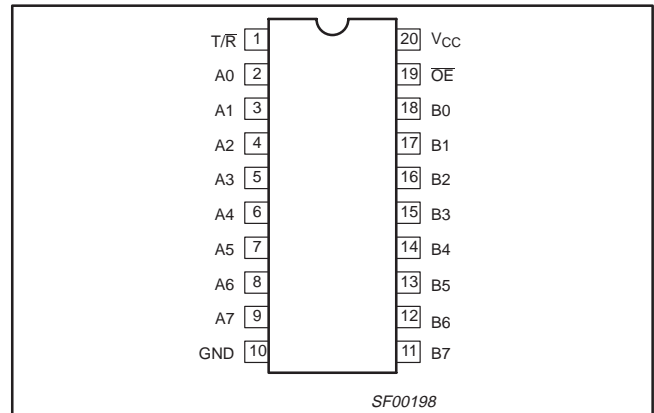
## FEATURES

- Octal bidirectional bus interface
- 3-State buffer outputs sink 64mA
- 15mA source current
- Outputs are placed in high impedance state during power-off conditions

## DESCRIPTION

The 74F245 is an octal transceiver featuring non-inverting 3-State bus compatible outputs in both transmit and receive directions. The B port outputs are capable of sinking 64mA and sourcing 15mA, producing very good capacitive drive characteristics. The device features an Output Enable ( $\overline{OE}$ ) input for easy cascading and Transmit/Receive (T/R) input for direction control. The 3-State outputs, B0–B7, have been designed to prevent output bus loading if the power is removed from the device.

## PIN CONFIGURATION



TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
74F245	4.0ns	70mA

## ORDERING INFORMATION

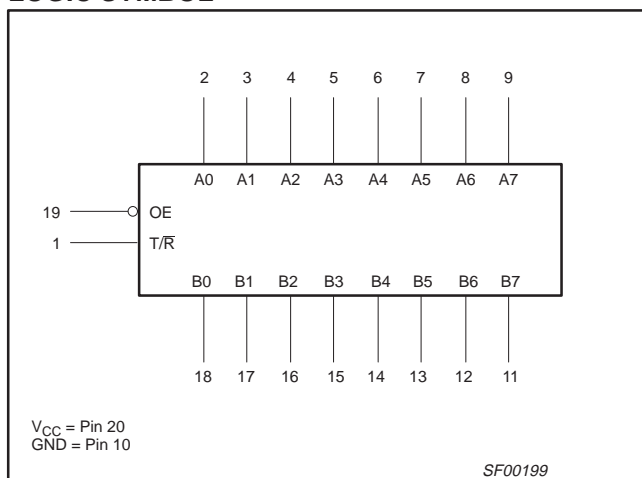
DESCRIPTION	COMMERCIAL RANGE $V_{CC} = 5V \pm 10\%$ , $T_{amb} = 0^{\circ}C$ to $+70^{\circ}C$	DRAWING NUMBER
20-Pin Plastic DIP	N74F245N	SOT146-1
20-Pin Plastic SO	N74F245D	SOT163-1
20-Pin Plastic SSOP Type II	N74F245DB	SOT339-1

## INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

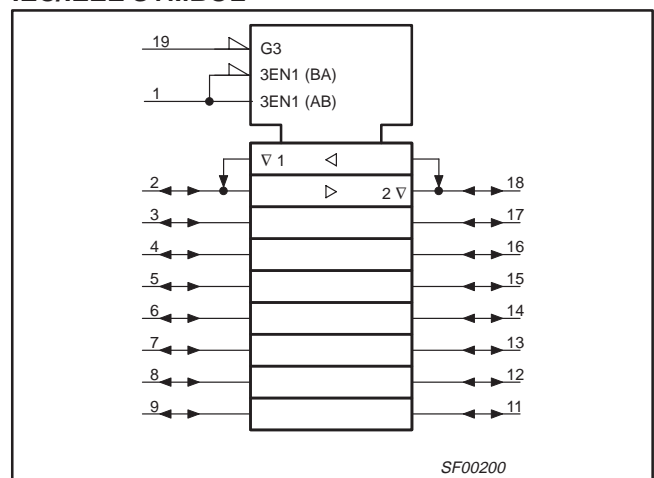
PINS	DESCRIPTION	74F (U.L.) HIGH/LOW	LOAD VALUE HIGH/LOW
A0–A7, B0–B7	Data inputs	3.5/1.0	70 $\mu$ A/0.6mA
$\overline{OE}$	Output Enable input (active Low)	1.0/2.0	20 $\mu$ A/1.2mA
T/R	Transmit/Receive input	1.0/2.0	20 $\mu$ A/1.2mA
A0–A7	A port outputs	150/40	3.0mA/24mA
B0–B7	B port outputs	750/106.7	15mA/64mA

NOTE: One (1.0) FAST unit load is defined as: 20 $\mu$ A in the High state and 0.6mA in the Low state.

## LOGIC SYMBOL



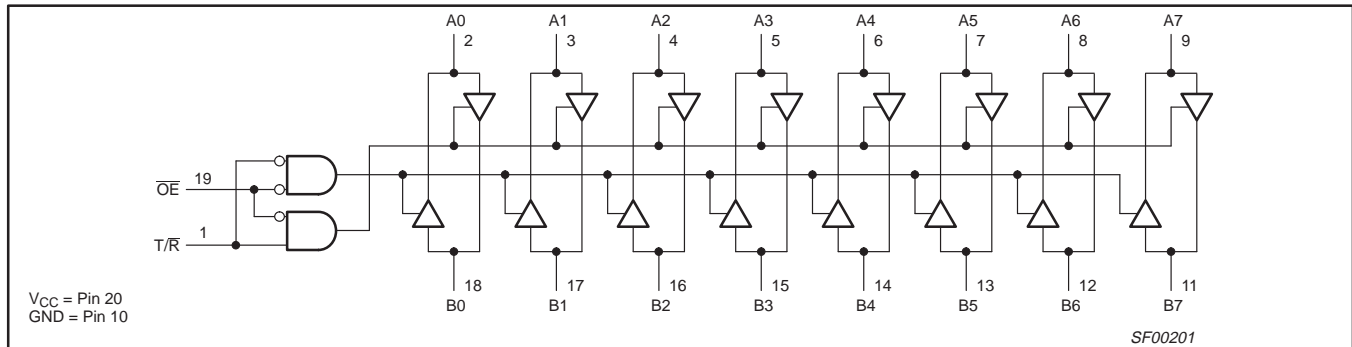
## IEC/IEEE SYMBOL



# Octal transceiver (3-State)

74F245

## LOGIC DIAGRAM



## FUNCTION TABLE

INPUTS		OUTPUTS
OE	T/R	
L	L	Bus B data to Bus A
L	H	Bus A data to Bus B
H	X	Z

H = High voltage level  
L = Low voltage level  
X = Don't care  
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 <sub>CC</sub>	Supply voltage	-0.5 to +7.0	V
V <sub>IN</sub>	Input voltage	-0.5 to +7.0	V
I <sub>IN</sub>	Input current	-30 to +5	mA
V <sub>OUT</sub>	Voltage applied to output in High output state	-0.5 to +5.5	V
I <sub>OUT</sub>	Current applied to output in Low output state	A0-A7	48
		B0-B7	128
T <sub>amb</sub>	Operating free-air temperature range	0 to +70	°C
T <sub>stg</sub>	Storage temperature range	-65 to +150	°C

## RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	LIMITS			UNIT
		MIN	NOM	MAX	
V <sub>CC</sub>	Supply voltage	4.5	5.0	5.5	V
V <sub>IH</sub>	High-level input voltage	2.0			V
V <sub>IL</sub>	Low-level input voltage			0.8	V
I <sub>IK</sub>	Input clamp current			-18	mA
I <sub>OH</sub>	High-level output current	A0-A7		-3	mA
		B0-B7		-15	mA
I <sub>OL</sub>	Low-level output current	A0-A7		24	mA
		B0-B7		64	mA
T <sub>amb</sub>	Operating free-air temperature range	0		+70	°C

## Octal transceiver (3-State)

74F245

## DC ELECTRICAL CHARACTERISTICS

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

SYMBOL	PARAMETER		TEST CONDITIONS <sup>1</sup>			LIMITS			UNIT	
						MIN	TYP <sup>2</sup>	MAX		
V <sub>OH</sub>	High-level output voltage	A0–A7, B0–B7	V <sub>CC</sub> = MIN, V <sub>IL</sub> = MAX, V <sub>IH</sub> = MIN	I <sub>OH</sub> = –3mA	±10% V <sub>CC</sub>	2.4			V	
					±5% V <sub>CC</sub>	2.7	3.4		V	
		B0–B7		I <sub>OH</sub> = –15mA	±10% V <sub>CC</sub>	2.0			V	
					±5% V <sub>CC</sub>	2.0			V	
V <sub>OL</sub>	Low-level output voltage	A0–A7	V <sub>CC</sub> = MIN, V <sub>IL</sub> = MAX, V <sub>IH</sub> = MIN	I <sub>OL</sub> = 20mA	±10% V <sub>CC</sub>		0.30	0.50	V	
				I <sub>OL</sub> = 24mA	±5% V <sub>CC</sub>		0.35	0.50	V	
		B0–B7		I <sub>OL</sub> = MAX	±10% V <sub>CC</sub>			0.55	V	
V <sub>OL</sub>	Low-level output voltage	B0–B7	V <sub>CC</sub> = MIN, V <sub>IL</sub> = MAX, V <sub>IH</sub> = MIN	I <sub>OL</sub> = MAX	±5% V <sub>CC</sub>		0.42	0.55	V	
V <sub>IK</sub>	Input clamp voltage		V <sub>CC</sub> = MIN, I <sub>I</sub> = I <sub>IK</sub>				–0.73	–1.2	V	
I <sub>I</sub>	Input current at maximum input voltage	OE, T/R	V <sub>CC</sub> = 5.5V, V <sub>I</sub> = 7.0V					100	μA	
		A0–A7, B0–B7	V <sub>CC</sub> = 5.5V, V <sub>I</sub> = 5.5V					1	mA	
I <sub>IH</sub>	High-level input current	OE, T/R only	V <sub>CC</sub> = MAX, V <sub>I</sub> = 2.7V					20	μA	
I <sub>IL</sub>	Low-level input current	OE, T/R only	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.5V					–1.2	mA	
I <sub>IH</sub> +I <sub>OZH</sub>	Off-state output current High level voltage applied		V <sub>CC</sub> = MAX, V <sub>O</sub> = 2.7V					70	μA	
I <sub>IL</sub> +I <sub>OZL</sub>	Off-state output current Low level voltage applied		V <sub>CC</sub> = MAX, V <sub>O</sub> = 0.5V					–600	μA	
I <sub>OS</sub>	Short-circuit output current <sup>3</sup>	A0–A7	V <sub>CC</sub> = MAX				–60		–150	mA
		B0–B7					–100		–225	mA
I <sub>CC</sub>	Supply current (total)	I <sub>CC</sub> H	V <sub>CC</sub> = MAX				60	87	mA	
		I <sub>CC</sub> L					70	100	mA	
		I <sub>CC</sub> Z					75	110	mA	

## NOTES:

- For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable type.
- All typical values are at V<sub>CC</sub> = 5V, T<sub>amb</sub> = 25°C.
- Not more than one output should be shorted at a time. For testing I<sub>OS</sub>, 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<sub>OS</sub> tests should be performed last.

## AC ELECTRICAL CHARACTERISTICS

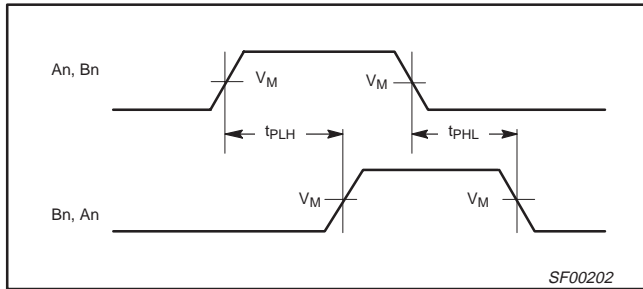
SYMBOL	PARAMETER	TEST CONDITION	LIMITS					UNIT
			V <sub>CC</sub> = +5.0V T <sub>amb</sub> = +25°C C <sub>L</sub> = 50pF, R <sub>L</sub> = 500Ω			V <sub>CC</sub> = +5.0V ± 10% T <sub>amb</sub> = 0°C to +70°C C <sub>L</sub> = 50pF, R <sub>L</sub> = 500Ω		
			MIN	TYP	MAX	MIN	MAX	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation delay An to Bn, Bn to An	Waveform 1	2.5 2.5	3.5 4.0	6.0 6.0	2.5 2.5	7.0 7.0	ns
t <sub>PZH</sub> t <sub>PZL</sub>	Output Enable time to High or Low level	Waveform 2 Waveform 3	2.0 3.5	4.5 5.5	7.0 8.0	2.0 3.5	8.0 9.0	ns
t <sub>PHZ</sub> t <sub>PLZ</sub>	Output Disable time from High or Low level	Waveform 2 Waveform 3	2.5 1.0	5.0 3.5	6.5 6.0	2.0 1.0	7.5 7.0	ns

# Octal transceiver (3-State)

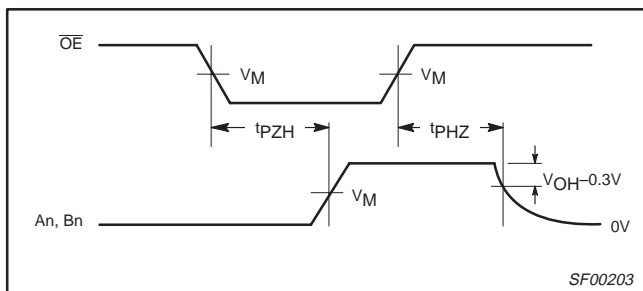
# 74F245

## AC WAVEFORMS

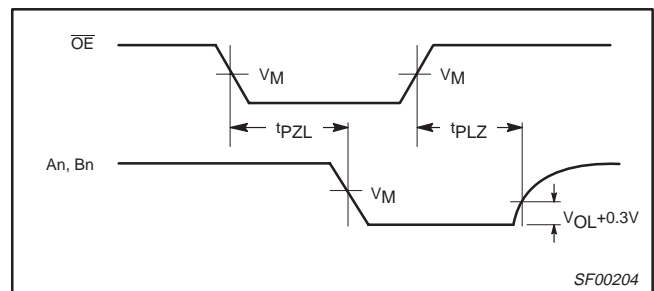
For all waveforms,  $V_M = 1.5V$ .



**Waveform 1. Propagation Delay for Non-Inverting Output**



**Waveform 2. 3-State Output Enable Time to High Level and Output Disable Time from High Level**



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

## TEST CIRCUIT AND WAVEFORMS

**Test Circuit for Open Collector Outputs**

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.

**Input Pulse Definition**

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

SF00128

# Octal transceiver (3-State)

# 74F245

**DIP20: plastic dual in-line package; 20 leads (300 mil)**

**SOT146-1**



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

UNIT	A max.	A <sub>1</sub> min.	A <sub>2</sub> max.	b	b <sub>1</sub>	c	D <sup>(1)</sup>	E <sup>(1)</sup>	e	e <sub>1</sub>	L	M <sub>E</sub>	M <sub>H</sub>	w	Z <sup>(1)</sup> max.
mm	4.2	0.51	3.2	1.73 1.30	0.53 0.38	0.36 0.23	26.92 26.54	6.40 6.22	2.54	7.62	3.60 3.05	8.25 7.80	10.0 8.3	0.254	2.0
inches	0.17	0.020	0.13	0.068 0.051	0.021 0.015	0.014 0.009	1.060 1.045	0.25 0.24	0.10	0.30	0.14 0.12	0.32 0.31	0.39 0.33	0.01	0.078

**Note**

1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

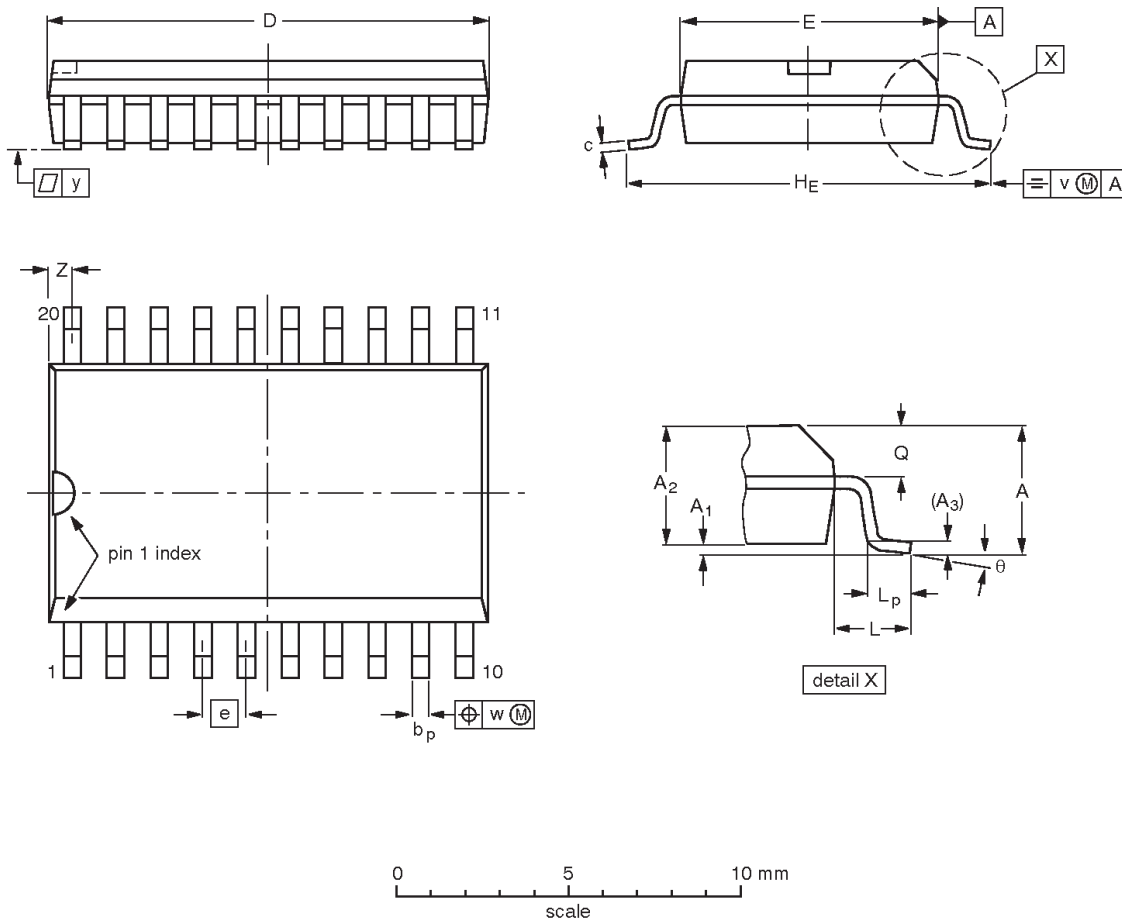
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT146-1			SC603			92-11-17 95-05-24

# Octal transceiver (3-State)

## 74F245

**SO20:** plastic small outline package; 20 leads; body width 7.5 mm

**SOT163-1**



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

UNIT	A max.	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	b <sub>p</sub>	c	D <sup>(1)</sup>	E <sup>(1)</sup>	e	H <sub>E</sub>	L	L <sub>p</sub>	Q	v	w	y	z <sup>(1)</sup>	θ
mm	2.65	0.30 0.10	2.45 2.25	0.25	0.49 0.36	0.32 0.23	13.0 12.6	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° 0°
inches	0.10	0.012 0.004	0.096 0.089	0.01	0.019 0.014	0.013 0.009	0.51 0.49	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			
SOT163-1	075E04	MS-013AC				95-01-24 97-05-22

---

Octal transceiver (3-State)

74F245

---

**NOTES**

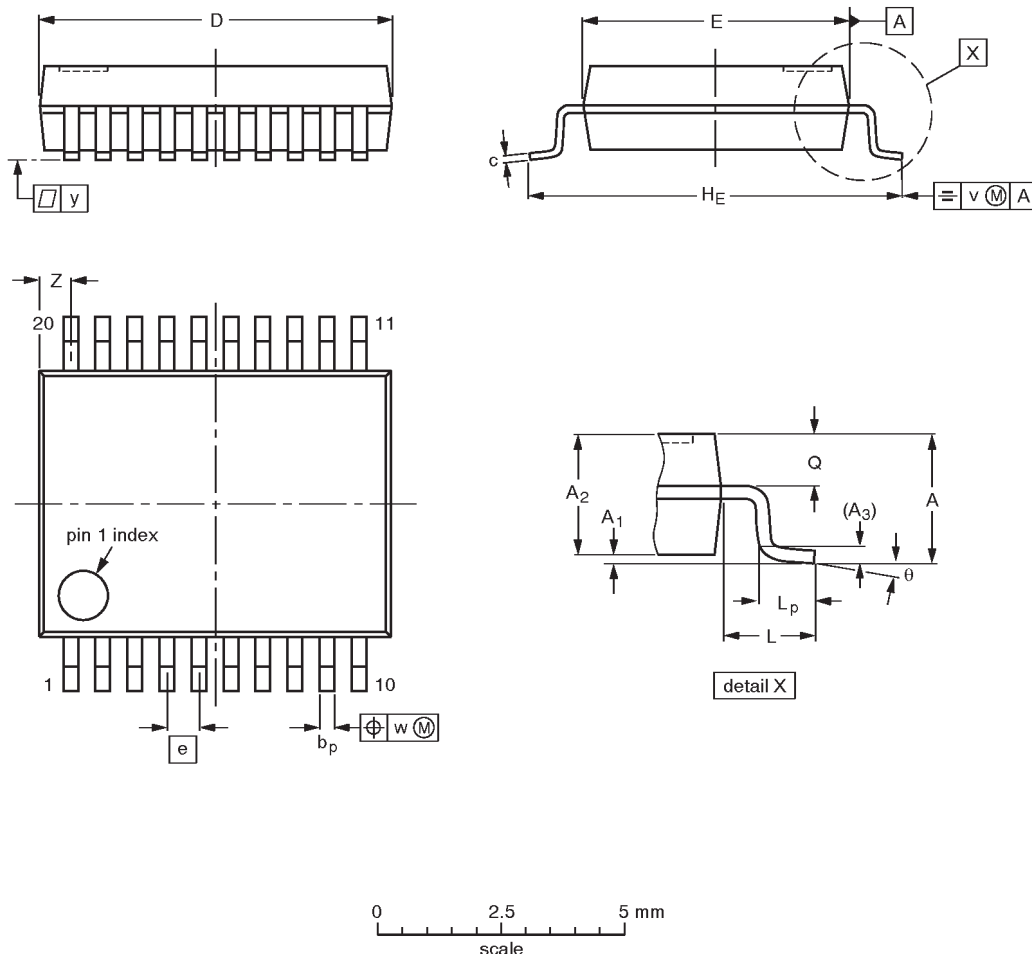


# Octal transceiver (3-State)

## 74F245

**SSOP20: plastic shrink small outline package; 20 leads; body width 5.3 mm**

**SOT339-1**



**DIMENSIONS (mm are the original dimensions)**

UNIT	A max.	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	b <sub>p</sub>	c	D <sup>(1)</sup>	E <sup>(1)</sup>	e	H <sub>E</sub>	L	L <sub>p</sub>	Q	v	w	y	Z <sup>(1)</sup>	θ
mm	2.0	0.21 0.05	1.80 1.65	0.25	0.38 0.25	0.20 0.09	7.4 7.0	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	0.9 0.5	8° 0°

**Note**

1. Plastic or metal protrusions of 0.20 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT339-1		MO-150AE				93-09-08 95-02-04

## Octal transceiver (3-State)

74F245

## DEFINITIONS

Data Sheet Identification	Product Status	Definition
<i>Objective Specification</i>	<b>Formative or in Design</b>	This data sheet contains the design target or goal specifications for product development. Specifications may change in any manner without notice.
<i>Preliminary Specification</i>	<b>Preproduction Product</b>	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.
<i>Product Specification</i>	<b>Full Production</b>	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**

Philips Semiconductors and Philips Electronics North America Corporation register eligible circuits under the Semiconductor Chip Protection Act.  
 © Copyright Philips Electronics North America Corporation 1996  
 All rights reserved. Printed in U.S.A.

(print code)

Date of release: July 1994

Document order number:

9397-750-05104