

# DATA SHEET

**74F245**

Octal transceiver (3-State)

Product specification

1994 Nov 15

IC15 Data Handbook

**Philips Semiconductors**



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# Octal transceiver (3-State)

# 74F245

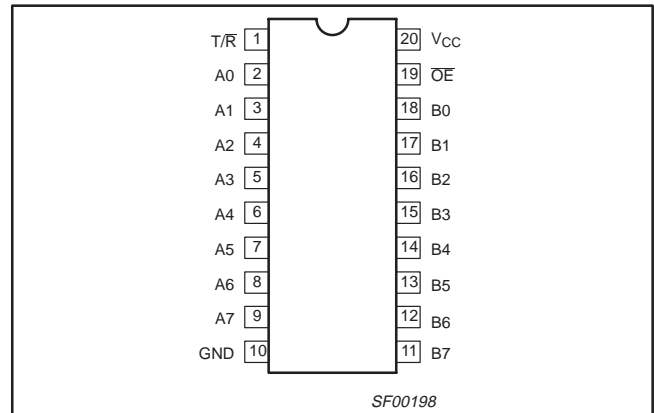
## FEATURES

- 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

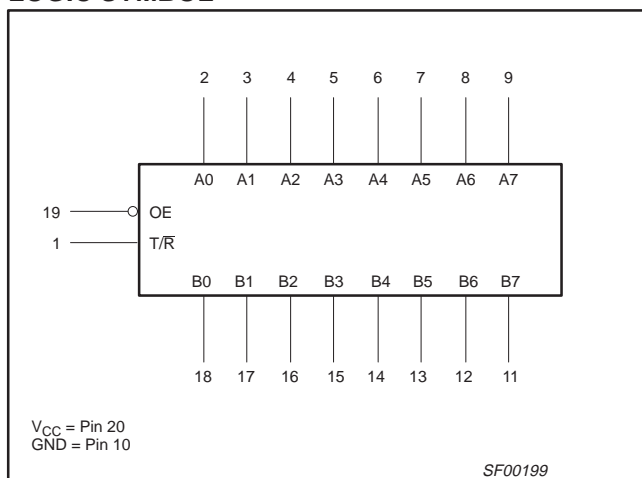
DESCRIPTION	COMMERCIAL RANGE $V_{CC} = 5V \pm 10\%$ , $T_{amb} = 0^{\circ}C$ to $+70^{\circ}C$	DRAWING NUMBER
20-Pin Plastic DIP	N74F245N	SOT146-1
20-Pin Plastic SO	N74F245D	SOT163-1
20-Pin Plastic SSOP Type II	N74F245DB	SOT339-1

## INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

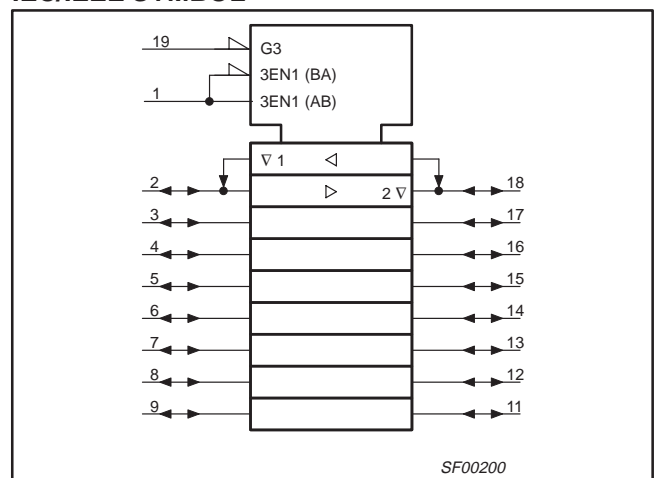
PINS	DESCRIPTION	74F (U.L.) HIGH/LOW	LOAD VALUE HIGH/LOW
A0–A7, B0–B7	Data inputs	3.5/1.0	70 $\mu$ A/0.6mA
$\overline{OE}$	Output Enable input (active Low)	1.0/2.0	20 $\mu$ A/1.2mA
T/R	Transmit/Receive input	1.0/2.0	20 $\mu$ A/1.2mA
A0–A7	A port outputs	150/40	3.0mA/24mA
B0–B7	B port outputs	750/106.7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



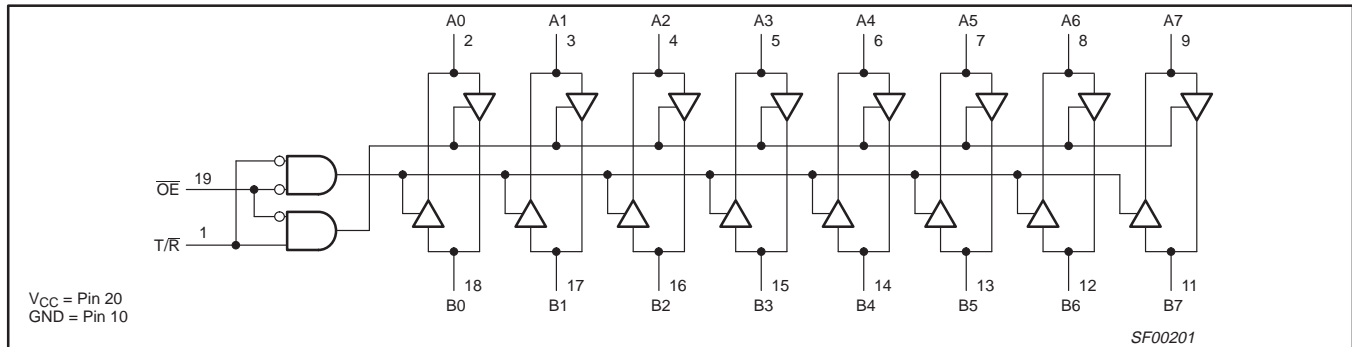
## IEC/IEEE SYMBOL



# Octal transceiver (3-State)

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## LOGIC DIAGRAM



## FUNCTION TABLE

INPUTS		OUTPUTS
$\overline{OE}$	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
$V_{CC}$	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 +5.5	V
$I_{OUT}$	Current applied to output in Low output state	A0-A7	48
		B0-B7	128
$T_{amb}$	Operating free-air temperature range	0 to +70	°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	A0-A7		-3	mA
		B0-B7		-15	mA
$I_{OL}$	Low-level output current	A0-A7		24	mA
		B0-B7		64	mA
$T_{amb}$	Operating free-air temperature range	0		+70	°C

## Octal transceiver (3-State)

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## 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>CCH</sub>	V <sub>CC</sub> = MAX				60	87	mA
		I <sub>CCL</sub>					70	100	mA
		I <sub>CCZ</sub>					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

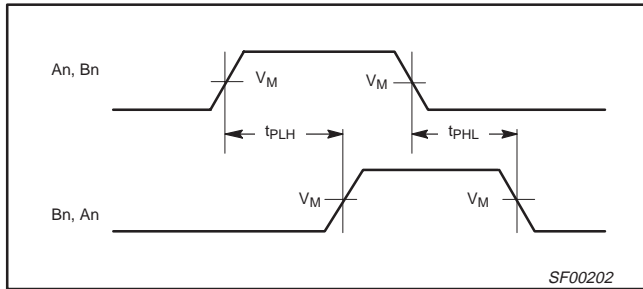
SYMBOL	PARAMETER	TEST CONDITION	LIMITS					UNIT
			V <sub>CC</sub> = +5.0V T <sub>amb</sub> = +25°C C <sub>L</sub> = 50pF, R <sub>L</sub> = 500Ω			V <sub>CC</sub> = +5.0V ± 10% T <sub>amb</sub> = 0°C to +70°C C <sub>L</sub> = 50pF, R <sub>L</sub> = 500Ω		
			MIN	TYP	MAX	MIN	MAX	
t <sub>PLH</sub> t <sub>PHL</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)

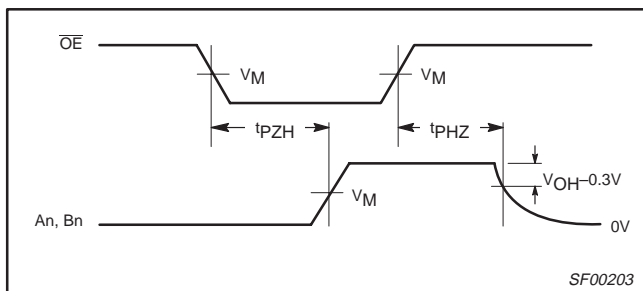
74F245

## AC WAVEFORMS

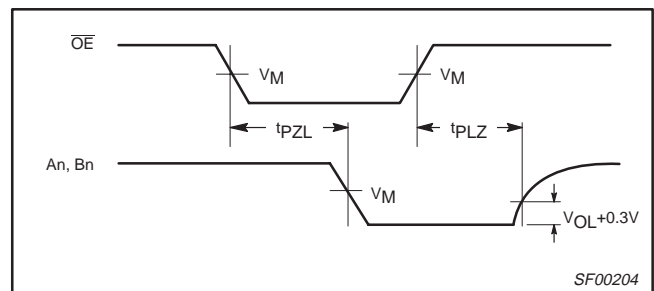
For all waveforms,  $V_M = 1.5V$ .



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

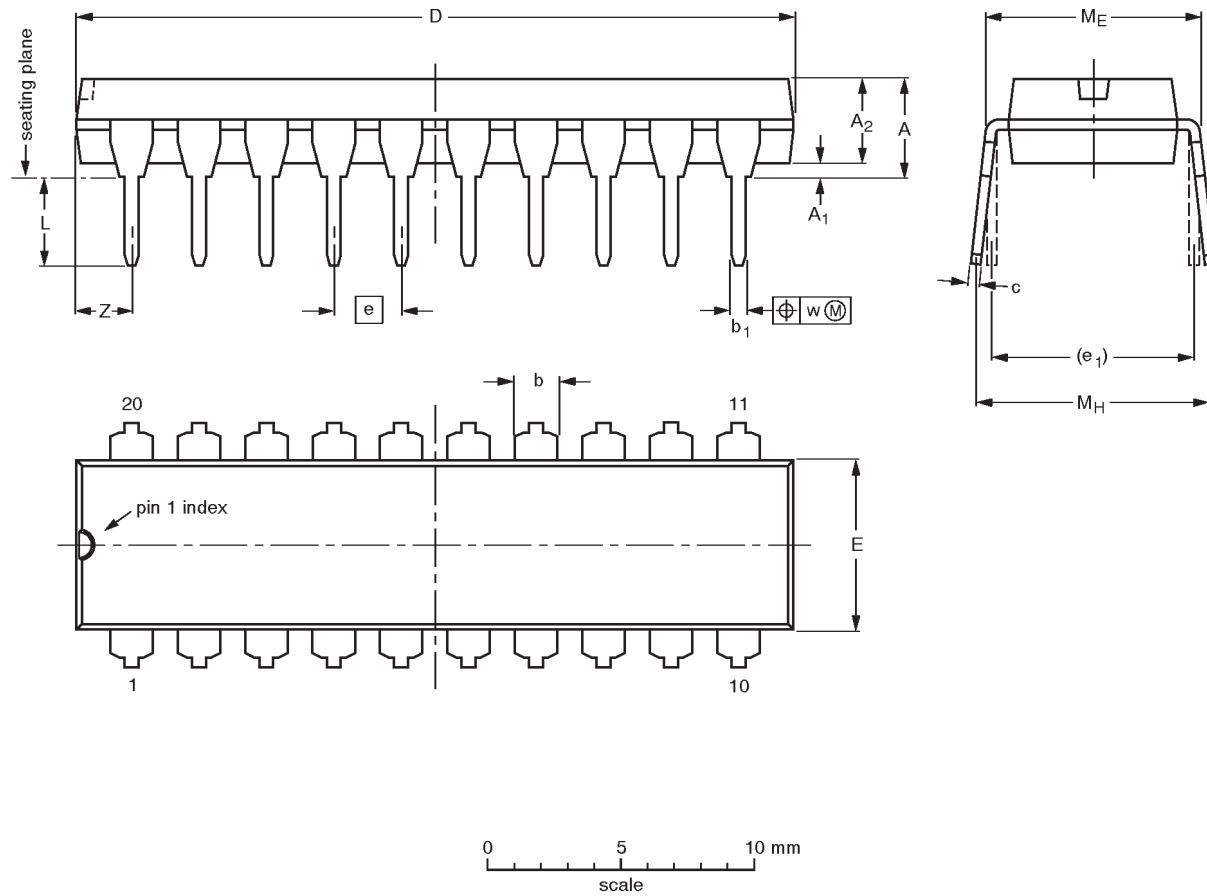
SF00128

# 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.

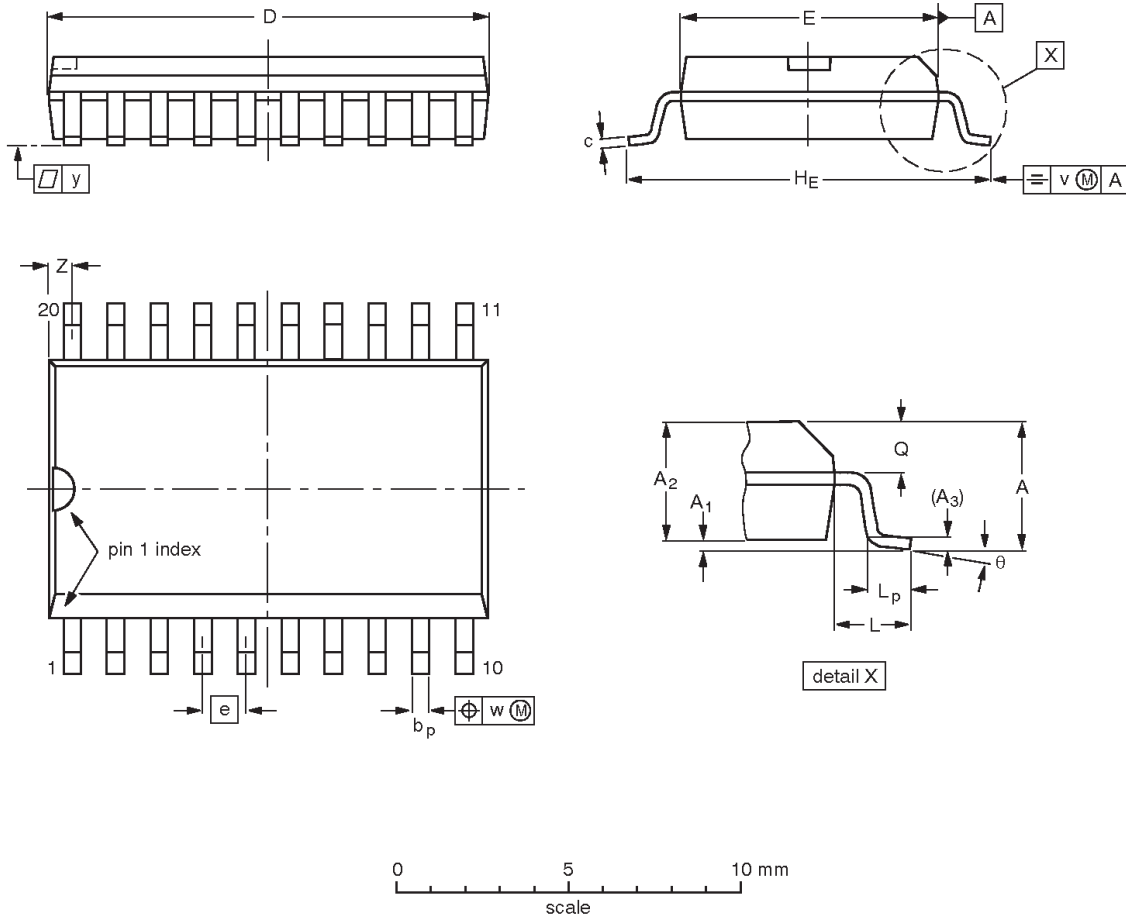
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT146-1			SC603			92-11-17 95-05-24

# 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

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Octal transceiver (3-State)

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**NOTES**

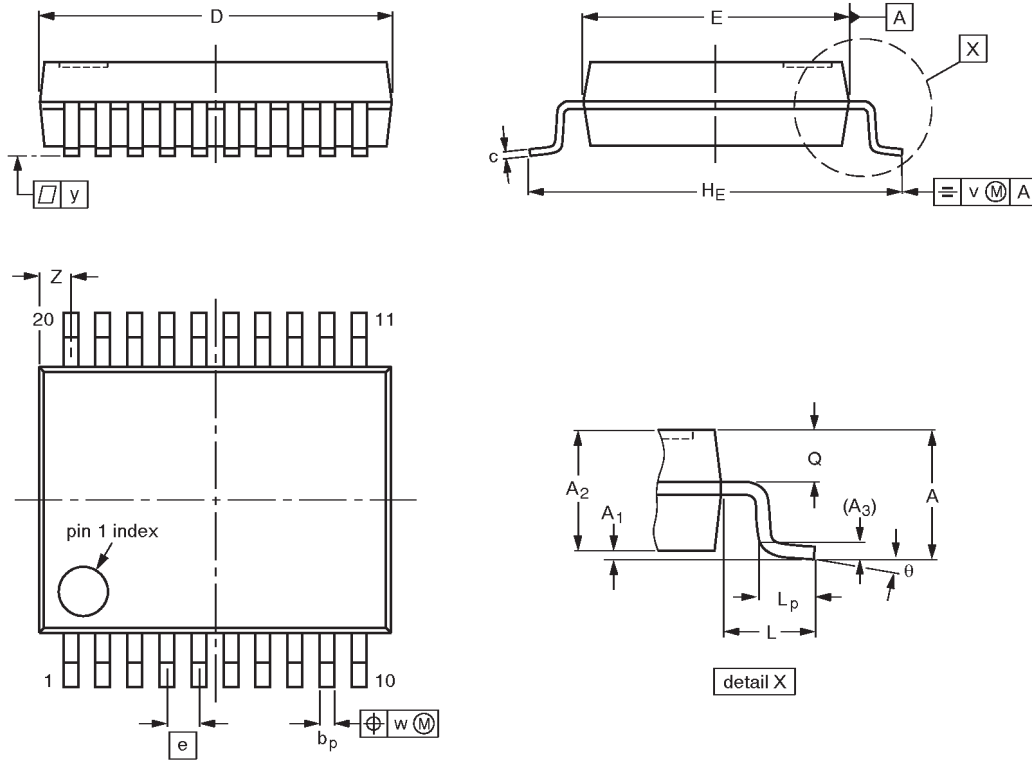


# Octal transceiver (3-State)

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)

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## 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.

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

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