

# DATA SHEET

**74F245**  
Octal transceiver (3-State)

Product specification  
IC15 Data Handbook

1994 Nov 15

**Philips Semiconductors**



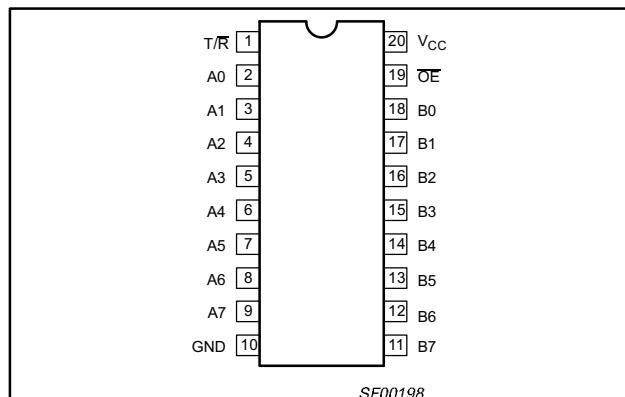
**PHILIPS**

**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

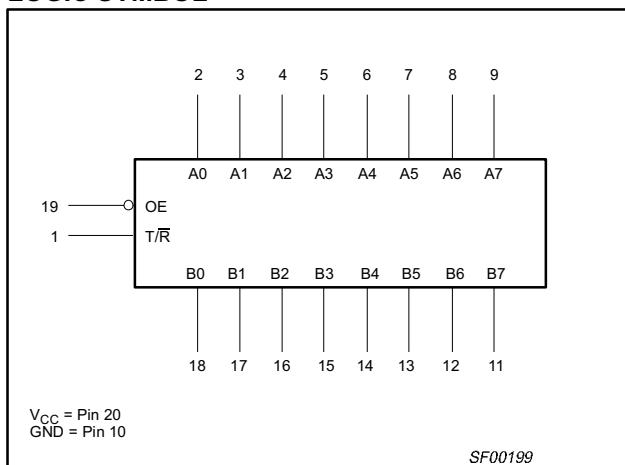
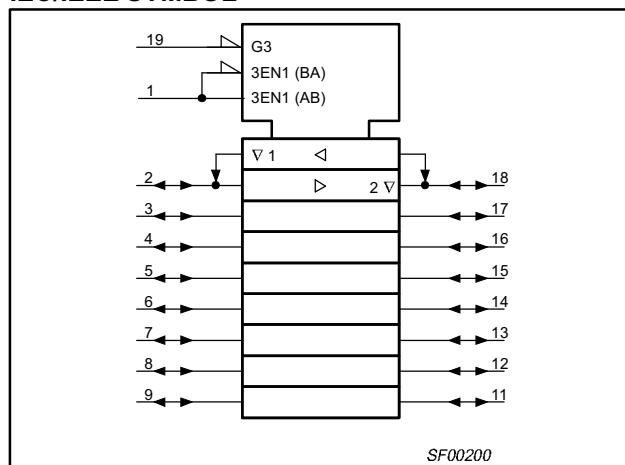
**ORDERING INFORMATION**

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

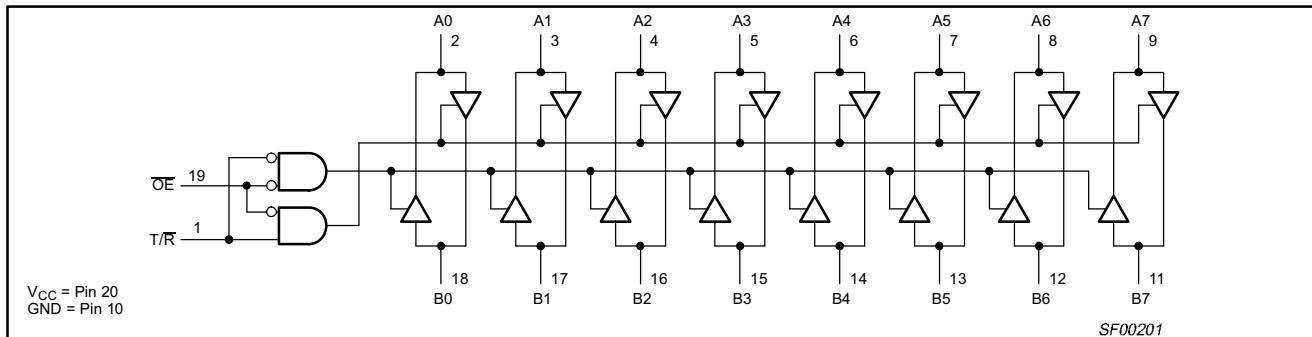
NOTE: One (1.0) FAST unit load is defined as: 20 $\mu$ A in the High state and 0.6mA in the Low state.

**LOGIC SYMBOL****IEC/IEEE SYMBOL**

## Octal transceiver (3-State)

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## 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
		MIN	NOM	
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)

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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	
$V_{OH}$	High-level output voltage	A0–A7, B0–B7	$V_{CC} = \text{MIN}$ , $V_{IL} = \text{MAX}$ , $V_{IH} = \text{MIN}$	$I_{OH} = -3\text{mA}$	$\pm 10\% V_{CC}$	2.4			V
		B0–B7			$\pm 5\% V_{CC}$	2.7	3.4		V
	Low-level output voltage	A0–A7		$I_{OL} = -15\text{mA}$	$\pm 10\% V_{CC}$	2.0			V
		B0–B7			$\pm 5\% V_{CC}$	2.0			V
$V_{OL}$	Low-level output voltage	B0–B7	$V_{CC} = \text{MIN}$ , $V_{IL} = \text{MAX}$ , $V_{IH} = \text{MIN}$	$I_{OL} = \text{MAX}$	$\pm 5\% V_{CC}$		0.42	0.55	V
$V_{IK}$	Input clamp voltage		$V_{CC} = \text{MIN}$ , $I_I = I_{IK}$				-0.73	-1.2	V
$I_I$	Input current at maximum input voltage	$\overline{OE}$ , T/R	$V_{CC} = 5.5\text{V}$ , $V_I = 7.0\text{V}$					100	$\mu\text{A}$
		A0–A7, B0–B7	$V_{CC} = 5.5\text{V}$ , $V_I = 5.5\text{V}$					1	mA
$I_{IH}$	High-level input current	$\overline{OE}$ , T/R only	$V_{CC} = \text{MAX}$ , $V_I = 2.7\text{V}$					20	$\mu\text{A}$
$I_{IL}$	Low-level input current	$\overline{OE}$ , T/R only	$V_{CC} = \text{MAX}$ , $V_I = 0.5\text{V}$					-1.2	mA
$I_{IH} + I_{OZH}$	Off-state output current High level voltage applied		$V_{CC} = \text{MAX}$ , $V_O = 2.7\text{V}$					70	$\mu\text{A}$
$I_{IL} + I_{OZL}$	Off-state output current Low level voltage applied		$V_{CC} = \text{MAX}$ , $V_O = 0.5\text{V}$					-600	$\mu\text{A}$
$I_{OS}$	Short-circuit output current <sup>3</sup>	A0–A7	$V_{CC} = \text{MAX}$		$-60$		-150	mA	
		B0–B7			$-100$		-225	mA	
$I_{CC}$	Supply current (total)	$I_{CCH}$	$V_{CC} = \text{MAX}$			60	87	mA	
		$I_{CCL}$				70	100	mA	
		$I_{CCZ}$				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  $V_{CC} = 5\text{V}$ ,  $T_{amb} = 25^\circ\text{C}$ .
- 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.

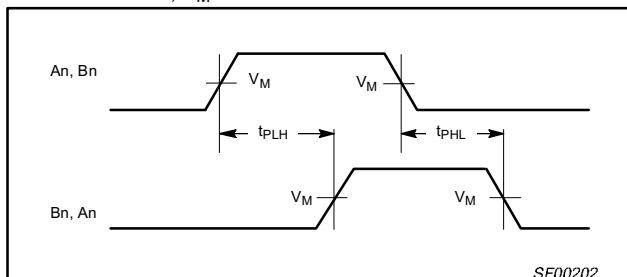
## AC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITION	LIMITS					UNIT	
			$V_{CC} = +5.0\text{V}$ $T_{amb} = +25^\circ\text{C}$ $C_L = 50\text{pF}$ , $R_L = 500\Omega$			$V_{CC} = +5.0\text{V} \pm 10\%$ $T_{amb} = 0^\circ\text{C}$ to $+70^\circ\text{C}$ $C_L = 50\text{pF}$ , $R_L = 500\Omega$			
			MIN	TYP	MAX	MIN	MAX		
$t_{PLH}$ $t_{PHL}$	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	
$t_{PZH}$ $t_{PZL}$	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	
$t_{PHZ}$ $t_{PLZ}$	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	

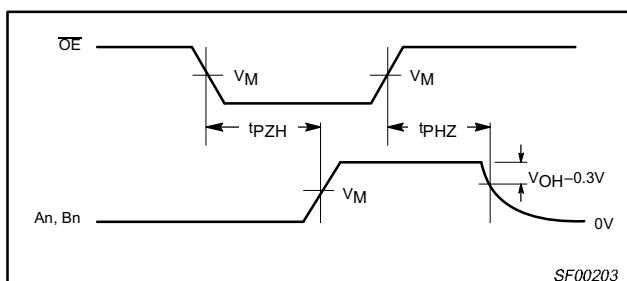
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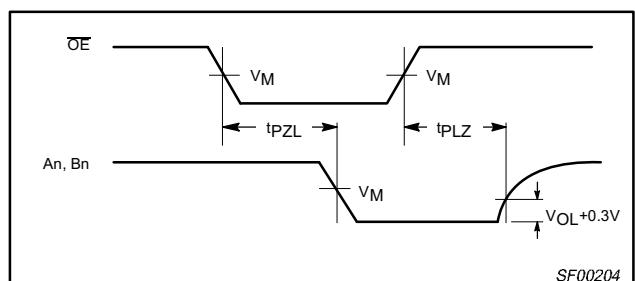
## AC WAVEFORMS

For all waveforms,  $V_M = 1.5V$ .

Waveform 1. Propagation Delay for Non-Inverting Output

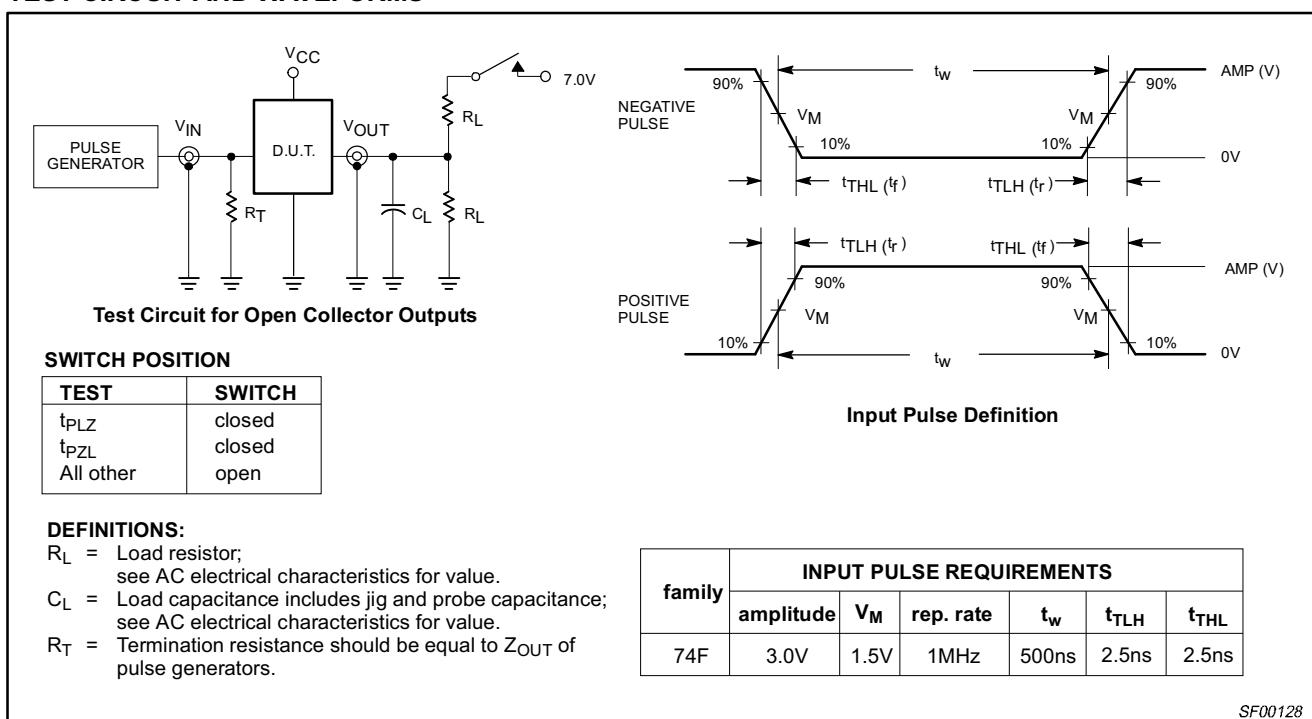


Waveform 2. 3-State Output Enable Time to High Level and Output Disable Time from High Level



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

## TEST CIRCUIT AND WAVEFORMS

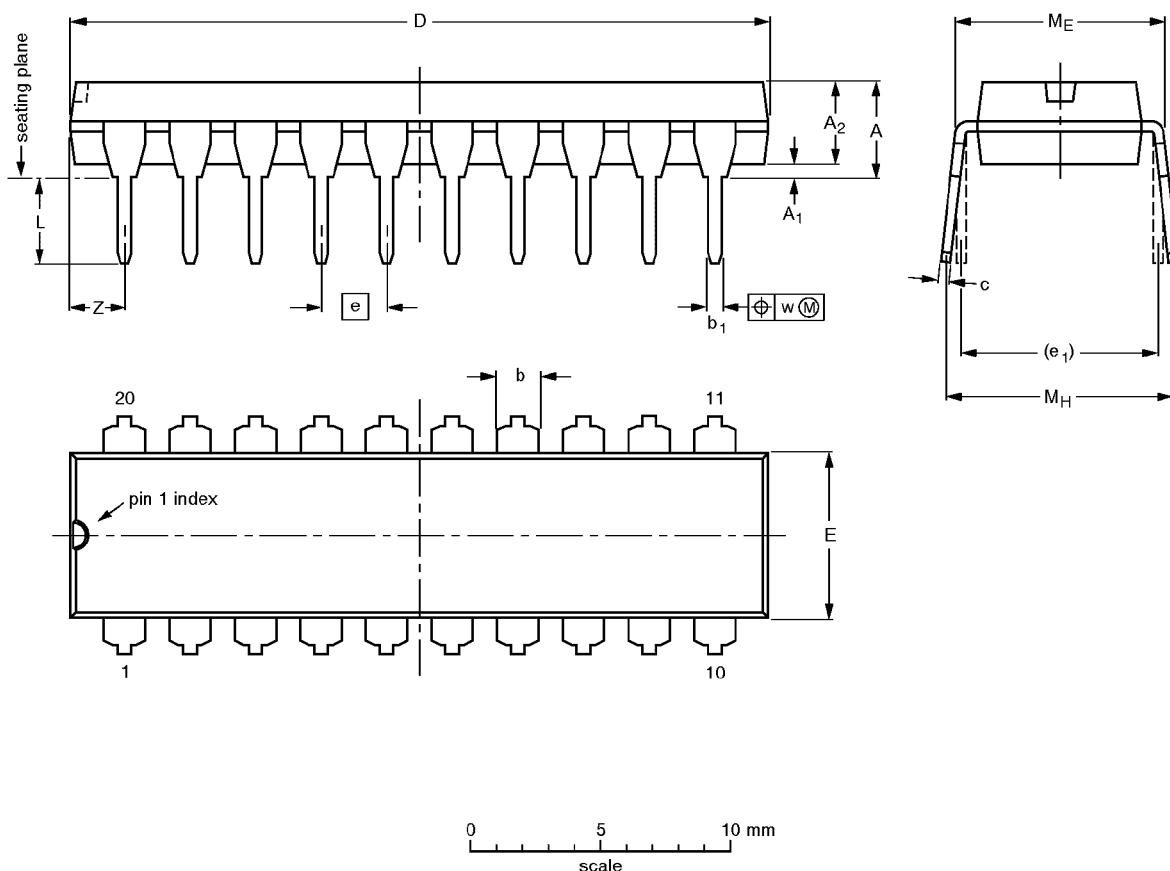


## Octal transceiver (3-State)

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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**

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

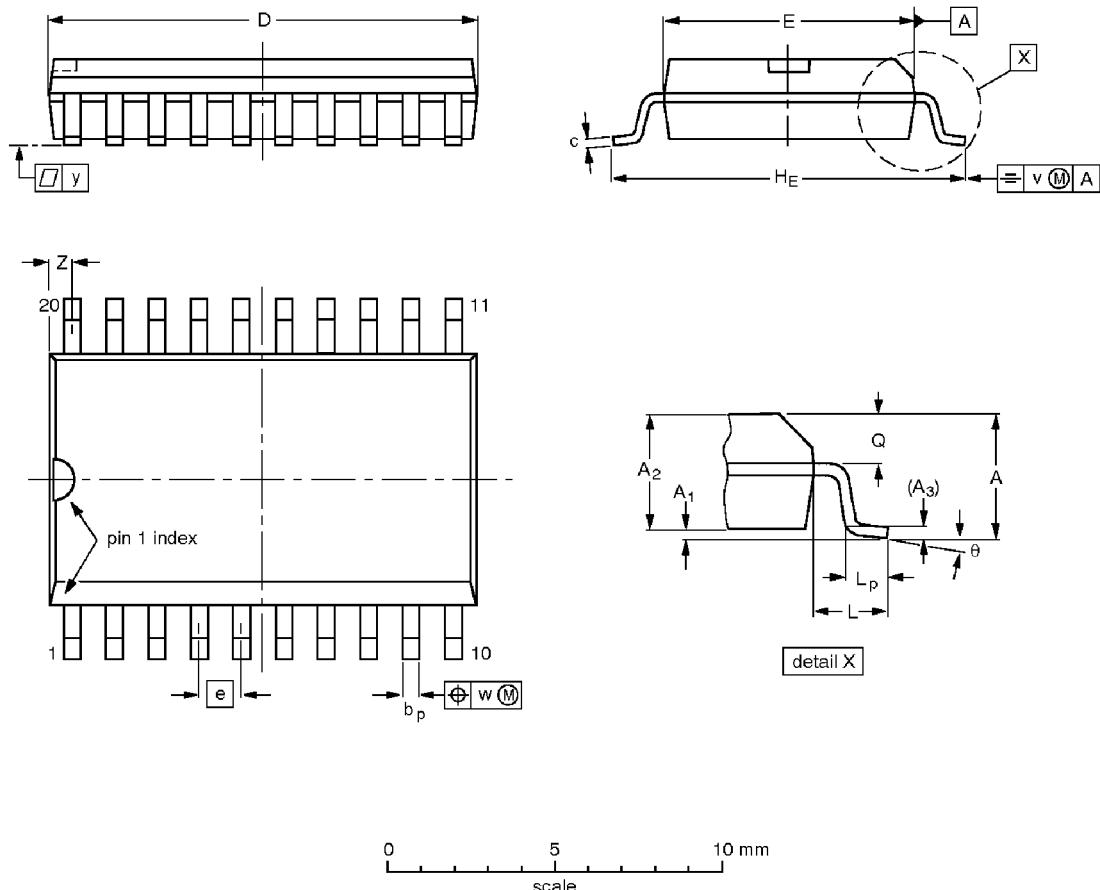
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT146-1			SC603			92-11-17 95-05-24

## Octal transceiver (3-State)

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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 0.10	0.30 0.25	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 1.0	1.1 1.0	0.25	0.25	0.1	0.9 0.4	8° 0°
inches	0.10 0.004	0.012 0.089	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	0° 0°

## Note

- 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)

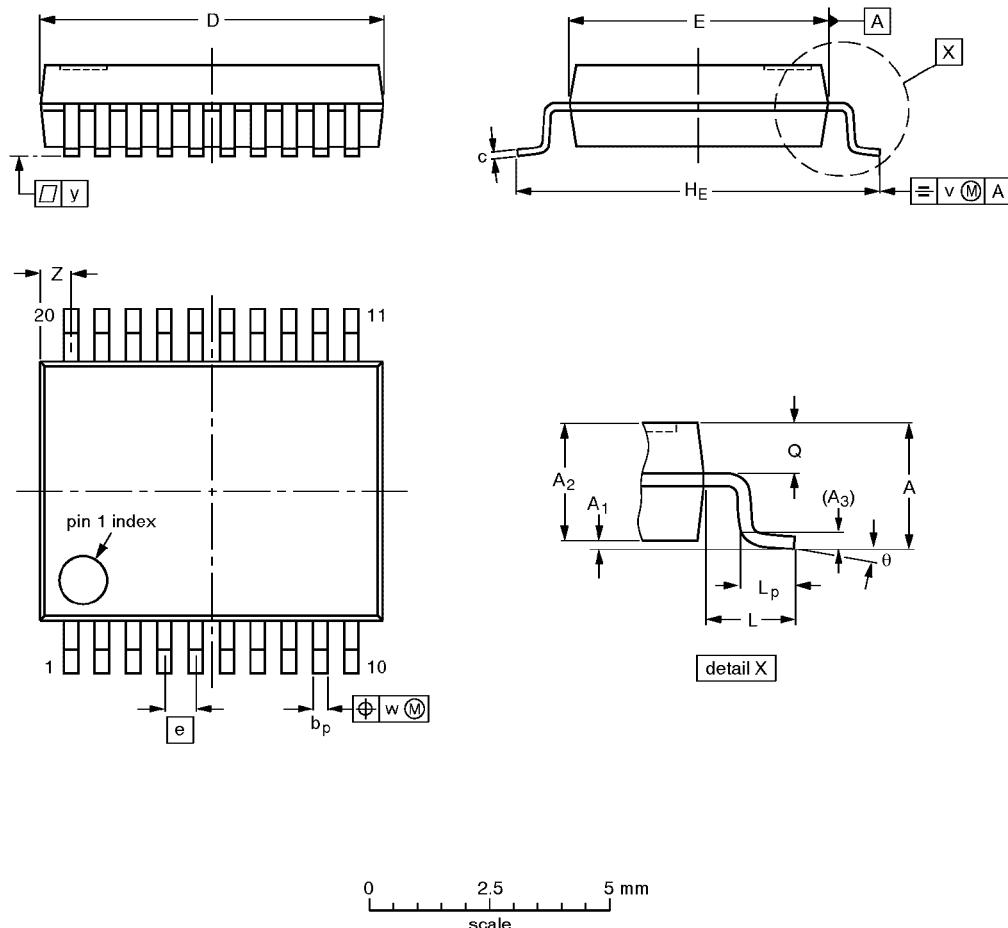
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**NOTES**

## Octal transceiver (3-State)

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**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 0.05	0.21 1.65	1.80	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**

- 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>	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.
<i>Preliminary Specification</i>	Preproduction Product	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.
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