

# DATA SHEET

## **74F756**

Octal inverter buffer (open-collector)

## **74F757**

Octal buffer (open-collector)

## **74F760**

Octal buffer (open-collector)

Product specification

1989 Nov 27

IC15 Data Handbook

## Buffers

## 74F756/74F757/74F760

74F756 Octal Inverter Buffer (Open Collector)

74F757 Octal Buffer (Open Collector)

74F760 Octal Buffer (Open Collector)

### FEATURES

- Octal bus interface
- Open collector versions of 74F240, 74F241 and 74F244

### DESCRIPTION

The 74F756, 74F757 and 74F760 are octal buffers that are ideal for driving bus lines of buffer memory address registers. The 74F756 is the open collector version of 74F240, 74F757 is the open collector version of 74F241 and 74F760 is the open collector version of 74F244. These devices feature two Output Enables,  $\overline{OE}a$  and  $\overline{OE}b$  (or  $OEB$  for the 74F757), each controlling four of the outputs.

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
74F756	9.0ns	40mA
74F757	9.0ns	45mA
74F760	9.0ns	45mA

### ORDERING INFORMATION

DESCRIPTION	ORDER CODE	PKG DWG #
	COMMERCIAL RANGE $V_{CC} = 5V \pm 10\%$ , $T_{amb} = 0^{\circ}C$ to $+70^{\circ}C$	
20-pin plastic DIP	N74F756N, N74F757AN, N74F760N	SOT146-1
20-pin plastic SOL	N74F756D, N74F757AD, N74F760D	SOT163-1

### INPUT AND OUTPUT LOADING AND FAN OUT TABLE

PINS	DESCRIPTION	74F (U.L.) HIGH/LOW	LOAD VALUE HIGH/LOW
Ian, Ibn	Data inputs	1.0/1.67	20 $\mu$ A/1.0mA
$\overline{OE}a$ , $\overline{OE}b$	Output enable input (active Low)	1.0/1.67	20 $\mu$ A/0.2mA
OEB	Output enable input (active High 74F757)	1.0/1.67	20 $\mu$ A/1.0mA
Yan, Ybn	Data outputs (74F757, 74F760)	OC/106.7	OC/64mA
$\overline{Y}an$ , $\overline{Y}bn$	Data outputs (74F756)	OC/106.7	OC/64mA

#### Notes:

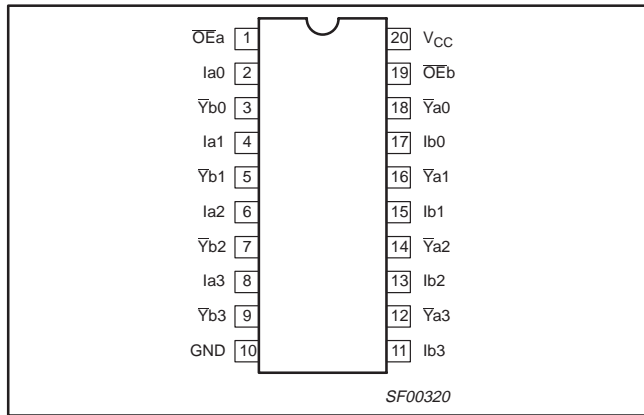
One (1.0) FAST unit load is defined as: 20 $\mu$ A in the high state and 0.6mA in the Low state.

OC=Open Collector

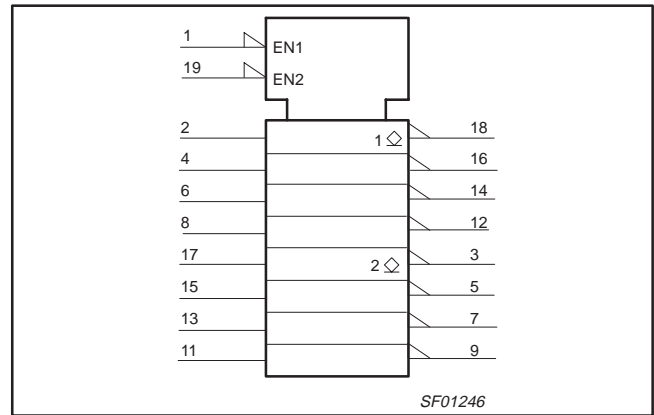
# Buffers

# 74F756/74F757/74F760

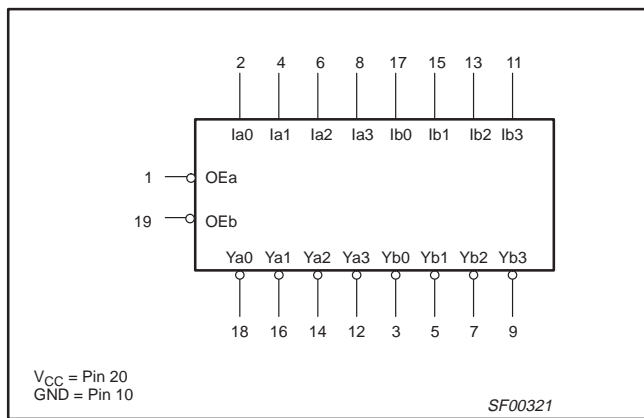
### PIN CONFIGURATION for 74F756



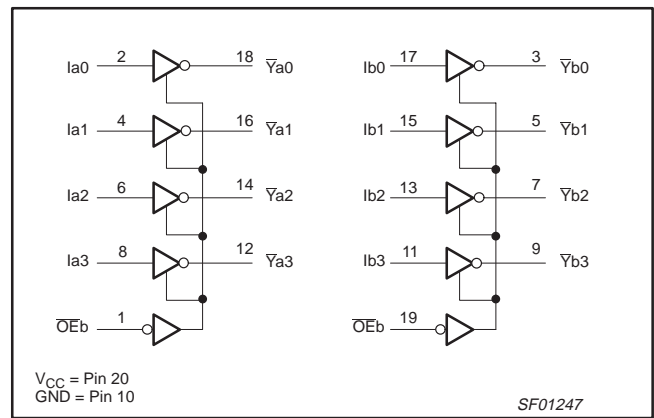
### IEC/IEEE SYMBOL for 74F756



### LOGIC SYMBOL for 74F756



### LOGIC DIAGRAM for 74F756



### FUNCTION TABLE for 74F756

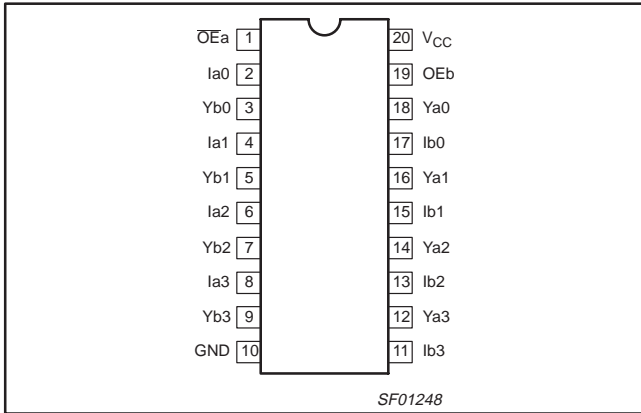
INPUTS				OUTPUTS	
$\overline{OE}a$	$Ia$	$\overline{OE}b$	$Ib$	$\overline{Y}a$	$\overline{Y}b$
L	L	L	L	H	H
L	H	L	H	L	L
H	X	H	X	H (off)	H (off)

H = High voltage level  
 L = Low voltage level  
 X = Don't care

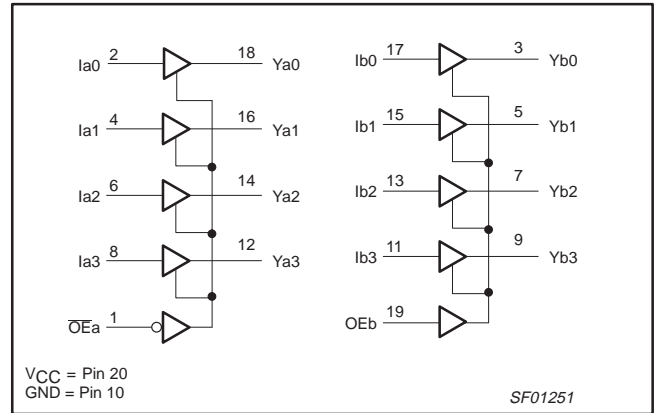
# Buffers

# 74F756/74F757/74F760

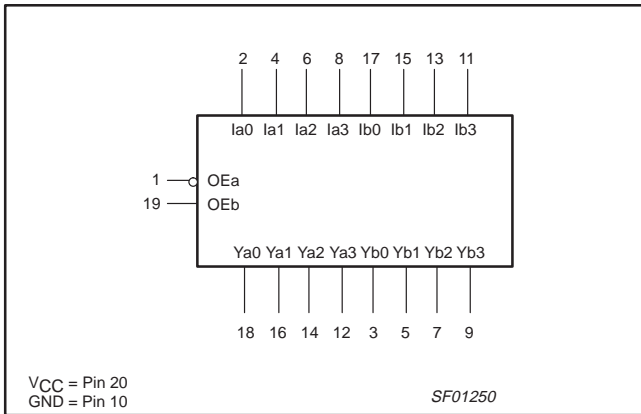
### PIN CONFIGURATION for 74F757



### LOGIC DIAGRAM for 74F757



### LOGIC SYMBOL for 74F757

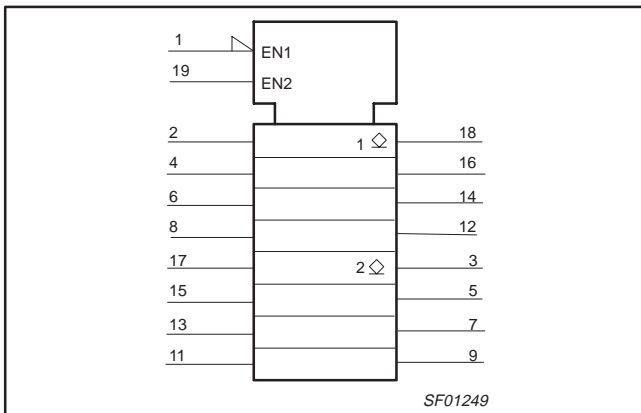


### FUNCTION TABLE for 74F757

INPUTS				OUTPUTS	
OEa	Ia	OEb	Ib	Ya	Yb
L	L	H	L	L	L
L	H	H	H	H	H
H	X	L	X	H (off)	H (off)

H = High voltage level  
 L = Low voltage level  
 X = Don't care

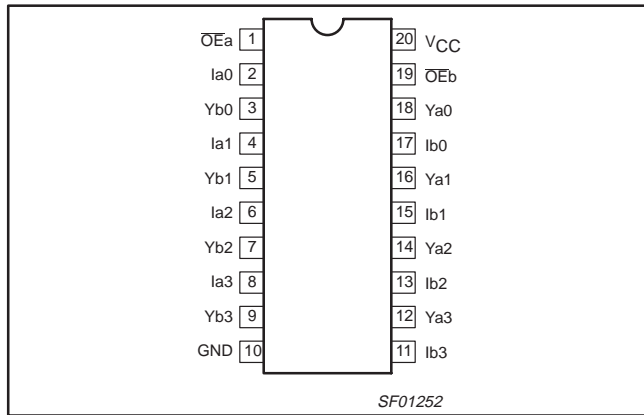
### IEC/IEEE SYMBOL for 74F757



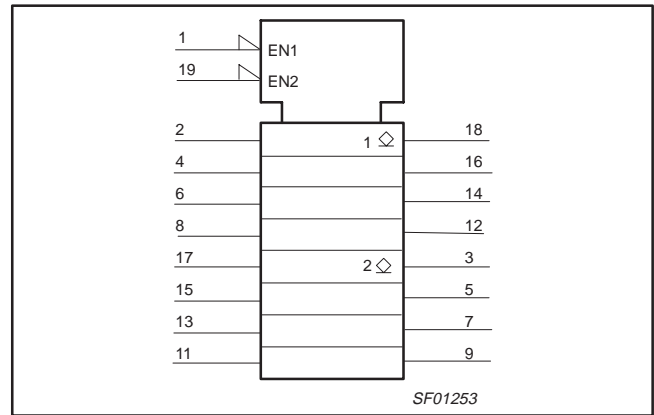
# Buffers

# 74F756/74F757/74F760

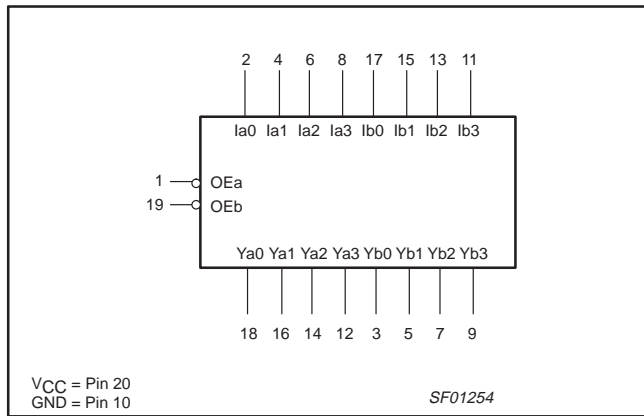
### PIN CONFIGURATION for 74F760



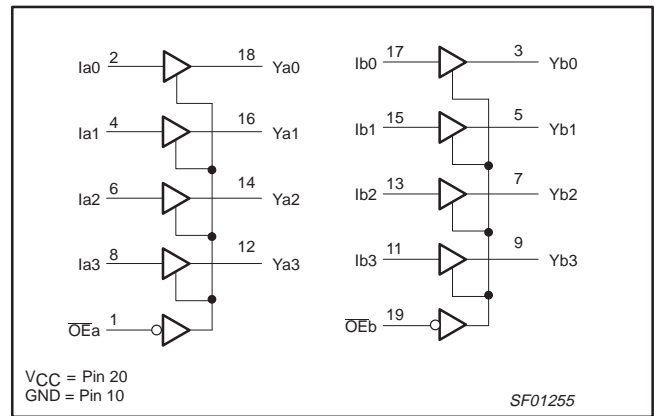
### IEC/IEEE SYMBOL for 74F760



### LOGIC SYMBOL for 74F760



### LOGIC DIAGRAM for 74F760



### FUNCTION TABLE for 74F760

INPUTS				OUTPUTS	
OEa	Ia	OEb	Ib	Ya	Yb
L	L	L	L	L	L
L	H	L	H	H	H
H	X	H	X	H (off)	H (off)

H = High voltage level  
 L = Low voltage level  
 X = Don't care

## Buffers

## 74F756/74F757/74F760

**ABSOLUTE MAXIMUM RATINGS**

(Operation beyond the limit 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 V <sub>CC</sub>	V
I <sub>OUT</sub>	Current applied to output in Low output state	128	mA
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
V <sub>OH</sub>	High-level output voltage			4.5	V
I <sub>OL</sub>	Low-level output current			64	mA
T <sub>amb</sub>	Operating free-air temperature range	0		70	°C

**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		
I <sub>OH</sub>	High-level output current		V <sub>CC</sub> = MIN, V <sub>IL</sub> = MAX, V <sub>IH</sub> = MIN, V <sub>OH</sub> = MAX			250	μA	
V <sub>OL</sub>	Low-level output voltage		V <sub>CC</sub> = MIN, V <sub>IL</sub> = MAX, V <sub>IH</sub> = MIN, I <sub>OL</sub> = 48MAX	±10%V <sub>CC</sub>	0.38	0.55	V	
				±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		V <sub>CC</sub> = MAX, V <sub>I</sub> = 7.0V			100	μA	
I <sub>IH</sub>	High-level input current		V <sub>CC</sub> = MAX, V <sub>I</sub> = 2.7V			20	μA	
I <sub>IL</sub>	Low-level input current		V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.5V			-1.0	mA	
I <sub>CC</sub>	Supply current (total)	74F756	I <sub>CCH</sub>	V <sub>CC</sub> = MAX		20	30	mA
			I <sub>CCL</sub>			50	70	mA
		74F757	I <sub>CCH</sub>			30	40	mA
			I <sub>CCL</sub>			55	80	mA
		74F760	I <sub>CCH</sub>			25	37	mA
			I <sub>CCL</sub>			55	80	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.

Buffers

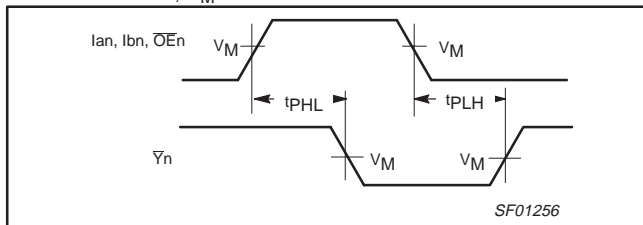
74F756/74F757/74F760

AC ELECTRICAL CHARACTERISTICS

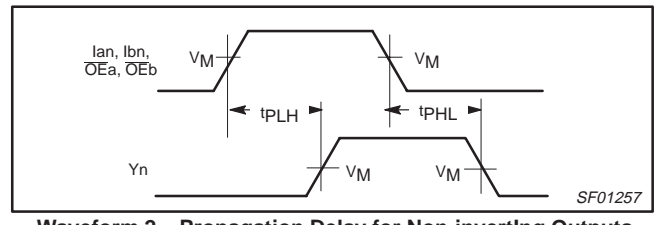
SYMBOL	PARAMETER	TEST CONDITION	LIMITS					UNIT
			T <sub>amb</sub> = +25°C V <sub>CC</sub> = +5.0V C <sub>L</sub> = 50pF, R <sub>L</sub> = 500Ω			T <sub>amb</sub> = 0°C to +70°C V <sub>CC</sub> = +5.0V ± 10% C <sub>L</sub> = 50pF, R <sub>L</sub> = 500Ω		
			MIN	TYP	MAX	MIN	MAX	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation delay I <sub>an</sub> , I <sub>bn</sub> to $\bar{Y}_n$	Waveform 1, 2	8.5	11.0	14.0	8.5	15.0	ns
			1.0	3.0	6.0	1.0	6.5	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation delay $\bar{O}E_n$ to $\bar{Y}_n$	Waveform 1, 2	9.0	11.5	14.5	9.0	15.0	ns
			5.0	7.0	10.0	4.5	10.5	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation delay I <sub>an</sub> , I <sub>bn</sub> to $\bar{Y}_n$	Waveform 1, 2	7.5	10.5	13.5	7.5	14.0	ns
			3.0	5.5	8.5	3.0	9.0	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation delay $\bar{O}E_a$ or $\bar{O}E_b$ to $\bar{Y}_n$	Waveform 1, 2	9.0	10.5	15.0	8.5	16.0	ns
			4.5	7.0	10.0	4.0	10.5	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation delay I <sub>an</sub> , I <sub>bn</sub> to $\bar{Y}_n$	Waveform 1, 2	7.5	10.0	13.5	7.5	14.0	ns
			3.5	5.5	8.5	3.0	9.0	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation delay $\bar{O}E_n$ to $\bar{Y}_n$	Waveform 1, 2	9.5	11.5	14.5	9.0	15.0	ns
			5.0	7.0	10.5	4.5	10.5	

AC WAVEFORMS

For all waveforms, V<sub>M</sub> = 1.5V.

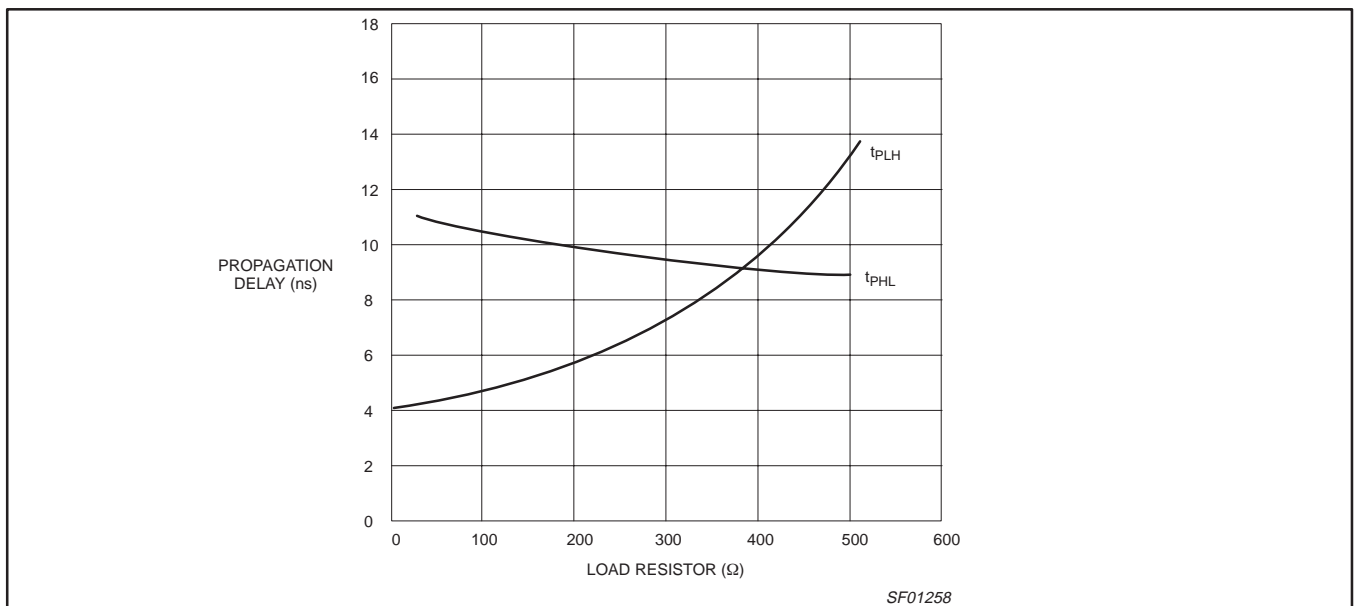


Waveform 1. Propagation Delay for Inverting Outputs



Waveform 2. Propagation Delay for Non-inverting Outputs

TYPICAL PROPAGATION DELAYS VERSUS LOAD FOR OPEN COLLECTOR OUTPUTS



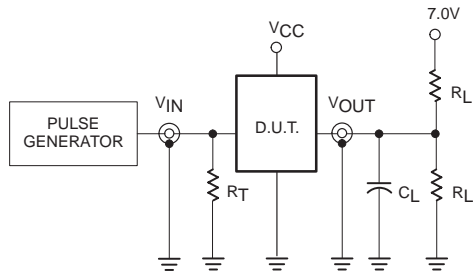
NOTE:

When using open-collector parts, the value of the pull-up resistor greatly affects the value of the t<sub>PLH</sub>. For example, changing the pull-up resistor value from 500Ω to 100Ω will improve the t<sub>PLH</sub> up to 50% with only slight increase in the t<sub>PHL</sub>. However, if the pull-up resistor is changed, the user must make certain that the total I<sub>OL</sub> current through the resistor and the total I<sub>IL</sub>'s of the receivers do not exceed the I<sub>OL</sub> maximum specification.

# Buffers

# 74F756/74F757/74F760

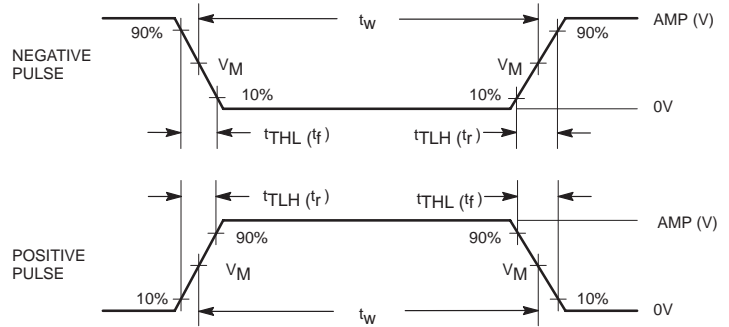
## TEST CIRCUIT AND WAVEFORMS



**Test Circuit for Open Collector Outputs**

**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

SF00027

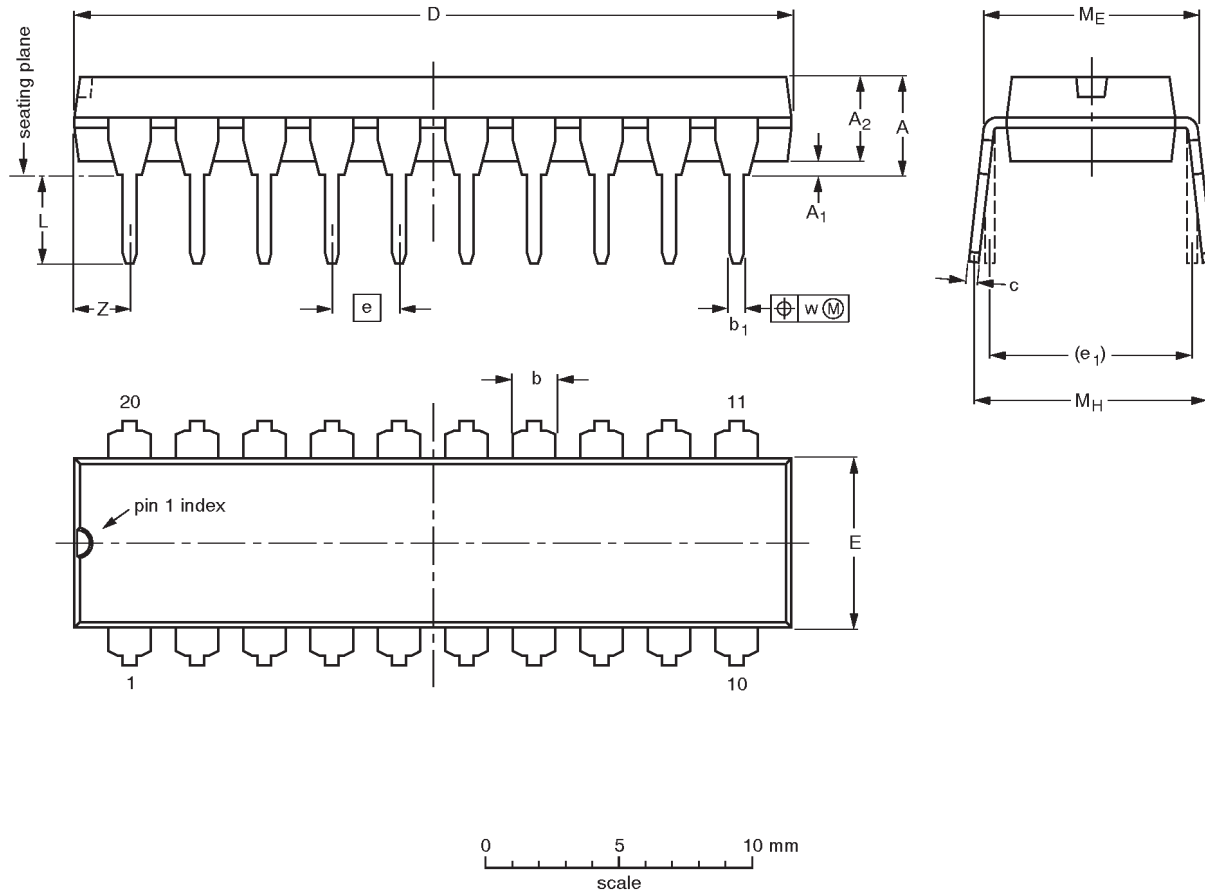


Buffers

74F756, 74F757,  
74F760

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.

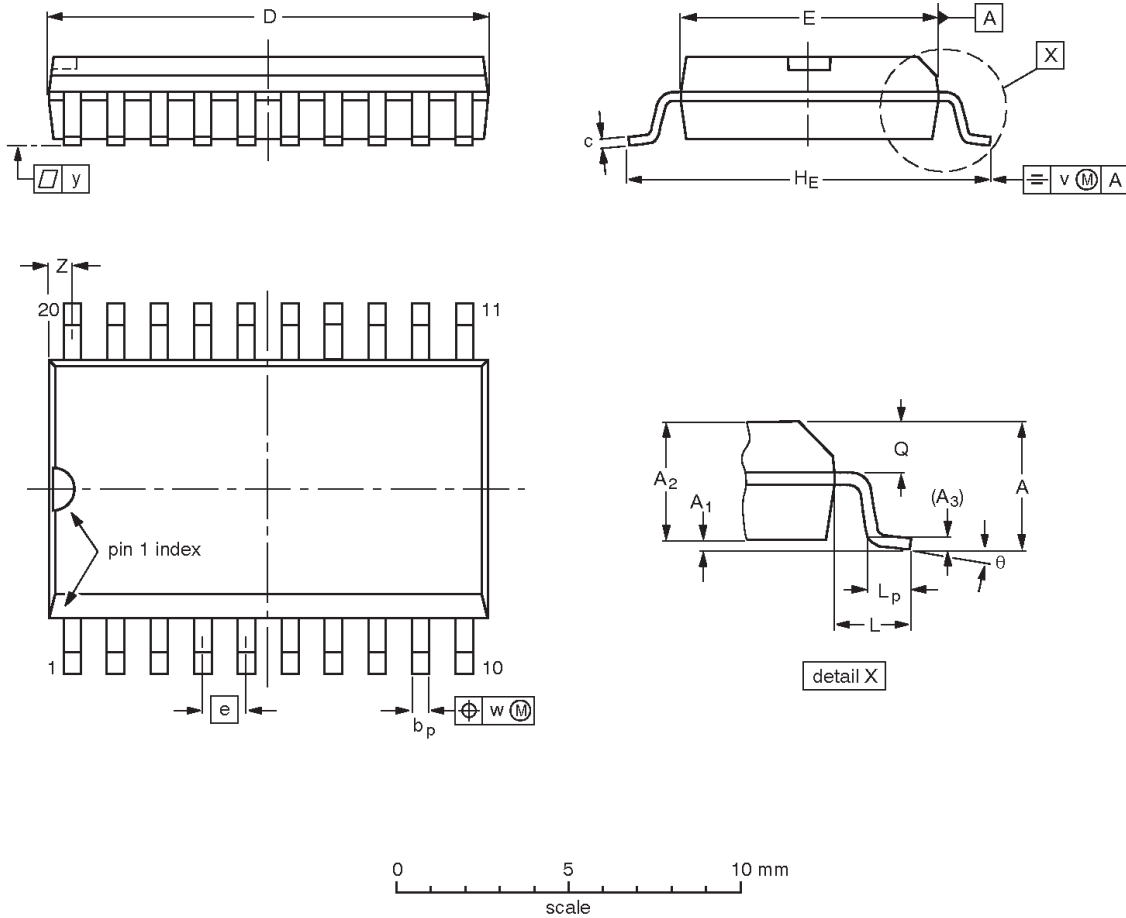
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT146-1			SC603			92-11-17 95-05-24

Buffers

74F756, 74F757,  
74F760

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>	$\theta$
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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Buffers

74F756, 74F757,  
74F760

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**NOTES**

## Buffers

74F756, 74F757,  
74F760

## 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.

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