DATA SHEET

74F641/~~74F642~~*
Transceivers

** Discontinued part. Please see the Discontinued Product List.*

Product specification
Supersedes data of 1989 Nov 27
IC15 Data Handbook

1999 Jan 08

Philips Semiconductors

PHILIPS

Transceivers 74F641/~~74F642~~*

74F641 Octal Bus Transceiver with Common Output Enable, Non-Inverting (Open Collector)
74F642 Octal Bus Transceiver with Common Output Enable, Inverting (Open Collector)

FEATURES

- High-impedance NPN base inputs for reduced loading (20µA in High and Low states)
- Octal bidirectional bus interface
- Common Output Enable for both Transmit and Receive modes
- Open collector outputs sink 64mA
- —74F641, non-inverting
  —74F642, inverting

ORDERING INFORMATION

DESCRIPTION	COMMERCIAL RANGE V_{CC} = 5V ±10%, T_{amb} = 0°C to +70°C	PKG DWG #
20-pin plastic DIP	N74F641N	SOT146-1
20-pin plastic SOL	N74F641D	SOT163-1

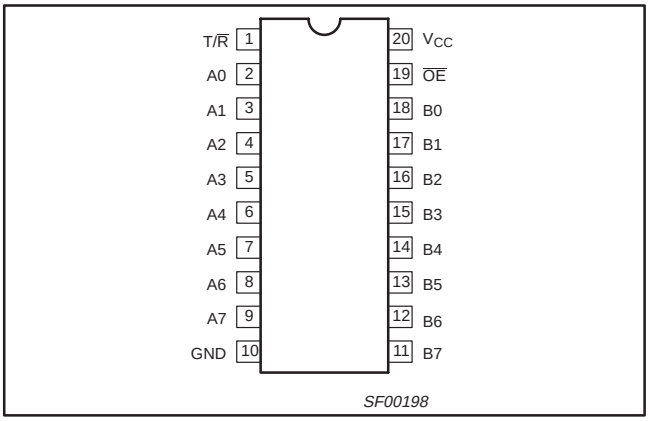
TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
74F641	8.0ns	69mA
74F642	8.5ns	52mA

INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

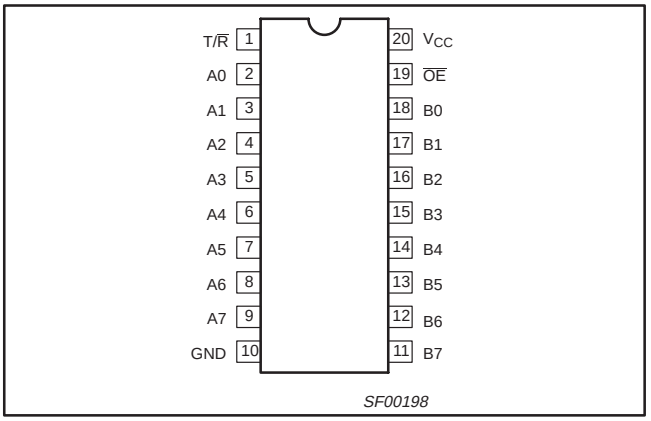
PINS	DESCRIPTION	74F(U.L.) HIGH/LOW	LOAD VALUE HIGH/LOW
A0 - A7, B0 - B7	Data inputs	1.0/0.033	20µA/20µA
T/$\overline{R}$	Transmit/Receive input	2.0/0.067	40µA/40µA
$\overline{OE}$	Output Enable inputs	2.0/0.067	40µA/40µA
A0 - A7	Data outputs	OC/40	OC/24mA
B0 - B7	Data outputs	OC/106.7	OC/64mA

NOTE: One (1.0) FAST unit load is defined as: 20µA in the High state and 0.6mA in the Low state. OC = Open Collector.

PIN CONFIGURATION – 74F641

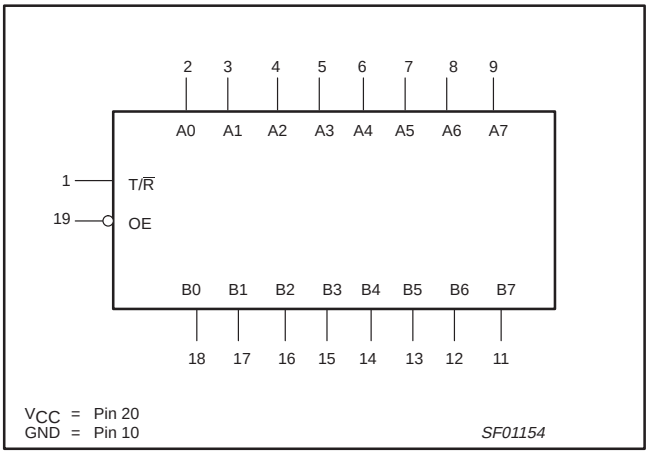


PIN CONFIGURATION – 74F642

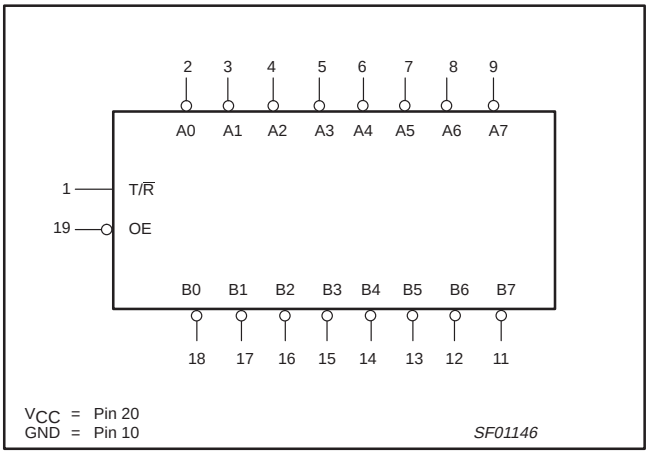


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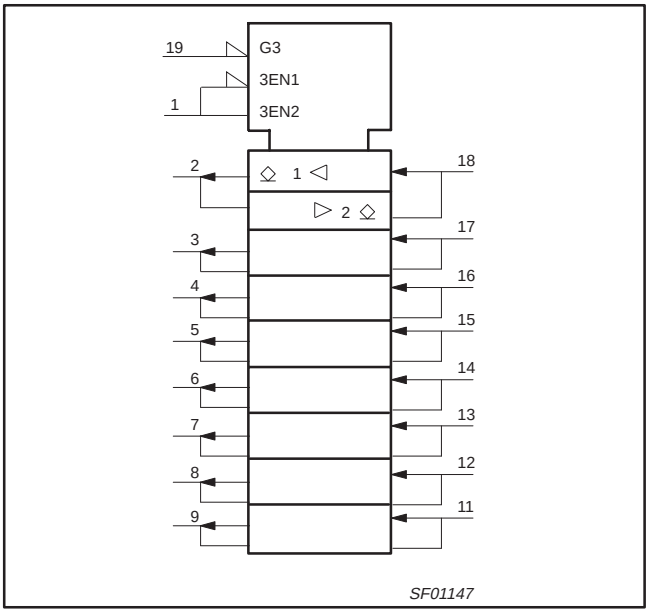
LOGIC SYMBOL – 74F641



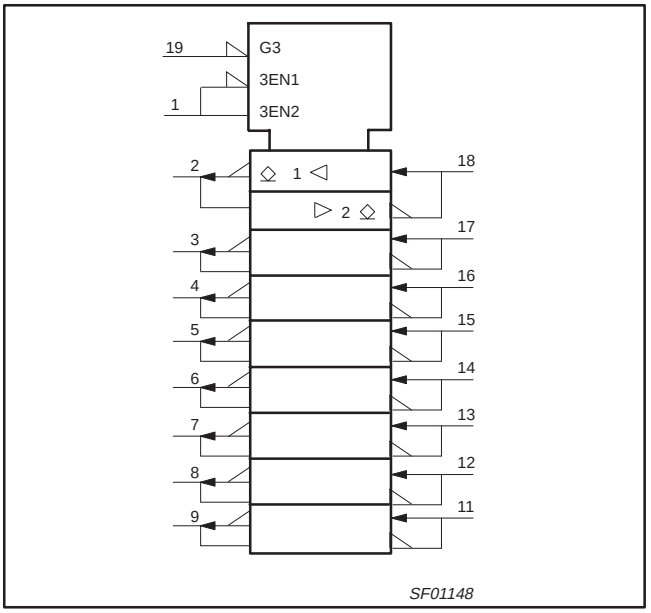
LOGIC SYMBOL – 74F642



LOGIC SYMBOL (IEEE/IEC) – 74F641

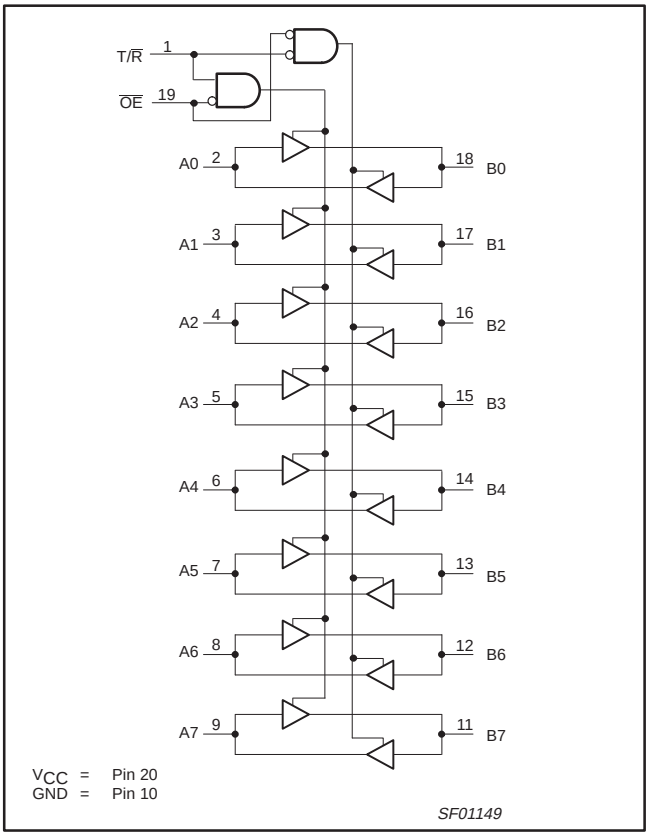


LOGIC SYMBOL (IEEE/IEC) – 74F642

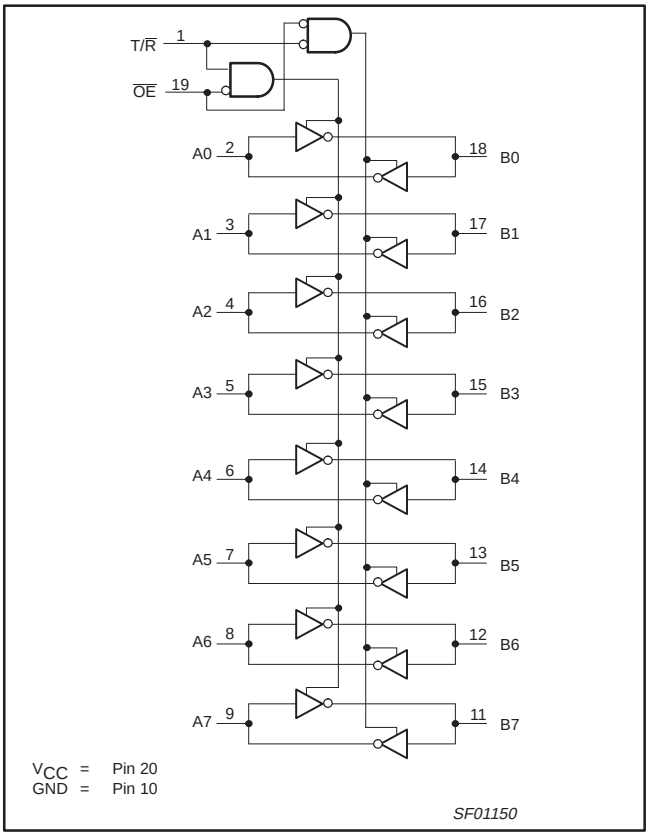


** Discontinued part. Please see the Discontinued Products List.*

LOGIC DIAGRAM – 74F641



LOGIC DIAGRAM – 74F642



FUNCTION TABLE – 74F641

INPUTS		INPUTS/OUTPUTS	
$\overline{OE}$	T/$\overline{R}$	An	Bn
L	L	A=B	INPUTS
H	H	INPUTS	B=A
H	X	OFF	OFF

H = High voltage level
L = Low voltage level
X = Don't care
OFF= High if pull-up resistor is connected to open collector output

FUNCTION TABLE – 74F642

INPUTS		INPUTS/OUTPUTS	
$\overline{OE}$	T/$\overline{R}$	An	Bn
L	L	A=$\overline{B}$	INPUTS
H	H	INPUTS	B=$\overline{A}$
H	X	OFF	OFF

H = High voltage level
L = Low voltage level
X = Don't care
OFF= High if pull-up resistor is connected to open collector output

** Discontinued part. Please see the Discontinued Products List.*

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	A0–A7	48	mA
		B0–B7	128	mA
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				4.5	V
I_{OL}	Low-level output current	A0–A7			24	mA
		B0–B7			64	mA
T_{amb}	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[NO TAG]			LIMITS MIN	LIMITS TYP NO TAG	LIMITS MAX	UNIT
I_{OH}	High-level output current			V_{CC} = MIN, V_{IL} = MAX, V_{IH} = MIN, V_{OH} = MAX					250	µA
V_{OL}	Low-level output voltage		A0–A7	V_{CC} = MIN, V_{IL} = MAX, V_{IH} = MIN,	I_{OL} = 24mA	±10%V_{CC}		0.35	0.50	V
						±5%V_{CC}		0.35	0.50	V
			B0–B7		I_{OL} = 48mA	±10%V_{CC}		0.38	0.55	V
					I_{OL} = 64mA	±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		T/$\overline{R}$, $\overline{OE}$	V_{CC} = 0.0V, V_I = 7.0V					100	µA
			An, Bn	V_{CC} = 5.5V, V_I = 5.5V					1	mA
I_{IH}	High-level input current		T/$\overline{R}$, $\overline{OE}$	V_{CC} = MAX, V_I = 2.7V					40	µA
			An, Bn						20	µA
I_{IL}	Low-level input current		T/$\overline{R}$, $\overline{OE}$	V_{CC} = MAX, V_I = 0.5V					–40	µA
			An, Bn						–20	µA
I_{CC}	Supply current (total)	74F641	I_{CCH}	V_{CC} = MAX	An=T/$\overline{R}$=4.5, $\overline{OE}$=GND			60	90	mA
			I_{CCL}		T/$\overline{R}$=4.5V, An=$\overline{OE}$=GND			78	120	mA
		74F642	I_{CCH}		An=T/$\overline{R}$=$\overline{OE}$=4.5V			37	55	mA
			I_{CCL}		An=T/$\overline{R}$=4.5V, $\overline{OE}$=GND			67	98	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.

** Discontinued part. Please see the Discontinued Products List.*

AC ELECTRICAL CHARACTERISTICS – 74F641

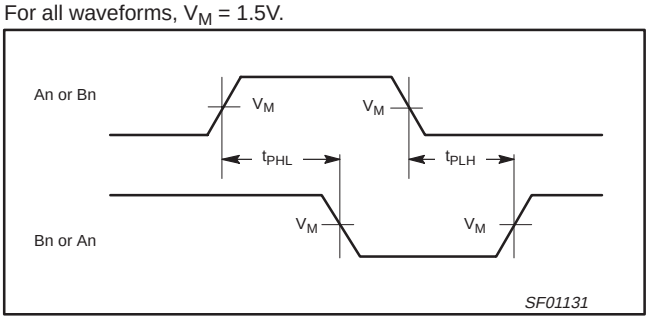
SYMBOL	PARAMETER	TEST CONDITION	LIMITS					UNIT
			V_{CC} = +5V T_{amb} = +25°C C_L = 50pF, R_L = 500Ω			V_{CC} = +5V ± 10% T_{amb} = 0°C to +70°C C_L = 50pF, R_L = 500Ω		
			MIN	TYP	MAX	MIN	MAX	
t_{PLH} t_{PHL}	Propagation delay An to Bn	Waveform NO TAG	6.5 4.0	8.5 6.0	11.5 9.5	6.5 4.0	12.5 11.0	ns
t_{PLH} t_{PHL}	Propagation delay Bn to An	Waveform NO TAG	6.0 3.5	8.0 5.5	11.5 7.5	6.0 3.5	12.0 8.0	ns
t_{PLH} t_{PHL}	Propagation delay $\overline{OE}$ to An	Waveform 4	7.0 5.0	10.5 7.0	12.5 9.0	7.0 5.0	13.0 10.0	ns
t_{PLH} t_{PHL}	Propagation delay $\overline{OE}$ to Bn	Waveform 4	8.0 3.5	9.0 7.5	12.5 9.5	8.0 5.5	13.5 10.5	ns

AC ELECTRICAL CHARACTERISTICS – 74F642

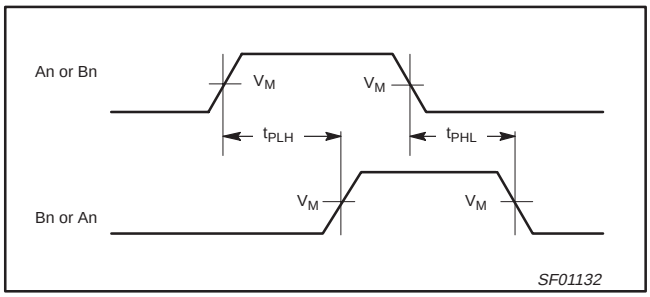
SYMBOL	PARAMETER	TEST CONDITION	LIMITS					UNIT
			V_{CC} = +5V T_{amb} = +25°C C_L = 50pF, R_L = 500Ω			V_{CC} = +5V ± 10% T_{amb} = 0°C to +70°C C_L = 50pF, R_L = 500Ω		
			MIN	TYP	MAX	MIN	MAX	
t_{PLH} t_{PHL}	Propagation delay An to Bn	Waveform NO TAG	8.0 2.0	9.0 4.5	12.5 6.5	8.0 2.0	13.5 7.0	ns
t_{PLH} t_{PHL}	Propagation delay Bn to An	Waveform NO TAG	7.5 1.5	8.0 4.0	12.0 6.0	7.5 1.5	12.5 6.5	ns
t_{PLH} t_{PHL}	Propagation delay $\overline{OE}$ to An	Waveform NO TAG	7.5 6.0	9.0 8.0	12.0 10.5	7.5 6.0	12.5 11.0	ns
t_{PLH} t_{PHL}	Propagation delay $\overline{OE}$ to Bn	Waveform NO TAG	8.0 6.0	9.0 7.0	12.5 10.5	8.0 6.0	13.0 11.0	ns

AC WAVEFORMS

For all waveforms, V_M = 1.5V.



Waveform 1. Propagation Delay for An to Bn or Bn to An (74F642)

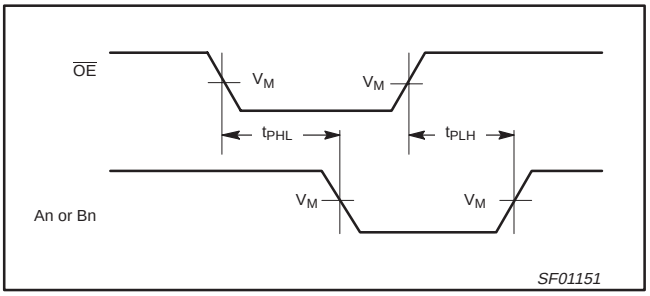


Waveform 2. Propagation Delay for An to Bn or Bn to An (74F641)

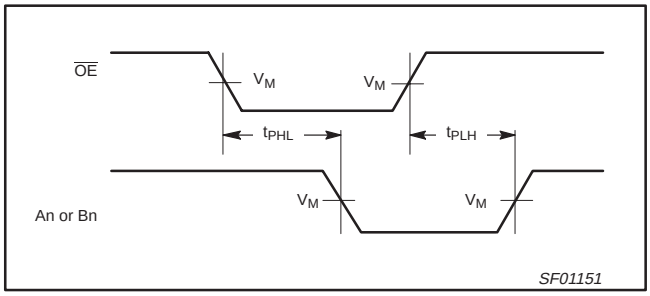
** Discontinued part. Please see the Discontinued Products List.*

AC WAVEFORMS (Continued)

For all waveforms, V_M = 1.5V.

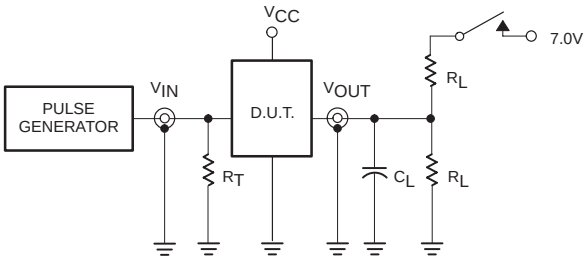


Waveform 3. Propagation Delay for $\overline{OE}$ to An or Bn Outputs (74F642) (Bn or An Inputs in High State)

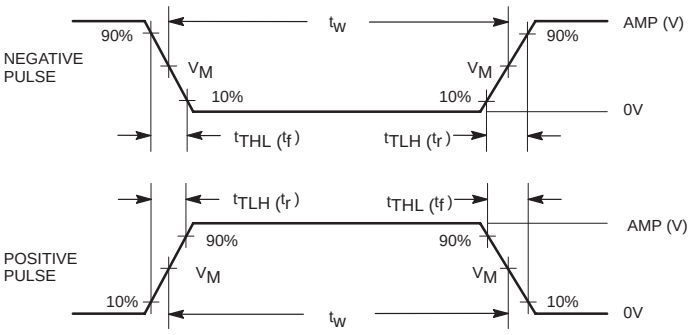


Waveform 4. Propagation Delay for $\overline{OE}$ to An or Bn Outputs (74F641) (Bn or An Inputs in Low State)

TEST CIRCUIT AND WAVEFORMS



Test Circuit for 3-State Outputs



Input Pulse Definition

SWITCH POSITION

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

DEFINITIONS:

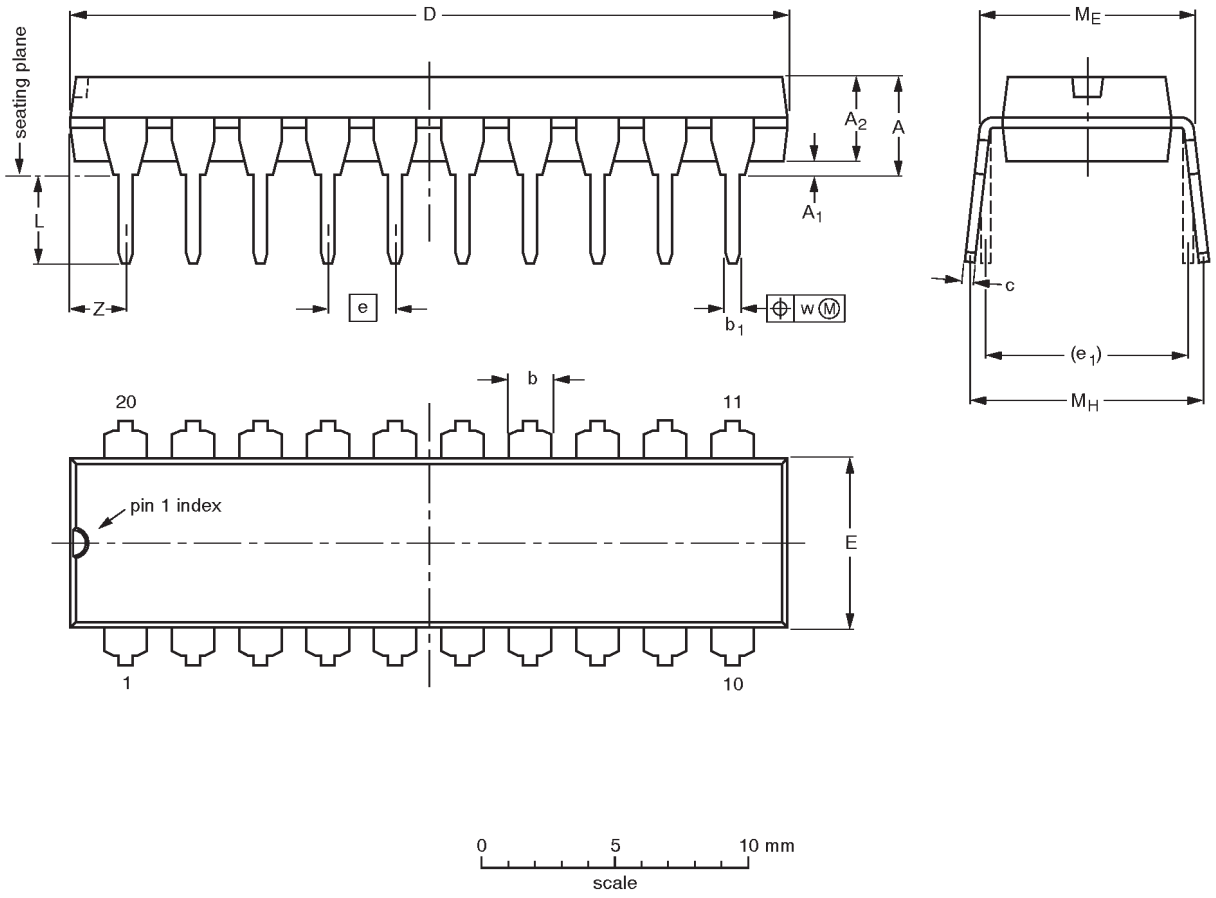
R_L = Load resistor; see AC electrical characteristics for value.
C_L = Load capacitance includes jig and probe capacitance; see AC electrical characteristics for value.
R_T = Termination resistance should be equal to Z_{OUT} of pulse generators.

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

* *Discontinued part. Please see the Discontinued Products List.*

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_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	4.2	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

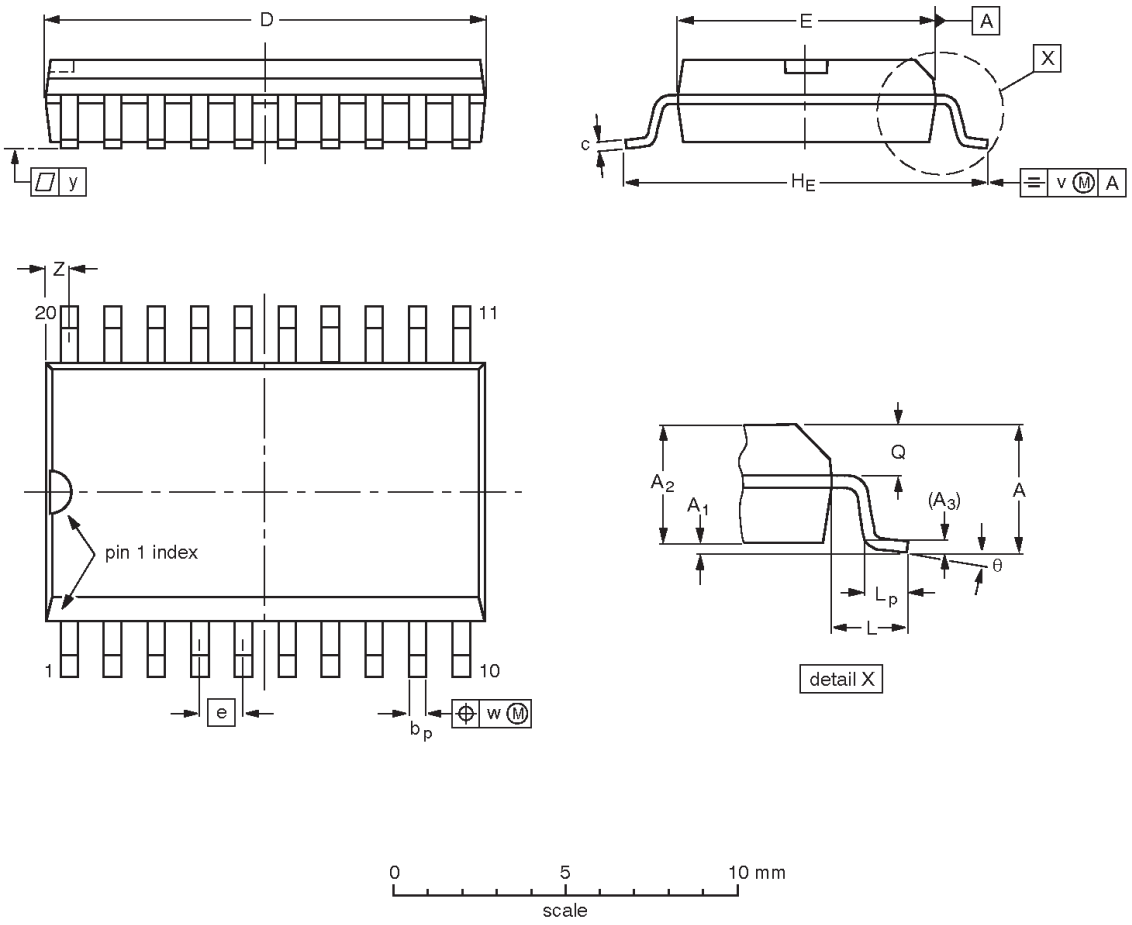
Note

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

** Discontinued part. Please see the Discontinued Product List.*

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_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	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^o 0^o
inches	0.10	0.012 0.004	0.096 0.089	0.01	0.019 0.014	0.013 0.009	0.51 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

** Discontinued part. Please see the Discontinued Product List.*

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 chages 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.

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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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