DATA SHEET

74F640

Octal bus transceiver, inverting (3-State)

Product specification

1989 Nov 27

IC15 Data Handbook

Philips
Semiconductors

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Octal bus transceiver, inverting (3-State) 74F640

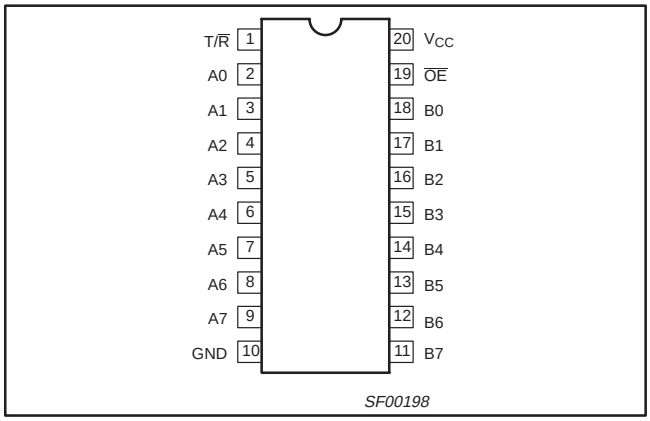
FEATURES

- High-impedance NPN base inputs for reduced loading (70µA in High and Low states)
- Ideal for applications which require high-output drive and minimal bus loading
- Inverting version of 74F245
- Octal bidirectional bus interface
- 3-State outputs sink 64mA and source 15mA

DESCRIPTION

The 74F640 is an octal transceiver featuring inverting 3-State bus compatible outputs in both transmit and receive directions. The B port outputs are capable of sinking 64mA and sourcing 15mA, providing very good capacitive drive characteristics. The device features an Output Enable ($\overline{OE}$) input for easy cascading and Transmit/Receiver (T/$\overline{R}$) 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)
74F640	3.5ns	78mA

ORDERING INFORMATION

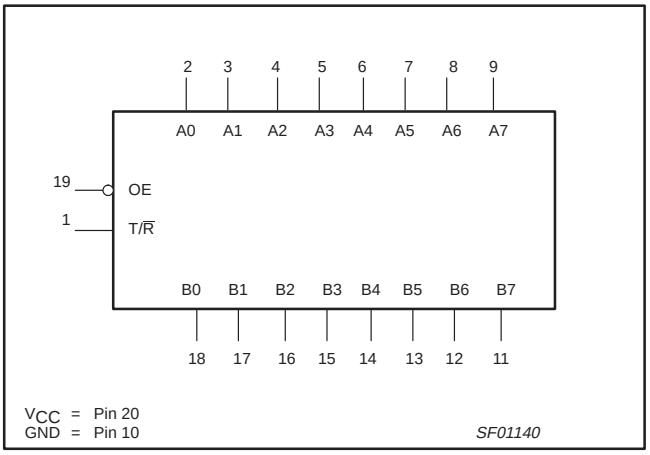
DESCRIPTION	COMMERCIAL RANGE V_{CC} = 5V ±10%, T_{amb} = 0°C to +70°C	PKG DWG #
20-pin plastic DIP	N74F640N	SOT146-1
20-pin plastic SOL	N74F640D	SOT163-1

INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

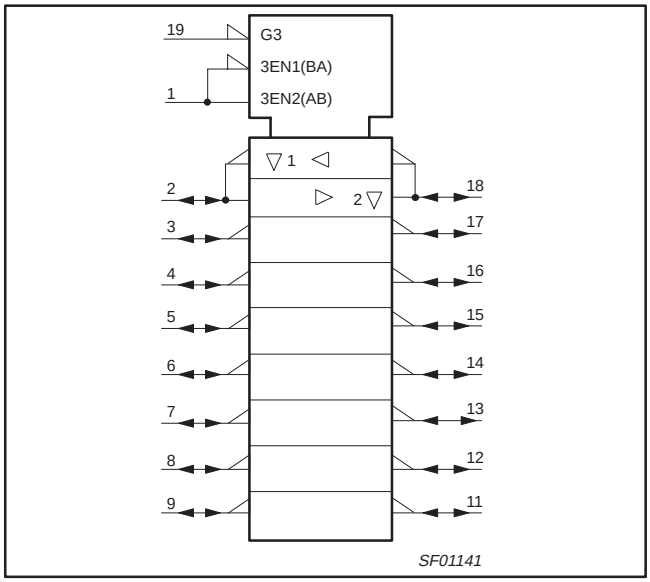
PINS	DESCRIPTION	74F(U.L.) HIGH/LOW	LOAD VALUE HIGH/LOW
A0 - A7, B0 - B7	Data inputs	3.5/0.115	70µA/70µA
$\overline{OE}$	Output Enable input (active Low)	2.0/0.067	40µA/40µA
T/$\overline{R}$	Transmit/Receive input	2.0/0.067	40µA/40µA
A0 - A7	A port outputs	150/40	3.0mA/24mA
B0 - B7	B port outputs	750/106.7	15mA/64mA

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

LOGIC SYMBOL



LOGIC SYMBOL (IEEE/IEC)

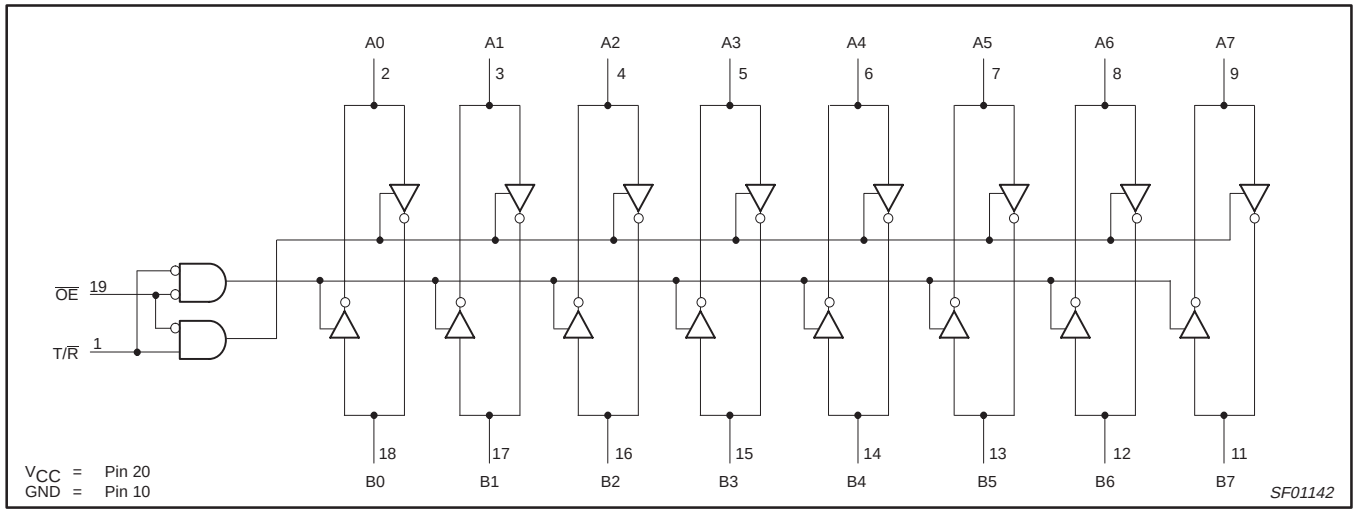


FUNCTION TABLE

INPUTS		OUTPUTS
$\overline{OE}$	T/$\overline{R}$	
L	L	Bus B data to Bus $\overline{A}$
L	H	Bus A data to Bus $\overline{B}$
H	X	Z

H = High voltage level
L = Low voltage level
X = Don't care
Z = High impedance "off" state

LOGIC DIAGRAM



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	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

DC ELECTRICAL CHARACTERISTICS

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

SYMBOL	PARAMETER		TEST CONDITIONS[NO TAG]			LIMITS			UNIT
						MIN	TYP NO TAG	MAX	
V_{OH}	High-level output voltage	A0–A7 B0–B7	V_{CC} = MIN, V_{IL} = MAX, V_{IH} = MIN	I_{OH} = –3mA	±10%V_{CC}	2.4			V
					±5%V_{CC}	2.7	3.3		V
		B0–B7		I_{OH} = –15mA	±10%V_{CC}	2.0			V
					±5%V_{CC}	2.0			V
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} = MAX	±10%V_{CC}			0.55	V
					±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	$\overline{OE}$, T/$\overline{R}$	V_{CC} = 0.0V, V_I = 7.0V					100	µA
		A0–A7, B0–B7	V_{CC} = 5.5V, V_I = 5.5V					1.0	mA
I_{IH}	High-level input current	$\overline{OE}$, T/$\overline{R}$ only	V_{CC} = MAX, V_I = 2.7V					40	µA
I_{IL}	Low-level input current		V_{CC} = MAX, V_I = 0.5V					–40	µA
I_{OZH}+I_{IH}	Off-state output current, High level of voltage applied		V_{CC} = MAX, V_I = 2.7V					70	µA
I_{OZL}+I_{IL}	Off-state output current, Low level of voltage applied		V_{CC} = MAX, V_I = 0.5V					–70	µA
I_{OS}	Short-circuit output current[NO TAG]	A0–A7	V_{CC} = MAX			–60		–150	mA
		B0–B7				–100		–225	µA
I_{CC}	Supply current (total)	I_{CCH}	V_{CC} = MAX	T/$\overline{R}$ = An = 4.5V, $\overline{OE}$ = GND			66	85	mA
		I_{CCL}		T/$\overline{R}$ = Bn = $\overline{OE}$ = GND			91	120	mA
		I_{CCZ}		T/$\overline{R}$ = Bn = GND, $\overline{OE}$ = 4.5V			78	102	mA

NOTES:

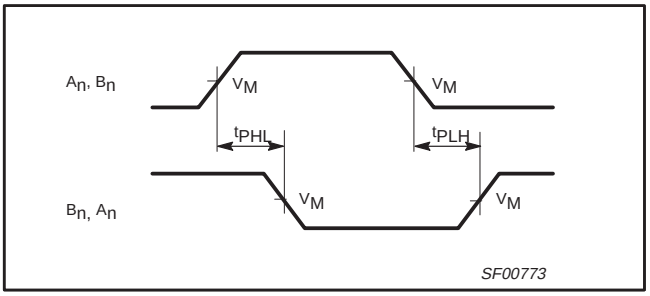
1. For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable type.
2. All typical values are at V_{CC} = 5V, T_{amb} = 25°C.
3. Not more than one output should be shorted at a time. For testing I_{OS}, the use of high-speed test 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

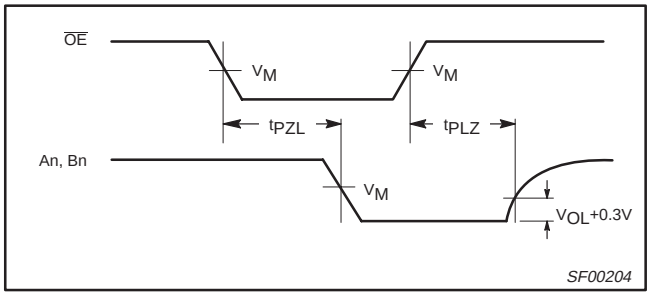
SYMBOL	PARAMETER	TEST CONDITION	LIMITS					UNIT
			V_{CC} = +5V T_{amb} = +25°C C_L = 50pF, R_L = 500Ω			V_{CC} = +5V ± 10% T_{amb} = 0°C to +70°C C_L = 50pF, R_L = 500Ω		
			MIN	TYP	MAX	MIN	MAX	
t_{PLH} t_{PHL}	Propagation delay An to Bn, Bn to An	Waveform NO TAG	2.0 1.0	4.5 2.5	7.0 5.0	2.0 1.0	8.0 5.5	ns
t_{PZH} t_{PZL}	Output Enable time to High or Low level	Waveform 3 Waveform 2	5.5 5.5	6.5 7.0	10.5 10.5	5.0 5.0	12.0 11.0	ns
t_{PHZ} t_{PLZ}	Output Disable time from High or Low level	Waveform 3 Waveform 2	2.0 2.0	3.5 4.5	6.5 7.0	1.5 2.0	8.0 7.5	ns

AC WAVEFORMS

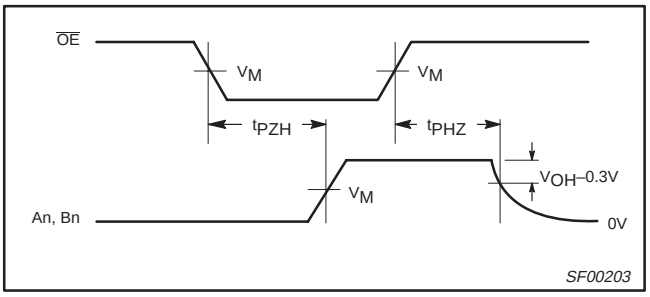
For all waveforms, V_M = 1.5V.



Waveform 1. Propagation Delay for Inverting Outputs

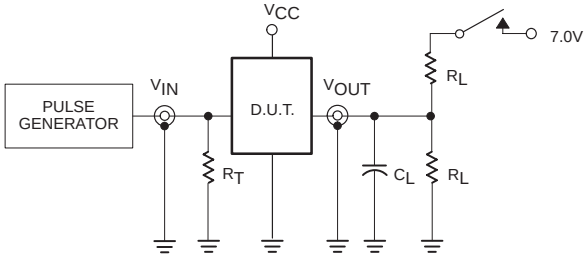


Waveform 2. 3-State Output Enable Time to Low Level and Output Disable Time from Low Level

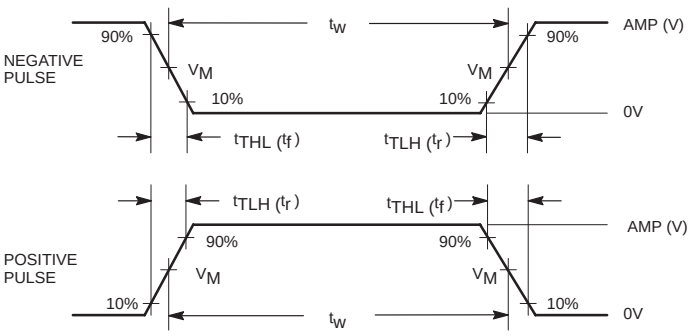


Waveform 3. 3-State Output Enable Time to High Level and Output Disable Time from High Level

TEST CIRCUIT AND WAVEFORMS



Test Circuit for Open Collector Outputs



Input Pulse Definition

SWITCH POSITION

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

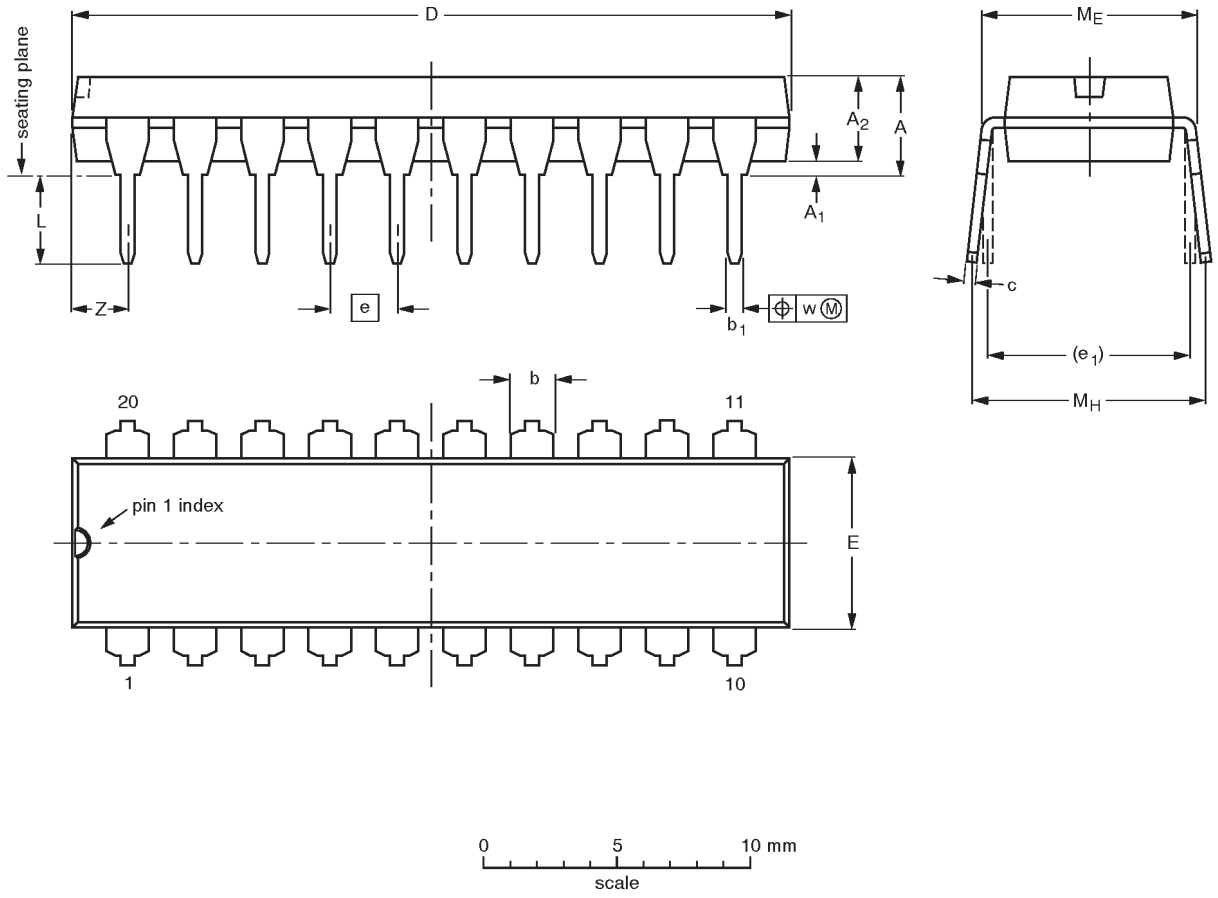
DEFINITIONS:

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

SF00128

DIP20: plastic dual in-line package; 20 leads (300 mil) **SOT146-1**



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

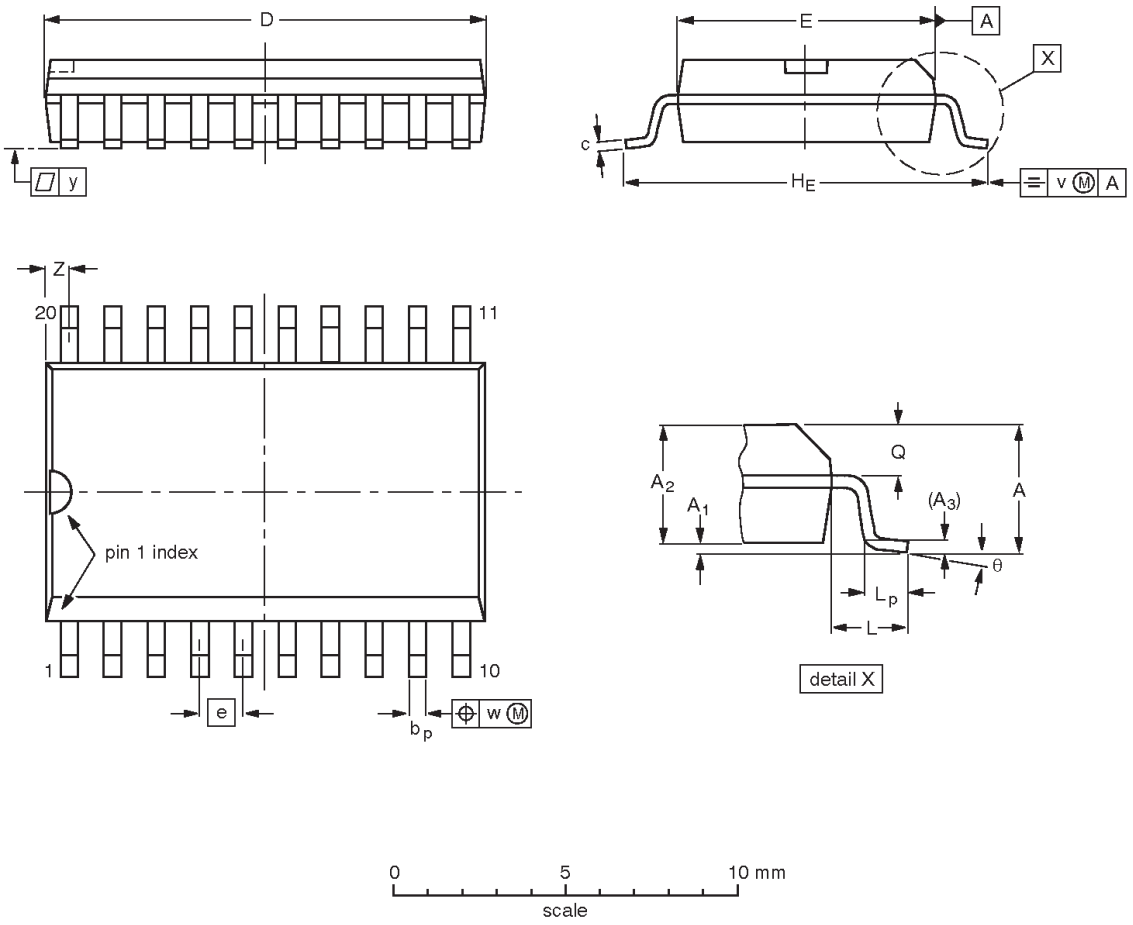
UNIT	A max.	A_1 min.	A_2 max.	b	b_1	c	D (1)	E (1)	e	e_1	L	M_E	M_H	w	Z (1) max.
mm	4.2	0.51	3.2	1.73 1.30	0.53 0.38	0.36 0.23	26.92 26.54	6.40 6.22	2.54	7.62	3.60 3.05	8.25 7.80	10.0 8.3	0.254	2.0
inches	0.17	0.020	0.13	0.068 0.051	0.021 0.015	0.014 0.009	1.060 1.045	0.25 0.24	0.10	0.30	0.14 0.12	0.32 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

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

NOTES

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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.
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[1] Please consult the most recently issued datasheet before initiating or completing a design.

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

print code Date of release: 10-98

Document order number: 9397-750-05148

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