

DATA SHEET

74ALS645A/74ALS645A-1 Octal transceiver (3-State)

Product specification
IC05 Data Handbook

1991 Jun 03

Octal transceiver (3-State)

74ALS645A/74ALS645A-1

FEATURES

- Octal bidirectional bus interface
- 3-State buffer outputs sink 24mA and source 15mA
- Outputs are placed in high impedance state during power-off conditions
- The -1 version sinks 48mA I_{OL} within the +5% V_{CC} range

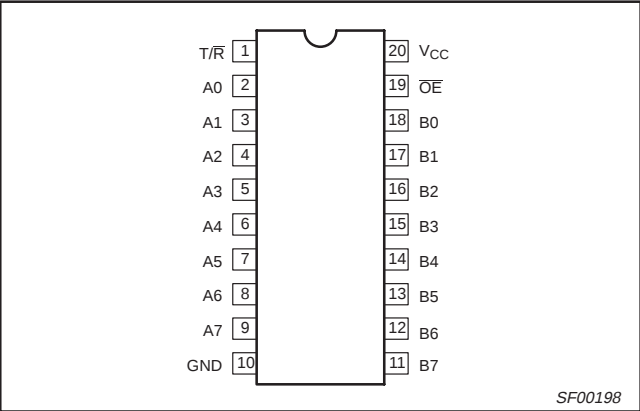
DESCRIPTION

The 74ALS645A is an octal transceiver featuring non-inverting 3-State bus compatible outputs in both transmit and receive directions. The device features an output enable ($\overline{OE}$) input for easy cascading and transmit/receive ($\overline{T/R}$) input for direction control.

The 74ALS645A-1 is the same as the 74ALS645A except that both ports sink 48mA within the $\pm 5\%$ V_{CC} range.

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
74ALS645A	7.0ns	34mA
74ALS645A-1	7.0ns	34mA

PIN CONFIGURATION



ORDERING INFORMATION

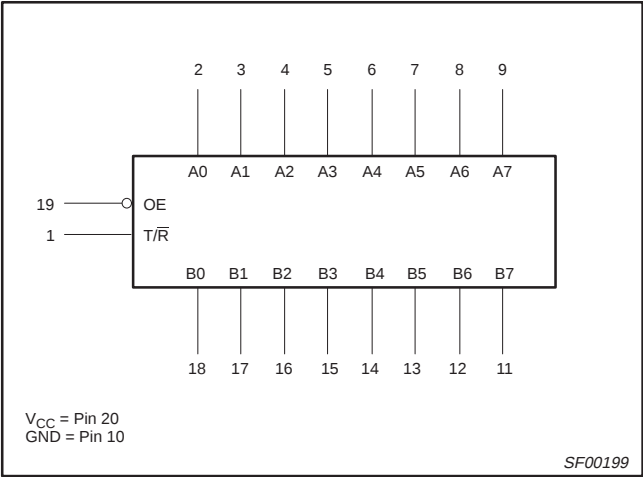
DESCRIPTION	ORDER CODE	DRAWING NUMBER
	COMMERCIAL RANGE $V_{CC} = 5V \pm 10\%$, $T_{amb} = 0^{\circ}C \text{ to } +70^{\circ}C$	
20-pin plastic DIP	74ALS645AN, 74ALS645A-1N	SOT146-1
20-pin plastic SOL	74ALS645AD, 74ALS645A-1D	SOT163-1

INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

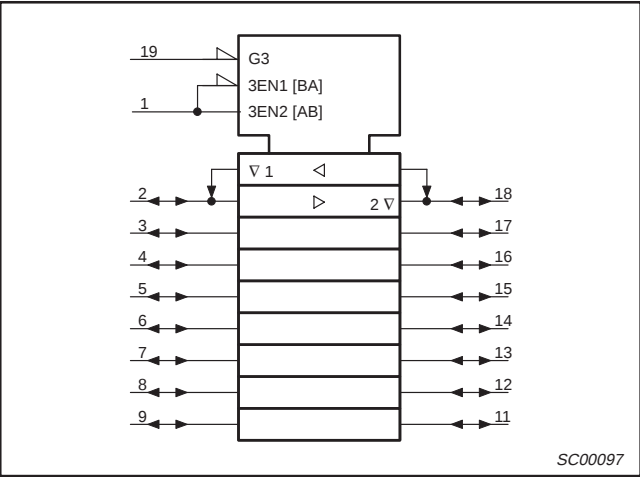
PINS	DESCRIPTION	74ALS (U.L.) HIGH/LOW	LOAD VALUE HIGH/LOW
A0 – A7, B0 – B7	Data inputs	1.0/1.0	20 μ A/0.1mA
$\overline{OE}$	Output Enable input (active-Low)	1.0/1.0	20 μ A/0.1mA
$\overline{T/R}$	Transmit/receive input	1.0/1.0	20 μ A/0.1mA
A0 – A7	A port outputs	750/240	15mA/24mA
B0 – B7	B port outputs	750/240	15mA/24mA
A0 – A7	A port outputs (-1 version)	750/480	15mA/48mA
B0 – B7	B port outputs (-1 version)	750/480	15mA/48mA

NOTE: One (1.0) ALS unit load is defined as: 20 μ A in the High state and 0.1mA in the Low state.

LOGIC SYMBOL



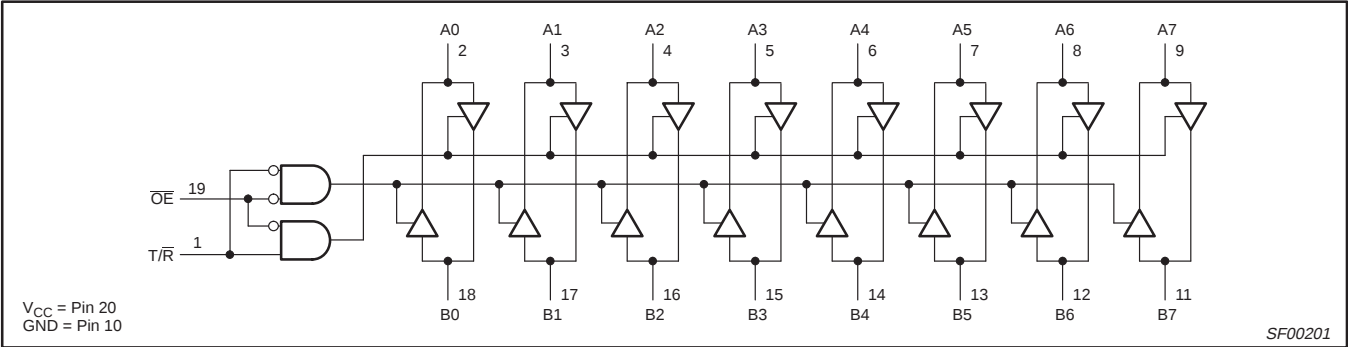
IEC/IEEE SYMBOL



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 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 _{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	All versions	48	mA
		-1 version	96	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				−15	mA
I _{OL}	Low-level output current	All versions			24	mA
		-1 version			48 ¹	mA
T _{amb}	Operating free-air temperature range		0		+70	°C

NOTES:

1. The 48mA limit applies only under the condition of V_{CC} = 5.0V ± 5%.

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DC ELECTRICAL CHARACTERISTICS

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

SYMBOL	PARAMETER		TEST CONDITIONS ¹	LIMITS			UNIT
				MIN	TYP ²	MAX	
V _{OH}	High-level output voltage		V _{CC} ±10%, V _{IL} = MAX, V _{IH} = MIN	I _{OH} = -0.4mA	V _{CC} - 2		V
				I _{OH} = -3mA	2.4	3.2	V
			V _{CC} = MIN, V _{IL} = MAX, V _{IH} = MIN	I _{OH} = -15mA	2.0		V
V _{OL}	Low-level output voltage	All versions	V _{CC} = MIN, V _{IL} = MAX, V _{IH} = MIN	I _{OL} = 12mA		0.25	V
				I _{OL} = 24mA		0.35	V
		-1 version	V _{CC} = 4.75V, V _{IL} = MAX, V _{IH} = MIN	I _{OL} = 48mA		0.35	V
V _{IK}	Input clamp voltage		V _{CC} = MIN, I _I = I _{IK}		-0.73	-1.5	V
I _I	Input current at maximum input voltage	$\overline{OE}$ or T/ $\overline{R}$	V _{CC} = MAX, V _I = 7.0V			0.1	mA
		A or B ports	V _{CC} = MAX, V _I = 5.5V			0.1	mA
I _{IH}	High-level input current ³		V _{CC} = MAX, V _I = 2.7V			20	μA
I _{IL}	Low-level input current ³		V _{CC} = MAX, V _I = 0.4V			-0.1	mA
I _O	Output current ⁴		V _{CC} = MAX, V _O = 2.25V	-30		-112	mA
I _{CC}	Supply current (total)	I _{CCH}	V _{CC} = MAX		28	45	mA
		I _{CCL}			40	55	mA
		I _{CCZ}			44	58	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} = 5V, T_{amb} = 25°C.
- For I/O ports, the parameter I_{IH} and I_{IL} include the off-state current.
- The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I_{OS}.

AC ELECTRICAL CHARACTERISTICS

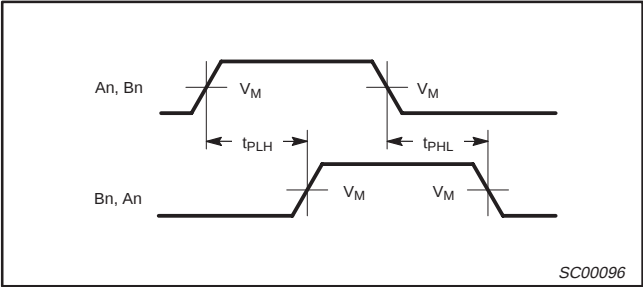
SYMBOL	PARAMETER	TEST CONDITION	LIMITS		UNIT
			T _{amb} = 0°C to +70°C V _{CC} = +5.0V ± 10% C _L = 50pF, R _L = 500Ω		
			MIN	MAX	
t _{PLH} t _{PHL}	Propagation delay An to Bn, Bn to An	Waveform 1	2.0 2.0	10.0 10.0	ns
t _{PZH} t _{PZL}	Output enable time to High or Low level	Waveform 2 Waveform 3	3.0 3.0	20.0 20.0	ns
t _{PHZ} t _{PLZ}	Output disable time from High or Low level	Waveform 2 Waveform 3	2.0 4.0	10.0 15.0	ns

Octal transceiver (3-State)

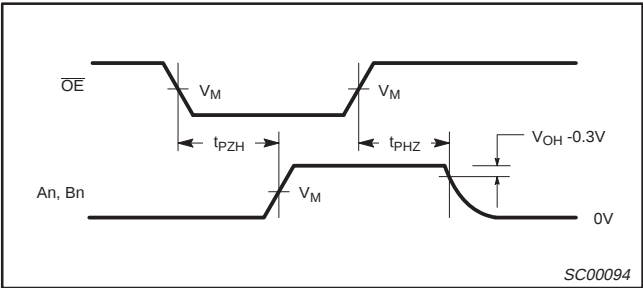
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AC WAVEFORMS

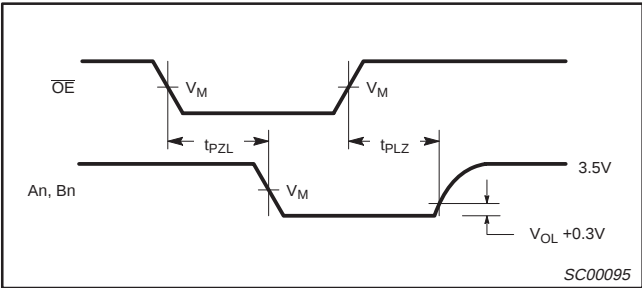
For all waveforms, $V_M = 1.3V$.



Waveform 1. Propagation Delay for Non-inverting Outputs

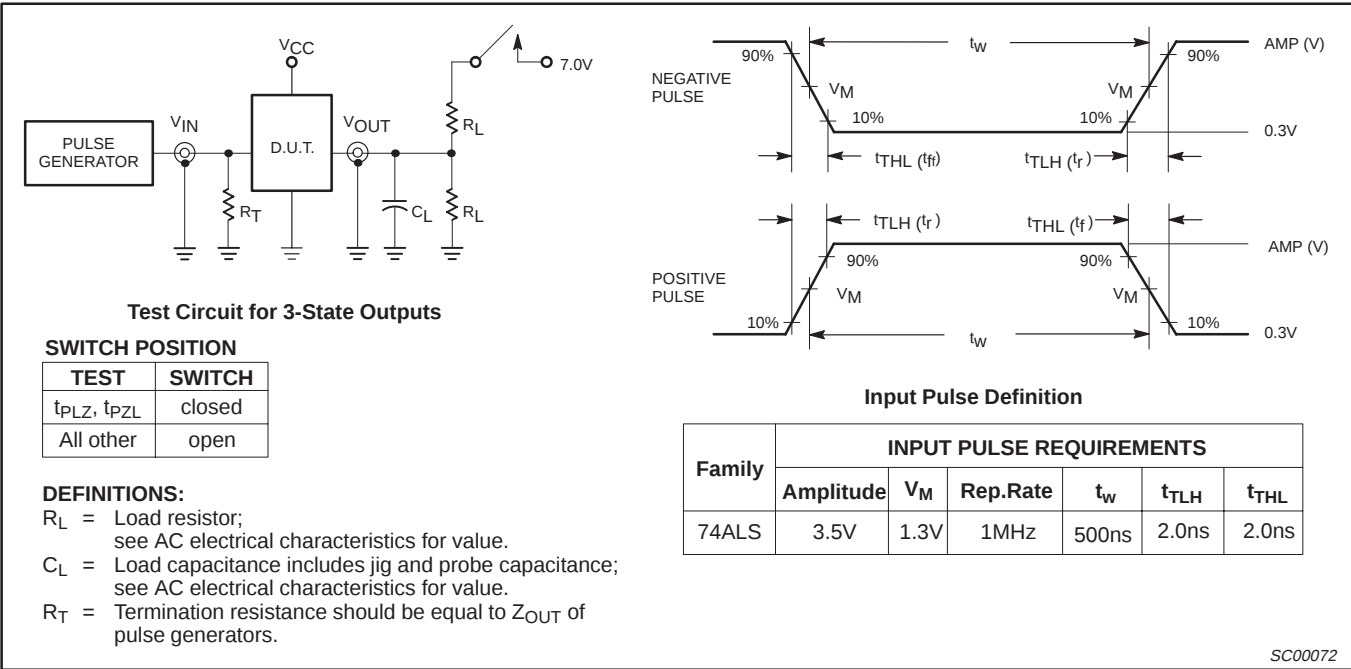


Waveform 2. 3-State Output Enable Time to High Level and Output Disable Time from High Level



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

TEST CIRCUIT AND WAVEFORMS

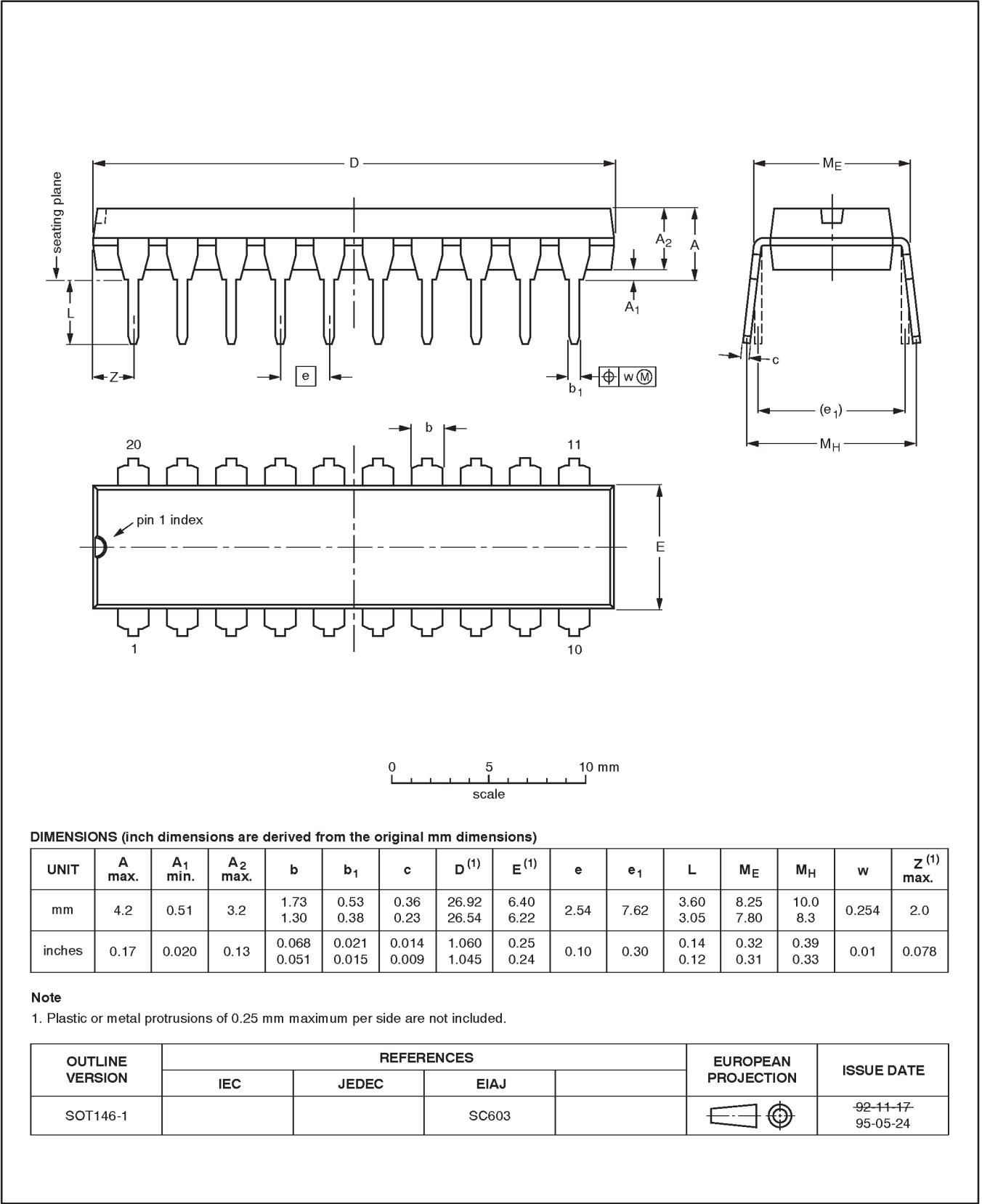


Octal transceiver (3-State)

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

SOT146-1

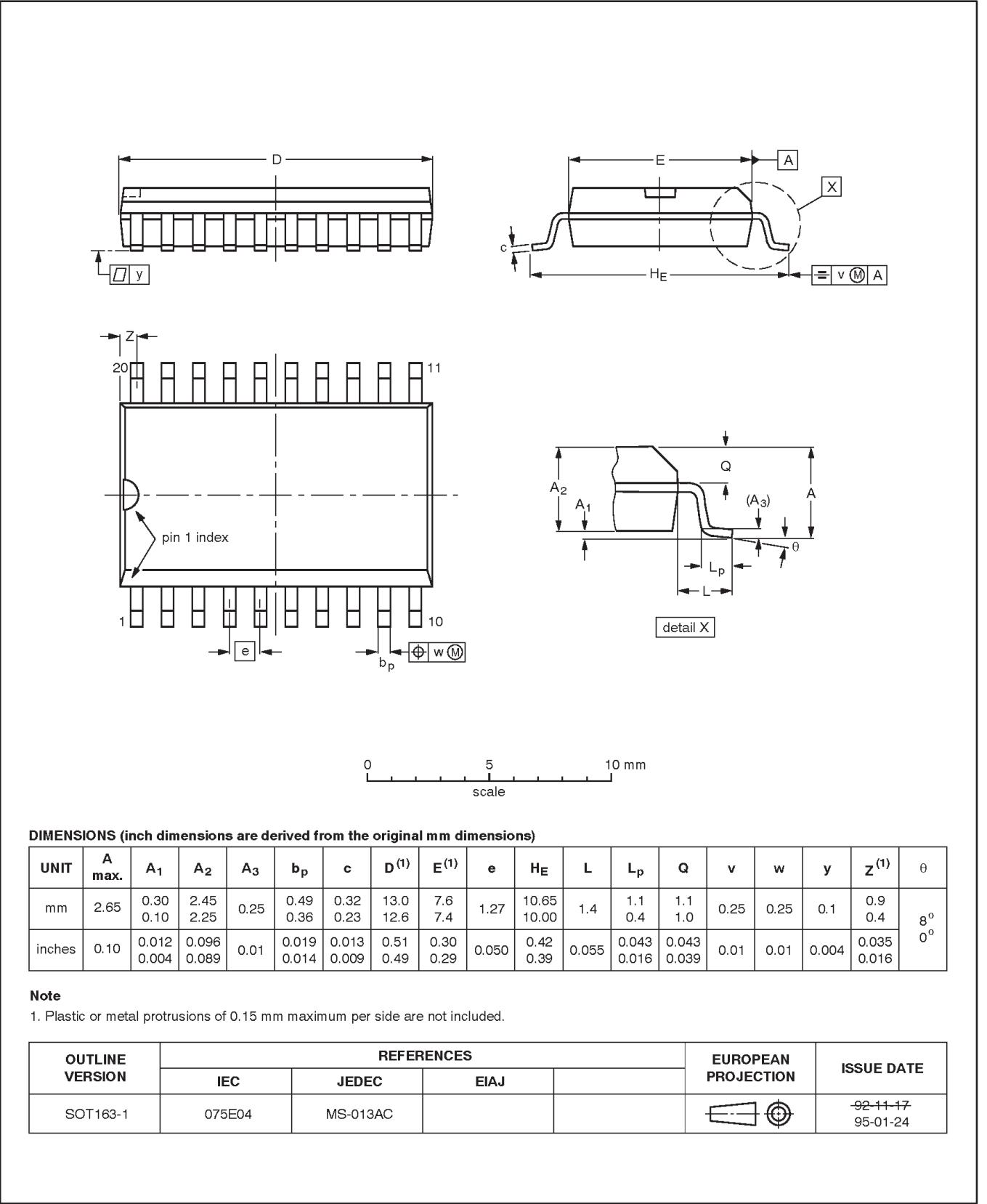


Octal transceiver (3–State)

74ALS645A/74ALS645A–1

SO20: plastic small outline package; 20 leads; body width 7.5 mm

SOT163-1



Octal transceiver (3–State)

74ALS645A/74ALS645A–1

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.

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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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