16-bit bus transceiver (3-State)

74ABT16245B
74ABTH16245B

FEATURES

- 16-bit bidirectional bus interface
- Power-up 3-State
- Multiple V_{CC} and GND pins minimize switching noise
- 3-State buffers
- Output capability: +64 mA/–32mA
- Latch–up protection exceeds 500mA per JEDEC Std 17
- Live insertion/extraction permitted
- ESD protection exceeds 2000 V per MIL STD 883 Method 3015 and 200V per Machine Model
- 74ABTH16245B incorporates bus hold data inputs which eliminate the need for external pull-up resistors to hold unused inputs
- Bus-hold data inputs eliminate the need for external pull-up resistors to hold unused inputs

DESCRIPTION

The 74ABT16245B high-performance BiCMOS device combines low static and dynamic power dissipation with high speed and high output drive.

The 74ABT16245B device is a dual octal transceiver featuring non-inverting 3-State bus compatible outputs in both send and receive directions. The control function implementation minimizes external timing requirements. The device features two Output Enable ($1\overline{OE}$, $2\overline{OE}$) inputs for easy cascading and two Direction (1DIR, 2DIR) inputs for direction control.

Two options are available, 74ABT16245B which does not have the bus hold feature and the 74ABTH16245B which incorporates the bus hold feature.

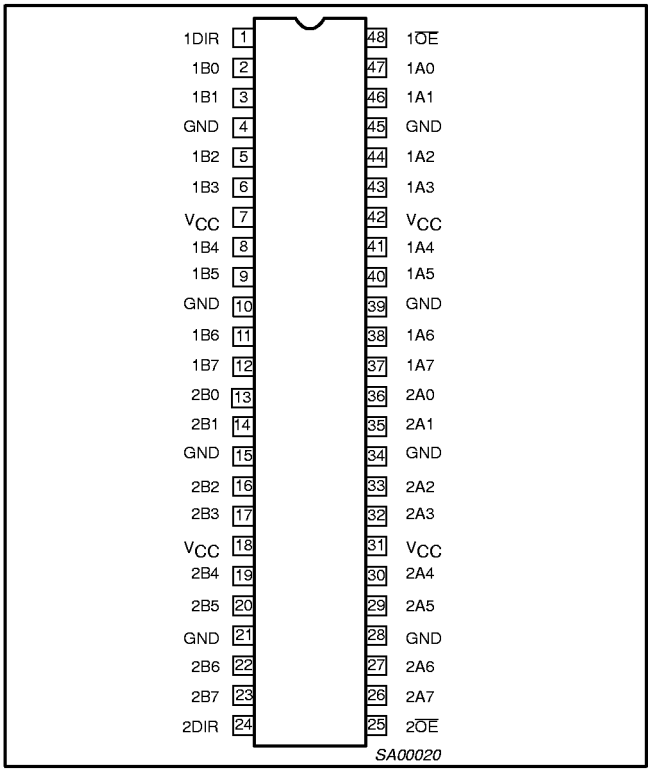
QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS T_{amb} = 25°C; GND = 0V	TYPICAL	UNIT
t_{PLH} t_{PHL}	Propagation delay nAx to nBx or nBx to nAx	C_L = 50pF; V_{CC} = 5V	2.0 2.3	ns
C_{IN}	Input capacitance	V_I = 0V or V_{CC}	4	pF
$C_{I/O}$	I/O pin capacitance	V_O = 0V or V_{CC}; 3-State	7	pF
I_{CCZ}	Quiescent supply current	Outputs disabled; V_{CC} =5.5V	500	µA
I_{CCL}		Output Low; V_{CC} =5.5V	10	mA

ORDERING INFORMATION

PACKAGES	TEMPERATURE RANGE	OUTSIDE NORTH AMERICA	NORTH AMERICA	DWG NUMBER
48-Pin Plastic SSOP Type III	–40°C to +85°C	74ABT16245B DL	BT16245B DL	SOT370-1
48-Pin Plastic TSSOP Type II	–40°C to +85°C	74ABT16245B DGG	BT16245B DGG	SOT362-1
48-Pin Plastic SSOP Type III	–40°C to +85°C	74ABTH16245B DL	BH16245B DL	SOT370-1
48-Pin Plastic TSSOP Type II	–40°C to +85°C	74ABTH16245B DGG	BH16245B DGG	SOT362-1

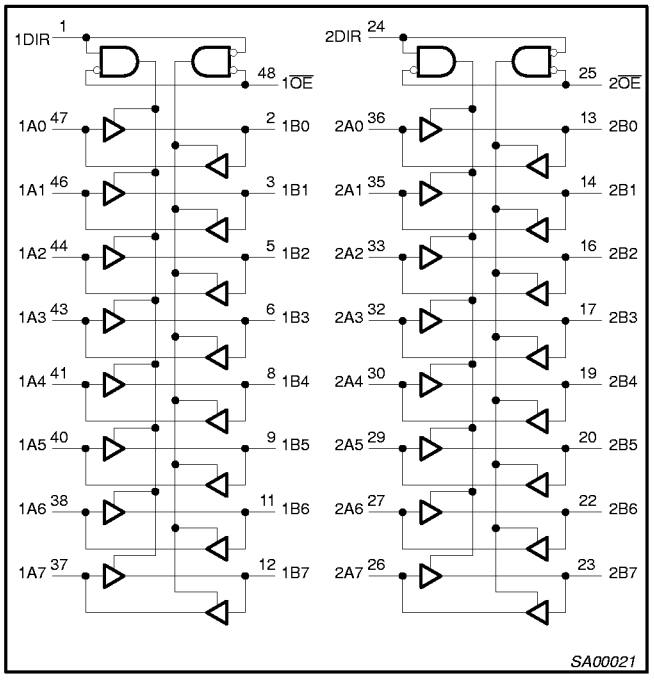
PIN CONFIGURATION



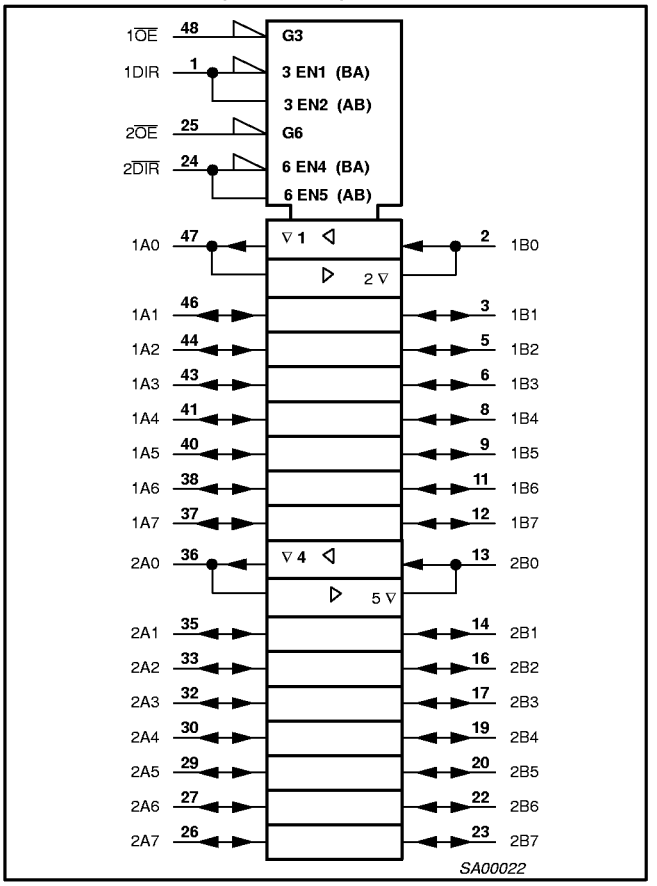
PIN DESCRIPTION

SYMBOL	PIN NUMBER	NAME AND FUNCTION
1DIR, 2DIR	1, 24	Direction control inputs (Active-High)
1A0 – 1A7, 2A0 – 2A7	47, 46, 44, 43 41, 40, 38, 37 36, 35, 33, 32 30, 29, 27, 26	Data inputs/outputs (A side)
1B0 – 1B7 2B0 – 2B7	2, 3, 5, 6 8, 9, 11, 12 13, 14, 16, 17 19, 20, 22, 23	Data inputs/outputs (B side)
$1\overline{OE}$, $2\overline{OE}$	48, 25	Output enables
GND	4, 10, 15, 21 28, 34, 39, 45	Ground (0V)
V_{CC}	7, 18, 31, 42	Positive supply voltage

LOGIC SYMBOL



LOGIC SYMBOL (IEEE/IEC)



FUNCTION TABLE

INPUTS		INPUTS/OUTPUTS	
$n\overline{OE}$	nDIR	nAx	nBx
L	L	A = B	Inputs
L	H	Inputs	B = A
H	X	Z	Z

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

ABSOLUTE MAXIMUM RATINGS[1, 2]

SYMBOL	PARAMETER	CONDITIONS	RATING	UNIT
V_{CC}	DC supply voltage		–0.5 to +7.0	V
I_{IK}	DC input diode current	$V_I < 0$	–18	mA
V_I	DC input voltage[3]		–1.2 to +7.0	V
I_{OK}	DC output diode current	$V_O < 0$	–50	mA
V_{OUT}	DC output voltage[3]	output in Off or High state	–0.5 to +5.5	V
I_{OUT}	DC output current	output in Low state	128	mA
		output in High state	–64	
T_{stg}	Storage temperature range		–65 to 150	°C

NOTES:
1. Stresses beyond those listed may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
2. The performance capability of a high-performance integrated circuit in conjunction with its thermal environment can create junction temperatures which are detrimental to reliability. The maximum junction temperature of this integrated circuit should not exceed 150°C.
3. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	LIMITS		UNIT
		Min	Max	
V_{CC}	DC supply voltage	4.5	5.5	V
V_I	Input voltage	0	V_{CC}	V
V_{IH}	High-level input voltage	2.0		V
V_{IL}	Low-level Input voltage		0.8	V
I_{OH}	High-level output current		–32	mA
I_{OL}	Low-level output current		64	mA
$\Delta t/\Delta v$	Input transition rise or fall rate	0	10	ns/V
T_{amb}	Operating free-air temperature range	–40	+85	°C

DC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS					UNIT
			T_{amb} = +25°C			T_{amb} = –40°C to +85°C		
			Min	Typ	Max	Min	Max	
V_{IK}	Input clamp voltage	V_{CC} = 4.5V; I_{IK} = –18mA		–0.9	–1.2		–1.2	V
V_{OH}	High-level output voltage	V_{CC} = 4.5V; I_{OH} = –3mA; V_I = V_{IL} or V_{IH}	2.5	2.9		2.5		V
		V_{CC} = 5.0V; I_{OH} = –3mA; V_I = V_{IL} or V_{IH}	3.0	3.4		3.0		V
		V_{CC} = 4.5V; I_{OH} = –32mA; V_I = V_{IL} or V_{IH}	2.0	2.4		2.0		V
V_{OL}	Low-level output voltage	V_{CC} = 4.5V; I_{OL} = 64mA; V_I = V_{IL} or V_{IH}		0.42	0.55		0.55	V
I_I	Input leakage current	V_{CC} = 5.5V; V_I = GND or 5.5V; Control pins		±0.01	±1.0		±1.0	µA
I_{HOLD}	Bus hold current A and B inputs 74ABTH16245B	V_{CC} = 4.5V; V_I = 0.8V	50			50		µA
		V_{CC} = 5.5V; V_I = 2.0V	–75			–75		
		V_{CC} = 5.5V; V_I = 0 to 5.5V	±500					
I_{OFF}	Power-off leakage current	V_{CC} = 0.0V; V_O or V_I ≤ 4.5V		±5.0	±100		±100	µA
I_{PU}/I_{PD}	Power-up/down 3-State output current	V_{CC} = 2.0V; V_O = 0.5V; V_I = GND or V_{CC}; V_{OE} = Don't care		±5.0	±50		±50	µA
$I_{IH}+I_{OZH}$	3-State output High current	V_{CC} = 5.5V; V_O = 5.5V; V_I = V_{IL} or V_{IH}		0.1	10		10	µA
$I_{IL}+I_{OZL}$	3-State output Low current	V_{CC} = 5.5V; V_O = 0.0V; V_I = V_{IL} or V_{IH}		0.1	10		10	µA
I_{CEX}	Output high leakage current	V_{CC} = 5.5V; V_O = 5.5V; V_I = GND or V_{CC}		5.0	50		50	µA
I_O	Output current[1]	V_{CC} = 5.5V; V_O = 2.5V	–50	–92	–180	–50	–180	mA
I_{CCH}	Quiescent supply current	V_{CC} = 5.5V; Outputs High, V_I = GND or V_{CC}		0.30	0.70		0.70	mA
I_{CCL}		V_{CC} = 5.5V; Outputs Low, V_I = GND or V_{CC}		10	19		19	mA
I_{CCZ}		V_{CC} = 5.5V; Outputs 3-State; V_I = GND or V_{CC}		0.30	0.70		0.70	mA
ΔI_{CC}	Additional supply current per input pin[2]	Outputs enabled, one data input at 3.4V, other inputs at V_{CC} or GND; V_{CC} = 5.5V		400	700		700	µA
		Outputs disabled, one data input at 3.4V, other inputs at V_{CC} or GND; V_{CC} = 5.5V		100	250		250	µA
		Control pins, outputs disabled, one enable input at 3.4V, other inputs at V_{CC} or GND; V_{CC} = 5.5V		400	700		700	µA

NOTES:
1. Not more than one output should be tested at a time, and the duration of the test should not exceed one second.
2. This is the increase in supply current for each input at 3.4V.
3. This is the bus hold overdrive current required to force the input to the opposite logic state.

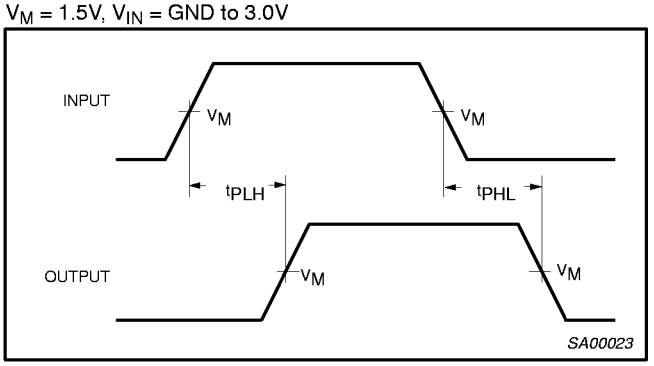
AC CHARACTERISTICS

GND = 0V; $t_R = t_F$ = 2.5ns; C_L = 50pF, R_L = 500Ω

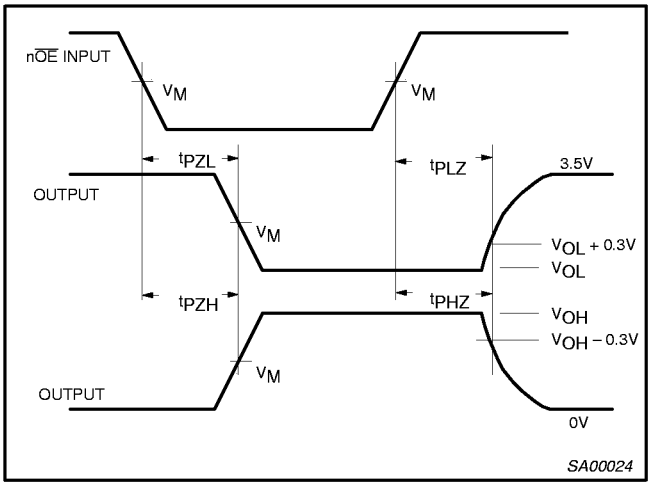
SYMBOL	PARAMETER	WAVEFORM	LIMITS					UNIT
			T_{amb} = +25°C, V_{CC} = +5.0V			T_{amb} = –40°C to +85°C, V_{CC} = +5.0V ±0.5V		
			Min	Typ	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation delay nAx to nBx or nBx to nAx	1	1.0 1.0	2.0 2.3	3.2 3.5	1.0 1.0	3.5 4.0	ns
t_{PZH} t_{PZL}	Output enable time to High and Low level	2	1.0 1.7	3.1 4.0	4.4 5.2	1.0 1.7	5.1 6.1	ns
t_{PHZ} t_{PLZ}	Output disable time from High and Low level	2	1.7 1.5	3.5 3.2	4.9 4.4	1.7 1.5	5.4 5.0	ns

AC WAVEFORMS

V_M = 1.5V, V_{IN} = GND to 3.0V

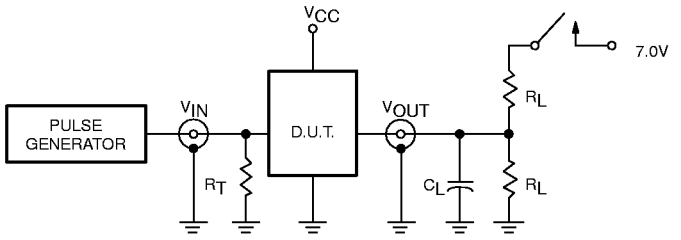


Waveform 1. Input to Output Propagation Delays

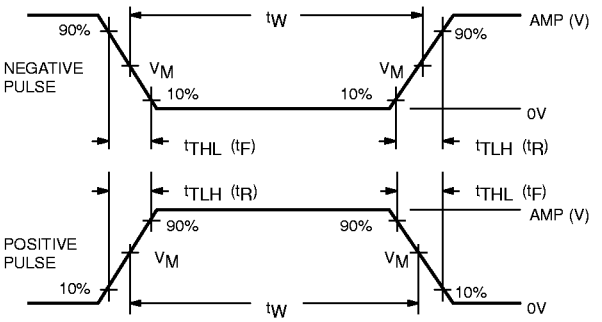


Waveform 2. 3-State Output Enable and Disable Times

TEST CIRCUIT



Test Circuit for 3-State Outputs



V_M = 1.5V
Input Pulse Definition

SWITCH POSITION

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

DEFINITIONS

R_L = Load resistor; see AC CHARACTERISTICS for value.

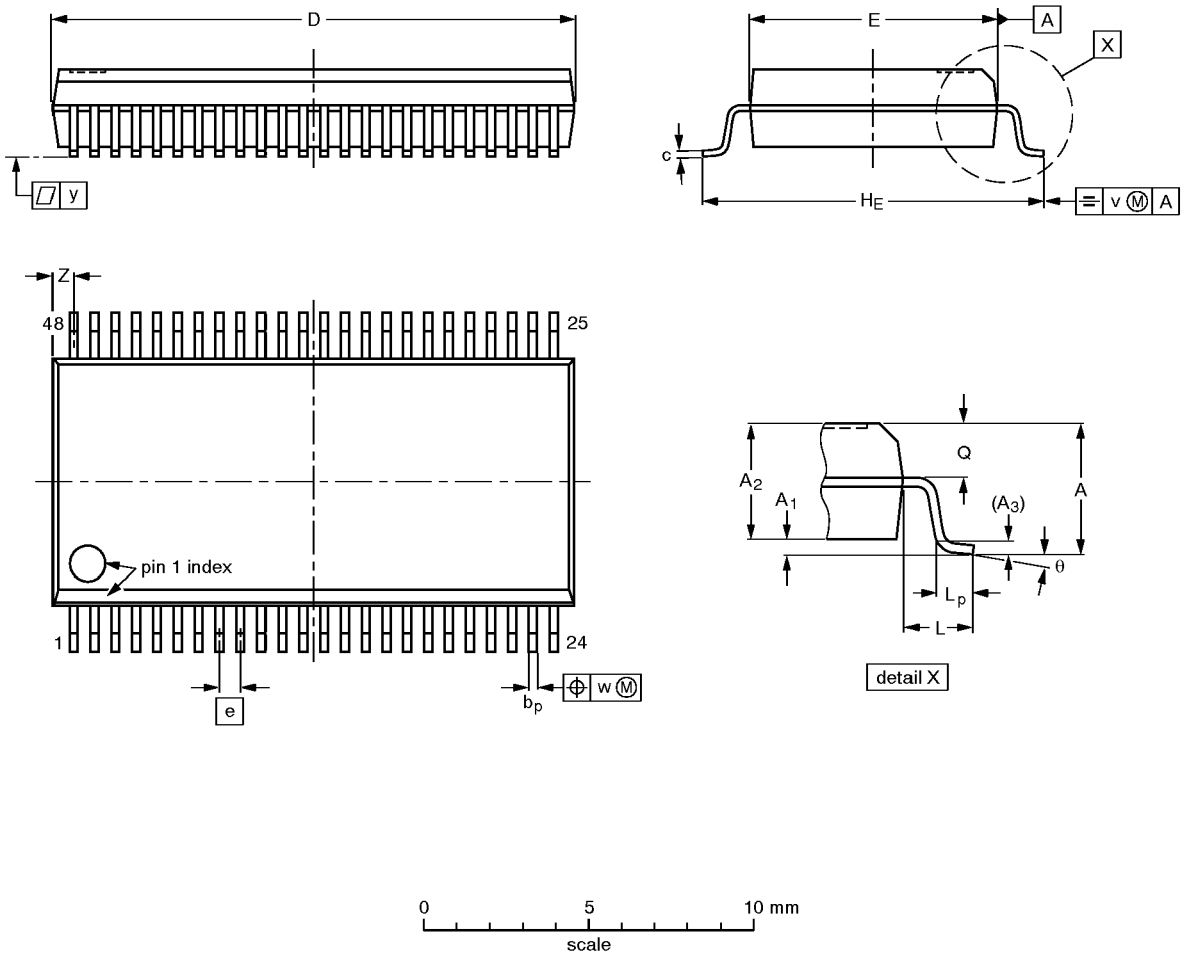
C_L = Load capacitance includes jig and probe capacitance; see AC CHARACTERISTICS for value.

R_T = Termination resistance should be equal to Z_{OUT} of pulse generators.

FAMILY	INPUT PULSE REQUIREMENTS				
	Amplitude	Rep. Rate	t_W	t_R	t_F
74ABT/H16	3.0V	1MHz	500ns	2.5ns	2.5ns

SA00018

SSOP48: plastic shrink small outline package; 48 leads; body width 7.5 mm **SOT370-1**



DIMENSIONS (mm are the original dimensions)

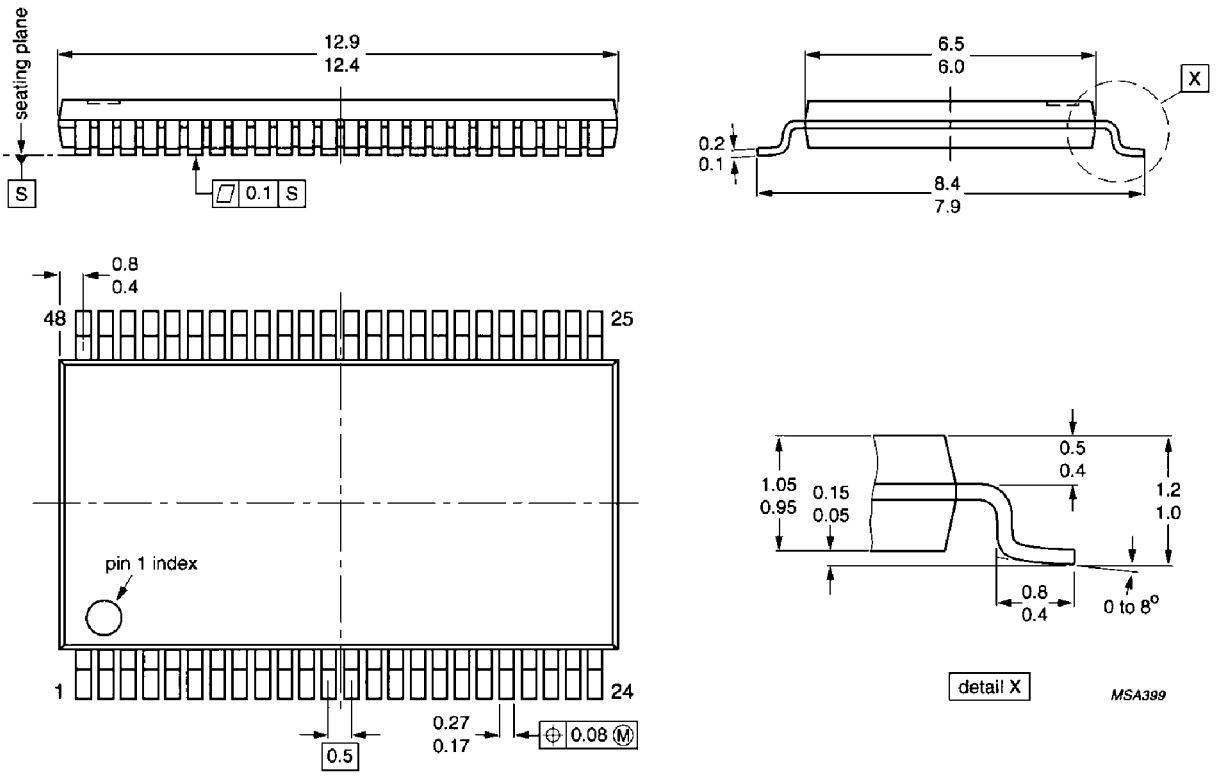
UNIT	A max.	A_1	A_2	A_3	b_p	c	$D^{(1)}$	$E^{(1)}$	e	H_E	L	L_p	Q	v	w	y	$Z^{(1)}$	θ
mm	2.8	0.4 0.2	2.35 2.20	0.25	0.3 0.2	0.22 0.13	16.00 15.75	7.6 7.4	0.635	10.4 10.1	1.4	1.0 0.6	1.2 1.0	0.25	0.18	0.1	0.85 0.40	8° 0°

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			
SOT370-1		MO-118AA				~~93-11-02~~ 95-02-04

TSSOP48: plastic thin shrink small outline package; 48 leads; body width 6.1mm **SOT362-1**



Dimensions in mm.