DATA SHEET

MB2541

Dual octal buffer line driver (3-State)

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16-bit buffer/line drivers (3-State) MB2541

FEATURES

- Two 8-bit bus interfaces

- Power-up 3-State

- Multiple V_{CC} and GND pins minimize switching noise

- Provides ideal interface and increases fan-out of MOS Microprocessors

- 3-State buffers sink 64mA and source 32mA

- Latch-up protection exceeds 500mA per Jedec Std 17

- ESD protection exceeds 2000 V per MIL STD 883 Method 3015 and 200 V per Machine Model

- Inputs are disabled during 3-State mode

DESCRIPTION

The MB2541 high-performance BiCMOS device combines low static and dynamic power dissipation with high speed and high output drive.

The MB2541 has two 8-bit buffers that are ideal for driving bus lines. The outputs are all capable of sinking 64mA and sourcing 32mA.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS T_{amb} = 25°C; GND = 0V	TYPICAL	UNIT
t_{PLH} t_{PHL}	Propagation delay nIx to nYx	C_L = 50pF; V_{CC} = 5V	3.0 3.1	ns
C_{IN}	Input capacitance	V_I = 0V or V_{CC}	4	pF
C_{OUT}	Output capacitance	V_O = 0V or V_{CC}; 3-State	7	pF
I_{CCZ}	Total supply current	Outputs disabled; V_{CC} =5.5V	65	µA

ORDERING INFORMATION

PACKAGES	TEMPERATURE RANGE	OUTSIDE NORTH AMERICA	NORTH AMERICA	DWG NUMBER
52–pin plastic Quad Flat Pack	−40°C to +85°C	MB2541 BB	MB2541 BB	SOT379-1

PIN CONFIGURATION

SB00082
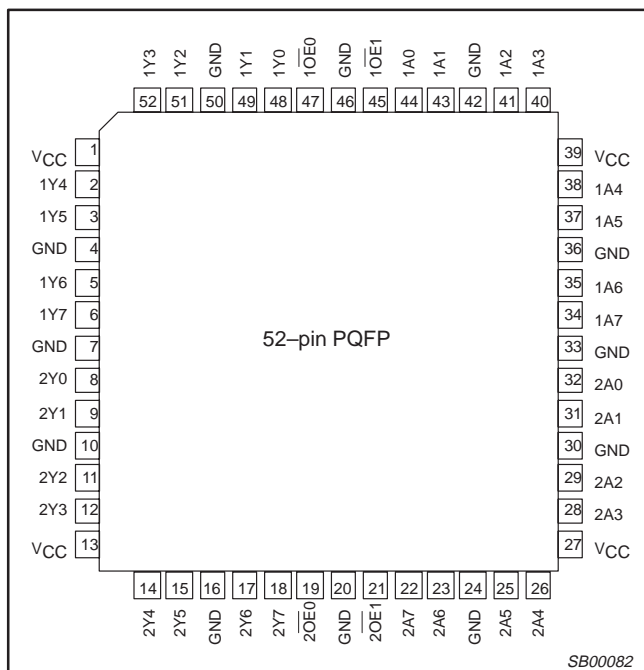
PIN DESCRIPTION

PIN NUMBER	SYMBOL	NAME AND FUNCTION
44, 43, 41, 40, 38, 37, 35, 34, 32, 31, 29, 28, 26, 25, 23, 22	1A0 – 1A7 2A0 – 2A7	Data inputs
48, 49, 51, 52, 2, 3, 5, 6, 8, 9, 11, 12, 14, 15, 17, 18	1Y0 – 1Y7, 2Y0 – 2Y7	Data outputs
47, 45, 19, 21	1$\overline{OE}$0, 1$\overline{OE}$1, 2$\overline{OE}$0, 2$\overline{OE}$1	Output enables
4, 7, 10, 16, 20, 24, 30, 33, 36, 42, 46, 50	GND	Ground (0V)
1, 13, 27, 39	V_{CC}	Positive supply voltage

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LOGIC SYMBOL

SB00083
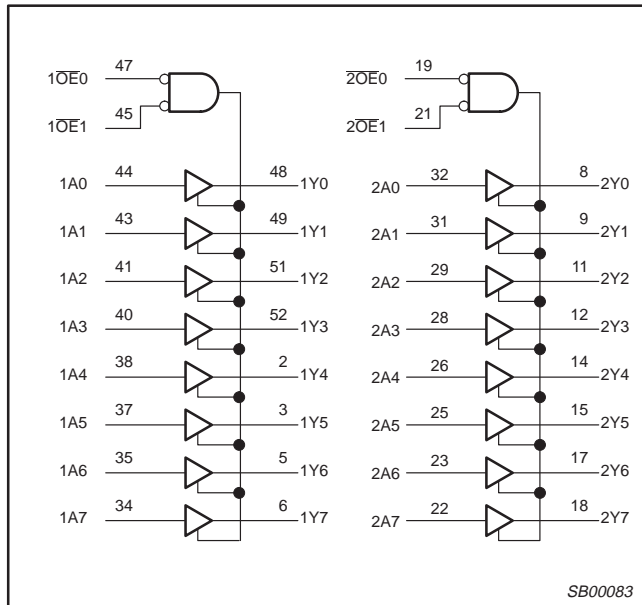
LOGIC SYMBOL (IEEE/IEC)

SB00084
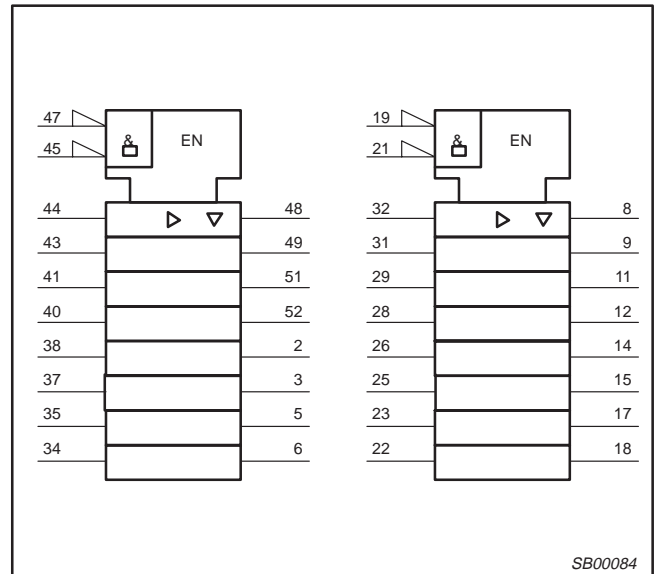
FUNCTION TABLE

INPUTS			OUTPUTS
n$\overline{\text{OE}}$0	n$\overline{\text{OE}}$1	nIx	nYx
L	L	L	L
L	L	H	H
X	H	X	Z
H	X	X	Z

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
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.

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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		±0.01	±1.0		±1.0	µA
I_{OFF}	Power-off leakage current	$V_{CC} = 0.0V$; V_O or $V_I \leq 4.5V$		±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}; $V_{OE} = V_{CC}$		±5.0	±50		±50	µA
I_{OZH}	3-State output High current	$V_{CC} = 5.5V$; $V_O = 2.7V$; $V_I = V_{IL}$ or V_{IH}		5.0	50		50	µA
I_{OZL}	3-State output Low current	$V_{CC} = 5.5V$; $V_O = 0.5V$; $V_I = V_{IL}$ or V_{IH}		−5.0	−50		−50	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	−70	−180	−50	−180	mA
I_{CCH}		$V_{CC} = 5.5V$; Outputs High, $V_I = GND$ or V_{CC}		65	250		250	µA
I_{CCL}	Quiescent supply current	$V_{CC} = 5.5V$; Outputs Low, $V_I = GND$ or V_{CC}		48	60		60	mA
I_{CCZ}		$V_{CC} = 5.5V$; Outputs 3-State; $V_I = GND$ or V_{CC}		65	250		250	µA
ΔI_{CC}	Additional supply current per input pin[2]	Outputs enabled, one input at 3.4V, other inputs at V_{CC} or GND; $V_{CC} = 5.5V$		0.5	1.5		1.5	mA

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.
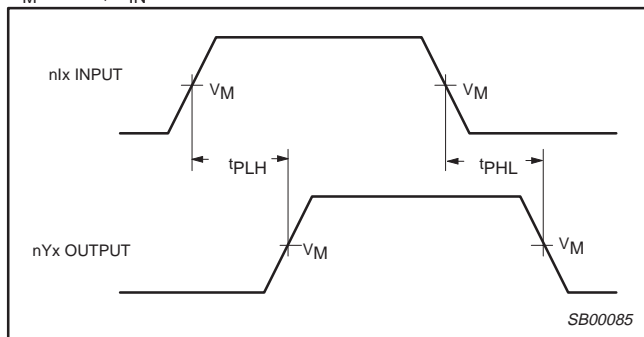
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AC CHARACTERISTICS

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

SYMBOL	PARAMETER	WAVEFORM	LIMITS					UNIT
			$T_{amb} = +25°C$ $V_{CC} = +5.0V$			$T_{amb} = -40°C$ to $+85°C$ $V_{CC} = +5.0V \pm 0.5V$		
			Min	Typ	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation delay nIx to nYx	1	1.2 1.2	3.0 3.1	4.5 4.5	1.2 1.2	5.1 5.1	ns
t_{PZH} t_{PZL}	Output enable time to High and Low level	2	1.3 2.1	3.6 4.7	5.2 6.1	1.3 2.1	5.8 7.1	ns
t_{PHZ} t_{PLZ}	Output disable time from High and Low level	2	1.8 1.7	4.3 4.0	6.2 5.4	1.8 1.7	6.8 5.9	ns

AC WAVEFORMS

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

Waveform 1. Waveforms Showing the Input (An) to Output (Yn) Propagation Delays
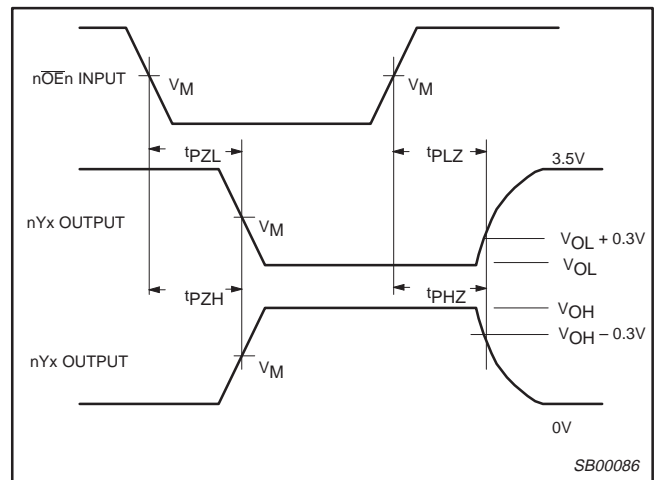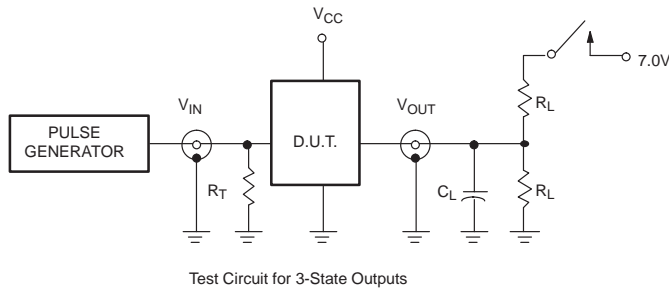

Waveform 2. Waveforms Showing the 3-State Output Enable and Disable Times
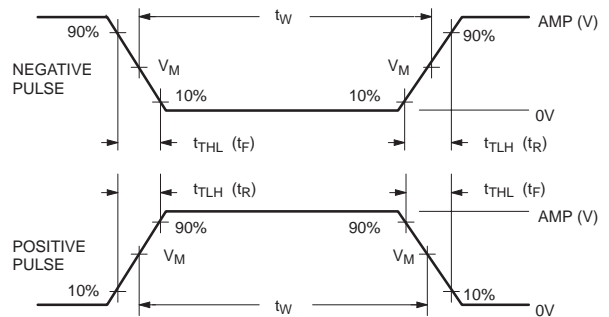
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TEST CIRCUIT AND WAVEFORMS

Test Circuit for 3-State Outputs

Input Pulse Definition

$V_M = 1.5V$

SWITCH POSITION

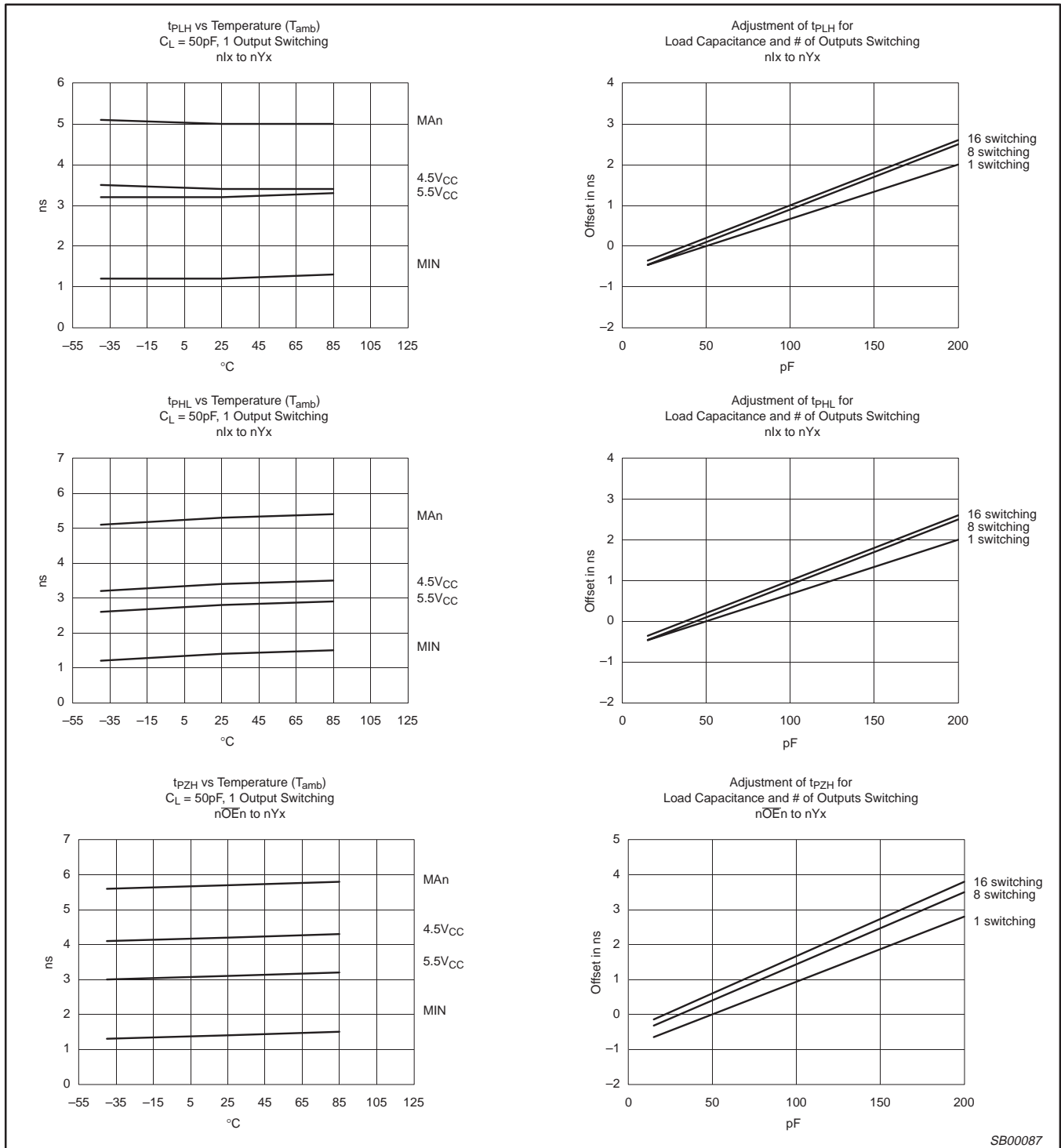| TEST	SWITCH
t_{PLZ}	closed
t_{PZL}	closed
All other	open

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
MB	3.0V	1MHz	500ns	2.5ns	2.5ns

SB00010

16-bit buffer/line drivers (3-State)

SB00087

16-bit buffer/line drivers (3-State)

t_{PZL} vs Temperature (T_{amb})
C_L = 50pF, 1 Output Switching
n$\overline{OE}$n to nYx

Adjustment of t_{PZL} for
Load Capacitance and # of Outputs Switching
n$\overline{OE}$n to nYx

t_{PHZ} vs Temperature (T_{amb})
C_L = 50pF, 1 Output Switching
n$\overline{OE}$n to nYx

Adjustment of t_{PHZ} for
Load Capacitance and # of Outputs Switching
n$\overline{OE}$n to nYx

t_{PLZ} vs Temperature (T_{amb})
C_L = 50pF, 1 Output Switching
n$\overline{OE}$n to nYx

Adjustment of t_{PLZ} for
Load Capacitance and # of Outputs Switching
n$\overline{OE}$n to nYx

SB00088

t_{TLH} vs Temperature (T_{amb})
C_L = 50pF, 1 Output Switching

Adjustment of t_{TLH} for
Load Capacitance and # of Outputs Switching

t_{THL} vs Temperature (T_{amb})
C_L = 50pF, 1 Output Switching

Adjustment of t_{THL} for
Load Capacitance and # of Outputs Switching

V_{OHV} and V_{OLP} vs Load Capacitance
V_{CC} = 5V, V_{IN} = 0 to 3V

V_{OHP} and V_{OLV} vs Load Capacitance
V_{CC} = 5V, V_{IN} = 0 to 3V

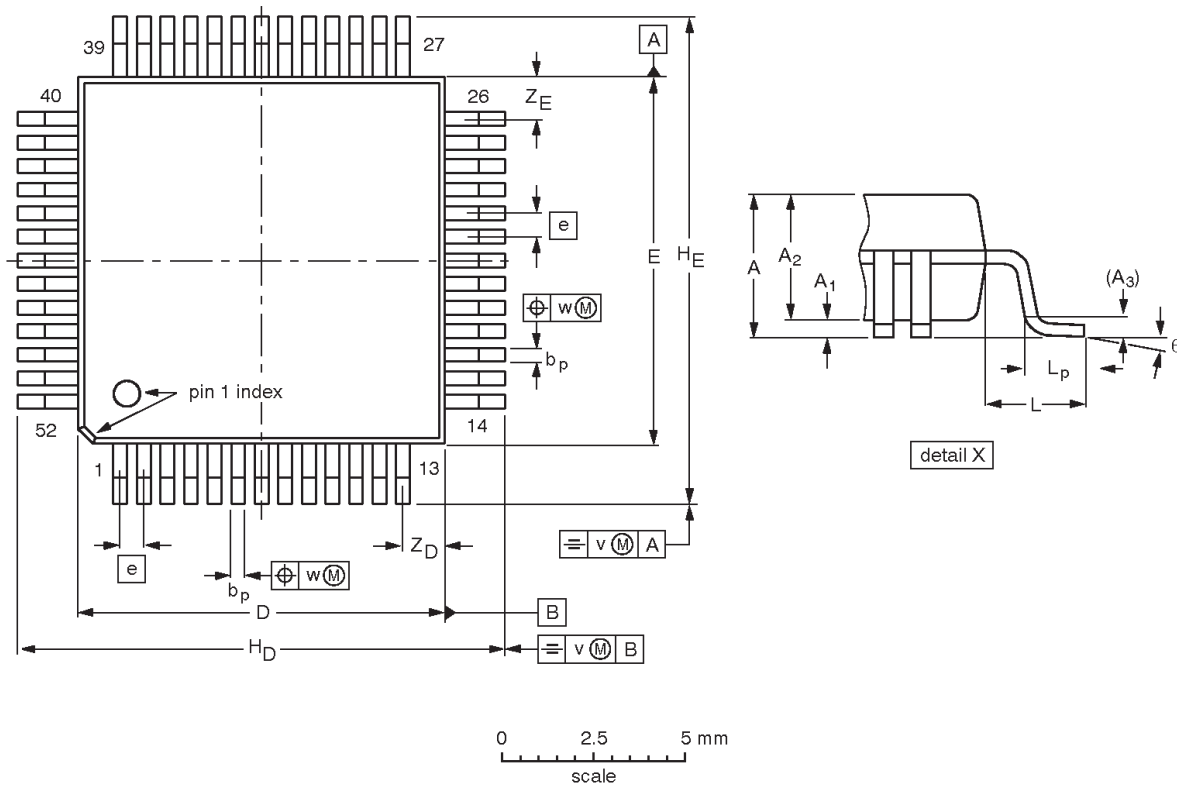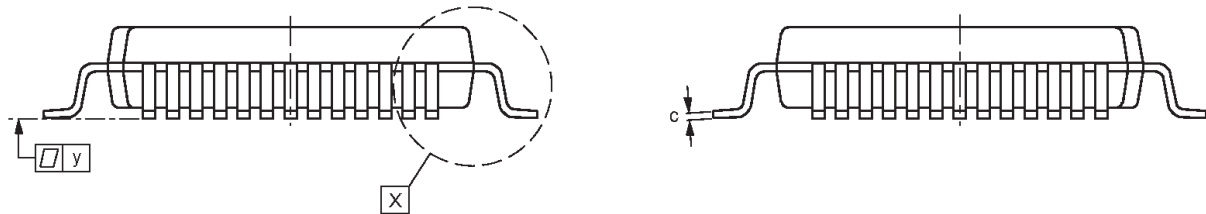SB00089

Dual octal buffer line driver (3-State)

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QFP52:   plastic quad flat package; 52 leads (lead length 1.6 mm); body 10 x 10 x 2.0 mm   **SOT379-1**

0   2.5   5 mm

scale

DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A$_1$	A$_2$	A$_3$	b$_p$	c	D(1)	E(1)	e	H$_D$	H$_E$	L	L$_p$	v	w	y	Z$_D$(1)	Z$_E$(1)	θ
mm	2.45	0.45 0.25	2.10 1.95	0.25	0.38 0.22	0.23 0.13	10.1 9.9	10.1 9.9	0.65	13.45 12.95	13.45 12.95	1.60	0.95 0.65	0.20	0.12	0.10	1.24 0.95	1.24 0.95	7° 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			
SOT379-1		MO-108				95-02-04 97-08-04

NOTES

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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.

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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