

DATA SHEET

MB2244

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

Product specification
Supersedes data of 1993 Aug 24
IC23 Data Handbook

1998 Jan 16

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

MB2244

FEATURES

- 16-bit bus interface
- Multiple V_{CC} and GND pins minimize switching noise
- Power-up 3-State
- 3-State buffers
- Output capability: +64 mA/-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 MB2244 high-performance BiCMOS device combines low static and dynamic power dissipation with high speed and high output drive.

The MB2244 device is an 16-bit buffer that is ideal for driving bus lines. The device features four Output Enables ($1\overline{OE}$, $2\overline{OE}$, $3\overline{OE}$, $4\overline{OE}$), each controlling four of the 3-State outputs.

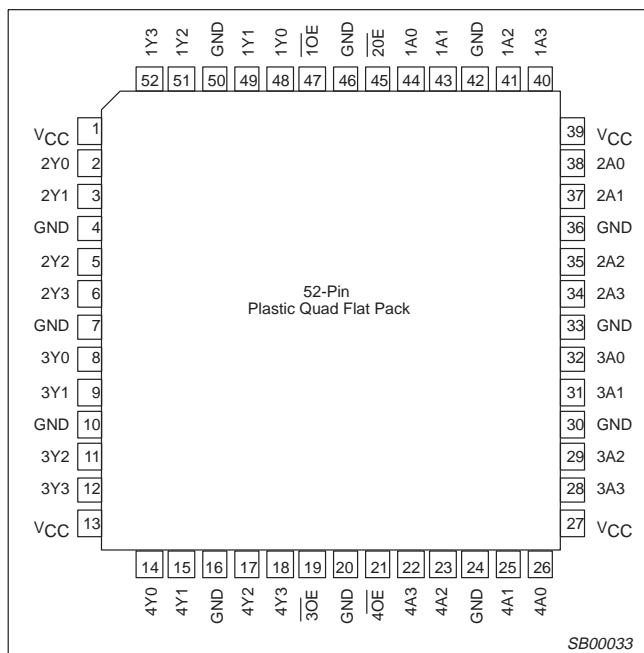
QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS $T_{amb} = 25^{\circ}C$; GND = 0V	TYPICAL	UNIT
t_{PLH} t_{PHL}	Propagation delay nAx to nYx	$C_L = 50pF$; $V_{CC} = 5V$	3.2 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; $V_{CC} = 5.5V$	50	μA

ORDERING INFORMATION

PACKAGES	TEMPERATURE RANGE	OUTSIDE NORTH AMERICA	NORTH AMERICA	DWG NUMBER
52-pin plastic Quad Flat Pack	-40°C to +85°C	MB2244 BB	MB2244 BB	SOT379-1

PIN CONFIGURATION



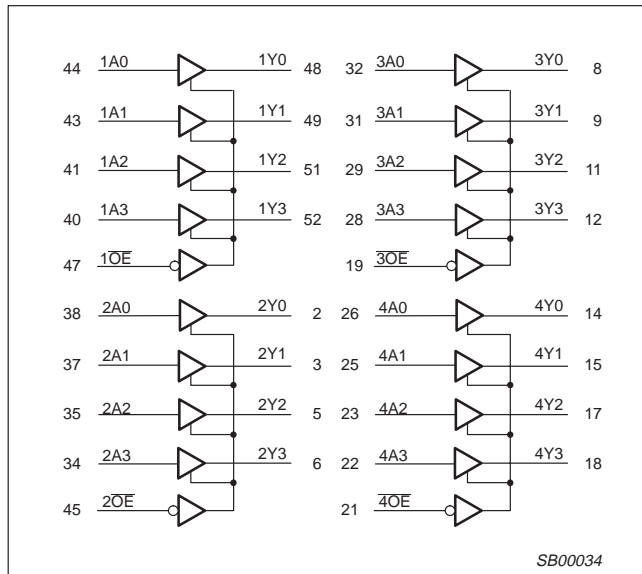
PIN DESCRIPTION

PIN NUMBER	SYMBOL	NAME AND FUNCTION
44, 43, 41, 40, 38, 37, 35, 34, 32, 31, 29, 28, 26, 25, 23, 22	1A0 – 1A3, 2A0 – 2A3, 3A0 – 3A3, 4A0 – 4A3	Data inputs
48, 49, 51, 52, 2, 3, 5, 6, 8, 9, 11, 12, 14, 15, 17, 18	1Y0 – 1Y3, 2Y0 – 2Y3, 3Y0 – 3Y3, 4Y0 – 4Y3	Data outputs
47, 45, 19, 21	$1\overline{OE}$, $2\overline{OE}$, $3\overline{OE}$, $4\overline{OE}$	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

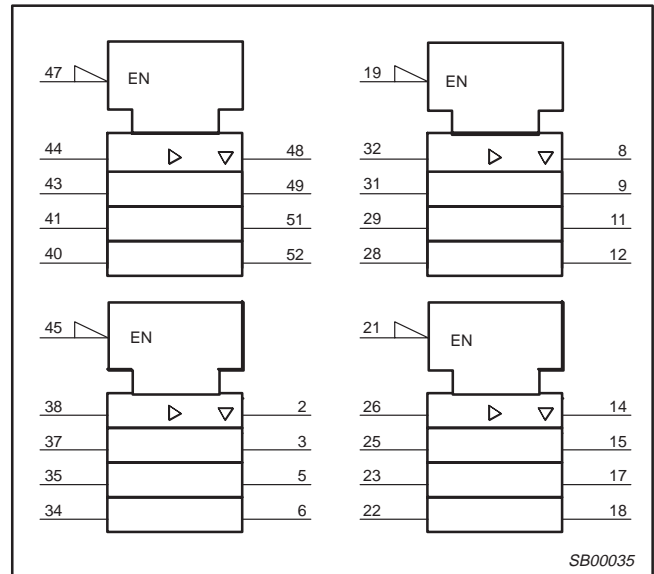
16-bit buffer/line driver (3-State)

MB2244

LOGIC SYMBOL



LOGIC SYMBOL (IEEE/IEC)



FUNCTION TABLE

INPUTS		OUTPUTS
$n\overline{OE}$	nAx	nYx
L	L	L
L	H	H
H	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:

- 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.
- 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.
- The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

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

MB2244

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
			$T_{amb} = +25^{\circ}\text{C}$			$T_{amb} = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$		
			Min	Typ	Max	Min	Max	
V_{IK}	Input clamp voltage	$V_{CC} = 4.5\text{V}; I_{IK} = -18\text{mA}$		-0.9	-1.2		-1.2	V
V_{OH}	High-level output voltage	$V_{CC} = 4.5\text{V}; I_{OH} = -3\text{mA}; V_I = V_{IL}$ or V_{IH}	2.5	2.9		2.5		V
		$V_{CC} = 5.0\text{V}; I_{OH} = -3\text{mA}; V_I = V_{IL}$ or V_{IH}	3.0	3.4		3.0		V
		$V_{CC} = 4.5\text{V}; I_{OH} = -32\text{mA}; V_I = V_{IL}$ or V_{IH}	2.0	2.4		2.0		V
V_{OL}	Low-level output voltage	$V_{CC} = 4.5\text{V}; I_{OL} = 64\text{mA}; V_I = V_{IL}$ or V_{IH}		0.42	0.55		0.55	V
I_I	Input leakage current	$V_{CC} = 5.5\text{V}; V_I = \text{GND}$ or 5.5V		± 0.01	± 1.0		± 1.0	μA
I_{OFF}	Power-off leakage current	$V_{CC} = 0.0\text{V}; V_O$ or $V_I \leq 4.5\text{V}$		± 5.0	± 100		± 100	μA
$I_{PU/PD}$	Power-up/down 3-State output current	$V_{CC} = 2.0\text{V}; V_O = 0.5\text{V}; V_I = \text{GND}$ or $V_{CC}; V_{OE} = V_{CC}$		± 5.0	± 50		± 50	μA
I_{OZH}	3-State output High current	$V_{CC} = 5.5\text{V}; V_O = 2.7\text{V}; V_I = V_{IL}$ or V_{IH}		5.0	50		50	μA
I_{OZL}	3-State output Low current	$V_{CC} = 5.5\text{V}; V_O = 0.5\text{V}; V_I = V_{IL}$ or V_{IH}		-5.0	-50		-50	μA
I_{CEX}	Output High leakage current	$V_{CC} = 5.5\text{V}; V_O = 5.5\text{V}; V_I = \text{GND}$ or V_{CC}		5.0	50		50	μA
I_O	Output current ¹	$V_{CC} = 5.5\text{V}; V_O = 2.5\text{V}$	-50	-100	-180	-50	-180	mA
I_{CCH}	Quiescent supply current	$V_{CC} = 5.5\text{V};$ Outputs High, $V_I = \text{GND}$ or V_{CC}		50	100		100	μA
I_{CCL}		$V_{CC} = 5.5\text{V};$ Outputs Low, $V_I = \text{GND}$ or V_{CC}		48	60		60	mA
I_{CCZ}		$V_{CC} = 5.5\text{V};$ Outputs 3-State; $V_I = \text{GND}$ or V_{CC}		50	100		100	μA
ΔI_{CC}	Additional supply current per input pin ²	Outputs enabled, one input at 3.4V, other inputs at V_{CC} or GND; $V_{CC} = 5.5\text{V}$		0.5	1.5		1.5	mA

NOTES:

- Not more than one output should be tested at a time, and the duration of the test should not exceed one second.
- This is the increase in supply current for each input at 3.4V.

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

MB2244

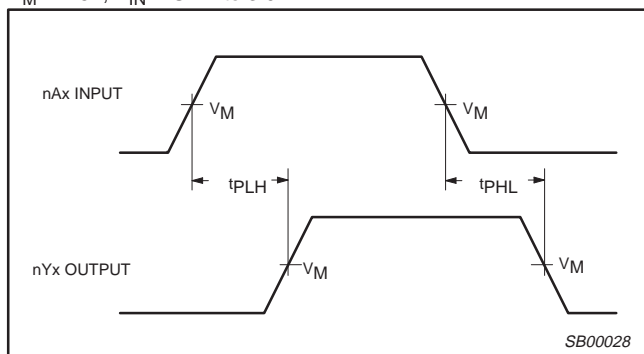
AC CHARACTERISTICS

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

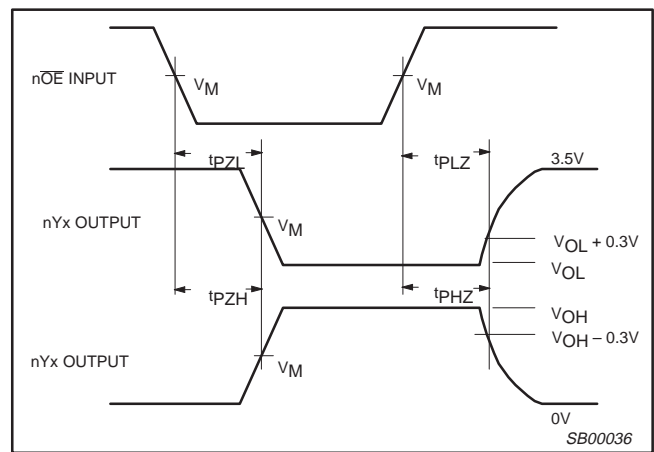
SYMBOL	PARAMETER	WAVEFORM	LIMITS					UNIT
			$T_{\text{amb}} = +25^\circ\text{C}$ $V_{\text{CC}} = +5.0\text{V}$			$T_{\text{amb}} = -40^\circ\text{C to } +85^\circ\text{C}$ $V_{\text{CC}} = +5.0\text{V} \pm 0.5\text{V}$		
			Min	Typ	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation delay nAx to nYx	1	1.2 1.2	3.2 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	1.1 1.8	3.0 4.0	4.4 5.4	1.1 1.8	5.1 6.4	ns
t_{PHZ} t_{PLZ}	Output disable time from High and Low level	2	1.6 1.7	4.0 3.4	5.6 5.0	1.6 1.7	6.2 5.6	ns

AC WAVEFORMS

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



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

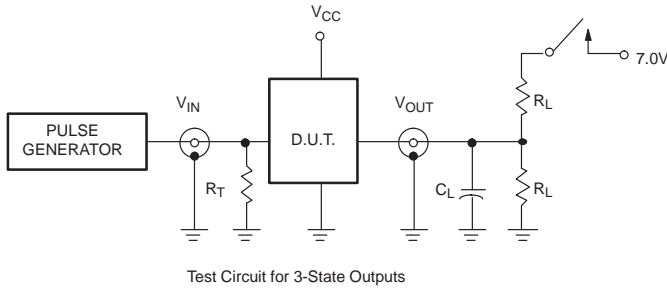


Waveform 2. 3-State Output Enable and Disable Times

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

MB2244

TEST CIRCUIT AND WAVEFORMS



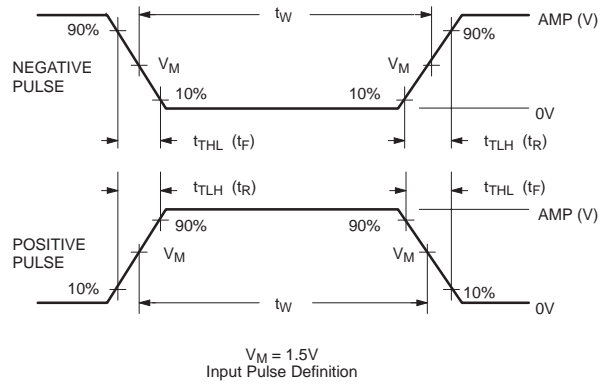
Test Circuit for 3-State Outputs

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.

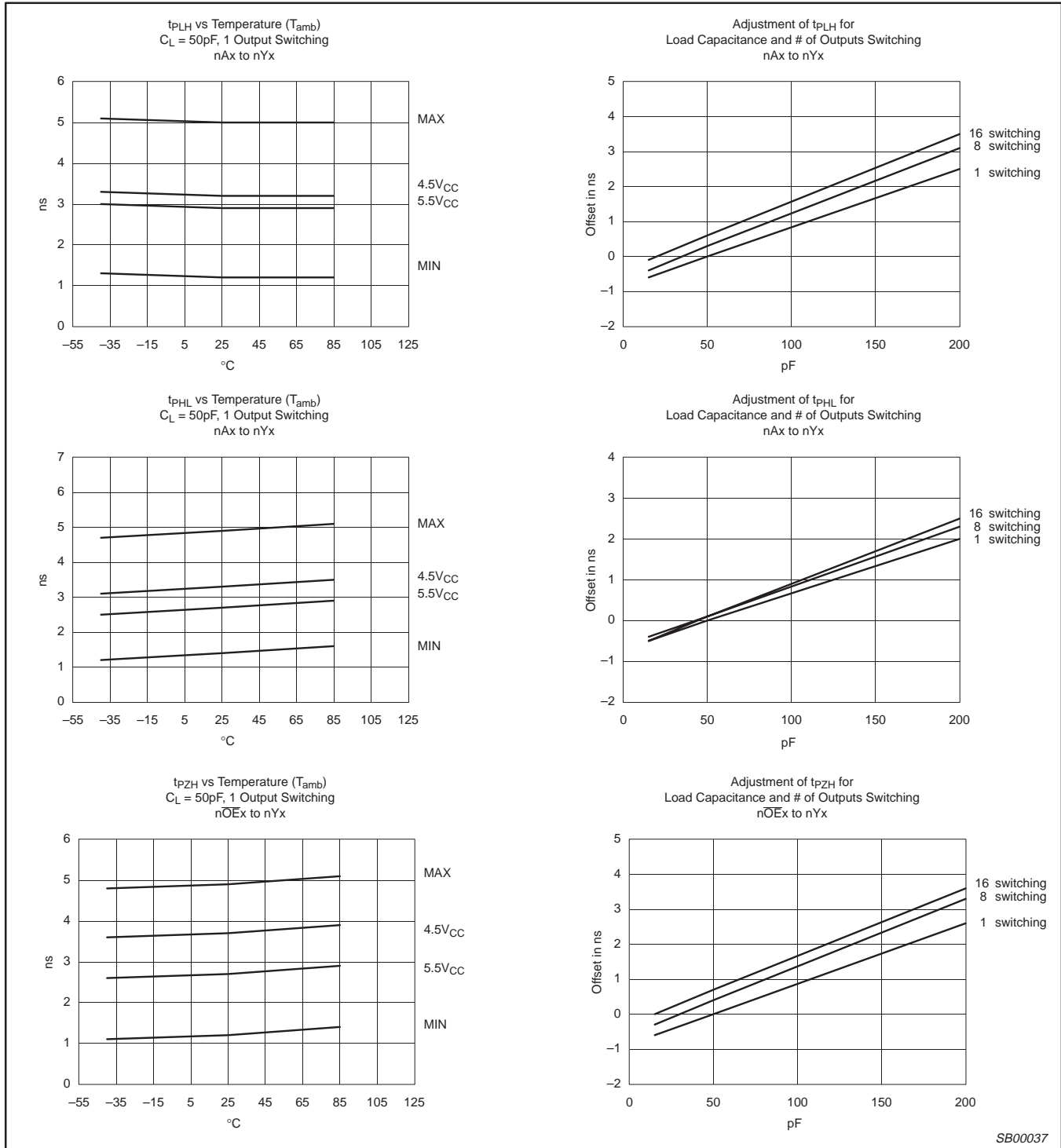


FAMILY	INPUT PULSE REQUIREMENTS				
	Amplitude	Rep. Rate	t_w	t_r	t_f
MB	3.0V	1MHz	500ns	2.5ns	2.5ns

SB00010

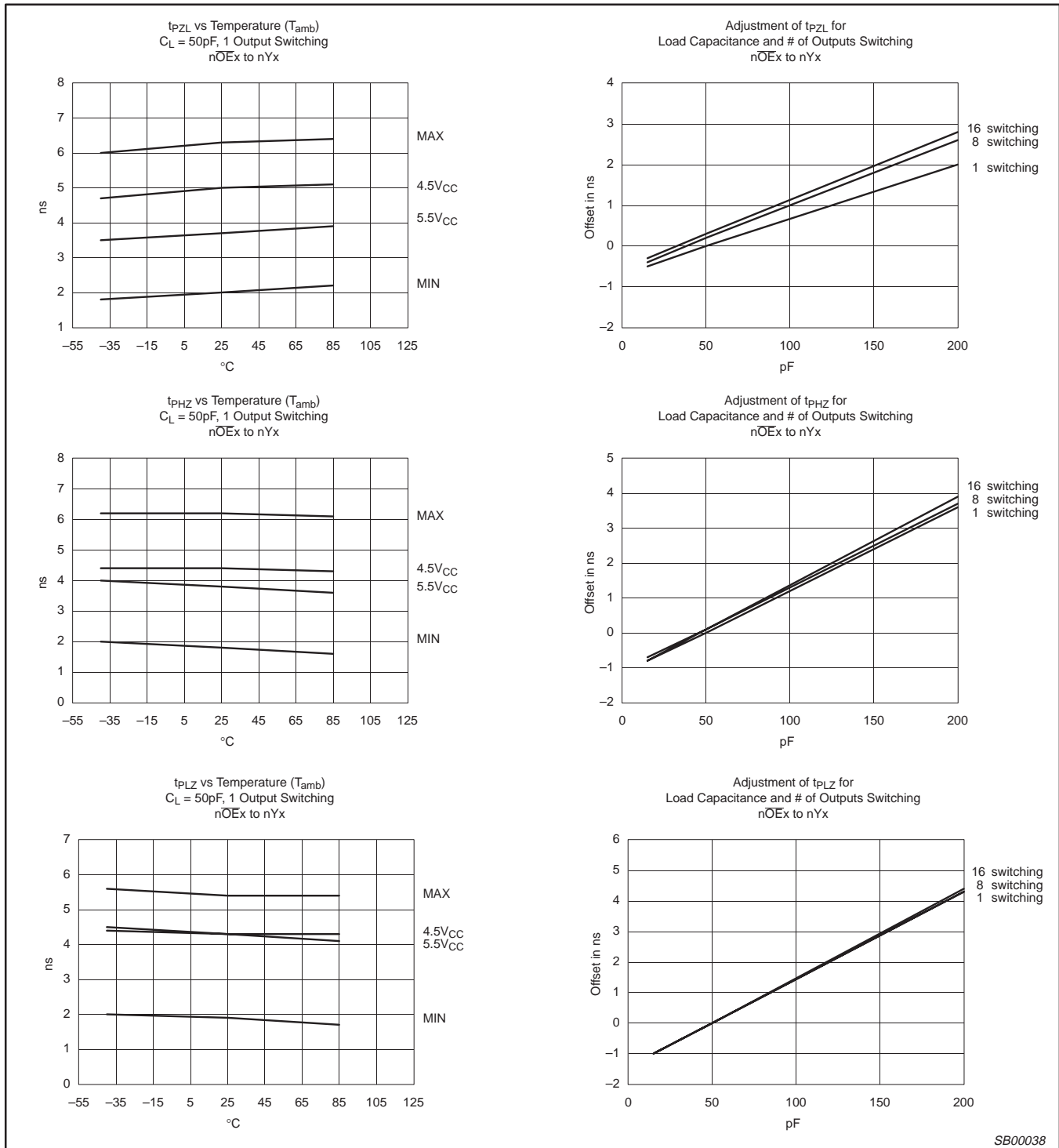
16-bit buffer/line driver (3-State)

MB2244



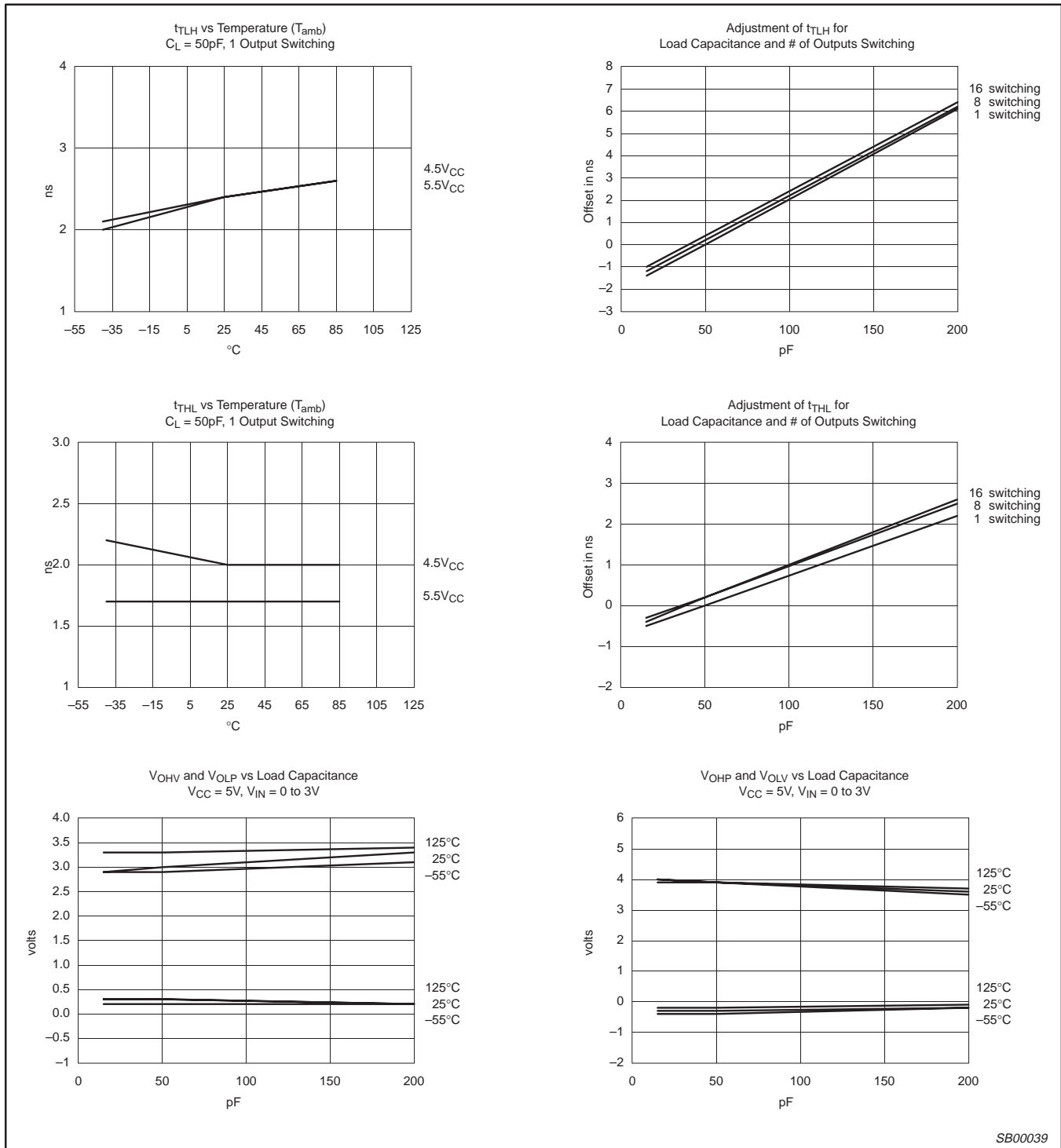
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MB2244



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MB2244



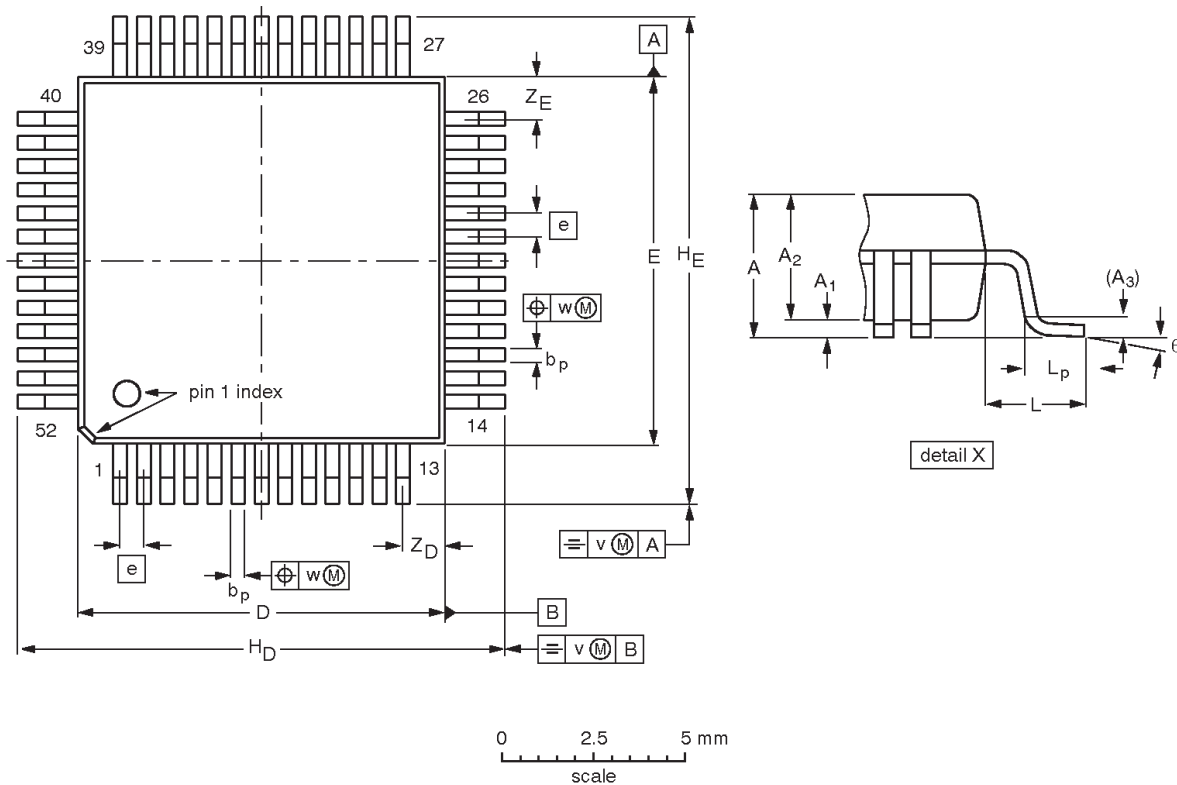
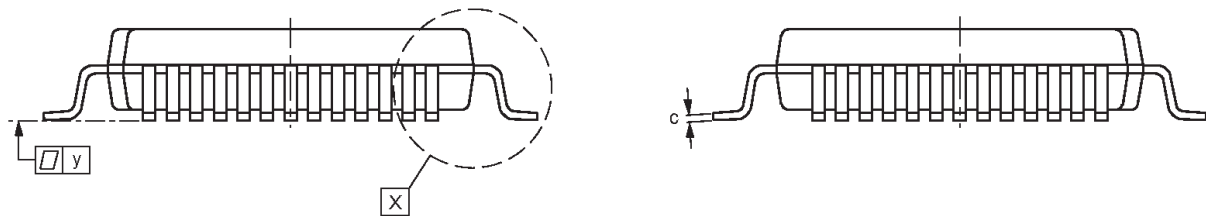
SB00039

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MB2244

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

SOT379-1



DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A ₁	A ₂	A ₃	b _p	c	D ⁽¹⁾	E ⁽¹⁾	e	H _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

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

MB2244

NOTES

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

MB2244

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.
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[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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