DATA SHEET

MB2623
16-bit transceiver with dual enable, non-inverting (3-State)

Product specification
Supersedes data of 1993 Aug 24
IC23 Data Handbook

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Philips
Semiconductors

PHILIPS

16-bit transceiver with dual enable, non-inverting (3-State)

MB2623

FEATURES

- Two 8-bit bidirectional bus interfaces
- 3-State buffers
- Power-up 3-State
- Multiple V_{CC} and GND pins minimize switching noise
- Output capability: +64mA/–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 MB2623 high-performance BiCMOS device combines low static and dynamic power dissipation with high speed and high output drive.

The MB2623 is a 16-bit transceiver featuring non-inverting 3-State bus compatible outputs in both send and receive directions. The MB2623 is designed for asynchronous two-way communication between data buses.

The control function implementation allows for maximum flexibility in timing. This device allows data transmission from the A bus to the B bus or from the B bus to the A bus, depending upon the logic levels at the Enable inputs (n$\overline{\text{OEBA}}$ and nOEAB). The Enable inputs can be used to disable the device so that the buses are effectively isolated.

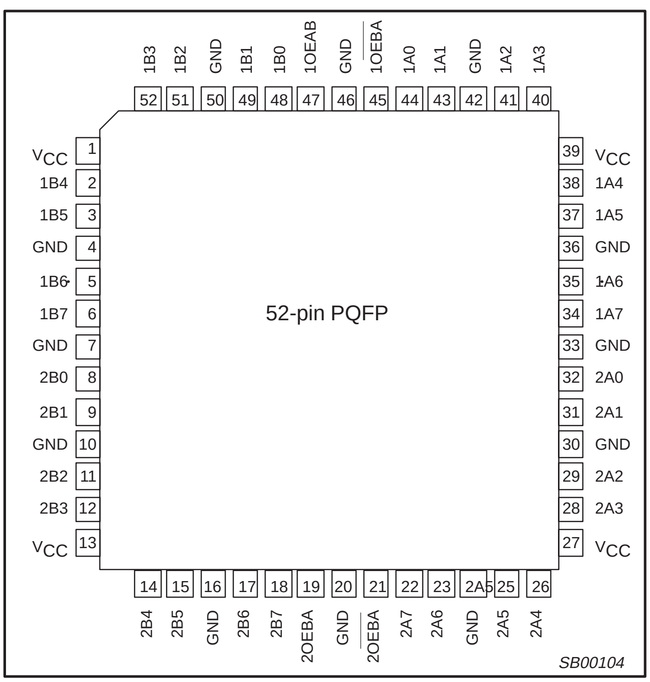
QUICK REFERENCE DATA

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	3.2 3.1	ns
C_{IN}	Input capacitance	V_I = 0V or V_{CC}	4	pF
$C_{I/O}$	I/O 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	MB2623 BB	MB2623 BB	SOT379-1

LOGIC SYMBOL



PIN DESCRIPTION

PIN NUMBER	SYMBOL	FUNCTION
44, 43, 41, 40, 38, 37, 35, 34, 32, 31, 29, 28, 26, 25, 23, 22	1A0 – 1A7 2A0 – 2A7	Data inputs/outputs (A side)
48, 49, 51, 52, 2, 3, 5, 6, 8, 9, 11, 12, 14, 15, 17, 18	1B0 – 1B7 2B0 – 2B7	Data inputs/outputs (B side)
47, 19	1OEAB, 2OEAB	Output enable inputs (active-High)
45, 21	1$\overline{\text{OEBA}}$, 2$\overline{\text{OEBA}}$	Output enable inputs (active-Low)
4, 7, 10, 16, 20, 24, 30, 33, 36, 42, 46, 50	GND	Ground (0V)
1, 13, 27, 39	V_{CC}	Positive supply voltage

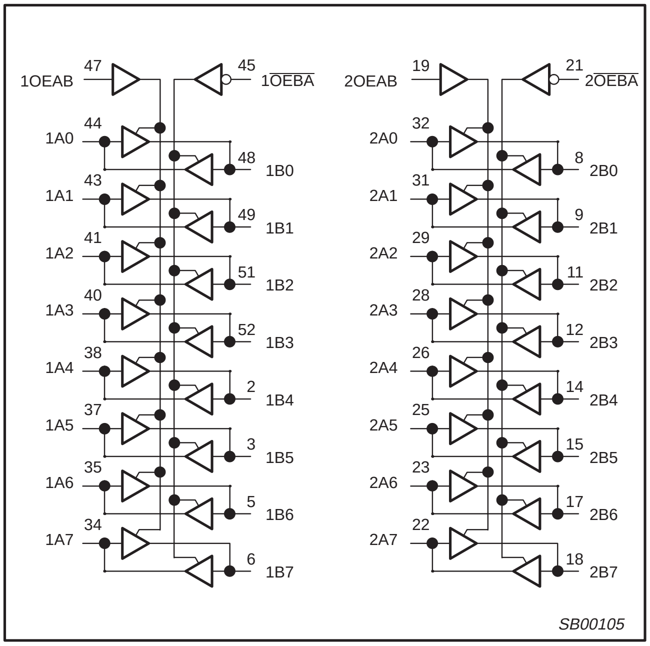
16-bit transceiver with dual enable, non-inverting (3-State)

FUNCTION TABLE

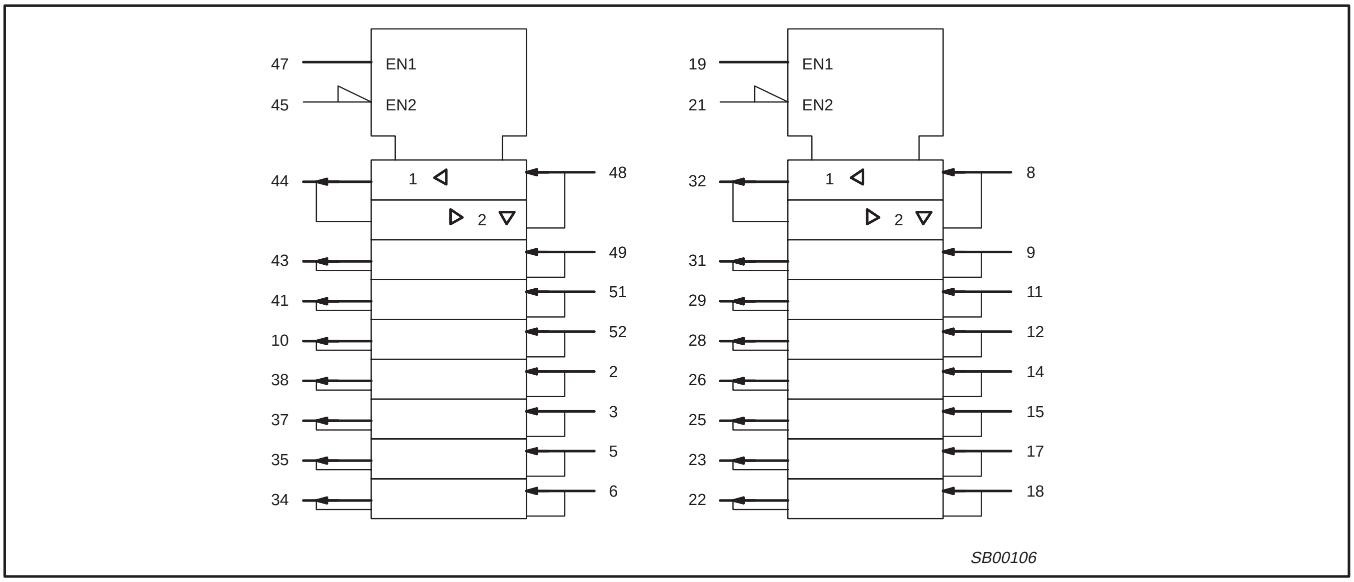
INPUTS		OUTPUTS	
n$\overline{\text{OEBA}}$	nOEAB	nAx	nBx
L	L	A = B	Inputs
H	H	Inputs	B = A
H	L	Z	Z
L	H	A = B	B = A

H = High voltage level
L = Low voltage level
Z = High impedance "off" state

PIN CONFIGURATION



LOGIC SYMBOL (IEEE/IEC)



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.

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	Control pins	V_{CC} = 5.5V; V_I = GND or 5.5V		±0.01	±1.0		±1.0	µA
		Data pins	V_{CC} = 5.5V; V_I = GND or 5.5V		±5	±100		±100	µA
I_{OFF}	Power-off leakage current		V_{CC} = 0.0V; V_O or $V_I \leq$ 4.5V		±5.0	±50		±50	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}; $\overline{V_{OE}} = V_{CC}$; V_{OE} = GND		±5.0	±100		±100	µA
$I_{IH} + I_{OZH}$	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
$I_{IL} + I_{OZL}$	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	–100	–180	–50	–180	mA
I_{CCH}	Quiescent supply current		V_{CC} = 5.5V; Outputs High, V_I = GND or V_{CC}		50	100		100	µA
I_{CCL}			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}		50	100		100	µA
ΔI_{CC}	Additional supply current per input pin[2]		V_{CC} = 5.5V; one input at 3.4V, other inputs at V_{CC} or GND		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.

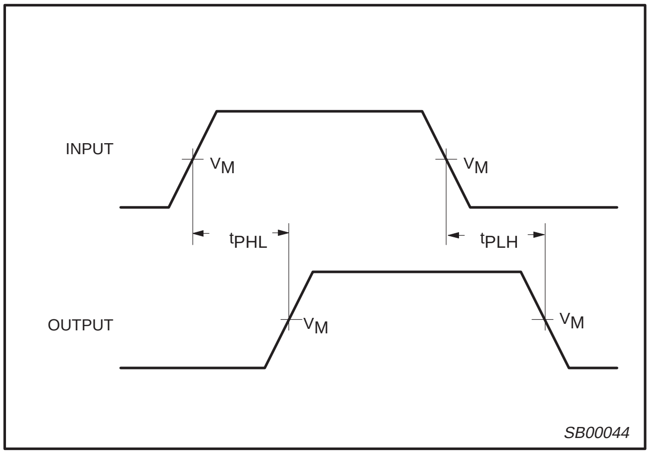
AC CHARACTERISTICS

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

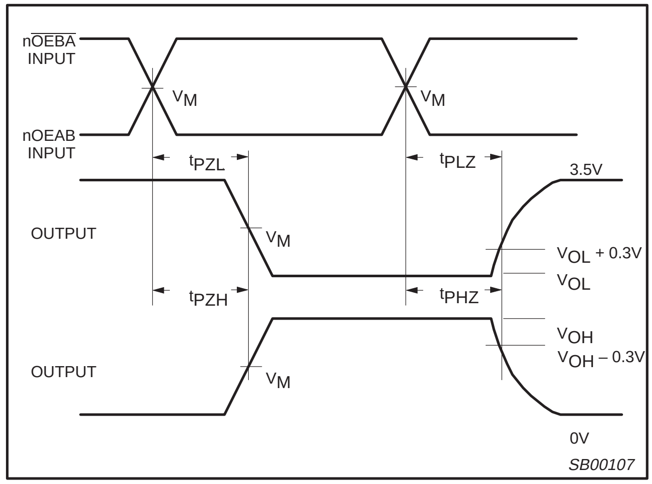
SYMBOL	PARAMETER	WAVEFORM	LIMITS					UNIT
			T_{amb} = +25°C V_{CC} = +5.0V			T_{amb} = -40 to +85°C V_{CC} = +5.0V ±0.5V		
			Min	Typ	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation delay An to Bn or Bn to An	1	1.2 1.2	3.2 3.1	4.5 4.5	1.2 1.2	5.1 5.1	ns
t_{PZH} t_{PZL}	Output enable time to High and Low level	2	1.5 1.7	4.8 5.4	6.5 6.8	1.5 1.7	7.2 7.8	ns
t_{PHZ} t_{PLZ}	Output disable time from High and Low level	2	1.5 1.4	4.7 4.2	6.5 5.8	1.5 1.4	7.2 6.5	ns

AC WAVEFORMS

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

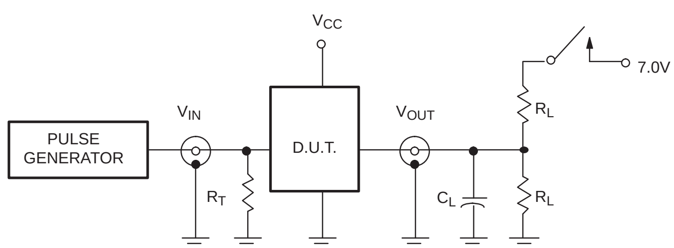


Waveform 1. Waveforms Showing the Input to Output Propagation Delays

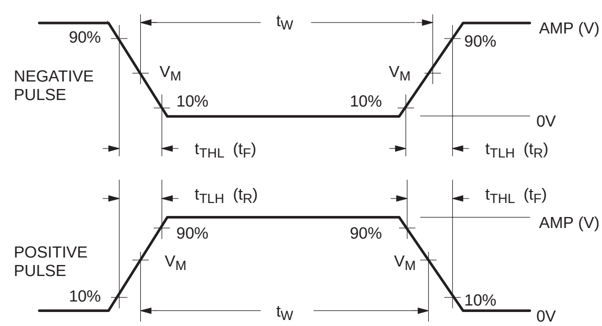


Waveform 2. Waveforms Showing the 3-State Output Enable and Disable Times

TEST CIRCUIT AND WAVEFORM



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
MB	3.0V	1MHz	500ns	2.5ns	2.5ns

SB00010

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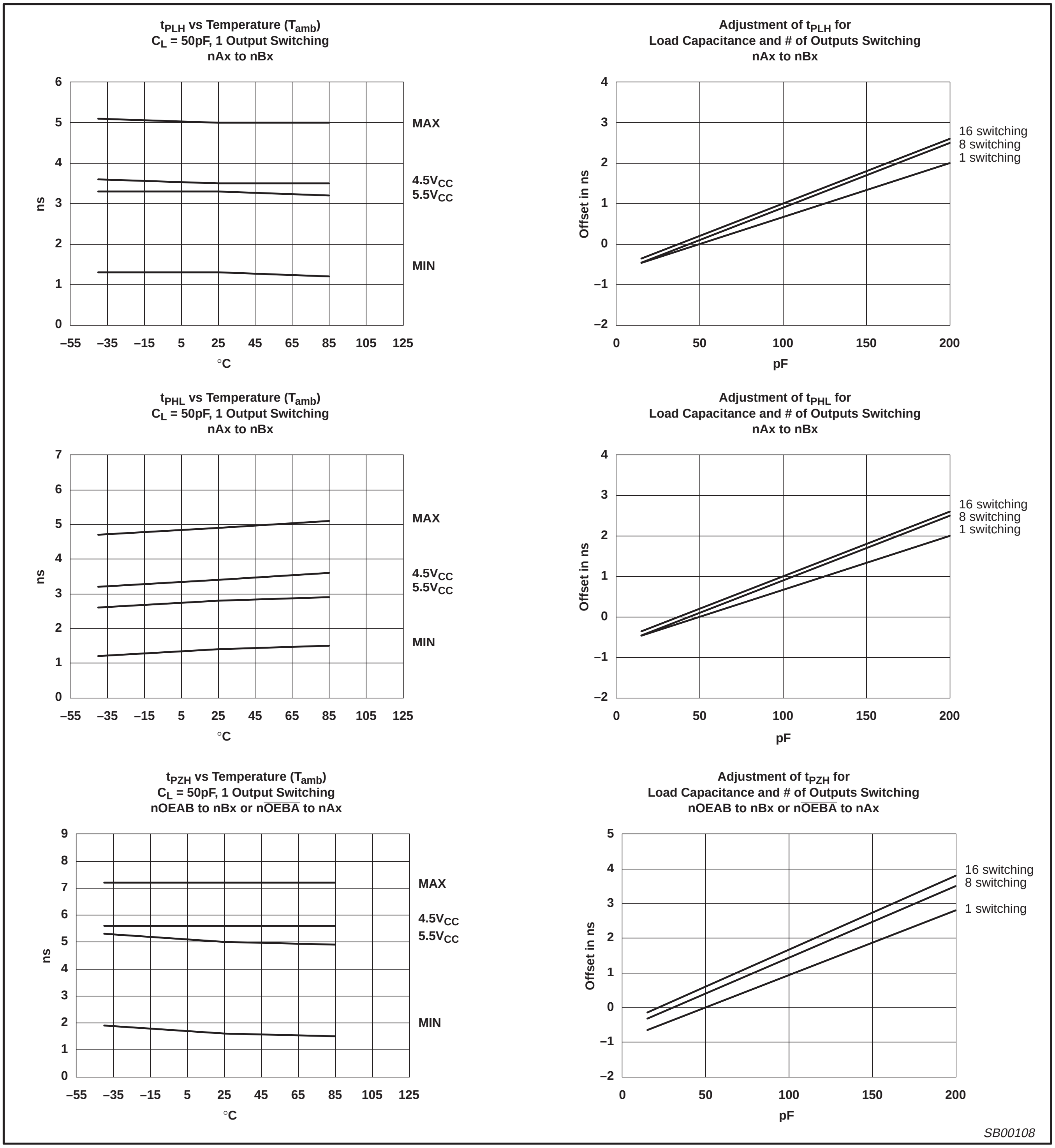

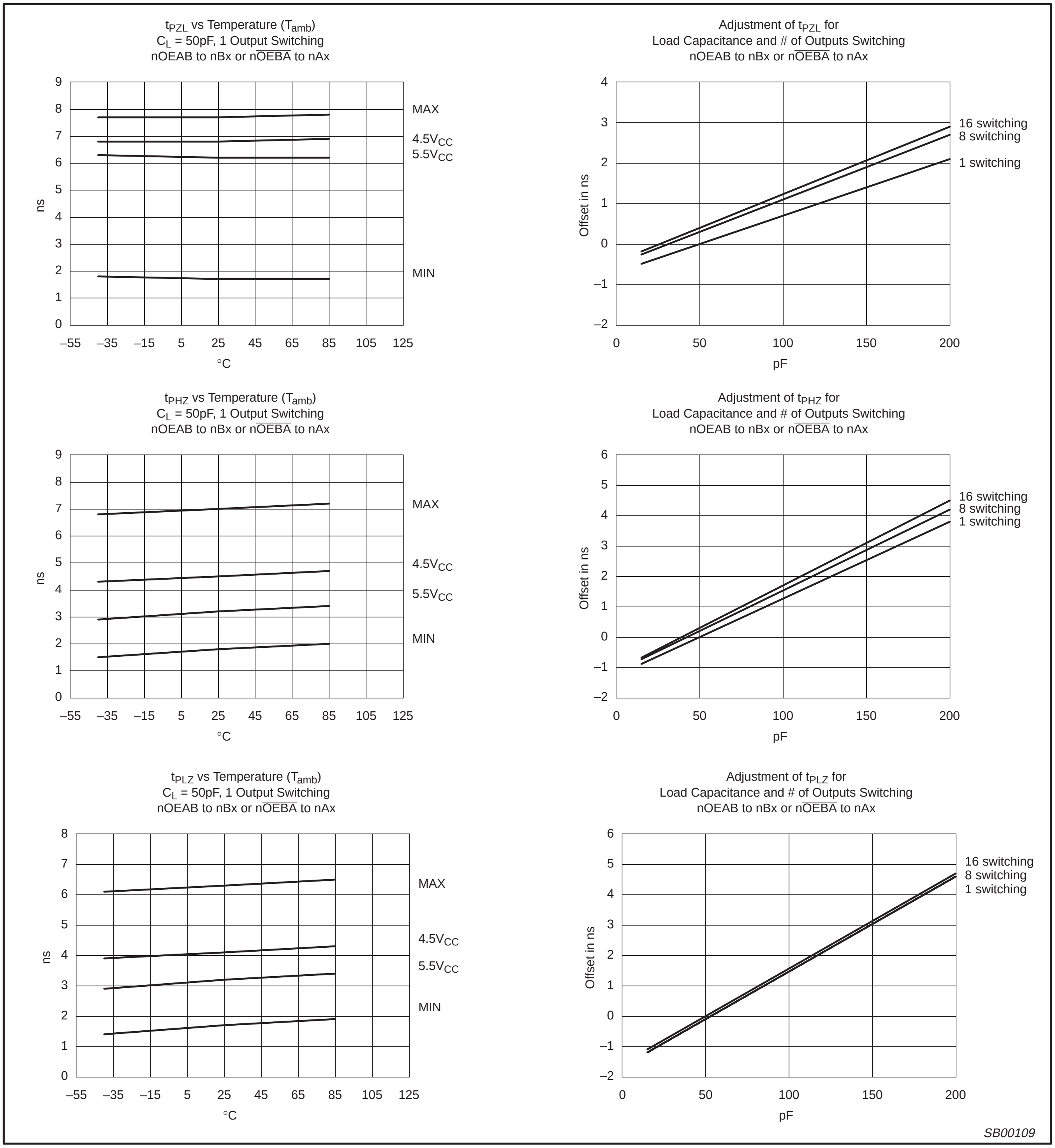
t_{PZL} vs Temperature (T_{amb})
C_L = 50pF, 1 Output Switching
nOEAB to nBx or n$\overline{OEBA}$ to nAx
ns
°C
MAX
4.5V_{CC}
5.5V_{CC}
MIN
Adjustment of t_{PZL} for
Load Capacitance and # of Outputs Switching
nOEAB to nBx or n$\overline{OEBA}$ to nAx
Offset in ns
pF
16 switching
8 switching
1 switching
t_{PHZ} vs Temperature (T_{amb})
C_L = 50pF, 1 Output Switching
nOEAB to nBx or n$\overline{OEBA}$ to nAx
ns
°C
MAX
4.5V_{CC}
5.5V_{CC}
MIN
Adjustment of t_{PHZ} for
Load Capacitance and # of Outputs Switching
nOEAB to nBx or n$\overline{OEBA}$ to nAx
Offset in ns
pF
16 switching
8 switching
1 switching
t_{PLZ} vs Temperature (T_{amb})
C_L = 50pF, 1 Output Switching
nOEAB to nBx or n$\overline{OEBA}$ to nAx
ns
°C
MAX
4.5V_{CC}
5.5V_{CC}
MIN
Adjustment of t_{PLZ} for
Load Capacitance and # of Outputs Switching
nOEAB to nBx or n$\overline{OEBA}$ to nAx
Offset in ns
pF
16 switching
8 switching
1 switching
SB00109

16-bit transceiver with dual enable, non-inverting (3-State)

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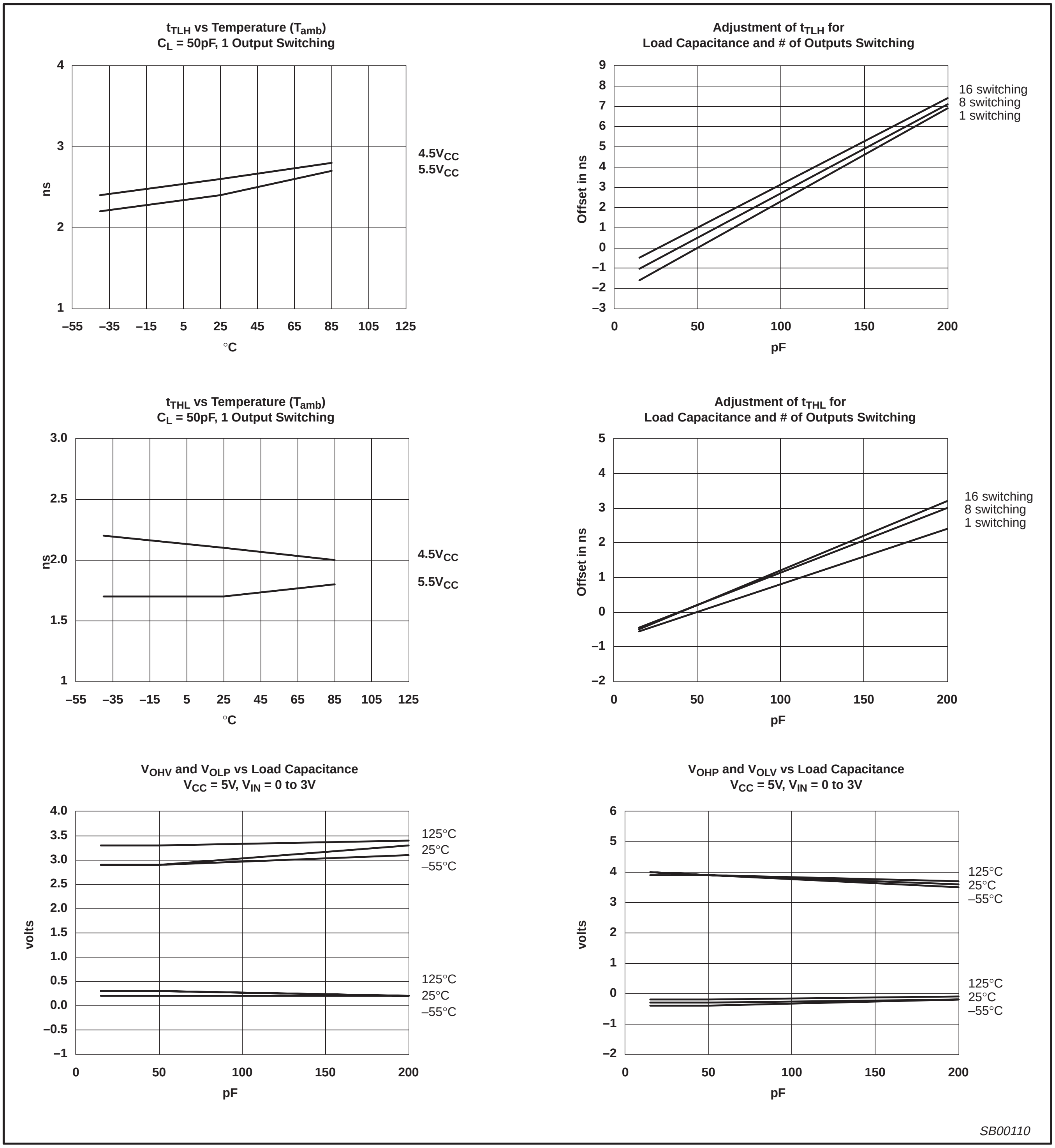
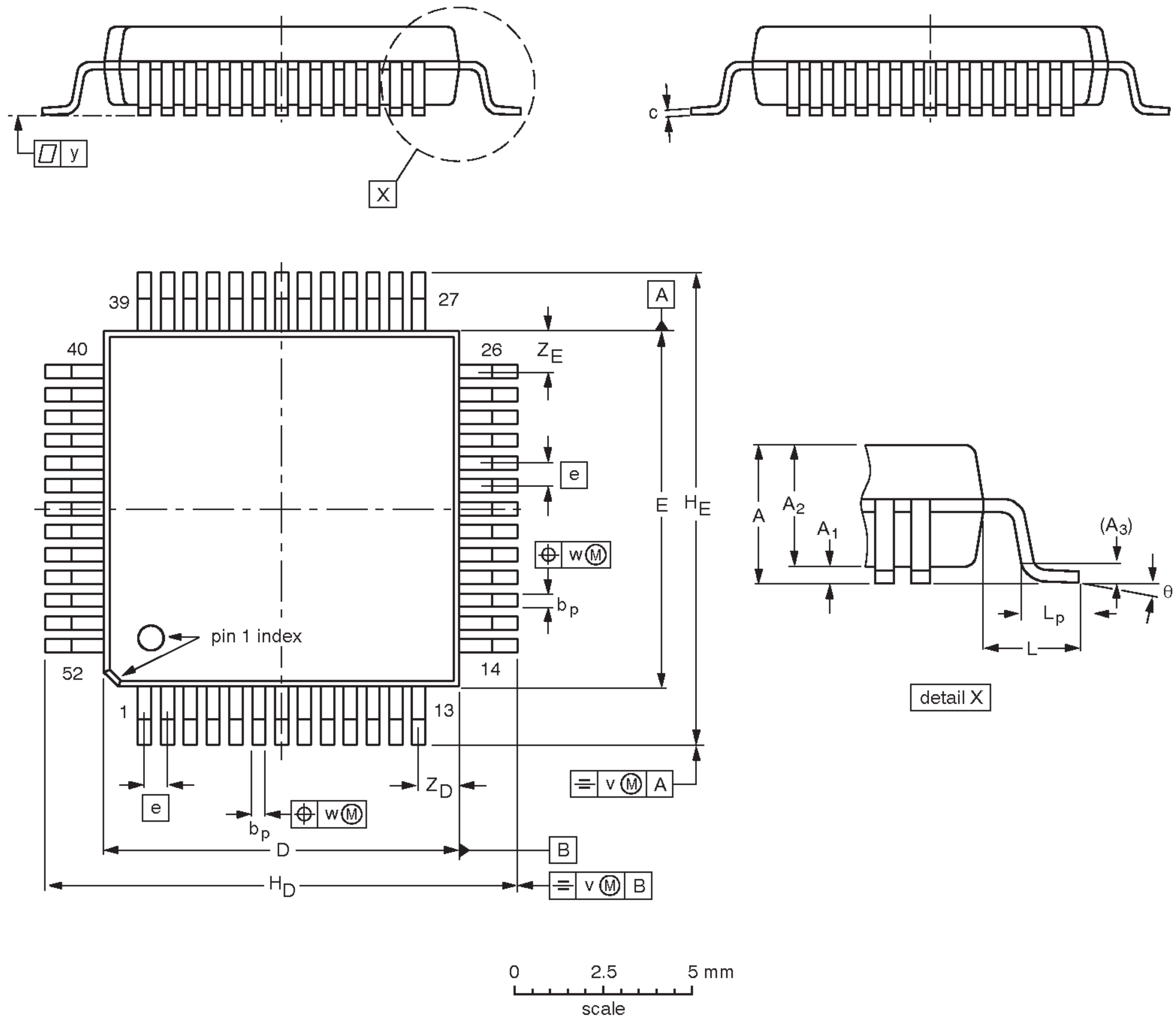


QFP52: plastic quad flat package; 52 leads (lead length 1.6 mm); body 10 x 10 x 2.0 mm SOT379-1



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

16-bit transceiver with dual enable, non-inverting (3-State)

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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.
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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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