

DESCRIPTION

The M54610P is a semiconductor integrated circuit consisting of an 8-bit parallel data interface function.

FEATURES

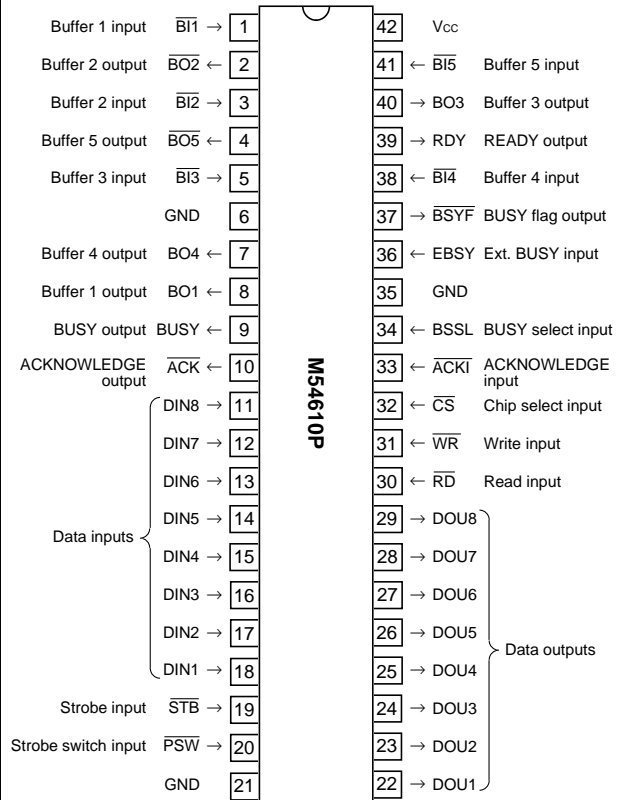
- I/O electrical characteristics equivalent to LSTTL
- 3-state 8-bit data output
- Strobe signal with polarity switching input
- Wide operating temperature range $T_a = -20 - +75^{\circ}\text{C}$

APPLICATION

Printer

FUNCTION

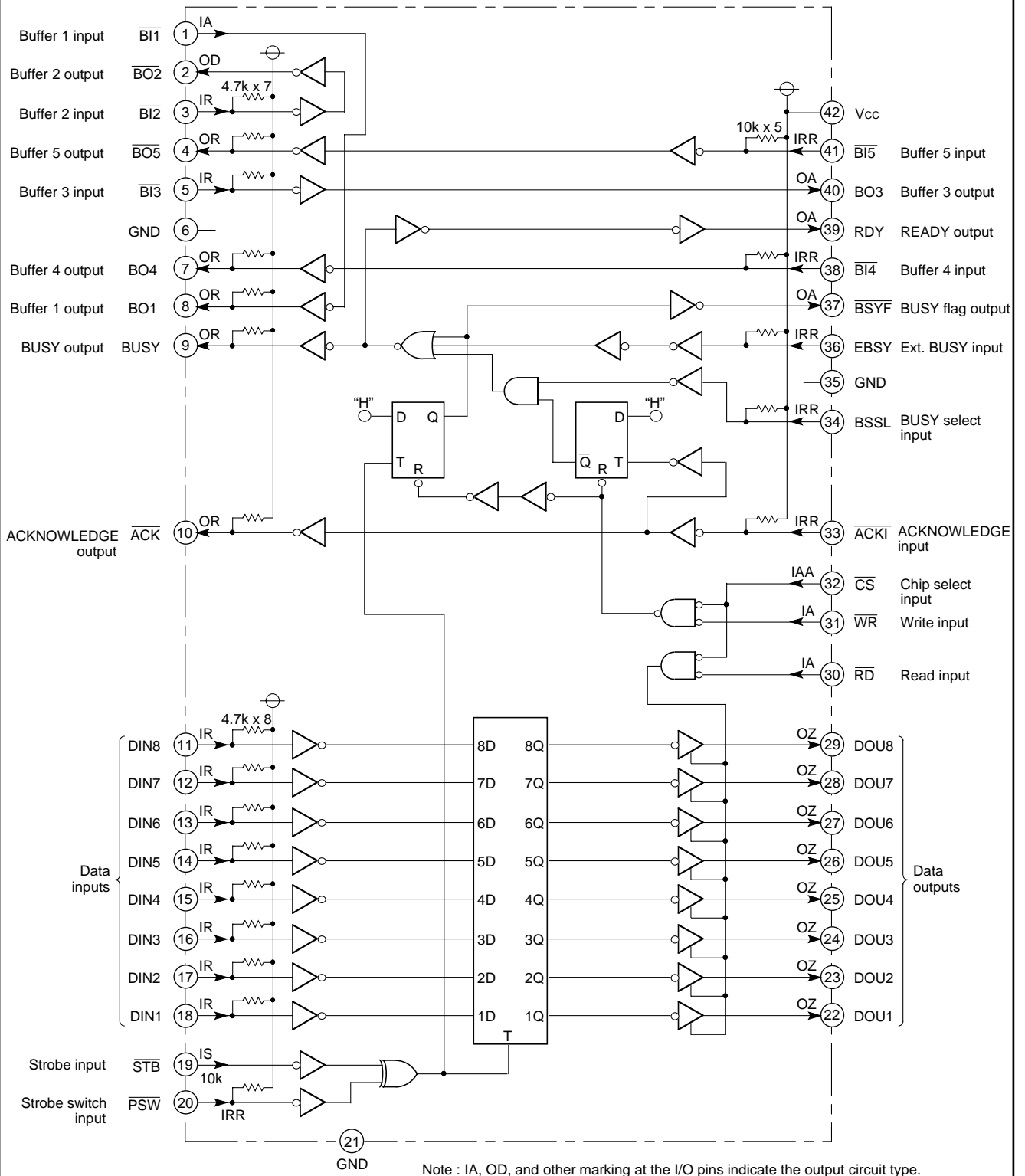
The M54610P, when used in a printer, is capable of implementing a standard 8-bit parallel data interface. As shown in the timing diagram, printing data DIN 1 through 8 and strobe pulses $\overline{\text{STB}}$ are input from a host computer. Data are exchanged by outputting the BUSY and $\overline{\text{ACK}}$ (ACKNOWLEDGE) signals to the host computer. Control signals EBSY, $\overline{\text{CS}}$, $\overline{\text{WR}}$, $\overline{\text{RD}}$ and $\overline{\text{ACKI}}$ are input from a printer controller, and this IC outputs DOU 1 through 8, and $\overline{\text{BSYF}}$.

PIN CONFIGURATION (TOP VIEW)

Outline 42P4B

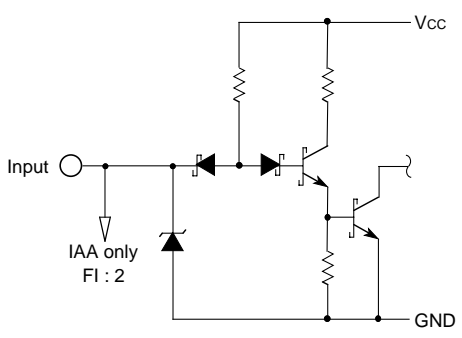
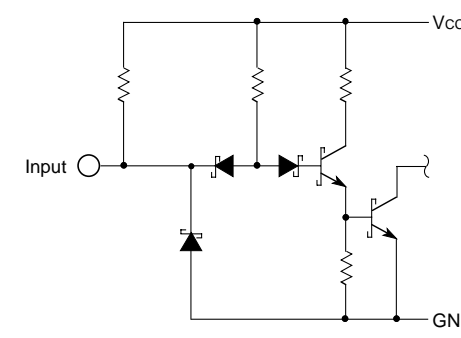
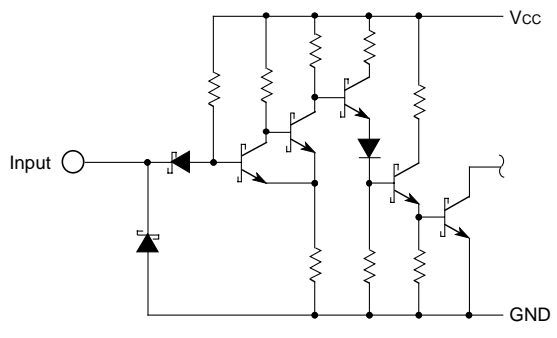
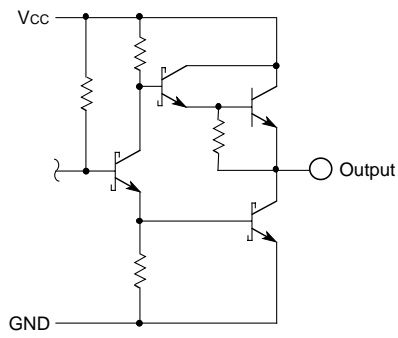
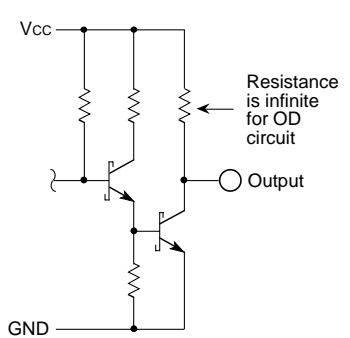
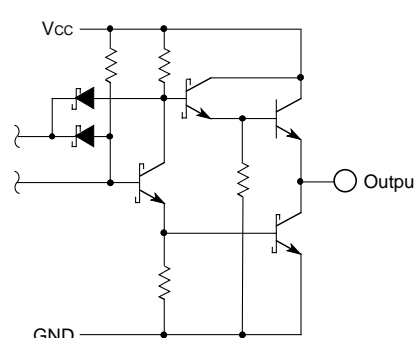
8-BIT PARALLEL DATA INTERFACE FOR PRINTER

BLOCK DIAGRAM



8-BIT PARALLEL DATA INTERFACE FOR PRINTER

I/O CIRCUIT DIAGRAM

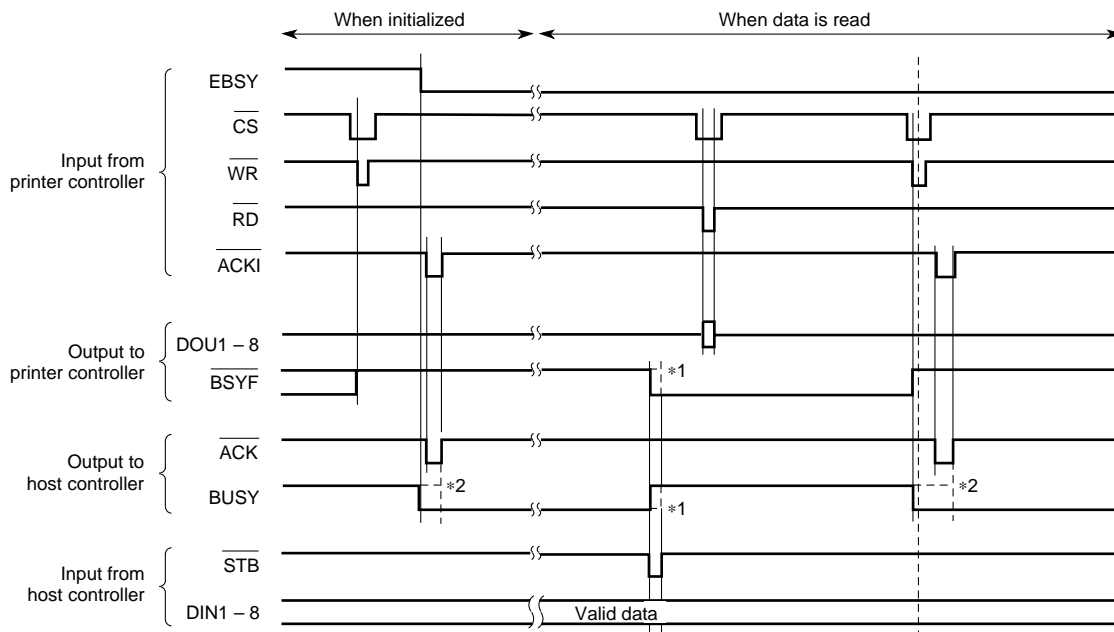
<p>1 Input circuit form: IA, IAA</p> 	<p>2 Input circuit form: IR, IRR</p> 
<p>3 Input circuit form: IS</p> 	<p>4 Output circuit form: OA</p> 
<p>5 Output circuit form: OR, OD</p> 	<p>6 Output circuit form: OZ</p> 

8-BIT PARALLEL DATA INTERFACE FOR PRINTER

PIN FUNCTION DESCRIPTION

Pin No.	Pin name	Function
⑨	BUSY	BUSY output to host
⑩	ACK	ACKNOWLEDGE output to host
⑪ ⑮	DIN8 DIN1	8-bit parallel data input from host
⑲	STB	Data strobe pulse input from host
⑳	PSW	Polarity switching input for STB
⑥ ⑳ ㉑ ㉓	GND	GND
㉒ ㉔	DOU1 DOU8	8-bit parallel data output to printer controller (3-state)
⑳	RD	Read input from printer controller
㉑	WR	Write input from printer controller
㉒	CS	Chip select input from printer controller
㉓	ACKI	ACKNOWLEDGE input from printer controller
㉔	BSSL	BUSY select input. Switches busy timing.
㉕	EBSY	External BUSY input from printer controller
㉖	BSYF	BUSY flag output to printer controller
㉗	RDY	Inverted BUSY output to printer controller
④	Vcc	Power supply

OPERATION TIMING DIAGRAM



*1 : The broken lines of \overline{BSYF} and \overline{BUSY} show the timing when \overline{PSW} is low.

*2 : The broken lines of \overline{BUSY} signal show the timing when \overline{BSSL} is low.

8-BIT PARALLEL DATA INTERFACE FOR PRINTER

ABSOLUTE MAXIMUM RATINGS (Ta = -20 – 75°C unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		-0.5 – +7	V
Vi	Input voltage	IR, IS	-0.5 – +15	V
		IA, IAA, IRR	-0.5 – Vcc	
Vo	Output voltage	OR	When output is "H" -0.5 – +15	V
		OA, OD	When output is "H" -0.5 – Vcc	
		OZ	When output is "H" -0.5 – +5.5	
Topr	Operating temperature		-20 – 75	°C
Tstg	Storage temperature		-55 – 125	°C

RECOMMENDED OPERATING CONDITIONS (Ta = -20 – 75°C unless otherwise noted)

Symbol	Parameter	Limits			Unit
		Min.	Typ.	Max.	
Vcc	Supply voltage	4.75	5	5.25	V
IoH	"H" output current	OR, OA	0	-400	μA
		OZ	0	-2.8	mA
		OD Vo = 5.5V	0	100	μA
IoL	"L" output current	OR, OA	0	8	mA
		OZ	0	8	
		OD	0	100	

8-BIT PARALLEL DATA INTERFACE FOR PRINTER

ELECTRICAL CHARACTERISTICS (Ta = -20 – 75°C unless otherwise noted)

Symbol	Parameter		Test conditions		Limits			Unit		
					Min.	Typ.*	Max.			
V _{IH}	"H" input voltage		IA, IAA, IRR, IR		2			V		
V _{IL}	"L" input voltage		IA, IAA, IRR, IR				0.8	V		
V _{T+}	Positive threshold voltage		IS		V _{CC} = 5V	1.4	1.6	1.9	V	
V _{T-}	Negative threshold voltage		IS		V _{CC} = 5V	0.5	0.8	1.0	V	
V _{T+} – V _{T-}	Hysteresis width		IS		V _{CC} = 5V	0.4	0.8		V	
V _{IC}	Input clamp voltage		All inputs		V _{CC} = 4.75V, I _I = -1mA			-1.5	V	
V _{OH}	"H" output voltage		OA	V _{CC} = 4.75V	I _{OH} = -400μA	2.7	3.1		V	
			OZ		I _{OH} = -2.6mA	2.4	2.9			
			OR		I _{OH} = -400μA	2.4	3.1			
I _{OH}	"H" output current		OD	V _{CC} = 4.75V, V _O = 5.5V				100	μA	
V _{OL}	"L" output voltage		OD	V _{CC} = 4.75V	I _{OL} = 24mA		0.3	0.4	V	
			OA, OZ		I _{OL} = 8mA		0.3	0.4		
			OR		I _{OL} = 8mA		0.3	0.4		
I _{OZH}	OFF-state "H" output current		OZ	V _{CC} = 5.25V				20	μA	
I _{OZL}	OFF-state "L" output current		OZ	V _{CC} = 5.25V				-20	μA	
I _{IH}	"H" input current		IA, IS	V _{CC} = 5.25V, V _I = 2.7V				20	μA	
			IAA					40		
I _{IH}	"H" input current		IRR	V _{CC} = 5.25V, V _I = 2.7V		-0.2		-0.4	mA	
			IR					-0.4		-0.8
I _{IL}	"L" input current		IA, IS	V _{CC} = 5.25V, V _I = 0.4V				-0.4	mA	
			IAA							-0.8
I _{IL}	"L" input current		IRR	V _{CC} = 5.25V, V _I = 0.4V				-1.1	mA	
			IR							-1.8
I _{OS}	Output short-circuit current		OA	(Note 1) V _{CC} = 5.25V, V _O = 0V		-20		-100	mA	
			OZ					-30		-130
			OR					-0.8		-1.5
I _{CC}	Supply current			V _{CC} = 5.25V Point "A" in the operational timing diagram. When: 4.5V: $\overline{BI1}$ Open: $\overline{BI2}$, BSSL and $\overline{BI5}$ 0V: $\overline{BI3}$, DIN1 – 8, EBSY and $\overline{BI4}$.			35	45	mA	

*: Typical values are at V_{CC} = 5V and Ta = 25°C.

Note 1: Measurements are conducted in the shortest possible time, and no two outputs are shorted simultaneously.

8-BIT PARALLEL DATA INTERFACE FOR PRINTER

SWITCHING CHARACTERISTICS ($V_{CC} = 5V$ and $T_a = 25^\circ C$ unless otherwise noted)

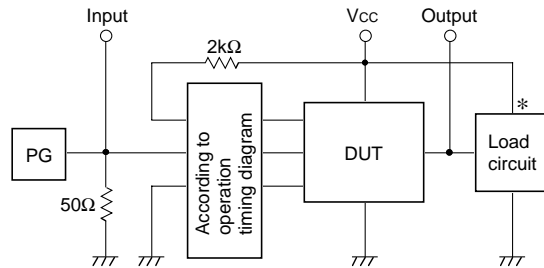
Symbol	Parameter	Test conditions (Note 2)	Limits			Unit
			Min.	Typ.	Max.	
tPLH	Output "L-H" and "H-L" propagation time 1 Buffer				200	ns
tPHL					200	
tPLH	Output "L-H" and "H-L" propagation time 2 Buffer				300	ns
tPHL					300	
tPLH	Output "L-H" and "H-L" propagation time EBSY to BUSY				500	ns
tPHL					500	
tPLH	Output "L-H" and "H-L" propagation time STB to DOU1 – 8				500	ns
tPHL					500	
tPLH	Output "L-H" propagation time STB to BUSY				500	ns
tPHL	Output "H-L" propagation time ACKI to BUSY				500	ns
tPHL	Output "H-L" propagation time WR to BUSY				500	ns
tPLH	Output "L-H" propagation time WR to BSYF				500	ns
tPHL	Output "H-L" propagation time STB to BSYF				500	ns
tPZH	"H" output enabled time	$R_L = 1k\Omega, C_L = 30pF$			80	ns
tPZL	"L" output enabled time	$R_L = 1k\Omega, C_L = 30pF$			80	ns
tPH2	"H" output disabled time	$R_L = 1k\Omega, C_L = 5pF$			100	ns
tPL2	"L" output disabled time	$R_L = 1k\Omega, C_L = 5pF$			100	ns

Note 2: Refer to switching test circuits for measurement conditions.

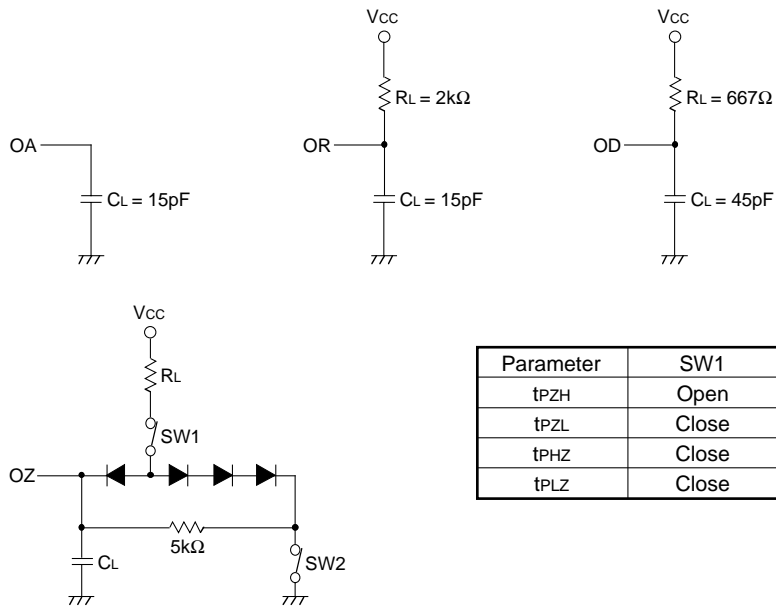
TIMING REQUIREMENTS ($V_{CC} = 5V$ and $T_a = 25^\circ C$ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
tW(STB)	STB "L" and "H" pulse width		500			ns
tW(ACK)	ACKI pulse width		500			ns
tW(WR)	WR pulse width		200			ns
tSU(DIN)	DIN1 – DIN8 setup time to STB		500			ns
tH(DIN)	DIN1 – DIN8 holding time to STB		500			ns
trec(WR)	WR recovery time to ACKI		500			ns

SWITCHING TEST CIRCUIT



* The load circuit to the output circuit type is as follows

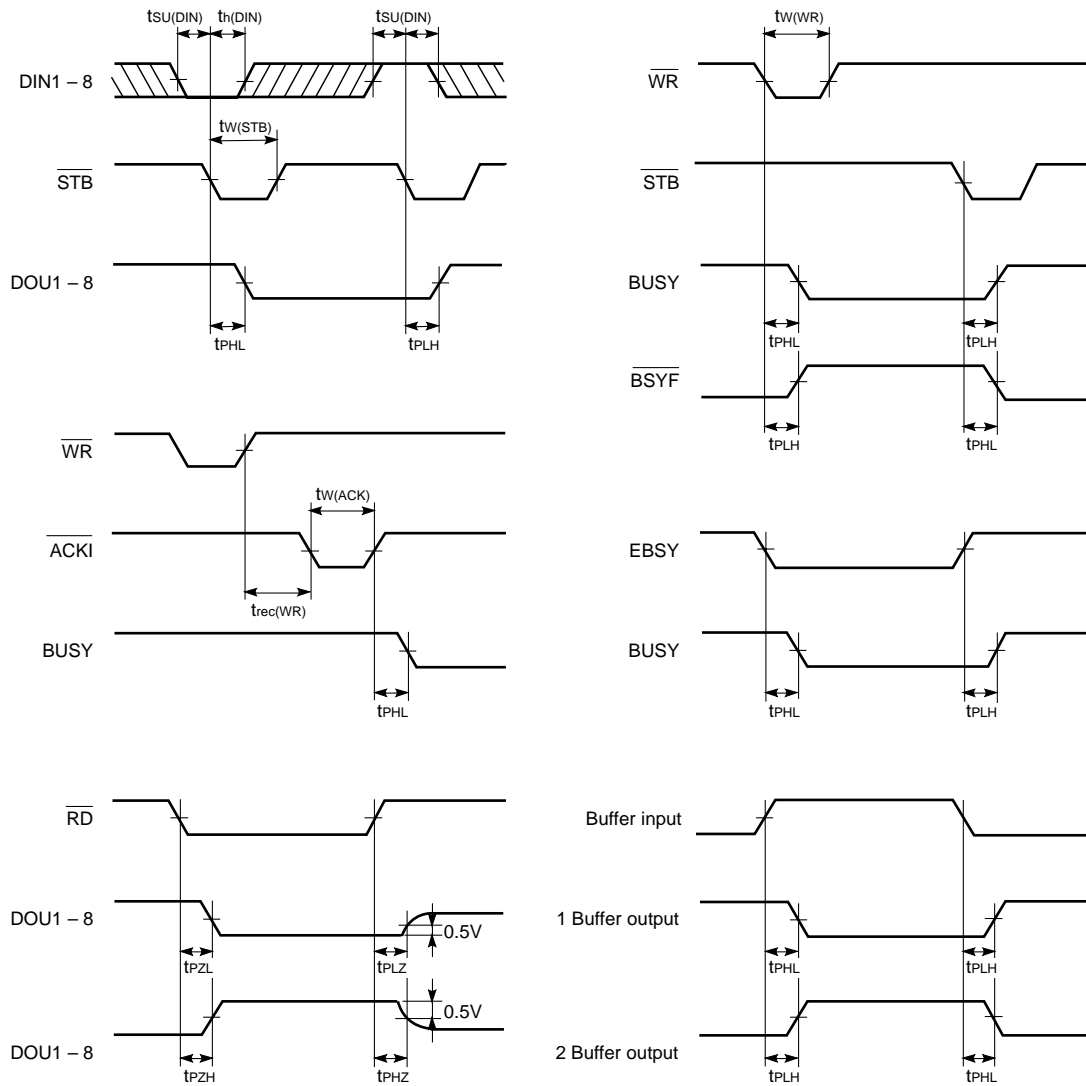


Parameter	SW1	SW2
tPZH	Open	Close
tPZL	Close	Open
tPHZ	Close	Close
tPLZ	Close	Close

- (1) The pulse generator (PG) characteristics: PRR = 100kHz, $t_r = 6\text{ns}$, $t_f = 6\text{ns}$, $t_w = 5\mu\text{s}$, $V_P = 3\text{VP-P}$, $Z_O = 50\Omega$
- (2) The diodes used are all high-speed switching diodes ($t_{rr} \leq 4\text{ns}$).
- (3) The capacitance C_L includes stray wiring capacitance and the probe input capacitance.

8-BIT PARALLEL DATA INTERFACE FOR PRINTER

TIMING DIAGRAM (Reference voltage = 1.3V)



Note: The shaded are indicated the period when switching is possible.