

M54610P

8-BIT PARALLEL DATA INTERFACE FOR PRINTER

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 $T_a = -20 - +75^{\circ}\text{C}$

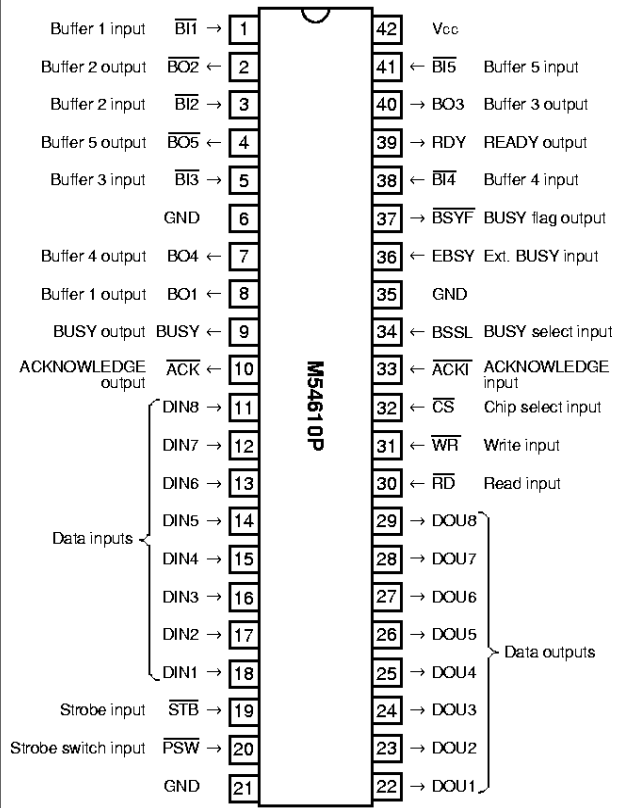
APPLICATION

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 $\overline{\text{BSYF}}$.

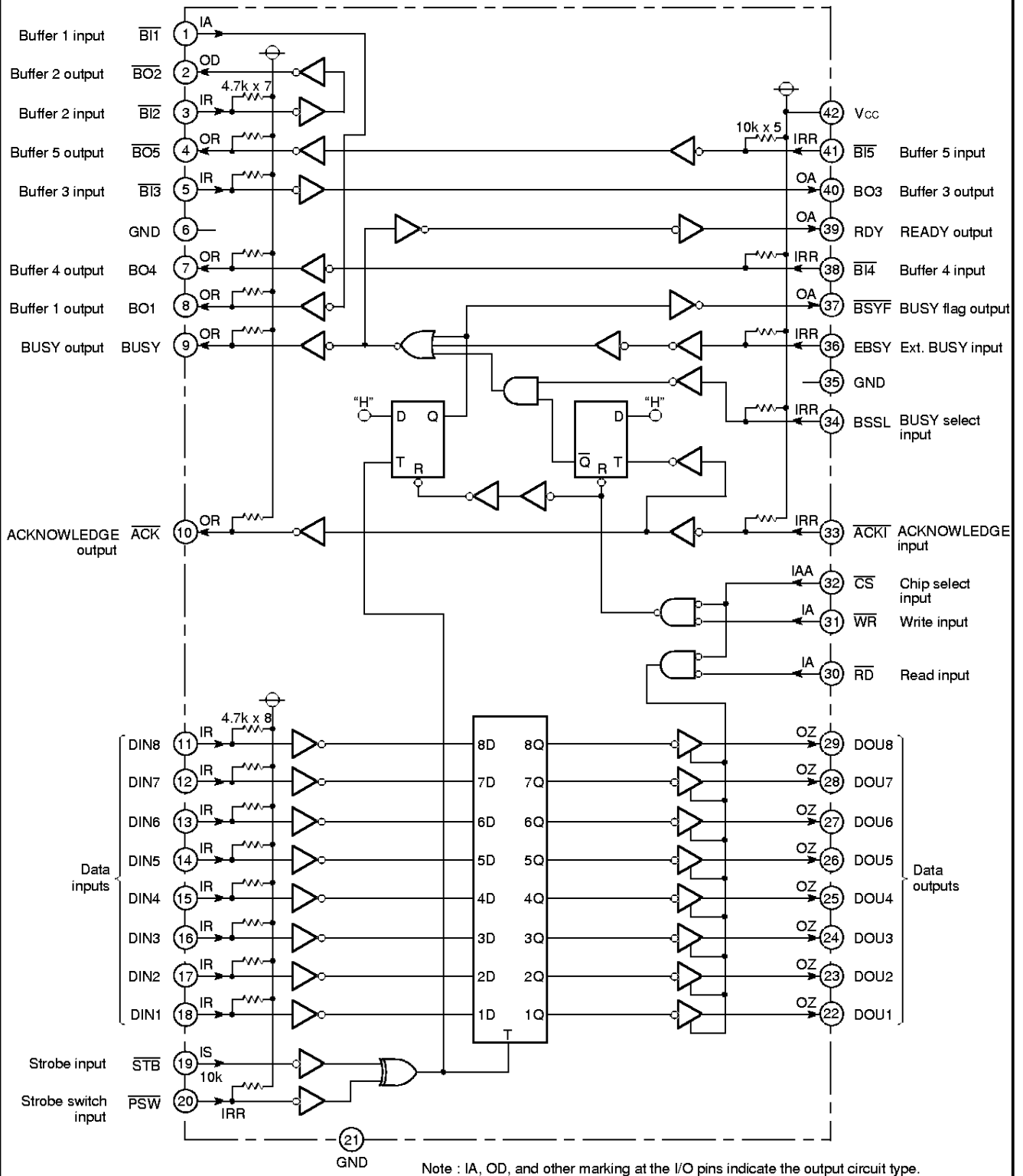
PIN CONFIGURATION (TOP VIEW)



Outline 42P4B

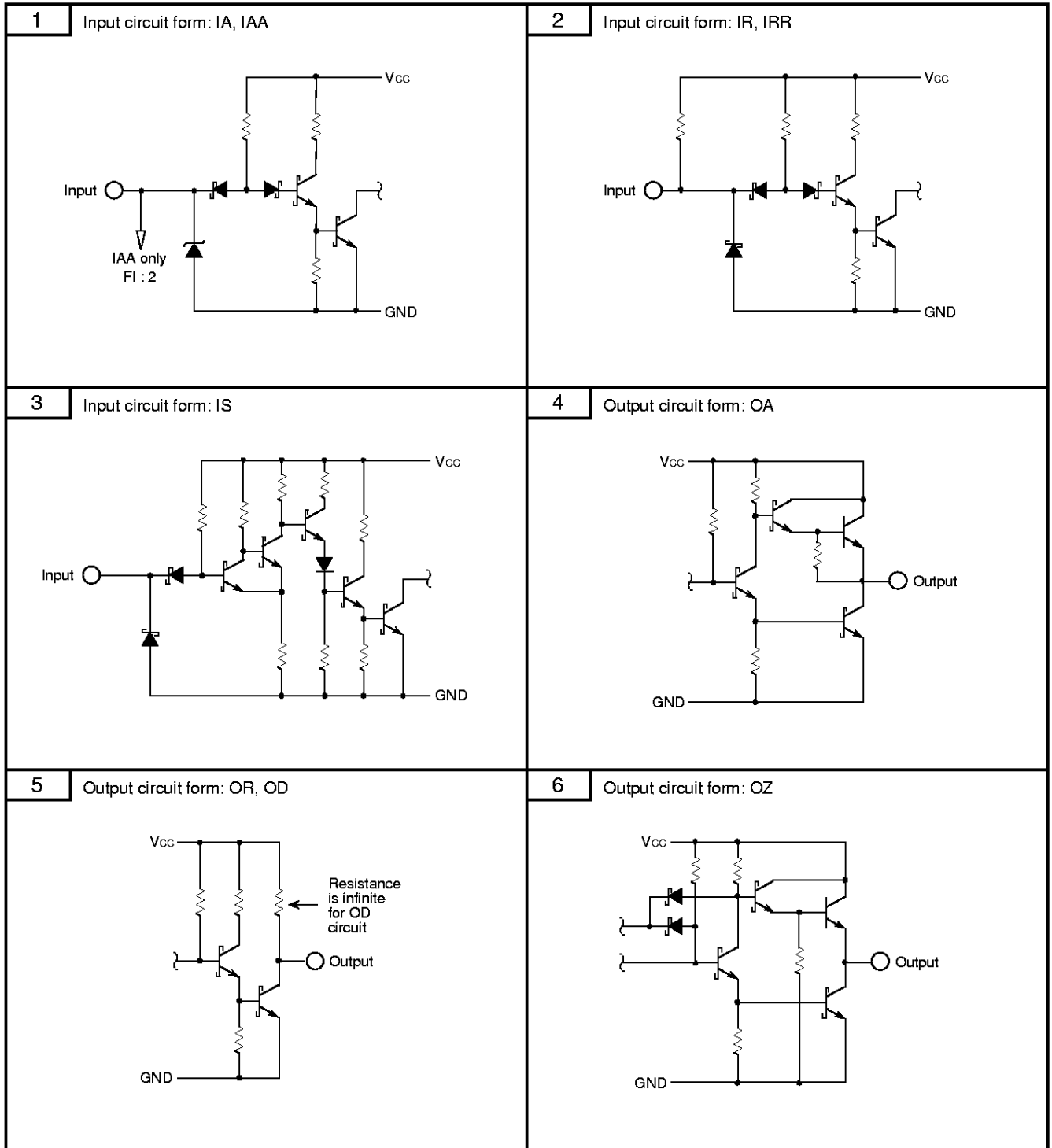
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BLOCK DIAGRAM



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I/O CIRCUIT DIAGRAM

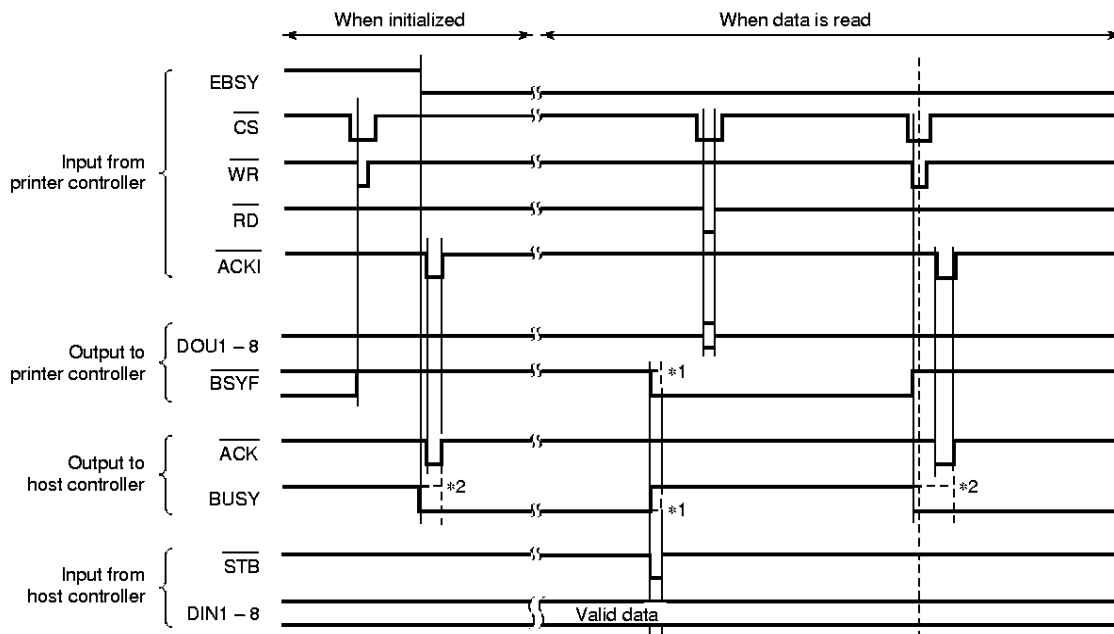


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PIN FUNCTION DESCRIPTION

Pin No.	Pin name	Function
⑨	BUSY	BUSY output to host
⑩	ACK	ACKNOWLEDGE output to host
⑪ ⑬	DIN8 DIN1	8-bit parallel data input from host
⑰	STB	Data strobe pulse input from host
⑳	PSW	Polarity switching input for STB
⑥ ⑰ ⑳	GND	GND
㉒ ㉔	DOU1 DOU8	8-bit parallel data output to printer controller (3-state)
㉖	RD	Read input from printer controller
㉗	WR	Write input from printer controller
㉘	CS	Chip select input from printer controller
㉙	ACKI	ACKNOWLEDGE input from printer controller
㉚	BSSL	BUSY select input. Switches busy timing.
㉛	EBSY	External BUSY input from printer controller
㉜	BSYF	BUSY flag output to printer controller
㉝	RDY	Inverted BUSY output to printer controller
㉞	Vcc	Power supply

OPERATION TIMING DIAGRAM



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

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

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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.

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

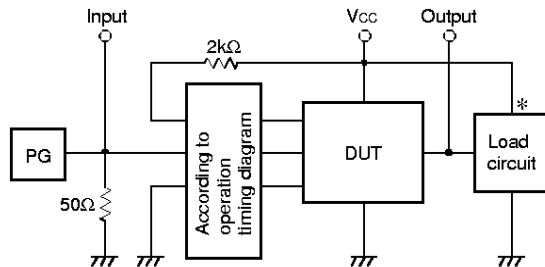
Symbol	Parameter	Test conditions (Note 2)	Limits			Unit
			Min.	Typ.	Max.	
t _{PLH}	Output "L-H" and "H-L" propagation time				200	ns
t _{PHL}	1 Buffer				200	ns
t _{PLH}	Output "L-H" and "H-L" propagation time				300	ns
t _{PHL}	2 Buffer				300	ns
t _{PLH}	Output "L-H" and "H-L" propagation time				500	ns
t _{PHL}	EBSY to BUSY				500	ns
t _{PLH}	Output "L-H" and "H-L" propagation time				500	ns
t _{PHL}	STB to DOU1 – 8				500	ns
t _{PLH}	Output "L-H" propagation time				500	ns
t _{PHL}	STB to BUSY				500	ns
t _{PHL}	Output "H-L" propagation time				500	ns
t _{PHL}	ACKI to BUSY				500	ns
t _{PHL}	Output "H-L" propagation time				500	ns
t _{PHL}	WR to BUSY				500	ns
t _{PLH}	Output "L-H" propagation time				500	ns
t _{PHL}	WR to BSYF				500	ns
t _{PHL}	Output "H-L" propagation time				500	ns
t _{PHL}	STB to BSYF				500	ns
t _{PZH}	"H" output enabled time	R _L = 1kΩ, C _L = 30pF			80	ns
t _{PZL}	"L" output enabled time	R _L = 1kΩ, C _L = 30pF			80	ns
t _{PH2}	"H" output disabled time	R _L = 1kΩ, C _L = 5pF			100	ns
t _{PL2}	"L" output disabled time	R _L = 1kΩ, C _L = 5pF			100	ns

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

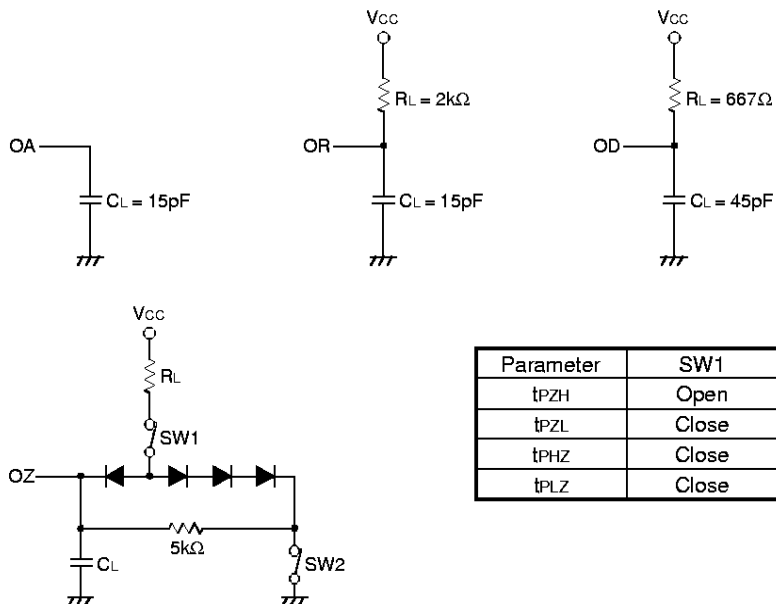
TIMING REQUIREMENTS ($V_{CC} = 5V$ and $T_a = 25^\circ C$ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
t _{w(STB)}	STB "L" and "H" pulse width		500			ns
t _{w(ACK)}	ACKI pulse width		500			ns
t _{w(WR)}	WR pulse width		200			ns
t _{SU(DIN)}	DIN1 – DIN8 setup time to STB		500			ns
t _{H(DIN)}	DIN1 – DIN8 holding time to STB		500			ns
t _{rec(WR)}	WR recovery time to ACKI		500			ns

SWITCHING TEST CIRCUIT



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

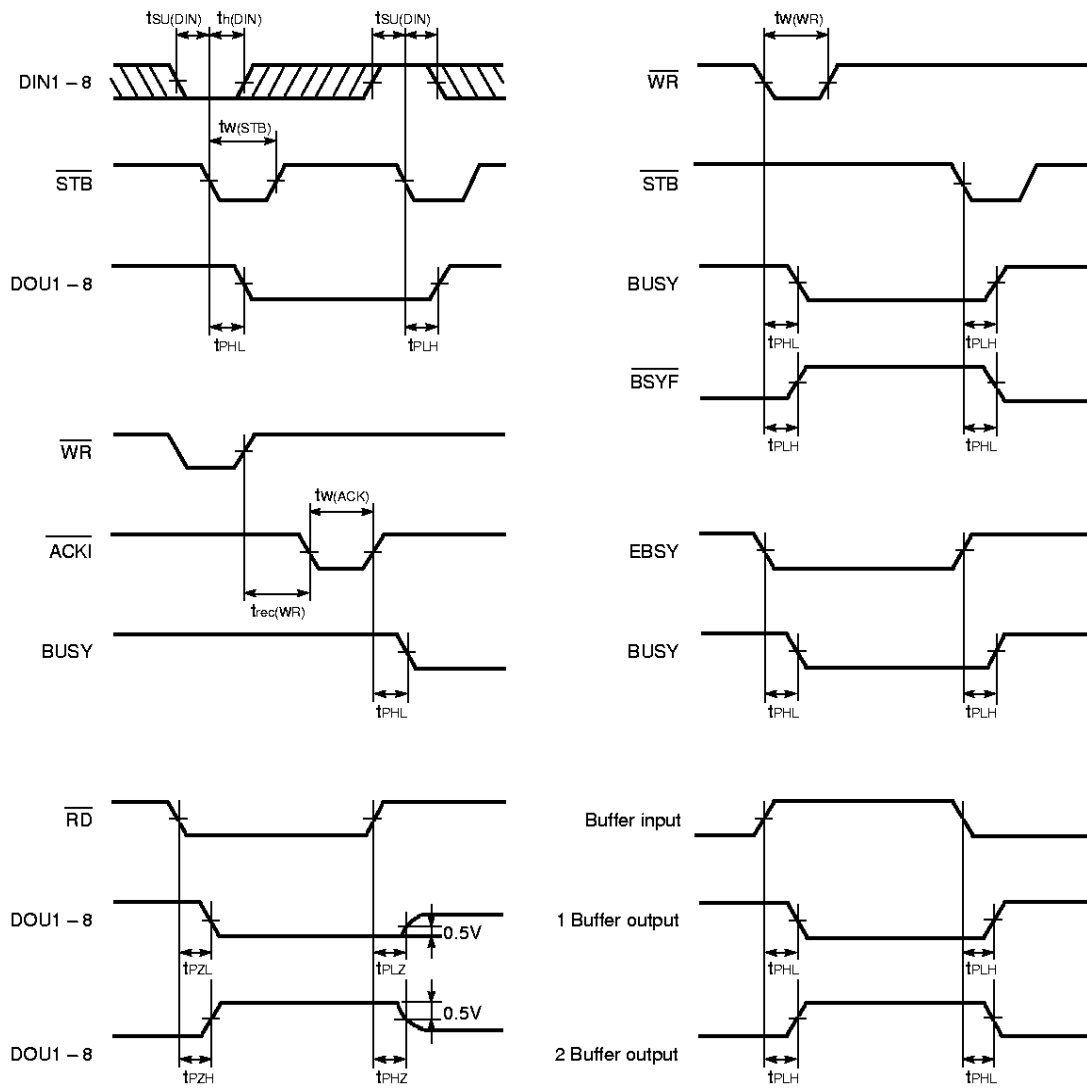


Parameter	SW1	SW2
tPZH	Open	Close
tPZL	Close	Open
tPHZ	Close	Close
tPLZ	Close	Close

- (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 ($t_r \leq 4\text{ns}$).
- (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.