

# DN8643S

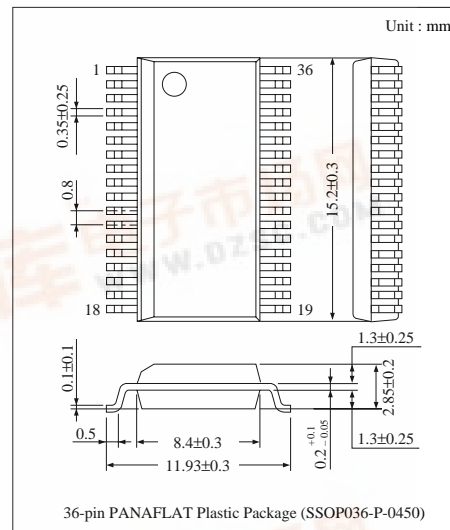
## 24-bit Shift Register Latch Driver IC

### Overview

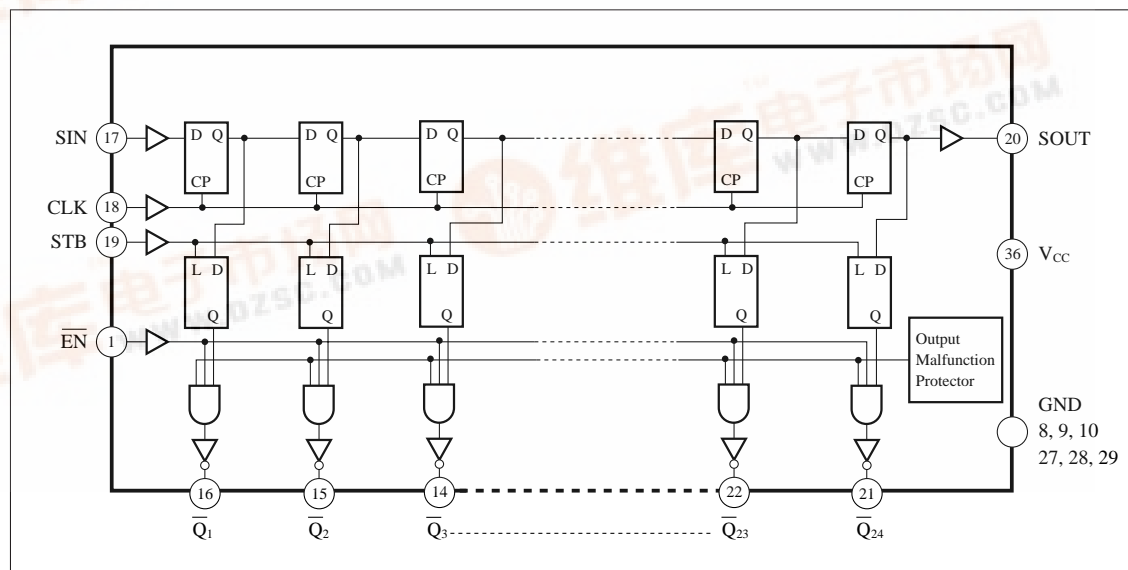
The DN8643S is an IC which incorporates a 24-bit shift register and a latch driver to meet high-speed operation, low power consumption and high-density printout of the thermal printers for the work processors, and so on. It employs the Bi-CMOS process in which the serial-in and serial-out/parallel-out functions are incorporated, the 24-step shift register block and latch block are composed of CMOS, and the 24-step parallel driver block is bipolar.

### Features

- Serial-in and serial-out/parallel-out
- Cascade connection allowed
- Built-in output malfunctioning preventive circuit
- Low current at standby  $I_{CC} \leq 100\mu A$
- High-breakdown, large current drive type output steps  
Breakdown : 30V  
Output current : 120mA
- Surface mountable USONF-36D package (pin pitch : 0.8mm)



### Block Diagram



## ■ Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Rating	Unit
Supply voltage	V <sub>CC</sub>	0 to 7	V
Output voltage	V <sub>O</sub>	0 to 30	V
Output current	I <sub>O</sub>	120	mA
Power dissipation	P <sub>D</sub>	1.3 *	W
Operating ambient temperature	T <sub>opr</sub>	-20 to +75	°C
Storage temperature	T <sub>stg</sub>	-55 to +125	°C

\* When mounting onto the PCB, power dissipation is reduced at a rate of 10.4mW/°C from Ta=25°C

## ■ Recommended Operating Range (Ta=25°C)

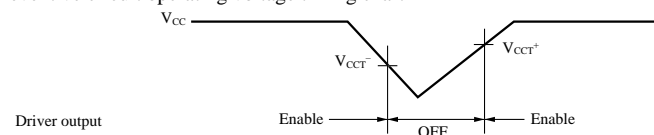
Parameter	Symbol	Condition	min	typ	max	Unit
Supply voltage	V <sub>CC</sub>		4	5	6	V
Output voltage	V <sub>O</sub>		—	—	30	V
Output current *	I <sub>O</sub>		—	—	100	mA
Clock frequency	f <sub>CLK</sub>	Input Duty 40 to 60%	—	—	10	MHz
Input pulse width	CLK	t <sub>w</sub>	40	—	—	ns
	STB		40	—	—	ns
Setup time	SIN	t <sub>su</sub>	30	—	—	ns
	STB		40	—	—	ns
Hold time	SIN	t <sub>h</sub>	20	—	—	ns
	STB		0	—	—	ns
Clock pulse rise time	t <sub>r</sub>		—	—	500	ns
Clock pulse fall time	t <sub>f</sub>		—	—	500	ns

\* An allowable value changes depends on the number of simultaneously turned-on circuits and the duty. Use with power dissipation taken into full account.

## ■ Electrical Characteristics (Ta=25°C)

Parameter	Symbol	Condition	min	typ	max	Unit
Input voltage	V <sub>IH</sub>	V <sub>CC</sub> =4 to 6V	0.7V <sub>CC</sub>	—	V <sub>CC</sub>	V
	V <sub>IL</sub>		0	—	0.3V <sub>CC</sub>	V
Input current	I <sub>IH</sub>	V <sub>IH</sub> =5V	—	—	25	μA
	I <sub>IL</sub>	V <sub>IL</sub> =0V	—	—	-25	μA
Output voltage	V <sub>OH</sub>	I <sub>O</sub> =-1μA	4.9	—	—	V
	V <sub>OL</sub>	I <sub>O</sub> =1μA	—	—	0.1	V
Output current	I <sub>OH</sub>	V <sub>OH</sub> =4.5V	-4	—	—	mA
	I <sub>OL</sub>	V <sub>OL</sub> =0.4V	4	—	—	mA
Output saturation voltage	V <sub>CE(sat)1</sub>	I <sub>OL</sub> =100mA	—	—	0.4	V
	V <sub>CE(sat)2</sub>	I <sub>OL</sub> =80mA	—	—	0.35	V
Output leakage current	I <sub>OLK1</sub>	V <sub>O</sub> =30V (output OFF)	—	—	50	μA
	I <sub>OLK2</sub>	V <sub>O</sub> =15V (output Off)	—	—	25	μA
Supply current	I <sub>CC1</sub>	Total driver output OFF	—	—	100	μA
	I <sub>CC2</sub>	Driver output 1 circuit ON	—	—	5	mA
Output malfunctioning preventive circuit operating voltage *	V <sub>CCT+</sub>		2.9	—	3.9	V
	V <sub>CCT-</sub>		2.6	—	3.6	V

\* Output malfunctioning preventive circuit operating voltage timing chart

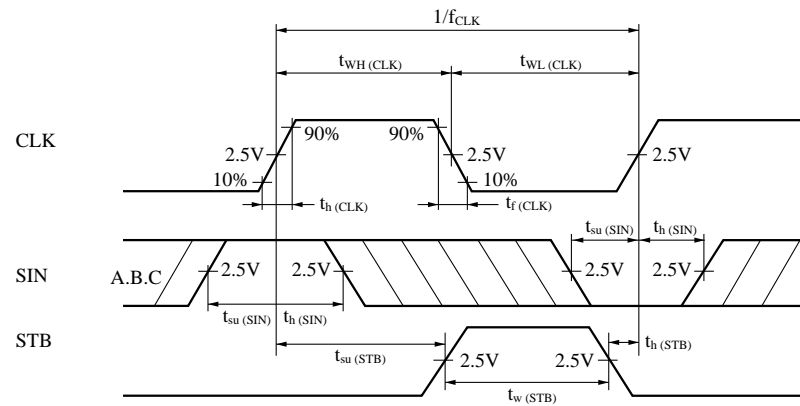


## ■ Switching Characteristics (Ta=25°C)

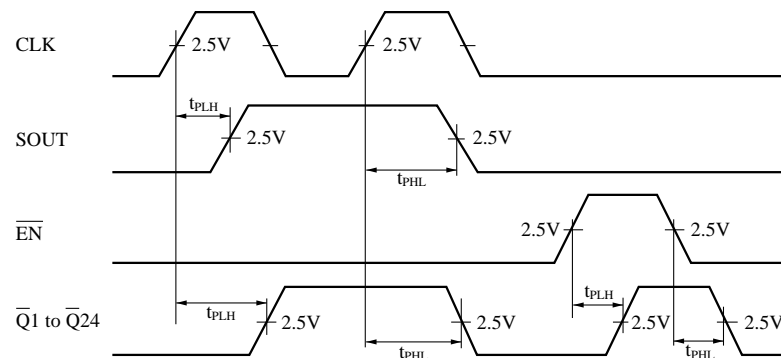
Parameter	Symbol	Input	Output	Condition	min	typ	max	Unit
Maximum clock frequency	$f_{max}$	CLK			10	—	—	MHz
Propagation delay time	$t_{PLH}$	CLK	SOUT	$V_{CC}=5V$ $C_L=15pF$	—	—	100	ns
	$t_{PHL}$				—	—	100	ns
	$t_{PLH}$	CLK	$\bar{Q}n$	$V_{CC}=5V$ $R_L=100\Omega$	—	—	2	$\mu s$
	$t_{PHL}$				—	—	0.5	$\mu s$
	$t_{PLH}$	$\bar{EN}$	$\bar{Q}n$	$C_L=15pF$	—	—	2	$\mu s$
	$t_{PHL}$				—	—	0.5	$\mu s$

## ■ Timing Chart

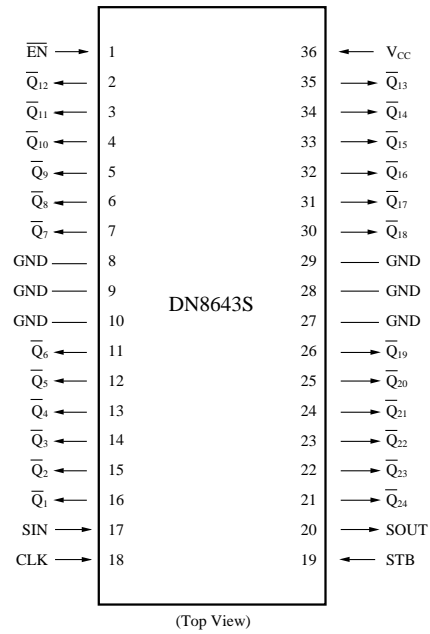
### 1. Input Timing



### 2. Propagation Delay Time



## ■ Pin Assignments



## ■ Functions Table

Input				Driver output		SOUT
CLK	$\overline{EN}$	STB	SIN	$\overline{Q}_1$	$\overline{Q}_n$	
↑	H	×	×	H	H	$Q'_{23}$
↓	H	×	×	H	H	nc
↑	L	L	×	nc	nc	$Q'_{23}$
↑	L	H	L	H	$\overline{Q}_{n-1}$	$Q'_{23}$
↑	L	H	H	L	$\overline{Q}_{n-1}$	$Q'_{23}$
↓	L	H	×	nc	nc	nc

Note) H=High level, L=Low level, × = Either "H" or "L" will do, ↑ = Transition from "H" or "L", ↓ = Transition from "H" to "L", nc=No change,  $Q'_{23}$ =Status of the 23rd shift register