

LC7935



3057

CMOS LSI

T-51-15

# 32-Bit Thermal Printer Head Driver

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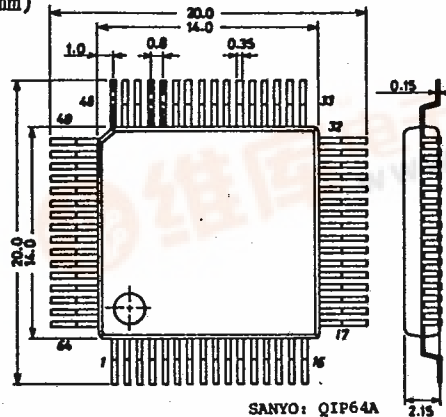
## Features

- High-speed, high-voltage silicon gate CMOS device
- Contains high-speed shiftable (5MHz max) 32-bit shift register, 32-bit latch, output driver on/off control circuit, 32-bit N-channel open drain output driver.
- Serial shift data is shifted on the positive transition of the clock (CLOCK).
- 32-bit latch data is changed on the negative transition of the LATCH pad and is held on the positive transition.
- The STROBE pad, BEO pad can be used to exercise on/off control of the output driver.
- Complete separation of logic circuit GND (pad 1) and thermal driver GND (pad 4)
- Maximum ratings of driver output:  $V_O=15V$ ,  $I_{OL}=30mA$
- Logic unit operating voltage:  $V_{DD}=4.5V$  to  $5.5V$

## Absolute Maximum Ratings at $T_a=25^\circ C$

Parameter	Symbol	Value	unit
Maximum Supply Voltage	$V_{DD}$	-0.3 to 7.0	V
Input Voltage	$V_I$	-0.3 to $V_{DD}+0.3$	V
Output Voltage	$V_{O(1)}$	S <sub>OUT</sub> output D1 to D32 output	-0.3 to $V_{DD}+0.3$
	$V_{O(2)}$		
Output Circuit	$I_O$	D1 to D32 output,	30
		per output	
Allowable Power Dissipation of Package	$P_C(max)$	QIP-64 package at 70°C	450
Operating Temperature	Topg	QIP-64 package	0 to +70
Storage Temperature	Tstg	QIP-64 package	-35 to +125

Case Outline 3057-Q64AIC (unit:mm)



SANYO: QIP64A



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## Allowable Operating Conditions at Ta=0 to +70°C

	Pin Name	min	typ	max	unit
Supply Voltage	V <sub>DD</sub> V <sub>DD</sub>	4.5		5.5	V
"H"-Level Input Voltage	V <sub>IH</sub> S <sub>IN</sub> , CLOCK, LATCH BEO, STROBE	0.8V <sub>DD</sub>		V <sub>DD</sub>	V
"L"-Level Input Voltage	V <sub>IL</sub> S <sub>IN</sub> , CLOCK, LATCH, BEO, STROBE	V <sub>SS</sub> (L)	0.2V <sub>DD</sub>		V
Clock Frequency	f <sub>CLK</sub> CLOCK Duty: 50%			5.0	MHz
Clock Pulse Width	t <sub>W6</sub> CLOCK	75			ns
Clock Rise/Fall Time	t <sub>r</sub> , t <sub>f</sub> CLOCK			200	ns
Data Setup Time	t <sub>DS</sub> S <sub>IN</sub> , CLOCK	100			ns
Data Hold Time	t <sub>DH</sub> S <sub>IN</sub> , CLOCK	50			ns
Latch Pulse Width	t <sub>WL</sub> LATCH	100			ns

## Electrical Characteristics at Ta=25°C

		min	typ	max	unit
"H"-Level Input Current	I <sub>IN</sub> (1) S <sub>IN</sub> , CLOCK LATCH			10	uA
"L"-Level Input Current	I <sub>IN</sub> (2) BEO I <sub>IL</sub> (1) S <sub>IN</sub> , CLOCK LATCH		12	72	uA
"H"-Level Output Voltage	V <sub>OH</sub> S <sub>OUT</sub>	V <sub>DD</sub> -0.5			V
"L"-Level Output Voltage	V <sub>OL</sub> (1) S <sub>OUT</sub>	V <sub>DD</sub> -0.5		0.5	V
	V <sub>OL</sub> (2) D1toD32			0.5	V
Output Off-State Leakage Current	I <sub>OFF</sub> D1toD32			20	uA
Input Capacitance	C <sub>IN</sub> CLOCK		5.0		pF
Operating Current Dissipation	I <sub>DD</sub> V <sub>DD</sub>			5	mA

V<sub>DD</sub>=5V,  
I<sub>OH</sub>=-0.5mA  
V<sub>DD</sub>=5V,  
I<sub>OL</sub>=0.5mA  
V<sub>DD</sub>=5V,  
I<sub>OL</sub>=30mA  
V<sub>O</sub>=15V

f<sub>CLK</sub>=5MHz,  
all outputs: no load

## Switching Characteristics at Ta=25°C

	Pin Name	min	typ	max	unit
Clock Latch Delay Width	t <sub>CL</sub> CLOCK, LATCH	100			ns
Latch Clock Delay Width	t <sub>LC</sub> CLOCK, LATCH	0			ns
"H"-Level Output Propagation Delay Time	t <sub>PLH</sub> (1) LATCH, D1toD32			400	ns
	t <sub>PLH</sub> (2) BEO, STROBE			300	ns
	t <sub>PLH</sub> (3) CLOCK, S <sub>OUT</sub>			200	ns
"L"-Level Output Propagation Delay Time	t <sub>PHL</sub> (1) LATCH, D1toD32			200	ns
	t <sub>PHL</sub> (2) BEO, STROBE D1toD32			100	ns
	t <sub>PHL</sub> (3) CLOCK, S <sub>OUT</sub>			200	ns

V<sub>DD</sub>=5V  
V<sub>DD</sub>=5V  
V<sub>DD</sub>=5V,  
Dn: R<sub>L</sub>=1.0kohm  
C<sub>L</sub>=15pF  
V<sub>DD</sub>=5V,  
Dn: R<sub>L</sub>=1.0kohm  
C<sub>L</sub>=15pF  
V<sub>DD</sub>=5V,  
S<sub>OUT</sub>: C<sub>L</sub>=15pF  
V<sub>DD</sub>=5V,  
Dn: R<sub>L</sub>=1.0kohm  
C<sub>L</sub>=15pF  
V<sub>DD</sub>=5V,  
Dn: R<sub>L</sub>=1.0kohm  
C<sub>L</sub>=15pF  
V<sub>DD</sub>=5V,  
S<sub>OUT</sub>: C<sub>L</sub>=15pF

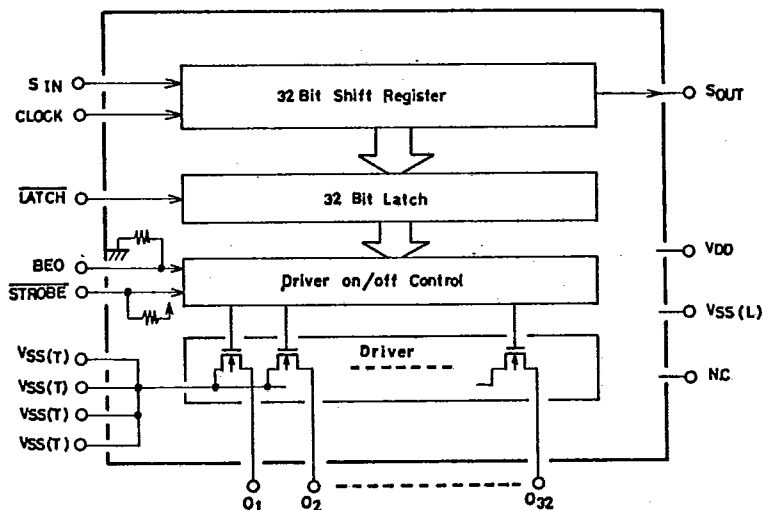
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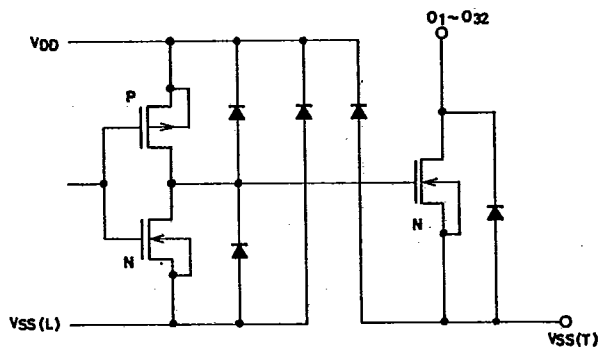
Thermal Driver On/Off Truth Table

Latch Data (Q)	BEO	STROBE	Thermal Driver
0	0	0	OFF
1	0	0	OFF
0	1	0	OFF
1	1	0	ON Thermal on
0	0	1	OFF
1	0	1	OFF
0	1	1	OFF
1	1	1	OFF

Equivalent Circuit Block Diagram



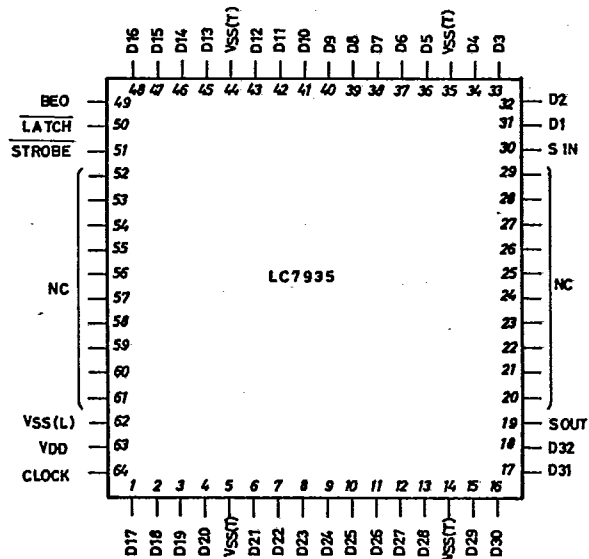
Output Driver Section Equivalent Circuit



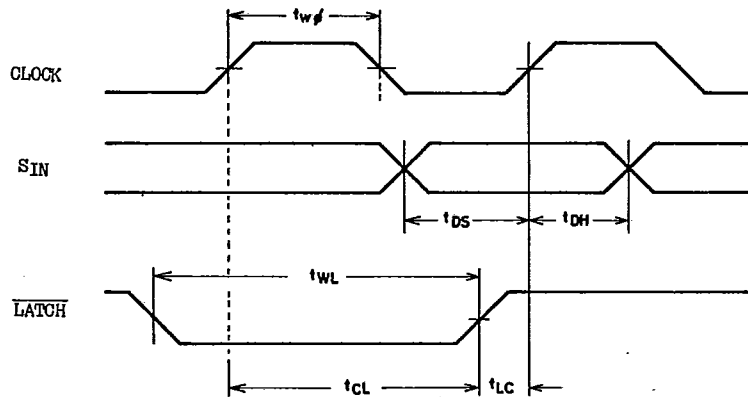
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Pin Assignment



Input Data Timing Chart



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Output Data Timing Chart

