

TOSHIBA Bi-CMOS Constant Current Interface Driver



TB62708N

16 Bit Constant Current LED Source Driver with Shift Register and Latch Functions

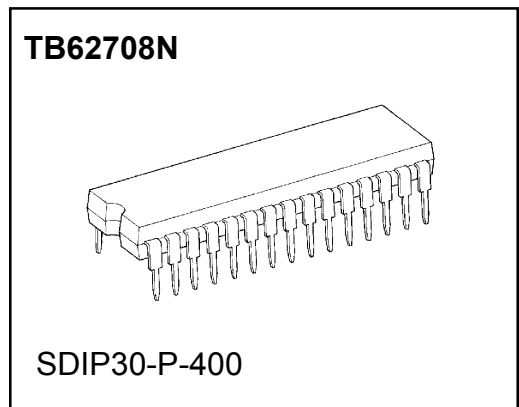
Product Description:

The TB62708N is specifically designed for LED display applications. The Bi-CMOS device has 16 Bi-polar constant current output source channels and includes CMOS shift register and latch functions.

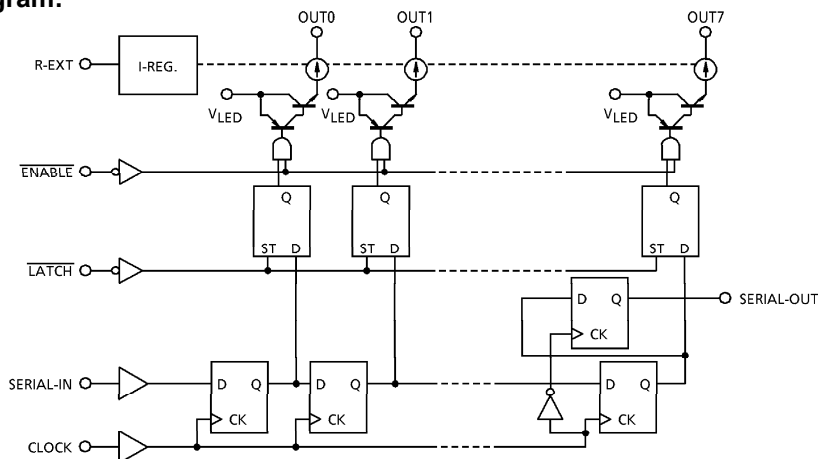
The LED drive current is programmed by the installation of a single resistor per device. Current is programmable from 5-90mA and is held constant across all 16 source outputs effectively compensating for the inherent circuit and component variables which affect the brightness of the LEDs.

Features:

- Current Source Device
- 16 Constant Current Output Channels
- Current Programmable from 5-90mA
- 5V CMOS Compatible Inputs
- 15MHz Max Clock Frequency (Cascade)



Block Diagram:

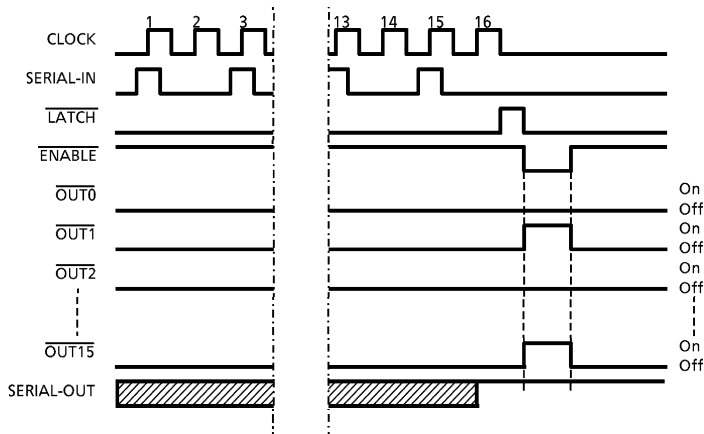




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Timing Diagram:



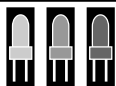
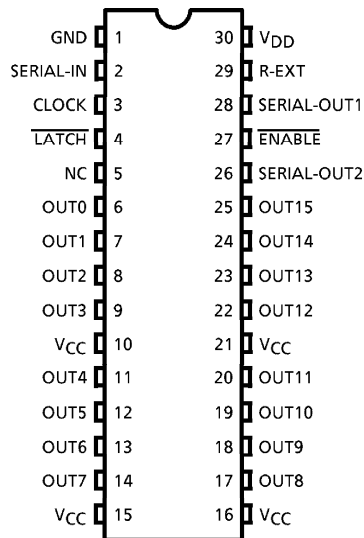
Latches are:

1. Level Sensitive
2. Not edge sensitive
3. Not clock synchronous
4. Passing Data when $\overline{\text{LATCH}}$ is H
5. Hold Data when $\overline{\text{LATCH}}$ is L

All Outputs are OFF when $\overline{\text{ENABLE}}$ is H and ON when $\overline{\text{ENABLE}}$ is L.

Terminal Description & Pin Out:

PIN No.	PIN NAME	FUNCTION
1	GND	GND terminal
2	SERIAL-IN	Serial Data Input terminal
3	CLOCK	Clock Input terminal
4	LATCH	Latch Input Terminal
6-9,11-14, 17-20,22-25	OUT0-15	Output terminals
27	ENABLE	Output Enable Input Terminal
28	SERIAL-OUT	Serial Data Out Terminal
29	R-EXT	Constant Current Programming
30	VDD	5V Supply voltage terminal
10,15,16,21	VLED	0-17V Supply voltage terminal for LED



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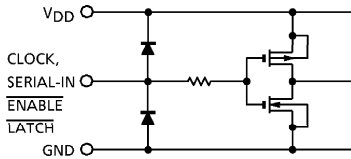
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Truth Table:

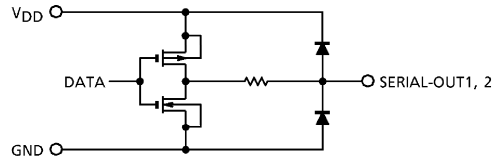
CLOCK	LATCH	ENABLE	SERIAL-IN	OUT0	OUT7	OUT15	SERIAL-OUT2
UP	H	L	Dn	Dn	Dn-7	Dn-15	Dn-16
DOWN	H	L	Dn	Dn	Dn-7	Dn-15	Dn-15
UP	L	L	Dn+1	No Change (data hold)			No Change
DOWN	L	L	Dn+1	No Change (data hold)			Dn-14
No Edge	H	L	Dn+1	Dn+1	Dn-6	Dn-14	No Change
No Edge	X	H	Dn+1	Off			No Change

Equivalent Circuit of Inputs and Outputs:

1. ENABLE, LATCH, CLOCK & SERIAL-IN terminal



2. SERIAL-OUT terminal



Maximum Ratings:

CHARACTER	SYMBOL	RATING	UNIT
Supply Voltage	VDD	+7.0	V
Supply Voltage for LED	VCC	+17.0	V
Output Voltage	VCE	-0.4~+17.0	V
Output Current	IOUT	-90	mA
Input Voltage	VIN	-0.4~VDD + 0.4	V
GND Terminal Current	IGND	1440	mA
Clock Frequency	FCLK	15	MHz
Power Dissipation	PD	2.08 (ON PCB, Ta=25°C) 1.56 (FREE AIR, Ta=25°C)	W
Operating Temperature	Topr	-40~+85	°C
Storage Temperature	Tstg	-55~+150	°C

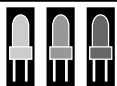


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Recommended Operating Condition:

CHARACTERISTIC	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Voltage	VDD		4.5	5.0	5.5	V
Supply Voltage for LED	VCC		—	—	17	V
Output Voltage	VOUT		—	—	-17	V
Output Current	IOUT	DC 1 Circuit	-5	—	-78	mA
	IOH	SERIAL-OUT	—	—	1.0	mA
	IOL	SERIAL-OUT	—	—	-1.0	mA
Input Voltage	VIH		0.7VDD	—	VDD+0.3	V
	VIL		-0.3	—	0.3VDD	V
LATCH Pulse Width	tw LAT	VDD=4.5 ~ 5.5V	100	—	—	ns
CLOCK Pulse Width	tw CLK		50	—	—	ns
ENABLE Pulse Width	tw EN		1000	—	—	ns
Set-up Time	tsetup(D)		50	—	—	ns
Hold Time	thold(D)		30	—	—	ns
Clock Frequency	FCLK	Cascade Operation	—	—	10.0	MHz
Power Dissipation	PD	ON PCB, Ta=85°C	—	—	1.08	W



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Electrical Characteristics:

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	CONDITION	MIN.	TYP.	MAX.	UNIT
Input Voltage	"H" level	V _{IH}	—	—	0.7V _{DD}	—	V _{DD}	V
	"L" level	V _{IL}	—	—	GND	—	0.3V _{DD}	
Output Leakage Current		I _{LEAK}	—	V _{LED} =17.0V	—	—	-10	μA
Output Voltage	SERIAL-OUT	V _{OL}	—	I _{OL} =+1.0mA	—	—	0.4	V
		V _{OH}	—	I _{OH} =-1.0mA	4.6	—	—	V
Output Current 1		I _{OL1}	—	V _{OUT} =V _{CC} -2 REXT=360Ω	-66.3	-78	-89.7	mA
	Current Skew	ΔI _{OL1}	—	V _{OUT} =V _{CC} -2 REXT=360Ω	—	±1.5	±6.0	%
Supply Voltage Regulation		% / V _{DD}	—	REXT=360Ω Ta=-40~+85°C	—	1.5	5.0	% / V
Supply Current		IDD (off) 1	—	REXT=OPEN OUT0~15=off	—	0.6	1.2	mA
		IDD (on)	—	REXT=360Ω, DATA="H" OUT0~15=on	—	10.0	15.0	
		ICC(off)	—	REXT=360Ω, ALL DATA="L" OUT0~15=off	—	1	2	
		ICC(on)	—	REXT=360Ω, ALL DATA="H" OUT0~15=on	—	1260	—	



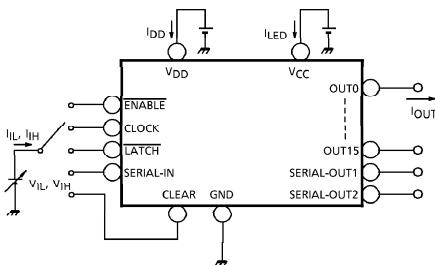
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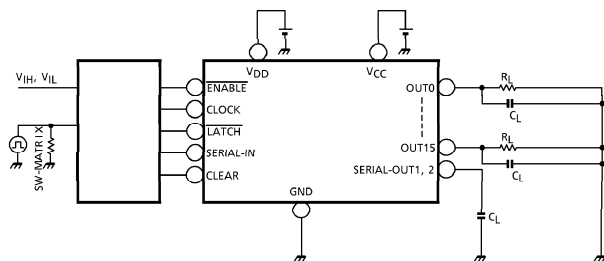
Switching Characteristics:

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT			
Propagation Delay Time ("L" to "H")	CLK-SOUT	tpLH	{CLK,LATCH & ENABLE to tpLH & tpHL : 50% to 50%} VDD = 5.0V,VCC=17.0V VOUT=VCC-2.0V VIH = VDD VIL = GND REXT = 360Ω RL = 300Ω	—	30	70	ns			
	CLK-OUTn			—	200	500				
	LATCH-OUTn			—	200	500				
	ENABLE-OUTn			—	200	500				
Propagation Delay Time ("H" to "L")	CLK-OUTn	tpHL		{CLK,LATCH & ENABLE to tpLH & tpHL : 50% to 50%} VDD = 5.0V,VCC=17.0V VOUT=VCC-2.0V VIH = VDD VIL = GND REXT = 360Ω RL = 300Ω	—	200	500	ns		
	LATCH-OUTn				—	200	500			
	ENABLE-OUTn				—	200	500			
	CLK-SOUT				—	30	70			
Pulse Width	CLK	tw CLK,CLK			{CLK,LATCH & ENABLE to tpLH & tpHL : 50% to 50%} VDD = 5.0V,VCC=17.0V VOUT=VCC-2.0V VIH = VDD VIL = GND REXT = 360Ω RL = 300Ω	—	20	30	ns	
	LATCH	tw LAT,LAT				—	10	25		
Latch Set Up Time		tsetup LAT				{CLK,LATCH & ENABLE to tpLH & tpHL : 50% to 50%} VDD = 5.0V,VCC=17.0V VOUT=VCC-2.0V VIH = VDD VIL = GND REXT = 360Ω RL = 300Ω	—	25	50	ns
Latch Hold Time		thold LAT					—	0	15	ns
Maximum Clock Rise Time		tr	{CLK,LATCH & ENABLE to tpLH & tpHL : 50% to 50%} VDD = 5.0V,VCC=17.0V VOUT=VCC-2.0V VIH = VDD VIL = GND REXT = 360Ω RL = 300Ω				—	—	10	μs
Maximum Clock Fall Time		tf					—	—	10	
Maximum Output Rise Time		tor					150	300	600	ns
Maximum Output Fall Time		tof					150	300	600	ns

DC Characteristic Test Circuit:



AC Characteristic Test Circuit:



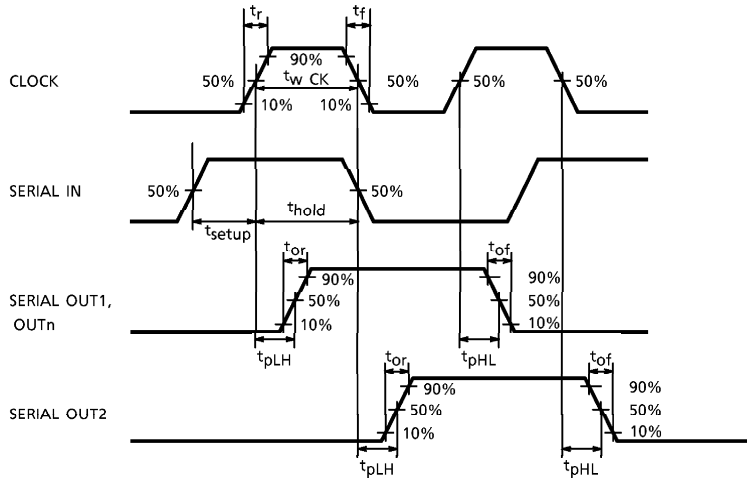
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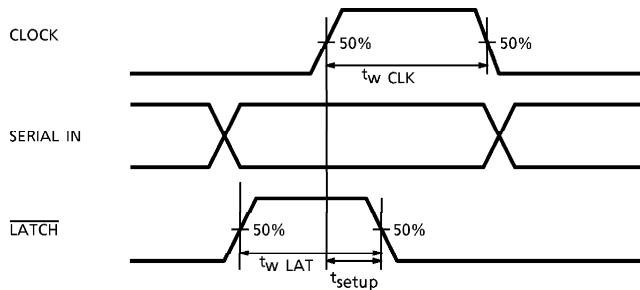
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Timing Wave Form:

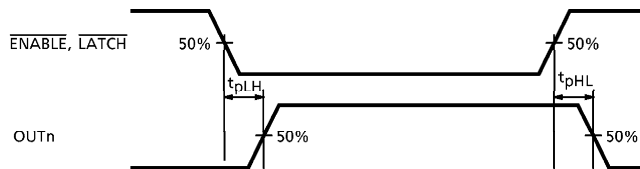
1. CLOCK-SERIAL OUT, OUT_n



2. CLOCK-LATCH



3. ENABLE, LATCH-OUT_n

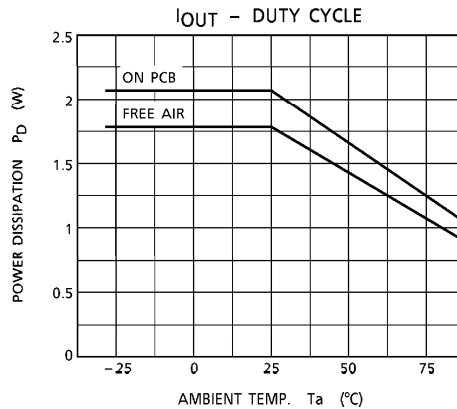
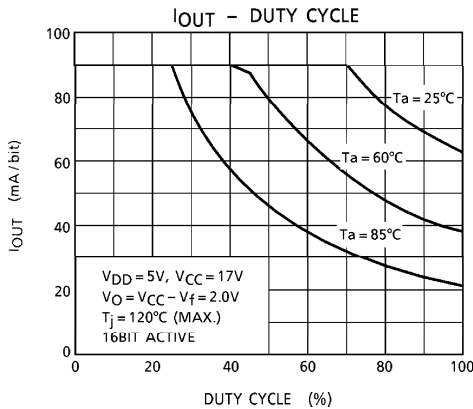




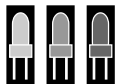
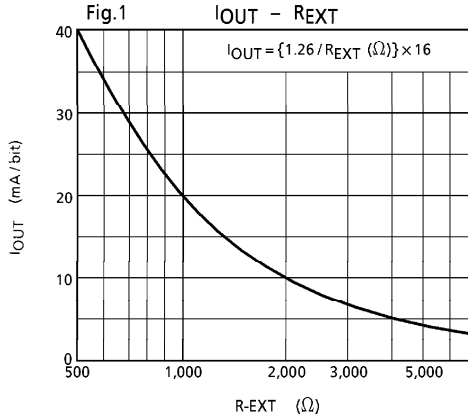
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Graphs:



Current Programming Resistor Selection::



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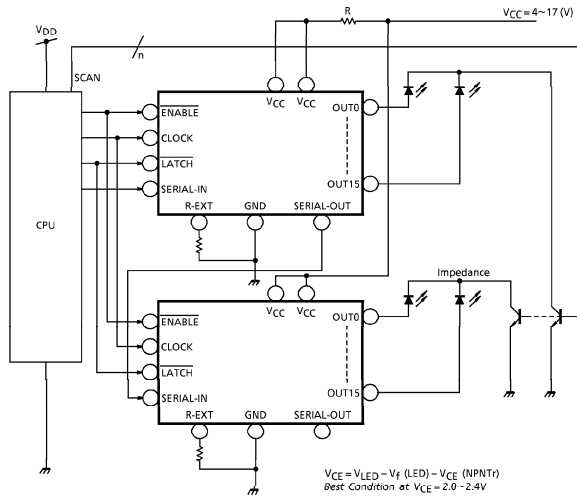
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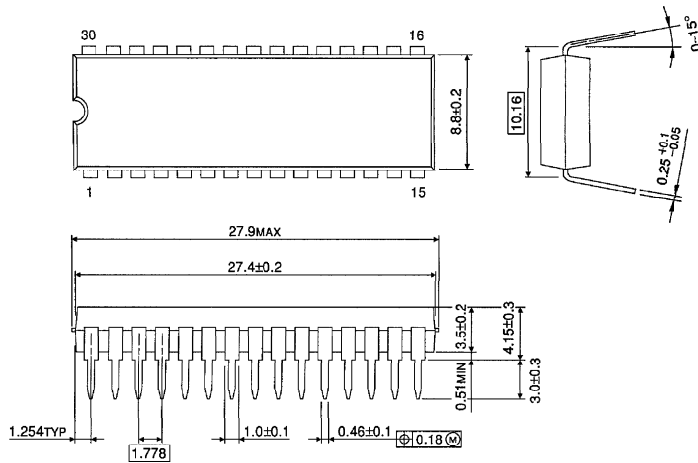
Application Circuit:



Outline Drawing:

SDIP30-P-400-1.78

Unit : mm



Weight : 1.99g (Typ.)



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All specifications subject to change.