TOSHIBA Bi-CMOS
Constant Current Interface Driver

TB62707F

8 Bit Constant Current LED Driver with Latch Function

Product Description:

The TB62707F is specifically designed for LED display applications. The Bi-CMOS device has 8 Bi-polar constant current output channels and includes CMOS latch function.

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 8 outputs effectively compensating for the inherent circuit and component variables which affect the brightness of the LEDs.

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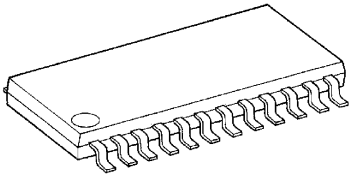
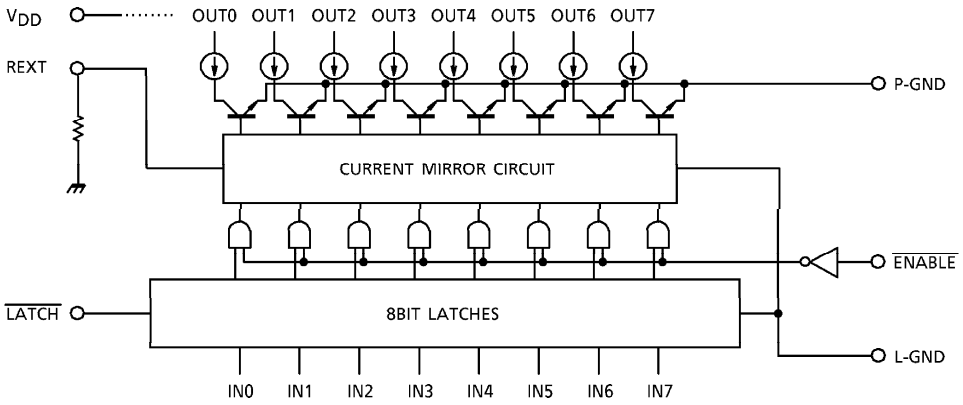


SSOP24-P-300 Weight: 0.32g(typ)

Features:

- 8 Constant Current Output Channels
- Current Programmable from 5-90mA
- 5V CMOS Compatible Inputs
- Surface Mount Package

Block Diagram:



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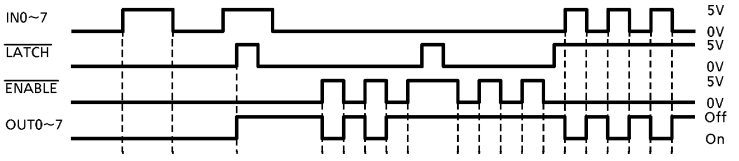
Timing Diagram:



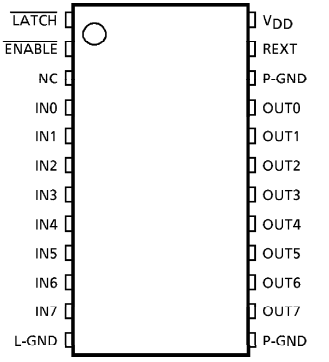
Latches are:

1. Level Sesitive
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
12	L-GND	GND terminal for control logic.
13,22	P-GND	GNt terminal for output constant current drivers.
4~11	IN0~7	Iinput terminal of a parallel-data for latches.
1	$\overline{\text{LATCH}}$	Input terminal of a data strobe. Latches passes data with "H" level input of $\overline{\text{LATCH}}$-terminal, and hold data with "L" level input.
14~21	OUT0~7	Output terminals.
2	$\overline{\text{ENABLE}}$	Input terminal of output enable. All outputs (OUT0~7) do off with "H" level input of $\overline{\text{ENABLE}}$-terminal, and do on with "L" level input.
23	R-EXT	Input terminal of connects with a resister for to set up all output current.
24	VDD	5V Supply voltage terminal



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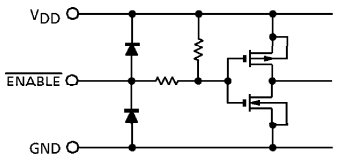
Truth Table:

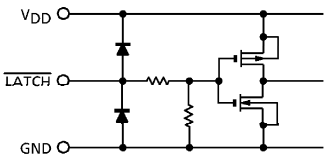
IN0~7	$\overline{\text{LATCH}}$	$\overline{\text{ENABLE}}$	OUT0~7
L	L	L	OFF
H	L	L	OFF
L	H	L	OFF
H	H	L	ON
L	↓	L	OFF
H	↓	L	ON
H	↓	H	OFF

Equivalent Circuit of Inputs and Outputs:

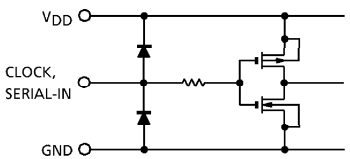
1. $\overline{\text{ENABLE}}$ terminal



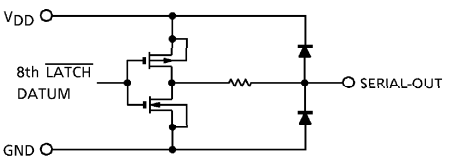
2. $\overline{\text{LATCH}}$ terminal



3. CLOCK、SERIAL-IN terminal



4. SERIAL-OUT terminal



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Maximum Ratings:

CHARACTER	SYMBOL	RATING	UNIT
Supply Voltage	VDD	+7.0	V
Output Voltage	VOUT	-0.5~+17.0	V
Output Current	IOUT	+90	mA
Input Voltage	VIN	-0.3~VDD + 0.3	V
GND Terminal Current	IGND	720	mA
Power Dissipation	PD	0.78	W
Operating Temperature	Topr	-40~+85	°C
Storage Temperature	Tstg	-55~+150	°C

* On 50 x 50 x 1.66mm 30% Copper, Glass Epoxy PWB
Ambient Temperature Derated 6.66mW/ºC above 25ºC

Recommended Operating Condition:

CHARACTER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Voltage	VDD		4.5	5.0	5.5	V
Output Voltage	VOUT		—	—	15.0	V
Output Current	IOUT	DC 1 Circuit	5	—	88	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 INPUT Pulse Width ENABLE Pulse Width	tw LAT	VDD=4.5 ~ 5.5V	100	—	—	ns
	tw IN		4500	—	—	ns
	tw EN		4500	—	—	ns
Set-up Time for LATCH	tsetup(L)		100	—	—	ns
Hold Time for ENABLE	thold(L)		100	—	—	ns
Power Dissipation	P_D	ON PCB,Ta=85°C	—	—	0.6	W

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Electrical Characteristics:

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	CONDITION		MIN.	TYP.	MAX.	UNIT
Input Voltage	"H" level	VIH	—	—		0.7VDD	—	VDD	V
	"L" level	VIL	—	—		GND	—	0.3VDD	
Output Leakage Current		IOH	—	VOH=15.0V		—	—	10	μA
Output Voltage	SERIAL-OUT	VOL	—	IOL=+1.0mA		—	—	0.4	V
		VOH		IOH=-1.0mA		4.6	—	—	V
Output Current 1		IOL1	—	VCE=0.7V	REXT=620Ω (include Current Matching)	35.7	42	48.3	mA
		IOL2	—	VCE=0.4V		68	80	92	
	Current Skew	dIOL1	—	IO=40mA, VCE=0.4V	REXT=620Ω	—	±1.5	±6.0	%
Output Current 2		IOL3	—	VCE=0.4V	REXT=330Ω (Include Current Matching)	64.2	75.5	86.8	mA
		IOL4	—	VCE=0.7V		63.8	75.0	86.2	
	Current Skew	dIOL2	—	IO=75mA, VCE=0.7V	REXT=330Ω	—	±1.5	±5.0	%
Supply Voltage Regulation		% / VDD	—	REXT=470Ω	Ta=40~+85°C	—	5	—	% /V
Supply Current	"OFF"	IDD (off) 1	—	REXT=OPEN	OUT~8=off	—	0.6	1.2	mA
		IDD (off) 2	—	REXT=500Ω	OUT~8=off	6	8	10	
		IDD (off) 3	—	REXT=280Ω	OUT~8=off	12	15	18	
	"ON"	IDD (on)1	—	REXT=500Ω	OUT~8=on	8	13	20	
		IDD (on)2	—	REXT=280Ω	OUT~8=on	18	25	35	
Reference Voltage		Uref	—	—		—	1.26	—	V

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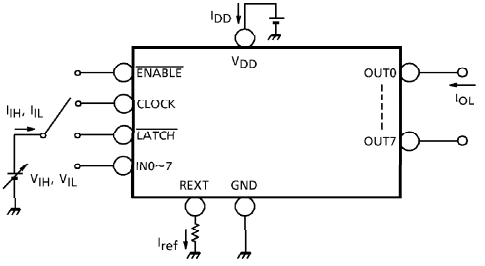
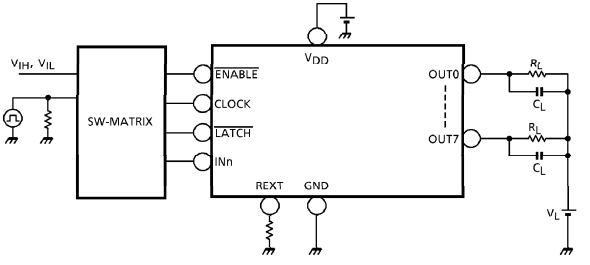
Switching Characteristics:

CHARACTERISTIC		SYMBOL	TEST CIRCUIT	CONDITION	MIN.	TYP.	MAX.	UNIT
Propagation Delay Time ("L" to "H")	INn-OUTn	tpLH	—	VDD = 5.0V VCE = 0.4V VIH = VDD VIL = GND REXT = 470Ω IOUT = 40mA VL = 3.0V RL = 65Ω CL = 10.5pF	—	600	1200	ns
	$\overline{LATCH}$-$\overline{OUTn}$				—	600	1200	ns
	$\overline{ENABLE}$-$\overline{OUTn}$				—	600	1200	ns
Propagation Delay Time ("H" to "L")	INn-OUTn	tpHL	—		—	300	1200	ns
	$\overline{LATCH}$-$\overline{OUTn}$				—	300	1200	ns
	$\overline{ENABLE}$-$\overline{OUTn}$				—	300	1200	ns
Pulse Width	/$\overline{ENABLE}$	tw ENA	—		—	2000	3500	ns
	/$\overline{LATCH}$	tw LAT	—		—	25	50	ns
	/IN	tw IN	—		—	2000	3500	ns
Set-up Time for Latch	L-H	tsetup LAT	—		—	25	50	ns
	H-L		—		—	25	50	ns
Hold Time for LATCH & CLOCK	L-H	thold LAT	—		—	0	15	ns
	H-L		—		—	0	15	ns
Maximum CLOCK Rise Time		tr	—		—	—	10	μs
Maximum CLOCK Fall Time		tf	—		—	—	10	μs
Output Rise Time		tor	—		200	1000	1200	ns
Output Fall Time		tof	—		200	1000	1200	ns

DC Characteristic Test Circuit:



AC Characteristic Test Circuit:



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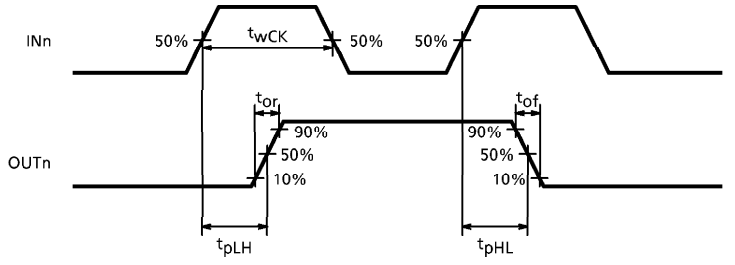
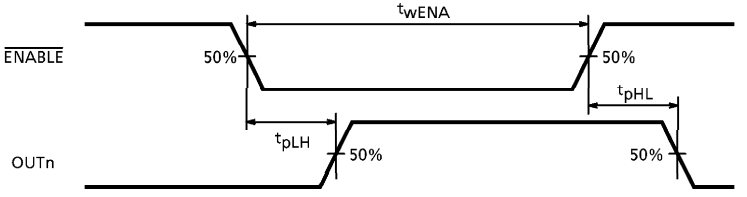
Timing Wave Form:

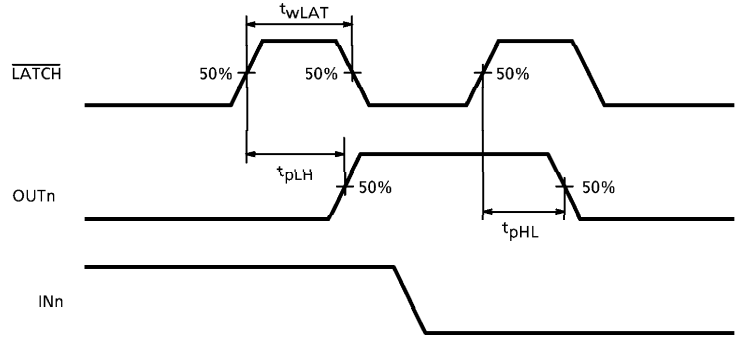
1. INn-OUTn



2. $\overline{\text{ENABLE}}$-OUTn



3. $\overline{\text{LATCH}}$-OUTn



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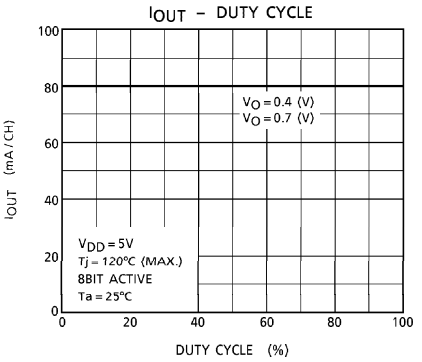
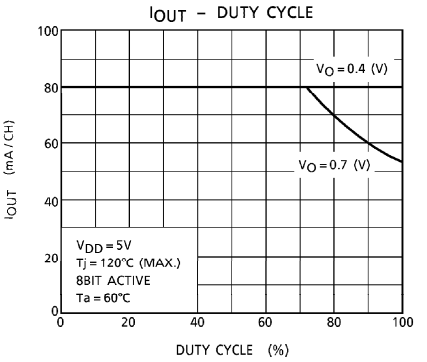
Graphs:





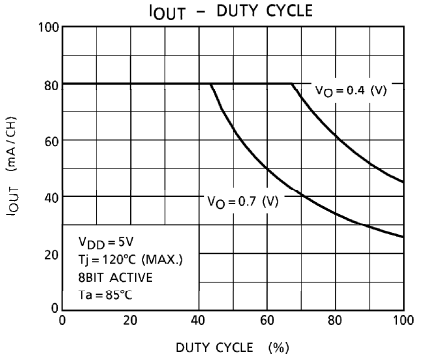
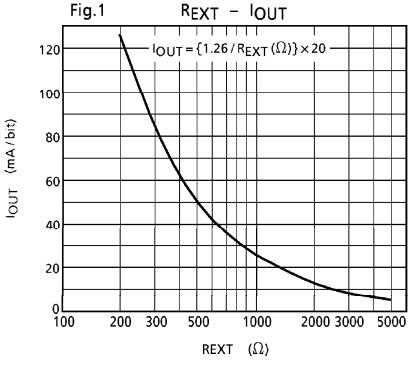


Fig.1 R_{EXT} – I_{OUT}



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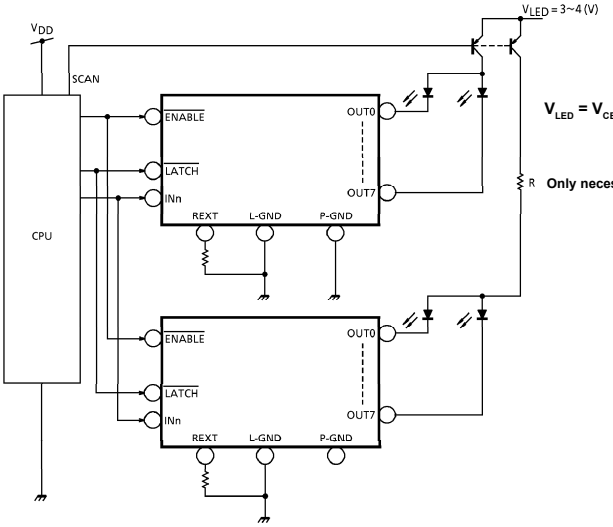
Application Circuit:

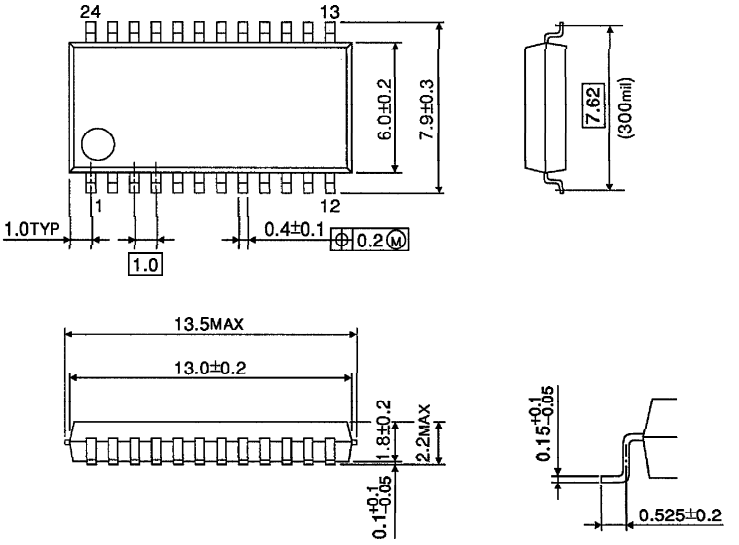


$V_{LED} = V_{CE}(t_r, V_{SAT}) + V_f(LED) + V_O(IC\ Supply)$

Only necessary to reduce power dissipation (if required)

Outline Drawing:

SSOP24-P-300-1.00 Unit : mm



Weight : 0.32g (Typ.)