TOSHIBA Bi-CMOS Integrated Circuit Silicon Monolithic

TB62781FNG

9-Channel Constant-Current LED Driver of the 3.3V and 5V Power Supply Voltage Operation

1. Features

- Power supply voltages: V_{CC} = 3.3 V/5 V
- Output drive capability and output count: 80 mA (max)× 9 channels
- Constant-current output range: 5 to 40 mA
- Voltage applied to constant-current output terminals: 0.4 V(min) (I_{OUT} = 5 to 40 mA)
- Designed for common-anode LEDs
- The input interface is controlled by the SDA and SCLK signal lines.
- Thermal shutdown (TSD) (min: 150°C)
- Logical Input signal voltage level: 3.3V and 5V CMOS interfaces (Schmitt trigger input)
- Maximum output voltage: 28 V
- Incorporates PWM control circuitry: Provides seven-bit PWM control.
- Driver identification: Up to 64 drivers can be controlled individually.
- Operating temperature range: T_{opr} = −40 to 85°C
- Package: SSOP20-P-225-0.65A

Absolute Maximum Ratings (T_a = 25 °C)

Characteristics	Symbol	Rating	Unit
Supply voltage	V_{CC}	6.0	V
Input voltage	V_{IN}	−0.3 to V_{CC} + 0.3 (Note 1)	V
Output current	I_{OUT}	85	mA/ch
Output voltage	V_{OUT}	−0.3 to 29	V
Power dissipation	P_d	1.02 (Notes 2 and 3)	W
Thermal resistance	$R_{th\ (j\text{-}a)}$	122 (Note 2)	°C/W
Operating temperature range	T_{opr}	−40 to 85	°C
Storage temperature range	T_{stg}	−55 to 150	°C
Maximum junction temperature	T_j	150	°C

Note 1: However, do not exceed 6.0 V.

Note 2: When mounted on a PCB (76.2 × 114.3 × 1.6 mm; Cu = 30%; 35-μm-thick; SEMI-compliant)

Note 3: Power dissipation is reduced by 1/$R_{th\ (j\text{-}a)}$ for each °C above 25°C ambient.

Please use contents on this material as reference.
Please contact if you need formal datasheet.

Operating Condition (Unless otherwise specified, V_{DD} = 3.0~5.5 V T_a = –40~85 °C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Supply voltage	Vcc	—	3	—	5.5	V
Input voltage	V_{IH}	SDA、SCLK、RESET	0.7 × Vcc	—	Vcc	V
	V_{IL}		GND	—	0.3 × Vcc	
	V_{ID0}	ID0、ID1、ID2	0	—	0.3	
	V_{ID1}		1/3Vcc-0.3	1/3 Vcc	1/3Vcc+0.3	
	V_{ID2}		2/3Vcc-0.3	2/3 Vcc	2/3Vcc+0.3	
	V_{ID3}		Vcc –0.3	—	Vcc	
Clock frequency	fCLK	SCLK	—	—	10	MHz

Electrical Characteristics (Unless otherwise specified, V_{DD} = 3.3 V or 5.0 V, T_a = 25 °C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Output current	I_{OUT1}	V_{OUT} = 0.4 V, Rext-R/G/B = 1.2kΩ, Vcc = 5 V,	12.69	13.5	14.41	mA
Output current error between channels	ΔI_{OUT2}	V_{OUT} = 0.4 V, Rext-R/G/B = 1.2kΩ, All ch ON Vcc = 5 V	—	—	±3	%

Pin Assignment

Pin No.	Name
1	RESET
2	SDA
3	SCLK
4	ID0
5	ID1
6	ID2
7	Rext-R
8	Rext-G
9	Rext-B
10	GND
11	/OUTR0
12	/OUTG0
13	/OUTB0
14	/OUTR1
15	/OUTG1
16	/OUTB1
17	/OUTR2
18	/OUTG2
19	/OUTB2
20	Vcc

Package

Weight：0.10 g (typ)

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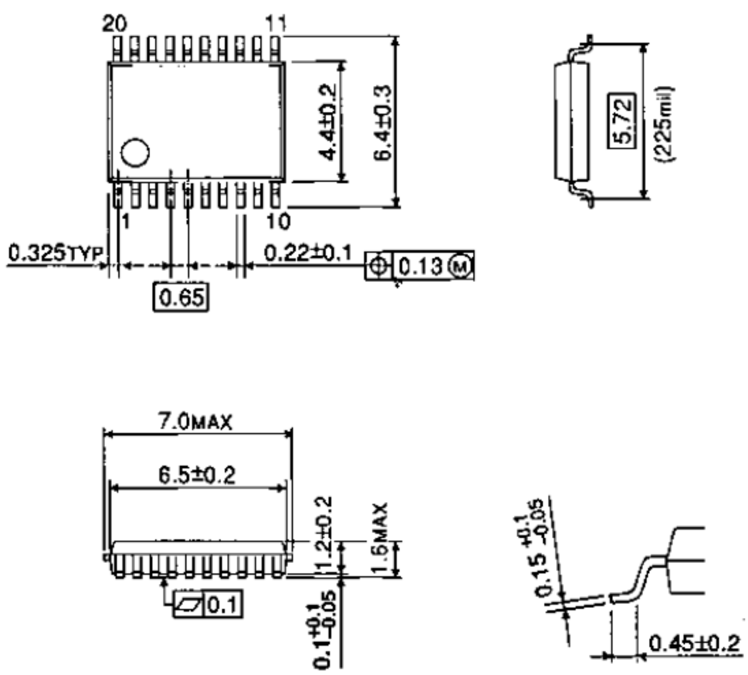
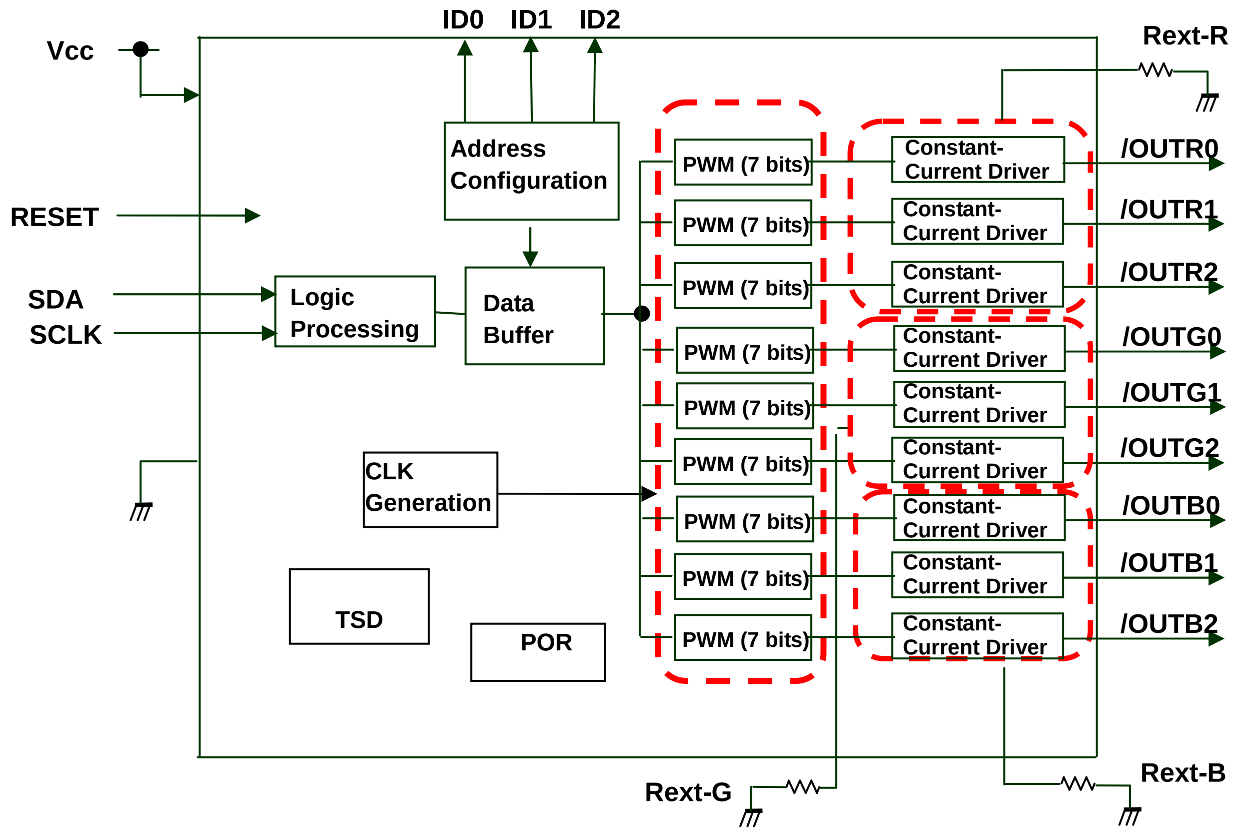


Block Diagram



Notes on Contents

1. Block Diagrams

Some of the functional blocks, circuits, or constants in the block diagram may be omitted or simplified for explanatory purposes.

2. Equivalent Circuits

The equivalent circuit diagrams may be simplified or some parts of them may be omitted for explanatory purposes.

4. Application Circuits

The application circuits shown in this document are provided for reference purposes only. Thorough evaluation is required, especially at the mass production design stage.

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5. Test Circuits

Components in the test circuits are used only to obtain and confirm the device characteristics. These components and circuits are not guaranteed to prevent malfunction or failure from occurring in the application equipment.

IC Usage Considerations

Notes on handling of ICs

[1] The absolute maximum ratings of a semiconductor device are a set of ratings that must not be exceeded, even for a moment. Do not exceed any of these ratings.
Exceeding the rating(s) may cause the device breakdown, damage or deterioration, and may result injury by explosion or combustion.

[2] Use an appropriate power supply fuse to ensure that a large current does not continuously flow in case of over current and/or IC failure. The IC will fully break down when used under conditions that exceed its absolute maximum ratings, when the wiring is routed improperly or when an abnormal pulse noise occurs from the wiring or load, causing a large current to continuously flow and the breakdown can lead smoke or ignition. To minimize the effects of the flow of a large current in case of breakdown, appropriate settings, such as fuse capacity, fusing time and insertion circuit location, are required.

[3] If your design includes an inductive load such as a motor coil, incorporate a protection circuit into the design to prevent device malfunction or breakdown caused by the current resulting from the inrush current at power ON or the negative current resulting from the back electromotive force at power OFF. IC breakdown may cause injury, smoke or ignition.
Use a stable power supply with ICs with built-in protection functions. If the power supply is unstable, the protection function may not operate, causing IC breakdown. IC breakdown may cause injury, smoke or ignition.

[4] Do not insert devices in the wrong orientation or incorrectly.
Make sure that the positive and negative terminals of power supplies are connected properly.
Otherwise, the current or power consumption may exceed the absolute maximum rating, and exceeding the rating(s) may cause the device breakdown, damage or deterioration, and may result injury by explosion or combustion.
In addition, do not use any device that is applied the current with inserting in the wrong orientation or incorrectly even just one time.

[5] Carefully select external components (such as inputs and negative feedback capacitors) and load components (such as speakers), for example, power amp and regulator.
If there is a large amount of leakage current such as input or negative feedback condenser, the IC output DC voltage will increase. If this output voltage is connected to a speaker with low input withstand voltage, overcurrent or IC failure can cause smoke or ignition. (The over current can cause smoke or ignition from the IC itself.) In particular, please pay attention when using a Bridge Tied Load (BTL) connection type IC that inputs output DC voltage to a speaker directly.

Points to remember on handling of ICs

(1) Heat Radiation Design

In using an IC with large current flow such as power amp, regulator or driver, please design the device so that heat is appropriately radiated, not to exceed the specified junction temperature (T_J) at any time and condition. These ICs generate heat even during normal use. An inadequate IC heat radiation design can lead to decrease in IC life, deterioration of IC characteristics or IC breakdown. In addition, please design the device taking into considerate the effect of IC heat radiation with peripheral components.

(2) Back-EMF

When a motor rotates in the reverse direction, stops or slows down abruptly, a current flow back to the motor's power supply due to the effect of back-EMF. If the current sink capability of the power supply is small, the device's motor power supply and output pins might be exposed to conditions beyond maximum ratings. To avoid this problem, take the effect of back-EMF into consideration in system design.

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