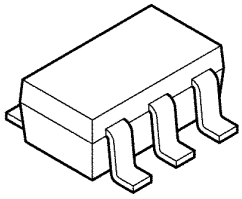
TOSHIBA BiCD Digital Integrated Circuit Silicon Monolithic

TB62752AFUG

Step Up Type DC/DC Converter for White LED

Features

The TB62752AFUG is a high efficient Step-Up Type DC/DC Converter specially designed for constant current driving of White LED.
This IC can drive 2-8 white LEDs connected series using a Li-ion battery.
This IC contains N-ch MOS-FET Transistor for Coil-Switching, and LED Current (I_F) is set with an external resistor.
This IC is especially for driving back light white LEDs in LCD of PDA, Cellular Phone, or Handy Terminal Equipment.



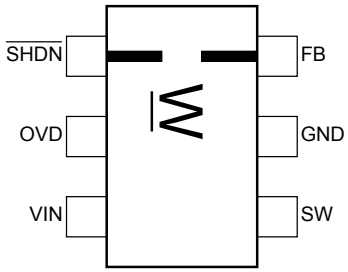
SSOP6-P-0.95B

Weight: 0.016 g (Typ.)

Characteristics

- 2-8 white LEDs connected series (Typ. 7LEDs)
- Variable LED Current I_F is set with a external resistor :
  20 mA (Typ.) @RSENS = 15 Ω
- Output Power : Available for 800mW LED loading
- High Efficiency : 80% over (Using recommended external parts: Typ. 7LEDs)
- Output Over Voltage Shutdown Function :
  Switching Operation is shut downed when OVD terminal Voltage is over 37 V (typ.).
- IC Package : SSOP6=p=0.95B
- Switching Frequency : 1.1 MHz (Typ.)

Pin Assignment (Top view)



Caution 1: *This IC could be destroyed in some case if amounted in 180° inverse direction.*
Please be careful about IC direction in mounting.

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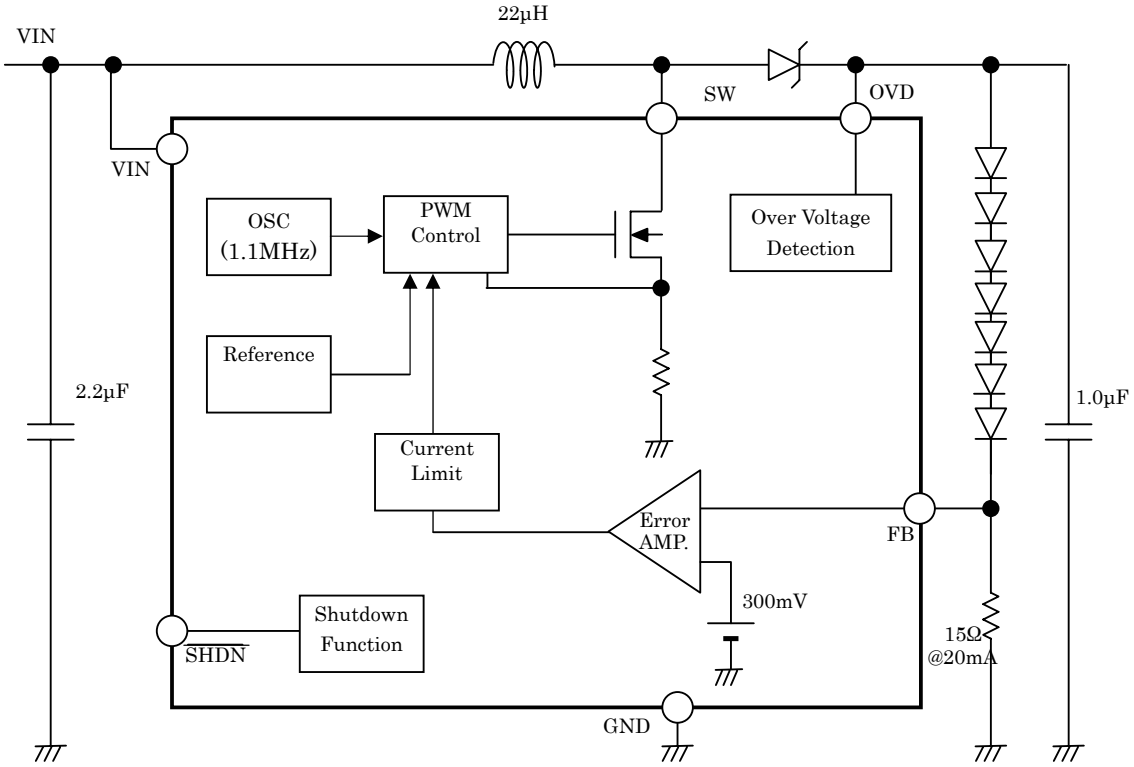
Block Diagram



Pin Function

Pin No.	Symbol	Function Description
1	$\overline{\text{SHDN}}$	Voltage-Input Terminal for IC-Enable / Disable LED-I_F. I_F adjustment with PWM input signal is also available.
2	OVD	Over Voltage Detection Terminal. IC Switching Operation is disabled with detection over voltage. If the voltage returns to detection level or less, Operation is enabled again.
3	VIN	Supply Voltage Input Terminal. (2.8V to 5.5V)
4	SW	Switch Terminal for DC/DC Converter. Nch MOSFET Built-In.
5	GND	Ground Terminal.
6	FB	LED I_F Setting Resister Connecting Terminal.

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Absolute Maximum Ratings (Topr = 25°C if without notice)

Characteristics	Symbol	Ratings	Unit
Power Supply Voltage	VIN	−0.3 to +6.0	V
Input Voltage	$V\overline{SHDN}$	−0.3 to +VIN + 0.3	V
Switching Terminal Voltage	Vo (SW)	-0.3 to 40	V
Switching Terminal Current	Io (SW)	1500	mA
Power Dissipation	PD	0.41 (Device)	W
		0.47 (on PCB) Caution 2	
Thermal Resistance	Rth (j-a)	300 (Device)	°C/W
		260 (on PCB)	
Operation Temperature Range	Topr	−40 to +85	°C
Storage Temperature Range	Tstg	−55 to +150	°C
Maximum Junction Temperature	Tj	150	°C

Caution 2: Power Dissipation must be calculated with subtraction of 3.8 mW/°C from Maximum Rating with every 1°C if T_{opr} is upper 25°C. (on PCB)

Recommended Operating Condition (Ta = -40°C to 85°C if without notice)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ	Max	Unit
Power Supply Voltage	VIN	-		2.8	-	5.5	V
LED Current (Average Value)	Io1	-	VIN = 3.6 V, RSENS=15Ω 4LEDs, Topr = 25°C	-	20	-	mA

Electrical Characteristics (Ta = 25°C, V_{IN}=2.8V to 5.5V if without notice)

Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
Input Voltage Range	V_{IN}		2.8	-	5.5	V
Operating Consumption Current	I_{IN} (On)	VIN=3.6V, RSENS=15Ω	-	TBD	-	mA
Quiescent Consumption Current	I_{IN} (Off)	VIN=3.6V,$V_{\overline{SHDN}}$=0V	-	0.5	1.0	μA
SHDN Terminal 'H' Level Input Voltage	$V\overline{SHDN}H$	-	1.3	-	VIN	V
SHDN Terminal 'L' Level Input Voltage	$V\overline{SHDN}L$	-	0	-	0.4	V
SHDN Terminal Current	$I_{\overline{SHDN}}$	VIN=3.6V,$V_{\overline{SHDN}}$=3.6V	-	0	1.0	μA
Integrated MOS-Tr Switching Frequency	f_{OSC}	VIN=3.6V,$V_{\overline{SHDN}}$=3.6V	0.77	1.1	1.43	MHz
Switching Terminal Current	I_{oZ} (SW)	-	-	600	-	mA
Switching Terminal Leak Current	I_{oz} (SW)	-	-	0.5	1	μA
FB Terminal Feedback Voltage (V_{FB})	V_{FB}	V_{IN}=3.6V, RSENS=15Ω T_{opr}=25°C, L=22μH	285	300	315	mV
FB Terminal Line Regulation	ΔV_{FB}	V_{IN}=3.6V center V_{IN}=3.0 to 5.0V	-5	-	5	%
FB Terminal Current	I_{oZ} (SW)	-	-	TBD	-	μA
OVD terminal Voltage	V_{OVD}	-	34.5	37	39.5	V
OVD Terminal Leakage Current	I_{OVDZ}	V_{OVD}=30V	-	0.5	1	μA

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Protection in LED opened condition

The operation with OVD terminal is available for the protection in case LED Circuit opened.
Please see the example of application circuit.
If load of LED is detached, Nch MOS switching operation is disabled with detection of boost circuit voltage.

Setting of external Capacitor

In case not using PWM signal to $\overline{SHDN}$ terminal for brightness control, recommended values are
C_1 = Over 2.2 (μF), C_2 = Over 1.0 (μF)

In case with PWM signal to $\overline{SHDN}$ terminal for brightness control, recommended values are
C_1 = Over 4.7 (μF), C_2=Under 0.1 (μF) to reduce fluctuation of input current
and up accuracy of brightness.

The recommended capacitor values depend on the Brightness Control Method.
<Please see after page-8>
The capacitor value must be considered for gain enough accuracy of brightness with reduction of noise from Input current changing.

Setting of I_O

Resistance connects between RSENS pin and GND.
The average current is set by this RSENS value and average current are obtained by the following equation.

$$I_F[mA] = \frac{300[mV]}{RSENS\ [\Omega]}$$

Current Value error is within ±5%.

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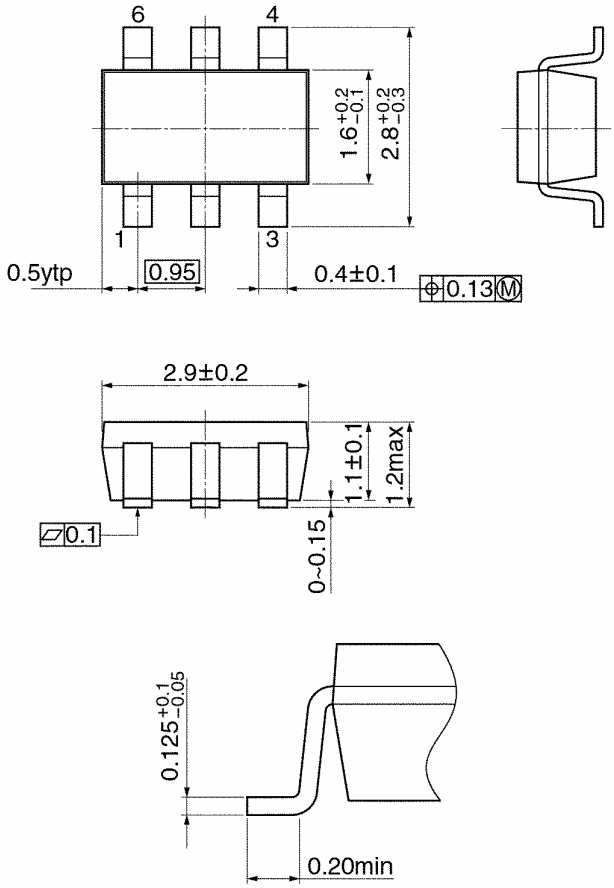
Package Dimensions

SSOP6-P-0.95B Unit: mm



Weight : 0.016 g (Typcal)

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About solderability, following conditions were confirmed

- Solderability

(1) Use of Sn-63Pb solder Bath
- solder bath temperature = 230°C
- dipping time = 5 seconds
- the number of times = once
- use of R-type flux

(2) Use of Sn-3.0Ag-0.5Cu solder Bath
- solder bath temperature = 245°C
- dipping time = 5 seconds
- the number of times = once
- use of R-type flux

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