

TOSHIBA BiCD Digital Integrated Circuit Silicon Monolithic

TB62752AFUG

Step Up Type DC/DC Converter for White LED

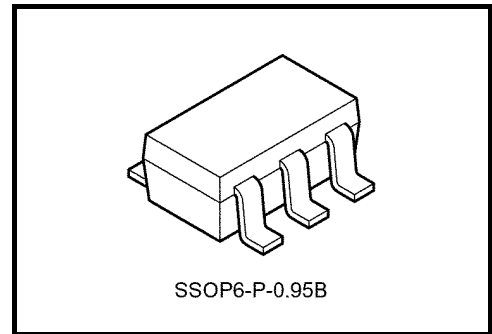
Features

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.

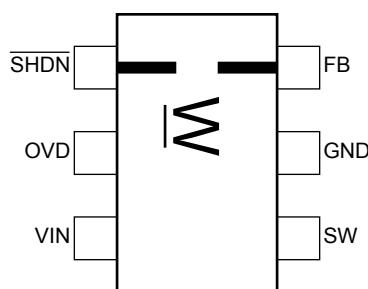


Weight: 0.016 g (Typ.)

Characteristics

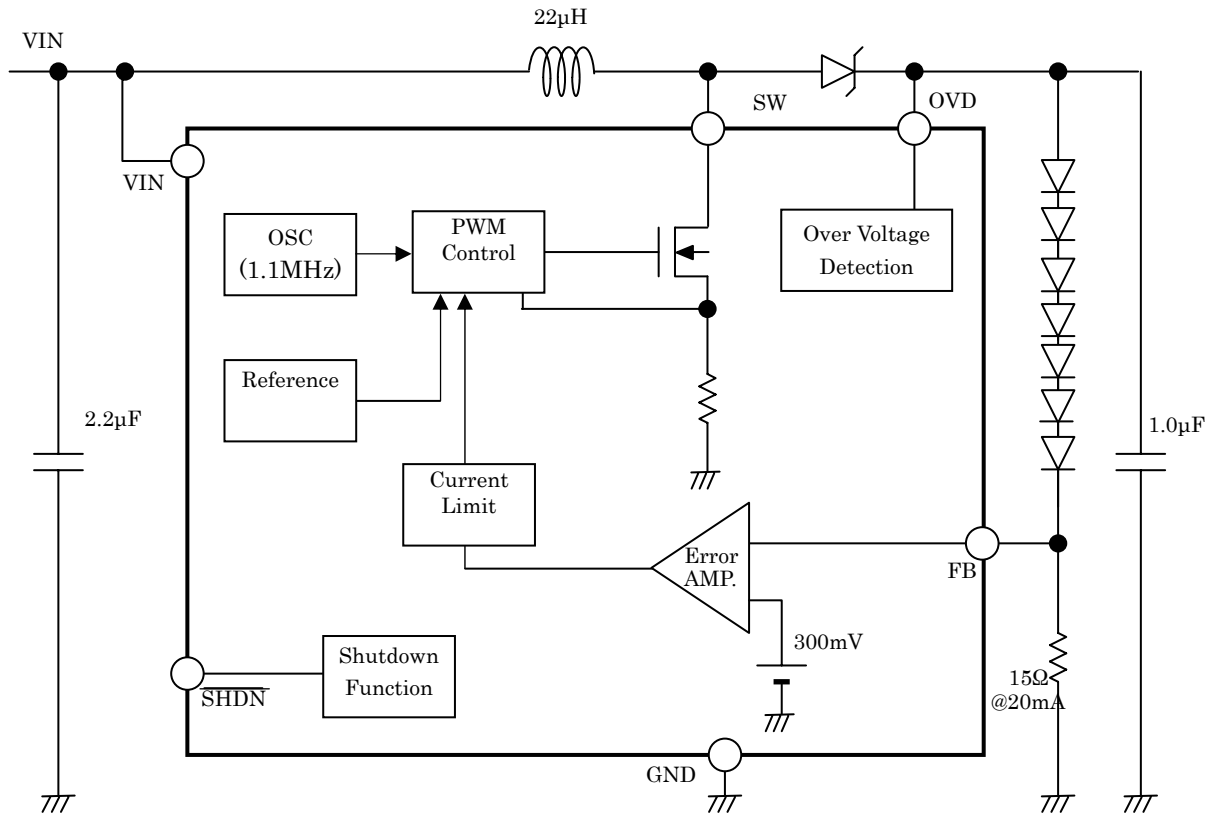
- 2-8 white LEDs connected series (Typ. 7LEDs)
- Variable LED Current I_F is set with a external resistor :
20 mA (Typ.) @RSENS = 15 Ω
- Output Power : Available for 800mW LED loading
- High Efficiency : 80% over (Using recommended external parts: Typ. 7LEDs)
- Output Over Voltage Shutdown Function :
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.

Block Diagram



Pin Function

| Pin No. | Symbol | Function Description |
|---------|--------|---|
| 1 | 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 Resistor Connecting Terminal. |

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 | VSHDN | -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, VIN=2.8V to 5.5V if without notice)

| Characteristics | Symbol | Test Condition | Min | Typ | Max | Unit |
|---------------------------------------|-----------|--|------|-----|------|------|
| Input Voltage Range | VIN | | 2.8 | - | 5.5 | V |
| Operating Consumption Current | IIN (On) | VIN=3.6V, RSENS=15Ω | - | TBD | - | mA |
| Quiescent Consumption Current | IIN (Off) | VIN=3.6V, VSHDN=0V | - | 0.5 | 1.0 | μA |
| SHDN Terminal 'H' Level Input Voltage | VSHDNH | - | 1.3 | - | VIN | V |
| SHDN Terminal 'L' Level Input Voltage | VSHDNL | - | 0 | - | 0.4 | V |
| SHDN Terminal Current | ISHDN | VIN=3.6V, VSHDN=3.6V | - | 0 | 1.0 | μA |
| Integrated MOS-Tr Switching Frequency | fOSC | VIN=3.6V, VSHDN=3.6V | 0.77 | 1.1 | 1.43 | MHz |
| Switching Terminal Current | IoZ (SW) | - | - | 600 | - | mA |
| Switching Terminal Leak Current | IoZ (SW) | - | - | 0.5 | 1 | μA |
| FB Terminal Feedback Voltage (VFB) | VFB | VIN=3.6V, RSENS=15Ω Topr=25°C, L=22μH | 285 | 300 | 315 | mV |
| FB Terminal Line Regulation | ΔVFB | VIN=3.6V center VIN=3.0 to 5.0V | -5 | - | 5 | % |
| FB Terminal Current | IoZ (SW) | - | - | TBD | - | μA |
| OVD terminal Voltage | VOVD | - | 34.5 | 37 | 39.5 | V |
| OVD Terminal Leakage Current | IOVDZ | VOVD=30V | - | 0.5 | 1 | μA |

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 $\overline{\text{SHDN}}$ terminal for brightness control, recommended values are

$C_1 = \text{Over } 2.2 (\mu\text{F}), C_2 = \text{Over } 1.0 (\mu\text{F})$

In case with PWM signal to $\overline{\text{SHDN}}$ terminal for brightness control, recommended values are

$C_1 = \text{Over } 4.7 (\mu\text{F}), C_2 = \text{Under } 0.1 (\mu\text{F})$ 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.

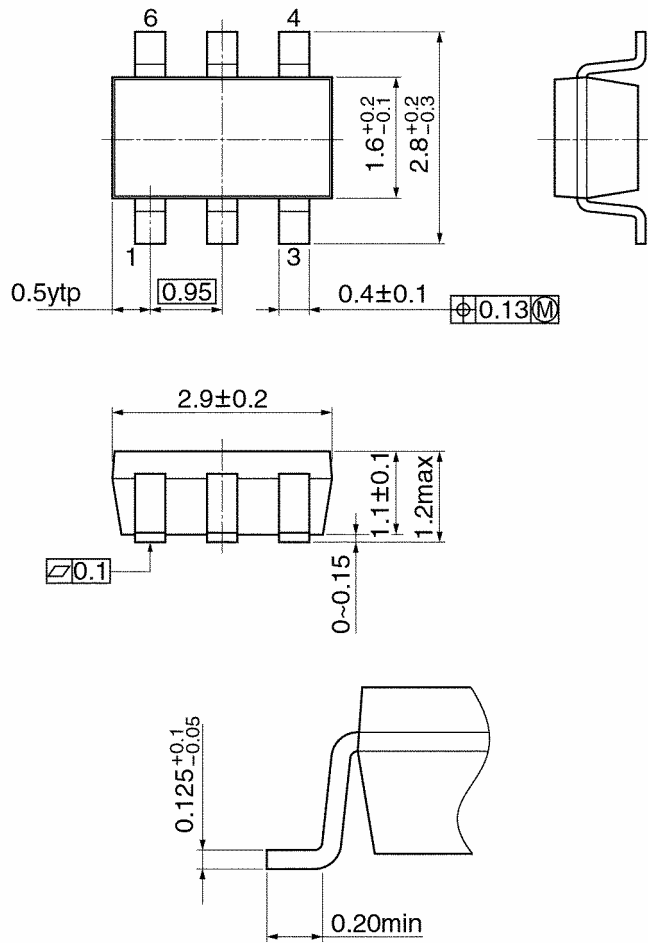
The average current is set by this RSENS value and average current are obtained by the following equation.

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

Current Value error is within $\pm 5\%$.

Package Dimensions
SSOP6-P-0.95B

Unit: mm



Weight : 0.016 g (Typcal)

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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