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.



i



- 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.

TOSHIBA

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 Resister 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	lo (SW)	1500	mA	
Power Dissipation	PD	0.41 (Device)	W	
		0.47 (on PCB) Caution 2	_ vv	
		300 (Device)	°C/W	
Thermal Resistance	Rth (j-a)	260 (on PCB)		
Operation Temperature Range	Topr	-40 to +85	°C	
Storage Temperature Range	Tstg	–55 to +150	°C	
Maximum Junction Temperature	Тј	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	Тур	Max	Unit
Power Supply Voltage	VIN	-		2.8	-	5.5	V
LED Current (Average Value)	lo1	-	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	Тур	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 _{SHDN} =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,V _{SHDN} =3.6V	-	0	1.0	μA
Integrated MOS-Tr Switching Frequency	f _{osc}	VIN=3.6V,V _{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

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 C₁ = Over 2.2 (µF), C₂ = Over 1.0 (µF)

In case with PWM signal to \overline{SHDN} terminal for brightness control, recommended values are $C_1 = Over 4.7 \ (\mu F), C_2 = Under 0.1 \ (\mu F)$ 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 Io

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%.

Package Dimensions SSOP6-P-0.95B

TOSHIBA

Unit: mm



Weight : 0.016 g (Typcal)

About solderability, following conditions were confirmed

Solderability

- (1) Use of Sn-63Pb solder Bath
 - · solder bath temperature = $230^{\circ}C$
 - dipping time = 5 seconds
 - \cdot the number of times = once
 - · use of R-type flux
- (2) Use of Sn-3.0Ag-0.5Cu solder Bath
 - \cdot solder bath temperature = 245°C
 - dipping time = 5 seconds
 - \cdot the number of times = once
 - · use of R-type flux

RESTRICTIONS ON PRODUCT USE

030619EBA

- The information contained herein is subject to change without notice.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA for any infringements of patents or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of TOSHIBA or others.
- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.
 In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as

set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the "Handling Guide for Semiconductor Devices," or "TOSHIBA Semiconductor Reliability Handbook" etc..

- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury ("Unintended Usage"). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer's own risk.
- The products described in this document are subject to the foreign exchange and foreign trade laws.
- TOSHIBA products should not be embedded to the downstream products which are prohibited to be produced and sold, under any law and regulations.