## TOSHIBA CMOS INTEGRATED CIRCIUTS SILICON MONOLITHIC

TCA62753FUG

Charge Pump type DC/DC Converter for White LED Driver

TOSHIBA MICROELECTRONICS CORP.
APPLICATION ENGINEERING GROUP 3

Ver	Data	Note	Charge	chek
0.1	2005-08-01	New	Miura	
0.2	2005-08-10	TSD	Miura	
0.3	2005-10-17	Pin Assignment	Miura	
0.4	2005-11-10	Electrical Characteristics	Miura	

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Charge Pump type DC/DC Converter for White LED Driver

The TCA62753FUG is a charge pump type DC/DC Converter
specially designed for constant current driving of White LED.
This IC can outputs LED current 100mA or more to 3.0-5.5V input.
This IC is especially for driving back light white LEDs in LCD of PDA,
Cellular Phone, or Handy Terminal Equipment.
This IC is Pb-free product.

SSOP6-P-0.95B
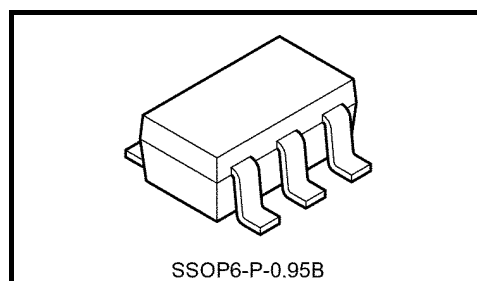
Weight: 0.016 g (Typ.)

Features

|	
Input Voltage	: V_{IN}=2.7V to 5.5V
Output Current (V_{OUT}=5V)	: 100mA (V_{IN}=3.0V or more)
	50mA (V_{IN}=2.7V to 3.0V)
Switching Frequency	: 1MHz(Typ.)
Integrated protection circuit	: Thermal Shut Down function
	Output short circuit detection function
	Output over voltage detection function
Package	: SSOP6-P-0.95B

Pin Assignment (top view)
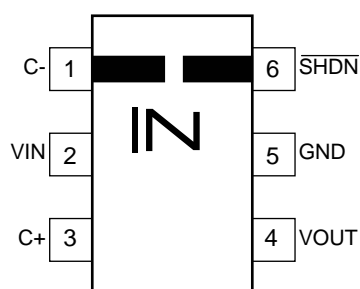
Explanation of the Terminal

No.	Symbol	Function
1	C-	Capacitance connection terminal for charge pump.
2	V_{IN}	Power supply terminal.
3	C+	Capacitance connection terminal for charge pump.
4	V_{OUT}	Output terminal.
5	GND	GND terminal.
6	$\overline{SHDN}$	Logic input terminal. (input a chip enable signal) $\overline{SHDN}$ = "H" → Operation mode, $\overline{SHDN}$ = "L" → Shutdown mode

Block Diagram
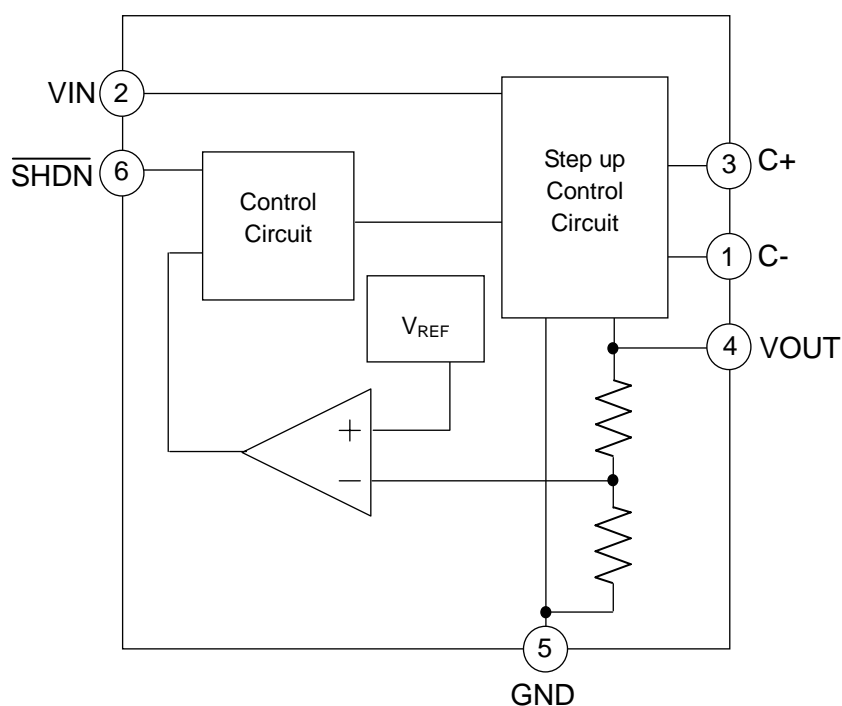
Absolute Maximum Ratings (T$_a$=25°C)

Characteristics	Symbol	Ratings	Unit
Power supply voltage	V$_{IN}$	−0.3 to +6.0	V
Input Voltage	V$_{\overline{SHDN}}$	−0.3~+V$_{IN}$ +0.3 *Note1	V
Output Voltage	V$_{OUT}$	−0.3~+6.0	V
Power Dissipation	P$_D$	0.41(Device)	W
		0.47(with PCB) *Note2	
Thermal resistance	R$_{th (j-a)}$	300(Device)	°C/W
		260(with PCB)	
Operating temperature range	T$_{opr}$	−40~+85	°C
Storage temperature	T$_{stg}$	−55~+150	°C
Maximum junction temperature	T$_j$	150	°C

Note2: However, do not exceed 6V.

Note3: When every time the ambient temperature gets over 25°C with 1°C, the allowable loss must reduce 3.8mW/°C
more than maximum rated value. (When on PCB.)

## Recommended Operating Condition (unless otherwise specified, T$_a$ = −40~85°C)

Characteristics	Symbol	Test Circuit	Test Conditions	Min.	Typ.	Max.	Unit
Power supply voltage	V$_{IN}$	-	-	2.7	-	5.5	V
Capacitance for Charge Pump	C	-	-	-	1.0	-	mA
Capacitance for input	C$_{IN}$	-	-	1.0	2.2	10	μF
Capacitance for output	C$_{OUT}$	-	-	1.0	2.2	10	μF

Electrical Characteristics (unless otherwise specified, V$_{IN}$ = 3.6V, T$_a$ = 25°C)

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Power supply voltage	V$_{IN}$	-	2.7	-	5.5	V
Output Voltage	V$_{OUT}$	V$_{IN}$=2.7~3.0V, I$_{OUT}$=50mA V$_{IN}$=3.0~5.0V, I$_{OUT}$=100mA	4.8	5.0	5.2	V
Operating consumption current	I$_{IN}$	I$_{OUT}$=0mA, V$_{\overline{SHDN}}$=V$_{IN}$			8	mA
Quiescent consumption current	I$_{IN}$	V$_{IN}$=2.7~3.6V, I$_{OUT}$=0mA, V$_{\overline{SHDN}}$=0V	-	0.01	1	μA
		V$_{IN}$=3.6~5.0V, I$_{OUT}$=0mA, V$_{\overline{SHDN}}$=0V	-	-	2.5	
$\overline{SHDN}$ terminal H level input voltage	V$_{\overline{SHDN}H}$	-	1.3	-	V$_{IN}$	V
$\overline{SHDN}$ terminal L level input voltage	V$_{\overline{SHDN}L}$	-	0	-	0.3	V
$\overline{SHDN}$ terminal current	I$_{\overline{SHDN}H}$	V$_{\overline{SHDN}}$=V$_{IN}$	-1	-	1	μA
	I$_{\overline{SHDN}L}$	V$_{\overline{SHDN}}$=0V	-1		1	
Clock Frequency	f$_{OSC}$	V$_{\overline{SHDN}}$=3.6V	-	1	-	MHz
Short Circuit Current	I$_{SC}$	V$_{OUT}$=GND, V$_{\overline{SHDN}}$=3.6V	-	250	-	mA

The example of Application Circuit
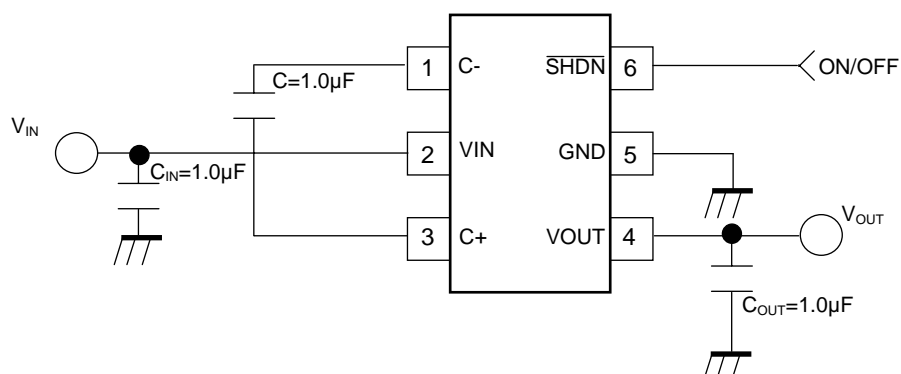
*Output

 This product outputs 5V(±0.2V) from the terminal V_{OUT} in input voltage V_{IN}=2.7V or more.
 In VIN=2.7V~3.0V, it becomes 50mA or more. In VIN=3.0V or more, it becomes 100mA or more.

*Thermal shutdown function

 The thermal shutdown circuit works when the junction temperature exceeds 150 (standard),
 and IC stops operating.
 (This function is not included in the product inspection.)

*Output short circuit detection function

 When the output do short-circuit, IOUT is limited to 250mA(standard).

*Output over voltage detection function

 The output is clamped so that VOUT should not become 6V or more even when the LED load is opened.

Package Dimensions

SSOP6-P-0.95B   Unit: mm
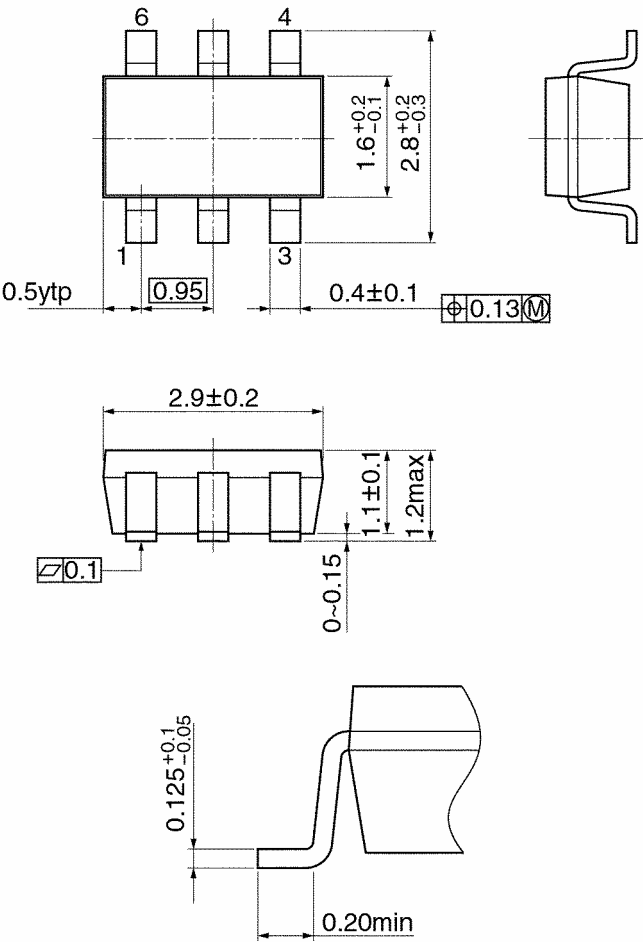
Weight: 0.016 g (Typ.)

Notes on Contents

Block Diagrams

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

Equivalent Circuitry

Some parts of the equivalent circuitry may have been omitted or simplified for explanatory purposes.

Maximum Ratings

The absolute maximum ratings of a semiconductor device are a set of specified parameter values that must not be exceeded during operation, even for an instant.

If any of these ratings are exceeded during operation, the electrical characteristics of the device may be irreparably altered and the reliability and lifetime of the device can no longer be guaranteed.

Moreover, any exceeding of the ratings during operation may cause breakdown, damage and/or degradation in other equipment. Applications using the device should be designed so that no maximum rating will ever be exceeded under any operating conditions.

Before using, creating and/or producing designs, refer to and comply with the precautions and conditions set forth in this document.

Application Examples

The application examples provided in this data sheet are provided for reference only. Thorough evaluation and testing should be implemented when designing your application's mass production design.

In providing these application examples, Toshiba does not grant the use of any industrial property rights.

Handling of the IC

Ensure that the product is installed correctly to prevent breakdown, damage and/or degradation in the product or equipment.

Short circuiting between output and line to ground faults may result in damage to the IC. Please exercise precaution in designing the output line, power line and GND line so as to prevent such damage.

Be careful to insert the IC correctly. Inserting the IC the wrong way (e.g., wrong direction) may result in damage to the IC.

Please exercise precaution in handling external components as shorting and opening such components may cause an overcurrent, which in turn may result in power overcurrent and/or in damage to the IC.

Overcurrent and Thermal Protection

Toshiba does not guarantee that these protection functions will prevent damage to the product. These functions are only intended as a temporary means of preventing output short circuiting and other abnormal conditions.

If the guaranteed operating ranges of this product are exceeded, these protection functions may not function as intended and this product might be damaged due to output short circuiting.

The overcurrent protection function is intended to protect this product from temporary short circuiting only. Short circuiting that last for a long time may cause excessive stress and damage to this product.

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

RESTRICTIONS ON PRODUCT USE
030619EBA

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