

◆ **Description**

LC5203D is non-isolated type driver IC for LED lighting which can achieve high efficiency in simple circuitry. Its compact package which includes output MOSFET and controller, and low external components are suitable for small lighting equipment which requires saving space, like LED light bulb.

Its high voltage capability allows direct connection to rectified AC supply.

Protection features ensure safety LED drive.

◆ **Applications**

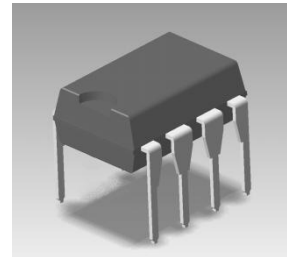
- LED Lighting equipment
- LED Light bulb

◆ **Features**

- DIP8Package
Output MOSFET and controller are included in one package.
- High voltage supply input
Able to direct connection to rectified AC supply.
- Built-in constant current controller
- PWM mode current control circuitry.
- Adjustable output current by input voltage to Ref pin.

◆ **Package**

Package: DIP8

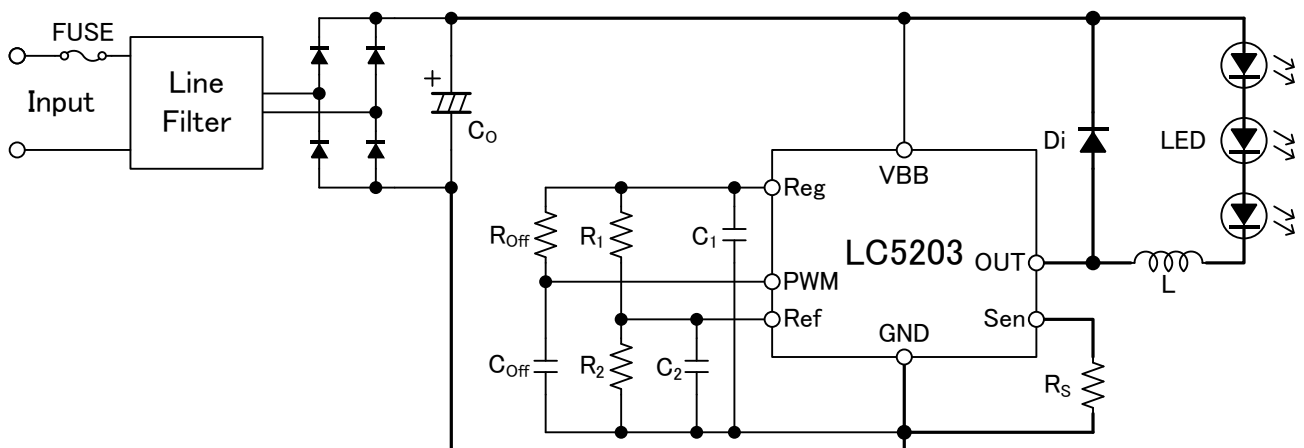


◆ **Main Specification**

MOSFET	250V (MIN), 1.3Ω (MAX)
Output Current	1.0A (MAX)
Main Supply Voltage	250V (MAX)

- External PWM
- PWM signal input to PWM pin enables dimming.
- Low signal shuts off output current.
- Under voltage lockout protection (UVLO)
Prevents malfunction when supply voltage is low.
- Over current protection (OCP)
Latched in response to the load short condition.
- Thermal Shutdown protection (TSD)
Protects IC from damage due to excess temperature, auto-restart when temperature drops below threshold

Typical application circuit



1 Scope

The present specifications shall apply to a LED driver IC for LED lighting, LC5203D.

2 Outline

Type	Hybrid Integrated Circuit
Structure	Plastic Molded (Transfer Mold)
Applications	LED Lighting

3 Absolute Maximum Ratings (Ta=25°C)

Parameter	Terminal	Symbol	Ratings	Units	Remarks
Main Power Supply Voltage	6-8	V _{BB}	250	V	
Output MOSFET Breakdown Voltage	5-4	V _O	250	V	
Output Current	5-4	I _O	1.0 ^{※1}	A	Exclude t _w <1μs
Ref Input Voltage	3-8	V _{Ref}	-0.3~V _{Reg} +0.3	V	
Sense Voltage	4-8	V _{Sen}	-0.3~4	V	Exclude t _w <1μs
Allowable Power Dissipation	—	P _D	1.73 ^{※2}	W	Mounted on PWB ^{※3}
Junction Temperature	—	T _j	150	°C	
Operating Temperature Range	—	T _a	-40~105	°C	
Storage Temperature Range	—	T _{stg}	-40~150	°C	

※1 Output current rating may be limited by duty cycle, ambient temperature, and heat sinking.

Under any set of conditions, do not exceed the specified junction temperature (T_j).

※2 Allowable Power Dissipation depends on PWB pattern layout.

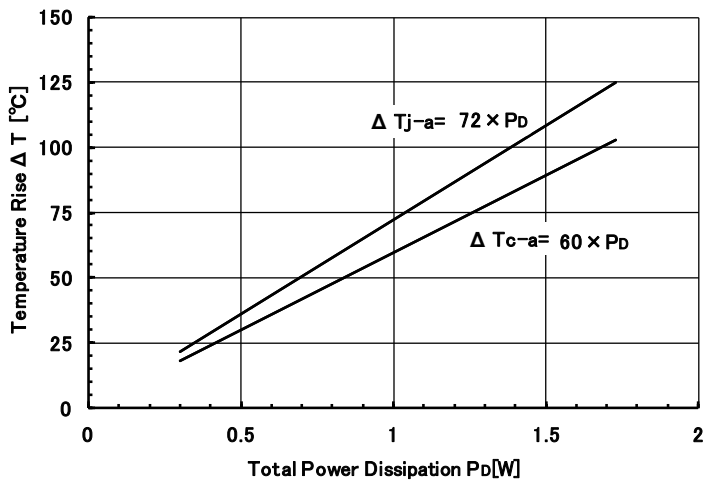
※3 Mounted on SanKen evaluation board.

4 Electrical Characteristic (Ta=25°C, V_{BB}=140V, Unless Otherwise Noted.)

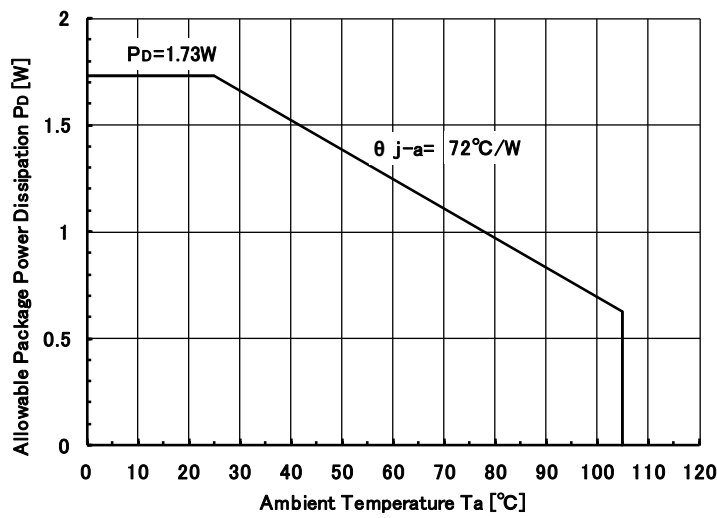
Parameter	Terminal	Symbol	Ratings			Units	Remarks
			MIN	TYP	MAX		
Main Power Supply Current	6-8	I _{BB}	—	2	—	mA	At enable
	6-8	I _{BBs}	—	0.8	1.2	mA	At disable
Drain-Source Breakdown Voltage	5-4	V _{DS(BR)}	250	—	—	V	I _D =1mA
Output MOS-FET On Resistance	5-4	R _{DS(on)}	—	0.7	1.3	Ω	I _D =1.0A
Body Diode Forward Voltage	4-5	V _F	—	0.75	1.2	V	I _F =1.0A
Reg Output Voltage	1-8	V _{Reg}	11.5	12	12.5	V	I _{Reg} =0.1mA
Reg Maximum Output Current	1-8	I _{Reg}	—	—	2	mA	
Maximum PWM Frequency	2-8	f _{clk}	200※4	—	—	kHz	duty=50%
Ref Input Voltage Range	3-8	V _{Ref}	0	—	1	V	
Ref Input Current	3-8	I _{Ref}	—	±10	—	μA	
Sense Input Voltage	4-8	V _{Sen}	V _{Ref} -30	V _{Ref}	V _{Ref} +30	mV	
Sense Input Current	4-8	I _{Sen}	—	±10	—	μA	
Over Current Protect Voltage	4-8	V _{OCP}	—	3	—	V	
Under Voltage Lock Out Threshold (Turn On)	6-8	V _{UVLOon}	—	14	—	V	
Under Voltage Lock Out Threshold (Turn Off)	6-8	V _{UVLOoff}	—	13	—	V	
Thermal Shutdown Threshold	—	T _{TSD}	—	150	—	°C	Temperature of Control IC
Thermal Shutdown Hysteresis	—	T _{TSDhys}	—	55	—	°C	
Blanking Time	—	t _{BLK}	—	400	—	ns	
Switching Time	5-4	t _r	—	20	—	ns	I _o =0.4A
	5-4	t _f	—	50	—	ns	I _o =0.4A

※4 Operation at a PWM frequency greater than 200kHz is possible but not warranted.

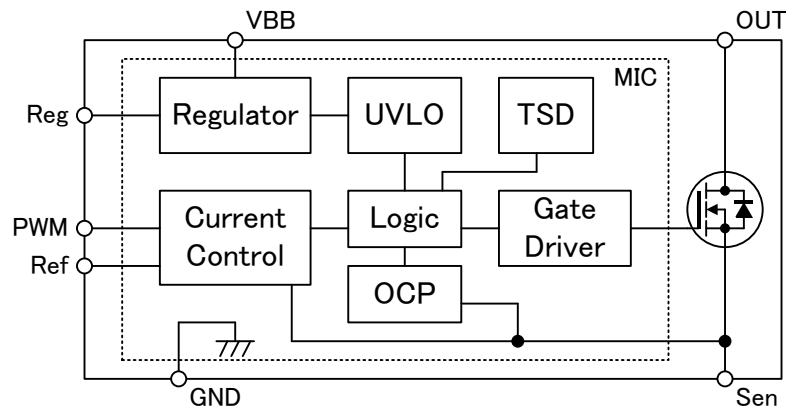
Thermal Data



Power Dissipation versus Ambient Temperature



5 Functional Block Diagram (Pin assignment)



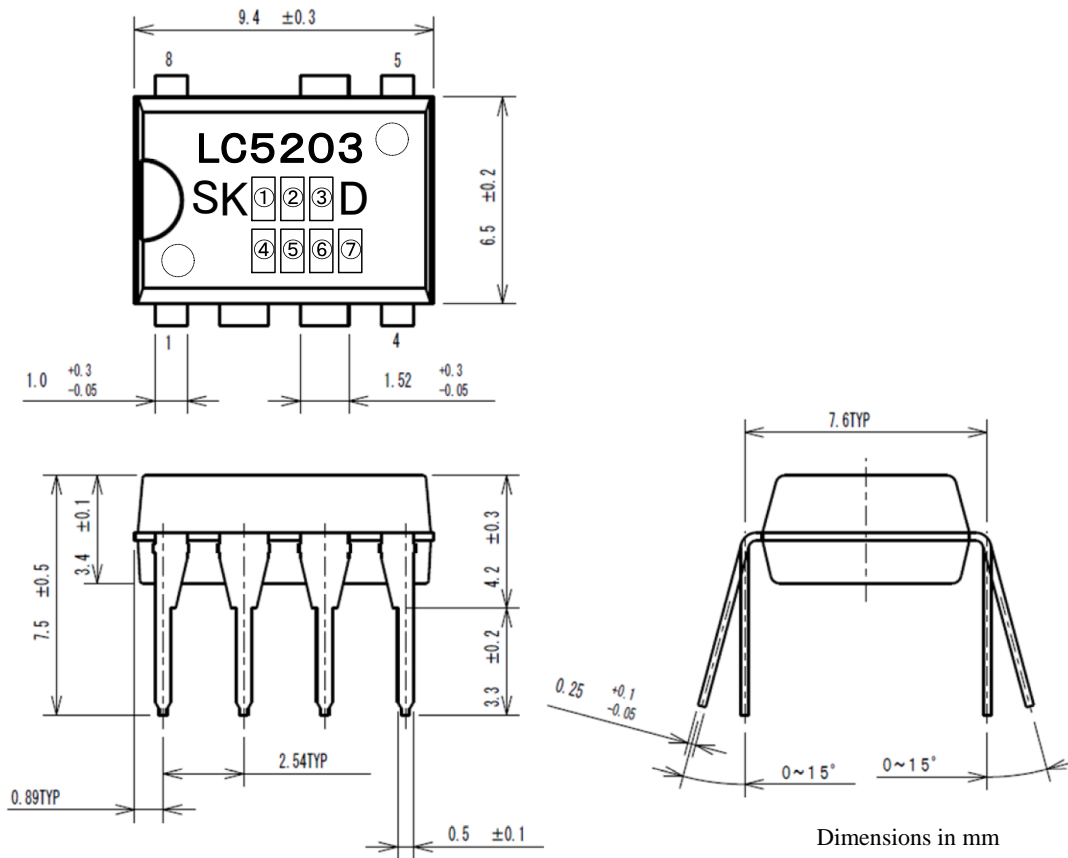
Pin Assignment

Number	Name	Function
1	Reg	12V Internal regulator output pin
2	PWM	Connect to PWM Off-Time Setting C&R
3	Ref	Reference Voltage for PWM Control
4	Sen	Output-current detection pin
5	OUT	Output pin
6	VBB	Supply voltage pin
7	—	—
8	GND	Device ground pin.

6 Package

6.1 Package Drawing and Material

- DIP8 Package



Terminal material: Cu

Terminal treatment:
 Solder plating (Pb-free)

Marking

Position	Contents	Indication
①	The last digit of the year	0 to 9
②	The Month	1 to 9,O,N,D
③	The week	1 to 3
④	SanKen Registration Number	alphanumeric characters
⑤		
⑥		
⑦		

6.2 Appearance

The body shall be clean and shall not bear any stain, rust or flaw.

6.3 Marking

The type number and lot number shall be clearly marked by laser so that cannot be erased easily.

7 Cautions and warnings

Since reliability can be affected adversely by improper storage environment and handling methods during Characteristic tests, please observe the following cautions.

7.1 Cautions for Storage

- Ensure that storage conditions comply with the standard temperature (5 to 35°C) and the standard relative humidity (around 40 to 75%) and avoid storage locations that experience extreme changes in temperature or humidity.
- Avoid locations where dust or harmful gases are present and avoid direct sunlight.
- Reinspect for rust in leads and solderability that have been stored for a long time.

7.2 Cautions for characteristic Tests and Handling

- When characteristic tests are carried out during inspection testing and other standard tests periods, protect the devices from surge of power from the testing device, shorts between the devices and the heatsink.

7.3 Considerations to protect the Products from Electrostatic Discharge

- When handling the devices, operator must be grounded. Grounded wrist straps be worn and should have at least 1MΩ of resistance near operators to ground to prevent shock hazard.
- Workbenches where the devices are handled should be grounded and be provided with conductive table and floor mats.
- When using measuring equipment such as a curve tracer, the equipment should also be grounded.
- When soldering the devices, the head of a soldering iron or a solder bath must be grounded in order to prevent leak voltage generated by them from being applied to the devices.
- The devices should always be stored and transported in our shipping containers or conductive containers, or be wrapped up in aluminum foil.

7.4 Others

- The contents in this document are subject to changes, for improvement and other purposes, without notice. Make sure that this is the latest revision of the document before use.
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- In the case that you use our semiconductor devices or design your products by using our semiconductor devices, the reliability largely depends on the degree of derating to be made to the rated values. Derating may be interpreted as a case that an operation range is set by derating the load from each rated value or surge voltage or noise is considered for derating in order to assure or improve the reliability. In general, derating factors include electric stresses such as electric voltage, electric current, electric power etc., environmental stresses such as ambient temperature, humidity etc. and thermal stress caused due to self-heating of semiconductor devices. For these stresses, instantaneous values, maximum values and minimum values must be taken into consideration.
In addition, it should be noted that since power devices or IC's including power devices have large self-heating value, the degree of derating of junction temperature (T_j) affects the reliability significantly.
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