1-3-1 LED Lighting ICs

LC5200 Series LED Driver ICs

■Features

- AC rectification voltage can be applied directly
- Output current I_O: Two types available: 0.5 A (LC5205D) and 1 A (LC5210D)
- Self-excitation PWM current control method
- Undervoltage lockout (UVLO)
- Overcurrent protection (OCP)
- Thermal shutdown (TSD)
- DIP-8 type mold package
- Supports driving without input electrolytic capacitor
- Power factor correction (PFC) application circuit
- Triac dimmer control application circuit

■Applications

- LED light bulbs
- LED lighting equipment

■Absolute Maximum Ratings

Parameter	Symbol	Ratings		Unit	Conditions
		LC5205D	LC5210D		
Main Supply Voltage	V_{BB}	450		V	
Output MOSFET Breakdown Voltage	V_O	450		V	
Output current*1	I_O	0.5	1.0	A	Excluding when tw is less than 1µs
REF Input Voltage	V_{Ref}	–0.3 to V_{REG} + 0.3		V	
Sense Voltage	V_{Sen}	–0.3 to + 4		V	Excluding when tw is less than 1µs
Power Dissipation*2	P_D	1.73		W	When using a Sanken evaluation board
Junction Temperature	T_j	150		℃	
Thermal Resistance	$\theta_{j\text{-}a}$	72		℃/W	When using a Sanken evaluation board
	$\theta_{c\text{-}a}$	60			
Operating Ambient Temperature	T_a	–40 to + 105		℃	
Storage Temperature	T_{stg}	–40 to + 150		℃	

*1: The output current value may be limited depending on the duty ratio, ambient temperature, and heating conditions. Do not exceed the junction temperature T_j under any circumstances.

*2: The power dissipation P_D depends on the pattern layout of the circuit board used.

■Recommended Operating Conditions

Parameter	Symbol	Ratings				Unit
		LC5205D		LC5210D		
		min.	max.	min.	max.	
Main Supply Voltage	V_{BB}	25	400	25	400	V
Output Current (Average)	I_O		0.4		0.8	A
REF Input Voltage	V_{Ref}		0.8		0.8	V
Case temperature*	T_C		105		105	℃

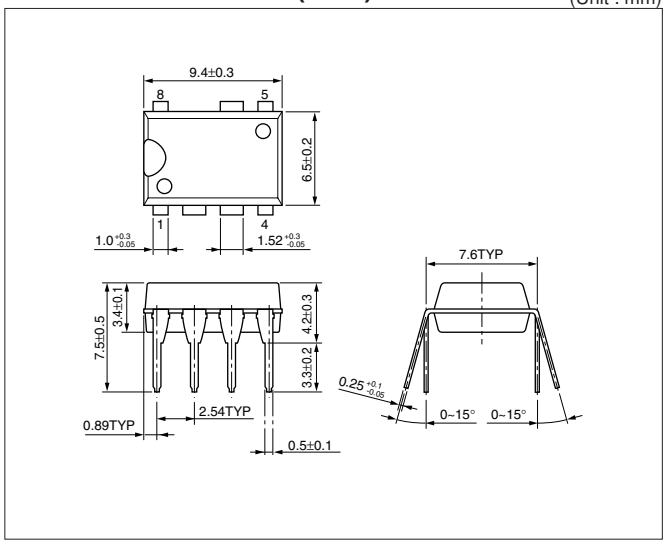
*: At the center of the marking (when there is no fin)

■Electrical Characteristics

Parameter	Symbol	Ratings						Unit
		LC5205D			LC5210D			
		min.	typ.	max.	min.	typ.	max.	
Main Supply Current	I_{BB}		2.0			2.0		mA
	Conditions	During operation			During operation			
	I_{BBs}		0.8	1.2		0.8	1.2	mA
	Conditions	When the output is off			When the output is off			
Output MOSFET Breakdown Voltage	$V_{DS(BR)}$	450			450			V
	Conditions	I_D=1mA			I_D=1mA			
Output MOSFET ON Resistance	$R_{DS(on)}$		3.5			1.7		Ω
	Conditions	I_D=0.5A			I_D=1.0A			
Output MOSFET Diode Forward Voltage	V_F		0.8			0.88		V
	Conditions	I_D=0.5A			I_D=1.0A			
Reg Output Voltage	V_{Reg}	11.5	12.0	12.5	11.5	12.0	12.5	V
	Conditions	I_{Reg}=0.1mA			I_{Reg}=0.1mA			
Reg Maximum Output Current	I_{Reg}			2			2	mA
Maximum Input Response Frequency	fclk	200			200			kHz
	Conditions	duty=50%			duty=50%			
REF Input Voltage	V_{Ref}	0		1	0		1	V
REF Input Current	I_{Ref}		±10			±10		µA
Sense Voltage	V_{Sen}	V_{Ref} –30	V_{Ref}	V_{Ref} +30	V_{Ref} –30	V_{Ref}	V_{Ref} +30	mV
Sense Input Current	I_{Sen}		±10			±10		µA
Overcurrent Sense Voltage	V_{ocp}		3			3		V
	Conditions	At the Sen pin			At the Sen pin			
UVLO Release Voltage	V_{UVLOon}		14			14		V
	Conditions	At the V_{BB} voltage			At the V_{BB} voltage			
UVLO Operation Voltage	$V_{UVLOoff}$		13			13		V
	Conditions	At the V_{BB} voltage			At the V_{BB} voltage			
TSD Operating Temperature	T_{TSD}		150			150		℃
	Conditions	Control IC chip temperature			Control IC chip temperature			
TSD Temperature Hysteresis	T_{TSDhys}		55			55		℃
	Conditions	Control IC chip temperature			Control IC chip temperature			
Blanking Time	t_{BLK}		400			400		ns

■External Dimensions (DIP8)

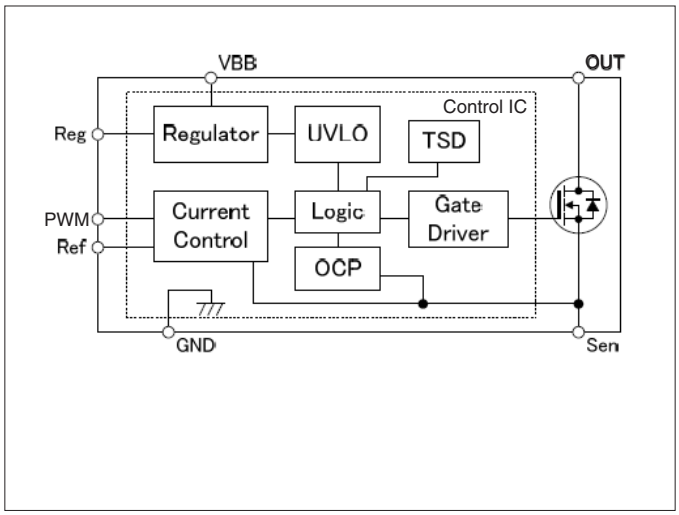
(Unit : mm)



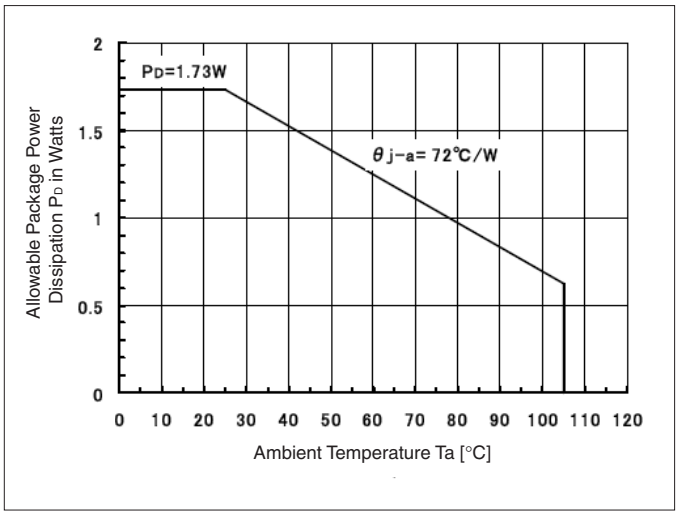
■Pin Assignment

Pin No.	Symbol	Function
1	Reg	12-V Reg output pin
2	PWM	CR connection pin for setting PWM
3	Ref	Reference voltage input pin for controlling PWM
4	Sen	Load current sense pin
5	OUT	Load output pin
6	VBB	Main power supply pin
7	NC	Pin removed
8	GND	Device ground pin

■Block Diagram



■T_a-P_D Characteristics



■Typical Connection Diagram