

SM5910

High performance internal MOSFET LED Driver IC

DESCRIPTION

SM5910 is a highly-integrated, single stage power factor correction, low startup current, Quasi resonant mode, integrated Power MOSFET controller. These functions enable the LED driver to easily meet constant current accuracy of <3%, low current THD and high power factor requirements. SM5910 integrate 600V power MOSFET with low RDSON. It works without secondary feedback circuitry or compensation circuitry. Our proprietary closed-loop feedback constant current technology helps in achieving precision constant current control under a small number of peripheral devices and loosen parameter conditions. The integrated functions also include the LED short protection, over voltage protection, over load protection.

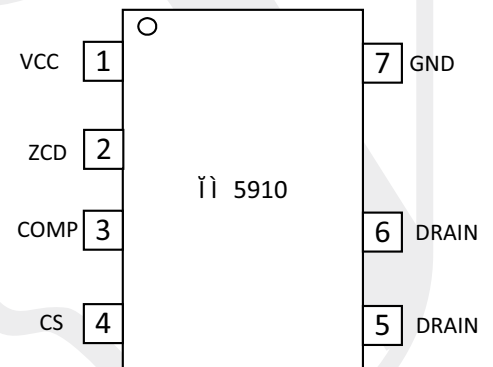
The COMP pin controls the duty by connected an RC compensation network to ground and forming the closed loop feedback control.

SM5910 improves the performance and reduces the system cost of LED driver. It is a 7 pin, SOP-7L package.

FEATURES

- Built in single-stage, active power factor correction
- Internal 600V Power MOSFET
- $\pm 3\%$ LED Output current accuracy
- Excellent line voltage regulation and load regulation
- Proprietary closed-loop feedback constant-current control
- Quasi-resonant switching mode, switching loss
- Ultra-low start up current
- Low Input current Total Harmonic Distortion
- LED Open circuit/Short circuit protection
- Current sampling resistor open circuit protection
- CS cycle-by-cycle current limit
- VCC power supply Over-voltage/Under-voltage protection
- Auto restart function
- Over temperature protection
- SOP-7L Package

PIN CONFIGURATION



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PIN DESCRIPTIONS

Pin Name	Pin Description
VCC	Compensation loop
ZCD	Inductor current zero-cross detection, LED open-circuit protection
COMP	Loop compensation, RC network to ground
CS	Inductor current sampling
DRN	Drain of Internal Power MOSFET
GND	Ground return for all internal circuit

TYPICAL APPLICATION CIRCUITS

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ABSOLUTE MAXIMUM RATINGS (Note 1)

Parameter	Symbol	Range	Unit
MOSFET Drain Voltage	V _{DRAIN}	-0.3 ~ 600	V
VCC voltage to GND	V _{CS}	-0.3 ~ 25	V
CS, COMP voltage to GND	V _{COMP}	-0.3 ~ 6	V
ZCD voltage to GND	V _{ZCD}	-0.3 ~ 6	V
Junction Temperature Range	T _j	-40 to +150	C
Storage Temperature Range	T _{STG}	-50 to +150	C
Lead Temperature (Soldering 10 sec)	T _{LEAD}	260	C
Maximum current sink to VDD		5	mA
Thermal Resistance Junction to Ambient (Note2)		220	C/W
Thermal Resistance Junction to Case		106.6	C/W
ESD Rating (Human body mode) (Note 3)	V _{ESD}	2	kV

Note 1: Stresses listed as the above "Absolute Maximum Ratings" may cause permanent damage to the device. These are for stress ratings. Functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may remain possibility to affect device reliability.

Note 2: Thermal Resistance is specified with the component mounted on a low effective thermal conductivity test board in free air at T=25°C.

Note 3: Devices are ESD sensitive. Handling precaution recommended.

Note 4: The device is not guaranteed to function outside its operating conditions.

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ELECTRICAL CHARACTERISTICS

TA= 25°C, unless otherwise specified.

Symbol	Parameters	Test Conditions	Min	Typ	Max	Unit
Power ON						
V _{ST}	VCC Starting voltage	V _{VCC} Rise		16.5		V
V _{UV}	VCC Under-voltage lockout	V _{VCC} Decline		9.5		V
V _{VCC_OVP}	VCC Over-voltage protection threshold	V _{VCC} Rise		23.7		V
I _{ST}	VCC Starting current	V _{VCC} = V _{ST} -1V		16		μA
I _{OP}	VCC Operating current	F _{OSC} =70kHz; CL=100pF		1		mA
I _{OV}	Over-voltage leakage current at VCC	V _{VCC} >V _{VCC_OVP}		45		mA
Voltage Reference						
V _{REF}	Avg I _{OUT} reference voltage threshold		291	300	309	mV
V _{CS_LIMIT}	CS -by cycle current limit threshold voltage			1.2		V
V _{ZCD_OVP}	ZCD over-voltage protection			2		V
Timing or Frequency						
T _{LEB}	Current detecting leading edge blanking time			400		ns
T _{ON_MAX}	Maximum ON time	V _{COMP} =2.5V		35		μs
T _{OFF_MIN}	Minimum off-time			1		μs
T _{OFF_MAX}	Maximum Off-time			100		μs
F _{OSC_MAX}	Maximum operating frequency			180		kHz
MOSFET						
R _{ON}	Power MOSFET ON resistance	V _{GS} = 18V / I _{DS} =0.5A		3.5		ohm
B _{VDSS}	Maximum Breakdown voltage	V _{GS} =0V / I _{DS} =250uA	600	250		V
I _{LEAK}	MOSFET Leakage current	V _{GS} =0V / V _{DS} = 600V		500		mA
Over temperature Protection						
T _{SD}	OTP temperature			150		deg C
T _{HYS}	OTP Hysteresis			125		deg C

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BLOCK DIAGRAM

