

General Description

QX5259 is an ASIC for solar LED lawn lights.

The maximum drive efficiency can exceed 84%.

QX5259 has automatic charge characteristic.

QX5259 uses CMOS technology, therefore the power consumption is very small.

QX5259 uses patented technique to realize the LED lights shutdown without flicker when the battery voltage is low.

The operating voltage of QX5259 ranges from 0.9V to 1.5V, suitable for a single AA battery or a single Ni-H battery.

Features

- Operating Voltage: 0.9V~1.5V
- Output Current: 3mA~100mA
- Patented over-discharge protection: shutdown without flicker
- Integrated light control switch
- Integrated Schottky Diode
- High Efficiency
- Low quiescent current: 17uA

Applications

- Solar lawn
- Solar Landscape

Typical Application

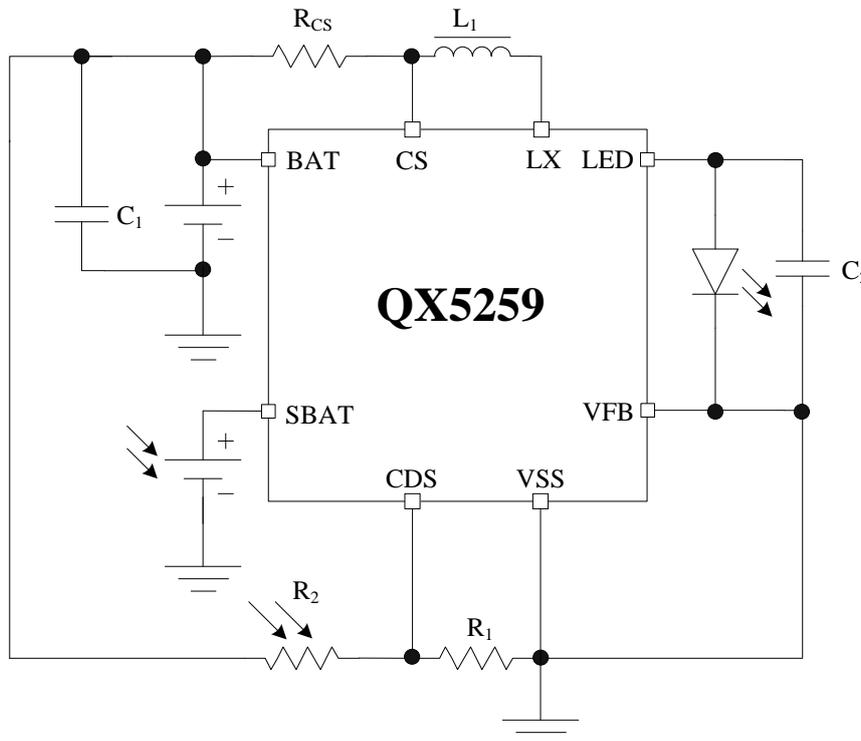


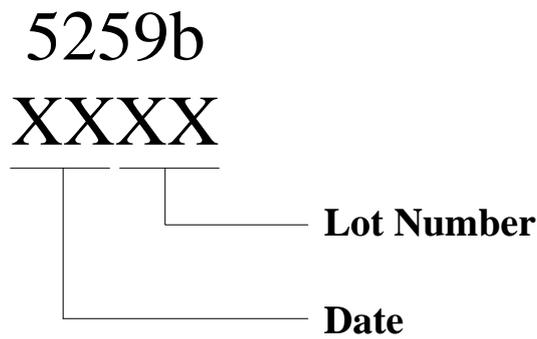
Figure 1: Typical Application Circuit Diagrams of QX5259

Ordering Information

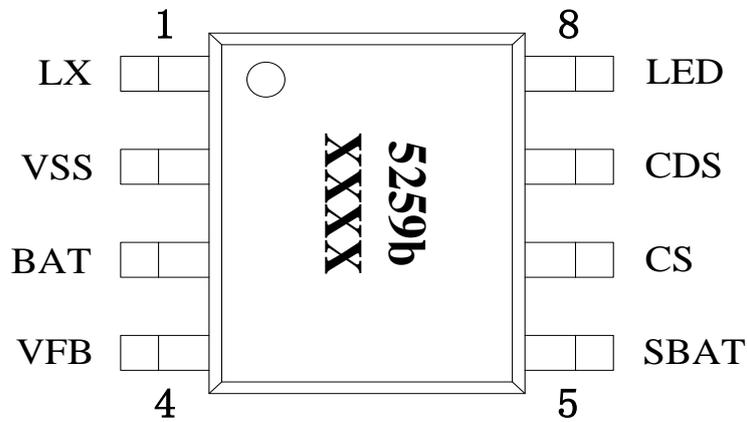
Type Number

QX5259

Package Marking



Pin Assignments



SOP8

Pin Description

Pin	Pin Name	Pin Type	Description
1	LX	Output	Drain of the switching power MOSFET
2	VSS	Ground	Ground
3	BAT	Input	Connect to rechargeable battery positive terminal
4	VFB	Input	Connect to VSS
5	SBAT	Input	Connect to solar cells positive terminal
6	CS	Input	Input current sense
7	CDS	Input	Lighting sense
8	LED	Output	Connect to LED positive terminal

Functional Block Diagram

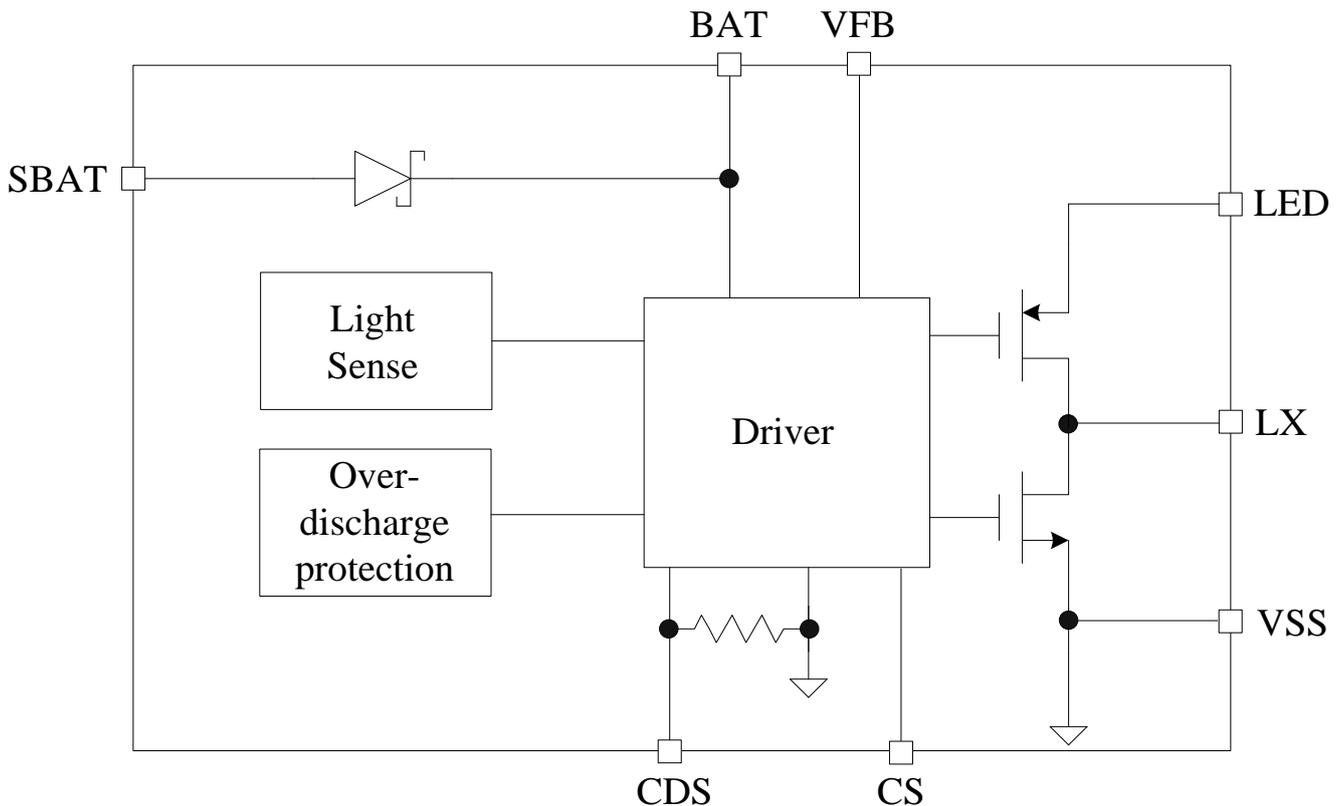


Figure 2: Functional Block Diagram of QX5259

Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Description	Min	Max	Unit
Voltage	V_{MAX}	Maximum Voltage On SBAT,BAT and LX Pins		7	V
Current	I_{LX_MAX}	Maximum Current On LX Pin		800	mA
Power Dissipation	P_{SOP8}	Maximum Power Dissipation for P _{SOP8} Package		0.5	W
Thermal	T_J	Junction Temperature Range	-20	125	°C
	T_A	Operating Temperature Range	-20	85	°C
	T_{STG}	Storage Temperature Range	-40	120	°C
	T_{SD}	Soldering Temperature Rang (less than 30 sec)	230	240	°C
ESD	V_{ESD}	ESD Voltage for Human Body Mode		2000	V

Note 1: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Exposure to Absolute Maximum Rating conditions for extended periods may affect device reliability.

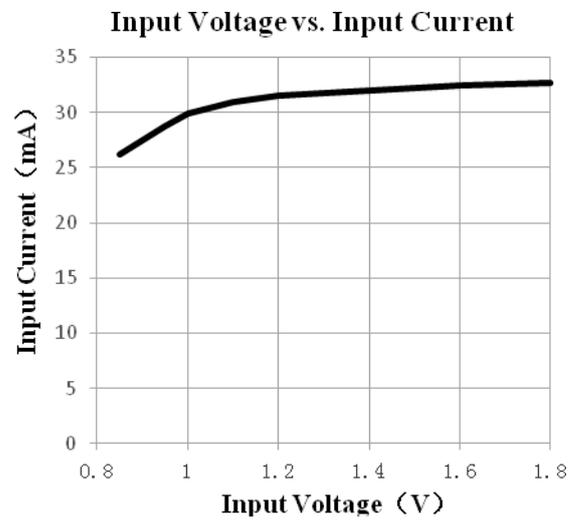
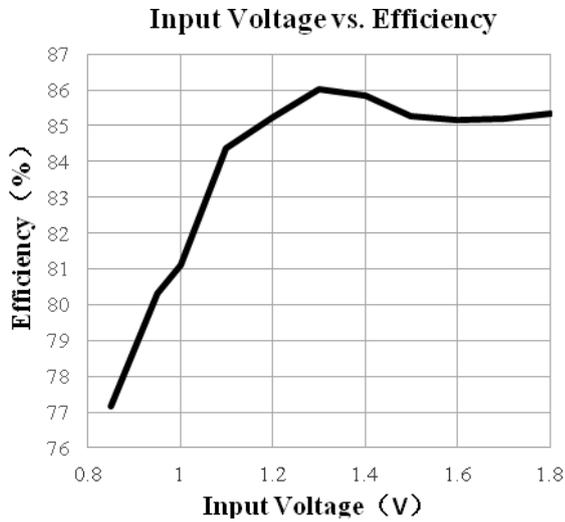
Electronic Characteristics

$T_A=25^\circ\text{C}$, $V_{BAT}=1.3\text{V}$, $L_1=47\mu\text{H}$, unless otherwise specified

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Supply Voltage						
Operating Voltage	V_{BAT}		0.9		1.5	V
UVLO	V_{UV}			0.85		V
Sense Resistor						
R_{CDS}	R_{CDS}			60		$\text{K}\Omega$
Input Current						
Current Accuracy	ΔI_{IN}		-5		5	%
Output Current						
Current Range	I_{LED}		3		100	mA
Output Current Classification						
CS Voltage	V_{CS}	$R_{CS}=2.7\Omega$, Class A	68		80	mV
		$R_{CS}=2.7\Omega$, Class B	80		94	mV
Efficiency						
Efficiency	η	$L_1=180\mu\text{H}$, $C_1=22\mu\text{F}$		85		%

Typical Electrical Curves

$T_A = 25^\circ\text{C}$, $L_1 = 200\mu\text{H}$, $C_2 = 10\mu\text{F}$, $R_{CS} = 5.1\Omega$, unless otherwise specified



Applications Information

Detailed Description

QX5259 is an ASIC for solar LED lawn lights.

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QX5259 uses CMOS technology, therefore the power consumption is very small.

QX5259 uses patented technique to realize the LED lights shutdown without flicker when the battery voltage is low.

The internal circuits of QX5259 include switching driver, light control switching circuit, over-discharge protection, and the internal integrated Schottky diode.

LED Power Setting

QX5259 features a programmable LED current adjusted by an external resistor connected between BAT and CS pins. The equation to calculate the LED current is as follows:

$$I_{LED} = \frac{V_{CS}}{R_{CS}}$$

Light Control Switch Settings

QX5259 need an external photo-resistor in the CDS and an ordinary resistor. CDS terminal voltage is set by the following equation:

$$V_{CDS} = \frac{R_1 // R_{CDS}}{R_1 // R_{CDS} + R_2} * V_{BAT}$$

Where, R_{CDS} is a built-in resistor of 60K Ω typically, V_{BAT} is the BAT voltage to ground. When V_{CDS} is higher than 0.36* V_{BAT} , the light control switch makes the LED light off,

when V_{CDS} is lower than 0.22* V_{BAT} , the light control switch makes the LED light turn on.

Inductance, Capacitance Selection

Inductance value is usually about 100uH. Increasing the inductance will reduce the switching frequency, and reducing the inductance will increase switching frequency.

To achieve high efficiency, the low ESR inductor is chosen.

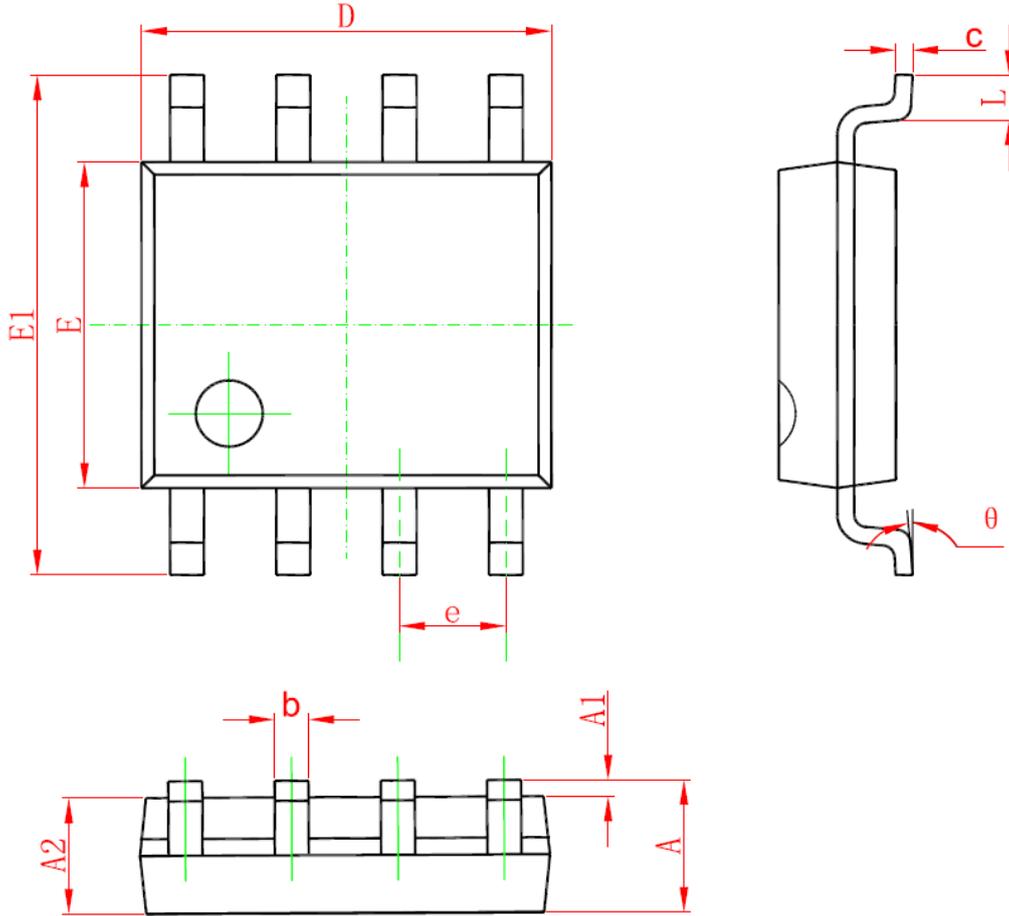
Input and output capacitors uses 1uF~ 4.7uF ceramic capacitors.

PCB layout

To ensure stable operation of the circuit, the input capacitor C_1 must be near BAT and VSS pins. The area surrounded by the power loop including inductor should be as small as possible.

Package Information

Physical Dimensions for SOP8 Package:



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 (BSC)		0.050 (BSC)	
L	0.400	1.270	0.016	0.050
theta	0°	8°	0°	8°

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