General Description

QX5252 is an ASIC for solar LED lawn lights.

Only a peripheral inductor is required to realize the step-up power supply, and the maximum drive efficiency can exceed 84%.

QX5252 has automatical charge characteristic.

QX5252 uses CMOS technology , therefore the power consumption is very small.

QX5252 uses patented technique to realize the LED lights shutdown without flicker when the battery voltage is low.

The operating voltage of QX5252 is 0.9V to 1.5V, suitable for a single AA battery or a single Ni-H battery.

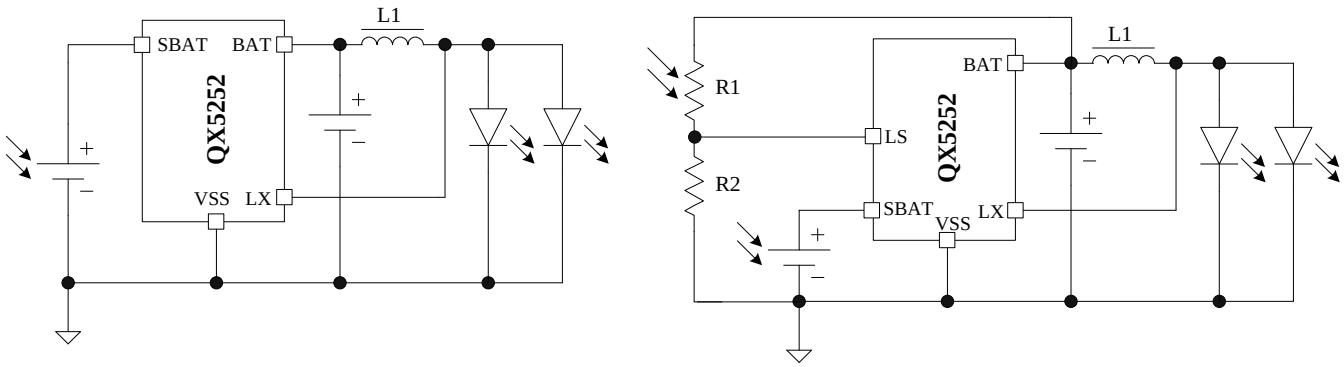
Features

- Operating Voltage: 0.9V~1.5V
- 3mA~300mA Output current
- Patented over-discharge protection: shutdown without flicker
- Integrated light control switch
- Integrated Schottky Diode
- Only an external inductor is requierd
- High Efficiency
- Low quiescent current: 17uA

Applications

- Solar lawn
- Solar Landscape

Typical Application



(a)Uses solar panel to achieve light control

(b) Uses photo-resistor to achieve light control

Figure 1：Typical Application Circuit Diagrams of QX5252

Ordering Information

Type Number

QX5252

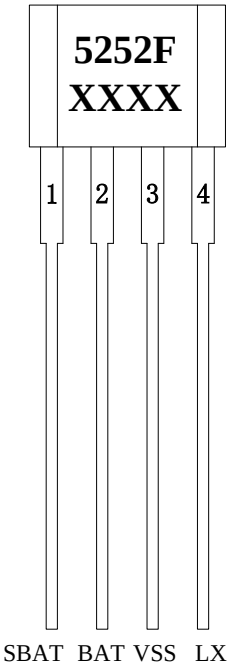
Package Marking

5252F
XXXX

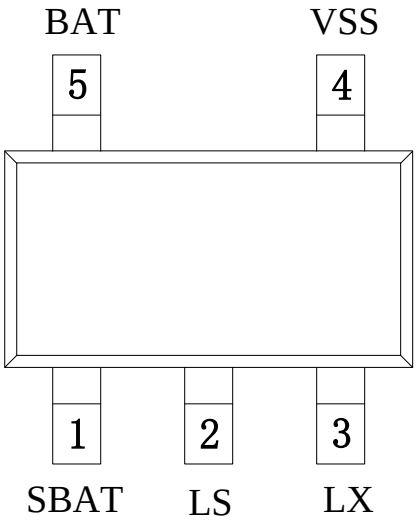
Lot Number

Date

Pin Assignments



TO-94



SOT23-5

Pin Description

Pin Name	Package Type and Pin Number		Pin Type	Description
	SOT23-5	TO-94		
LX	3	4	Output	Drain of the switching power MOSFET
SBAT	1	1	Input	Connect to solar cells positive terminal
VSS	4	3	Ground	Ground
BAT	5	2	Output	Connect to rechargeable battery positive terminal
LS	2	-	Input	Light sense

Functional Block Diagram

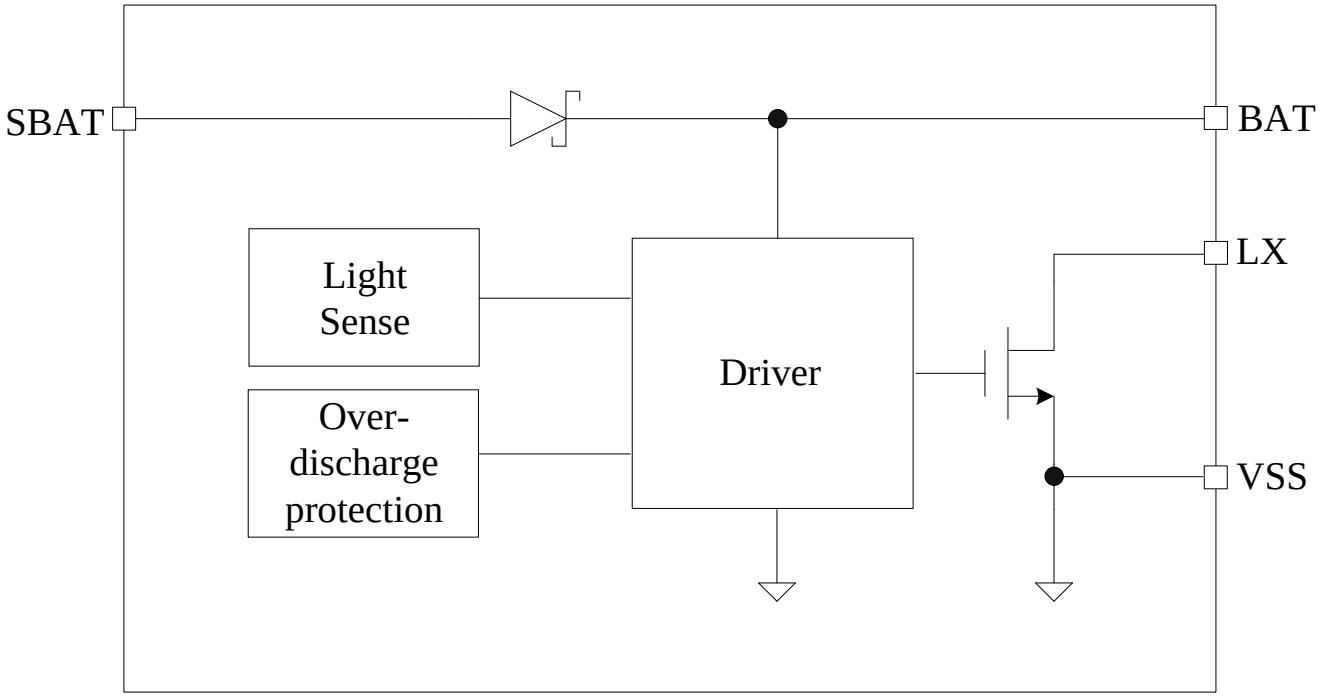


Figure 2：Functional Block Diagram of QX5252

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_{TO-94}	Maximum Power Dissipation for P_{TO-94} Package		0.75	W
	$P_{SOT23-5}$	Maximum Power Dissipation for $P_{SOT23-5}$ Package		0.25	W
Thermal	T_A	Operating Temperature Range	-20	85	^oC
	T_{STG}	Storage Temperature Range	-40	120	^oC
	T_{SD1}	Soldering Temperature Rang for TO-94 Package （less than 5 sec）	250	260	^oC
	T_{SD2}	Soldering Temperature Rang for SOT23-5 Package （less than 30 sec）	230	240	^oC
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.

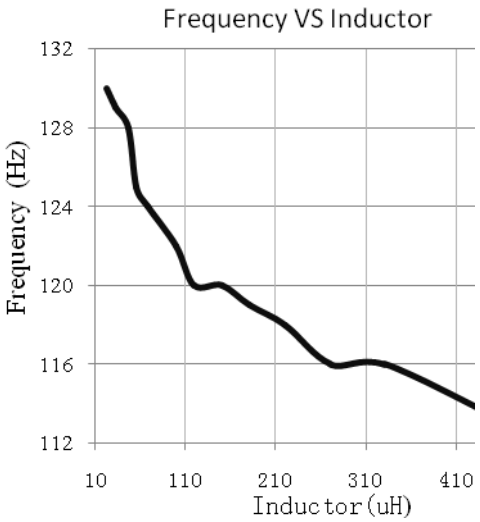
Electronic Characteristics

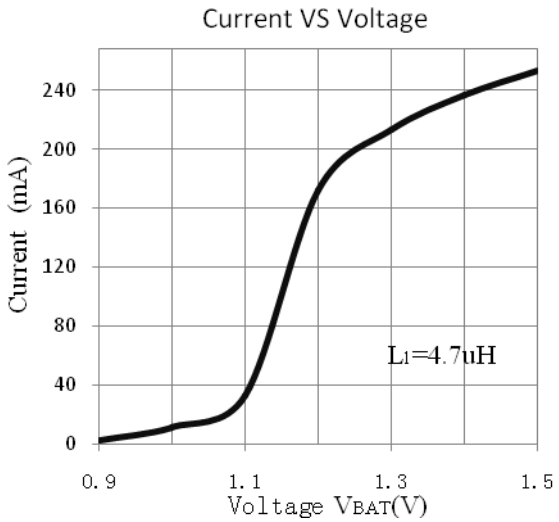
T_A =25 ^oC, L_1 =47uH, unless otherwise specified

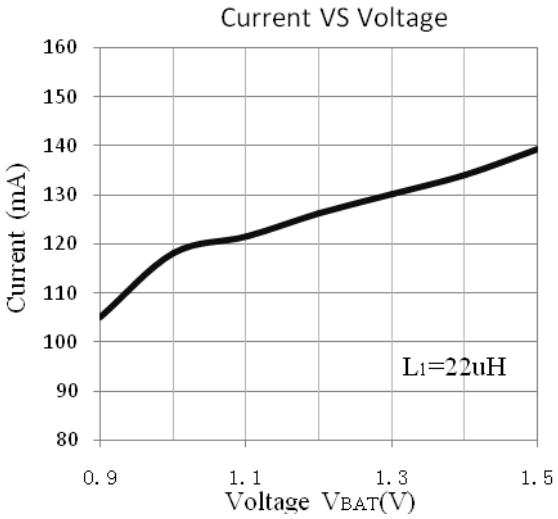
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Supply Voltage						
Operating Voltage	V_{BAT}		0.9		1.5	V
Supply Current						
Quiescent Current	I_{BAT0}			17		uA
T_{ON} Time						
T_{ON} Time	T_{ON}			5		us
Efficiency						
Efficiency	η	L_1 =180uH，C_1=22uF		84		%

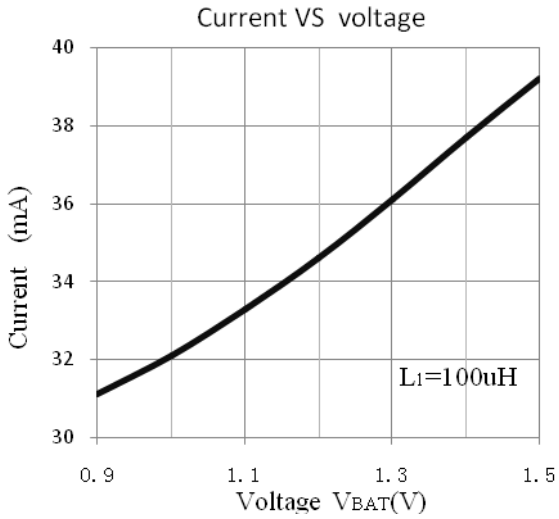
Typical Electrical Curves

V_{BAT}=1.2V, T_A=25 °C, unless otherwise specified









Applications Information

Detailed Description

QX5252 is an ASIC for solar LED lawn lights.

Only a peripheral inductor is required to realize the step-up power supply, and the maximum drive efficiency can exceed 84%.

QX5252 has automatically charge characteristics.

The operating voltage of QX5252 is 0.9V to 1.5V, suitable for a single AA battery or a single Ni-H battery.

QX5252 uses CMOS technology , therefore the power consumption is very small.

QX5252 uses patented technique to realize the LED lights shutdown without flicker when the battery voltage is low.

The internal circuits of QX5252 include switching driver, light control switching circuit, over-discharge protection, and the internal integrated Schottky diode.

Light Control Switch Setting

TO-94 Package Uses solar panels to achieve light control.

SOT23-5 Package Uses an external photo-resistor and an ordinary resistor to achieve light control, LS terminal voltage is set by the following equation:

$$V_{LS} = \frac{R2}{R1 + R2} * V_{BAT}$$

When V_{LS} higher than 0.3 * V_{BAT}, the light control switch makes the LED light control switches off, when V_{LS} lower than 0.22 * V_{BAT}, the light control switch makes the LED lights turn on.

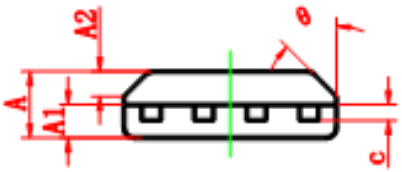
Power Setting

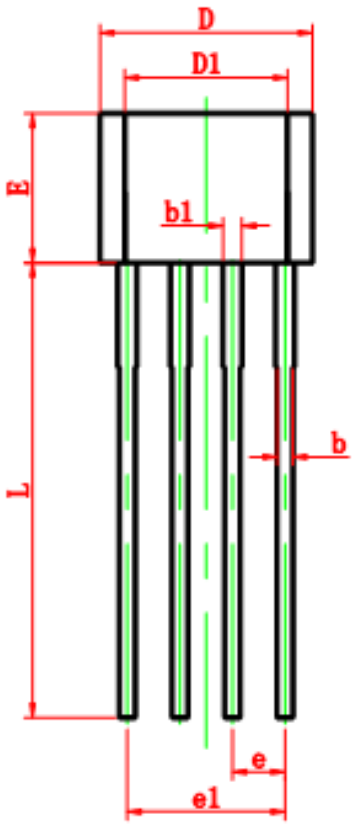
The LED power is set to:

$$P_{LED} = \frac{2.5 \cdot \eta \cdot V_{BAT}^2}{L_1} \times 10^{-6}$$

Package Information

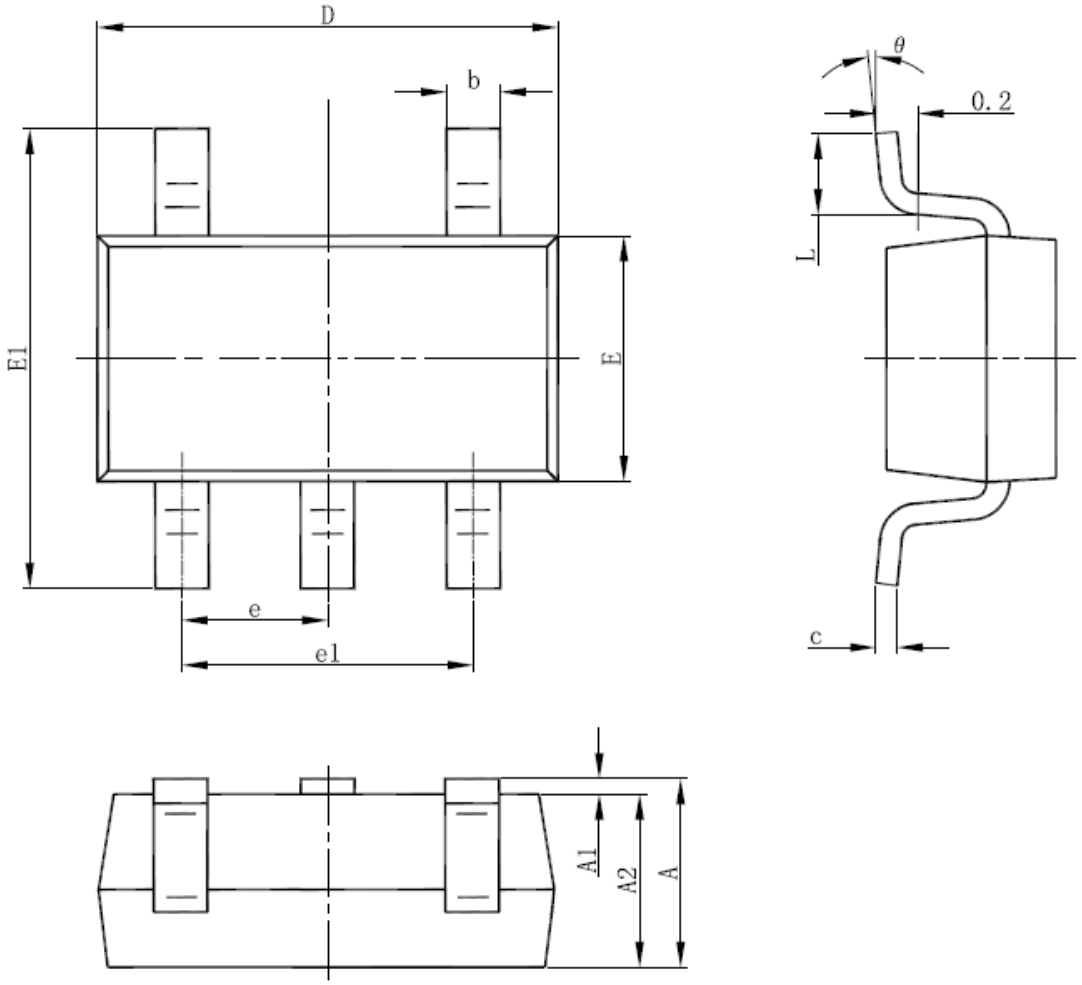
Physical Dimensions for TO-94 Package:





Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.800	0.055	0.071
A1	0.700	0.900	0.028	0.035
A2	0.500	0.700	0.020	0.028
b	0.360	0.500	0.014	0.020
b1	0.380	0.550	0.015	0.022
c	0.360	0.510	0.014	0.020
D	4.980	5.280	0.196	0.208
D1	3.780	4.080	0.149	0.161
E	3.450	3.750	0.136	0.148
e	1.270 TYP		0.050 TYP	
e1	3.710	3.910	0.146	0.154
L	14.900	15.300	0.587	0.602
θ	45° TYP		45° TYP	

Physical Dimensions for SOT23-5 Package:



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

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