



3W High Power White LED ME2206

Description

The ME2206 is a CMOS BOOST DC-DC converter that delivers a regulated output current. It switches at a 1MHz constant frequency (TYP), using of small value external inductor and ceramic capacitors.

The ME2206 is aimed to be used for driving loads up to 1A from a one or two-cell alkaline battery (according to specific package). Additionally, it can limit the LED current by the sense resistor connected between the feedback pin (FB) and ground. A low 95mV feedback voltage reduces the power loss in the Rs for better efficiency. During the shutdown mode, the current consumption is reduced to less than 1uA.

Applications

- White LED Torch (Flashlight)
- White LED Camera Flash
- DSC(Digital Still Camera)Flash
- Cellular Camera Phone Flash
- PDA Camera Flash
- Camcorder Torch(Flashlight) Lamp

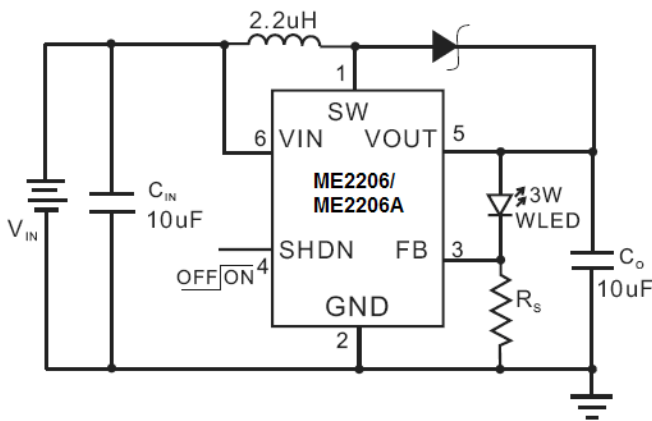
Features

- LED Power Efficiency: up to 90%
- Current Accuracy: $\pm 10\%$
- Low Start-Up Voltage: 0.9V($I_{LED}=270mA$)
- Low Hold Voltage:0.75V($I_{LED}=200mA$)
- 1MHz Switching Frequency
- Uses small, Low Profile External Components
- Low RDS(ON) : 100m Ω (TYP.)
- Open LED Protection
- Over Temperature Protection
- Pb-Free Package

Package

- 6-pin : SOT23-6
- 5-pin : SOT89-5

Typical Application Circuit



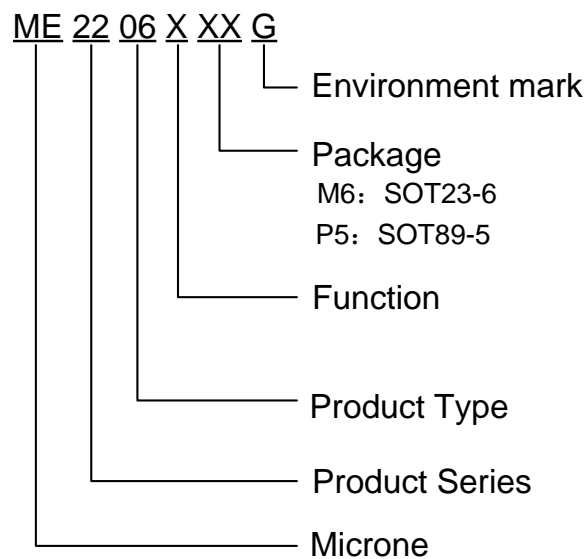
Rs Resistor Value Selection:

TYP. (mΩ)	I _{LED} (mA)
127	750
270	351.8

Precautions:

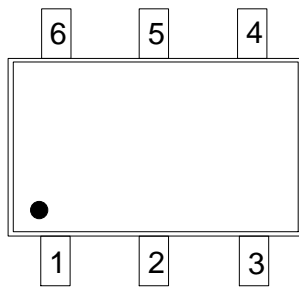
ME2206 is only applicable to two battery-driven 1W or 3W white LED, ME2206A a battery can drive 1W or 3W white LED.

Selection Guide

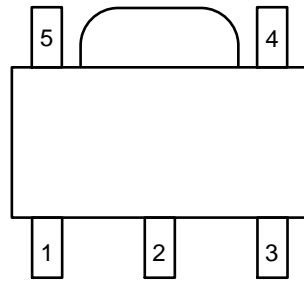


product series	product description
ME2206M6G	two battery-driven; package: SOT23-6
ME2206P5G	two battery-driven; package: SOT89-5
ME2206AM6G	a battery-driven; package: SOT23-6
ME2206AP5G	a battery-driven; package: SOT89-5

Pin Configuration



SOT23-6

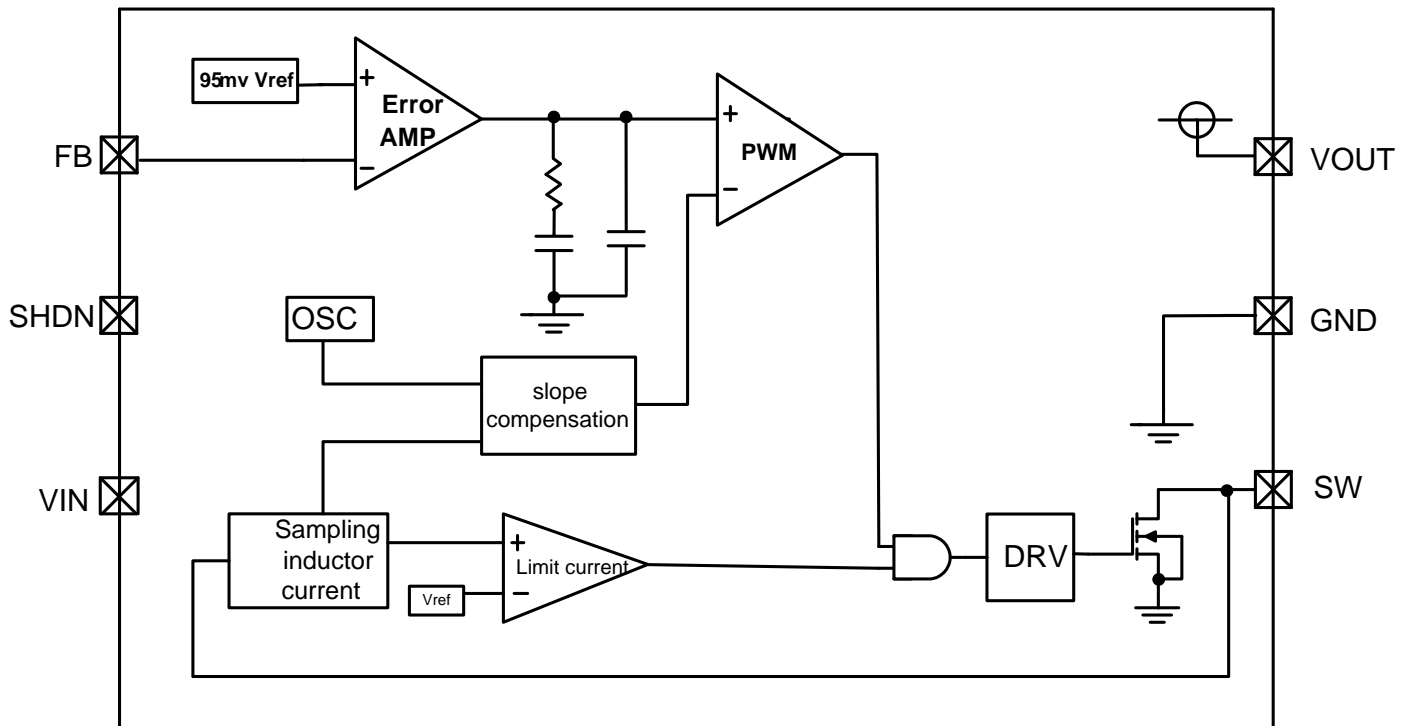


SOT89-5

Pin Assignment

Pin Number		Name	Function
SOT23-6	SOT89-5		
1	4	SW	Switch
2	2	GND	Ground
3	3	FB	Feedback
4	1	SHDN	Shut Down
5	5	V _{OUT}	Output
6	/	V _{IN}	Input

Block Diagram



Absolute Maximum Ratings

Parameter	Symbol	Ratings	Units	
Input Voltage	V_{IN}	-0.3V~6V	V	
SW Pin Voltage	SW	-0.3V~6V	V	
SHDN, FB Pin Voltage	SHDN/FB	-0.3V~6V	V	
Operating Temperature Range	T_{OPR}	-40°C~85°C	°C	
Storage Temperature Range	T_{STG}	-55°C~125°C	°C	
Lead Temperature (Soldering, 10 sec)	T_L	260°C	°C	
Internal Power Dissipation	SOT23-6	P_D	400	mW
	SOT89-5	P_D	500	mW

Electrical Characteristic

$T=25^{\circ}\text{C}$, $V_{in}=2.4\text{V}$, $I_{LED}=750\text{mA}$, $V_{SHDN}=V_{in}$, $L=2.2\mu\text{H}$, $C_{in}=C_{out}=10\mu\text{F}$, unless otherwise noted.

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Input Voltage Range	V_{in}		0.9		$V_F-0.2$	V
Feedback Voltage	V_{FB}		85	95	105	mV
Start-up Voltage	V_{START}	$V_{in}: 0\text{V}\sim 3\text{V}$ $I_{LED}=270\text{mA}$		0.9		V
Hold Voltage	V_{HOLD}	$V_{in}: 3\text{V}\sim 0\text{V}$ $I_{LED}=750\text{mA}\sim 200\text{mA}$		0.75		V
Oscillator Frequency	F_{OSC}			1		MHz
SHDN Input High	V_{SH}	$V_{in}=1.8\text{V}$	1.0			V
SHDN Input Low	V_{SL}	$V_{in}=1.8\text{V}$			0.4	V
Over Temperature Shutdown	OTS			150		°C
Over Temperature Hysteresis	OTH			15		°C
Maximum Output Current Range	I_{MAX}		750			mA
Quiescent Current	I_Q	$I_{LED}=0\text{mA}$, $V_{out}=3.4\text{V}$, Device Switch at 1MHz		1	3	mA
Shutdown Current	I_{SD}	Shutdown mode			1	uA
Switch on Resistance	R_{DSON}	$V_{out}=3.4\text{V}$		0.1		Ω
Current Limit	I_{LIM}	$V_{out}=3.4\text{V}$	2			A
Efficiency	η	$I_{LED}=750\text{mA}$		90		%

Note: V_F for LED forward voltage

Operation Principles

The ME2206 could work at low input voltage condition. The ME2206 is supplied by VOUT. When the output voltage is lower than 2V, the internal low voltage OSC starts work. After the VOUT voltage is higher than 2V, the circuit loop began to work normally. According to the sampled feedback voltage at FB pin, the chip adjusts the Duty, to make the output constant current. The ME2206 has the limiting inductor's current function, and the limiting current is 2A. When the chip's temperature is higher than 150°C, it enters the OTP function. And the chip

stops work. When the chip's temperature down to 135°C, the ME2206 works again. If the load open, The ME2206 enters load open protection state. Then the VOUT will up to 5V and the ME2206 stops working. After the VOUT down to 4.6V, ME2206 began working again.

External Parts Selection

1. Inductor

The recommended L value of the ME2206 Series is 2.2μH.

The inductance (L) has a strong influence on the maximum output current (I_{OUT}) and efficiency (η). The inductor peak current (I_{PK}) increases when L is decreased, which improves the circuit stability and increases the I_{OUT} users can obtain. The ME2206 can use small value inductors due to its switching frequency of 1MHz. User could accord to applications to choose the value of inductor in range of 2.2μH to 4.7μH. The inductor should have low DCR (DC resistance) to minimize the I^2R power loss, and it requires a current rating of 2A to handle the peak inductor current without saturating.

2. Diode

It's necessary to use a Schottky diode rated at 2A with the ME2206. Using a Schottky diode with a lower forward voltage drop is better to improve the power LED efficiency, and its reverse breakdown voltage should be greater than the output voltage.

3. Input capacitor (C_{IN}) and output capacitor (C_{OUT})

To improve efficiency, an input capacitor (C_{IN}) lowers the power supply impedance and averages the input current.

For better input decoupling, Low ESR (equivalent series resistance) capacitors should be used at the input. At least 10μF input capacitor is recommended for most applications.

An output capacitor (C_{OUT}), which is used to smooth the output voltage, requires a capacitance larger than that of the step-down type because the current is intermittently supplied from the input to the output side in the step-up type. A minimum output ceramic capacitor value of 10μF is recommended for the ME2206. However, a higher capacitance is recommended if the output voltage is high or the load current is large. 10μF~22μF output capacitor is recommended for higher power applications.

4. LED Current Setting

The LED current is set by the single external R_s resistor connected to the FB pin as shown in the typical application circuit. The typical FB reference is internally regulated to 95mV. The LED current is $95mV/R_s$. It's recommended to use a 1% or better precision resistor for the better LED current accuracy. The formula and table for R_s selection are shown as follows:

$$R_s = 95\text{m}\Omega / I_{LED}$$

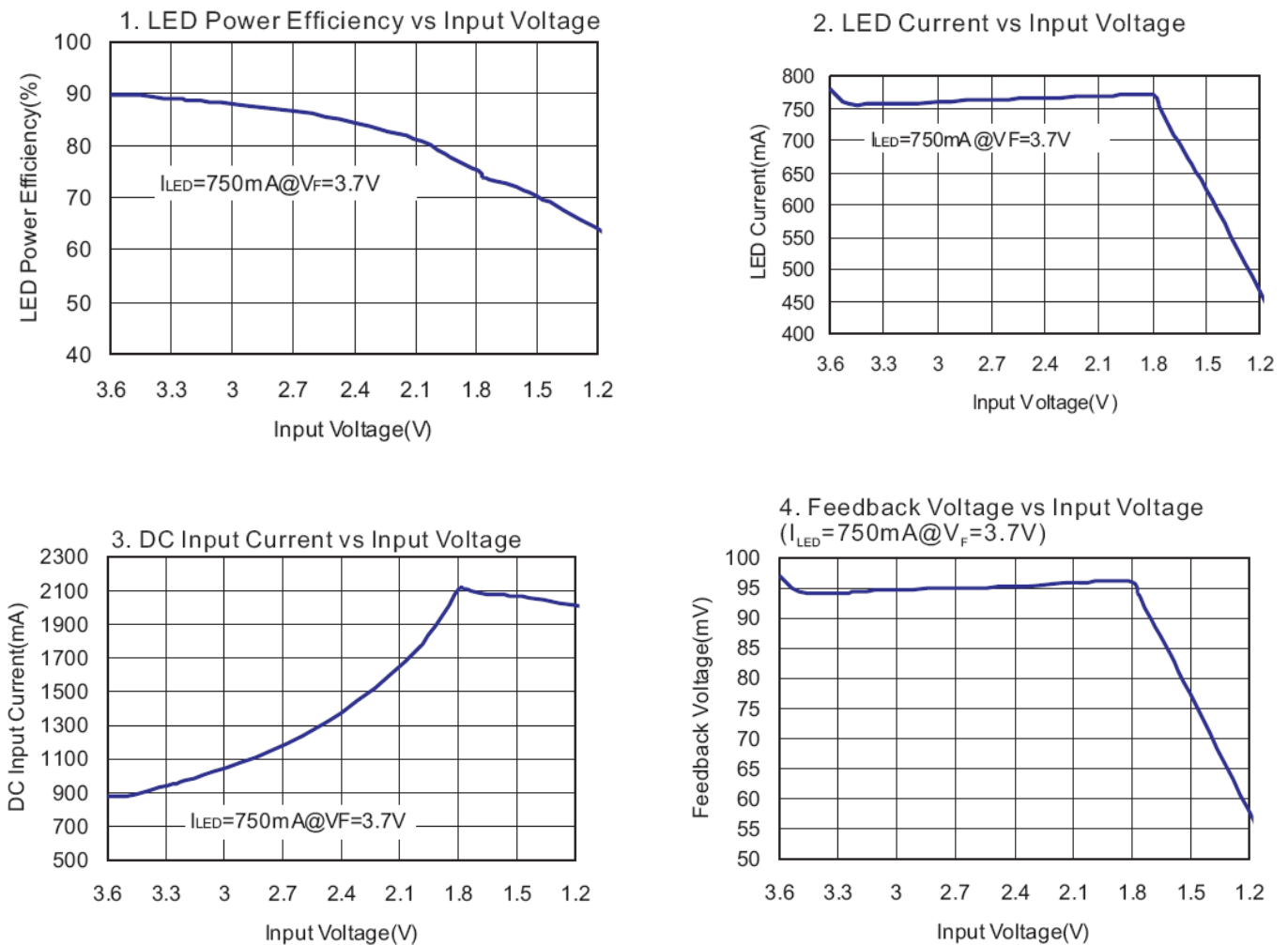
Standard Value(Ω)	I_{LED} (mA)
0.18	528
0.15	633
0.12	792
0.10	950

5. PCB Layout Guidelines

The input capacitor and output capacitor should be placed respectively as close as possible to the input pin and out pin of the IC; the inductor and schottky diode should be placed as close as possible to the switch pin by using wide and short traces for the main current path; the current sense resistor should be placed as close as possible between the GND pin and FB pin.

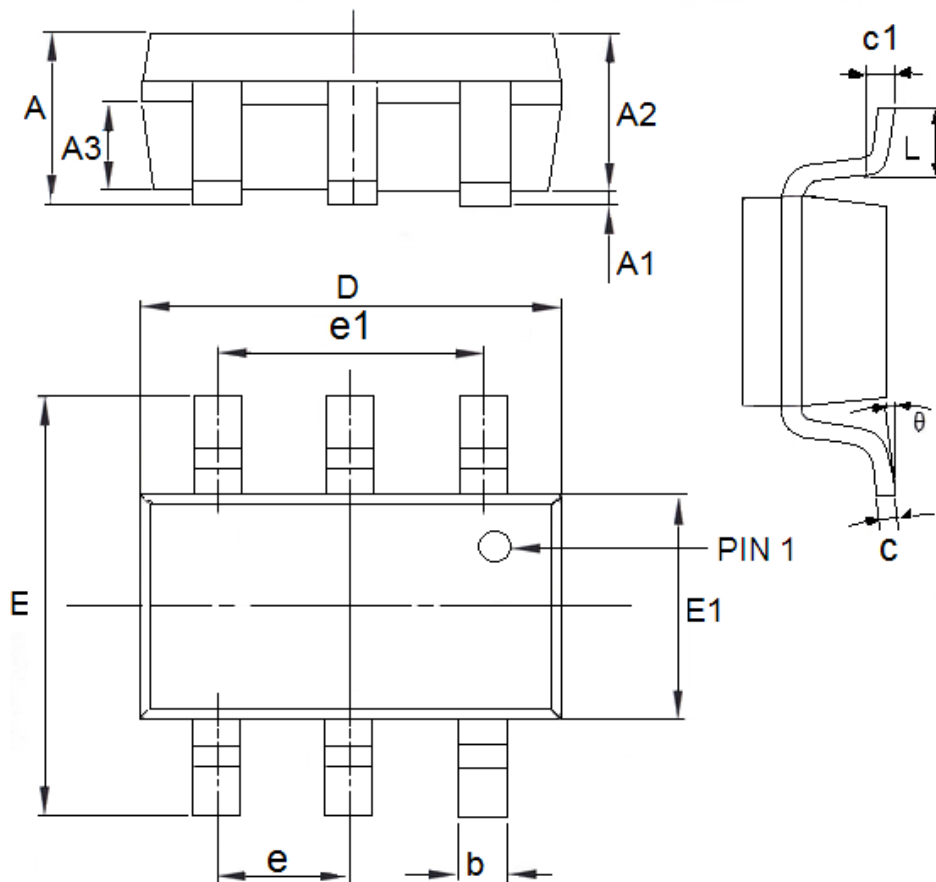
Typical Performance Characteristics

$T=25^\circ\text{C}$, $L=2.2\mu\text{H}$, $C_{in}=C_{out}=10\mu\text{F}$, unless otherwise noted.



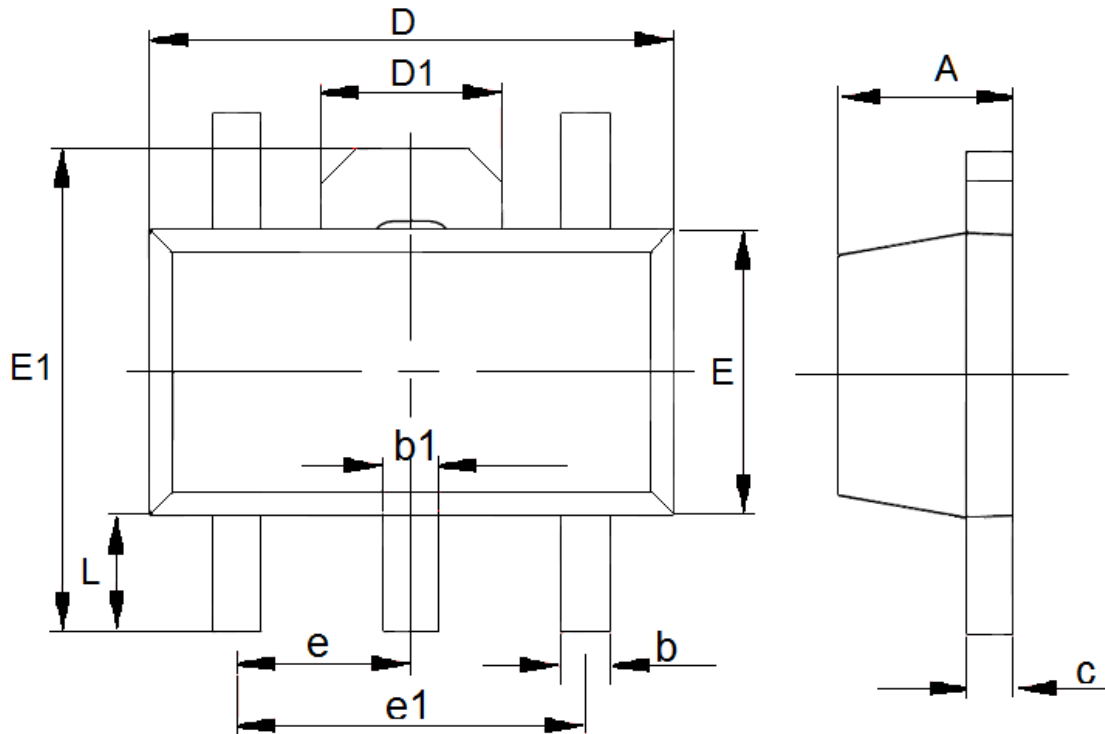
Packaging Information

- Package type: SOT23-6



DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	1.05	1.45	0.0413	0.0571
A1	0	0.15	0.0000	0.0059
A2	0.9	1.3	0.0354	0.0512
A3	0.55	0.75	0.0217	0.0295
b	0.25	0.5	0.0098	0.0197
c	0.1	0.25	0.0039	0.0098
D	2.7	3.12	0.1063	0.1228
e1	1.9(TYP)		0.0748(TYP)	
E	2.6	3.1	0.1024	0.1220
E1	1.4	1.8	0.0551	0.0709
e	0.95(TYP)		0.0374(TYP)	
L	0.25	0.6	0.0098	0.0236
theta	0	8°	0.0000	8°
c1	0.2(TYP)		0.0079(TYP)	

- Package type: SOT89-5



DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	1.4	1.6	0.0551	0.0630
b	0.32	0.52	0.0126	0.0205
b1	0.38	0.58	0.0150	0.0228
c	0.35	0.47	0.0138	0.0185
D	4.4	4.6	0.1732	0.1811
D1	1.55(TYP)		0.061(TYP)	
e1	3(TYP)		0.1181(TYP)	
E	2.3	2.6	0.0906	0.1023
E1	3.94	4.4	0.1551	0.1732
e	1.5(TYP)		0.0591(TYP)	
L	0.8	1.2	0.0315	0.0472

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