

## GENERAL DESCRIPTION

OB2106 is a High voltage hysteresis mode Buck converter. The input voltage can be as high as 80V and the output voltage is programmable by external resistor divider. It delivers up to 200mA load current with excellent line and load transient response. With On-Bright patented control scheme, OB2106 works with a wide input and output range with a minimum number of external components.

OB2106 automatically adjusts the switching frequency based on the output power. It provides output short circuit protection, over temperature protection, under voltage lock-out and cycle by cycle over current protections. When output short circuit happens, OB2106 enters hiccup mode until short circuit condition is released, which greatly saves the energy loss and avoid the chip overheating. OB2106 provides soft startup control to avoid inrush output current.

OB2106 is provided with SOT23-6 package.

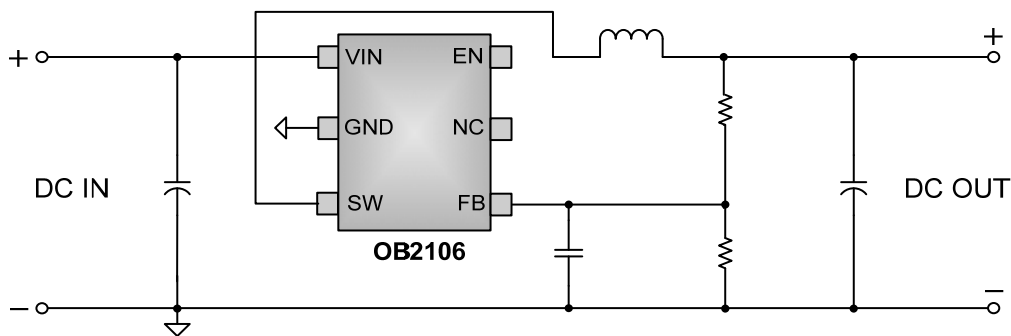
## FEATURES

- Enable control
- Wide input voltage range (5.5V to 80V)
- Wide output voltage range (programmable by external resistor divider)
- Up to 200mA output current
- Excellent line and load transient response
- Minimum number of external components
- Output short-Circuit protection
- Over temperature protection
- Cycle-by-cycle over current protection
- Under voltage lock-out

## APPLICATIONS

- LED lighting
- Portable device
- Motor driver

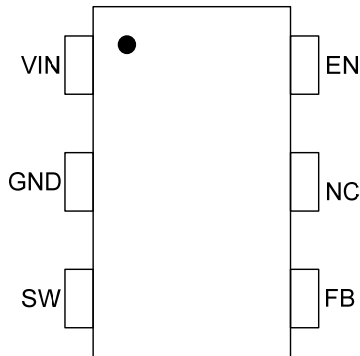
## TYPICAL APPLICATION



### GENERAL INFORMATION

#### Pin Configuration

The pin map of OB2106 in SOT23-6 package is shown as below.



#### Ordering Information

Part Number	Description
OB2106MP	SOT23-6, Halogen-free in T&R

#### Package Dissipation Rating

Package	R $\theta$ JA (°C/W)
SOT23-6	200

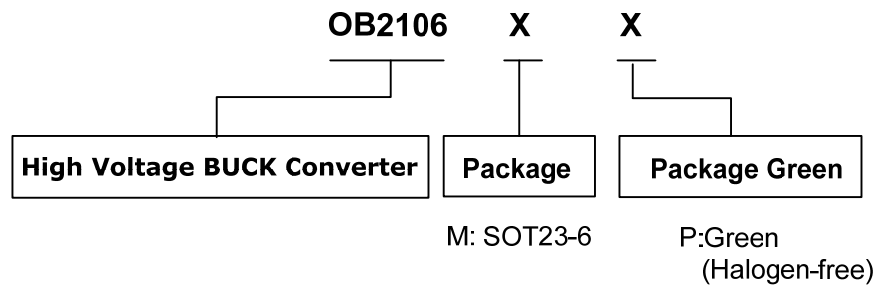
#### Absolute Maximum Ratings

Parameter	Value
VIN Voltage (room temperature)	-0.3V to 80V
SW Voltage	-3V to VIN
EN, FB Voltage	-0.3 to 8V
Min/Max Operating Junction Temperature TJ	-40 to 150 °C
Operating Ambient Temperature TA	-40 to 85 °C
Min/Max Storage Temperature Tstg	-55 to 150 °C
Lead Temperature (Soldering, 10secs)	260 °C

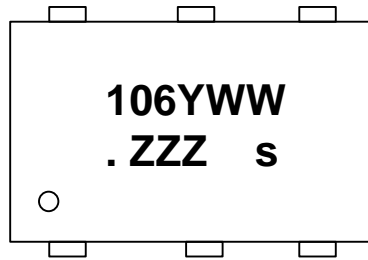
**Note:** Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute maximum-rated conditions for extended periods may affect device reliability.

#### Recommended Operating Condition

Symbol	Parameter	Min	Max	Unit
VIN	Input Voltage	5.5	75	V



## Marking Information

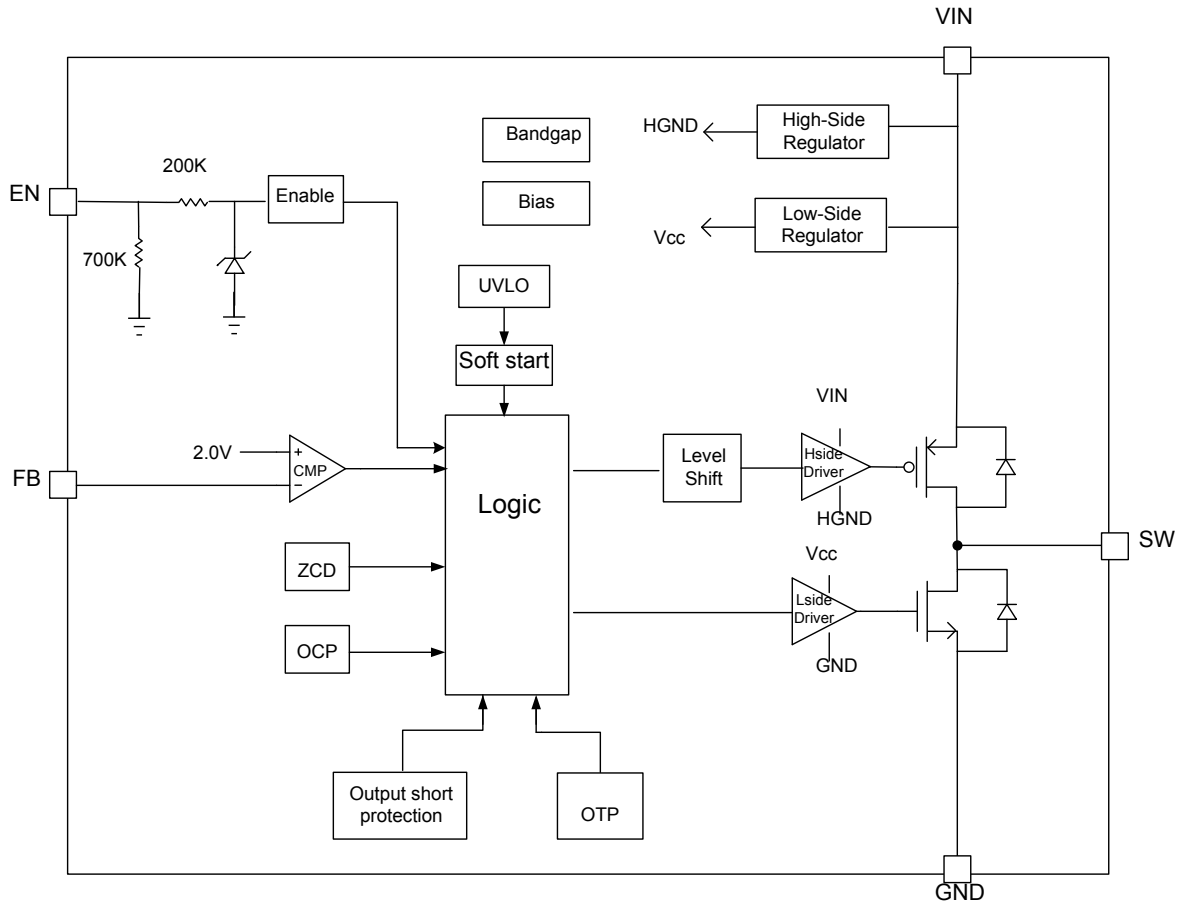


Y:Year Code  
 WW:Week Code(01-52)  
 ZZZ:Lot Code  
 S:Internal Code

## TERMINAL ASSIGNMENTS

Pin Num	Pin Name	I/O	Description
1	VIN	I	External power supply input pin.
2	GND	P	Ground pin of the IC
3	SW	O	Power switch output Pin. Connect an inductor to this pin.
4	FB	I	Output voltage feedback pin. A 100pF capacitor close to the IC is recommended to be placed between this pin and pin GND.
5	NC		
6	EN	I	Enable control Pin.

**BLOCK DIAGRAM**

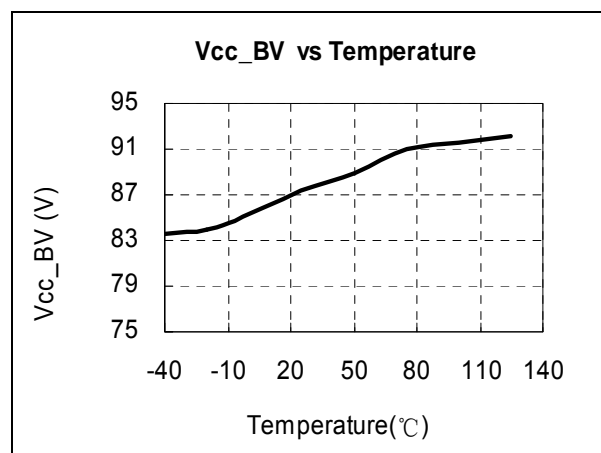
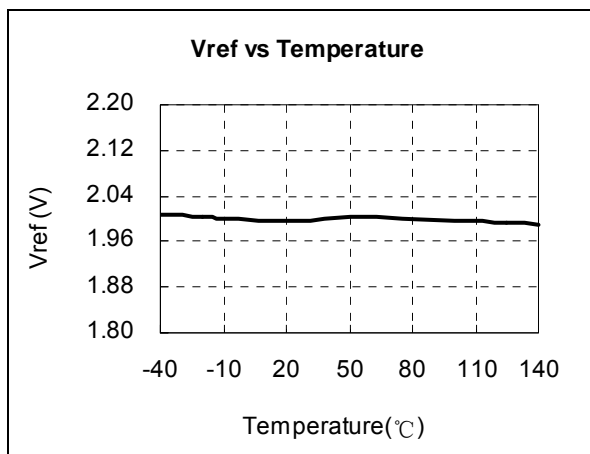


### ELECTRICAL CHARACTERISTICS

(T<sub>A</sub> = 25°C, V<sub>IN</sub>=36V, if not otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ.	Max	Unit
<b>Supply Voltage Section</b>						
I <sub>q</sub>	Operation supply current	switching		700		uA
	Quiescent supply current	no switching		550		uA
	EN shut down current				2	uA
UVLO	Threshold of UVLO			4	5.5	V
V <sub>th_en_on</sub>	EN on threshold voltage	EN rising up	1.4			V
V <sub>th_en_off</sub>	EN off threshold voltage	EN falling down			0.4	V
OTP	Over temperature protection threshold			180		°C
OTP_HYS	Over temperature protection hysteresis			20		°C
<b>BUCK Section</b>						
V <sub>ref</sub>	Feedback compare reference voltage		1.9	2	2.1	V
I <sub>limit</sub>	Inductor peak current limit threshold			330		mA
I <sub>demag</sub>	Inductor min demagnetizing current			160		mA
T <sub>sst</sub>	Soft start time			4		ms
T <sub>hiccup</sub>	Hiccup time			1		s
V <sub>th_short</sub>	FB threshold voltage for vout short protection		0.405	0.45	0.495	V
T <sub>max_on</sub>	The max high side turn on time			60		us
T <sub>deadtime</sub>	Dead time			100		ns
R <sub>dson_p</sub>	R <sub>dson</sub> of PMOS power transistor			4.5	9	Ω
R <sub>dson_n</sub>	R <sub>dson</sub> of NMOS power transistor			1.7	3.4	Ω

### CHARACTERIZATION PLOTS



### OPERATION DESCRIPTION

OB2106 is a high voltage hysteresis mode Buck converter. When FB voltage becomes lower than reference voltage and the inductor current is lower than the minimum demagnetizing current, the high side power transistor turns on to provide current to the output. When the inductor current increase to the current limit threshold value of 300mA (typical), OB2106 turns off the high side power transistor and then turns on the low side power transistor for after following. If the inductor current decreases to zero, the OB2106 turns off the low side power transistor.

#### Enable control

OB2106 can be switched to an ON or OFF state by a logic input at the EN pin. A voltage on this pin greater than  $V_{th\_en\_on}$  turns the device on, while a voltage less than  $V_{th\_en\_off}$  turns the device off. When the EN pin is low, the buck output is off and the device typically consumes less than 1uA (typical) current.

An internal 700k $\Omega$  (typical) pull-down resistor ties the EN input to ground, ensuring that the device remains off if the EN pin is left open circuit. A clamp circuit is also integrated at the EN pin for inrush voltage protection.

#### UVLO protection

OB2106 integrated VIN under voltage lock-out protection (UVLO). When VIN rise up to above 4V (typical), OB2106 will start up and enter switching operation mode. When VIN decreases to under 4V (typical), OB2106 will stop switching operation.

#### Soft start

OB2106 implements soft start function. During the start-up procedure, the output voltage increases up gradually. The soft start time is 4ms (typical).

#### Short circuit protection

At the end of soft startup, if output short circuit happens, the high side power transistor will not turn on after the last switching process finished. After around 1s (typical), OB2106 resumes soft start procedure. The threshold for output short circuit detection is 0.5V (typical) for FB voltage.

#### Zero current detection (ZCD)

OB2106 integrates Zero Current Detection (ZCD) function. During the low side power transistor turn-on phase, ZCD module detects the inductor current by sensing the SW voltage. When it detects the inductor current decreases to zero, OB2106 turns off the low side power transistor.

#### Current limit protection

OB2106 integrated current limit protection for preventing the inductor entering into saturation.

And the cycle by cycle current limiting is also part of the control process. After the high side power transistor turn on, the only turn off condition is the inductor current increase to the current limit threshold value of 330mA (typical)

#### Demagnetizing control

OB2106 integrated demagnetizing control function for preventing the inductor current cumulating cycle by cycle at the condition that the inductor current can't demagnetize fully in one cycle.

OB2106 detects the inductor demagnetizing current after the high side power transistor turns off, if the inductor current hasn't decrease to lower than the minimum demagnetizing threshold value of 160ma (typical), even the FB voltage is lower than the reference voltage, the high side power transistor can't be turn on again. Just when the inductor current decrease to lower than the minimum demagnetizing threshold value, the high side power transistor is allowed to be turn on.

#### Over temperature protection

OB2106 turns off the switching operation mode when the IC junction temperature exceeds 180C (typical) and resumes the switching operation mode when the IC junction temperature drops to 160C (typical).

#### Switching frequency

When the load is lower than  $1/2 \cdot I_{limit}$ , OB2106 works in DCM mode and the average inductor current equals to the load current. The switching frequency determined by the following equation:

$$F = \frac{2I_{out}}{I_{limit}^2 \cdot L} * \frac{V_{out}(V_{in}-V_{out})}{V_{in}}$$

When the load is higher than  $1/2 \cdot I_{limit}$ , OB2106 works in CCM mode and the average inductor current also equals to the load current. The switching frequency determined by the following equation:

$$F = \frac{V_{out}(V_{in}-V_{out})}{2LV_{in}(I_{limit}-I_{out})}$$

When the load is higher than  $1/2 \cdot (I_{limit} + I_{demag})$ , OB2106 works at the maximum switching frequency of:

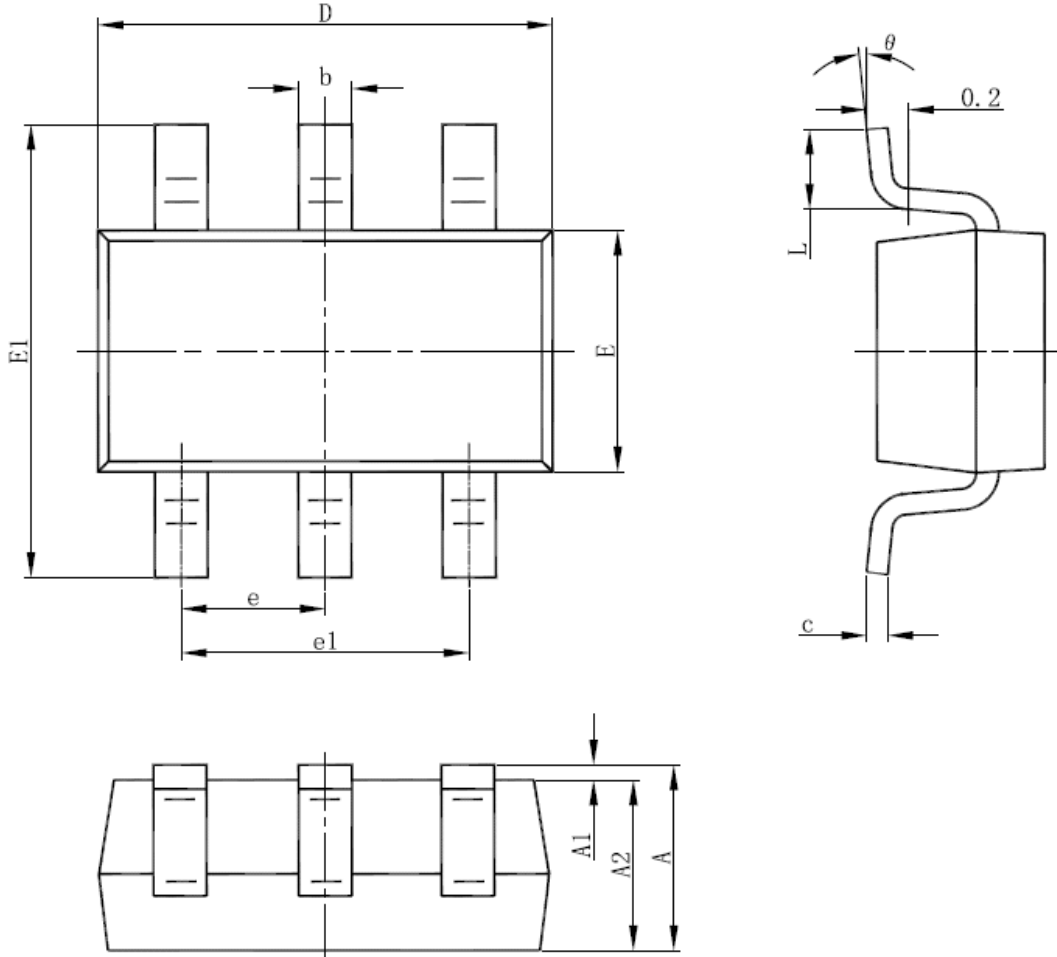
$$F_{max} = \frac{V_{out}(V_{in}-V_{out})}{LV_{in}(I_{limit}-I_{demag})}$$

#### High side voltage regulator

OB2106 integrates a high side voltage regulator to generate a 'VIN-5V' floating ground voltage for driver the high side power transistor.

**PACKAGE MECHANICAL DATA**

**SOT-23-6L PACKAGE OUTLINE DIMENSIONS**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.000	1.450	0.039	0.057
A1	0.000	0.150	0.000	0.006
A2	0.900	1.300	0.035	0.051
b	0.300	0.500	0.012	0.020
c	0.080	0.220	0.003	0.009
D	2.800	3.020	0.110	0.119
E	1.500	1.726	0.059	0.068
E1	2.600	3.000	0.102	0.118
e	0.950 (BSC)		0.037 (BSC)	
e1	1.800	2.000	0.071	0.079

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