GENERAL DESCRIPTION

OB2100 is a High voltage hysteresis mode Buck converter. The input voltage can be as high as 70V and the output voltage is programmable by external resistor divider. It delivers up to 50mA load current with excellent line and load transient response. With On-Bright patented control scheme, OB2100 works with a wide input and output range with a minimum number of external components.

OB2100 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 protection. When output short circuit happens, OB2100 enters hiccup mode until short circuit condition is released, which greatly saves the energy loss and avoid the chip overheating.

OB2100 provides soft startup control to avoid inrush output current.

OB2100 is provided with SOT23-6 package.

FEATURES

■ Wide input voltage range (12V to 70V)
■ Wide output voltage range (programmabled by external resistor divider)
■ Up to 50mA 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
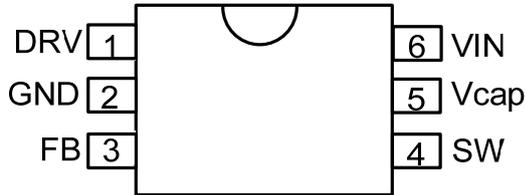
LED lighting
Portable device
Motor driver

TYPICAL APPLICATION
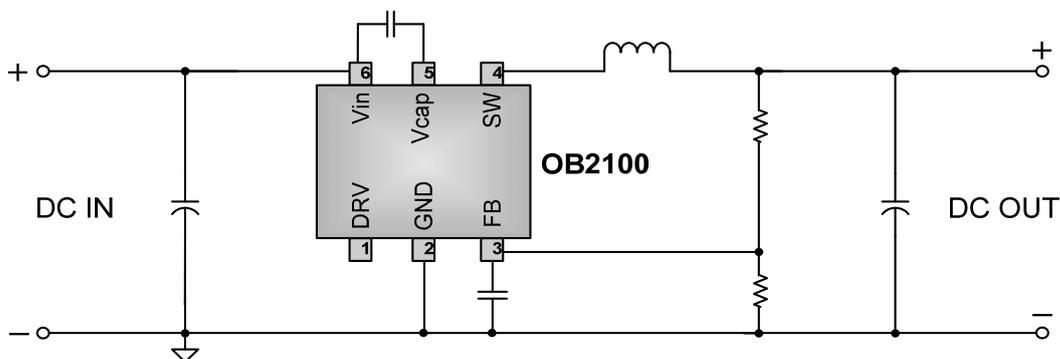
GENERAL INFORMATION

Pin Configuration

The pin map of OB2100 in SOT-23-6 package is shown as below.

```
DRV  [1]          [6]  VIN
GND  [2]          [5]  Vcap
FB   [3]          [4]  SW
```

Ordering Information

Part Number	Description
OB2100MP	SOT23-6, Halogen-free in T&R

Package Dissipation Rating

Package	RθJA (℃/W)
SOT23-6	200

Recommended Operating Condition

Symbol	Parameter	Min	Max	Unit
VIN	Input Voltage	12	70	V

Absolute Maximum Ratings

Parameter	Value
VIN Voltage (room temperature)	-0.3V to 80V
Vcap Voltage	-0.3V to (VIN-5V)
SW Voltage	-3V to VIN
DRV, FB Voltage	-0.3 to 8V
Min/Max Operating Junction Temperature T_J	-40 to 150 ℃
Operating Ambient Temperature T_A	-40 to 85 ℃
Min/Max Storage Temperature T_{stg}	-55 to 150 ℃
Lead Temperature (Soldering, 10secs)	260 ℃

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.

```
          OB2100    X    X
```

High input voltage Buck controller   **Package**   **Package Pb free**

M: SOT23-6   P: Green
                    (Halogen-free)
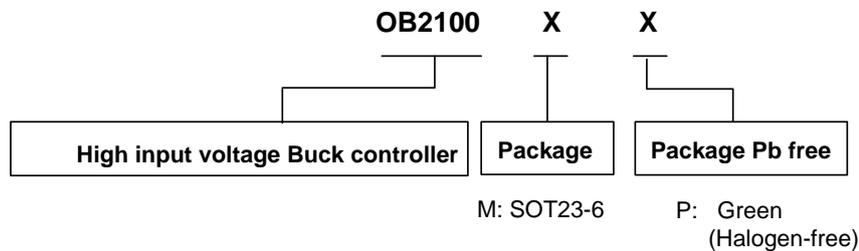
Marking Information

```
┌─────────────────────┐
│  100YWW             │
│  . ZZZ    s         │
└─────────────────────┘
```

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

TERMINAL ASSIGNMENTS

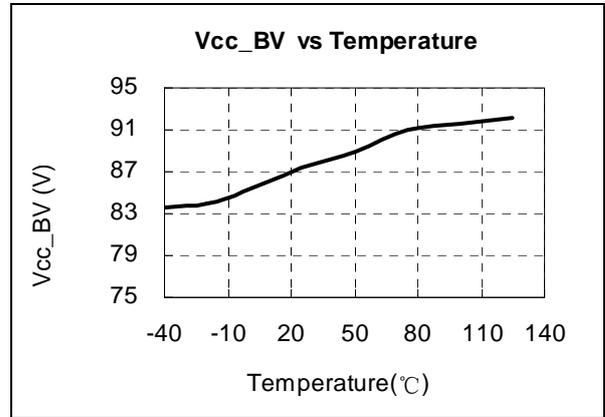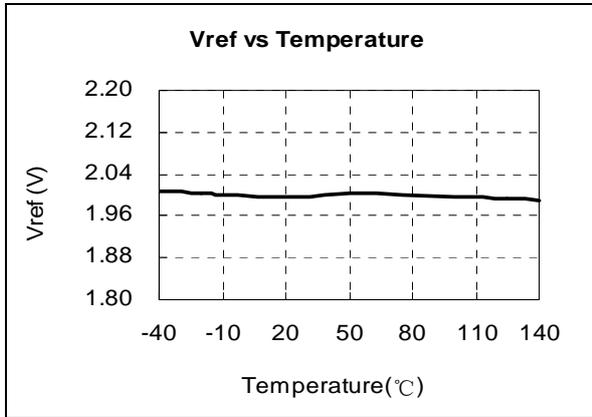| Pin Num	Pin Name	I/O	Description
1	DRV	O	Sink current output Pin. It provides around 1mA current sink from the PIN when 8V<VIN<12V.
2	GND	P	Ground pin of the IC
3	FB	I	Output voltage feedback pin. A 100pF capacitor close to the IC is recommended to be placed between this pin and pin GND.
4	SW	O	Power switch output Pin. Connect an inductor to this pin.
5	Vcap	O	High side regulator output pin. A 100nf capacitor close to the IC is recommended to be placed between this pin and pin VIN.
6	VIN	I	External power supply input pin.

BLOCK DIAGRAM
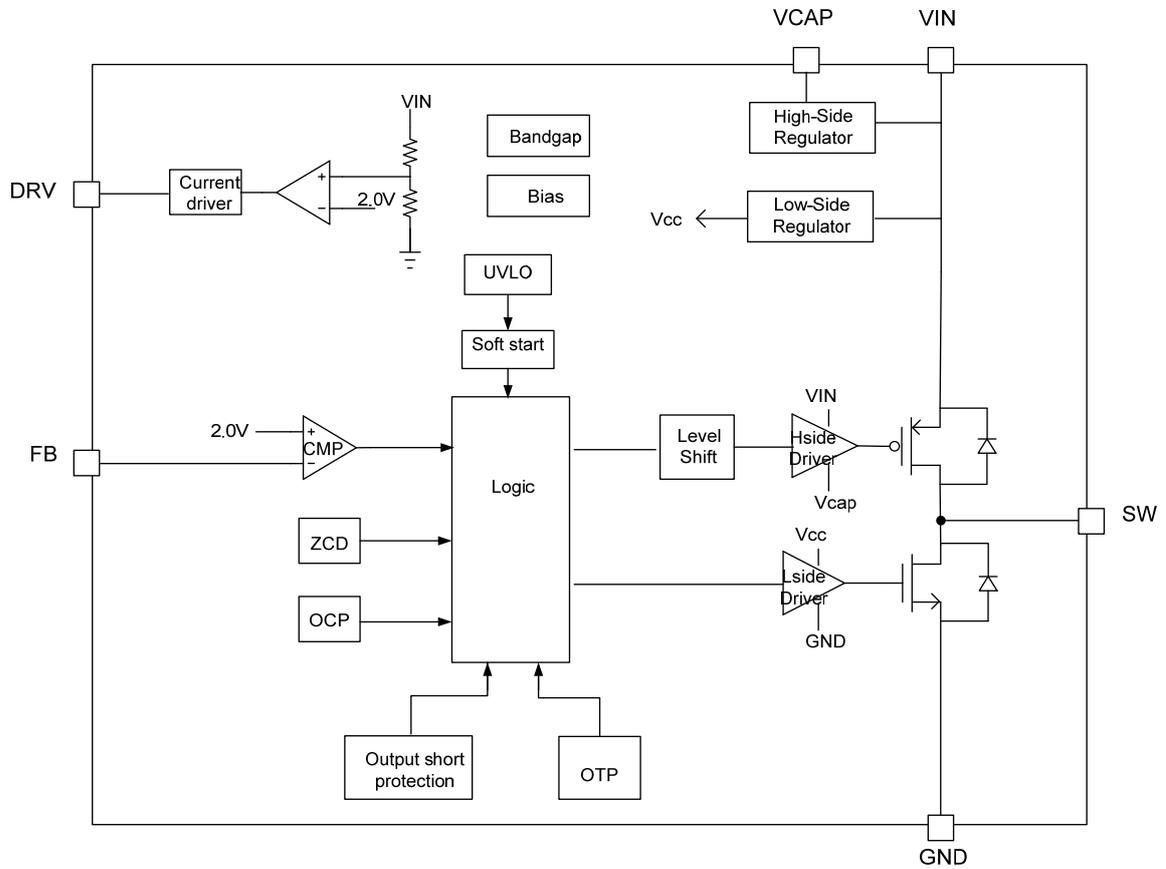
ELECTRICAL CHARACTERISTICS

(T_A = 25℃, VIN=36V, if not otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Supply Voltage Section						
Iq	Operation supply current	switching		550		uA
	Quiescent supply current	no switching		350		uA
UVLO_on	Threshold of UVLO on	VIN falling		8		V
UVLO_off	Threshold of UVLO off	VIN rising		9	10.8	V
Vin_low	VIN low feedback threshold voltage		10.8	12	13.2	V
I_sink	Sink current	VDRV=2V		1		mA
OTP	Over temperature protection threshold			150		℃
OTP_HYS	Over temperature protection hysteresis			20		℃
BUCK Section						
Vref	Feedback compare reference voltage		1.9	2	2.1	V
IL_limit	Inductor peak current limit threshold		120	140	160	mA
T_sst	Soft start time			4		ms
T_hiccup	Hiccup time			400		ms
Vth_short	FB threshold voltage for Vout short protection			0.5		V
T_max_on	The max high side turn on time		48	60	72	us
T_deadtime	Dead time			60		ns
Rdson_p	Rdson of PMOS power transistor			10	20	Ohm
Rdson_n	Rdson of NMOS power transistor			5	10	Ohm

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CHARACTERIZATION PLOTS

Vref vs Temperature

Vref (V)

Temperature(℃)

Vcc_BV vs Temperature

Vcc_BV (V)

Temperature(℃)

OPERATION DESCRIPTION

OB2100 is a high voltage hysteresis mode Buck converter. It always works in DCM mode. When FB voltage becomes lower than reference voltage and the inductor current decreases to zero, the high side power transistor will turn on to provide current to the output. When the inductor current reaches the current limit threshold value of 140mA (typical), OB2100 turns off the high side power transistor and then turns on the low side power transistor. When the inductor current reaches zero, the OB2100 turns off the low side power transistor.

● **UVLO protection**
OB2100 integrated VIN under voltage lock-out protection (UVLO). It features hysteresis characteristic. When VIN rise up to above 9V (typical), OB2100 will start up and enter switching operation mode. When VIN decreases to under 8V (typical), OB2100 will stop switching operation.

● **Soft start**
OB2100 implements soft start function. During the start-up procedure, the output voltage and inductor current 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 400ms (typical), OB2100 resumes soft start procedure. The threshold for output short circuit detection is 0.5V (typical) for FB voltage.

● **Zero current detection (ZCD)**
OB2100 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, OB2100 turns off the low side power transistor.

● **Current limit protection**
OB2100 integrated current limit protection for preventing the inductor entering into saturation. After ZCD is detected the inductor current decreases to zero, if FB voltage is higher than the reference voltage of 2V (typical), both high side and low side power transistors are in off state. When FB voltage becomes lower than the reference voltage of 2V (typical), the high side power transistor turns on, and then the inductor current increases from zero. When and only when the inductor current increases to the peak current

limit threshold of 140mA (typical), OB2100 turns off the high side power transistor, and then turns on the low side power transistor after 60ns (typical) dead time for sustaining the inductor current. Then the inductor current starts decreasing until to zero. The above procedure repeats.

● **Over temperature protection**
OB2100 turns off the switching operation mode when the IC junction temperature exceeds 150C (typical) and resumes the switching operation mode when the IC junction temperature drops to 130C (typical).

● **Switching frequency**
OB2100s works in DCM mode and the average inductor current equals to the load current. The switching frequency determined by the following equation:

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

● **High side voltage regulator**
OB2100 integrates a high side voltage regulator to generate a 'VIN-5V' floating ground (at pin Vcap) voltage for high side power transistor. For Vin rising slope of faster than 8V/us, a greater than 200pF capacitor is recommended to be connected between pin VIN and pin Vcap.

● **Sink current**
OB2100 integrates a current sink to provide driving current for opto-coupler which can be used as control signal transfer to primary side controller in applications such as LED lighting. The current source sinks around 1mA (typical) current from the pin DRV when VIN decreases to lower than 12V (typical) threshold voltage but above 8V (typical) UVLO on threshold voltage.

PACKAGE MECHANICAL DATA

SOT-23-6L PACKAGE OUTLINE DIMENSIONS
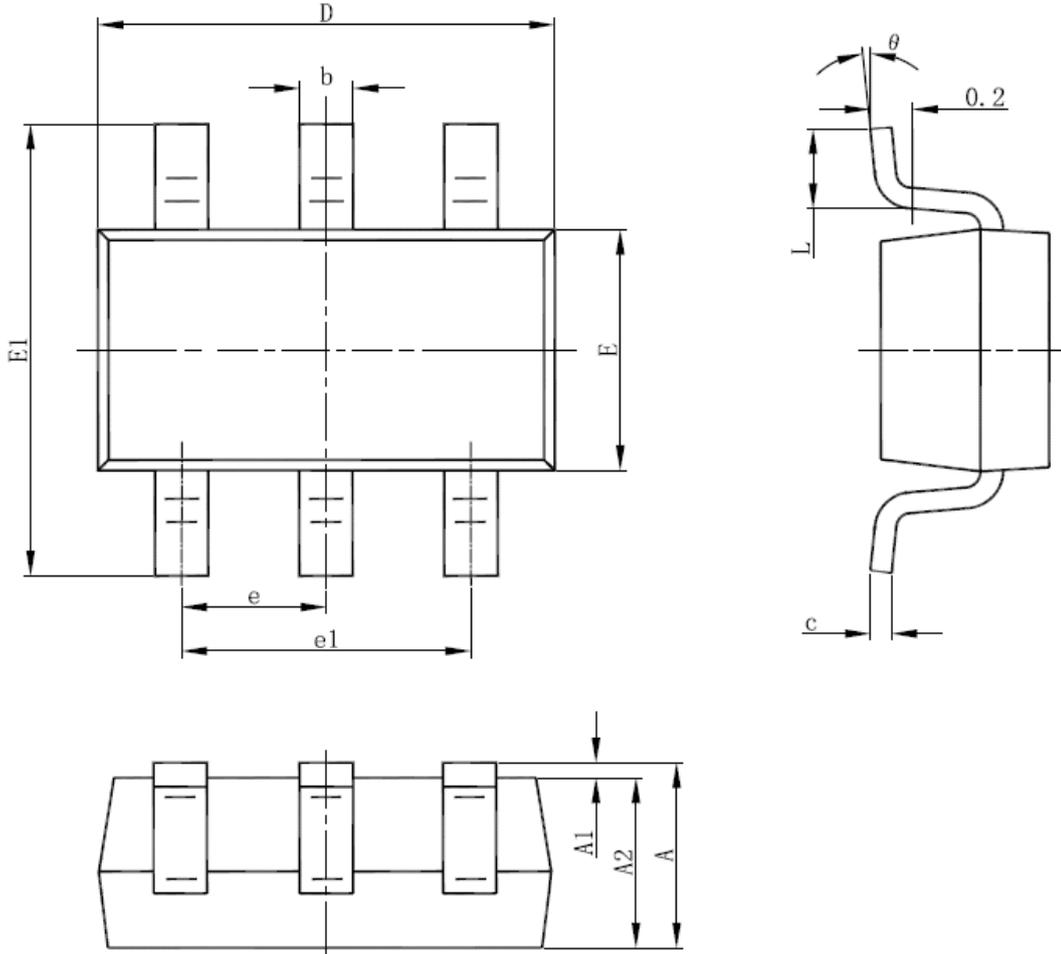
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	**Max**	**Min**	**Max**
A	1.000	1.450	0.039	0.057
A1	0.000	0.150	0.000	0.006
A2	0.900	1.300	0.035	0.051
b	0.300	0.500	0.012	0.020
c	0.080	0.220	0.003	0.009
D	2.800	3.020	0.110	0.119
E	1.500	1.726	0.059	0.068
E1	2.600	3.000	0.102	0.118
e	0.950 (BSC)		0.037 (BSC)	
e1	1.800	2.000	0.071	0.079

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