2A,4.5V-18V Input,500kHz Synchronous Step-Down Converter

■ INTRODUCTION:

The HG1104 is a constant frequency, current mode step-down converter. The device integrates a main switch and a synchronous rectifier for high efficiency without an external Schottky diode. It is ideal for powering portable equipment that runs from a single cell Lithium-Ion (Li+) battery. The output voltage can be regulated as low as 0.6V. The HG1104 can also run at 100% duty cycle for low dropout operation, extending battery life in portable system. This device offers two operation modes, PWM control and PFM Mode switching control, which allows a high efficiency over the wider range of the load.

The HG1104 is offered in a low profile 5-pin, SOT package, and is available in an adjustable version.

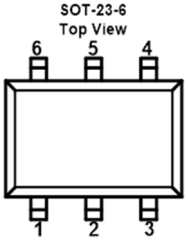
■ FEATURES:

- High efficiency :Up to 96%
- 500kHz Constant Frequency Operation
- 2A Output Current
- No Schottky Diode Required
- 4.5V to 18V Input Voltage Range
- Output Voltage as Low as 0.6V
- Slope Compensated Current Mode Control for Excellent Line and Load Transient Response
- Integrated internal compensation
- Stable with Low ESR Ceramic Output Capacitors
- Over Current Protection with Hiccup-Mode
- Thermal Fault Protection
- Inrush Current Limit and Soft Start
- SOT23-6 package
- -40° C to +85° C Temperature Range

■ APPLICATIONS：

- Distributed Power Systems
- Digital Set Top Boxes
- Flat Panel Television and Monitors
- Wireless and DSL Modems
- Notebook Computer

■ PIN CONFIGURATION:



■ ORDER INFORMATIO

HG1104①②

DESIGNATOR	SYMBOL	DESCRIPTION
①	A	Standard
②	E	Package：SOT23-6

Tabel1. Pin Description

PIN NUMBER E	PIN NAME	FUNCTION
1	BS	Boostrap. A capacotpr connected between SW and BS pins is required to form a floating supply across the high-side switch driver.
2	V_{SS}	Analog ground pin.
3	FB	Adjustable version feedback input. Connect FB to the center point of the external resistor divider.
4	EN	Drive this pin to a logic-high to enable the IC Drive to a logic-low to disable the IC and enter micro-power shutdown mode.
5	VIN	Power supply Pin
6	SW	Switching Pin

■ ABSOLUTE MAXIMUM RATINGS(Note1)

PARAMETER		SYMBOL	RATINGS	UNITS
Input Voltage		V_{IN}	V_{SS}-0.3~V_{SS}+20	V
EN Voltages		V_{EN}	V_{SS}-0.3~V_{SS}+20	V
FB Voltage			V_{SS}-0.3~ V_{SS}+6	V
SW Voltage			V_{SS}-0.3~V_{IN}+0.5	V
BS Voltage			V_{SW}-0.3~V_{SW}+5	V
Power Dissipation	SOT23-6	P_D	400	mW
Thermal Resistance				
Operating Temperature		T_{opr}	-40~+85	℃
Junction Temperature		T_j	150	℃
Storage Temperature		T_{stg}	-40~+125	℃
Soldering Temperature & Time		T_{solder}	260℃, 10s	
ESD HBM(Human Body Mode)		-	2	kV
ESD MM(Machine Mode)		-	200	V

■ ELECTRICAL CHARACTERISTICS

HG1104 Series (V_{IN}=V_{EN}=3.6V, V_{OUT}=1.8V, T_A = 25°C, unless otherwise noted.)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Input Voltage		4.5		18	V
Supply Current in Operation	V_{EN}=2.0V, V_{FB}=1.1V		0.4	0.6	mA
Supply Current in Shutdown	V_{EN} =0 or EN = GND		1		μA
Regulated Feedback Voltage VFB	T_A = 25℃ 4.5V≤ V_{IN} ≤18V	0.588	0.600	0.612	V
High-Side Switch On-Resistance			90		mΩ
Low-Side Switch On-Resistance			70		mΩ
High-Side Switch Leakage Current	V_{EN}=0V, V_{SW}=0V		0	10	μA
Upper Switch Current Limit	Minimum Duty Cycle		2.6		A
Oscillation Frequency			0.5		MHZ
Maximum Duty Cycle	V_{FB}=0.6V		92		%
Minimum On-Time			60		ns
Soft-start Time	T_{SS}		4		ms
Thermal Shutdown			160		℃

Note 1: Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.

Note 2: T_J is calculated from the ambient temperature TA and power dissipation P_D according to the following formula: $T_J = T_A + (P_D)$ x (170°C/W).

Note 3: 100% production test at +25°C. Specifications over the temperature range are guaranteed by design and characterization.

■ TYPICAL APPLICATION CIRCUITS

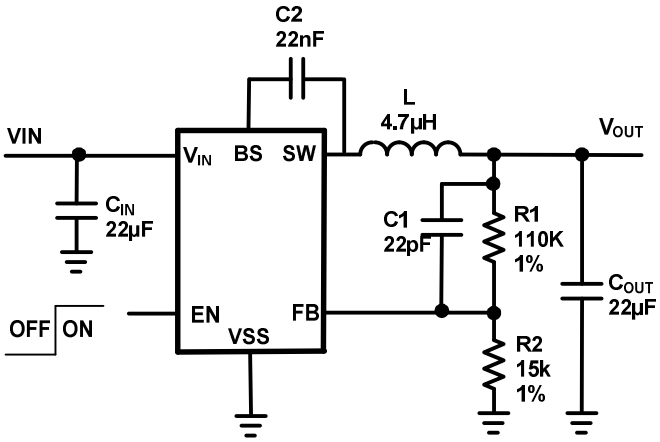
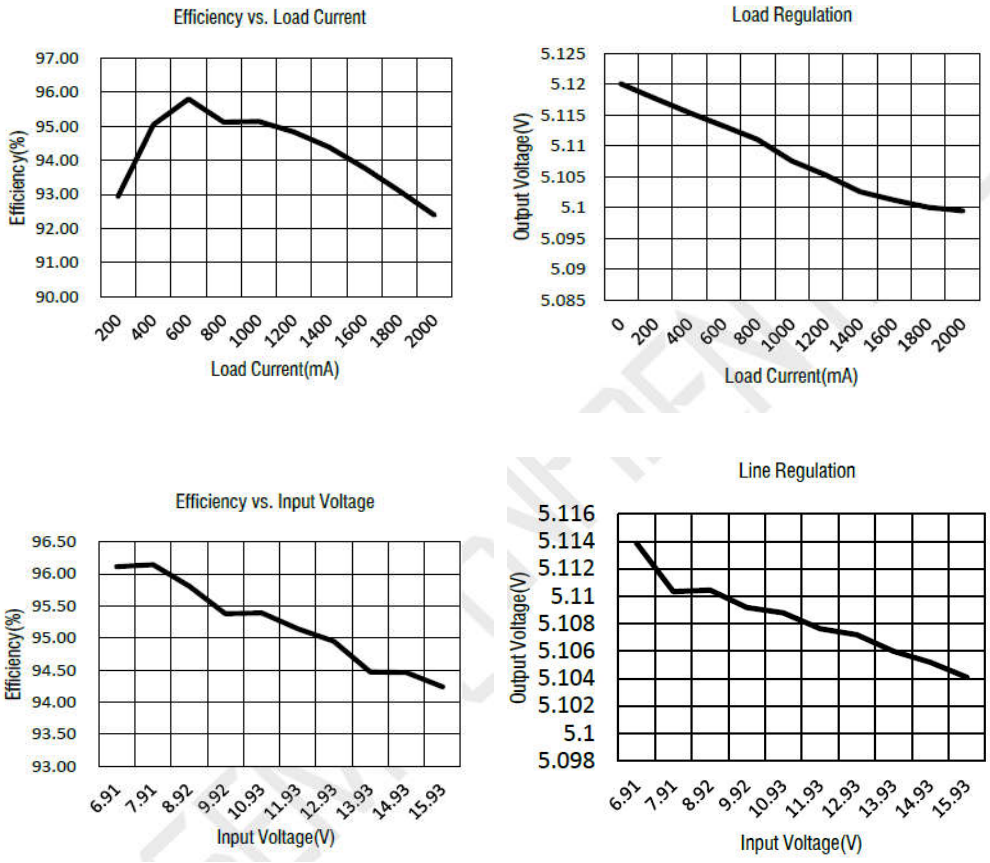


Figure1 Basic Application Circuit

Note: $V_{OUT} = V_{FB} \times \left(1 + \frac{R1}{R2}\right)$

■ TYPICAL PERFORMANCE CHARACTERISTICS

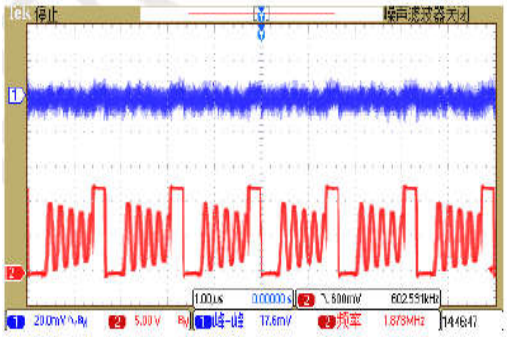
(Test Figure1 above, unless otherwise specified)



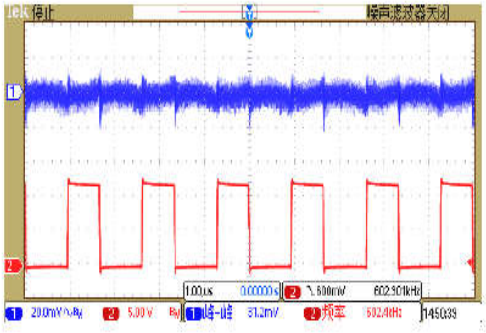
■ TYPICAL PERFORMANCE CHARACTERISTICS

(Test Figure1 above, unless otherwise specified)

PFM MODE (CH1:$V_{OUT(ripple)}$ CH2:V_{SW})



PWM MODE(CH1:$V_{OUT(ripple)}$ CH2:V_{SW})



■ FUNCTIONAL BLOCK DIAGRAM

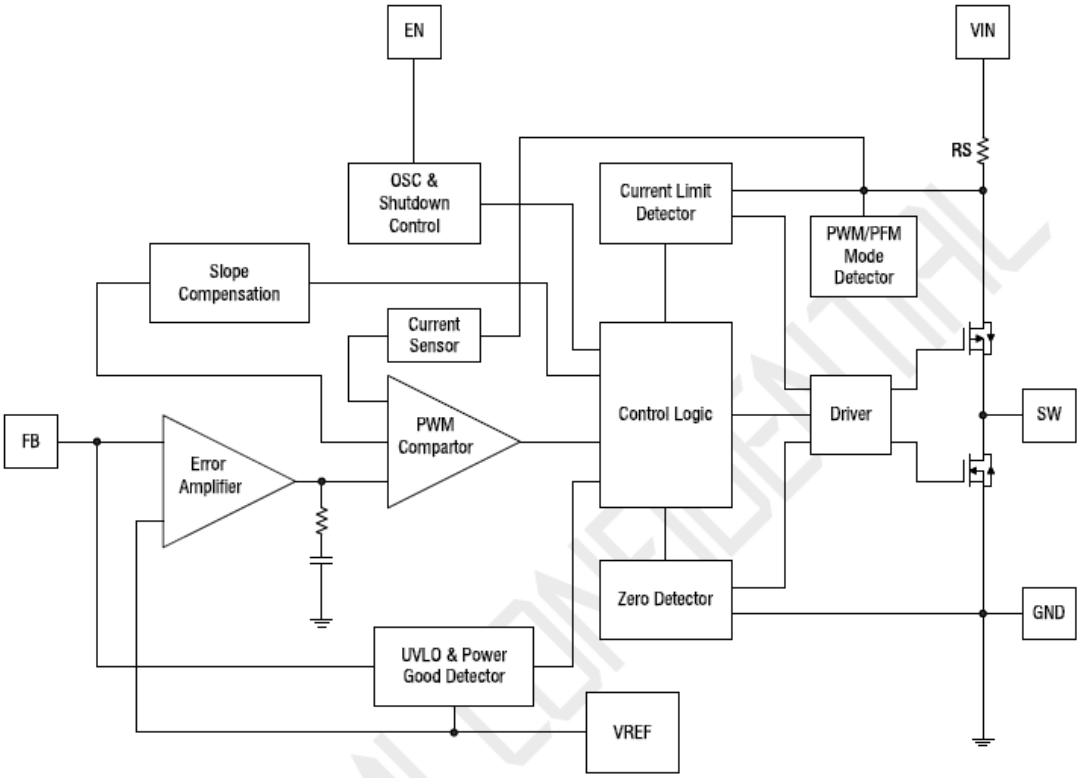
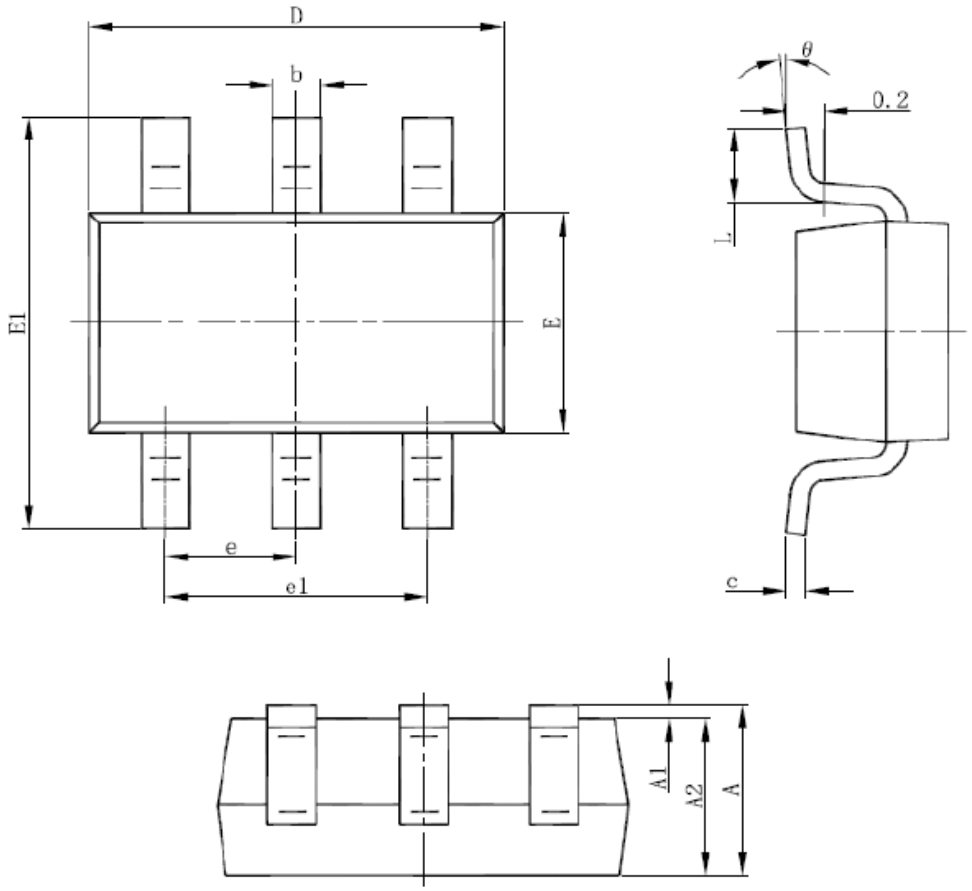


Figure2 Block Diagram

■ PACKAGING INFORMATION

● SOT23-6 Package Outline Dimensions



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°