

## 800mA,2V-6.5V Input,1.5MHz Synchronous Step-Down Converter

### ■ INTRODUCTION

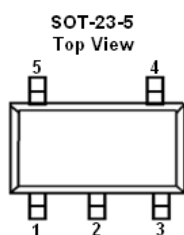
The HG1103 is a constant frequency, current mode step-down converter. The device integrates a main switch and a synchronous rectifier for high efficiency without an external Scotty diode. It is ideal for powering portable equipment that runs from a single cell Lithium-Ion (Li+) battery. The output voltage can be regulated as low as 0.6V. The HG1103 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 HG1103 is offered in a low profile 5-pin, SOT package, and is available in an adjustable version.

### ■ APPLICATIONS

- Cellular and Smart Phones
- PDAs
- Wireless and DSL Modems

### ■ PIN CONFIGURATION



### ■ FEATURES

- High efficiency :Up to 96%
- 1.5MHz Constant Frequency Operation
- 800mA Output Current
- No Scotty Diode Required
- 2V to 6.5V Input Voltage Range
- Output Voltage as Low as 0.6V
- PFM Mode for High Efficiency in Light Load
- 100% Duty Cycle in Dropout Operation
- Low Quiescent Current: 20 $\mu$ A
- Slope Compensated Current Mode Control for Excellent Line and Load Transient Response
- Short Circuit Protection
- Thermal Fault Protection
- Inrush Current Limit and Soft Start
- <1 $\mu$ A Shutdown Current
- SOT23-5 package

- Digital Still and Video Cameras
- DTV
- Portable Instruments

### ■ ORDER INFORMATION

#### HG1103①②

DESIGNATOR	SYMBOL	DESCRIPTION
①	A	Standard
②	M/MR	Package: SOT23-5

**Tabel1. Pin Description**

PIN NUMBER		PIN NAME	FUNCTION
M	MR		
1	3	EN	Chip Enable Pin. Drive EN above 1.5V to turn on the part. Drive EN below 0.3V to turn it off. Do not leave EN floating
2	2	V <sub>SS</sub>	Analog Ground Pin
3	5	SW	Power Switch Output. It is the switch node connection to Inductor. This pin connects to the drains of the internal P-ch and N-ch MOSFET switches.
4	1	V <sub>IN</sub>	Power Supply Input. Must be closely decoupled to GND with a 4.7μF or greater ceramic capacitor.
5	4	FB	Output Voltage Feedback Pin. An internal resistive divider divides the output voltage down for comparison to the internal reference voltage.

■ **ABSOLUTE MAXIMUM RATINGS<sup>(1)</sup>**

PARAMETER	SYMBOL	RATINGS	UNITS
Input Voltage	V <sub>IN</sub>	V <sub>SS</sub> -0.3~V <sub>SS</sub> +7.5	V
CE,SW,FB/V <sub>OUT</sub> Voltage		V <sub>SS</sub> -0.3~V <sub>IN</sub> +0.3	V
Power Dissipation	SOT23-5	P <sub>D</sub>	400
Operating Temperature	T <sub>opr</sub>	-40~+85	°C
Junction Temperature	T <sub>j</sub>	150	°C
Storage Temperature	T <sub>stg</sub>	-40~+125	°C
Soldering Temperature & Time	T <sub>solder</sub>	260°C, 10s	
ESD HBM(Human Body Mode)	-	2	kV
ESD MM(Machine Mode)	-	200	V

## ■ ELECTRICAL CHARACTERISTICS

HG1103 Series (V<sub>IN</sub>=V<sub>EN</sub>=3.6V, V<sub>OUT</sub>=1.8V, T<sub>A</sub> = 25°C, unless otherwise noted.)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Input Voltage		2.0		6.5	V
Input DC Supply Current	Note (4)	-	-	-	μA
PWM Mode	V <sub>OUT</sub> = 90%, I <sub>LOAD</sub> =0mA	-	140	300	μA
PFM Mode	V <sub>OUT</sub> = 105%, I <sub>LOAD</sub> =0mA	-	20	35	μA
Shutdown Mode	V <sub>EN</sub> = 0V, V <sub>IN</sub> =4.2V	-	0.1	1.0	μA
Regulated Feedback Voltage VFB	T <sub>A</sub> = 25°C	0.588	0.600	0.612	V
	T <sub>A</sub> = 0°C ≤ T <sub>A</sub> ≤ 85°C	0.586	0.600	0.613	V
	T <sub>A</sub> = -40°C ≤ T <sub>A</sub> ≤ 85°C	0.585	0.600	0.615	V
Reference Voltage Line Regulation	V <sub>IN</sub> =2.7V to 5.5V	-	0.04	0.40	%/V
Output Voltage Line Regulation	V <sub>IN</sub> =2.7V to 5.5V		0.04	0.40	%
Output Voltage Load Regulation			0.5		%
Oscillation Frequency	V <sub>OUT</sub> =100%		1.5		MHz
	V <sub>OUT</sub> =0V		300		KHZ
On Resistance of PMOS	I <sub>SW</sub> =100mA		300	450	mΩ
On Resistance of NMOS	I <sub>SW</sub> =-100mA		300	450	mΩ
Peak Current Limit	V <sub>IN</sub> = 3V, V <sub>OUT</sub> =90%		1.5		A
Turn on delay time			0.2		ms
EN "High" Voltage <sup>(1)</sup>	V <sub>ENH</sub>	1.5		V <sub>IN</sub>	V
EN "Low" Voltage <sup>(2)</sup>	V <sub>ENL</sub>			0.4	V
EN Leakage Current			±0.01	±1.0	μA
SW Leakage Current	V <sub>EN</sub> =0V, V <sub>IN</sub> =V <sub>SW</sub> =5V		±0.01	±1.0	μA

Note:

- 1: Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.
- 2: T<sub>J</sub> is calculated from the ambient temperature T<sub>A</sub> and power dissipation P<sub>D</sub> according to the following formula: T<sub>J</sub> = T<sub>A</sub> + (P<sub>D</sub>) × (250°C/W).
- 3: 100% production test at +25°C. Specifications over the temperature range are guaranteed by design and characterization.
- 4: Dynamic supply current is higher due to the gate charge being delivered at the switching frequency.

■ TYPICAL APPLICATION CIRCUITS

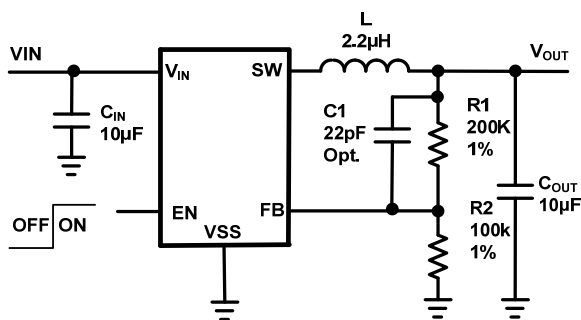
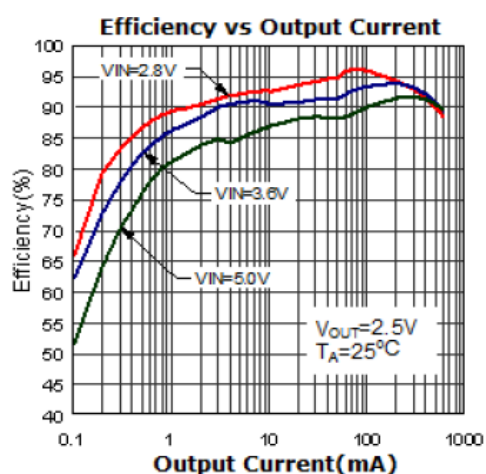
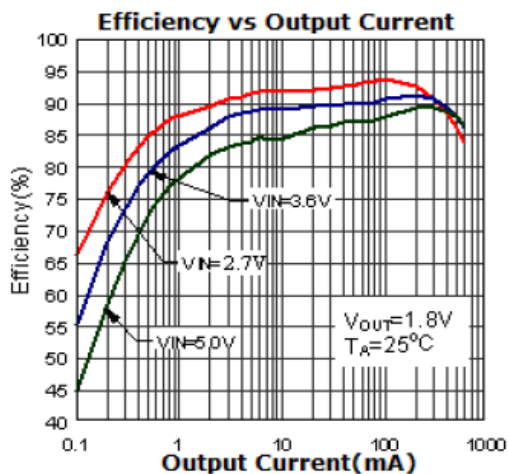
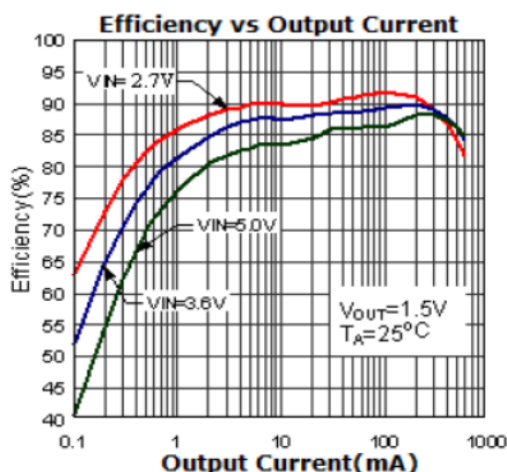
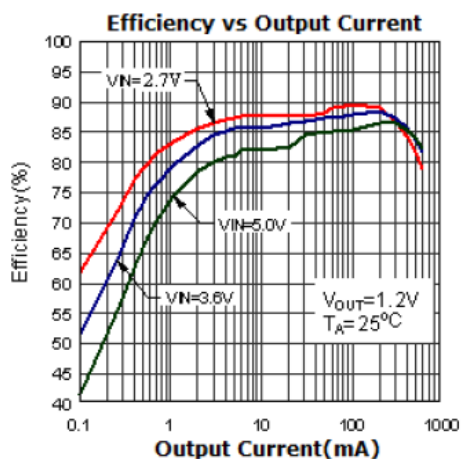


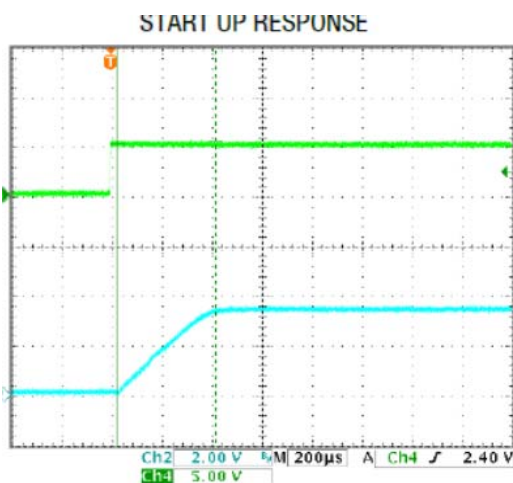
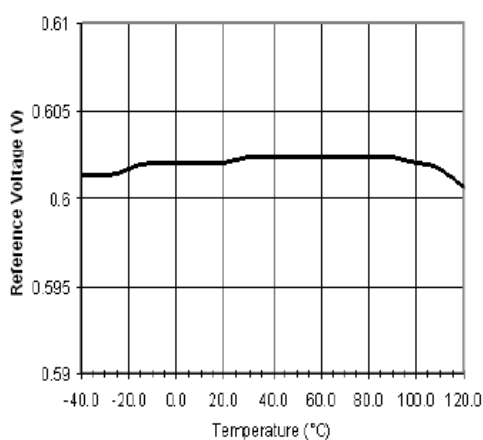
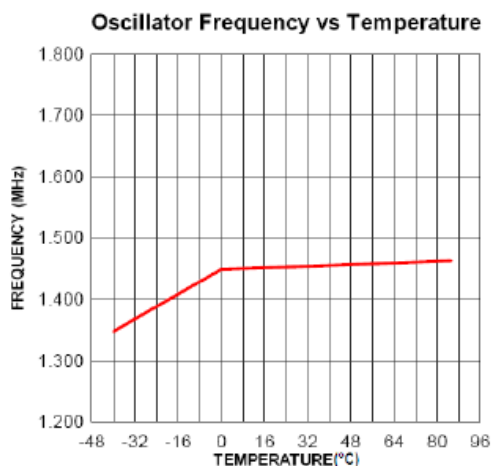
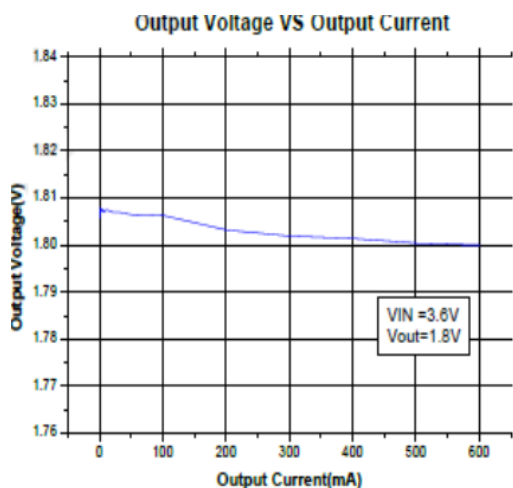
Figure1Basic Application Circuit

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

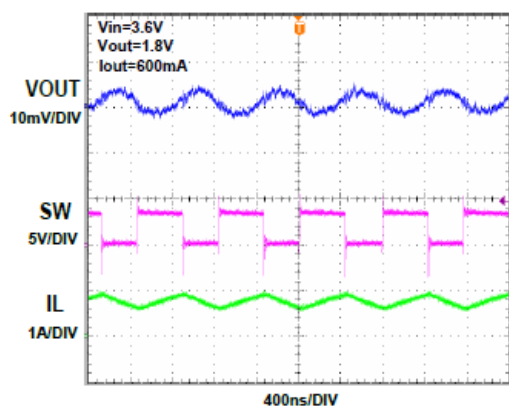
■ TYPICAL PERFORMANCE CHARACTERISTICS

(Test Figure1 above, unless otherwise specified)

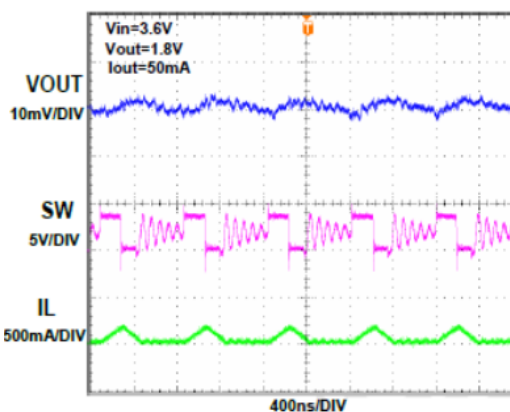




### PWM MODE



### PFM MODE



■ FUNCTIONAL BLOCK DIAGRAM

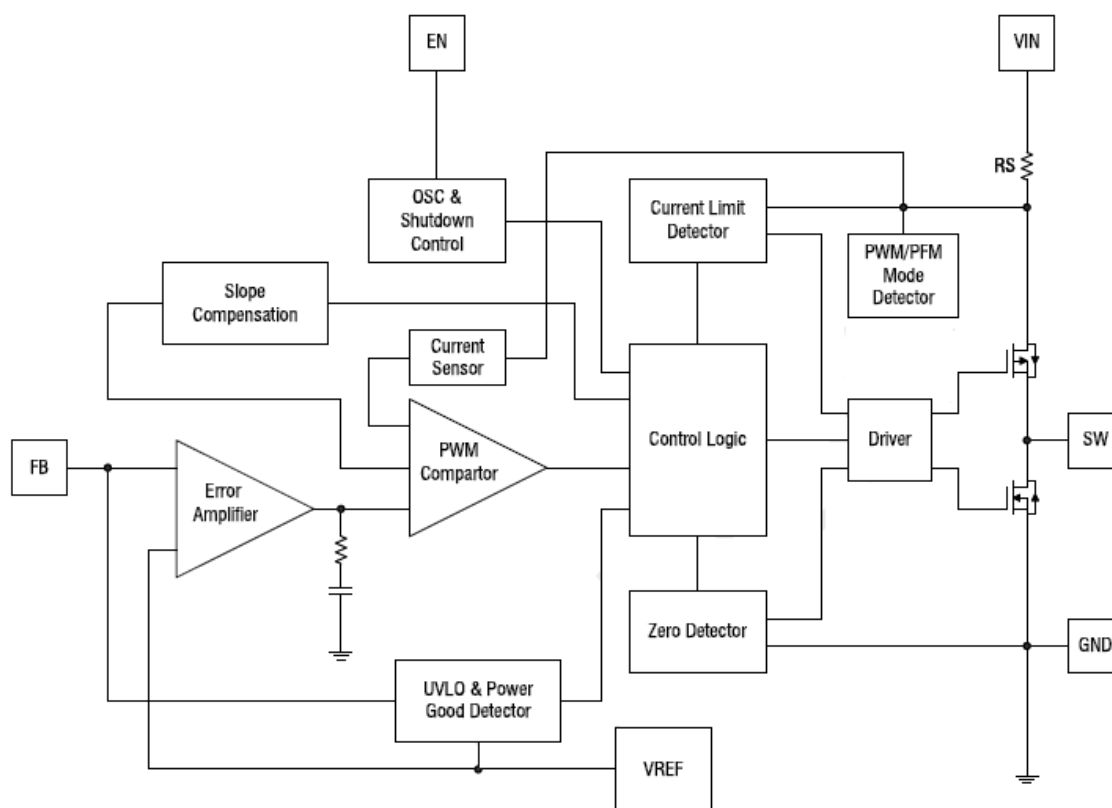
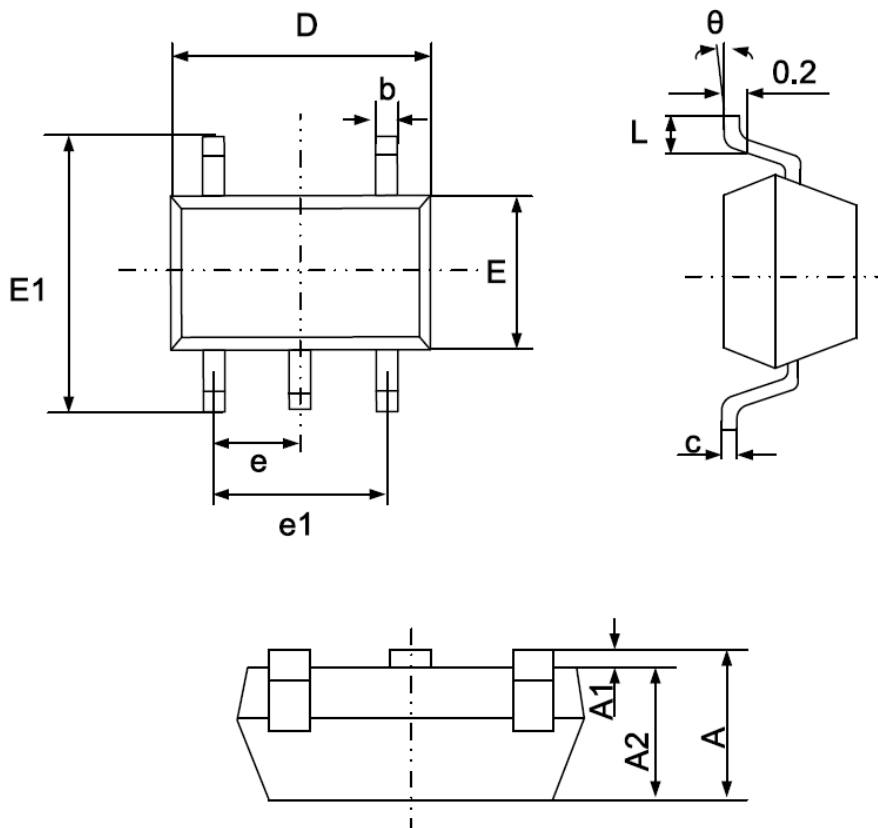


Figure2 Block Diagram

■ PACKAGING INFORMATION

● SOT-23-5 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
$\theta$	0°	8°	0°	8°