



Description

The MH7702 is a constant frequency, 6-pin SOT23 current mode step-up converter intended for small, low power applications. The MH7702 switches at 1.2MHz and allows the use of tiny, low cost capacitors and inductors 2mm or less in height. Internal soft-start results in small inrush current and extends battery life.

The MH7702 features automatic shifting to pulse frequency modulation mode at light loads. The MH7702 includes under-voltage lockout, current limiting, and thermal overload protection to prevent damage in the event of an output overload.

The MH7702 is available in a 6-pin SOT-23 package.

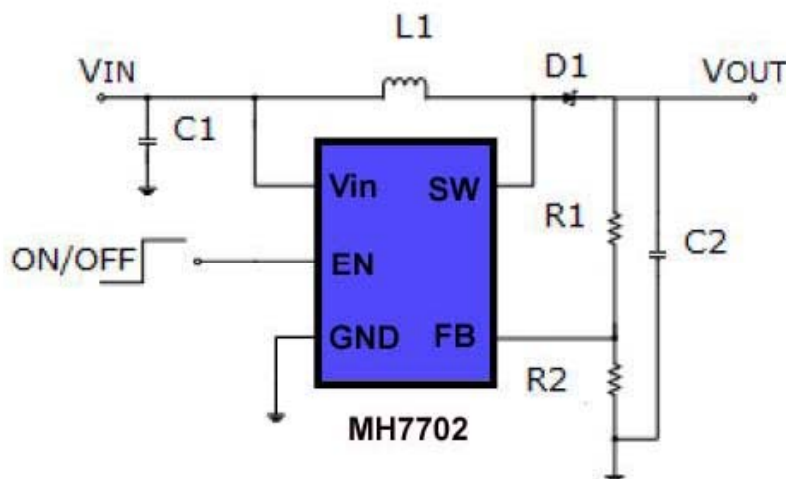
Features

- Integrated 80mΩ Power MOSFET
- 2V to 24V Input Voltage
- 1.2MHz Fixed Switching Frequency
- Internal 4A Switch Current Limit
- Adjustable Output Voltage
- Internal Compensation
- Up to 28V Output Voltage
- Automatic Pulse Frequency Modulation Mode at Light Loads
- 97% Efficiency
- Available in a 6-Pin SOT23-6 Package

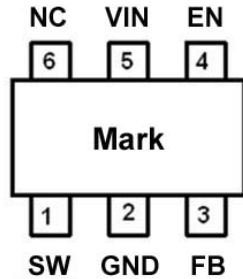
Applications

- Battery-Powered Equipment
- Set-Top Boxed
- LCD Bais Supply
- DSL and Cable Modems and Routers

Typical Application



Package



Pin Assignment

Pin No.	Pin Name	Description
1	SW	Power Switch Output. SW is the drain of the internal MOSFET switch. Connect the power inductor and output rectifier to SW. SW can swing between GND and 28V.
2	GND	Ground
3	FB	Feedback Input. The FB voltage is 0.6V.
4	EN	Regulator On/Off Control Input. A high input at EN turns on the converter, and a low input turns it off. When not used, connect EN to the input supply for automatic startup.
5	VIN	Input Supply Pin. Must be locally bypassed.
6	NC	No Connected.

Absolute Maximum Ratings

Description	Value	Unit
IN, EN voltages	-0.3~26	V
SW Voltage	-0.3~30	V
FB Voltages	-0.3~ 6	V
Operation temperature range	-40-85	°C
Junction Temperature	160	°C
Peak SW Sink and Source Current	4	A
Lead Temperature (Soldering, 10s)	300	°C



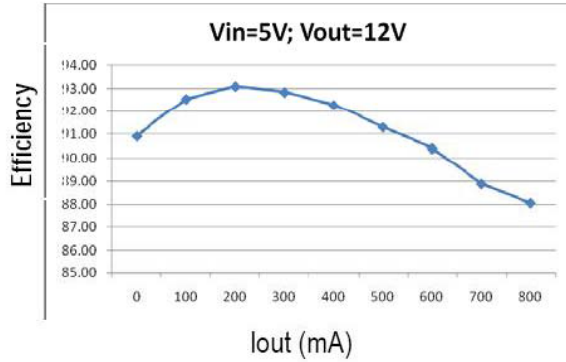
Electronic Characteristics (VIN = VEN = 5V, TA = 25°C)

Parameter	Test Condition	Min	Typ	Max	Unit
Power supply		2		24	V
Under Voltage Lockout				1.98	V
Under Voltage Lockout Hysteresis			100		mV
Current (Shutdown)	VEN= 0V		0.1	1	uA
Quiescent Current (PFM)	VFB=0.7V, No switch		100	200	uA
Quiescent Current (PWM)	VFB=0.5V, switch		1.6	2.2	mA
Switching Frequency			1.2		MHz
Maximum Duty Cycle	VFB = 0V	90			%
EN Input High Voltage		1.5			V
EN Input Low Voltage				0.4	V
FB Voltage		0.588	0.6	0.612	V
FB Input Bias Current	VFB = 0.6V	-50	-10		nA
SW On Resistance (1)			80	150	mΩ
SW Current Limit (1)	VIN= 5V, Duty cycle=50%		4		A
SW Leakage	VSW = 20V			1	uA
Thermal Shutdown			155		°C

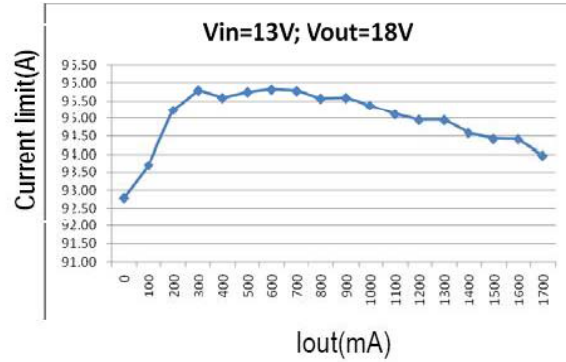


TYPICAL OPERATING CHARACTERISTICS

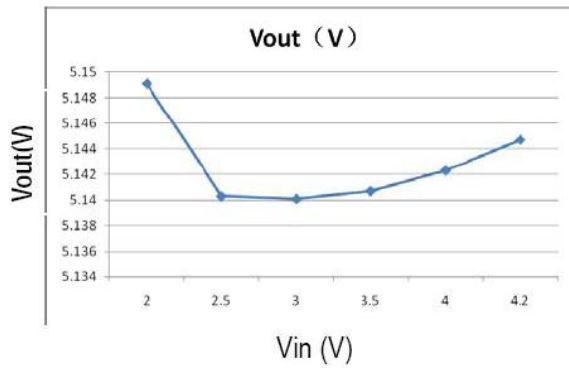
Efficiency Curve



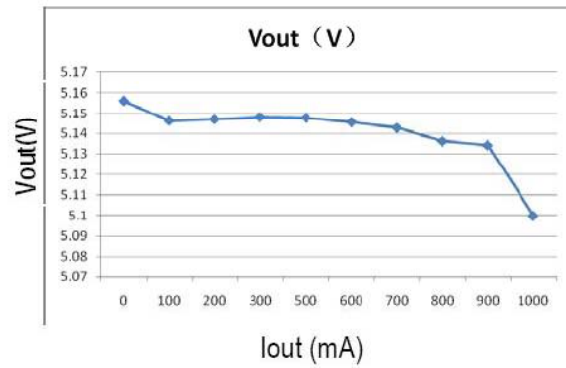
Efficiency Curve



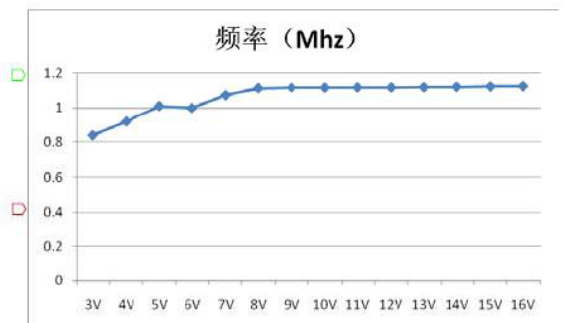
line Regulation



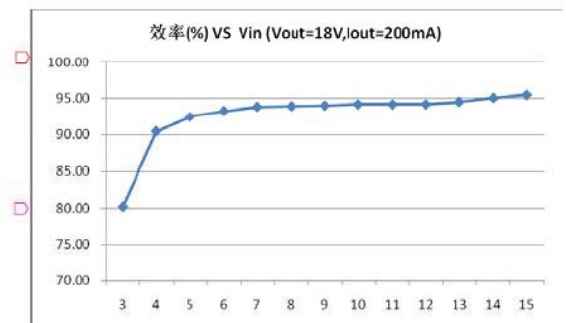
Load regulation



Freq VS Vin



Efficiency VS Vin





APPLICATION INFORMATION

Setting the Output Voltage

The internal reference VREF is 0.6V (Typical). The output voltage is divided by a resistor divider, R1 and R2 to the FB pin. The output voltage is given by :

$$V_{out} = V_{FB} \times (1 + R1 / R2)$$

Inductor Selection

The recommended values of inductor are 4.7 to 22μH. Small size and better efficiency are the major concerns for portable device, such as MH7702 used for mobile phone. The inductor should have low core loss at 1.2MHz and low DCR for better efficiency. To avoid inductor saturation current rating should be considered.

Capacitor Selection

Input and output ceramic capacitors of 22μF are recommended for MH7702 applications. For better voltage filtering, ceramic capacitors with low ESR are recommended. X5R and X7R types are suitable because of their wider voltage and temperature ranges.

Diode Selection

Schottky diode is a good choice for MH7702 because of its low forward voltage drop and fast reverses recovery. Using Schottky diode can get better efficiency. The high speed rectification is also a good characteristic of Schottky diode for high switching frequency. Current rating of the diode must meet the root mean square of the peak current and output average current multiplication as following :

$$I_D (RMS) \approx \sqrt{I_{OUT} \times I_{PEAK}}$$

The diode's reverse breakdown voltage should be larger than the output voltage.



Layout Consideration

1. For best performance of the MH7702, the following guidelines must be strictly followed.
2. Input and Output capacitors should be placed close to the IC and connected to ground plane to reduce noise coupling.
3. The GND should be connected to a strong ground plane for heat sinking and noise protection.
4. Keep the main current traces as possible as short and wide.
5. SW node of DC-DC converter is with high frequency voltage swing. It should be kept at a small area.
6. Place the feedback components as close as possible to the IC and keep away from the noisy devices.



SOT23-6 Package Outline

