

■ GENERAL DESCRIPTION

The ACP2802 is a high-efficiency PWM step-down DC-DC converters. They are with Capable of delivering 1.2A output current over a wide input voltage range from 2.6V to 5.5V. Internal synchronous rectifier with low resistance dramatically reduces conduction loss at PWM mode. Internal synchronous rectifier also can save external Schottky diode in practical application. The switching ripple is easily smoothed-out by small package filtering elements due to a fixed operation frequency of 1.5MHz. This along with small SOT23-5L provides small PCB area application. Other features include soft start, lower internal reference voltage with 2% accuracy, over temperature protection, and over current protection.

■ FEATURES

- Capable of Delivering 1.2A Continuous Current
- Maximum Operating Voltage: 2.6~5.5V
- Output Voltage Range: 0.6V to Vin
- Low Standby Current: 1μA (TYP.)
- Low Quiescent Current: 30μA (TYP.)
- Internal Soft Start and Thermal Shutdown
- 100% Duty Cycle for Lowest Dropout Voltage
- Short Circuit Protection

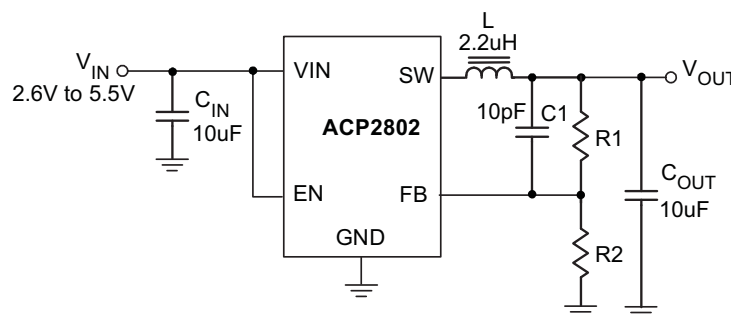
■ APPLICATION

- GPS Module
- DSP Core Supplies
- Wireless LAN
- Portable Instruments

■ PIN CONFIGURATION

ACP2802 (SOT23-5L)	Symbol	Name	Descriptions
	1	EN	Chip Enable .Active High, do not leave EN pin floating
	2	GND	Ground.
	3	SW	Pin for Switching.
	4	VIN	Power Input.
	5	FB	Feedback

■ APPLICATION CIRCUITS



■ ORDERING AND INFORMATION

Standard Part NO.	Vout	Package	Packing	Min. Quantity	RoHS
ACP2802-60BTRAL	0.6V(ADJ)	SOT23-5L	Tape&Reel	3000PCS	Lead Free

■ ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Input Voltage	V _{IN}	-0.3~6	V
Enable Input Voltage	V _{CE}	-0.3 to V _{IN}	V
Peak SW Sink and Source Current	I _{sw}	2	A
Junction Temperature	T _J	125	°C
Storage Temperature Range	T _{STG}	-65 to 150	°C
Lead Temperature (Soldering, 10sec)	T _{LEAD}	260	°C
Power Dissipation(SOT23-5L)	P _D	400	mW
ESD(HBM)	V _{ESD}	2000	V

■ RECOMMENDED OPERATING CONDITIONS

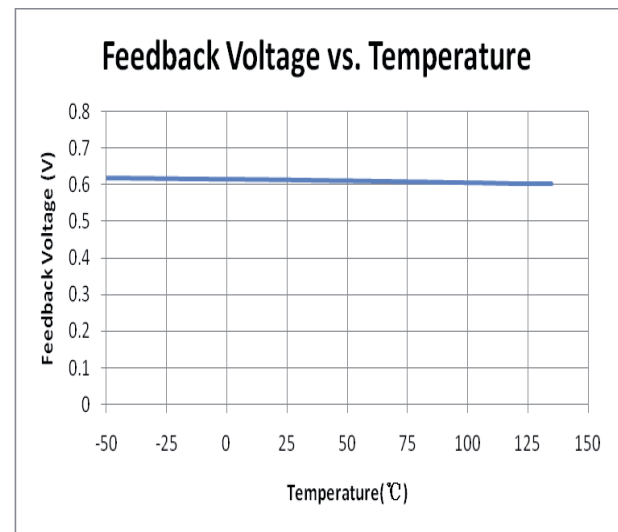
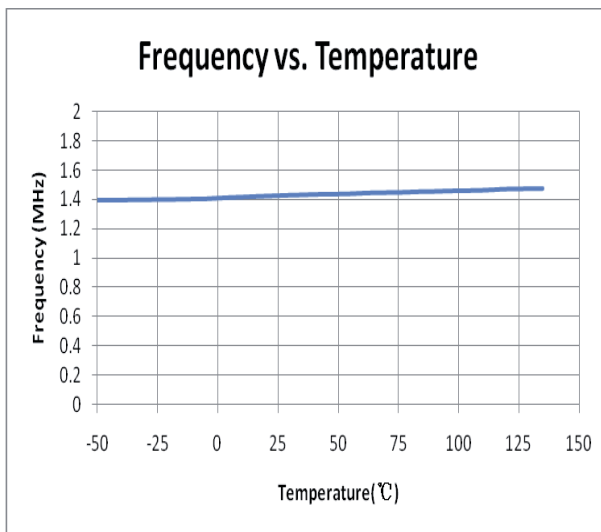
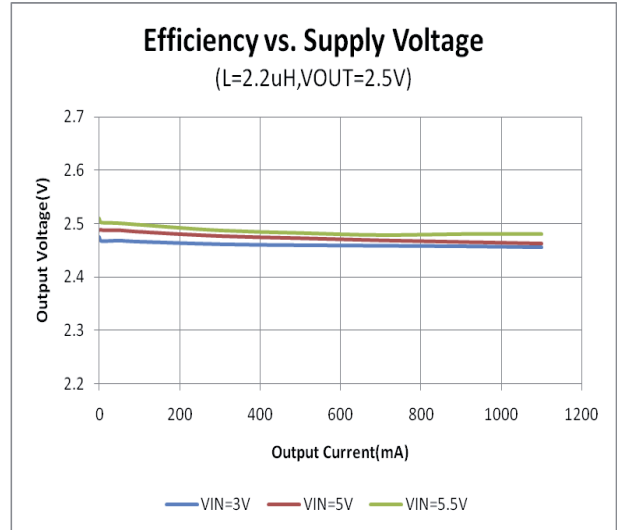
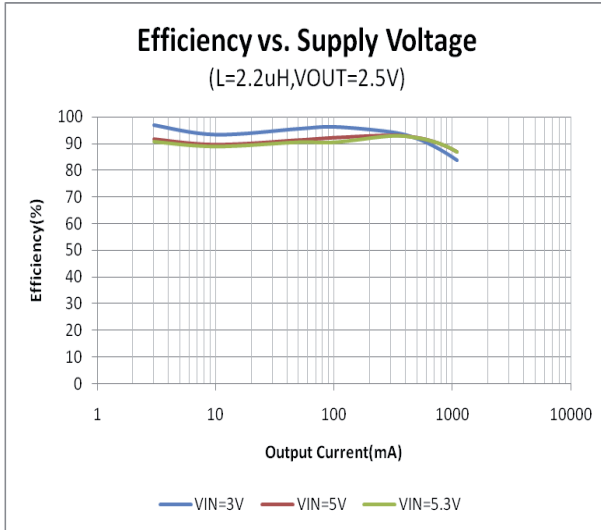
Parameter	Symbol	Min	Max	Unit
Input Voltage	V _{IN}	2.6	5.5	V
Operating Junction Temperature Range	T _J	-40	85	°C

■ ELECTRICAL CHARACTERISTICS

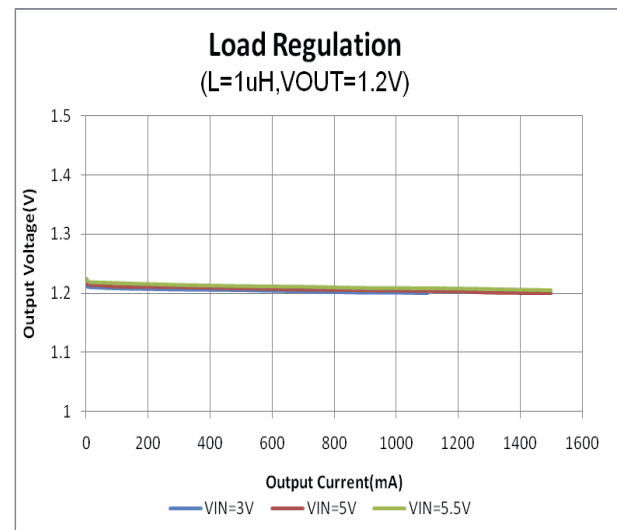
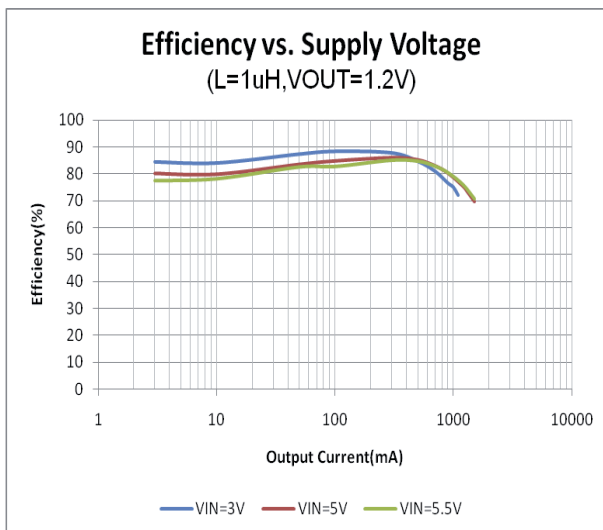
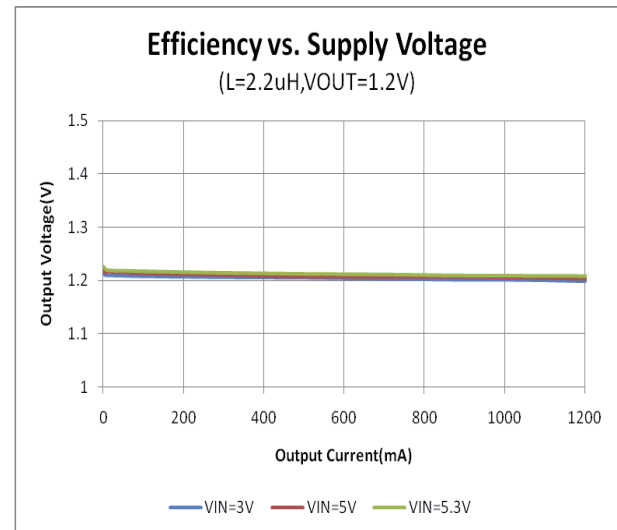
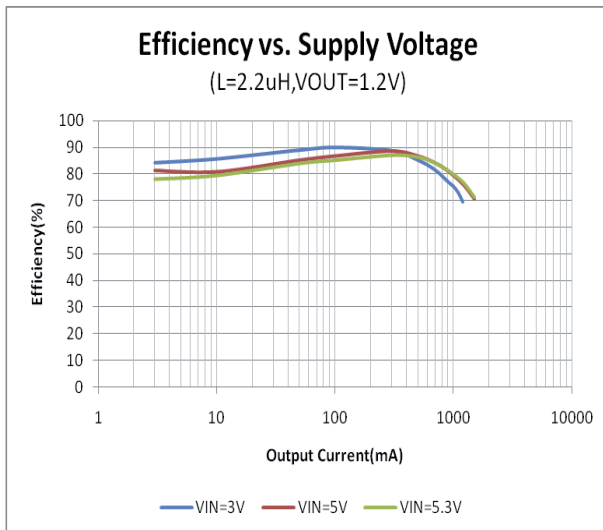
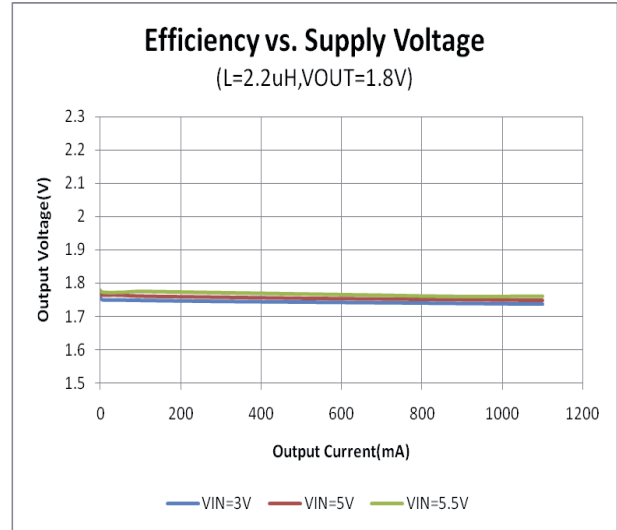
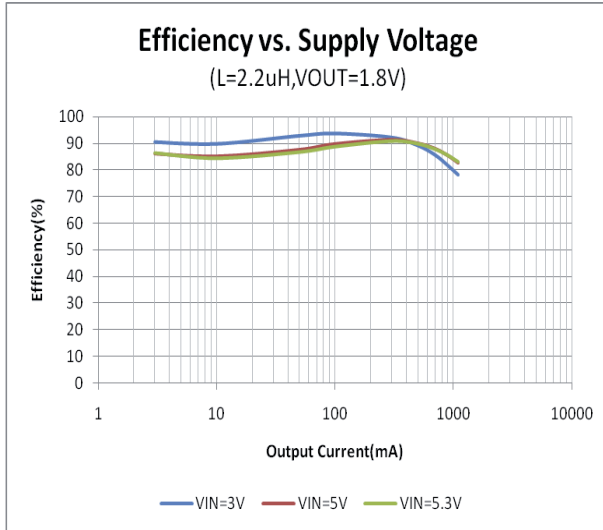
(T_A=25°C, unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V _{DD}	Input Voltage Range		2.6		5.5	V
V _{FB}	Feedback Voltage		0.585	0.6	0.615	V
I _{FB}	Feedback Leakage current			0.1	0.4	uA
I _Q	Quiescent Current(Switching)	Active, V _{FB} =0.65, No Switching		30		uA
I _{SD}	Quiescent Current(Switch Off)	Shutdown			1	uA
L _{LINE(REG)}	Line Regulation	V _{IN} =2.7V to 5.5V		0.04	0.2	%/V
L _{LOAD(REG)}	Load Regulation	I _{OUT} =0.01 to 1A		0.1	0.2	%/A
f	Switching Frequency			1.5		MHz
R _{DS(ON)-P}	PMOS Rdson			300	400	mΩ
R _{DS(ON)-N}	NMOS Rdson			220	300	mΩ
I _{LIMIT}	Peak Current Limit		1.2	1.5	2	A
I _{L(SW)}	SW Leakage Current	V _{OUT} =5.5V; V _{EN} =0; V _{SW} =0 or 5.5V			10	uA
I _{L(EN)}	EN Leakage Current				1	uA
V _{EN(H)}	EN Input High Voltage		1.5			V
V _{IEN(L)}	EN Input Low Voltage				0.4	V

■ PERFORMANCE CHARACTERISTICS



■ PERFORMANCE CHARACTERISTICS (Continued)



■ APPLICATION NOTES

Soft-Start

The devices have an internal soft-start circuit that limits the inrush current and output voltage overshoot during startup. The soft-start is implemented with a digital circuit increasing the switch current in steps.

Inductor Selection

Typically a 2.2uH is used as output inductor. But if V_{in} higher than 5.3V and V_{out} lower than 1.3V, it is recommended to change to 1uH inductor. Larger or smaller inductor values can be used to optimize the performance of the device for specific operation conditions. The output inductor is selected to limit the ripple current to some predetermined value, typically 20%~40% of the full load current at the maximum input voltage. Large value inductors lower ripple currents. Higher V_{IN} or V_{OUT} also increases the ripple current as shown in equation. The DC current rating of the inductor should be at least equal to the maximum load current plus half the ripple current to prevent core saturation. The DC-resistance of the inductor directly influences the efficiency of the converter. Therefore for better efficiency, choose a low DC-resistance inductor.

Cin and Cout Selection

A low ESR input capacitor sized for the maximum RMS current must be used. The size required will vary depending on the load, output voltage and input voltage source impedance characteristics. A typical value is around 10μF. The input capacitor RMS current varies with the input voltage and the output voltage. The output capacitor C_{OUT} has a strong effect on loop stability. The selection of C_{OUT} is driven by the required effective series resistance (ESR). ESR is a direct function of the volume of the capacitor; that is, physically larger capacitors have lower ESR. Once the ESR requirement for C_{OUT} has been met, the RMS current rating generally far exceeds the $I_{RIPPLE}(P-P)$ requirement. When choosing the input and output ceramic capacitors, choose the X5R or X7R dielectric formulations. These dielectrics have the best temperature and voltage characteristics of all the ceramics for a given value and size.

Output Voltage Setting

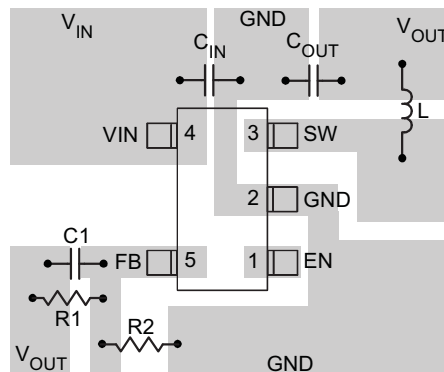
An external feedback resistor divider is required to divide the output voltage down to the nominal 0.6V reference voltage(V_{FB}). The current drawn by the resistor network should be limited to maintain the overall converter efficiency. The maximum value of the resistor network is limited by the feedback input bias current and the potential for noise being coupled into the feedback pin. Selecting R_2 in the range of 10kΩ to 100 kΩ. The output voltage determined by the relationship:

$$V_{OUT}=V_{FB} \times (R_1+R_2)/R_2.$$

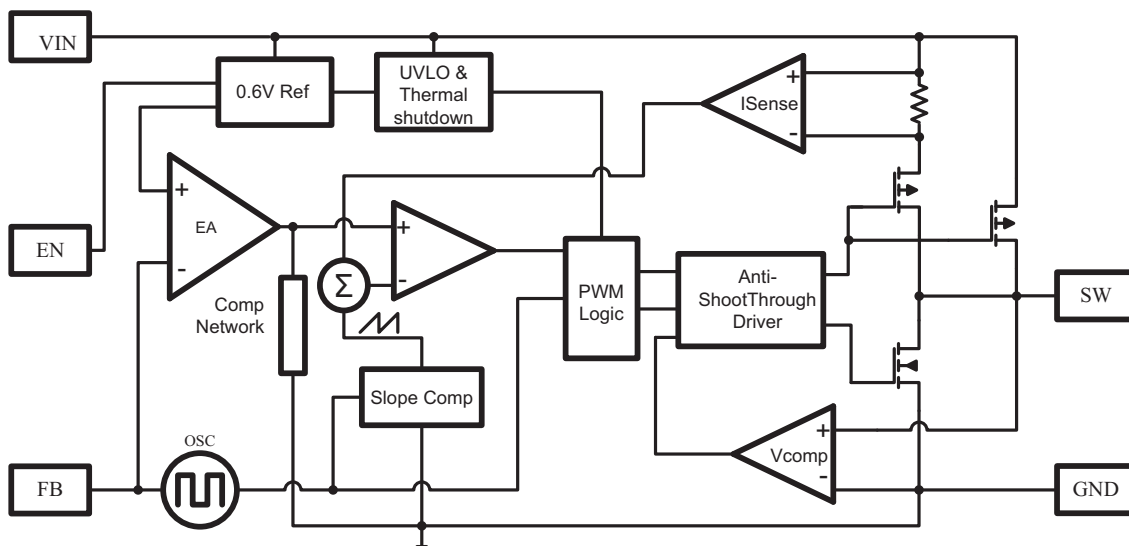
For example, if we need set 1.2v output, so $R_2=120$ kΩ, $R_1=120$ kΩ; If we need set 1.8v output, so $R_2=120$ kΩ and $R_1=240$ kΩ

■ PCB LAYOUT GUIDELINES

- 1, The input capacitor C_{IN} should connect to V_{IN} as closely as possible. This capacitor provides the AC current to the internal power MOSFETs.
- 2, The power traces, consisting of the GND trace, the SW trace and the V_{IN} trace should be kept short, direct and wide.
- 3, The FB pin should connect directly to the feedback resistors. The resistive divider $R1/R2$ must be connected between the C_{OUT} and ground.
- 4, Keep the switching node, SW, away from the sensitive FB node.

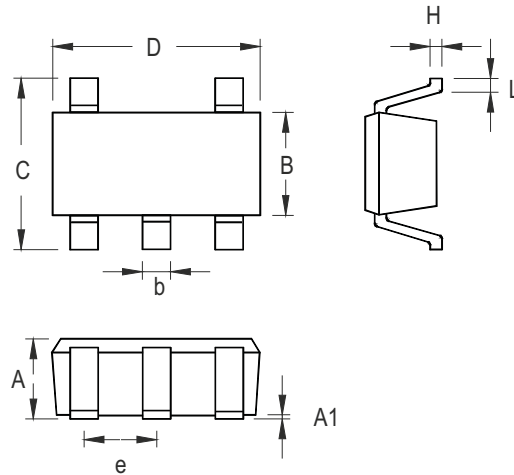


■ FUNCTION BLOCK



■ PACKAGE INFORMATION

◆ SOT23-5L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.889	1.295	0.035	0.051
A1	0.000	0.152	0.000	0.006
B	1.397	1.803	0.055	0.071
b	0.356	0.559	0.014	0.022
C	2.591	2.997	0.102	0.118
D	2.692	3.099	0.106	0.122
e	0.838	1.041	0.033	0.041
H	0.080	0.254	0.003	0.010
L	0.300	0.610	0.012	0.024

SOT23-5L Surface Mount Package