Features

- High Efficiency: 84% Typical
- 36V High Output Voltage
- Fast 1MHz Switching Frequency
- Low Profile SOT25 Pb-Free Packaging
- SOT25: Available in “Green” Molding Compound (No Br, Sb)
- Lead Free Finish/RoHS Compliant for Lead Free and “Green” products (Note 1)

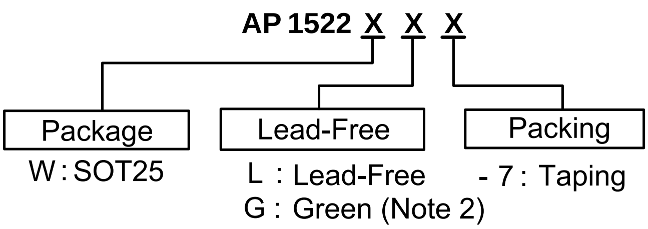
General Description

The AP1522 is a step-up DC/DC converter in a 5-Lead low profile SOT25 package. The AP1522 switches at 1MHz that allows the use of tiny external components. A low 1.25V feedback voltage minimizes power loss in the current setting resistor for better efficiency.

Applications

- Cellular Phones
- PDA’s, Hand-held Computers
- Digital Cameras
- LCD Bias Voltage, Battery Backup

Ordering Information



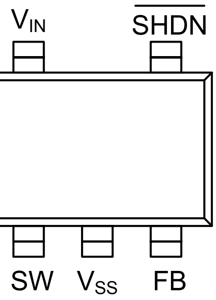
Note: 1. RoHS revision 13.2.2003. Glass and High Temperature Solder Exemptions Applied, see *EU Directive Annex Notes 5 and 7*.
2. Green is for SOT25.

Device (Note 3)	Package Code	Packaging	Tube		-7” Tape and Reel	
			Quantity	Part Number Suffix	Quantity	Part Number Suffix
AP1522W	W	SOT25	5000	-B	3000/Tape & Reel	-7

Note: 3. Pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at http://www.diodes.com/datasheets/ap02001.pdf.

Pin Assignments

Top View

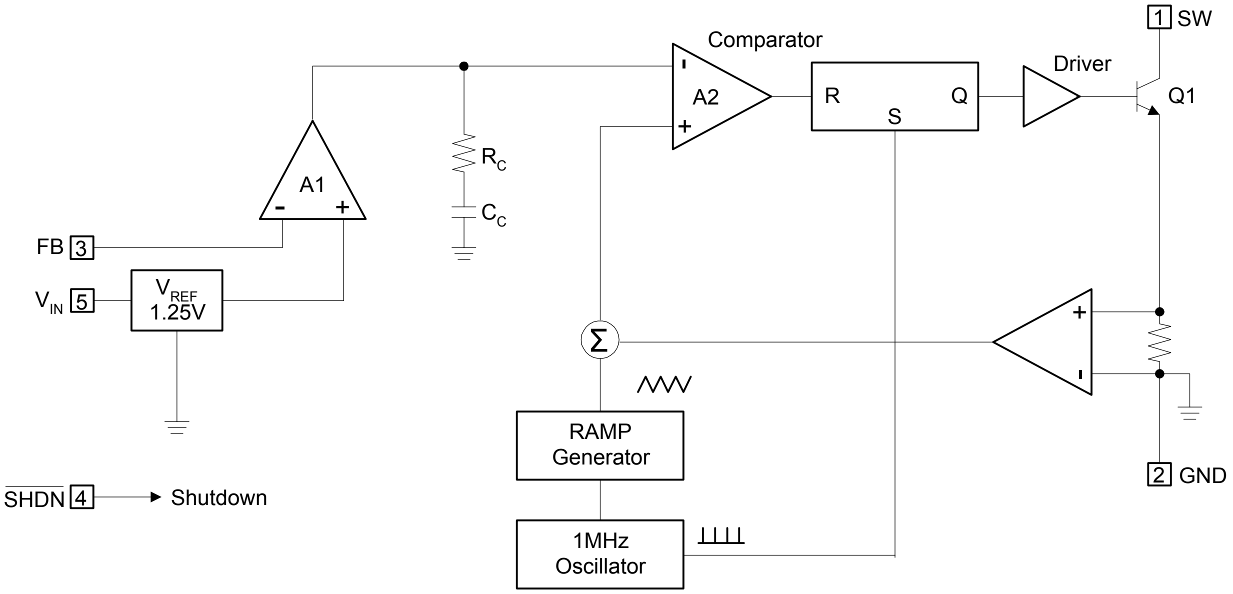


SOT25

Pin Descriptions

Name	Description
SW	Switch Pin. Connect inductor/diode here. Minimize trace area at this pin to reduce EMI.
V_{SS}	GND pin
FB	Feedback Pin. Reference voltage is 1.25V.
$\overline{SHDN}$	Shutdown Pin. Tie to 0.6V or higher to enable device; 0.5V or less to disable device.
V_{IN}	Input Supply Pin. Must be locally bypassed.

Block Diagram



Absolute Maximum Ratings

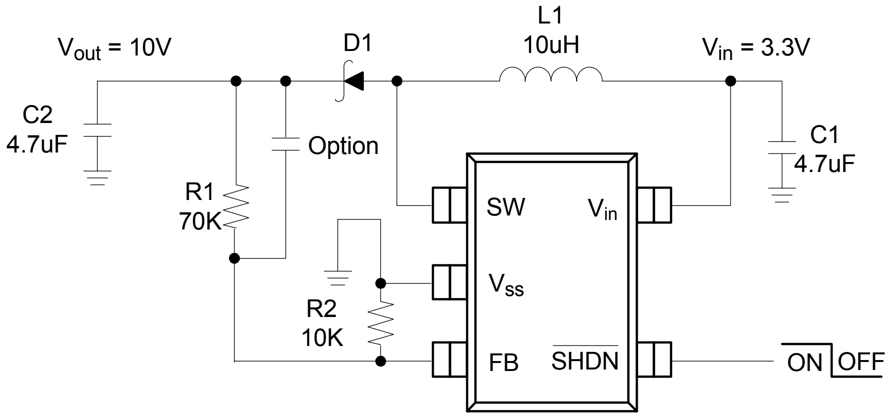
Symbol	Parameter	Rating	Unit
V_{IN}	V_{IN} Pin Voltage	10	V
V_{SW}	SW Voltage	36	V
V_{FB}	Feedback Pin Voltage	10	V
V_{SHDN}	SHDN Pin Voltage	10	V
T_J	Maximum Junction Temperature	125	^oC
T_{LEAD}	Lead Temperature (Soldering for 10s.)	300	^oC
T_{OPR}	Operating Ambient Temperature Range	0 to +85	^oC
T_{STG}	Storage Temperature Range	-40 to +125	^oC

Caution: The absolute maximum ratings are rated values exceeding which the product could suffer physical damage. These values must therefore not be exceeded under any conditions.

Electrical Characteristics (T$_a$ = 25°C, V_{IN} = 5V, V_{SHDN} = 5V, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{IN}	Minimum Operation Voltage	-	2.5	-	-	V
V_{IN}	Maximum Operation Voltage	-	-	-	10	V
V_{FB}	Feedback Pin Voltage	-	1.225	1.25	1.275	V
I_{FB}	Feedback Pin Bias Current	-	10	45	100	nA
I_{IN}	Supply Current	Operation Current	-	2	3	mA
		V_{SHDN} = 0V	-	0.1	1.0	μA
F_{SW}	Switching Frequency		0.75	1.0	1.25	MHz
Duty	PWM Maximum Duty Cycle		85	90	-	%
I_{SW}	Switch Current		280	320	360	mA
V_{SAT}	Switch V_{SAT}	I_{SW} = 250mA	-	350	-	mV
	Switch Leakage Current	V_{SW} = 5V	-	0.1	5	μA
V_{SHDN}	SHDN Pin Voltage High	Enable	0.6	-	-	V
V_{SHDN}	SHDN Pin Voltage Low	Disable	-	-	0.5	V
I_{SHDN}	SHDN Pin Bios Current		-	10	-	μA

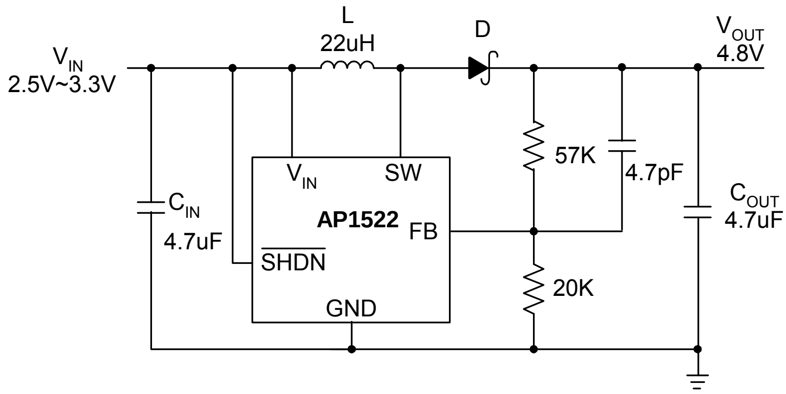
Typical Application Circuit



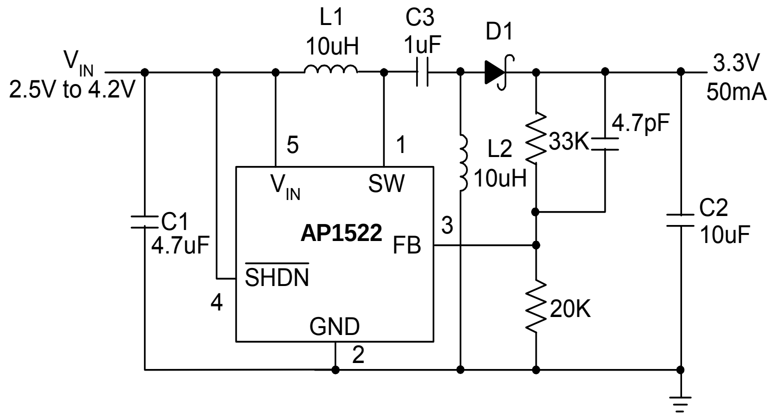
$$V_{OUT} = V_{FB}\left(1+\frac{R1}{R2}\right)$$

1K ≤ R2 ≤ 50K

Step Up DC-DC Regulator

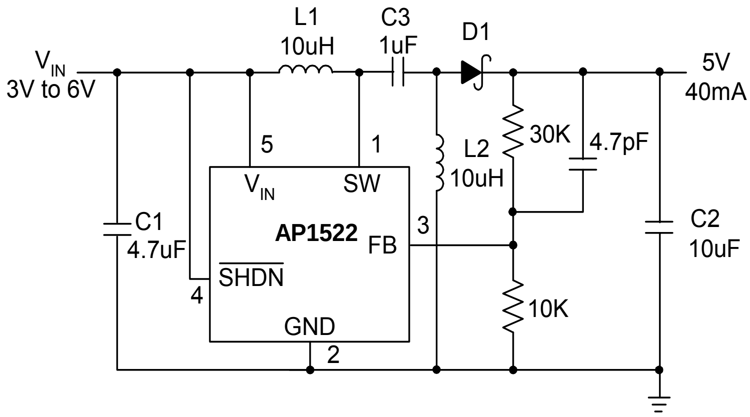


1-Cell Li-Ion to 3.3V SEPIC Converter

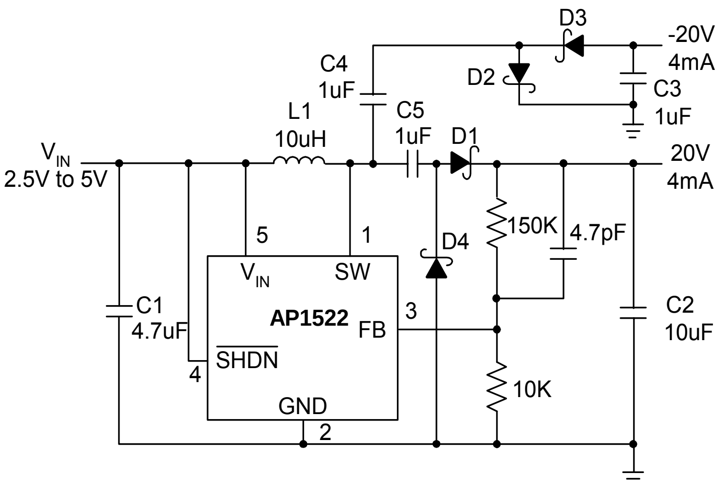


Typical Application Circuit (Continued)

4-Cell to 5V SEPIC Converter



±20V Dual Output Converter with Output Disconnect



Applications Information

Inductor Selection

A 10μH inductor is recommended for most AP1522 applications. Although small size and high efficiency are major concerns, the inductor should have low core losses at 1MHz and low DCR (copper wire resistance).

Capacitor Selection

The small size of ceramic capacitors makes them ideal for AP1522 applications. X5R and X7R types are recommended because they retain their capacitance over wider voltage and temperature ranges than other types such as Y5V or Z5U. A 4.7μF input capacitor and a 4.7μF output capacitor are sufficient for most AP1522 applications.

Diode Selection

Schottky diodes, with their low forward voltage drop and fast reverse recovery, are the ideal choices for AP1522 applications. The forward voltage drop of a Schottky diode represents the conduction losses in the diode, while the diode capacitance (C_T or C_D) represents the switching losses. For diode selection, both forward voltage drop and diode capacitance need to be considered. Schottky diodes with higher current ratings usually have lower forward voltage drop and larger diode capacitance, which can cause significant switching losses at the 1MHz switching frequency of the AP1522. A Schottky diode rated at 100mA to 200mA is sufficient for most AP1522 applications.

Open-Circuit Protection

In the cases of output open circuit, when the R1 are disconnected from the circuit, the feedback voltage will be zero. The AP1522 will then switch at a high duty cycle resulting in a high output voltage, which may cause the SW pin voltage to exceed its maximum 36V rating. A Zener diode can be used at the output to limit the voltage on the SW pin (**Figure 1**). The Zener voltage should be larger than the maximum forward voltage of the V_{OUT}. The current rating of the Zener should be larger than 0.1mA.

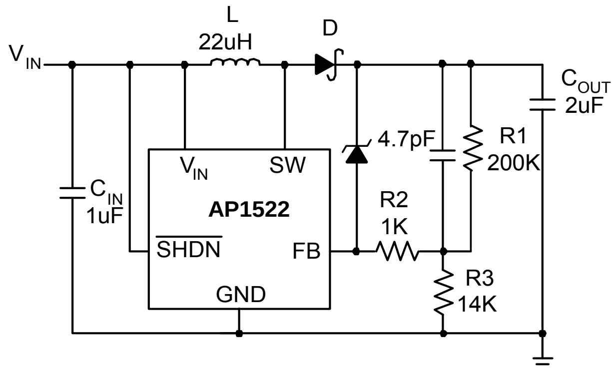
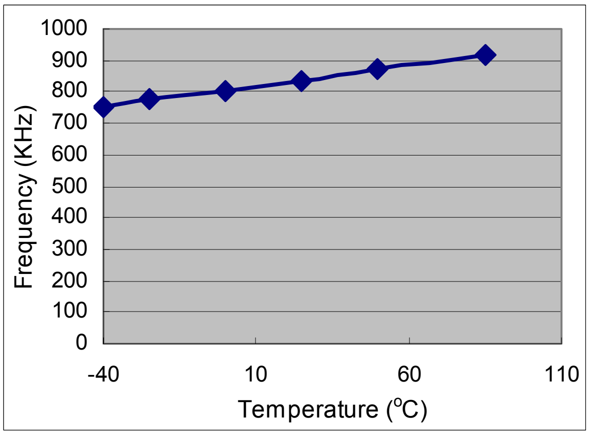


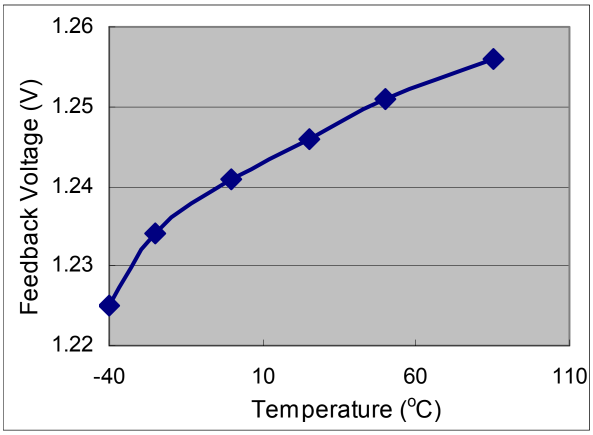
Figure 1. With Open-Circuit Protection

Typical Performance Characteristics

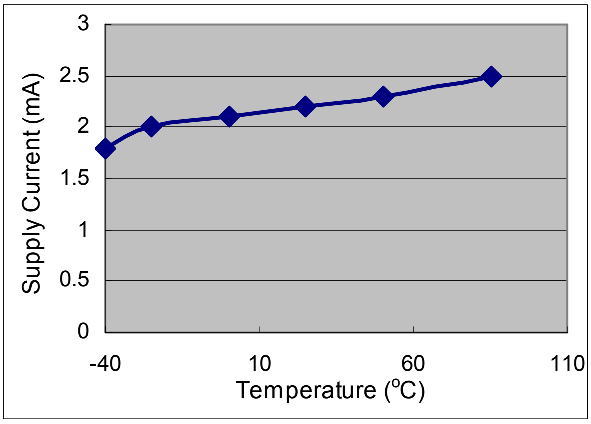
Frequency vs. Temperature
V_{in} = 5V; V_{out} = 15V



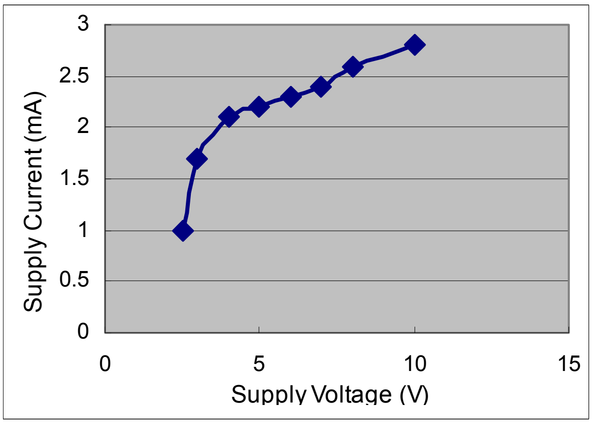
Feedback Voltage vs. Temperature
V_{in} = 5V; V_{out} = 15V



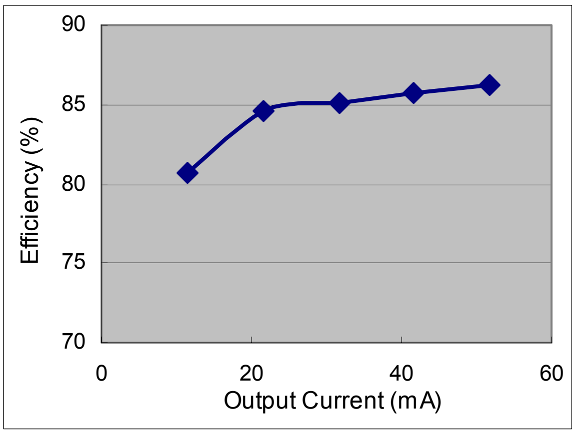
Supply Current vs. Temperature
V_{in} = 5V; V_{out} = 15V; I_{out} = 0A



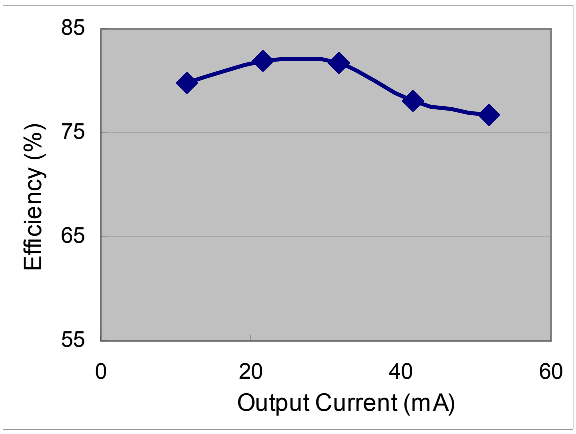
Supply Current vs. Supply Voltage
V_{out} = 15V; I_{out} = 0A



Efficiency vs. Output Current
V_{in} = 5V; V_{out} = 15V

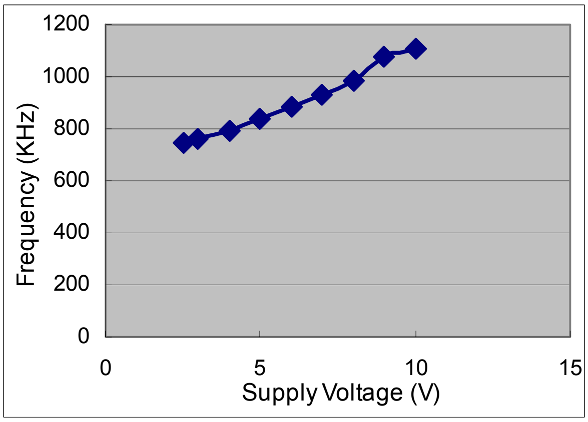


Efficiency vs. Output Current
V_{in} = 3.3V; V_{out} = 15V



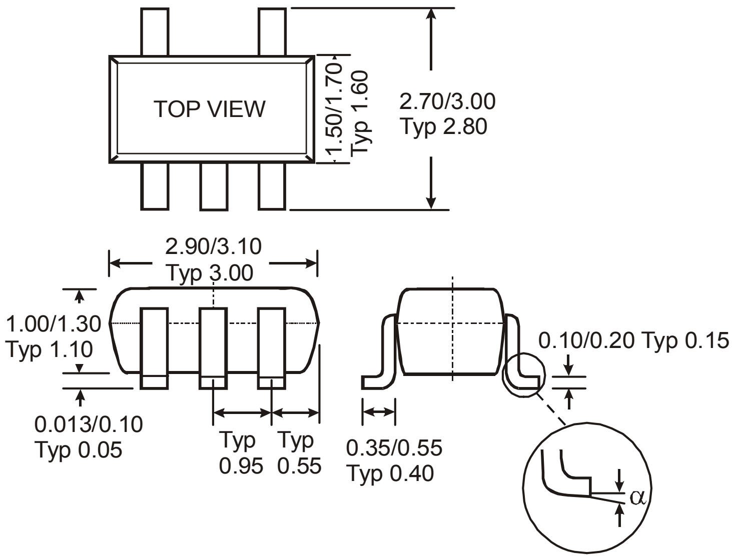
Typical Performance Characteristics (Continued)

Frequency vs. Supply Voltage
V_{out} = 15V



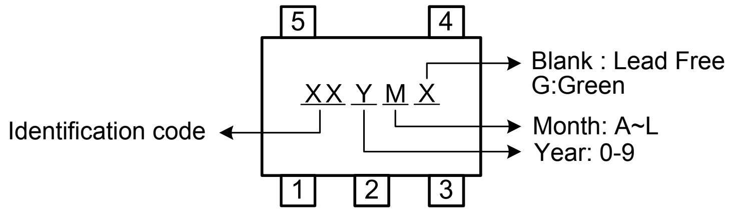
Package Diagrams (All Dimensions in mm)

(1) SOT25



Marking Information

(1) SOT25



Device	Package (Note 4)	Identification Code
AP1522W	SOT25	FA

Note: 4. For Packaging Details, go to our website at http://www.diodes.com/datasheets/ap02007.pdf.