



**Modify Record**

时间	新版本	旧版本	修改人	修改内容
2012-09-07	Rev.1.0	NA	Jiao	
2012-09-07	Rev.1.1	Rev1.0	LZM	修改为 SE5220CB 的参数
2017-06-30	Rev.1.2	Rev1.1	JOE	修改热阻描述方法和表头电流数
2017-08-30	Rev.1.3	Rev1.2	JOE	根据 AP7365 修改 VINMAX 到 6.5V
2017-08-30	Rev.1.4	Rev1.3	JOE	去掉 EN 对 VIN 的 ESD 二极管
2020-05-22	Rev 1.5	Rev 1.3	Shiyan	Power is reduced to 0.4W for SOT23, and 0.9W for PSOP8

## General Description

The SE5220 series of adjustable output ultra low dropout linear regulators are designed for portable battery powered applications, which require low power consumption and low dropout voltage. Each device contains a bandgap voltage reference, an error amplifier, a PMOS power transistor, and current limit and temperature limit protection circuits. The output voltage can be adjusted via the external resistor network, based on the internal reference voltage of 0.8V

The SE5220 is designed to work with low cost electrolytic and ceramic capacitors and requires a minimum output capacitor of 1μF.

## Features

- Typical 150mV Dropout Voltage at 500mA.
- Fast Enable Turn-On Time of 20μs (Typ.)
- Excellent Line and Load Regulation.
- High Accuracy Output Voltage of 2%.
- Ultra-Low Ground Current at 78μA(Typ)
- Disable Current Less than 1μA (Typ.)
- Thermal and Over-Current Protection.
- Short Circuit Protection
- Standard SOT23-5 Package.

## Applications

- USB removable devices
- MPEG4 devices
- Wireless LAN's
- Hand-Held Instrumentation.
- Portable DVD players
- Digital camera

## Typical Application

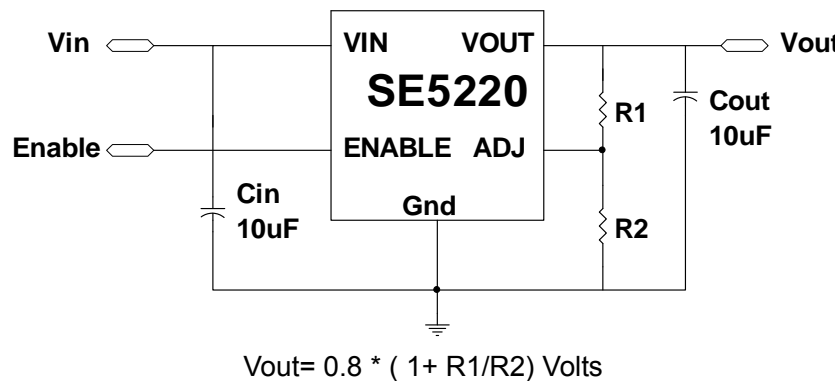
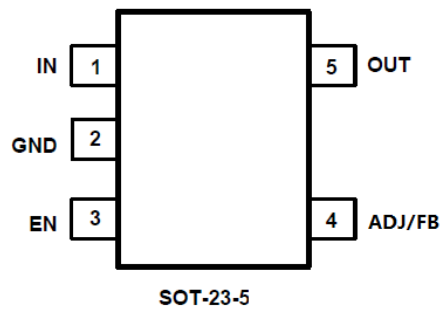


Figure 2. ADJ Vout Typical Application Circuit (Minimum Cout 1uF)



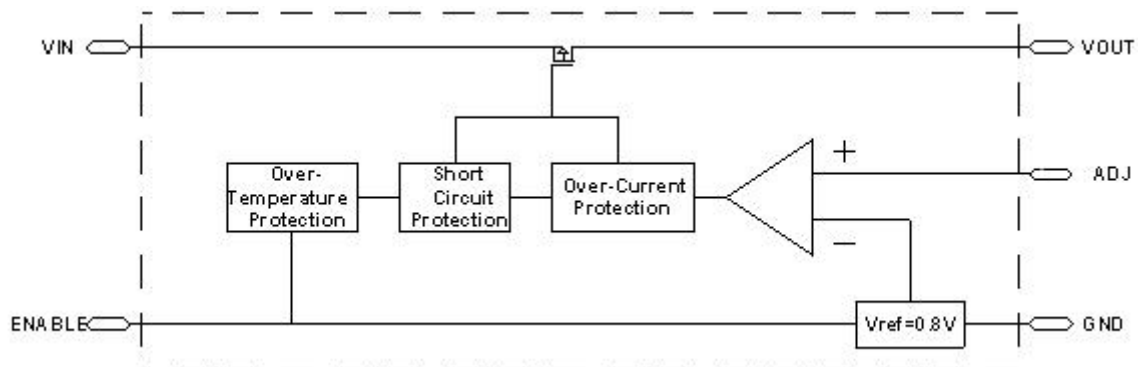
### Pin Configuration



### Pin Description

NO.	Pin Name	Pin Function Description
1	ENABLE	Enable Pin
2	VIN	Input Voltage
3	VOUT	Output Voltage
4	ADJ	Adjust Pin
5	GND	Ground

### Functional Block Diagram





**Ordering Information**

Package	Ordering Information		Marking Information	
	ADJ	SE5220-HF-ADJ	5220X	Adjustable output voltage  X means Production batch.code. (A-Z: 1-26, a-z: 27-52)
	3.3V	SE5220ALG-HF	220Alx	x means Production batch.code. (A-Z: 1-26, a-z: 27-52)
	2.8V	SE5220BLG-HF	220BLx	
	2.5V	SE5220CLG-HF	220CLx	
	1.8V	SE5220DLG-HF	220DLx	
	1.5V	SE5220ELG-HF	220ELx	
	3.0V	SE5220FLG-HF	220FLx	
	1.2V	SE5220GLG-HF	220GLx	



### Absolute Maximum Ratings<sup>(1)</sup>

Parameter	Symbol	Value	Units
Input Voltage	$V_{IN}$	6.5	V
Enable Voltage Range	$V_{EN}$	-0.3 to $V_{IN}$	V
Output Voltage Range	$V_{OUT}$	-0.3 to $V_{IN}$	V
Power Dissipation	$P_D$	SOT23-5: 0.4 PSOP8: 0.9	W
Thermal Resistance, Junction-to-Ambient	$\Theta_{JA}$	SOT23-5: 150	°C/W
		PSOP8: 30	
	$\Theta_{JC}$	SOT23-5: 33	
		PSOP8: 20	
Lead Temperature (Soldering, 5 sec.)		260	°C
Junction Temperature Range	$T_J$	-40 to +150	°C
Storage Temperature Range	$T_S$	-40 to +150	°C

Test condition for all packages: Device mounted on FR-4 substrate PC board, 1oz copper, with minimum recommended pad layout.

MIL-STD-202G 210F

### Recommended Operating Conditions<sup>(2)</sup>

Parameter	Symbol	Value	Units
Supply Input Voltage Range	$V_{IN}$	2~6	V
Junction Temperature Range	$T_J$	-40 to +125	°C
Ambient Temperature	$T_A$	-40 to 85	°C

### Electrical Characteristics

( $V_{IN} = V_{out} + 1.0V$ );  $C_{IN} = 10\mu F$ ;  $C_{OUT} = 10\mu F$ ;  $I_{OUT} = 10mA$ ;  $T_J = 25^\circ C$ ; unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{OUT}$	Output Voltage Accuracy		-2%		2%	V
$V_{REF}$	ADJ Pin Voltage	SE5220 – ADJ	-2%	0.8	2%	V
$\Delta V_{OUT}/V_{OUT}$	Line Regulation	$V_{IN} = (V_{OUT} + 0.7)V$ to 6V	--	0.05	0.2	%/V
$\Delta V_{OUT}/V_{OUT}$	Load Regulation <sup>(5)</sup>	$V_{IN} = (V_{OUT} + 0.7)V$ $I_{OUT} = 10mA$ to 500mA	--	0.12	1	%
$\Delta V_{OUT}/\Delta T$	Output Voltage Temperature Coefficient	Note 4	--	0.1	--	mV/°C



$V_{IN} - V_{OUT}$	Dropout Voltage (6)	$V_{out} < 2.5V, I_{out} = 600mA$	--	306	550	mV
		$V_{out} \geq 2.5V, I_{out} = 600mA$	--	240	350	
$T_{PROTECTION}$	Thermal Protection	Thermal Protect Threshold	--	150	--	°C
		Hysterisys		30		
$I_Q$	Quiescent Current	$V_{EN} = V_{IN}; I_{OUT} = 0mA$	--	78	100	$\mu A$
		$V_{EN} = 0.4V; I_{OUT} = 0mA$	--	0.1	1	
$V_{TH(EN)}$	Enable Input Threshold Voltage	Voltage Increasing, Output Turns On, Logic High	1.6	--	--	V
		Voltage Decreasing, Output Turns Off, Logic Low	--	--	0.4	V
$I_{LIMIT}$	Current Limit		1	1.7	--	A
$I_{short}$	Short Circuit Current	$V_{IN} = V_{out} + 1V; V_{out} < 0.4V$	--	0.32	--	A
PSRR	Ripple Rejection	$f = 100Hz, V_{IN} = 4.5V$ $V_{p-p} = 1V, I_{Load} = 50mA$		53.6		dB

**Note 1:** Exceeding the absolute maximum rating may damage the device.

**Note 2:** The device is not guaranteed to function outside its operating rating.

**Note 3:** The maximum allowable power dissipation at any  $T_A$  (ambient temperature) is calculated using:  $P_{D(MAX)} = (T_{J(MAX)} - T_A) / \theta_{JA}$ . Exceeding the maximum allowable power dissipation will result in excessive die temperature, and the regulator will go into thermal shutdown. See "Thermal Consideration" section for details

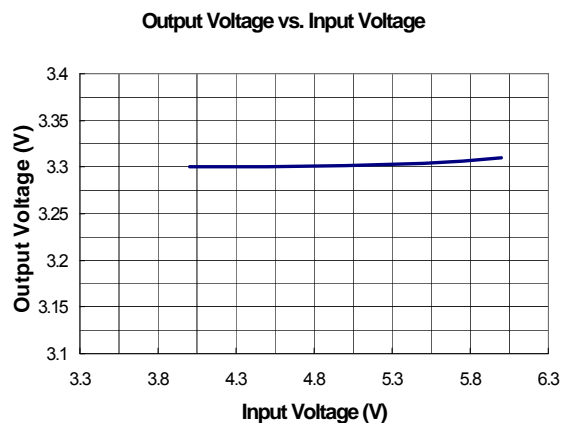
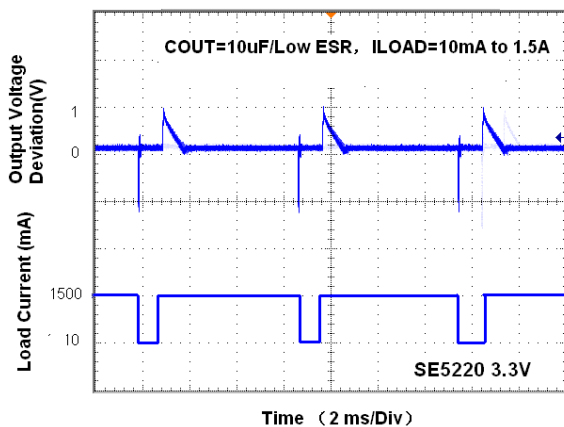
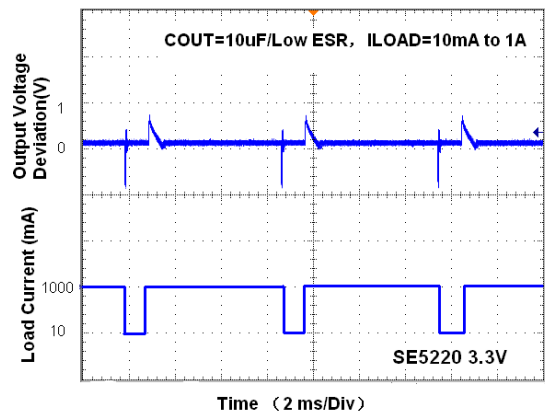
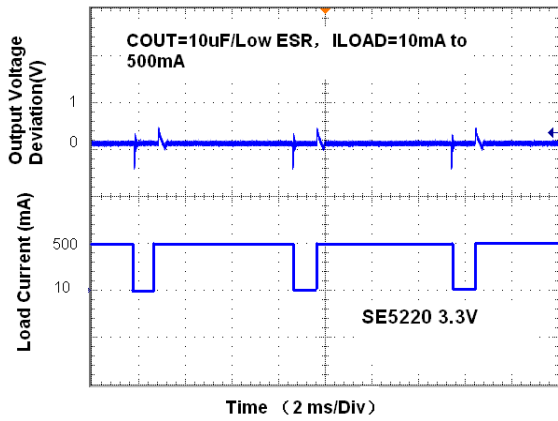
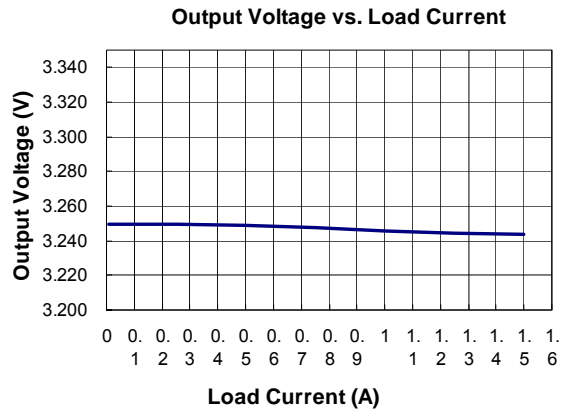
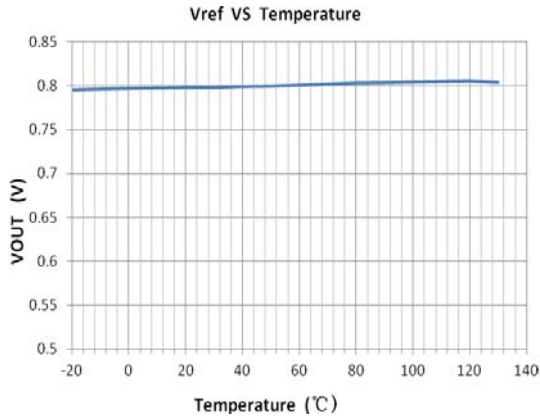
**Note 4:** Output voltage temperature coefficient is the worst case voltage change divided by the total temperature range.

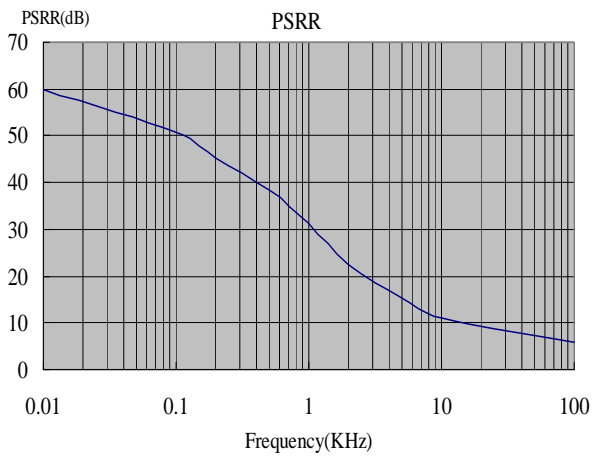
**Note 5:** Regulation is measured at constant junction temperature using low duty cycle pulse testing. Parts are tested for load regulation in the load range from 10mA to 600mA. Changes in output voltage due to heating effects are covered by the thermal regulation specification.

**Note 6:** Dropout voltage is defined as the input to output differential at which the output voltage drops 2% below its nominal value measured at 1V differential. Input voltage above minimum  $V_{in} = 2V$ .



## Typical Performance Characteristics









## Applications Information

### Application Hints

Like any low dropout regulator, SE5220 requires external capacitors to ensure stability. The external capacitors must be carefully selected to ensure performance.

### Input Capacitor

An input capacitor of at least 10 $\mu$ F is required. Ceramic or Tantalum can be used. The value can be increased without upper limit.

### Output Capacitor

An output capacitor is required for stability. It must be placed no more than 1 cm away from the V<sub>OUT</sub> pin, and connected directly between V<sub>OUT</sub> and GND pins. The minimum value is 10 $\mu$ F but may be increased without limit.

### Thermal Considerations

It is important that the thermal limit of the package is not exceeded. The SE5220 has built-in thermal protection. When the thermal limit is exceeded, the IC will enter protection, and V<sub>OUT</sub> will be pulled to ground. The power dissipation for a given application can be calculated as following:

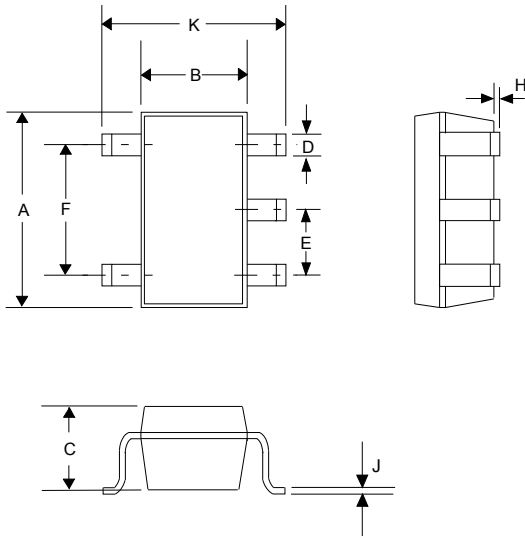
The power dissipation (P<sub>D</sub>) is

$$P_D = I_{OUT} * [V_{IN} - V_{OUT}]$$

The thermal limit of the package is then limited to  $P_{D(MAX)} = [T_J - T_A] / \Theta_{JA}$  where T<sub>J</sub> is the junction temperature, T<sub>A</sub> is the ambient temperature, and  $\Theta_{JA}$  is around 150°C/W (SOT23-5) for SE5220. SE5220 is designed to enter thermal protection at 150°C. For example, if T<sub>A</sub> is 25°C then the maximum P<sub>D</sub> is limited to about 0.7W. In other words, if I<sub>OUT(MAX)</sub> = 300mA, then [V<sub>IN</sub> - V<sub>OUT</sub>] cannot exceed 2.33V. (Test condition for all packages: Device mounted on FR-4 substrate PC board, 1oz copper, with minimum recommended pad layout.)



**Outline Drawing For SOT23-5**



DIM <sup>N</sup>	DIMENSIONS			
	INCHES		MM	
	MIN	MAX	MIN	MAX
A	0.110	0.120	2.80	3.05
B	0.059	0.070	1.50	1.75
C	0.036	0.051	0.90	1.30
D	0.014	0.020	0.35	0.50
E	-	0.037	-	0.95
F	-	0.075	-	1.90
H	-	0.006	-	0.15
J	0.0035	0.008	0.090	0.20
K	0.102	0.118	2.60	3.00

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