600mA CMOS Ultra LDO Voltage Regulator with EN

DESCRIPTIONS

The EC49220 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 band gap 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 EC49220 is designed to work with low cost electrolytic and ceramic capacitors and requires a minimum output capacitor of 1µF.

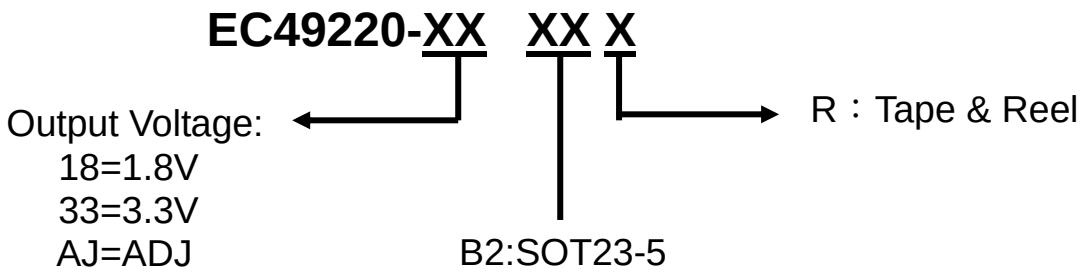
FEATURE

- 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.

APPLICATION

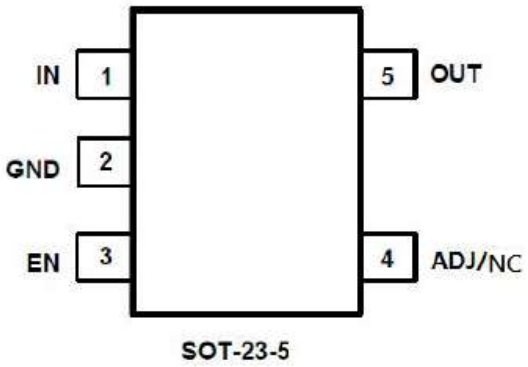
- USB removable devices
- MPEG4 devices
- Wireless LAN's
- Hand-Held Instrumentation.
- Portable DVD players
- Digital camera

ORDERING INFORMATION



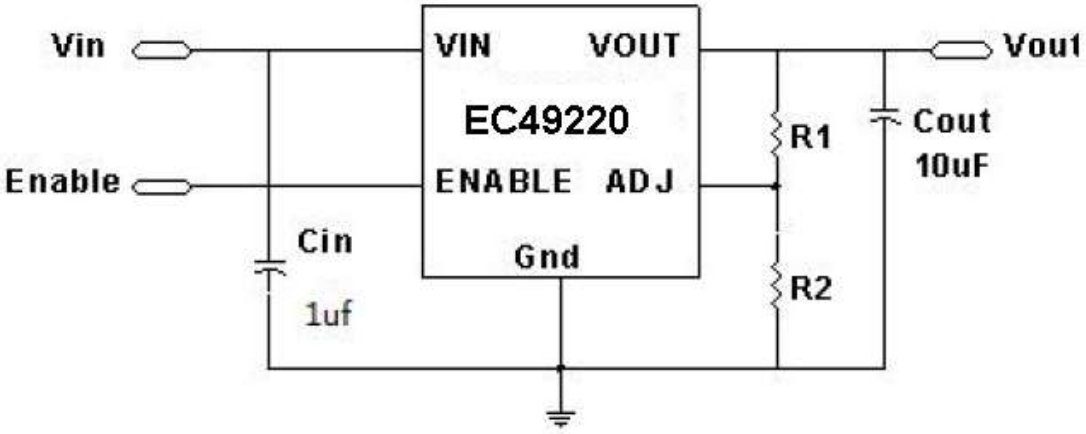
Part Number	Package	Marking	Marking Information
EC49220XXB2R	SOT23-5	220XXX	1. Adjustable output voltage X means Production batch. 2. Fixed output voltage 1.0~4.3V X means Production batch.

PIN CONFIGURATION



SOT-23-5

Typical Application



Vout= 0.8 * (1+ R1/R2) Volts

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

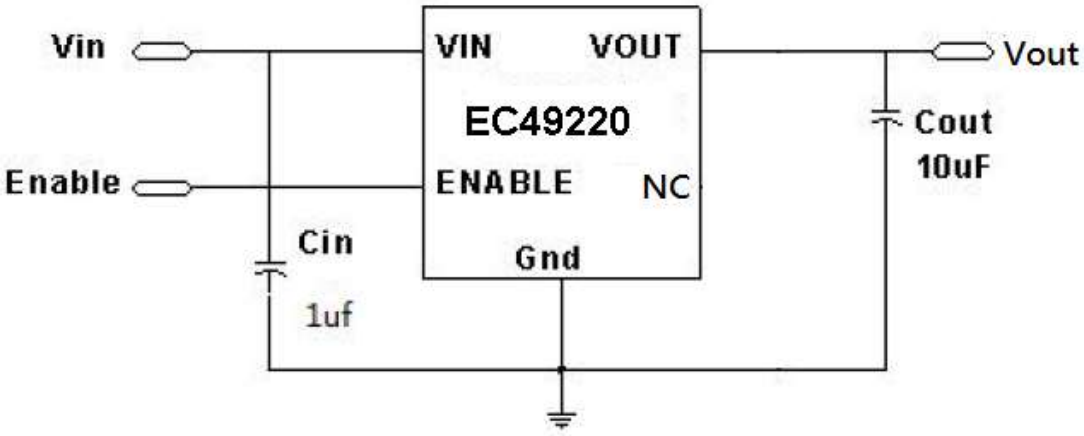
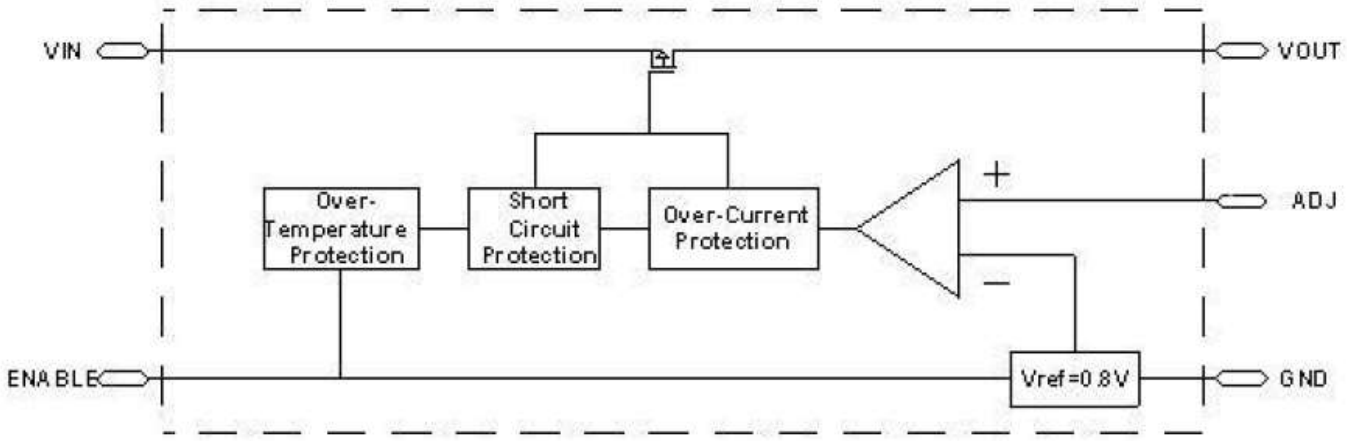


Figure 3. Fix Vout Typical Application Circuit（Minimum Cout 1uF）

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



Absolute Maximum Ratings(1)

Parameter	Symbol	Value	Units
Input Voltage	VIN	6.5	V
Enable Voltage Range	VEN	-0.3 to VIN	V
Output Voltage Range	VOUT	-0.3 to VIN	V
Power Dissipation	PD	SOT23-5：0.4 PSOP8：0.9	W
Thermal Resistance, Junction-to-Ambient	ΘJA	SOT23-5: 150	°C/W
		PSOP8：30	
	ΘJC	SOT23-5: 33	
		PSOP8：20	
Lead Temperature (Soldering, 5 sec.)		260	°C
Junction Temperature Range	TJ	-40 to +150	°C
Storage Temperature Range	TS	-60 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(2)

Parameter	Symbol	Value	Units
Supply Input Voltage Range	VIN	2~6	V
Junction Temperature Range	TJ	-40 to +125	°C
Ambient Temperature	TA	-40 to 85	°C

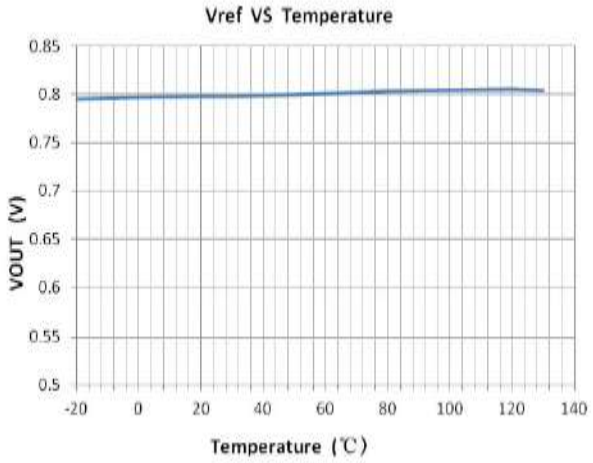
Electrical Characteristics

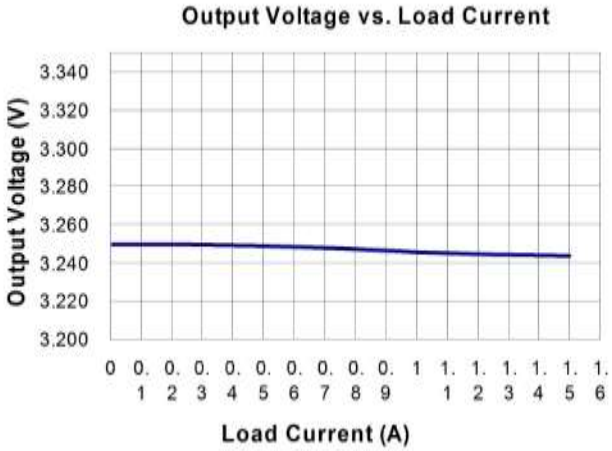
（VIN = （Vout+1.0V）; CIN = 10μF; COUT = 10μF; IOUT = 10mA; TJ = 25°C; unless otherwise noted）

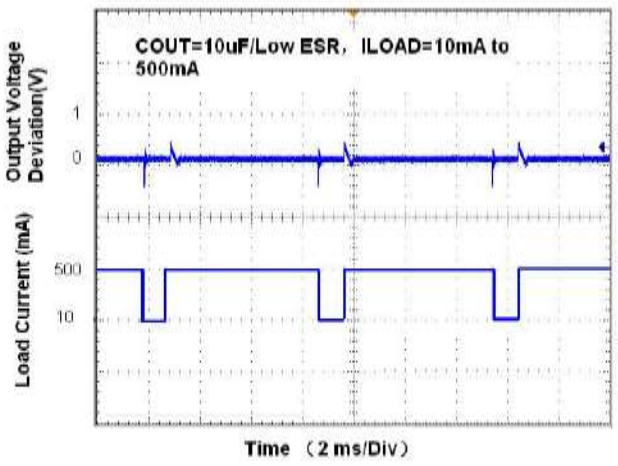
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
VOUT	Output Voltage Accuracy	Iout=10mA	-2%		2%	V
VREF	ADJ Pin Voltage	EC49220 – ADJ	-2%	0.8	2%	V
ΔVOUT/VOU	Line Regulation	VIN = (VOUT + 0.7)V to 6V	--	0.05	0.2	%/V
ΔVOUT/VOU	Load Regulation **(5)**	VIN = (VOUT + 0.7)V IOUT = 10mA to 600mA	--	0.12	1	%
ΔVOUT/ΔT	Output Voltage Temperature Coefficient	Note 4	--	0.1	--	mV/°C
VIN – VOUT	Dropout Voltage (6)	VOUT＜2.5V ,IOUT = 600mA	--	306	550	mV
		VOUT≥2.5V ,IOUT = 600mA	--	240	350	
TPROTECTI	Thermal Protection	Thermal Protect Threshold	--	150	--	°C
		Hysterisys		30		
IQ	Quiescent Current	VEN = VIN; IOUT = 0mA	--	78	100	μA
		VEN = 0.4V; IOUT = 0mA	--	0.1	1	
VTH(EN)	Enable Input Threshold Voltage	Voltage Increasing, Output Turns On, Logic High	1.6	--	--	V
		Voltage Decreasing, Output Turns Off, Logic Low	--	--	0.4	
ILIMIT	Current Limit		1	1.7	--	A
Ishort	Short Circuit Current	VIN=Vout+1V; Vout< 0.4V	--	0.32	--	A
PSRR	Ripple Rejection	f =1KHz VIN=4.5V Vp-p=0.5V, ILoad=50mA		53.6		dB

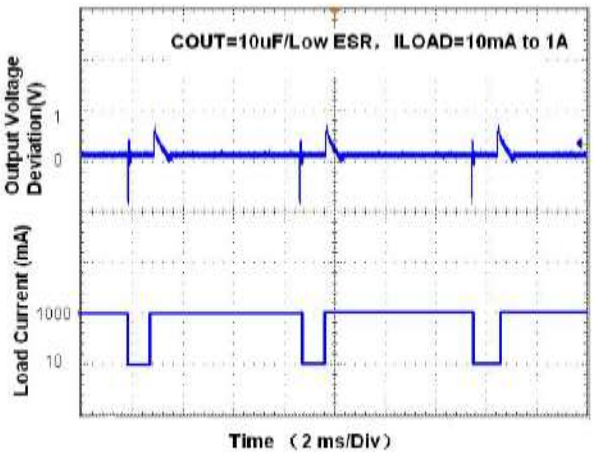
Note 1: Exceeding the absolute maximum rating may damage the device.
Note 2: The device is not guaranteed to function outside its operating rating.
Note 3: The maximum allowable power dissipation at any TA (ambient temperature) is calculated using: PD(MAX) = (TJ(MAX) – TA)/ΘJA. Exceeding the maximum 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 Vin=2V.

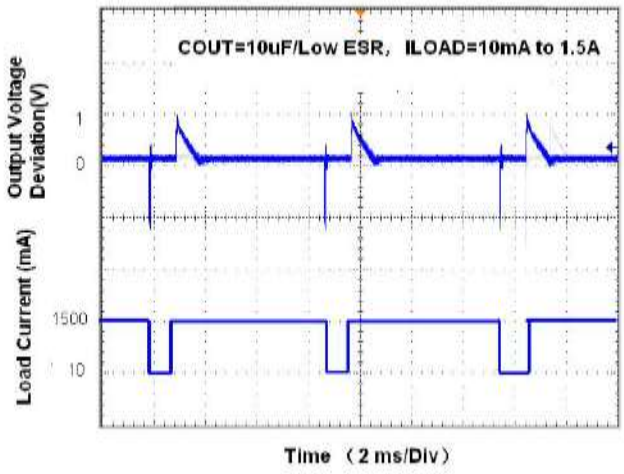
Typical Performance Characteristics

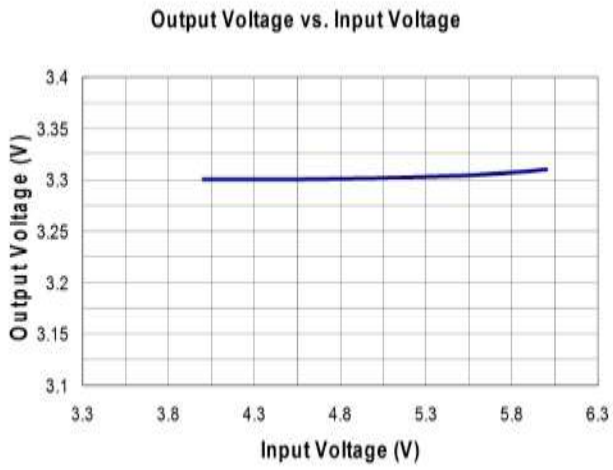


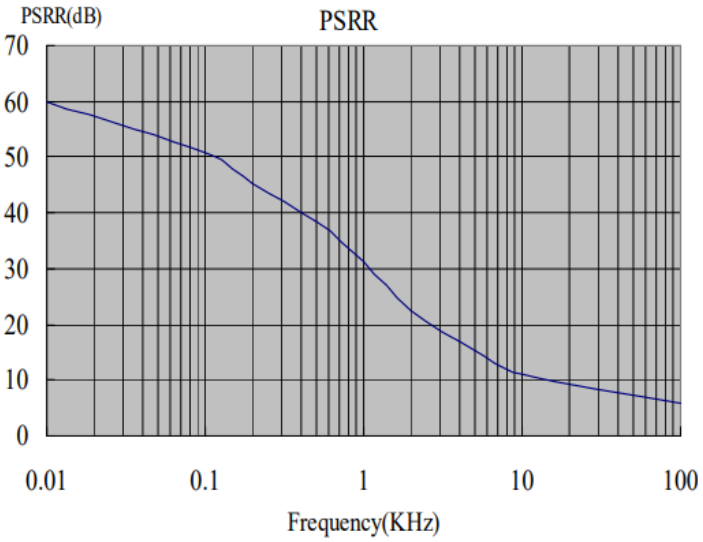











PSRR(dB)
PSRR
70
60
50
40
30
20
10
0
0.01
0.1
1
10
100
Frequency(KHz)

Applications Information

Application Hints

Like any low dropout regulator, EC49220 requires external capacitors to ensure stability.The external capacitors must be carefully selected to ensure performance.

Input Capacitor

An input capacitor of at least 1μF is required. Ceramic or Tantalum can be used. The value can be increase without upper limit.

Output Capacitor

An output capacitor is required for stability. It must be placed no more than 1cm away from the VOUT pin, and connected directly between VOUT and GND pins.The minimum value is 1μF but may be increase without limit.

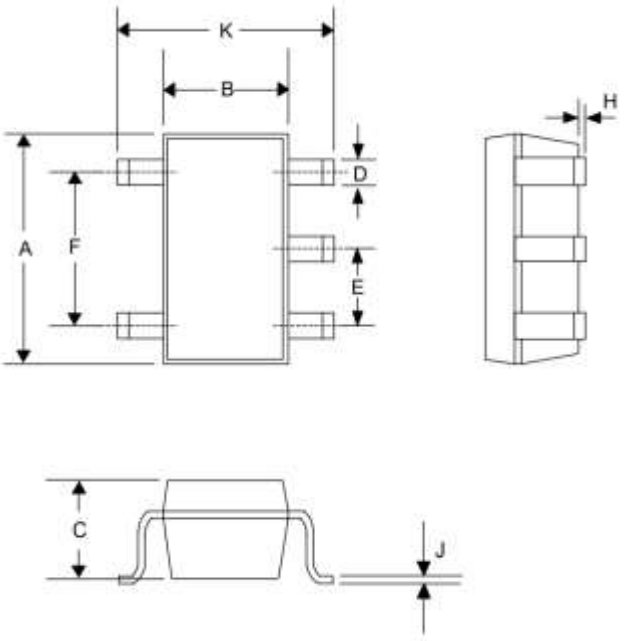
Thermal Considerations

It is important that the thermal limit of the package is not exceeded. The EC49220 has built-in thermal protection. When the thermal limit is exceeded, the IC will enter protection, and V_{OUT} will be pulled to ground.
The power dissipation for a given application can be calculated as following:

The power dissipation (P_D) is $\mathbf{P_D = I_{OUT} * [V_{IN} – V_{OUT}]}$

The thermal limit of the package is then limited to $P_{D(MAX)} = [T_J – T_A]/\Theta_{JA}$ where T_J is the junction temperature, T_A is the ambient temperature, and Θ_{JA} is around 150°C/W for EC49220. EC49220 is designed to enter thermal protection at 150°C. For example, if T_A is 25°C then the maximum PD is limited to about 0.7W. In other words, if $I_{OUT(MAX)}$ = 300mA, then $[V_{IN} – V_{OUT}]$ cannot exceed 2.33mV.
（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



DIMENSIONS				
DIM	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