ACE500EC

Low-Dropout CMOS Voltage Regulator

Description

The ACE500EC series are a group of positive voltage regulators manufactured by CMOS technologies with high ripple rejection, ultra-low noise, low power consumption and low dropout voltage, which can prolong battery life in portable electronics. The ACE500EC series work with low-ESR ceramic capacitors, reducing the amount of board space necessary for power applications. The ACE500EC series consume less than 0.1μA in shutdown mode and have fast turn-on time less than 50μs.The series are very suitable for the battery-powered equipment's, such as RF applications and other systems requiring a quiet voltage source

Features

- 500mA RF Low-Dropout Regulator With Enable
- Ultralow-Noise：40μVRMS(10Hz~100kHz)
- High PSRR: 70dB@1kHz
- Fast Start-Up Time (20μs)
- Excellent Load/Line Transient Response
- Low Dropout Voltage: 110mV@100mA
- Stable With a 1μF Ceramic Capacitor
- Available in Adjustable Voltage Version (0.6V to 5.5V)
- Built-in Current Limiter, Short-Circuit Protection

Application

- RF: VCOs, Receivers, ADCs
- Cellular and Cordless Telephones
- Handheld Organizers
- Audio
- Bluetooth, Wireless LAN
- Tablet, MID

Absolute Maximum Ratings Unless otherwise specified, T_A=25°C

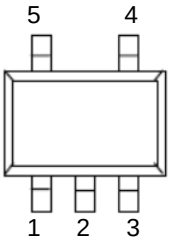
Parameter		Symbol	Max	Unit
Input Voltage		V_{IN}	V_{SS}-0.3~V_{SS}+8	V
Output Current		I_{OUT}	750	mA
Output Voltage		V_{OUT}	V_{SS}-0.3~V_{IN}+0.3	V
Power Dissipation	SOT-23-5	Pd	400	mW
	SOT-23-6			
Operating Temperature		T_{opr}	- 40~85	°C
Storage Temperature		T_{stg}	- 40~125	°C
Soldering Temperature & Time		T_{solder}	260°C,10s	

ACE500EC

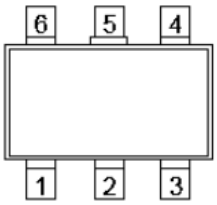
Low-Dropout CMOS Voltage Regulator

Packaging Type

SOT23-5



SOT23-6



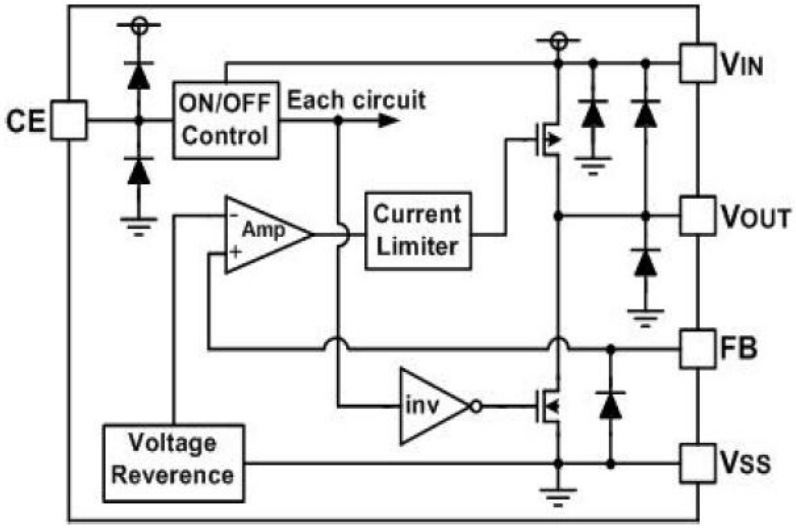
SOT-23-5	SOT-23-6	Description	Function
1	1	V_{IN}	Power input Pin
2	2	V_{SS}	Ground
3	3	CE	Chip Enable Pin
4	5	FB	Feedback Pin: Used to Set Output Voltage
5	6	V_{OUT}	Output Pin
	4	NC	Not Connection

Ordering information

ACE500EC XX XX + H

- Halogen - free
- Pb - free
- BN：SOT-23-5
  GM：SOT-23-6
- Output Voltage：1.1 / 1.5V …../5.5V / Default： Adjustable Version

Block Diagram



Electrical Characteristics

(V_{IN}=V_{OUT}+1V, C_{IN}=C_{OUT}=1μF,T_A=25 °C, unless otherwise specified)

Parameter		Symbol	Conditions	Min	Typ	Max	Units
Input Voltage		V_{IN}		1.8(1)		7.0	V
Output Current		I_{OUT}	V_{OUT}≥1.8V	500			mA
Supply Current		I_{SS}	I_{OUT}=0mA		45	80	uA
Standby Current		I_{STBY}	V_{CE}=0V			0.1	uA
CE "High" Voltage		V_{CEH}		1.2		V_{IN}	V
CE "Low" Voltage		V_{CEL}				0.3	V
CE pin current			V_{CE}=0V	-1		1	V
FB Voltage		V_{FB}	I_{OUT}=1mA	0.588	0.600	0.612	V
FB pin current			V_{FB}=1.8V			1	uA
Output voltage range				0.6		5.5-V_{DD}	V
Line Regulation		$\frac{\Delta V_{OUT}}{V_{OUT} \cdot V_{IN}}$	I_{OUT}=10mA V_{OUT}+1V≤V_{IN}≤7V		0.01	0.2	%/V
Load Regulation		ΔV_{OUT}	V_{IN}=V_{OUT}+1V 1mA≤I_{OUT}≤100mA		1		mV
Dropout Voltage(2)		V_{dif}	I_{OUT}=100mA V_{OUT}≥3.0V		110		mV
Output Voltage Temperature Characteristics		$\frac{\Delta V_{OUT}}{\Delta T \cdot V_{OUT}}$	I_{OUT}=10mA - 40≤T≤+85		50		ppm
Current Limit		I_{LIM}		600	750		mA
Short Current		I_{SHORT}	V_{OUT}=V_{SS}		20		mA
Power Supply Ripple Rejection	V_{OUT}= 1.2V	PSRR	f=100Hz I_{OUT}=50mA		80		dB
			f=1kHz, I_{OUT}=50mA		70		
			f=10kHz, I_{OUT}=50mA		50		
Output noise voltage			BW=10Hz to 100kHz, I_{OUT}=10mA		40		uV_{RMS}
Time, start-up			I_{OUT}=10mA C_{OUT}=1uF		20		uS

NOTE:

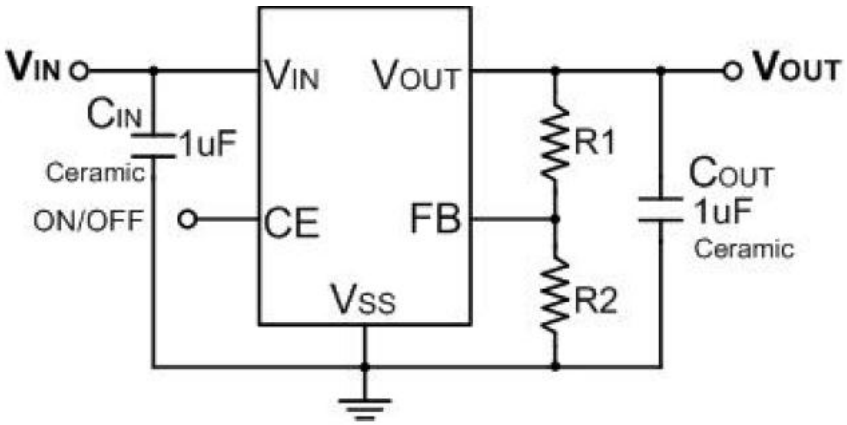
(1) Minimum V_{IN} is 1.8V or V_{OUT} + V_{DO}, whichever is greater.

(2) V_{dif} : The difference of output voltage and input voltage when input voltage is decreased gradually till output voltage equals to 98% of V_{OUT} (E).

Dropout Voltage Chart

Setting Output Voltage	Dropout Voltage (mV) Typ.			
V_{OUT}(V)	I_{OUT}=100mA	I_{OUT}=200mA	I_{OUT}=300mA	I_{OUT}=500mA
1.2	372mV	642mV	876mV	1.368V
1.5	248mV	471mV	681mV	1.128V
1.8	189mV	370mV	550mV	947mV
2.1	157mV	311mV	469mV	820mV
2.5	132mV	265mV	400mV	706mV
2.8	120mV	241mV	365mV	645mV
3.0	111mV	229mV	348mV	612mV
3.3	107mV	214mV	325mV	574mV
3.6	101mV	203mV	307mV	542mV
4.0	98mV	184mV	292mV	506mV
4.5	93mV	183mV	275mV	474mV
5.0	88mV	173mV	261mV	446mV

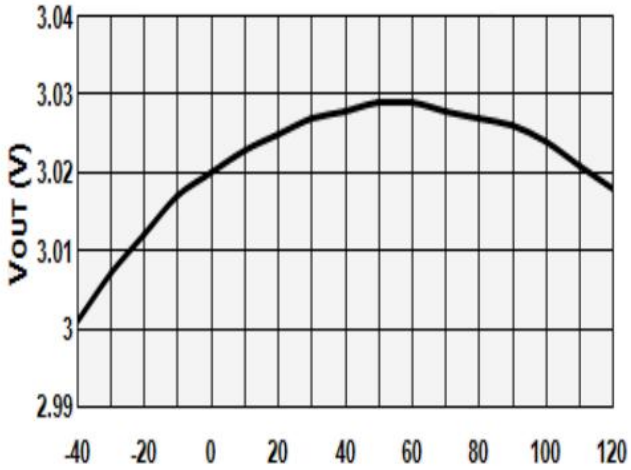
Typical Application Circuit



Figurer 1. Typical Application Circuit

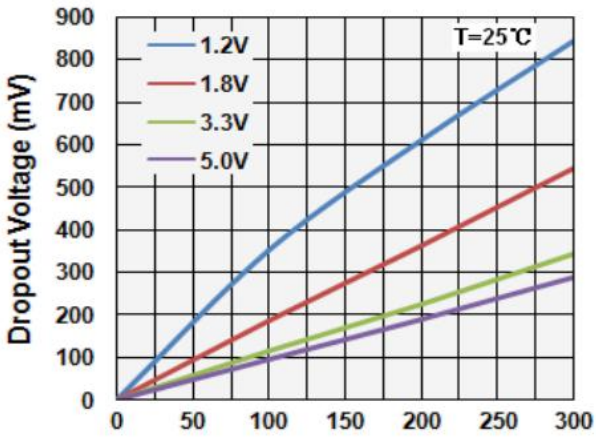
Typical Performance Characteristics

Output Voltage vs Temperature



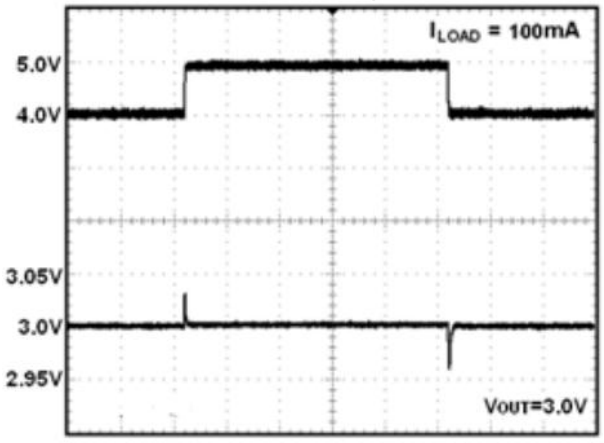
Temperature(°C)

Dropout Voltage vs. Load Current



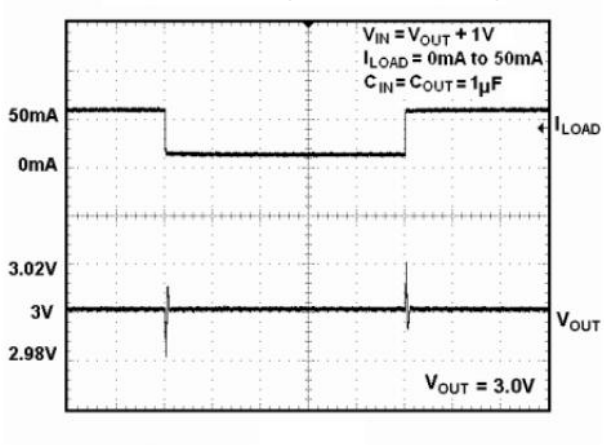
Load Current (mA)

Iine-Transient Response



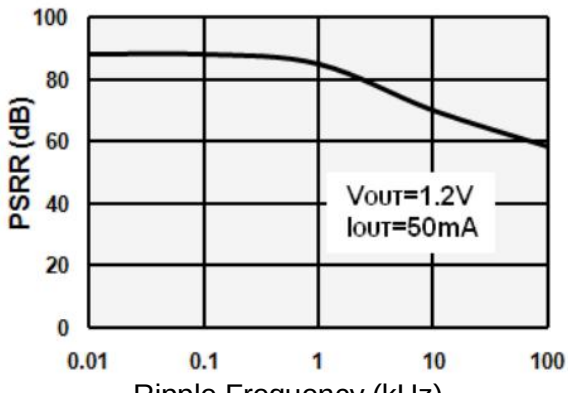
100uS/div

load-Transient Response Near Dropout



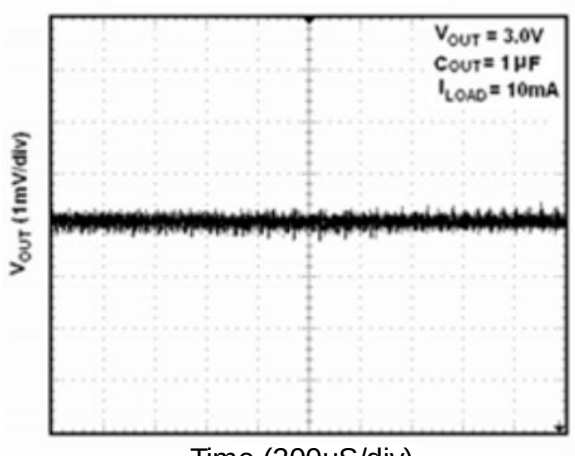
100uS/div

PSRR vs. Frequency



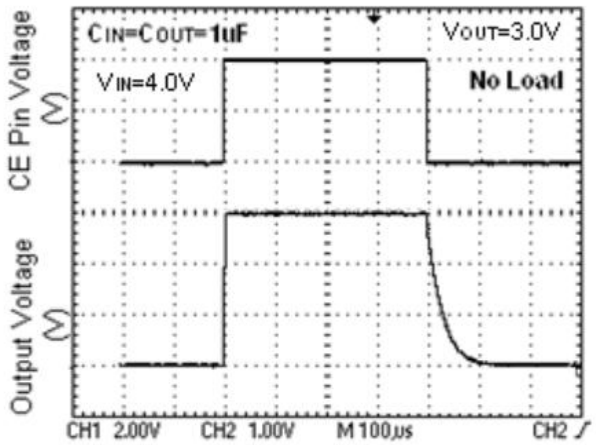
Ripple Frequency (kHz)

Output Noise 10Hz to100KHz

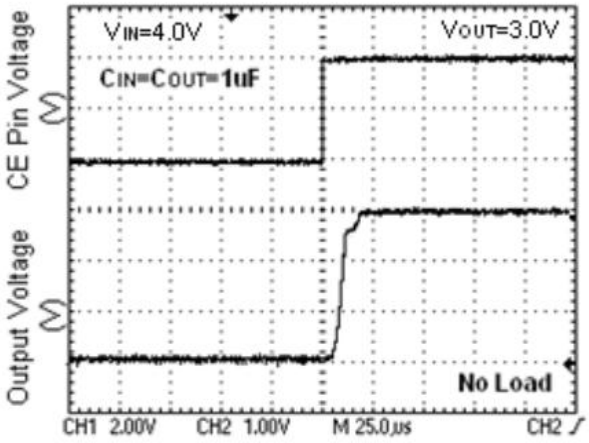


Time (200uS/div)

CE Pin Shutdown Response



Start Up



Application Information

Setting The Output Voltage

Figure 1 shows the typical application circuit with ACE500EC. The external resistor sets the output voltage according to the following equation:

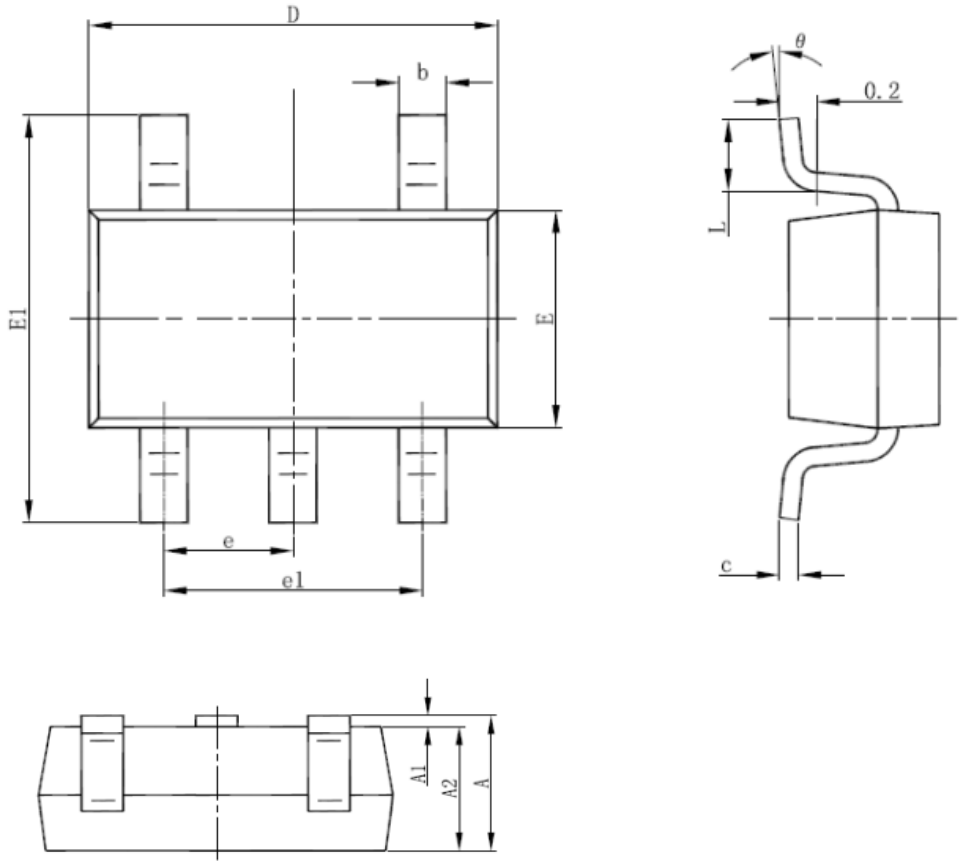
$$V_{OUT} = 0.6V \times \left(1 + \frac{R1}{R2}\right)$$

Table 1.Resistor select for output voltage setting

V_{OUT}	R1	R2
1.2V	30.1K	30.1K
1.5V	45.3K	30.1K
1.8V	60.4K	30.1K
2.5V	95.3K	30.1k
2.8V	110K	30.1k
3.0V	120K	30.1K
3.3V	137K	30.1K
5.0V	221K	30.1k

Packing Information

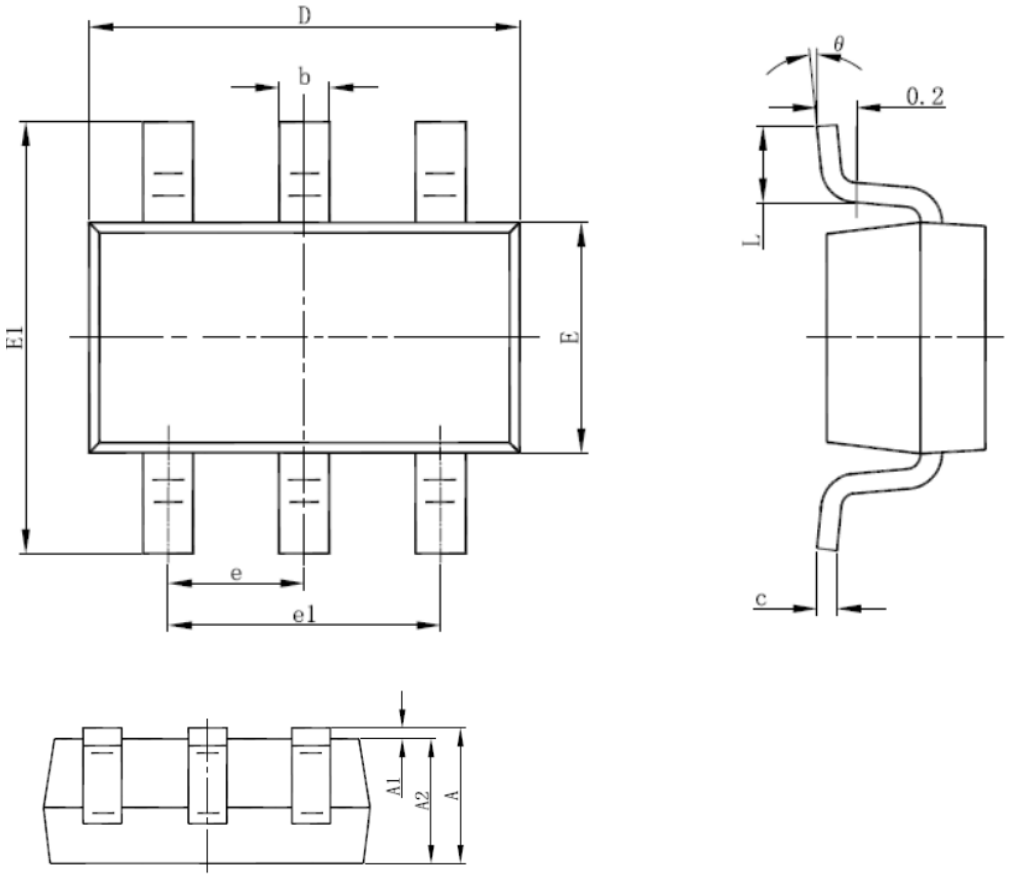
SOT-23-5



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

Packing Information

SOT-23-6



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

Notes

ACE does not assume any responsibility for use as critical components in life support devices or systems without the express written approval of the president and general counsel of ACE Electronics Co., LTD. As sued herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and shoes failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.