Ultralow-Noise, High PSRR, Fast RF Low-Dropout CMOS Voltage Regulator

AF6213-ADJ

■ INTRODUCTION

The AF6213-ADJ 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 AF6213-ADJ work with low-ESR ceramic capacitors, reducing the amount of board space necessary for power applications. The AF6213-ADJ 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 equipments, such as RF applications and other systems requiring a quiet voltage source.

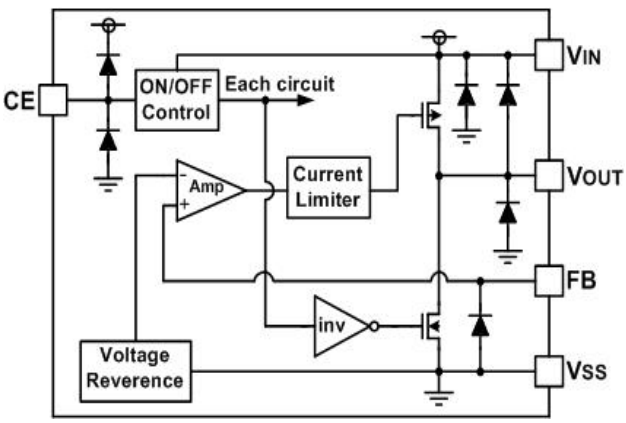
■ FEATURES

- 500mA RF Low-Dropout Regulator With Enable
- Ultralow-Noise：40μV_{RMS}(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

■ APPLICATIONS

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

■ BLOCK DIAGRAM



■ ORDER INFORMATION

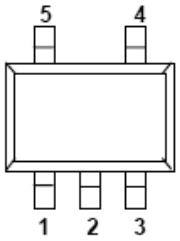
AF6213_ADJ_①

DESIGNATOR	DESCRIPTION
Adj.	Adjustable Voltage Version
①	Package:SOT-23-5：C
	Package:SOT-353：R

■ PIN CONFIGURATION

SOT-23-5

SOT-353(SC70-5)



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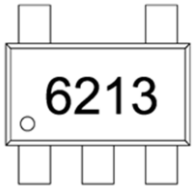


SOT-23-5

PIN NUMBER		PIN NAME	FUNCTION
SOT23-5	SOT-353		
1	1	V_{IN}	Power input Pin
2	2	V_{SS}	Ground
3	3	CE	Chip Enable Pin
4	4	FB	Feedback Pin: Used to Set Output Voltage
5	5	V_{OUT}	Output Pin

■ TYPICAL APPLICATION

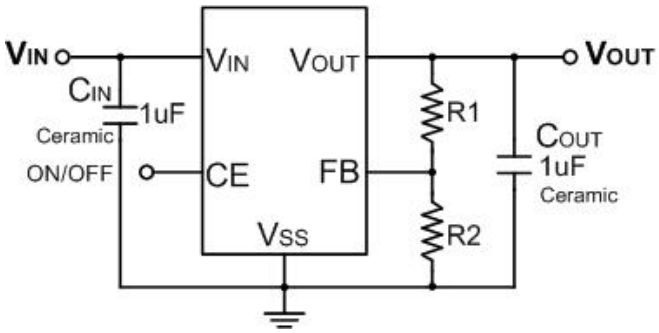


Fig.1 Typical Application Circuit

■ ABSOLUTE MAXIMUM RATINGS

(Unless otherwise specified, T_A=25°C)

PARAMETER		SYMBOL	RATINGS	UNITS
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
Operating Temperature		T_{opr}	-40~+85	℃
Storage Temperature		T_{stg}	-40~+125	℃
Soldering Temperature & Time		T_{solder}	260℃, 10s	

■ ELECTRICAL CHARACTERISTICS

AF6213-ADJ **(V_{IN}=V_{OUT}+1V, C_{IN}=C_{OUT}=1μF, T_A=25℃,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	μA
Standby Current	I_{STBY}	V_{CE}=0V			0.1	μA
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	μA
Output voltage range			0.6		5.5 – V_{DO}	V
Line Regulation	$\frac{\Delta V_{OUT}}{V_{OUT} \times \Delta V_{IN}}$	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	$\frac{\Delta V_{OUT}}{\Delta T \times V_{OUT}}$	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		μV_{RMS}
Time, start-up		I_{OUT}=0mA, C_{OUT}=1μF		20		μS

NOTE:

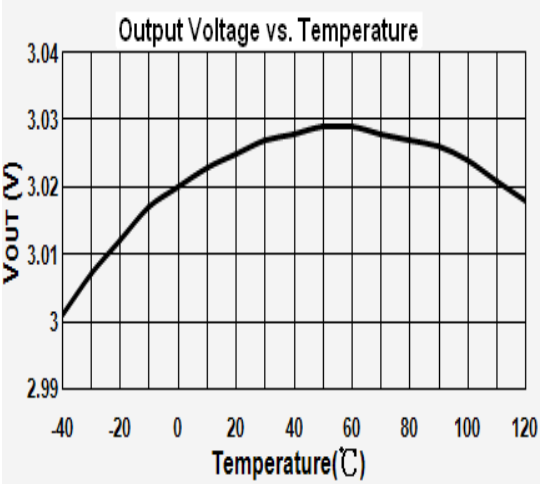
(1) Minimum V_{IN} is 1.8V or V_{OUT} + V_{DO}, whichever is greater.

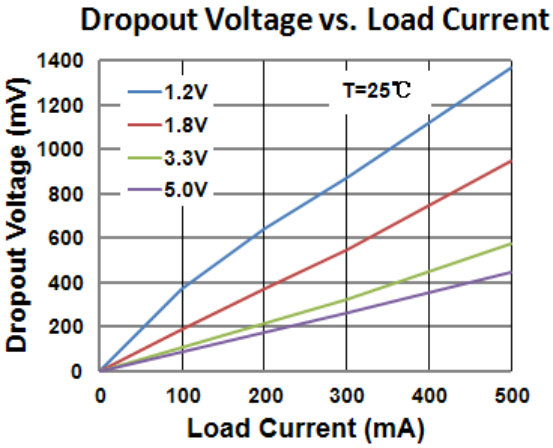
(2) V_{dif}: The difference of output voltage and input voltage when input voltage is decreased gradually till output voltage equals to 98% of V_{OUT} (E).

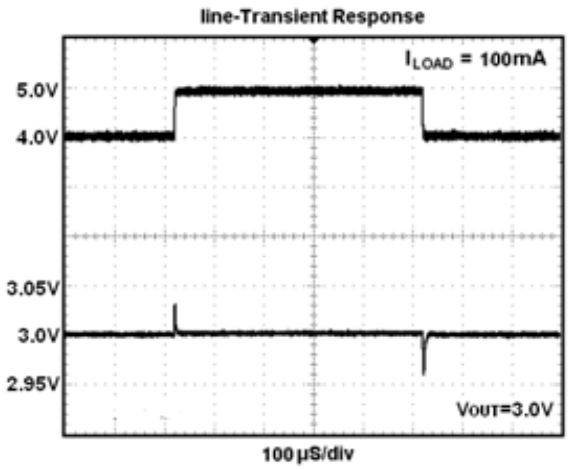
■ DROPOUT VOLTAGE CHART

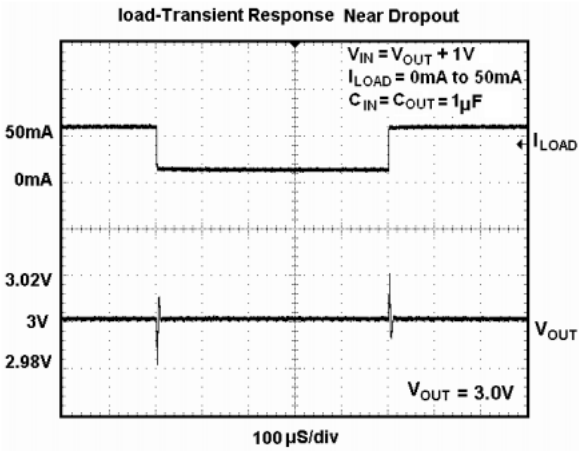
Setting Output Voltage	Dropout Voltage (mV) Typ.			
V_{OUT}(V)	I_{OUT}=100mA	I_{OUT}=200mA	I_{OUT}=300mA	I_{OUT}=500mA
1.2	372mV	642mV	876mV	1.368V
1.5	248mV	471mV	681mV	1.128V
1.8	189mV	370mV	550mV	947mV
2.1	157mV	311mV	469mV	820mV
2.5	132mV	265mV	400mV	706mV
2.8	120mV	241mV	365mV	645mV
3.0	111mV	229mV	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 PERFORMANCE CHARACTERISTICS

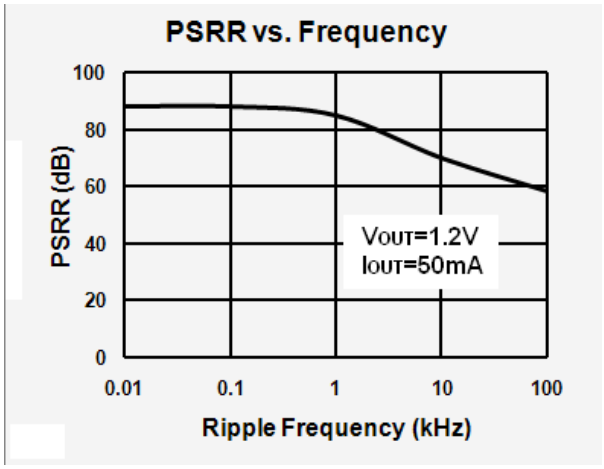


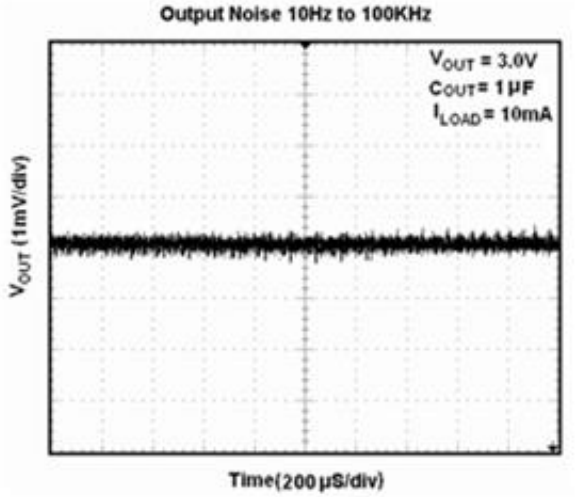


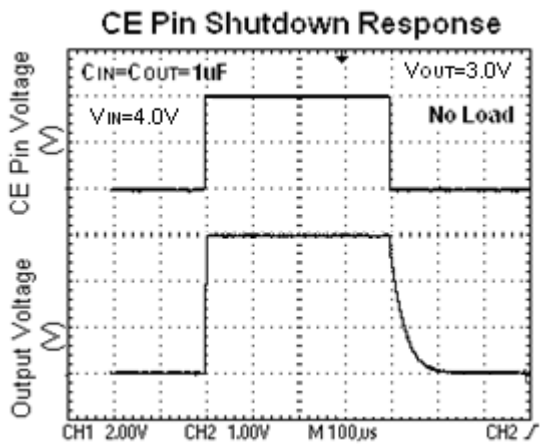


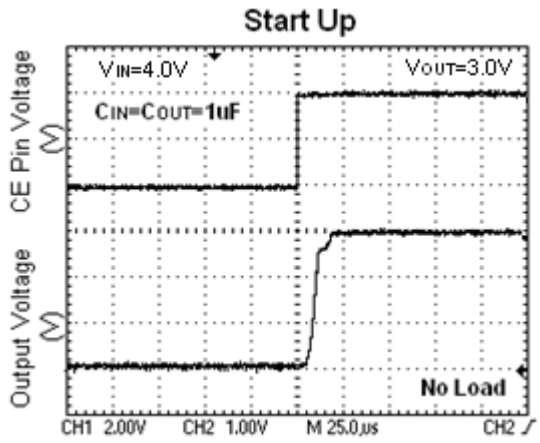


■ TYPICAL PERFORMANCE CHARACTERISTICS(Continued)









■ APPLICATION INFORMATION

Setting The Output Voltage

Figure 1 shows the typical application circuit with AF6213-ADJ. The external resistor sets the output voltage according to the following equation:

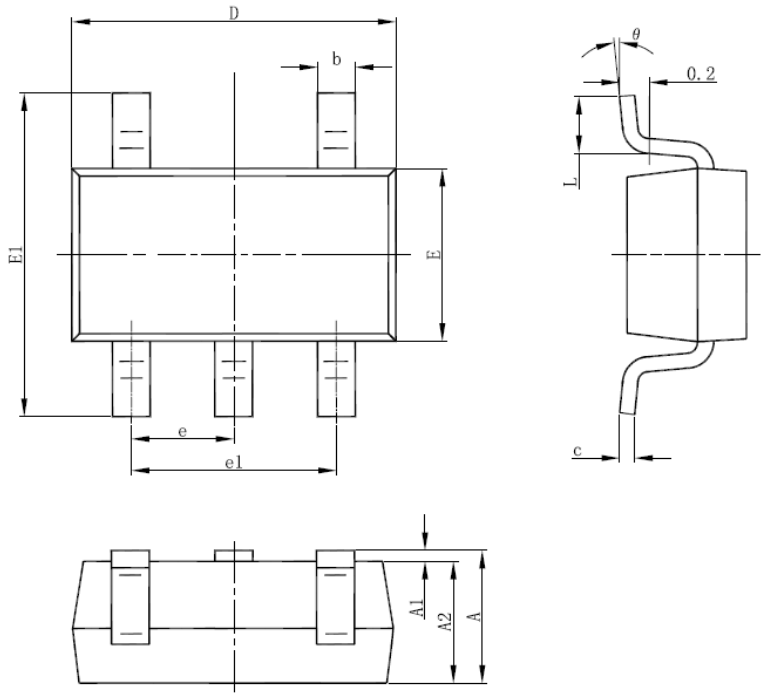
$$V_{OUT} = 0.6V \times \left(1 + \frac{R1}{R2}\right)$$

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

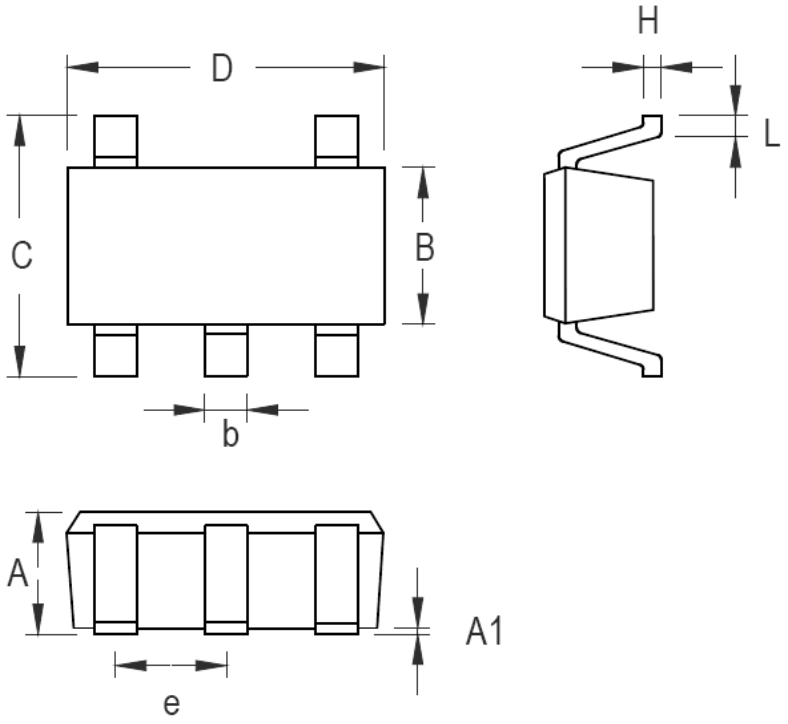
■ PACKAGING INFORMATION

● SOT-23-5 PACKAGE OUTLINE DIMENSIONS



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°

● SOT-353 (SC70-5) PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.800	1.100	0.031	0.044
A1	0.000	0.100	0.000	0.004
B	1.150	1.350	0.045	0.054
b	0.150	0.400	0.006	0.016
C	1.800	2.450	0.071	0.096
D	1.800	2.250	0.071	0.089
e	0.650		0.026	
H	0.080	0.260	0.003	0.010
L	0.210	0.460	0.008	0.018

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