Elektronische Bauelemente

SM2113

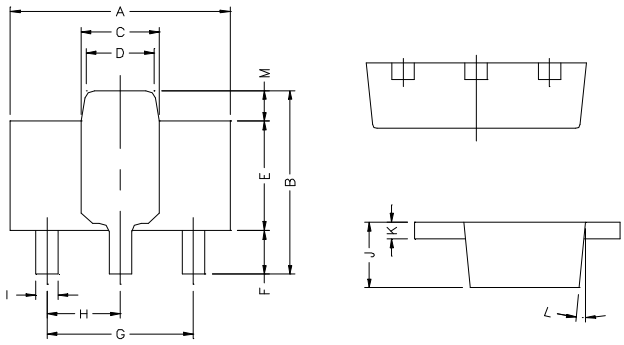
CMOS Positive Voltage Regulator

RoHS Compliant Product

Description

The SM2113 series of positive,linear regulators feature low quiescent current (30μA typ.) with low dropout voltage, making them ideal for battery applications. These rugged devices have both Thermal Shutdown, and Current Fold-back to prevent device failure under the "Worst" of operating conditions. The SM2113 is stable with an output capacitance of 2.2μF or greater.

SOT-89

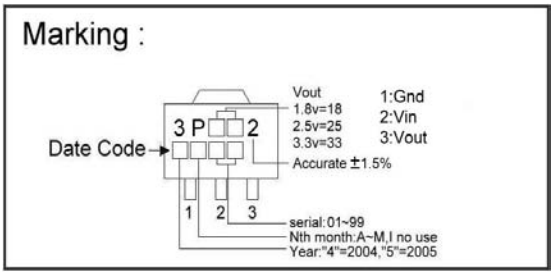


REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	4.4	4.6	G	3.00 REF.	
B	4.05	4.25	H	1.50 REF.	
C	1.50	1.70	I	0.40	0.52
D	1.30	1.50	J	1.40	1.60
E	2.40	2.60	K	0.35	0.41
F	0.89	1.20	L	5° TYP.	
			M	0.70 REF.	

Features

* High Accurate ±1.5%
* Over-Temperature Shutdown
* Factory Pre-set Output Voltage
* Very Low Dropout Voltage
* Low Temperature Coefficient
* Short Circuit Current Fold-back
* Guaranteed 300mA output
* Current Limiting

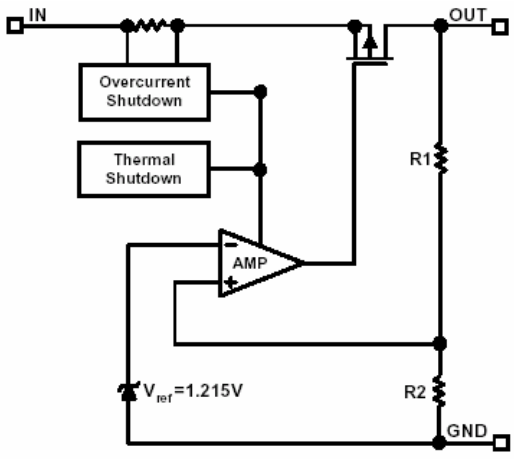
Marking :



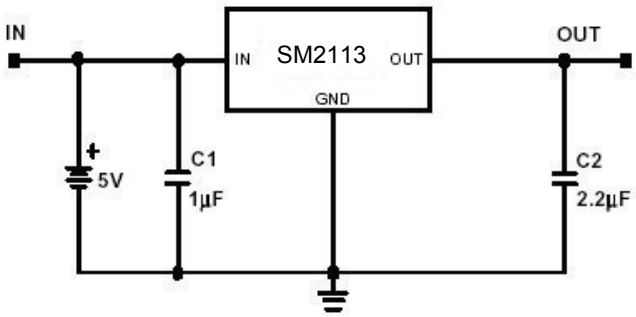
Applications

* PC Peripherals
* Wireless Devices
* Portable Electronics
* Battery Powered Widgets
* Electronic Scales
* Instrumentation
* Cordless Phones

Block Diagram



Typical Application Circuit



Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Input Voltage	V_{IN}	8	V
Output Current	I_{OUT}	$P_D/(V_{IN}-V_O)$	mA
Output Voltage	V_{OUT}	1.3~5	V
Operating Ambient Temperature	Topr	-40~+85	°C
Junction Temperature	Tj	-40~+125	°C
Max. Junction Temperature	Tj Max.	150	°C
Thermal Resistance	θjc	38	W/°C
	θja	180	W/°C
Power Dissipation (△ T=100°C)	P_D	550	mW
EDS Classification		B	

Electrical Characteristics Ta=25°C

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition	
Output Voltage	$V_{OUT}(E)$[1]	- 1.5%	$V_{OUT}(E)$[2]	1.5%	V	$V_{IN}=V_{OUT}(T)+1V$,1o=1mA	
Output Current	Io	300	–	–	mA	$V_{IN}=V_{OUT}(T)+2V$,$V_{OUT}\geq V_{OUT}(E)*0.96$	
Current Limit	I_{LIM}	300	450	–	mA	Vo>1.2V	
Load Regulation	REG_{LOAD}	-1	0.2	1	%	$V_{IN}=V_{OUT}(T)+2V$,Io=1mA to300mA	
Dropout Voltage	$V_{DROPOUT}$	–	–	1300	mV	$1.3V\leq V_{OUT}(T)\leq 2.0V$	Io=300mA $Vo=V_{OUT}(E)-2\%$
		–	–	400		$2.0V< V_{OUT}(T)\leq 2.8V$	
		–	–	300		$2.8V<V_{OUT}(T)$	
Quiescent Current	I_Q	–	30	50	uA	$V_{IN}=V_{OUT}(T)+1V$	
Line Regulation	REG_{LINE}	-0.2	–	0.2	%	$1.3V\leq V_{OUT}(T)\leq 1.4V$	Io=1mA $V_{IN}=V_{OUT}(T)+1$ to $V_{OUT}(T)+2$
		-0.15	–	0.15		$1.4V<V_{OUT}(T)\leq 2.0V$	
		-0.1	0.02	0.1		$2.0V<V_{OUT}(T)<4.0V$	
		-0.4	0.2	0.4		$4.0V\leq V_{OUT}(T)$	
Input Voltage	V_{IN}	Note[3]	–	7	V		
Over Temperature Shutdown	O_{TS}	–	150	–	°C		
Over Temperature Hystersis	O_{TH}	–	30	–	°C		
Output Voltage Temperature Coefficient	T_C	–	30	–	ppm/°C		
Short Circuit Current[4]	I_{SC}	–	150	300	mA	$V_{IN}=V_{OUT}(T)+1V$,$V_{OUT}=0V$	
	PSRR	–	50	–	dB	f=1kHz	Io=100mA Co=2.2uF
		–	20	–		f=10kHz	
		–	15	–		f=100kHz	
Output Voltage Noise	eN	–	30	–	uVrms	Co=2.2uF	f=10Hz~100kHz Io=10mA

Note 1: V_{OUT} (E) =Effective Output Voltage (i.e. the output voltage when "V_{OUT} (T) +1.0V" is provided at the VIN pin while maintaining a certain I_{OUT} value).

2: V_{OUT} (T) =Specified Output Voltage

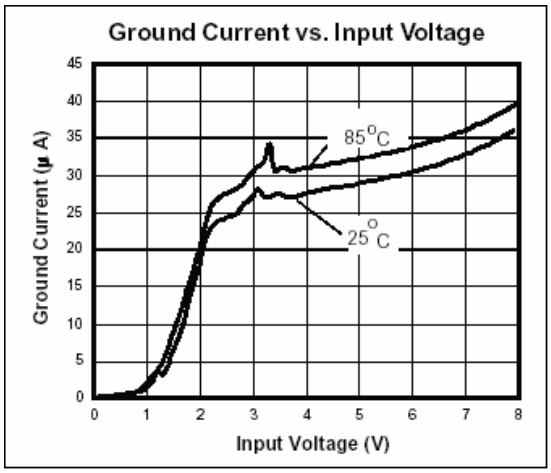
3: $V_{IN\ (MIN)}$ =V_{OUT}+$V_{DROPOUT}$

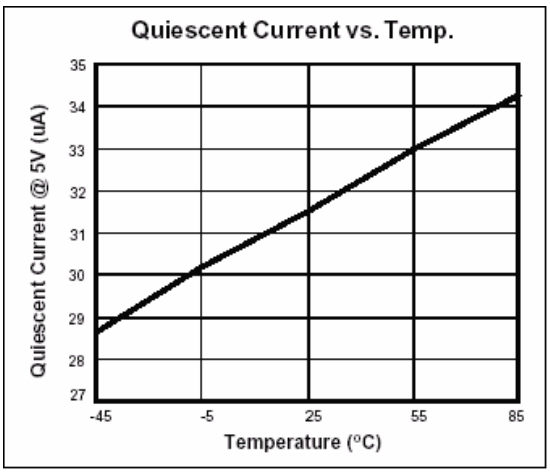
4: To prevent the Short Circuit Current protection feature from being prematurely activated, the input voltage must be applied before a current source load is applied.

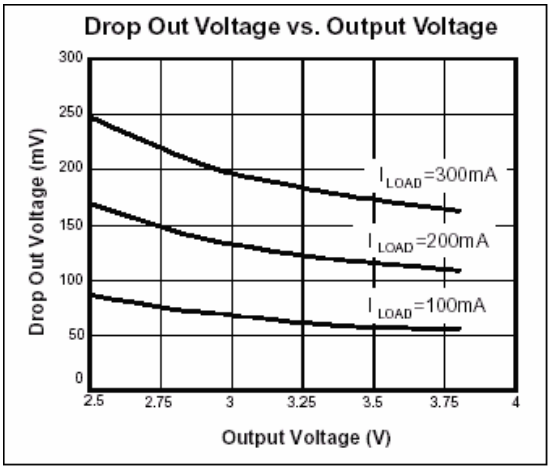
Ordering Information(contd.)

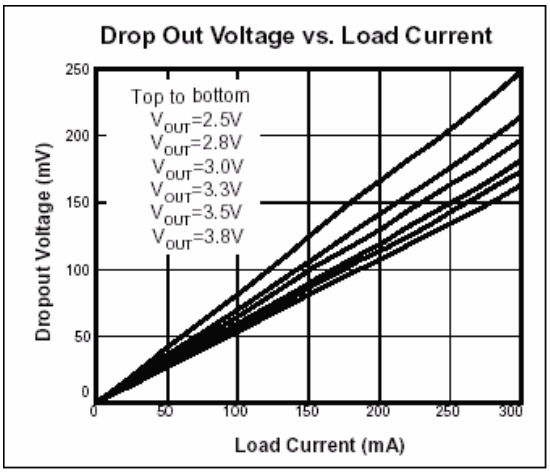
Part Number	Marking	Output Voltage	Part Number	Marking	Output Voltage
SM2113-13	3P132 XXXX	1.3V	SM2113-15	3P152 XXXX	1.5V
SM2113-18	3P182 XXXX	1.8V	SM2113-19	3P192 XXXX	1.9V
SM2113-20	3P202 XXXX	2.0V	SM2113-25	3P252 XXXX	2.5V
SM2113-27	3P272 XXXX	2.7V	SM2113-28	3P282 XXXX	2.8V
SM2113-29	3P292 XXXX	2.9V	SM2113-30	3P302 XXXX	3.0V
SM2113-31	3P312 XXXX	3.1V	SM2113-33	3P332 XXXX	3.3V
SM2113-34	3P342 XXXX	3.4V	SM2113-35	3P352 XXXX	3.5V
SM2113-36	3P362 XXXX	3.6V	SM2113-37	3P372 XXXX	3.7V
SM2113-38	3P382 XXXX	3.8V	SM2113-50	3P502 XXXX	5.0V

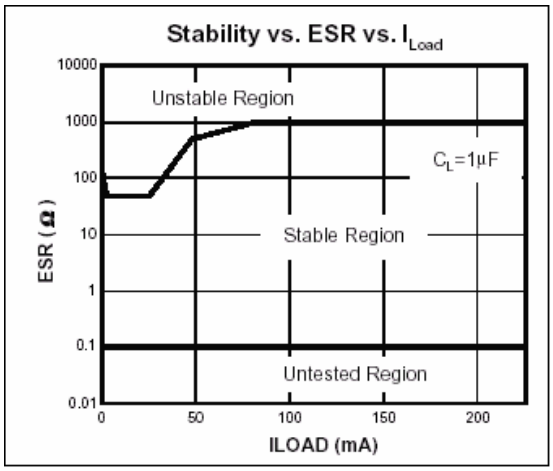
Characteristics Curve

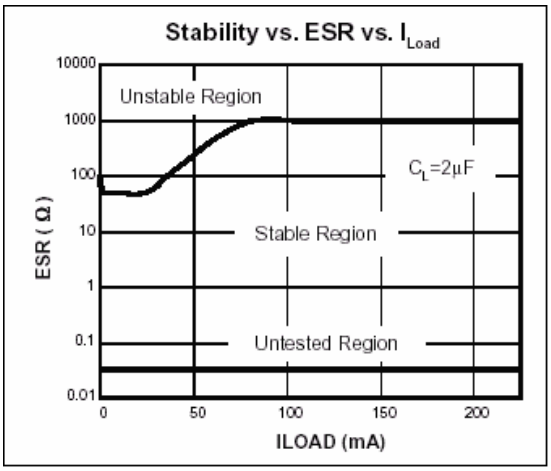


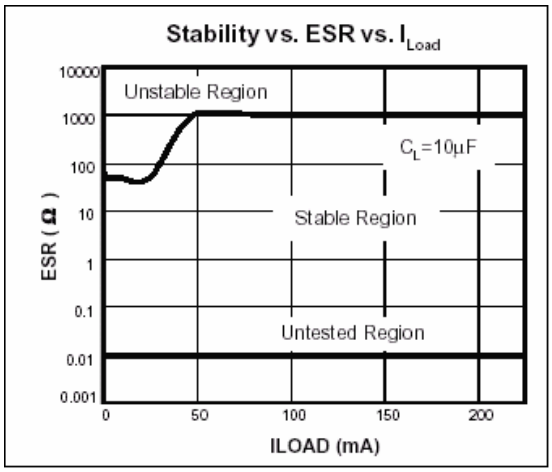


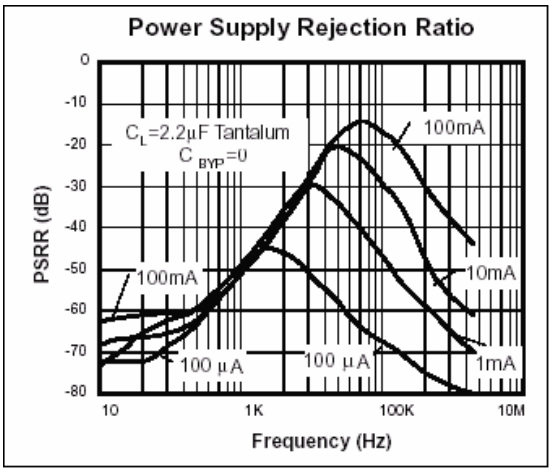


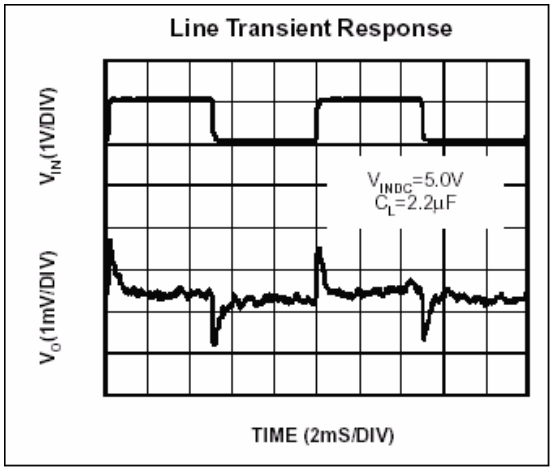


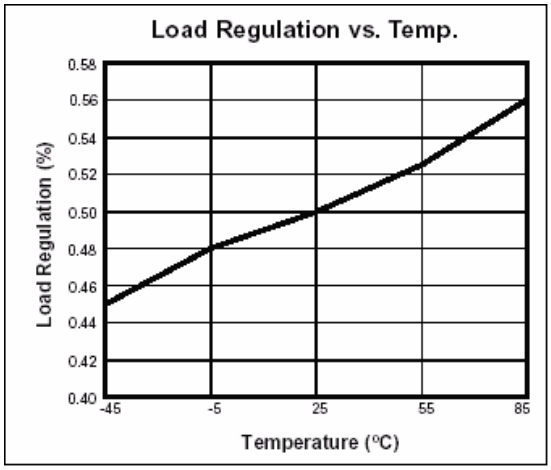

Stability vs. ESR vs. I Load
Unstable Region
C L =1µF
Stable Region
Untested Region
ESR (Ω)
ILOAD (mA)

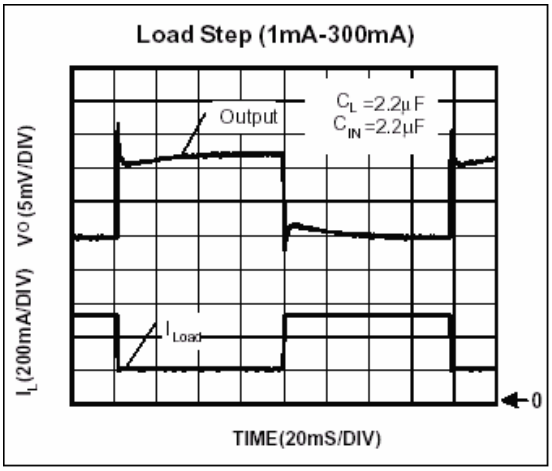

Stability vs. ESR vs. I Load
Unstable Region
C L =2µF
Stable Region
Untested Region
ESR (Ω)
ILOAD (mA)

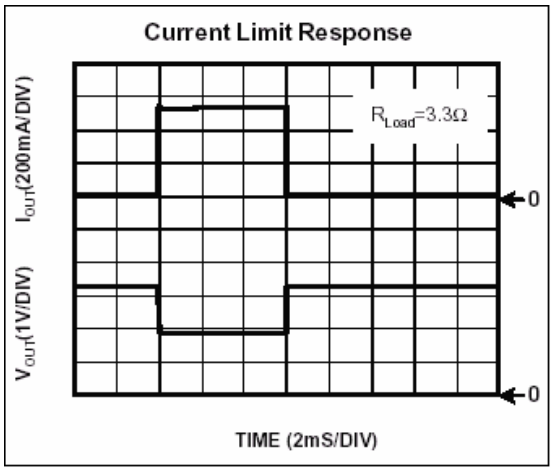

Stability vs. ESR vs. I Load
Unstable Region
C L =10µF
Stable Region
Untested Region
ESR (Ω)
ILOAD (mA)

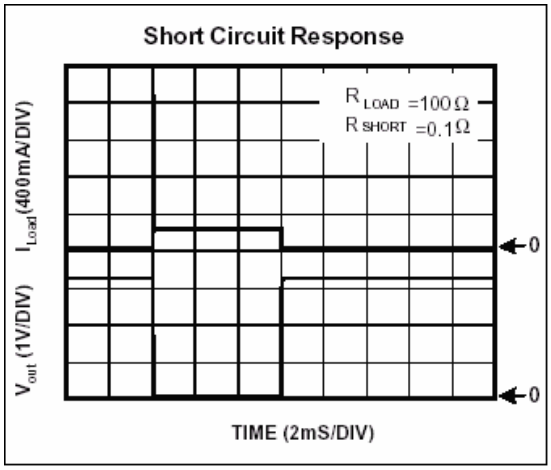

Power Supply Rejection Ratio
C L =2.2µF Tantalum
C BYP =0
100mA
10mA
1mA
100 µA
PSRR (dB)
Frequency (Hz)

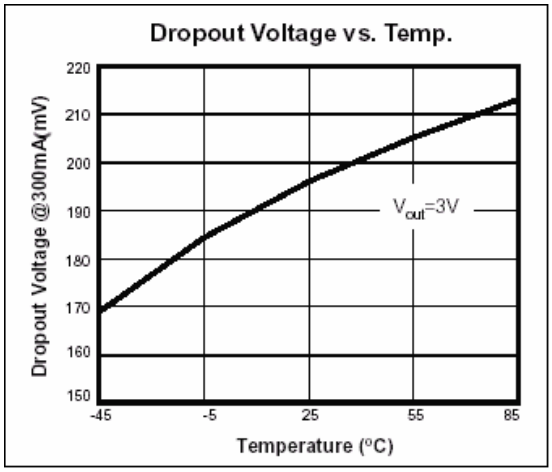

Line Transient Response
V IN (1V/DIV)
V O (1mV/DIV)
V INDC =5.0V
C L =2.2µF
TIME (2mS/DIV)

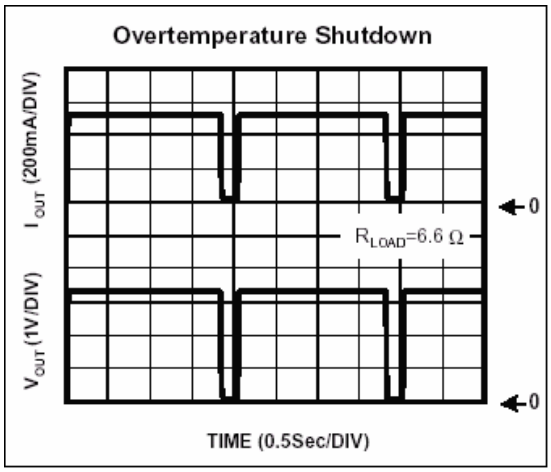

Load Regulation vs. Temp.
Load Regulation (%)
Temperature (°C)

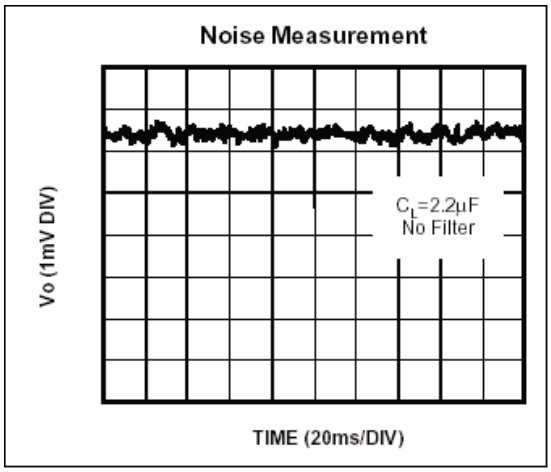

Load Step (1mA-300mA)
Output
C_L =2.2µF
C_{IN} =2.2µF
I_{Load}
I_L(200mA/DIV) V^O (5mV/DIV)
0
TIME(20mS/DIV)


Current Limit Response
R_{Load}=3.3Ω
I_{OUT}(200mA/DIV)
V_{OUT}(1V/DIV)
0
0
TIME (2mS/DIV)


Short Circuit Response
R_{LOAD} =100Ω
R_{SHORT} =0.1Ω
I_{Load}(400mA/DIV)
V_{out} (1V/DIV)
0
0
TIME (2mS/DIV)


Dropout Voltage vs. Temp.
220
210
200
190
180
170
160
150
V_{out}=3V
Dropout Voltage @300mA(mV)
-45
-5
25
55
85
Temperature (°C)


Overtemperature Shutdown
R_{LOAD}=6.6 Ω
I_{OUT} (200mA/DIV)
V_{OUT} (1V/DIV)
0
0
TIME (0.5Sec/DIV)


Noise Measurement
C_L=2.2µF
No Filter
Vo (1mV DIV)
TIME (20ms/DIV)