Elektronische Bauelemente

SM6330P50-C

Low Current Consumption
300mA CMOS Voltage Regulator

RoHS Compliant Product
A suffix of "-C" specifies halogen or lead -free

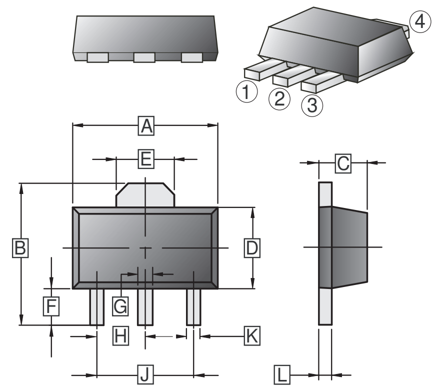
DESCRIPTION

The SM6330P50-C is a group of positive voltage regulators manufactured by CMOS technologies with low power consumption and low dropout voltage, which provide large output currents even when the difference of the input-output voltage is small.

The SM6330P50-C can deliver 300mA output current and allow an input voltage as high as 18V.

The SM6330P50-C is very suitable for the battery-powered equipment, such as RF applications and other systems requiring a quiet voltage source.

SOT-89

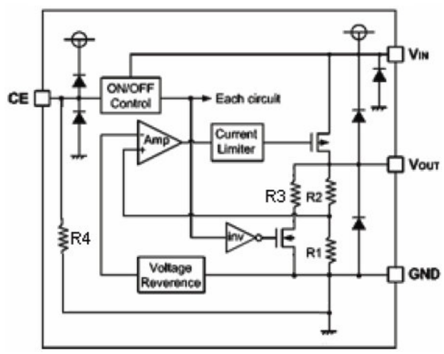


REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	4.40	4.60	G	0.40	0.58
B	3.94	4.25	H	1.50 TYP	
C	1.40	1.60	J	3.00 TYP	
D	2.25	2.60	K	0.32	0.52
E	1.55 TYP.		L	0.35	0.44
F	0.89	1.20			

FEATURES

- Low Quiescent Current: 2μA
- Operating Voltage: 2.5V~18V
- Output Current: 300mA
- Low Dropout Voltage: 160mV @100mA(V_{OUT}=3.3V)
- Output Voltage: 1.2V~5V
- High Accuracy: ±2%/±1% (Typ.)
- High Power Supply Rejection Ratio: 65dB @1kHz
- Low Output Noise: 27xV_{OUT} μV_{RMS} (10Hz~100kHz)
- Excellent Line and Load Transient Response
- Built-in Current Limiter, Short-Circuit Protection
- Over-Temperature Protection

Block Diagram



MARKING

A7P□□ ← □ = Lot Code

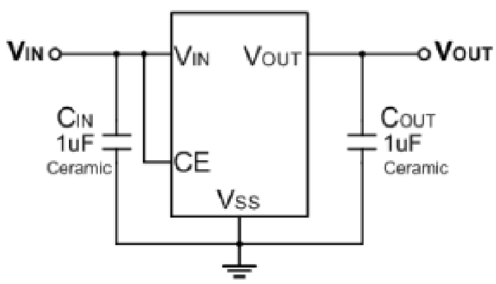
PACKAGE INFORMATION

Package	MPQ	Leader Size
SOT-89	1K	7 inch

ORDER INFORMATION

Part Number	Type
SM6330P50-C	Lead (Pb)-free and Halogen-free

Typical Characteristics



PIN CONFIGURATION

Pin No.	Name	Function
1	V_{SS}	Ground
2	V_{IN} / CE	Power Input / Chip Enable Pin
3	V_{OUT}	Output

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Rating	Unit
Supply Voltage @V_{IN}	V_{CC}	2.5~18	V
Operating Junction Temperature Range	T_J	-40~125	°C
Operating Free Air Temperature Range	T_A	-40~85	°C

ABSOLUTE MAXIMUM RATINGS (T_A=25, unless otherwise noted.)

Parameter		Symbol	Ratings	Unit
Input Voltage [2]		V_{IN}	-0.3~24	V
Output Voltage [2]		V_{OUT}	-0.3~10	V
CE Pin Voltage		V_{CE}	-0.3~24	V
Output Current		I_{OUT}	600	mA
Power Dissipation		P_D	0.8	W
Lead Temperature (Soldering, 10 sec)		T_{SOLDER}	260	°C
Operating Junction Temperature Range [3]		T_J	-40~125	°C
Storage Temperature Range		T_{STG}	-40~125	°C
ESD Rating [4]	Human Body Model	V_{ESD}	8	kV
	Machine Model		400	V

Notes:

1. Stresses beyond those listed under absolute maximum ratings may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under recommended operating conditions is not implied. Exposure to absolute-maximum-rated conditions for extended periods my affect device reliability.
2. All voltages are with respect to network ground terminal.
3. This IC includes over temperature protection that is intended to protect the device during momentary overload. Junction temperature will exceed 125℃ when over temperature protection is ac tive. Continuous operation above the specified maximum operating junction temperature may impair device reliability.
4. ESD testing is performed according to the respective JESD22 JEDEC standard. The human body model is a 100pF capacitor discharged through a 1.5kΩ resistor into each pin. The machine model is a 200pF capacitor discharged directly into each pin.

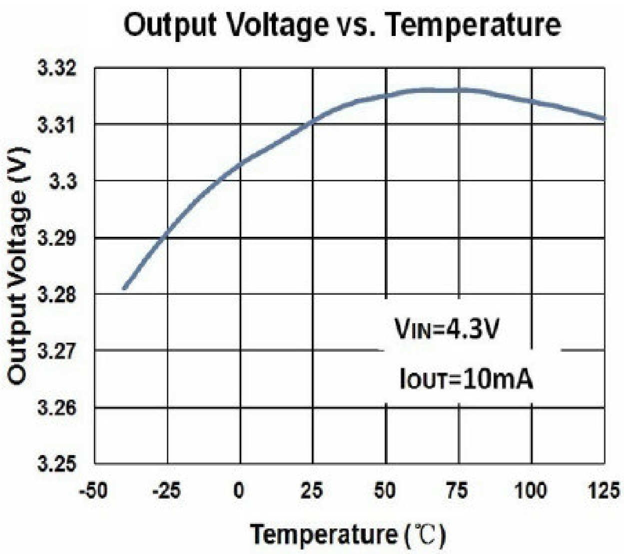
ELECTRICAL CHARACTERISTICS ($V_{IN}=V_{OUT}$+1V, $C_{IN}=C_{OUT}$=1μF, T_A=25℃, unless otherwise specified)

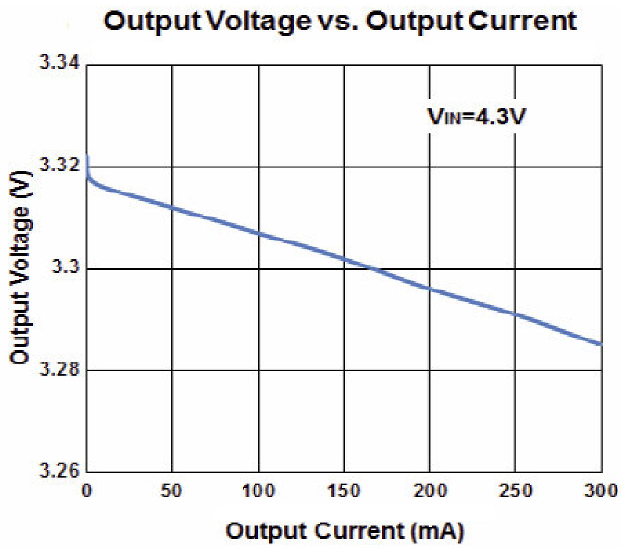
Parameter	Symbol	Test Condition		Min.	Typ.[1]	Max.	Unit
Input Voltage	V_{IN}			2.5	-	18	V
Output Voltage Range	V_{OUT}			1.2	-	5	V
DC Output Accuracy		I_{OUT}=1mA		-2	-	2	%
				-1	-	1	
Dropout Voltage [2]	V_{dif}	I_{OUT}=100mA, V_{OUT}=3.3V		-	160	-	mV
Supply Current	I_{SS}	I_{OUT}=0A		-	2	5	μA
Line Regulation	$\frac{\Delta V_{OUT}}{V_{OUT} \times \Delta V_{IN}}$	I_{OUT}=10mA V_{OUT} 1V≤V_{IN}≤18V		-	0.01	0.3	%/V
Load Regulation	ΔV_{OUT}	$V_{IN}=V_{OUT}$ 1V, 1mA≤I_{OUT}≤100mA		-	10	-	mV
Temperature Coefficient	$\frac{\Delta V_{OUT}}{V_{OUT} \times \Delta T_A}$	I_{OUT}=10mA, -40℃<T_A<125℃		-	50	-	ppm
Output Current Limit	I_{LIM}	V_{OUT}=0.5*$V_{OUT(Normal)}$, V_{IN}=5V		350	500	-	mA
Short Current	I_{SHORT}	$V_{OUT}=V_{SS}$		-	25	-	mA
Power Supply Rejection Ratio	PSRR	I_{OUT}=50mA	100Hz	-	80	-	dB
			1kHz	-	65	-	
			10kHz	-	50	-	
			100kHz	-	45	-	
Output Noise Voltage	V_{ON}	BW=10Hz~100kHz		-	27* V_{OUT}	-	$μV_{RMS}$
Thermal Shutdown Temperature	T_{SD}			-	150	-	℃
Thermal Shutdown Hysteresis	ΔT_{SD}			-	20	-	℃
Standby Current	I_{STBY}	CE=V_{SS}		-	-	0.3	V
CE "High" Voltage	V_{CE}"H"			1.5	-	V_{IN}	V
CE "Low" Voltage	V_{CE}"L"			-	-	0.3	V
C_{OUT} Auto-Discharge Resistance	$R_{DISCHRG}$	V_{IN}=5V, V_{OUT}=3V, $V_{CE}=V_{SS}$		-	150	-	Ω

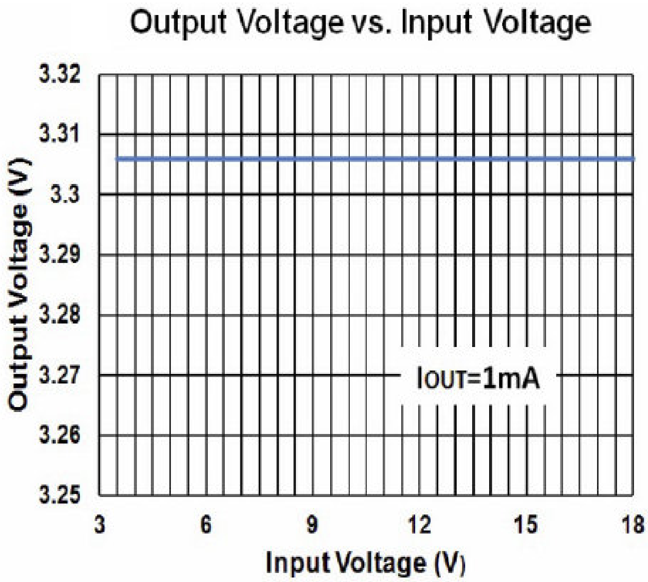
Notes:

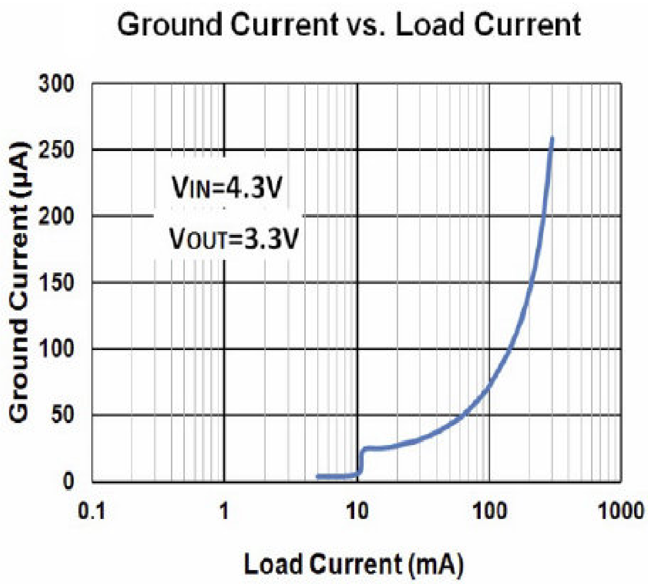
1. Typical numbers are at 25℃ and represent the mo st likely norm.
2. V_{dif}: The difference of output voltage and input voltage when input voltage is decreased gradually till output voltage equals to 98% of V_{out}.

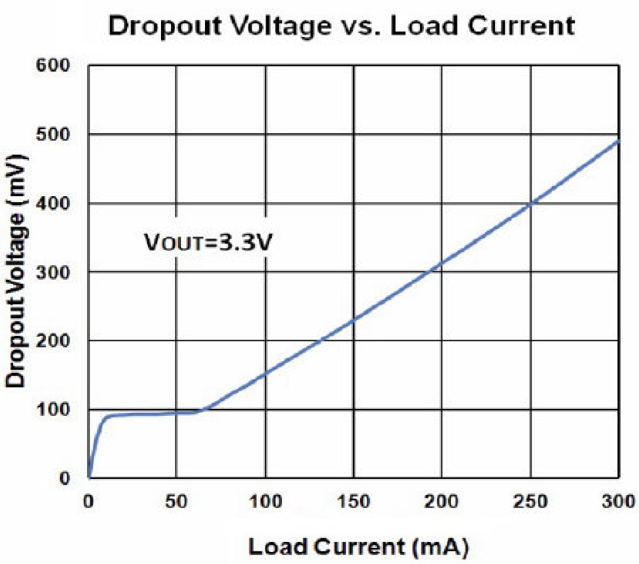
CHARACTERISTICS CURVE

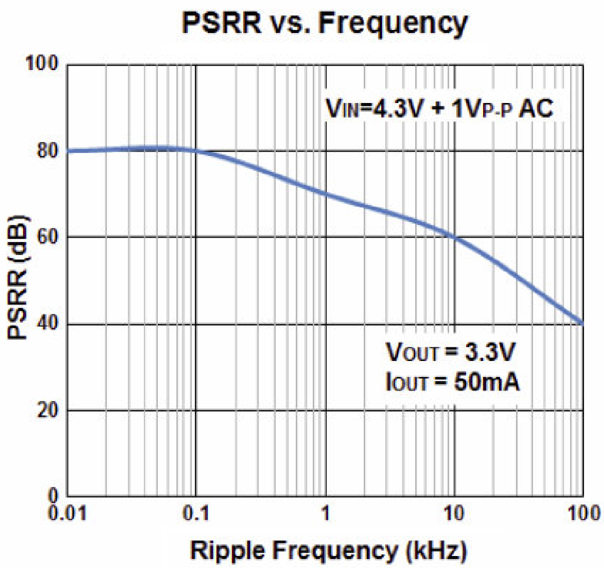




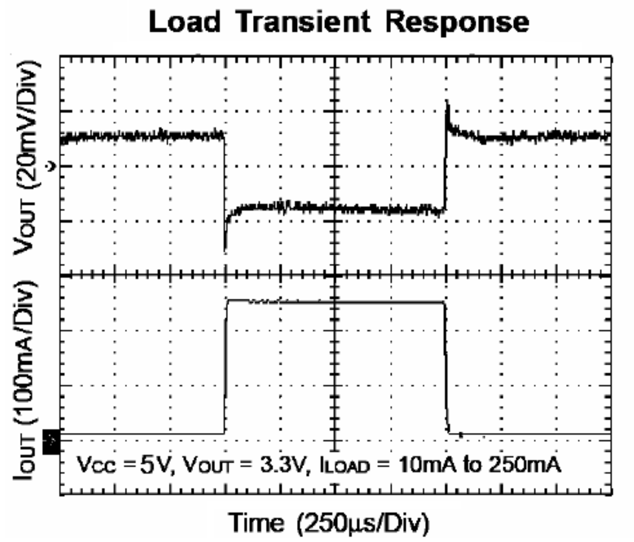


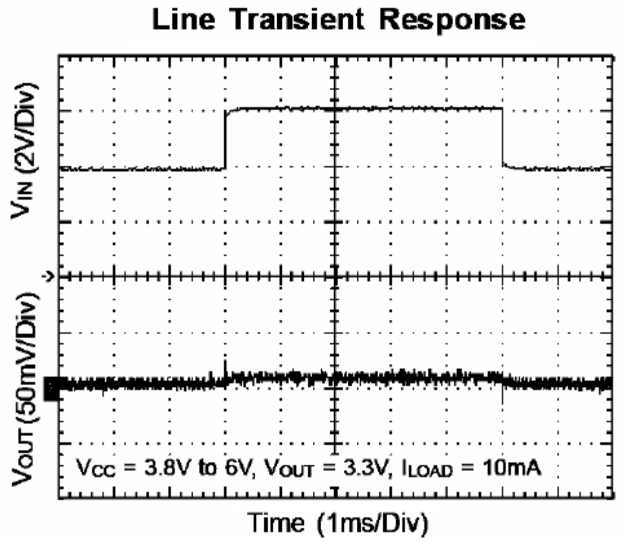


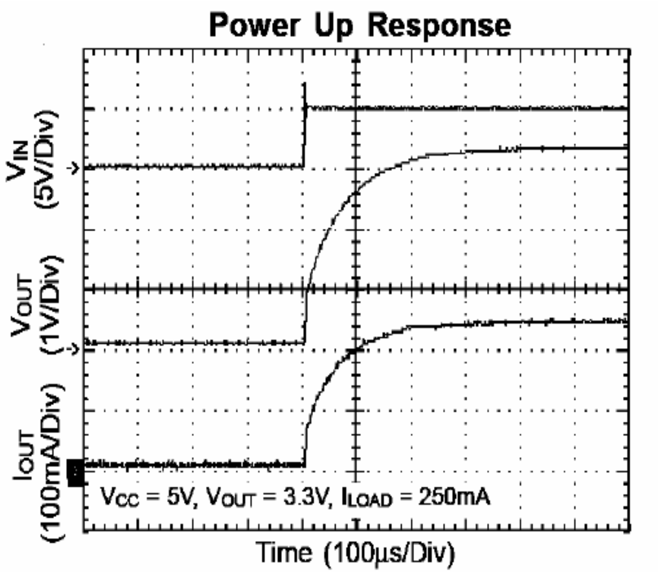


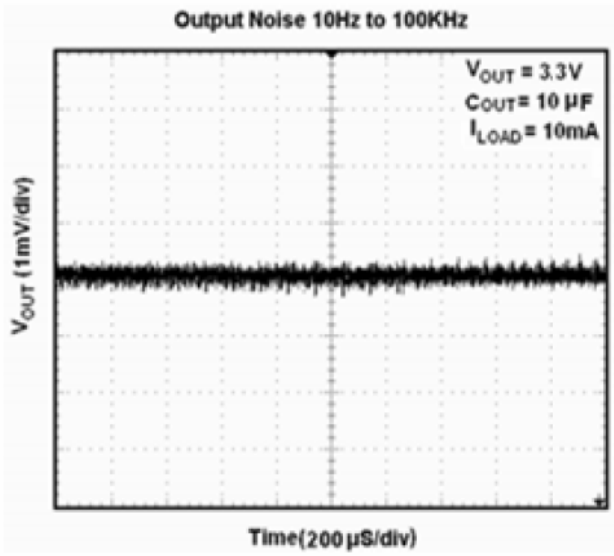


CHARACTERISTICS CURVE









APPLICATION INFORMATION

Selection of Input/ Output Capacitors

In general, all the capacitors need to be low leakage. Any leakage the capacitors have will reduce efficiency, increase the quiescent current. A recent trend in the design of portable devices has been to use ceramic capacitors to filter DC-DC converter inputs. Ceramic capacitors are often chosen because of their small size, low equivalent series resistance (ESR) and high RMS current capability. Also, recently, designers have been looking to ceramic capacitors due to shortages of tantalum capacitors.

Unfortunately, using ceramic capacitors for input filtering can cause problems. Applying a voltage step to a ceramic capacitor causes a large current surge that stores energy in the inductances of the power leads. A large voltage spike is created when the stored energy is transferred from these inductances into the ceramic capacitor. These voltage spikes can easily be twice the amplitude of the input voltage step.

Many types of capacitors can be used for input bypassing, however, caution must be exercised when using multilayer ceramic capacitors (MLCC). Because of the self-resonant and high Q characteristics of some types of ceramic capacitors, high voltage transients can be generated under some start-up conditions, such as connecting the LDO input to a live power source. Adding a 3Ω resistor in series with an X5R ceramic capacitor will minimize start-up voltage transients.

The LDO also requires an output capacitor for loop stability. Connect a 1µF tantalum capacitor from OUT to GND close to the pins. For improved transient response, this output capacitor may be ceramic.