Elektronische Bauelemente

SSC2166

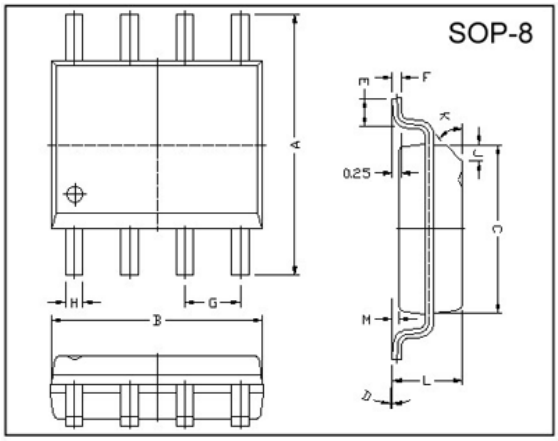
600mA CMOS

Positive Voltage Regulator

RoHS Compliant Product

Description

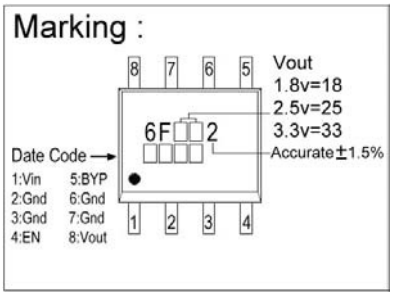
The SSC2166 series of positive,linear regulators feature low quiescent current (30μA typ.) with low dropout voltage, making them ideal for battery applications. The space-saving SOP-8 package is attractive for "Pocket" and "Hand Held" applications. These rugged devices have both Thermal Shutdown and Current Fold-back to prevent device failure under the "Worst" of operating conditions. In applications requiring a low noise, regulated supply, place a 1000pF capacitor between Bypass and ground.The SSC2166 is stable with an output capacitance of 2.2μF or greater.



REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	5.80	6.20	M	0.10	0.25
B	4.80	5.00	H	0.35	0.49
C	3.80	4.00	L	1.35	1.75
D	0°	8°	J	0.375 REF.	
E	0.40	0.90	K	45°	
F	0.19	0.25	G	1.27 TYP.	

Features

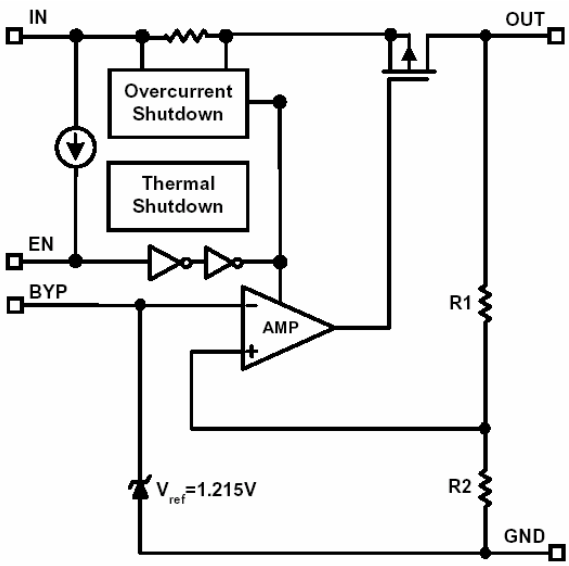
* Low Temperature Coefficient
* Over-Temperature Shutdown
* Factory Pre-set Output Fold-Back
* Very Low Dropout Voltage
* Noise Reduction Bypass Capacitor
* Short Circuit Current Fold-back
* Guaranteed 600mA output
* Current Limiting
* Highly Accurate ±1.5%



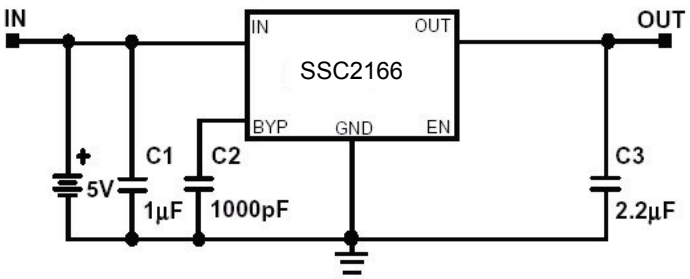
Applications

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

Functional 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}	1.5~3.8	V
Operating Ambient Temperature	Topr	-40~+85	°C
Junction Temperature	Tj	-40~+125	°C
Max. Junction Temperature	Tj Max.	150	°C
Thermal Resistance	θja	123.7	°C/W
Power Dissipation (△ T=100°C)	P_D	810	mW
EDS Classification		B	

Electrical Characteristics Ta=25°C unless otherwise noted

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition	
Output Voltage	$V_{OUT}(E)$[1]	-1.5%	$V_{OUT}(T)$[2]	1.5%	V	$V_{IN}=V_{OUT}(T)+2V$,1o=1mA	
Output Current	I_O	600	–	–	mA	$V_{IN}=V_{OUT}(T)+2V$,V_O>1.2V	
Current Limit	I_{LIM}	600	800	–	mA	$V_{IN}=V_{OUT}(T)+2V$,V_O>1.2V	
Load Regulation	REG_{LOAD}	–	0.2	1	%	$V_{IN}=V_{OUT}(T)+2V$,Io=1mA~ 600mA	
Dropout Voltage	$V_{DROPOUT}$	–	–	1900	mV	1.3V≤$V_{OUT}(T)$≤1.4V	Io=600mA
		–	–	1400		1.4V<$V_{OUT}(T)$ ≤2.0V	
		–	–	800		2.0V<$V_{OUT}(T)$ ≤2.8V	Vo=$V_{OUT}(E)$-2%
		–	–	600		2.8V<$V_{OUT}(T)$	
Quiescent Current	I_Q	–	30	50	uA	$V_{IN}=V_{OUT}(T)+1V$,Io=0mA	
Line Regulation	REG_{LINE}	-0.2	–	0.2	%	1.3V≤$V_{OUT}(T)$≤1.4V	Io=1mA
		-0.15	–	0.15		1.4V< $V_{OUT}(T)$≤2.0V	$V_{IN}=V_{OUT}(T)+1$
		-0.1	0.02	0.1		2.0V<$V_{OUT}(T)$	to $V_{OUT}(T)+2$
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}	–	300	600	mA	$V_{IN}=V_{OUT}(T)+1V$,V_{OUT}<0.8V	
Power Supply Rejection	PSRR	–	75	–	dB	f=1kHz	Io=100mA
		–	55	–		f=10kHz	Co=2.2uF (ceramic)
		–	30	–		f=100Hz	C_{BYP}=0.01uF
Output Voltage Noise	eN	–	30	–	uVrms	f=10Hz~100kHz, Io=10mA C_O=2.2uF,C_{BYP}=0.01uF	
EN Input Threshold	V_{EH}	2	–	V_{IN}	V	V_{IN}=2.7V to 7V	
	V_{EL}	0	–	0.4			
EN Input Bias Current	I_{EH}	–	–	0.1	uA	$V_{EN}=V_{IN}$,V_{IN}=2.7V to 7V	
	I_{EL}	–	–	0.5		V_{EN}=0V,V_{IN}=2.7V to 7V	
Shutdown Supply Current	I_{SD}	–	0.5	0.1	uA	V_{IN}=5V,Vo=0V,V_{EN}<V_{EL}	

Note 1: V_{OUT} (E) =Effective Output Voltage (i.e. the output voltage when "V_{OUT} (T) +2.0V" 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
SSC2166-15	6F152 XXXX	1.5V	SSC2166-18	6F182 XXXX	1.8V
SSC2166-25	6F252 XXXX	2.5V	SSC2166-27	6F272 XXXX	2.7V
SSC2166-28	6F282 XXXX	2.8V	SSC2166-2H	6F2H2 XXXX	2.85V
SSC2166-29	6F292 XXXX	2.9V	SSC2166-30	6F302 XXXX	3.0V
SSC2166-31	6F312 XXXX	3.1V	SSC2166-33	6F332 XXXX	3.3V
SSC2166-34	6F342 XXXX	3.4V	SSC2166-35	6F352 XXXX	3.5V
SSC2166-36	6F362 XXXX	3.6V	SSC2166-37	6F372 XXXX	3.7V
SSC2166-38	6F382 XXXX	3.8V			

Detailed Description

The SSC2166 series of COMS regulators contain a PMOS pass transistor,voltage reference, error amplifier,over-current protection and thermal shutdown.The P-channel pass transistor receives data from the error amplifier, over-current shutdown, and thermal protection circuits. During normal operation, the error amplifier compares the output voltage to a precision reference. Over-current and Thermal shutdown circuits become active when the junction temperature exceeds 150ºC, or the current exceeds 600mA. During thermal shutdown , the output voltage remains low. Normal operation is restored when the junction temperature drops below 120ºC. The SSC2166 switches from voltage mode to current mode when the load exceeds the rated output current. This prevents over-stress. The SSC2166 also incorporates current fold-back to reduce power dissipation when the output is short circuited. The feature becomes active when the output drops below 0.8 V, and reduces the current flow by 65%. Full current is restored when the voltage exceeds 0.8 V.

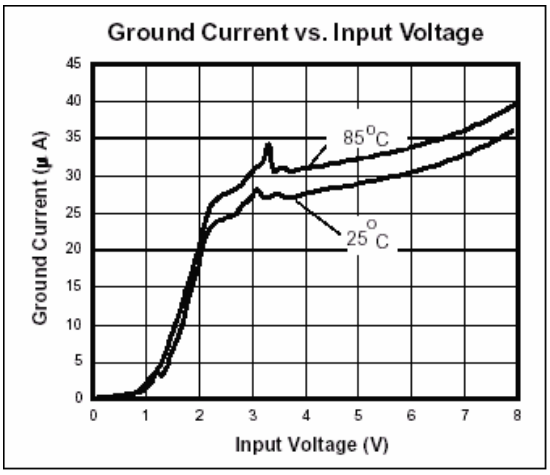
External Capacitors

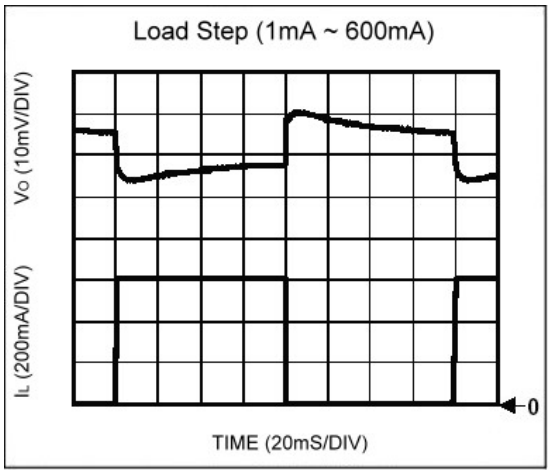
The SSC2166 is stable with an output capacitance to ground of 2.2uF or greater. Ceramic capacitors have the lowest ESR, and will offer the best AC performance. Conversely, Aluminum Electrolytic capacitors exhibit the highest ESR, resulting in the poorest AC response. Unfortunately, large value ceramic capacitors are comparatively expensive. One option is to parallel a 0.1uF ceramic capacitor with a 10uF Aluminum Electrolytic. The benefit is low ESR, high capacitance, and low overall cost. A second capacitor is recommended between the input and ground to stabilize V_{IN}. The input capacitor should be at least 0.1uF to have a beneficial effect. A third capacitor can be connected between the BY-PASS pin and GND. This capacitor can be a low cost Polyester Film variety between the value of 0.001~0.01uF. A large capacitor improves the AC ripple rejection,but also makes the output come up slowly. This "Soft" turn-on is desirablein some applications to limit turn-on surges. All capacitors should be placed in close proximity to the pins. A "Quiet" ground termination is desirable. This can be achieved with a "Star" connection.

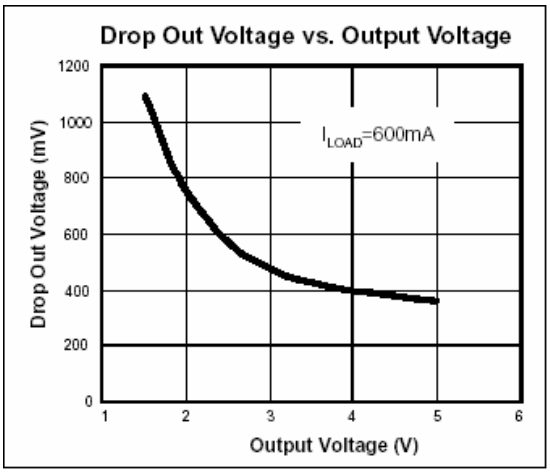
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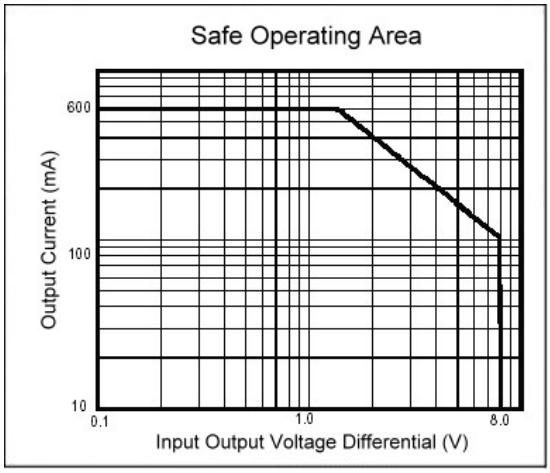
When EN pin is pulled low, the PMOS pass transistor shuts off, and all internal circuits are powered down. In this state, the quiescent current is less than 2uA. This pin behaves much like an electronic switch.

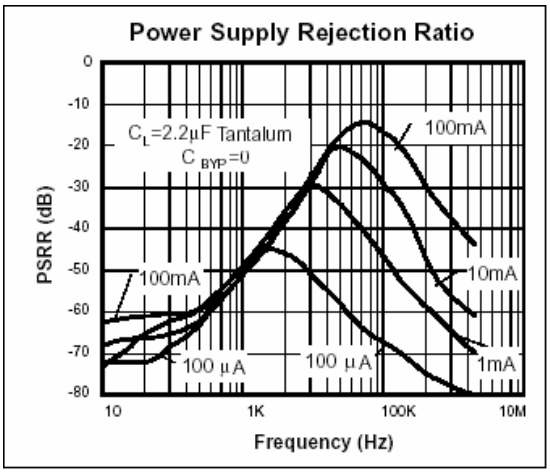
Characteristics Curve

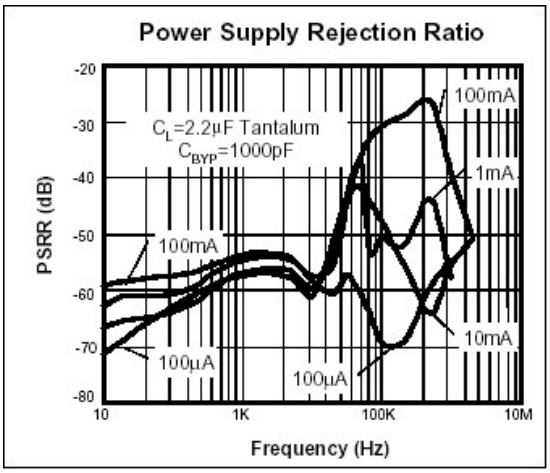


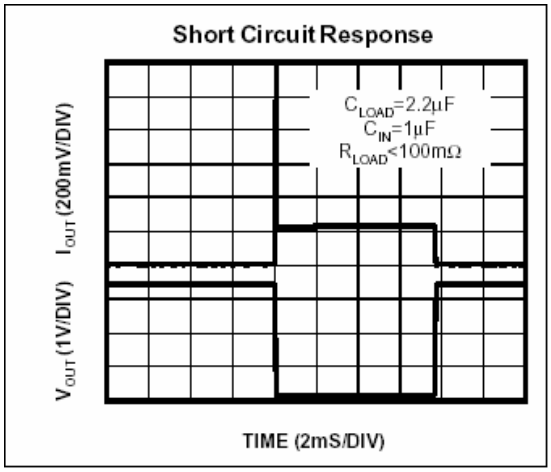


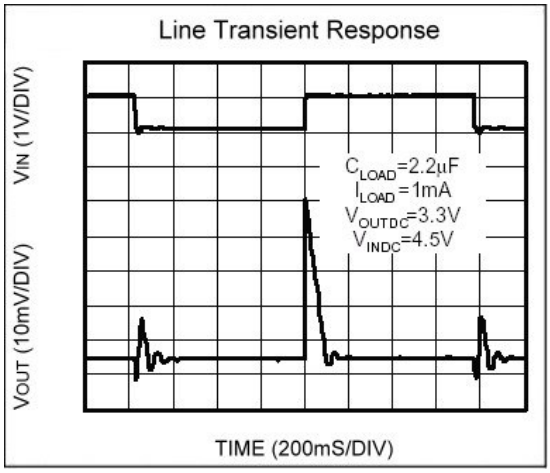


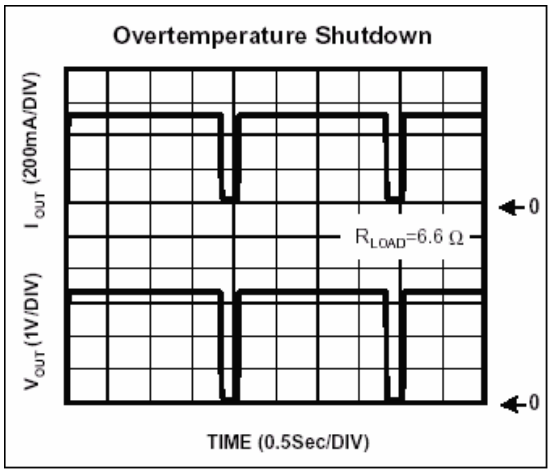


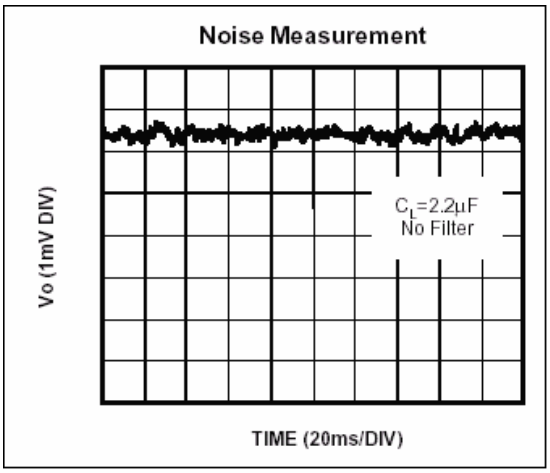


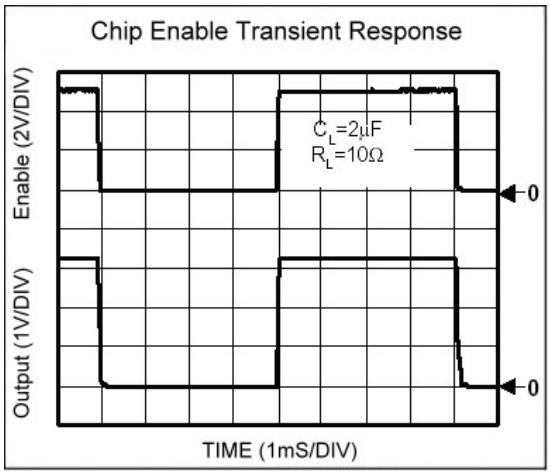


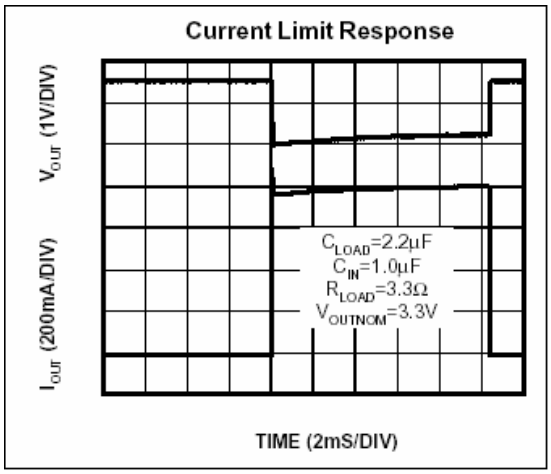

Short Circuit Response
C_{LOAD}=2.2µF
C_{IN}=1µF
R_{LOAD}<100mΩ
I_{OUT} (200mV/DIV)
V_{OUT} (1V/DIV)
TIME (2mS/DIV)


Line Transient Response
V_{IN} (1V/DIV)
VOUT (10mV/DIV)
C_{LOAD}=2.2µF
I_{LOAD}=1mA
V_{OUTDC}=3.3V
V_{INDC}=4.5V
TIME (200mS/DIV)


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


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


Chip Enable Transient Response
Enable (2V/DIV)
Output (1V/DIV)
C_L=2µF
R_L=10Ω
0
0
TIME (1mS/DIV)


Current Limit Response
V_{OUT} (1V/DIV)
I_{OUT} (200mA/DIV)
C_{LOAD}=2.2µF
C_{IN}=1.0µF
R_{LOAD}=3.3Ω
V_{OUTNOM}=3.3V
TIME (2mS/DIV)