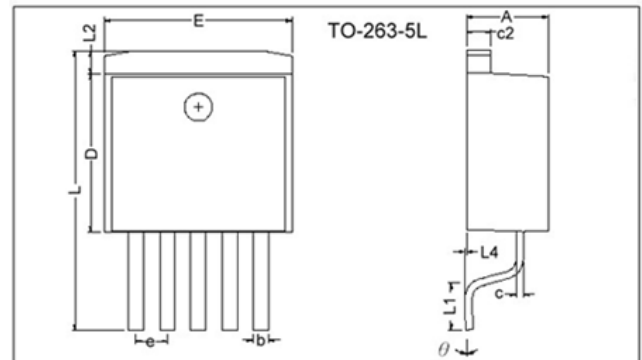


Description

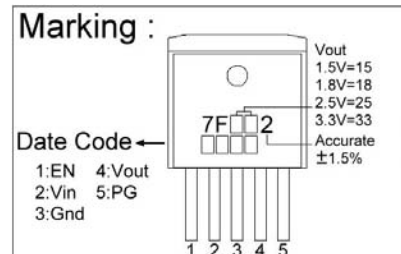
The S5U2167 series positive, linear regulators feature low quiescent current (45µA typ.) with low dropout voltage, making them ideal for battery applications. Output voltage are set at the factory and trimmed to 1.5% accuracy. These rugged devices have both Thermal Shutdown and Current Fold-back to prevent device failure under the "Worst" of operating conditions. An additional feature is a "Power Good" detector, which pulls low when the output is out of regulation. The S5U2167 is stable with an output capacitance of 4.7µF or greater.



Features

- * Low Temperature Coefficient
- * Over-Temperature Shutdown
- * Power Good Output Function
- * Very Low Dropout Voltage
- * Noise Reduction Bypass Capacitor
- * Short Circuit Current Fold-back
- * Guaranteed 750mA output
- * Current Limiting
- * Power-Saving Shutdown Mode

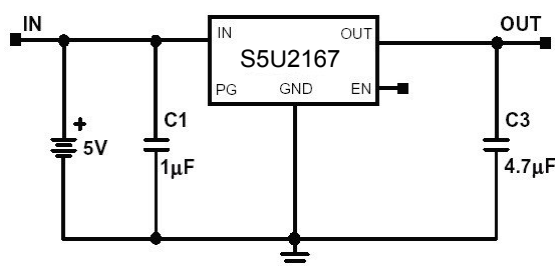
REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	4.40	4.80	c2	1.25	1.45
b	0.66	0.91	L2	1.27	REF.
L4	0.00	0.30		8.6	9.0
c	0.36	0.5	e	1.70	REF.
L1	2.29	2.79	L	14.6	15.8
E	9.80	10.4	θ	0°	8°



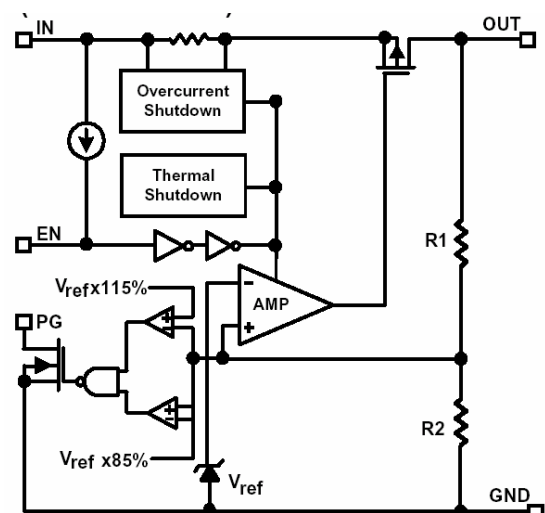
Applications

- * PC Peripherals
- * Wireless Devices
- * Portable Electronics
- * Battery Powered Widgets
- * Instrumentation

Typical Application Circuit



Functional Block Diagram



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}	1.5~3.3	V
Operating Ambient Temperature	T_{opr}	-40~+85	°C
Junction Temperature	T_j	-40~+125	°C
Max. Junction Temperature	$T_j \text{ Max.}$	150	°C
Power Dissipation ($\Delta T=100^\circ\text{C}$)	P_D	3.0	W
EDS Classification		B	

Electrical Characteristics $T_A=25^\circ\text{C}$ unless otherwise noted

 $(V_{IN}=V_{OUT}(T) + 2V, V_{EN}=V_{IN}, C_{IN}=1\mu F, C_{OUT}=4.7\mu F)$

Parameter	Symbol	Condition	Min	TYP	Max	Unit
Output Voltage	$V_{OUT}(E)$ (Note1)	$I_O=1\text{mA}, V_{IN}=V_{OUT}(T)+2V$	-1.5	$V_{OUT}(T)$ (Note2)	1.5	%
Output Current	I_O	$V_O > 1.2V$	750	-	-	mA
Current Limit	I_{LIM}	$V_O > 1.2V$	750	-	-	mA
Short Circuit Current	I_{SC}	$V_{IN}=V_{OUT}(T)+1V, V_O < 0.4V$	-	750	-	mA
Load Regulation	REG_{LOAD}	$V_{IN}=V_{OUT}(T)+2V, I_O=1\text{mA to } 750\text{mA}$	-1	0.2	1	%
Dropout Voltage	$V_{DROPOUT}$	$I_O=750\text{mA}$ $V_O=V_{OUT}(E)-2\%$ $V_{OUT}(T)=1.5V$	-	-	1000	mV
		$V_{OUT}(T)=1.8V$	-	-	650	
		$V_{OUT}(T)\geq 2.0V$	-	-	500	
Quiescent Current	I_Q	$V_{IN}=V_{OUT}(T)+2V, I_O=0\text{mA}$	-	45	70	μA
Ground Pin Current	I_{GND}	$V_{IN}=V_{OUT}(T)+2V, I_O=1\text{mA to } 750\text{mA}$	-	45	-	μA
Line Regulation	REG_{LINE}	$I_O=1\text{mA}$ $V_{IN}=V_{OUT}$ $V_{OUT}(T)+2$ $V_{OUT}(T) < 2.0V$	-0.15	-	0.15	%
		$2.0V \leq V_{OUT}(T) < 4.0V$	-0.1	0.02	0.1	
		$4.0V \leq V_{OUT}(T)$	-0.4	-	0.4	
Input Voltage	V_{IN}		Note3	-	7	V
Over Temperature Shutdown	OTS		-	150	-	°C
Over Temperature Hysteresis	OTH		-	30	-	°C
Output Voltage Temperature Coefficient	TC		-	30	-	ppm/°C
Power Supply Rejection	PSRR	$I_O=100\text{mA}$ $C_O=4.7\mu F$ (ceramic) $f=1\text{kHz}$	-	75	-	dB
		$f=10\text{kHz}$	-	55	-	
		$f=100\text{kHz}$	-	30	-	
Output Voltage Noise	eN	$f=10\text{Hz} \sim 100\text{kHz}, I_O=10\text{mA}, C_O=4.7\mu F$	-	30	-	μV_{rms}
EN Input Threshold	V_{EH}	$V_{IN}=2.7V \text{ to } 7V$	2.0	-	V_{IN}	V
	V_{EL}	$V_{IN}=2.7V \text{ to } 7V$	0	-	0.4	V
EN Input Bias Current	I_{EH}	$V_{EN}=V_{IN}, V_{IN}=2.7V \text{ to } 7V$	-	-	1	μA
	I_{EL}	$V_{EN}=0V, V_{IN}=2.7V \text{ to } 7V$	-	-	1	μA
Shutdown Supply Current	I_{SD}	$V_{IN}=5V, V_O=0V, V_{EN}<V_{EL}$	-	0.5	2	μA
Output Under Voltage	V_{UV}	PG goes Low when V_{OUT} too Low	-	-	84	% $V_{OUT}(T)$
Output Over Voltage	V_{OV}	PG goes Low when V_{OUT} too High	105	-	-	% $V_{OUT}(T)$
PG Leakage Current	I_{LC}	$V_{PG}=7V$	-	-	1.0	μA
PG Voltage Low	V_{OL}	$I_{SINK}=0.25\text{mA}$	-	-	0.4	V

Note 1: $V_{OUT}(E)$ =Effective Output Voltage (i.e. the output voltage when " $V_{OUT}(T) + 2.0V$ " is provided at the V_{IN} pin while maintaining a certain I_{OUT} value).

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

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

Ordering Information(contd.)

Part Number	Marking	Output Voltage	Part Number	Marking	Output Voltage
S5U 2167-15	7F152 XXXX	1.5V	S5U 2167-18	7F182 XXXX	1.8V
S5U 2167-25	7F252 XXXX	2.5V	S5U 2167-33	7F332 XXXX	3.3V

Detailed Description

The S5U 2167 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 140°C, or the current exceeds 2.2A. During thermal shutdown, the output voltage remains low. Normal operation is restored when the junction temperature drops below 120°C. The S5U 2167 behaves like a current source when the load reaches 2.2A. However, if the load impedance drops below 0.3 Ω , the current drops back to 600mA to prevent excessive power dissipation. Normal operation is restored when the load resistance exceeds 0.75 Ω .

External Capacitors

The S5U 2167 is stable with an output capacitance to ground of 4.7uF 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. All capacitors should be placed in closed proximity to the pins. A "Quiet" ground termination is desirable. This can be achieved with a "Star" connection.

Enable

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. 100K Ω resistor is necessary between V_{EN} source and EN pin when V_{EN} is high than V_{IN} . (Note: There is no internal pull-up for EN pin. It can not be floating.)

Power Good

The S5U 2167 includes the Power Good feature. When the output is not within $\pm 15\%$ of the specified voltage, it pulls low. This can occur under the following conditions:

1. Input voltage too low.
 2. During over-temperature.
 3. During over-current.
 4. If output is pulled up.
- (Note: PG pin is an open-drain output.)

Characteristics Curve

