300mA High Speed, Fast Enable with Low Noise LDO

DESCRIPTION

The STL6118 series is a low-dropOut linear regulator with ON/OFF control that operates in the input voltage range from +1.8V to +5.5V and delivers 300mA output current.

The fixed output voltage is preset at an internally trimmed voltage 1.2V, 1.5V, 1.8V, 2.5V, 2.85V, 3.0V, 3.3V and 3.6V are available by special order only.

The STL6118 consissts of a 0.87V bandgap reference, an error amplifier, and a P-channel pass transistor, Other features include short-circuit protection, thermal shutdown protections. The STL6118 series devices are available in SOT-25, SOT-23 package.

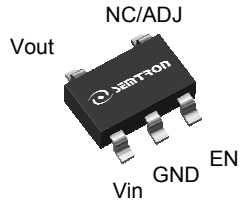
FEATURE

- Low Current Consumption: 30μA
- Short Circuit Protection: 70mA
- Typical Dropout Voltage: 90mV@100mA(Typ.)
- Fast Response in Power-on Transient: 35μs
- Output Current Limit Protection: 500mA
- Thermal Overload Shutdown Protection
- Control Output ON/OFF Function

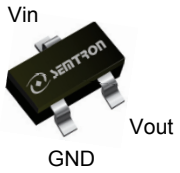
APPLICATIONS

- Battery Powered Equipment.
- Cameras, Video Cameras
- Portable Games
- Radio Communication Equipment
- Mobile Phone, Coreless Phone

PIN CONFIGURATION



SOT-23 -5L
Top View



SOT-23L
Top View

PART MARKING INFORMATION

STL 6118 – XX X – TR G a b c d e f	a : Company name,Product Serial number. b : Product Number c: Output Voltage Code. d: Package code. e : Handling code. f : Green produce code.

■ORDERING INFORMATION

Part Number	Output Voltage	Package Code	Handling Code	Shipping
STL6118-12S-TRG	1.2V	S : SOT-23L	TR : Tape&Reel	3K/Reel
STL6118-15S-TRG	1.5V			
STL6118-18S-TRG	1.8V			
STL6118-25S-TRG	2.5V			
STL6118-28S-TRG	2.85V			
STL6118-30S-TRG	3.0V			
STL6118-33S-TRG	3.3V			
STL6118-36S-TRG	3.6V			

※ SOT-23L : Only available in tape and reel packaging.

Part Number	Output Voltage	Package Code	Handling Code	Shipping
STL6118-12S5-TRG	1.2V	S5 : SOT-23-5L	TR : Tape&Reel	3K/Reel
STL6118-15S5-TRG	1.5V			
STL6118-18S5-TRG	1.8V			
STL6118-25S5-TRG	2.5V			
STL6118-28S5-TRG	2.85V			
STL6118-30S5-TRG	3.0V			
STL6118-33S5-TRG	3.3V			
STL6118-36S5-TRG	3.6V			

※ SOT-23-5L : Only available in tape and reel packaging.

■ABSOLUTE MAXIMUM RATINGS (T_A = 25℃ Unless otherwise noted)

Parameter	Symbol	Maximum	Unit
Power Dissipation	P_D	400	mW
Input voltage	V_{IN}	6	V
Output Current Limit	I_{OUT}	0.5	A
Thermal resistance junction to case	θ_{JA}	250	°C /W
Operating Junction Temperature Range	T_J	+165	°C
Storage Temperature Range	T_{STG}	-55~+150	°C
Lead Soldering Temperature	T_{LEAD}	+260	°C

Note: Exceeding these ratings could cause damage to the device. All voltages are with respect to Ground. Currents are positive into, negative out of the specified terminal.

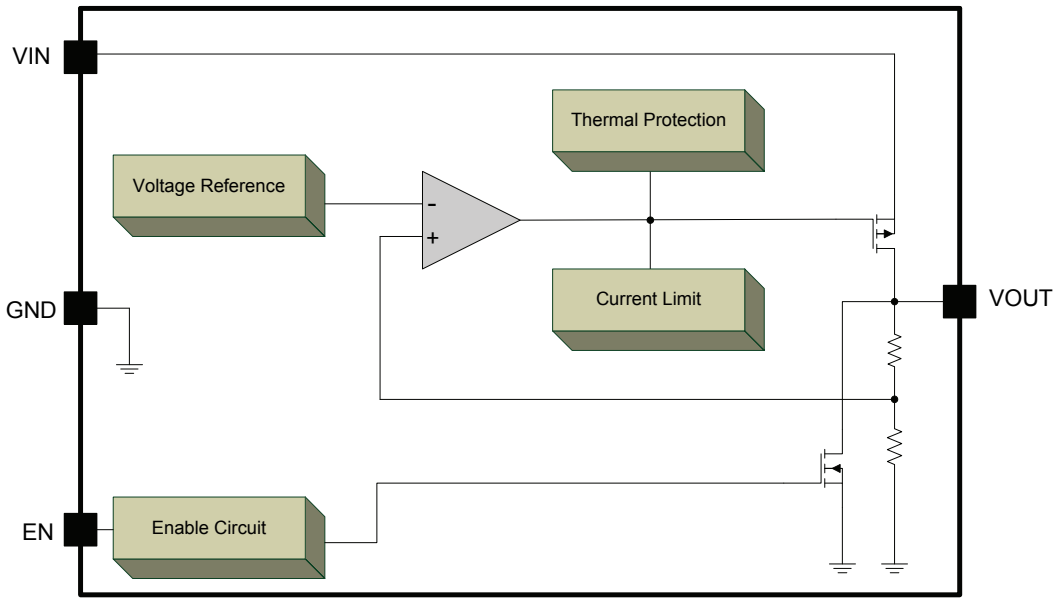
ELECTRICAL CHARACTERISTICS (T_A = 25℃ Unless otherwise noted)

Operating conditions: V_{IN}=5V, T_A=25℃,unless otherwise noted

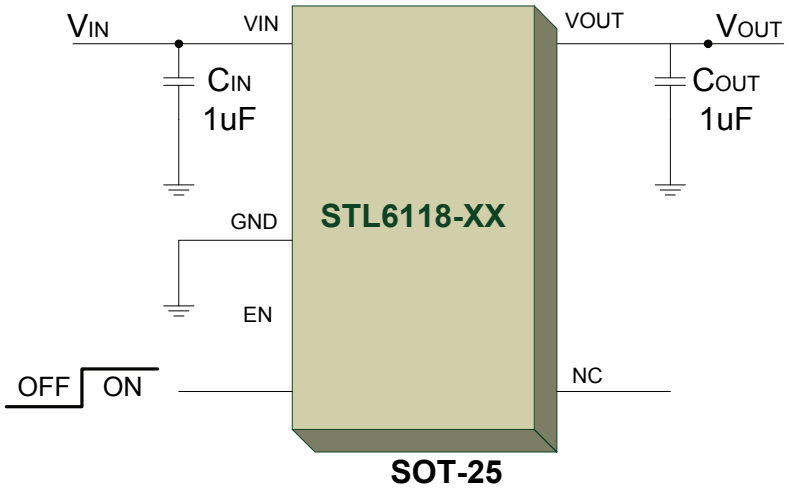
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Voltage	V_{IN}	-	1.8	-	5.5	V
Output Voltage	V_{OUT}	V_{IN}=V_{OUT}+1V, I_{OUT} =1mA V_{OUT}≧1.8V	2%	V_{OUT}	2%	V
Line Regulation	V_{SR}	V_{OUT}+1V≦V_{IN}≦5.5V I_{OUT}=1mA	-	0.2	0.3	%
Load Regulation	V_{LR}	1mA≦I_{OUT}≦100mA V_{IN}=V_{OUT}+1V	-	0.01	0.02	%
Dropout Voltage	V_D	V_{OUT}＞2.0V, I_{OUT}=300mA	-	300	500	mV
Current Limit	I_{CL}		-	500	-	mA
Outpur Current (1)	I_{OUT}	V_{OUT}+1V≦V_{IN}≦5.5V V_{IN}≧2.4	300	-	-	mA
Quiescent Current	I_Q	V_{IN}=V_{OUT}+1V	-	30	50	μA
Temperature Coefficient	T_C		-	0.1	-	%/℃
Thermal Shutdown Temperature	T_{SD}		-	155	-	℃
Thermal Shutdown Hysteresis	T_{HYS}		-	30	-	℃
Enable input Treshold Voltaage	V_{ENH}	Voltage Increasing Output Turns On	1.6	-	-	V
	V_{ENL}	Voltage Decreasing Output Turns Off	-	-	0.3	V
Ripple Rejection Ratio	R_A	f=1KHz, I_{OUT}=30mA, C_{OUT}=1μF	-	70	-	dB

NOTES: (1) Measured using a double sided board with 1 x 2 square inches of copper area connected to the GND pin for “heat spreading.

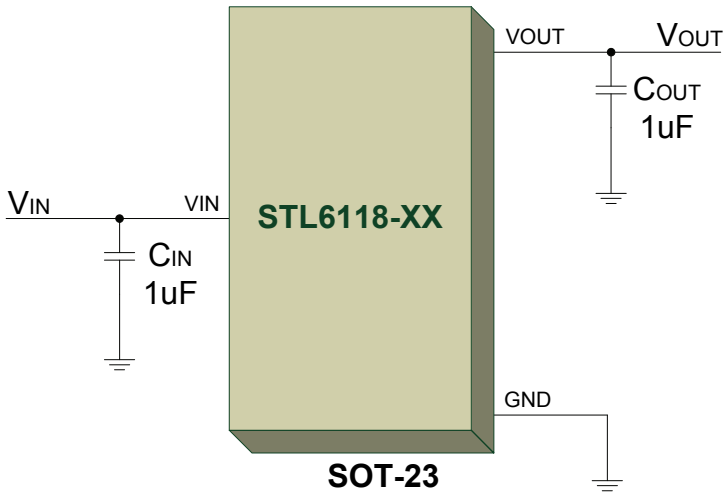
FUNCTION BLOCK DIAGRAM



TYPICAL APPLICATIONS



SOT-25



SOT-23

APPLICATION INFORMATION

◆Detail Description

The STL6118 is a low-dropout linear regulator. The device provides preset 1.2V to 3.3V output voltages for output current up to 300mA. Other mask options for special output voltages are also available. As illustrated in function block diagram, it consists of a 0.87V bandgap reference, an error amplifier, a P-channel pass transistor and an internal feedback voltage divider.

The bandgap reference for is connected to the error amplifier, which compares this reference with the feedback voltage and amplifies the voltage difference. If the feedback voltage is lower than the reference voltage, the pass transistor's gate is pulled lower, which allows more current to pass to the output pin and increases the output voltage. If the feedback voltage is too high, the pass transistor's gate is pulled up to decrease the output voltage.

The output voltage is feed back through an internal resistor divider connected to VOUT pin. Additional blocks include an output current limiter, thermal sensor, and shutdown logic.

◆Output Voltage Selection

The output voltage is preset at an internally trimmed voltage. The first two digits of part number suffix identify the output voltage (see Ordering Information). For example, the STL6118-33 has a preset 3.3V output voltage.

◆Current Limit

The STL6118 includes a foldback current limiter. It monitors and controls the pass transistor's gate voltage, estimates the output current, and limits the output current under 500mA.

◆Thermal Overload Protection

Thermal overload protection limits total power dissipation of the STL6118. When the junction temperature exceeds TJ = +155°C, a thermal sensor turns off the pass transistor, allowing the IC to cool down. The thermal sensor turns the pass transistor on again after the junction temperature cools down by 30°C, resulting from a pulsed output during continuous thermal overload conditions.

Thermal overload protection is designed to protect STL6118 from the event of fault conditions. For continuous operation, the absolute maximum operating junction temperature rating of TJ = +125°C should not be exceeded.

◆Internal P-channel Pass Transistor

The STL6118 features a P-channel MOSFET pass transistor. Unlike similar designs using PNP pass transistors, P-channel MOSFETs require no base drive, which reduces quiescent current. PNP-based regulators also waste considerable current in dropout when the pass transistor saturates, and use high base-drive currents under large loads.

The STL6118 does not suffer from these problems and consumes only 30μA (Typ.) of current consumption under heavy loads as well as in dropout conditions.

◆Enable Function

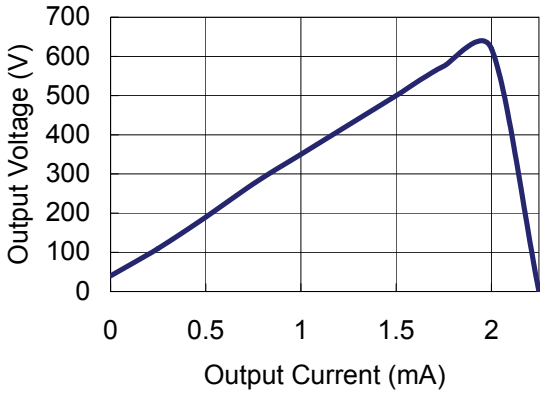
EN pin starts and stops the regulator. When the EN pin is switched to the power off level, the operation of all internal circuit stops, the build-in P-channel MOSFET output transistor between pins VIN and VOUT is switched off, allowing current consumption to be drastically reduced. The VOUT pin enters the GND level through the internal discharge path between VOUT and GND pins.

◆Fast Discharge Function

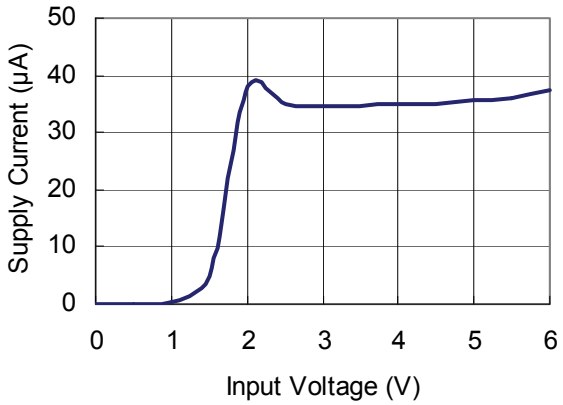
The STL6118 has fast discharge function on EN pin disable. When user turns off the device, its internal pull-low resistor will discharge output capacitor's charge. It'll avoid the following device to arise malfunctions.

TYPICAL CHARACTERISTICS (25℃ Unless Note)

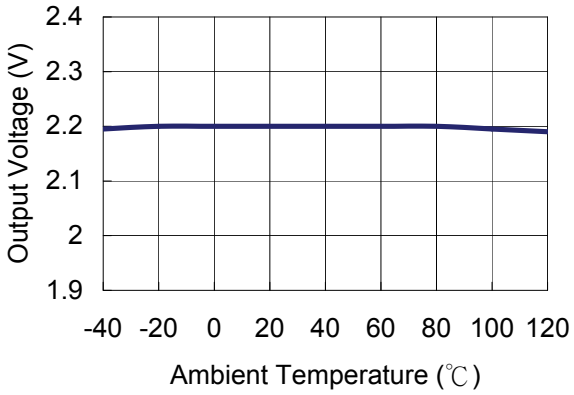
Output Voltage VS. Output Current



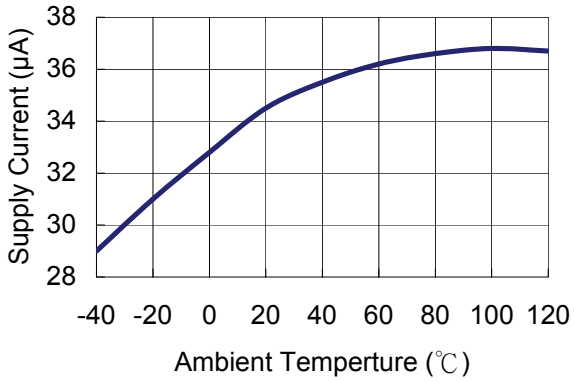
Supply Current VS. Input Voltage



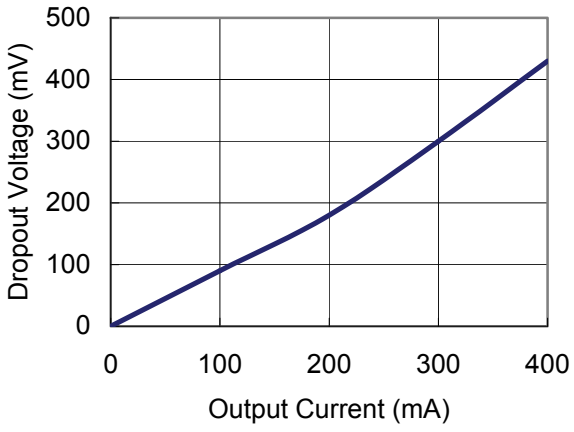
Output Voltage VS. Ambient Temperature



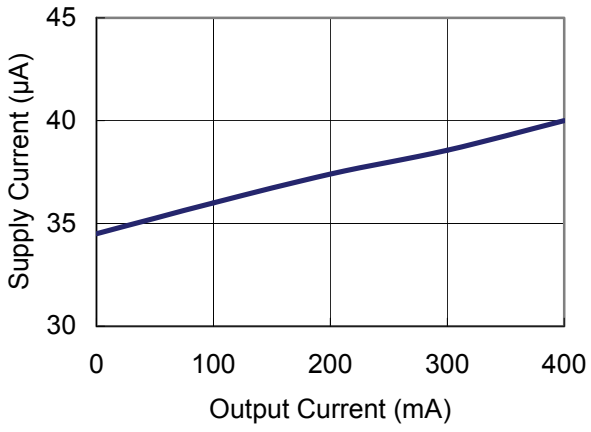
Supply Current VS. Ambient Temperature



Dropout Voltage VS. Output Current

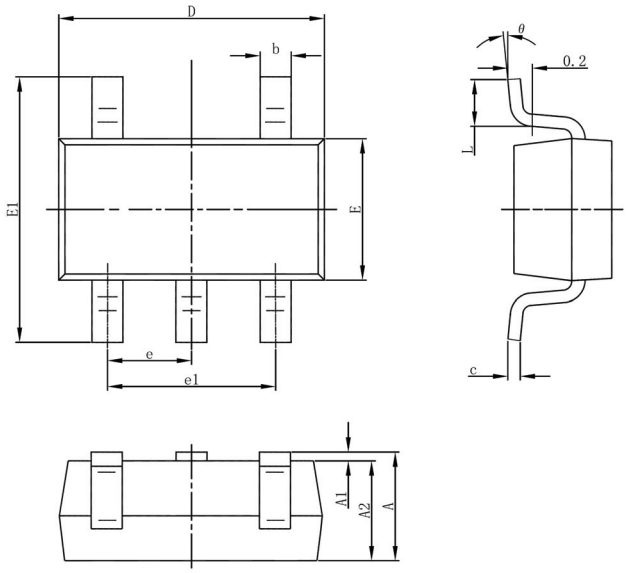


Supply Current VS. Output Current



SOT-23-5L PACKAGE 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	0.710	0.790
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°



SOT-23L PACKAGE 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°