600mA Low Dropout Linear Regulator

Description

The FP6132 series are low dropout, positive linear regulators with very low quiescent current. The FP6132 can supply 600mA output current with a low dropout voltage at about 600mV.

The FP6132 regulator is able to operate with output capacitors as small as 1μF for stability. The FP6132 also offers on chip thermal shutdown feature providing protection against overload or any condition when the ambient temperature exceeds the junction temperature.

The FP6132 series are available in fixed output voltage ranging from 1.2V to 4.5V with 0.1V interval.

The FP6132 series are available in space-saving SOT-89 packages.

Features

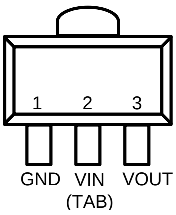
- Low Dropout Voltage of 600mV at 600mA
- Guaranteed 600mA Output Current
- Very Low Quiescent Current at about 30μA
- Max. ±2%Output Accuracy
- Needs Only 1μF Capacitor for Stability
- Thermal Shutdown Protection
- Current Limit Protection
- Low-ESR Ceramic Capacitor for Output Stability
- RoHS Compliant

Applications

- DVD/CD-ROM, CD/RW
- Wireless Device
- LCD Module
- Battery Power System
- Card Reader
- XDSL Router

Pin Assignments

GB3 Package (SOT-89)



VB3 Package (SOT-89)

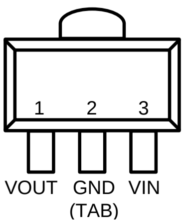
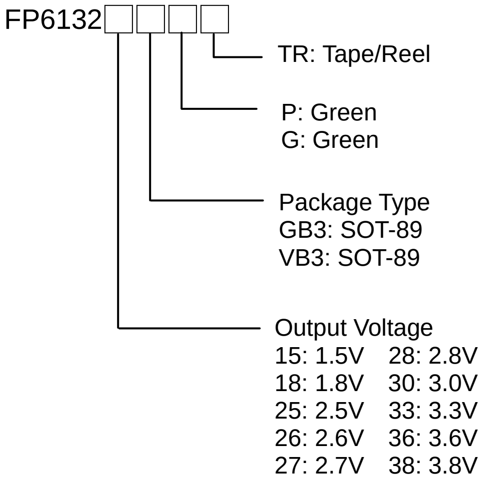


Figure1. Pin Assignment of FP6132

Ordering Information



Note 1 : Please consult Fitipower sales office or authorized distributor for availability of special output voltages.

Typical Application Circuit

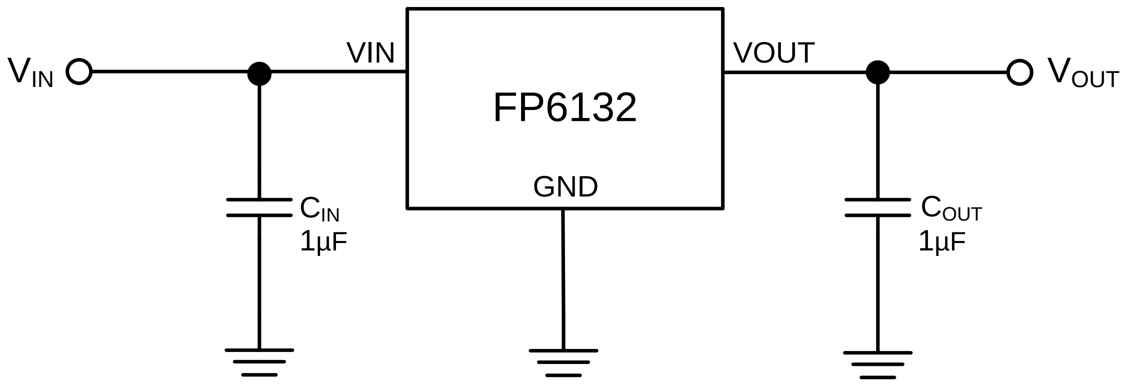


Figure2. Typical Application Circuit of FP6132

Note 2：To prevent oscillation, it is recommended to use minimum 1μF X7R or X5R dielectric capacitors if ceramics are used as input/output capacitors.

Functional Pin Description

Pin Name	Pin Function
VIN	Power is supplied to this device from this pin which is required an input filter capacitor. In general, the input capacitor in the range of 1μF to 10μF is sufficient.
VOUT	The output supplies power to loads. The output capacitor is required to prevent output voltage unstable. The FP6132 is stable with an output capacitor 1μF or greater. The larger output capacitor will be required for application with large transit load to limit peak voltage transits, besides could reduce output noise, improve stability, PSRR.
GND	Common ground pin

Block Diagram

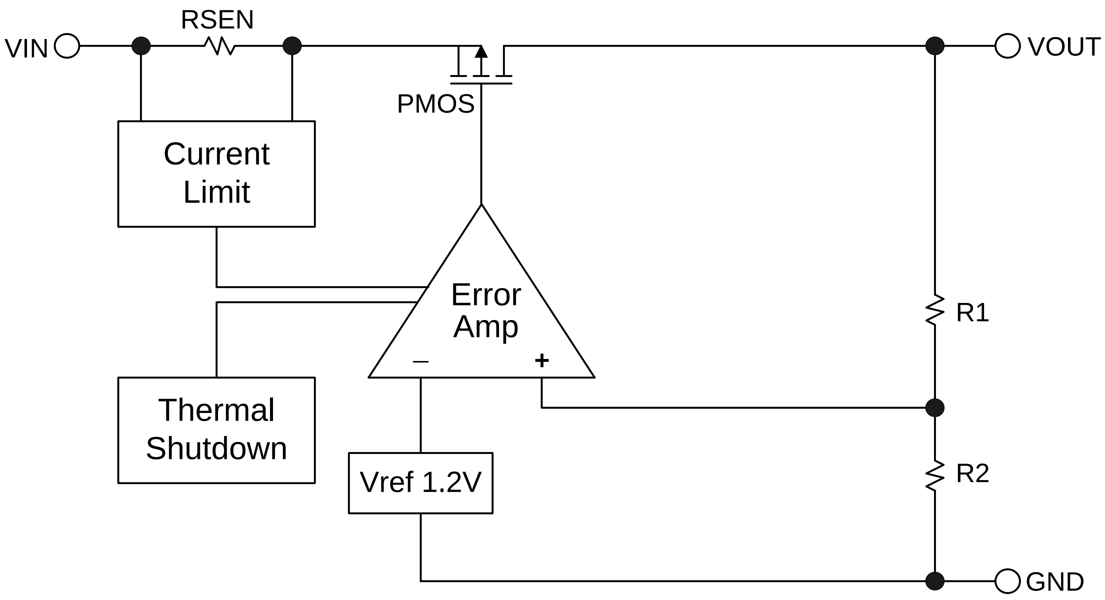


Figure3. Block Diagram of FP6132

Absolute Maximum Ratings

- Supply Input Voltage (V_{IN}) -- +6V
- Power Dissipation @25ºC (P_D)
  SOT-89 --- +0.57W
- Package Thermal Resistance (θ_{JA})
  SOT-89 --- +175℃/W
- Maximum Junction Temperature (T_J) --- +150ºC
- Storage Temperature Range (T_S) -- -65ºC to +150ºC
- Lead Temperature (Soldering,10 sec.) (T_{LEAD}) -- +260ºC

Note 3：Stresses beyond those listed under “Absolute Maximum Ratings" may cause permanent damage to the device.

Recommended Operating Conditions

- Input Voltage (V_{IN}) -- +2.8V to +5.5V
- Operating Temperature Range (T_{OPR}) -- -40ºC to +85ºC

Electrical Characteristics

(V_{IN}=V_{OUT}+1V or V_{IN}=2.8V whichever is greater, C_{IN}=1µF, C_{OUT}=1µF, T_A=25ºC, unless otherwise specified)

Parameter	Symbol	Conditions		Min	Typ	Max	Unit
Output Voltage Accuracy	ΔV_{OUT}	I_O= 1mA		-2		+2	%
Current Limit	I_{LIMIT}	R_{Load}=1Ω		600			mA
Quiescent Current	I_Q	I_O= 0mA			30	50	µA
Dropout Voltage (Note4)	V_{DROP}	I_O=600mA	V_{OUT}=1.5V		1550	1690	mV
			V_{OUT}=1.8V		1300	1420	
			V_{OUT}=2.5V		800	900	
			V_{OUT}=3.0V		650	730	
			V_{OUT}=3.3V		600	670	
Line Regulation	ΔV_{LINE}	I_O=1mA, V_{IN}=V_{OUT} +1V to 5V			1	5	mV
Load Regulation (Note5)	ΔV_{LOAD}	I_O=0mA to 600mA			13	50	mV
Ripple Rejection (Note6)	PSRR	V_{IN}=V_{OUT}+1V f_{RIPPLE} = 120Hz, C_{OUT} = 1µF			60		dB
Temperature Coefficient (Note6)	T.C.	I_{OUT} = 1mA, V_{IN} = 5V			50		ppm/ºC
Thermal Shutdown Temperature (Note6)	T_{SD}				160		ºC
	ΔT_{SD}	Hysteresis			25		ºC

Note 4：The dropout voltage is defined as V_{IN}-V_{OUT}, which is measured when V_{OUT} drops 2% of its normal value with the specified output current.

Note 5：Load regulation and dropout voltage are measured at a constant junction temperature by using a 40ms low duty cycle current pulse.

Note 6：Guarantee by design.

Typical Performance Curves

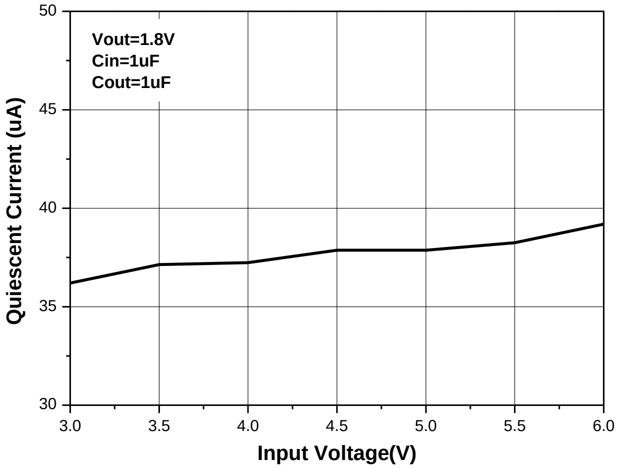


Figure4. Quiescent Current vs. Input Voltage

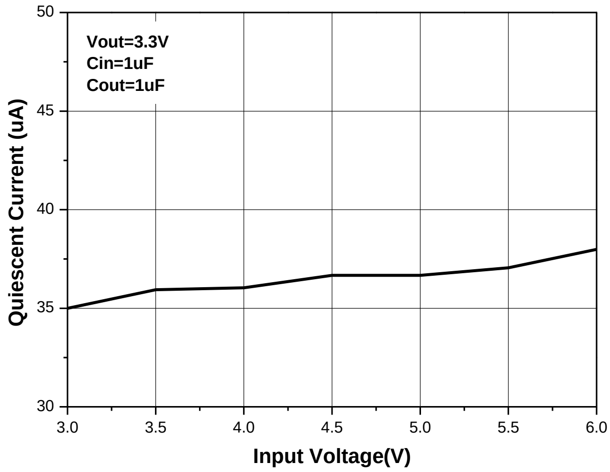


Figure5. Quiescent Current vs. Input Voltage

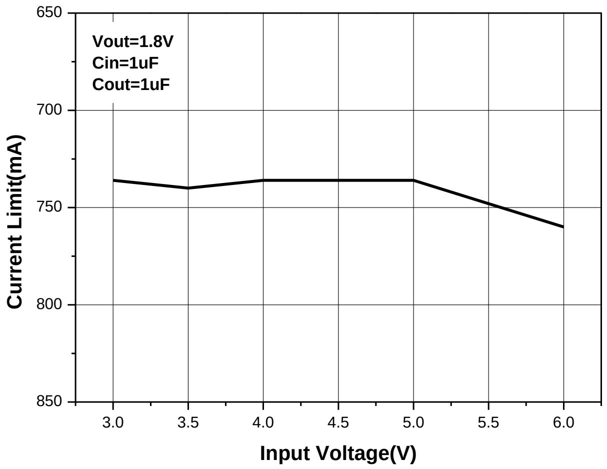


Figure6. Current limit vs. Input Voltage

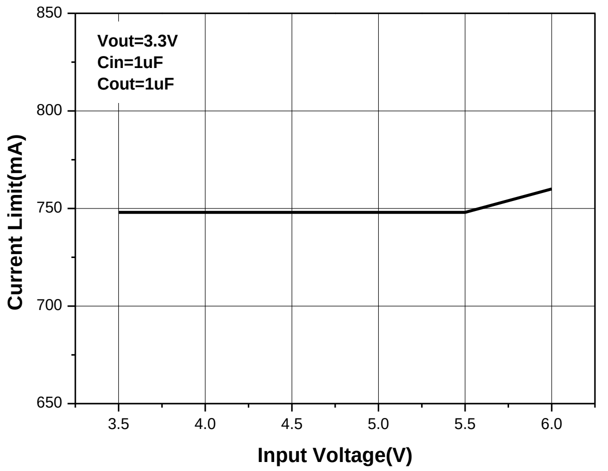


Figure7. Current Limit vs. Input Voltage

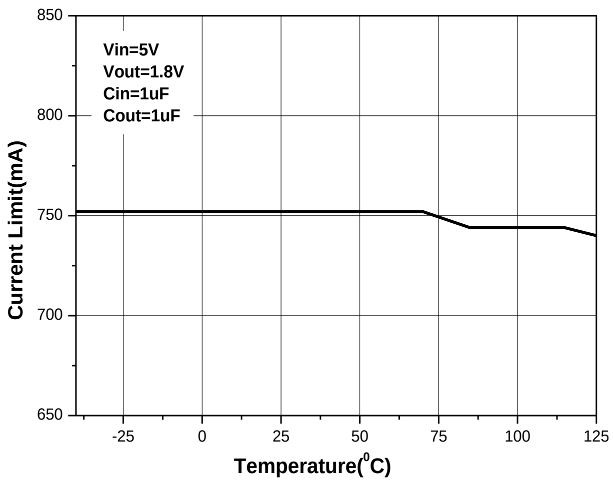


Figure8. Current limit vs. Temperature

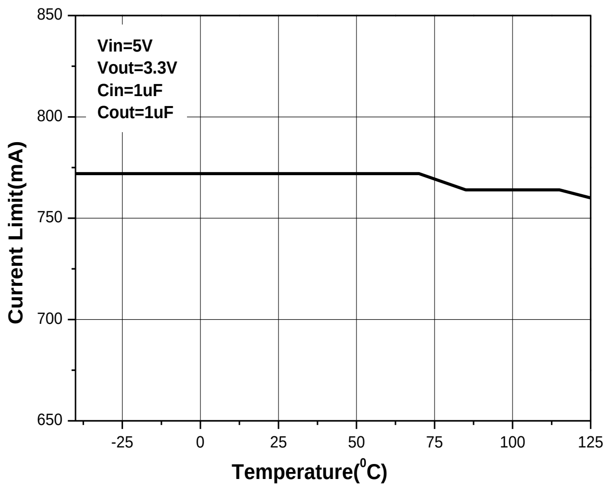


Figure9. Current limit vs. Temperature

Typical Performance Curves (Continued)

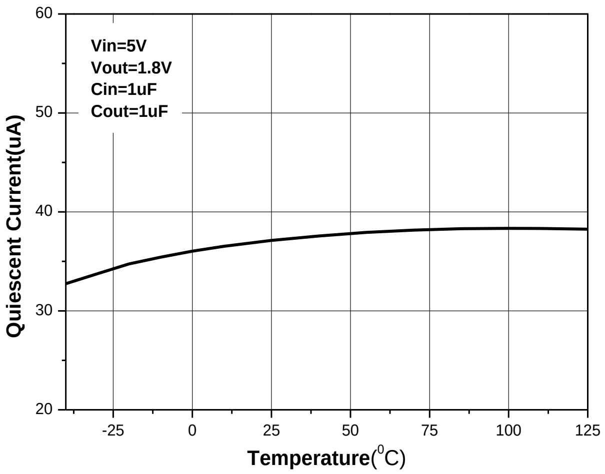


Figure10. Quiescent Current vs. Temperature

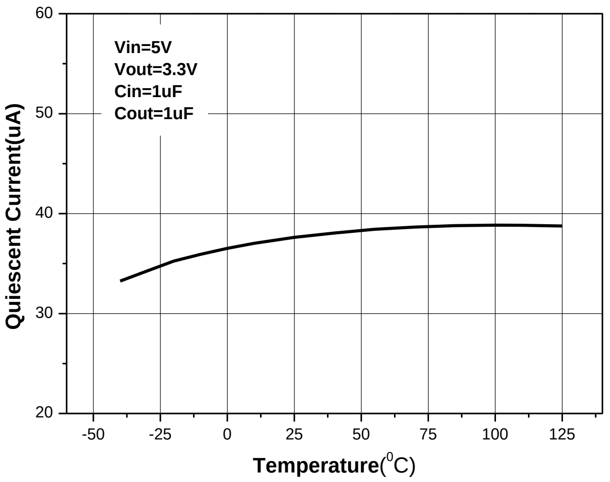


Figure11. Quiescent Current vs. Temperature

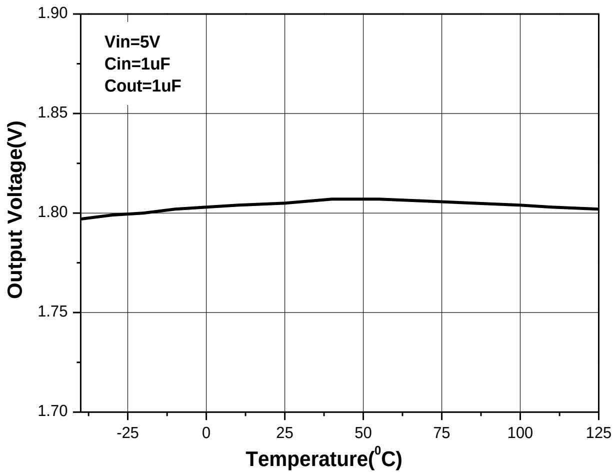


Figure12. Temperature Stability

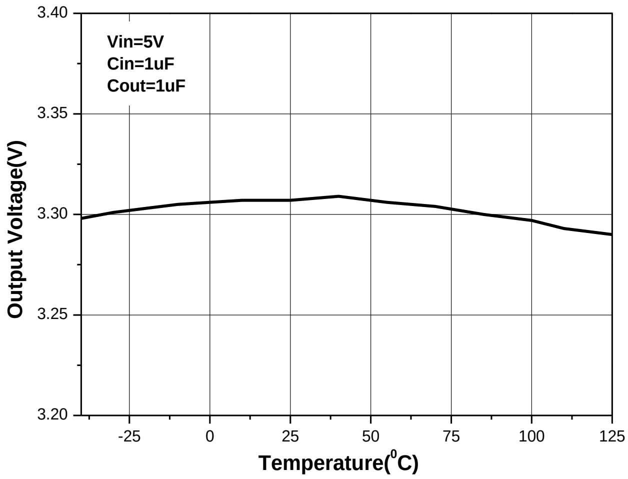


Figure13. Temperature Stability

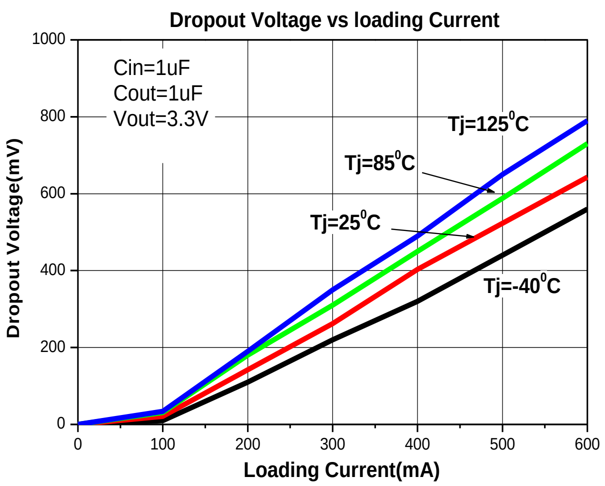


Figure14. Dropout Voltage vs. Loading Current

Typical Performance Curves (Continued)

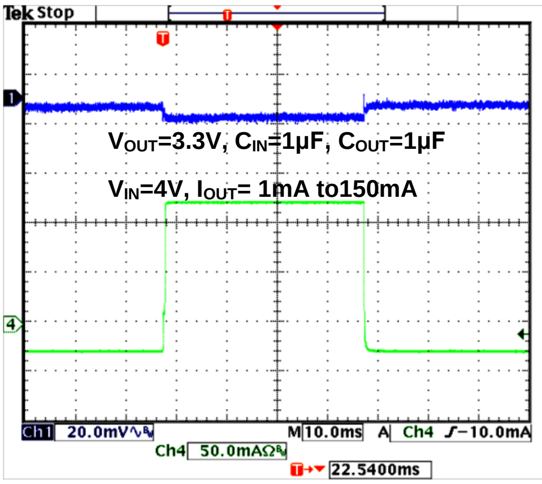


Figure15. Load Transition Response

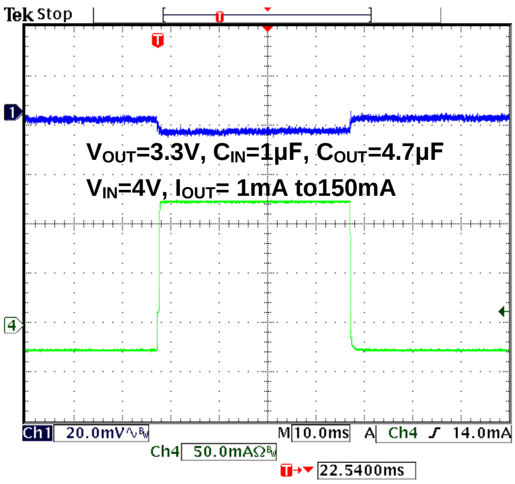


Figure16. Load Transition Response

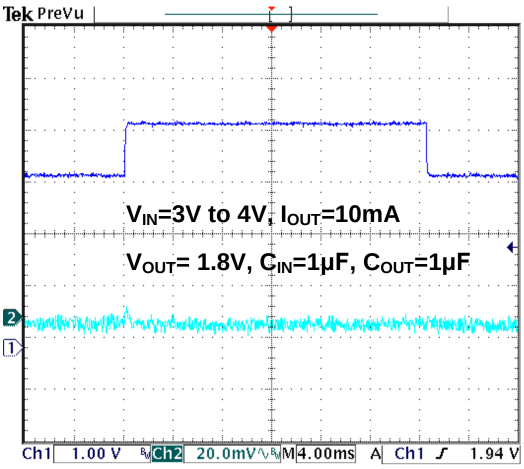


Figure17. Line Transition Response

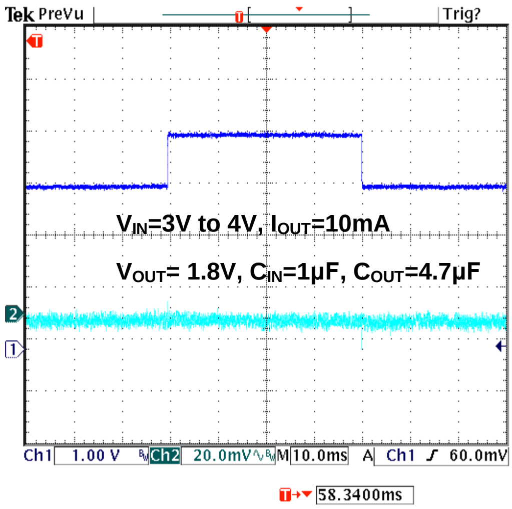


Figure18. Line Transition Response

Application Information

The FP6132 series are low dropout linear regulators that could provide 600mA output current at dropout voltage about 600mV. Besides, current limit and on chip thermal shutdown features provide protection against any combination of overload or ambient temperature that could exceed junction temperature.

Output and Input Capacitor

The FP6132 regulator is designed to be stable with a wide range of output capacitors. The ESR of the output capacitor affects stability. Larger value of the output capacitor decreases the peak deviations and provides to improve transition response for larger current changes.

The capacitor types (aluminum, ceramic, and tantalum) have different characterizations such as temperature and voltage coefficients. All ceramic capacitors are manufactured with a variety of dielectrics, each with different behavior across temperature and applications. Common dielectrics used are X5R, X7R and Y5V. It is recommended to use 1μF to 10μF X5R or X7R dielectric ceramic capacitors with 30mΩ to 50mΩ ESR range between device outputs to ground for transient stability. The FP6132 is designed to be stable with low ESR ceramic capacitors and higher values of capacitors and ESR could improve output stability.

So the ESR of output capacitor is very important because it generates a zero to provide phase lead for loop stability.

There are no requirements for the ESR on the input capacitor, but its voltage and temperature coefficient have to be considered for device application environment.

Protection Features

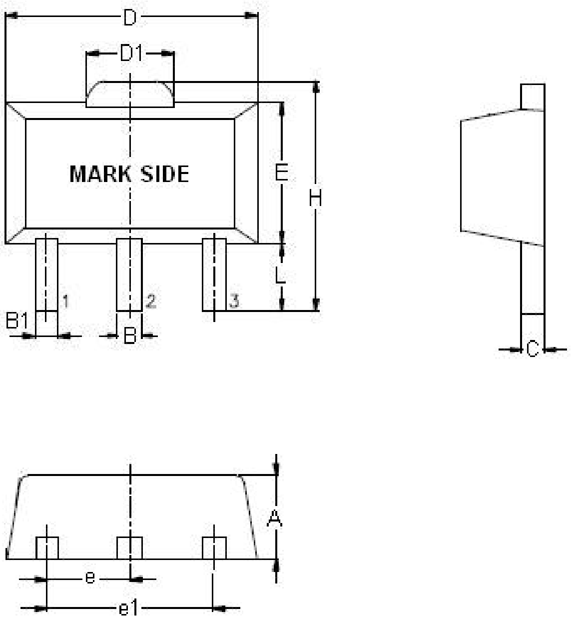
In order to prevent overloading or thermal condition from damaging device, FP6132 regulator has internal thermal and current limiting functions designed to protect the device. It will rapidly shut off PMOS pass element during over temperature condition.

Thermal Consideration

The power handling capability of the device will be limited by allowable operation junction temperature (125°C). The power dissipated by the device will be estimated by $P_D = I_{OUT} \times (V_{IN}-V_{OUT})$. The power dissipation should be lower than the maximum power dissipation listed in "Absolute Maximum Ratings" section.

Outline Information

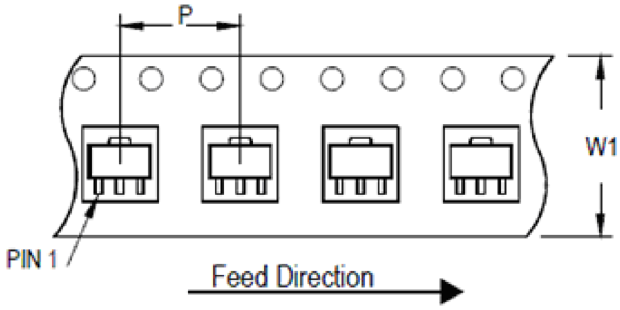
SOT-89-3 Package (Unit: mm)

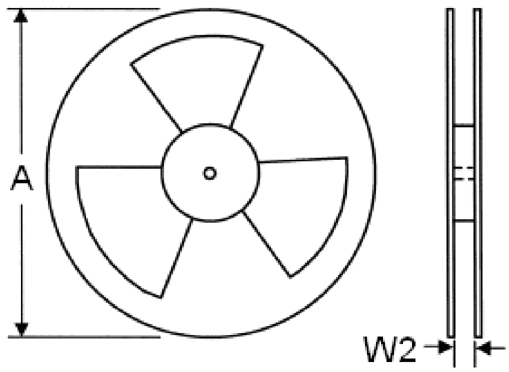


SYMBOLS UNIT	DIMENSION IN MILLIMETER	
	MIN	MAX
A	1.40	1.60
L	0.89	1.20
B	0.44	0.56
B1	0.36	0.48
C	0.35	0.44
D	4.40	4.60
D1	1.35	1.83
H	3.94	4.25
E	2.29	2.60
e	1.45	1.55
e1	2.90	3.10

Note：Followed From JEDEC TO-243-C.

Carrier Dimensions





Tape Size (W1) mm	Pocket Pitch (P) mm	Reel Size (A)		Reel Width (W2) mm	Empty Cavity Length mm	Units per Reel
		in	mm			
12	8	7	180	12.4	300~1000	1,000