Low Power, 1.1uA LDO Regulator

FEATURES

- Maximum Output Current: more than 250mA
- Dropout Voltage: 160 mV @ 100mA (Vout=3.0V)
- Low Power Consumption 1.1uA (TYP.)
- Maximum Operating Voltage 6.0V
- Output Voltage Range 2.8V to 3.6V
- Input Voltage Range 2.8V to 6V
- Highly Accurate ± 2%
- Operational Temperature Range -40℃~ 85℃
- Ultra Small Packages SOT-23-3L and SOT-89-3L
- Low ESR Capacitor Ceramic Compatible

APPLLICATIONS

- Battery Powered Equipment
- Cellular Phones
- Digital Cameras, Video Cameras
- Portable AV Systems
- Communication Tools
- Portable Games

DESCRIPTION

The FT510xx series are precise, extra low power consumption, positive voltage regulators with a significantly small dropout voltage. Each device contains a current limiter circuit, a PMOS power transistor, a precision reference voltage and an error amplifier circuit.

The FT510xx has been designed to be used with low capacitors and requires a minimum output capacitor of 1.0 uF. Standard output voltage versions are 2.8V, 3.0V, 3.3V, 3.6V.

TYPICAL APPLICATION CIRCUIT

Typical Application Circuit

ABSOLUTE MAXIMUM RATINGS*

Operating Ambient Temperature -- -40°C to 85°C

Storage Temperature -- -55°C to 125°C

Maximum Voltage --- 6V

Output Current --- 500mA

Power Dissipation --- 400mW

ESD Protection   HBM --- 6000V

　　　　　　　　　　 MM --- 600V

* Stresses exceed those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. Functional operation of the device at conditions beyond those listed in the specification is not guaranteed. Prolonged exposure to extreme conditions may affect device reliability or functionality.

PIN CONFIGURATION
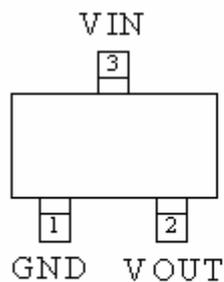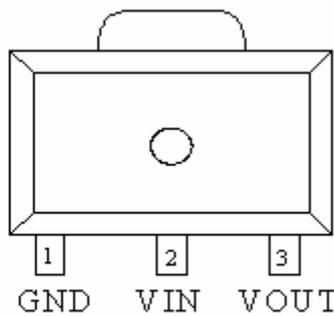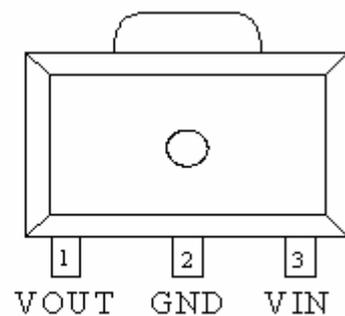
TERMINAL FUNCTION

Pin Name	Pin Function
VIN	Power Input Voltage
VOUT	Output Voltage
GND	Ground

ORDERING INFORMATION

FT510①②

DESIGNATOR	SYMBOL	OUTPUT VOLTAGE
①	E	2.8V
	F	3.0V
	G	3.3V
	H	3.6V

DESIGNATOR	SYMBOL	PACKAGE TYPE
②	a	SOT-23-3LA
	b	SOT-89-3LA
	c	SOT-89-3LB

MARKING RULE
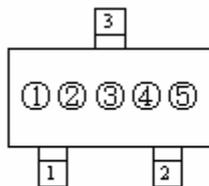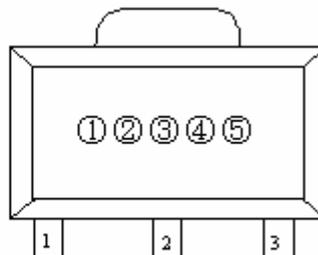

① **Represent Product Series**

SYMBOL	PRODUCT SERIES
2	FT510xx

② Represent output voltage and operating temperature range

E represent the output voltage is 2.8V, operating temperature is –40C ~ 85C.

③④⑤ For internal reference.

BLOCK DIAGRAM
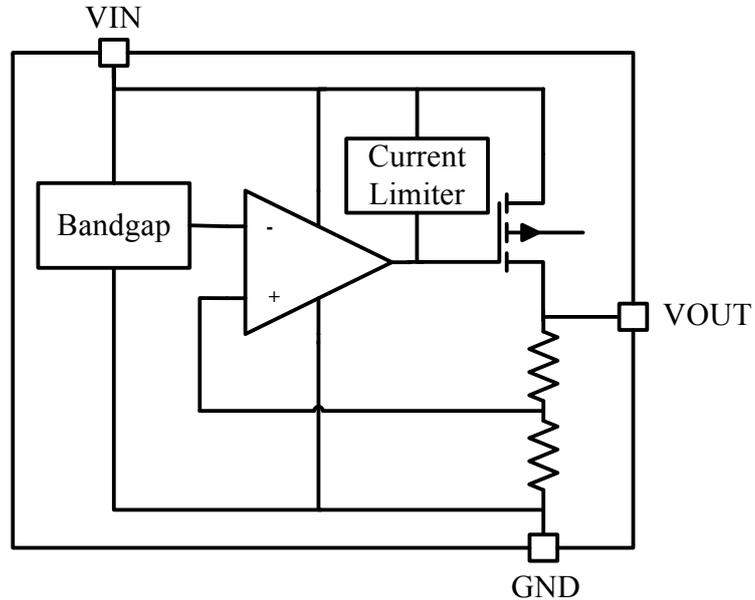
Block Diagram

ELECTRICAL CHARACTERISTICS

Vin=Vout+1V; Cin=1.0uF; Vout=2.8V

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Output Voltage	Vout	Iout=1mA	2.744	2.8	2.856	V
Input Voltage	Vin		2.8		6	V
Maximum Output Current	Imax	Vin=Vout+1V	250			mA
Load Regulation	△Vout	1mA≤Iout≤100mA		25		mV
Dropout Voltage **	Vdrp1 Vdrp2	Iout=100 mA Iout=30 mA		180 80		mV
Supply Current	Iq	Vin=Vout+1V		1.1		uA
Line Regulation	△Vout/ (△Vin* Vout)	Vout+1.0V ≤ Vout ≤6V Iout=1mA		0.04	0.3	%/V
Output Voltage Temperature Characteristics	△Vout/ (△Temp* Vout)	Iout=1mA -40°C≤Temp≤85°C		100		ppm/C
Current Limiter	Ishort	Vin=Vout+1V, Vout=2.8V		70		mA

Vin=Vout+1V; Cin=1.0uF; Vout =3.0V

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Output Voltage	Vout	Iout=1mA	2.940	3.0	3.060	V
Input Voltage	Vin		2.8		6	V
Maximum Output Current	Imax	Vin=Vout+1V	250			mA
Load Regulation	△Vout	1mA≤Iout≤100mA		25		mV
Dropout Voltage **	Vdrp1	Iout=100 mA		160		mV
	Vdrp2	Iout=30 mA		70		
Supply Current	Iq	Vin=Vout+1V		1.1		uA
Line Regulation	△Vout/ (△Vin* Vout)	Vout+1.0V ≤ Vout ≤6V Iout=1mA		0.04	0.3	%/V
Output Voltage Temperature Characteristics	△Vout/ (△Temp* Vout)	Iout=1mA -40°C≤Temp≤85°C		100		ppm/C
Current Limiter	Ishort	Vin=Vout+1V, Vout=3.0V		70		mA

Vin=Vout+1V; Cin=1.0uF; Vout =3.3V

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Output Voltage	Vout	Iout=1mA	3.234	3.3	3.366	V
Input Voltage	Vin		2.8		6	V
Maximum Output Current	Imax	Vin=Vout+1V	250			mA
Load Regulation	△Vout	1mA≤Iout≤100mA		25		mV
Dropout Voltage **	Vdrp1	Iout=100 mA		150		mV
	Vdrp2	Iout=30 mA		60		
Supply Current	Iq	Vin=Vout+1V		1.1		uA
Line Regulation	△Vout/ (△Vin* Vout)	Vout+1.0V ≤ Vout ≤6V Iout=1mA		0.04	0.3	%/V
Output Voltage Temperature Characteristics	△Vout/ (△Temp* Vout)	Iout=1mA -40°C≤Temp≤85°C		100		ppm/C
Current Limiter	Ishort	Vin=Vout+1V, Vout=3.3V		70		mA

Dropout voltage is defined as the input to output differential at which the output voltage drops 2% below its nominal value measured at 1V differential.

TYPICAL PERFORMANCE CHARACTERISTICS FT510F

Vout=3.0V, Vin=4.0V, Cin=Co=1uF, temp=27C unless otherwise noted

**1. Output Voltage vs. Output Current**
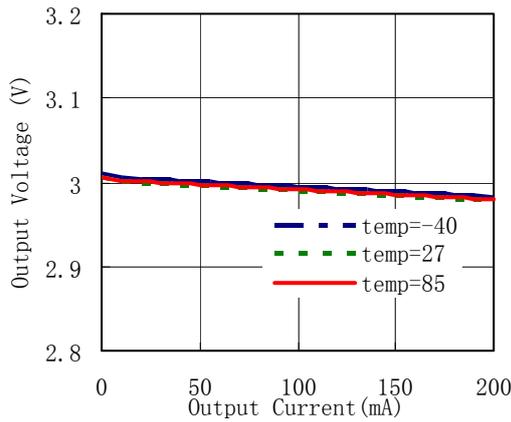
2. Output Voltage vs. Input Voltage
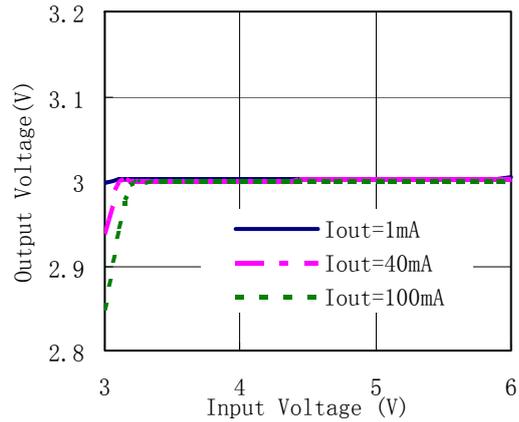

3. Supply Current vs. Input Voltage
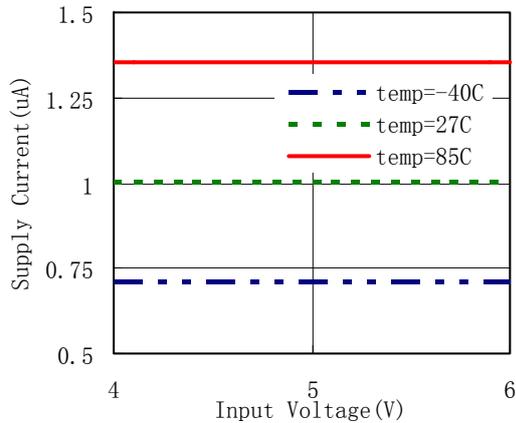
**4. Output Voltage vs. Temperature**
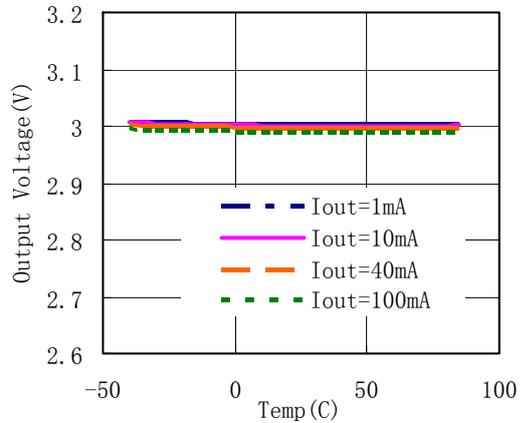
**5. Input Transient Response (1)**
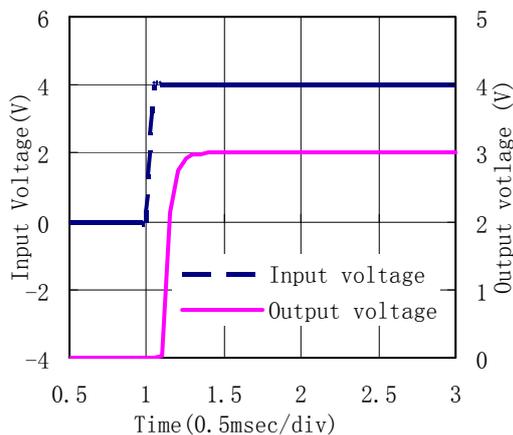
**6. Input Transient Response (2)**
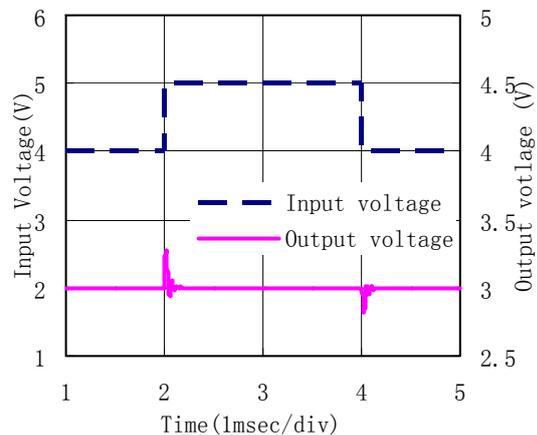
7. Load Transient Response
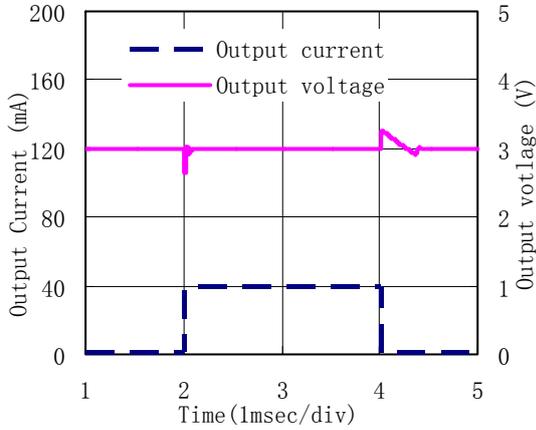
8. Current Limiting
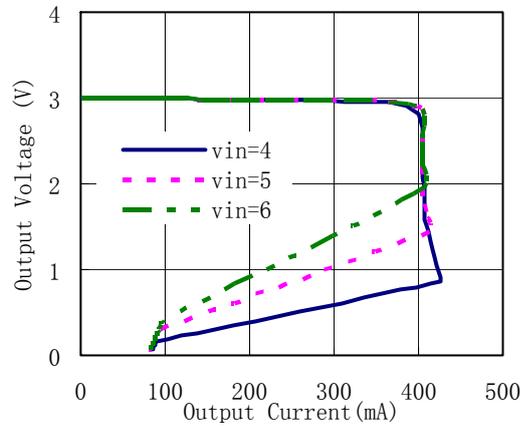
9. Power Supply Ripple Rejection
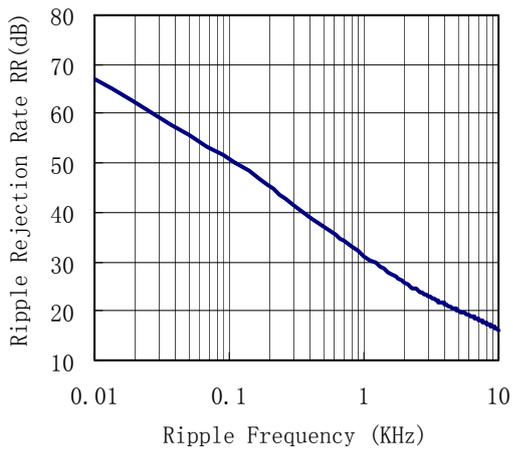
PACKAGING INFORMATION

SOT-23-3L
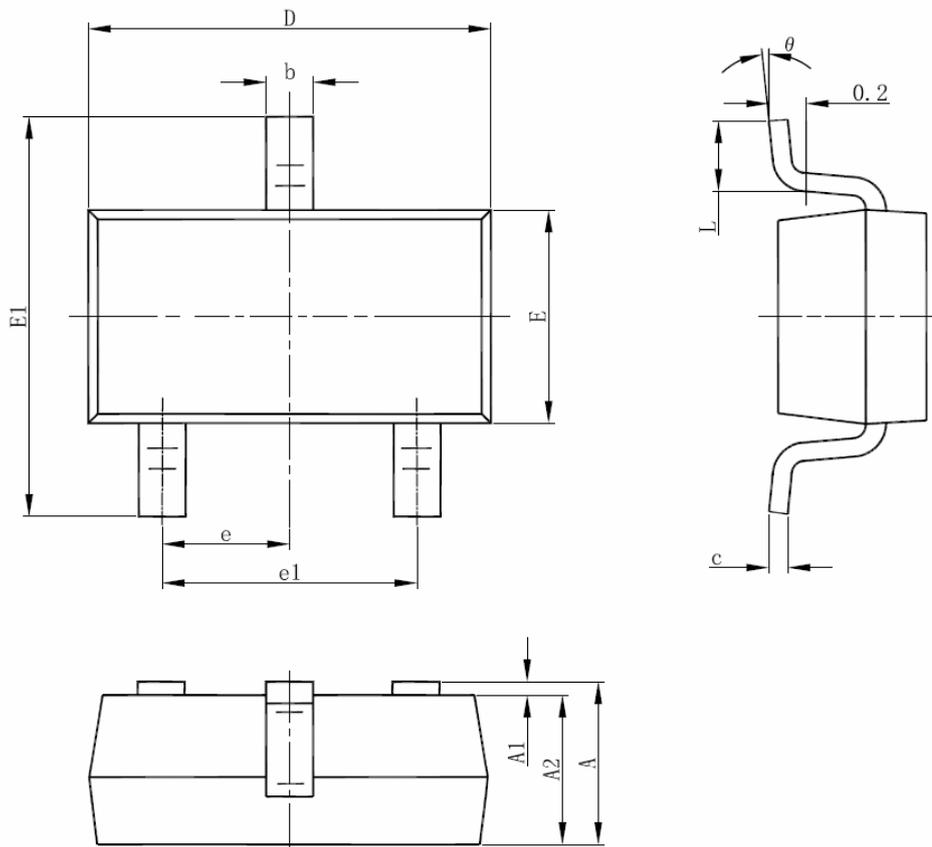
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

SOT-89-3L
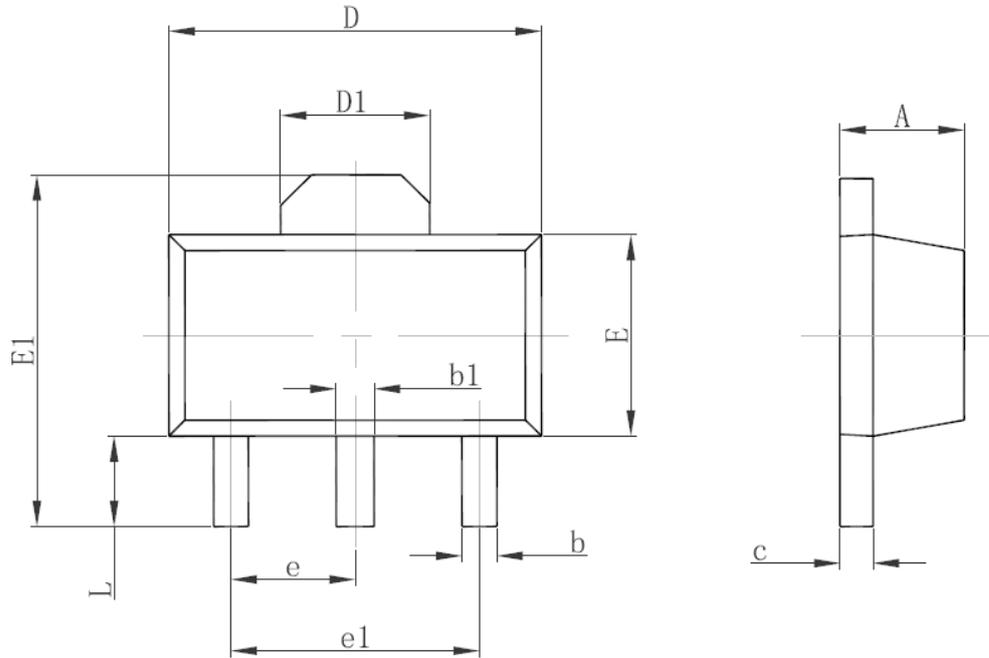
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF.		0.061 REF.	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP.		0.060 TYP.	
e1	3.000 TYP.		0.118 TYP.	
L	0.900	1.200	0.035	0.047