

600mA LOW DROPOUT CMOS VOLTAGE REGULATORS

PRODUCT DESCRIPTION

The FC8805 series is a low-dropout linear regulator. This device is designed specifically for battery-operated systems. Its ground current is very small - 50 μ A (typ.) that significantly extends the battery life.

The low power consumption and high accuracy are achieved through CMOS and programmable fuse technologies. Its versions are FC8805-adj (Vref=1.27V), FC8805-1.2, FC8805-1.8, FC8805-2.5, FC8805-2.6, FC8805-3.3.

It is possible to extend the output voltage range from 1.2V to 6.0V. The FC8805 consists of a high-precision voltage reference, an error-correction circuit, and a current-limited output driver. With good transient responses the device output remains stable even when the load changes. The EN (Shutdown) input enables the output to be turned off resulting in reduced power consumption.

The FC8805 can stably work with cheap MLCC output capacitors. Owing to high ripple rejection ratios, the FC8805 series can be used in the case of a power supply with noise. A 470pF capacitor from the BP (bypass) input to the ground reduces the noise, which is present on the internal reference, and that, in turn, significantly reduces the output noise. If that noise is not a concern, the said input may be left unconnected. Larger C_{BP} capacitor values may be used, but that extends a time period until the rated output voltage is reached after the power has been initially applied.

The FC8805 incorporates both over-temperature and over-current protections. The small packages - SOT-25 (300mW) and SOT-89 (500mW) - are usable too.

FEATURES

- Maximum output current 600mA
- Highly accurate output voltage: +/-1.5%
- Low power consumption
- On-chip protections: thermal, short-circuit
- Small input/output differential: 600mV at 600mA
- Adjustable version

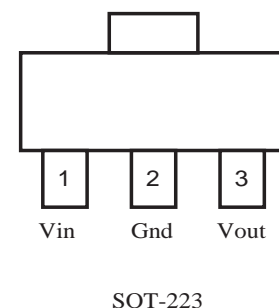
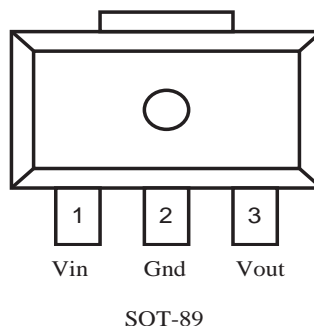
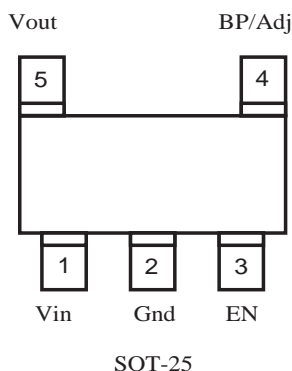
APPLICATIONS

- Battery-operated systems
- Portable computers
- Portable cameras and video recorders
- Reference voltage sources
- Instrumentation
- Pagers

ABSOLUTE MAXIMUM RATINGS

PARAMETER		SYMBOL	RATING	UNIT
Input voltage		V _{in}	8	V
Output current		I _{out}	1	A
Output voltage		V _{out}	-0.3 to V _{in} +0.3	V
Continuous total power dissipation	SOT-25	P _D	300	mW
	SOT-89		500	
	SOT-223		625	
Operating ambient temperature		T _{Opr}	-40 to +125	°C
Storage temperature		T _{STG}	-40 to +125	°C

PIN CONFIGURATION



ELECTRICAL CHARACTERISTICS

(At $T_A = 25^\circ\text{C}$, $V_{in} = V_{out} \text{ (nominal)} + 1\text{V}$, unless otherwise noted)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT	TEST CIRCUIT
Output voltage accuracy	$I_{out} = 1\text{mA}$	-1.5		+1.5	%	
Reference voltage in Adj version (Note 2)	$I_{out} = 1$ to 600mA	-3		+2		
Line Regulation $\Delta V_{out}/\Delta V_{in} V_{out}$	$I_{out} = 1\text{mA}$, $(V_{out} + 1\text{V}) < V_{in} < 6.5\text{V}$	-0.3	0.05	0.3	%/V	Fig.1
Load regulation (Note1)	$1\text{mA} \leq I_{out} \leq 600\text{mA}$, $C_{out} = 1\mu\text{F}$		0.5	1.5	%	Fig.2
Dropout voltage for $V_{out} > 2.8\text{V}$ $2.0\text{V} < V_{out} \leq 2.8\text{V}$ $V_{out} \leq 2.0\text{V}$	$I_{out} = 600\text{mA}$		600	750	mV	
			800	1000		
			1300	1600		
Maximum output current	$V_{out} > 0.96 \cdot V_{rating}$	600			mA	
Current limit			1300		mA	
EN exit delay	$C_{BP} = 0\mu\text{F}$, $C_{out} = 1\mu\text{F}$ $I_{out} = 100\text{mA}$		600		μsec	
EN input bias current	$V_{EN} = V_{in}$			100	nA	
EN input Low current	$V_{EN} = \text{Gnd}$	-1	-0.3		μA	
EN supply current	$V_{EN} = \text{Gnd}$		0.01	1	μA	
EN input threshold Low	$V_{in} = 2.5$ to 5.5V			0.4	V	
EN input threshold High	$V_{in} = 2.5$ to 5.5V	2			V	
Gnd (Ground) pin current	$I_{out} = 0\text{mA}$ to 600mA		50	85	μA	Fig.3
Over-temperature shutdown	$I_{out} = 10\text{mA}$		155		$^\circ\text{C}$	
Over-temperature hysteresis	$I_{out} = 10\text{mA}$		10		$^\circ\text{C}$	
V_{OUT} temperature coefficient	$I_{out} = 10\text{mA}$		30		ppm	
PSRR	$I_{out} = 100\text{mA}$, $C_{out} = 2.2\mu\text{F}$, $f = 100\text{Hz}$		55		dB	
Output voltage noise	$f = 20\text{Hz}$ to 100kHz $I_{out} = 10\text{mA}$		12		μV_{rms}	

Note:

1. The **Load regulation** is measured by using pulse techniques with the duty cycle $< 5\%$
2. The **Reference voltage** nominal value of the adjustable version is 1.27V

TEST CIRCUITS

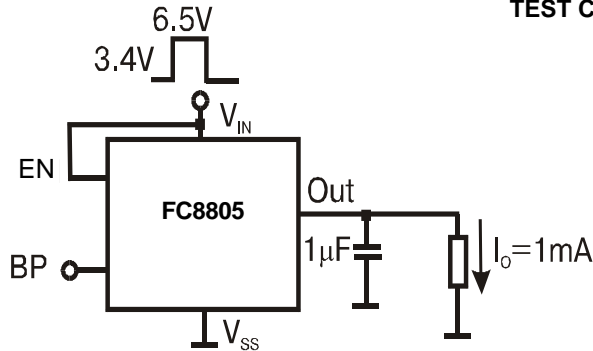


Fig.1. Line regulation

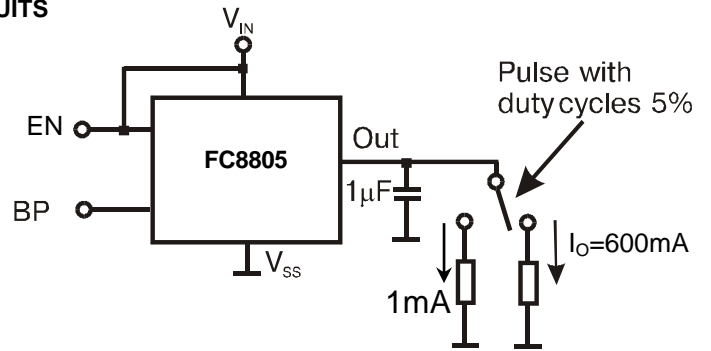


Fig.2. Load regulation

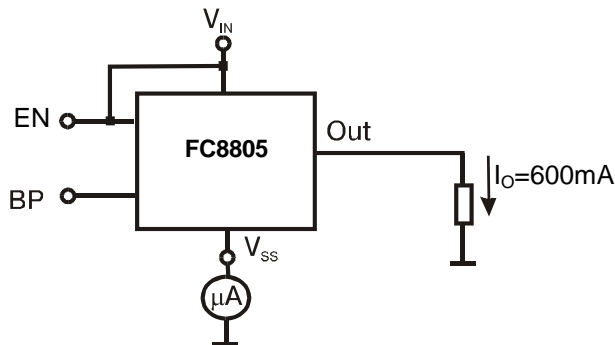
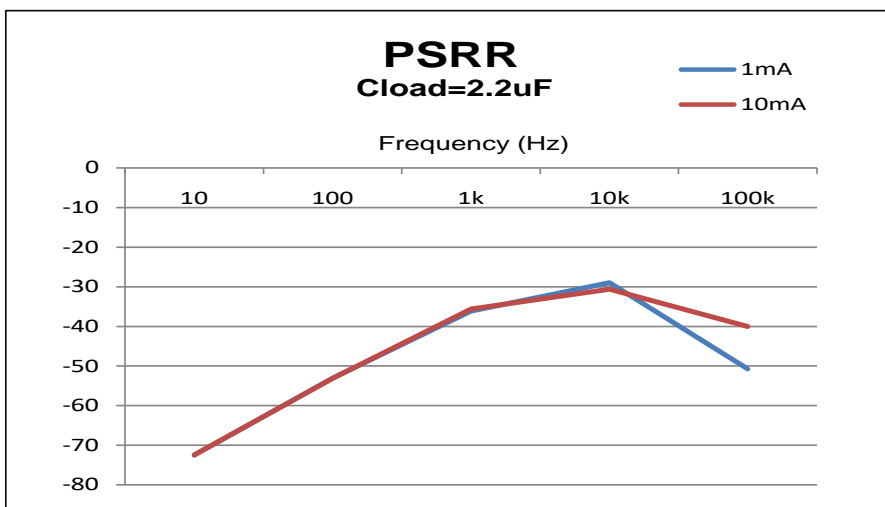
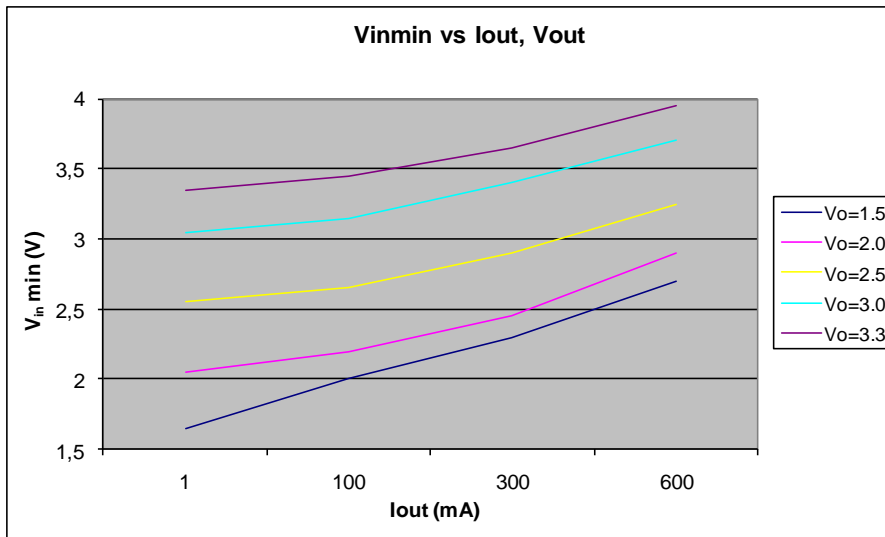
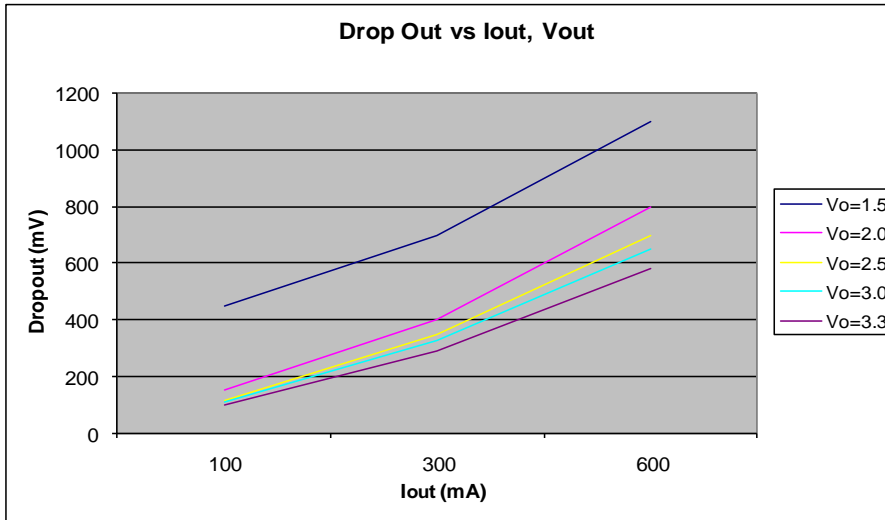
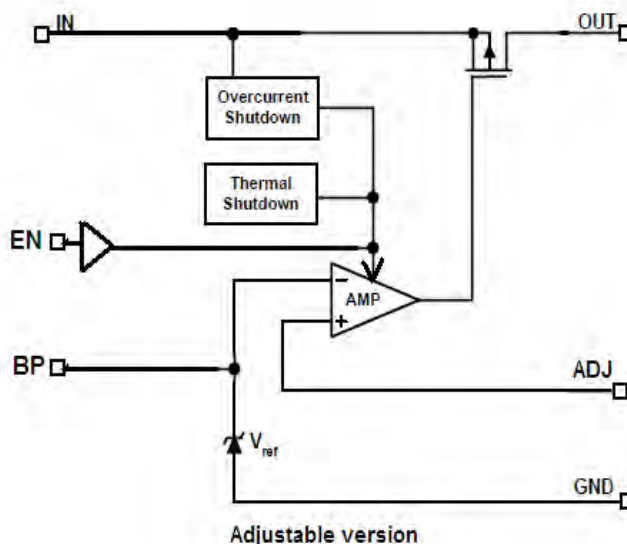
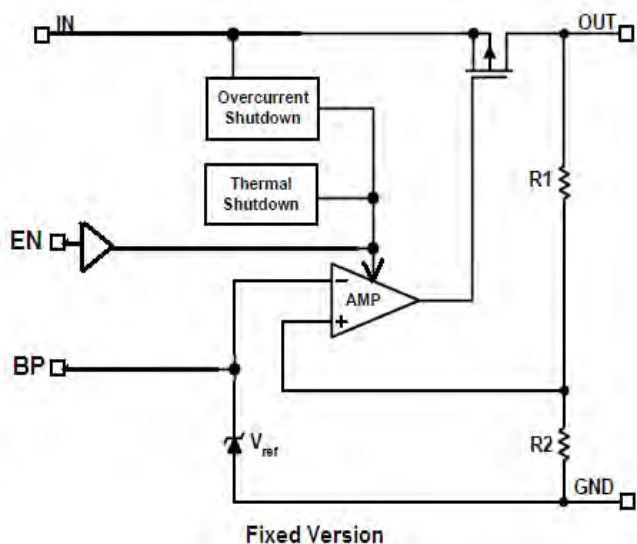


Fig.3. Ground current

TYPICAL CHARACTERISTICS



FUNCTIONAL BLOCK DIAGRAM



ORDERING INFORMATION

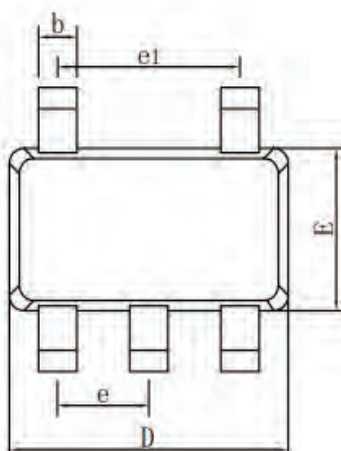
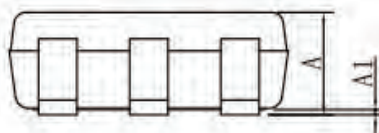
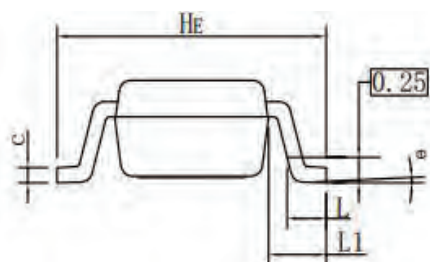
Designator	Description
a	Output Voltage eg. 30=3.0V 50=5.0V
b	Output Voltage Accuracy 2 = ±2.0% 3 = ±3.0%
c	Package Type N = SOT-25 P = SOT-89 T = TO-92
d	Device Orientation R = Embossed Tape (Orientation of Device : Right) L = Embossed Tape (Orientation of Device : Left) B = Bag (TO-92) H = Paper Tape (TO-92)
G	G = Lead Free Part

FC8805- X X X X X G

 a b c d

SOT-25: FC8805-XXXNRG
 SOT-89: FC8805-XXXPRG
 SOT-223: FC8805-XXXTRG

SOT-25 PACKAGE OUTLINE DIMENSIONS

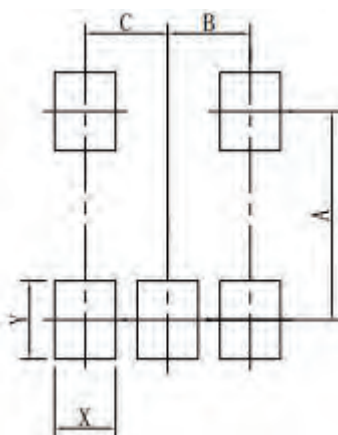


DIM	MIN	NOR	MAX
A	0.90	1.00	1.10
A1	0.01	0.06	0.10
b	0.30	0.40	0.50
c	0.10	0.17	0.20
D	2.80	2.90	3.00
E	1.50	1.60	1.70
e	0.85	0.95	1.05
e1	1.80	1.90	2.00
L	0.20	0.40	0.60
L1	0.60REF		
He	2.60	2.80	3.00
θ	0°	-	10°

GENERAL NOTES

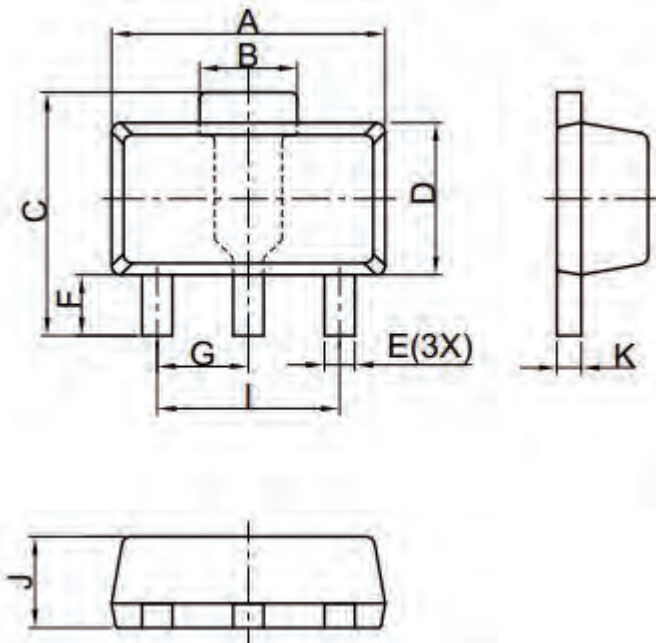
- 1.Top package surface finish Ra0.4±0.2um
- 2.Bottom package surface finish Ra0.7±0.2um
- 3.Side package surface finish Ra0.4±0.2um

SOLDERING FOOTPRINT



DIM	(mm)
X	0.70
Y	0.90
A	2.40
B	0.95
C	0.95

SOT-89 PACKAGE OUTLINE DIMENSIONS

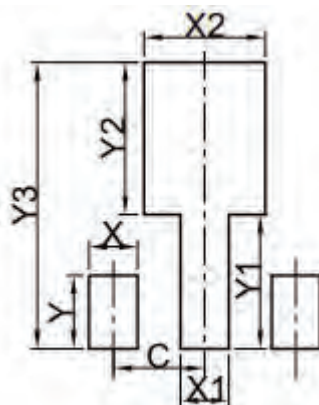


DIM	MIN	NOR	MAX
A	4.40	4.50	4.60
B	1.40	1.60	1.80
C	3.90	4.00	4.25
D		2.50	2.60
E		0.50	0.58
F	0.90	1.00	1.20
G	1.50 BSC		
I	3.00 BSC		
J	1.40	1.50	1.60
K	0.34	0.40	0.50
All Dimensions in mm			

GENERAL NOTES

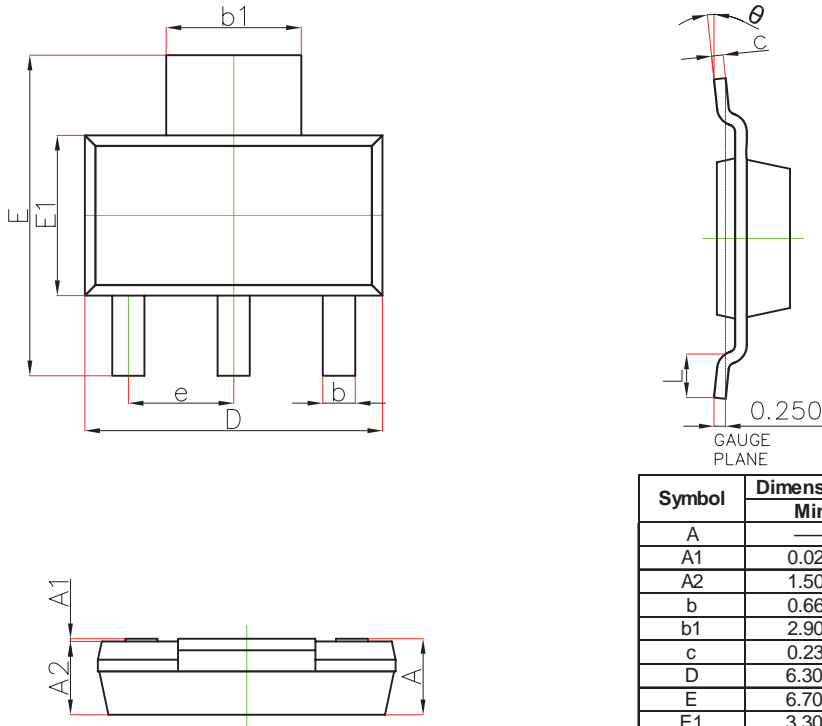
1. Top package surface finish $Ra0.4\pm0.2\mu m$
2. Bottom package surface finish $Ra0.7\pm0.2\mu m$
3. Side package surface finish $Ra0.4\pm0.2\mu m$
4. Protrusion or Gate Burrs shall not exceed 0.10mm per side.

SOLDERING FOOTPRINT



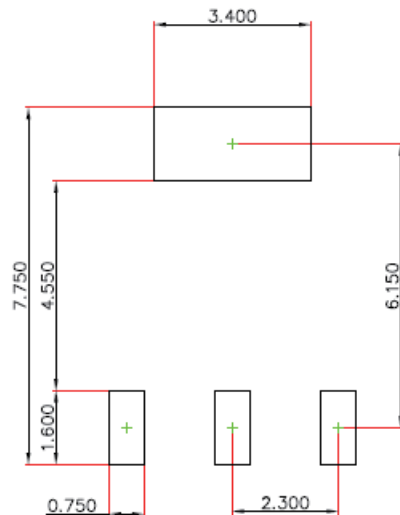
DIM	(mm)
X	0.80
Y	1.20
X1	0.80
Y1	2.20
X2	2.00
Y2	2.50
C	1.50
Y3	4.70

SOT-223 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	—	1.800	—	0.071
A1	0.020	0.100	0.001	0.004
A2	1.500	1.700	0.059	0.067
b	0.660	0.840	0.026	0.033
b_1	2.900	3.100	0.114	0.122
c	0.230	0.350	0.009	0.014
D	6.300	6.700	0.248	0.264
E	6.700	7.300	0.264	0.287
E_1	3.300	3.700	0.130	0.146
e	2.300(BSC)		0.091(BSC)	
L	0.750	—	0.030	—
θ	0°	10°	0°	10°

SOLDERING FOOTPRINT



Note:

1. Controlling dimension: in millimeters.
2. General tolerance: ± 0.050 mm.
3. The pad layout is for reference purposes only.