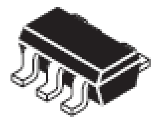
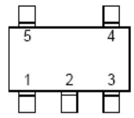
FEATURES

- Extremely Low Supply Current(50μA,Typ.)
- Very Low Dropout Voltage
- 150mA Output Current
- High Output Voltage Accuracy +/- 1.4 %
- Standard or Custom Output Voltages
- Over Currentand Over Temperature Protection
- Small input/output differential : 0.165V at 150mA

SOT-23-5L(SOT-25)





1.Vin 2.Gnd 3.$\overline{SHDN}$ 4.Bypass 5.Vout

ORDERING INFORMATION

Device	Marking	Package
LM1185 SF5	HAXX	SOT-25

(Note : "XX" is Output Voltage for SOT-25 Pkg, 1.5V=HA15, 1.8V=HA18….3.3V=HA33)

APPLICATIONS

- Battery Operated Systems
- Portable Computers
- Portable Cameras and Video Recorders
- Medical Instruments
- Instrumentation
- Cellular/GSM/PHS Phones
- Linear Post-Regulators for SMPS
- Pagers

DESCRIPTION

The LM1185 series is a low-dropout linear regulators.
There are devices designed specifically for battery-operated Systems. Ground current is very small (2μA - Typ), that significantly extending battery life.
Low power consumption and high accuracy is achieved through CMOS and programmable fuse technologies. Output voltage: 1.5V to 6.0V.
The LM1185 consists of a high-precision voltage reference, an error correction circuit, and a current limited output driver. With good transient responses, output remains stable even during load changes.
The SHDN input enables the output to be turned off, resulting in reduced power consumption. Also, the LM1185 having high ripple rejection ratios, the series can be used with power supply noise. A 470pF capacitor from the Bypass input to ground reduces noise present on the internal reference, which in turn significantly reduces output noise.
If output noise is not a concern, this input may be left unconnected. Larger capacitor values Cbp be used, but results in a longer time period to rated output voltage when power is initially applied. The LM1185 incorporates both over-temperature and over-current protection. SOT23-5 (300mW) and SOT-89-5 (500mW) packages are available.

ABSOLUTE MAXIMUM RATING (Note 1)

Supply Voltage (Vin)	+6.5V
Output Current (Iout)	150 mA
Output Voltage (Vout)	Vss-0.3 to Vin+0.3V
Total Power Dissipation (Pd) SOT-23-5L	300 mW
SOT-89-5L	500 mW
Operating Ambient Temperature (Topr)	-30 ~ +80 °C
Lead Temperature (soldering, 5 sec)	260°C
Storage Temperature (Tstg)	-40 ~ +125 °C

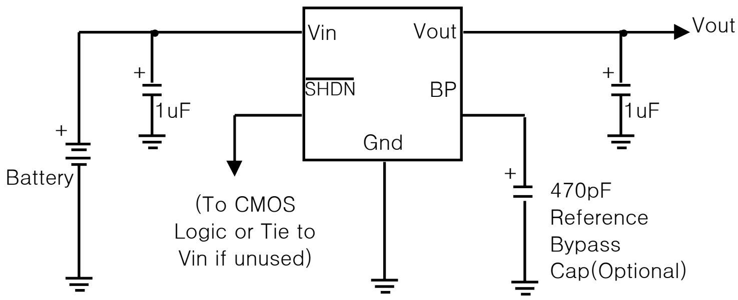
ELECTRICAL CHARACTERISTICS

(at Ta = 25℃, VIN = Vout+0.5V, unless otherwise noted)

Parameter	Symbol	Condition	Limit			Units
			Min	Typ	Max	
Output Voltage Accuracy	Vout	Io=1mA	-1.5%	1	1.5%	V
		Io=0.1~150 mA		1.5%		
Line Reguration	ΔVout/ΔVin	Io=1mA, (Vout+0.1V)<Vin<6.5V		0.15	0.35	%/V
Load Reguration(Note.1)	ΔVout/ΔIo	Vin=6V, 1mA<Io<120 mA, Cout=1uF		0.01	0.05	%/mA
Maximum Output Current	Io	Vin=5V, Vout >0.96VRATING	150			mA
Current Limit	ICL		160	500		mA
Ground Current	IGND	Io=0~300 mA		2	5	µA
Dropout Voltage for Vout>2.5	Vdrop	Io=150 mA		165	250	mV
for 2.0V<Vout<2.5V				220	350	
for Vout<2.0V				330	500	
Shutdown Exit Delay		CBP=0µF Cout=1µF Io=100mA		450	800	µs
Shutdown Input Bias Current		V_{SHDN}=Vin		200	400	nA
Shutdown Supply Current		V_{SHDN}=Gnd		600	1100	µA
Shutdown Input Threshold Low		Vin=2.5 to 5.5V			0.4	V
Shutdown Input Threshold High		Vin=2.5 to 5.5V	2			V

Note : Load Regulation is measured using pulse techniques with duty cycle < 5%

Typical Application Circuit



Detail Description

1. Output Capacitor

1uF(min) capacitor from VOUT to Gnd is required.
The output capacitor hould have an effective series resistance greater than 0.1 Ω and less than .0Ω.
1uF capacitor should be connected from VIN to GND if there is more than 10 inche sofwire between the regulator and the AC filter capacitor ,or if a battery is used as the power source. Aluminum electrolytic or tantalum capacitor types can be used. (Since many aluminum electrolytic capacitors freeze at approximately -30°C, solid tantalums are recommended for applications operating below -25°C.)
When operating from sources other than batteries,supply-noise rejection and transient response can be improved by increasing the value of the input and output capacitors and employing passive filtering techniques.

2. Bypass Input

470pF capacitor connected from the Bypass input to ground reduces noise present on the internal reference,which in turn significantly reduces output noise. If output noise is not aconcern, this input maybe left unconnected. Larger capacitor values maybe used,but results in alonger time period to rated output voltage when power is initially applied.

3. THERMAL CONSIDERATIONS

3.1 Thermal Shutdown

Integrated thermal protection circuitry shuts the regulator off when die temperature exceeds150°C. The regulator remains off until the die temperature drops to approxi mately 140°C.

3.2 Power Dissipation

The amount of power the regulator dissipate is primarily a function of input and output voltage, and output current. The following equation is used to calculate worst case actual power dissipation:

EQUATION 3-1:

$$P_D \approx (V_{INMAX} - V_{OUTMIN}) I_{LOADMAX}$$

Where:

P_D = Worst case actual power dissipation
V_{INMAX} = Maximum voltage on V_{IN}
V_{OUTMIN} = Minimum regulator output voltage
$I_{LOADMAX}$ = Maximum output (load) current

The maximum allowable power dissipation (Equation 3-2) is a function of the maximum ambient temperature(T_{AMAX}), the maximum allowable die temperature(T_{JMAX}) and the thermal resistance from junction-to-air(θ_{JA}).

EQUATION 3-2:

$$P_{DMAX} = \frac{(T_{JMAX} - T_{AMAX})}{\theta_{JA}}$$

Where all terms are previously defined.

Equation 3-1 can be used in conjunction with Equation 4-2 to ensure regulator thermal operation is within limits.Forexample:

Given:

V_{INMAX} = 3.0V +10%
V_{OUTMIN} = 2.7V – 2.5%
$I_{LOADMAX}$ = 40mA
T_{JMAX} = 125°C
T_{AMAX} = 55°C

Find: 1. Actual power dissipation
2. Maximum allowable dissipation

Actual power dissipation:

$$P_D \approx (V_{INMAX} - V_{OUTMIN}) I_{LOADMAX}$$
$$= [(3.0 \times 1.1) - (2.7 \times .975)]40 \times 10^{-3}$$
$$= 26.7\text{mW}$$

Maximum allowable power dissipation:

$$P_{DMAX} = \frac{(T_{JMAX} - T_{AMAX})}{\theta_{JA}}$$
$$= \frac{(125 - 55)}{220}$$
$$= 318\text{mW}$$

3.3 Layout Considerations :

The primary path of heat conduction out of the package is via the package leads. Therefore,layouts having a ground plane,wide traces at the pads,and wide power supply bus lines combine to lower θ_{JA} and therefore increase the maximum allow able power dissipation limit.