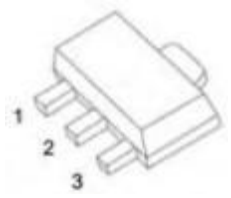
36V Low Current Consumption 250mA CMOS Voltage Regulators

ZS75XX

INTRODUCTION

The ZS75XX series are a group of positive voltage regulators manufactured by CMOS technologies with low power consumption and low dropout voltage, which provide large output currents even when the difference of the input- output voltage is small. The ZS75 XX series can deliver 250mA output current and allow an input voltage as high as 36V. The series are very suitable for the battery- powered equipments, such as RF applications and other systems requiring a quiet voltage

SOT-89-3L



1.GND
2.IN
3.OUT

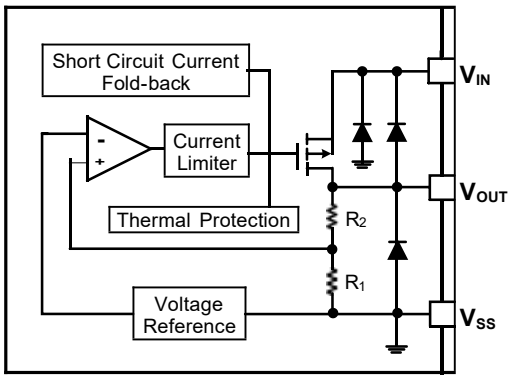
FEATURES

- Low Quiescent Current: 2μA
- Operating Voltage Range: 2.5V～36V
- Output Current: 250mA
- Low Dropout Voltage:
  700mV@100mA(V_{OUT}=3.3V)
- Output Voltage: 2.1~ 5.0V
- High Accuracy: ±2%/±1%(Typ.)
- High Power Supply Rejection Ratio:
  70dB@1kHz
- Low Output Noise:
  27xV_{OUT} μV_{RMS}(10Hz~100kHz)
- Excellent Line and Load Transient Response
- Built-in Current Limiter,
  Short-Circuit Protection
- Over-Temperature Protection
- Stable with Ceramic or Tantalum Capacitor

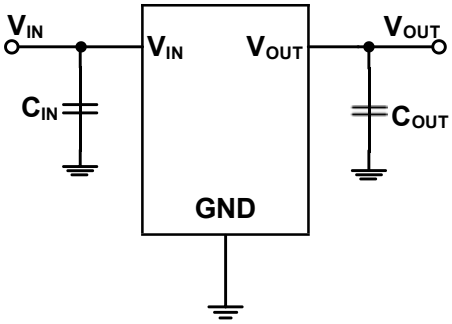
APPLICATIONS

- Cordless Phones
- Radio control systems
- Laptop, Palmtops and PDAs
- Single-lens reflex DSC
- PC peripherals with memory
- Wireless Communication Equipments
- Portable Audio Video Equipments
- Car Navigation Systems
- LAN Cards
- Ultra Low Power Microcontrollers

BLOCK DIAGRAM



TYPICAL APPLICATION CIRCUIT



For ZS75XX series, input and output capacitors are required to achieve stability and help the equipment obtain better transient response and PSRR. It is recommended to use 1μF input and 1μF output capacitors.

Electrical Characteristics

ABSOLUTE MAXIMUM RATINGS

(Unless otherwise specified, T_A=25℃)

PARAMETER	SYMBOL	RATINGS	UNITS
Input Voltage(2)	V_{IN}	-0.3~40	V
Output Voltage(2)	V_{OUT}	-0.3~13	V
Power Dissipation	P_D	0.6	W
Operating Ambient Temperature Range	T_A	-40~+85	°C
Operating Junction Temperature Range(3)	T_j	-40~+125	°C
Storage Temperature	T_{stg}	-40~+125	°C
Lead Temperature(Soldering, 10 sec)	T_{solder}	260	°C

(1) Stresses beyond those listed under *absolute maximum ratings may* cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under *recommended operating conditions* is not implied. Exposure to absolute-maximum-rated conditions for extended periods my affect device reliability.

(2) All voltages are with respect to network ground terminal.

(3) This IC includes over temperature protection that is intended to protect the device during momentary overload. Junction temperature will exceed 125°C when over temperature protection is active. Continuous operation above the specified maximum operating junction temperature may impair device reliability.

RECOMMENDED OPERATING CONDITIONS

PARAMETER	MIN.	NOM.	MAX.	UNITS
Supply voltage at V_{IN}	2.5		36	V
Operating junction temperature range, T_j	-40		125	°C
Operating free air temperature range, T_A	-40		85	°C

ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	CONDITIONS		MIN.	TYP.(4)	MAX.	UNITS
Input Voltage	V_{IN}			2.5	–	36	V
Output Voltage Range	V_{OUT}			2.1	–	5.0	V
DC Output Accuracy		I_{OUT}=10mA		-2	–	2	%
				-1	–	1	%
Dropout Voltage	V_{dif}(5)	I_{OUT} =100mA,V_{OUT}=3.3V		–	700	–	mV
Supply Current	I_{SS}	I_{OUT}=0A		–	2	5	μA
Line Regulation	$\frac{\Delta V_{OUT}}{V_{OUT} \times \Delta V_{IN}}$	I_{OUT} =10mA V_{OUT} +1V≤V_{IN}≤36V		–	0.01	0.3	%/V
Load Regulation	ΔV_{OUT}	V_{IN}= V_{OUT} +2V, 1mA≤I_{OUT}≤100mA		–	10	–	mV
Temperature Coefficient	$\frac{\Delta V_{OUT}}{V_{OUT} \times \Delta T_A}$	I_{OUT}=40mA, -40°C<T_A<85°C			50		ppm
Output Current Limit	I_{LIM}	V_{OUT}= 0.5 x $V_{OUT(Normal)}$			350		mA
Short Current	I_{SHORT}	V_{OUT} =V_{SS}		–	25	–	mA
Power Supply Rejection Ratio	PSRR	I_{OUT}=50mA	100Hz		80		dB
			1kHz	–	70	–	
			10kHz	–	60	–	
			100kHz	–	50	–	

Electrical Characteristics

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.(4)	MAX.	UNITS
Output Noise Voltage	V_{ON}	BW=10Hz to 100kHz	–	27 x V_{OUT}	–	μV_{RMS}
Thermal Shutdown Temperature	T_{SD}	I_{LOAD} = 30mA	–	160	–	°C
Thermal Shutdown Hysteresis	$\triangle T_{SD}$	——	–	20	–	°C

(4) Typical numbers are at 25°C and represent the most likely norm.

(5)V_{dif}：The Difference Of Output Voltage And Input Voltage When Input Voltage Is Decreased Gradually Till Output Voltage Equals To 98% Of V_{OUT} (E).

APPLICATION INFORMATION

Selection of Input/ Output Capacitors

In general, all the capacitors need to below leakage. Any leakage the capacitors have will reduce efficiency, increase the quiescent current.

A recent trend in the design of portable devices has been to use ceramic capacitors to filter DC-DC converter inputs. Ceramic capacitors are often chosen because of their small size, low equivalent series resistance (ESR) and high RMS current capability. Also, recently, designers have been looking to ceramic capacitors due to shortages of tantalum capacitors.

Unfortunately, using ceramic capacitors for input filtering can cause problems. Applying a voltage step to a ceramic capacitor causes a large current surge that stores energy in the inductances of the power leads. A large voltage spike is created when the stored energy is transferred from these inductances into the ceramic capacitor. These voltage spikes can easily be twice the amplitude of the input voltage step.

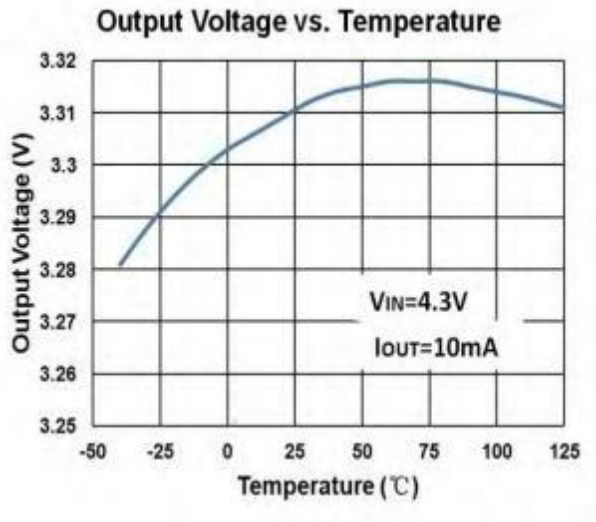
Many types of capacitors can be used for input bypassing, however, caution must be exercised when using multilayer ceramic capacitors (MLCC). Because of the self-resonant and high Q characteristics of some types of ceramic capacitors, high voltage transients can be generated under some start-up conditions, such as connecting the LDO input to a live power source. Adding a 3Ω res istor in series with an X5R ceramic capacitor will minimize start-up voltage transients.

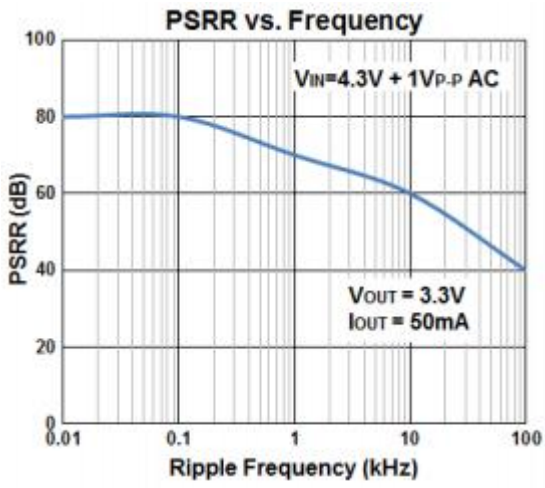
The LDO also requires an output capacitor for loop stability. Connect a 1μF tantalum capacitor from OUT to GND close to the pins. For improved transient response, this output capacitor may be ceramic.

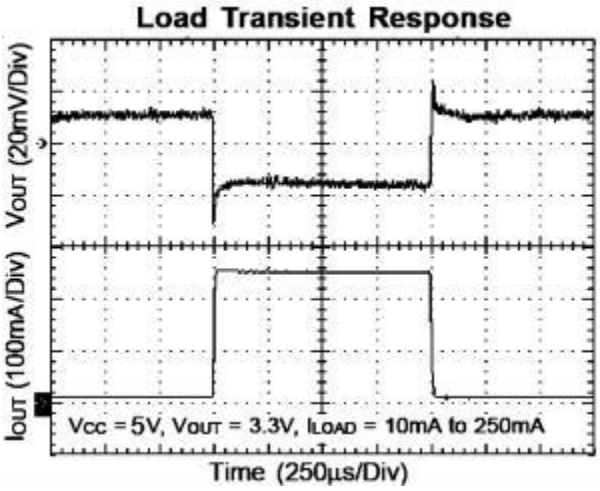
MODEL DEFINITION INFORMATION

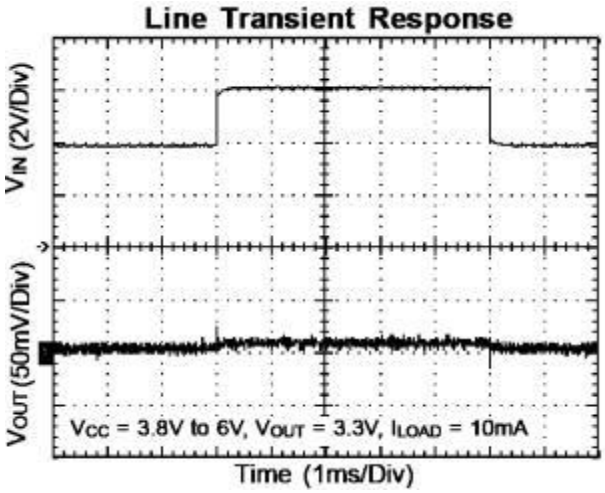
Model	Output Voltage
ZS7521	2.1V
ZS7523	2.3V
ZS7525	2.5V
ZS7527	2.7V
ZS7530	3.0V
ZS7533	3.3V
ZS7536	3.6V
ZS7540	4.0V
ZS7544	4.4V
ZS7550	5.0V

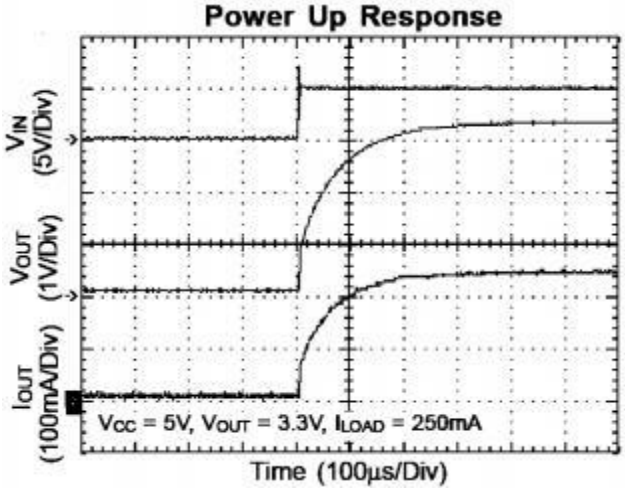
Typical Characteristics

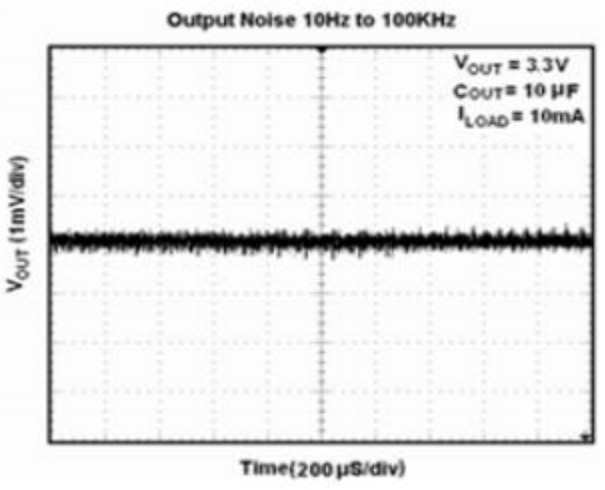




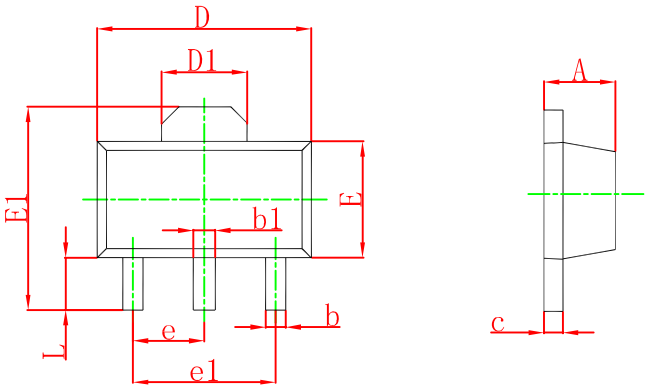






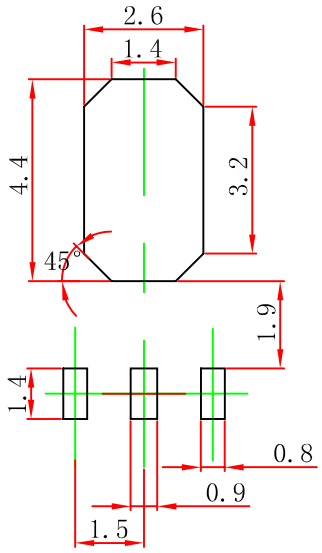


SOT-89-3L Package Outline Dimensions



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	0.197
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

SOT-89-3L Suggested Pad Layout



Note:
1.Controlling dimension:In millimeters.
2.General tolerance:±0.05mm.
3.The pad layout is for reference purposes only.

DISCLAIMER

IMPORTANT NOTICE, PLEASE READ CAREFULLY

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