



YOUSHANG SEMICONDUCTOR

设计研发新型功率器件

各类小信号开关

中低压及高压大电流等场效应管

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Description

The NK-AZ2117 is a low dropout three-terminal regulator.

The NK-AZ2117 has been optimized for low voltage where transient response and minimum input voltage are critical. It provides current limit and thermal shutdown. Its circuit includes a trimmed bandgap reference to assure output voltage accuracy to be within $\pm 1\%$. On-chip thermal shutdown provides protection against a combination of high current and ambient temperature that would create excessive junction temperature.

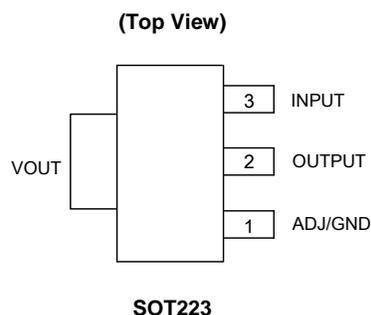
The NK-AZ2117 is available in ADJ output voltage version. It is available in an adjustable version which can set the output voltage with two external resistors.

The NK-AZ2117 is available in the industry-standard SOT223 Series power packages.

Features

- Current Limit: 1.35A (Typ)
- Output Noise from 10Hz to 10kHz: 0.003% of V_{OUT}
- PSRR at $I_{OUT} = 300mA$ and $f = 120Hz$: 60dB
- Output Voltage Accuracy: $\pm 1\%$
- On-chip Thermal Shutdown
- Maximum Quiescent Current: $I_{QMAX} = 1mA$
- Compatible with Low ESR Ceramic Capacitor
- Operation Junction Temperature: $-40^{\circ}C$ to $+125^{\circ}C$

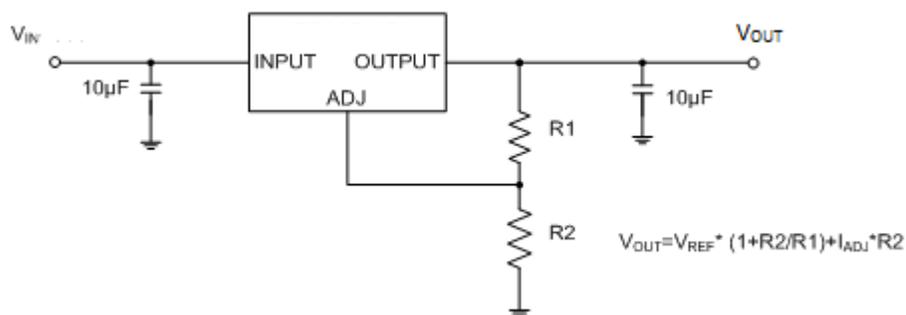
Pin Assignments



Applications

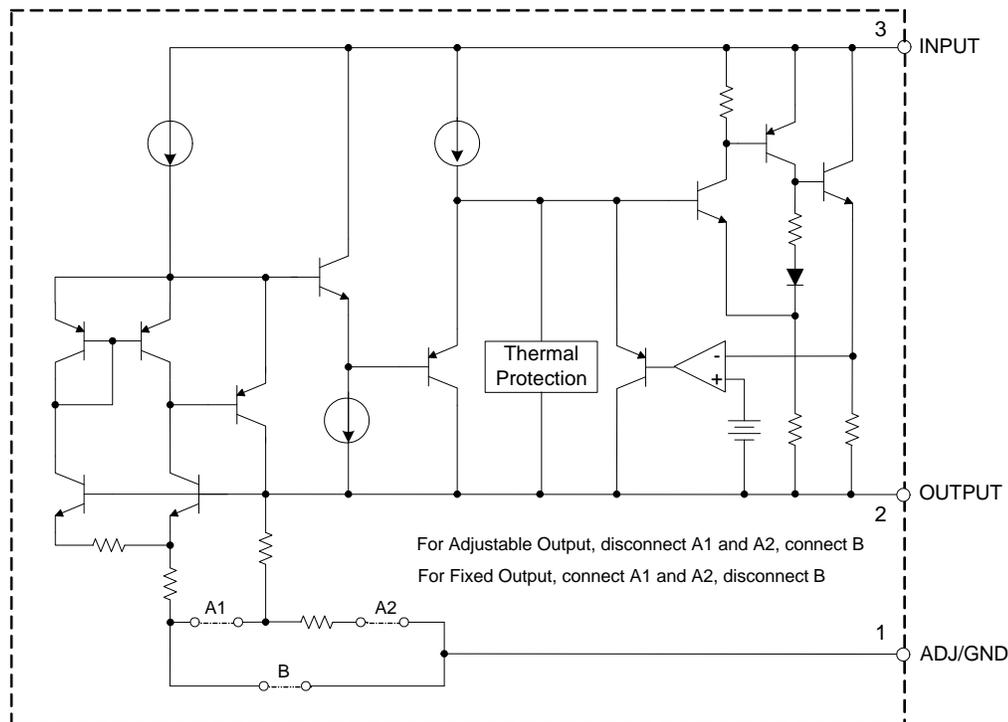
- USB Device
- Add-on Card
- DVD Player
- PC Motherboard

Typical Applications Circuit (Note 4)



Note 4: The NK-AZ2117 is compatible with low ESR ceramic capacitor. The ESR of the output capacitors must be less than 20Ω . A minimum of $1\mu F$ output capacitor is required.

Functional Block Diagram



Absolute Maximum Ratings (Note 5)

Symbol	Parameter	Rating		Unit
V_{IN}	Input Voltage	18		V
T_J	Operating Junction Temperature Range	+150		°C
T_{STG}	Storage Temperature Range	-65 to +150		°C
θ_{JA}	Thermal Resistance (Without Heatsink)	SOT223	125	°C/W
θ_{JA}	Thermal Resistance (With Heatsink) (Note 6)	SOT223	100	°C/W
T_{LEAD}	Lead Temperature (Soldering, 10sec)	+260		°C

Notes: 5. Stresses greater than 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 Ratings" for extended periods may affect device reliability.

6. Chip is soldered to 100mm²(10mm*10mm) copper (top side solder mask) on 2oz.2 layers FR-4 PCB with 8*0.5mm vias.

Recommended Operating Conditions

Symbol	Parameter	Min	Max	Unit
V_{IN}	Input Voltage	—	15	V
T_J	Operating Junction Temperature Range	-40	+125	°C

Electrical Characteristics

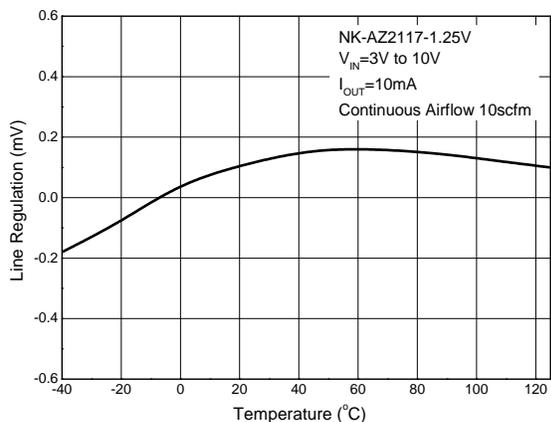
(Operating Conditions: $V_{IN} \leq 10V$, $I_{OUT} = 10mA$, $T_J = +25^\circ C$, unless otherwise specified. ($P \leq$ maximum power dissipation). Limits appearing in **Boldface** type apply over the entire junction temperature range for operation, $-40^\circ C$ to $+125^\circ C$.)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
V_{REF}	Reference Voltage	$V_{OUT}+1.75V \leq V_{IN} \leq 12V$, $I_{OUT} = 10mA$	1.238	1.250	1.262	V	
			98%*V_{OUT}	V_{OUT}	102%*V_{OUT}	V	
V_{DROP}	Dropout Voltage	$I_{OUT} = 1A$	—	1.3	1.5	V	
I_{LIMIT} (Note 7)	Maximum Output Current	$1.75V \leq V_{IN}-V_{OUT}$	1.25	1.35	1.5	A	
V_{RLOAD}	Load Regulation	$V_{IN} = V_{OUT}+1.75V$ $1mA \leq I_{OUT} \leq 1A$	—	0.2	0.6	%/A	
V_{RLINE}	Line Regulation	$1.75V \leq V_{IN}-V_{OUT} \leq 10V$, $I_{OUT} = 30mA$	—	0.001	0.04	%/V	
I_Q	Quiescent Current	$I_{OUT} = 0$	—	0.35	1	mA	
—	Minimum Load Current	For ADJ Version, $1.75V \leq V_{IN}-V_{OUT} \leq 10V$	—	0.3	1	mA	
I_{ADJ}	Adjustable Pin Current	—	—	7	10	μA	
—	Adjustable Pin Current Change	$1.75V \leq V_{IN}-V_{OUT} \leq 10V$	—	0.3	2	μA	
PSRR	Power Supply Rejection Ratio	Ripple 1.0 Vp-p $V_{IN} = V_{OUT}+2V$, $I_{OUT} = 100mA$	f = 120Hz	—	60	—	dB
			f = 1kHz	—	60	—	
$\frac{\Delta V_{OUT}}{V_{OUT}} / \Delta T$	Output Voltage Temperature Coefficient	$I_{OUT} = 30mA$	—	± 100	—	ppm/ $^\circ C$	
V_{NOISE}	RMS Output Noise	$10Hz \leq f \leq 100kHz$, No Load	—	0.003	—	%	
T_{OTSD}	Thermal Shutdown Temperature	—	—	+170	—	$^\circ C$	
T_{HYOTSD}	Thermal Shutdown Hysteresis	—	—	+20	—	$^\circ C$	
θ_{JC}	Thermal Resistance (Junction to Case)	SOT223	—	40	—	$^\circ C/W$	

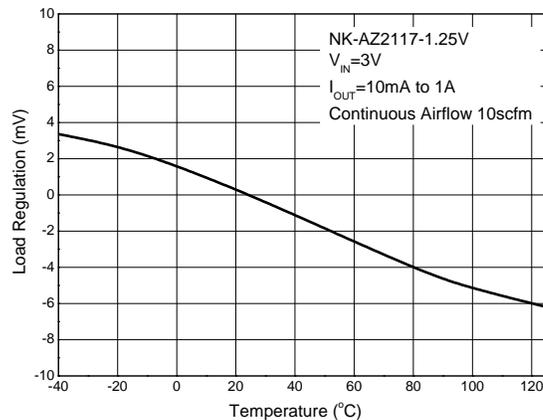
Note 7: Make the V_{OUT} down to about 98% of the test values, I_{OUT} value is set to I_{LIMIT} at this time.

Performance Characteristics

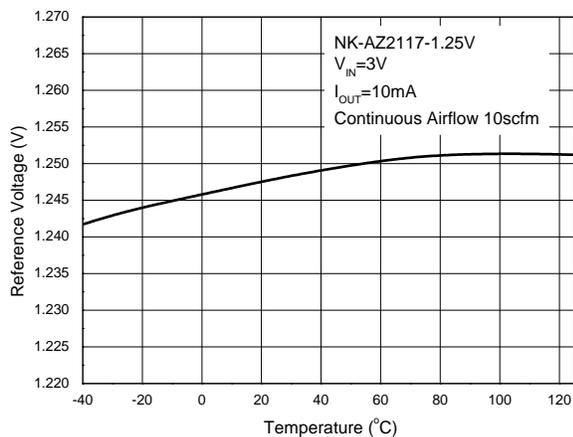
Line Regulation vs. Temperature



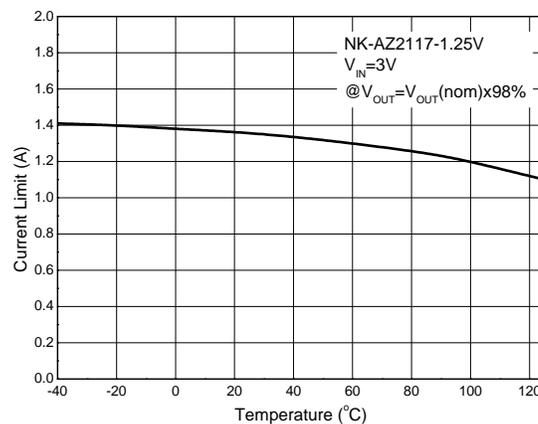
Load Regulation vs. Temperature



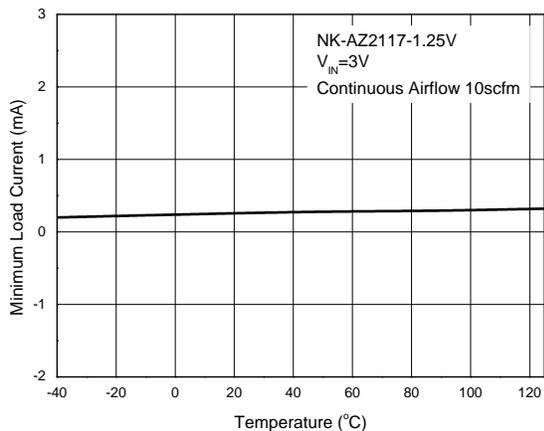
Reference Voltage vs. Temperature



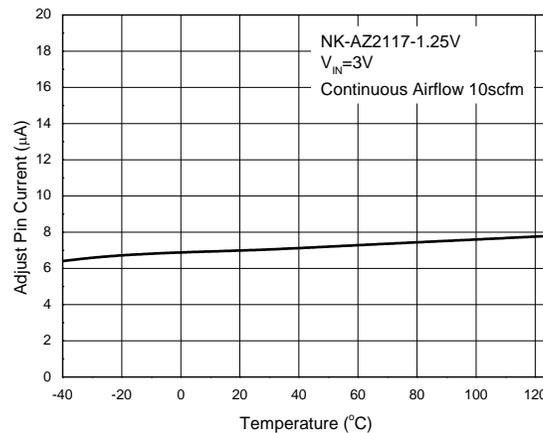
Current Limit vs. Temperature



Minimum Load Current vs. Temperature

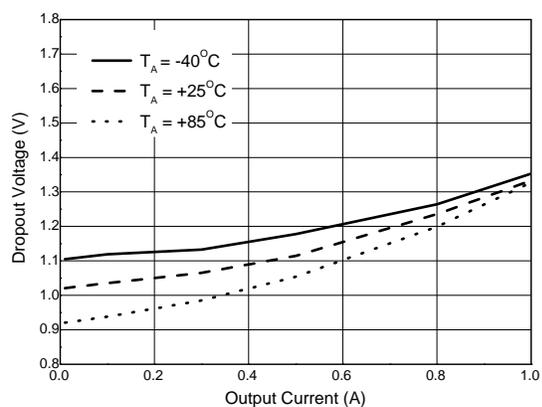


Adjust Pin Current vs. Temperature

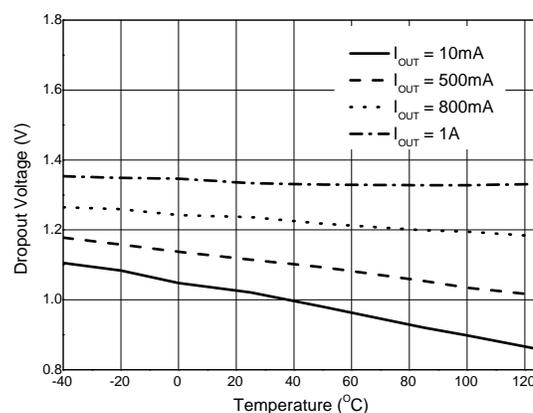


Performance Characteristics (Cont.)

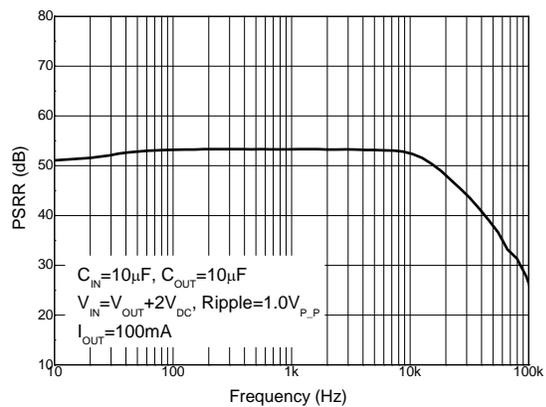
Dropout Voltage vs. Output Current



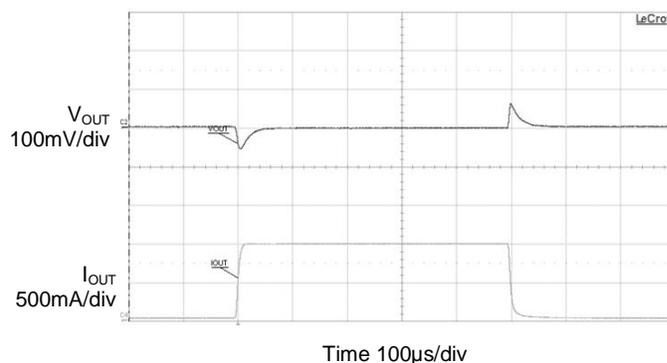
Dropout Voltage vs. Temperature



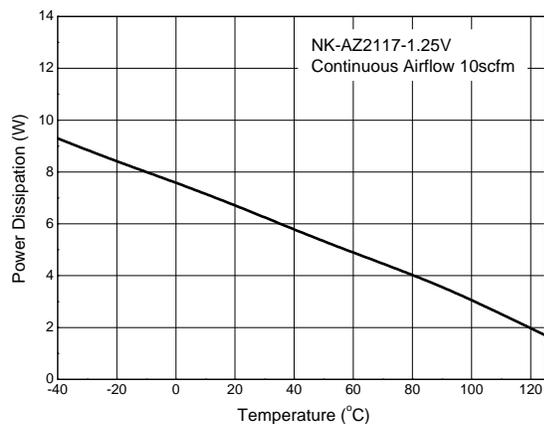
PSRR vs. Frequency



Load Transient Response

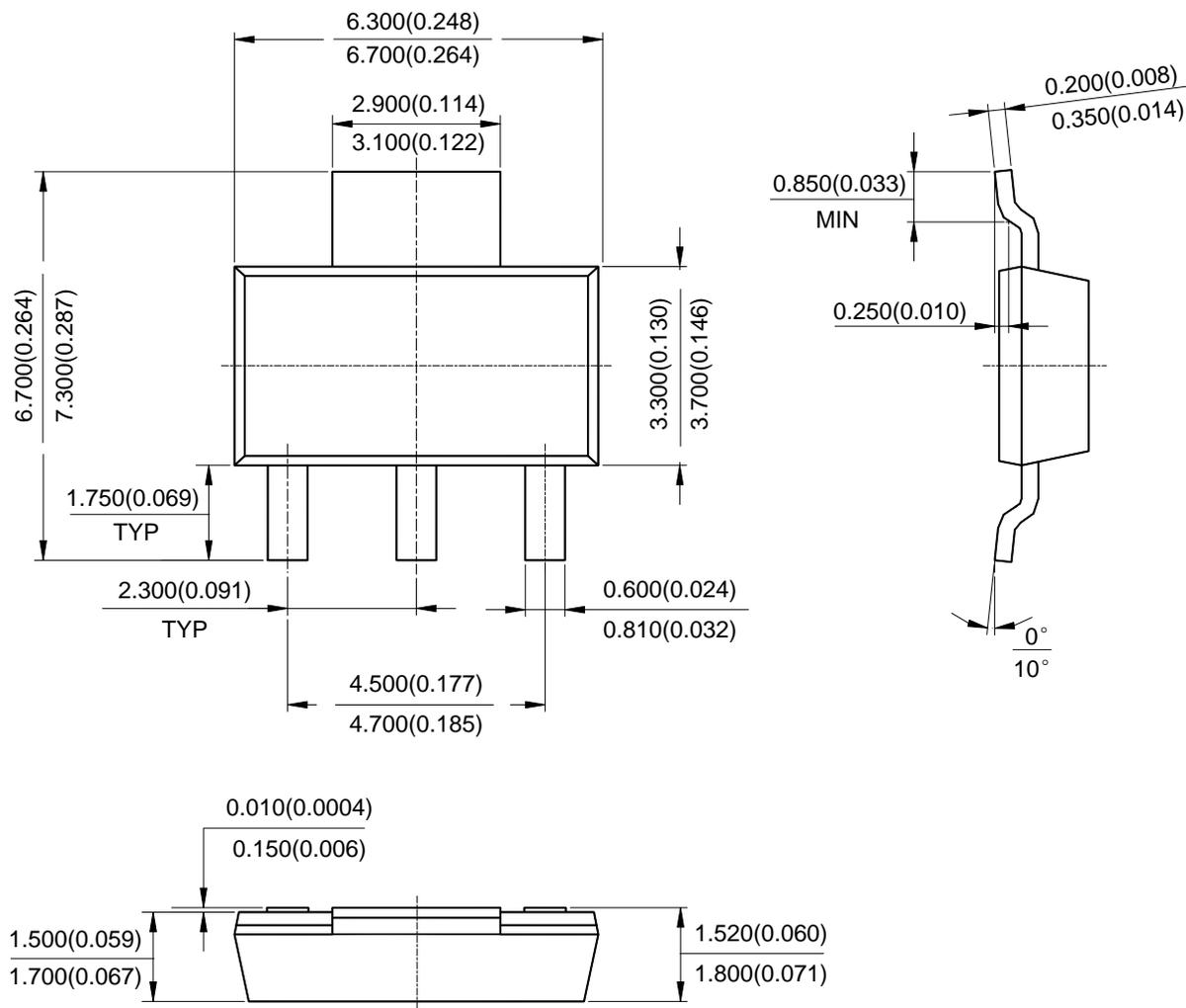


Power Dissipation vs. Temperature



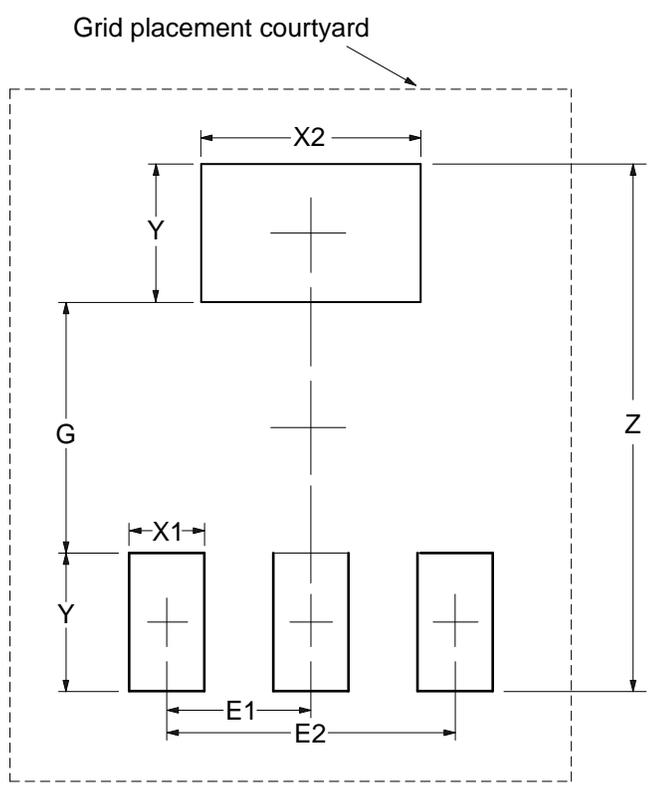
Package Outline Dimensions (All dimensions in mm (inch).)

(1) Package Type: SOT223



Suggested Pad Layout

(1) Package Type: SOT223



Dimensions	Z (mm)/(inch)	G (mm)/(inch)	X1 (mm)/(inch)	X2 (mm)/(inch)	Y (mm)/(inch)	E1 (mm)/(inch)	E2 (mm)/(inch)
Value	8.400/0.331	4.000/0.157	1.200/0.047	3.500/0.138	2.200/0.087	2.300/0.091	4.600/0.181