

General Description

The AHK1117 is a Positive Linear Regulator designed to deliver 1 amp. It features adjustable or fixed output voltages and excellent performance over line and load variations. The device is able to protect itself and the load from short circuit conditions with integrated current limiting circuitry. Thermal shutdown is activated to prevent damage under extreme conditions.

The AHK1117 is available in surface mount SOT-223 or TO-252 (DPAK), and through-hole TO-220 packages.

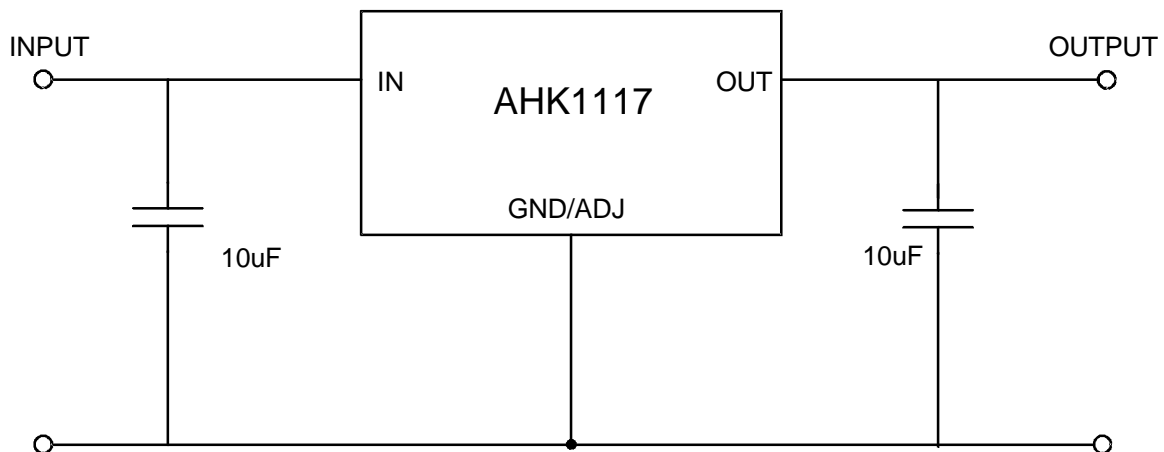
Features

- Guaranteed 1.2V max Dropout at max current
- Adjustable or Factory programmed output voltages
- Excellent performance over line, load
- Current limit protection
- Over-Temperature protection
- SOT-223, TO-252 (DPAK) and TO-220 packages

Applications

- Active SCSI Terminators
- High Efficiency Linear Regulators
- Post Regulators for Switching Supplies
- Battery Chargers
- 5V to 3.3V Linear Regulators

Typical Application



Absolute Maximum Ratings ($T_A=25^\circ\text{C}$ unless otherwise noted)

Symbol	Description	Max	Units
V_{IN}	Input Voltage	15	V
I_{OUT}	DC Output Current	$P_D/(V_{IN}-V_O)$	mA
T_J	Operating Junction Temperature Range	0 to 125	$^\circ\text{C}$
Θ_{JA}	Thermal Resistance (SOT-223)	150	$^\circ\text{C/W}$
Θ_{JA}	Thermal Resistance (TO-252)	80	$^\circ\text{C/W}$
Θ_{JA}	Thermal Resistance (TO-220)	60	$^\circ\text{C/W}$
P_D	Maximum Power Dissipation (SOT-223)	Internally Limited	mW
P_D	Maximum Power Dissipation (TO-252)		mW
P_D	Maximum Power Dissipation (SOT-220)		mW
T_{LEAD}	Maximum Soldering Temperature (at leads, 10 sec)	300	$^\circ\text{C}$

Note: Stresses above those listed in Absolute Maximum Ratings may cause permanent damage to the device. Functional operation at conditions other than the operating conditions specified is not implied. Only one Absolute Maximum rating should be applied at any one time.

Recommended Operating Conditions

Symbol	Description	Rating	Units
V_{IN}	Input Voltage	$V_{OUT}+1.2$ to 13.2	V
T	Ambient Temperature Range	-40 to +85	$^\circ\text{C}$

Electrical Characteristics AHK1117-ADJ ($T_J=25^\circ\text{C}$ unless otherwise noted)

Symbol	Description	Conditions	Min	Typ	Max	Units		
V_{REF}	Reference Voltage	$V_{IN} = 5V, I_{OUT} = 10mA$	$T_J=25^\circ\text{C}$	1.238	1.250	1.262	V	
			Full temp	1.225	1.250	1.275		
$\Delta V_{OUT}/V_{OUT}$	Line Regulation	$V_{IN} = 4.75 - 7V, I_{OUT} = 10mA$	$T_J=25^\circ\text{C}$			0.2	%	
			Full temp	$T_J=25^\circ\text{C}$				0.3
								0.4
$\Delta V_{OUT}/V_{OUT}$	Load Regulation	$V_{IN} = 5V, I_{OUT} = 10mA - 1A$	$T_J=25^\circ\text{C}$		0.05	0.3	%	
			Full temp		0.2	0.4		
V_{DO}	Dropout Voltage ¹	$I_{OUT} = 10mA - 1A, \Delta V_{OUT} = \pm 1\%$	Full temp		1.0	1.2	V	
I_{LIM}	Current Limit	$V_{IN} = 2.75 - 7V$	Full temp	1.0			A	
TC	Output Voltage Temp. Coeff.	$V_{IN} = 2.75 - 7V, I_{OUT} = 10mA - 1A$		0.005			$\%/^\circ\text{C}$	
$\Delta V/\Delta T$	Temperature Stability	$V_{IN} = 5V, I_{OUT} = 100mA$	Full temp	0.5			%	
I_{ADJ}	Adjust Pin Current	$V_{IN} = 2.75 - 7V, I_{OUT} = 10mA - 1A$	$T_J=25^\circ\text{C}$		55		μA	
			Full temp			90		
ΔI_{ADJ}	Adjust Pin Current Change	$V_{IN} = 2.75 - 7V, I_{OUT} = 10mA - 1A$	Full temp		0.2	5	μA	
I_{OUTMIN}	Minimum Load Current	$V_{IN} = 5V$		5	10		mA	
V_N	RMS Output Noise	$T_J = 25^\circ\text{C}$		0.003			$\%V_{OUT}$	
PSRR	Ripple Rejection Ratio	$V_{IN} = 5V, I_{OUT} = 1A$	Full temp	60	72		dB	

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1250 Oakmead Pkwy, Suite 310, Sunnyvale, CA 94086
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Electrical Characteristics AHK1117-3.3 (fixed)($T_J=25^\circ\text{C}$ unless otherwise noted)

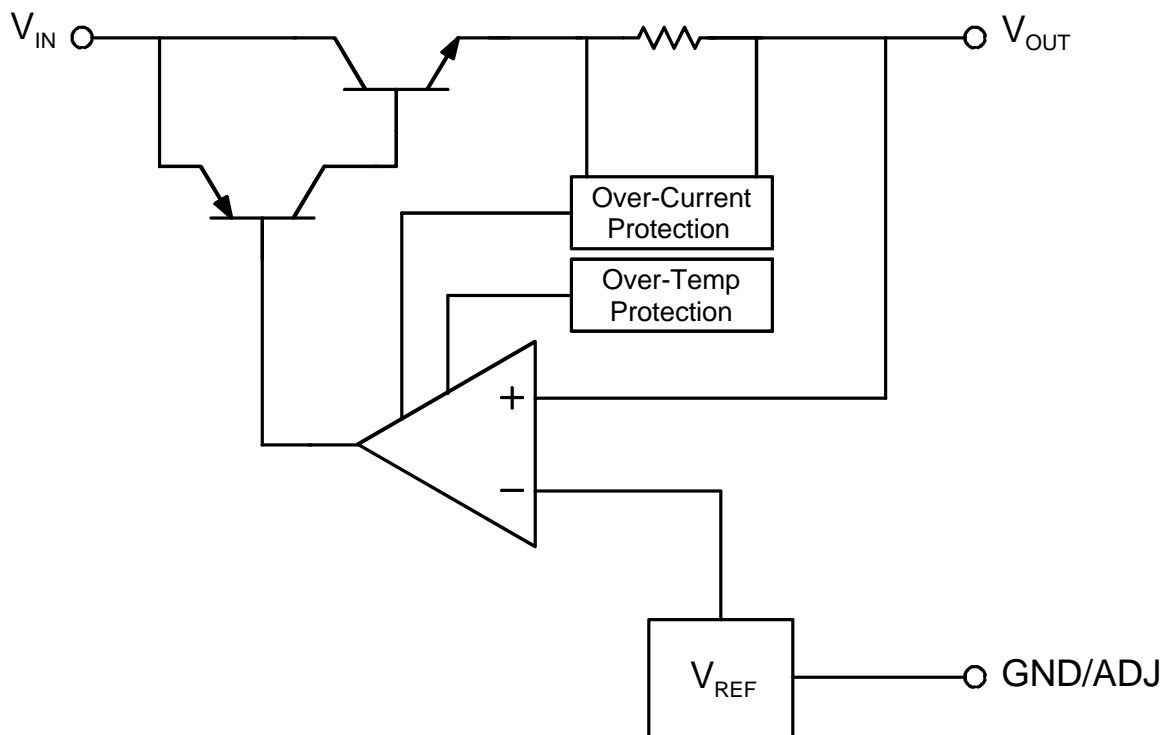
Symbol	Description	Conditions	Min	Typ	Max	Units	
V_{OUT}	Output Voltage	$V_{IN} = 5V, I_{OUT} = 0A$	$T_J=25^\circ\text{C}$	3.270	3.30	3.330	V
			Full temp	3.234	3.30	3.336	
$\Delta V_{OUT}/V_{OUT}$	Line Regulation	$V_{IN} = 4.75 - 7V,$ $I_{OUT} = 0A$	$T_J=25^\circ\text{C}$			0.2	%
			Full temp			0.4	
$\Delta V_{OUT}/V_{OUT}$	Load Regulation	$V_{IN} = 4.75 - 15V,$ $I_{OUT} = 0A$	$T_J=25^\circ\text{C}$			0.3	%
			Full temp			0.4	
$\Delta V_{OUT}/V_{OUT}$	Load Regulation	$V_{IN} = 5V,$ $I_{OUT} = 0A - 1A$	$T_J=25^\circ\text{C}$		0.05	0.3	%
			Full temp		0.2	0.4	
V_{DO}	Dropout Voltage ¹	$I_{OUT} = 0A - 1A, \Delta V_{OUT} = \pm 1\%,$ Full temp		1.0	1.2	V	
I_{LIM}	Current Limit	$V_{IN} = 4.75 - 7V, \text{ Full temp}$	1.0			A	
I_Q	Quiescent Current	$V_{IN} = 5V, I_{OUT} = 0-1A, \text{ Full temp}$		6	13	mA	
TC	Output Voltage Temp. Coeff.	$V_{IN} = 4.75 - 7V, I_{OUT} = 0 - 1A$		0.005		%/ $^\circ\text{C}$	
$\Delta V/\Delta T$	Temperature Stability	$V_{IN} = 5V, I_{OUT} = 100mA, \text{ Full temp}$		0.5		%	
V_N	RMS Output Noise	$T_J = 25^\circ\text{C}$		0.003		% V_{OUT}	
PSRR	Ripple Rejection Ratio	$V_{IN} = 5V, I_{OUT} = 1A, \text{ Full temp}$	60	72		dB	

Note 1: V_{DO} is defined as $V_{IN} - V_{OUT}$ when V_{OUT} is 98% of nominal.

Pin Descriptions

Pin #	Symbol	Function
1	GND/ADJ	For the fixed version of AHK1117, pin 1 is the ground connection. For the adjustable version, this pin is the ADJ pin. See detailed description for further information regarding configurations.
2	OUT	Output pin – should be decoupled with 10 μ F tantalum or greater output capacitor.
3	IN	Input pin - should be decoupled with 10 μ F tantalum or greater capacitor.

Functional Block Diagram



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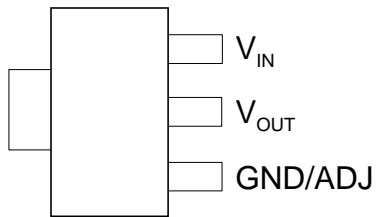
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 (408)524-9684 Fax (408)524-9689

Ordering Information

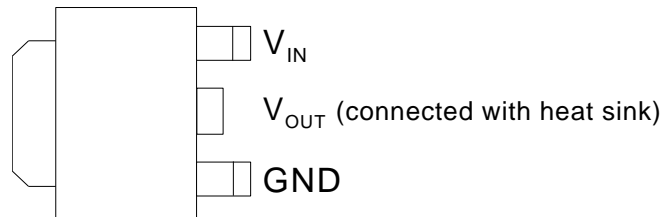
Output Voltage	Package	Marking	Part Number	
			Bulk	Tape and Reel
3.3V	SOT-223		AHK1117XMY-3.3-B1	AHK1117XMY-3.3-T1
3.3V	TO-252 (DPAK)		N/A	AHK1117XNY-3.3-T1
3.3V	TO-220		AHK1117XPY-3.3-B1	N/A
Adjustable	SOT-223		AHK1117XMY-ADJ- B1	AHK1117XMY-ADJ-T1
Adjustable	TO-252 (DPAK)		N/A	AHK1117XNY-ADJ-T1
Adjustable	TO-220		AHK1117XPY-ADJ-B1	N/A

Pin Configuration

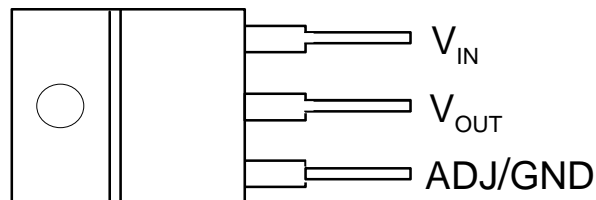
SOT-223
(Top View)



TO-252
(Top View)

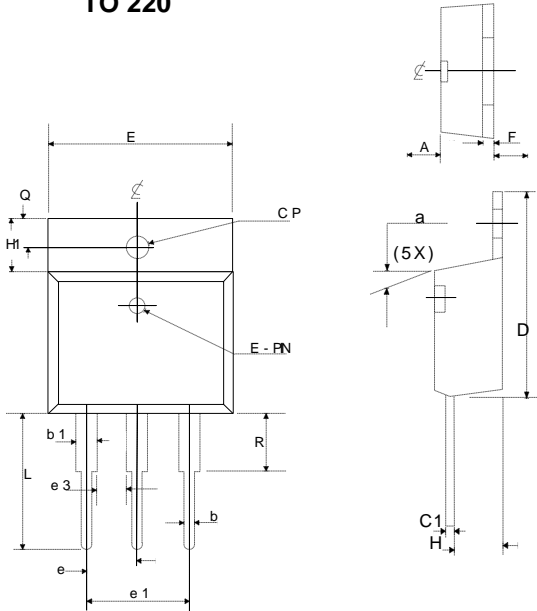


TO-220
(Top View)



Package Information

TO 220

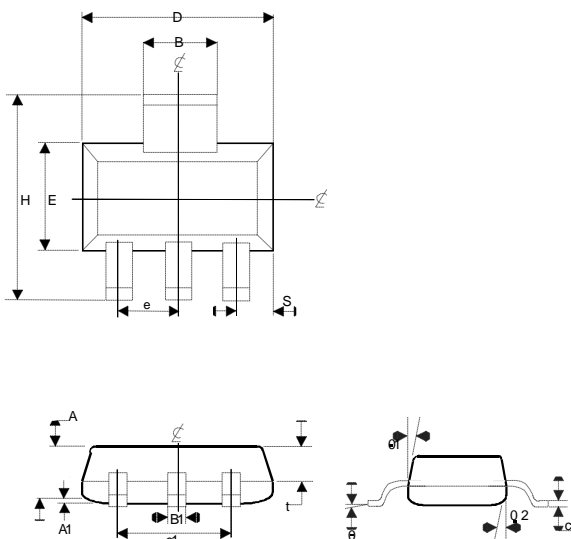


	Millimeters		Inches	
	Min	Max	Min	Max
A	4.06	4.83	0.160	0.190
b	0.63	1.02	0.025	0.040
C1	0.38	0.56	0.015	0.022
D	14.22	14.99	0.560	0.590
E	9.78	10.54	0.385	0.415
e	2.29	2.79	0.090	0.110
e1	4.83	5.33	0.190	0.210
e3	1.14	1.40	0.045	0.055
F	1.14	1.40	0.045	0.055
H1	5.94	6.55	0.234	0.258
K	2.29	2.92	0.090	0.115
CP	3.71	3.96	0.146	0.156
Q	2.62	2.87	0.103	0.113
L	13.16	13.79	0.518	0.543
a	3°	7°	3°	7°
b1	1.14	1.52	0.045	0.060
R	6.17 REF		0.243 REF	

Note:

1. Dimension C1 apply for TIN plate finish.
2. For solder DIP lead finish dimension, C1 should be 0.015"~0.027" (0.38mm~0.69mm)

SOT 223



Dim	Millimeters		Inches	
	Min	Max	Min	Max
A	1.50	4.83	0.060	0.067
A1	0.02	1.02	0.001	0.004
B	2.95	0.56	0.116	0.124
B1	0.65	14.99	0.026	0.033
C	0.25	10.54	0.100	0.014
D	6.30	2.79	0.248	0.264
e	2.30 TYP		0.0905 TYP	
e1	4.60 TYP		0.181 TYP	
E	3.30	1.40	0.130	0.146
H	6.70	6.55	0.264	0.287
S	0.85	2.92	0.033	0.041
t	1.10	3.96	0.043	0.051
θ	10° MAX		10° MAX	
θ1	10	16°	10°	16°
θ2	10	16°	10°	16°

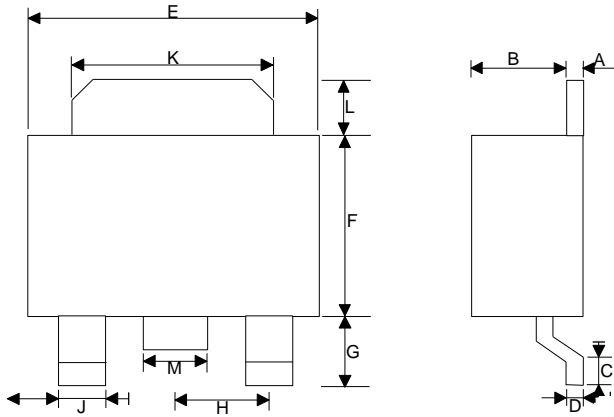
Note:

1. Package outline exclusive of any mold flashes dimension.
2. Package outline exclusive of burr dimension.

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TO - 252 (D P A K)



Dim	Millimeters		Inches	
	Min	Max	Min	Max
A	0.45	0.55	0.0177	0.0217
B	1.65	1.95	0.0650	0.0768
C	0.90	1.50	0.0354	0.0591
D	0.45	0.60	0.0177	0.0236
E	6.40	6.80	0.2520	0.2677
F	5.40	5.80	0.2126	0.2283
G	2.20	2.85	0.0866	0.1122
H	0.00	*2.30	0.0000	*0.0906
I	0.00	0.90	0.0000	0.0354
J	0.00	0.80	0.0000	0.0315
K	5.20	5.50	0.2047	0.2165
L	1.20	1.60	0.0472	0.0630

Note:

1. Controlling dimension: Millimeters.
2. Maximum lead thickness includes lead finish thickness; minimum lead thickness is the minimum thickness of base material.