

General Description:

The uP1117AH/AR series are low dropout three-terminal regulators optimized for low voltage where transient response and minimum input voltage are critical. The device provides current-limit and thermal shutdown features. Its circuit includes a trimmed bandgap reference to assure output voltage accuracy of 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 uP1117AH is available in fixed output voltage versions of 3.3V, 5.0V, and an adjustable output voltage version which can set the output voltage with two external resistors. The uP1117AR is available in fixed output voltage version of 3.3V and 5.0V.

The uP1117AH is available in the industry-standard SOT223 package, and uP1117AR is SOT-89.

Features:

- Rated Output Current: 1A
- Current Limit: 1.3A
- Output Noise from 10Hz to 10kHz: 0.003% of V_{OUT}
- PSRR at $I_{OUT}=300mA$ and $f=120Hz$: 70 dB
- Output Voltage Accuracy: $\pm 1\%$
- On-chip Thermal Shutdown
- Maximum Quiescent Current: $I_{QMAX}=5mA$
- No External Components
- Compatible with Low ESR Ceramic Capacitor
- Operation Junction Temperature: -40 to 125 °C
- Totally Lead-free and fully ROHS compliant (Note 1&2)

Applications:

- USB devices
- TV and Monitors
- Add-on cards
- Mother Boards

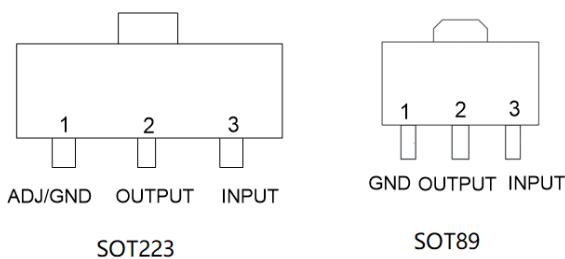


Fig 1.SOT223/SOT89 Package of uP1117A

Ordering Information

Device Name	Package	Mark ID	Voltage Tolerance	Operating Free-Air Temperature (TA)
μP1117AH-ADJ	SOT223	GHA	1%	-40°C to 125°C
μP1117AH-3.3	SOT223	GH3	1%	
μP1117AH-5.0	SOT223	GH5	1%	
μP1117AR-3.3	SOT89	GR3	1%	
μP1117AR-5.0	SOT89	GR5	1%	

Typical Applications

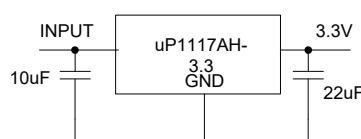


Figure 2, Typical Application Circuit 1

$$V_{ADJ} = V_{REF} \times (1 + R2/R1) + I_{ADJ} \times R2$$

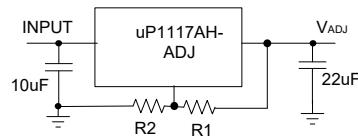
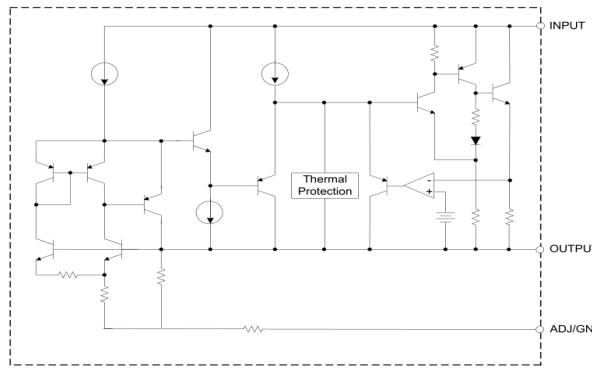


Figure 3, Typical Application Circuit 2

Functional Block Diagram:Figure 4. Functional Block Diagram of μ P1117**Absolute Maximum Ratings(Note1)**

(Operation temperature range applies unless otherwise specified.)

Parameter	Symbol	Range	Unit
Input Voltage	V_{IN}	20	V
Operating Junction Temperature	T_J	150	°C
Lead Temperature (Soldering, 10sec)	T_{LEAD}	260	°C
Storage Temperature Range	T_{STG}	-65 to 150	°C
Thermal resistance(without heatsink), SOT223	θ_{JA}	125	°C/W
Thermal resistance(with heatsink), SOT223	θ_{JA}	100	°C/W
Thermal resistance(with heatsink), SOT89	θ_{JA}	150	°C/W
ESD rating, human body mode	HBM	3000	V
ESD rating, machine mode	MM	300	V

Note: 1. Absolute maximum ratings indicate stresses beyond which may cause permanent damage to the device.

Recommended Operation Ratings:

Parameter	Symbol	Min.	Max.	Unit
Input voltage	V_{IN}		18	V
Operating junction Temperature	T_J	-40	125	°C

Electrical Characteristics,uP1117AH/AR-3.3 (Test conditions: $V_{IN} \leq 10V$, $I_O = 10mA$, $T_J = 25^{\circ}C$ unless otherwise noted.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	25 °C	3.267	3.3	3.333	V
		-20~125 °C	3.235	3.3	3.365	
Line Regulation	V_{Rline}	1.5V ≤ $V_{IN} - V_O \leq 10V$	-	0.5	6	mV
		1.5V ≤ $V_{IN} - V_O \leq 10V$, -20~125 °C	-	-	10	
Load Regulation	V_{Rload}	10mA ≤ $I_O \leq 1A$	-	2	15	mV
Quiescent Current	I_Q	-		3.5	5	mA
Current Limit	I_{LIMIT}	-	1	1.1	-	A
Ripple Rejection	PSRR	f=120Hz, $I_O = 0.3A$, $V_{IN} - V_O = 3V$, $C_{OUT} = 22\mu F$	-	70	-	dB
Dropout Voltage	V_{DROP}	Δ $V_O = 1\%$, $I_O = 1A$	-	1.2	1.3	V
RMS output noise (% of V_O)	N_O	10Hz ≤ f ≤ 10kHz	-	0.003	-	%
Temperature Stability		-	-	0.5	-	%
Thermal Shutdown	θ_{JTS}		-	160	-	°C
Thermal Shutdown Hysteresis	-		-	16	-	°C
Thermal Resistance	θ_{JC}		-	15	-	°C/W

Electrical Characteristics,uP1117AH/AR-5.0 (Test conditions: $V_{IN} \leq 10V$, $I_O = 10mA$, $T_J = 25^{\circ}C$ unless otherwise noted.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	1.5V ≤ $V_{IN} - V_O \leq 10V$	4.950	5.0	5.050	V
		1.5V ≤ $V_{IN} - V_O \leq 10V$, -20~125 °C	4.900	5.0	5.100	
Line Regulation	V_{Rline}	1.5V ≤ $V_{IN} - V_O \leq 10V$, 25 °C	-	0.5	6	mV
		1.5V ≤ $V_{IN} - V_O \leq 10V$, -20~125 °C	-	-	10	
Load Regulation	V_{Rload}	10mA ≤ $I_O \leq 1A$	-	2	15	mV
Quiescent Current	I_Q	-		3.5	6	mA
Current Limit	I_{LIMIT}	-	1	1.35	-	A
Ripple Rejection	PSRR	f=120Hz, $I_O = 0.3A$, $V_{IN} - V_O = 3V$, $C_{OUT} = 22\mu F$	-	70	-	dB
Dropout Voltage	V_{DROP}	Δ $V_O = 1\%$, $I_O = 1A$	-	1.2	1.3	V
RMS output noise (% of V_O)	N_O	10Hz ≤ f ≤ 10kHz	-	0.003	-	%
Temperature Stability		-	-	0.5	-	%
Thermal Shutdown	θ_{JTS}		-	160	-	°C
Thermal Shutdown Hysteresis	-		-	16	-	°C
Thermal Resistance	θ_{JC}		-	15	-	°C/W

Electrical Characteristics,uP1117AH-ADJ (Test conditions: $V_{IN} = V_O + 2V$, $I_O = 10mA$, $T_J = 25^{\circ}C$ unless otherwise noted.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Reference Voltage	V_{REF}	1.5V ≤ $V_{IN} - V_O \leq 10V$	1.238	1.250	1.262	V
		1.5V ≤ $V_{IN} - V_O \leq 10V$, -20~125 °C	1.225	1.250	1.270	
Line Regulation	V_{Rline}	1.5V ≤ $V_{IN} - V_O \leq 10V$, 25 °C	-	0.001	0.1	%
		1.5V ≤ $V_{IN} - V_O \leq 10V$, -20~125 °C	-	-	0.2	
Load Regulation	V_{Rload}	10mA ≤ $I_O \leq 1A$	-	0.4	1	%
Adjust Pin Current	I_{ADJ}		-	60	120	uA
Adjust Pin Current Change	Δ I_{ADJ}	1.5V ≤ $V_{IN} - V_O \leq 10V$	-	0.2	0.5	uA
Minimum Load Current	I_{MIN}	1.5V ≤ $V_{IN} - V_O \leq 10V$	-	1.7	5	mA
Current Limit	I_{LIMIT}	-	1	1.35	-	A
Ripple Rejection	PSRR	f=120Hz, $I_O = 0.3A$, $V_{IN} - V_O = 3V$, $C_{OUT} = 22\mu F$	-	70	-	dB
Dropout Voltage	V_{DROP}	Δ $V_O = 1\%$, $I_O = 1A$	-	1.2	1.3	V
RMS output noise (% of V_O)	N_O	10Hz ≤ f ≤ 10kHz	-	0.003	-	%
Temperature Stability		-	-	0.5	-	%
Thermal Shutdown	θ_{JTS}		-	160	-	°C
Thermal Shutdown Hysteresis	-		-	16	-	°C
Thermal Resistance	θ_{JC}		-	15	-	°C/W

uP1117AH/AR

Low Dropout Linear Regulators



Note 2, 0.01 μ F minimum load capacitance is recommended to limit high frequency noise.

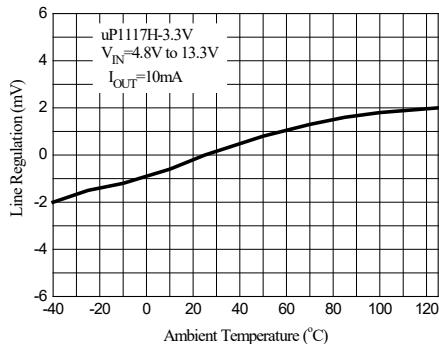


Figure 5, Line Regulation vs. Ambient Temperature

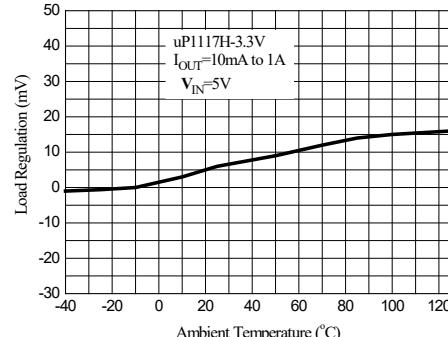


Figure 6, Load Regulation vs. Ambient Temperature

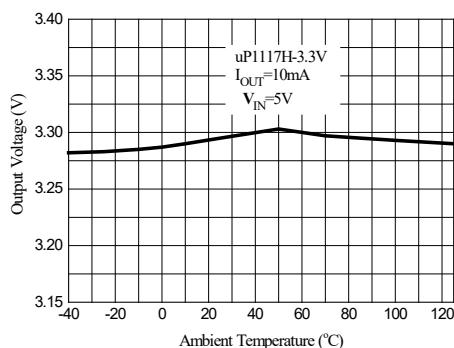


Figure 7, Output Voltage vs. Ambient Temperature

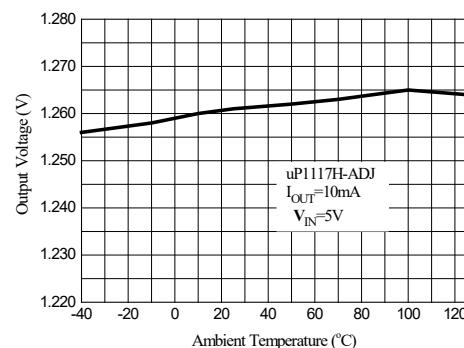


Figure 8, Reference Voltage vs. Ambient Temperature

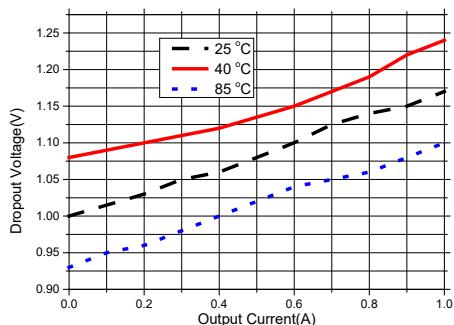


Figure 9, Output voltage vs Output Current(A)

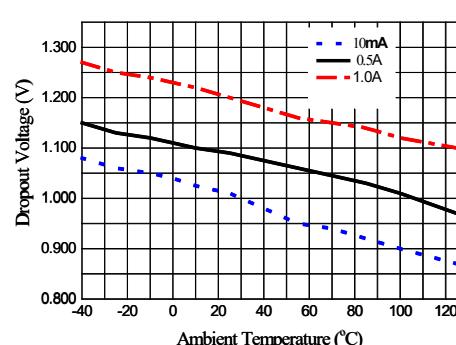


Figure 10, Dropout Voltage vs. Ambient Temperature

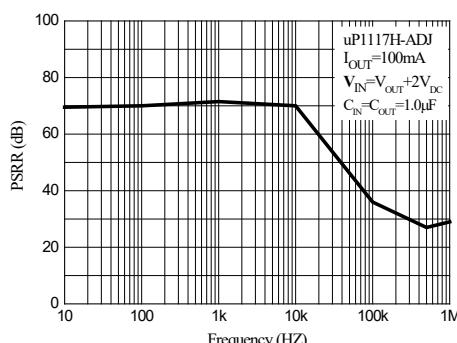


Figure 11, PSRR vs. Frequency

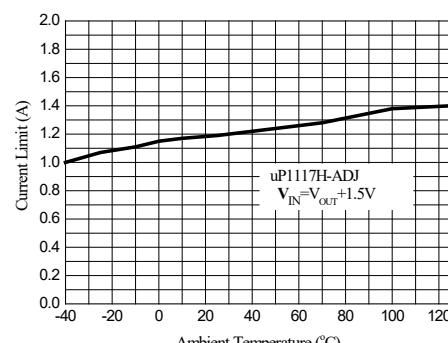
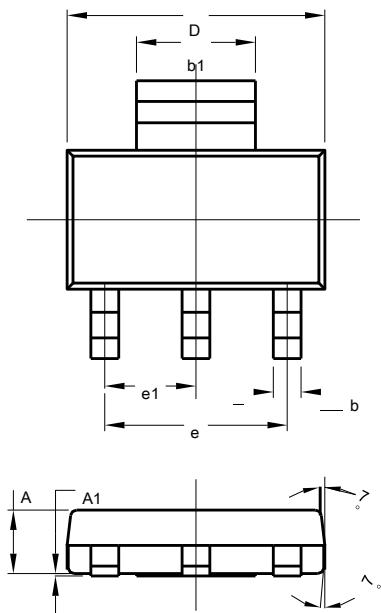


Figure 12, Current Limit vs. Ambient Temperature

Package Outline



SOT223			
Dim	Min	Max	Typ
A	1.55	1.65	1.60
A1	0.010	0.15	0.05
b	0.60	0.80	0.70
b1	2.90	3.10	3.00
C	0.20	0.30	0.25
D	6.45	6.55	6.50
E	3.45	3.55	3.50
E1	6.90	7.10	7.00
e	-	-	4.60
e1	-	-	2.30
L	0.85	1.05	0.95
Q	0.84	0.94	0.89

All Dimensions in mm

SOT-89

