UMW LD1117

1A LDO Voltage Regulator

1.Description

The LD1117 is a positive low voltage dropout regulator; typical voltage dropout is only 1.2V at 1A. LD1117 provides two versions: fixed and adjustable versions.The output accuracy of the adjustable voltage version is 1.5%.The output accuracy of the fixed voltage version is 2%.The LD1117 offers some key features include thermal shutdown and current limiting. It is suitable for all electronic products.

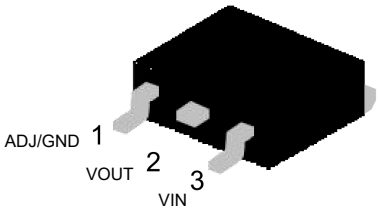
2.Features

- The output accuracy of fixed versions 1.2V,1.5V, 1.8V,2.5V,3.3V, and 5.0V is 2%,and the output accuracy of adjustable versions is 1.5%
- Adjustable output voltage
- Low Dropout Voltage: Typical 1.2V@1A
- Current Limiting
- Thermal Shutdown
- Temperature Range: -40°C to 125°C

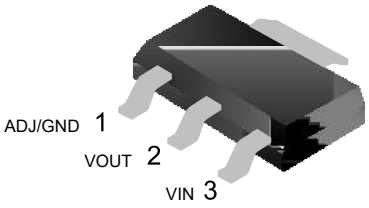
3.Applications

- Laptop, Palmtop, and Notebook Computers
- Battery Charger
- SCSI-II Active Terminator
- Cellular Phone
- Cordless Telephones
- Battery Powered Systems
- Portable Instrumentation
- SMPS Post-Regulator

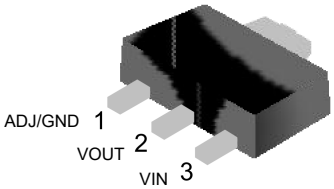
4.Pinning information



TO-252

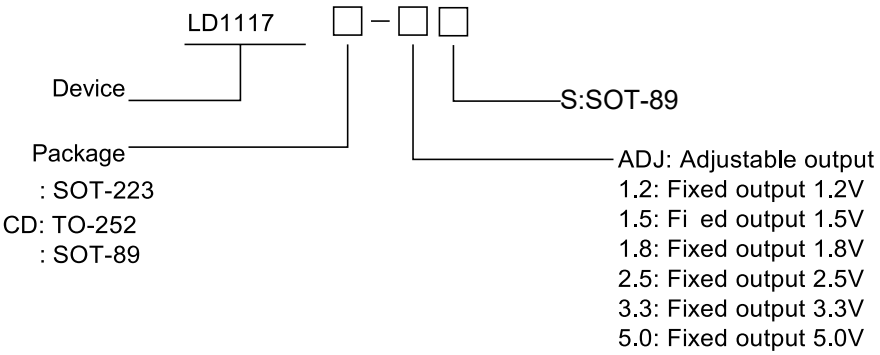


SOT-223

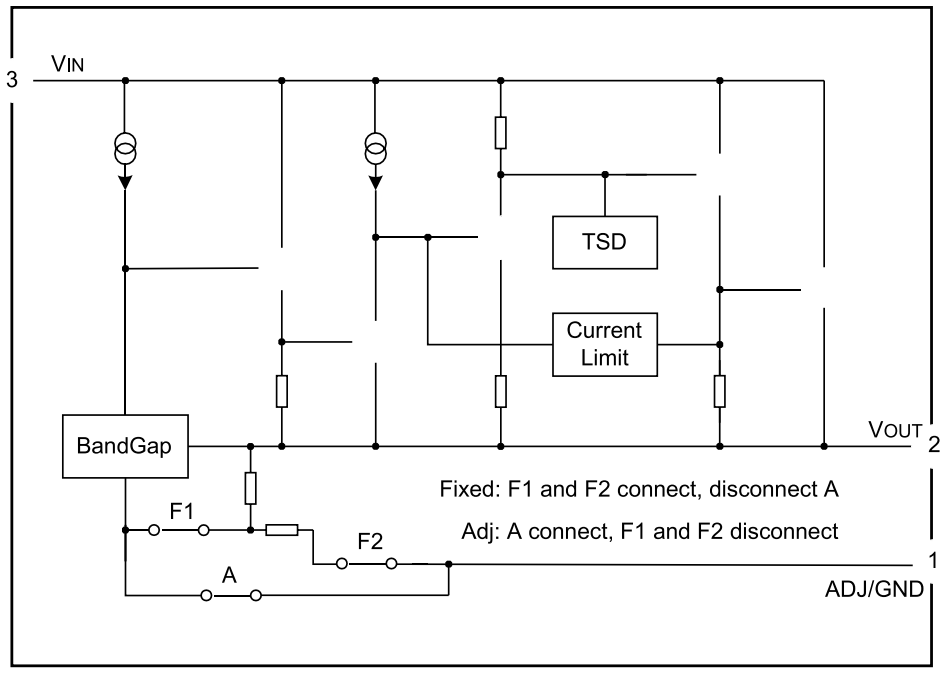


SOT-89

5.Nomenclature



6.Block Diagram



7.Absolute Maximum Ratings

Parameter		Symbol	Value	Units
Input Supply Voltage		V_{IN}	18	V
Lead Temperature (Soldering, 5 seconds)		T_{Lead}	260	°C
Junction Temperature Range		T_J	150	°C
Storage Temperature Range		T_{STG}	-65 to 150	°C
Power Dissipation		P_D	Internally Limited (Note1)	mW
Thermal Resistance from Junction to Ambient	SOT-223	Rja	88	°C/W
	TO-252		86	°C/W
	SOT-89		102	°C/W
ESD Tolerance (Minimum)		ESD	2000	V

Note1: The maximum allowable power dissipation is a function of maximum operating junction temperature, $T_{J\,(max)}$, the junction to ambient thermal resistance, Rja, and the ambient temperature T_{amb}. The maximum allowable power dissipation at any ambient temperature is given: $P_{D(max)} = (T_{J\,(max)} - T_{amb})/ Rja$, exceeding the maximum allowable power limit will result in excessive die temperature; thus, the regulator will go into thermal shutdown. The junction to ambient thermal resistance, θ_{JA} of some packages may be different, The value of θ_{JA} depends on mounting technique.

8.Recommended Operating Conditions

Parameter	Symbol	Value	Units
Input voltage	V_{IN}	12	V
Junction Temperature Range	T_J	-40 to 125	°C

9.Electrical Characteristics

Characteristics	Symbol	Conditions	Min	Typ	Max	Units
Reference Voltage	V_{REF}	LD1117-ADJ I_{OUT}=10mA,V_{IN}-V_{OUT}=2V,T_J=25°C	1.231	1.250	1.269	V
Output Voltage	V_{OUT}	LD1117-1.2 I_{OUT}=10mA,V_{IN}=3.2V,T_J=25°C	1.176	1.2	1.224	V
		LD1117-1.5 I_{OUT}=10mA,V_{IN}=3.5V,T_J=25°C	1.470	1.500	1.530	V
		LD1117-1.8 I_{OUT}=10mA,V_{IN}=3.8V,T_J=25°C	1.764	1.800	1.836	V
		LD1117-2.5 I_{OUT}=10mA,V_{IN}=4.5V,T_J=25°C	2.450	2.500	2.550	V
		LD1117-3.3 I_{OUT}=10mA,V_{IN}=5V,T_J=25°C	3.234	3.300	3.366	V
		LD1117-5.0 I_{OUT}=10mA,V_{IN}=7V,T_J=25°C	4.900	5.000	5.100	V
Output Voltage Temperature Stability	T_{SOUT}			0.3		%
Line Regulation	R_{line}	V_{INMIN} ≤V_{IN}≤ 12V V_{OUT}=Fixed/Adj,I_{OUT}=10mA		9	18	mV

Load Regulation	R_{load}	10mA≤I_{OUT}≤1A, V_{OUT}=Fixed/Adj		10	18	mV
Dropout Voltage	V_{drop}	I_{OUT}=100mA		1	1.20	V
		I_{OUT}=500mA		1.05	1.25	V
		I_{OUT}=1A		1.20	1.30	V
Quiescent Current	I_q	4.25V≤V_{IN}≤ 6.5V		5	10	mA
Ripple Rejection	P_{SRR}	f_{RIPPLE}=120Hz, (V_{IN}-V_{OUT})=3V V_{RIPPLE}=1V_{PP}	60	75		dB
Adjust pin Current	I_{adj}			60	120	μA
Adjust pin Current Change		0≤ I_{OUT}≤1A, 1.4V ≤V_{IN}-V_{OUT}≤10V		0.2	5	μA
Thermal shutdown	TSD			150		°C
Current limitting	I_{limit}		1.25		1.6	A
Temperature Stabiliy				0.5		%
Long Term Stability		T_A=125°C, 1000Hrs		0.3		%
RMS Output Noise		% of V_{OUT}, 10Hz≤f≤10kHz		0.003		%

10.function Description

The LD1117 is a LDO regulator, it's pass transistor is made up of a single NPN transistor being driven by a PNP.

The dropout voltage is defined as: $V_{DROP} = V_{BE} + V_{SAT}$.

The LD1117 series of fixed and adjustable regulators are easy to use. Output voltages are 1.2V, 1.5V, 1.8V, 2.5V, 3.3V, and 5.0V.On-chip thermal shut down provides protection against any combination of overload and ambient temperature that would create excessive junction temperature.

The LD1117 requires an output capacitor for device stability. Its value of 22μF tantalum covers all cases of bypassing the adjustment terminal. Without bypassing the adjustment terminal smaller capacitors can be used with equally good results which depend upon the application circuit. In general, linear regulator stability decreases with higher output currents.

11.typical Application Circuit

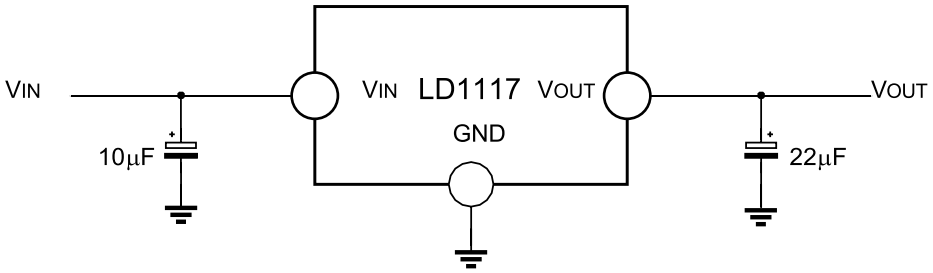


Figure 1. Typical Fixed Output Voltage

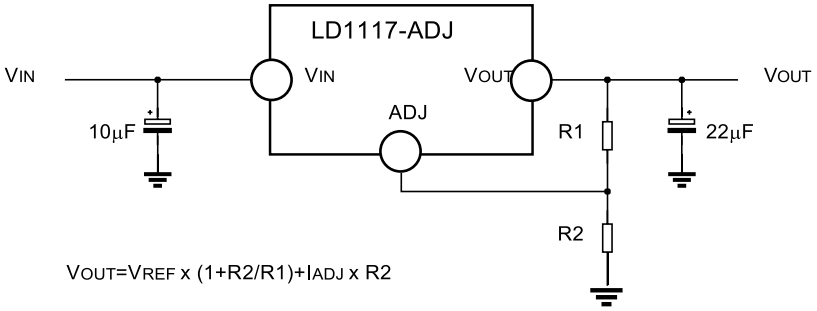


Figure 2. Typical Adjustable Output Voltage

Notes: The circuit and parameters are reference only, please set the parameters of the real application circuit based on the real test.

12.1Typical characteristic

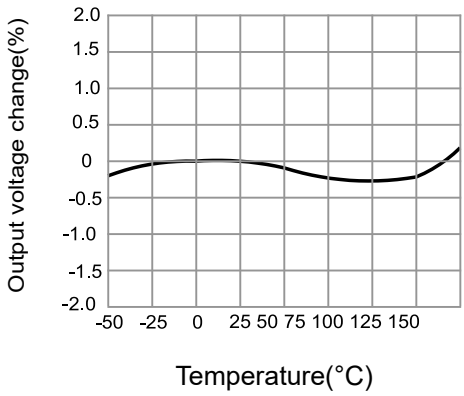


Figure 1: Temperature Stability

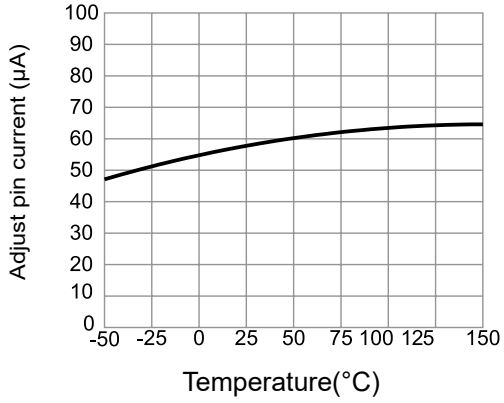


Figure 2: Adjust Pin Current

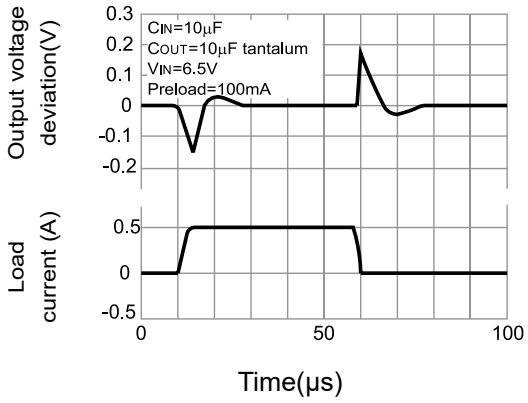


Figure 3: V_{OUT}=5V Load Transient Response

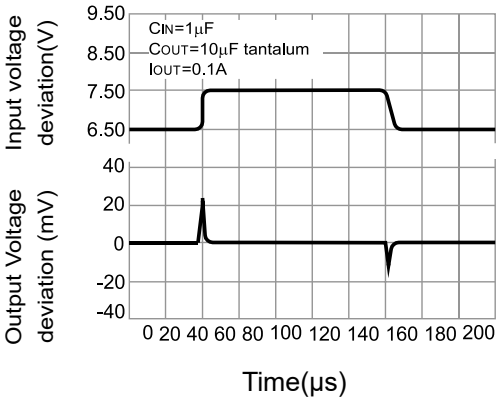


Figure 4: V_{OUT}=5V Line Transient Response

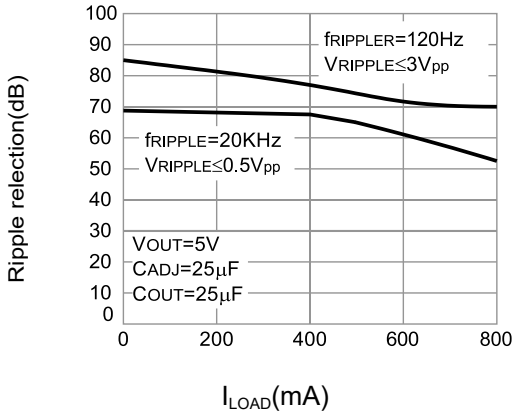


Figure 5: Ripple Rejection VS Current

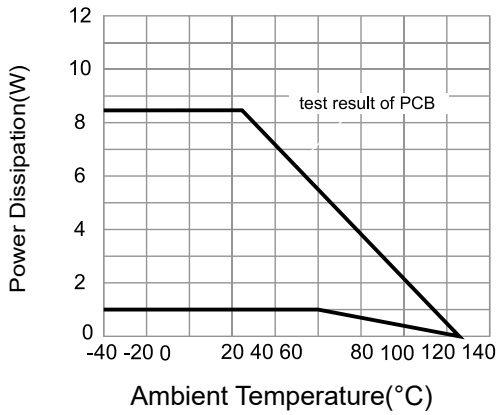


Figure 6: Power Dissipation VS Ambient Temperature(SOT-223)

12.2Typical characteristic

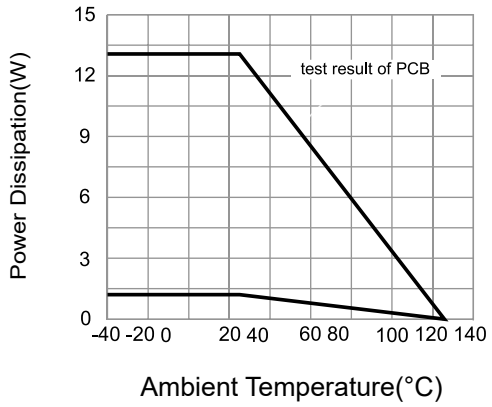
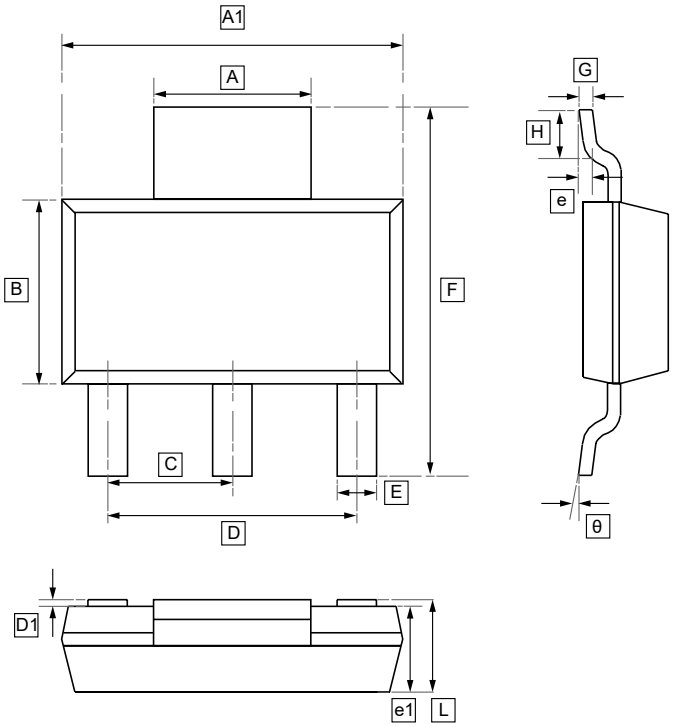


Figure 7: Power Dissipation VS Ambient Temperature(TO-252)

13.1 SOT-223 Package Outline Dimensions

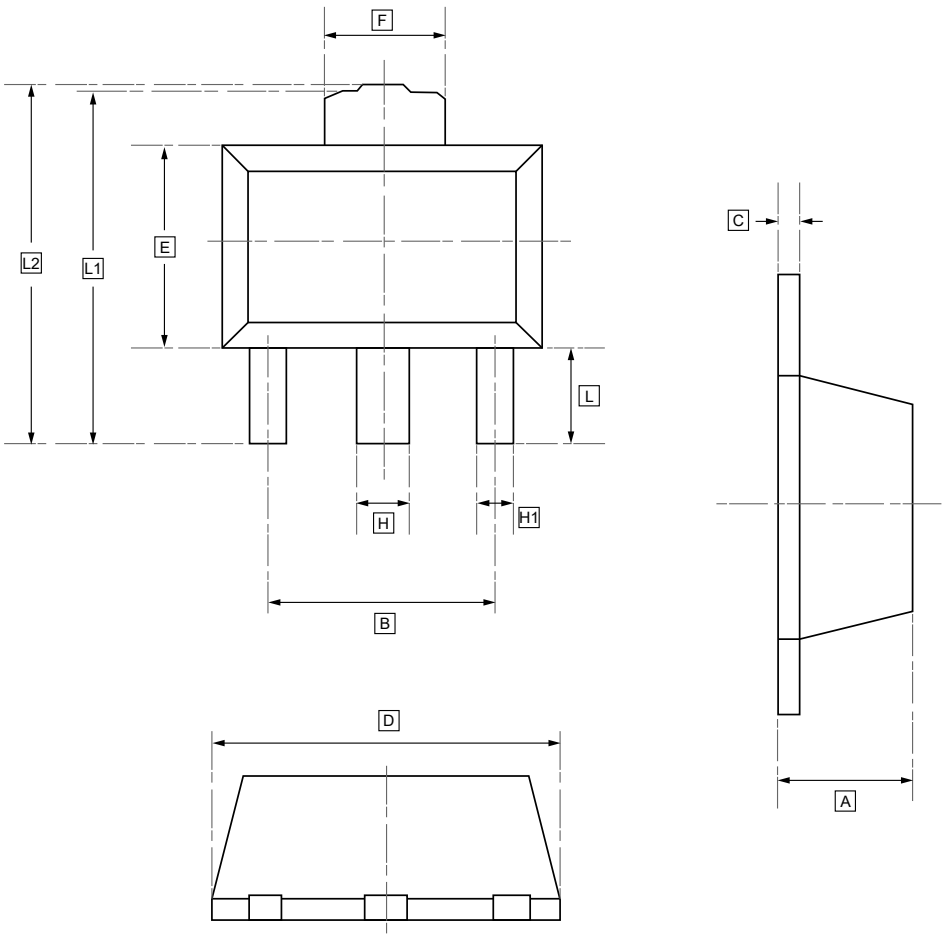


DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	B	C	D	D1	E	e	e1	F	G	H
Min	3.20	5.90	3.80	2.30	4.75	0.00	0.85	0.25	1.75	7.30	0.40	0.90
Max	2.80	6.70	3.20	TYP	4.45	0.10	0.60		1.45	6.70	0.20	1.15

Symbol	L	θ
Min	1.80	0°
Max	1.50	10°

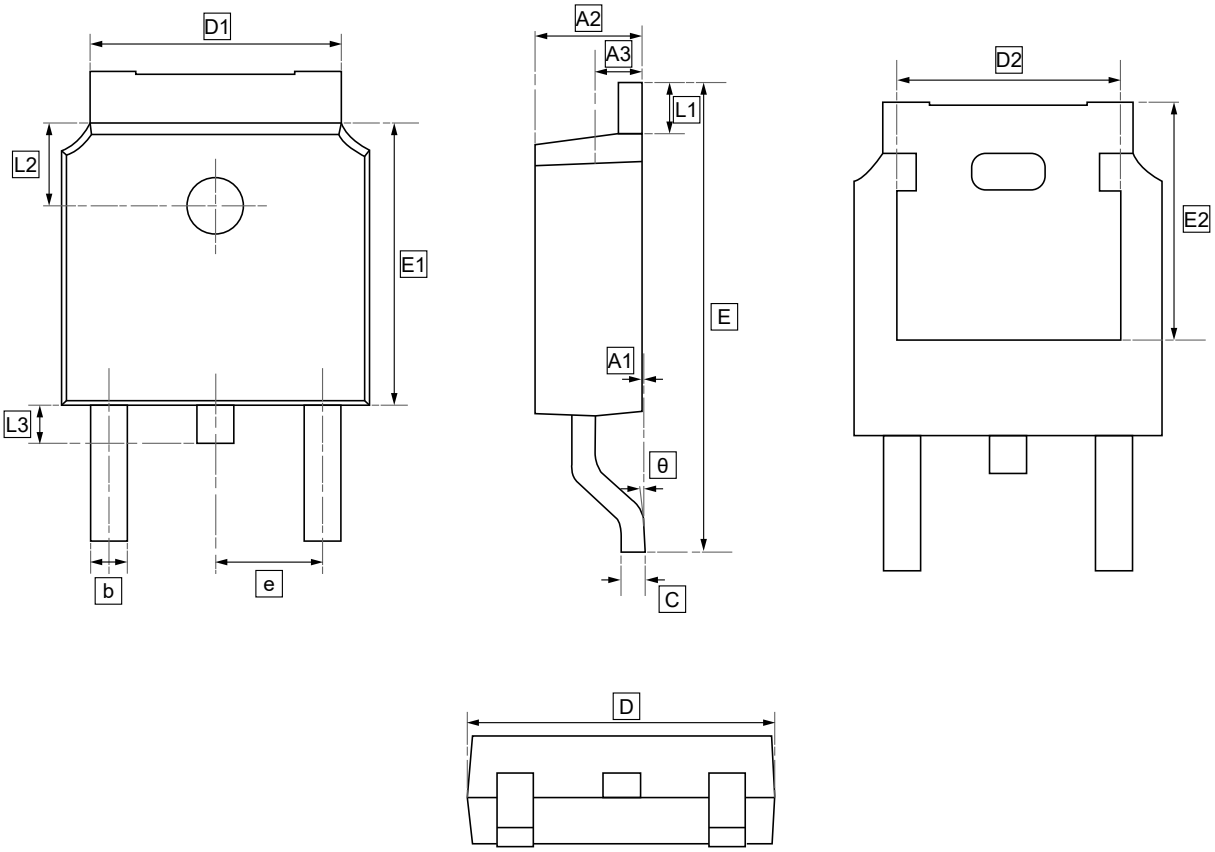
13.2 SOT-89 Package Outline Dimensions



DIMENSIONS (mm are the original dimensions)

Symbol	A	B	C	D	E	F	H	H1	L	L1	L2
Min	1.450	2.950	0.330	4.450	2.450	1.650	0.450	0.370	0.900	4.100	4.100
Max	1.550	3.050	0.430	4.550	2.550	1.750	0.580	0.480	1.000	4.300	4.350

13.3 TO-252 Package Outline Dimensions

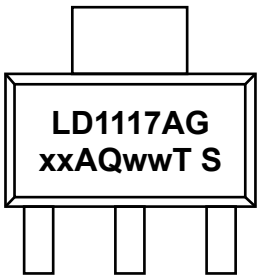


DIMENSIONS (mm are the original dimensions)

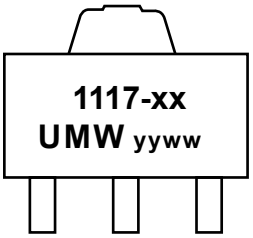
Symbol	A1	A2	A3	b	c	D	D1	D2	E	E1	E2	e	L1	L2	L3	θ
Min	0.00	2.18	0.90	0.65	0.46	6.35	4.95	4.32	9.40	5.97	5.21	2.286	0.89	1.70	0.60	0.00
Max	0.13	2.39	1.10	0.85	0.61	6.73	5.46	4.90	10.41	6.22	5.38	BSC	1.27	1.90	1.00	8.00

14.Ordering information

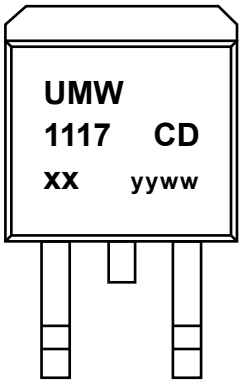
SOT-223



SOT-89



TO-252



yy: Year Code
ww: Week Code
xx: Voltage

Order Code	Marking	Package	Base QTY	Delivery Mode
UMW LD1117-xx	LD1117AG xx	SOT-223	2500	Tape and reel
UMW LD1117-xxS	1117-xx	SOT-89	1000	Tape and reel
UMW LD1117CD-xx	1117-CD xx	TO-252	2500	Tape and reel

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