ALPHA & OMEGA SEMICONDUCTOR

AOZ1117

1A Low Dropout Linear Regulator

General Description

The AOZ1117 is a low dropout positive adjustable or fixed-mode regulator with minimum of 1A output current capability. The product is specifically designed to provide well-regulated supply for low voltage IC applications such as high-speed bus termination and low current 3.3V logic supply. The AOZ1117 is also well suited for other applications such as VGA cards. The AOZ1117 is guaranteed to have lower than 1.4V dropout at full load current making it ideal to provide well-regulated outputs of 1.25V to 5.0V with 2.75V to 14V input supply.

Features

- 1.4V maximum dropout at full load current
- Fast transient response
- Output current limiting
- Built-in thermal shutdown
- Good noise rejection
- 3-terminal adjustable or fixed 1.5V, 1.8V, 2.5V, 3.3V, or 5.0V
- TO252 package

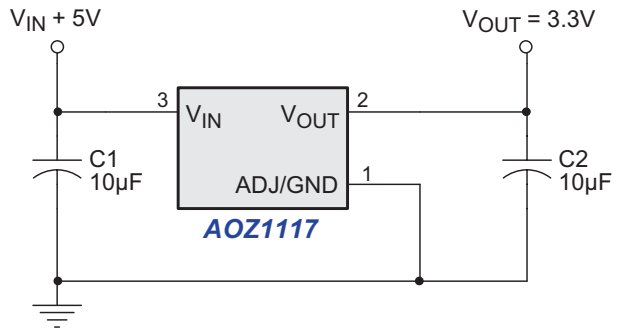
Applications

- PC peripheral
- Communication

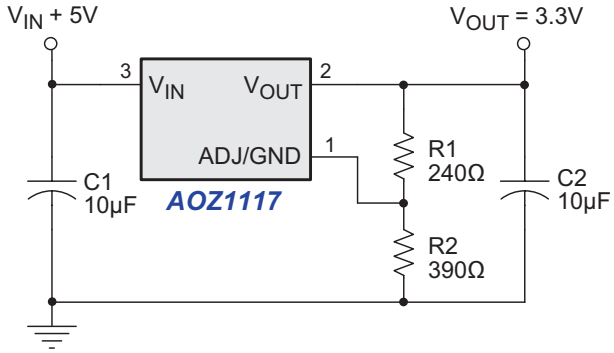
Green Product

Typical Circuits

Fixed Output Example



Adjustable Output Example



$$V_{OUT} = V_{REF} \times \left(1 + \frac{R2}{R1}\right)$$

$$V_{REF} = 1.250V$$

Figure 1.

Ordering Information

Part Number	Output Voltage	Ambient Temperature Range	Package	Environmental
AOZ1117TI-AAL	Adjustable	-40°C to +85°C	TO-252	Green Product
AOZ1117TI-15L	1.5V			
AOZ1117TI-18L	1.8V			
AOZ1117TI-25L	2.5V			
AOZ1117TI-33L	3.3V			
AOZ1117TI-50L	5.0V			

• All AOS products are offered in packages with Pb-free plating and compliant to RoHS standards.

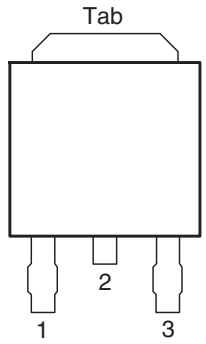
• Parts marked as Green Products (with "L" suffix) use reduced levels of Halogens, and are also RoHS compliant.

Please visit www.aosmd.com/web/quality/rohs_compliant.jsp for additional information.

Pin Configuration

Pinout:
1. Adjust/Ground
2. V_{OUT}
3. V_{IN}

Heat sink tab is connected to Pin 2.



TO-252
(Top View)

Pin Description

Name	I/O	Pin #	Function
Adj (GND)	I	1	A resistor divider from this pin to the Vout pin and ground sets the output voltage. (Ground only for Fixed-Mode)
Vout	O	2	The output of the regulator. A minimum of 10uF capacitor ($0.15\Omega \le ESR \le 20\Omega$) must be connected from this pin to ground to insure stability.
Vin	I	3	The input pin of regulator. Typically a large storage capacitor ($0.15\Omega \le ESR \le 20\Omega$) is connected from this pin to ground to insure that the input voltage does not sag below the minimum dropout voltage during the load transient response. This pin must always be 1.4V higher than Vout in order for the device to regulate properly.

Absolute Maximum Ratings

Exceeding the Absolute Maximum ratings may damage the device.

Parameter	Rating
V_{IN} to GND	-0.3V to +15V
Maximum Junction Temperature (T_J)	150°C
Power Dissipation (P_D), T_A = 25°C, T_J = 125°C, $P_D = (T_J - T_A) / \theta J_A$	
No heat sink; no air flow	1050mW
Multi-layer PCB copper area (10mm x 10mm)	1818mW
Storage Temperature (T_S)	-65°C to +150°C
ESD Rating(1)	±TBDkV

Note:

1. Devices are inherently ESD sensitive, handling precautions are required. Human body model rating: 1.5kΩ in series with 100pF.

Recommend Operating Ratings

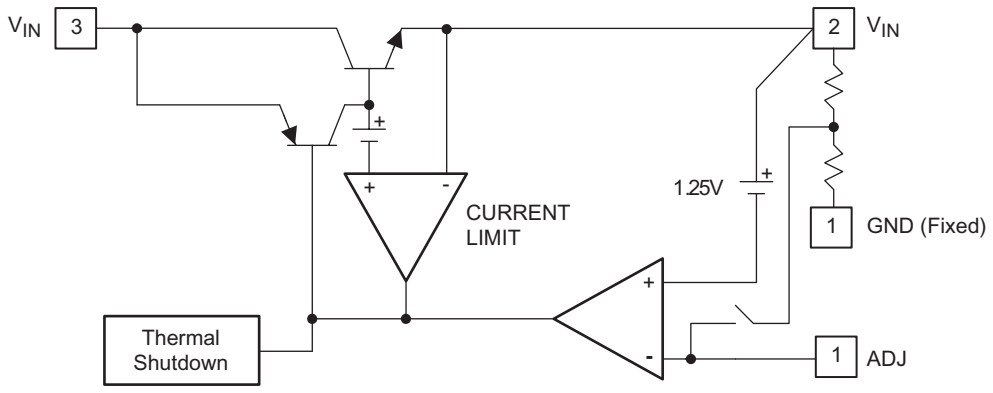
The device is not guaranteed to operate beyond the Maximum Operating Ratings.

Parameter	Rating
Supply Voltage (V_{IN})	2.75V to +14V
Operating Junction Temperature (T_J)	0°C to +125°C
Ambient Temperature (T_A)	-40°C to +85°C
Package Thermal Resistance (Θ_{JA})(2)	TBD°C/W

Note:

2. The package Θ_{JA} is measured with the device mounted on 1-in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A = 25°C. The value in any given application depends on the user's specific board design.

Block Diagram



Electrical Characteristics

Under Operating Conditions

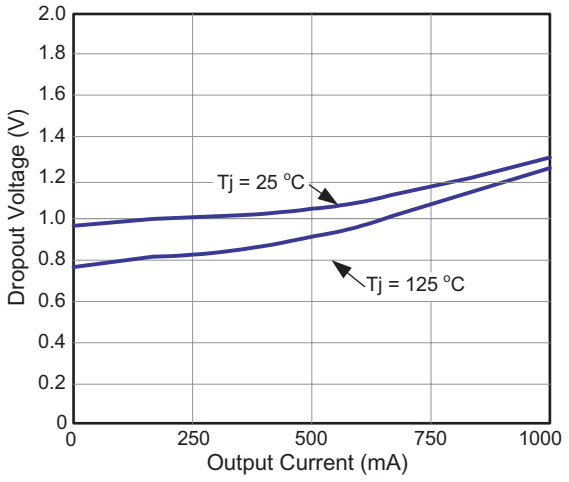
Parameter	Device	Conditions	Min.	Typ.	Max	Unit
Operation Input Voltage	All		2.75		14	V
Reference Voltage	AOZ1117-ADJ	T_J = 25°C, (V_{IN-OUT}) = 1.5V, I_{OUT} = 10mA	1.225	1.250	1.275	V
Output Voltage	AOZ1117-1.5	I_{OUT} = 10mA, T_J = 25°C, 3V ≤ V_{IN} ≤ 12V	1.470	1.500	1.530	V
	AOZ1117-1.8	I_{OUT} = 10mA, T_J = 25°C, 3.3V ≤ V_{IN} ≤ 12V	1.764	1.800	1.836	V
	AOZ1117-2.5	I_{OUT} = 10mA, T_J = 25°C, 4V ≤ V_{IN} ≤ 12V	2.450	2.500	2.550	V
	AOZ1117-3.3	I_{OUT} = 10mA, T_J = 25°C, 4.8V ≤ V_{IN} ≤ 12V	3.235	3.300	3.365	V
	AOZ1117-5.0	I_{OUT} = 10mA, T_J = 25°C, 6.5V ≤ V_{IN} ≤ 12V	4.900	5.000	5.100	V
Line Regulation[1][2]	All	V_{IN} = V_{OUT}+1.5V~7V, I_O = 10mA, T_J = 25°C		0.1	0.3	%
		V_{IN} = V_{OUT}+1.5V~12V, I_O = 10mA, T_J = 25°C		0.1	0.5	%
Load Regulation[1][2]	AOZ1117-ADJ	V_{IN} = 3V, Vadj = 0,10mA < I_O <1A, T_J = 25°C			1	%
	AOZ1117-1.5	V_{IN} = 3V, 10mA < I_O < 1A, T_J = 25°C		12	15	mV
	AOZ1117-1.8	V_{IN} = 3.3V, 10mA < I_O < 1A, T_J = 25°C		15	18	mV
	AOZ1117-2.5	V_{IN} = 4V, 10mA < I_O < 1A, T_J = 25°C		20	25	mV
	AOZ1117-3.3	V_{IN} = 5V, 10mA ≤ I_{OUT} ≤ 1A, T_J = 25°C		26	33	mV
	AOZ1117-5.0	V_{IN} = 6.5V, 10mA ≤ I_{OUT} ≤ 1A, T_J = 25°C		40	50	mV
Dropout Voltage (V_{IN}–V_{OUT})	All	I_{OUT} = 1A, ΔV_{OUT} = 1% V_{OUT}		1.3	1.4	V
Current Limit	All	V_{IN} – V_{OUT} = 3V	1. 1			A
Minimum Load Current	All	0°C ≤ T_j ≤ 125°C		5	10	mA
Ripple Rejection	All	V_{IN} = V_{OUT} + 3V, f = 120Hz, C_{OUT} = 25µF Tantalum		60	70	dB
Temperature Stability	All	I_O = 10mA		0.5		%
Thermal Resistance (θ_{JA})	All	Junction-to-Ambient (No heat sink; no air flow)		92		°C/W
		Junction-to-Ambient[4]		55		
Thermal Resistance (θ_{JC})	All	Junction-to-Case		10		°C/W

Notes:

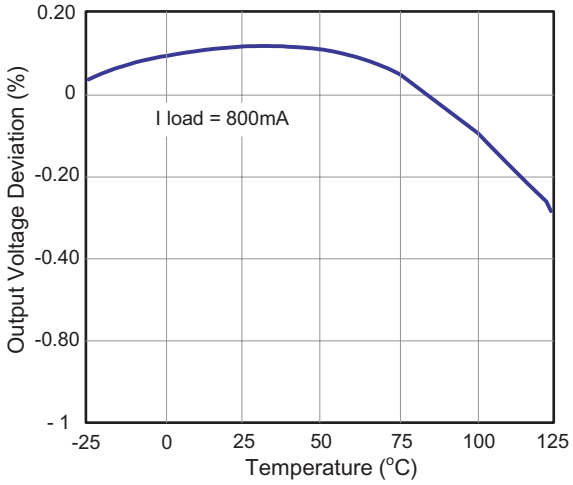
1. See thermal regulation specifications for changes in output voltage due to heating effects. Line and load regulation are measured at a constant junction temperature by low duty cycle pulse testing. Load regulation is measured at the output lead = 1/18" from the package.
2. Line and load regulation are guaranteed up to the maximum power dissipation of 15W. Power dissipation is determined by the difference between input and output differential and the output current. Guaranteed maximum power dissipation will not be available over the full input/output range.
3. Quiescent current is defined as the minimum output current required in maintaining regulation. At 12V input/output differential the device is guaranteed to regulate if the output current is greater than 10mA.
4. Output is connected to the multi-layer PCB cupper area 10mm x 10mm separately. If you need large PD or lower Tc & Tj, please connect to the large copper area > 10mm x 10mm.

Typical Performance Characteristics

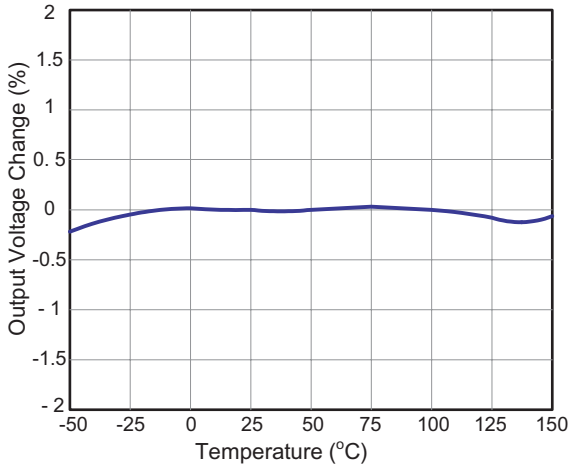
Dropout Voltage vs Output Current



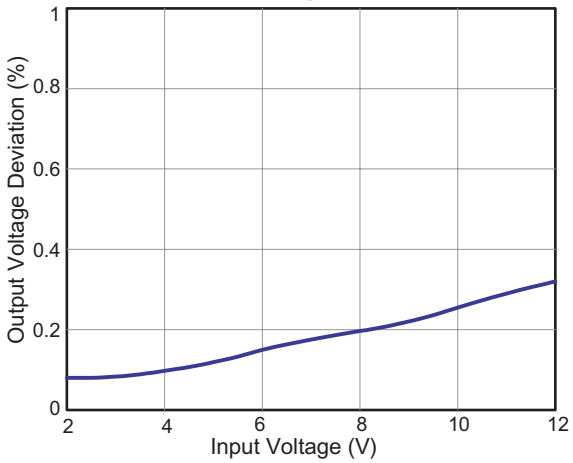
Load Regulation vs Temperature



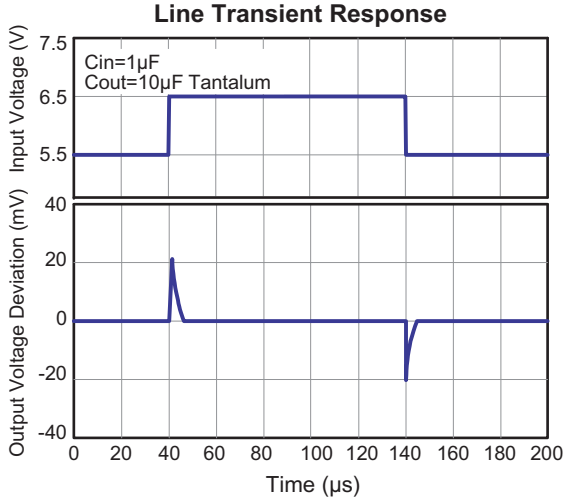
Percent Change in Output Voltage vs Temperature



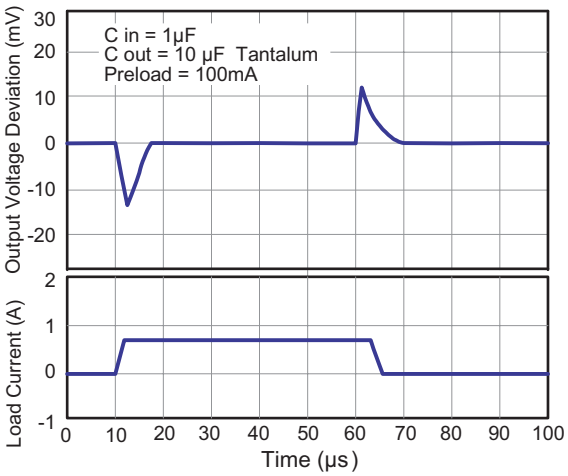
Line Regulation



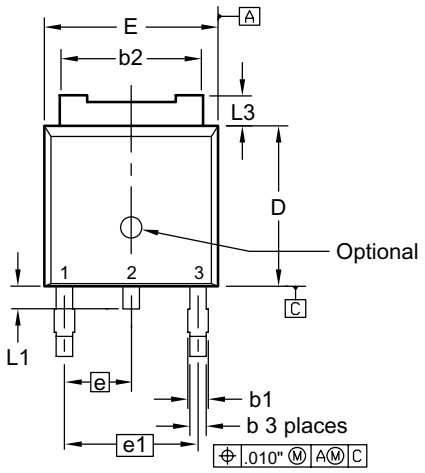
Line Transient Response

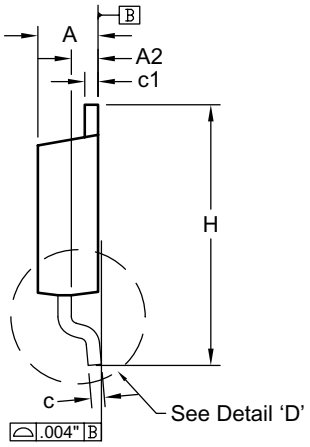


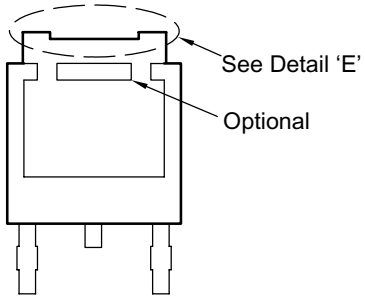
Load Transient Response

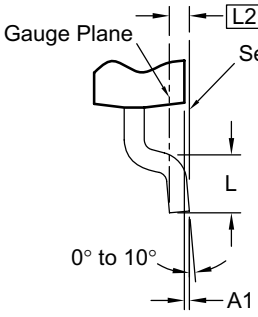


Package Dimensions, TO252-3L

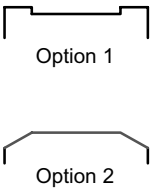






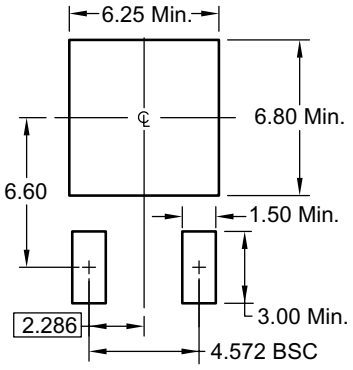


DETAIL 'D'



DETAIL 'E'

RECOMMENDED LAND PATTERN



UNIT: mm

Dimensions in millimeters

Symbols	Min.	Nom.	Max.
A	2.184	2.286	2.388
A1	0.000	—	0.127
A2	0.889	—	1.143
b	0.635	0.762	0.889
b1	0.762	—	1.143
b2	4.953	—	5.461
c	0.450	0.508	0.610
c1	0.450	—	0.610
D	5.969	6.096	6.223
E	6.350	6.604	6.731
e	2.286 BSC		
e1	4.572 BSC		
H	9.398	—	10.414
L	1.270	—	2.032
L1	0.635	—	1.016
L2	0.508 BSC		
L3	0.889	—	1.270

Dimensions in inches

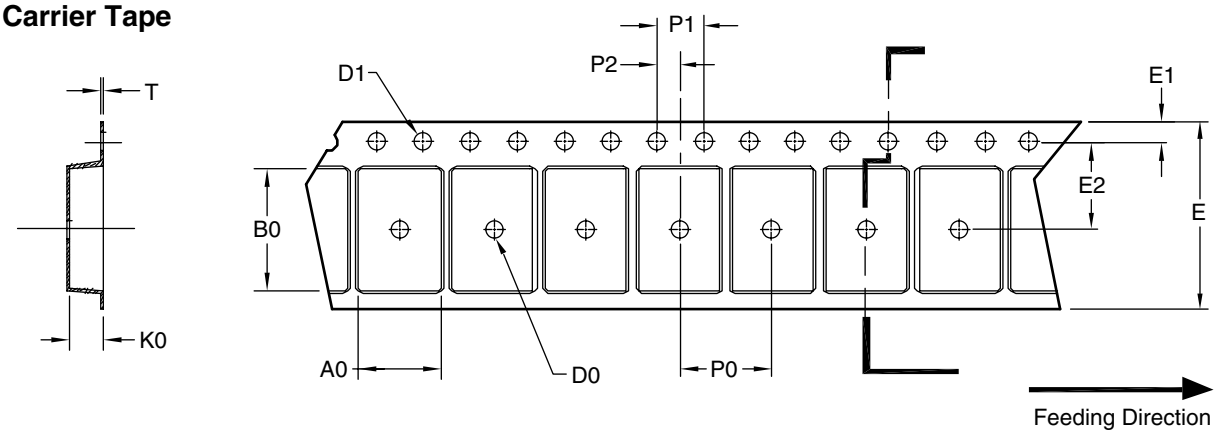
Symbols	Min.	Nom.	Max.
A	0.086	0.090	0.094
A1	0.000	—	0.005
A2	0.035	—	0.045
b	0.025	0.030	0.035
b1	0.030	—	0.045
b2	0.195	—	0.215
c	0.018	0.020	0.024
c1	0.018	—	0.024
D	0.235	0.240	0.245
E	0.250	0.260	0.265
e	0.090 BSC		
e1	0.180 BSC		
H	0.370	—	0.410
L	0.050	—	0.080
L1	0.025	—	0.040
L2	0.020 BSC		
L3	0.035	—	0.050

Notes:

1. Package body sizes exclude mold flash and gate burrs. Mold flash should be less than 6 mils.
2. Dimension L is measured in gauge plane.
3. Tolerance 0.10mm unless otherwise specified.
4. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.
5. Refer to JEDEC TO-252(AA).

Tape and Reel Dimensions, TO252-3L

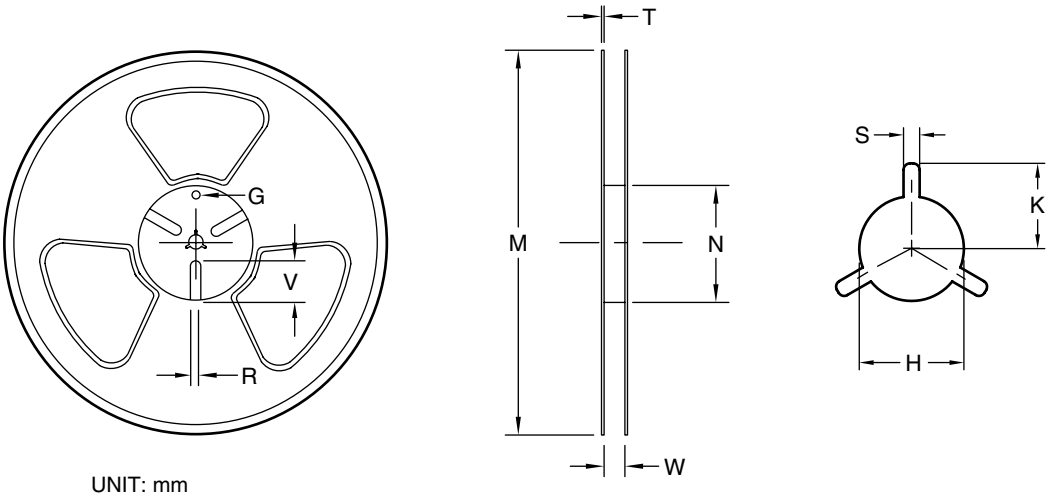
Carrier Tape



UNIT: mm

Package	A0	B0	K0	D0	D1	E	E1	E2	P0	P1	P2	T
TO-252 (DPAK) (16mm)	6.90 ±0.10	10.50 ±0.10	2.70 ±0.10	1.50 +0.10	1.50 Min.	16.00 ±0.10	1.75 ±0.10	7.50 ±0.10	8.00 ±0.10	4.00 ±0.10	2.00 ±0.10	0.30 ±0.05

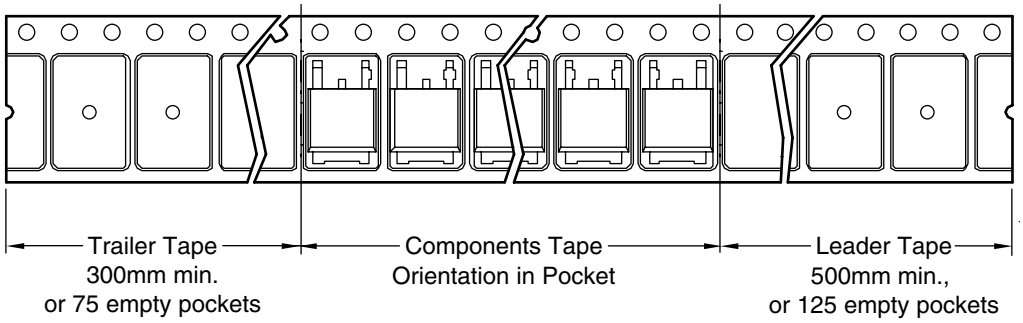
Reel



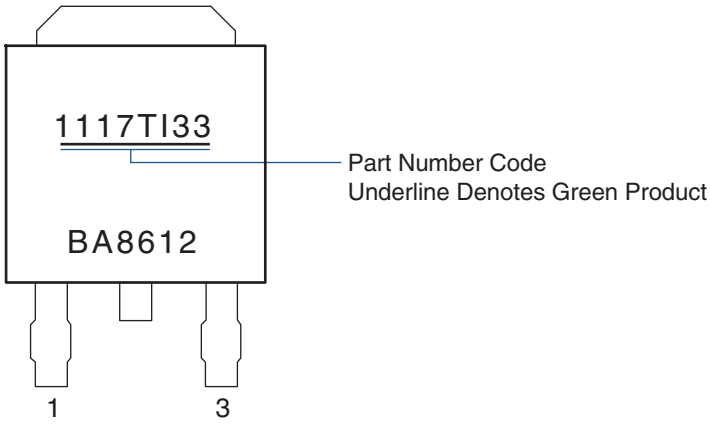
UNIT: mm

Tape Size	Reel Size	M	N	W	T	H	K	S	G	R	V
16mm	ø330	ø330.00 ±0.5	ø99.50 ±1.0	17.50 ±0.50	2.30	ø13.50 +0.10	10.60	2.5 ±0.10	—	—	—

Leader / Trailer & Orientation



Part Marking



This datasheet contains preliminary data; supplementary data may be published at a later date.
Alpha & Omega Semiconductor reserves the right to make changes at any time without notice.

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2. A critical component in any component of a life support, device, or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.