1A LOW DROPOUT POSITIVE ADJUSTABLE OR FIXED-MODE REGULATOR

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, 5.0V
- Lead Free Packages: SOT223-3L, TO252-3L, SOT89-3L, TO263-3L and TO220-3L
- SOT223-3L, TO252-3L, SOT89-3L, TO263-3L and TO220-3L: Available in "Green" Molding Compound (No Br, Sb)
- Lead Free Finish/RoHS Compliant (Note 1)

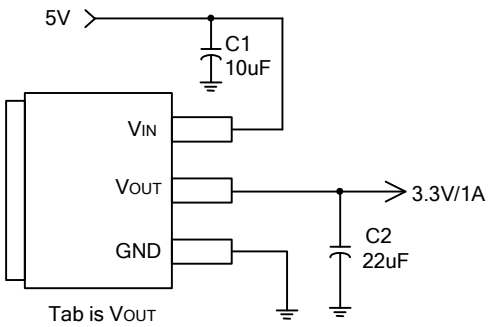
General Description

AP1117 is a low dropout positive adjustable or fixed-mode regulator with 1A output current capability. The product is voltage specifically designed to provide well-regulated supply for low IC applications such as high-speed bus termination and low current 3.3V logic supply. AP1117 is also well suited for other applications such as VGA cards. AP1117 is guaranteed to have lower than 1.4V dropout at full load current making it ideal to provide well-regulated outputs of 1.25 to 5.0 with 6.4V to 18V input supply. AP1117 is available in commercial temperature grade.

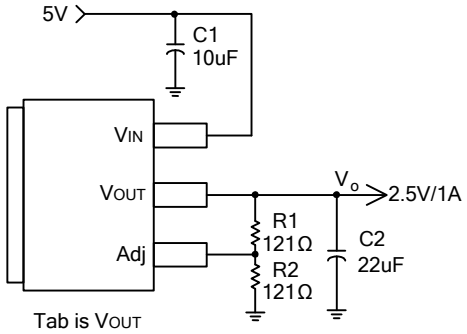
Applications

- PC Peripheral
- Communication

Typical Application Circuit



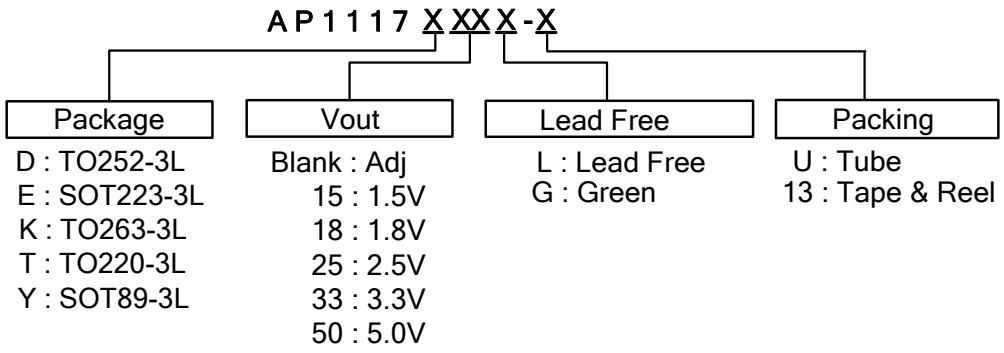
(5V/3.3V fixed output)



(5V/2.5V ADJ output)

Note: $V_o = V_{REF} \times (1 + \frac{R_2}{R_1})$

Ordering Information

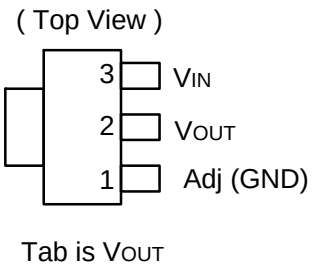


Device	Package Code	Packaging (Note 2)	Tube		13" Tape and Reel	
			Quantity	Part Number Suffix	Quantity	Part Number Suffix
AP1117DXXL-13	D	TO252-3L	NA	NA	2500/Tape & Reel	-13
AP1117DXXG-13	D	TO252-3L	NA	NA	2500/Tape & Reel	-13
AP1117EXXL-13	E	SOT223-3L	NA	NA	2500/Tape & Reel	-13
AP1117EXXG-13	E	SOT223-3L	NA	NA	2500/Tape & Reel	-13
AP1117KXXL-13	K	TO263-3L	NA	NA	800/Tape & Reel	-13
AP1117KXXG-13	K	TO263-3L	NA	NA	800/Tape & Reel	-13
AP1117TXXL-U	T	TO220-3L	50	-U	NA	NA
AP1117TXXG-U	T	TO220-3L	50	-U	NA	NA
AP1117YXXL-13	Y	SOT89-3L	NA	NA	2500/Tape & Reel	-13
AP1117YXXG-13	Y	SOT89-3L	NA	NA	2500/Tape & Reel	-13

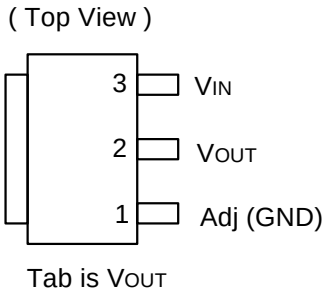
Notes: 1. EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied. Please visit our website at http://www.diodes.com/products/lead_free.html.
2. Pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at http://www.diodes.com/datasheets/ap02001.pdf.

Pin Assignments

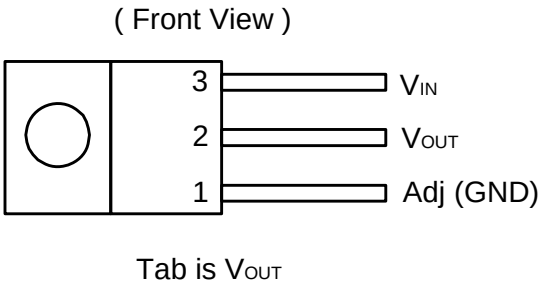
(1) SOT89-3L



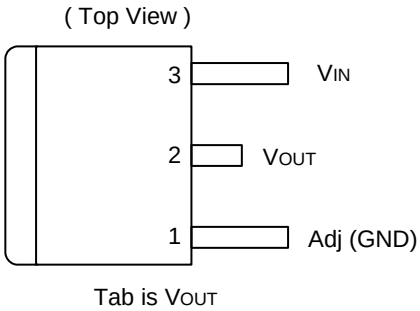
(2) SOT223-3L



(3) TO220-3L



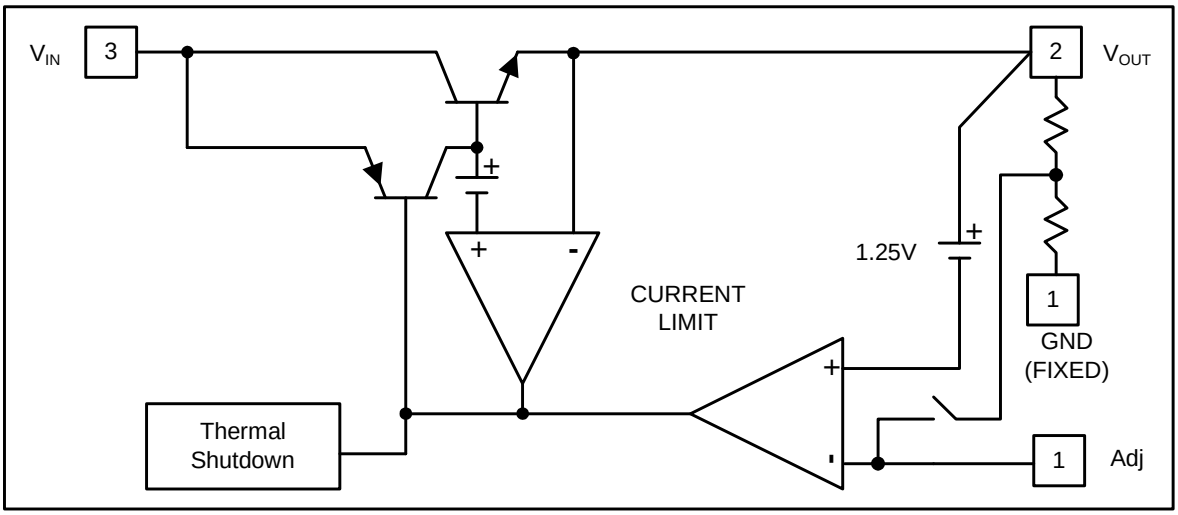
(4) TO252-3L and TO263-3L



Pin Descriptions

Pin Name	I/O	PIN #	Description
Adj (GND)	I	1	A resistor divider from this pin to the V_{OUT} pin and ground sets the output voltage (Ground only for Fixed-Mode).
V_{OUT}	O	2	The output of the regulator. A minimum of 10uF capacitor (0.15Ω ≤ ESR ≤ 20Ω) must be connected from this pin to ground to insure stability.
V_{IN}	I	3	The input pin of regulator. Typically a large storage capacitor 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 1.3V higher than V_{OUT} in order for the device to regulate properly.

Block Diagram



Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
V_{IN}	DC Supply Voltage	-0.3 to 18	V
T_{MJ}	Maximum Junction Temperature	150	^oC
P_D	Power Dissipation SOT89-3L SOT223-3L TO220-3L TO252-3L TO263-3L	Internally limited by maximum junction temperature of 150 ^oC (Note 3)	mW
T_{ST}	Storage Temperature	-65 to +150	^oC

Notes: 3. AP1117 contains an internal thermal limiting circuit that is designed to protect the regulator in the event that the maximum junction temperature exceeded. When activated, typically at 150°C, the regulator output switches off and then back on as the die cools.

Recommended Operating Conditions

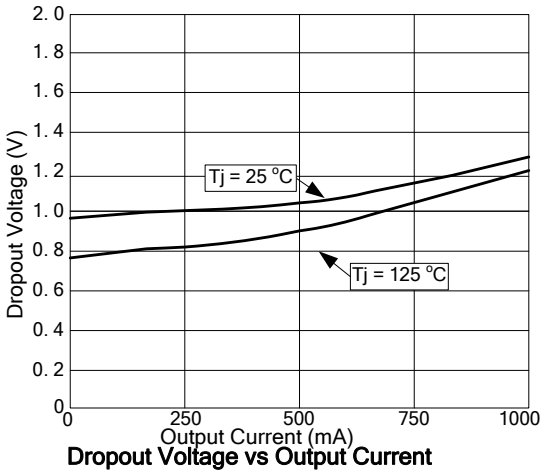
Symbol	Parameter	Min	Max	Unit
T_{OP}	Operating Junction Temperature Range	0	125	^oC

Electrical Characteristics (Under Operating Conditions)

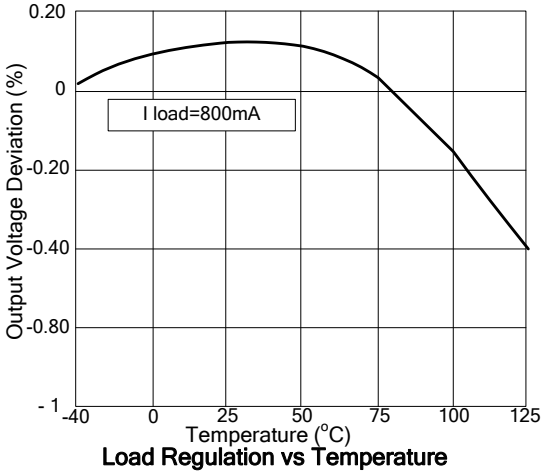
Parameter	Conditions		Min	Typ.	Max	Unit
Reference Voltage	AP1117-ADJ	T_A = 25°C, (V_{IN}-$_{OUT}$) = 1.5V I_O = 10mA	1.225	1.250	1.275	V
Output Voltage	AP1117-1.5	I_{OUT} = 10mA, T_A = 25°C, 3V≦V_{IN}≦12V	1.470	1.500	1.530	V
	AP1117-1.8	I_{OUT} = 10mA, T_A = 25°C, 3.3V≦V_{IN}≦12V	1.764	1.800	1.836	V
	AP1117-2.5	I_{OUT} = 10mA, T_A = 25°C, 4V≦V_{IN}≦12V	2.450	2.500	2.550	V
	AP1117-3.3	I_{OUT} = 10mA, T_A = 25°C, 4.8V≦V_{IN}≦12V	3.235	3.300	3.365	V
	AP1117-5.0	I_{OUT} = 10mA, T_A = 25°C, 6.5V≦V_{IN}≦12V	4.900	5.000	5.100	V
Line Regulation	AP1117-XXX	I_O = 10mA,V_{OUT}+1.5V<V_{IN}<12V, T_A = 25°C			0.2	%
Load Regulation	AP1117-ADJ	V_{IN}=3.3V,Vadj=0,0mA<Io<1A, T_A = 25°C (Note 4, 5)			1	%
	AP1117-1.5	V_{IN} = 3V, 0mA<Io<1A, T_A = 25°C (Note 4, 5)		12	15	mV
	AP1117-1.8	V_{IN} = 3.3V, 0mA<Io<1A, T_A = 25°C (Note 4, 5)		15	18	mV
	AP1117-2.5	V_{IN} = 4V, 0mA<Io<1A, T_A = 25°C (Note 4, 5)		20	25	mV
	AP1117-3.3	V_{IN} = 5V, 0≦I_{OUT}≦1A, T_A = 25°C (Note 4, 5)		26	33	mV
	AP1117-5.0	V_{IN} = 8V, 0≦I_{OUT}≦1A, T_A = 25°C (Note 4, 5)		40	50	mV
Dropout Voltage (V_{IN}-V_{OUT})	AP1117-ADJ/1.5/1.8 /2.5/3.3/5.0	I_{OUT} = 1A, ΔV_{OUT} = 1%V_{OUT}		1.3	1.4	V
Current Limit	AP1117-ADJ/1.5/1.8 /2.5/3.3/5.0	(V_{IN}-V_{OUT}) = 5V	1. 1			A
Minimum Load Current (Note 6)	AP1117-XXX	0°C≦T_J≦125°C		5	10	mA
Thermal Regulation	T_A = 25°C, 30ms pulse			0.008	0.04	%/W
Ripple Rejection	F = 180Hz, C_{OUT} = 25uF Tantalum, I_{OUT} = 1A					
	AP1117-XXX	V_{IN} = V_{OUT}+3V		60	70	dB
Temperature Stability	I_O = 10mA			0.5		%
θ_{JA} Thermal Resistance Junction-to-Ambient	SOT89-3L: Control Circuitry/Power Transistor (Note 7) SOT223-3L: Control Circuitry/Power Transistor (Note 8) TO252-3L: Control Circuitry/Power Transistor (Note 7) TO220-3L: Control Circuitry/Power Transistor (Note 7) TO263-3L: Control Circuitry/Power Transistor (Note 7)			164 107 73 78 60		°C/W
θ_{JC} Thermal Resistance Junction-to-Case	SOT89-3L: Control Circuitry/Power Transistor (Note 7) SOT223-3L: Control Circuitry/Power Transistor (Note 8) TO252-3L: Control Circuitry/Power Transistor (Note 7) TO220-3L: Control Circuitry/Power Transistor (Note 7) TO263-3L: Control Circuitry/Power Transistor (Note 7)			42 15 12 3.5 3.5		°C/W

Notes:
4. 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.
5. 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.
6. 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.
7. Test conditions for SOT89-3L, TO220-3L, TO252-3L and TO263-3L: Devices mounted on FR-4 substrate, single sided PC board, 2oz copper, with minimum recommended pad layout, no air flow. The case point of θ_{JC} is located on the thermal tab.
8. Test conditions for SOT223-3L: Devices mounted on FR-4 substrate, single sided PC board, 2oz copper, with 5mmx5mm thermal pad layout, no air flow. The case point of θ_{JC} is located on the thermal tab.

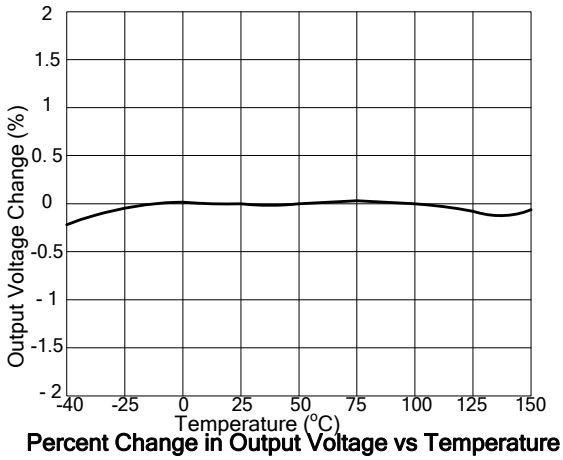
Typical Performance Characteristics



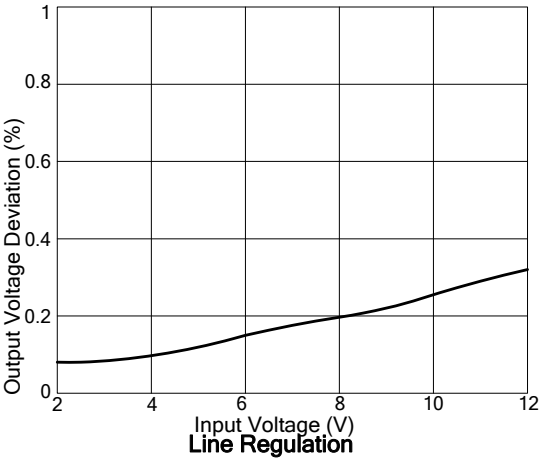
Dropout Voltage vs Output Current



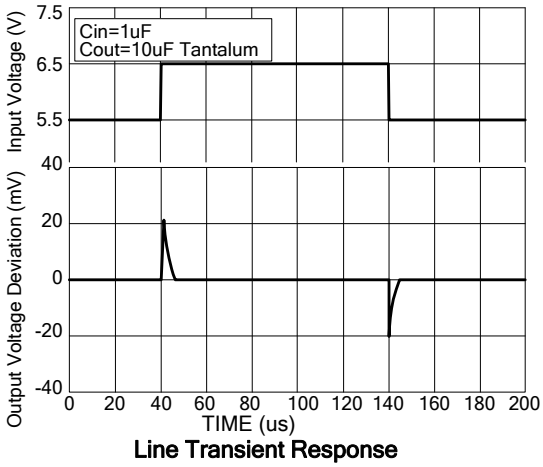
Load Regulation vs Temperature



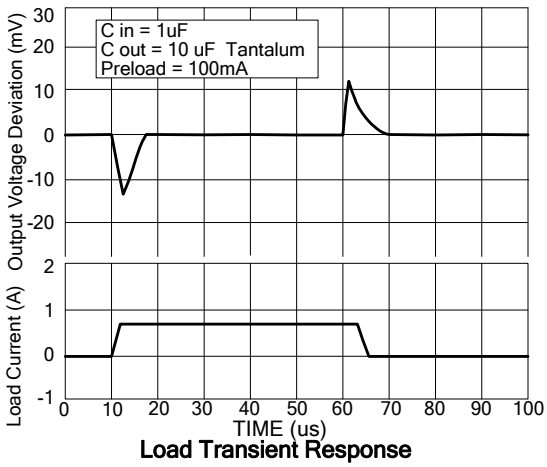
Percent Change in Output Voltage vs Temperature



Line Regulation



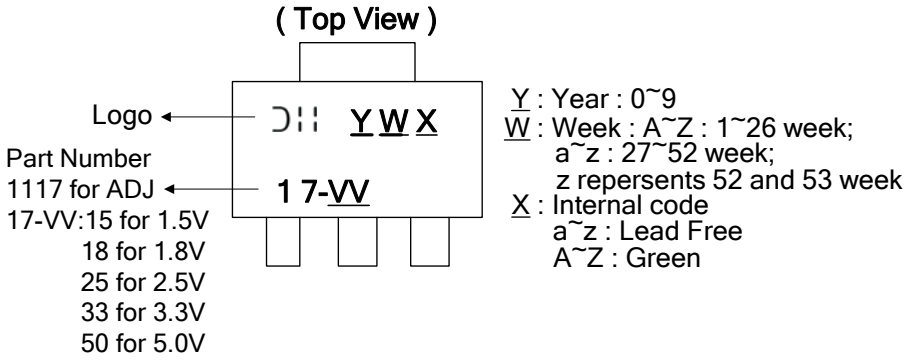
Line Transient Response



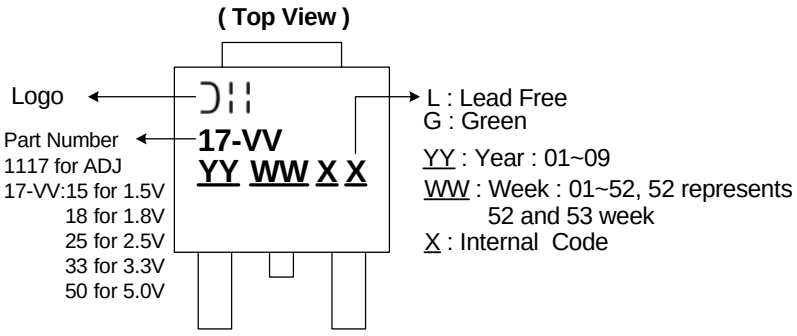
Load Transient Response

Marking Information

(1) SOT223-3L

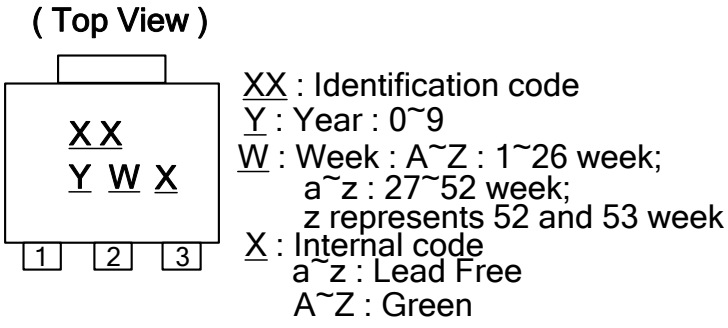


(2) TO252-3L



Marking Information (Continued)

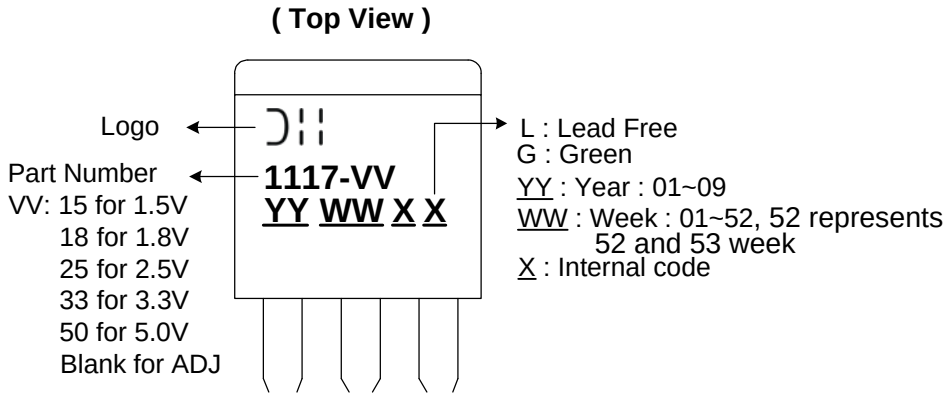
(3) SOT89-3L



Marking Code Table

Identification Code	Output Version
DA	AP1117-ADJ
DB	AP1117-1.5V
DC	AP1117-1.8V
DD	AP1117-2.5V
DE	AP1117-3.3V
DF	AP1117-5.0V

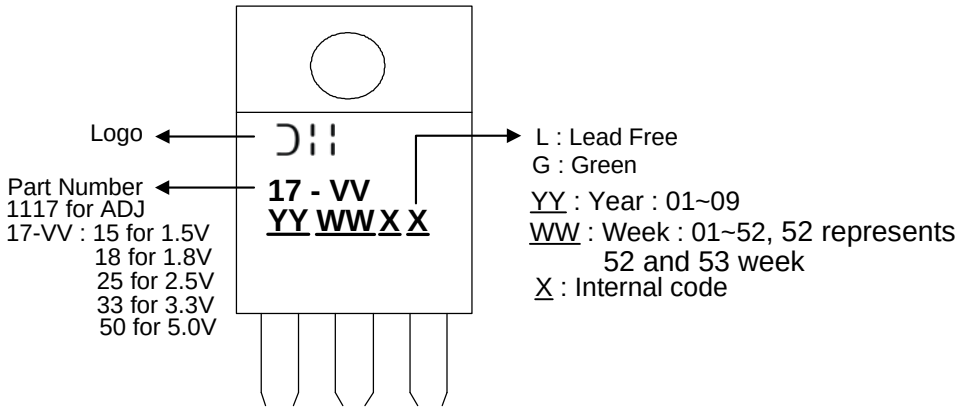
(4) TO263-3L



Marking Information (Continued)

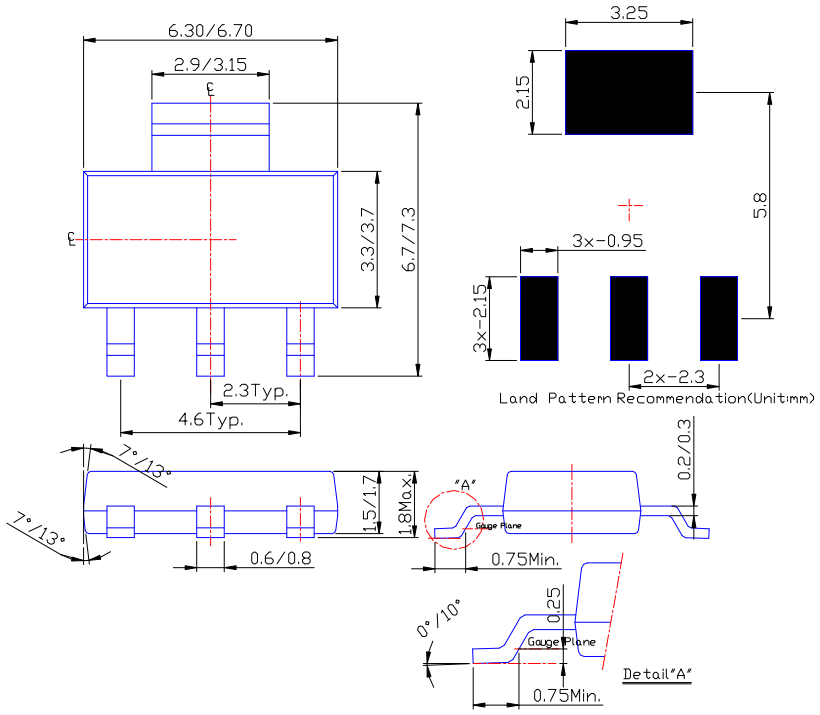
(5) TO220-3L

(Top View)



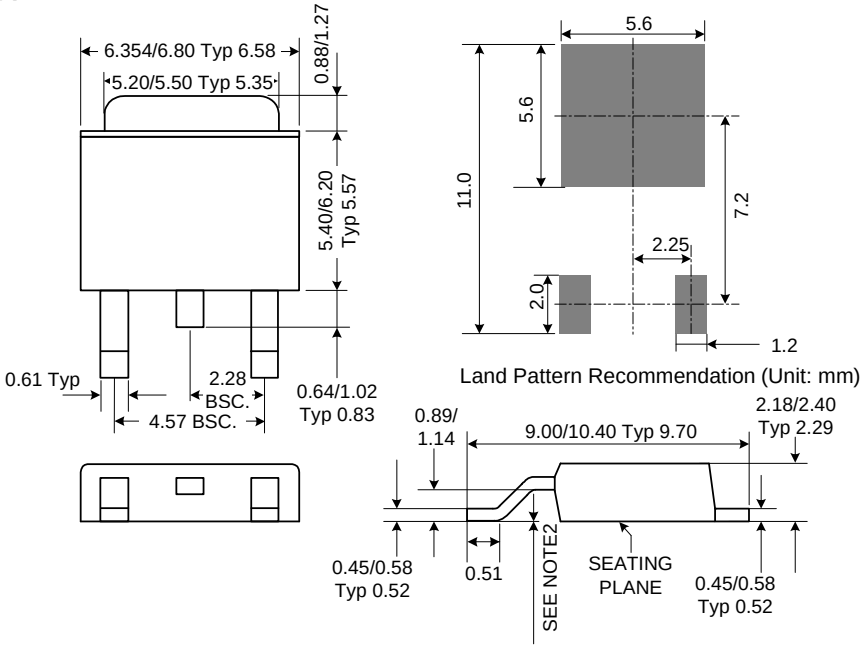
Package Information (All Dimensions in mm)

(1) Package Type: SOT223-3L

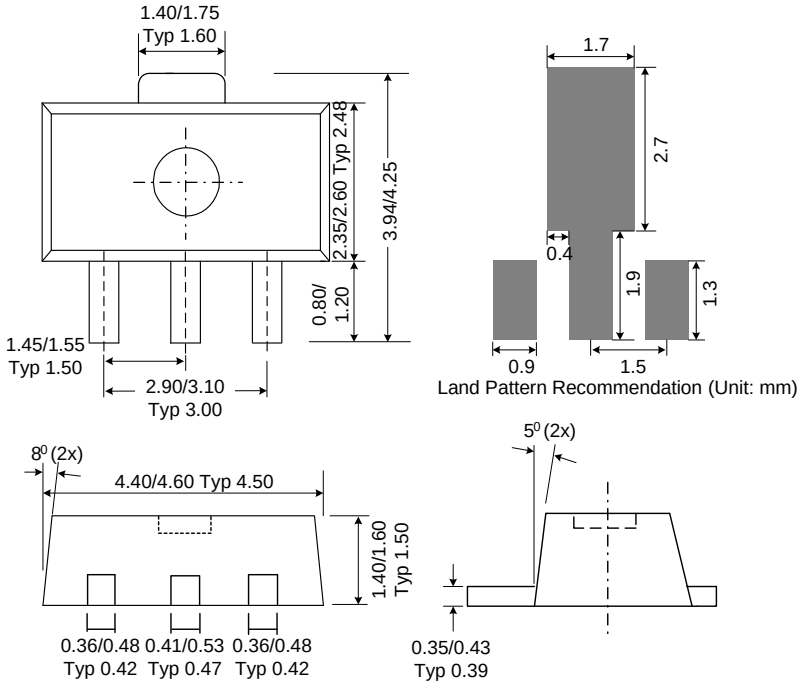


Package Information (Continued)

(2) Package Type: TO252-3L

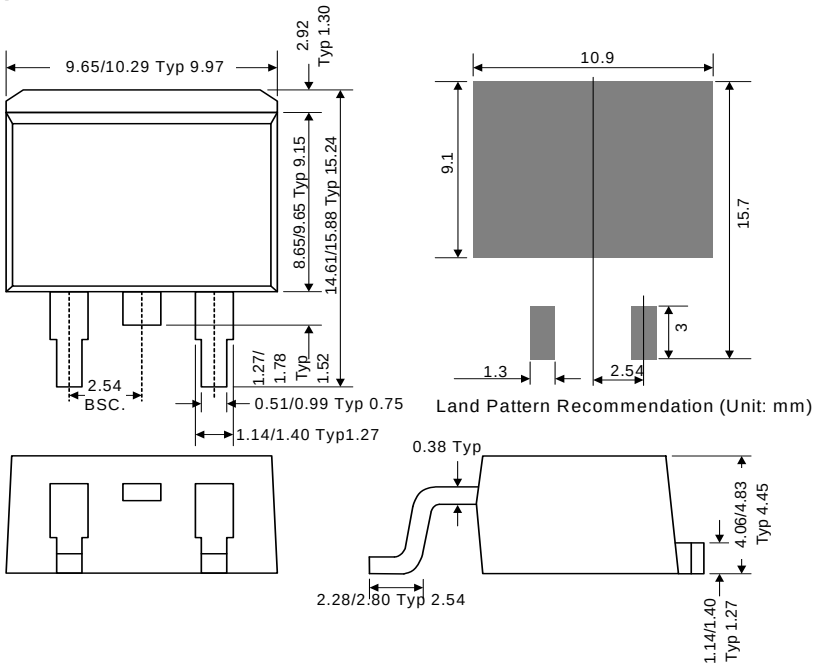


(3) Package Type: SOT89-3L

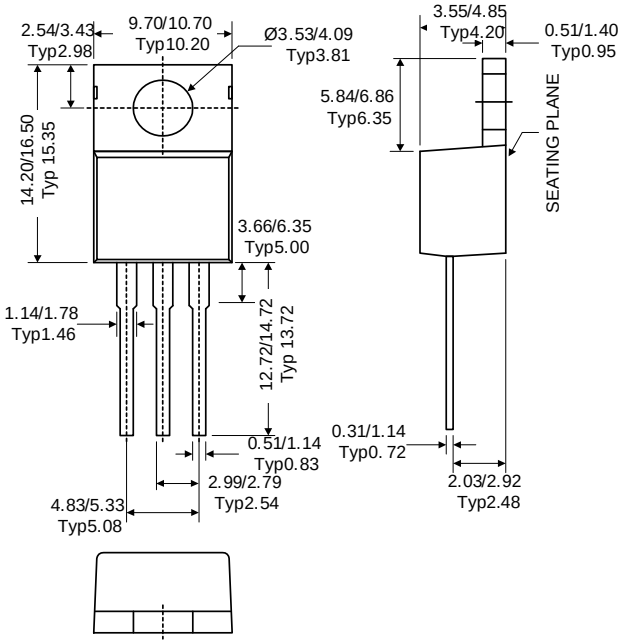


Package Information (Continued)

(4) Package Type: TO263-3L



(5) Package Type: TO220-3L



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