


TO-252-3L

TO-220F-3L

SN317M_x

[0.5 A Adjustable Output] Positive Voltage Regulator

Description

The SN317 is an adjustable 3-terminal positive voltage regulator capable of supplying in excess of 0.5A over an output voltage range of 1.2 V to 37 V. This voltage regulator is exceptionally easy to use and requires only two external resistors to set the output voltage. Further, it employs internal current limiting, thermal shutdown and safe area compensation, making it essentially blow-out proof.

This device can also be used to make a programmable output regulator, or by connecting a fixed resistor between the adjustment and output, the SN317 can be used as a precision current regulator.

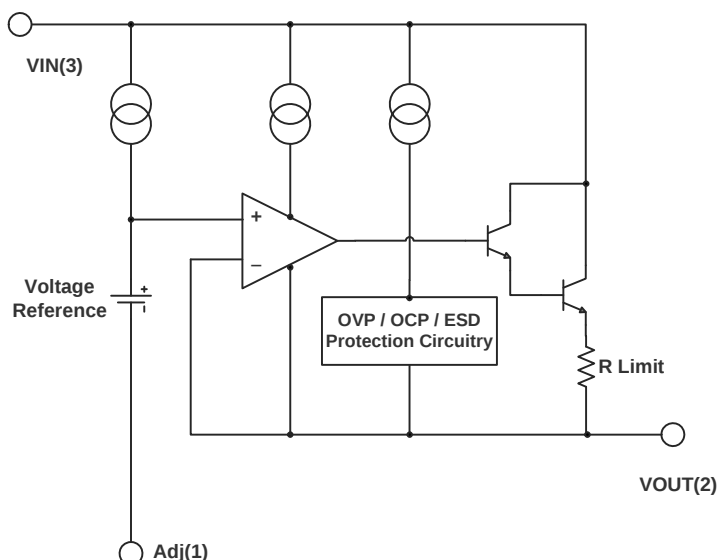
Application

- ◆ Consumer and personal electronics
- ◆ SMPS post-regulator / dc-to-dc modules
- ◆ High-efficiency linear power supplies
- ◆ LED Light Constant Current Controllers

Features and Benefits

- ◆ Output Current up to 0.5A
- ◆ Output Adjustable Level : 1.2V to 37V
- ◆ Built in OVP, CLP circuit.
- ◆ Built in TSD Protection.
- ◆ Output Transistor Safe Area Protection.
- ◆ Ultra High level of ESD [Built in ESD Protection Cell]

Equivalent Circuit



ORDERING INFORMATION

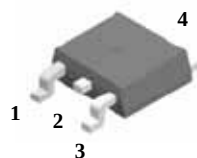
Product	Marking	Package
SN317MPI	SN317MPI	TO-220F-3L
SN317MD	SN317MD	TO-252-3L

▲ Marking Detail Information



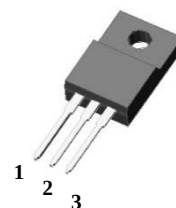
- ① AUK Logo
- ② Grade & M Code & Year & Week Code
- ③ Device Code

◆ Pin Configuration



TO-252-3L

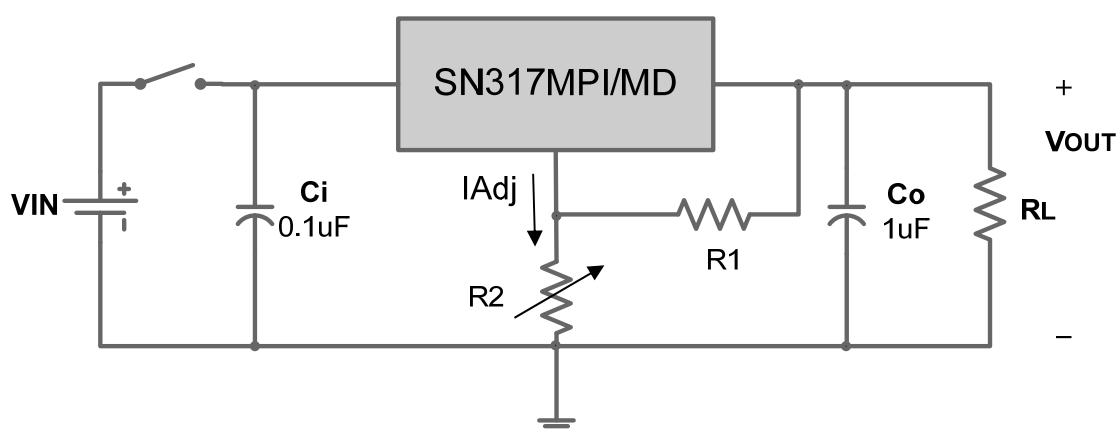
- 1: Adj.
- 2: V_{OUT}
- 3: V_{IN}
- 4: V_{OUT}



TO-220F-3L

- 1: Adj.
- 2: V_{OUT}
- 3: V_{IN}

◆ Standard Application



C_i is required if regulator is located an appreciable distance from power supply filter.

C_o is not needed for stability, however, it is necessary to improve transient response.

Since I_{Adj} is controlled to less than 0.1mA, the error associated with this term is insignificant in most applications.

$$V_{OUT} = V_{ref(1.25V)} \times (1 + R_2/R_1) + I_{adj}R_2$$

◆ **Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)**

Parameter		Symbol	Limits		Unit
			TO-220F-3L	TO-252-3L	
Input-Output Voltage Differential		$V_I - V_O$	40		V
Power Dissipation	TO-252-3L	P_D	Internally Limited		W
	TO-220F-3L				
Thermal Resistance Junction to Case		$R_{\theta JC}$	5.0	5.0	$^\circ\text{C}/\text{W}$
Thermal Resistance Junction to Air		$R_{\theta JA}$	65	92	$^\circ\text{C}/\text{W}$
Junction Temperature		T_J	150		$^\circ\text{C}$
Operate Temperature Range		T_{opr}	0 ~ +125		$^\circ\text{C}$
Storage Temperature Range		T_{stg}	-55 ~ +150		$^\circ\text{C}$

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the recommended operating conditions is not implied. Extended exposure to Stresses above the Recommended Operating Conditions may affect device reliability.

The maximum allowable power dissipation is a function of the maximum junction temperature, $T_{J(max)}$, the junction-to-ambient thermal resistance, θ_{JA} , and the ambient temperature, T_A .

The maximum allowable power dissipation at any ambient temperature is calculated using:

$PD(max) = (T_{J(max)} - T_A) \div \theta_{JA}$. Exceeding the maximum allowable power dissipation will result in excessive die temperature, and the regulator will go into thermal shutdown.

◆ Electrical characteristics

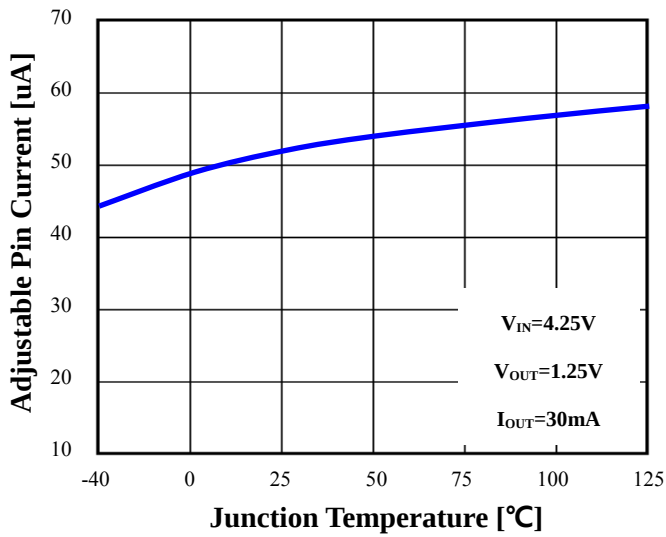
($V_I - V_O = 5V$, $I_O = 0.1A$, $T_J = 0^\circ C \sim 125^\circ C$, $P_{D_{MAX}} = 7.5W$; unless otherwise specified)

Characteristic	Symbol	Test Condition*		SN317Mx			Unit
				Min.	Typ.	Max.	
Line Regulation *	$\Delta V_{O(Line)}$	$3.0V \leq V_I - V_O \leq 40V$	$T_A = +25^{\circ}C$	-	0.01	0.04	% / V
		$3.0V \leq V_I - V_O \leq 40V$	$T_A = 0 \sim +125^{\circ}C$	-	0.02	0.07	
Load Regulation *	$\Delta V_{O(Load)}$	$10mA \leq I_O \leq 0.5A$ $T_A = +25^{\circ}C$	$V_O < 5V$ $V_O \geq 5V$	-	5.0 0.1	25.0 0.5	mV % / V_O
		$10mA \leq I_O \leq 0.5A$ $T_A = 0 \sim +125^{\circ}C$	$V_O < 5V$ $V_O \geq 5V$	-	20.0 0.3	70.0 1.5	mV % / V_O
Adjustable Pin Current	I_{ADJ}	-		-	50	100	uA
Adjustable Pin Current Change	ΔI_{ADJ}	$3.0V \leq V_I - V_O \leq 40V$ $10mA \leq I_O \leq 0.5A$, $P_D < P_{D_{MAX}}$		-	2.0	5.0	uA
Reference Voltage	V_{REF}	$3.0V \leq V_I - V_O \leq 40V$ $10mA \leq I_O \leq 0.5A$, $P_D < P_{D_{MAX}}$		1.20	1.25	1.30	V
Temperature Stability	ST_T	$0^{\circ}C \leq T_j \leq 125^{\circ}C$		-	1.0	-	% / V_O
Ripple Rejection	RR	$V_O = 10V$, $f = 120Hz$ without C_{ADJ}		-	65.0	-	dB
		$V_O = 10V$, $f = 120Hz$, $C_{ADJ} = 10uF$ **		-	80.0	-	
Output Noise Voltage	V_{NO}	$10Hz \leq f \leq 100kHz$	$T_A = 25^{\circ}C$	-	0.003	-	%
Minimum Load Current to Maintain Regulation	$I_{L(MIN)}$	$V_I - V_O = 40V$		-	3.5	10.0	mA
Maximum Output Current	$I_{O(MAX)}$	$V_I - V_O \leq 15V$, $P_D < P_{D_{MAX}}$	$T_A = 25^{\circ}C$	0.5	0.9	-	A
		$V_I - V_O \leq 40V$, $P_D < P_{D_{MAX}}$		0.15	0.25	-	
Long-Term Stability	ST	$T_A = +25^{\circ}C$ for end point measurements, 1000HR		-	0.3	1.0	%

* Load and line regulation are specified at constant temperature. Change in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

** C_{ADJ} is connected between the adjustable pin and ground.

**Fig.1 Adjustable Pin Current
vs. Junction Temperature**



**Fig.2 Output Peak Current
vs. Input to Output Differential**

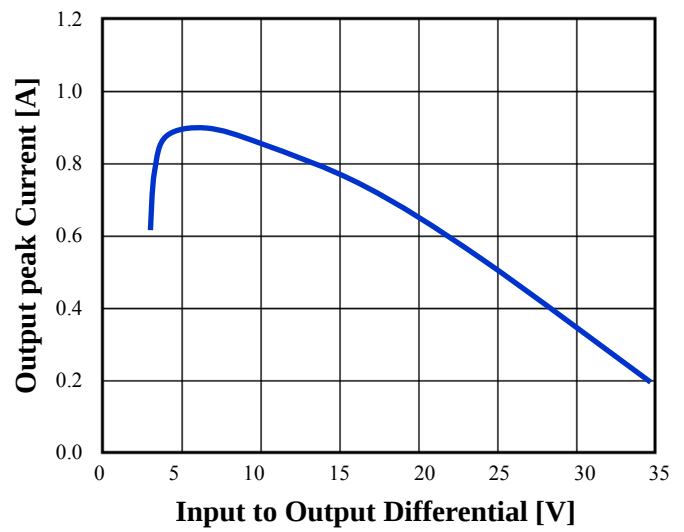


Fig.3 Output Voltage vs. Junction Temperature

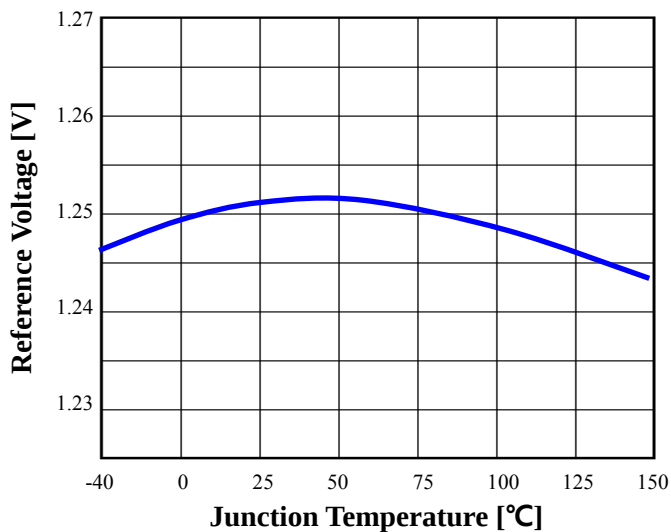


Fig.4 Dropout Voltage vs. Input Voltage

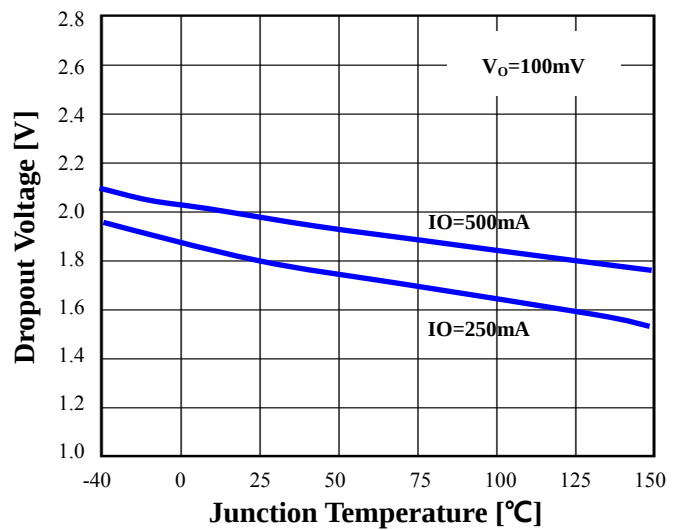


Fig.5 Line Transient Response

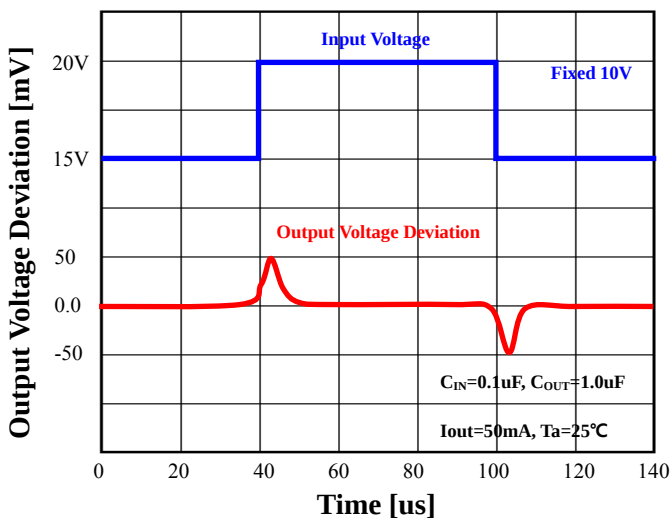
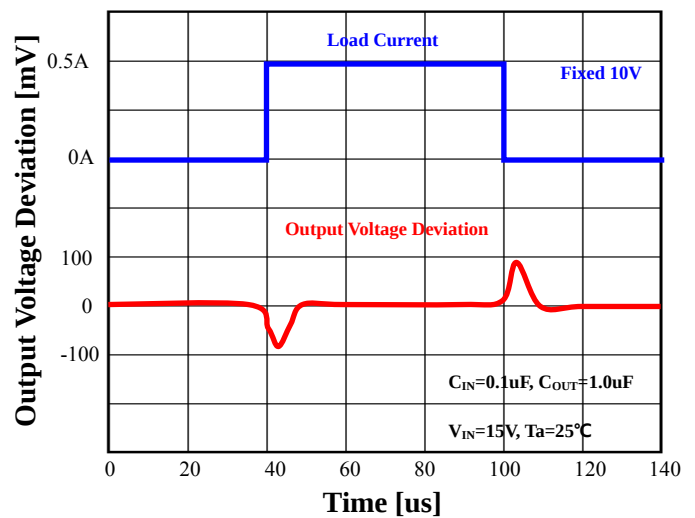
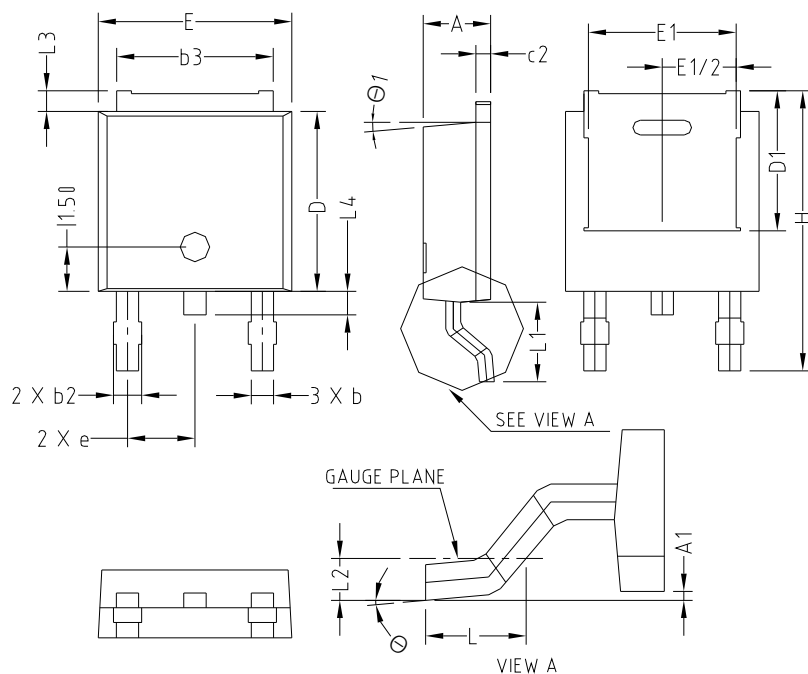


Fig.6 Load Transient Response

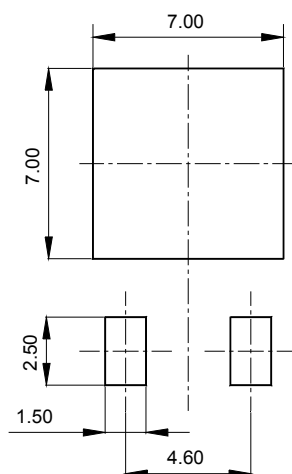


◆ TO-252-3L Outline Dimension (Unit : mm)

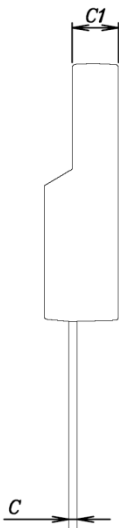
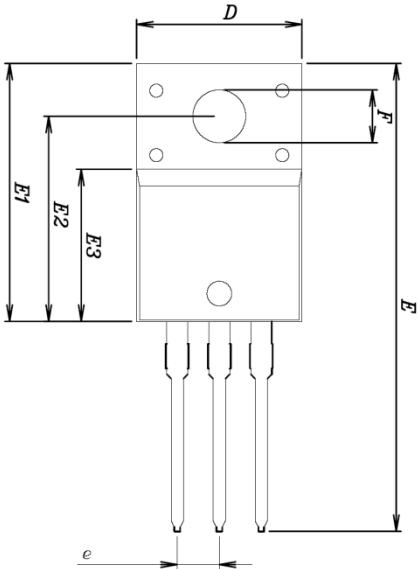


SYMBOL	MILLIMETERS			NOTE
	MINIMUM	NOMINAL	MAXIMUM	
A	2.20	2.30	2.40	
A1	0.00		0.127	
b	0.66	0.76	0.86	
b2	-	-	0.96	
b3	5.04	5.34	5.64	
c2	0.40	0.50	0.60	
D	5.90	6.10	6.30	
D1	14.75			
E	6.40	6.60	6.80	
E1	15.04			
e	2.30 BSC			
H	9.20	9.50	9.80	
L	1.27	1.47	1.67	
L1	2.50	2.70	2.90	
L2	0.508 BSC			
L3	0.50	0.70	0.90	
L4	0.60	0.80	1.00	
Θ	0°	-	10°	
Θ 1	5°			

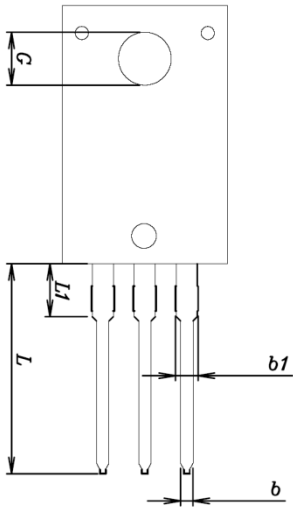
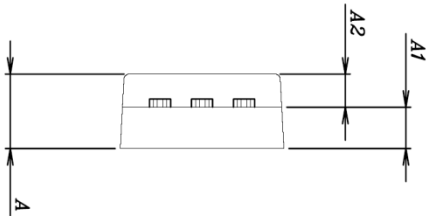
※ Recommend PCB solder land [Unit: mm]



◆ TO-220F-3L Outline Dimension (Unit : mm)



SYMBOL	MILLIMETERS			NOTE
	MINIMUM	NOMINAL	MAXIMUM	
A	—	—	4.60	
A1	2.45	2.50	2.55	
A2	1.95	2.00	2.05	
b	0.65	0.75	0.85	
b1	1.07	1.27	1.47	
C	0.40	0.50	0.60	
C1	2.70	2.80	2.90	
D	9.90	10.00	10.10	
E	28.00	—	28.60	
E1	15.50	15.60	15.70	
E2	12.30	12.40	12.50	
E3	9.15	9.20	9.25	
F	3.10	3.20	3.30	
G	3.30	3.40	3.50	
e	2.54 BSC			
L	12.40	—	13.00	
L1	3.46 BSC			



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