
**TO-220F-3L**

**TO-252-3L**

**D2PAK**

### Description

The SN317 is an adjustable 3-terminal positive voltage regulator capable of supplying in excess of 1.5 A 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

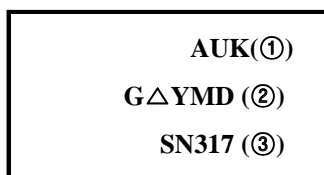
### Features and Benefits

- ◆ Output Current up to 1.5A
- ◆ 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 ]

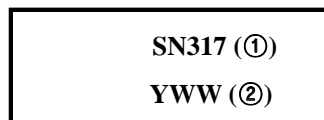
### ORDERING INFORMATION

Product	Marking	Package
SN317PI	SN317	TO-220F-3L
SN317D	SN317	TO252-3L
SN317D2	SN317	D2PAK

#### ▲ Marking Detail Information

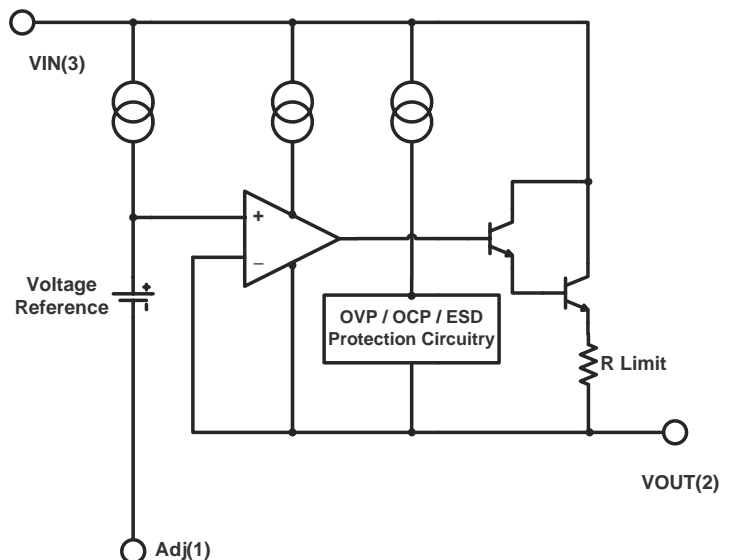


- ① AUK Logo
- ② Grade & M Code & Y/M/D Code
- ③ Device Code [ TO220F-3L / D2PAK ]

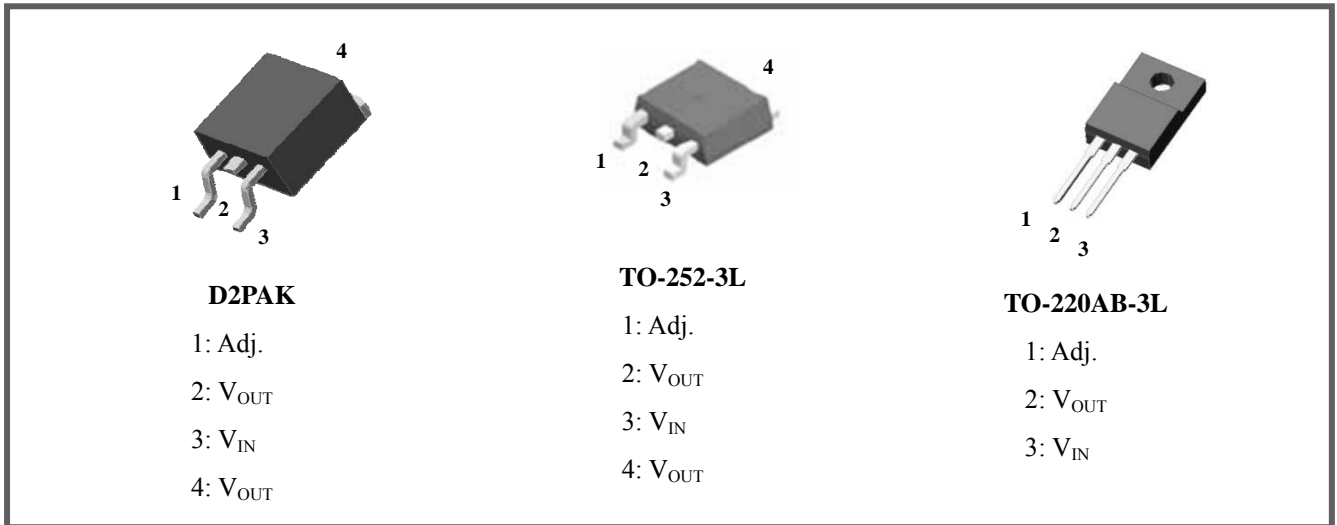


- ① Device Code [ TO252-3L ]
- ② Year & Week Code

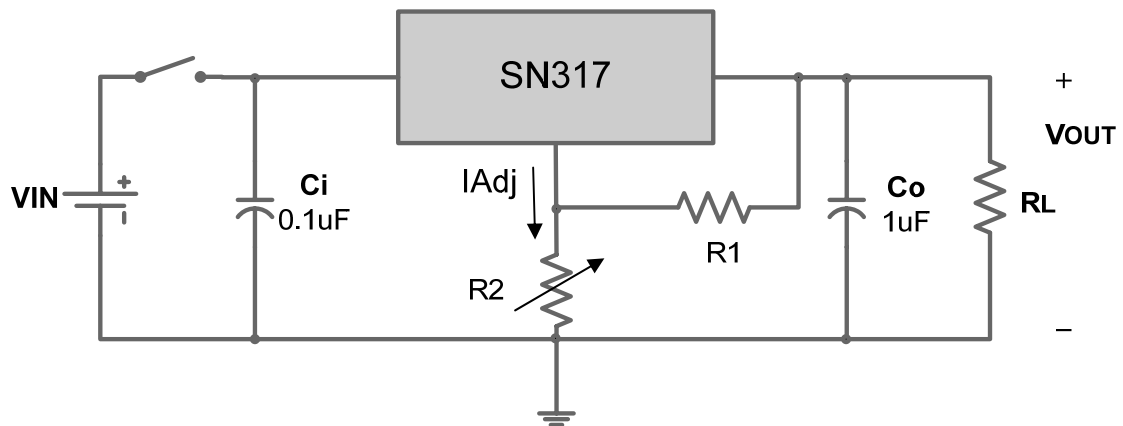
### Equivalent Circuit



## ◆ Pin Configuration



## ◆ 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	D2PAK	
Input-Output Voltage Differential		$V_I-V_O$	40			V
Power Dissipation	D2PAK	$P_d$	Internally Limited			W
	TO-252-3L					
	TO-220F-3L					
Thermal Resistance Junction to Case		$R_{\theta JC}$	5.0	5.0	5.0	$^\circ\text{C}/\text{W}$
Thermal Resistance Junction to Air		$R_{\theta JA}$	65	92	72	$^\circ\text{C}/\text{W}$
Junction Temperature		$T_J$	150			$^\circ\text{C}$
Operating Junction 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,  $\theta_{JA}$ , 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

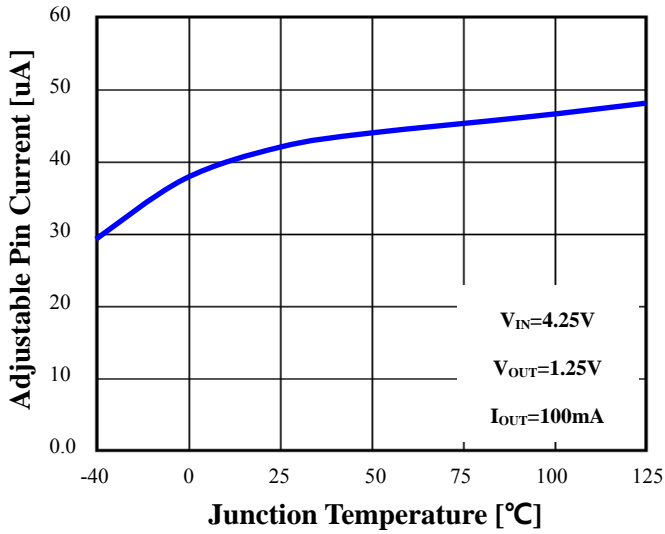
( $V_I - V_O = 5V$ ,  $I_O = 0.5A$ ,  $I_{MAX} = 1.5A$ ,  $T_J = 0^\circ C \sim 125^\circ C$ ,  $P_{DMAX} = 20W$  ; unless otherwise specified )

Characteristic	Symbol	Test Condition*		SN317x			Unit
				Min.	Typ.	Max.	
Line Regulation *	$\Delta V_{O(Line)}$	$3.0V \leq V_I - V_O \leq 40V$ $I_O = 10mA$	$T_A = +25^\circ C$	-	0.01	0.04	% / V
		$3.0V \leq V_I - V_O \leq 40V$ $I_O = 10mA$	$T_A = 0 \sim +125^\circ C$	-	0.02	0.07	
Load Regulation *	$\Delta V_{O(Load)}$	$10mA \leq I_O \leq I_{MAX}$ $T_A = +25^\circ C$	$V_O < 5V$ $V_O \geq 5V$	-	18.0 0.4	25.0 0.5	mV % / $V_O$
		$10mA \leq I_O \leq I_{MAX}$ $T_A = 0 \sim +125^\circ C$	$V_O < 5V$ $V_O \geq 5V$	-	40.0 0.8	70.0 1.5	mV % / $V_O$
Adjustable Pin Current	$I_{ADJ}$	-		-	50	100	$\mu A$
Adjustable Pin Current Change	$\Delta I_{ADJ}$	$3.0V \leq V_I - V_O \leq 40V$ $10mA \leq I_O \leq I_{MAX}$ , $P_D \leq P_{DMAX}$		-	2.0	5.0	$\mu A$
Reference Voltage	$V_{REF}$	$3.0V \leq V_I - V_O \leq 40V$ $10mA \leq I_O \leq I_{MAX}$ , $P_D \leq P_{DMAX}$		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
		$V_O = 10V$ , $f = 120Hz$ , $C_{ADJ} = 10\mu F$ **		-	75.0	-	
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	12.0	mA
Maximum Output Current	$I_{O(MAX)}$	$V_I - V_O \leq 15V$ , $P_D \leq P_{DMAX}$	$T_A = 25^\circ C$	1.0	2.2	-	A
		$V_I - V_O \leq 40V$ , $P_D \leq P_{DMAX}$		-	0.3	-	
Long-Term Stability	ST	$T_A = +25^\circ C$ for end point measurements, 1000HR		-	0.3	1.0	%

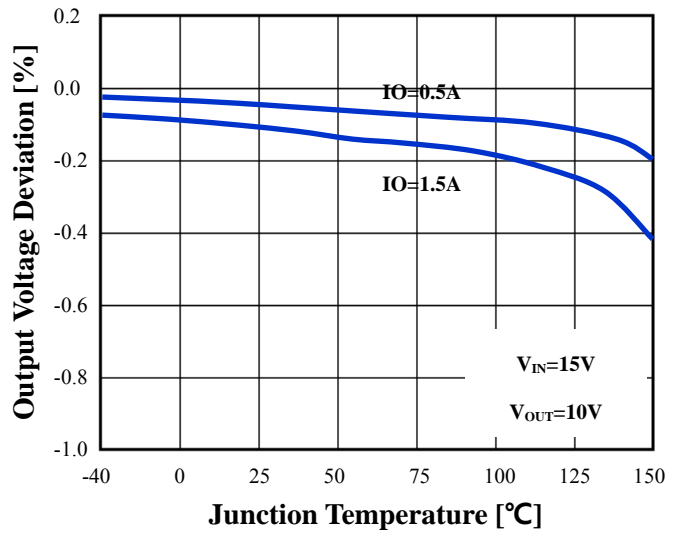
\* Load and line regulation are specified at constant temperature. Change in  $V_O$  due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

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

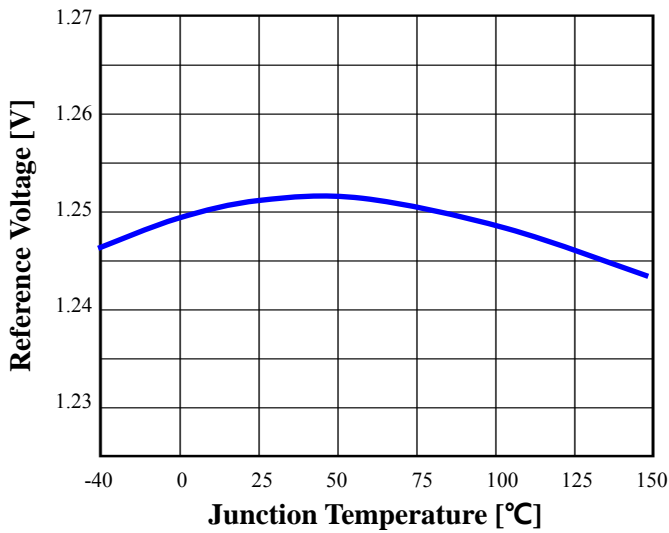
**Fig.1 Adjustable Pin Current vs. Junction Temperature**



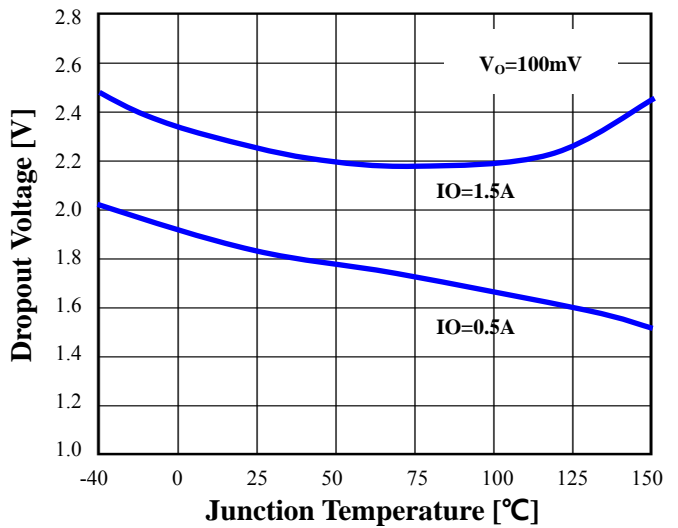
**Fig.2 Load Regulation**



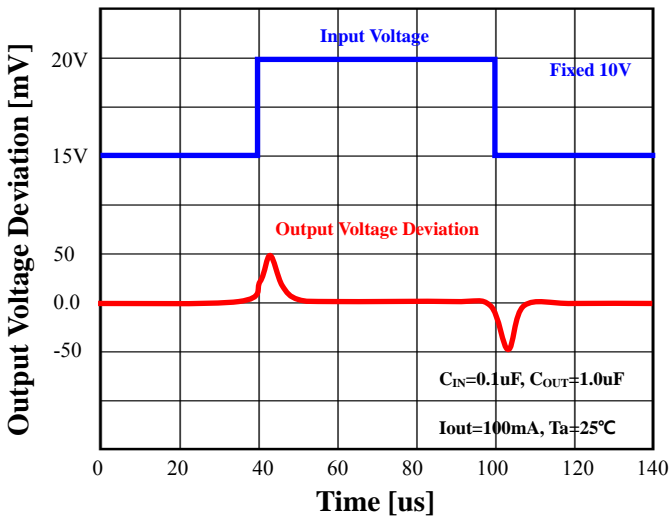
**Fig.3 Output Voltage vs. Junction Temperature**



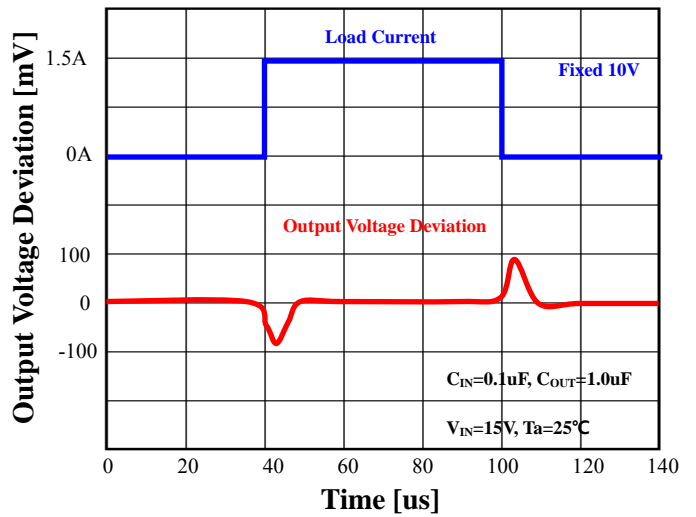
**Fig.4 Dropout Voltage vs. Input Voltage**



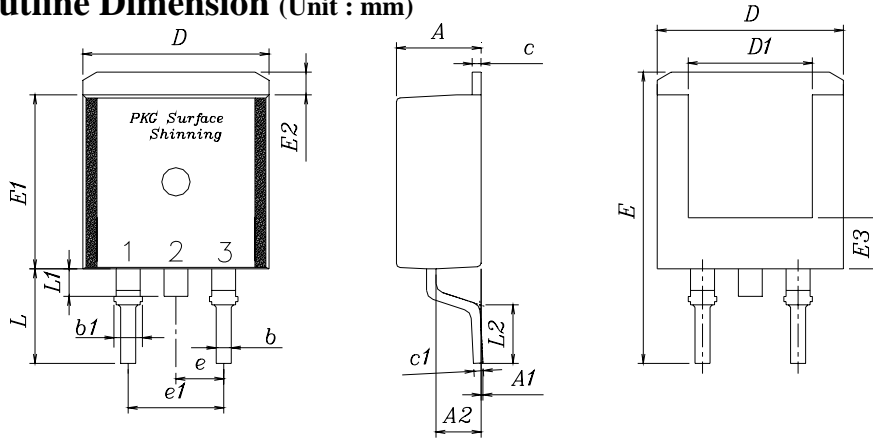
**Fig.5 Line Transient Response**



**Fig.6 Load Transient Response**

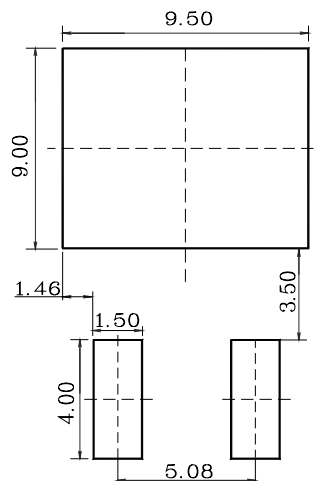


## ◆ D2PAK Outline Dimension (Unit : mm)

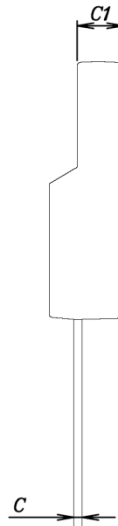
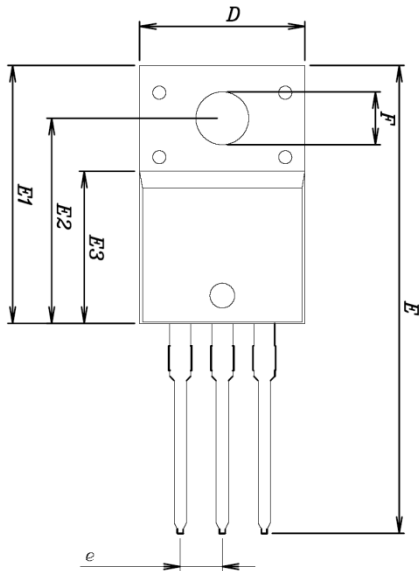


SYMBOL	MILLIMETERS			NOTE
	MINIMUM	NOMINAL	MAXIMUM	
A	4.35	4.50	4.65	
A1	—	—	0.15	
A2	2.20	2.40	2.60	
b	0.70	0.80	0.90	
b1	1.17	1.27	1.37	
c	0.40	0.50	0.60	
c1	0.40	0.50	0.60	
D	9.80	10.00	10.20	
D1	6.40	6.60	6.80	
E	15.00	15.40	15.80	
E1	9.05	9.20	9.35	
E2	1.00	1.20	1.40	
E3	2.50	2.70	2.90	
e	2.34	2.54	2.74	
e1	4.88	5.08	5.28	
L	4.60	5.00	5.40	
L1	1.40	1.45	1.50	
L2	2.50	—	—	

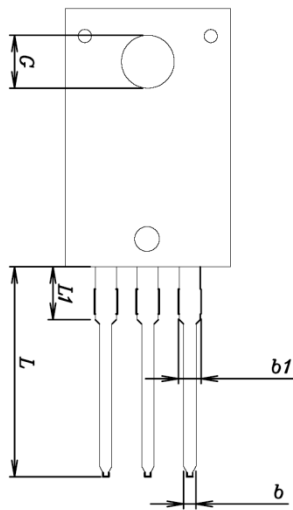
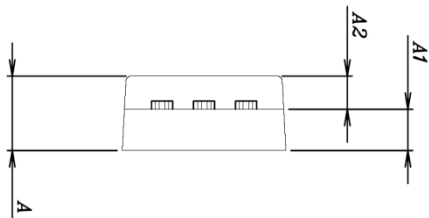
### ※ Recommend PCB solder land [Unit: mm]



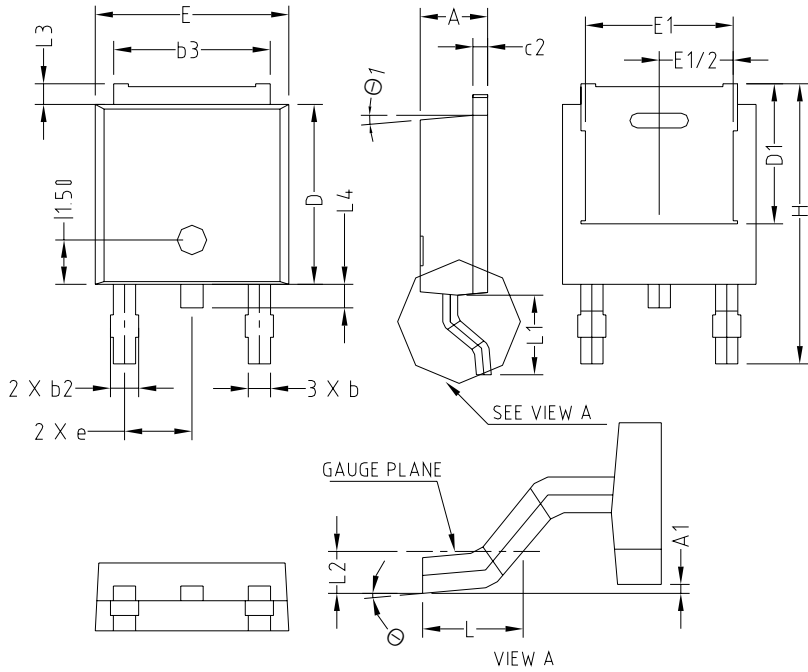
◆ **TO-220F-3L Outline Dimension** (Unit : mm)



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			

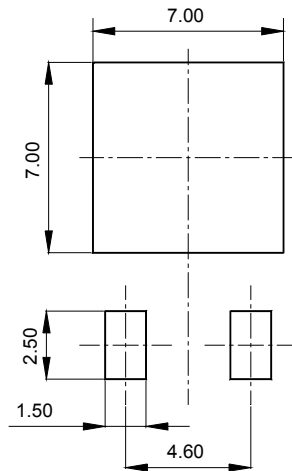


◆ TO-252-3L Outline Dimension (Unit : mm)



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	4.75			
E	6.40	6.60	6.80	
E1	5.04			
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°	
Θ1	5°			

※ Recommend PCB solder land [Unit: mm]



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