

### GENERAL DESCRIPTION

The L1117 Series are positive and low drop-out three-terminal voltage regulators with 1A output current capability. These devices are designed for use in low voltage applications that offers lower dropout voltage and faster transient response.

These devices are fully protected against over current faults, over temperature operation, reversed input polarity, reversed lead insertion, transient voltage spike ...etc.

On-Chips trimming the reference voltage to 2% and features the low dropout of maximum 1.45 volts.

The L1117 Series regulators offer fixed and adjustable voltage options available in the popular industry standard SOT-223, TO-220, TO-252 and TO-263 packages.

### FEATURES

- Fixed 2.5V, 2.85V, 3.3V, 5V or adjustable output voltage
- Low dropout voltage: 1.2V typical at up to 1A
- Low ground current
- Fast transient response
- Current & thermal limiting
- Line regulation: 0.5% typical
- Load regulation: 0.5% typical
- SOT-223, TO-220, TO-252, TO-263 package

### APPLICATIONS

- 2.85V active SCSI terminators
- 8-12V to 5V linear regulators
- 5V to 2.5V or 3.3V linear regulators
- Low voltage microcontrollers
- Battery Chargers
- Motherboard clock supplies
- Post regulator for switching supplies
- Micro-controllers

### ABSOLUTE MAXIMUM RATINGS

● Maximum Supply Voltage	15V*	● Operating Junction Temperature Range	0 to 125 °C
● Power Dissipation	Internally Limited	● Storage Temperature Range	-40 to 150 °C
● Thermal Resistance Junction to Case, $\theta_{JC}$	16 °C/W	● Lead Temperature (Soldering, 10 Seconds)	260 °C
● Thermal Resistance Junction to Ambient, $\theta_{JA}$			
SOT-223	158 °C/W		
TO-252	70 °C/W		
TO-220	50 °C/W		
TO-263	60 °C/W		

\* When considering short circuits to ground, the maximum input-to-output differential voltage shall not be allowed greater than approximate 2~3V at values of supply voltage in excess of 10V, continuous short-circuits can exceed the power dissipation ratings and cause eventual destruction.

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**ELECTRICAL CHARACTERISTICS for ADJUSTABLE** (Unless otherwise specified,  $T_A = 25^\circ\text{C}$ )

Parameter	Symbol	Test Conditions	Typical	Limits
Reference Voltage (Adjustable version)	$V_{REF}$	$V_{IN} = 5V, I_{OUT} = 10mA$	1.25V	$1.23V_{Min}$ $1.27V_{Max}$
Output Voltage (Fixed version)	$V_O$	$V_{IN} = 5V, I_{OUT} = 10mA$	$V_O$	$0.98V_{O(Min)}$ $1.02V_{O(Max)}$
Dropout Voltage	$V_D$	$\Delta V_{REF} = 1\%, I_{OUT} = 1A$	1.2V	1.45V
Line Regulation	$REG_{(LINE)}$	$(V_{OUT} + 1.5V) \leq V_{IN} \leq 15V, I_{OUT} = 10mA$	0.5%	2%
Load Regulation	$REG_{(LOAD)}$	$(V_{IN} - V_{OUT}) = 2V, 10mA \leq I_{OUT} \leq 1A$	0.5%	2.5%
Minimum Load Current	$I_O$	$1.5V \leq (V_{IN} - V_{OUT}) \leq 5.75V$	10mA	
Adjust Pin Current	$I_{ADJ}$		55 $\mu$ A	100 $\mu$ A
Current Limit	$I_{CL}$	$V_{IN} - V_{OUT} = 2V$	1.2A	1.1A (Min)
RMS Output Noise	$V_N$		0.003% of $V_{OUT}$	
Ripple Rejection Ratio	$R_A$	$f = 120Hz, C_{ADJ} = 22\mu F$ for ADJ pin, $V_{IN} = 5V, I_{OUT} = 1A$	72dB	60dB (Min)

**ELECTRICAL CHARACTERISTICS for L1117-2.5** (Unless otherwise specified,  $T_A = 25^\circ\text{C}$ )

Parameter	Symbol	Test Conditions	Typical	Limits
Output Voltage (Fixed version)	$V_O$	$V_{IN} = 5V, I_{OUT} = 10mA$	$V_O$	$2.45V_{(Min)}$ $2.55V_{(Max)}$
Dropout Voltage	$V_D$	$\Delta V_O = 1\%, I_{OUT} = 1A$	1.2V	1.45V
Line Regulation	$REG_{(LINE)}$	$(V_{OUT} + 1.5V) \leq V_{IN} \leq 15V, I_{OUT} = 10mA$	0.5%	2.0%
Load Regulation	$REG_{(LOAD)}$	$(V_{IN} - V_{OUT}) = 2V, 10mA \leq I_{OUT} \leq 1A$	0.5%	2.0%
Minimum Load Current	$I_O$	$1.5V \leq (V_{IN} - V_{OUT}) \leq 5.75V$	10mA	
GND Pin Current	$I_{GND}$		55 $\mu$ A	100 $\mu$ A
Current Limit	$I_{CL}$	$V_{IN} - V_{OUT} = 2V$	1.2A	1.1A (Min)
RMS Output Noise	$V_N$		0.003% of $V_{OUT}$	
Ripple Rejection Ratio	$R_A$	$f = 120Hz, C_O = 22\mu F, V_{IN} = 5V,$ $I_{OUT} = 1A$	72dB	60dB (Min)

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**ELECTRICAL CHARACTERISTICS for L1117-2.85**(Unless otherwise specified,  $T_A = 25^\circ\text{C}$ )

Parameter	Symbol	Test Conditions	Typical	Limits
Output Voltage (Fixed version)	$V_O$	$V_{IN} = 5V, I_{OUT} = 10mA$	$V_O$	$2.793V_{(Min)}$ $2.907V_{(Max)}$
Dropout Voltage	$V_D$	$\Delta V_O = 1\%, I_{OUT} = 1A$	1.2V	1.45V
Line Regulation	$REG_{(LINE)}$	$(V_{OUT} + 1.5V) \leq V_{IN} \leq 8V, I_{OUT} = 10mA$	0.5%	2.0%
Load Regulation	$REG_{(LOAD)}$	$(V_{IN} - V_{OUT}) = 2V, 10mA \leq I_{OUT} \leq 1A$	0.5%	2.0%
Minimum Load Current	$I_O$	$1.5V \leq (V_{IN} - V_{OUT}) \leq 5.75V$	10mA	
GND Pin Current	$I_{GND}$		55 $\mu A$	100 $\mu A$
Current Limit	$I_{CL}$	$V_{IN} - V_{OUT} = 2V$	1.2A	1.1A (Min)
RMS Output Noise	$V_N$		0.003% of $V_{OUT}$	
Ripple Rejection Ratio	$R_A$	$f = 120Hz, C_o = 22\mu F, V_{IN} = 5V,$ $I_{OUT} = 1A$	72dB	60dB (Min)

**ELECTRICAL CHARACTERISTICS for L1117-3.3**(Unless otherwise specified,  $T_A = 25^\circ\text{C}$ )

Parameter	Symbol	Test Conditions	Typical	Limits
Output Voltage (Fixed version)	$V_O$	$V_{IN} = 5V, I_{OUT} = 10mA$	$V_O$	$3.234V_{(Min)}$ $3.367V_{(Max)}$
Dropout Voltage	$V_D$	$\Delta V_O = 1\%, I_{OUT} = 1A$	1.2V	1.45V
Line Regulation	$REG_{(LINE)}$	$(V_{OUT} + 1.5V) \leq V_{IN} \leq 15V, I_{OUT} = 10mA$	0.5%	2.0%
Load Regulation	$REG_{(LOAD)}$	$(V_{IN} - V_{OUT}) = 2V, 10mA \leq I_{OUT} \leq 1A$	0.5%	2.0%
Minimum Load Current	$I_O$	$1.5V \leq (V_{IN} - V_{OUT}) \leq 5.75V$	10mA	
GND Pin Current	$I_{GND}$		55 $\mu A$	100 $\mu A$
Current Limit	$I_{CL}$	$V_{IN} - V_{OUT} = 2V$	1.2A	1.1A (Min)
RMS Output Noise	$V_N$		0.003% of $V_{OUT}$	
Ripple Rejection Ratio	$R_A$	$f = 120Hz, C_o = 22\mu F, V_{IN} = 5V,$ $I_{OUT} = 1A$	72dB	60dB (Min)

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**ELECTRICAL CHARACTERISTICS for L1117-5**(Unless otherwise specified,  $T_A = 25\text{ }^{\circ}\text{C}$ )

Parameter	Symbol	Test Conditions	Typical	Limits
Output Voltage (Fixed version)	$V_O$	$V_{IN} = 8\text{V}$ , $I_{OUT} = 10\text{mA}$	$V_O$	$4.90\text{V}_{(\text{Min})}$ $5.10\text{V}_{(\text{Max})}$
Dropout Voltage	$V_D$	$\Delta V_O = 1\%$ , $I_{OUT} = 1\text{A}$	1.2V	1.45V
Line Regulation	$\text{REG}_{(\text{LINE})}$	$(V_{OUT} + 1.5\text{V}) \leq V_{IN} \leq 15\text{V}$ , $I_{OUT} = 10\text{mA}$	0.5%	1.0%
Load Regulation	$\text{REG}_{(\text{LOAD})}$	$(V_{IN} - V_{OUT}) = 2\text{V}$ , $10\text{mA} \leq I_{OUT} \leq 1\text{A}$	0.5%	1.0%
Minimum Load Current	$I_O$	$1.5\text{V} \leq (V_{IN} - V_{OUT}) \leq 5.75\text{V}$	10mA	
GND Pin Current	$I_{\text{GND}}$		55 $\mu\text{A}$	100 $\mu\text{A}$
Current Limit	$I_{\text{CL}}$	$V_{IN} - V_{OUT} = 2\text{V}$	1.2A	1.1A (Min)
RMS Output Noise	$V_N$		0.003% of $V_{OUT}$	
Ripple Rejection Ratio	$R_A$	$f = 120\text{Hz}$ , $C_O = 22\mu\text{F}$ , $V_{IN} = 8\text{V}$ , $I_{OUT} = 1\text{A}$	72dB	60dB (Min)

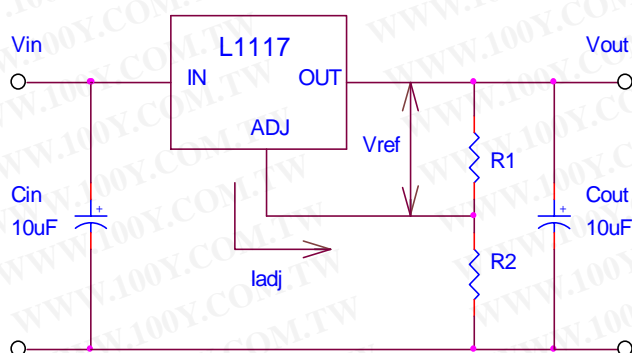
**DEVICE SELECTION GUIDE**

Device	L1117L	L1117D	L1117L-2.5	L1117L-2.85	L1117L-3.3	L1117D-3.3	L1117L-5
Voltage Version	ADJ	ADJ	2.5	2.85	3.3	3.3	5
Package	SOT-223	TO-252	SOT-223	SOT-223	SOT-223	TO-252	SOT-223
Marking	L1117L	L1117D	L1117L-2.5	L1117L-2.85	L1117L-3.3	L1117D-3.3	L1117L-5

Device	L1117D-5	L1117T	L1117T-3.3	L1117T-5	L1117S-5
Voltage Version	5	ADJ	3.3	5	5
Package	TO-252	TO-220	TO-220	TO-220	TO-263
Marking	L1117D-5	L1117T	L1117T-3.3	L1117T-5	L1117S-5

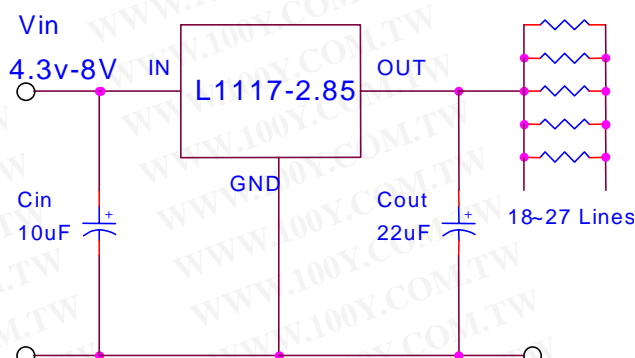
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### TYPICAL APPLICATION



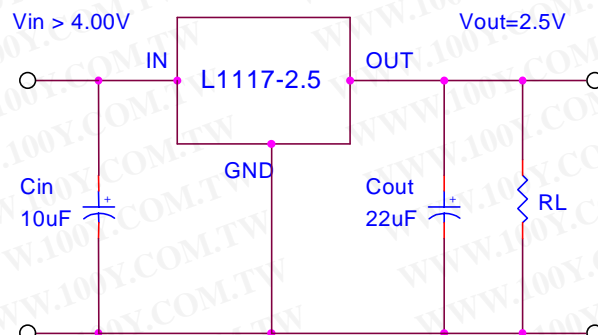
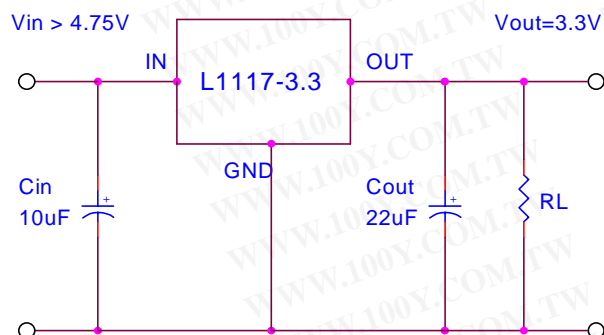
$$V_o = V_{ref} (1 + R_2/R_1) + I_{adj} \times R_2$$

1. Cin needed if device is far from filter capacitors.
2. Cout required for stability.



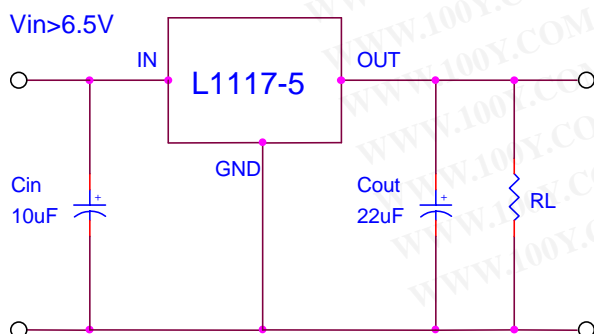
### - Basic Adjustable Regulator Circuit -

### - Active SCSI Bus Terminators -



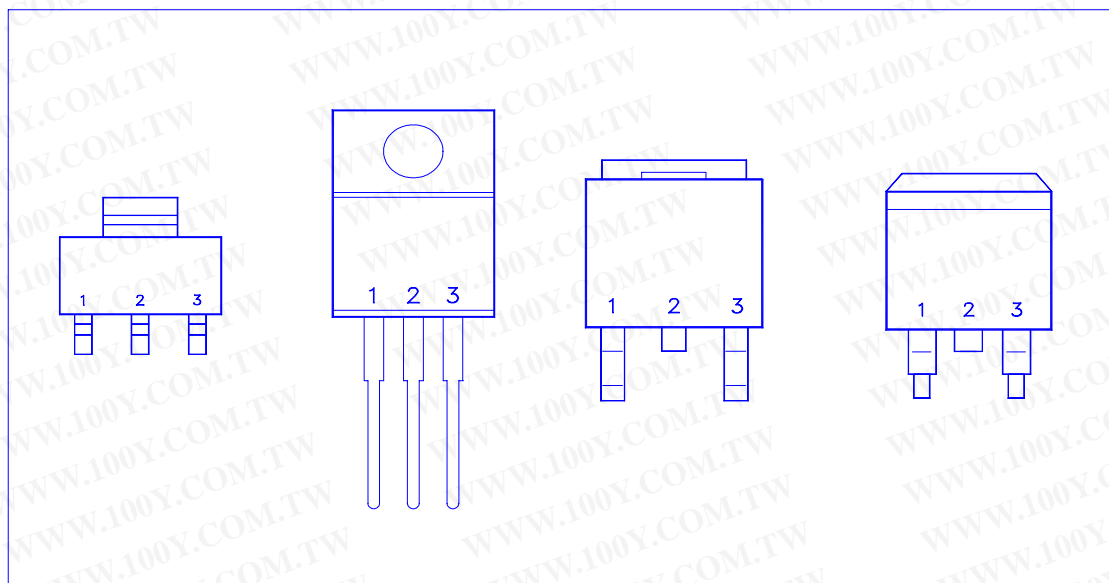
### Basic Fixed Output Regulator Circuit

### Basic Fixed Output Regulator Circuit



### Basic Fixed Output Regulator Circuit

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**PIN CONFIGURATIONS**

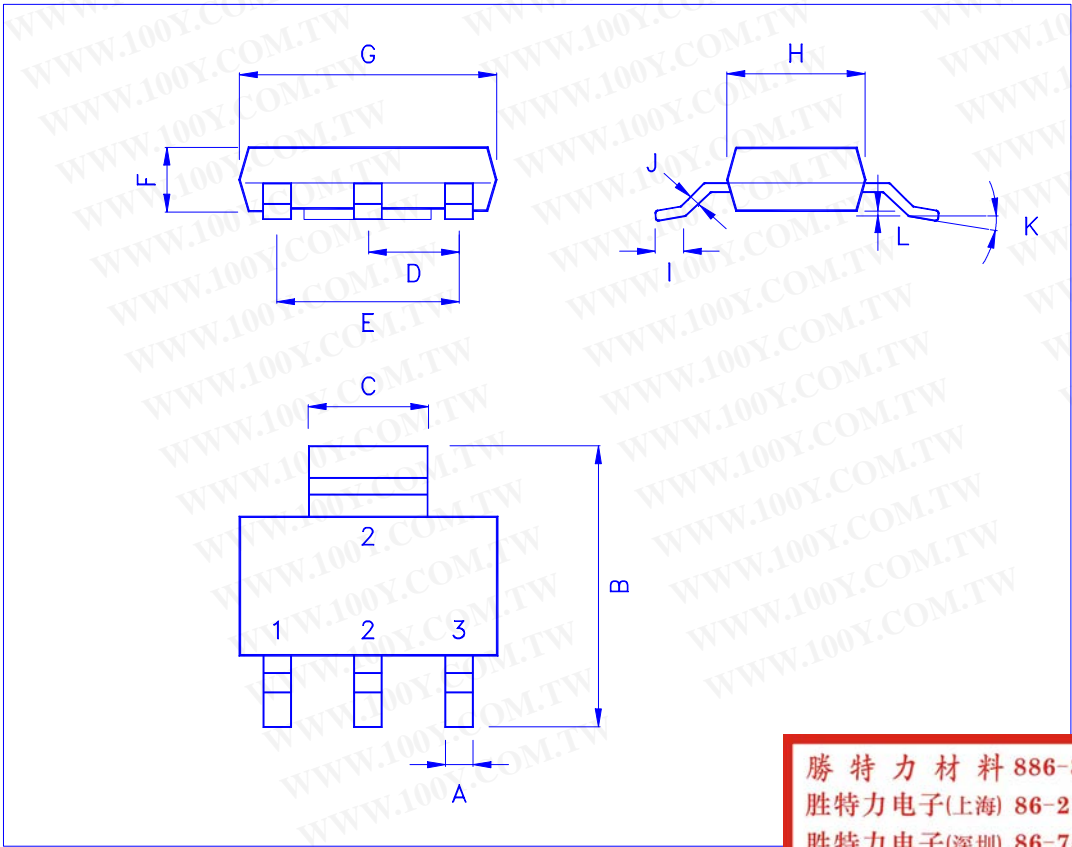
Pin #	Function
1	Adjust/Ground
2	Output
3	Input

**Note: TAB is Output Pin**

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SOT-223 MECHANICAL DATA

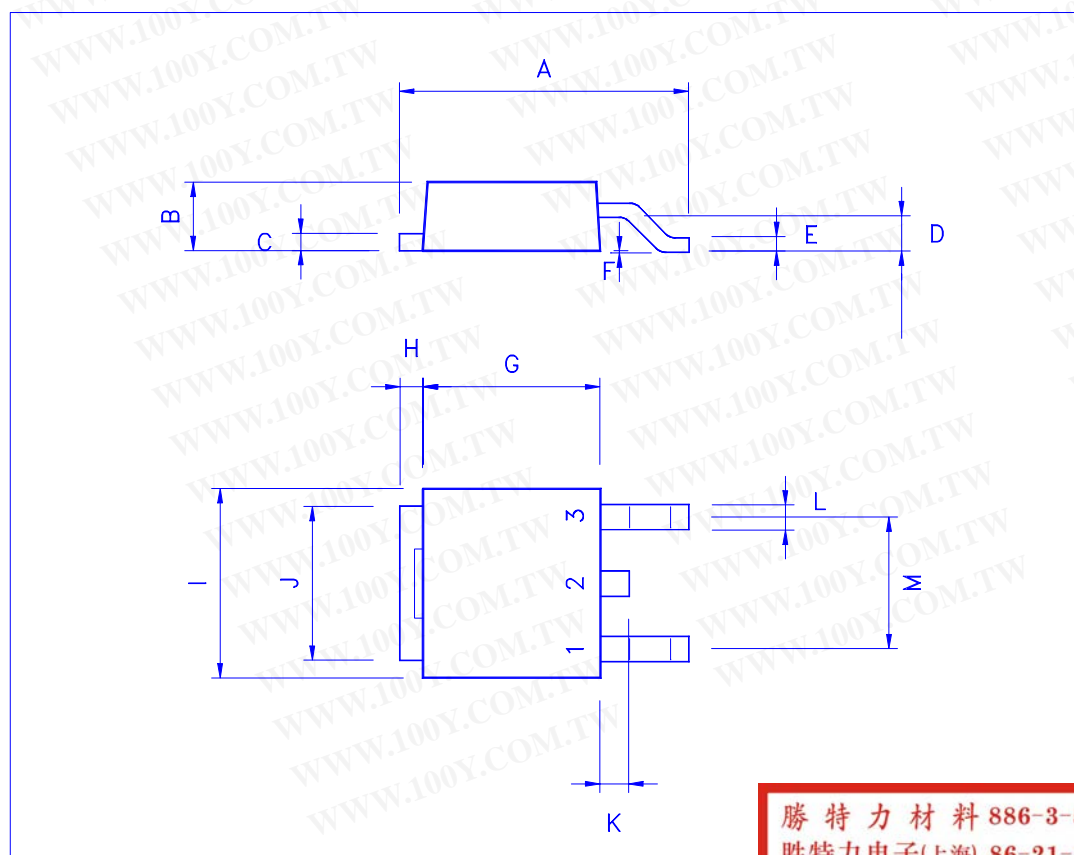
Dimension	mm			Dimension	mm		
	Min.	Typ.	Max.		Min.	Typ.	Max.
A	0.67	0.7	0.73	H	3.3	3.5	3.7
B	6.7	7	7.3	I	0.63	0.65	0.67
C	2.9	3	3.1	J		0.32	0.4
D	2.27	2.3	2.33	K	0°		10°
E	4.57	4.6	4.63	L	0.03		0.1
F	1.5	1.6	1.7	M			
G	6.3	6.5	6.7	N			



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**TO-252 (DPAK) MECHANICAL DATA**

Dimension	mm			Dimension	mm		
	Min.	Typ.	Max.		Min.	Typ.	Max.
A	9.35		10.1	H		0.8	
B	2.2		2.4	I	6.4		6.6
C	0.48		0.6	J	5.2		5.4
D	0.89		1.5	K	0.6		1
E	0.45		0.6	L	0.64		0.9
F	0.03		0.23	M	4.4		4.6
G	6		6.2	N			

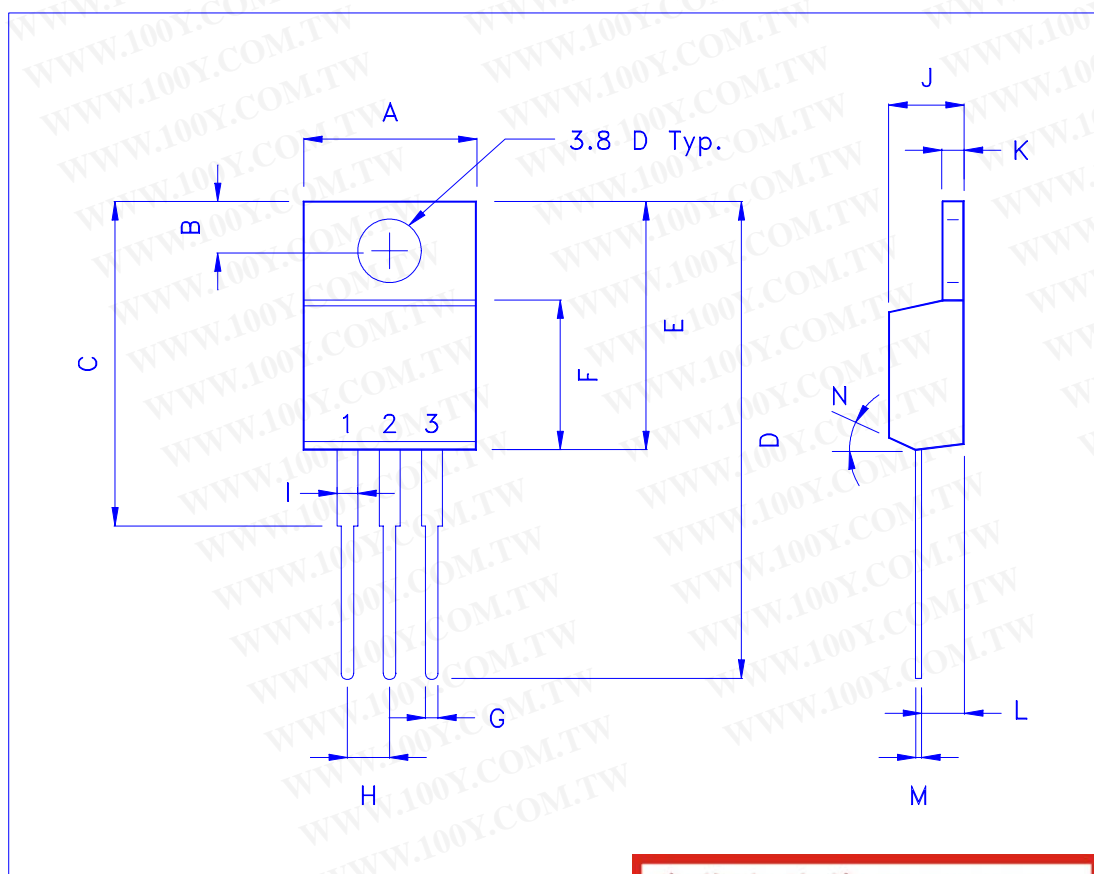


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**TO-220 (3-Lead) MECHANICAL DATA**

Dimension	mm			Dimension	mm		
	Min.	Typ.	Max.		Min.	Typ.	Max.
A	9.78	10.16	10.54	H	2.4	2.54	2.68
B	2.61	2.74	2.87	I	1.19	1.27	1.35
C		20		J	4.4	4.6	4.8
D	28.5	28.9	29.3	K	1.14	1.27	1.4
E	14.6	15.0	15.4	L	2.3	2.6	2.9
F	8.4	8.8	9.2	M	0.26	0.46	0.66
G	0.72	0.8	0.88	N		7°	



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TO-263 (D<sup>2</sup>PAK) MECHANICAL DATA

Dimension	mm			Dimension	mm		
	Min.	Typ.	Max.		Min.	Typ.	Max.
A	14.5	15	15.8	H	1.0	1.5	1.8
B	4.2		4.7	I	9.8		10.3
C	1.20		1.35	J		6.5	
D		2.8		K		1.5	
E	0.3	0.4	0.5	L	0.7		1.4
F	-0.102		0.203	M	4.83	5.08	5.33
G	8.5	9	9.5	N			

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