FSP1117

■ FEATURES

- Low Dropout Voltage: 1.15V at 1A Output Current
- Trimmed Current Limit
- On-chip Thermal Shutdown
- Three-terminal Adjustable or Fixed 1.2V, 1.5V, 1.8V, 2.5V, 3.3V, 5.0V

■ APPLICATIONS

- PC Motherboard
- LCD Monitor
- Graphic Card
- DVD-video player
- NIC/Switch
- Telecom Equipment
- ADSL Modem
- Printer and other Peripheral Equipment

■ GENERAL DESCRIPTION

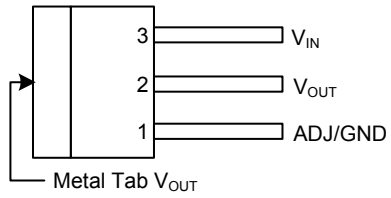
The FSP1117 is a series of low dropout three-terminal regulators with a dropout of 1.15V at 1A output current. The FSP1117 series provides current limiting and thermal shutdown. Its circuit includes a trimmed bandgap reference to assure output voltage accuracy to be within 1% for 1.5V, 1.8V, 2.5V, 3.3.V, 5.0V and adjustable versions or 2% for 1.2V version. Current limit is trimmed to ensure specified output current and controlled short-circuit current. On-chip thermal shutdown provides protection against any combination of overload and ambient temperature that would create excessive junction temperature.

The FSP1117 has an adjustable version that can provide the output voltage from 1.25V to 12V with only two external resistors.

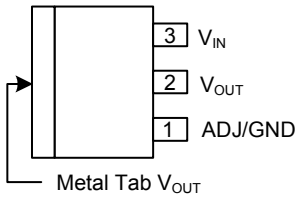
The FSP1117 series is available in the industry standard TO220-3L, TO263-3L, TO252-2L and SOT223 power packages.

■ PIN CONFIGURATION

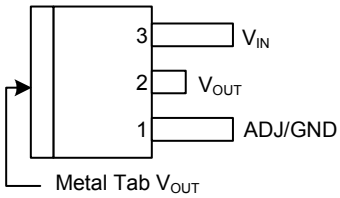
(1) TO220-3L



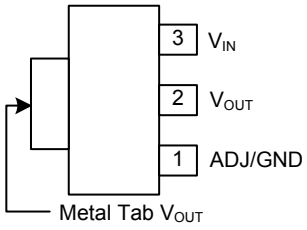
(2) TO263-3L



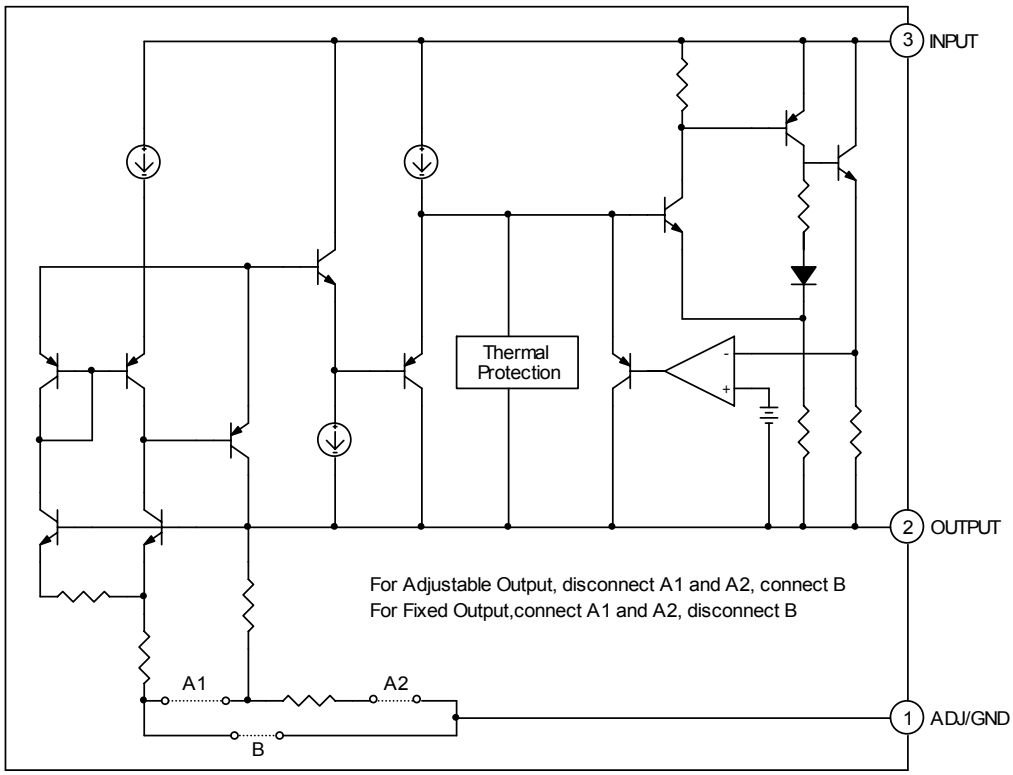
(3) TO252-2L



(4) SOT223



■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS (NOTE 1)

Symbol	Parameter	Rating	Unit
V_{IN}	Input Voltage	20	V
T_J	Maximum Junction Temperature	150	℃
T_S	Storage Temperature	-65~150	℃
T_{LEAD}	Lead Temperature (10 sec.)	300	℃
ESD	ESD (Machine Model)	600	V

Note 1: Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress rating only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.

■ RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Rating	Unit
V_{IN}	Input Voltage	15	V
T_J	Operating Junction Temperature Range	-40~125	℃

■ ELECTRICAL CHARACTERISTICS

Operating Conditions: V_{IN}≤10V, T_J=25℃, unless otherwise specified

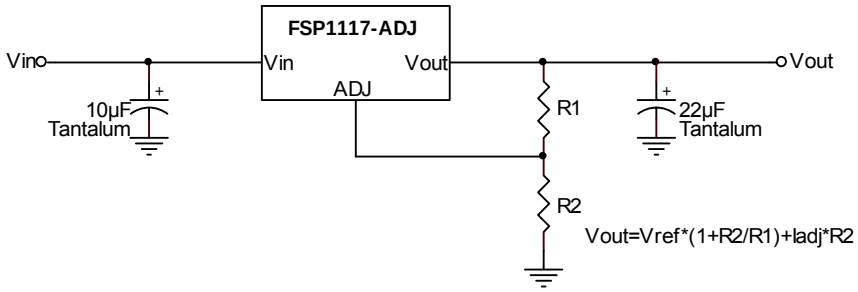
Parameter	Symbol	Test Condition		Min.	Typ.	Max.	Unit
Reference Voltage	V_{REF}	FSP1117 -adj	I_O=10mA, V_{IN}-V_{OUT}=2V	1.238	1.250	1.262	V
			I_O=10mA~1A,1.4V≤V_{IN}-V_{OUT}≤8 V	1.225	1.250	1.270	
Output Voltage	V_{OUT}	FSP1117 -1.2	I_O=10mA, V_{IN}=3.2V	1.176	1.2	1.224	V
			I_O=10mA~1A, 3V≤V_{IN}≤10V	1.152	1.2	1.248	
		FSP1117 -1.5	I_O=10mA, V_{IN}=3.5V	1.485	1.5	1.515	V
			I_O=10mA~1A, 3V≤V_{IN}≤10V	1.470	1.5	1.530	
		FSP1117 -1.8	I_O=10mA, V_{IN}=3.8V	1.782	1.8	1.818	V
			I_O=10mA~1A, 3.2V≤V_{IN}≤10V	1.746	1.8	1.854	V
		FSP1117 -2.5	I_O=10mA, V_{IN}=4.5V	2.475	2.5	2.525	V
			I_O=10mA~1A, 3.9V≤V_{IN}≤10V	2.450	2.5	2.550	
		FSP1117 -3.3	I_O=10mA, V_{IN}=5.0V	3.267	3.3	3.333	V
			I_O=10mA~1A, 4.75V≤V_{IN}≤10V	3.235	3.3	3.365	
		FSP1117 -5.0	I_O=10mA, V_{IN}=7.0V	4.950	5.0	5.050	V
			I_O=10mA~1A, 6.5V≤V_{IN}≤12V	4.900	5.0	5.100	
Line Regulation	Reg_{LINE}	FSP1117 -adj	I_O=10mA,1.5V≤V_{IN}-V_{OUT}≤10V,		0.035	0.2	%
	ΔV_{OUT}	FSP1117 -1.2/1.5/1.8/2.5/ 3.3	I_O=10mA,1.5V≤V_{IN}-V_{OUT}≤10V		1	6	mV
		FSP1117 -5.0	I_O=10mA,1.5V≤V_{IN}-V_{OUT}≤10V		1	10	mV
Load Regulation	Reg_{Load}	FSP1117 -adj	I_O=10mA~1A, V_{IN}-V_{OUT}=2V		0.2	0.4	%
			I_O=10mA~1A, V_{IN}-V_{OUT}=2V		0.1	0.3	%
Dropout Voltage (V_{IN}-V_{OUT})		FSP1117 -adj	ΔV_{REF}=1%,I_{OUT}=0.1A		1.00	1.1	V
			ΔV_{REF}=1%,I_{OUT}=0.5A		1.08	1.18	
			ΔV_{REF}=1%,I_{OUT}=1.0A		1.15	1.25	
			ΔV_{OUT}=1%,I_{OUT}=0.1A		1.00	1.1	
			ΔV_{OUT}=1%,I_{OUT}=0.5A		1.08	1.18	
			ΔV_{OUT}=1%,I_{OUT}=1.0A		1.15	1.25	
Current Limit	I_{LIMT}		V_{IN}-V_{OUT}=2V	1.25	1.35		A

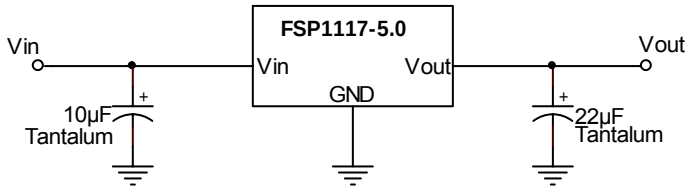
■ ELECTRICAL CHARACTERISTICS (CONTINUED)

Operating Conditions: V_{IN}≤10V, T_J=25℃, unless otherwise specified

Parameter	Symbol	Test Condition		Min.	Typ.	Max.	Unit
Adjust Pin Current		I_O=10mA~1A, 1.5V≤V_{IN}-V_{OUT}≤10V			60	120	μA
Adjust Pin Current Change		I_O=10mA~1A, 1.4V≤V_{IN}-V_{OUT}≤10V			0.2	5	μA
Minimum Load Current(ADJ)		FSP1117 E	1.5V≤V_{IN}-V_{OUT}≤10V		1.7	5	mA
		FSP1117			5	10	mA
Quiescent Current		V_{IN}=V_{OUT}+1.25V			5	10	mA
Ripple Rejection		f=120Hz,C_{OUT}=22uF Tantalum, V_{IN}-V_{OUT}=3V, I_{OUT}=1A		60	75		dB
Temperature Stability					0.5		%
Long-term Stability		T_A=125℃, 1000hrs			0.3		%
RMS Output Noise (% of V_{OUT})		T_A=25℃, 10Hz≤f≤10kHz			0.003		%
Thermal Resistance, Junction to case	θ_{JC}	SOT223			15		℃/W
		TO252-2L			10		
		TO220-3L			4.5		
		TO263-3L			4		
Thermal Shutdown		Junction Temperature			150		℃
Thermal Shutdown Hysteresis					25		℃

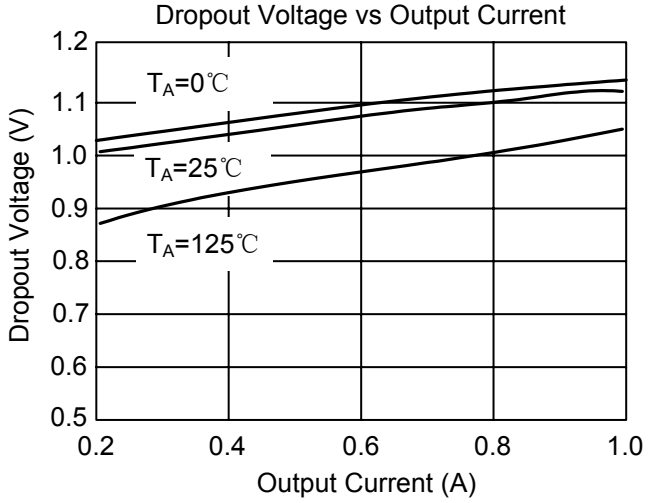
■ TYPICAL APPLICATIONS



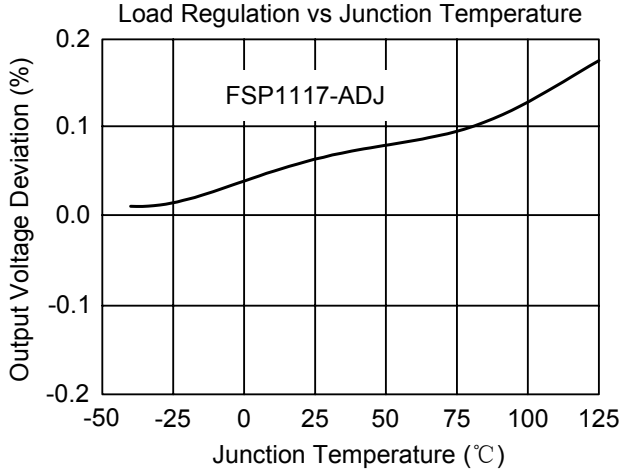


■ TYPICAL PERFORMANCE CHARACTERISTICS

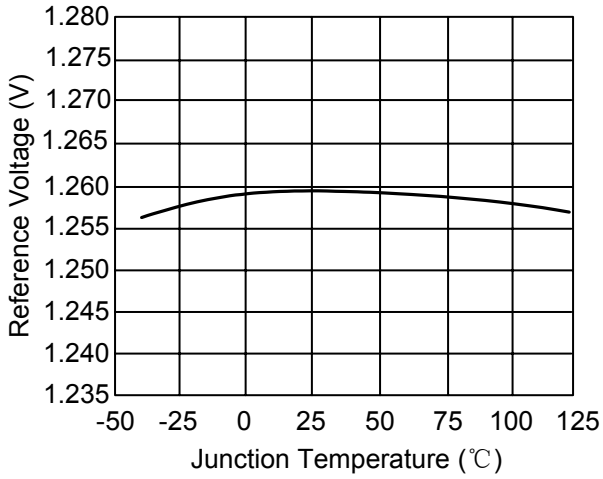
Dropout Voltage vs Output Current



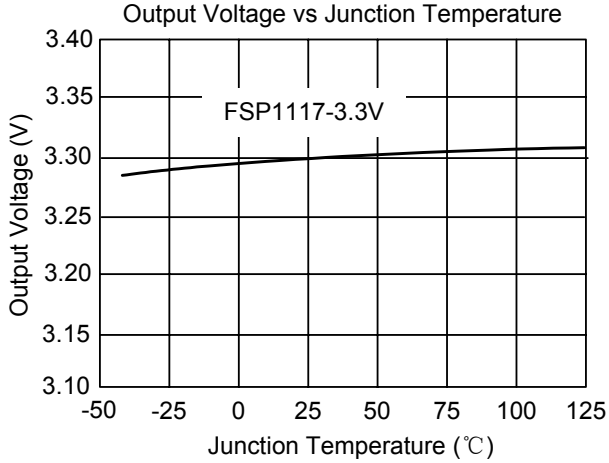
Load Regulation vs Junction Temperature



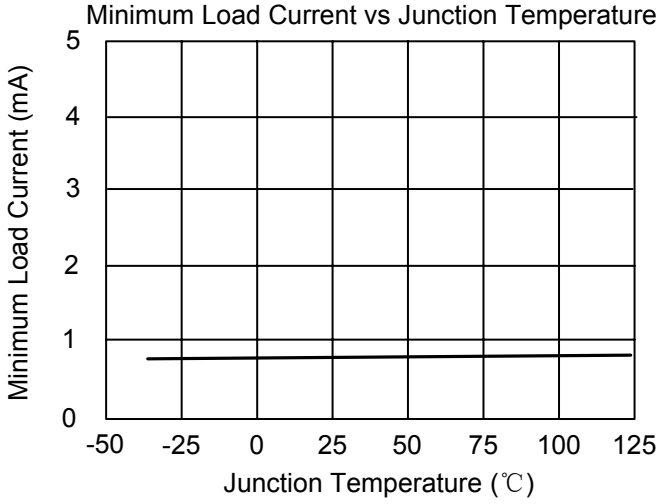
Reference Voltage vs Junction Temperature



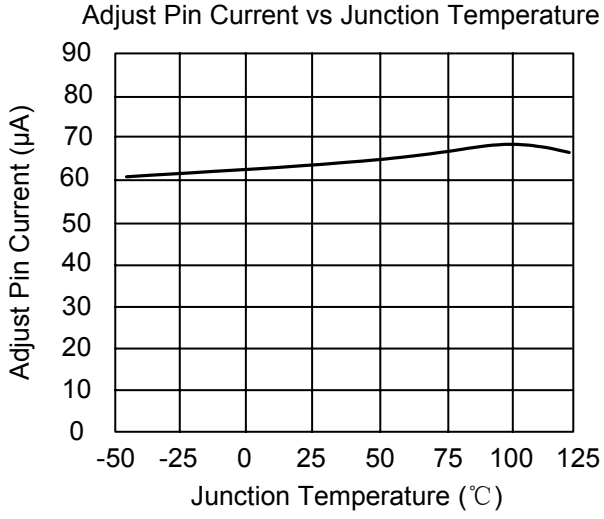
Output Voltage vs Junction Temperature



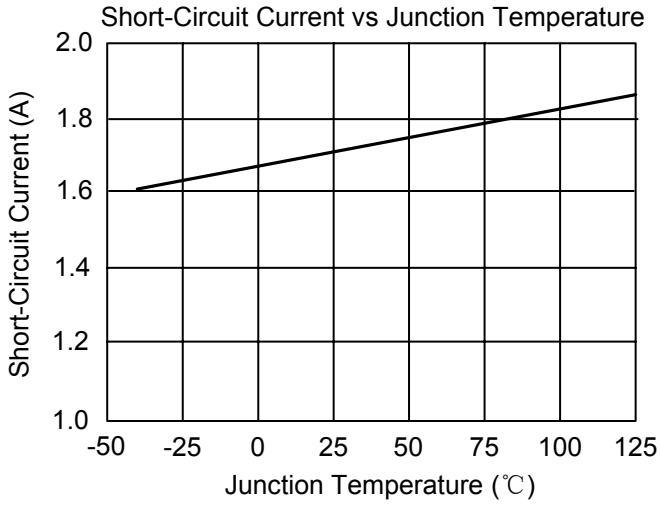
Minimum Load Current vs Junction Temperature

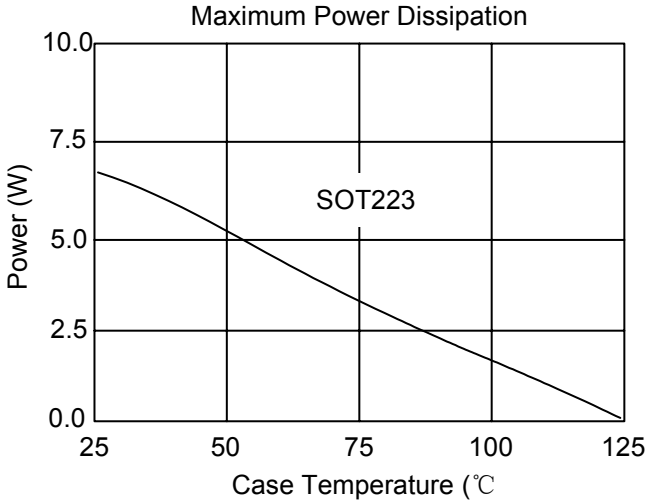


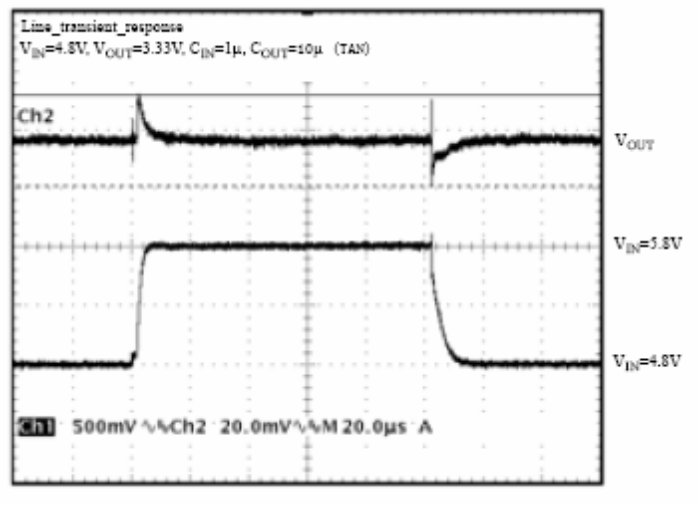
Adjust Pin Current vs Junction Temperature



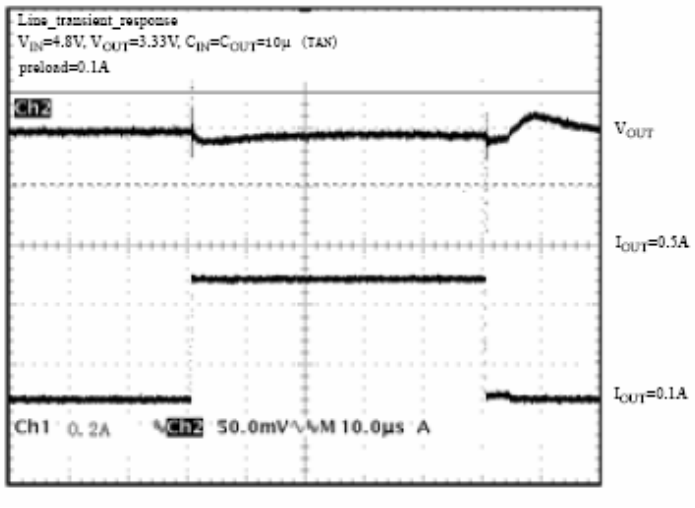
■ TYPICAL PERFORMANCE CHARACTERISTICS (CONTINUED)



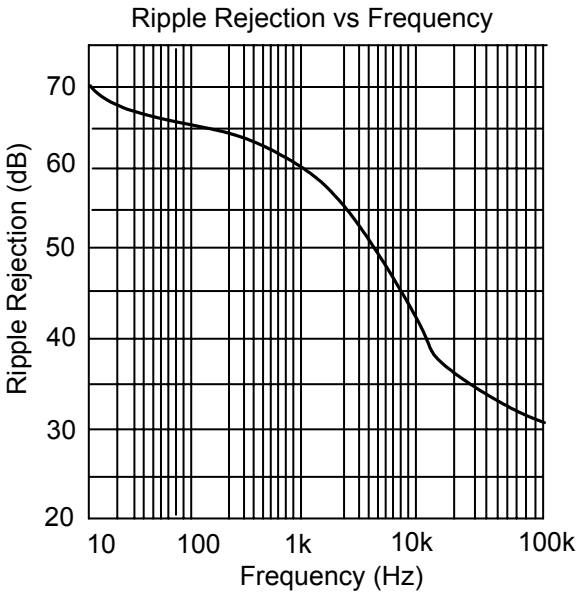




Line Transient Response



Load Transient Response



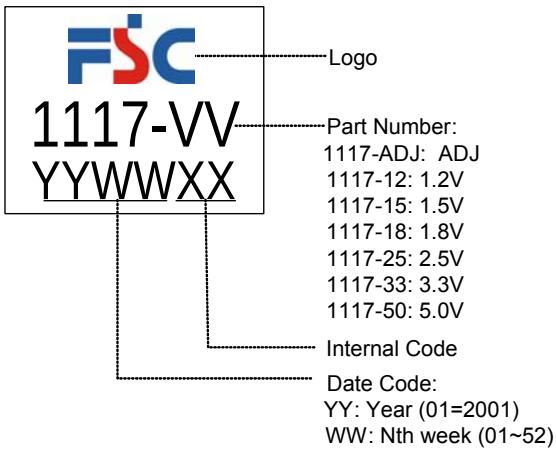
■ ORDERING INFORMATION

FSP1117XXXX

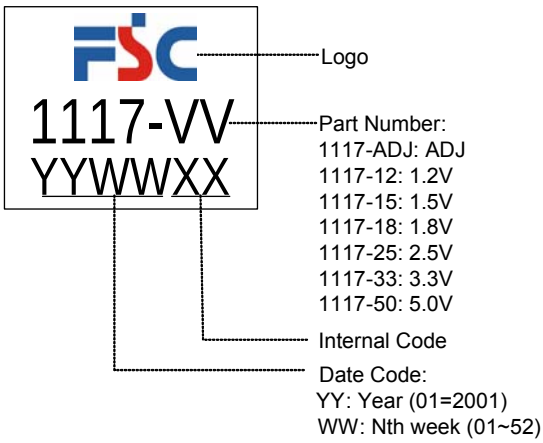
Package:	Output Voltage:	Packing:	Temperature Grade:
T:TO220-3L	Blank: ADJ	Blank: Tube or Bulk	Blank:0~70℃
K:TO263-3L	12: 1.2V	A: Tape & Reel	E:-40~125℃
D:TO252-2L	15: 1.5V		
E:SOT223	18: 1.8V		
	25: 2.5V		
	33: 3.3V		
	50: 5.0V		

■ MARKING INFORMATION

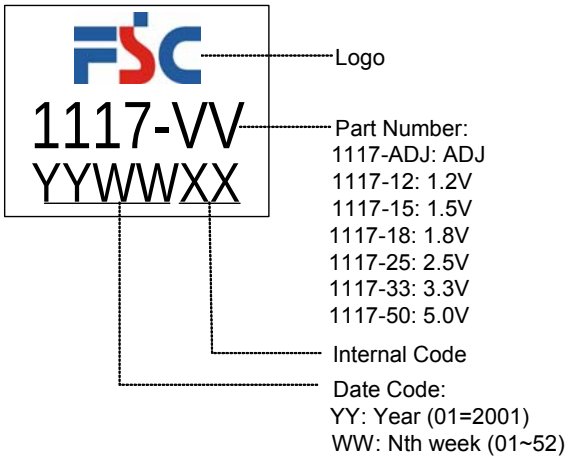
(1)TO220-3L



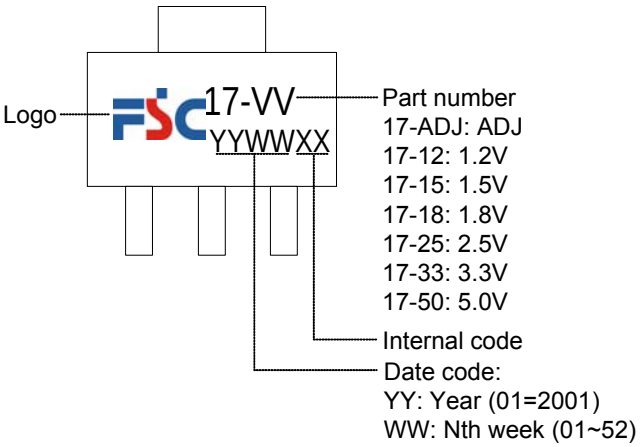
(2) TO263-3L



(3) TO252-2L

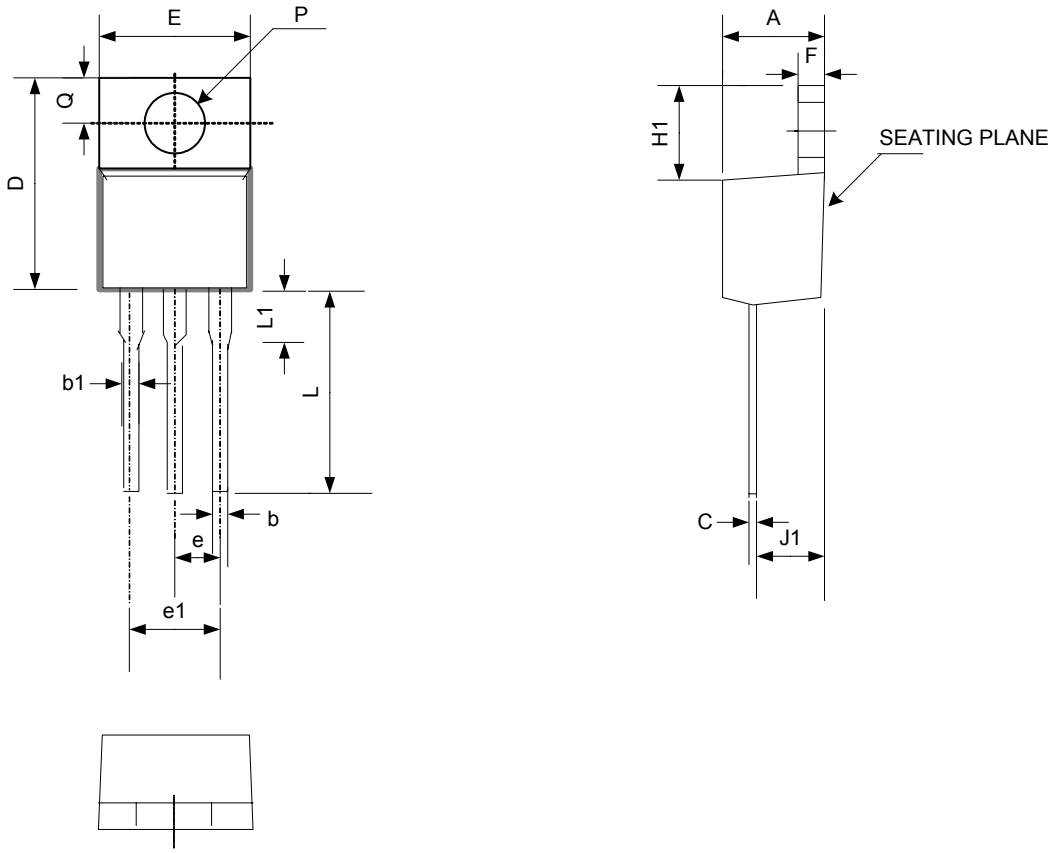


(4) SOT223



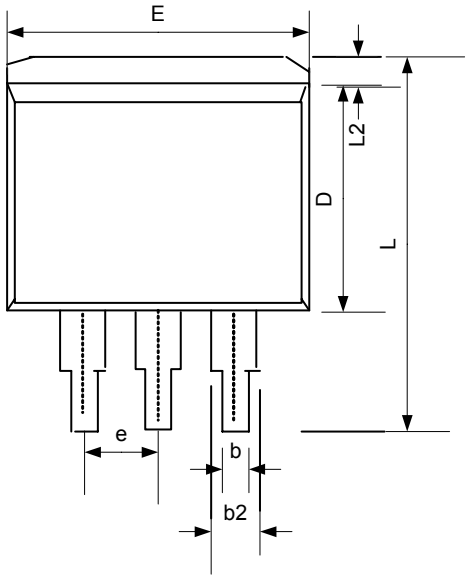
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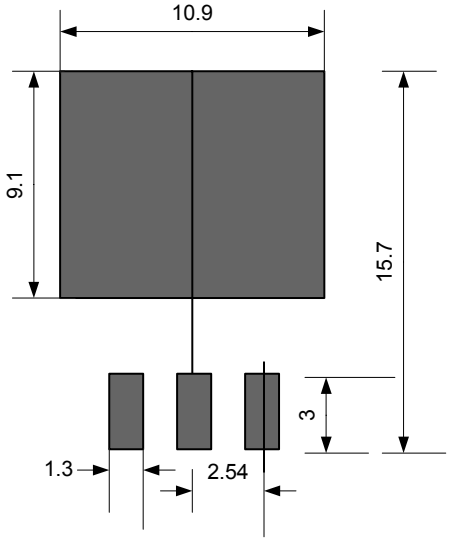
(1) TO220-3L



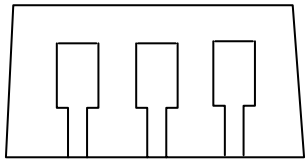
Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	3.55	4.20	4.85	0.140	0.165	0.191
b1	1.14	1.46	1.78	0.045	0.057	0.070
b	0.51	0.83	1.14	0.020	0.033	0.045
C	0.31	0.72	1.14	0.012	0.028	0.045
D	14.20	15.35	16.50	0.559	0.604	0.650
E	9.70	10.20	10.70	0.382	0.402	0.421
e	2.29	2.54	2.79	0.090	0.100	0.110
e1	4.83	5.08	5.33	0.190	0.200	0.210
F	0.51	0.95	1.40	0.020	0.037	0.055
H1	5.84	6.35	6.86	0.230	0.250	0.270
J1	2.03	2.48	2.92	0.080	0.098	0.115
L	12.72	13.72	14.72	0.501	0.540	0.580
L1	3.66	5.00	6.35	0.144	0.197	0.250
P	3.53	3.81	4.09	0.139	0.150	0.161
Q	2.54	2.98	3.43	0.100	1.117	0.135

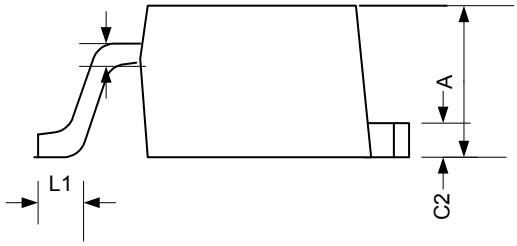
(2) TO263-3L





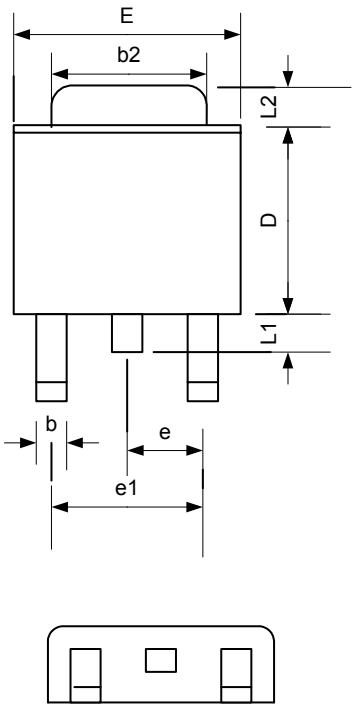
Land Pattern Recommendation (Unit : mm)

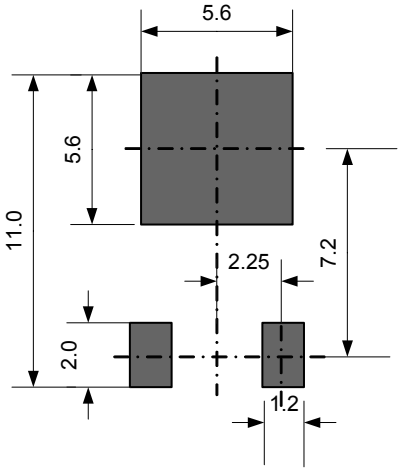




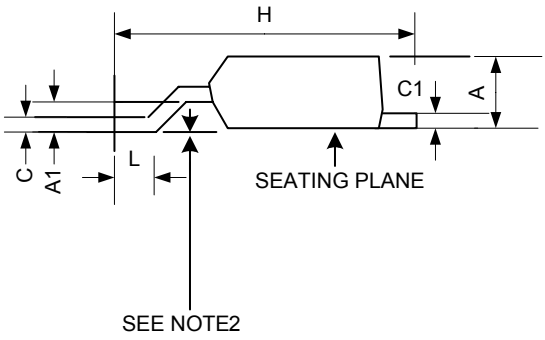
Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	4.06	4.45	4.83	0.160	0.175	0.190
b	0.51	0.75	0.99	0.020	0.030	0.039
b2	1.14	1.27	1.40	0.045	0.050	0.055
C		0.38TYP.			0.015TYP.	
C2	1.14	1.27	1.40	0.045	0.050	0.055
D	8.65	9.15	9.65	0.341	0.360	0.380
E	9.65	9.97	10.29	0.380	0.393	0.405
e		2.54BSC.			0.100BSC.	
L	14.61	15.24	15.88	0.575	0.600	0.625
L1	2.28	2.54	2.80	0.090	0.100	0.110
L2		1.30	2.92		0.051	0.115

(3) TO252-2L





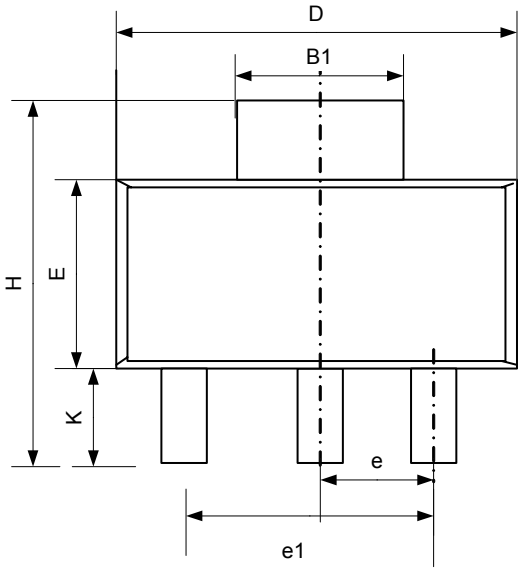
Land Pattern Recommendation (Unit : mm)

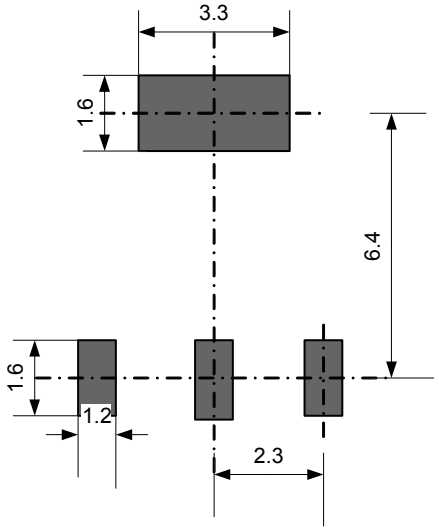


Notes:
1. JEDEC Outline:TO-252 AB
2. Mils suggested for positive contact at mounting

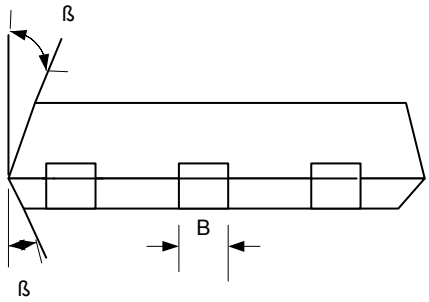
Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	2.18	2.29	2.39	0.086	0.090	0.094
A1	1.02	1.15	1.27	0.040	0.045	0.050
b		0.61TYP.			0.024TYP.	
b2	5.20	5.35	5.50	0.205	0.211	0.217
C	0.46	0.52	0.58	0.018	0.020	0.023
C1	0.46	0.52	0.58	0.018	0.020	0.023
D	5.33	5.57	5.80	0.210	0.219	0.228
E	6.35	6.58	6.80	0.250	0.259	0.268
e		2.25BSC.			0.089BSC.	
e1		4.50BSC.			0.177BSC.	
H	9.00	9.70	10.40	0.354	0.382	0.409
L	0.51			0.020		
L1	0.64	0.83	1.02	0.025	0.033	0.040
L2	1.52	1.78	2.03	0.060	0.070	0.080

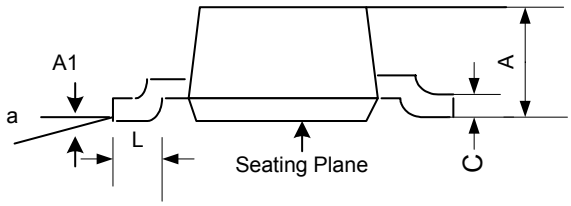
(4) SOT223





Land Pattern Recommendation (Unit :mm)





Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	1.50	1.65	1.80	0.059	0.065	0.071
A1	0.02	0.05	0.08	0.001	0.002	0.003
B	0.60	0.70	0.80	0.024	0.028	0.031
B1	2.90		3.15(Ref.)	0.114		0.124(Ref.)
c	0.28	0.30	0.32	0.011	0.012	0.013
D	6.30	6.50	6.70	0.248	0.256	0.264
E	3.30	3.50	3.70	0.130	0.138	0.146
e	2.3Basic			0.091Basic		
e1	4.6Basic			0.181Basic		
H	6.70	7.00	7.30	0.264	0.276	0.287
L	0.91	1.00	1.10	0.036	0.039	0.043
K	1.50	1.75	2.00	0.059	0.069	0.079
α	0°	5°	10°	0°	5°	10°
β		13°			13°	