

FEATURES

- Low Dropout Voltage: 1.3V Typically at 5A
- Current Limiting and Thermal Protection
- Output Current: 5A
- Current Limit: 6.5A
- Operating Junction Temperature Range: 0 to 125°C
- Line Regulation: 0.015%(Typical)
- Load Regulation: 0.2%(Typical)

APPLICATIONS

- High Efficiency Linear Regulators
- Battery Chargers
- Post Regulation for Switching Supply
- Microprocessor Supply
- Desktop PCs, RISC and Embedded Processors' Supply

GENERAL DESCRIPTION

The FSP1084 is a series of low dropout positive voltage regulators with a maximum dropout of 1.5V at 5A of load current.

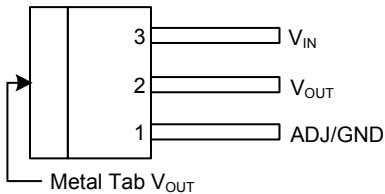
The series features on-chip thermal limiting which provides protection against any combination of overload and ambient temperatures that would create excessive junction temperatures. It also includes a trimmed bandgap reference and a current limiting circuit.

The FSP1084 is available in 1.5V, 1.8V, 2.5V, 3.3V and 5.0V versions. The fixed versions integrate the adjust resistors. It is also available in an adjustable version which can set output voltage with two external resistors.

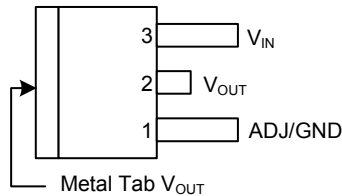
The FSP1084 series is available in standard package of TO263-2L, TO220-3L and TO252-2L.

PIN CONFIGURATION

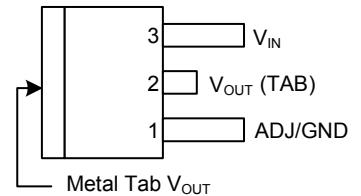
(1) TO220-3L



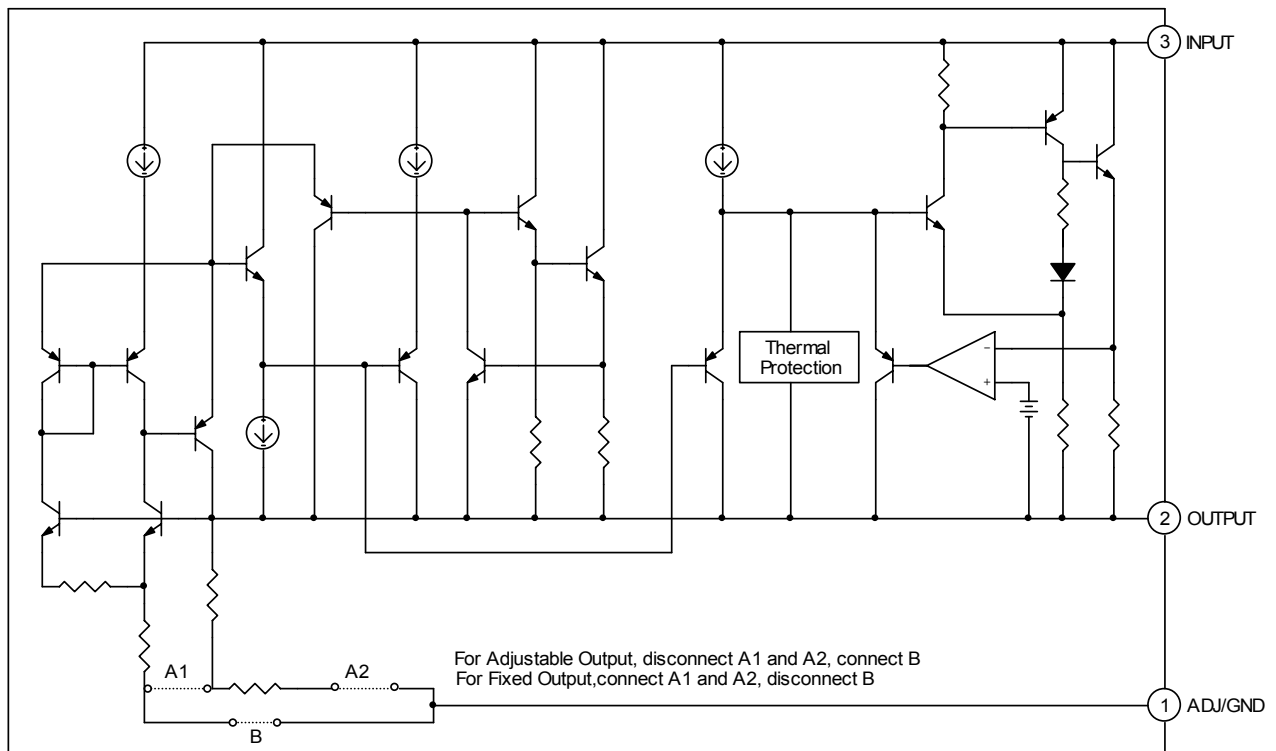
(2) TO252-2L



(3) TO263-2L



BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS (NOTE 1)

Symbol	Parameter	Rating	Unit
T_J	Maximum Junction Temperature	150	°C
T_S	Storage Temperature Range	-65~150	°C
T_{LEAD}	Lead Temperature (10 sec.)	300	°C
ESD	ESD (Human Body Model)	2000	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	12	V
T_J	Operating Junction Temperature Range	0~125	°C

■ ELECTRICAL CHARACTERISTICS

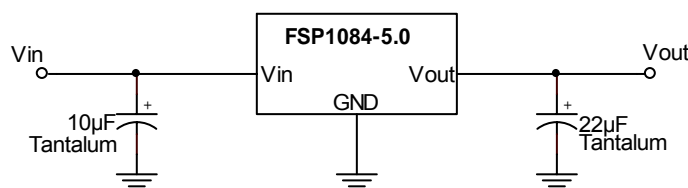
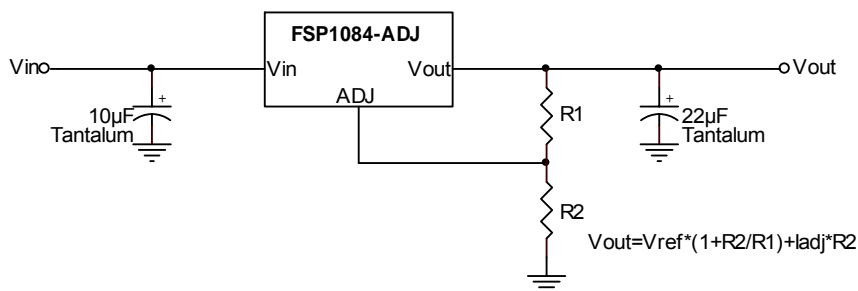
Typicals and limits appearing in normal type apply for $T_J=25^\circ\text{C}$. Limiting appearing in **Boldface** type apply over the entire operating junction temperature range.

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit		
Reference Voltage	V_{REF}	FSP1084-ADJ	$I_O=10\text{mA}$, $V_{IN}-V_{OUT}=3\text{V}$	1.238	1.250	1.262	V	
			$I_O=10\text{mA}\sim 5\text{A}$, $1.5\text{V}\leq V_{IN}-V_{OUT}\leq 5\text{V}$	1.225	1.250	1.270		
Output Voltage	V_{OUT}	FSP1084-1.5	$I_O=0\text{mA}$, $V_{IN}=4.5\text{V}$	1.485	1.5	1.515	V	
			$I_O=10\text{mA}\sim 5\text{A}$, $3.1\text{V}\leq V_{IN}\leq 6\text{V}$	1.470	1.5	1.530		
		FSP1084-1.8	$I_O=0\text{mA}$, $V_{IN}=4.8\text{V}$	1.782	1.8	1.818		V
			$I_O=10\text{mA}\sim 5\text{A}$, $3.4\text{V}\leq V_{IN}\leq 6\text{V}$	1.764	1.8	1.836		
		FSP1084-2.5	$I_O=0\text{mA}$, $V_{IN}=5.5\text{V}$	2.475	2.5	2.525		
	$I_O=10\text{mA}\sim 5\text{A}$, $4.1\text{V}\leq V_{IN}\leq 7\text{V}$	2.450	2.5	2.550				
	FSP1084-3.3	$I_O=0\text{mA}$, $V_{IN}=6.3\text{V}$	3.267	3.3	3.333	V		
		$I_O=10\text{mA}\sim 5\text{A}$, $4.9\text{V}\leq V_{IN}\leq 8\text{V}$	3.234	3.3	3.366			
	FSP1084-5.0	$I_O=0\text{mA}$, $V_{IN}=8\text{V}$	4.950	5.0	5.050	V		
		$I_O=10\text{mA}\sim 5\text{A}$, $6.6\text{V}\leq V_{IN}\leq 10\text{V}$	4.900	5.0	5.100			
Line Regulation	Reg_{LINE}	FSP1084-ADJ	$I_O=10\text{mA}$, $2.85\text{V}\leq V_{IN}\leq 10\text{V}$		0.015 0.035	0.2 0.2	%	
	ΔV_{OUT}	FSP1084-1.5	$I_O=10\text{mA}$, $3.1\text{V}\leq V_{IN}\leq 10\text{V}$		0.5 1	6 6	mV	
		FSP1084-1.8	$I_O=10\text{mA}$, $3.4\text{V}\leq V_{IN}\leq 10\text{V}$		0.5 1	6 6	mV	
		FSP1084-2.5	$I_O=10\text{mA}$, $4.1\text{V}\leq V_{IN}\leq 10\text{V}$		0.5 1	6 6		
		FSP1084-3.3	$I_O=10\text{mA}$, $4.9\text{V}\leq V_{IN}\leq 10\text{V}$		0.5 1	6 6		
		FSP1084-5.0	$I_O=10\text{mA}$, $6.6\text{V}\leq V_{IN}\leq 10\text{V}$		0.5 1	10 10		

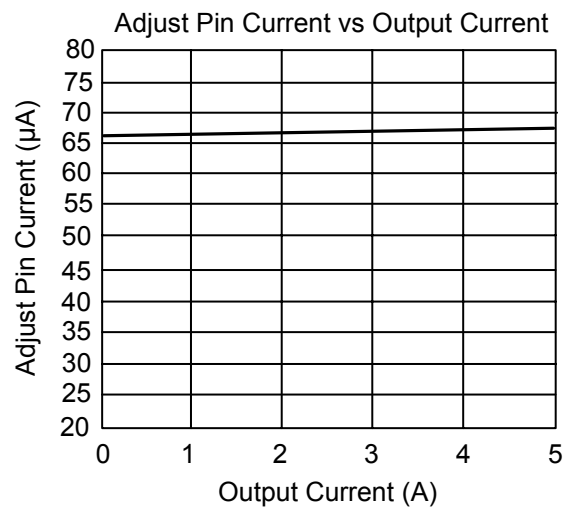
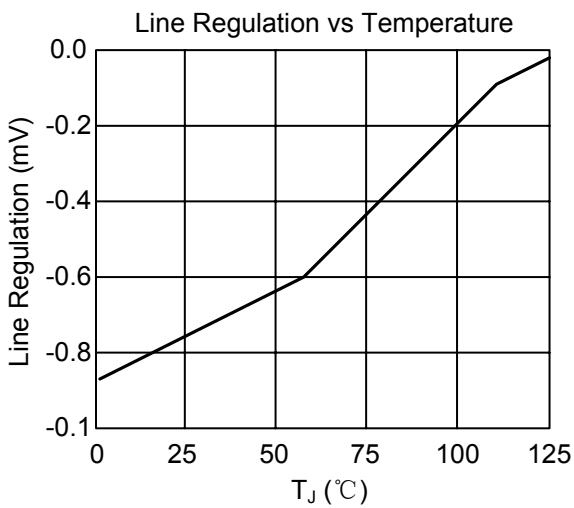
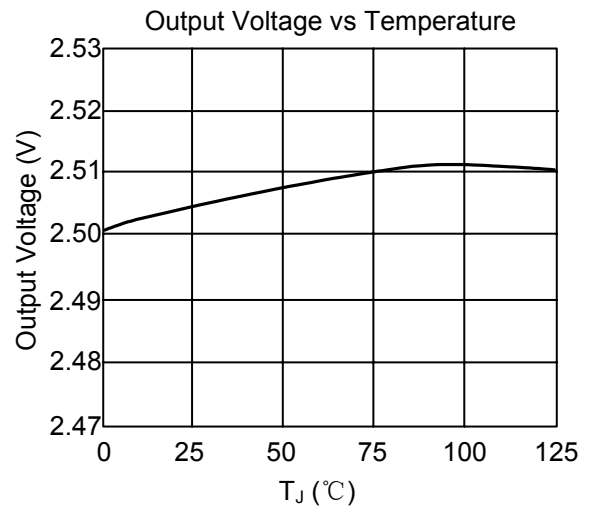
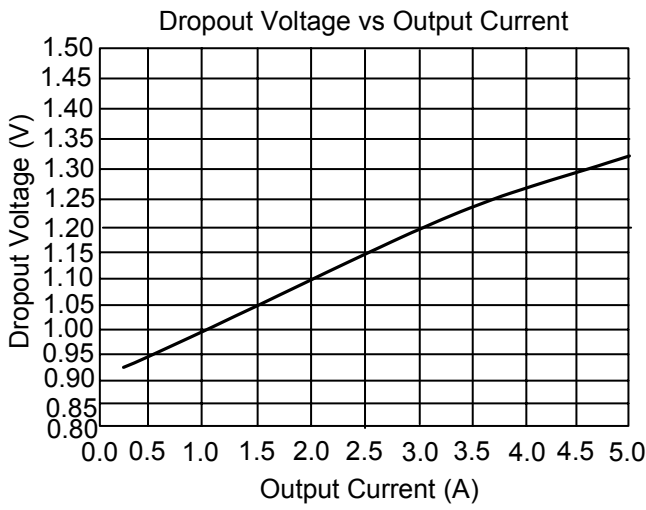
ELECTRICAL CHARACTERISTICS (CONTINUED)

Typicals and limits appearing in normal type apply for $T_J=25^{\circ}\text{C}$. Limiting appearing in **Boldface** type apply over the entire operating junction temperature range.

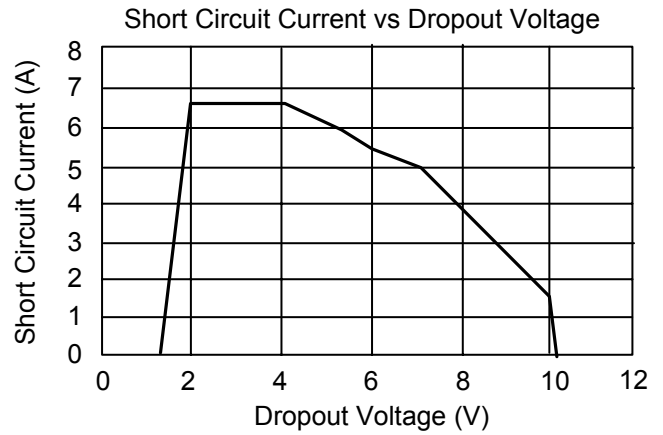
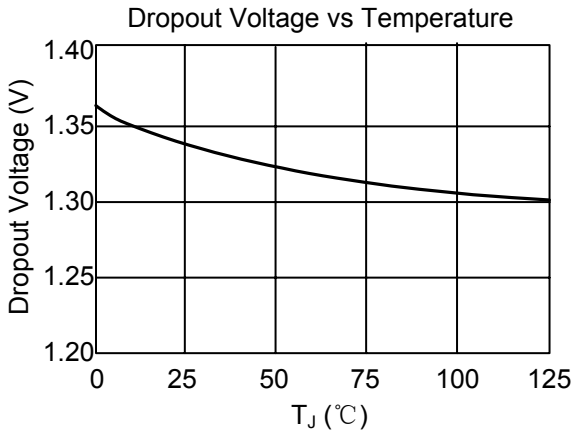
Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Load Regulation	Reg_{Load}	FSP1084-ADJ $I_O=0\text{mA}\sim 5\text{A}, V_{\text{IN}}-V_{\text{OUT}}=3\text{V}$		0.1 0.2	0.3 0.4	%
	ΔV_{OUT}	FSP1084-1.5/ 1.8/2.5/3.3	$I_O=0\text{mA}\sim 5\text{A}, V_{\text{IN}}-V_{\text{OUT}}=3\text{V}$	3 7	15 20	mV
		FSP1084-5.0	$I_O=0\text{mA}\sim 5\text{A}, V_{\text{IN}}-V_{\text{OUT}}=3\text{V}$	5 10	20 35	mV
Dropout Voltage		$I_O=5\text{A}, \Delta V_{\text{REF}}, \Delta V_{\text{OUT}}=1\%$		1.3	1.5	V
Current Limit	I_{LIMIT}	$V_{\text{IN}}-V_{\text{OUT}}=3\text{V}$	5.5	6.5		A
Adjust Pin Current		$I_O=10\text{mA}, V_{\text{IN}}=4.25\text{V}$		55	120	μA
Adjust Pin Current Change		$I_O=10\text{mA}\sim 5\text{A}, 1.5\text{V}\leq V_{\text{IN}}-V_{\text{OUT}}\leq 4.5\text{V}$		0.2	5	μA
Minimum Load Current		$V_{\text{IN}}=10\text{V}$ (FSP1084-ADJ)		3	10	mA
Quiescent Current		$V_{\text{IN}}=10\text{V}$ (FSP1084)		5	10	mA
Ripple Rejection		$f=120\text{Hz}, C_{\text{OUT}}=25\mu\text{F}$ Tantalum, $V_{\text{IN}}-V_{\text{OUT}}=3\text{V}, I_{\text{OUT}}=5\text{A}$	60	72		dB
Temperature Stability		$I_O=10\text{mA}, V_{\text{IN}}-V_{\text{OUT}}=1.5\text{V}$		0.5		%
Long-term Stability		$T_A=125^{\circ}\text{C}, 1000\text{hrs}$		0.5		%
RMS Noise (% of V_{OUT})		$10\text{Hz}\leq f\leq 10\text{kHz}$		0.003		%
Thermal Resistance, Junction to case	θ_{JC}	TO252-2L		4		$^{\circ}\text{C/W}$
		TO220-3L		3		
		TO263-2L		3		

TYPICAL APPLICATIONS


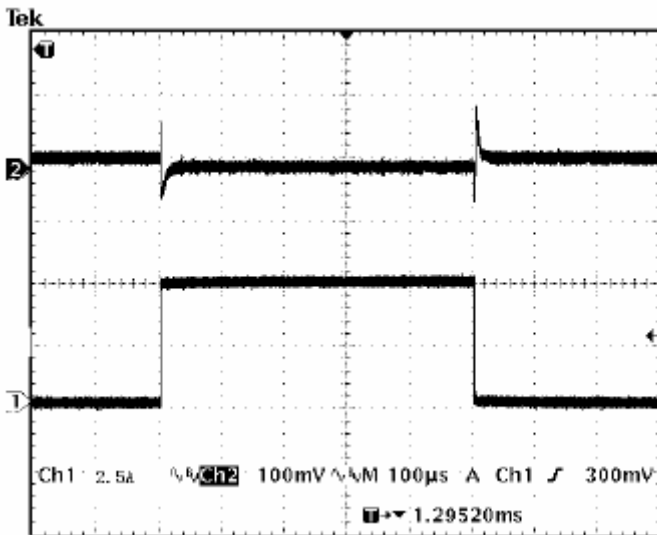
■ TYPICAL PERFORMANCE CHARACTERISTICS



■ **TYPICAL PERFORMANCE CHARACTERISTICS (CONTINUED)**

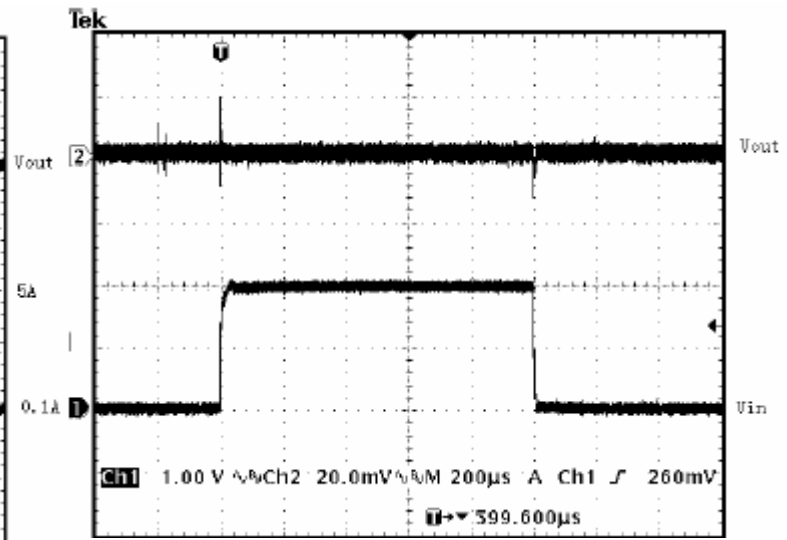


Load Transient Response



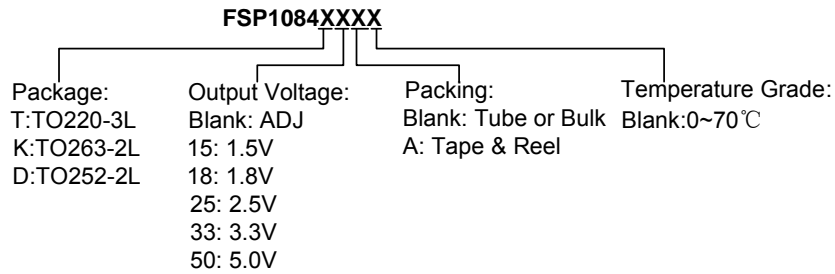
$V_{in}=5.5V, V_{out}=2.5V, I_o=100mA$ to $5A, C_{in}=C_{out}=10\mu(tan)$

Line Transient Response



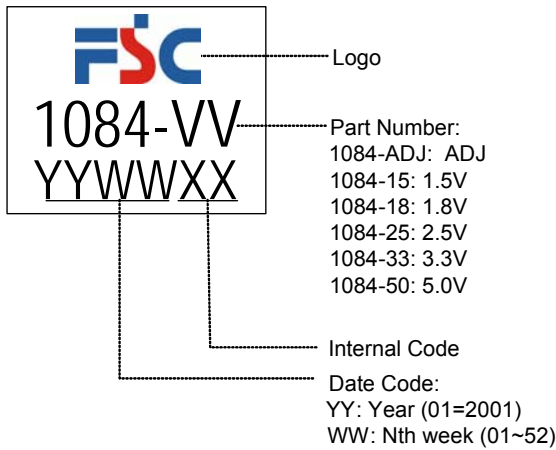
$V_{in}=4.5V$ to $6.5V, V_{out}=2.5V, I_o=200mA, C_{in}=1\mu(tan), C_{out}=10\mu(tan)$

■ ORDERING INFORMATION

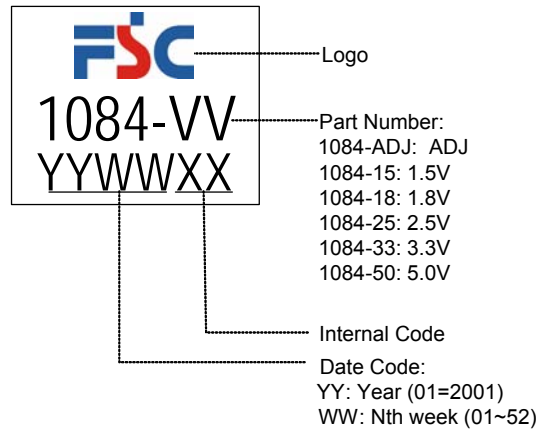


■ MARKING INFORMATION

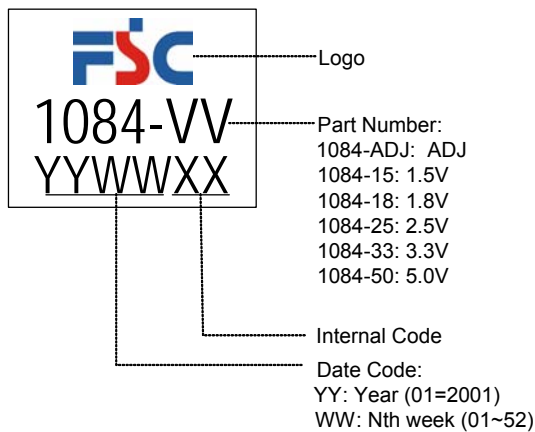
(1)TO220-3L



(2) TO263-2L

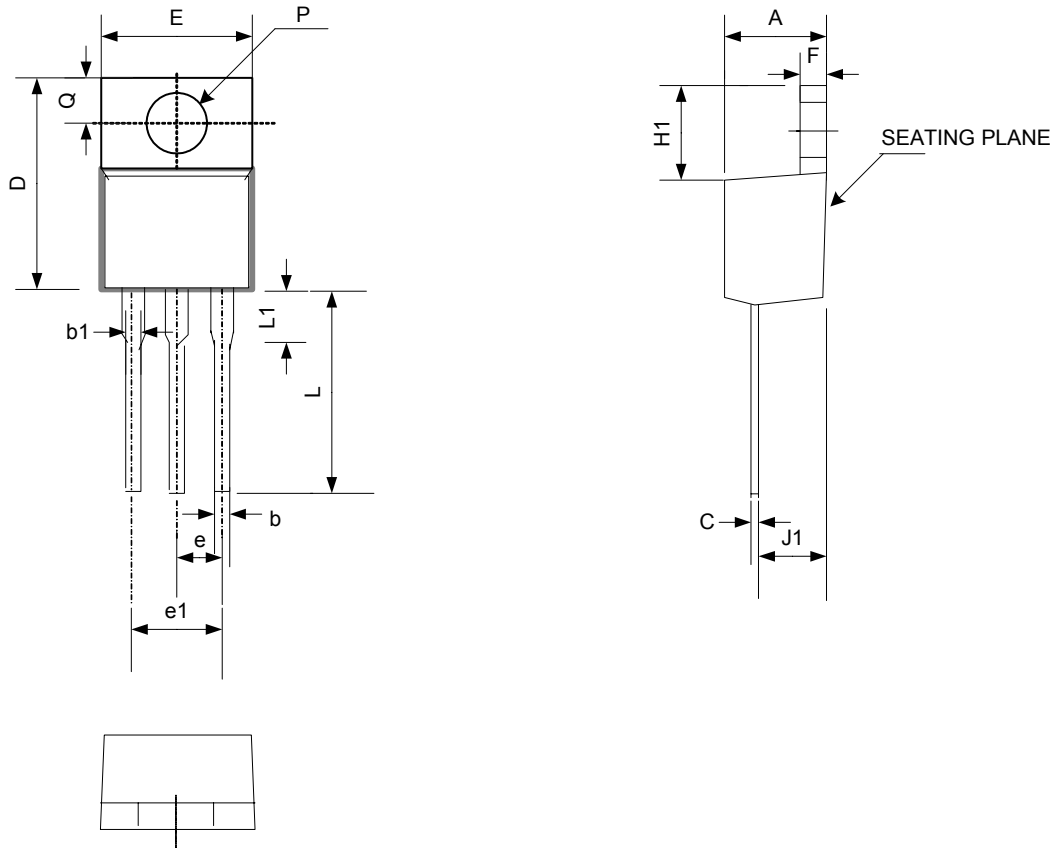


(3) TO252-2L



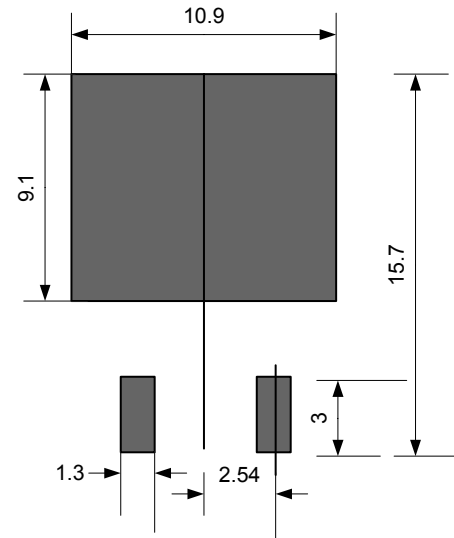
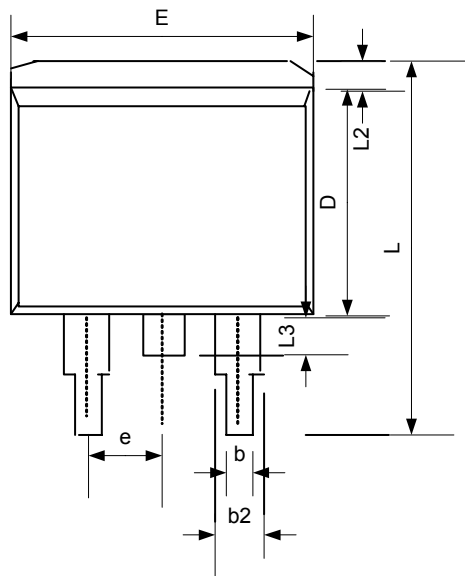
■ PACKAGE INFORMATION

(1) TO220-3L

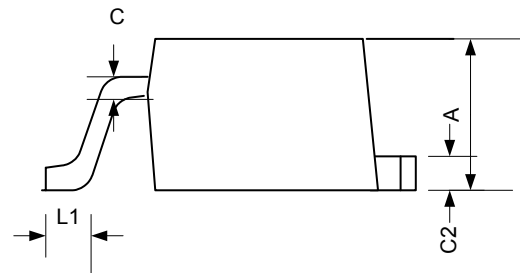
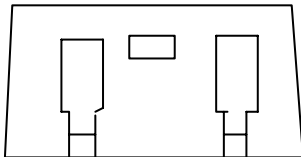


Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	3.56	4.20	4.82	0.140	0.165	0.190
b1	1.16	1.46	1.76	0.046	0.057	0.069
b	0.51	0.813	1.14	0.020	0.032	0.045
C	0.356		0.406	0.014		0.016
D	14.20	15.35	16.50	0.559	0.604	0.650
E	9.66	10.20	10.66	0.380	0.402	0.420
e	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	0.55	0.95	1.35	0.022	0.037	0.053
H1	5.84	6.35	6.86	0.230	0.250	0.270
J1	2.08	2.48	2.88	0.082	0.098	0.113
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	3.56	3.81	4.06	0.140	0.150	0.160
Q	2.58	2.98	3.38	0.102	1.117	0.133

(2) TO263-2L

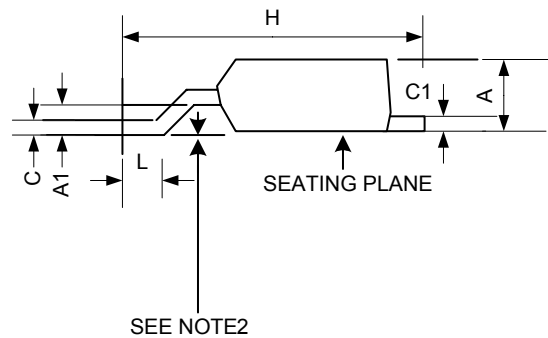
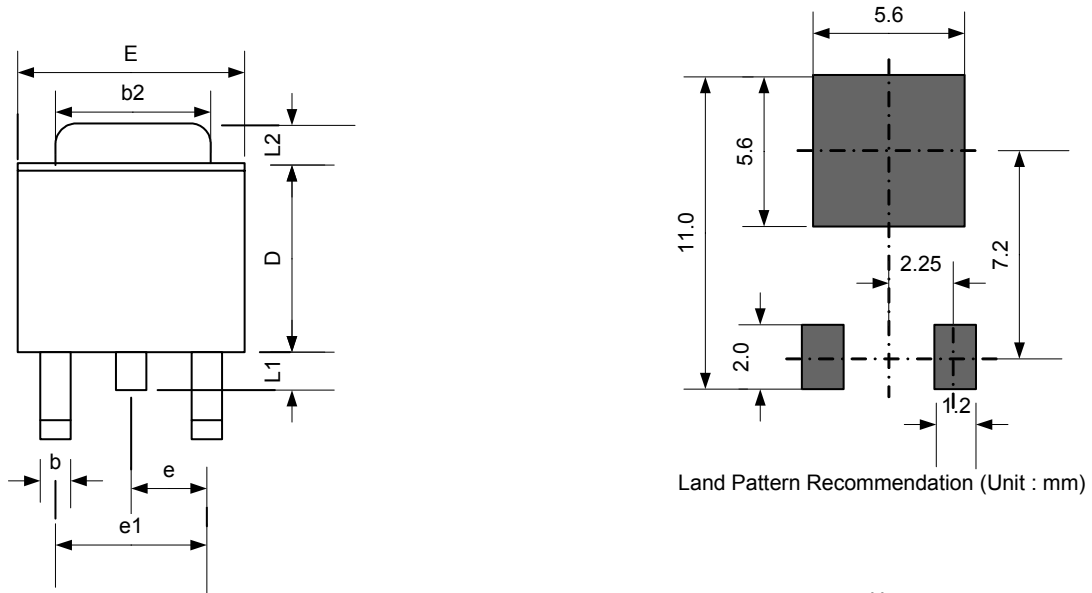


Land Pattern Recommendation (Unit : mm)



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
L3	1.27	1.52	1.78	0.050	0.060	0.070

(3) TO252-2L


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	2.38	0.086	0.090	0.094
A1	1.08	1.15	1.32	0.043	0.045	0.052
b	0.64		0.78	0.025		0.031
b2	5.23	5.35	5.43	0.206	0.211	0.214
C	0.51TYP.			0.020TYP.		
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	6.38	6.58	6.68	0.251	0.259	0.263
e	2.24		2.34	0.088		0.092
e1	4.48		4.68	0.176		0.184
H	9.00	9.70	10.40	0.354	0.382	0.409
L	0.51			0.020		
L1	0.65	0.83	0.95	0.026	0.033	0.037
L2	1.52	1.78	2.03	0.060	0.070	0.080