2A Ultra Low Dropout Linear Regulator

❖ GENERAL DESCRIPTION

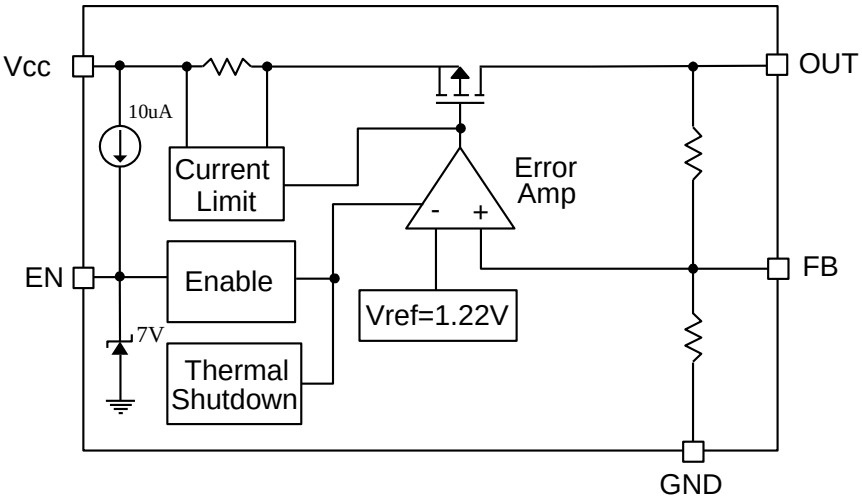
The AX1202 is a low-dropout voltage regulator suitable for various electronic equipments. It provides constant voltage power source. The dropout voltage of AX1202 is below 0.27V in full rated current (2A). This regulator has various functions such as a peak current protection, a thermal shut down, a short circuit protect.

The AX1202 is available in SOP-8L, TO252-5L, TO220-5L, TO220-5LR, TO263-5L and PDIP-8L power packages which features small size to reduce the junction-to-case resistance, being applicable in 0.5~3W applications.

❖ FEATURES

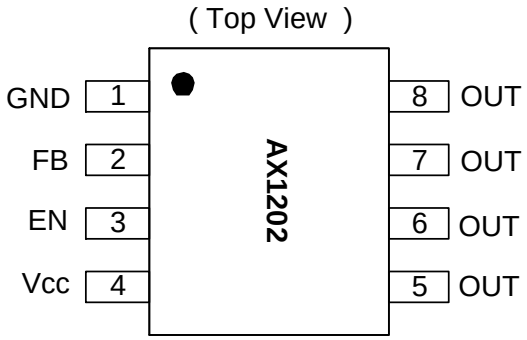
- Ultra Low Dropout - 0.27V(typical) at 2A Output Current
- Adjustable mode: 1.22V Reference Voltage
- Fixed mode:5V, 9V, 12V output voltage
- Operating voltage: up to 23V for TO220 and TO263 packages.
  up to 16V for TO252, PDIP-8L and SOP-8L packages.
- Current-Limit and Thermal Shutdown Protection
- Short circuit protection, Enable function.
- Built-in internal SW P-channel MOS
- SOP-8L, TO252-5L, TO220-5L, TO220-5LR, TO263-5L, and PDIP-8L Pb-Free Packages.

❖ BLOCK DIAGRAM

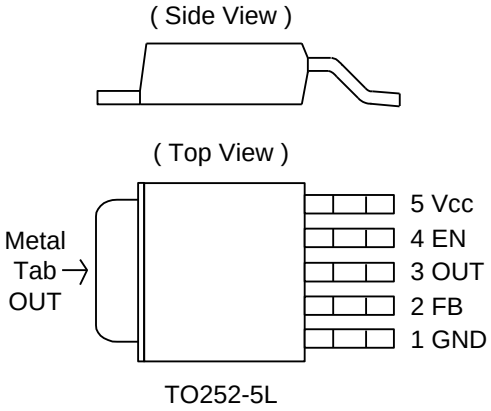


❖ PIN ASSIGNMENT

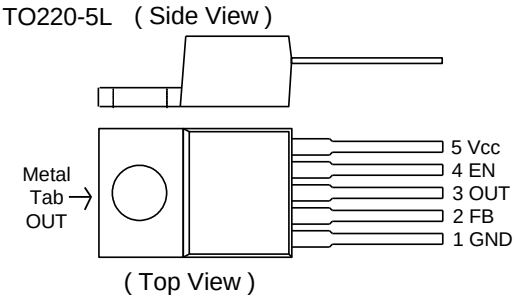
The packages of AX1202 are SOP-8L, PDIP-8L, TO252-5L, TO220-5L, TO220-5LR and TO263-5L; the pin assignment is given by:

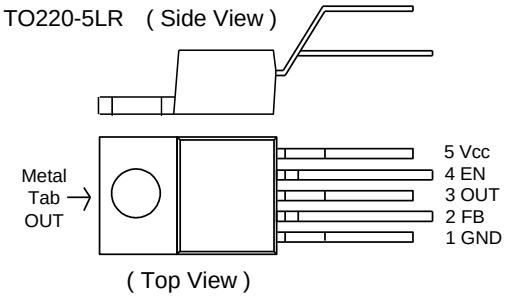


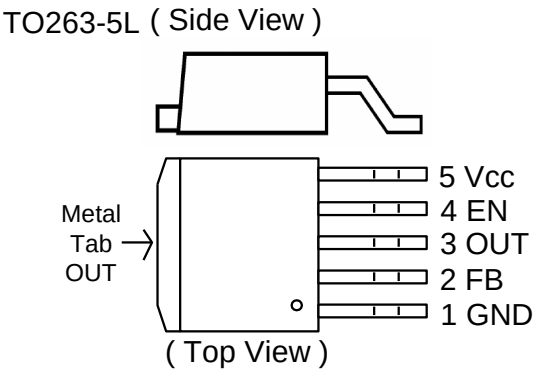
SOP-8L

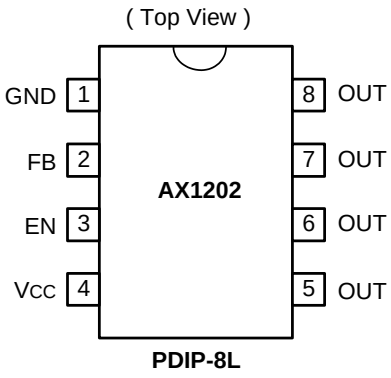


TO252-5L









PDIP-8L

Name	Description
FB	Feedback pin
EN	Enable input, it is pull-high typically. Drive EN high or floating to turn on the regulator, driver it low to turn it off.
V_{CC}	IC power supply pin
OUT	Output Voltage pin
GND	Ground pin

❖ ORDER/MARKING INFORMATION

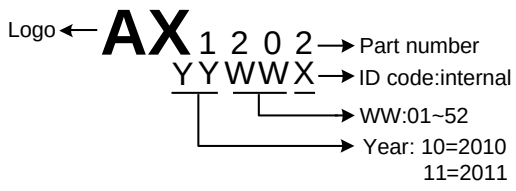
Order Information

AX1202 XXX XX X

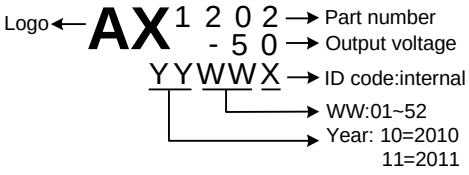
Package	Vout	Packing
N : PDIP-8L S : SOP-8L D5: TO252-5L M5:TO263-5L T5 : TO220-5L T5R:TO220-5LR	Blank : Adj 50 = 5.0V 90 = 9.0V 12 = 12V	Blank : Tube A : Taping

Top Marking

ADJ Version



FIXED Version (V_{OUT}=5.0V)



❖ ABSOLUTE MAXIMUM RATINGS (T_A=25°C)

Characteristics		Symbol	Rating	Unit
V_{CC} Supply Voltage		V_{CC}	-0.3 to 25	V
EN Pin Voltage		V_{EN}	-0.3 to 7	V
FB Pin Voltage		V_{FB}	-0.3 to Vcc+0.3	V
Output current		I_{OUT}	2.5	A
Power Dissipation	TO220	PD	4	W
	TO252		2.3	
	SOP-8L		1.6,	
	TO263		4	
Storage Temperature Range		T_{ST}	-65 to +150	°C
Junction Temperature Range		T_J	-40 to 125	°C
Operating Temperature Range		T_{OP}	-40 to +85	°C
Thermal Resistance from Junction to case	TO220	θ_{JC}	3.5	°C/W
	TO263		3.5	
	TO252		10	
	PDIP-8L		15	
	SOP-8L		20	
Thermal Resistance from Junction to ambient	TO220	θ_{JA}	25	°C/W
	TO263		25	
	TO252		45	
	PDIP-8L		50	
	SOP-8L		60	

Note: θ_{JA} is measured with the PCB copper area(need connect to OUT pin) of approximately 1.5 in^2 (Multi-layer).

❖ ELECTRICAL CHARACTERISTICS

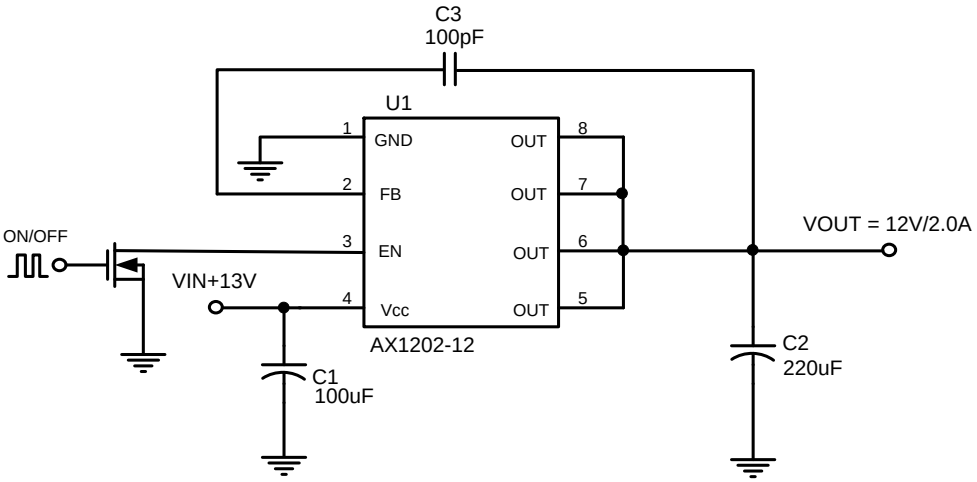
(Unless otherwise specified, T_A=25°C, V_{CC}=12V)

Characteristics	Symbol	Conditions		Min	Typ	Max	Units
V_{CC} Supply Voltage	V_{CC}	I_{OUT} =2A	TO220, TO263 packages	5.1	-	23	V
			TO252,SOP-8L,PDIP-8L packages	5.1	-	16	V
Feedback Voltage	V_{FB}	I_{OUT}=10mA, V_{CC} =10V		1.196	1.22	1.244	V
Output Voltage	V_{OUT}	I_{OUT}=10mA, V_{CC} =6V		4.90	5.0	5.10	V
		I_{OUT}=10mA, V_{CC} =10V		8.82	9.0	9.18	
		I_{OUT}=10mA, V_{CC} =13V		11.76	12	12.24	
GND Current	I_{GND}	I_{OUT}= 0~2A		-	1.2	3	mA
Shutdown Current	I_{SD}	V_{EN}=0V		-	0.15	0.4	mA
Load regulation	V_{Load}	5mA < I_{OUT} < 2A		-	0.5	1.5	%
Line regulation	V_{Line}	I_{OUT}=10mA, V_{OUT}+1.0V<V_{CC}< V_{OUT}+10V		-	0.1	0.5	%
Ripple rejection ratio	PSRR	Note1		-	65	-	dB
Dropout Voltage	V_{DROP}	I_{OUT}= 2A, V_{OUT}=5V		-	0.27	0.4	V
		I_{OUT}= 2A, V_{OUT}=9V		-	0.26	0.39	
		I_{OUT}= 2A, V_{OUT}=12V		-	0.18	0.31	
Short circuit protect	Iscp	V_{OUT}<20%		-	0.6	-	A
Current Limit	CL	SOP-8L, PDIP-8L		2.2	-	-	A
		TO220, TO263, TO252L		2.5	-	-	A
EN Pin Logic input threshold voltage	V_{ENH}	High (regulator ON)		2.0	-	-	V
	V_{ENL}	Low (regulator OFF)		-	-	0.8	V
EN Pin Input Current	I_{ENH}	V_{EN}=2.5V (ON)		-	20	-	uA
	I_{ENL}	V_{EN}=0.3V (OFF)		-	-10	-	uA
Internal MOSFET RDSON	R_{DSON}	V_{CC}=5.5V		-	120	150	mΩ
		V_{CC}=12V		-	80	100	
Thermal Shutdown	T_{SD}			-	140	-	°C

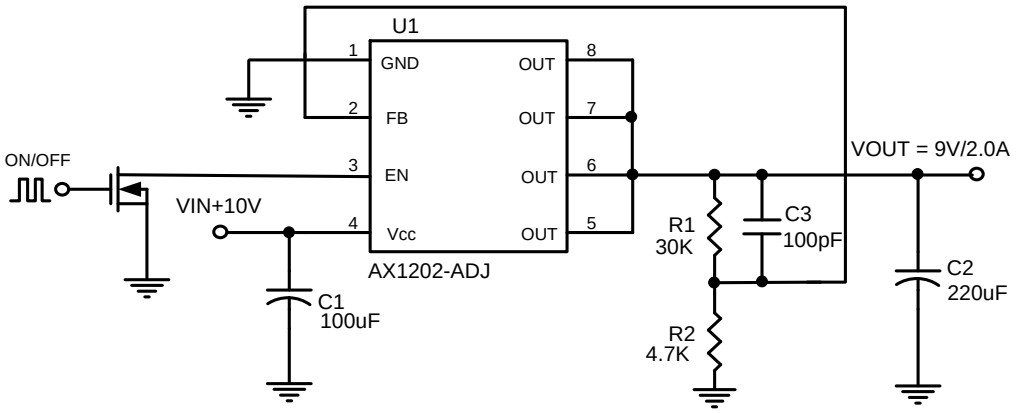
Note: These parameters, although guaranteed, are not 100% tested in production.

❖ APPLICATION CIRCUIT

1. FIXED (SOP-8L, PDIP-8L)



2. ADJ (SOP-8L, PDIP-8L)



VOUT=VFB*(1+R1/R2)

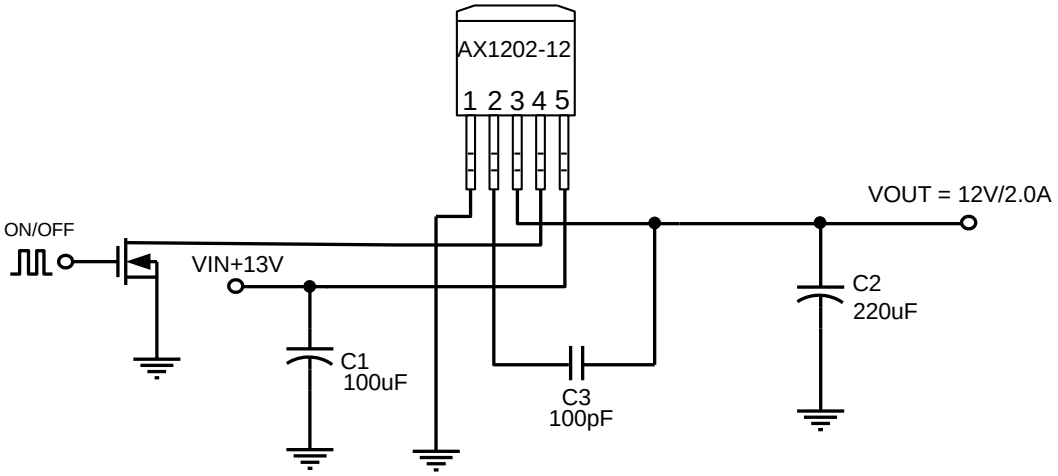
VFB = 1.22V

R2 suggest 1K~5.6KΩ

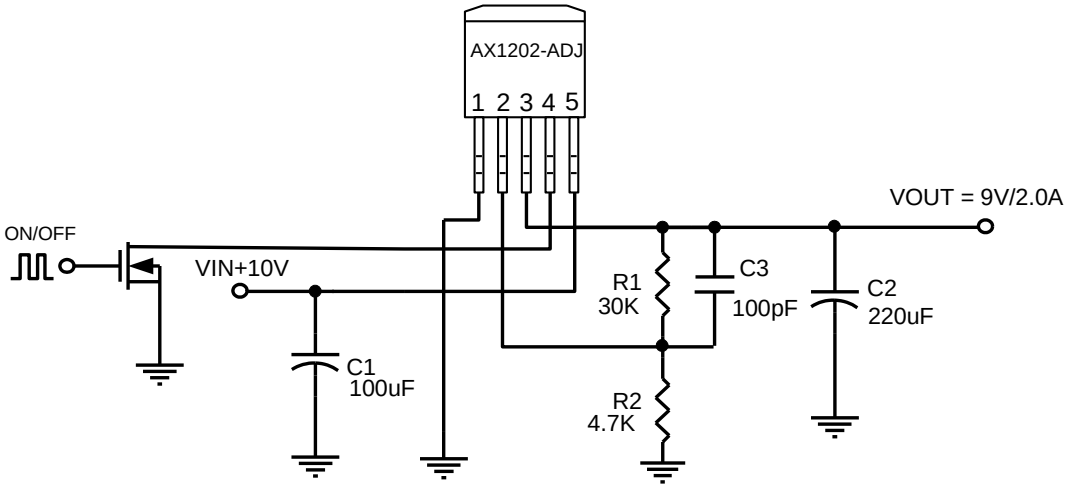
C2 choose Low ESR capacitor

C3=47pF~100pF for stability issue

3. FIXED (TO252-5L, TO220-5L, TO263-5L)



4. ADJ (TO252-5L, TO220-5L, TO263-5L)



VOUT=VFB*(1+R1/R2)

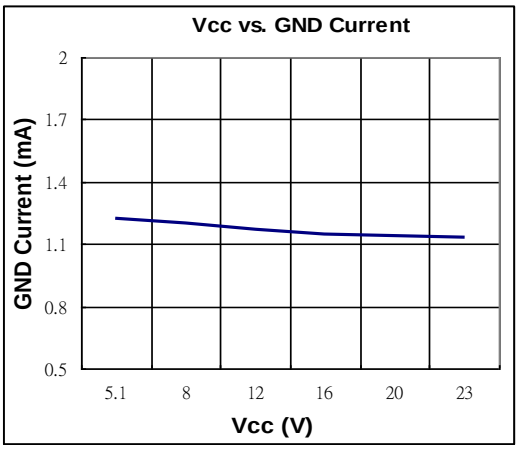
VFB = 1.22V

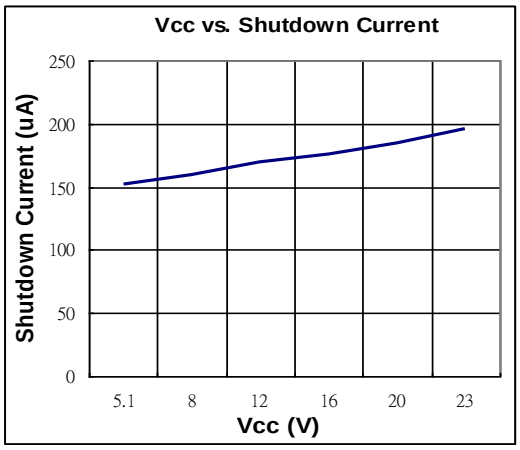
R2 suggest 1K~5.6KΩ

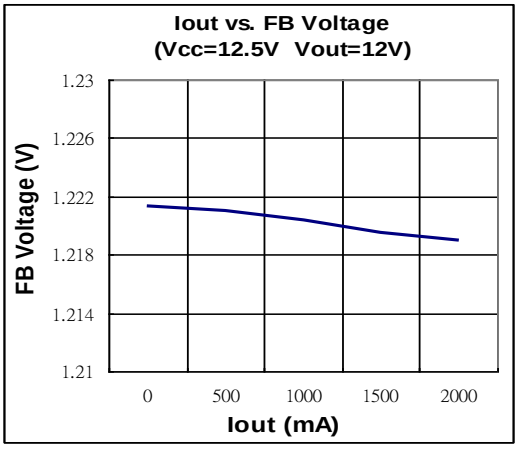
C2 choose Low ESR capacitor

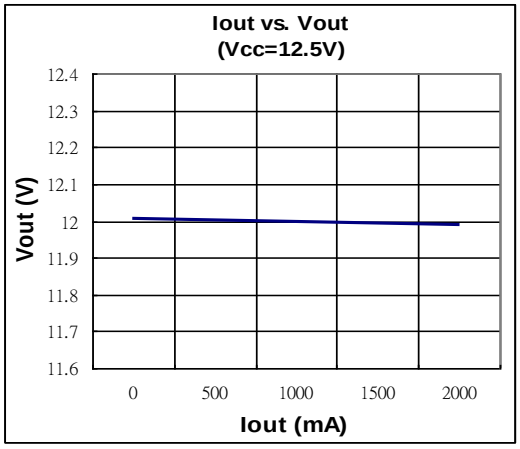
C3=47pF~100pF for stability issue

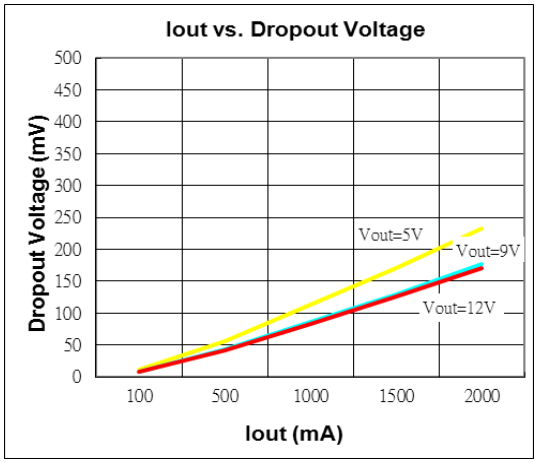
❖ TYPICAL CHARACTERISTICS

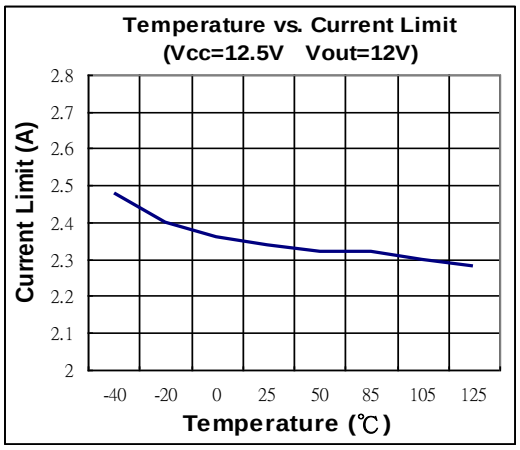




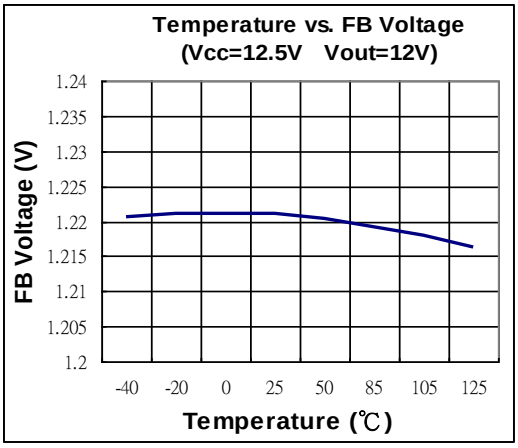


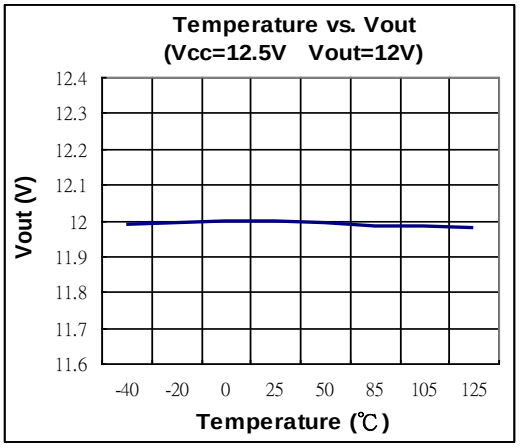


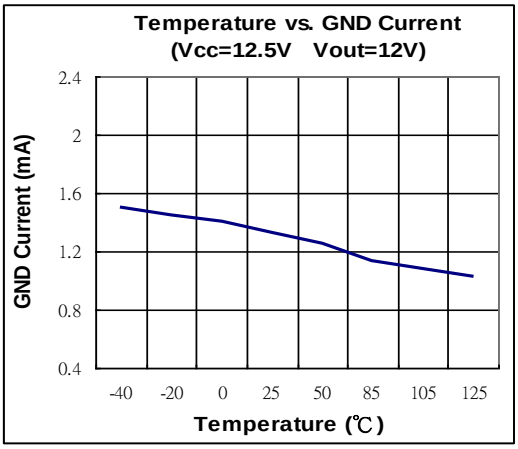


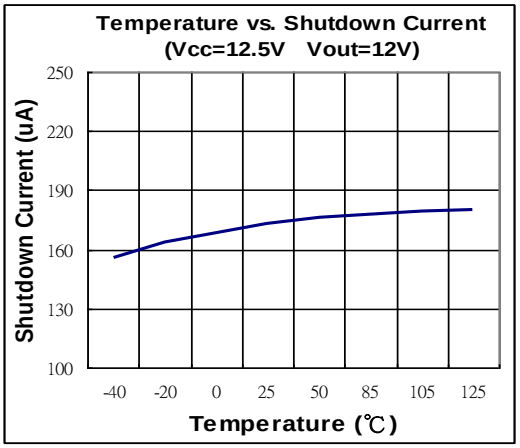


❖ TYPICAL CHARACTERISTICS (CONTINUED)

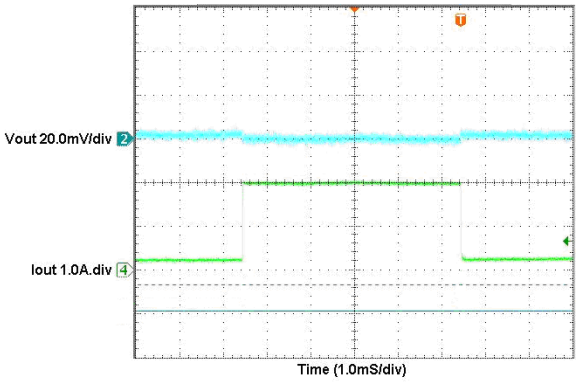




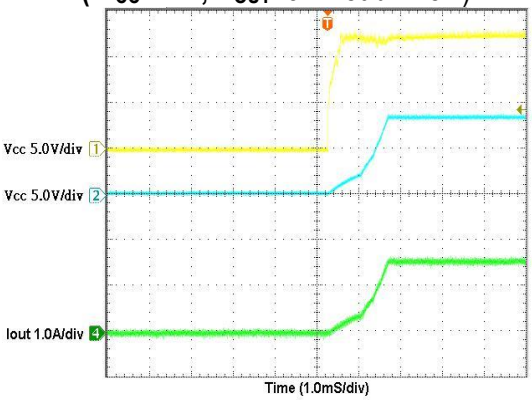




Load Transient
(V_{CC}=12.5V, V_{OUT}=12V Load=0.1~2A)

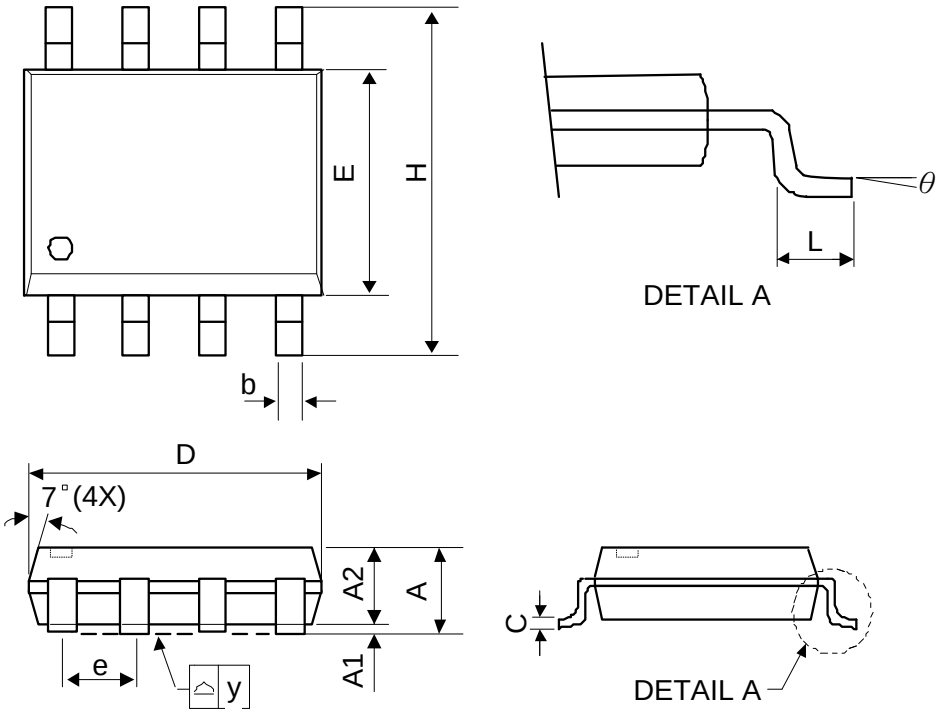


Power-ON
(V_{CC}=12V, V_{OUT}=9V Load=1.5A)



❖ PACKAGE OUTLINES

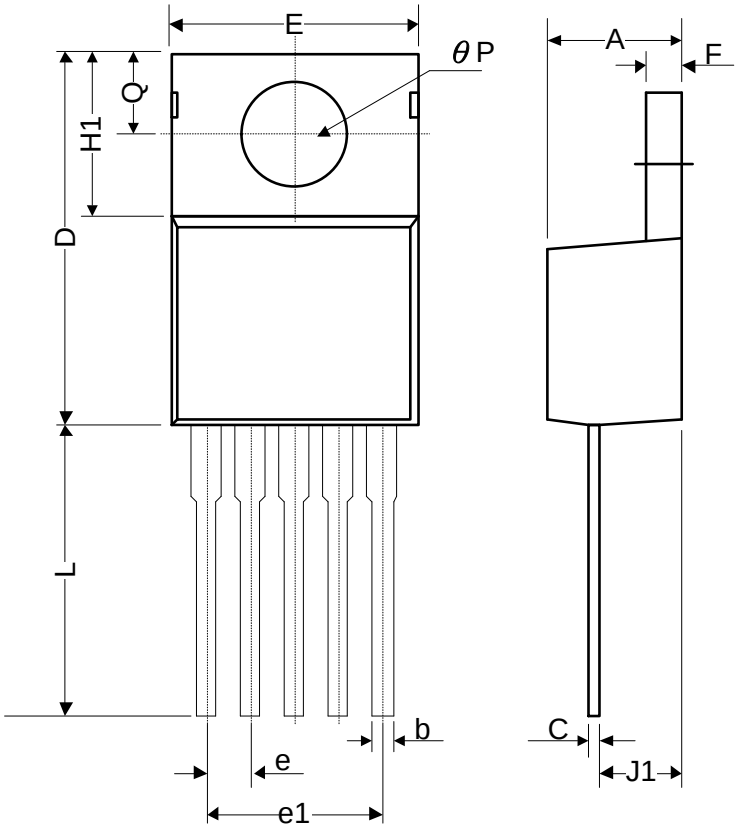
(1) SOP-8L



Symbol	Dimensions in Millimeters			Dimensions in Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	-	-	1.75	-	-	0.069
A1	0.1	-	0.25	0.04	-	0.1
A2	1.25	-	-	0.049	-	-
C	0.1	0.2	0.25	0.0075	0.008	0.01
D	4.7	4.9	5.1	0.185	0.193	0.2
E	3.7	3.9	4.1	0.146	0.154	0.161
H	5.8	6	6.2	0.228	0.236	0.244
L	0.4	-	1.27	0.015	-	0.05
b	0.31	0.41	0.51	0.012	0.016	0.02
e	1.27 BSC			0.050 BSC		
y	-	-	0.1	-	-	0.004
θ	0^o	-	8^o	0^o	-	8^o

Mold flash shall not exceed 0.25mm per side
JEDEC outline: MS-012 AA

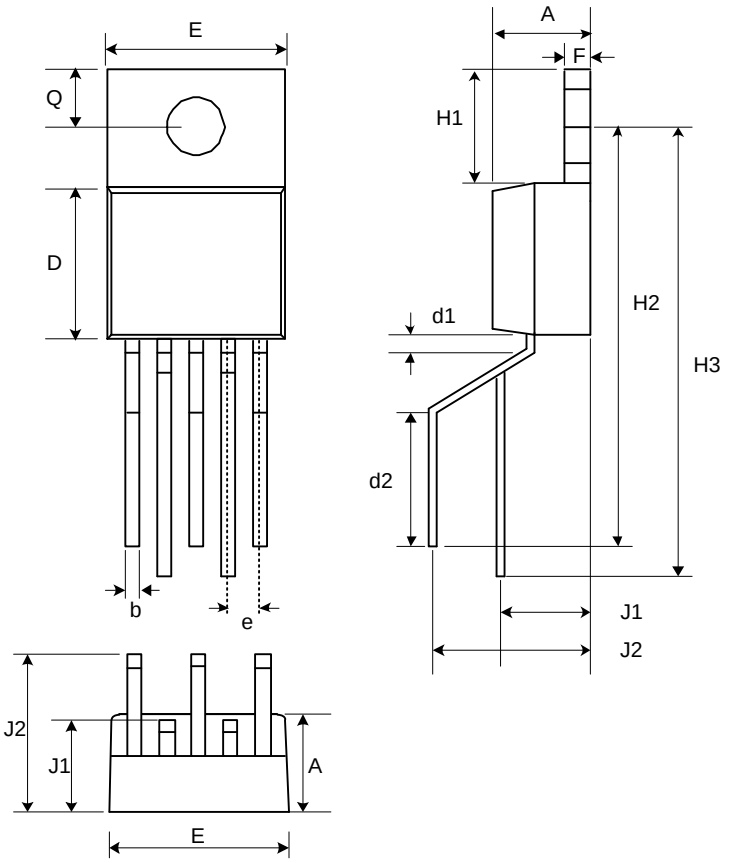
(2) TO220-5L



Symbol	Dimensions in Millimeters			Dimensions in Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	4.07	4.45	4.82	0.16	0.175	0.19
b	0.76	0.89	1.02	0.03	0.035	0.04
C	0.36	0.5	0.64	0.014	0.02	0.025
D	14.22	14.86	15.5	0.56	0.585	0.61
E	9.78	10.16	10.54	0.385	0.4	0.415
e	1.57	1.71	1.85	0.062	0.067	0.073
e1	6.68	6.81	6.93	0.263	0.268	0.273
F	1.14	1.3	1.45	0.045	0.051	0.057
H1	5.46	6.16	6.86	0.215	0.243	0.27
J1	2.29	2.74	3.18	0.09	0.108	0.125
L	13.21	13.97	14.73	0.52	0.55	0.58
θP	3.68	3.81	3.96	0.145	0.15	0.156
Q	2.54	2.73	2.92	0.1	0.107	0.115

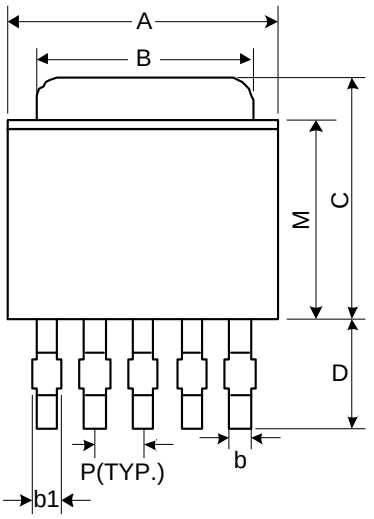
Mold flash shall not exceed 0.005inch per side
JEDEC outline: NA

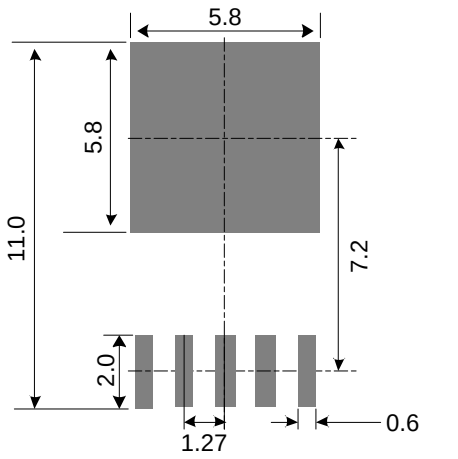
(3) TO220-5LR



Symbol	Dimensions in Millimeters			Dimensions in Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	4.4	4.6	4.7	0.175	0.18	0.185
b	0.7	0.8	0.9	0.027	0.032	0.037
D	8.4	8.7	8.9	0.33	0.34	0.35
d1		1			0.039	
d2		6.3			0.248	
E	9.91	10.16	10.41	0.39	0.4	0.41
e	1.6	1.7	1.8	0.062	0.067	0.072
F	1.2	1.25	1.3	0.048	0.05	0.052
H1		6.4			0.25	
H2	20.8	21.6	22.4	0.82	0.85	0.88
H3	23.9	24.7	25.5	0.942	0.972	1.002
J1	3.7	4.5	5.3	0.147	0.177	0.207
J2		8.4			0.331	
Q	2.5	2.8	3	0.1	0.11	0.12

(4) TO252-5L



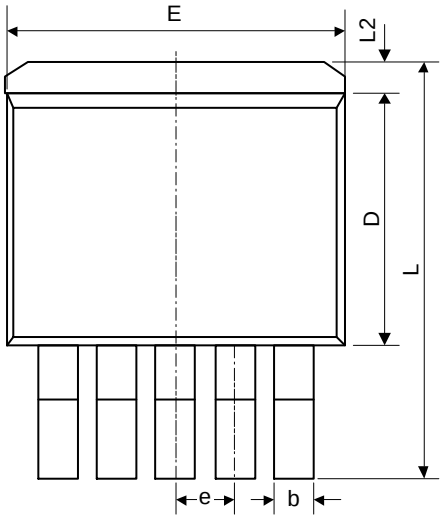


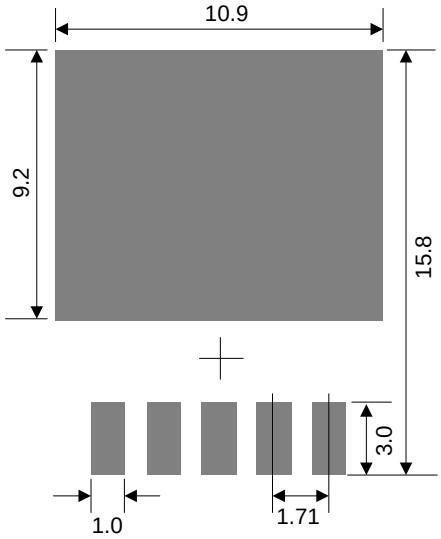
Land Pattern Recommendation (Unit: mm)

Symbol	Dimensions in Millimeters			Dimensions in Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	6.35	6.6	6.73	0.25	0.26	0.265
B	5.21	5.33	5.46	0.205	0.21	0.215
C	6.86	7.24	7.62	0.27	0.285	0.3
D	2.67 REF			0.105 REF		
P	1.27 REF			0.050 REF		
H	2.18	2.29	2.39	0.086	0.09	0.094
J	0.46	0.51	0.58	0.018	0.02	0.023
K	0	0.08	0.13	0	0.003	0.005
L	1.4	1.6	1.78	0.055	0.063	0.07
M	5.33	5.46	5.59	0.21	0.215	0.22
b	0.38	0.56	0.71	0.015	0.022	0.028
b1	0.38	0.53	0.66	0.015	0.021	0.026

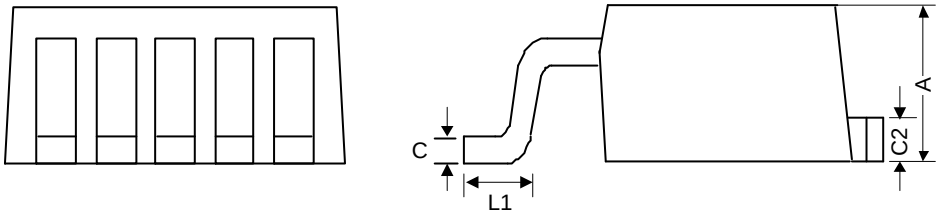
Mold flash shall not exceed 0.005inch per side

(5) TO263-5L





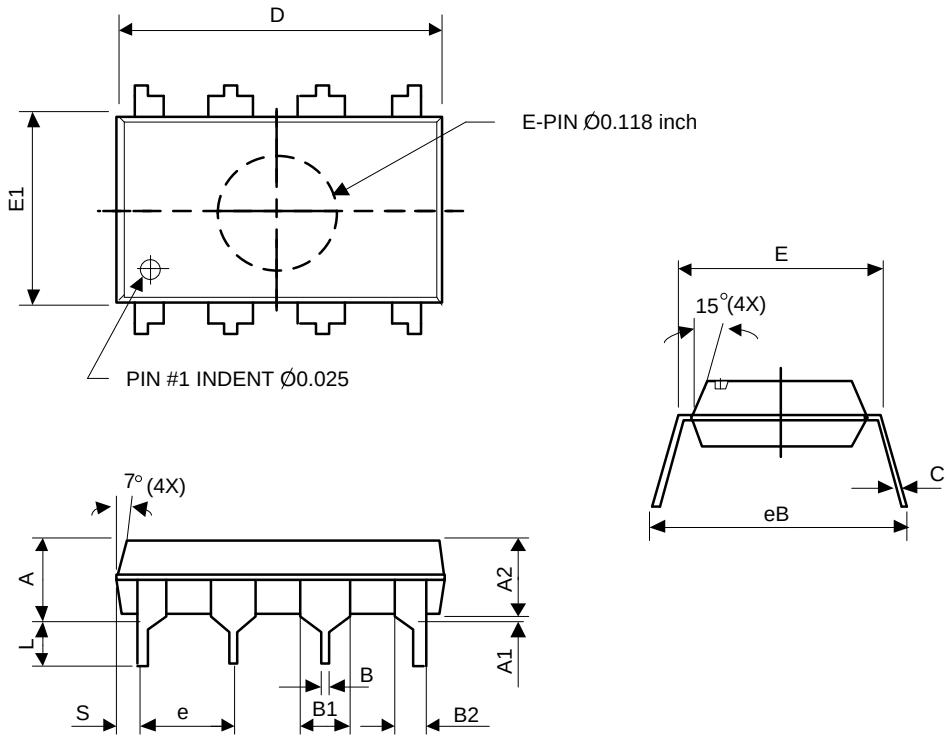
Land Pattern Recommendation
(Unit: mm)



Symbol	Dimensions in Millimeters			Dimensions in Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	4.06	4.45	4.83	0.16	0.175	0.19
b	0.51	0.76	0.99	0.02	0.03	0.039
C	0.38	0.56	0.74	0.015	0.022	0.029
C2	1.14	1.4	1.65	0.045	0.055	0.065
D	8.38	9.02	9.65	0.33	0.355	0.38
E	9,65	10.2	10.7	0.38	0.4	0.42
e	1.70 BSC			0.067 BSC		
L	14.6	15.2	15.9	0.575	0.6	0.625
L1	1.78	2.29	2.79	0.07	0.09	0.11
L2	-	-	1.68	-	-	0.066

Mold flash shall not exceed 0.005inch per side
JEDEC outline: TO-263 BA

(6) PDIP-8L



Symbol	Dimensions in millimeters			Dimensions in inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	-	-	5.33	-	-	0.21
A1	0.38			0.015	-	-
A2	2.92	3.3	4.95	0.115	0.13	0.195
B	0.36	0.46	0.51	0.014	0.018	0.02
B1	1.14	1.52	1.78	0.045	0.06	0.07
B2	0.76	0.99	1.14	0.03	0.039	0.045
C	0.2	0.25	0.36	0.008	0.01	0.014
D	9.02	9.27	10.16	0.355	0.365	0.4
E	7.62	7.87	8.26	0.3	0.31	0.325
E1	6.1	6.35	7.11	0.24	0.25	0.28
e	2.54 BSC			0.100 BSC		
L	2.92	3	3.81	0.115	0.13	0.15
eB	-	-	10.92	-	-	0.43
S	0.13	-	-	0.005	-	-

JEDEC outline: MO-100 BA