

2A Ultra Low Dropout Linear Regulator

❖ GENERAL DESCRIPTION

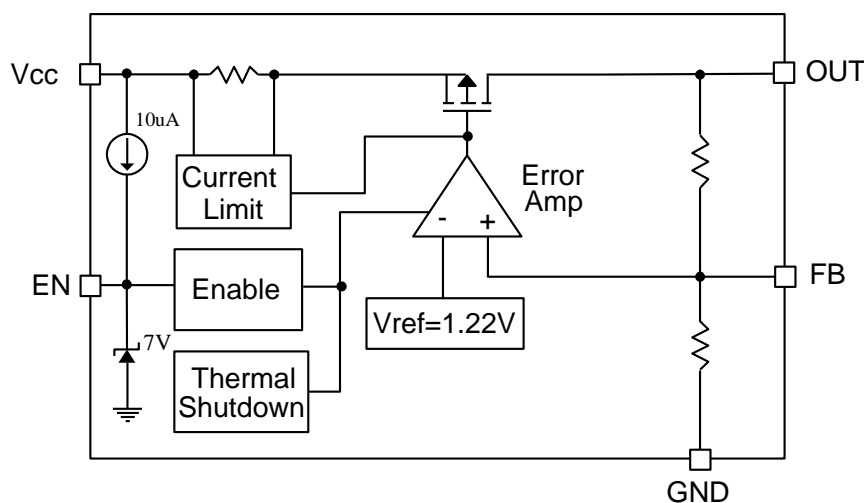
The AX1202 is a low-dropout voltage regulator suitable for various electronic equipments. It provides constant voltage power source. The dropout voltage of AX1202 is below 0.27V in full rated current (2A). This regulator has various functions such as a peak current protection, a thermal shut down, a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

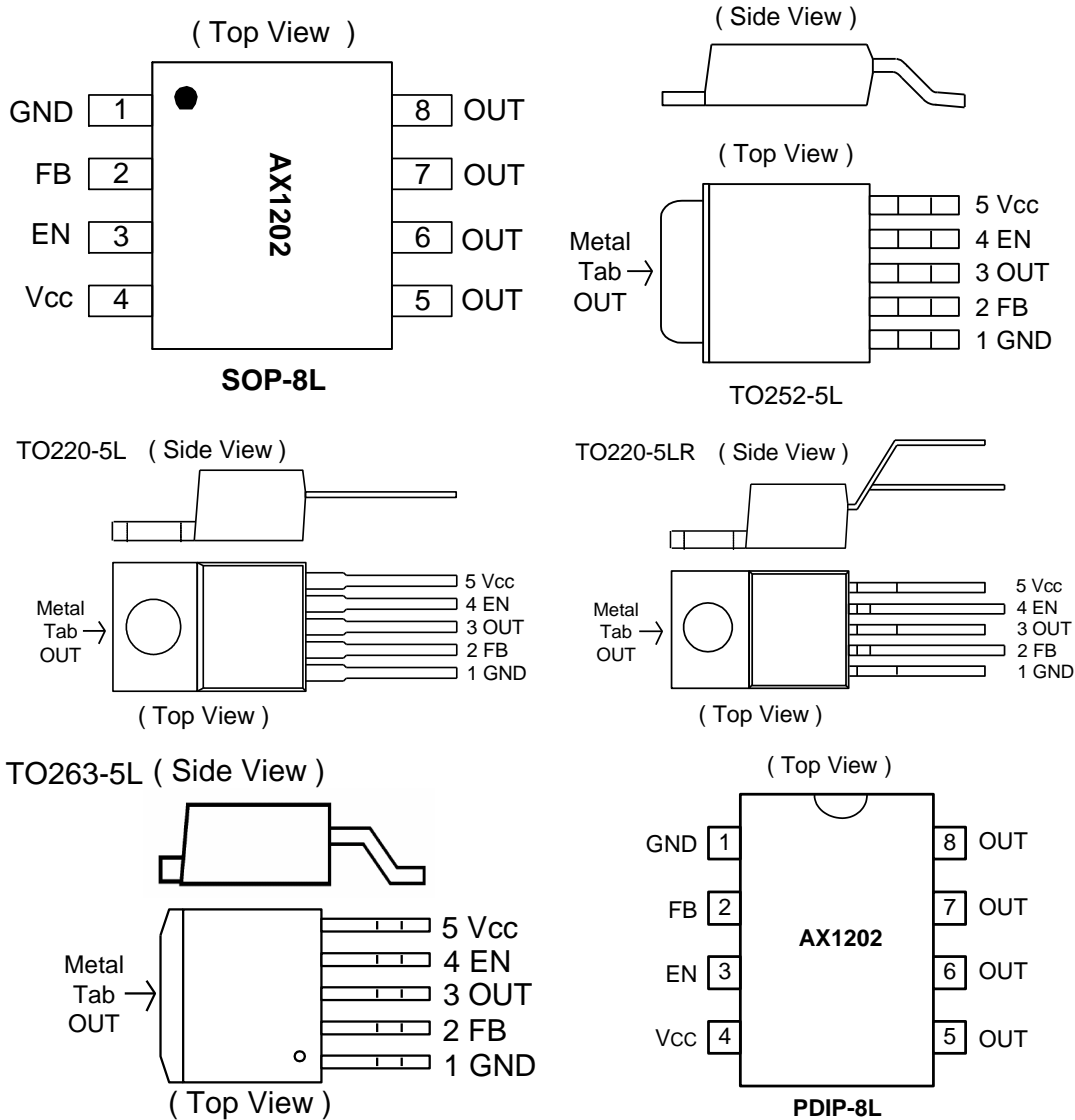
- Ultra Low Dropout - 0.27V(typical) at 2A Output Current
- Adjustable mode: 1.22V Reference Voltage
- Fixed mode:5V, 9V, 12V output voltage
- Operating voltage: up to 23V for TO220 and TO263 packages.
up to 16V for TO252, PDIP-8L and SOP-8L packages.
- Current-Limit and Thermal Shutdown Protection
- 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:



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 <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 2px; width: 30%;"> Package N : PDIP-8L S : SOP-8L D5: TO252-5L M5: TO263-5L T5 : TO220-5L T5R: TO220-5LR </div> <div style="border: 1px solid black; padding: 2px; width: 30%;"> Vout Blank : Adj 50 = 5.0V 90 = 9.0V 12 = 12V </div> <div style="border: 1px solid black; padding: 2px; width: 30%;"> Packing Blank : Tube A : Taping </div> </div>	
Top Marking	
ADJ Version <p>Logo ← AX 1 2 0 2 → Part number YY WW X → ID code:internal WW:01~52 Year: 10=2010 11=2011</p>	FIXED Version (V_{OUT}=5.0V) <p>Logo ← AX 1 2 0 2 → Part number - 5 0 → Output voltage YY WW X → ID code:internal WW:01~52 Year: 10=2010 11=2011</p>

❖ 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 V _{CC} +0.3	V
Output current	I _{OUT}	2.5	A
Power Dissipation	TO220	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	3.5	°C/W
	TO263	3.5	
	TO252	10	
	PDIP-8L	15	
	SOP-8L	20	
Thermal Resistance from Junction to ambient	TO220	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 in² (Multi-layer).

❖ ELECTRICAL CHARACTERISTICS

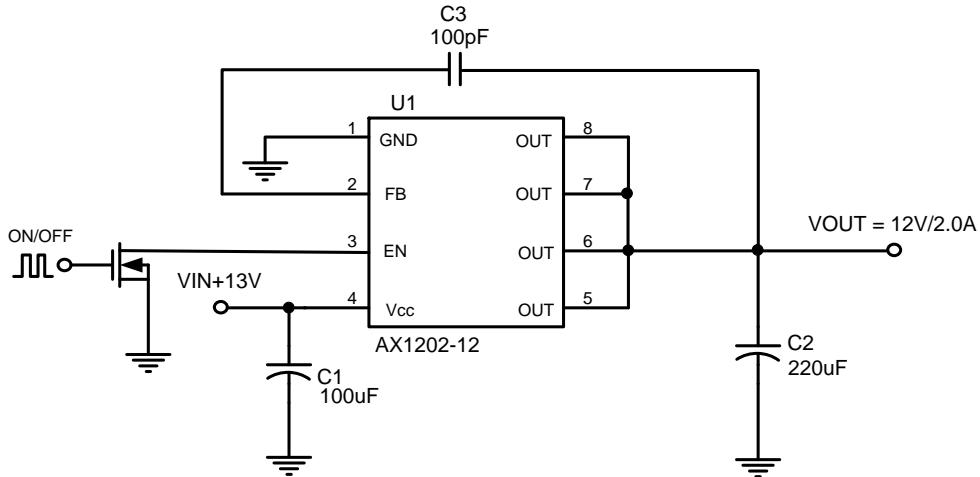
(Unless otherwise specified, $T_A=25^{\circ}\text{C}$, $V_{CC}=12\text{V}$)

Characteristics	Symbol	Conditions	Min	Typ	Max	Units
V _{CC} Supply Voltage	V _{CC}	I _{OUT} =2A TO220, TO263 packages	5.1	-	23	V
		I _{OUT} =2A 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	I _{scp}	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

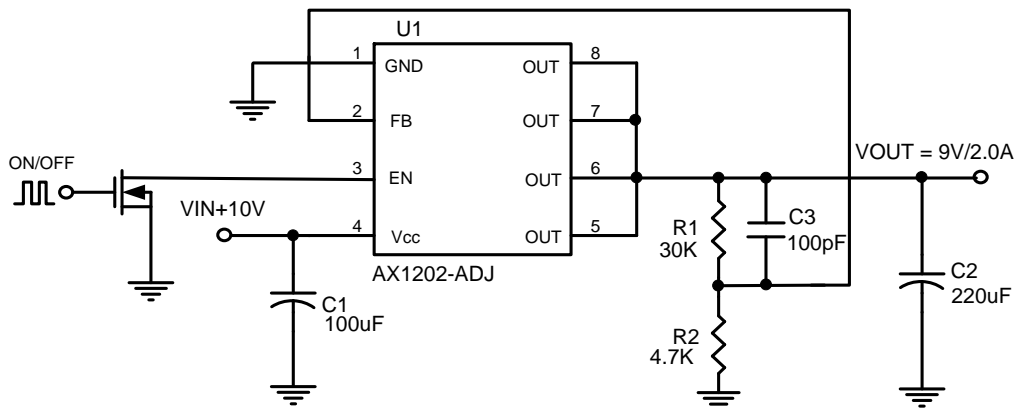
Note: These parameters, although guaranteed, are not 100% tested in production.

❖ APPLICATION CIRCUIT

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



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



$$V_{OUT} = V_{FB} * (1 + R1/R2)$$

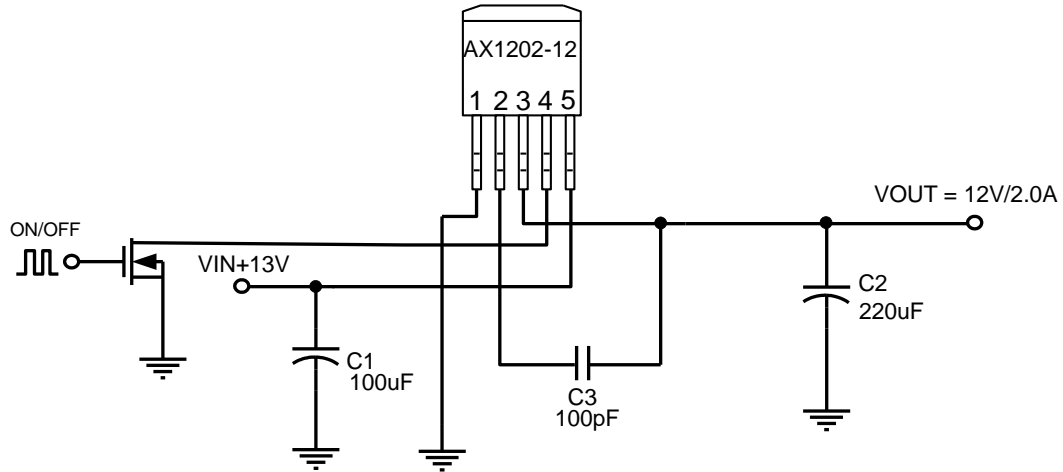
$$V_{FB} = 1.22V$$

R2 suggest 1K~5.6KΩ

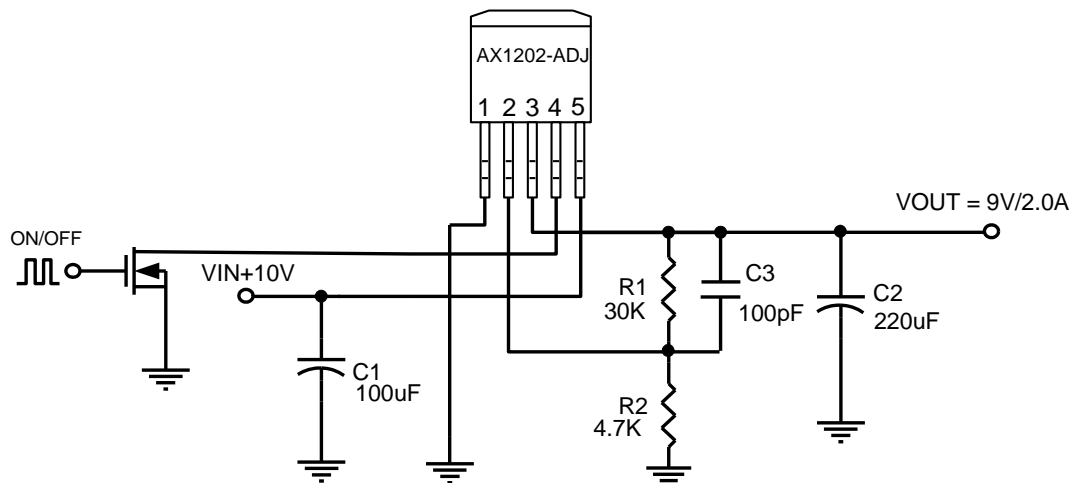
C2 choose Low ESR capacitor

C3=47pF~100pF for stability issue

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



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



$$V_{OUT} = V_{FB} * (1 + R1/R2)$$

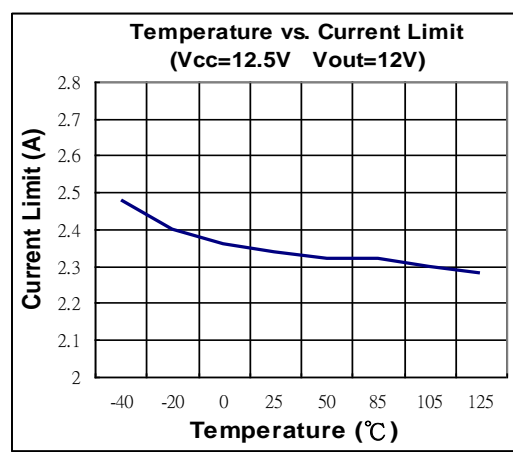
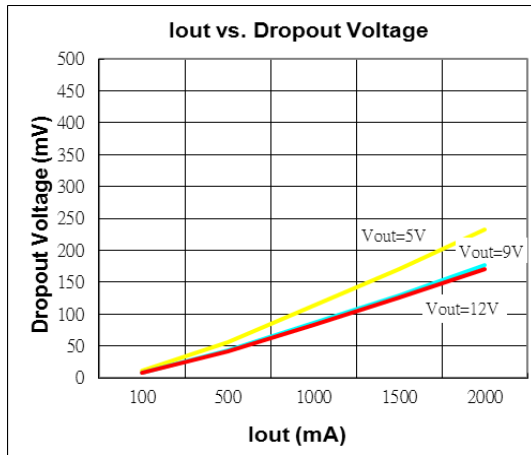
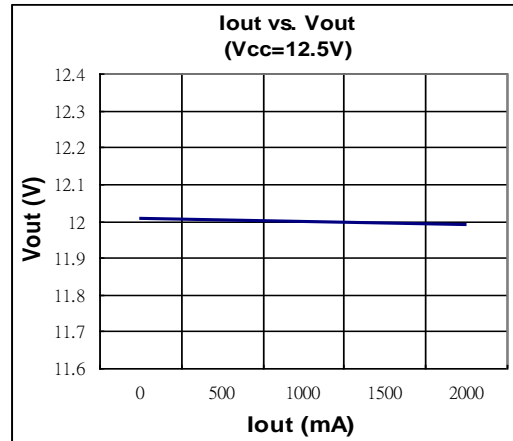
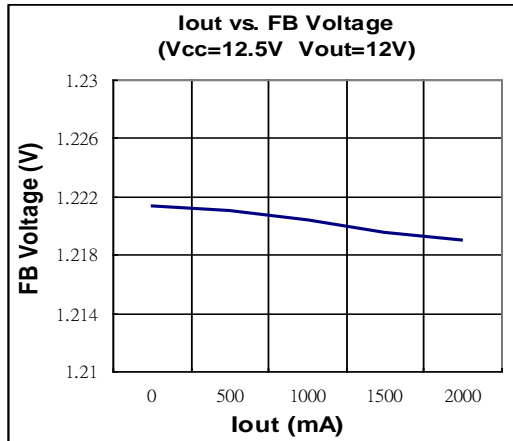
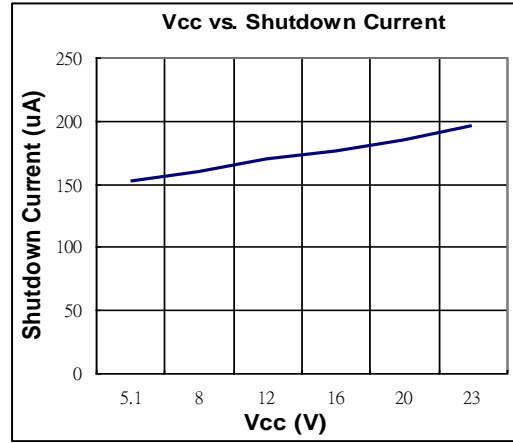
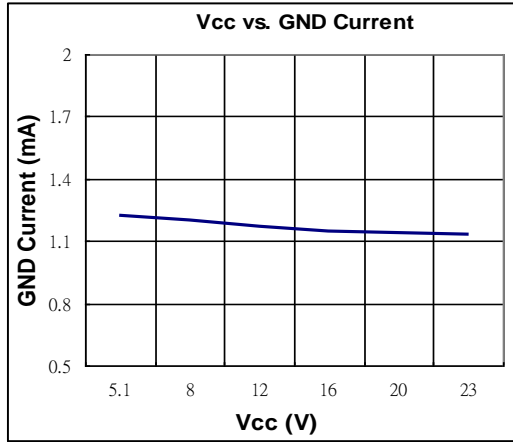
$$V_{FB} = 1.22V$$

R2 suggest 1K~5.6KΩ

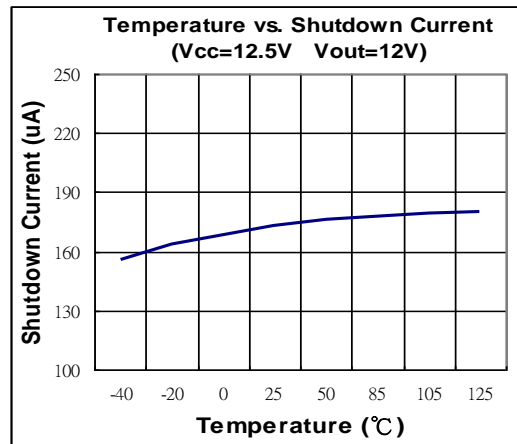
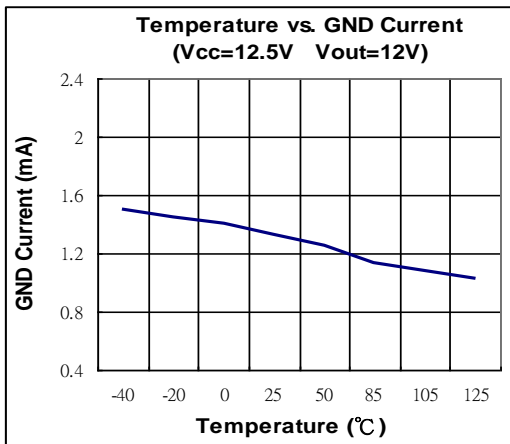
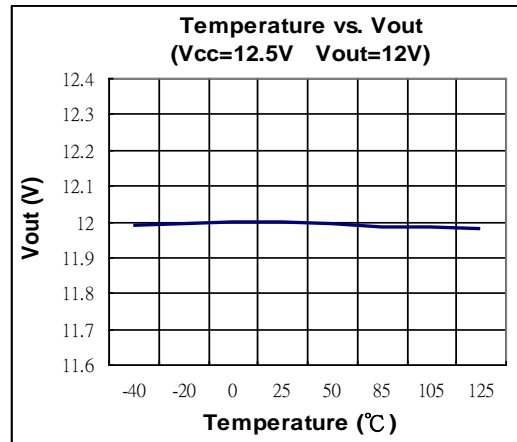
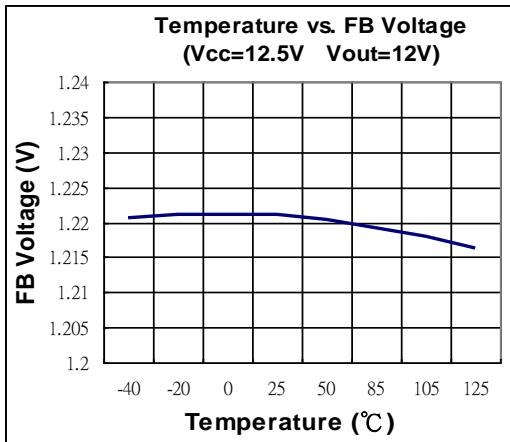
C2 choose Low ESR capacitor

C3=47pF~100pF for stability issue

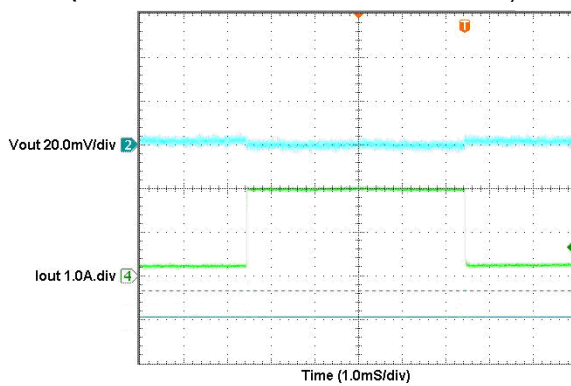
❖ TYPICAL CHARACTERISTICS



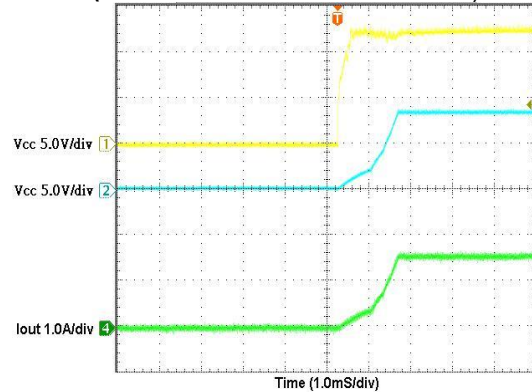
❖ TYPICAL CHARACTERISTICS (CONTINUED)

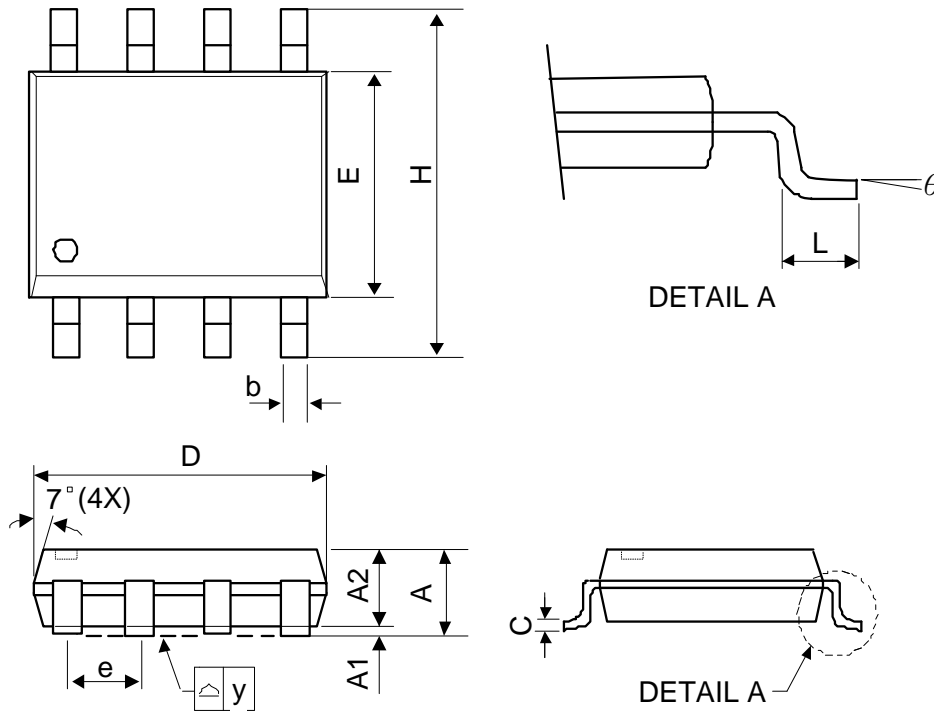


Load Transient
(V_{CC}=12.5V, V_{OUT}=12V Load=0.1~2A)



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



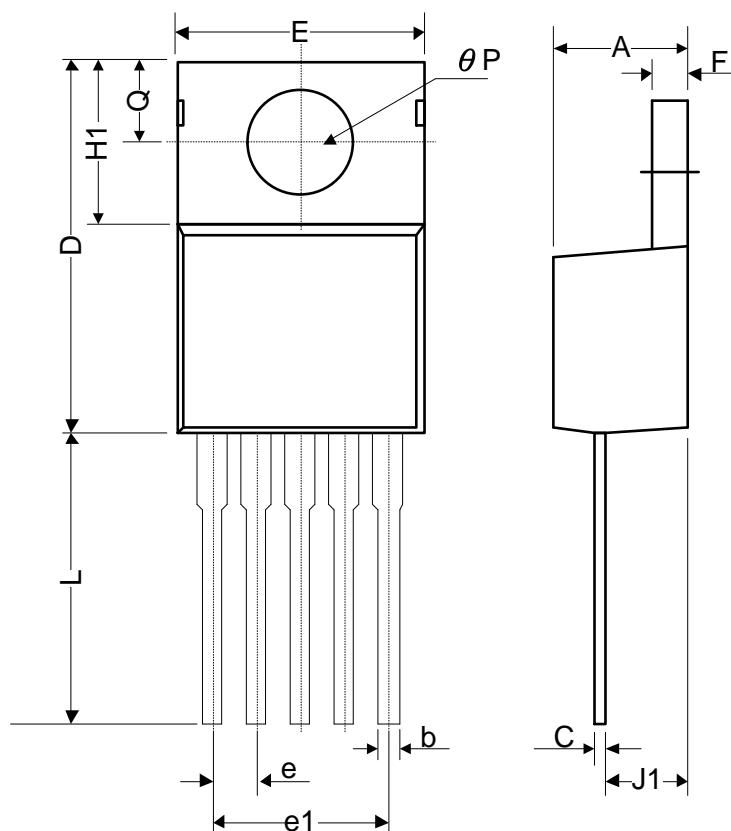
❖ PACKAGE OUTLINES
(1) SOP-8L


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
theta	0°	-	8°	0°	-	8°

Mold flash shall not exceed 0.25mm per side

JEDEC outline: MS-012 AA

(2) T0220-5L

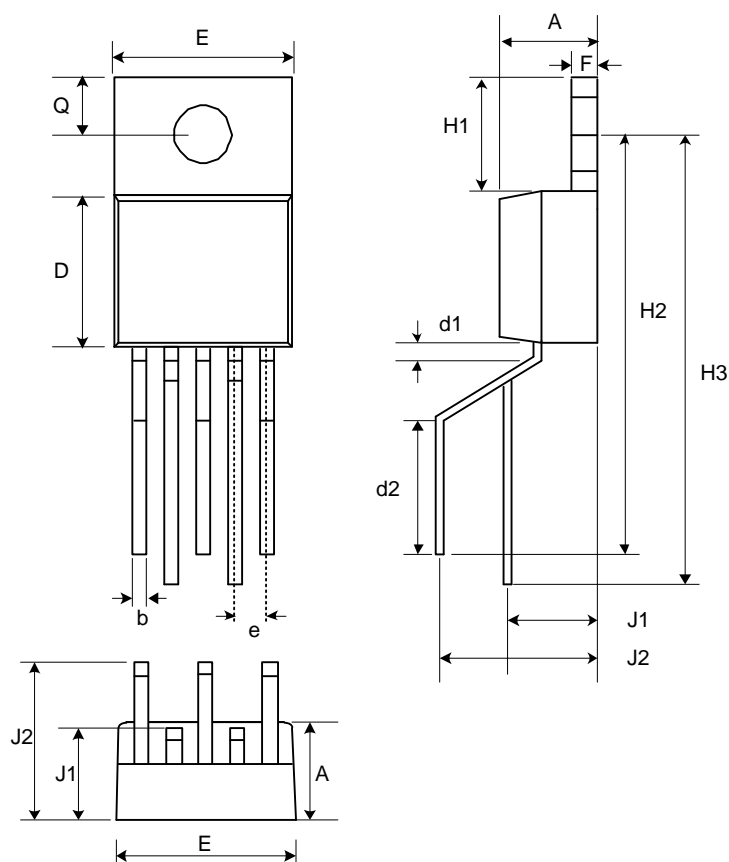


Symbol	Dimensions in Millimeters			Dimensions in Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	4.07	4.45	4.82	0.16	0.175	0.19
b	0.76	0.89	1.02	0.03	0.035	0.04
C	0.36	0.5	0.64	0.014	0.02	0.025
D	14.22	14.86	15.5	0.56	0.585	0.61
E	9.78	10.16	10.54	0.385	0.4	0.415
e	1.57	1.71	1.85	0.062	0.067	0.073
e1	6.68	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
theta P	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

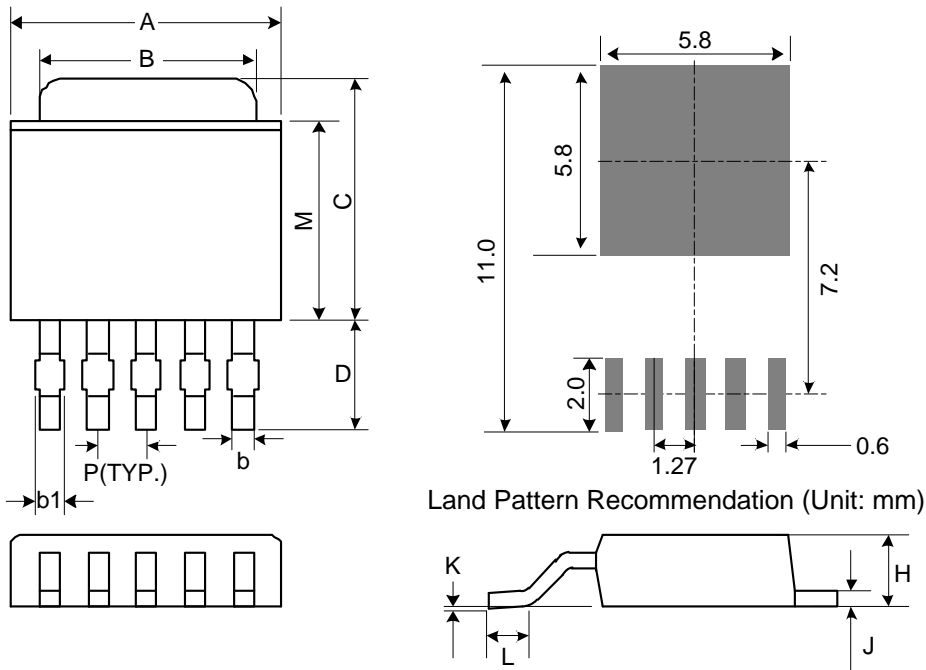
JEDEC outline: NA

(3) T0220-5LR



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

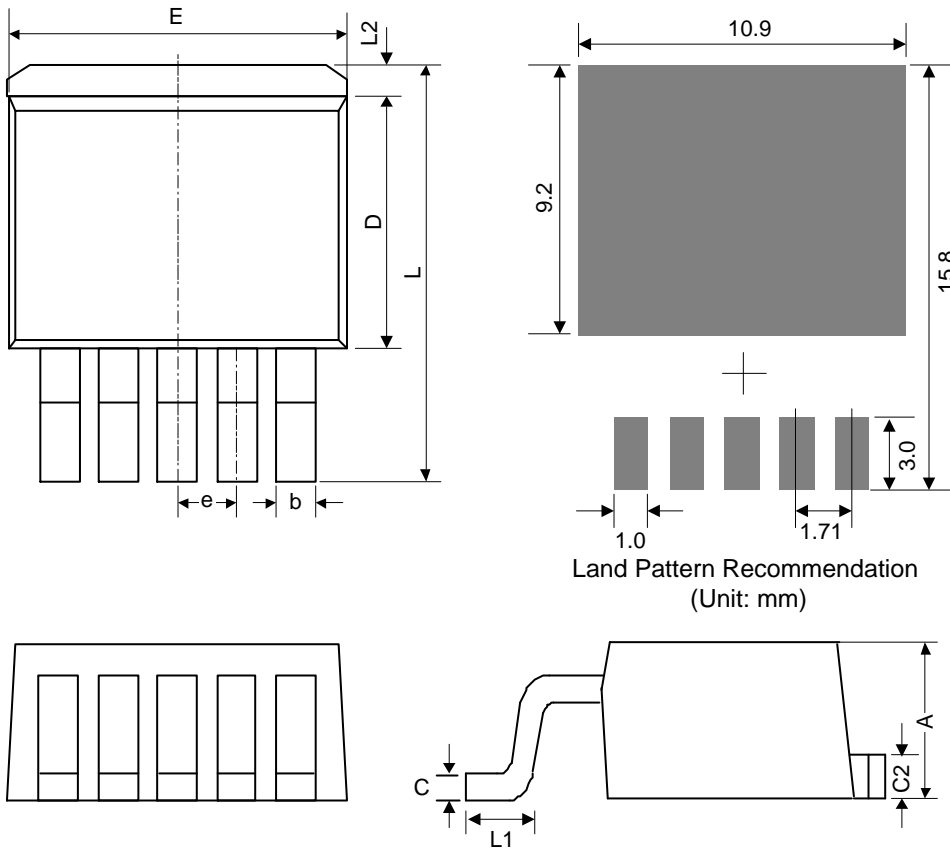
(4) T0252-5L



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

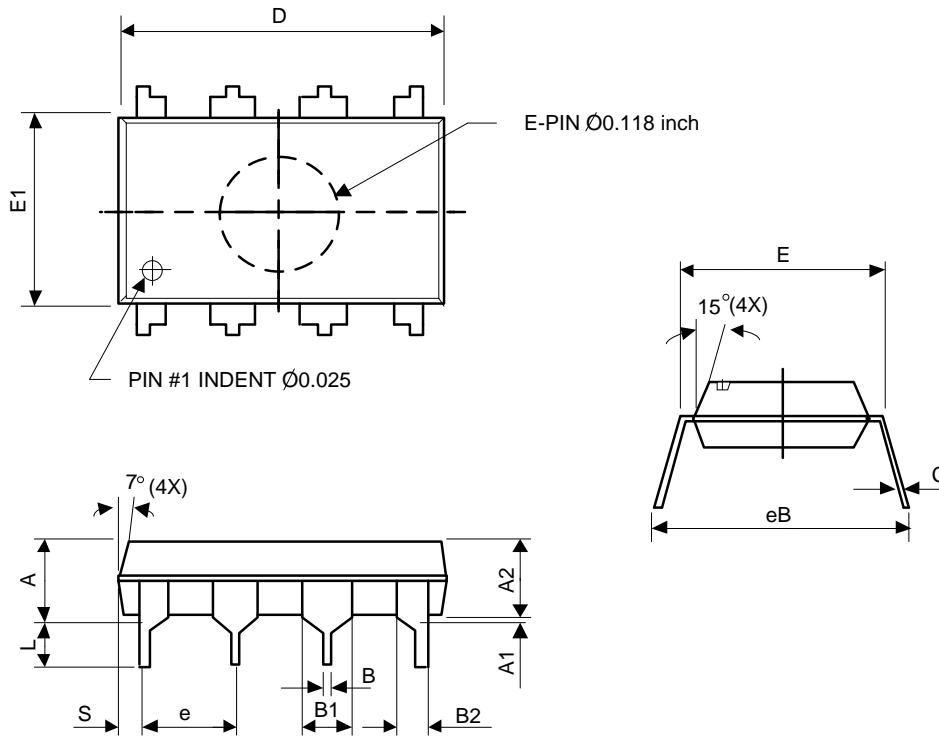


Land Pattern Recommendation (Unit: mm)

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