

1A Ultra Low Dropout Linear Regulator

❖ GENERAL DESCRIPTION

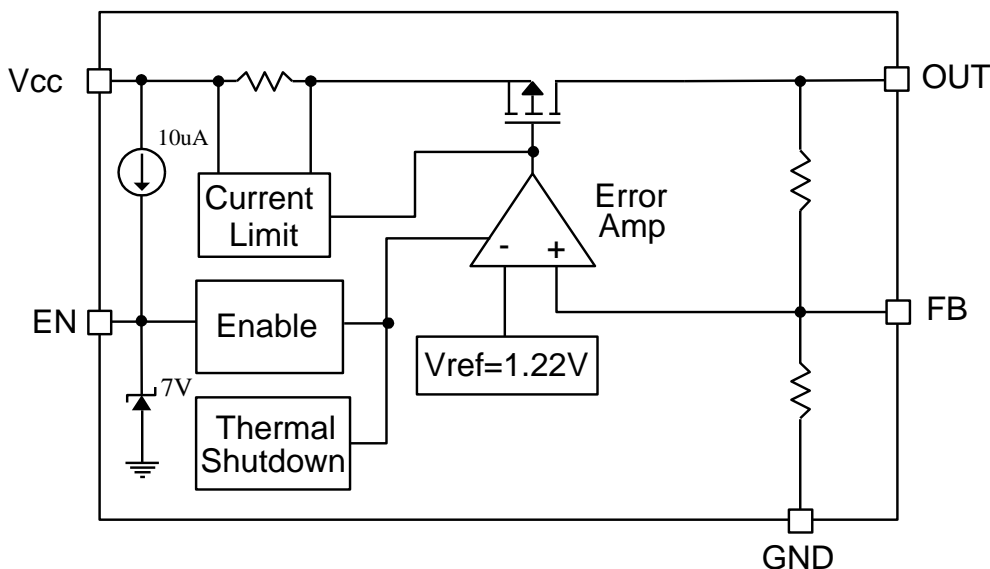
The AX1201 is a low-dropout voltage regulator suitable for various electronic equipments. It provides constant voltage power source. The dropout voltage of AX1201 is below 0.14V in full rated current (1A). This regulator has various functions such as a peak current protection, a thermal shut down, a short circuit protect.

The AX1201 is available in SOP-8L and TO220-5L power packages which features small size to reduce the junction-to-case resistance, being applicable in 0.5~3W applications.

❖ FEATURES

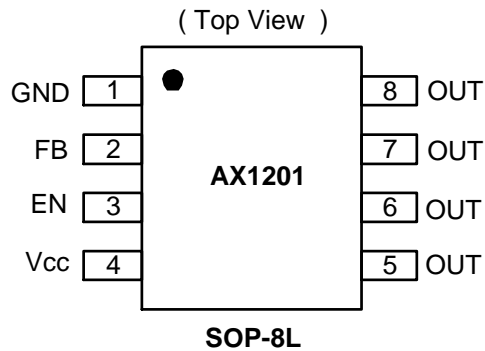
- Ultra Low Dropout - 0.14V(typical) at 1A Output Current
- Adjustable mode: 1.22V Reference Voltage
- Fixed mode: 5V, 9V, 12V output voltage
- Operating voltage can be up to 23V.
- Current-Limit and Thermal Shutdown Protection
- Short circuit protection, Enable function.
- Built-in internal SW P-channel MOS
- SOP-8L, TO220-5L and TO220-5LR Pb-Free Packages.

❖ BLOCK DIAGRAM

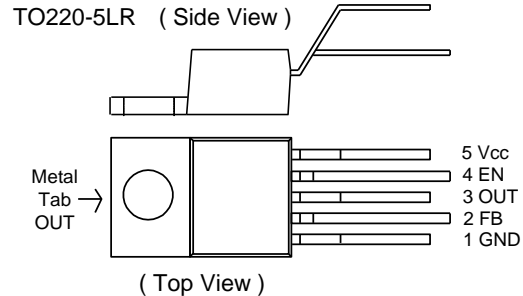
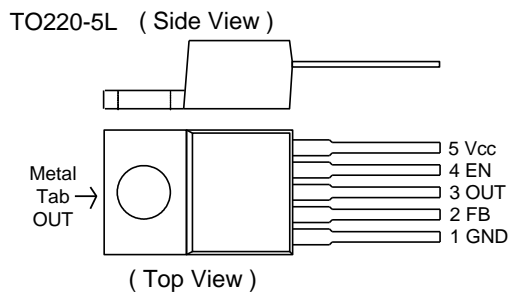


❖ PIN ASSIGNMENT

The packages of AX1201 are SOP-8L, TO220-5L and TO220-5LR; 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.
VCC	IC power supply pin
OUT	Output Voltage pin
GND	Ground pin



❖ ORDER/ MARKING INFORMATION

Order Information	
AX1201 XXX XX X	
Package S : SOP-8L T5 : TO220-5L T5R:TO220-5LR	Vout Blank : Adj 50 = 5.0V 90 = 9.0V 12 = 12V
Packing Blank : Tube A : Taping	
Top Marking (SOP-8L/TO220-5L/TO220-5LR)	Top Marking (SOP-8L/TO220-5L/TO220-5LR)
ADJ Version Logo ← AX 1 2 0 1 → Part number YY WW X → ID code:internal WW:01~52 Year: 10=2010 11=2011	FIXED Version (V _{OUT} =5.0V) Logo ← AX 1 2 0 1 → Part number - 5 0 → Output voltage YY WW X → ID code:internal WW:01~52 Year: 10=2010 11=2011

❖ **ABSOLUTE MAXIMUM RATINGS** ($T_A=25^{\circ}\text{C}$)

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_o	1.5	A
Power Dissipation	PD	TO220=4, SOP8=1.6	W
Storage Temperature Range	T_{ST}	-65 to +150	$^{\circ}\text{C}$
Junction Temperature Range	T_J	-40 to 125	$^{\circ}\text{C}$
Operating Temperature Range	T_{OP}	-40 to +85	$^{\circ}\text{C}$
Thermal Resistance from Junction to case	TO220	3.5	$^{\circ}\text{C}/\text{W}$
	SOP8	20	
Thermal Resistance from Junction to ambient	TO220	25	$^{\circ}\text{C}/\text{W}$
	SOP8	60	

Note: θ_{JA} is measured with the PCB copper area(need connect to OUT pin) of approximately 1.5 in² (Multi-layer).

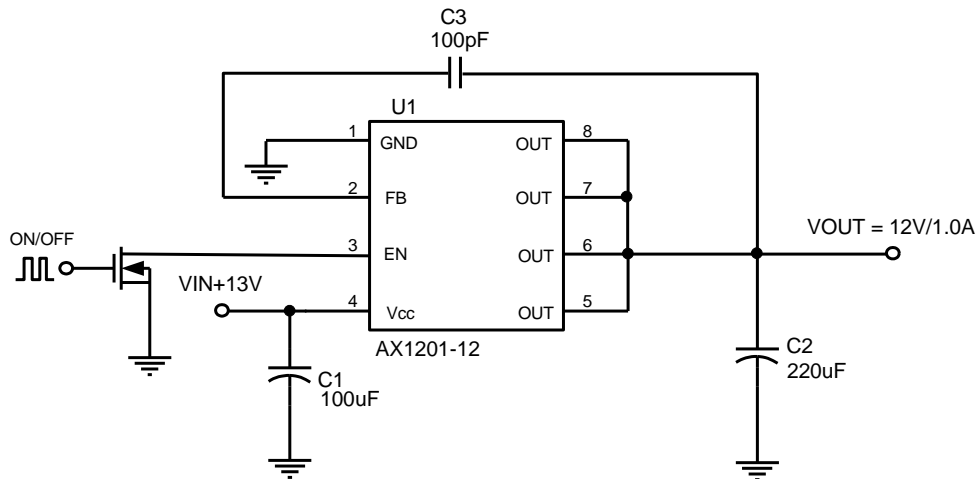
❖ **ELECTRICAL CHARACTERISTICS** (Unless otherwise specified, $T_A=25^{\circ}\text{C}$, $V_{CC}=12\text{V}$)

Characteristics	Symbol	Conditions	Min	Typ	Max	Units
V_{CC} Supply Voltage	V_{CC}	$I_{OUT}=1\text{A}$	5.1	-	23	V
Feedback Voltage	V_{FB}	$I_{OUT}=10\text{mA}$, $V_{CC}=10\text{V}$	1.196	1.22	1.244	V
Output Voltage	V_{OUT}	$I_{OUT}=10\text{mA}$, $V_{CC}=6\text{V}$	4.90	5.0	5.10	V
		$I_{OUT}=10\text{mA}$, $V_{CC}=10\text{V}$	8.82	9.0	9.18	
		$I_{OUT}=10\text{mA}$, $V_{CC}=13\text{V}$	11.76	12	12.24	
GND Current	I_{GND}	$I_{OUT}=0\sim 1\text{A}$	-	1.2	3	mA
Shutdown Current	I_{SD}	$V_{EN}=0\text{V}$	-	0.15	0.4	mA
Load regulation	V_{Load}	$5\text{mA} < I_{OUT} < 1\text{A}$	-	0.5	1.5	%
Line regulation	V_{Line}	$I_{OUT}=10\text{mA}$, $V_{OUT}+1.0\text{V} < V_{CC} < V_{OUT}+10\text{V}$	-	0.1	0.5	%
Ripple rejection ratio	PSRR	Note1	-	65	-	dB
Dropout Voltage	V_{DROP}	$I_{OUT}=1\text{A}$, $V_{OUT}=5\text{V}$	-	0.14	0.2	V
		$I_{OUT}=1\text{A}$, $V_{OUT}=9\text{V}$	-	0.13	0.19	
		$I_{OUT}=1\text{A}$, $V_{OUT}=12\text{V}$	-	0.1	0.15	
Short circuit protect	I_{scp}	$V_{OUT} < 20\%$	-	0.3	-	A
Current Limit	CL		1.1	-	-	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}	$V_{EN}=2.5\text{V}$ (ON)	-	20	-	μA
	I_{ENL}	$V_{EN}=0.3\text{V}$ (OFF)	-	-10	-	μA
Internal MOSFET RDSON	R_{DSON}	$V_{CC}=5.5\text{V}$	-	140	200	m Ω
		$V_{CC}=12\text{V}$	-	100	150	
Thermal Shutdown	T_{SD}		-	140	-	$^{\circ}\text{C}$

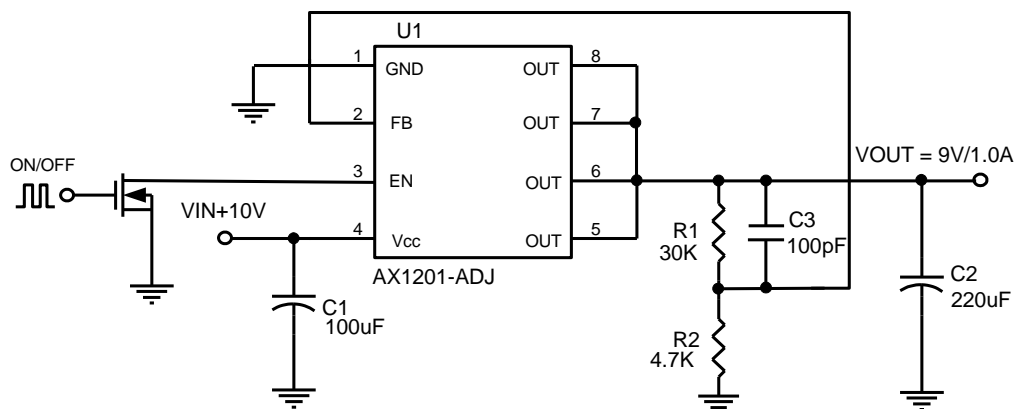
Note1. These parameters, although guaranteed, are not 100% tested in production.

❖ APPLICATION CIRCUIT

1. FIXED



2. ADJ



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

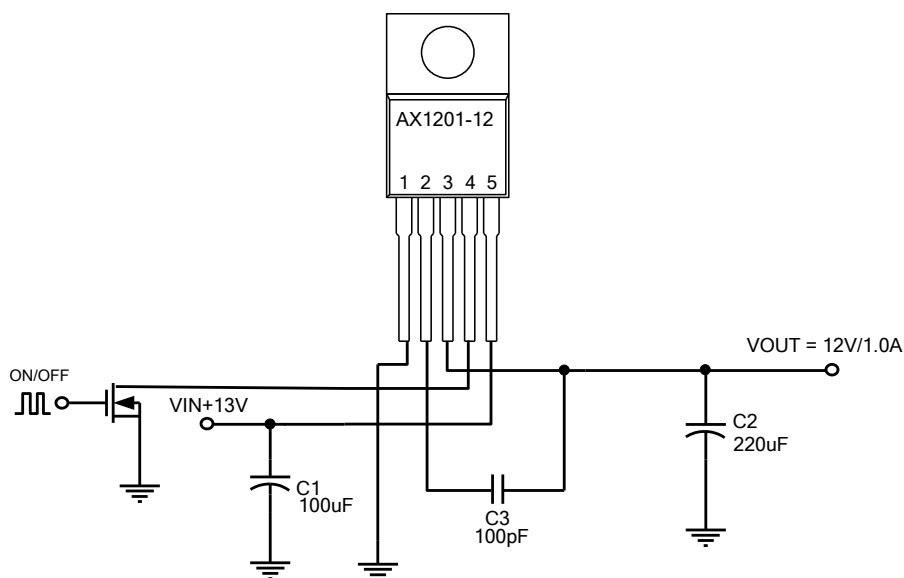
$$V_{FB} = 1.22V$$

R2 suggest 1K~5.6KΩ

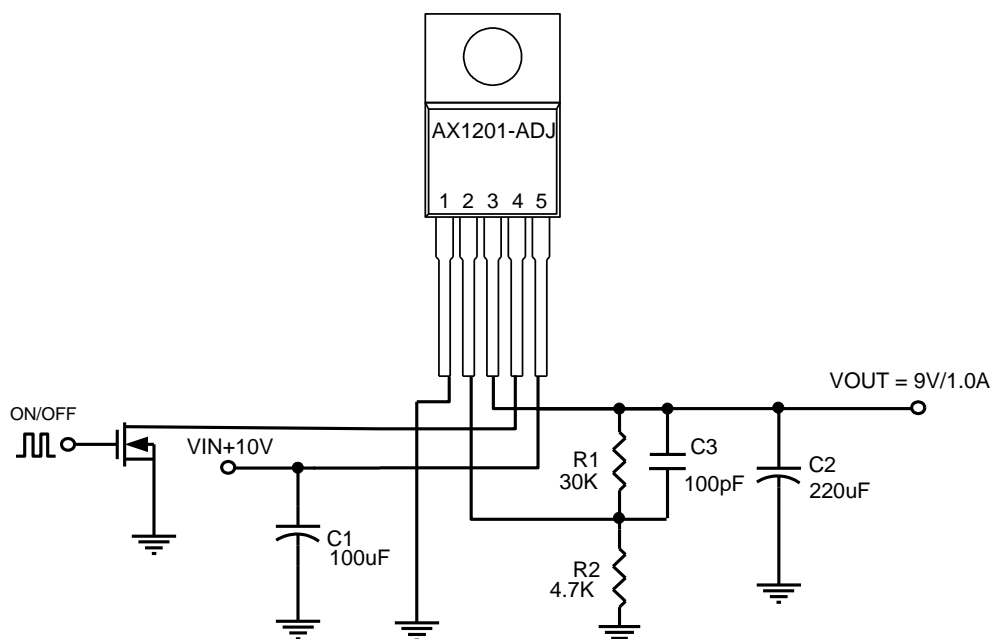
C2 choose Low ESR capacitor

C3=47pF~100pF for stability issue

3. FIXED (TO220-5L)



4. ADJ (TO220-5L)



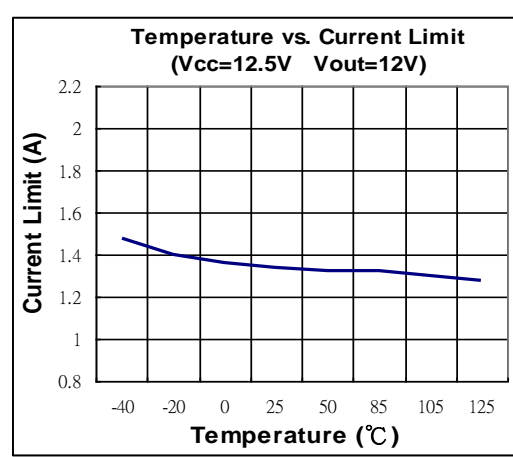
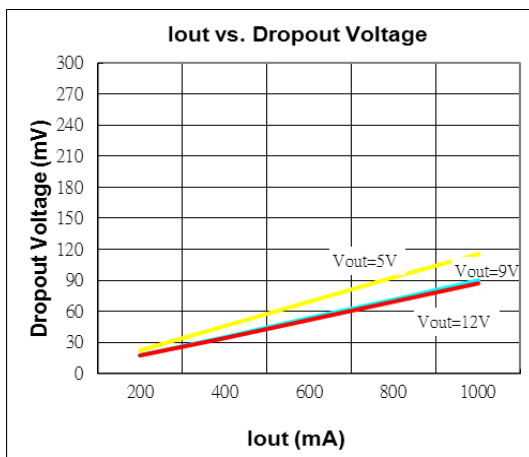
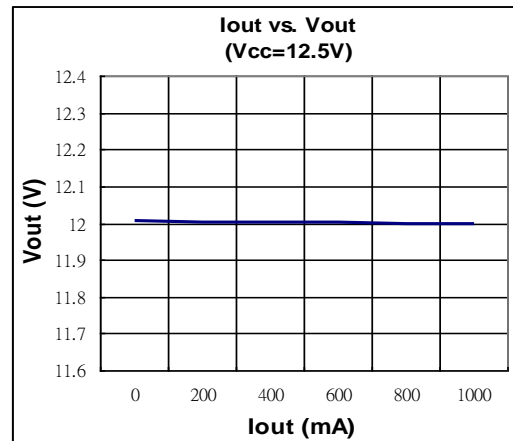
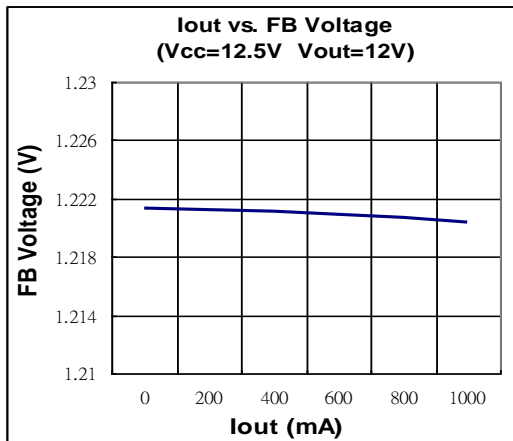
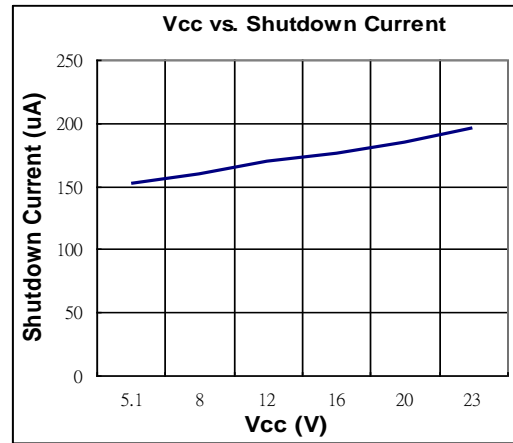
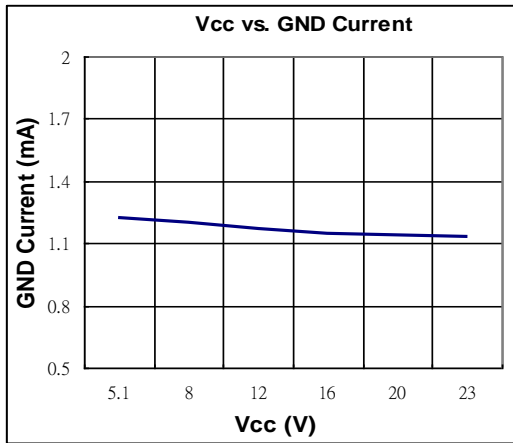
$$V_{OUT} = V_{FB} * (1 + R1/R2)$$

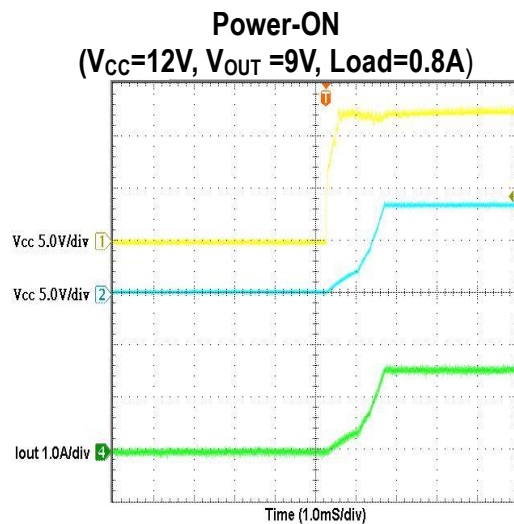
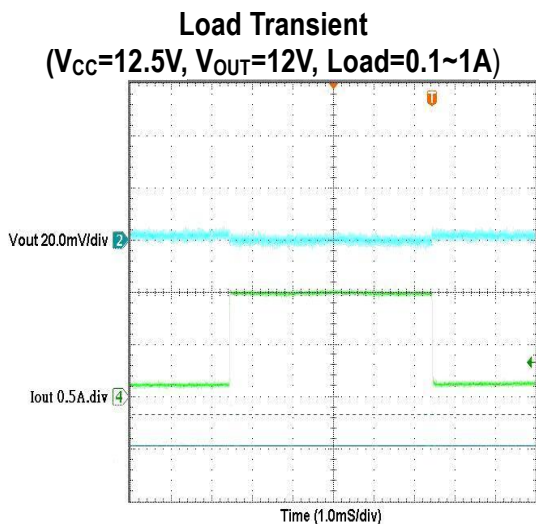
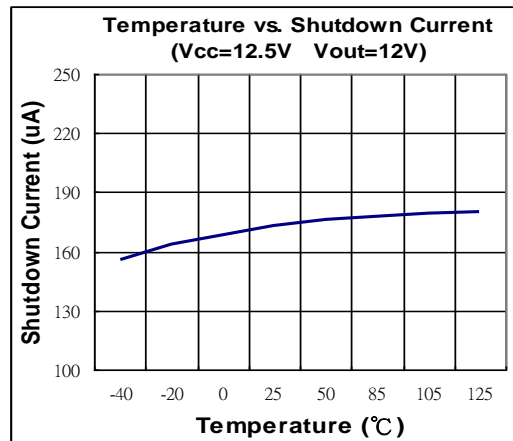
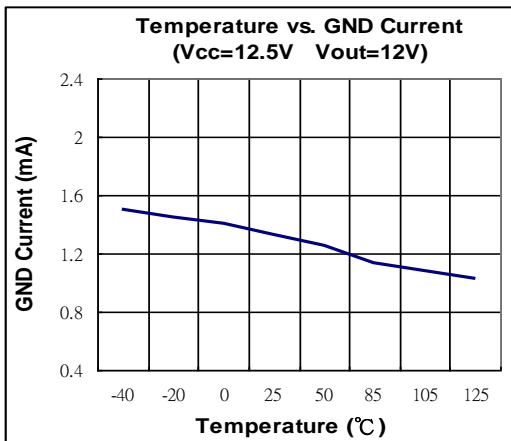
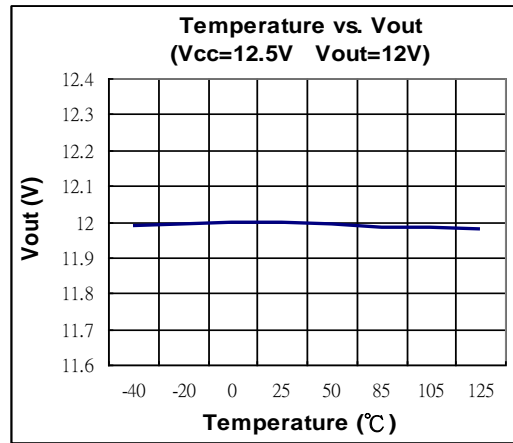
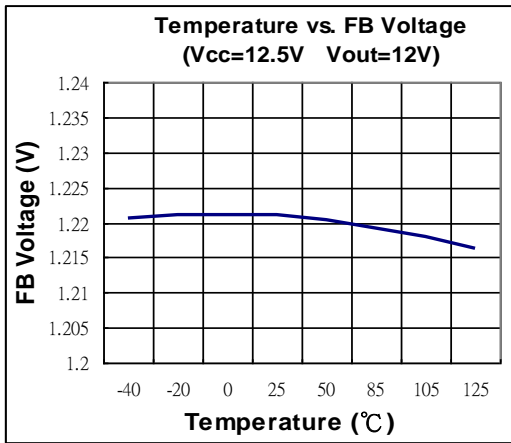
$$V_{FB} = 1.22V$$

R2 suggest 1K~5.6KΩ

C2 choose Low ESR capacitor

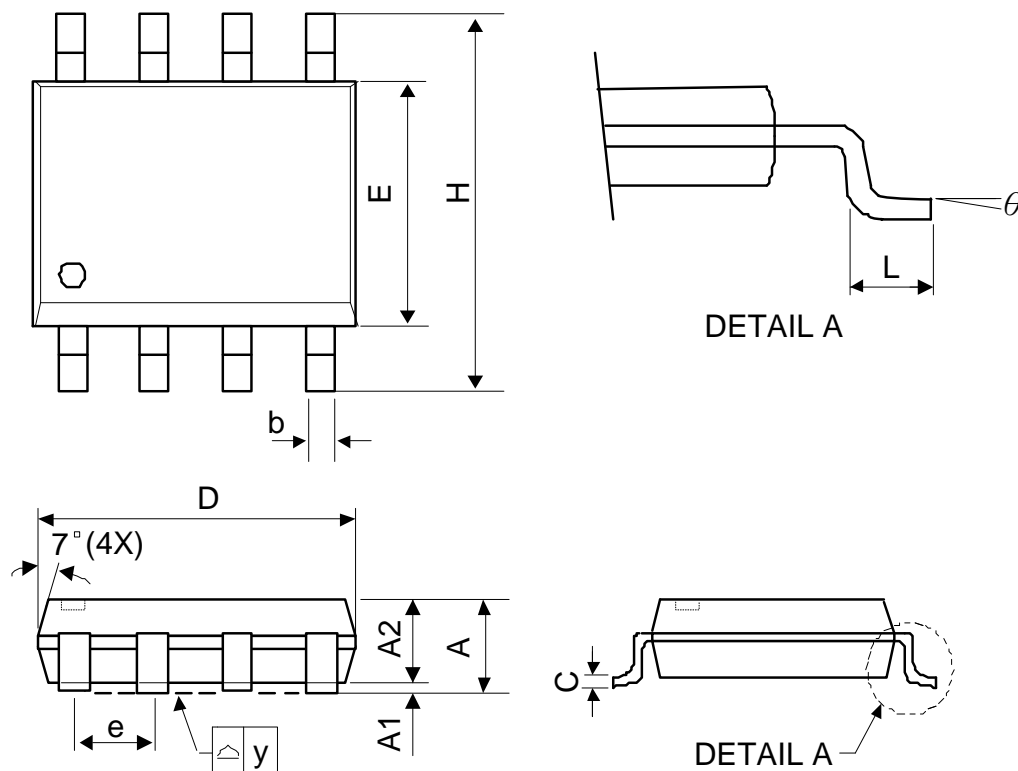
C3=47pF~100pF for stability issue

❖ TYPICAL CHARACTERISTICS


❖ TYPICAL CHARACTERISTICS (CONTINUED)


❖ PACKAGE OUTLINES

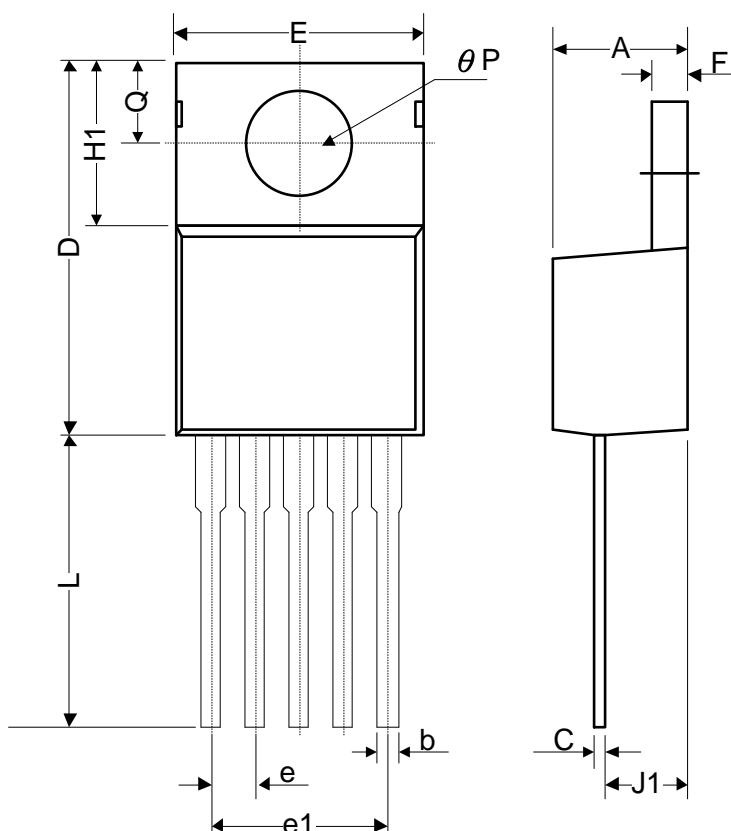
(1) SOP-8L



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°	-	8°	0°	-	8°

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

(2) T0220-5L

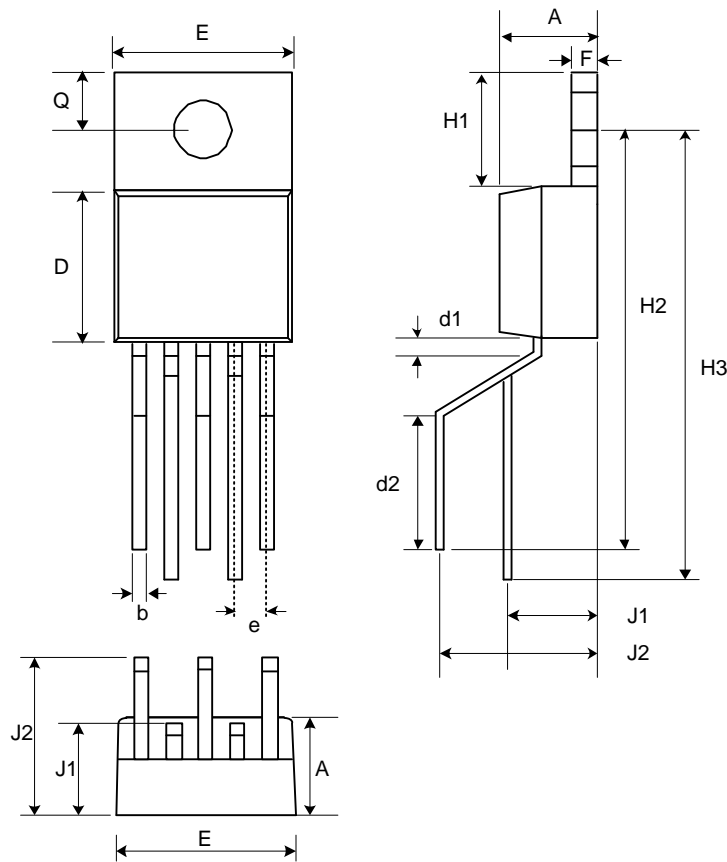


Symbol	Dimensions in Millimeters			Dimensions in Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	4.07	4.45	4.82	0.16	0.175	0.19
b	0.76	0.89	1.02	0.03	0.035	0.04
C	0.36	0.5	0.64	0.014	0.02	0.025
D	14.22	14.86	15.5	0.56	0.585	0.61
E	9.78	10.16	10.54	0.385	0.4	0.415
e	1.57	1.71	1.85	0.062	0.067	0.073
e1	6.68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