# 1A Ultra Low Dropout Linear Regulator

## ❖ GENERAL DESCRIPTION

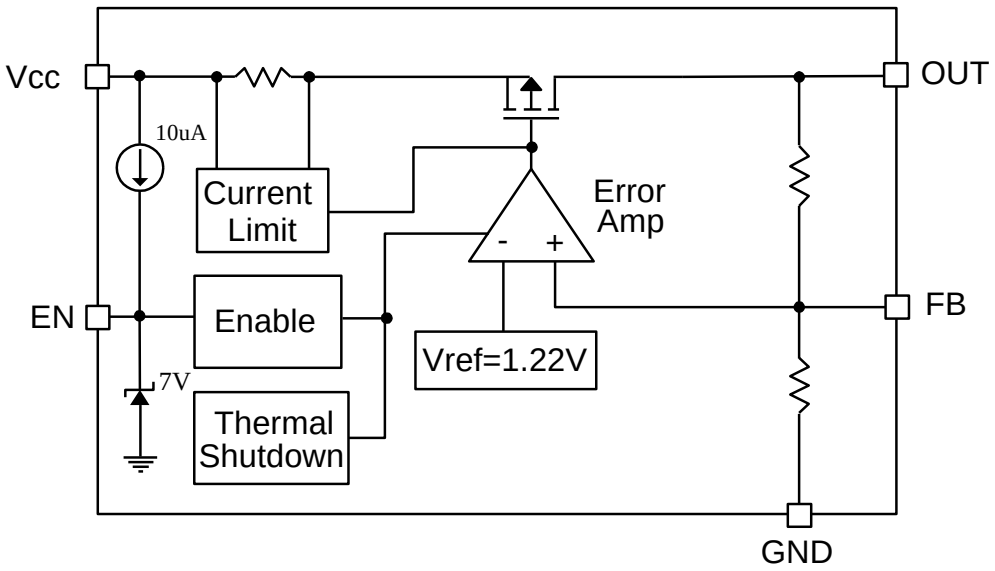
The AX1201 is a low-dropout voltage regulator suitable for various electronic equipments. It provides constant voltage power source. The dropout voltage of AX1201 is below 0.14V in full rated current (1A). This regulator has various functions such as a peak current protection, a thermal shut down, a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

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

## ❖ FEATURES

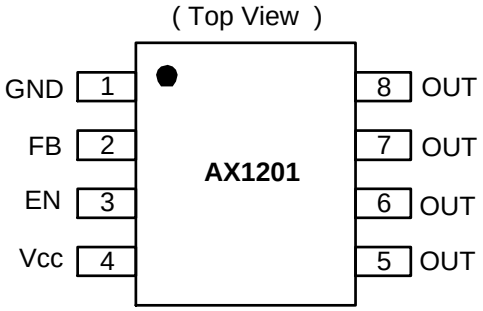
- Ultra Low Dropout - 0.14V(typical) at 1A Output Current
- Adjustable mode: 1.22V Reference Voltage
- Fixed mode:5V, 9V, 12V output voltage
- Operating voltage can be up to 23V.
- Current-Limit and Thermal Shutdown Protection
- Short circuit protection, Enable function.
- Built-in internal SW P-channel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

## ❖ BLOCK DIAGRAM

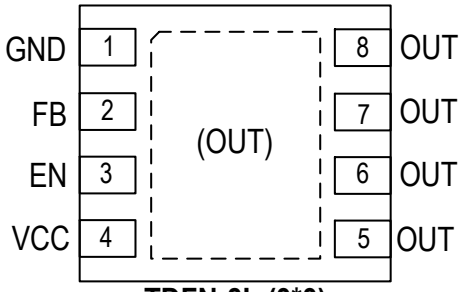


## ❖ PIN ASSIGNMENT

The packages of AX1201 are SOP-8L and TDFN-8L; the pin assignment is given by:




SOP-8L

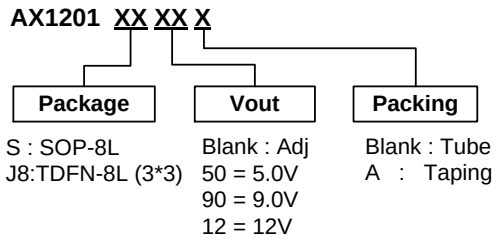



TDFN-8L (3*3)

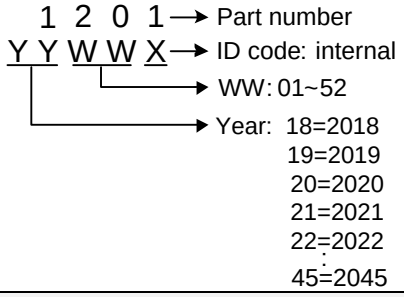
| Name | Description |
|---|---|
| **FB** | Feedback pin |
| **EN** | Enable input, it is pull-high typically. Drive EN high or floating to turn on the regulator, driver it low to turn it off. |
| **VCC** | IC power supply pin |
| **OUT** | Output Voltage pin |
| **GND** | Ground pin |

## ❖ ORDER/ MARKING INFORMATION

**Order Information**

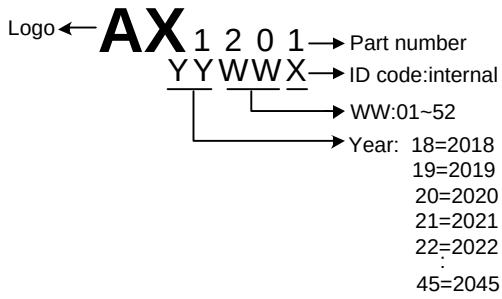



**Top Marking (TDFN-8L 3*3)**



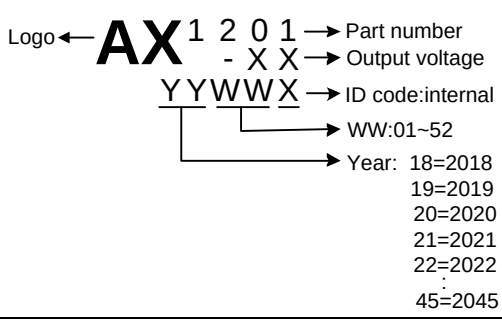

**Top Marking (SOP-8L)**

ADJ Version




**Top Marking (SOP-8L)**

FIXED Version



## ❖ 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 | | Io | 1.5 | A |
| Power Dissipation | | PD | TO220=4, SOP8=1.6 | W |
| 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 | SOP8 | $\theta_{JC}$ | 20 | °C/W |
| | TDFN-8L | | 15 | |
| Thermal Resistance from Junction to ambient | SOP8 | $\theta_{JA}$ | 60 | °C/W |
| | TDFN-8L | | 45 | |

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

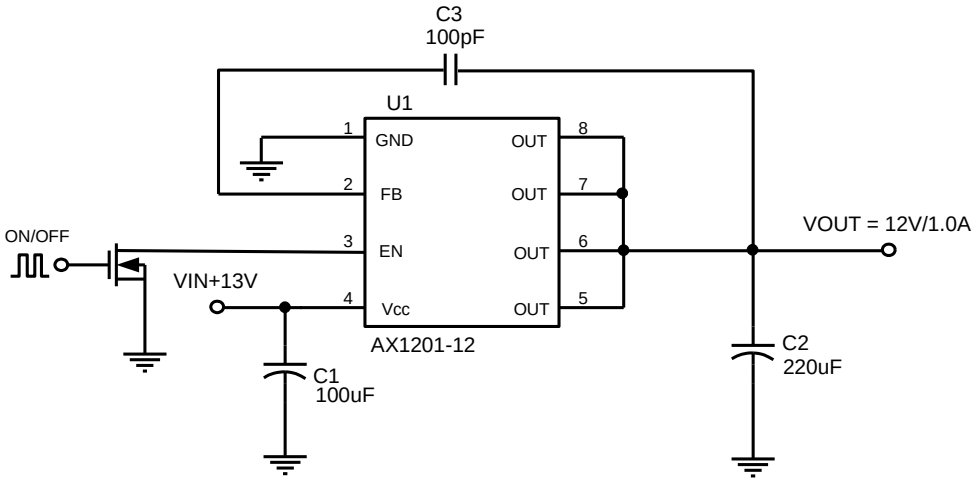
## ❖ ELECTRICAL CHARACTERISTICS (Unless otherwise specified, $T_A$=25°C, $V_{CC}$=12V)

| Characteristics | Symbol | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| $V_{CC}$ Supply Voltage | $V_{CC}$ | $I_{OUT}$=1A | 5.1 | - | 23 | 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 | $I_{GND}$ | $I_{OUT}$= 0~1A | - | 1.2 | 3 | mA |
| Shutdown Current | $I_{SD}$ | $V_{EN}$=0V | - | 0.15 | 0.4 | mA |
| Load regulation | $V_{Load}$ | 5mA < $I_{OUT}$ < 1A | - | 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 | $V_{DROP}$ | $I_{OUT}$= 1A, $V_{OUT}$=5V | - | 0.14 | 0.2 | V |
| | | $I_{OUT}$= 1A, $V_{OUT}$=9V | - | 0.13 | 0.19 | |
| | | $I_{OUT}$= 1A, $V_{OUT}$=12V | - | 0.1 | 0.15 | |
| Short circuit protect | Iscp | $V_{OUT}$<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 | $I_{ENH}$ | $V_{EN}$=2.5V (ON) | - | 20 | - | uA |
| | $I_{ENL}$ | $V_{EN}$=0.3V (OFF) | - | -10 | - | uA |
| Internal MOSFET RDSON | $R_{DSON}$ | $V_{CC}$=5.5V | - | 140 | 200 | mΩ |
| | | $V_{CC}$=12V | - | 100 | 150 | |
| Thermal Shutdown | $T_{SD}$ | | - | 140 | - | °C |

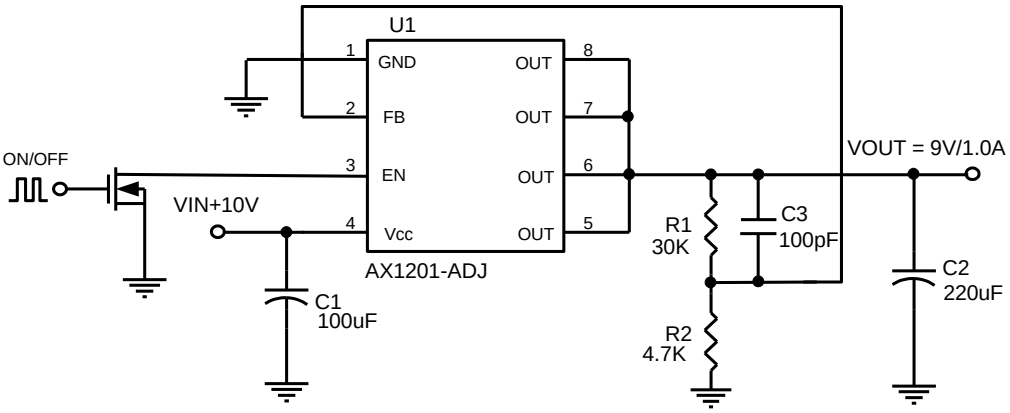
Note. These parameters, although guaranteed, are not 100% tested in production.

## ❖ APPLICATION CIRCUIT

### 1. FIXED




### 2. ADJ




VOUT=VFB*(1+R1/R2)

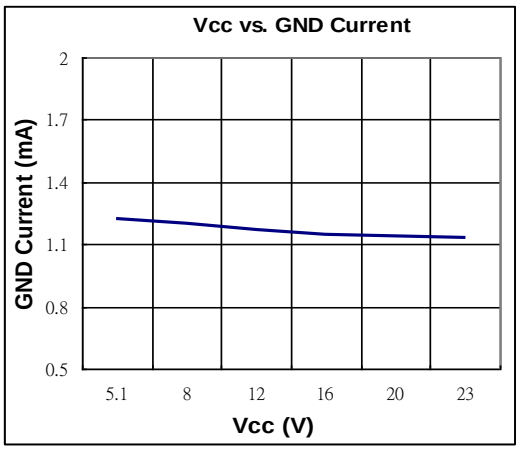
VFB = 1.22V

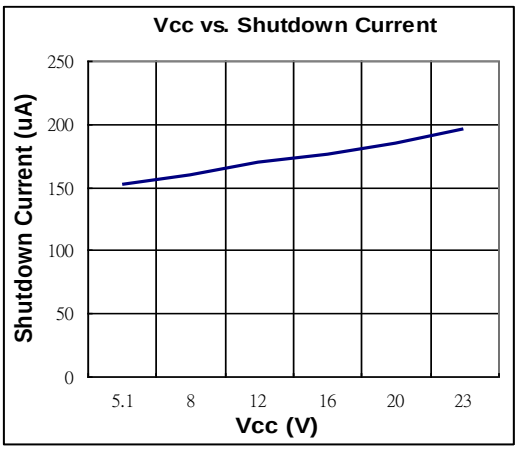
R2 suggest 1K~5.6KΩ

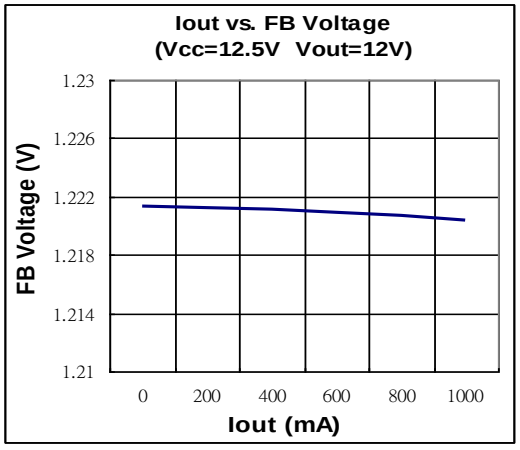
C2 choose Low ESR capacitor

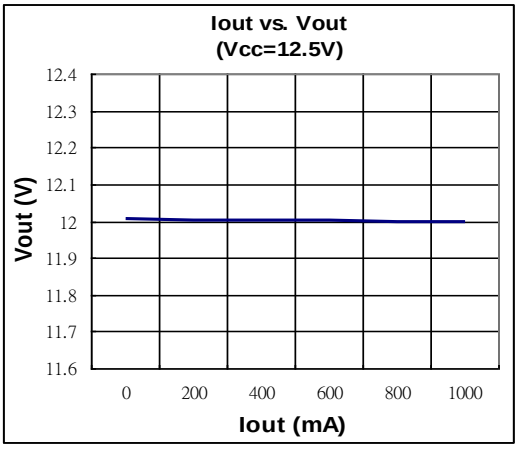
C3=47pF~100pF for stability issue

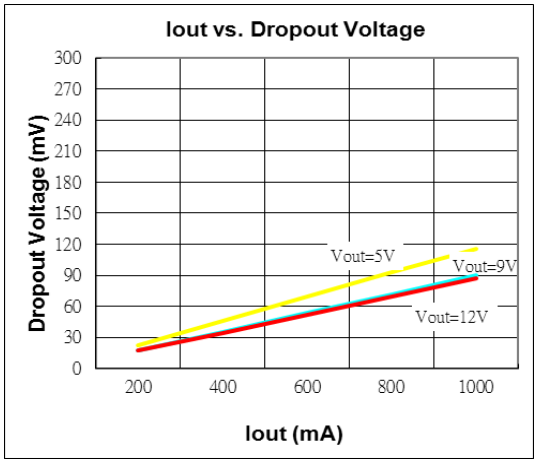
## ❖ TYPICAL CHARACTERISTICS

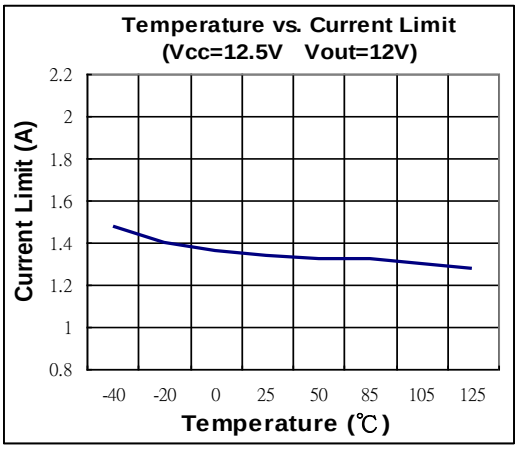


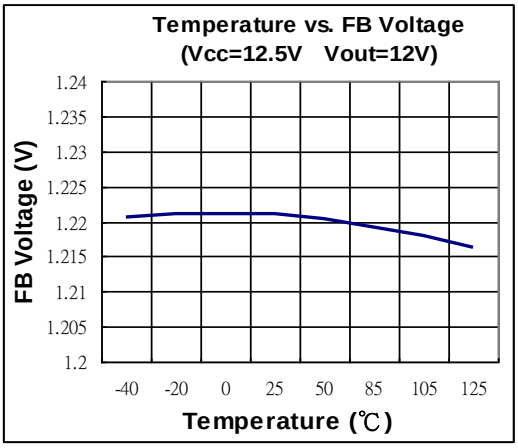



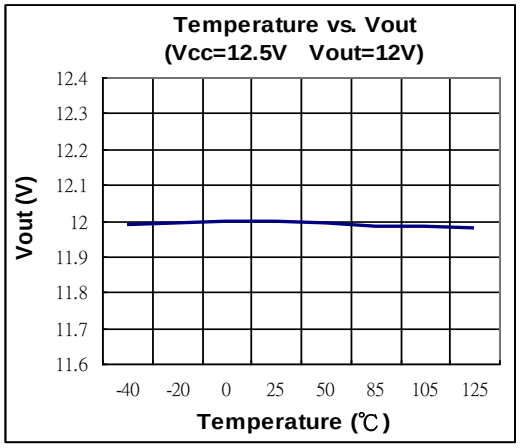



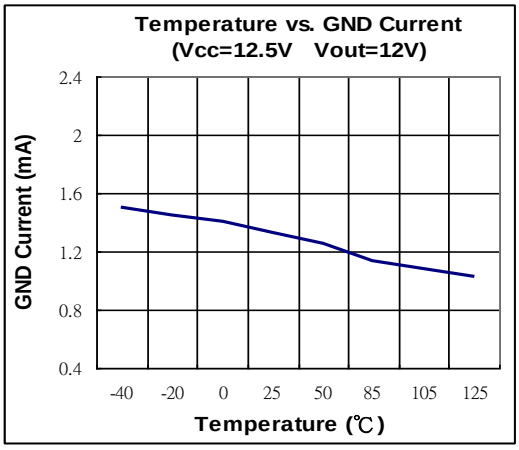



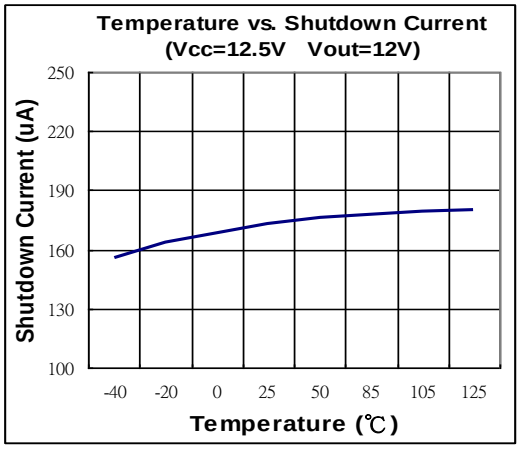



## ❖ TYPICAL CHARACTERISTICS (CONTINUED)

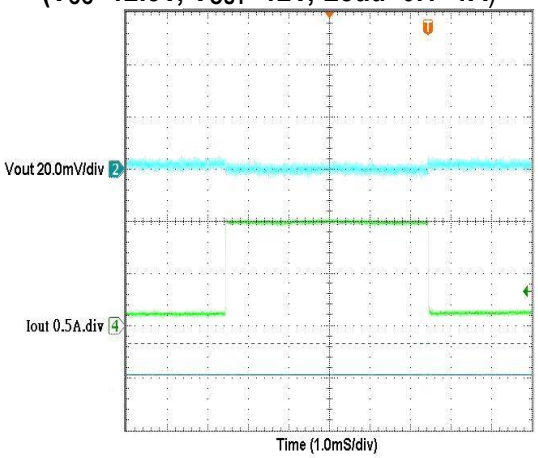


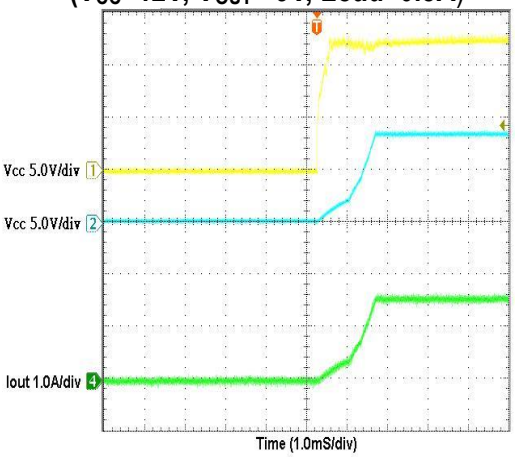




**Load Transient**
**($V_{CC}$=12.5V, $V_{OUT}$=12V, Load=0.1~1A)**

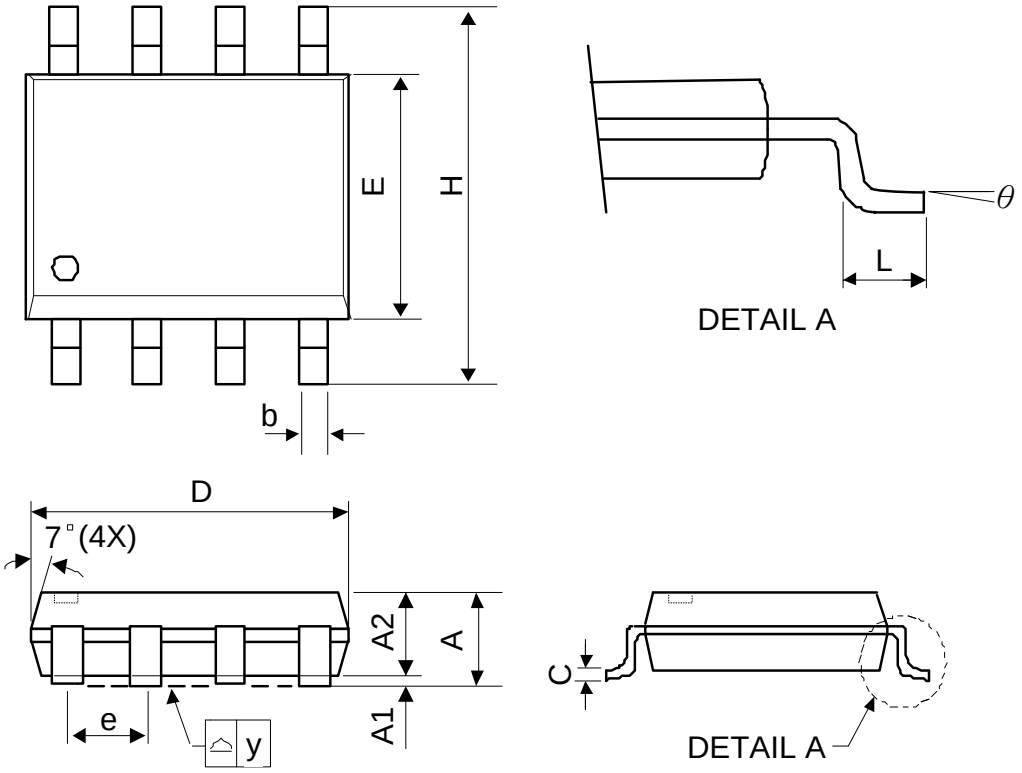



**Power-ON**
**($V_{CC}$=12V, $V_{OUT}$ =9V, Load=0.8A)**



## ❖ PACKAGE OUTLINES

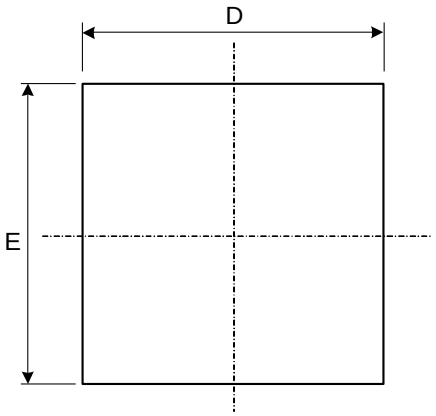
### (1) SOP-8L



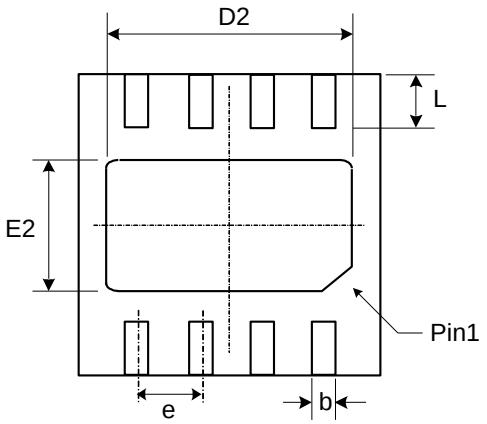

| Symbol | Dimensions in Millimeters | | | Dimensions in Inches | | |
|---|---|---|---|---|---|---|
| | Min. | Nom. | Max. | Min. | Nom. | Max. |
| A | - | - | 1.75 | - | - | 0.069 |
| A1 | 0.1 | - | 0.25 | 0.04 | - | 0.1 |
| A2 | 1.25 | - | - | 0.049 | - | - |
| C | 0.1 | 0.2 | 0.25 | 0.0075 | 0.008 | 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

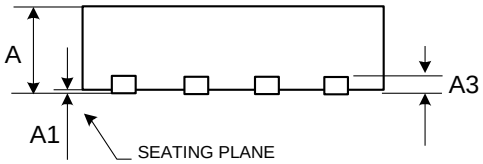
### (2) TDFN-8L (3*3 0.75mm)




(Top View)




(Bottom View)

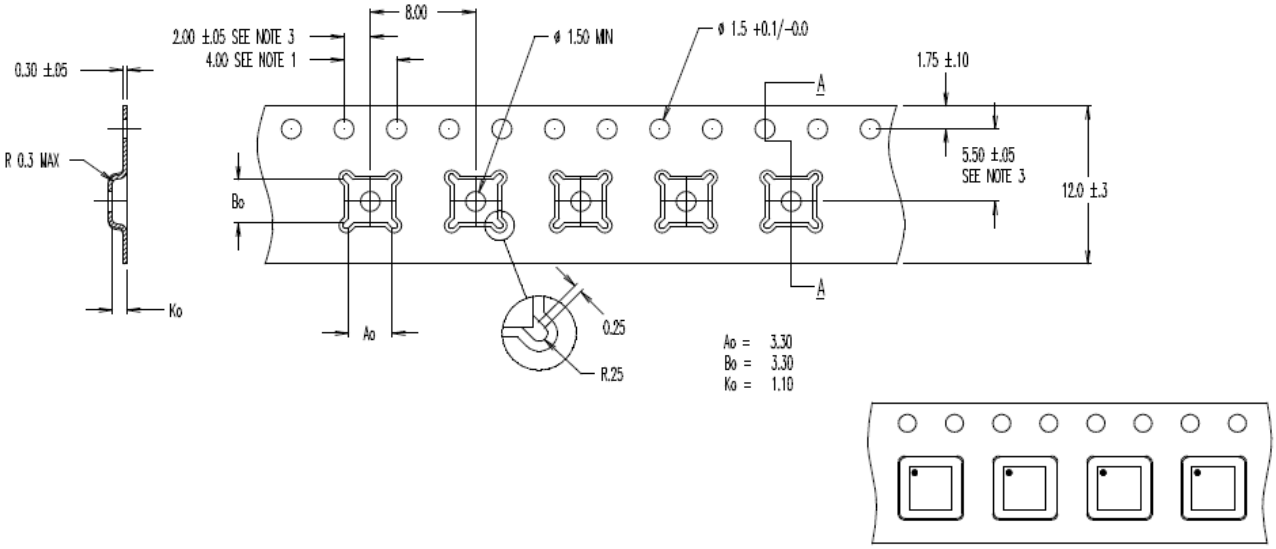


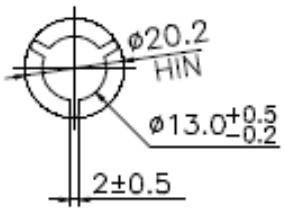

(SIDE View)

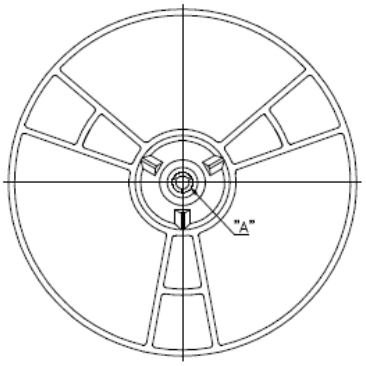
| Symbol | Dimensions in Millimeters | | | Dimensions in Inches | | |
|---|---|---|---|---|---|---|
| | Min. | Nom. | Max. | Min. | Nom. | Max. |
| A | 0.70 | 0.75 | 0.80 | 0.028 | 0.030 | 0.031 |
| A1 | 0.00 | 0.02 | 0.05 | 0.000 | 0.001 | 0.002 |
| A3 | 0.203 REF. | | | 0.008 REF. | | |
| b | 0.23 | 0.30 | 0.35 | 0.009 | 0.012 | 0.014 |
| D | 2.90 | 3.00 | 3.10 | 0.114 | 0.118 | 0.122 |
| D2 | 2.30 | 2.40 | 2.50 | 0.091 | 0.094 | 0.098 |
| E | 2.90 | 3.00 | 3.10 | 0.114 | 0.118 | 0.122 |
| E2 | 1.50 | 1.60 | 1.70 | 0.059 | 0.063 | 0.070 |
| e | 0.65 BSC. | | | 0.026 BSC. | | |
| L | 0.25 | 0.38 | 0.50 | 0.012 | 0.015 | 0.020 |

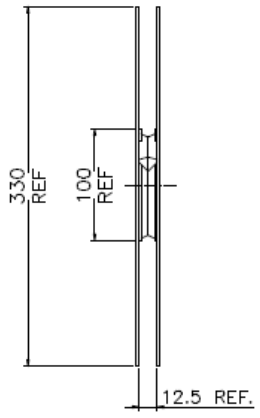
## ❖ Carrier tape dimension

**TDFN-8L (3*3 0.75mm)**

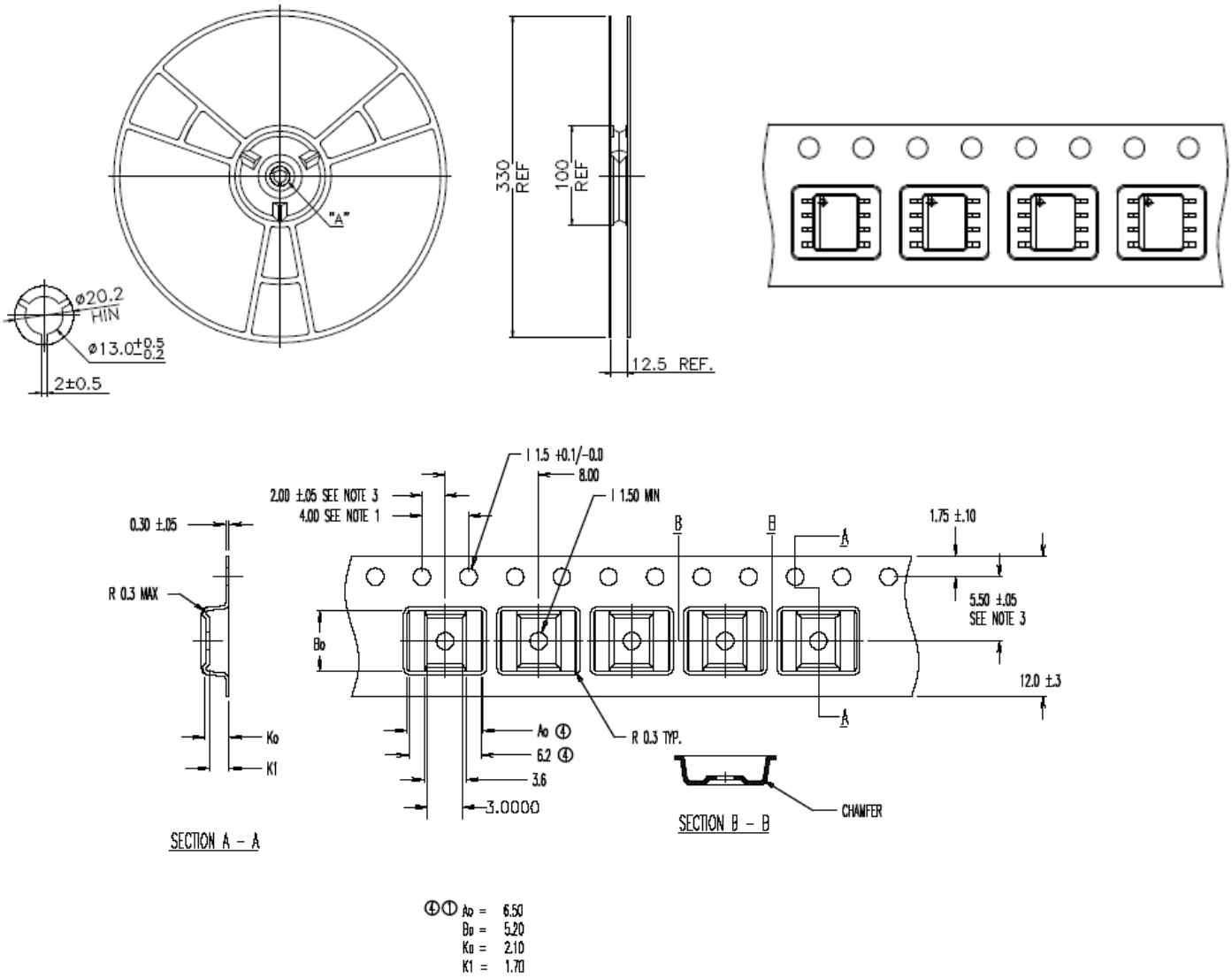


## SOP8L




Notes:

1. 10 sprocket hole pitch cumulative tolerance ± 0.2mm
2. Camber not to exceed 1mm in 100mm.
3. Material: Anti-Static Black Advantek Polystyrene.
4. Ao and Bo measured on a plane 0.3mm above the bottom of the pocket.
5. Ko measured from a plane on the inside bottom of the pocket to the top surface of the carrier.
6. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.