

2A Low Dropout Regulator with Enable



General Description

The FP9102 is a high performance positive voltage regulator designed for use in applications requiring very low Input voltage with very low dropout output voltage at up to 2A load. It can regulate the programmable output voltage to as low as 0.8V with a 5V V_{CC} voltage and a minimum 1.6V V_{IN} . The FP9102 features include ultra low dropout. It is ideal for applications where V_{OUT} is very close to V_{IN} . Additionally, there is an ENABLE pin to further reduce power dissipation while shutdown. The FP9102 provides excellent regulation over variations in line, load and temperature. The FP9102 provides a power GOOD signal to indicate if the voltage level of V_{OUT} reaches 90% of its rating value.

The FP9102 is available in the SOP-8L (Exposed Pad) package. It is available with 1.2V, 1.5V, 1.8V and 2.5V internally preset outputs that are also adjustable using external resistors.

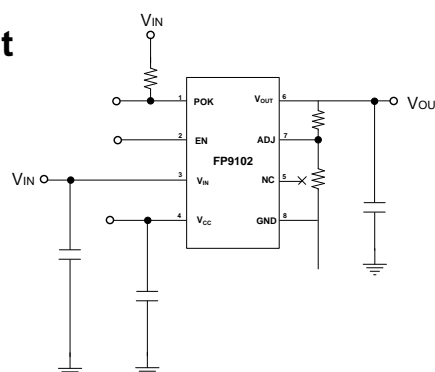
Features

- Adjustable Output Low to 0.8V
- Input Voltage as Low as 1.6V and V_{CC} Voltage 5V
- High Accuracy Output Voltage: $\pm 2\%$
- 1.2V, 1.5V, 1.8V, 2.5V Options and Adjustable Externally Using Resistors
- 360mV Dropout at 2A Load Typically
- OCP, OVP & Thermal Shutdown Protections
- Power Good Output
- Output Voltage Pull Low Resistance when Disable
- Package: SOP-8L (EP)

Applications

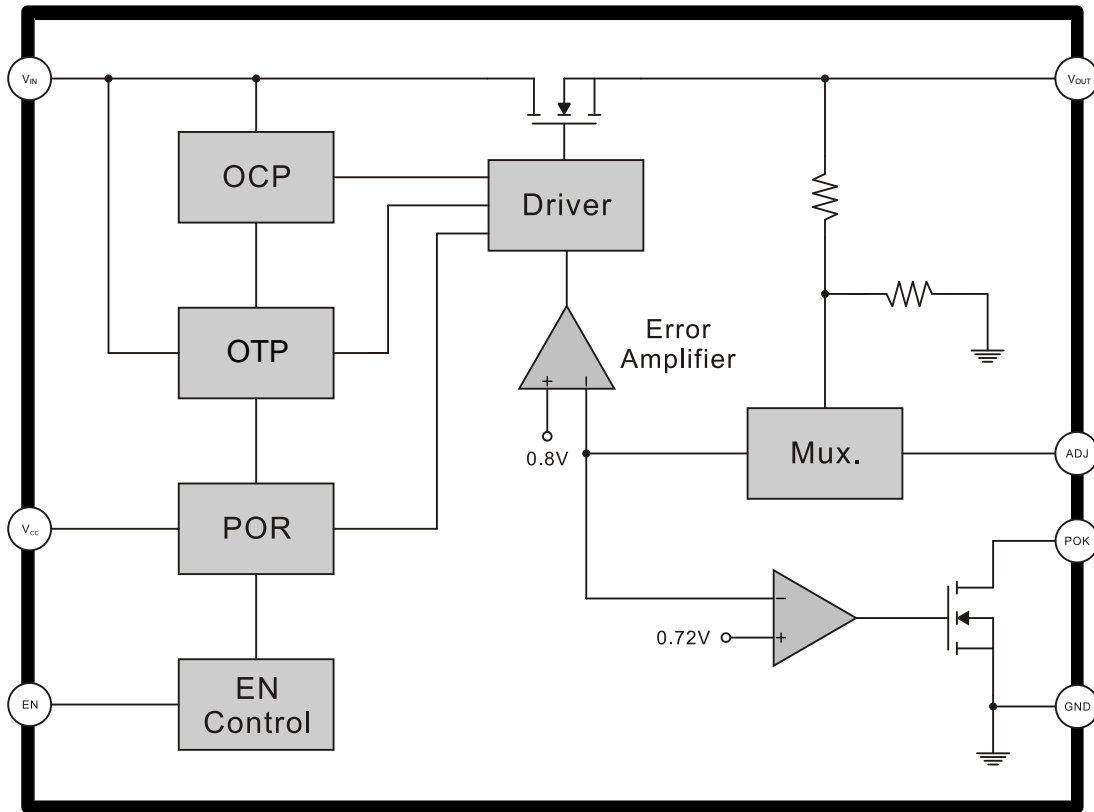
- Motherboard Applications
- Notebook PC Applications
- Network Cards

Typical Application Circuit



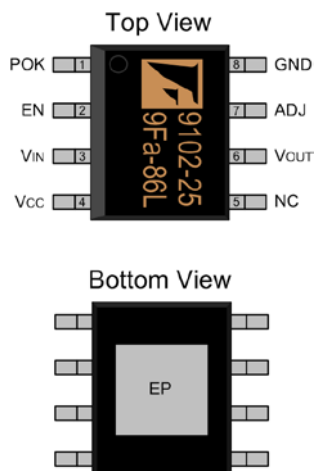
This datasheet contains new product information. Feeling Technology reserves the rights to modify the product specification without notice. No liability is assumed as a result of the use of this product. No rights under any patent accompany the sales of the product.

Function Block Diagram



Pin Descriptions

SOP-8L(EP)

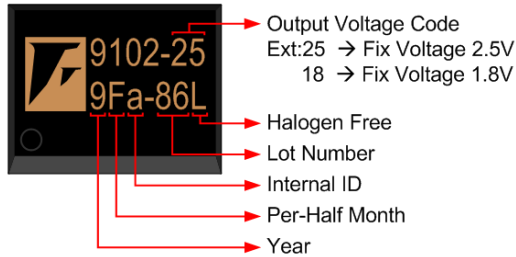


Name	No.	I / O	Description
POK	1	O	Power GOOD Open Drain Output
EN	2	I	Enable Control
V _{IN}	3	P	V _{OUT} Pin Power Supply
V _{CC}	4	P	Chip Power Supply
NC	5		No Internal Connection
V _{OUT}	6	O	Output Voltage
ADJ	7	I	Adjust Feedback Resistors or connect to Ground
GND	8	P	IC Ground
EP	9	P	Exposed PAD is GND

This datasheet contains new product information. Feeling Technology reserves the rights to modify the product specification without notice. No liability is assumed as a result of the use of this product. No rights under any patent accompany the sales of the product.

Marking Information

SOP-8L (EP)



Output Voltage Code:

For Example: 12 → Fix $V_{OUT}=1.2V$
15 → Fix $V_{OUT}=1.5V$
18 → Fix $V_{OUT}=1.8V$
25 → Fix $V_{OUT}=2.5V$

Halogen Free: Halogen free product indicator

Lot Number: Wafer lot number's last two digits

For Example: 1323⁸⁶TB → 86

Internal ID: Internal Identification Code

Per-Half Month: Production period indicated in half month time unit

For Example: January → A(Front Half Month),B(Last Half Month)
February → C(Front Half Month),D(Last Half Month)

Year: Production year's last digit

Ordering Information

Part Number	Output Voltage	Output Voltage Code	Operating Temp.	Package	MOQ	Description
FP9102-12XR-LF	1.2V / ADJ	12	-25°C ~ +85°C	SOP-8L (EP)	2500EA	Tape & Reel
FP9102-15XR-LF	1.5V / ADJ	15	-25°C ~ +85°C	SOP-8L (EP)	2500EA	Tape & Reel
FP9102-18XR-LF	1.8V / ADJ	18	-25°C ~ +85°C	SOP-8L (EP)	2500EA	Tape & Reel
FP9102-25XR-LF	2.5V / ADJ	25	-25°C ~ +85°C	SOP-8L (EP)	2500EA	Tape & Reel

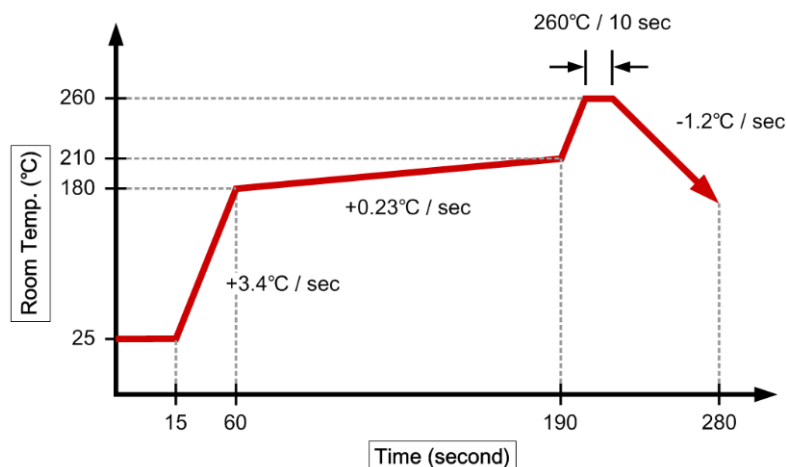
Absolute Maximum Ratings

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Power Supply Voltage	V_{IN}		1.6		5.5	V
Power Supply Voltage	V_{CC}		4.5		5.5	V
Output Voltage	V_{OUT}		0.8		5.5	V
Maximum Power Dissipation	P_D	SOP-8L(EP) @ $T_A=25^\circ\text{C}$			1.2	W
Thermal Resistance	θ_{JA}	(Note2)		70		$^\circ\text{C} / \text{W}$
	θ_{JC}			15		$^\circ\text{C} / \text{W}$
Junction Temperature	T_J	-			150	$^\circ\text{C}$
Operating Temperature	T_{OP}		-25		85	$^\circ\text{C}$
Storage Temperature	T_{ST}		-55		125	$^\circ\text{C}$
IR Re-flow Lead Temperature	T_{IR}	Soldering 10 sec.			260	$^\circ\text{C}$

Note:

- Absolute Maximum Ratings are limits beyond which damage to the device may occur. Operating conditions are conditions under which the device functions but the specifications might not be guaranteed for guaranteed specifications and test conditions see the Electrical Characteristics.
- Mounted on Recommended Minimum Footprint.

IR Re-flow Soldering Curve



This datasheet contains new product information. Feeling Technology reserves the rights to modify the product specification without notice. No liability is assumed as a result of the use of this product. No rights under any patent accompany the sales of the product.

Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Power Supply Voltage	V_{IN}		1.6		5.5	V
Power Supply Voltage	V_{CC}		4.5		5.5	V
Operating Temperature Range	T_{OP}		-20		+85	°C

Electrical Characteristics

$V_{IN}=V_{OUT}+500mV$, $V_{CC}=5V$, $C_{IN}=C_{OUT}=10\mu F$, $T_A=T_J=25^\circ C$, unless otherwise specified (Note 3)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
ADJ section						
Reference Voltage	V_{REF}	$V_{ADJ}=V_O$	0.788	0.8	0.812	V
Adjust Pin Current	I_{ADJ}			20	100	nA
Adjust Pin Threshold	V_{ADJ}		0.15	0.2	0.25	V
Chip Enable (EN) Section						
EN Input Bias Current	I_{EN}	$V_{EN}=0V$		12		μA
EN Threshold Voltage	V_{ENH}	Logic-High Voltage	1.6			V
	V_{ENL}	Logic-Low Voltage			0.4	V
Power Good (POK) Section						
Power Good Rising Threshold Voltage	V_{THPOK}			92		%
Power Good Hysteresis	ΔV_{THPOK}			7		%
Power Good Sink Capability	I_{POK_SINK}	$I_{POK}=10mA$		0.2	0.4	V
Thermal Shutdown Protection Section						
Thermal Shutdown Temperature	T_{SD}			150		°C
Thermal Shutdown Hysteresis	ΔT_{SD}			30		°C
Output Section						
Fixed Output Voltage Range	ΔV_{OUT}	$V_{IN}=V_{OUT}+0.5V$	-2	0	2	%
Line Regulation (V_{IN})	ΔV_{LINE_VIN}	$V_{IN}=V_{OUT}+0.5V$ to 5V, $I_{OUT}=1mA$		0.2	0.6	%
Load Regulation(V_{OUT}) (Note 3)	$\Delta V_{LOAD_V_{OUT}}$	$V_{IN}=V_{OUT}+1V$, $I_{OUT}=1mA$ to 2A		0.2	1	%
Dropout Voltage (Note 4)	ΔV_{DROP}	$I_{OUT}=2A$		360	400	mV
Current Limit	I_{LIM}		2.4	3.0		A
Short Circuit Current				1.8		A
V_{OUT} Pull Low Resistance		$V_{EN}=0V$		90		Ω

This datasheet contains new product information. Feeling Technology reserves the rights to modify the product specification without notice. No liability is assumed as a result of the use of this product. No rights under any patent accompany the sales of the product.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Total Device Section						
V _{IN} Input Voltage Range	V _{IN}		1.6		5.5	V
V _{CC} Input Voltage Range	V _{CC}		4.5		5.5	V
Quiescent Current(Ground current) (Note 4)	I _{QH}	V _{OUT} =Fix Output Voltage		0.5	0.7	mA
	I _{QL}	V _{EN} =0V		26	50	μA

Note 1: Low duty pulse techniques are used during test to maintain junction temperature as close to ambient as possible.

Note 2: Regulation is measured at constant junction temperature by using a 2ms current pulse. Devices are tested for load regulation in the load range from 1mA to 2A

Note 3: The dropout voltage is defined as V_{IN}-V_{OUT}, which is measured when V_{OUT} is normal V_{OUT}-100mV

Note 4: Quiescent current is the difference between input and outputs. It is defined by I_Q=I_{IN}-I_{OUT} under no load condition (I_{OUT}=0mA). The total current drawn from the supply is the sum of the load current plus the ground pin current.

Application Information

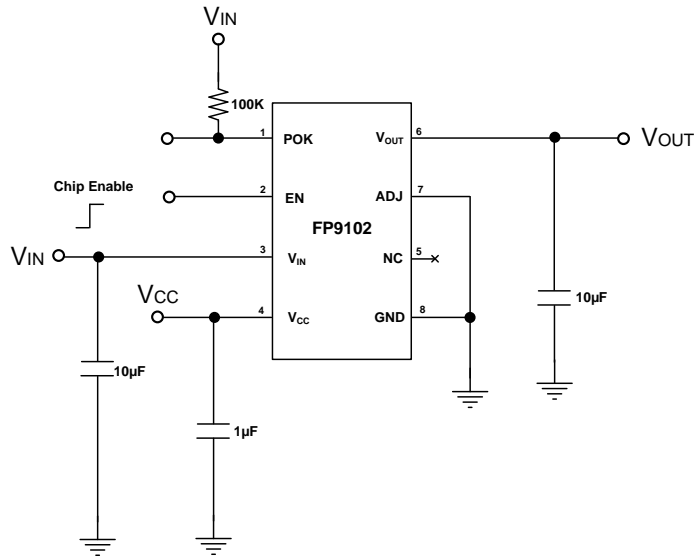


Figure 1
Fixed Voltage Regulator Circuit

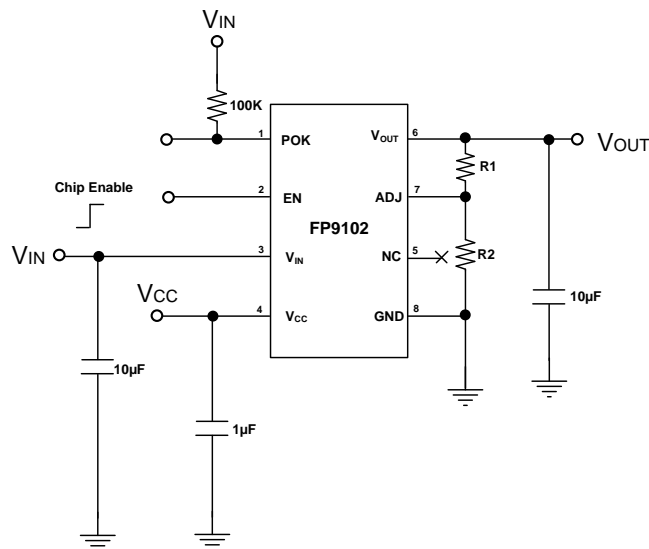


Figure 2
Adjustable Voltage Regulator Circuit

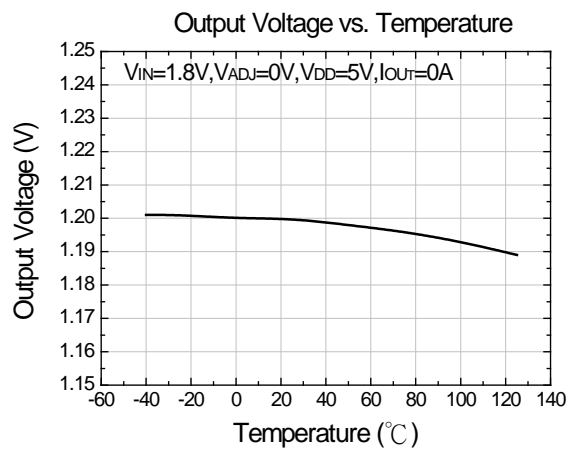
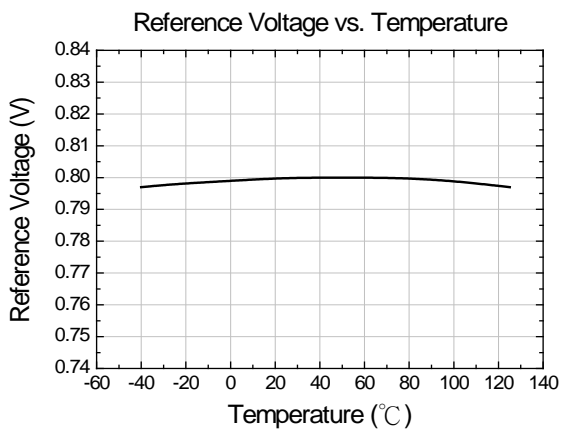
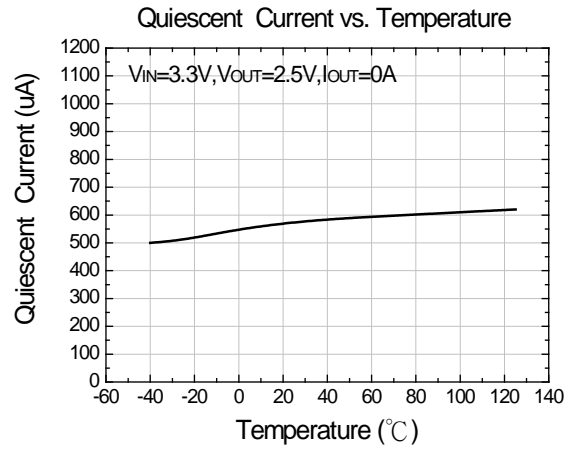
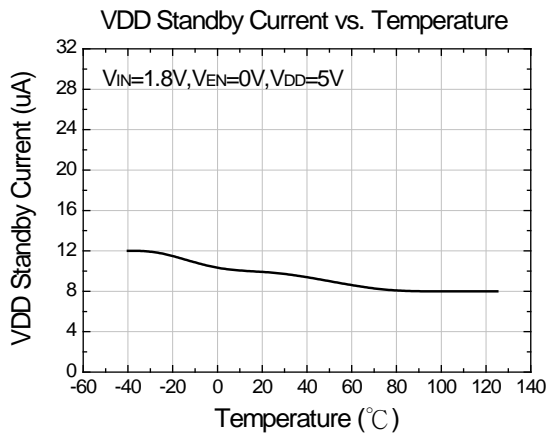
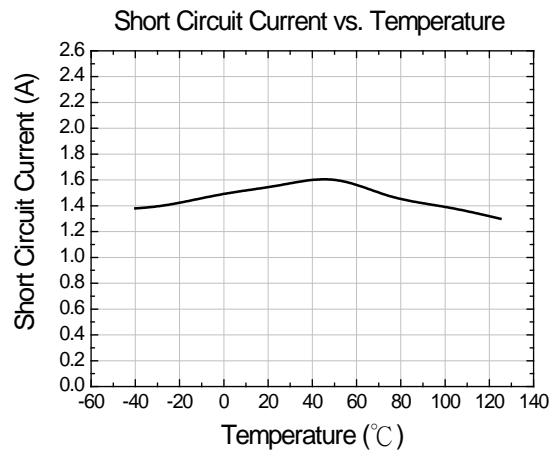
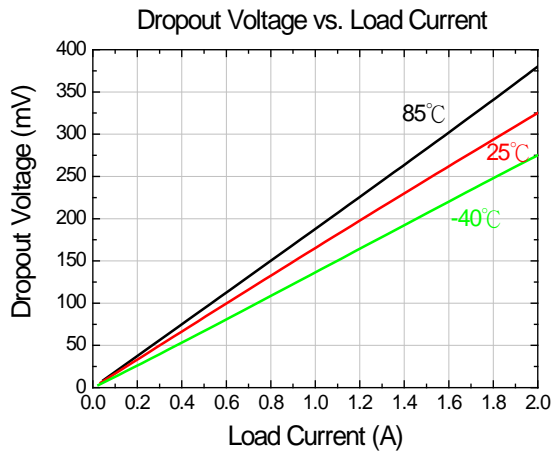
For example:

The output voltage equation is

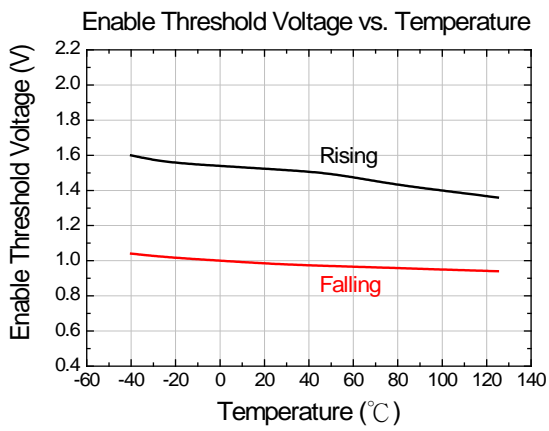
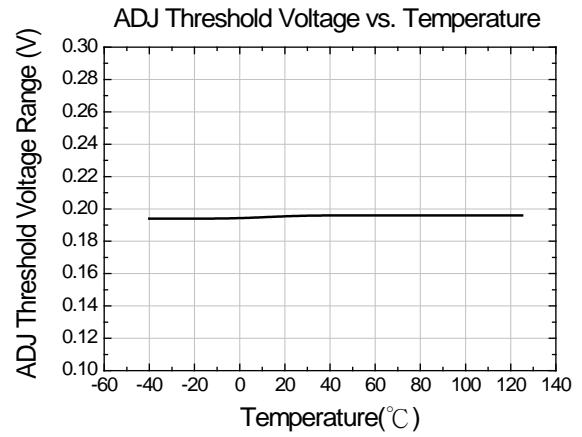
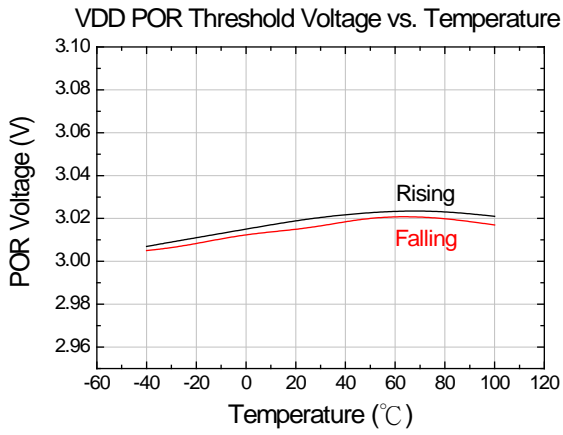
$$V_{OUT} = 0.8 \times \frac{R1 + R2}{R2} = 0.8V \times \frac{15K + 10K}{10K} = 2.0V$$

This datasheet contains new product information. Feeling Technology reserves the rights to modify the product specification without notice. No liability is assumed as a result of the use of this product. No rights under any patent accompany the sales of the product.

Typical Operating Characteristics

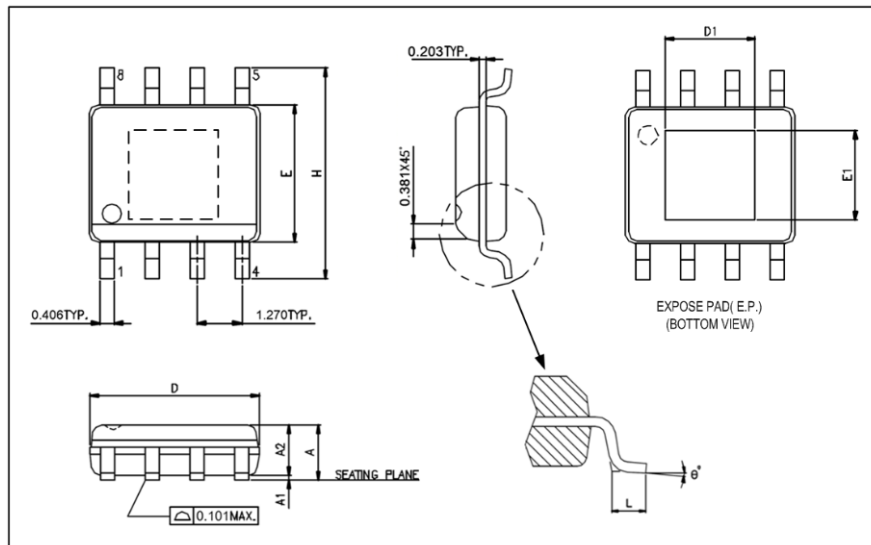


This datasheet contains new product information. Feeling Technology reserves the rights to modify the product specification without notice. No liability is assumed as a result of the use of this product. No rights under any patent accompany the sales of the product.



Package Outline

SOP-8L (EP)



UNIT: mm

Symbols	Min. (mm)	Max. (mm)
A	1.346	1.752
A1	0.050	0.152
A2		1.498
D	4.800	4.978
E	3.810	3.987
H	5.791	6.197
L	0.406	1.270
θ°	0°	8°

Exposed PAD Dimensions:

Symbols	Min. (mm)	Max. (mm)
E1		2.184 REF
D1		2.971 REF

Note:

1. Package dimensions are in compliance with JEDEC outline: MS-012 AA.
2. Dimension "D" does not include molding flash, protrusions or gate burrs.
3. Dimension "E" does not include inter-lead flash or protrusions.

This datasheet contains new product information. Feeling Technology reserves the rights to modify the product specification without notice. No liability is assumed as a result of the use of this product. No rights under any patent accompany the sales of the product.