

## SINGLE OPERATIONAL AMPLIFIER AND VOLTAGE REFERENCE

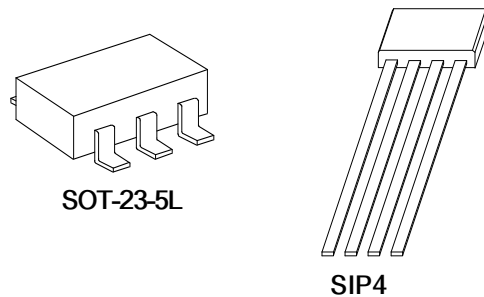
### GENERAL DESCRIPTION

The **FP702**, a 1-chip composed one op-amp (OPA) with a 1.25V precision voltage reference on inverting input and an open collector output, applied to offer space and low cost in many applications such as the secondary feedback control of power supply, AC/DC converter or adaptor.

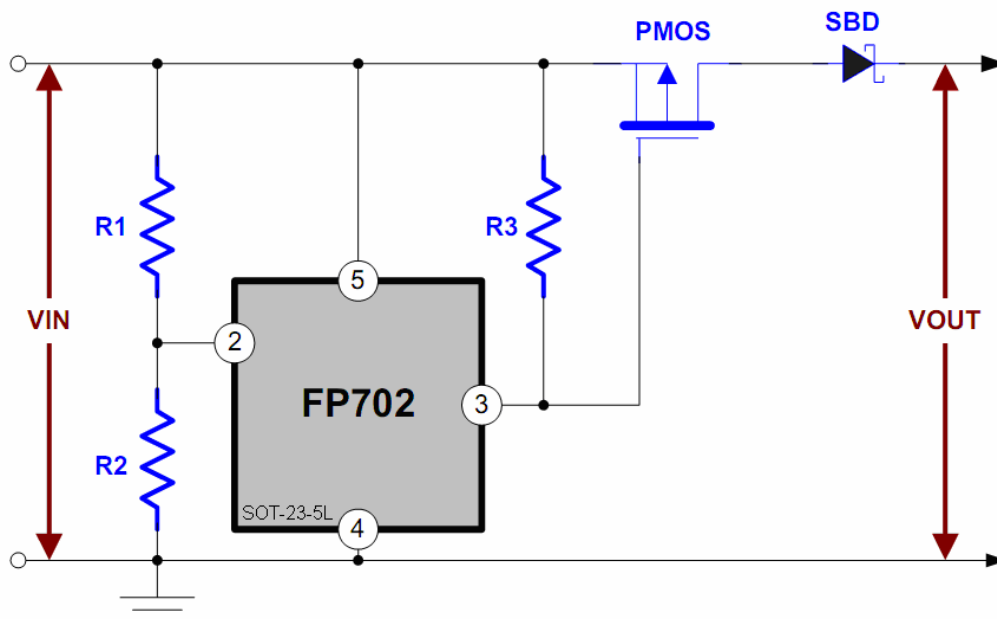
Using few external components, **FP702**, a high performance integrated IC, is designed for an OVP detector. The circuit diagram of the typical application example is as below.

### FEATURES

- Fixed reference voltage: 1.25V
- High precision over temperature: 1%
- Wide operating voltage from 3.0V~25V
- Open collector output
- Sink current up to 20mA
- Low input offset voltage: 1mV
- Package: SOT-23-5L & SIP-4L

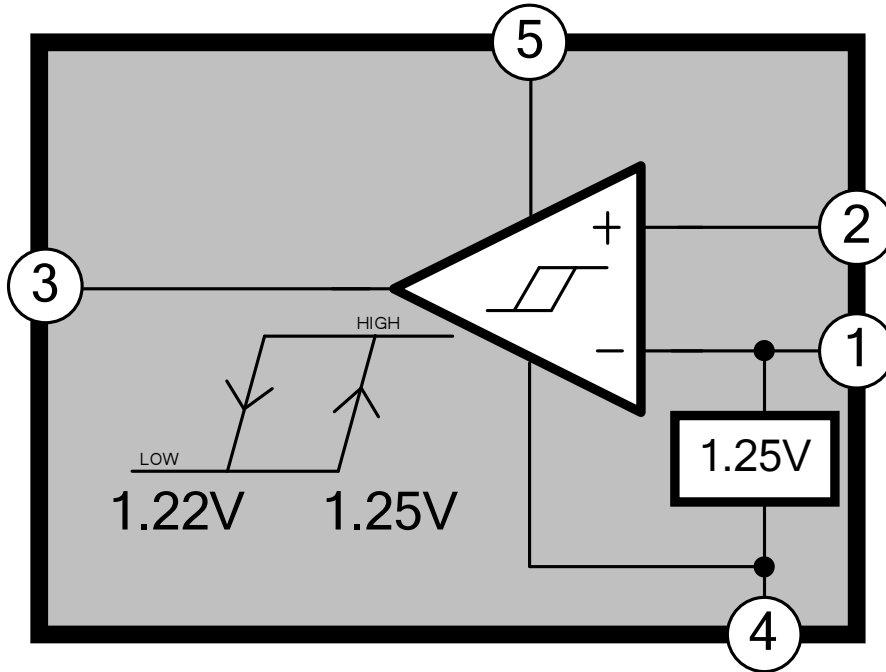


### TYPICAL APPLICATION CIRCUIT

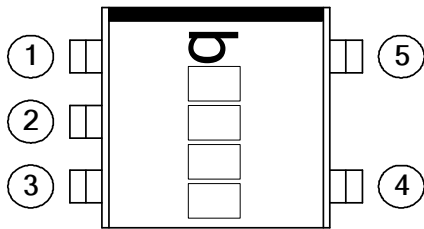


## FUNCTIONAL BLOCK DIAGRAM

SOT-23-5L



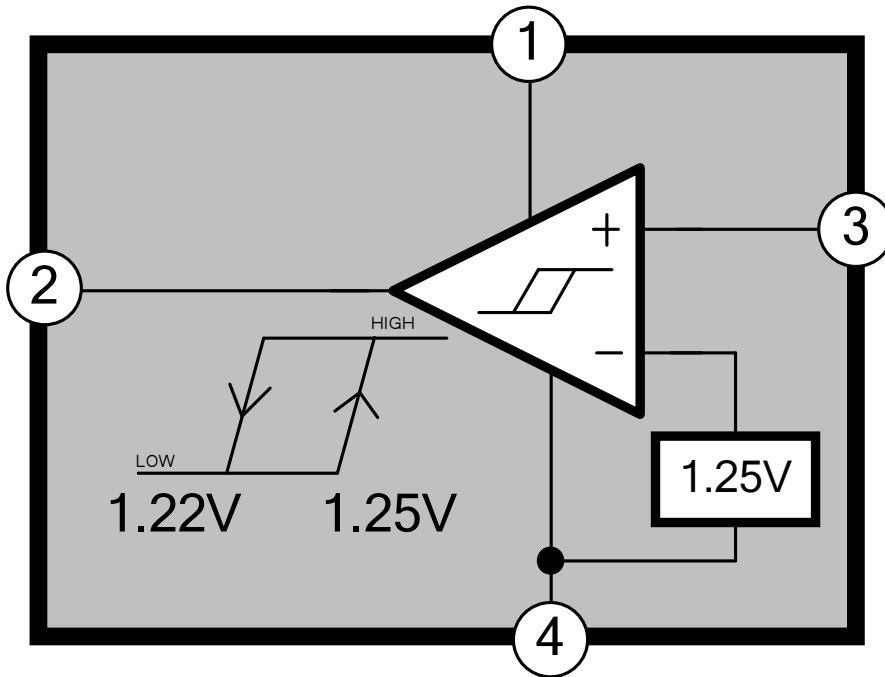
### MARK VIEW



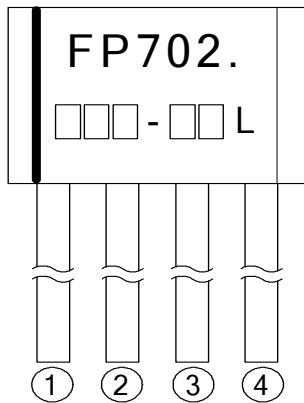
### PIN DESCRIPTION

NAME	NO.	STATUS	DESCRIPTION
REF	1	O/I	1.25V Reference Output OPA Inverting Input
IN+	2	I	OPA Non-Inverting Input
OUT	3	O	OPA Open Collector Output
GND	4	P	IC Ground
VCC	5	P	IC Power Supply

SIP-4L



**MARK VIEW**



**PIN DESCRIPTION**

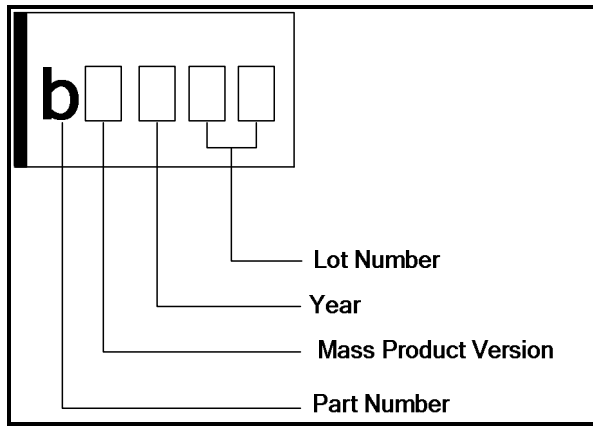
NAME	NO.	STATUS	DESCRIPTION
VCC	1	P	IC Power Supply
OUT	2	O	OPA Open Collector Output
IN+	3	I	OPA Non-Inverting Input
GND	4	P	IC Ground

## ORDER INFORMATION

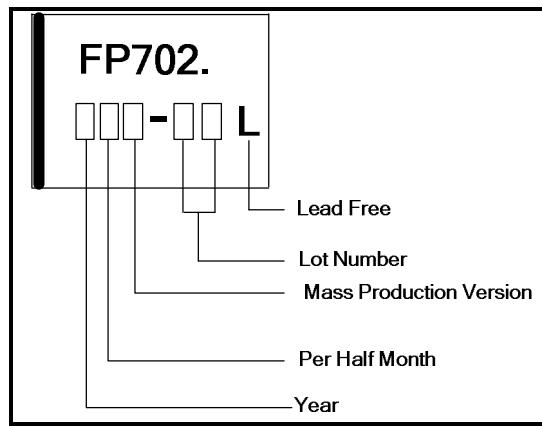
Part Number	Op. Temperature	Package	Description
FP702K-LF	-20°C ~ 85°C	SOT-23-5L	
FP702KR-LF		SOT-23-5L	Tape & Reel
FP702H-LF		SIP4	BAG

## IC DATE CODE DISTINGUISH

SOT23-5L



SIP-4L



### For example:

- 1 – Year 2001
- 2 – Year 2002
- 3 – Year 2003 ----- And so on

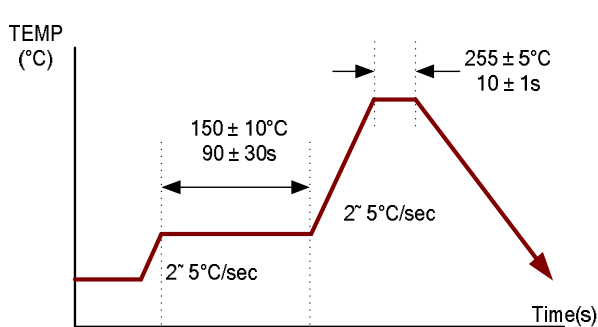
Lot Number is the last two numbers

### For example:

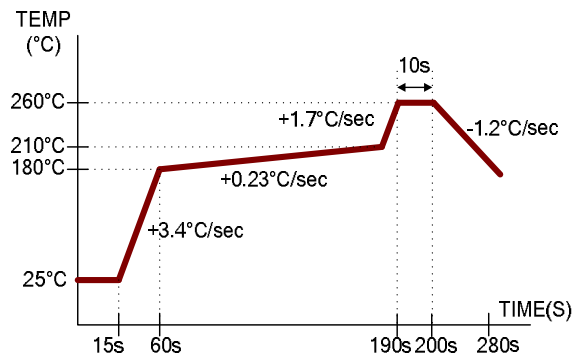
A3311C<sup>62</sup>  
 ↳ Lot Number

## ABSOLUTE MAXIMUM RATINGS

Supply Voltage ( $V_{CC}$ ) .....	+25V
IN+ Input Voltage .....	-0.3V~+VCC
Output Voltage .....	+25V
Output Sink Current .....	+30mA
Maximum Junction Temperature.....	+150°C
Thermal Resistance Junction to Ambient ( $\theta_{ja}$ )	
SOT-23-5L .....	400°C/W
SIP-4L.....	150°C/W
Power Dissipation ( $P_D$ )	
SOT-23-5L .....	250mW
SIP-4L.....	700mW
Operating Temperature Range .....	-20°C ~ 85°C
Storage Temperature Range .....	-65°C ~ +150°C
Lead Temperature (soldering, 10 sec) .....	+260°C



Wave Soldering Temperature vs. Second Curve



IR Re-flow Temperature vs. Second Curve

**Note:**

- Suggest IR Reflow Soldering Profile Condition.**

## DC ELECTRICAL CHARACTERISTICS (Ta=25°C, VCC=12V, unless otherwise noted)

### Operating Amplifier

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Offset Voltage	V <sub>io</sub>	T <sub>amb</sub> =25°C		1	3	mV
		T <sub>min</sub> ≤ T <sub>amb</sub> ≤ T <sub>max</sub>			5	
Input Offset Voltage Drift	DV <sub>io</sub>			7		μV/°C
IN- Input Bias Current	I <sub>ib</sub>	T <sub>amb</sub> =25°C		-80	-250	nA
		T <sub>min</sub> ≤ T <sub>amb</sub> ≤ T <sub>max</sub>			-500	
Large Signal Voltage Gain	A <sub>vd</sub>			50		V/mV
Output Sink Current	I <sub>SINK</sub>	V <sub>IN+</sub> =0.5V, V <sub>OUT</sub> =1.2V		30		mA
Low Level Output Voltage	V <sub>OL</sub>	V <sub>IN+</sub> =0.5V, I <sub>SINK</sub> =20mA		0.9	1	V
Output Leakage Current	I <sub>LEAK</sub>	V <sub>OUT</sub> =25V, V <sub>IN+</sub> =2V		0.1	1	uA
Output Switch Hysteris	HYS.			30		mV

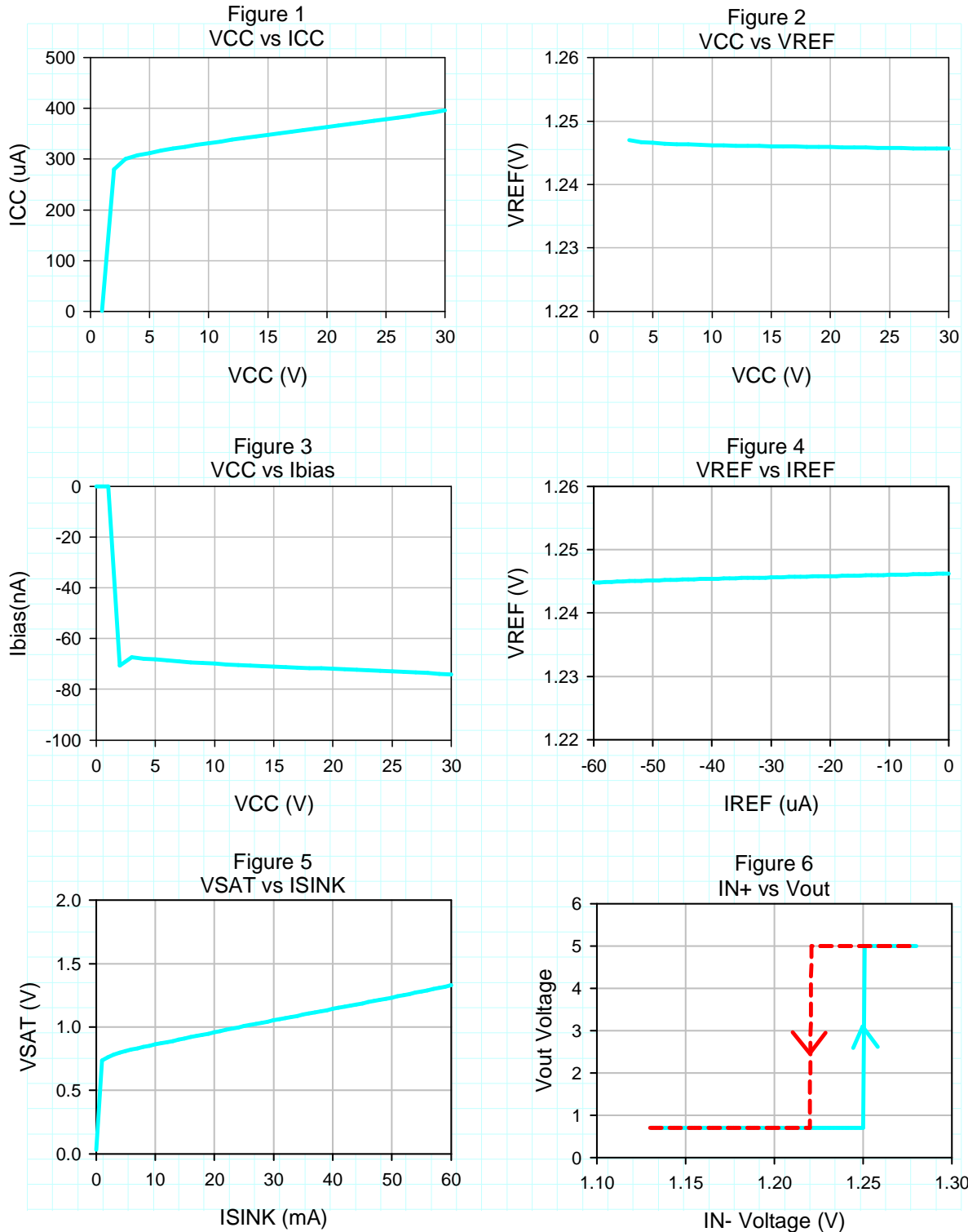
### Voltage Reference

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Reference Voltage	V <sub>ref</sub>	T <sub>amb</sub> =25°C	1.237	1.25	1.263	V
		T <sub>min</sub> ≤ T <sub>amb</sub> ≤ T <sub>max</sub>	1.225		1.275	
Reference Voltage Deviation Over Temperature Range	ΔV <sub>ref</sub>	T <sub>min</sub> ≤ T <sub>amb</sub> ≤ T <sub>max</sub>		10		mV
Line Regulation		3.0V ≤ V <sub>CC</sub> ≤ 25V		1	3	mV
Load Regulation		I <sub>ref</sub> = 0uA to 40uA		3	5	mV

### Total Supply Current

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
IC Supply Current	I <sub>CC</sub>	V <sub>CC</sub> =25V		0.4		mA

**TYPICAL CHARACTERISTICS** ( $T_a=25^{\circ}\text{C}$ ,  $V_{CC}=12\text{V}$ , unless otherwise noted)



TYPICAL CHARACTERISTICS ( $T_a=25^{\circ}\text{C}$ ,  $V_{CC}=12\text{V}$ ,  $R_{out}=2\text{K}$ )

IN+ to Vout Delay Time

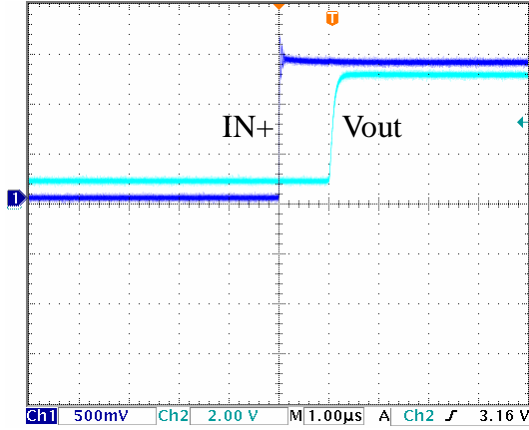


Figure 7

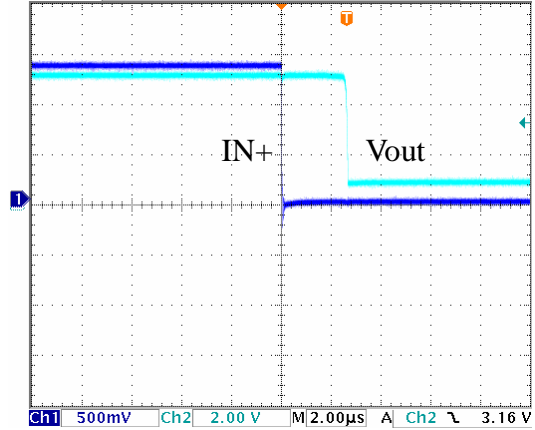


Figure 8

APPLICATION NOTE

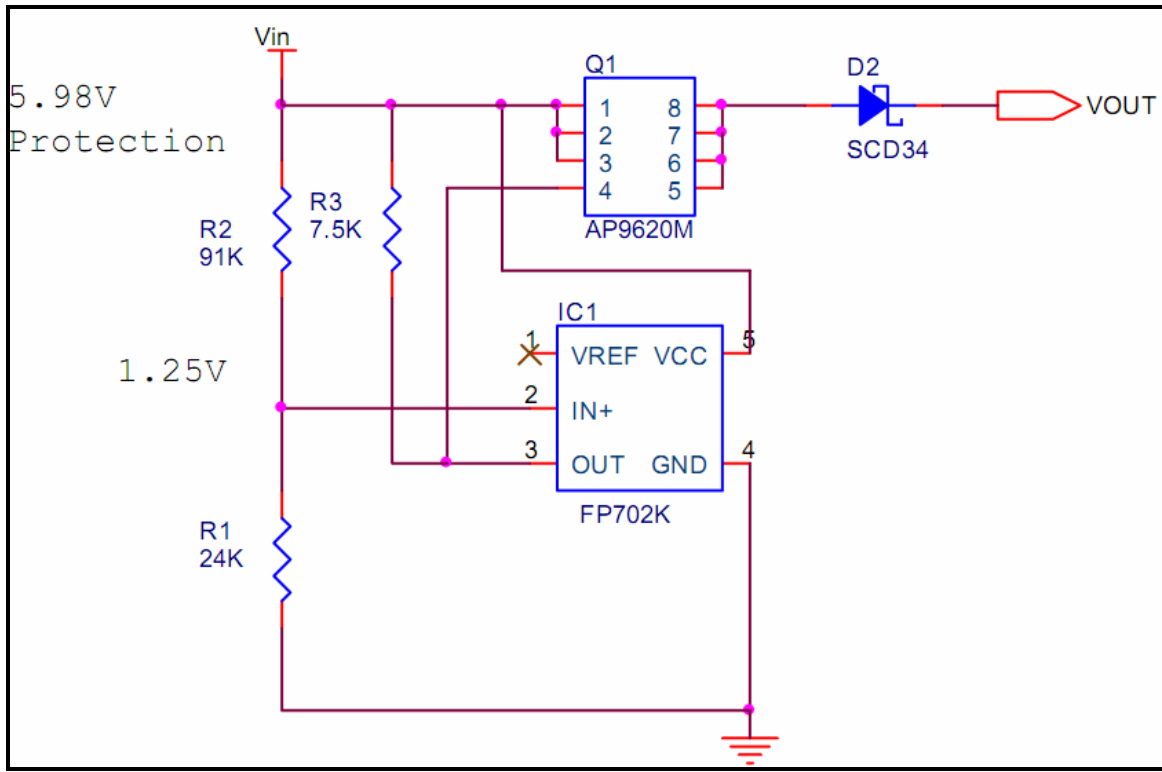
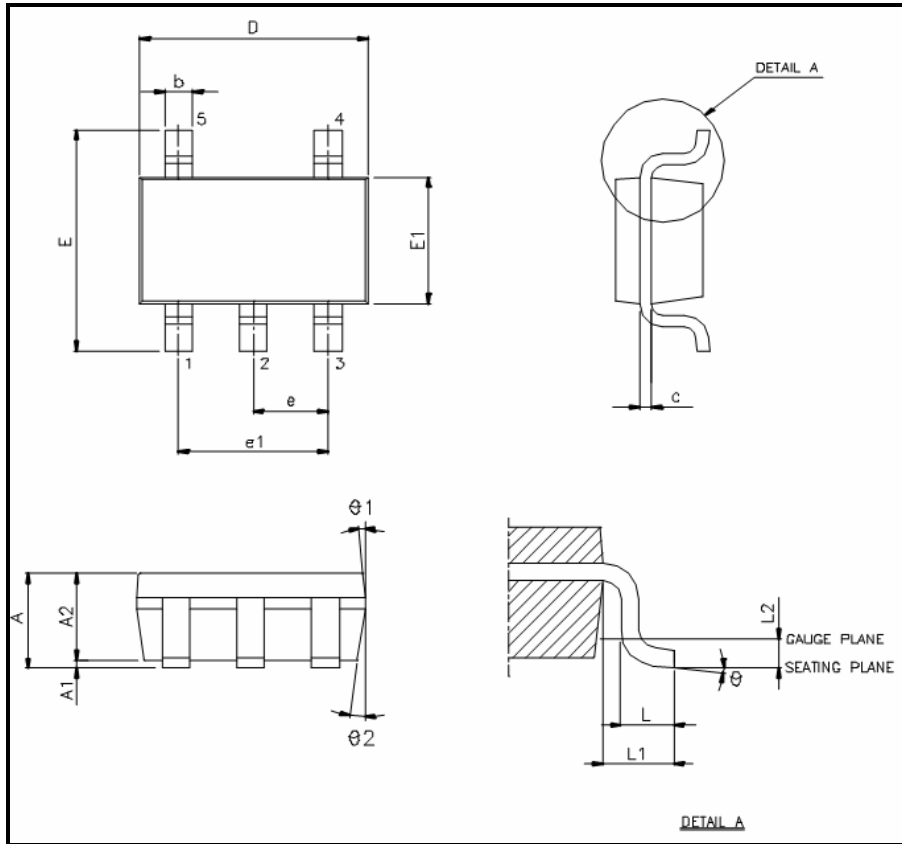


Figure 9. FP702 Over Voltage Protection Circuits

## PACKAGE OUTLINE

SOT-23-5L



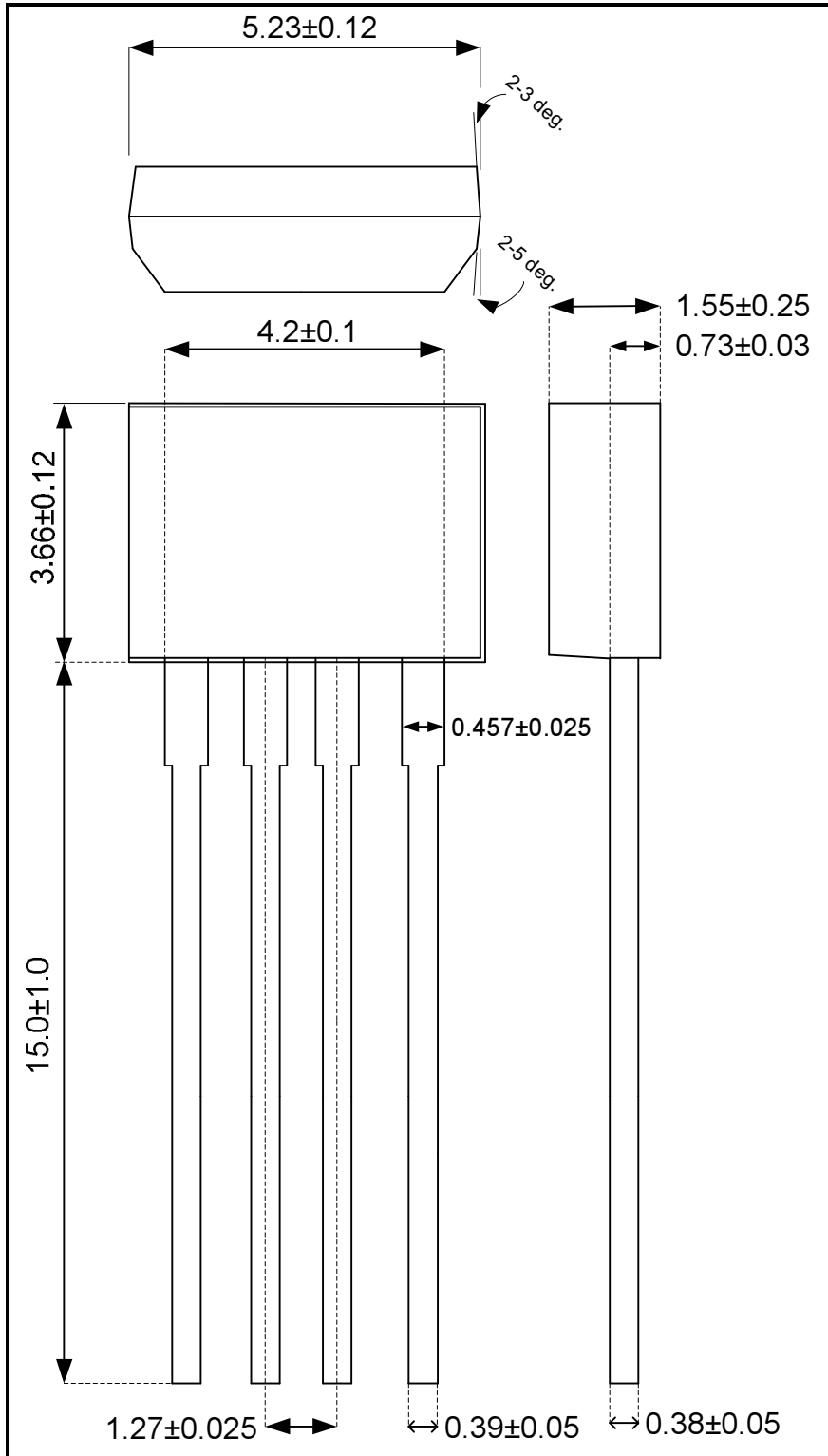
SYMBOLS	MIN	MAX
A	1.05	1.35
A1	0.05	0.15
A2	1.00	1.20
b	0.25	0.50
c	0.08	0.20
D	2.70	3.00
E	2.60	3.00
E1	1.50	1.70
e	0.95 BSC.	
e1	1.90 BSC.	
L	0.30	0.55
L1	0.60 REF.	
L2	0.25 BSC.	
θ°	0	10

UNIT:mm

### NOTE:

1. JEDEC OUTLINE:MO-178 AA ◦

SIP-4L

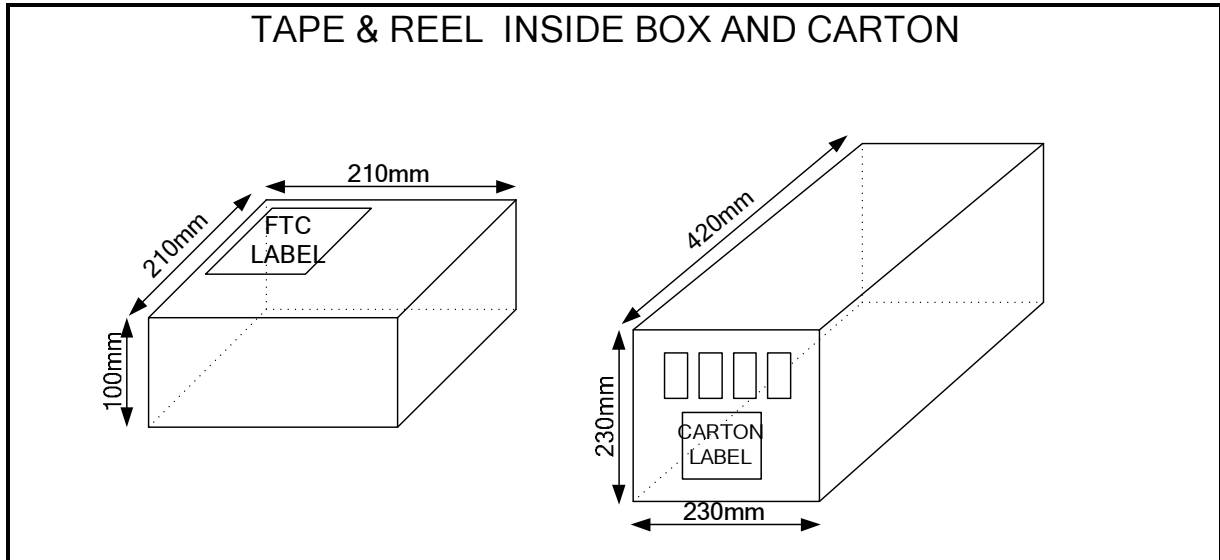


UNIT:mm

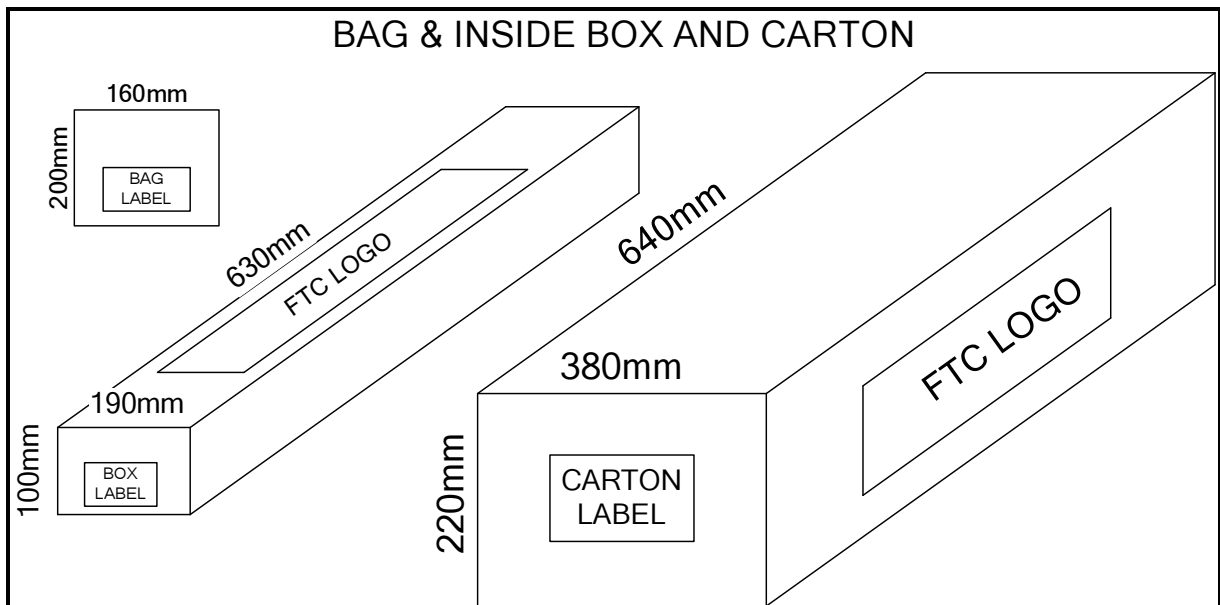
**PACKING SPECIFICATIONS**

**BOX & CARTON DIMENSION**

**SOT-23-5L**



**SIP-4L**



## PACKING QUANTITY SPECIFICATIONS

SOT-23-5L	SIP-4L
2500 EA / REEL	1000 EA / BAG
4 REELS / INSIDE BOX	25 BAGS / INSIDE BOX
4 INSIDE BOXES / CARTON	4 INSIDE BOXES / CARTON

## LABEL SPECIFICATIONS

### REEL & BAG

Feeling Technology Corp Product:FP702KR-LF Lot NO: XXXXXXXXX D/C: xxxx Q`ty: 2500 <div style="border: 1px solid black; padding: 2px; display: inline-block;">無鉛 Lead Free</div>	Feeling Technology Corp Product:FP702H-LF Lot NO: XXXXXXXXX D/C: XXx-XXL Q`ty: 1000 <div style="border: 1px solid black; padding: 2px; display: inline-block;">無鉛 Lead Free</div>
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### CARTON

Feeling Technology Corp Product Type: FP702KR-LF Lot No: XXXXXXXXX Date Code: bxxxx Package Type:SOT-23-5L Marking Type:Laser Total Q`ty: 40K <div style="border: 1px solid black; padding: 2px; display: inline-block;">無鉛 Lead Free</div>	Feeling Technology Corp Product Type: FP702H-LF Lot No: XXXXXXXXX Date Code: XXx-XXL Package Type:SIP-4L Marking Type:Laser Total Q`ty: 100K <div style="border: 1px solid black; padding: 2px; display: inline-block;">無鉛 Lead Free</div>
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