Single Operational Amplifier and Voltage Reference

General Description

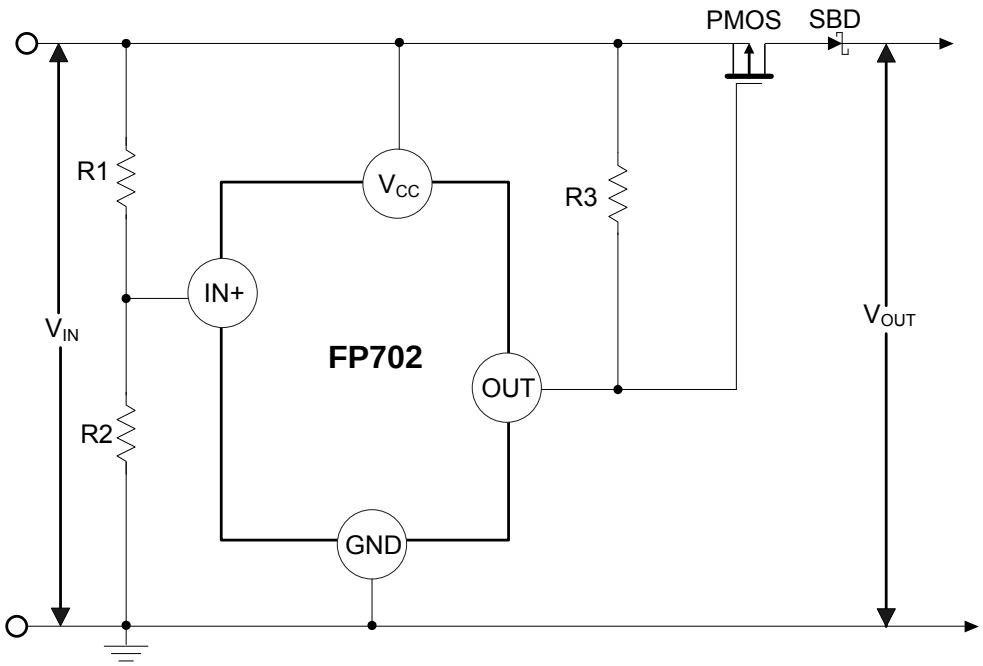
The FP702 is composed one op-amp (OPA) with a 1.25V precision voltage reference on inverting input with an open collector output. It is applied to offer space and low cost in many applications such as the secondary feedback control of power supply, AC / DC converter or adaptor.

The FP702 is designed as an OVP detector with few external components. The circuit diagram of typical application example is shown as below:

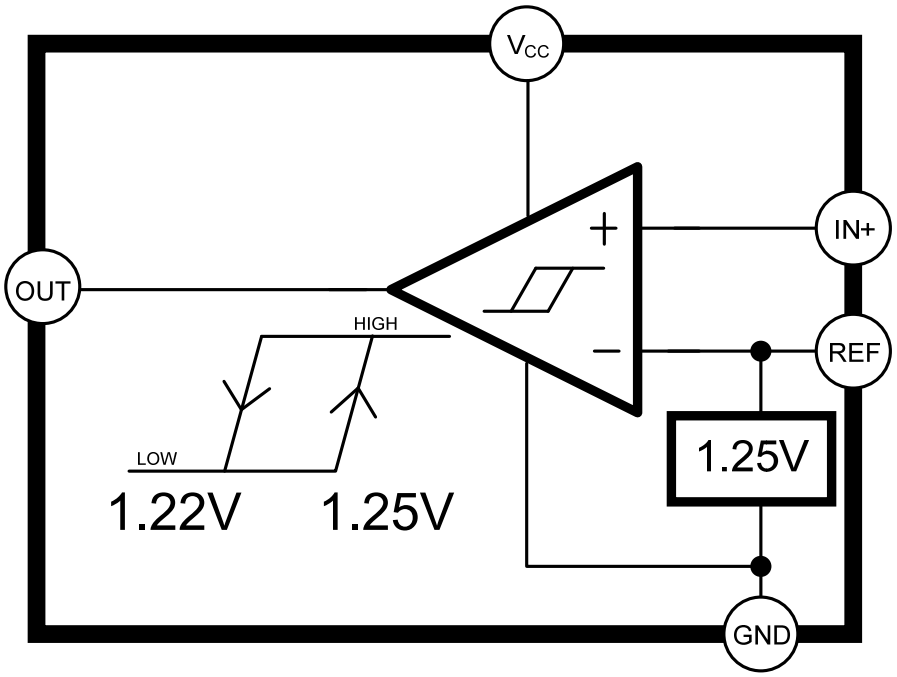
Features

- Wide Operating Voltage From 3.0V~25V
- Fixed Reference Voltage: 1.25V
- Low input Offset Voltage: 1mV
- High Precision Over Temperature: 1%
- Open Collector Output
- Sink Current up to 20mA
- Package: SOT23-5L

Typical Application Circuit

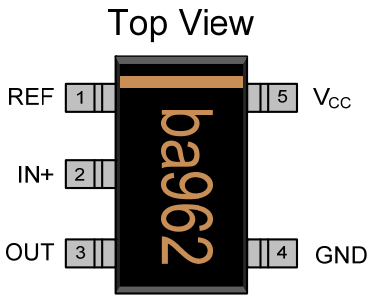


Function Block Diagram



Pin Descriptions

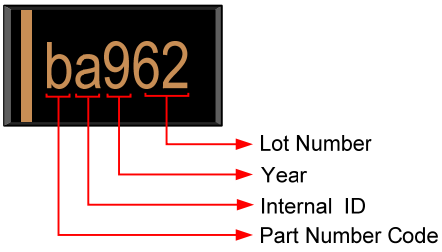
SOT23-5L



Name	No.	I / O	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
V_{CC}	5	P	IC Power Supply

Marking Information

SOT23-5L



Lot Number: Wafer lot number's last two digits

For Example: 132362TB → 62

Year: Production year's last digit

Internal ID: Internal Identification Code

Part Number Code: Part number identification code for this product. It should be always "b".

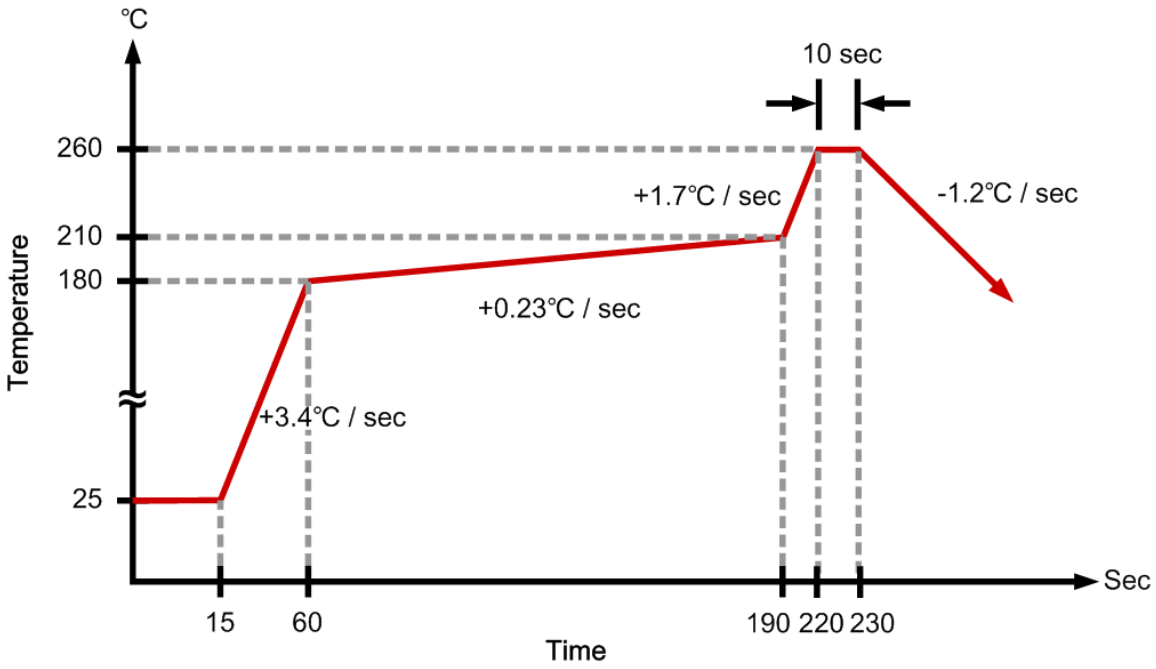
Ordering Information

Part Number	Operating Temperature	Package	MOQ	Description
FP702KR-LF	-20°C ~ +85°C	SOT23-5L	2500EA	Tape & Reel

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
IN+ Input Voltage	V_i		-0.3		V_{CC}-1.8	V
Output Voltage					25	V
Output Sink Current					30	mA
Maximum Junction Temperature					+150	°C
Thermal Resistance Junction to Ambient	θja	SOT23-5L			+400	°C / W
Power Dissipation	P_D	SOT23-5L			250	mW
Storage Temperature	T_{ST}		-65		+150	°C
Lead Temperature		(soldering, 10 sec)			+260	°C

IR Re-flow Soldering Curve



Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply Voltage	V_{CC}		3		25	V
Operating Temperature			-20		+85	°C

DC Electrical Characteristics (V_{CC}=12V, T_A=25°C unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Operating Amplifier						
Input Offset Voltage	V_{io}	T_{AMB}=25℃		1	3	mV
		$T_{MIN} \leqq T_{AMB} \leqq T_{MAX}$			5	
Under Voltage Lockout	DV_{io}			7		μV / ℃
IN- Input Bias Current	I_{ib}	T_{AMB}=25℃		-80	-250	nA
		$T_{MIN} < T_{AMB} < T_{MAX}$			-500	
Large Signal Voltage Gain	A_{vd}			50		V / mV
Output Sink Current	I_{SINK}	V_{IN+}=0.5V, V_{OUT}=1.2V		30		mA
Low Level Output Voltage	V_{OL}	V_{IN+}=0.5V, I_{SINK}=20mA		0.9	1	V
Output Leakage Current	I_{LEAK}	V_{OUT}=25V, V_{IN+}=2V		0.1	1	μA
Output Switch Hystereris	HYS			30		mV
Voltage Reference						
Reference Voltage	V_{REF}	T_{AMB}=25℃	1.237	1.25	1.263	V
		$T_{MIN} \leqq T_{AMB} \leqq T_{MAX}$	1.225		1.275	%
Reference Voltage Deviation Over Temperature Range	ΔV_{REF}	$T_{MIN} \leqq T_{AMB} \leqq T_{MAX}$		10		mV
Line Regulation		3.0V $\leqq V_{CC} \leqq$ 25V		1	3	mV
Load Regulation		I_{REF} =0μA to 40μA		3	5	mV
Total Supply Current						
IC Supply Current	I_{CC}	V_{CC}=25V		0.4		mA

Typical Operating Characteristics (V_{CC}=12V, T_A=25℃ unless otherwise noted))

Figure 1
VCC vs ICC

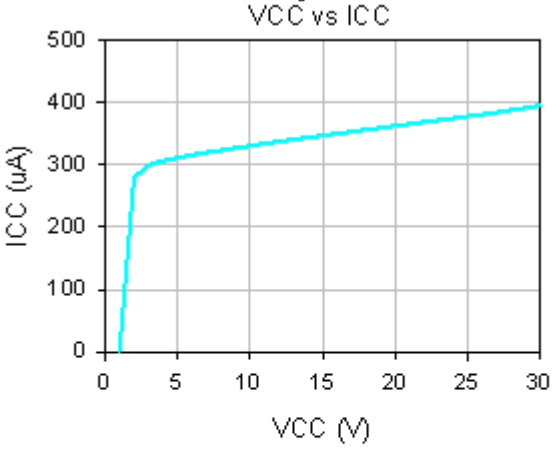


Figure 2
VCC vs VREF

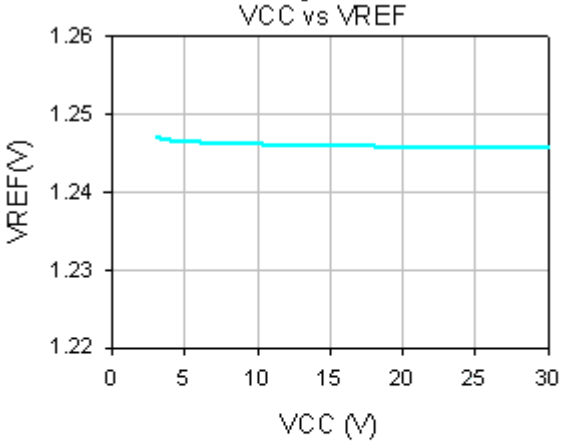


Figure 3
VCC vs Ibias

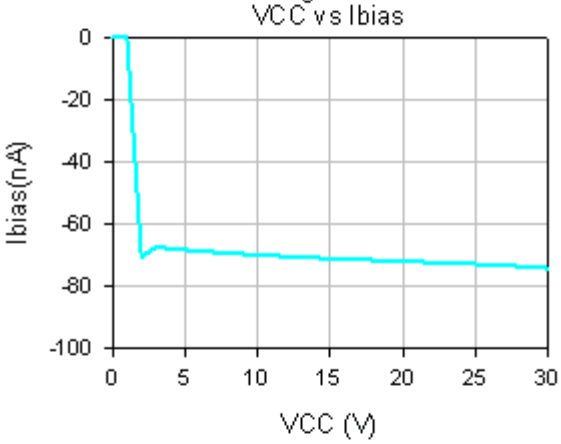


Figure 4
VREF vs IREF

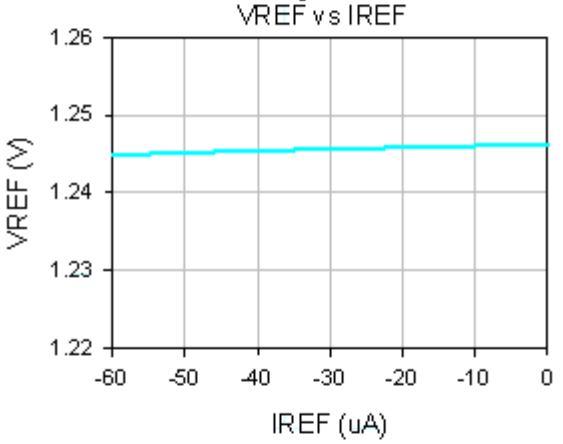


Figure 5
VSAT vs IS NK

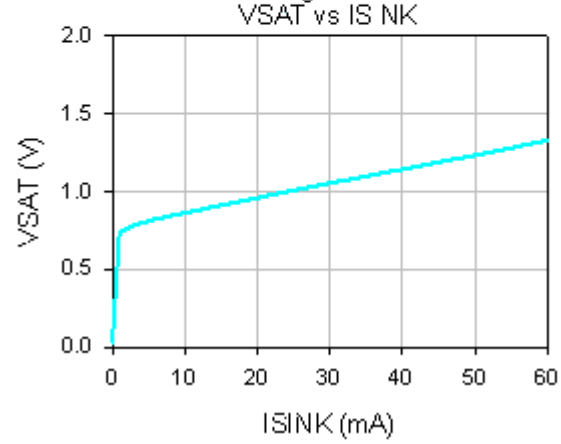
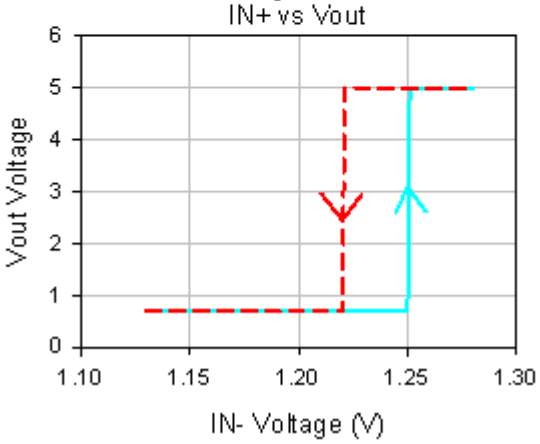


Figure 6
IN+ vs Vout



Typical Operating Characteristics (V_{CC}=12V, T_A=25℃, R_{OUT}=2K)

IN+ to V_{OUT} Delay Time

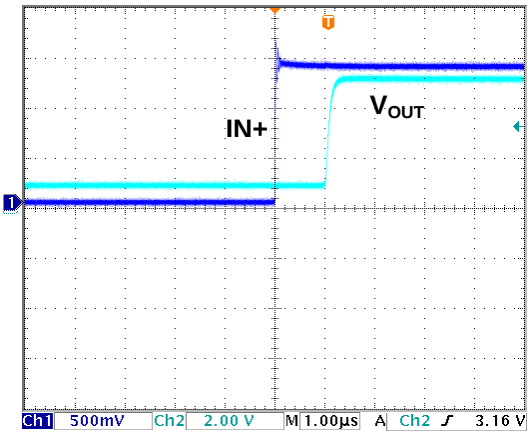


Figure 7

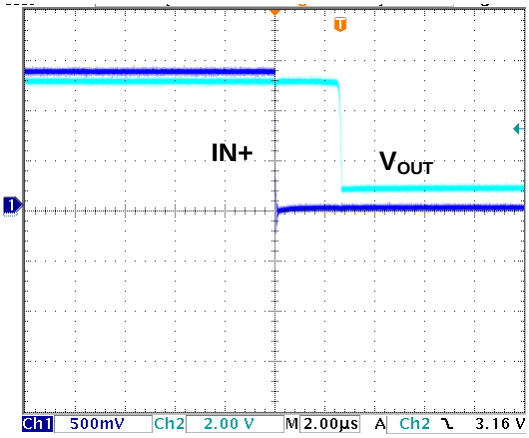


Figure 8

Application Information

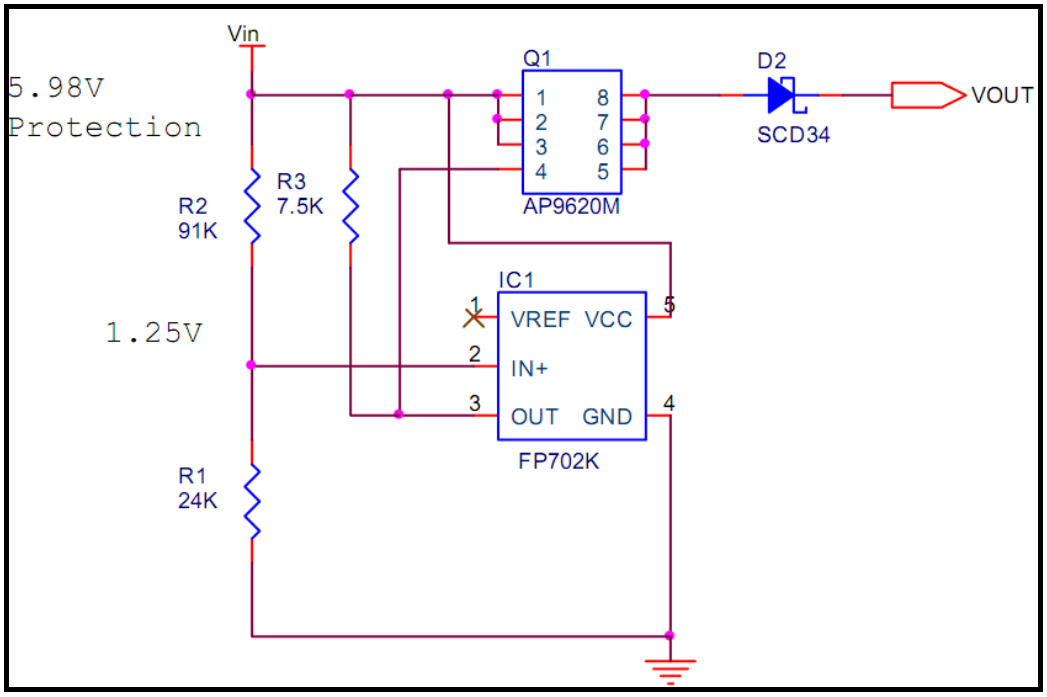
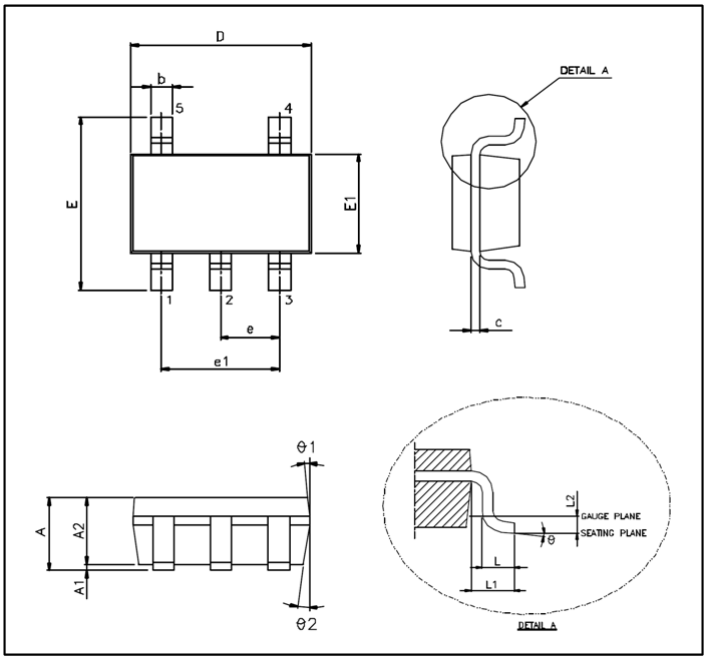


Figure 9. FP702 Over Voltage Protection Circuits

Package Outline

SOT23-5L



Unit: mm

Symbols	Min. (mm)	Max. (mm)
A	1.050	1.350
A1	0.050	0.150
A2	1.000	1.200
b	0.250	0.500
c	0.080	0.200
D	2.700	3.000
E	2.600	3.000
E1	1.500	1.700
e	0.950 BSC	
e1	1.900 BSC	
L	0.300	0.550
L1	0.600 REF	
L2	0.250 BSC	
θ°	0°	10°
θ1°	3°	7°
θ2°	6°	10°

Note:

1. Package dimensions are in compliance with JEDEC outline: MO-178 AA.
2. Dimension “D” does not include molding flash, protrusions or gate burrs.
3. Dimension “E1” does not include inter-lead flash or protrusions.