Single Operational Amplifier and Voltage Reference

Halogen Free

General Description

The FP701 is a single chip composed one op-amp (OPA) with a 1.25V precision voltage reference on non-inverting input and an open collector output. It offers space and low cost in many applications such as the secondary feedback control of power supply, AC to DC converter or adaptor.

The FP701 is designed to used as OCP detector with few external components. The circuit diagram for typical application example is shown as below.

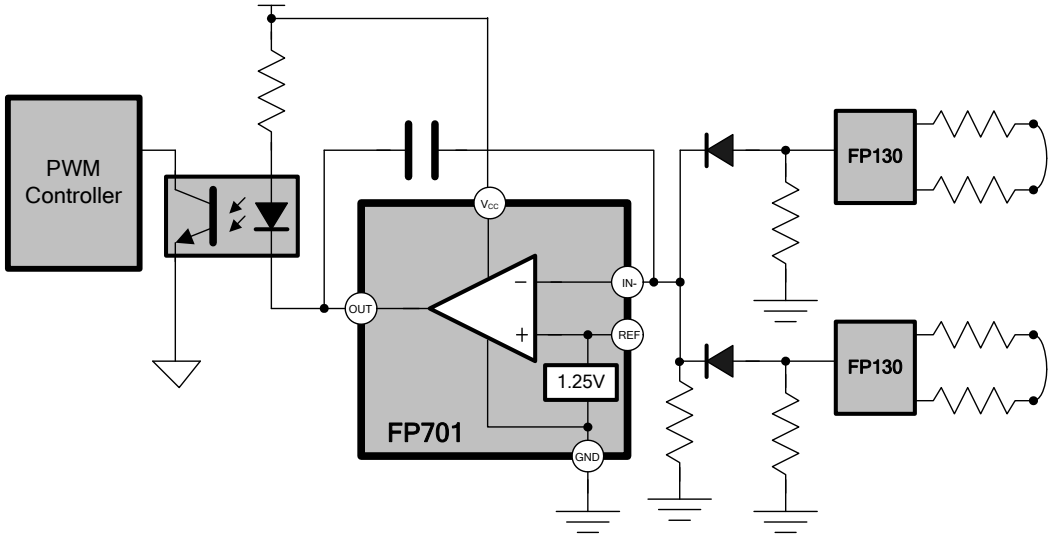
Features

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

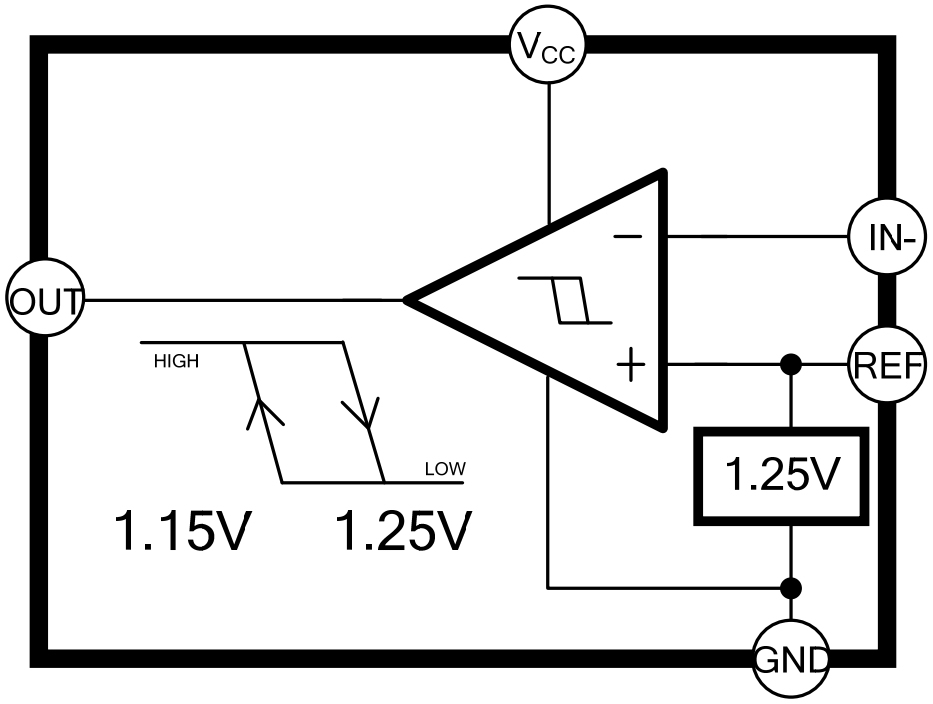
Applications

- Battery Charger
- High Side Rail Current Detector
- SPS (Adaptor)
- Current Sense Networking System

Typical Application Circuit

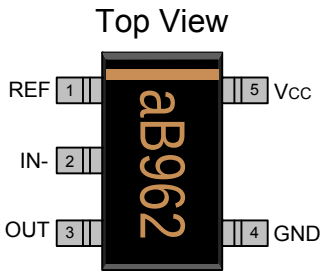


Function Block Diagram



Pin Descriptions

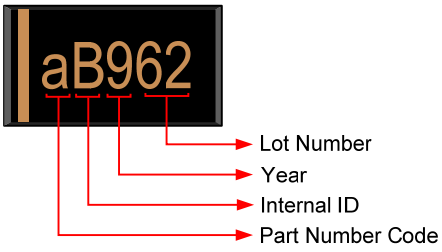
SOT23-5L



Name	No.	I / O	Description
REF	1	O	1.25V Reference Output OPA Non-Inverting Input
IN-	2	I	OPA 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 "a".

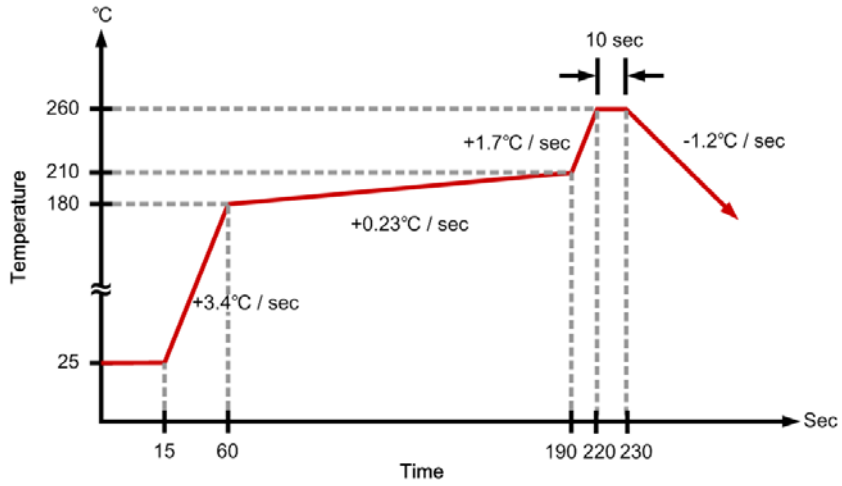
Ordering Information

Part Number	Operating Temperature	Package	MOQ	Description
FP701KR-LF	-20°C ~ +85°C	SOT23-5L	2500EA	Tape & Reel

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply Voltage	V_{cc}				25	V
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	θ_{JA}				250	°C / W
Power Dissipation (P_D)					250	mW
Operating Temperature Range			-20		+85	°C
Storage Temperature Range			-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 noted)

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	
Input Offset Voltage Drift	DV_{io}			7		μV / ℃
IN- Input Bias Current	I_{ib}	T_{AMB}=25℃		-80	-250	nA
		$T_{MIN} \leqq T_{AMB} \leqq T_{MAX}$			-500	
Large Signal Voltage Gain	A_{vd}			50		V / mV
Output Sink Current	I_{SINK}	V_{IN-}=2V, V_{OUT}=1.2V		30		mA
Low Level Output Voltage	V_{OL}	V_{IN-}=2V, I_{SINK}=20mA		0.9	1	V
Output Leakage Current	I_{LEAK}	V_{OUT}=25V, V_{IN-}=0.5V		0.1	1	μA
Output Switch Hysteresis	HYS.			100		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°C, unless otherwise noted)

Figure 1
VCC vs ICC

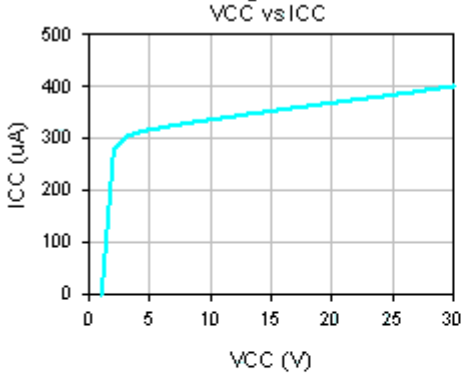


Figure 2
VCC vs VREF

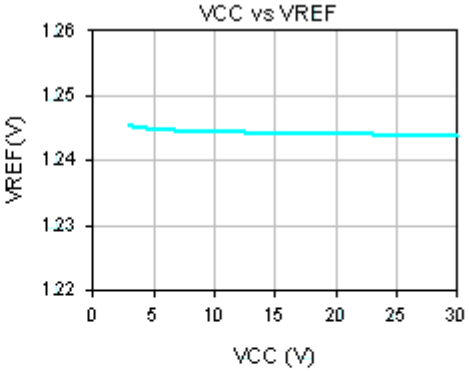


Figure 3
VCC vs Ibias

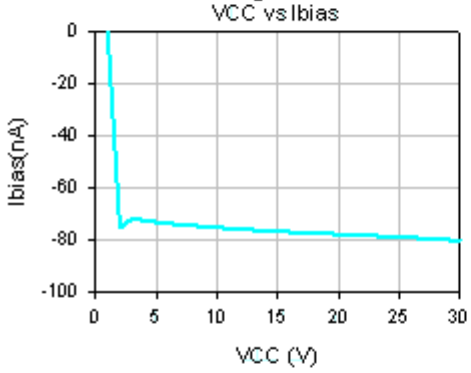


Figure 4
VREF vs IREF

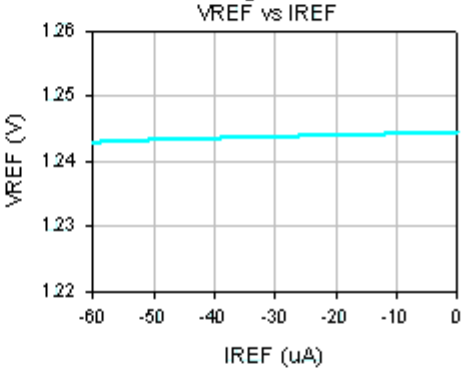


Figure 5
VSAT vs ISINK

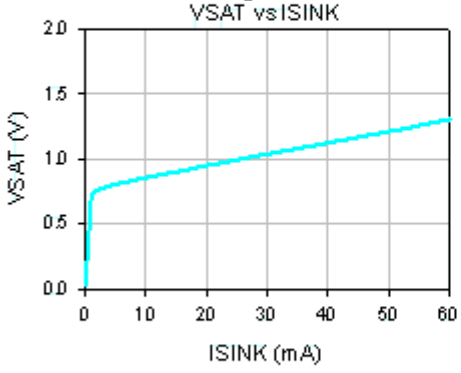
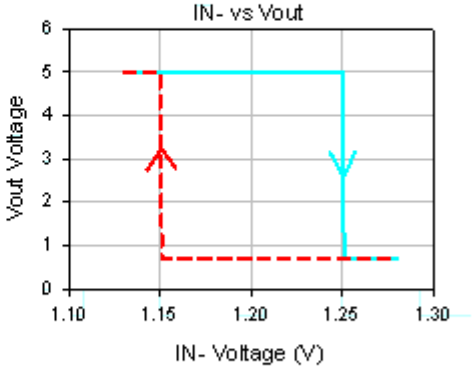


Figure 6
IN- vs Vout



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

IN- to V_{OUT} Delay Time

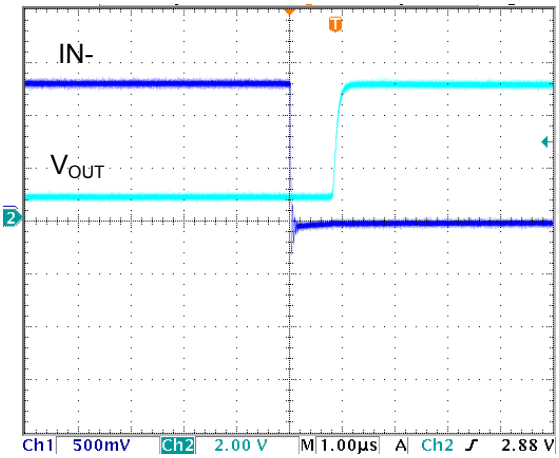


Figure 7

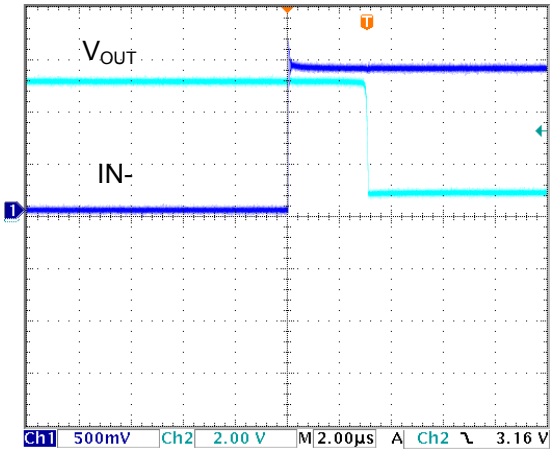


Figure 8

Typical Application

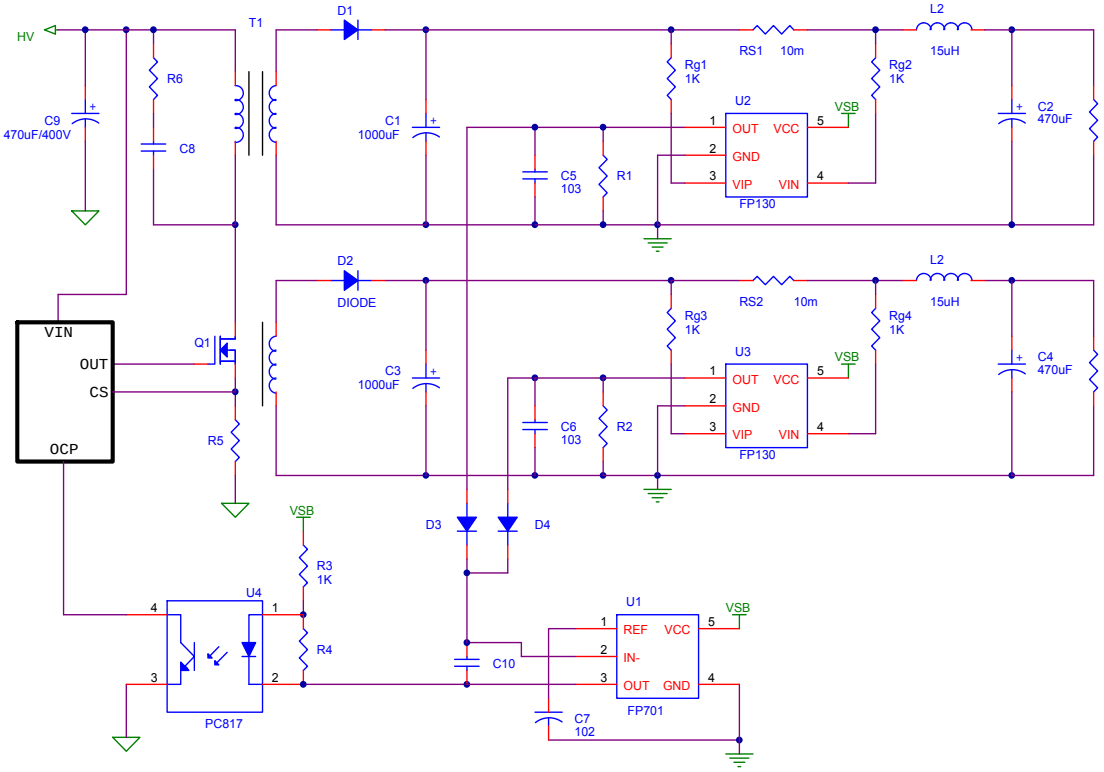
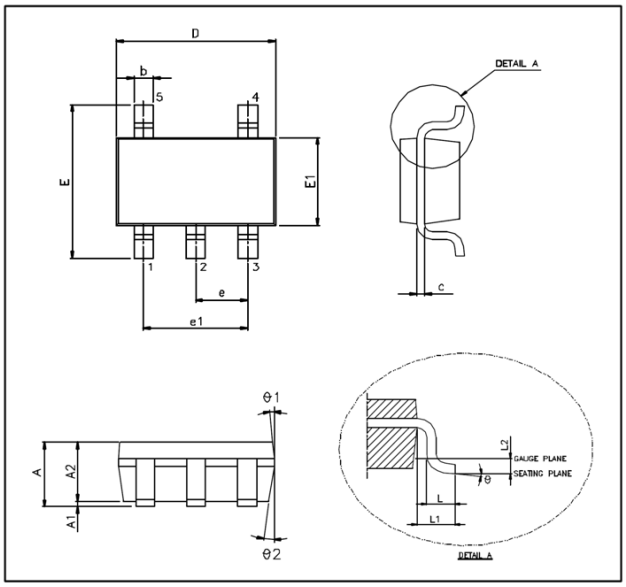


Figure 1 FP701 Over Current Protection Circuits with FP130x2 (Dual Output SPS)

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.