

Voltage Detectors, FC2803 Series

General Description

FC2803 Series are highly precise, low power consumption voltage detectors, manufactured using CMOS technologies. Detect voltage is extremely accurate with minimal temperature drift. CMOS output configurations are available.

Features

- Highly accuracy : $\pm 1\%$ ($-V_{DET}=1.5V$ above)
- Low power consumption :
TYP 0.7 μ A ($V_{IN}=3.5V, -V_{DET}=2.0V$)
- Detect voltage range : 1.0V~6.5V in 0.1V increments
- Operating voltage range : 0.7V~7V
- Detect voltage temperature characteristics :
TYP ± 100 ppm/ $^{\circ}$ C
- Output configuration : CMOS

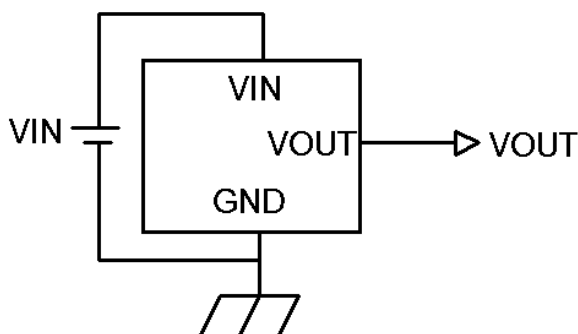
Typical Application

- Microprocessor reset circuitry
- Memory battery back-up circuits
- Power-on reset circuits
- Power failure detection

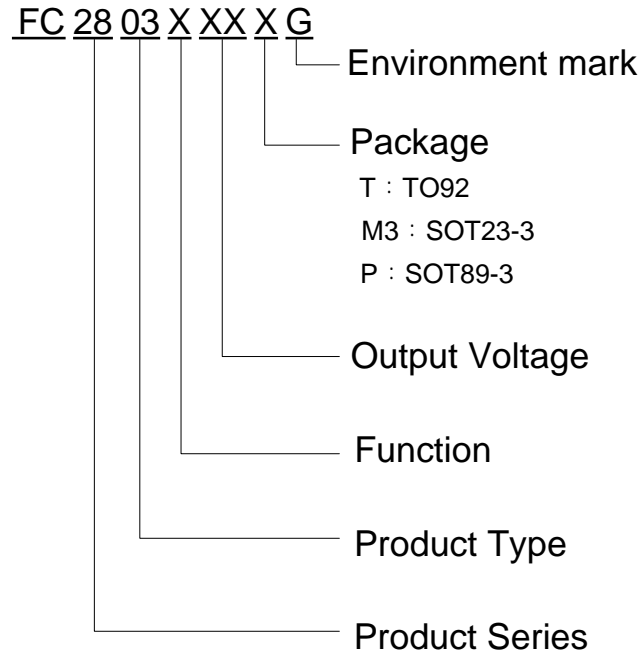
Packages

- 3-pin SOT23-3, SOT89-3, TO-92

Typical Application Circuit



Selection Guide

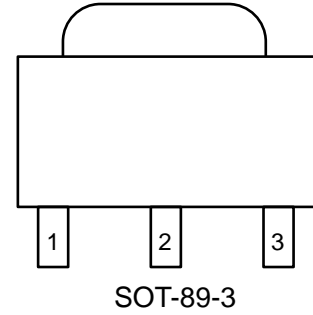
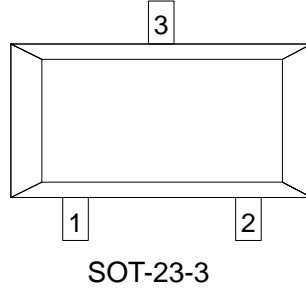
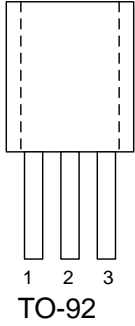


product series	product description
FC2803A10M3G	$V_{OUT} = 1.0V$; Rising edge detection ; Package : SOT23-3
FC2803A33M3G	$V_{OUT} = 3.3V$; Rising edge detection ; Package : SOT23-3

NOTE:

1. At present, there are seventeen kinds of voltage value:
 1.0V、1.1V、1.4V、1.6V、1.8V、1.9V、2.2V、2.5V、2.6V、2.7V、2.8V、3.0V、3.3V、
 3.4V、3.5V、3.8V、4.2V。
2. If you need other voltage and package, please contact our sales staff.

Pin Configuration

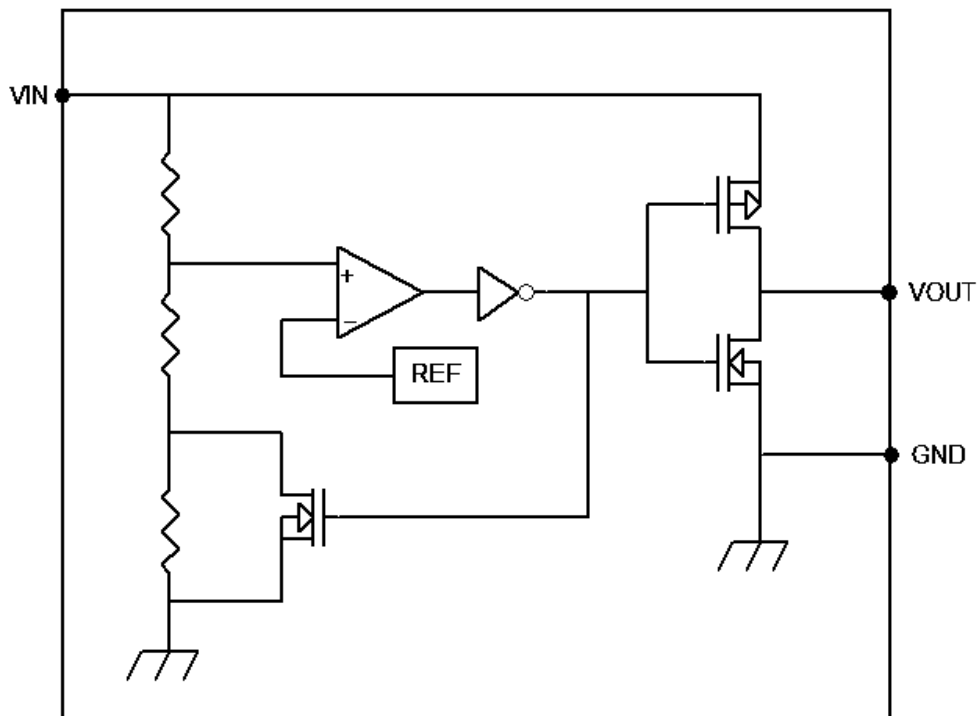


Pin Assignment

FC2803XX

Pin Number			Pin Name	Functions
SOT-23-3	SOT-89-3	TO-92		
2	3	3	GND	Ground
1	1	1	VOUT	Output Voltage
3	2	2	VIN	Input Voltage

Block Diagram





FC2803

Absolute Maximum Ratings

Parameter		Symbol	Ratings	Units
V _{IN} Input Voltage		V _{IN}	8	V
Output Current		I _{OUT}	50	mA
Output Voltage	CMOS	V _{OUT}	GND-0.3~V _{IN} +0.3	V
Continuous Total Power Dissipation	SOT-23-3	Pd	300	mW
	SOT-89-3		500	
	TO-92		500	
Operating Ambient Temperature		T _{Opr}	-40~+85	°C
Storage Temperature		T _{stg}	-40~+125	°C
Soldering temperature and time		T _{solder}	260 °C, 10s	
ESD		MM	400	V
		HBM	4000	V

Electrical Characteristics

(-V_{DET}(S)=1.0V to 6.5V±1% ,T_a=25°C , unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ	Max.	Units
Detect Voltage	-VDET	-VDET (S) ≤ 1.5V	-VDET (S) ×0.98	-VDET(S)	-VDET(S) ×1.02	V
		-VDET (S) > 1.5V	-VDET (S) ×0.99	-VDET(S)	-VDET(S) ×1.01	
Hysteresis Range	VHYS	-	0.03	0.06	0.1	V
Supply Current	ISS	V _{IN} =2V (1.0V-1.5V)	-	0.7	1	uA
		V _{IN} =3.5V (1.6V-2.0V)	-	0.7	1	
		V _{IN} =4.5V (2.1V-3.9V)		1.2	2	
		V _{IN} =6V (4.0V-5.6V)	-	1.1	2	
		V _{IN} =7V (5.7V-6.5V)		1.0	2	
Output Current	I _{out} N-ch	V _{DS} =0.5V V _{IN} =0.7V	0.01	0.14	--	mA
	I _{out} P-ch	V _{DS} =0.5V V _{IN} =7V	1.7	3.4	--	mA
Operating voltage	V _{IN}	-	0.7	-	7	V
Responding time	tpLH				60	us
Temperature characteristics	$\frac{\Delta - VDET}{\Delta T_a \cdot -VDET}$	ΔT _a =-40°C ~ 85°C	-	±100	±350	ppm/°C

Note : 1、-VDET(S) : Specified Detection Voltage value

2、-VDET : Actual Detection Voltage value

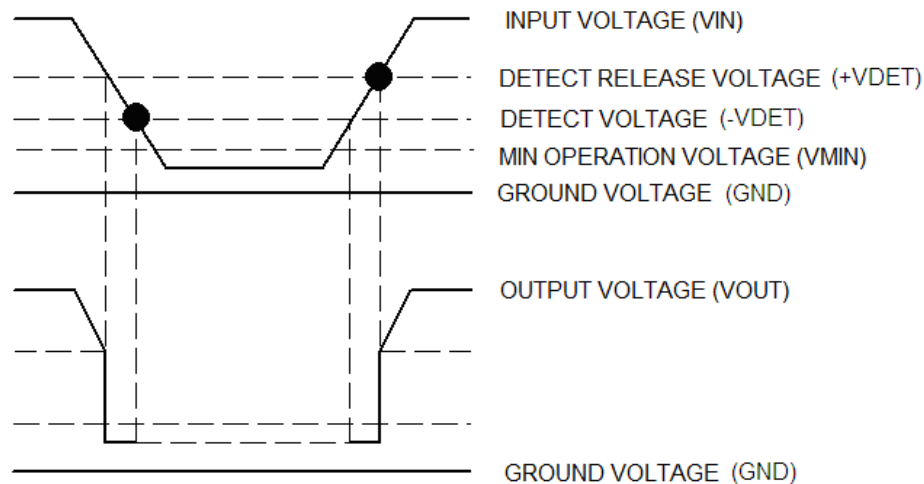
3、Release Voltage : +VDET=-VDET+VHYS

Functional Description :

- 1、 When input voltage (V_{IN}) rises above detect voltage ($-V_{DET}$), output voltage (V_{OUT}) will be equal to V_{IN} .
- 2、 When input voltage (V_{IN}) falls below detect voltage ($-V_{DET}$), output voltage (V_{OUT}) will be equal to the ground voltage (GND) level.
- 3、 When input voltage (V_{IN}) falls to a level below that of the minimum operating voltage (V_{MIN}), output will become unstable. In this condition, V_{IN} will equal the pulled-up output (should output be pulled-up.)
- 4、 When input voltage (V_{IN}) rises above the ground voltage (GND) level, output will be unstable at levels below the minimum operating voltage (V_{MIN}). Between the V_{MIN} and detect release voltage $+V_{DET}$ levels, the ground voltage (GND) level will be maintained.
- 5、 When input voltage (V_{IN}) rises above detect release voltage ($+V_{DET}$), output voltage (V_{OUT}) will be equal to V_{IN} .
- 6、 The difference between $+V_{DET}$ and $-V_{DET}$ represents the hysteresis range.

Timing Chart

FC2803 XX:



Directions for use

- 1、 Please use this IC within the stated maximum ratings. Operation beyond these limits may cause degrading or permanent damage to the device.
- 2、 When a resistor is connected between the V_{IN} pin and the input with CMOS output configurations, oscillation may occur as a result of voltage drops at R_{IN} if load current (I_{OUT}) exists. (refer to the Oscillation Description(1) below)
- 3、 When a resistor is connected between the V_{IN} pin and the input with CMOS output configurations, oscillation may occur as a result of through current at the time of voltage release even if load current (I_{OUT}) does not exist. (refer to the Oscillation Description(2) below)
- 4、 With a resistor connected between the V_{IN} and the input, detect and release voltage will rise as a result of the IC's supply current flowing through the V_{IN} pin.



5. In order to stabilize the IC's operations, please ensure that V_{IN} pin's input frequency's rise and fall times are more than several $\mu\text{Sec/V}$.

Oscillation Description

1. Output current oscillation with the CMOS output configuration

When the voltage applied at IN rises, release operations commence and the detector's output voltage increase. Load current (I_{OUT}) will flow at R_L . Because a voltage drop ($R_{IN} * I_{OUT}$) is produced at the R_{IN} resistor, located between the input (IN) and the V_{IN} pin. The load current will flow via the IC's pin. The voltage drop will also lead to a fall in the voltage level at the V_{IN} pin. When the V_{IN} pin voltage level falls below the detect voltage level, detect operations will commence. Following detect operations, load current flow will cease and since voltage drop at R_{IN} will disappear, the voltage level at the V_{IN} pin will rise and release operations will begin over again. Oscillation may occur with this "release - detect-release" repetition. Further, this condition will also appear via means of a similar mechanism during detect operations.

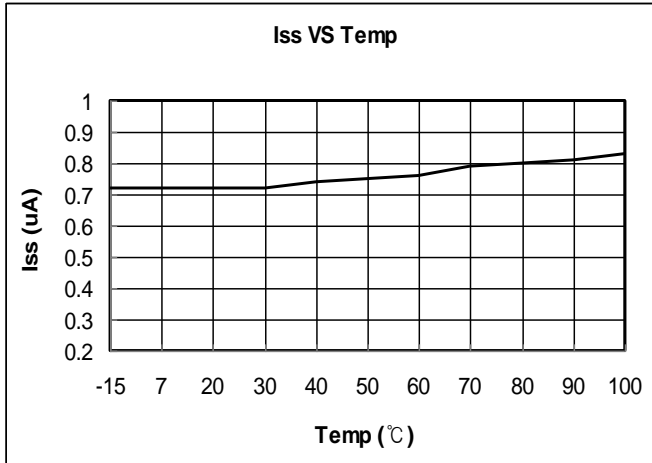
2. Oscillation as a result of through current

Since the FC2803 series are CMOS IC's, through current will flow when the IC's internal circuit switching operates (during release and detect operations). Consequently, oscillation is liable to occur as a result of drops in voltage at the through current's resistor (R_{IN}) during release voltage operations.(refer to diagram 2) since hysteresis exists during detect operations, oscillation is unlikely to occur.

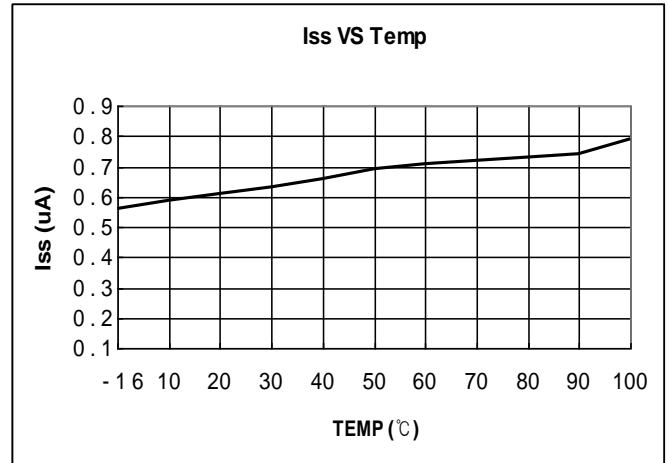
Type Characteristics

1、 Supply Current Vs. Ambient Temperature

VIN=2V, -VDET=1.1V

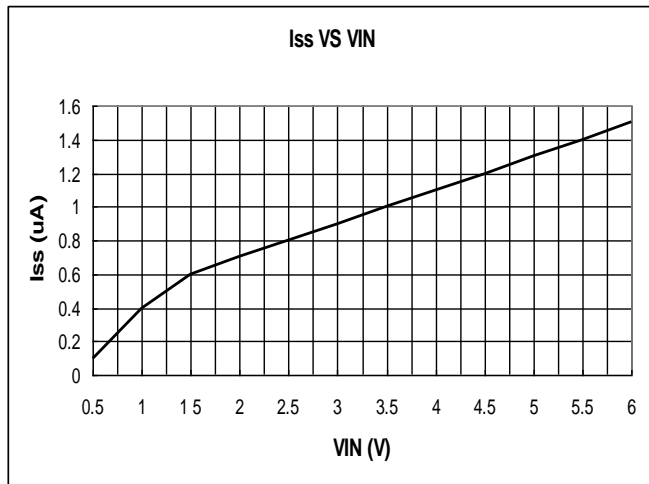


VIN=3V, -VDET=2.2V

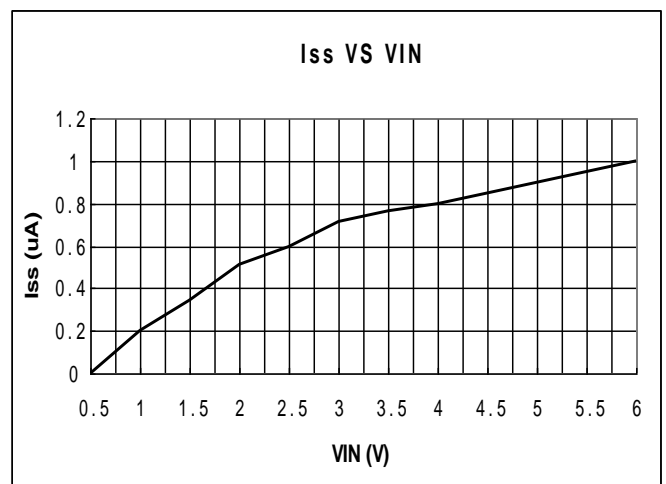


2、 Supply Current Vs. Input Voltage

-VDET=1.1V (T=25°C)

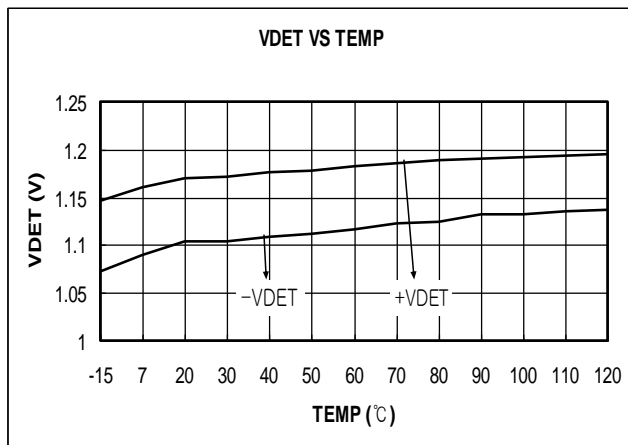


-VDET=2.2V (T=25°C)

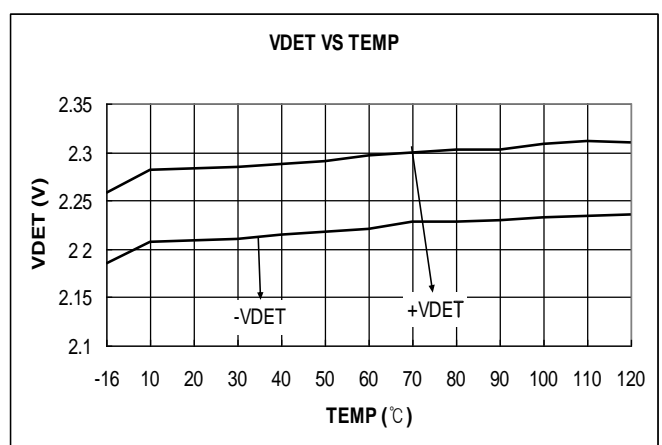


3、 Detect, Release Voltage Vs. Ambient Temperature

-VDET=1.1V

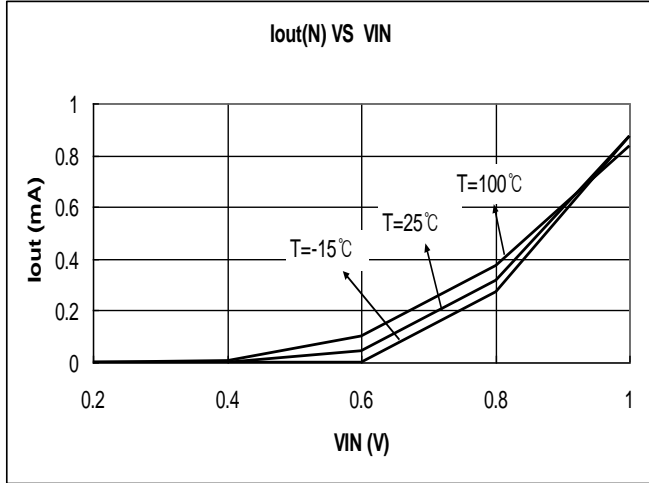


-VDET=2.2V

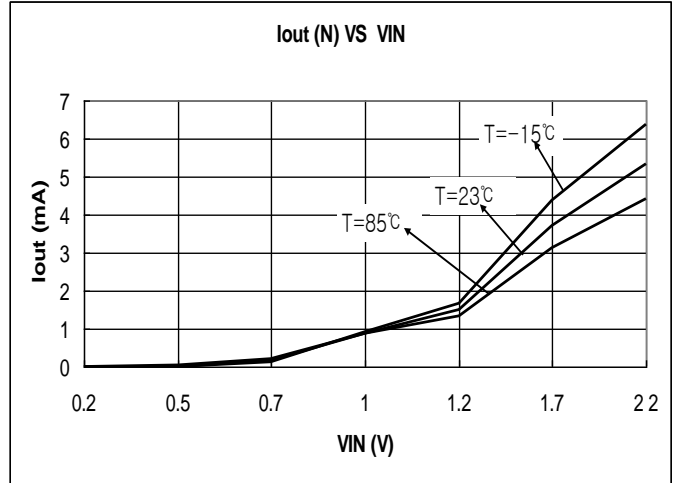


4、 N-Ch Output Current Vs. Input Voltage

VDS=0.5V, -VDET=1.1V

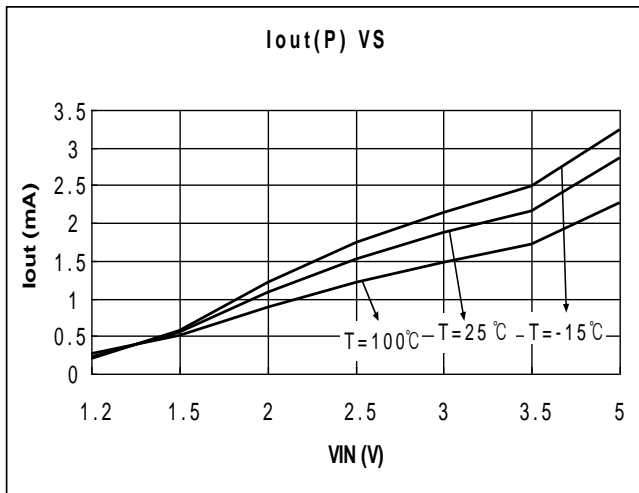


VDS=0.5V, -VDET=2.2V

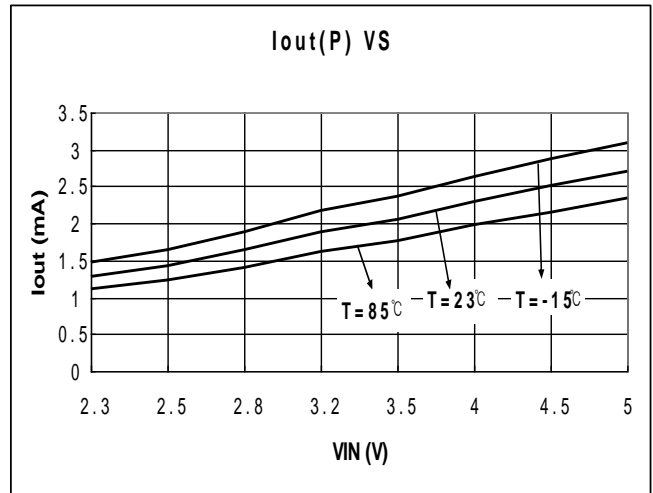


5、 P-Ch Output Current Vs. Input Voltage

VDS=0.5V, -VDET=1.1V

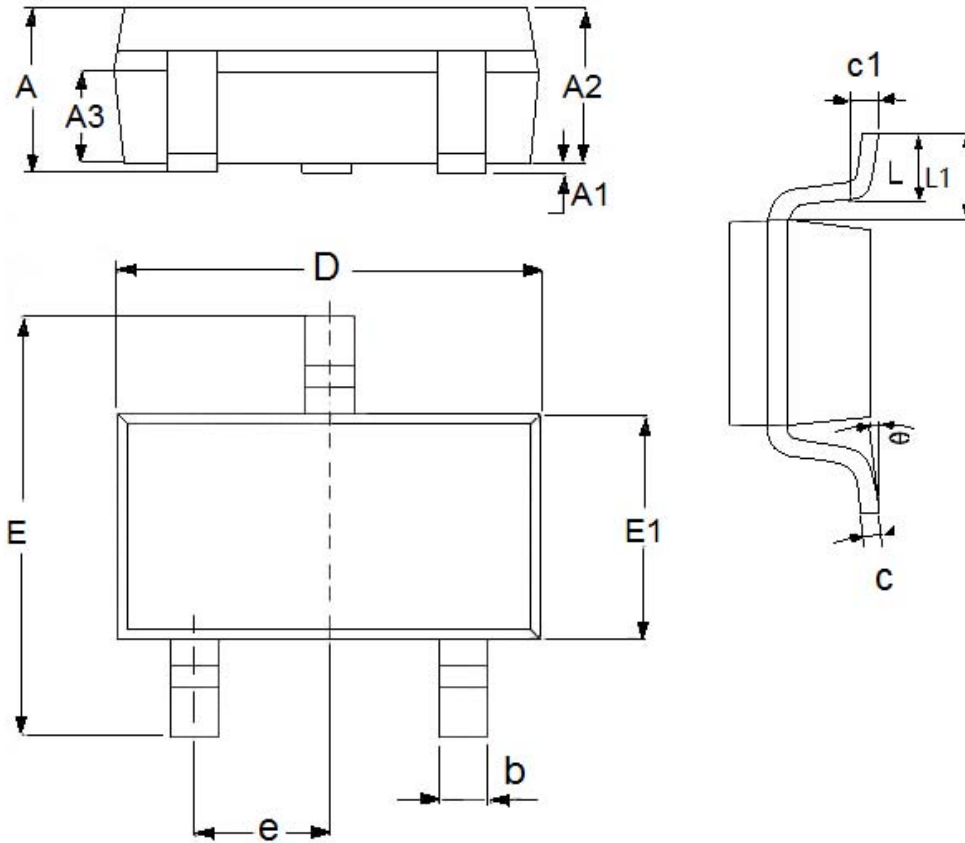


VDS=0.5V, -VDET=2.2V



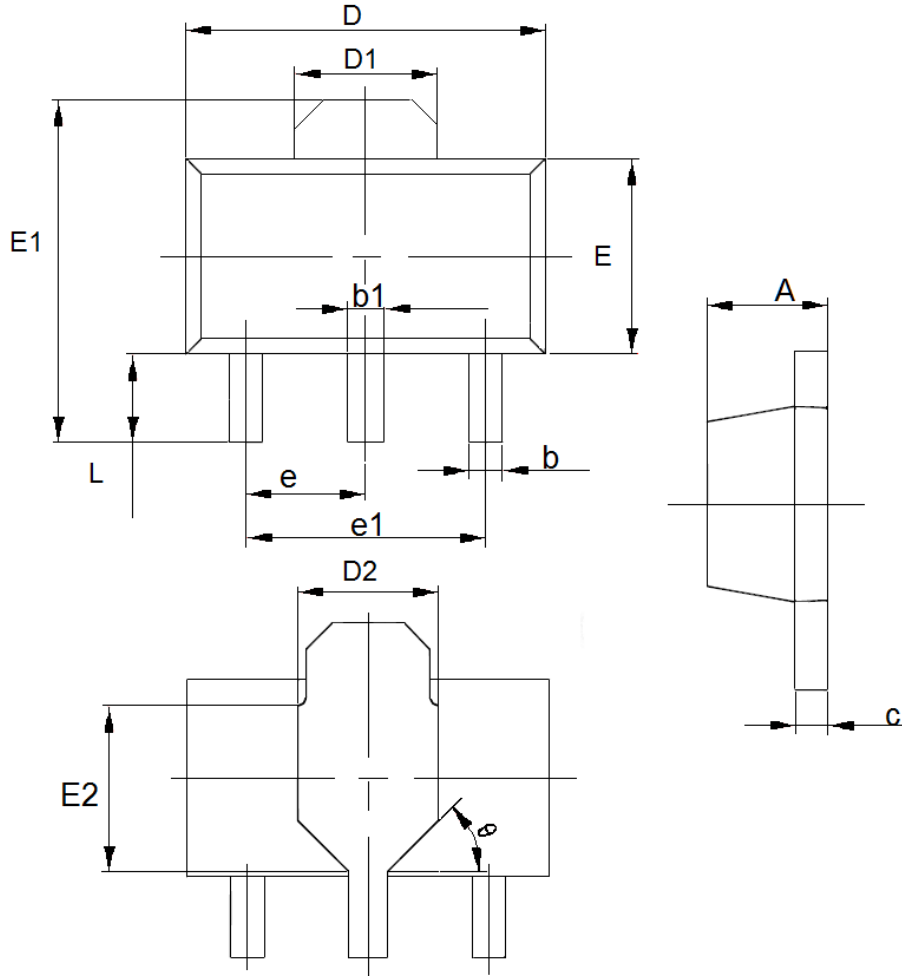
Packaging Information

- Package Type : SOT23-3



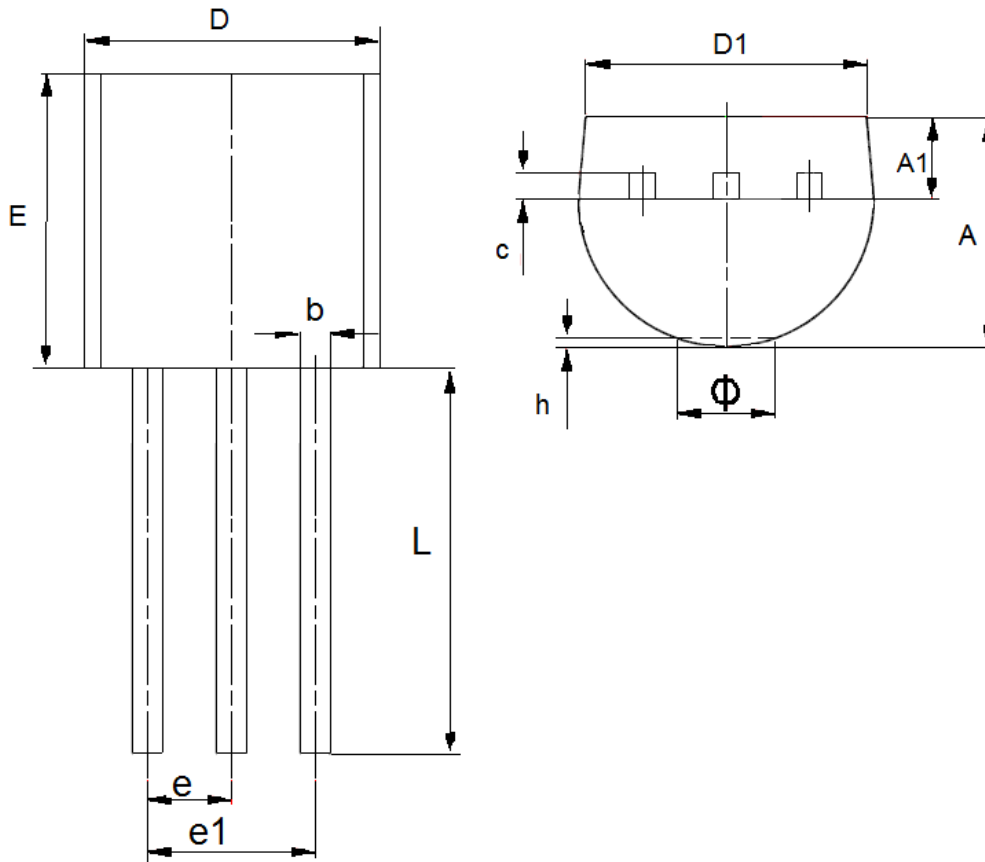
DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	1.05	1.45	0.0413	0.0571
A1	0	0.15	0.0000	0.0059
A2	0.9	1.3	0.0354	0.0512
A3	0.6	0.7	0.0236	0.0276
b	0.25	0.5	0.0098	0.0197
c	0.1	0.25	0.0039	0.0098
D	2.8	3.1	0.1102	0.1220
E	2.6	3.1	0.1023	0.1220
E1	1.5	1.8	0.0591	0.0709
e	0.95(TYP)		0.0374(TYP)	
L	0.25	0.6	0.0098	0.0236
L1	0.59(TYP)		0.0232(TYP)	
θ	0	8°	0.0000	8°
c1	0.2(TYP)		0.0079(TYP)	

● Package Type : SOT89-3



DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	1.4	1.6	0.0551	0.0630
b	0.32	0.52	0.0126	0.0205
b1	0.4	0.58	0.0157	0.0228
c	0.35	0.45	0.0138	0.0177
D	4.4	4.6	0.1732	0.1811
D1	1.55(TYP)		0.061(TYP)	
D2	1.75(TYP)		0.0689(TYP)	
e1	3.0(TYP)		0.1181(TYP)	
E	2.3	2.6	0.0906	0.1023
E1	3.94	4.4	0.1551	0.1732
E2	1.9(TYP)		0.0748(TYP)	
e	1.5(TYP)		0.0591(TYP)	
L	0.8	1.2	0.0315	0.0472
θ	45°		45°	

● Package Type : TO-92



DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	3.3	3.7	0.1299	0.1457
A1	1.1	1.4	0.0433	0.0551
b	0.38	0.55	0.015	0.0217
c	0.36	0.51	0.0142	0.0201
D	4.3	4.7	0.1693	0.185
D1	3.43	—	0.135	—
E	4.3	4.7	0.1693	0.185
e	1.27TYP		0.05TYP	
e1	2.44	2.64	0.0961	0.1039
L	14.1	14.5	0.5551	0.5709
h	0	0.38	0	0.015
Φ	—	1.6	—	0.063