AF810 Series

Ultra-Small Built-In Delay High-Precision Voltage Detector

➢ Description

The AF810 Series is a series of high-precision voltage detectors with a built-in delay time generator of fixed time. developed using CMOS process.

The detection voltage is fixed internally, with an accuracy of ±2.0%. Internal oscillator and counter timer can delay the release signal without external parts, delay times 200 ms Two output forms, NMOS open-drain and CMOS utput are available.

➢ Applications

- Memory battery back-up circuits
- Power-on reset circuits
- Power failure detection
- Power monitor for portable equipment such as notebook computers, digital cameras, PDA, and cellular phones.
- Constant voltage power monitors for cameras, video equipment and communication devices.
- Power monitor for microcomputers and reset for CPUs.

➢ Features

- Ultra-low current consumption:
  0.9μA@3.5V(Typ.)
- High-precision detection voltage: ±2.0%
- Hysteresis characteristics: -VDET×5%(Typ.)
- Operating voltage range: 0.95V to 7.0V
- Detection voltage: 1.5V to 6.0V (10mV step)
- Delaytime: 210 ms (Typ.)
- Output forms:
  NMOS open-drain output (Active High)
  CMOS output (Active High)

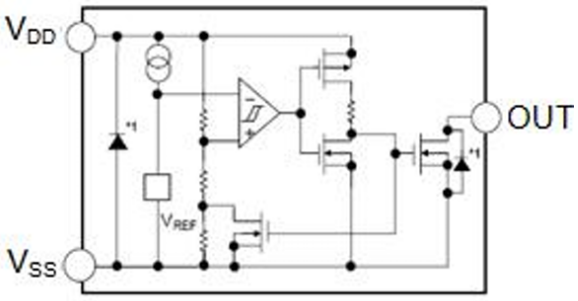
➢ Order Information

AF810①②③④⑤

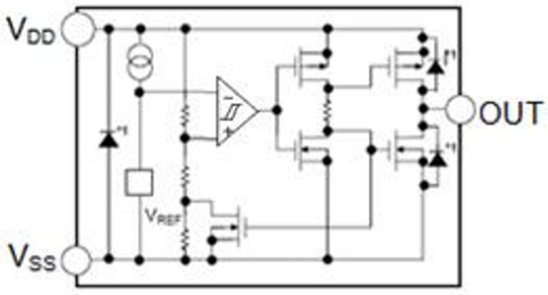
DESIGNATOR	SYMBOL	DESCRIPTION
①	C	CMOS
	N	NMOS open drain
②③④	Integer	Detection Voltage (1.50V~6.00V), "④"elide when it is "0" e.g. 3.0V=②:3, ③:0 2.93V=②:2, ③:9, ④:3
⑤	封装类型	对应字母
	Package：SOT-89	P
	Package：TO-92	T
	Package：SOT-23	N

➢ BLOCK DIAGRAMS

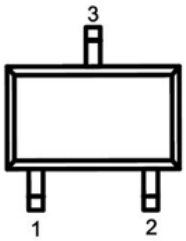
NMOS open-drain



CMOS output

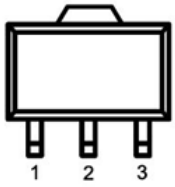


➢ PIN Configuration



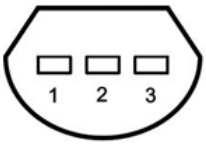
AF810 Series（SOT-23）

PIN NO.	N	FUNCTION
1	V_{SS}	Ground
2	V_{OUT}	Voltage detection output pin
3	V_{DD}	Voltage input pin



AF810 Series（SOT-89）

PIN NO.	P	FUNCTION
1	V_{OUT}	Voltage detection output pin
2	V_{DD}	Voltage input pin
3	V_{SS}	Ground



AF810 Series（SOT-92）

PIN NO.	T	FUNCTION
1	V_{OUT}	Voltage detection output pin
2	V_{DD}	Voltage input pin
3	V_{SS}	Ground

➢ Selection Table

Part No	Detectable voltage	Package	Marking	Shipping
AF810Y-XXXZ	4.63V	SOT23	SAAA	3000/Tape & Reel
AF810Y-XXXZ	4.38V		SBAA	
AF810Y-XXXZ	4.00V	SOT-89	SWAA	
AF810Y-XXXZ	3.08V		SCAA	
AF810Y-XXXZ	2.93V	TO-92	SDAA	
AF810Y-XXXZ	2.63V		SFAA	

Note: ”Y” is CMOS or NMOS output. ”XXX” stand for output voltages. Z” stands for package.

➢ Absolute Maximum Ratings (Unless otherwise specified, T_A=25°C)

PARAMETER		SYMBOL	RATINGS	UNITS
Power supply Voltage		V_{DD}	V_{SS}-0.3~ V_{SS} +8	V
Output Voltage		V_{OUT}	V_{SS}-0.3~ V_{SS} +8	V
Power Dissipation	SOT-23	P_D	400	mW
	SOT-89		600	
	YO-92		500	
Operating Ambient Temperature		T_{opr}	-40~+85	°C
Storage Temperature		T_{STG}	-40~+125	°C
Soldering Temperature & Time		T_{solder}	260°C,10s	

➢ Thermal Characteristics

Symbol	Parameter	Package	Max	Units
Θ JA	Thermal Resistance(Junction to ambient）（Assume to ambient airflow,no heat sink)	SOT23	260	°C/W
		SOT89	150	°C/W
		TO-92	200	°C/W

➢ Electronics Characteristics

(Unless otherwise specified, T_A=25°C,)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNIT
Detection voltage*1	$-V_{DET}$	—		$-V_{DET(S)}$ ×0.98	$-V_{DET(S)}$	$-V_{DET(S)}$ ×1.02	V
Hysteresis width	V_{HYS}	—		0.02× $-V_{DET(S)}$	0.05× $-V_{DET(S)}$	0.08× $-V_{DET(S)}$	V
Current consumption	I_{SS}	V_{DD}= - V_{DET}+0.5V	AF810C/N20～26	—	1.0	3.0	uA
			AF810C/N26～39	—	1.2	3.2	
			AF810C/N39～60	—	1.5	3.5	
Operating voltage	V_{DD}	—		0.95	—	7	V
Output current	I_{OUT}	NMOS： V_{OUT}=0.5V V_{DD} =- V_{DET}+0.5 V	AF810C/N20～26	3.0	13.0	—	mA
			AF810C/N26～39	3.0	15.0	—	mA
			AF810C/N39～60	3.0	18.0	—	mA
		PMOS： V_{DD}-V_{OUT} =0.5V V_{DD}=- V_{DET}-0.5V	AF810C/N20～26	1.5	4.0	—	mA
			AF810C/N26～39	1.5	6.0	—	mA
			AF810C/N39～60	1.5	8.0	—	mA
Leakage current	I_{LEAK}	Only for NMOS open-drain output products, V_{DD}=6.0V,V_{OUT}=6.0V			—	1.0	uA
temperature coefficient		Ta=−40°C~+85°C		—	±120	±360	ppm/°C
Delay time	T_{PLH}			130	210	290	ms

***1.** −VDET: Actual detection voltage value, −VDET(S): Specified detection voltage value

➢ Functional Description

1. When a voltage higher than the release voltage (+V_{DET}) is applied to the voltage input pin (V_{DD}), the voltage will gradually fall. When a voltage higher than the detect voltage (-V_{DET}) is applied to V_{DD}, output (V_{OUT}) will be equal to the ground voltage (V_{SS}). Note that this also applies to N-channel open drain configurations.

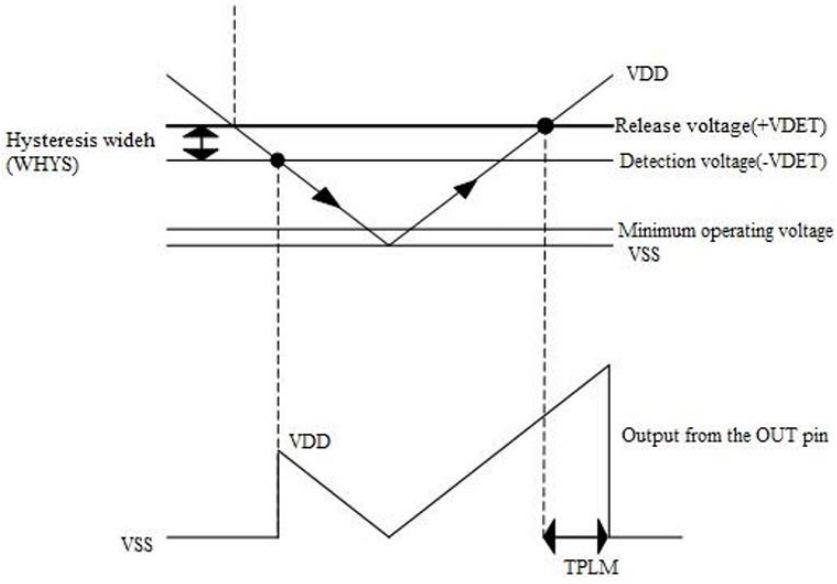
2. When V_{DD} falls below -V_{DET}, V_{OUT} will be equal to the input at V_{DD} (detect state). Note that high impedance exists at V_{OUT} with the N-channel open drain configuration. If the pin is pulled up, V_{OUT} T will be equal to the pull up voltage.

3. When V_{DD} falls to a level below that of the minimum operating voltage (V_{MIN}) output will become unstable. Because the output pin is generally pulled up with N-channel open drain configurations, output will be equal to pull up voltage.

4. When V_{DD} rises above the V_{SS} level (excepting levels lower than minimum operating voltage), V_{OUT} will be equal to V_{DD} until V_{DD} reaches the +V_{DET} level.

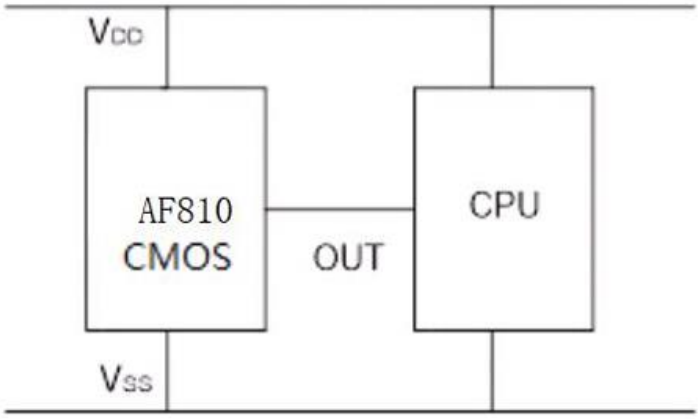
5 . Although V_{DD} will rise to a level higher than +V_{DET}, V_{OUT} maintains V_{DD} voltage level via the delay circuit.

6. Following transient delay time, V_{SS} will be output at V_{OUT}.

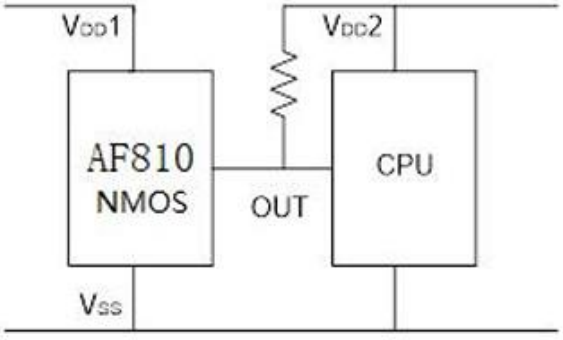


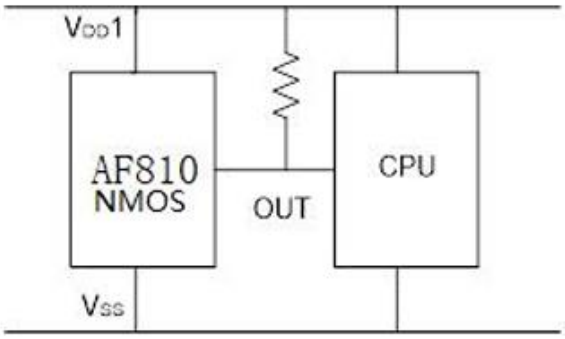
➢ Typical Application Circuits

1、CMOS output

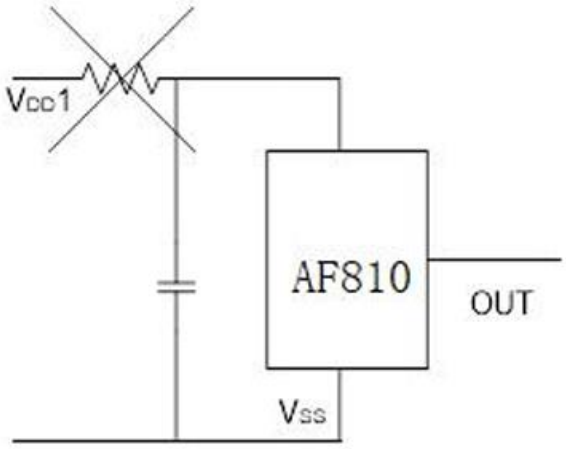


2、NMOS pen-drain



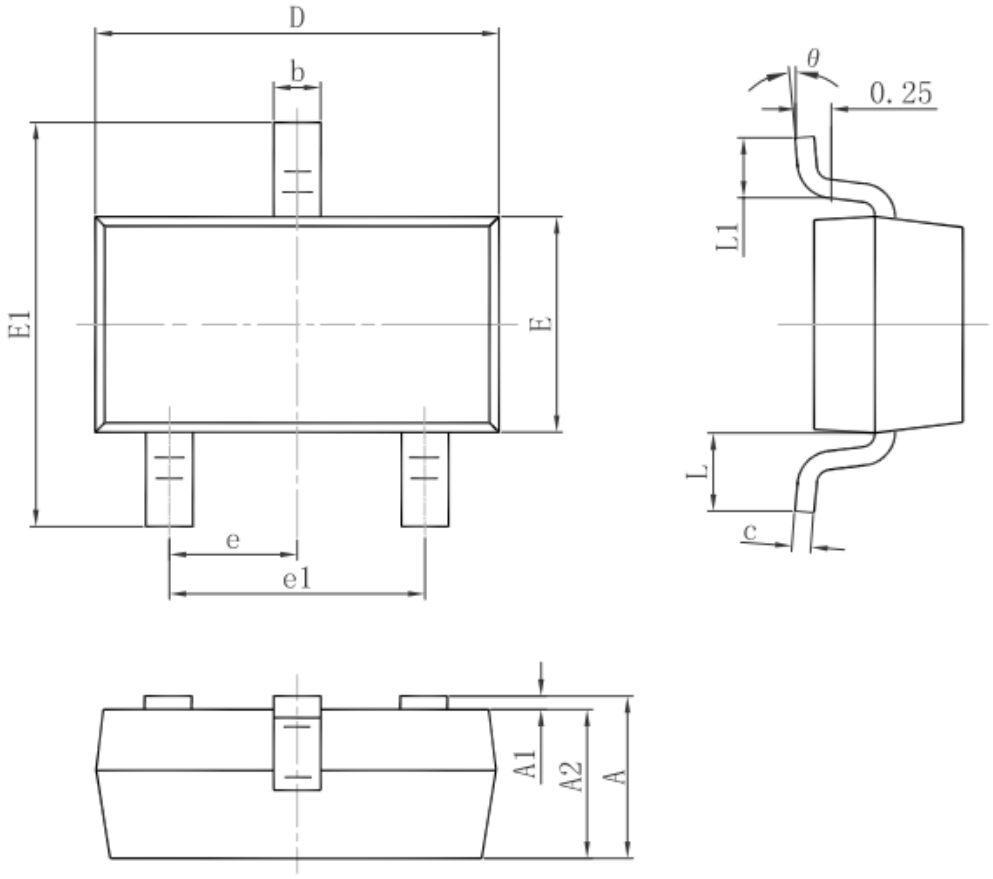


3. Forbidden Circuits



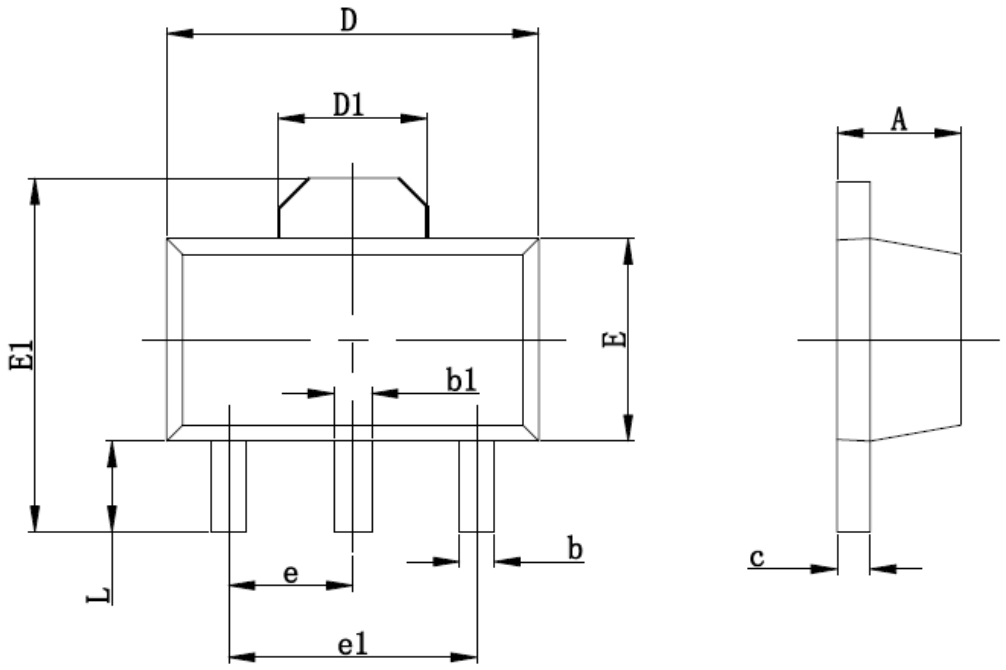
➢ Package Information

SOT-23



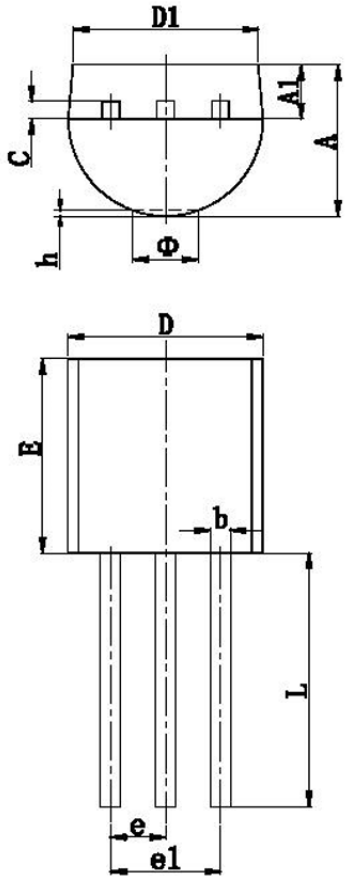
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.550 REF.		0.022 REF.	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

SOT-89



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.350	0.520	0.013	0.197
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF		0.061 REF	
E	2.350	2.550	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP		0.060TYP	
e1	3.000 TYP		0.118TYP	
L	0.900	1.100	0.035	0.047

TO-92



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	3.300	3.700	0.130	0.146
A1	1.100	1.400	0.043	0.055
b	0.380	0.550	0.015	0.022
c	0.360	0.510	0.014	0.020
D	4.400	4.700	0.173	0.185
D1	3.430		0.135	
E	4.300	4.700	0.169	0.185
e	1.270 TYP		0.050 TYP	
e1	2.440	2.640	0.096	0.104
L	14.100	14.500	0.555	0.571
Φ		1.600		0.063
h	0.000	0.380	0.000	0.015

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