WA1811-WA1812

Microprocessor Reset Circuit with Manual Reset Input

1. General Description

The WA1811 and WA1812 are integrated microprocessor supervisory devices which can be reset under power-up, power-down or even voltage reduction brownout conditions. When V_{CC} is as low as 1V, the reset output can still operate. On the power-on state, the internal timer maintains a 200ms reset assertion, which keeps the microprocessor in the reset state until the condition is stable.

The WA1811 has an active-low nRESET output, while the WA1812 has an active-high RESET output. These devices provide seven reset threshold voltage options for 1.8V, 2.5V, 3V, 3.3V and 5V voltage monitoring.

These devices also provide a manual reset (nMR) function. It can reduce damage if the device loses its control or is locked.

The WA1811 and WA1812 are available in a Green SOT-143 package. They operate over a junction temperature range of -40℃ to +125℃.

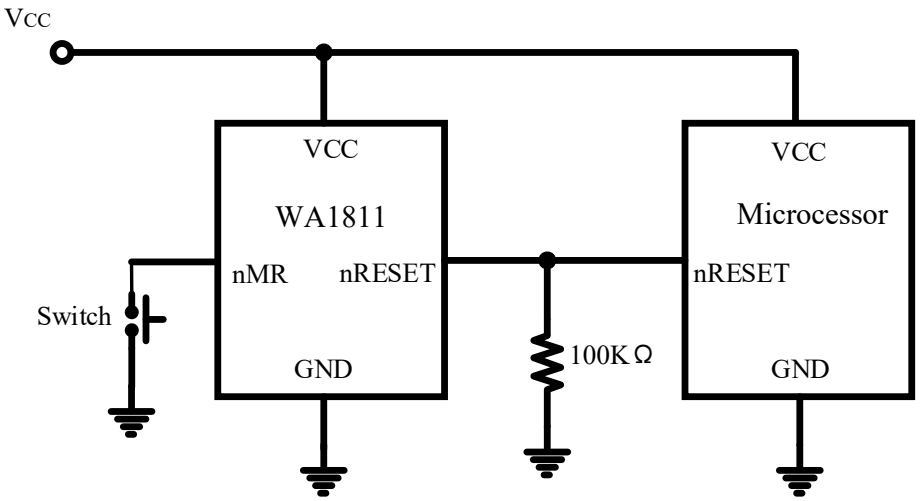
2. Features

- High Accuracy Fixed Detection Options: 1.8V, 2.5V, 3V, 3.3V and 5V
- Low Supply Current: < 1μA (TYP)
- 200ms (TYP) Power-on Reset Pulse Width
- Reset Output Options:
  Active-Low nRESET Output: WA1811
  Active-High RESET Output: WA1812
- Manual Reset Input
- Reset Valid Down to V_{CC} = 1V
- Available in a Green SOT-143 Package

3. Applications

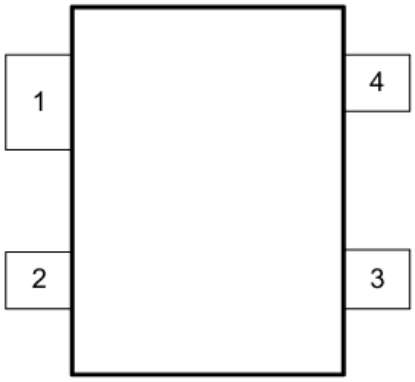
- Computers
- Automotive Equipment
- Intelligent Instruments
- Critical μP and μC Power Monitoring
- Battery Powered Applications
- Portable Equipment

4. Typical Application Circuit



5. Pin Configuration

(Top View)



SOT-143

6. Pin Description

PIN NUMBER		PIN NAME	I/O	PIN FUNCTION
SOT-143 (WA1811)	SOT-143 (WA1812)			
1	1	GND	-	Ground.
2	-	nRESET	O	Active-Low Reset Output Pin. If V_{CC} falls below the reset threshold or nMR is low, nRESET will keep low. If V_{CC} exceeds the reset threshold, the nRESET will keep low for 200ms (TYP).
-	2	RESET	O	Active-High Reset Output Pin. If the V_{CC} falls below the reset threshold or nMR is low, RESET will keep high. If the V_{CC} exceeds the reset threshold, RESET will keep high for 200ms (TYP).
3	3	nMR	I	Manual Reset Input Pin. It is an active-low reset input with an internal pull-up resistor of 60kΩ. nRESET keeps low when nMR is low. When nMR is high, nRESET becomes high after a timeout period. The nMR can be driven by a CMOS logic or by a switch shorting to GND. If not used, leave it open or connect it to VCC.
4	4	VCC	I	Operating voltage input.

7. Absolute Maximum Ratings

Operating free-air temperature range (unless otherwise noted) [1]

SYMBOL	PARAMETER	RATING	UNIT
V_{CC}	Supply Voltage	-0.3 to +6.0	V
V_{nMR}	nMR Input Voltage	-0.3 to V_{CC}+0.3	V
V_{RESET}, V_{NRESET}	Output Voltage	-0.3 to V_{CC}+0.3	V
I_{CC}, I_{nMR}	Input Current	20	mA
I_{nRESET}, I_{RESET}	Output Current	20	mA
$R_{\theta JA}$	Thermal Resistance Junction-to-Ambient	305	℃/W
T_J	Junction Temperature	+150	℃
T_{STG}	Storage Temperature Range	-65 to 150	℃
T_{SDR}	Lead Temperature (Soldering, 10 sec)	260	℃
V_{ESD}	ESD(HBM)	4000	V

NOTE1: Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

8. Recommended Operating Conditions

SYMBOL	PARAMETER	MIN	MAX	UNIT
V_{CC}	Supply Voltage	1.0	5.5	V
V_{nRESET}	nRESET Output Voltage	0	5.5	V
V_{RESET}	RESET Output Voltage	0	5.5	V
T_A	Operating Ambient Temperature	-40	+125	℃

9. Electrical Characteristics

(T_A=25℃, unless otherwise noted)

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP.	MAX	UNIT
I_{CC}	Supply Current	W/Z/R/S/T Models, V_{CC} = 3.6V, T_A = +25℃		0.6	1.0	μA
		W/Z/R/S/T Models, V_{CC} = 3.6V, T_A = -40℃ to +125℃		0.6	1.2	
		M/J Models, V_{CC} = 5.5V, T_A = +25℃		0.7	1.2	
		M/J Models, V_{CC} = 5.5V, T_A = -40℃ to +125℃		0.7	1.5	
V_{TH}	M Model	T_A=+25℃	4.35	4.43	4.52	V
		T_A=-40℃ to +125℃	4.34		4.53	
	J Model	T_A=+25℃	3.98	4.05	4.13	
		T_A=-40℃ to +125℃	3.97		4.14	
	T Model	T_A=+25℃	3.04	3.09	3.16	
		T_A=-40℃ to +125℃	3.03		3.17	
	S Model	T_A=+25℃	2.89	2.93	3.00	
		T_A=-40℃ to +125℃	2.88		3.01	
	R Model	T_A=+25℃	2.59	2.63	2.69	
		T_A=-40℃ to +125℃	2.58		2.70	
	Z Model	T_A=+25℃	2.28	2.33	2.37	
		T_A=-40℃ to +125℃	2.27		2.38	
	W Model	T_A=+25℃	1.64	1.67	1.71	
		T_A=-40℃ to +125℃	1.59		1.76	

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP.	MAX	UNIT
V_{HYS}	M Model			20		mV
	J Model			18		
	T Model			13		
	S Model			13		
	R Model			12		
	Z Model			12		
	W Model			8		
$\frac{\Delta V_{TH}}{V_{TH} \times \Delta T}$	Reset Threshold Tempco	T_A=-40℃ to +125℃		20		ppm/℃
t_{RD}	V_{CC} to Reset Delay	V_{CC}= V_{TH}-200mV		100		μs
t_{RS}	Reset Active Timeout Period	V_{CC} ≥ 1.02 x V_{TH}	110	200	300	ms
t_{PW_nMR}	Minimum Pulse Width		320			ns
t_{GR_nMR}	Glitch Immunity			140		ns
t_{d_nMR}	Reset Propagation Delay				360	ns
R_{PU_nMR}	Pull-up Resistance		35	60	89	kΩ
V_{IH_nMR}	Input Threshold Voltage High for nMR		0.7V_{CC}			V
V_{IL_nMR}	Input Threshold Voltage Low for nMR				0.3V_{CC}	
V_{OH}	nRESET Output Voltage High (WA1811 Only)	W/Z/R/S/T Models, V_{CC}>V_{TH_MAX}, I_{SOURCE}=500μA	0.8V_{CC}			V
		M/J Models, V_{CC}>V_{TH_MAX}, I_{SOURCE}=800μA	0.8V_{CC}			V

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP.	MAX	UNIT
V_{OL}	nRESET Output Voltage Low (WA1811 Only)	W/Z/R/S/T Models, $V_{CC}=V_{TH_MIN}$, I_{SINK} = 1.2mA			0.3	V
		M/J Models, $V_{CC}=V_{TH_MIN}$, I_{SINK} = 3.2mA			0.4	
		All Models, V_{CC} > 1.0V, I_{SINK} = 50μA			0.3	
V_{OH}	RESET Output Voltage High (WA1812 Only)	All Models,1.8V < V_{CC} < V_{TH_MIN}, I_{SOURCE} = 150μA	0.8V_{CC}			V
V_{OL}	RESET Output Voltage High (WA1812 Only)	W/Z/R/S/T Models, $V_{CC}=V_{TH_MAX}$, I_{SINK} = 1.2mA			0.3	
		M/J Models, $V_{CC}=V_{TH_MAX}$, I_{SINK} = 3.2mA			0.4	

10. Application Information

10.1 Manual Reset Input

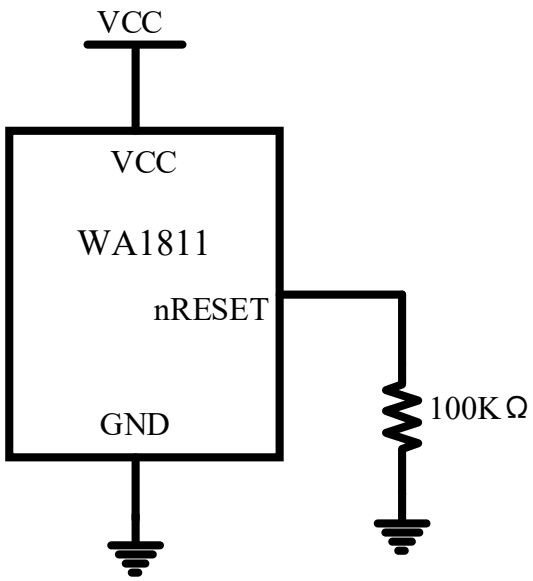
The WA1811 and WA1812 provide a manual reset (nMR) function that allows users to reset the system manually. It is an active-low reset input with an internal pull-up resistor of 60kΩ. When the nMR is low, and for t_{RS} (200ms, TYP) after nMR returns high, the reset remains active. The nMR can be driven by a CMOS logic or by a reset switch shorting to GND. If not used, leave it open or connect it to the V_{CC}. When the device is far away from the reset switch or used in a noisy environment, a 0.1μF capacitor is recommended to connect between nMR and GND.

10.2 Precise Reset Threshold

When the supply voltage drops significantly for the power supply fault, the WA1811 and WA1812 can even operate normally, which greatly reduces the possibility of system failure. In addition, the internal reference voltage accuracy of the WA1811 and WA1812 is very high, which provides high reliability of the devices.

10.3 nRESET Valid to V_{CC} = 0V (WA1811)

The nRESET of WA1811 will stop sinking current and become open circuit if V_{CC} is below 1.0V. And if a high impedance CMOS logic input is connected to the nRESET, the logic level of the CMOS input is undetermined. To solve the problem, it is recommended to use a 100kΩ resistor between nRESET and GND.

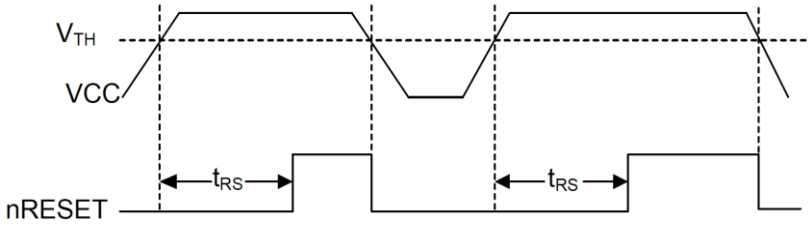


10.4 Reset Output

To ensure sufficient time for the power supply and microprocessor to stabilize after power-up, a 200ms (TYP) reset output will hold by the internal timer after VCC exceeds the reset threshold voltage. Similarly, a 200ms (TYP) reset output will also exist after the power supply recover from brownout or interruption that allows the power supply and microprocessor to have enough time to reach a steady state.
The WA1811 has an active-low nRESET output, while the WA1812 has an active-high RESET output. When VCC is as low as 1V during power-down, the nRESET of the WA1811 will continue output a low level. This not only keeps the microprocessor shutdown when the supply voltage falls, but also prevents the microprocessor occurring false actions when it powers up.

10.5 Glitch Immunity

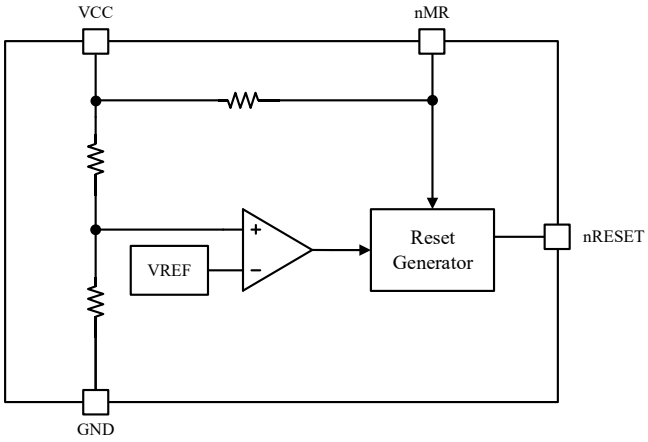
The WA1811 and WA1812 have an internal filter circuit, which makes them have glitch immunity ability to bear the fast transient glitches on the power supply.



10.6 Interfacing to Other Devices Output

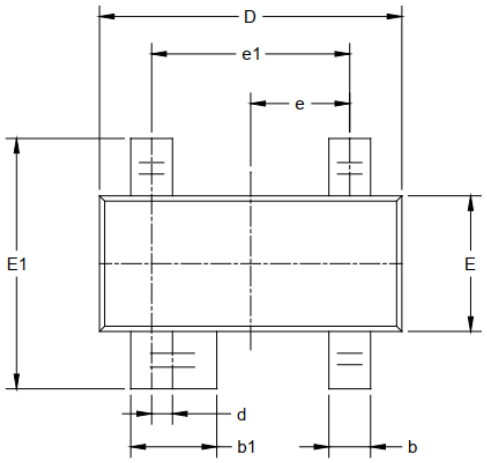
In order to allow the WA1811 and WA1812 to be integrated with a variety of devices, it is guaranteed that the reset output is proportional to the VCC when the VCC is more than 1V. This allows the device to be used with any supply voltage between the minimum and maximum of the Vcc, including 1.8V, 2.5V, 3V, 3.3V and 5V.

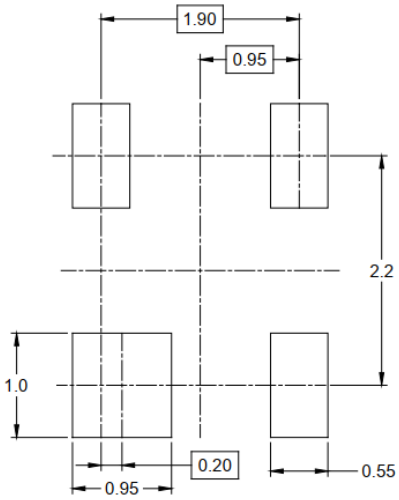
11. Block Diagram



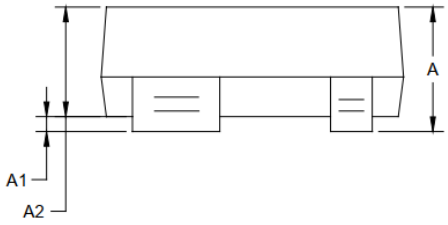
12. Package Information

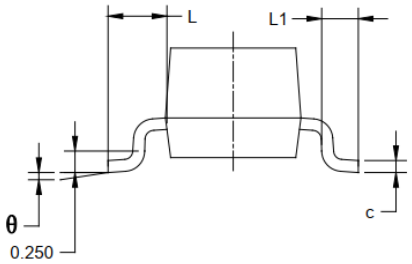
SOT-143





RECOMMENDED LAND PATTERN (Unit: mm)





SYMBOL	DIMENSIONS IN MILLIMETERS		SYMBOL	DIMENSIONS IN MILLIMETERS	
	MIN	MAX		MIN	MAX
A	0.90	1.15	**E**	1.20	1.40
A1	0.00	0.10	**E1**	2.25	2.55
A2	0.90	1.50	**e**	0.95TYP	
b	0.30	0.50	**e1**	1.80	2.00
b1	0.75	0.90	**L**	0.55REF	
c	0.08	0.15	**L1**	0.30	0.50
D	2.80	3.00	θ	0°	8°
d	0.20TYP				

13. Ordering Information

PART NUMBER	V_{TH}(V)	PACKAGE	PACKING QUANTITY
WA1811MMKR	4.43	SOT-143	3k/Reel
WA1811JMKR	4.05	SOT-143	3k/Reel
WA1811TMKR	3.09	SOT-143	3k/Reel
WA1811SMKR	2.93	SOT-143	3k/Reel
WA1811RMKR	2.63	SOT-143	3k/Reel
WA1811ZMKR	2.33	SOT-143	3k/Reel
WA1811WMKR	1.67	SOT-143	3k/Reel
WA1812MMKR	4.43	SOT-143	3k/Reel
WA1812JMKR	4.05	SOT-143	3k/Reel
WA1812TMKR	3.09	SOT-143	3k/Reel
WA1812SMKR	2.93	SOT-143	3k/Reel
WA1812RMKR	2.63	SOT-143	3k/Reel
WA1812ZMKR	2.33	SOT-143	3k/Reel
WA1812WMKR	1.67	SOT-143	3k/Reel

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2.The product parameters described in the product specification are numerical values, characteristics, and functions obtained through actual testing or theoretical calculations of the product in an independent or ideal state. Due to the complexity of product applications and variations in test conditions and equipment, there may be slight fluctuations in parameter test values. WAYON shall not guarantee that the actual performance of the product when installed in the customer's system or equipment will be entirely consistent with the product specification, especially concerning dynamic parameters. It is recommended that users consult with professionals for product selection and system design. Users should also thoroughly validate and assess whether the actual parameters and performance when installed in their respective systems or equipment meet their requirements or expectations. Additionally, users should exercise caution in verifying product compatibility issues, and WAYON assumes no responsibility for the application of the product.

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