Reset Circuits with Manual Reset Input

FEATURES

- Ultra Low Supply Current 1μA(typ.)
- Guaranteed Reset Valid to Vcc=0.9V
- Available in two Output Types: Push-Pull Active Low (AIC811), Push-Pull Active High (AIC812)
- 140ms Min. Power-On Reset Pulse Width
- Internally Fixed Threshold 2.3V, 2.6V, 2.9V, 3.1V, 4.0V, 4.4V, and 4.6V
- Tight Voltage Threshold Tolerance: 1.5%
- Low profile Package: SOT-23-5

APPLICATIONS

- Notebook Computers
- Digital Still Cameras
- PDAs
- Critical Microprocessor Monitoring

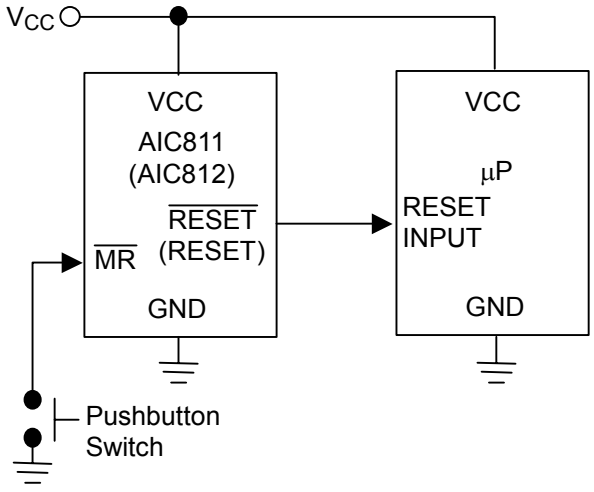
DESCRIPTION

AIC811/AIC812 are low-power microprocessor (μP) supervisory circuits used to monitor power supplies in μP and digital systems. They provide applications with benefits of circuit reliability and low cost by eliminating external components. AIC811/AIC812 also offer a manual reset input.

These devices perform as valid singles in applications with Vcc ranging from 6.0V down to 0.9V. The reset signal lasts for a minimum period of 140ms whenever VCC supply voltage falls below preset threshold. Both AIC811 and AIC812 were designed with a reset comparator to help identify invalid signals, which last less than 140ms. The only difference between them is that they have an active-low $\overline{\text{RESET}}$ output and active-high RESET output, respectively.

Low supply current (1μA) makes AIC811/AIC812 ideal for portable equipment. The devices are available in SOT-23-5 package.

TYPICAL APPLICATION CIRCUIT



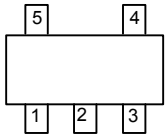
ORDERING INFORMATION

AIC811-XXXXXX
AIC812-XXXXXX

- PACKING TYPE
  TR: TAPE & REEL
  BG: BAG
- PACKAGE TYPE
  V: SOT-23-5
- C: COMMERCIAL
  P: LEAD FREE COMMERCIAL
- RESET THRESHOLD VOLTAGE
  23: 2.3V
  26: 2.6V
  29: 2.9V
  31: 3.1V
  40: 4.0V
  44: 4.4V
  46: 4.6V

PIN CONFIGURATION

SOT-23-5
TOP VIEW
1: GND
2: NC
3: $\overline{\text{RESET}}$ (RESET)
4: MR
5: VCC



(Additional voltage versions with a unit of 0.1V within the voltage range from 1.5V to 5.5V for this product line may be available on demand with prior consultation with AIC.)

Example: AIC811-31CVTR
→ 3.1V version, in SOT-23-5 Package & Tape & Reel Packing Type
AIC811-31PVTR
→ 3.1V version, in Lead Free SOT-23-5 Package & Tape & Reel Packing Type

- **SOT-23-5 Marking**

Part No.	Marking
AIC811-23CV	BQ23
AIC811-26CV	BQ26
AIC811-29CV	BQ29
AIC811-31CV	BQ31
AIC811-40CV	BQ40
AIC811-44CV	BQ44
AIC811-46CV	BQ46

Part No.	Marking
AIC812-23CV	BR23
AIC812-26CV	BR26
AIC812-29CV	BR29
AIC812-31CV	BR31
AIC812-40CV	BR40
AIC812-44CV	BR44
AIC812-46CV	BR46

Part No.	Marking
AIC811-23PV	BQ23P
AIC811-26PV	BQ26P
AIC811-29PV	BQ29P
AIC811-31PV	BQ31P
AIC811-40PV	BQ40P
AIC811-44PV	BQ44P
AIC811-46PV	BQ46P

Part No.	Marking
AIC812-23PV	BR23P
AIC812-26PV	BR26P
AIC812-29PV	BR29P
AIC812-31PV	BR31P
AIC812-40PV	BR40P
AIC812-44PV	BR44P
AIC812-46PV	BR46P

■ ABSOLUTE MAXIMUM RATINGS

V_{CC} ..... -0.3V ~6.5V

RESET, $\overline{RESET}$ ..... -0.3V ~ (VCC+0.3V)

Input Current (V_{CC}, $\overline{MR}$) 20mA

Output Current (RESET or $\overline{RESET}$) 20mA

Continuous Power Dissipation (T_A = +70°C) 320mW

Operating Junction Temperature Range ..... -40°C ~ 85°C

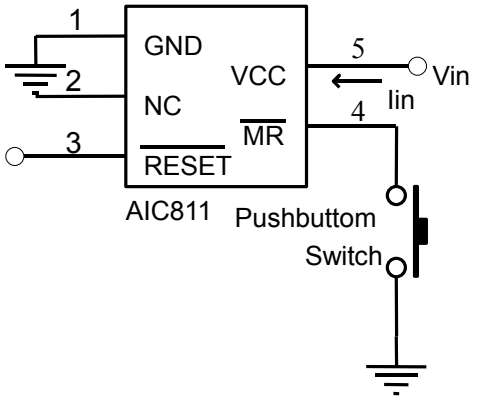
Junction Temperature ..... 125°C

Storage Temperature Range ..... - 65°C ~ 150°C

Lead Temperature (Soldering) 10 sec ..... 260°C

Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.

■ TEST CIRCUIT



ELECTRICAL CHARACTERISTICS

(Typical values are at T_A=25°C, unless otherwise specified) (Note 1)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Operating Voltage Range	V_{CC}			0.9		6	V
Supply Current	I_{CC}	V_{CC} = V_{TH} +0.1V			1	3	μA
Reset Threshold	V_{TH}	AIC811-23	T_A=+25°C	2.265	2.3	2.335	V
			T_A= -40°C to +85°C	2.254		2.346	
		AIC811-26	T_A=+25°C	2.561	2.6	2.639	
			T_A= -40°C to +85°C	2.548		2.652	
		AIC811-29	T_A=+25°C	2.857	2.9	2.944	
			T_A= -40°C to +85°C	2.842		2.958	
		AIC811-31	T_A=+25°C	3.054	3.1	3.147	
			T_A= -40°C to +85°C	3.038		3.162	
		AIC811-40	T_A=+25°C	3.940	4.0	4.060	
			T_A= -40°C to +85°C	3.920		4.080	
		AIC811-44	T_A=+25°C	4.334	4.4	4.466	
			T_A= -40°C to +85°C	4.312		4.488	
		AIC811-46	T_A=+25°C	4.531	4.6	4.669	
			T_A=-40°C to +85°C	4.508		4.692	
V_{CC} to Reset Delay	T_{RD}	V_{CC}=V_{TH} to (V_{TH} –0.1V), V_{TH}=3.1V			20		μS
Reset Active Timeout Period	T_{RP}	V_{CC} = $V_{TH(MAX)}$	T_A=+25°C	140	230	560	mS
			T_A= -40°C to +85°C	100		1030	
$\overline{MR}$ to Reset Propagation Delay	T_{MD}	Vcc=6V			0.5		μS
$\overline{MR}$ Input Threshold	V_{IH}			0.7V_{CC}			V
	V_{IL}					0.25V_{CC}	
$\overline{MR}$ Pull-Up Resistance				10	20	30	KΩ
$\overline{RESET}$ Output Voltage	V_{OH}	V_{CC}=V_{TH}+0.1V, I_{SOURCE}=1mA		0.8V_{CC}			V
	V_{OL}	V_{CC}=V_{TH} - 0.1V, I_{SINK}=1mA				0.2Vcc	
RESET Output Voltage	V_{OH}	V_{CC}=V_{TH}+0.1V, I_{SOURCE}=1mA		0.8V_{CC}			V
	V_{OL}	V_{CC}=V_{TH} - 0.1V, I_{SINK}=1mA				0.2Vcc	

Note1: Specifications are production tested at T_A=25°C. Specifications over the -40°C to 85°C operating temperature range are assured by design, characterization and correlation with Statistical Quality Controls (SQC).

Note2: $\overline{RESET}$ output is for AIC811; RESET output is for AIC812.

TYPICAL PERFORMANCE CHARACTERISTICS

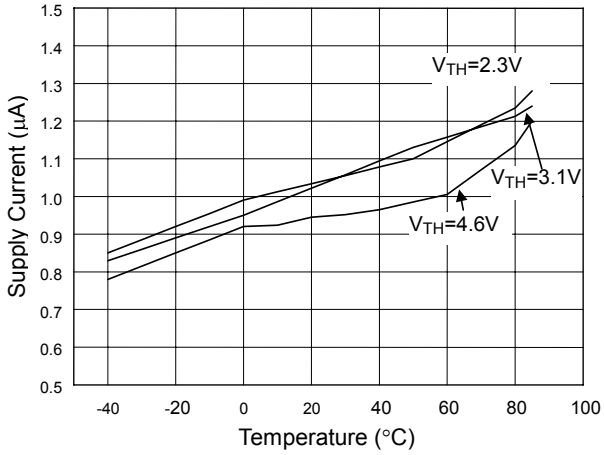


Fig 1 Supply Current vs. Temperature

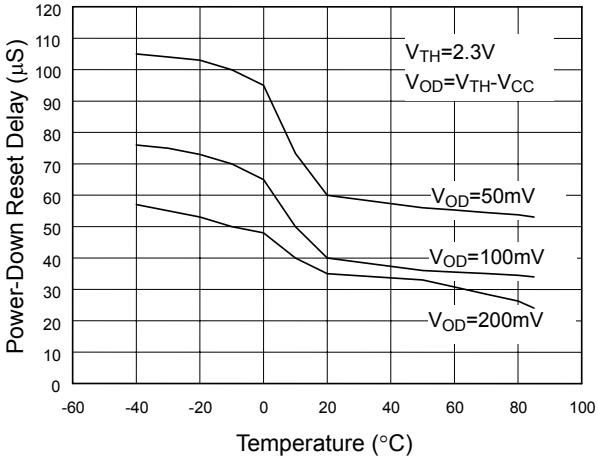


Fig 2 Power-Down Reset Delay vs. Temperature

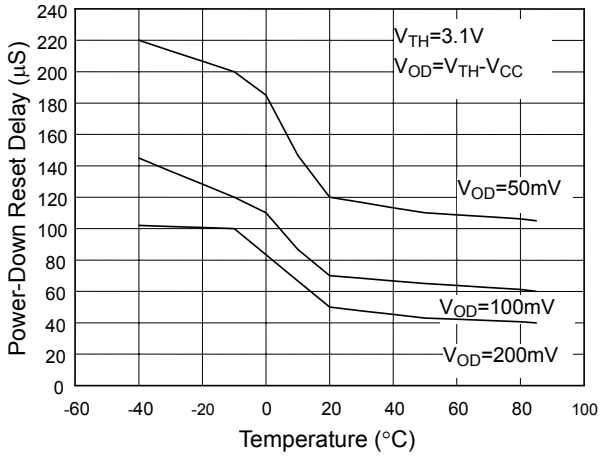


Fig 3 Power-Down Reset Delay vs. Temperature

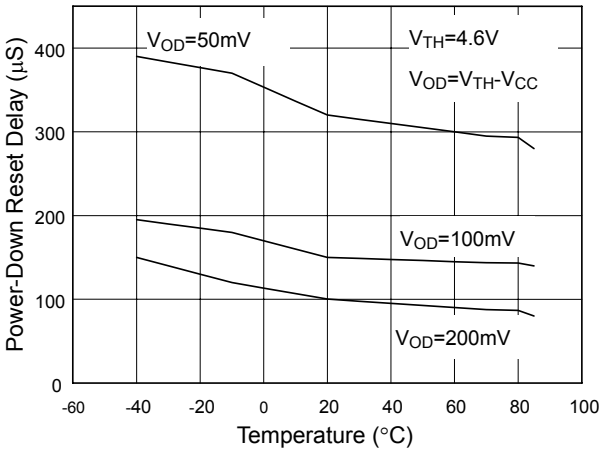


Fig 4 Power-Down Reset Delay vs. Temperature

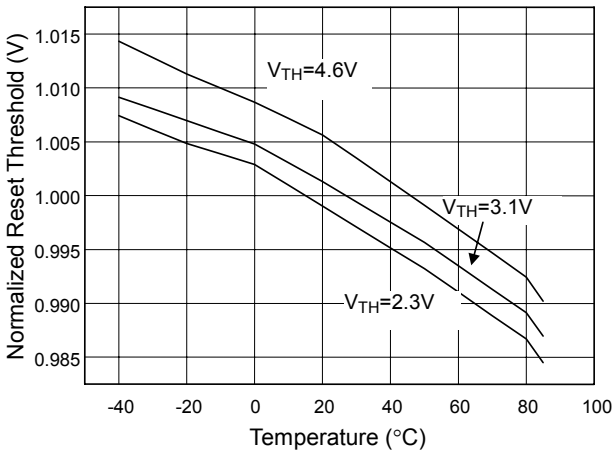


Fig 5 Normalized Reset Threshold vs. Temperature

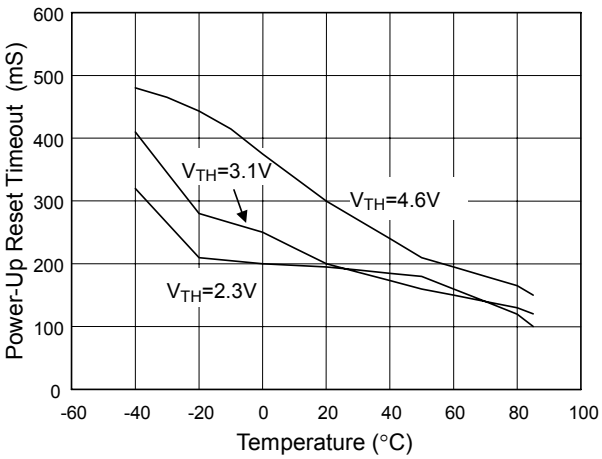
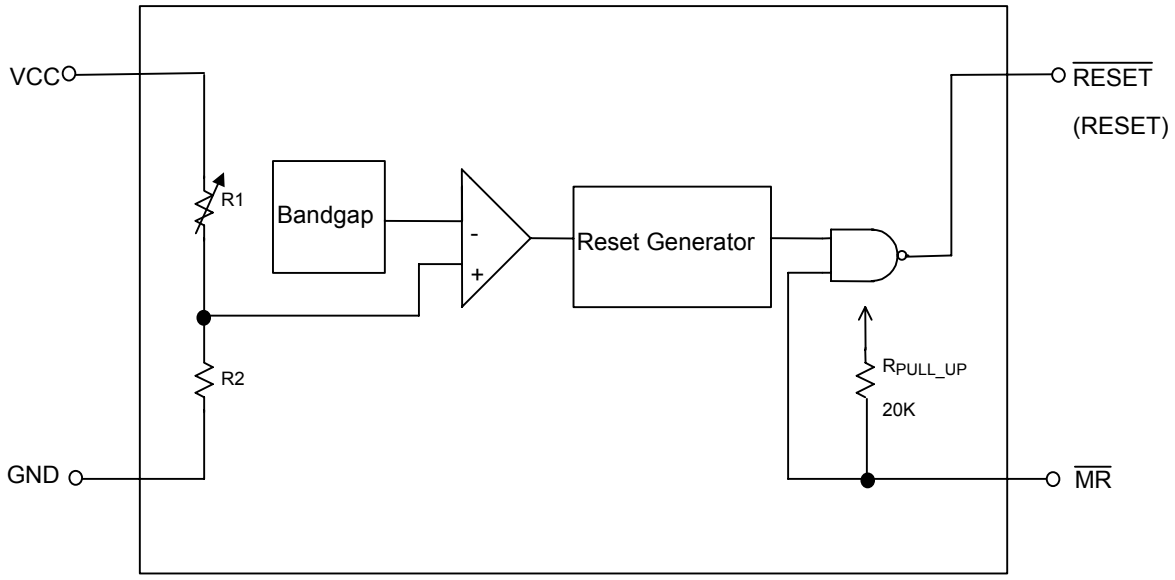


Fig 6 Power-Up Reset Timeout vs. Temperature

BLOCK DIAGRAM



PIN DESCRIPTIONS

GND Pin	:	Ground.
$\overline{\text{RESET}}$ Pin (AIC811)	:	Active low output pin. $\overline{\text{RESET}}$ Output remains low while Vcc below reset threshold.
RESET Pin (AIC812)	:	Active high output pin. RESET output remains high while Vcc below reset threshold.
$\overline{\text{MR}}$ Pin	:	Logic low manual reset input. This active-low input has an internal 20kΩ pull-up resistor. It can be driven by a TTL or CMOS, or shorted to ground with a switch. Leave open when unused.
Vcc Pin	:	Supply voltage.

DETAILED DESCRIPTIONS OF TECHNICAL TERMS

RESET OUTPUT

μP will be activated at a valid reset state. These μP supervisory circuits assert reset to prevent code execution errors during power-up, power-down, or brownout conditions.

$\overline{\text{RESET}}$ is guaranteed to be a logic low for V_{TH}>VCC>0.9V. Once VCC exceeds the reset threshold, an internal timer keeps $\overline{\text{RESET}}$ low for the reset timeout period; after this interval, $\overline{\text{RESET}}$ goes high.

If a brownout condition occurs (VCC drops below the reset threshold), $\overline{\text{RESET}}$ goes low. Any time VCC goes below the reset threshold, the internal timer resets to zero, and $\overline{\text{RESET}}$ goes low. The internal timer is activated after VCC returns above the reset threshold, and $\overline{\text{RESET}}$ remains low for the reset timeout period.

The manual reset input ($\overline{\text{MR}}$) can also initiate a reset. AIC812 has an active-high RESET output that is the inverse of AIC811's $\overline{\text{RESET}}$ output.

MANUAL RESET INPUT

Many μP-based products require manual reset capability, allowing operators, test technicians, or external logic circuitry to initiate a reset. Logic low on $\overline{MR}$ asserts reset. Reset will remain asserted for the Reset Active Timeout Period (t_{RP}) after $\overline{MR}$ returns high. This input has an internal 20KΩ pull-up resistor, so it can be floating if it is not used. $\overline{MR}$ can be driven with TTL or CMOS-logic levels, or with open-drain/collector outputs. Another alternative is to connect a normal switch from $\overline{MR}$ to GND to create a manual reset function. Connecting a 0.1μF capacitor from $\overline{MR}$ to ground can provide noise immunity to prevent noise caused by long cables of $\overline{MR}$ or noisy environment.

BENEFITS OF HIGHLY ACCURATE RESET THRESHOLD

AIC811/812 with specified voltage as 5V±10% or 3V±10% are ideal for systems using a 5V±5% or 3V ±5% power supply. The reset is guaranteed to assert after the power supply falls out of regulation, but before power drops below the minimum specified operating voltage range of the system ICs. The pre-trimmed thresholds are reducing the range over which an undesirable reset may occur.

APPLICATION INFORMATION

NEGATIVE-GOING VCC TRANSIENTS

In addition to issuing a reset to the μP during power-up, power-down, and brownout conditions, AIC811 series are relatively resistant to short-duration negative-going VCC transient.

ENSURING A VALID RESET OUTPUT DOWN TO VCC=0

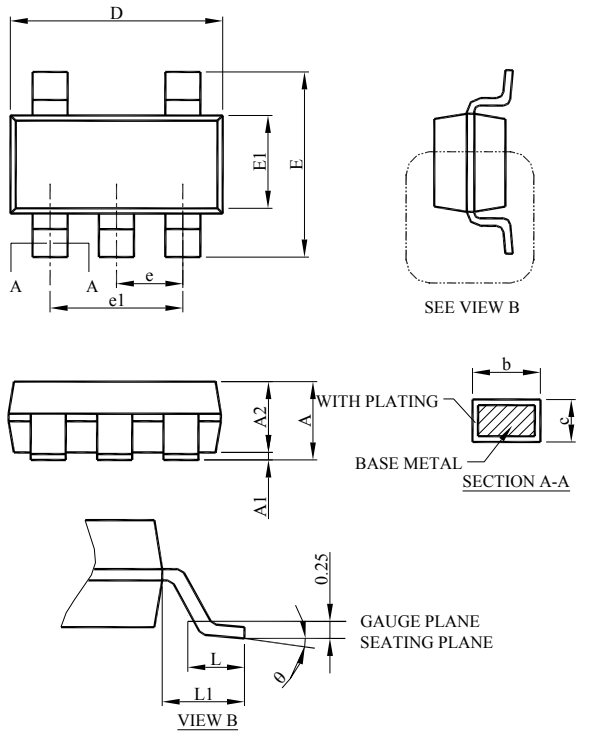
When VCC falls below 0.9V, AIC811 $\overline{RESET}$ output no longer sinks current; it becomes an open circuit. In this case, high-impedance CMOS logic inputs connecting to $\overline{RESET}$ can drift to undetermined voltages. Therefore, AIC811/2 with CMOS is perfect for most applications of VCC below 0.9V. However in applications where $\overline{RESET}$ must be valid down to 0V, adding a pull-down resistor to $\overline{RESET}$ causes any leakage currents to flow to ground, holding $\overline{RESET}$ low.

INTERFACING TO μP WITH BIDIRECTIONAL RESET PINS

μPs with bidirectional reset pins can contend with AIC811/812 reset outputs. If AIC811 $\overline{RESET}$ output is asserted high and the μP wants to pull it low, indeterminate logic levels may occur. To correct such cases, connect a resistor between AIC811 $\overline{RESET}$ (or AIC812 RESET) output and the μP reset I/O. Buffer the reset output to other system components.

PHYSICAL DIMENSIONS (unit: mm)

- **SOT-23-5**



SYMBOL	SOT-25	
	MILLIMETERS	
	MIN.	MAX.
A	0.95	1.45
A1	0.05	0.15
A2	0.90	1.30
b	0.30	0.50
c	0.08	0.22
D	2.80	3.00
E	2.60	3.00
E1	1.50	1.70
e	0.95 BSC	
e1	1.90 BSC	
L	0.30	0.60
L1	0.60 REF	
θ	0°	8°

Note:

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