ACE803ND
3-Pin Microprocessor Reset Circuits

Description

The ACE803ND is a microprocessor (μP) supervisory circuit used to monitor the power supplies in μP and digital systems. It provides excellent circuit reliability and low cost by eliminating external components and adjustments when used with 5V, 3.3V, 3.0V or 2.5V powered circuits.

The circuit performs a single function: it asserts a reset signal whenever the V_{CC} supply voltage declines below a preset threshold, keeping it asserted for at least 140ms after V_{CC} has risen above the reset threshold. Reset thresholds suitable for operation with a variety of supply voltages are available.

The ACE803ND has an open-drain output stage. The ACE803ND's open-drain $\overline{\text{RESET}}$ output requires a pull-up resistor that can be connected to a voltage higher than V_{CC}. The ACE803ND has an active-low $\overline{\text{RESET}}$ output. The reset comparator is designed to ignore fast transients on V_{CC}, and the outputs are guaranteed to be in the correct logic state for V_{CC} down to 1V.

Low supply current makes the ACE803ND ideal for use in portable equipment. The ACE803ND is available in a SOT-323 and SOT23-3 package.

Features

- No External Components
- Power Supply Transient Immunity
- Guaranteed Reset Valid to V_{CC}=+1V
- Precision V_{CC} Monitoring of 2.5V, 3V, 3.3V and 5V Supplies
- Fully Specified Over Temperature
- 2μA Supply Current
- 140ms Minimum Power-On Reset Pulse Width
- Available in One Output Configuration: Open-Drain Active-Low $\overline{\text{RESET}}$ Output
- SOT-323 and SOT23-3 Packages
- Wide Operation Temperature: -40°C to +85°C

Application

- Computers
- Controllers
- Portable/Battery-Powered Equipments
- Intelligent Instruments
- Critical μP and μC Power Monitoring
- Automotive

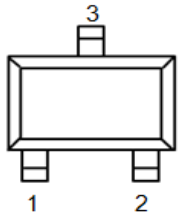
Absolute Maximum Ratings

Symbol	Parameter		Value	Unit
V_{CC}	Supply Voltage		-0.3 to 6.0	V
	$\overline{RESET}$		-0.3 to 6.0	
I_{CC}	Input Current, VCC		20	mA
I_O	Output Current, $\overline{RESET}$		20	mA
	Rate of Rise, V_{CC}		100	V/μs
P_D	Continuous Power Dissipation	SOT-323 (Derate 2.17mW/°C above 70°C)	174	mW
		SOT23-3 (Derate 4mW/°C above 70°C)	320	
T_A	Operating Temperature Range	SOT323	-40 to 125	°C
		SOT23-3	-40 to 105	
T_{STG}	Storage Temperature Range		-65 to 150	°C
	Lead Temperature (Soldering, 10s)		300	°C

Note: Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Packaging Type

SOT-323/SOT-23-3



Pin Number	Pin Name	Function
1	GND	Ground
2	$\overline{RESET}$	$\overline{RESET}$ Output remains low while V_{CC} is below the reset threshold, and for at least 140ms after V_{CC} rises above the reset threshold.
3	Vcc	+5V, +3.3V, +3V or +2.5V Supply Voltage

Ordering information

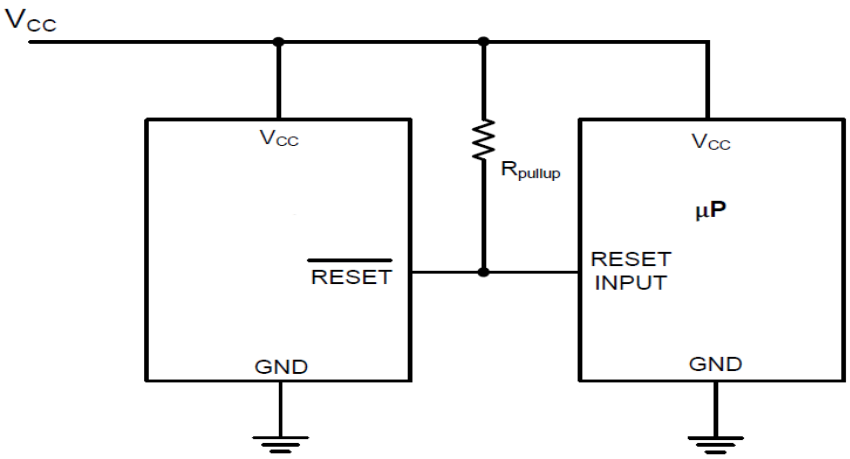
ACE803ND X XX + H

- H: Halogen - free
- +: Pb - free
- XX: BM：SOT-23-3 / CM：SOT-323
- X: Voltage：L：4.63V / M：4.38V / J：4.00V / T：3.08V / S：2.93V / R：2.63V / Z：2.32V

Device Function Reference Table:

Part No.	Reset threshold	Timeout Period (ms)	Output Type
ACE803NDLBM	4.63V	240	Open-Drain, Active Low
ACE803NDLCM			
ACE803NDMBM	4.38V		
ACE803NDMCM			
ACE803NDJBM	4.00V		
ACE803NDJCM			
ACE803NDTBM	3.08V		
ACE803NDTCM			
ACE803NDSBM	2.93V		
ACE803NDSCM			
ACE803NDRBM	2.63V		
ACE803NDRCM			
ACE803NDZBM	2.32V		
ACE803NDZCM			

Typical Operating Circuit



Electrical Characteristics

(V_{CC}=5V for L/M/J versions, V_{CC}=3.3V for T/S versions, V_{CC}=3V for R version, and V_{CC}=2.5V for Z version, T_A=-40°C to 85°C, unless otherwise noted. Typical values are at T_A=+25°C.) (Note 1)

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CC}	Input Voltage	T_A=0°C to 70°C		1.0		5.5	V
I_{CC}	Supply Current				2.0		uA
V_{TH}	Reset Threshold	L Version	TA=25°C	4.56	4.63	4.70	V
			TA=-40°C to 85°C	4.50		4.75	
		M Version	TA=25°C	4.31	4.38	4.45	
			TA=-40°C to 85°C	4.25		4.50	
		J Version	TA=25°C	3.93	4.00	4.06	
			TA=-40°C to 85°C	3.89		4.10	
		T Version	TA=25°C	3.04	3.08	3.11	
			TA=-40°C to 85°C	3.00		3.15	
		S Version	TA=25°C	2.89	2.93	2.96	
			TA=-40°C to 85°C	2.85		3.00	
		R Version	TA=25°C	2.59	2.63	2.66	
			TA=-40°C to 85°C	2.55		2.70	
		Z Version	TA=25°C	2.28	2.32	2.35	
			TA=-40°C to 85°C	2.25		2.38	
	Reset Threshold Tempco				150		ppm/℃
	V_{CC} to $\overline{RESET}$ Delay	V_{CC}=V_{TH} to (V_{TH}–100mV)			10		μs
t_{RP}	Reset Active Timeout Period			140	240	560	ms
V_{OL}	$\overline{RESET}$ Output Voltage Low	V_{CC}=V_{TH} min, I_{SINK}=1.2mA, ACE803NDT/S/R/Z				0.3	V
		V_{CC}=V_{TH} min, I_{SINK}=3.2mA, ACE803NDL/M/J				0.4	
		V_{CC}>1.0V, I_{SINK}=50μA				03	
	$\overline{RESET}$ Open-Drain Output Leakage Current (Note 2)	V_{CC}>VTH, RESET Deasserted				1	μA

Note :1. Production testing done at T_A=25°C; limits over temperature guaranteed by design only.

2.Guaranteed by design, not production tested.

Detailed Description

A microprocessor's (µP's) reset input starts the µP in a known state. The ACE803ND asserts reset to prevent code-execution errors during power-up, power-down, or brownout conditions. It asserts a reset signal whenever the V_{CC} supply voltage declines below a preset threshold, keeping it asserted for at least 140ms after V_{CC} has risen above the reset threshold. The ACE803ND uses an open-drain output. Connect a pull-up resistor on the ACE803ND's RESET output to any supply between 0 and 6V.

Applications Information

Negative-Going V_{CC} Transients

In addition to issuing a reset to the µP during power-up, power-down, and brownout conditions, the ACE803ND is relatively immune to short-duration negative-going V_{CC} transients (glitches).

Figure 1 shows typical transient duration vs. reset comparator overdrive, for which the ACE803ND does not generate a reset pulse. The graph was generated using a negative-going pulse applied to VCC, starting 0.5V above the actual reset threshold and ending below it by the magnitude indicated (reset comparator overdrive). The graph indicates the maximum pulse width a negative-going V_{CC} transient can have without causing a reset pulse. As the magnitude of the transient increases (goes farther below the reset threshold), the maximum allowable pulse width decreases. Typically, for the ACE803NDL_, ACE803NDM_ and ACE803NDJ_, a VCC transient that goes 100mV below the reset threshold and lasts 20µ s or less will not cause a reset pulse. A 0.1µF bypass capacitor mounted as close as possible to the V_{CC} pin provides additional transient immunity.

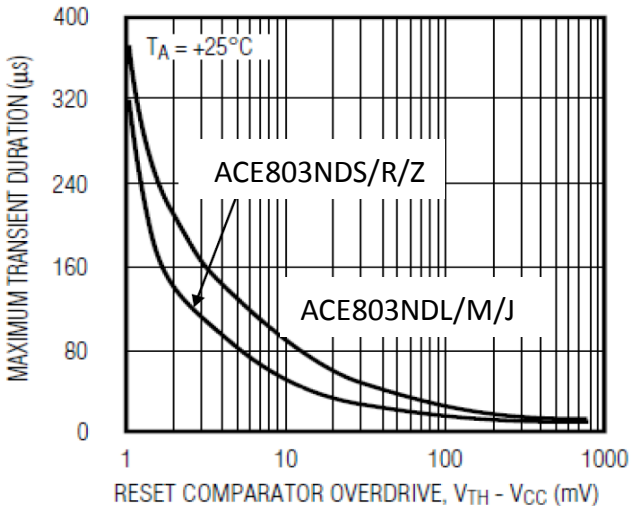


Figure 1. Maximum Transient Duration without Causing a Reset Pulse vs. Reset Comparator Overdrive

Interfacing to µPs with Bidirectional Reset Pins

Since the $\overline{\text{RESET}}$ output on the ACE803ND is open drain, this device interfaces easily with µPs that have bidirectional reset pins, such as the Motorola 68HC11. Connecting the µP supervisor's $\overline{\text{RESET}}$ output directly to the microcontroller's (µC's) RESET pin with a single pull-up resistor allows either device to assert reset (Figure 2)

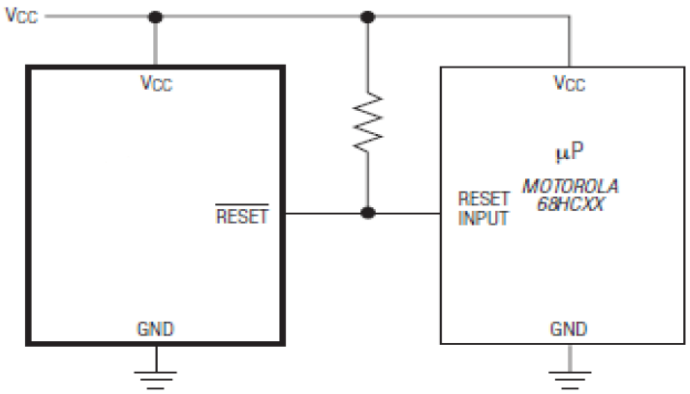


Figure 2. Interfacing to µPs with Bidirectional Reset I/O

ACE803ND Open-Drain $\overline{\text{RESET}}$ Output Allows Use with Multiple Supplies

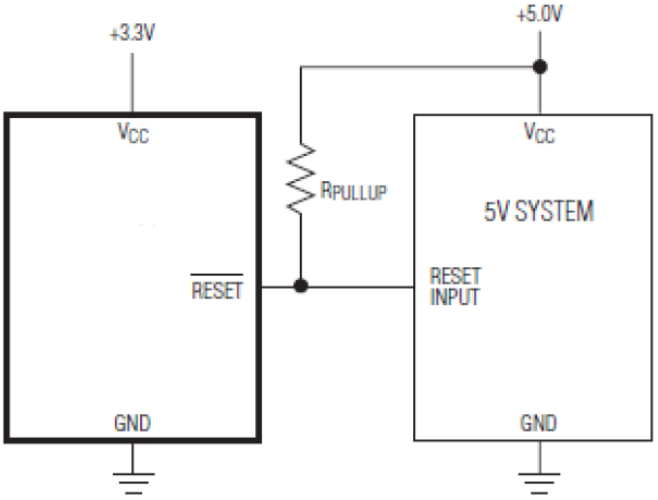


Figure 3. ACE803ND Open-Drain RESET Output Allows Use with Multiple

Benefits of Highly Accurate Reset Threshold

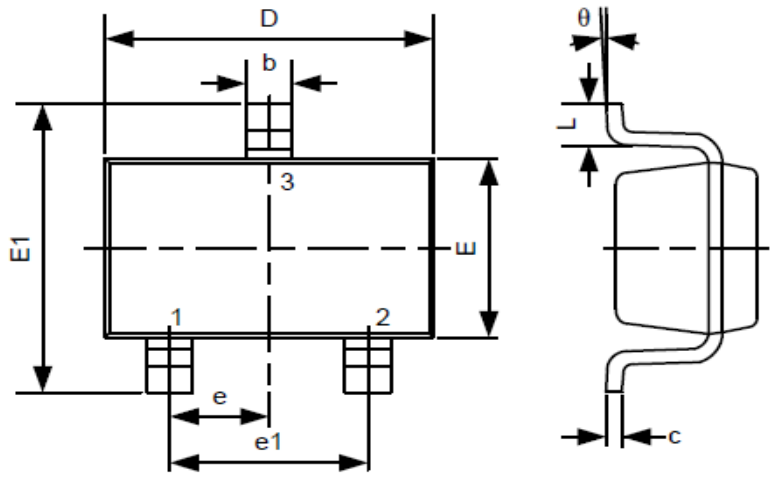
Most µP supervisor circuits have reset threshold voltages between 5% and 10% below the value of nominal supply voltages. This ensures a reset will not occur within 5% of the nominal supply, but will occur when the supply is 10% below nominal.

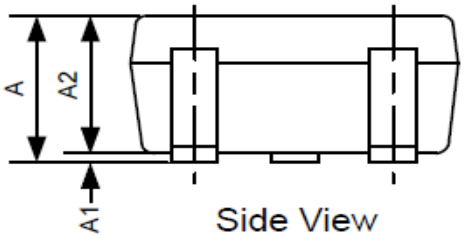
When using ICs rated at only the nominal supply ±5%, this leaves a zone of uncertainty where the supply is between 5% and 10% low, and where the reset may or may not be asserted.

The ACE803NDL/M/Z use highly accurate circuitry to ensure that reset is asserted close to the 5% limit, and long before the supply has declined to 10% below nominal.

Packing Information

SOT-23-3





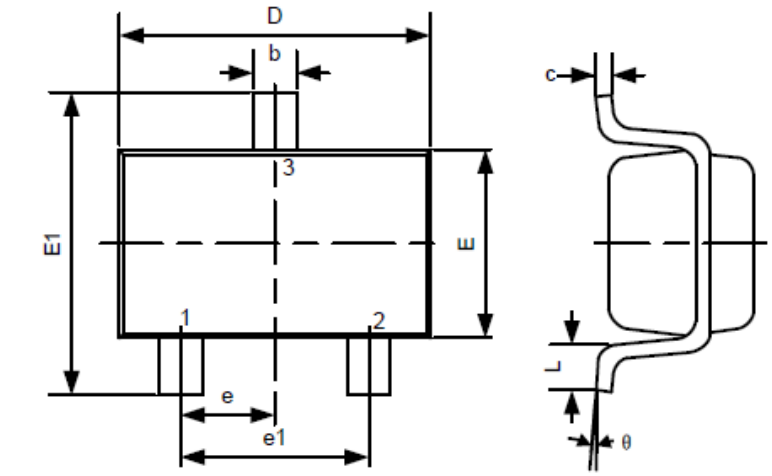
NOTES:

1. Compound dimension: 2.92×1.60
2. Unit: mm
3. General tolerance ±0.05mm unless otherwise specified
4. The layout is just for reference

DIMENSIONS						
Symbol	MILLIMETERS			INCHES		
	Min	Typ	Max	Min	Typ	Max
A	1.013	1.15	1.40	0.040	0.045	0.055
A1	0.00	0.05	0.10	0.000	0.002	0.004
A2	1.00	1.10	1.30	0.039	0.043	0.051
b	0.30		0.50	0.012		0.020
c	0.10	0.15	0.20	0.004	0.006	0.008
D	2.82		3.10	0.111		0.122
E	1.50	1.60	1.70	0.059	0.063	0.067
E1	2.60	2.80	3.00	0.102	0.110	0.118
e	0.95REF			0.037REF		
e1	1.90REF			0.075REF		
L	0.30		0.60	0.012		0.024
θ	0°		8°	0°		8°

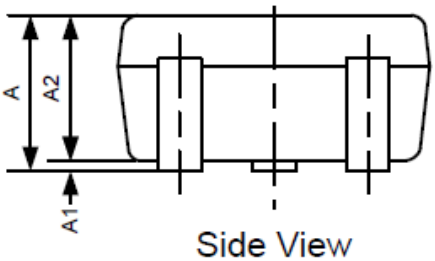
Packing Information

SOT-323



Top View

End View



Side View

NOTES:

1. Compound dimension: 2.15×1.30
2. Unit: mm
3. General tolerance ±0.05mm unless otherwise specified
4. The layout is just for reference

DIMENSIONS						
Symbol	MILLIMETERS			INCHES		
	Min	Typ	Max	Min	Typ	Max
A	0.90		1.10	0.035		0.043
A1	0.00	0.05	0.10	0.000	0.002	0.004
A2	0.90		1.00	0.035		0.039
b	0.20	0.30	0.40	0.008	0.012	0.016
c	0.08		0.18	0.003		0.007
D	1.80	2.15	2.20	0.071	0.085	0.087
E	1.15	1.30	1.35	0.045	0.051	0.053
E1	2.00		2.45	0.079		0.096
e	0.65BSC			0.026BSC		
e1	1.20	1.30	1.40	0.047	0.051	0.055
L	0.25		0.46	0.010		0.018
θ	0°		8°	0°		8°

Notes

ACE does not assume any responsibility for use as critical components in life support devices or systems without the express written approval of the president and general counsel of ACE Electronics Co., LTD. As sued herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and shoes failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.