

Low-Power, Microprocessor Supervisory Circuits

Features

- Operating Range: 1.0V to 5.5V
- Fixed Reset Time Delay: 200ms, 55ms(Only for AWS70809ASBSTR)
- Low Supply Current: 1.6 μ A (Typical)
- Precision Supply Voltage Monitor : 1.8V, 2.5V, 3V, 3.3V, 5V options
- High Reset Threshold accuracy: $\pm 2\%$ (Typical)
- Guaranteed RESETN Valid at $V_{CC} = 1V$
- Reset Output Types:
AWS70803: Open-Drain, active Low
AWS70809: Push-Pull, active Low
- Package: SOT23-3L and SSOT23-3L
- Temperature Range: -40°C to +125°C

Applications

Intelligent Instruments

Security equipment

Critical μ P Power Monitoring

Device Information

Part Number	Package	Body Size(Nom)
AWS70803	SOT23-3L	2.926mm x 1.626mm
AWS70809	SSOT23-3L	2.9mm x 1.3mm

General Description

The AWS70803 and AWS70809 supervisory circuit monitor the power supply voltage in microprocessor and digital systems. It provides a reset output during power-up, power-down and brownout conditions. On power-up, an internal timer holds reset asserted for 200ms. This holds the microprocessor in a reset state until conditions have stabilized. The RESETN output remain operational with V_{CC} as low as 1V. The AWS70803 and AWS70809 provide an active low reset signal (RESETN). The AWS70803 has open-drain output. The AWS70809 has push-pull output.

Multiple reset threshold voltage options are available, suitable for monitoring 1.8V, 2.5V, 3.3V, and 5V supply voltage.

The reset comparator features built-in glitch immunity, making it immune to fast transients on V_{CC} .

The low supply current of typically 1.6 μ A makes AWS70803 and AWS70809 ideal for using in portable, battery operated equipment. It is specified over the extended -40°C to +125°C temperature range.

Device Comparison

Figure 1 shows the device naming rules to compare the difference device variants. See Ordering Information for more details.

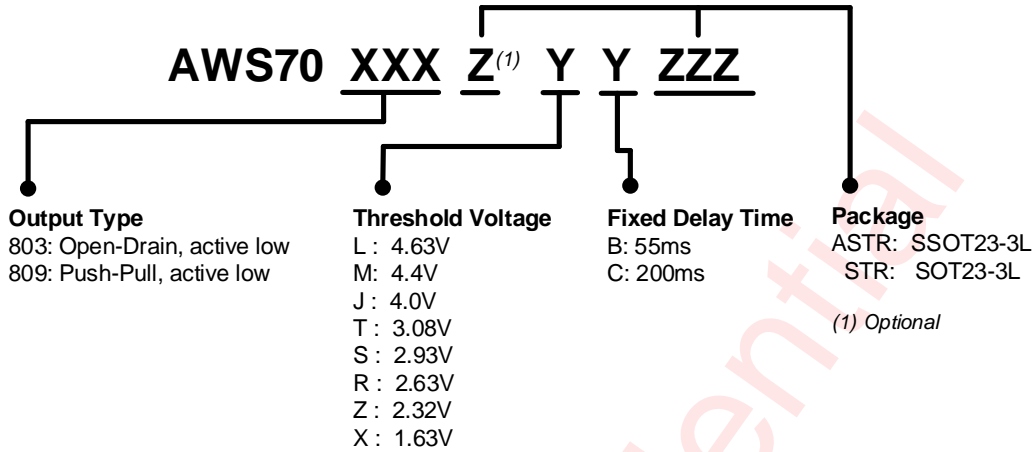


Figure 1 Device Naming Rules

Typical Application Circuit

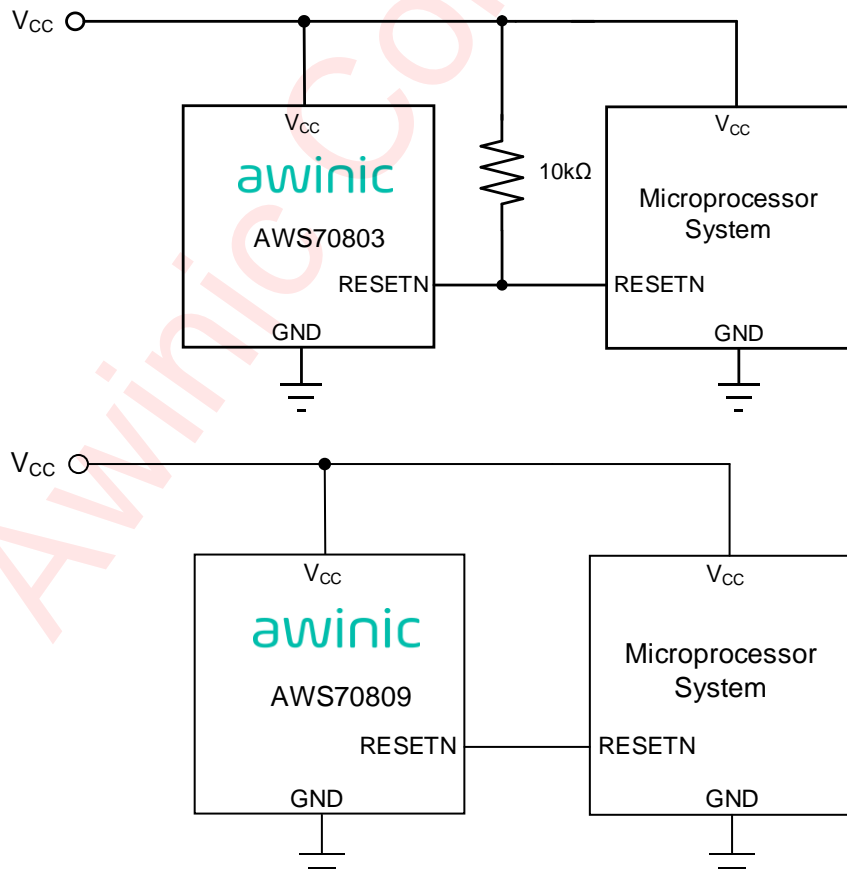
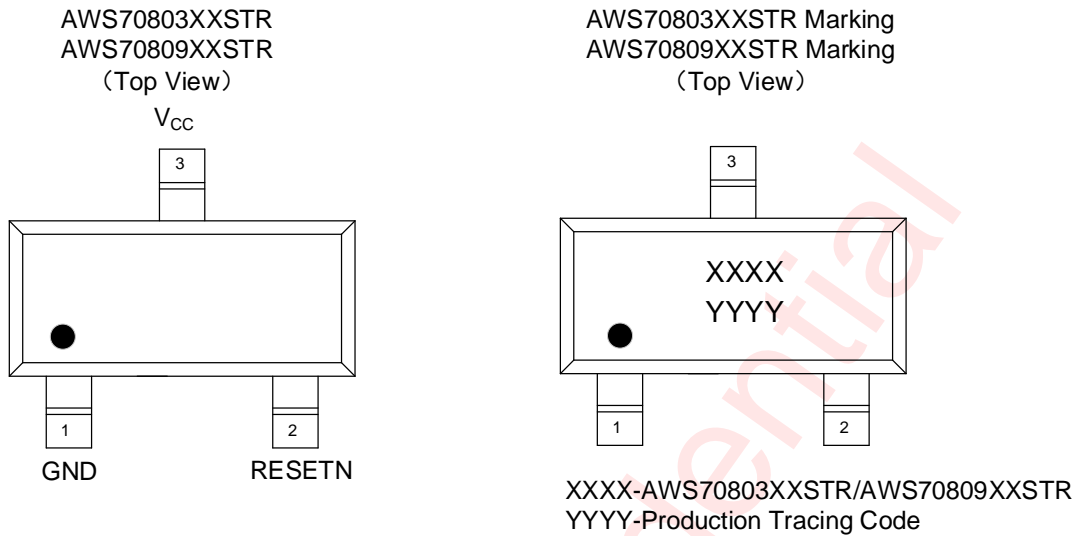


Figure 2 Typical Application Circuit of AWS70803 and AWS70809

Pin Configuration And Top Mark

SOT23-3L



SSOT23-3L

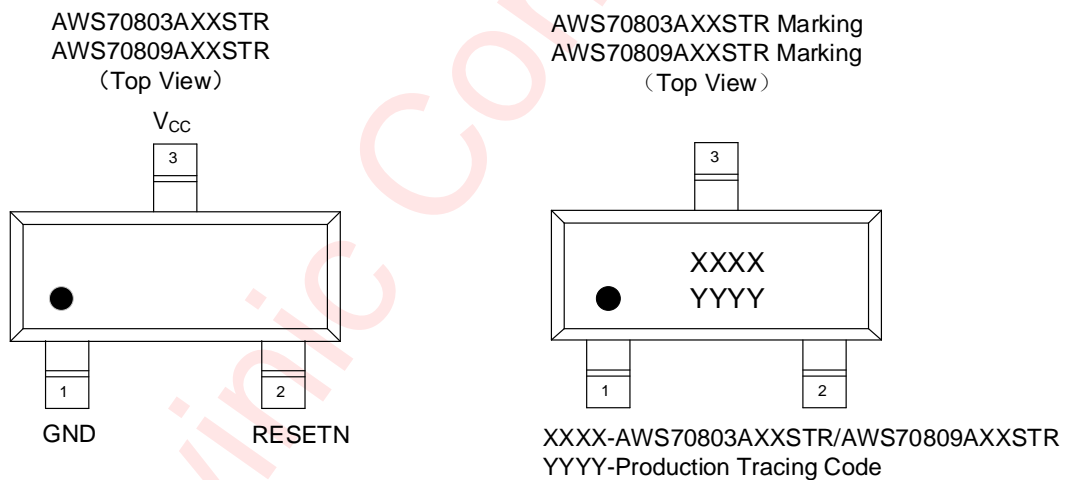


Figure 3 Pin Configuration and Top Mark

Pin Definition

No.	NAME	DESCRIPTION
1	GND	Ground.
2	RESETN	Active Low Reset. RESETN remains low while V _{CC} is below the reset threshold, and remains low for 200ms (TYP) after V _{CC} rises above the reset threshold.
3	V _{CC}	Power Supply. Power supply voltage that is monitored.

Functional Block Diagram

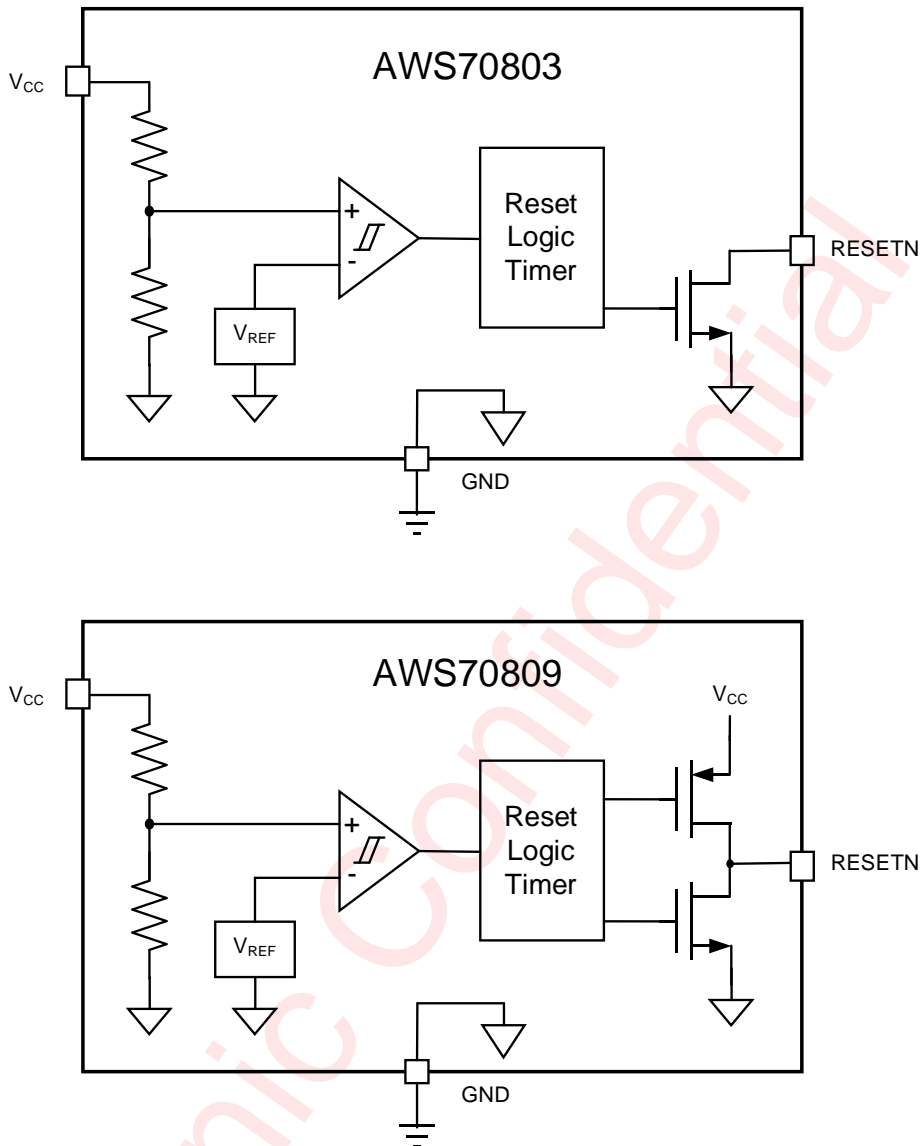


Figure 4 Function Block

Ordering Information

Part Number	Reset Threshold (V)	Temperature	Package	Marking	Moisture Sensitivity Level	Environmental Information	Delivery Form
AWS70809JCSTR	4.0	-40°C~125°C	SOT23-3L	F1X5	MSL3	ROHS+HF	3000 units/ Tape and Reel
AWS70803TCSTR	3.08	-40°C~125°C	SOT23-3L	E1QY	MSL3	ROHS+HF	3000 units/ Tape and Reel
AWS70803ATCSTR	3.08	-40°C~125°C	SSOT23-3L	AZX6	MSL1	ROHS+HF	3000 units/ Tape and Reel
AWS70809ATCSTR	3.08	-40°C~125°C	SSOT23-3L	HHN7	MSL1	ROHS+HF	3000 units/ Tape and Reel
AWS70809TCSTR	3.08	-40°C~125°C	SOT23-3L	FCLL	MSL3	ROHS+HF	3000 units/ Tape and Reel
AWS70809SCSTR	2.93	-40°C~125°C	SOT23-3L	H70C	MSL3	ROHS+HF	3000 units/ Tape and Reel
AWS70809ASCSTR	2.93	-40°C~125°C	SSOT23-3L	VPKP	MSL1	ROHS+HF	3000 units/ Tape and Reel
AWS70809ASBSTR	2.93	-40°C~125°C	SSOT23-3L	79RK	MSL1	ROHS+HF	3000 units/ Tape and Reel

Absolute Maximum Ratings^(NOTE1)

PARAMETERS	RANGE
Supply voltage range V_{CC}	-0.3V to 6.0V
V_{RESETN}	-0.3V to 6.0V
Operating free-air temperature range	-40°C to 125°C
Maximum operating junction temperature T_{JMAX}	150°C
Storage temperature T_{STG}	-65°C to 150°C
Lead temperature (soldering 10 seconds)	260°C

NOTE1: Conditions out of those ranges listed in "absolute maximum ratings" may cause permanent damages to the device. In spite of the limits above, functional operation conditions of the device should within the ranges listed in "recommended operating conditions". Exposure to absolute-maximum-rated conditions for prolonged periods may affect device reliability.

ESD Rating and Latch Up

PARAMETERS	VALUE	UNIT
HBM (Human Body Model) ^(NOTE 2)	±4	kV
CDM ^(NOTE 3)	±2	kV
Latch-Up ^(NOTE 4)	+IT: 200; -IT: -200	mA

NOTE2: The human body model is a 100pF capacitor discharged through a 1.5kΩ resistor into each pin. Test method: ESDA/JEDEC JS-001-2017

NOTE3: Test method: ESDA/JEDEC JS-002-2018

NOTE4: Test method: JEDEC78E

Electrical Characteristics

$V_{CC}=1.0$ to $5.5V$, $T_A=-40^{\circ}C$ to $+125^{\circ}C$, typical values are at $V_{CC}=5V$ and $T_A=25^{\circ}C$. (unless otherwise noted)

PARAMETER		TEST CONDITION	MIN	TYP	MAX	UNIT
Basic Operation						
Operating Voltage Range (V_{CC})			1.0		5.5	V
Supply Current (I_{SUPPLY})				1.6		μA
Reset Threshold (V_{TH})						
AWS70803/809_L		$T_A = +25^{\circ}C$		4.63		V
AWS70803/809_M		$T_A = +25^{\circ}C$		4.4		V
AWS70803/809_J		$T_A = +25^{\circ}C$		4		V
AWS70803/809_T		$T_A = +25^{\circ}C$		3.08		V
AWS70803/809_S		$T_A = +25^{\circ}C$		2.93		V
AWS70803/809_R		$T_A = +25^{\circ}C$		2.63		V
AWS70803/809_Z		$T_A = +25^{\circ}C$		2.32		V
AWS70803/809_X		$T_A = +25^{\circ}C$		1.63		V
Threshold Voltage Accuracy (ΔV_{TH})		$T_A = +25^{\circ}C$		± 2.0		%
Timing Requirements						
t_{PD_HL}	Propagation delay from V_{CC} falling below V_{TH} to RESETN	$V_{CC} = (V_{TH} + 200mV)$ to $(V_{TH} - 200mV)$		40		μs
t_D	Release time or reset active timeout period	AWS70809_B		55		ms
		AWS70803_C AWS70809_C		200		ms
RESETN Output Voltage						
V_{OL}	Low level output voltage	$V_{CC} = V_{TH(min)}$, $I_{SINK} = 1.2mA$ AWS70809R/S/T/Z/X AWS70803R/S/T/Z/X			0.3	V
		$V_{CC} = V_{TH(min)}$, $I_{SINK} = 3.2mA$ AWS70809L/M/J AWS70803L/M/J			0.4	V
		$1.0V < V_{CC} < V_{TH(min)}$, $I_{SINK} = 50\mu A$ AWS70809 AWS70803			0.3	V
V_{OH}	High level output voltage	$V_{CC} > V_{TH(MAX)}$, $I_{SOURCE} = 500\mu A$ AWS70809R/S/T/Z/X	$0.8 \times V_{CC}$			V
		$V_{CC} > V_{TH(MAX)}$, $I_{SOURCE} = 800\mu A$ AWS70809L/M/J	$V_{CC} - 1.5$			V

Typical Characteristics

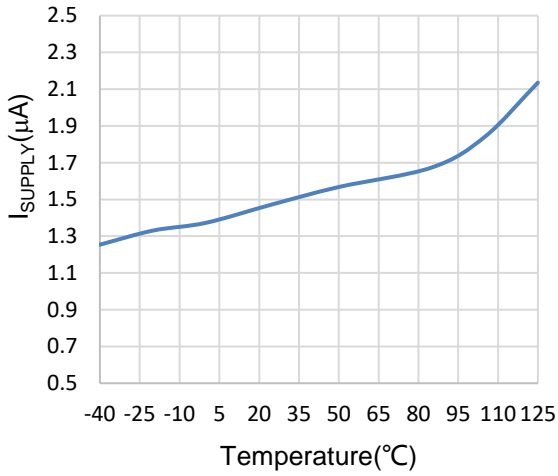


Figure 5 Supply Current vs. Temp.

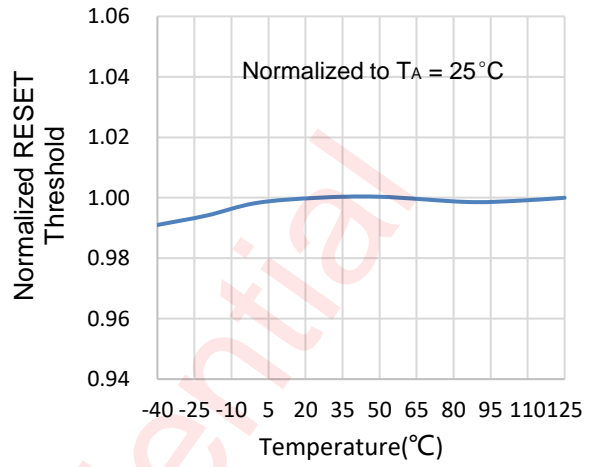


Figure 6 Normalized RESET Threshold vs. Temp.

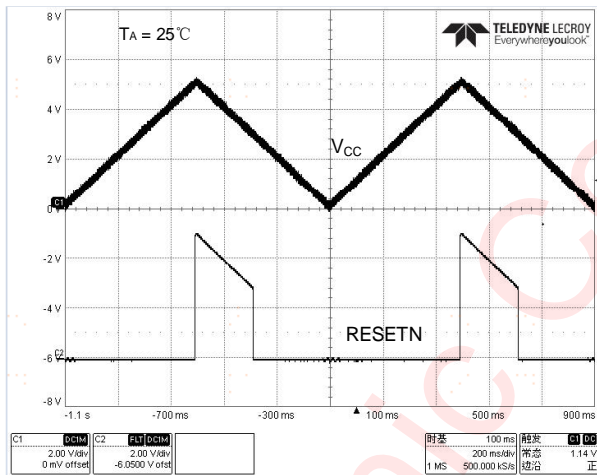


Figure 7 Output Voltage vs. Supply Voltage

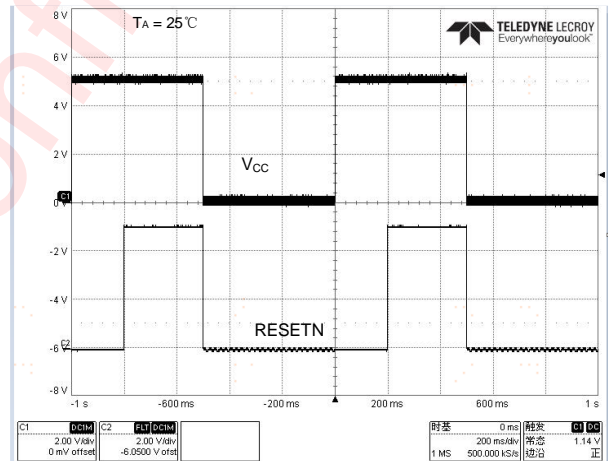


Figure 8 Output Voltage vs. Supply Voltage

Detailed Functional Description

RESETN Output, Active Low

RESETN remains high (de-asserted) as long as V_{CC} is above the threshold. If V_{CC} falls below the threshold, then reset is asserted and RESETN goes to low impedance pulling output low V_{OL} .

When V_{CC} rises above V_{TH} , the delay circuit holds RESETN low for the specified reset active timeout period. When the reset delay has elapsed, the RESETN pin goes back to high impedance and output goes high voltage (V_{OH}).

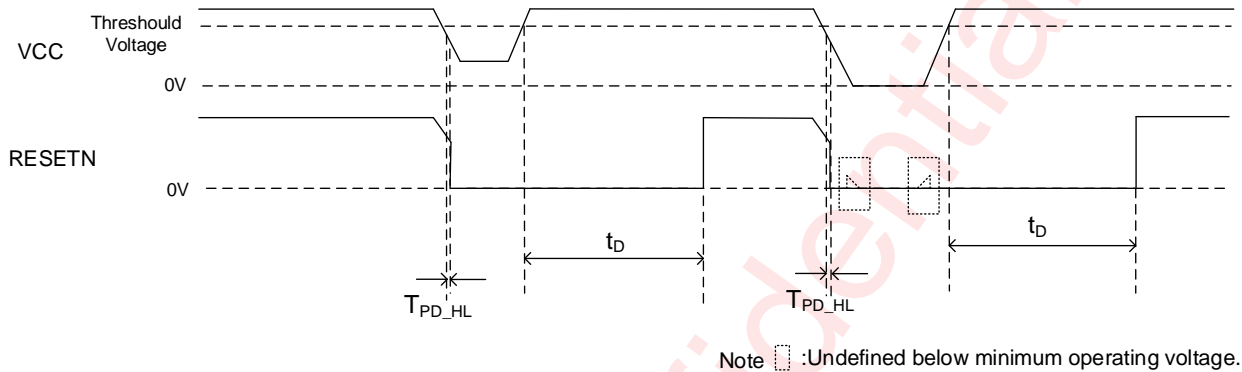


Figure 9 AWS70809 Reset Output Timing Diagram

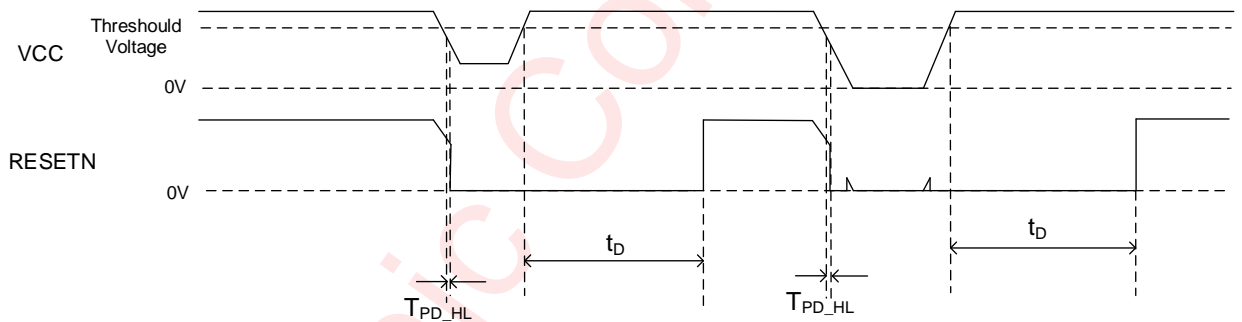


Figure 10 AWS70803 Reset Output Timing Diagram

Application Information

Benefits of an Accurate Reset Threshold

In other microprocessor supervisory circuits, tolerances in supply voltages lead to an overall increase in reset tolerance levels due to the deterioration of the microprocessor reset circuit's power supply. The possibility of a malfunction during a power failure is greatly reduced because the AWS70809 and AWS70803 can operate effectively even when there are large degradations of the supply voltages. Another advantage of the AWS70809 and AWS70803 is its very accurate internal voltage reference circuit. These benefits combine to produce an exceptionally reliable voltage monitor circuit.

Interfacing to Other Devices' Output

The AWS70809 and AWS70803 are designed to integrate with as many devices as possible, therefore, has a standard output dependent on V_{CC} . This enables the parts to be used in both 3V and 5V, or any nominal voltage within the minimum and maximum specifications for V_{CC} . This design simplifies interfacing this device to other devices.

Ensuring a Valid Reset Output Down to $V_{CC} = 0V$

When V_{CC} falls below 1.0V, the AWS70809 RESETN no longer sinks current. A high impedance CMOS logic input connected to RESETN may, therefore, drift to undetermined logic levels. To eliminate this problem, a 100k Ω resistor should be connected from RESETN to ground.

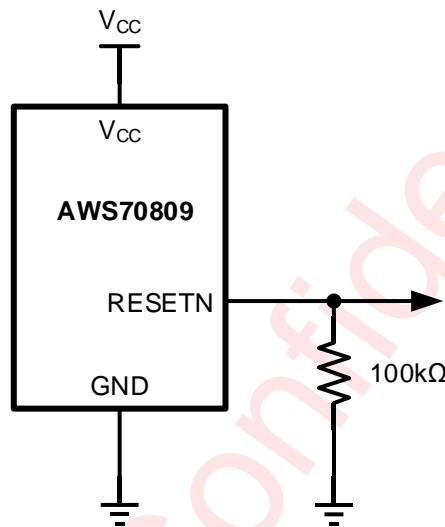


Figure 11 Ensuring a Valid Reset Output Down to $V_{CC} = 0V$

Preventing the High Voltage Spike

To prevent the high voltage spike damage or to limit input V_{CC} current, It is recommended to connect a resistor R1 (0 Ω to 1k Ω) in series to V_{CC} , and one capacitor C1 (0.1 μ F to 4.7 μ F) should be connected between V_{CC} Pin and GND. The schematic is shown in Figure 12. It must be noted that, the input resistor will affect output driving capability.

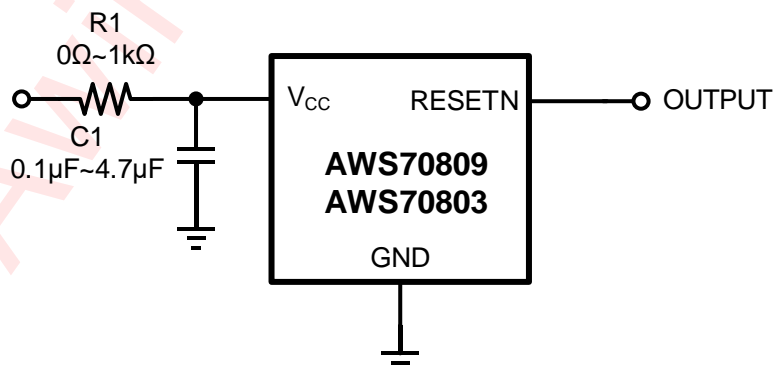


Figure 12 Preventing the High Voltage Spike

PCB Layout Consideration

AWS70803 and AWS70809 PCB layout should be considered. Here is an example of PCB Layout:

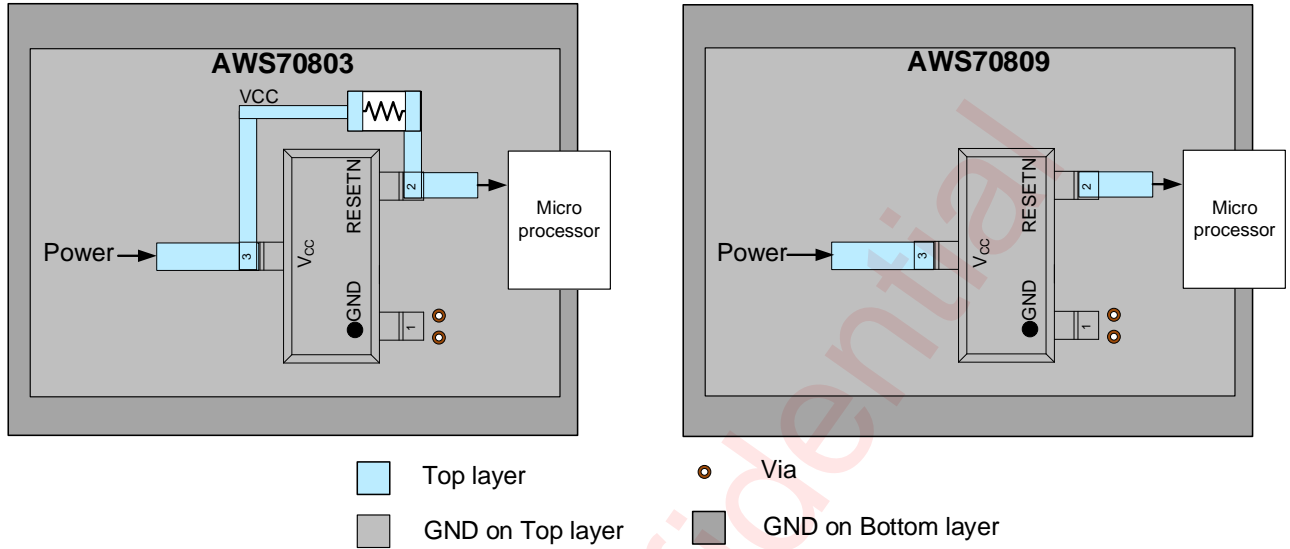
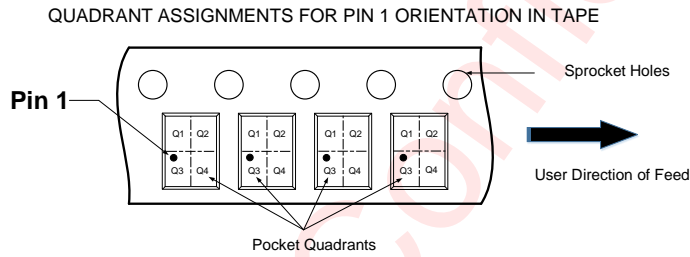
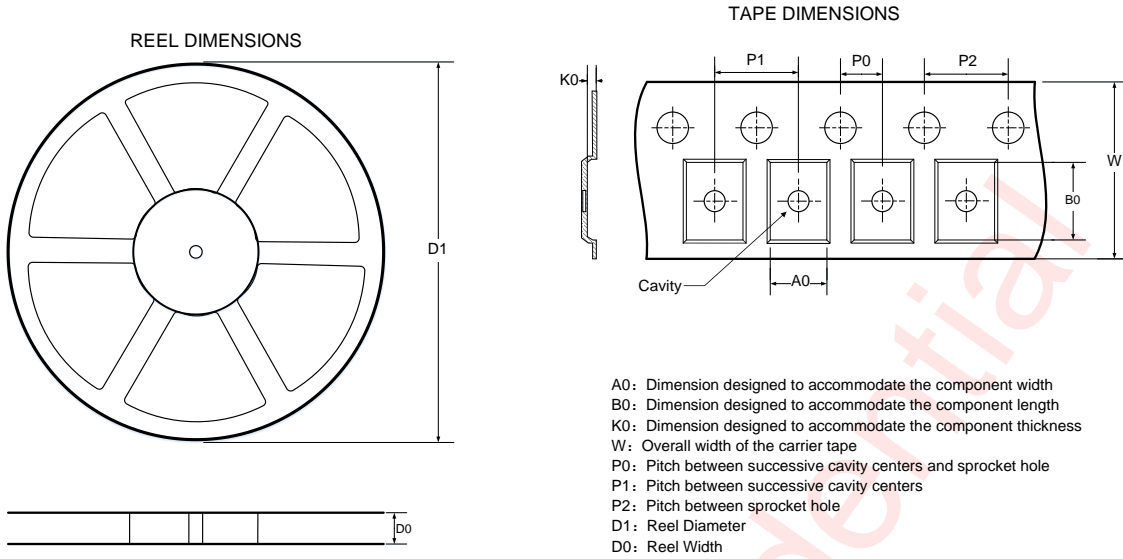


Figure 13 External Components Placements and PCB Layout Example

Tape And Reel Information

SOT23-3L(1.25)



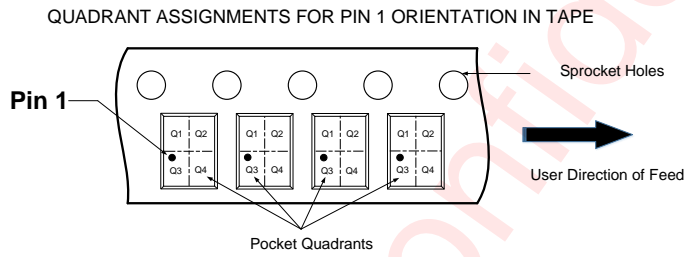
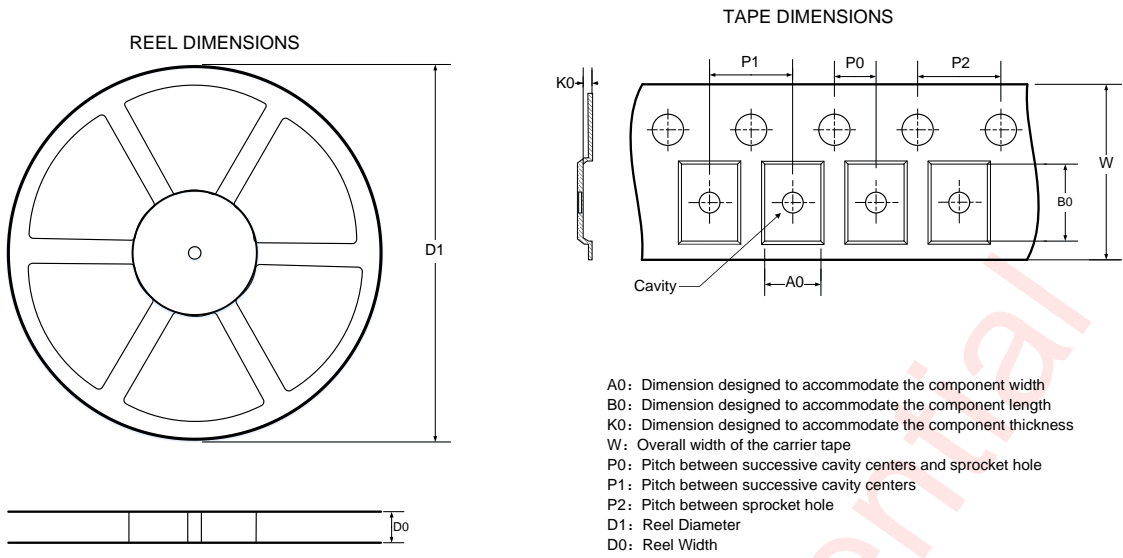
Note: The above picture is for reference only. Please refer to the value in the table below for the actual size

DIMENSIONS AND PIN1 ORIENTATION

D1 (mm)	D0 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
178.00	8.40	3.30	3.20	1.47	2.00	4.00	4.00	8.00	Q3

All dimensions are nominal

SSOT23-3L(1.12)



Note: The above picture is for reference only. Please refer to the value in the table below for the actual size

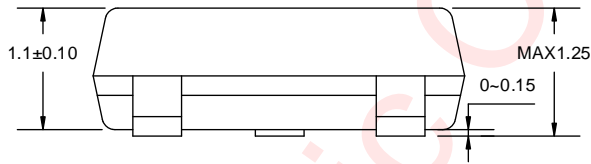
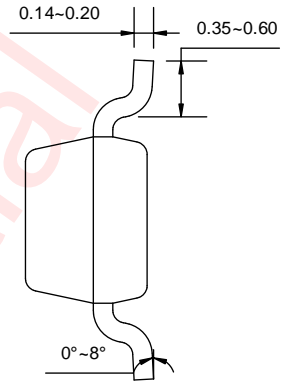
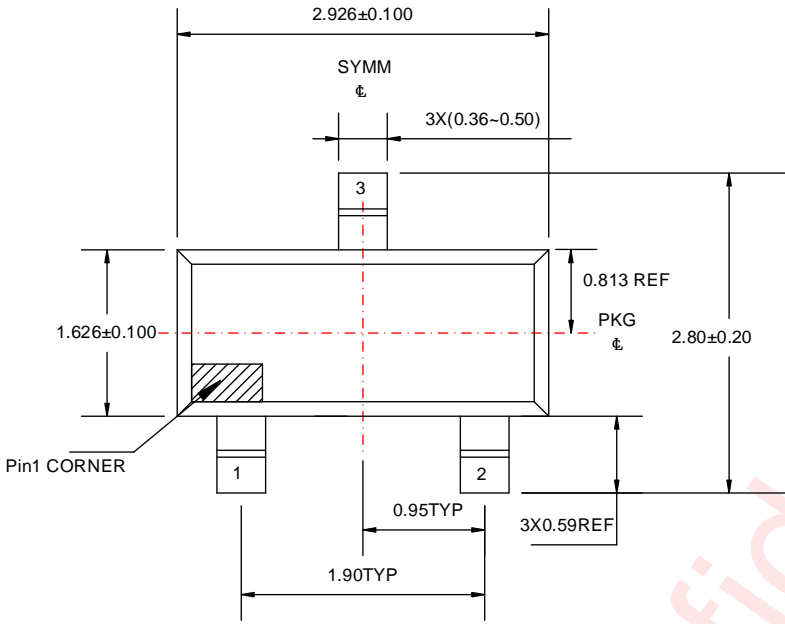
DIMENSIONS AND PIN1 ORIENTATION

D1 (mm)	D0 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
178.00	8.40	3.15	2.77	1.22	2.00	4.00	4.00	8.00	Q3

All dimensions are nominal

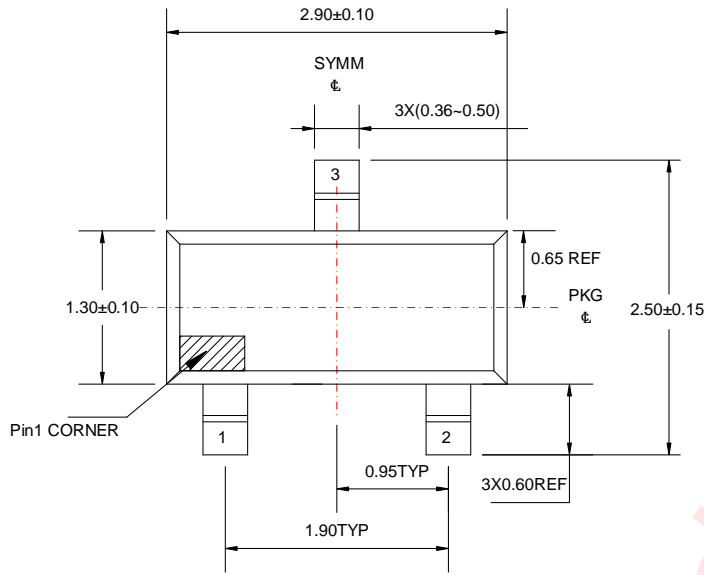
Package Description

SOT23-3L(1.25)

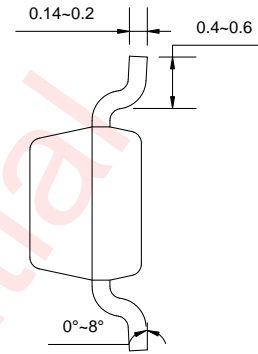


Unit: mm

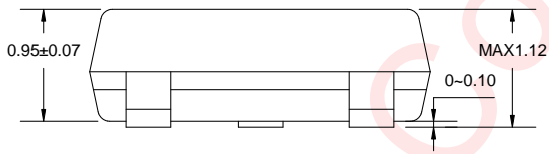
SSOT23-3L(1.12)



TOP VIEW



SIDE VIEW

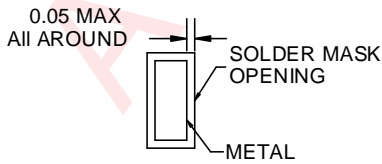
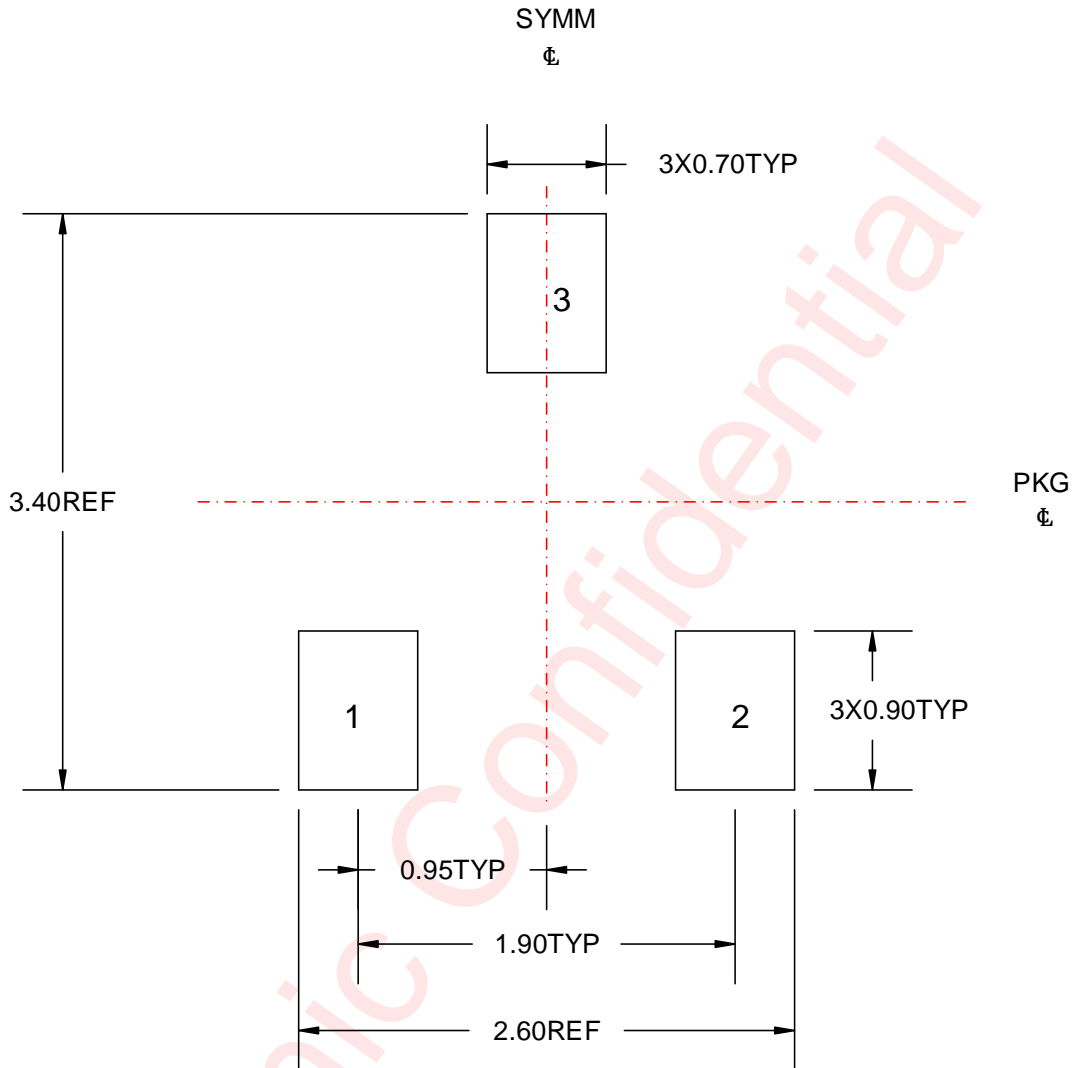


SIDE VIEW

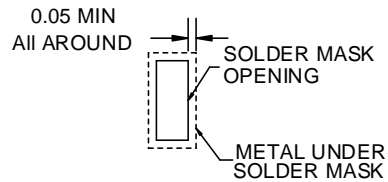
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Land Pattern Data

SOT23-3L(1.25)



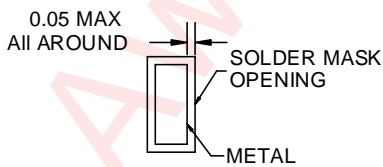
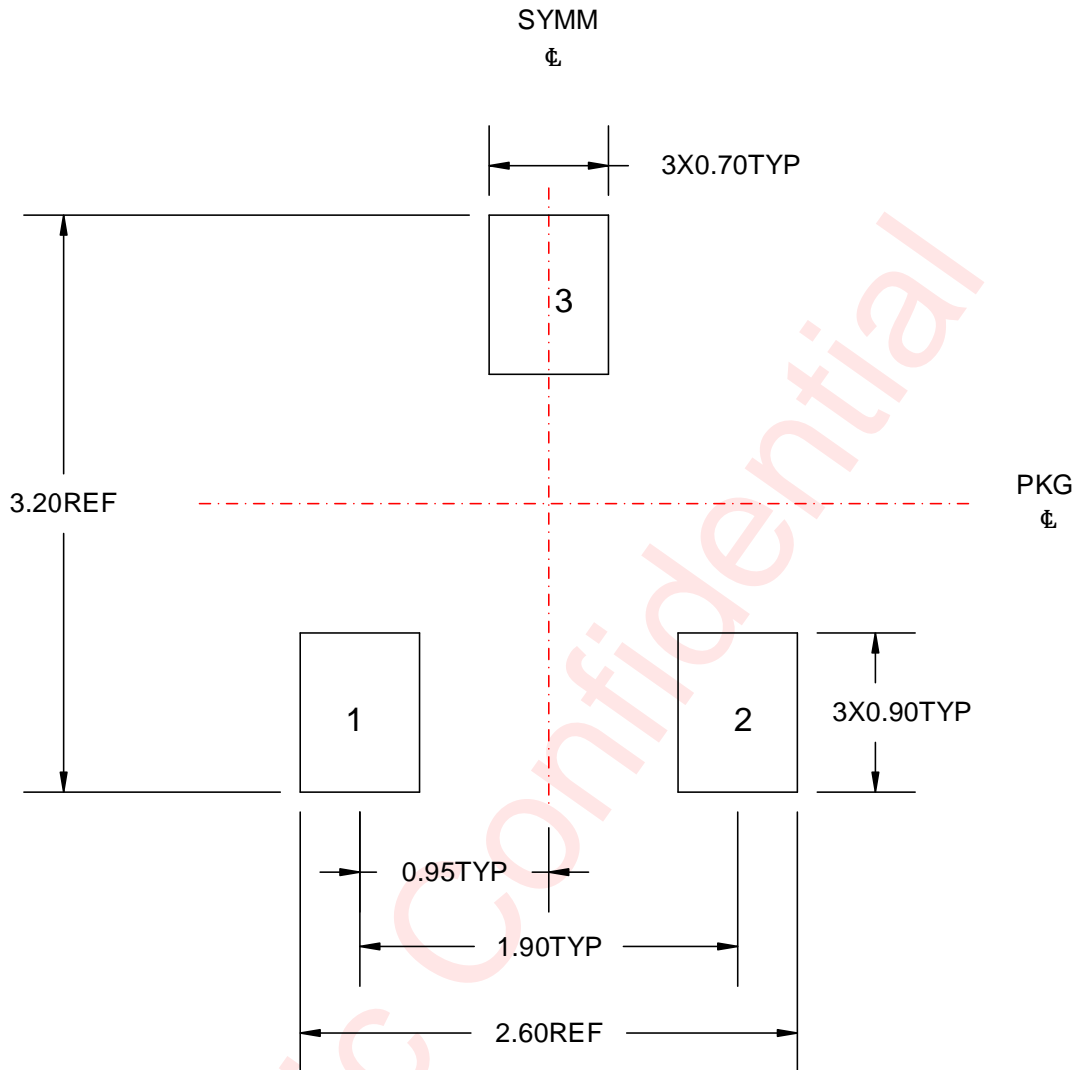
NON SOLDER MASK DEFINED



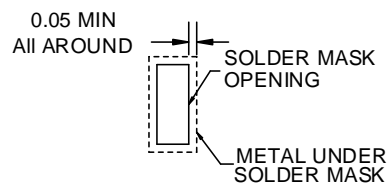
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Unit: mm

SSOT23-3L(1.12)



NON SOLDER MASK DEFINED



SOLDER MASK DEFINED

Unit: mm

Revision History

Version	Date	Change Record
V1.0	Apr.2023	Officially released
V1.1	Jul.2023	<ol style="list-style-type: none">1. Updated the Pin Configuration and Top Mark. (P3)2. Updated the Ordering Information.(P5)3. Updated the t_D in the Electrical Characteristics.(P7)
V1.2	Nov.2024	<ol style="list-style-type: none">1. Combine AWS70803 and AWS70809 together2. Update the Features and Add Device Information. (P1)3. Add Device Comparison. (P2)
V1.3	Dec.2025	<ol style="list-style-type: none">1. Updated the Ordering Information.(P5)

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