

Features

- Precision supply-voltage monitor
 - 4.63V (PT7M7803/09/10L)
 - 4.26V (PT7M7803/09/10M)
 - 3.08V (PT7M78003/09/10T)
 - 2.93V (PT7M78003/09/10S)
 - 2.63V (PT7M7803/09/10R)
 - 2.32V (PT7M7803/09/10Z)
- 140ms(min) reset pulse width
- Push-Pull /RESET Output Configurations for PT7M7809
- Push-Pull RESET Output Configurations for PT7M7810
- Open-Drain /RESET output configuration for PT7M7803
- 12μA Supply Current
- Guaranteed Reset(/Reset) Valid to $V_{CC} = +1.0V$
- Power Supply Transient Immunity
- No External Components

Ordering Information

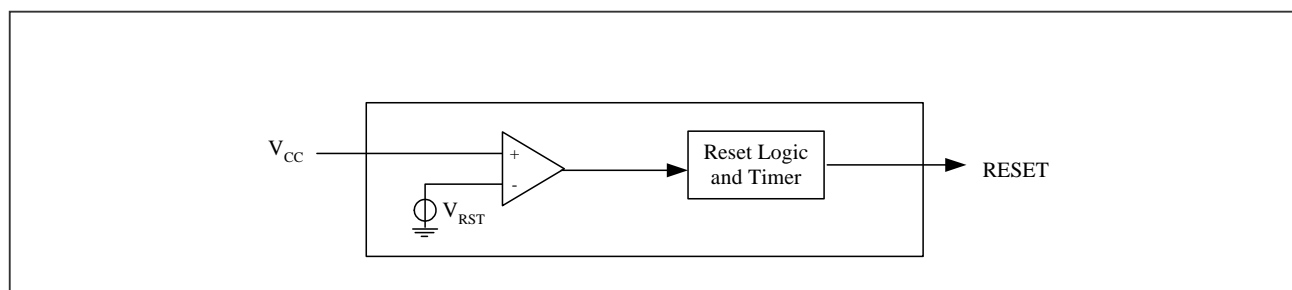
Part Number	Package
PT7M7803XTE	Lead free and Green SOT23-3
PT7M7809XTE	Lead free and Green SOT23-3
PT7M7809XTE	Lead free and Green SOT23-3

Note: “x” refers to voltage range, see below table.

Suffix: X—Monitored Voltage

X	L	M	T	S	R	Z
Reset Threshold (V)	4.63	4.26	3.08	2.93	2.63	2.32

Block Diagram



Description

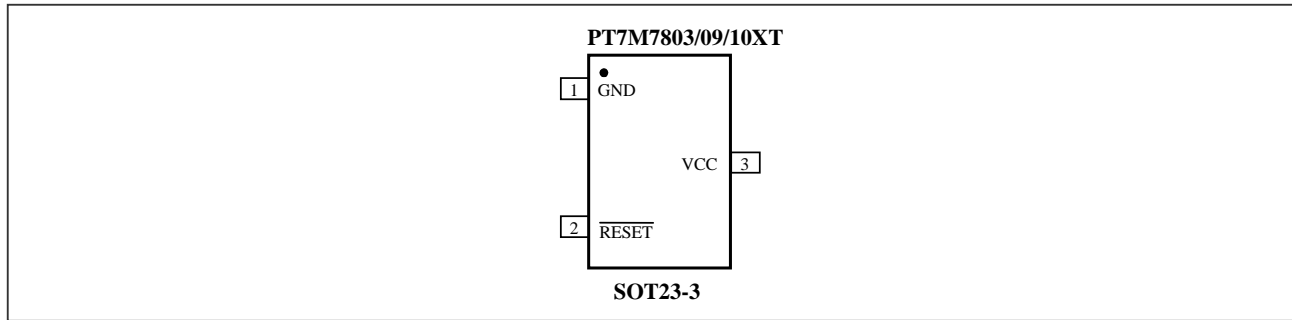
The PT7M7803/09/10 are microprocessor (μP) supervisory circuits used to monitor the power supplies in μP and digital systems. They provide excellent circuit reliability and low cost by eliminating external components and adjustments when used with +3.3V, +3.0V, or 2.5V powered circuits.

These circuits perform a single function: they assert a reset signal whenever the VCC supply voltage declines below a preset threshold, keeping it asserted for at least 140ms after VCC has risen above the reset threshold. Reset thresholds suitable for operation with a variety of supply voltages are available.

The PT7M7803 has an open-drain output stage, while the PT7M7809/10 have push-pull outputs. The PT7M7803's open-drain /Reset output requires a pull-up resistor that can be connected to a voltage higher than V_{CC} . The PT7M7803/09 have an active-low /RESET output while the PT7M7810 has an active-high 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 PT7M7803/09/10 ideal for use in portable equipment. The ICs are available in 3 pin SOT23 packages.

Pin Configuration



Pin Description

Pin	Type	Description
VCC	-	Supply Voltage. Reset is asserted when V _{CC} drops below the Reset Threshold Voltage (V _{RST}). Reset remains asserted until V _{CC} rises above V _{RST} and keep asserted for the duration of the Reset Timeout Period (t _{RS}) once V _{CC} rises above V _{RST} .
GND	-	Ground
$\overline{\text{RESET}}$	O	Active-Low Reset Output (Push-Pull). It goes low when Vcc is below the reset threshold. It remains low for about 200ms after Vcc rises above the reset threshold (V _{RST}).

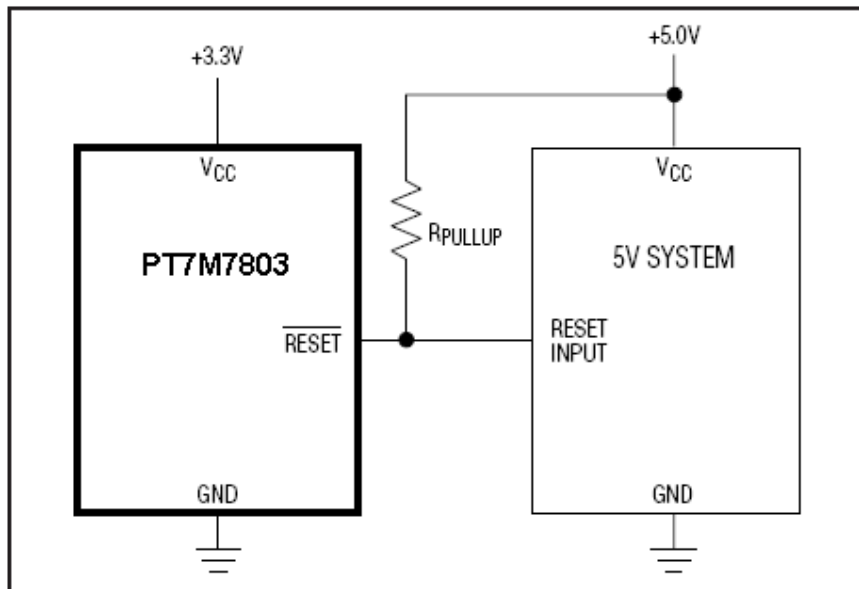
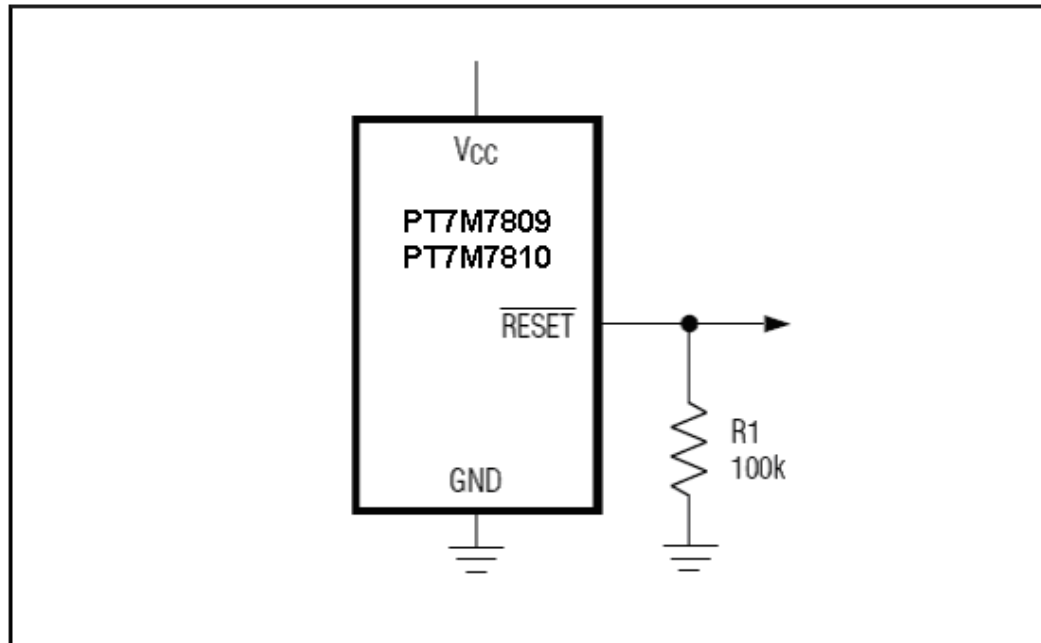
Functional Description

Reset Output

A microprocessor (μP) reset input starts the μP in a known state. Whenever the μP is in an unknown state, it should be held in reset. The supervisory circuits assert reset during power-up and prevent code execution errors during power-down or brownout conditions.

On power-up, once Vcc reaches about 1.0V, /RESET is a guaranteed logic low of 0.4V or less. As Vcc rises, /RESET stays low. When Vcc rises above the reset threshold, an internal timer releases /RESET after about 200ms. /RESET pulses low whenever Vcc drops below the reset threshold, i.e. brownout condition. If brownout occurs in the middle of a previously initiated reset pulse, the pulse continues for at least another 200ms. On power-down, once Vcc falls below the reset threshold, /RESET stays low and is guaranteed to be 0.4V or less until Vcc drops below 1.0V. *Reset Timing Diagram* shows the timing relationship.

Typical Application Circuit



Maximum Ratings

Storage Temperature	-65°C to +150°C
Ambient Temperature with Power Applied.....	-40°C to +85°C
Supply Voltage to Ground Potential (V _{CC} to GND)	-0.3V to +6.0V
DC Input Voltage (All inputs except V _{CC} and GND).....	-0.3V to V _{CC} +0.3V
DC Output Current (All outputs)	20mA
Power Dissipation	320mW

Note:

Stresses greater than those listed under MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

Recommended Operation Conditions

Sym	Description	Test Conditions	Min	Typ	Max	Unit
V _{CC}	Supply Voltage for 7803/09/10(L/M)	-	4.5	5.0	5.5	V
	Supply Voltage for 7803/09/10(T/S)	-	3.0	3.3	5.5	V
	Supply Voltage for 7803/09/10(R/Z)	-	2.7	3.0	5.5	V
T _A	Operating Temperature	-	-40	-	85	

DC Electrical Characteristics

($V_{CC} = V_{RN} + 5\%$ to 5.5V, $T_A = -40 \sim 85^\circ\text{C}$, unless otherwise noted.)(Note 1)

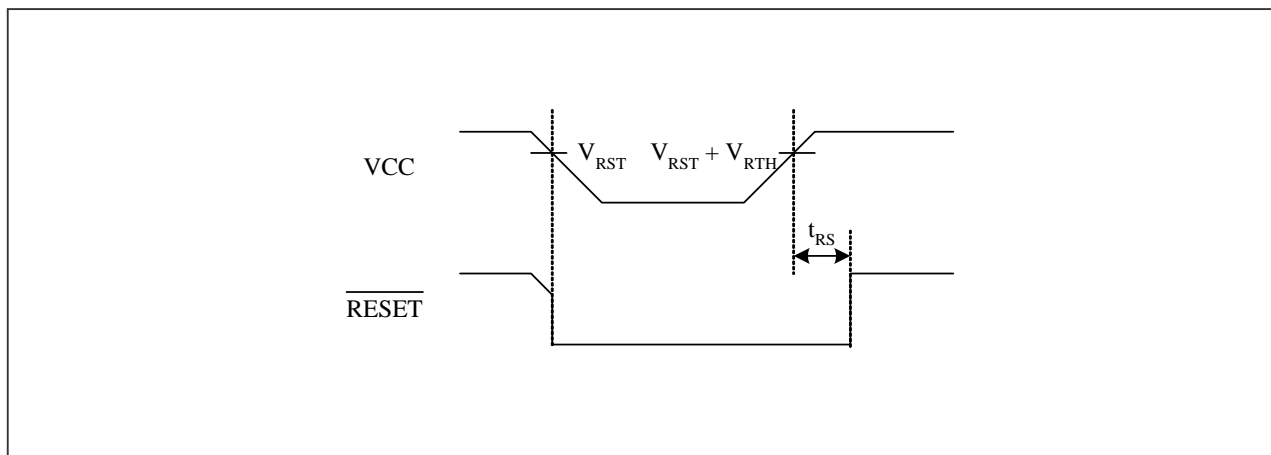
Symbol	Description	Test Conditions		Min	Typ	Max	Unit
V_{CC}	Operating Voltage Range	-		1.0	-	5.5	V
I_{CC}	Supply Current	$V_{CC} < 5.5\text{V}$, PT7M78xxL/M		-	10	30	μA
I_{CC}	Supply Current	$V_{CC} < 3.6\text{V}$, PT7M78xxR/S/T/Z		-	10	30	
V_{RST} (V_{RTH-})	Threshold Voltage(Falling-edge)(Note 2)	$T_A = 25^\circ\text{C}$	PT7M7809M	$V_{RN} - 1.1\%$	V_{RN}	$V_{RN} + 1.1\%$	V
			All except 7809M	$V_{RN} - 1.5\%$	V_{RN}	$V_{RN} + 1.5\%$	
		$T_A = -40 \sim 85^\circ\text{C}$	PT7M7809M	$V_{RN} - 1.8\%$	V_{RN}	$V_{RN} + 2\%$	
		$T_A = -40 \sim 85^\circ\text{C}$	All except 7809M	$V_{RN} - 2.5\%$	V_{RN}	$V_{RN} + 2.5\%$	
V_{RTH+}	Threshold Voltage(Rising-edge) (Note 2)	$T_A = -40 \sim 85^\circ\text{C}$	PT7M7809M	4.232	4.31	4.396	
V_{RTH}	Reset Threshold Hysteresis (Note 2)	V_{CC} varies between $V_{RN} \pm 5\%$ (Only for 78xxL/M)		-	50	-	mV
V_{OH}	Output High Voltage	$V_{CC} \geq 4.5\text{V}$ $I_{source} = 800\mu\text{A}$		$V_{CC} - 1.5$	-	-	V
		$V_{CC} \geq 2.7\text{V}$ $I_{source} = 500\mu\text{A}$		$0.8 \times V_{CC}$	-	-	
		$V_{CC} \geq 1.8\text{V}$ $I_{source} = 150\mu\text{A}$		$0.8 \times V_{CC}$	-	-	
		$V_{CC} \geq 1.0\text{V}$ $I_{source} = 4\mu\text{A}$		$0.8 \times V_{CC}$	-	-	
V_{OL}	Output Low Voltage	$V_{CC} \geq 4.5\text{V}$ $I_{sink} = 3.2\text{mA}$		-	-	0.4	V
		$V_{CC} \geq 2.7\text{V}$ $I_{sink} = 1.2\text{mA}$		-	-	0.3	
		$V_{CC} \geq 1.0\text{V}$ $I_{sink} = 100\mu\text{A}$		-	-	0.3	

Note: 1. Parameters of room temperature guaranteed by production test and parameters of full-temperature guaranteed by design.
2. V_{RST} is Reset threshold voltage when V_{CC} falls from high to low level. V_{RN} is nominal reset threshold voltage.

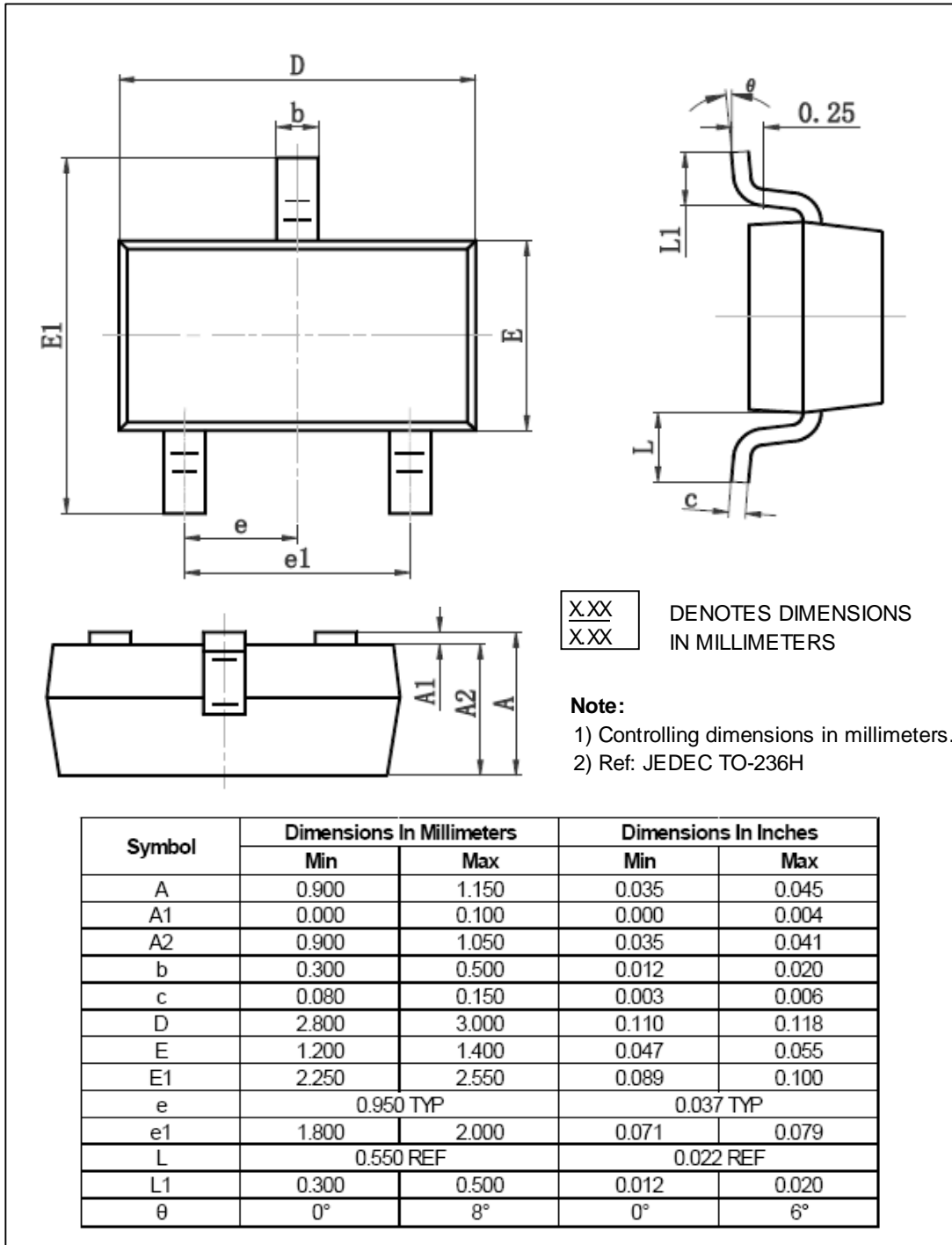
AC Electrical Characteristics

Symbol	Description	Test Conditions		Min	Typ	Max	Unit
t_{RS}	Reset Pulse Width	-	78xxT/S/R/Z	140	240	560	ms
		$T_A = 25^\circ\text{C}$	78xxL/M	140	200	280	

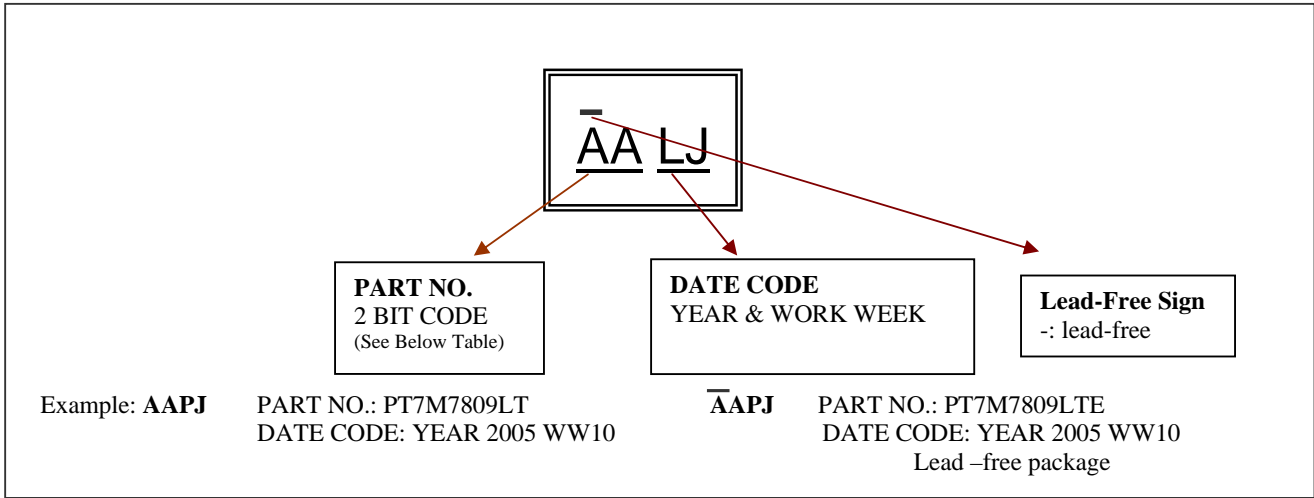
Reset Timing Diagram



Mechanical Information
 TE (Lead free and Green SOT23-3)



Marking Information



No.	Part No.	Code	No.	Part No.	Code	No.	Part No.	Code
1	PT7M7809L	AA	7	PT7M7803L	BC	13	PT7M7810L	AH
2	PT7M7809M	AB	8	PT7M7803M	BD	14	PT7M7810M	AI
3	PT7M7809T	AC	9	PT7M7803T	BE	15	PT7M7810T	AJ
4	PT7M7809S	AD	10	PT7M7803S	BF	16	PT7M7810S	AK
5	PT7M7809R	AE	11	PT7M7803R	BG	17	PT7M7810R	AL
6	PT7M7809Z	AF	12	PT7M7803Z	BH	18	PT7M7810Z	AM

Notes

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