Smart Multi-Voltage Detector

General Description

The RT9823 is an integrated smart multi voltage detector supervising two power supply voltage levels including 5V, and another voltage (such as 3.3V or 12V) , which can be set via an external resistive voltage divider.

The RT9823 performs supervisory function by sending out a CTR signal whenever the monitored voltages fall below 80% of the voltage levels. The CTR signal will last the whole period before VCC recovers. Once the supervising voltages are recovered to higher than 80% of the voltage levels, the CTR signal will be released after a 300ms delay time.

MR (Manual Reset) controls the CTR signal when the two monitored power supply voltages are at normal voltage levels. When the MR signal is in logic high, the CTR signal will be pulled low immediately.

The RT9823 is available in a SOT-23-6 package.

Ordering Information

RT9823 □ □

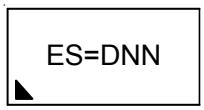
- Package Type
  E : SOT-23-6
- Lead Plating System
  G : Green (Halogen Free and Pb Free)

Note :

Richtek products are :

- RoHS compliant and compatible with the current requirements of IPC/JEDEC J-STD-020.
- Suitable for use in SnPb or Pb-free soldering processes.

Marking Information



ES= : Product Code

DNN : Date Code

Features

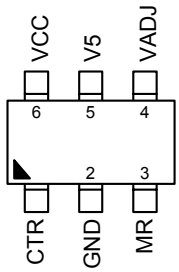
- **Capable of Monitoring Two Inputs Precisely**
- **VCC Connect to 5V or 3.3V Standby Power**
- **Detection Threshold Voltages**
  - **V5 : 5V x 80%**
  - **VADJ : 1V (Using Resistor Divider)**
- **Accuracy : ±2%**
- **CTR (Open Drain Output Active Low)**
- **Built-in Recovery Delay 300ms**
- **Manual CTR (MR) Function**
- **SOT-23-6 Package**
- **RoHS Compliant and Halogen Free**

Applications

- LCD TV or Monitors
- Consumer Electronic Products
- System Voltage Detector

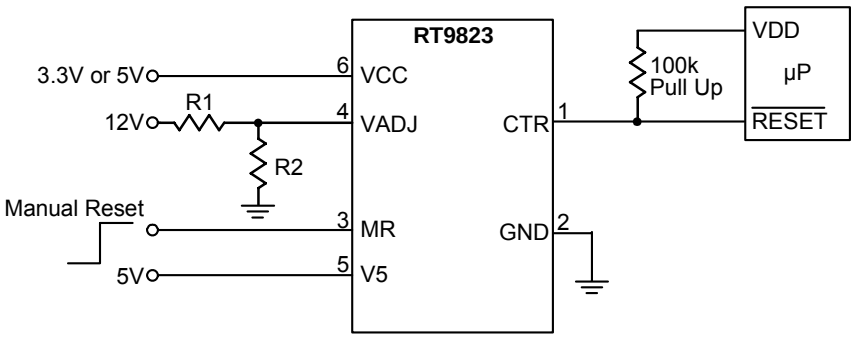
Pin Configurations

(TOP VIEW)



SOT-23-6

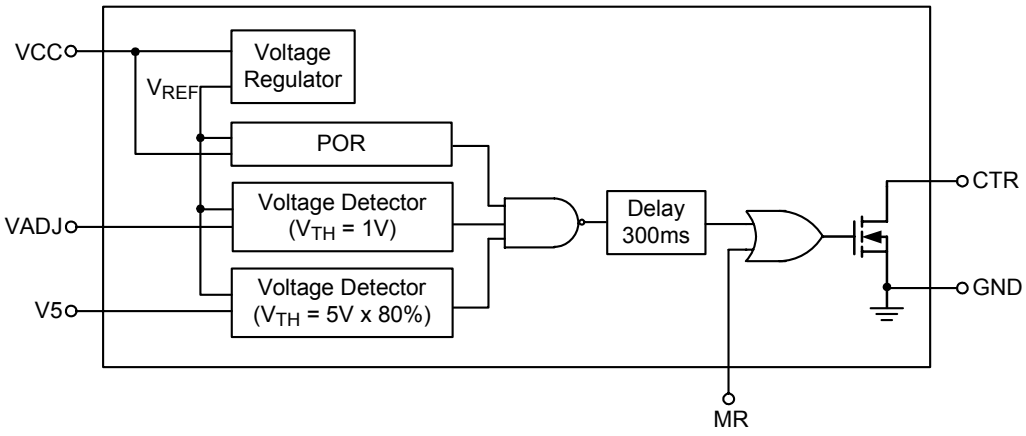
Typical Application Circuit



Functional Pin Description

Pin No.	Pin Name	Pin Function
1	CTR	Reset Output (Open Drain, Active-Low) . When V_{CC} > POR, V5 > 80%, and V_{ADJ} > 1V, CTR will delay 300ms and become high. Once V5 or V_{ADJ} is < 80%, the signal will become low. When MR is high, CTR will become low.
2	GND	Ground.
3	MR	Manual Reset Input. Manual reset with internal pull high resister (1MΩ) , H : CTR = Low; L : CTR signal is dependent on voltage detector output.
4	VADJ	Voltage Detection Input. Connect 12V or other power with external resistive voltage divider to this pin. The V_{ADJ} logic-high threshold voltage is 1V.
5	V5	5V Voltage Detection Input. The detection threshold is 5V x 80%.
6	VCC	Supply Input. Connect this pin to standby power from system.

Function Block Diagram



Absolute Maximum Ratings (Note 1)

- VCC, MR, CTR, V5, VADJ ---------- –0.3V to 6.5V
- Power Dissipation, P_D @ T_A = 25°C
  SOT-23-6 ---------- 0.4W
- Package Thermal Resistance (Note 2)
  SOT-23-6, θ_{JA} ---------- 250°C/W
  SOT-23-6, θ_{JC} ---------- 135°C/W
- Junction Temperature ---------- 150°C
- Lead Temperature (Soldering, 10 sec.) ---------- 260°C
- Storage Temperature Range ---------- –65°C to 150°C
- ESD Susceptibility (Note 3)
  HBM (Human Body Mode) ---------- 2kV
  MM (Machine Mode) ---------- 200V

Recommended Operating Conditions (Note 4)

- Junction Temperature Range ---------- –40°C to 125°C

Electrical Characteristics

(V_{CC} = 5V, T_A = 25°C, unless otherwise specified)

Parameter		Symbol	Test Conditions	Min	Typ	Max	Unit
VCC Supply Current		I_{VCC}	Without load	--	--	200	μA
VCC Operating Voltage		V_{CC}		2.97	5	5.94	V
VCC POR Rising		V_{POR}		--	2.8	--	V
VCC POR Hysteresis		V_{POR_Hys}		--	0.15	--	V
Voltage Detector & MUTE Threshold							
V5 High Threshold Voltage		V_{V5_TH}		3.92	4	4.08	V
VADJ High Threshold Voltage		V_{VADJ_TH}		0.98	1	1.02	V
Manual Reset Input Threshold Voltage	Logic-High	V_{IH}		2	--	--	V
	Logic-Low	V_{IL}		--	--	0.8	V
Voltage Detector Deglitch and Delay							
Voltage Detectors Delay Time		t_{DELAY}		200	300	--	ms
Voltage Detectors Deglitch Time		$t_{DEGLITCH}$		--	20	--	μs
Output : Open Drain							
CTR Output Low Voltage		V_{OL_CTR}	V_{CC} = 3.3V, 5mA sinking current at CTR output	--	--	0.3	V

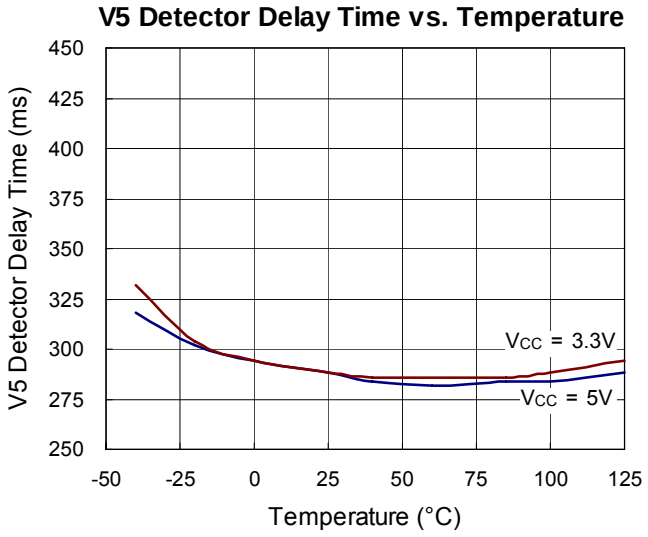
Note 1. Stresses listed as the above "Absolute Maximum Ratings" may cause permanent damage to the device. These are for stress ratings. Functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may remain possibility to affect device is reliability.

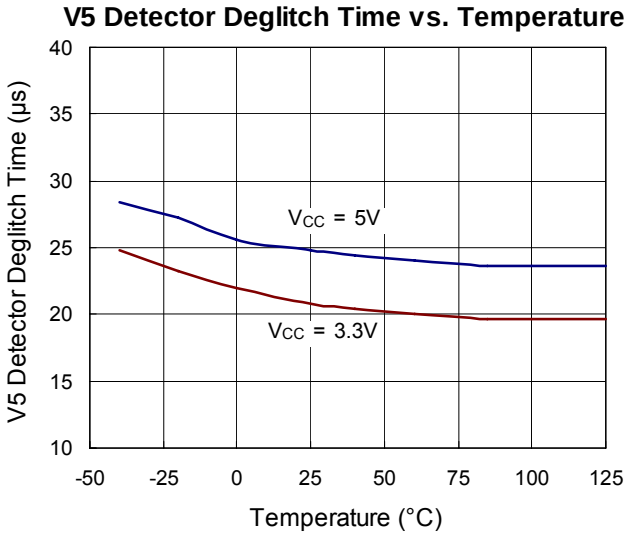
Note 2. θ_{JA} is measured in natural convection at T_A = 25°C on a low-effective thermal conductivity test board of JEDEC 51-3 thermal measurement standard. The measurement case position of θ_{JC} is on the lead of the package.

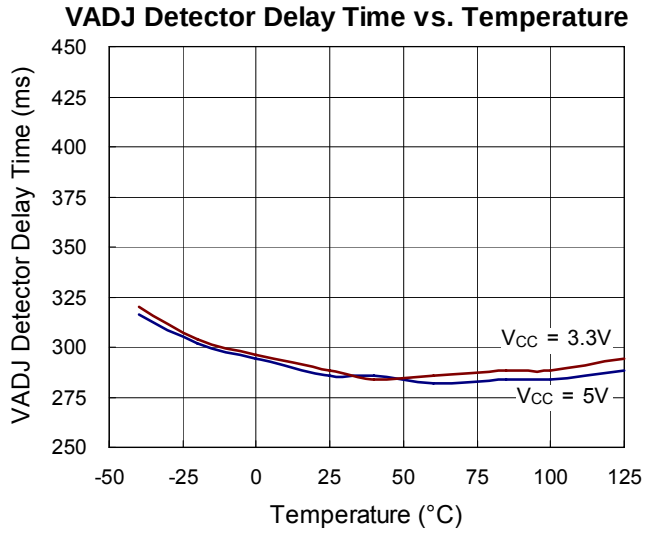
Note 3. Devices are ESD sensitive. Handling precaution is recommended.

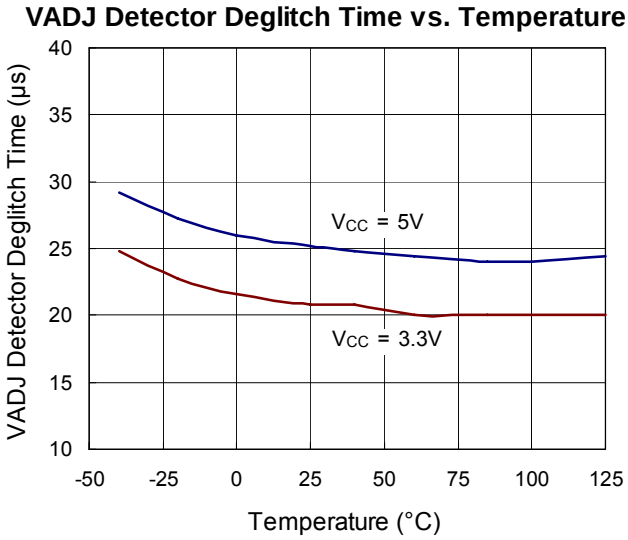
Note 4. The device is not guaranteed to function outside its operating conditions.

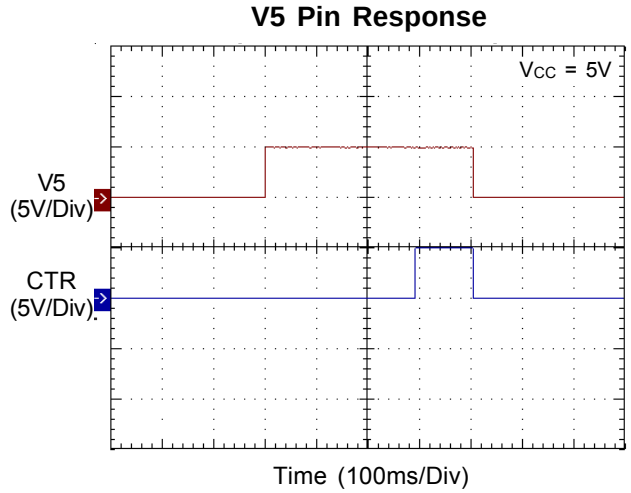
Typical Operating Characteristics

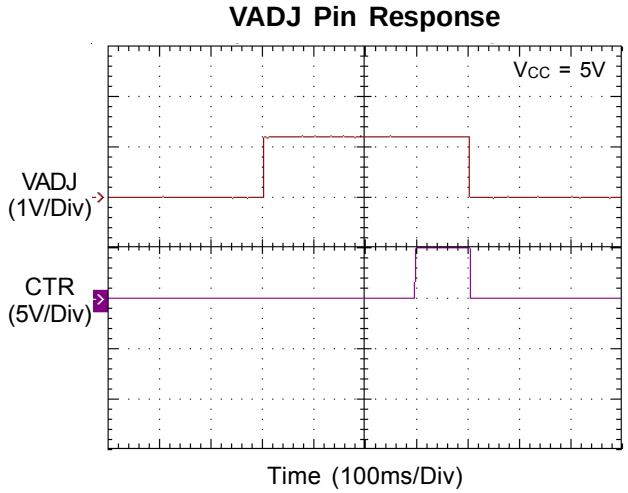




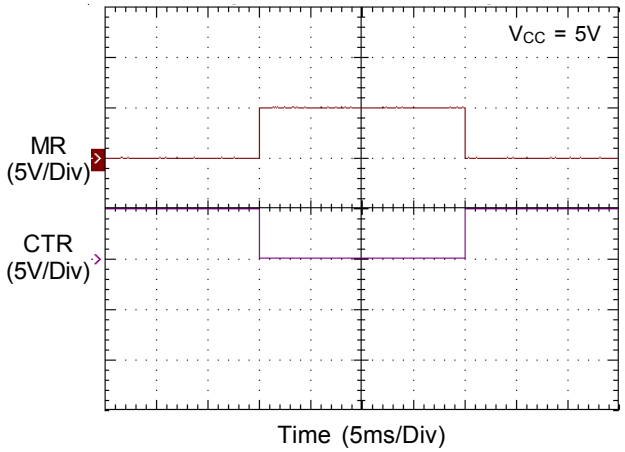




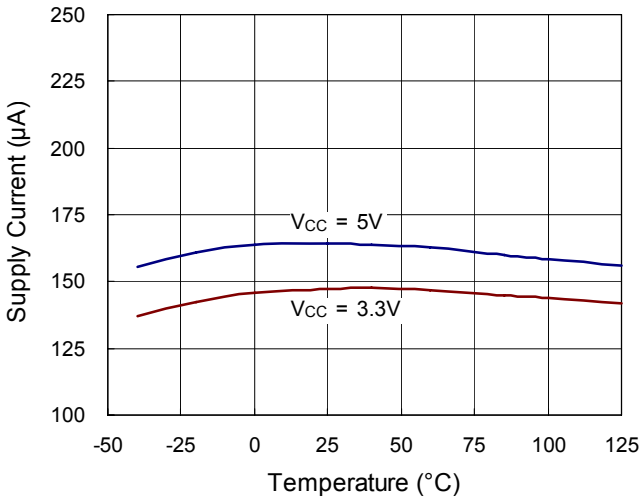




MR Pin Response



Supply Current vs. Temperature



Application Information

The RT9823 smart voltage detector monitors two voltage levels at the same time to ensure that the micro processor is operated within the recommended input voltage range. In conventional reset IC application, to monitor one power rail needs one reset IC. The RT9823 can monitor two power rails simultaneously, by using just one reset IC. The RT9823 also provides a Manual reset (MR) function for easy application. Glitch rejection is implemented in the RT9823 to prevent false operation and eliminate additional de-bouncing circuitry.

Thermal Considerations

For continuous operation, do not exceed absolute maximum junction temperature. The maximum power dissipation depends on the thermal resistance of the IC package, PCB layout, rate of surrounding airflow, and difference between junction and ambient temperature. The maximum power dissipation can be calculated by the following formula :

$P_{D(MAX)} = (T_{J(MAX)} - T_A) / \theta_{JA}$

where $T_{J(MAX)}$ is the maximum junction temperature, T_A is the ambient temperature, and θ_{JA} is the junction to ambient thermal resistance.

For recommended operating condition specifications of the RT9823, the maximum junction temperature is 125°C and T_A is the ambient temperature. The junction to ambient thermal resistance, θ_{JA}, is layout dependent. For SOT-23-6 packages, the thermal resistance, θ_{JA}, is 250°C/W on a standard JEDEC 51-3 single-layer thermal test board. The maximum power dissipation at T_A = 25°C can be calculated by the following formula :

$P_{D(MAX)}$ = (125°C – 25°C) / (250°C/W) = 0.4W for SOT-23-6 package

The maximum power dissipation depends on the operating ambient temperature for fixed $T_{J(MAX)}$ and thermal resistance, θ_{JA}. For the RT9823 package, the derating curve in Figure 1 allows the designer to see the effect of rising ambient temperature on the maximum power dissipation.

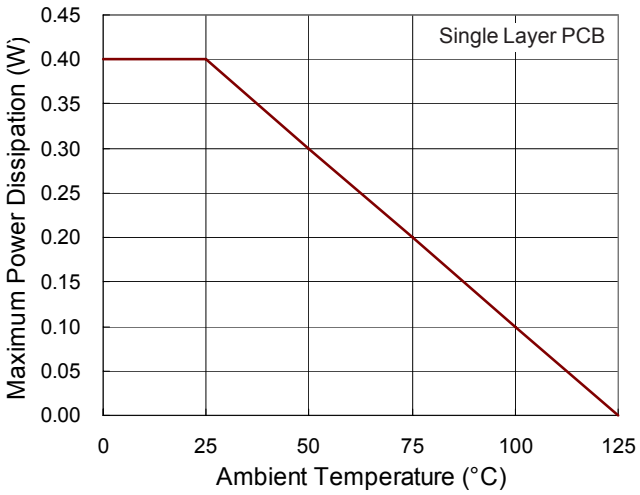
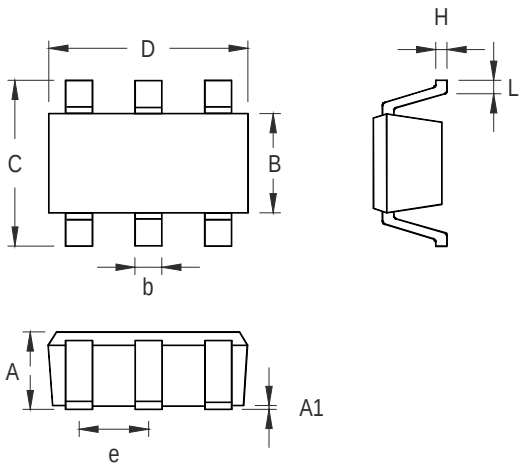


Figure 1. Derating Curves for RT9823 Package

Outline Dimension



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.889	1.295	0.031	0.051
A1	0.000	0.152	0.000	0.006
B	1.397	1.803	0.055	0.071
b	0.250	0.560	0.010	0.022
C	2.591	2.997	0.102	0.118
D	2.692	3.099	0.106	0.122
e	0.838	1.041	0.033	0.041
H	0.080	0.254	0.003	0.010
L	0.300	0.610	0.012	0.024

SOT-23-6 Surface Mount Package

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