Low Voltage Supervisory Circuits with Watchdog & Manual Reset in 5-Lead SOT-23

Preliminary Technical Data

ADM6821–ADM6825

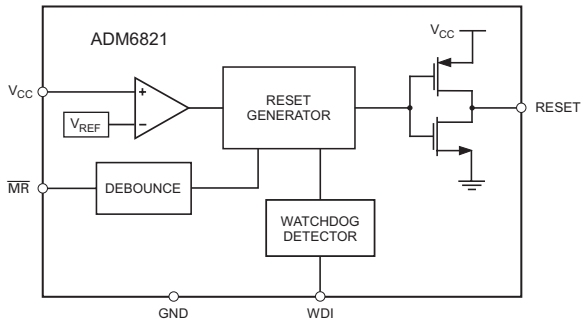
FEATURES

- Precision Low Voltage Monitoring down to 1.8V
- 9 Reset Threshold Options:
  - 1.58V to 4.63V
- 140ms (Min) Reset Timeout
- Watchdog Timer with 1.6s Timeout
- Manual Reset Input
- Reset Output Stages
  - Push-Pull Active-Low
  - Open-Drain Active-Low
  - Push-Pull Active-High
- Low Power Consumption (3µA)
- Guaranteed Reset Output valid to V_{CC}=1V
- Power Supply Glitch Immunity
- Specified from -40°C to +125°C
- 5-Lead SOT-23 Package

APPLICATIONS

- Microprocessor Systems
- Computers
- Controllers
- Intelligent Instruments
- Portable Equipment

FUNCTIONAL BLOCK DIAGRAM



GENERAL DESCRIPTION

The ADM6821-ADM6825 are supervisory circuits which monitor power supply voltage levels and code execution integrity in microprocessor-based systems. As well as providing power-on-reset signals, an on-chip watchdog timer can reset the microprocessor if it fails to strobe within a preset timeout period. A reset signal can also be asserted by means of an external push-button, through a manual reset input. The three parts feature different combinations of watchdog input, manual reset input and output stage configuration, as shown in table 1.

Each part is available in a choice of 9 reset threshold options ranging from 1.58V to 4.63V. The reset and watchdog timeout periods are fixed at 140ms (min) and 1.6s (typ), respectively.

The ADM6821-ADM6825 are available in 5-lead SOT-23 packages and typically consume only 3µA, making them suitable for use in low power portable applications.

Table 1. Selection Table

Part No.	Watchdog Timer	Manual Reset	Output Stage	
			$\overline{\text{RESET}}$	RESET
ADM6821	Yes	Yes	-	Push-Pull
ADM6822	Yes	Yes	Open-Drain	-
ADM6823	Yes	Yes	Push-Pull	-
ADM6824	Yes	-	Push-Pull	Push-Pull
ADM6825	-	Yes	Push-Pull	Push-Pull

Rev. PrA

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ADM6821–ADM6825—SPECIFICATIONS

Table 2. V_{CC}=4. 5V to 5.5V for ADM682_L/M, V_{CC}=2.7V to 3.6V for ADM682_T/S/R, V_{CC}=2.1V to 2.75V for ADM682_Z/Y, V_{CC}=1.53V to 2.0V for ADM682_W/V, T_A=-40°C to +125°C, unless otherwise noted.

Parameter	Min	Typ	Max	Units	Test Conditions/Comments
SUPPLY					
V_{CC} Operating Voltage Range	1		5.5	V	T_A=0°C to +70°C
	1.2		5.5	V	T_A=--40°C to +125°C
Supply Current (WDI and $\overline{MR}$ unconnected)		10	24	µA	V_{CC}=5.5V, no load, T_A=--40°C to +85°C
			30	µA	V_{CC}=5.5V, no load, T_A=--40°C to +125°C
		7	16	µA	V_{CC}=3.6V, no load, T_A=--40°C to +85°C
			25	µA	V_{CC}=3.6V, no load, T_A=--40°C to +125°C
		5	12	µA	V_{CC}=3.6V, no load, T_A=--40°C to +85°C (ADM6825 only)
			20	µA	V_{CC}=3.6V, no load, T_A=--40°C to +125°C (ADM6825 only)
RESET THRESHOLD VOLTAGE					
ADM682_L	4.50	4.63	4.75	V	T_A=-40°C to +85°C
	4.47		4.78	V	T_A=-40°C to +125°C
ADM682_M	4.25	4.38	4.50	V	T_A=-40°C to +85°C
	4.22		4.53	V	T_A=-40°C to +125°C
ADM682_T	3.00	3.08	3.15	V	T_A=-40°C to +85°C
	2.97		3.17	V	T_A=-40°C to +125°C
ADM682_S	2.85	2.93	3.00	V	T_A=-40°C to +85°C
	2.83		3.02	V	T_A=-40°C to +125°C
ADM682_R	2.55	2.63	2.70	V	T_A=-40°C to +85°C
	2.53		2.72	V	T_A=-40°C to +125°C
ADM682_Z	2.25	2.32	2.38	V	T_A=-40°C to +85°C
	2.24		2.40	V	T_A=-40°C to +125°C
ADM682_Y	2.12	2.19	2.25	V	T_A=-40°C to +85°C
	2.11		2.27	V	T_A=-40°C to +125°C
ADM682_W	1.62	1.67	1.71	V	T_A=-40°C to +85°C
	1.61		1.72	V	T_A=-40°C to +125°C
ADM682_V	1.52	1.58	1.62	V	T_A=-40°C to +85°C
RESET THRESHOLD TEMPERATURE COEFFICIENT		60		ppm/°C	
RESET THRESHOLD HYSTERESIS		2x V_{TH}		mV	
RESET TIMEOUT PERIOD	140	200	280	ms	
	100		320	ms	
V_{CC} TO RESET DELAY		20		µs	V_{CC} = V_{TH} to (V_{TH} - 100mV)
$\overline{RESET}$ Output Voltage Low			0.4	V	V_{CC}>=4.25V, I_{SINK}=3.2mA, reset asserted
			0.3	V	V_{CC}>=2.55V, I_{SINK}=1.2mA, reset asserted
			0.3	V	V_{CC}>=1.25V, I_{SINK}=100uA, reset asserted
			0.3	V	V_{CC}>=1.0V, I_{SINK}=50uA, reset asserted, T_A=-40°C to +85°C
$\overline{RESET}$ Output Voltage High	0.8×V_{CC}			V	V_{CC}>=4.75V, I_{SOURCE}=800uA, reset not asserted

Parameter	Min	Typ	Max	Units	Test Conditions/Comments
	$0.8\times V_{CC}$			V	V_{CC}>=3.15V, I_{SOURCE}=500uA, reset not asserted
	$0.8\times V_{CC}$			V	V_{CC}>=1.8V, I_{SOURCE}=200uA, reset not asserted
RESET Output Voltage High	$0.8\times V_{CC}$				V_{CC}>=4.25V, I_{SOURCE}=800uA, reset asserted
	$0.8\times V_{CC}$				V_{CC}>=2.55V, I_{SOURCE}=500uA, reset asserted
	$0.8\times V_{CC}$				V_{CC}>=1.50V, I_{SOURCE}=100uA, reset asserted
	$0.8\times V_{CC}$				V_{CC}>=1.0V, I_{SOURCE}=1uA, reset asserted, T_A=-40°C to +85°C
RESET Output Voltage Low			0.4	V	V_{CC}>=4.75V, I_{SINK}=3.2mA, reset not asserted
			0.3	V	V_{CC}>=3.15V, I_{SINK}=1.2mA, reset not asserted
			0.3	V	V_{CC}>=1.8V, I_{SINK}=500uA, reset not asserted
WATCHDOG INPUT (ADM6821-ADM6824)					
Watchdog Timeout Period	1.12	1.6	2.40	s	
WDI Pulse Width	50			ns	V_{IL}=0.4V, $V_{IH}=0.8\times V_{CC}$,
WDI Input Threshold					
V_{IL}			$0.3xV_{CC}$	V	
V_{IH}	$0.7xV_{CC}$			V	
WDI Input Current		120	160	µA	V_{WDI}= V_{CC}, time average
	-20	-15		µA	V_{WDI}=0, time average
MANUAL RESET INPUT (ADM6821-ADM6823/ADM6825)					
$\overline{MR}$ Input Threshold			$0.3xV_{CC}$	V	
	$0.7xV_{CC}$			V	
$\overline{MR}$ Input Pulse Width	1			µs	
$\overline{MR}$ Glitch Rejection		100		ns	
$\overline{MR}$ Pull-up Resistance	25	50	75	kΩ	
$\overline{MR}$ to Reset Delay		200		ns	

ABSOLUTE MAXIMUM RATINGS

Table 3. T_A = 25°C unless otherwise noted.

Parameter	Rating
V_{CC}	-0.3V to +6V
Output Current (RESET, $\overline{RESET}$)	20mA
Operating Temperature Range	-40°C to +125°C
Storage Temperature Range	-65°C to +150°C
θ_{JA} Thermal Impedance	270°C/W
Lead Temperature	
Soldering (10 sec)	300°C
Vapour Phase (60 sec)	215°C
Infrared (15 sec)	220°C

Stresses above those listed under Absolute 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 section of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

PIN CONFIGURATIONS AND FUNCTIONAL DESCRIPTIONS

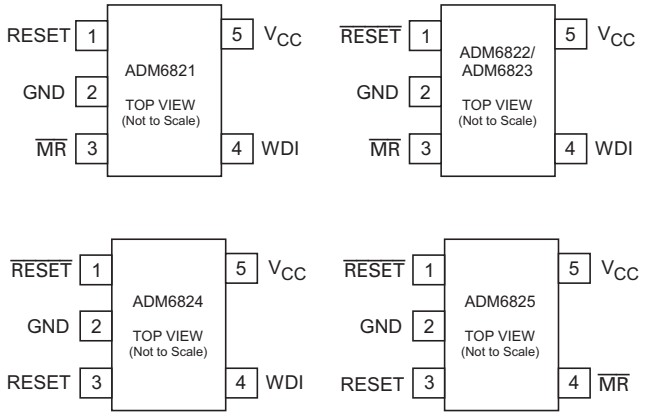

Table 4. Pin Functional Descriptions

Pin No.	Name	Description
1	$\overline{\text{RESET}}$ (ADM6822/23/24/25)	Active-Low Reset Output, which is asserted whenever V_{CC} is below the reset.threshold, V_{TH}. Open-Drain Output Stage for ADM6822. Push-Pull Output Stage for ADM6823/24/25.
	RESET (ADM6821)	Active-High Reset Output
2	GND	Ground
3	$\overline{\text{MR}}$ (ADM6821/22/23)	Manual Reset Input. This is an active-low input which, when forced low for at least 1µs, generates a reset. Features a 52kΩ internal pull-up.
	RESET (ADM6824/ADM6825)	Active-High Push-Pull Reset Output.
4	WDI (ADM6821/22/23/24)	Watchdog Input. Generates a reset if the voltage on the pin remains low or high for the duration of the watchdog timeout. The timer is cleared if a logic transition occurs on this pin or if a reset is generated.
	$\overline{\text{MR}}$ (ADM6825)	Manual Reset Input.
5	V_{CC}	Power Supply Voltage being Monitored

ESD CAUTION

ESD (electrostatic discharge) sensitive device. Electrostatic charges as high as 4000 V readily accumulate on the human body and test equipment and can discharge without detection. Although this product features proprietary ESD protection circuitry, permanent damage may occur on devices subjected to high energy electrostatic discharges. Therefore, proper ESD precautions are recommended to avoid performance degradation or loss of functionality.

ORDERING GUIDE

Model	Reset Threshold (V)	Temperature Range	Quantity	Package Type	Branding
ADM6821LART-RL	4.63	-40°C to +125°C	10k	SOT-23-5	N0A
ADM6821LART-RL7	4.63	-40°C to +125°C	3k	SOT-23-5	N0A
ADM6821MART-RL	4.38	-40°C to +125°C	10k	SOT-23-5	N0A
ADM6821MART-RL7	4.38	-40°C to +125°C	3k	SOT-23-5	N0A
ADM6821TART-RL	3.08	-40°C to +125°C	10k	SOT-23-5	N0A
ADM6821TART-RL7	3.08	-40°C to +125°C	3k	SOT-23-5	N0A
ADM6821SART-RL	2.93	-40°C to +125°C	10k	SOT-23-5	N0A
ADM6821SART-RL7	2.93	-40°C to +125°C	3k	SOT-23-5	N0A
ADM6821RART-RL	2.63	-40°C to +125°C	10k	SOT-23-5	N0A
ADM6821RART-RL7	2.63	-40°C to +125°C	3k	SOT-23-5	N0A
ADM6821ZART-RL	2.32	-40°C to +125°C	10k	SOT-23-5	N0A
ADM6821ZART-RL7	2.32	-40°C to +125°C	3k	SOT-23-5	N0A
ADM6821YART-RL	2.19	-40°C to +125°C	10k	SOT-23-5	N0A
ADM6821YART-RL7	2.19	-40°C to +125°C	3k	SOT-23-5	N0A
ADM6821WART-RL	1.67	-40°C to +125°C	10k	SOT-23-5	N0A
ADM6821WART-RL7	1.67	-40°C to +125°C	3k	SOT-23-5	N0A
ADM6821VART-RL	1.58	-40°C to +125°C	10k	SOT-23-5	N0A
ADM6821VART-RL7	1.58	-40°C to +125°C	3k	SOT-23-5	N0A
ADM6822LART-RL	4.63	-40°C to +125°C	10k	SOT-23-5	N0B
ADM6822LART-RL7	4.63	-40°C to +125°C	3k	SOT-23-5	N0B
ADM6822MART-RL	4.38	-40°C to +125°C	10k	SOT-23-5	N0B
ADM6822MART-RL7	4.38	-40°C to +125°C	3k	SOT-23-5	N0B
ADM6822TART-RL	3.08	-40°C to +125°C	10k	SOT-23-5	N0B
ADM6822TART-RL7	3.08	-40°C to +125°C	3k	SOT-23-5	N0B
ADM6822SART-RL	2.93	-40°C to +125°C	10k	SOT-23-5	N0B
ADM6822SART-RL7	2.93	-40°C to +125°C	3k	SOT-23-5	N0B
ADM6822RART-RL	2.63	-40°C to +125°C	10k	SOT-23-5	N0B
ADM6822RART-RL7	2.63	-40°C to +125°C	3k	SOT-23-5	N0B
ADM6822ZART-RL	2.32	-40°C to +125°C	10k	SOT-23-5	N0B
ADM6822ZART-RL7	2.32	-40°C to +125°C	3k	SOT-23-5	N0B
ADM6822YART-RL	2.19	-40°C to +125°C	10k	SOT-23-5	N0B
ADM6822YART-RL7	2.19	-40°C to +125°C	3k	SOT-23-5	N0B
ADM6822WART-RL	1.67	-40°C to +125°C	10k	SOT-23-5	N0B
ADM6822WART-RL7	1.67	-40°C to +125°C	3k	SOT-23-5	N0B
ADM6822VART-RL	1.58	-40°C to +125°C	10k	SOT-23-5	N0B
ADM6822VART-RL7	1.58	-40°C to +125°C	3k	SOT-23-5	N0B
ADM6823LART-RL	4.63	-40°C to +125°C	10k	SOT-23-5	N0C
ADM6823LART-RL7	4.63	-40°C to +125°C	3k	SOT-23-5	N0C
ADM6823MART-RL	4.38	-40°C to +125°C	10k	SOT-23-5	N0C
ADM6823MART-RL7	4.38	-40°C to +125°C	3k	SOT-23-5	N0C
ADM6823TART-RL	3.08	-40°C to +125°C	10k	SOT-23-5	N0C
ADM6823TART-RL7	3.08	-40°C to +125°C	3k	SOT-23-5	N0C
ADM6823SART-RL	2.93	-40°C to +125°C	10k	SOT-23-5	N0C
ADM6823SART-RL7	2.93	-40°C to +125°C	3k	SOT-23-5	N0C
ADM6823RART-RL	2.63	-40°C to +125°C	10k	SOT-23-5	N0C
ADM6823RART-RL7	2.63	-40°C to +125°C	3k	SOT-23-5	N0C
ADM6823ZART-RL	2.32	-40°C to +125°C	10k	SOT-23-5	N0C
ADM6823ZART-RL7	2.32	-40°C to +125°C	3k	SOT-23-5	N0C
ADM6823YART-RL	2.19	-40°C to +125°C	10k	SOT-23-5	N0C
ADM6823YART-RL7	2.19	-40°C to +125°C	3k	SOT-23-5	N0C

ORDERING GUIDE (CONTD.)

Model	Reset Threshold (V)	Temperature Range	Quantity	Package Type	Branding
ADM6823WART-RL	1.67	-40°C to +125°C	10k	SOT-23-5	N0C
ADM6823WART-RL7	1.67	-40°C to +125°C	3k	SOT-23-5	N0C
ADM6823VART-RL	1.58	-40°C to +125°C	10k	SOT-23-5	N0C
ADM6823VART-RL7	1.58	-40°C to +125°C	3k	SOT-23-5	N0C
ADM6824LART-RL	4.63	-40°C to +125°C	10k	SOT-23-5	N0D
ADM6824LART-RL7	4.63	-40°C to +125°C	3k	SOT-23-5	N0D
ADM6824MART-RL	4.38	-40°C to +125°C	10k	SOT-23-5	N0D
ADM6824MART-RL7	4.38	-40°C to +125°C	3k	SOT-23-5	N0D
ADM6824TART-RL	3.08	-40°C to +125°C	10k	SOT-23-5	N0D
ADM6824TART-RL7	3.08	-40°C to +125°C	3k	SOT-23-5	N0D
ADM6824SART-RL	2.93	-40°C to +125°C	10k	SOT-23-5	N0D
ADM6824SART-RL7	2.93	-40°C to +125°C	3k	SOT-23-5	N0D
ADM6824RART-RL	2.63	-40°C to +125°C	10k	SOT-23-5	N0D
ADM6824RART-RL7	2.63	-40°C to +125°C	3k	SOT-23-5	N0D
ADM6824ZART-RL	2.32	-40°C to +125°C	10k	SOT-23-5	N0D
ADM6824ZART-RL7	2.32	-40°C to +125°C	3k	SOT-23-5	N0D
ADM6824YART-RL	2.19	-40°C to +125°C	10k	SOT-23-5	N0D
ADM6824YART-RL7	2.19	-40°C to +125°C	3k	SOT-23-5	N0D
ADM6824WART-RL	1.67	-40°C to +125°C	10k	SOT-23-5	N0D
ADM6824WART-RL7	1.67	-40°C to +125°C	3k	SOT-23-5	N0D
ADM6824VART-RL	1.58	-40°C to +125°C	10k	SOT-23-5	N0D
ADM6824VART-RL7	1.58	-40°C to +125°C	3k	SOT-23-5	N0D
ADM6825LART-RL	4.63	-40°C to +125°C	10k	SOT-23-5	N0E
ADM6825LART-RL7	4.63	-40°C to +125°C	3k	SOT-23-5	N0E
ADM6825MART-RL	4.38	-40°C to +125°C	10k	SOT-23-5	N0E
ADM6825MART-RL7	4.38	-40°C to +125°C	3k	SOT-23-5	N0E
ADM6825TART-RL	3.08	-40°C to +125°C	10k	SOT-23-5	N0E
ADM6825TART-RL7	3.08	-40°C to +125°C	3k	SOT-23-5	N0E
ADM6825SART-RL	2.93	-40°C to +125°C	10k	SOT-23-5	N0E
ADM6825SART-RL7	2.93	-40°C to +125°C	3k	SOT-23-5	N0E
ADM6825RART-RL	2.63	-40°C to +125°C	10k	SOT-23-5	N0E
ADM6825RART-RL7	2.63	-40°C to +125°C	3k	SOT-23-5	N0E
ADM6825ZART-RL	2.32	-40°C to +125°C	10k	SOT-23-5	N0E
ADM6825ZART-RL7	2.32	-40°C to +125°C	3k	SOT-23-5	N0E
ADM6825YART-RL	2.19	-40°C to +125°C	10k	SOT-23-5	N0E
ADM6825YART-RL7	2.19	-40°C to +125°C	3k	SOT-23-5	N0E
ADM6825WART-RL	1.67	-40°C to +125°C	10k	SOT-23-5	N0E
ADM6825WART-RL7	1.67	-40°C to +125°C	3k	SOT-23-5	N0E
ADM6825VART-RL	1.58	-40°C to +125°C	10k	SOT-23-5	N0E
ADM6825VART-RL7	1.58	-40°C to +125°C	3k	SOT-23-5	N0E

OUTLINE DIMENSIONS

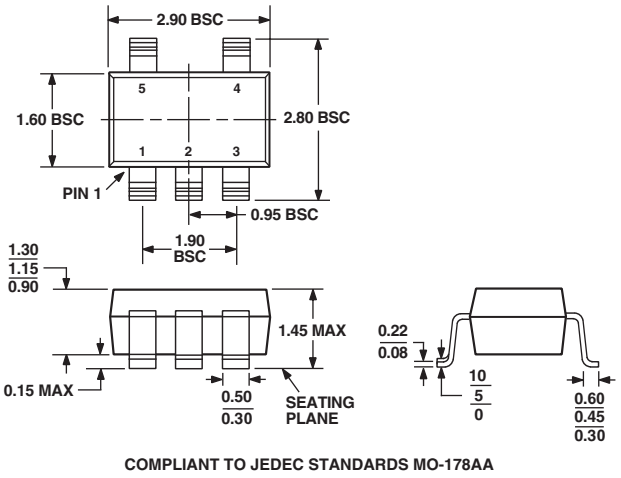

Figure 1. 5-Lead Small Outline Transistor Package [SOT-23]

(RT-5)

Dimensions shown in millimeters

PR04535-0-2/04(PrA)