

## General Description

The AAT3560/2/4 series of PowerManager products are part of AnalogicTech's Total Power Management IC™ (TPMIC™) product family. These voltage detectors are ideal for monitoring voltage supplies in portable systems, where extended battery life is critical. They provide a low-cost, reliable solution by eliminating several external components. The AAT3560 series operates by monitoring the system power supply voltage. When the input voltage drops below a fixed threshold, the device output changes state depending upon configuration. When the input voltage rises above the threshold, the device output reverts back to the previous state. The AAT3560 series is available with three different output stages: AAT3560 push-pull active high output; AAT3562 push-pull active low output; and AAT3564 open drain active low output.

The quiescent supply current is extremely low, typically 1µA, making it ideal for portable battery-operated equipment.

AAT3560/2/4 devices are available in a Pb-free, 3-pin SOT23 package and are specified over the -40°C to +85°C operating temperature range.

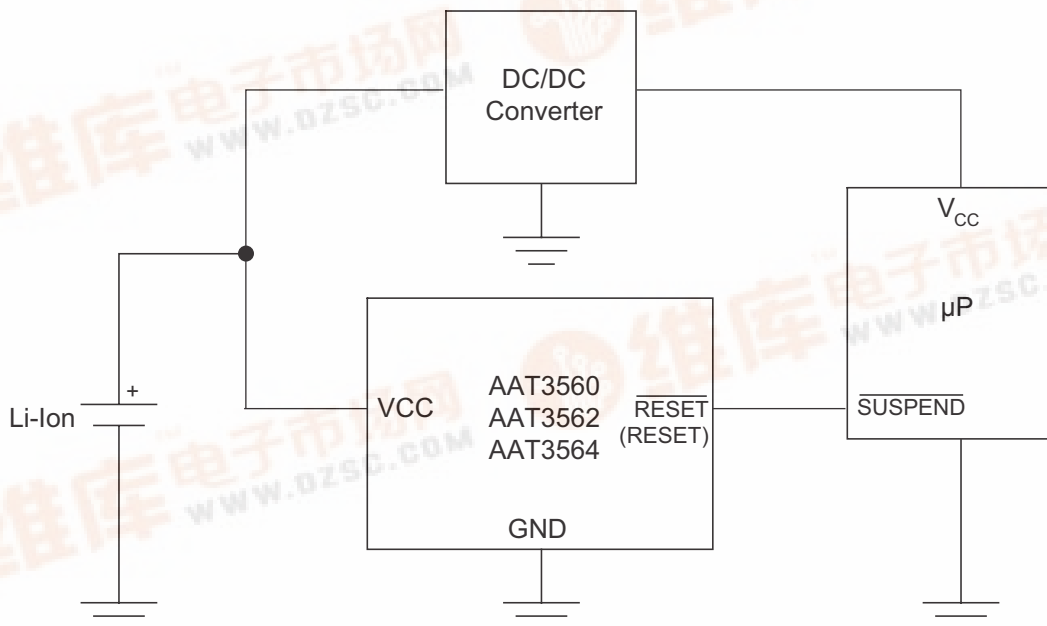
## Features

- Input Voltage Range: 1.2V to 5.5V
- Operates Down to 1.2V
- Extremely Low Quiescent Current: Less Than 2µA
- High Accuracy Detection Threshold: ±1.5%
- Monitor Power Supply Voltages
  - Fixed Thresholds from 2.2V to 4.6V
- Active Noise Suppression
- Available Output Configurations:
  - Open-Drain Output
  - CMOS Active High Output
  - CMOS Active Low Output
- Temperature Range: -40°C to +85°C
- 3-Pin SOT23 Package

## Applications

- Battery Charger Circuits
- Battery Packs
- Data Acquisition Systems
- Intelligent Instruments
- Notebook Computers
- Portable Electronics
- Power Supplies

## Typical Application



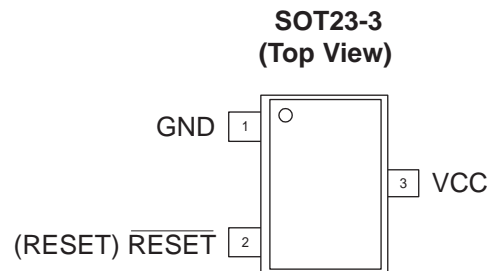
## Pin Descriptions

| Pin # | Symbol                              | Function   |
|-------|-------------------------------------|--|
| 1     | GND                                 | Ground   |
| 2     | RESET ( $\overline{\text{RESET}}$ ) | Reset output. See table below for output configurations. |
| 3     | VCC                                 | Supply voltage (+1.2V to +5.5V).                         |

## Part Number Descriptions

| SOT23-3 Part Number | Part Description                                 |
|---------------------|--|
| AAT3560             | RESET Push Pull Active High                      |
| AAT3562             | $\overline{\text{RESET}}$ Push Pull Active Low   |
| AAT3564             | $\overline{\text{RESET}}$ Open Drain, Active Low |

## Pin Configuration



## Absolute Maximum Ratings<sup>1</sup>

T<sub>A</sub> = 25°C, unless otherwise noted.

| Symbol             | Description  | Value                        | Units |
|--------------------|--|------------------------------|-------|
| V <sub>CC</sub>    | V <sub>CC</sub> to GND                               | -0.3 to 5.5                  | V     |
| V <sub>RESET</sub> | RESET to GND (Push-Pull Output)                      | -0.3 to V <sub>CC</sub> +0.3 | V     |
|                    | $\overline{\text{RESET}}$ to GND (Open-Drain Output) | -0.3 to 5.5                  |       |
| I <sub>MAX</sub>   | Maximum Continuous Input Current                     | 20                           | mA    |
| I <sub>RESET</sub> | RESET/ $\overline{\text{RESET}}$ Current             | 20                           | mA    |
| T <sub>J</sub>     | Operating Junction Temperature Range                 | -40 to 150                   | °C    |
| T <sub>LEAD</sub>  | Maximum Soldering Temperature (at Leads) for 10s     | 300                          | °C    |

## Thermal Information<sup>2</sup>

| Symbol          | Description                | Value | Units |
|-----------------|----------------------------|-------|-------|
| θ <sub>JA</sub> | Maximum Thermal Resistance | 200   | °C/W  |
| P <sub>D</sub>  | Maximum Power Dissipation  | 320   | mW    |

1. Stresses above those listed in Absolute Maximum Ratings may cause permanent damage to the device. Functional operation at conditions other than the operating conditions specified is not implied. Only one Absolute Maximum Rating should be applied at any one time.
2. Mounted on an FR4 board.

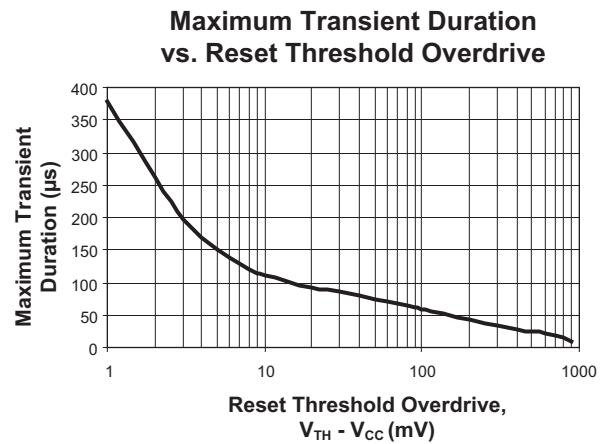
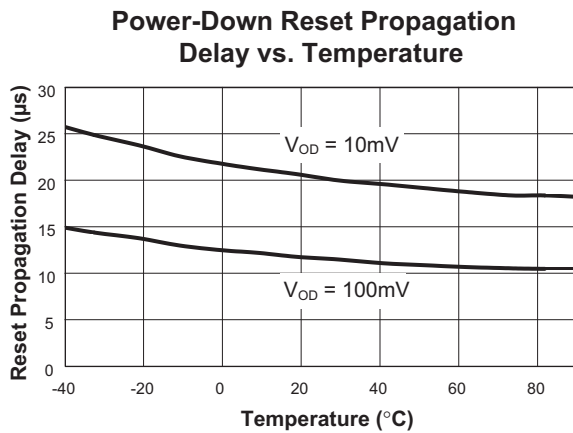
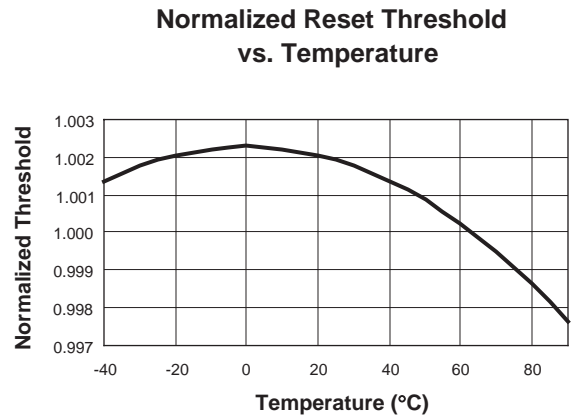
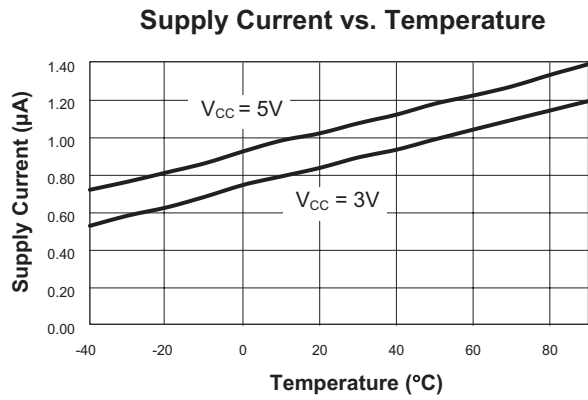
### Electrical Characteristics

$V_{IN} = 5V$ ;  $T_A = -40^{\circ}C$  to  $+85^{\circ}C$ , unless otherwise noted. Typical values are at  $T_A = 25^{\circ}C$ ;  $V_{CC} = 5V$  for 4.63/4.38V versions;  $V_{CC} = 3.3V$  for 3.08/2.93V versions;  $V_{CC} = 3.0V$  for 2.63V version;  $V_{CC} = 2.5V$  for 2.32/2.2V versions.

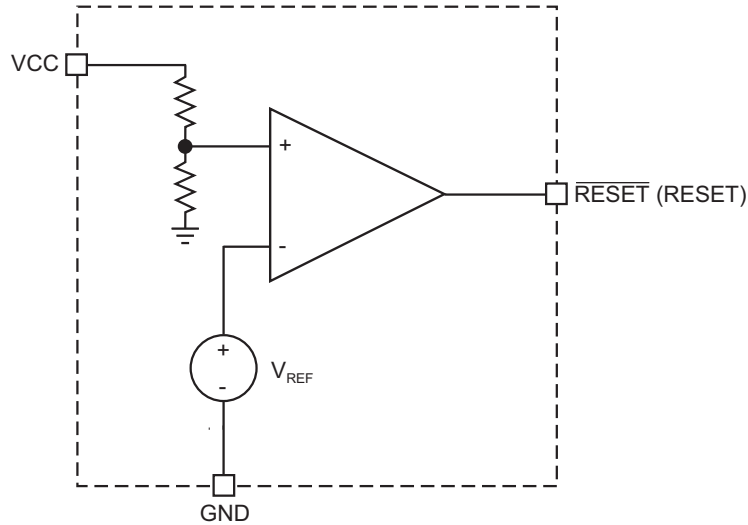
| Symbol              | Description                                  | Conditions  | Min              | Typ      | Max              | Units            |
|---------------------|--|---|------------------|----------|------------------|------------------|
| $V_{CC}$            | Operation Voltage                            | $T_A = 0^{\circ}C$ to $+70^{\circ}C$  | 1.0              |          | 5.5              | V                |
|                     |  | $T_A = -40^{\circ}C$ to $+85^{\circ}C$  | 1.2              |          | 5.5              |                  |
| $I_Q$               | Quiescent Current                            | $V_{CC} = 3V$   |                  | 0.85     | 2                | $\mu A$          |
|                     |  | $V_{CC} = 5.5V$   |                  | 1.05     | 3                |                  |
| $V_{TH}$            | RESET Threshold (Table 1)                    | $T_A = 25^{\circ}C$   | $V_{TH} - 1.5\%$ | $V_{TH}$ | $V_{TH} + 1.5\%$ | V                |
|                     |  | $T_A = -40^{\circ}C$ to $+85^{\circ}C$  | $V_{TH} - 2.5\%$ | $V_{TH}$ | $V_{TH} + 2.5\%$ |                  |
| $dV_{TH}/^{\circ}C$ | RESET Threshold Tempco                       |   |                  | 40       |                  | ppm/ $^{\circ}C$ |
| $V_{OL}$            | RESET Low Output Voltage<br>AAT3562, AAT3564 | $I_{SINK} = 1.2mA$ , $V_{CC} = V_{TH(min)}$ ,<br>$V_{TH} \leq 3.08V$ , RESET Asserted     |                  |          | 0.3              | V                |
|                     |  | $I_{SINK} = 3.2mA$ , $V_{CC} = V_{TH(min)}$ ,<br>$V_{TH} > 3.08V$ , RESET Asserted        |                  |          | 0.4              |                  |
| $V_{OH}$            | RESET High Output Voltage,<br>AAT3562        | $I_{SOURCE} = 800\mu A$ , $V_{TH} > 3.08V$ ,<br>$V_{CC} > V_{TH(max)}$                    | $V_{CC} - 1.5$   |          |                  | V                |
|                     |  | $I_{SOURCE} = 500\mu A$ , $V_{TH} \leq 3.08V$ ,<br>$V_{CC} > V_{TH(max)}$                 | $0.8 V_{CC}$     |          |                  |                  |
| $V_{OL}$            | RESET Low Output Voltage<br>AAT3560          | $I_{SINK} = 1.2mA$ , $V_{CC} > V_{TH(max)}$ ,<br>$V_{TH} \leq 3.08V$ , RESET Not Asserted |                  |          | 0.3              | V                |
|                     |  | $I_{SINK} = 3.2mA$ , $V_{CC} > V_{TH(max)}$ ,<br>$V_{TH} > 3.08V$ , RESET Not Asserted    |                  |          | 0.4              |                  |
| $V_{OH}$            | RESET High Output Voltage<br>AAT3560         | $I_{SOURCE} = 500\mu A$ , $V_{CC} >$<br>$2.1V$ , RESET Asserted                           | $0.8V_{CC}$      |          |                  | V                |
|                     |  | $I_{SOURCE} = 50\mu A$ , $V_{CC} >$<br>$1.2V$ , RESET Asserted                            | $0.8V_{CC}$      |          |                  |                  |
| $I_{DOFF}$          | RESET Leakage Current,<br>AAT3564            | $V_{CC} > V_{TH}$   |                  |          | 1                | $\mu A$          |

## Typical Characteristics

$V_{IN} = 5V$ ;  $T_A = 25^\circ C$ , unless otherwise noted.



## Functional Block Diagram



## Functional Description

### General

The AAT3560 series of NanoPower voltage detectors monitor a system power supply and assert an output signal (low for AAT3562 and AAT3564; high for AAT3560) when the supply voltage drops below a factory-programmed threshold voltage. The output signal will remain valid until the input voltage

falls below the minimum operating voltage of 1V. Below this value, the output voltage is undefined. When the input voltage rises above the factory-programmed threshold, the output signal will resume its inactive state. An active noise-suppression circuit in the AAT3560/2/4 gives the output excellent immunity from power supply transients. See graph titled "Maximum Transient Duration vs. Reset Threshold Overdrive" for further information.

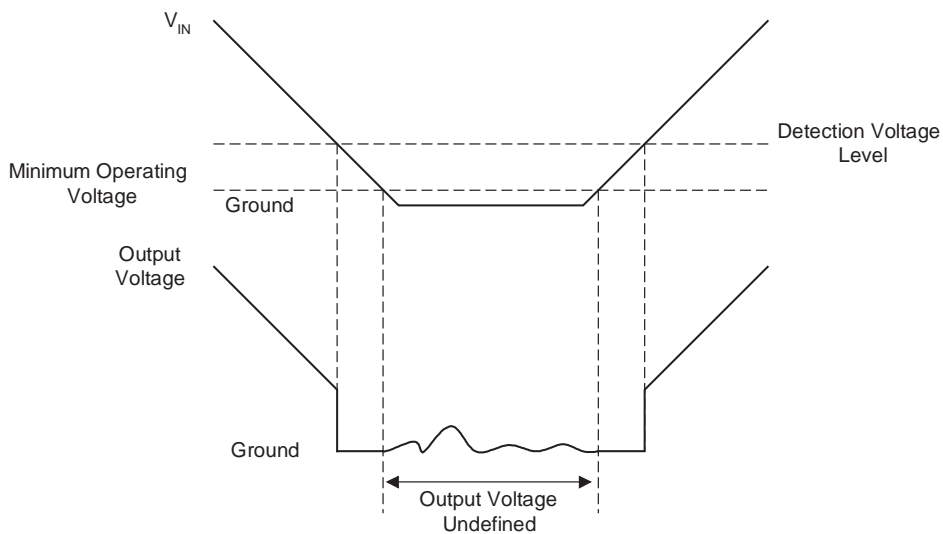


Figure 1: AAT3562 Timing Diagram.

## Factory-Trimmed Reset Thresholds<sup>1</sup> and Ordering Information

| Ordering Part Number <sup>2</sup> | Package Marking Code <sup>3</sup> | Reset Threshold Voltage, $V_{TH}$ (V) |       |       |   |       |
|-----------------------------------|-----------------------------------|---------------------------------------|-------|-------|---|-------|
|                                   |                                   | $T_A = 25^\circ\text{C}$              |       |       | $T_A = -40^\circ\text{C to } +85^\circ\text{C}$ |       |
|                                   |                                   | MIN                                   | TYP   | MAX   | MIN   | MAX   |
| <b>AAT3560IGY-2.20-T1</b>         | EBXYY                             | 2.167                                 | 2.200 | 2.233 | 2.145   | 2.255 |
| <b>AAT3562IGY-2.20-T1</b>         | FWXYY                             |                                       |       |       |   |       |
| <b>AAT3562IGY-2.30-T1</b>         | FXXYY                             | 2.266                                 | 2.300 | 2.335 | 2.243   | 2.358 |
| <b>AAT3560IGY-2.50-T1</b>         | ECXYY                             | 2.463                                 | 2.500 | 2.538 | 2.438   | 2.563 |
| <b>AAT3562IGY-2.50-T1</b>         | IPXYY                             |                                       |       |       |   |       |
| <b>AAT3562IGY-2.70-T1</b>         | FOXYY                             | 2.660                                 | 2.700 | 2.741 | 2.633   | 2.768 |
| <b>AAT3562IGY-3.10-T1</b>         | KOXYY                             | 3.054                                 | 3.100 | 3.147 | 3.023   | 3.178 |

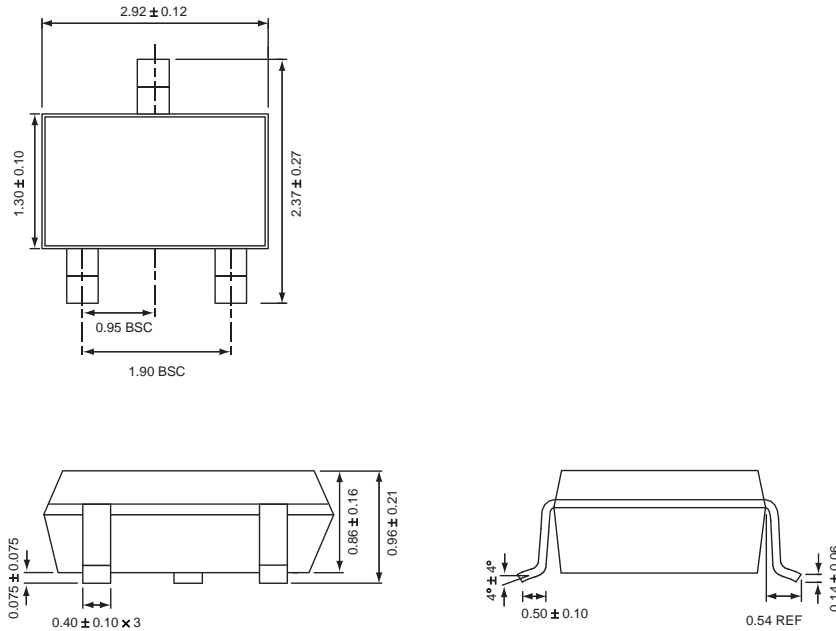


All AnalogicTech products are offered in Pb-free packaging. The term “Pb-free” means semiconductor products that are in compliance with current RoHS standards, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. For more information, please visit our website at <http://www.analogictech.com/pbfree>.

1 Contact local sales office for custom trim options.  
2. Sample stock is generally held on part numbers listed in **BOLD**.  
3. XYY = assembly and date code.

**Package Information**

**SOT23-3**



All dimensions in millimeters.

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