

General Description

The AAT4644 is a four-channel resettable fuse. It utilizes independent current-limited and thermally protected P-channel MOSFETs to protect against short circuits. Each switch's current limit is factory programmed at 1A. Additional protection is provided with undervoltage lockout; the switches are turned off when the input voltage drops below a preset level. The quiescent supply current is typically 20µA. The AAT4644 is a flexible solution, allowing system designers to gang outputs together for lower $R_{DS(ON)}$ and higher current limit.

The AAT4644 is available in 8 pin TSSOP or SOP packages, specified over -40 to 85°C.

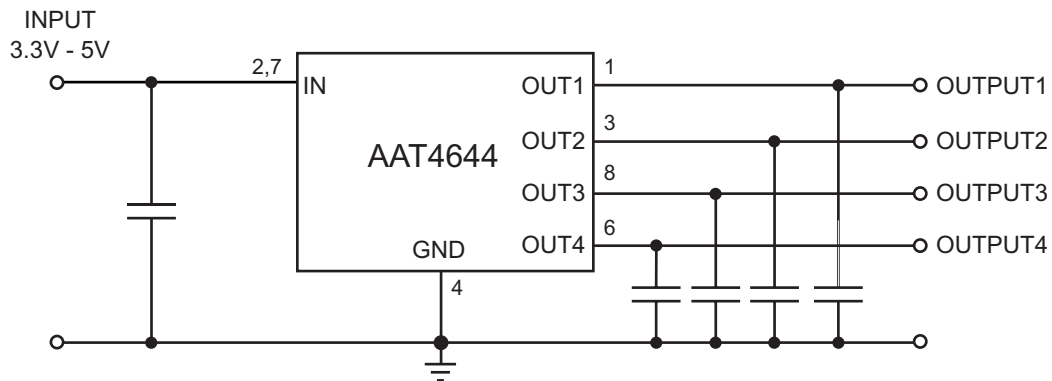
Features

- 500mA per channel steady state
- 4 X 1A current limit trip point
- Over-temp protection
- Fast transient response:
 - 1µs (typ) response to short circuit
- 100mΩ typical $R_{DS(ON)}$
- Undervoltage Lockout
- Temp range -40 to 85°C
- 8 pin TSSOP or SOP packages

Applications

- USB ports
- Peripheral ports
- Desktop PCs

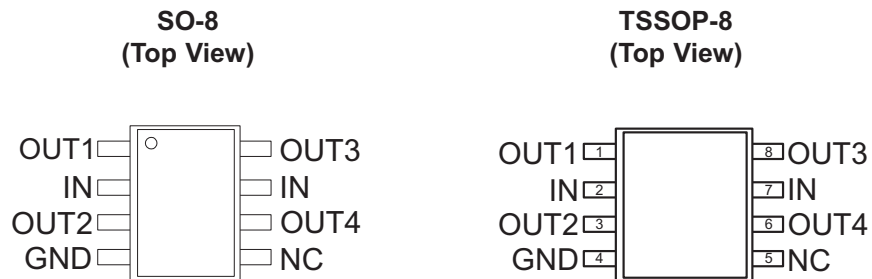
Typical Application



Pin Descriptions

| Pin # | Symbol | Function |
|-------|--------|--|
| 1 | OUT1 | Channel 1 output |
| 2, 7 | IN | These pins are the input supply to the circuit |
| 3 | OUT2 | Channel 2 output |
| 4 | GND | Ground connection |
| 5 | NC | Not internally connected |
| 6 | OUT4 | Channel 4 output |
| 8 | OUT3 | Channel 3 output |

Pin Configuration



Absolute Maximum Ratings ($T_A=25^\circ\text{C}$ unless otherwise noted)

| Symbol | Description | Value | Units |
|------------|--|--------------------|------------------|
| V_{IN} | IN to GND | -0.3 to 6 | V |
| V_{OUT} | OUT to GND | -0.3 to 6 | V |
| I_{OUT} | Output Current | Internally Limited | A |
| T_J | Operating Junction Temperature Range | -40 to 85 | $^\circ\text{C}$ |
| V_{ESD} | ESD Rating ¹ —HBM | 4000 | V |
| T_{LEAD} | Maximum Soldering Temperature (at Leads) | 300 | $^\circ\text{C}$ |

Note: 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.

Note 1: Human body model is a 100pF capacitor discharged through a 1.5k Ω resistor into each pin.

Thermal Characteristics

| Symbol | Description | Value | Units |
|---------------|----------------------------|-------|---------------------------|
| Θ_{JA} | Maximum Thermal Resistance | 100 | $^\circ\text{C}/\text{W}$ |
| P_D | Maximum Power Dissipation | 1.25 | W |

Note 2: Mounted on a demo board.

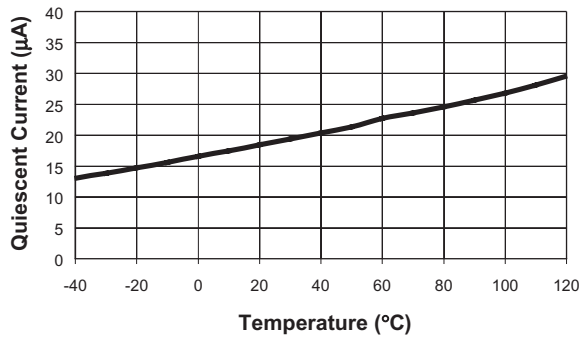
Electrical Characteristics ($V_{IN} = 5\text{V}$, $T_A = -40$ to 85°C unless otherwise noted. Typical values are at $T_A=25^\circ\text{C}$; **bold** values designate full temperature range)

| Symbol | Description | Conditions | Min | Typ | Max | Units |
|-----------------|---------------------------------|---|------------|------|------------|------------------|
| V_{IN} | Operation Voltage | | 2.7 | | 5.5 | V |
| I_Q | Quiescent Current | $V_{in} = 5\text{V}$, $I_{out} = 0$ | | 20 | 40 | μA |
| V_{UVLO} | Undervoltage Lockout | Rising edge | | 1.75 | | V |
| $V_{UVLO(hys)}$ | Undervoltage Lockout Hysteresis | | | 0.3 | | V |
| $R_{DS(ON)}$ | On-Resistance | $V_{in}=5.0\text{V}$, $T_A = 25^\circ\text{C}$ | | 100 | 125 | m Ω |
| I_{LIM} | Current Limit | Each output $OUT < IN - 1\text{V}$ | 0.6 | 1.0 | 1.5 | A |
| t_{RESP} | Current Loop Response | $V_{in}=5\text{V}$ | | 1 | | μs |
| T_{SD} | Over-temperature threshold | | | 125 | | $^\circ\text{C}$ |

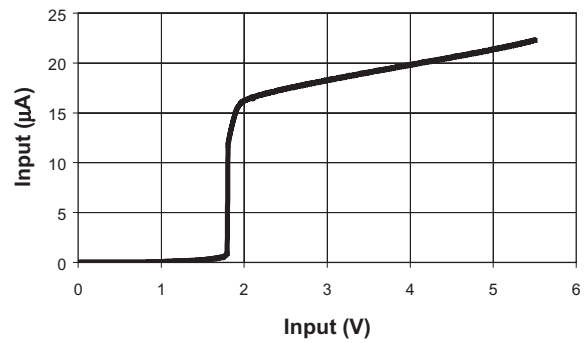
Typical Characteristics

($T_A = 25^\circ\text{C}$ unless otherwise noted)

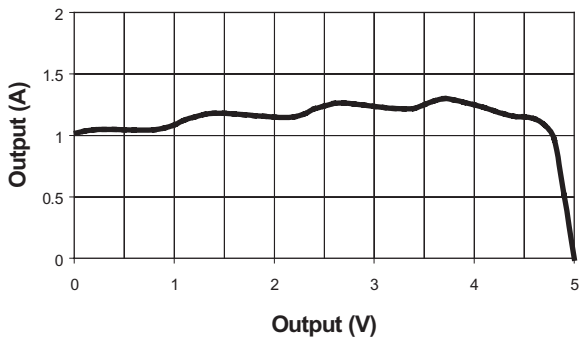
Quiescent Current vs. Temperature



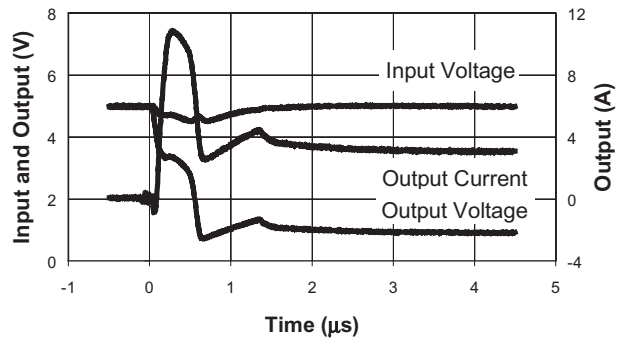
Quiescent Current



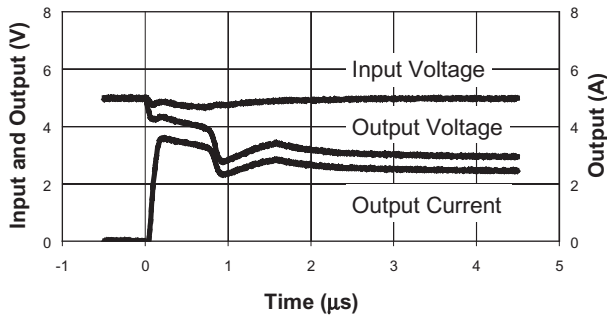
Current Limit



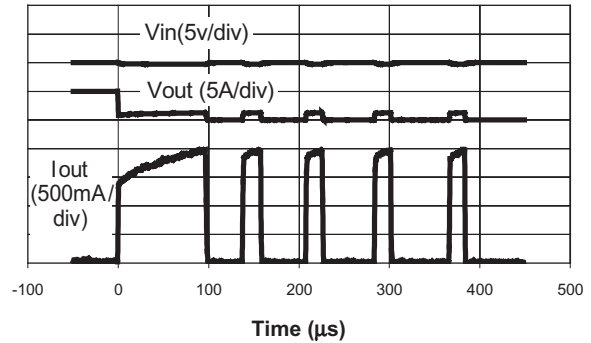
Short Circuit Through 0.3 Ohm



Short Circuit Through 0.6 Ohm

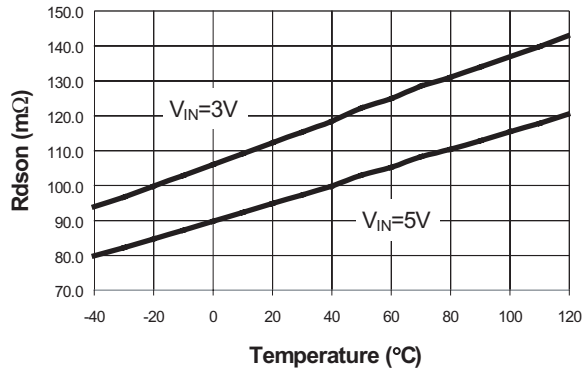


Thermal Shutdown Response 0.3 Ω Load

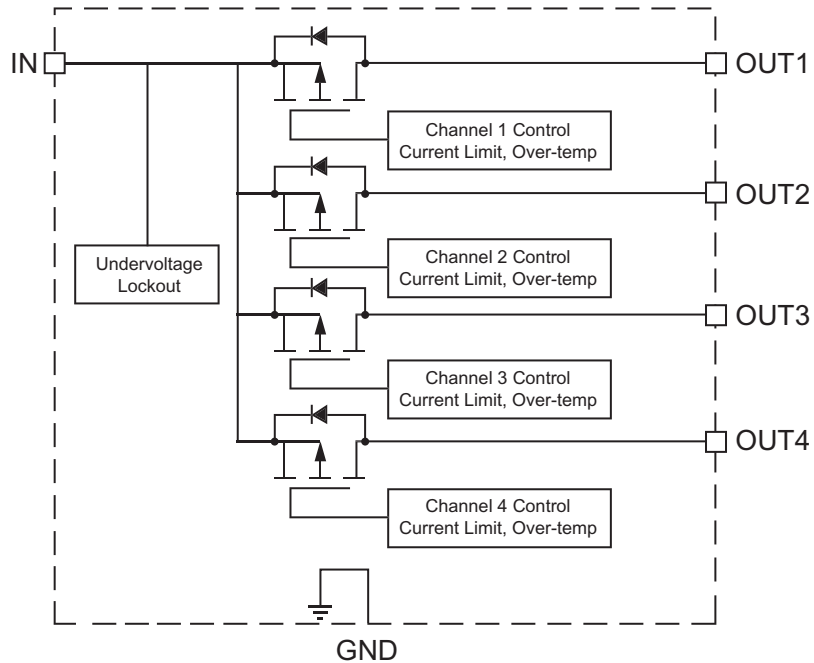


($T_A = 25^\circ\text{C}$ unless otherwise noted)

Rdson vs. Temperature



Block Diagram

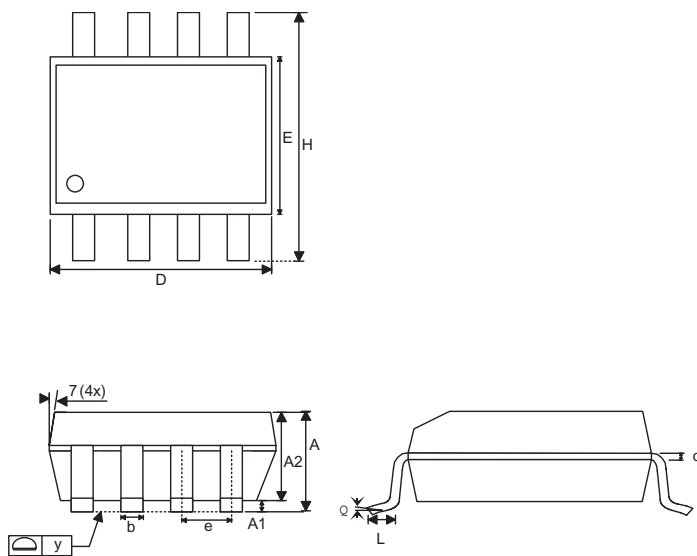


Ordering Information

| Package | Marking | Part Number | |
|---------|---------|---------------|---------------|
| | | Bulk | Tape and Reel |
| SOP8 | | AAT4644IAS-B1 | AAT4644IAS-T1 |
| TSSOP8 | | AAT4644IHS-B1 | AAT4644IHS-T1 |

Package Information

SOP-8

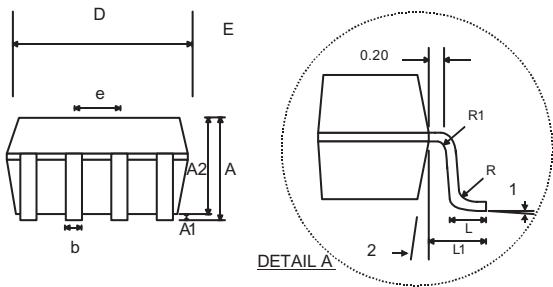
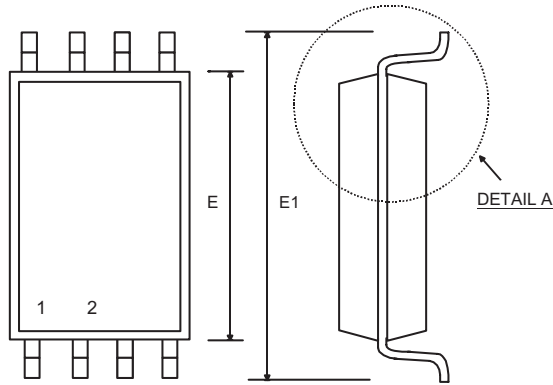


| Dim | Millimeters | | Inches | |
|------------|-------------|------|--------|-------|
| | Min | Max | Min | Max |
| A | 1.35 | 1.75 | 0.053 | 0.069 |
| A1 | 0.10 | 0.25 | 0.004 | 0.010 |
| A2 | 1.45 | | 0.057 | |
| B | 0.33 | 0.51 | 0.013 | 0.020 |
| C | 0.19 | 0.25 | 0.007 | 0.010 |
| D | 4.80 | 5.00 | 0.189 | 0.197 |
| E | 3.80 | 4.00 | 0.150 | 0.157 |
| e | 1.27 | | 0.050 | |
| H | 5.80 | 6.20 | 0.228 | 0.244 |
| L | 0.40 | 1.27 | 0.016 | 0.050 |
| Y | 0.00 | 0.10 | 0.000 | 0.004 |
| $\theta 1$ | 0° | 8° | 0° | 8° |

Note:

1. PACKAGE BODY SIZES EXCLUDE MOLD FLASH PROTRUSIONS OR GATE BURRS.
2. TOLERANCE 0.1000mm (4mil) UNLESS OTHERWISE SPECIFIED
3. COPLANARITY: 0.1000mm
4. DIMENSION L IS MEASURED IN GAGE PLANE.
5. CONTROLLING DIMENSION IS MILLIMETER; CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.

TSSOP-8



| Dim | Millimeters | | Inches | |
|------|-------------|------|-----------|-------|
| | Min | Max | Min | Max |
| A | 1.05 | 1.20 | 0.041 | 0.047 |
| A1 | 0.05 | 0.15 | 0.002 | 0.006 |
| A2 | - | 1.05 | - | 0.041 |
| b | 0.25 | 0.30 | 0.010 | 0.012 |
| c | 0.127 | | 0.005 | |
| D-8 | 2.90 | 3.10 | 0.114 | 0.122 |
| D-28 | 9.60 | 9.80 | 0.378 | 0.386 |
| E | 4.30 | 4.50 | 0.170 | 0.177 |
| E1 | 6.20 | 6.60 | 0.244 | 0.260 |
| e | 0.65 BSC | | 0.025 BSC | |
| L | 0.50 | 0.70 | 0.20 | 0.028 |
| L1 | 1.0 | | 0.039 | |
| R | 0.09 | - | 0.004 | - |
| R1 | 0.09 | - | 0.004 | - |
| θ1 | 0° | 8° | 0° | 8° |
| θ2 | 12° | | | |

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