



AAT8543 20V P-Channel Power MOSFET

General Description

The AAT8543 is a low threshold P-channel MOSFET designed for the battery, cell phone, and PDA markets. Using AnalogicTech's ultra-high-density MOSFET process and space-saving, small-outline, J-lead package, performance superior to that normally found in a TSOP-6 footprint has been squeezed into the footprint of an SC70JW-8 package.

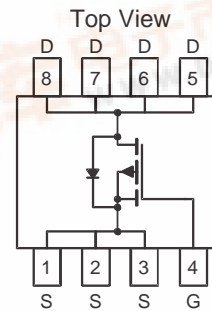
Applications

- Battery Packs
- Battery-Powered Portable Equipment
- Cellular and Cordless Telephones

Features

- Drain-Source Voltage (max): -20V
- Continuous Drain Current¹ (max): -4.2A @ 25°C
- Low On-Resistance:
 - 57mΩ @ V_{GS} = -4.5V
 - 104mΩ @ V_{GS} = -2.5V

SC70JW-8 Package



Absolute Maximum Ratings

T_A = 25°C, unless otherwise noted.

| Symbol | Description | Value | Units |
|------------------|--|-----------------------|-------|
| V _{DS} | Drain-Source Voltage | -20 | V |
| V _{GS} | Gate-Source Voltage | ±12 | V |
| I _D | Continuous Drain Current @ T _J = 150°C ¹ | T _A = 25°C | ±4.2 |
| | | T _A = 70°C | ±3.3 |
| I _{DM} | Pulsed Drain Current ² | ±20 | A |
| I _S | Continuous Source Current (Source-Drain Diode) ¹ | -1.2 | A |
| T _J | Operating Junction Temperature Range | -55 to 150 | °C |
| T _{STG} | Storage Temperature Range | -55 to 150 | °C |

Thermal Characteristics¹

| Symbol | Description | Typ | Max | Units |
|-------------------|--|-----------------------|-----|-------|
| R _{θJA} | Typical Junction-to-Ambient Steady State | 100 | 124 | °C/W |
| R _{θJA2} | Maximum Junction-to-Ambient t<5 Seconds | 62 | 76 | °C/W |
| R _{θJF} | Typical Junction-to-Foot | 35 | 42 | °C/W |
| P _D | Maximum Power Dissipation | T _A = 25°C | 1.6 | W |
| | | T _A = 70°C | 1.0 | |

1. Based on thermal dissipation from junction to ambient while mounted on a 1" x 1" PCB with optimized layout. A 5-second pulse on a 1" x 1" PCB approximates testing a device mounted on a large multi-layer PCB as in most applications. R_{θJF} + R_{θFA} = R_{θJA} where the foot thermal reference is defined as the normal solder mounting surface of the device's leads. R_{θJF} is guaranteed by design; however, R_{θFA} is determined by the PCB design. Actual maximum continuous current is limited by the application's design.

2. Pulse test: Pulse Width = 300μs.

Electrical Characteristics

$T_J = 25^\circ\text{C}$, unless otherwise noted.

| Symbol | Description | Conditions | Min | Typ | Max | Units |
|--|---|---|------|-----|-----------|------------|
| DC Characteristics | | | | | | |
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS} = 0V, I_D = -250\mu A$ | -20 | | | V |
| $R_{DS(ON)}$ | Drain-Source On-Resistance ¹ | $V_{GS} = -4.5V, I_D = -4.2A$ | | 45 | 57 | m Ω |
| | | $V_{GS} = -2.5V, I_D = -3.1A$ | | 80 | 104 | |
| $I_{D(ON)}$ | On-State Drain Current ¹ | $V_{GS} = -4.5V, V_{DS} = -5V$ (pulsed) | -20 | | | A |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS} = V_{DS}, I_D = -250\mu A$ | -0.6 | | | V |
| I_{GSS} | Gate-Body Leakage Current | $V_{GS} = \pm 12V, V_{DS} = 0V$ | | | ± 100 | nA |
| I_{DSS} | Drain Source Leakage Current | $V_{GS} = 0V, V_{DS} = -20V$ | | | -1 | μA |
| | | $V_{GS} = 0V, V_{DS} = -16V, T_J = 70^\circ\text{C}$ ² | | | -5 | |
| g_{fs} | Forward Transconductance ¹ | $V_{DS} = -5V, I_D = -4.2A$ | | 7 | | S |
| Dynamic Characteristics² | | | | | | |
| Q_G | Total Gate Charge | $V_{DS} = -10V, R_D = 2.4\Omega, V_{GS} = -4.5V$ | | 8.5 | | nC |
| Q_{GS} | Gate-Source Charge | $V_{DS} = -10V, R_D = 2.4\Omega, V_{GS} = -4.5V$ | | 1.5 | | |
| Q_{GD} | Gate-Drain Charge | $V_{DS} = -10V, R_D = 2.4\Omega, V_{GS} = -4.5V$ | | 2.8 | | |
| $t_{D(ON)}$ | Turn-On Delay | $V_{DS} = -10V, R_D = 2.4\Omega, V_{GS} = -4.5V, R_G = 6\Omega$ | | 10 | | ns |
| t_R | Turn-On Rise Time | $V_{DS} = -10V, R_D = 2.4\Omega, V_{GS} = -4.5V, R_G = 6\Omega$ | | 32 | | |
| $t_{D(OFF)}$ | Turn-Off Delay | $V_{DS} = -10V, R_D = 2.4\Omega, V_{GS} = -4.5V, R_G = 6\Omega$ | | 61 | | |
| t_F | Turn-Off Fall Time | $V_{DS} = -10V, R_D = 2.4\Omega, V_{GS} = -4.5V, R_G = 6\Omega$ | | 38 | | |
| Source-Drain Diode Characteristics | | | | | | |
| V_{SD} | Source-Drain Forward Voltage ¹ | $V_{GS} = 0, I_S = -4.2A$ | | | -1.3 | V |
| I_S | Continuous Diode Current ³ | | | | -1.2 | A |

1. Pulse test: Pulse Width = 300 μs .

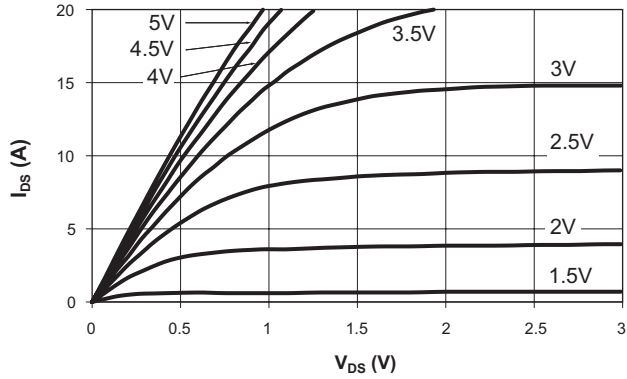
2. Guaranteed by design. Not subject to production testing.

3. Based on thermal dissipation from junction to ambient while mounted on a 1" x 1" PCB with optimized layout. A 5-second pulse on a 1" x 1" PCB approximates testing a device mounted on a large multi-layer PCB as in most applications. $R_{\theta JF} + R_{\theta FA} = R_{\theta JA}$ where the foot thermal reference is defined as the normal solder mounting surface of the device's leads. $R_{\theta JF}$ is guaranteed by design; however, $R_{\theta CA}$ is determined by the PCB design. Actual maximum continuous current is limited by the application's design.

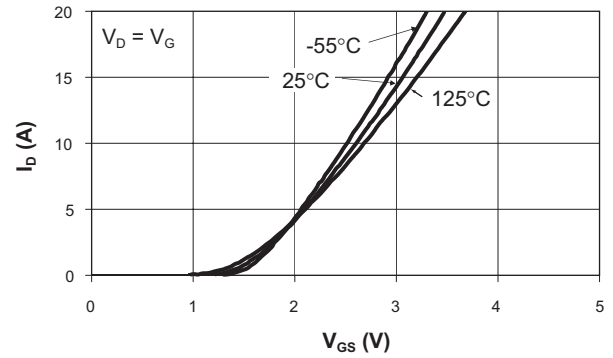
Typical Characteristics

$T_J = 25^\circ\text{C}$, unless otherwise noted.

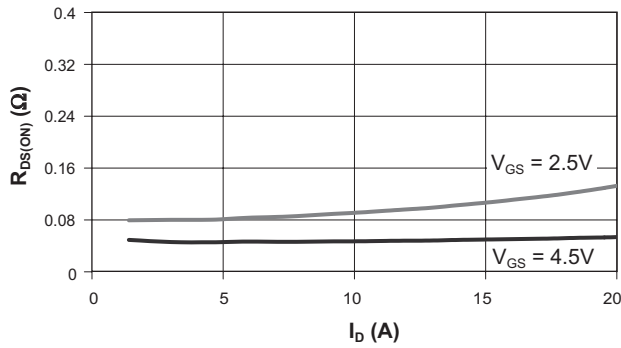
Output Characteristics



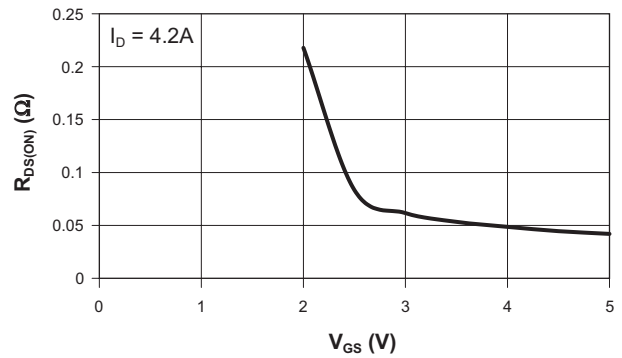
Transfer Characteristics



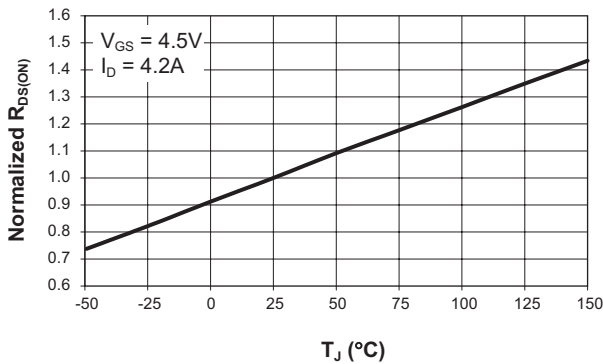
On-Resistance vs. Drain Current



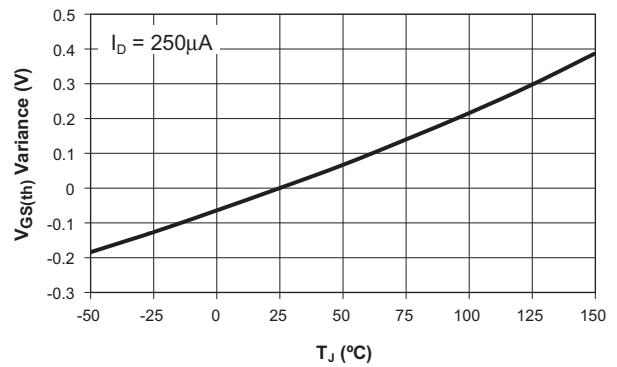
On-Resistance vs. Gate-to-Source Voltage



On-Resistance vs. Junction Temperature



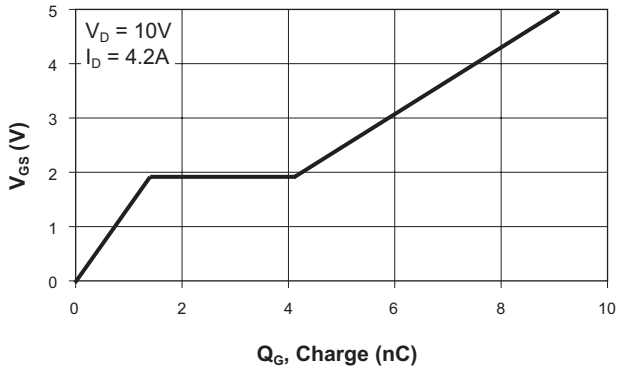
Threshold Voltage



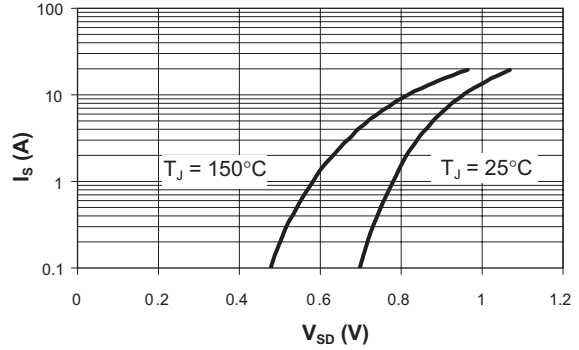
Typical Characteristics

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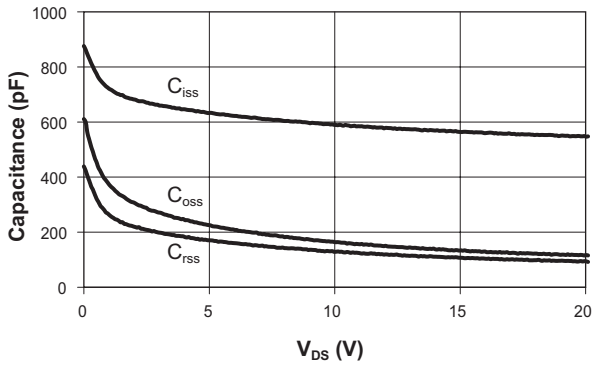
Gate Charge



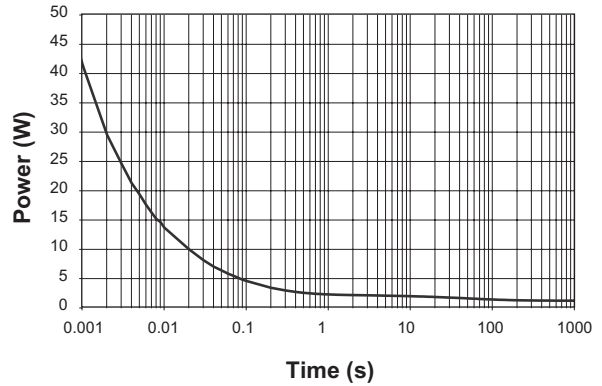
Source-Drain Diode Forward Voltage



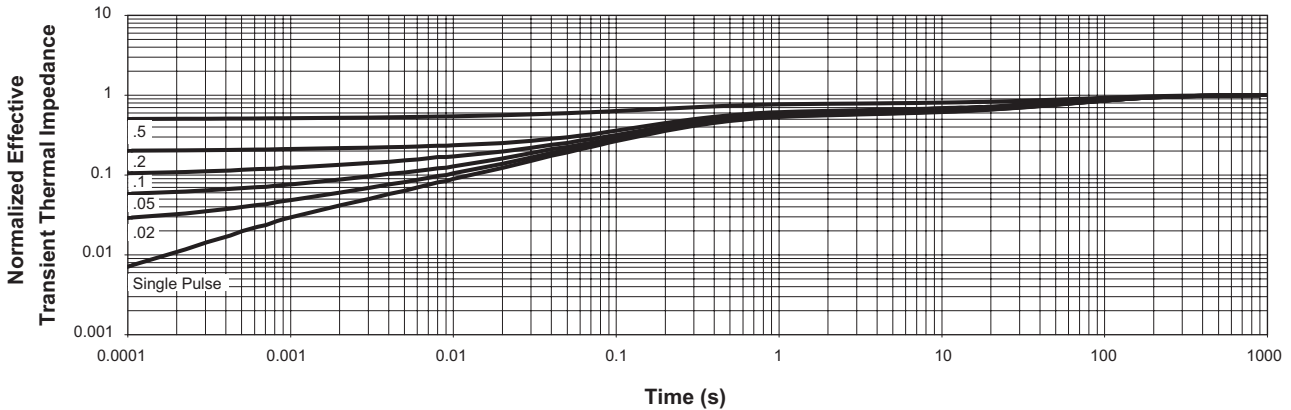
Capacitance



Single Pulse Power, Junction to Ambient



Transient Thermal Response, Junction to Ambient

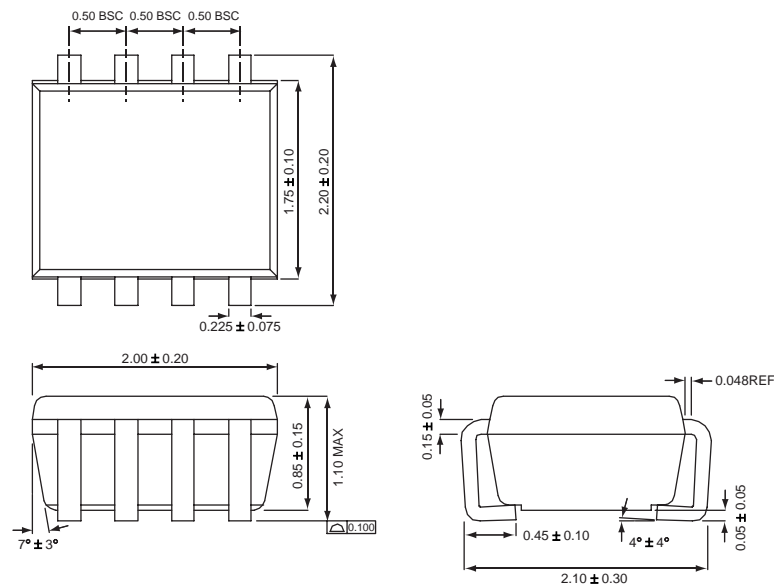


Ordering Information

| Package | Marking ¹ | Part Number (Tape and Reel) ² |
|----------|----------------------|--|
| SC70JW-8 | JTXYY | AAT8543IJS-T1 |

Package Information

SC70JW-8



All dimensions in millimeters.

1. XYY = assembly and date code.
 2. Sample stock is generally held on part numbers listed in **BOLD**.

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