



AAT8107

20V P-Channel Power MOSFET

General Description

The AAT8107 low threshold 20V, P-Channel MOSFET is a member of AnalogicTech™'s TrenchDMOS™ product family. Using an ultra-high density proprietary TrenchDMOS technology the AAT8107 is designed for use as a load switch in battery powered applications and protection in battery packs.

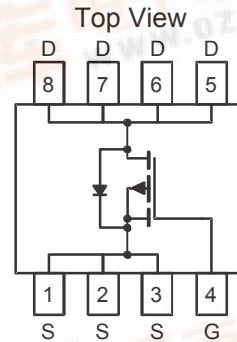
Features

- $V_{DS(MAX)} = -20V$
- $I_{D(MAX)}^1 = -6.5A @ 25^{\circ}C$
- LOW $R_{DS(ON)}$:
 - $35 m\Omega @ V_{GS} = -4.5V$
 - $60 m\Omega @ V_{GS} = -2.5V$

Applications

- Battery Packs
- Battery-powered portable equipment

SOP-8L Package



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

| Symbol | Description | Value | Units |
|----------------|---|---------------------|-------------|
| V_{DS} | Drain-Source Voltage | -20 | V |
| V_{GS} | Gate-Source Voltage | ± 12 | |
| I_D | Continuous Drain Current @ $T_J=150^{\circ}C$ ¹ | $T_A = 25^{\circ}C$ | ± 6.5 |
| | | $T_A = 70^{\circ}C$ | ± 5.2 |
| I_{DM} | Pulsed Drain Current ² | ± 32 | A |
| I_S | Continuous Source Current (Source-Drain Diode) ¹ | -1.7 | |
| P_D | Maximum Power Dissipation ¹ | $T_A = 25^{\circ}C$ | 2.5 |
| | | $T_A = 70^{\circ}C$ | 1.6 |
| T_J, T_{STG} | Operating Junction and Storage Temperature Range | -55 to 150 | $^{\circ}C$ |

Thermal Characteristics

| Symbol | Description | Value | Units |
|------------------|---|-------|---------------|
| $R_{\theta JA}$ | Typical Junction-to-Ambient steady state ¹ | 80 | $^{\circ}C/W$ |
| $R_{\theta JA2}$ | Maximum Junction-to-Ambient $t < 10$ seconds ¹ | 50 | |
| $R_{\theta JF}$ | Typical Junction-to-Foot ¹ | 27 | |



Electrical Characteristics (T_J=25°C unless otherwise noted)

| Symbol | Description | Conditions | Min | Typ | Max | Units |
|---|---|---|------|------|------|-------|
| DC Characteristics | | | | | | |
| BV _{DSS} | Drain-Source Breakdown Voltage | V _{GS} =0V, I _D =-250μA | -20 | | | V |
| R _{DS(ON)} | Drain-Source ON-Resistance ² | V _{GS} =-4.5V, I _D =-6.5A | | 27 | 35 | mΩ |
| | | V _{GS} =-2.5V, I _D =-5.0A | | 46 | 60 | |
| I _{D(ON)} | On-State Drain Current ² | V _{GS} =-4.5V, V _{DS} =5V (Pulsed) | -32 | | | A |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =-250μA | -0.6 | | | V |
| I _{GSS} | Gate-Body Leakage Current | V _{GS} =±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°C | | | -5 | |
| g _{fs} | Forward Transconductance ² | V _{DS} =-5V, I _D =-6.5A | | 12 | | S |
| Dynamic Characteristics ³ | | | | | | |
| Q _G | Total Gate Charge | V _{DS} =-15V, R _D =2.3Ω, V _{GS} =-4.5V | | 13.6 | | nC |
| Q _{GS} | Gate-Source Charge | V _{DS} =-15V, R _D =2.3Ω, V _{GS} =-4.5V | | 2.3 | | |
| Q _{GD} | Gate-Drain Charge | V _{DS} =-15V, R _D =2.3Ω, V _{GS} =-4.5V | | 5.5 | | |
| t _{D(ON)} | Turn-ON Delay | V _{DS} =-15V, R _D =2.3Ω, V _{GS} =-4.5V, R _G =6Ω | | 10 | | ns |
| t _R | Turn-ON Rise Time | V _{DS} =-15V, R _D =2.3Ω, V _{GS} =-4.5V, R _G =6Ω | | 35 | | |
| t _{D(OFF)} | Turn-OFF Delay | V _{DS} =-15V, R _D =2.3Ω, V _{GS} =-4.5V, R _G =6Ω | | 38 | | |
| t _F | Turn-OFF Fall Time | V _{DS} =-15V, R _D =2.3Ω, V _{GS} =-4.5V, R _G =6Ω | | 50 | | |
| Source-Drain Diode Characteristics | | | | | | |
| V _{SD} | Source-Drain Forward Voltage ² | V _{GS} =0, I _S =-6.5A | | | -1.5 | V |
| I _S | Continuous Diode Current ¹ | | | | -1.7 | A |

Note 1: Based on thermal dissipation from junction to ambient while mounted on a 1" x 1" PCB with optimized layout. A 10 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_{θCA} is determined by the PCB design. Actual maximum continuous current is limited by the application's design.

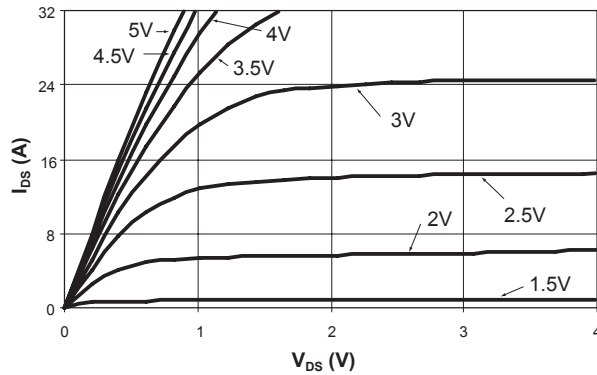
Note 2: Pulse test: Pulse Width = 300 μs

Note 3: Guaranteed by design. Not subject to production testing.

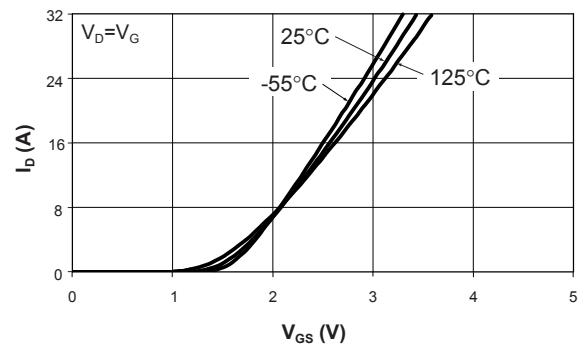
Typical Characteristics

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

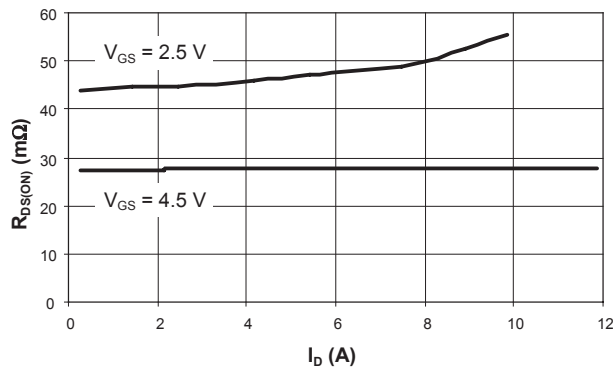
Output Characteristics



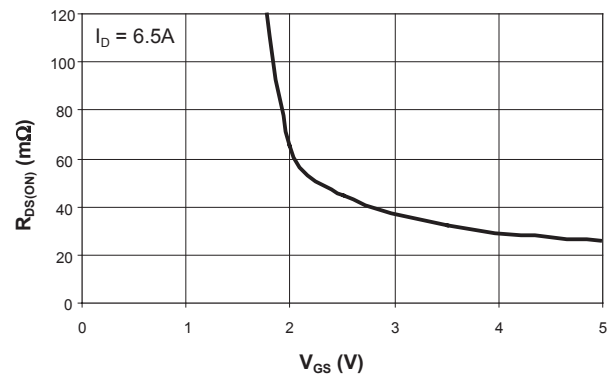
Transfer Characteristics



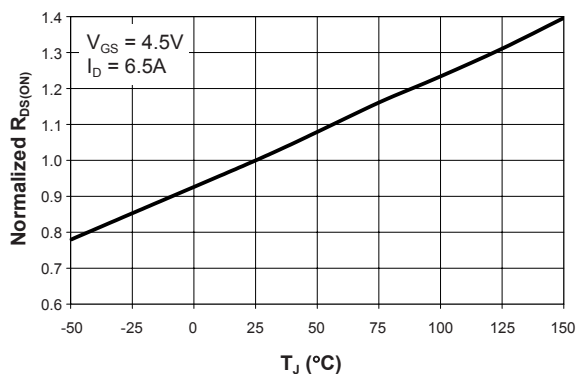
On-Resistance vs. Drain Current



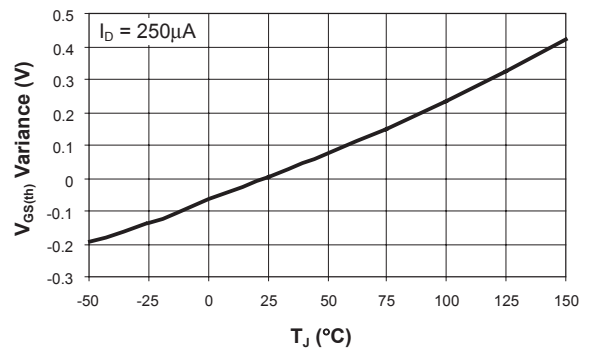
On-Resistance vs. Gate to Source Voltage



On-Resistance vs. Junction Temperature



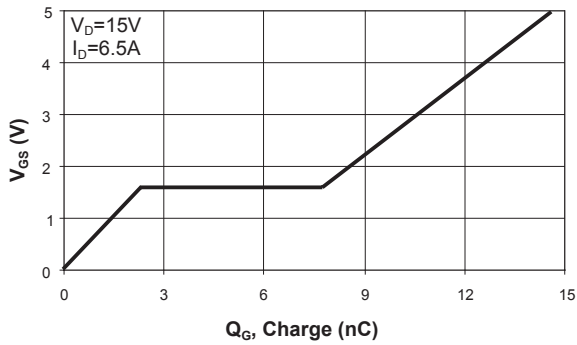
Threshold Voltage



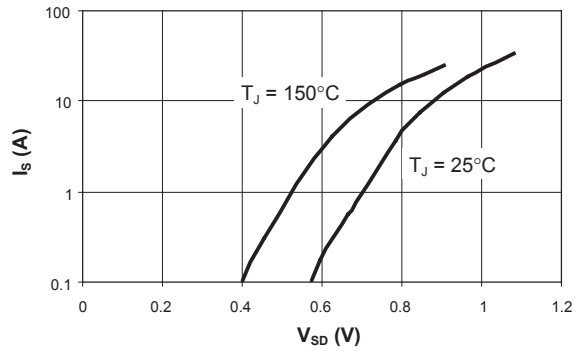
Typical Characteristics

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

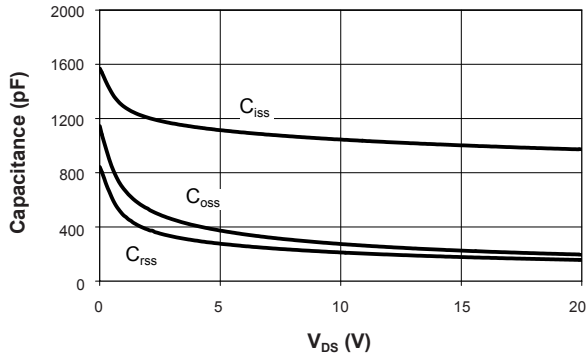
Gate Charge



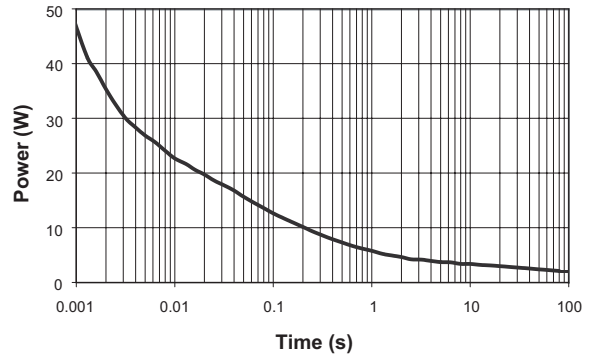
Source-Drain Diode Forward Voltage



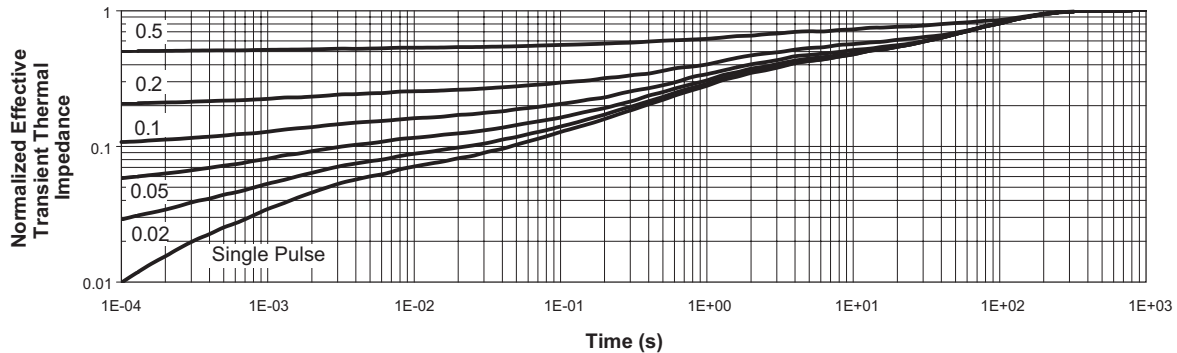
Capacitance



Single Pulse Power, Junction to Ambient



Transient Thermal Response, Junction to Ambient



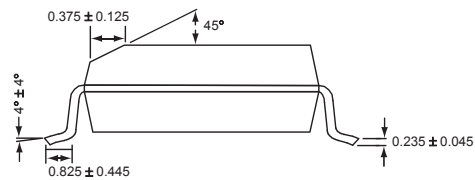
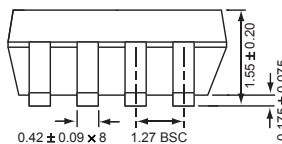
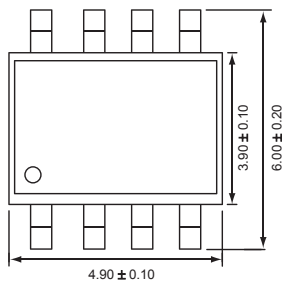
Ordering Information

| Package | Marking | Part Number (Tape and Reel) |
|---------|---------|-----------------------------|
| SOP-8 | 8107 | AAT8107IAS-T1 |

Note: Sample stock is generally held on all part numbers listed in **BOLD**.

Package Information

SOP-8



All dimensions in millimeters.

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