AAT7157
20V P-Channel Power MOSFET

TrenchDMOS™

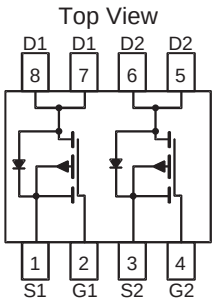
General Description

The AAT7157 low threshold 20V, dual P-channel MOSFET is a member of AnalogicTech's TrenchDMOS product family. Using an ultra-high density proprietary TrenchDMOS technology, the AAT7157 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] = -5.8A @ 25°C
- Low $R_{DS(ON)}$:
  - 36mΩ @ V_{GS} = -4.5V
  - 62mΩ @ V_{GS} = -2.5V

Dual SOP-8L Package



Applications

- Battery Packs
- Battery-Powered Portable Equipment

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	
I_D	Continuous Drain Current @ T_J = 150°C[1]	T_A = 25°C	±5.8	A
		T_A = 70°C	±4.6	
I_{DM}	Pulsed Drain Current[2]		±24	
I_S	Continuous Source Current (Source-Drain Diode)[1]		-1.5	
P_D	Maximum Power Dissipation[1]	T_A = 25°C	2.0	W
		T_A = 70°C	1.25	
T_J, T_{STG}	Operating Junction and Storage Temperature Range		-55 to 150	°C

Thermal Characteristics

Symbol	Description	Value	Units
$R_{\theta JA}$	Typical Junction-to-Ambient Steady State[1]	100	°C/W
$R_{\theta JA2}$	Maximum Junction-to-Ambient t<10 Seconds[1]	62.5	
$R_{\theta JF}$	Typical Junction-to-Foot[1]	35	

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. $R_{\theta JF}$ + $R_{\theta FA}$ = $R_{\theta JA}$ 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.
2. Pulse test: Pulse Width = 300µs.

Electrical Characteristics

T_J = 25°C, unless otherwise noted.

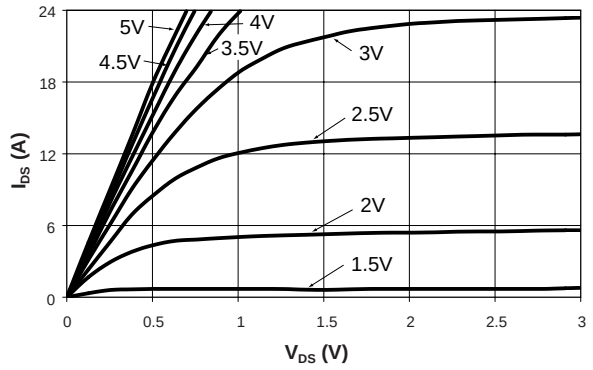
Symbol	Description	Conditions	Min	Typ	Max	Units
DC Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = -250µA	-20			V
$R_{DS(ON)}$	Drain-Source On-Resistance[1]	V_{GS} = -4.5V, I_D = -5.8A		29	36	mΩ
		V_{GS} = -2.5V, I_D = -4.4A		49	62	
$I_{D(ON)}$	On-State Drain Current[1]	V_{GS} = -4.5V, V_{DS} = 5V (Pulsed)	-24			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[2]			-5	
g_{fs}	Forward Transconductance[1]	V_{DS} = -5V, I_D = -5.8A		12		S
Dynamic Characteristics[2]						
Q_G	Total Gate Charge	V_{DS} = -15V, R_D = 2.6Ω, V_{GS} = -4.5V		14		nC
Q_{GS}	Gate-Source Charge	V_{DS} = -15V, R_D = 2.6Ω, V_{GS} = -4.5V		2.3		
Q_{GD}	Gate-Drain Charge	V_{DS} = -15V, R_D = 2.6Ω, V_{GS} = -4.5V		5.5		
$t_{D(ON)}$	Turn-On Delay	V_{DS} = -15V, R_D = 2.6Ω, V_{GS} = -4.5V, R_G = 6Ω		10		ns
t_R	Turn-On Rise Time	V_{DS} = -15V, R_D = 2.6Ω, V_{GS} = -4.5V, R_G = 6Ω		37		
$t_{D(OFF)}$	Turn-Off Delay	V_{DS} = -15V, R_D = 2.6Ω, V_{GS} = -4.5V, R_G = 6Ω		36		
t_F	Turn-Off Fall Time	V_{DS} = -15V, R_D = 2.6Ω, V_{GS} = -4.5V, R_G = 6Ω		52		
Source-Drain Diode Characteristics						
V_{SD}	Source-Drain Forward Voltage[1]	V_{GS} = 0, I_S = -5.8A			-1.5	V
I_S	Continuous Diode Current[3]				-1.5	A

1. Pulse test: Pulse Width = 300µs.
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 10-second pulse on a 1" x 1" PCB approximates testing a device mounted on a large multi-layer PCB as in most applications. $R_{\theta JF}$ + $R_{\theta FA}$ = $R_{\theta JA}$ 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.

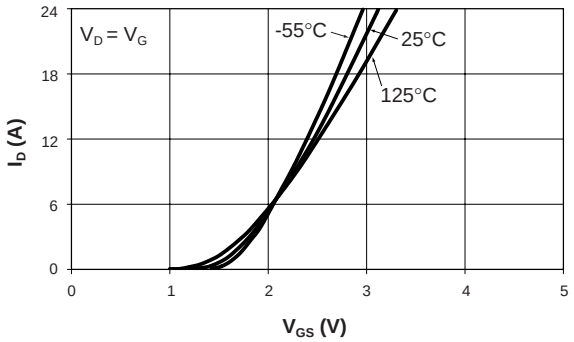
Typical Characteristics

T_J = 25ºC, unless otherwise noted.

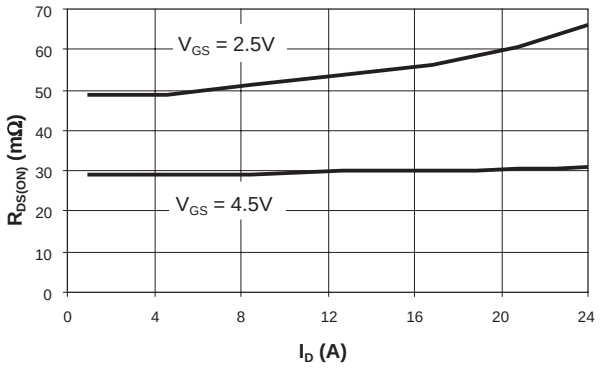
Output Characteristics



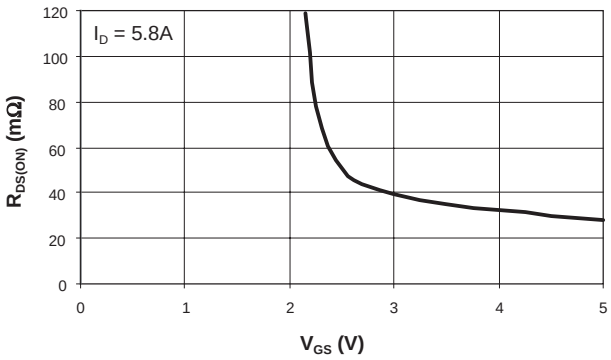
Transfer Characteristics



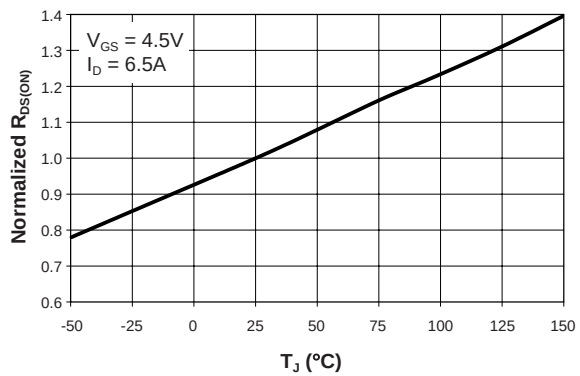
On-Resistance vs. Drain Current



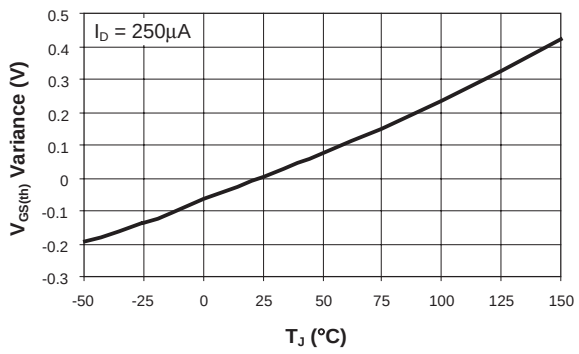
On-Resistance vs. Gate-to-Source Voltage



On-Resistance vs. Junction Temperature



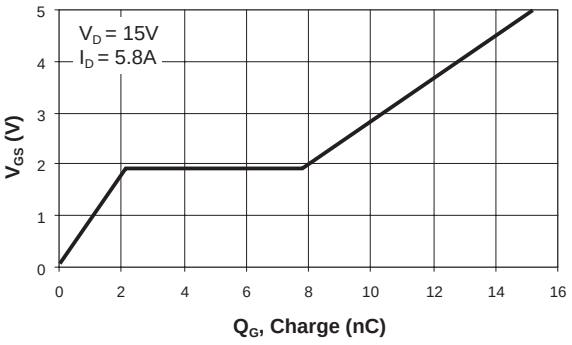
Threshold Voltage



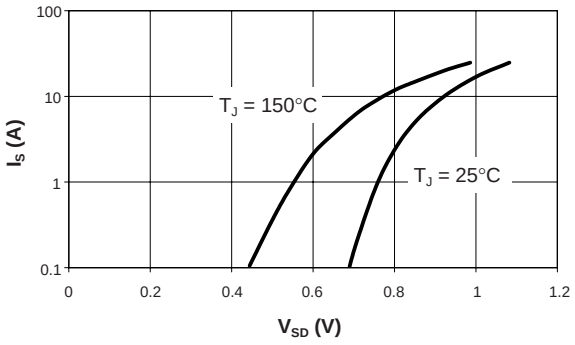
Typical Characteristics

T_J = 25ºC, unless otherwise noted.

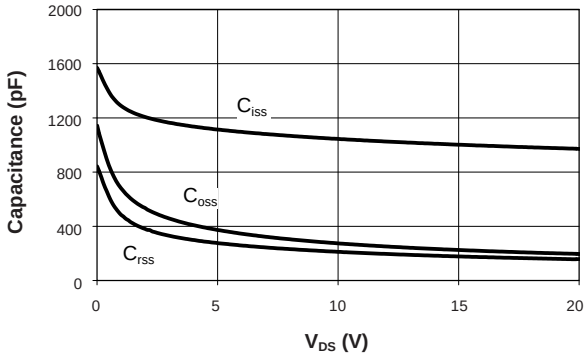
Gate Charge



Source-Drain Diode Forward Voltage



Capacitance

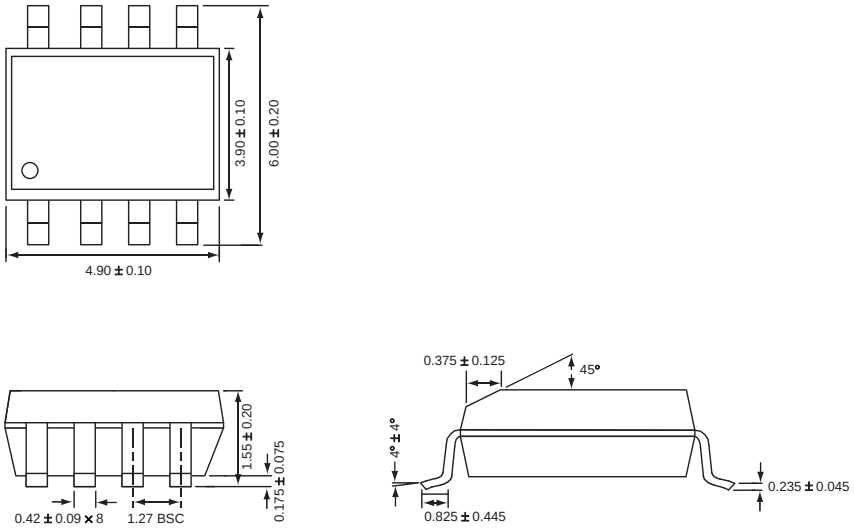


Ordering Information

Package	Marking	Part Number (Tape and Reel)[1]
SOP-8	7157	**AAT7157IAS-T1**

Package Information

SOP-8



All dimensions in millimeters.

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

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