

General Description

The AAT8401 is a low threshold P-channel MOSFET designed for the battery, cell phone, and PDA markets. Using AnalogicTech's ultra-high-density proprietary TrenchDMOS™ technology, this product demonstrates high power handling and small size.

Applications

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

Absolute Maximum Ratings

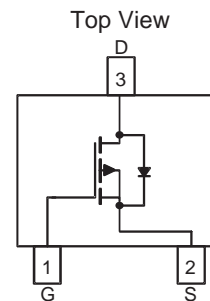
$T_A = 25^\circ\text{C}$, unless otherwise noted.

Symbol	Description	Value	Units	
V_{DS}	Drain-Source Voltage	-20	V	
V_{GS}	Gate-Source Voltage	± 12		
I_D	Continuous Drain Current @ $T_J = 150^\circ\text{C}^1$	$T_A = 25^\circ\text{C}$	± 2.4	A
		$T_A = 70^\circ\text{C}$	± 2.0	
I_{DM}	Pulsed Drain Current ²	± 9		
I_S	Continuous Source Current (Source-Drain Diode) ¹	-0.9		
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$	
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$	

Features

- Drain-Source Voltage (max): -20V
- Continuous Drain Current¹ (max): -2.4A @ 25°C
- Low On-Resistance:
 - $100\text{m}\Omega$ @ $V_{GS} = -4.5\text{V}$
 - $175\text{m}\Omega$ @ $V_{GS} = -2.5\text{V}$

SC59 Package



Thermal Characteristics¹

Symbol	Description	Value	Units	
$R_{\theta JA}$	Typical Junction-to-Ambient Steady State	145	$^\circ\text{C}/\text{W}$	
$R_{\theta JA2}$	Maximum Junction-to-Ambient $t < 5$ Seconds	125	$^\circ\text{C}/\text{W}$	
$R_{\theta JF}$	Typical Junction-to-Foot	50	$^\circ\text{C}/\text{W}$	
P_D	Maximum Power Dissipation	$T_A = 25^\circ\text{C}$	1.0	W
		$T_A = 70^\circ\text{C}$	0.6	

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. $R_{\theta JF} + R_{\theta FA} = R_{\theta JA}$ 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 = 300 μs .

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	$V_{GS} = -4.5V, I_D = -2.4A$		88	100	m Ω
		$V_{GS} = -2.5V, I_D = -1.8A$		146	175	
$I_{D(ON)}$	On-State Drain Current ¹	$V_{GS} = -4.5V, V_{DS} = -5V$ (pulsed)	-9			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	$V_{DS} = -5V, I_D = -2.4A$		4		S
Dynamic Characteristics²						
Q_G	Total Gate Charge	$V_{DS} = -15V, R_D = 5.6\Omega, V_{GS} = -4.5V$		4		nC
Q_{GS}	Gate-Source Charge	$V_{DS} = -15V, R_D = 5.6\Omega, V_{GS} = -4.5V$		0.6		
Q_{GD}	Gate-Drain Charge	$V_{DS} = -15V, R_D = 5.6\Omega, V_{GS} = -4.5V$		1.4		
$t_{D(ON)}$	Turn-On Delay	$V_{DS} = -15V, R_D = 5.6\Omega, V_{GS} = -4.5V, R_G = 6\Omega$		6.5		ns
t_R	Turn-On Rise Time	$V_{DS} = -15V, R_D = 5.6\Omega, V_{GS} = -4.5V, R_G = 6\Omega$		13		
$t_{D(OFF)}$	Turn-Off Delay	$V_{DS} = -15V, R_D = 5.6\Omega, V_{GS} = -4.5V, R_G = 6\Omega$		15		
t_F	Turn-Off Fall Time	$V_{DS} = -15V, R_D = 5.6\Omega, V_{GS} = -4.5V, R_G = 6\Omega$		20		
Source-Drain Diode Characteristics						
V_{SD}	Source-Drain Forward Voltage ¹	$V_{GS} = 0, I_S = -2.4A$			-1.3	V
I_S	Continuous Diode Current ³				-0.9	A

1. Pulse test: Pulse Width = 300 μs .

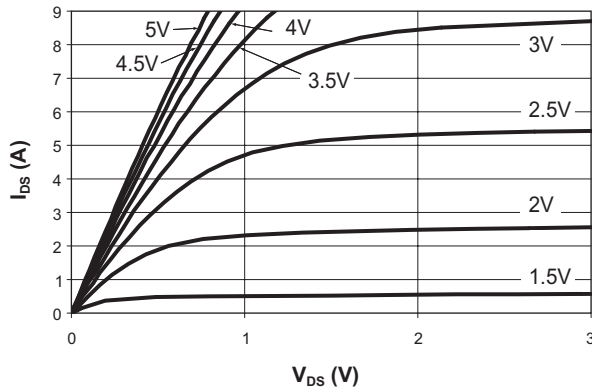
2. Guaranteed by design. Not subject to production testing.

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.

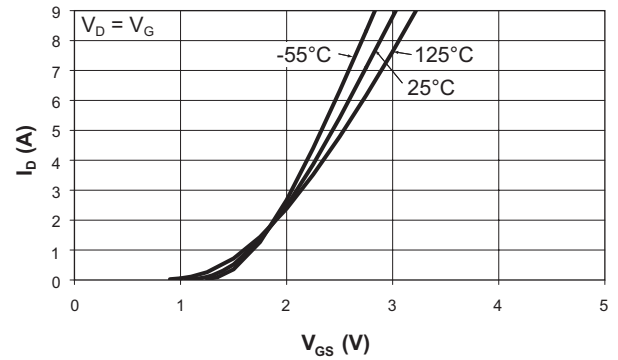
Typical Characteristics

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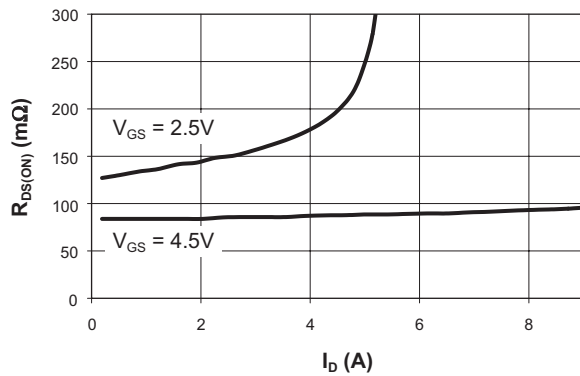
Output Characteristics



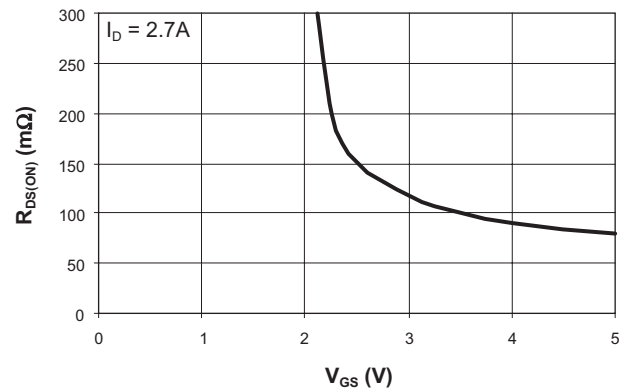
Transfer Characteristics



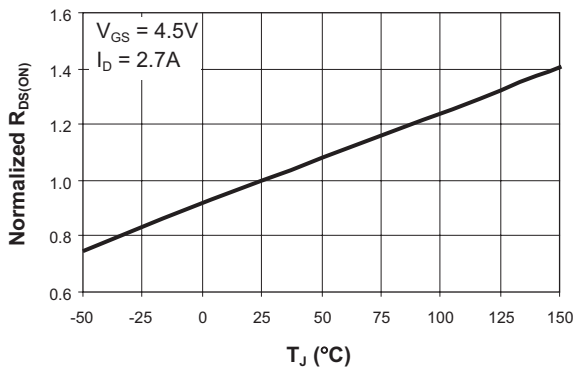
On-Resistance vs. Drain Current



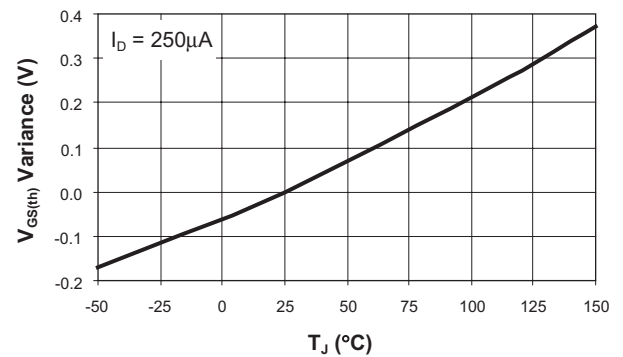
On-Resistance vs. Gate-to-Source Voltage



On-Resistance vs. Junction Temperature



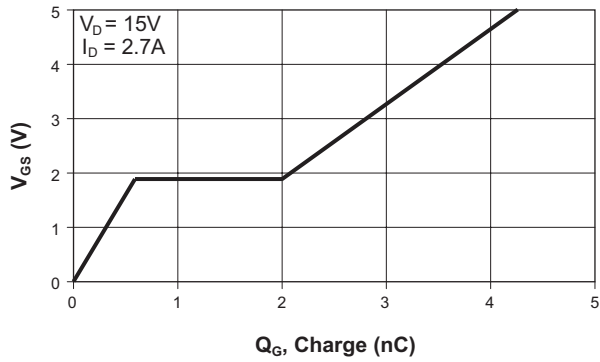
Threshold Voltage



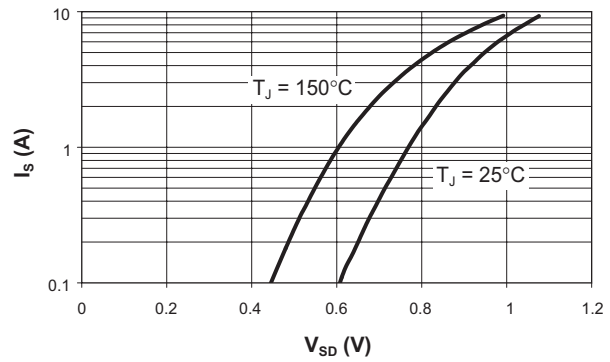
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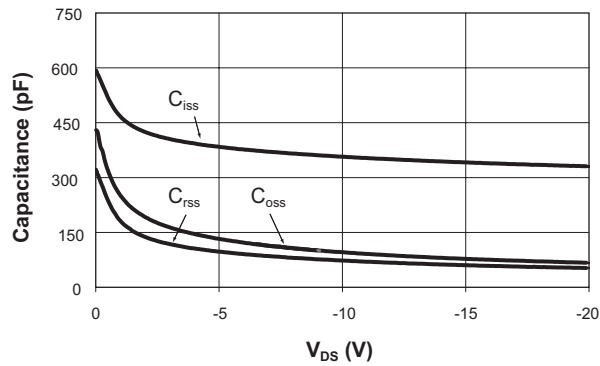
Gate Charge



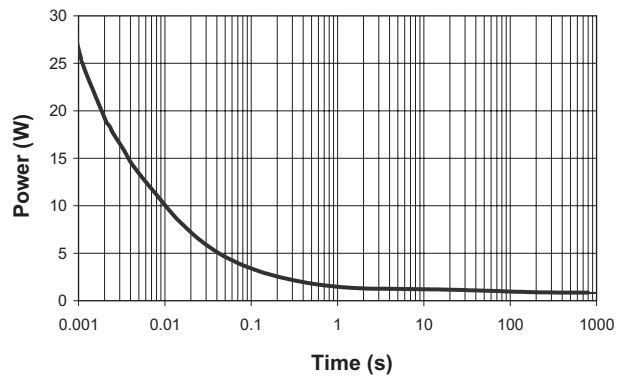
Source-Drain Diode Forward Voltage



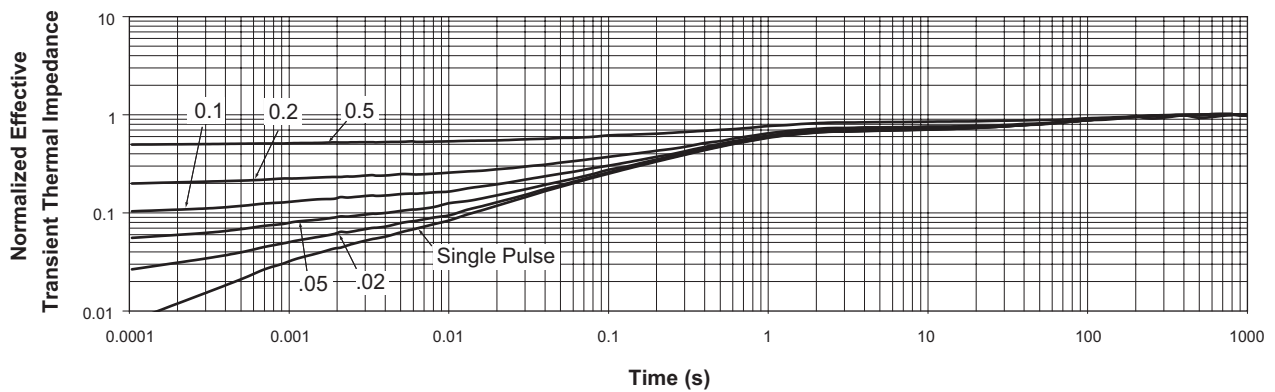
Capacitance



Single Pulse Power, Junction to Ambient



Transient Thermal Response, Junction to Ambient

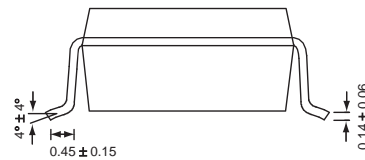
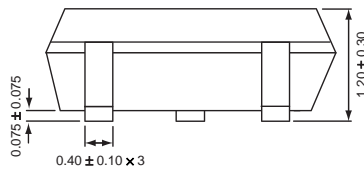
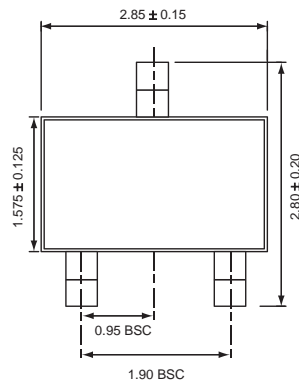


Ordering Information

Package	Marking ¹	Part Number (Tape and Reel) ²
SC59	IGXY	AAT8401IGY-T1

Package Information

SC59



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

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