



# AAT9512

## 28V N-Channel Power MOSFET

### General Description

The AAT9512 is a low threshold 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 a SC70 package.

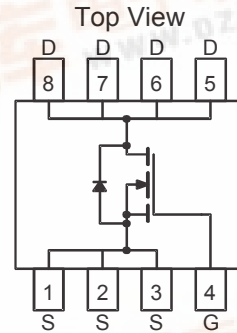
### Features

- $V_{DS(MAX)} = 28V$
- $I_{D(MAX)}^1 = 4.5A @ 25^{\circ}C$
- LOW  $R_{DS(ON)}$ :
  - $48 m\Omega @ V_{GS} = 4.5V$
  - $76 m\Omega @ V_{GS} = 2.5V$

### Applications

- Battery Packs
- Cellular & Cordless Telephones
- Battery-powered portable equipment

### SC70JW-8 Package



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

Symbol	Description	Value	Units
$V_{DS}$	Drain-Source Voltage	28	V
$V_{GS}$	Gate-Source Voltage	$\pm 12$	
$I_D$	Continuous Drain Current @ $T_J=150^{\circ}C$ <sup>1</sup>	$T_A = 25^{\circ}C$	$\pm 4.5$
		$T_A = 70^{\circ}C$	$\pm 3.6$
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	$\pm 20$	A
$I_S$	Continuous Source Current (Source-Drain Diode) <sup>1</sup>	1.2	
$P_D$	Maximum Power Dissipation <sup>1</sup>	$T_A = 25^{\circ}C$	1.6
		$T_A = 70^{\circ}C$	1.0
$T_J, T_{STG}$	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 <sup>1</sup>	102	$^{\circ}C/W$
$R_{\theta JA2}$	Maximum Junction-to-Ambient $t < 5$ seconds <sup>1</sup>	78	$^{\circ}C/W$
$R_{\theta JF}$	Typical Junction-to-Foot <sup>1</sup>	35	$^{\circ}C/W$

Preliminary Information



### Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)

Symbol	Description	Conditions	Min	Typ	Max	Units
<b>DC Characteristics</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	28			V
R <sub>DS(ON)</sub>	Drain-Source ON-Resistance <sup>2</sup>	V <sub>GS</sub> =4.5V, I <sub>D</sub> =4.5A		36	48	mΩ
		V <sub>GS</sub> =2.5V, I <sub>D</sub> =3.6A		57	76	
I <sub>D(ON)</sub>	On-State Drain Current <sup>2</sup>	V <sub>GS</sub> =4.5V, V <sub>DS</sub> =5V (Pulsed)	20			A
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250μA	0.6			V
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> =±12V, V <sub>DS</sub> =0V			±100	nA
I <sub>DSS</sub>	Drain Source Leakage Current	V <sub>GS</sub> =0V, V <sub>DS</sub> =28V			1	μA
		V <sub>GS</sub> =0V, V <sub>DS</sub> =23V, T <sub>J</sub> =70°C			5	
g <sub>fs</sub>	Forward Transconductance <sup>2</sup>	V <sub>DS</sub> =5V, I <sub>D</sub> =4.5A		7		S
<b>Dynamic Characteristics <sup>3</sup></b>						
Q <sub>G</sub>	Total Gate Charge	V <sub>DS</sub> =15V, R <sub>D</sub> =3.0Ω, V <sub>GS</sub> =4.5V		5		nC
Q <sub>GS</sub>	Gate-Source Charge	V <sub>DS</sub> =15V, R <sub>D</sub> =3.0Ω, V <sub>GS</sub> =4.5V		0.9		
Q <sub>GD</sub>	Gate-Drain Charge	V <sub>DS</sub> =15V, R <sub>D</sub> =3.0Ω, V <sub>GS</sub> =4.5V		1		
t <sub>D(ON)</sub>	Turn-ON Delay	V <sub>DD</sub> =15V, V <sub>GS</sub> =4.5V, R <sub>D</sub> =3.0Ω, R <sub>G</sub> =6Ω		6		ns
t <sub>R</sub>	Turn-ON Rise Time	V <sub>DD</sub> =15V, V <sub>GS</sub> =4.5V, R <sub>D</sub> =3.0Ω, R <sub>G</sub> =6Ω		3		
t <sub>D(OFF)</sub>	Turn-OFF Delay	V <sub>DD</sub> =15V, V <sub>GS</sub> =4.5V, R <sub>D</sub> =3.0Ω, R <sub>G</sub> =6Ω		30		
t <sub>F</sub>	Turn-OFF Fall Time	V <sub>DD</sub> =15V, V <sub>GS</sub> =4.5V, R <sub>D</sub> =3.0Ω, R <sub>G</sub> =6Ω		8		
<b>Source-Drain Diode Characteristics</b>						
V <sub>SD</sub>	Source-Drain Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0, I <sub>S</sub> =4.5A			1.6	V
I <sub>S</sub>	Continuous Diode Current <sup>1</sup>				1.2	A

Note 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 many 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,  $R_{\theta FA}$  is determined by PCB design. Actual maximum continuous current is limited by the application's design.

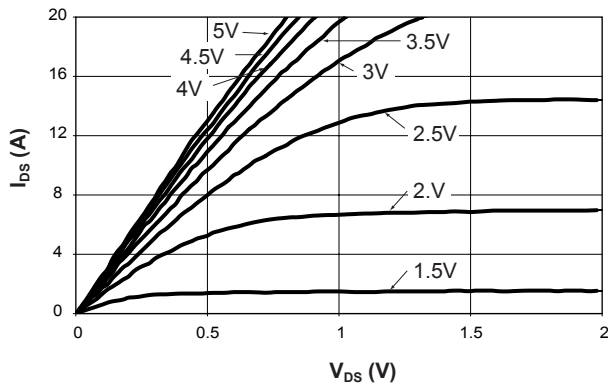
Note 2: Pulse test: Pulse width = 300 μs.

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

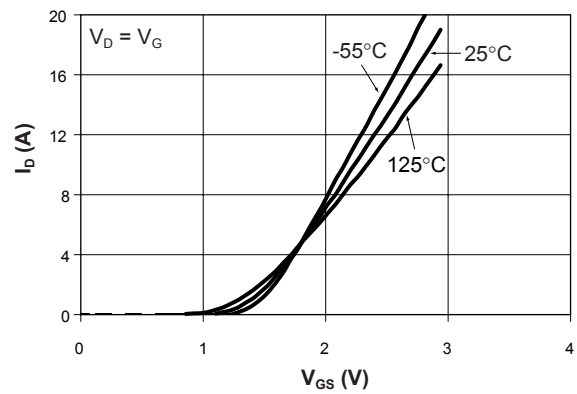
### Typical Characteristics

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

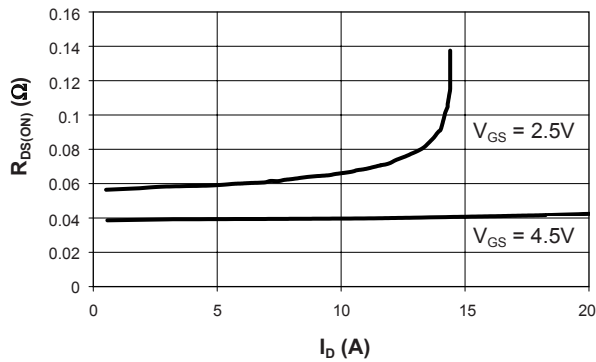
#### Output Characteristics



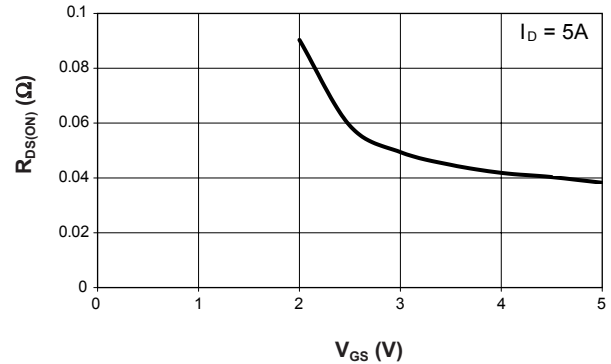
#### Transfer Characteristics



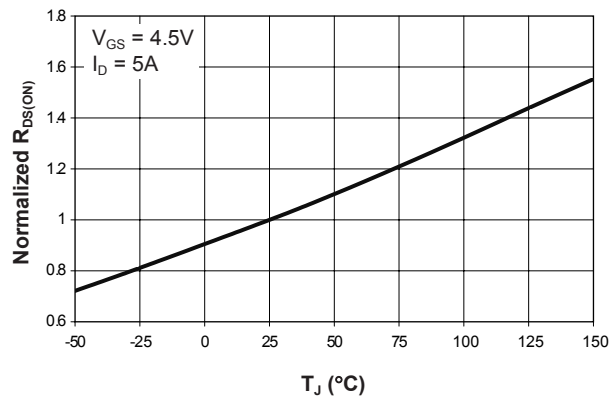
#### On-Resistance vs. Drain Current



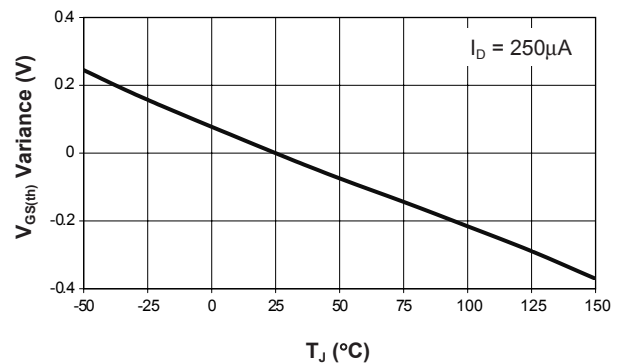
#### On-Resistance vs. Gate to Source Voltage



#### On-Resistance vs. Junction Temperature



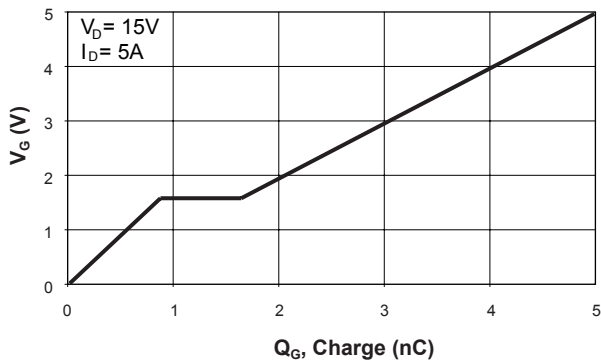
#### Threshold Voltage



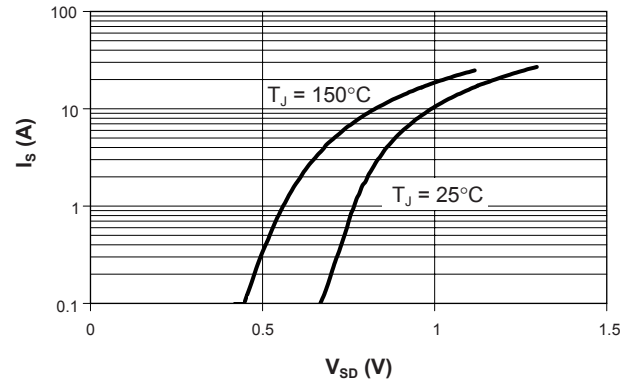
### Typical Characteristics

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

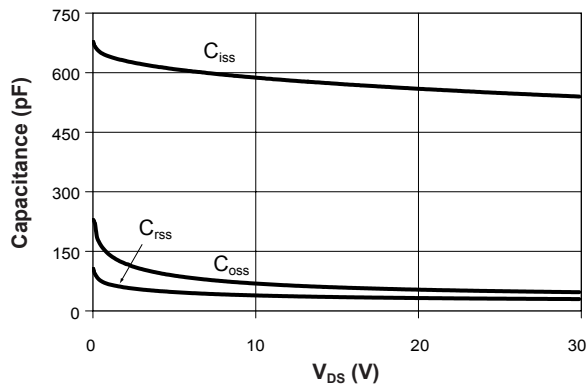
**Gate Charge**



**Source-Drain Diode Forward Voltage**



**Capacitance**

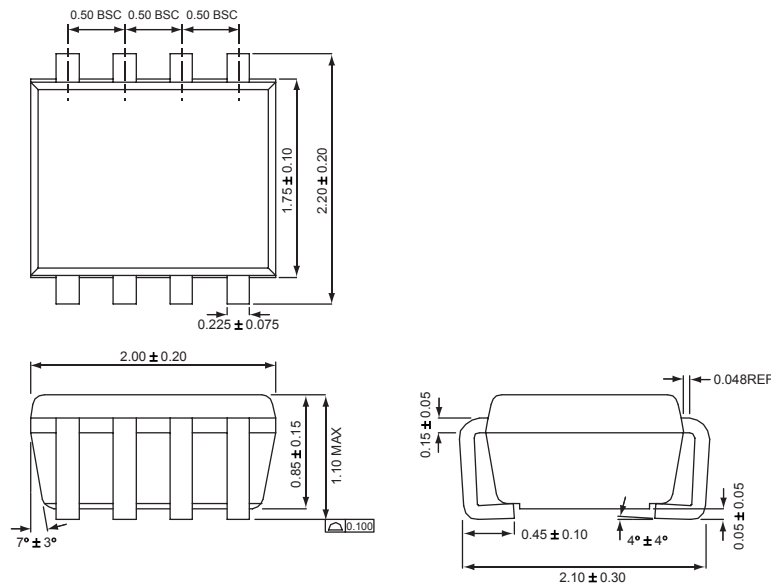


### Ordering Information

Package	Marking <sup>1</sup>	Part Number (Tape and Reel)
SC70JW-8	GOXY	<b>AAT9512IJS-T1</b>

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

### Package Information



All dimensions in millimeters.

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