

### General Description

The AAT8303 is a low threshold P-channel MOSFET designed for the battery, cell phone, and PDA markets. Using AnalogicTech's proprietary ultra-high-density trench technology and space-saving, small-outline, J-lead package, performance superior to that normally found in a larger footprint has been squeezed into the area of a TSOPJW-8 package.

### Applications

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

### Absolute Maximum Ratings

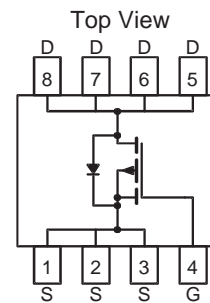
$T_A = 25^\circ\text{C}$ , unless otherwise noted.

Symbol	Description	Value	Units	
$V_{DS}$	Drain-Source Voltage	-20	V	
$V_{GS}$	Gate-Source Voltage	$\pm 12$		
$I_D$	Continuous Drain Current @ $T_J = 150^\circ\text{C}^1$	$T_A = 25^\circ\text{C}$	$\pm 10$	A
		$T_A = 70^\circ\text{C}$	$\pm 8$	
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	$\pm 48$		
$I_S$	Continuous Source Current (Source-Drain Diode) <sup>1</sup>	-2.3		
$T_J$	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 Current<sup>1</sup> (max):  
-10A @  $25^\circ\text{C}$
- Low On-Resistance:
  - $14\text{m}\Omega$  @  $V_{GS} = -4.5\text{V}$
  - $24\text{m}\Omega$  @  $V_{GS} = -2.5\text{V}$

### TSOPJW-8 Package



### Thermal Characteristics<sup>1</sup>

Symbol	Description	Typ	Max	Units
$R_{\theta JA}$	Junction-to-Ambient Steady State	86	105	$^\circ\text{C}/\text{W}$
$R_{\theta JA2}$	Junction-to-Ambient $t < 5$ Seconds	44	54	$^\circ\text{C}/\text{W}$
$R_{\theta JF}$	Junction-to-Foot	27	32	$^\circ\text{C}/\text{W}$
$P_D$	Maximum Power Dissipation	$T_A = 25^\circ\text{C}$	2.3	W
		$T_A = 70^\circ\text{C}$	1.5	

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.

### Electrical Characteristics

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

Symbol	Description	Conditions	Min	Typ	Max	Units
<b>DC Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = -250\mu A$	-20			V
$R_{DS(ON)}$	Drain-Source On-Resistance <sup>1</sup>	$V_{GS} = -4.5V, I_D = -10A$		11	14	m $\Omega$
		$V_{GS} = -2.5V, I_D = -7.6A$		18	24	
$I_{D(ON)}$	On-State Drain Current <sup>1</sup>	$V_{GS} = -4.5V, V_{DS} = -5V$ (pulsed)	-48			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	$V_{GS} = \pm 12V, V_{DS} = 0V$			$\pm 100$	nA
$I_{DSS}$	Drain Source Leakage Current	$V_{GS} = 0V, V_{DS} = -20V$			-1	$\mu A$
		$V_{GS} = 0V, V_{DS} = -16V, T_J = 70^\circ\text{C}^2$			-5	
$g_{fs}$	Forward Transconductance <sup>1</sup>	$V_{DS} = -5V, I_D = -10A$		31		S
<b>Dynamic Characteristics<sup>2</sup></b>						
$Q_G$	Total Gate Charge	$V_{DS} = -10V, R_D = 1.0\Omega, V_{GS} = -4.5V$		36		nC
$Q_{GS}$	Gate-Source Charge	$V_{DS} = -10V, R_D = 1.0\Omega, V_{GS} = -4.5V$		5		
$Q_{GD}$	Gate-Drain Charge	$V_{DS} = -10V, R_D = 1.0\Omega, V_{GS} = -4.5V$		13		
$t_{D(ON)}$	Turn-On Delay	$V_{DS} = -10V, V_{GS} = -4.5V, R_D = 1.0\Omega, R_G = 6\Omega$		10		ns
$t_R$	Turn-On Rise Time	$V_{DS} = -10V, V_{GS} = -4.5V, R_D = 1.0\Omega, R_G = 6\Omega$		72		
$t_{D(OFF)}$	Turn-Off Delay	$V_{DS} = -10V, V_{GS} = -4.5V, R_D = 1.0\Omega, R_G = 6\Omega$		78		
$t_F$	Turn-Off Fall Time	$V_{DS} = -10V, V_{GS} = -4.5V, R_D = 1.0\Omega, R_G = 6\Omega$		108		
<b>Source-Drain Diode Characteristics</b>						
$V_{SD}$	Source-Drain Forward Voltage <sup>1</sup>	$V_{GS} = 0, I_S = -10A$			-1.1	V
$I_S$	Continuous Diode Current <sup>3</sup>				-2.3	A

1. Pulse test: Pulse Width = 300 $\mu$ s.

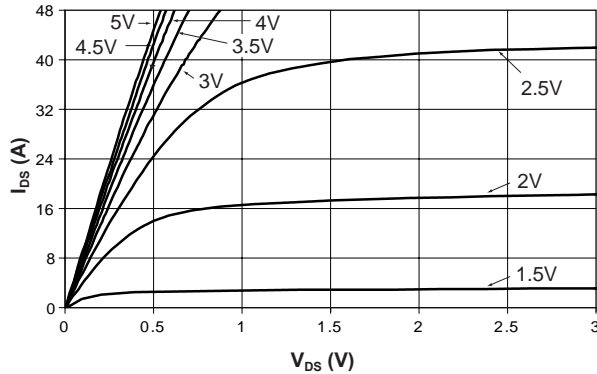
2. Guaranteed by design. Not subject to production testing.

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.

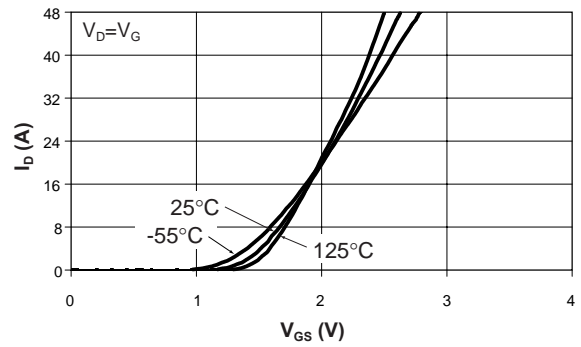
### Typical Characteristics

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

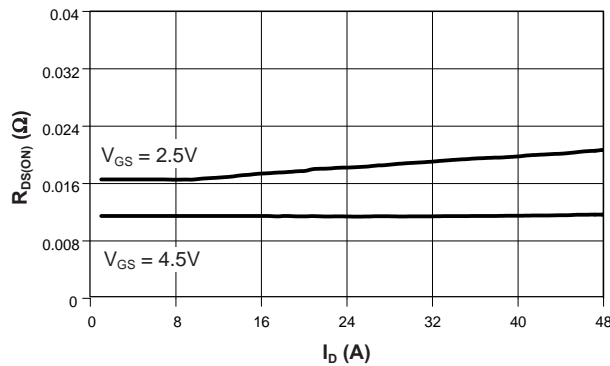
Output Characteristics



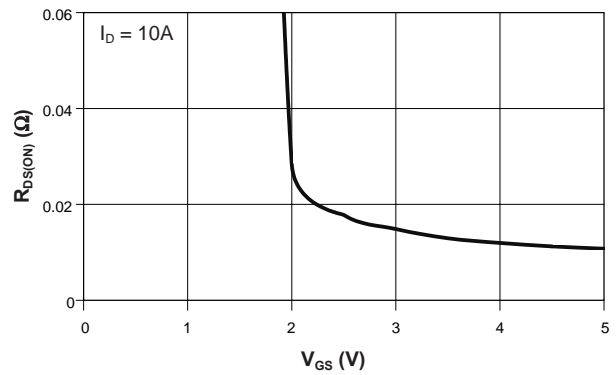
Transfer Characteristics



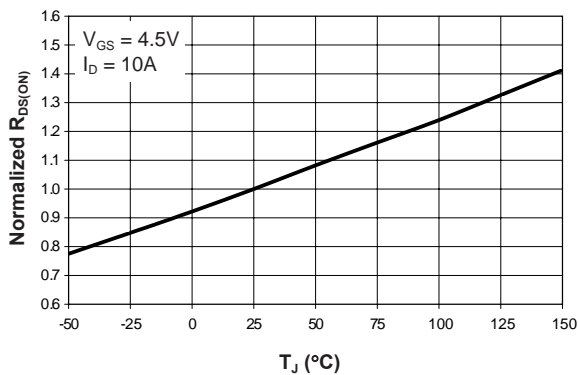
On-Resistance vs. Drain Current



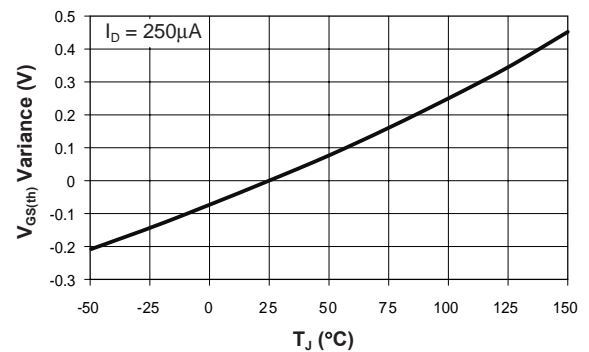
On-Resistance vs. Gate-to-Source Voltage



On-Resistance vs. Junction Temperature



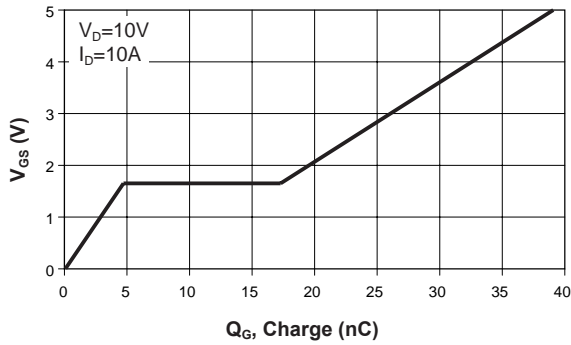
Threshold Voltage



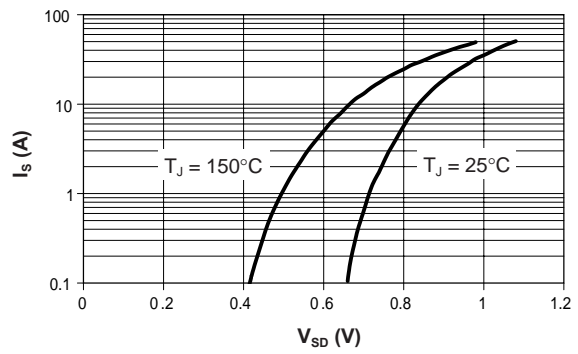
## Typical Characteristics

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

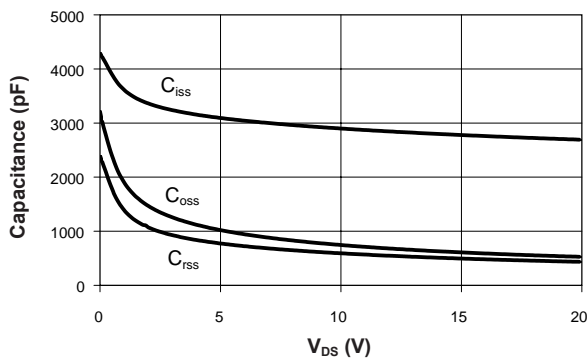
**Gate Charge**



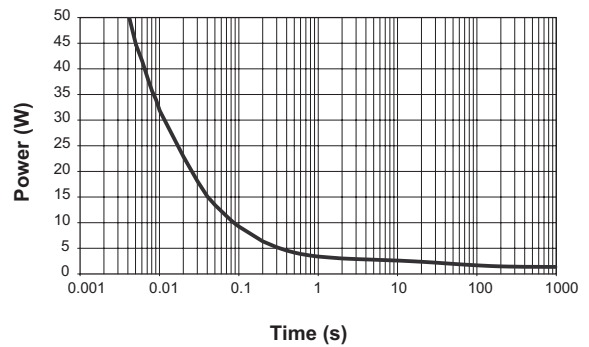
**Source-Drain Diode Forward Voltage**



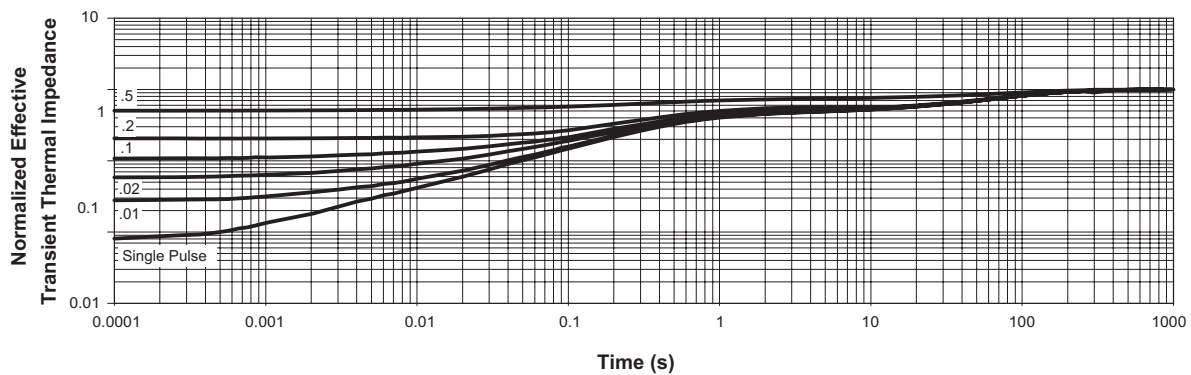
**Capacitance**



**Single Pulse Power, Junction to Ambient**



**Transient Thermal Response, Junction to Ambient**

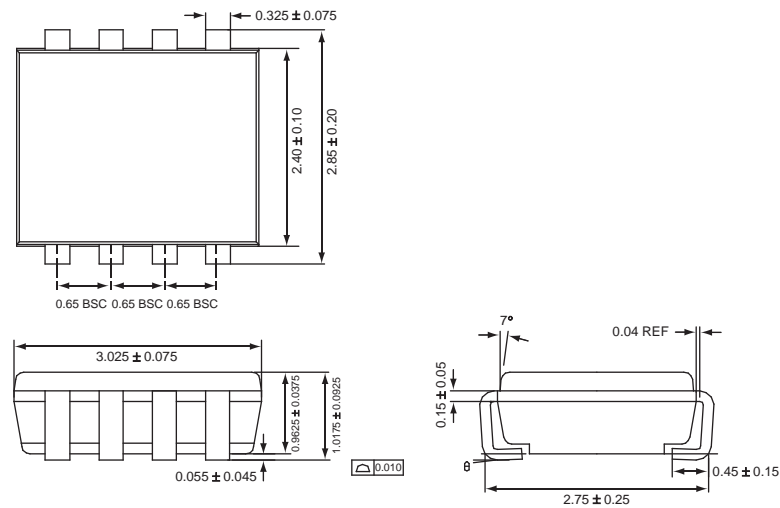


### Ordering Information

Package	Marking <sup>1</sup>	Part Number (Tape and Reel) <sup>2</sup>
TSOPJW-8	JXXYY	<b>AAT8303ITS-T1</b>

### Package Information

#### TSOPJW-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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