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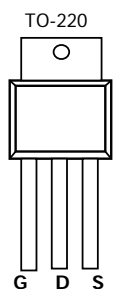
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**AOT404**
**N-Channel Enhancement Mode Field Effect Transistor**
**General Description**

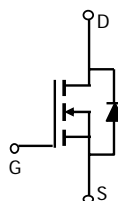
The AOT404 uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. This device is suitable for use in high voltage synchronous rectification, load switching and general purpose applications. *Standard Product AOT404 is Pb-free (meets ROHS & Sony 259 specifications). AOT404L is a Green Product ordering option. AOT404 and AOT404L are electrically identical.*

**Features**

$V_{DS}$  (V) = 105V  
 $I_D$  = 40 A ( $V_{GS}$  = 10V)  
 $R_{DS(ON)}$  < 28 m $\Omega$  ( $V_{GS}$  = 10V) @ 20A  
 $R_{DS(ON)}$  < 31 m $\Omega$  ( $V_{GS}$  = 6V)



Top View  
Drain Connected to Tab


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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	105	V
Gate-Source Voltage	$V_{GS}$	$\pm 25$	V
Continuous Drain Current	$I_D$	$T_C=25^\circ\text{C}$	40
		$T_C=100^\circ\text{C}$	28
Pulsed Drain Current <sup>C</sup>	$I_{DM}$	100	A
Avalanche Current <sup>C</sup>	$I_{AR}$	20	A
Repetitive avalanche energy $L=0.1\text{mH}$ <sup>C</sup>	$E_{AR}$	200	mJ
Power Dissipation <sup>B</sup>	$P_D$	$T_C=25^\circ\text{C}$	100
		$T_C=100^\circ\text{C}$	50
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 175	$^\circ\text{C}$

**Thermal Characteristics**

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup>	$R_{\theta JA}$	50	60	$^\circ\text{C/W}$
Maximum Junction-to-Case <sup>B</sup>	$R_{\theta JC}$	1	1.5	$^\circ\text{C/W}$

**AOT404**
**Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)**

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	I <sub>D</sub> =10mA, V <sub>GS</sub> =0V	105			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =84V, V <sub>GS</sub> =0V T <sub>J</sub> =55°C			1 5	μA
I <sub>GSS</sub>	Gate-Body leakage current	V <sub>DS</sub> =0V, V <sub>GS</sub> =±25V			100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2.5	3.2	4	V
I <sub>D(ON)</sub>	On state drain current	V <sub>GS</sub> =10V, V <sub>DS</sub> =5V	100			A
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =20A		21.5	28	mΩ
		T <sub>J</sub> =125°C		44	53	
		V <sub>GS</sub> =6V, I <sub>D</sub> =20A		24	31	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =20A		50		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =1A, V <sub>GS</sub> =0V		0.73	1	V
I <sub>S</sub>	Maximum Body-Diode Continuous Current				55	A
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1MHz		2038	2445	pF
C <sub>oss</sub>	Output Capacitance			204		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			85		pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz		1.3	1.56	Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g(10V)</sub>	Total Gate Charge	V <sub>GS</sub> =10V, V <sub>DS</sub> =50V, I <sub>D</sub> =30A		38.5	46	nC
Q <sub>gs</sub>	Gate Source Charge			7.7		nC
Q <sub>gd</sub>	Gate Drain Charge			13.4		nC
t <sub>D(on)</sub>	Turn-On DelayTime	V <sub>GS</sub> =10V, V <sub>DS</sub> =50V, R <sub>L</sub> =2.7Ω, R <sub>GEN</sub> =3Ω		12.7		ns
t <sub>r</sub>	Turn-On Rise Time			8.2		ns
t <sub>D(off)</sub>	Turn-Off DelayTime			31.5		ns
t <sub>f</sub>	Turn-Off Fall Time			11.2		ns
t <sub>rr</sub>	Body Diode Reverse Recovery Time		I <sub>F</sub> =30A, dI/dt=100A/μs		61.6	74
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =30A, dI/dt=100A/μs		172.4		nC

A: The value of R<sub>θJA</sub> is measured with the device in a still air environment with T<sub>A</sub>=25°C.

B: The power dissipation P<sub>D</sub> is based on T<sub>J(MAX)</sub>=175°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

C: Repetitive rating, pulse width limited by junction temperature T<sub>J(MAX)</sub>=175°C.

D: The R<sub>θJA</sub> is the sum of the thermal impedance from junction to case R<sub>θJC</sub> and case to ambient.

E: The static characteristics in Figures 1 to 6 are obtained using <300 μs pulses, duty cycle 0.5% max.

F: These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T<sub>J(MAX)</sub>=175°C.

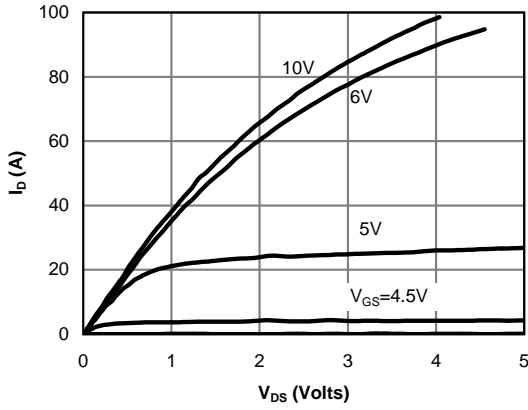
G: The maximum current rating is limited by bond-wires.

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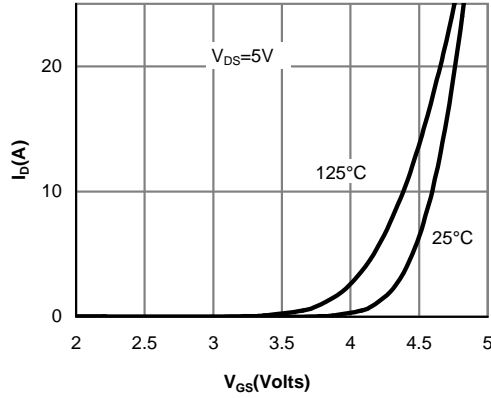
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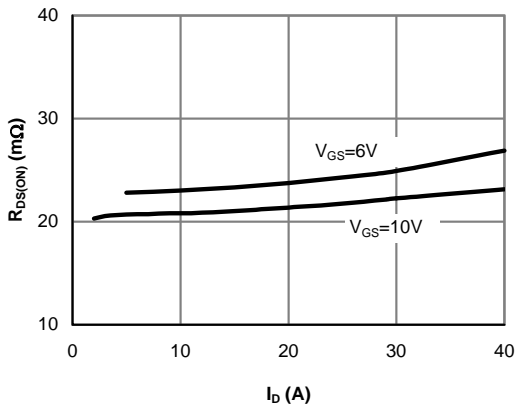
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



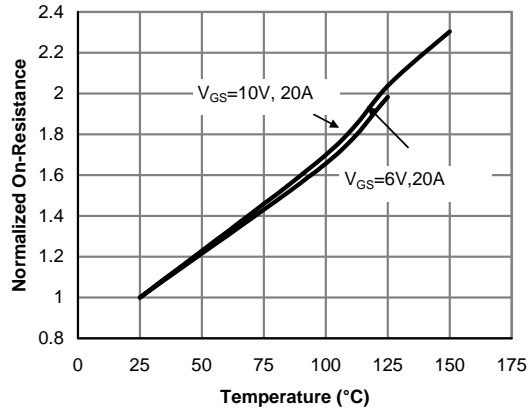
**Fig 1: On-Region Characteristics**



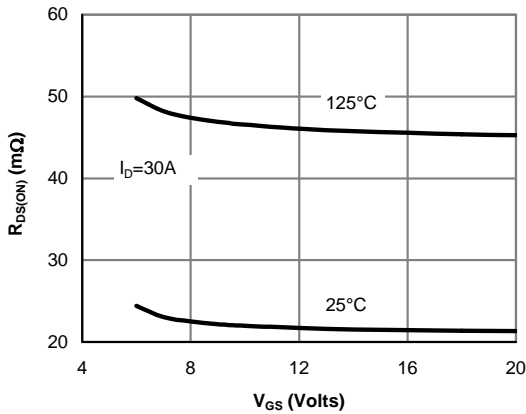
**Figure 2: Transfer Characteristics**



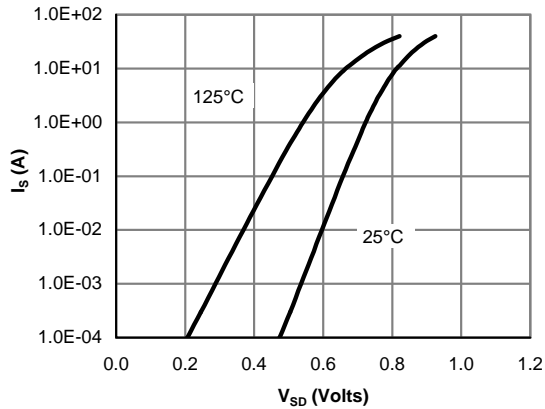
**Figure 3: On-Resistance vs. Drain Current and Gate Voltage**



**Figure 4: On-Resistance vs. Junction Temperature**



**Figure 5: On-Resistance vs. Gate-Source Voltage**



**Figure 6: Body-Diode Characteristics**

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

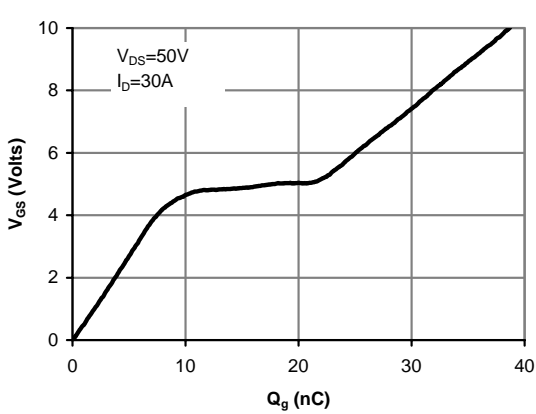


Figure 7: Gate-Charge Characteristics

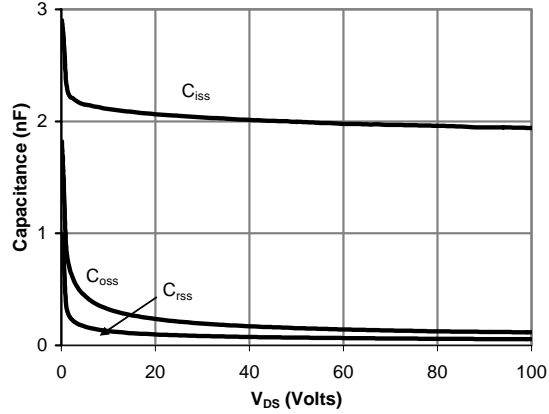


Figure 8: Capacitance Characteristics

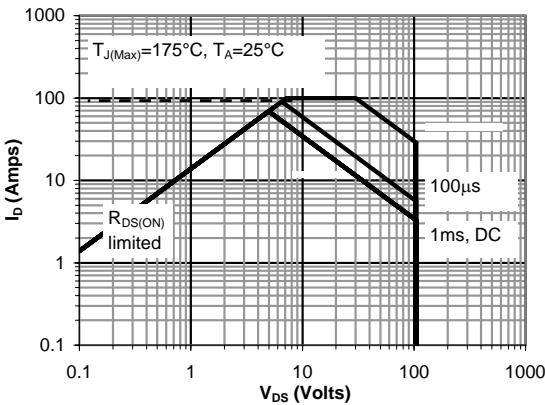


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

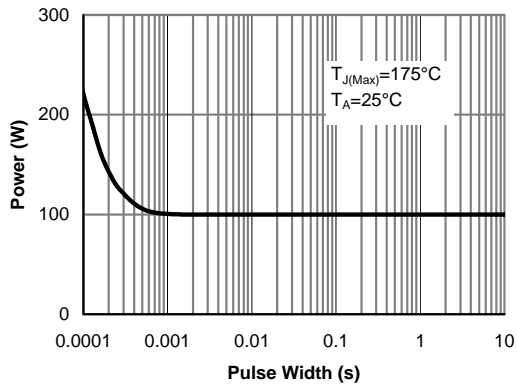


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

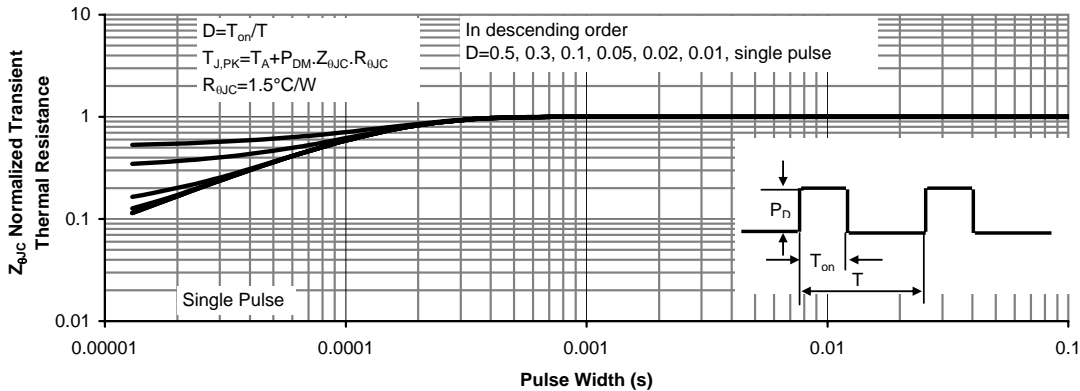


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

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**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

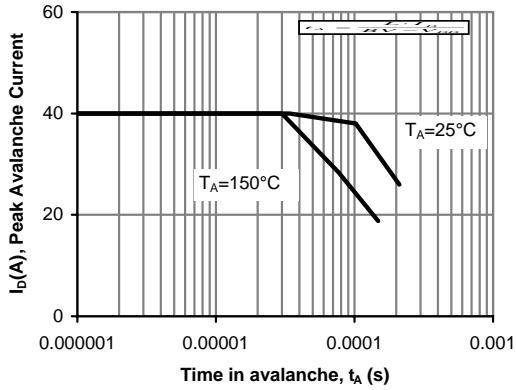


Figure 12: Single Pulse Avalanche capability

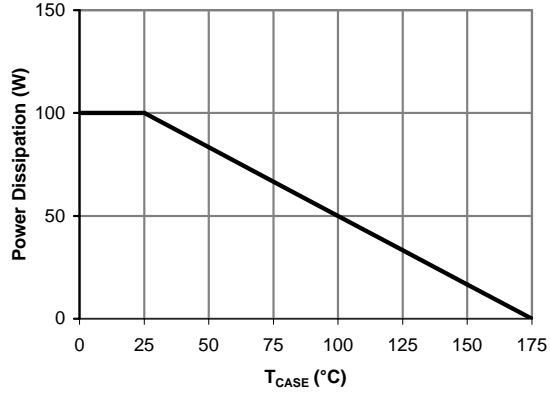


Figure 13: Power De-rating (Note B)

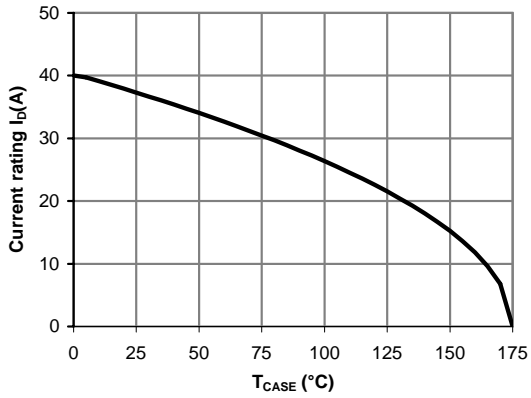


Figure 14: Current De-rating (Note B)