



AOT402

N-Channel Enhancement Mode Field Effect Transistor

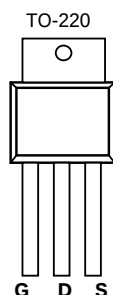


General Description

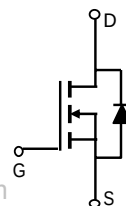
The AOT402 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. This device is suitable for use in PWM, load switching and general purpose applications. *Standard Product AOT402 is Pb-free (meets ROHS & Sony 259 specifications). AOT402L is a Green Product ordering option. AOT402 and AOT402L are electrically identical.*

Features

V_{DS} (V) = 105V
 I_D = 110 A (V_{GS} = 10V)
 $R_{DS(ON)} < 8.6 \text{ m}\Omega$ (V_{GS} = 10V) @ I_D = 30A
 $R_{DS(ON)} < 10 \text{ m}\Omega$ (V_{GS} = 6V)



Top View
Drain Connected
to Tab



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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}	± 25	V
Continuous Drain Current ^G	$T_C=25^\circ\text{C}$	110	A
	$T_C=100^\circ\text{C}$	85	
Pulsed Drain Current ^C	I_{DM}	200	
Avalanche Current ^C	I_{AR}	100	A
Repetitive avalanche energy $L=0.3\text{mH}$ ^C	E_{AR}	540	mJ
Power Dissipation ^B	$T_C=25^\circ\text{C}$	300	W
	$T_C=100^\circ\text{C}$	150	
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 ^A	Steady-State	R _{θJA}	47	60	°C/W
Maximum Junction-to-Case ^B	Steady-State	R _{θJC}	0.25	0.5	°C/W

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Electrical Characteristics (T_J=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV _{DSS}	Drain-Source Breakdown Voltage	I _D =10mA, V _{GS} =0V	105			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =84V, V _{GS} =0V T _J =55°C			1 5	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} =±25V			100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	2	3.3	4	V
I _{D(ON)}	On state drain current	V _{GS} =10V, V _{DS} =5V	200			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =30A T _J =125°C		6.9 12.8	8.6 15	mΩ
		V _{GS} =6V, I _D =30A		7.9	10	mΩ
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =30A		88		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.7	1	V
I _S	Maximum Body-Diode Continuous Current				110	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =25V, f=1MHz		7.7	10	nF
C _{oss}	Output Capacitance			820		pF
C _{rss}	Reverse Transfer Capacitance			300		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		1.25	2	Ω
SWITCHING PARAMETERS						
Q _{g(10V)}	Total Gate Charge	V _{GS} =10V, V _{DS} =25V, I _D =30A		182	230	nC
Q _{gs}	Gate Source Charge			54		nC
Q _{gd}	Gate Drain Charge			44		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =10V, V _{DS} =25V, R _L =0.75Ω, R _{GEN} =3Ω		30.5		ns
t _r	Turn-On Rise Time			42.5		ns
t _{D(off)}	Turn-Off DelayTime			66		ns
t _f	Turn-Off Fall Time			16		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =30A, dI/dt=100A/μs		86	115	ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =30A, dI/dt=100A/μs		375		nC

A: The value of R_{θJA} is measured with the device in a still air environment with T_A=25°C.

B: The power dissipation P_D is based on T_{J(MAX)}=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_{J(MAX)}=175°C.

D: The R_{θJA} is the sum of the thermal impedance from junction to case R_{θJC} and case to ambient.

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

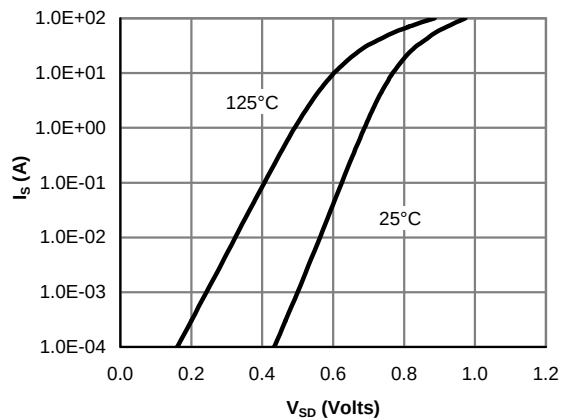
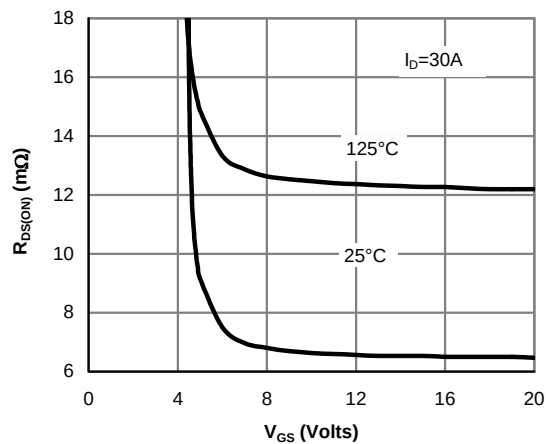
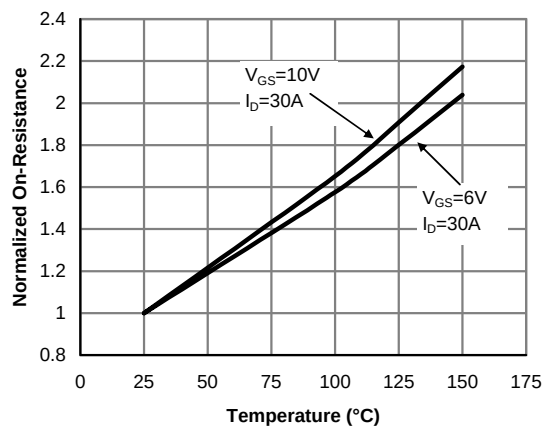
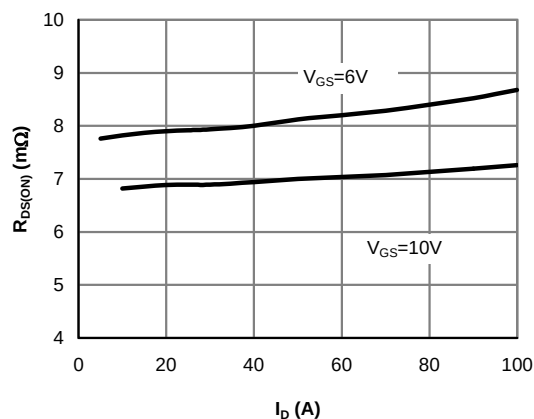
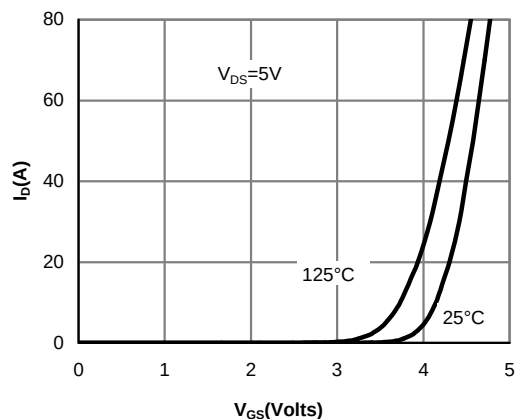
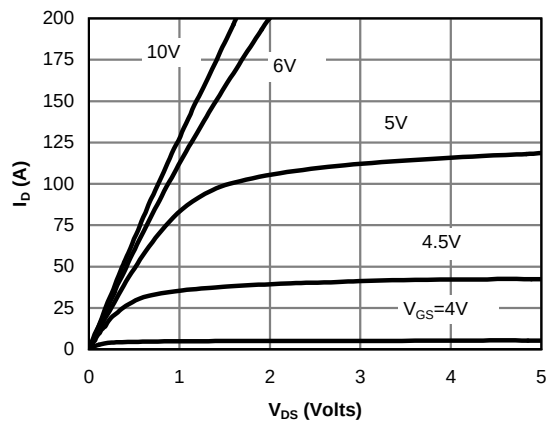
F: These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T_{J(MAX)}=175°C.

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

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



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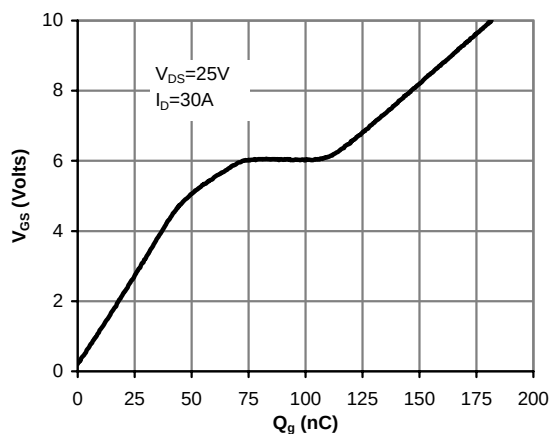


Figure 7: Gate-Charge Characteristics

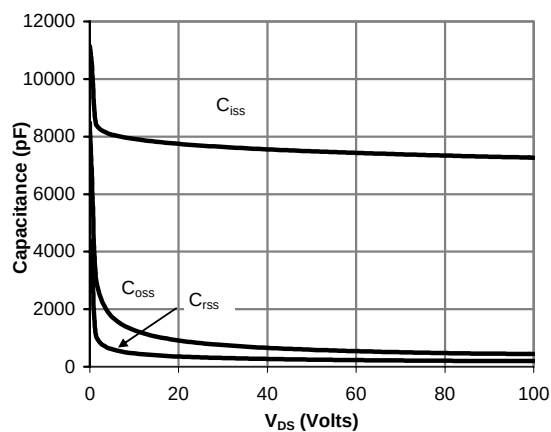


Figure 8: Capacitance Characteristics

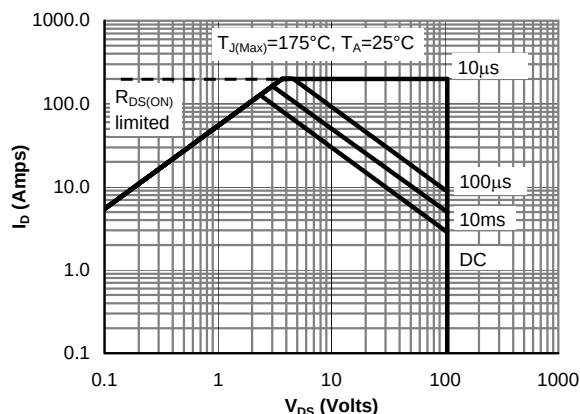


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

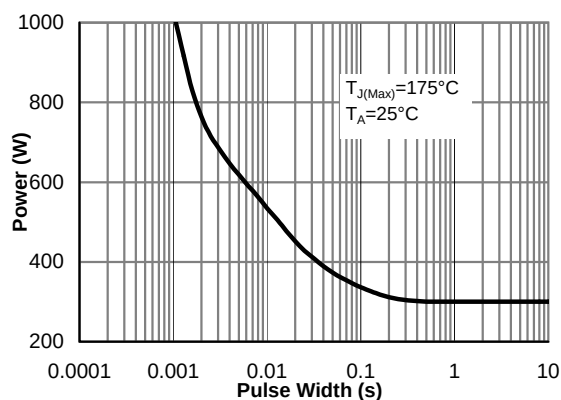


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

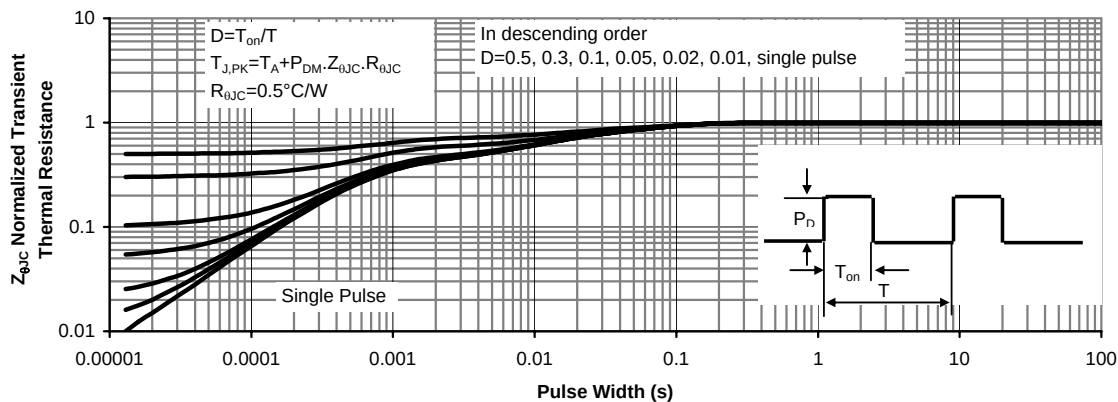


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

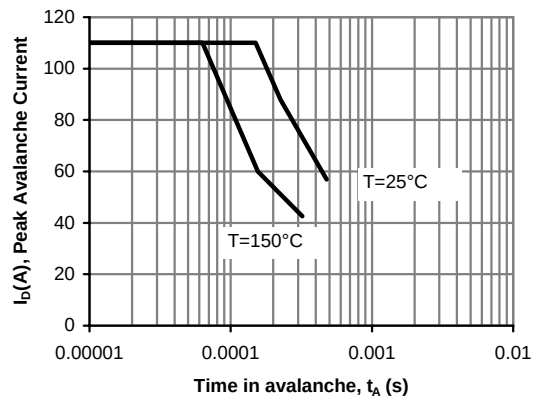


Figure 12: Single Pulse Avalanche capability

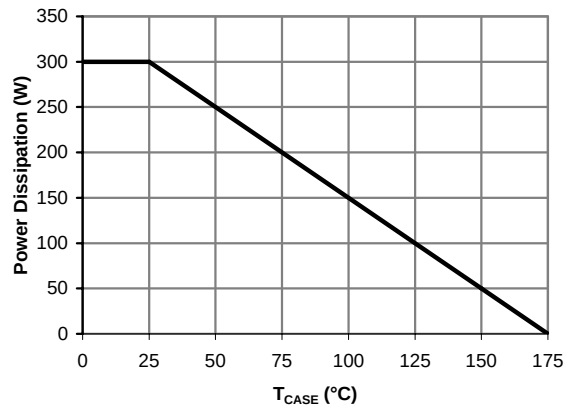


Figure 13: Power De-rating (Note B)

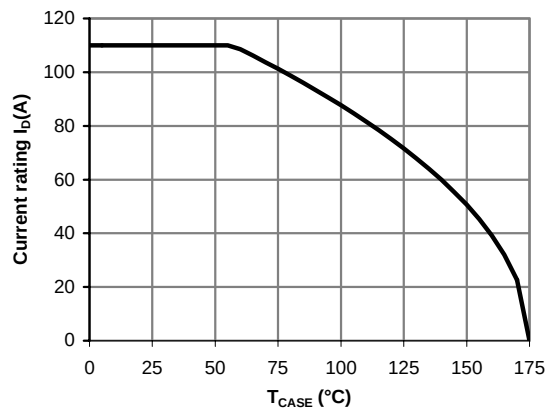


Figure 14: Current De-rating (Note B)