

General Description

The AOT20N25 is fabricated using an advanced high voltage MOSFET process that is designed to deliver high levels of performance and robustness in popular AC-DC applications. By providing low $R_{DS(on)}$, C_{iss} and C_{rss} along with guaranteed avalanche capability this device can be adopted quickly into new and existing offline power supply designs. This device is ideal for boost converters and synchronous rectifiers for consumer, telecom, industrial power supplies and LED backlighting.

For Halogen Free add "L" suffix to part number:
AOT20N25L

Product Summary

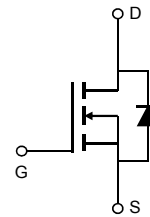
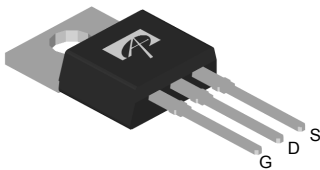
V_{DS}	300V@150°C
I_D (at $V_{GS}=10V$)	20A
$R_{DS(on)}$ (at $V_{GS}=10V$)	< 0.17Ω

100% UIS Tested
100% R_g Tested



Top View

TO-220



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

Parameter	Symbol	AOT20N25	Units
Drain-Source Voltage	V_{DS}	250	V
Gate-Source Voltage	V_{GS}	±30	V
Continuous Drain Current	I_D	$T_C=25^\circ\text{C}$	20
		$T_C=100^\circ\text{C}$	14
Pulsed Drain Current ^C	I_{DM}	51	A
Avalanche Current ^C	I_{AS}	4.5	A
Single pulsed avalanche energy ^G	E_{AS}	608	mJ
Peak diode recovery dv/dt	dv/dt	5	V/ns
Power Dissipation ^B	P_D	$T_C=25^\circ\text{C}$	208
		Derate above 25°C	1.7
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	°C
Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds	T_L	300	°C

Thermal Characteristics

Parameter	Symbol	AOT20N25	Units
Maximum Junction-to-Ambient ^{A,D}	$R_{\theta JA}$	65	°C/W
Maximum Case-to-sink ^A	$R_{\theta CS}$	0.5	°C/W
Maximum Junction-to-Case	$R_{\theta JC}$	0.6	°C/W

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 =250μA, V _{GS} =0V, T _J =25°C	250			V
		I _D =250μA, V _{GS} =0V, T _J =150°C		300		
BV _{DSS} /ΔT _J	Zero Gate Voltage Drain Current	I _D =250μA, V _{GS} =0V		0.25		V/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =250V, V _{GS} =0V			1	μA
		V _{DS} =200V, T _J =125°C			10	
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} =±30V			±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =5V, I _D =250μA	3.2	3.8	4.5	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =10A		0.14	0.17	Ω
g _{FS}	Forward Transconductance	V _{DS} =40V, I _D =10A		16		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.72	1	V
I _S	Maximum Body-Diode Continuous Current				20	A
I _{SM}	Maximum Body-Diode Pulsed Current				51	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =25V, f=1MHz		1028		pF
C _{oss}	Output Capacitance			167		pF
C _{rss}	Reverse Transfer Capacitance			11		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz	1.9	3.9	5.9	Ω
SWITCHING PARAMETERS						
Q _g	Total Gate Charge	V _{GS} =10V, V _{DS} =200V, I _D =20A		20	25	nC
Q _{gs}	Gate Source Charge			5.7		nC
Q _{gd}	Gate Drain Charge			8		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =10V, V _{DS} =125V, I _D =20A, R _G =25Ω		27		ns
t _r	Turn-On Rise Time			31		ns
t _{D(off)}	Turn-Off DelayTime			70		ns
t _f	Turn-Off Fall Time			25		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =20A, dI/dt=100A/μs, V _{DS} =100V		179		ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =20A, dI/dt=100A/μs, V _{DS} =100V		1.6		μC

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)}=150° 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)}=150° C. Ratings are based on low frequency and duty cycles to keep initial T_J=25° 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)}=150° C. The SOA curve provides a single pulse rating.

G. L=60mH, I_{AS}=4.5A, V_{DD}=150V, R_G=25Ω, Starting T_J=25° C

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

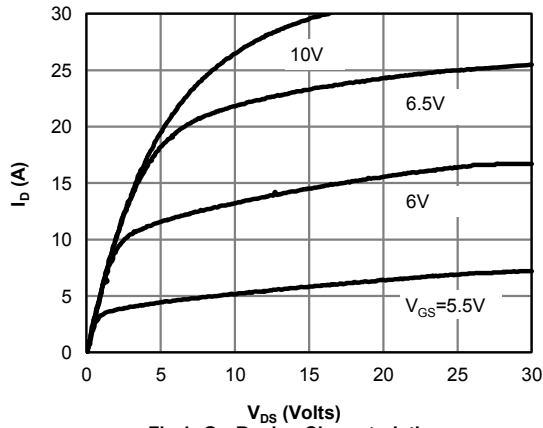


Fig 1: On-Region Characteristics

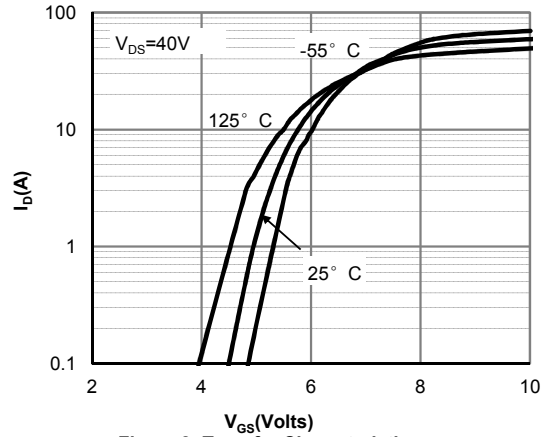


Figure 2: Transfer Characteristics

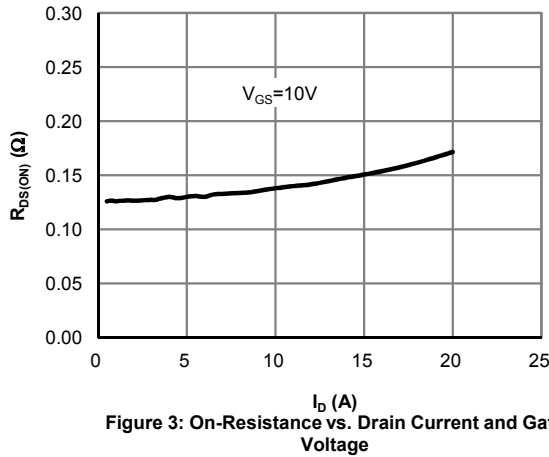


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

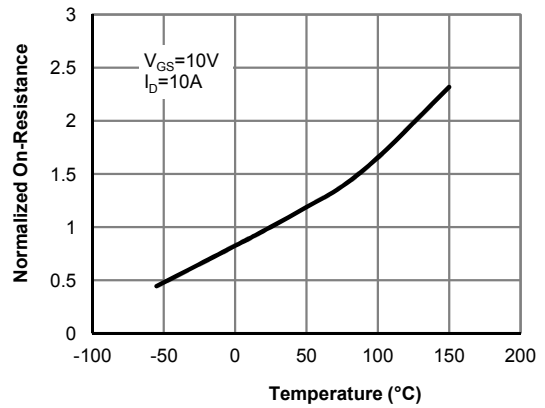


Figure 4: On-Resistance vs. Junction Temperature

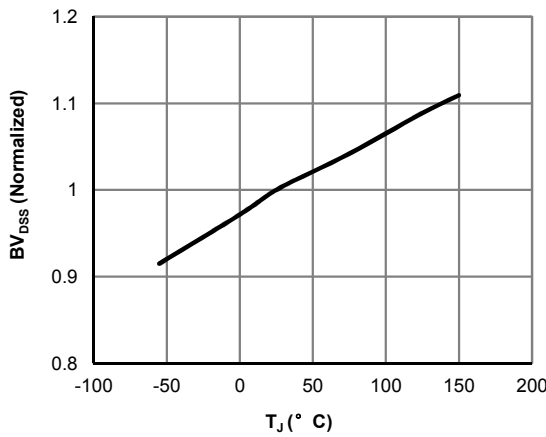


Figure 5: Break Down vs. Junction Temperature

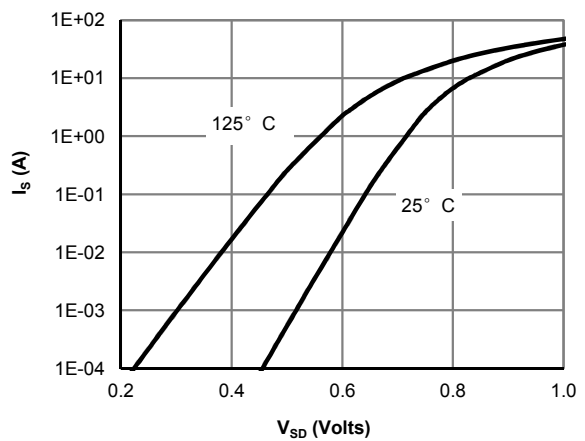


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

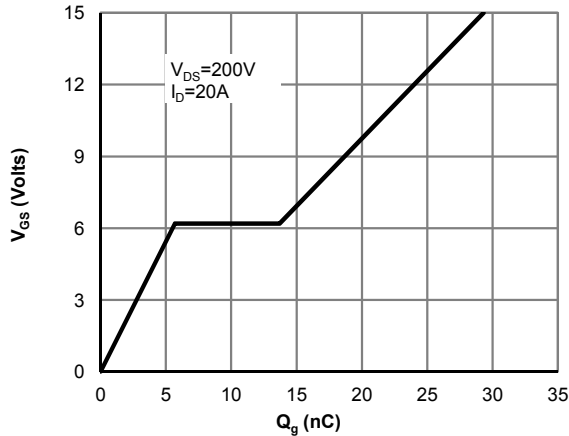


Figure 7: Gate-Charge Characteristics

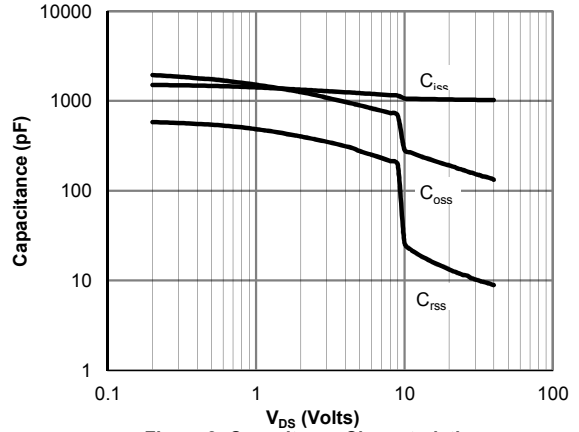


Figure 8: Capacitance Characteristics

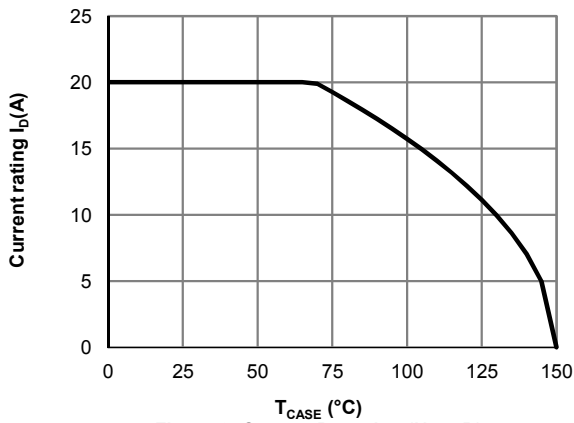


Figure 9: Current De-rating (Note B)

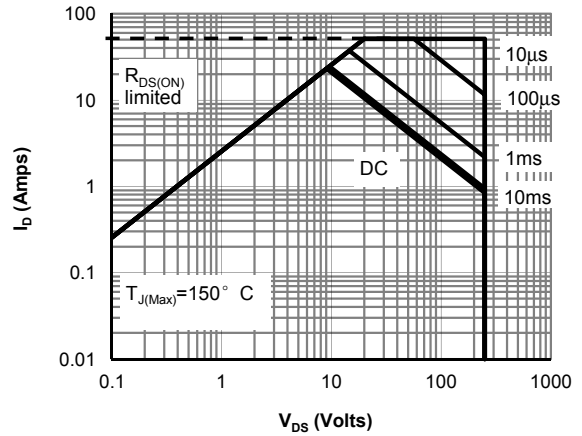


Figure 10: Maximum Forward Biased Safe Operating Area for AOT20N25 (Note F)

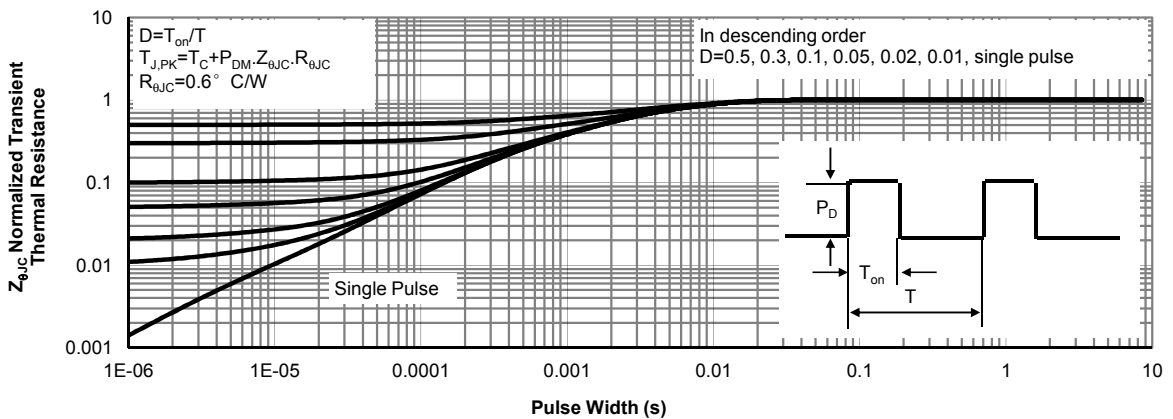
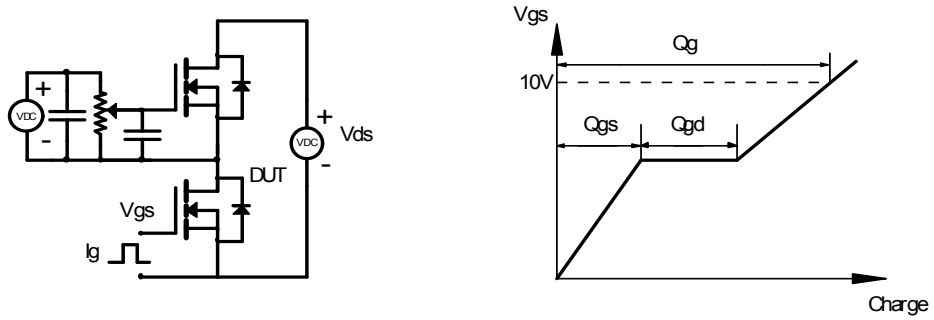
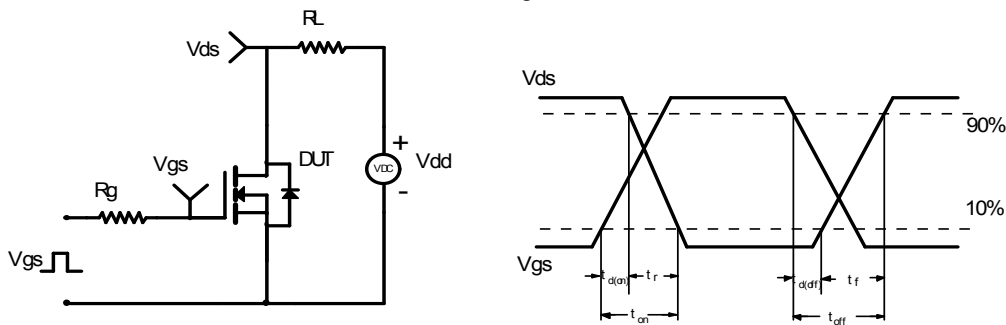


Figure 11: Normalized Maximum Transient Thermal Impedance for AOT20N25 (Note F)

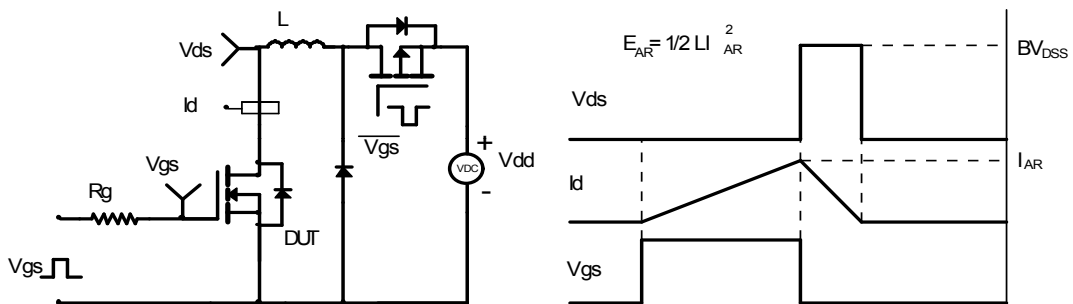
Gate Charge Test Circuit & Waveform



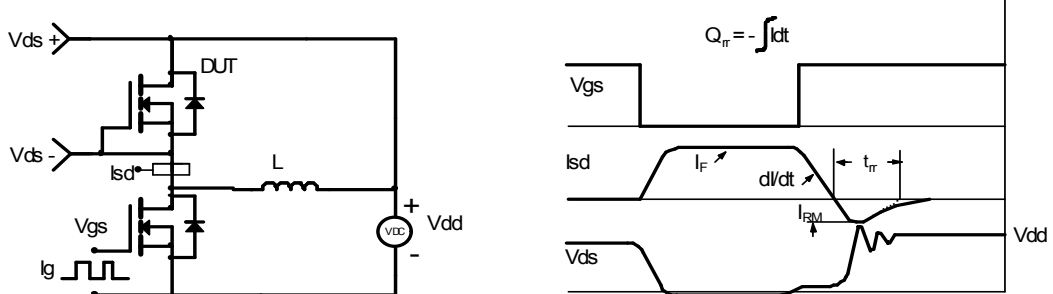
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



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