AOT20N25

250V,20A N-Channel MOSFET

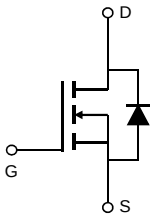
General Description

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.

Features

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

RoHS Compliant



Absolute Maximum Ratings T_A=25℃ unless otherwise noted

Parameter		Symbol	AOT20N25	Units
Drain-Source Voltage		V_{DS}	250	V
Gate-Source Voltage		V_{GS}	±30	V
Continuous Drain Current	T_C=25℃	I_D	20	A
	T_C=100℃		14	
Pulsed Drain Current [C]		I_{DM}	51	
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]	T_C=25℃	P_D	208	W
	Derate above 25°C		1.7	W/ °C
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	℃
Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds		T_L	300	℃

Thermal Characteristics

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

Electrical Characteristics (T_J=25℃ 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℃	250			V
		I_D=250μA, V_{GS}=0V, T_J=150℃		300		
BV_{DSS} /ΔTJ	Zero Gate Voltage Drain Current	ID=250μA, VGS=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℃			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 $R_{\theta JA}$ 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 $R_{\theta JA}$ is the sum of the thermal impedance from junction to case $R_{\theta JC}$ 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

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

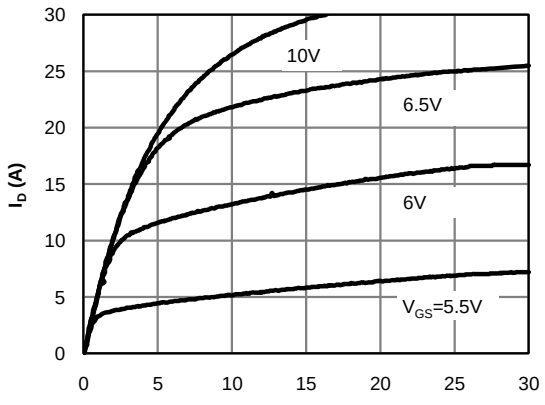


Fig 1: On-Region Characteristics

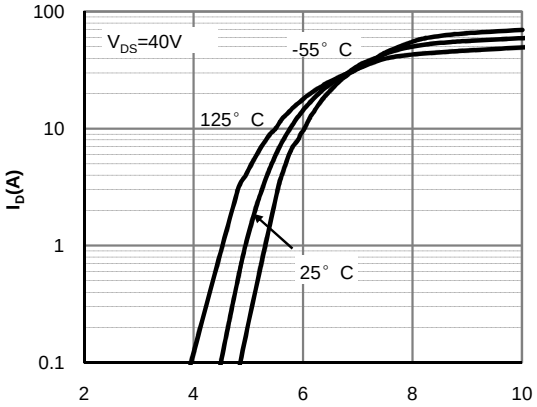


Figure 2: Transfer Characteristics

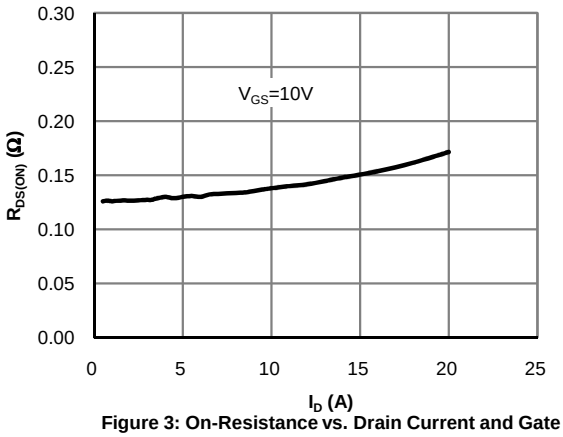


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

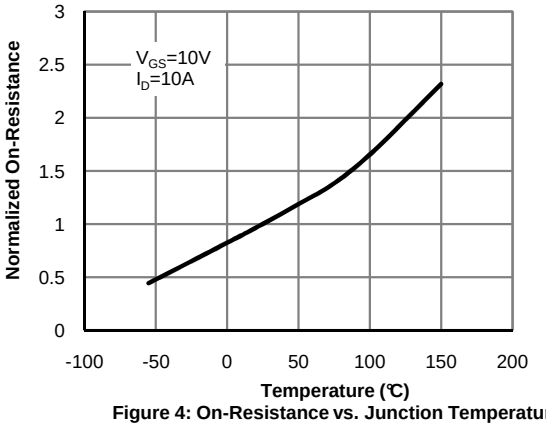


Figure 4: On-Resistance vs. Junction Temperature

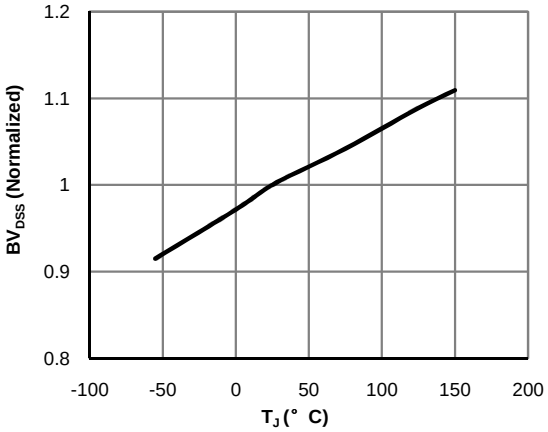


Figure 5:Break Down vs. Junction Temparature

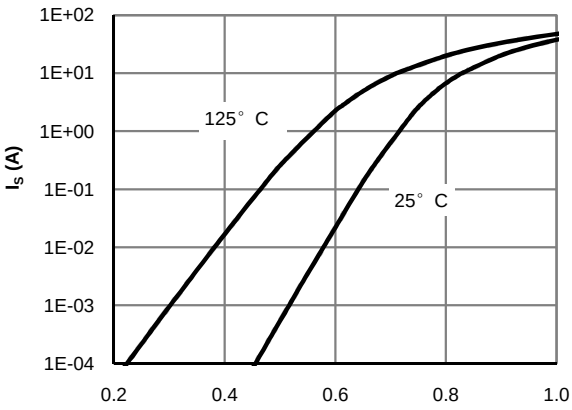


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

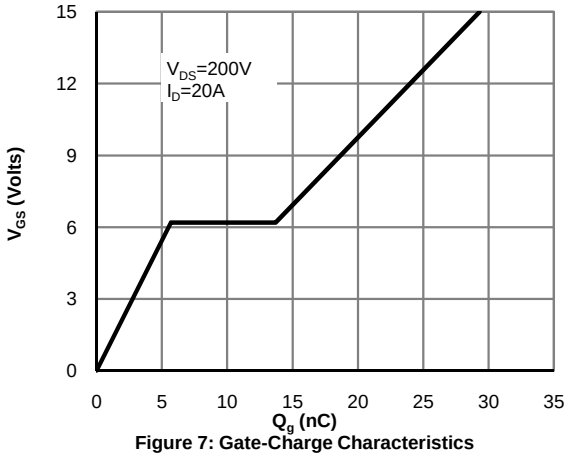


Figure 7: Gate-Charge Characteristics

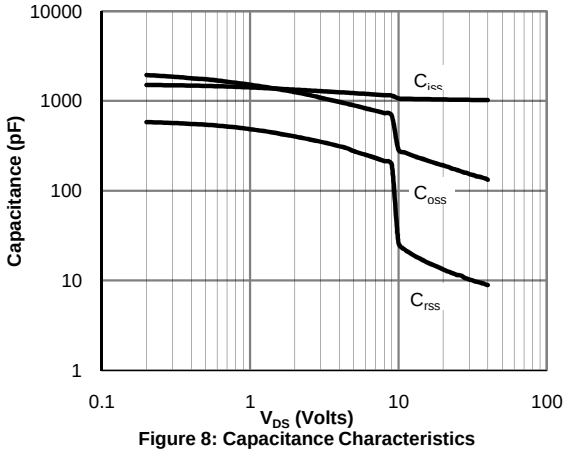


Figure 8: Capacitance Characteristics

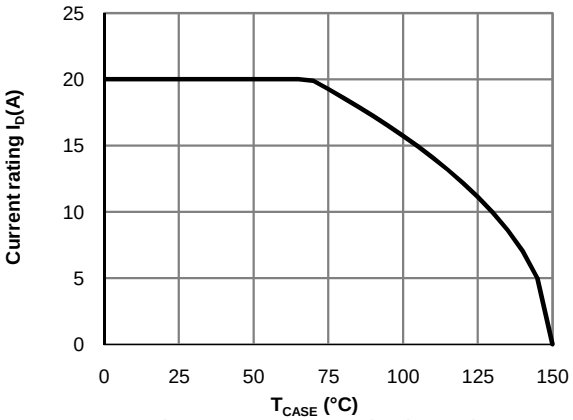


Figure 9: Current De-rating (Note B)

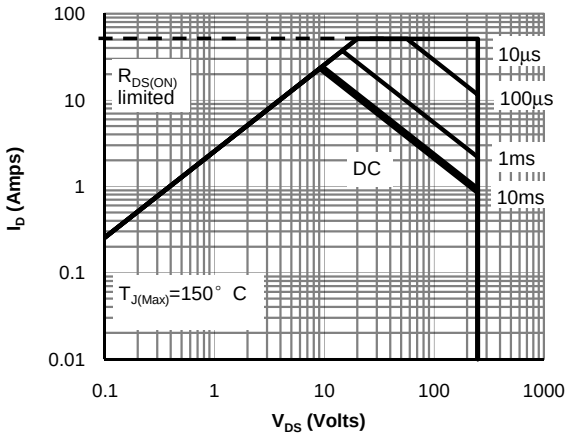


Figure 10: Maximum Forward Biased Safe Operating Area for AOT20N25 (Note F)

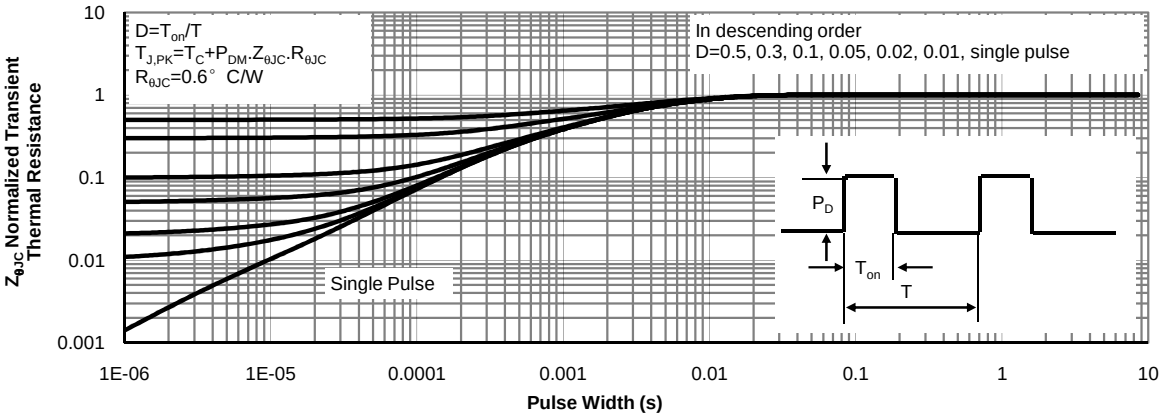
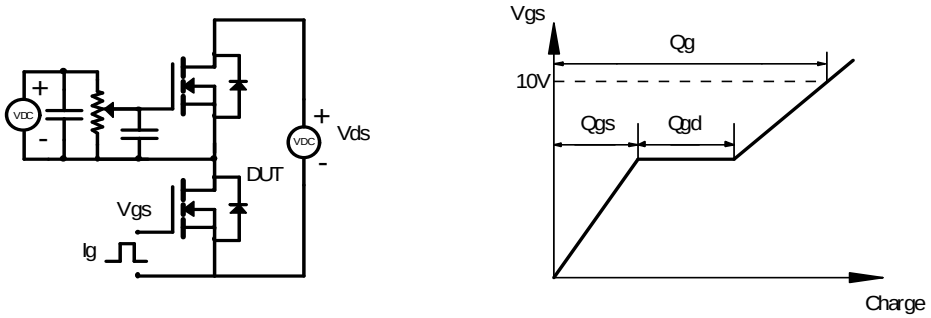
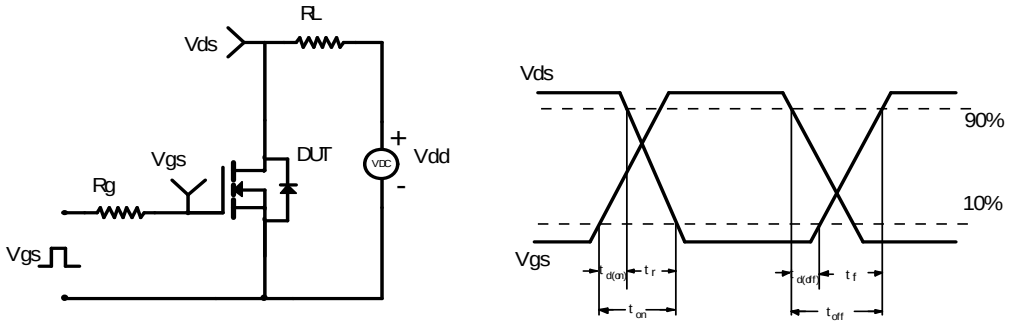


Figure 11: Normalized Maximum Transient Thermal Impedance for AOT20N25 (Note F)

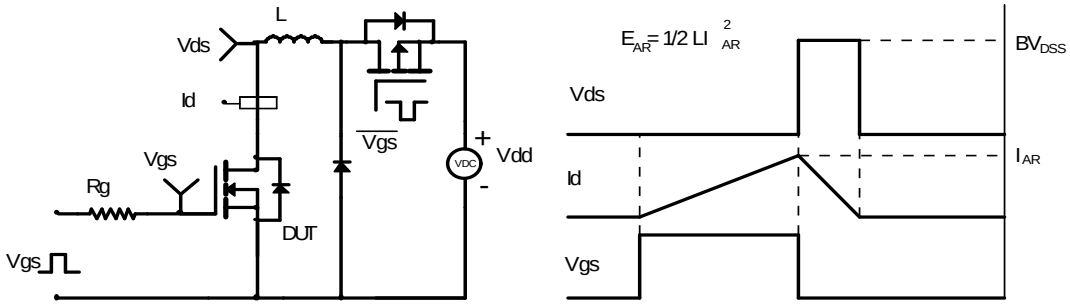
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms