AO4630

30V Complementary MOSFET

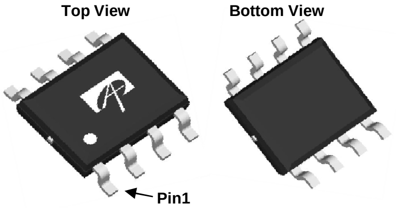
General Description

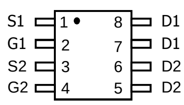
AO4630 uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. This complementary N and P channel MOSFET configuration is ideal for low Input Voltage inverter applications.

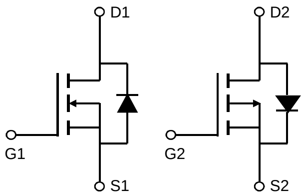
Product Summary

N-Channel	P-Channel
V_{DS}= 30V	-30V
I_D= 7A (V_{GS}=10V)	-5A (V_{GS}=-10V)
$R_{DS(ON)}$	$R_{DS(ON)}$
< 23mΩ (V_{GS}=10V)	< 48mΩ (V_{GS}=-10V)
< 28mΩ (V_{GS}=4.5V)	< 57mΩ (V_{GS}=-4.5V)
< 36mΩ (V_{GS}=2.5V)	< 78mΩ (V_{GS}=-2.5V)
100% UIS Tested	100% UIS Tested
100% R_g Tested	100% R_g Tested

SOIC-8







N-channel P-channel

Orderable Part Number	Package Type	Form	Minimum Order Quantity
AO4630	SO-8	Tape & Reel	3000

Absolute Maximum Ratings T_A=25℃ unless otherwise noted

Parameter		Symbol	Max N-channel	Max P-channel	Units
Drain-Source Voltage		V_{DS}	30	-30	V
Gate-Source Voltage		V_{GS}	±12	±12	V
Continuous Drain Current	T_A=25℃	I_D	7	-5	A
	T_A=70℃		5.6	-4	
Pulsed Drain Current [C]		I_{DM}	30	-25	
Avalanche Current [C]		I_{AS}	14	18	A
Avalanche energy	L=0.1mH [C]	E_{AS}	10	16	mJ
V_{DS} Spike	10µs	V_{SPIKE}	36	-36	V
Power Dissipation [B]	T_A=25℃	P_D	2		W
	T_A=70℃		1.3		
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150		℃

Thermal Characteristics

Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{\theta JA}$	48	62.5	℃/W
Maximum Junction-to-Ambient [A D]	Steady-State		74	90	℃/W
Maximum Junction-to-Lead	Steady-State	$R_{\theta JL}$	32	40	℃/W

N-Channel 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		30			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=30V, V_{GS}=0V				1	µA
			T_J=55°C			5	
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}=±12V				±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250µA		0.65	1.05	1.45	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=7A			17.8	23	mΩ
			T_J=125°C		28	40	
		V_{GS}=4.5V, I_D=6A			19	28	mΩ
		V_{GS}=2.5V, I_D=5A			24	36	mΩ
g_{FS}	Forward Transconductance	V_{DS}=5V, I_D=7A			35		S
V_{SD}	Diode Forward Voltage	I_S=1A, V_{GS}=0V			0.7	1	V
I_S	Maximum Body-Diode Continuous Current					2.5	A
DYNAMIC PARAMETERS							
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=15V, f=1MHz			670		pF
C_{oss}	Output Capacitance				75		pF
C_{rss}	Reverse Transfer Capacitance				45		pF
R_g	Gate resistance	f=1MHz		1.5	3	4.5	Ω
SWITCHING PARAMETERS							
Q_g(10V)	Total Gate Charge	V_{GS}=10V, V_{DS}=15V, I_D=7A			13	20	nC
Q_g(4.5V)	Total Gate Charge				6	12	nC
Q_{gs}	Gate Source Charge				1.3		nC
Q_{gd}	Gate Drain Charge				1.8		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=10V, V_{DS}=15V, R_L=2.2Ω, R_{GEN}=3Ω			3		ns
t_r	Turn-On Rise Time				2.5		ns
$t_{D(off)}$	Turn-Off DelayTime				25		ns
t_f	Turn-Off Fall Time				4		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=7A, di/dt=500A/µs			6.5		ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=7A, di/dt=500A/µs			7.5		nC

A. The value of $R_{\theta JA}$ is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A =25°C. The value in any given application depends on the user's specific board design.
B. The power dissipation P_D is based on $T_{J(MAX)}$=150°C, using ≤ 10s junction-to-ambient thermal resistance.
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 initialT_J=25°C.
D. The $R_{\theta JA}$ is the sum of the thermal impedance from junction to lead $R_{\theta JL}$ and lead to ambient.
E. The static characteristics in Figures 1 to 6 are obtained using <300µs pulses, duty cycle 0.5% max.
F. These curves are based on the junction-to-ambient thermal impedance which is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, assuming a maximum junction temperature of $T_{J(MAX)}$=150°C. The SOA curve provides a single pulse rating.

N-Channel: TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

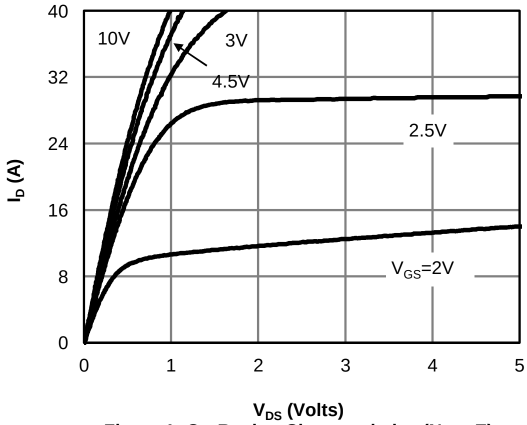


Figure 1: On-Region Characteristics (Note E)

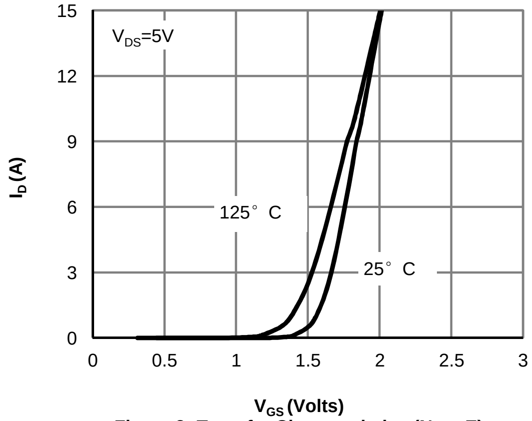


Figure 2: Transfer Characteristics (Note E)

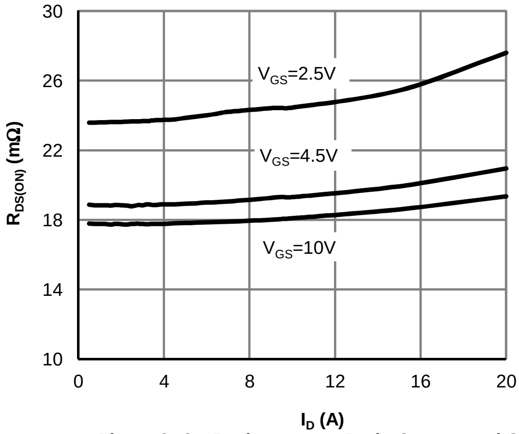


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

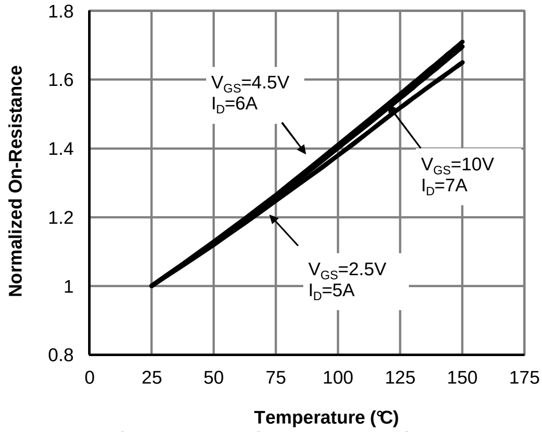


Figure 4: On-Resistance vs. Junction Temperature (Note E)

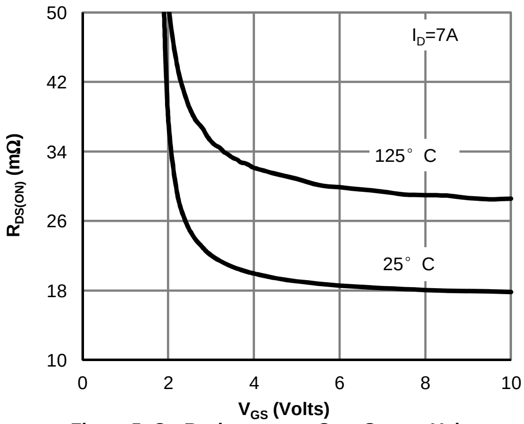


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

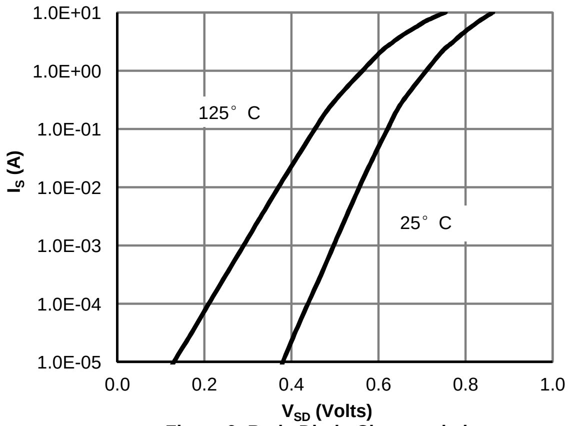


Figure 6: Body-Diode Characteristics (Note E)

N-Channel: TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

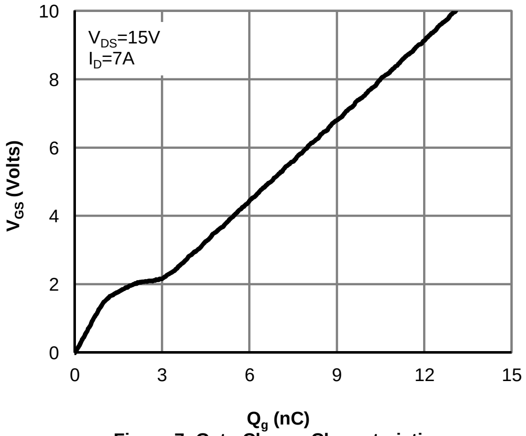


Figure 7: Gate-Charge Characteristics

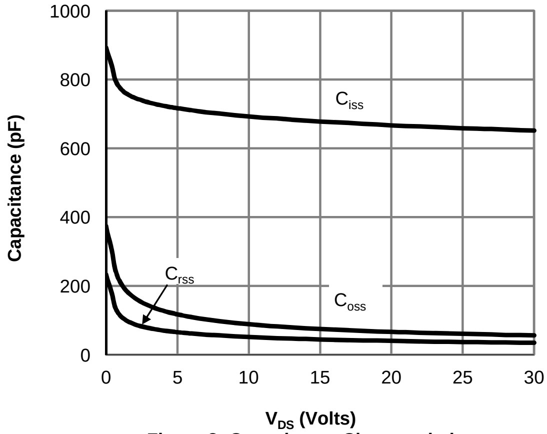
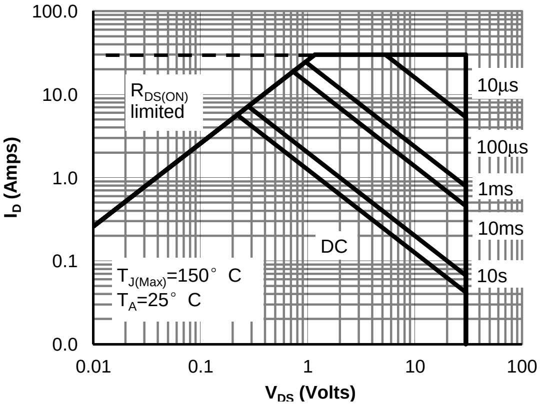


Figure 8: Capacitance Characteristics



V_{GS}> or equal to 2.5V
Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

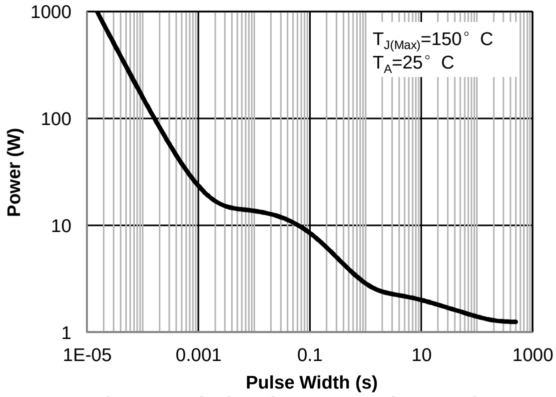


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

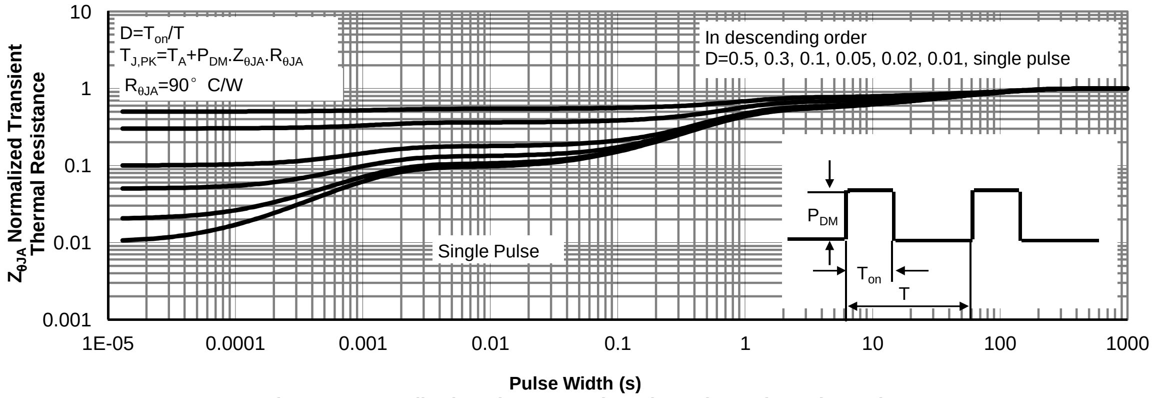


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

Figure A: Gate Charge Test Circuit & Waveforms

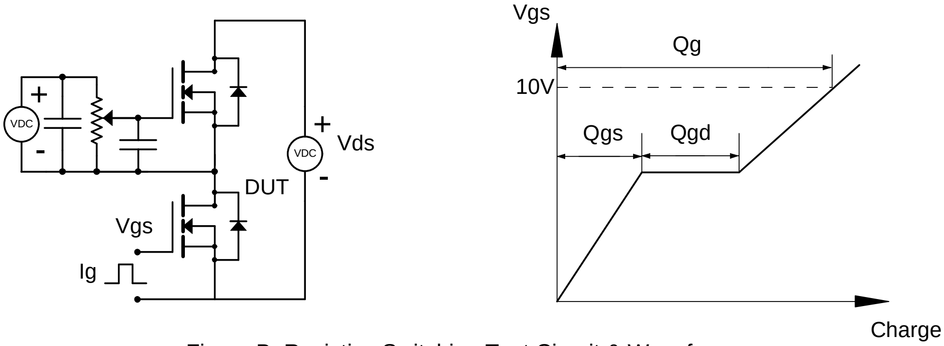


Figure B: Resistive Switching Test Circuit & Waveforms

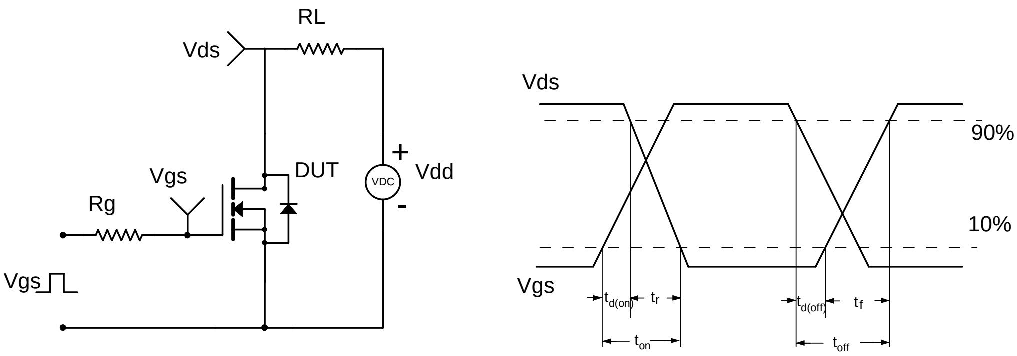


Figure C: Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

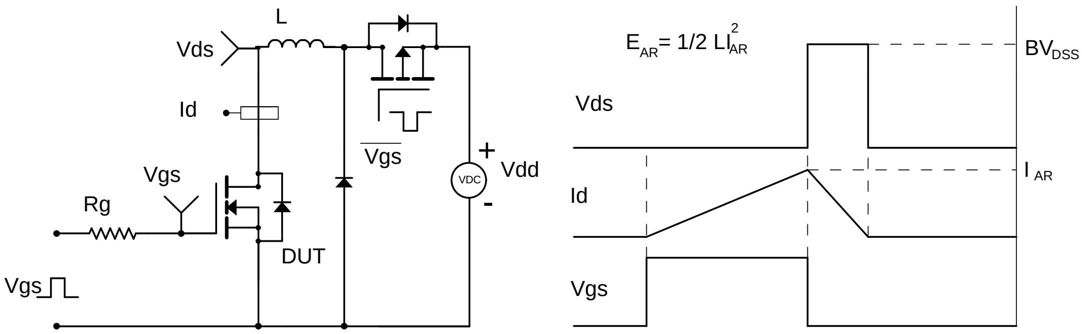
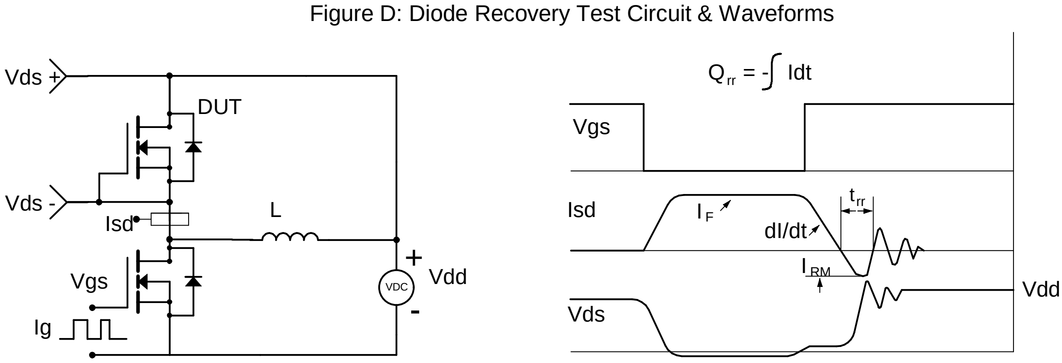


Figure D: Diode Recovery Test Circuit & Waveforms



P-Channel 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		-30			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-30V, V_{GS}=0V				-1	µA
			T_J=55℃			-5	
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}=±12V				±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=$V_{GS,}$ I_D=-250µA		-0.5	-0.9	-1.3	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=-10V, I_D=-5A			40	48	mΩ
			T_J=125℃		48	60	
		V_{GS}=-4.5V, I_D=-3.5A			45	57	mΩ
		V_{GS}=-2.5V, I_D=-2.5A			60	78	mΩ
g_{FS}	Forward Transconductance	V_{DS}=-5V, I_D=-5A			18		S
V_{SD}	Diode Forward Voltage	I_S=-1A, V_{GS}=0V			-0.7	-1	V
I_S	Maximum Body-Diode Continuous Current					-2.5	A
DYNAMIC PARAMETERS							
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=-15V, f=1MHz			700		pF
C_{oss}	Output Capacitance				80		pF
C_{rss}	Reverse Transfer Capacitance				60		pF
R_g	Gate resistance	f=1MHz		4	8	12	Ω
SWITCHING PARAMETERS							
Q_g(10V)	Total Gate Charge	V_{GS}=-10V, V_{DS}=-15V, I_D=-5A			14	25	nC
Q_g(4.5V)	Total Gate Charge				7	15	nC
Q_{gs}	Gate Source Charge				1.5		nC
Q_{gd}	Gate Drain Charge				2.5		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=-10V, V_{DS}=-15V, R_L=3Ω, R_{GEN}=3Ω			6.5		ns
t_r	Turn-On Rise Time				3.5		ns
$t_{D(off)}$	Turn-Off DelayTime				41		ns
t_f	Turn-Off Fall Time				9		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=-5A, di/dt=500A/µs			15		ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=-5A, di/dt=500A/µs			40		nC

A. The value of $R_{\theta JA}$ is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A =25° C. The value in any given application depends on the user's specific board design.
B. The power dissipation P_D is based on $T_{J(MAX)}$=150° C, using ≤ 10s junction-to-ambient thermal resistance.
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 initialT_J=25° C.
D. The $R_{\theta JA}$ is the sum of the thermal impedance from junction to lead $R_{\theta JL}$ and lead to ambient.
E. The static characteristics in Figures 1 to 6 are obtained using <300µs pulses, duty cycle 0.5% max.
F. These curves are based on the junction-to-ambient thermal impedance which is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, assuming a maximum junction temperature of $T_{J(MAX)}$=150° C. The SOA curve provides a single pulse rating.

P-Channel: TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

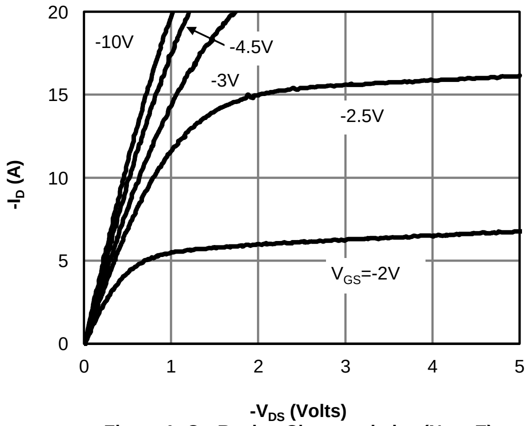


Figure 1: On-Region Characteristics (Note E)

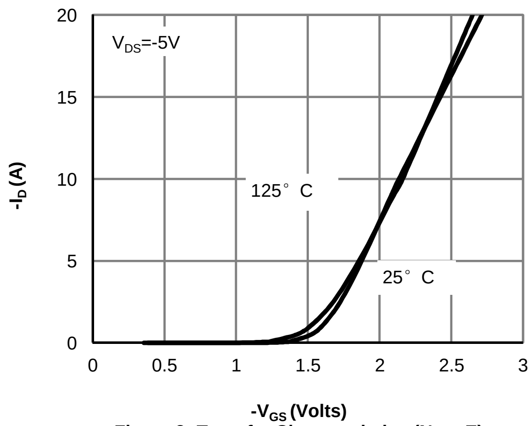


Figure 2: Transfer Characteristics (Note E)

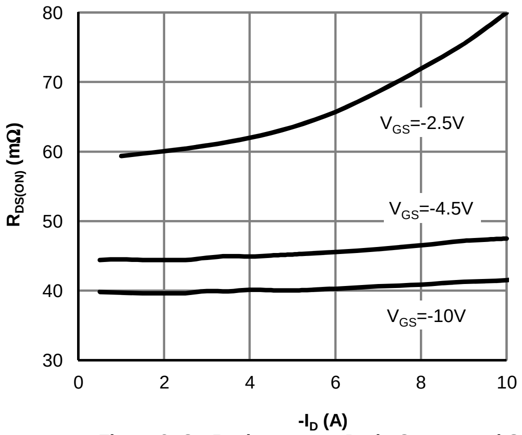


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

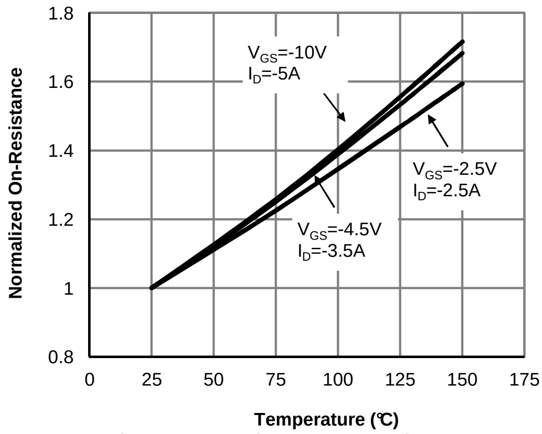


Figure 4: On-Resistance vs. Junction Temperature (Note E)

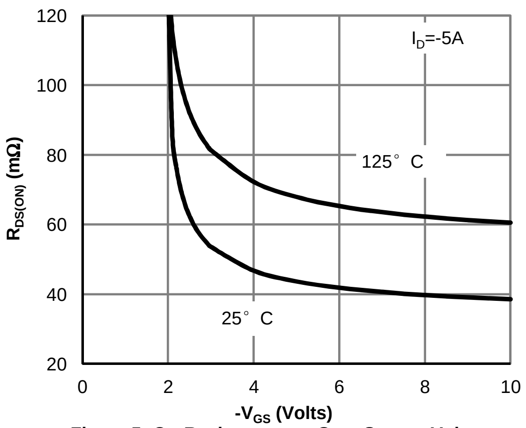


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

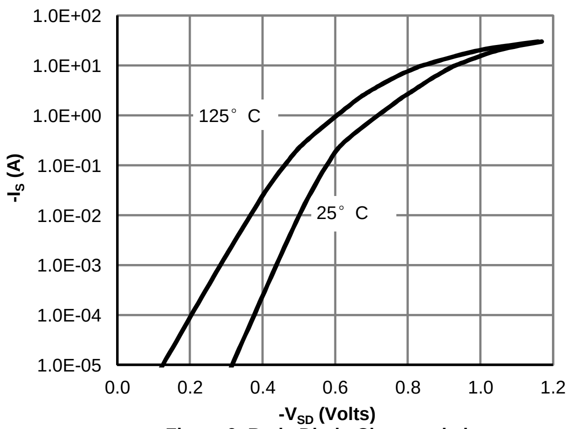


Figure 6: Body-Diode Characteristics (Note E)

P-Channel: TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

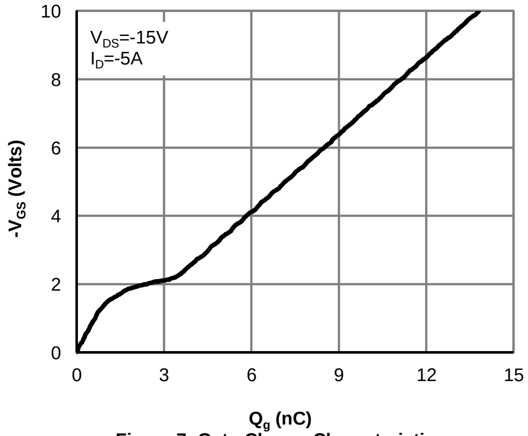


Figure 7: Gate-Charge Characteristics

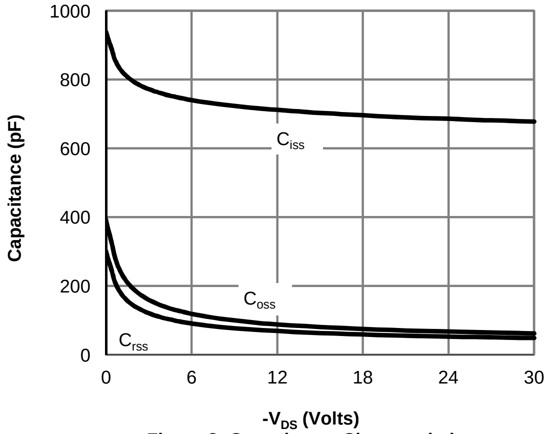
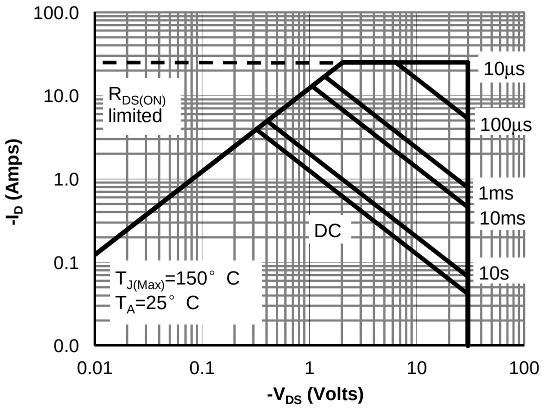


Figure 8: Capacitance Characteristics



V_{GS}<or equal to -2.5V
Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

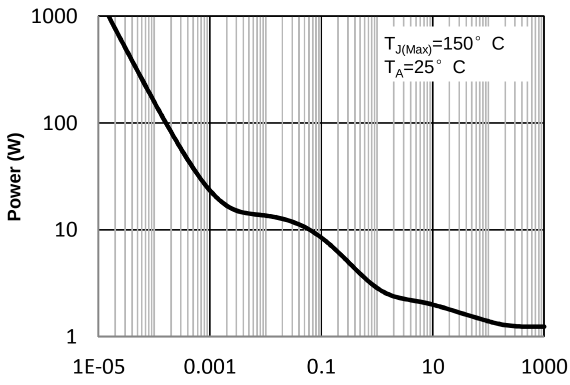


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

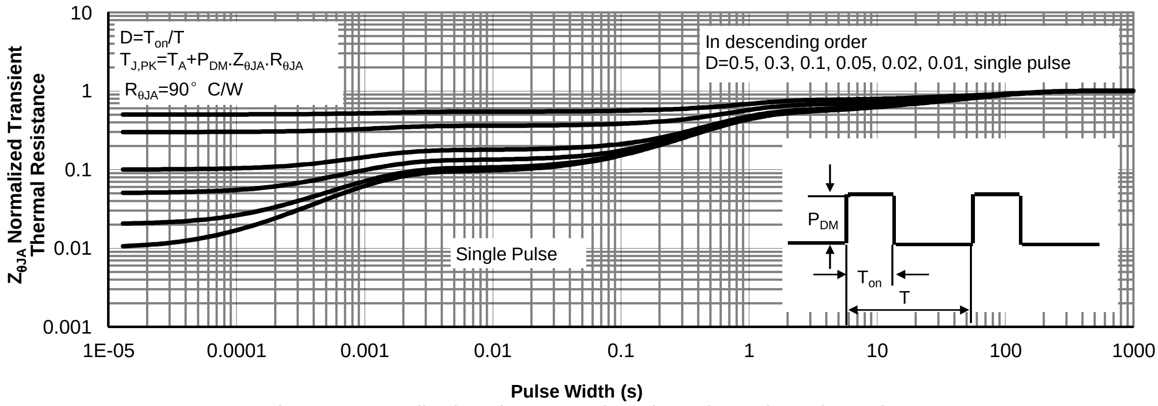
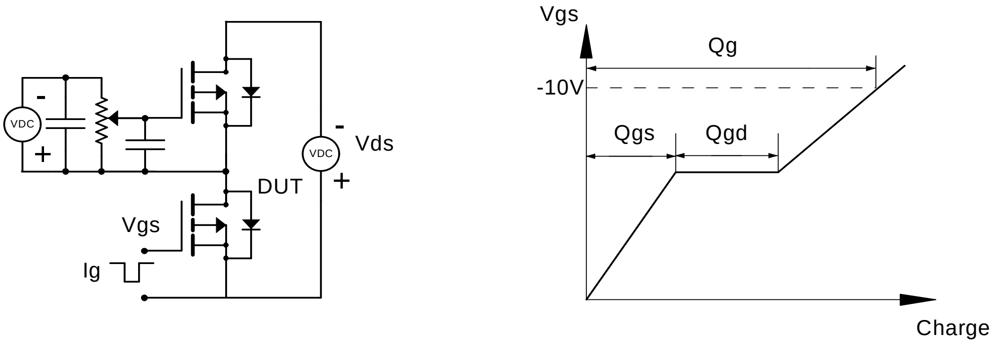
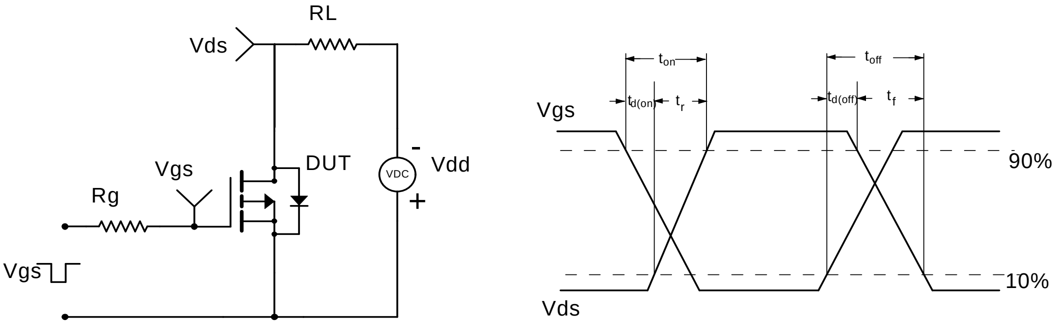


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

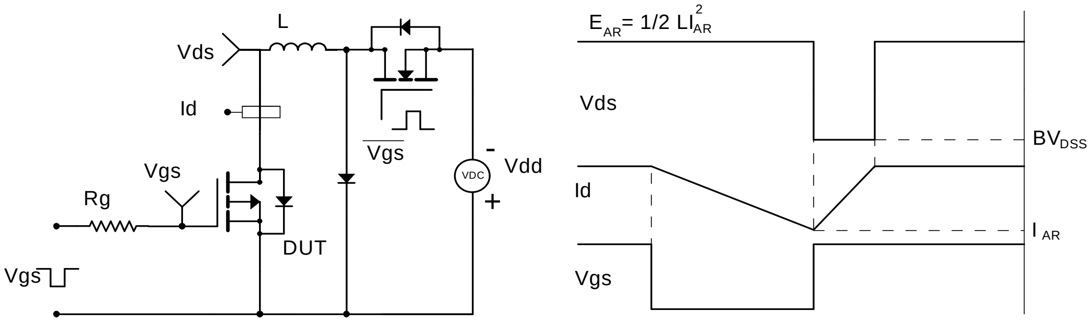
Gate Charge Test Circuit & Waveform



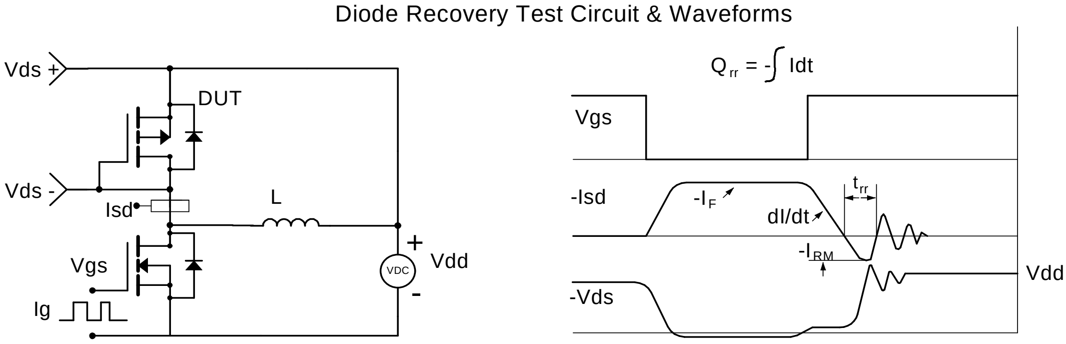
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



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