

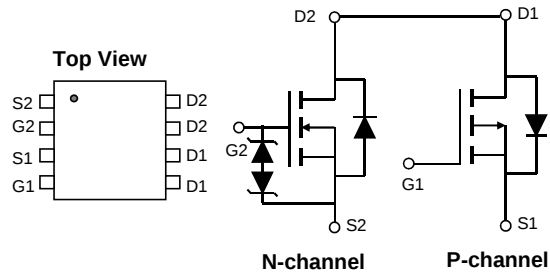
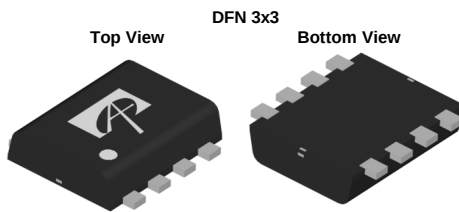
General Description

The AON3613 uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. The complementary MOSFETs may be used in inverter and other applications.

Product Summary

N-channel	P-channel
$V_{DS} (V) = 30V$	$V_{DS} (V) = -30V$
$I_D = 4.5A$	$I_D = -4.5A$ ($V_{GS} = \pm 10V$)
$R_{DS(ON)} < 52m\Omega$	$R_{DS(ON)} < 68m\Omega$ ($V_{GS} = \pm 10V$)
$R_{DS(ON)} < 60m\Omega$	$R_{DS(ON)} < 100m\Omega$ ($V_{GS} = \pm 4.5V$)

ESD protection
HBM Class 3A



Absolute Maximum Ratings $T_A = 25^\circ C$ 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	± 20	V
Continuous Drain Current	I_D	4.5	-4.5	A
		3.5	-3.5	
Pulsed Drain Current ^C	I_{DM}	20	-20	
Power Dissipation ^B	P_D	2.1	2.1	W
		1.3	1.3	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	-55 to 150	$^\circ C$

Thermal Characteristics: N-channel

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A $t \leq 10s$	$R_{\theta JA}$	50	60	$^\circ C/W$
Maximum Junction-to-Ambient ^{A D} Steady-State		80	100	$^\circ C/W$
Maximum Junction-to-Lead	$R_{\theta JL}$	30	40	$^\circ C/W$

Thermal Characteristics: P-channel

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A $t \leq 10s$	$R_{\theta JA}$	50	60	$^\circ C/W$
Maximum Junction-to-Ambient ^{A D} Steady-State		80	100	$^\circ C/W$
Maximum Junction-to-Lead	$R_{\theta JL}$	30	40	$^\circ C/W$

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 T _J =55°C			1 5	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} =±10V			±10	μA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	0.7	1.05	1.5	V
I _{D(ON)}	On state drain current	V _{GS} =10V, V _{DS} =5V	20			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =4.5A T _J =125°C		42 66	52 82	mΩ
		V _{GS} =4.5V, I _D =3A		47	60	mΩ
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =4.5A		15		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.75	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		245		pF
C _{oss}	Output Capacitance			35		pF
C _{rss}	Reverse Transfer Capacitance			20		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		5.3		Ω
SWITCHING PARAMETERS						
Q _{g(10V)}	Total Gate Charge	V _{GS} =10V, V _{DS} =15V, I _D =4.5A		5.7	10	nC
Q _{g(4.5V)}	Total Gate Charge			2.6	5	nC
Q _{gs}	Gate Source Charge			0.5		nC
Q _{gd}	Gate Drain Charge			1		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =10V, V _{DS} =15V, R _L =3.3Ω, R _{GEN} =3Ω		2		ns
t _r	Turn-On Rise Time			3.5		ns
t _{D(off)}	Turn-Off DelayTime			22		ns
t _f	Turn-Off Fall Time			3.5		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =4.5A, di/dt=500A/μs		6.5		ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =4.5A, di/dt=500A/μs		7.5		nC

A. The value of R_{qJA} is measured with the device mounted on 1in² 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 initial T_J=25° C.

D. The R_{qJA} is the sum of the thermal impedance from junction to lead R_{qJL} and lead to ambient.

E. The static characteristics in Figures 1 to 6 are obtained using <300ms 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 1in² 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.

G. The maximum current rating is package limited.

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N-channel TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

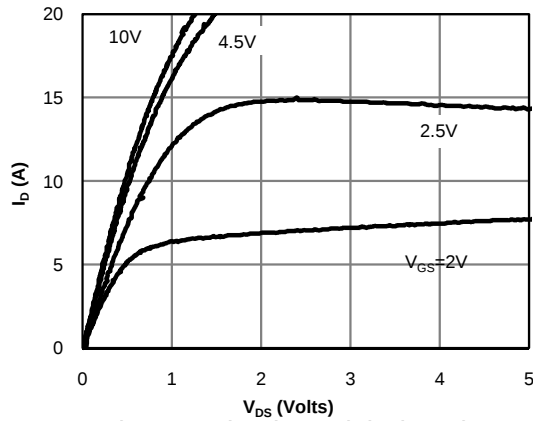


Fig 1: On-Region Characteristics (Note E)

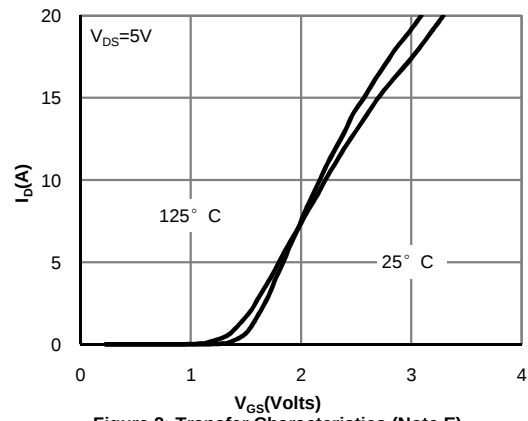


Figure 2: Transfer Characteristics (Note E)

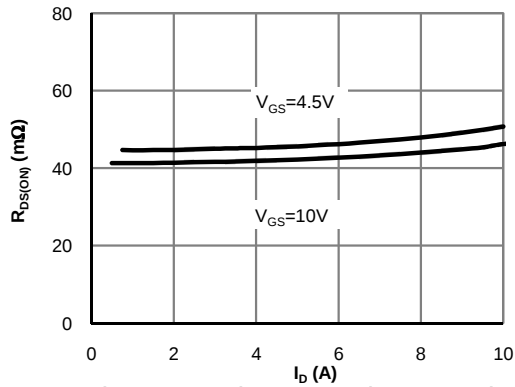


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

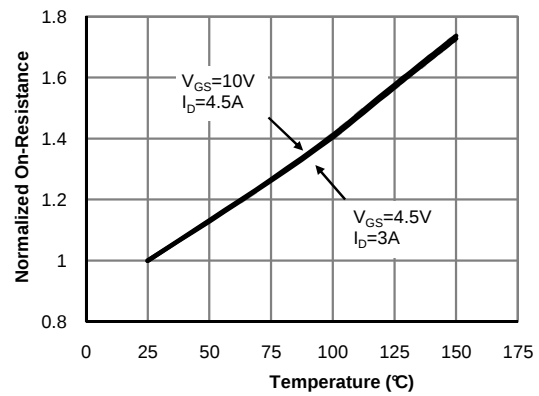


Figure 4: On-Resistance vs. Junction Temperature (Note E)

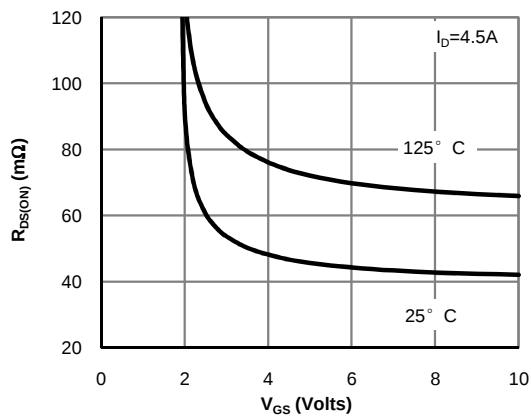


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

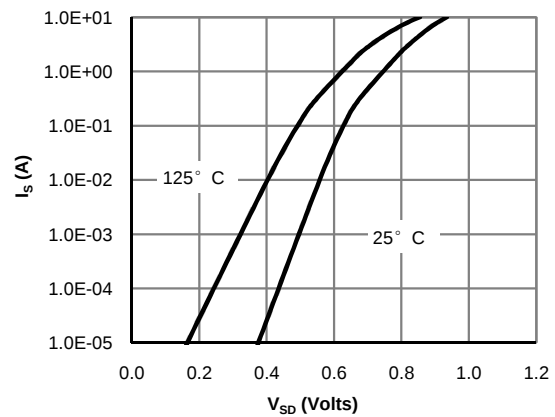


Figure 6: Body-Diode Characteristics (Note E)

N-channel TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

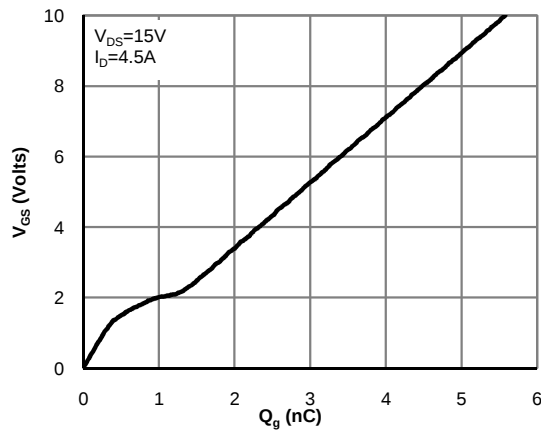


Figure 7: Gate-Charge Characteristics

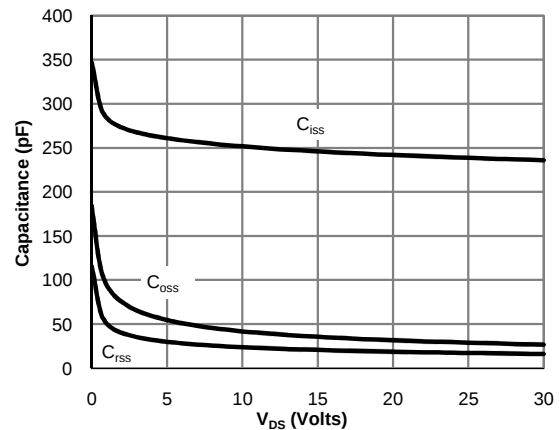


Figure 8: Capacitance Characteristics

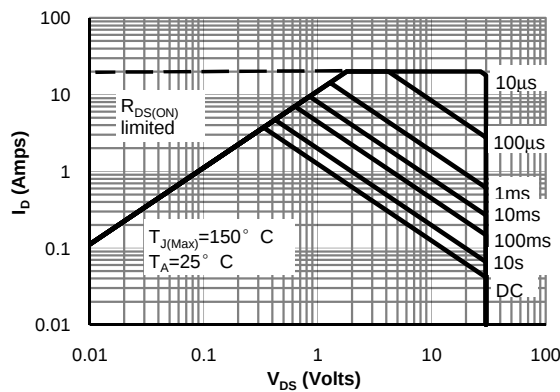


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

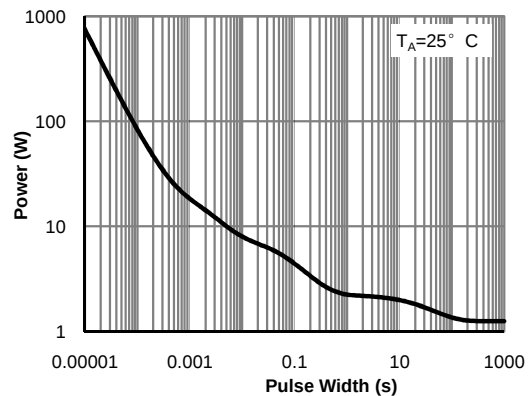


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

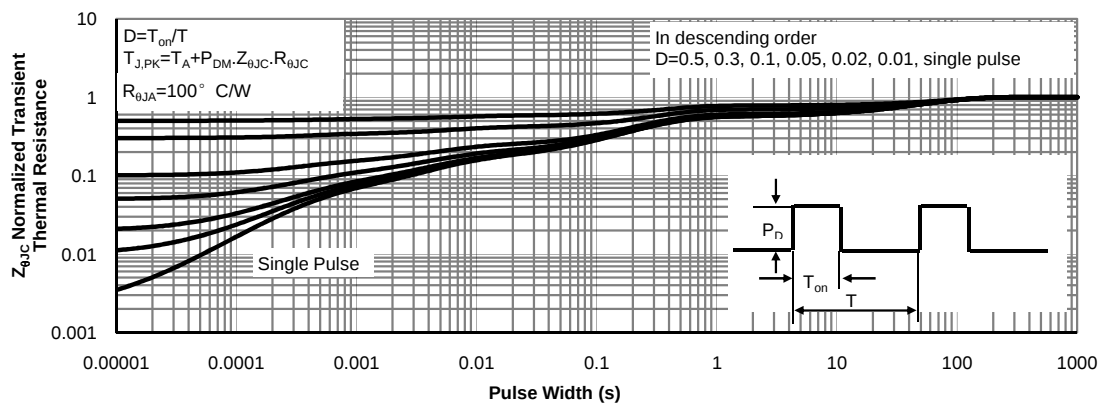
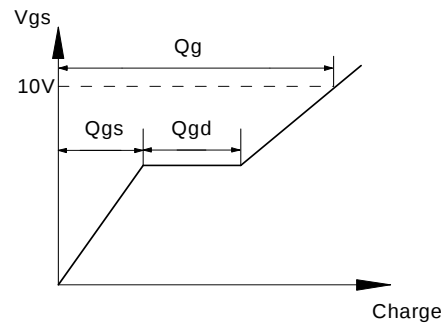
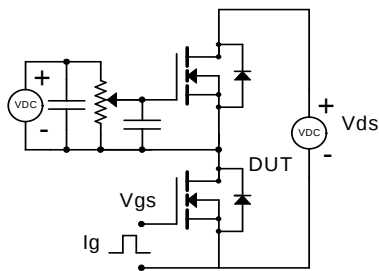
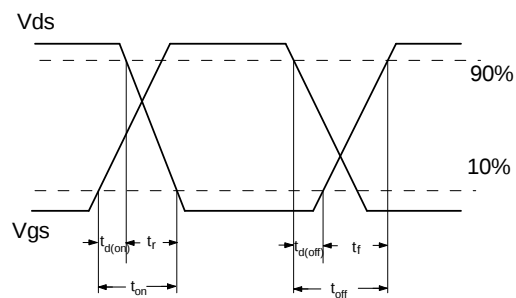
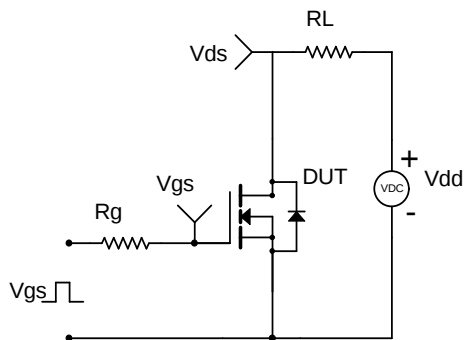


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

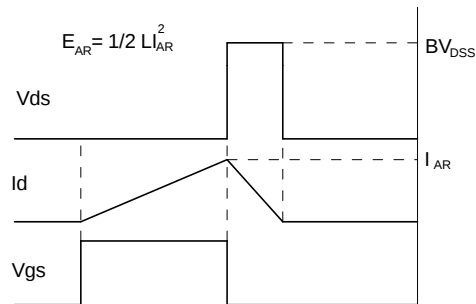
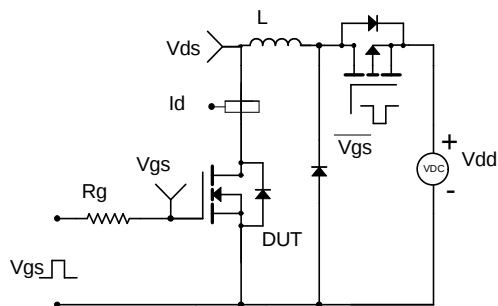
Gate Charge Test Circuit & Waveform



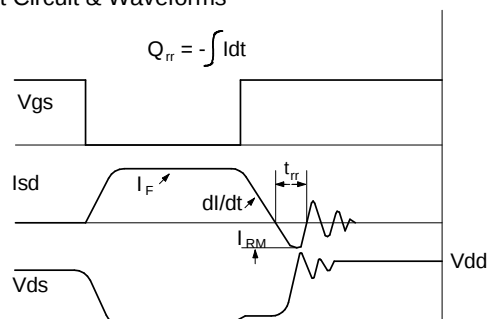
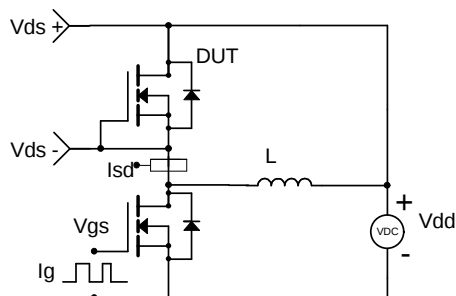
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



P-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 T _J =55°C			-1 -5	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} =±20V			±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =-250μA	-1.3	-1.8	-2.3	V
I _{D(ON)}	On state drain current	V _{GS} =-10V, V _{DS} =-5V	-20			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =-10V, I _D =-4.5A T _J =125°C		56 79	68 96	mΩ
		V _{GS} =-4.5V, I _D =-3A		80	100	mΩ
g _{FS}	Forward Transconductance	V _{DS} =-5V, I _D =-4.5A		8		S
V _{SD}	Diode Forward Voltage	I _S =-1A, V _{GS} =0V		-0.78	-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		290		pF
C _{oss}	Output Capacitance			60		pF
C _{rss}	Reverse Transfer Capacitance			40		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		16		Ω
SWITCHING PARAMETERS						
Q _{g(10V)}	Total Gate Charge	V _{GS} =-10V, V _{DS} =-15V, I _D =-4.5A		5.8	10	nC
Q _{g(4.5V)}	Total Gate Charge			2.8	6	nC
Q _{gs}	Gate Source Charge			1.1		nC
Q _{gd}	Gate Drain Charge			1.3		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =-10V, V _{DS} =-15V, R _L =3.3Ω, R _{GEN} =3Ω		6		ns
t _r	Turn-On Rise Time			5		ns
t _{D(off)}	Turn-Off DelayTime			21		ns
t _f	Turn-Off Fall Time			9		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =-4.5A, dI/dt=500A/μs		10		ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =-4.5A, dI/dt=500A/μs		20		nC

A. The value of R_{qJA} is measured with the device mounted on 1in² 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 initial T_J=25° C.

D. The R_{qJA} is the sum of the thermal impedance from junction to lead R_{qJL} and lead to ambient.

E. The static characteristics in Figures 1 to 6 are obtained using <300ms 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 1in² 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.

G. The maximum current rating is package limited.

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P-channel TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

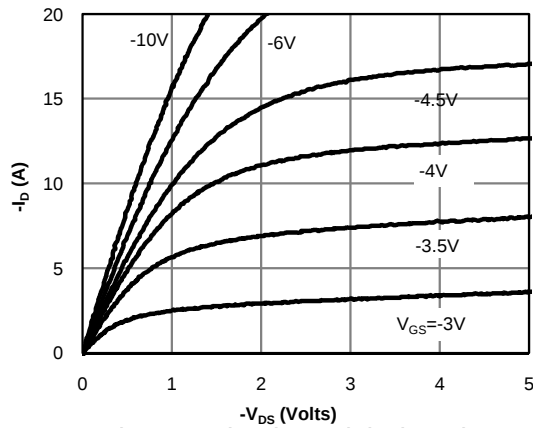


Fig 1: On-Region Characteristics (Note E)

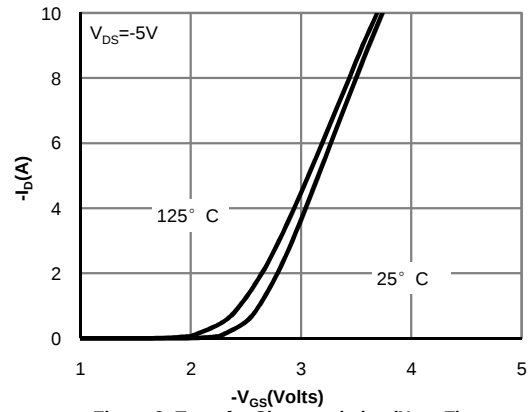


Figure 2: Transfer Characteristics (Note E)

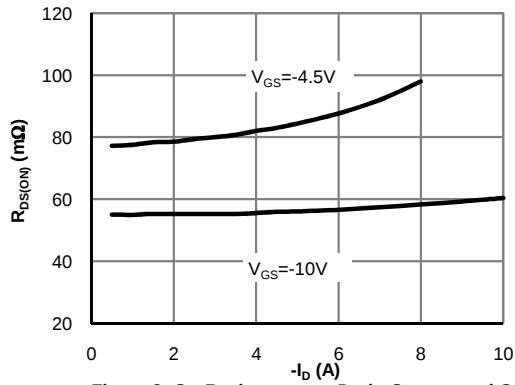


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

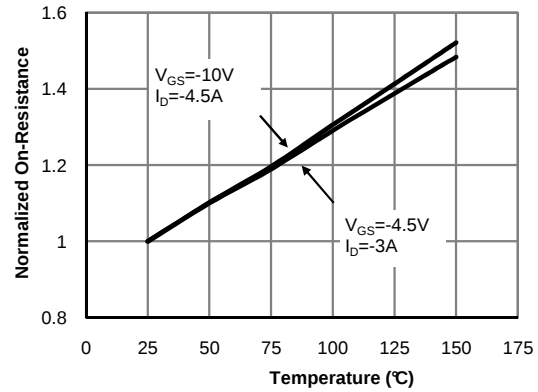


Figure 4: On-Resistance vs. Junction Temperature (Note E)

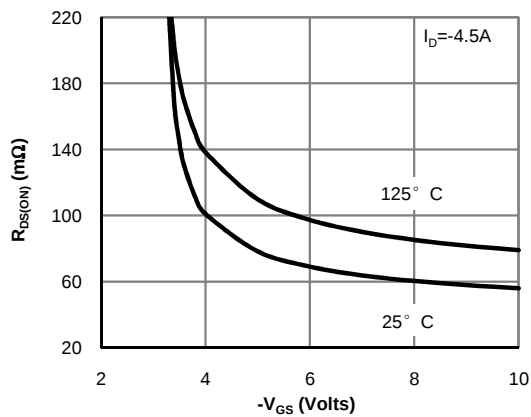


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

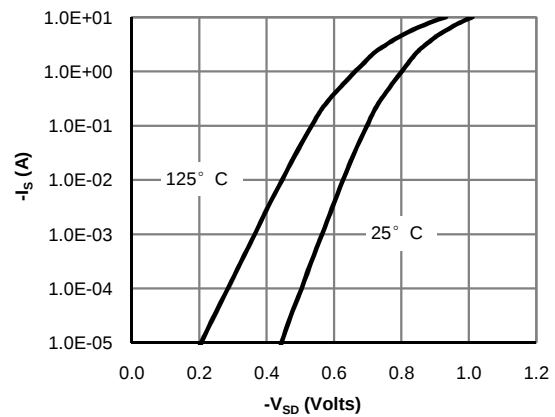


Figure 6: Body-Diode Characteristics (Note E)

P-channel TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

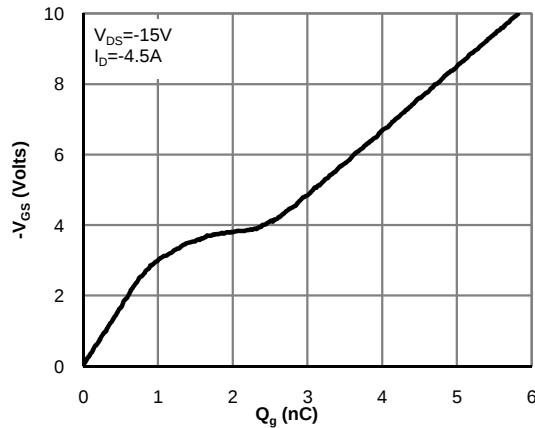


Figure 7: Gate-Charge Characteristics

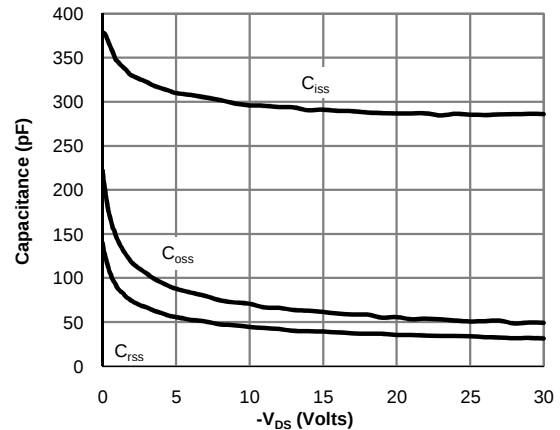


Figure 8: Capacitance Characteristics

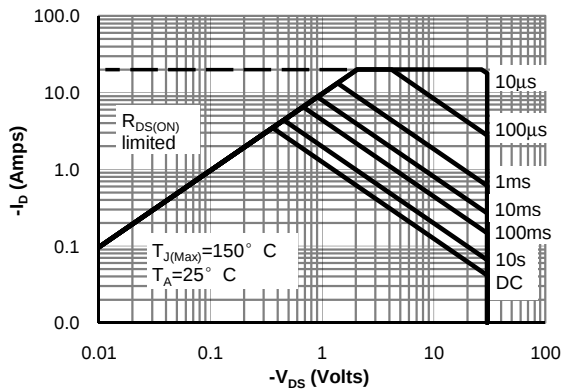


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

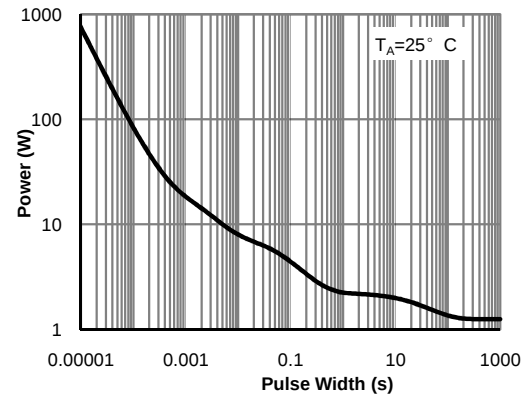


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

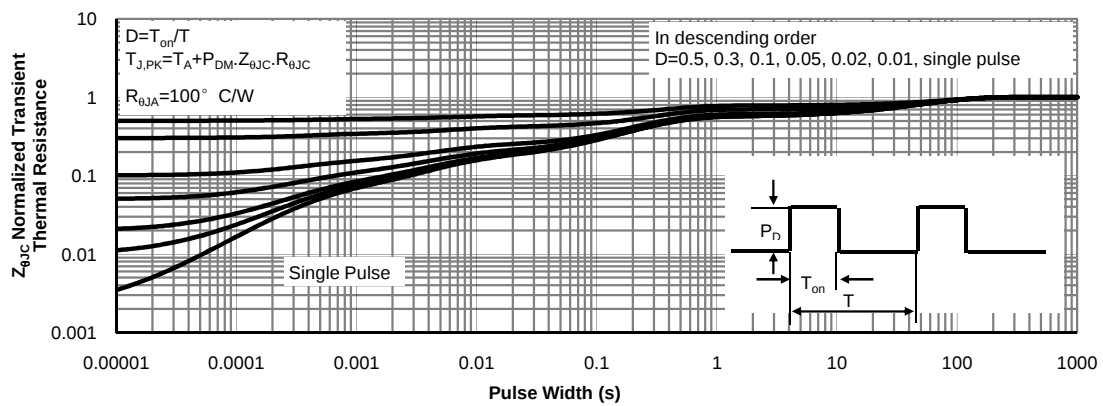
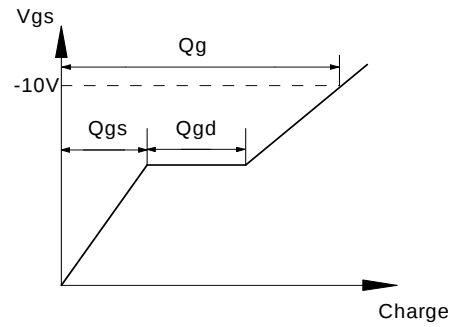
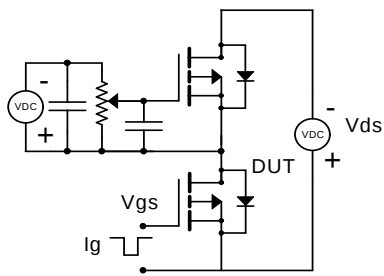
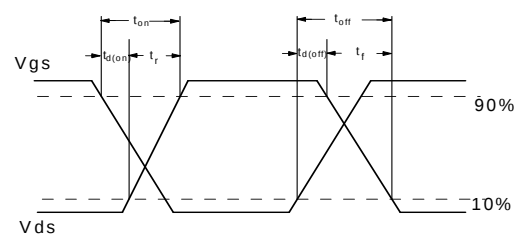
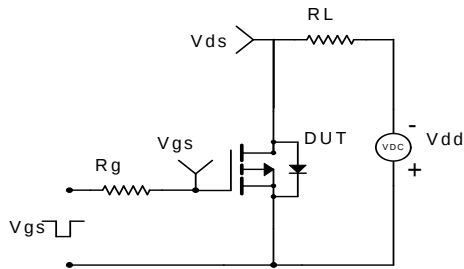


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

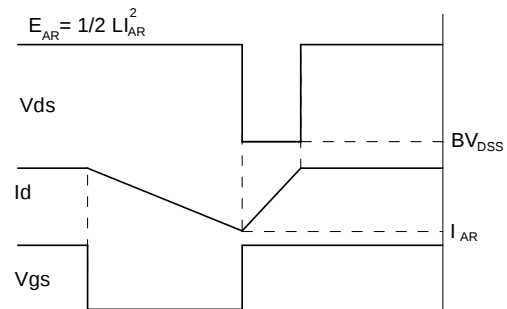
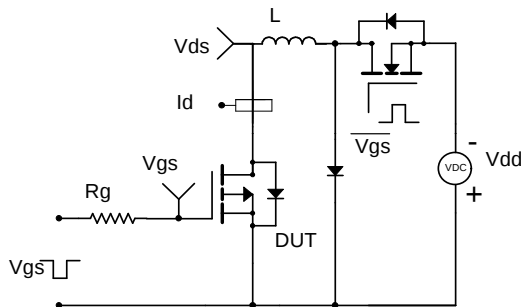
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

