

General Description

The AON7611 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.

Features

N-channel P-channel

V_{DS} (V) = 30V V_{DS} (V) = -30V

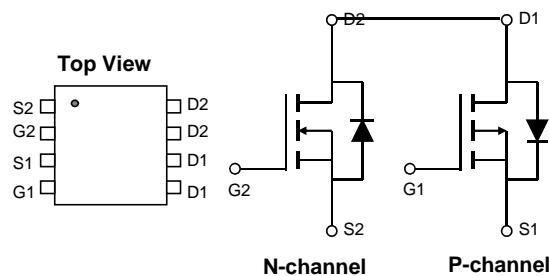
I_D = 9.0A I_D = -18.5A (V_{GS} = ±10V)

$R_{DS(ON)}$ < 50mΩ $R_{DS(ON)}$ < 38mΩ (V_{GS} = ±10V)

$R_{DS(ON)}$ < 70mΩ $R_{DS(ON)}$ < 62mΩ (V_{GS} = ±4.5V)

100% UIS Tested

100% R_g Tested



Absolute Maximum Ratings $T_A=25^\circ\text{C}$ 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}	±20	±20	V
Continuous Drain Current Current	I_D	9	-18.5	
		5.5	-11.5	
Pulsed Drain Current ^C	I_{DM}	20	-35	A
Continuous Drain Current ^A	I_{DSM}	4	-5	
		3	-4	
Avalanche Current ^C	I_{AR}	7	-17	A
Repetitive avalanche energy L=0.1mH ^C	E_{AR}	2	14	mJ
Power Dissipation ^B	P_D	7	20.8	W
		2.8	8.3	
Power Dissipation ^A	P_{DSM}	1.5	1.5	W
		0.9	0.9	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	-55 to 150	°C

Thermal Characteristics: N-channel

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A $t \leq 10\text{s}$	$R_{\theta JA}$	40	50	°C/W
Maximum Junction-to-Ambient ^{A,D} Steady-State		70	85	°C/W
Maximum Junction-to-Case ^B Steady-State	$R_{\theta JC}$	15	18	°C/W
Thermal Characteristics: P-channel				
Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A $t \leq 10\text{s}$	$R_{\theta JA}$	40	50	°C/W
Maximum Junction-to-Ambient ^{A,D} Steady-State		70	85	°C/W
Maximum Junction-to-Case ^B Steady-State	$R_{\theta JC}$	5	6	°C/W

N-channel Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	$I_D=250\mu\text{A}, V_{GS}=0\text{V}$	30			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=30\text{V}, V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			1 5	μA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}, V_{GS}=\pm20\text{V}$			±100	nA
$V_{\text{GS(th)}}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	1.5	2	2.5	V
$I_{\text{D(ON)}}$	On state drain current	$V_{GS}=10\text{V}, V_{DS}=5\text{V}$	20			A
$R_{\text{DS(ON)}}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}, I_D=4\text{A}$ $T_J=125^\circ\text{C}$	40	50		$\text{m}\Omega$
		$V_{GS}=4.5\text{V}, I_D=3\text{A}$	64	80		
g_{FS}	Forward Transconductance	$V_{DS}=5\text{V}, I_D=4\text{A}$	53	70		$\text{m}\Omega$
V_{SD}	Diode Forward Voltage	$I_S=1\text{A}, V_{GS}=0\text{V}$	0.79	1		V
I_S	Maximum Body-Diode Continuous Current				9.5	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=15\text{V}, f=1\text{MHz}$		170		pF
C_{oss}	Output Capacitance			35		pF
C_{rss}	Reverse Transfer Capacitance			23		pF
R_g	Gate resistance	$V_{GS}=0\text{V}, V_{DS}=0\text{V}, f=1\text{MHz}$	1.7	3.5	5.3	Ω
SWITCHING PARAMETERS						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=10\text{V}, V_{DS}=15\text{V}, I_D=4\text{A}$		4.05	10	nC
$Q_g(4.5\text{V})$	Total Gate Charge			2	6	nC
Q_{gs}	Gate Source Charge			0.55		nC
Q_{gd}	Gate Drain Charge			1		nC
$t_{\text{D(on)}}$	Turn-On Delay Time	$V_{GS}=10\text{V}, V_{DS}=15\text{V}, R_L=3.75\Omega, R_{\text{GEN}}=3\Omega$		4.5		ns
t_r	Turn-On Rise Time			1.5		ns
$t_{\text{D(off)}}$	Turn-Off Delay Time			18.5		ns
t_f	Turn-Off Fall Time			15.5		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=4\text{A}, dI/dt=100\text{A}/\mu\text{s}$		7.5		ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=4\text{A}, dI/dt=100\text{A}/\mu\text{s}$		2.5		nC

A. The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$. The Power dissipation P_{DSM} is based on $R_{\theta JA}$ and the maximum allowed junction temperature of 150°C . The value in any given application depends on the user's specific board design, and the maximum temperature of 150°C may be used if the PCB allows it.

B. The power dissipation P_D is based on $T_{J(\text{MAX})}=150^\circ\text{C}$, 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 $T_{J(\text{MAX})}=150^\circ\text{C}$.

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 <300μs 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 $T_{J(\text{MAX})}=150^\circ\text{C}$.

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

H. These tests are performed with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$. The SOA curve provides a single pulse rating.

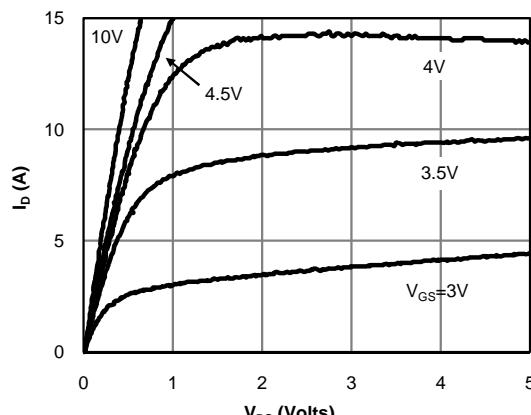
N-channel TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS


Fig 1: On-Region Characteristics (Note E)

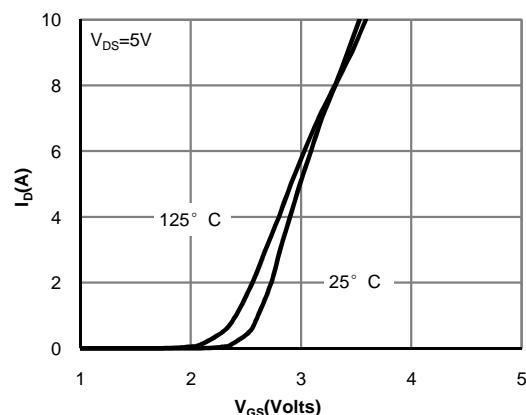


Figure 2: Transfer Characteristics (Note E)

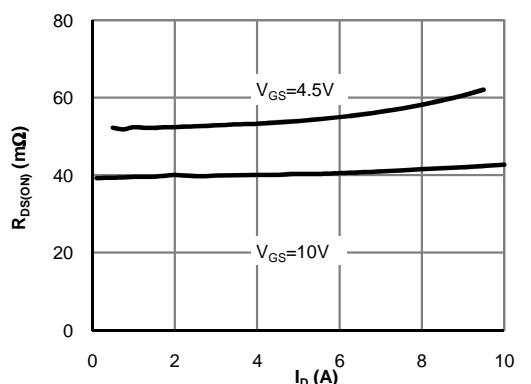


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

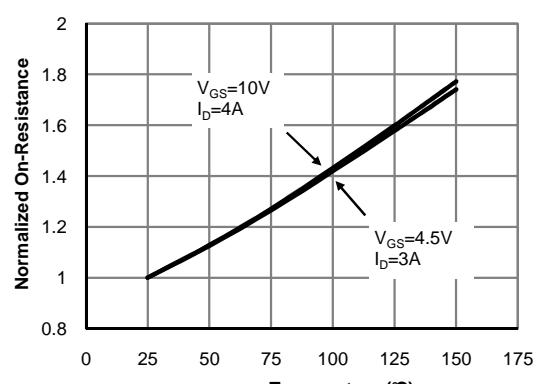


Figure 4: On-Resistance vs. Junction Temperature (Note E)

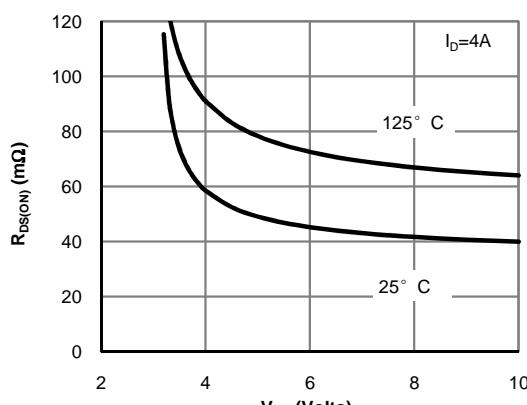


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

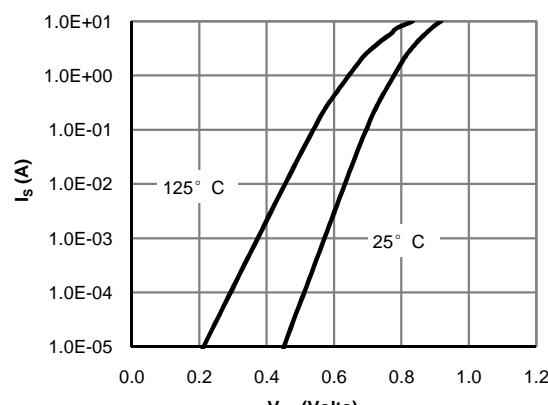


Figure 6: Body-Diode Characteristics (Note E)

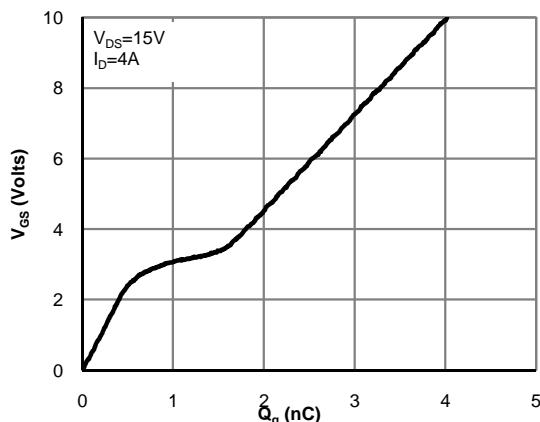
N-channel TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS


Figure 7: Gate-Charge Characteristics

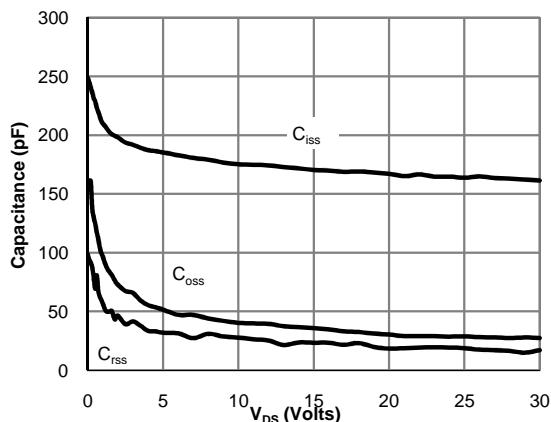


Figure 8: Capacitance Characteristics

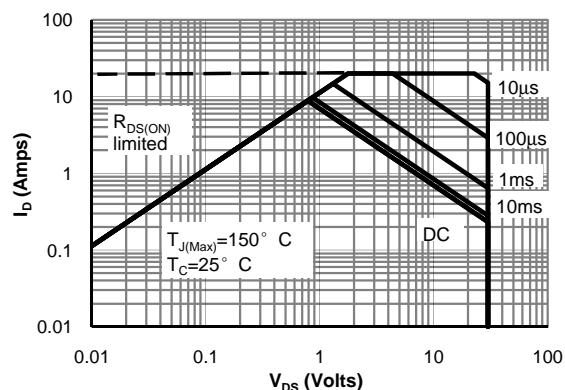


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

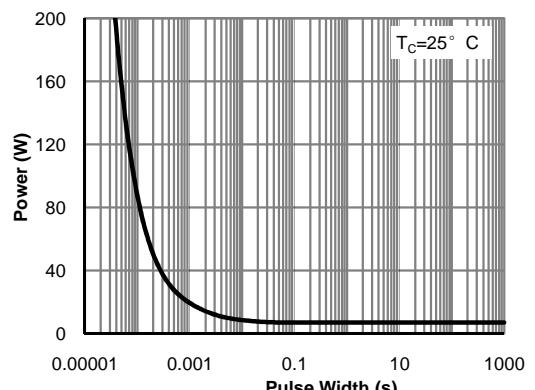


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

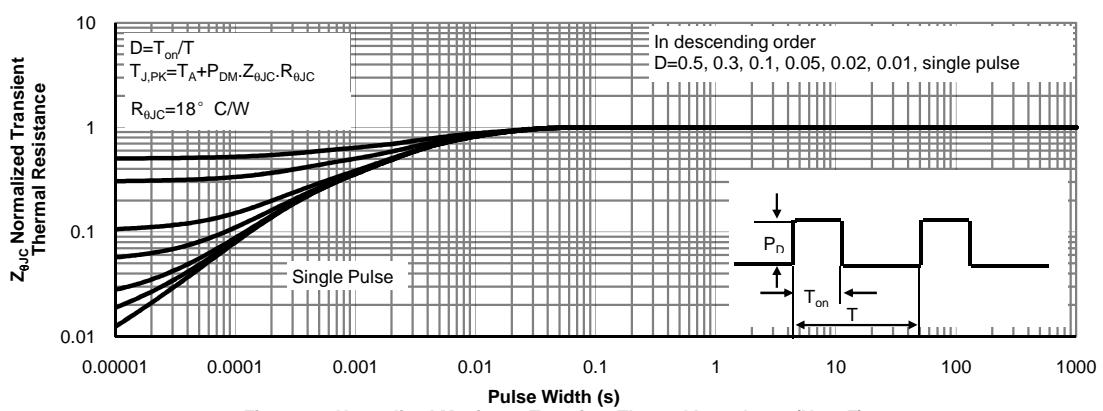


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

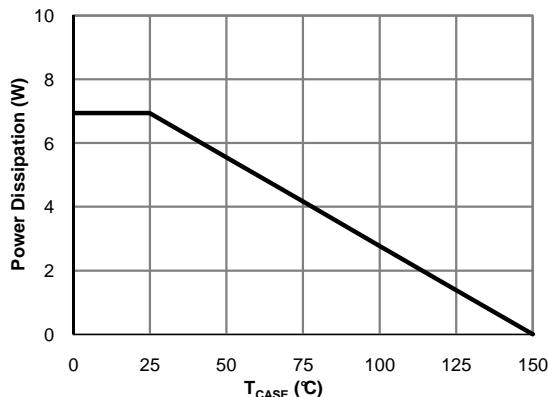
N-channel TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS


Figure 12: Power De-rating (Note F)

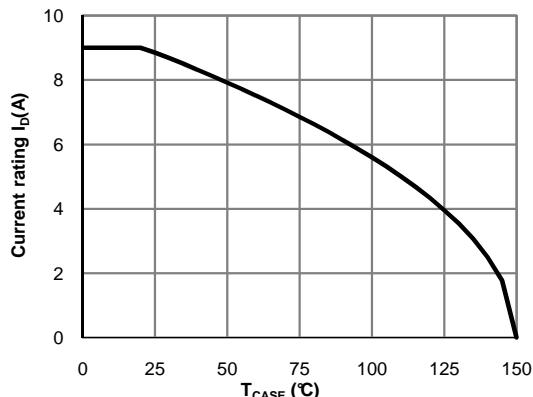


Figure 13: Current De-rating (Note F)

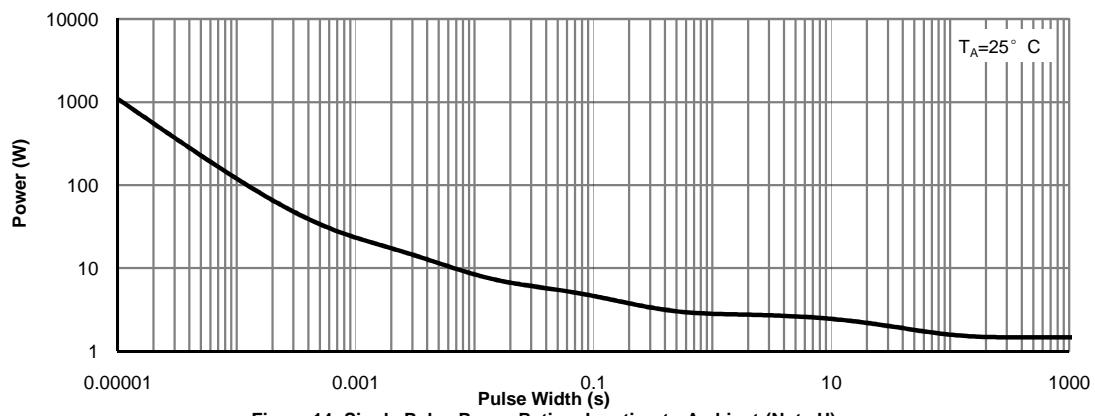


Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note H)

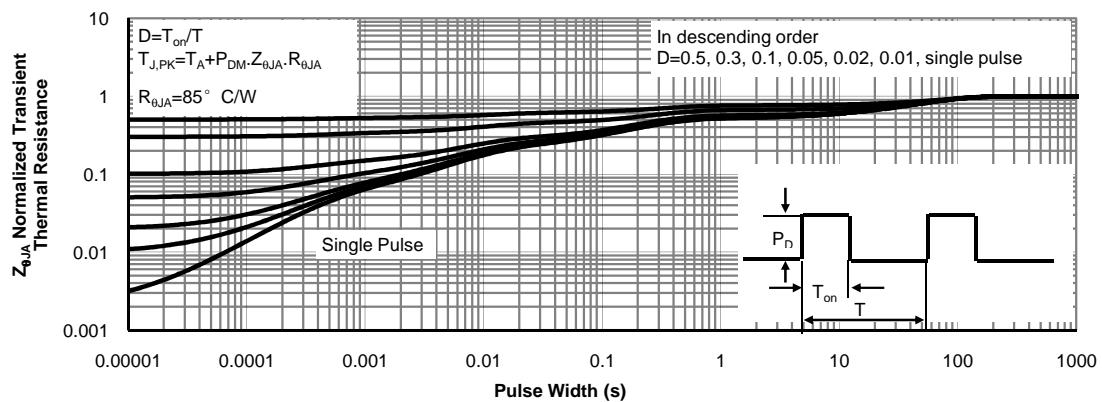
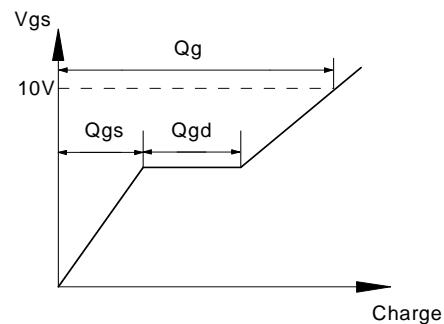
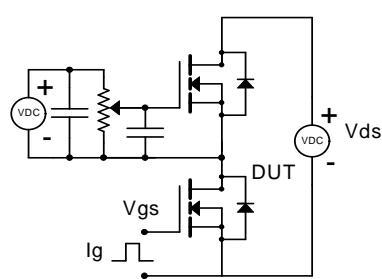
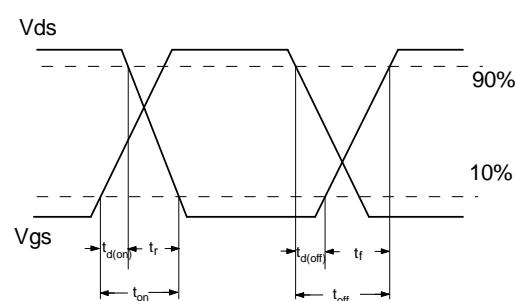
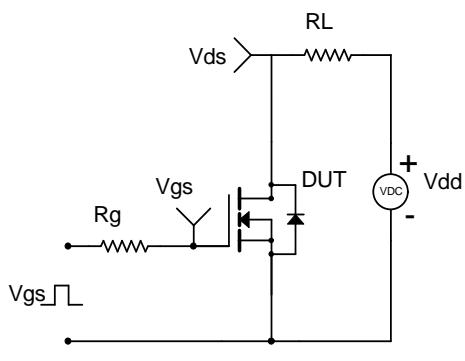


Figure 15: Normalized Maximum Transient Thermal Impedance (Note H)

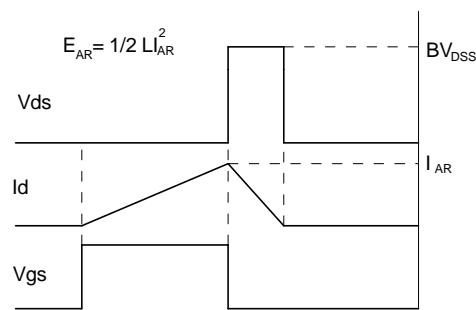
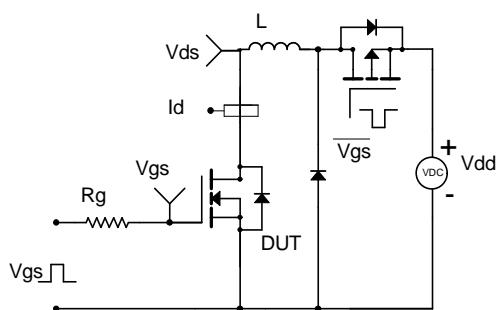
Gate Charge Test Circuit & Waveform



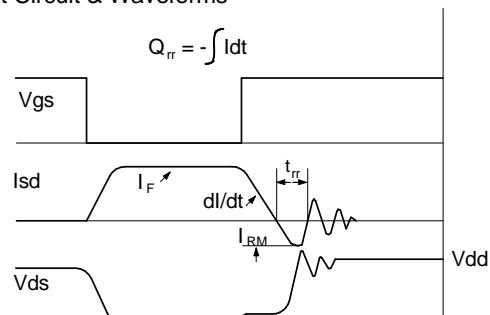
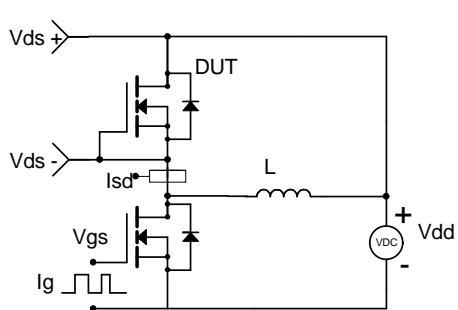
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



P-channel Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	$I_D=-250\mu\text{A}, V_{GS}=0\text{V}$	-30			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=-30\text{V}, V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			-1 -5	μA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}, V_{GS}=\pm20\text{V}$			±100	nA
$V_{\text{GS(th)}}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu\text{A}$	-1.4	-1.9	-2.4	V
$I_{\text{D(ON)}}$	On state drain current	$V_{GS}=-10\text{V}, V_{DS}=-5\text{V}$	-35			A
$R_{\text{DS(ON)}}$	Static Drain-Source On-Resistance	$V_{GS}=-10\text{V}, I_D=-5\text{A}$ $T_J=125^\circ\text{C}$	30	38		$\text{m}\Omega$
		$V_{GS}=-4.5\text{V}, I_D=-4\text{A}$	45	57		
g_{FS}	Forward Transconductance	$V_{DS}=-5\text{V}, I_D=-5\text{A}$	46	62		$\text{m}\Omega$
V_{SD}	Diode Forward Voltage	$I_S=-1\text{A}, V_{GS}=0\text{V}$	-0.76	-1		V
I_S	Maximum Body-Diode Continuous Current				-20	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=-15\text{V}, f=1\text{MHz}$		520		pF
C_{oss}	Output Capacitance			100		pF
C_{rss}	Reverse Transfer Capacitance			65		pF
R_g	Gate resistance	$V_{GS}=0\text{V}, V_{DS}=0\text{V}, f=1\text{MHz}$	3.5	7.5	11.5	Ω
SWITCHING PARAMETERS						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=-10\text{V}, V_{DS}=-15\text{V}, I_D=-5\text{A}$		9.2	20	nC
$Q_g(4.5\text{V})$	Total Gate Charge			4.6	10	nC
Q_{gs}	Gate Source Charge			1.6		nC
Q_{gd}	Gate Drain Charge			2.2		nC
$t_{\text{D(on)}}$	Turn-On Delay Time	$V_{GS}=-10\text{V}, V_{DS}=-15\text{V}, R_L=3.0\Omega, R_{\text{GEN}}=3\Omega$		7.5		ns
t_r	Turn-On Rise Time			5.5		ns
$t_{\text{D(off)}}$	Turn-Off Delay Time			19		ns
t_f	Turn-Off Fall Time			7		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=-5\text{A}, dI/dt=100\text{A}/\mu\text{s}$		11		ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=-5\text{A}, dI/dt=100\text{A}/\mu\text{s}$		5.3		nC

A. The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$. The Power dissipation P_{DSM} is based on $R_{\theta JA}$ and the maximum allowed junction temperature of 150°C . The value in any given application depends on the user's specific board design, and the maximum temperature of 150°C may be used if the PCB allows it.

B. The power dissipation P_D is based on $T_{J(\text{MAX})}=150^\circ\text{C}$, 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 $T_{J(\text{MAX})}=150^\circ\text{C}$.

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 <300μs 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 $T_{J(\text{MAX})}=150^\circ\text{C}$.

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

H. These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$. The SOA curve provides a single pulse rating.

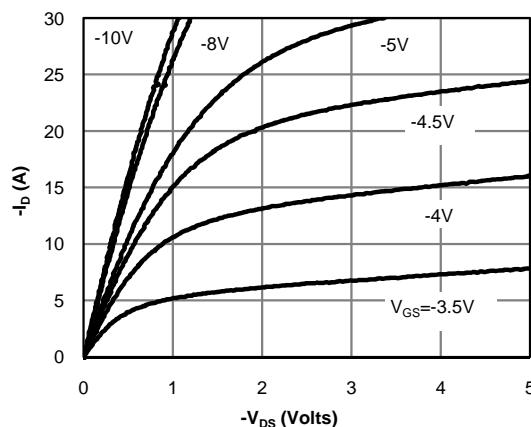
P-channel TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS


Fig 1: On-Region Characteristics (Note E)

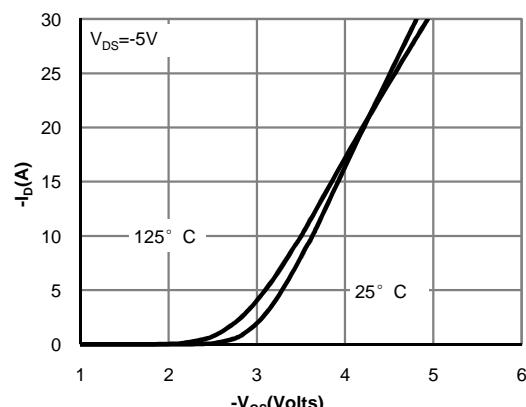


Figure 2: Transfer Characteristics (Note E)

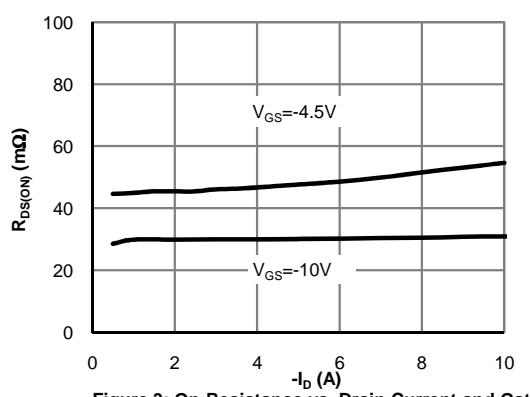


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

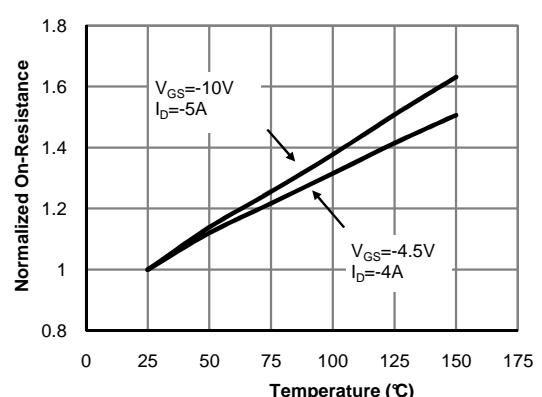


Figure 4: On-Resistance vs. Junction Temperature (Note E)

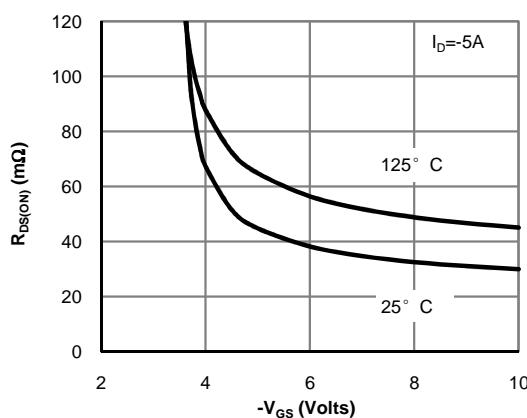


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

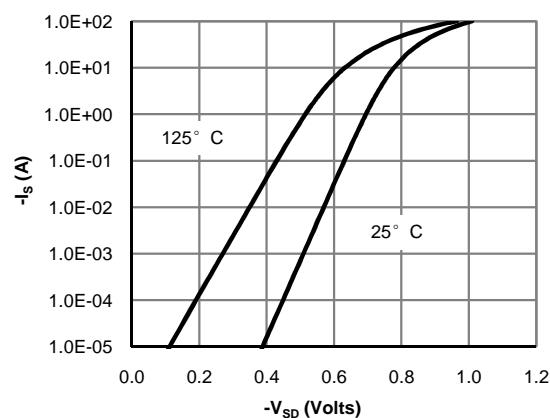


Figure 6: Body-Diode Characteristics (Note E)

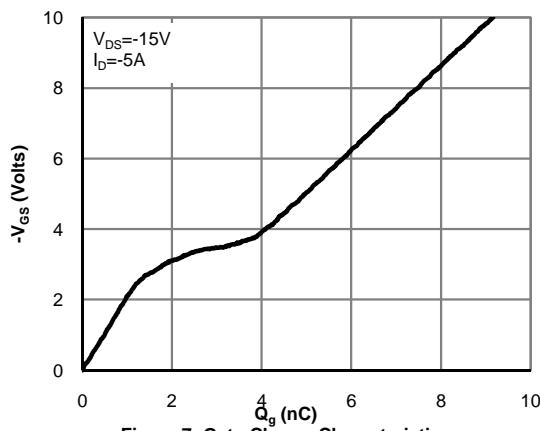
P-channel TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS


Figure 7: Gate-Charge Characteristics

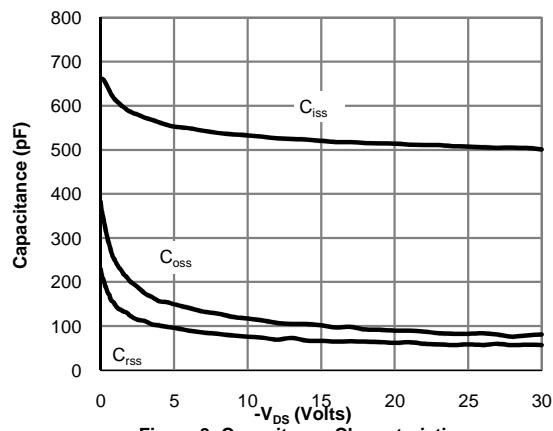


Figure 8: Capacitance Characteristics

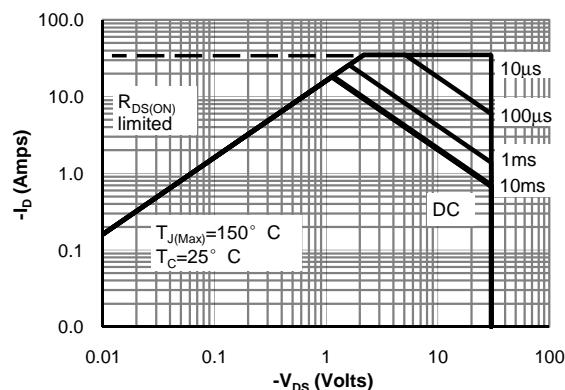


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

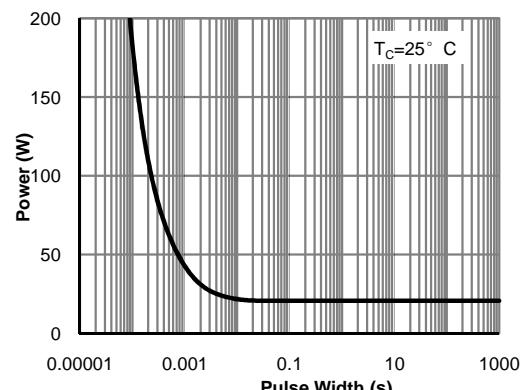


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

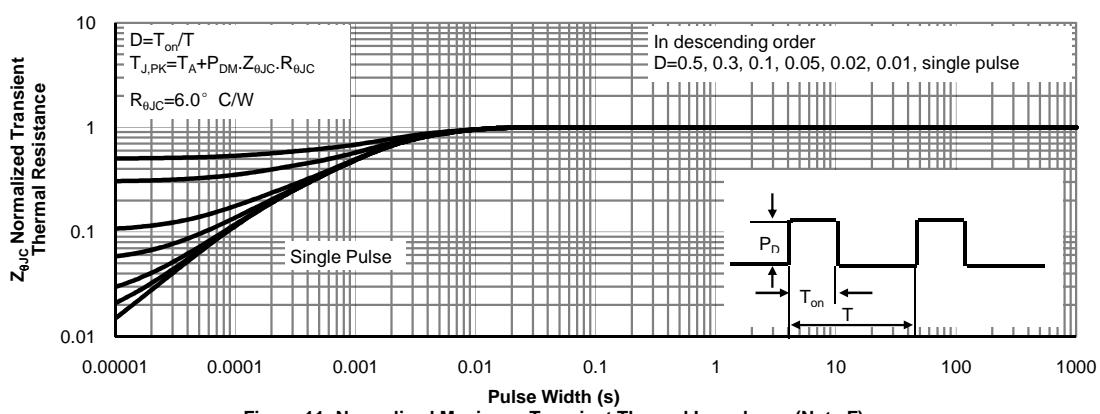


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

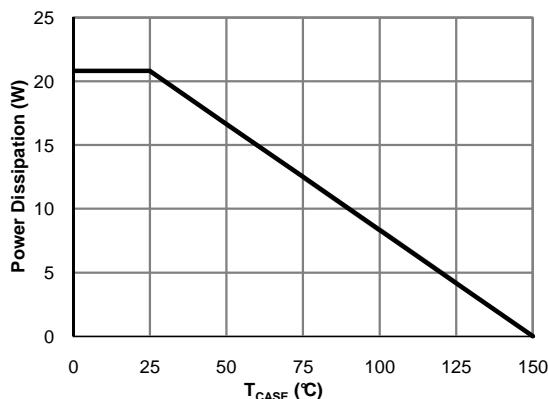
P-channel TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS


Figure 12: Power De-rating (Note F)

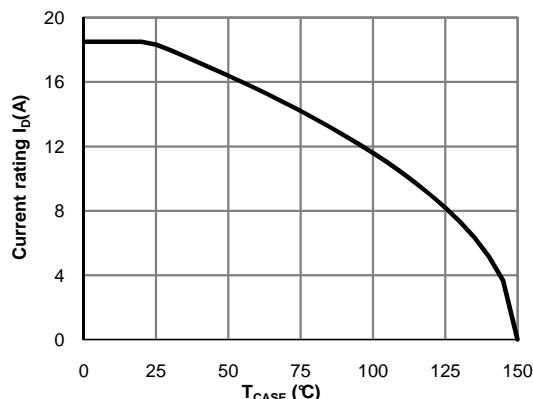


Figure 13: Current De-rating (Note F)

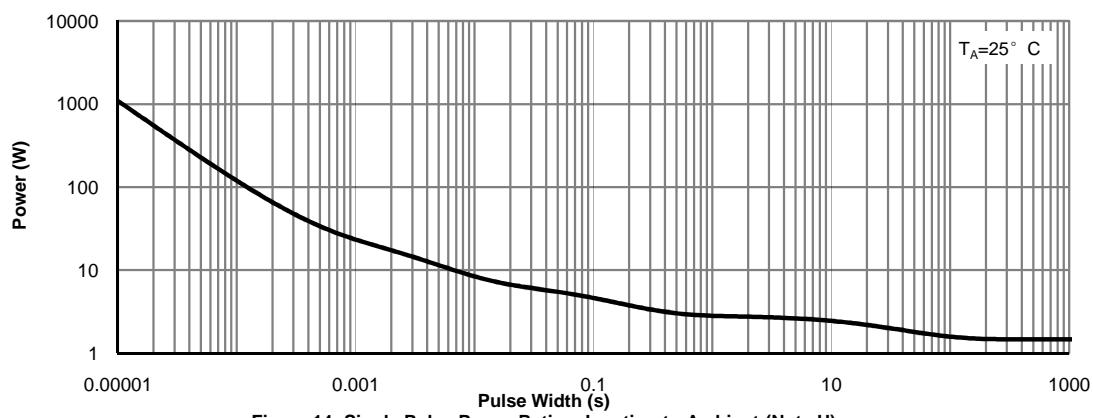


Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note H)

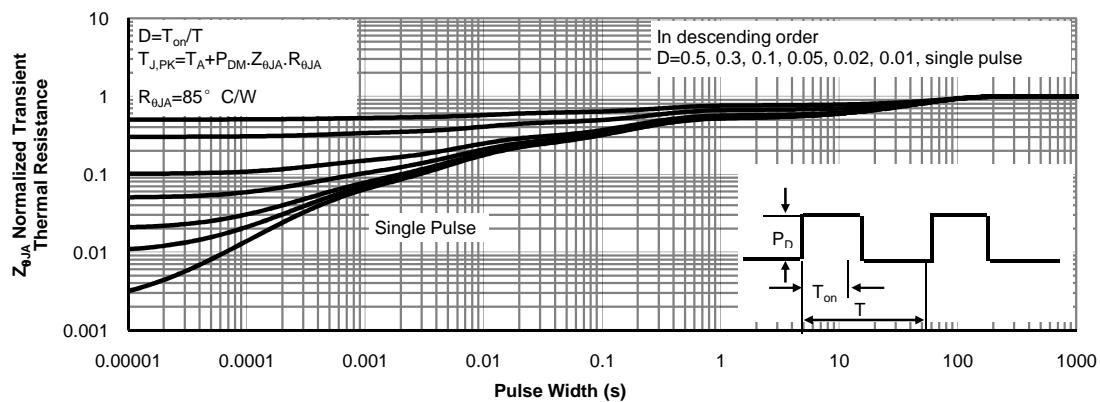
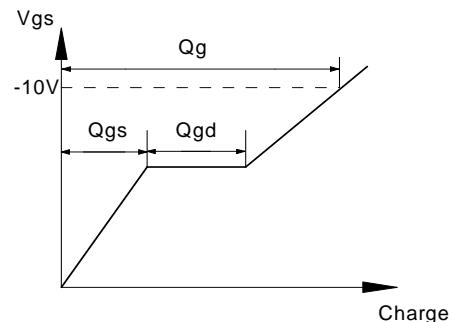
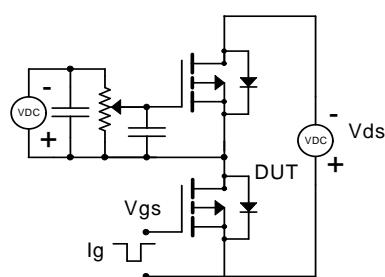
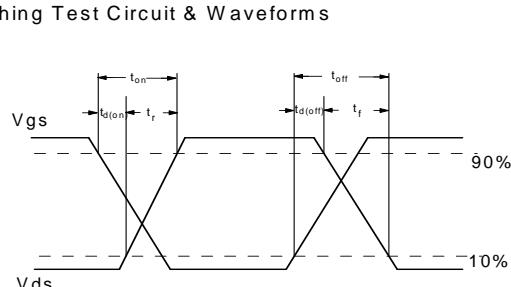
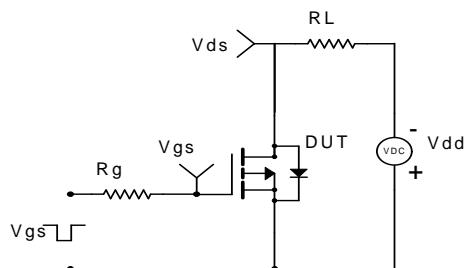
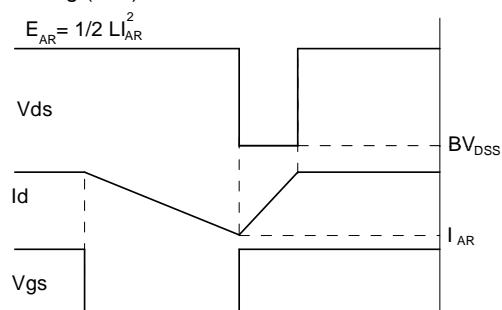
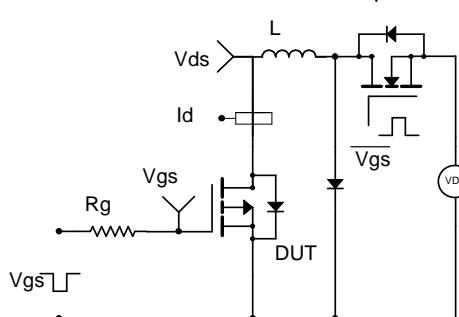


Figure 15: Normalized Maximum Transient Thermal Impedance (Note H)

Gate Charge Test Circuit & Waveform

Resistive Switching Test Circuit & Waveforms

Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

Diode Recovery Test Circuit & Waveforms
