



ALPHA & OMEGA
SEMICONDUCTOR

AON3611

30V Complementary MOSFET

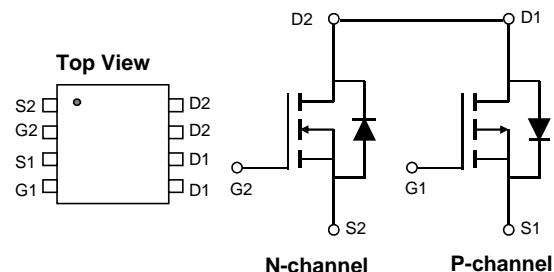
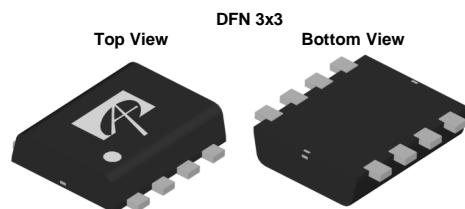
General Description

The AON3611 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 = 5A	I_D = -6A
$R_{DS(ON)} < 50\text{m}\Omega$	$R_{DS(ON)} < 38\text{m}\Omega$
$R_{DS(ON)} < 70\text{m}\Omega$	$R_{DS(ON)} < 62\text{m}\Omega$

($V_{GS} = \pm 10\text{V}$)
($V_{GS} = \pm 10\text{V}$)
($V_{GS} = \pm 4.5\text{V}$)



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 $T_A=25^\circ\text{C}$	I_D	5	-6	A
		3.8	-4.7	
Pulsed Drain Current ^C	I_{DM}	20	-30	W
Power Dissipation ^B $T_A=25^\circ\text{C}$	P_D	2.1	2.5	
		1.3	1.6	
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 $t \leq 10\text{s}$	$R_{\theta JA}$	50	60	°C/W
Maximum Junction-to-Ambient ^{A,D} Steady-State		80	98	°C/W
Maximum Junction-to-Lead	$R_{\theta JL}$	48	58	°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-Lead	$R_{\theta JL}$	38	46	°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	$V_{GS}=10\text{V}, I_D=5\text{A}$ $T_J=125^\circ\text{C}$	40	50		$\text{m}\Omega$
		$V_{GS}=4.5\text{V}, I_D=3\text{A}$	64	80		
g_{FS}	Forward Transconductance	$V_{DS}=5\text{V}, I_D=5\text{A}$	11			S
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				1.5	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	$V_{GS}=0\text{V}, V_{DS}=0\text{V}, f=1\text{MHz}$	1.5	2.0	3.0	Ω
SWITCHING PARAMETERS						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=10\text{V}, V_{DS}=15\text{V}, I_D=5\text{A}$		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	$V_{GS}=10\text{V}, V_{DS}=15\text{V}, R_L=3\Omega, R_{\text{GEN}}=3\Omega$		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	$I_F=5\text{A}, dI/dt=100\text{A}/\mu\text{s}$		7.5		ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=5\text{A}, dI/dt=100\text{A}/\mu\text{s}$		2.5		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 $T_A = 25^\circ\text{C}$. The value in any given application depends on the user's specific board design.

B. The power dissipation P_D is based on $T_{J(\text{MAX})}=150^\circ\text{C}$, using $\leq 10\text{s}$ junction-to-ambient thermal resistance.

C. Repetitive rating, pulse width limited by junction temperature $T_{J(\text{MAX})}=150^\circ\text{C}$. Ratings are based on low frequency and duty cycles to keep initial $T_J=25^\circ\text{C}$.

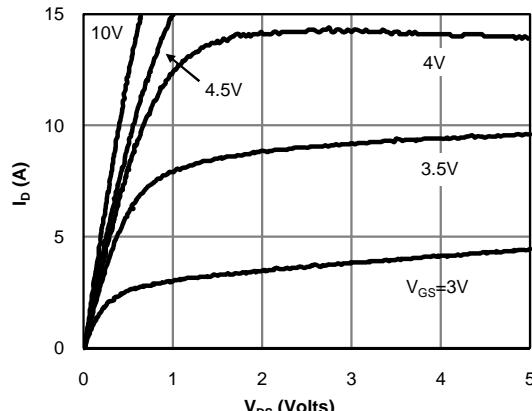
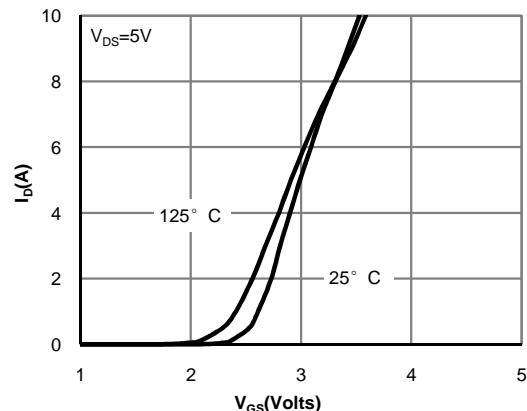
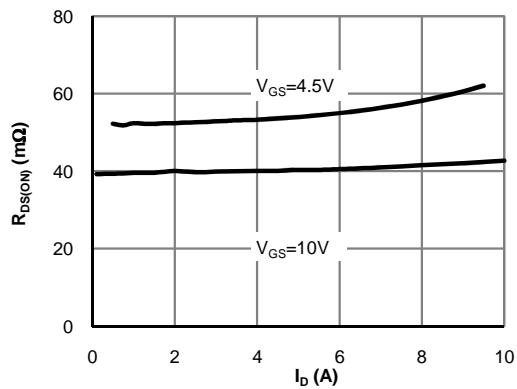
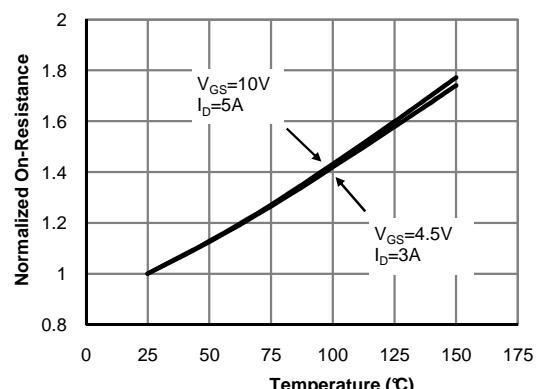
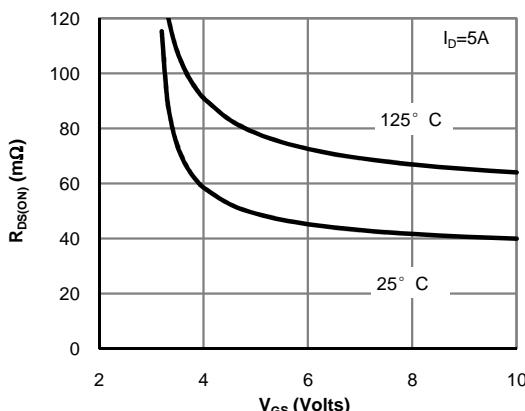
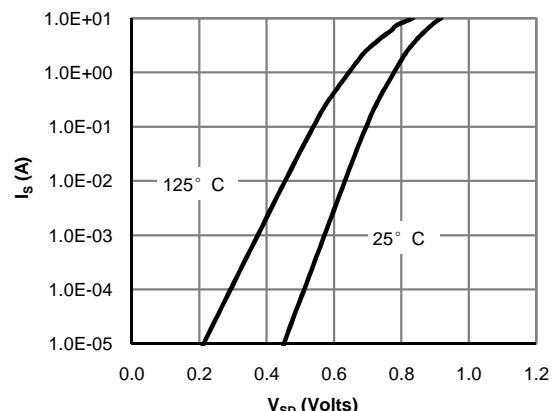
D. The R_{qJA} is the sum of the thermal impedance from junction to lead R_{qJL} and lead to ambient.

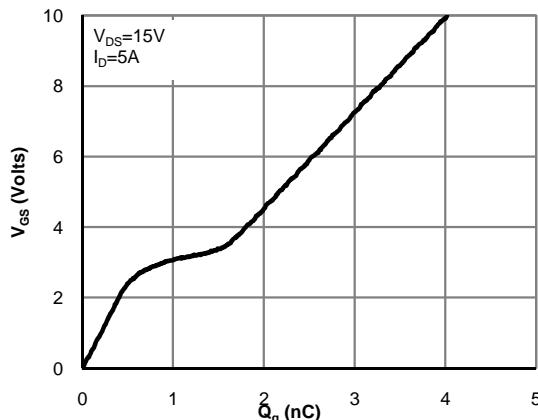
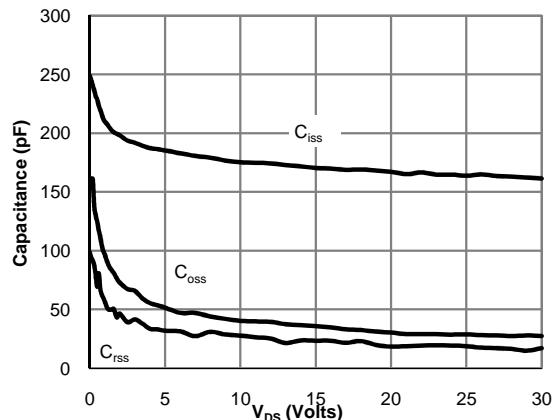
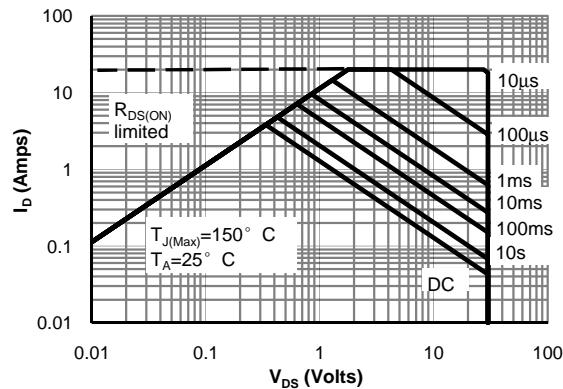
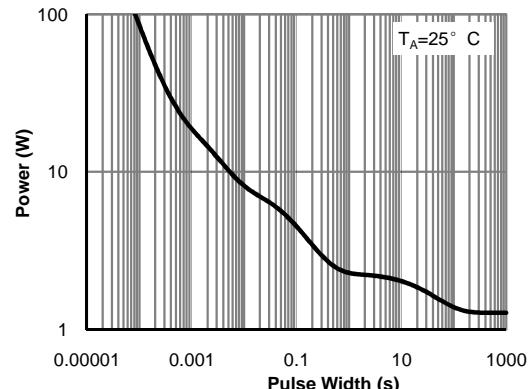
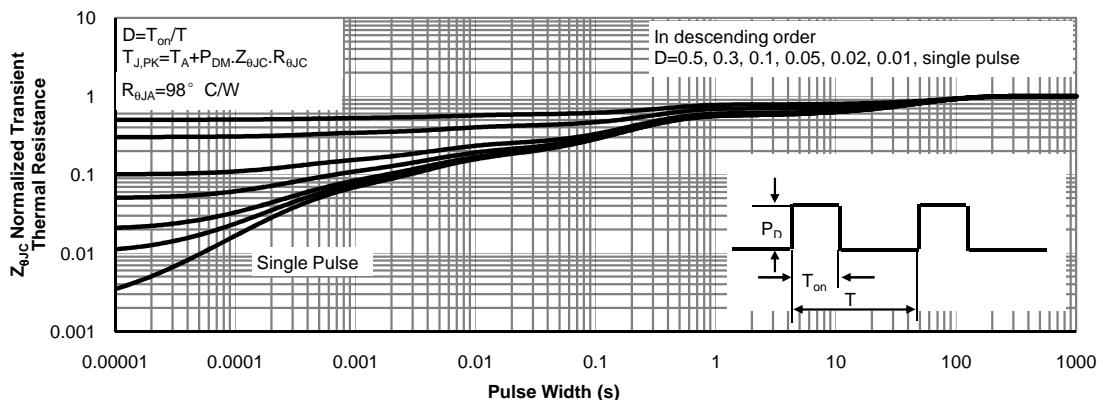
E. The static characteristics in Figures 1 to 6 are obtained using $<300\text{ms}$ pulses, duty cycle 0.5% max.

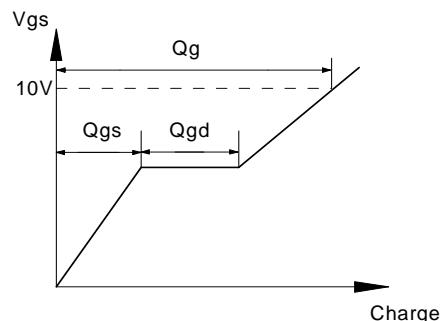
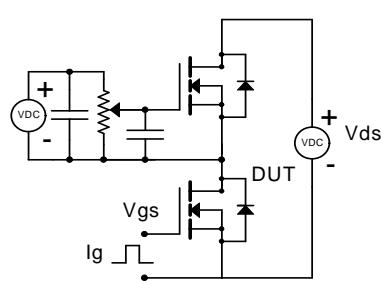
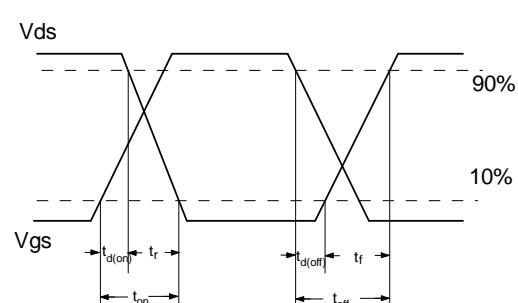
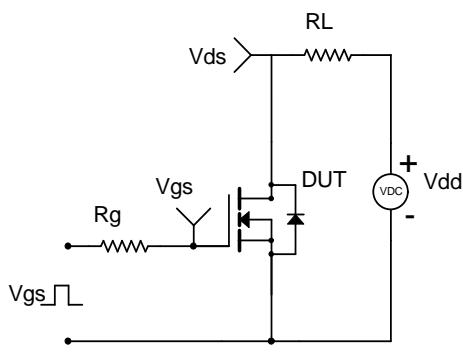
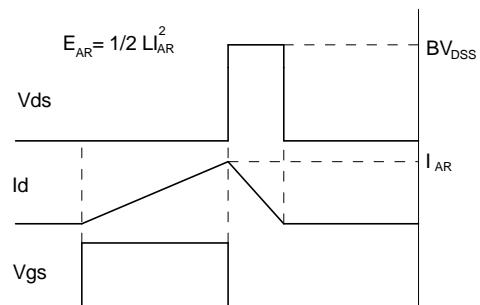
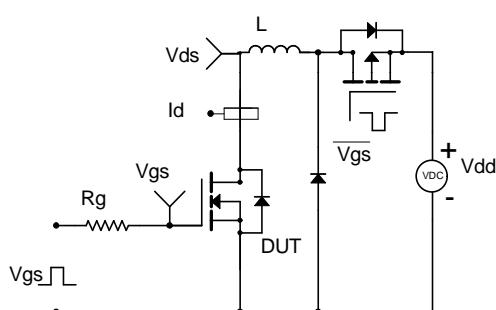
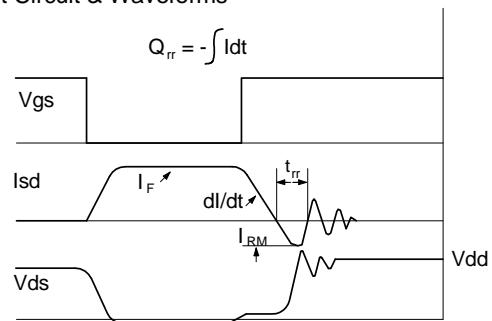
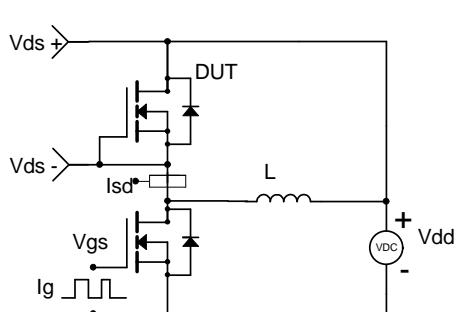
F. These curves are based on the junction-to-ambient thermal impedance which is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, assuming a maximum junction temperature of $T_{J(\text{MAX})}=150^\circ\text{C}$. The SOA curve provides a single pulse rating.

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 ($T_J=25^\circ\text{C}$ 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	$V_{GS}=-10\text{V}, V_{DS}=-5\text{V}$	-30			A
$R_{\text{DS(ON)}}$	Static Drain-Source On-Resistance	$V_{GS}=-10\text{V}, I_D=-6\text{A}$		30	38	$\text{m}\Omega$
		$T_J=125^\circ\text{C}$ $V_{GS}=-4.5\text{V}, I_D=-4\text{A}$		45	57	
g_{FS}	Forward Transconductance	$V_{DS}=-5\text{V}, I_D=-6\text{A}$		13		S
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				-2	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	$V_{GS}=0\text{V}, V_{DS}=0\text{V}, f=1\text{MHz}$		7.5	11.5	Ω
SWITCHING PARAMETERS						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=-10\text{V}, V_{DS}=-15\text{V}, I_D=-6\text{A}$		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	$V_{GS}=-10\text{V}, V_{DS}=-15\text{V}, R_L=2.5\Omega, R_{\text{GEN}}=3\Omega$		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	$I_F=-6\text{A}, dI/dt=100\text{A}/\mu\text{s}$		11		ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=-6\text{A}, dI/dt=100\text{A}/\mu\text{s}$		5.3		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 $T_A = 25^\circ\text{C}$. The value in any given application depends on the user's specific board design.

B. The power dissipation P_D is based on $T_{J(\text{MAX})}=150^\circ\text{C}$, using $\leq 10\text{s}$ junction-to-ambient thermal resistance.

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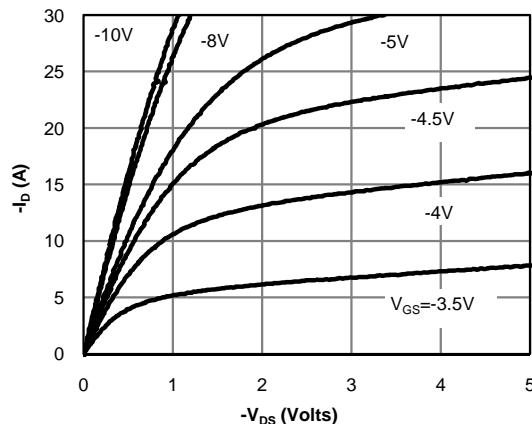
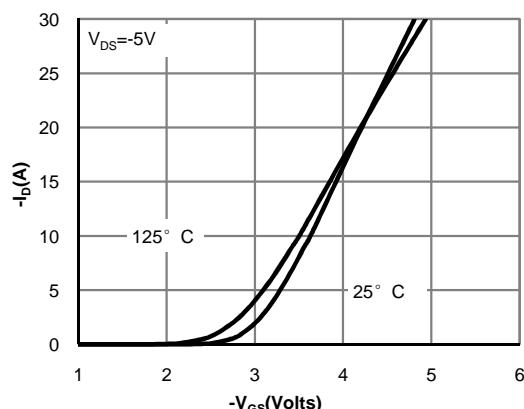
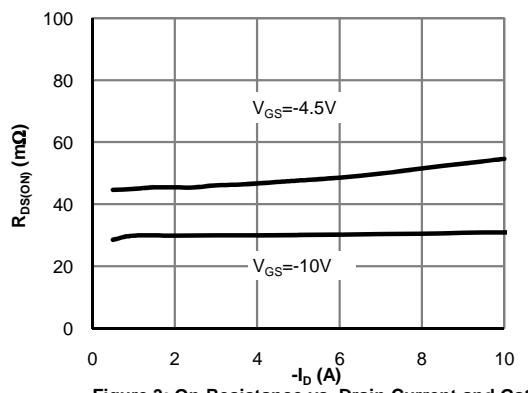
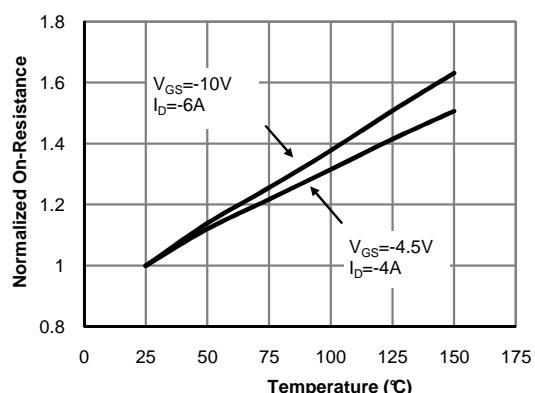
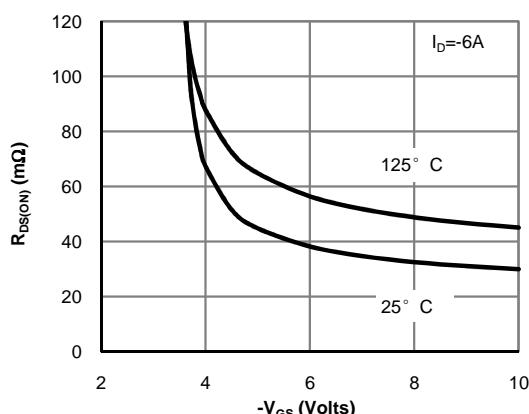
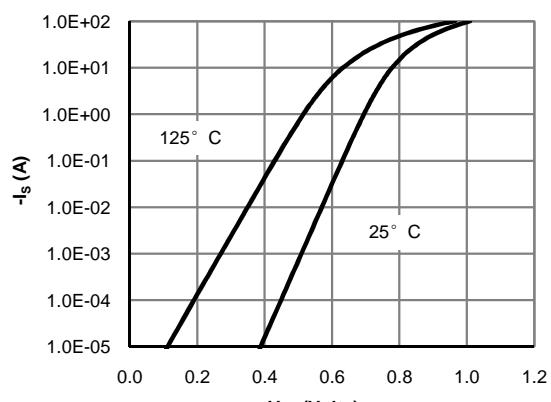
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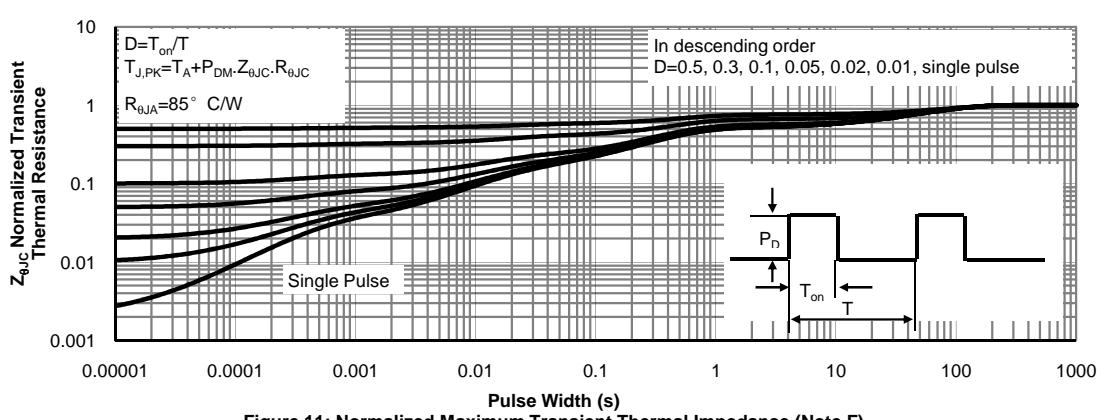
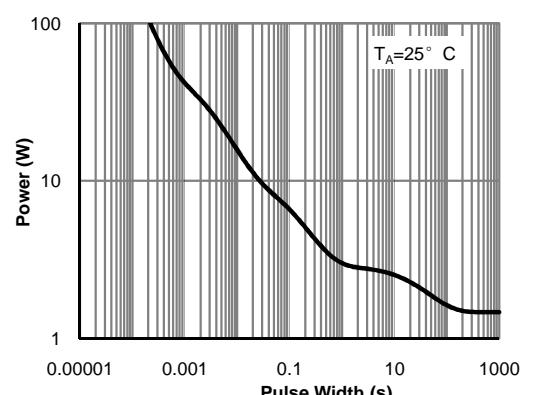
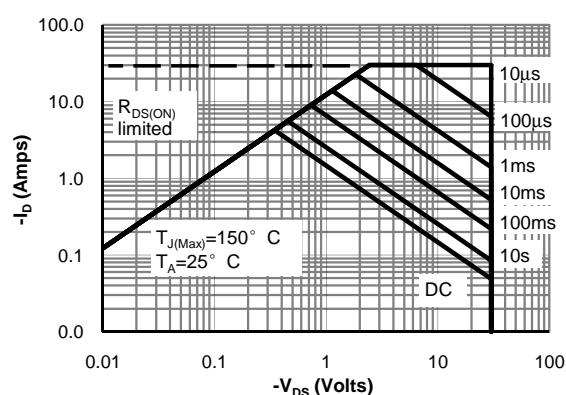
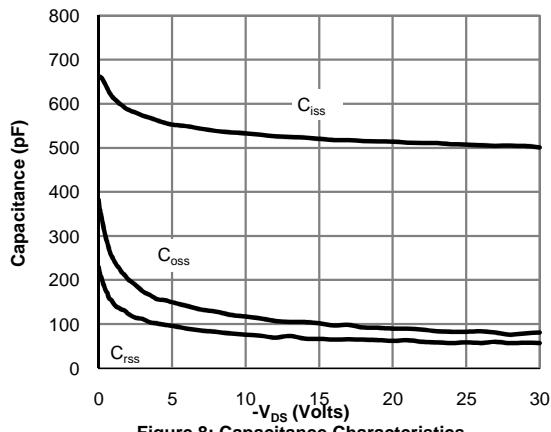
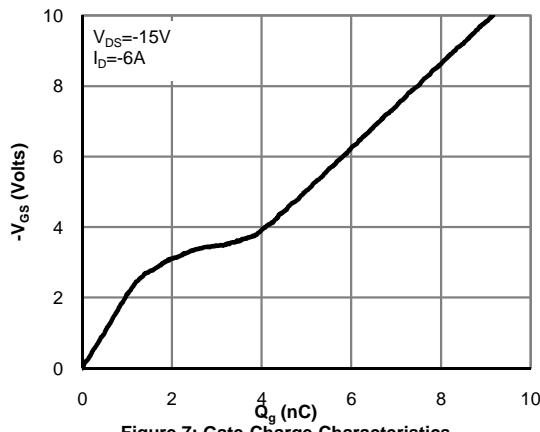
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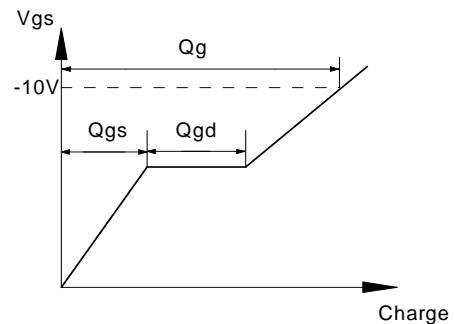
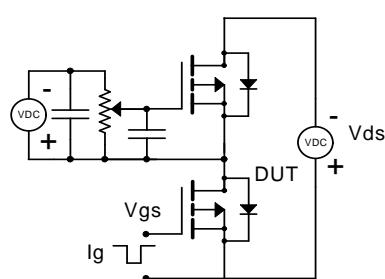
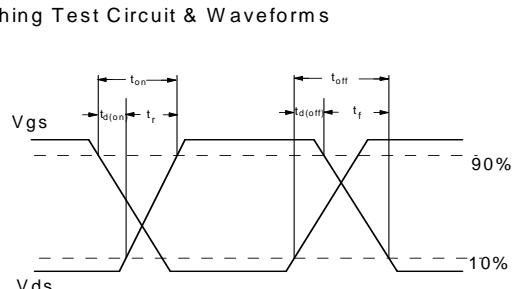
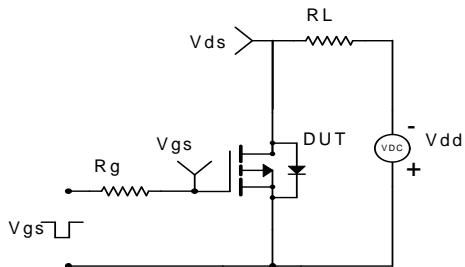
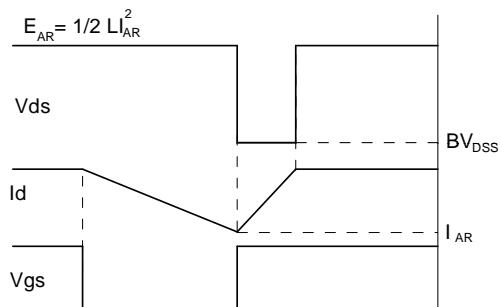
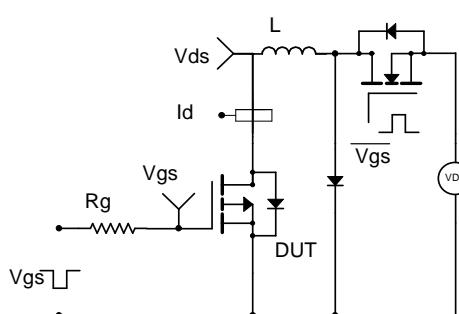
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