

AON4603

Complementary Enhancement Mode Field Effect Transistor

General Description

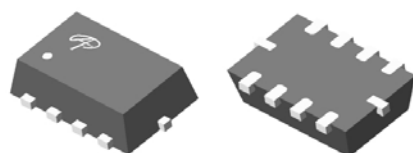
The AON4603 uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. The complementary MOSFETs form a high-speed power inverter, suitable for a multitude of applications. Standard Product AON4603 is Pb-free (meets ROHS & Sony 259 specifications). AON4603L is a Green Product ordering option. AON4603 and AON4603L are electrically identical.

Features

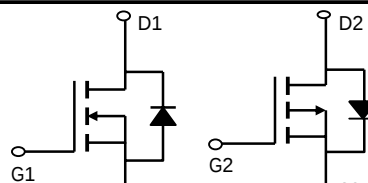
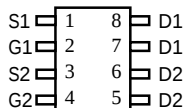
n-channel

p-channel

V_{DS} (V) = 30V	-30V	
I_D = 4A	-3.6A	($V_{GS} = \pm 10V$)
$R_{DS(ON)} < 75m\Omega$	$< 100m\Omega$	($V_{GS} = \pm 10V$)
$R_{DS(ON)} < 115m\Omega$	$< 180m\Omega$	($V_{GS} = \pm 4.5V$)



DFN2X3



n-channel

p-channel

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}	± 20	± 20	V
Continuous Drain Current ^A	I_D	4	-3.6	A
$T_A = 25^\circ C$				
$T_A = 70^\circ C$		3.2	-2.9	
Pulsed Drain Current ^B	I_{DM}	12	-12	
Power Dissipation	P_D	1.9	2.1	W
$T_A = 25^\circ C$				
$T_A = 70^\circ C$		1.2	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	$R_{\theta JA}$	54	65	$^\circ C/W$
$t \leq 10s$				
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	102	125	$^\circ C/W$
Steady-State				
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	58	70	$^\circ C/W$
Steady-State				

Thermal Characteristics: p-channel

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	50	60	$^\circ C/W$
$t \leq 10s$				
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	85	110	$^\circ C/W$
Steady-State				
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	41	50	$^\circ C/W$
Steady-State				

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	$V_{DS}=24\text{V}$, $V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			1 5	μA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}$, $V_{GS}=\pm 20\text{V}$			100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	1	1.9	3	V
$I_{D(ON)}$	On state drain current	$V_{GS}=10\text{V}$, $V_{DS}=5\text{V}$	12			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}$, $I_D=4\text{A}$ $T_J=125^\circ\text{C}$		55 78	75	$\text{m}\Omega$
		$V_{GS}=4.5\text{V}$, $I_D=2\text{A}$		95	115	$\text{m}\Omega$
g_{FS}	Forward Transconductance	$V_{DS}=5\text{V}$, $I_D=4\text{A}$		5.4		S
V_{SD}	Diode Forward Voltage	$I_S=1\text{A}$		0.82	1	V
I_S	Maximum Body-Diode Continuous Current				2.5	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}$, $V_{DS}=15\text{V}$, $f=1\text{MHz}$		200	260	pF
C_{oss}	Output Capacitance			40		pF
C_{rss}	Reverse Transfer Capacitance			20		pF
R_g	Gate resistance	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$		2.3	3.5	Ω
SWITCHING PARAMETERS						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=10\text{V}$, $V_{DS}=15\text{V}$, $I_D=4\text{A}$		6.5	8.5	nC
$Q_g(4.5\text{V})$	Total Gate Charge			3.1	4	nC
Q_{gs}	Gate Source Charge			1.2		nC
Q_{gd}	Gate Drain Charge			1.6		nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=10\text{V}$, $V_{DS}=15\text{V}$, $R_L=3.75\Omega$, $R_{GEN}=3\Omega$		3.3		ns
t_r	Turn-On Rise Time			2.5		ns
$t_{D(off)}$	Turn-Off DelayTime			13.2		ns
t_f	Turn-Off Fall Time			1.7		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=4\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		9.4	12	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=4\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		3.5		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 value in any a given application depends on the user's specific board design. The current rating is based on the $\leq 10\text{s}$ thermal resistance rating.

B: Repetitive rating, pulse width limited by junction temperature.

C. The $R_{\theta JA}$ is the sum of the thermal impedance from junction to lead $R_{\theta JL}$ and lead to ambient.

D. The static characteristics in Figures 1 to 6, 12, 14 are obtained using 80 μs pulses, duty cycle 0.5% max.

E. 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.

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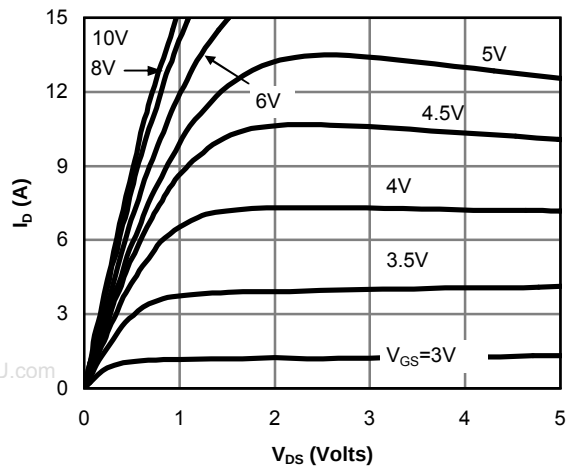
N-Channel Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise noted)

Fig 1: On-Region Characteristics

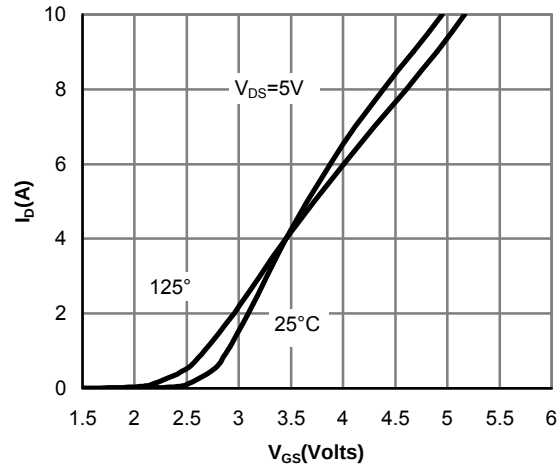


Figure 2: Transfer Characteristics

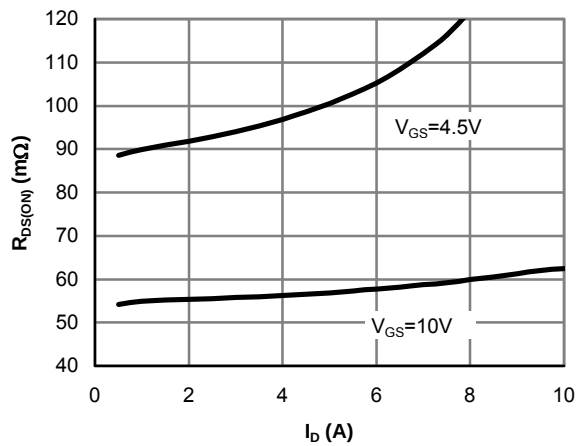


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

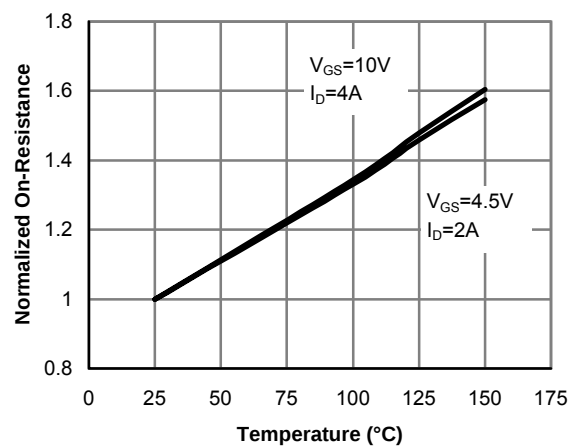


Figure 4: On-Resistance vs. Junction Temperature

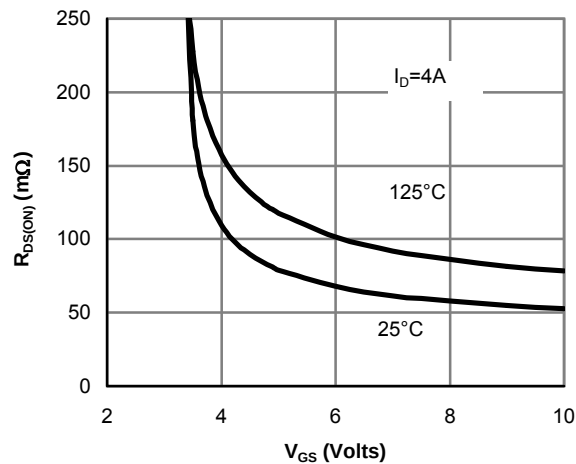


Figure 5: On-Resistance vs. Gate-Source Voltage

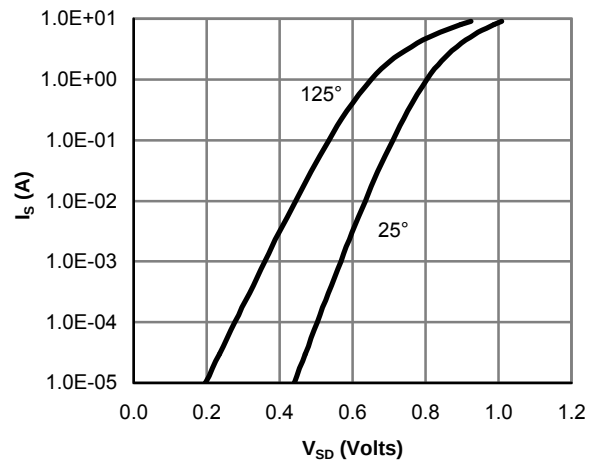


Figure 6: Body-Diode Characteristics

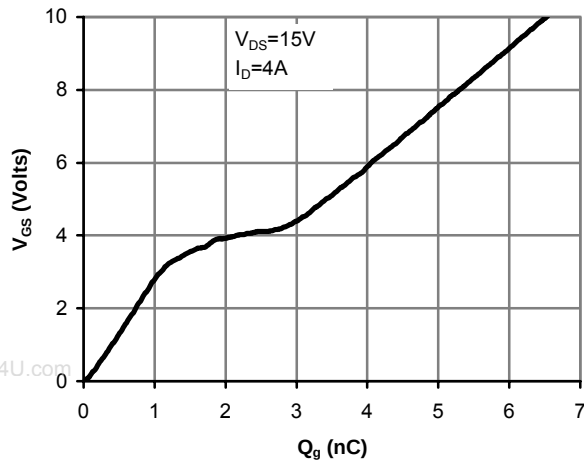
N-Channel Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise noted)

Figure 7: Gate-Charge Characteristics

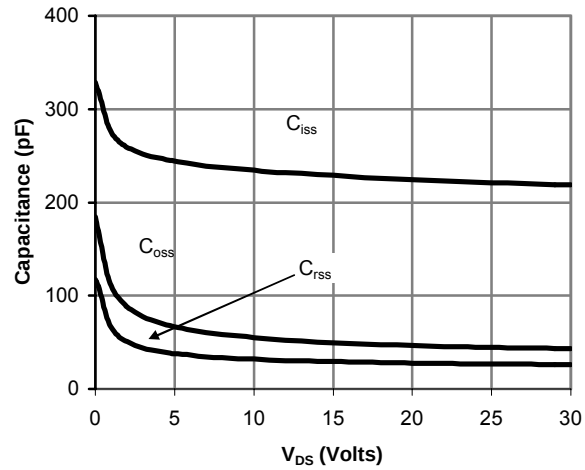


Figure 8: Capacitance Characteristics

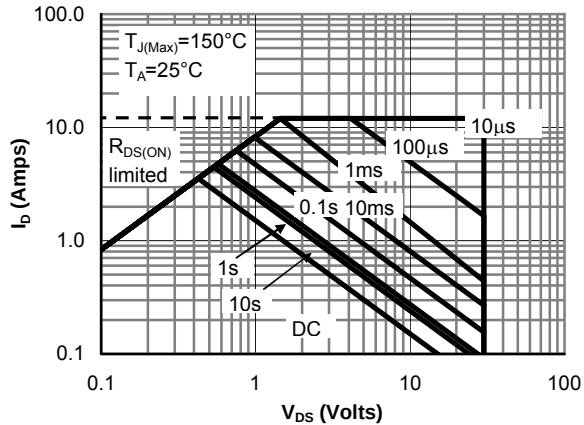


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

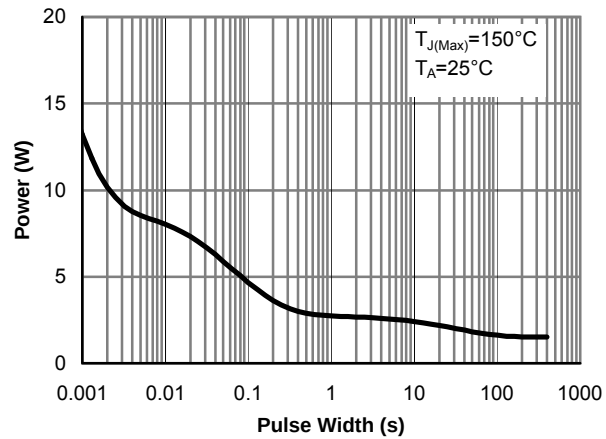


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

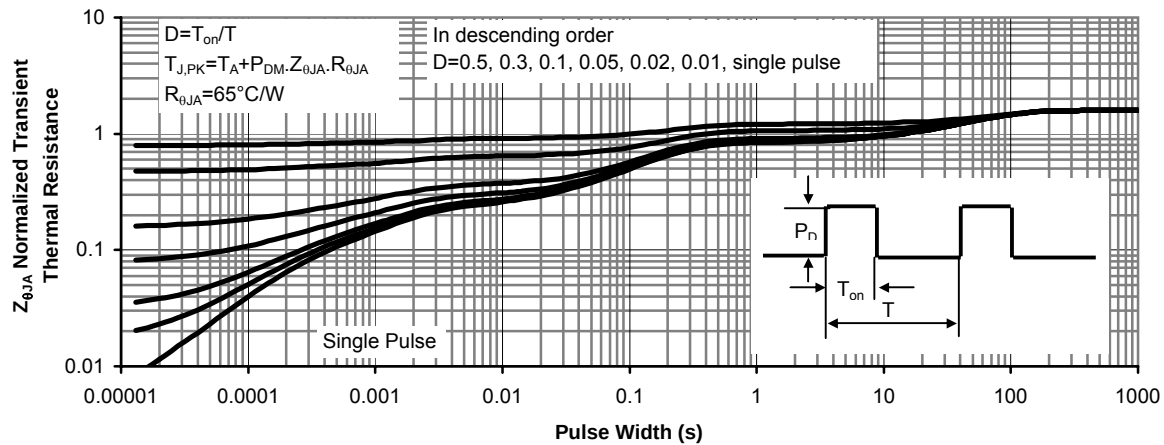


Figure 11: Normalized Maximum Transient Thermal Impedance

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	$V_{DS}=-24\text{V}$, $V_{GS}=0\text{V}$ $T_J=55^{\circ}\text{C}$			-1 -5	μA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}$, $V_{GS}=\pm 20\text{V}$			± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=-250\mu\text{A}$	-1	-2	-3	V
$I_{D(ON)}$	On state drain current	$V_{GS}=-10\text{V}$, $V_{DS}=-5\text{V}$	-12			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=-10\text{V}$, $I_D=-3.6\text{A}$ $T_J=125^{\circ}\text{C}$		81 115	100	$m\Omega$
		$V_{GS}=-4.5\text{V}$, $I_D=-2\text{A}$		136	180	$m\Omega$
g_{FS}	Forward Transconductance	$V_{DS}=-5\text{V}$, $I_D=-3.6\text{A}$		4.8		S
V_{SD}	Diode Forward Voltage	$I_S=-1\text{A}$, $V_{GS}=0\text{V}$		-0.82	-1	V
I_S	Maximum Body-Diode Continuous Current				-2.5	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}$, $V_{DS}=-15\text{V}$, $f=1\text{MHz}$		260	340	pF
C_{oss}	Output Capacitance			55		pF
C_{rss}	Reverse Transfer Capacitance			44		pF
R_g	Gate resistance	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$		4.3	6.5	Ω
SWITCHING PARAMETERS						
$Q_g(10)$	Total Gate Charge(10V)	$V_{GS}=-10\text{V}$, $V_{DS}=-15\text{V}$, $I_D=-3.6\text{A}$		5.8	7	nC
$Q_g(4.5)$	Total Gate Charge(4.5V)			3	4	nC
Q_{gs}	Gate Source Charge			0.78		nC
Q_{gd}	Gate Drain Charge			1.6		nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=-10\text{V}$, $V_{DS}=-15\text{V}$, $R_L=4.2\Omega$, $R_{GEN}=3\Omega$		7		ns
t_r	Turn-On Rise Time			6		ns
$t_{D(off)}$	Turn-Off DelayTime			15		ns
t_f	Turn-Off Fall Time			7.5		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=-3.6\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		12.5	15	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=-3.6\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		5.5		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 value in any a given application depends on the user's specific board design. The current rating is based on the $\leq 10\text{s}$ thermal resistance rating.

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E. 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.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: P-CHANNEL

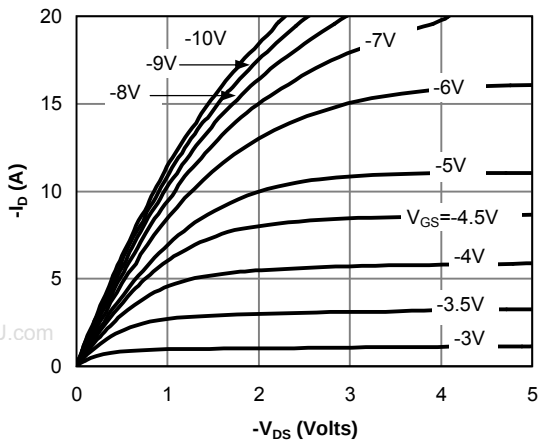


Fig 1: On-Region Characteristics

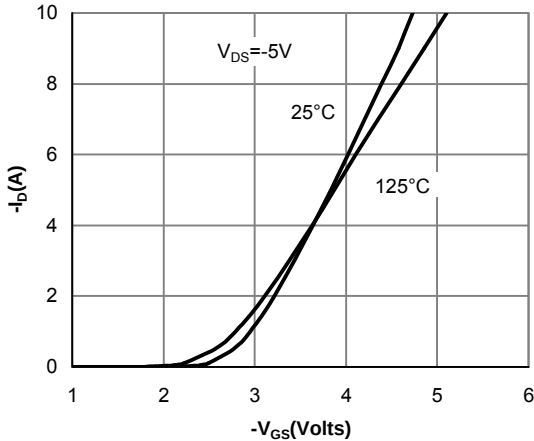


Figure 2: Transfer Characteristics

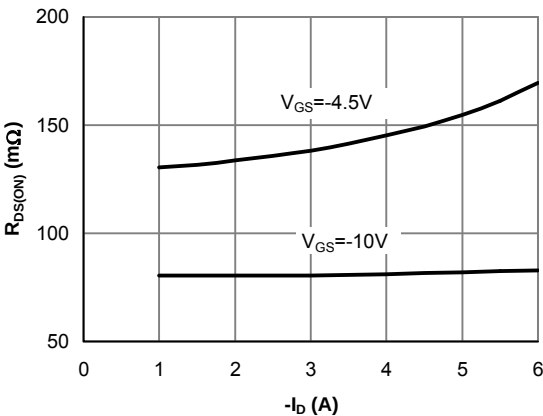


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

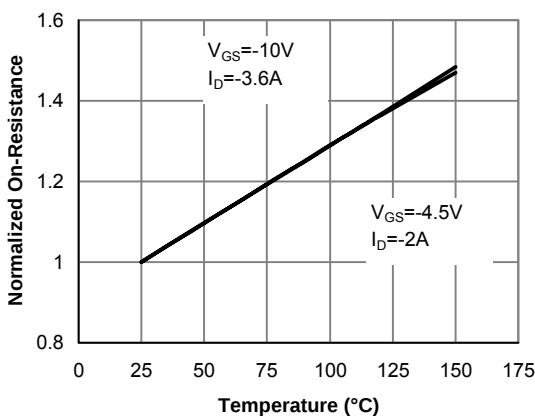


Figure 4: On-Resistance vs. Junction Temperature

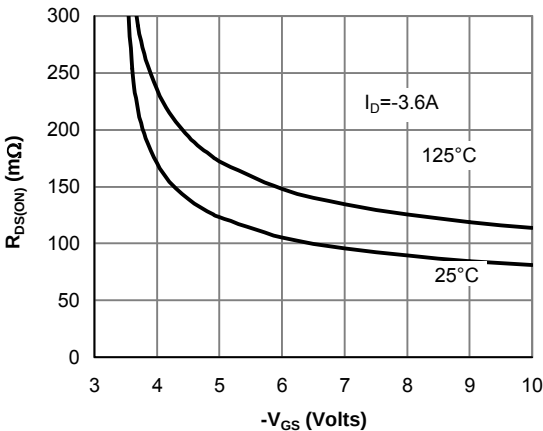


Figure 5: On-Resistance vs. Gate-Source Voltage

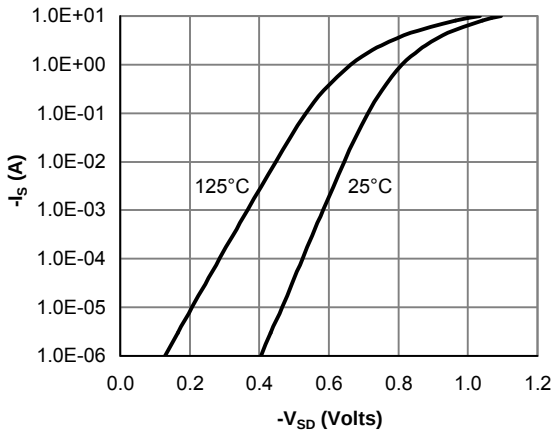


Figure 6: Body-Diode Characteristics

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