

AON3601

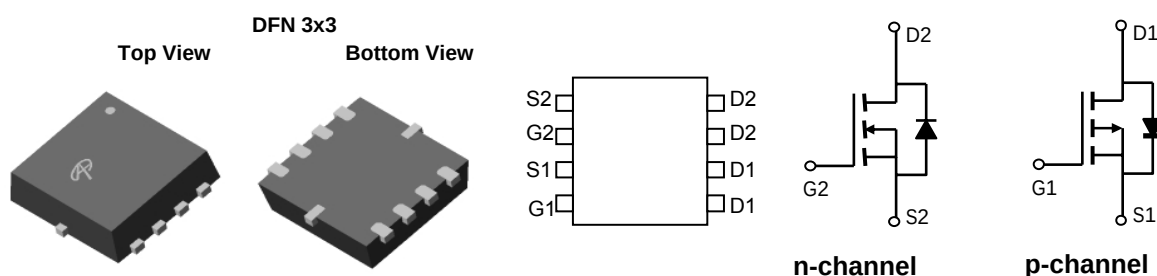
Complementary Enhancement Mode Field Effect Transistor

General Description

The AON3601 uses advanced trench technology MOSFETs to provide excellent $R_{DS(ON)}$ and low gate charge. The complementary MOSFETs may be used in power inverters, and other applications. *Standard Product AON3601 is Pb-free (meets ROHS & Sony 259 specifications). AON3601L is a Green Product ordering option. AON3601 and AON3601L are electrically identical.*

Features

n-channel	p-channel
V_{DS} (V) = 30V	-30V
I_D = 6.6A ($V_{GS}=10V$)	-5A ($V_{GS} = -10V$)
$R_{DS(ON)}$	$R_{DS(ON)}$
< 29m Ω ($V_{GS}=10V$)	< 52m Ω ($V_{GS} = -10V$)
< 42m Ω ($V_{GS}=4.5V$)	< 72m Ω ($V_{GS} = -4.5V$)



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 ^A	I_D	6.6	-5	A
		5.6	-4.2	
Pulsed Drain Current ^B	I_{DM}	30	-20	
Power Dissipation	P_D	2	2	W
		1.44	1.44	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	-55 to 150	$^\circ\text{C}$

Thermal Characteristics: n-channel and p-channel

Parameter	Symbol	Device	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	n-ch	50	62.5	$^\circ\text{C/W}$
Maximum Junction-to-Ambient ^A		n-ch	90	110	$^\circ\text{C/W}$
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	n-ch	43	53	$^\circ\text{C/W}$
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	p-ch	45	62.5	$^\circ\text{C/W}$
Maximum Junction-to-Ambient ^A		p-ch	80	110	$^\circ\text{C/W}$
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	p-ch	40	50	$^\circ\text{C/W}$

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	$V_{DS}=24\text{V}$, $V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$		0.004	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	1.8	3	V
$I_{D(ON)}$	On state drain current	$V_{GS}=4.5\text{V}$, $V_{DS}=5\text{V}$	20			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}$, $I_D=6.6\text{A}$ $T_J=125^\circ\text{C}$		24.3 34	29 41	$m\Omega$
		$V_{GS}=4.5\text{V}$, $I_D=5.5\text{A}$		34.5	42	$m\Omega$
g_{FS}	Forward Transconductance	$V_{DS}=5\text{V}$, $I_D=6.6\text{A}$	10	15.4		S
V_{SD}	Diode Forward Voltage	$I_S=1\text{A}$		0.78	1	V
I_S	Maximum Body-Diode Continuous Current				3	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}$, $V_{DS}=15\text{V}$, $f=1\text{MHz}$		680	820	pF
C_{oss}	Output Capacitance			102		pF
C_{rss}	Reverse Transfer Capacitance			77		pF
R_g	Gate resistance	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$		3	3.6	Ω
SWITCHING PARAMETERS						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=10\text{V}$, $V_{DS}=15\text{V}$, $I_D=6.6\text{A}$		13.84	17	nC
$Q_g(4.5\text{V})$	Total Gate Charge			6.74	8.1	nC
Q_{gs}	Gate Source Charge			1.82		nC
Q_{gd}	Gate Drain Charge			3.2		nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=10\text{V}$, $V_{DS}=15\text{V}$, $R_L=2.3\Omega$, $R_{GEN}=3\Omega$		4.6		ns
t_r	Turn-On Rise Time			4.1		ns
$t_{D(off)}$	Turn-Off DelayTime			20.6		ns
t_f	Turn-Off Fall Time			5.2		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=6.6\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		16.5	20	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=6.6\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		7.8		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 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.

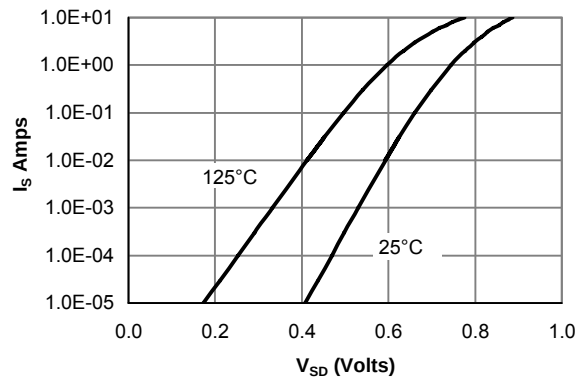
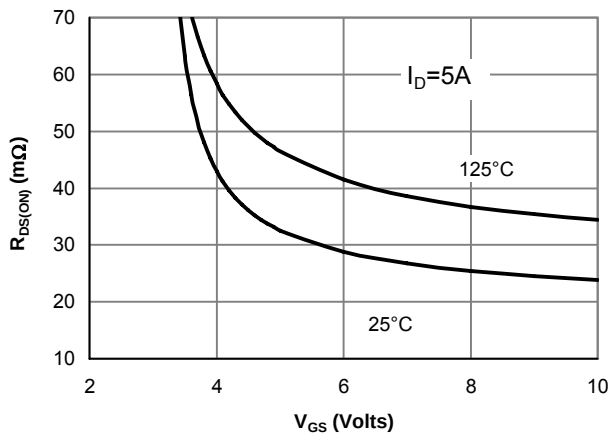
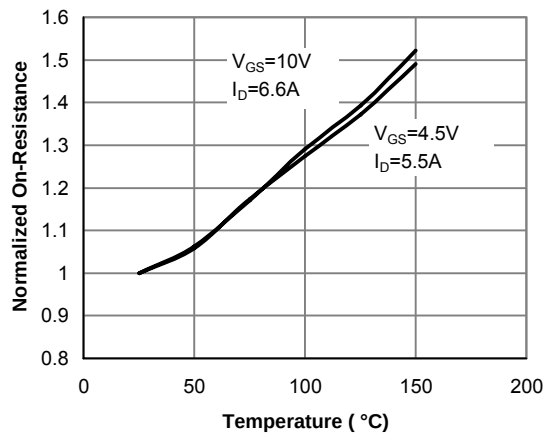
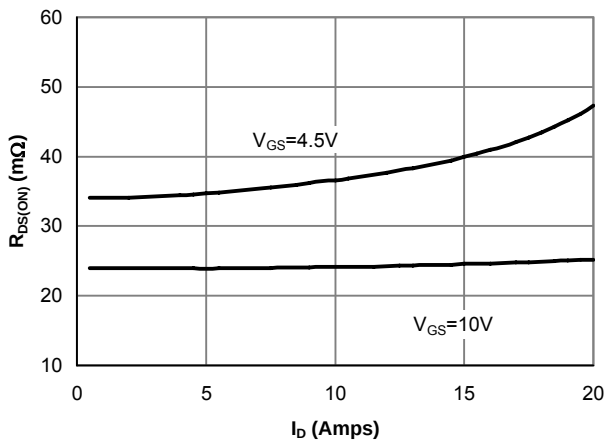
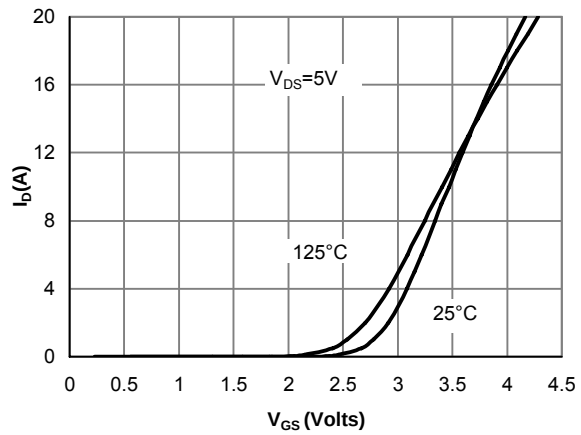
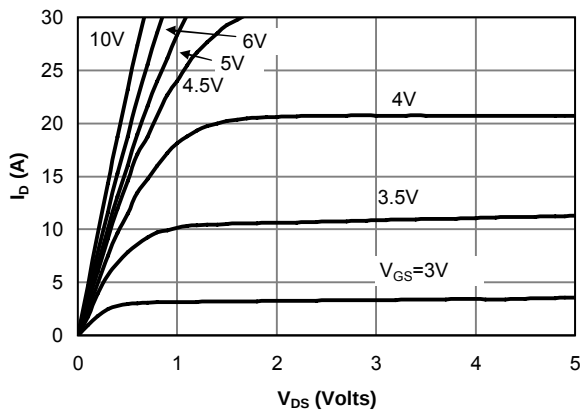
D: The static characteristics in Figures 1 to 6 are obtained using 80 μs pulses, duty cycle 0.5% max.

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.

Rev 0: April 2006

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N-CHANNEL: TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



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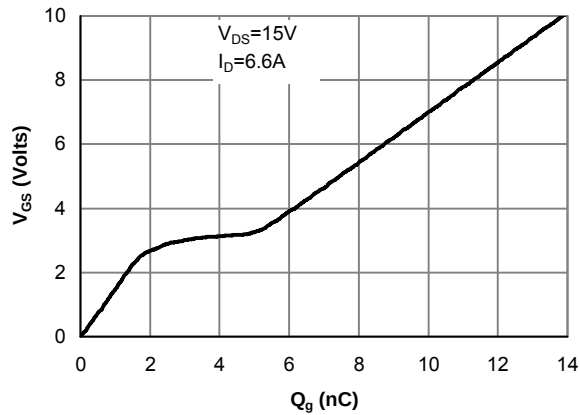


Figure 7: Gate-Charge characteristics

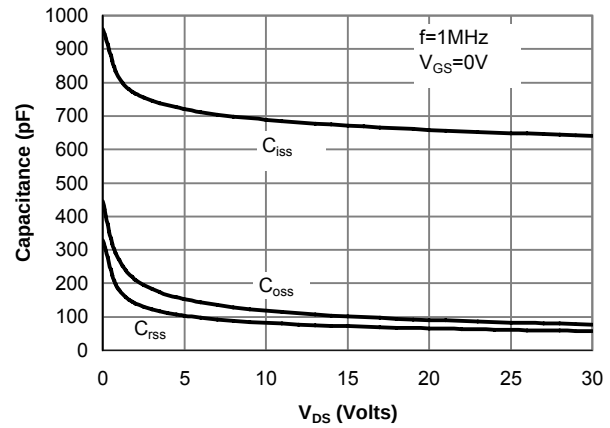


Figure 8: Capacitance Characteristics

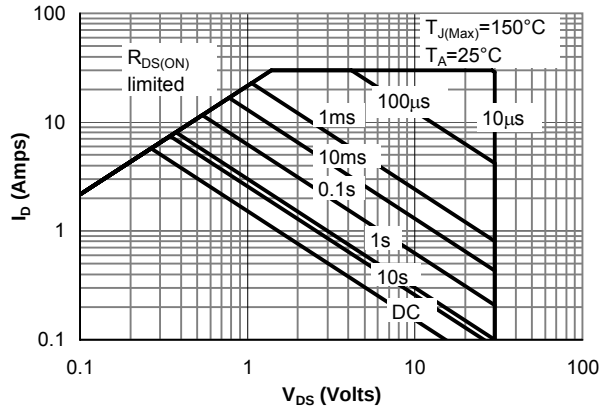


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

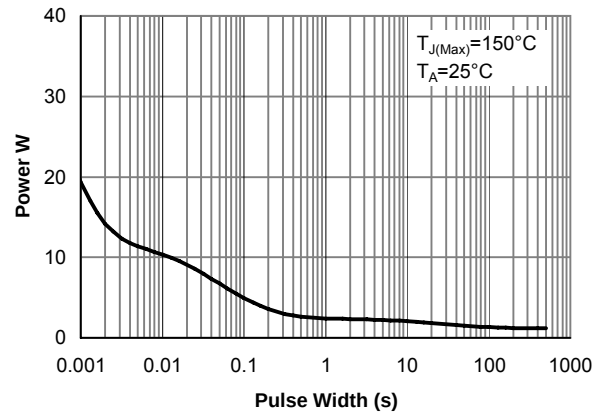


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

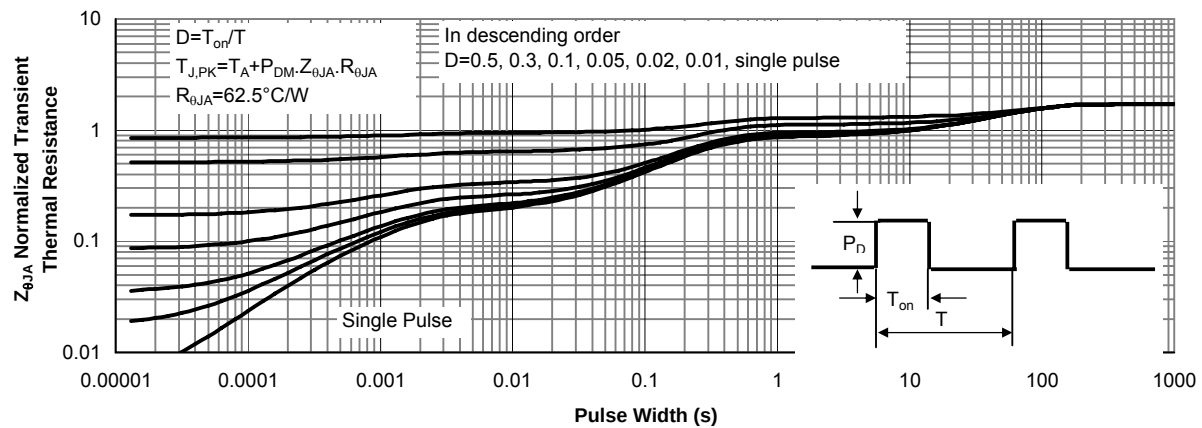


Figure 11: Normalized Maximum Transient Thermal Impedance

P-CHANNEL: Electrical Characteristics (T_J=25°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} =-24V, 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	-2	-3	V
I _{D(ON)}	On state drain current	V _{GS} =-4.5V, V _{DS} =-5V	-20			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =-10V, I _D =-5A T _J =125°C		39 54	52 70	mΩ
		V _{GS} =-4.5V, I _D =-4.2A		60	72	mΩ
g _{FS}	Forward Transconductance	V _{DS} =-5V, I _D =-5A	6	8.6		S
V _{SD}	Diode Forward Voltage	I _S =-1A, V _{GS} =0V		-0.79	-1	V
I _S	Maximum Body-Diode Continuous Current				-2.8	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =-15V, f=1MHz		700	900	pF
C _{oss}	Output Capacitance			120		pF
C _{rss}	Reverse Transfer Capacitance			75		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		10	15	Ω
SWITCHING PARAMETERS						
Q _g (10V)	Total Gate Charge (10V)	V _{GS} =-10V, V _{DS} =-15V, I _D =-5A		14.7	19	nC
Q _g (4.5V)	Total Gate Charge (4.5V)			7.6	10	nC
Q _{gs}	Gate Source Charge			2		nC
Q _{gd}	Gate Drain Charge			3.8		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =-10V, V _{DS} =-15V, R _L =3Ω, R _{GEN} =3Ω		8.3		ns
t _r	Turn-On Rise Time			5		ns
t _{D(off)}	Turn-Off DelayTime			29		ns
t _f	Turn-Off Fall Time			14		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =-5A, dI/dt=100A/μs		23.5	30	ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =-5A, dI/dt=100A/μs		13.4		nC

A: The value of R_{θJA} 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. The current rating is based on the t≤ 10s thermal resistance rating.

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

C: The R_{θJA} is the sum of the thermal impedance from junction to lead R_{θJL} and lead to ambient.

D: The static characteristics in Figures 1 to 6,12,14 are obtained using 80μs 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°C. The SOA curve provides a single pulse rating.

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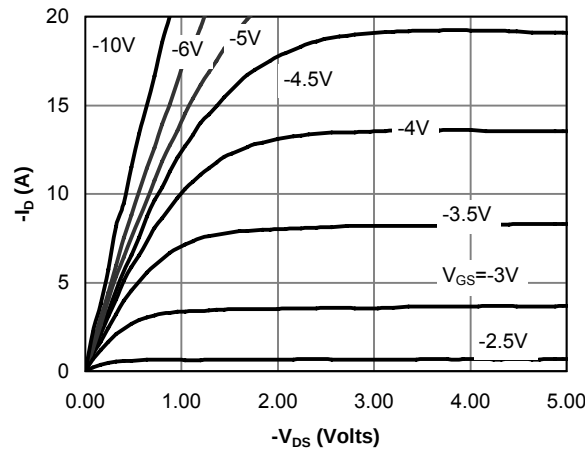


Figure 1: On-Region Characteristics

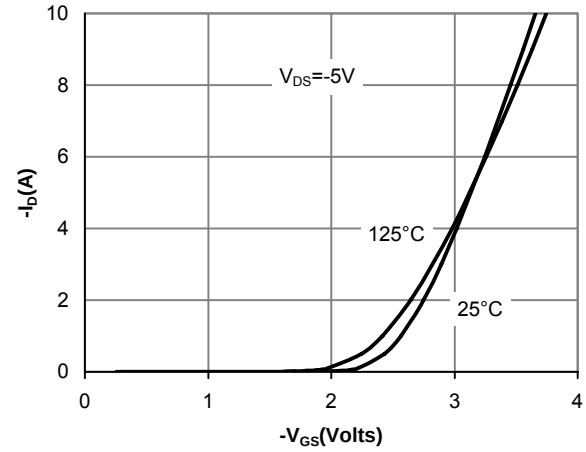


Figure 2: Transfer Characteristics

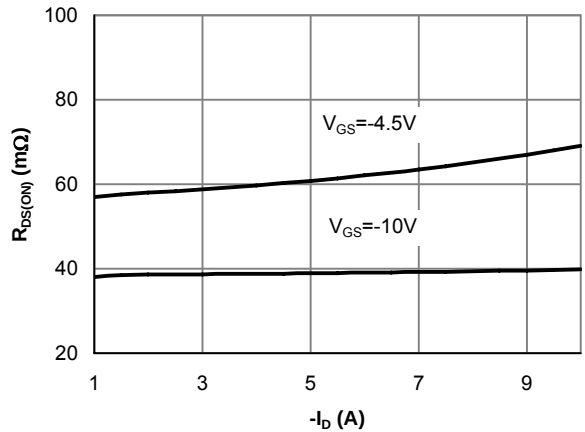


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

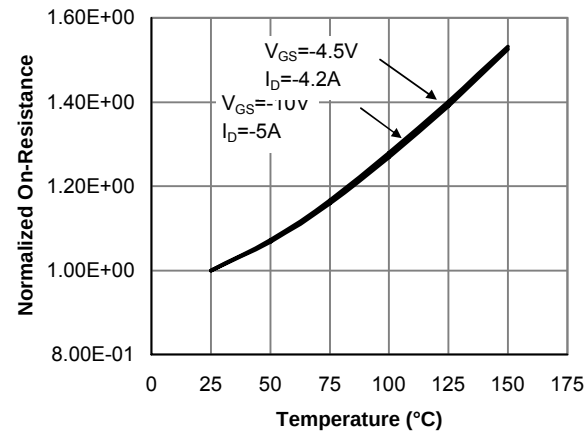


Figure 4: On-Resistance vs. Junction Temperature

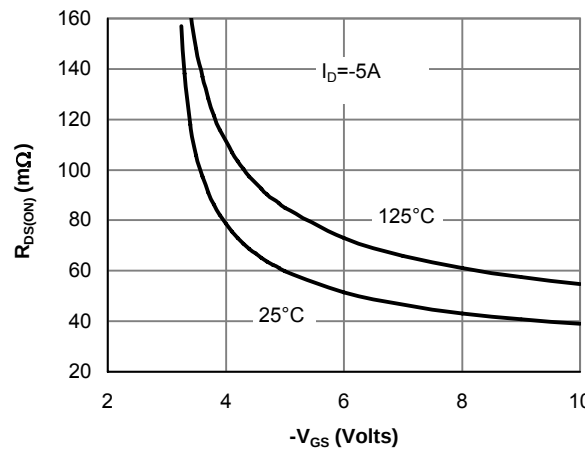


Figure 5: On-Resistance vs. Gate-Source Voltage

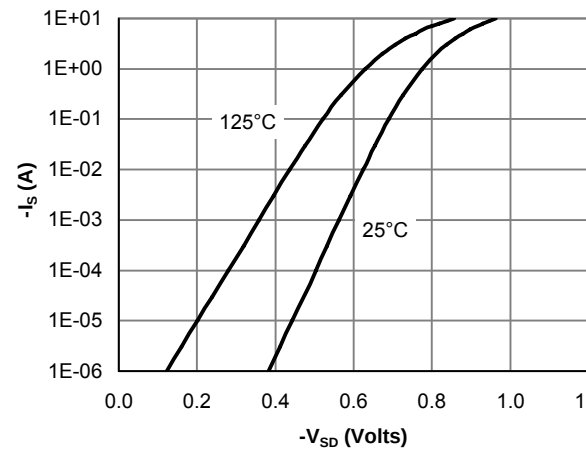


Figure 6: Body-Diode Characteristics

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