



AO4617

Complementary Enhancement Mode Field Effect Transistor

General Description

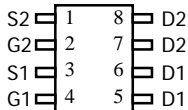
The AO4617 uses advanced trench technology MOSFETs to provide excellent $R_{DS(ON)}$ and low gate charge. The complementary MOSFETs may be used in H-bridge, Inverters and other applications. *Standard Product AO4617 is Pb-free (meets ROHS & Sony 259 specifications). AO4617L is a Green Product ordering option. AO4617 and AO4617L are electrically identical.*

Features

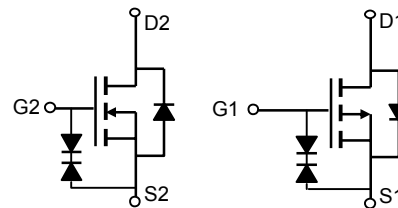
n-channel	p-channel
V_{DS} (V) = 40V	-40V
I_D = 6A ($V_{GS}=10V$)	-5A ($V_{GS} = -10V$)
$R_{DS(ON)}$	$R_{DS(ON)}$
< 32m Ω ($V_{GS}=10V$)	< 48m Ω ($V_{GS} = -10V$)
< 45m Ω ($V_{GS}=4.5V$)	< 75m Ω ($V_{GS} = -4.5V$)

ESD rating: 3000V (HBM)

UIS TESTED!
Rg,Ciss,Coss,Crss Tested



SOIC-8



n-channel

p-channel

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}	40	-40	V
Gate-Source Voltage	V_{GS}	± 20	± 20	V
Continuous Drain Current ^A	I_D	$T_A=25^\circ\text{C}$	6	-5
		$T_A=70^\circ\text{C}$	5	-4
Pulsed Drain Current ^B	I_{DM}	30	-25	A
Power Dissipation	P_D	$T_A=25^\circ\text{C}$	2	2
		$T_A=70^\circ\text{C}$	1.28	1.28
Avalanche Current ^B	I_{AR}	13	17	A
Repetitive avalanche energy 0.3mH ^B	E_{AR}	25	43	mJ
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	$t \leq 10s$	48	62.5
Maximum Junction-to-Ambient ^A			Steady-State	74	110
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	n-ch	Steady-State	35	50
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	p-ch	$t \leq 10s$	48	62.5
Maximum Junction-to-Ambient ^A			Steady-State	74	110
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	p-ch	Steady-State	35	50

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	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	40			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=32\text{V}$, $V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			1	μA
					5	
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}$, $V_{GS}=\pm 20\text{V}$			± 1	mA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	1	2.2	3	V
$I_{D(ON)}$	On state drain current	$V_{GS}=10\text{V}$, $V_{DS}=5\text{V}$	30			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}$, $I_D=6\text{A}$ $T_J=125^\circ\text{C}$		26	32	m Ω
				39	48	
					36	45
g_{FS}	Forward Transconductance	$V_{DS}=5\text{V}$, $I_D=6\text{A}$		18		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				3	A
DYNAMIC PARAMETERS						
C_{ISS}	Input Capacitance	$V_{GS}=0\text{V}$, $V_{DS}=20\text{V}$, $f=1\text{MHz}$		506		pF
C_{OSS}	Output Capacitance			106		pF
C_{RSS}	Reverse Transfer Capacitance			38		pF
R_g	Gate resistance	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$		2.6	3.9	Ω
SWITCHING PARAMETERS						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=10\text{V}$, $V_{DS}=20\text{V}$, $I_D=6\text{A}$		8.4		nC
$Q_g(4.5\text{V})$	Total Gate Charge			4.1		nC
Q_{gs}	Gate Source Charge			1.6		nC
Q_{gd}	Gate Drain Charge			2.7		nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=10\text{V}$, $V_{DS}=20\text{V}$, $R_L=3.3\Omega$, $R_{GEN}=3\Omega$		4.8		ns
t_r	Turn-On Rise Time			2		ns
$t_{D(off)}$	Turn-Off DelayTime			17		ns
t_f	Turn-Off Fall Time			2.1		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=6\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		17.4		ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=6\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		10.9		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 $t_s \leq 10\text{s}$ 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 $<300\mu\text{s}$ 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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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: N-CANNEL

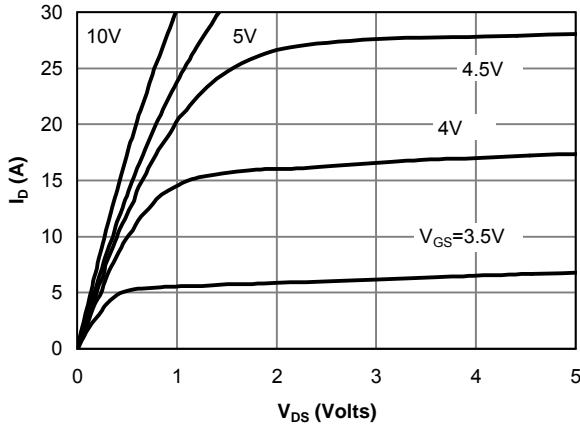


Figure 1: On-Region Characteristics

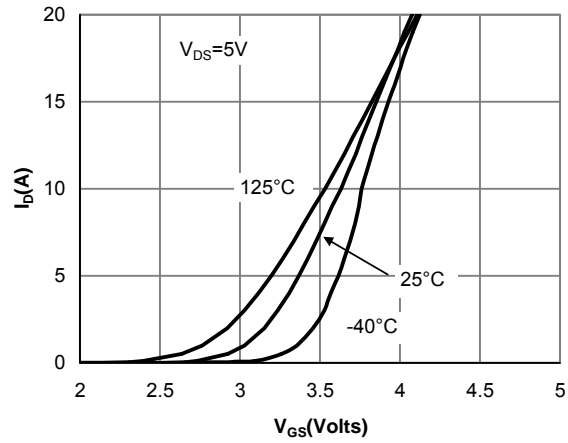


Figure 2: Transfer Characteristics

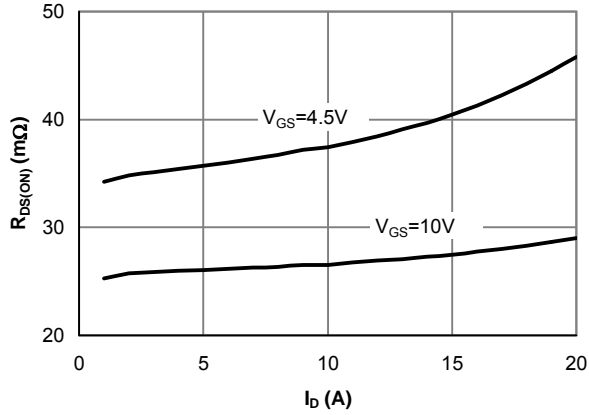


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

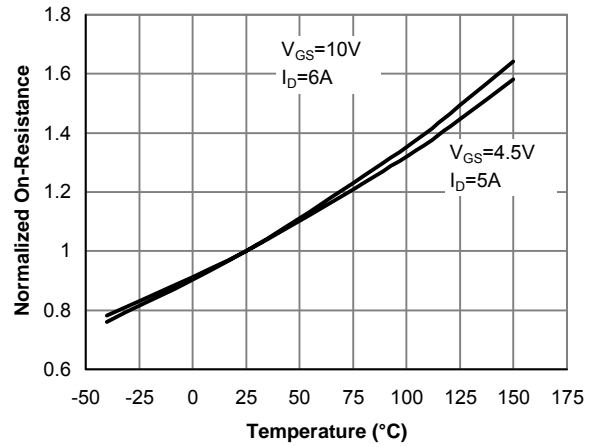


Figure 4: On-Resistance vs. Junction Temperature

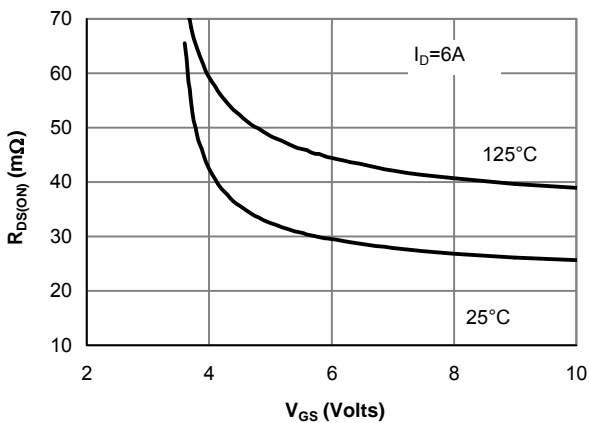


Figure 5: On-Resistance vs. Gate-Source Voltage

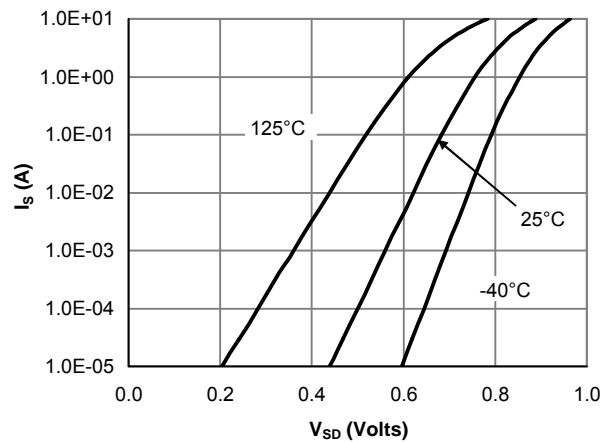


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: N-CHANNEL

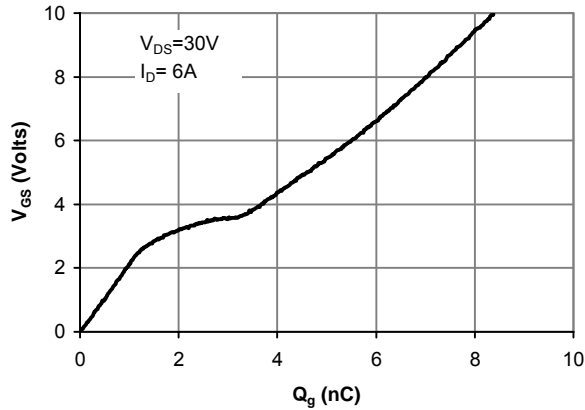


Figure 7: Gate-Charge Characteristics

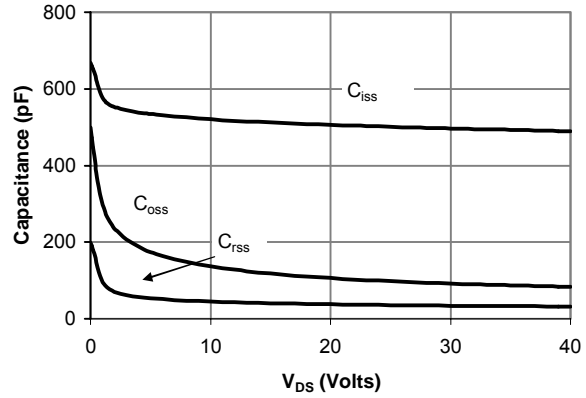


Figure 8: Capacitance Characteristics

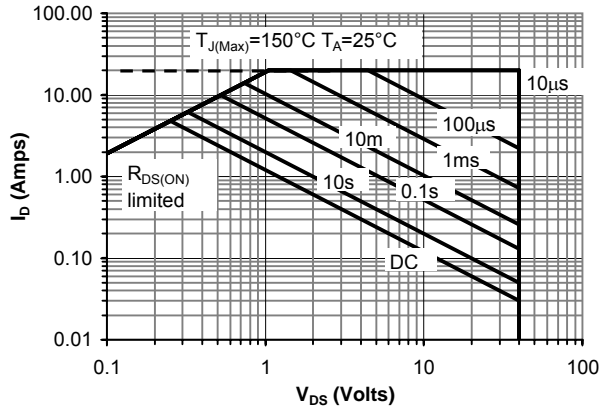


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

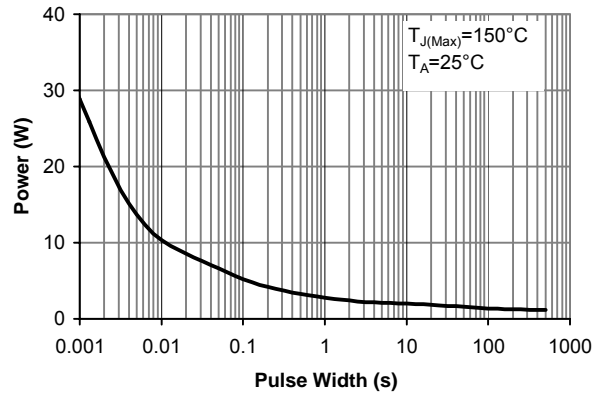


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

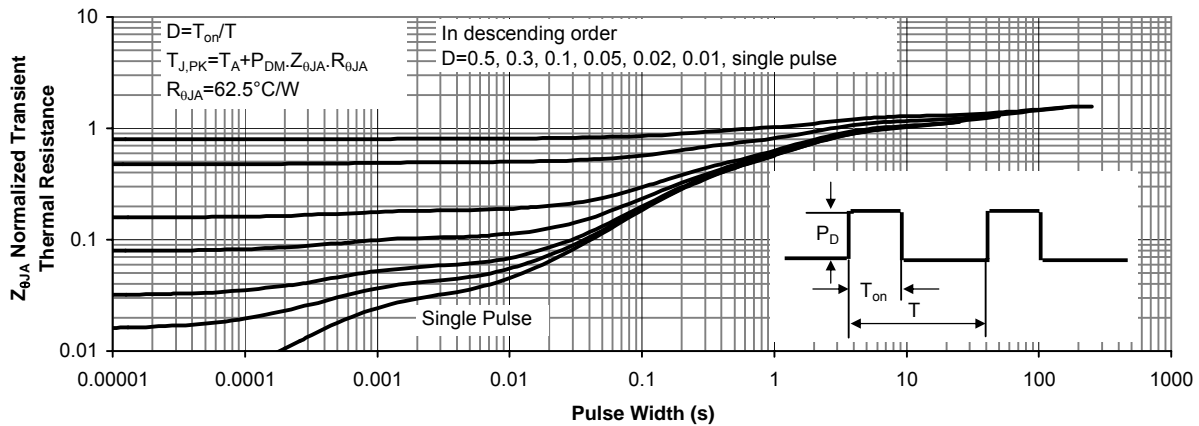


Figure 11: Normalized Maximum Transient Thermal Impedance

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	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	-40			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=-32\text{V}$, $V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			-1	μA
					-5	
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}$, $V_{GS}=\pm 20\text{V}$			± 150	μA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=-250\mu\text{A}$	-1	-2	-3	V
$I_{D(ON)}$	On state drain current	$V_{GS}=-10\text{V}$, $V_{DS}=-5\text{V}$	-25			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=-10\text{V}$, $I_D=-5\text{A}$ $T_J=125^\circ\text{C}$		40	48	m Ω
				56	68	
		$V_{GS}=-4.5\text{V}$, $I_D=-4\text{A}$		61	75	m Ω
g_{FS}	Forward Transconductance	$V_{DS}=-5\text{V}$, $I_D=-5\text{A}$		11		S
V_{SD}	Diode Forward Voltage	$I_S=-1\text{A}$, $V_{GS}=0\text{V}$		-0.76	-1	V
I_S	Maximum Body-Diode Continuous Current				3.5	A
DYNAMIC PARAMETERS						
C_{ISS}	Input Capacitance	$V_{GS}=0\text{V}$, $V_{DS}=-20\text{V}$, $f=1\text{MHz}$		1006		pF
C_{OSS}	Output Capacitance			152		pF
C_{RSS}	Reverse Transfer Capacitance			77		pF
R_g	Gate resistance	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$		11		Ω
SWITCHING PARAMETERS						
$Q_g(10\text{V})$	Total Gate Charge (10V)	$V_{GS}=-10\text{V}$, $V_{DS}=-20\text{V}$, $I_D=-5\text{A}$		17.4		nC
$Q_g(4.5\text{V})$	Total Gate Charge (4.5V)			8.9		nC
Q_{gs}	Gate Source Charge			3.1		nC
Q_{gd}	Gate Drain Charge			4.6		nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=-10\text{V}$, $V_{DS}=-20\text{V}$, $R_L=4\Omega$, $R_{GEN}=3\Omega$		9.7		ns
t_r	Turn-On Rise Time			6.3		ns
$t_{D(off)}$	Turn-Off DelayTime			35.5		ns
t_f	Turn-Off Fall Time			26		ns
t_{rr}	Body Diode Reverse Recovery Time		$I_F=-5\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		21.8	
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=-5\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		15.5		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 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 $<300\mu\text{s}$ 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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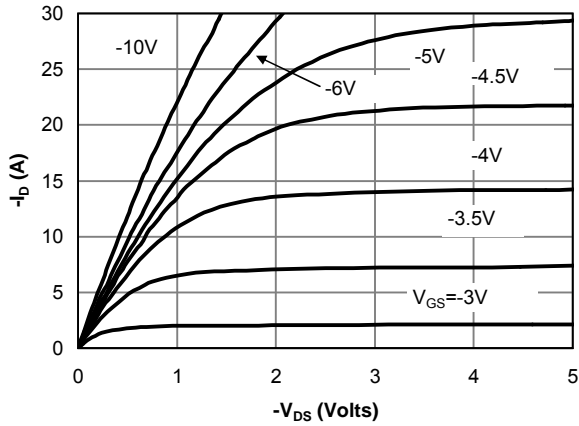


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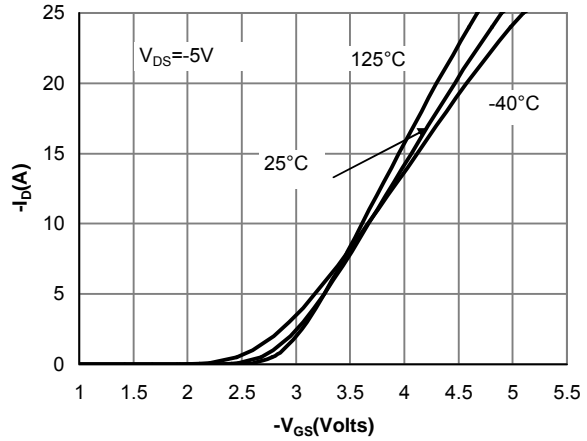


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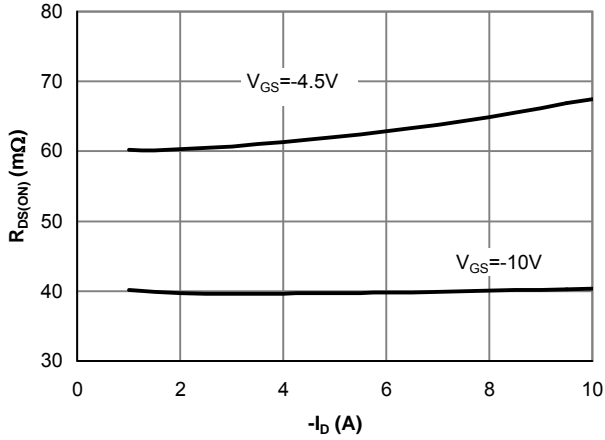


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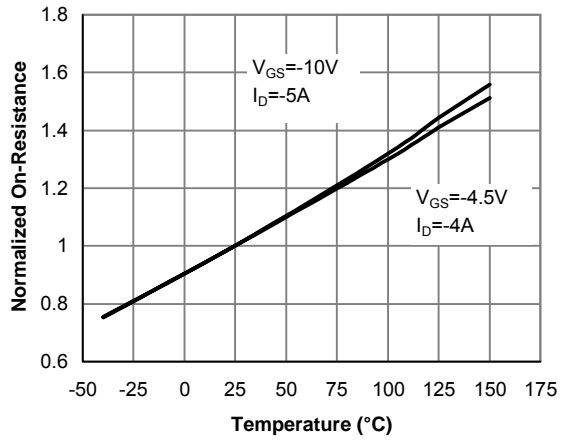


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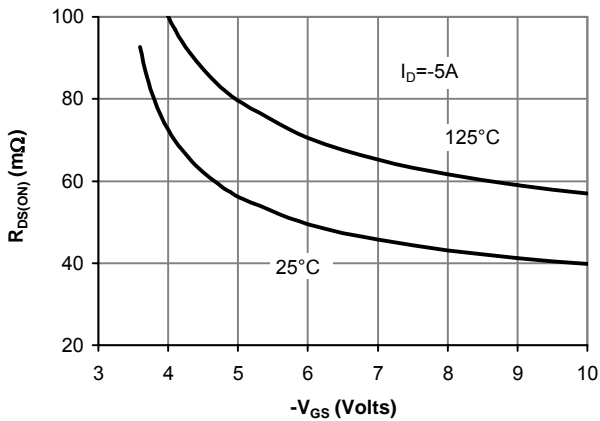


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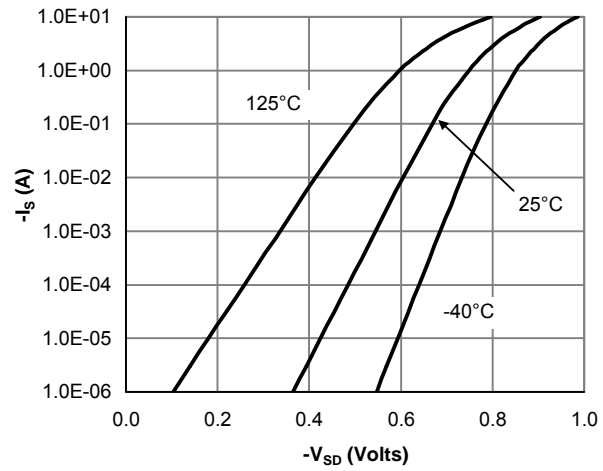


Figure 6: Body-Diode Characteristics

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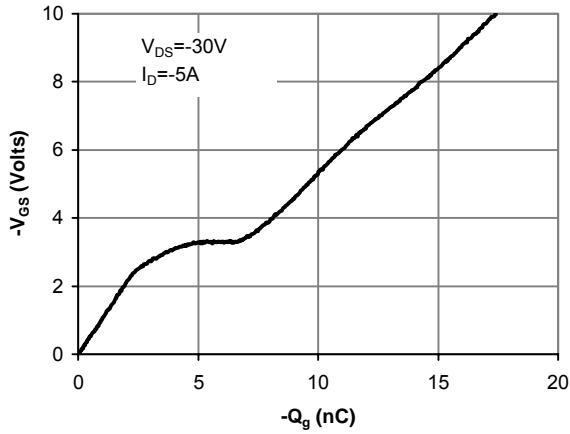


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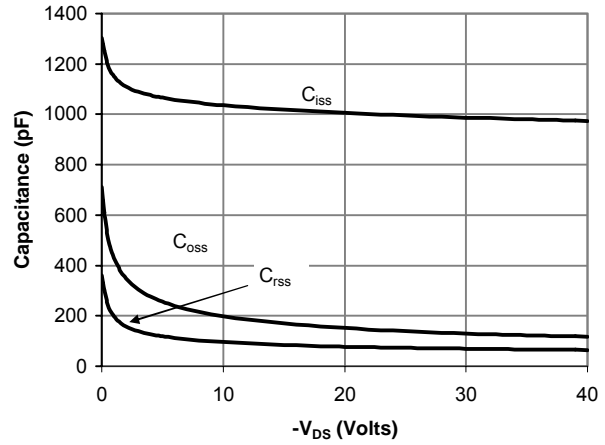


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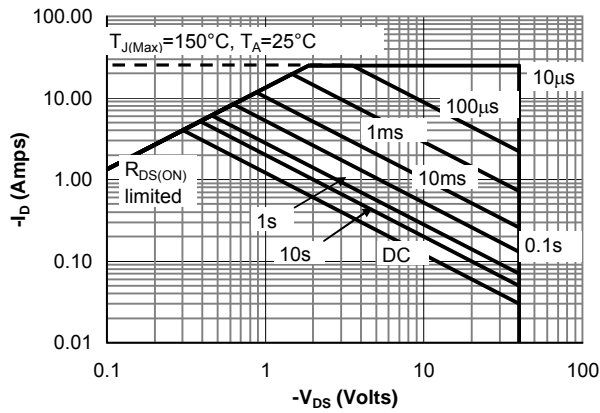


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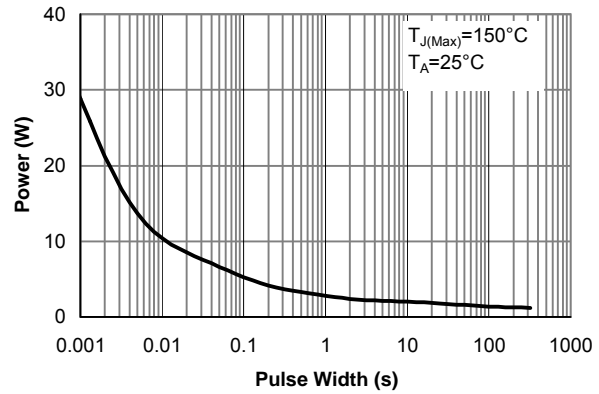


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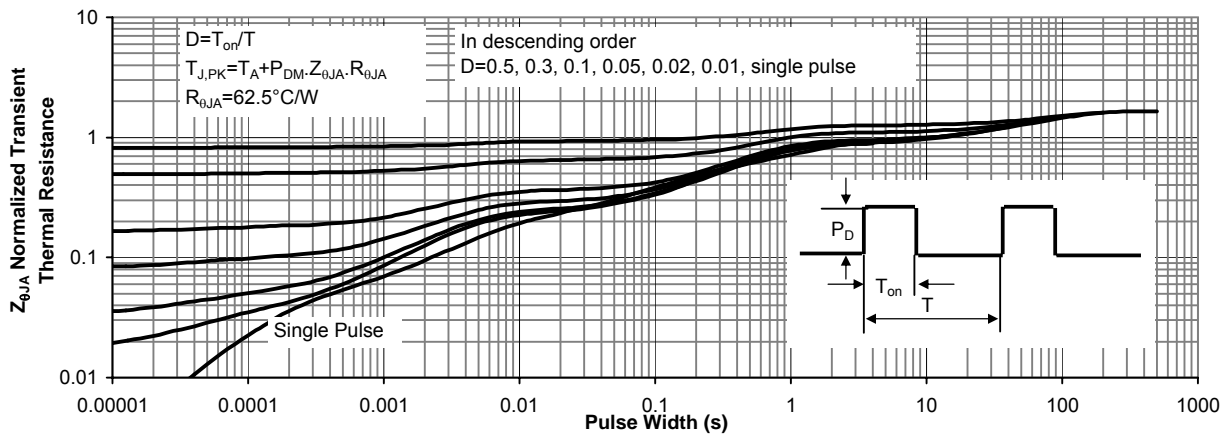


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