



ALPHA & OMEGA
SEMICONDUCTOR



AO4F800

Asymmetric Dual N-Channel Enhancement Mode Field Effect Transistor

General Description

The AO4F800 uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. The two MOSFETs make a compact and efficient switch and synchronous rectifier combination for use in DC-DC converters. *Standard Product AOF800 is Pb-free (meets ROHS & Sony 259 specifications). AOF800L is a Green Product ordering option. AOF800 and AOF800L are electrically identical.*

Features

Q1

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

$I_D = 8.3A$ ($V_{GS} = 10V$)

$R_{DS(ON)} < 18m\Omega$

$R_{DS(ON)} < 27m\Omega$

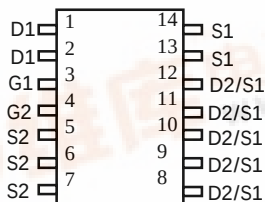
Q2

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

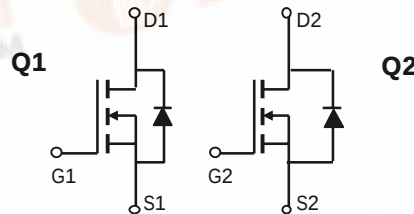
$I_D = 17.7A$

$R_{DS(ON)} < 6.5m\Omega$ ($V_{GS} = 10V$)

$R_{DS(ON)} < 8.5m\Omega$ ($V_{GS} = 4.5V$)



SOIC-14



Absolute Maximum Ratings $T_A = 25^\circ C$ unless otherwise noted

Parameter	Symbol	Max Q1	Max Q2	Units
Drain-Source Voltage	V_{DS}	30	30	V
Gate-Source Voltage	V_{GS}	± 20	± 20	V
Continuous Drain Current ^A	I_D	8.3	17.7	A
$T_A = 25^\circ C$		6.7	13	
$T_A = 70^\circ C$				
Pulsed Drain Current ^B	I_{DM}	30	80	
Power Dissipation	P_D	2	3	W
		1.28	2.1	
$T_A = 25^\circ C$				
$T_A = 70^\circ C$				
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	-55 to 150	$^\circ C$
Parameter: Thermal Characteristics MOSFET Q1		Symbol	Typ	Max
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$		47	62.5
$t \leq 10s$				
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$		83	110
Steady-State				
Maximum Junction-to-Lead ^C	$R_{\theta JL}$		23	40
Steady-State				
Parameter: Thermal Characteristics MOSFET Q2		Symbol	Typ	Max
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$		31	40
$t \leq 10s$				
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$		59	75
Steady-State				
Maximum Junction-to-Lead ^C	$R_{\theta JL}$		16	24
Steady-State				



AO4F800

Q1 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	1.8	3	V
I _{D(ON)}	On state drain current	V _{GS} =4.5V, V _{DS} =5V	30			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =8.3A		15	18	mΩ
		T _J =125°C		21	25	
		V _{GS} =4.5V, I _D =6.7A		22	27	mΩ
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =8.3A	18	23		S
V _{SD}	Diode Forward Voltage	I _S =1A		0.76	1	V
I _S	Maximum Body-Diode Continuous Current				3	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =15V, f=1MHz		1040	1250	pF
C _{oss}	Output Capacitance			190		pF
C _{rss}	Reverse Transfer Capacitance			120		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		0.7	0.85	Ω
SWITCHING PARAMETERS						
Q _{g(10V)}	Total Gate Charge	V _{GS} =10V, V _{DS} =15V, I _D =8.3A		19.8	24	nC
Q _g	Total Gate Charge			9.8	12	nC
Q _{gs}	Gate Source Charge			2.5		nC
Q _{gd}	Gate Drain Charge			3.5		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =10V, V _{DS} =15V, R _L =1.8Ω, R _{GEN} =3Ω		5.2	6.25	ns
t _r	Turn-On Rise Time			5	6	ns
t _{D(off)}	Turn-Off DelayTime			20.5	25	ns
t _f	Turn-Off Fall Time			3.6	4.3	ns
t _{rr}	Body Diode Reverse Recovery time	I _F =8.3A, dI/dt=100A/μs		15	18	ns
Q _{rr}	Body Diode Reverse Recovery charge	I _F =8.3A, dI/dt=100A/μs		8	10	nC

A: The value of R_{θJA} is measured with the device mounted on 1 in² 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_s 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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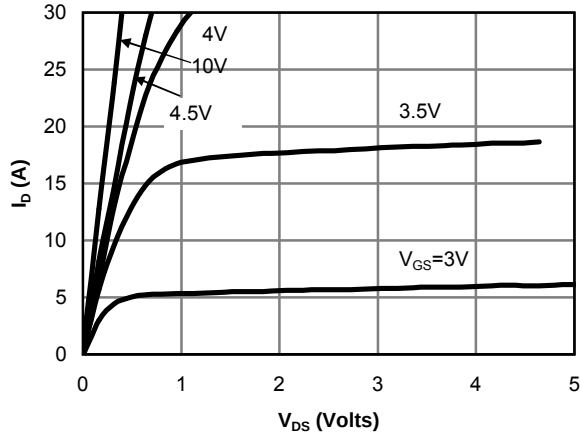
Q1 Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise noted)

Fig 1: On-Region Characteristics

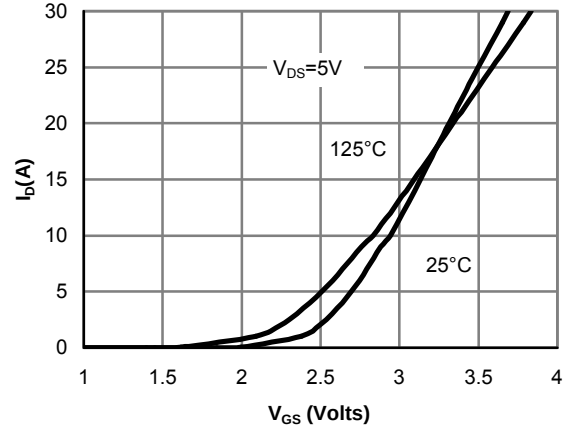


Figure 2: Transfer Characteristics

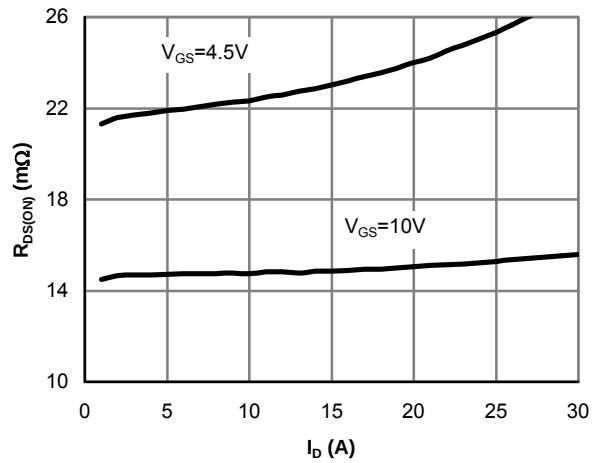


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

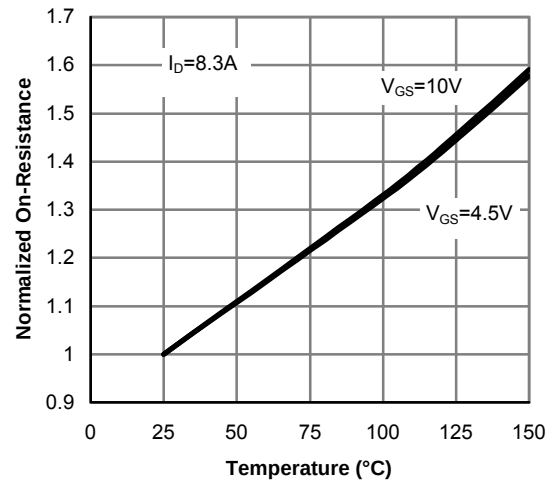


Figure 4: On resistance vs. Junction Temperature

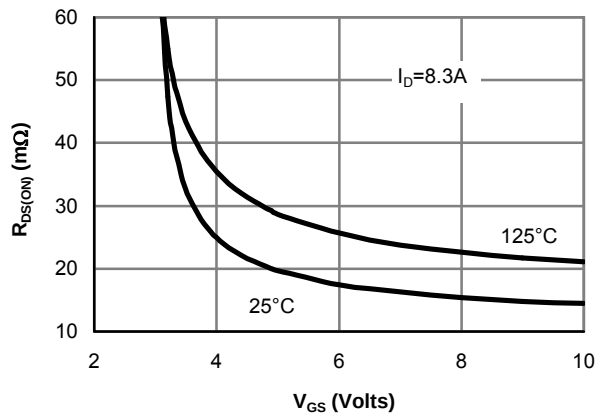


Figure 5: On resistance vs. Gate-Source Voltage

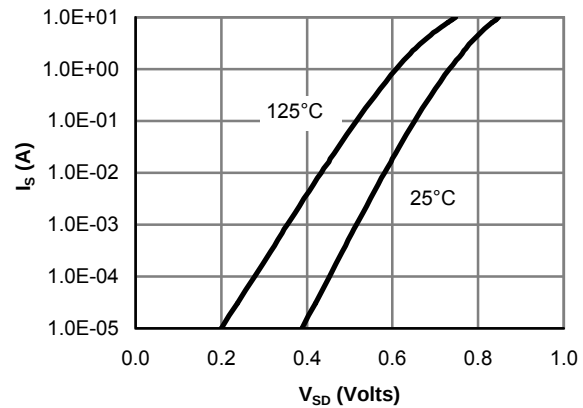


Figure 6: Body-Diode Characteristics

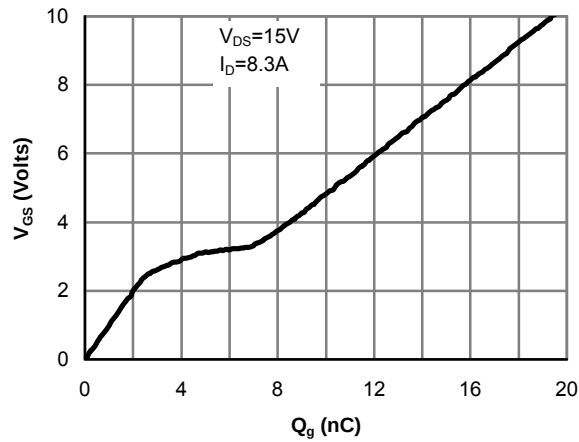
Q1 Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise noted)

Figure 7: Gate-Charge Characteristics

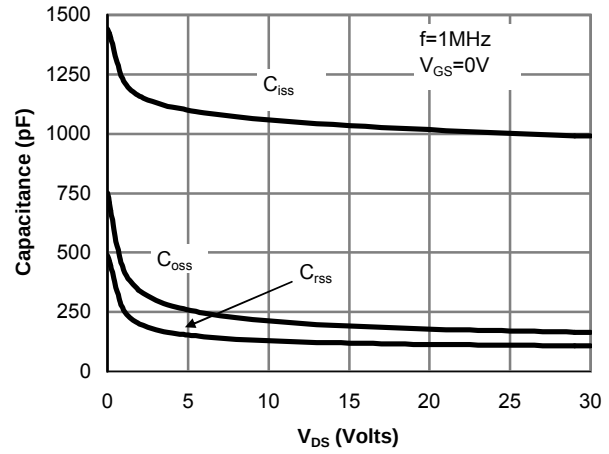


Figure 8: Capacitance Characteristics

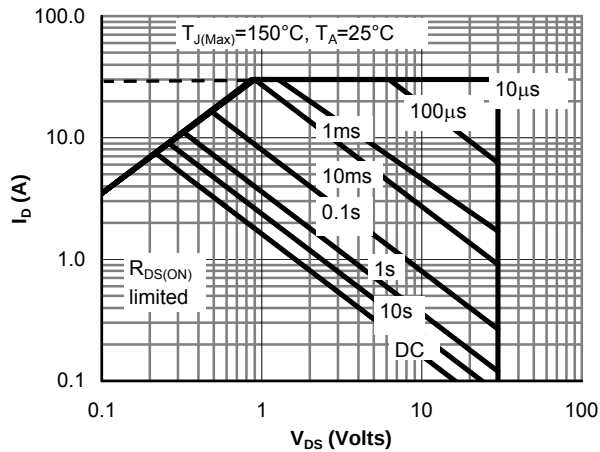


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

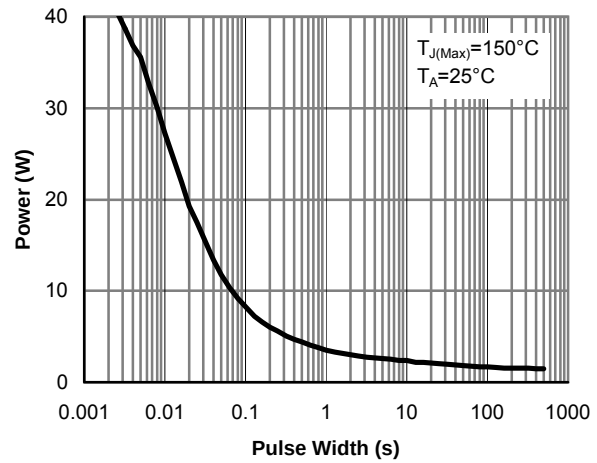


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

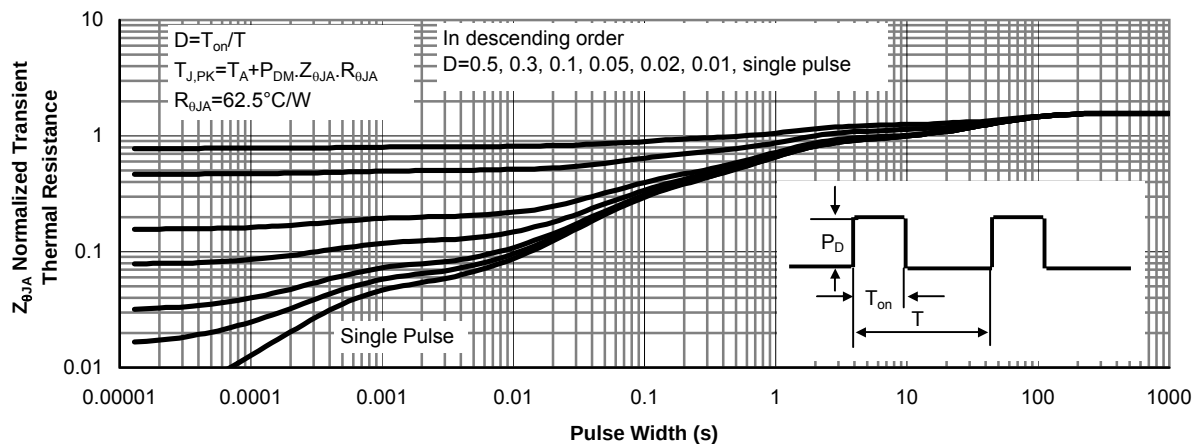


Figure 11: Normalized Maximum Transient Thermal Impedance

Q2 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	1.8	2.5	V
I _{D(ON)}	On state drain current	V _{GS} =4.5V, V _{DS} =5V	80			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =17.7A T _J =125°C		5.4 7.56	6.5 9.1	mΩ
		V _{GS} =4.5V, I _D =13A		6.8	8.5	mΩ
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =17.7A		82		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.7	1	V
I _S	Maximum Body-Diode Continuous Current				4.5	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =15V, f=1MHz		6060	7270	pF
C _{oss}	Output Capacitance			638		pF
C _{rss}	Reverse Transfer Capacitance			355		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		0.45	0.54	Ω
SWITCHING PARAMETERS						
Q _g (10V)	Total Gate Charge	V _{GS} =10V, V _{DS} =15V, I _D =17.7A		103	124	nC
Q _g (4.5V)	Total Gate Charge			48	57	nC
Q _{gs}	Gate Source Charge			18		nC
Q _{gd}	Gate Drain Charge			15		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =10V, V _{DS} =15V, R _L =0.85Ω, R _{GEN} =3Ω		12	14	ns
t _r	Turn-On Rise Time			8	10	ns
t _{D(off)}	Turn-Off DelayTime			51.5	62	ns
t _f	Turn-Off Fall Time			8.8	11	ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =17.7A, dI/dt=100A/μs		33.5	40	ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =17.7A, dI/dt=100A/μs		22	26	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 ≤ 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 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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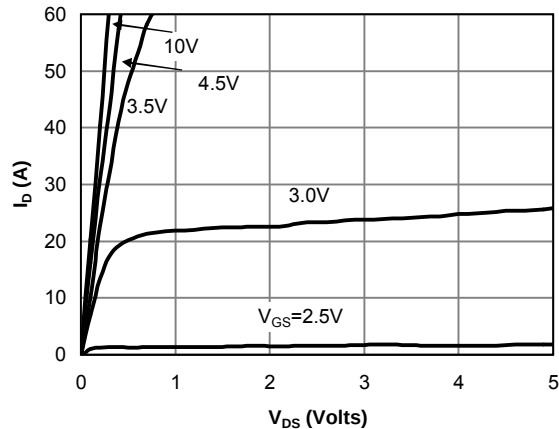


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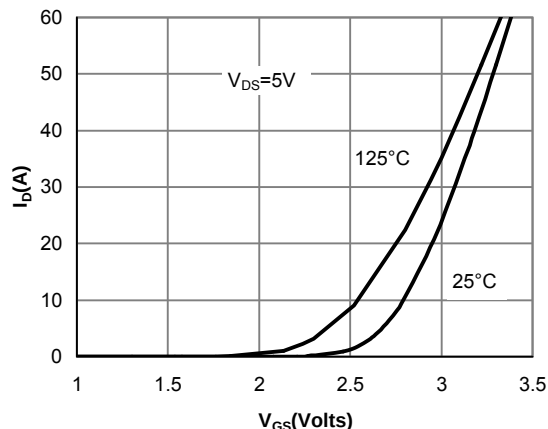


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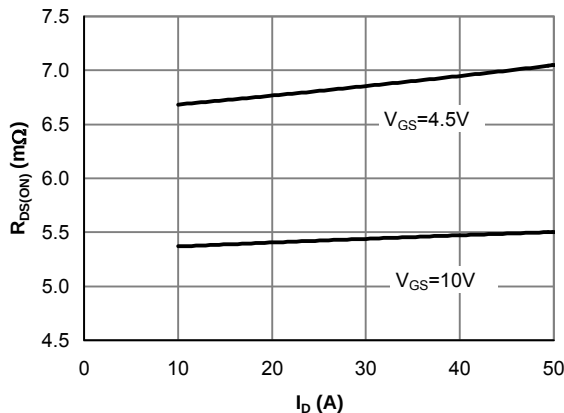


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

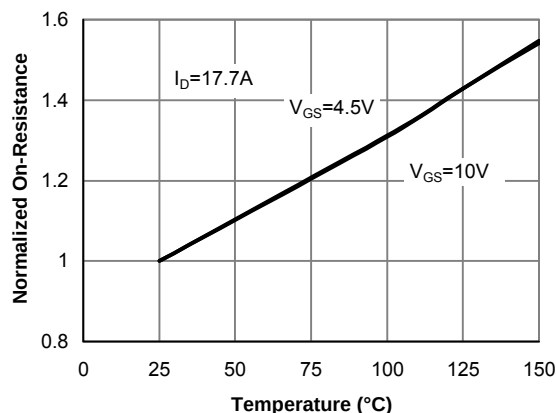


Figure 4: On-Resistance vs. Junction Temperature

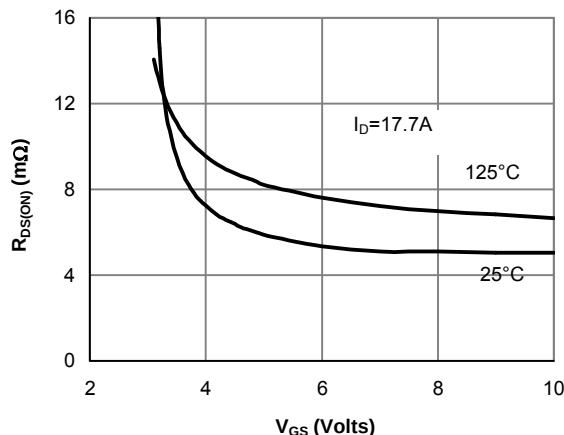


Figure 5: On-Resistance vs. Gate-Source Voltage

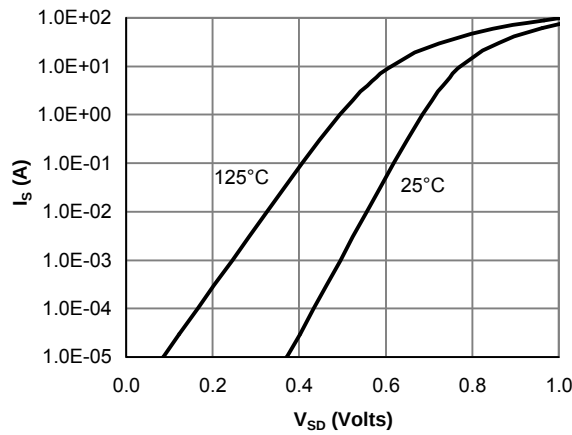


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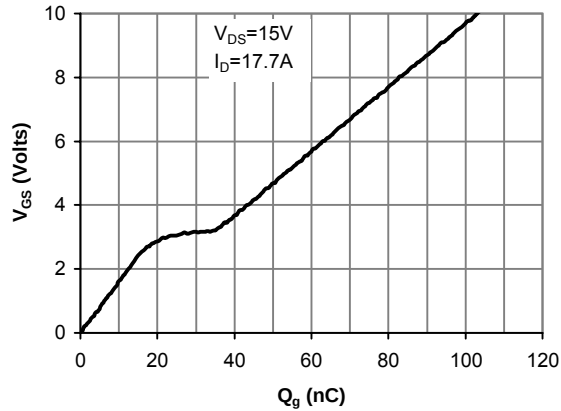


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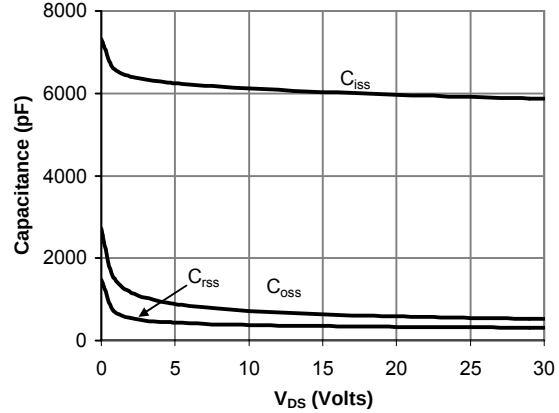


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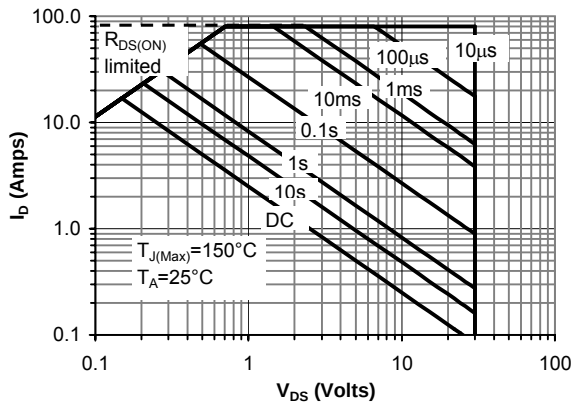


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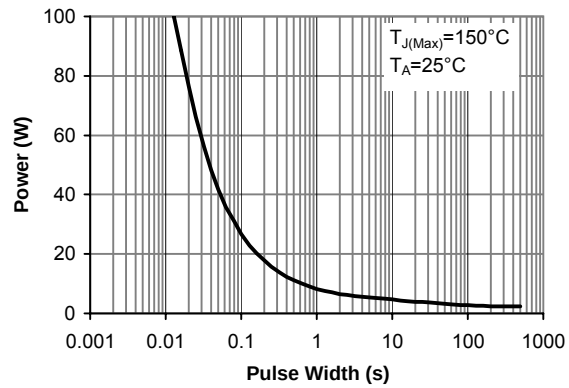


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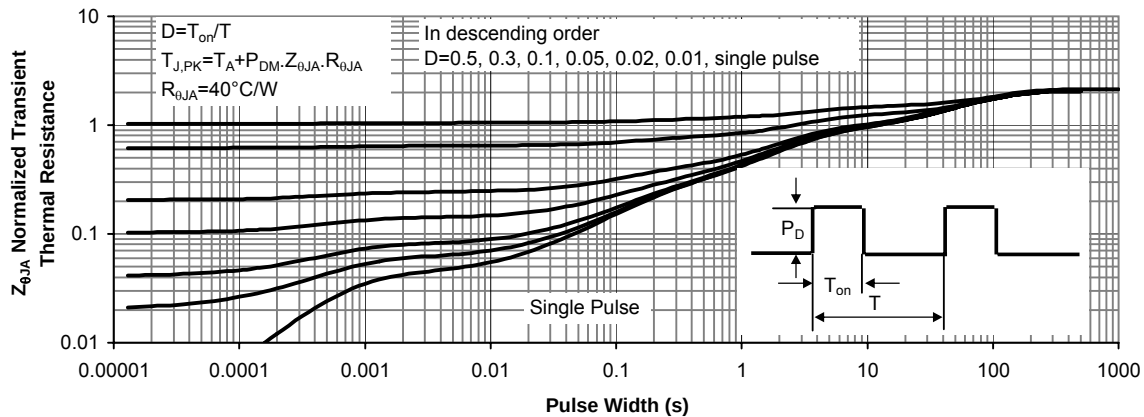


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