



AO4918

Asymmetric Dual N-Channel Enhancement Mode Field Effect Transistor

General Description

The AO4918 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. A Schottky diode is co-packaged in parallel with the synchronous MOSFET to boost efficiency further. *Standard Product AO4918 is Pb-free (meets ROHS & Sony 259 specifications). AO4918L is a Green Product ordering option. AO4918 and AO4918L are electrically identical.*

Features

Q1

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

$$I_D = 9.3A (V_{GS} = 10V)$$

$$R_{DS(ON)} < 14.5m\Omega$$

$$R_{DS(ON)} < 16m\Omega$$

Q2

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

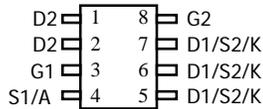
$$I_D=8.3A$$

$$<18m\Omega (V_{GS} = 10V)$$

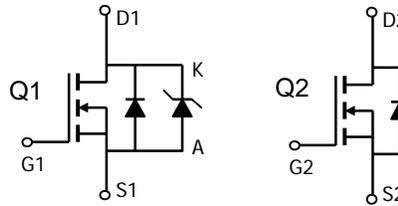
$$<27m\Omega (V_{GS} = 4.5V)$$

SCHOTTKY

$$V_{DS} (V) = 30V, I_F = 3A, V_F < 0.5V @ 1A$$



SOIC-8



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}	± 12	± 20	V
Continuous Drain Current ^A	I_D	$T_A=25^\circ C$	9.3	A
		$T_A=70^\circ C$	7.4	
Pulsed Drain Current ^B	I_{DM}	40	40	
Power Dissipation	P_D	$T_A=25^\circ C$	2	W
		$T_A=70^\circ C$	1.28	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	-55 to 150	$^\circ C$

Parameter	Symbol	Maximum Schottky	Units
Reverse Voltage	V_{DS}	30	V
Continuous Forward Current ^A	I_F	$T_A=25^\circ C$	A
		$T_A=70^\circ C$	
Pulsed Diode Forward Current ^B	I_{FM}	20	
Power Dissipation ^A	P_D	$T_A=25^\circ C$	W
		$T_A=70^\circ C$	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^\circ C$

Parameter: Thermal Characteristics MOSFET Q1		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	t ≤ 10s	R _{θJA}	53	62.5	°C/W
Maximum Junction-to-Ambient ^A	Steady-State		81.9	110	
Maximum Junction-to-Lead ^C	Steady-State	R _{θJL}	30.5	40	

Parameter: Thermal Characteristics MOSFET Q2		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	t ≤ 10s	R _{θJA}	53	62.5	°C/W
Maximum Junction-to-Ambient ^A	Steady-State		81.9	110	
Maximum Junction-to-Lead ^C	Steady-State	R _{θJL}	30.5	40	

Thermal Characteristics Schottky					
Maximum Junction-to-Ambient ^A	t ≤ 10s	R _{θJA}	50.4	62.5	°C/W
Maximum Junction-to-Ambient ^A	Steady-State		86	110	
Maximum Junction-to-Lead ^C	Steady-State	R _{θJL}	26.6	40	

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 are obtained using <300 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°C. The SOA curve provides a single pulse rating.

F: The Schottky appears in parallel with the MOSFET body diode, even though it is a separate chip. Therefore, we provide the net forward drop, capacitance and recovery characteristics of the MOSFET and Schottky. However, the thermal resistance is specified for each chip separately.

Rev4: August 2005

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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. (Set by Schottky leakage)	V _R =30V		0.007	0.05	mA
		V _R =30V, T _J =125°C		3.2	10	
		V _R =30V, T _J =150°C		12	20	
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} = ±12V			100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} I _D =250μA	0.6	1.1	2	V
I _{D(ON)}	On state drain current	V _{GS} =4.5V, V _{DS} =5V	40			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =9.3A		11.7	14.5	mΩ
		T _J =125°C		15.4	19	
		V _{GS} =4.5V, I _D =8.8A		13.1	16	mΩ
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =9.3A	30	37		S
V _{SD}	Diode+Schottky Forward Voltage	I _S =1A		0.46	0.5	V
I _S	Maximum Body-Diode+Schottky Continuous Current				3.5	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance			3740	4488	pF
C _{oss}	Output Capacitance (FET + Schottky)	V _{GS} =0V, V _{DS} =15V, f=1MHz		295		pF
C _{rss}	Reverse Transfer Capacitance			186		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		0.86	1.1	Ω
SWITCHING PARAMETERS						
Q _g	Total Gate Charge			30.5	37	nC
Q _{gs}	Gate Source Charge	V _{GS} =4.5V, V _{DS} =15V, I _D =9.3A		4.5		nC
Q _{gd}	Gate Drain Charge			8.5		nC
t _{D(on)}	Turn-On DelayTime			6	9	ns
t _r	Turn-On Rise Time	V _{GS} =10V, V _{DS} =15V, R _L =1.6Ω,		8.2	12	ns
t _{D(off)}	Turn-Off DelayTime	R _{GEN} =3Ω		54.5	75	ns
t _f	Turn-Off Fall Time			10.5	15	ns
t _{rr}	Body Diode + Schottky Reverse Recovery Time	I _F =9.3A, dI/dt=100A/μs		23.5	28	ns
Q _{rr}	Body Diode + Schottky Reverse Recovery Charge	I _F =9.3A, dI/dt=100A/μs		13.3	16	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 ≤ 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 <300 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°C. The SOA curve provides a single pulse rating.

F: The Schottky appears in parallel with the MOSFET body diode, even though it is a separate chip. Therefore, we provide the net forward drop, capacitance and recovery characteristics of the MOSFET and Schottky. However, the thermal resistance is specified for each chip separately.

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Q1 TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

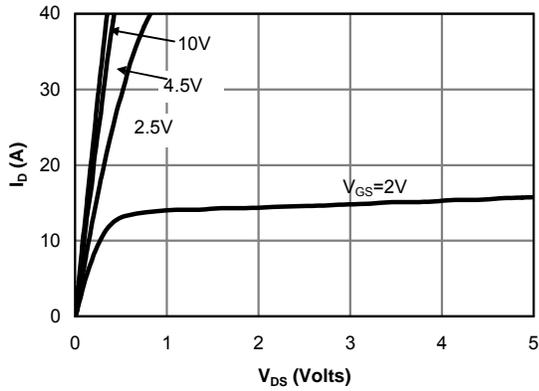


Fig 1: On-Region Characteristics

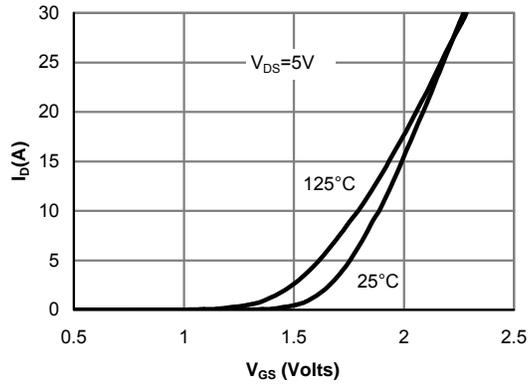


Figure 2: Transfer Characteristics

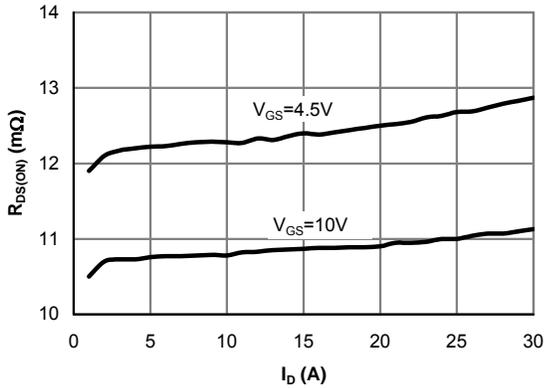


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

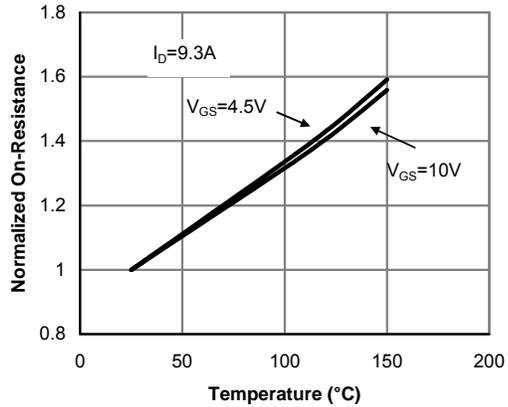


Figure 4: On resistance vs. Junction Temperature

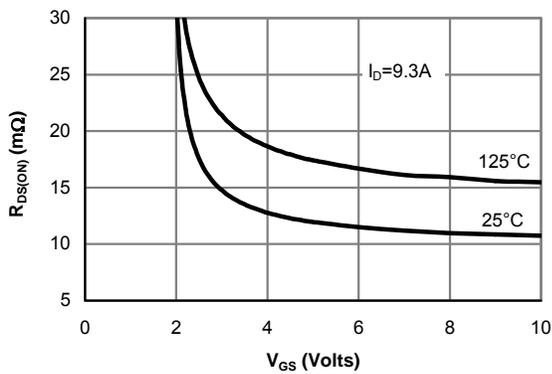


Figure 5: On resistance vs. Gate-Source Voltage

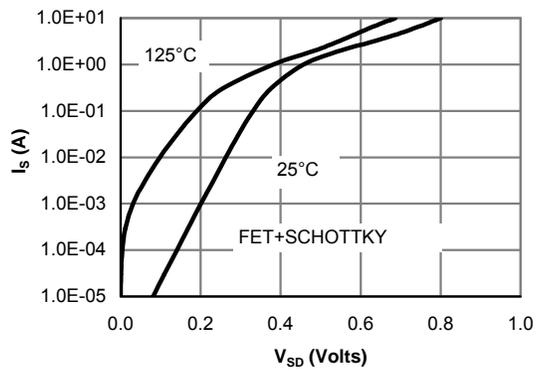
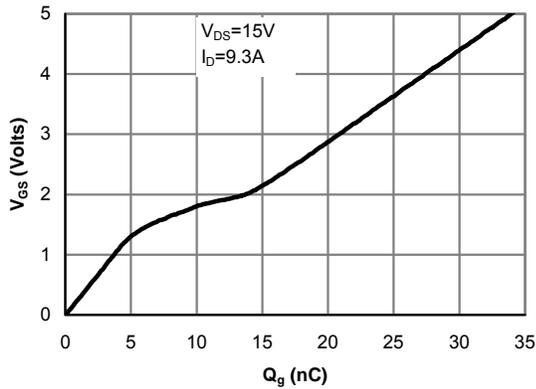
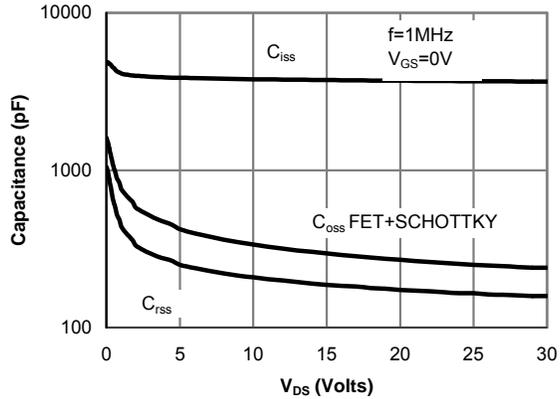
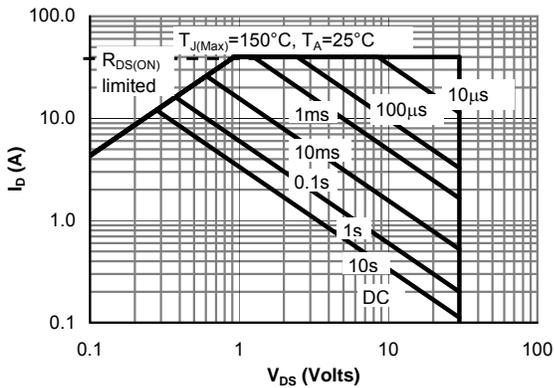
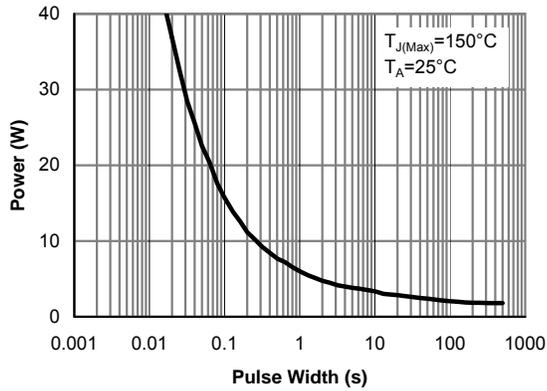
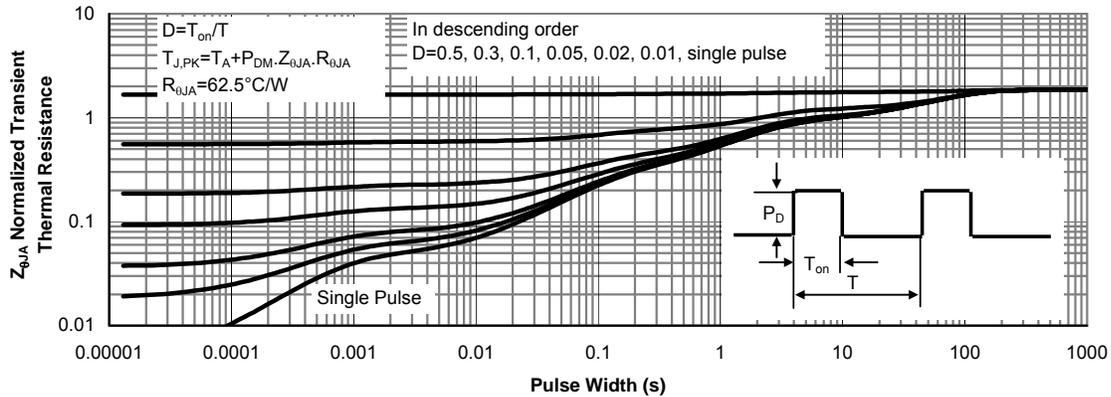


Figure 6: Body-Diode Characteristics (Note F)

Q1 TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

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						
B _V 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		0.004	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 T _J =125°C		14.9 22	18 27	mΩ
		V _{GS} =4.5V, I _D =7A		21.6	27	mΩ
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =8.3A		23		S
V _{SD}	Diode+Schottky Forward Voltage	I _S =1A		0.45	0.5	V
I _S	Maximum Body-Diode+Schottky Continuous Current				3	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance			1040	1250	pF
C _{oss}	Output Capacitance	V _{GS} =0V, V _{DS} =15V, f=1MHz		180		pF
C _{riss}	Reverse Transfer Capacitance			110		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			19.2	24	nC
Q _g	Total Gate Charge	V _{GS} =10V, V _{DS} =15V, I _D =8.3A		9.36	12	nC
Q _{gs}	Gate Source Charge			2.6		nC
Q _{gd}	Gate Drain Charge			4.2		nC
t _{D(on)}	Turn-On DelayTime			5.2	7.5	ns
t _r	Turn-On Rise Time	V _{GS} =10V, V _{DS} =15V, R _L =1.8Ω,		4.4	6.5	ns
t _{D(off)}	Turn-Off DelayTime	R _{GEN} =3Ω		17.3	25	ns
t _f	Turn-Off Fall Time			3.3	5	ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =8.5A, di/dt=100A/μs		16.7	21	ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =8.5A, di/dt=100A/μs		6.7	10	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_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 <300μs pulses, duty cycle 0.5% max.

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Q2 Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise noted)

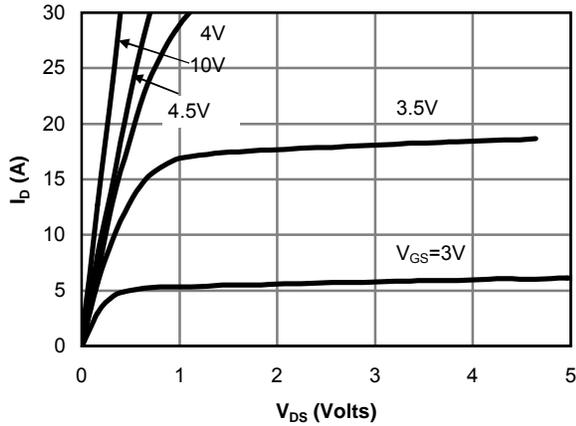


Fig 1: On-Region Characteristics

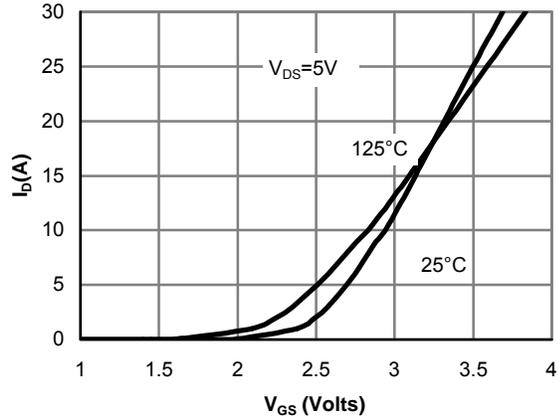


Figure 2: Transfer Characteristics

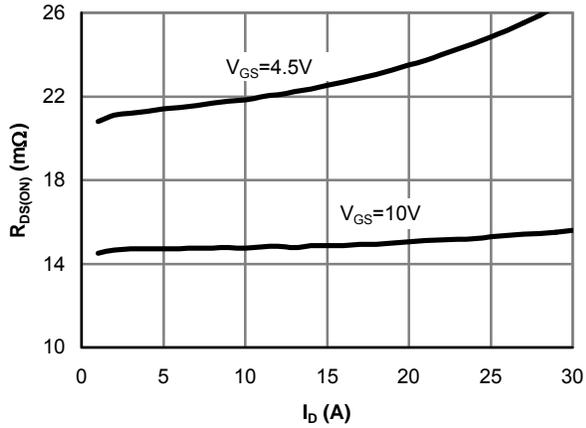


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

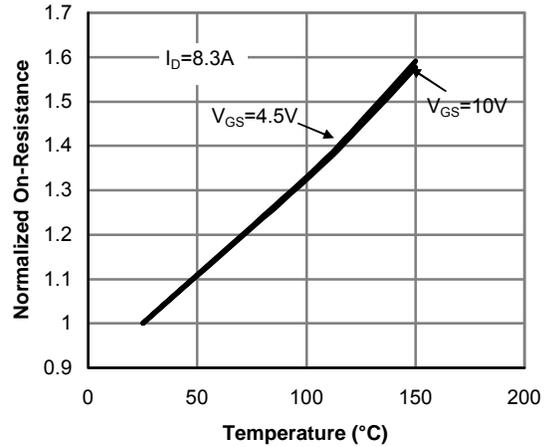


Figure 4: On resistance vs. Junction Temperature

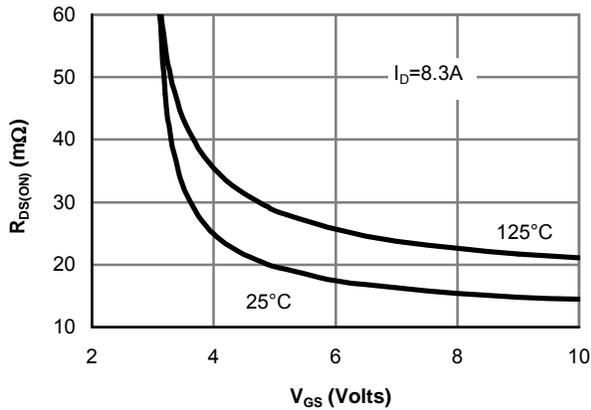


Figure 5: On resistance vs. Gate-Source Voltage

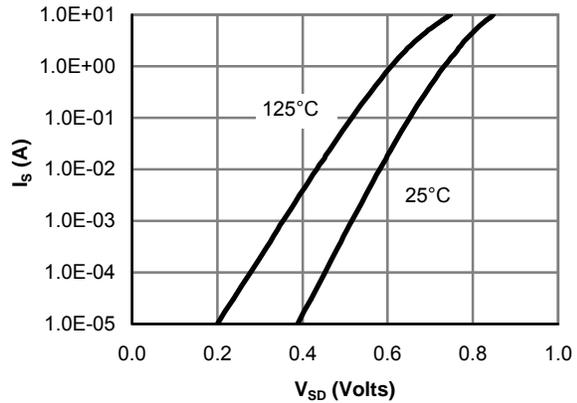


Figure 6: Body-Diode Characteristics

Q2 Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise noted)

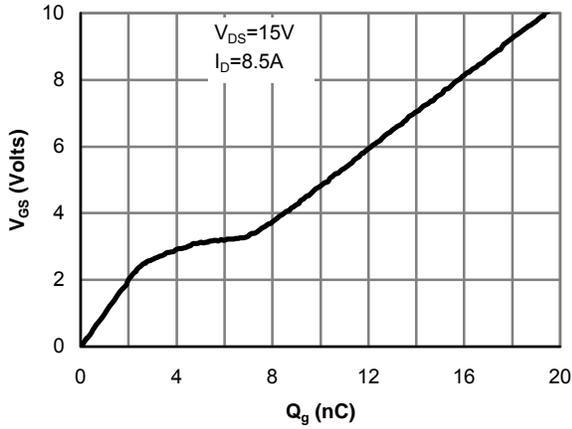


Figure 7: Gate-Charge Characteristics

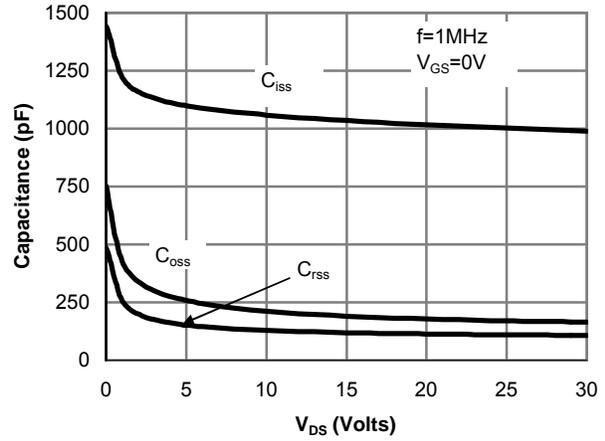


Figure 8: Capacitance Characteristics

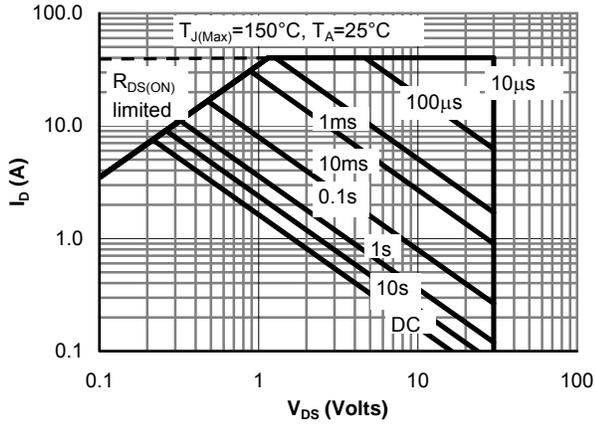


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

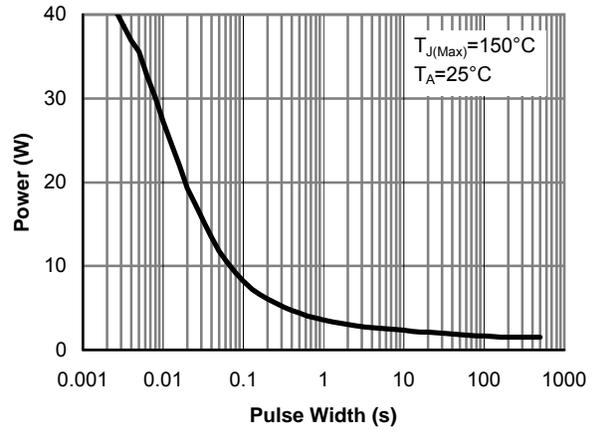


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

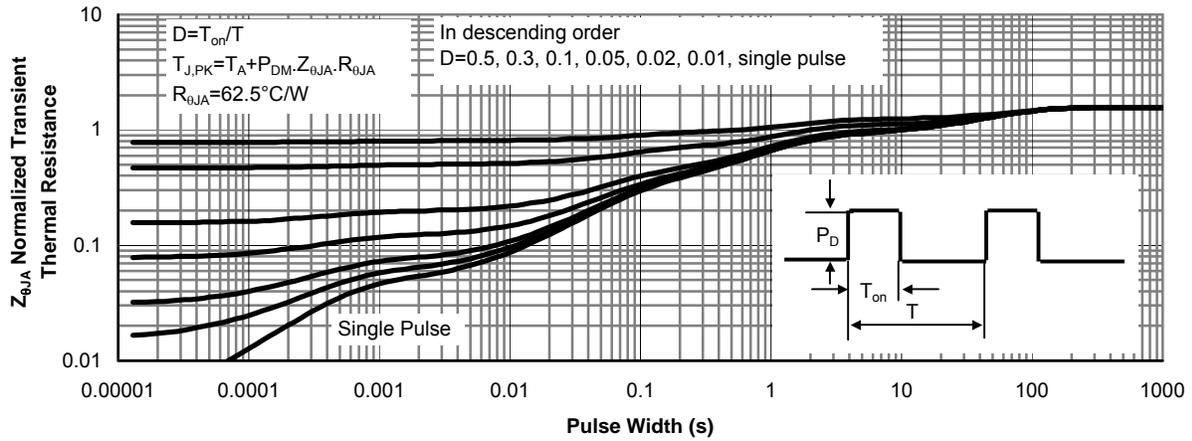


Figure 11: Normalized Maximum Transient Thermal Impedance