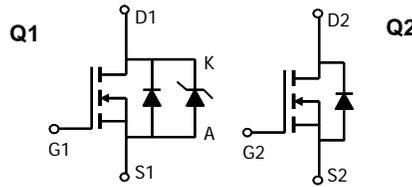
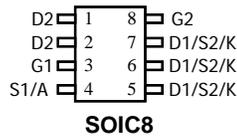



**AO4916A**
**Dual N-Channel Enhancement Mode Field Effect Transistor with Schottky Diode**
**General Description**

The AO4916A 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 AO4916A is Pb-free (meets ROHS & Sony 259 specifications). AO4916AL is a Green Product ordering option. AO4916A and AO4916AL are electrically identical.*

**Features**

<b>Q1</b>	<b>Q2</b>
$V_{DS} (V) = 30V$	$V_{DS}(V) = 30V$
$I_D = 8.5A (V_{GS} = 10V)$	$I_D = 8.5A (V_{GS} = 10V)$
$R_{DS(ON)} < 17m\Omega$	$<17m\Omega (V_{GS} = 10V)$
$R_{DS(ON)} < 27m\Omega$	$<27m\Omega (V_{GS} = 4.5V)$

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

**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	$V_{GS}$	$\pm 20$	$\pm 20$	V
Continuous Drain Current <sup>A</sup>	$T_A=25^\circ C$	8.5	8.5	A
	$T_A=70^\circ C$	6.6	6.6	
Pulsed Drain Current <sup>B</sup>	$I_{DM}$	30	30	
Power Dissipation	$T_A=25^\circ C$	2	2	W
	$T_A=70^\circ C$	1.28	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 <sup>A</sup>	$T_A=25^\circ C$	3	A
	$T_A=70^\circ C$	2.2	
Pulsed Diode Forward Current <sup>B</sup>	$I_{FM}$	20	
Power Dissipation <sup>A</sup>	$T_A=25^\circ C$	2	W
	$T_A=70^\circ C$	1.28	
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	$^\circ C$

AO4916A

Parameter: Thermal Characteristics MOSFET Q1		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup>	t ≤ 10s	R <sub>θJA</sub>	48	62.5	°C/W
Maximum Junction-to-Ambient <sup>A</sup>	Steady-State		74	110	
Maximum Junction-to-Lead <sup>C</sup>	Steady-State	R <sub>θJL</sub>	35	40	

Parameter: Thermal Characteristics MOSFET Q2		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup>	t ≤ 10s	R <sub>θJA</sub>	48	62.5	°C/W
Maximum Junction-to-Ambient <sup>A</sup>	Steady-State		74	110	
Maximum Junction-to-Lead <sup>C</sup>	Steady-State	R <sub>θJL</sub>	35	40	

Thermal Characteristics Schottky					
Maximum Junction-to-Ambient <sup>A</sup>	t ≤ 10s	R <sub>θJA</sub>	47.5	62.5	°C/W
Maximum Junction-to-Ambient <sup>A</sup>	Steady-State		71	110	
Maximum Junction-to-Lead <sup>C</sup>	Steady-State	R <sub>θJL</sub>	32	40	

A: The value of R<sub>θJA</sub> is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=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<sub>θJA</sub> is the sum of the thermal impedance from junction to lead R<sub>θJL</sub> 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 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=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 Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V	30			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current. (Set by Schottky leakage)	V <sub>R</sub> =30V		0.007	0.05	mA
		V <sub>R</sub> =30V, T <sub>J</sub> =125°C		3.2	10	
		V <sub>R</sub> =30V, T <sub>J</sub> =150°C		12	20	
I <sub>GSS</sub>	Gate-Body leakage current	V <sub>DS</sub> =0V, V <sub>GS</sub> = ±20V			100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> I <sub>D</sub> =250μA	1	1.7	3	V
I <sub>D(ON)</sub>	On state drain current	V <sub>GS</sub> =10V, V <sub>DS</sub> =5V	30			A
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =8.5A		14.2	17	mΩ
		T <sub>J</sub> =125°C		20.5	27	
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =6A		20.3	27	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =8.5A		23		S
V <sub>SD</sub>	Diode+Schottky Forward Voltage	I <sub>S</sub> =1A		0.47	0.6	V
I <sub>S</sub>	Maximum Body-Diode+Schottky Continuous Current				3.5	A
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =15V, f=1MHz		955	1250	pF
C <sub>oss</sub>	Output Capacitance (FET + Schottky)			175		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			112		pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz		0.5	0.85	Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g</sub> (10V)	Total Gate Charge	V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, I <sub>D</sub> =8.5A		17	24	nC
Q <sub>g</sub> (4.5V)	Total Gate Charge			9	12	nC
Q <sub>gs</sub>	Gate Source Charge			3.4		nC
Q <sub>gd</sub>	Gate Drain Charge			4.7		nC
t <sub>D(on)</sub>	Turn-On DelayTime	V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, R <sub>L</sub> =1.8Ω, R <sub>GEN</sub> =3Ω		5	6.5	ns
t <sub>r</sub>	Turn-On Rise Time			6	7.5	ns
t <sub>D(off)</sub>	Turn-Off DelayTime			19	25	ns
t <sub>f</sub>	Turn-Off Fall Time			4.5	6	ns
t <sub>rr</sub>	Body Diode + Schottky Reverse Recovery Time	I <sub>F</sub> =8.5A, dI/dt=100A/μs		20	24	ns
Q <sub>rr</sub>	Body Diode + Schottky Reverse Recovery Charge	I <sub>F</sub> =8.5A, dI/dt=100A/μs		9.5	12	nC

A: The value of R<sub>θJA</sub> is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=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<sub>θJA</sub> is the sum of the thermal impedance from junction to lead R<sub>θJL</sub> 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 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=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

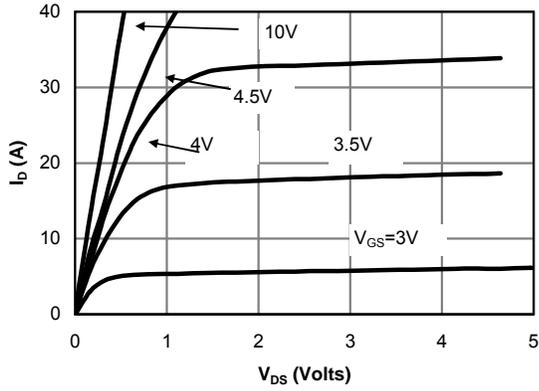


Fig 1: On-Region Characteristics

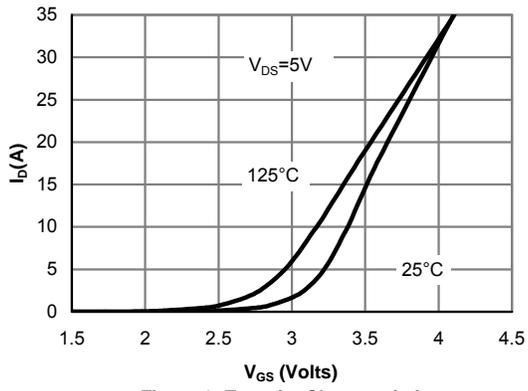


Figure 2: Transfer Characteristics

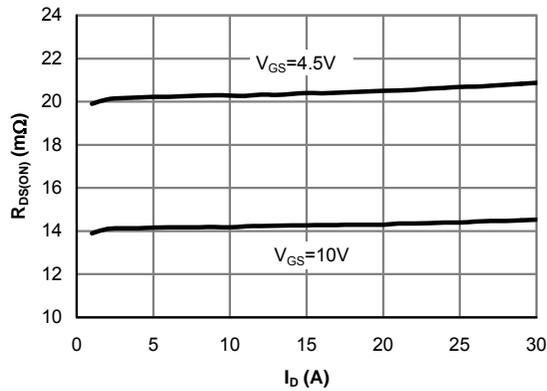


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

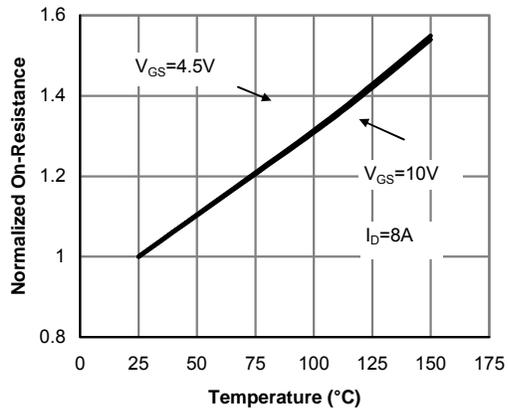


Figure 4: On resistance vs. Junction Temperature

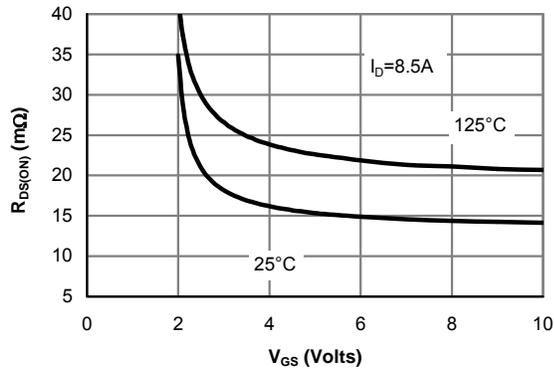


Figure 5: On resistance vs. Gate-Source Voltage

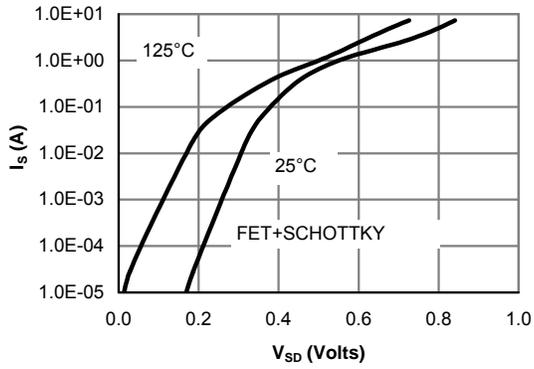


Figure 6: Body-Diode Characteristics (Note F)

Q1 TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

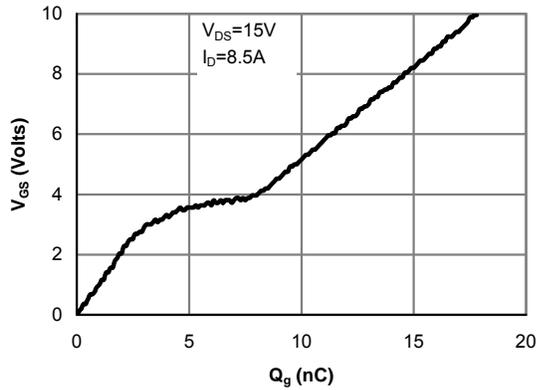


Figure 7: Gate-Charge Characteristics

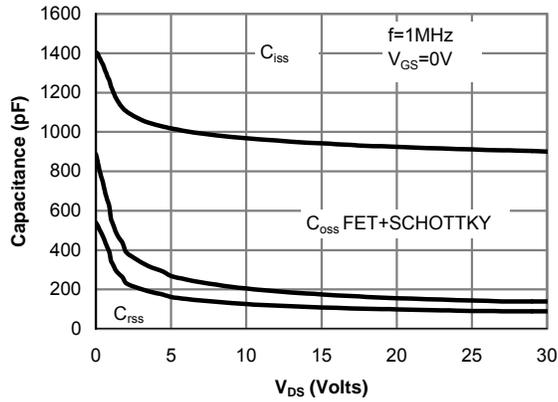


Figure 8: Capacitance Characteristics

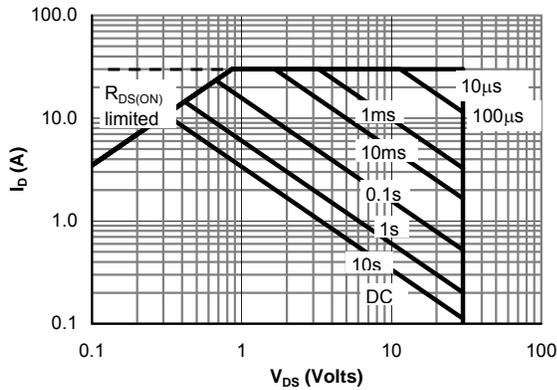


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

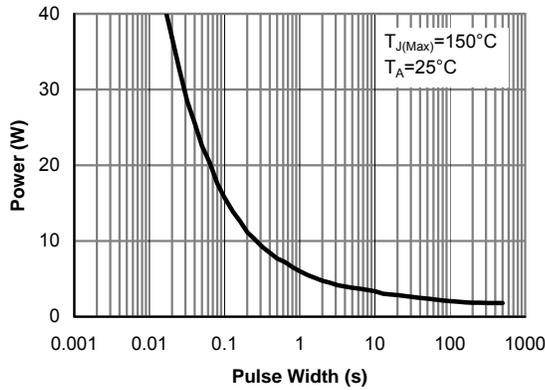


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

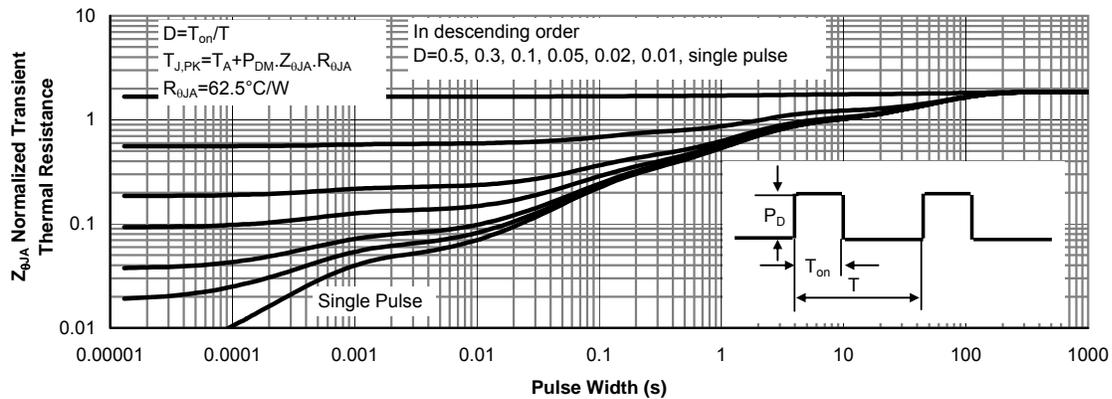


Figure 11: Normalized Maximum Transient Thermal Impedance

**Q2 Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)**

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V	30			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =24V, V <sub>GS</sub> =0V T <sub>J</sub> =55°C			1 5	μA
I <sub>GSS</sub>	Gate-Body leakage current	V <sub>DS</sub> =0V, V <sub>GS</sub> = ±20V			100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> I <sub>D</sub> =250μA	1	1.7	3	V
I <sub>D(ON)</sub>	On state drain current	V <sub>GS</sub> =4.5V, V <sub>DS</sub> =5V	30			A
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =8.5A		14.4	17	mΩ
		T <sub>J</sub> =125°C		22	27	
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =6A		20.3	27	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =8.5A		23		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =1A		0.75	1	V
I <sub>S</sub>	Maximum Body-Diode Continuous Current				3	A
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =15V, f=1MHz		955	1250	pF
C <sub>oss</sub>	Output Capacitance			145		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			112		pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz		0.5	0.85	Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g</sub> (10V)	Total Gate Charge	V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, I <sub>D</sub> =8.5A		17	24	nC
Q <sub>g</sub>	Total Gate Charge			9	12	nC
Q <sub>gs</sub>	Gate Source Charge			3.4		nC
Q <sub>gd</sub>	Gate Drain Charge			4.7		nC
t <sub>D(on)</sub>	Turn-On Delay Time	V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, R <sub>L</sub> =1.8Ω, R <sub>GEN</sub> =3Ω		5	6.5	ns
t <sub>r</sub>	Turn-On Rise Time			6	7.5	ns
t <sub>D(off)</sub>	Turn-Off Delay Time			19	25	ns
t <sub>f</sub>	Turn-Off Fall Time			4.5	6	ns
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =8.5A, di/dt=100A/μs		16.7	21	ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =8.5A, di/dt=100A/μs		6.3	10	nC

A: The value of R<sub>θJA</sub> is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=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<sub>θJA</sub> is the sum of the thermal impedance from junction to lead R<sub>θJL</sub> 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 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25°C. The SOA curve provides a single pulse rating.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

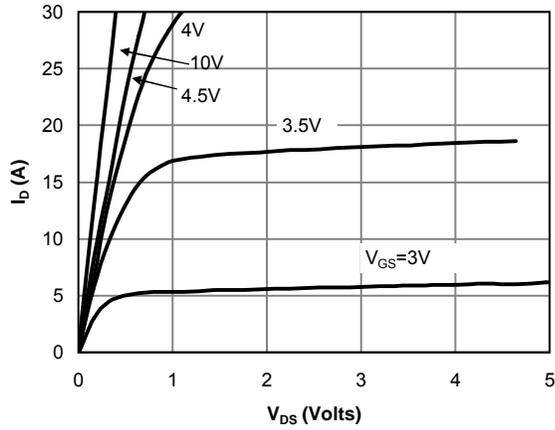


Fig 1: On-Region Characteristics

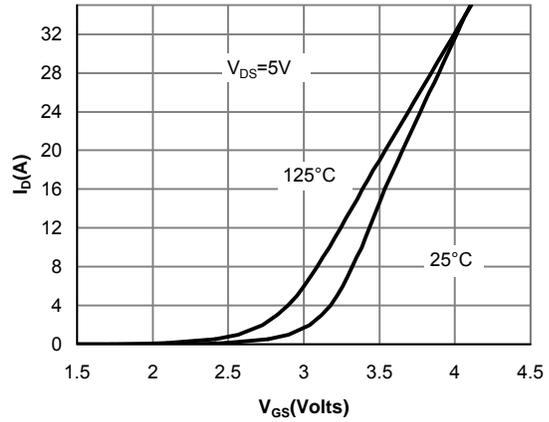


Figure 2: Transfer Characteristics

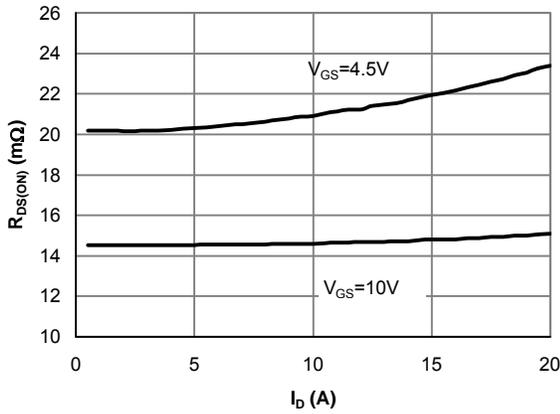


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

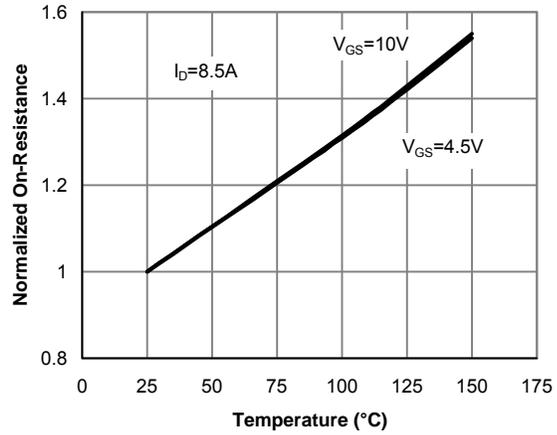


Figure 4: On-Resistance vs. Junction Temperature

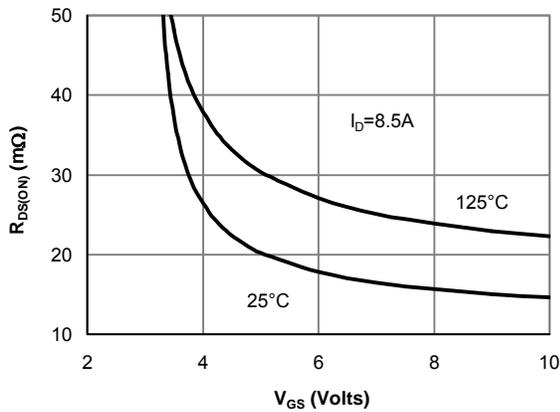


Figure 5: On-Resistance vs. Gate-Source Voltage

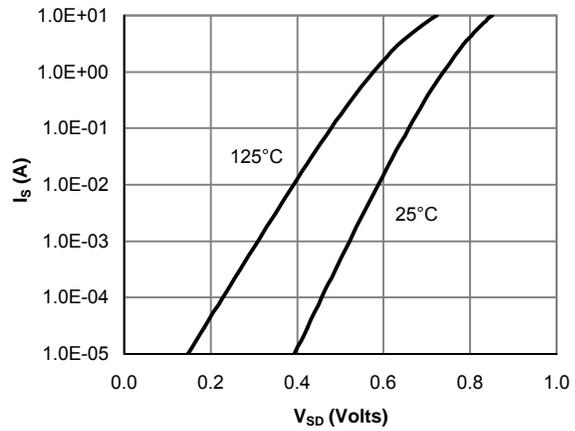


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

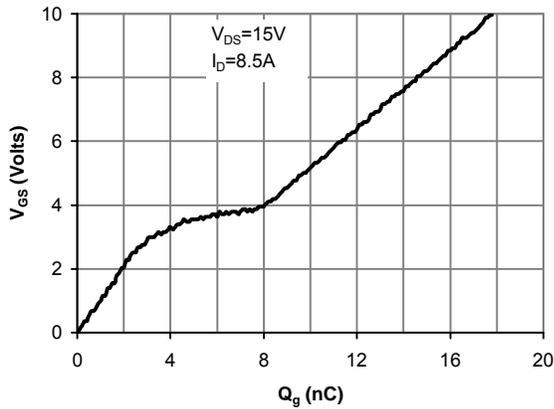


Figure 7: Gate-Charge Characteristics

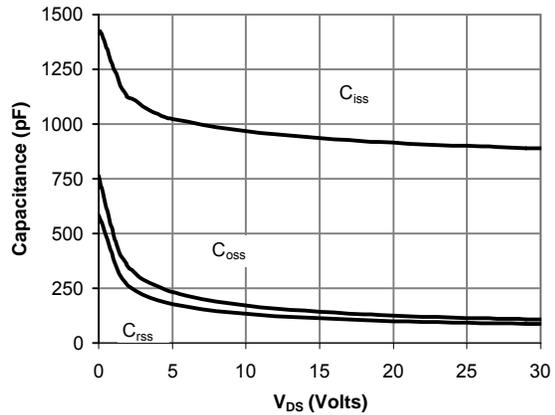


Figure 8: Capacitance Characteristics

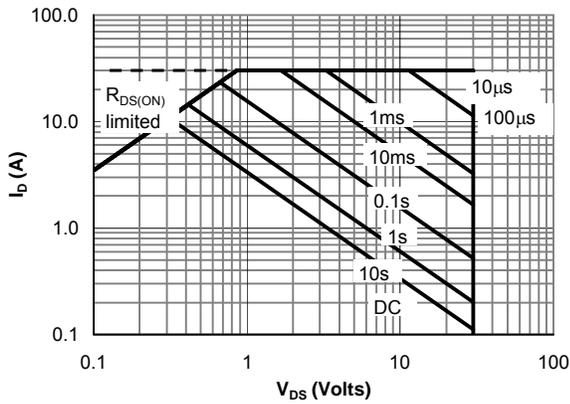


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

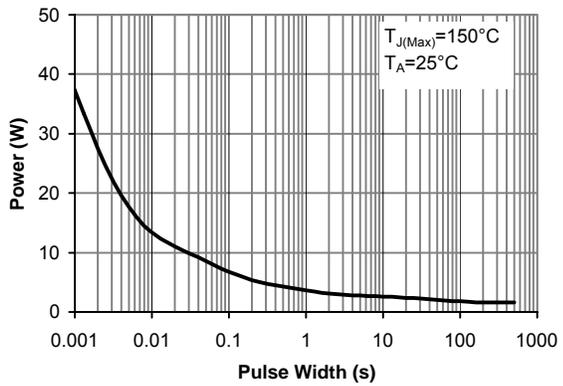


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

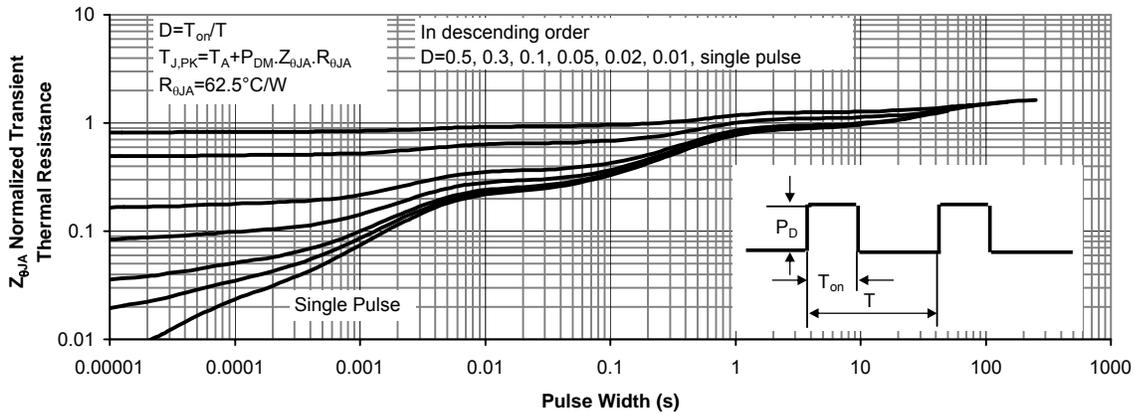


Figure 11: Normalized Maximum Transient Thermal Impedance