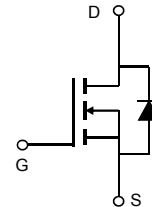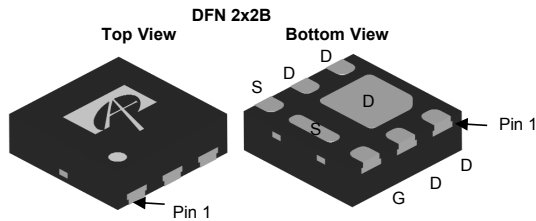## General Description

The AON2290 combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$. This device is ideal for load switch and battery protection applications.

Product Summary

V_{DS}	100V
I_D (at V_{GS}=10V)	4.5A
$R_{DS(ON)}$ (at V_{GS} =10V)	< 72mΩ
$R_{DS(ON)}$ (at V_{GS} =4.5V)	< 97mΩ

Green Product

DFN 2x2B

Top View   Bottom View

Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	100	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current	T_A=25°C	I_D	4.5	A
	T_A=70°C		3.5	
Pulsed Drain Current [C]		I_{DM}	25	
Power Dissipation [A]	T_A=25°C	P_D	2.8	W
	T_A=70°C		1.8	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

Thermal Characteristics

Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{\theta JA}$	37	45	°C/W
Maximum Junction-to-Ambient [A D]	Steady-State		66	80	°C/W
Maximum Junction-to-Case	Steady-State	$R_{\theta JC}$	6.5	8.0	°C/W

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		100			V
I$_{DSS}$	Zero Gate Voltage Drain Current	V$_{DS}$=100V, V$_{GS}$=0V				1	µA
			T$_J$=55°C			5	
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		1.7	2.3	2.8	V
I$_{D(ON)}$	On state drain current	V$_{GS}$=10V, V$_{DS}$=5V		25			A
R$_{DS(ON)}$	Static Drain-Source On-Resistance	V$_{GS}$=10V, I$_D$=4.5A			59	72	mΩ
			T$_J$=125°C		110	134	
		V$_{GS}$=4.5V, I$_D$=4A			77	97	mΩ
g$_{FS}$	Forward Transconductance	V$_{DS}$=5V, I$_D$=4.5A			13		S
V$_{SD}$	Diode Forward Voltage	I$_S$=1A,V$_{GS}$=0V			0.78	1	V
I$_S$	Maximum Body-Diode Continuous Current					3.5	A
DYNAMIC PARAMETERS							
C$_{iss}$	Input Capacitance	V$_{GS}$=0V, V$_{DS}$=50V, f=1MHz			415		pF
C$_{oss}$	Output Capacitance				32		pF
C$_{rss}$	Reverse Transfer Capacitance				3		pF
R$_g$	Gate resistance	V$_{GS}$=0V, V$_{DS}$=0V, f=1MHz			1.4		Ω
SWITCHING PARAMETERS							
Q$_g$	Total Gate Charge	V$_{GS}$=10V, V$_{DS}$=50V, I$_D$=4.5A			6.5	12	nC
Q$_g$	Total Gate Charge				3	6	nC
Q$_{gs}$	Gate Source Charge				1.5		nC
Q$_{gd}$	Gate Drain Charge				1.5		nC
t$_{D(on)}$	Turn-On DelayTime	V$_{GS}$=10V, V$_{DS}$=50V, R$_L$=11Ω, R$_{GEN}$=3Ω			4		ns
t$_r$	Turn-On Rise Time				2		ns
t$_{D(off)}$	Turn-Off DelayTime				15		ns
t$_f$	Turn-Off Fall Time				2		ns
t$_{rr}$	Body Diode Reverse Recovery Time	I$_F$=4.5A, dI/dt=500A/µs			16		ns
Q$_{rr}$	Body Diode Reverse Recovery Charge	I$_F$=4.5A, dI/dt=500A/µs			44		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 Power dissipation P$_{DSM}$ is based on R$_{θJA}$ t ≤ 10s value and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.
B. The power dissipation P$_D$ is based on T$_{J(MAX)}$=150°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.
C. Repetitive rating, pulse width limited by junction temperature T$_{J(MAX)}$=150°C. Ratings are based on low frequency and duty cycles to keep initial T$_J$=25°C.
D. The R$_{θJA}$ is the sum of the thermal impedance from junction to case R$_{θJC}$ and case to ambient.
E. The static characteristics in Figures 1 to 6 are obtained using <300µs pulses, duty cycle 0.5% max.
F. These curves are based on the junction-to-ambient thermal impedance which is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, assuming a maximum junction temperature of TJ(MAX)=150°C. The SOA curve provides a single pulse rating.   G. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of TJ(MAX)=150°C.
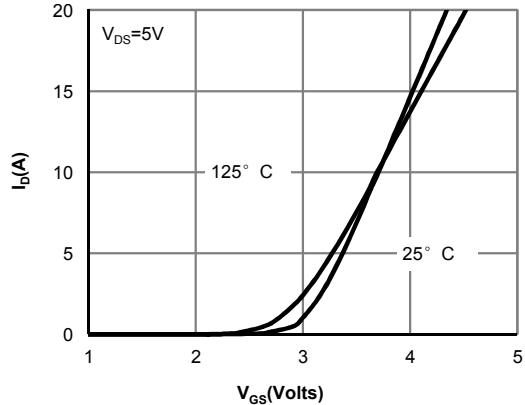H. These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with T$_A$=25°C.
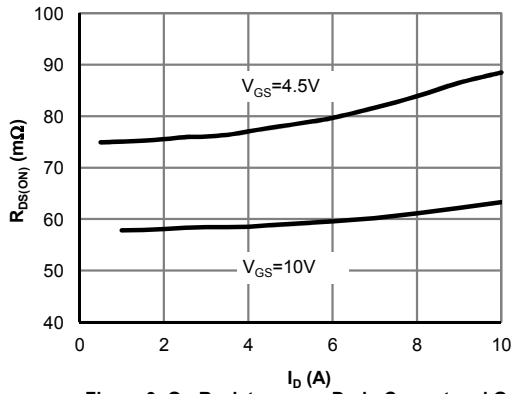
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS
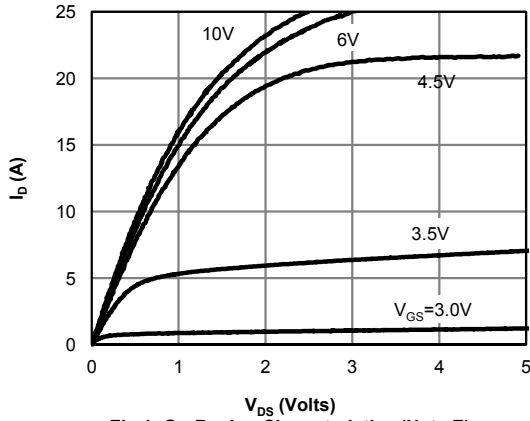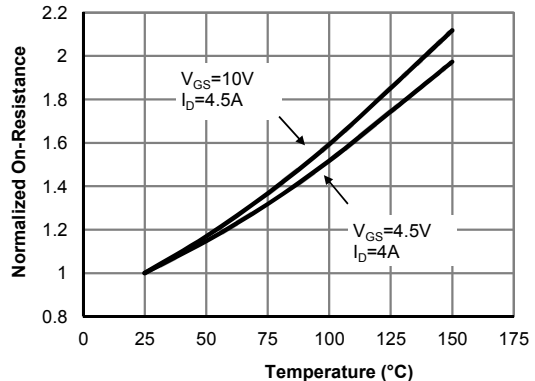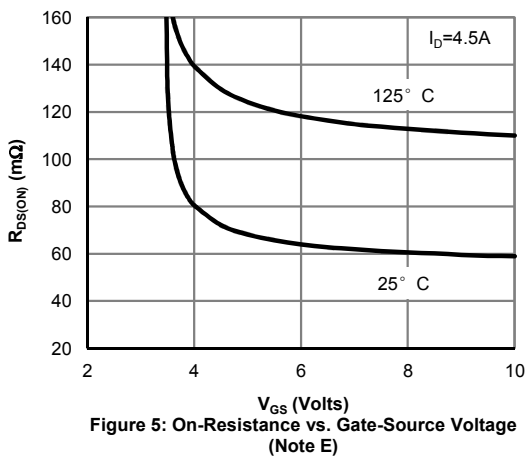

Fig 1: On-Region Characteristics (Note E)

Figure 2: Transfer Characteristics (Note E)
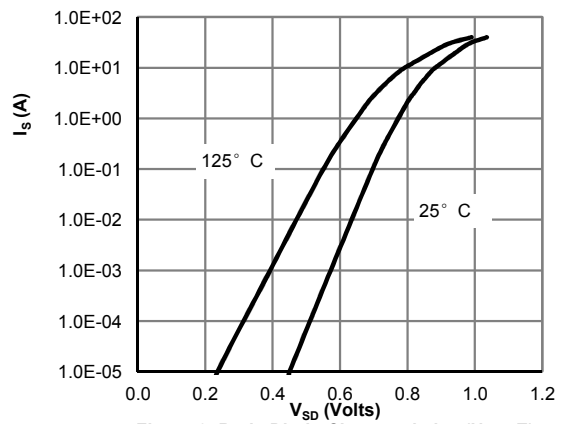

Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)
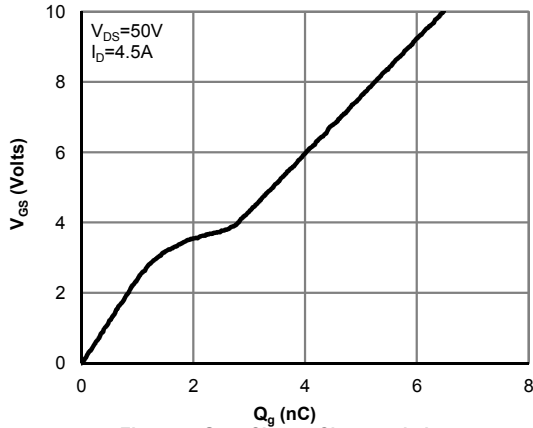

Figure 4: On-Resistance vs. Junction Temperature (Note E)
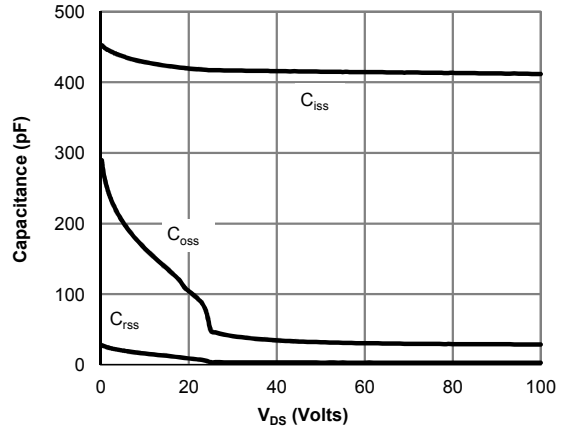

Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

Figure 6: Body-Diode Characteristics (Note E)

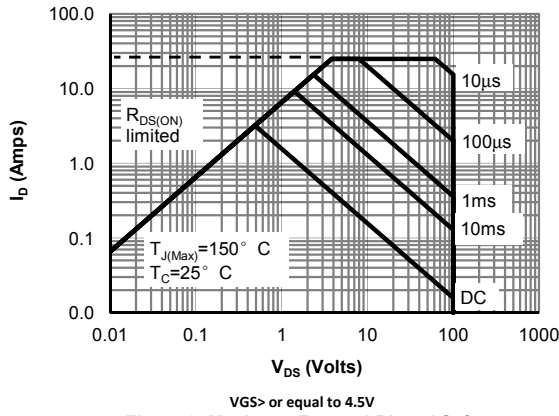ALPHA & OMEGA SEMICONDUCTOR

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 7: Gate-Charge Characteristics

V_{DS}=50V
I_D=4.5A

Figure 8: Capacitance Characteristics

C_{iss}
C_{oss}
C_{rss}

VGS> or equal to 4.5V
Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

$R_{DS(ON)}$ limited
$T_{J(Max)}$=150°C
T_C=25°C

10μs
100μs
1ms
10ms
DC
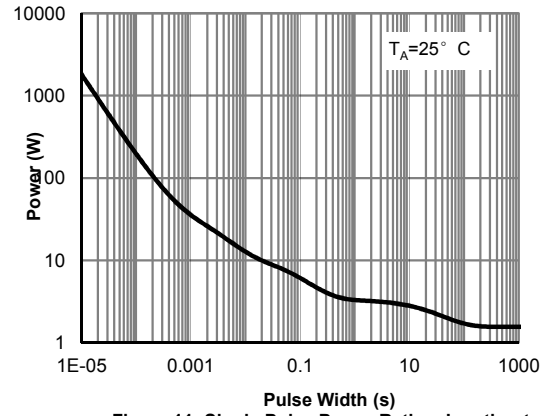
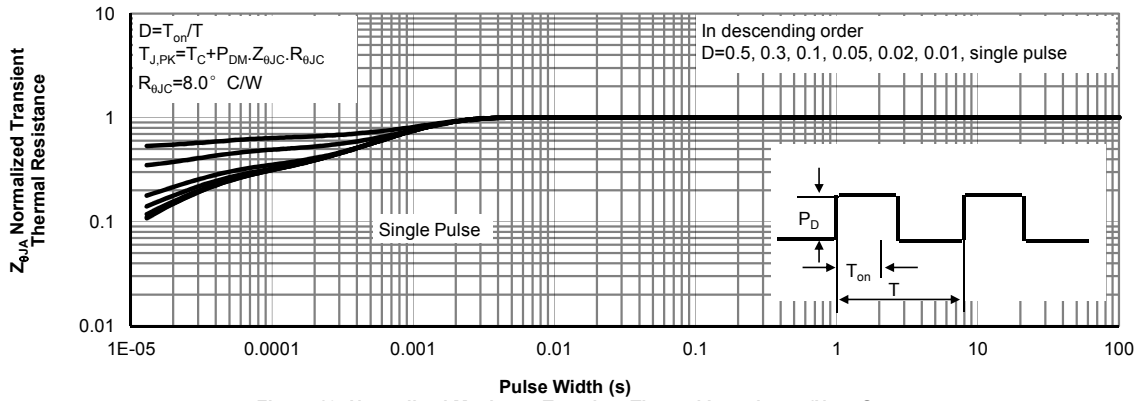

Figure 11: Single Pulse Power Rating Junction-to-Ambient (Note H)

T_A=25°C
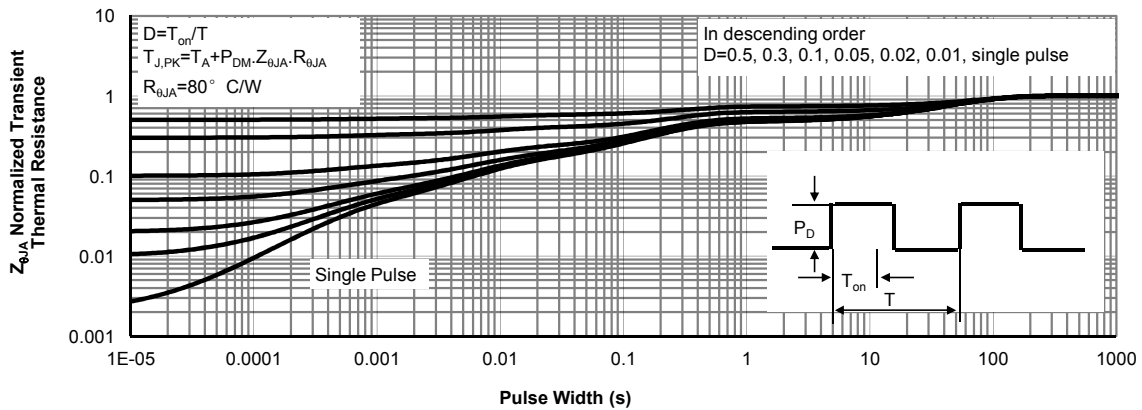
Figure 12: Normalized Maximum Transient Thermal Impedance (Note H)

D=T_{on}/T
$T_{J,PK}$=T_A+P_{DM}.$Z_{\theta JA}$.$R_{\theta JA}$
$R_{\theta JA}$=80°C/W

In descending order
D=0.5, 0.3, 0.1, 0.05, 0.02, 0.01, single pulse

Single Pulse

P_D
T_{on}
T

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

$D = T_{on}/T$
$T_{J,PK} = T_C + P_{DM} \cdot Z_{\theta JC} \cdot R_{\theta JC}$
$R_{\theta JC} = 8.0°$ C/W

In descending order
D=0.5, 0.3, 0.1, 0.05, 0.02, 0.01, single pulse

Single Pulse

$Z_{\theta JA}$ Normalized Transient Thermal Resistance

Pulse Width (s)
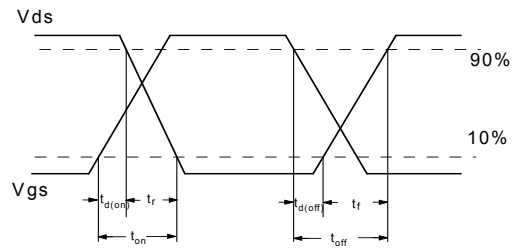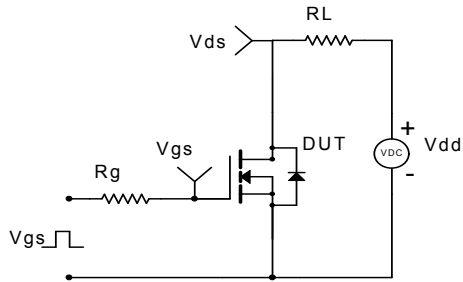
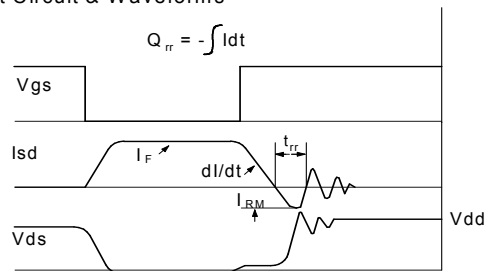**Figure 13: Normalized Maximum Transient Thermal Impedance (Note G**

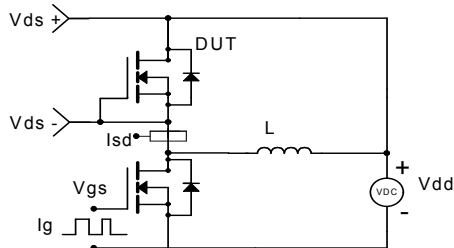## Gate Charge Test Circuit & Waveform
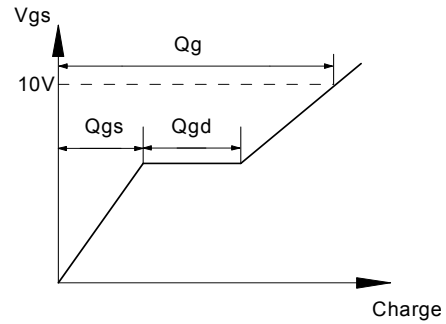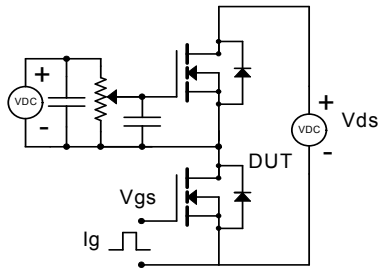
Resistive Switching Test Circuit & Waveforms

Diode Recovery Test Circuit & Waveforms

$$Q_{rr} = -\int Idt$$

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