

### General Description

- Low  $R_{DS(ON)}$
- With ESD Protection to improve battery performance and safety
- Common drain configuration for design simplicity
- RoHS and Halogen-Free Compliant

### Application

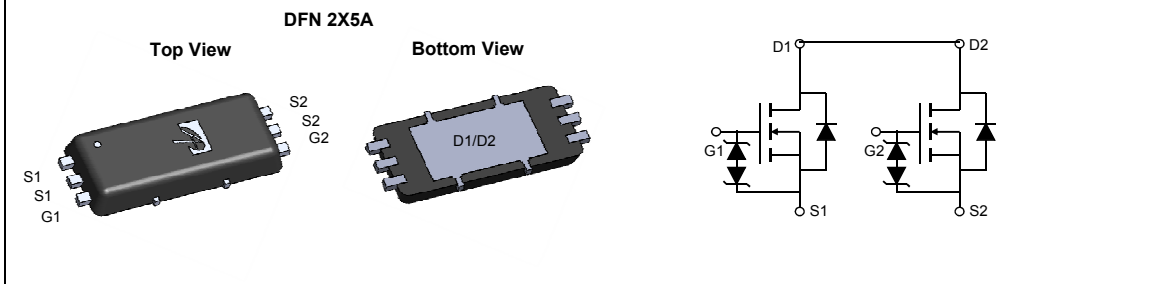
- Battery protection switch
- Mobile device battery charging and discharging

### Product Summary

$V_{DS}$	20V
$I_D$ (at $V_{GS}=4.5V$ )	12A
$R_{DS(ON)}$ (at $V_{GS}=4.5V$ )	< 6.5m $\Omega$
$R_{DS(ON)}$ (at $V_{GS}=3.7V$ )	< 7m $\Omega$
$R_{DS(ON)}$ (at $V_{GS}=3.1V$ )	< 7.8m $\Omega$
$R_{DS(ON)}$ (at $V_{GS}=2.5V$ )	< 8.5m $\Omega$

### Typical ESD protection

HBM Class 2



Orderable Part Number	Package Type	Form	Minimum Order Quantity
AON5816	DFN2X5A	Tape & Reel	5000

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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	20	V
Gate-Source Voltage	$V_{GS}$	$\pm 12$	V
Continuous Drain Current	$I_D$	$T_A=25^\circ C$	12
		$T_A=70^\circ C$	10
Pulsed Drain Current <sup>C</sup>	$I_{DM}$	110	A
Power Dissipation <sup>A</sup>	$P_{DSM}$	$T_A=25^\circ C$	1.7
		$T_A=70^\circ C$	1
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	$^\circ C$

### Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup>	$R_{\theta JA}$	$t \leq 10s$	30	$^\circ C/W$
Maximum Junction-to-Ambient <sup>A,D</sup>		Steady-State	61	75
Maximum Junction-to-Case	$R_{\theta JC}$	4.5	5.5	$^\circ C/W$

**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	20			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =20V, 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> =±10V			10	μA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	0.5	0.9	1.3	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =4.5V, I <sub>D</sub> =12A T <sub>J</sub> =125°C		5 6.9	6.5 9	mΩ
		V <sub>GS</sub> =3.7V, I <sub>D</sub> =10A		5.2	7	mΩ
		V <sub>GS</sub> =3.1V, I <sub>D</sub> =8A		5.5	7.8	mΩ
		V <sub>GS</sub> =2.5V, I <sub>D</sub> =8A		6.2	8.5	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =12A		100		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =1A, V <sub>GS</sub> =0V		0.63	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> =10V, f=1MHz		2170		pF
C <sub>oss</sub>	Output Capacitance			330		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			270		pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz		3.5		Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g</sub>	Total Gate Charge	V <sub>GS</sub> =4.5V, V <sub>DS</sub> =10V, I <sub>D</sub> =12A		22	35	nC
Q <sub>gs</sub>	Gate Source Charge			3		nC
Q <sub>gd</sub>	Gate Drain Charge			6		nC
t <sub>D(on)</sub>	Turn-On DelayTime	V <sub>GS</sub> =4.5V, V <sub>DS</sub> =10V, R <sub>L</sub> =0.8Ω, R <sub>GEN</sub> =3Ω		12		ns
t <sub>r</sub>	Turn-On Rise Time			24		ns
t <sub>D(off)</sub>	Turn-Off DelayTime			65		ns
t <sub>f</sub>	Turn-Off Fall Time			27		ns
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =12A, dI/dt=500A/μs		23		ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =12A, dI/dt=500A/μs		45		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 Power dissipation P<sub>DSM</sub> is based on R<sub>θJA</sub> 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<sub>D</sub> is based on T<sub>J(MAX)</sub>=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<sub>J(MAX)</sub>=150° C. Ratings are based on low frequency and duty cycles to keep initial T<sub>J</sub>=25° C.

D. The R<sub>θJA</sub> is the sum of the thermal impedance from junction to case R<sub>θJC</sub> and case to ambient.

E. The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max.

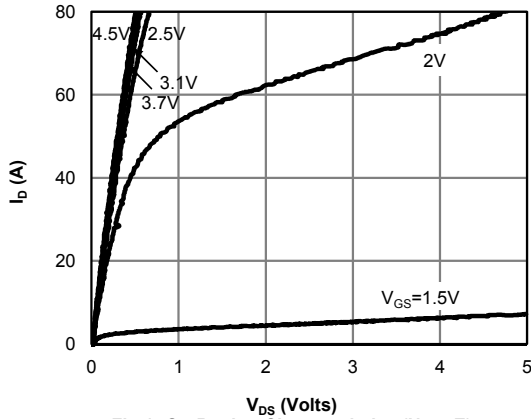
F. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T<sub>J(MAX)</sub>=150° C. The SOA curve provides a single pulse rating.

G. The maximum current rating is package limited.

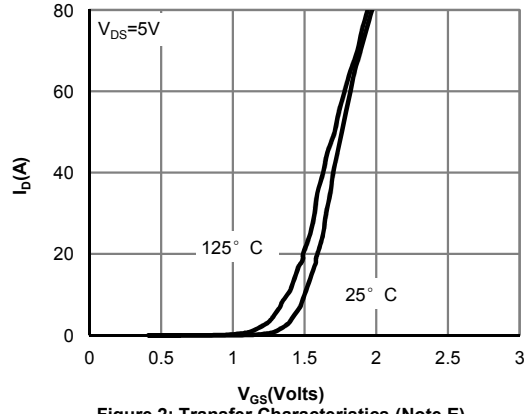
H. These tests are performed with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25° C.

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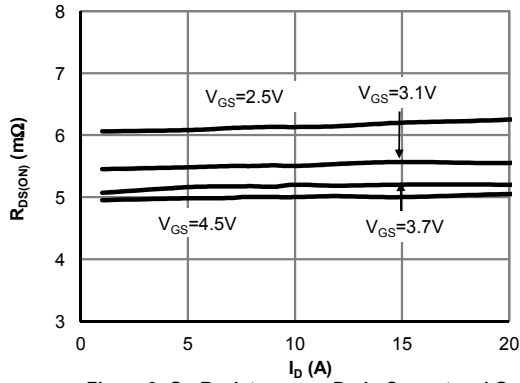
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



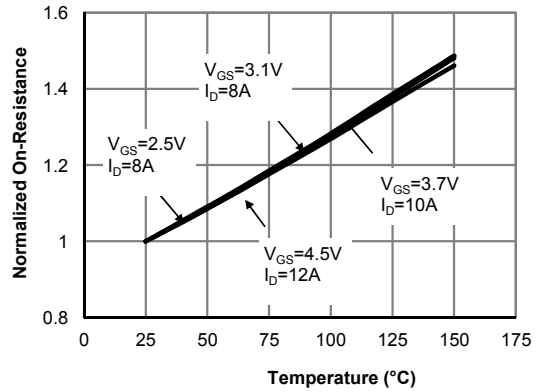
**Fig 1: On-Region Characteristics (Note E)**



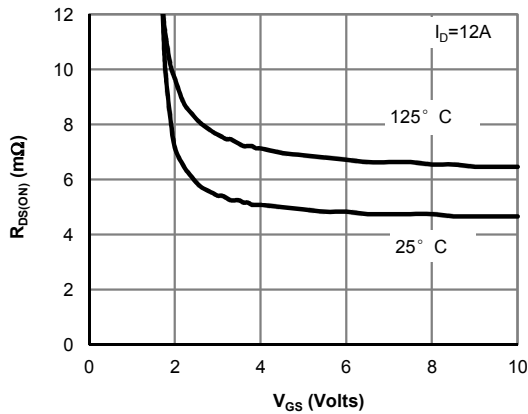
**Figure 2: Transfer Characteristics (Note E)**



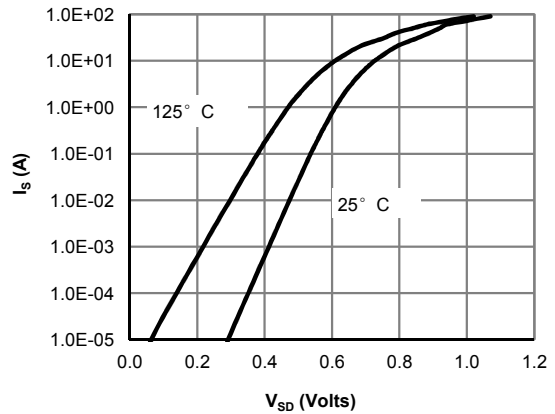
**Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)**



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

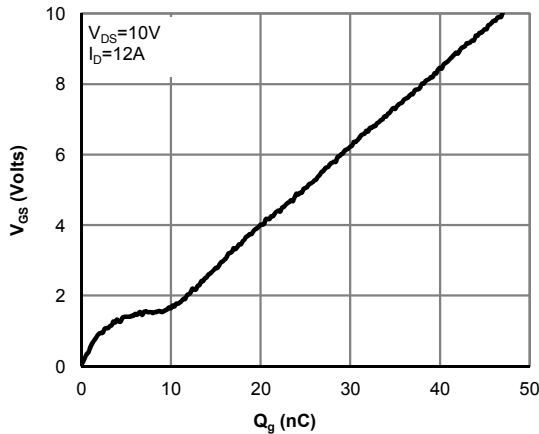


**Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)**

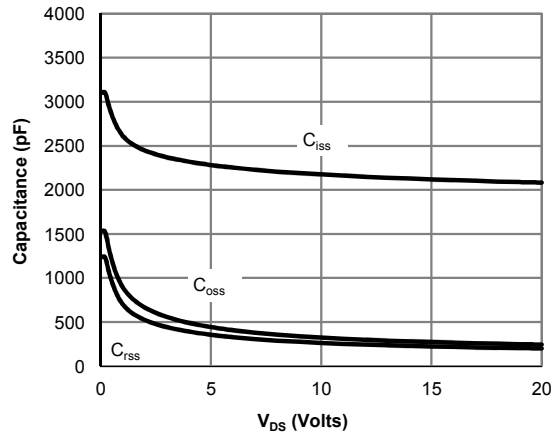


**Figure 6: Body-Diode Characteristics (Note E)**

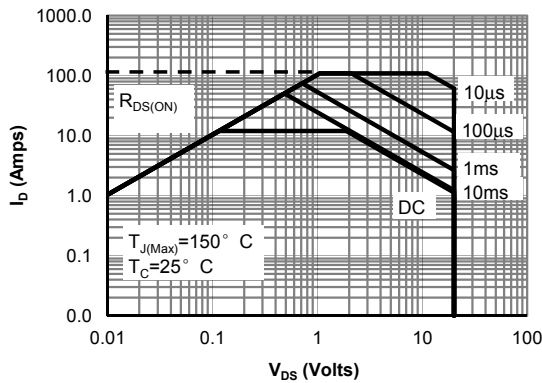
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



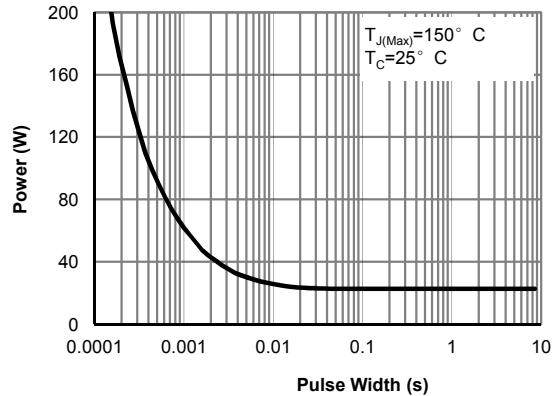
**Figure 7: Gate-Charge Characteristics**



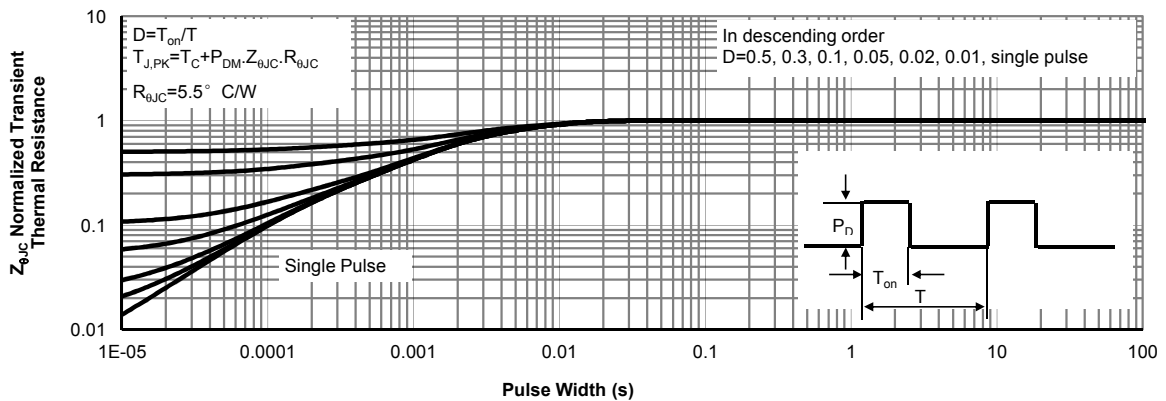
**Figure 8: Capacitance Characteristics**



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



**Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)**



**Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)**

**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

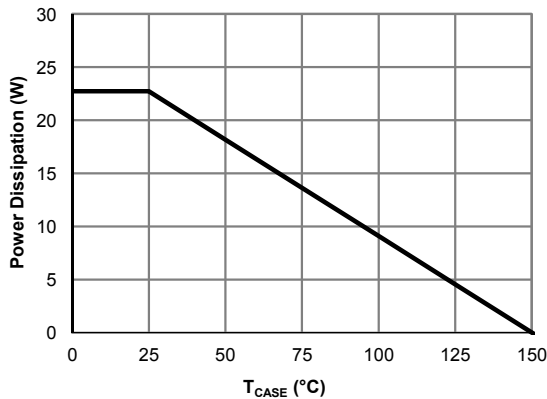


Figure 12: Power De-rating (Note F)

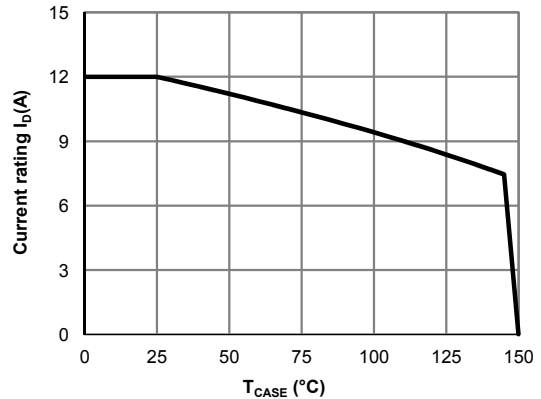


Figure 13: Current De-rating (Note F)

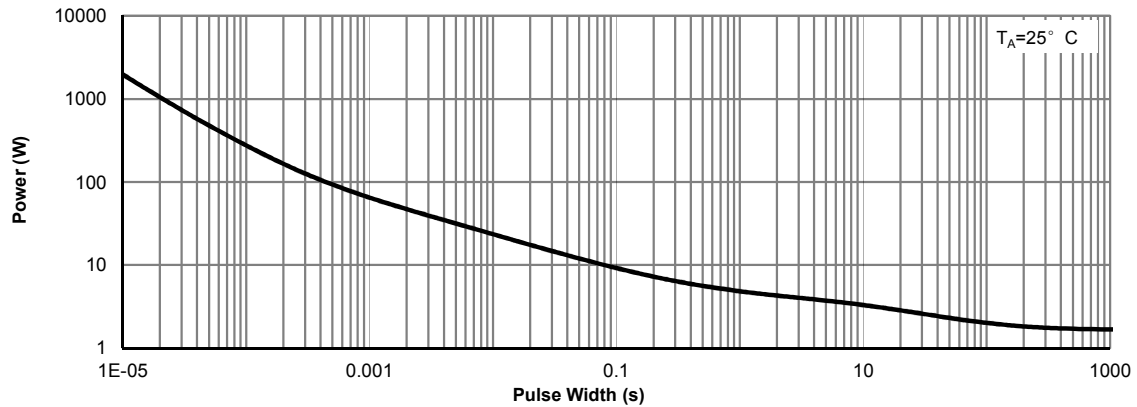


Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note H)

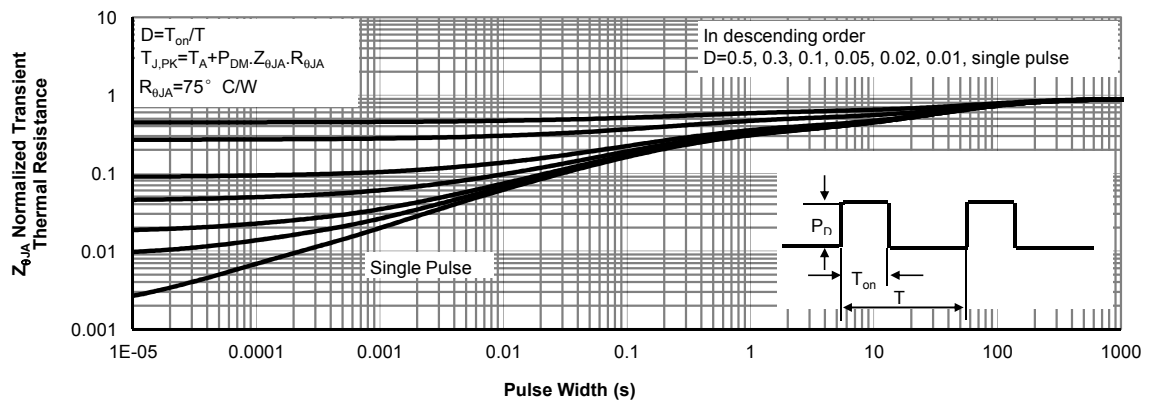
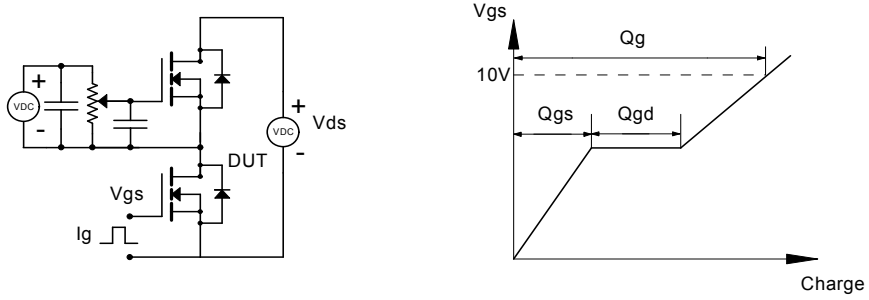
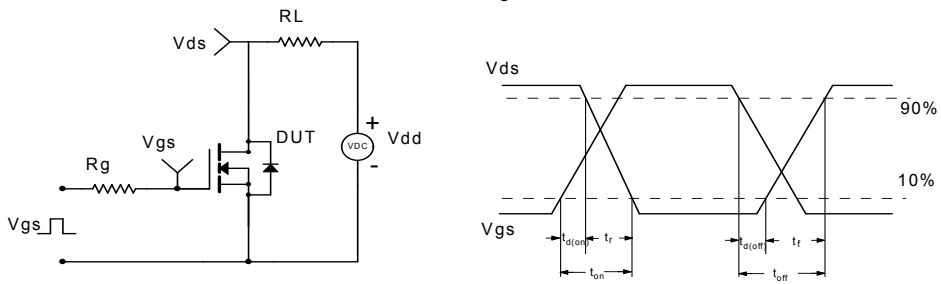


Figure 15: Normalized Maximum Transient Thermal Impedance (Note H)

**Gate Charge Test Circuit & Waveform**



**Resistive Switching Test Circuit & Waveforms**



**Diode Recovery Test Circuit & Waveforms**

