



## AON4407L

### P-Channel Enhancement Mode Field Effect Transistor

#### General Description

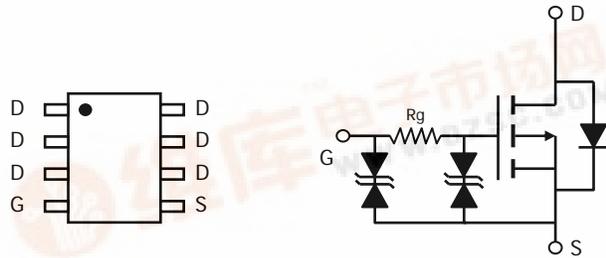
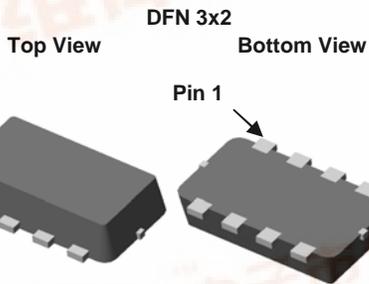
The AON4407L uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 1.8V. This device is suitable for use as a load switch.

- RoHS Compliant
- Halogen Free

#### Features

- $V_{DS}$  (V) = -12V
- $I_D$  = -9 A ( $V_{GS}$  = -4.5V)
- $R_{DS(ON)} < 20m\Omega$  ( $V_{GS}$  = -4.5V)
- $R_{DS(ON)} < 25m\Omega$  ( $V_{GS}$  = -2.5V)
- $R_{DS(ON)} < 31m\Omega$  ( $V_{GS}$  = -1.8V)

**ESD Protected!**



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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	-12	V
Gate-Source Voltage	$V_{GS}$	$\pm 8$	V
Continuous Drain Current	$I_D$	$T_A=25^\circ\text{C}$	-9
		$T_A=70^\circ\text{C}$	-7
Pulsed Drain Current <sup>C</sup>	$I_{DM}$	-60	A
Power Dissipation <sup>B</sup>	$P_D$	$T_A=25^\circ\text{C}$	2.5
		$T_A=70^\circ\text{C}$	1.6
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	$^\circ\text{C}$

#### Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup>	$R_{\theta JA}$	42	50	$^\circ\text{C/W}$
Maximum Junction-to-Ambient <sup>A,D</sup>				
Maximum Junction-to-Lead	$R_{\theta JL}$	25	30	$^\circ\text{C/W}$

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	-12			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =-12V, 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> =±8V			±10	μA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA	-0.35	-0.5	-0.85	V
I <sub>D(ON)</sub>	On state drain current	V <sub>GS</sub> =-4.5V, V <sub>DS</sub> =-5V	-60			A
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-9A T <sub>J</sub> =125°C		16.5 22	20 26	mΩ
		V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-8.5A		20	25	mΩ
		V <sub>GS</sub> =-1.8V, I <sub>D</sub> =-7.5A		24	31	mΩ
		V <sub>GS</sub> =-1.5V, I <sub>D</sub> =-7A		29	38	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =-5V, I <sub>D</sub> =-9A		45		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =-1A, V <sub>GS</sub> =0V		-0.53	-1	V
I <sub>S</sub>	Maximum Body-Diode Continuous Current				-2.5	A
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =-6V, f=1MHz		1740	2100	pF
C <sub>oss</sub>	Output Capacitance			334		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			200		pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz		1.3	1.7	kΩ
<b>SWITCHING PARAMETERS</b>						
Q <sub>g</sub>	Total Gate Charge	V <sub>GS</sub> =-4.5V, V <sub>DS</sub> =-6V, I <sub>D</sub> =-9A		19	23	nC
Q <sub>gs</sub>	Gate Source Charge			4.5		nC
Q <sub>gd</sub>	Gate Drain Charge			5.3		nC
t <sub>D(on)</sub>	Turn-On Delay Time	V <sub>GS</sub> =-4.5V, V <sub>DS</sub> =-6V, R <sub>L</sub> =0.67Ω, R <sub>GEN</sub> =3Ω		240		ns
t <sub>r</sub>	Turn-On Rise Time			580		ns
t <sub>D(off)</sub>	Turn-Off Delay Time			7		μs
t <sub>f</sub>	Turn-Off Fall Time			4.2		μs
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =-9A, dI/dt=100A/μs		22	27	ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =-9A, dI/dt=100A/μs		17		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.

B. The power dissipation P<sub>D</sub> is based on T<sub>J(MAX)</sub>=150°C, using ≤ 10s junction-to-ambient thermal resistance.

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 lead R<sub>θJL</sub> and lead to ambient.

E. The static characteristics in Figures 1 to 6 are obtained using <300 μs 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 1in<sup>2</sup> FR-4 board with 2oz. Copper, assuming a maximum junction temperature of T<sub>J(MAX)</sub>=150°C. The SOA curve provides a single pulse rating.

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**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

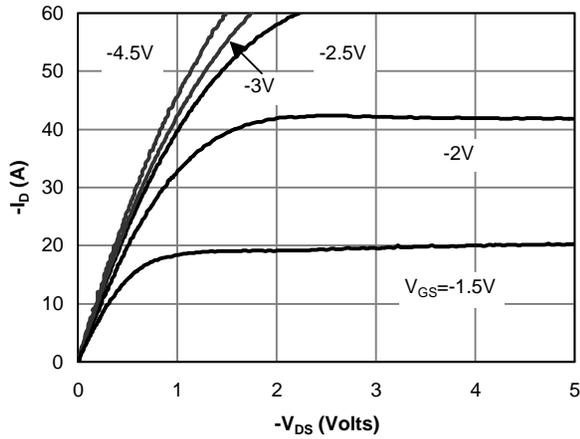


Figure 1: On-Region Characteristics(Note E)

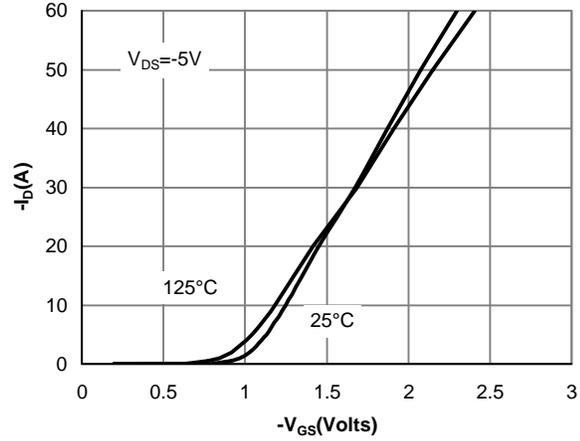


Figure 2: Transfer Characteristics(Note E)

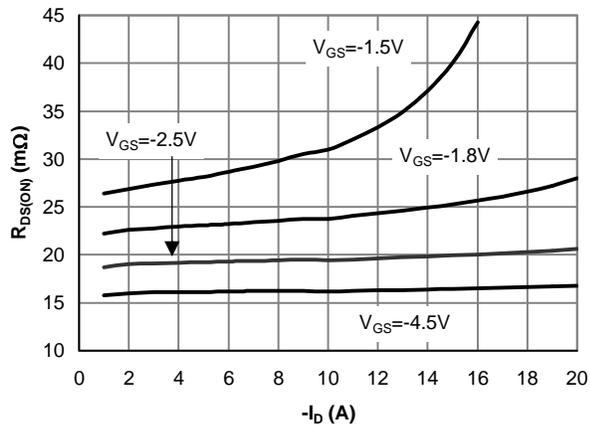


Figure 3: On-Resistance vs. Drain Current and Gate Voltage(Note E)

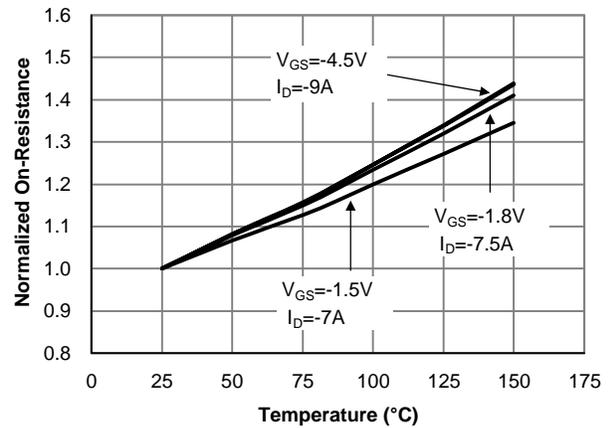


Figure 4: On-Resistance vs. Junction Temperature(Note E)

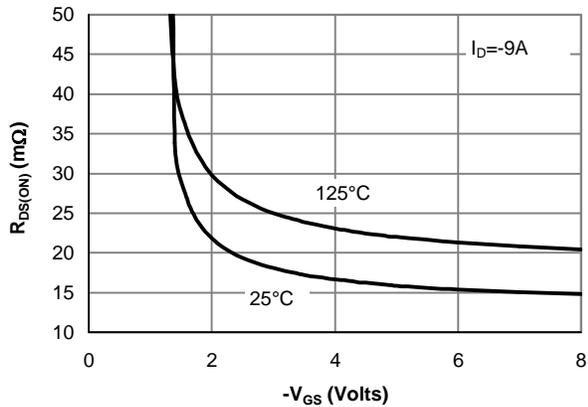


Figure 5: On-Resistance vs. Gate-Source Voltage(Note E)

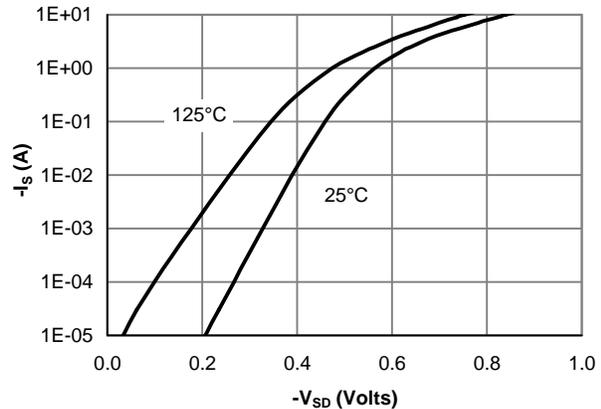


Figure 6: Body-Diode Characteristics(Note E)

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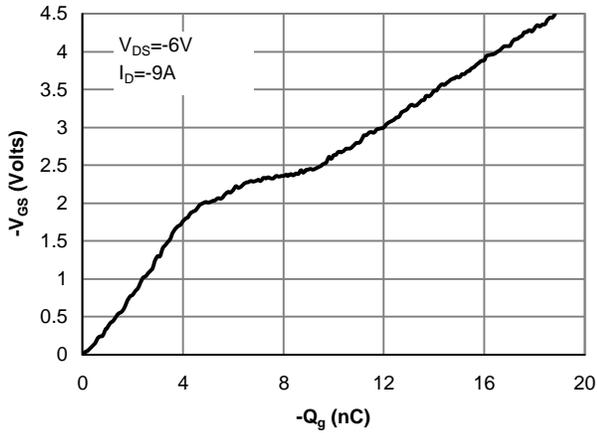


Figure 7: Gate-Charge Characteristics

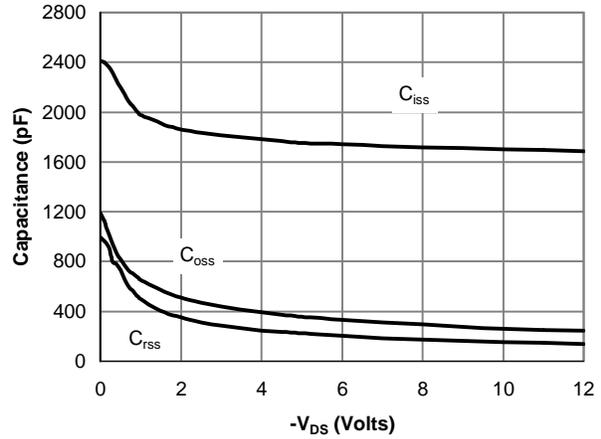


Figure 8: Capacitance Characteristics

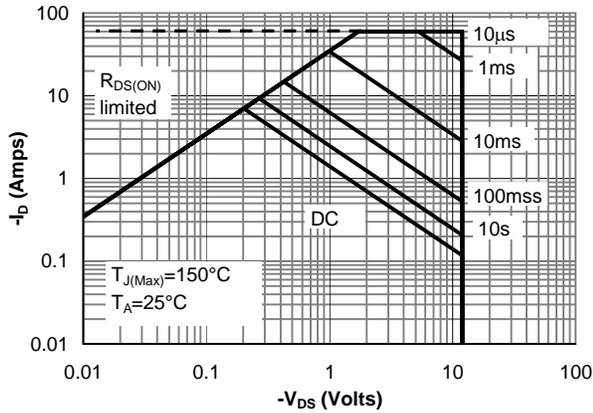


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

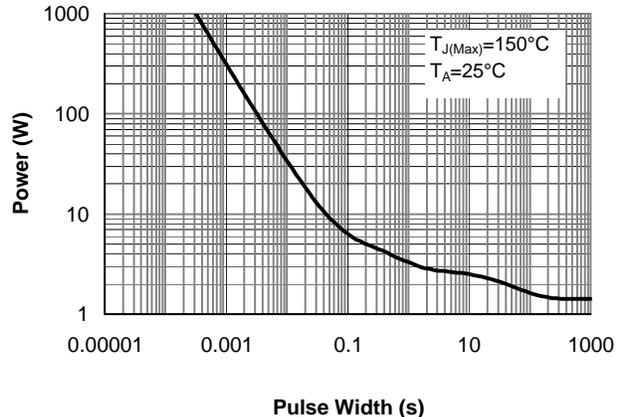


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

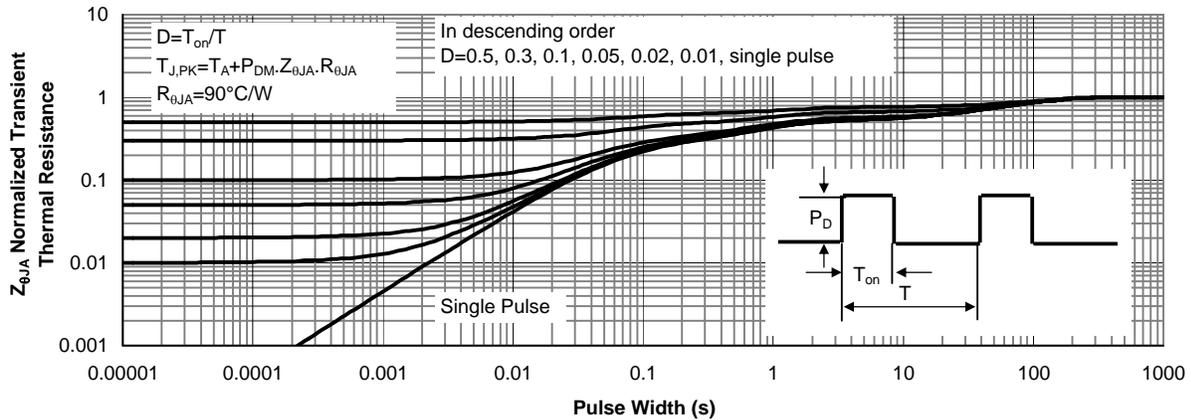
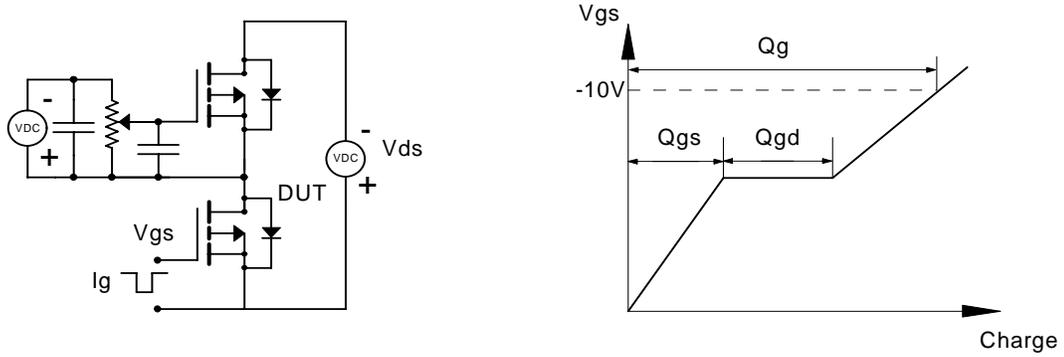
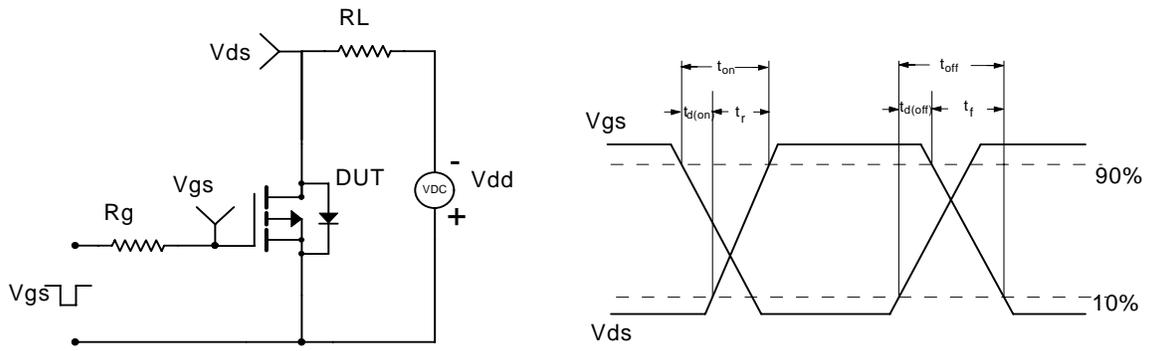


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

