

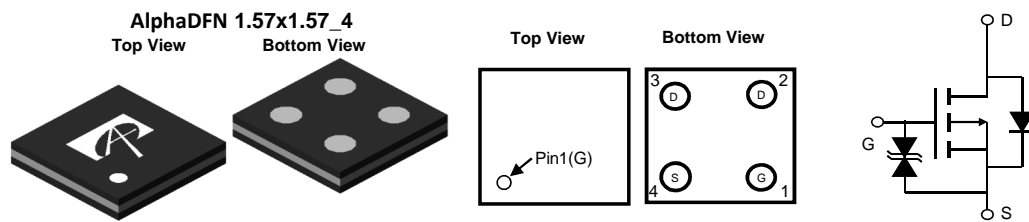
### General Description

The AOC2413 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 1.2V while retaining a 5V  $V_{GS(MAX)}$  rating.

### Product Summary

$V_{DS}$	-8V
$I_D$ (at $V_{GS}=-2.5V$ )	-3.5A
$R_{DS(ON)}$ (at $V_{GS}=-2.5V$ )	< 28m $\Omega$
$R_{DS(ON)}$ (at $V_{GS}=-1.8V$ )	< 32m $\Omega$
$R_{DS(ON)}$ (at $V_{GS}=-1.5V$ )	< 37m $\Omega$
$R_{DS(ON)}$ (at $V_{GS}=-1.2V$ )	< 47m $\Omega$

Typical ESD protection **HBM Class 3A**



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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	-8	V
Gate-Source Voltage	$V_{GS}$	$\pm 5$	V
Source Current (DC) <sup>Note1</sup>	$I_D$	-3.5	A
$T_A=25^\circ\text{C}$			
Source Current (Pulse) <sup>Note2</sup>	$I_{DM}$	-50	
Power Dissipation <sup>Note1</sup>	$P_D$	0.55	W
$T_A=25^\circ\text{C}$			
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>	$R_{\theta JA}$	140	170	$^\circ\text{C}/\text{W}$
$t \leq 10\text{s}$		190	230	$^\circ\text{C}/\text{W}$
Maximum Junction-to-Ambient <sup>A D</sup>				
Steady-State				

**Note 1.** Mounted on minimum pad PCB

**Note 2.** PW < 300  $\mu\text{s}$  pulses, duty cycle 0.5% max

**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	-8			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =-8V, 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> =±5V			±10	μA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA	-0.15	-0.42	-0.65	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-1.5A T <sub>J</sub> =125°C		22.5	28	mΩ
				29.5	37	
		V <sub>GS</sub> =-1.8V, I <sub>D</sub> =-1A		25	32	mΩ
		V <sub>GS</sub> =-1.5V, I <sub>D</sub> =-1A		28	37	mΩ
		V <sub>GS</sub> =-1.2V, I <sub>D</sub> =-1A		34	47	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =-5V, I <sub>D</sub> =-1.5A		14		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =-1A, V <sub>GS</sub> =0V		-0.52	-1	V
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =-4V, f=1MHz		1935		pF
C <sub>oss</sub>	Output Capacitance			475		pF
C <sub>riss</sub>	Reverse Transfer Capacitance			240		pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz		1.7		KΩ
<b>SWITCHING PARAMETERS</b>						
Q <sub>g</sub>	Total Gate Charge	V <sub>GS</sub> =-4.5V, V <sub>DS</sub> =-4V, I <sub>D</sub> =-1.5A		19	27	nC
Q <sub>gs</sub>	Gate Source Charge			7.5		nC
Q <sub>gd</sub>	Gate Drain Charge			3.5		nC
t <sub>D(on)</sub>	Turn-On DelayTime	V <sub>GS</sub> =-2.5V, V <sub>DS</sub> =-4V, R <sub>L</sub> =2.67Ω, R <sub>GEN</sub> =3Ω		1.6		μs
t <sub>r</sub>	Turn-On Rise Time			2.8		μs
t <sub>D(off)</sub>	Turn-Off DelayTime			2.7		μs
t <sub>f</sub>	Turn-Off Fall Time			6.2		μs
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =-1.5A, di/dt=100A/μs		17		ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =-1.5A, di/dt=100A/μs		9		nC

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

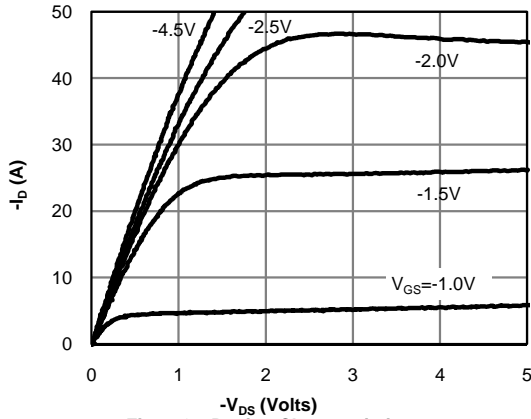


Fig 1: On-Region Characteristics

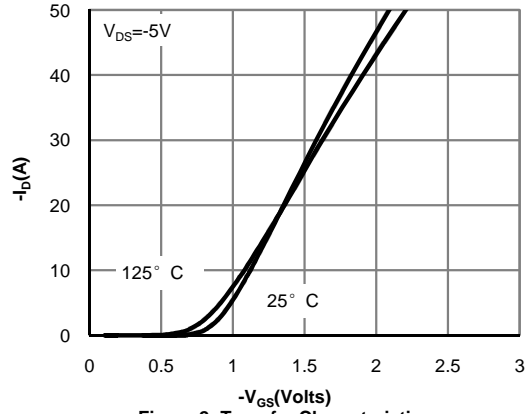


Figure 2: Transfer Characteristics

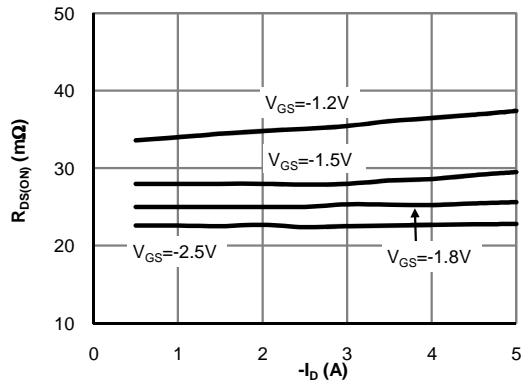


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

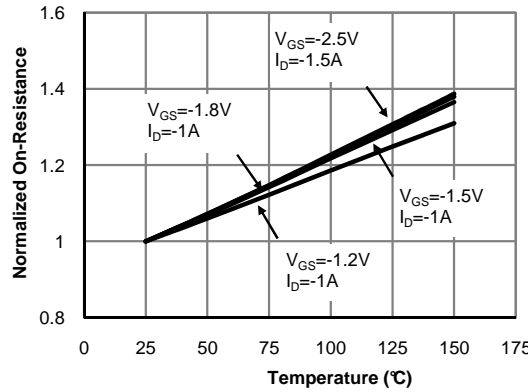


Figure 4: On-Resistance vs. Junction Temperature (Note E)

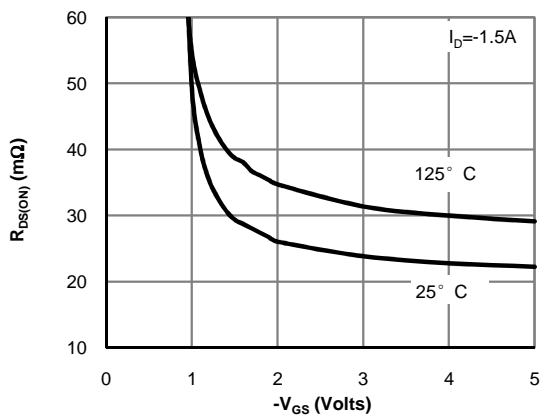


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

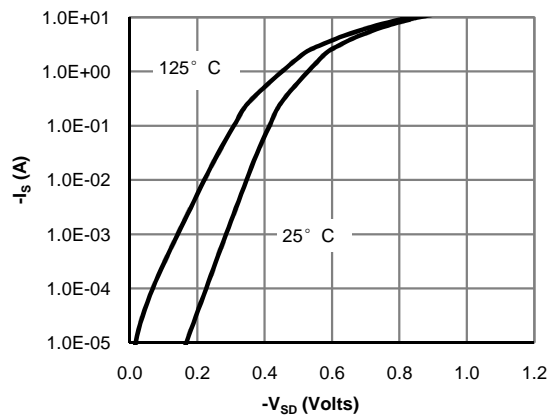


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

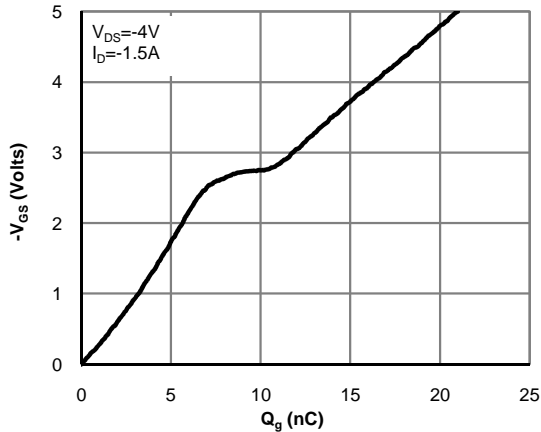


Figure 7: Gate-Charge Characteristics

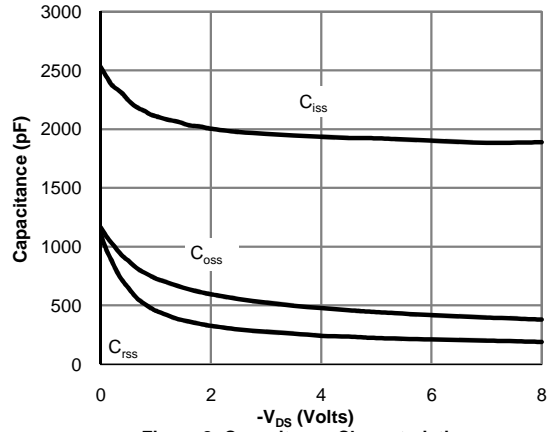


Figure 8: Capacitance Characteristics

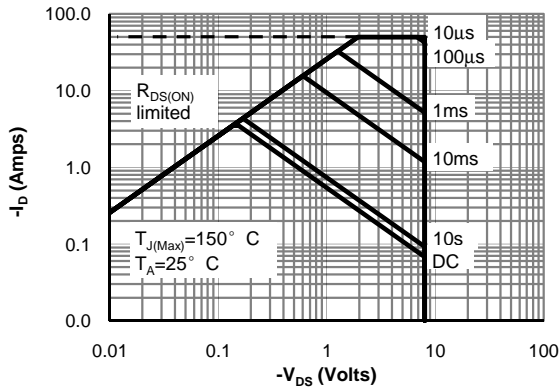


Figure 9: Maximum Forward Biased Safe Operating Area

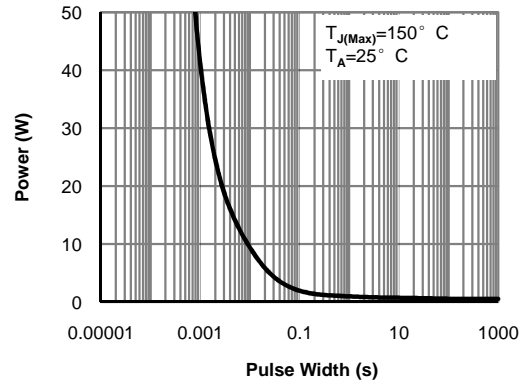


Figure 10: Single Pulse Power Rating Junction-to-Ambient

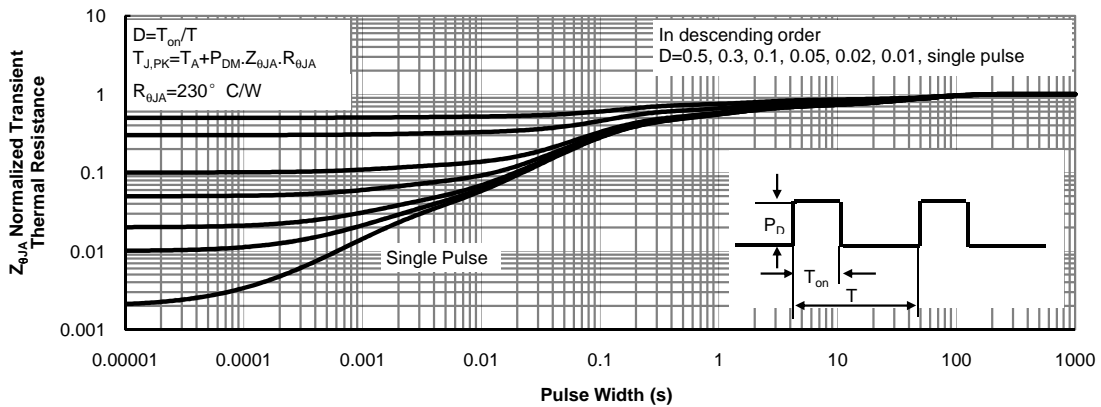
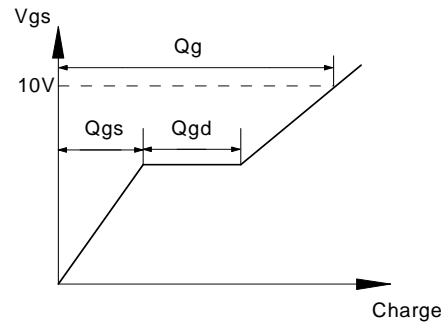
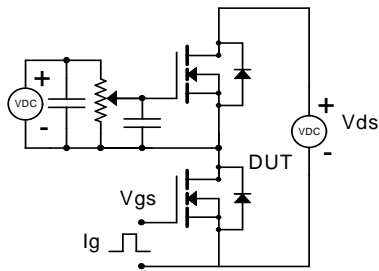
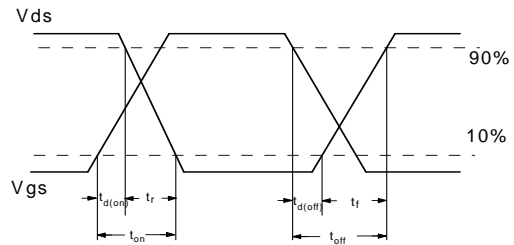
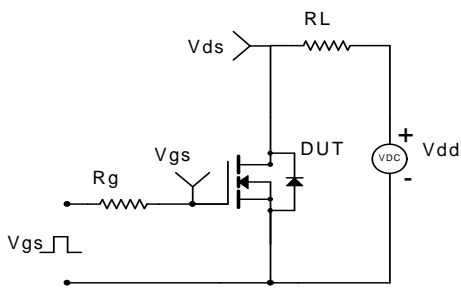


Figure 11: Normalized Maximum Transient Thermal Impedance

**Gate Charge Test Circuit & Waveform**



**Resistive Switching Test Circuit & Waveforms**



**Diode Recovery Test Circuit & Waveforms**

