

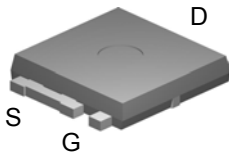

General Description

The AOL1413 uses advanced trench technology to provide excellent $R_{DS(ON)}$ and ultra-low low gate charge with a 25V gate rating. This device is suitable for use as a load switch or in PWM applications. The device is ESD protected. *Standard product AOL1413 is Pb-free (meets ROHS & Sony 259 specifications).*

Features

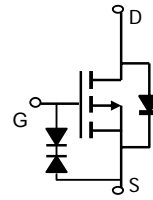
V_{DS} (V) = -30V
 I_D = -20A (V_{GS} = -10V)
 $R_{DS(ON)}$ < 17m Ω (V_{GS} = -10V)
 $R_{DS(ON)}$ < 36m Ω (V_{GS} = -5V)
 ESD Protected!

Ultra SO-8™ Top View



Bottom tab
connected to
drain

**Fits SOIC8
footprint !**


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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	-30	V
Gate-Source Voltage	V_{GS}	± 25	V
Continuous Drain Current ^B	I_D	$T_C=25^\circ\text{C}$	A
		$T_C=100^\circ\text{C}$	
Pulsed Drain Current ^C	I_{DM}	-70	A
Continuous Drain Current ^A	I_{DSM}	$T_A=25^\circ\text{C}$	W
		$T_A=70^\circ\text{C}$	
Power Dissipation ^B	P_D	$T_C=25^\circ\text{C}$	W
		$T_C=100^\circ\text{C}$	
Power Dissipation ^A	P_{DSM}	$T_A=25^\circ\text{C}$	W
		$T_A=70^\circ\text{C}$	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 175	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	$t \leq 10\text{s}$	18	$^\circ\text{C/W}$
		Steady-State	49	
Maximum Junction-to-Case ^B	$R_{\theta JC}$	2.9	4	$^\circ\text{C/W}$

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	-30			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-30V, V _{GS} =0V T _J =55°C			-1 -5	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} = ±25V			±10	μA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =-250μA	-1.5	-2.5	-3.5	V
I _{D(ON)}	On state drain current	V _{GS} =-10V, V _{DS} =-5V	-70			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =-10V, I _D =-20A T _J =125°C		13.5 18.5	17 24	mΩ
		V _{GS} =-5V, I _D =-20A		28	36	
g _{FS}	Forward Transconductance	V _{DS} =-5V, I _D =20A		27		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		-0.72	-1	V
I _S	Maximum Body-Diode Continuous Current				-40	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =-15V, f=1MHz		1760	2200	pF
C _{oss}	Output Capacitance			360		pF
C _{rss}	Reverse Transfer Capacitance			255		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		6.4	8	Ω
SWITCHING PARAMETERS						
Q _g (10V)	Total Gate Charge	V _{GS} =-10V, V _{DS} =-15V, I _D =-20A		30	38	nC
Q _g (4.5V)	Total Gate Charge			11		nC
Q _{gs}	Gate Source Charge			7		nC
Q _{gd}	Gate Drain Charge			8		nC
t _{D(on)}	Turn-On Delay Time			11.5		ns
t _r	Turn-On Rise Time	V _{GS} =-10V, V _{DS} =-15V, R _L =0.75Ω,		8		ns
t _{D(off)}	Turn-Off Delay Time	R _{GEN} =3Ω		35		ns
t _f	Turn-Off Fall Time			18.5		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =-20A, dI/dt=100A/μs		24	30	ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =-20A, dI/dt=100A/μs		16		nC

A. The value of R_{θJA} is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The Power dissipation P_{DSM} is based on t<10s R_{θJA} and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design, and the maximum temperature of 175°C may be used if the PCB allows it.

B. The power dissipation P_D is based on T_{J(MAX)}=175°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)}=175°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 <300 us 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_{J(MAX)}=175°C. The SOA curve provides a single pulse rating.

G. The maximum current rating is limited by bond-wires.

H. These tests are performed with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C.

Rev0: Sep, 2007

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

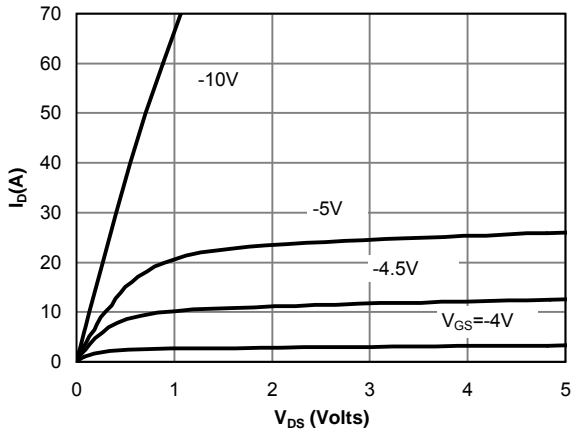


Figure 1: On-Region Characteristics

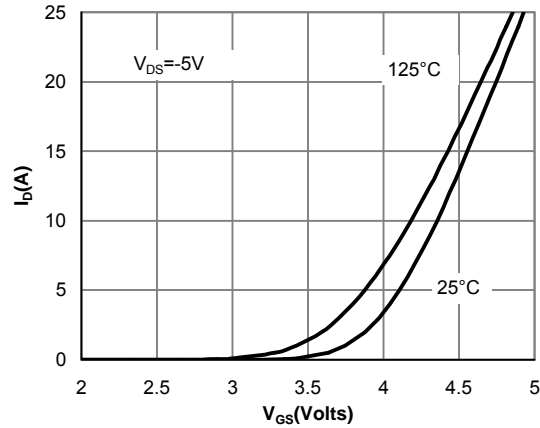


Figure 2: Transfer Characteristics

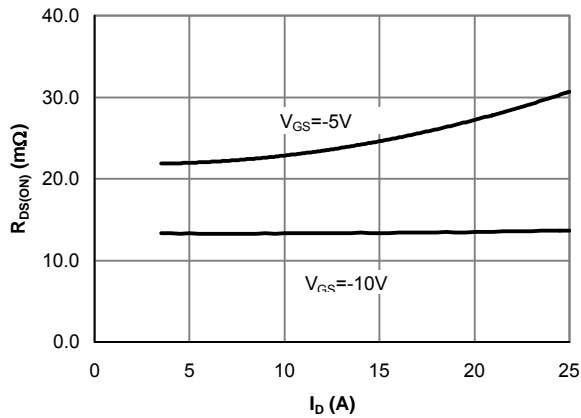


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

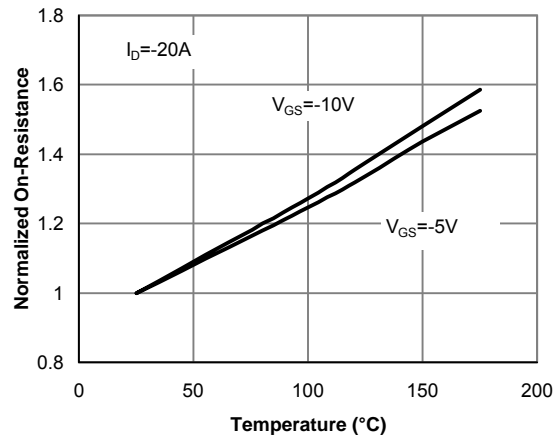


Figure 4: On-Resistance vs. Junction Temperature

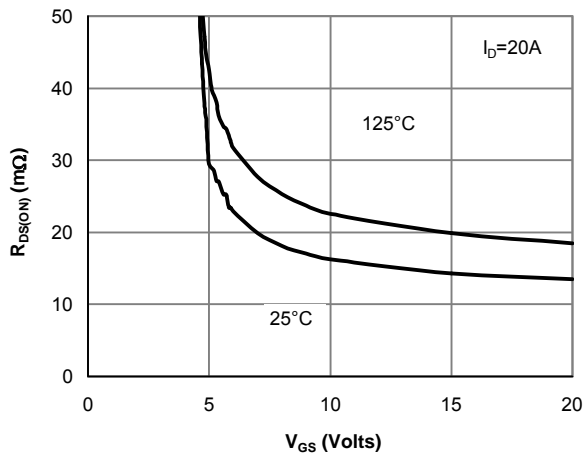


Figure 5: On-Resistance vs. Gate-Source Voltage

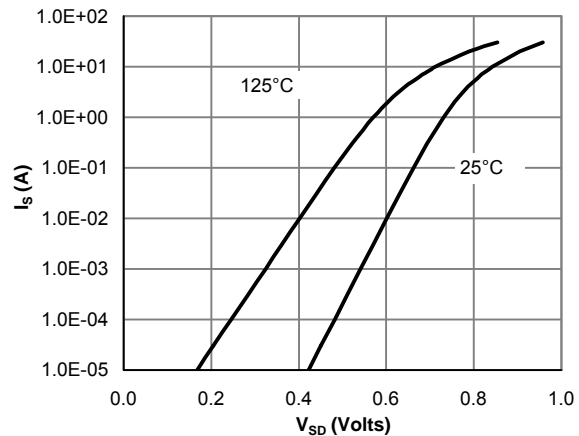


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

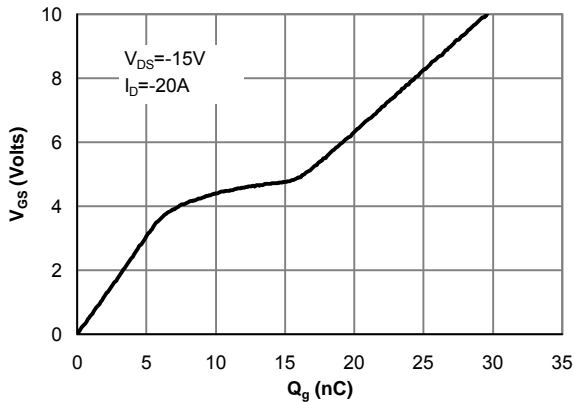


Figure 7: Gate-Charge Characteristics

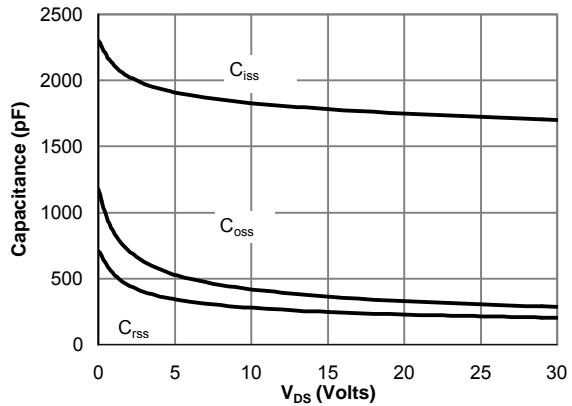


Figure 8: Capacitance Characteristics

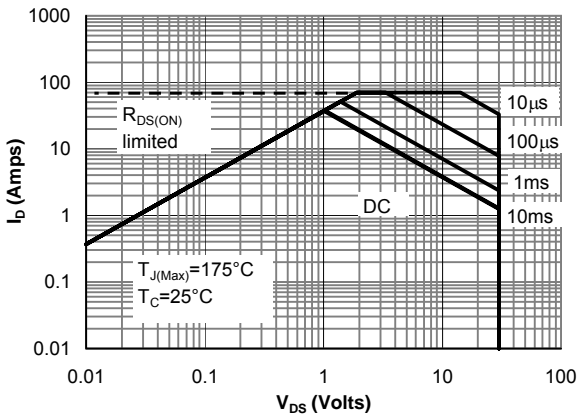


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

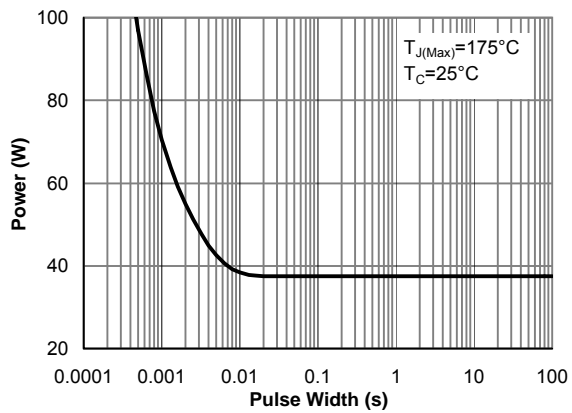


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

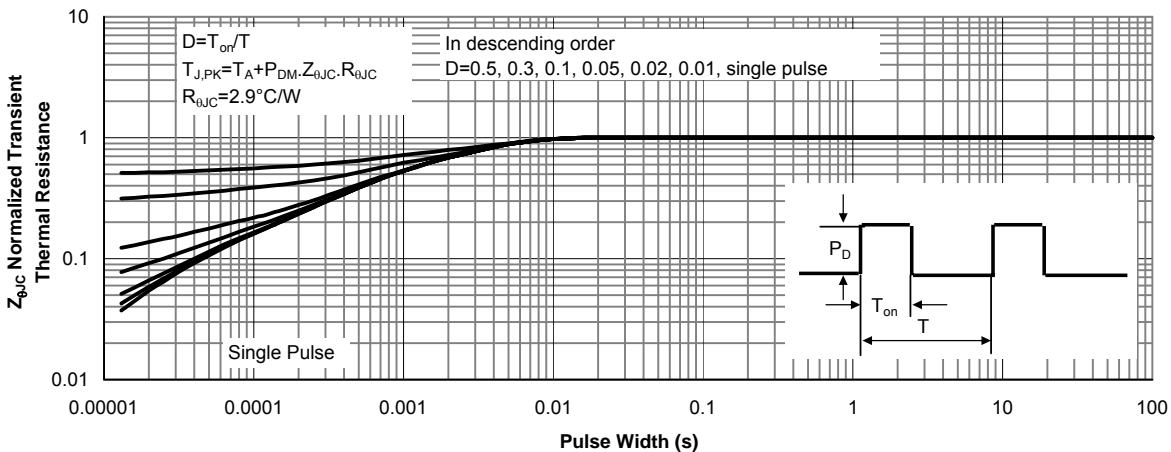


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

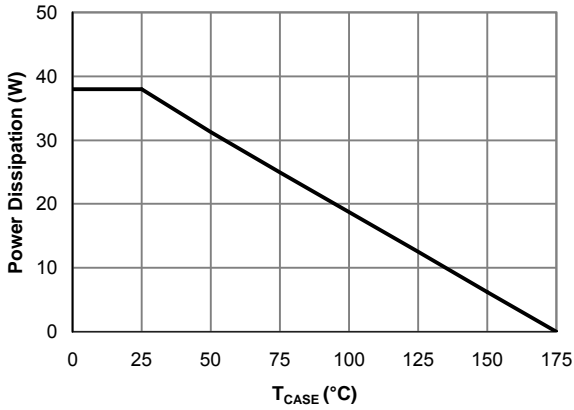


Figure 13: Power De-rating (Note B)

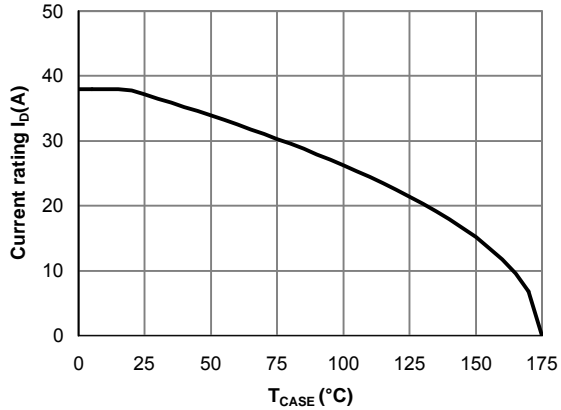


Figure 14: Current De-rating (Note B)

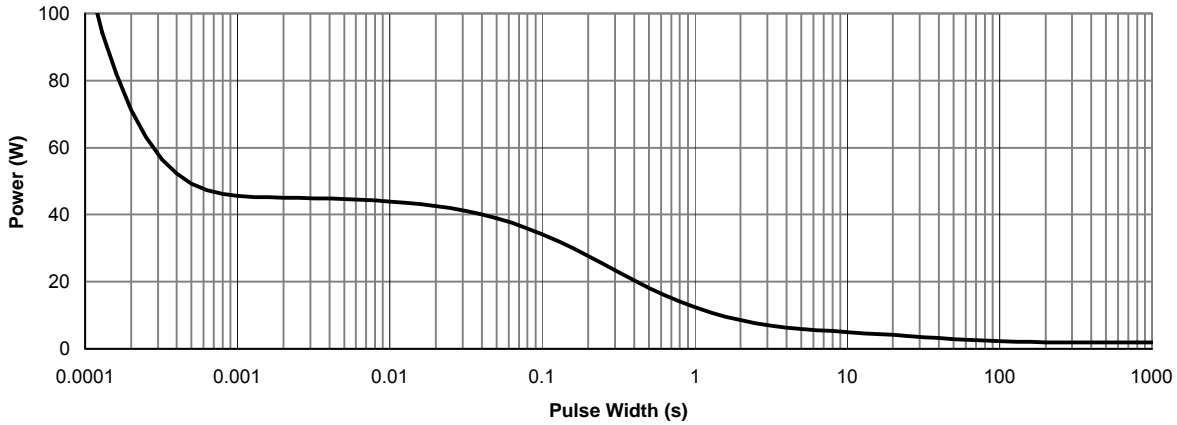


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

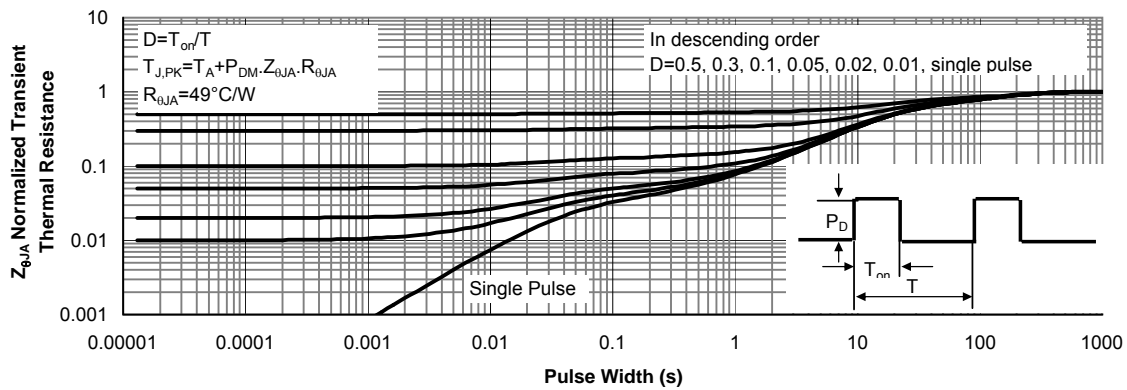


Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)