

Product Specification

XBLW AOD413A

P-Channel Enhancement Mode MOSFET

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Description

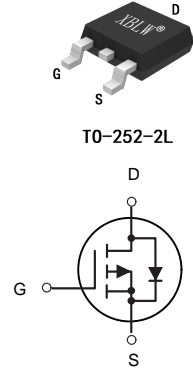
The AOD413A uses advanced trench technology to provide excellent RDS(ON), low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

General Features

- VDS = -40V ID = -25A
- RDS(ON) < 44 mΩ@VGS=10V

Application

- Battery protection
- Load switch
- Uninterruptible power supply



P-Channel MOSFET

Package Marking and Ordering Information

Product Model	Package Type	Marking	Packing	Packing Qty
XBLW AOD413A	TO-252-2L	AOD413A	Tape	2500Pcs/Reel

Absolute Maximum Ratings (TC=25°C unless otherwise noted)

Symbol	Parameter	Rating	Units
VDS	Drain-Source Voltage	-40	V
VGS	Gate-Source Voltage	±25	V
ID@TC=25°C	Continuous Drain Current, VGS @ 10V ¹	-25	A
ID@TC=100°C	Continuous Drain Current, VGS @ 10V ¹	-12	A
IDM	Pulsed Drain Current ²	-40	A
PD@TC=25°C	Total Power Dissipation ⁴	8	W
TSTG	Storage Temperature Range	-55 to 150	°C
TJ	Operating Junction Temperature Range	-55 to 150	°C
ReJA	Thermal Resistance Junction-ambient ¹	62	°C/W
ReJC	Thermal Resistance Junction-Case ¹	18.8	°C/W

Electrical Characteristics (T_J=25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D = -250μA	-40	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = -40V, V _{GS} =0V	-	-	-1	μA
I _{GSS}	Gate to Body Leakage Current	V _{DS} =0V, V _{GS} = ±20V	-	-	±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D = -250μA	-1.0	-1.6	-2.5	V
R _{DS(on)}	Static Drain-Source on-Resistance <small>note3</small>	V _{GS} = -10V, I _D = -8A	-	31	44	mΩ
		V _{GS} = -4.5V, I _D = -5A	-	44	60	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = -20V, V _{GS} =0V, f=1.0MHz	-	1034	-	pF
C _{oss}	Output Capacitance		-	107	-	pF
C _{rss}	Reverse Transfer Capacitance		-	79.5	-	pF
Q _g	Total Gate Charge	V _{DS} = -20V, I _D = -5A, V _{GS} = -10V	-	20	-	nC
Q _{gs}	Gate-Source Charge		-	3.5	-	nC
Q _{gd}	Gate-Drain("Miller") Charge		-	4.2	-	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DD} = -20V, I _D = -5A, V _{GS} = -10V, R _{GEN} =2.5Ω	-	8	-	ns
t _r	Turn-on Rise Time		-	15	-	ns
t _{d(off)}	Turn-off Delay Time		-	23	-	ns
t _f	Turn-off Fall Time		-	9	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	-23	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-40	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} =0V, I _S = -10A	-	-0.8	-1.2	V
t _{rr}	Reverse Recovery Time	V _{GS} =0V, I _S =-5A,	-	29	-	ns
Q _{rr}	Reverse Recovery Charge	di/dt=100A/μs	-	20	-	nC

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

 2. EAS condition: T_J= 25°C, V_{DD}= -20V, V_G= -10V, L=0.5mH, R_G= 25Ω, I_{AS}= -10.5A

3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%

Typical Performance Characteristics

Figure 1: Output Characteristics

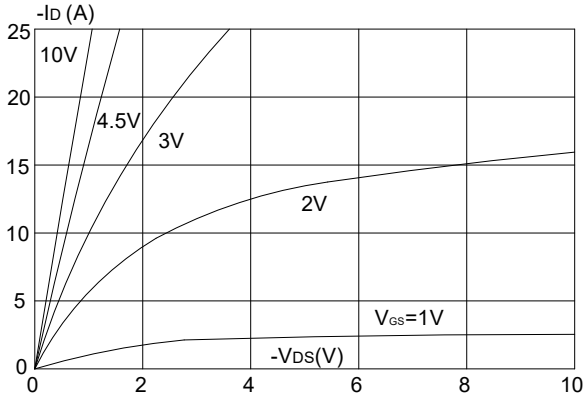


Figure 2: Typical Transfer Characteristics

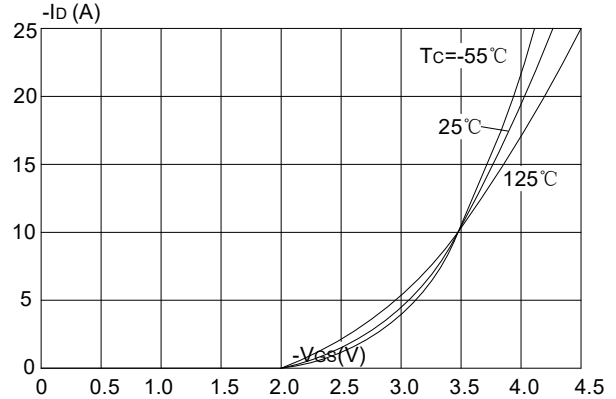


Figure 3: On-resistance vs. Drain Current

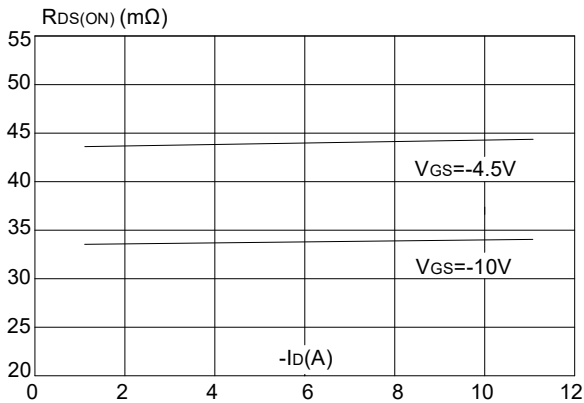


Figure 4: Body Diode Characteristics

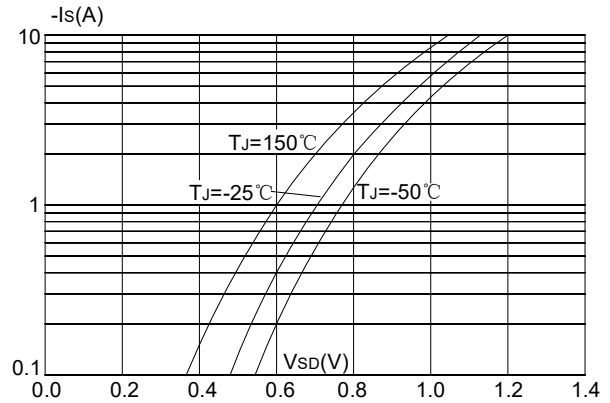


Figure 5: Gate Charge Characteristics

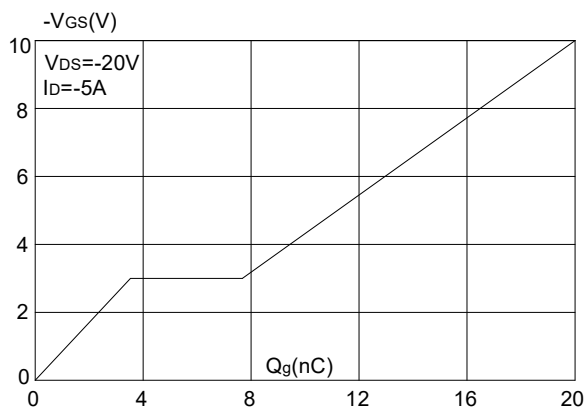


Figure 6: Capacitance Characteristics

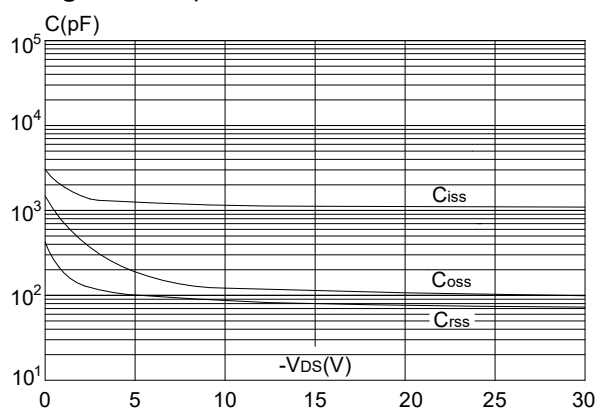


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

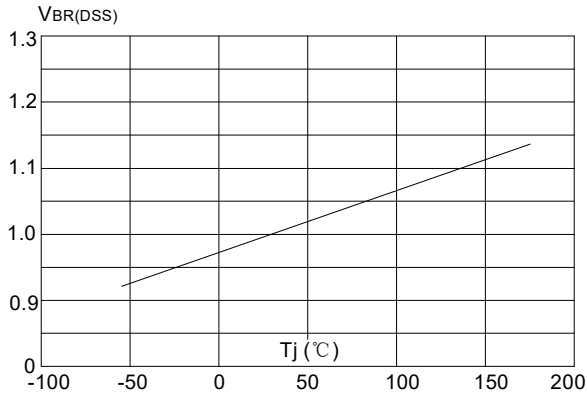


Figure 8: Normalized on Resistance vs. Junction Temperature

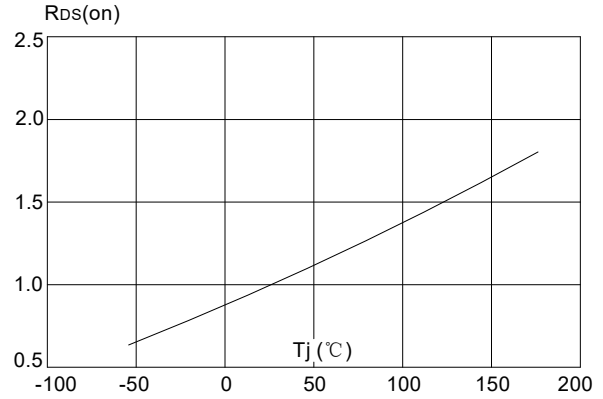


Figure 9: Maximum Safe Operating Area

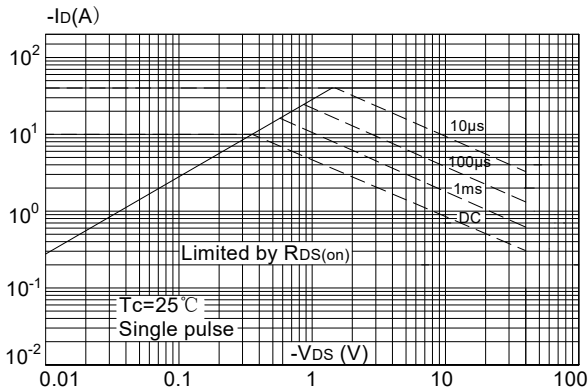


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

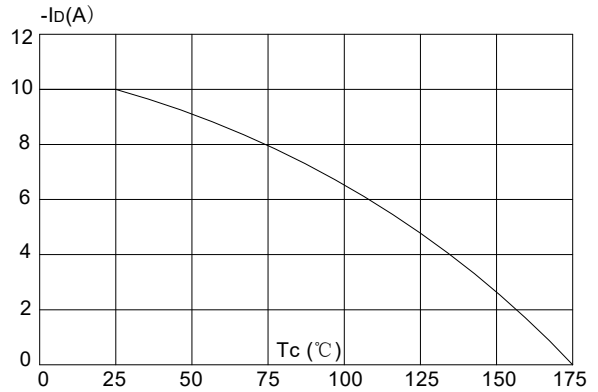
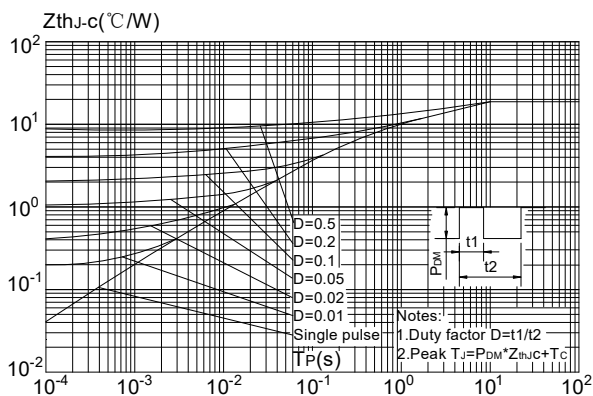


Figure 11: Maximum Effective Transient Thermal Impedance, Junction-to-Case



Test Circuit

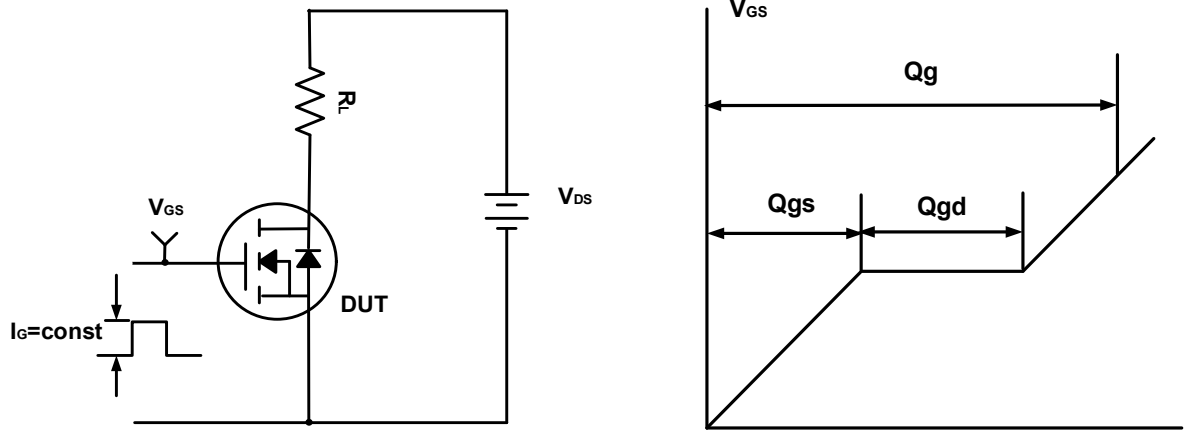


Figure A. Gate Charge Test Circuit & Waveforms

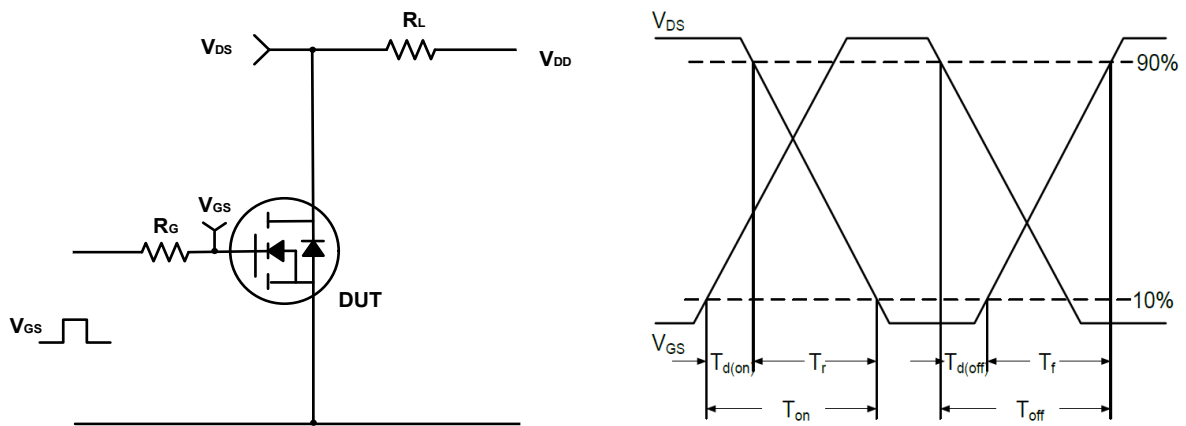


Figure B. Switching Test Circuit & Waveforms

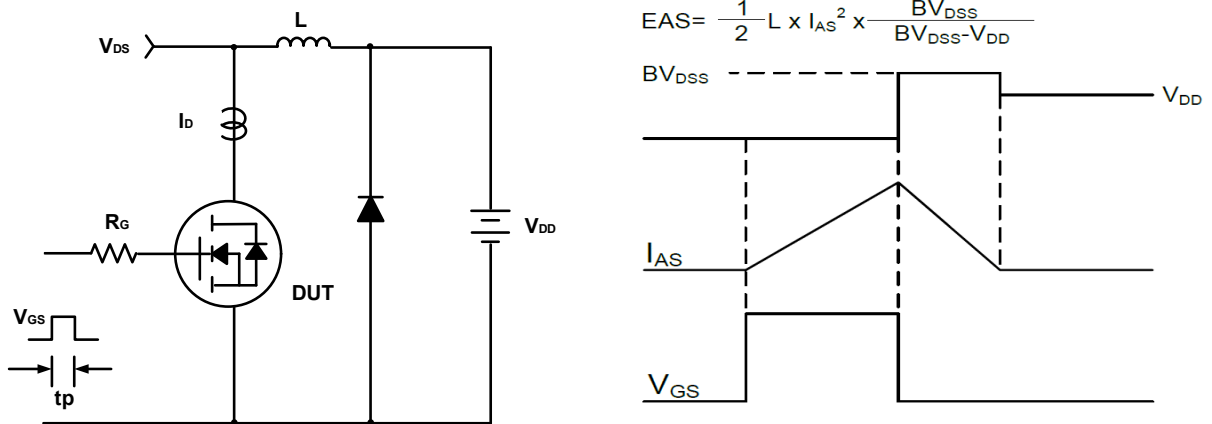
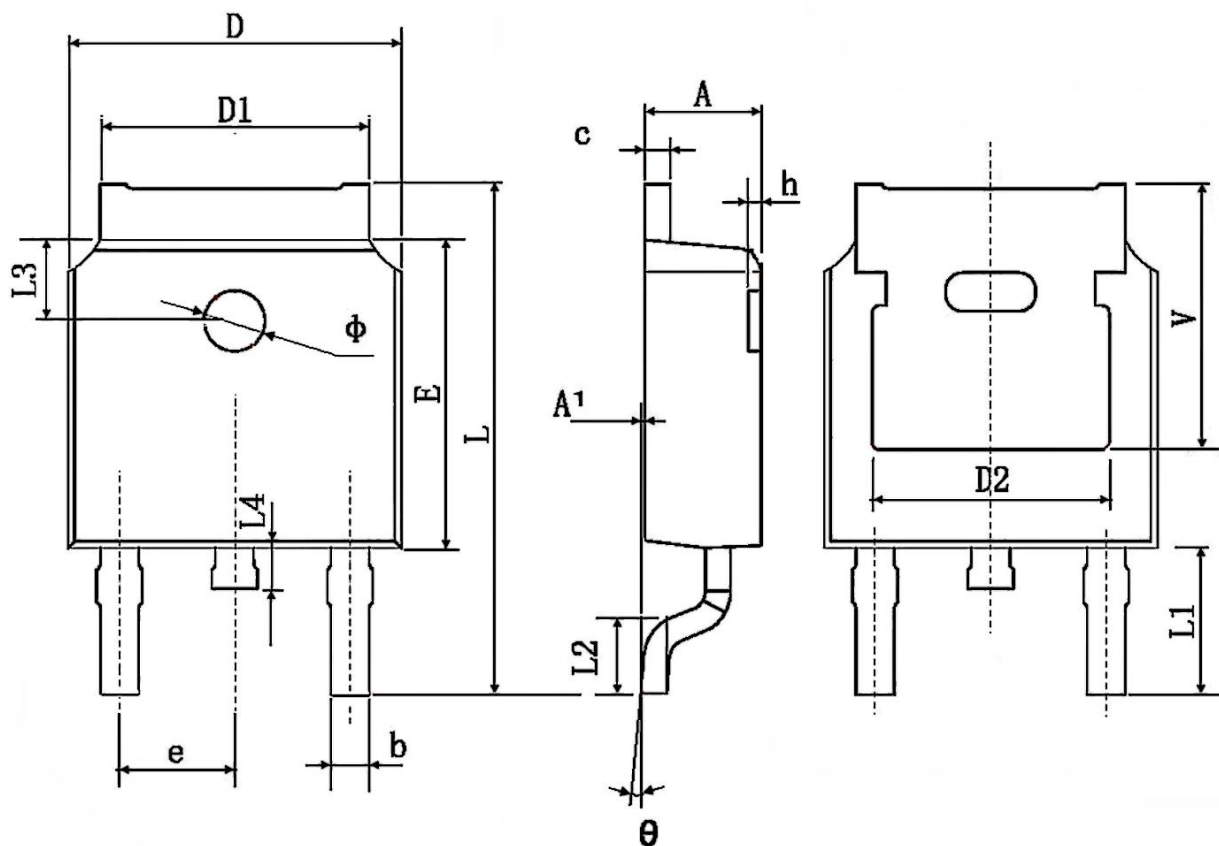


Figure C. Unclamped Inductive Switching Circuit & Waveforms

Package Information

T0252-2L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 TYP.		0.190 TYP.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 TYP.		0.114 TYP.	
L2	1.400	1.700	0.055	0.067
L3	1.600 TYP.		0.063 TYP.	
L4	0.600	1.000	0.024	0.039
φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 TYP.		0.211 TYP.	

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