AOD4132

N-Channel Enhancement Mode Field Effect Transistor

飞思卡尔(深圳)功率半导体有限公司

General Description

The AOD4132 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and low

gate resistance. This device is ideally suited for use as a low side switch in CPU core power conversion.

Features

V_{DS} (V) = 30V
I_D = 85A (V_{GS} = 10V)
$R_{DS(ON)}$ < 4mΩ (V_{GS} = 10V)
$R_{DS(ON)}$ < 6mΩ (V_{GS} = 4.5V)

Green Product   RoHS Compliant
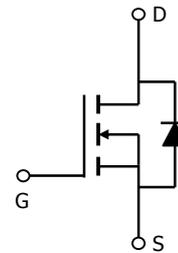
Absolute Maximum Ratings T_A=25℃ unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current [B,G]	T_C=25℃ [G]	I_D	85	A
	T_C=100℃ [B]		63	
Pulsed Drain Current		I_{DM}	200	
Avalanche Current [C]		I_{AR}	30	A
Repetitive avalanche energy L=0.1mH [C]		E_{AR}	112	mJ
Power Dissipation [B]	T_C=25℃	P_D	100	W
	T_C=100℃		50	
Power Dissipation [A]	T_A=25℃	P_{DSM}	2.5	W
	T_A=70℃		1.6	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 175	℃

Thermal Characteristics

Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{θJA}$	14.2	20	℃/W
Maximum Junction-to-Ambient [A]	Steady-State		39	50	℃/W
Maximum Junction-to-Case [C]	Steady-State	$R_{θJC}$	0.8	1.5	℃/W

Electrical Characteristics (T$_J$=25℃ 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$_{DS}$=24V, V$_{GS}$=0V				1	µA
			T$_J$=55℃			5	
I$_{GSS}$	Gate-Body leakage current	V$_{DS}$=0V, V$_{GS}$= ±20V				100	nA
V$_{GS(th)}$	Gate Threshold Voltage	V$_{DS}$=V$_{GS}$ I$_D$=250µA		1	1.8	3	V
I$_{D(ON)}$	On state drain current	V$_{GS}$=10V, V$_{DS}$=5V		85			A
R$_{DS(ON)}$	Static Drain-Source On-Resistance	V$_{GS}$=10V, I$_D$=20A			2.8	4	mΩ
			T$_J$=125℃		4.4	5.5	
		V$_{GS}$=4.5V, I$_D$=20A			4.4	6	mΩ
g$_{FS}$	Forward Transconductance	V$_{DS}$=5V, I$_D$=20A			106		S
V$_{SD}$	Diode Forward Voltage	I$_S$=1A,V$_{GS}$=0V			0.72	1	V
I$_S$	Maximum Body-Diode Continuous Current					85	A
DYNAMIC PARAMETERS							
C$_{iss}$	Input Capacitance	V$_{GS}$=0V, V$_{DS}$=15V, f=1MHz			3700	4400	pF
C$_{oss}$	Output Capacitance				700		pF
C$_{rss}$	Reverse Transfer Capacitance				390		pF
R$_g$	Gate resistance	V$_{GS}$=0V, V$_{DS}$=0V, f=1MHz			0.54	0.7	Ω
SWITCHING PARAMETERS							
Q$_g$(10V)	Total Gate Charge	V$_{GS}$=4.5V, V$_{DS}$=15V, I$_D$=20A			63	76	nC
Q$_g$(4.5V)	Total Gate Charge				33	40	nC
Q$_{gs}$	Gate Source Charge				8.6		nC
Q$_{gd}$	Gate Drain Charge				17.6		nC
t$_{D(on)}$	Turn-On DelayTime	V$_{GS}$=10V, V$_{DS}$=15V, R$_L$=0.75Ω, R$_{GEN}$=3Ω			12		ns
t$_r$	Turn-On Rise Time				15.5		ns
t$_{D(off)}$	Turn-Off DelayTime				40		ns
t$_f$	Turn-Off Fall Time				14		ns
t$_{rr}$	Body Diode Reverse Recovery Time	I$_F$=20A, dI/dt=100A/µs			34	41	ns
Q$_{rr}$	Body Diode Reverse Recovery Charge	I$_F$=20A, dI/dt=100A/µs			30		nC

A: The value of R$_{θJA}$ is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, in a still air environment with T$_A$=25℃. The Power dissipation P$_{DSM}$ is based on steady-state R$_{θJA}$ and the maximum allowed junction temperature of 150℃. The value in any given application depends on the user's specific board design, and the maximum temperature fo 175℃ may be u sed if the PCB or heatsink allows it.

B. The power dissipation P$_D$ is based on T$_{J(MAX)}$=175℃, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

C: Repetitive rating, pulse width limited by junction temperature T$_{J(MAX)}$=175℃.

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 µs pulses, duty cycle 0.5% max.

F. 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℃. The SOA curve provides a single pulse rating.

G. The maximum current rating is limited by the package current capability.

*This device is guaranteed green after data code 8X11 (Sep 1ST 2008).

Rev 1: Sep 2008

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS
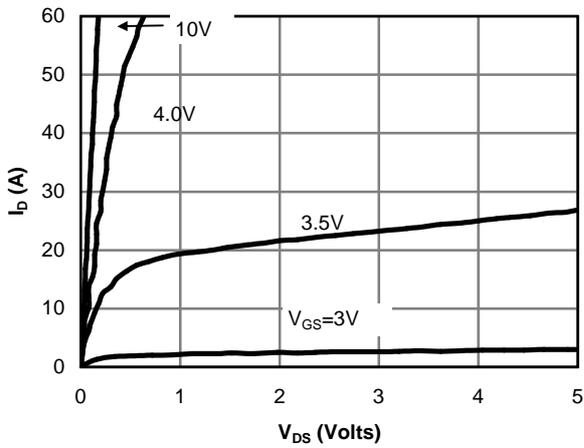
Fig 1: On-Region Characteristics
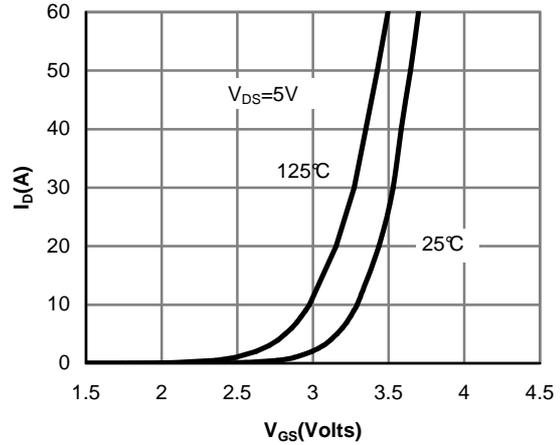
Figure 2: Transfer Characteristics
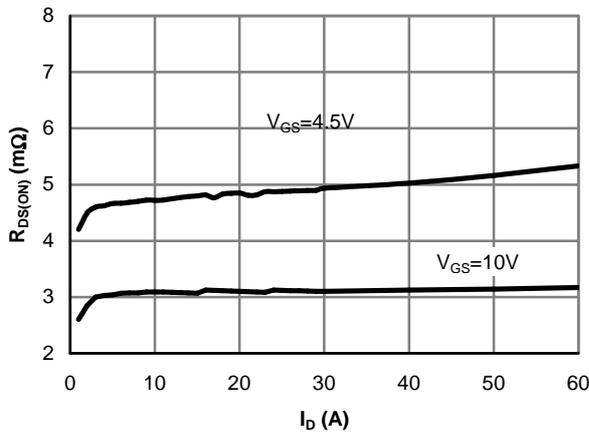
Figure 3: On-Resistance vs. Drain Current and Gate Voltage
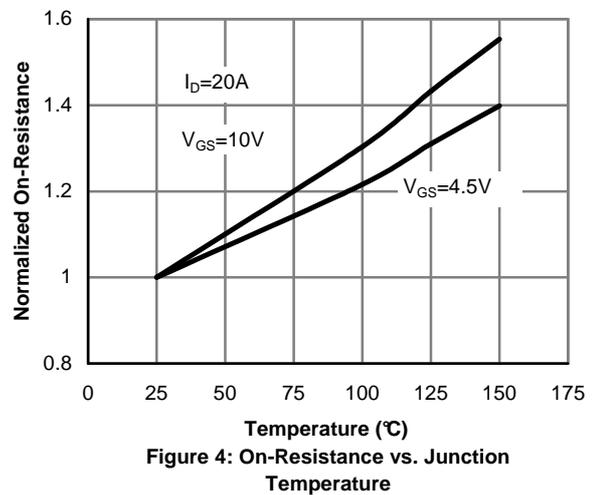
Figure 4: On-Resistance vs. Junction Temperature
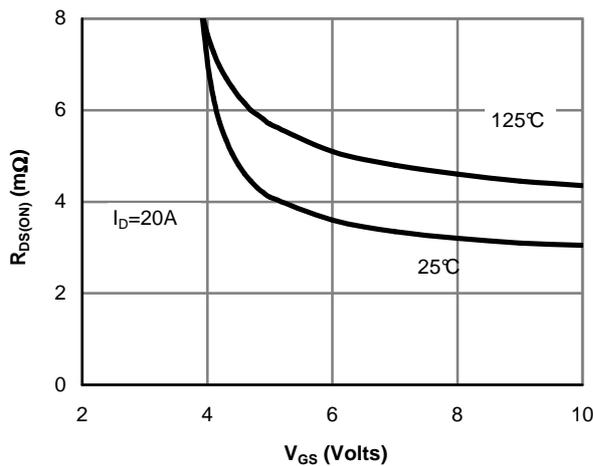
Figure 5: On-Resistance vs. Gate-Source Voltage
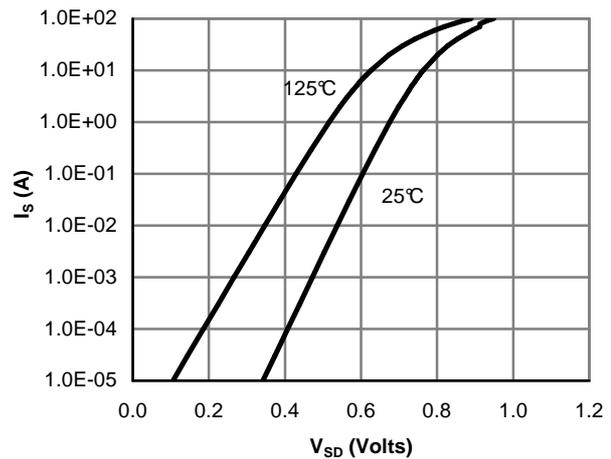
Figure 6: Body-Diode Characteristics

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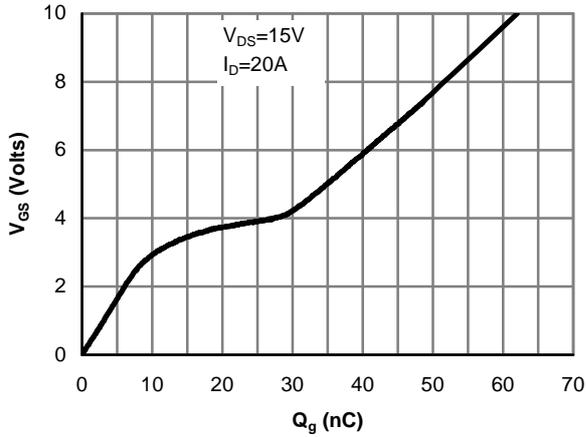
Figure 7: Gate-Charge Characteristics
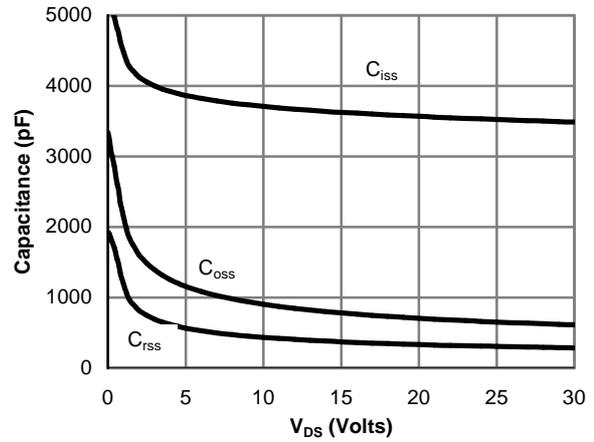
Figure 8: Capacitance Characteristics
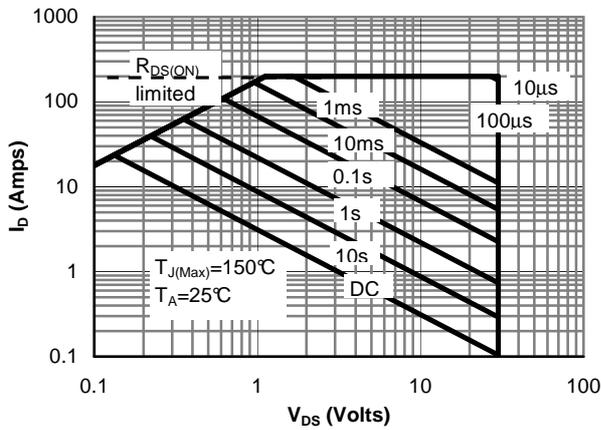
Figure 9: Maximum Forward Biased Safe
Operating Area (Note F)
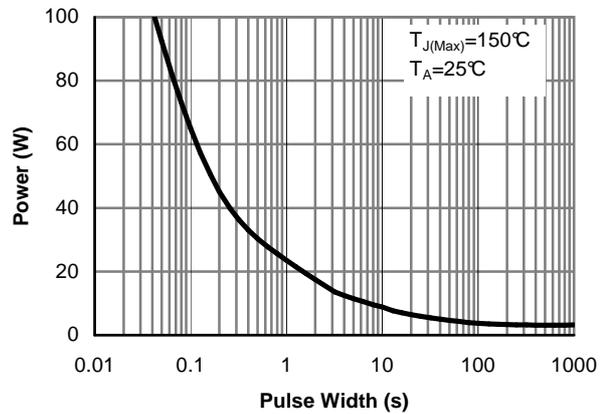
Figure 10: Single Pulse Power Rating Junction-to-
Ambient (Note F)
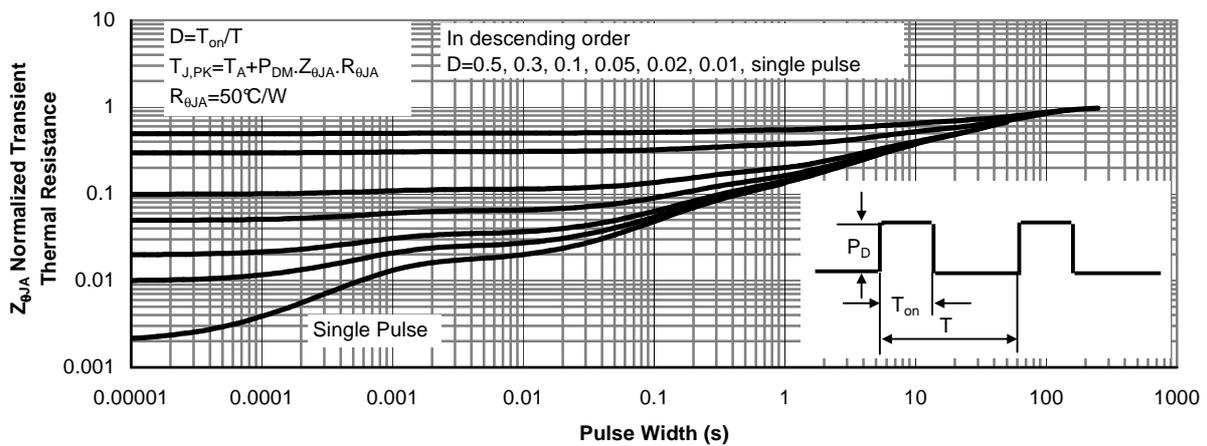
Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

$$t_A = \frac{L \cdot I_D}{BV - V_{DD}}$$
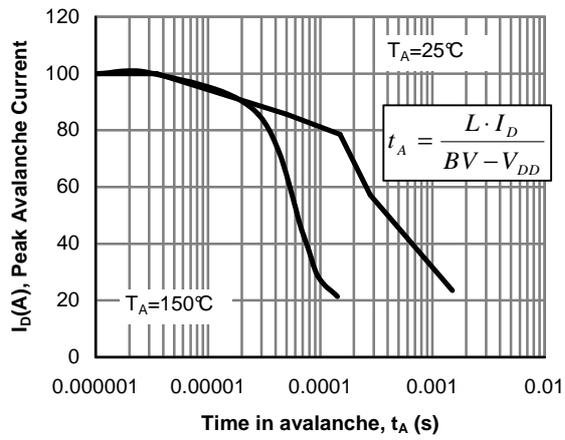
**Figure 12: Single Pulse Avalanche capability**
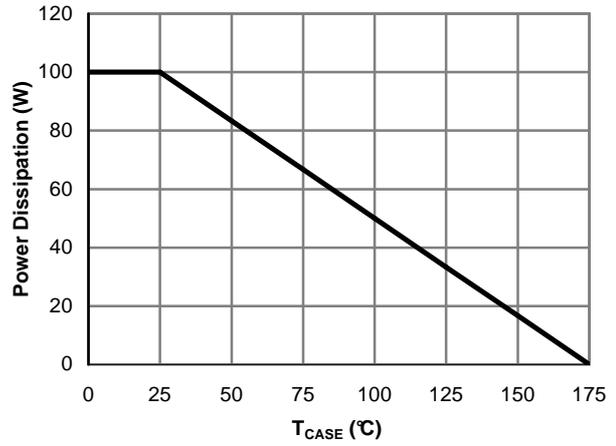

Figure 13: Power De-rating (Note B)
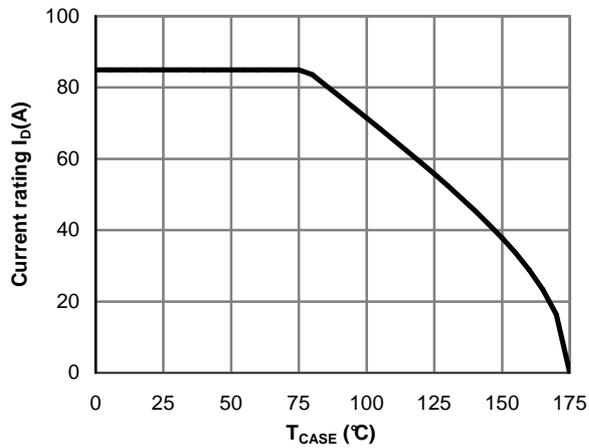

Figure 14: Current De-rating (Note B)

Gate Charge Test Circuit & Waveform
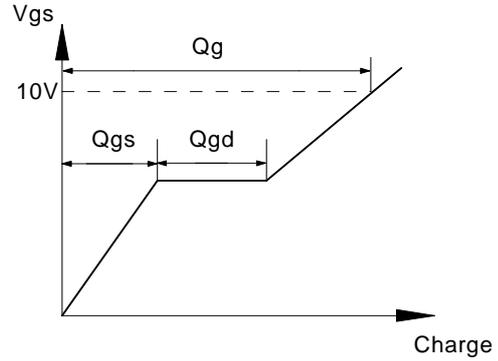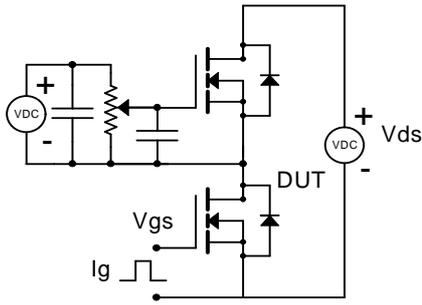
Resistive Switching Test Circuit & Waveforms
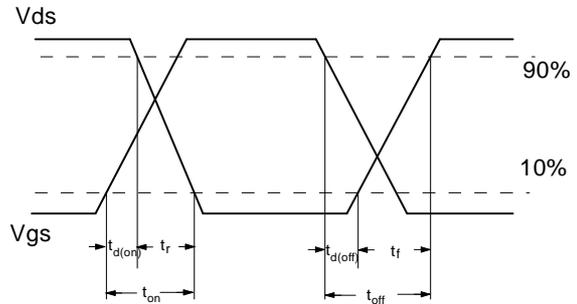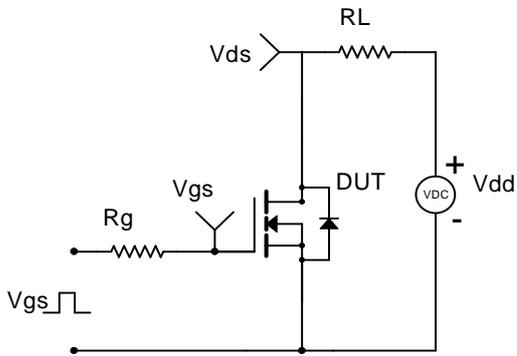
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

$$E_{AR} = 1/2 \, LI_{AR}^2$$
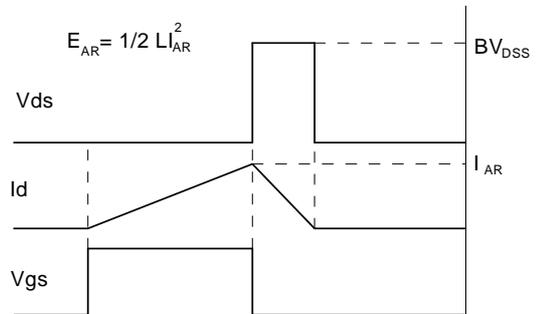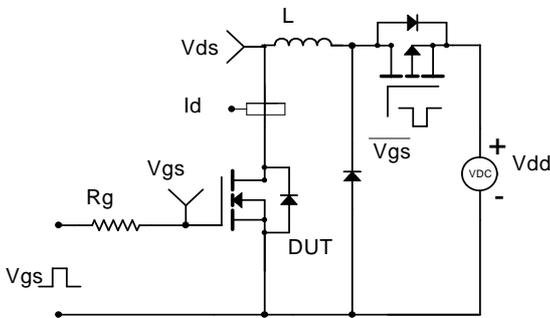
Diode Recovery Test Circuit & Waveforms

$$Q_{rr} = -\int I dt$$