



THE DATASHEET OF AOI452



AOI452A
N-Channel SDMOS™ Power Transistor
General Description

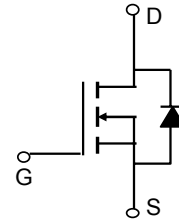
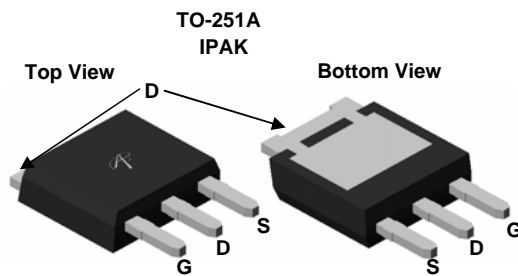
The AOI452A is fabricated with SDMOS™ trench technology that combines excellent $R_{DS(ON)}$ with low gate charge. The result is outstanding efficiency with controlled switching behavior. This universal technology is well suited for PWM, load switching and general purpose applications.

- RoHS Compliant
- Halogen Free

Features

V_{DS} (V) = 25V
 I_D = 55A ($V_{GS} = 10V$)
 $R_{DS(ON)} < 7.3m\Omega$ ($V_{GS} = 10V$)
 $R_{DS(ON)} < 14m\Omega$ ($V_{GS} = 4.5V$)

100% UIS Tested!
100% R_g Tested!


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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	25	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ^G	$T_C=25^\circ\text{C}$	55	A
	$T_C=100^\circ\text{C}$	43	
Pulsed Drain Current ^C	I_{DM}	120	
Continuous Drain Current	$T_A=25^\circ\text{C}$	16	A
	$T_A=70^\circ\text{C}$	13	
Avalanche Current ^C	I_{AR}	27	A
Repetitive avalanche energy $L=0.1\text{mH}$ ^C	E_{AR}	36	mJ
Power Dissipation ^B	$T_C=25^\circ\text{C}$	50	W
	$T_C=100^\circ\text{C}$	25	
Power Dissipation ^A	$T_A=25^\circ\text{C}$	3.2	W
	$T_A=70^\circ\text{C}$	2.2	
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	$R_{\theta JA}$	14.2	17	$^\circ\text{C}/\text{W}$
Maximum Junction-to-Ambient ^{A,D}		Steady-State	39	47
Maximum Junction-to-Case	$R_{\theta JC}$	2.5	3	$^\circ\text{C}/\text{W}$

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	25			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =25V, V _{GS} =0V T _J =55°C			10 50	μA
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	1.5	2	2.5	V
I _{D(ON)}	On state drain current	V _{GS} =10V, V _{DS} =5V	120			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =20A T _J =125°C		6 9	7.3 10.8	mΩ
		V _{GS} =4.5V, I _D =20A		11.1	14	mΩ
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =20A		50		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.7	1	V
I _S	Maximum Body-Diode Continuous Current				55	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance		990	1180	1450	pF
C _{oss}	Output Capacitance	V _{GS} =0V, V _{DS} =12.5V, f=1MHz	210	275	350	pF
C _{rss}	Reverse Transfer Capacitance		125	175	245	pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz	1.1	1.7	2.5	Ω
SWITCHING PARAMETERS						
Q _g (10V)	Total Gate Charge		17	21.7	26	nC
Q _g (4.5V)	Total Gate Charge	V _{GS} =10V, V _{DS} =12.5V, I _D =20A	35	11	13	nC
Q _{gs}	Gate Source Charge		3	4	5	nC
Q _{gd}	Gate Drain Charge		4	6.4	9	nC
t _{D(on)}	Turn-On Delay Time			6.8		ns
t _r	Turn-On Rise Time	V _{GS} =10V, V _{DS} =12.5V, R _L =0.42Ω,		13.8		ns
t _{D(off)}	Turn-Off Delay Time	R _{GEN} =3Ω		21.5		ns
t _f	Turn-Off Fall Time			8.7		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =20A, dI/dt=500A/μs	8.5	10.6	13	ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =20A, dI/dt=500A/μs	13	16	20	nC

A. The value of R_{θJA} is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The Power dissipation P_{DSM} is based on 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. Ratings are based on low frequency and duty cycles to keep initial T_J=25°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 <300μs 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 in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C.

Rev 0 : Nov-08

COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS ARE NOT AUTHORIZED. AOS DOES NOT ASSUME ANY LIABILITY ARISING OUT OF SUCH APPLICATIONS OR USES OF ITS PRODUCTS. AOS RESERVES THE RIGHT TO IMPROVE PRODUCT DESIGN, FUNCTIONS AND RELIABILITY WITHOUT NOTICE.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

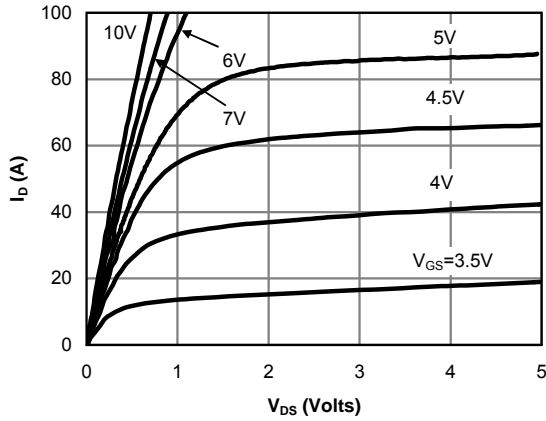


Figure 1: On-Region Characteristics (Note E)

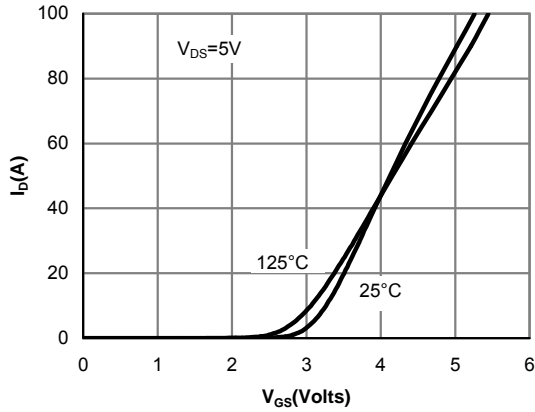


Figure 2: Transfer Characteristics (Note E)

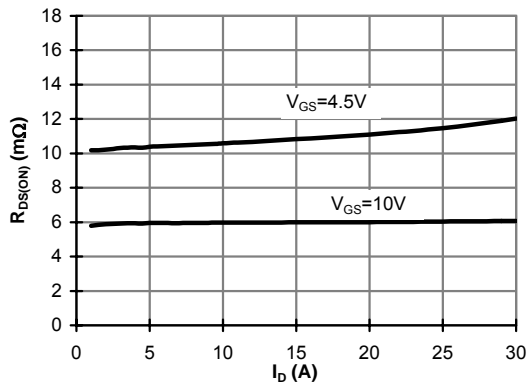


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

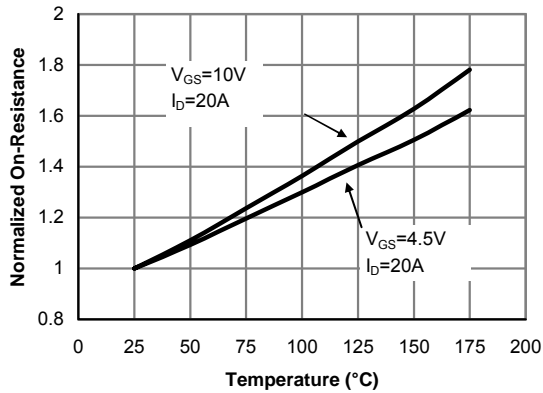


Figure 4: On-Resistance vs. Junction Temperature (Note E)

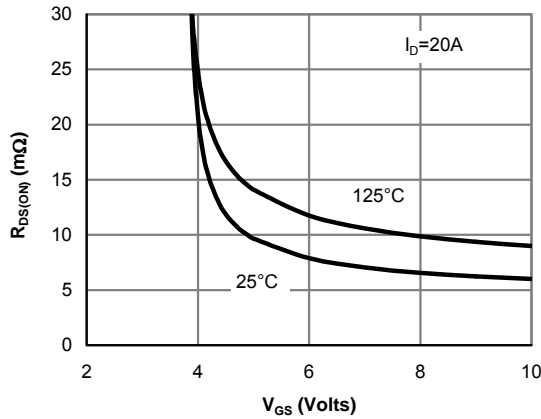


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

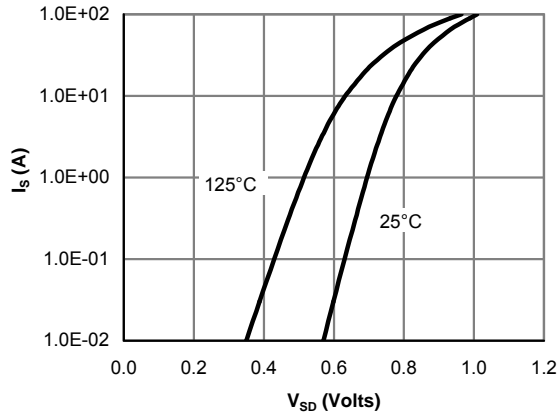


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

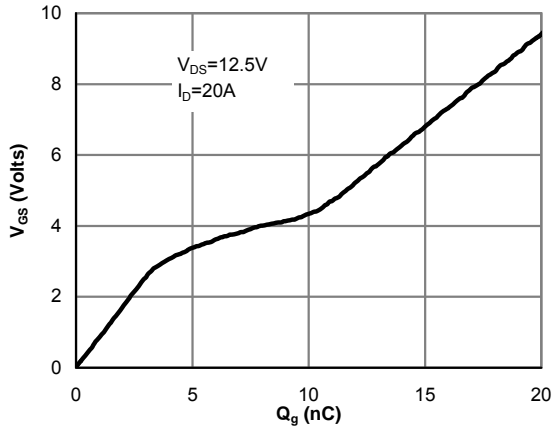


Figure 7: Gate-Charge Characteristics

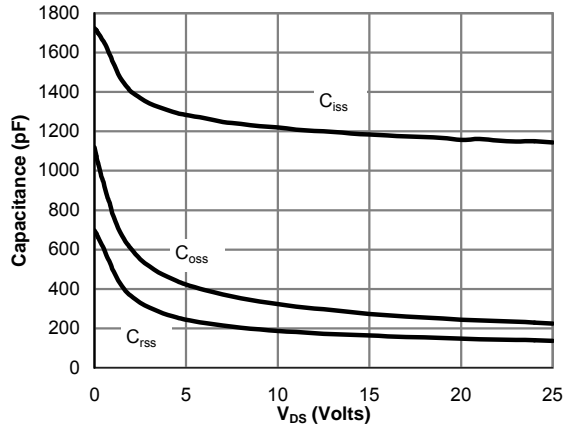


Figure 8: Capacitance Characteristics

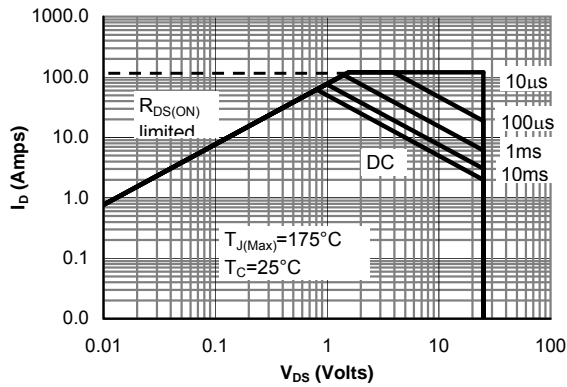


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

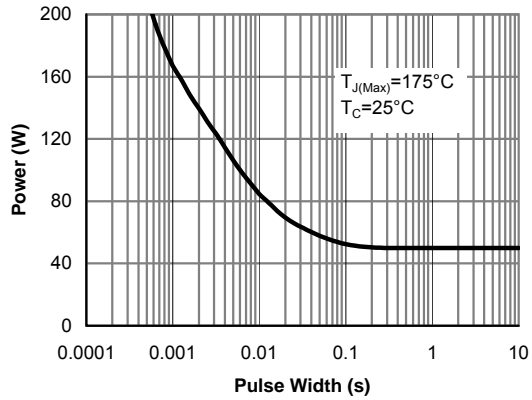


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

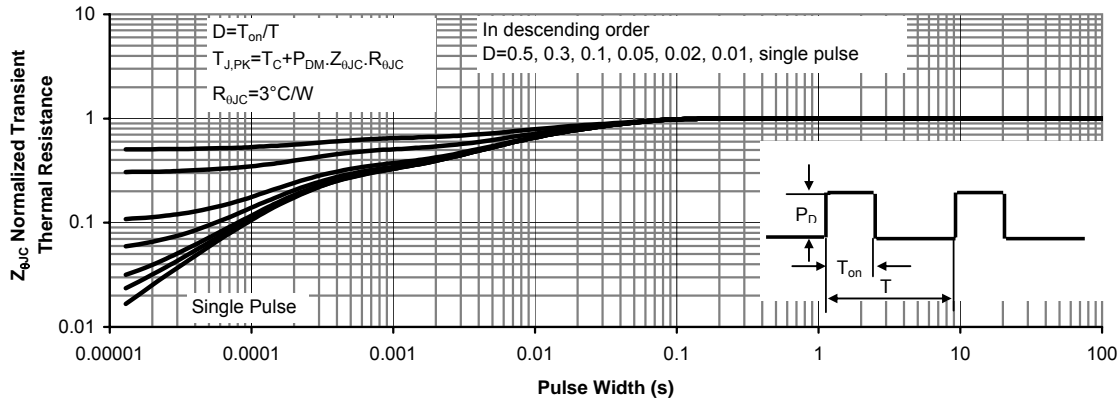


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

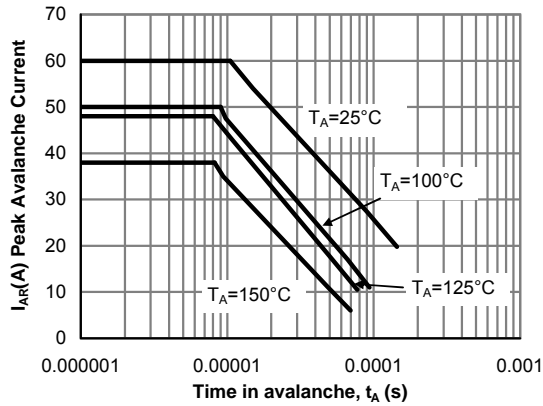


Figure 12: Single Pulse Avalanche capability (Note C)

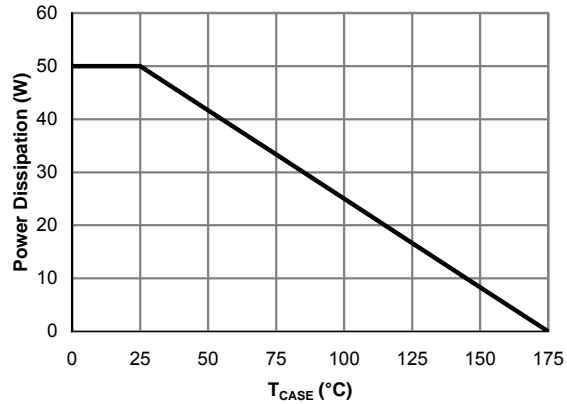


Figure 13: Power De-rating (Note F)

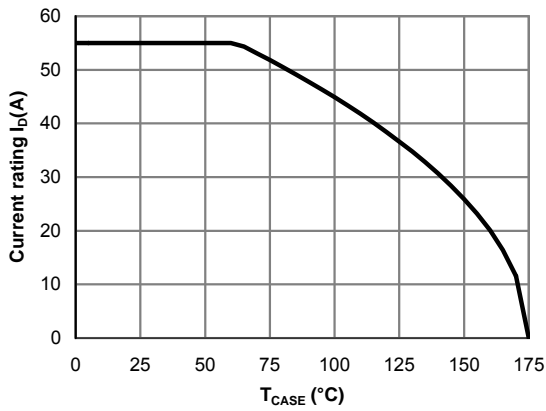


Figure 14: Current De-rating (Note F)

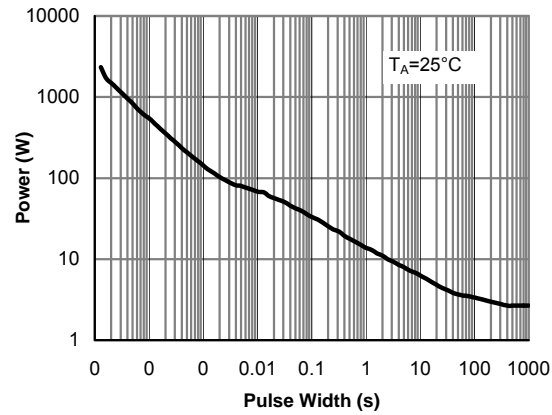


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

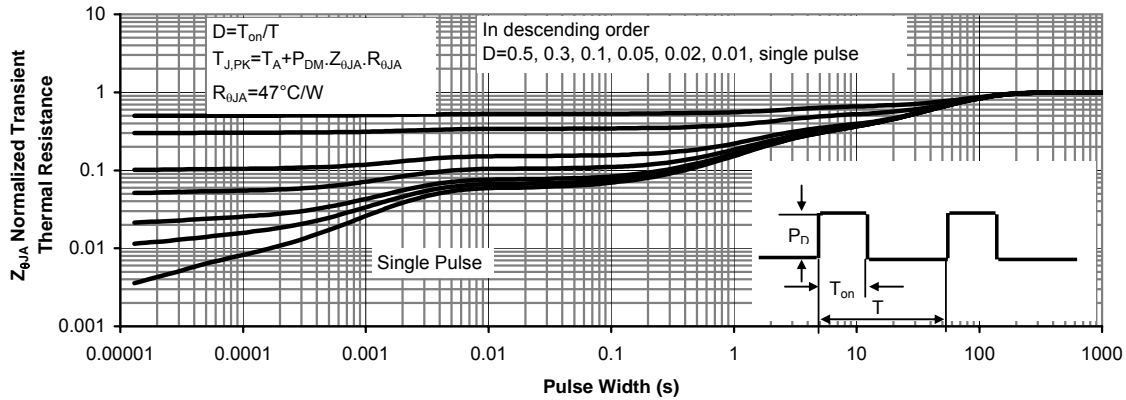


Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

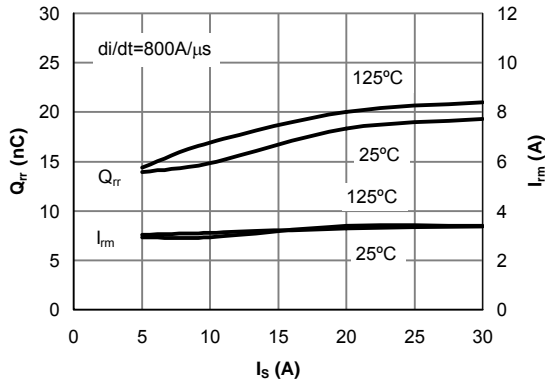


Figure 17: Diode Reverse Recovery Charge and Peak Current vs. Conduction Current

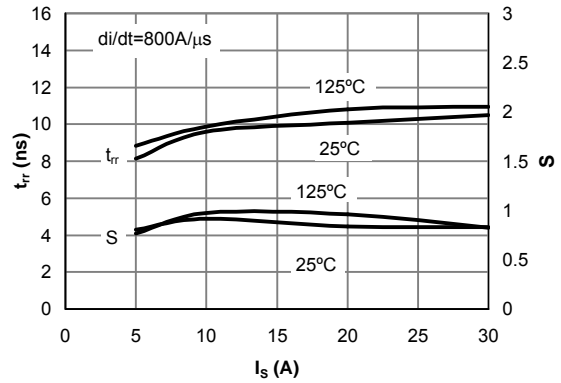


Figure 18: Diode Reverse Recovery Time and Softness Factor vs. Conduction Current

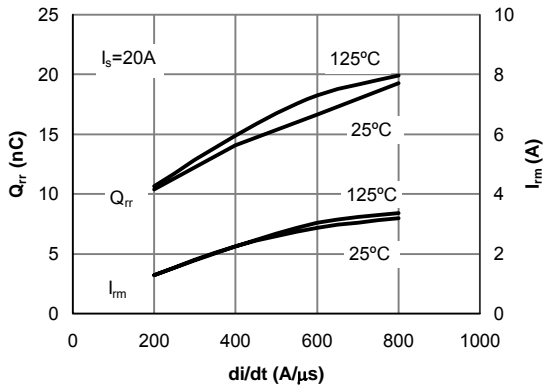


Figure 19: Diode Reverse Recovery Charge and Peak Current vs. di/dt

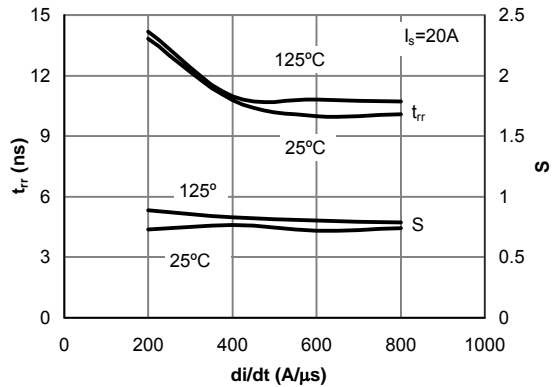
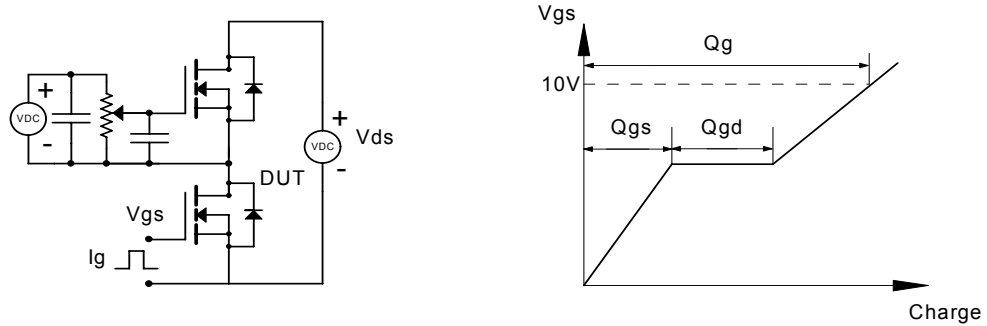
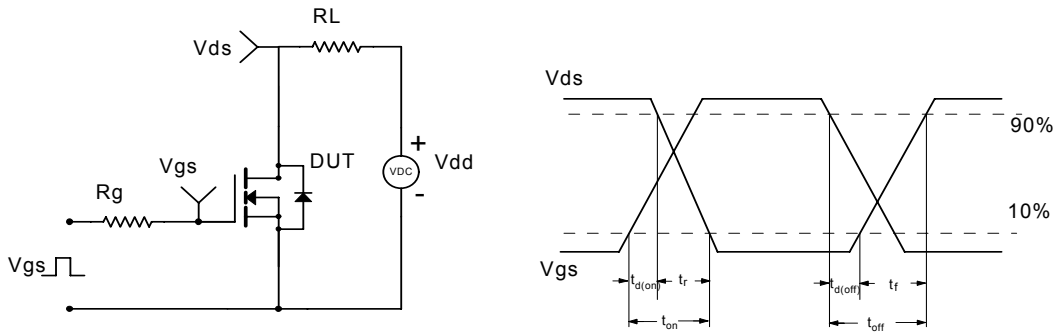


Figure 20: Diode Reverse Recovery Time and Softness Factor vs. di/dt

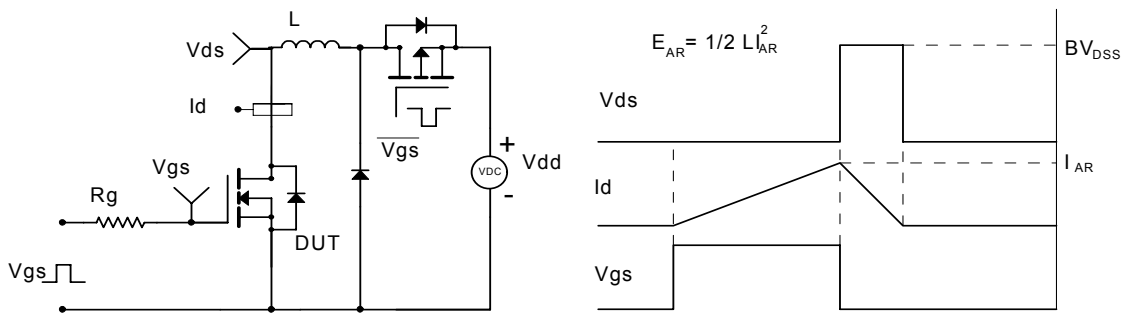
Gate Charge Test Circuit & Waveform



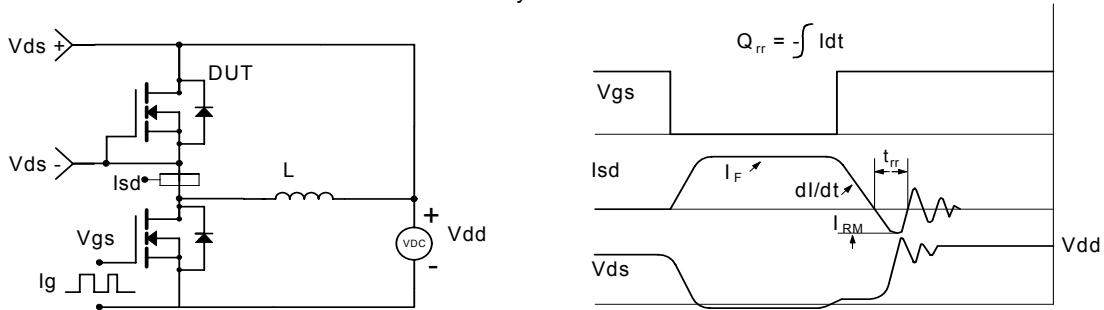
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

- ⊖ [View AOI452 on WIN SOURCE](#)
- ⊖ [Alpha & Omega Semiconductor Inc. Information](#)

Optimize Your Supply Chain with WIN SOURCE Solutions

- ✓ Global Sourcing Solution
- ✓ Obsolete Management
- ✓ Cost Control Management
- ✓ Shortage Management
- ✓ Alternative Solution
- ✓ Excess Inventory Management