

General Description

- Latest Advanced Trench Technology
- Low $R_{DS(ON)}$
- High Current Capability
- RoHS and Halogen-Free Compliant

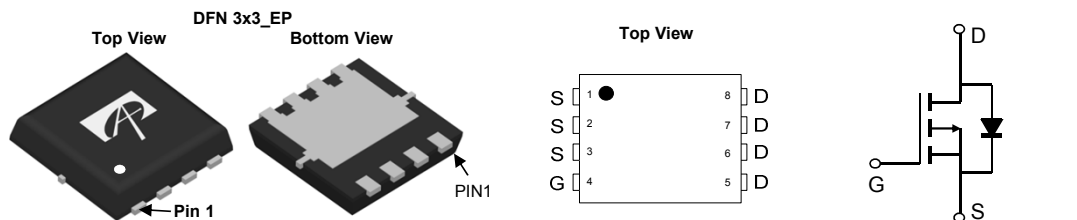
Applications

- Notebook AC-in Load Switch
- Battery Protection Charge/Discharge

Product Summary

V_{DS}	-30V
I_D (at $V_{GS}=-10V$)	-24A
$R_{DS(ON)}$ (at $V_{GS}=-10V$)	< 16.5m Ω
$R_{DS(ON)}$ (at $V_{GS}=-4.5V$)	< 29.5m Ω

100% UIS Tested
 100% Rg Tested



Orderable Part Number	Package Type	Form	Minimum Order Quantity
AONR21321	DFN 3x3 EP	Tape & Reel	5000

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 ^G	$T_C=25^\circ\text{C}$	-24	A
	$T_C=100^\circ\text{C}$	-20	
Pulsed Drain Current ^C	I_{DM}	-66	
Continuous Drain Current	$T_A=25^\circ\text{C}$	-13	A
	$T_A=70^\circ\text{C}$	-10	
Avalanche Current ^C	I_{AS}	25	A
Avalanche energy L=0.1mH ^C	E_{AS}	31	mJ
Power Dissipation ^B	$T_C=25^\circ\text{C}$	24	W
	$T_C=100^\circ\text{C}$	9.6	
Power Dissipation ^A	$T_A=25^\circ\text{C}$	4.1	W
	$T_A=70^\circ\text{C}$	2.6	
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 ^A $t \leq 10s$	$R_{\theta JA}$	24	30	$^\circ\text{C/W}$
Maximum Junction-to-Ambient ^{A,D} Steady-State		47	60	$^\circ\text{C/W}$
Maximum Junction-to-Case Steady-State	$R_{\theta JC}$	4.2	5.2	$^\circ\text{C/W}$

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			±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =-250μA	-1.3	-1.8	-2.3	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} =-10V, I _D =-12A T _J =125°C		13.5	16.5	mΩ
		V _{GS} =-4.5V, I _D =-10A		19.5	23.5	
g _{FS}	Forward Transconductance	V _{DS} =-5V, I _D =-12A		25		S
V _{SD}	Diode Forward Voltage	I _S =-1A, V _{GS} =0V		-0.72	-1	V
I _S	Maximum Body-Diode Continuous Current ^G				-24	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =-15V, f=1MHz		1180		pF
C _{oss}	Output Capacitance			185		pF
C _{rss}	Reverse Transfer Capacitance			155		pF
R _g	Gate resistance	f=1MHz		5	10	Ω
SWITCHING PARAMETERS						
Q _{g(10V)}	Total Gate Charge	V _{GS} =-10V, V _{DS} =-15V, I _D =-12A		21	34	nC
Q _{g(4.5V)}	Total Gate Charge			11	18	
Q _{gs}	Gate Source Charge			6		
Q _{gd}	Gate Drain Charge			3		
t _{D(on)}	Turn-On DelayTime	V _{GS} =-10V, V _{DS} =-15V, R _L =1.3Ω, R _{GEN} =3Ω		10.5		ns
t _r	Turn-On Rise Time			8.5		
t _{D(off)}	Turn-Off DelayTime			30		
t _f	Turn-Off Fall Time			11.5		
t _{rr}	Body Diode Reverse Recovery Time	I _F =-12A, di/dt=500A/μs		10		ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =-12A, di/dt=500A/μs		15		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} ≤ 10s and the maximum allowed junction temperature of 150° C. The value in any given application depends on the user's specific board design.

B. The power dissipation P_D is based on T_{J(MAX)}=150° 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. Single pulse width limited by junction temperature T_{J(MAX)}=150° 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)}=150° C. The SOA curve provides a single pulse rating.

G. The maximum current rating is package limited.

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.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

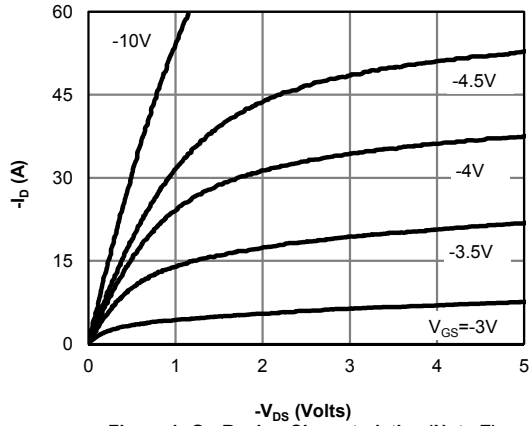


Figure 1: On-Region Characteristics (Note E)

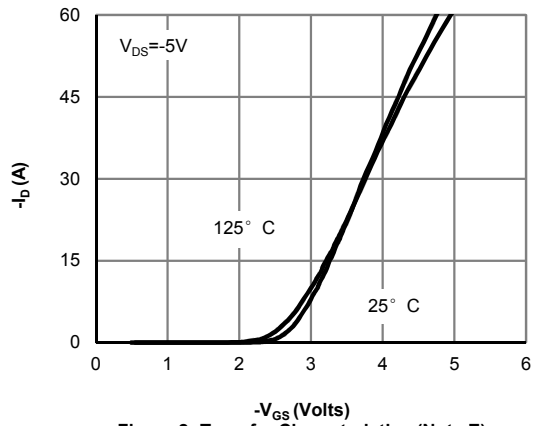


Figure 2: Transfer Characteristics (Note E)

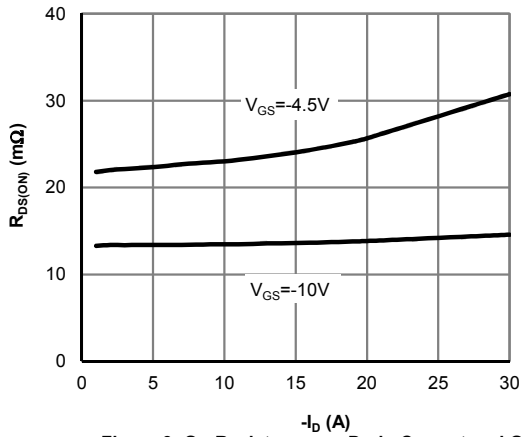


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

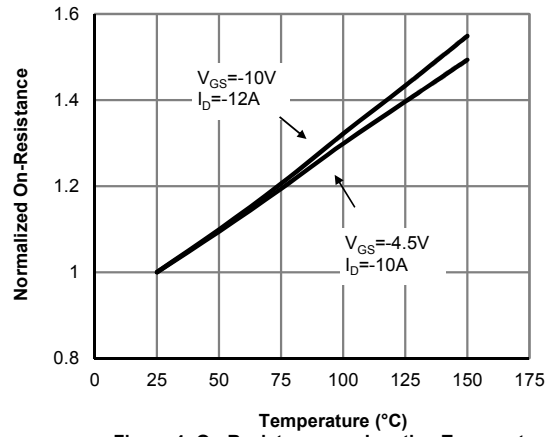


Figure 4: On-Resistance vs. Junction Temperature (Note E)

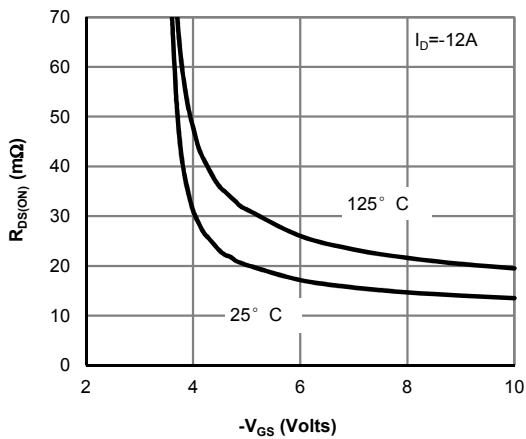


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

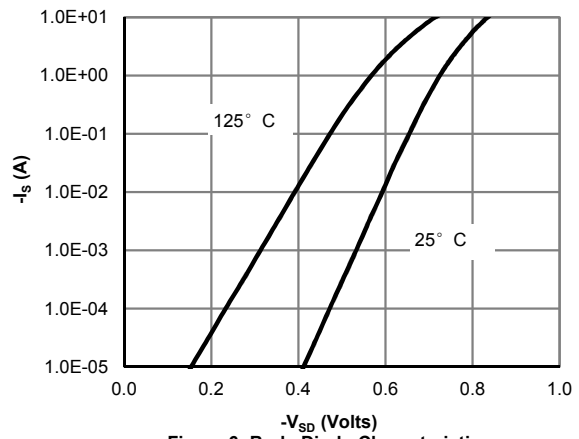


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

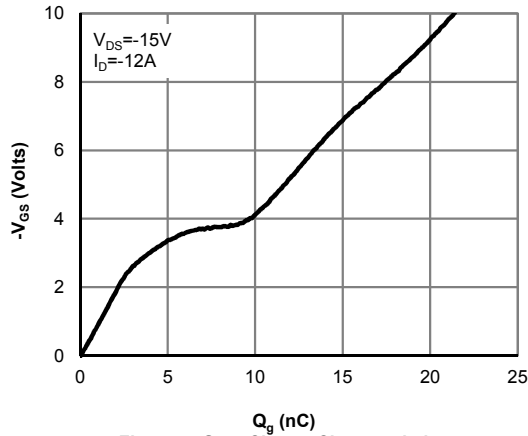


Figure 7: Gate-Charge Characteristics

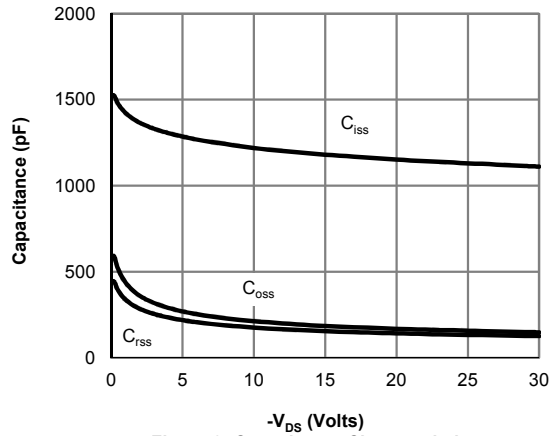


Figure 8: Capacitance Characteristics

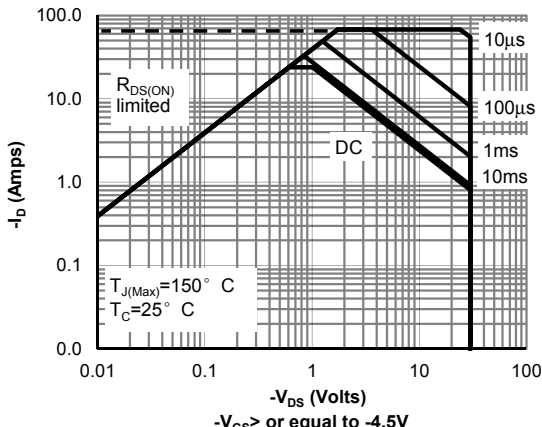


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

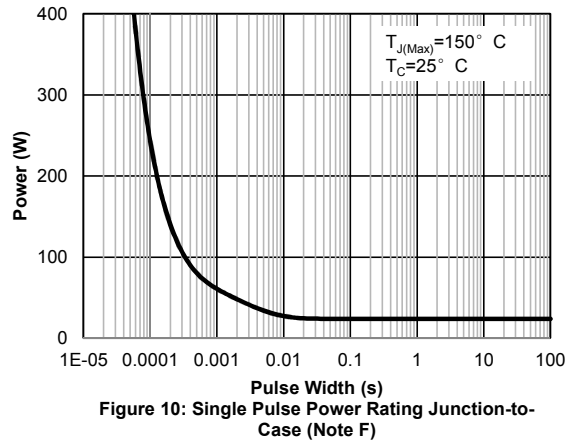


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

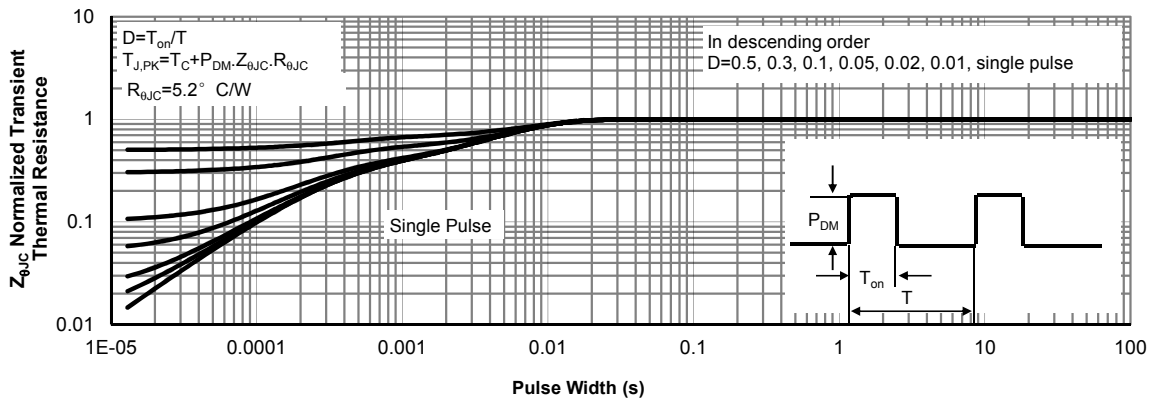


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

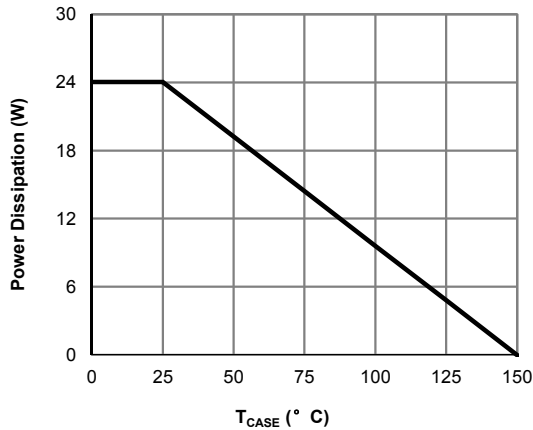


Figure 12: Power De-rating (Note F)

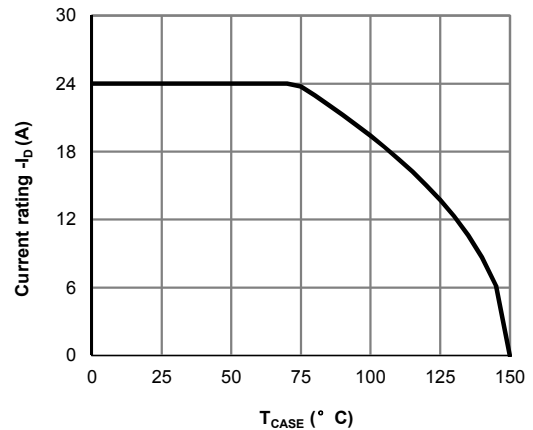


Figure 13: Current De-rating (Note F)

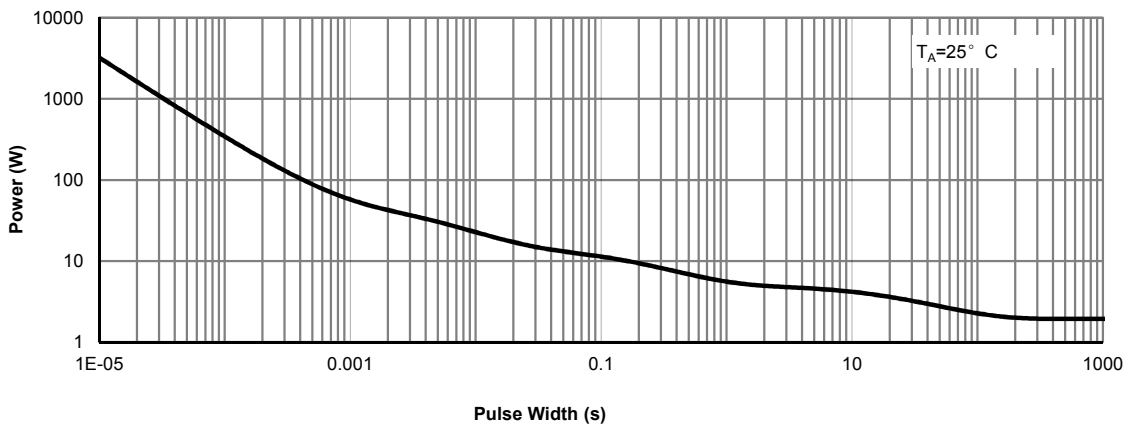


Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note H)

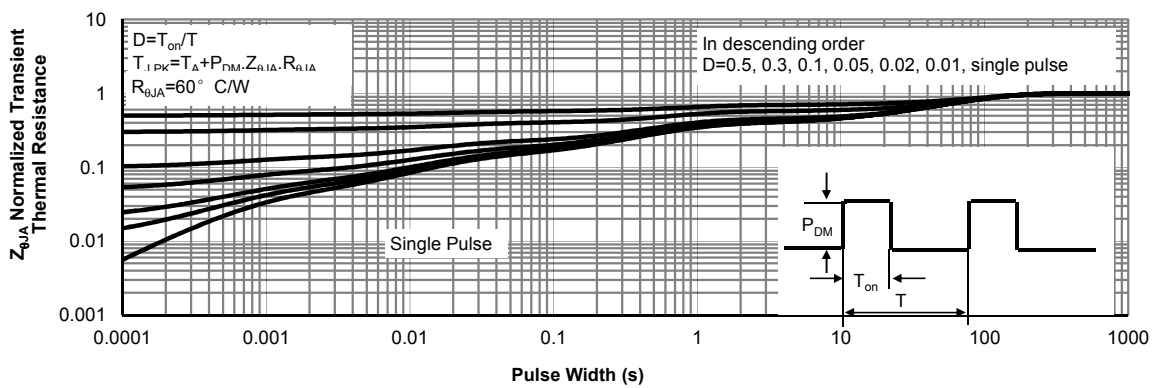
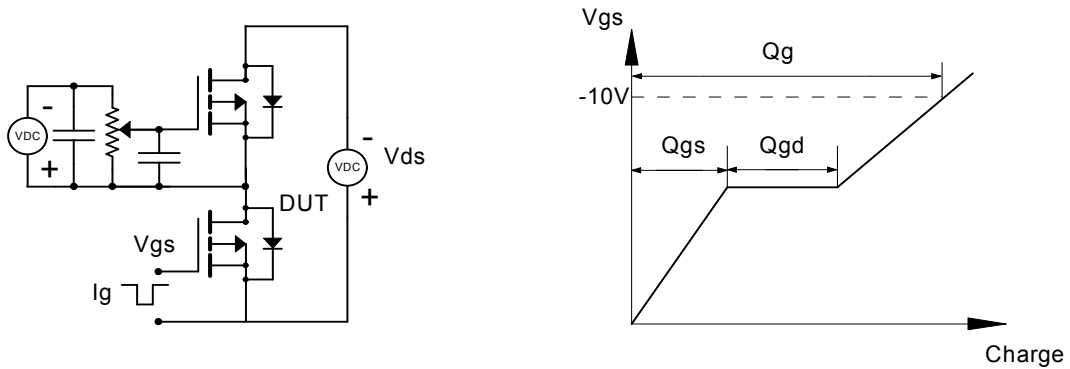
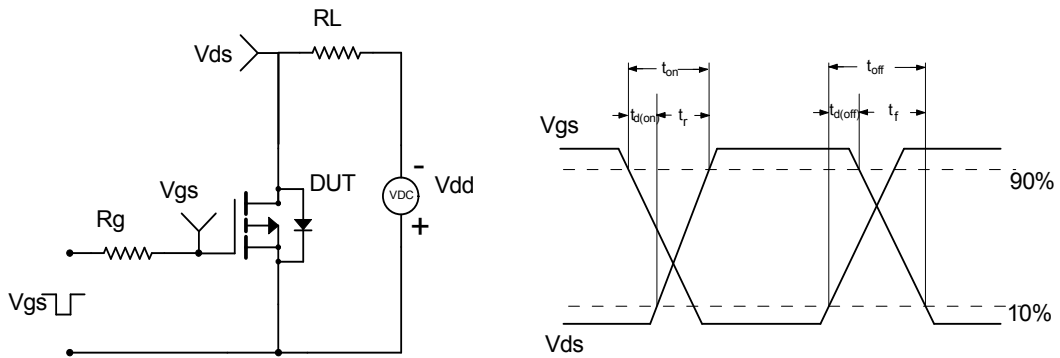


Figure 15: Normalized Maximum Transient Thermal Impedance (Note H)

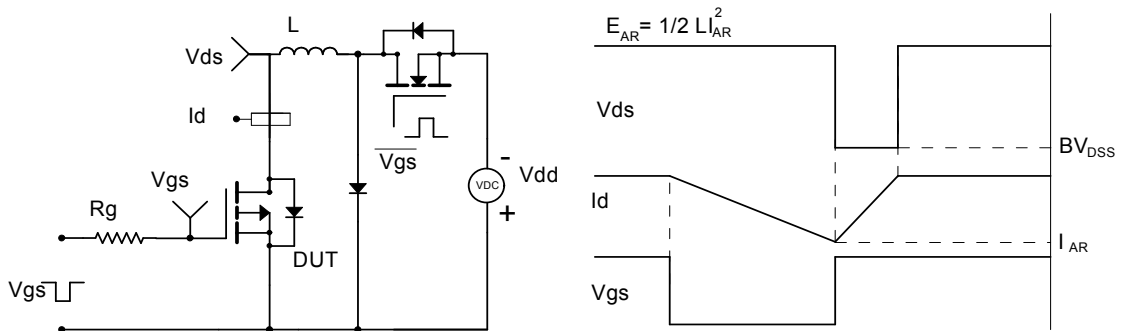
Gate Charge Test Circuit & Waveform



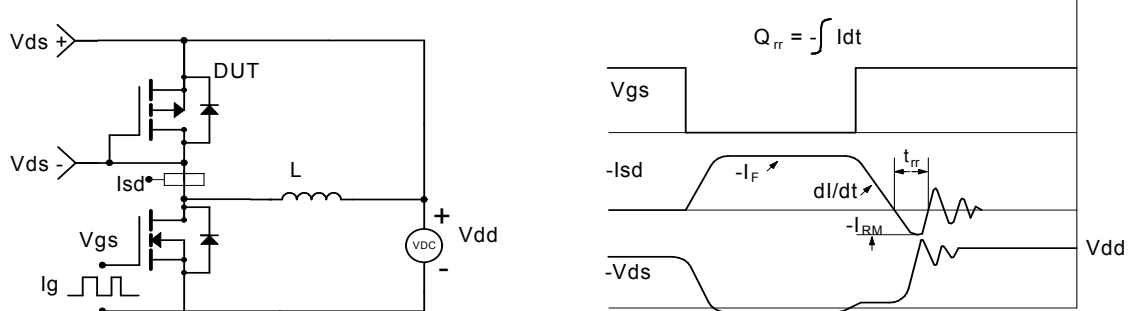
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



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