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AOT2916L/AOTF2916L
100V N-Channel MOSFET

General Description

The AOT2916L & AOTF2916L uses trench MOSFET technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of $R_{DS(ON)}$, Ciss and Coss. This device is ideal for boost converters and synchronous rectifiers for consumer, telecom, industrial power supplies and LED backlighting.

Product Summary

V_{DS}	100V
I_D (at V_{GS}=10V)	23A / 17A
$R_{DS(ON)}$ (at V_{GS}=10V)	< 34mΩ
$R_{DS(ON)}$ (at V_{GS}=4.5V)	< 43.5mΩ

100% UIS Tested
100% R_g Tested

Green Product

Top View
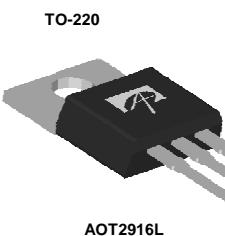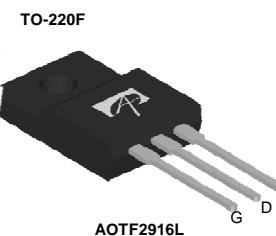
TO-220

TO-220F
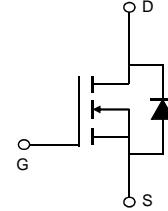
AOT2916L

AOTF2916L

Absolute Maximum Ratings T_A=25℃ unless otherwise noted

Parameter		Symbol	AOT2916L	AOTF2916L	Units
Drain-Source Voltage		V_{DS}	100		V
Gate-Source Voltage		V_{GS}	±20		V
Continuous Drain Current	T_C=25℃	I_D	23	17	A
	T_C=100℃		16	12	
Pulsed Drain Current [C]		I_{DM}	50		
Continuous Drain Current	T_A=25℃	I_{DSM}	5		A
	T_A=70℃		4		
Avalanche Current [C]		I_{AS}	8		A
Avalanche energy L=0.1mH [C]		E_{AS}	3		mJ
Power Dissipation [B]	T_C=25℃	P_D	41.5	23.5	W
	T_C=100℃		20.5	11.5	
Power Dissipation [A]	T_A=25℃	P_{DSM}	2.1		W
	T_A=70℃		1.3		
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 175		℃

Thermal Characteristics

Parameter		Symbol	AOT2916L	AOTF2916L	Units
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{θJA}$	15	15	℃/W
Maximum Junction-to-Ambient [A D]	Steady-State		60	60	℃/W
Maximum Junction-to-Case	Steady-State	$R_{θJC}$	3.6	6.4	℃/W

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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		100			V
I$_{DSS}$	Zero Gate Voltage Drain Current	V$_{DS}$=100V, 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		1.6	2	2.7	V
I$_{D(ON)}$	On state drain current	V$_{GS}$=10V, V$_{DS}$=5V		50			A
R$_{DS(ON)}$	Static Drain-Source On-Resistance	V$_{GS}$=10V, I$_D$=10A			28	34	mΩ
			T$_J$=125℃		51	62	
		V$_{GS}$=4.5V, I$_D$=3A			35	43.5	mΩ
g$_{FS}$	Forward Transconductance	V$_{DS}$=5V, I$_D$=10A			28		S
V$_{SD}$	Diode Forward Voltage	I$_S$=1A,V$_{GS}$=0V			0.75	1	V
I$_S$	Maximum Body-Diode Continuous Current					23	A
DYNAMIC PARAMETERS							
C$_{iss}$	Input Capacitance	V$_{GS}$=0V, V$_{DS}$=50V, f=1MHz			870		pF
C$_{oss}$	Output Capacitance				68		pF
C$_{rss}$	Reverse Transfer Capacitance				3.5		pF
R$_g$	Gate resistance	V$_{GS}$=0V, V$_{DS}$=0V, f=1MHz			7		Ω
SWITCHING PARAMETERS							
Q$_g$(10V)	Total Gate Charge	V$_{GS}$=10V, V$_{DS}$=50V, I$_D$=10A			12.5	20	nC
Q$_g$(4.5V)	Total Gate Charge				5.5	10	nC
Q$_{gs}$	Gate Source Charge				2.5		nC
Q$_{gd}$	Gate Drain Charge				2		nC
t$_{D(on)}$	Turn-On DelayTime	V$_{GS}$=10V, V$_{DS}$=50V, R$_L$=5Ω, R$_{GEN}$=3Ω			7.5		ns
t$_r$	Turn-On Rise Time				3.5		ns
t$_{D(off)}$	Turn-Off DelayTime				23		ns
t$_f$	Turn-Off Fall Time				5.5		ns
t$_{rr}$	Body Diode Reverse Recovery Time	I$_F$=10A, dI/dt=500A/µs			20		ns
Q$_{rr}$	Body Diode Reverse Recovery Charge	I$_F$=10A, dI/dt=500A/µs			88		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 limited by package.
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

Fig 1: On-Region Characteristics (Note E)
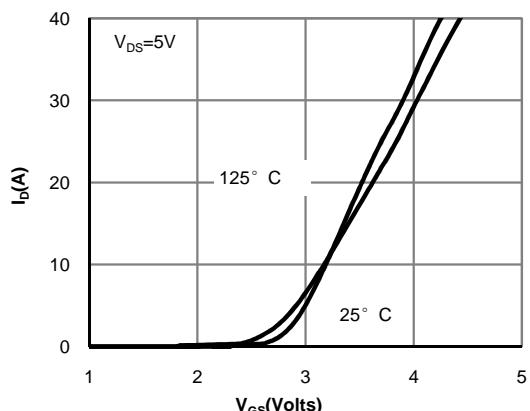
Figure 2: Transfer Characteristics (Note E)
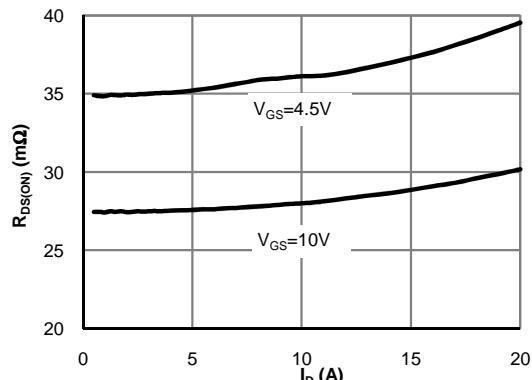
Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)
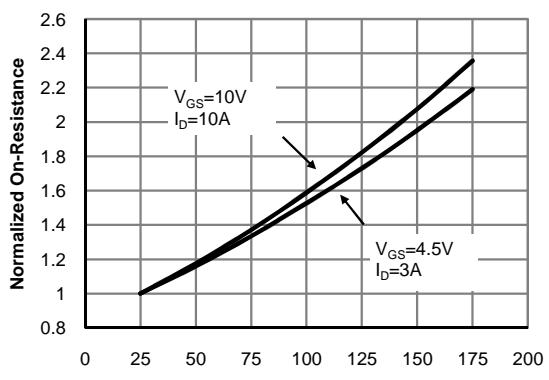
Figure 4: On-Resistance vs. Junction Temperature (Note E)
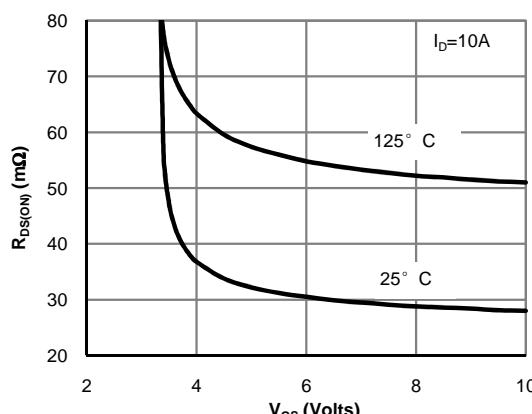
Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)
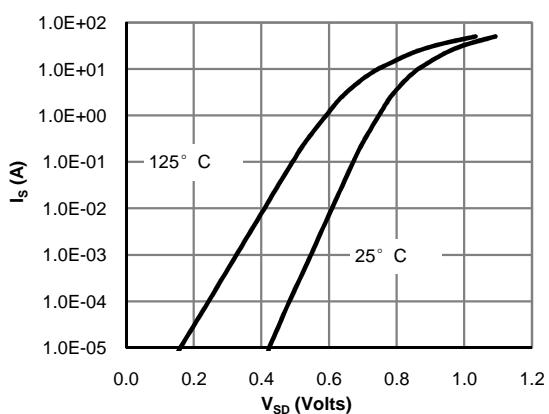
Figure 6: Body-Diode Characteristics (Note E)

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS
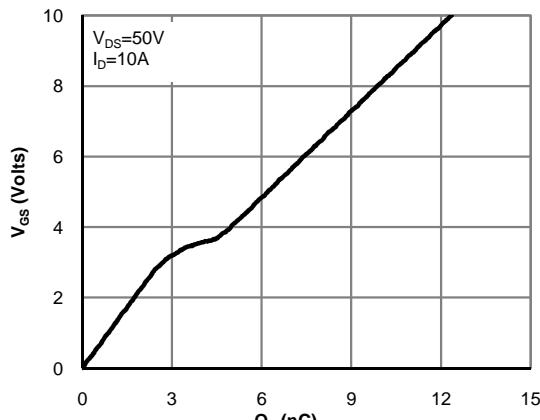
Figure 7: Gate-Charge Characteristics
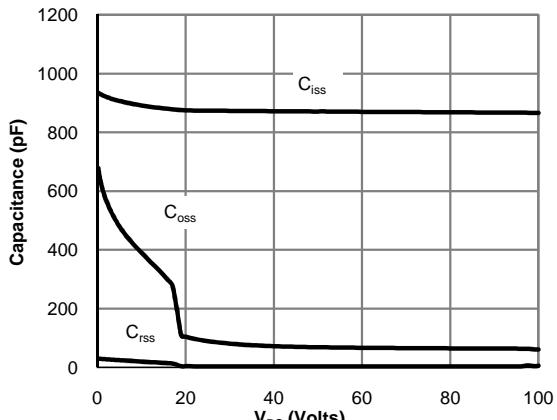
**Figure 8: Capacitance Characteristics**
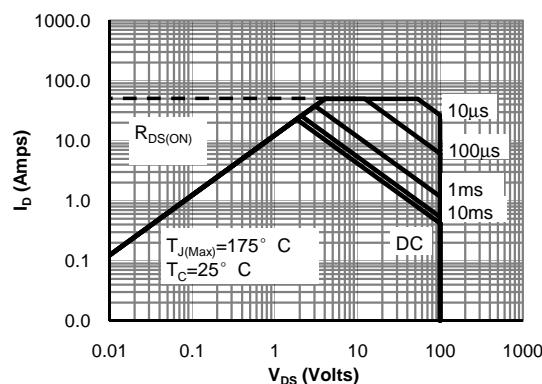
Figure 9: Maximum Forward Biased Safe Operating Area for AOT2916L (Note F)
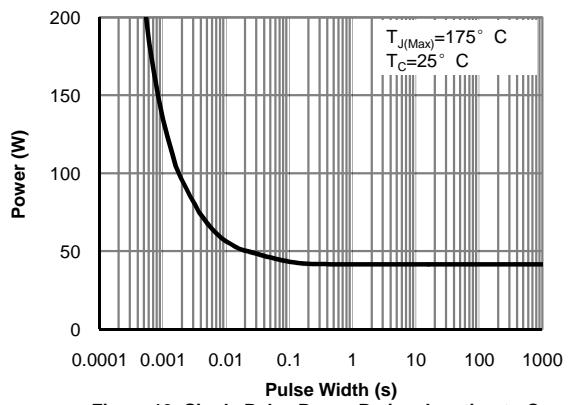

Figure 10: Single Pulse Power Rating Junction-to-Case for AOT2916L (Note F)
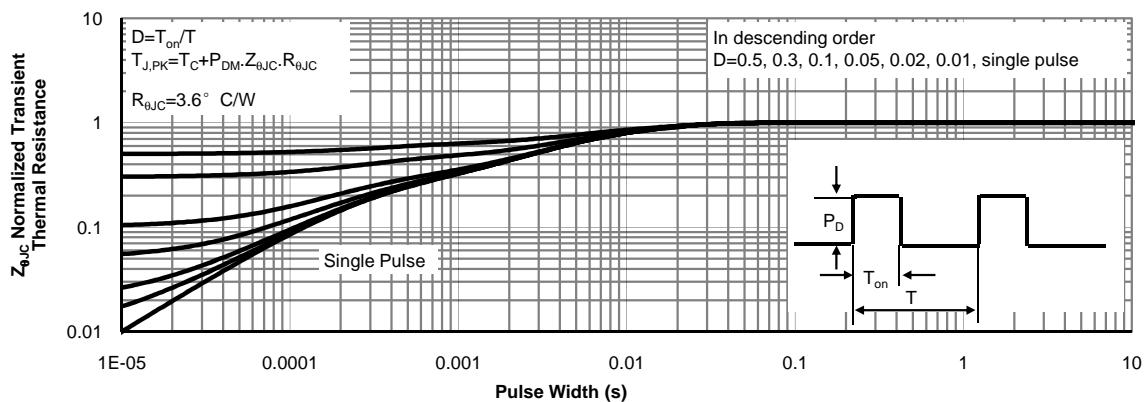
Figure 11: Normalized Maximum Transient Thermal Impedance for AOT2916L (Note F)

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

**Figure 9: Maximum Forward Biased
Safe Operating Area for AOTF2916L**

**Figure 10: Single Pulse Power Rating Junction-to-Case
for AOTF2916L (Note F)**

Figure 11: Normalized Maximum Transient Thermal Impedance for AOTF2916L (Note F)

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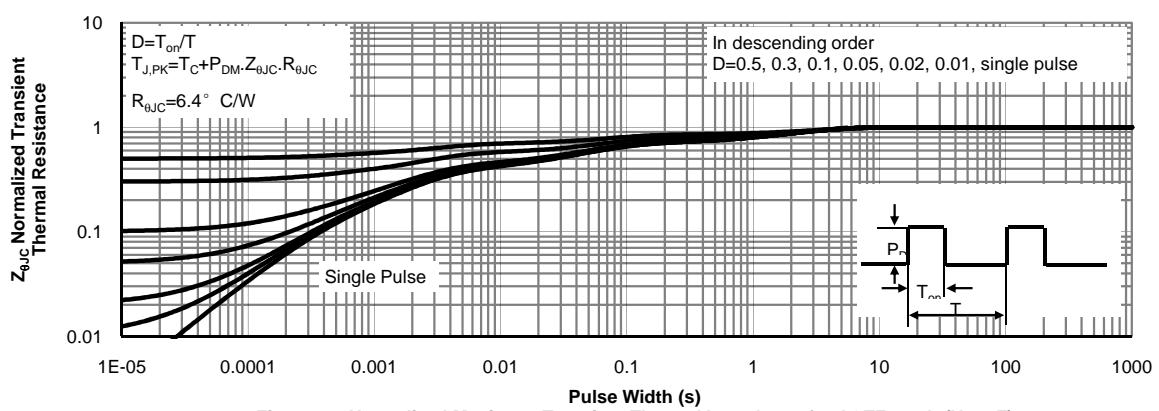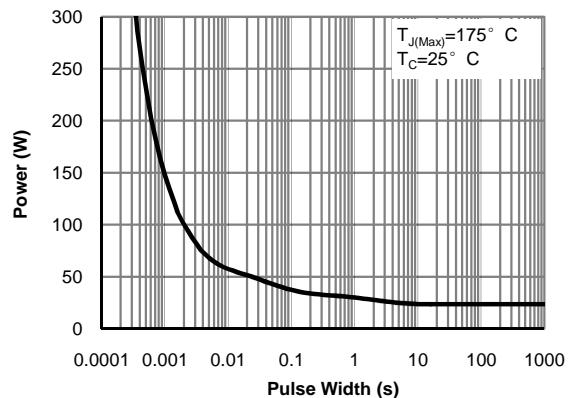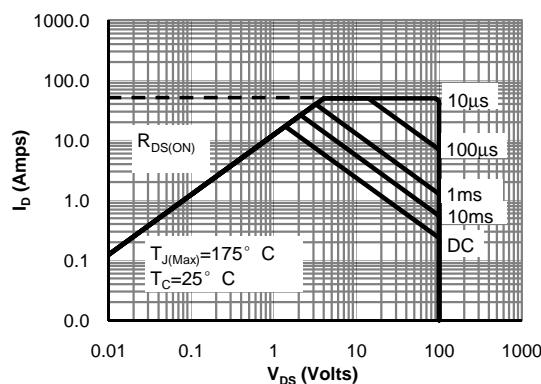
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS
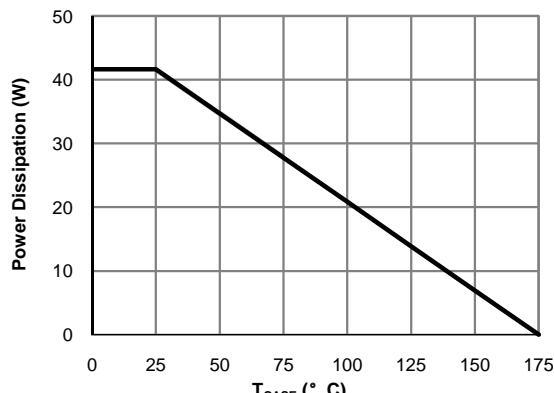
Figure 12: Power De-rating (Note F)
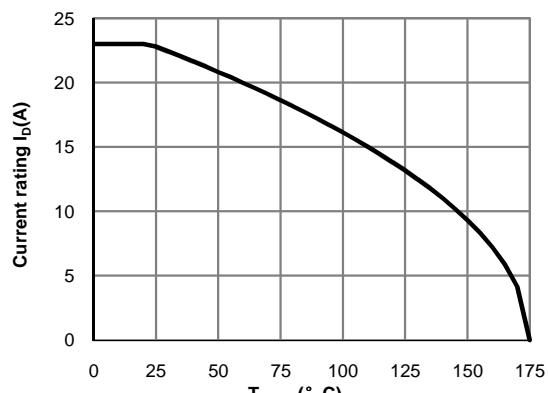
Figure 13: Current De-rating (Note F)

$T_A=25°C$
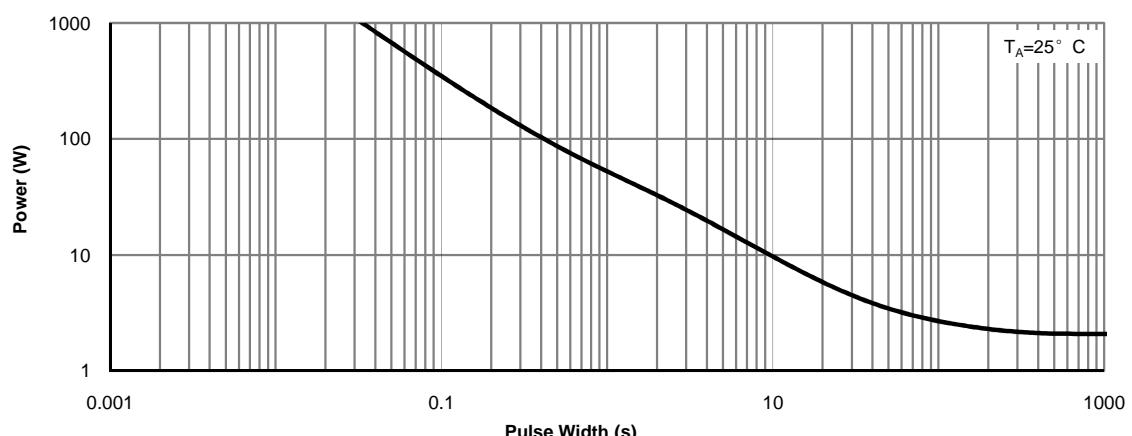
Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note H)

$D=T_{on}/T$
$T_{J,PK}=T_A+P_{DM}\cdot Z_{\theta JA}\cdot R_{\theta JA}$
$R_{\theta JA}=60°C/W$

In descending order
D=0.5, 0.3, 0.1, 0.05, 0.02, 0.01, single pulse

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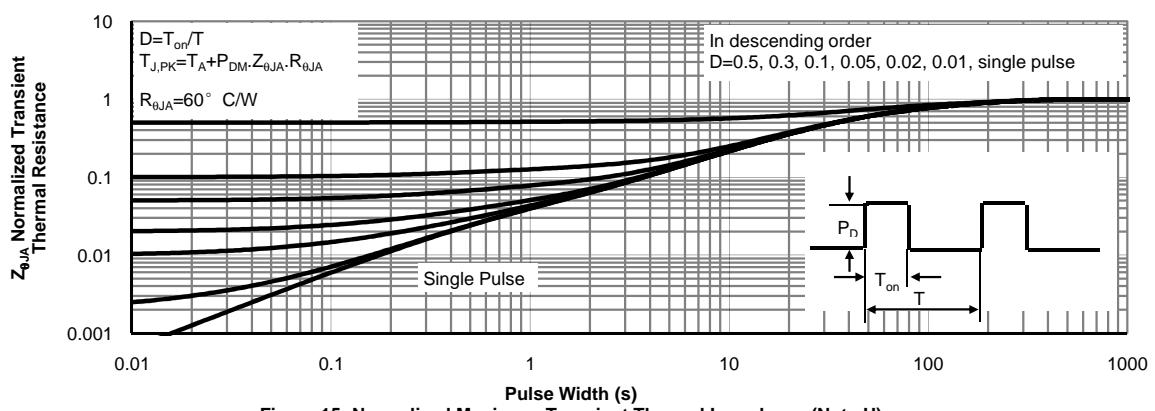
Figure 15: Normalized Maximum Transient Thermal Impedance (Note H)

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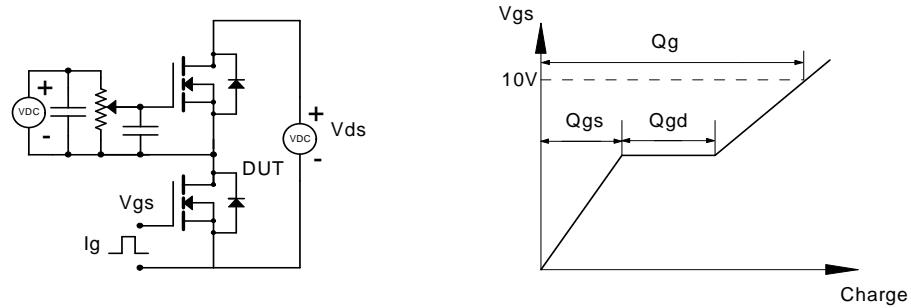
Resistive Switching Test Circuit & Waveforms
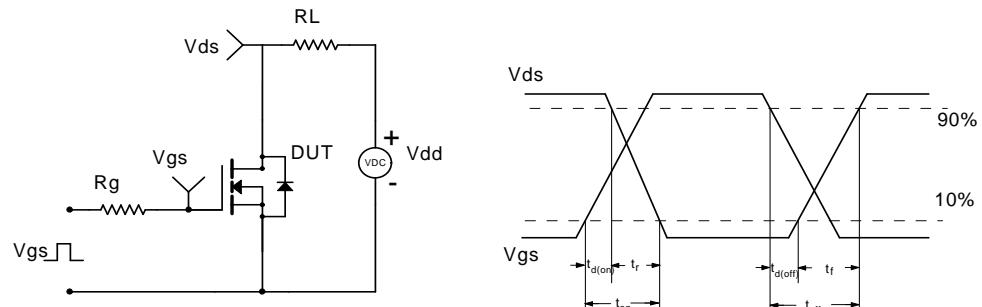
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

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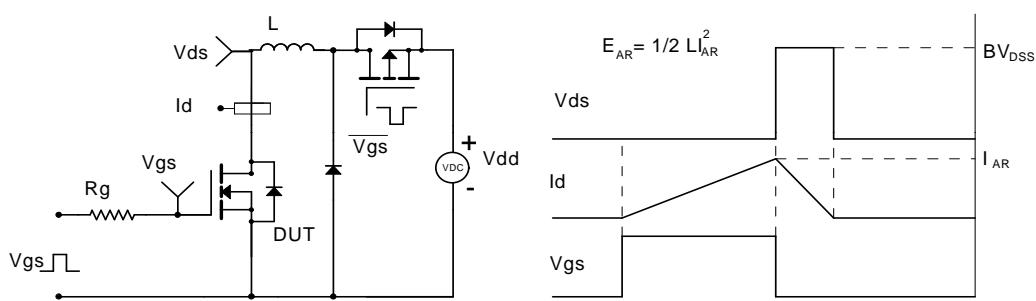
Diode Recovery Test Circuit & Waveforms

$Q_{rr} = -\int Idt$