ALPHA & OMEGA
SEMICONDUCTOR

AOT266L/AOB266L/AOTF266L

60V N-Channel MOSFET

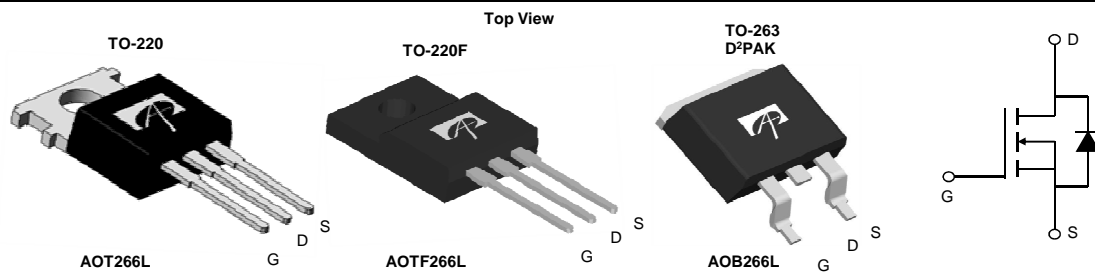## General Description

The AOT266L & AOB266L & AOTF266L 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}	60V
I_D (at V_{GS}=10V)	140A/78A
$R_{DS(ON)}$ (at V_{GS}=10V)	< 3.5mΩ (< 3.2mΩ*)
$R_{DS(ON)}$ (at V_{GS}=6V)	< 4.0mΩ (< 3.8mΩ*)

100% UIS Tested
100% R_g Tested

Green Product

Top View

TO-220   TO-220F   TO-263 D²PAK

AOT266L   AOTF266L   AOB266L

Orderable Part Number	Package Type	Form	Minimum Order Quantity
AOT266L	TO220 Green	Tube	1000
AOTF266L	TO220F Green	Tube	1000
AOB266L	TO263 Green	Tape & Reel	800

Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	AOT266L/AOB266L	AOTF266L	Units
Drain-Source Voltage		V_{DS}	60		V
Gate-Source Voltage		V_{GS}	±20		V
Continuous Drain Current [G]	T_C=25°C	I_D	140	78	A
	T_C=100°C		110	55	
Pulsed Drain Current [C]		I_{DM}	450		
Continuous Drain Current	T_A=25°C	I_{DSM}	18		A
	T_A=70°C		14		
Avalanche Current [C]		I_{AS}	90		A
Avalanche energy L=0.1mH [C]		E_{AS}	405		mJ
Power Dissipation [B]	T_C=25°C	P_D	268	45.5	W
	T_C=100°C		134	22.5	
Power Dissipation [A]	T_A=25°C	P_{DSM}	2.1		W
	T_A=70°C		1.3		
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 175		°C

Thermal Characteristics

Parameter		Symbol	AOT266L/AOB266L	AOTF266L	Units
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{θJA}$	15	15	°C/W
Maximum Junction-to-Ambient [A D]	Steady-State		60	60	°C/W
Maximum Junction-to-Case	Steady-State	$R_{θJC}$	0.56	3.3	°C/W

* Surface mount package TO263

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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		60			V
I$_{DSS}$	Zero Gate Voltage Drain Current	V$_{DS}$=60V, 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		2.2	2.7	3.2	V
R$_{DS(ON)}$	Static Drain-Source On-Resistance	V$_{GS}$=10V, I$_D$=20A TO220/TO220F			2.9	3.5	mΩ
			T$_J$=125℃		4.9	5.9	
		V$_{GS}$=6V, I$_D$=20A TO220/TO220F			3.2	4	mΩ
		V$_{GS}$=10V, I$_D$=20A TO263			2.6	3.2	mΩ
		V$_{GS}$=6V, I$_D$=20A TO263			3	3.8	mΩ
g$_{FS}$	Forward Transconductance	V$_{DS}$=5V, I$_D$=20A			80		S
V$_{SD}$	Diode Forward Voltage	I$_S$=1A,V$_{GS}$=0V			0.65	1	V
I$_S$	Maximum Body-Diode Continuous Current ^{G}					140	A
DYNAMIC PARAMETERS							
C$_{iss}$	Input Capacitance	V$_{GS}$=0V, V$_{DS}$=30V, f=1MHz			5650		pF
C$_{oss}$	Output Capacitance				720		pF
C$_{rss}$	Reverse Transfer Capacitance				20		pF
R$_g$	Gate resistance	V$_{GS}$=0V, V$_{DS}$=0V, f=1MHz		0.4	0.9	1.4	Ω
SWITCHING PARAMETERS							
Q$_g$(10V)	Total Gate Charge	V$_{GS}$=10V, V$_{DS}$=30V, I$_D$=20A			65	90	nC
Q$_{gs}$	Gate Source Charge				20		nC
Q$_{gd}$	Gate Drain Charge				7		nC
t$_{D(on)}$	Turn-On DelayTime	V$_{GS}$=10V, V$_{DS}$=30V, R$_L$=1.5Ω, R$_{GEN}$=3Ω			21		ns
t$_r$	Turn-On Rise Time				20		ns
t$_{D(off)}$	Turn-Off DelayTime				36		ns
t$_f$	Turn-Off Fall Time				6		ns
t$_{rr}$	Body Diode Reverse Recovery Time	I$_F$=20A, dI/dt=500A/µs			27		ns
Q$_{rr}$	Body Diode Reverse Recovery Charge	I$_F$=20A, dI/dt=500A/µs			145		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.
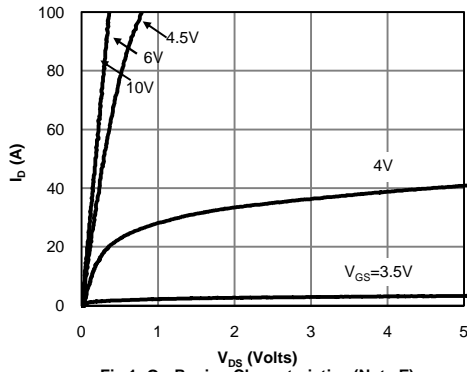
F. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T$_{J(MAX)}$=175° C. The SOA curve provides a single pulse rating.
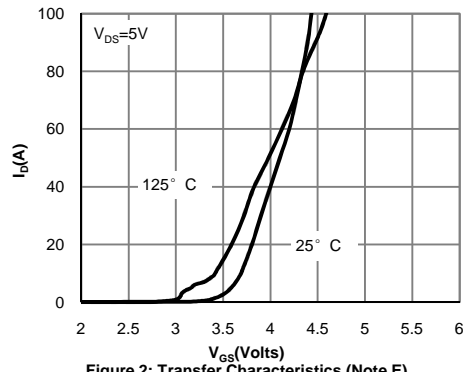
G. The maximum current limited by package.

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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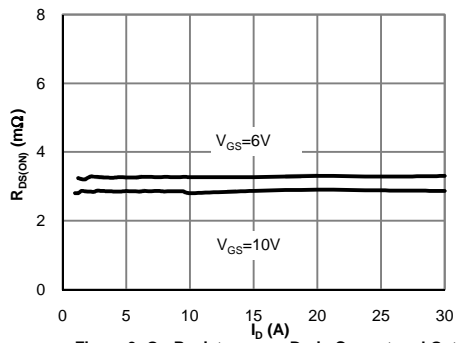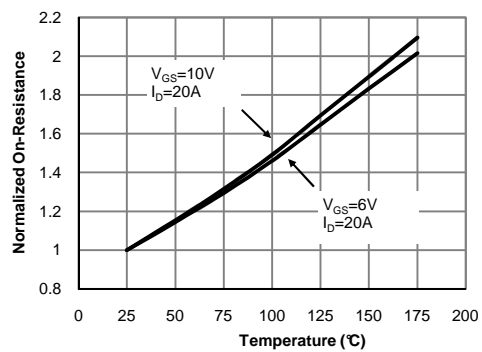
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Fig 1: On-Region Characteristics (Note E)
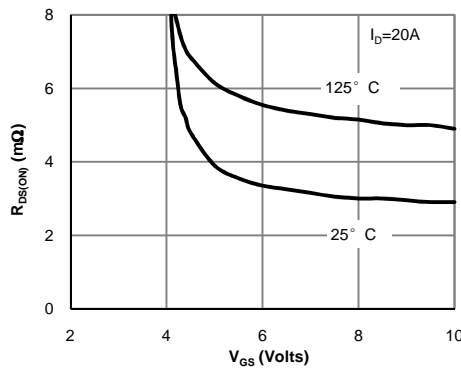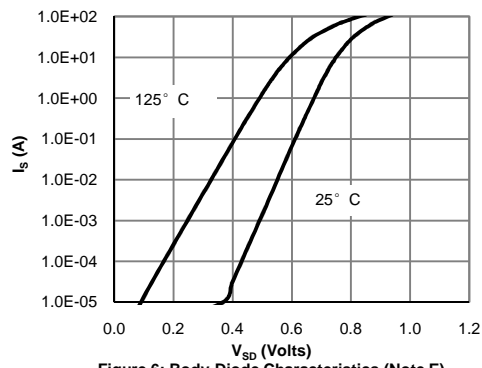
Figure 2: Transfer Characteristics (Note E)

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

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

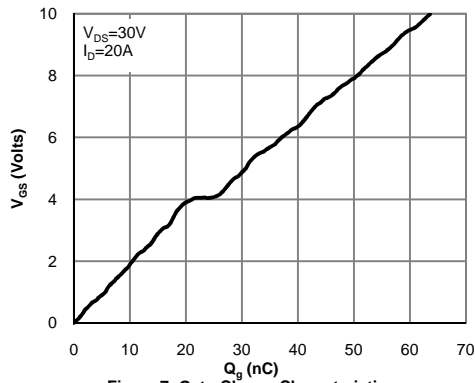Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

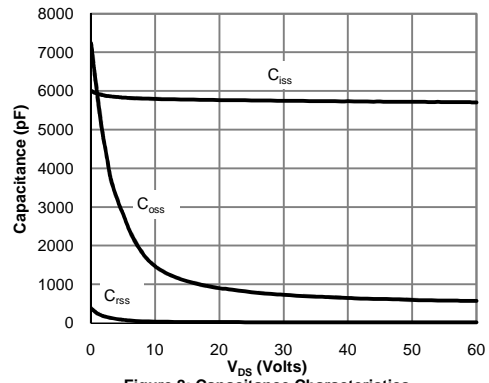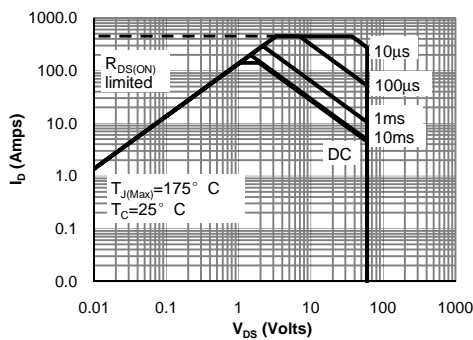Figure 6: Body-Diode Characteristics (Note E)

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Figure 7: Gate-Charge Characteristics

Figure 8: Capacitance Characteristics

Figure 9: Maximum Forward Biased Safe Operating Area for AOT266L and AOB266L (Note F)
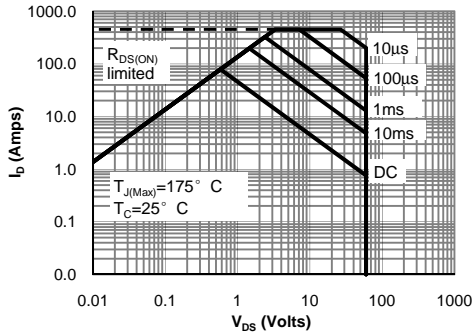

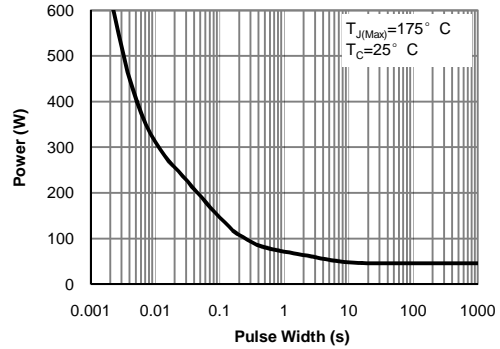**Figure 10: Single Pulse Power Rating Junction-to-Case for AOT266L and AOB266L (Note F)**

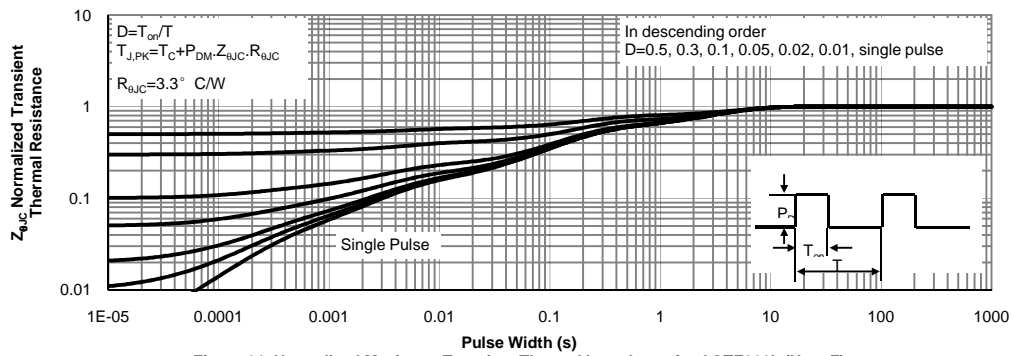**Figure 11: Normalized Maximum Transient Thermal Impedance for AOT266L and AOB266L (Note F)**

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

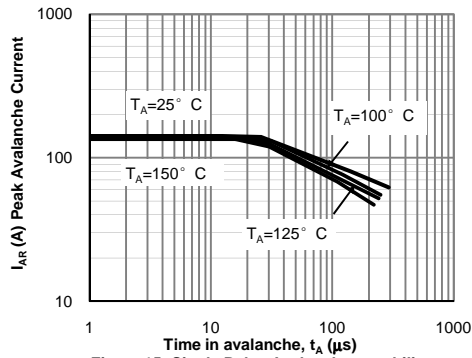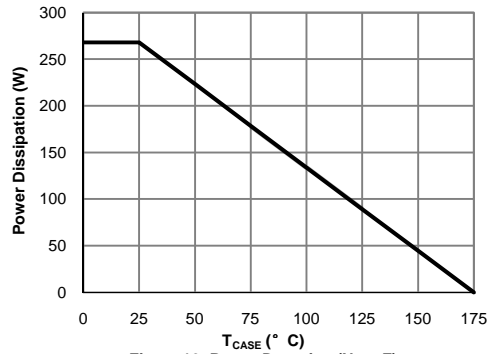**Figure 12: Maximum Forward Biased Safe Operating Area for AOTF266L (Note F)**

$T_{J(Max)}=175°C$
$T_C=25°C$

$R_{DS(ON)}$ limited

10μs
100μs
1ms
10ms
DC

Figure 13: Single Pulse Power Rating Junction-to-Case for AOTF266L (Note F)

$T_{J(Max)}=175°C$
$T_C=25°C$

Figure 14: Normalized Maximum Transient Thermal Impedance for AOTF266L (Note F)

$D=T_{on}/T$
$T_{J,PK}=T_C+P_{DM}·Z_{θJC}·R_{θJC}$
$R_{θJC}=3.3°C/W$

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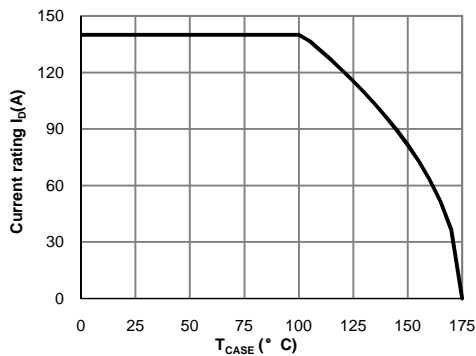D=0.5, 0.3, 0.1, 0.05, 0.02, 0.01, single pulse

Single Pulse

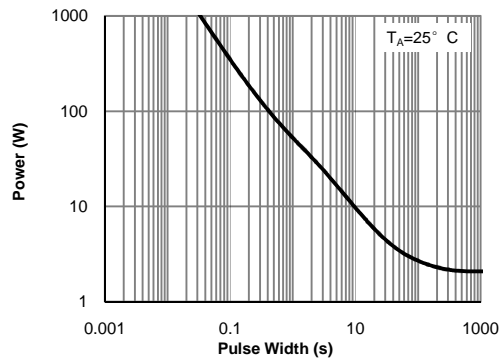## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 15: Single Pulse Avalanche capability (Note C)
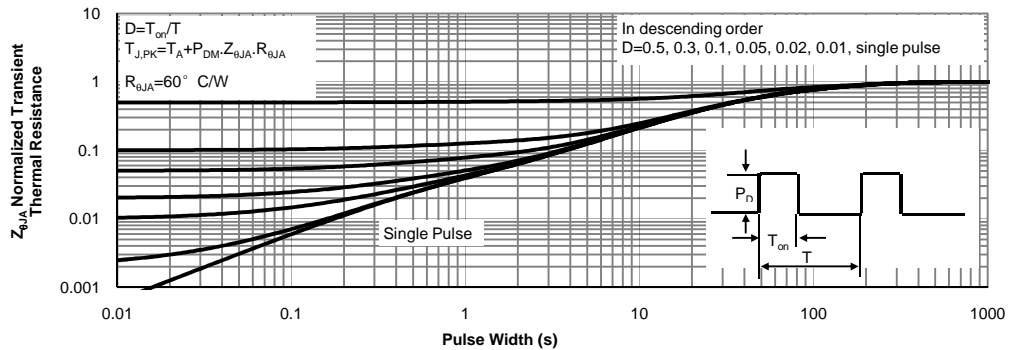

Figure 16: Power De-rating (Note F)
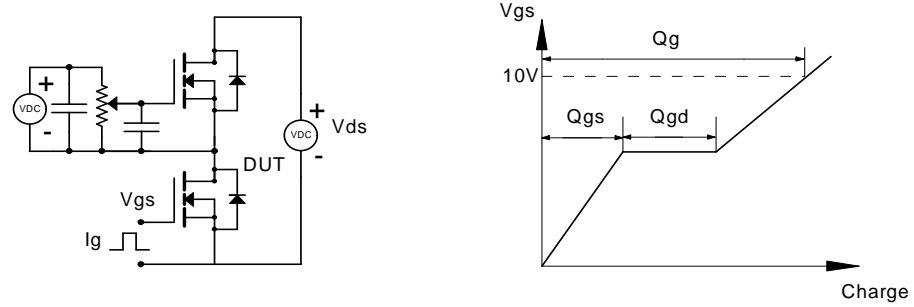

Figure 17: Current De-rating (Note F)

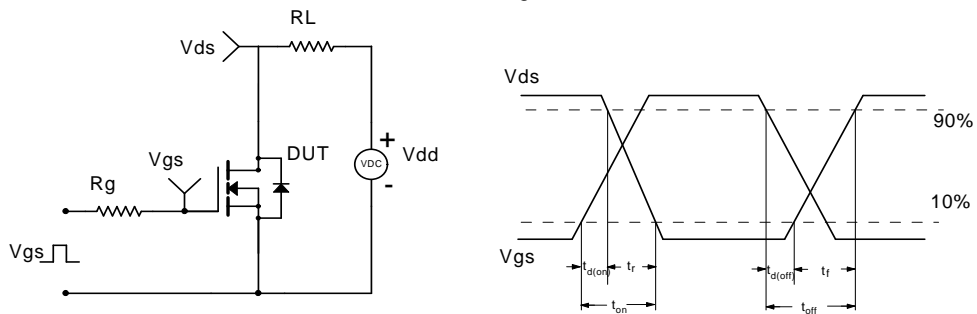**Figure 18: Single Pulse Power Rating Junction-to-Ambient (Note H)**

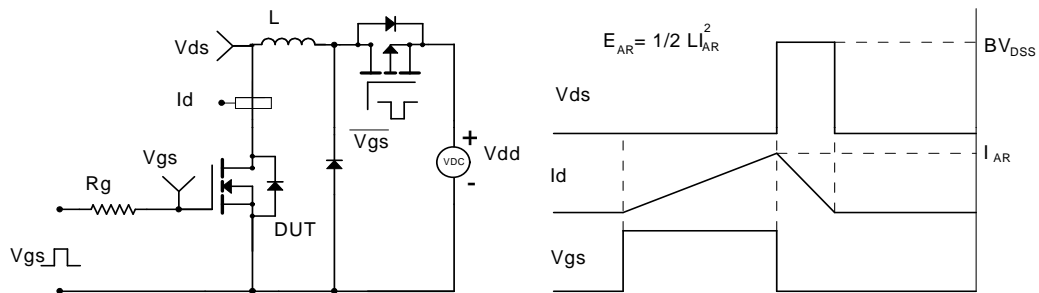**Figure 19: Normalized Maximum Transient Thermal Impedance (Note H)**
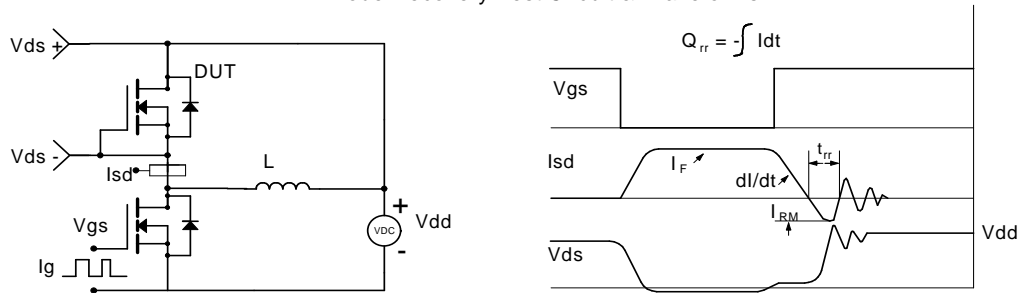
Gate Charge Test Circuit & Waveform

Resistive Switching Test Circuit & Waveforms

Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

$$E_{AR} = 1/2 \, LI_{AR}^2$$

Diode Recovery Test Circuit & Waveforms

$$Q_{rr} = -\int Idt$$

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