

**30V, 32A, 7.6 mΩ N-channel Power SGT MOSFET**
**JMSL0315PRD**
**Features**

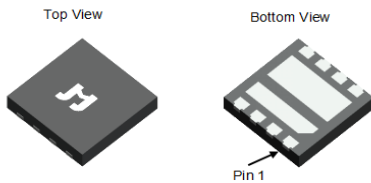
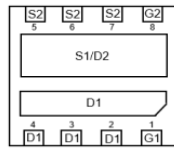
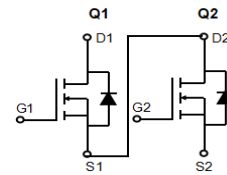
- Excellent  $R_{DS(ON)}$  and Low Gate Charge
- 100% UIS Tested
- 100%  $\Delta V_{ds}$  Tested
- Halogen-free; RoHS-compliant

**Applications**

- Load Switch
- PWM Application
- Power Management

**Product Summary**

Parameters	Value	Unit
$V_{DSS}$	30	V
$V_{GS(th\_Typ)}$	1.6	V
$I_D(@V_{GS}=10V)$	32	A
$R_{DS(ON\_Typ)}(@V_{GS}=10V)$	7.6	mΩ
$R_{DS(ON\_Typ)}(@V_{GS}=4.5V)$	11.7	mΩ


**DFN3030-8L**

**Pin Assignment**

**Schematic Diagram**
**Ordering Information**

Device	Marking	MSL	Form	Package	Reel(pcs)	Per Carton (pcs)
JMSL0315PRD-13	L0315PD	1	Tape&Reel	DFN3030-8L	5000	50000

**Absolute Maximum Ratings** (@  $T_C = 25^\circ\text{C}$  unless otherwise specified)

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-to-Source Voltage	30	V
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	V
$I_D$	Continuous Drain Current	$T_C = 25^\circ\text{C}$	32
		$T_C = 100^\circ\text{C}$	20
$I_{DM}$	Pulsed Drain Current <sup>(1)</sup>	Refer to Fig.4	A
$E_{AS}$	Single Pulsed Avalanche Energy <sup>(2)</sup>	26	mJ
$P_D$	Power Dissipation	$T_C = 25^\circ\text{C}$	16
		$T_C = 100^\circ\text{C}$	6
$T_J, T_{STG}$	Junction & Storage Temperature Range	-55 to 150	$^\circ\text{C}$

**Thermal Characteristics**

Symbol	Parameter	Max	Unit
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient <sup>(3)</sup>	70	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance, Junction to Case	8.0	

**Electrical Characteristics** ( $T_J = 25^\circ\text{C}$  unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
<b>Off Characteristics</b>						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$I_D = 250\mu\text{A}$ , $V_{GS} = 0\text{V}$	30	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 24\text{V}$ , $V_{GS} = 0\text{V}$	-	-	1.0	$\mu\text{A}$
$I_{GSS}$	Gate-Body Leakage Current	$V_{DS} = 0\text{V}$ , $V_{GS} = \pm 20\text{V}$	-	-	$\pm 100$	nA
<b>On Characteristics</b>						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$ , $I_D = 250\mu\text{A}$	1.1	1.6	2.2	V
$R_{DS(ON)}$	Static Drain-Source ON-Resistance <sup>(4)</sup>	$V_{GS} = 10\text{V}$ , $I_D = 20\text{A}$	-	7.6	9.9	m $\Omega$
		$V_{GS} = 4.5\text{V}$ , $I_D = 15\text{A}$	-	11.7	15.2	m $\Omega$
<b>Dynamic Characteristics</b>						
$R_g$	Gate Resistance	$f = 1\text{MHz}$	-	2.2	-	$\Omega$
$C_{iss}$	Input Capacitance	$V_{GS} = 0\text{V}$ , $V_{DS} = 15\text{V}$ , $f = 1\text{MHz}$	-	470	705	pF
$C_{oss}$	Output Capacitance		-	292	438	pF
$C_{riss}$	Reverse Transfer Capacitance		-	7.0	-	pF
$Q_g$	Total Gate Charge	$V_{GS} = 0$ to $10\text{V}$ $V_{DS} = 15\text{V}$ , $I_D = 15\text{A}$	-	8.3	-	nC
$Q_{gs}$	Gate Source Charge		-	1.9	-	nC
$Q_{gd}$	Gate Drain("Miller") Charge		-	1.6	-	nC
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-On DelayTime	$V_{GS} = 10\text{V}$ , $V_{DD} = 15\text{V}$ $I_D = 15\text{A}$ , $R_{GEN} = 3\Omega$	-	4.6	-	ns
$t_r$	Turn-On Rise Time		-	12	-	ns
$t_{d(off)}$	Turn-Off DelayTime		-	12	-	ns
$t_f$	Turn-Off Fall Time		-	2.8	-	ns
<b>Body Diode Characteristics</b>						
$I_S$	Maximum Continuous Body Diode Forward Current		-	-	32	A
$I_{SM}$	Maximum Pulsed Body Diode Forward Current		-	-	129	A
$V_{SD}$	Body Diode Forward Voltage	$V_{GS} = 0\text{V}$ , $I_S = 20\text{A}$	-		1.2	V
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F = 15\text{A}$ , $di/dt = 100\text{A/us}$	10	19	29	ns
$Q_{rr}$	Body Diode Reverse Recovery Charge		-	8.3	-	nC

- Notes:
1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
  2.  $E_{AS}$  condition: Starting  $T_J = 25^\circ\text{C}$ ,  $V_{DD} = 15\text{V}$ ,  $V_{GS} = 10\text{V}$ ,  $R_G = 25\text{ohm}$ ,  $L = 3\text{mH}$ ,  $I_{AS} = 4.2\text{A}$ ,  $V_{DD} = 0\text{V}$  during time in avalanche.
  3.  $R_{\theta JA}$  is measured with the device mounted on a  $1\text{inch}^2$  pad of 2oz copper FR4 PCB.
  4. Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 0.5\%$ .



# Typical Performance Characteristics

Figure 1: Power De-rating

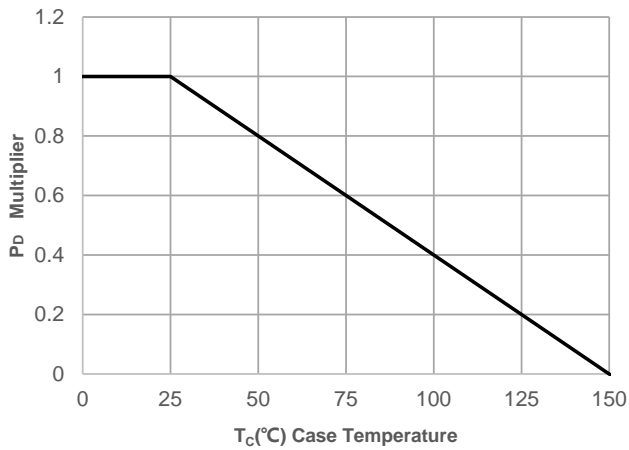


Figure 2: Current De-rating

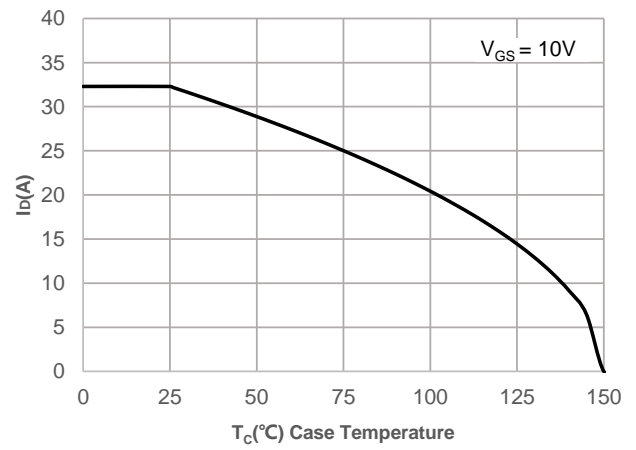


Figure 3: Normalized Maximum Transient Thermal Impedance

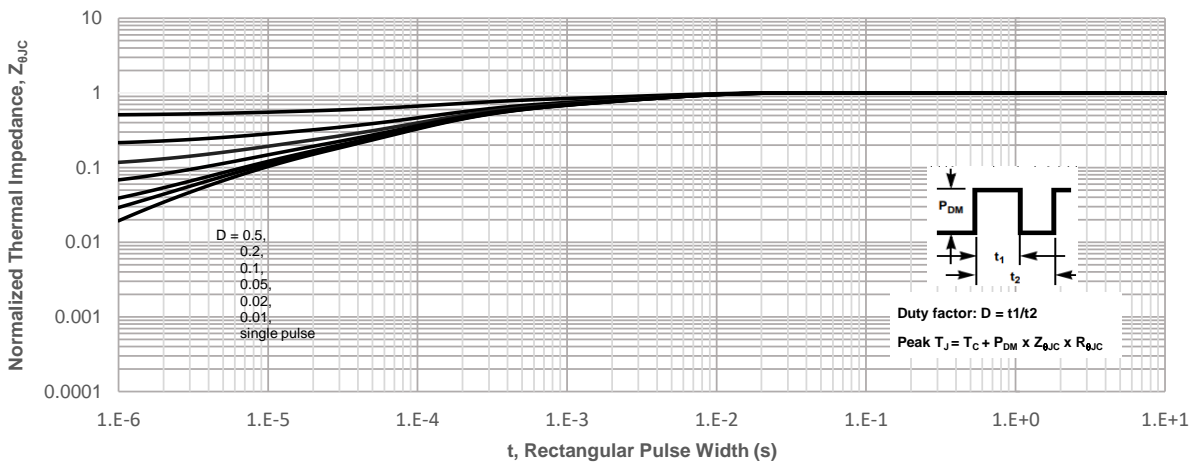
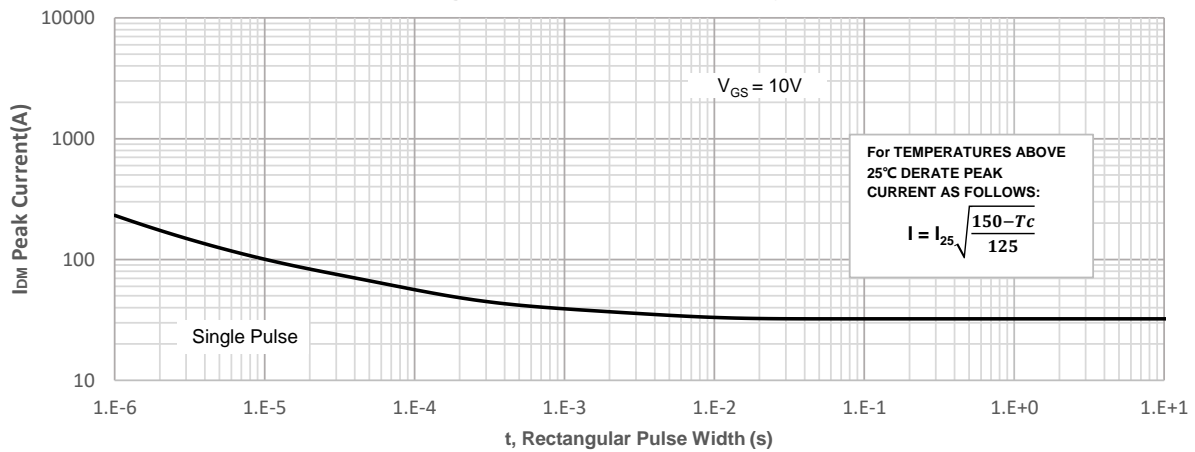


Figure 4: Peak Current Capacity



## Typical Performance Characteristics

Figure 5: Output Characteristics

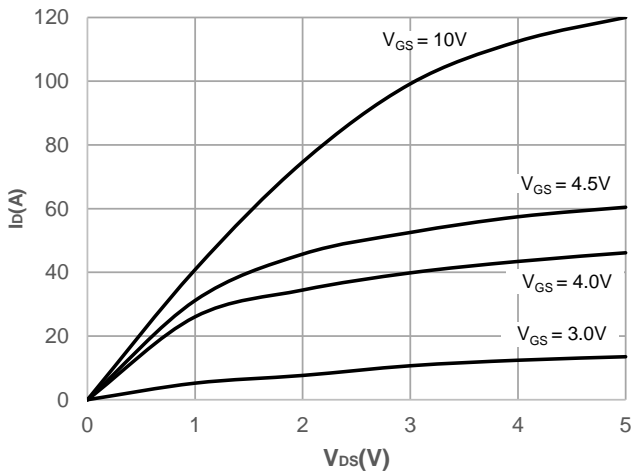


Figure 6: Typical Transfer Characteristics

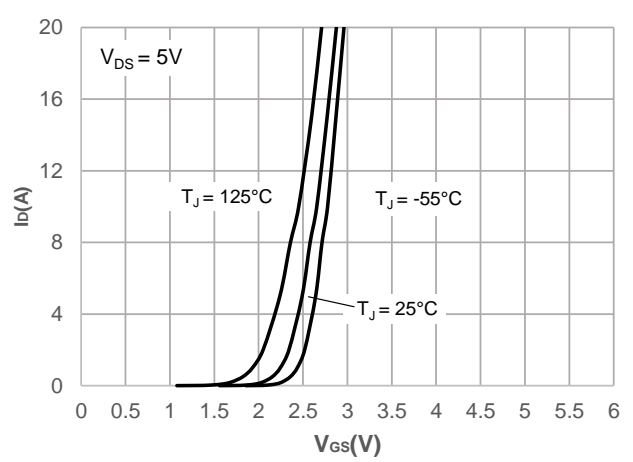


Figure 7: On-resistance vs. Drain Current

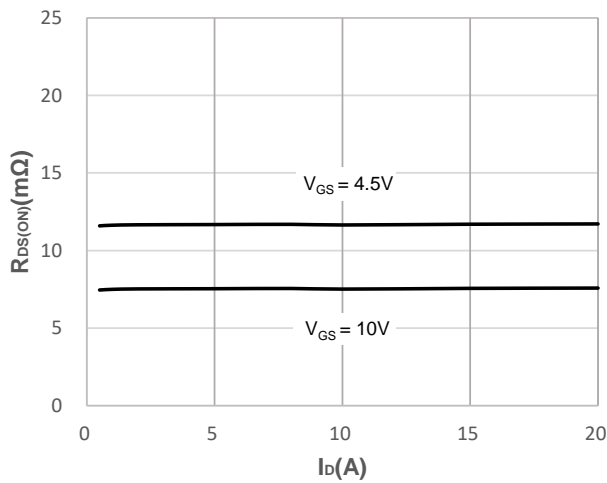


Figure 8: Body Diode Characteristics

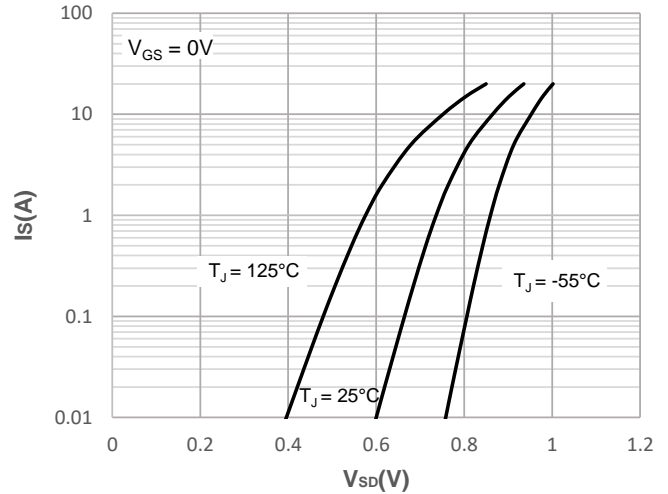


Figure 9: Gate Charge Characteristics

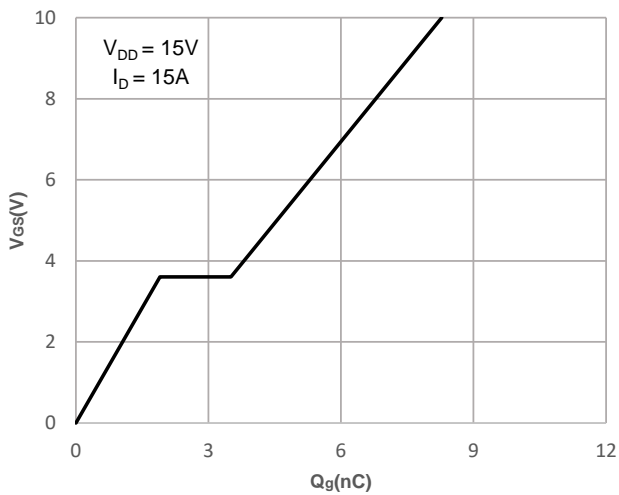
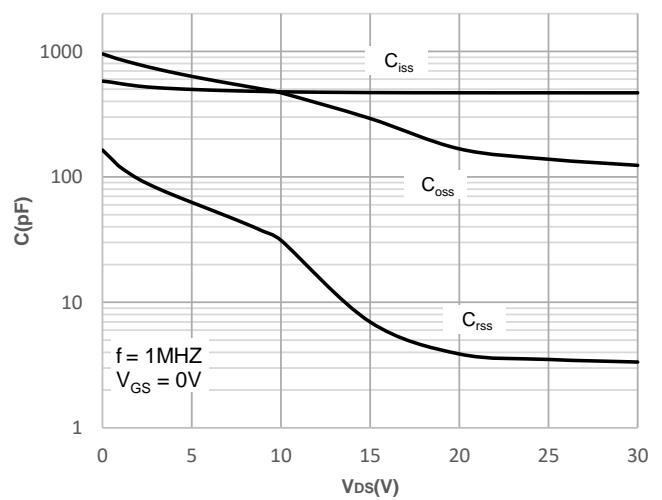


Figure 10: Capacitance Characteristics



## Typical Performance Characteristics

Figure 11: Normalized Breakdown voltage vs. Junction Temperature

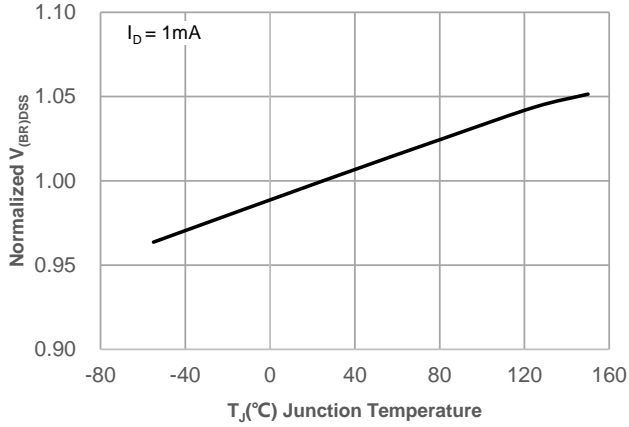


Figure 12: Normalized on Resistance vs. Junction Temperature

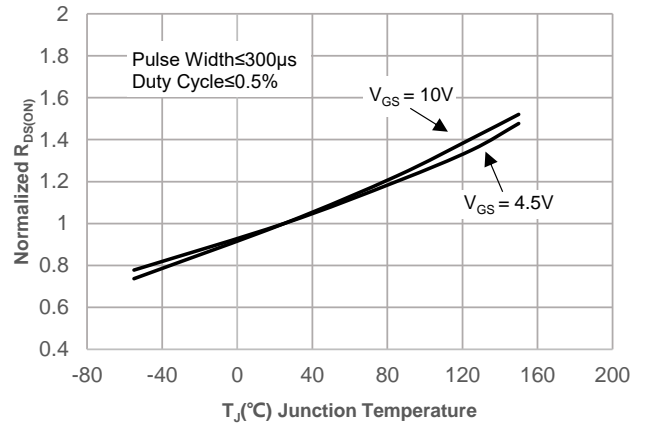


Figure 13: Normalized Threshold Voltage vs. Junction Temperature

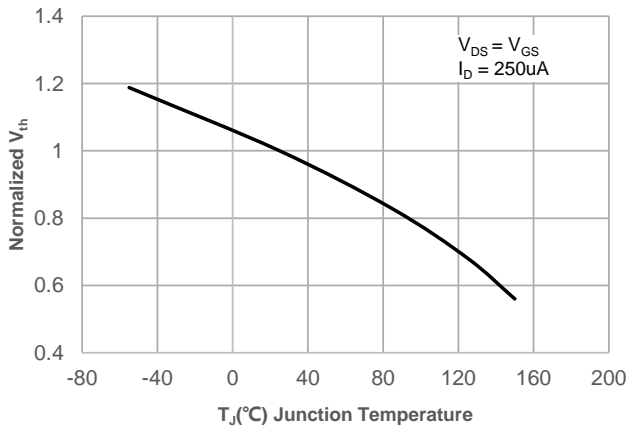


Figure 14: R<sub>DS(ON)</sub> vs. V<sub>GS</sub>

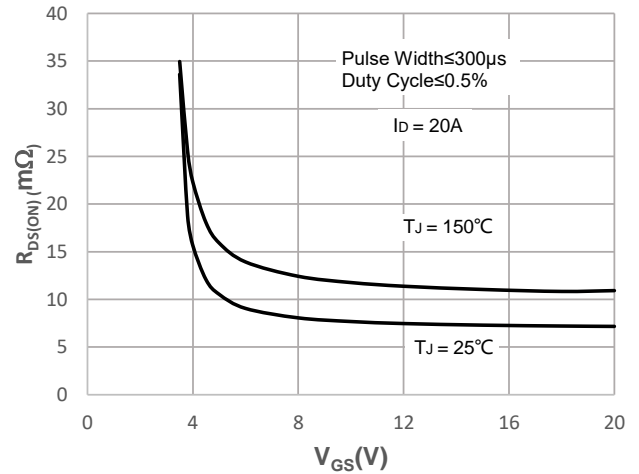
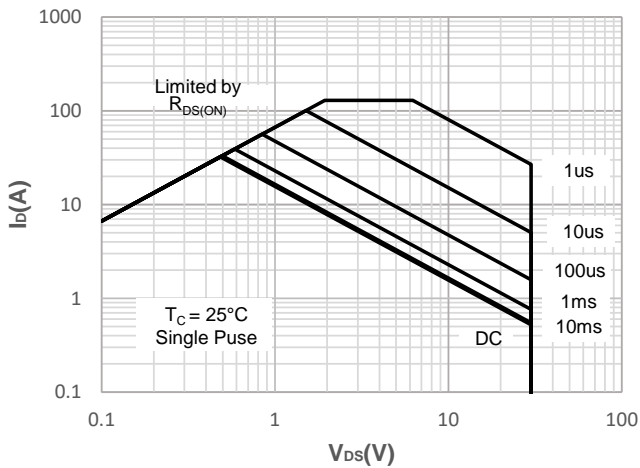


Figure 15: Maximum Safe Operating Area



### Test Circuit

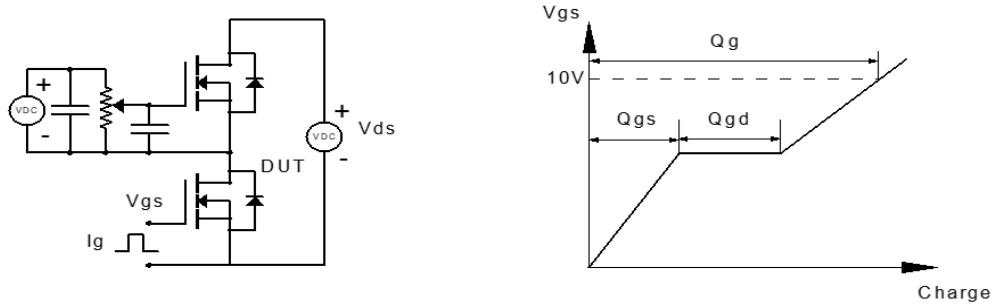


Figure 1: Gate Charge Test Circuit & Waveform

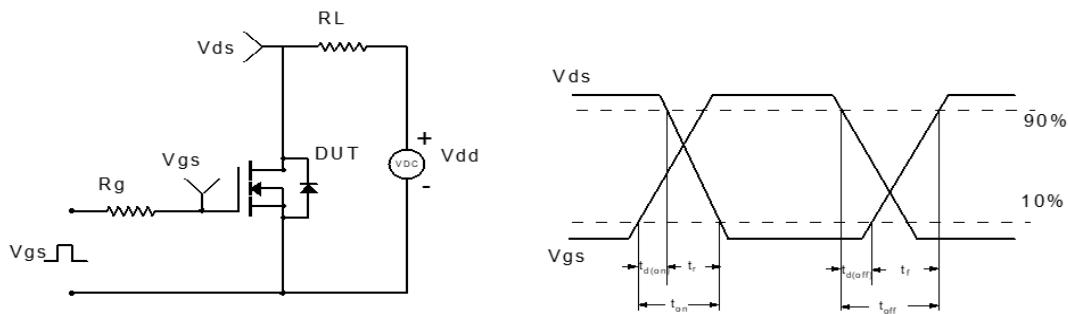


Figure 2: Resistive Switching Test Circuit & Waveform

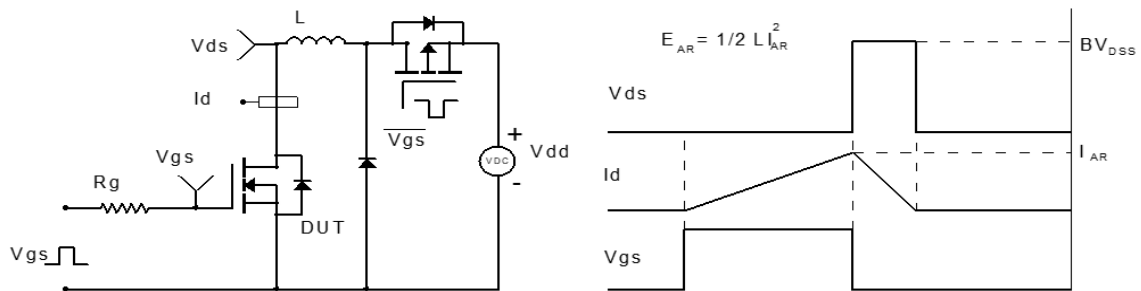


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

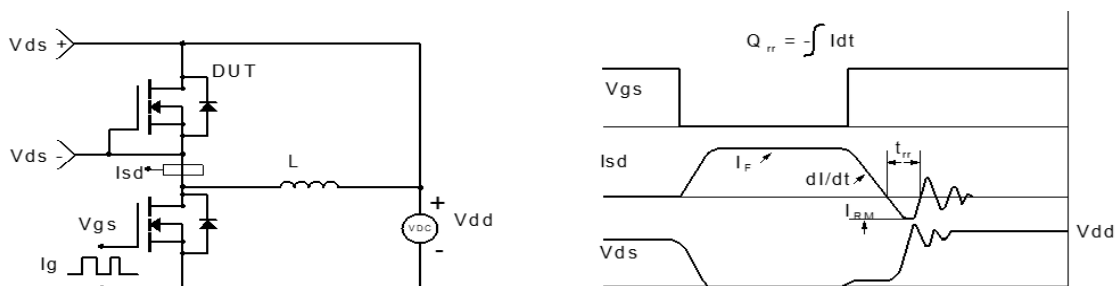


Figure 4: Diode Recovery Test Circuit & Waveform

