Features

- Excellent $R_{DS(ON)}$ and Low Gate Charge
- Halogen-free; RoHS-compliant
- Pb-free plating

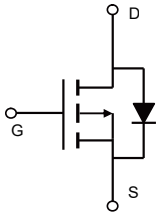
Applications

- Load Switch
- PWM Application
- Power Management

Product Summary

Parameters	Value	Unit
V_{DSS}	-50	V
$V_{GS(th)\_Typ}$	-1.4	V
I_D(@V_{GS}=10V)	-0.44	A
$R_{DS(ON)\_Typ}$(@V_{GS}=-10V	2.0	Ω
$R_{DS(ON)\_Typ}$(@V_{GS}=-4.5V	2.1	Ω

SOT-23



Schematic

Ordering Information

Device	Marking	MSL	Form	Package	Reel(pcs)	Per Carton (pcs)
VSM84K-S2	VSM84K	3	Tape&Reel	SOT-23	3000	120000

Absolute Maximum Ratings (@ T_A = 25°C unless otherwise specified)

Symbol	Parameter		Value	Unit
V_{DS}	Drain-to-Source Voltage		-50	V
V_{GS}	Gate-to-Source Voltage		±20	V
I_D	Continuous Drain Current	T_A = 25°C	-0.44	A
		T_A = 100°C	-0.28	
I_{DM}	Pulsed Drain Current (1)		Refer to Fig.4	A
P_D	Power Dissipation	T_A = 25°C	1.0	W
		T_A = 100°C	0.4	
T_J, T_{STG}	Junction & Storage Temperature Range		-55 to 150	°C

Thermal Characteristics

Symbol	Parameter	Max	Unit
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient(2)	131	

Electrical Characteristics (T_J = 25°C unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	I_D = -250 μA, V_{GS} = 0V	-50	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = -50V, V_{GS} = 0V	-	-	-1.0	μA
I_{GSS}	Gate-Body Leakage Current	V_{DS} = 0V, V_{GS} = ±20V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = -250 μA	-1.0	-1.4	-1.9	V
$R_{DS(ON)}$	Static Drain-Source ON-Resistance(3)	V_{GS} = -10V, I_D = -0.13A	-	2.0	2.6	Ω
		V_{GS} = -4.5V, I_D = -0.1A	-	2.1	3.6	Ω
Dynamic Characteristics						
R_g	Gate Resistance	f = 1MHz	-	154	-	Ω
C_{iss}	Input Capacitance	V_{GS} = 0V, V_{DS} = -25V, f = 1MHz	-	55	82	pF
C_{oss}	Output Capacitance		-	13	-	pF
C_{rss}	Reverse Transfer Capacitance		-	6.7	-	pF
Q_g	Total Gate Charge	V_{GS} = 0 to -10V, V_{DS} = -25V, I_D = -2A	-	1.7	-	nC
Q_{gs}	Gate Source Charge		-	0.5	-	nC
Q_{gd}	Gate Drain("Miller") Charge		-	0.3	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On DelayTime	V_{GS} = -10V, V_{DD} = -25V, I_D= -2A, R_{GEN} = 3Ω	-	2	-	ns
t_r	Turn-On Rise Time		-	2	-	ns
$t_{d(off)}$	Turn-Off DelayTime		-	16	-	ns
t_f	Turn-Off Fall Time		-	12	-	ns
Body Diode Characteristics						
I_S	Maximum Continuous Body Diode Forward Current		-	-	-0.4	A
I_{SM}	Maximum Pulsed Body Diode Forward Current		-	-	-1.8	A
V_{SD}	Body Diode Forward Voltage	V_{GS} = 0V, I_S = -0.13A	-		-1.2	V
trr	Body Diode Reverse Recovery Time	I_F = -2A, di/dt = 100A/us	-	22	-	ns
Qrr	Body Diode Reverse Recovery Charge		-	16	-	nC

Notes: 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.

2. $R_{\theta JA}$ is measured with the device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square pad layout.

3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%.

Typical Performance Characteristics

Figure 1: Power De-rating

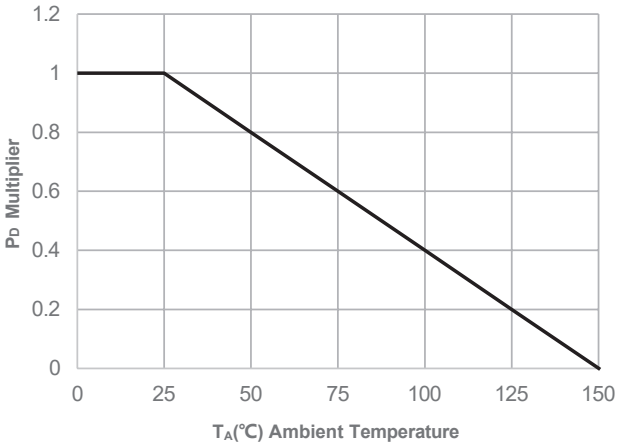


Figure 2: Current De-rating

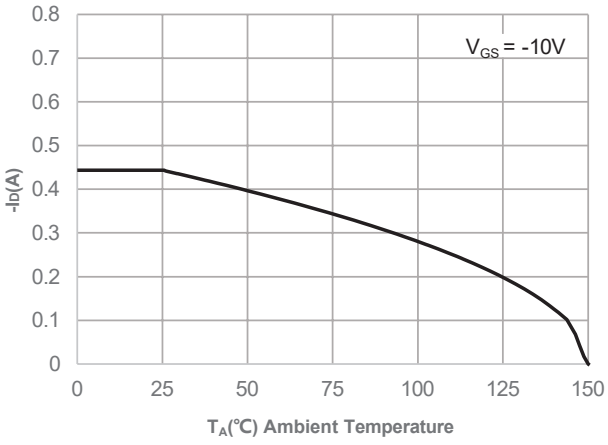


Figure 3: Normalized Maximum Transient Thermal Impedance

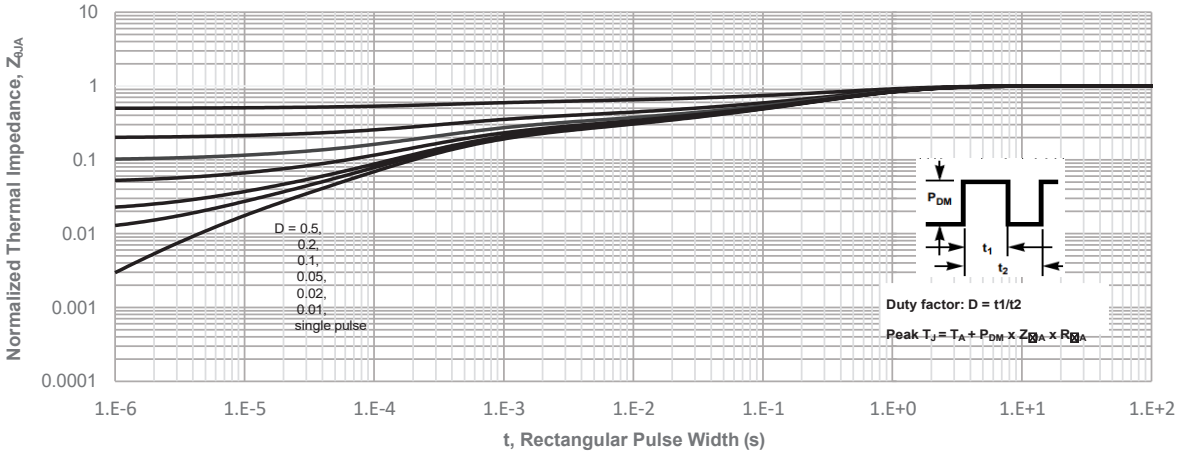
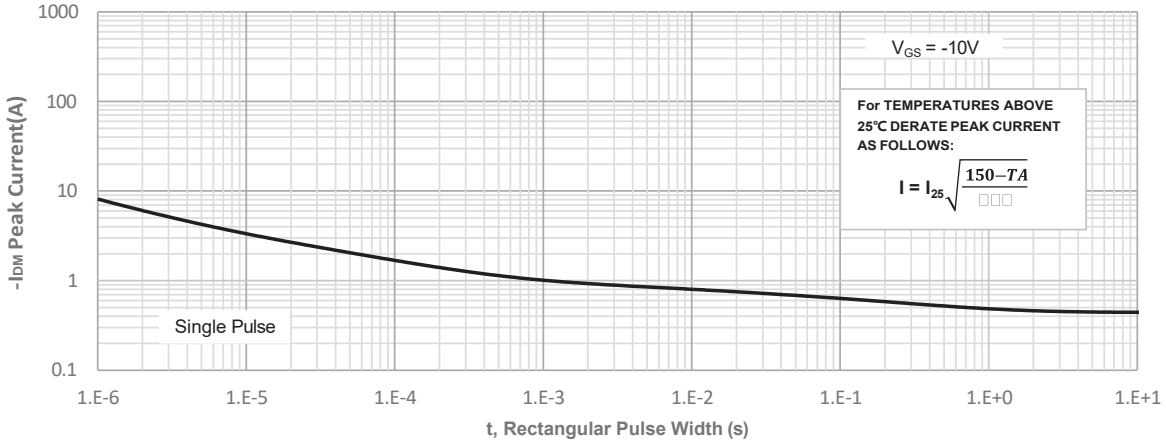


Figure 4: Peak Current Capacity



Typical Performance Characteristics

Figure 5: Output Characteristics

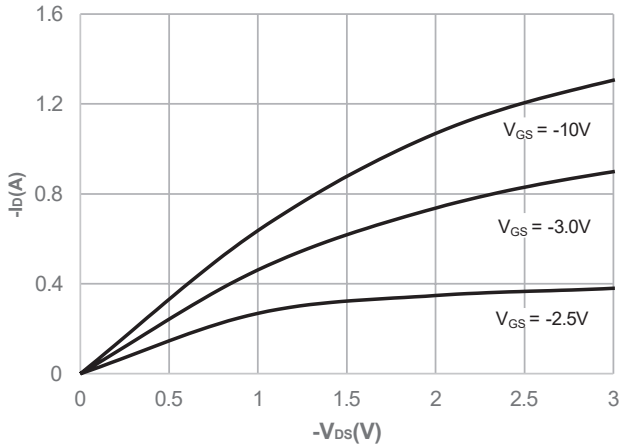


Figure 6: Typical Transfer Characteristics

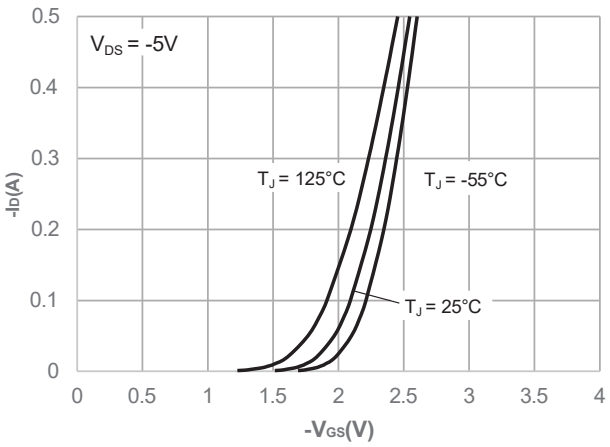


Figure 7: On-resistance vs. Drain Current

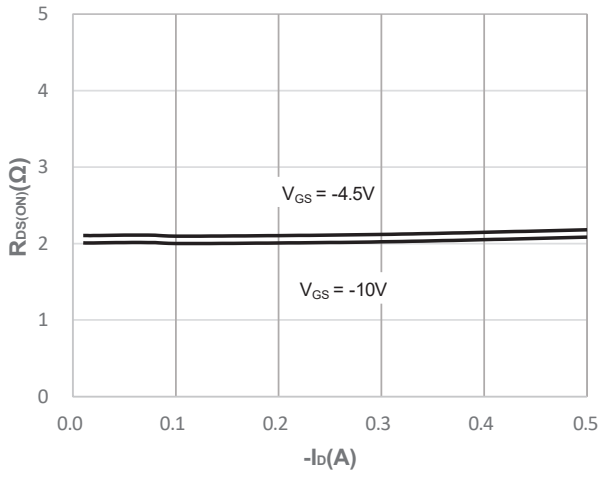


Figure 8: Body Diode Characteristics

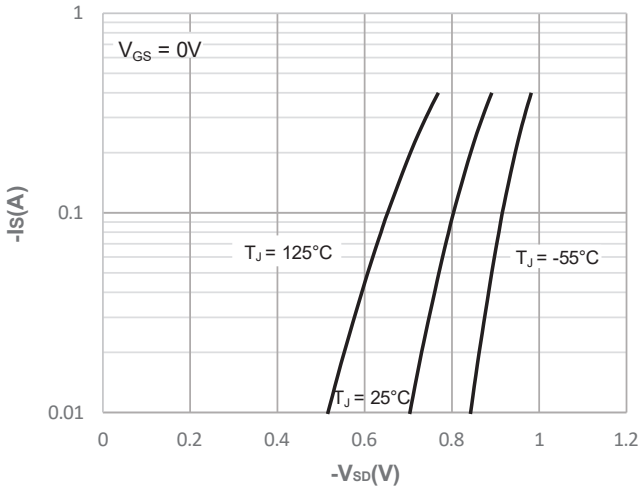


Figure 9: Gate Charge Characteristics

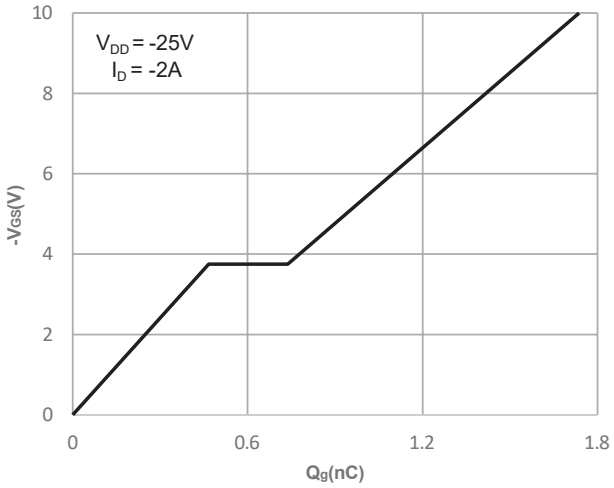
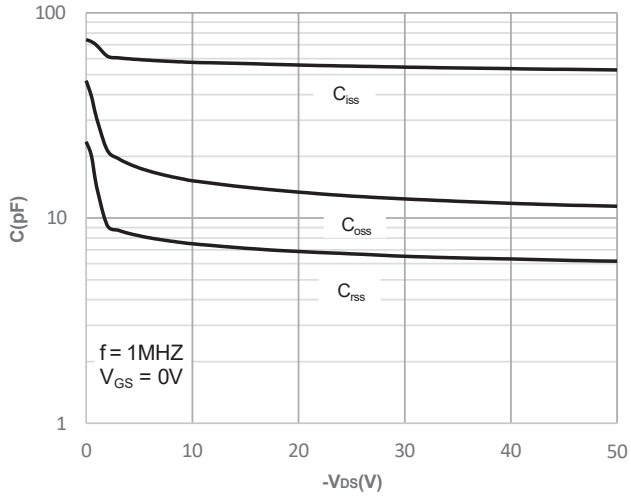


Figure 10: Capacitance Characteristics



Typical Performance Characteristics

Figure 11: Normalized Breakdown voltage vs. Junction Temperature

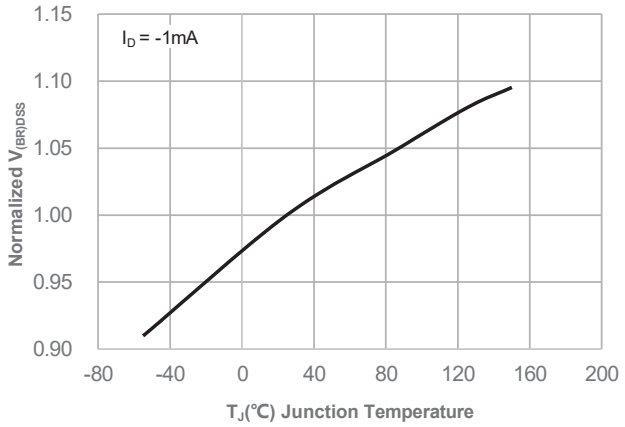


Figure 12: Normalized on Resistance vs. Junction Temperature

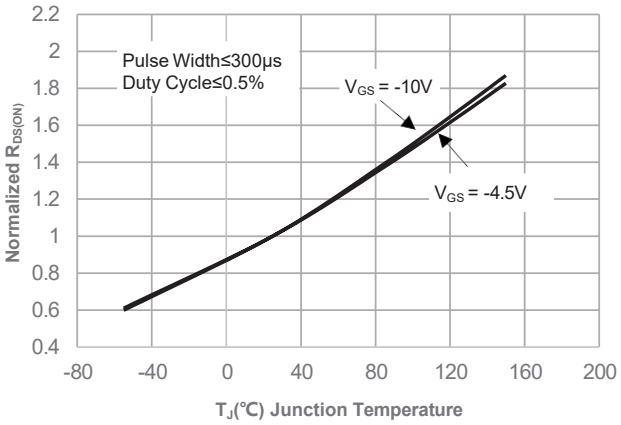


Figure 13: Normalized Threshold Voltage vs. Junction Temperature

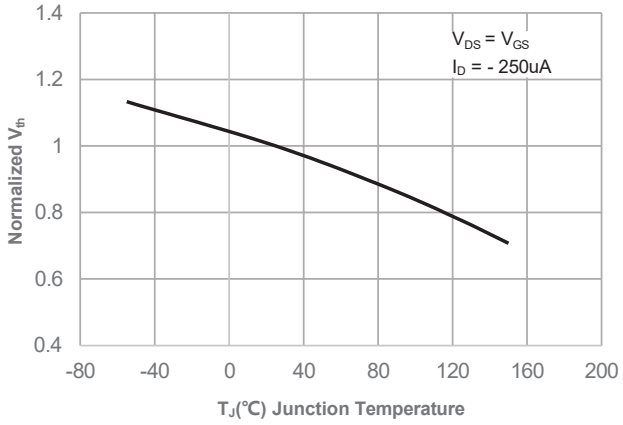


Figure 14: $R_{DS(ON)}$ vs. V_{GS}

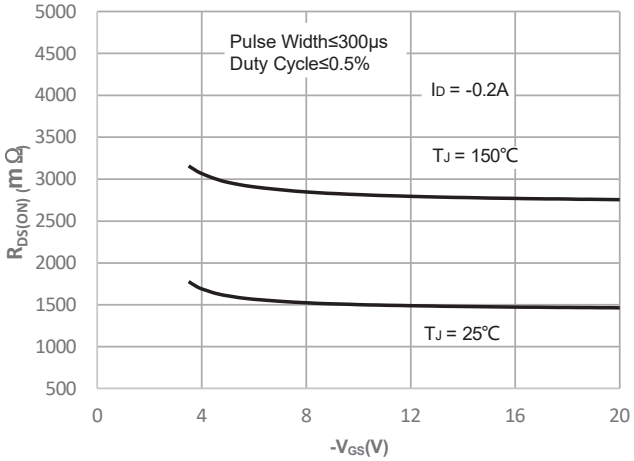
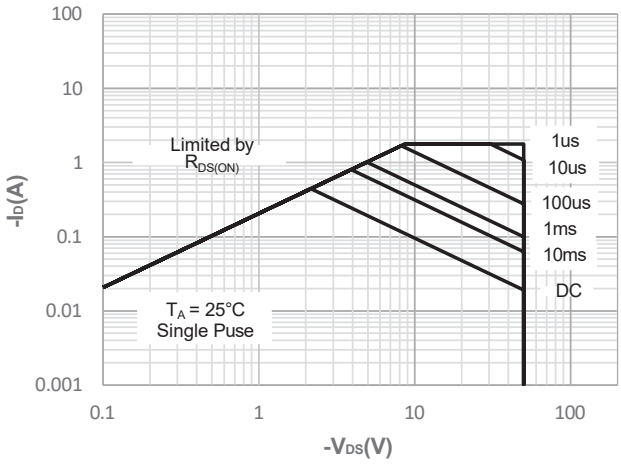


Figure 15: Maximum Safe Operating Area



Test Circuit

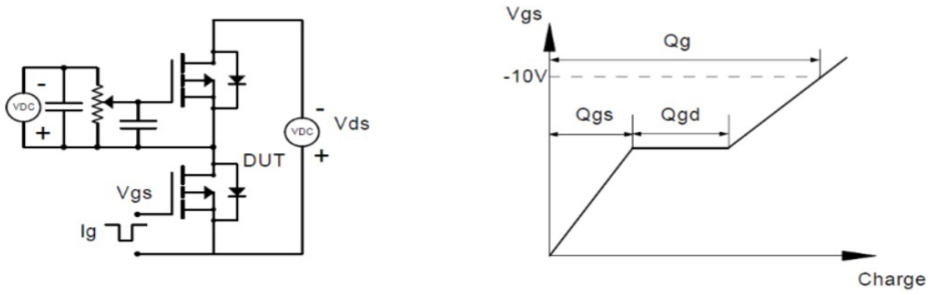


Figure 1: Gate Charge Test Circuit & Waveform

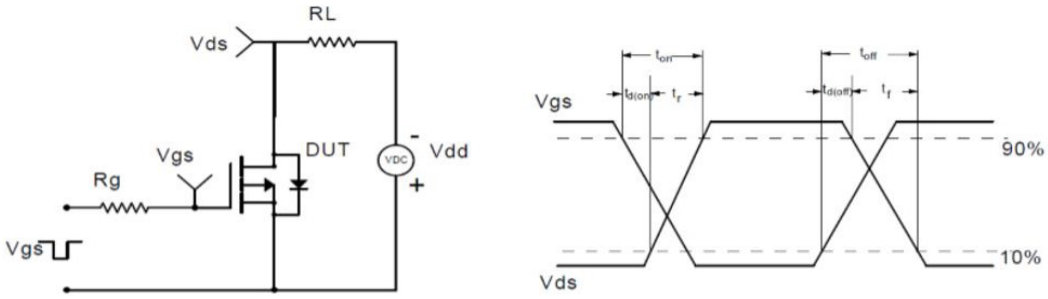


Figure 2: Resistive Switching Test Circuit & Waveform

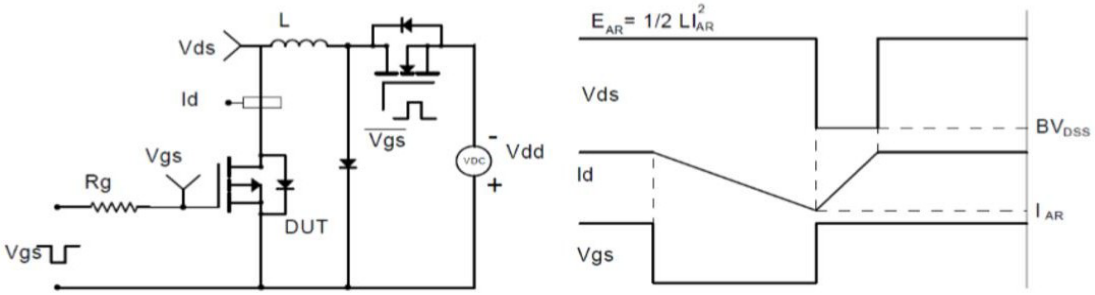


Figure 3: Unclamped Inductive Switching Test Circuit& Waveform

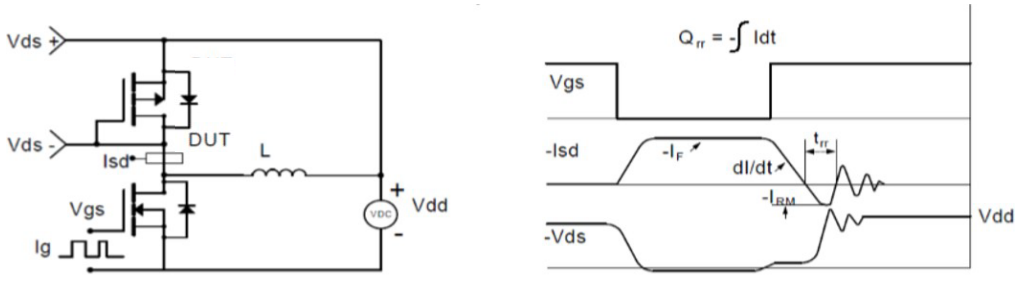


Figure 4: Diode Recovery Test Circuit & Waveform