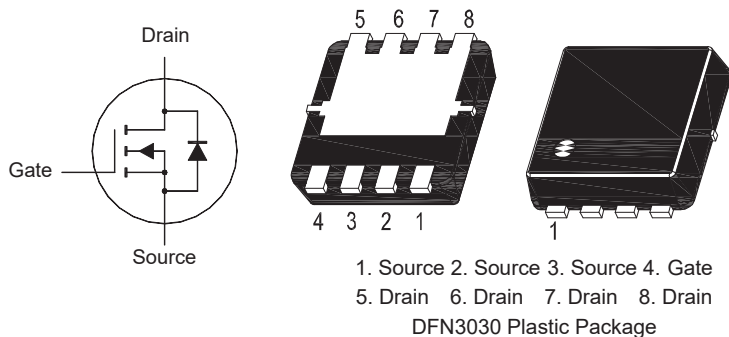


N-Channel Enhancement Mode MOSFET

Features

- Low $R_{DS(ON)}$
- AEC-Q101 Qualified
- Low Input Capacitance
- Low Input/Output Leakage
- Halogen and Antimony Free(HAF), RoHS compliant



Application

- Load Switch
- DC-DC converters and Off-line UPS

Key Parameters

Parameter	Value	Unit
BV_{DSS}	40	V
$R_{DS(ON)}$ Max	7.3 @ $V_{GS} = 10$ V	m Ω
	9.3 @ $V_{GS} = 4.5$ V	
$V_{GS(th)}$ typ	1.6	V
Q_g typ	48.5 @ $V_{GS} = 10$ V	nC

Absolute Maximum Ratings (at $T_a = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	I_D	48	A
		30	
Peak Drain Current, Pulsed ¹⁾	I_{DM}	200	A
Avalanche Current	I_{AS}	26	A
Single Pulse Avalanche Energy ²⁾	E_{AS}	33	mJ
Power Dissipation	P_D	31	W
		12.5	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to + 150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Max.	Unit
Thermal Resistance from Junction to Case	$R_{\theta JC}$	4	$^\circ\text{C/W}$
Thermal Resistance from Junction to Ambient ³⁾	$R_{\theta JA}$	50	$^\circ\text{C/W}$

¹⁾ Pulse Test: Pulse Width ≤ 100 μs , Duty Cycle $\leq 2\%$, Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)} = 150^\circ\text{C}$.

²⁾ Limited by $T_{J(MAX)}$, starting $T_J = 25^\circ\text{C}$, $L = 0.1$ mH, $R_g = 25$ Ω , $I_{AS} = 26$ A, $V_{GS} = 10$ V.

³⁾ Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate in still air.

Characteristics at T_a = 25°C unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit
STATIC PARAMETERS					
Drain-Source Breakdown Voltage at I _D = 250 μ A	BV _{DSS}	40	-	-	V
Drain-Source Leakage Current at V _{DS} = 40 V	I _{DSS}	-	-	1	μ A
Gate Leakage Current at V _{GS} = $\pm$ 20 V	I _{GSS}	-	-	$\pm$ 100	nA
Gate-Source Threshold Voltage at V _{DS} = V _{GS} , I _D = 250 μ A	V _{GS(th)}	1	-	2.5	V
Drain-Source On-State Resistance at V _{GS} = 10 V, I _D = 12 A at V _{GS} = 4.5 V, I _D = 10 A	R _{DS(on)}	- -	6 -	7.3 9.3	m Ω
DYNAMIC PARAMETERS					
Forward Transconductance at V _{DS} = 5 V, I _D = 12 A	g _{fs}	-	22	-	S
Gate resistance at V _{DS} = 0 V, V _{GS} = 0 V, f = 1 MHz	R _g	-	1.3	-	Ω
Input Capacitance at V _{GS} = 0 V, V _{DS} = 20 V, f = 1 MHz	C _{iss}	-	2268	-	pF
Output Capacitance at V _{GS} = 0 V, V _{DS} = 20 V, f = 1 MHz	C _{oss}	-	169	-	pF
Reverse Transfer Capacitance at V _{GS} = 0 V, V _{DS} = 20 V, f = 1 MHz	C _{rss}	-	121	-	pF
Gate charge total at V _{DS} = 20 V, I _D = 12 A, V _{GS} = 10 V at V _{DS} = 20 V, I _D = 12 A, V _{GS} = 4.5 V	Q _g	- -	48.5 23	- -	nC
Gate to Source Charge at V _{DS} = 20 V, I _D = 12 A, V _{GS} = 10 V	Q _{gs}	-	8.5	-	nC
Gate to Drain Charge at V _{DS} = 20 V, I _D = 12 A, V _{GS} = 10 V	Q _{gd}	-	10	-	nC
Turn-On Delay Time at V _{DS} = 20 V, I _D = 12 A, V _{GS} = 10 V, R _g = 3.3 Ω	t _{d(on)}	-	17	-	ns
Turn-On Rise Time at V _{DS} = 20 V, I _D = 12 A, V _{GS} = 10 V, R _g = 3.3 Ω	t _r	-	30	-	ns
Turn-Off Delay Time at V _{DS} = 20 V, I _D = 12 A, V _{GS} = 10 V, R _g = 3.3 Ω	t _{d(off)}	-	17	-	ns
Turn-Off Fall Time at V _{DS} = 20 V, I _D = 12 A, V _{GS} = 10 V, R _g = 3.3 Ω	t _f	-	2	-	ns
Body-Diode PARAMETERS					
Drain-Source Diode Forward Voltage at I _S = 1 A, V _{GS} = 0 V	V _{SD}	-	-	1.2	V
Body-Diode Continuous Current	I _S	-	-	48	A
Body-Diode Continuous Current, Pulsed	I _{SM}	-	-	200	A
Body Diode Reverse Recovery Time at I _S = 12 A, di/dt = 100 A / μ s	t _{rr}	-	13	-	ns
Body Diode Reverse Recovery Charge at I _S = 12 A, di/dt = 100 A / μ s	Q _{rr}	-	7	-	nC

Electrical Characteristics Curves

Fig. 1 Typical Output Characteristics

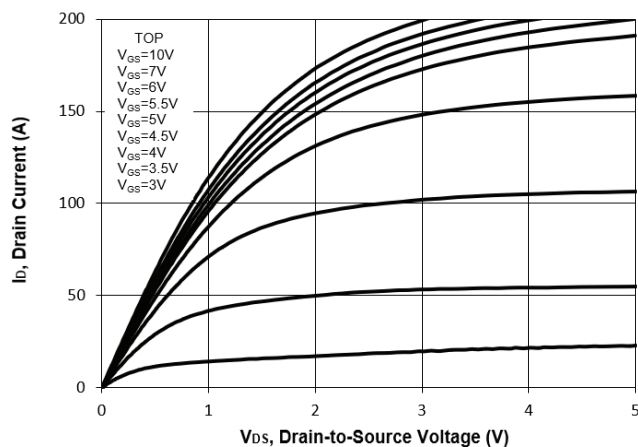


Fig. 2 Typical Transfer Characteristics

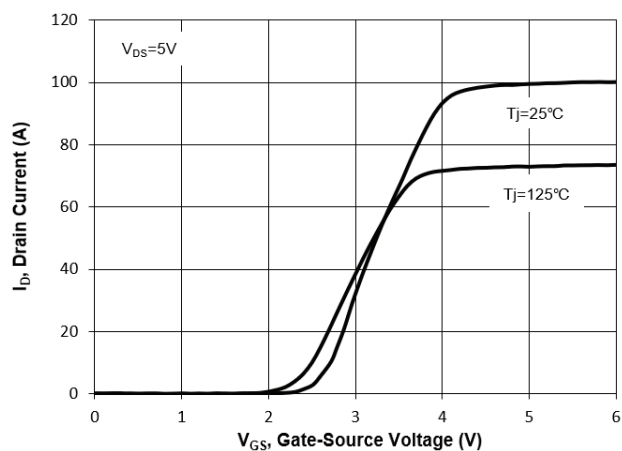


Fig. 3 on-Resistance vs. Drain Current

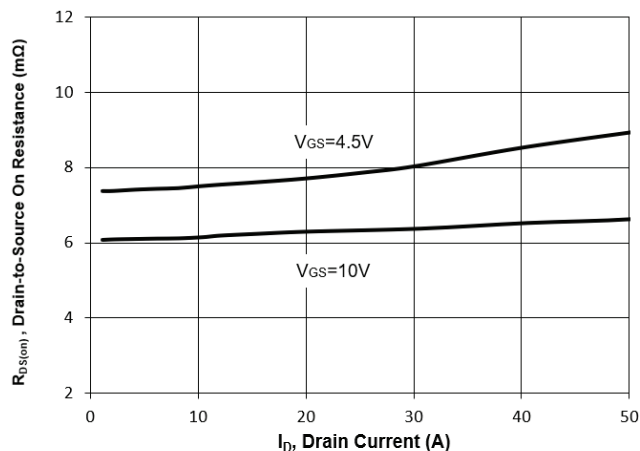


Fig. 4 on-Resistance vs. Gate to Source Voltage

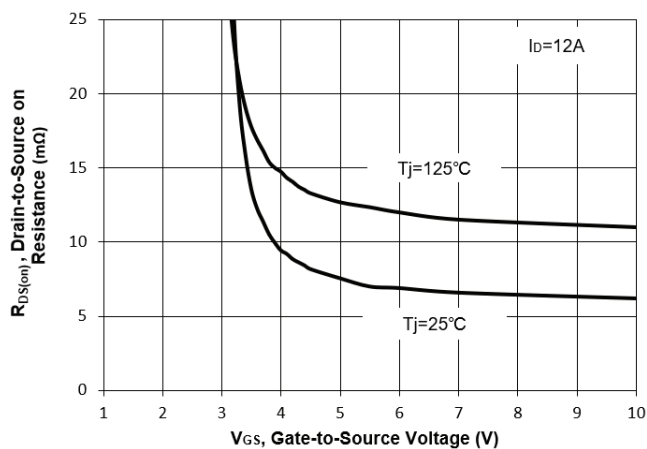


Fig. 5 on-Resistance vs. TJ

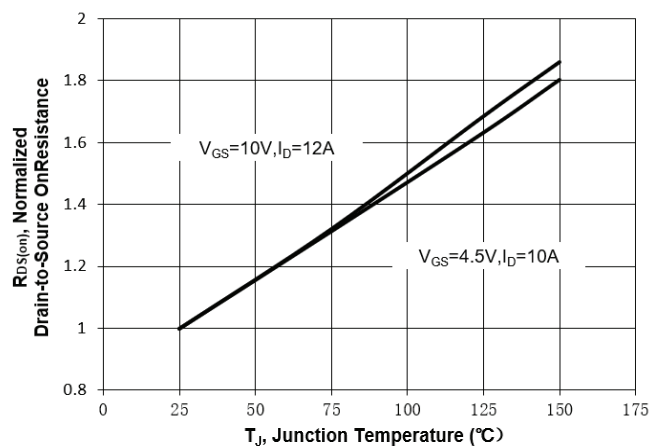
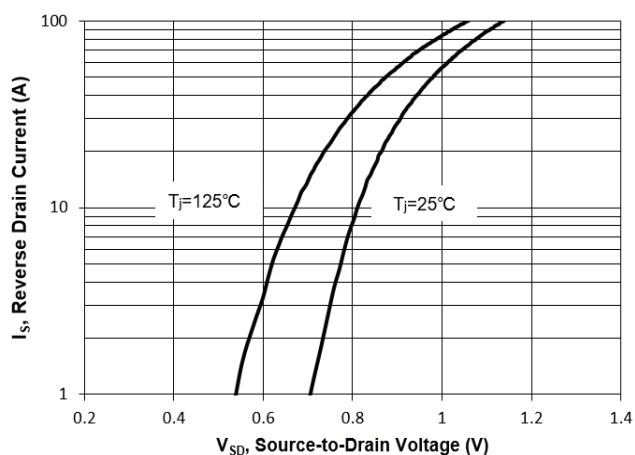


Fig. 6 Typical Body-Diode Forward Characteristics



Electrical Characteristics Curves

Fig. 7 Typical Junction Capacitance

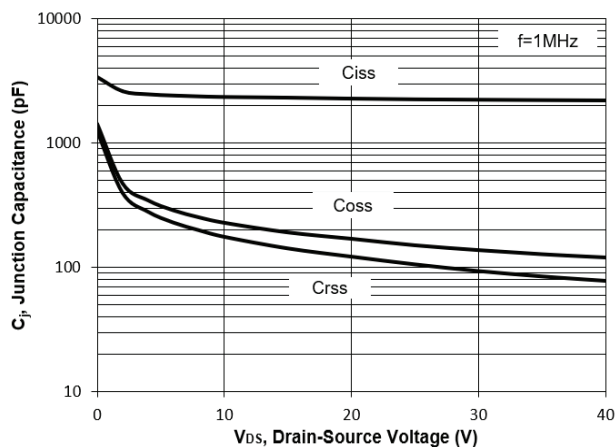


Fig. 8 Drain-Source Leakage Current vs. T_J

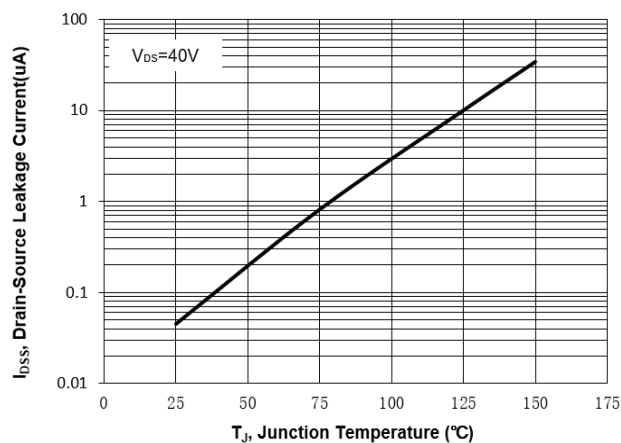


Fig. 9 V_{(BR)DSS} vs. Junction Temperature

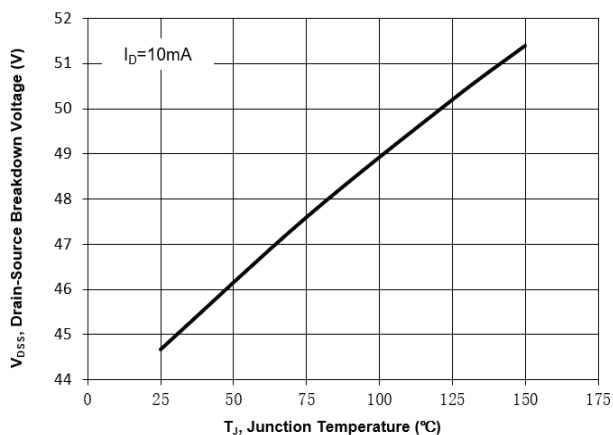


Fig. 10 Gate Threshold Variation vs. T_J

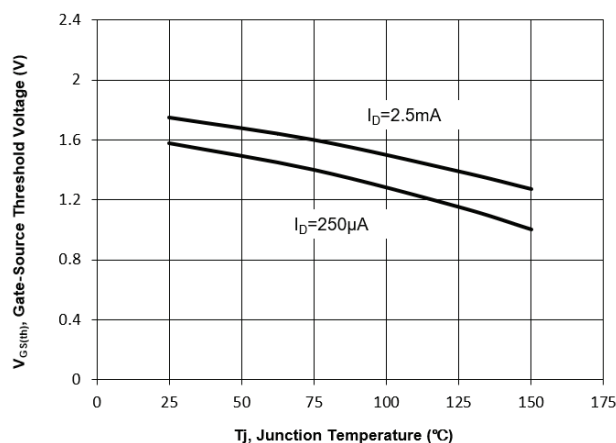


Fig. 11 Gate Charge

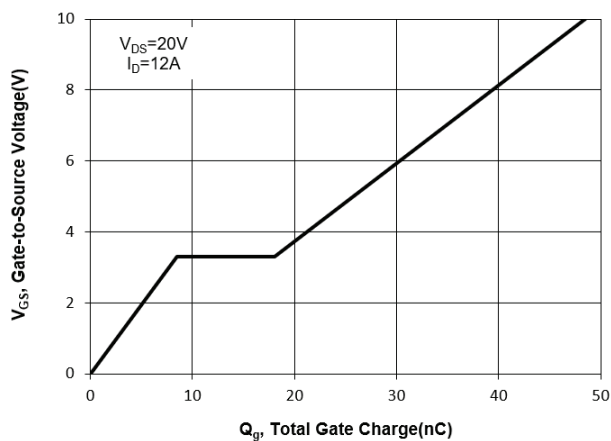
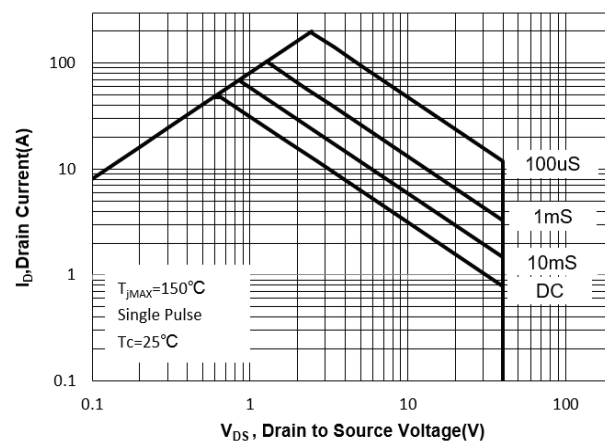


Fig. 12 Safe Operation Area



Electrical Characteristics Curves

Fig.13 Normalized Maximum Transient Thermal Impedance($z_{\theta JC}$)

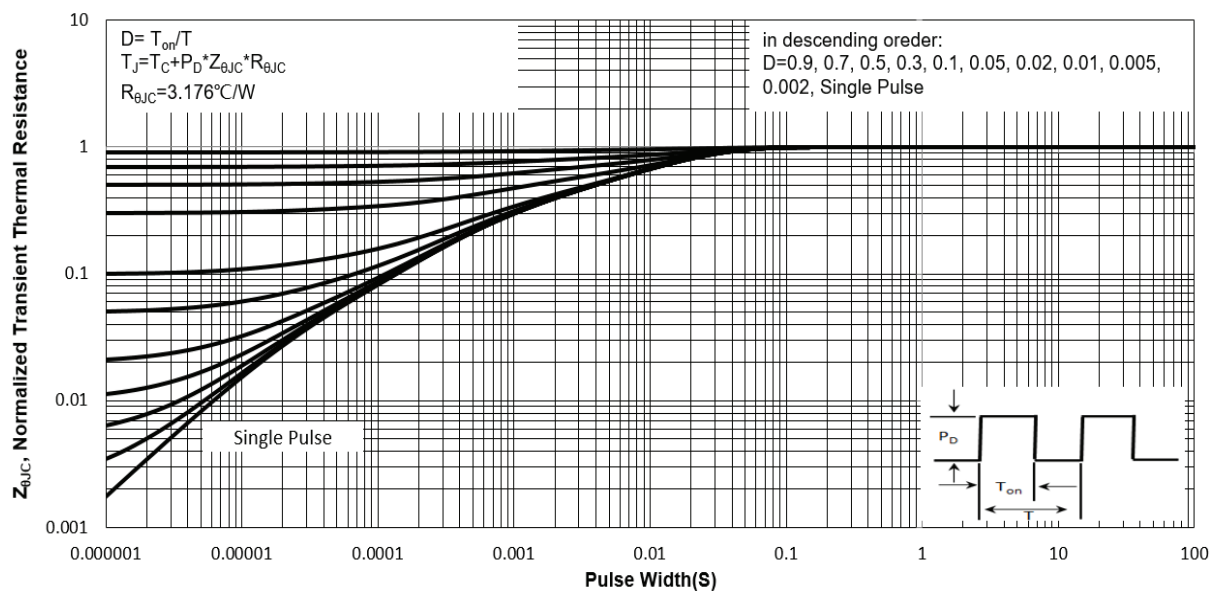
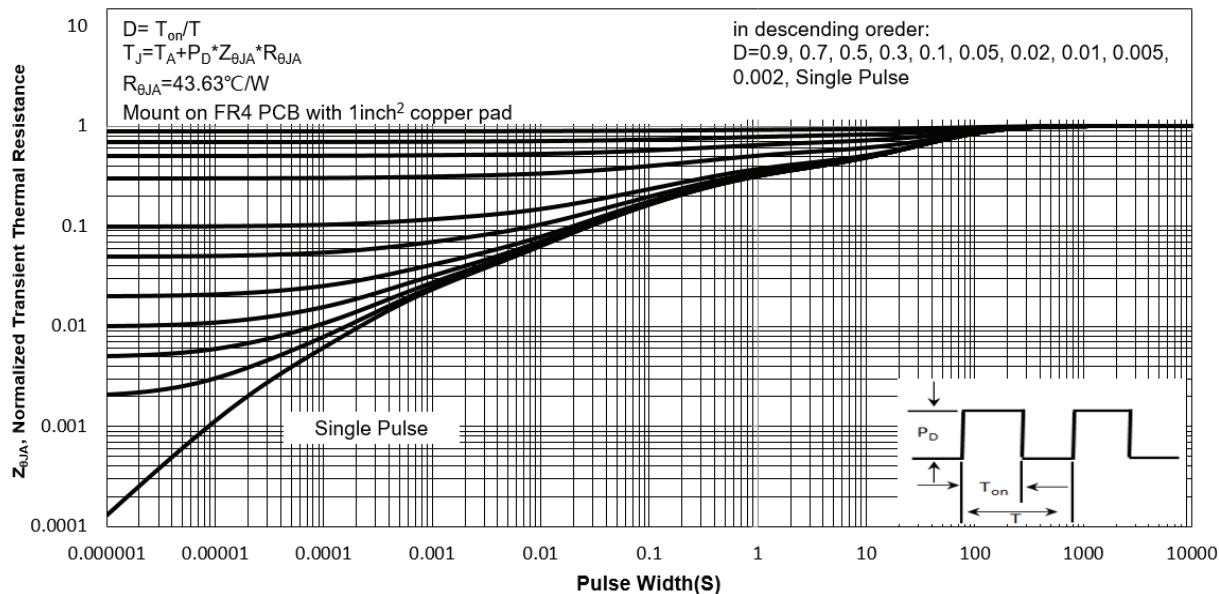


Fig.14 Normalized Maximum Transient Thermal Impedance($z_{\theta JA}$)



Test Circuits

Fig.1-1 Switching times test circuit

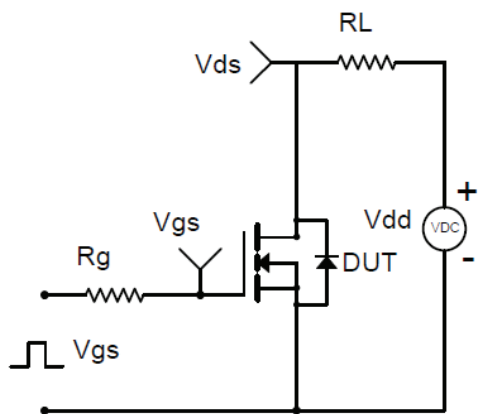


Fig.1-2 Switching Waveform

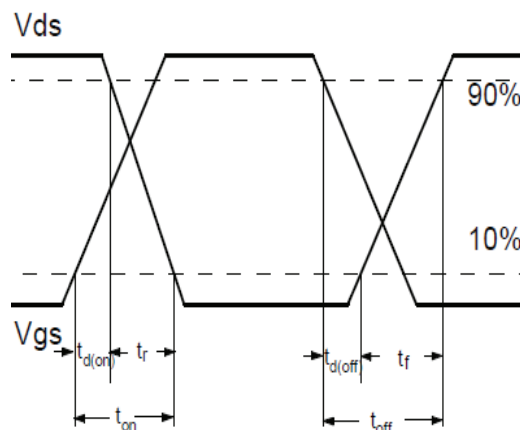


Fig.2-1 Gate charge test circuit

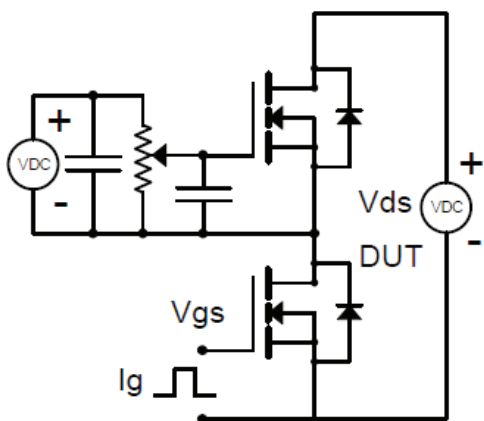


Fig.2-2 Gate charge waveform

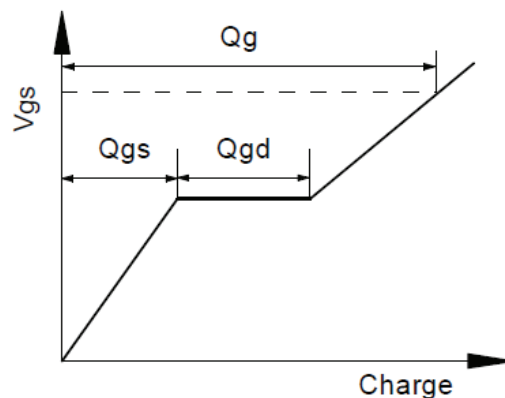


Fig.3-1 Avalanche test circuit

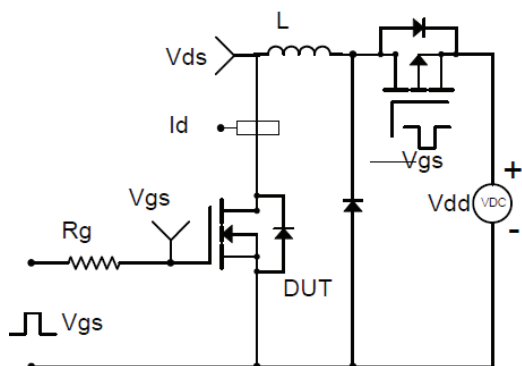


Fig.3-2 Avalanche waveform

