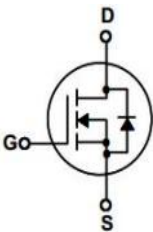
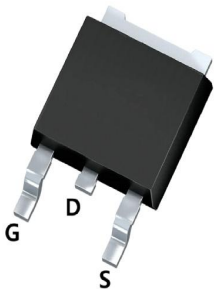




1.Features

- $R_{DS(ON)} \leq 33\Omega$ @ $V_{GS}=10V$, $I_D=10A$
- Excellent $R_{DS(ON)}$ and Low Gate Charge
- Advanced trench technology
- Lead free product is acquired

TO-252



1. Gate
2. Drain
3. Source

2.Mechanical Data

- Case:Molded Plastic,TO-252;
- Epoxy:UL 94V-0 rate flame retardant
- Terminals:Plated Leads Solderable per MIL-STD-750,Method-2026.
- Marking: marked on body.
- Mounting Position : Any.

3.Maximum Ratings and Electrical Characteristics

Rating at 25°C Cambient temperature unless otherwise specified

Characteristics		Symbol	Ratings	Unit
Drain-Source Voltage		V_{DS}	60	V
Drain Current Continuous	$T_C=25^{\circ}C$	I_D	20	A
	$T_C=100^{\circ}C$		14	
Drain Current Pulsed(Note 1)		I_{DM}	80	A
Single Pulsed Avalanche Energy		E_{AS}	18	mJ
Gate-Source Voltage		V_{GS}	± 20	V
Power Dissipation($T_C=25^{\circ}C$)		P_D	27.8	W
Maximum Junction Temperature		T_J	150	$^{\circ}C$
Storage Temperature Range		T_{stg}	-55 to +150	$^{\circ}C$
Thermal Resistance, Junction-to-Case		$R_{\theta JC}$	5.4	$^{\circ}C/W$



Characteristics	Symbol	Test conditions	Min	TYP	Max	Unit
Off Characteristics						
Drain -Source Breakdown Voltage	BV_{DSS}	$V_{GS}= 0V, I_D=250\mu A$	60	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}= 60V, V_{GS}= 0V$	-	-	1	μA
Gate-Source Leakage Current	I_{GSS}	$V_{GS}= 20V$	-	-	100	nA
Gate-Source Leakage Current		$V_{GS}= -20V$	-	-	-100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}= V_{DS}, I_D=250\mu A$	1.0	1.6	2.5	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=10A$	-	26	33	$m\Omega$
		$V_{GS}=4.5V, I_D=5A$	-	33	45	$m\Omega$
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DB} =25V$ $V_{GS}=0V$ $f=1.0MHZ$	-	975	-	pF
Output Capacitance	C_{oss}		-	61	-	
Reverse Transfer Capacitance	C_{rss}		-	56	-	
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=30V, V_{GS}=10V$ $R_G=1.8\Omega; I_D=20A$	-	7.2	-	ns
Turn-on Rise Time	t_r		-	20	-	
Turn-off Delay Time	$t_{d(off)}$		-	15	-	
Turn-off Fall Time	t_f		-	24	-	
Total Gate Charge	Q_g	$V_{DS}=30V, V_{GS}=10A$ $I_D=10A$	-	24.5	-	nC
Gate-Source Charge	Q_{gs}		-	4.3	-	
Gate-Drain Charge	Q_{gd}		-	6.4	-	
Drain-Source Diode Characteristics						
Diode Forward Voltage	V_{SD}	$I_S=20A, V_{GS}=0V$	-	-	1.2	V
Continuous Source Current	I_S		-	-	20	A
Pulsed Source Current	I_{SM}		-	-	80	
Reverse Recovery Time	T_{rr}	$I_F=20A,$	-	29	-	ns
Reverse Recovery Charge	Q_{rr}	$dI/dt=100A/\mu S$	-	50	-	nC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. Essentially independent of operating temperature



4. Rating And Characteristic Curves

Fig.1 Output Characteristics

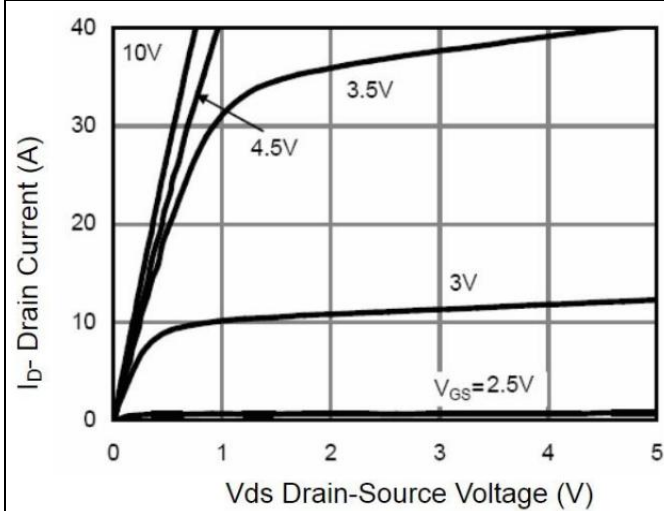


Fig.2 Transfer Characteristics

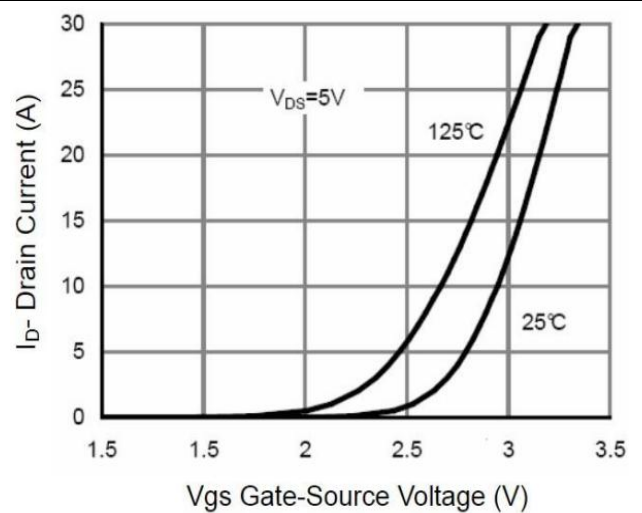


Fig.3 Rdson- Drain Current

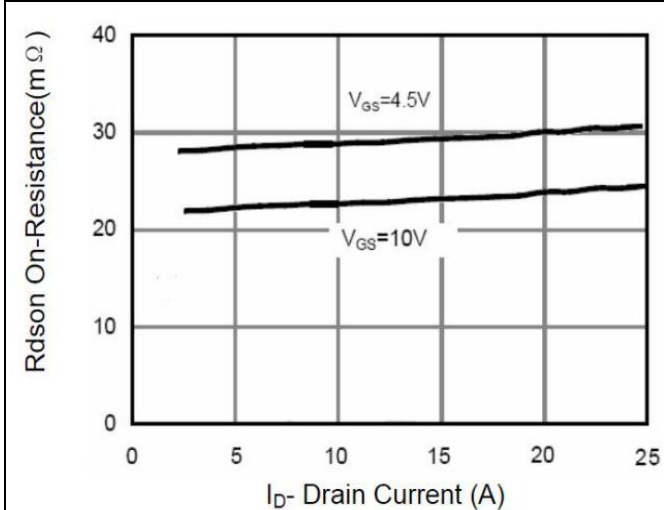


Fig.4 Rdson-Junction Temperature

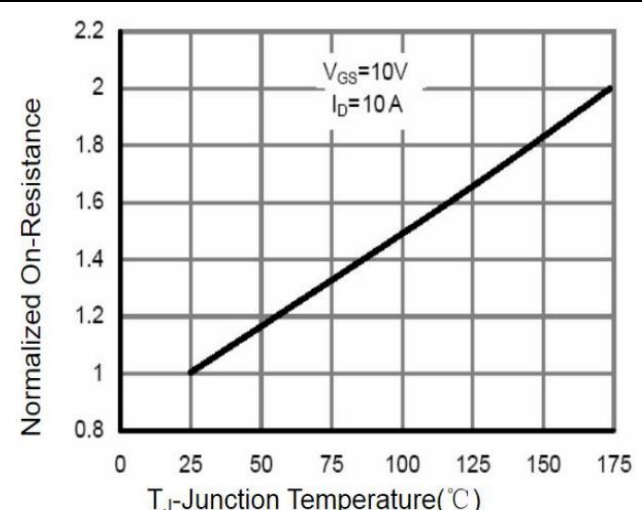


Fig.5 Gate Charge

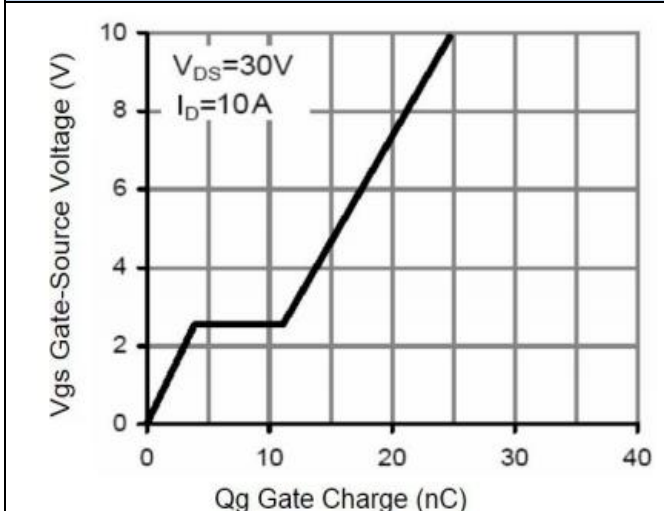


Fig.6 Source- Drain Diode Forward

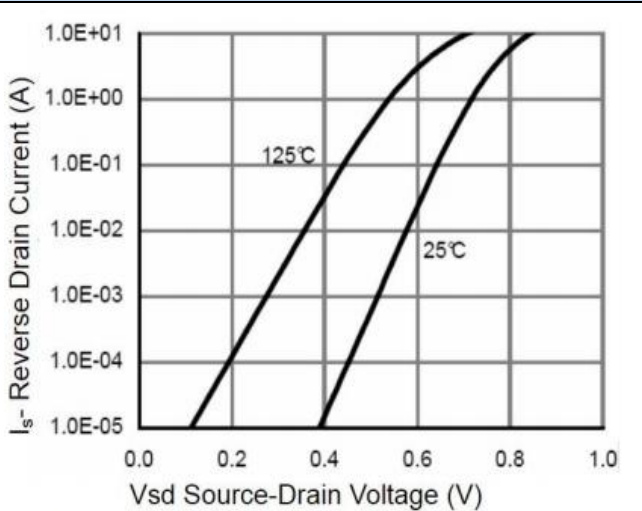




Fig.7 Capacitance vs V_{DS}

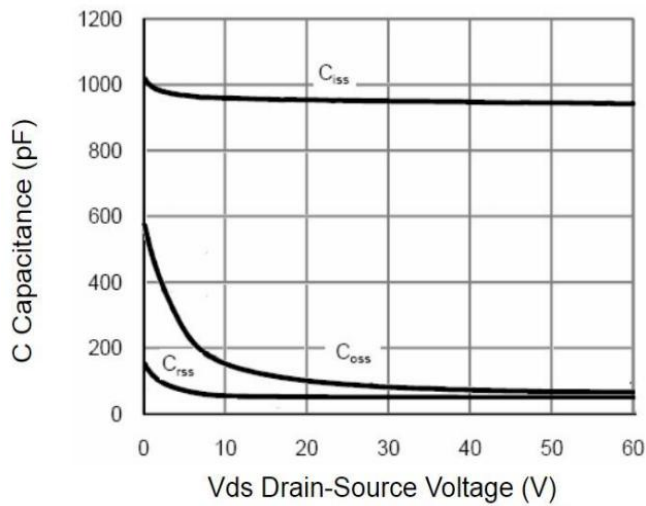


Fig.8 Safe Operation Area

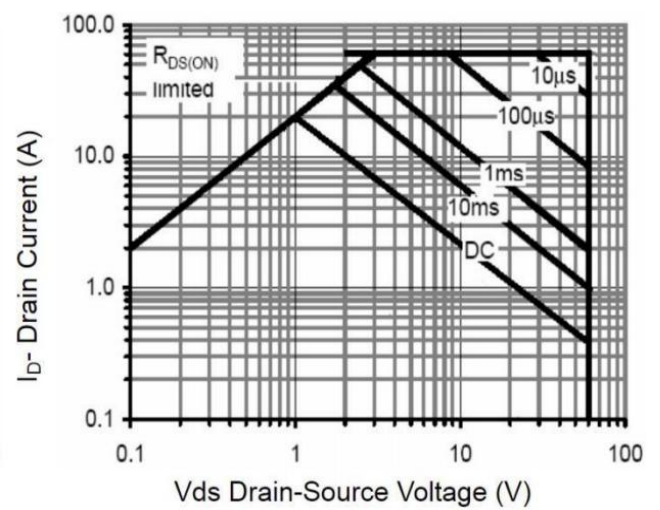


Fig.9 BV_{DSS} Vs Junction Temperature

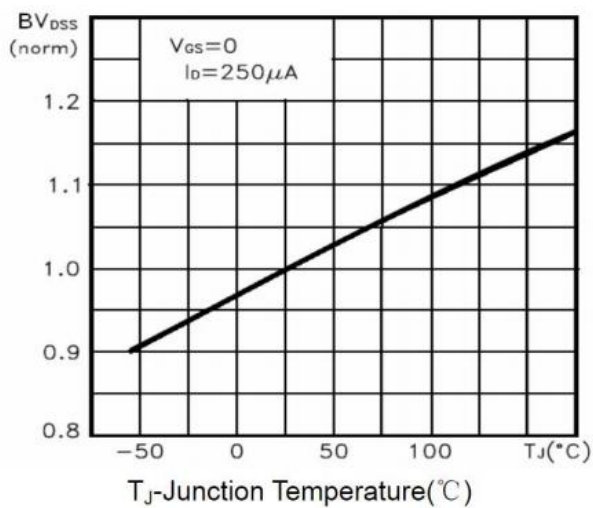


Fig.10 $V_{GS(th)}$ vs Junction Temperature

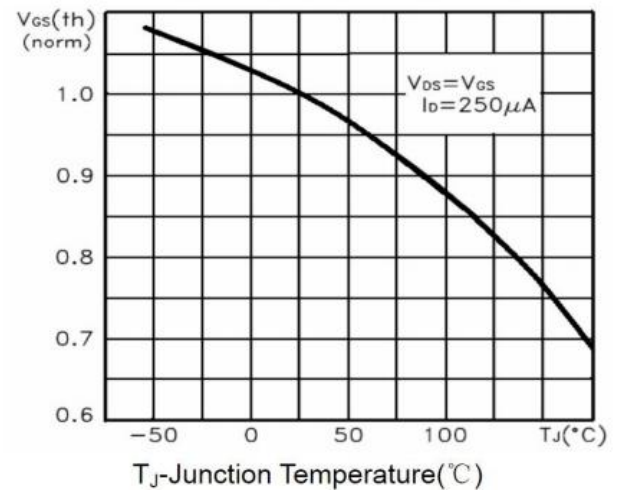
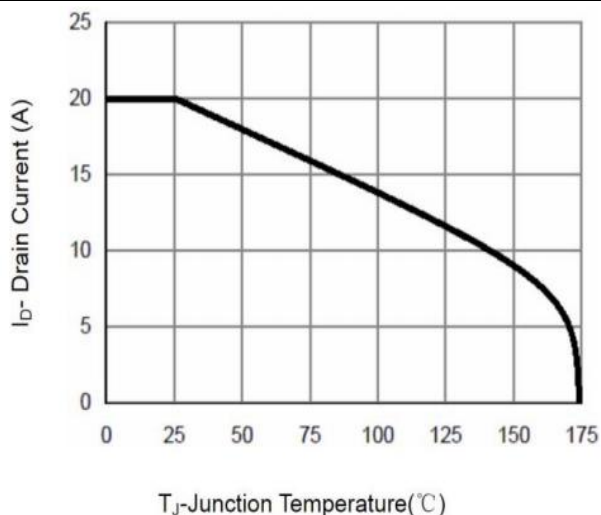
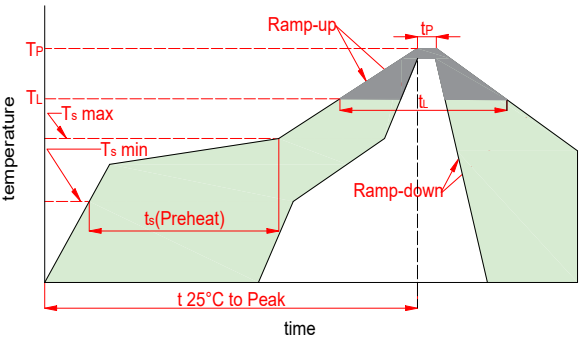


Fig.11 Current De-rating





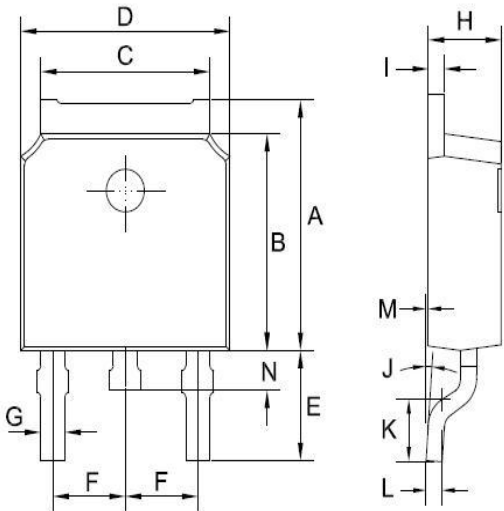
5. Soldering Parameters



Reflow Condition		Lead-free
Pre Heat	Temp. min($T_s(\min)$)	150℃
	Temp. max($T_s(\min)$)	200℃
	Time(min to max)(t_s)	60~180s
Aver. ramp up rate(Liquidus Temp.)(T_L)to peak		3℃/s max
$T_s(\max)$ to T_L -Ramp-up Rate		3℃/s max
Reflow	Temp.(T_L)(Liquidus)	217℃
	Temp.(t_L)(Liquidus)	60~150s
Peak Temp.(T_P)		260 ^{+0/-5} ℃
Time within actual peak Temp.(t_p)		30s max
Ramp-down Rate		6℃/s max
Time 25℃ to peak Tempe.(T_P)		8 minutes max
Do not exceed		260℃

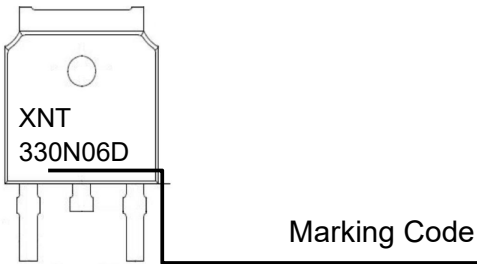
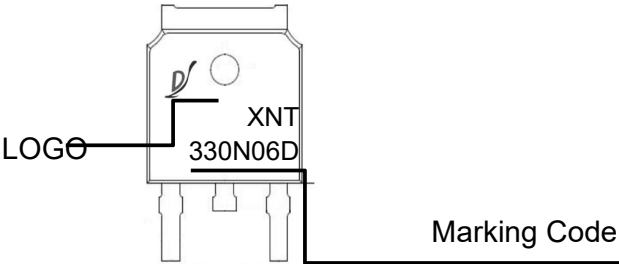
6.Dimensions

TO-252 Mechanical Drawing



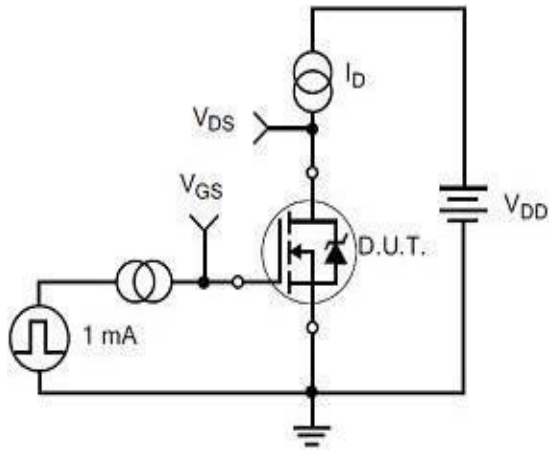
Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	0.270	0.285	6.85	7.25
B	0.232	0.248	5.90	6.30
C	0.202	0.218	5.13	5.53
D	0.252	0.268	6.40	6.80
E	0.114	0.130	2.90	3.30
F	0.086	0.094	2.19	2.39
G	0.018	0.033	0.45	0.85
H	0.087	0.094	2.20	2.40
I	0.016	0.024	0.41	0.61
J	0°	8°	0°	8°
K	0.057	0.073	1.45	1.85
L	0.016	0.024	0.41	0.61
M	0.000	0.005	0.00	0.12
N	0.024	0.039	0.60	1.00

7. Part Marking System

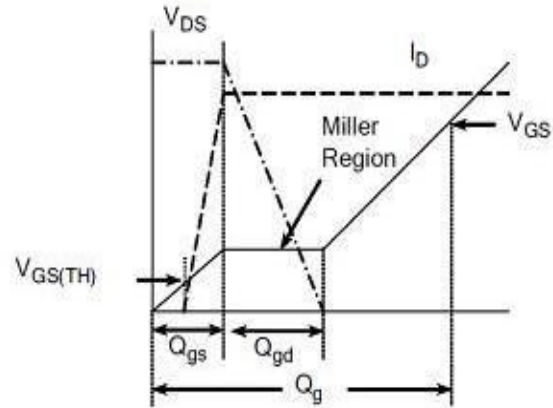




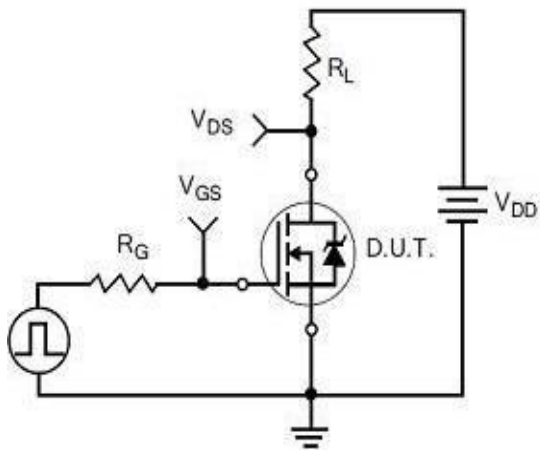
8. Test circuits



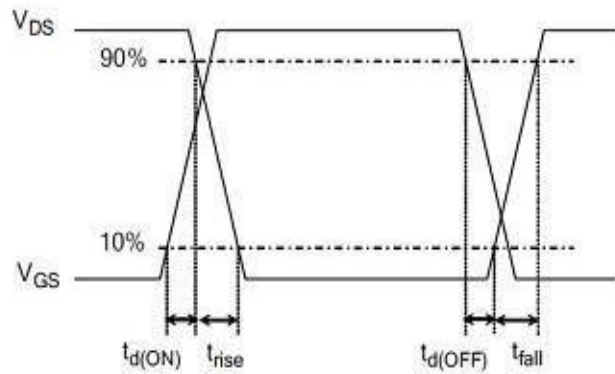
Gate Charge Test Circuit



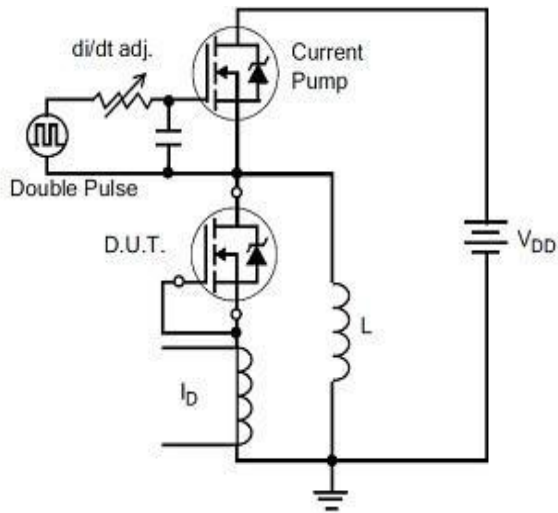
Gate Charge Waveform



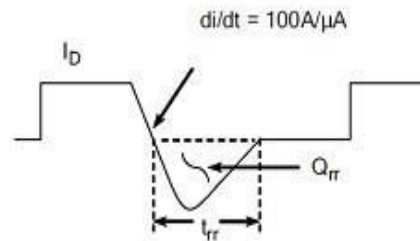
Resistive Switching Test Circuit



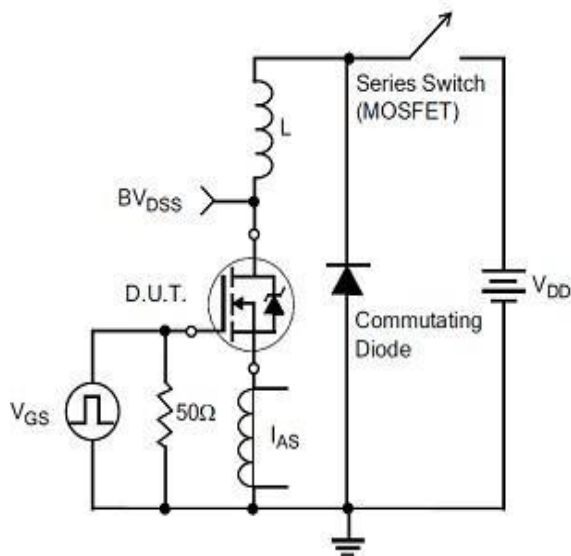
Resistive Switching Waveforms



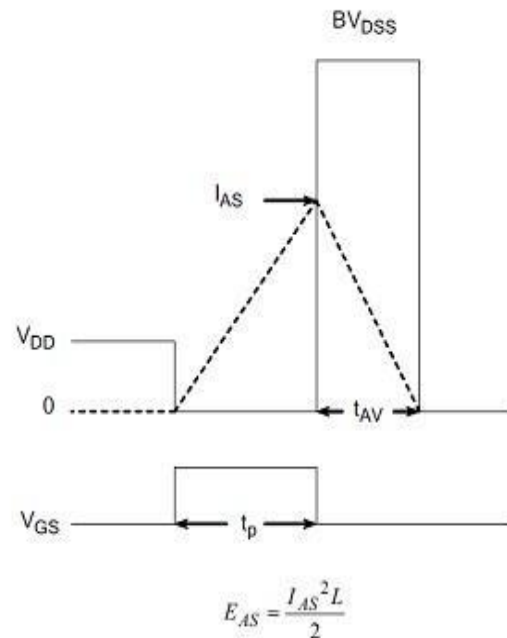
Diode Reverse Recovery Test Circuit



Diode Reverse Recovery Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms



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