KHB9D0N90P1/F1

N CHANNEL MOS FIELD EFFECT TRANSISTOR

General Description

This planar stripe MOSFET has better characteristics, such as fast switching time, low on resistance, low gate charge and excellent avalanche characteristics. It is mainly suitable for electronic ballast and switching mode power supplies.

FEATURES

- $V_{DSS(Min.)}$= 900V, I_D= 9A
- Drain-Source ON Resistance : $R_{DS(ON)}$=1.4 Ω @V_{GS} =10V
- Qg(typ.) =75nC

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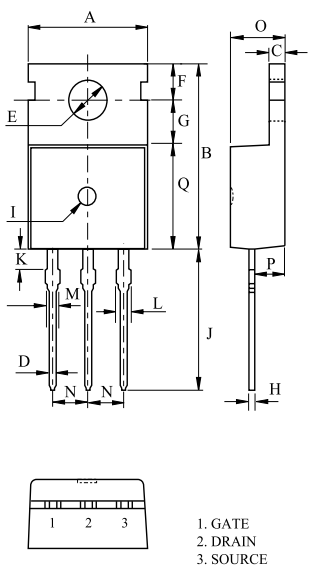
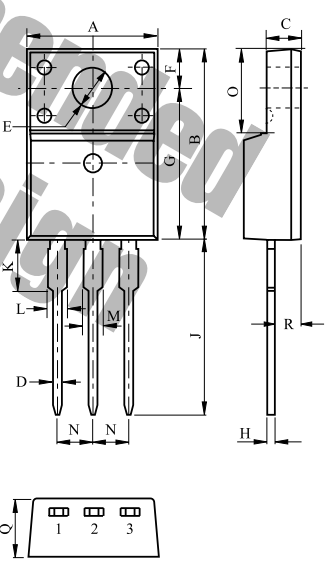


DIM	MILLIMETERS
A	9.9 ± 0.2
B	15.95 MAX
C	1.3+0.1/-0.05
D	0.8± 0.1
E	ø 3.6 ±0.2
F	2.8± 0.1
G	3.7
H	0.5+0.1/-0.05
I	ø 1.5
J	13.08± 0.3
K	1.46
L	1.4± 0.1
M	1.27± 0.1
N	2.54± 0.2
O	4.5± 0.2
P	2.4± 0.2
Q	9.2± 0.2

TO-220AB

KHB9D0N90F1



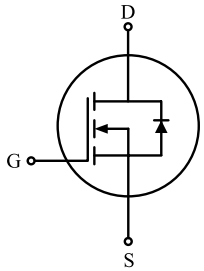
DIM	MILLIMETERS
A	10.16 ± 0.2
B	15.87 ± 0.2
C	2.54 ± 0.2
D	0.8 ± 0.1
E	ø3.18 ± 0.1
F	3.3 ± 0.1
G	12.57 ± 0.2
H	0.5 ± 0.1
J	13.0 ± 0.5
K	3.23 ± 0.1
L	1.47 MAX
M	1.47 MAX
N	2.54 ± 0.2
O	6.68 ± 0.2
Q	4.7 ± 0.2
R	2.76 ± 0.2

TO-220IS (1)

MAXIMUM RATING (Tc=25℃)

CHARACTERISTIC		SYMBOL	RATING		UNIT
			KHB9D0N90P1	KHB9D0N90P1	
Drain-Source Voltage		V_{DSS}	900		V
Gate-Source Voltage		V_{GSS}	±30		V
Drain Current	@T_C=25℃	I_D	9.0	9.0*	A
	@T_C=100℃		36	36*	
	Pulsed (Note1)	I_{DP}	36	36*	
Single Pulsed Avalanche Energy (Note 2)		E_{AS}	900		mJ
Repetitive Avalanche Energy (Note 1)		E_{AR}	20.5		mJ
Peak Diode Recovery dv/dt (Note 3)		dv/dt	4.5		V/ns
Drain Power Dissipation	Tc=25℃	P_D	205	68	W
	Derate above25℃		1.65	0.54	W/℃
Maximum Junction Temperature		T_j	150		℃
Storage Temperature Range		T_{stg}	-55 150		℃
Thermal Characteristics					
Thermal Resistance, Junction-to-Case		R_{thJC}	0.61	1.85	℃/W
Thermal Resistance, Case-to-Sink		R_{thCS}	0.5	-	℃/W
Thermal Resistance, Junction-to-Ambient		R_{thJA}	62.5	62.5	℃/W

* : Drain current limited by maximum junction temperature.



ELECTRICAL CHARACTERISTICS (Tc=25℃)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	BV_{DSS}	I_D=250 μA, V_{GS}=0V	900	-	-	V
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_j$	I_D=250 μA, Referenced to 25℃	-	0.99	-	V/℃
Drain Cut-off Current	I_{DSS}	V_{DS}=900V, V_{GS}=0V	-	-	10	μA
Gate Threshold Voltage	V_{th}	V_{DS}=V_{GS}, I_D=250 μA	2.0	-	4.0	V
Gate Leakage Current	I_{GSS}	V_{GS}=±30V, V_{DS}=0V	-	-	±100	nA
Drain-Source ON Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=4.5A	-	1.12	1.4	Ω
Dynamic						
Total Gate Charge	Q_g	V_{DS}=720V, I_D=9A V_{GS}=10V (Note4,5)	-	75	90	nC
Gate-Source Charge	Q_{gs}		-	12	-	
Gate-Drain Charge	Q_{gd}		-	30.5	-	
Turn-on Delay time	$t_{d(on)}$	V_{DD}=4500V R_L=25Ω R_G=9.0A (Note4,5)	-	48	106	ns
Turn-on Rise time	t_r		-	70	150	
Turn-off Delay time	$t_{d(off)}$		-	289	588	
Turn-off Fall time	t_f		-	117	244	
Input Capacitance	C_{iss}	V_{DS}=25V, V_{GS}=0V, f=1.0MHz	-	2663	3462	pF
Reverse Transfer Capacitance	C_{rss}		-	183	238	
Output Capacitance	C_{oss}		-	20	26	
Source-Drain Diode Ratings						
Continuous Source Current	I_S	V_{GS}<V_{th}	-	-	8.0	A
Pulsed Source Current	I_{SP}		-	-	32.0	
Diode Forward Voltage	V_{SD}	I_S=8.0A, V_{GS}=0V	-	-	1.4	V
Reverse Recovery Time	t_{rr}	I_S=9.0A, V_{GS}=0V, dIs/dt=100A/μs	-	550	-	ns
Reverse Recovery Charge	Q_{rr}		-	6.5	-	μC

Note 1) Repetivity rating : Pulse width limited by junction temperature.

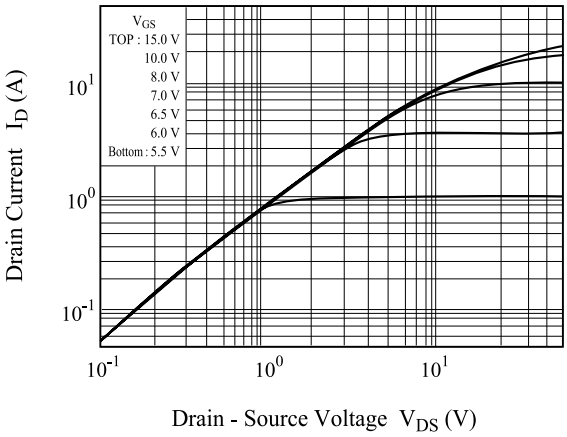
Note 2) L = 21mH, I_S=9.0A, V_{DD}=50V, R_G = 25Ω, Starting T_j = 25℃.

Note 3) I_S ≤9A, dI/dt≤200A/μs, V_{DD}≤BV_{DSS}, Starting T_j = 25℃.

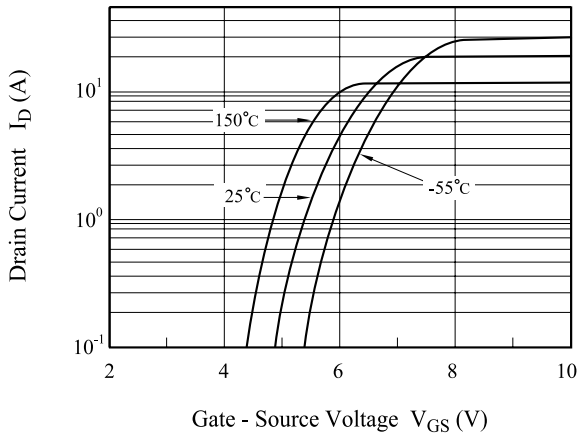
Note 4) Pulse Test : Pulse width ≤ 300μs, Duty Cycle ≤ 2%.

Note 5) Essentially independent of operating temperature.

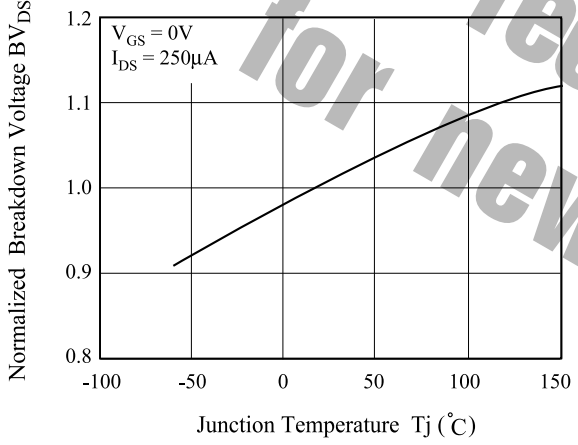
I_D - V_{DS}



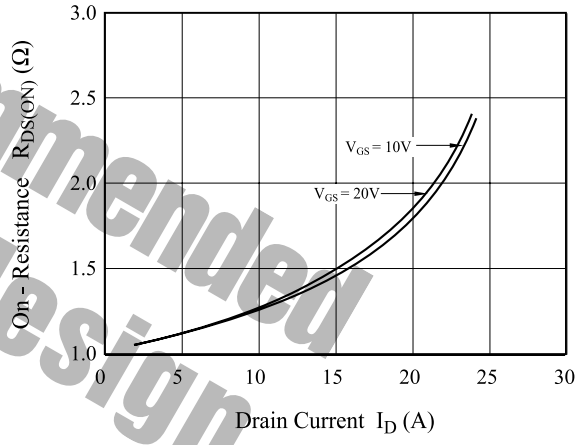
I_D - V_{GS}



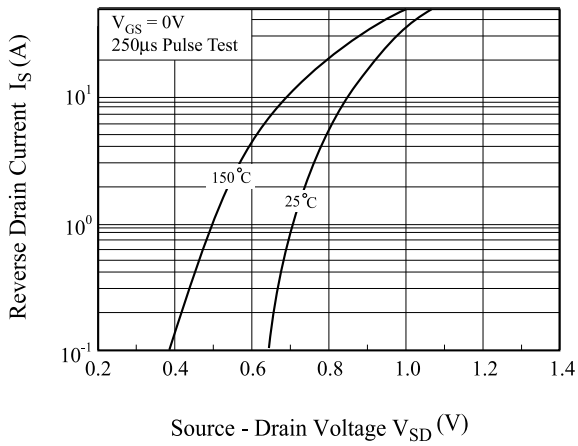
BV_{DSS} - T_j



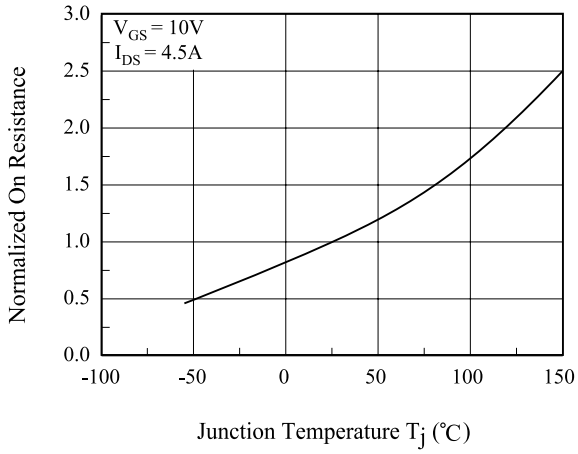
$R_{DS(ON)}$ - I_D



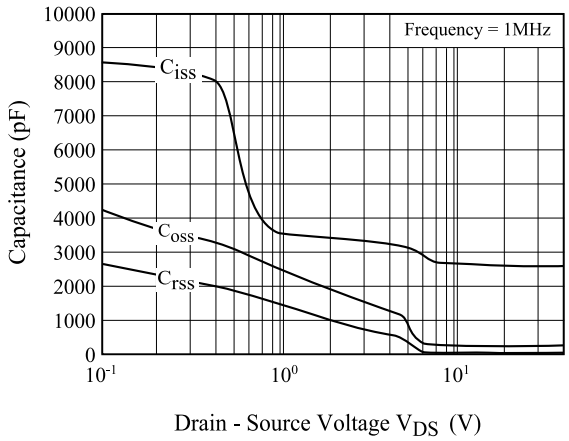
I_S - V_{SD}



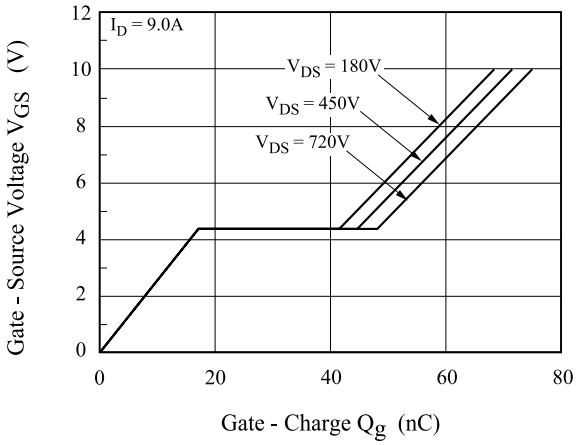
$R_{DS(ON)}$ - T_j



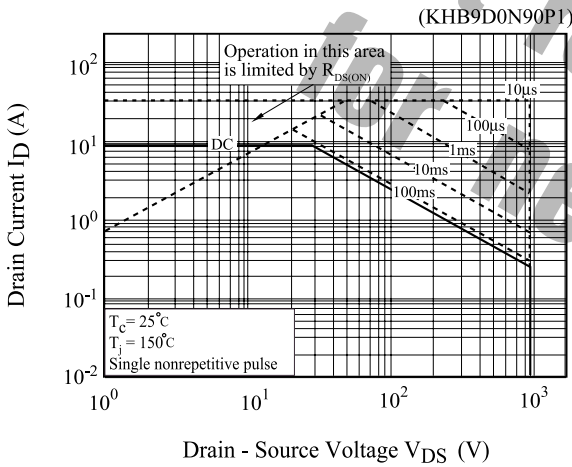
C - V_{DS}



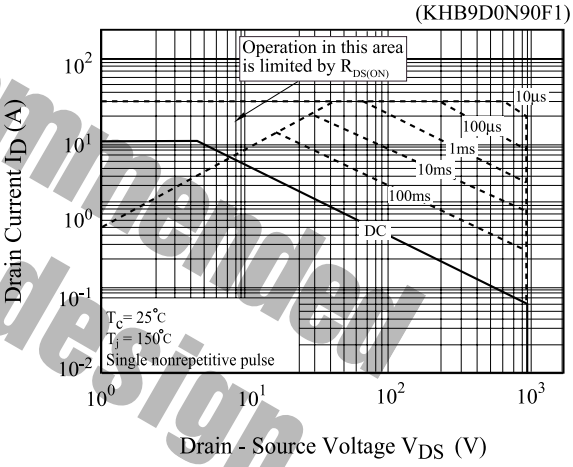
Q_g- V_{GS}



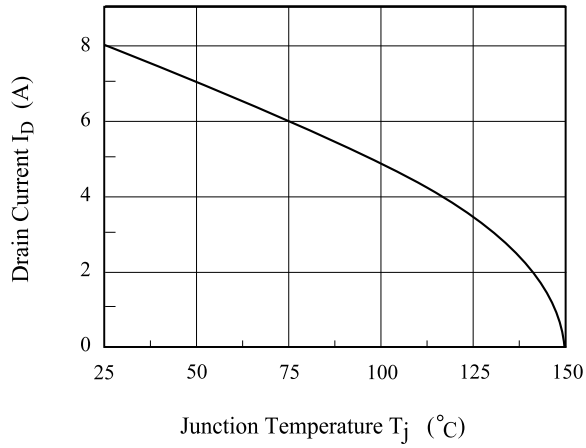
Safe Operation Area (KHB9D0N90P1)



Safe Operation Area (KHB9D0N90F1)



I_D - T_j



R_{th}

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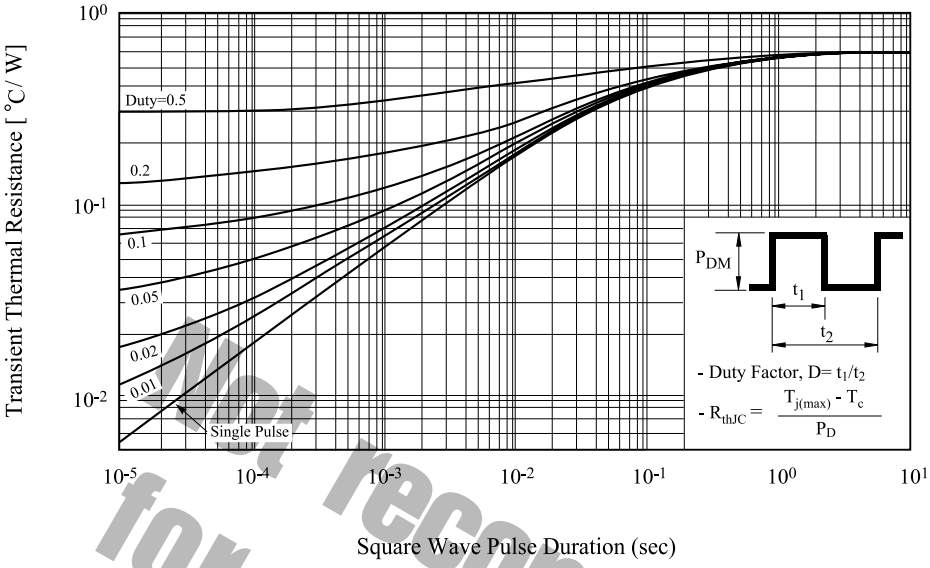

R_{th}

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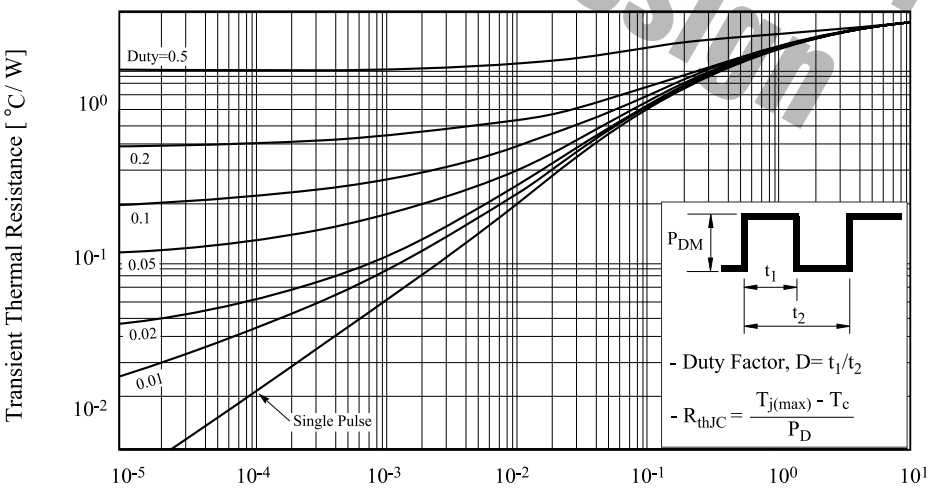
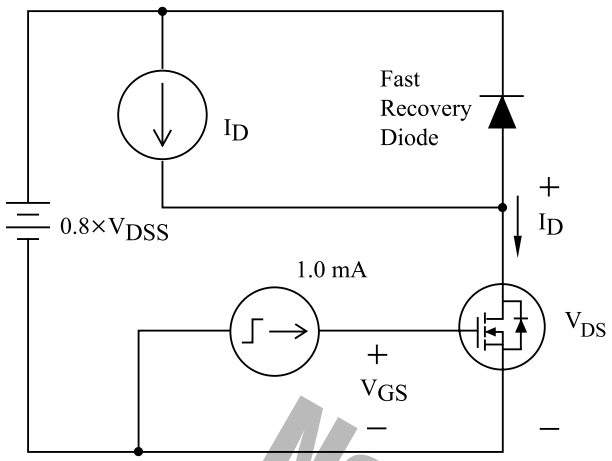
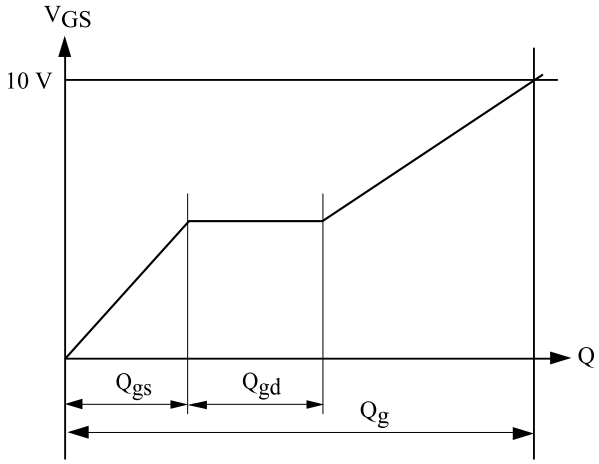
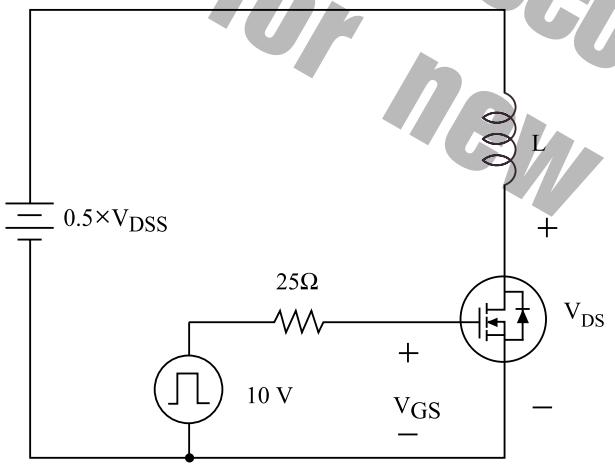


- Gate Charge

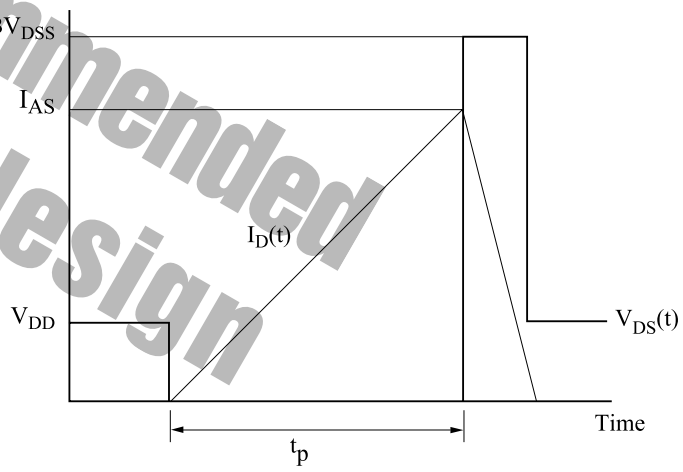




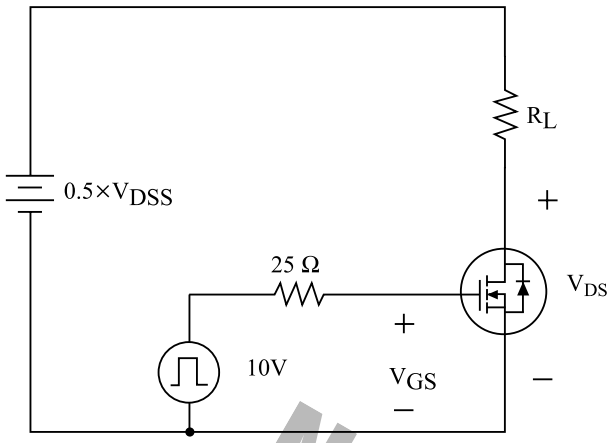
- Single Pulsed Avalanche Energy

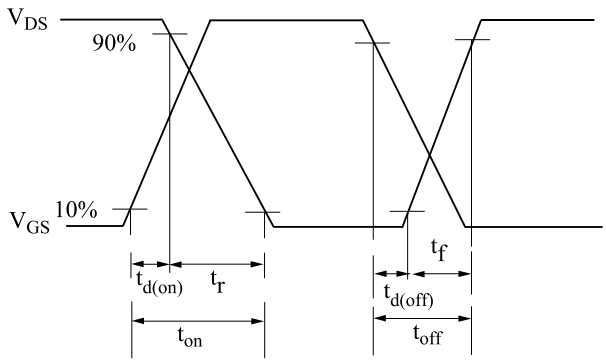


$$E_{AS}= \frac{1}{2} LI_{AS}^2 \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$



- Resistive Load Switching





- Source - Drain Diode Reverse Recovery and dv /dt