

### 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 switch mode power supplies.

### FEATURES

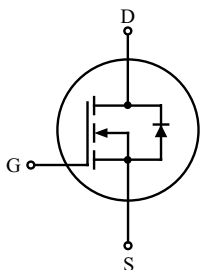
- $V_{DSS} = 900V$ ,  $I_D = 3A$
- Drain-Source ON Resistance  
:  $R_{DS(ON)} = 4.5 \Omega$  @  $V_{GS} = 10V$
- $Q_g(\text{typ.}) = 25nC$

### MAXIMUM RATING (Tc=25°C)

CHARACTERISTIC	SYMBOL	RATING		UNIT	
		KHB3D0N90P1	KHB3D0N90F1 KHB3D0N90F2		
Drain-Source Voltage	$V_{DSS}$	900		V	
Gate-Source Voltage	$V_{GSS}$	$\pm 30$		V	
Drain Current	@T <sub>C</sub> =25°C	$I_D$	3.0	3.0*	A
	Pulsed (Note 1)	$I_{DP}$	12	12*	
Single Pulsed Avalanche Energy (Note 2)	$E_{AS}$	450		mJ	
Repetitive Avalanche Energy (Note 1)	$E_{AR}$	13		mJ	
Peak Diode Recovery dv/dt (Note 3)	dv/dt	4.0		V/ns	
Drain Power Dissipation	Tc=25°C	$P_D$	130	43	W
	Derate above 25°C		1.04	0.34	
Maximum Junction Temperature	$T_j$	150		°C	
Storage Temperature Range	$T_{stg}$	-55~150		°C	
<b>Thermal Characteristics</b>					
Thermal Resistance, Junction-to-Case	$R_{thJC}$	0.96	2.9	°C/W	
Thermal Resistance, Junction-to-Ambient	$R_{thJA}$	62.5	62.5	°C/W	

\* : Drain current limited by maximum junction temperature.

### PIN CONNECTION



#### KHB3D0N90P1

DIM	MILLIMETERS
A	9.9 ± 0.2
B	15.95 MAX
C	1.3+0.1/-0.05
D	0.8 ± 0.1
E	∅3.6 ± 0.2
F	2.8 ± 0.1
G	3.7
H	0.5+0.1/-0.05
I	∅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

1. GATE  
2. DRAIN  
3. SOURCE

TO-220AB

#### KHB3D0N90F1

DIM	MILLIMETERS
A	10.16 ± 0.2
B	15.87 ± 0.2
C	2.54 ± 0.2
D	0.8 ± 0.1
E	∅3.18 ± 0.1
F	3.3 ± 0.1
G	12.57 ± 0.2
H	0.5 ± 0.1
J	13.0 MAX
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

1. GATE  
2. DRAIN  
3. SOURCE

TO-220IS (1)

#### KHB3D0N90F2

DIM	MILLIMETERS
A	10.0 ± 0.3
B	15.0 ± 0.3
C	2.70 ± 0.3
D	0.76+0.09/-0.05
E	∅3.2 ± 0.2
F	3.0 ± 0.3
G	12.0 ± 0.3
H	0.5+0.1/-0.05
J	13.6 ± 0.5
K	3.7 ± 0.2
L	1.2+0.25/-0.1
M	1.5+0.25/-0.1
N	2.54 ± 0.1
P	6.8 ± 0.1
Q	4.5 ± 0.2
R	2.6 ± 0.2
S	0.5 Typ

1. GATE  
2. DRAIN  
3. SOURCE

TO-220IS

# KHB3D0N90P1/F1/F2

## ELECTRICAL CHARACTERISTICS (Tc=25 °C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
<b>Static</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$I_D=250\mu A, V_{GS}=0V$	900	-	-	V
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_j$	$I_D=250\mu A$ , Referenced to 25 °C	-	1	-	V/°C
Gate Threshold Voltage	$V_{th}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	-	4.0	V
Drain Cut-off Current	$I_{DSS}$	$V_{DS}=900V, V_{GS}=0V$ ,	-	-	10	$\mu A$
Gate Leakage Current	$I_{GSS}$	$V_{GS}=\pm 30V, V_{DS}=0V$	-	-	$\pm 100$	nA
Drain-Source ON Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=1.5A$	-	4.0	4.5	$\Omega$
<b>Dynamic</b>						
Total Gate Charge	$Q_g$	$V_{DS}=720V, I_D=3.0A$ $V_{GS}=10V$ (Note4, 5)	-	25	32	nC
Gate-Source Charge	$Q_{gs}$		-	4	-	
Gate-Drain Charge	$Q_{gd}$		-	11.5	-	
Turn-on Delay time	$t_{d(on)}$	$V_{DD}=450V, R_G=25\Omega$ $I_D=3.0A$ (Note4, 5)	-	31	72	ns
Turn-on Rise time	$t_r$		-	65	139	
Turn-off Delay time	$t_{d(off)}$		-	104	218	
Turn-off Fall time	$t_f$		-	127	264	
Input Capacitance	$C_{iss}$	$V_{DS}=25V, V_{GS}=0V, f=1.0MHz$	-	820	1066	pF
Output Capacitance	$C_{oss}$		-	63	82	
Reverse Transfer Capacitance	$C_{rss}$		-	9	12	
<b>Source-Drain Diode Ratings</b>						
Continuous Source Current	$I_S$	$V_{GS}<V_{th}$	-	-	3.0	A
Pulsed Source Current	$I_{SP}$		-	-	12	
Diode Forward Voltage	$V_{SD}$	$I_S=3.0A, V_{GS}=0V$	-	-	1.6	V
Reverse Recovery Time	$t_{rr}$	$I_S=3.0A, V_{DD}=450V$ , $dI_S/dt=100A/\mu s$ (Note 4)	-	510	-	ns
Reverse Recovery Charge	$Q_{rr}$		-	2.2	-	$\mu C$

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

Note 2)  $L=94mH, I_S=3.0A, V_{DD}=50V, R_G=25\Omega$ , Starting  $T_j=25^\circ C$ .

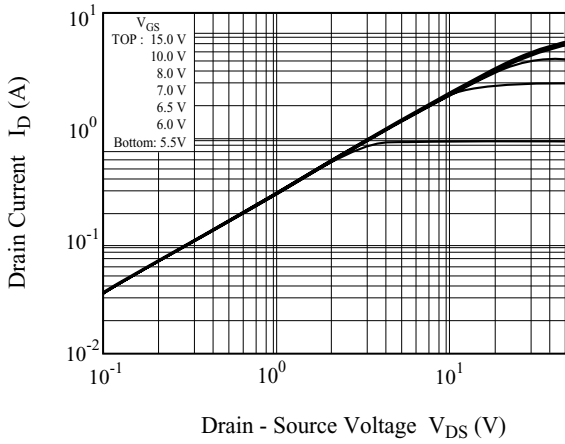
Note 3)  $I_S \leq 3.0A, dI/dt \leq 200A/\mu s, V_{DD} \leq BV_{DSS}$ , Starting  $T_j=25^\circ C$ .

Note 4) Pulse Test : Pulse width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .

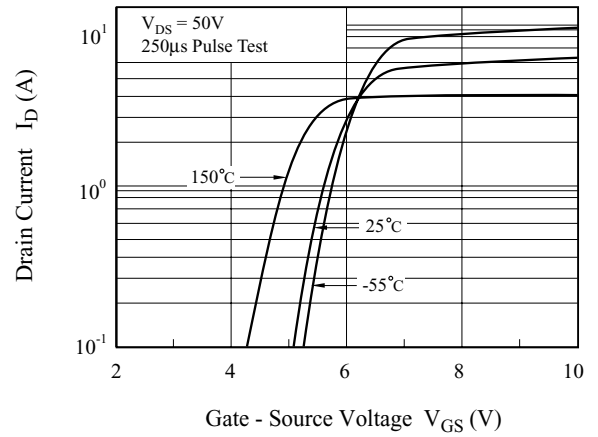
Note 5) Essentially independent of operating temperature.

# KHB3D0N90P1/F1/F2

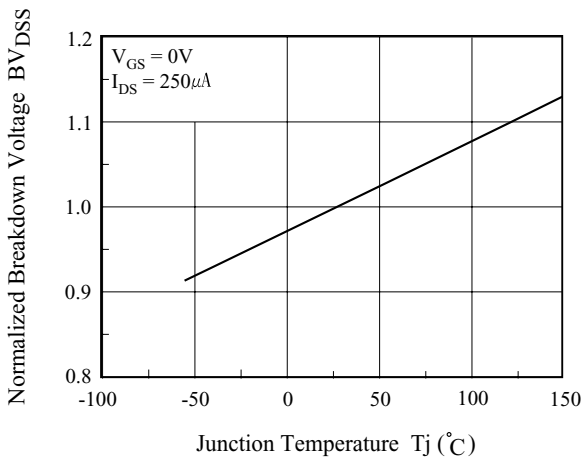
$I_D - V_{DS}$



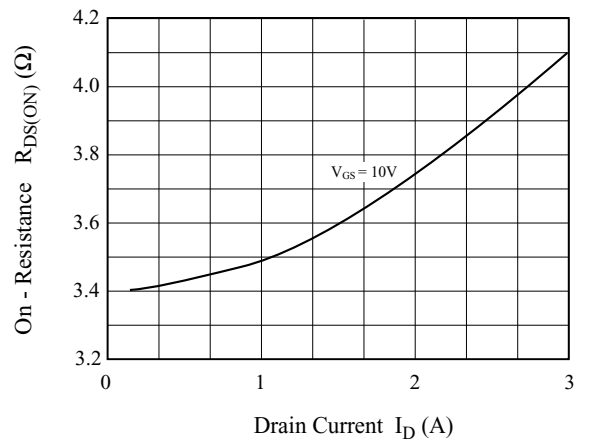
$I_D - V_{GS}$



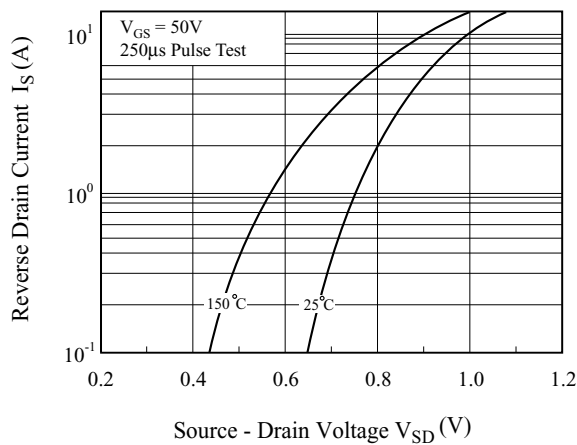
$BV_{DSS} - T_j$



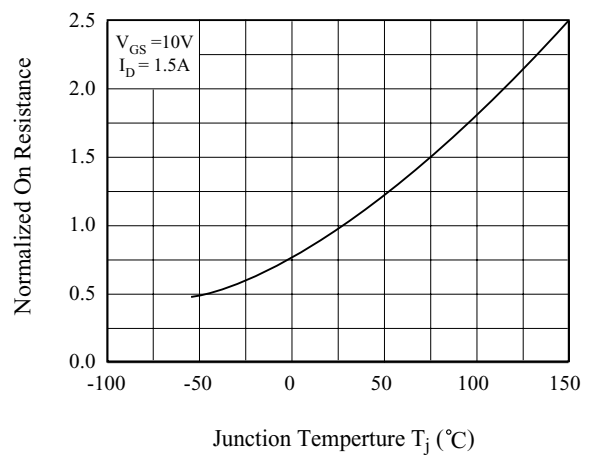
$R_{DS(ON)} - I_D$



$I_S - V_{SD}$

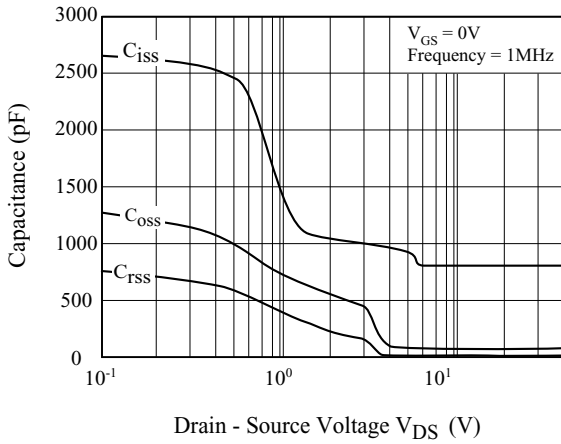


$R_{DS(ON)} - T_j$

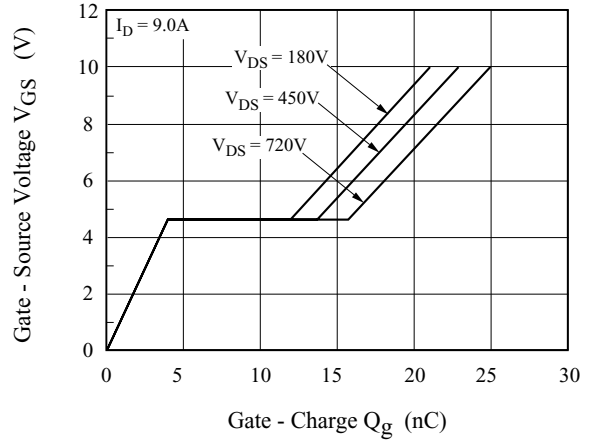


# KHB3D0N90P1/F1/F2

C - V<sub>DS</sub>

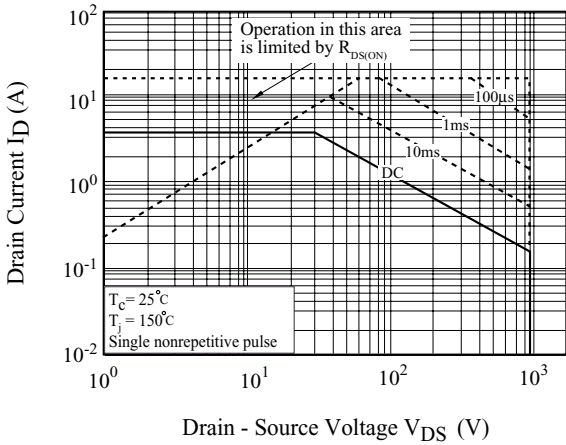


Q<sub>g</sub>- V<sub>GS</sub>



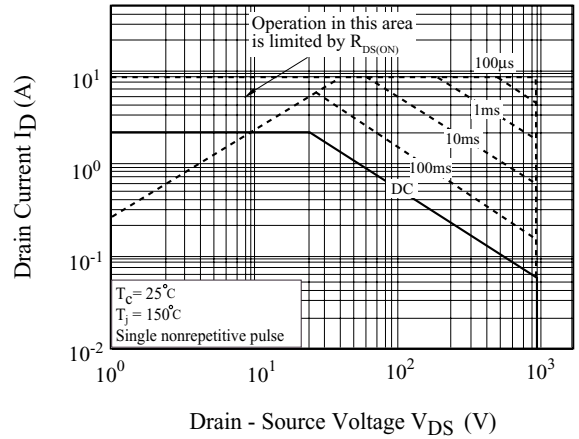
Safe Operation Area

(KHB3D0N90P1)

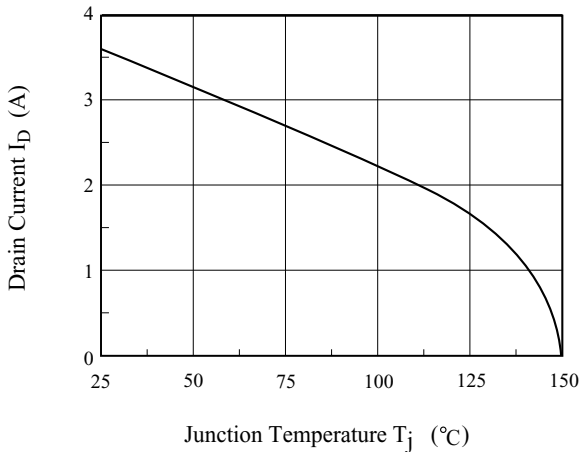


Safe Operation Area

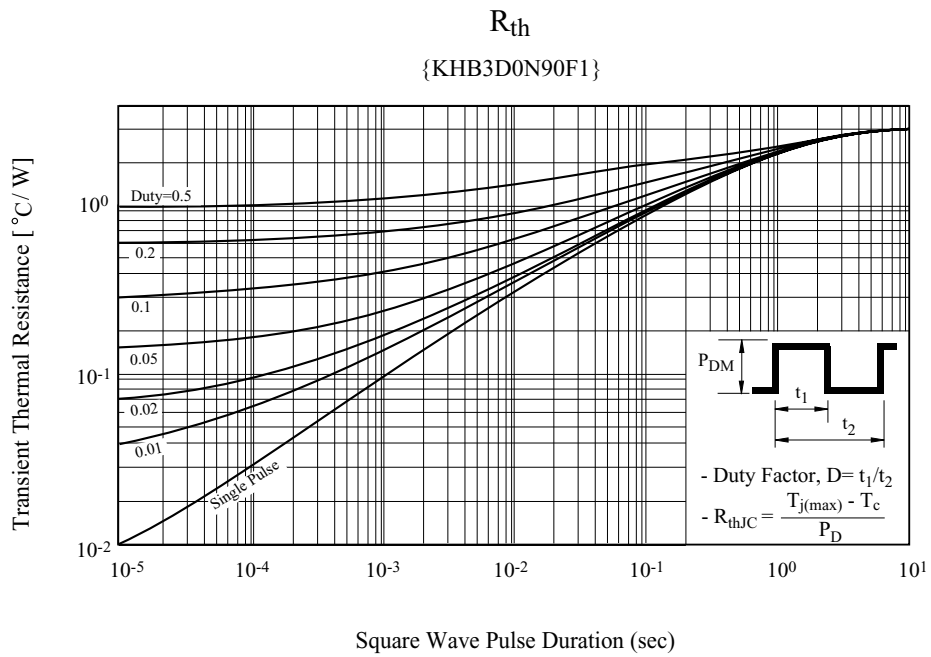
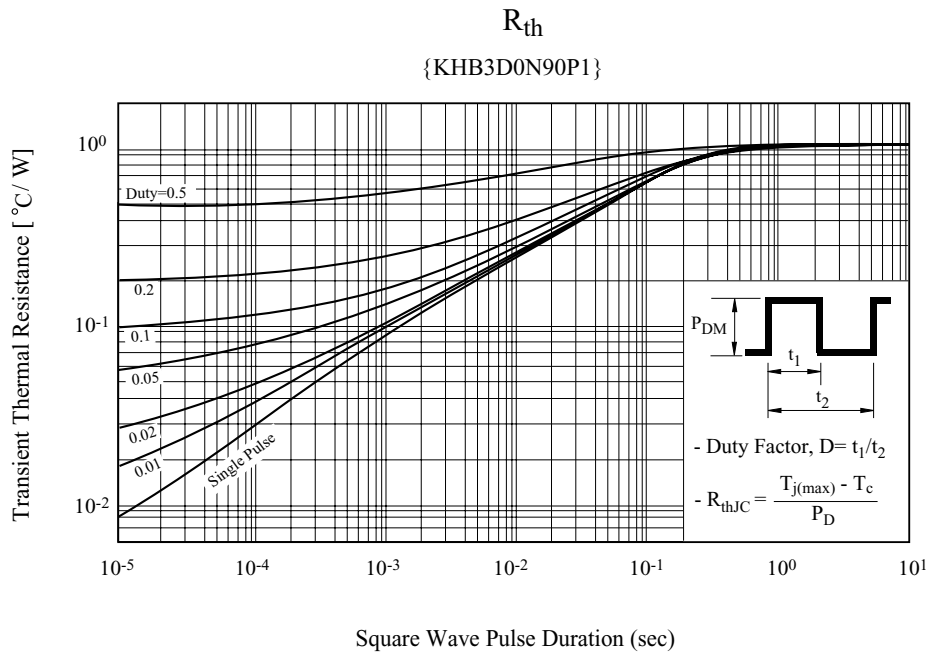
(KHB3D0N90F1)



I<sub>D</sub> - T<sub>j</sub>

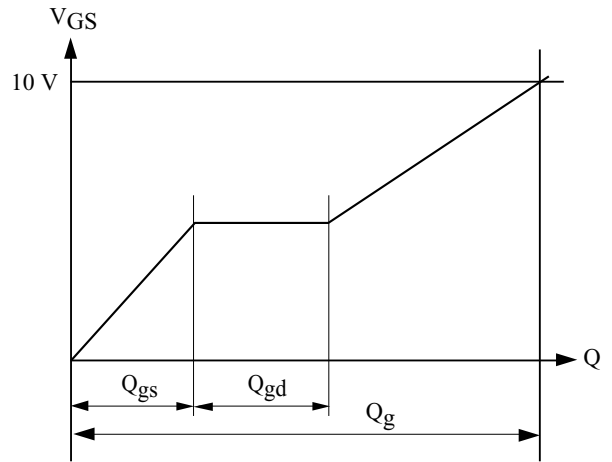
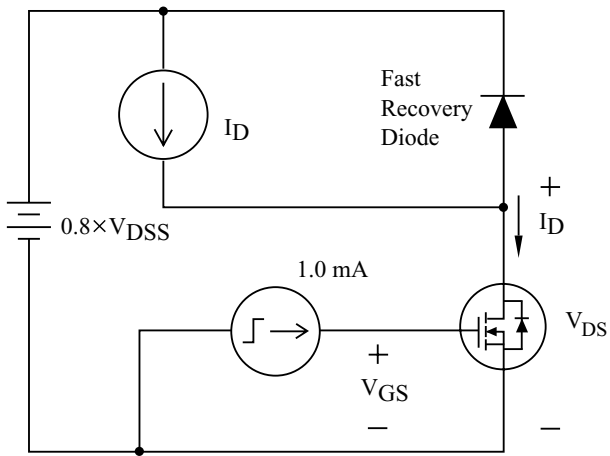


# KHB3D0N90P1/F1/F2

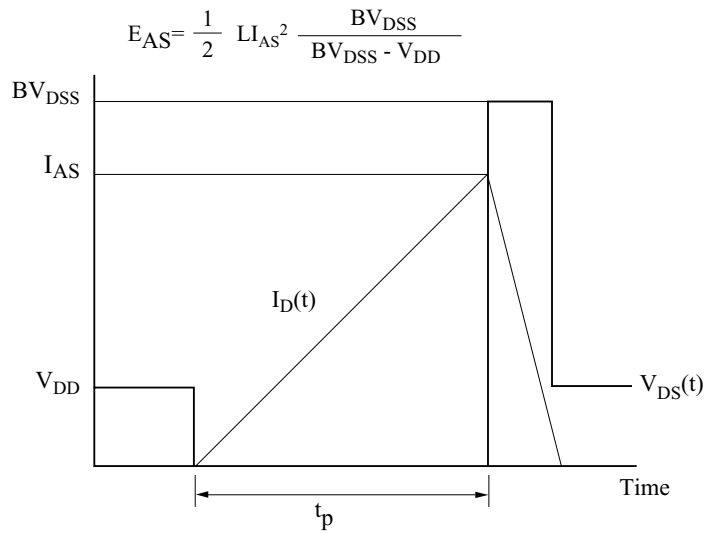
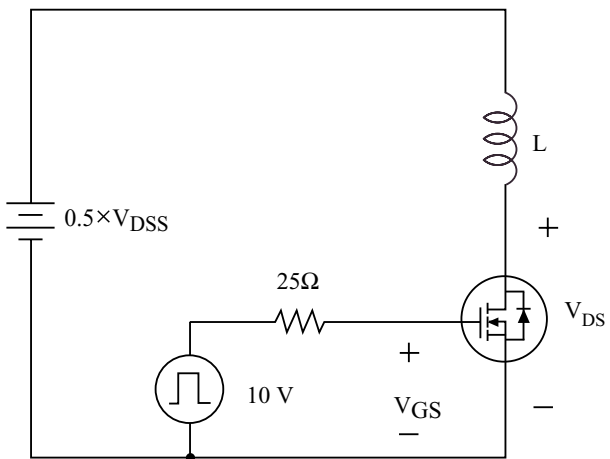


# KHB3D0N90P1/F1/F2

## - Gate Charge

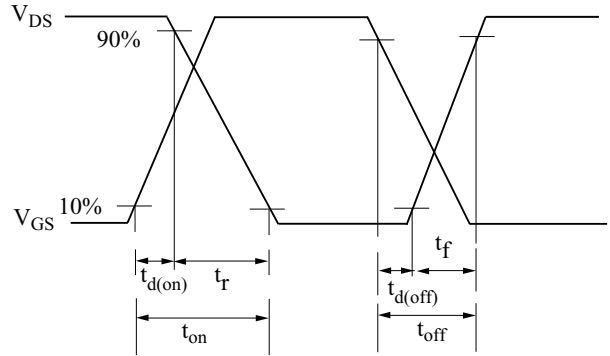
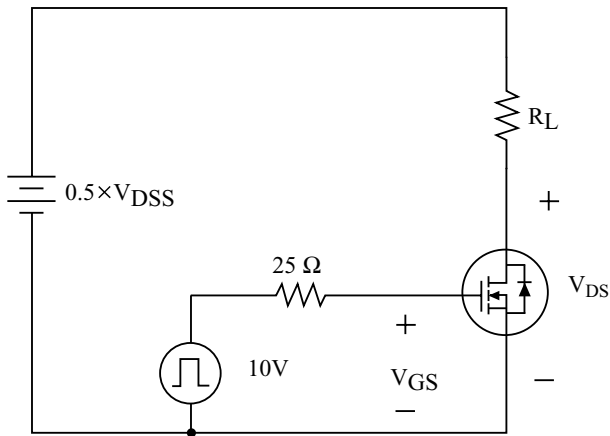


## - Single Pulsed Avalanche Energy



# KHB3D0N90P1/F1/F2

## - Resistive Load Switching



## - Source - Drain Diode Reverse Recovery and $dv/dt$

