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KEC

SEMICONDUCTOR
TECHNICAL DATA

KHB4D0N65P/F
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 switch mode power supplies.

FEATURES

- V_{DSS}=650V, I_D=4A
- Drain-Source ON Resistance
  : $R_{DS(ON)}$=3.0 Ω @V_{GS} = 10V
- Qg(typ.)=20nC

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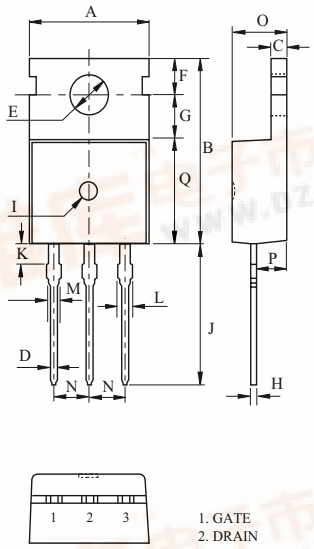
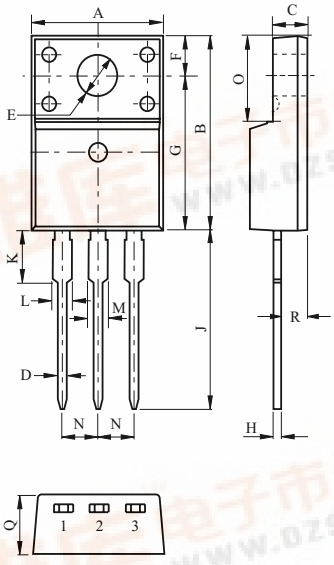


DIM	MILLIMETERS
A	9.9 ± 0.2
B	15.95 MAX
C	1.3+0.1/-0.05
D	0.8± 0.1
E	ø 3.6 ± 0.2
F	2.8± 0.1
G	3.7
H	0.5+0.1/-0.05
I	ø 1.5
J	13.08± 0.3
K	1.46
L	1.4 ± 0.1
M	1.27± 0.1
N	2.54 ± 0.2
O	4.5 ± 0.2
P	2.4 ± 0.2
Q	9.2 ± 0.2

1. GATE
2. DRAIN
3. SOURCE

TO-220AB

KHB4D0N65F



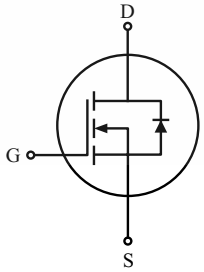
DIM	MILLIMETERS
A	10.16 ± 0.2
B	15.87 ± 0.2
C	2.54 ± 0.2
D	0.8 ± 0.1
E	ø3.18 ± 0.1
F	3.3 ± 0.1
G	12.57 ± 0.2
H	0.5 ± 0.1
J	13.0 MAX
K	3.23 ± 0.1
L	1.47 MAX
M	1.47 MAX
N	2.54 ± 0.2
O	6.68 ± 0.2
Q	4.7 ± 0.2
R	2.76 ± 0.2

TO-220IS (1)

MAXIMUM RATING (Tc=25℃)

CHARACTERISTIC		SYMBOL	RATING		UNIT
			KHB4D0N65P	KHB4D0N65F	
Drain-Source Voltage		V_{DSS}	650		V
Gate-Source Voltage		V_{GSS}	±30		V
Drain Current	@T_C=25℃	I_D	4.0	4.0*	A
	Pulsed (Note1)	I_{DP}	16	16*	
Single Pulsed Avalanche Energy (Note 2)		E_{AS}	260		mJ
Repetitive Avalanche Energy (Note 1)		E_{AR}	10.6		mJ
Peak Diode Recovery dv/dt (Note 3)		dv/dt	4.5		V/ns
Drain Power Dissipation	Tc=25℃	P_D	106	36	W
	Derate above25℃		0.85	0.29	W/℃
Maximum Junction Temperature		T_j	150		℃
Storage Temperature Range		T_{stg}	-55～150		℃
Thermal Characteristics					
Thermal Resistance, Junction-to-Case		R_{thJC}	1.18	3.47	℃/W
Thermal Resistance, Junction-to-Ambient		R_{thJA}	62.5	62.5	℃/W

* : Drain current limited by maximum junction temperature.



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ELECTRICAL CHARACTERISTICS (Tc=25℃)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	BV_{DSS}	I_D=250μA, V_{GS}=0V	650	-	-	V
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_j$	I_D=250μA, Referenced to 25℃	-	0.95	-	V/℃
Gate Threshold Voltage	V_{th}	V_{DS}=V_{GS}, I_D=250μA	2.0	-	4.0	V
Drain Cut-off Current	I_{DSS}	V_{DS}=650V, V_{GS}=0V,	-	-	10	μA
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=2.0A	-	2.4	3.0	Ω
Forward Transconductance	g_{FS}	V_{DS}=50V, I_D=2.0A (Note4)	-	3.8	-	S
Dynamic						
Total Gate Charge	Q_g	V_{DS}=520V, I_D=4.0A V_{GS}=10V (Note4, 5)	-	20	25	nC
Gate-Source Charge	Q_{gs}		-	4.0	-	
Gate-Drain Charge	Q_{gd}		-	7.5	-	
Turn-on Delay time	$t_{d(on)}$	V_{DD}=325V, R_G=25 Ω I_D=4.0A (Note4, 5)	-	29.5	69	ns
Turn-on Rise time	t_r		-	63.4	136.7	
Turn-off Delay time	$t_{d(off)}$		-	63.2	136.4	
Turn-off Fall time	t_f		-	30	70	
Input Capacitance	C_{iss}	V_{DS}=25V, V_{GS}=0V, f=1.0MHz	-	645	838	pF
Output Capacitance	C_{oss}		-	60	78	
Reverse Transfer Capacitance	C_{rss}		-	7.4	9.6	
Source-Drain Diode Ratings						
Continuous Source Current	I_S	V_{GS}<V_{th}	-	-	4.0	A
Pulsed Source Current	I_{SP}		-	-	16	
Diode Forward Voltage	V_{SD}	I_S=4.0A, V_{GS}=0V	-	-	1.4	V
Reverse Recovery Time	t_{rr}	I_S=4.0A, V_{GS}=0V, dIs/dt=100A/μs (Note 4)	-	350	-	ns
Reverse Recovery Charge	Q_{rr}		-	2.7	-	μC

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

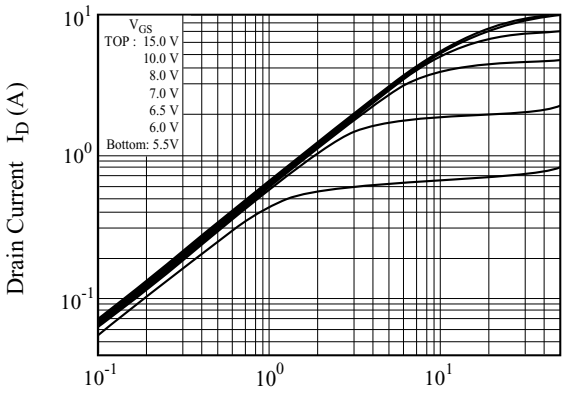
Note 2) L =30mH, I_S=4A, V_{DD}=50V, R_G=25 Ω, Starting T_j=25℃.

Note 3) I_S ≤4.0A, dI/dt ≤200A/μs, V_{DD} ≤BV_{DSS}, Starting T_j=25℃.

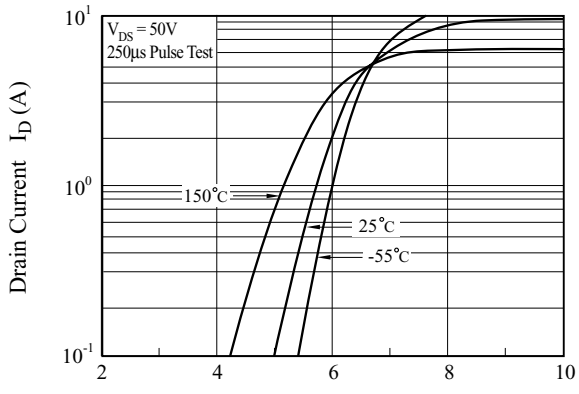
Note 4) Pulse Test : Pulse width ≤ 300μs, Duty Cycle ≤ 2%.

Note 5) Essentially independent of operating temperature.

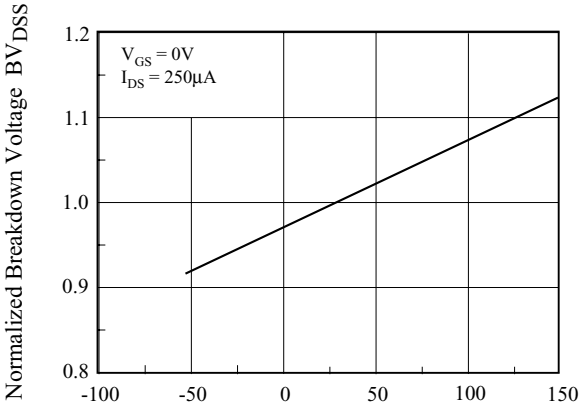
I_D - V_{DS}



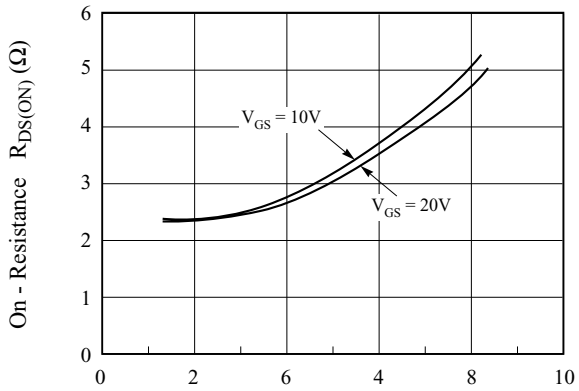
I_D - V_{GS}



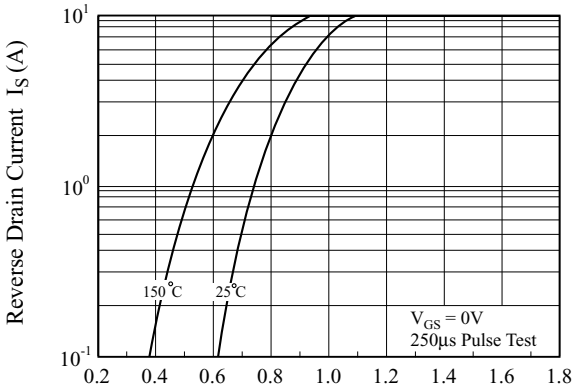
BV_{DSS} - T_j



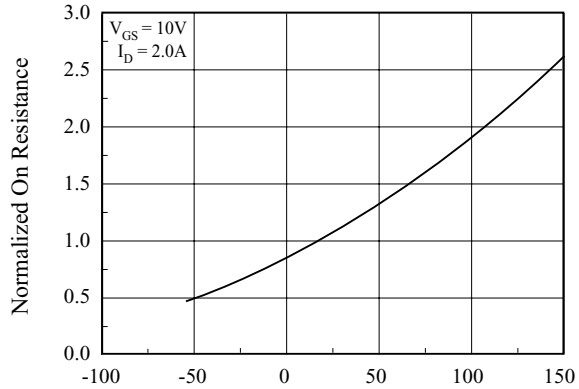
$R_{DS(ON)}$ - I_D



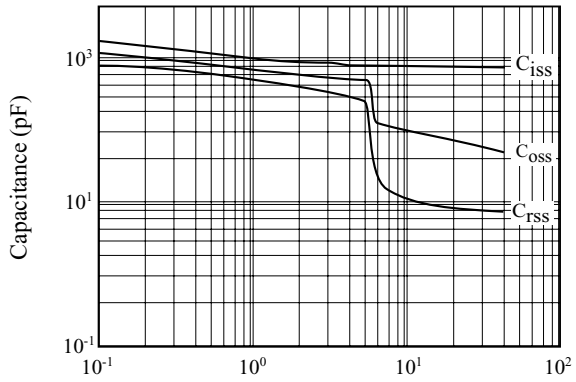
I_S - V_{SD}



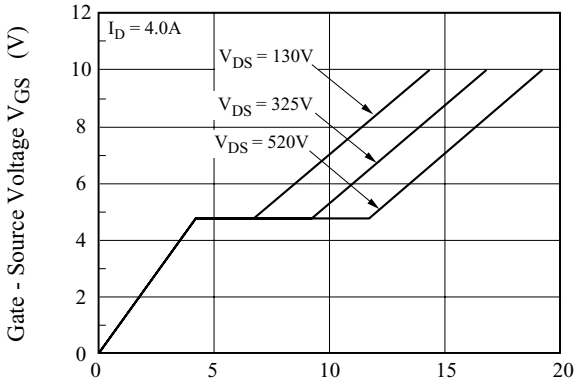
$R_{DS(ON)}$ - T_j



C - V_{DS}

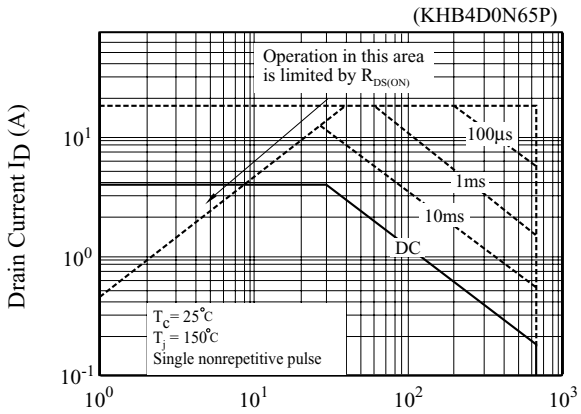


Q_g- V_{GS}



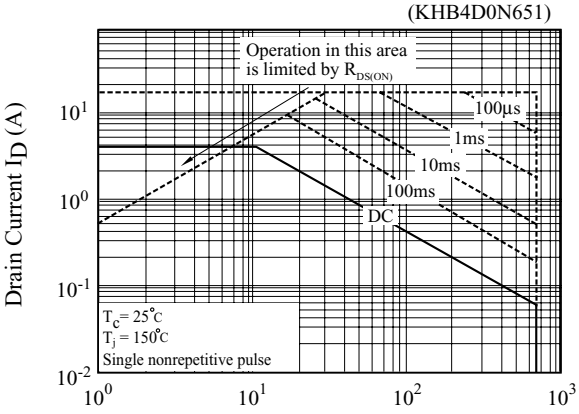
Safe Operation Area

(KHB4D0N65P)

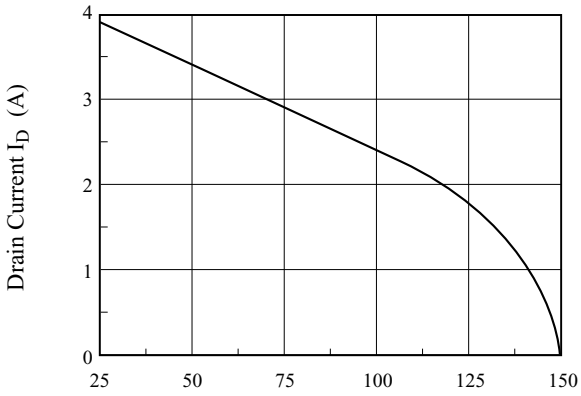


Safe Operation Area

(KHB4D0N651)



I_D - T_j



R_{th}

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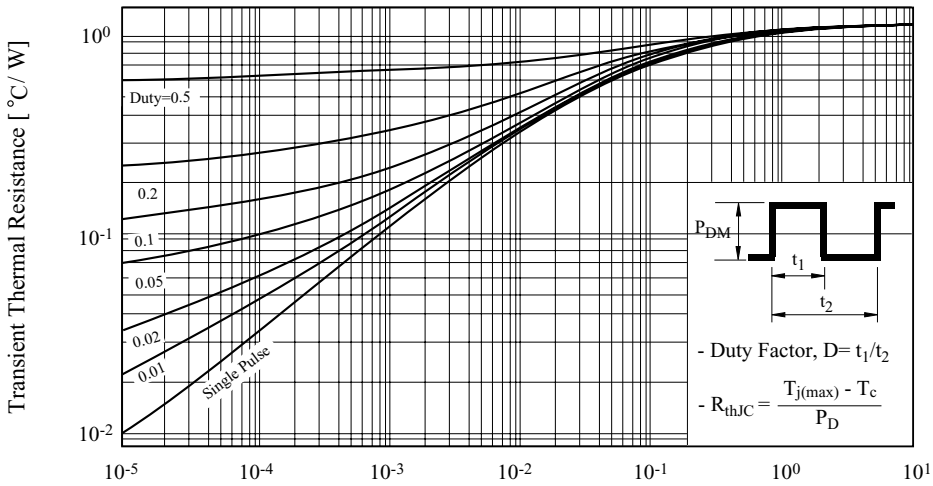
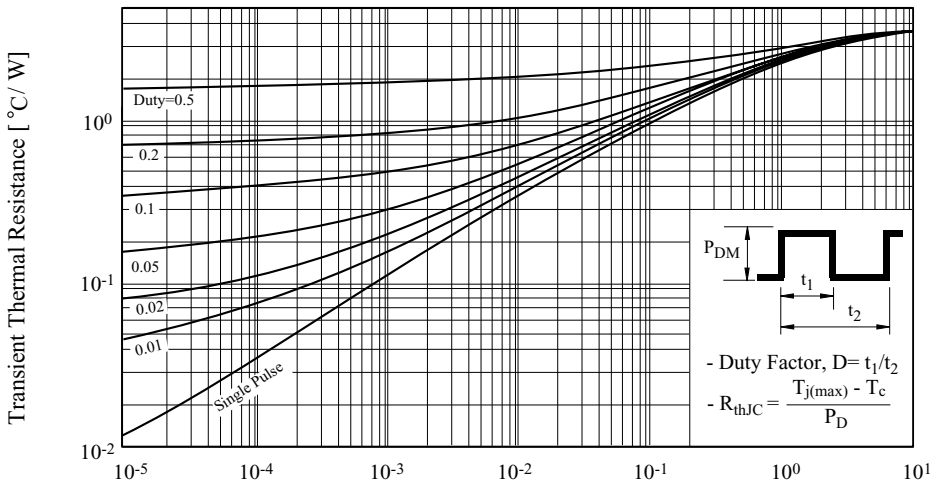
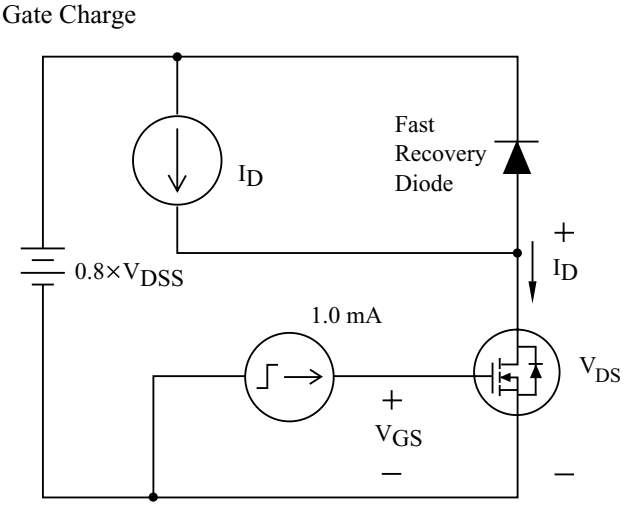


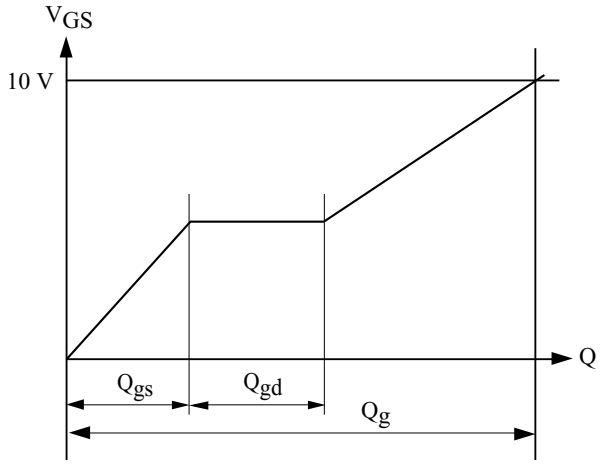
R_{th}

{KHB4D0N65F}

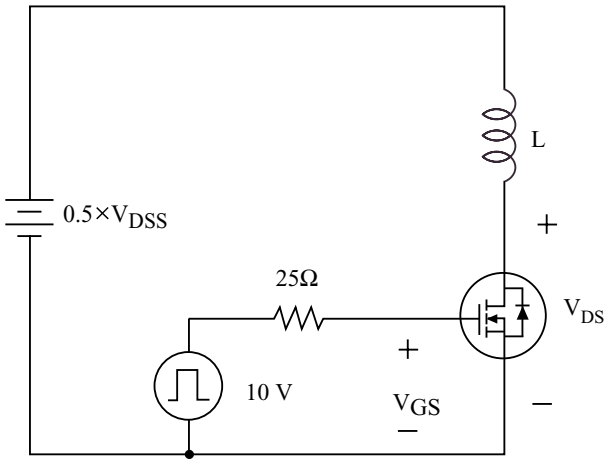


- Gate Charge

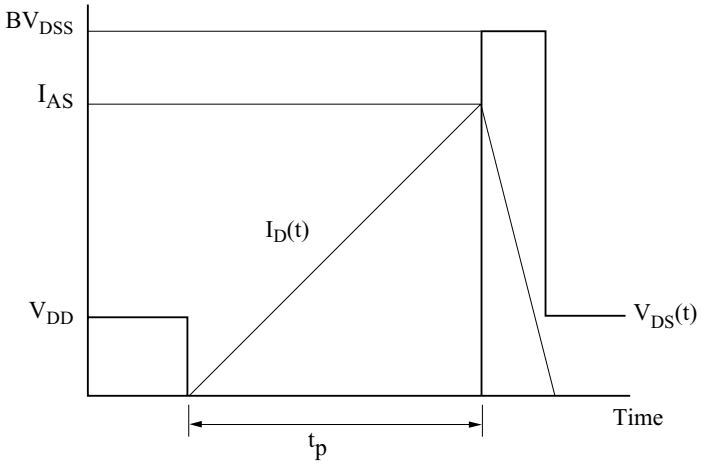




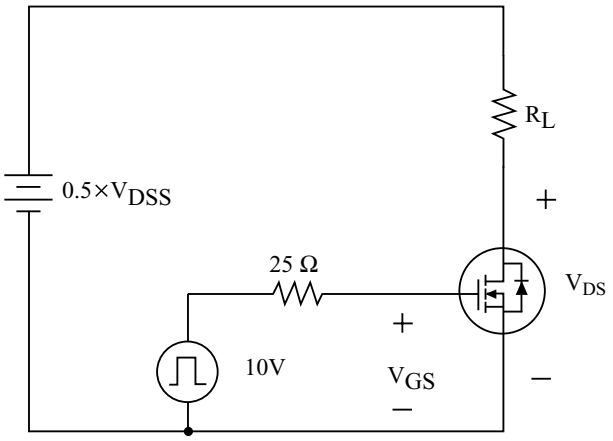
- Single Pulsed Avalanche Energy

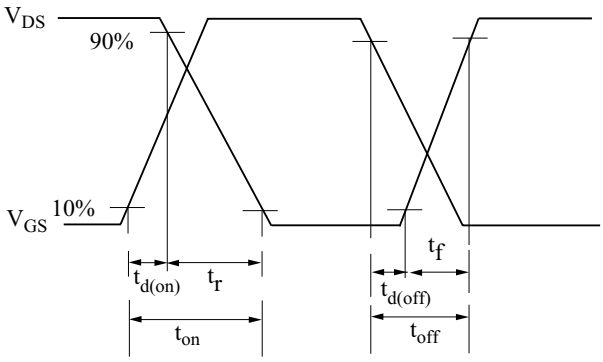
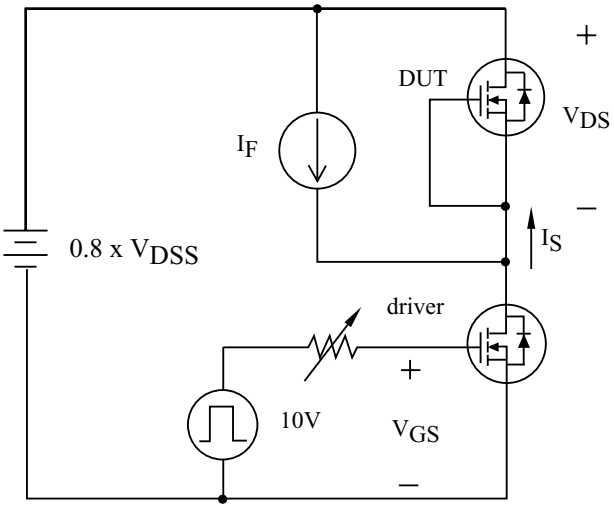
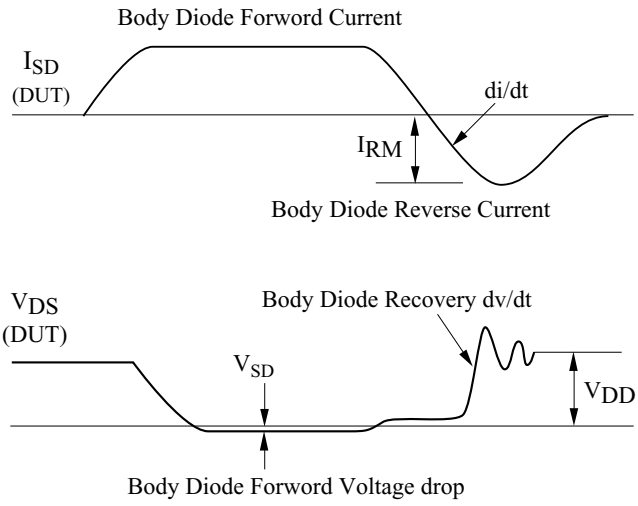


$$E_{AS} = \frac{1}{2} LI_{AS}^2 \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$



- Resistive Load Switching





- Source - Drain Diode Reverse Recovery and dv /dt