

KEC

SEMICONDUCTOR
TECHNICAL DATA

KHB011N40P1/F1/F2

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

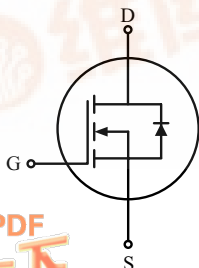
- $V_{DS(Min.)} = 400V$, $I_D = 10.5A$
- Drain-Source ON Resistance :
 $R_{DS(ON)} = 0.53 \Omega$ @ $V_{GS} = 10V$
- $Q_g(\text{typ.}) = 32.5nC$

MAXIMUM RATING (Tc=25

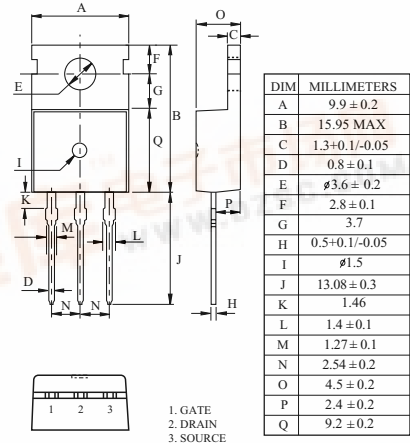
CHARACTERISTIC		SYMBOL	RATING		UNIT
			KHB011N40P1	KHB011N40F1 KHB011N40F2	
Drain-Source Voltage		V _{DSS}	400		V
Gate-Source Voltage		V _{GSS}	±30		V
Drain Current	@T _C =25 ℃	I _D	10.5	10.5*	A
	@T _C =100 ℃		6.6	6.6*	
	Pulsed (Note1)	I _{DP}	42	42*	
Single Pulsed Avalanche Energy (Note 2)		E _{AS}	360		mJ
Repetitive Avalanche Energy (Note 1)		E _{AR}	13.5		mJ
Peak Diode Recovery dv/dt (Note 3)		dv/dt	4.5		V/ns
Drain Power Dissipation	Tc=25 ℃	P _D	135	44	W
	Derate above25 ℃		1.07	0.35	W/ ℃
Maximum Junction Temperature		T _j	150		℃
Storage Temperature Range		T _{stg}	-55～150		℃
Thermal Characteristics					
Thermal Resistance, Junction-to-Case		R _{thJC}	0.93	2.86	℃/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.

PIN CONNECTION

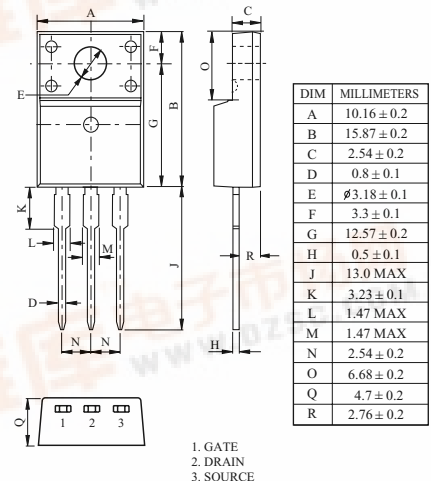


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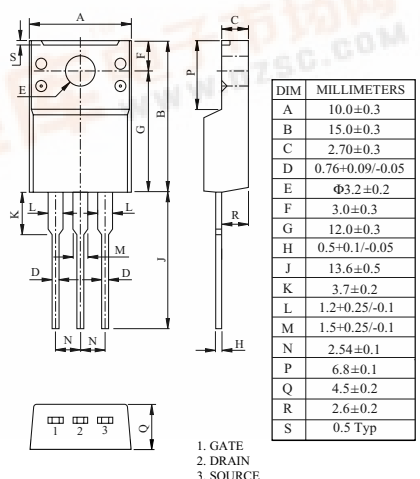
TO-220AB

KHB011N40F1



TO-220IS (1)

KHB011N40F2



TO-220IS

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ELECTRICAL CHARACTERISTICS (Tc=25 °C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	BV _{DSS}	I _D =250μA, V _{GS} =0V	400	-	-	V
Breakdown Voltage Temperature Coefficient	ΔBV _{DSS} / ΔT _j	I _D =250μA, Referenced to 25 °C	-	0.54	-	V/°C
Drain Cut-off Current	I _{DSS}	V _{DS} =400V, 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 =5.25A	-	0.5	0.53	Ω
Dynamic						
Total Gate Charge	Q _g	V _{DS} =320V, I _D =10.5A V _{GS} =10V (Note4,5)	-	32.5	37.5	nC
Gate-Source Charge	Q _{gs}		-	6.4	-	
Gate-Drain Charge	Q _{gd}		-	13	-	
Turn-on Delay time	t _{d(on)}	V _{DD} =200V R _L =20 Ω R _G =25 Ω (Note4,5)	-	23	45	ns
Turn-on Rise time	t _r		-	65	140	
Turn-off Delay time	t _{d(off)}		-	138	235	
Turn-off Fall time	t _f		-	81	170	
Input Capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V, f=1.0MHz	-	1472	1913	pF
Reverse Transfer Capacitance	C _{rss}		-	18.9	24.5	
Output Capacitance	C _{oss}		-	168	218	
Source-Drain Diode Ratings						
Continuous Source Current	I _S	V _{GS} <V _{th}	-	-	10.5	A
Pulsed Source Current	I _{SP}		-	-	42	
Diode Forward Voltage	V _{SD}	I _S =10.5A, V _{GS} =0V	-	-	1.5	V
Reverse Recovery Time	t _{rr}	I _S =10.5A, V _{GS} =0V, dIs/dt=100A/μs	-	355	-	ns
Reverse Recovery Charge	Q _{rr}		-	4.0	-	μC

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

Note 2) $L = 5.7mH$, $I_S=10.5A$, $V_{DD}=50V$, $R_G = 25\Omega$, Starting $T_j = 25\text{ °C}$.

Note 3) $I_S \leq 10.5A$, $dI/dt \leq 200A/\mu s$, $V_{DD} \leq BV_{DSS}$, Starting $T_j = 25\text{ °C}$.

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

Note 5) Essentially independent of operating temperature.

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Fig1. $I_D - V_{DS}$

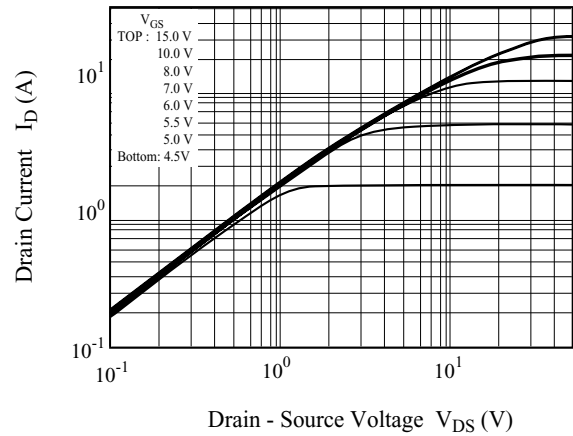


Fig2. $I_D - V_{GS}$

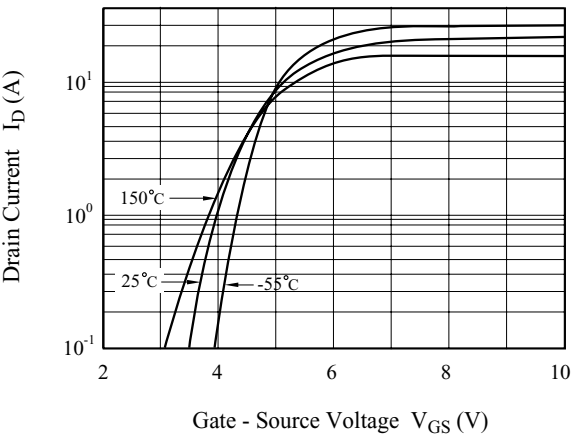


Fig3. $BV_{DSS} - T_j$

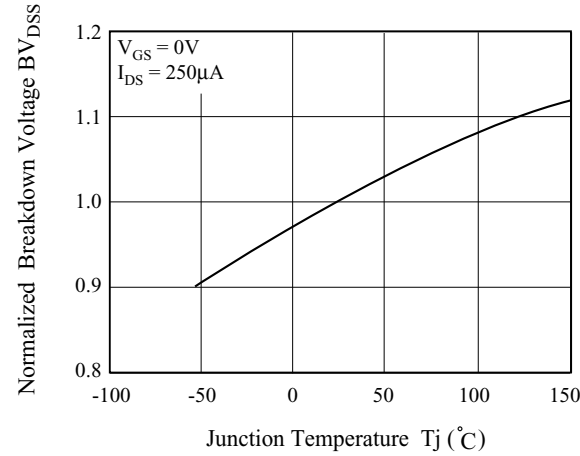


Fig4. $R_{DS(ON)} - I_D$

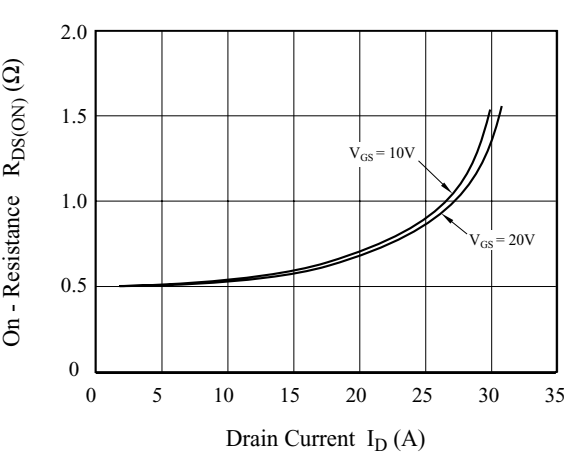


Fig5. $I_S - V_{SD}$

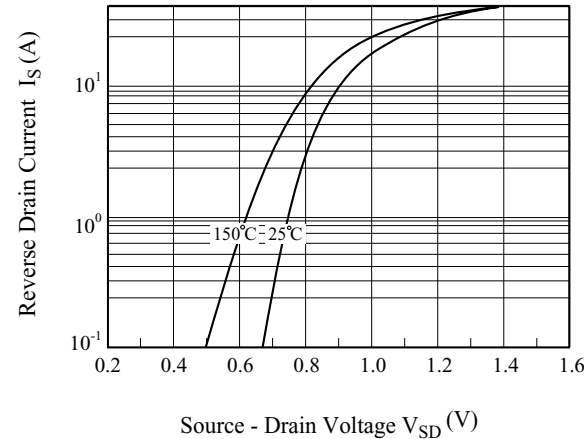
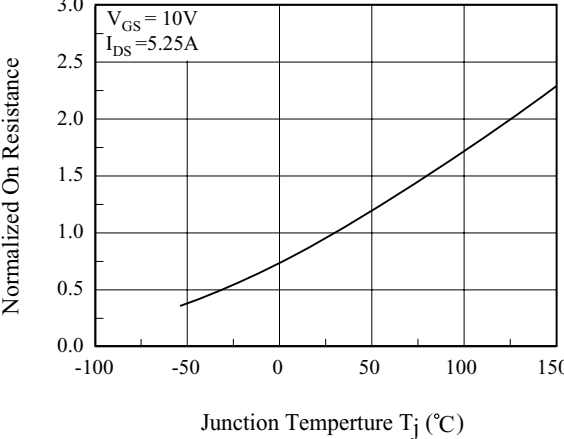


Fig6. $R_{DS(ON)} - T_j$



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Fig7. C - V_{DS}

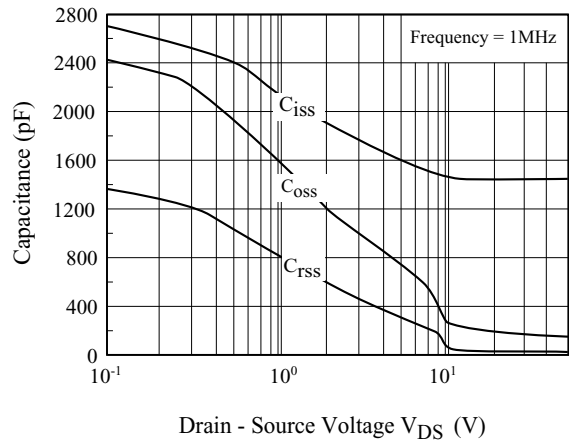


Fig8. Q_g - V_{GS}

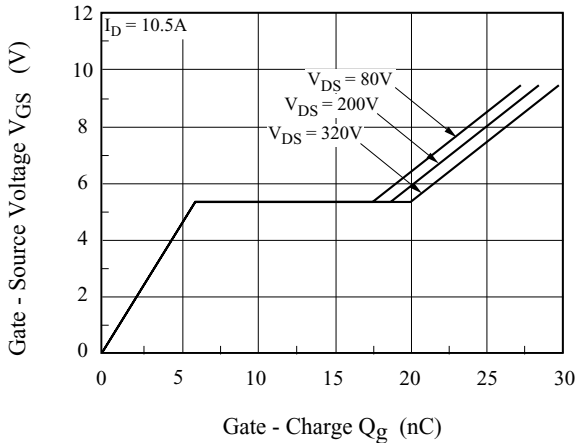


Fig9. Safe Operation Area

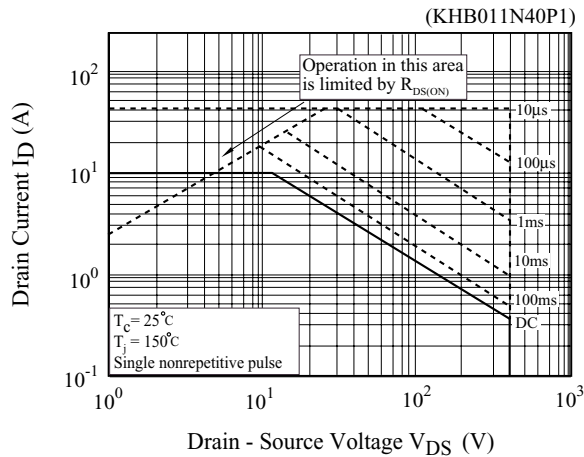


Fig10. Safe Operation Area

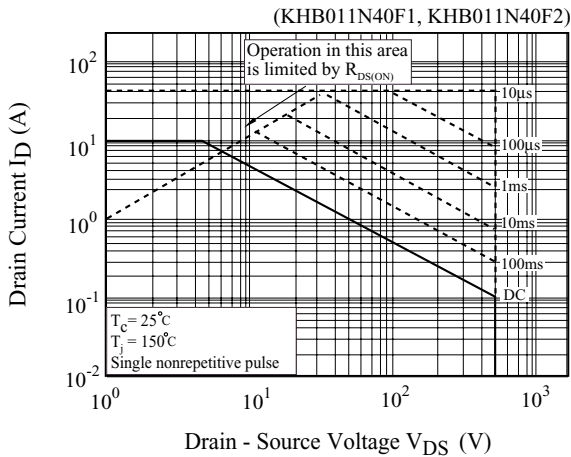
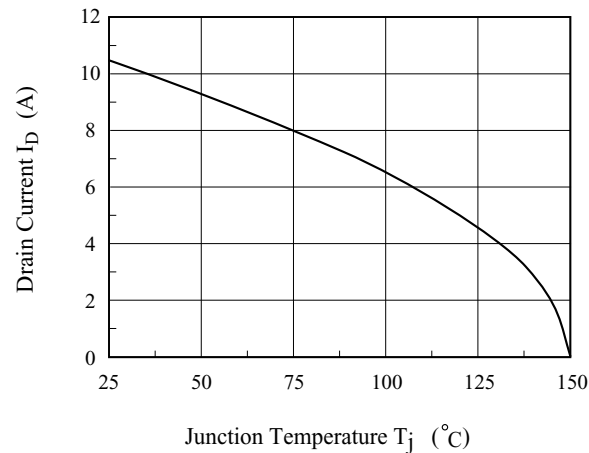


Fig11. I_D - T_j



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Fig12. Transient Thermal Response Curve

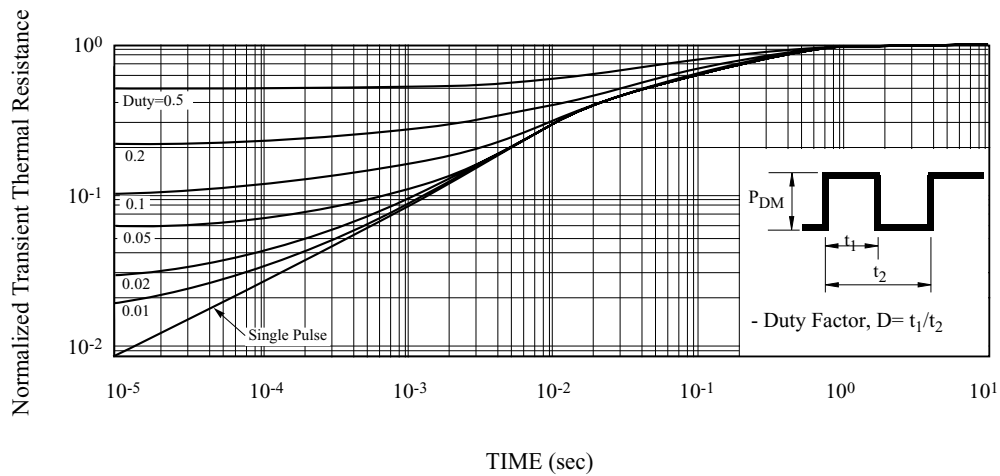
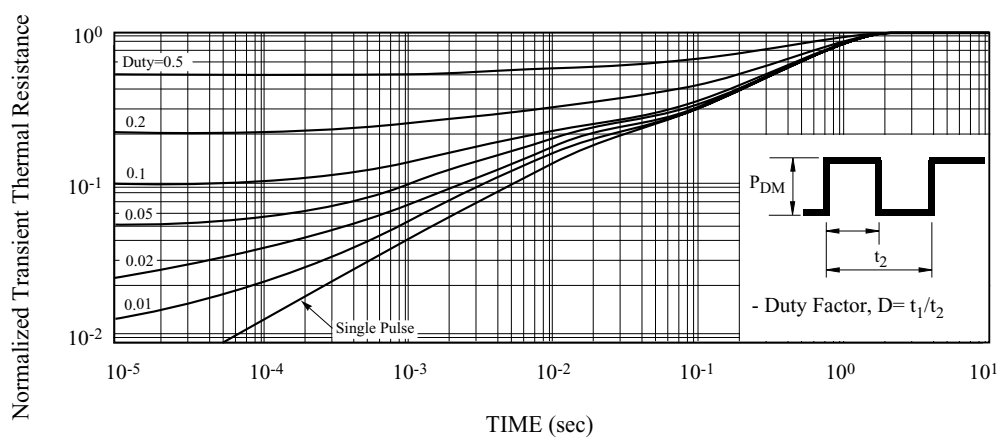


Fig13. Transient Thermal Response Curve



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Fig14. Gate Charge

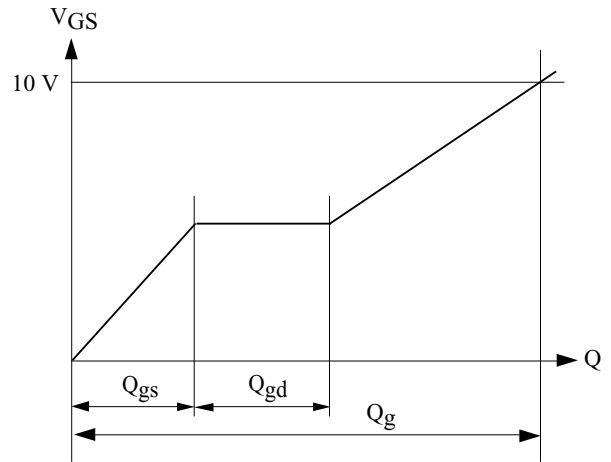
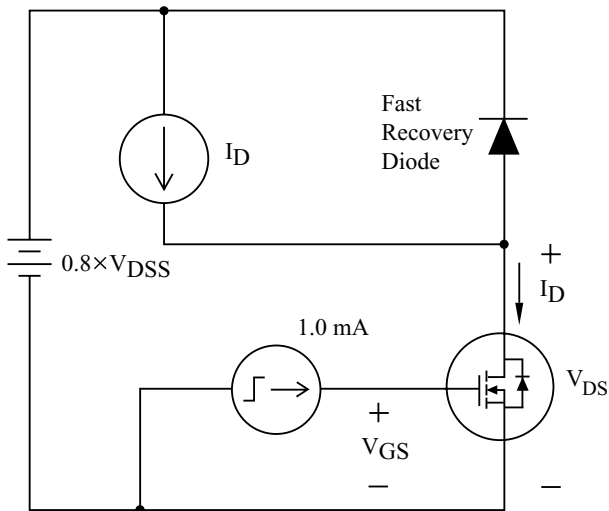


Fig15. Single Pulsed Avalanche Energy

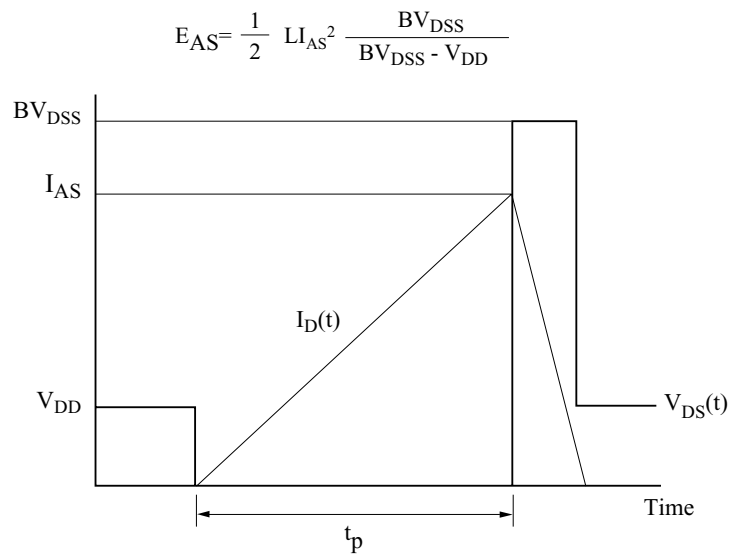
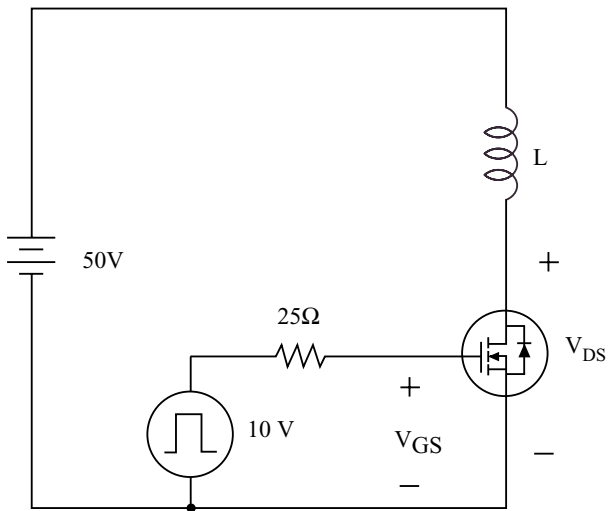
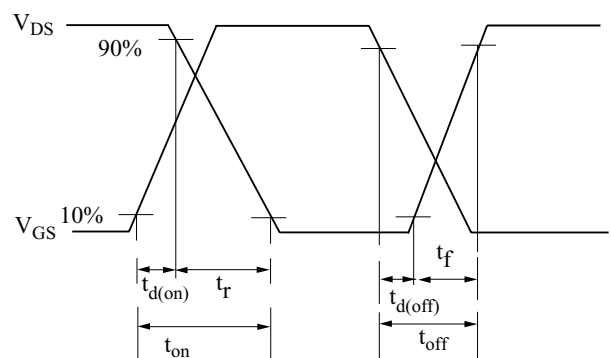
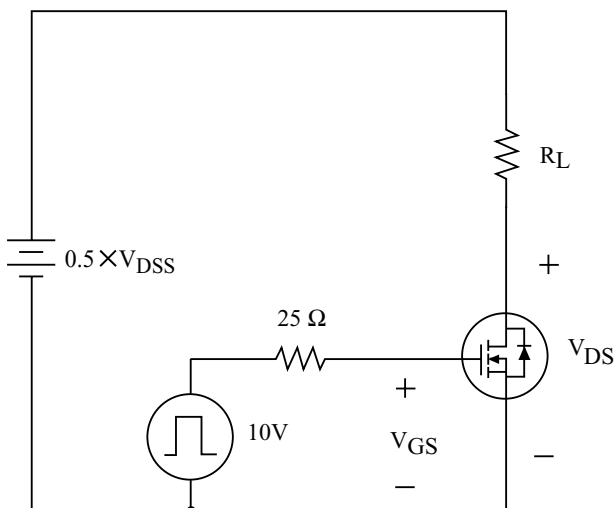


Fig16. Resistive Load Switching



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Fig17. Source - Drain Diode Reverse Recovery and dv /dt

