

### 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

- $V_{DSS} = 600V$ ,  $I_D = 4.5A$
- Drain-Source ON Resistance :  $R_{DS(ON)} = 2.0$  @  $V_{GS} = 10V$
- $Q_g(\text{typ}) = 12nC$

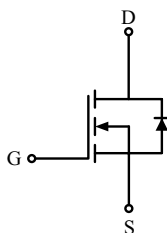
### MAXIMUM RATING (Ta=25 °C)

CHARACTERISTIC	SYMBOL	RATING		UNIT	
		KF5N60P KF5N60PZ	KF5N60F KF5N60FZ		
Drain-Source Voltage	$V_{DSS}$	600		V	
Gate-Source Voltage	$V_{GSS}$	± 30		V	
Drain Current	@ $T_c=25$	$I_D$	4.5	4.5*	A
	@ $T_c=100$	$I_D$	2.7	2.7*	
	Pulsed (Note1)	$I_{DP}$	13	13*	
Single Pulsed Avalanche Energy (Note 2)	$E_{AS}$	140		mJ	
Repetitive Avalanche Energy (Note 1)	$E_{AR}$	3.5		mJ	
Peak Diode Recovery dv/dt (Note 3)	dv/dt	4.5		V/ns	
Drain Power Dissipation	$T_c=25$	$P_D$	89	41.5	W
	Derate above 25		0.71	0.33	W/
Maximum Junction Temperature	$T_j$	150			
Storage Temperature Range	$T_{stg}$	-55 150			
<b>Thermal Characteristics</b>					
Thermal Resistance, Junction-to-Case	$R_{thJC}$	1.4	3.0	/W	
Thermal Resistance, Junction-to-Ambient	$R_{thJA}$	62.5	62.5	/W	

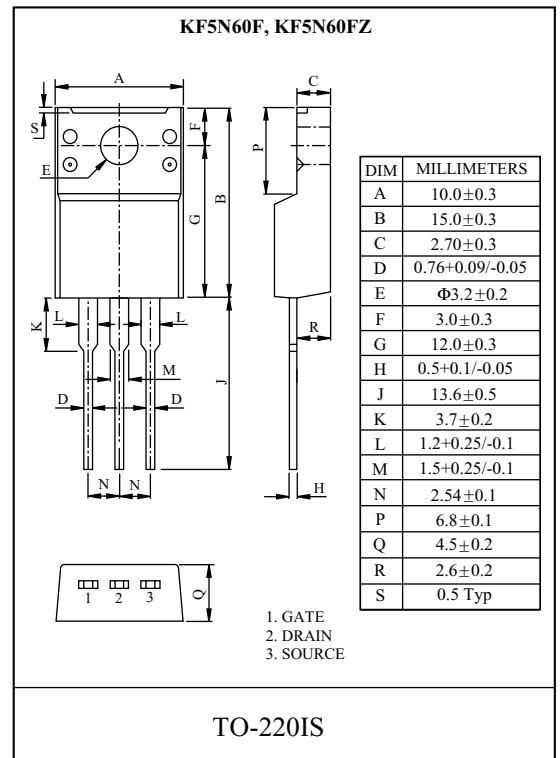
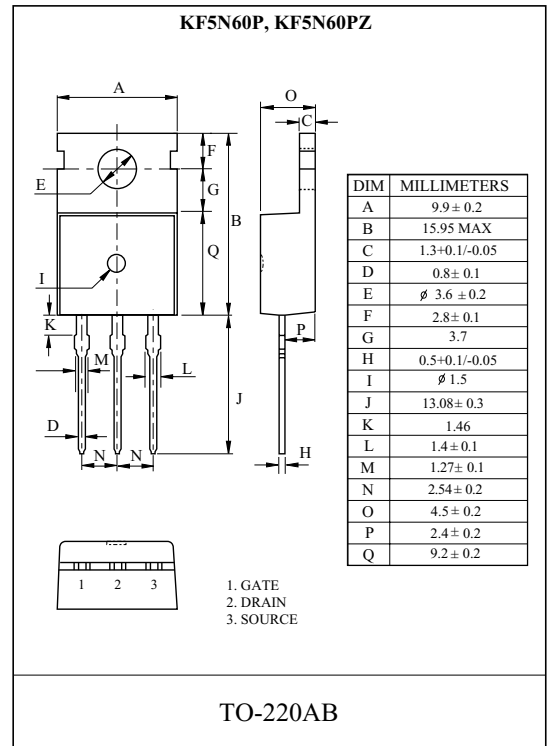
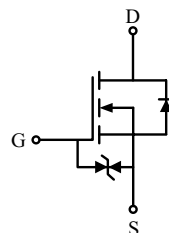
\* : Drain current limited by maximum junction temperature.

### PIN CONNECTION

(KF5N60P, KF5N60F)



(KF5N60PZ, KF5N60FZ)



# KF5N60P/F/PZ/FZ

## ELECTRICAL CHARACTERISTICS (Ta=25 °C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
<b>Static</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$I_D=250\mu A, V_{GS}=0V$	600	-	-	V
Breakdown Voltage Temperature Coefficient	$BV_{DSS}/T_j$	$I_D=250\mu A$ , Referenced to 25	-	0.61	-	V/°C
Drain Cut-off Current	$I_{DSS}$	$V_{DS}=600V, V_{GS}=0V$ ,	-	-	10	$\mu A$
Gate Threshold Voltage	$V_{th}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	-	4.0	V
Gate Leakage Current	$I_{GSS}$	KF5N60P/F $V_{GS}=\pm 30V, V_{DS}=0V$	-	-	$\pm 100$	nA
		KF5N60PZ/FZ $V_{GS}=\pm 25V, V_{DS}=0V$	-	-	$\pm 10$	$\mu A$
Drain-Source ON Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=2.25A$	-	1.7	2.0	$\Omega$
<b>Dynamic</b>						
Total Gate Charge	$Q_g$	$V_{DS}=480V, I_D=4.5A$ $V_{GS}=10V$ (Note4,5)	-	12	-	nC
Gate-Source Charge	$Q_{gs}$		-	2.8	-	
Gate-Drain Charge	$Q_{gd}$		-	4.5	-	
Turn-on Delay time	$t_{d(on)}$	$V_{DD}=300V$ $I_D=4.5A$ $R_G=25$ (Note4,5)	-	15	-	ns
Turn-on Rise time	$t_r$		-	16	-	
Turn-off Delay time	$t_{d(off)}$		-	30	-	
Turn-off Fall time	$t_f$		-	15	-	
Input Capacitance	$C_{iss}$	$V_{DS}=25V, V_{GS}=0V, f=1.0MHz$	-	550	-	pF
Output Capacitance	$C_{oss}$		-	57	-	
Reverse Transfer Capacitance	$C_{rss}$		-	4	-	
<b>Source-Drain Diode Ratings</b>						
Continuous Source Current	$I_S$	$V_{GS}<V_{th}$	-	-	4.5	A
Pulsed Source Current	$I_{SP}$		-	-	18	
Diode Forward Voltage	$V_{SD}$	$I_S=4.5A, V_{GS}=0V$	-	-	1.4	V
Reverse Recovery Time	$t_{rr}$	$I_S=4.5A, V_{GS}=0V$ , $dI_S/dt=100A/\mu s$	-	270	-	ns
Reverse Recovery Charge	$Q_{rr}$		-	1.8	-	$\mu C$

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

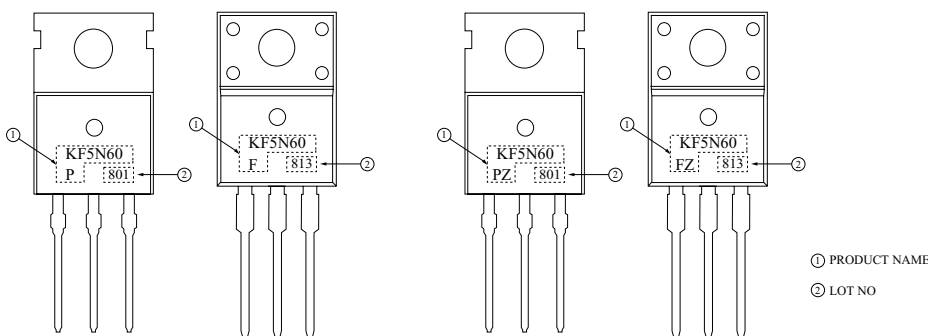
Note 2)  $L=12.7mH, I_S=4.5A, V_{DD}=50V, R_G=25 \Omega$ , Starting  $T_j=25^\circ C$ .

Note 3)  $I_S \leq 4.5A, dI/dt \leq 100A/\mu s, V_{DD} \leq BV_{DSS}$ , 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.

### Marking



# KF5N60P/F/PZ/FZ

Fig1.  $I_D - V_{DS}$

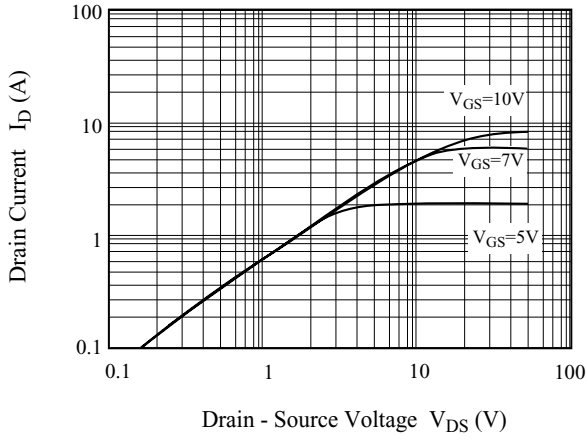


Fig2.  $I_D - V_{GS}$

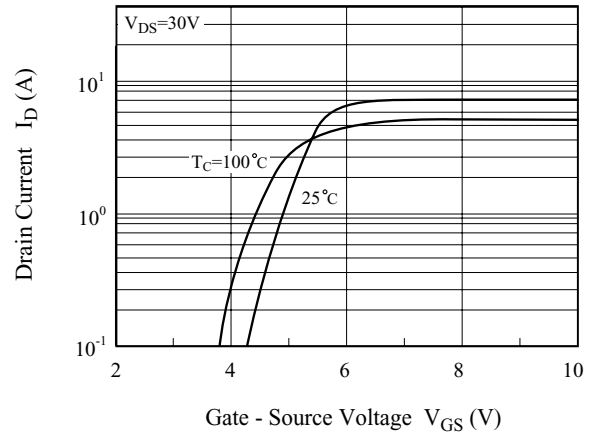


Fig3.  $BV_{DSS} - T_j$

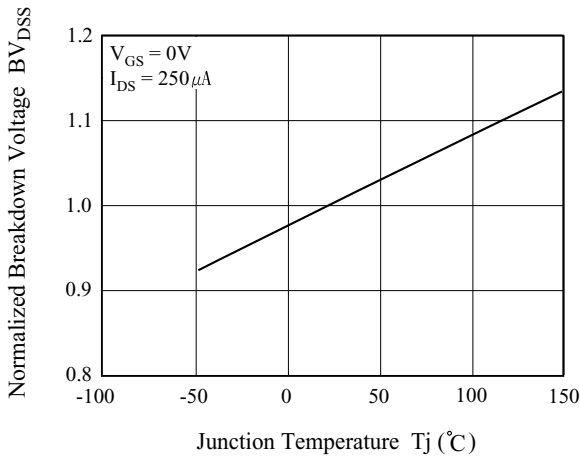


Fig4.  $R_{DS(ON)} - I_D$

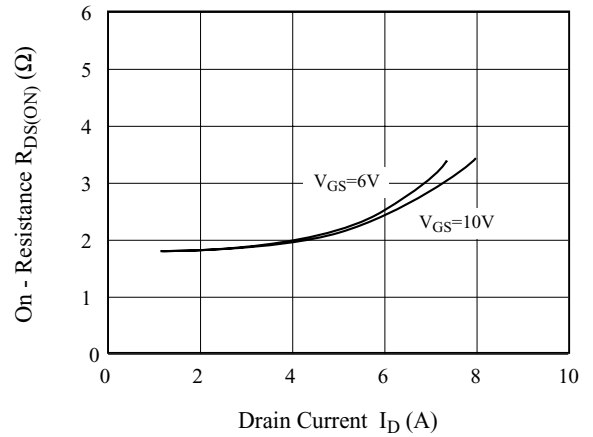


Fig5.  $I_S - V_{SD}$

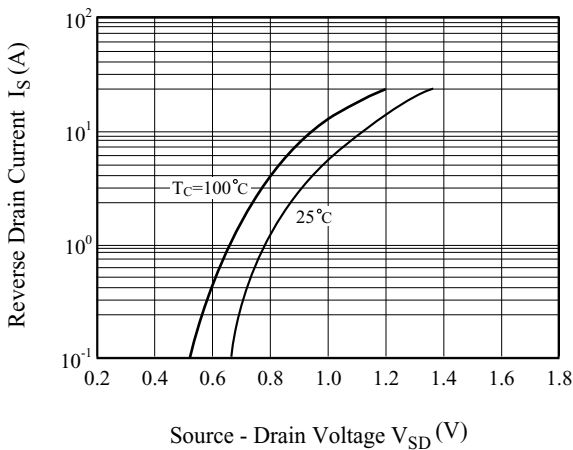
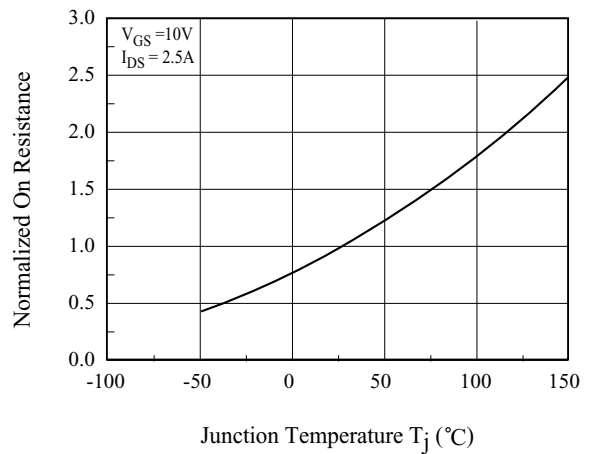


Fig6.  $R_{DS(ON)} - T_j$



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Fig 7. C - V<sub>DS</sub>

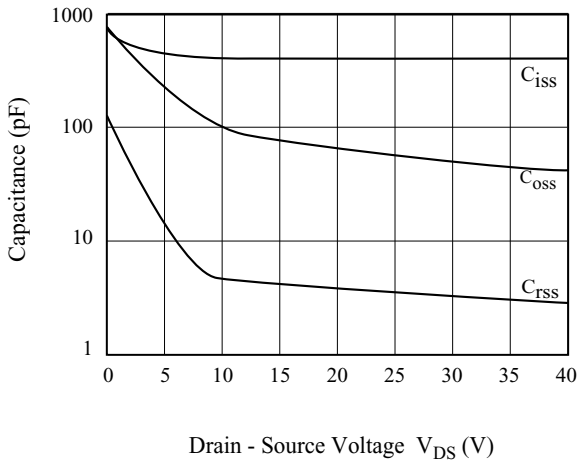


Fig8. Q<sub>g</sub>- V<sub>GS</sub>

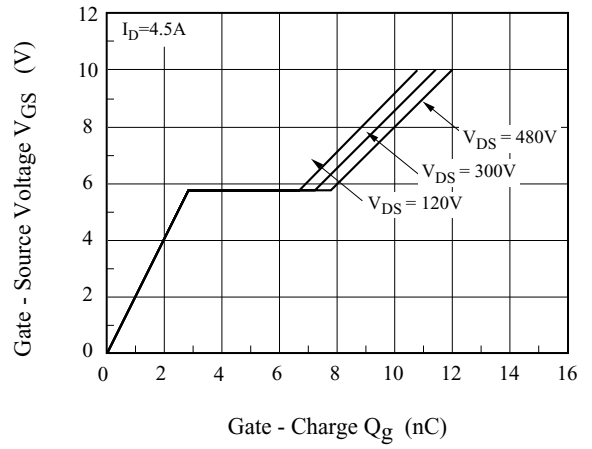


Fig9. Safe Operation Area

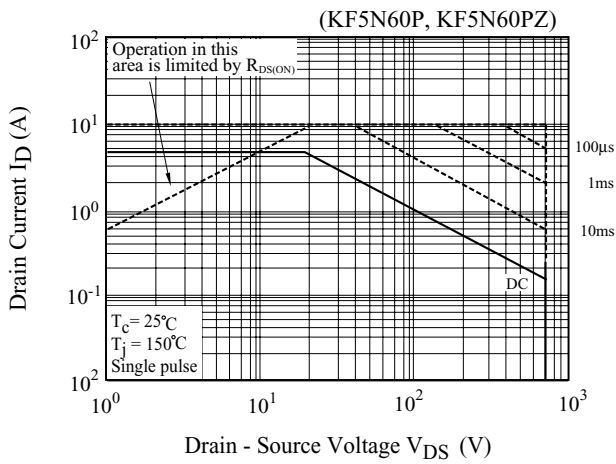


Fig10. Safe Operation Area

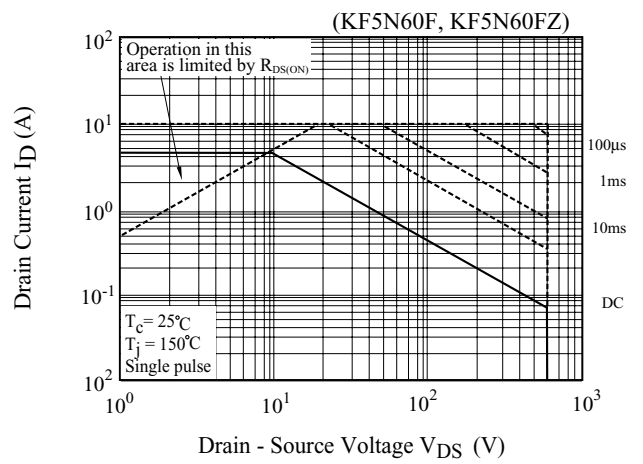
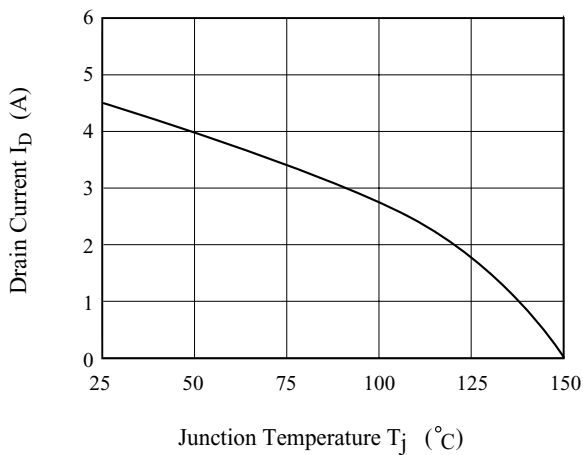


Fig11. I<sub>D</sub> - T<sub>j</sub>



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Fig12. Transient Thermal Response Curve

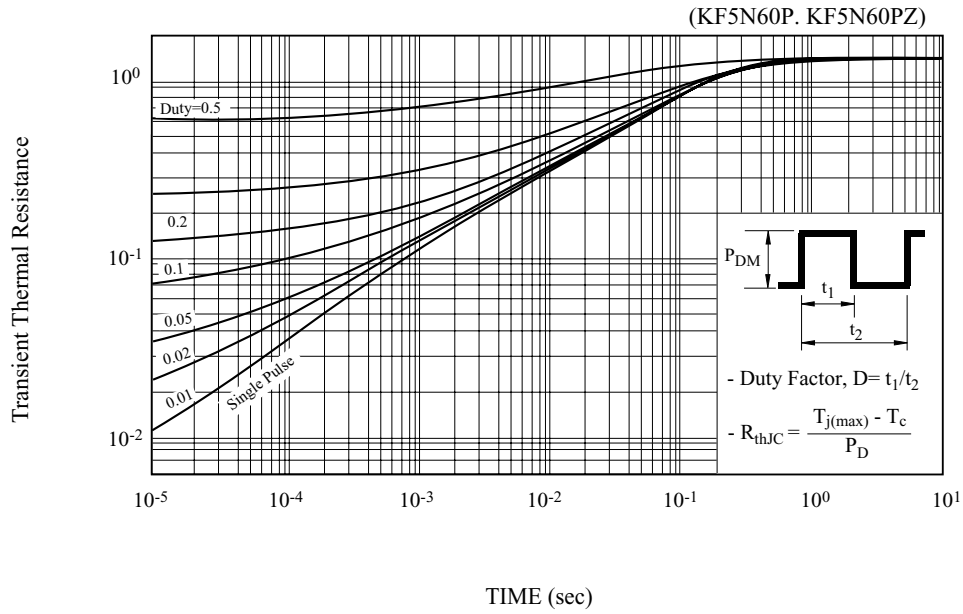
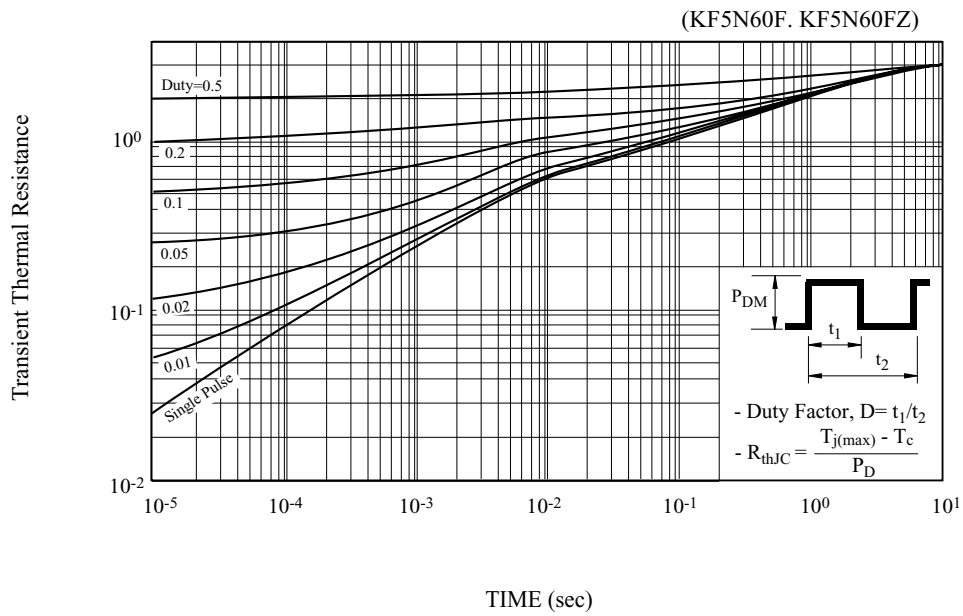


Fig13. Transient Thermal Response Curve



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Fig14. Gate Charge

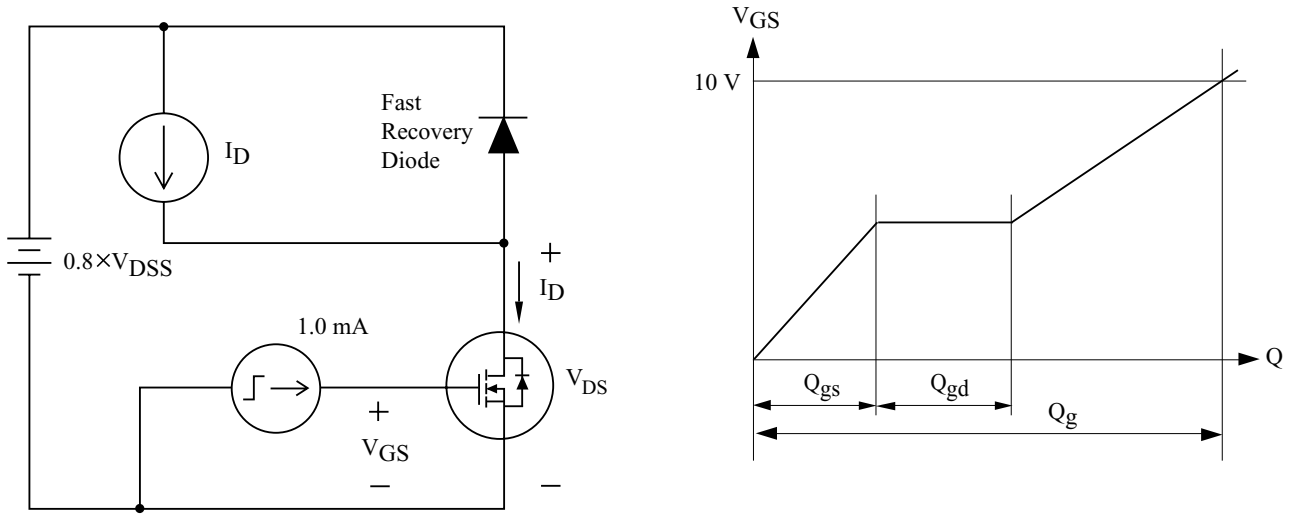


Fig15. Single Pulsed Avalanche Energy

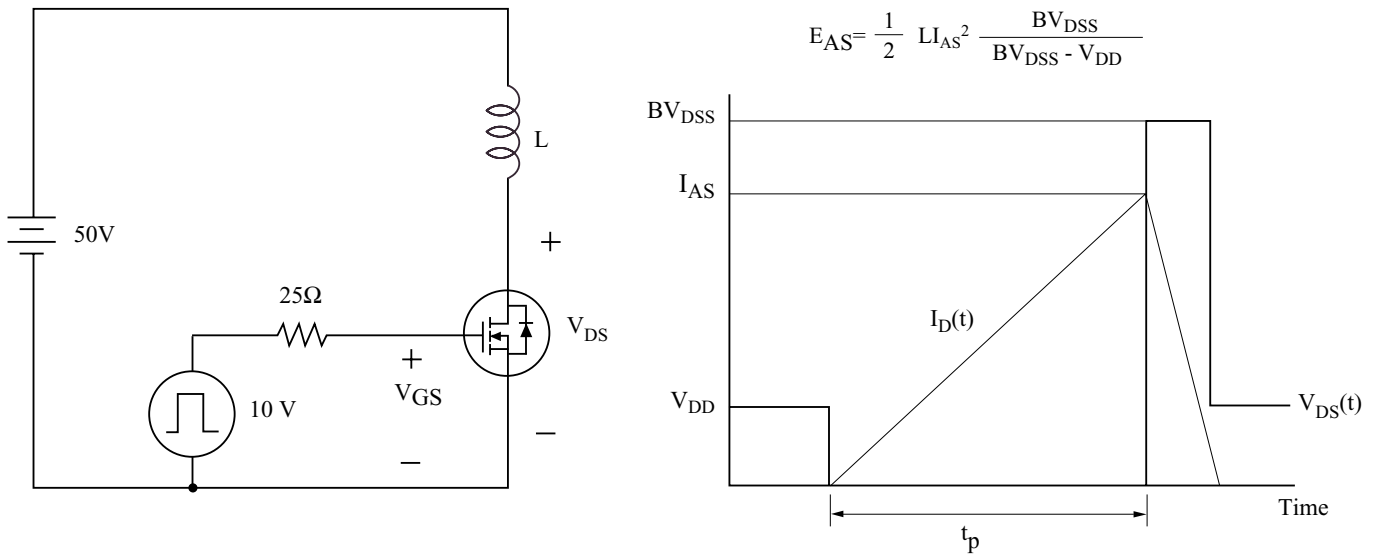


Fig16. Resistive Load Switching

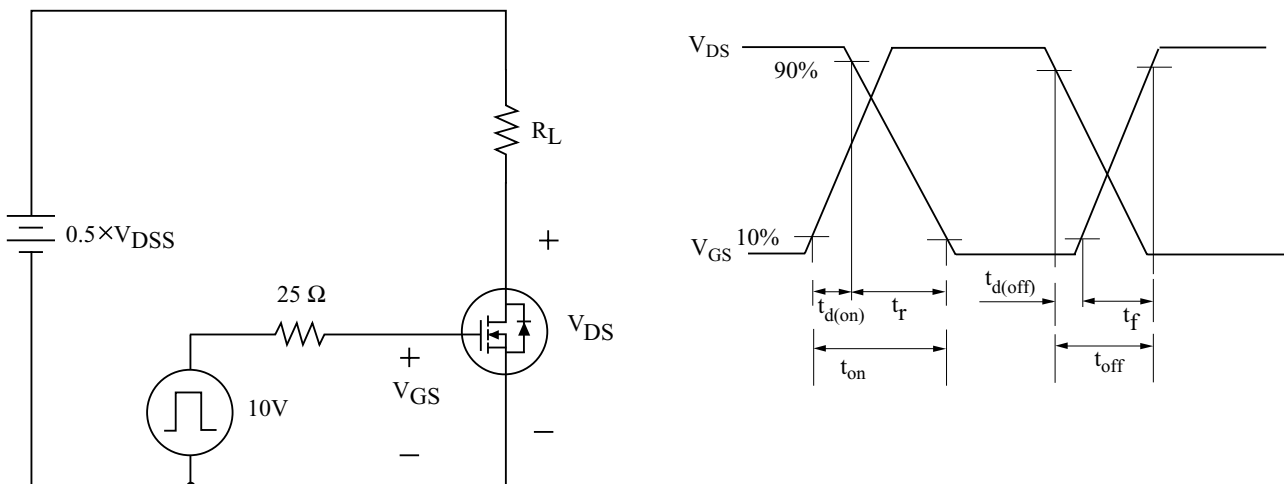


Fig17. Source - Drain Diode Reverse Recovery and  $dv/dt$

