

## 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 LED Converter and switching mode power supplies.

## FEATURES

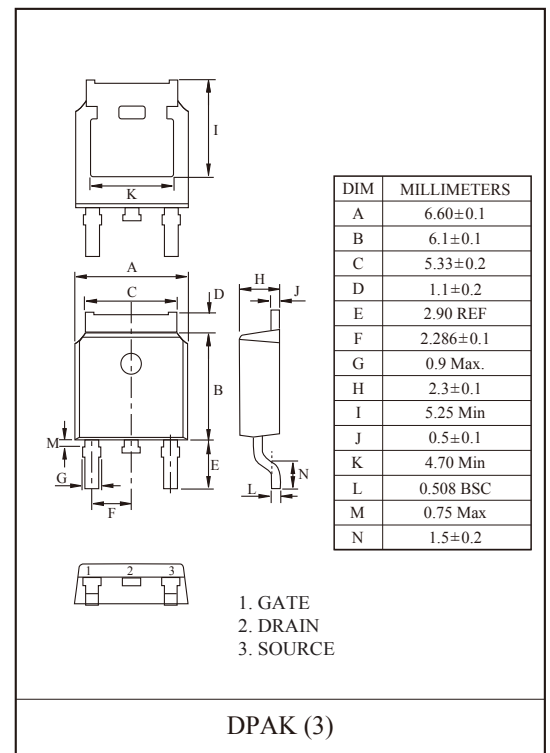
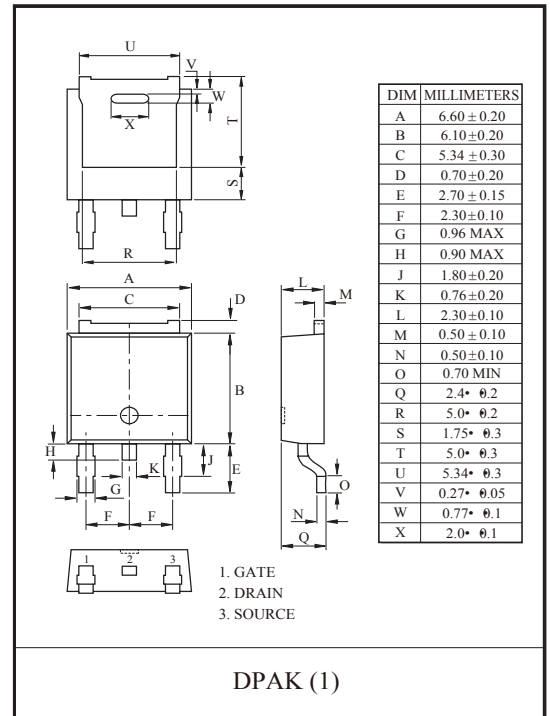
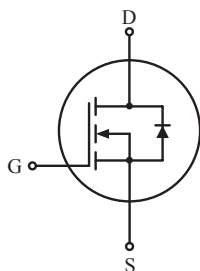
- $V_{DSS(Min.)} = 400V$ ,  $I_D = 6.5A$
- Drain-Source ON Resistance :  $R_{DS(ON)} = 0.83\Omega(max)$  @  $V_{GS} = 10V$
- $Q_g(typ.) = 13 nC$

## MAXIMUM RATING (Ta=25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Drain-Source Voltage	$V_{DSS}$	400	V
Gate-Source Voltage	$V_{GSS}$	± 30	V
Drain Current	@ $T_C = 25^\circ C$	6.5	A
	@ $T_C = 100^\circ C$	4.1	
	Pulsed (Note1)	18*	
Single Pulsed Avalanche Energy (Note 2)	$E_{AS}$	140	mJ
Repetitive Avalanche Energy (Note 1)	$E_{AR}$	3.9	mJ
Peak Diode Recovery dv/dt (Note 3)	dv/dt	4.5	V/ns
Drain Power Dissipation	$T_C = 25^\circ C$	78	W
	Derate above $25^\circ C$	0.63	W/°C
Maximum Junction Temperature	$T_j$	150	°C
Storage Temperature Range	$T_{stg}$	-55 ~ 150	°C
<b>Thermal Characteristics</b>			
Thermal Resistance, Junction-to-Case	$R_{thJC}$	1.6	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{thJA}$	110	°C/W

\* : Drain current limited by maximum junction temperature.

## PIN CONNECTION



# KF9N40D

## ELECTRICAL CHARACTERISTICS (T<sub>c</sub>=25 °C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
<b>Static</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	I <sub>D</sub> = 250 μA, V <sub>GS</sub> =0V	400	-	-	V
Breakdown Voltage Temperature Coefficient	BV <sub>DSS</sub> / T <sub>j</sub>	I <sub>D</sub> = 250 μA, Referenced to 25	-	0.4	-	V/°C
Drain Cut-off Current	I <sub>DSS</sub>	V <sub>DS</sub> =400V, V <sub>GS</sub> =0V,	-	-	10	μA
Gate Threshold Voltage	V <sub>th</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250 μA	2.5	-	4.5	V
Gate Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ± 30V, V <sub>DS</sub> =0V	-	-	± 100	nA
Drain-Source ON Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =3.25A	-	0.7	0.83	Ω
<b>Dynamic</b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =320V, I <sub>D</sub> =6.5A V <sub>GS</sub> =10V (Note4,5)	-	13	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	2.5	-	
Gate-Drain Charge	Q <sub>gd</sub>		-	5.0	-	
Turn-on Delay time	t <sub>d(on)</sub>	V <sub>DD</sub> =200V, I <sub>D</sub> =6.5A R <sub>G</sub> =25Ω (Note4,5) V <sub>GS</sub> =10V	-	20	-	ns
Turn-on Rise time	t <sub>r</sub>		-	20	-	
Turn-off Delay time	t <sub>d(off)</sub>		-	45	-	
Turn-off Fall time	t <sub>f</sub>		-	15	-	
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1.0MHz	-	530	-	pF
Output Capacitance	C <sub>oss</sub>		-	85	-	
Reverse Transfer Capacitance	C <sub>rss</sub>		-	9.5	-	
<b>Source-Drain Diode Ratings</b>						
Continuous Source Current	I <sub>S</sub>	V <sub>GS</sub> <V <sub>th</sub>	-	-	6.5	A
Pulsed Source Current	I <sub>SP</sub>		-	-	26	
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =6.5A, V <sub>GS</sub> =0V	-	-	1.4	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>S</sub> =6.5A, V <sub>GS</sub> =0V, dI <sub>S</sub> /dt=100A/μs	-	270	-	ns
Reverse Recovery Charge	Q <sub>rr</sub>		-	2.0	-	μC

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

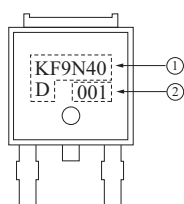
Note 2) L = 6 mH, I<sub>S</sub>=6.5A, V<sub>DD</sub>=50V, R<sub>G</sub> = 25Ω, Starting T<sub>j</sub> = 25 °C.

Note 3) I<sub>S</sub> = 6.5A, dI/dt = 100A/μs, V<sub>DD</sub> = BV<sub>DSS</sub>, Starting T<sub>j</sub> = 25 °C.

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

Note 5) Essentially independent of operating temperature.

### Marking



① PRODUCT NAME

② LOT NO

# KF9N40D

Fig1.  $I_D - V_{DS}$

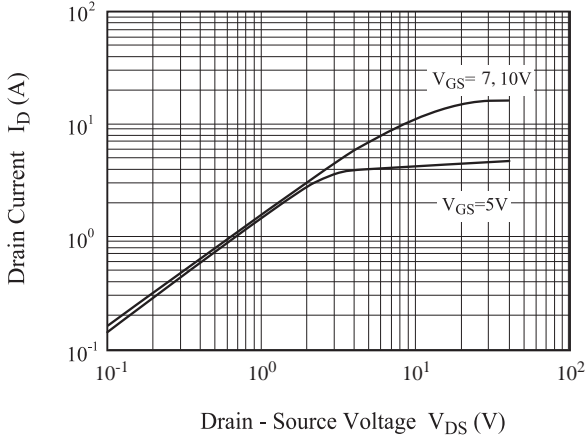


Fig2.  $I_D - V_{GS}$

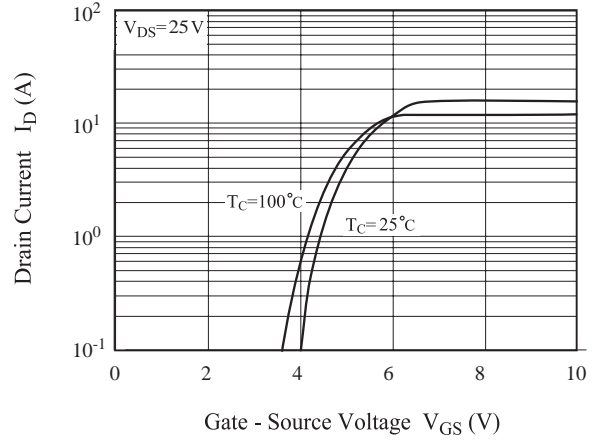


Fig3.  $BV_{DSS} - T_j$

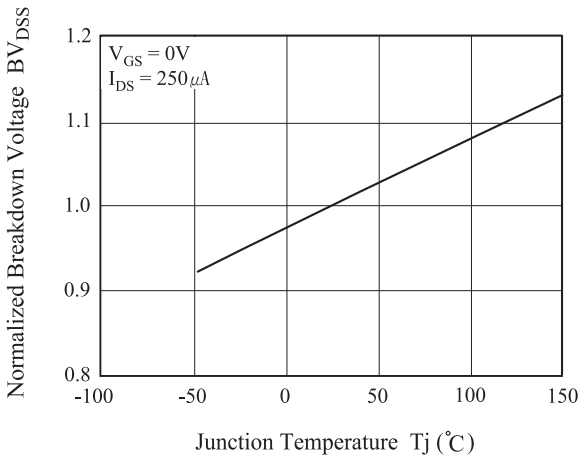


Fig4.  $R_{DS(ON)} - I_D$

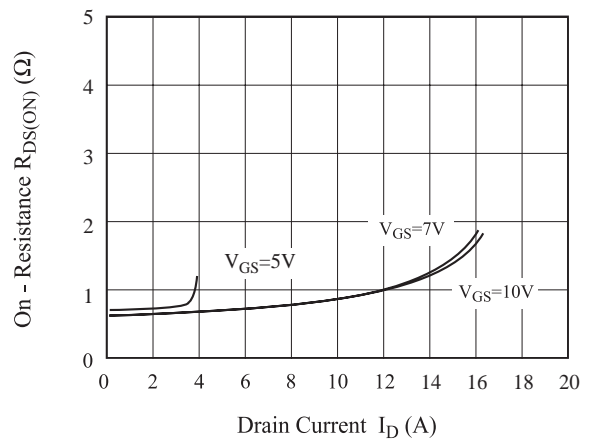


Fig5.  $I_S - V_{SD}$

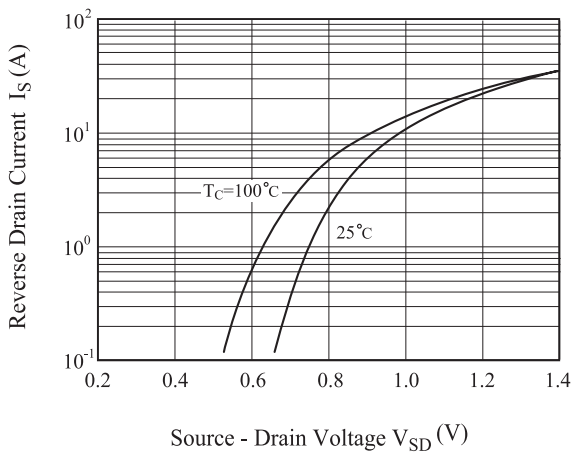
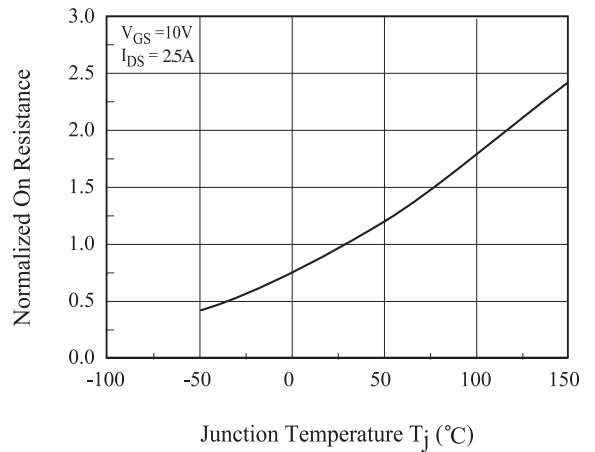


Fig6.  $R_{DS(ON)} - T_j$



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Fig 7. C -  $V_{DS}$

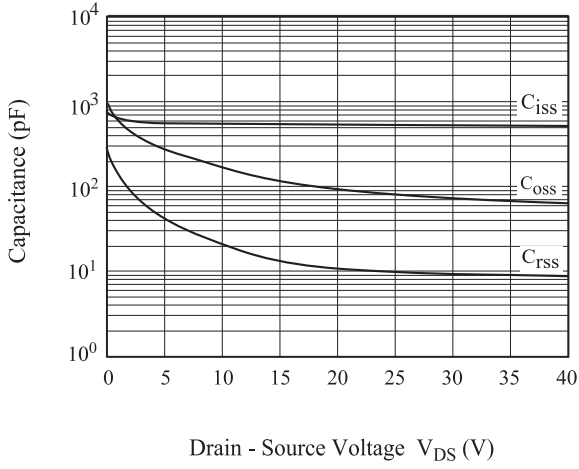


Fig8.  $Q_g$ -  $V_{GS}$

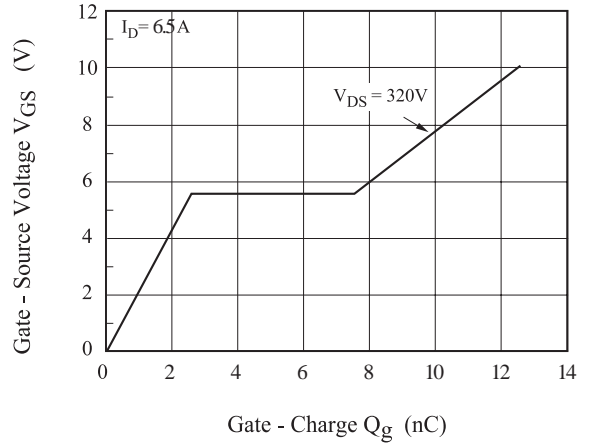


Fig9. Safe Operation Area

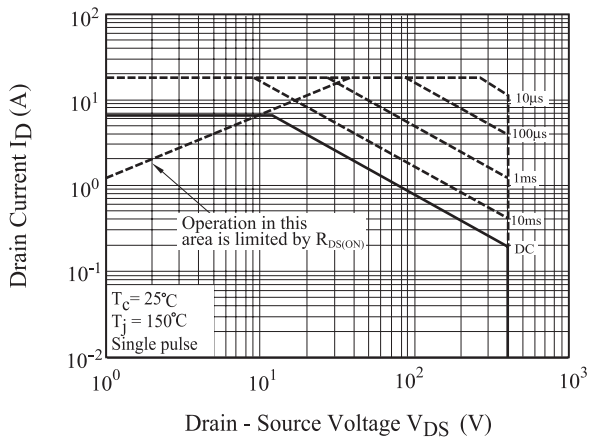


Fig10.  $I_D$  -  $T_j$

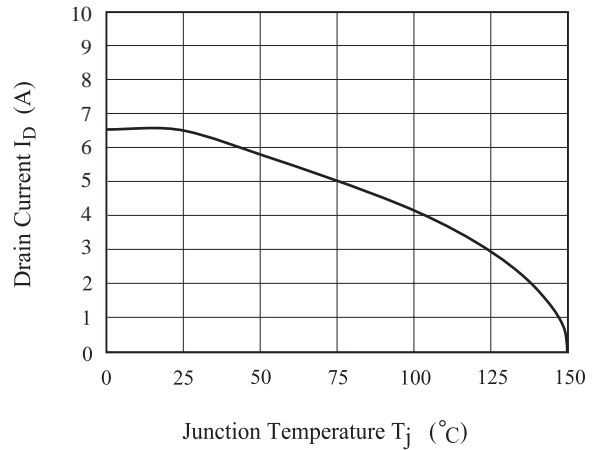
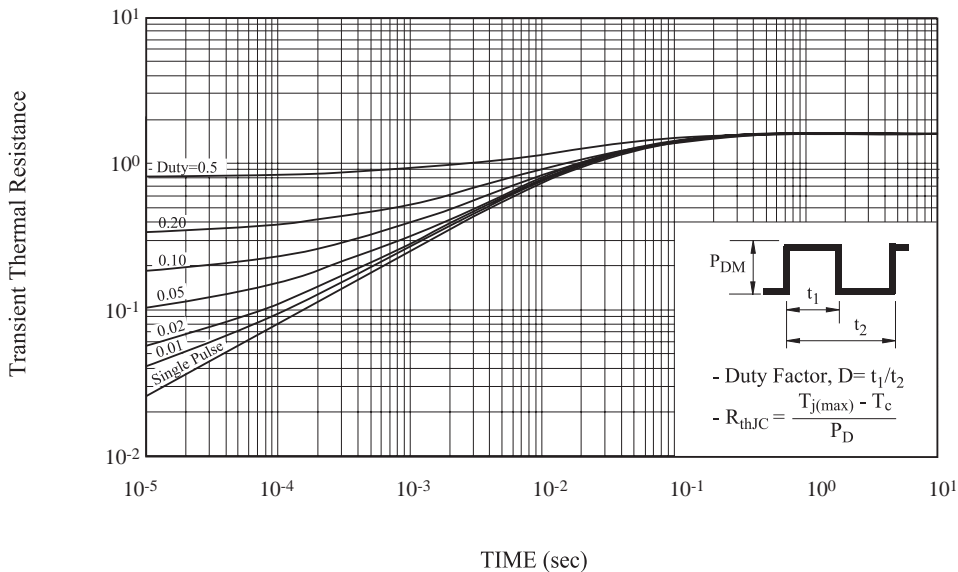


Fig11. Transient Thermal Response Curve



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Fig12. Gate Charge

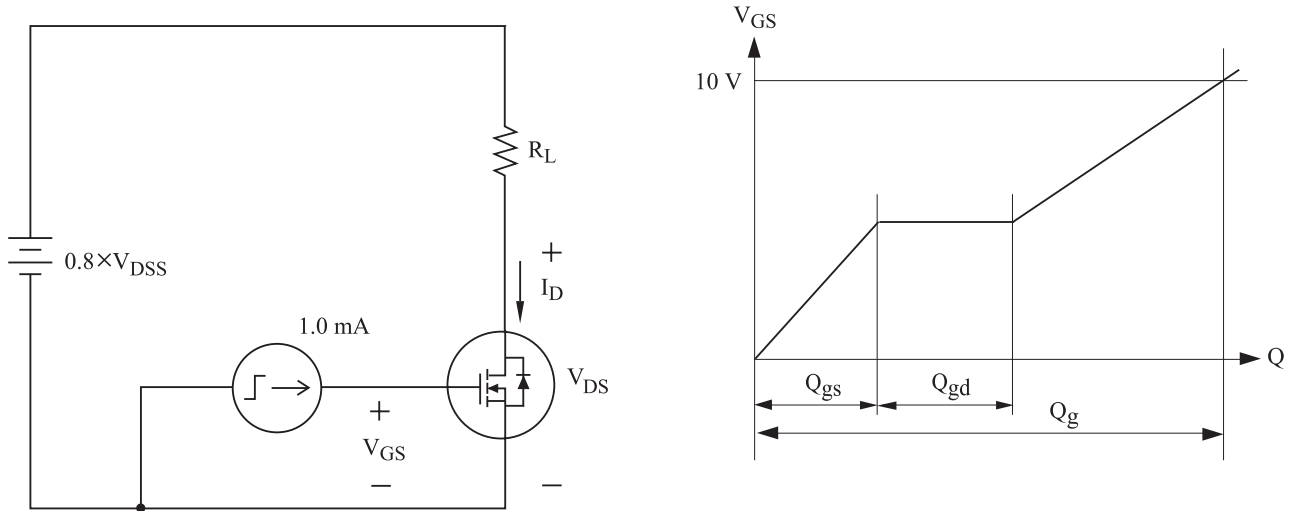


Fig13. Single Pulsed Avalanche Energy

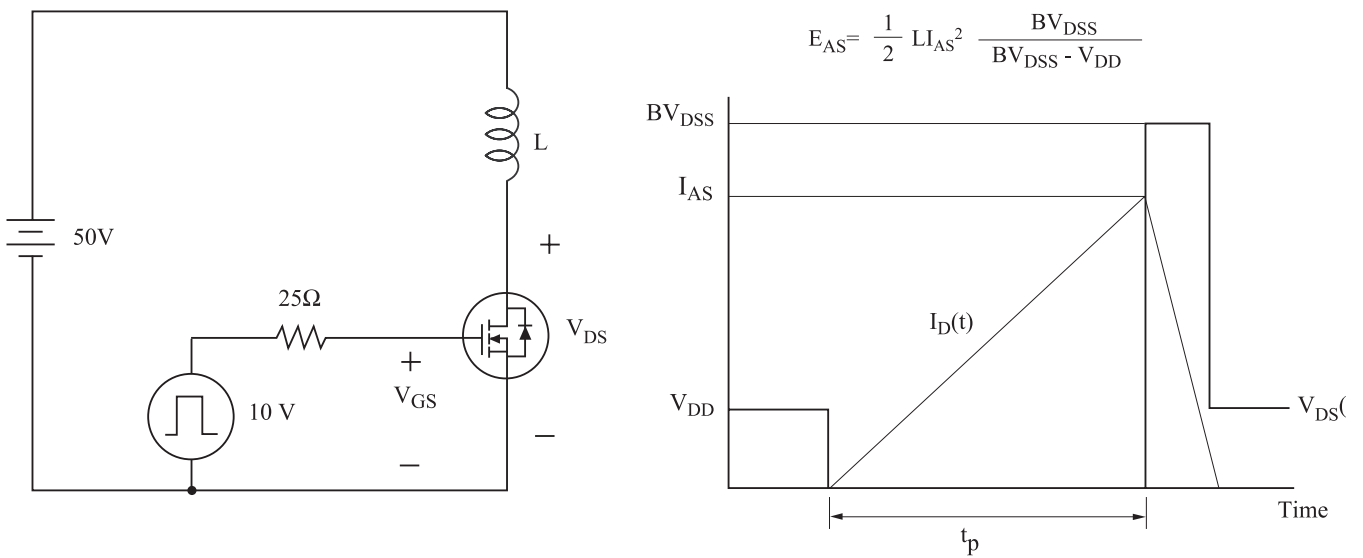


Fig14. Resistive Load Switching

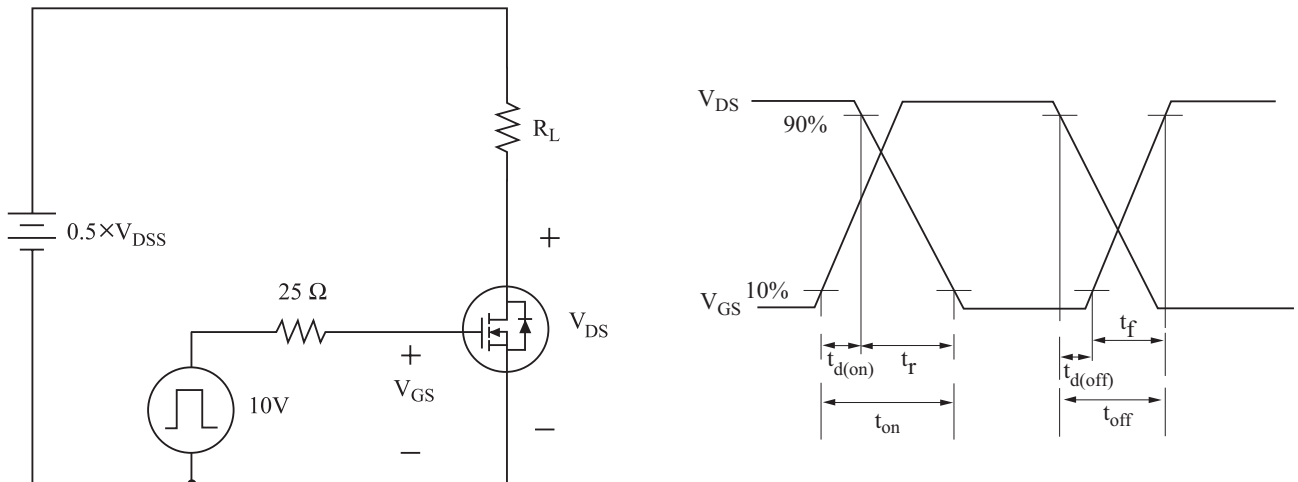


Fig15. Source - Drain Diode Reverse Recovery and  $dv/dt$

