KEC

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 active power factor correction and switching mode power supplies.

FEATURES

· V_{DSS}=600V, I_D=10A
· Drain-Source ON Resistance :
 $R_{DS(ON)}$(Max)=0.69 Ω @V_{GS}=10V
· Qg(typ.)= 29.5nC

MAXIMUM RATING (Tc=25℃)

CHARACTERISTIC		SYMBOL	RATING		UNIT
			KF10N60P	KF10N60F	
Drain-Source Voltage		V_{DSS}	600		V
Gate-Source Voltage		V_{GSS}	±30		V
Drain Current	@T_C=25℃	I_D	10	10*	A
	@T_C=100℃		6	6*	
	Pulsed (Note1)	I_{DP}	25	25*	
Single Pulsed Avalanche Energy (Note 2)		E_{AS}	400		mJ
Repetitive Avalanche Energy (Note 1)		E_{AR}	16.5		mJ
Peak Diode Recovery dv/dt (Note 3)		dv/dt	4.5		V/ns
Drain Power Dissipation	Tc=25℃	P_D	190	50	W
	Derate above 25℃		1.52	0.4	W/℃
Maximum Junction Temperature		T_j	150		℃
Storage Temperature Range		T_{stg}	-55～150		℃
Thermal Characteristics					
Thermal Resistance, Junction-to-Case		R_{thJC}	0.65	2.5	℃/W
Thermal Resistance, Junction-to-Ambient		R_{thJA}	62.5	62.5	℃/W

* : Drain current limited by maximum junction temperature.

PIN CONNECTION

(KF10N60P, KF10N60F)

KF10N60P

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

KF10N60F

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 ± 0.5
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)
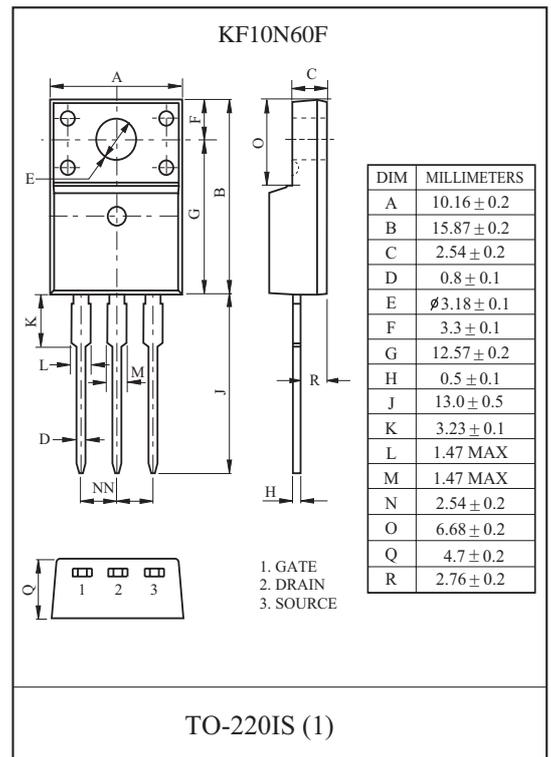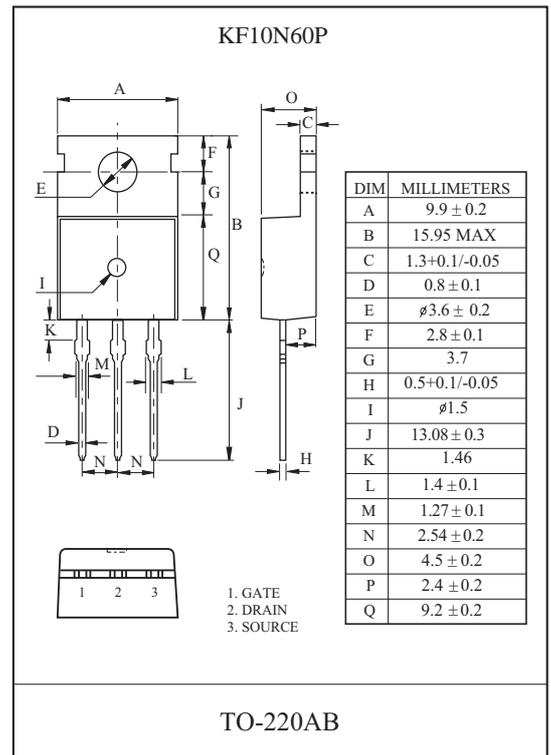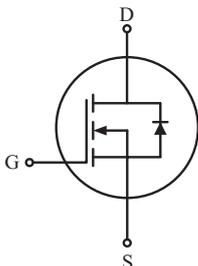
KF10N60P/F

ELECTRICAL CHARACTERISTICS (Tc=25℃)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D=250\mu A$, $V_{GS}=0V$	600	-	-	V
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_j$	$I_D=250\mu A$, Referenced to 25℃	-	0.6	-	V/℃
Drain Cut-off Current	I_{DSS}	$V_{DS}=600V$, $V_{GS}=0V$	-	-	10	μA
Gate Threshold Voltage	V_{th}	$V_{DS}=V_{GS}$, $I_D=250\mu A$	2	-	4	V
Gate Leakage Current	I_{GSS}	$V_{GS}=\pm30V$, $V_{DS}=0V$	-	-	±100	nA
Drain-Source ON Resistance	$R_{DS(ON)}$	$V_{GS}=10V$, $I_D=5A$	-	0.59	0.69	Ω
Dynamic						
Total Gate Charge	Q_g	$V_{DS}=480V$, $I_D=10A$ $V_{GS}=10V$ (Note4,5)	-	29.5	-	nC
Gate-Source Charge	Q_{gs}		-	6.5	-	
Gate-Drain Charge	Q_{gd}		-	12.5	-	
Turn-on Delay time	$t_{d(on)}$	$V_{DD}=300V$ $I_D=10A$ $R_G=25$ Ω (Note4,5)	-	32	-	ns
Turn-on Rise time	t_r		-	35	-	
Turn-off Delay time	$t_{d(off)}$		-	88	-	
Turn-off Fall time	t_f		-	30.5	-	
Input Capacitance	C_{iss}	$V_{DS}=25V$, $V_{GS}=0V$, $f=1.0MHz$	-	1255	-	pF
Output Capacitance	C_{oss}		-	160	-	
Reverse Transfer Capacitance	C_{rss}		-	16.5	-	
Source-Drain Diode Ratings						
Continuous Source Current	I_S	$V_{GS}<V_{th}$	-	-	10	A
Pulsed Source Current	I_{SP}		-	-	40	
Diode Forward Voltage	V_{SD}	$I_S=10A$, $V_{GS}=0V$	-	-	1.4	V
Reverse Recovery Time	t_{rr}	$I_S=10A$, $V_{GS}=0V$, $dIs/dt=100A/\mu s$	-	350	-	ns
Reverse Recovery Charge	Q_{rr}		-	4.2	-	μC

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

Note 2) L =5.5mH, $I_S=10A$, $V_{DD}=50V$, $R_G=25$ Ω, Starting $T_j=25$℃.

Note 3) $I_S \leq 10A$, $dI/dt \leq 200A/\mu s$, $V_{DD} \leq BV_{DSS}$, Starting $T_j=25$℃.

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

Note 5) Essentially independent of operating temperature.

Marking

① PRODUCT NAME
② LOT NO
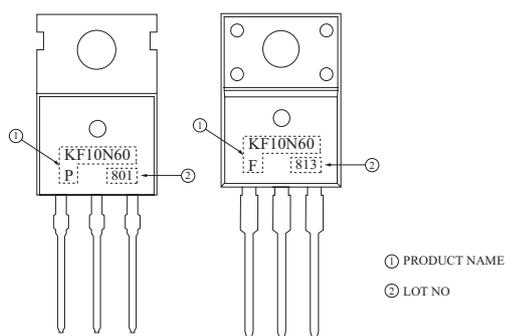
KF10N60PR/FR

Fig1. I_D - V_{DS}
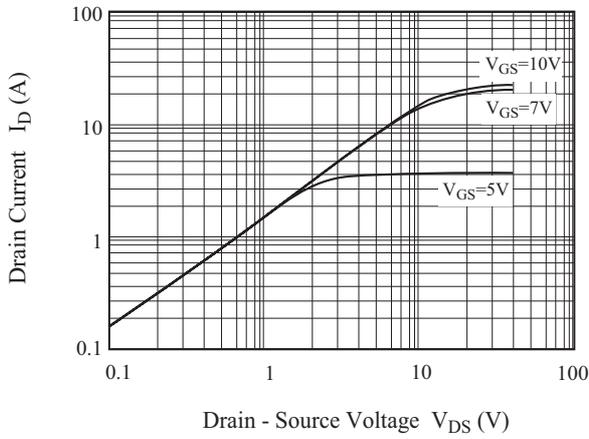
Fig2. I_D - V_{GS}
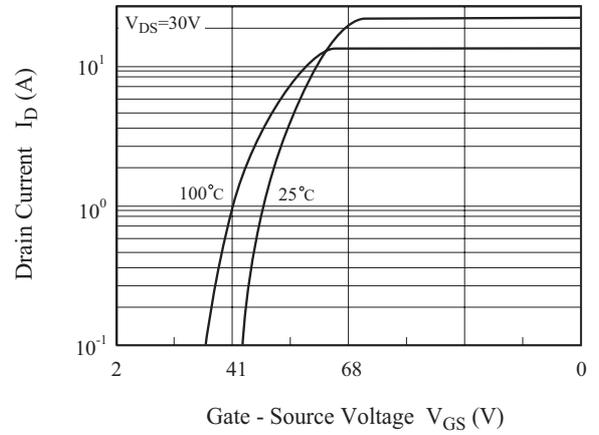
Fig3. BV_{DSS} - T_j
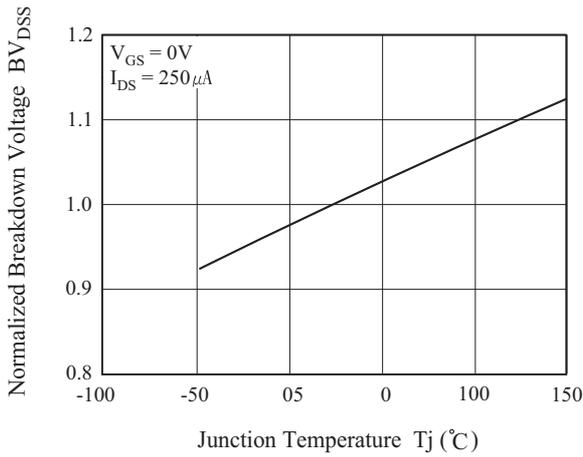

Fig4. $R_{DS(ON)}$ - I_D
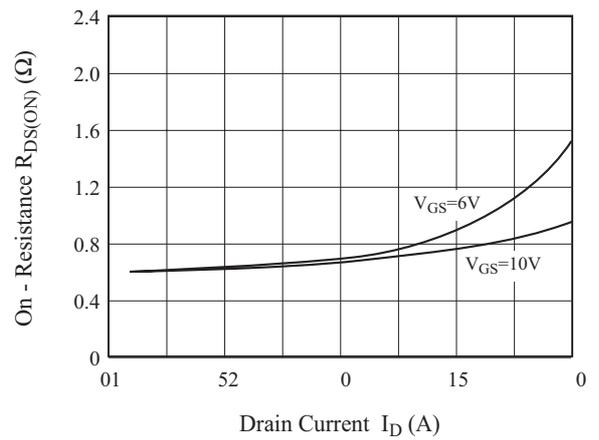
Fig5. I_S - V_{SD}
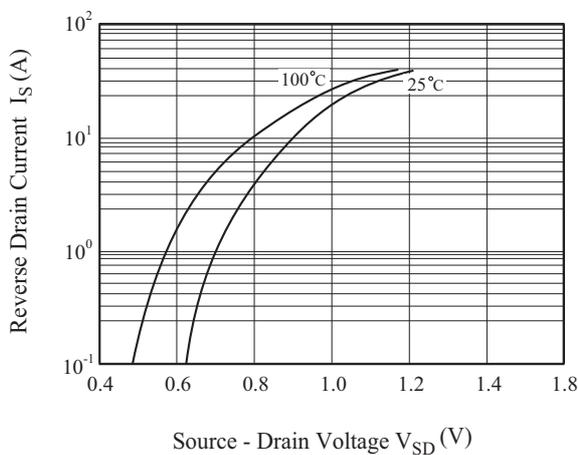
Fig6. $R_{DS(ON)}$ - T_j
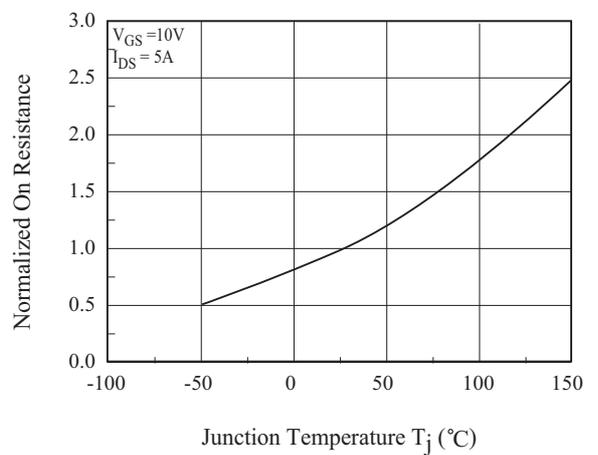
KF10N60PR/FR

Fig 7. C - V_{DS}
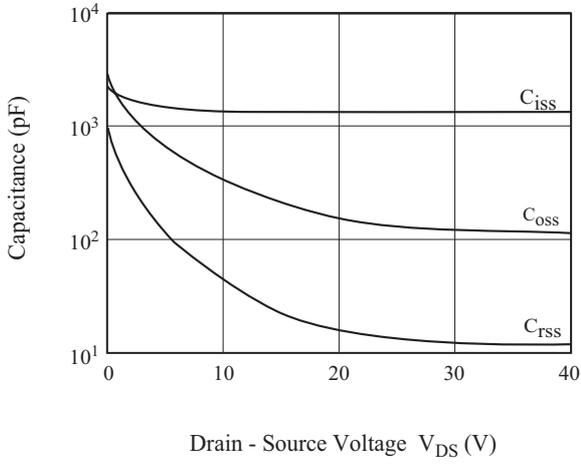
Fig8. Q_g- V_{GS}
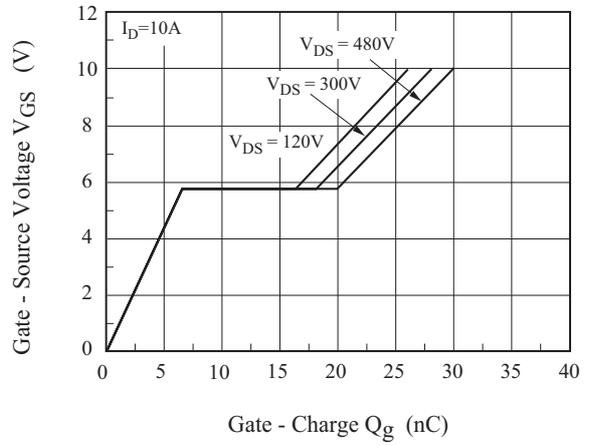
Fig9. Safe Operation Area
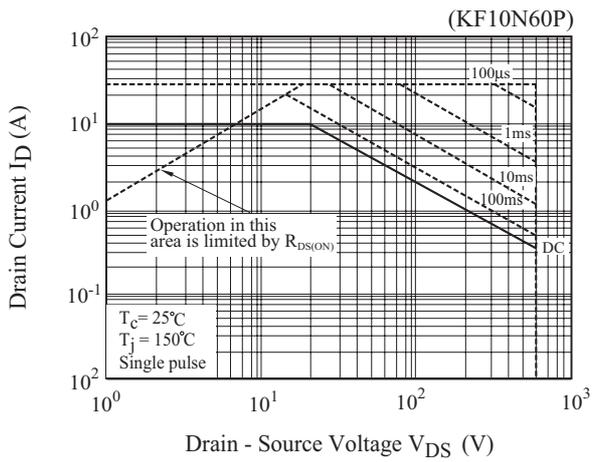
(KF10N60P)

Fig10. Safe Operation Area
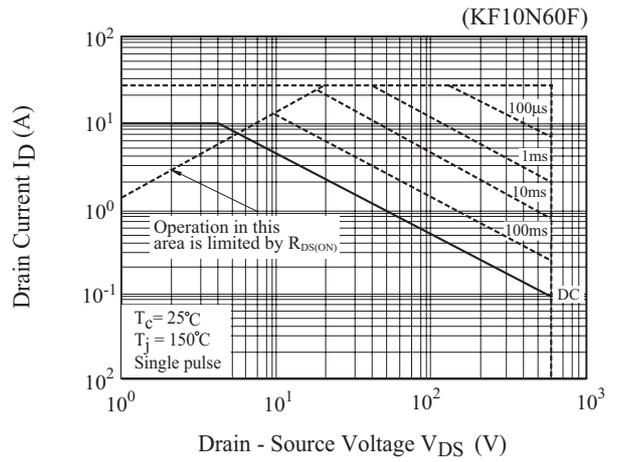
(KF10N60F)

Fig11. I_D - T_j
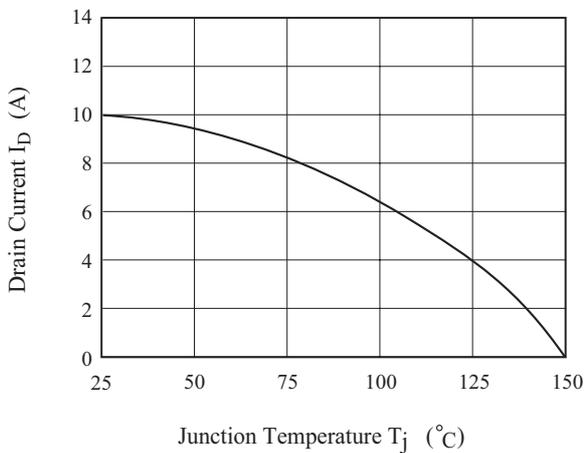
Fig12. Transient Thermal Response Curve

(KF10N60P)

TIME (sec)
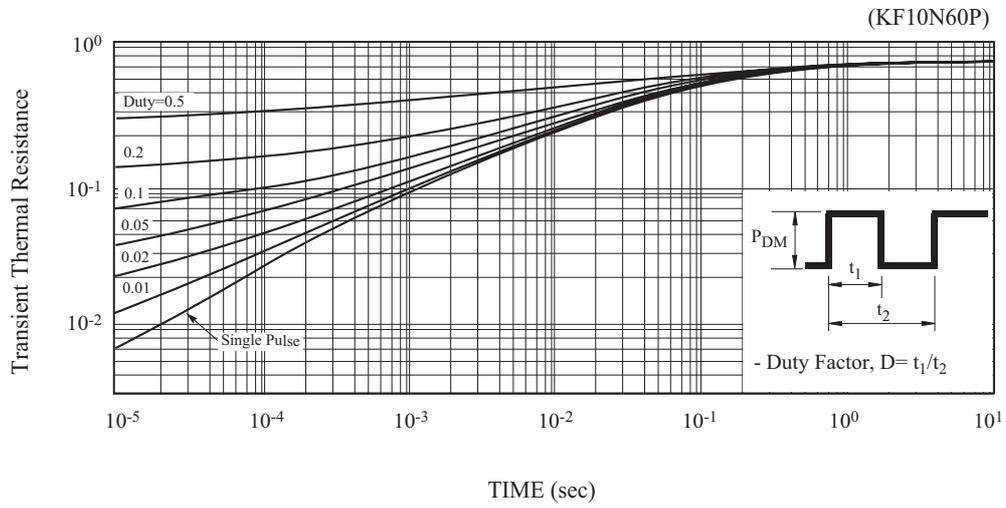
Fig13. Transient Thermal Response Curve

(KF10N60F)

TIME (sec)
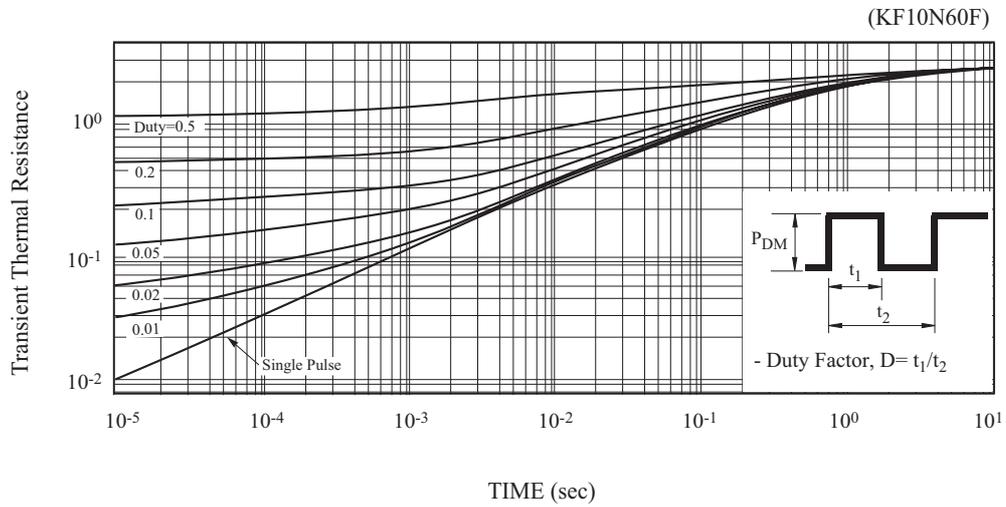
Fig14. Gate Charge

Fig15. Single Pulsed Avalanche Energy

$$E_{AS} = \frac{1}{2}\, LI_{AS}^2\, \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$
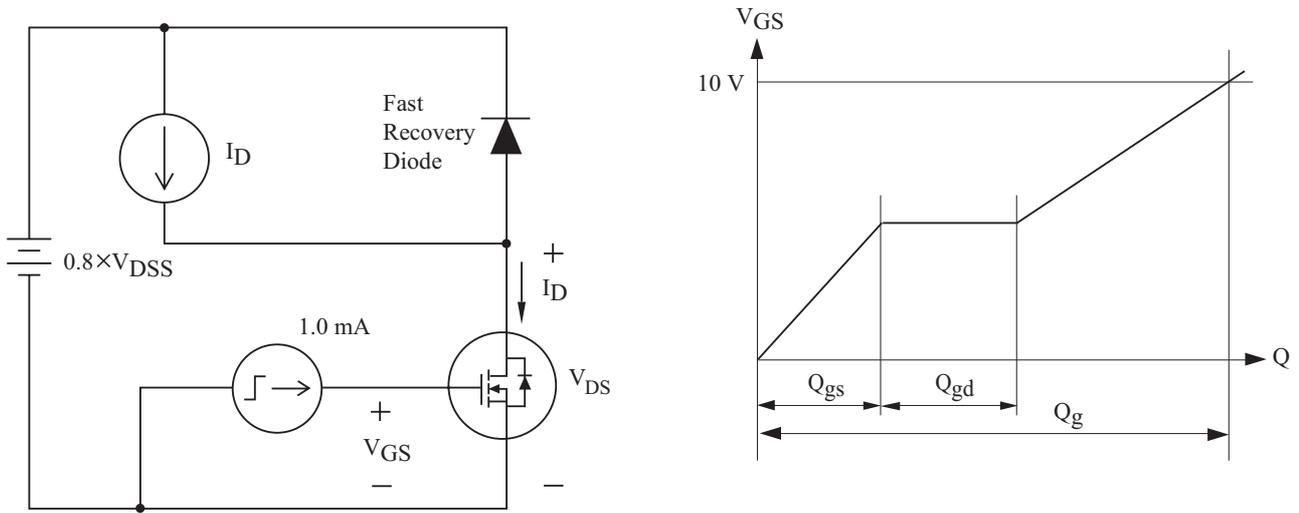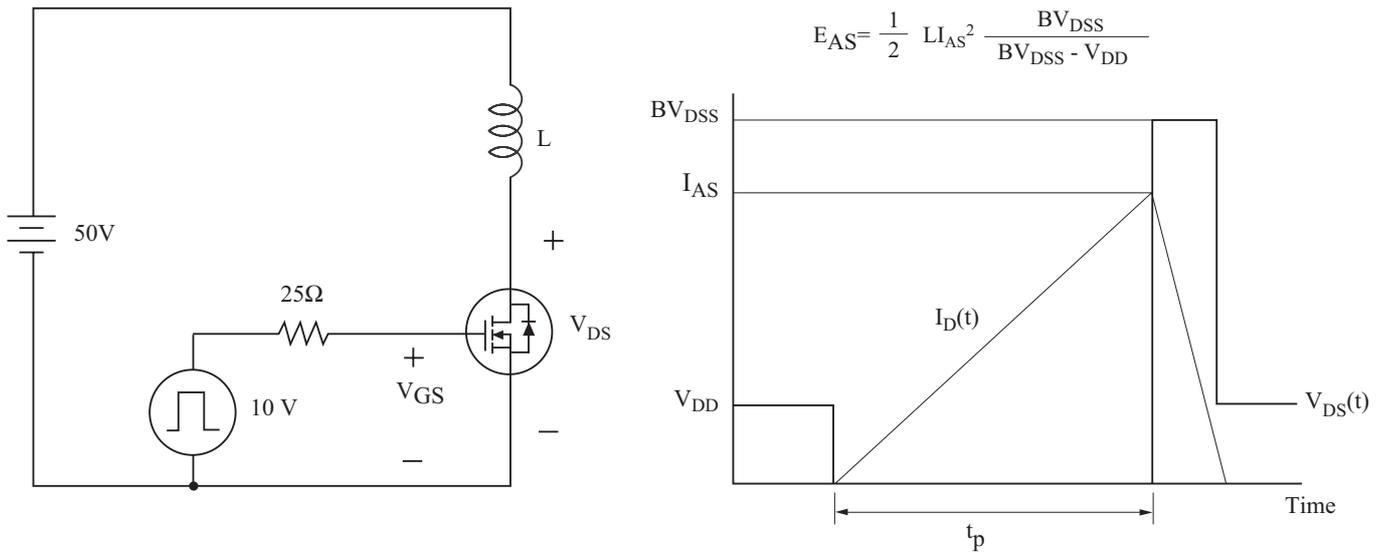
Fig16. Resistive Load Switching
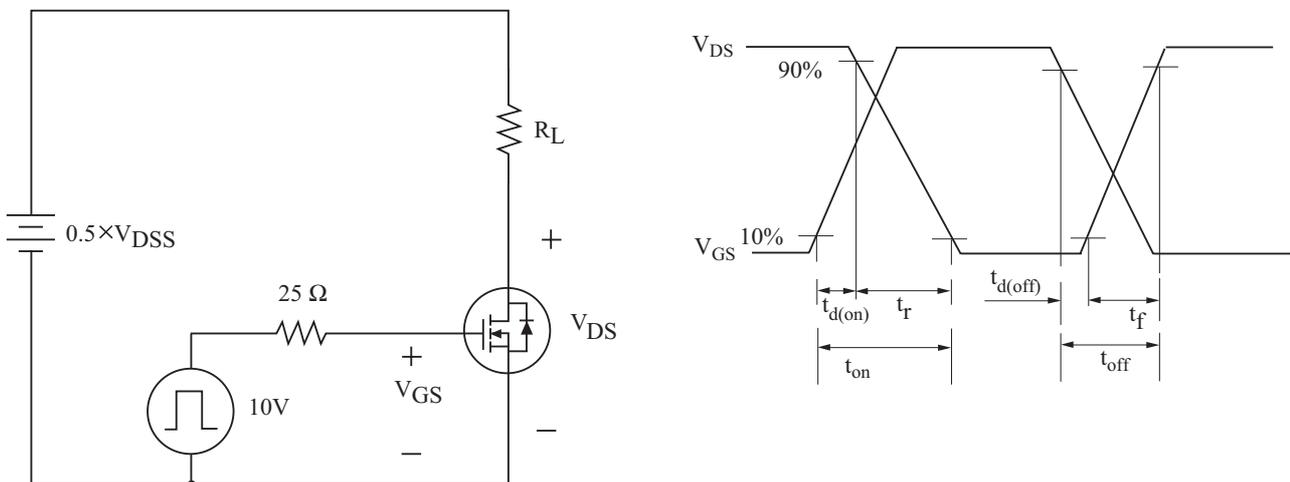
Fig17. Source - Drain Diode Reverse Recovery and dv /dt

I_F

DUT

V_{DS}

$+$

$-$

I_S

$0.5 \times V_{DSS}$

driver

$+$

10V

V_{GS}

$-$

I_{SD}
(DUT)

Body Diode Forword Current

di/dt

I_{RM}

Body Diode Reverse Current

V_{DS}
(DUT)

Body Diode Recovery dv/dt

V_{SD}

V_{DD}

Body Diode Forword Voltage drop