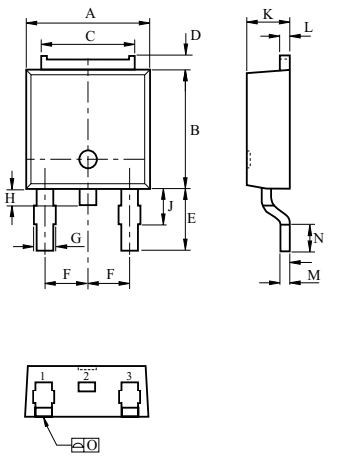
KHB9D5N20D

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 switch mode power supplies.



DIM	MILLIMETERS
A	6.60 ± 0.20
B	6.10±0.20
C	5.34 ±0.30
D	0.70±0.20
E	2.70 ± 0.15
F	2.30±0.10
G	0.96 MAX
H	0.90 MAX
J	1.80±0.20
K	2.30±0.10
L	0.50 ± 0.10
M	0.50±0.10
N	0.70 MIN
O	0.1 MAX

DPAK (1)

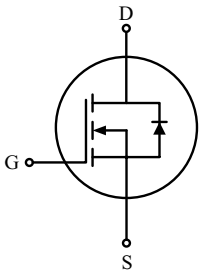
FEATURES

- V_{DSS}=200V, I_D=9.5A
- Drain-Source ON Resistance
  : $R_{DS(ON)}$=400mΩ @V_{GS} = 10V
- Qg(typ.)=18.5nC

MAXIMUM RATING (Tc=25℃)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		V_{DSS}	200	V
Gate-Source Voltage		V_{GSS}	±30	V
Drain Current	@T_C=25℃	I_D	9.5	A
	Pulsed (Note1)	I_{DP}	38	
Single Pulsed Avalanche Energy (Note 2)		E_{AS}	180	mJ
Repetitive Avalanche Energy (Note 1)		E_{AR}	8.7	mJ
Peak Diode Recovery dv/dt (Note 3)		dv/dt	5.5	V/ns
Drain Power Dissipation	Tc=25℃	P_D	54	W
Maximum Junction Temperature		T_j	150	℃
Storage Temperature Range		T_{stg}	-55 150	℃
Thermal Characteristics				
Thermal Resistance, Junction-to-Case		R_{thJC}	2.3	℃/W
Thermal Resistance, Junction-to-Ambient		R_{thJA}	50	℃/W

PIN CONNECTION



ELECTRICAL CHARACTERISTICS (Tc=25℃)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	BV_{DSS}	I_D=250 μA, V_{GS}=0V	200	-	-	V
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_j$	I_D=250 μA, Referenced to 25℃	-	0.19	-	V/℃
Gate Threshold Voltage	V_{th}	V_{DS}=V_{GS}, I_D=250 μA	2.0	-	4.0	V
Drain Cut-off Current	I_{DSS}	V_{DS}=200V, V_{GS}=0V,	-	-	1	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=4.75A	-	345	400	mΩ
Forward Transconductance	g_{FS}	V_{DS}=40V, I_D=4.75A (Note4)	-	6.7	-	S
Dynamic						
Total Gate Charge	Q_g	V_{DS}=160V, I_D=9.5A V_{GS}=10V (Note4, 5)	-	18.5	23	nC
Gate-Source Charge	Q_{gs}		-	2.7	-	
Gate-Drain Charge	Q_{gd}		-	9	-	
Turn-on Delay time	$t_{d(on)}$	V_{DD}=100V, R_G=25Ω I_D=9.5A (Note4, 5)	-	11	32	ns
Turn-on Rise time	t_r		-	62	135	
Turn-off Delay time	$t_{d(off)}$		-	46	102	
Turn-off Fall time	t_f		-	80	170	
Input Capacitance	C_{iss}	V_{DS}=25V, V_{GS}=0V, f=1.0MHz	-	387	503	pF
Output Capacitance	C_{oss}		-	96	125	
Reverse Transfer Capacitance	C_{rss}		-	34	45	
Source-Drain Diode Ratings						
Continuous Source Current	I_S	V_{GS}<V_{th}	-	-	9.5	A
Pulsed Source Current	I_{SP}		-	-	38	
Diode Forward Voltage	V_{SD}	I_S=9.5A, V_{GS}=0V	-	-	1.5	V
Reverse Recovery Time	t_{rr}	I_S=9.5A, V_{GS}=0V, dIs/dt=100A/μs (Note 4)	-	130	-	ns
Reverse Recovery Charge	Q_{rr}		-	0.6	-	μC

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

Note 2) L =3mH, I_{AS}=9.5A, V_{DD}=50V, R_G=25Ω, Starting T_j=25℃.

Note 3) I_S ≤9.5A, dI/dt≤300A/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.

Fig1. I_D - V_{DS}

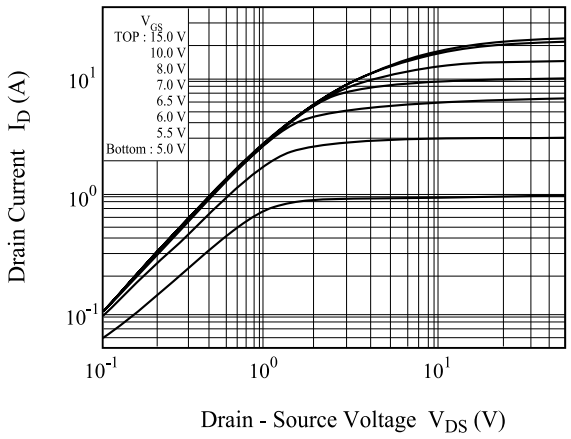


Fig2. I_D - V_{GS}

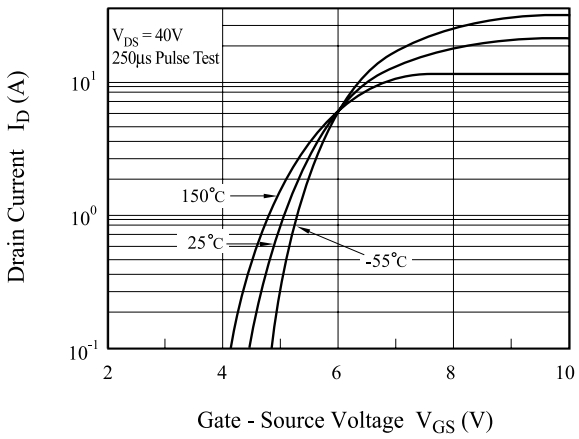


Fig4. BV_{DSS} - T_j

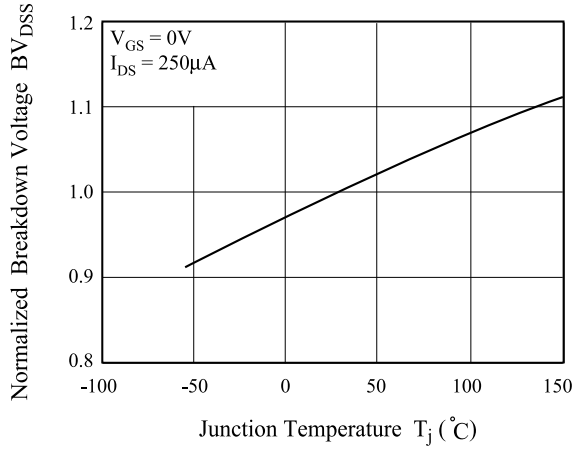


Fig5. $R_{DS(ON)}$ - I_D

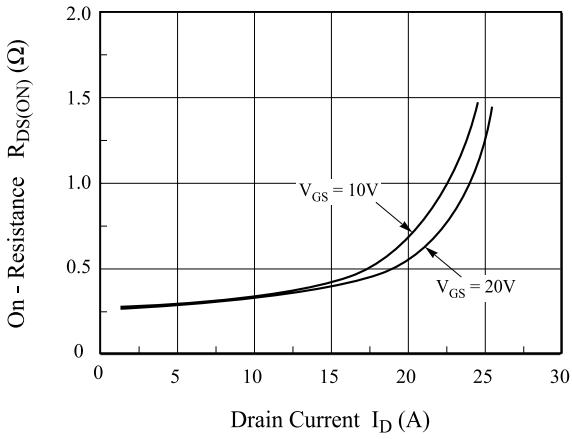


Fig6. I_S - V_{SD}

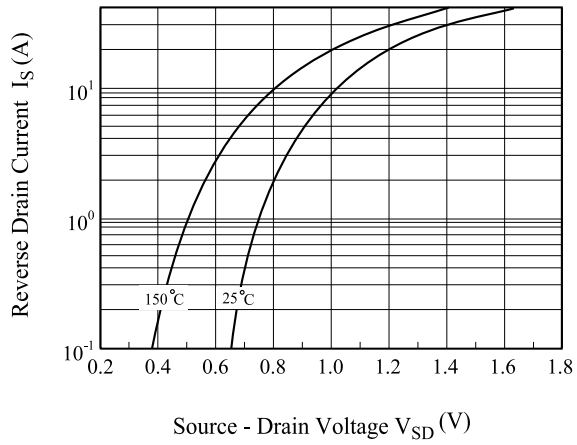


Fig6. $R_{DS(ON)}$ - T_j

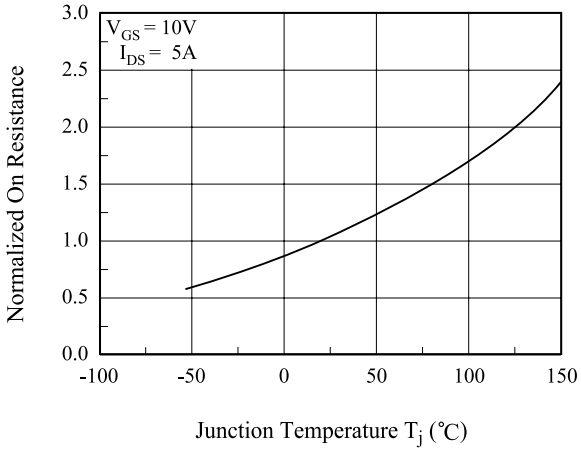


Fig7. C - V_{DS}

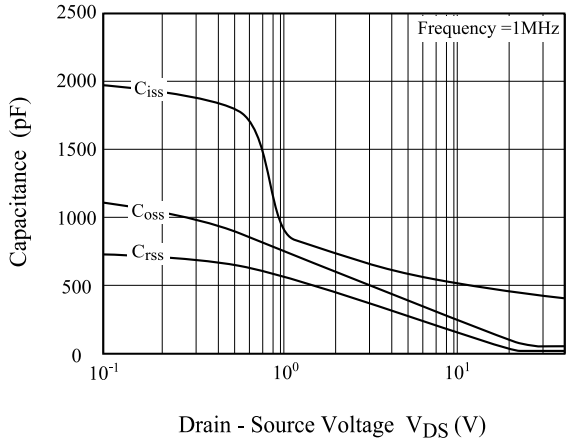


Fig8. Q_g- V_{GS}

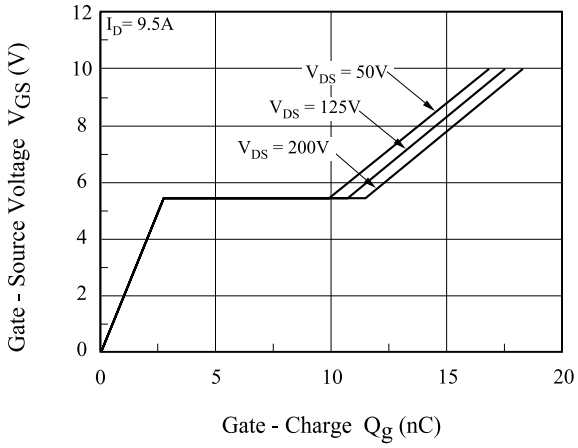


Fig9. Safe Operation Area

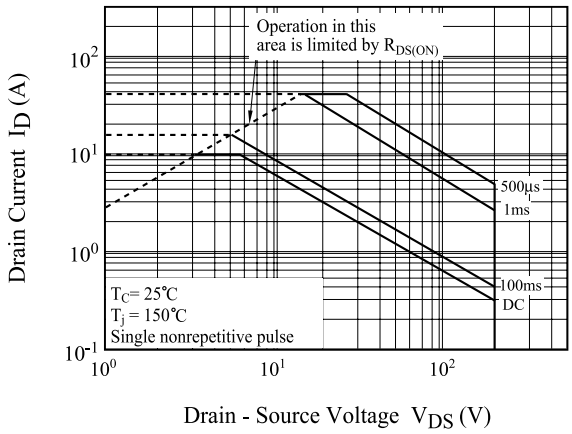


Fig10. I_D - T_j

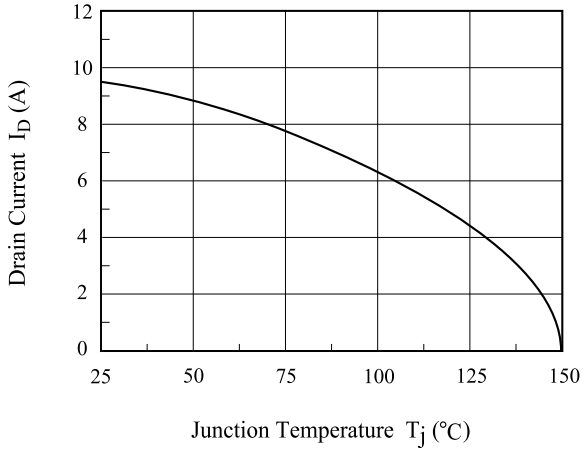


Fig11. Normalized Transient R_{th}

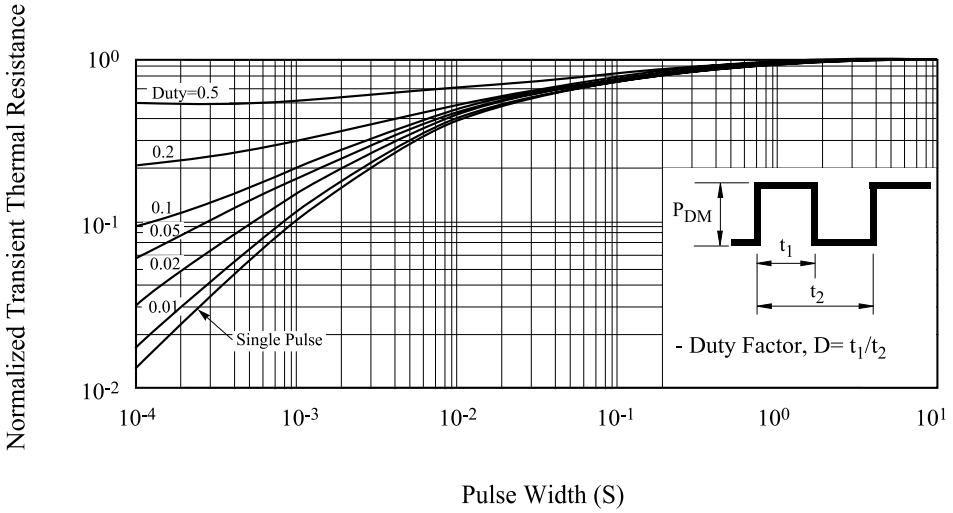
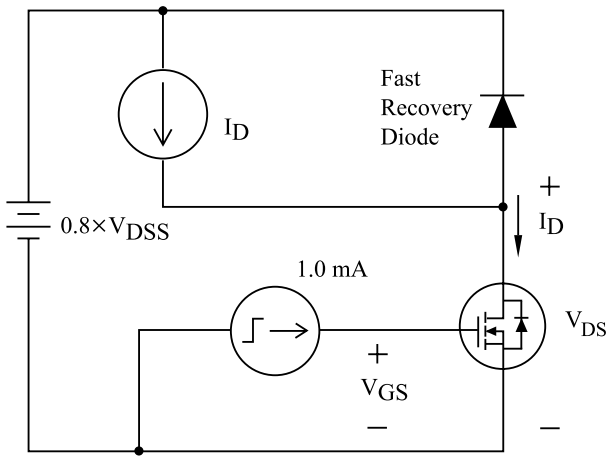


Fig12. Gate Charge



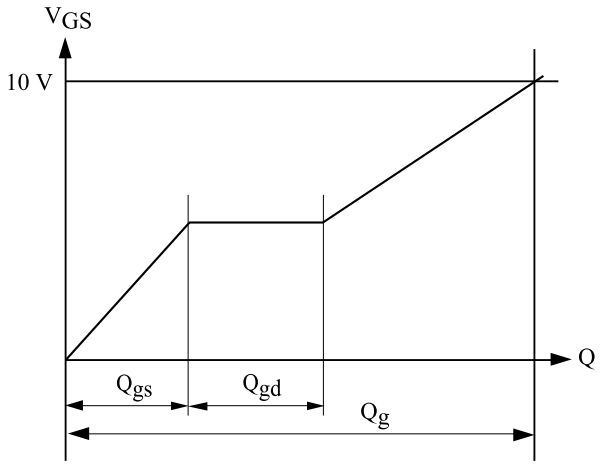
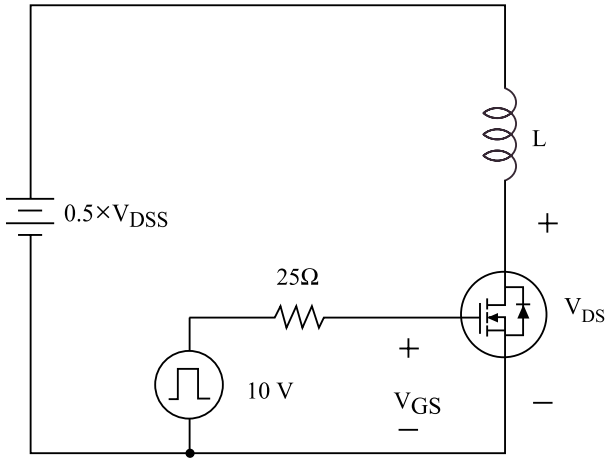


Fig13. Single Pulsed Avalanche Energy



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

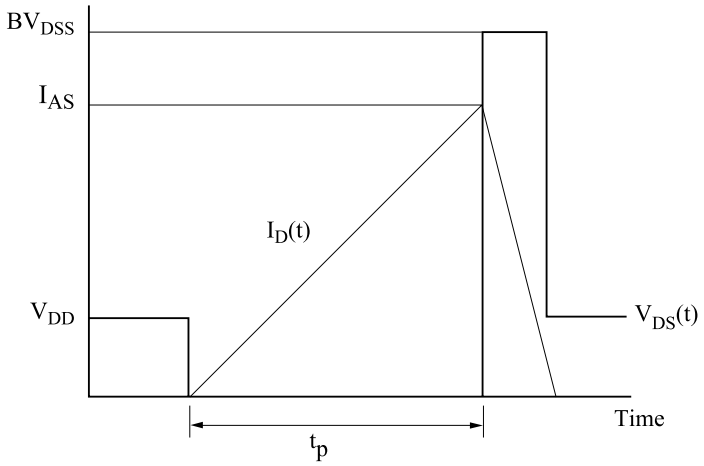
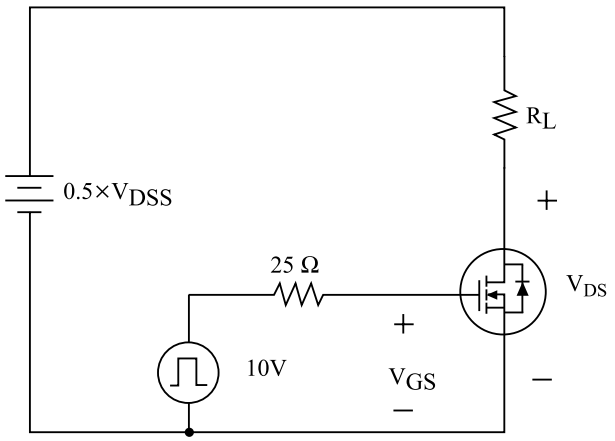


Fig14. Resistive Load Switching



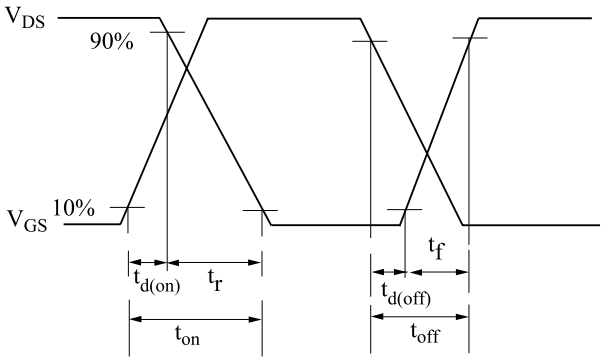


Fig15. Source - Drain Diode Reverse Recovery and dv /dt