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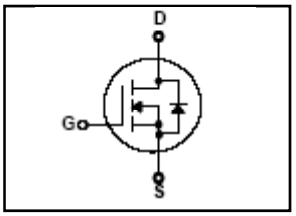
SemiHow
Know-How for Semiconductor

HFD5N50S
500V N-Channel MOSFET

BV_{DSS} = 500 V
$R_{DS(on)\ typ}$ = 1.2 Ω
I_D = 4.0 A

D-PAK I-PAK


HFD5N50S HFU5N50S
1.Gate 2. Drain 3. Source



FEATURES

- ❑ Originative New Design
- ❑ Superior Avalanche Rugged Technology
- ❑ Robust Gate Oxide Technology
- ❑ Very Low Intrinsic Capacitances
- ❑ Excellent Switching Characteristics
- ❑ Unrivalled Gate Charge : 25 nC (Typ.)
- ❑ Extended Safe Operating Area
- ❑ Lower $R_{DS(ON)}$: 1.2 Ω (Typ.) @V_{GS}=10V
- ❑ 100% Avalanche Tested

Absolute Maximum Ratings

T_C=25℃ unless otherwise specified

Symbol	Parameter		Value	Units
V_{DSS}	Drain-Source Voltage		500	V
I_D	Drain Current – Continuous (T_C = 25℃)		4.0	A
	Drain Current – Continuous (T_C = 100℃)		2.3	A
I_{DM}	Drain Current – Pulsed	(Note 1)	16	A
V_{GS}	Gate-Source Voltage		±30	V
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	300	mJ
I_{AR}	Avalanche Current	(Note 1)	4.0	A
E_{AR}	Repetitive Avalanche Energy	(Note 1)	5.0	mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	2.5	V/ns
P_D	Power Dissipation (T_C = 25℃)		50	W
	– Derate above 25℃		0.4	W/℃
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150	℃
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		300	℃

Thermal Resistance Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	--	2.5	℃/W
$R_{\theta JA}$	Junction-to-Ambient*	--	50	
$R_{\theta JA}$	Junction-to-Ambient	--	110	

* When mounted on the minimum pad size recommended (PCB Mount)

Electrical Characteristics T_C=25 °C unless otherwise specified

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
On Characteristics						
V_{GS}	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 μA	2.5	--	4.5	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS} = 10 V, I_D = 2.0 A	--	1.2	1.5	Ω
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 μA	500	--	--	V
ΔBV_{DSS} /ΔT_J	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, Referenced to25℃	--	0.54	--	V/℃
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 500 V, V_{GS} = 0 V	--	--	1	μA
		V_{DS} = 400 V, T_C = 125℃	--	--	10	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS} = 30 V, V_{DS} = 0 V	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS} = -30 V, V_{DS} = 0 V	--	--	-100	nA
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	--	620	--	pF
C_{oss}	Output Capacitance		--	154	--	pF
C_{rss}	Reverse Transfer Capacitance		--	45	--	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Time	V_{DS} = 250 V, I_D = 4.0 A, R_G = 25 Ω (Note 4,5)	--	15	--	ns
t_r	Turn-On Rise Time		--	40	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	60	--	ns
t_f	Turn-Off Fall Time		--	40	--	ns
Q_g	Total Gate Charge	V_{DS} = 400V, I_D = 4.0 A, V_{GS} = 10 V (Note 4,5)	--	25	--	nC
Q_{gs}	Gate-Source Charge		--	3.5	--	nC
Q_{gd}	Gate-Drain Charge		--	9	--	nC
Source-Drain Diode Maximum Ratings and Characteristics						
I_S	Continuous Source-Drain Diode Forward Current		--	--	4.0	A
I_{SM}	Pulsed Source-Drain Diode Forward Current		--	--	16	A
V_{SD}	Source-Drain Diode Forward Voltage	I_S = 4.0 A, V_{GS} = 0 V	--	--	1.4	V
trr	Reverse Recovery Time	I_S = 4.0 A, V_{GS} = 0 V di_F/dt = 100 A/μs (Note 4)	--	300	--	ns
Qrr	Reverse Recovery Charge		--	2.5	--	μC

Notes ;

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L=21.5mH, I_{AS}=4.0A, V_{DD}=50V, R_G=25Ω, Starting T_J =25°C
3. I_{SD}≤4.0A, di/dt≤200A/μs, V_{DD}≤BV_{DSS} , Starting T_J =25 °C
4. Pulse Test : Pulse Width ≤ 300μs, Duty Cycle ≤ 2%
5. Essentially Independent of Operating Temperature