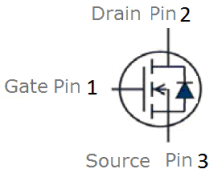
V_{DS}	700	V
$R_{DS(on),TYP}$@ V_{GS}=10V	350	mΩ
I_D	11	A

Features

- Extremely low gate charge
- 100% avalanche tested
- Super Junction Technology
- Pb-free lead plating; RoHS compliant; Halogen free
- Wide creepage distance of 4.25mm between the leads

Pb-Free RoHS HF Halogen-Free

TO-220WF



Part ID	Package Type	Marking	Tube Information
VSF450N70HS2	TO-220WF	450N70H	50pcs/Tube

Maximum ratings, at T_A =25°C, unless otherwise specified

Symbol	Parameter		Rating	Unit
$V_{(BR)DSS}$	Drain-Source breakdown voltage		700	V
V_{GS}	Gate-Source voltage		±30	V
I_S	Diode continuous forward current	T_C =25°C	11	A
I_D	Continuous drain current @VGS=10V	T_C =25°C	11	A
		T_C =100°C	7	A
I_{DM}	Pulse drain current tested ①	T_C =25°C	33	A
EAS	Avalanche energy, single pulsed ②		206	mJ
P_D	Maximum power dissipation	T_C =25°C	26	W
		T_C =100°C	10	W
T_{STG}, T_J	Storage and Junction Temperature Range		-55 to 150	°C

Thermal Characteristics

Symbol	Parameter	Typical	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	4.7	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62.5	°C/W

Electrical Characteristics

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
Static Electrical Characteristics @ T_j = 25°C (unless otherwise stated)						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250μA	700	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=700V,V_{GS}=0V	--	--	1	μA
	Zero Gate Voltage Drain Current(Tj=125℃)	V_{DS}=560V,V_{GS}=0V	--	--	50	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±30V,V_{DS}=0V	--	--	±100	nA
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250μA	2.4	3	3.6	V
$R_{DS(ON)}$	Drain-Source On-State Resistance ③	V_{GS}=10V, I_D=5.5A	--	350	420	mΩ
		Tj=100℃	--	510	--	mΩ
Dynamic Electrical Characteristics @ T_j= 25°C (unless otherwise stated)						
C_{iss}	Input Capacitance	V_{DS}=30V,V_{GS}=0V, f=1MHz	655	770	885	pF
C_{oss}	Output Capacitance		290	340	390	pF
C_{rss}	Reverse Transfer Capacitance		15	20	25	pF
Q_g	Total Gate Charge	V_{DS}=350V,I_D=11A, V_{GS}=10V	--	18	--	nC
Q_{gs}	Gate-Source Charge		--	4.2	--	nC
Q_{gd}	Gate-Drain Charge		--	6.4	--	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=350V, I_D=11A, R_G=10Ω, V_{GS}=10V	--	40	--	ns
t_r	Turn-on Rise Time		--	36	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	103	--	ns
t_f	Turn-Off Fall Time		--	107	--	ns
Source- Drain Diode Characteristics@ T_j = 25°C (unless otherwise stated)						
V_{SD}	Forward on voltage	I_{SD}=11A,V_{GS}=0V	--	0.9	1.2	V
t_{rr}	Reverse Recovery Time	T_j=25℃,I_{sd}=11A, V_{GS}=0V di/dt=100A/μs	--	285	--	ns
Q_{rr}	Reverse Recovery Charge		--	2.9	--	μC

NOTE: ① Repetitive rating; pulse width limited by max junction temperature.

② Limited by T_{Jmax}, starting T_J = 25°C, L = 8mH, R_G = 25Ω, I_{AS} = 7A, V_{GS} =10V. Part not recommended for use above this value.

③ Pulse width ≤ 380μs; duty cycle≤ 2%.

Typical Characteristics

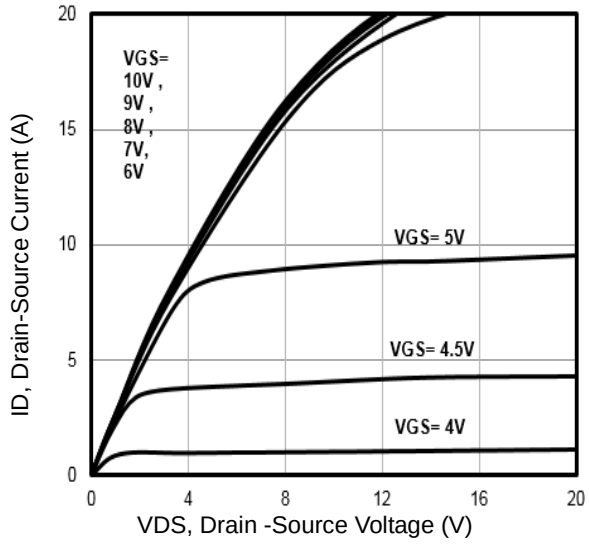


Fig1. Typical Output Characteristics

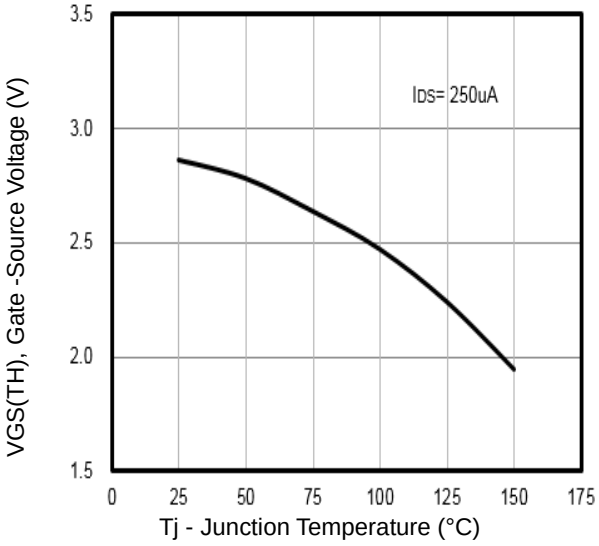


Fig2. $V_{GS(TH)}$ Gate -Source Voltage Vs. Tj

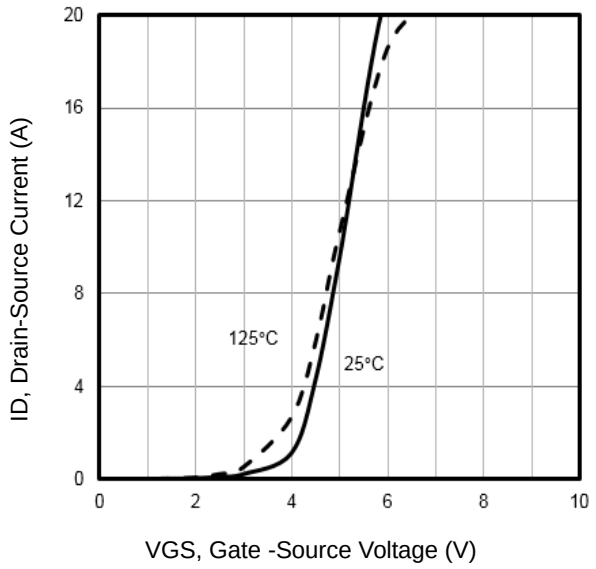


Fig3. Typical Transfer Characteristics

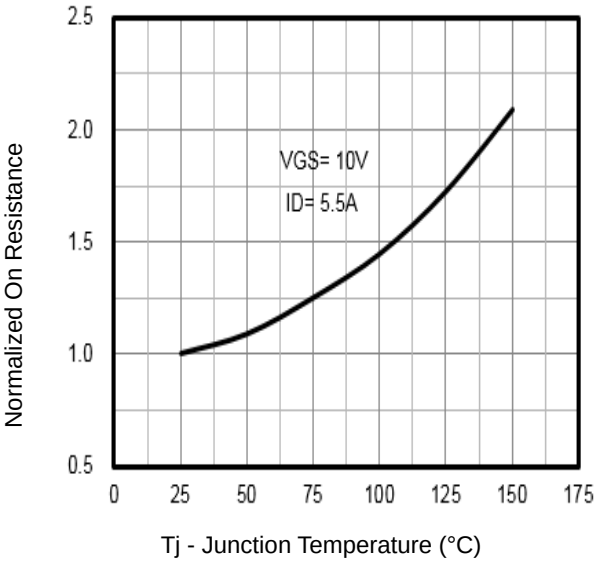


Fig4. Normalized On-Resistance Vs. Temperature

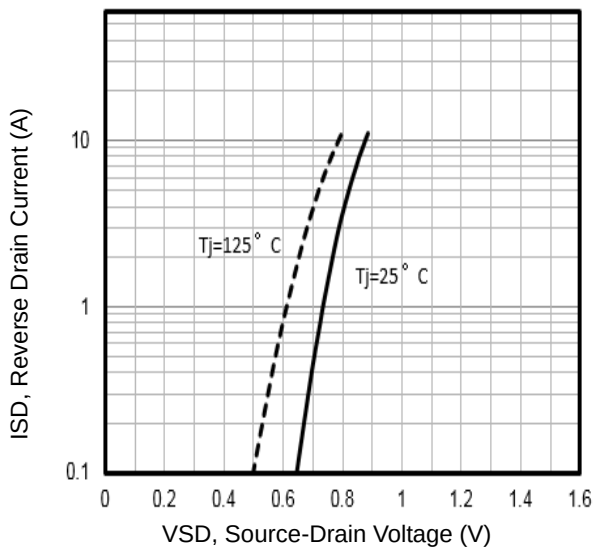


Fig5. Typical Source-Drain Diode Forward Voltage

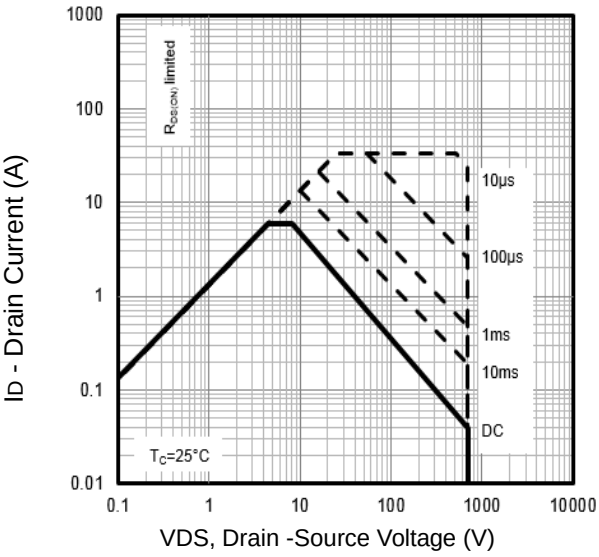


Fig6. Maximum Safe Operating Area

Typical Characteristics

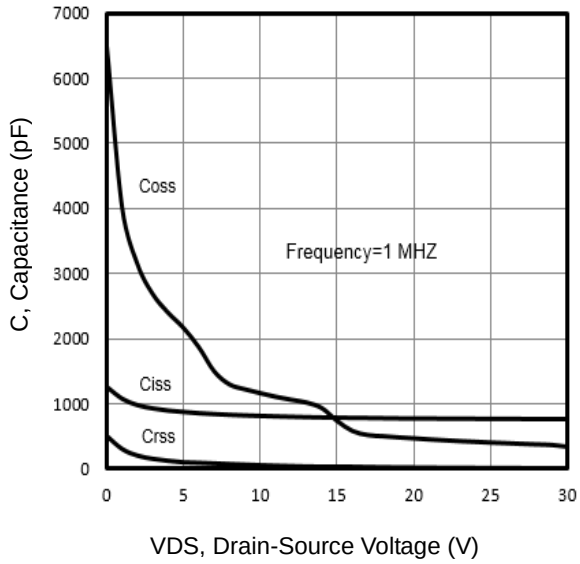


Fig7. Typical Capacitance Vs. Drain-Source Voltage

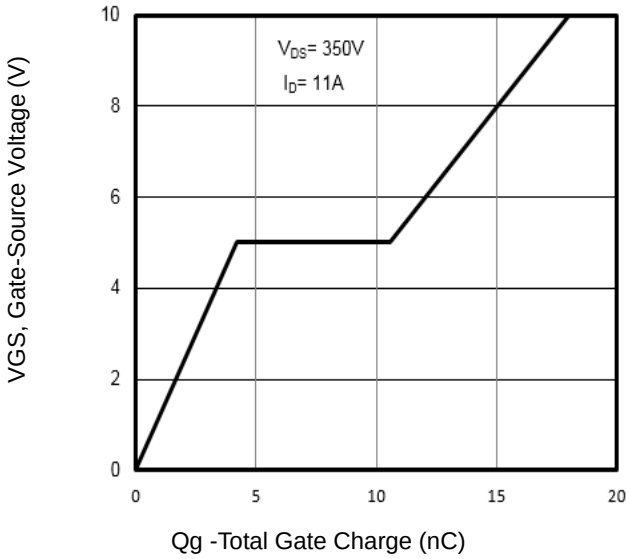


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

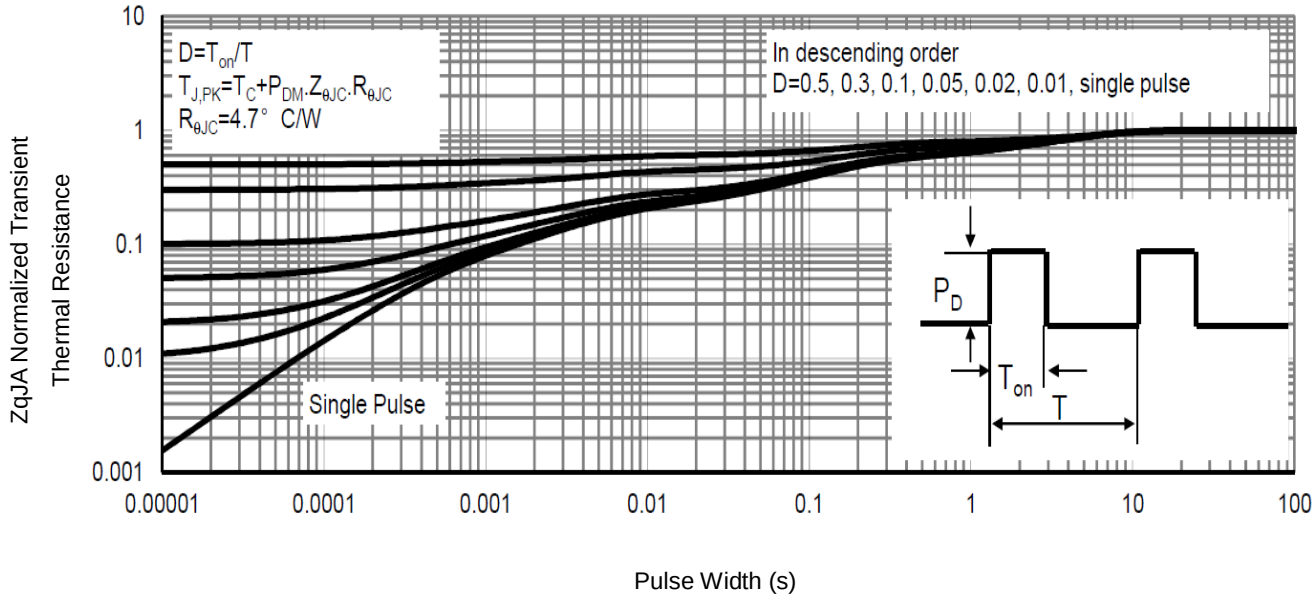


Fig9. Normalized Maximum Transient Thermal Impedance

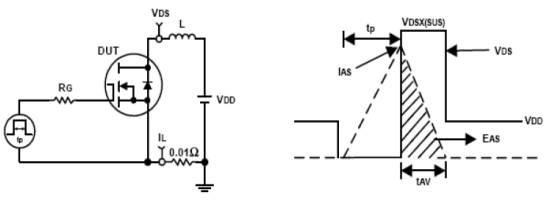


Fig10. Unclamped Inductive Test Circuit and waveforms

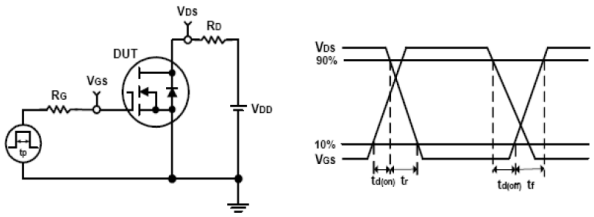
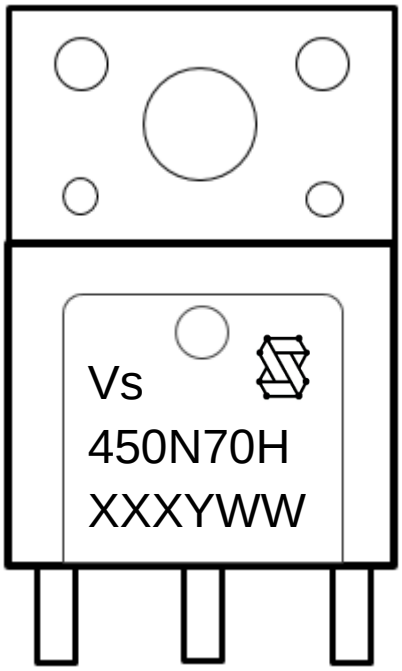


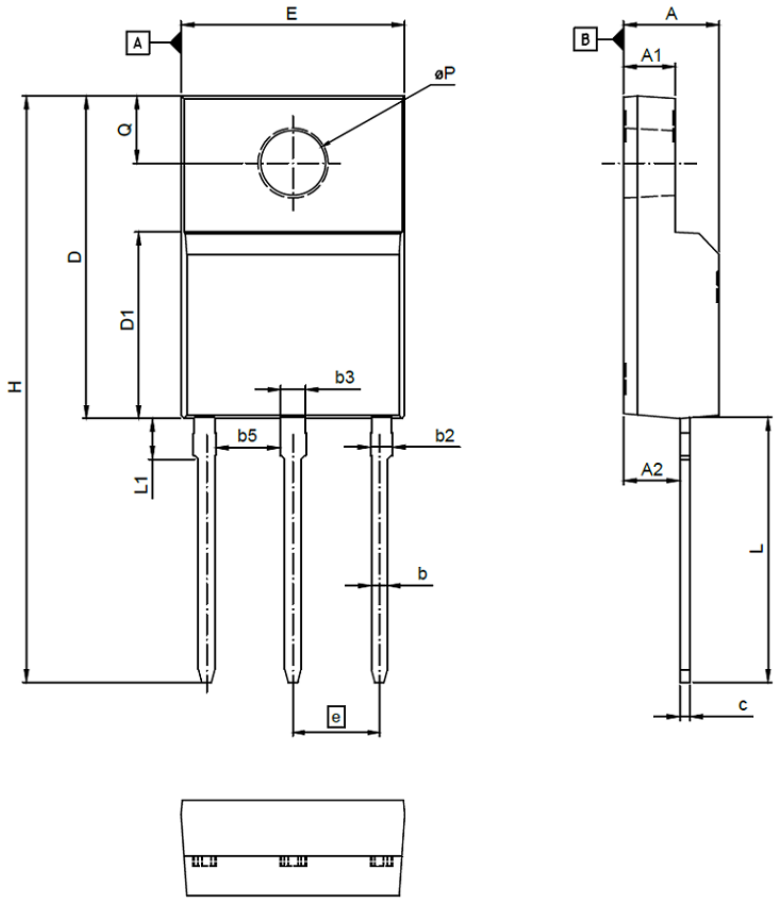
Fig11. Switching Time Test Circuit and waveforms

Marking Information



1st line： Vanguard Code（Vs），Vanguard Logo
2nd line： Part Number（450N70H）
3rd line： Date code （XXXYWW）
XXX： Wafer Lot Number Code , code changed with Lot Number
Y： Year Code，(e.g. E=2017, F=2018, G=2019, H=2020, etc)
WW： Week Code (01 to 53)

TO-220WF Package Outline Data



Symbol	Dimensions (unit: mm)		
	Min	Typ	Max
A	4.50	4.70	4.90
A1	2.34	2.54	2.74
A2	2.65	2.76	2.95
b	0.75	0.80	0.90
b2	0.98	1.08	1.26
b3	1.00	1.20	1.40
b5	3.00	--	--
c	0.40	0.50	0.60
D	15.47	15.87	16.27
D1	--	9.17	--
E	10.70	11.00	11.30
e	3.95	4.25	4.55
H	28.25	28.85	29.45
L	12.58	12.98	13.38
L1	1.70	2.00	2.30
ΦP	2.98	3.18	3.38
Q	3.10	3.30	3.50

Note:
1. Dimensions do NOT include mold flash, protrusions or gate burrs.

Customer Service

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