

Features

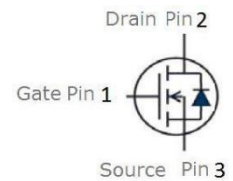
- Extremely low gate charge
- 100% avalanche tested
- Super Junction Technology
- Pb-free lead plating; RoHS compliant; Halogen free



Part ID	Package Type	Marking	Tube Information
VSF600N70HS	TO-220F	600N70H	50pcs/Tube

V_{DS}	700	V
$R_{DS(on),TYP@ V_{GS}=10V}$	520	m Ω
I_D	8	A

TO-220F



Maximum ratings, at $T_A=25^{\circ}\text{C}$, 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	$T_C=25^{\circ}\text{C}$ 8	A
I_D	Continuous drain current @ $V_{GS}=10\text{V}$	$T_C=25^{\circ}\text{C}$ 8	A
		$T_C=100^{\circ}\text{C}$ 5	A
I_{DM}	Pulse drain current tested ①	$T_C=25^{\circ}\text{C}$ 32	A
EAS	Avalanche energy, single pulsed ②	175	mJ
P_D	Maximum power dissipation	$T_C=25^{\circ}\text{C}$ 25	W
T_{STG}, T_J	Storage and Junction Temperature Range	-55 to 150	$^{\circ}\text{C}$

Thermal Characteristics

Symbol	Parameter	Typical	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	5	$^{\circ}\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62.5	$^{\circ}\text{C/W}$

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(T _j =125°C)	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	3.0	--	4.6	V
R _{DS(ON)}	Drain-Source On-State Resistance ③	V _{GS} =10V, I _D =4.0A	--	520	600	mΩ
		T _j =100°C	--	830	--	mΩ
Dynamic Electrical Characteristics @ T_j = 25°C (unless otherwise stated)						
C _{iss}	Input Capacitance	V _{DS} =30V, V _{GS} =0V, f=1MHz	500	585	670	pF
C _{oss}	Output Capacitance		235	275	315	pF
C _{rss}	Reverse Transfer Capacitance		--	12	20	pF
Q _g	Total Gate Charge	V _{DS} =350V, I _D =7A, V _{GS} =10V	--	13	--	nC
Q _{gs}	Gate-Source Charge		--	4	--	nC
Q _{gd}	Gate-Drain Charge		--	4.4	--	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DD} =350V, I _D =3.5A, R _G =10Ω, V _{GS} =10V	--	39	--	ns
t _r	Turn-on Rise Time		--	22	--	ns
t _{d(off)}	Turn-Off Delay Time		--	109	--	ns
t _f	Turn-Off Fall Time		--	29	--	ns
Source- Drain Diode Characteristics @ T_j = 25°C (unless otherwise stated)						
V _{SD}	Forward on voltage	I _{SD} =8A, V _{GS} =0V	--	0.9	1.2	V
t _{rr}	Reverse Recovery Time	T _j =25°C, I _{sd} =3.5A, V _{GS} =0V di/dt=100A/μs	--	190	--	ns
Q _{rr}	Reverse Recovery Charge		--	1.4	--	μC

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

② Limited by T_{Jmax}, starting T_J = 25°C, L = 14mH, R_G = 25Ω, I_{AS} = 5A, V_{GS} = 10V. Part not recommended for use above this value.

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

Typical Characteristics

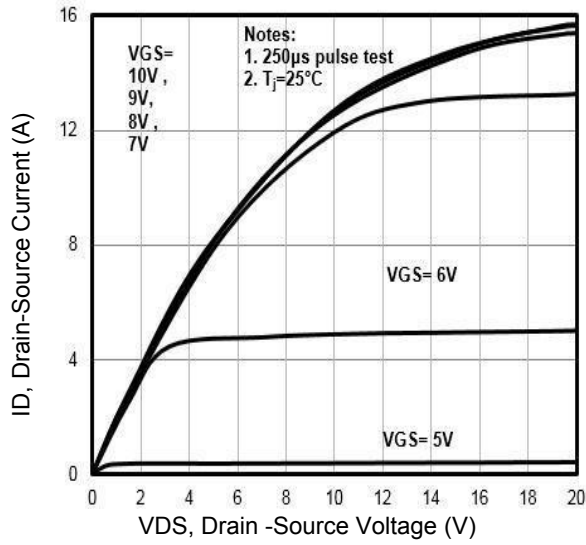


Fig1. Typical Output Characteristics

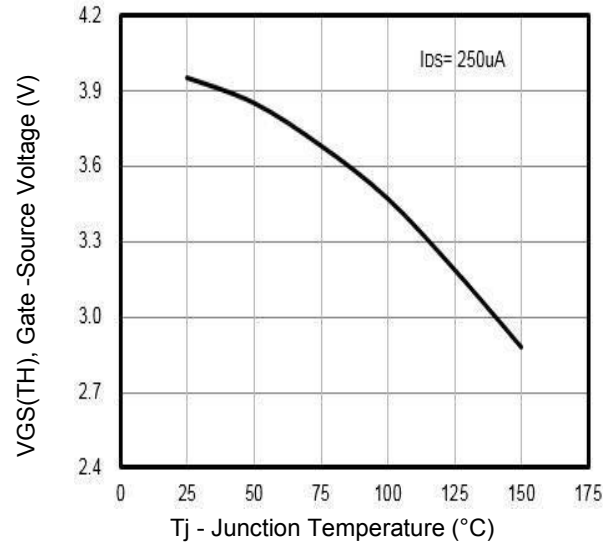


Fig2. $V_{GS(TH)}$ Gate-Source Voltage Vs. T_j

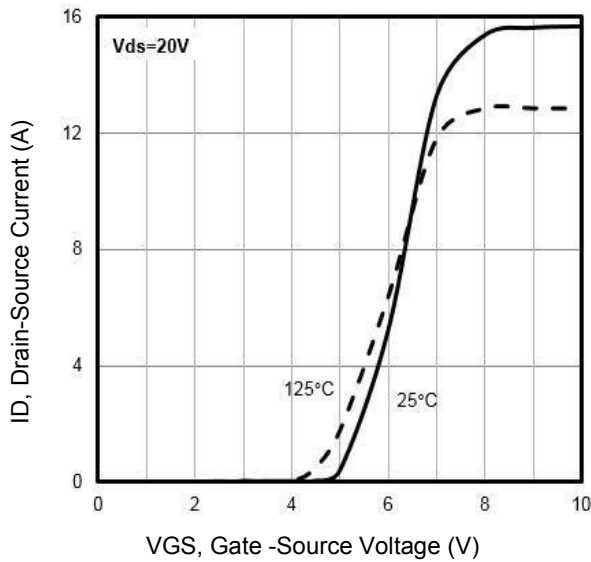


Fig3. Typical Transfer Characteristics

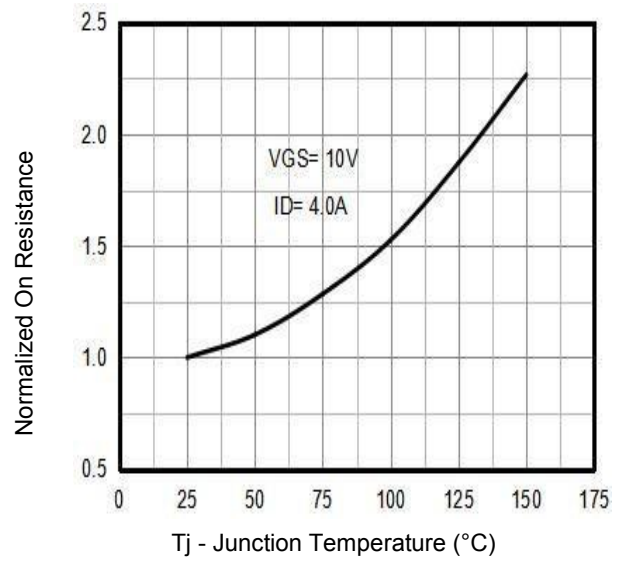


Fig4. Normalized On-Resistance Vs. Temperature

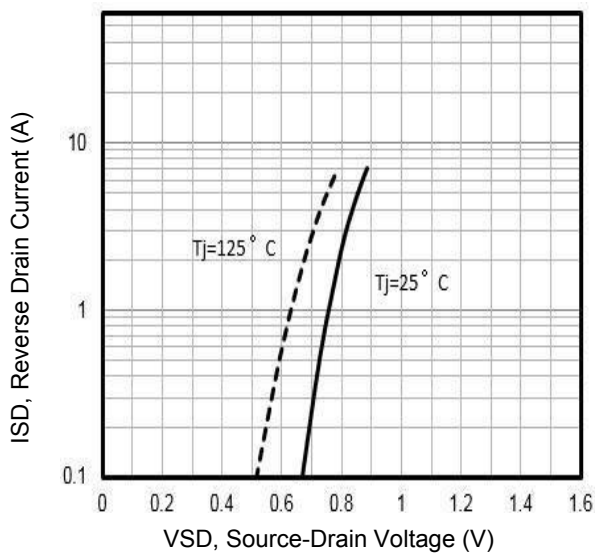


Fig5. Typical Source-Drain Diode Forward Voltage

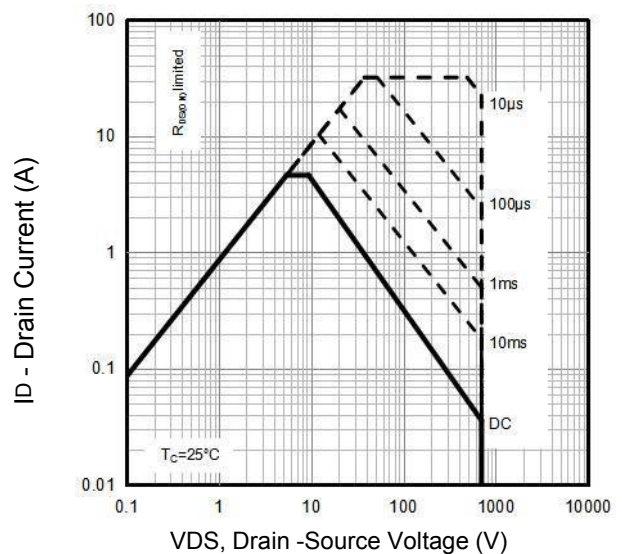


Fig6. Maximum Safe Operating Area

Typical Characteristics

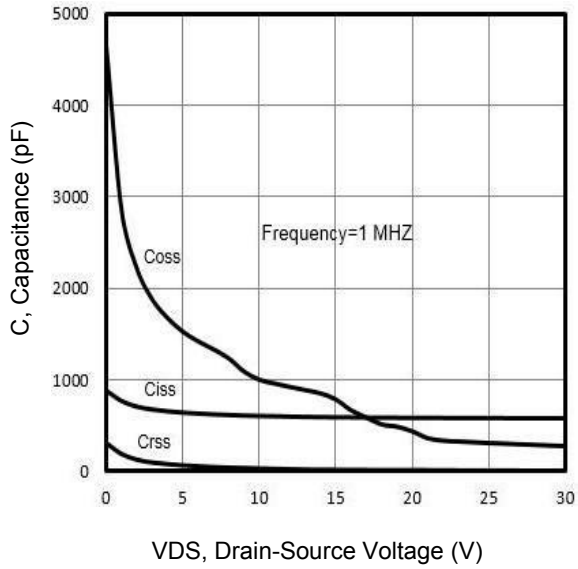


Fig7. Typical Capacitance Vs. Drain-Source Voltage

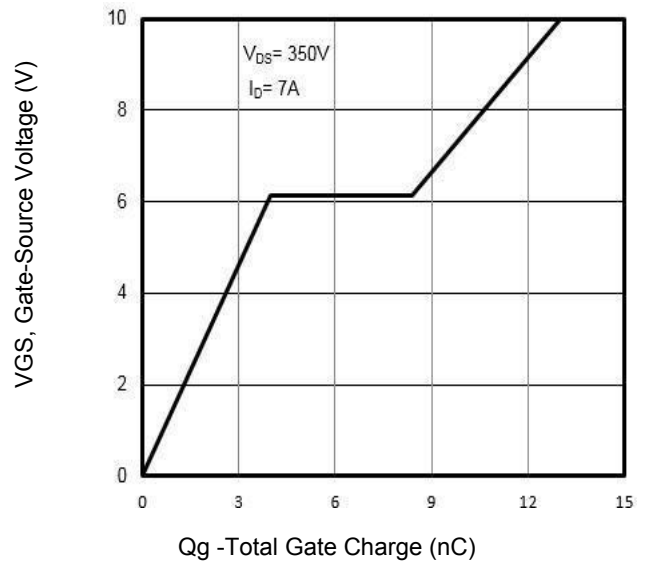


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

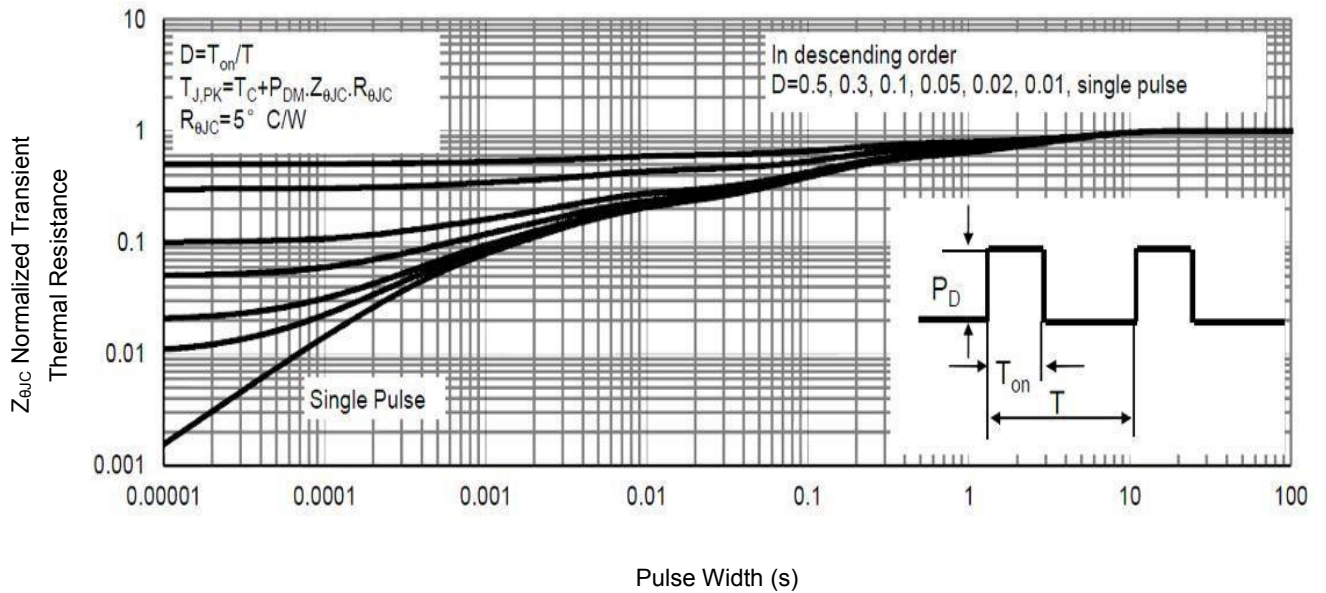


Fig9. Normalized Maximum Transient Thermal Impedance

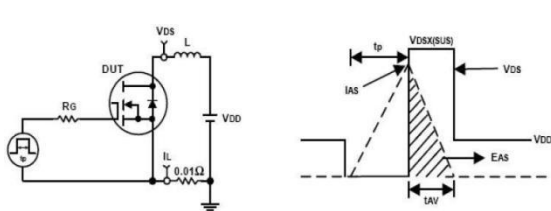


Fig10. Unclamped Inductive Test Circuit and waveforms

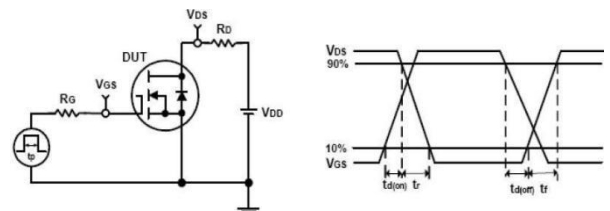
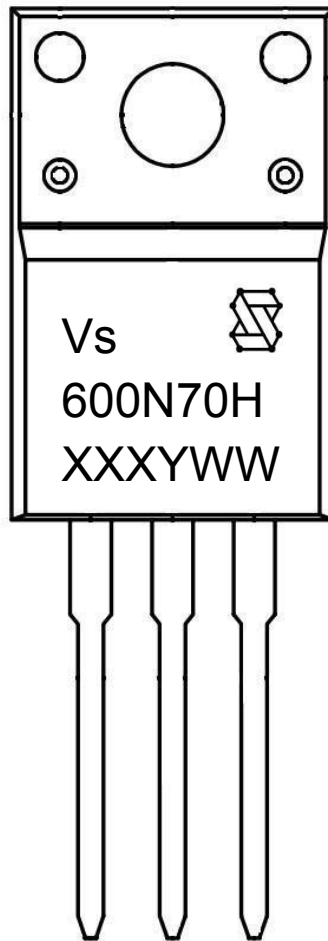


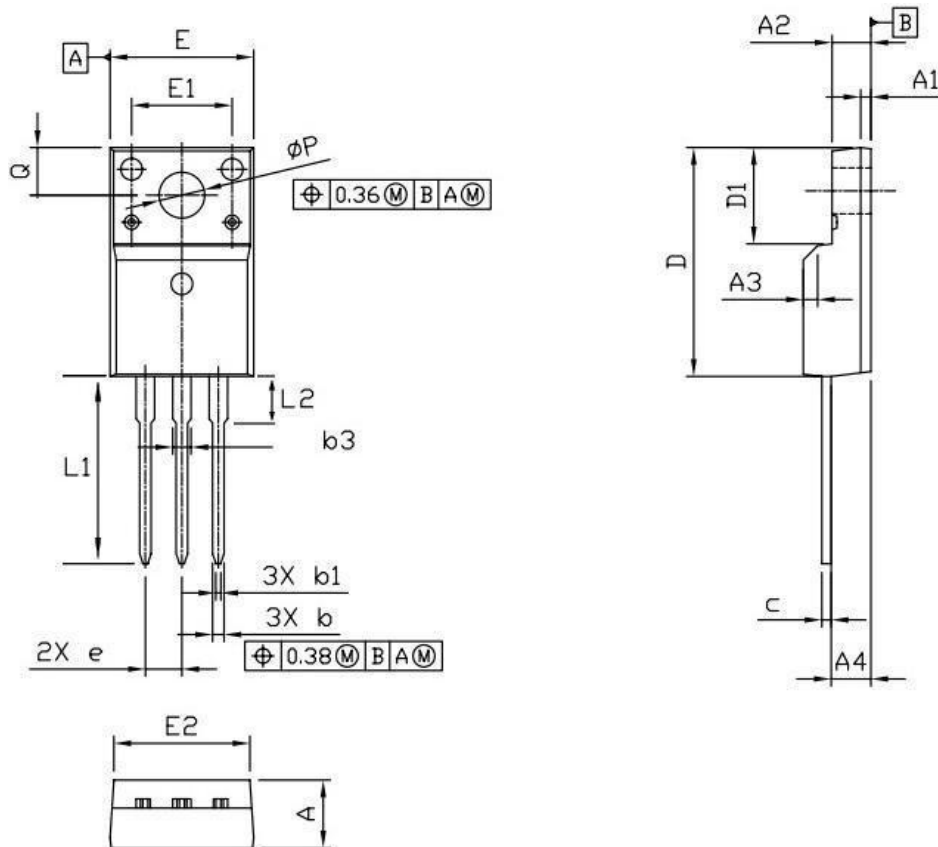
Fig11. Switching Time Test Circuit and waveforms

Marking Information



- 1st line: Vanguard Code (Vs), Vanguard Logo
2nd line: Part Number (600N70H)
3rd line: Date code (XXXYYWW)
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-220F Package Outline Data



Symbol	Dimensions (unit: mm)		
	Min	Typ	Max
A	4.40	4.70	5.00
A1	0.45	0.70	0.95
A2	2.30	2.55	2.80
A3	1.0 x 45°		
A4	2.45	2.76	3.05
b	0.60	0.80	1.00
b1	0.25	0.35	0.45
b3	1.18	--	1.47
c	0.30	0.50	0.70
D	15.40	15.90	16.40
D1	6.40	6.70	7.00
e	--	2.54	--
E	9.86	10.16	10.46
E1	6.80	7.00	7.20
E2	9.40	9.70	10.00
L1	12.30	12.80	13.30
L2	2.95	3.25	3.55
Q	3.05	3.30	3.55
ϕP	2.92	3.12	3.32

Customer Service

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