N 沟道增强型场效应晶体管
N-CHANNEL MOSFET
FHP230N6F3A

主要参数 MAIN CHARACTERISTICS

ID (Silicon limit)	230 A
VDSS	60 V
Rdson-typ（@Vgs=10V）	2.2 mΩ
Qg-typ	68.4 nC

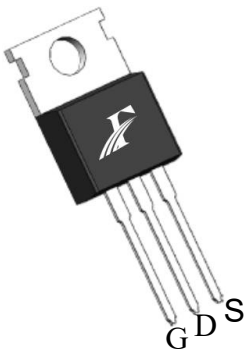
产品特性 FEATURES

低栅极电荷	Low gate charge
低 Crss (典型值 57.5 pF)	Low Crss (typical 57.5 pF)
开关速度快	Fast switching
100%经过 Rg 测试	100% Rg tested
100%经过雪崩测试	100% avalanche tested
100%经过热阻测试	100% DVDS tested
SGT 工艺	SGT process
符合 RoHS 标准	ROHS compliant

用途 APPLICATIONS

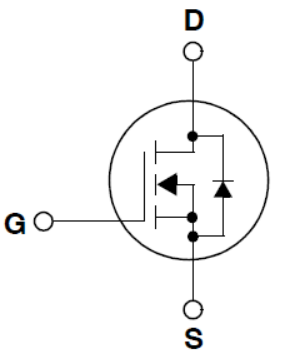
直流转换器	DC-DC Converter
逆变电源	Power management for inverter systems

封装形式 Package



TO-220
FHP series

等效电路 Equivalent Circuit



绝对最大额定值 ABSOLUTE RATINGS (Tc=25℃)

项目 **Parameter**	符号 **Symbol**	数值 **Value** **FHP230N6F3A**	单位 **Unit**
最高漏极一源极直流电压 Drain-Source Voltage	V_{DS}	60	V
连续漏极电流* Drain Current -continuous *	I_D(TC=25℃) (Silicon limit)	230	A
	I_D(TC=25℃) (Package limit)	120	
	I_D(TC=100℃) (Silicon limit)	142.2	
最大脉冲漏极电流（注 1） Drain Current – pulse（note 1）	I_{DM}	480	A
最高栅源电压 Gate-Source Voltage	V_{GS}	±20	V
单脉冲雪崩能量（注 2） Single Pulsed Avalanche Energy（note 2）	E_{AS}	312.5	mJ
雪崩电流（注 1） Avalanche Current（note 1）	I_{AR}	25	A
二极管反向恢复最大电压变化速率（注 3） Peak Diode Recovery dv/dt（note 3）	dv/dt	5.0	V/ns
耗散功率 Power Dissipation	P_D （TC=25℃）	192.3	W
	-Derate above 25℃	2.0	W/℃
最高结温及存储温度 Operating and Storage Temperature Range	T_J，T_{STG}	150，-55～+150	℃
引线最高焊接温度 Maximum Lead Temperature for Soldering Purposes	T_L	260	℃

*漏极电流由最高结温限制

*Drain current limited by maximum junction temperature

电特性 ELECTRICAL CHARACTERISTICS

项目 **Parameter**	符号 **Symbol**	测试条件 **Tests conditions**	最小 **Min**	典型 **Typ**	最大 **Max**	单位 **Units**
关态特性 **Off –Characteristics**						
漏－源击穿电压 Drain-Source Voltage	BV_{DSS}	I_D=250μA, V_{GS}=0V	60	-	-	V
击穿电压温度特性 Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	I_D=250μA, referenced to 25℃	-	0.06	-	V/℃
零栅压下漏极漏电流 Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=60V,V_{GS}=0V, T_C=25℃	-	-	1	μA
		V_{DS}=48V, T_C=125℃	-	-	100	μA
栅极体漏电流 Gate-body leakage current	I_{GSS}（F/R）	V_{DS}=0V, V_{GS} =±20V	-	-	±100	nA
通态特性 **On-Characteristics**						
阈值电压 Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = VGS , I_D=250μA	2.0	-	4.0	V
静态导通电阻 Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS} =10V , I_D=50A	-	2.2	2.6	mΩ
动态特性 **Dynamic Characteristics**						
栅电阻 Gate Resistance	Rg	f=1.0MHz,V_{DS} OPEN	-	1.7	-	Ω
输入电容 Input capacitance	Ciss	V_{DS}=30V, V_{GS} =0V, f=1.0MHz	-	4348	-	pF
输出电容 Output capacitance	Coss		-	1519	-	
反向传输电容 Reverse transfer capacitance	Crss		-	57.5	-	
开关特性 **Switching Characteristics**						
延迟时间 Turn-On delay time	td(on)	V_{DD}=30V, I_D=50A, R_G=3Ω V_{GS} =10V （note 4，5）	-	25	-	ns
上升时间 Turn-On rise time	tr		-	21	-	ns
延迟时间 Turn-Off delay time	td(off)		-	60	-	ns
下降时间 Turn-Off Fall time	tf		-	15	-	ns
栅极电荷总量 Total Gate Charge	Qg	V_{DS} =30V , I_D=50A , V_{GS} =10V （note 4，5）	-	68.4	-	nC
栅－源电荷 Gate-Source charge	Qgs		-	22.4	-	nC
栅－漏电荷 Gate-Drain charge	Qgd		-	10.5	-	nC
漏－源二极管特性及最大额定值 **Drain-Source Diode Characteristics and Maximum Ratings**						
正向最大连续电流 Maximum Continuous Drain -Source Diode Forward Current	I_S		-	-	120	A
正向最大脉冲电流 Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}		-	-	480	A
正向压降 Drain-Source Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=50A	-	-	1.2	V
反向恢复时间 Reverse recovery time	trr	V_{GS}=0V, I_S=50A ,dI_F/dt=100A/μs (note 4)	-	70	-	ns
反向恢复电荷 Reverse recovery charge	Qrr		-	115	-	nC

热特性 THERMAL CHARACTERISTIC

项目 Parameter	符号 Symbol	FHP230N6F3A	单位 Unit
结到管壳的热阻 Thermal Resistance, Junction to Case	Rth(j-c)	0.65	℃/W
结到环境的热阻 Thermal Resistance, Junction to Ambient	Rth(j-A)	62.5	℃/W

注释：
1：脉冲宽度由最高结温限制
2：L=1mH, I_{AS}=25A, V_{DD}=50V, R_G=25 Ω,起始结温 T_J=25℃
3：I_{SD} ≤120A,di/dt ≤300A/μs,V_{DD}≤BV_{DSS},起始结温 T_J=25℃
4：脉冲测试：脉冲宽度 ≤300μs,占空比≤2%
5：基本与工作温度无关

Notes:
1：Pulse width limited by maximum junction temperature
2：L=1mH, I_{AS}=25A, V_{DD}=50V, R_G=25 Ω,Starting T_J=25℃
3：I_{SD} ≤120A,di/dt ≤300A/μs,V_{DD}≤BV_{DSS}, Starting T_J=25℃
4：Pulse Test：Pulse Width ≤300μs,Duty Cycle≤2%
5：Essentially independent of operating temperature

Typical Performance Characteristics

Figure 1. Safe Operating Area

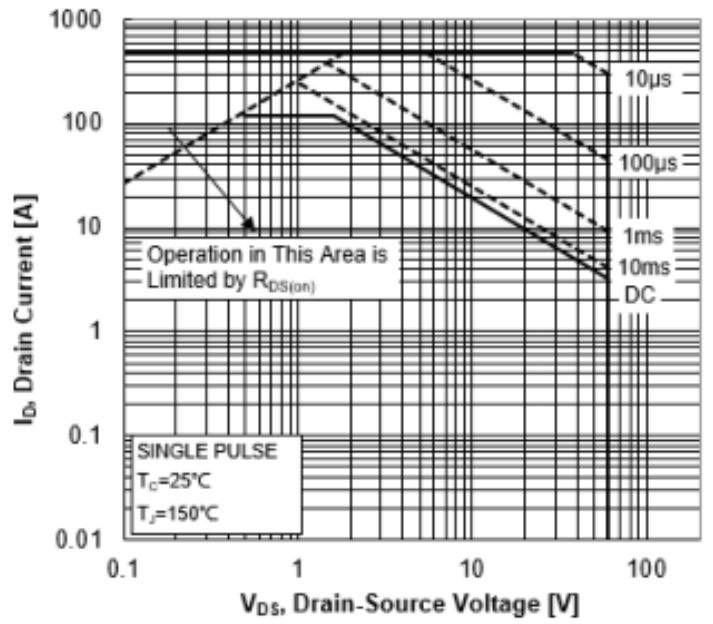


Figure 2. Maximum Power Dissipation vs Case Temperature

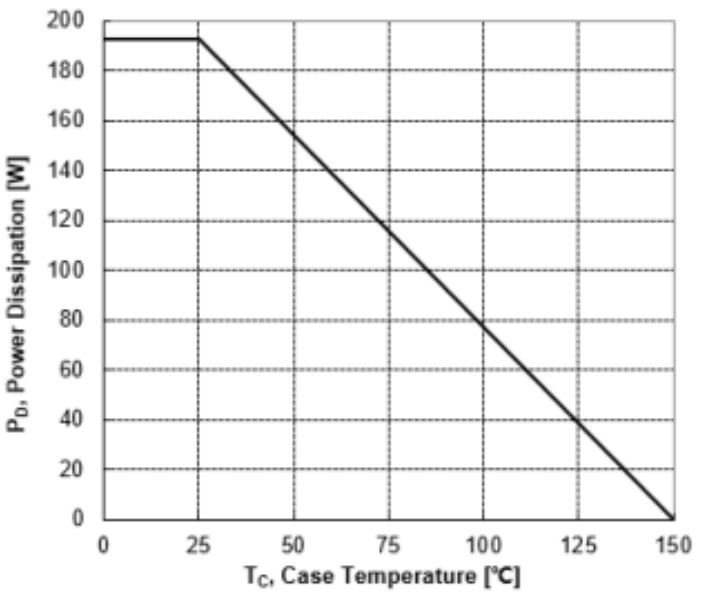


Figure 3. Maximum Continuous Drain Current vs Case Temperature

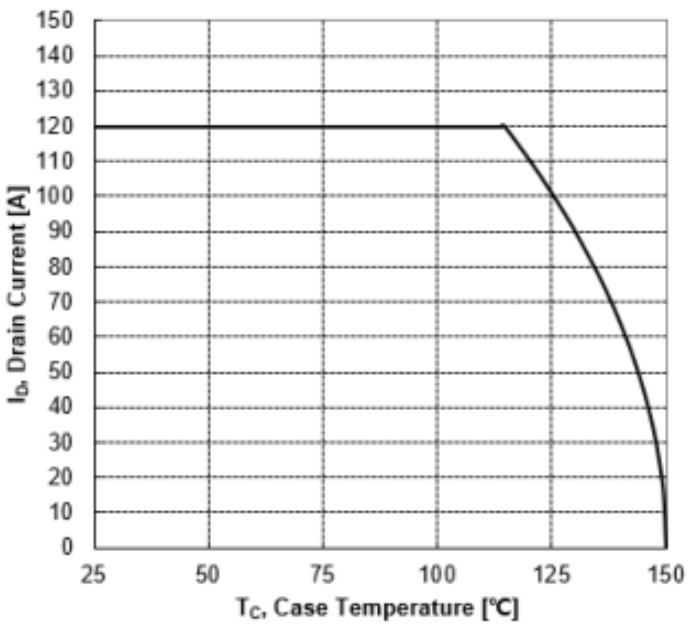


Figure 4. Typical Output Characteristics

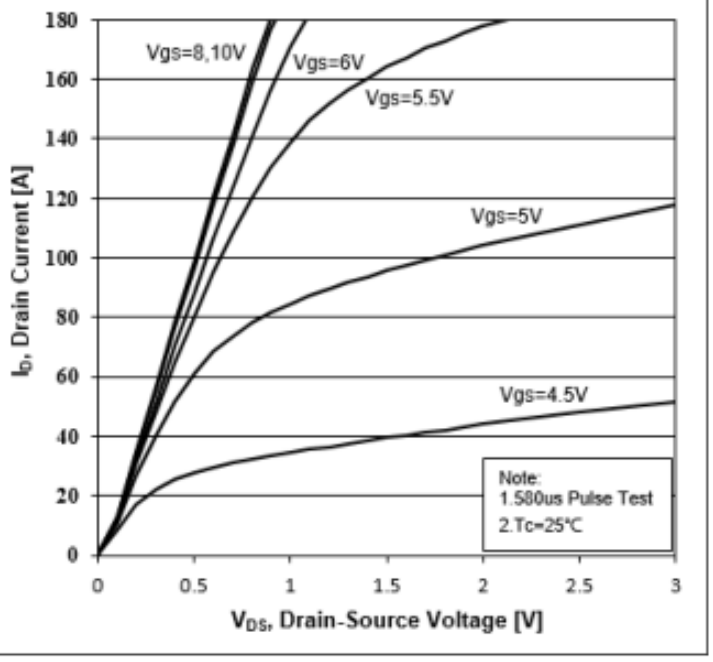


Figure 5. Transient Thermal Impedance

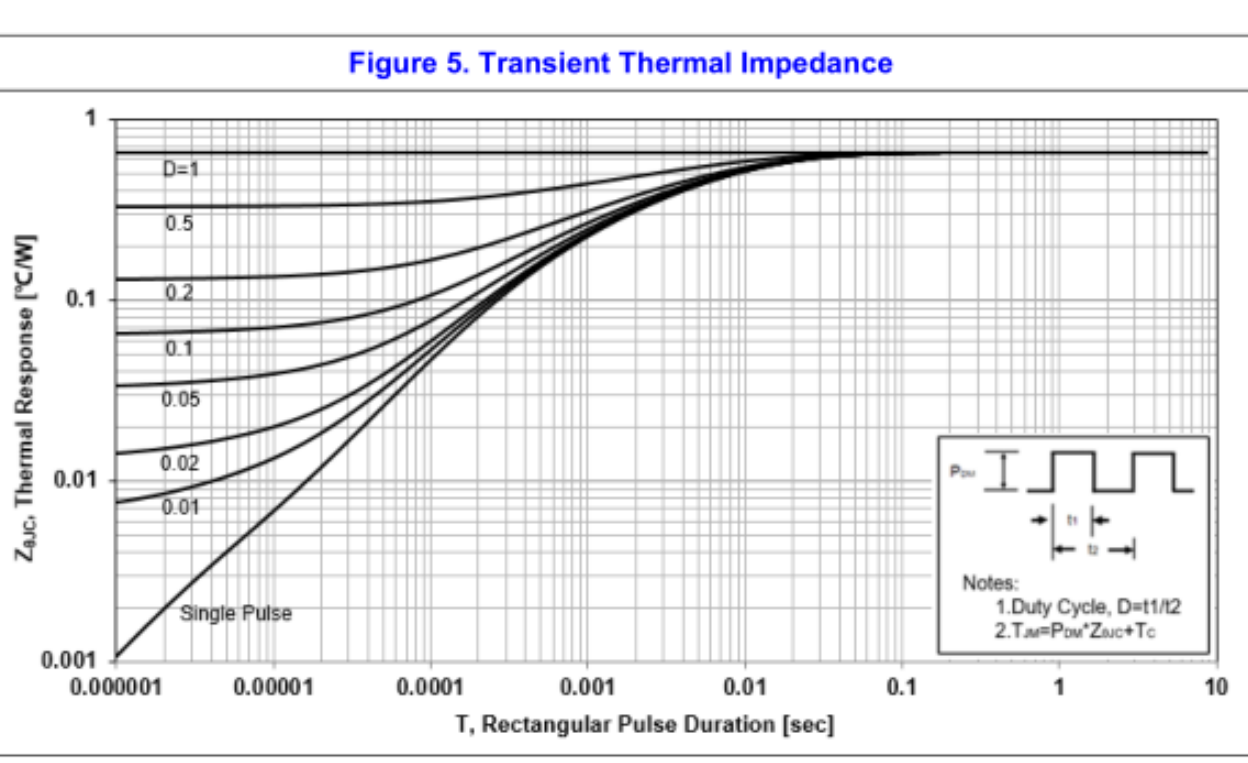


Figure 6. Typical Transfer Characteristics

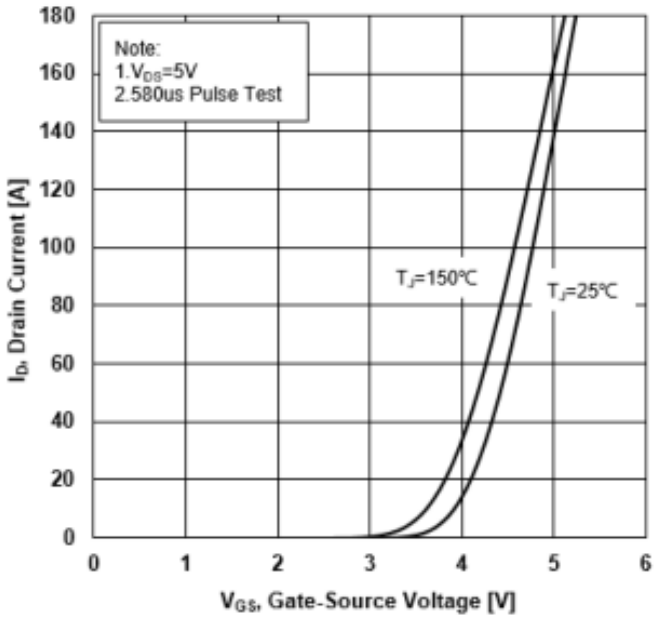


Figure 7. Source-Drain Diode Forward Characteristics

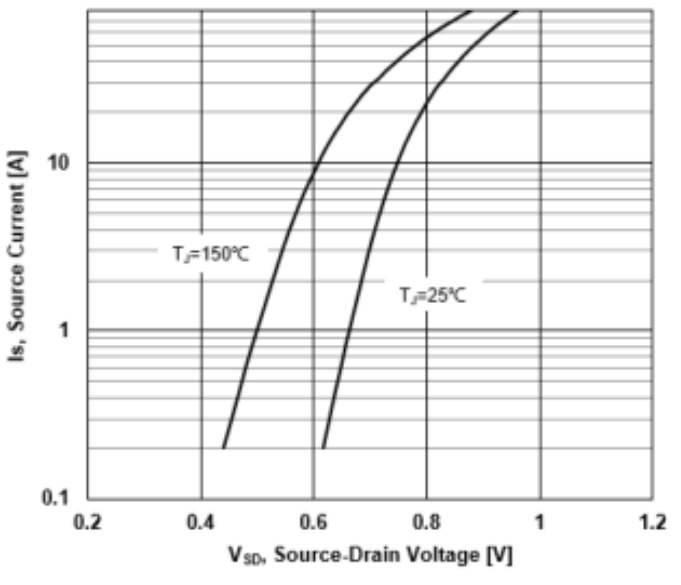


Figure 8. Drain-Source On-Resistance vs Drain Current

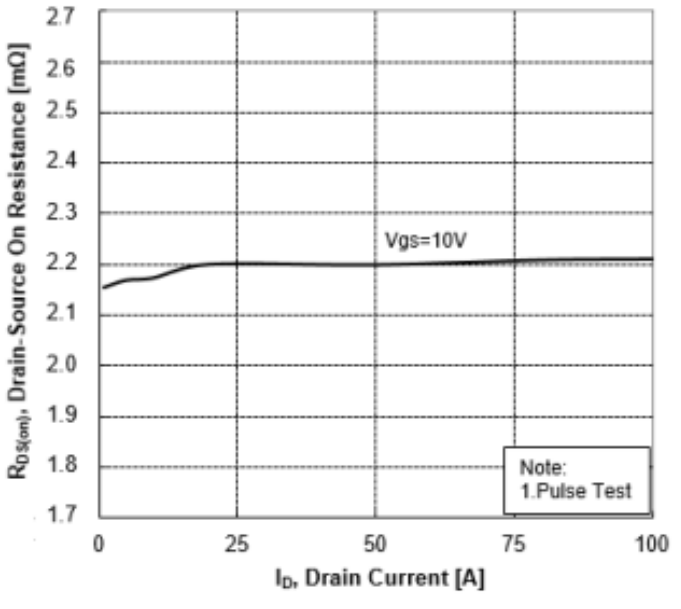


Figure 9. Normalized On-Resistance vs Junction Temperature

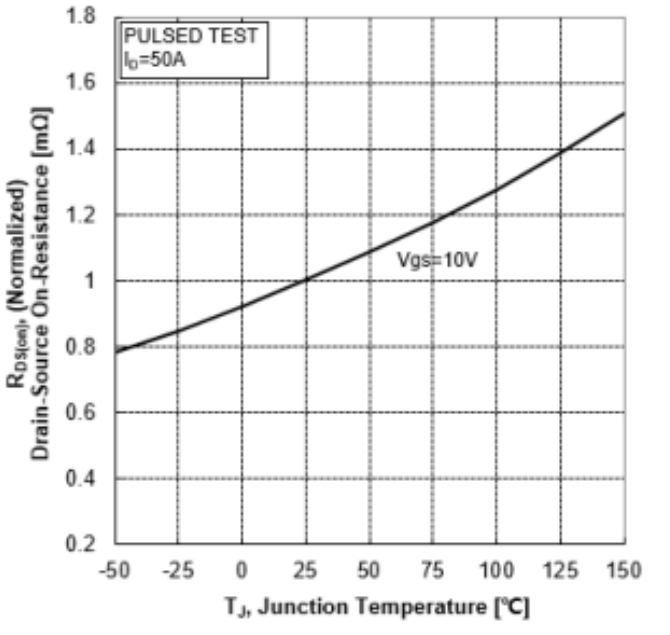


Figure 10. Normalized Threshold Voltage vs Junction Temperature

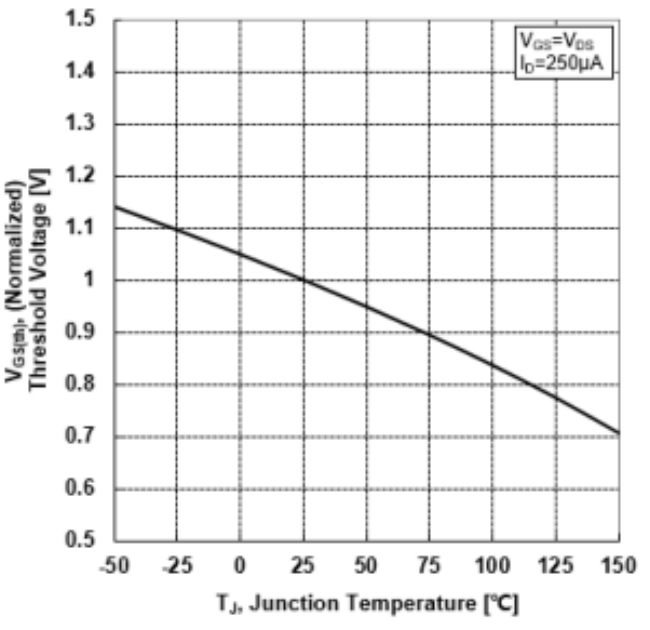


Figure 11. Normalized Breakdown Voltage vs Junction Temperature

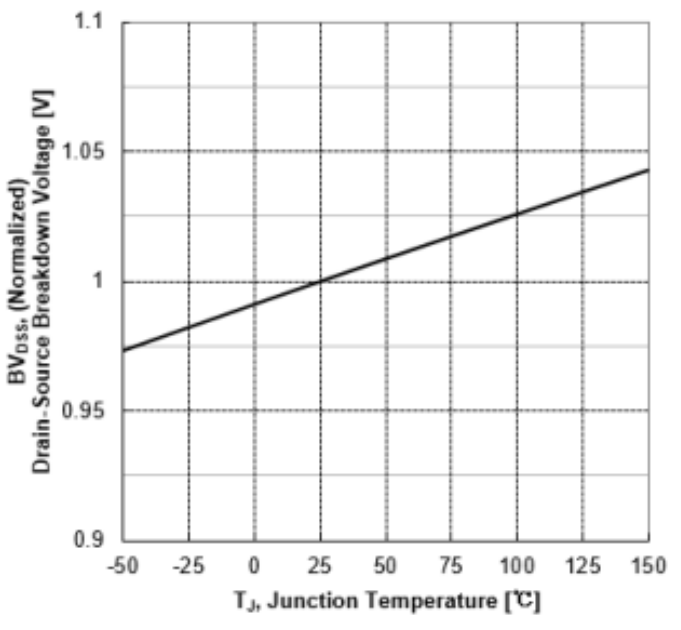


Figure 12. Capacitance Characteristics

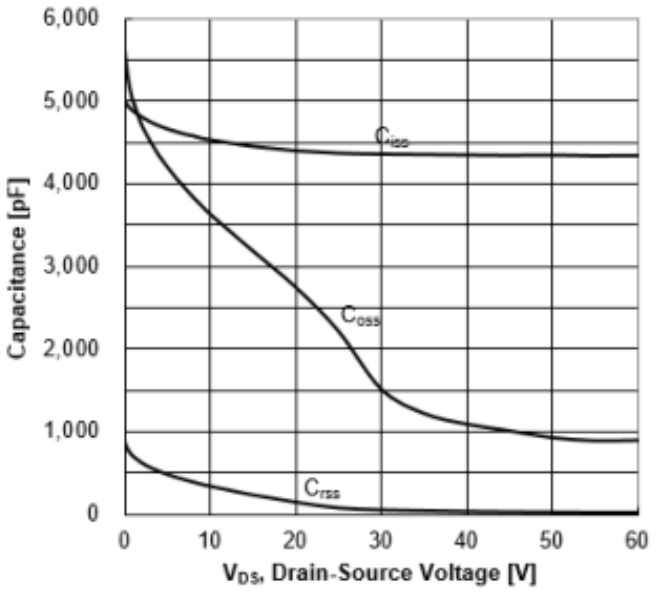
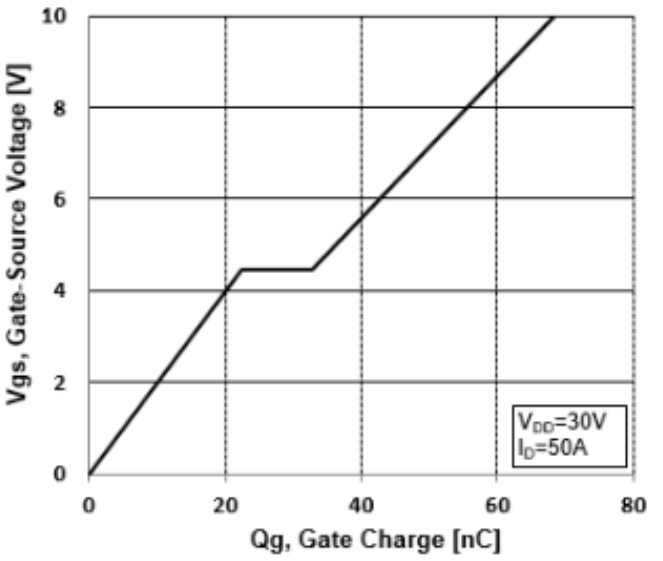
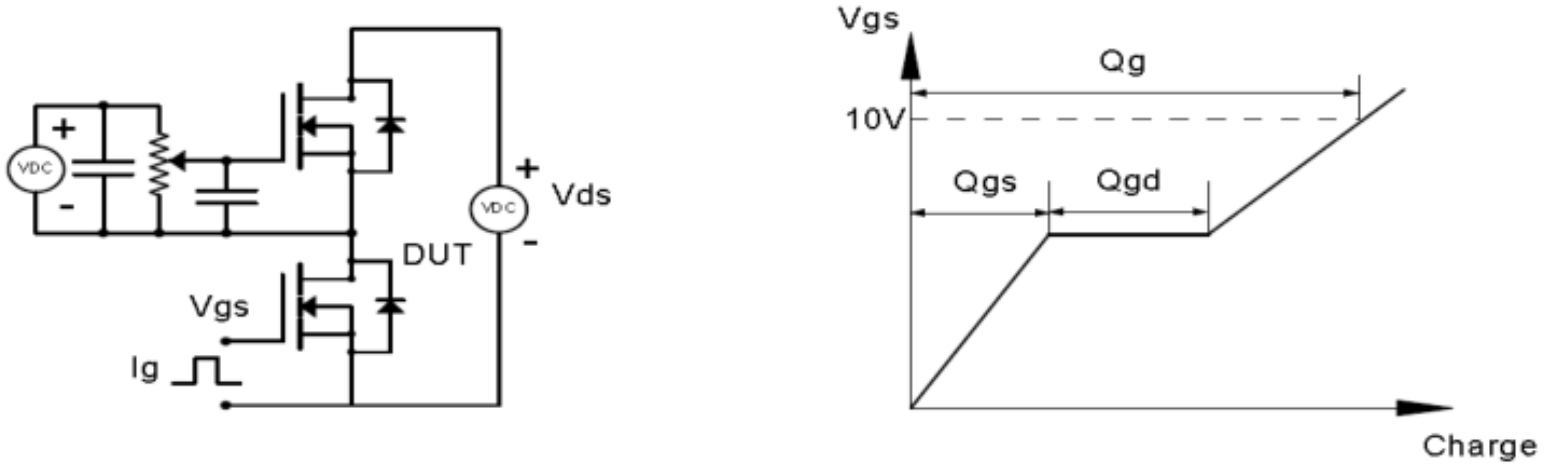


Figure 13. Typical Gate Charge vs Gate-Source Voltage

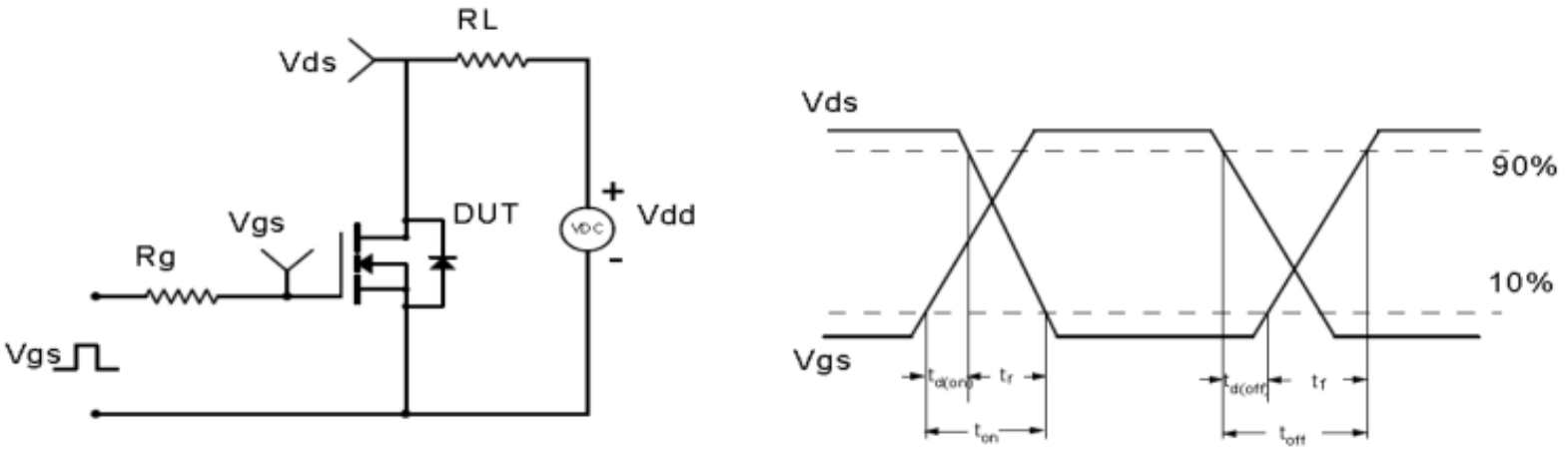


Test Circuit & Waveform

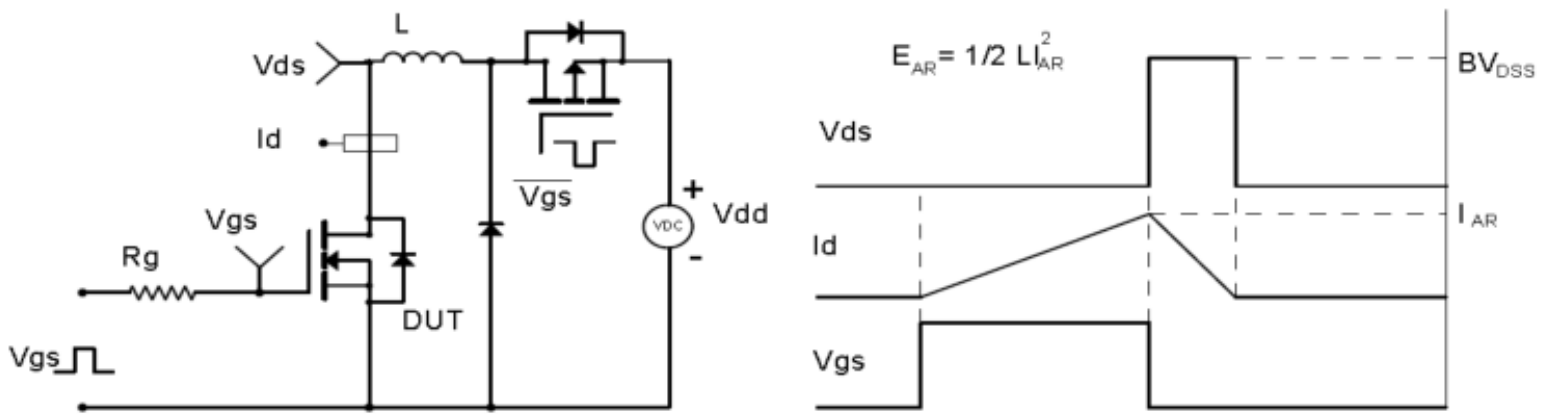
Gate Charge Test Circuit & Waveform



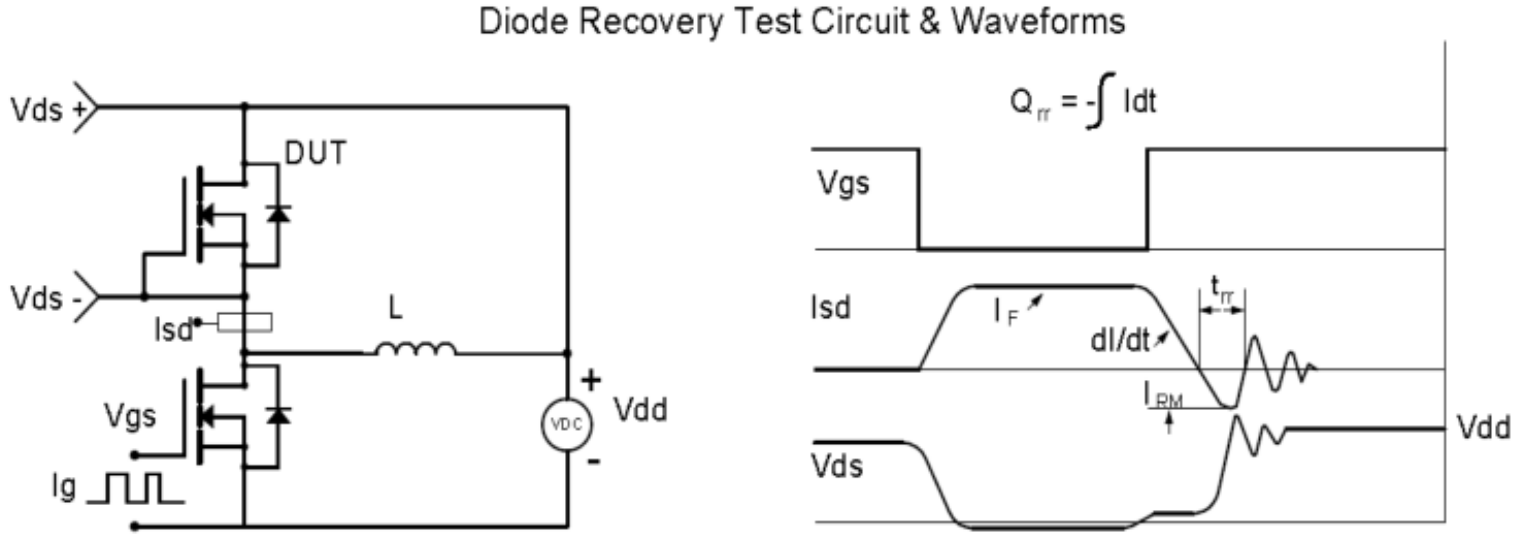
Resistive Switching Test Circuit & Waveforms



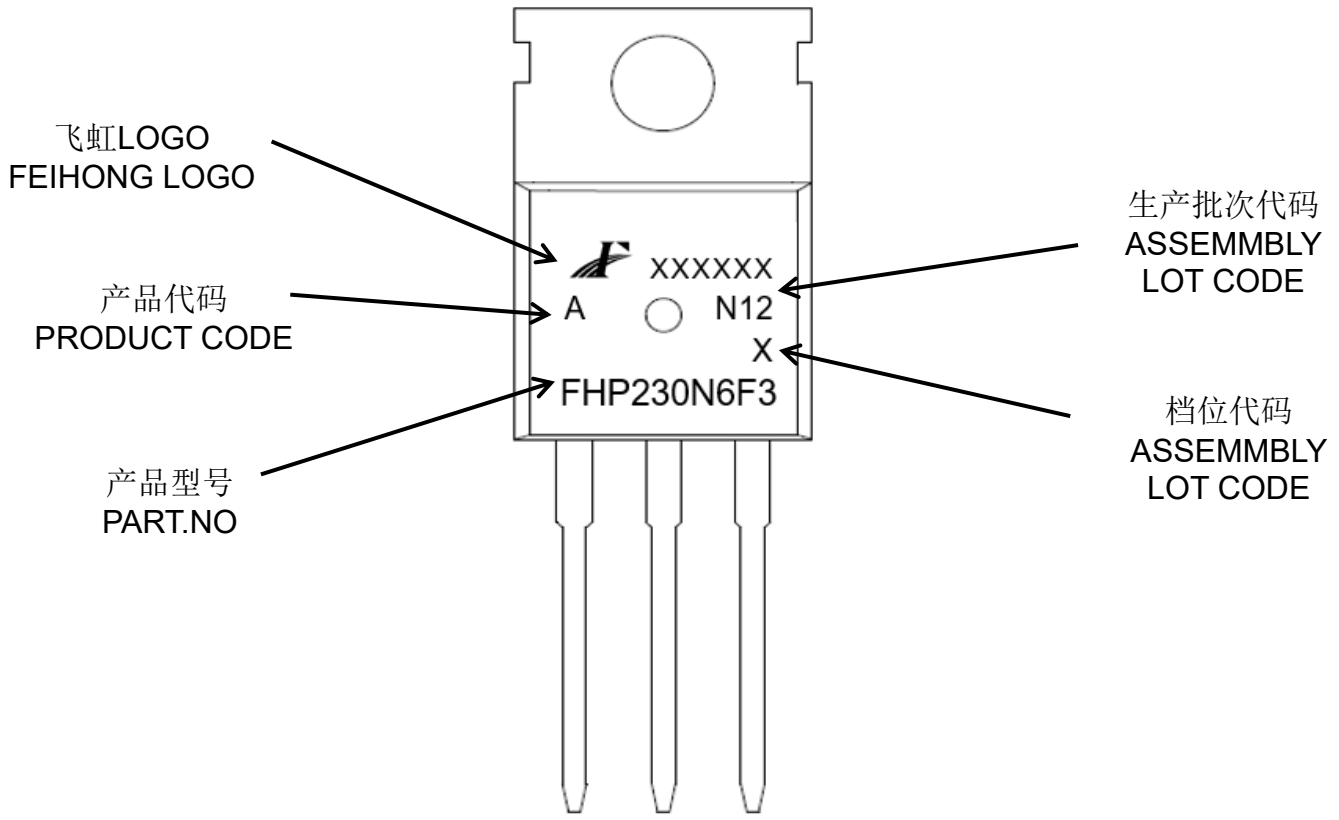
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



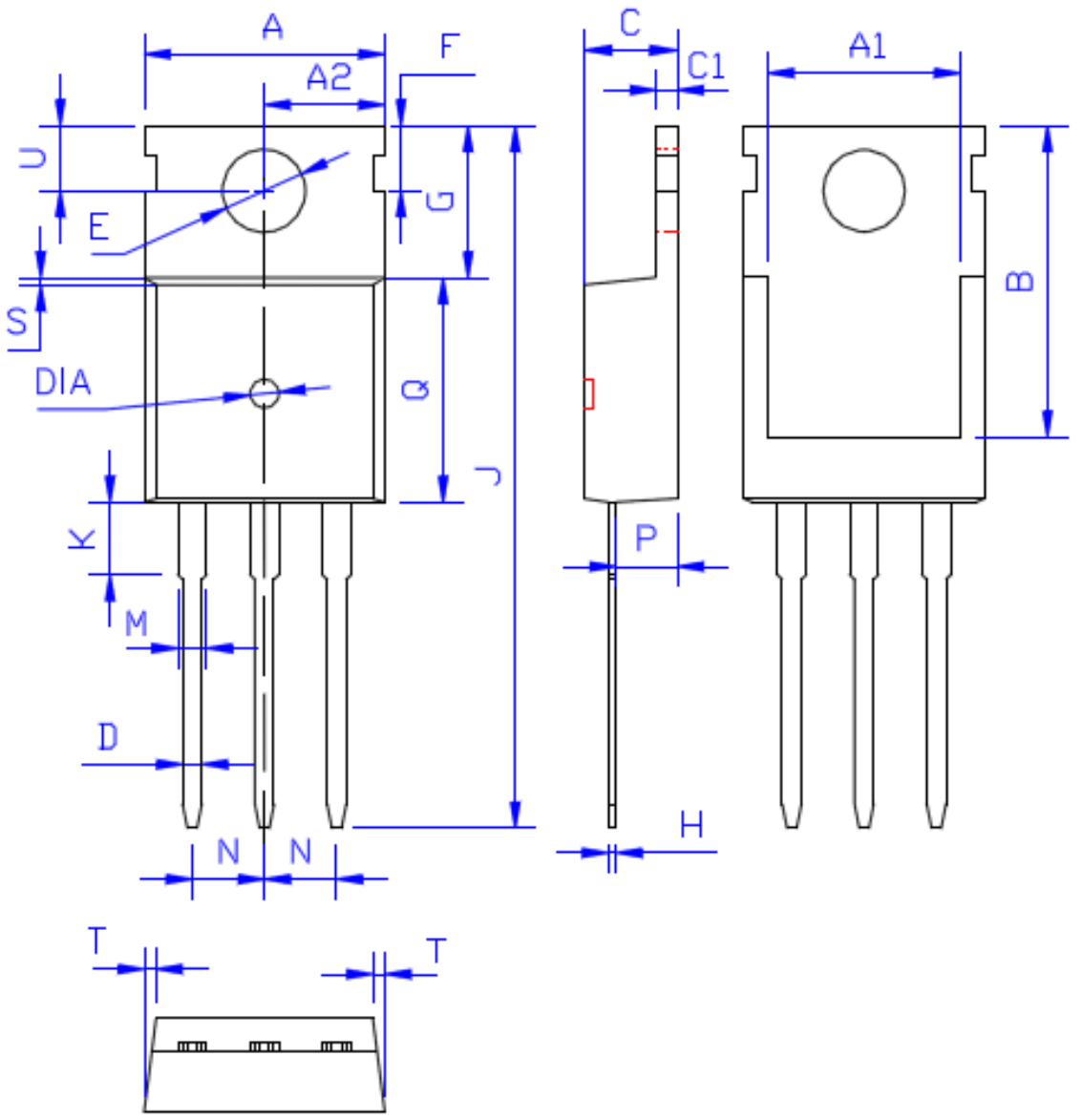
印记 Marking:


飞虹LOGO
FEIHONG LOGO
产品代码
PRODUCT CODE
产品型号
PART.NO
XXXXXX
A
N12
X
FHP230N6F3
生产批次代码
ASSEMMBLY
LOT CODE
档位代码
ASSEMMBLY
LOT CODE

外形尺寸：

Package Dimension：

TO-220



DIM	MILLIMETERS
A	10.00±0.30
A1	8.00±0.30
A2	5.00±0.30
B	13.20±0.40
C	4.50±0.20
C1	1.30±0.20
D	0.80±0.20
E	3.60±0.20
F	3.00±0.30
G	6.60±0.40
H	0.50±0.20
J	28.88±0.50
K	3.00±0.30
M	1.30±0.30
N	Typical 2.54
P	2.40±0.40
Q	9.20±0.40
S	0.25±0.15
T	0.25±0.15
U	2.80±0.30
DIA	宽 1.50±0.10 深 0.50 MAX

（Unit：mm）