N 沟道增强型场效应晶体管

N-CHANNEL MOSFET

FHP1404A

主要参数 MAIN CHARACTERISTICS

ID	180 A
VDSS	40 V
Rdson-typ（ @Vgs=10V）	2.5mΩ
Qg-typ	155nC

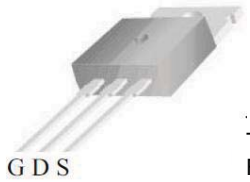
产品特性 FEATURES

低栅极电荷	Low gate charge
低 Crss (典型值 980pF)	Low Crss (typical 980pF)
开关速度快	Fast switching
100%经过雪崩测试	100% avalanche tested
高抗 dv/dt 能力	Improved dv/dt capability
RoHS 产品	RoHS product

用途 APPLICATIONS

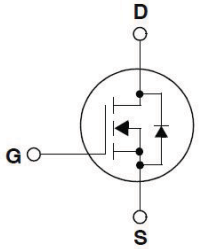
逆变电源	Power management for inverter systems
DC-DC转换器和功率开关	DC-DC converter and switch mode power supplies

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** FHP1404A	单位 **Unit**
最高漏极－源极直流电压 Drain-Source Voltage	V_{DS}	40	V
连续漏极电流* Drain Current -continuous *	I_D（T_C=25℃）	180	A
	I_D（T_C=100℃）	126	A
最大脉冲漏极电流（注 1） Drain Current – pulse（note 1）	I_{DM}	720	A
最高栅源电压 Gate-Source Voltage	V_{GS}	±25	V
单脉冲雪崩能量（注 2） Single Pulsed Avalanche Energy（note 2）	E_{AS}	1450	mJ
雪崩电流（注 1） Avalanche Current（note 1）	I_{AR}	27	A
重复雪崩能量（注 1） Repetitive Avalanche Current（note 1）	E_{AR}	12	mJ
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℃）	176	W
	-Derate above 25℃	1.17	W/℃
最高结温及存储温度 Operating and Storage Temperature Range	T_J，T_{STG}	-55～+175	℃
引线最高焊接温度 Maximum Lead Temperature for Soldering Purposes	T_L	300	℃

*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	40	-	-	V
击穿电压温度特性 Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta TJ$	I_D=250μA, referenced to 25℃	-	0.04	-	V/℃
零栅压下漏极漏电流 Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=40V,V_{GS}=0V, T_C=25℃	-	-	1	μA
		V_{DS}=32V, T_C=125℃	-	-	10	μA
栅极体漏电流 Gate-body leakage current	I_{GSS}（F/R）	V_{DS}=0V, V_{GS} =±25V	-	-	±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	3.0	4.0	V
静态导通电阻 Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS} =10V , I_D=40A	-	2.5	3.7	mΩ
正向跨导 Forward Transconductance	gfs	V_{DS} = 20V, I_D=40A（note 4）	-	90	-	S
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}=25V, V_{GS} =0V, f=1.0MHz	-	6200	-	pF
输出电容 Output capacitance	Coss		-	1400	-	
反向传输电容 Reverse transfer capacitance	Crss		-	980	-	
开关特性 **Switching Characteristics**						
延迟时间 Turn-On delay time	td(on)	V_{DS}=20V, I_D=30A, R_G=6Ω V_{GS} =10V （note 4，5）	-	90	-	ns
上升时间 Turn-On rise time	tr		-	130	-	ns
延迟时间 Turn-Off delay time	td(off)		-	180	-	ns
下降时间 Turn-Off Fall time	tf		-	110	-	ns
栅极电荷总量 Total Gate Charge	Qg	V_{DS} =32V , I_D=30A , V_{GS} =10V （note 4，5）	-	155	-	nC
栅－源电荷 Gate-Source charge	Qgs		-	25	-	nC
栅－漏电荷 Gate-Drain charge	Qgd		-	65	-	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		-	-	180	A
正向最大脉冲电流 Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}		-	-	720	A
正向压降 Drain-Source Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=30A	-	0.82	1.3	V
反向恢复时间 Reverse recovery time	trr	V_{GS}=0V, I_S=30A ,dI_F/dt=100A/μs (note 4)	-	70	-	ns
反向恢复电荷 Reverse recovery charge	Qrr		-	35	-	nC

热特性 THERMAL CHARACTERISTIC

项目 Parameter	符号 Symbol	最大值 Max	单位 Unit
结到管壳的热阻 Thermal Resistance, Junction to Case	Rth(j-c)	0.85	℃/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}=27A, V_{DD}=25V, R_G=25 Ω,起始结温 T_J=25℃
3：I_{SD} ≤180A,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}=27A, V_{DD}=25V, R_G=25 Ω,Starting T_J=25℃
3：I_{SD} ≤180A,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 temperatur

Typical Characteristics

典型特性曲线

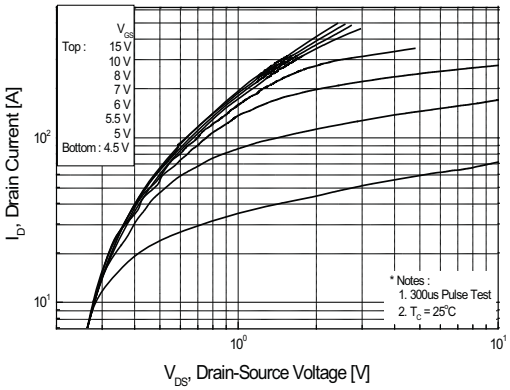


Figure 1. On Region Characteristics

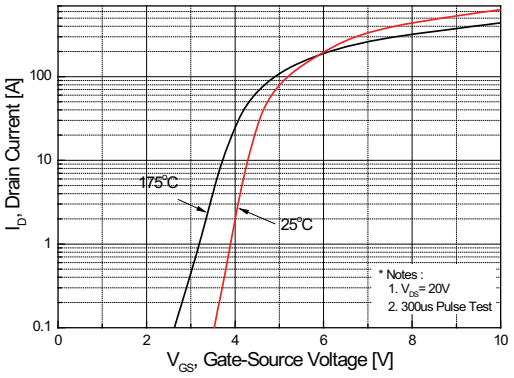


Figure 2. Transfer Characteristics

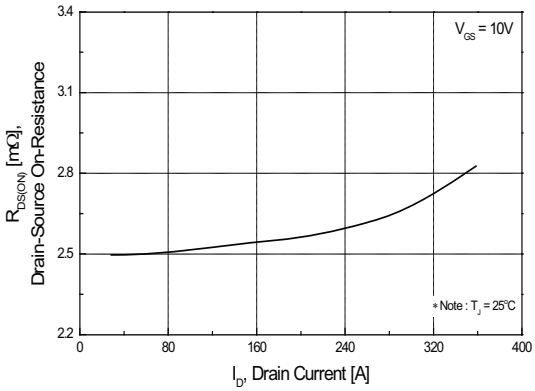


Figure 3. On Resistance Variation vs Drain Current and Gate Voltage

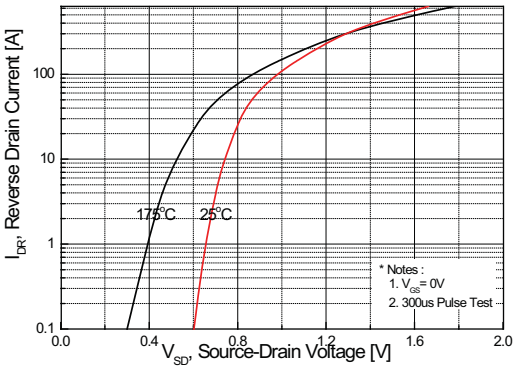


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

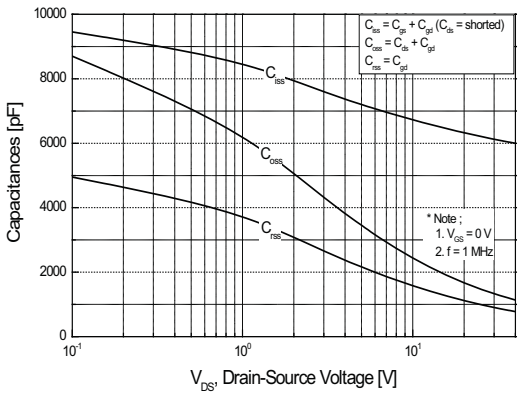


Figure 5. Capacitance Characteristics

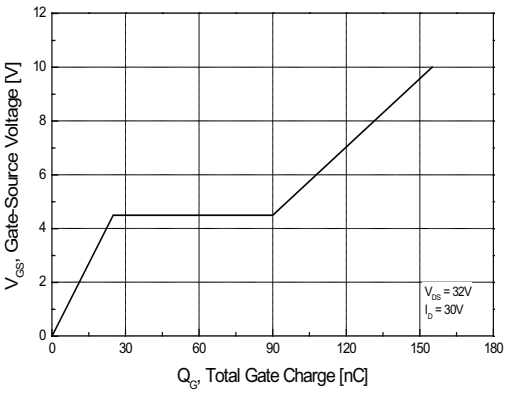


Figure 6. Gate Charge Characteristics

Typical Characteristics (continued)

典型特性曲线（续）

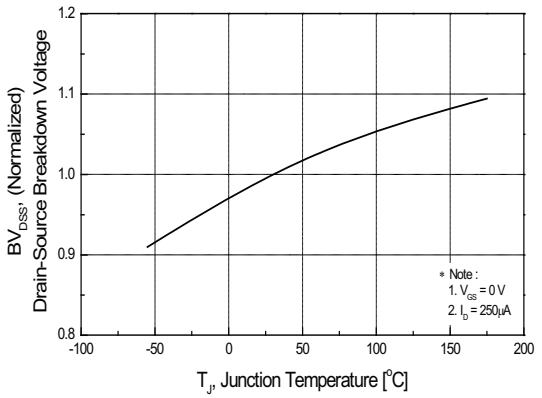


Figure 7. Breakdown Voltage Variation vs Temperature

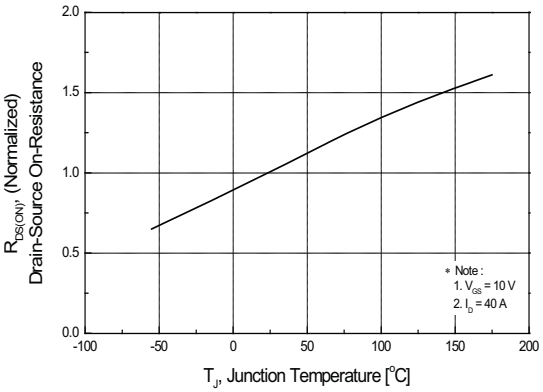


Figure 8. On-Resistance Variation vs Temperature

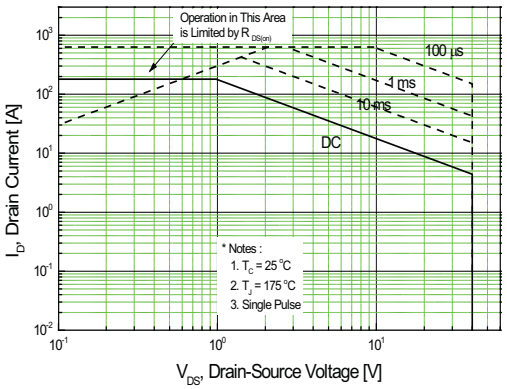


Figure 9. Maximum Safe Operating Area

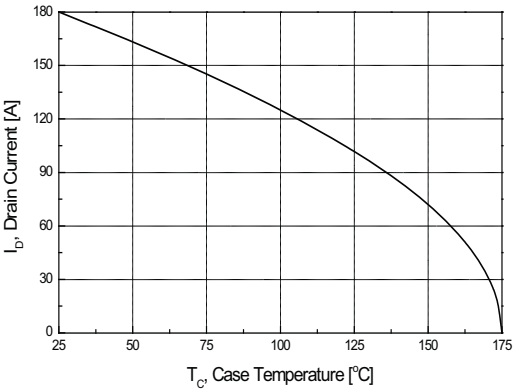


Figure 10. Maximum Drain Current vs Case Temperature

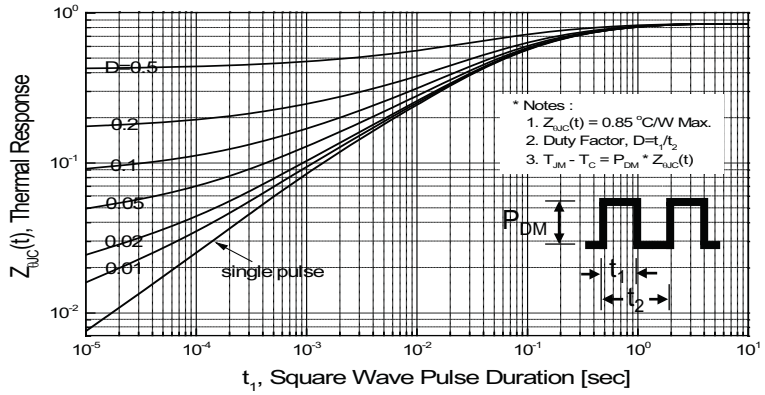


Figure 11. Transient Thermal Response Curve

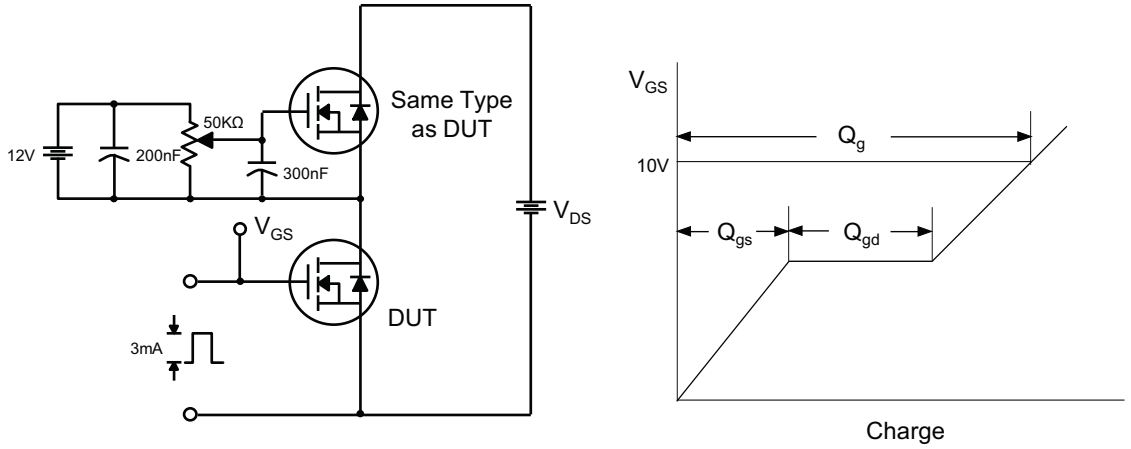


Fig 12. Gate Charge Test Circuit & Waveform

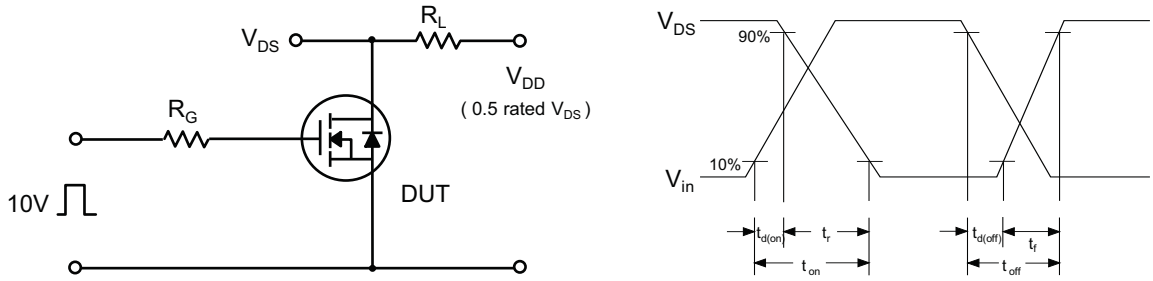


Fig 13. Resistive Switching Test Circuit & Waveforms

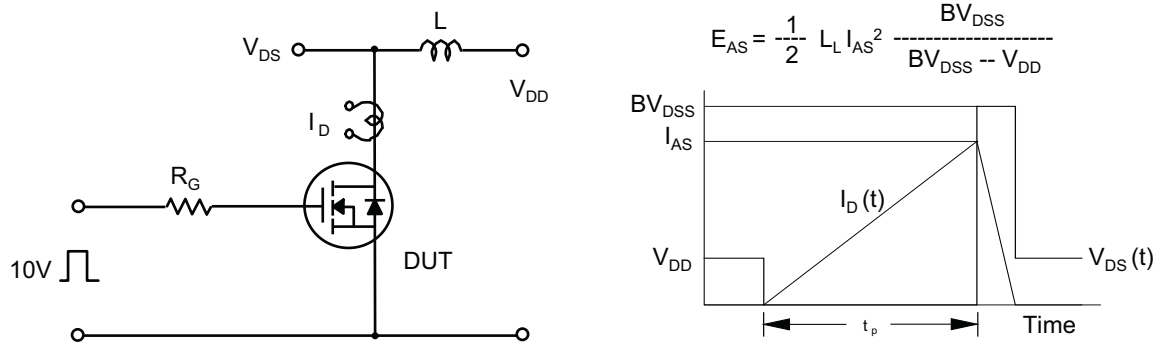


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

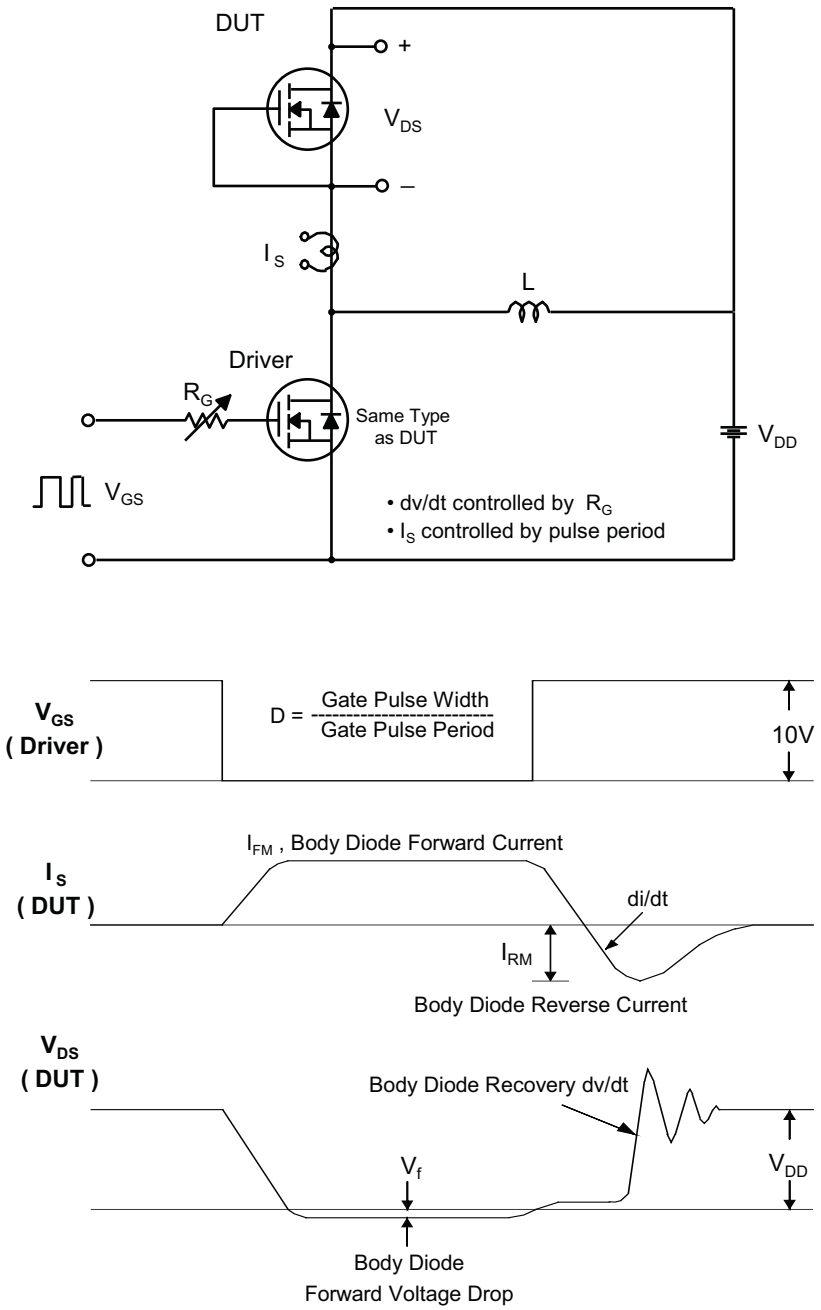
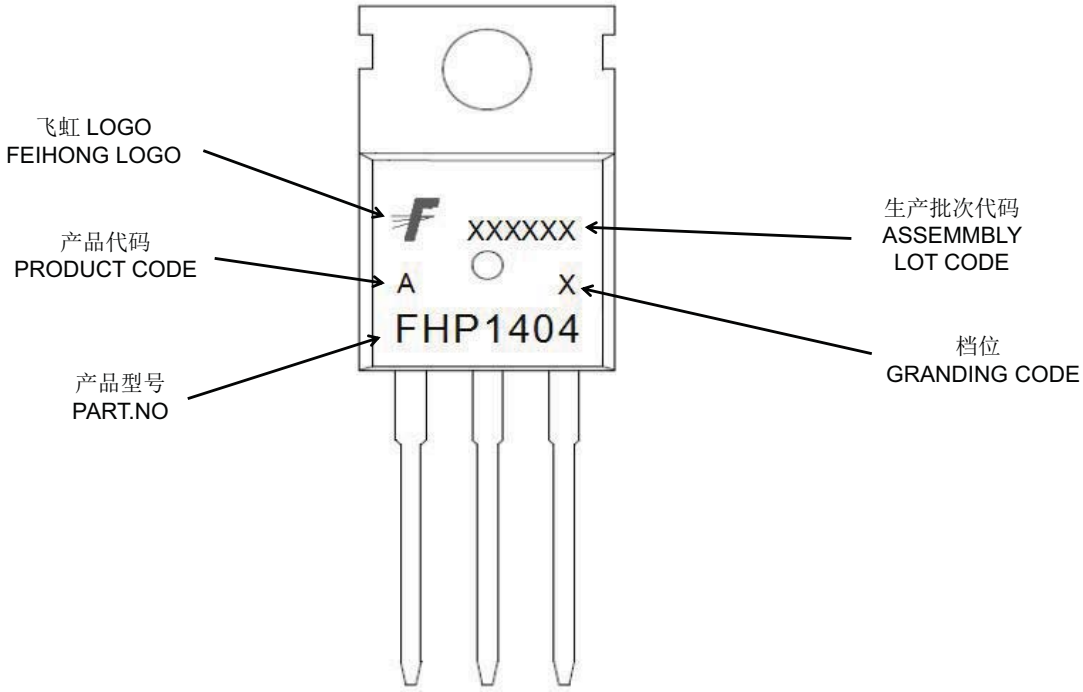


Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

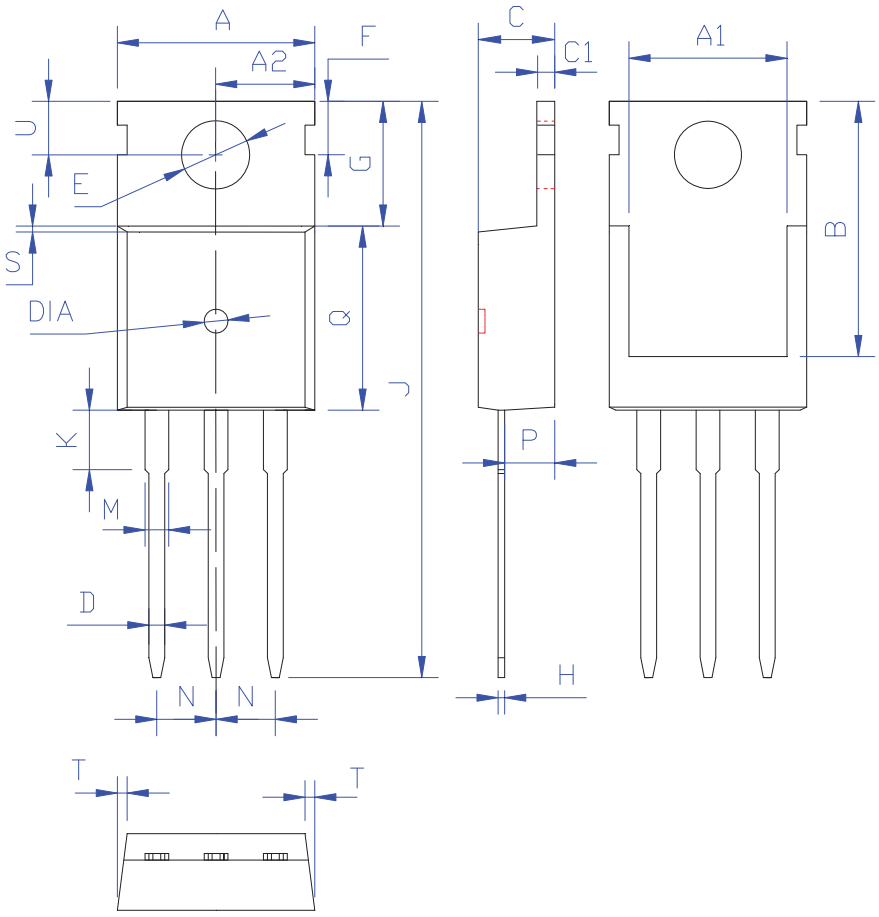
印记 Marking:


飞虹 LOGO
FEIHONG LOGO
产品代码
PRODUCT CODE
产品型号
PART.NO
XXXXXX
A
X
FHP1404
生产批次代码
ASSEMMBLY
LOT CODE
档位
GRANDING 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）

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