N 沟道增强型场效应晶体管
N-CHANNEL MOSFET
FHN60N1F10LA

主要参数 MAIN CHARACTERISTICS

ID	60A
VDSS	100 V
Rdson-typ（ @Vgs=10V）	10 mΩ
Rdson-typ（ @Vgs=4.5V）	12.5 mΩ
Qg-typ	33nC

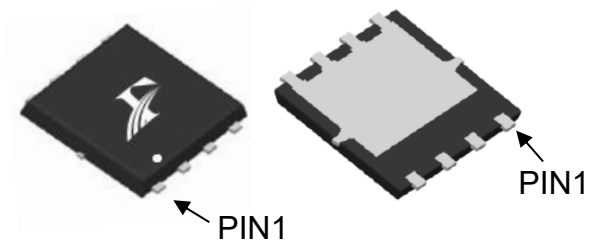
产品特性 FEATURES

低栅极电荷	Low gate charge
低 Crss (典型值 11pF)	Low Crss (typical11pF)
开关速度快	Fast switching
100%经过雪崩测试	100% avalanche tested
100%经过热阻测试	100% dvds tested
100%经过 UIS 测试	100% UIS Tested
100%经过 RG 测试	100% Rg tested
RoHS 产品	RoHS product
SGT 工艺	SGT process

用途 APPLICATIONS

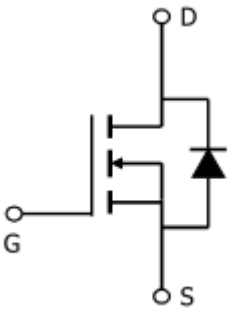
开关电源	Switching Power Supply
电机驱动	Motor Drive
同步整流	Synchronus Rectification

封装形式 Package



PDFN5X6-8
FHN 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**	单位 **Unit**
		FHN60N1F10LA	
最高漏极－源极直流电压 Drain-Source Voltage	V_{DS}	100	V
连续漏极电流* Drain Current -continuous *	I_D（T_C=25℃）	60	A
	I_D（T_C=100℃)	47	A
最大脉冲漏极电流（注 1） Drain Current – pulse（note 1）	I_{DM}	240	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}	56.25	mJ
雪崩电流（注 1） Avalanche Current（note 1）	I_{AR}	15	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℃）	56.5	W
	-Derate above 25℃	0.45	W/℃
最高结温及存储温度 Operating and Storage Temperature Range	T_J，T_{STG}	-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**						
漏一源击穿电压 Drain-Source Voltage	BV_{DSS}	I_D=250μA, V_{GS}=0V	100	-	-	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℃	-	0.01	-	V/℃
零栅压下漏极漏电流 Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=100V,V_{GS}=0V, T_C=25℃	-	-	1	μA
		V_{DS}=80V, 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	1.2	1.8	2.4	V
静态导通电阻 Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS} =10V , I_D=20A	-	10	12	mΩ
		V_{GS} =4.5V , I_D=20A	-	12.5	15.5	mΩ
正向跨导 Forward Transconductance	gfs	V_{DS} = 5V, I_D=20A（note 4）	-	60	-	S
动态特性 **Dynamic Characteristics**						
栅电阻 Gate Resistance	Rg	f=1.0MHz, V_{DS}=OPEN	-	1.8	-	Ω
输入电容 Input capacitance	Ciss	V_{DS}=50V, V_{GS} =0V, f=1.0MHz	-	2420	-	pF
输出电容 Output capacitance	Coss		-	170	-	
反向传输电容 Reverse transfer capacitance	Crss		-	11	-	
开关特性 **Switching Characteristics**						
延迟时间 Turn-On delay time	td(on)	V_{DD}=50V, I_D=20A, R_G=3Ω V_{GS} =10V （note 4，5）	-	8	-	ns
上升时间 Turn-On rise time	tr		-	3	-	ns
延迟时间 Turn-Off delay time	td(off)		-	25	-	ns
下降时间 Turn-Off Fall time	tf		-	4	-	ns
栅极电荷总量 Total Gate Charge	Qg	V_{DS} =50V , I_D=20A , V_{GS} =10V （note 4，5）	-	33	-	nC
栅一源电荷 Gate-Source charge	Qgs		-	7	-	nC
栅一漏电荷 Gate-Drain charge	Qgd		-	12	-	nC
漏一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		-	-	60	A
正向最大脉冲电流 Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}		-	-	240	A
正向压降 Drain-Source Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=20A	-	0.91	1.2	V
反向恢复时间 Reverse recovery time	trr	V_{GS}=0V, I_S=20A,dI_F/dt=500A/μs (note 4)	-	27	-	ns
反向恢复电荷 Reverse recovery charge	Qrr		-	128	-	nC

热特性 THERMAL CHARACTERISTIC

项目 Parameter	符号 Symbol	FHN60N1F10LA	单位 Unit
结到管壳的热阻 Thermal Resistance, Junction to Case	Rth(j-c)	2.12	℃/W
结到环境的热阻 Thermal Resistance, Junction to Ambient	Rth(j-A)	50	℃/W

注释:
1：脉冲宽度由最高结温限制
2：L=0.5mH, V_G=10V, V_{DD}=50V, R_G=25 Ω,起始结温 T_J=25℃
3：I_{SD} ≤60A,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=0.5mH, V_G=10V, V_{DD}=50V, R_G=25 Ω,Starting T_J=25℃
3：I_{SD} ≤60A,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 Operating Characteristics

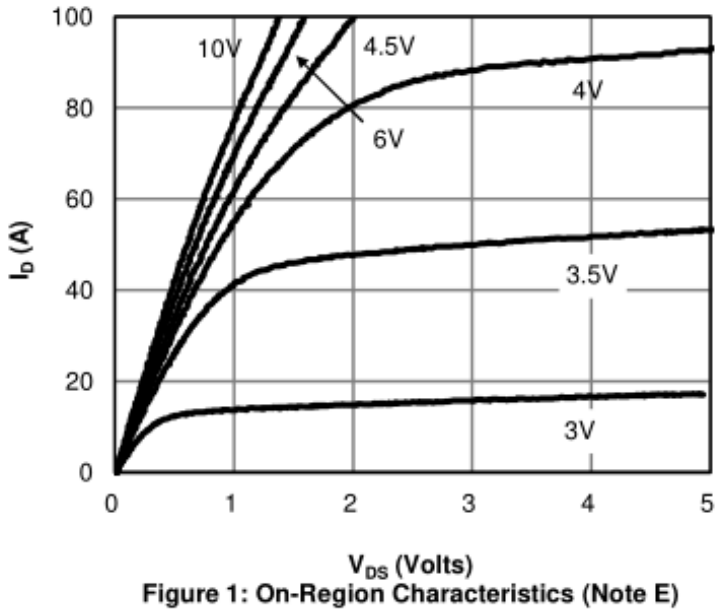


Figure 1: On-Region Characteristics (Note E)

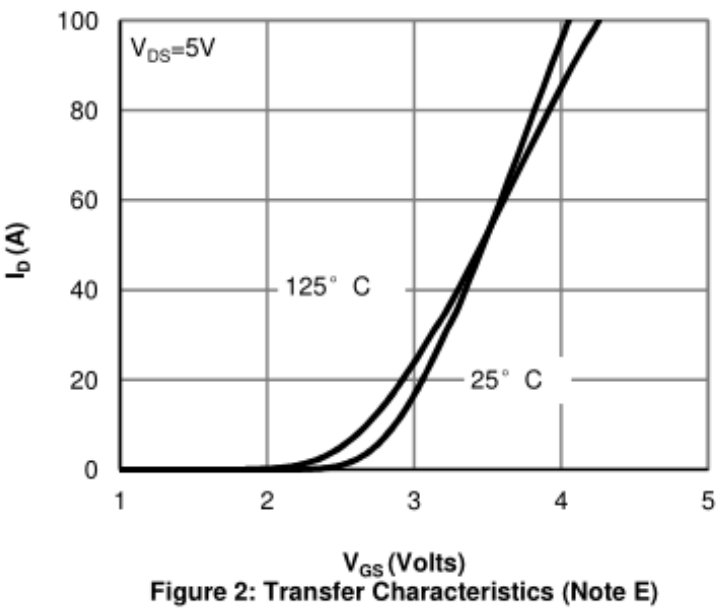


Figure 2: Transfer Characteristics (Note E)

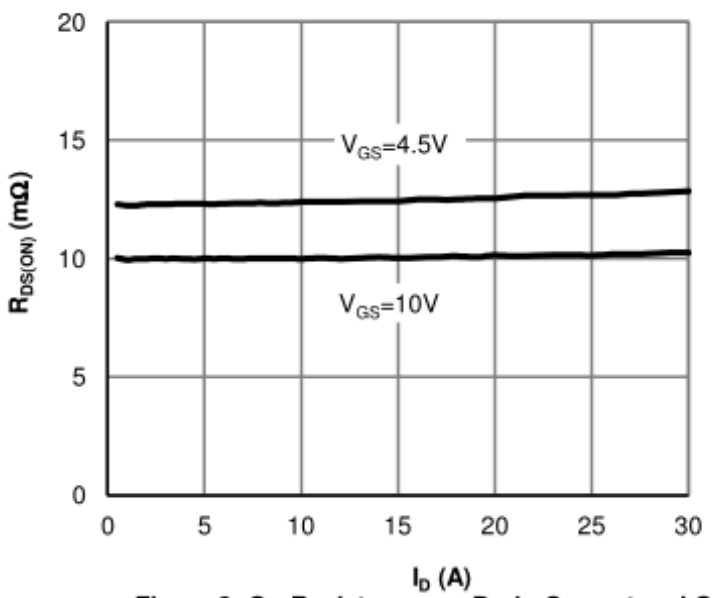


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

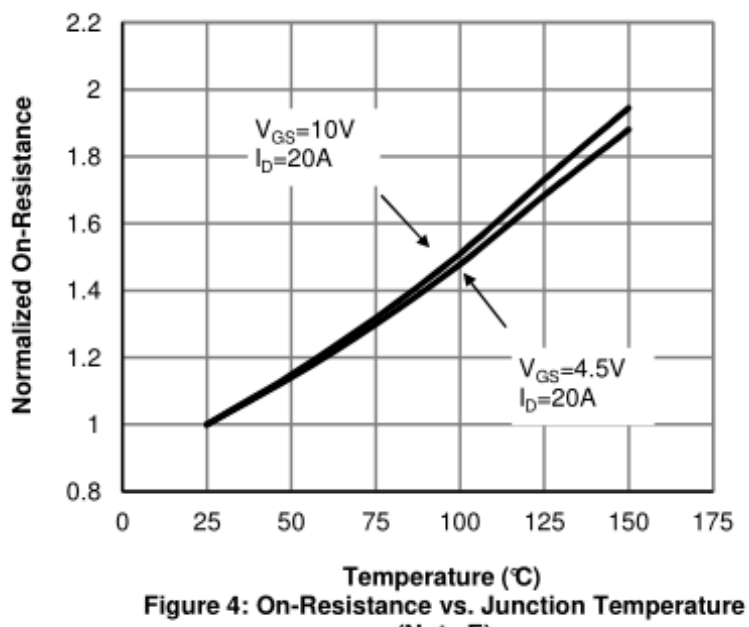


Figure 4: On-Resistance vs. Junction Temperature (Note E)

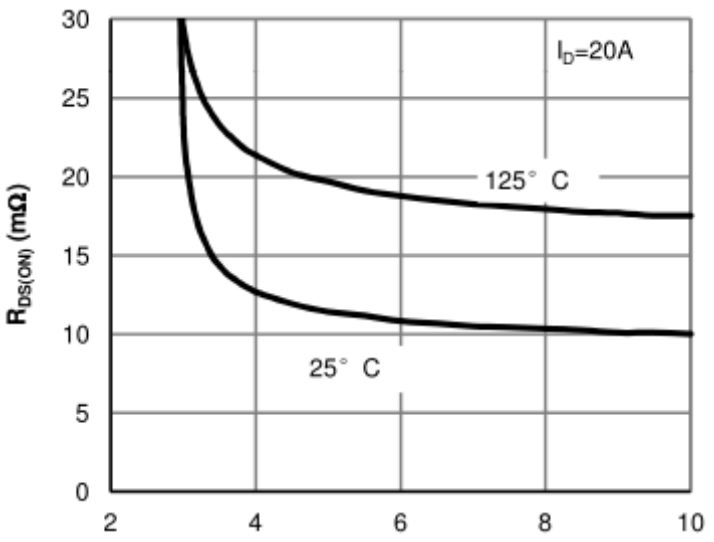


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

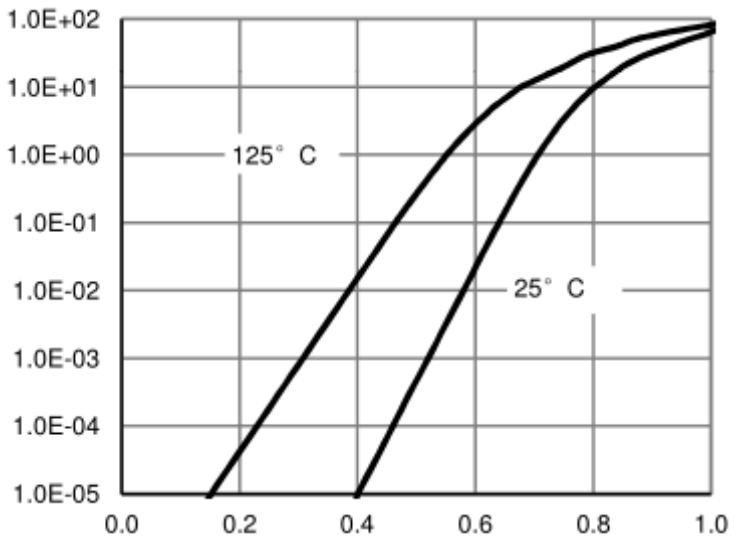


Figure 6: Body-Diode Characteristics (Note E)

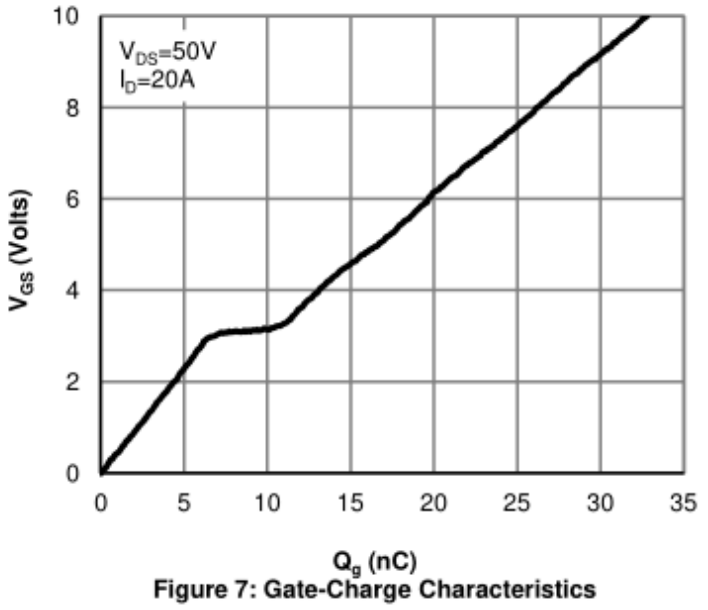


Figure 7: Gate-Charge Characteristics

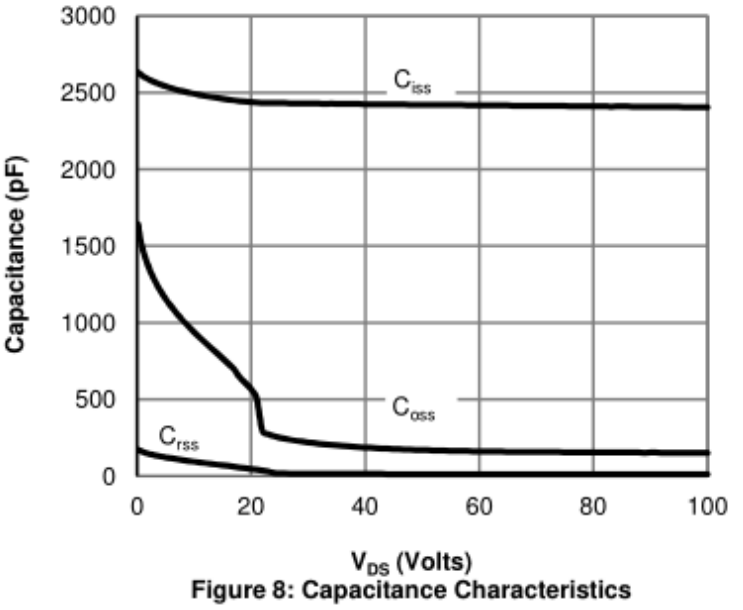
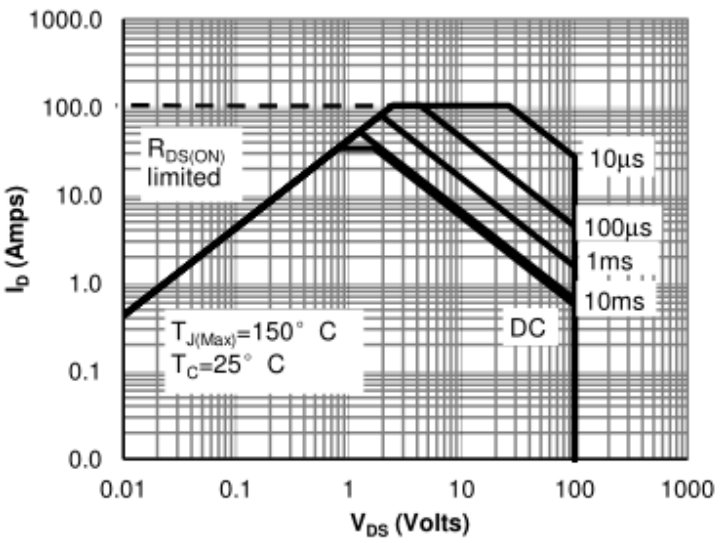


Figure 8: Capacitance Characteristics



V_{GS}> or equal to 4.5V

Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

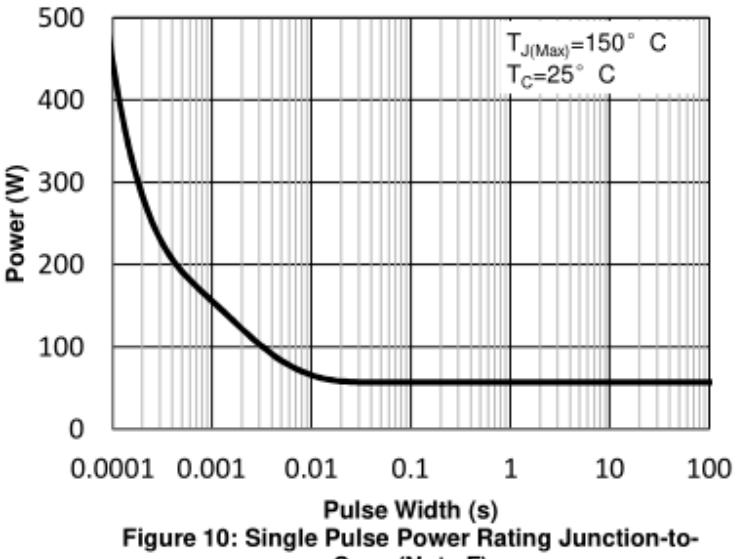


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

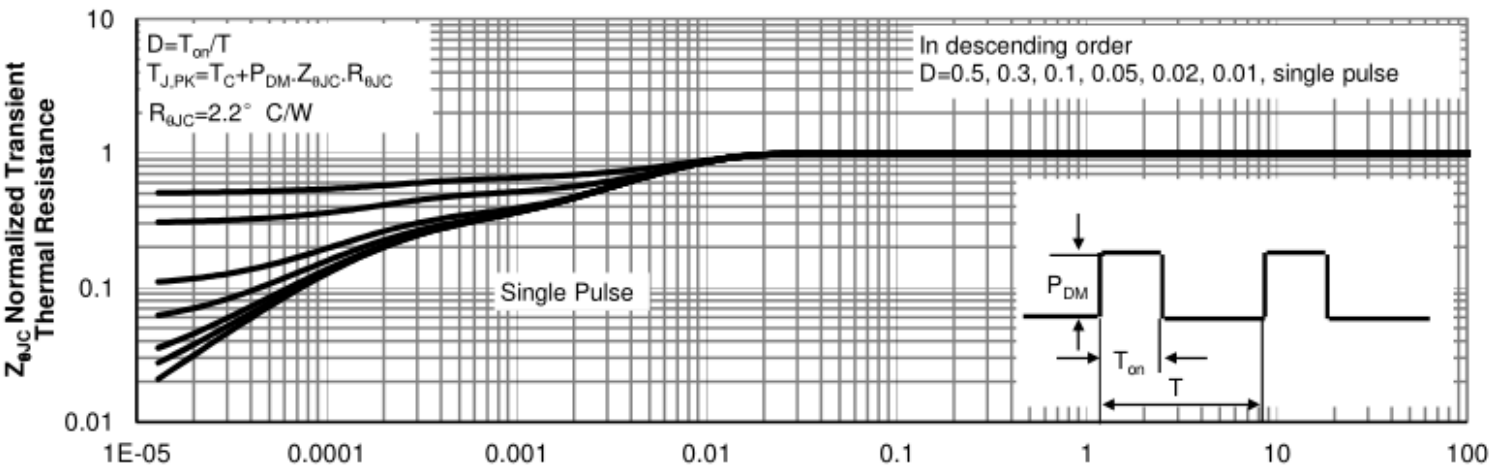


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

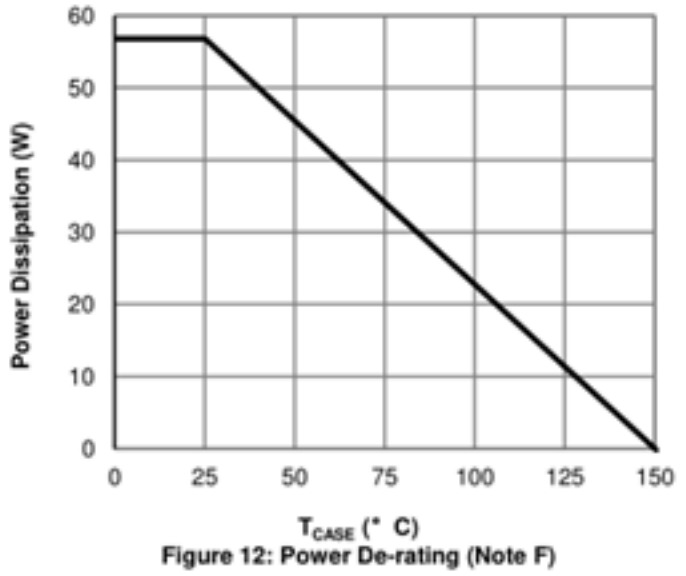


Figure 12: Power De-rating (Note F)

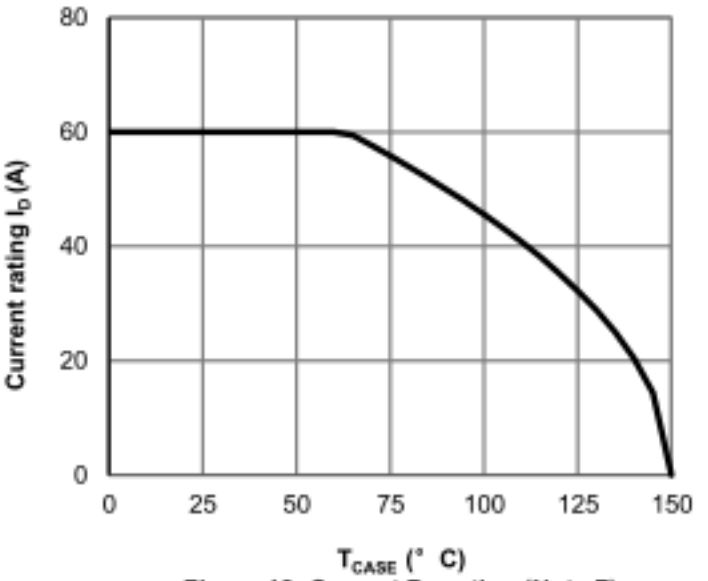


Figure 13: Current De-rating (Note F)

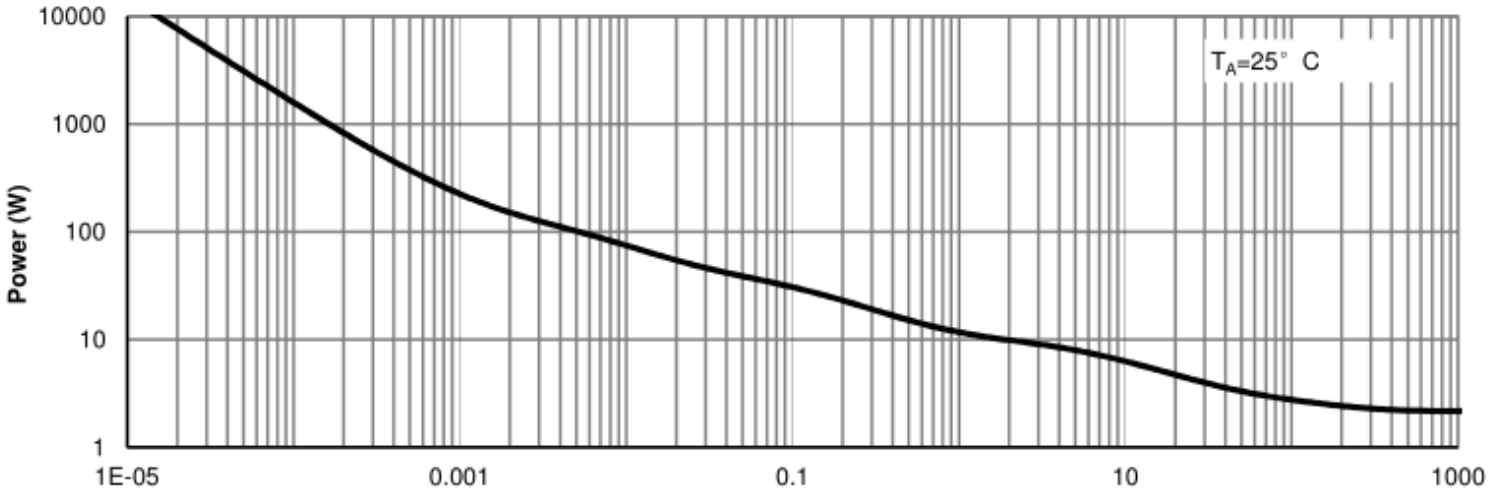


Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note H)

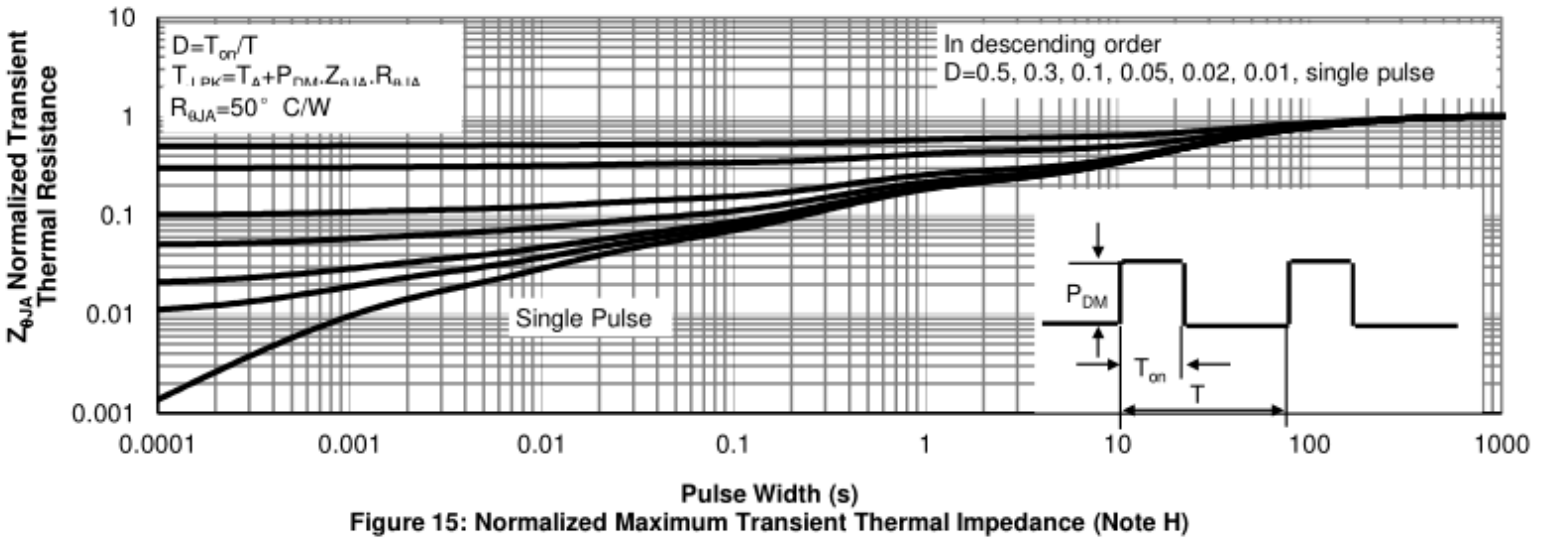
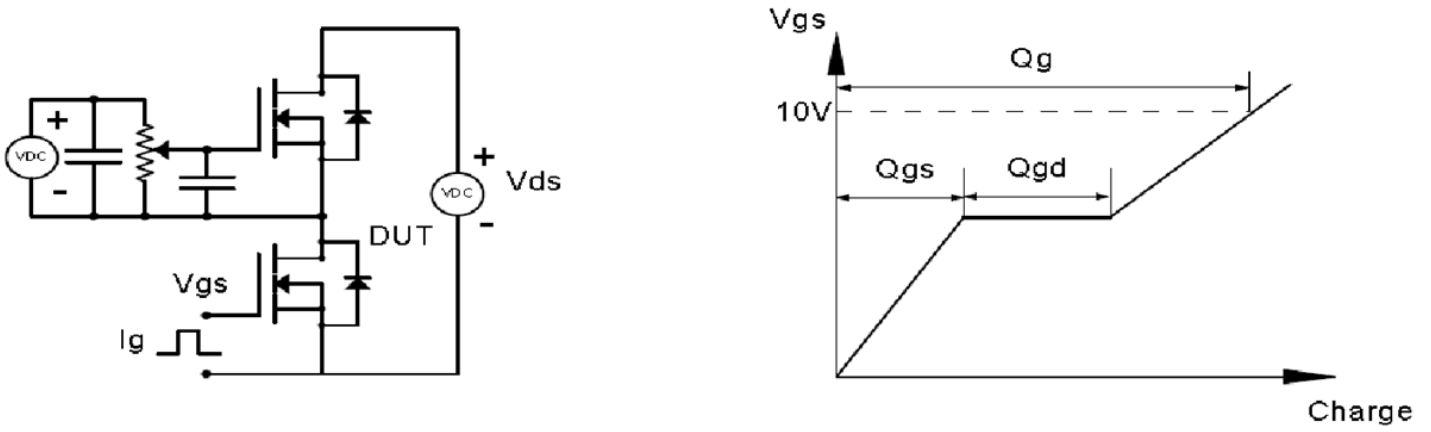


Figure 15: Normalized Maximum Transient Thermal Impedance (Note H)

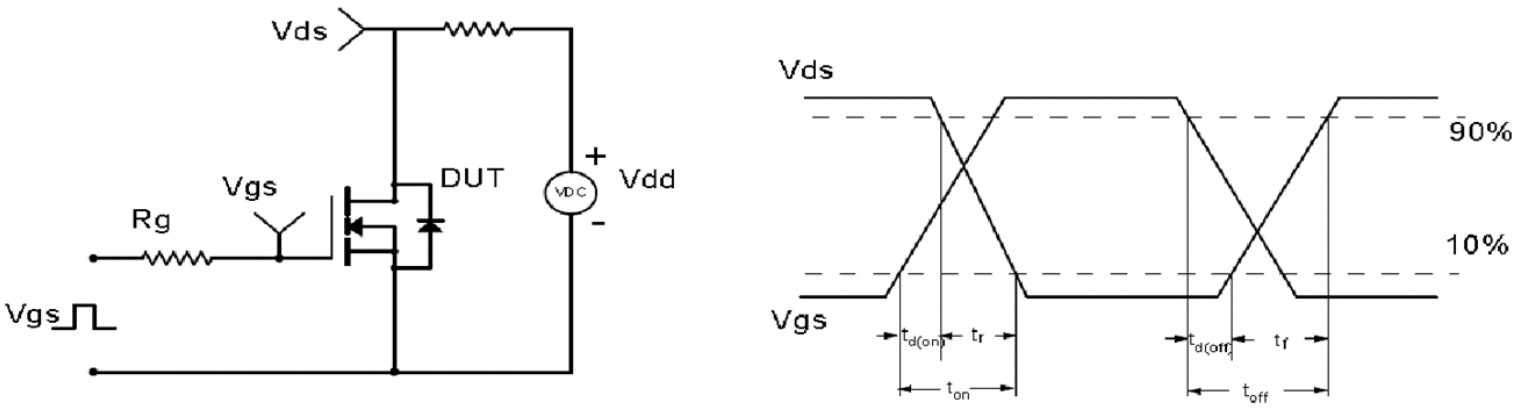
Test Circuit & Waveform

Gate Charge Test Circuit & Waveform

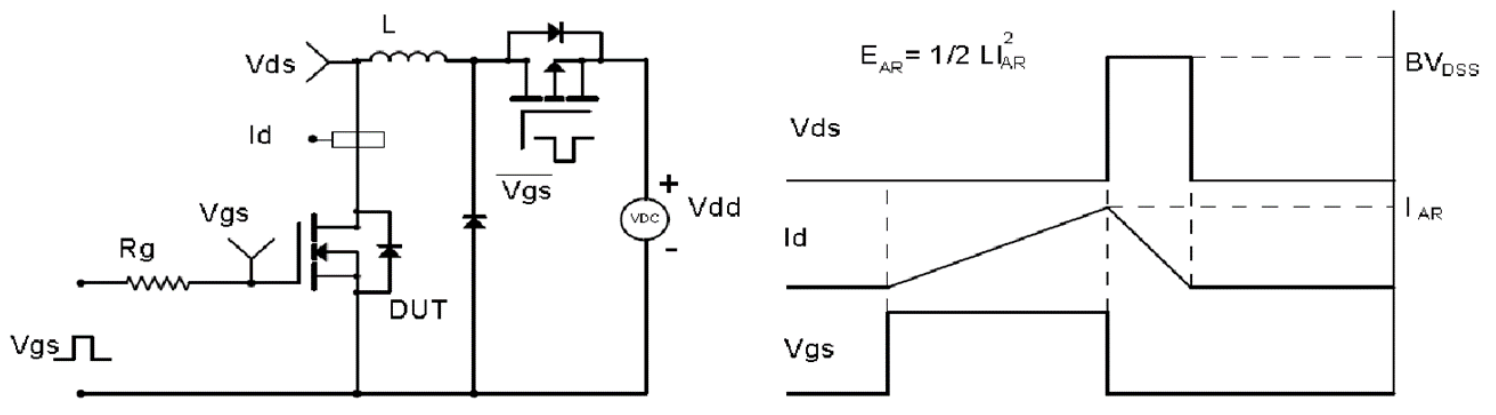


Resistive Switching Test Circuit & Waveforms

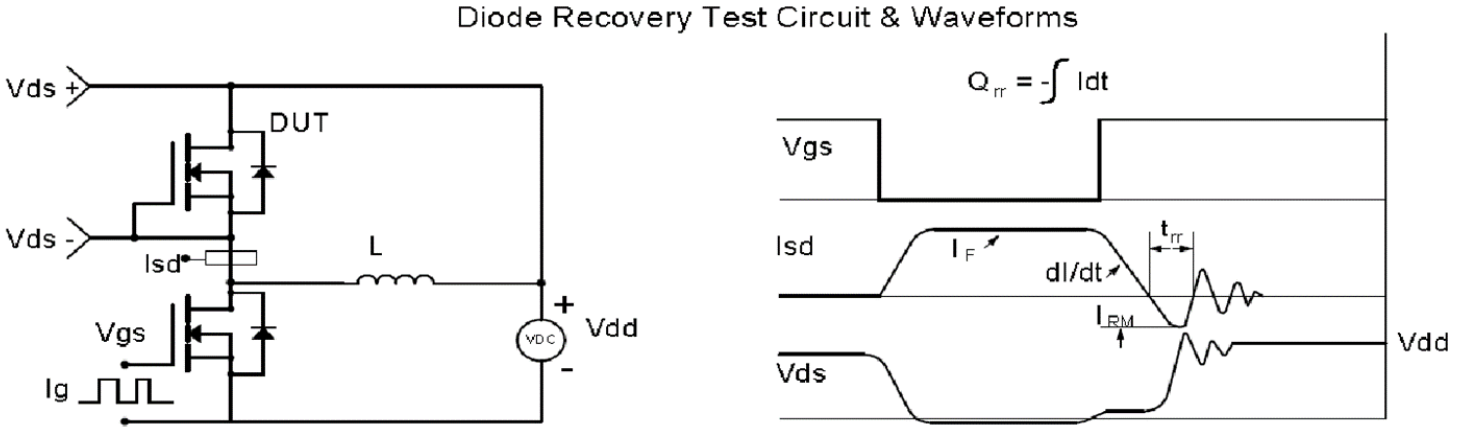
Resistive Switching Test Circuit & Waveforms



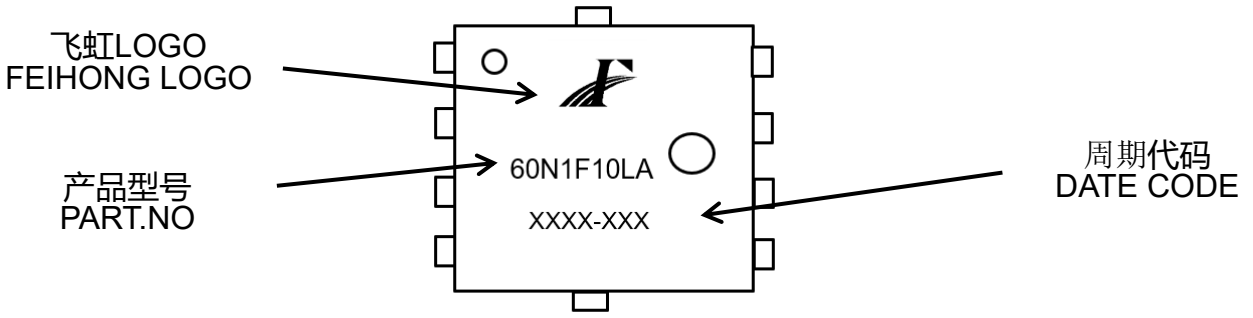
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



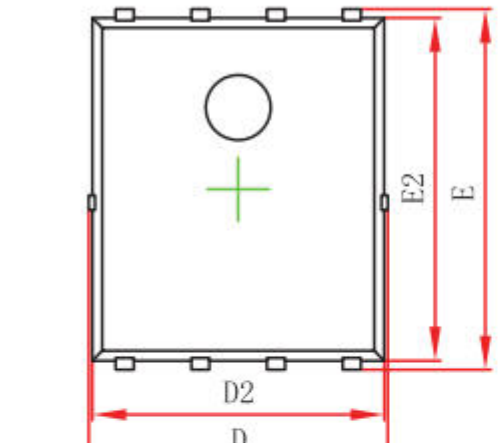
印记 Marking:


飞虹LOGO
FEIHONG LOGO
产品型号
PART.NO
60N1F10LA
XXXX-XXX
周期代码
DATE CODE

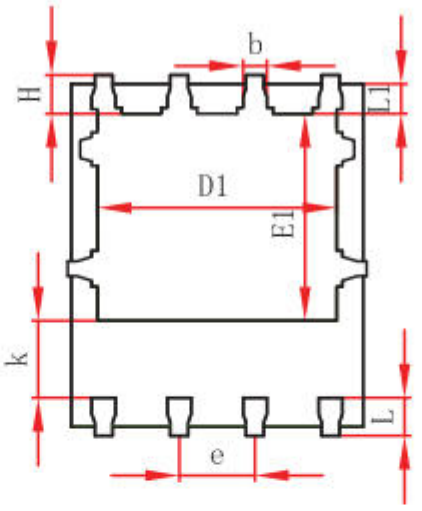
外形尺寸：

PDNF5X6-8

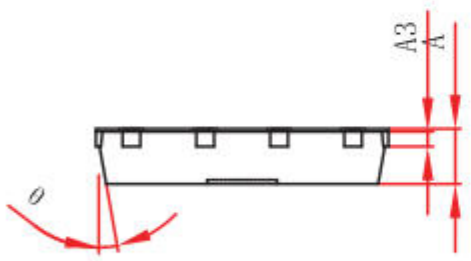
■ Package Outline Dimensions



Top View
[顶视图]



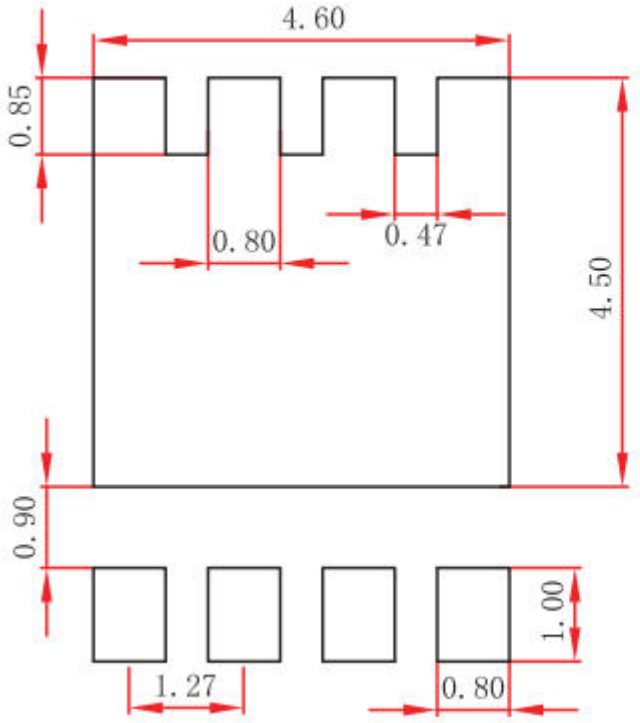
Bottom View
[背视图]



Side View
[侧视图]

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039
A3	0.254REF.		0.010REF.	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	3.910	4.110	0.154	0.162
E1	3.375	3.575	0.133	0.141
D2	4.824	4.976	0.190	0.196
E2	5.674	5.826	0.223	0.229
k	1.190	1.390	0.047	0.055
b	0.350	0.450	0.014	0.018
e	1.270TYP.		0.050TYP.	
L	0.559	0.711	0.022	0.028
L1	0.424	0.576	0.017	0.023
H	0.574	0.726	0.023	0.029
θ	10°	12°	10°	12°

■ Suggested Pad Layout



Note:

1.Controlling dimension:in millimeters.
2.General tolerance:±0.05mm.
3.The pad layout is for reference purposes only.