



N 沟道增强型场效应晶体管

N-CHANNEL MOSFET

FHD15N10D

主要参数 MAIN CHARACTERISTICS

ID	15 A
VDSS	100 V
Rdson-typ (@Vgs=10V)	90 mΩ
Rdson-typ (@Vgs=4.5V)	100 mΩ
Qg-typ	19.2 nC

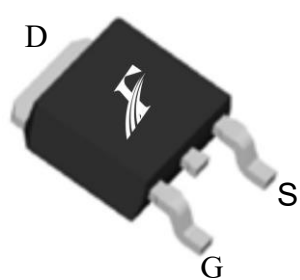
用途 APPLICATIONS

高频开关电源	High efficiency switch mode power supplies
加湿器	Humidifier

产品特性 FEATURES

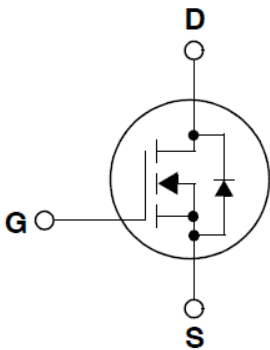
低栅极电荷	Low gate charge
低 Crss (典型值 23 pF)	Low Crss (typical 23 pF)
开关速度快	Fast switching
100%经过 Rg 测试	100% Rg tested
100%经过雪崩测试	100% avalanche tested
100%经过热阻测试	100% DVDS tested
沟槽工艺	Trench technology
RoHS 产品	RoHS product

封装形式 Package



TO-252
FHD 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
		FHD15N10D	
最高漏极—源极直流电压 Drain-Source Voltage	Vds	100	V
连续漏极电流* Drain Current -continuous *	Id (Tc=25℃)	15	A
	Id (Tc=100℃)	10	A
最大脉冲漏极电流 (注 1) Drain Current – pulse (note 1)	IDM	60	A
最高栅源电压 Gate-Source Voltage	VGS	±20	V
单脉冲雪崩能量 (注 2) Single Pulsed Avalanche Energy (note 2)	EAS	18	mJ
雪崩电流 (注 1) Avalanche Current (note 1)	IAR	6	A
重复雪崩能量 (注 1) Repetitive Avalanche Current (note 1)	EAR	10	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	PD (TC=25℃)	55	W
	-Derate above 25℃	0.37	W/℃
最高结温及存储温度 Operating and Storage Temperature Range	TJ, TSTG	-55~+175	℃
引线最高焊接温度 Maximum Lead Temperature for Soldering Purposes	TL	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	100	-	-	V
击穿电压温度特性 Breakdown Voltage Temperature Coefficient	ΔBV _{DSS} /ΔT _J	I _D =250μA, referenced to 25℃	-	0.1	-	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} = V _{GS} , I _D =250μA	1.4	1.7	2.4	V
静态导通电阻 Static Drain-Source On-Resistance	R _{DS(ON)}	V _{GS} =10V , I _D =8A	-	90	105	mΩ
		V _{GS} =4.5V , I _D =5A		100	120	
正向跨导 Forward Transconductance	g _{fs}	V _{DS} = 10V, I _D =8A (note 4)	-	25	-	S
动态特性 Dynamic Characteristics						
栅电阻 Gate Resistance	R _g	f=1.0MHz,V _{DS} OPEN	-	2.6	-	Ω
输入电容 Input capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V, f=1.0MHz	-	1238	-	pF
输出电容 Output capacitance	C _{oss}		-	320	-	
反向传输电容 Reverse transfer capacitance	C _{rss}		-	23	-	
开关特性 Switching Characteristics						
延迟时间 Turn-On delay time	t _{d(on)}	V _{DD} =30V, I _D =8A, R _G =1.8Ω V _{GS} =10V (note 4, 5)	-	12.6	-	ns
上升时间 Turn-On rise time	t _r		-	6	-	ns
延迟时间 Turn-Off delay time	t _{d(off)}		-	32.5	-	ns
下降时间 Turn-Off Fall time	t _f		-	4.3	-	ns
栅极电荷总量 Total Gate Charge	Q _g	V _{DS} =30V , I _D =8A , V _{GS} =10V (note 4, 5)	-	19.2	-	nC
栅－源电荷 Gate-Source charge	Q _{gs}		-	3.4	-	nC
栅－漏电荷 Gate-Drain charge	Q _{gd}		-	6.1	-	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		-	-	15	A
正向最大脉冲电流 Maximum Pulsed Drain-Source Diode Forward Current	I _{SM}		-	-	60	A
正向压降 Drain-Source Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =15A	-	-	1.2	V
反向恢复时间 Reverse recovery time	t _{rr}	V _{GS} =0V, I _S =15A ,dI _F /dt=100A/μs (note 4)	-	30	-	ns
反向恢复电荷 Reverse recovery charge	Q _{rr}		-	35	-	nC

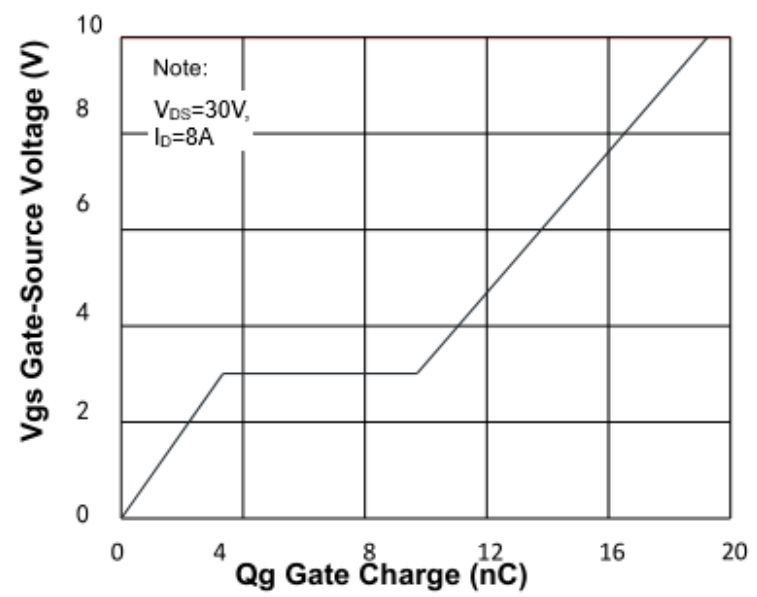
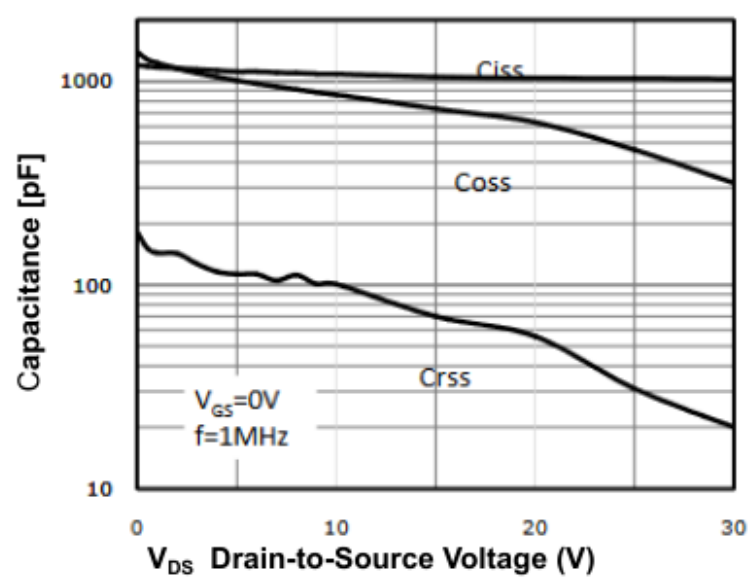
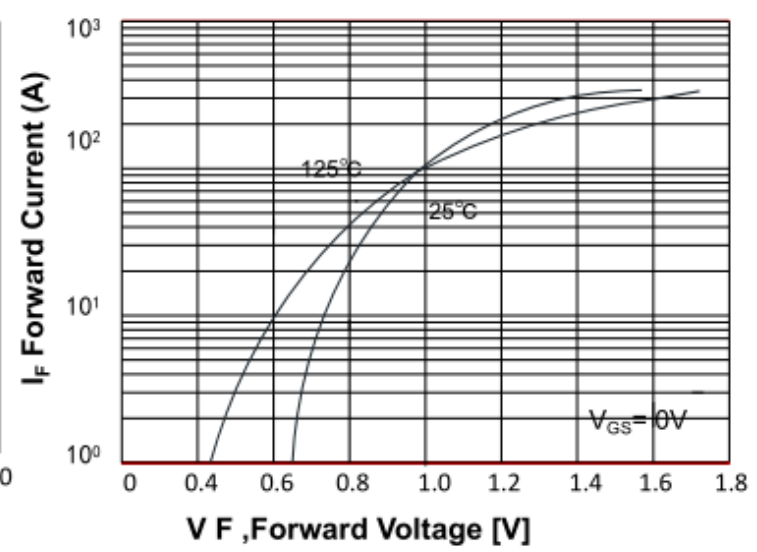
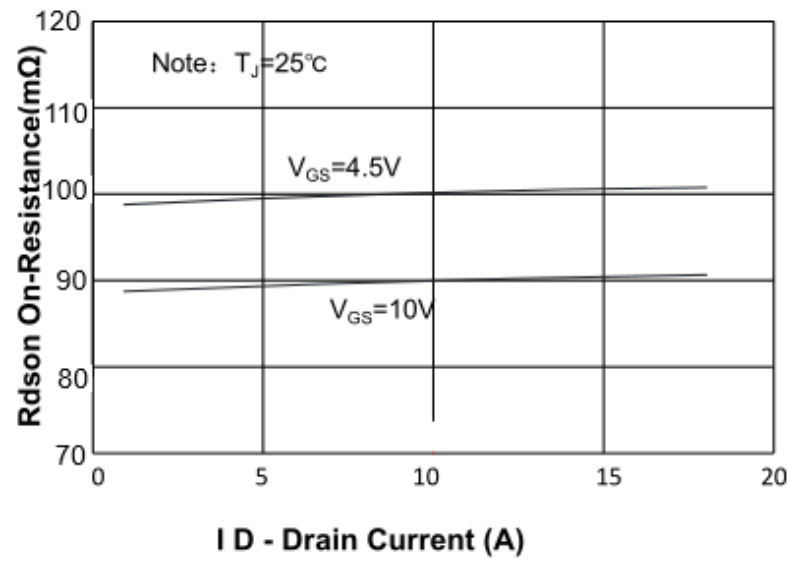
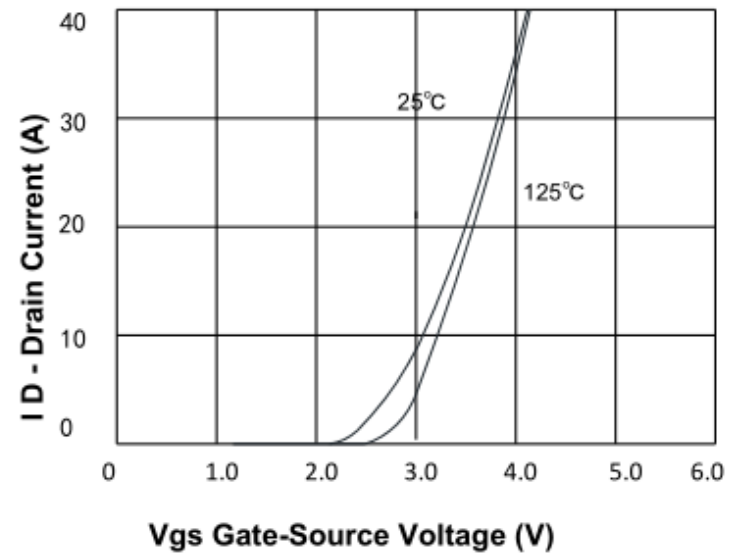
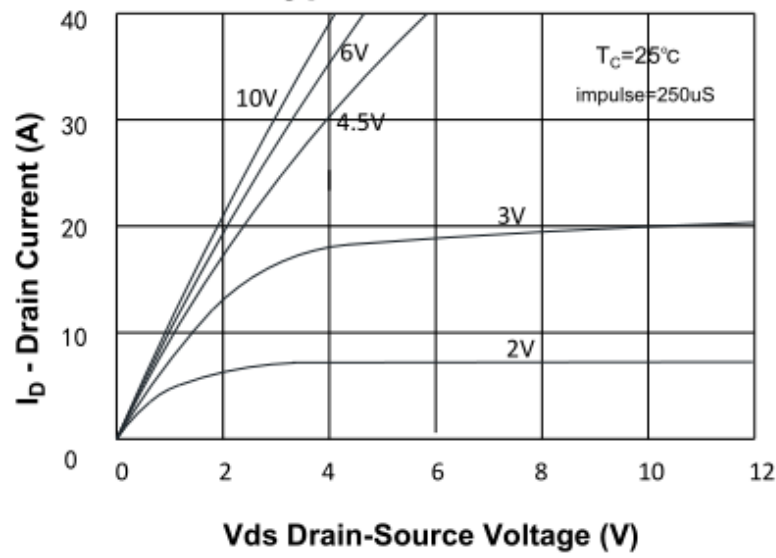
热特性 THERMAL CHARACTERISTIC

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)	2.73	℃/W
结到环境的热阻 Thermal Resistance, Junction to Ambient	Rth(j-A)	40	℃/W

注释：
1：脉冲宽度由最高结温限制
2：L=1mH, IAS=6A, VDD=50V, RG=25 Ω,起始结温 TJ=25℃
3：ISD ≤15A,di/dt ≤300A/μs,VDD≤BVDSS,起始结温 TJ=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, IAS=6A, VDD=50V, RG=25 Ω,Starting TJ=25℃
3: ISD ≤15A,di/dt ≤300A/μs,VDD≤BVDSS, Starting TJ=25℃
4: Pulse Test: Pulse Width ≤300μs,Duty Cycle≤2％
5: Essentially independent of operating temperature

Typical Performance Characteristics



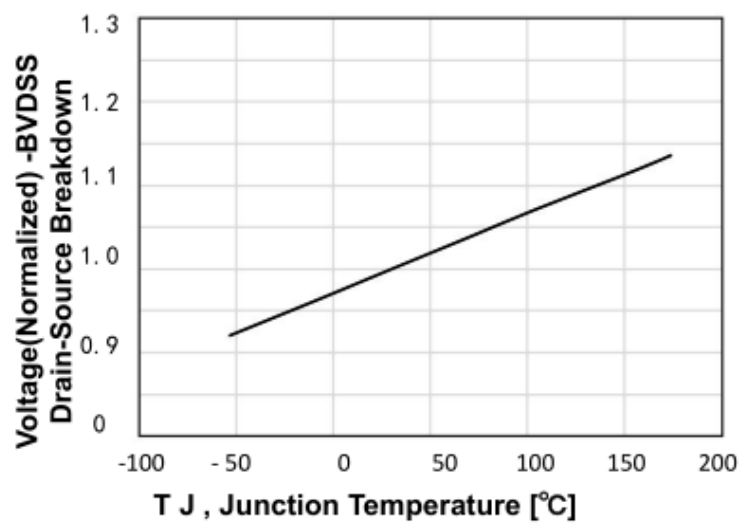


Figure 7. Breakdown Voltage Variation vs Temperature

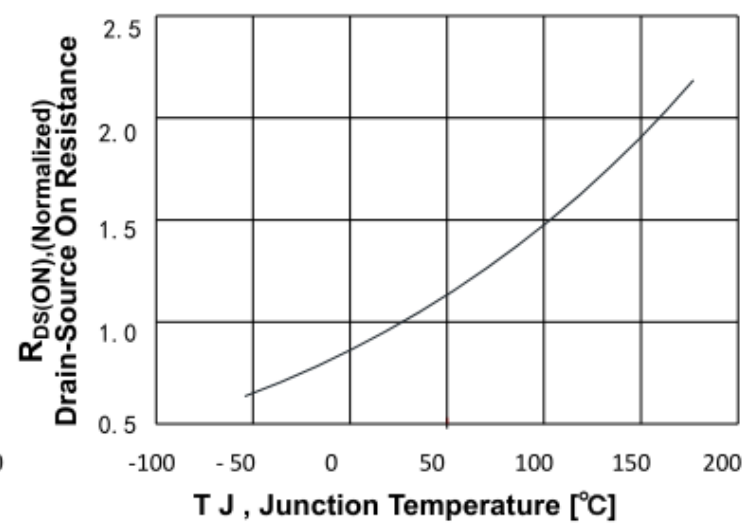


Figure 8. On-Resistance Variation vs Temperature

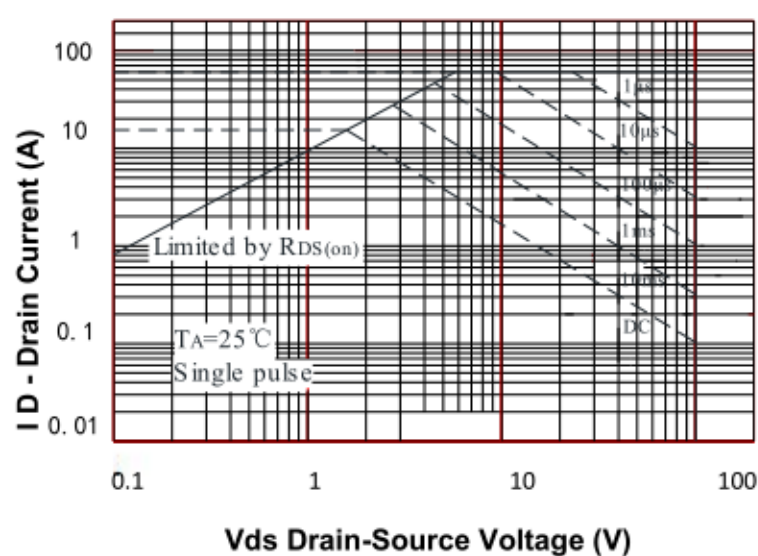


Figure 9. Maximum Safe Operating Area

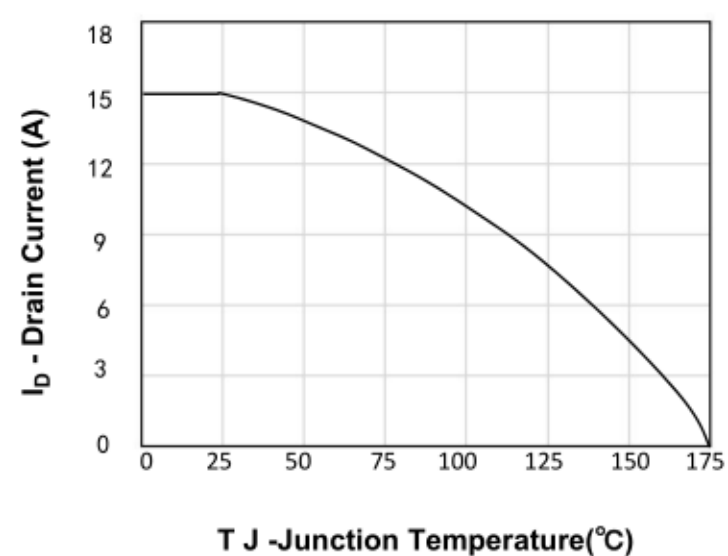


Figure 10. Maximum PContinuous Drain Current vs Case Temperature

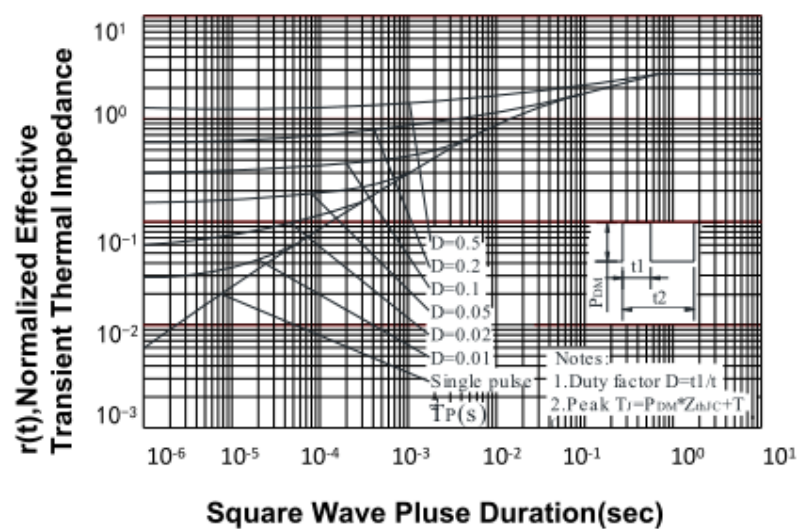
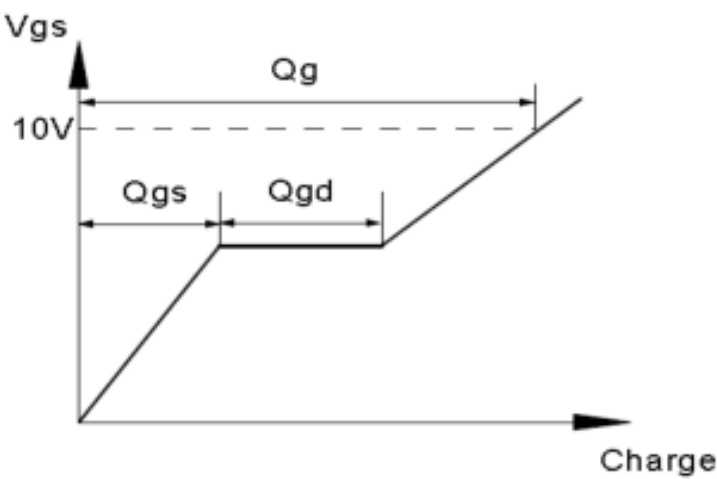
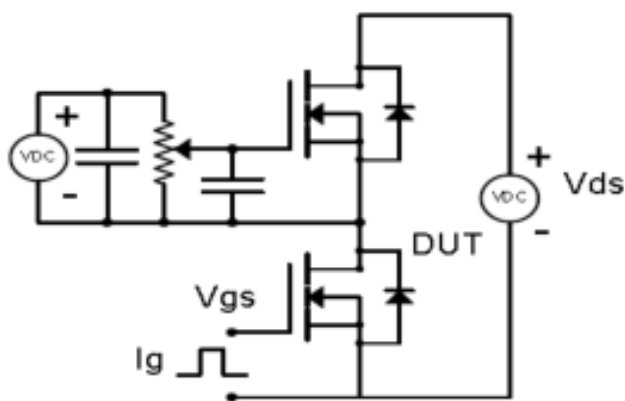


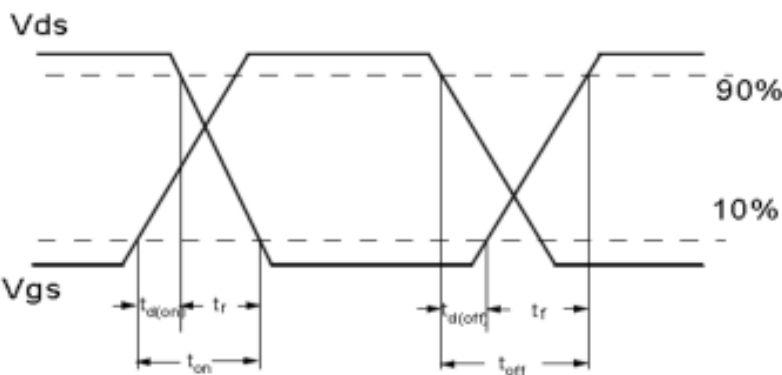
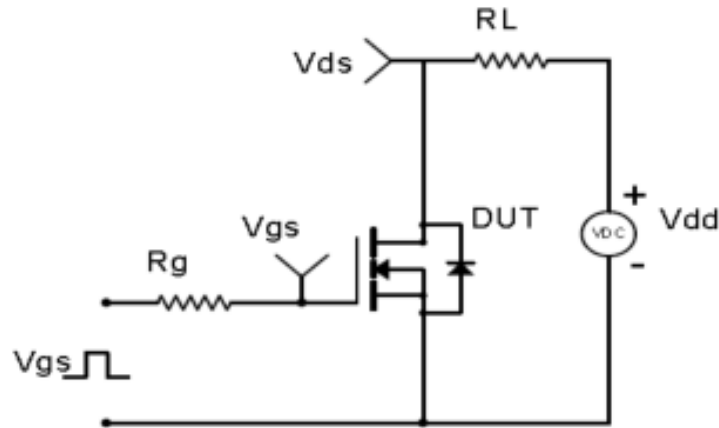
Figure 11. Transient Thermal Response Curve

Test Circuit & Waveform

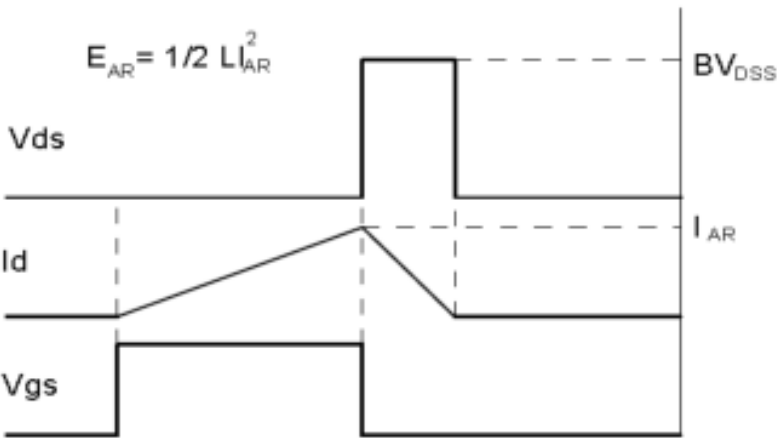
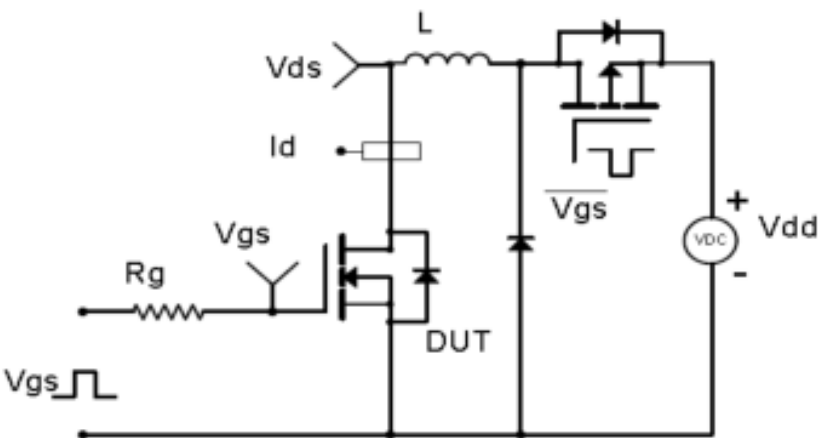
Gate Charge Test Circuit & Waveform



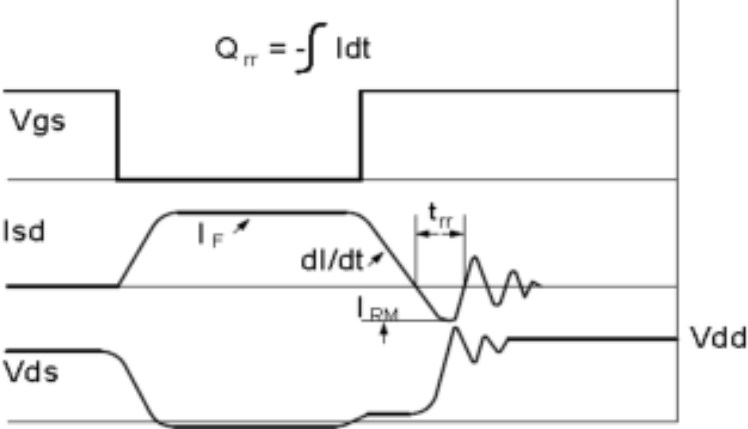
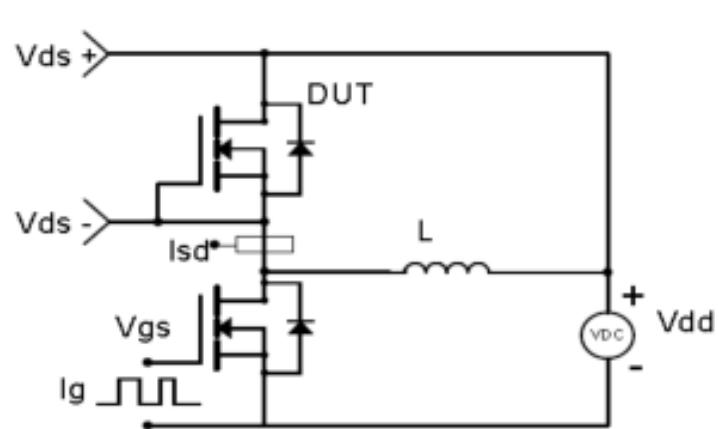
Resistive Switching Test Circuit & Waveforms



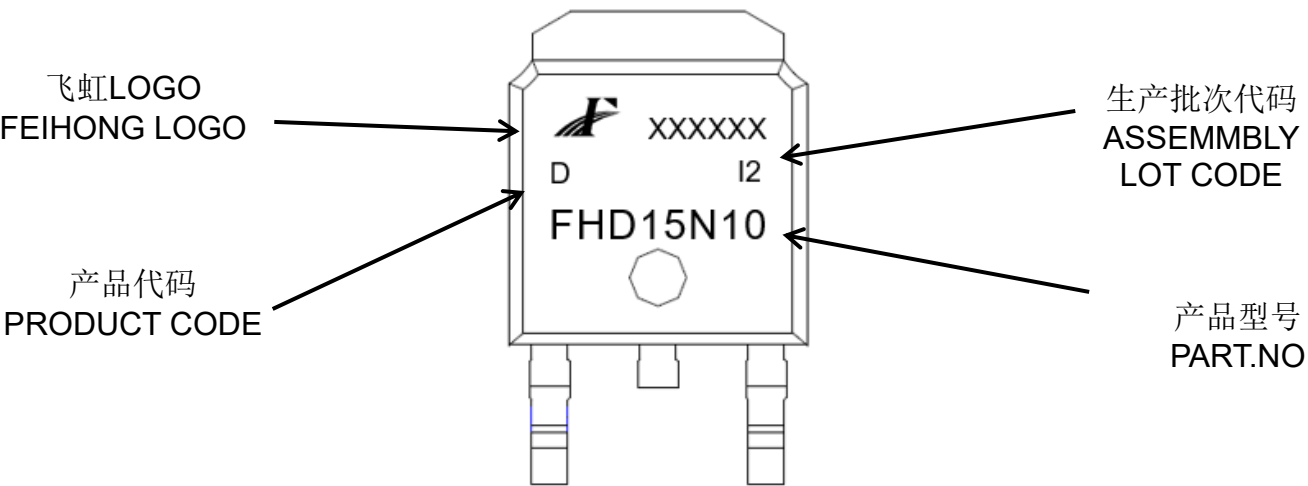
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



印记 Marking:



Package Dimension:

Technical drawing of a 10-pin D-sub connector showing front, side, and detail views with dimension labels A through V.

DIM	MILLIMETERS
A	5.34 ± 0.30
B	6.00 ± 0.30
C	1.05 ± 0.30
D	9.95 ± 0.30
E	0.76 ± 0.15
F	2.28 ± 0.15
G	2.30 ± 0.30
H	1.06 ± 0.30
I	$(4-10)^{\circ}$
J	0.51 ± 0.15
K	0.52 ± 0.15
L	0.80 ± 0.30
M	60°
N	$(0-10)^{\circ}$
O	0.05 ± 0.05
P	6.60 ± 0.30
Q	25°
R	$(4-8.5)^{\circ}$
S	R0.40
T	R0.40
U	0.05 ± 0.05
V	0.05 ± 0.05
W	0.90 ± 0.30
a	1.80 ± 0.30
b	0.75 ± 0.30
c	4.85 ± 0.30
d	5.30 ± 0.30
e	6.90 ± 0.30

(Units: mm)