

#### 主要参数 MAIN CHARACTERISTICS

ID	172 A
VDSS	100 V
Rdson-typ ( @Vgs=10V)	3.2 mΩ
Qg-typ	90 nC

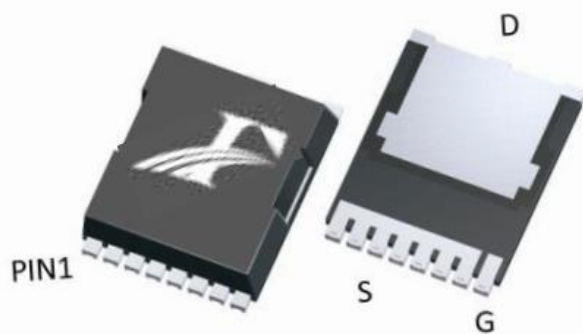
#### 用途 APPLICATIONS

电机驱动	Motor Drive
电池管理系统	Battery Management System
电动车控制器	Electric vehicle controller

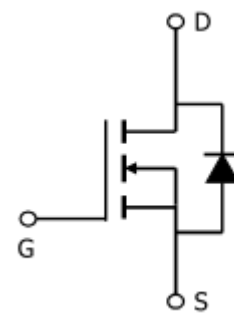
#### 产品特性 FEATURES

低栅极电荷	Low gate charge
低 Crss (典型值 33 pF)	Low Crss (typical 33 pF )
开关速度快	Fast switching
100%经过热阻测试	100% DVDS tested
100%经过雪崩测试	100% avalanche tested
100%经过 Rg 测试	100% Rg tested
符合 RoHS 标准	ROHS compliant
SGT 工艺	SGT technology

#### 封装形式 Package



#### 等效电路 Equivalent Circuit



#### 绝对最大额定值 ABSOLUTE RATINGS (Tc=25°C)

项目 Parameter	符号 Symbol	数值 Value	单位 Unit
		FHL170N1F4A	
最高漏极-源极直流电压 Drain-Source Voltage	V <sub>DS</sub>	100	V
连续漏极电流* Drain Current -continuous *	I <sub>D</sub> (T <sub>C</sub> =25°C), Silicon Limited	172	A
	I <sub>D</sub> (T <sub>C</sub> =25°C), Package Limited	120	
	I <sub>D</sub> (T <sub>C</sub> =100°C), Silicon Limited	109	A
最大脉冲漏极电流 (注 1) Drain Current – pulse (note 1)	I <sub>DM</sub>	480	A
最高栅源电压 Gate-Source Voltage	V <sub>GS</sub>	±20	V
单脉冲雪崩能量 (注 2) Single Pulsed Avalanche Energy (note 2)	E <sub>AS</sub>	312.5	mJ
雪崩电流 (注 1) Avalanche Current (note 1)	I <sub>AS</sub>	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 <sub>D</sub> (TC=25°C)	227	W
	-Derate above 25°C	1.82	W/°C
最高结温及存储温度 Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55~+150	°C
引线最高焊接温度 Maximum Lead Temperature for Soldering Purposes	T <sub>L</sub>	260	°C

\*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 <b>Off –Characteristics</b>						
漏-源击穿电压 Drain-Source Voltage	BV <sub>DSS</sub>	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V	100	111	-	V
击穿电压温度特性 Breakdown Voltage Temperature Coefficient	ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	I <sub>D</sub> =250μA, referenced to 25°C	-	0.1	-	V/°C
零栅压下漏极漏电流 Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =100V, V <sub>GS</sub> =0V, T <sub>C</sub> =25°C	-	-	1	μA
		V <sub>DS</sub> =80V, T <sub>C</sub> =125°C	-	-	100	μA
栅极体漏电流 Gate-body leakage current	I <sub>GSS</sub> (F/R)	V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V	-	-	±100	nA
通态特性 <b>On-Characteristics</b>						
阈值电压 Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA	2.0	2.9	4.0	V
静态导通电阻 Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V , I <sub>D</sub> =50A	-	3.2	4.0	mΩ
动态特性 <b>Dynamic Characteristics</b>						
栅电阻 Gate Resistance	R <sub>g</sub>	f=1.0MHz, V <sub>DS</sub> OPEN	-	0.8	-	Ω
输入电容 Input capacitance	C <sub>iss</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, f=1.0MHz	-	7762	-	pF
输出电容 Output capacitance	C <sub>oss</sub>		-	952	-	
反向传输电容 Reverse transfer capacitance	C <sub>rss</sub>		-	33	-	
开关特性 <b>Switching Characteristics</b>						
延迟时间 Turn-On delay time	t <sub>d(on)</sub>	V <sub>DS</sub> =50V, I <sub>D</sub> =50A, R <sub>G</sub> =3Ω V <sub>GS</sub> =10V (note 4, 5)	-	28	-	ns
上升时间 Turn-On rise time	t <sub>r</sub>		-	32	-	ns
延迟时间 Turn-Off delay time	t <sub>d(off)</sub>		-	48	-	ns
下降时间 Turn-Off Fall time	t <sub>f</sub>		-	27	-	ns
栅极电荷总量 Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =50V , I <sub>D</sub> =20A , V <sub>GS</sub> =10V (note 4, 5)	-	90	-	nC
栅-源电荷 Gate-Source charge	Q <sub>gs</sub>		-	28	-	nC
栅-漏电荷 Gate-Drain charge	Q <sub>gd</sub>		-	45	-	nC
漏-源二极管特性及最大额定值 <b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
正向最大连续电流 Maximum Continuous Drain-Source Diode Forward Current		I <sub>S</sub>	-	-	120	A
正向最大脉冲电流 Maximum Pulsed Drain-Source Diode Forward Current		I <sub>SM</sub>	-	-	480	A
正向压降 Drain-Source Diode Forward Voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =50A	-	-	1.3	V
反向恢复时间 Reverse recovery time	t <sub>rr</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =50A ,dI <sub>F</sub> /dt=100A/μs (note 4)	-	80	-	ns
反向恢复电荷 Reverse recovery charge	Q <sub>rr</sub>		-	190	-	nC

## 热特性 THERMAL CHARACTERISTIC

项目 Parameter	符号 Symbol	FHL170N1F4A	单位 Unit
结到管壳的热阻 Thermal Resistance, Junction to Case	Rth(j-c)	0.55	°C/W
结到环境的热阻 Thermal Resistance, Junction to Ambient	Rth(j-A)	62.5	°C/W

注释:

- 1: 脉冲宽度由最高结温限制
- 2: L=1mH, IAS=25A, VDD=48V, RG=25 Ω, 起始结温 TJ=25°C
- 3: ISD ≤120A, di/dt ≤100A/μs, VDD≤BVDS, 起始结温 TJ=25°C
- 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=25A, VDD=48V, RG=25 Ω, Starting TJ=25°C
- 3: ISD ≤120A, di/dt ≤100A/μs, VDD≤BVDS, Starting TJ=25°C
- 4: Pulse Test: Pulse Width ≤300μs, Duty Cycle≤2%
- 5: Essentially independent of operating temperature

# 特性曲线 Typical Characteristics

Fig 1: Output Characteristics

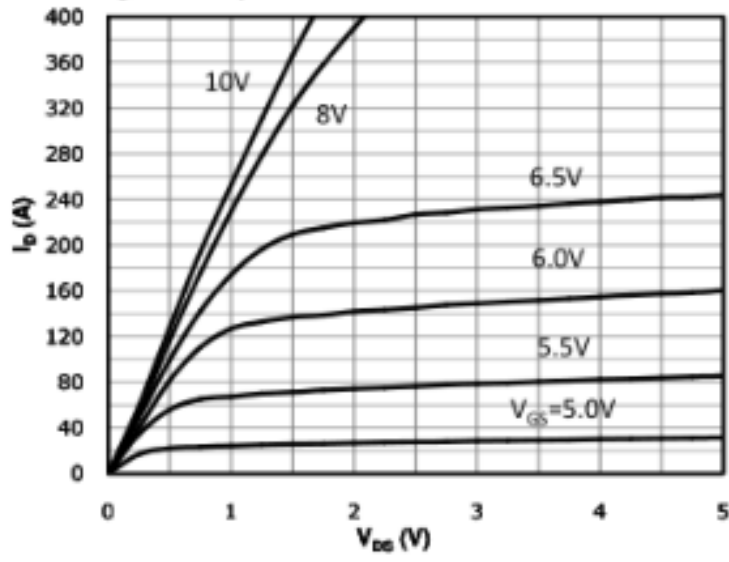


Fig 2: Transfer Characteristics

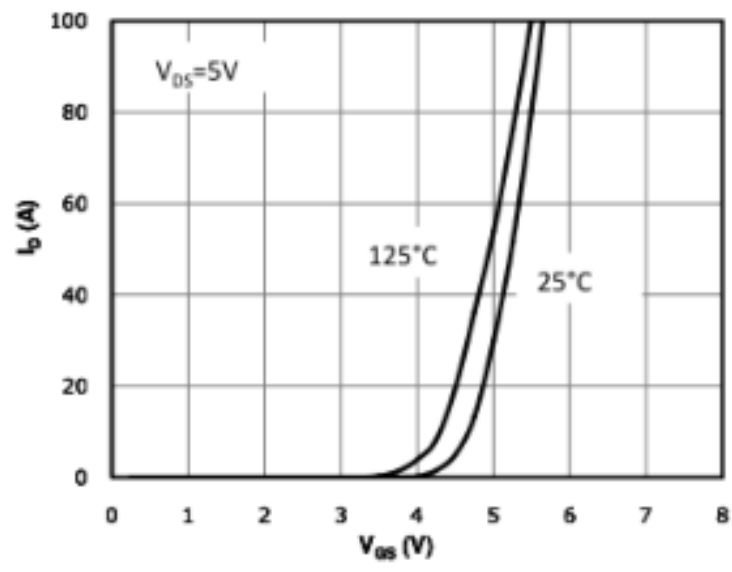


Fig 3: Rds(on) vs Drain Current and Gate Voltage

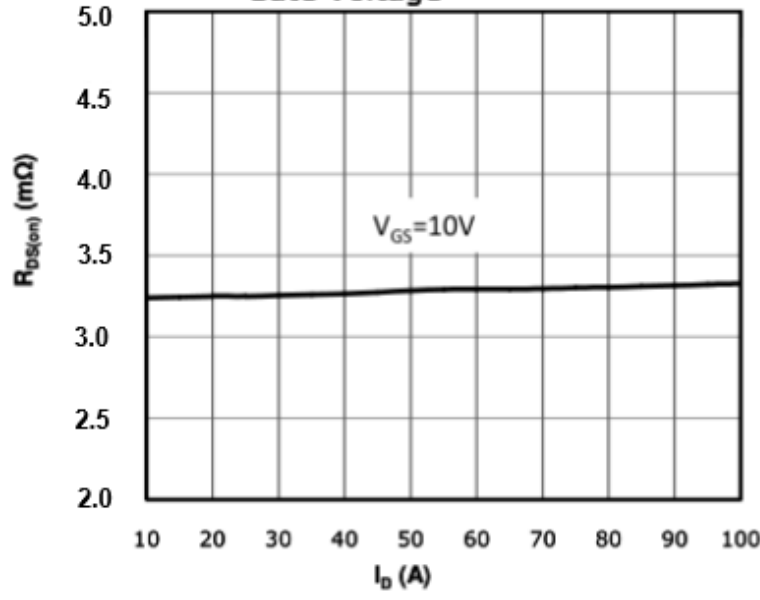


Fig 4: Rds(on) vs Gate Voltage

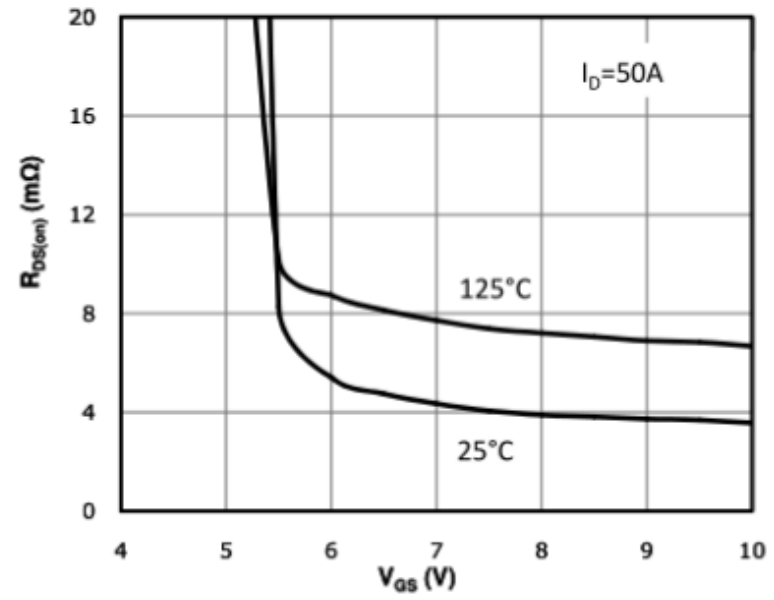


Fig 5: Rds(on) vs. Temperature

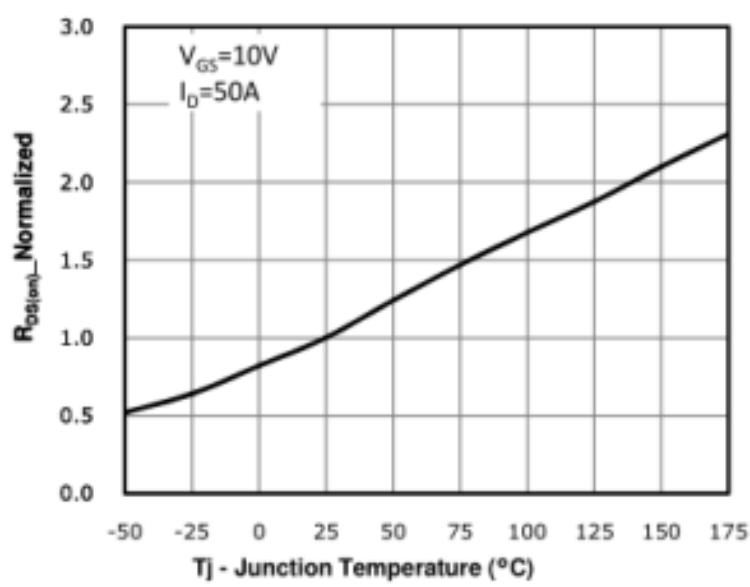
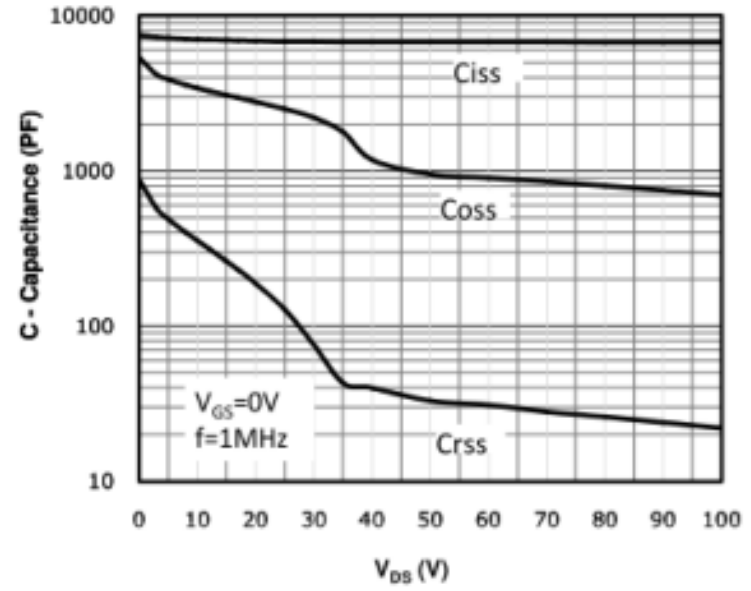
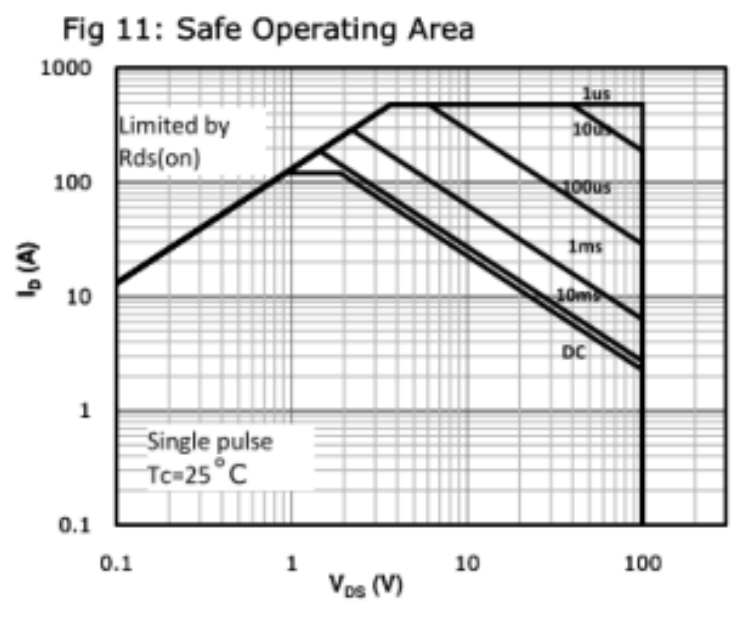
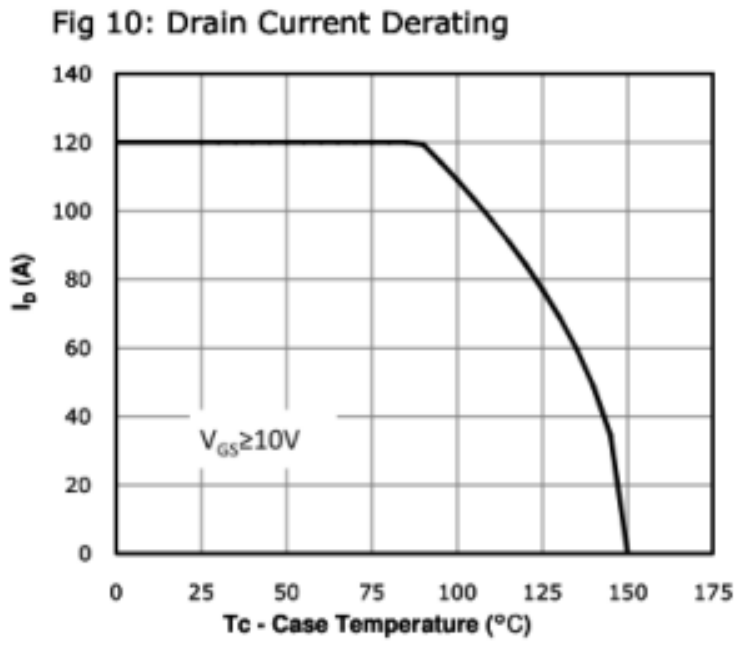
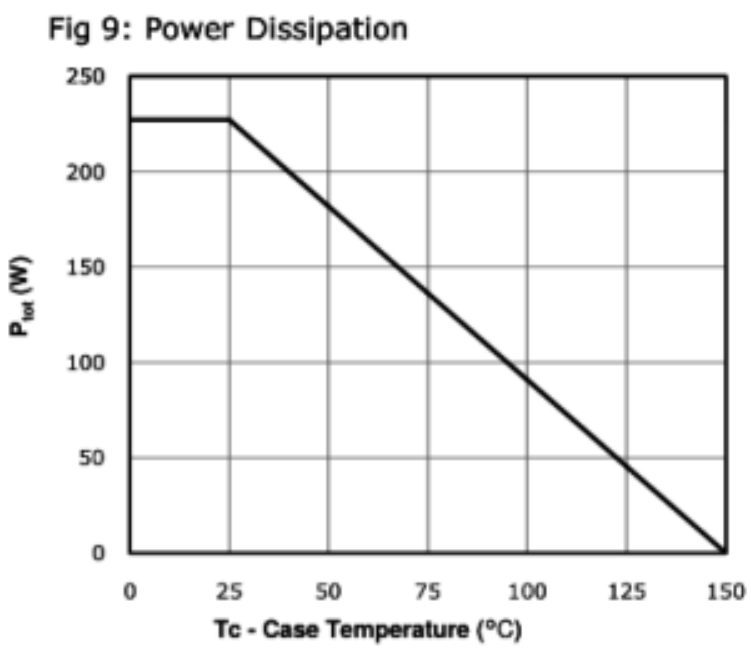
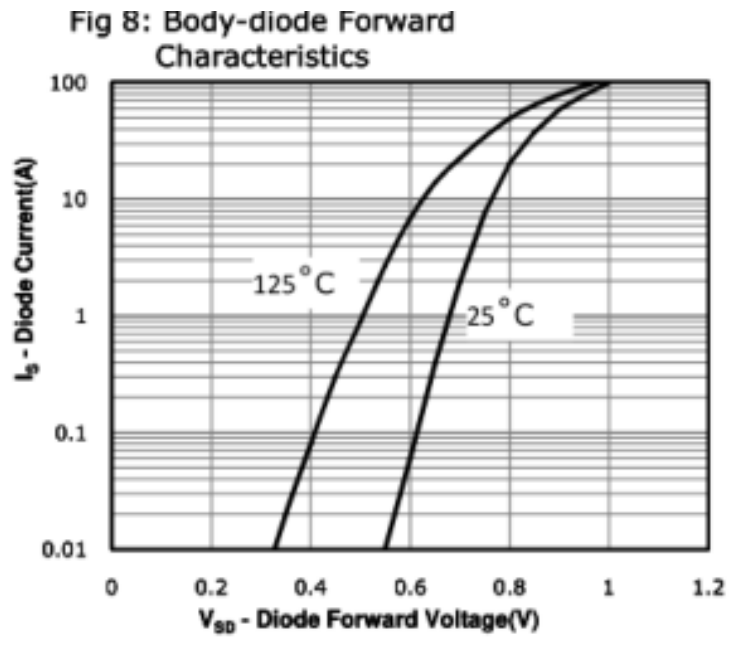
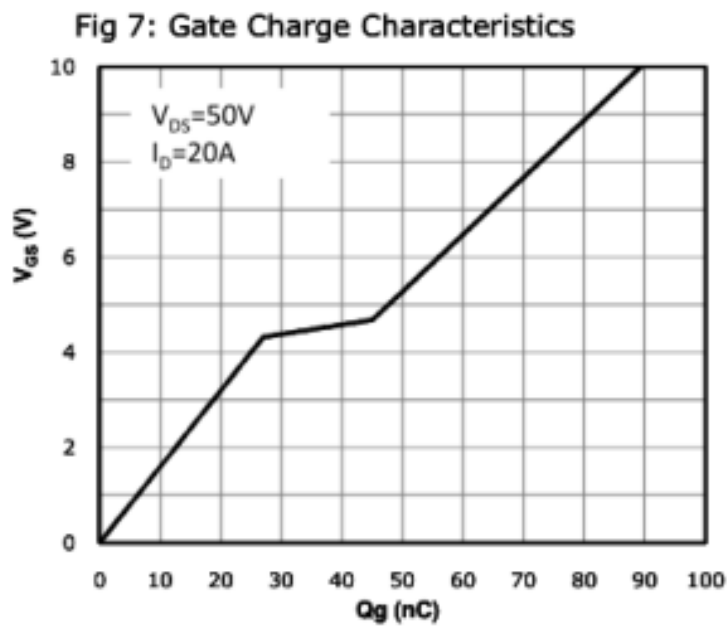


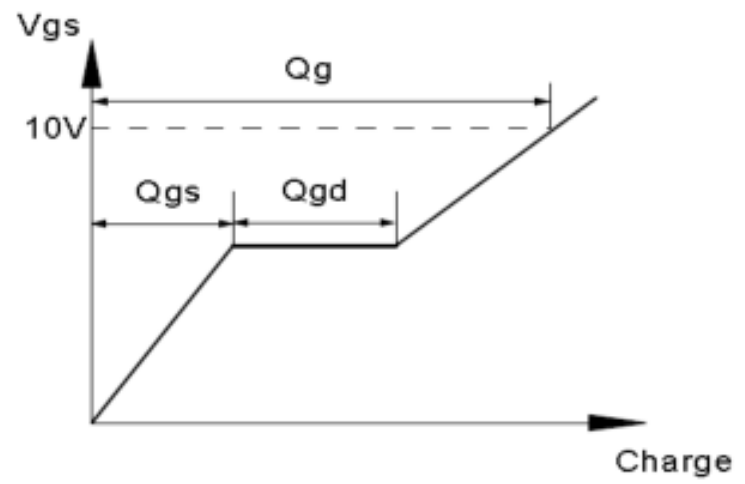
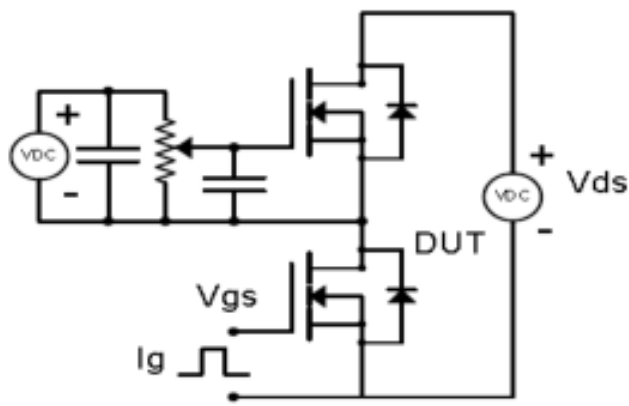
Fig 6: Capacitance Characteristics



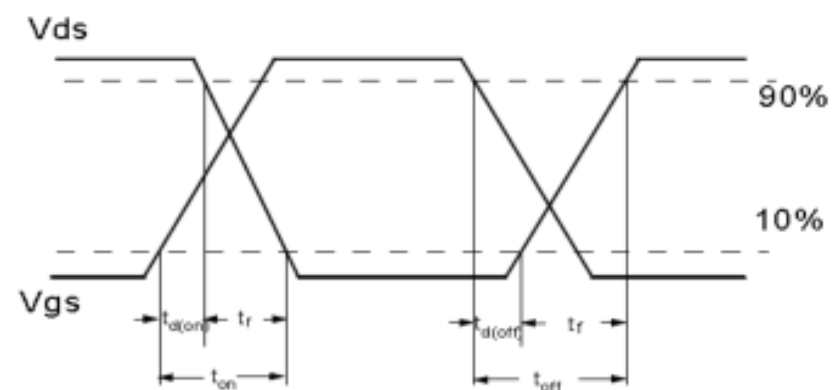
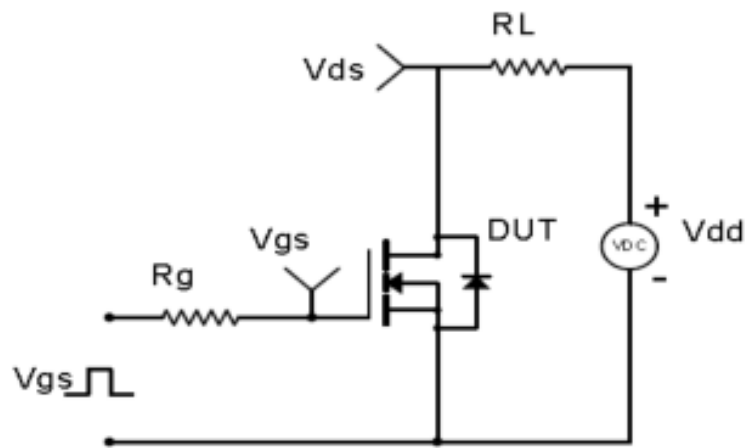


# Test Circuit & Waveform

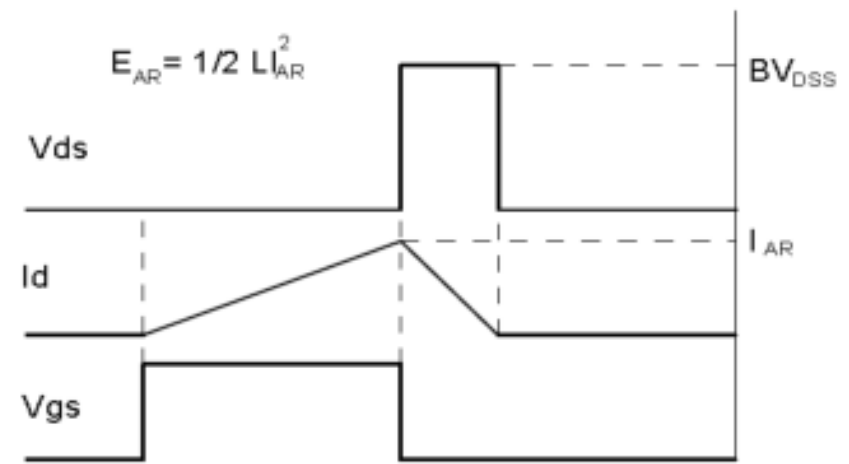
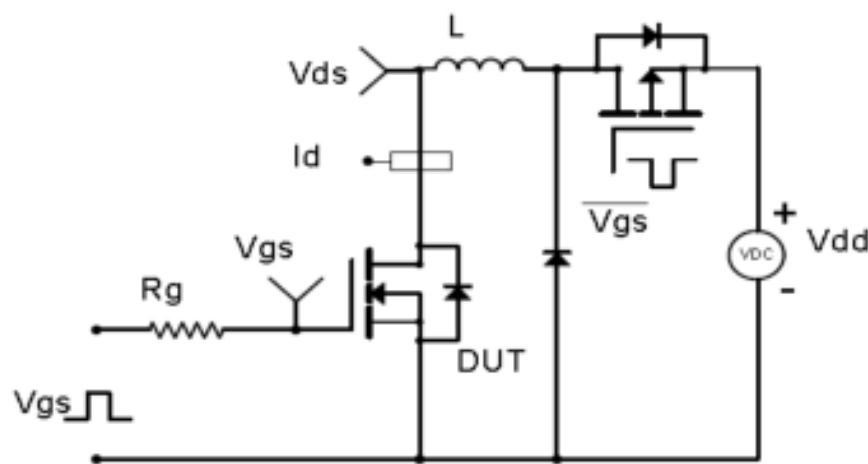
## Gate Charge Test Circuit & Waveform



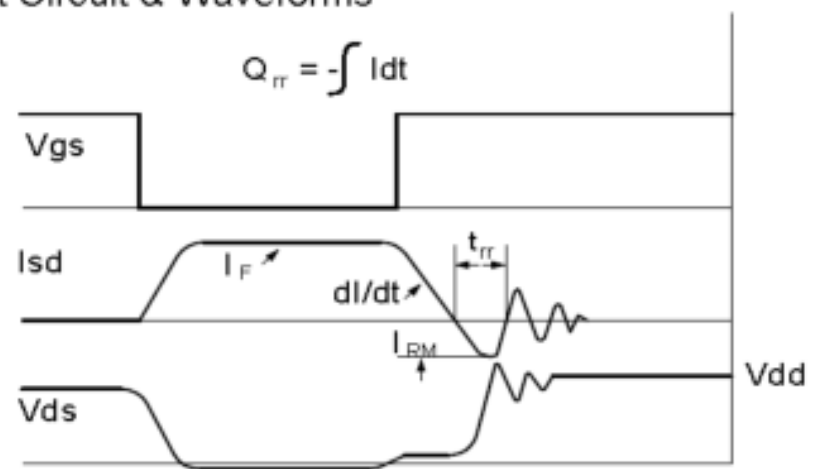
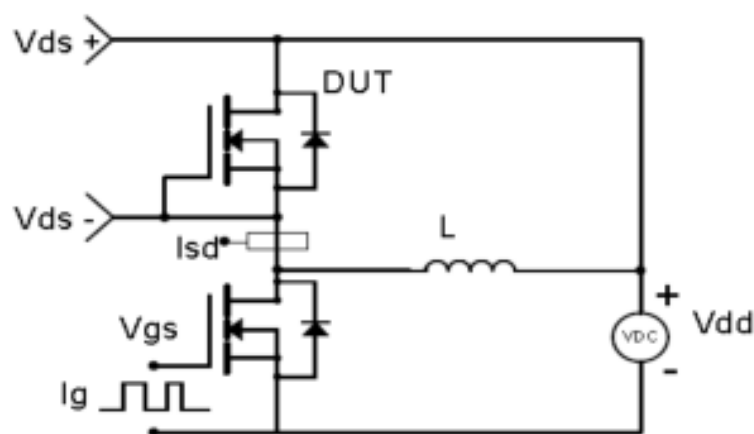
## Resistive Switching Test Circuit & Waveforms



## Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

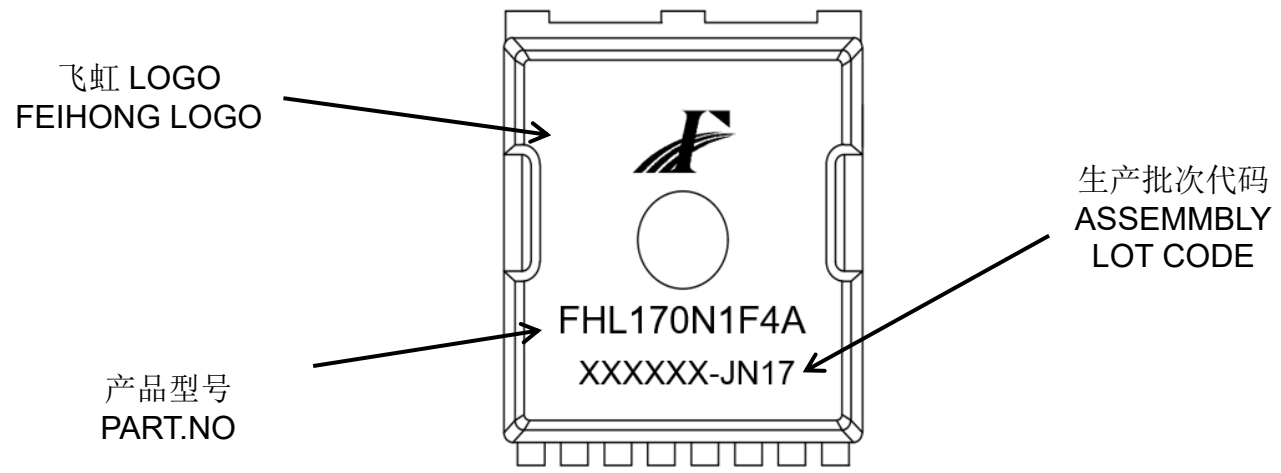


## Diode Recovery Test Circuit & Waveforms



---

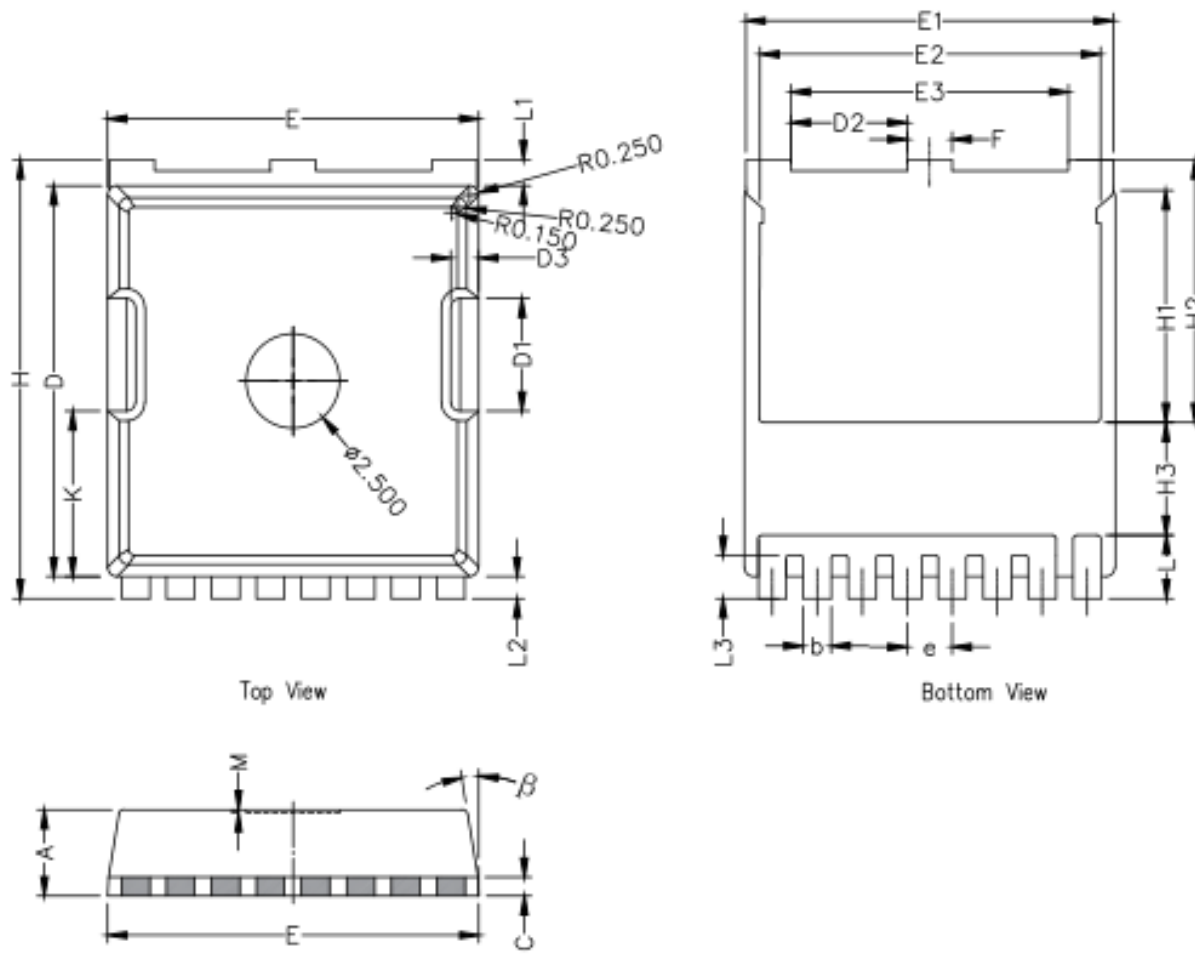
印记 Marking:



外形尺寸:

Package Dimension:

# TOLL8



Symbols	Millimeters		
	MIN.	NOM.	MAX.
A	2.20	2.30	2.40
b	0.65	0.75	0.85
C	0.508 REF		
D	10.25	10.40	10.55
D1	2.85	3.00	3.15
D2	2.95	3.10	3.25
D3	0.75 REF		
E	9.75	9.90	10.05
E1	9.65	9.80	9.95
E2	8.95	9.10	9.25
E3	7.25	7.40	7.55
e	1.20 BSC		
F	1.05	1.20	1.35
H	11.55	11.70	11.85
H1	6.03	6.18	6.33
H2	6.85	7.00	7.15
H3	3.00 BSC		
L	1.55	1.70	1.85
L1	0.55	0.70	0.85
L2	0.45	0.60	0.75
L3	1.00	1.15	1.30
M	0.08 REF		
$\beta$	8°	10°	12°
K	4.25	4.40	4.55