



N 沟道增强型场效应晶体管

N-CHANNEL MOSFET

FHA28N50A

**主要参数 MAIN CHARACTERISTICS**

ID	28A
VDSS	500V
Rdson-typ ( @Vgs=10V)	0.14Ω
Qg-typ	102nC

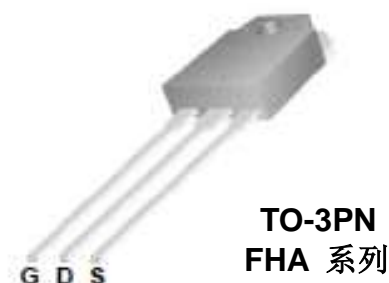
**产品特性 FEATURES**

低栅极电荷	Low gate charge
低 Crss (典型值 23pF)	Low Crss (typical 23pF)
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

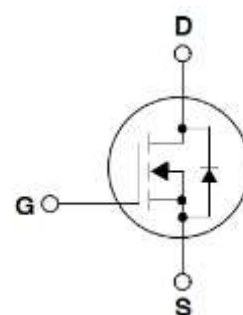
**用途 APPLICATIONS**

高频开关电源	High efficiency switch mode power supplies
逆变电源	Power management for inverter systems

**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
		FHA28N50A	
最高漏极-源极直流电压 Drain-Source Voltage	V <sub>DS</sub>	500	V
连续漏极电流* Drain Current -continuous *	I <sub>D</sub> (T <sub>C</sub> =25°C)	28	A
	I <sub>D</sub> (T <sub>C</sub> =100°C)	16.8	A
最大脉冲漏极电流 (注 1) Drain Current – pulse (note 1)	I <sub>DM</sub>	112	A
最高栅源电压 Gate-Source Voltage	V <sub>GS</sub>	±30	V
单脉冲雪崩能量 (注 2) Single Pulsed Avalanche Energy (note 2)	E <sub>AS</sub>	618	mJ
雪崩电流 (注 1) Avalanche Current (note 1)	I <sub>AR</sub>	28	A
重复雪崩能量 (注 1) Repetitive Avalanche Current (note 1)	E <sub>AR</sub>	43	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	4.5	V/ns
耗散功率 Power Dissipation	P <sub>D</sub> (T <sub>C</sub> =25°C)	479	W
	-Derate above 25°C	3.83	W/°C
最高结温及存储温度 Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	150, -55 to 150	°C
引线最高焊接温度 Maximum Lead Temperature for Soldering Purposes	T <sub>L</sub>	300	°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
<b>关态特性 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	500	-	-	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	-	0.5	-	V/°C
零栅压下漏极漏电流 Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =500V, V <sub>GS</sub> =0V, T <sub>C</sub> =25°C	-	-	1	μA
		V <sub>DS</sub> =400V, 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> =±30V	-	-	±100	nA
<b>通态特性 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	-	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> =14A	-	0.14	0.18	Ω
正向跨导 Forward Transconductance	g <sub>fs</sub>	V <sub>DS</sub> = 40V, I <sub>D</sub> =14A (note 4)	-	28	-	S
<b>动态特性 Dynamic Characteristics</b>						
输入电容 Input capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1.0MHz	-	4085	-	pF
输出电容 Output capacitance	C <sub>oss</sub>		-	474	-	
反向传输电容 Reverse transfer capacitance	C <sub>rss</sub>		-	60	-	
<b>开关特性 Switching Characteristics</b>						
延迟时间 Turn-On delay time	t <sub>d(on)</sub>	V <sub>DS</sub> =250V, I <sub>D</sub> =28A, R <sub>G</sub> =25Ω V <sub>GS</sub> =10V (note 4, 5)	-	45	-	ns
上升时间 Turn-On rise time	t <sub>r</sub>		-	87	-	ns
延迟时间 Turn-Off delay time	t <sub>d(off)</sub>		-	355	-	ns
下降时间 Turn-Off Fall time	t <sub>f</sub>		-	130	-	ns
栅极电荷总量 Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =400V , I <sub>D</sub> =28A , V <sub>GS</sub> =10V (note 4, 5)	-	102	-	nC
栅-源电荷 Gate-Source charge	Q <sub>gs</sub>		-	43	-	nC
栅-漏电荷 Gate-Drain charge	Q <sub>gd</sub>		-	20	-	nC
<b>漏-源二极管特性及最大额定值 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>	-	-	28	A
正向最大脉冲电流 Maximum Pulsed Drain-Source Diode Forward Current		I <sub>SM</sub>	-	-	112	A
正向压降 Drain-Source Diode Forward Voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =28A	-	-	1.4	V
反向恢复时间 Reverse recovery time	t <sub>rr</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =28A ,dI <sub>F</sub> /dt=100A/μs (note 4)	-	656	-	ns
反向恢复电荷 Reverse recovery charge	Q <sub>rr</sub>		-	11.5	-	μC

## 热特性 THERMAL CHARACTERISTIC

项目 Parameter	符号 Symbol	FHF28N50A	单位 Unit
结到管壳的热阻 Thermal Resistance, Junction to Case	Rth(j-c)	0.26	°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=12mH, IAS=4A, VDD=50V, RG=25 Ω, 起始结温 TJ=25°C
- 3: ISD ≤18A, di/dt ≤200A/μs, VDD≤BV<sub>DSS</sub>, 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=12mH, IAS=4A, VDD=50V, RG=25 Ω, Start TJ=25°C;
- 3: ISD ≤18A, di/dt ≤200A/μs, VDD≤BV<sub>DSS</sub>, Starting TJ=25°C
- 4: Pulse Test: Pulse Width ≤300μs, Duty Cycle≤2%
- 5: Essentially independent of operating temperature

# 特性曲线

## (ELECTRICAL CHARACTERISTICS (curves))

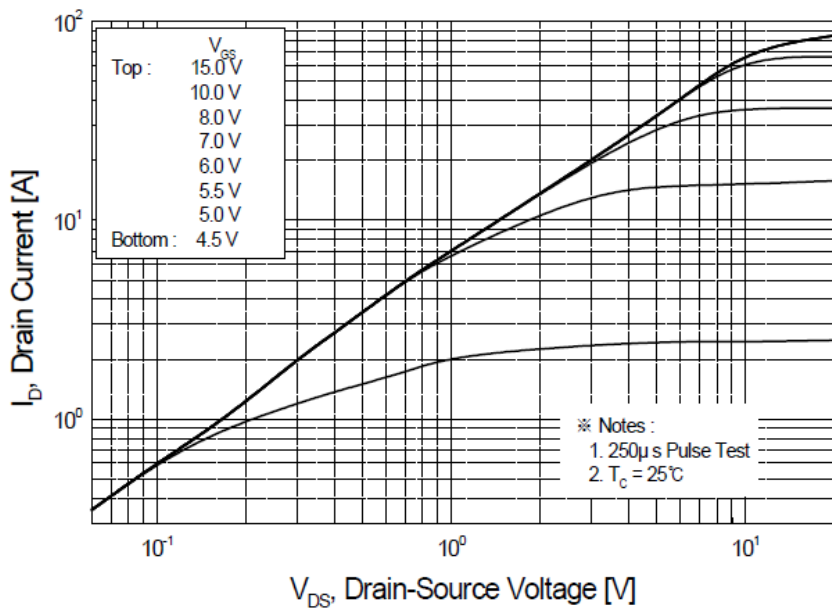


Figure 1. On-Region Characteristics

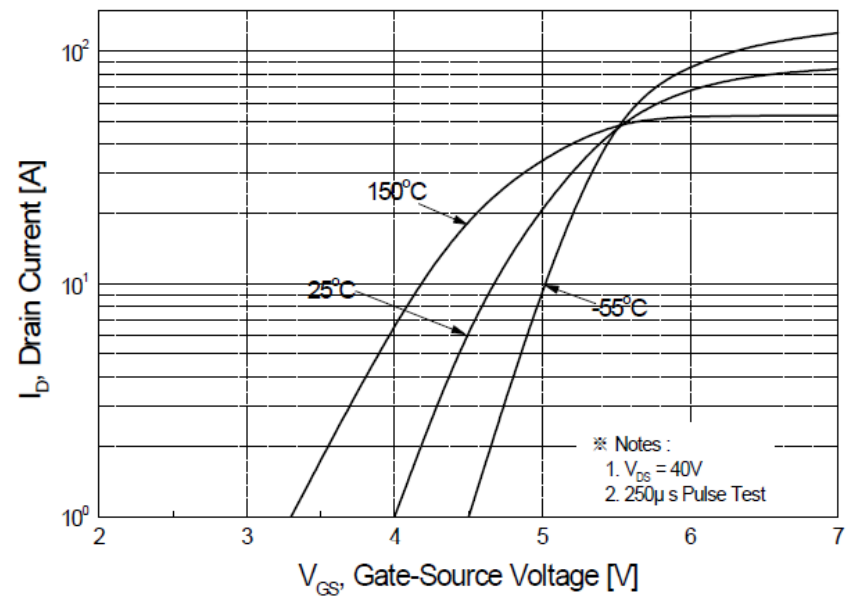


Figure 2. Transfer Characteristics

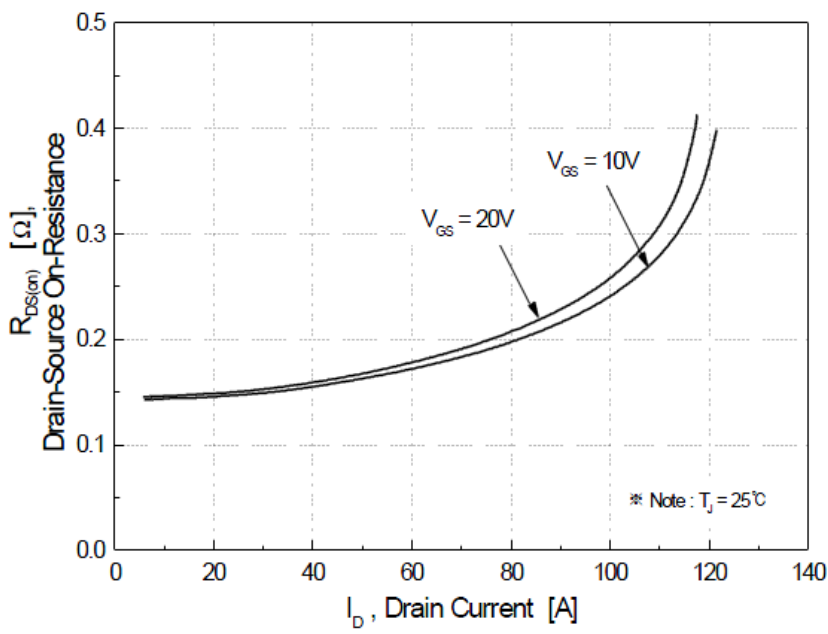


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

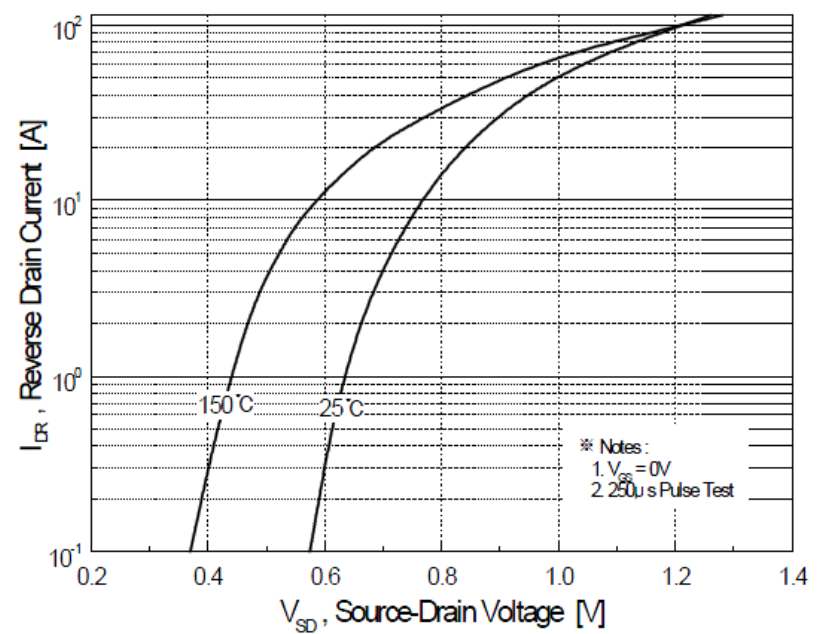


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

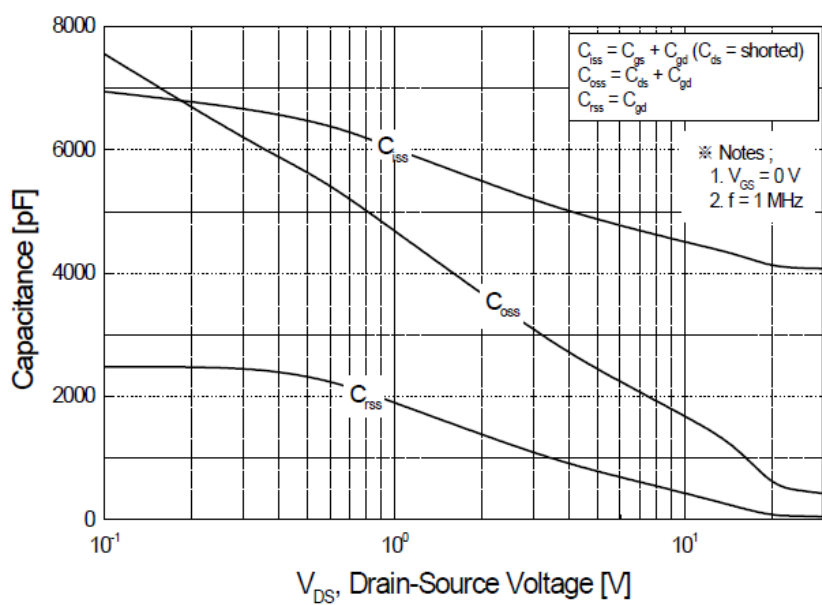


Figure 5. Capacitance Characteristics

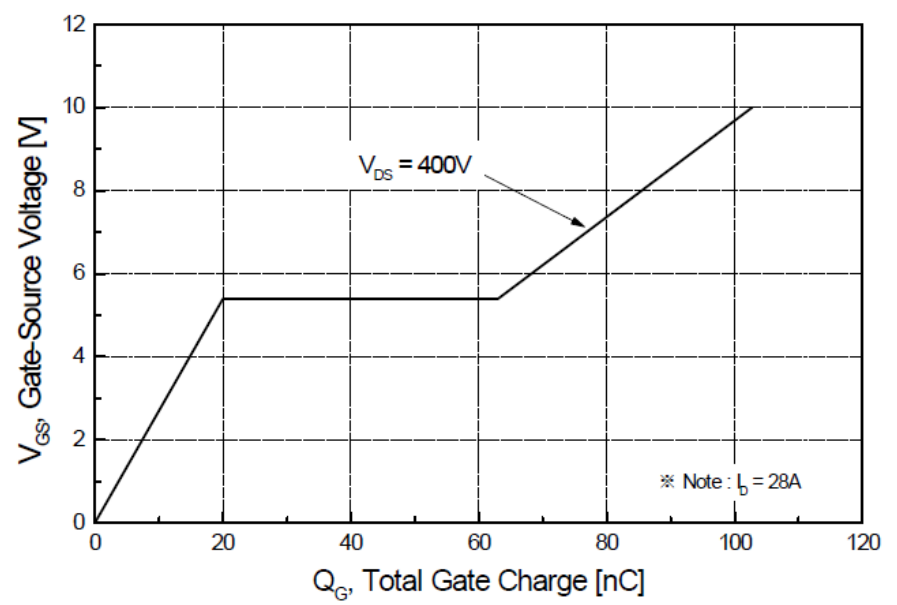
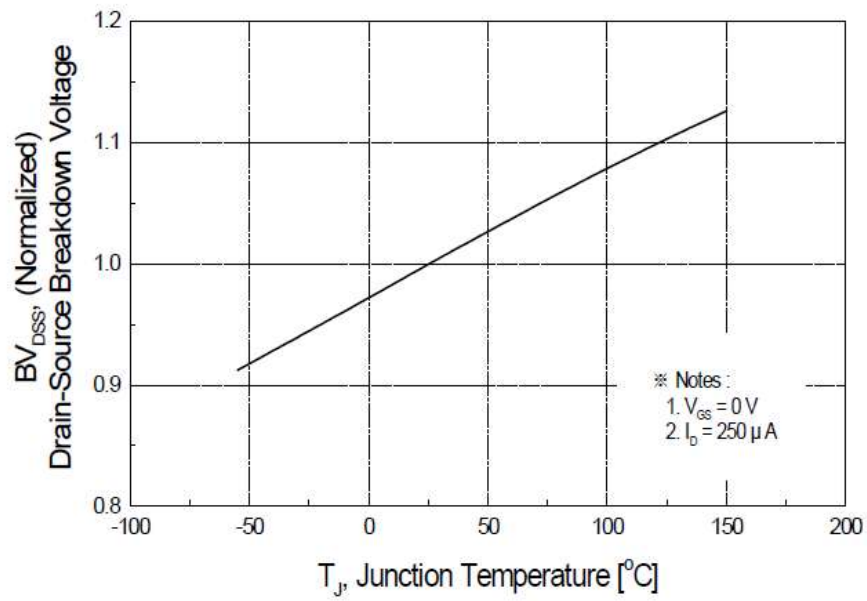
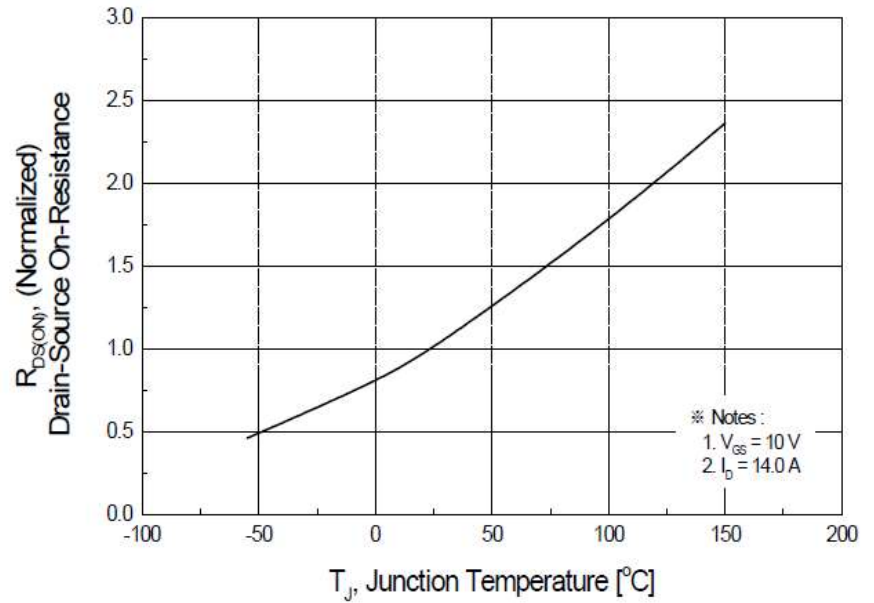


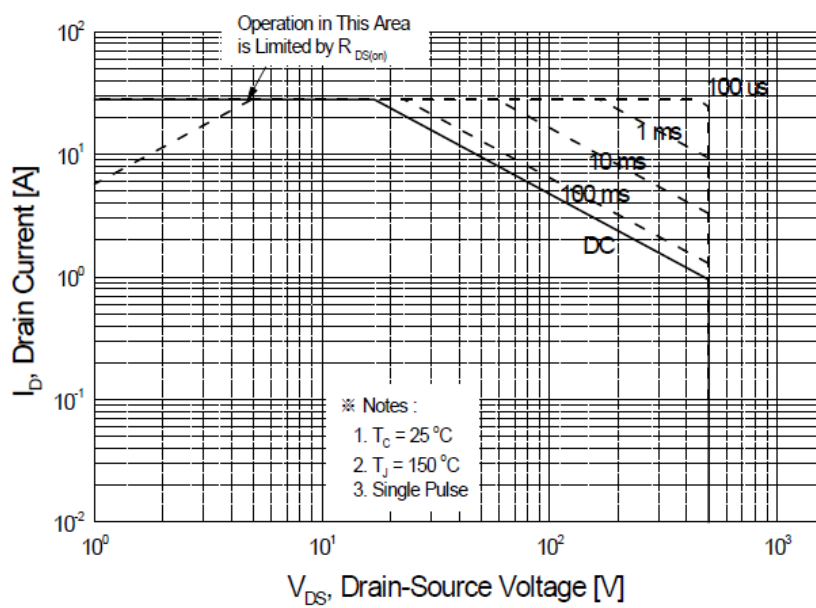
Figure 6. Gate Charge Characteristics



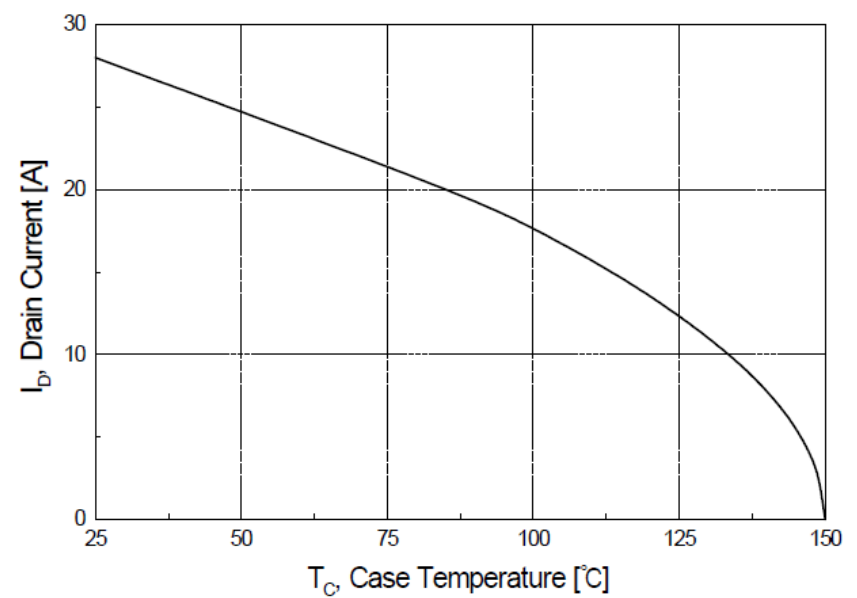
**Figure 7. Breakdown Voltage Variation vs Temperature**



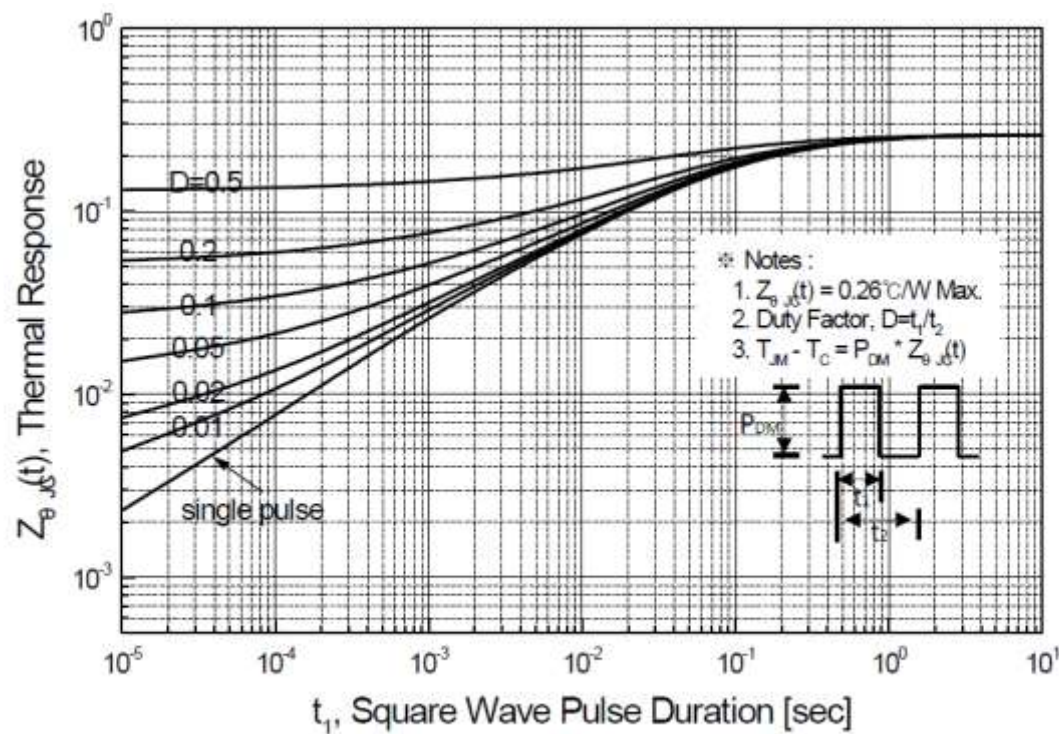
**Figure 8. On-Resistance Variation vs Temperature**



**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

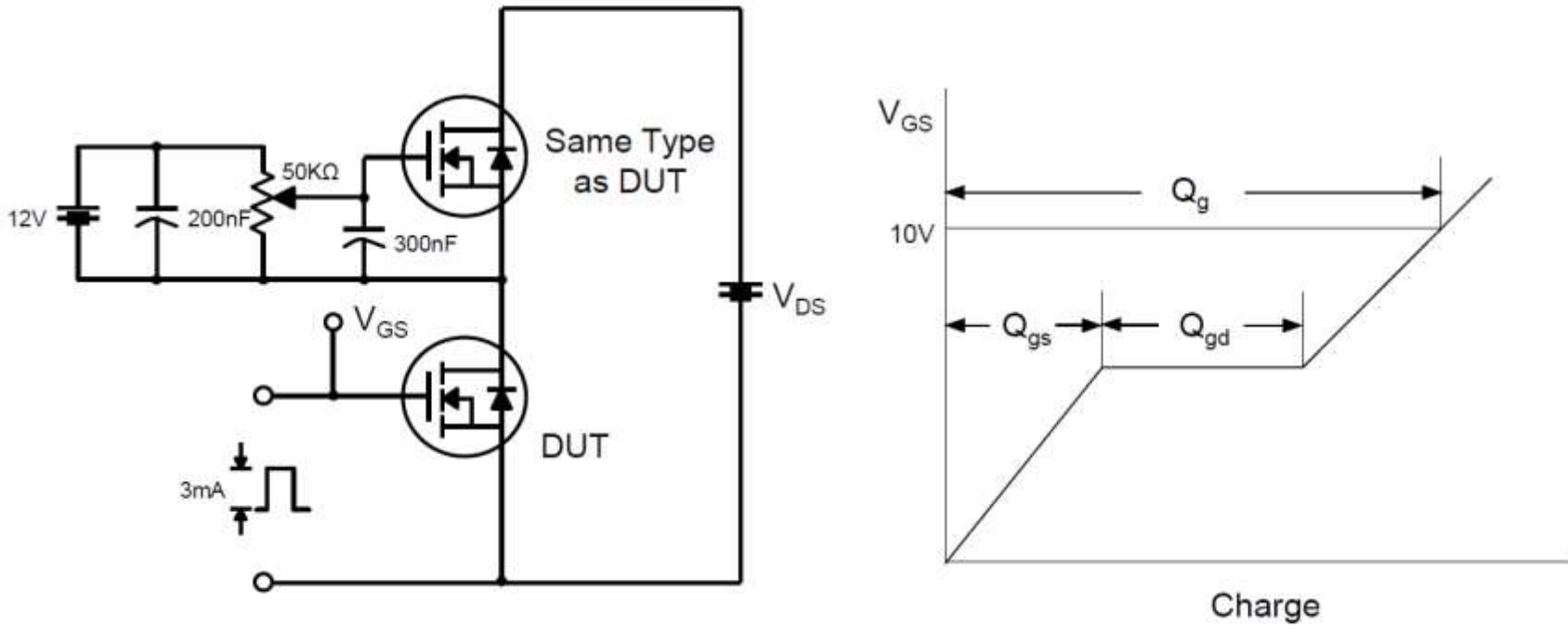


Fig 13. Resistive Switching Test Circuit & Waveforms

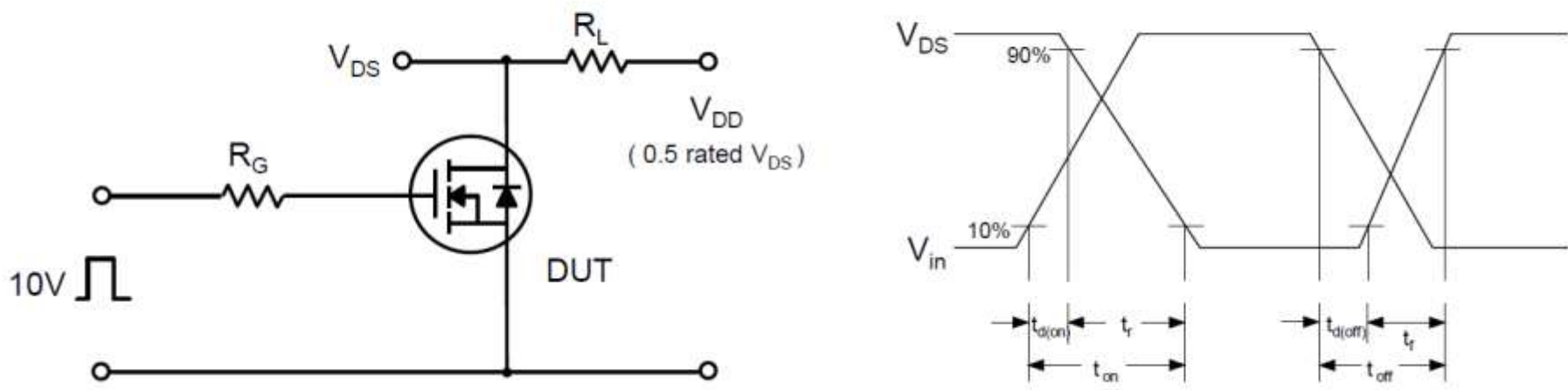


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

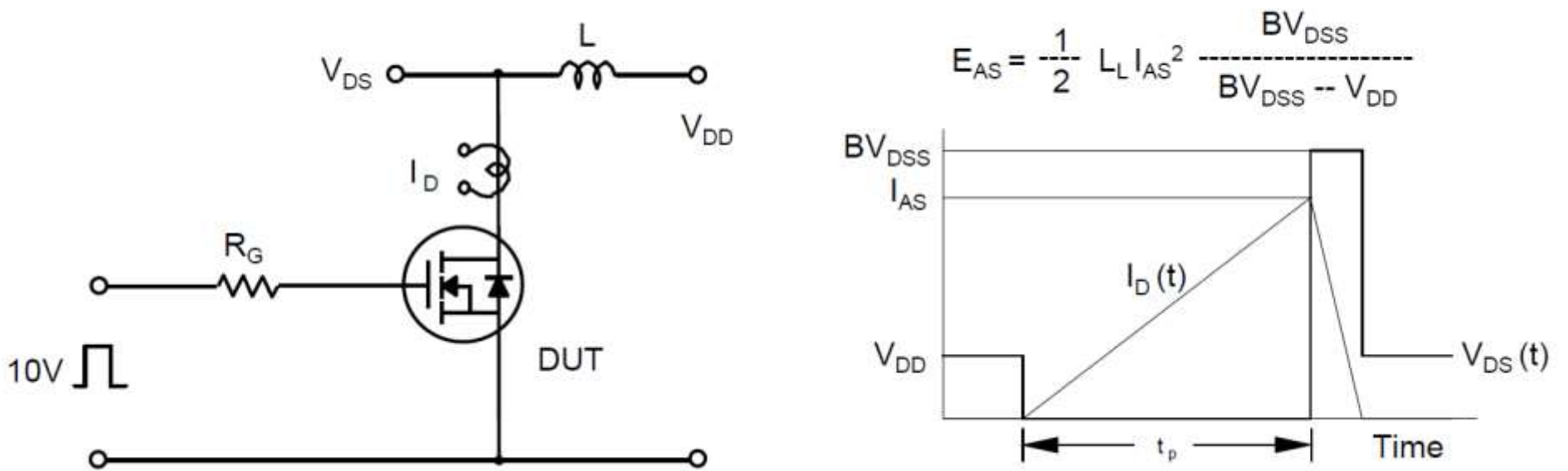
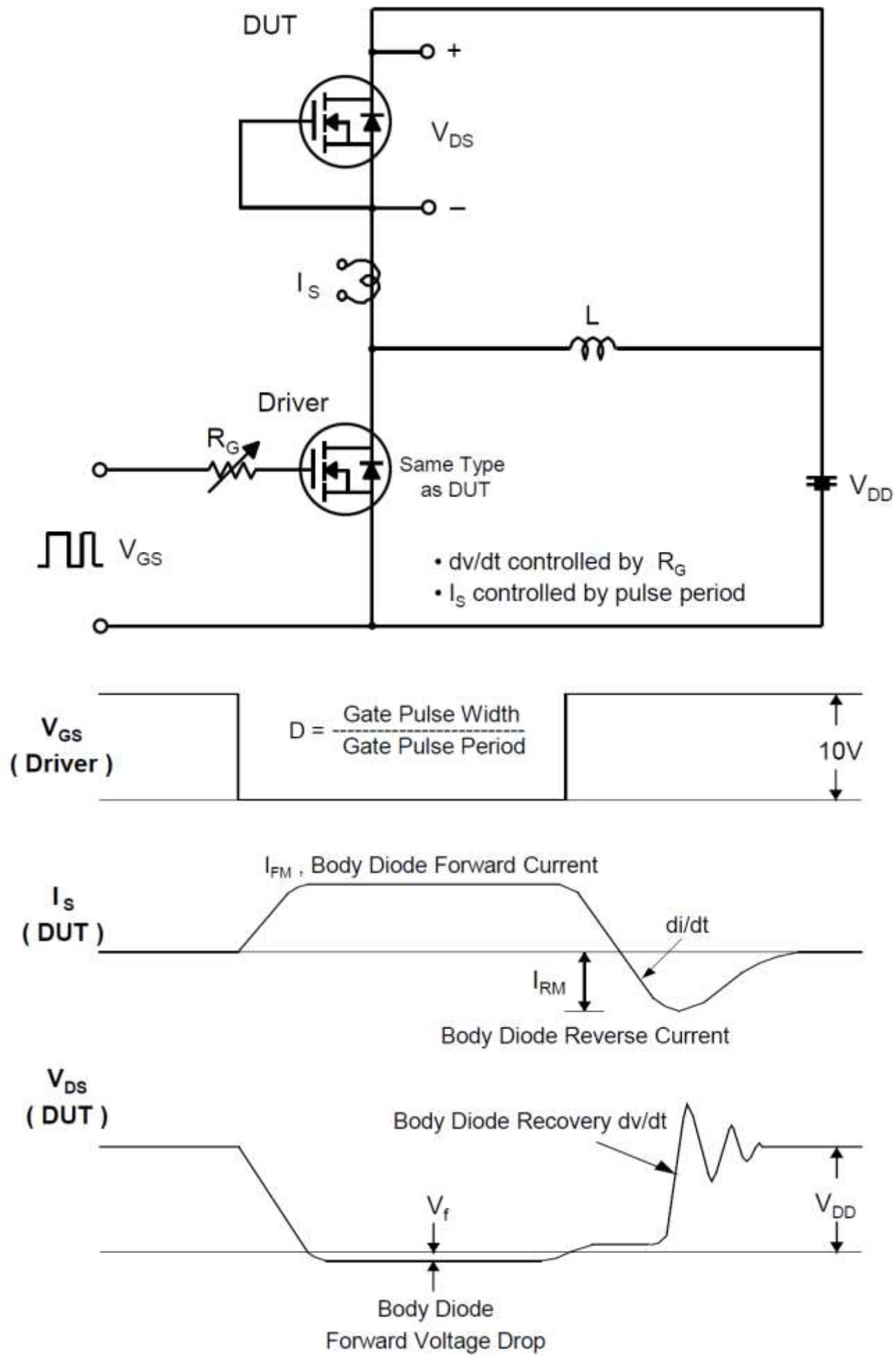
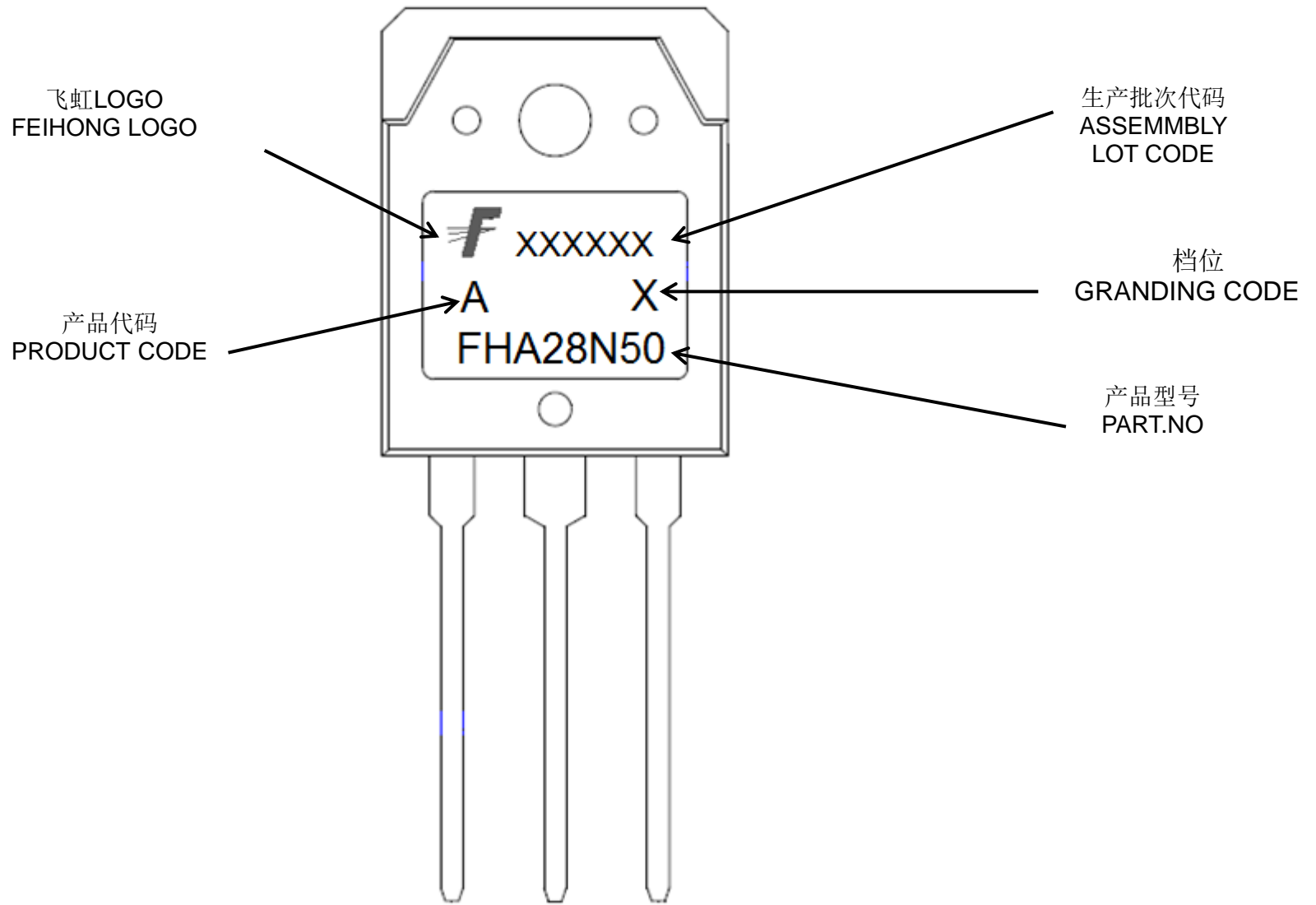


Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms



印记 Marking:

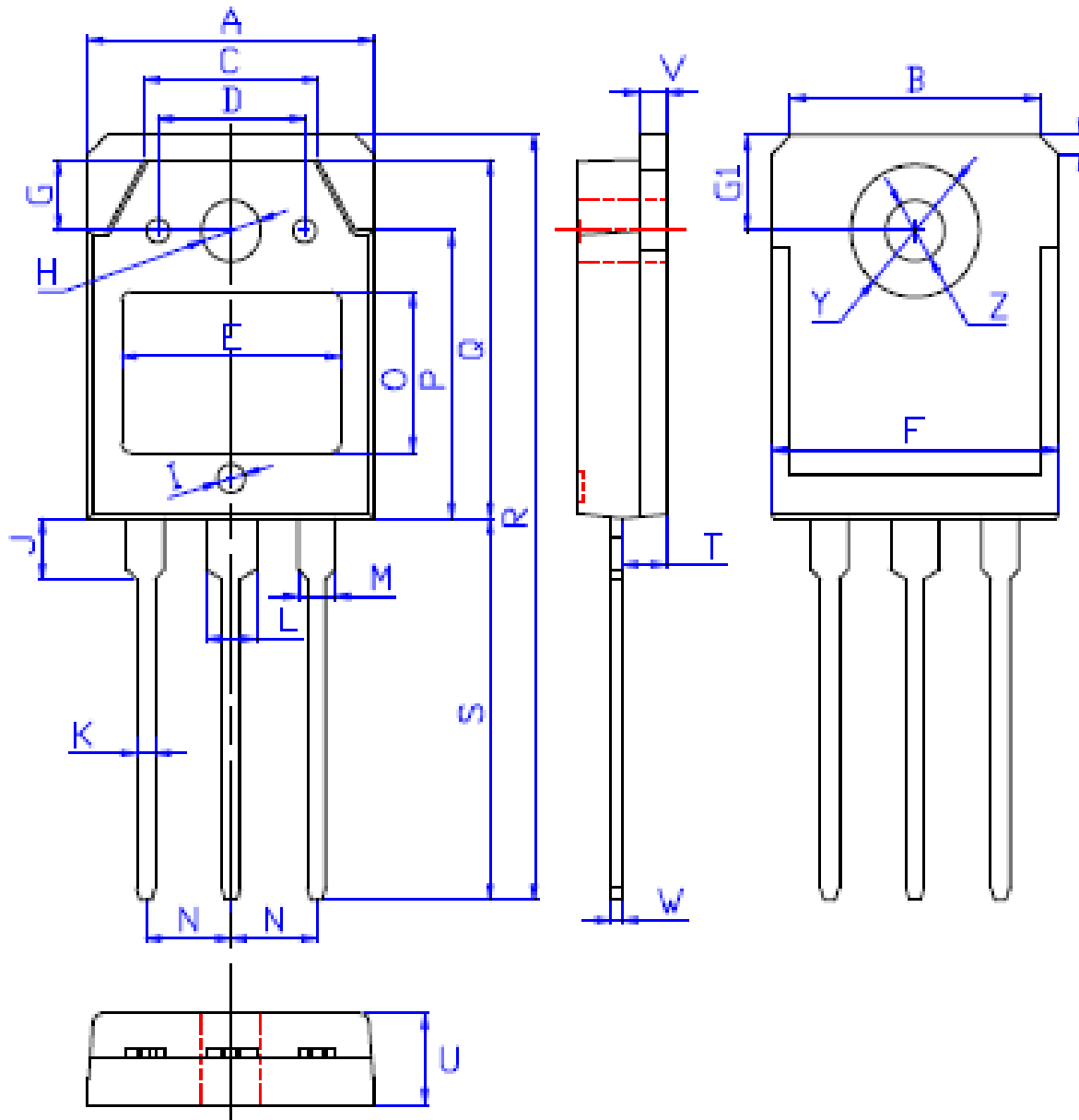




外形尺寸:

Package Dimension:

TO-3PN



DIM	MILLIMETERS
A	15.60 ± 0.30
B	13.60 ± 0.30
C	9.50 ± 0.30
D	8.00 ± 0.30
E	11.85 ± 0.30
F	15.65 ± 0.30
G	3.80 ± 0.30
G1	5.00 ± 0.30
H	φ 3.50 ± 0.30
I	φ 1.50 ± 0.30 深 0.15 ± 0.15
J	3.20 ± 0.30
K	1.00 ± 0.15
L	3.10 ± 0.15
M	2.10 ± 0.15
N	5.45 ± 0.30
O	8.40 ± 0.30
P	13.90 ± 0.30
Q	18.70 ± 0.30
R	40.00 ± 0.60
S	20.00 ± 0.40
T	2.40 ± 0.30
U	4.80 ± 0.30
V	1.50 ± 0.15
W	0.60 ± 0.15
X	1.80 ± 0.40
Y	7.00 ± 0.30
Z	3.20 ± 0.30

(Unit: mm)