



N 沟道增强型场效应晶体管

N-CHANNEL MOSFET

FHD15N10A

主要参数 MAIN CHARACTERISTICS

ID	15 A
VDSS	100 V
Rdson-typ (@Vgs=10V)	78mΩ
Rdson-typ (@Vgs=4.5V)	82mΩ
Qg-typ	15.6nC

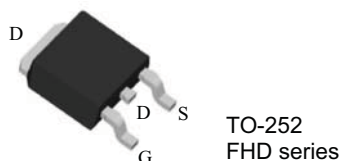
产品特性 FEATURES

低栅极电荷	Low gate charge
低 Crss (典型值 36pF)	Low Crss (typical 36pF)
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

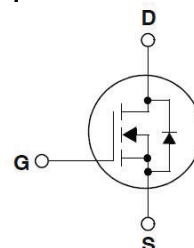
用途 APPLICATIONS

高频开关电源	High efficiency switch mode power supplies
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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
		FHD15N10A	
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°C)	15	A
	ID (Tc=100°C)	9	A
最大脉冲漏极电流 (注 1) Drain Current - pulse (note 1)	IDM	40	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	42	mJ
雪崩电流 (注 1) Avalanche Current (note 1)	IAR	6.5	A
重复雪崩能量 (注 1) Repetitive Avalanche Current (note 1)	EAR	6	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°C) -Derate above 25°C	50	W
		0.33	W/°C
最高结温及存储温度 Operating and Storage Temperature Range	TJ, TSTG	-55~+175	°C
引线最高焊接温度 Maximum Lead Temperature for Soldering Purposes	TL	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
关态特性 Off –Characteristics						
漏—源击穿电压 Drain-Source Voltage	BVDSS	$I_D=250\mu A, V_{GS}=0V$	100	-	-	V
击穿电压温度特性 Breakdown Voltage Temperature Coefficient	$\Delta BVDSS/\Delta T_J$	$I_D=250\mu A$, referenced to 25°C	-	0.1	-	V/°C
零栅压下漏极漏电流 Zero Gate Voltage Drain Current	IDSS	$V_{DS}=100V, V_{GS}=0V, T_C=25^\circ C$	-	-	1	μA
		$V_{DS}=80V, T_C=125^\circ C$	-	-	10	μA
栅极体漏电流 Gate-body leakage current	IGSS (F/R)	$V_{DS}=0V, V_{GS}=\pm 20V$	-	-	± 100	nA
通态特性 On-Characteristics						
阈值电压 Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D=250\mu A$	1.0	-	2.5	V
静态导通电阻 Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS} = 10V, I_D=8A$	-	78	90	m Ω
	$R_{DS(ON)}$	$V_{GS} = 4.5V, I_D=5A$	-	82	100	m Ω
正向跨导 Forward Transconductance	gfs	$V_{DS} = 10V, I_D=8A$ (note 4)	10	-	-	S
动态特性 Dynamic Characteristics						
栅电阻 Gate Resistance	Rg	$f=1.0MHz, V_{DS} OPEN$	-	2.6	-	Ω
输入电容 Input capacitance	Ciss	$V_{DS}=30V, V_{GS}=0V, f=1.0MHz$	-	525	-	pF
输出电容 Output capacitance	Coss		-	41	-	
反向传输电容 Reverse transfer capacitance	Crss		-	36	-	
开关特性 Switching Characteristics						
延迟时间 Turn-On delay time	td(on)	$V_{DS}=50V, I_D=1A, R_G=6.8\Omega, V_{GS}=4.5V$ (note 4, 5)	-	8	-	ns
上升时间 Turn-On rise time	tr		-	4.5	-	ns
延迟时间 Turn-Off delay time	td(off)		-	26	-	ns
下降时间 Turn-Off Fall time	tf		-	3.8	-	ns
栅极电荷总量 Total Gate Charge	Qg	$V_{DS} = 50V, I_D=3A, V_{GS} = 10V$ (note 4, 5)	-	15.6	-	nC
栅—源电荷 Gate-Source charge	Qgs		-	3.2	-	nC
栅—漏电荷 Gate-Drain charge	Qgd		-	4.4	-	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		IS	-	-	15	A
正向最大脉冲电流 Maximum Pulsed Drain-Source Diode Forward Current		ISM	-	-	60	A
正向压降 Drain-Source Diode Forward Voltage	VSD	$V_{GS}=0V, I_S=8A$	-	0.82	1.2	V
反向恢复时间 Reverse recovery time	trr	$V_{GS}=0V, I_S=15A, dI_F/dt=100A/\mu s$ (note 4)	-	25	-	ns
反向恢复电荷 Reverse recovery charge	Qrr		-	115	-	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)	5	°C/W
结到环境的热阻 Thermal Resistance, Junction to Ambient	Rth(j-A)	60	°C/W

注释:

- 1: 脉冲宽度由最高结温限制
- 2: L=1mH, I_{AS}=6.5A, V_{DD}=50V, R_G=25 Ω, 起始结温 T_J=25°C
- 3: I_{SD} ≤15A, di/dt ≤200A/μs, V_{DD} ≤BV_{DSS}, 起始结温 T_J=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, I_{AS}=6.5A, V_{DD}=50V, R_G=25 Ω, Starting T_J=25°C
- 3: I_{SD} ≤15A, di/dt ≤200A/μs, V_{DD} ≤BV_{DSS}, Starting T_J=25°C
- 4: Pulse Test: Pulse Width ≤300μs, Duty Cycle ≤2%
- 5: Essentially independent of operating temperature

Typical Characteristics

典型特性曲线

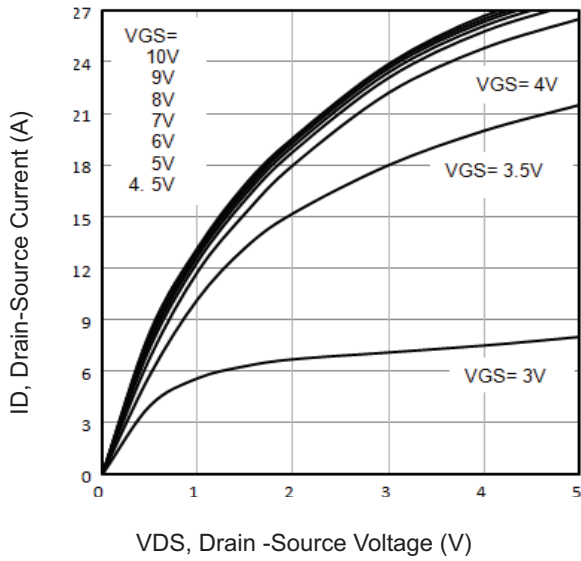


Fig1. Typical Output Characteristics

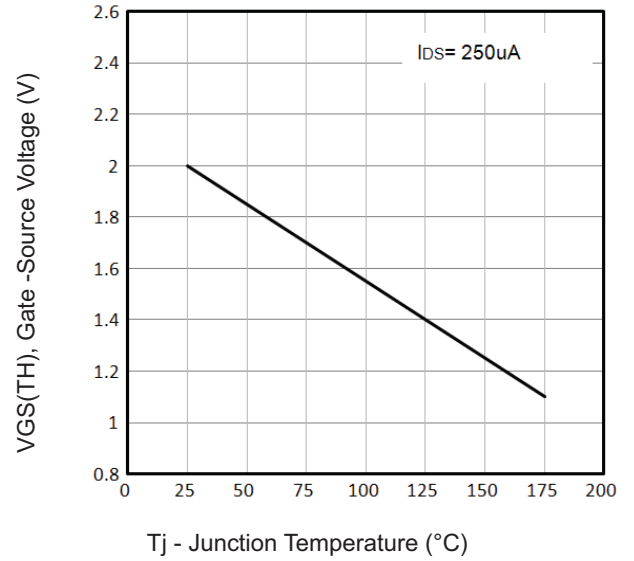


Fig2. $V_{GS(TH)}$ Gate-Source Voltage Vs. T_j

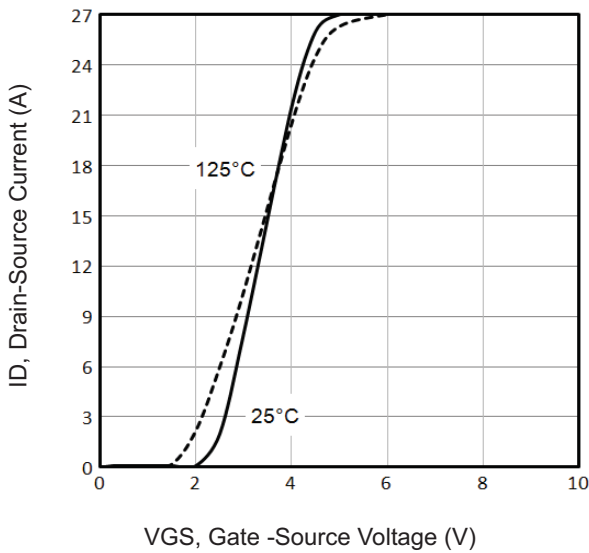


Fig3. Typical Transfer Characteristics

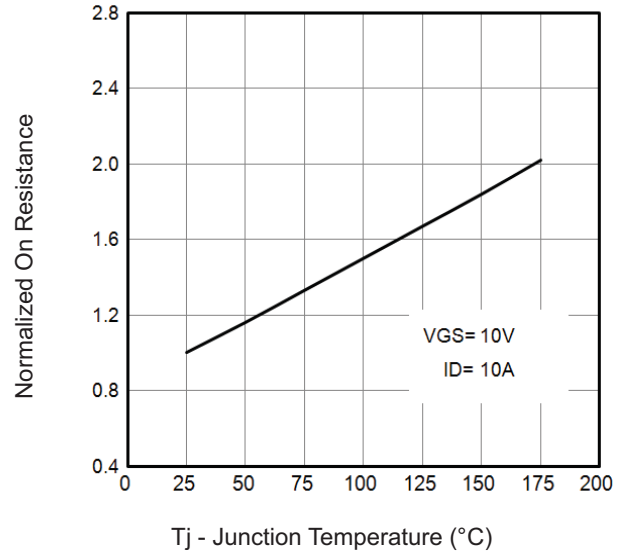


Fig4. Normalized On-Resistance Vs. T_j

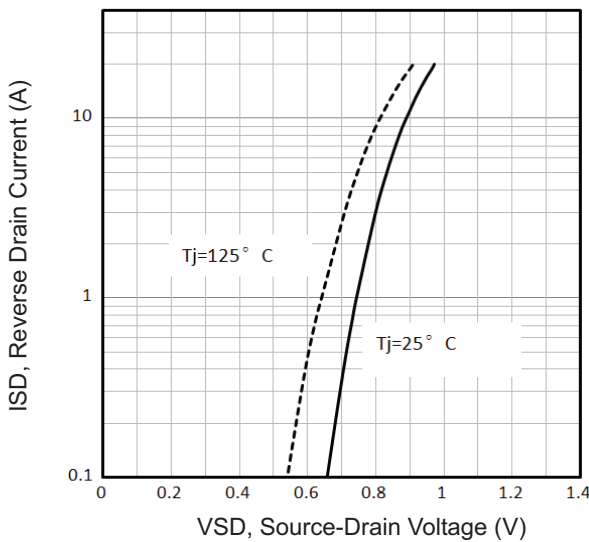


Fig5. Typical Source-Drain Diode Forward Voltage

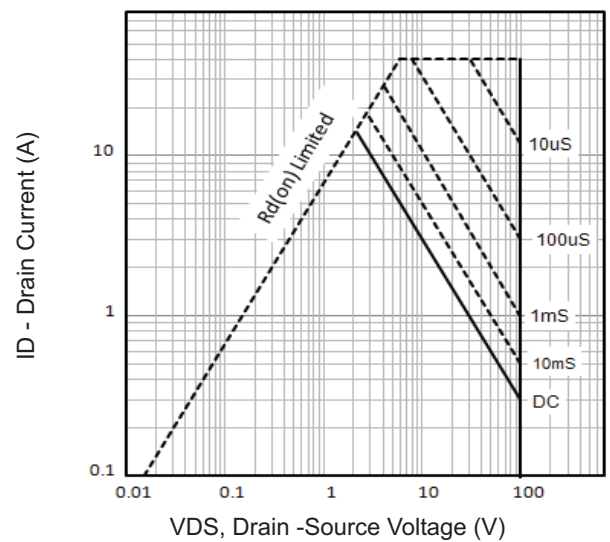


Fig6. Maximum Safe Operating Area

Typical Characteristics (continued)

典型特性曲线 (续)

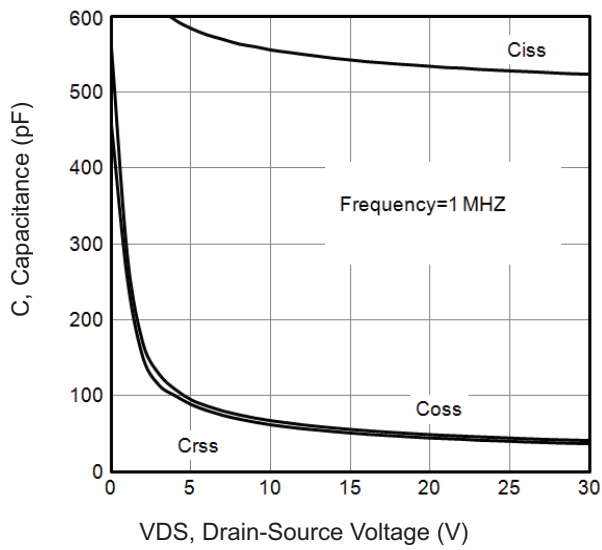


Fig7. Typical Capacitance Vs. Drain-Source Voltage

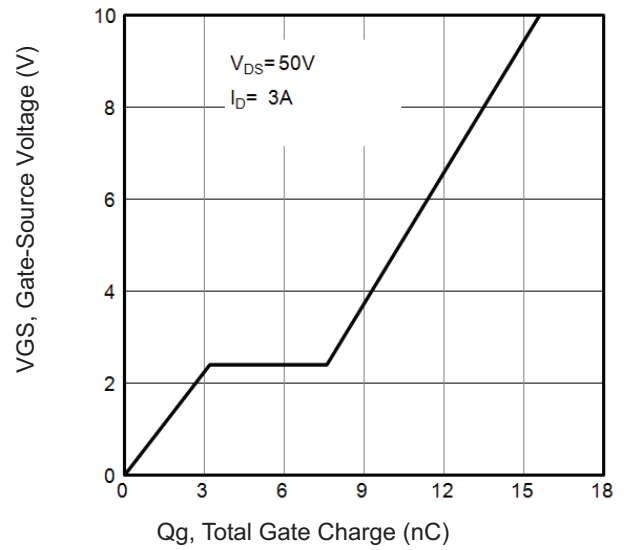


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

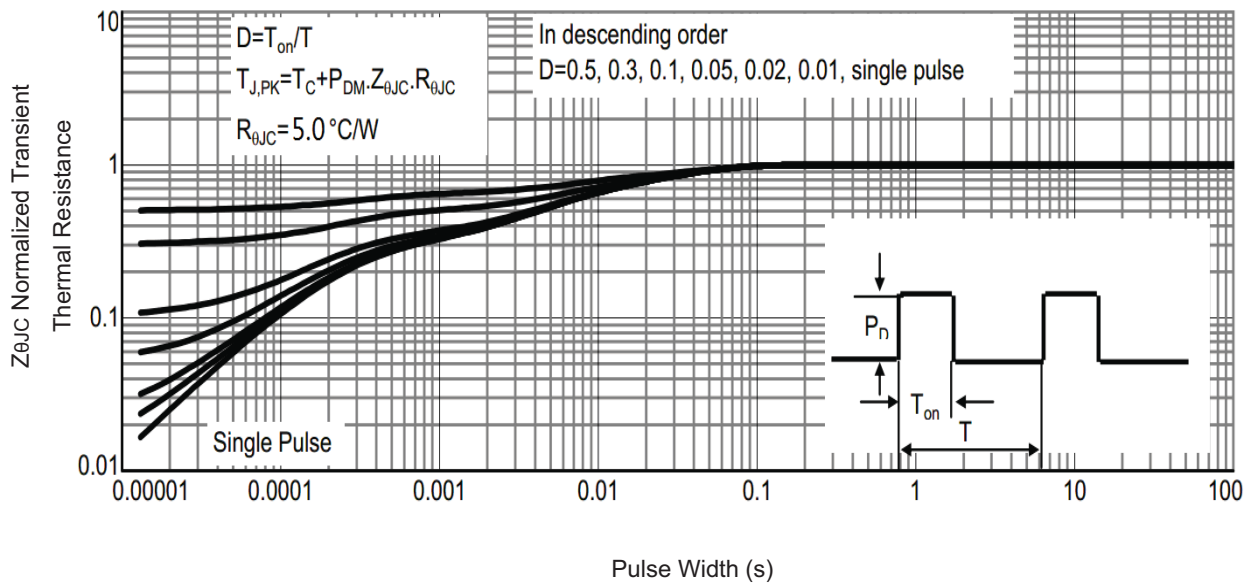


Fig9. Normalized Maximum Transient Thermal Impedance

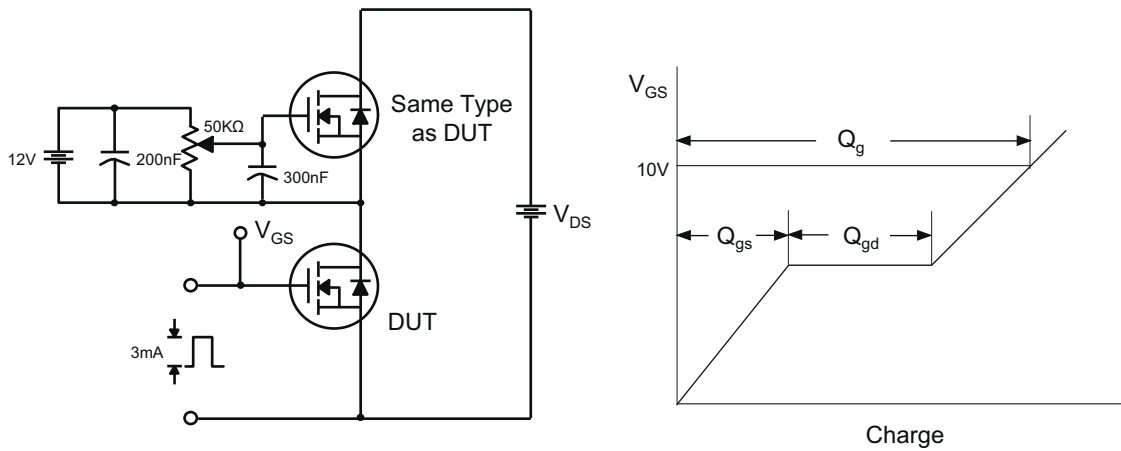


Fig 10. Gate Charge Test Circuit & Waveform

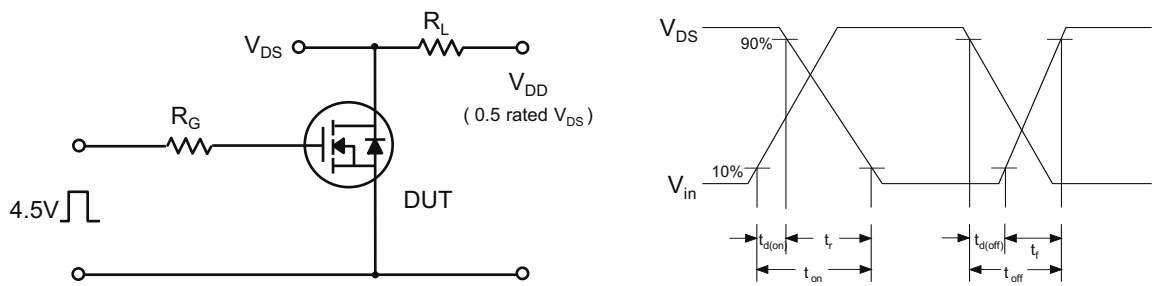


Fig 11. Resistive Switching Test Circuit & Waveforms

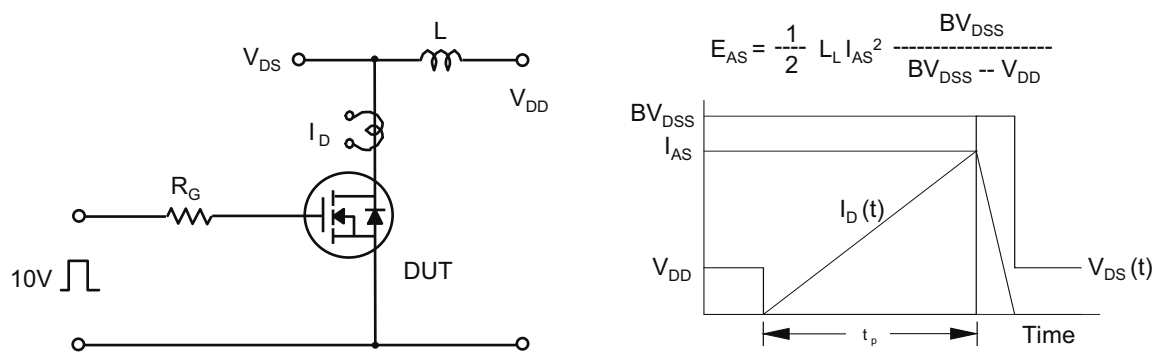


Fig 12. Unclamped Inductive Switching Test Circuit & Waveforms

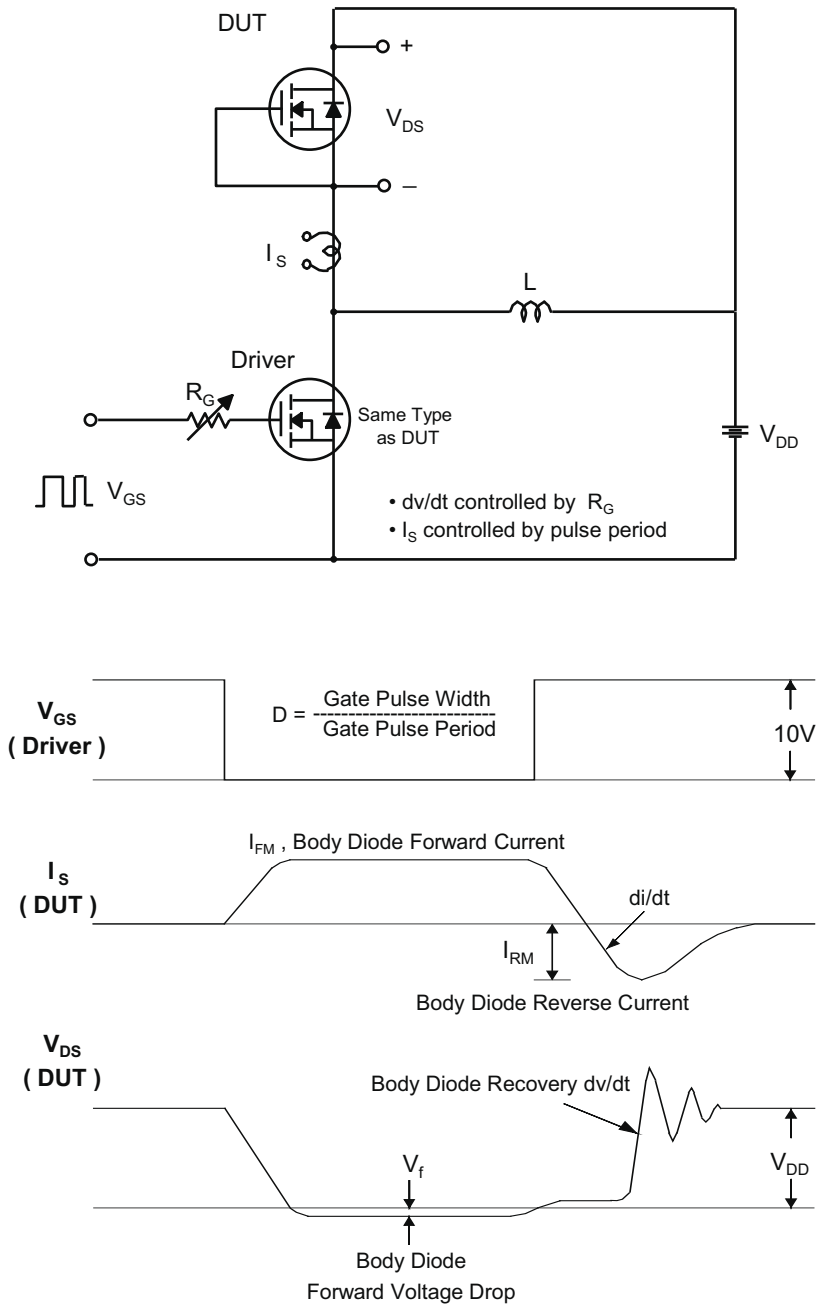
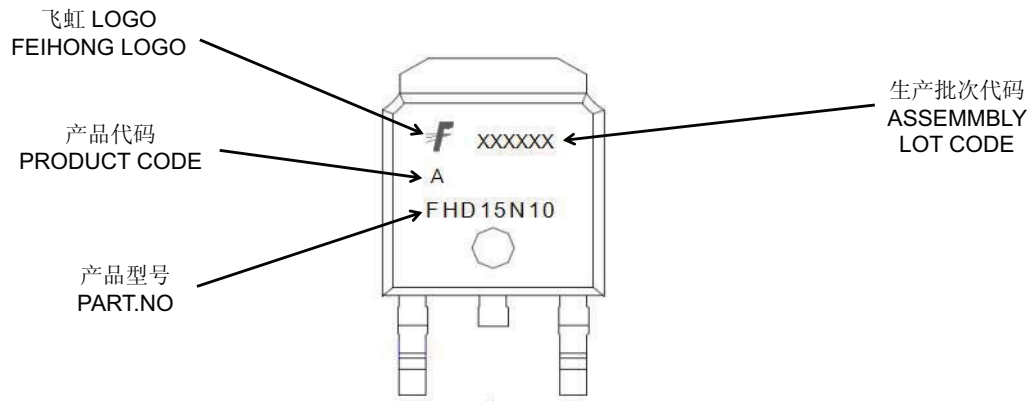


Fig 13. Peak Diode Recovery dv/dt Test Circuit & Waveforms

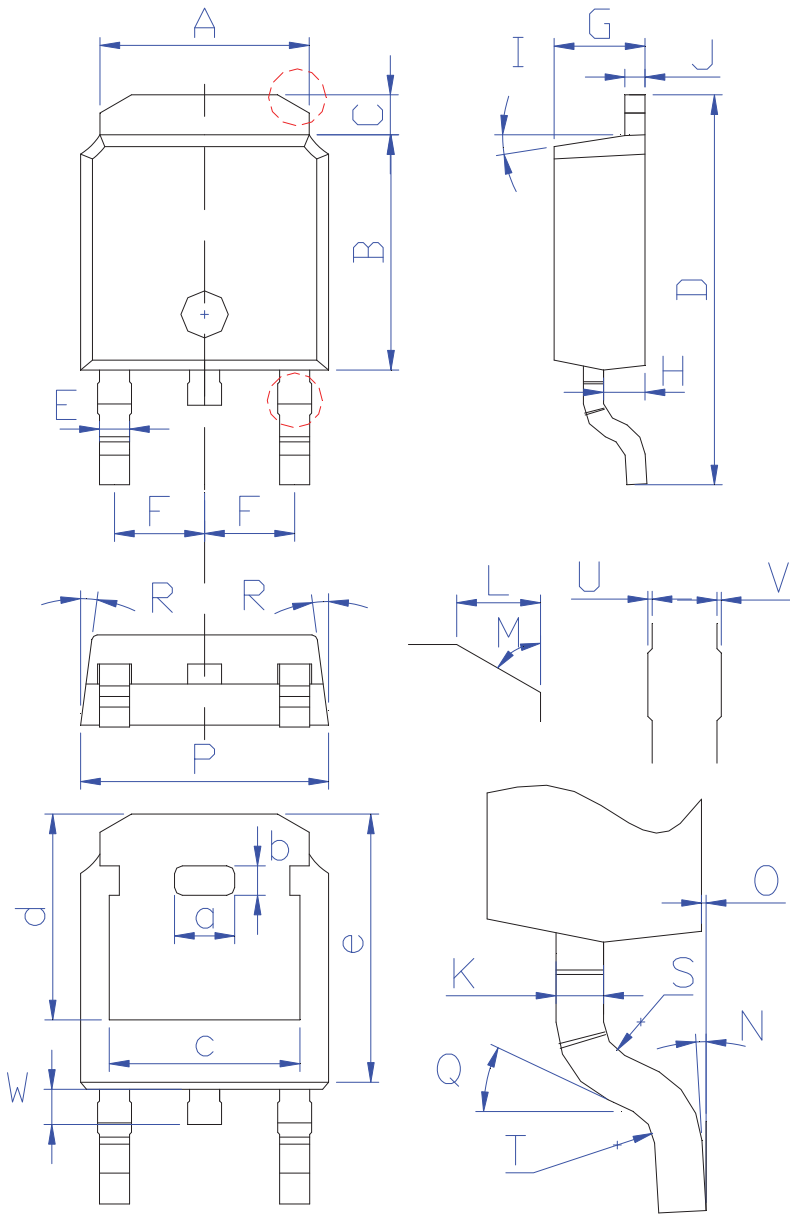
印记 Marking:



外形尺寸:

Package Dimension:

TO-252



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)