



# N 沟道增强型场效应晶体管

## N-CHANNEL MOSFET

### FHU120N03C/FHD120N03C

#### 主要参数 MAIN CHARACTERISTICS

ID	120 A
VDSS	30 V
Rdson-typ ( @Vgs=10V)	3.0mΩ
Rdson-typ ( @Vgs=4.5V)	3.7mΩ
Qg-typ	48nC

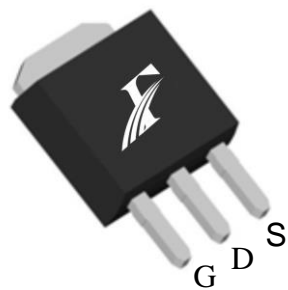
#### 产品特性 FEATURES

低栅极电荷	Low gate charge
低 Crss (典型值 120pF)	Low Crss (typical 120pF)
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

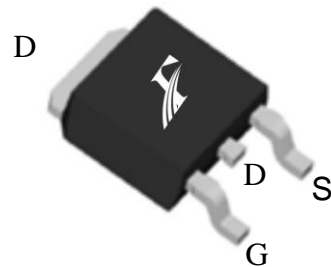
#### 用途 APPLICATIONS

逆变电源	Power management for inverter systems
DC-DC转换器和功率开关	DC-DC converter and switch mode power supplies

#### 封装形式 Package

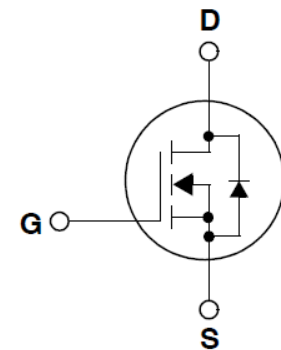


TO-251  
FHU series



TO-252  
FHD series

#### 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
		FHU120N03C	FHD120N03C	
最高漏极-源极直流电压 Drain-Source Voltage	VDS	30		V
连续漏极电流* Drain Current -continuous *	ID (Tc=25°C)	120		A
	ID (Tc=100°C)	84		A
最大脉冲漏极电流 (注 1) Drain Current - pulse (note 1)	IDM	480		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	420		mJ
雪崩电流 (注 1) Avalanche Current (note 1)	IAR	13		A
重复雪崩能量 (注 1) Repetitive Avalanche Current (note 1)	EAR	9.4		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)	45		W
	-Derate above 25°C	0.26		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 <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	30	-	-	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	-	0.03	-	V/°C
零栅压下漏极漏电流 Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V, T <sub>C</sub> =25°C	-	-	1	μA
		V <sub>DS</sub> =24V, T <sub>C</sub> =125°C	-	-	10	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> =±25V	-	-	±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	0.9	1.2	1.5	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> =20A	-	3.0	4	mΩ
		V <sub>GS</sub> =4.5V , I <sub>D</sub> =16A	-	3.7	6.5	mΩ
正向跨导 Forward Transconductance	g <sub>fs</sub>	V <sub>DS</sub> = 10V, I <sub>D</sub> =20A (note 4)	50	-	-	S
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	-	1.3	-	Ω
输入电容 Input capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1.0MHz	-	3550	-	pF
输出电容 Output capacitance	C <sub>oss</sub>		-	1350	-	
反向传输电容 Reverse transfer capacitance	C <sub>rss</sub>		-	120	-	
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> =15V, I <sub>D</sub> =20A, R <sub>G</sub> =6Ω V <sub>GS</sub> =10V (note 4, 5)	-	15	-	ns
上升时间 Turn-On rise time	t <sub>r</sub>		-	20	-	ns
延迟时间 Turn-Off delay time	t <sub>d(off)</sub>		-	65	-	ns
下降时间 Turn-Off Fall time	t <sub>f</sub>		-	70	-	ns
栅极电荷总量 Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =15V , I <sub>D</sub> =20A , V <sub>GS</sub> =10V (note 4, 5)	-	48	-	nC
栅-源电荷 Gate-Source charge	Q <sub>gs</sub>		-	11	-	nC
栅-漏电荷 Gate-Drain charge	Q <sub>gd</sub>		-	10	-	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> =20A	-	0.82	1.2	V
反向恢复时间 Reverse recovery time	t <sub>rr</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =20A ,dI <sub>F</sub> /dt=100A/μs (note 4)	-	20	-	ns
反向恢复电荷 Reverse recovery charge	Q <sub>rr</sub>		-	10	-	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)	1.25	°C/W
结到环境的热阻 Thermal Resistance, Junction to Ambient	Rth(j-A)	110	°C/W

注释:

- 1: 脉冲宽度由最高结温限制
- 2: L=1mH, IAS=13A, VDD=24V, RG=25 Ω, 起始结温 TJ=25°C
- 3: ISD ≤120A, di/dt ≤300A/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=13A, VDD=24V, RG=25 Ω, Starting TJ=25°C
- 3: ISD ≤120A, di/dt ≤300A/μs, VDD≤BVDS, Starting TJ=25°C
- 4: Pulse Test: Pulse Width ≤300μs, Duty Cycle≤2%
- 5: Essentially independent of operating temperatur

# 特性曲线

## (ELECTRICAL CHARACTERISTICS (curves))

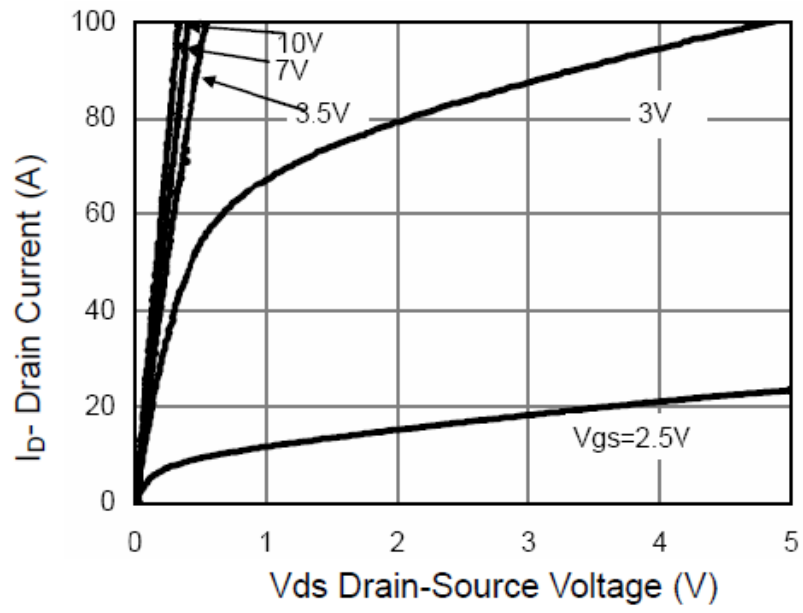


Figure 1 Output Characteristics

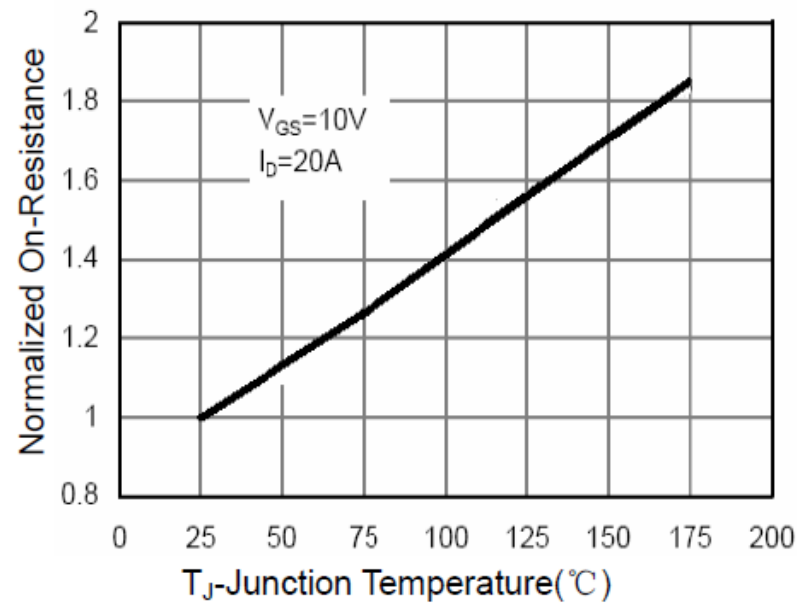


Figure 4  $R_{dson}$ -Junction Temperature

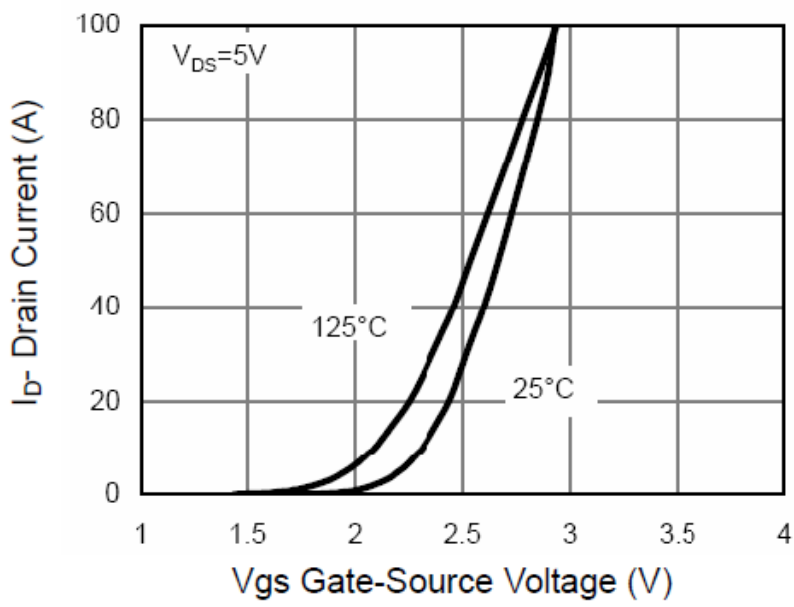


Figure 2 Transfer Characteristics

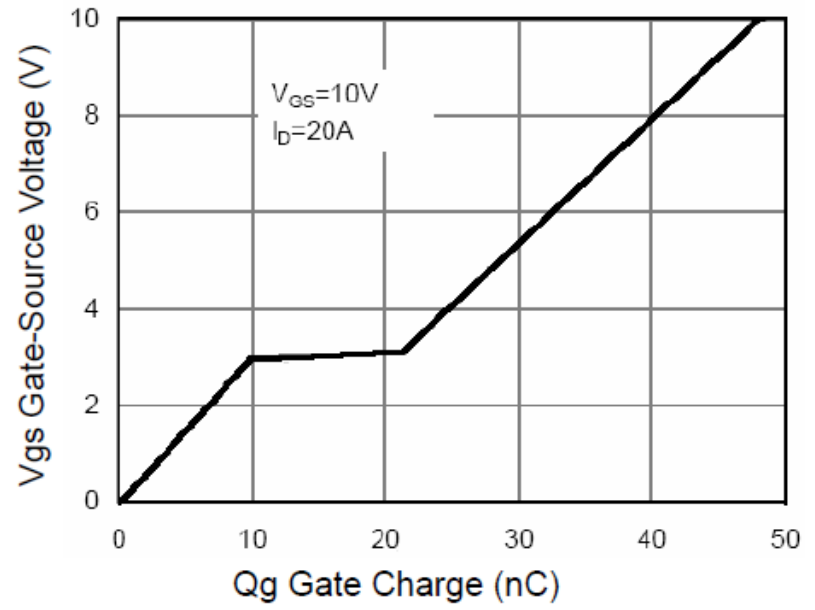


Figure 5 Gate Charge

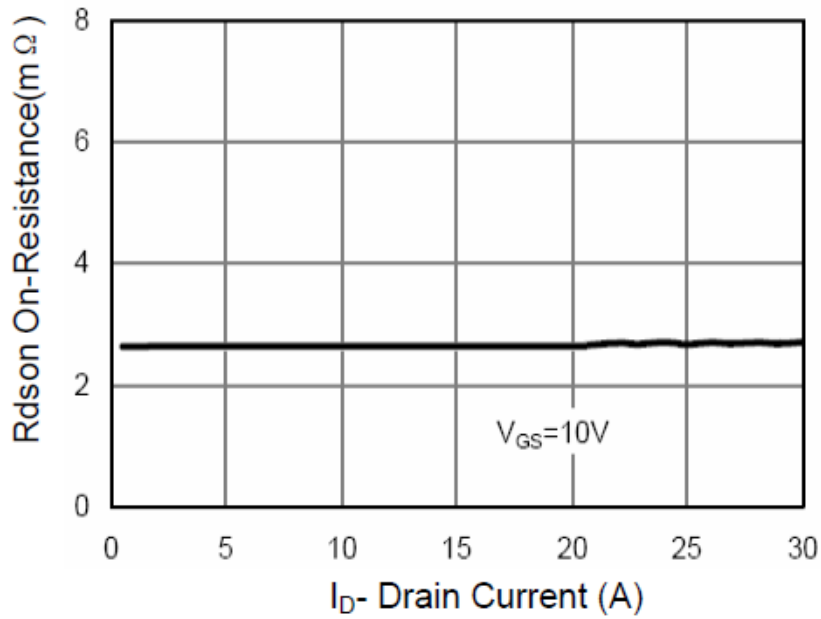


Figure 3  $R_{dson}$ - Drain Current

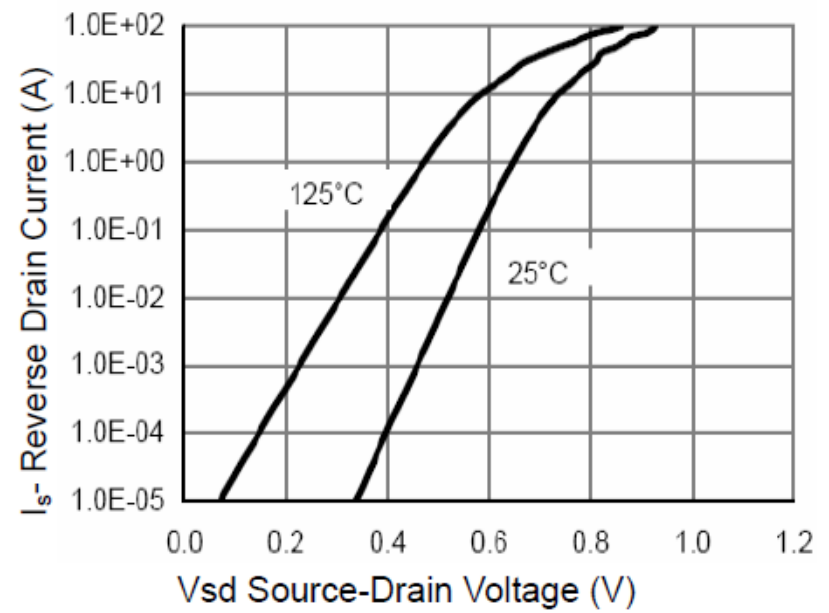


Figure 6 Source- Drain Diode Forward

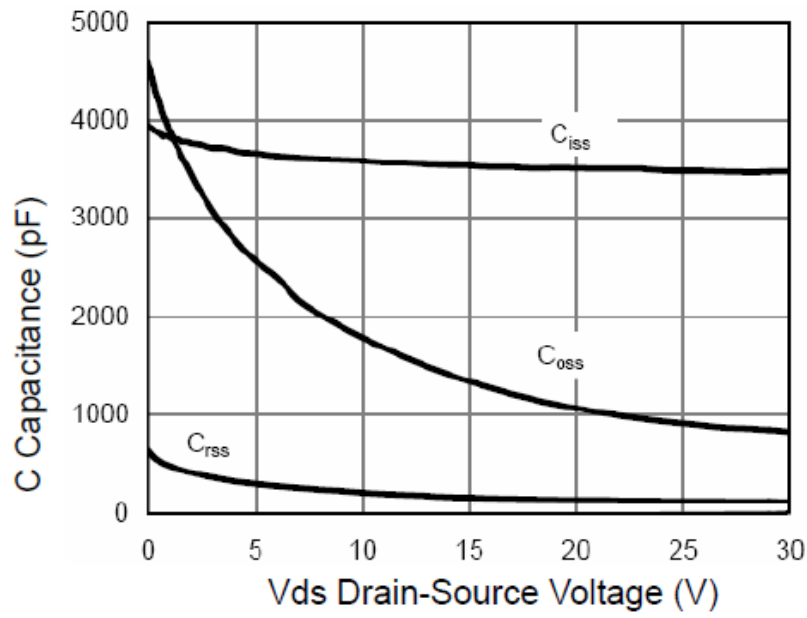


Figure 7 Capacitance vs Vds

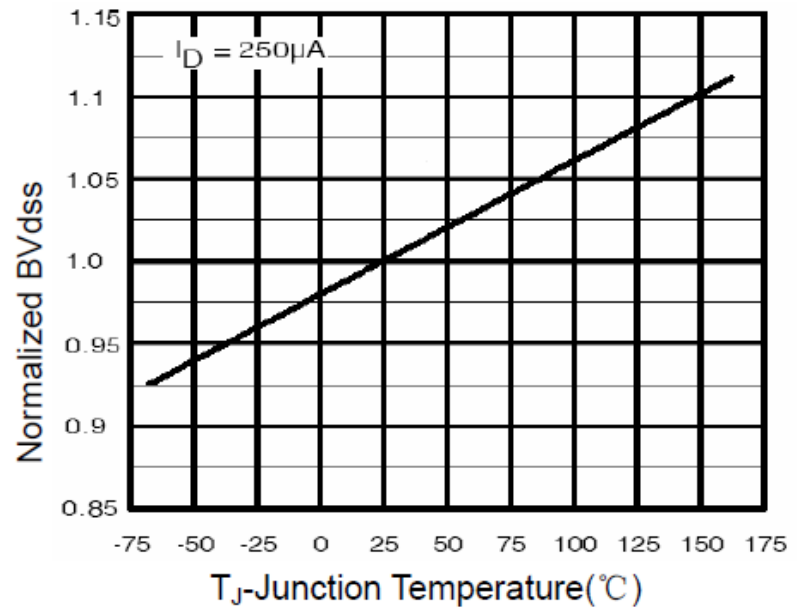


Figure 9  $BV_{DSS}$  vs Junction Temperature

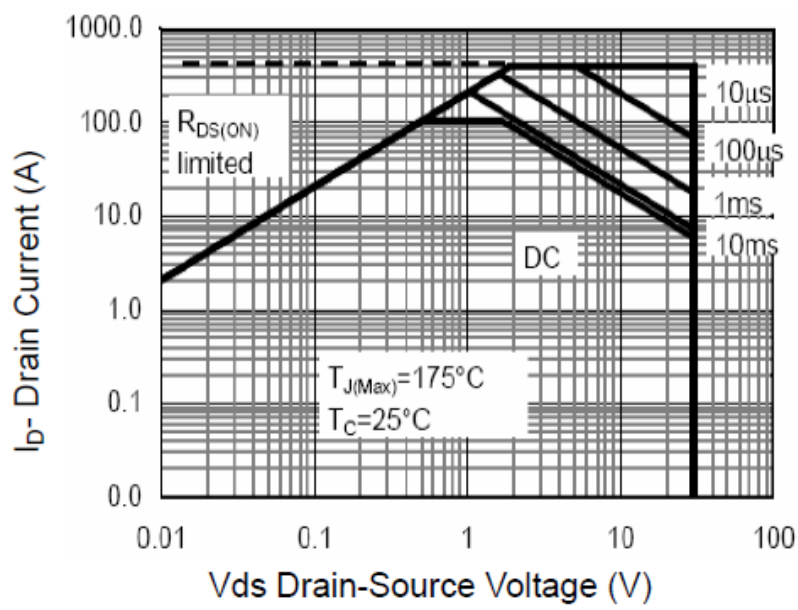


Figure 8 Safe Operation Area

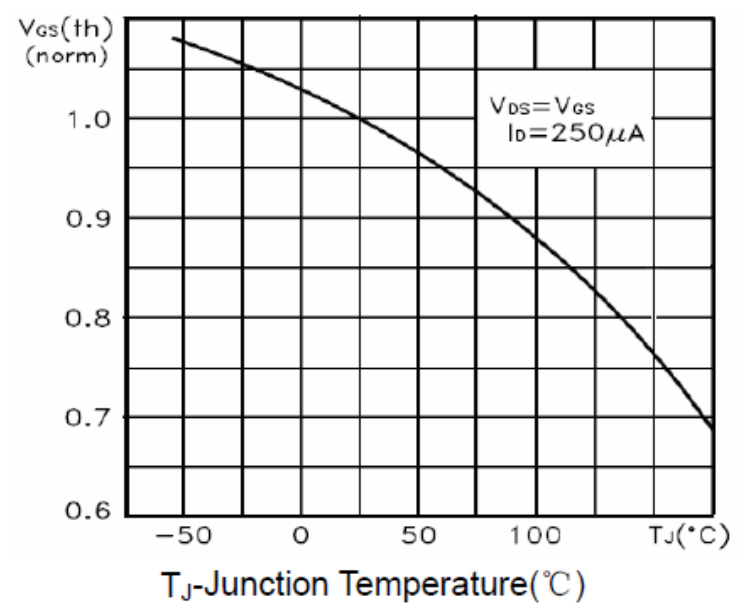


Figure 10  $V_{GS(th)}$  vs Junction Temperature

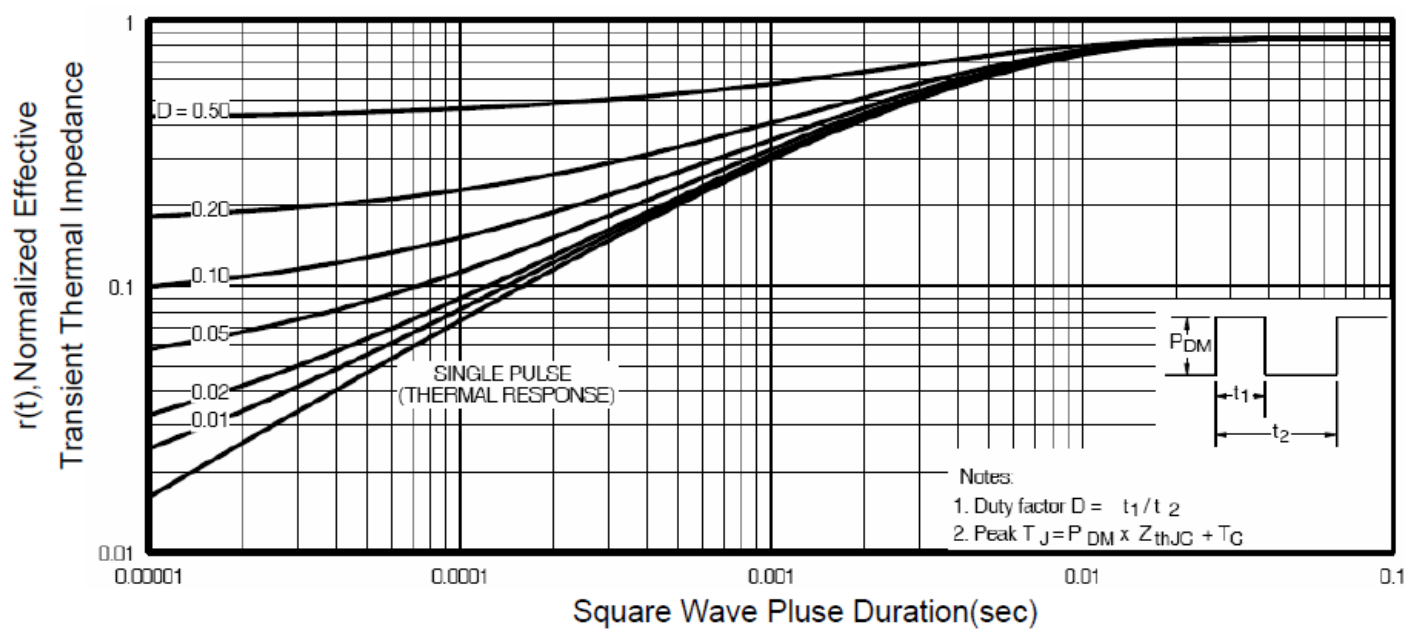
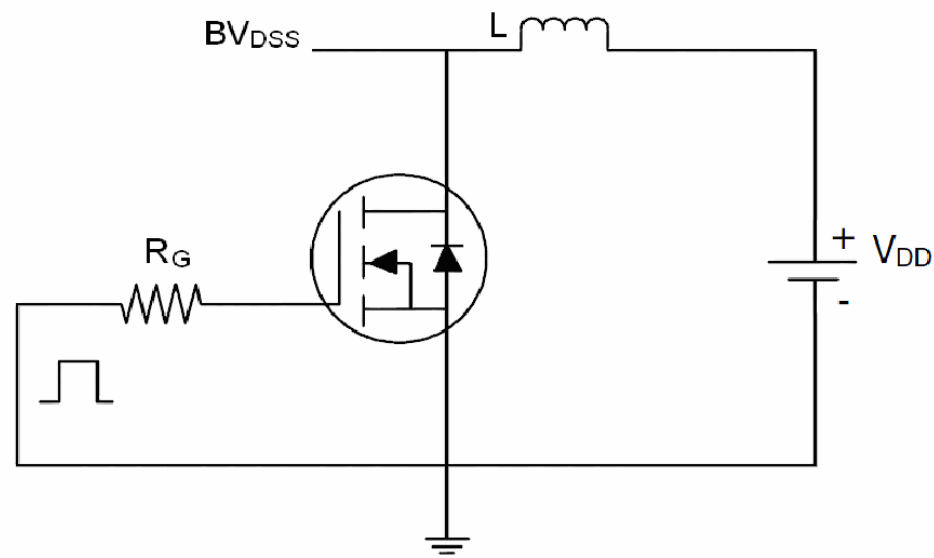


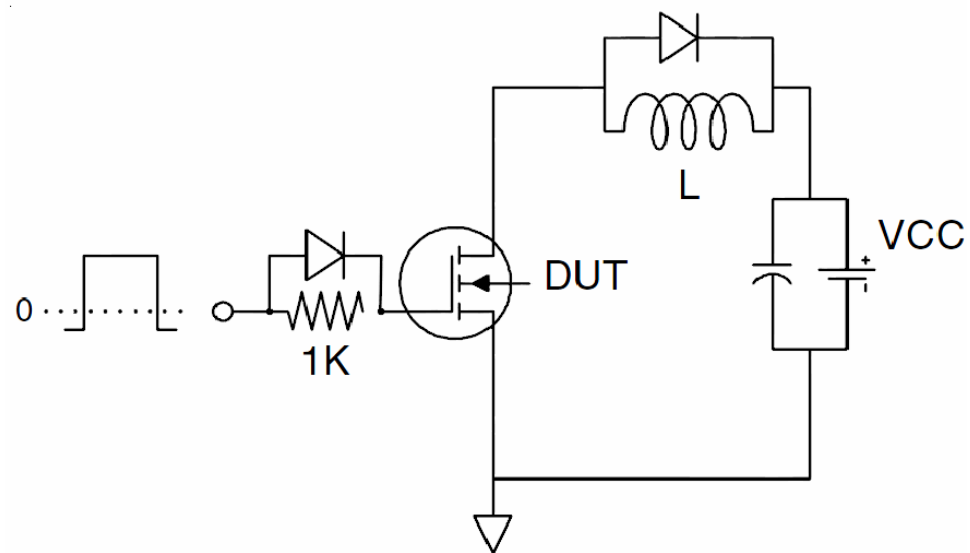
Figure 11 Normalized Maximum Transient Thermal Impedance

测试电路  
Test Circuits

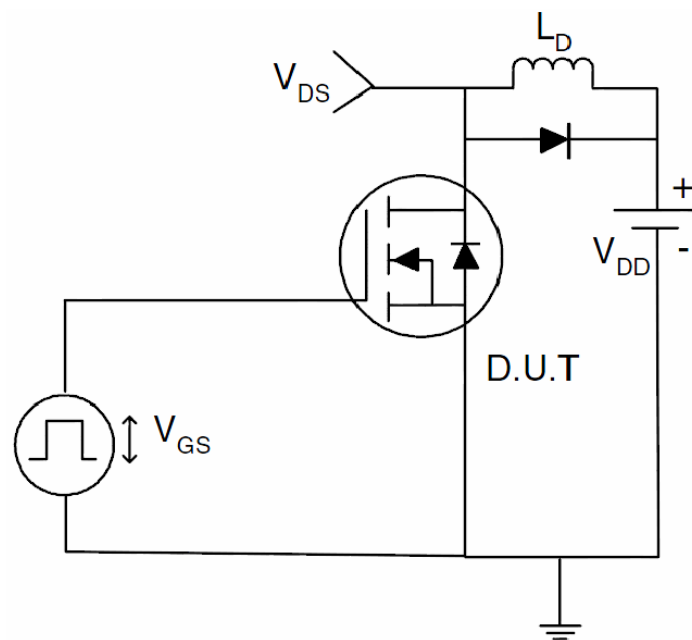
1)  $E_{AS}$  test Circuits



2) Gate charge test Circuit:

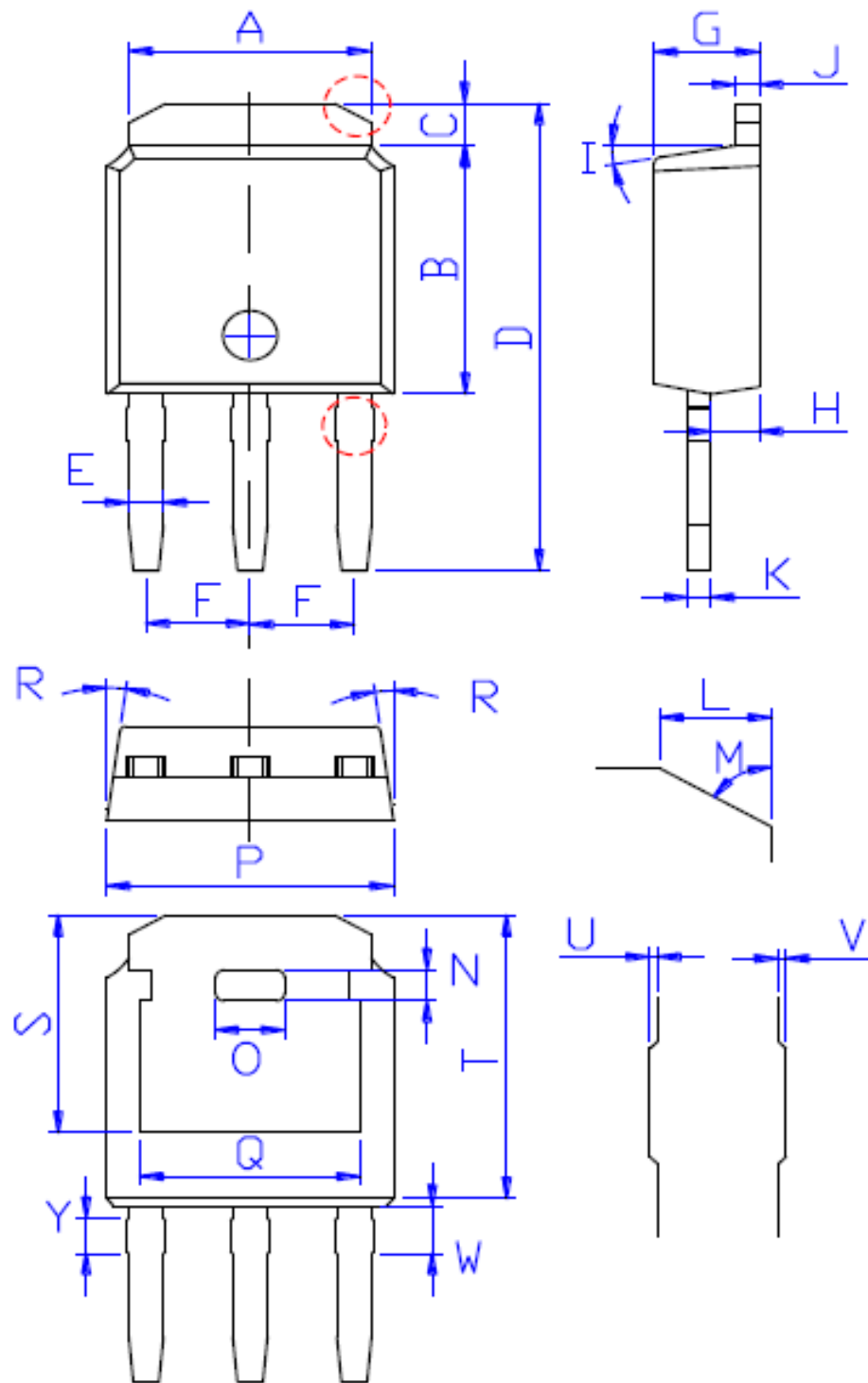


3) Switch Time Test Circuit:



外形尺寸：  
**Package Dimension:**

**TO-251**

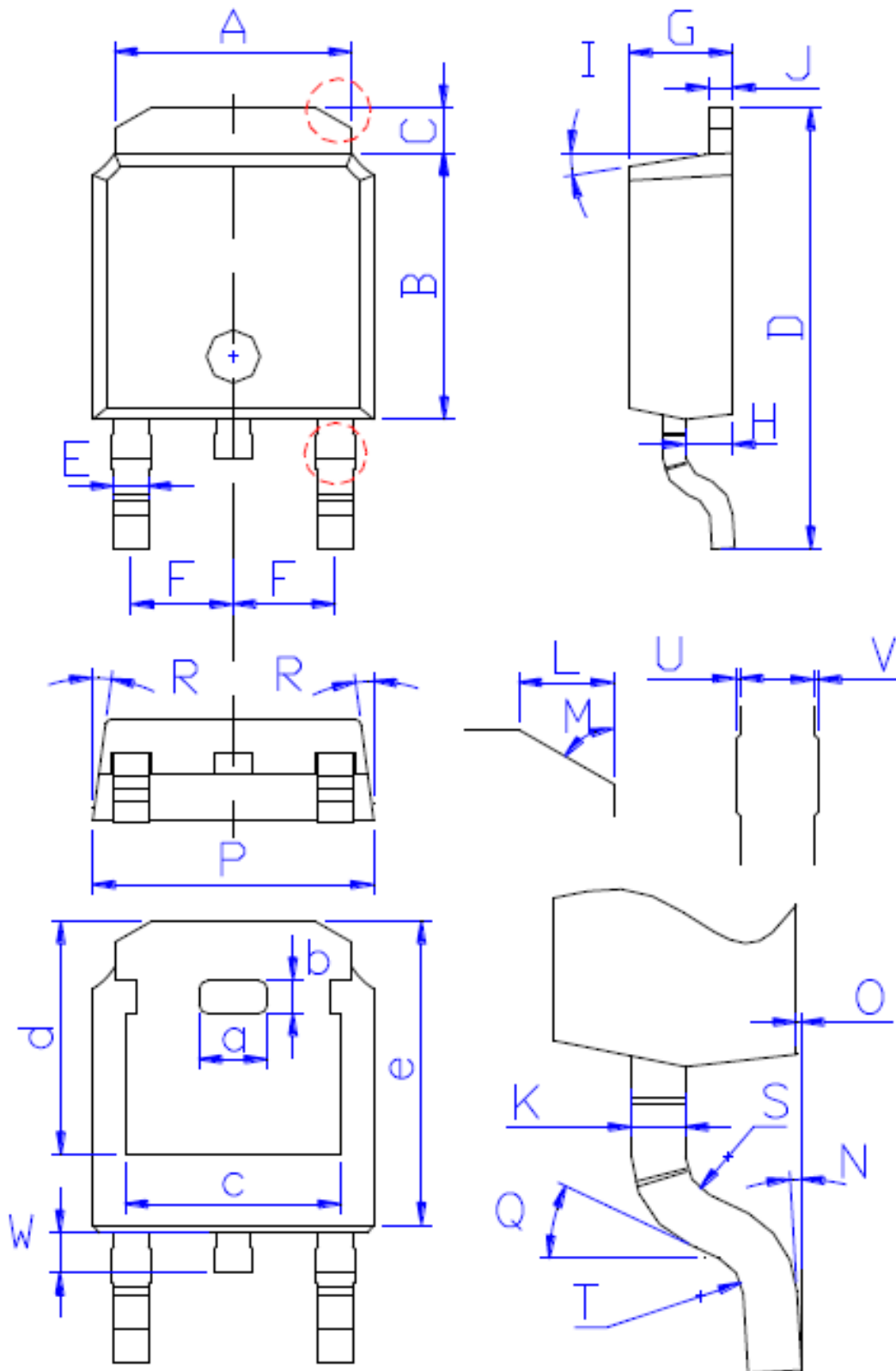


DIM	MILLIMETERS
A	5.34±0.30
B	6.00±0.30
C	1.05±0.30
D	11.31±0.30
E	0.76±0.15
F	2.28±0.15
G	2.30±0.30
H	1.06±0.30
I	(4-10)°
J	0.51±0.15
K	0.52±0.15
L	0.80±0.30
M	60°
N	0.75±0.30
O	1.80±0.30
P	6.60±0.30
Q	4.85±0.30
R	(4-8.5)°
S	5.30±0.30
T	6.90±0.30
U	0.05±0.05
V	0.05±0.05
W	1.15±0.25
Y	0.85±0.25

(Units: mm)

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)°
J	0.51±0.15
K	0.52±0.15
L	0.80±0.30
M	60°
N	(0-10)°
O	0.05±0.05
P	6.60±0.30
Q	25°
R	(4-8.5)°
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)



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