



N 沟道增强型场效应晶体管
N-CHANNEL MOSFET
FHU70N03D/FHD70N03D

主要参数 MAIN CHARACTERISTICS

ID	70 A
VDSS	30 V
Rdson-typ (@Vgs=10V)	7.0 mΩ
Rdson-typ (@Vgs=4.5V)	10 mΩ
Qg-typ	14 nC

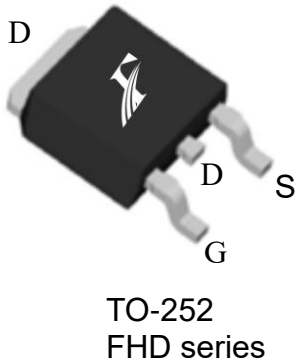
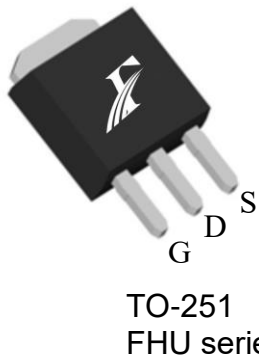
用途 APPLICATIONS

负载开关	Load Switch
锂电池保护	Lithium battery protection

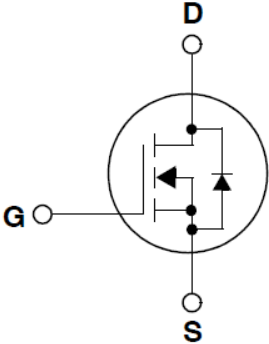
产品特性 FEATURES

低栅极电荷	Low gate charge
低 Crss (典型值 50 pF)	Low Crss (typical 50pF)
开关速度快	Fast switching
100%经过雪崩测试	100% avalanche tested
100%经过热阻测试	100% dvds tested
100%经过 RG 测试	100% Rg tested
高抗 dv/dt 能力	Improved dv/dt capability
RoHS 产品	RoHS product
Trench 工艺	Trench process

封装形式 Package



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
		FHU/D70N03D	
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℃)	70	A
	ID (Tc=100℃)	44.5	A
最大脉冲漏极电流 (注 1) Drain Current – pulse (note 1)	IDM	280	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	40.5	mJ
雪崩电流 (注 1) Avalanche Current (note 1)	IAR	9	A
重复雪崩能量 (注 1) Repetitive Avalanche Current (note 1)	EAR	12	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℃)	37.5	W
	-Derate above 25℃	0.25	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	30	-	-	V
击穿电压温度特性 Breakdown Voltage Temperature Coefficient	ΔBV _{DSS} /Δ T _J	I _D =250μA, referenced to 25℃	-	0.03	-	V/℃
零栅压下漏极漏电流 Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =30V,V _{GS} =0V, T _C =25℃	-	-	1	μA
		V _{DS} =24V, 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	1.1	1.8	2.3	V
静态导通电阻 Static Drain-Source On-Resistance	R _{DS(ON)}	V _{GS} =10V , I _D =20A	-	7.0	8.0	mΩ
		V _{GS} =4.5V , I _D =16A	-	10	12	
正向跨导 Forward Transconductance	g _{fs}	V _{DS} = 5V, I _D =20A (note 4)	-	45	-	S
动态特性 Dynamic Characteristics						
栅电阻 Gate Resistance	R _g	f=1.0MHz,V _{DS} =OPEN	-	1.8	-	Ω
输入电容 Input capacitance	C _{iss}	V _{DS} =15V, V _{GS} =0V, f=1.0MHz	-	1380	-	pF
输出电容 Output capacitance	C _{oss}		-	425	-	
反向传输电容 Reverse transfer capacitance	C _{rss}		-	50	-	
开关特性 Switching Characteristics						
延迟时间 Turn-On delay time	t _{d(on)}	V _{DS} =15V, I _D =20A R _G =3Ω V _{GS} =10V (note 4, 5)	-	7.2	-	ns
上升时间 Turn-On rise time	t _r		-	14.5	-	ns
延迟时间 Turn-Off delay time	t _{d(off)}		-	19.4	-	ns
下降时间 Turn-Off Fall time	t _f		-	5	-	ns
栅极电荷总量 Total Gate Charge	Q _g	V _{DS} =15V , I _D =20A , V _{GS} =10V (note 4, 5)	-	14	-	nC
栅－源电荷 Gate-Source charge	Q _{gs}		-	3	-	nC
栅－漏电荷 Gate-Drain charge	Q _{gd}		-	2.5	-	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		-	-	70	A
正向最大脉冲电流 Maximum Pulsed Drain-Source Diode Forward Current	I _{SM}		-	-	280	A
正向压降 Drain-Source Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =20A	-	-	1.2	V
反向恢复时间 Reverse recovery time	t _{rr}	V _{GS} =0V, I _S =20A ,dI _F /dt=100A/μs (note 4)	-	14	-	ns
反向恢复电荷 Reverse recovery charge	Q _{rr}		-	22	-	nC

热特性 THERMAL CHARACTERISTIC

项目 Parameter	符号 Symbol	FHU/D70N03D	单位 Unit
结到管壳的热阻 Thermal Resistance, Junction to Case	Rth(j-c)	4.0	℃/W
结到环境的热阻 Thermal Resistance, Junction to Ambient	Rth(j-A)	50	℃/W

注释：
1：脉冲宽度由最高结温限制
2：L=1mH, IAS=9A, VDD=25V, RG=25 Ω,起始结温 TJ=25℃
3：ISD ≤70A,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=9A, VDD=25V, RG=25 Ω,,Starting TJ=25℃
3: ISD ≤70A,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 Characteristics

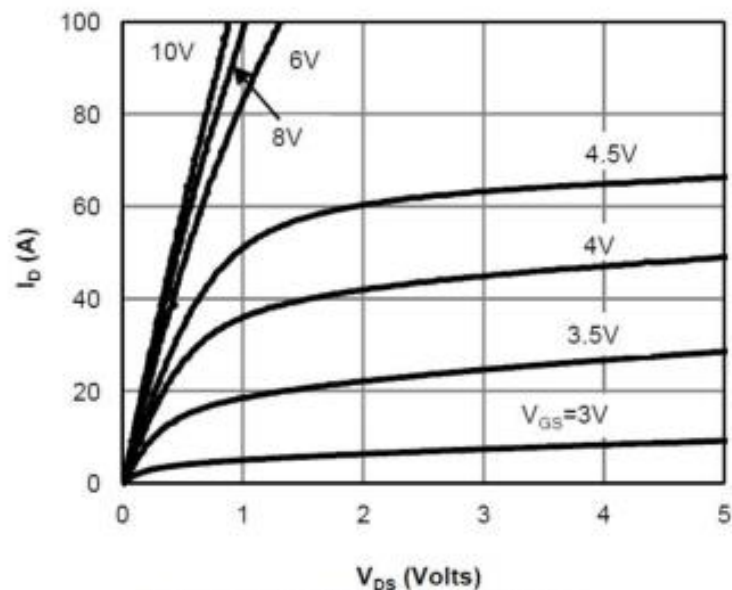


Figure 1: On-Region Characteristics

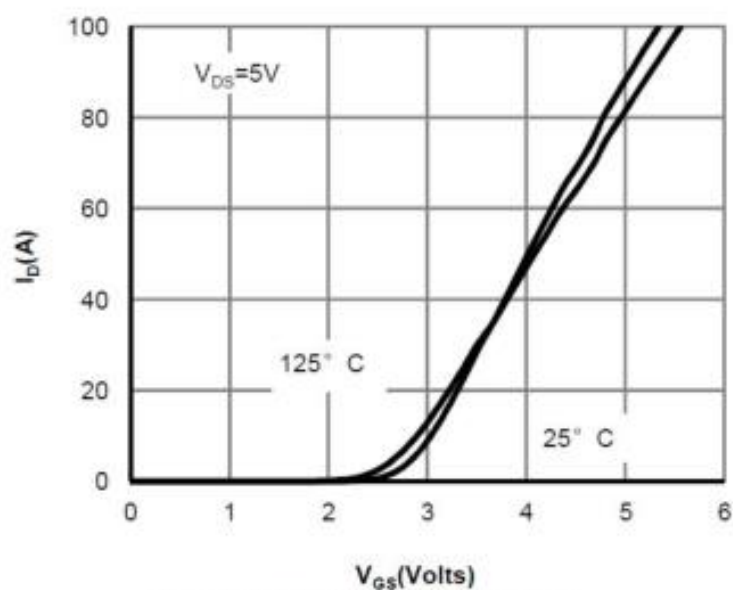


Figure 2: Transfer Characteristics

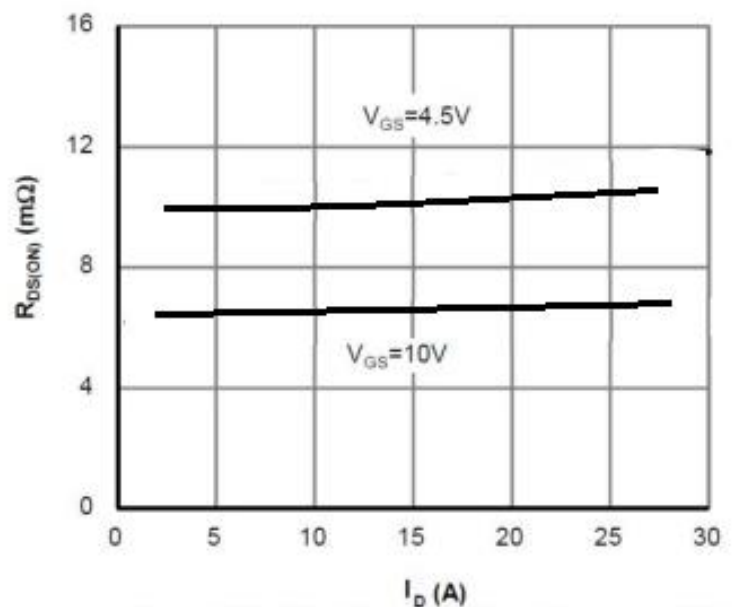


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

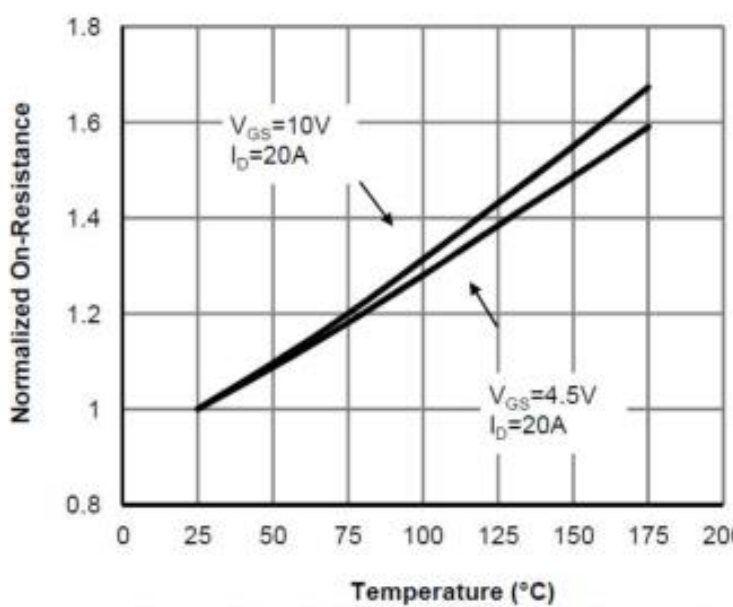


Figure 4: On-Resistance vs. Junction Temperature

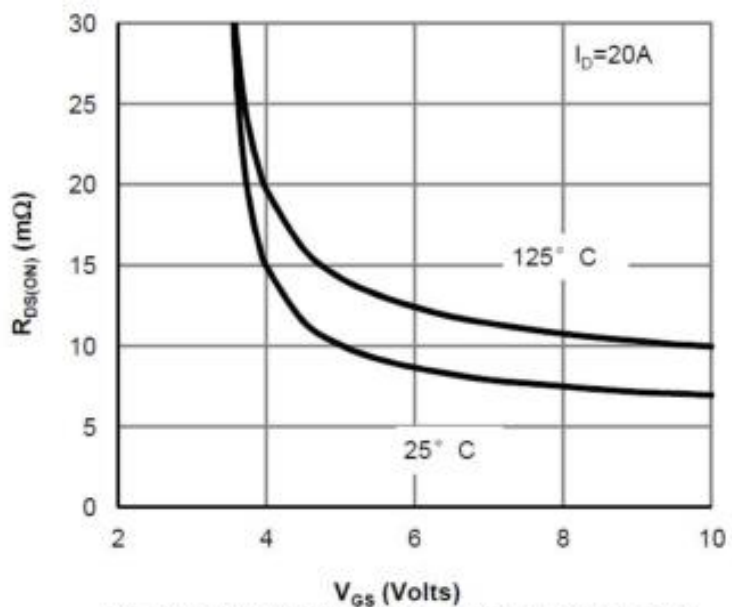


Figure 5: On-Resistance vs. Gate-Source Voltage

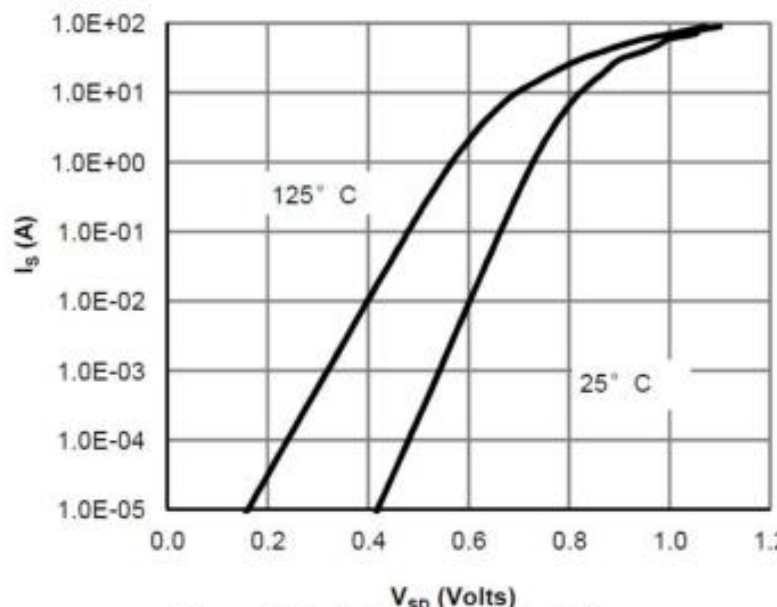
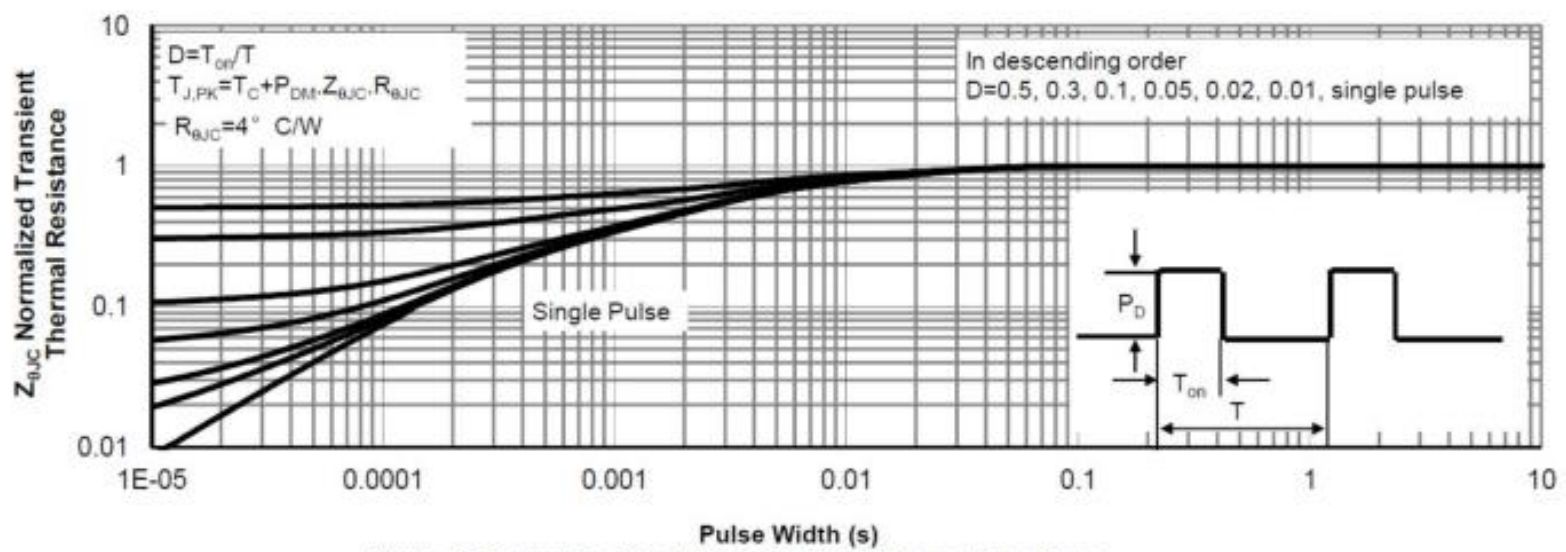
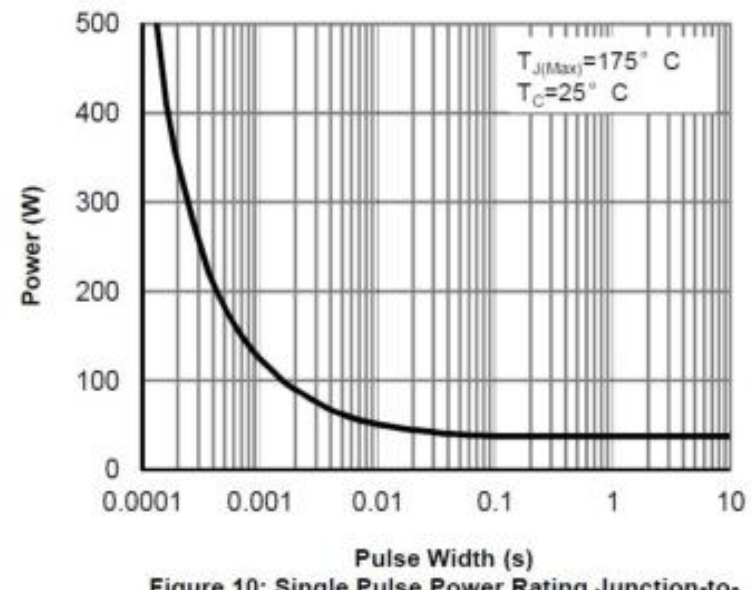
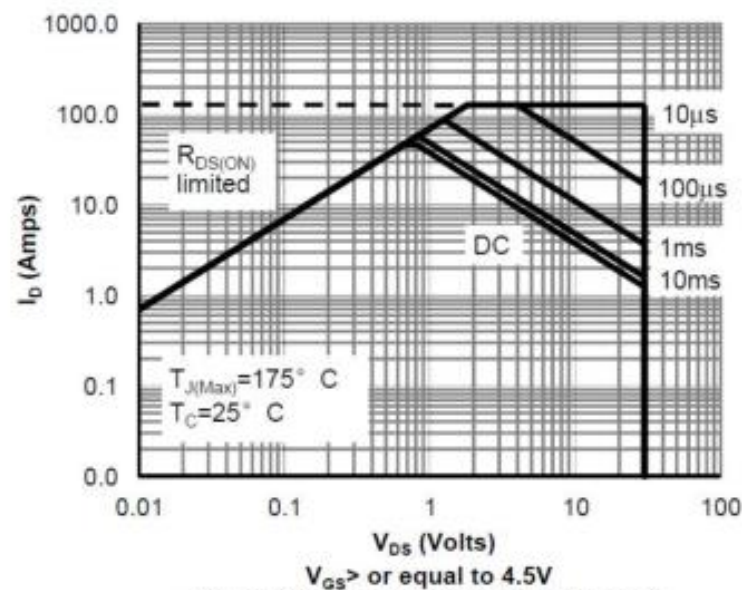
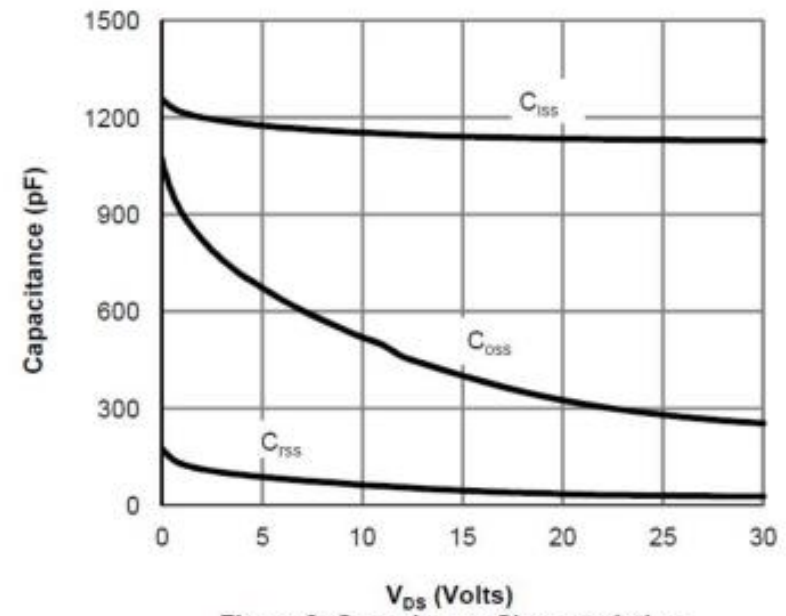
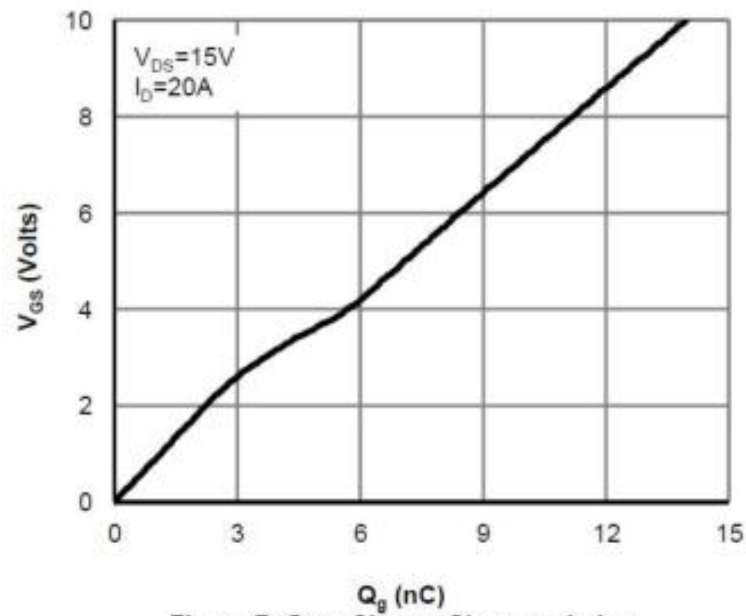
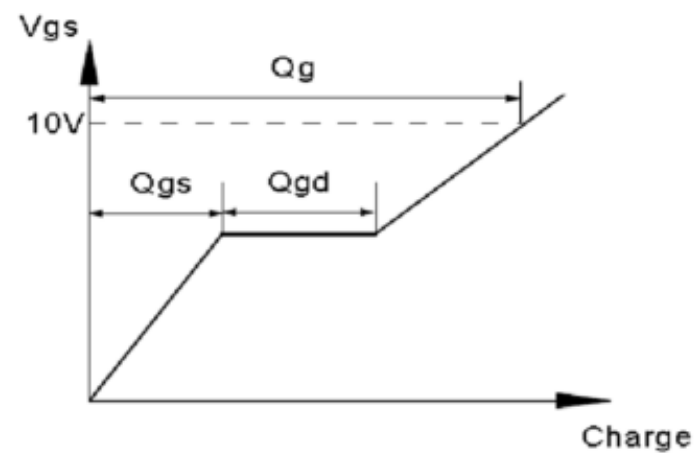
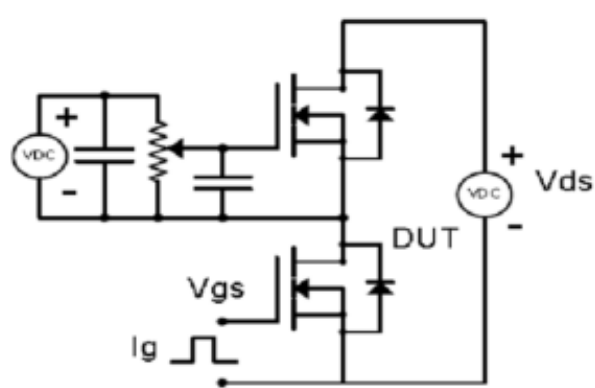


Figure 6: Body-Diode Characteristics

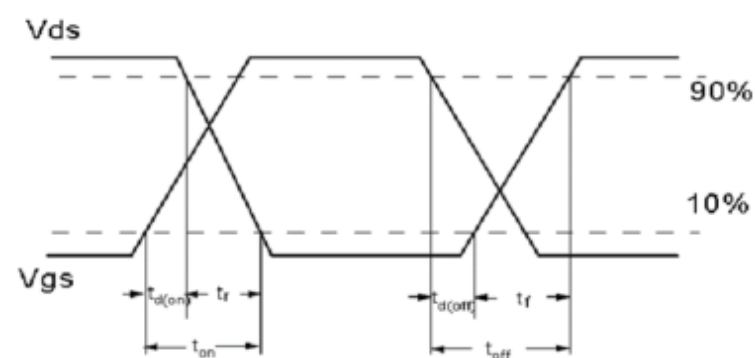
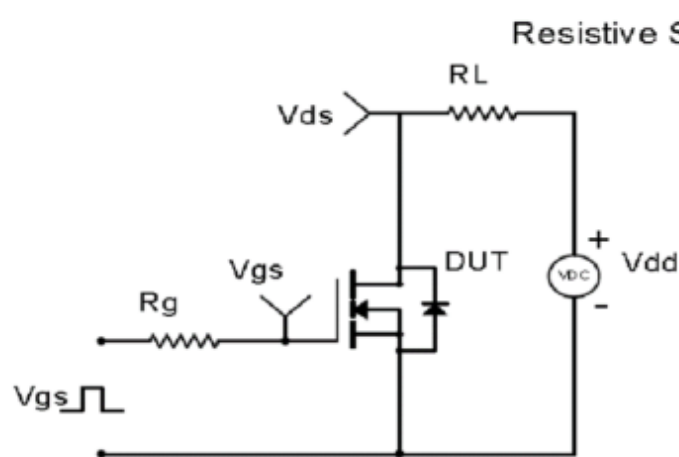


Test Circuit & Waveform

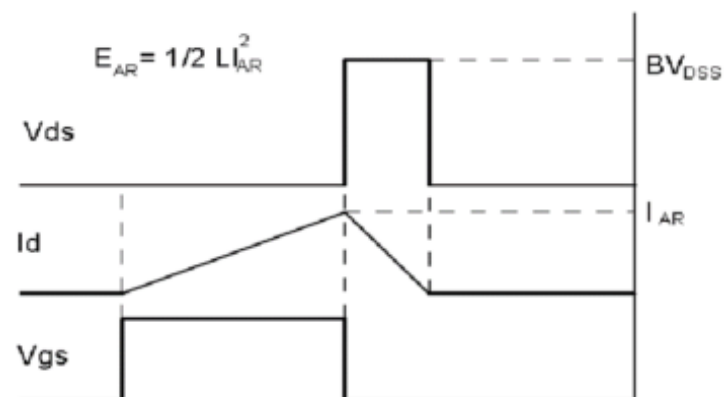
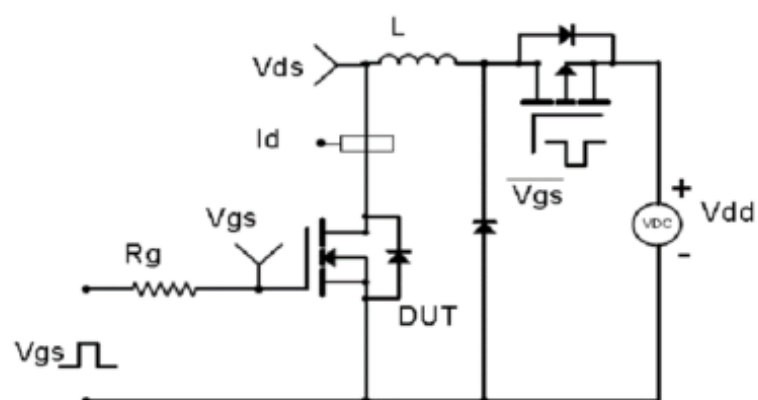
Gate Charge Test Circuit & Waveform



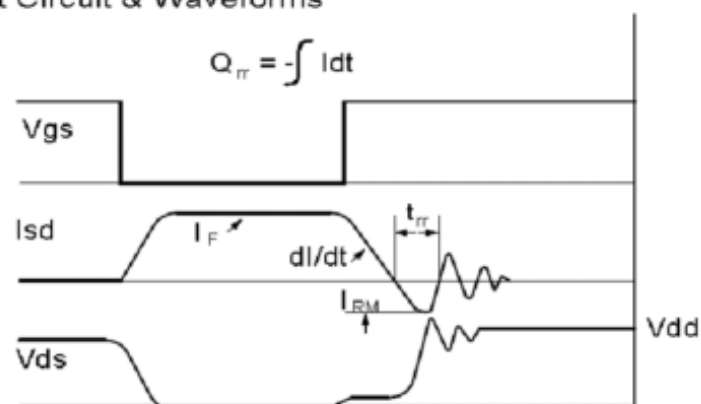
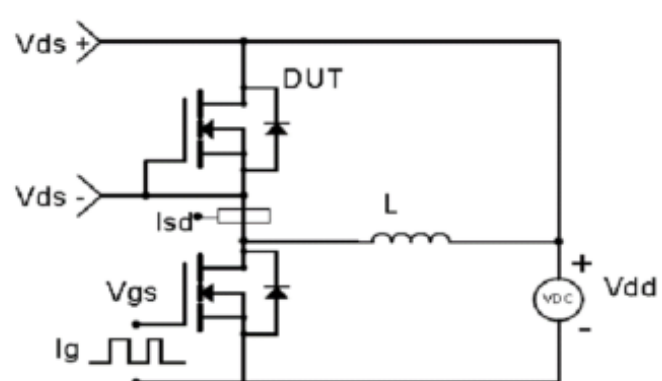
Resistive Switching Test Circuit & Waveforms



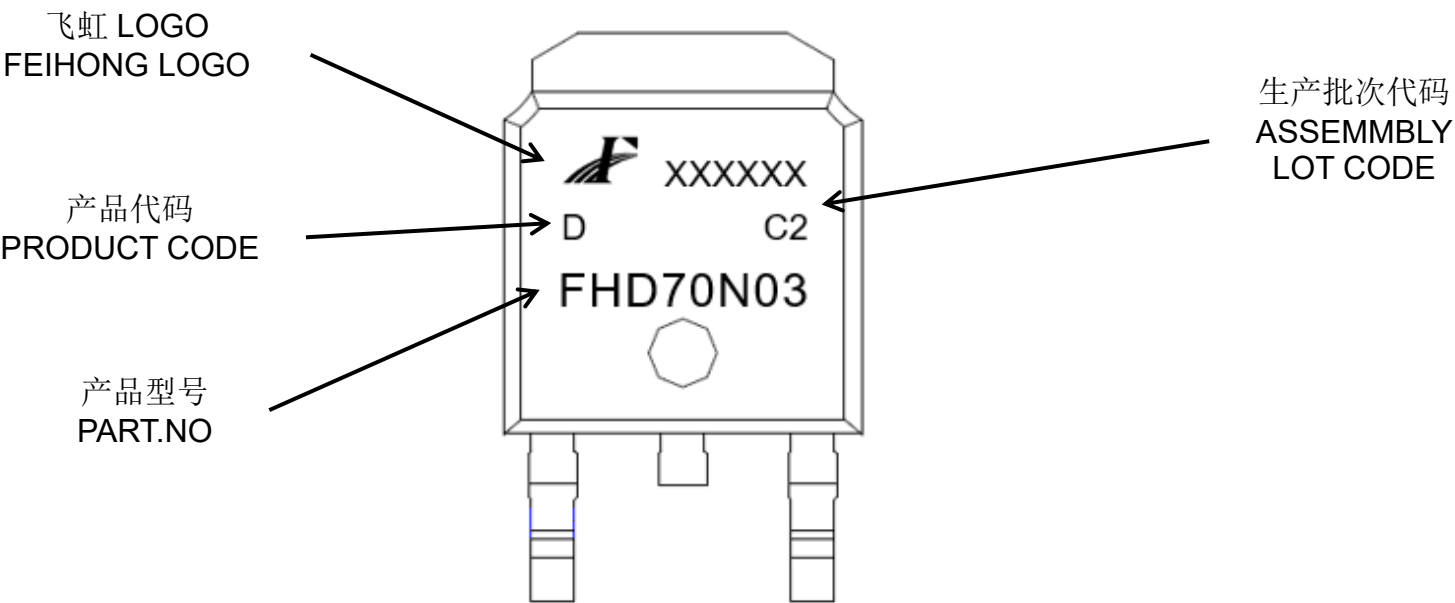
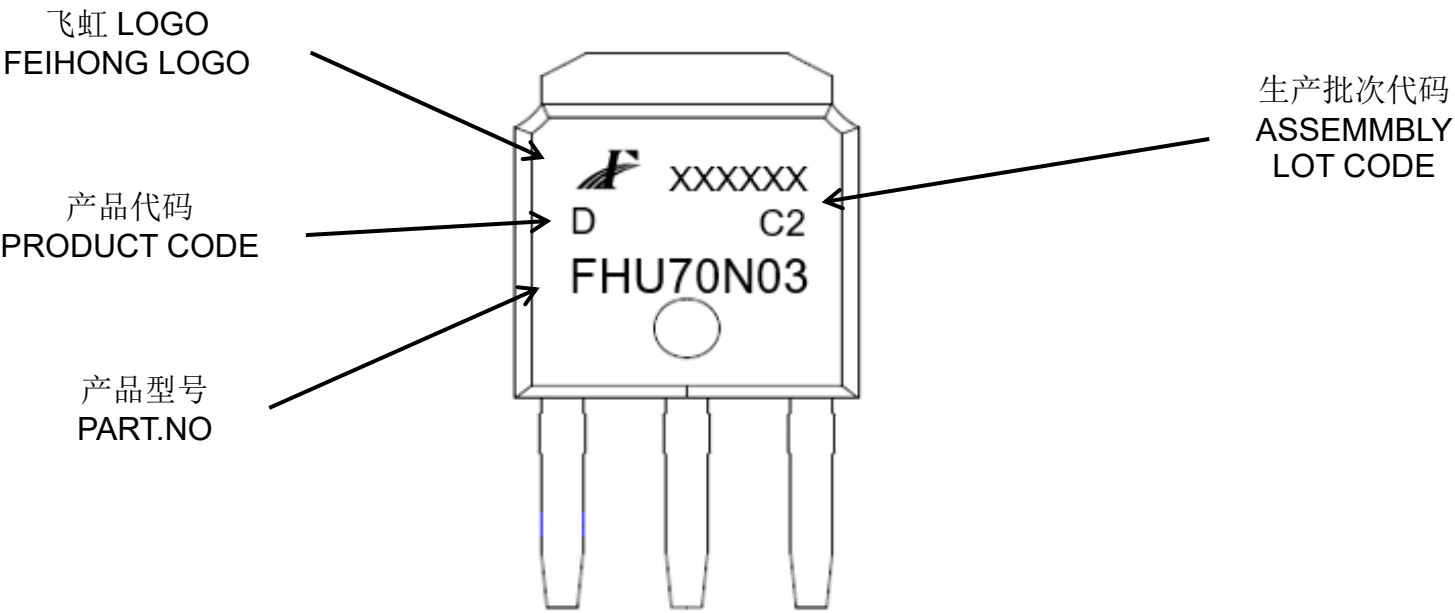
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



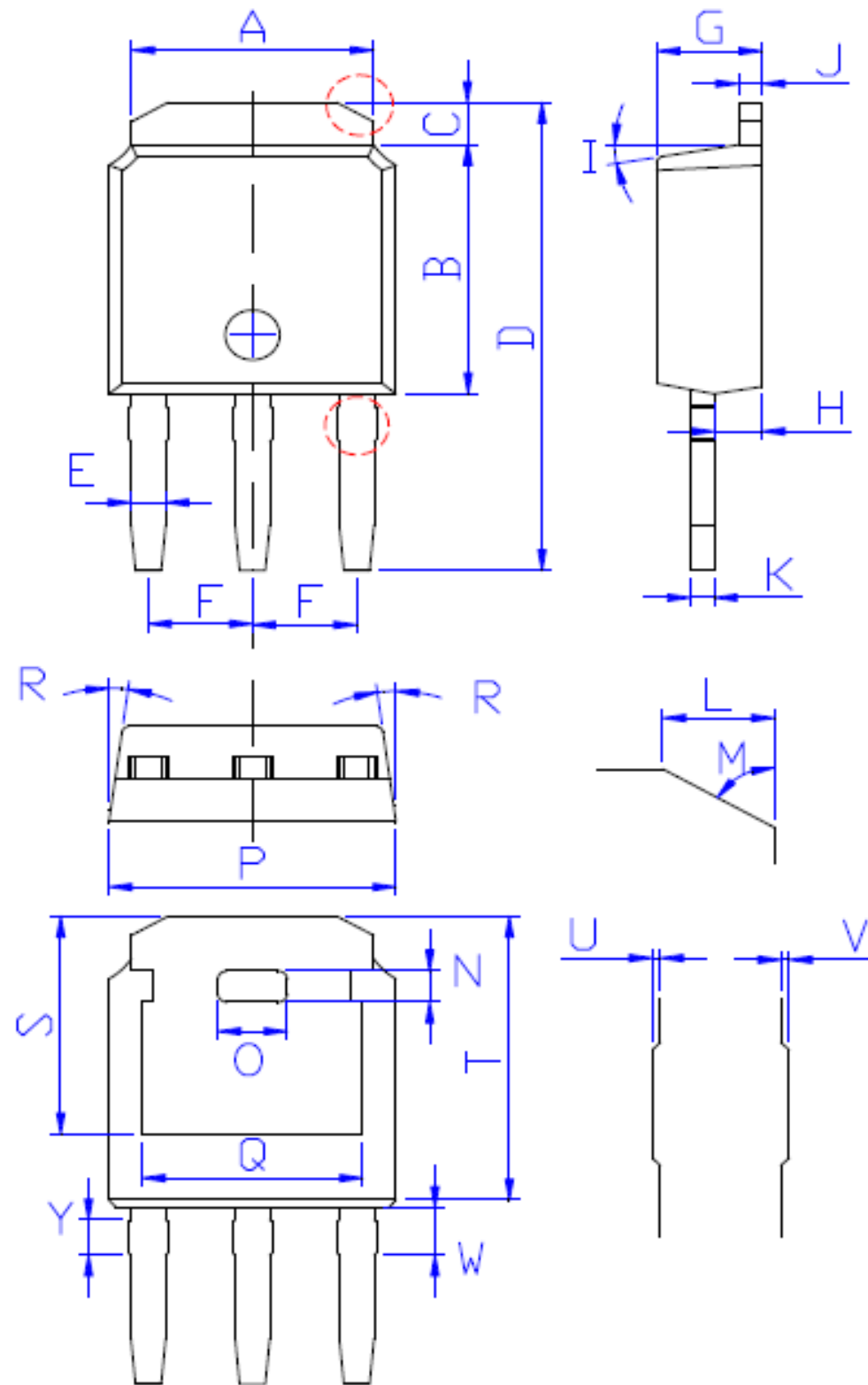
印记 Marking:



外形尺寸:

Package Dimension:

TO-251



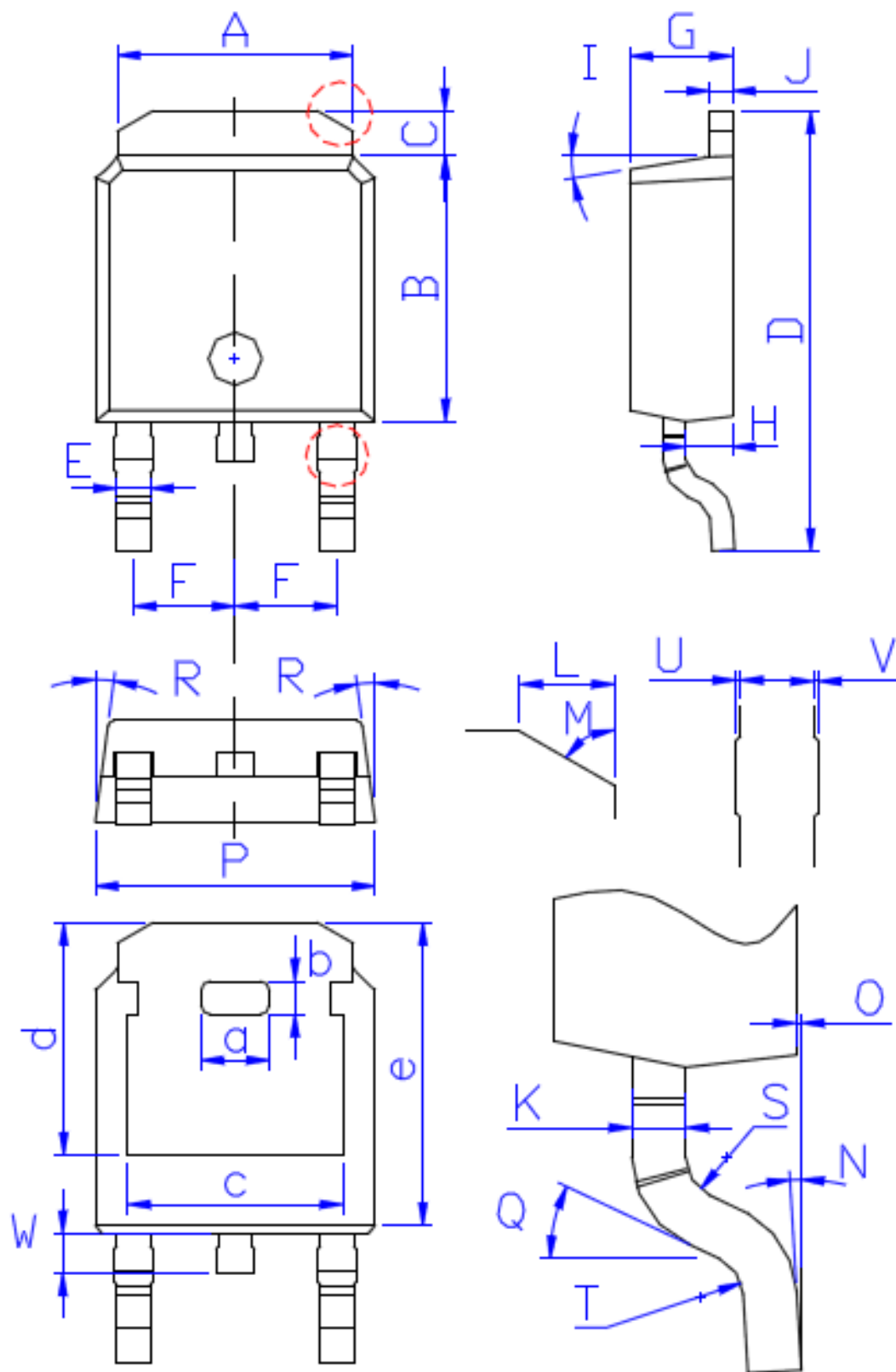
DIM	MILLIMETERS
A	5.34±0.30
B	6.00±0.30
C	1.05±0.30
D	11.31±0.30
E	0.76±0.15
F	2.28±0.15
G	2.30±0.30
H	1.06±0.30
I	(4-10)°
J	0.51±0.15
K	0.52±0.15
L	0.80±0.30
M	60°
N	0.75±0.30
O	1.80±0.30
P	6.60±0.30
Q	4.85±0.30
R	(4-8.5)°
S	5.30±0.30
T	6.90±0.30
U	0.05±0.05
V	0.05±0.05
W	1.15±0.25
Y	0.85±0.25

(Unit: 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	$(4-10)^{\circ}$
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)