



N 沟道增强型场效应晶体管 N-CHANNEL MOSFET FHP20N50B/ FHF20N50B/FHA20N50B

主要参数 MAIN CHARACTERISTICS

ID	20A
VDSS	500V
Rdson-typ (@Vgs=10V)	0.23Ω
Qg-typ	56nC

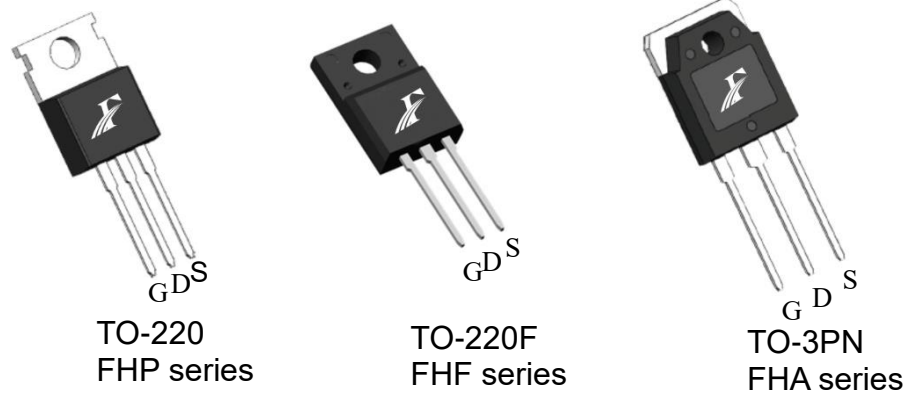
用途 APPLICATION

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

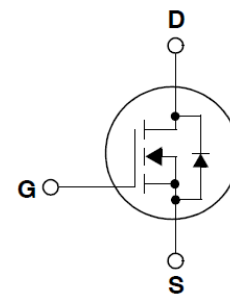
产品特性 FEATURES

低栅极电荷	Low gate charge
低 Crss (典型值 18pF)	Low Crss (typical 18pF)
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

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
		FHF20N50B	FHP20N50B	FHA20N50B	
最高漏极-源极直流电压 Drain-Source Voltage	VDS	500			V
连续漏极电流* Drain Current -continuous *	ID (TC=25°C)	20			A
	ID (TC=100°C)	12.6			A
最大脉冲漏极电流 (注 1) Drain Current - pulse (note 1)	IDM	80*			A
最高栅源电压 Gate-Source Voltage	VGS	±30			V
单脉冲雪崩能量 (注 2) Single Pulsed Avalanche Energy (note 2)	EAS	245			mJ
雪崩电流 (注 1) Avalanche Current (note 1)	IAR	7			A
重复雪崩能量 (注 1) Repetitive Avalanche Current (note 1)	EAR	100			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)	48	230	310	W
	-Derate above 25°C	0.38	1.84	2.48	W/°C
最高结温及存储温度 Operating and Storage Temperature Range	TJ, TSTG	150, -55 to 150			°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	ID=250μA, VGS=0V	500	-	-	V
击穿电压温度特性 Breakdown Voltage Temperature Coefficient	ΔBVDSS/Δ TJ	ID=250μA, referenced to 25°C	-	0.5	-	V/°C
零栅压下漏极漏电流 Zero Gate Voltage Drain Current	IDSS	VDS=500V, VGS=0V, TC=25°C	-	-	1.0	μA
		VDS=400V, TC=125°C	-	-	100	μA
栅极体漏电流 Gate-body leakage current	IGSS (F/R)	VDS=0V, VGS =±30V	-	-	±100	nA
通态特性 On-Characteristics						
阈值电压 Gate Threshold Voltage	VGS(th)	VDS = VGS , ID=250μA	2.0	-	4.0	V
静态导通电阻 Static Drain-Source On-Resistance	RDS(ON)	VGS =10V , ID=10A	-	0.23	0.28	Ω
动态特性 Dynamic Characteristics						
输入电容 Input capacitance	Ciss	VDS=25V, VGS =0V, f=1.0MHz	-	3620	-	pF
输出电容 Output capacitance	Coss		-	290	-	
反向传输电容 Reverse transfer capacitance	Crss		-	18	-	
开关特性 Switching Characteristics						
延迟时间 Turn-On delay time	td(on)	VDS=250V, ID=20A, RG=20Ω (note 4, 5)	-	33	-	ns
上升时间 Turn-On rise time	tr		-	75	-	ns
延迟时间 Turn-Off delay time	td(off)		-	91	-	ns
下降时间 Turn-Off Fall time	tf		-	83	-	ns
栅极电荷总量 Total Gate Charge	Qg	VDS =400V , ID=20A , VGS =10V (note 4, 5)	-	56	-	nC
栅-源电荷 Gate-Source charge	Qgs		-	13	-	nC
栅-漏电荷 Gate-Drain charge	Qgd		-	32	-	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	-	-	20	A
正向最大脉冲电流 Maximum Pulsed Drain-Source Diode Forward Current		ISM	-	-	80	A
正向压降 Drain-Source Diode Forward Voltage	VSD	VGS=0V, IS=20A	-	-	1.2	V
反向恢复时间 Reverse recovery time	trr	VGS=0V, IS=20A, dIF/dt=100A/μs (note 4)	-	536	-	ns
反向恢复电荷 Reverse recovery charge	Qrr		-	5.6	-	μC

热特性 THERMAL CHARACTERISTIC

项目 Parameter	符号 Symbol	FHF20N50B	FHP20N50B	FHA20N50B	单位 Unit
结到管壳的热阻 Thermal Resistance, Junction to Case	Rth(j-c)	2.6	0.54	0.40	°C/W
结到环境的热阻 Thermal Resistance, Junction to Ambient	Rth(j-A)	62.5	62.5	40	°C/W

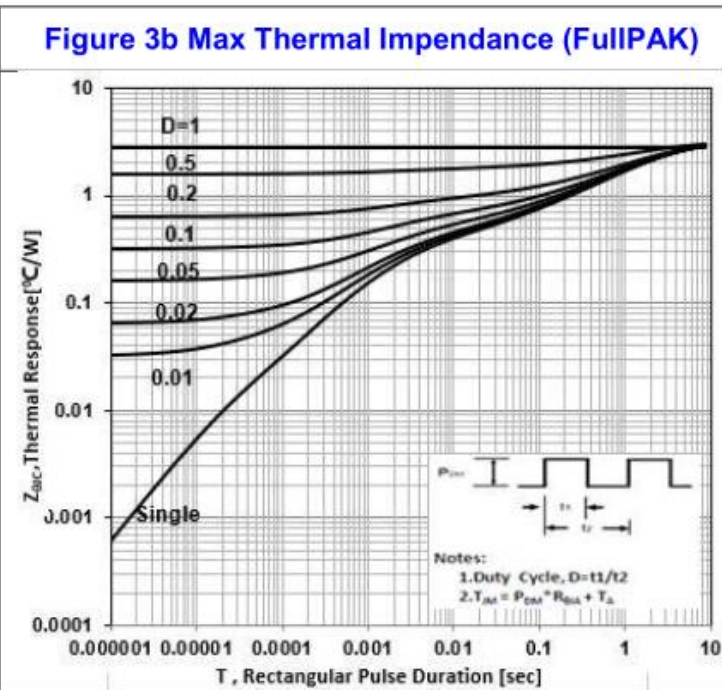
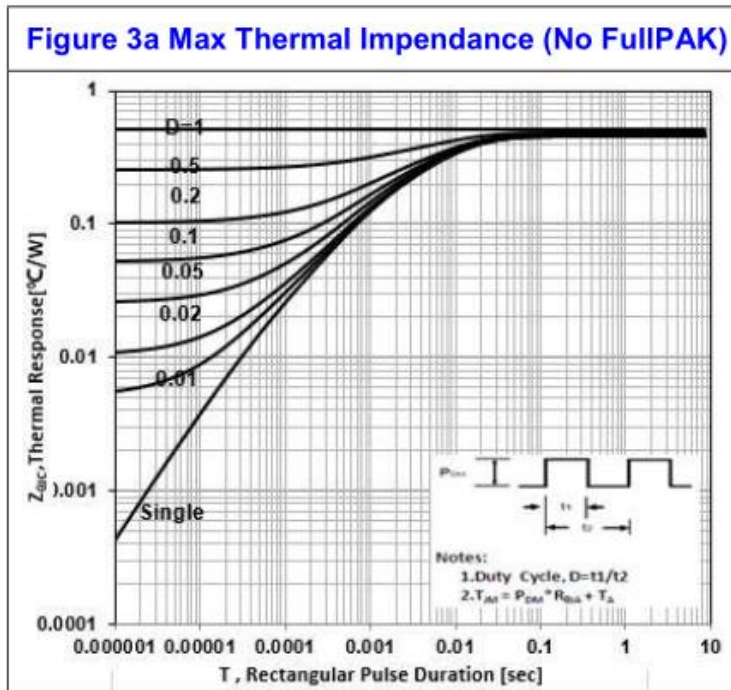
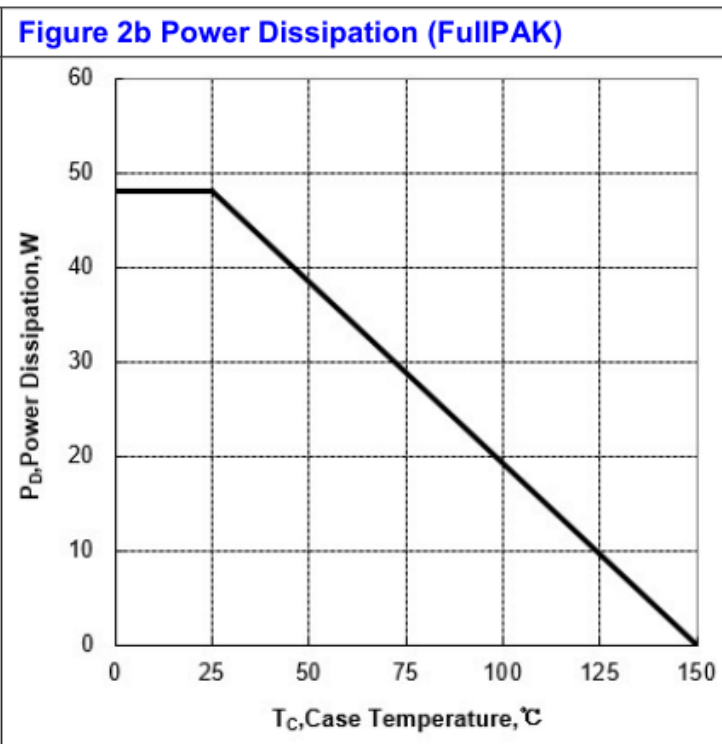
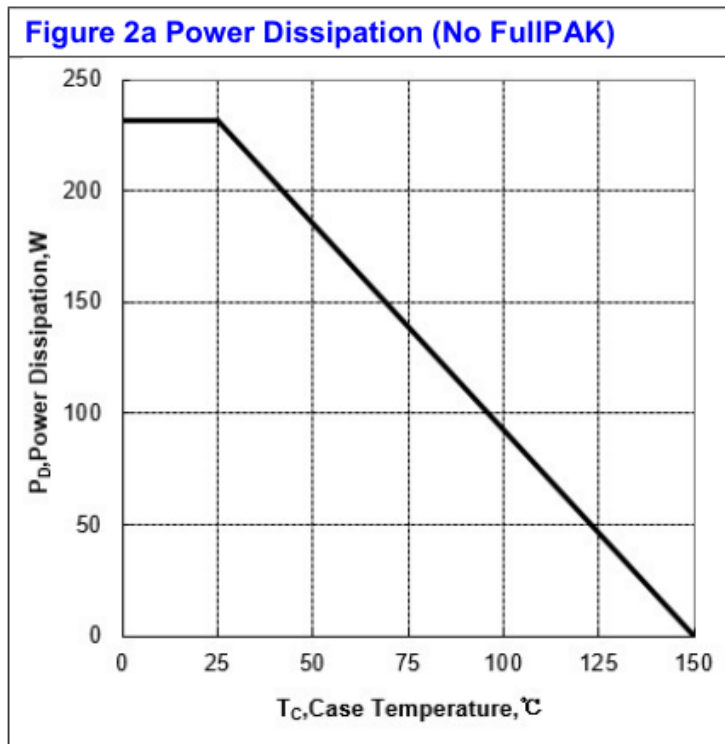
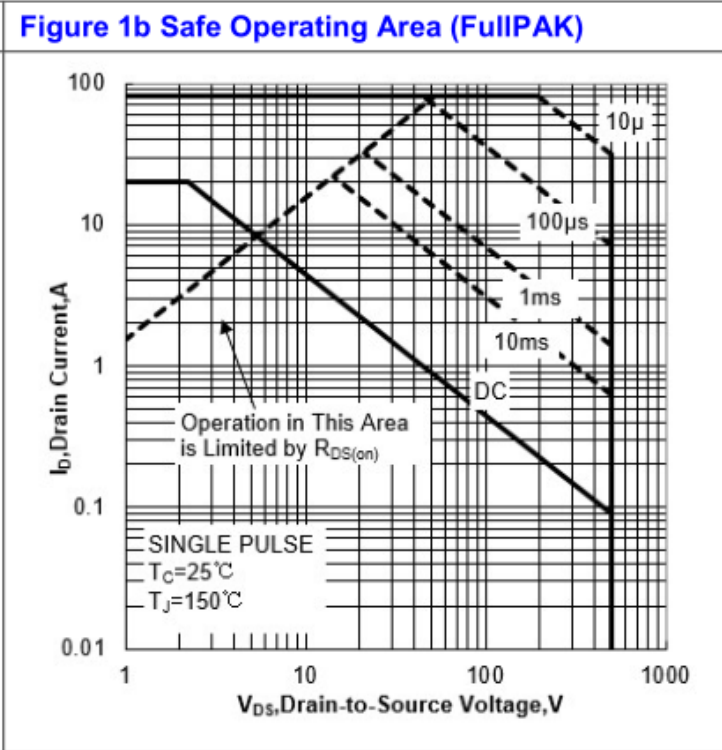
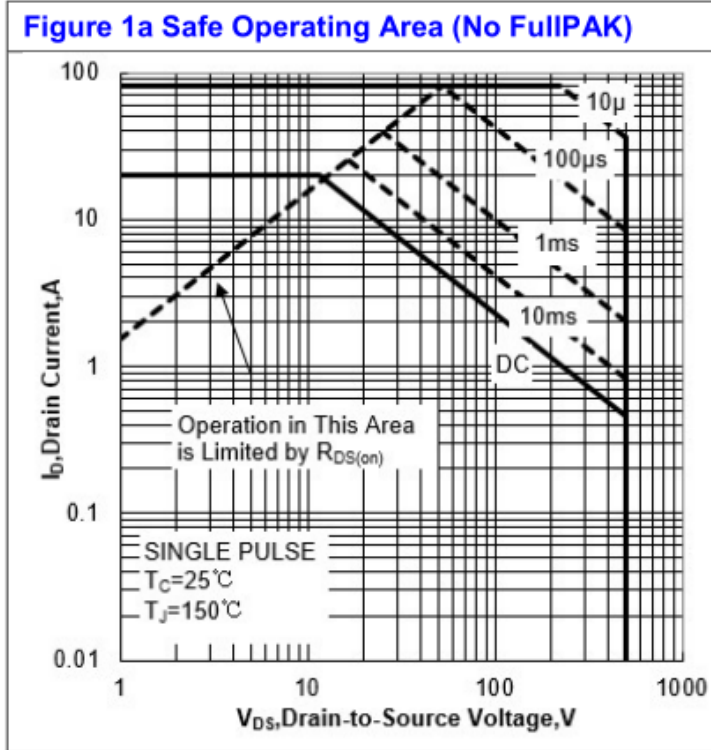
注释:
Notes:

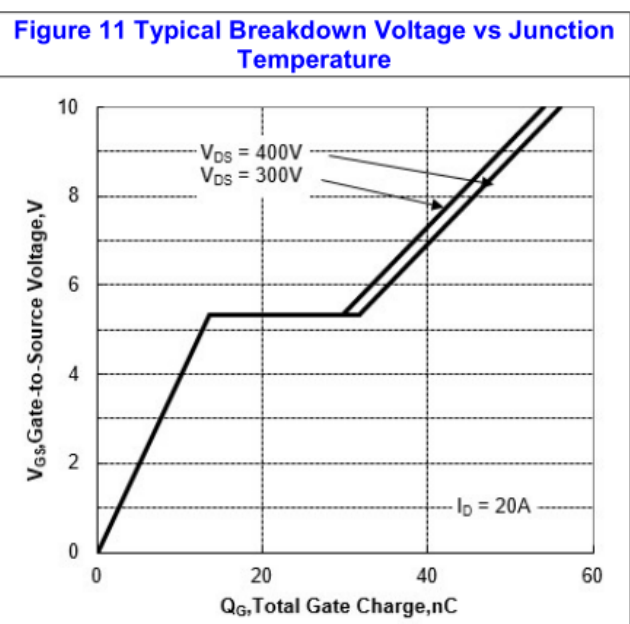
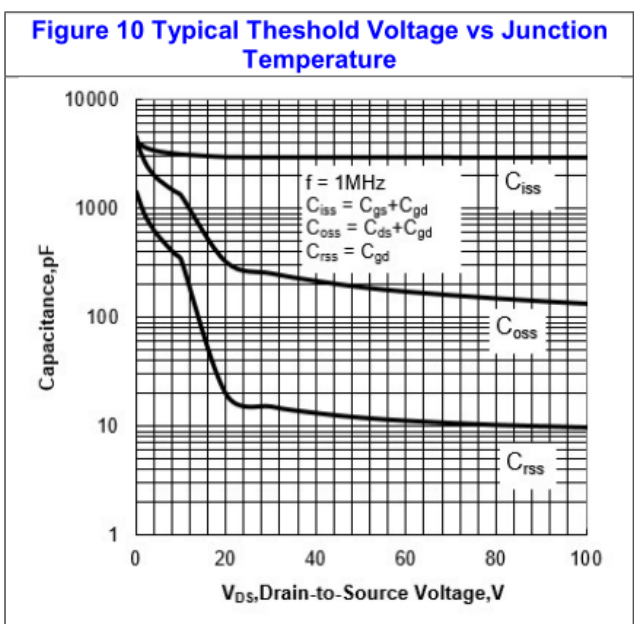
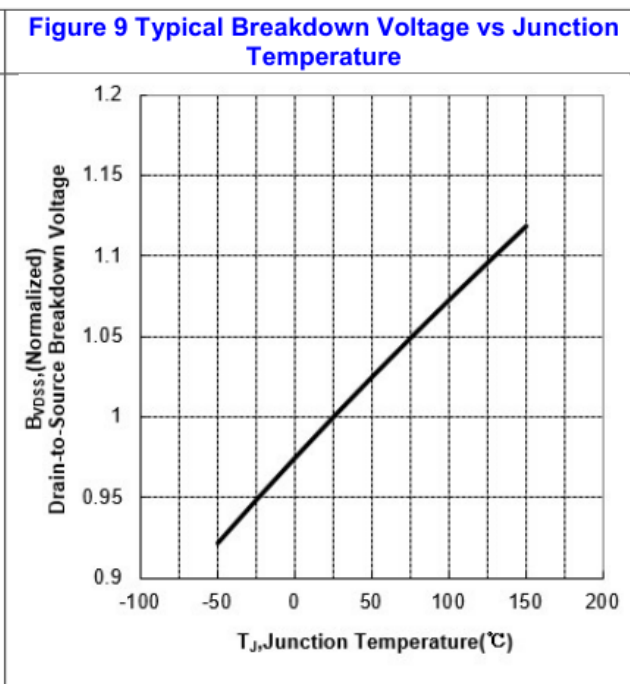
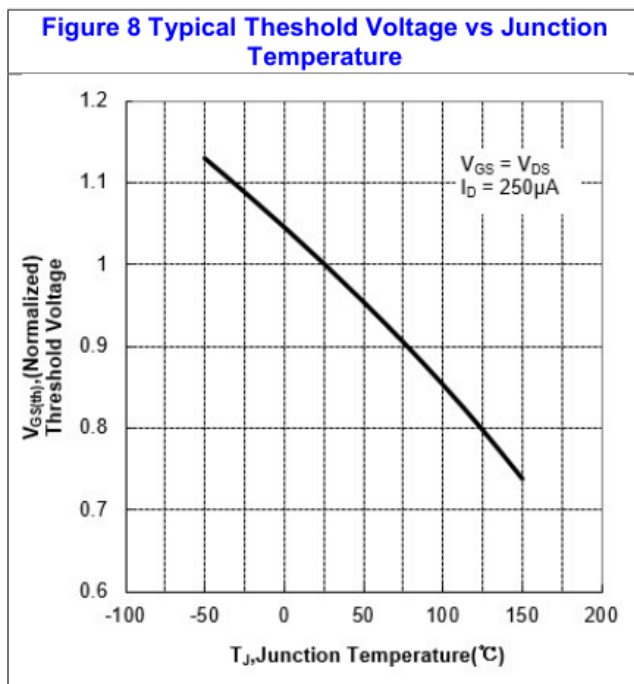
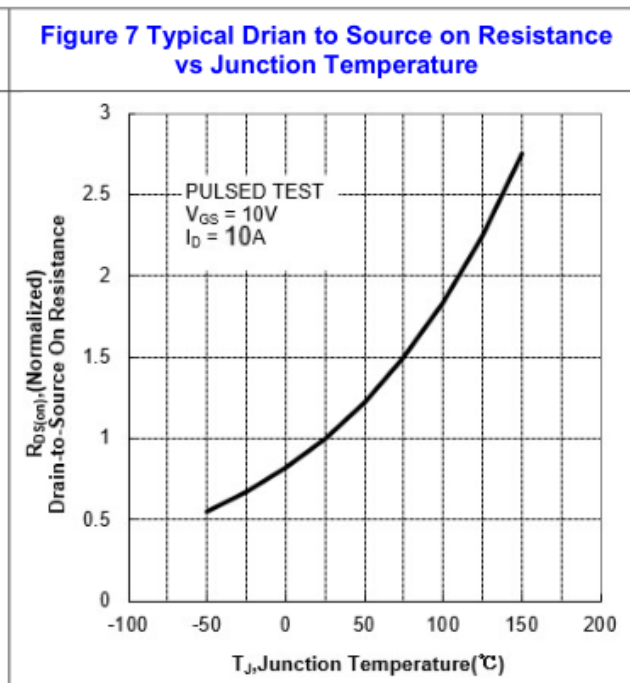
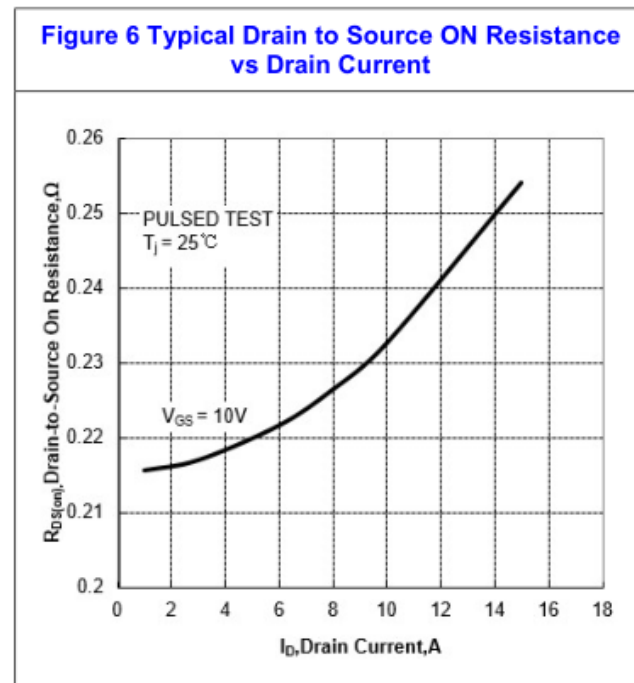
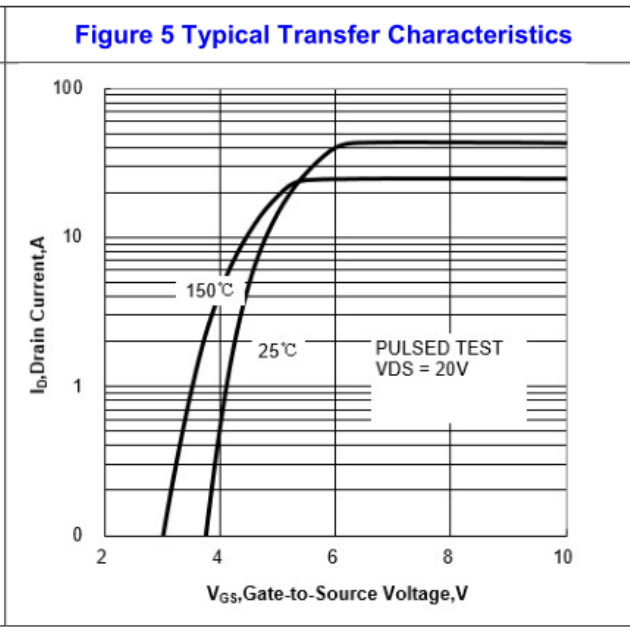
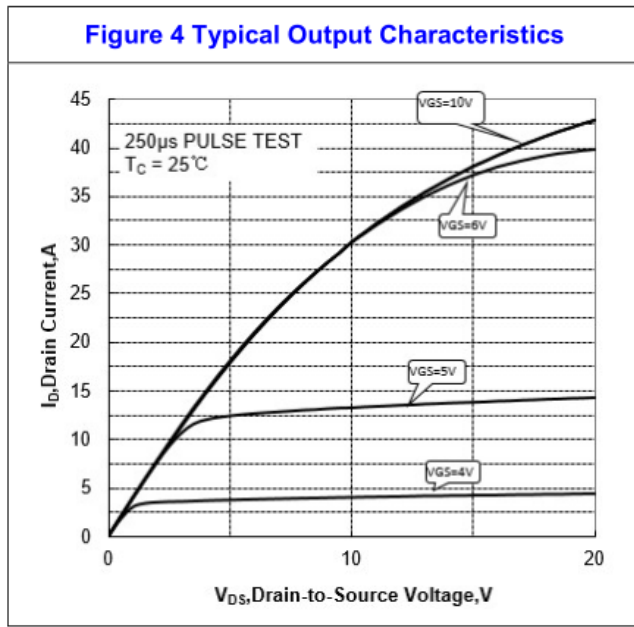
- 1: 脉冲宽度由最高结温限制
- 2: L=10mH, IAS=7A, VDD=50V, RG=25 Ω, 起始结温 TJ=25°C
- 3: ISD ≤20A, di/dt ≤100A/μs, VDD≤BVDSS, 起始结温 TJ=25°C
- 4: 脉冲测试: 脉冲宽度 ≤300μs, 占空比≤2%
- 5: 基本与工作温度无关

- 1: Pulse width limited by maximum junction temperature
- 2: L=10mH, ID=7A, VDD=50V, RG=25 Ω, Start TJ=25°C.
- 3: ISD ≤20A, di/dt ≤100A/μs, VDD≤BVDSS, 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)

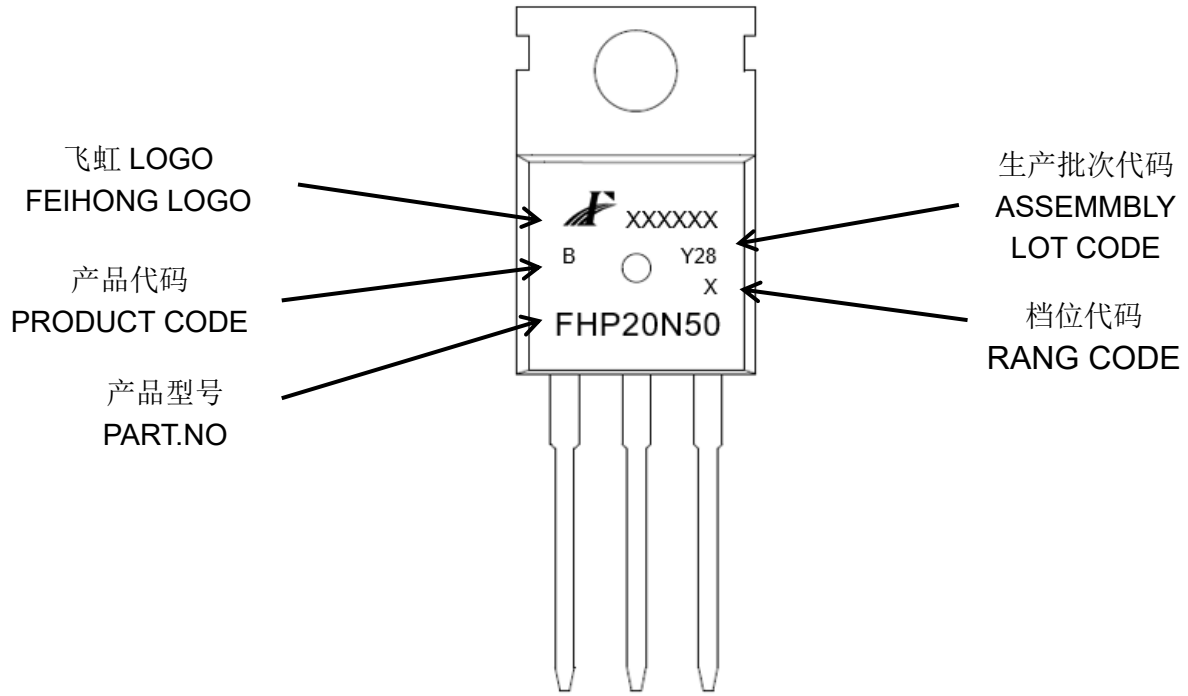




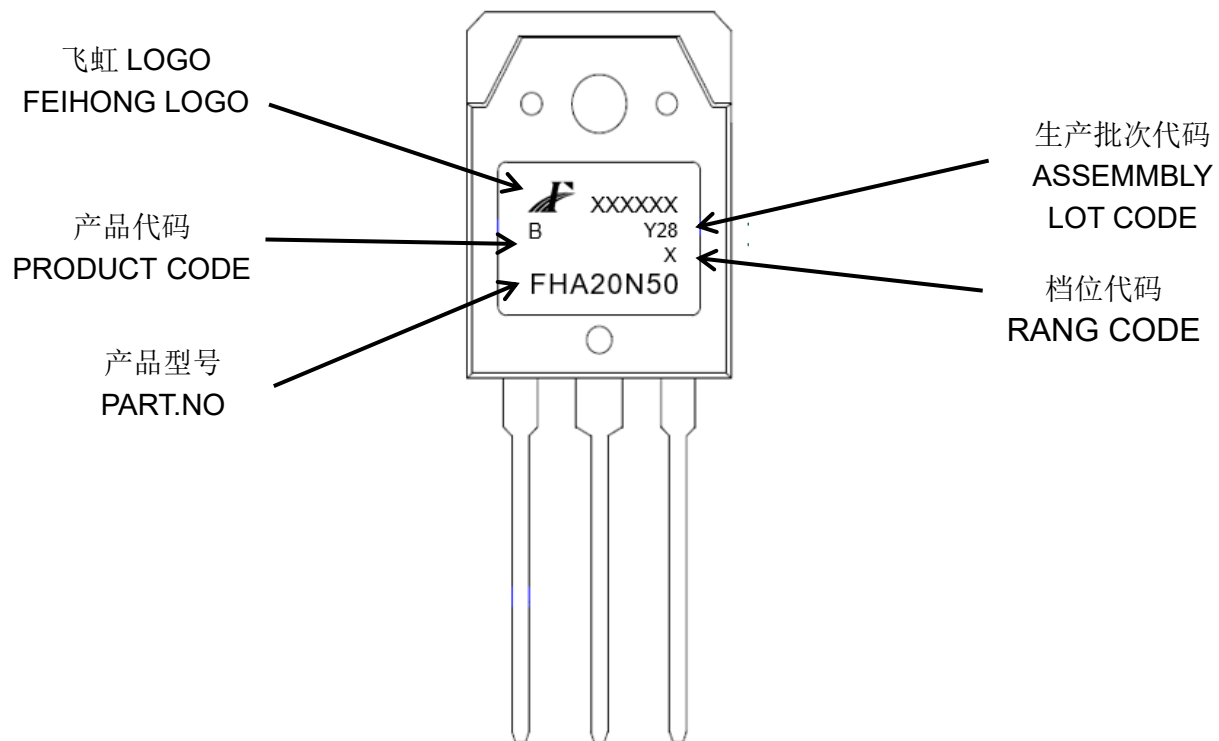
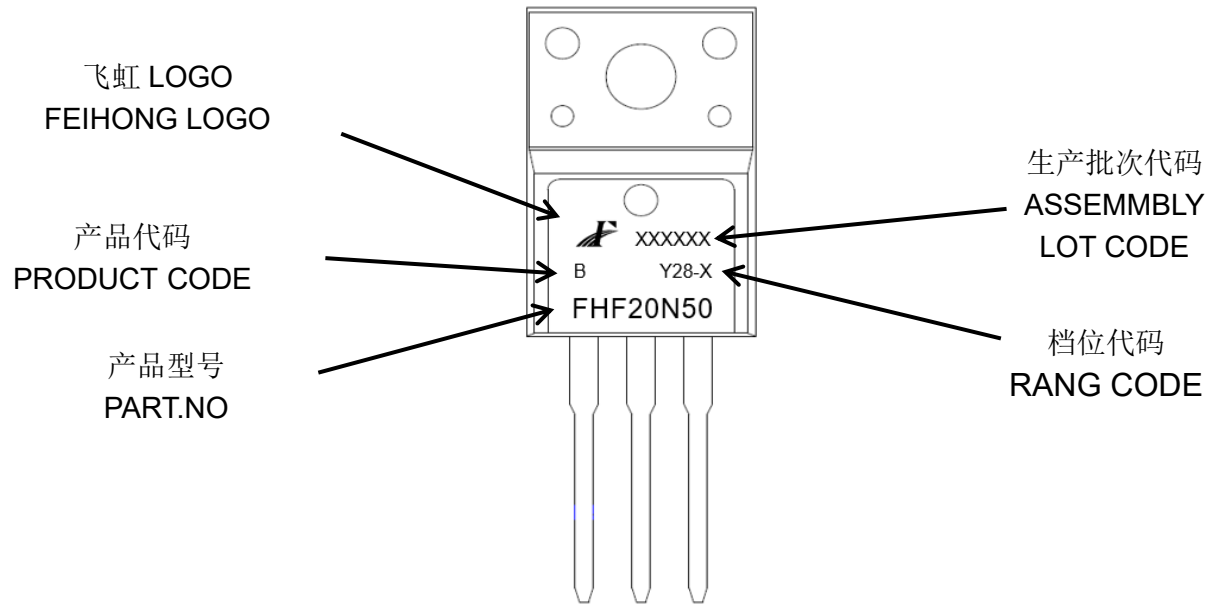
Test Circuit & Waveform

<p>Figure 12 Gate Charge Test Circuit</p>	<p>Figure 13 Gate Charge Waveforms</p>
<p>Figure 14 Resistive Switching Test Circuit</p>	<p>Figure 15 Resistive Switching Waveforms</p>
<p>Figure 16 Diode Reverse Recovery Test Circuit</p>	<p>Figure 17 Diode Reverse Recovery Waveform</p>
<p>Figure 18 Unclamped Inductive Switching Test Circuit</p>	<p>Figure 19 Unclamped Inductive Switching Waveform</p>

印记 Marking



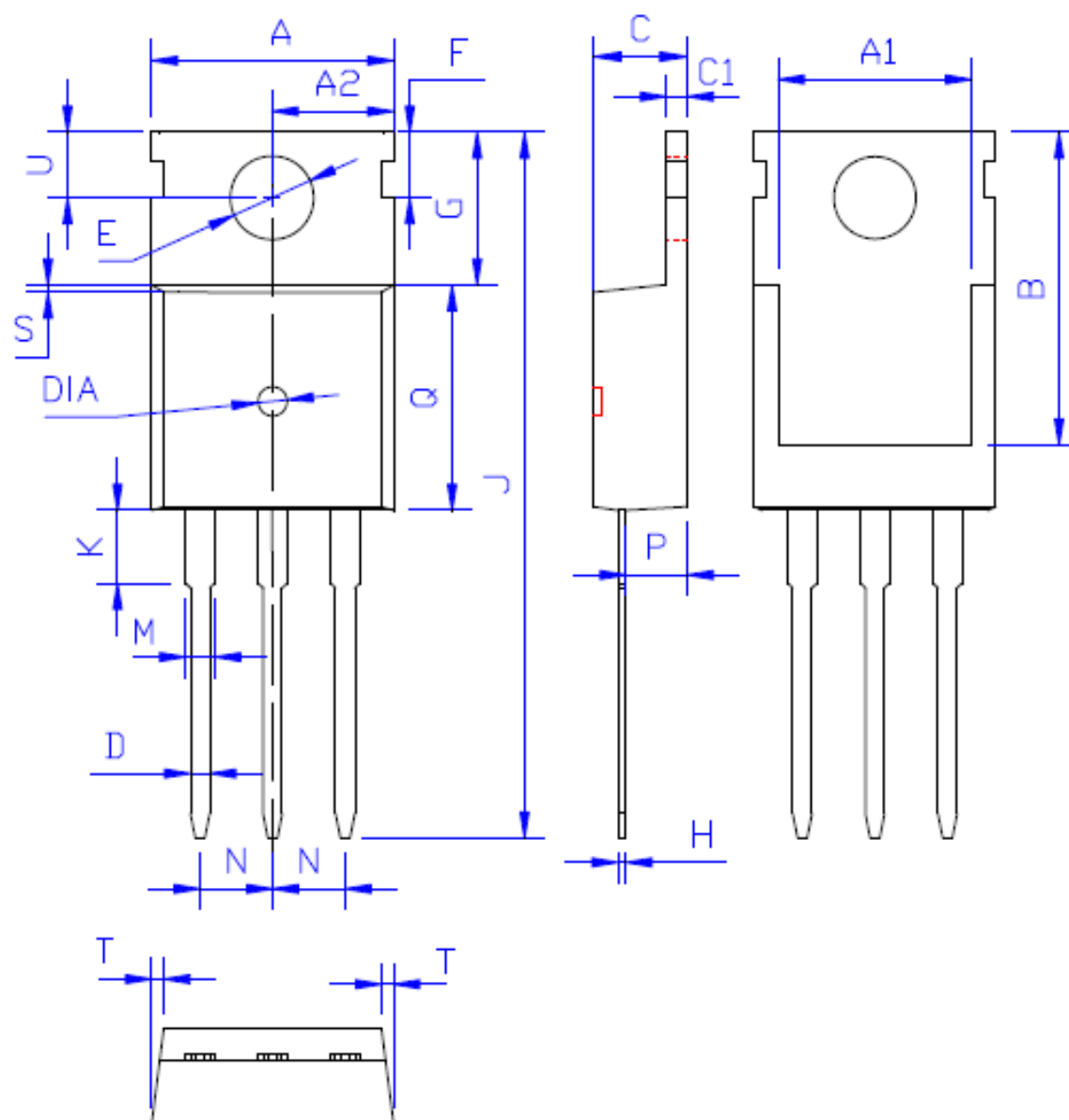
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外形尺寸:

Package Dimension:

TO-220



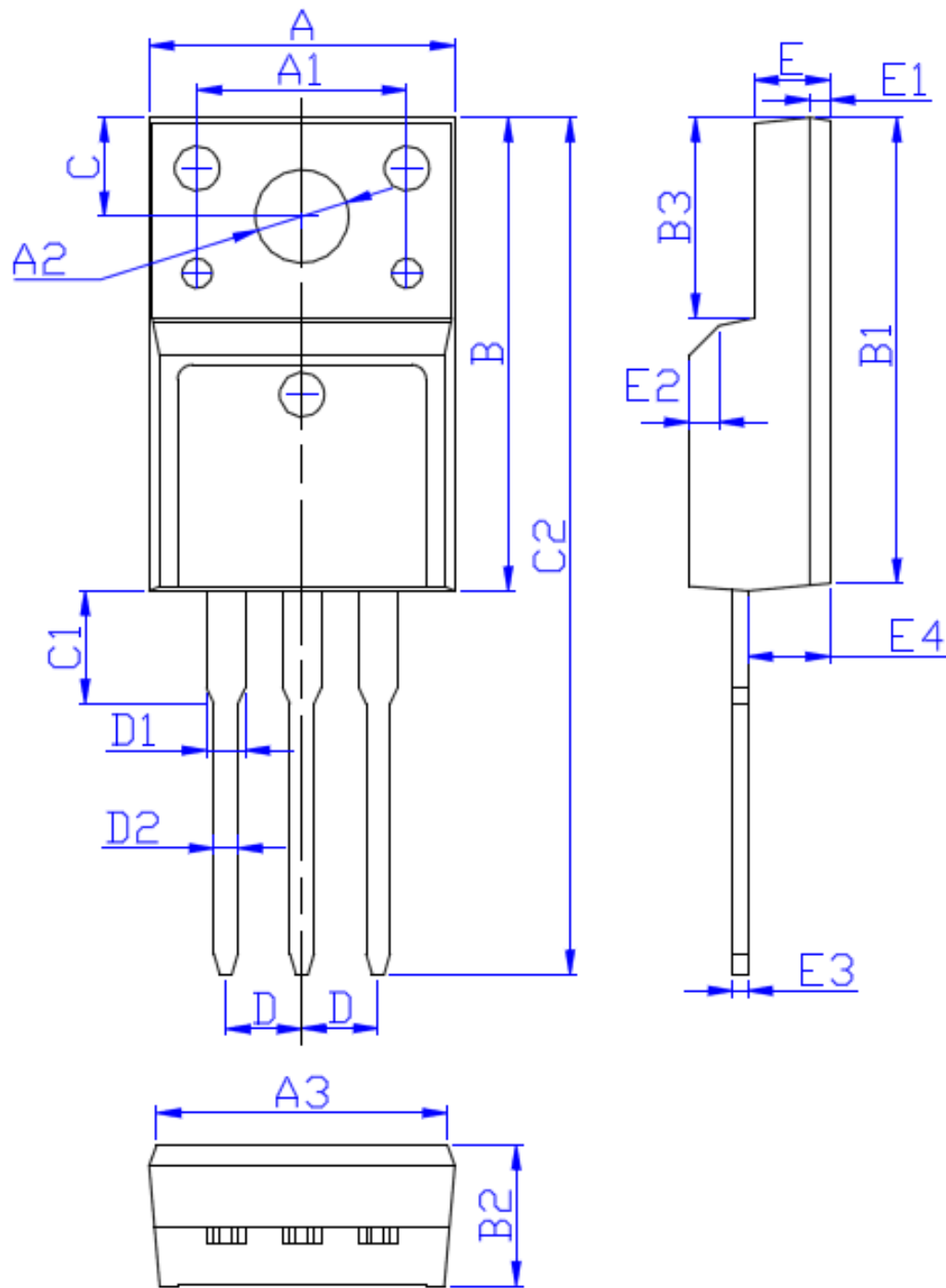
DIM	MILLIMETERS
A	10.00 ± 0.30
A1	8.00 ± 0.30
A2	5.00 ± 0.30
B	13.20 ± 0.40
C	4.50 ± 0.20
C1	1.30 ± 0.20
D	0.80 ± 0.20
E	3.60 ± 0.20
F	3.00 ± 0.30
G	6.60 ± 0.40
H	0.50 ± 0.20
J	28.88 ± 0.50
K	3.00 ± 0.30
M	1.30 ± 0.30
N	Typical 2.54
P	2.40 ± 0.40
Q	9.20 ± 0.40
S	0.25 ± 0.15
T	0.25 ± 0.15
U	2.80 ± 0.30
DIA	宽 1.50 ± 0.10 深 0.50 MAX

(Unit: mm)

外形尺寸:

Package Dimension:

TO-220F



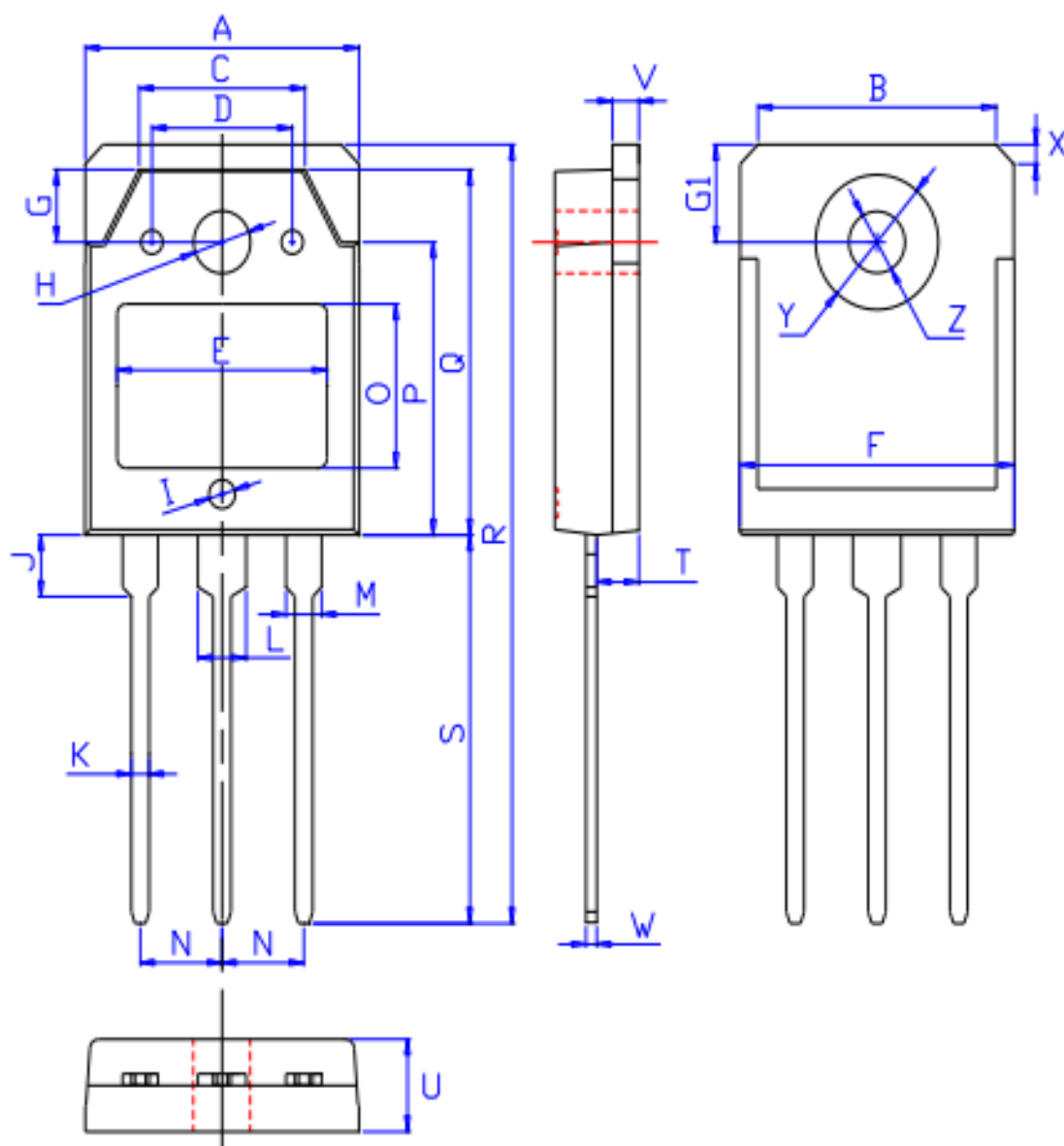
DIM	MILLIMETERS
A	10.16 ± 0.30
A1	7.00 ± 0.20
A2	3.12 ± 0.20
A3	9.70 ± 0.30
B	15.90 ± 0.50
B1	15.60 ± 0.50
B2	4.70 ± 0.30
B3	6.70 ± 0.30
C	3.30 ± 0.25
C1	3.25 ± 0.30
C2	28.70 ± 0.50
D	Typical 2.54
D1	1.47 (MAX)
D2	0.80 ± 0.20
E	2.55 ± 0.25
E1	0.70 ± 0.25
E2	1.0 × 45°
E3	0.50 ± 0.20
E4	2.75 ± 0.30

(Unit: mm)

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	φ3.50±0.30
I	φ1.50±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