XNF15N60T

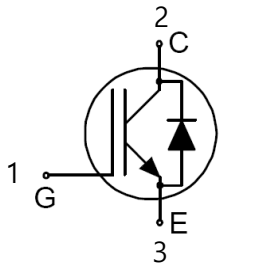
600V/15A 沟槽栅场截止型 IGBT

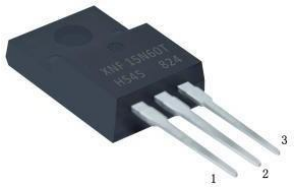
■ 产品特点/PRODUCT FEATURES

- 先进的沟槽栅+场截止技术
  Advanced Trench+FS IGBT technology
- 超低饱和压降
  Low Collector-Emitter Saturation voltage
- 反并快恢复二极管
  With anti-parallel fast recovery diode
- 最高结温 T_J = 175 °C
  Maximum junction temperature: T_J = 175 °C

■ 应用领域/APPLICATIONS

- 电机控制器
  Motor control





1.Gate/栅极
2.Collector/集电极
3.Emitter/发射极

关键性能和封装信息/Key Performance and Package Parameters

Type	V_{CE}	I_C	V_{CEsat}, T_{vj}=25℃	T_{vjmax}	Package
XNF15N60T	600V	15A	1.8V	175℃	TO-220F

深圳芯能半导体技术有限公司
Shenzhen invsemi technology co,ltd
IGBT_IPM_PIM_HVIC_深圳芯能半导体技术有限公司_(invsemi.com)

额定值、热阻
Ratings&Thermal Resistance

最大额定值/ Maximum Ratings

符号/Symbol	参数/Parameter	条件/Condition	值/Value	单位/Unit
V_{CES}	集电极-发射极电压 Collector-to-emitter voltage	T_{vj}=25℃	600	V
I_C	集电极连续直流电流 DC Collector current	T_C = 25℃	30	A
		T_C =100℃	15	
I_{CRM}①	集电极可重复脉冲电流 Pulsed Collector current	T_{vj}≤175℃	45	A
I_F	二极管连续直流电流 Diode continuous forward current	T_C = 25℃	30	A
		T_C = 100℃	15	
I_{FRM}①	二极管可重复脉冲电流 Diode pulsed current	T_{vj}≤175℃	45	A
V_{GES}	栅极-发射极峰值电压 Gate to emitter voltage	T_{vj}=25℃	± 30	V
t_{sc}	短路耐量 Short circuit withstand time	V_{GE}=15V,V_{CC}≤400V T_{vj}=25℃	10	μs
P_{tot}	总耗散功率 Power dissipation	T_C = 25℃	38	W
T_{vj}	可工作结温 Operating Junction Temperature	—	-40~+ 175	℃
T_{stg}	储存温度 Storage Temperature Range	—	-50~ + 150	℃

① 脉宽受限于最高结温/Pulse width limited by T_{vjmax}

热阻/Thermal Resistance

符号/Symbol	参数/Parameter	最大值/Max.Value	单位/Unit
$R_{th(J-C)}$	IGBT 芯片到底板热阻 IGBT thermal resistance Junction-to-Case	4	K/W
$R_{th-(J-C)}$	二极管芯片到底板热阻 FRD thermal resistance Maximum Junction-to-Case	5	K/W
$R_{th(J-A)}$	结到环境热阻 Thermal resistance Junction-to-Ambient	62	K/W

电气特性
Electrical Characteristic

静态电气特性/Static Electrical Characteristic

符号 Symbol	参数 Parameter	测试条件 Test conditions	Value值			单位 Units
			Min	Typ	Max	
$V_{(BR)CES}$	集电极-发射极击穿电压 Collector - Emitter breakdown voltage	V_{GE}=0V,I_c =0.5μA,T_{vj}=25℃	600	—	—	V
$V_{CE(sat)}$	集电极-发射极饱和压降 Collector-Emitter Saturation voltage	V_{GE}=15V,I_C=15A,T_{vj}=25℃	—	1.8	2.3	V
		V_{GE}=15V,I_C=15A,T_{vj}=175℃	—	2.3	—	
$V_{GE(th)}$	门极开启阀值电压 Gate threshold voltage	V_{GE}=V_{CE},I_c=1.5mA,T_{vj}=25℃	4.8	5.7	6.2	V
V_F	二极管正向导通压降 Diode Forward Voltage	V_{GE}=0V,I_F=15A,T_{vj}=25℃	—	1.4	2.2	V
		V_{GE}=0V,I_F=15A,T_{vj}=175℃	—	1.3	—	
I_{GES}	门极-发射极漏电流 Gate to Emitter Leakage current	V_{GE}=30V,V_{CE}=0V,T_{vj}=175℃	—	—	100	nA
I_{CES}	集电极-发射极漏电 Zero gate voltage collector current	V_{CE}=600V,V_{GE}=0V,T_{vj}=175℃	—	—	200	uA
R_{Gin}	内部门极电阻 Integrated gate resistor	—	—	0	—	Ω

动态电气特性/Dynamic Electrical Characteristic

符号 Symbol	参数 Parameter	测试条件 Test conditions	Value 值			单位 Units
			Min	Typ	Max	
C_{ies}	输入电容 Input capacitance	V_{GE} = 0V,V_{CE}= 25V, f = 1MHz, T_{vj}=25℃	—	718	—	pF
C_{oes}	输出电容 Output capacitance		—	37	—	
C_{res}	反向传输电容 Reverse transfer capacitance		—	7	—	
Q_g	门极电量 Total gate charge	I_C =15A,V_{CE}=480V, V_{GE}=15V, T_{vj}=25℃	—	25	—	nC
Q_{ge}	门极-发射极电量 Gate to emitter charge		—	7	—	
Q_{gc}	门极-集电极电量 Gate to collector charge		—	12	—	
I_{SC}	短路电流 Short circuit collector current	T_{vj}=25℃,V_{CE}=400V, V_{GE} = 15 V	—	64	—	A

开关特性、感性负载
Switching Characteristic Inductive Load

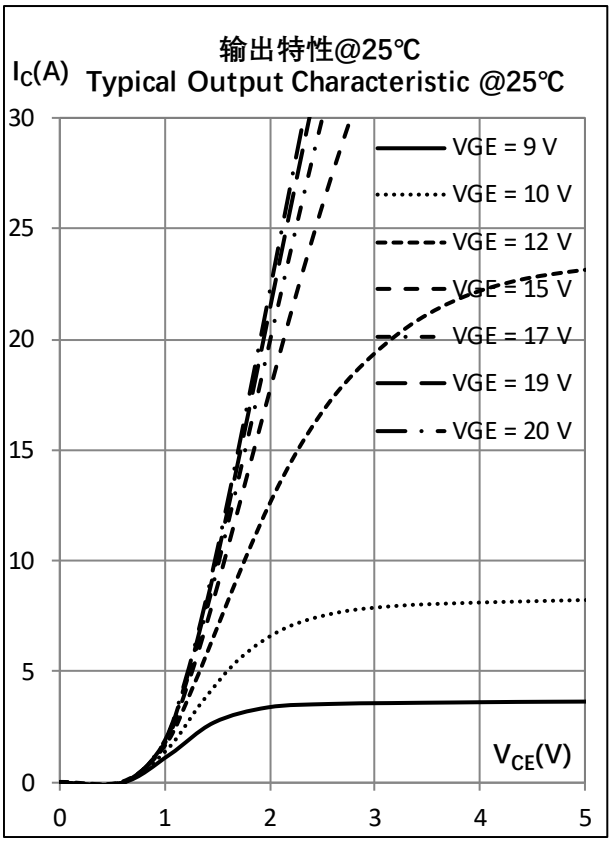
IGBT 特性/IGBT Characteristic

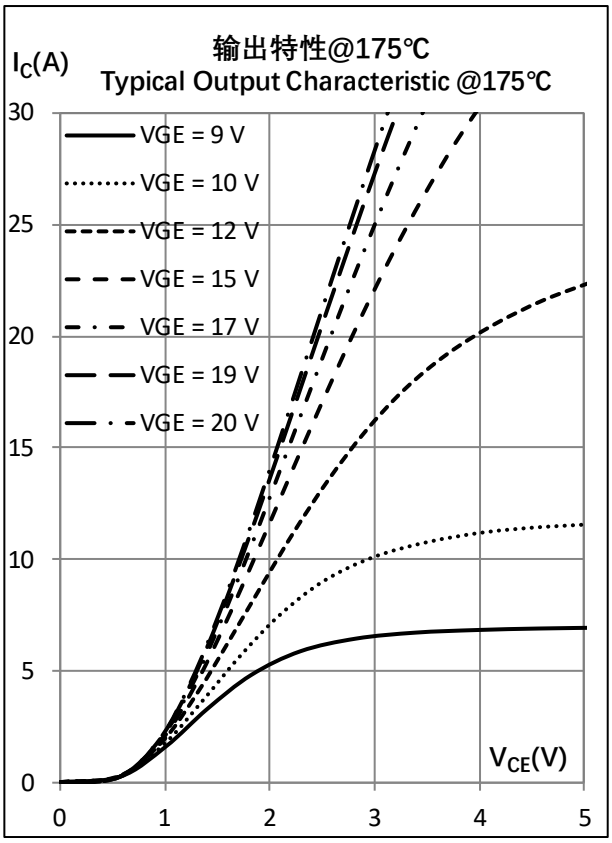
符号 Symbol	参数 Parameter	测试条件 Test conditions		值Value			单位 Units
				Min	Typ	Max	
$T_{d(on)}$	开启延迟时间 Turn-On Delay Time	V_{CC}=400V I_C=15A $R_{G(on)}$=30Ω $R_{G(off)}$=30Ω C=0nF V_{GE}=15V L_{load}=300μH	T_{vj}=25℃	—	32	—	ns
			T_{vj}=175℃	—	34	—	
Tr	上升时间 Rise time		T_{vj}=25℃	—	36	—	ns
			T_{vj}=175℃	—	37	—	
$T_{d(off)}$	关闭延迟时间 Turn-Off Delay Time		T_{vj}=25℃	—	80	—	ns
			T_{vj}=175℃	—	101	—	
t_f	下降时间 Turn-Off Fall Time		T_{vj}=25℃	—	67	—	ns
			T_{vj}=175℃	—	76	—	
E_{on}	单次开启损耗 Turn-on switch loss		T_{vj}=25℃	—	432	—	μJ
			T_{vj}=175℃	—	653	—	
E_{off}	单次关闭损耗 Turn-off switch loss		T_{vj}=25℃	—	337	—	μJ
			T_{vj}=175℃	—	374	—	

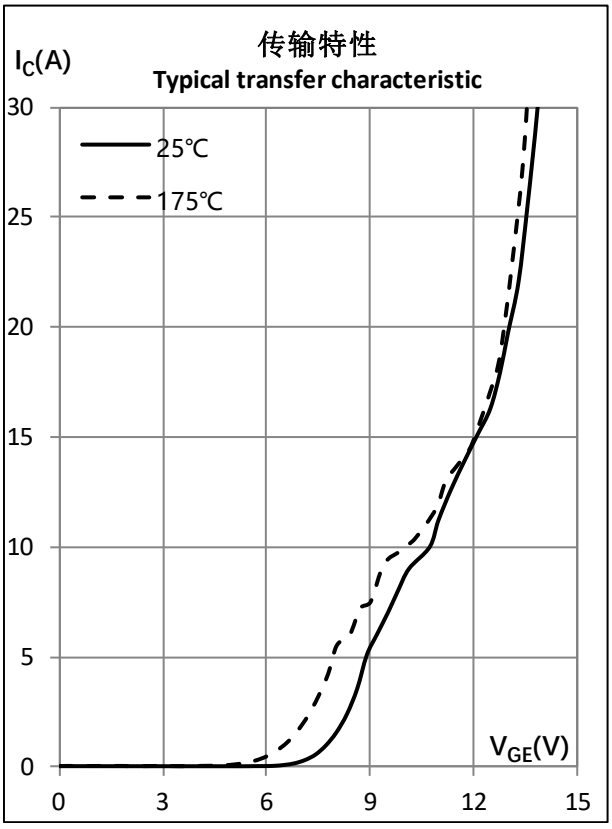
二极管特性/Diode Characteristic

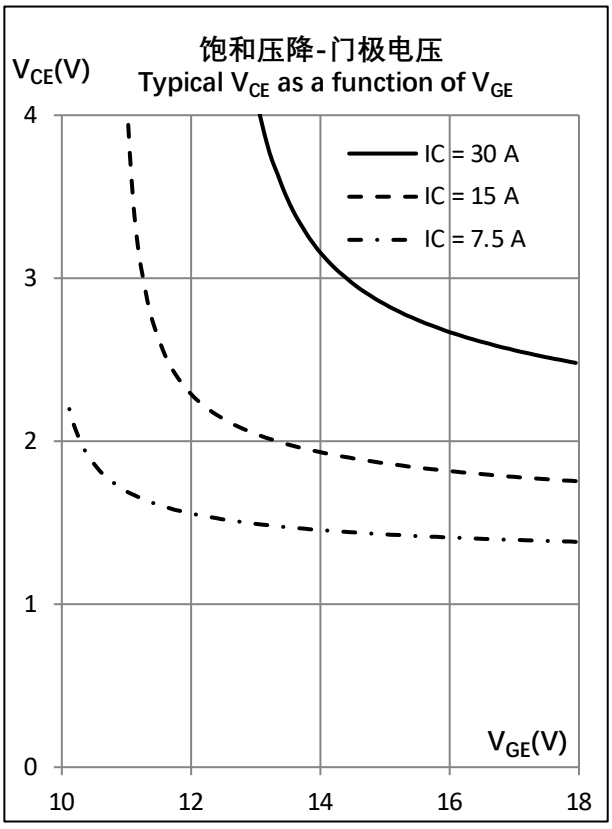
符号 Symbol	参数 Parameter	测试条件 Test conditions		值Value			单位 Units
				Min	Typ	Max	
t_{rr}	二极管反向恢复时间 Diode Reverse Recovery Time	I_F = 15A V_R=400V di_F/dt=-200A/μs	T_{vj}=25℃	—	59	—	ns
			T_{vj}=175℃	—	144	—	
Q_{rr}	二极管反向恢复电量 Diode Reverse Recovery Charge		T_{vj}=25℃	—	340	—	nC
			T_{vj}=175℃	—	723	—	
I_{rrm}	反向恢复峰值电流 Peak reverse recovery current		T_{vj}=25℃	—	8	—	A
			T_{vj}=175℃	—	11	—	
di_{rr}/dt	恢复下降电流最大电流变化率 Peak rate of i_{rr}		T_{vj}=25℃	—	128	—	A/μs
			T_{vj}=175℃	—	127	—	
E_{rec}	二极管反向恢复损耗 Diode Reverse Recovery loss		T_{vj}=25℃	—	54	—	μJ
			T_{vj}=175℃	—	165	—	

特征曲线
Characteristic Curve

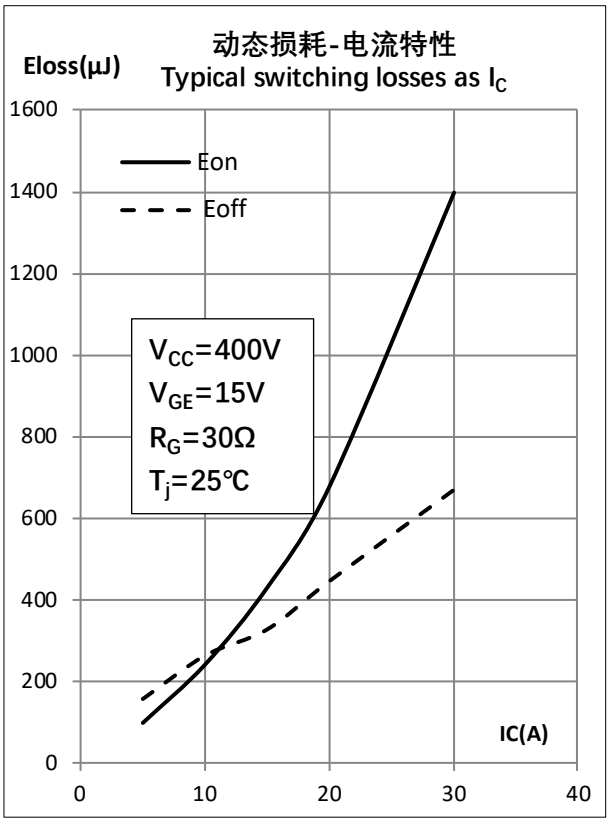


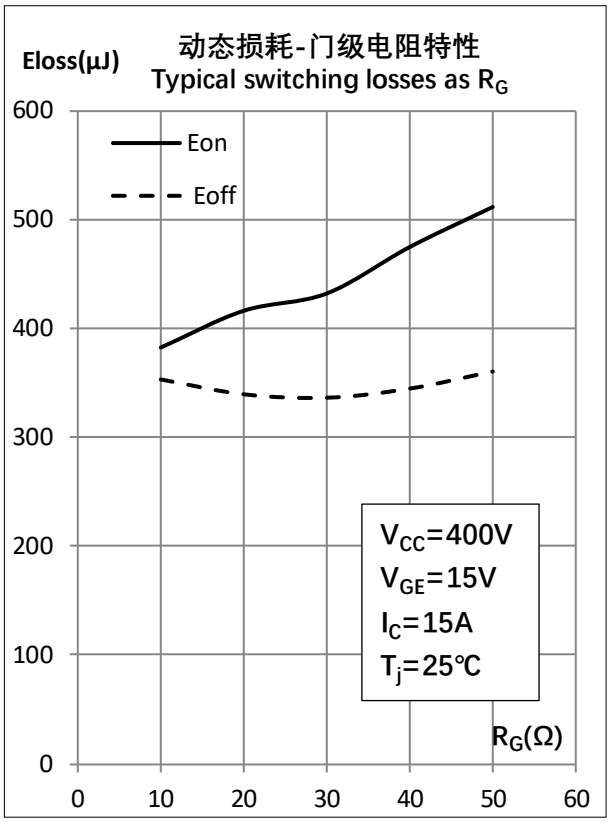


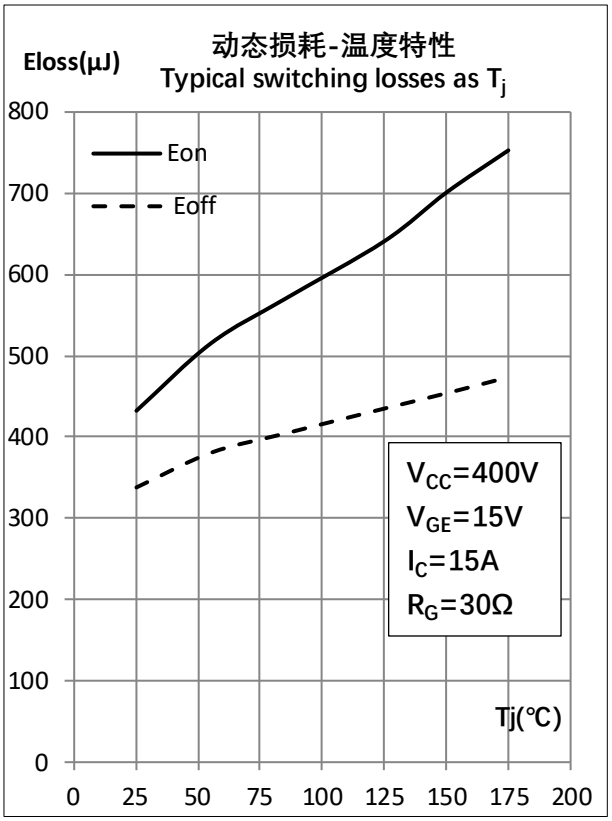


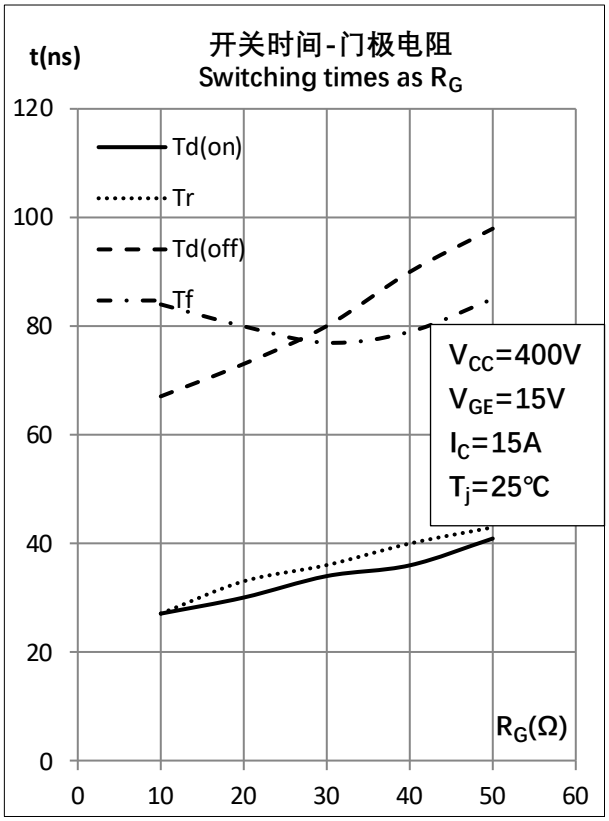


特征曲线
Characteristic Curve

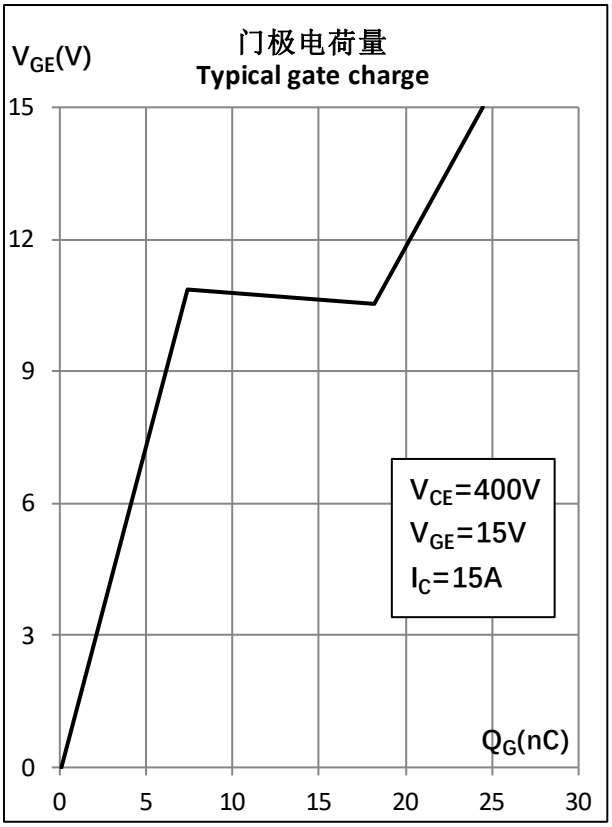


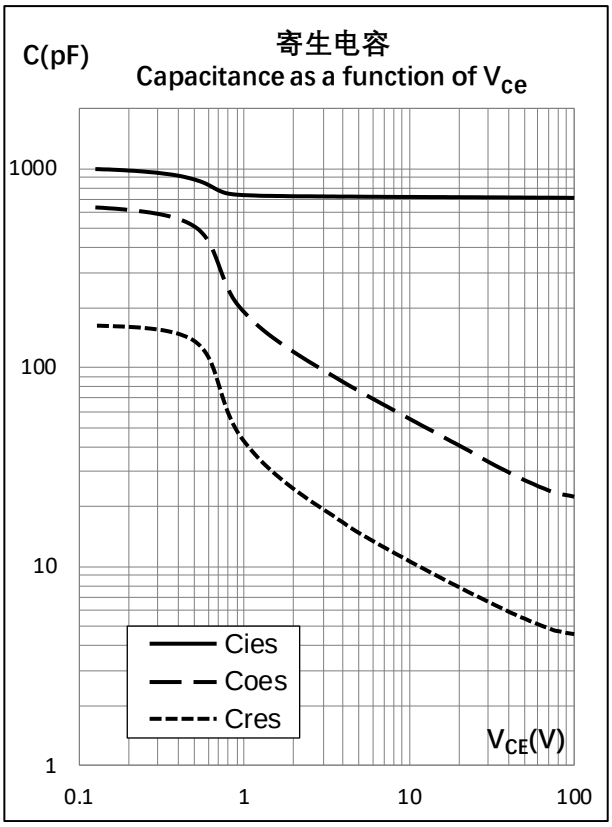


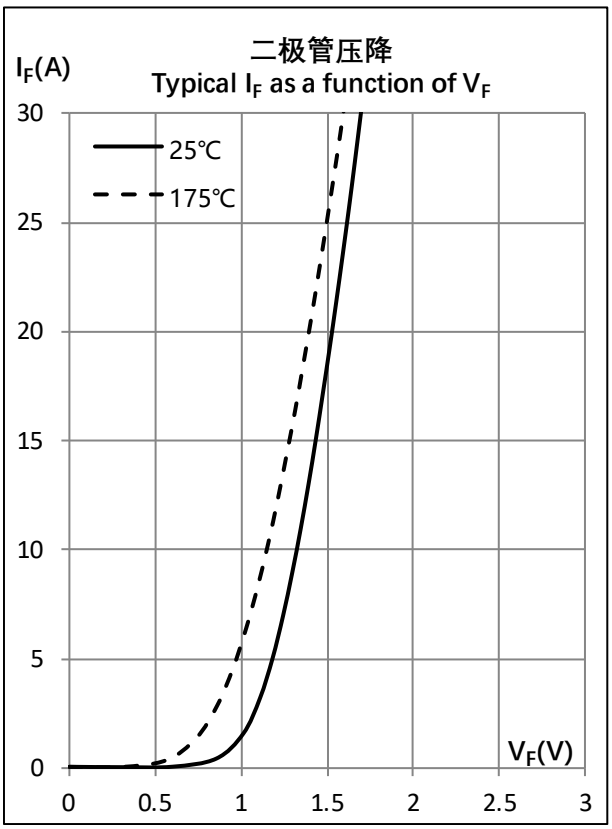


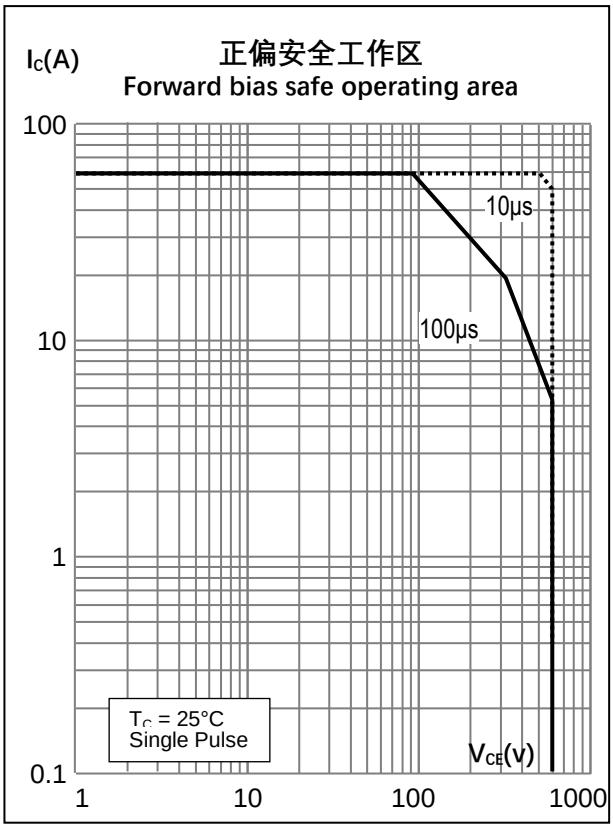


特征曲线
Characteristic Curve

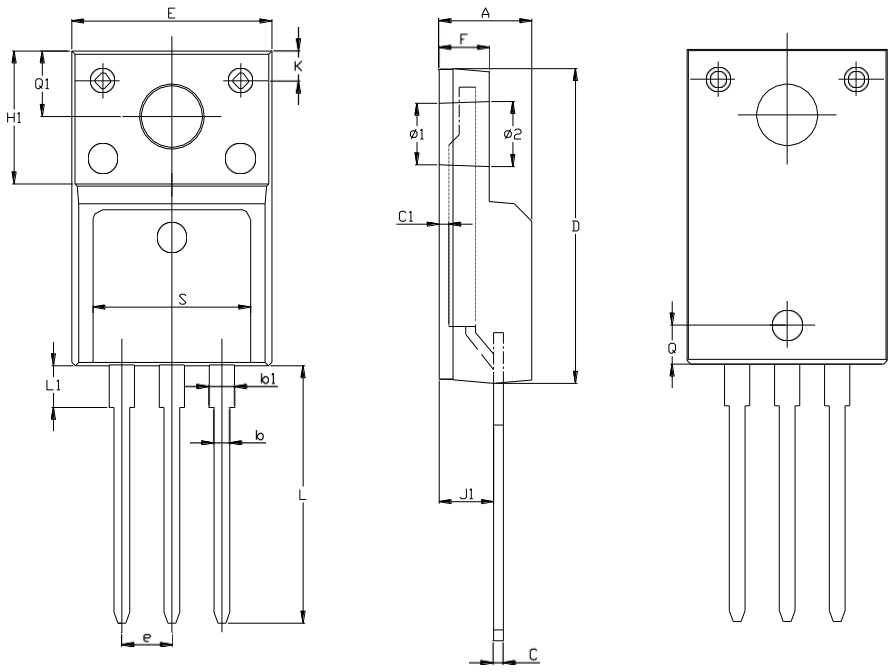








TO-220F 封装数据
TO-220F Package Data



DIM	MIM(mm)	MAX(mm)
A	4.53	4.93
b	0.71	0.91
b1	1.15	1.39
C / C1	0.45	0.6
D	15.67	16.07
E	9.96	10.36
F	2.34	2.74
H1	6.5	6.9
J	0.32	0.43
J1	2.56	2.96
K	1.9	2.1
e	2.54 BSC	
Q	1.9	2.1
Q1	3.1	3.5
S	7.9	8.1
L	12.78	13.18
L1	1.9	2.3
Ø1	3.08	3.28
Ø2	3.35	3.55

免责声明
Disclaimers

本文所述芯能产品规定了产品在各状态下的性能、特点和功能，并不保证所述产品安装在客户产品或设备中的性能、特点和功能。为了保证芯能产品在客户产品中工作状态，客户应严谨评估和测试。
Specifications of any and all Invsemi products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.

本产品在使用过程中，如应用条件超出本规格书规定值（如最大额定值、工作条件范围或其他参数），即使是短时超过，而引起使用该产品的设备出现故障，芯能不承担任何责任。
Invsemi assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all Silicon products described or contained herein.

由于产品/技术改进等原因，本文所述或包含的任何和所有信息可能会发生更改，恕不另行通知。
Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc.

深圳芯能半导体技术有限公司
Shenzhen invsemi technology co,ltd
IGBT IPM PIM HVIC 深圳芯能半导体技术有限公司 (invsemi.com)