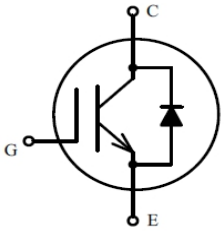
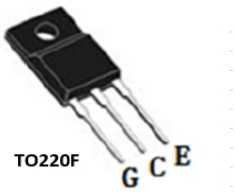
BGF15T65SD-I

IGBT in advanced TrenchFS Technology with soft and fast recovery anti-parallel diode
具有先进 TrenchFS 技术的 IGBT 且反并联软快恢复二极管

Features:
特性





- 650V TrenchFS technology
  650V 沟槽栅场终止技术
- Low conduction and switching losses
  低导通和开关损耗
- Positive temperature coefficient
  饱和电压正温度系数
- Low gate charge
  低栅极电荷
- Short Circuit withstand time-5μs
  具备5μs短路承受能力

Applications:
应用

- Industrial sewing machine
  工业缝纫机
- Inverter
  变频器

Type 型号	V_{CE}[V] 集电极-发射极电压	I_C[A] 集电极电流	V_{CEsat}[V] 饱和电压	T_{jmax}[℃] 最高结温	Marking 标记	Package 封装
BGF15T65SD-I	650	15	1.6	175	15T65SD-I	TO220F-3

Maximum Rated Values
最大额定参数

Parameter 参数	Symbol 符号	Value 值	Unit 单位
Collector-emitter voltage, T_j≥25℃ 集电极-发射极电压,T_j≥25℃	V_{CE}	650	V
Collector current,T_C=25℃ 集电极电流，Tc=25℃	I_C	30	A
Collector current,T_C=100℃ 集电极电流，Tc=100℃	I_C	15	
Pulsed collector current，t_p limited by $T_{j\,max}$ 集电极脉冲电流，脉宽时间受 $T_{j\,max}$ 限制	I_{Cpuls}	60	
Diode forward current,T_C=25℃ 二极管正向电流，Tc=25℃	I_F	30	
Diode forward current,T_C=100℃ 二极管正向电流，Tc=100℃	I_F	15	
Diode pulsed current 二极管脉冲电流	I_{Fpuls}	60	
Gate-emitter voltage 栅极-发射极电压	V_{GE}	±20	V
Short Circuit withstand time V_{GE}=15V,V_{CC}≤400V,T_j≤150℃ 短路耐受时间	t_{sc}	5	us
Total power dissipation, T_C=25℃ 总耗散功率，Tc=25℃	P_{tot}	37.5	W
Operating junction temperature 最高结温	T_{jmax}	175	℃
Operating junction temperature 工作结温	T_{jop}	-40…+150	
Storage temperature 储存温度	T_{stg}	-55…+150	
Soldering temperature,1.6mm from case for 10s 焊接温度	T_{st}	300	
Mounting Torque M3 锁装力矩	Md	0.6	Nm

Thermal Resistance
热阻

Parameter 参数	Symbol 符号	Value 值	Unit 单位
IGBT Thermal resistance junction to case IGBT 结-管壳热阻	$R_{th(j-c)}$	4.0	℃/W
Diode Thermal resistance junction to case 二极管结-管壳热阻	$R_{th(j-c)}$	8.0	℃/W
Thermal resistance junction to ambient 结-环境热阻	$R_{th(j-a)}$	62.5	℃/W

Electrical Characteristic at Tj = 25℃ （unless otherwise specified）
Tj=25℃时电学特性（除非特别声明）

Parameter 参数	Symbol 符号	Conditions 条件		Value 值			Unit 单位
				Min. 最小值	Typ. 典型值	Max. 最大值	
Static Characteristic **静态特性**							
Collector-emitter breakdown voltage 集电极-发射极击穿电压	$V_{(BR)CES}$	V_{GE}=0V, I_C=100uA		650	-	-	V
Collector-emitter saturation voltage 集电极-发射极饱和电压	Vcesat	V_{GE}=15V, I_C=15A	T_j=25℃	-	1.6	1.8	
			T_j=150℃	-	1.8	-	
Diode forward voltage 二极管正向电压	VF	V_{GE}=0V, I_F=15A	T_j=25℃	-	1.9	2.4	
			T_j=150℃	-	1.6	-	
Gate-emitter threshold voltage 栅极-发射极阈值电压	$V_{GE(th)}$	I_C=300uA, V_{CE}=V_{GE}		4.5	5.5	6.5	
Collector-emitter cut-off current 集电极-发射极截止电流	I_{CES}	V_{CE}=650V, V_{GE}=0V		-	-	100	μA
Gate-emitter leakage current 栅极-发射极漏电流	I_{GES}	V_{CE}=0V, V_{GE}=±20V		-200	-	200	nA
Dynamic Characteristic **动态特性**							
Input capacitance 输入电容	C_{ies}	V_{CE}=25V, V_{GE}=0V, f=1MHz		-	812	-	pF
Output capacitance 输出电容	C_{oes}			-	63	-	
Reverse transfer capacitance 反向传输电容	C_{res}			-	8	-	

Gate charge 门极电量	Q_G	V_{CC}=400V,I_C=30A, V_{GE}=15V	-	21.1	-	nC
Short circuit current 短路电流	$I_{C(sc)}$	V_{CC}=400V,V_{GE}=15V, tpsc≤5us,T_j=150℃	-	60	-	A

Switching Characteristic at T_j=25℃（Inductive Load）
T_j=25℃时开关特性（感性负载）

Parameter 参数	Symbol 符号	Conditions 条件	Value 值			Unit 单位
			Min. 最小值	Typ. 典型值	Max. 最大值	
IGBT Characteristic IGBT 特性						
Turn-on delay time 开通延迟时间	$t_{d(on)}$	T_j=25℃， V_{CC}=400V, I_C=15A, V_{GE}=-7.5/15V, R_G=10Ω, Energy losses include “tail” and diode reverse recovery.	-	45	-	ns
Rise time 上升时间	t_r		-	35	-	
Turn-off delay time 关断延迟时间	$t_{d(off)}$		-	115	-	
Fall time 下降时间	t_f		-	115	-	
Turn-on energy 开通损耗	E_{on}		-	0.21	-	mJ
Turn-off energy 关断损耗	E_{off}		-	0.26	-	
Total switching energy 总开关损耗	E_{ts}		-	0.47	-	
Anti-Parallel Diode Characteristic 反并联二极管特性						
Reverse recovery time 反向恢复时间	t_{rr}	T_j=25℃, V_R=400V, I_F=15A, diF/dt=100A/μs	-	186	-	ns
Recovered charge 恢复电荷	Q_r		-	320	-	nC
Peak reverse recovery current 反向恢复峰值电流	I_{RM}		-	3.3	-	A

Switching Characteristic at T_j=150℃（Inductive Load）

T_j=150℃时开关特性（感性负载）

Parameter 参数	Symbol 符号	Conditions 条件	Value 值			Unit 单位
			Min. 最小值	Typ. 典型值	Max. 最大值	
IGBT Characteristic **IGBT 特性**						
Turn-on delay time 开通延迟时间	$t_{d(on)}$	T_j=150℃， V_{CC}=400V, I_C=15A, V_{GE}=-7.5/15V, R_G=10Ω, Energy losses include “tail” and diode reverse recovery.	-	40	-	ns
Rise time 上升时间	t_r		-	40	-	
Turn-off delay time 关断延迟时间	$t_{d(off)}$		-	130	-	
Fall time 下降时间	t_f		-	145	-	
Turn-on energy 开通损耗	E_{on}		-	0.28	-	mJ
Turn-off energy 关断损耗	E_{off}		-	0.54	-	
Total switching energy 总开关损耗	E_{ts}		-	0.82	-	
Anti-Parallel Diode Characteristic **反并联二极管特性**						
Reverse recovery time 反向恢复时间	t_{rr}	T_j=150℃, V_R=400V, I_F=15A, diF/dt=100A/μs	-	252	-	ns
Recovered charge 恢复电荷	Q_r		-	920	-	nC
Peak reverse recovery current 反向恢复峰值电流	I_{RM}		-	4.8	-	A

ELECT RICAL CHARACTERISTICS
特性曲线

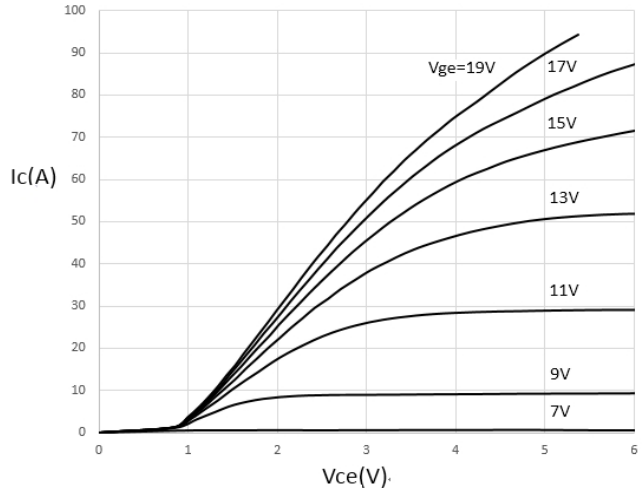


Figure 1. Typical output characteristic(T_j=25℃)

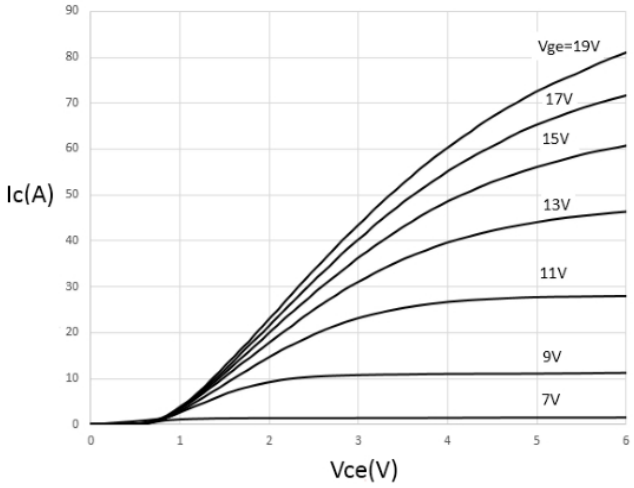


Figure 2. Typical output characteristic(T_j=150℃)

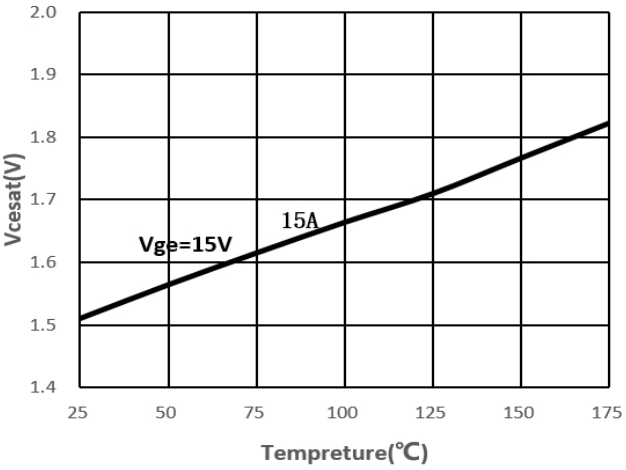


Figure 3. V_{cesat} vs. T_j

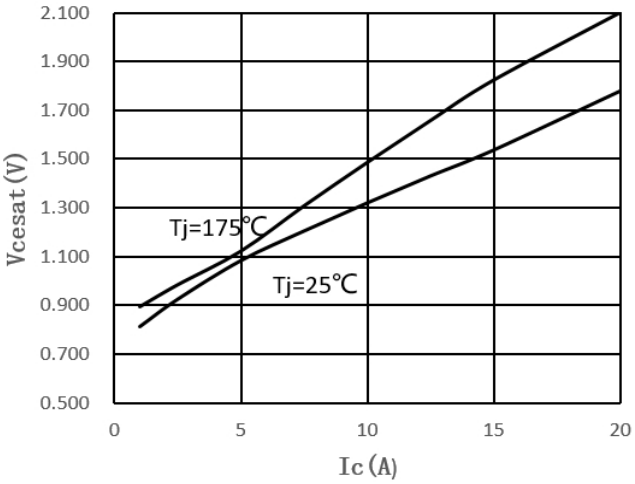


Figure 4. V_{cesat} vs. Ic

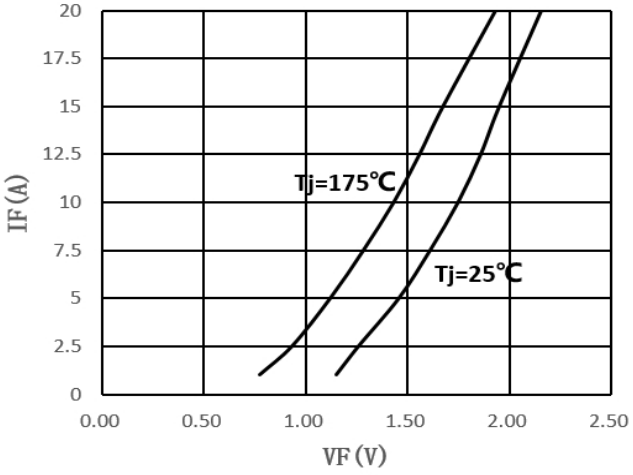


Figure 5. IF vs VF

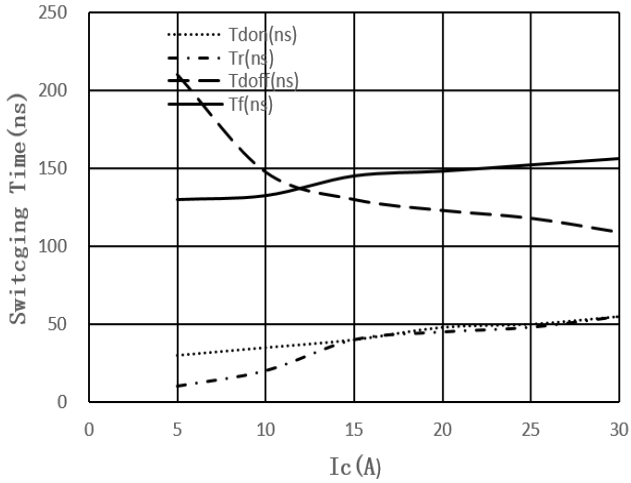


Figure 6. Switching times vs Ic
(T_j=150℃,V_{GE}=15V,V_{CE}=400V,R_G=10Ω)

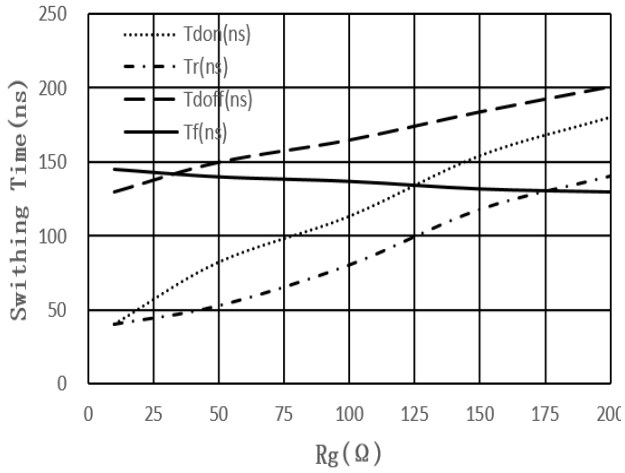


Figure 7. Switching times vs R_G
(T_j=150℃,V_{CE}=400V,V_{GE}=15V,I_C=15A)

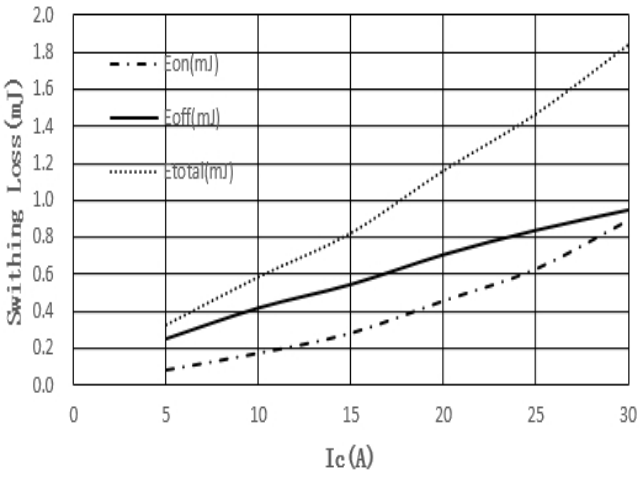


Figure 8. Switching energy losses vs Ic
(T_j=150℃,V_{CE}=400V,V_{GE}=15V, R_G=10Ω)

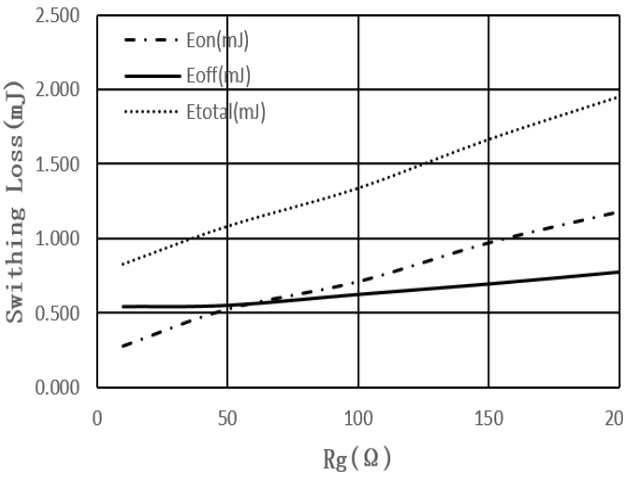


Figure 9. Switching energy losses vs R_G
(T_j=150℃,V_{CE}=400V,V_{GE}=15V,I_C=15A)

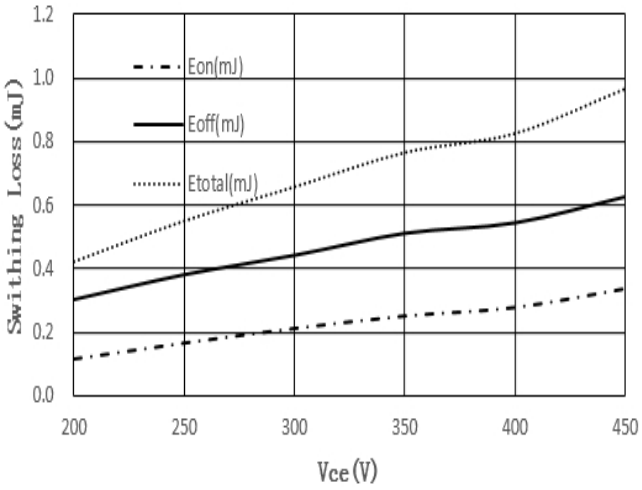


Figure 10. Switching energy losses vs V_{CE}
(T_j=150℃,V_{GE}=15V,I_C=15A, R_G=10Ω)

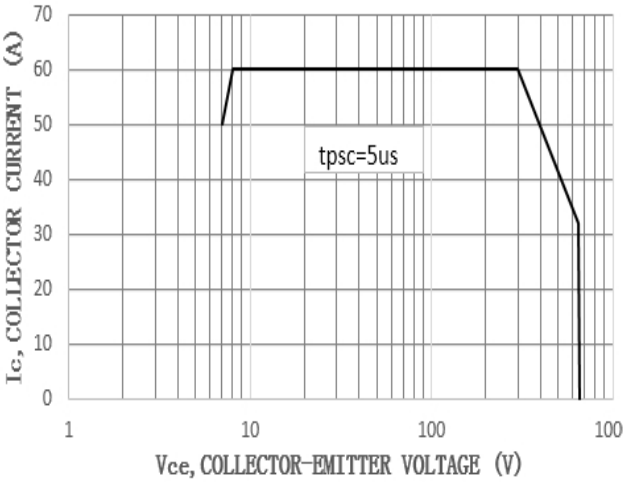


Figure 11. Safe Operating Area for TO-220F

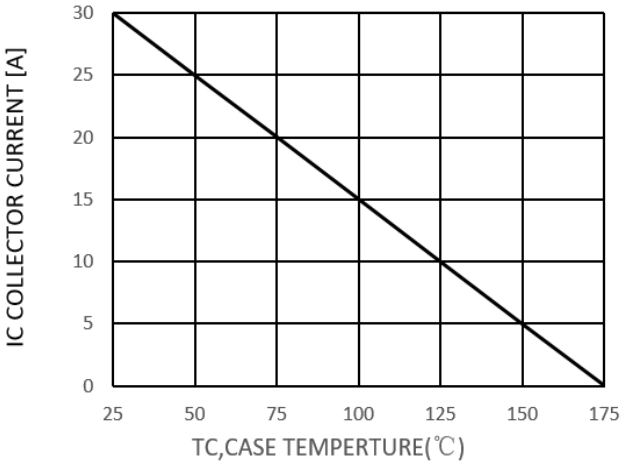
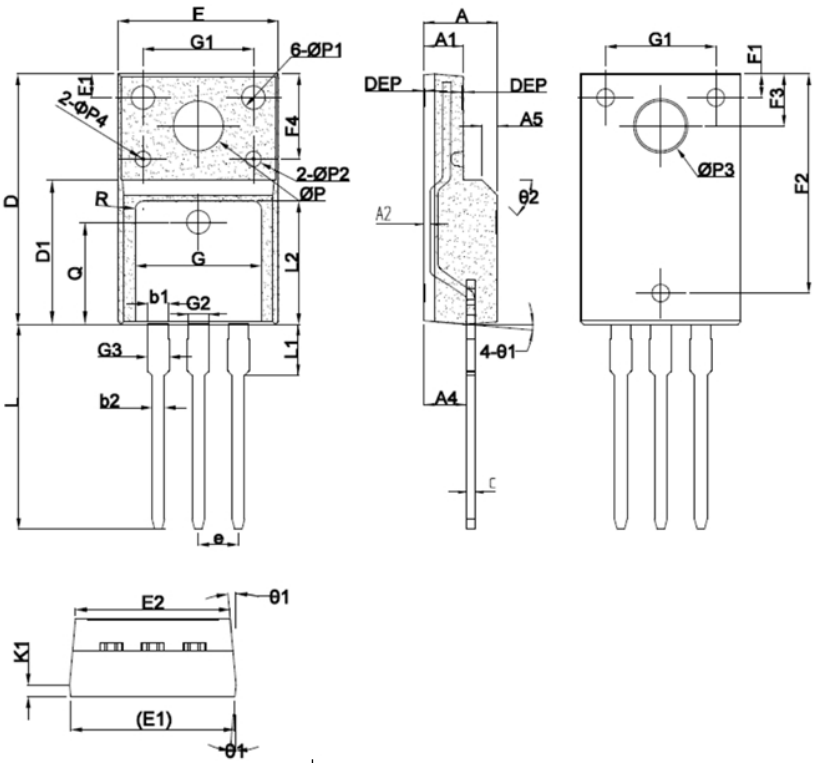


Figure 12. Ic vs Tc

TO220F-3 Outline Dimensions:

TO220F-3 外形尺寸



Common Dimensions (Units:Millimeter)			
Symbol	Min.	Nom.	Max.
*A	4.50	4.70	4.90
*A1	2.34	2.54	2.74
*A2	0.38	0.43	0.48
*A4	2.66	2.76	2.86
A5		1.0REF	
b1	1.23	1.28	1.33
*b2	0.75	0.80	0.85
*c	0.45	0.50	0.60
*D	15.67	15.87	16.07
*D1	9.04	9.12	9.20
*e	2.49	2.54	2.59
*E	10.00	10.16	10.32
E1	9.94	10.04	10.14
E2	9.36	9.46	9.56
F1	1.40	1.50	1.60
F2	13.80	13.90	14.00
*F3	3.20	3.30	3.40
F4	5.30	5.40	5.50
G	7.80	8.00	8.20
G1	6.90	7.00	7.10
*G3	1.28	--	1.43
K1	0.65	0.70	0.75
L	12.78	12.98	13.18
L1	3.13	3.23	3.33
L2	7.70	7.80	7.90
Q		6.5REF	
R		0.5REF	
*ΦP	3.08	3.18	3.28
ΦP1	1.40	1.50	1.60
ΦP2	0.95	1.00	1.05
ΦP3	3.35	3.40	3.45
ΦP4	0.15	0.20	0.25
*θ1	3°	5°	7°
θ2	--	45°	--
DEP	0.05	0.1	0.15
带*为检验尺寸			

Packing

包装

Packing	pcs/tube	tube/ inner box	inner box/ carton	pcs/carton
Tube	50	8	5	2000

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