



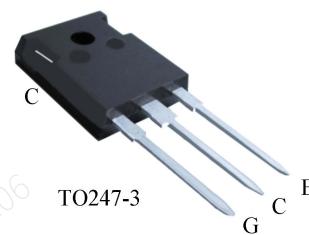
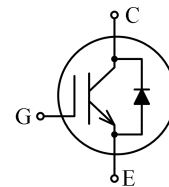
BGNE30T65SD

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
- Short Circuit withstand time-5 μ s
具备5 μ s短路承受能力



Applications:

应用

- PFC
功率因数校正
- General Inverter
通用变频器

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	$T_{jmax}[^{\circ}C]$ 最高结温	Marking 标记	Package 封装
BGNE30T65SD	650	30	1.6	175	30T65SD	TO-247-3L



BGNE30T65SD

Maximum Rated Values

最大额定参数

Parameter 参数	Symbol 符号	Value 值	Unit 单位
Collector-emitter voltage, $T_j \geq 25^\circ\text{C}$ 集电极-发射极电压, $T_j \geq 25^\circ\text{C}$	V_{CE}	650	V
Collector current, $T_C = 25^\circ\text{C}$ 集电极电流, $T_C = 25^\circ\text{C}$	I_C	60	A
Collector current, $T_C = 100^\circ\text{C}$ 集电极电流, $T_C = 100^\circ\text{C}$	I_C	30	
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}	120	
Diode forward current, $T_C = 25^\circ\text{C}$ 二极管正向电流, $T_C = 25^\circ\text{C}$	I_F	60	
Diode forward current, $T_C = 100^\circ\text{C}$ 二极管正向电流, $T_C = 100^\circ\text{C}$	I_F	30	
Diode pulsed current 二极管脉冲电流	I_{Fpuls}	120	V
Gate-emitter voltage 栅极-发射极电压	V_{GE}	± 20	
Short Circuit withstand time $V_{GE} = 15\text{V}, V_{CC} \leq 400\text{V}, T_j \leq 150^\circ\text{C}$ 短路耐受时间	t_{sc}	5	
Total power dissipation, $T_C = 25^\circ\text{C}$ 总耗散功率, $T_C = 25^\circ\text{C}$	P_{tot}	238	
Maximum junction temperature 最高结温	$T_{j\max}$	175	
Operating junction temperature 工作结温	T_{jop}	$-40 \dots +150$	$^\circ\text{C}$
Storage temperature 储存温度	T_{stg}	$-55 \dots +150$	
Soldering temperature, 1.6mm from case for 10s 焊接温度	T_{st}	260	
Mounting Torque M3 锁装力矩	M_d	0.6	Nm



BGNE30T65SD

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	$R_{th(j-c)}$	0.65	$^{\circ}\text{C}/\text{W}$
Diode Thermal resistance junction to case 二极管结-管壳热阻	$R_{th(j-c)}$	1.69	$^{\circ}\text{C}/\text{W}$
Thermal resistance junction to ambient 结-环境热阻	$R_{th(j-a)}$	40	$^{\circ}\text{C}/\text{W}$

Electrical Characteristic at $T_j = 25^{\circ}\text{C}$ (unless otherwise specified)

$T_j=25^{\circ}\text{C}$ 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	$V_{(BR)CES}$	$V_{GE}=0\text{V},$ $I_C=100\mu\text{A}$		650	-	-	V
Collector-emitter saturation voltage 集电极-发射极饱和电压	V_{cesat}	$V_{GE}=15\text{V},$ $I_C=30\text{A}$	$T_j=25^{\circ}\text{C}$	-	1.6	2.0	
			$T_j=150^{\circ}\text{C}$	-	1.8	-	
Diode forward voltage 二极管正向电压	V_F	$V_{GE}=0\text{V},$ $I_F=30\text{A}$	$T_j=25^{\circ}\text{C}$	-	1.7	2.5	
			$T_j=150^{\circ}\text{C}$	-	1.4	-	
Gate-emitter threshold voltage 栅极-发射极阈值电压	$V_{GE(th)}$	$I_C=300\mu\text{A},$ $V_{CE}=V_{GE}$		4.5	5.8	7.0	
Collector-emitter cut-off current 集电极-发射极截止电流	I_{CES}	$V_{CE}=650\text{V},$ $V_{GE}=0\text{V}$		-	-	100	μA
Gate-emitter leakage current 栅极-发射极漏电流	I_{GES}	$V_{CE}=0\text{V},$ $V_{GE}=\pm 20\text{V}$		-200	-	200	nA

Dynamic Characteristic

动态特性

Input capacitance 输入电容	C_{ies}	$V_{CE}=25\text{V},$ $V_{GE}=0\text{V},$ $f=1\text{MHz}$	-	1800	-	pF
Output capacitance 输出电容	C_{oes}		-	158	-	



BGNE30T65SD

Reverse transfer capacitance 反向传输电容	C_{res}		-	51.7	-	
Gate charge 门极电量	Q_G	$V_{CC}=400V, I_C=30A,$ $V_{GE}=15V$	-	63.9	-	nC
Short circuit current 短路电流	$I_{C(sc)}$	$V_{CC}=400V, V_{GE}=15V,$ $tpsc \leq 5\mu s, T_j=150^\circ C$	-	120	-	A

Switching Characteristic at $T_j=25^\circ C$ (Inductive Load)

$T_j=25^\circ C$ 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°C, V _{CC} =400V, I _C =30A, V _{GE} =-7.5/15V, R _G =10Ω, Energy losses include “tail” and diode reverse recovery.	-	47	-	ns
Rise time 上升时间	t _r		-	62	-	
Turn-off delay time 关断延迟时间	t _{d(off)}		-	95	-	
Fall time 下降时间	t _f		-	154	-	
Turn-on energy 开通损耗	E _{on}		-	0.97	-	mJ
Turn-off energy 关断损耗	E _{off}		-	0.45	-	
Total switching energy 总开关损耗	E _{ts}		-	1.42	-	

Anti-Parallel Diode Characteristic

反并联二极管特性

Reverse recovery time 反向恢复时间	t_{rr}	$T_j=25^\circ C,$ $V_R=400V,$ $I_F=30A,$ $diF/dt=390A/\mu s$	-	136	-	ns
Recovered charge 恢复电荷	Q_r		-	78	-	nC
Peak reverse recovery current 反向恢复峰值电流	I_{RM}		-	7.6	-	A



BGNE30T65SD

Switching Characteristic at $T_j=150^{\circ}\text{C}$ (Inductive Load)

$T_j=150^{\circ}\text{C}$ 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°C, V _{CC} =400V, I _C =30A, V _{GE} =-7.5/15V, R _G =10Ω, Energy losses include “tail” and diode reverse recovery.	-	46	-	ns
Rise time 上升时间	t _r		-	61	-	
Turn-off delay time 关断延迟时间	t _{d(off)}		-	111	-	
Fall time 下降时间	t _f		-	141	-	
Turn-on energy 开通损耗	E _{on}		-	1.27	-	mJ
Turn-off energy 关断损耗	E _{off}		-	0.72	-	
Total switching energy 总开关损耗	E _{ts}		-	1.99	-	

Anti-Parallel Diode Characteristic

反并联二极管特性

Reverse recovery time 反向恢复时间	t_{rr}	$T_j=150^{\circ}\text{C}$, $V_R=400\text{V}$, $I_F=30\text{A}$, $diF/dt=400\text{A}/\mu\text{s}$	-	208	-	ns
Recovered charge 恢复电荷	Q_r		-	680	-	nC
Peak reverse recovery current 反向恢复峰值电流	I_{RM}		-	13.4	-	A



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ELECTRICAL CHARACTERISTICS

特性曲线

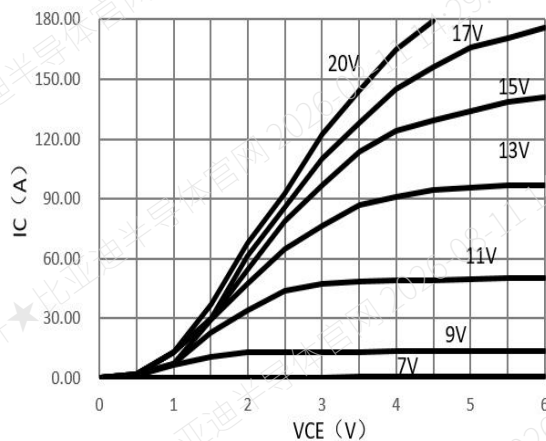


Figure 1. Typical output characteristic($T_j=25^{\circ}\text{C}$)

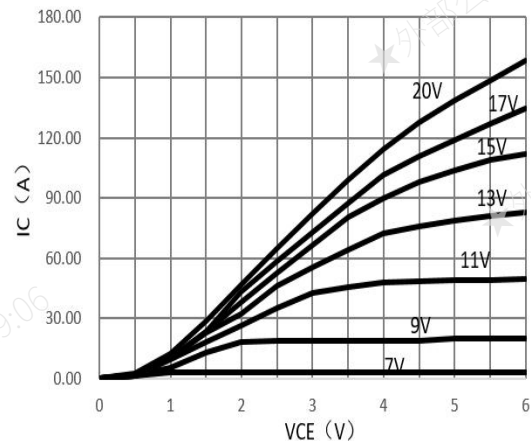


Figure 2. Typical output characteristic($T_j=150^{\circ}\text{C}$)

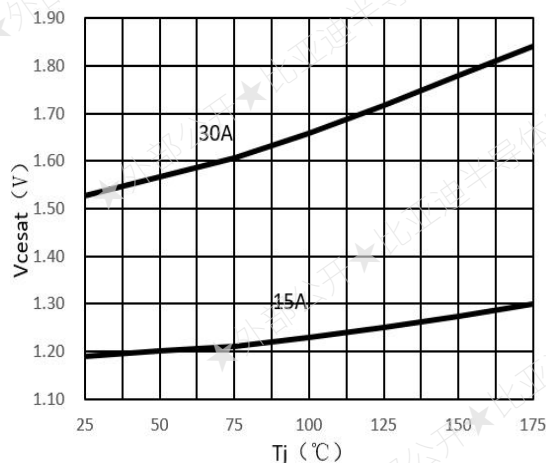


Figure 3. V_{cesat} vs. T_j

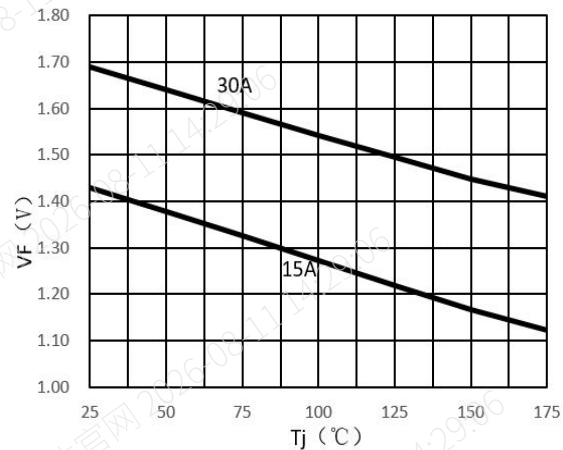


Figure 4. V_F vs. T_j

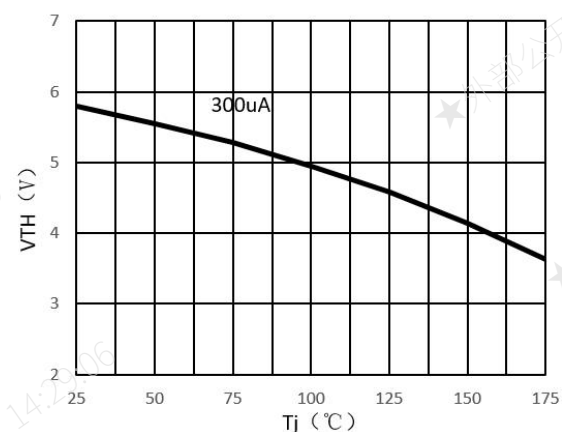


Figure 5. V_{TH} vs. T_j

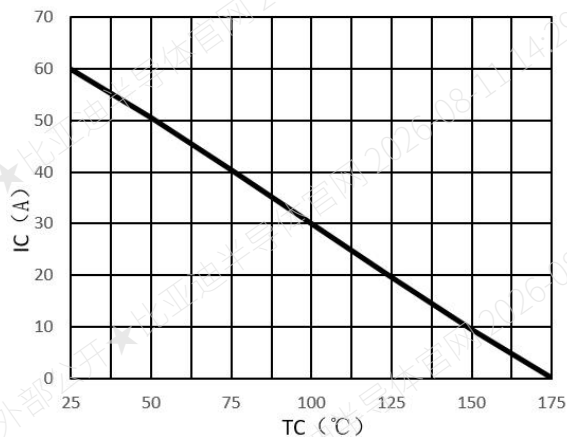


Figure 6. I_C VS T_C



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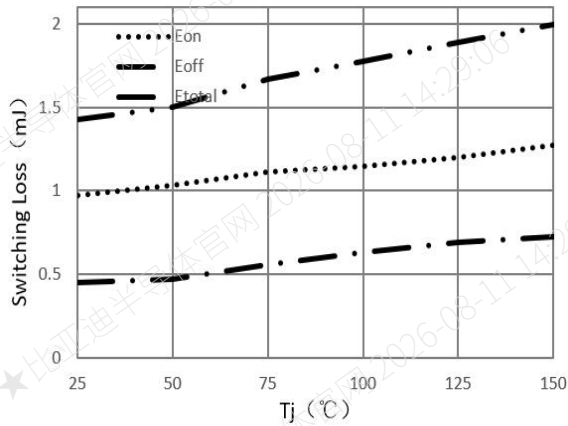


Figure 7. Switching energy losses vs T_j
($V_{CE}=400V, V_{GE}=15V, I_C=30A, R_G=10\Omega$)

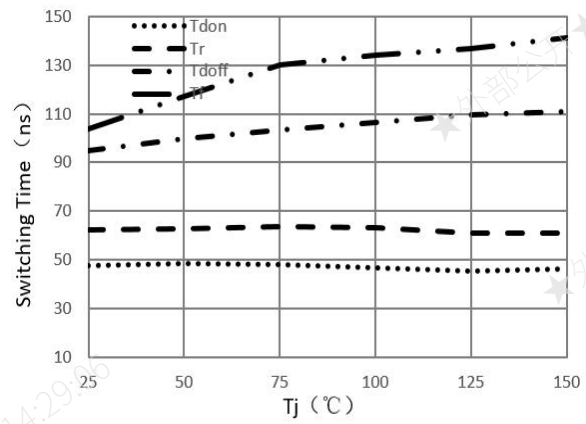


Figure 8. Switching times vs T_j
($T_j=25^\circ C, V_{GE}=15V, I_C=30A, R_G=10\Omega$)

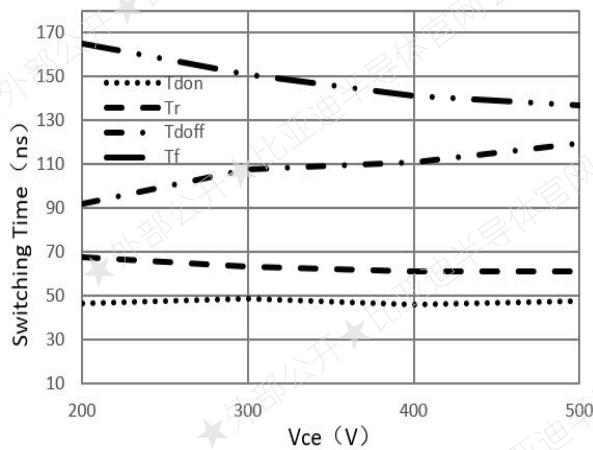


Figure 9. Switching times vs V_{CE}
($T_j=150^\circ C, V_{GE}=15V, I_C=30A, R_G=10\Omega$)

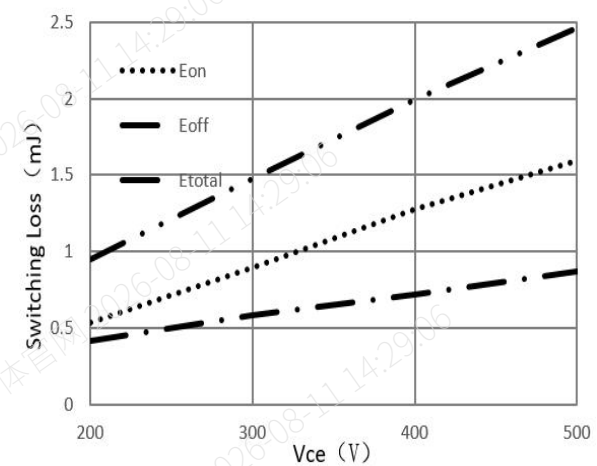


Figure 10. Switching energy losses vs V_{CE}
($T_j=150^\circ C, V_{CE}=400V, V_{GE}=15V, I_C=30A$)

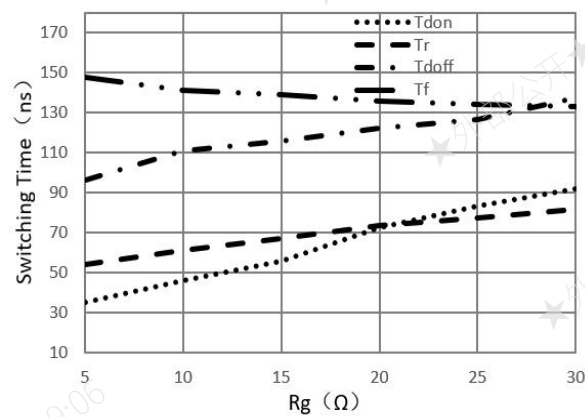


Figure 11. Switching times vs R_g
($T_j=150^\circ C, V_{CE}=400V, V_{GE}=15V, I_C=30A$)

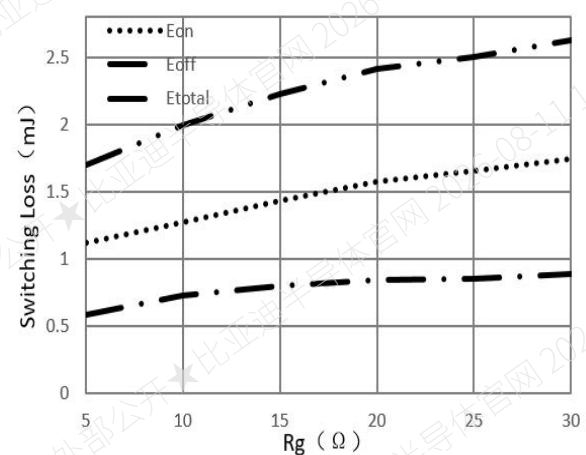


Figure 12. Switching energy losses vs R_g
($T_j=150^\circ C, V_{CE}=400V, V_{GE}=15V, I_C=30A$)



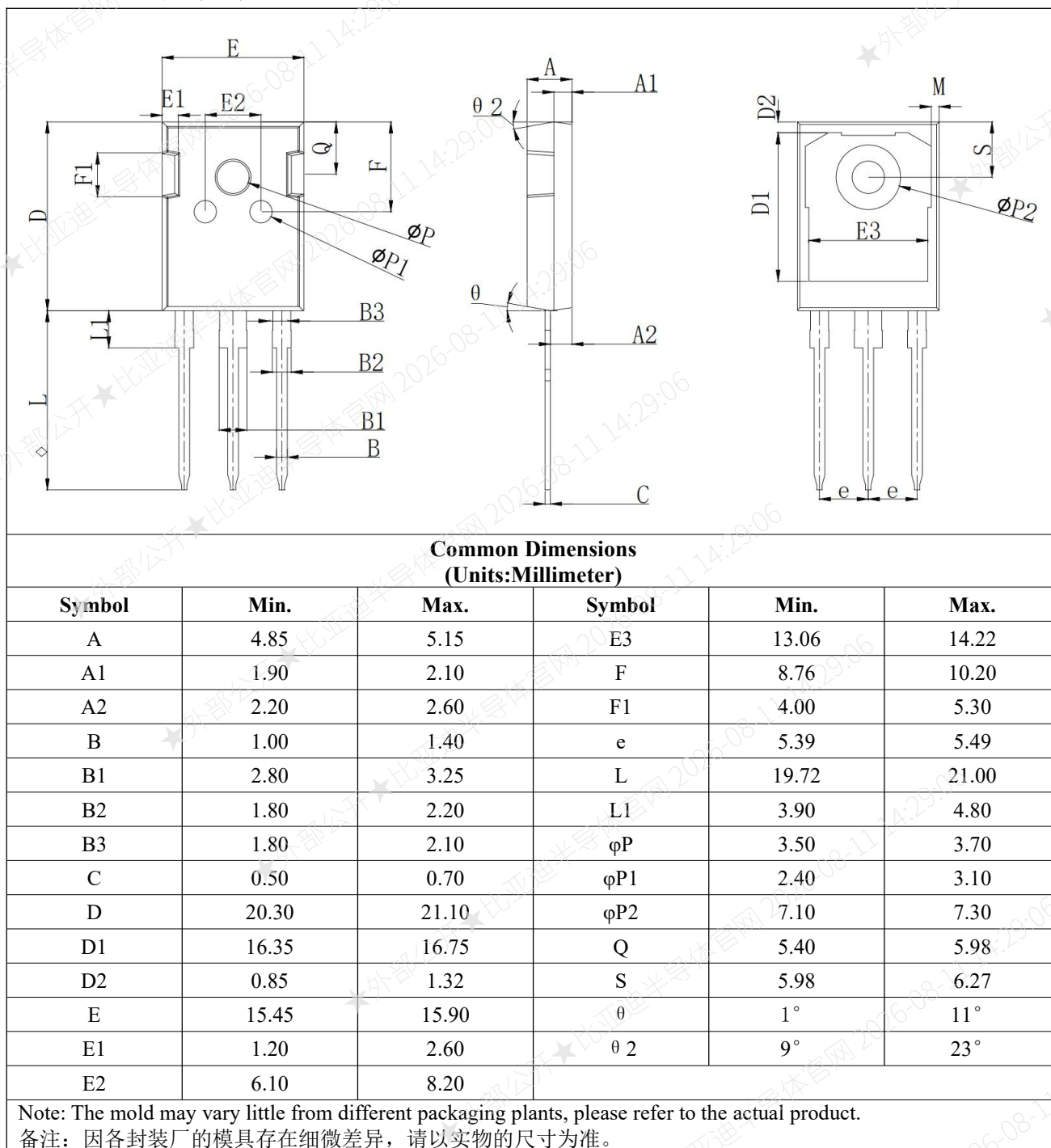
比亚迪
半导体

★外部公开★

BGNE30T65SD

TO-247-3L Outline Dimensions:

TO-247-3L 外形尺寸



Packing

包装

Packing	pcs/tube	tube/ inner box	inner box/ carton	pcs/carton
Tube	30	12	6	2160



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Special instructions: Storage Temperature: $20\pm 5^{\circ}\text{C}$; Relative Humidity: 30%-60%; The product should be stored in a place away from direct light and vibration.

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特殊说明: 储存温度: $20\pm 5^{\circ}\text{C}$; 相对湿度: 30%-60%; 产品应放置于避光地方, 避免震动。

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BGNE30T65SD

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