



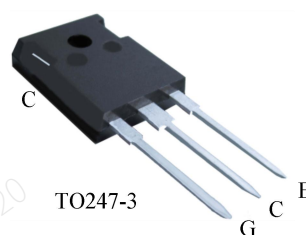
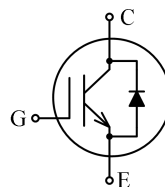
BGNE60T65HD

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 switching losses
低开关损耗
- 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

- UPS
不间断电源
- PFC
功率因数校正
- Welding
焊机
- Industrial Power Supply
工业电源

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
BGNE60T65HD	650	60	1.7	175	60T65HD	TO-247-3L



BGNE60T65HD

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	120	A
Collector current, $T_C = 100^\circ\text{C}$ 集电极电流, $T_C = 100^\circ\text{C}$	I_C	60	
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}	240	
Diode forward current, $T_C = 25^\circ\text{C}$ 二极管正向电流, $T_C = 25^\circ\text{C}$	I_F	120	
Diode forward current, $T_C = 100^\circ\text{C}$ 二极管正向电流, $T_C = 100^\circ\text{C}$	I_F	60	
Diode pulsed current 二极管脉冲电流	I_{Fpuls}	240	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}	333	
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



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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	$R_{th(j-c)}$	0.45	$^{\circ}\text{C}/\text{W}$
Diode Thermal resistance junction to case 二极管结-管壳热阻	$R_{th(j-c)}$	0.58	$^{\circ}\text{C}/\text{W}$
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	$V_{(BR)CES}$	$V_{GE}=0V,$ $I_C=100\mu A$		650	-	-	V
Collector-emitter saturation voltage 集电极-发射极饱和电压	V_{cesat}	$V_{GE}=15V,$ $I_C=60A$	$T_j=25^{\circ}C$	-	1.7	2.2	
			$T_j=150^{\circ}C$	-	2.1	-	
Diode forward voltage 二极管正向电压	V_F	$V_{GE}=0V,$ $I_F=60A$	$T_j=25^{\circ}C$	-	1.6	2.5	
			$T_j=150^{\circ}C$	-	1.4	-	
Gate-emitter threshold voltage 栅极-发射极阈值电压	$V_{GE(th)}$	$I_C=1mA,$ $V_{CE}=V_{GE}$		5.0	5.8	7.0	
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}	$V_{CE}=0V,$ $V_{GE}=\pm 20V$		-200	-	200	nA

Dynamic Characteristic

动态特性

Input capacitance 输入电容	C_{ies}	$V_{CE}=25\text{V},$ $V_{GE}=0\text{V},$ $f=1\text{MHz}$	-	7648	-	pF
Output capacitance 输出电容	C_{oes}		-	264	-	



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Reverse transfer capacitance 反向传输电容	C_{res}		-	156	-	
Gate charge 门极电量	Q_G	$V_{CC}=400V, I_C=40A,$ $V_{GE}=15V$	-	317	-	nC
Short circuit current 短路电流	$I_{C(sc)}$	$V_{CC}=400V, V_{GE}=15V,$ $tpsc \leq 5\mu s, T_j=150^\circ C$	-	320	-	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℃, V _{CC} =400V, I _C =60A, V _{GE} =-7.5/15V, R _G =10Ω, Energy losses include “tail” and diode reverse recovery.	-	65	-	ns
Rise time 上升时间	t _r		-	90	-	
Turn-off delay time 关断延迟时间	t _{d(off)}		-	75	-	
Fall time 下降时间	t _f		-	30	-	
Turn-on energy 开通损耗	E _{on}		-	1.86	-	mJ
Turn-off energy 关断损耗	E _{off}		-	0.33	-	
Total switching energy 总开关损耗	E _{ts}		-	2.19	-	

Anti-Parallel Diode Characteristic

反并联二极管特性

Reverse recovery time 反向恢复时间	t_{rr}	$T_j=25^\circ C,$ $V_R=400V,$ $I_F=60A,$ $diF/dt=380A/\mu s$	-	135	-	ns
Recovered charge 恢复电荷	Q_r		-	2.4	-	μC
Peak reverse recovery current 反向恢复峰值电流	I_{RM}		-	11	-	A
Reverse recovered energy 反向恢复损耗	E_{rec}		-	0.17	-	mJ



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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 =60A, V _{GE} =-7.5/15V, R _G =10Ω, Energy losses include “tail” and diode reverse recovery.	-	60	-	ns
Rise time 上升时间	t _r		-	85	-	
Turn-off delay time 关断延迟时间	t _{d(off)}		-	115	-	
Fall time 下降时间	t _f		-	25	-	
Turn-on energy 开通损耗	E _{on}		-	2.65	-	mJ
Turn-off energy 关断损耗	E _{off}		-	0.61	-	
Total switching energy 总开关损耗	E _{ts}		-	3.26	-	
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°C, V _R =400V, I _F =60A, diF/dt=345A/μs	-	225	-	ns
Recovered charge 恢复电荷	Q _r		-	5.1	-	μC
Peak reverse recovery current 反向恢复峰值电流	I _{RM}		-	25	-	A
Reverse recovered energy 反向恢复损耗	E _{rec}		-	0.27	-	mJ



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ELECTRICAL CHARACTERISTICS

特性曲线

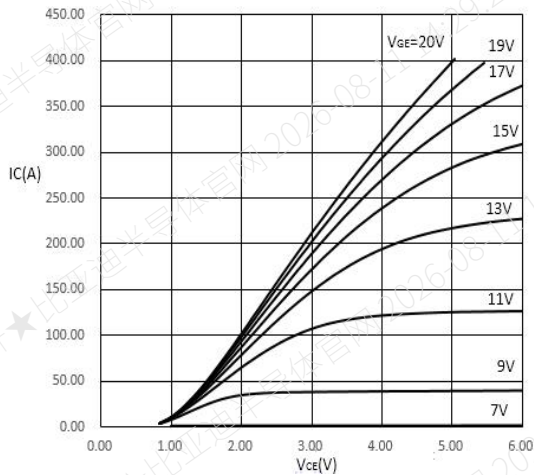


Figure 1. Typical output characteristic($T_j=25^{\circ}\text{C}$)

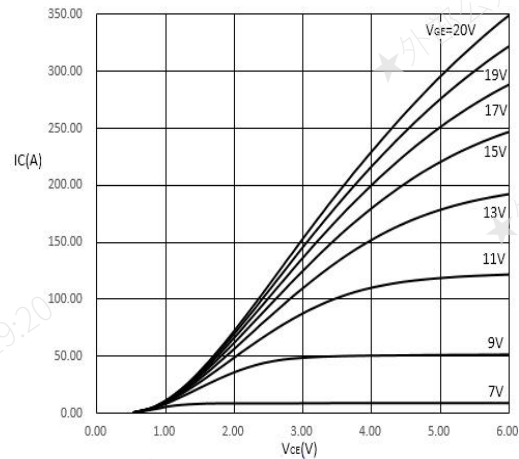


Figure 2. Typical output characteristic($T_j=150^{\circ}\text{C}$)

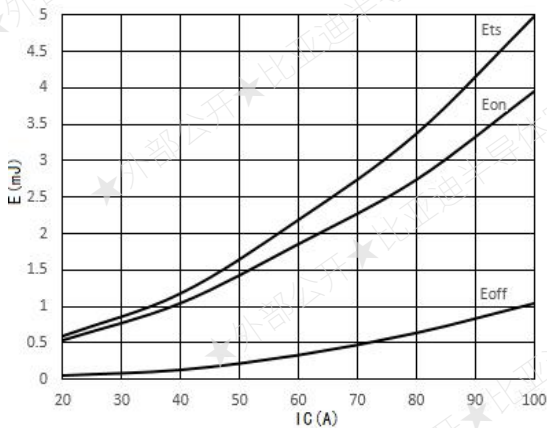


Figure 3. Switching energy vs I_C
($T_j=25^{\circ}\text{C}$, $V_{GE}=15\text{V}$, $V_{CE}=400\text{V}$, $R_g=10\ \Omega$)

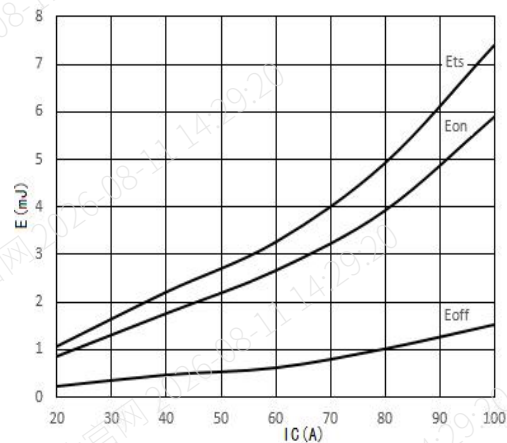


Figure 4. Switching energy vs I_C
($T_j=150^{\circ}\text{C}$, $V_{GE}=15\text{V}$, $V_{CE}=400\text{V}$, $R_g=10\ \Omega$)

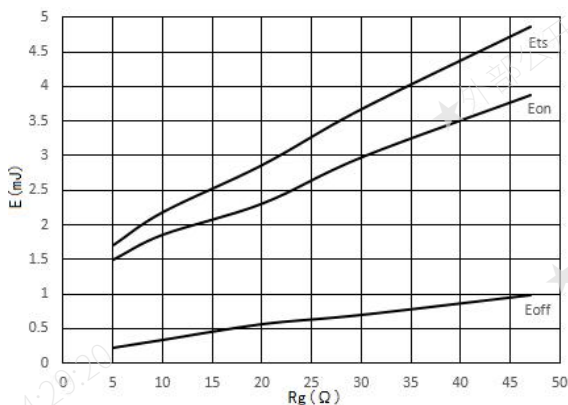


Figure 5. Switching energy losses vs R_g
($T_j=25^{\circ}\text{C}$, $V_{CE}=400\text{V}$, $V_{GE}=15\text{V}$, $I_C=60\text{A}$)

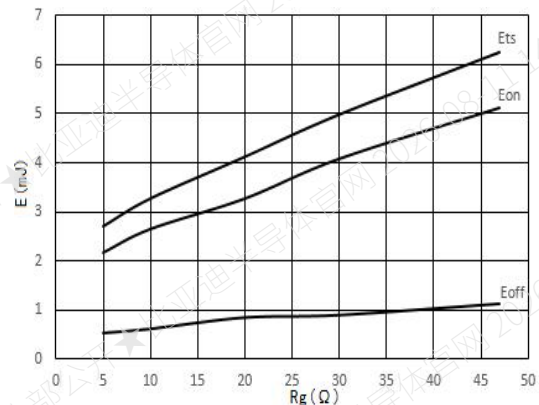


Figure 6. Switching energy losses vs R_g
($T_j=150^{\circ}\text{C}$, $V_{CE}=400\text{V}$, $V_{GE}=15\text{V}$, $I_C=60\text{A}$)



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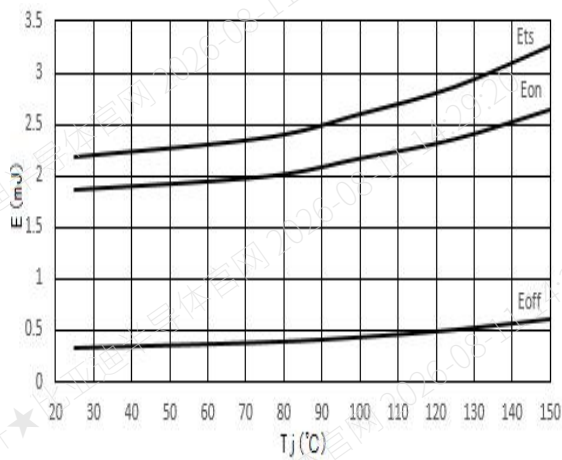


Figure 7. Switching energy losses vs T_j
($V_{CE}=400V, V_{GE}=15V, I_C=60A, R_g=10\Omega$)

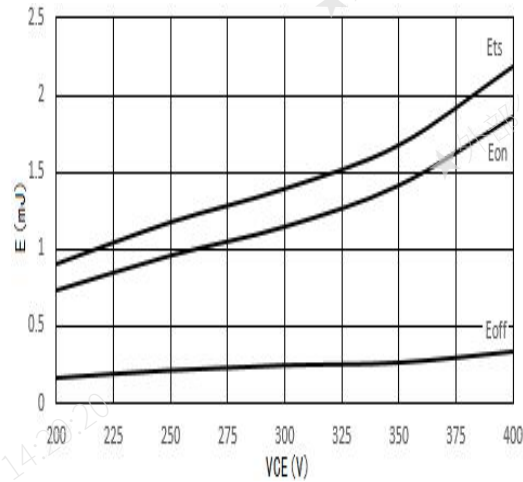


Figure 8. Switching energy losses vs V_{CE}
($T_j=25^\circ C, V_{GE}=15V, I_C=60A, R_g=10\Omega$)

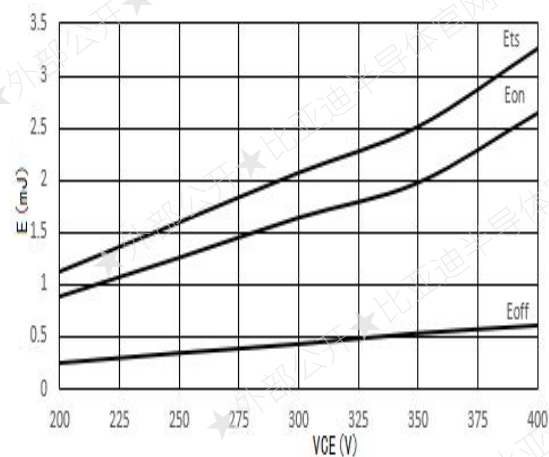


Figure 9. Switching energy losses vs V_{CE}
($T_j=150^\circ C, V_{GE}=15V, I_C=60A, R_g=10\Omega$)

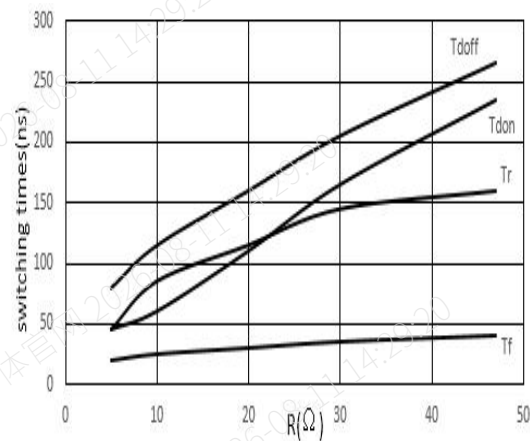


Figure 10. Switching times vs R_g
($T_j=150^\circ C, V_{CE}=400V, V_{GE}=15V, I_C=60A$)

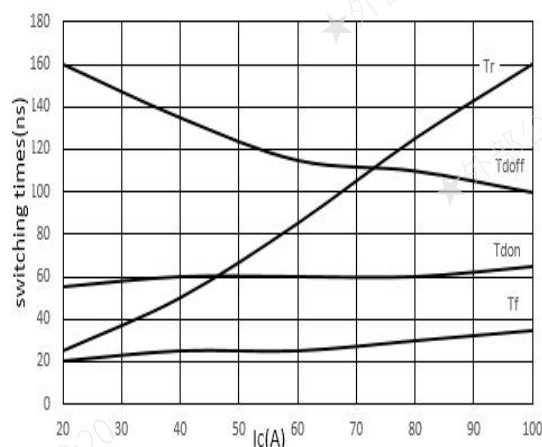


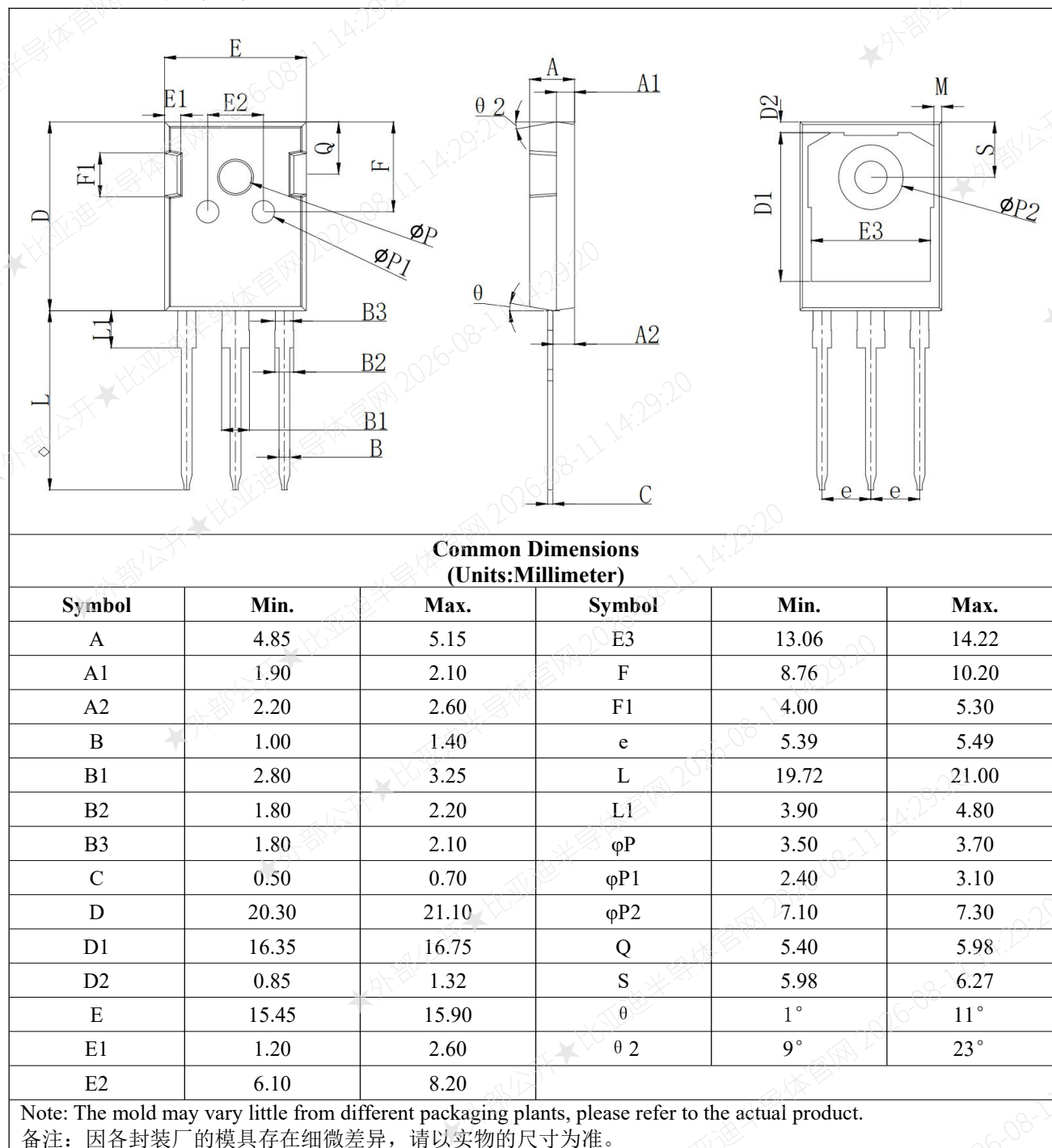
Figure 11. Switching times vs I_C
($T_j=150^\circ C, V_{CE}=400V, V_{GE}=15V, R_g=10\Omega$)



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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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- Warranty Period: Unless otherwise agreed in the COOPERATION AGREEMENT or other WRITTEN DOCUMENTS, the Warranty Period for products specified in this specification shall be one year from the date of purchase if the products are properly preserved.

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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