

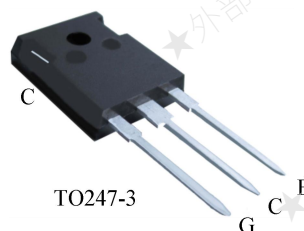
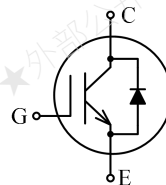


IGBT in advanced Trench FS Technology with soft and fast recovery anti-parallel diode
具有先进 Trench FS 技术的 IGBT 且反并联软快恢复二极管

Features

特性

- 650V TrenchFS technology
650V沟槽栅场终止技术
- Low saturation voltage
低饱和压降
- Low gate charge
低栅极电荷



Applications

应用

- Electric Automotive Air-Condition Compressor
电动汽车空调压缩机
- Electric Automotive PTC Heater
汽车PTC加热器
- Inverter
变频器

Ordering Information

订货信息

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
BGNE30V65SD	650	30	1.5	175	30V65SD	TO-247-3L



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	A
Pulsed collector current, t_p limited by T_{jmax} 集电极脉冲电流, 脉宽时间受 T_{jmax} 限制	I_{Cpuls}	120	A
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	A
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	A
Diode pulsed current 二极管脉冲电流	I_{Fpuls}	120	A
Gate-emitter voltage 栅极-发射极电压	V_{GE}	± 20	V
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	μs
Total power dissipation, $T_c = 25^\circ\text{C}$ 总耗散功率, $T_c = 25^\circ\text{C}$	P_{tot}	245	W
Operating junction temperature 最高结温	T_{jmax}	175	$^\circ\text{C}$
Operating junction temperature 工作结温	T_{jop}	$-40 \dots +150$	$^\circ\text{C}$
Storage temperature 储存温度	T_{stg}	$-40 \dots +150$	$^\circ\text{C}$
Soldering temperature, 1.6mm from case for 10s 焊接温度	T_{st}	260	$^\circ\text{C}$

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	$R_{th(j-c)}$	0.51	$^\circ\text{C/W}$
Diode Thermal resistance junction to case 二极管结-管壳热阻	$R_{th(j-c)}$	1.66	$^\circ\text{C/W}$
Thermal resistance junction to ambient 结-环境热阻	$R_{th(j-a)}$	40	$^\circ\text{C/W}$

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 =100uA		650	-	-	V
Collector-emitter saturation voltage 集电极-发射极饱和电压	V _{CEsat}	V _{GE} =15V, I _C =30A	T _J =25℃	-	1.5	1.8	V
			T _J =150℃	-	1.7	-	V
Diode forward voltage 二极管正向电压	V _F	V _{GE} =0V, I _F =30A	T _J =25℃	-	1.8	2.2	V
			T _J =150℃	-	1.7	-	V
Gate-emitter threshold voltage 栅极-发射极阈值电压	V _{GE(th)}	I _C =300uA, V _{CE} =V _{GE}		4	5.4	6	V
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		-100	-	100	nA
Dynamic Characteristic 动态特性							
Input capacitance 输入电容	C _{ies}	V _{CE} =25V, V _{GE} =0V, f=1MHz		-	1430	-	pF
Output capacitance 输出电容	C _{oes}			-	80	-	pF
Reverse transfer capacitance 反向传输电容	C _{res}			-	13	-	pF
Gate charge 门极电阻	R _G	V _{GE} =0V, V _{CE} =0V, f=1MHz		-	3.9	-	Ω



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

$T_j=25^\circ\text{C}$ 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	$t_{d(on)}$	$V_{CE}=400V$, $I_C=30A$, $V_{GE}=15V$, $R_G=10\Omega$, $T_j=25^\circ\text{C}$, Energy losses include "tail" and diode reverse recovery.	-	28	-	ns
Rise time 上升时间	t_r		-	52	-	ns
Turn-off delay time 关断延迟时间	$t_{d(off)}$		-	89	-	ns
Fall time 下降时间	t_f		-	59	-	ns
Turn-on energy 开通损耗	E_{on}		-	0.84	-	mJ
Turn-off energy 关断损耗	E_{off}		-	0.62	-	mJ
Total switching energy 总开关损耗	E_{ts}		-	1.46	-	mJ

Anti-Parallel Diode Characteristic

反并联二极管特性

Reverse recovery time 反向恢复时间	t_{rr}	$V_R=400V$, $I_F=30A$, $T_j=25^\circ\text{C}$,	-	112	-	ns
Reverse recovery charge 反向恢复电荷	Q_{rr}		-	0.61	-	μC
Peak reverse recovery current 反向恢复峰值电流	I_{rrm}		-	8.4	-	A
Reverse recovered energy 反向恢复损耗	E_{rec}		-	0.14	-	mJ



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	$t_{d(on)}$	$V_{CE}=400\text{V},$ $I_C=30\text{A},$ $V_{GE}=15\text{V},$ $R_G=10\Omega,$ $T_j=150^{\circ}\text{C},$ Energy losses include “tail” and diode reverse recovery.	-	28	-	ns
Rise time 上升时间	t_r		-	57	-	ns
Turn-off delay time 关断延迟时间	$t_{d(off)}$		-	106	-	ns
Fall time 下降时间	t_f		-	64	-	ns
Turn-on energy 开通损耗	E_{on}		-	1.24	-	mJ
Turn-off energy 关断损耗	E_{off}		-	0.87	-	mJ
Total switching energy 总开关损耗	E_{ts}		-	2.11	-	mJ

Anti-Parallel Diode Characteristic

反并联二极管特性

Reverse recovery time 反向恢复时间	t_{rr}	$V_R=400\text{V},$ $I_F=30\text{A},$ $T_j=150^{\circ}\text{C}$	-	318	-	ns
Reverse recovery charge 反向恢复电荷	Q_{rr}		-	1.89	-	μC
Peak reverse recovery current 反向恢复峰值电流	I_{rrm}		-	14.5	-	A
Reverse recovered energy 反向恢复损耗	E_{rec}		-	0.53	-	mJ

Typical Characteristics Diagrams

特性曲线

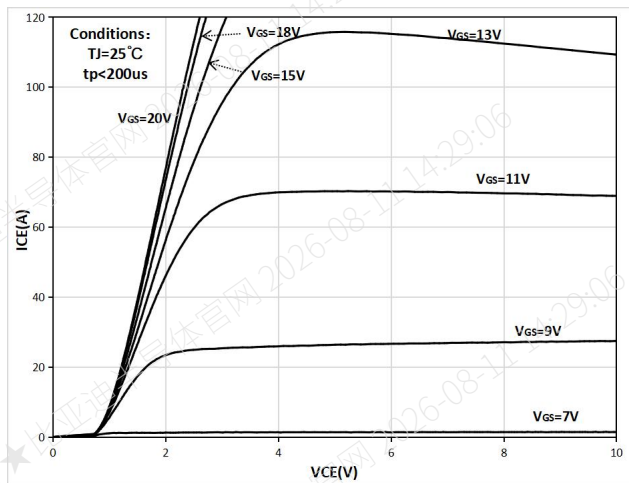


Figure 1. Typical output characteristic ($T_J=25^{\circ}\text{C}$)

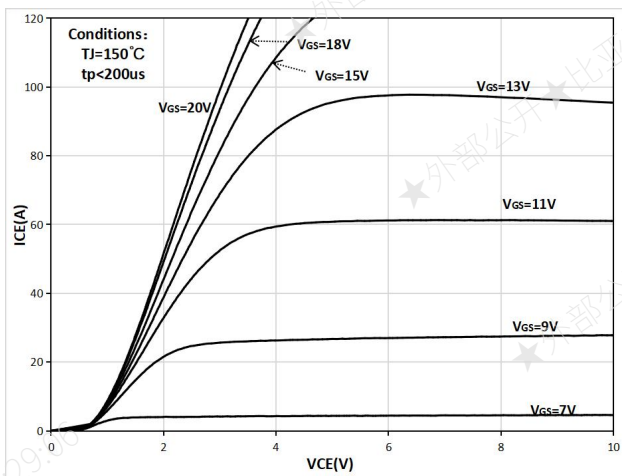


Figure 2. Typical output characteristic ($T_J=150^{\circ}\text{C}$)

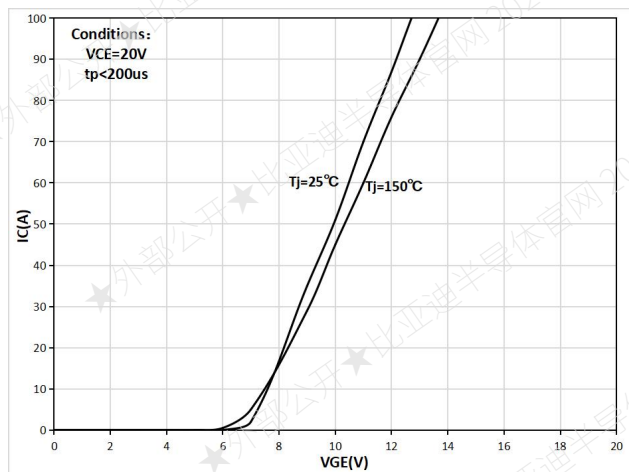


Figure 3. Typical transfer characteristic ($V_{CE}=20\text{V}$)

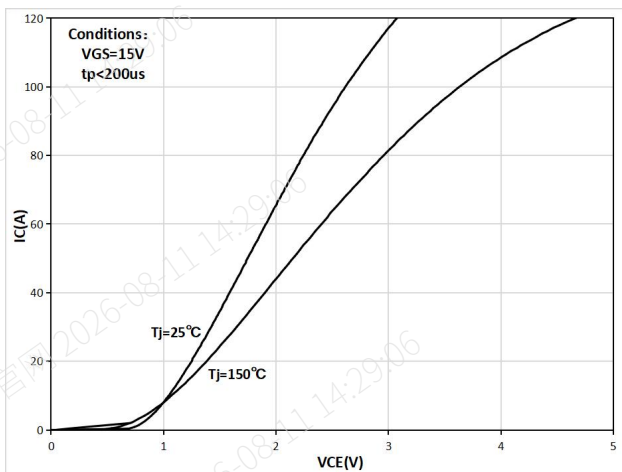


Figure 4. Typical collector current as a function of collector-emitter saturation voltage ($V_{GE}=15\text{V}$)

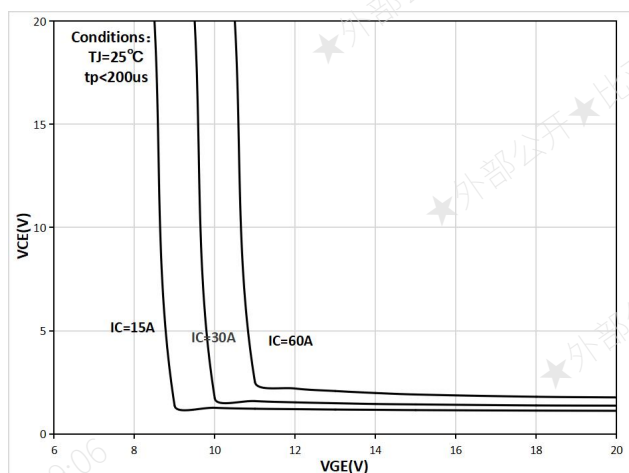


Figure 5. Typical collector-emitter saturation voltage as a function of gate-emitter voltage ($T_J=25^{\circ}\text{C}$)

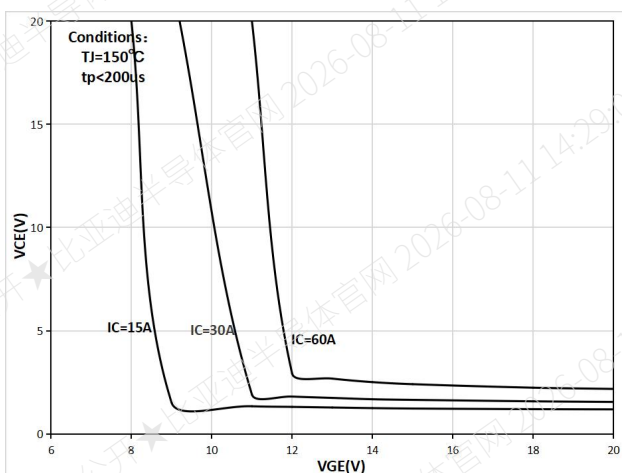


Figure 6. Typical collector-emitter saturation voltage as a function of gate-emitter voltage ($T_J=150^{\circ}\text{C}$)

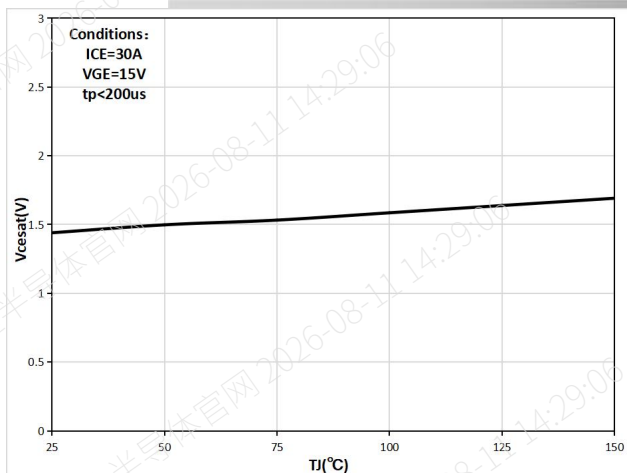


Figure 7. Typical collector-emitter saturation voltage as a function of junction temperature ($V_{GE}=15V$)

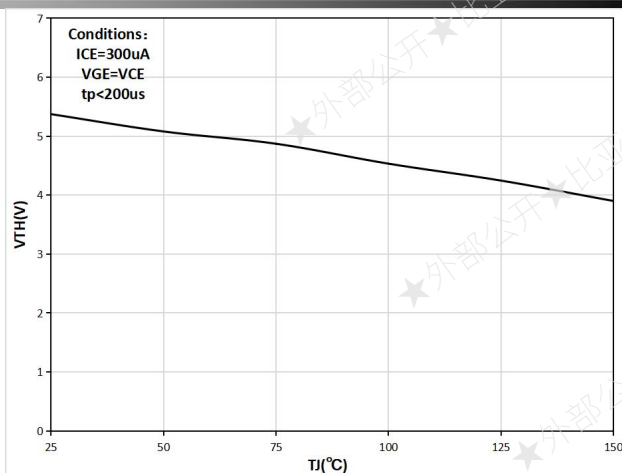


Figure 8. Gate-emitter threshold voltage as a function of junction temperature

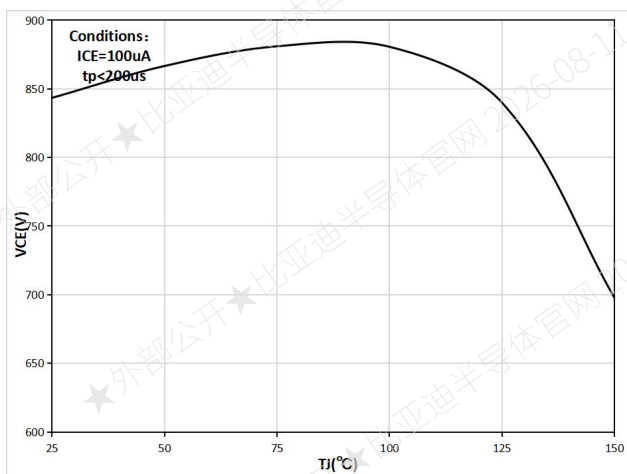


Figure 9. Collector-Emitter breakdown voltage as a function junction temperature ($I_c=100\mu A$)

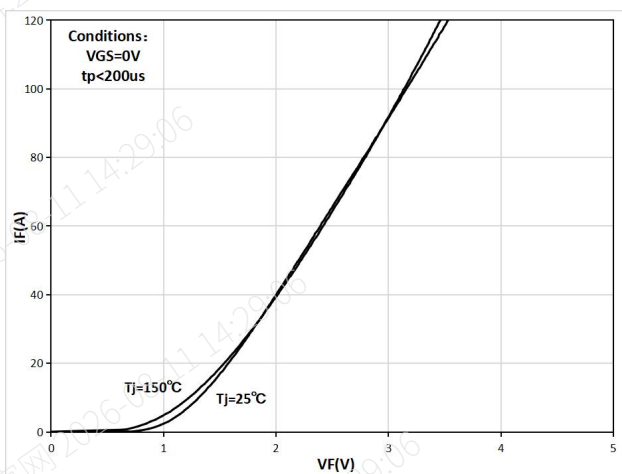


Figure 10. Typical diode forward current as a function of forward voltage

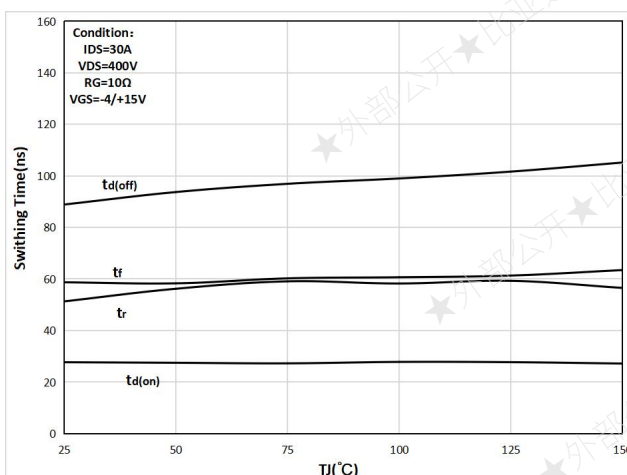


Figure 11. Typical switching time as a function of junction temperature
($V_{CE}=400V$, $I_c=30A$, $V_{GE}=15V$, $R_G=10\Omega$)

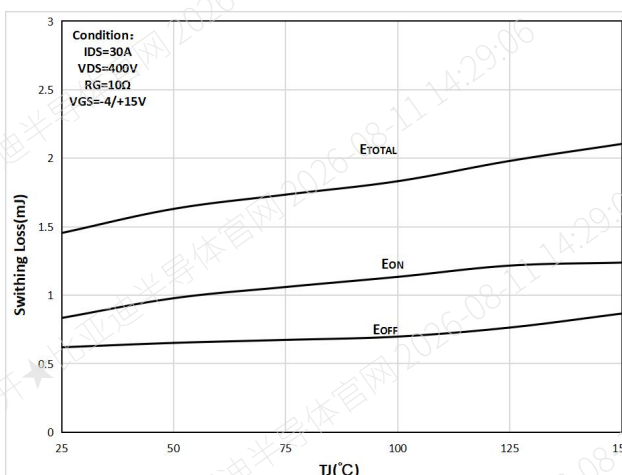


Figure 12. Typical switching energy losses as a function of junction temperature
($V_{CE}=400V$, $I_c=30A$, $V_{GE}=15V$, $R_G=10\Omega$)

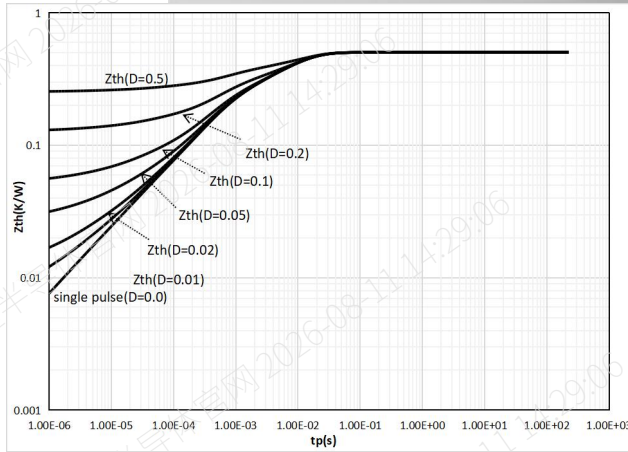


Figure 13.IGBT Transient thermal impedance as a function of pulse width($D=t_p/T$)

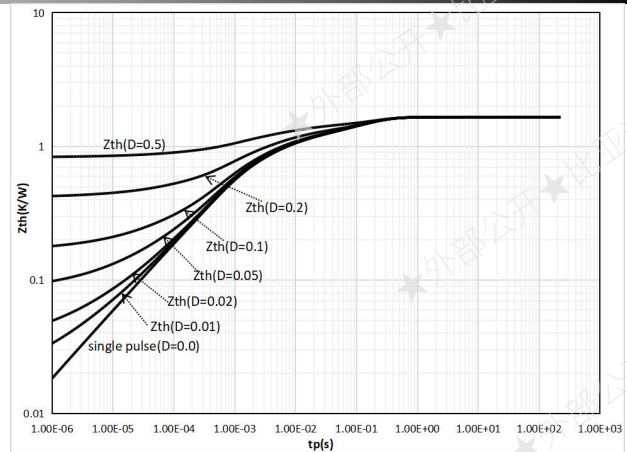
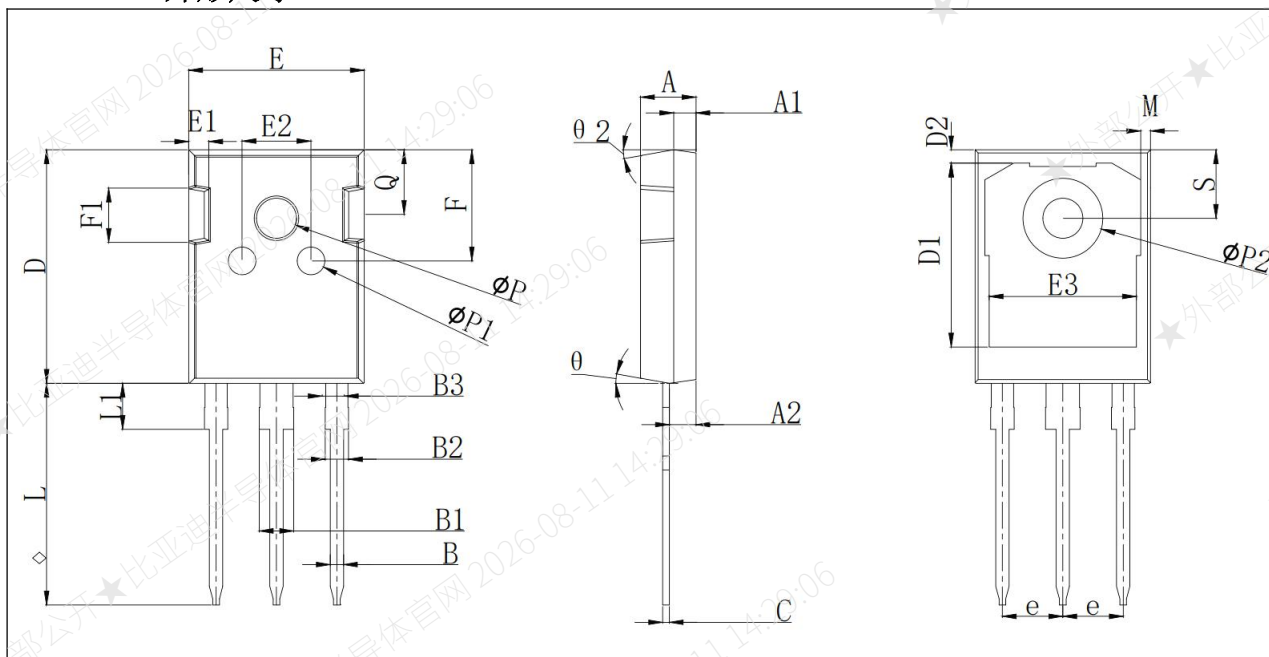


Figure 14.Diode Transient thermal impedance as a function of pulse width($D=t_p/T$)



TO-247-3L Outline Dimensions:

TO-247-3L 外形尺寸



Common Dimensions (Units:Millimeter)

Symbol	Min.	Max.	Symbol	Min.	Max.
A	4.85	5.15	E3	13.06	14.22
A1	1.90	2.10	F	8.76	10.20
A2	2.20	2.60	F1	4.00	5.30
B	1.00	1.40	e	5.39	5.49
B1	2.80	3.25	L	19.72	21.00
B2	1.80	2.20	L1	3.90	4.80
B3	1.80	2.10	phi P	3.50	3.70
C	0.50	0.70	phi P1	2.40	3.10
D	20.30	21.10	phi P2	7.10	7.30
D1	16.35	16.75	Q	5.40	5.98
D2	0.85	1.32	S	5.98	6.27
E	15.45	15.90	theta	1°	11°
E1	1.20	2.60	theta 2	9°	23°
E2	6.10	8.20			

Note: Please note that molds can vary between packaging plants. For definitive specifications, please refer to the physical product.

备注：因各封装厂的模具存在细微差异，请以实物的尺寸为准。

Packing

包装

Packing 包装	pcs/tube 个/料管	tube/inner box 料管/内盒	inner box/carton 内盒/箱	pcs/carton 个/箱
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.
质保期: 除双方在合作协议或其他书面文件中另行约定外, 产品妥当保存的情况下自购买之日起, 本规格书所述产品质保期为一年。
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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- This specification is written in both Chinese and English, and in case of any conflict between the Chinese and English versions, the Chinese version shall prevail.

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