



HBN40T120-SAOCH

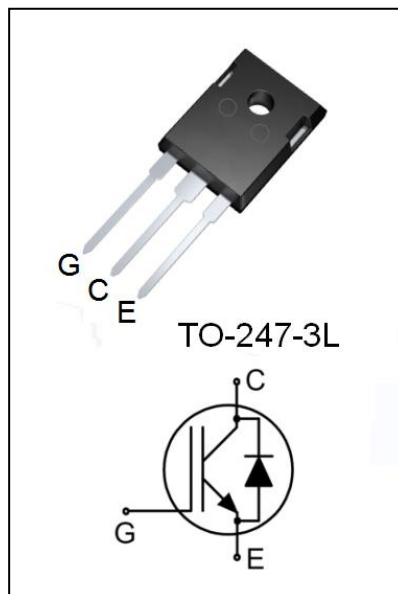
1200V N-Channel Insulated Gate Bipolar Transistor

● Features:

- 40.0A, 1200V, $V_{CESAT(Typ)} = 2.2V @ V_{GE}=15V, I_C=40A$
- Trench FS Technology
- With Fast Recovery anti-parallel Diode
- Low Gate Charge
- Low Saturation Voltage
- Low Switching Loss
- Positive Temperature Coefficient

● Application:

- General Purpose Inverters
- Welding Machine
- UPS



Absolute Maximum Ratings($T_C=25^{\circ}C$ unless otherwise noted)

Symbol	Parameter	Value	Unit
V_{CE}	Collector-Emitter Voltage	1200	V
I_C	Collector Current-Continuous - ($T_C=25^{\circ}C$) - ($T_C=100^{\circ}C$)	80	A
		40	A
I_{CM}	Collector Current – Pulse (Note1)	160	A
I_F	Diode Forward Current - ($T_C=25^{\circ}C$) - ($T_C=100^{\circ}C$)	40	A
		20	A
I_{FSM}	Surge non Repetitive Forward Current $t_p=10ms$ Sinusoidal	60	A
V_{GE}	Gate-Emitter Voltage	± 20	V
P_D	Power Dissipation($T_C = 25^{\circ}C$)	312	W
T_j	Operating Junction Temperature	150	$^{\circ}C$
T_{stg}	Storage Temperature Range	-55 to +150	$^{\circ}C$

*Collector Current Limited by Maximum Junction Temperature.

Thermal Characteristics

Symbol	Parameter	Max	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case for IGBT	0.4	$^{\circ}C / W$
$R_{\theta JC}$	Thermal Resistance, Junction to Case for Diode	1.2	$^{\circ}C / W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	39	$^{\circ}C / W$

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Electrical Characteristics(Tc=25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Off Characteristics						
BV _{CES}	Collector-Emitter Breakdown Voltage	V _{GE} =0V ,I _C =1mA	1200	--	--	V
I _{CES}	Zero Gate Voltage Collector Current	V _{CE} =1200V,V _{GE} =0V	--	--	500	μA
I _{GESF}	Gate-Body Leakage Current,Forward	V _{GE} =+20V, V _{CE} =0V	--	--	400	nA
I _{GESR}	Gate-Body Leakage Current,Reverse	V _{GE} =-20V, V _{CE} =0V	--	--	-400	nA
On Characteristics						
V _{GE(th)}	Gate Threshold Voltage	V _{CE} = V _{GE} , I _C =1mA	5.0	6.6	8.0	V
V _{CE(sat)}	Collector-Emitter Saturation Voltage	V _{GE} =15 V, I _C =40A	--	2.2	2.7	V
Dynamic Characteristics						
C _{ies}	Input Capacitance	V _{CE} =30V,V _{GE} =0V, f=1.0MHz	--	4400	--	pF
C _{oes}	Output Capacitance		--	140	--	pF
C _{res}	Reverse Transfer Capacitance		--	30	--	pF
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{CE} = 600 V, I _C = 40 A, R _G = 10 Ω,V _{GE} =15 V, Inductive Load	--	44	--	ns
t _r	Turn-On Rise Time		--	119	--	ns
t _{d(off)}	Turn-Off Delay Time		--	102	--	ns
t _f	Turn-Off Fall Time		--	85	--	ns
E _{on}	Turn-On Energy		--	3.9	--	mJ
E _{off}	Turn-off Energy		--	0.6	--	mJ
E _{ts}	Total Switching Energy	V _{CE} = 600 V, I _C =40 A, V _{GE} = 15 V	--	4.5	--	mJ
Q _g	Total Gate Charge		--	135	--	nC
Q _{ge}	Gate-Emitter Charge		--	44	--	nC
Q _{gc}	Gate-Collector Charge		--	46	--	nC
Anti-Parallel Diode Characteristics and Maximum Ratings						
V _F	Collector-Emitter Diode Forward Voltage	I _F =20A,T _C =25°C	--	2.5	3.1	V
		I _F =20A,T _C =125°C	--	2.2	--	V
t _{rr}	Diode Reverse Recovery Time	I _{EC} =20A	--	78	--	ns
Q _{rr}	Diode Reverse Recovery Charge	dI _{EC} /dt=100A/μs	--	136	--	nC

Notes:

1、 Repetitive Rating:Pulse Width Limited by Maximum Junction Temperature.

Typical Performance Characteristics

Fig 1. Output Characteristic

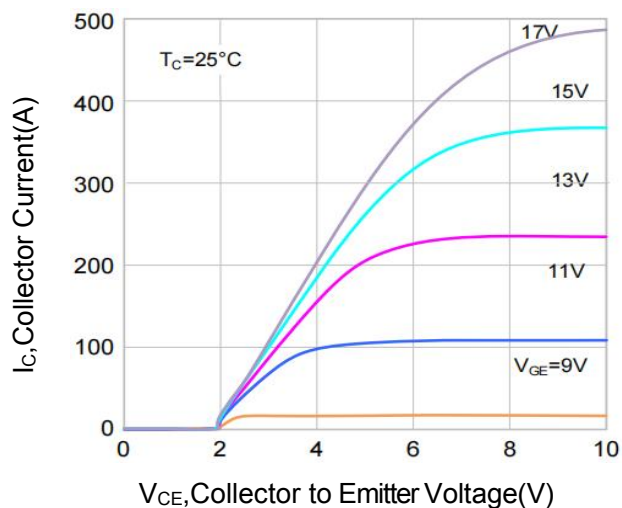


Fig 2. I_C vs T_C

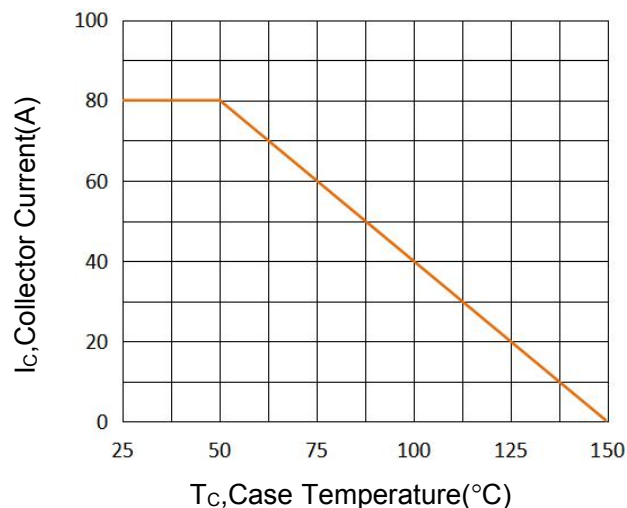


Fig 3. Saturation Voltage Characteristic

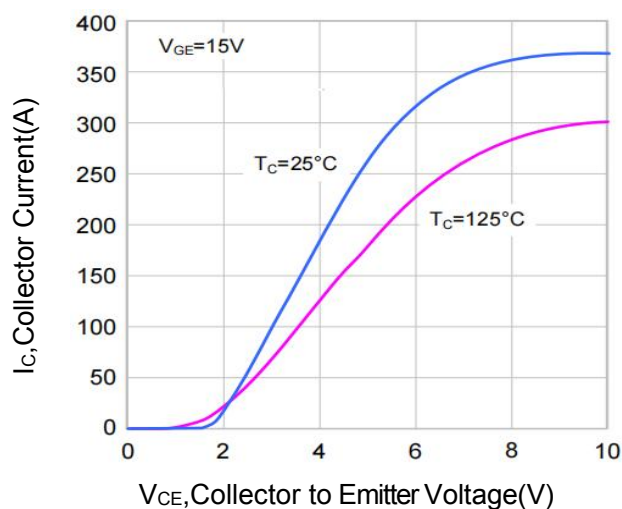


Fig 4. Transfer Characteristic

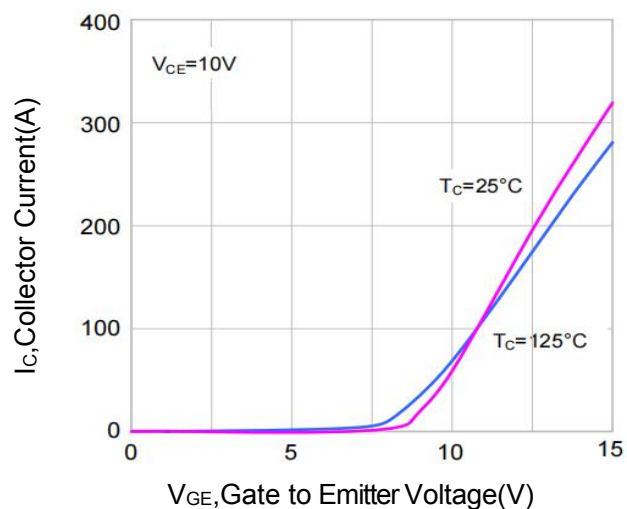


Fig 5. $V_{CE(sat)}$ vs. $V_{GE}(V)$

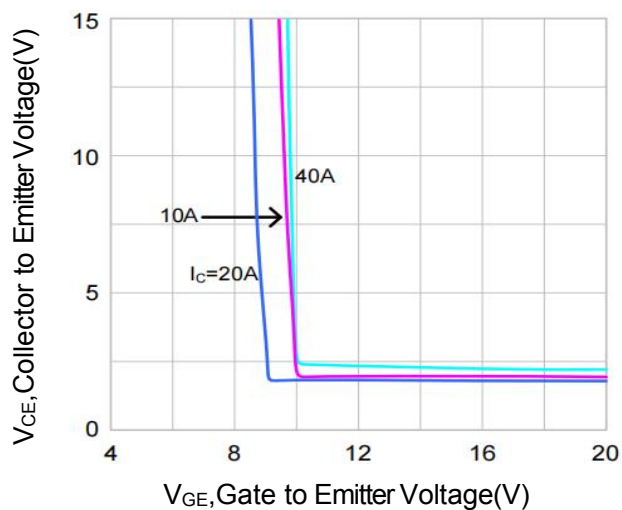


Fig 6. $V_{CE(sat)}$ vs. $V_{GE}(V)$

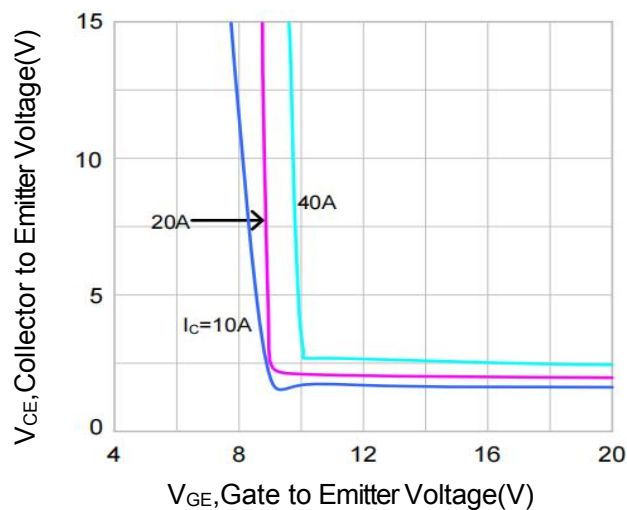


Fig 7. $V_{CE(sat)}$ vs. T_C

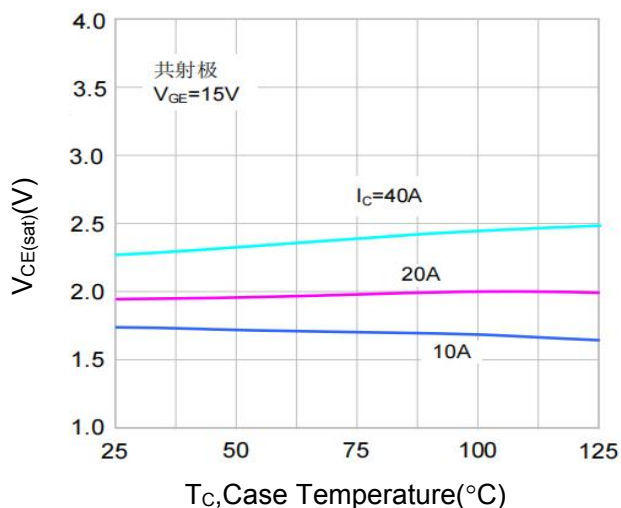


Fig 8. Capacitance Characteristic

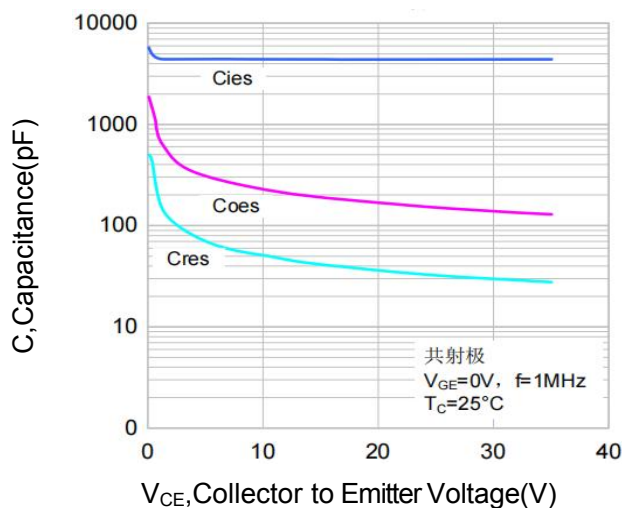


Fig 9. Gate Charge Characteristics

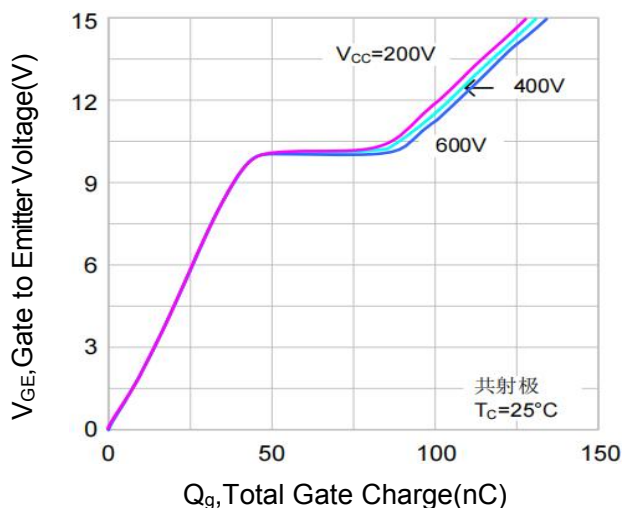


Fig 10. Switching Time vs. R_g

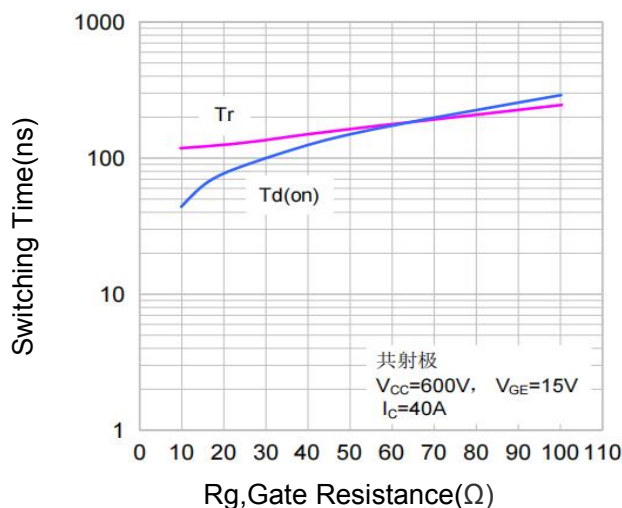


Fig 11. Switching Time vs. R_g

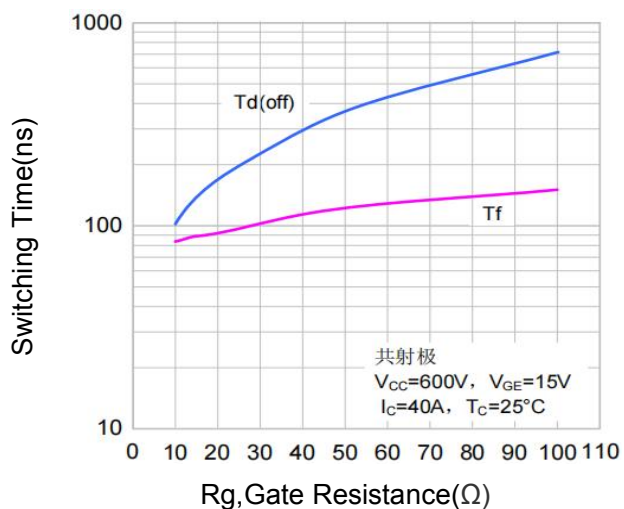


Fig 12. Switching Loss vs. R_g

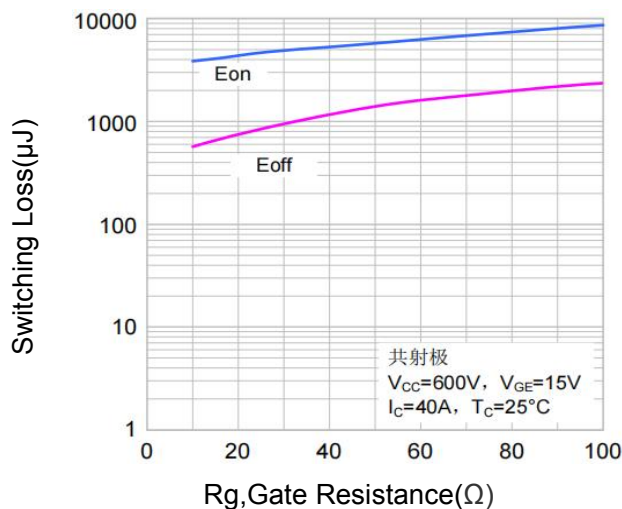


Fig 13. Switching Time vs. I_c

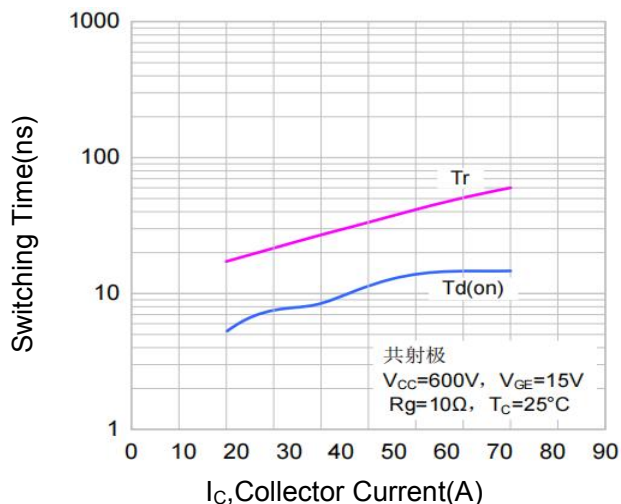


Fig 14. Switching Time vs. I_c

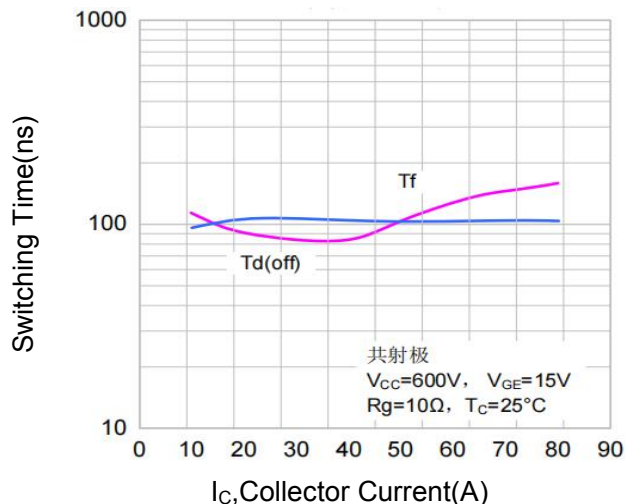


Fig 15. Switching Loss vs. I_c

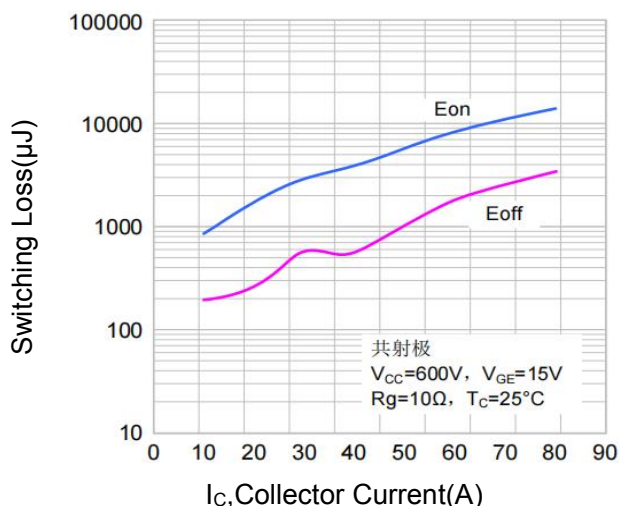


Fig 16. Diode Forward Characteristic

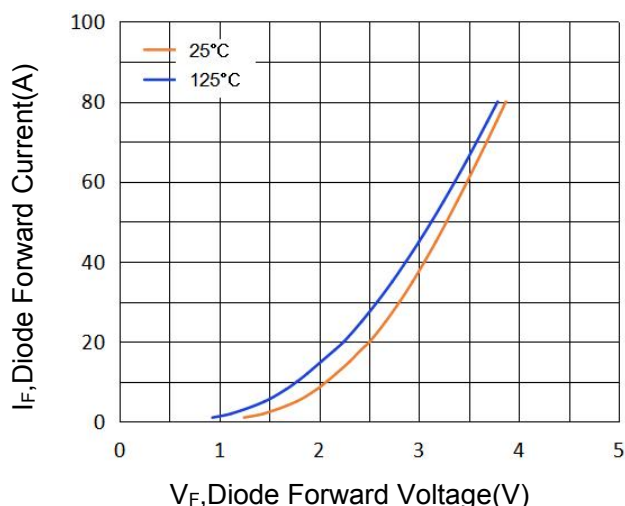
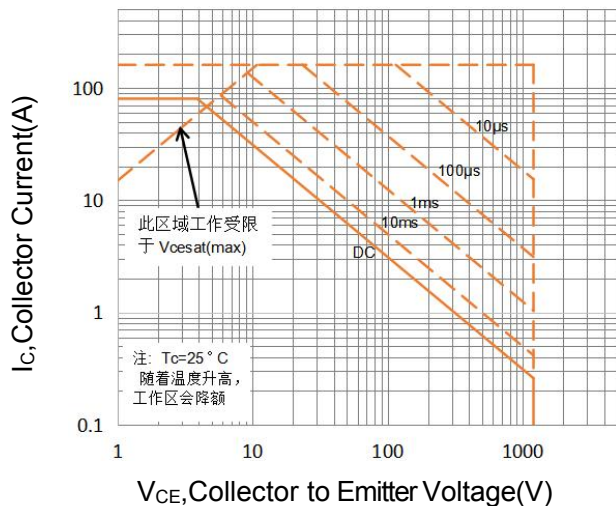


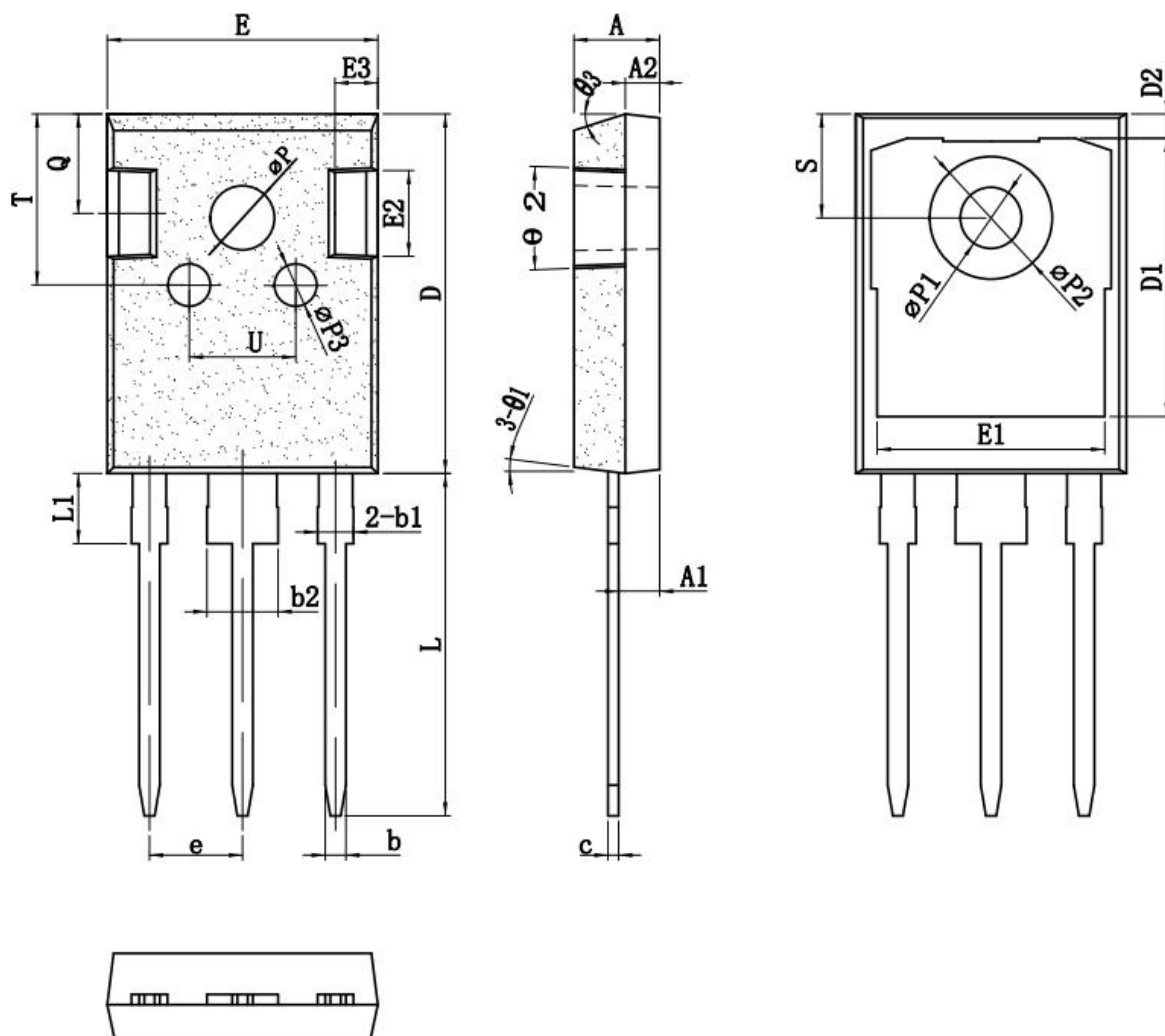
Fig 17. Safe Operating Area



TO-247-3L Package Dimensions

UNIT: mm

SYMBOL	min	nom	max	SYMBOL	min	nom	max
A	4.70	5.00	5.30	e	--	5.44	--
A1	2.20	2.40	2.60	L	19.00	20.00	21.00
A2	1.80	2.00	2.20	L1	3.90	4.30	4.70
b	1.00	1.20	1.40	ΦP	3.40	3.60	3.80
b1	1.90	2.10	2.30	$\Phi P1$	3.30	3.50	3.70
b2	2.90	3.10	3.30	$\Phi P2$	6.88	7.18	7.48
c	0.50	0.60	0.70	$\Phi P3$	2.20	2.50	2.80
D	20.50	21.00	21.50	Q	5.30	5.80	6.30
D1	15.50	16.50	17.50	S	5.65	6.15	6.65
D2	0.90	1.20	1.50	T	9.00	10.00	11.00
E	15.30	15.80	16.30	U	5.20	6.20	7.20
E1	12.75	13.25	13.75	$\theta 1$	5°	7°	9°
E2	4.70	5.00	5.30	$\theta 2$	1°	3°	5°
E3	2.20	2.50	2.80	$\theta 3$	13°	15°	17°



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注意事项：

- 1、在电路设计时请不要超过器件的最大额定值，否则会影响整机的可靠性。
- 2、IGBT产品为静电敏感型器件，使用时应注意采取防静电保护措施，如佩戴防静电手环、设备接地等。
- 3、如需安装散热片，请注意控制扭力大小及散热片的平整度。
- 4、该规格书由华科公司制作，并可能不定期更改，恕不另行通知。
- 5、如有疑问，请及时联系我司销售代表。

版本履历表：

序号	版本号	修改时间	修改记录
1	V1.0	2023-3-22	首次发行