HBP50T65-SATCM

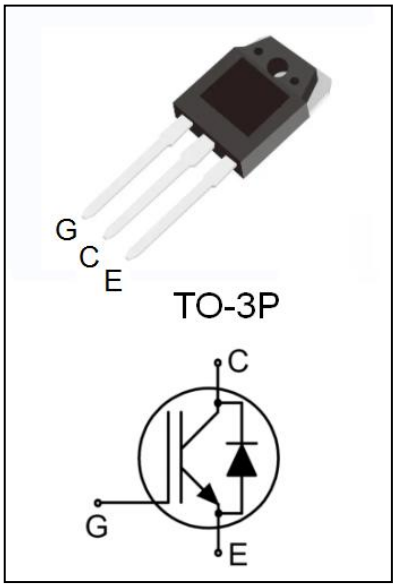
650V N-Channel Insulated Gate Bipolar Transistor

● **Features：**

- 50.0A, 650V, $V_{CESAT(Typ)}$ =1.65V@V_{GE}=15 V,I_C=50A
- 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(Tc=25°C unless otherwise noted)

Symbol	Parameter		Value	Unit
V_{CE}	Collector-Emitter Voltage		650	V
I_C	Collector Current-Continuous	- (Tc=25°C)	100	A
		- (Tc=100°C)	50	A
I_{CM}	Collector Current – Pulse	(Note1)	150	A
I_F	Diode Forward Current	- (Tc=25°C)	100	A
		- (Tc=100°C)	50	A
I_{FSM}	Surge non Repetitive Forward Current tp=10ms Sinusoidal		150	A
V_{GE}	Gate-Emitter Voltage		±20	V
Tsc	Short Circuit withstand Time(V_{GE} =15V,V_{CC} =300V)		10	μs
P_D	Power Dissipation(T_C =25°C)		273	W
Tj	Operating Junction Temperature		150	°C
Tstg	Storage Temperature Range		-55 to+150	°C

*Collector Current Limited by Maximum Junction Temperature.

Thermal Characteristics

Symbol	Parameter	Max	Unit
$R_{\theta JC}$	Thermal Resistance,Junction to Case for IGBT	0.46	°C /W
$R_{\theta JC}$	Thermal Resistance,Junction to Case for Diode	1.02	°C /W
$R_{\theta JA}$	Thermal Resistance,Junction to Ambient	40	°C /W

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	650	--	--	V
I_{CES}	Zero Gate Voltage Collector Current	V_{CE}=650V,V_{GE}=0V	--	--	200	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	4.0	5.5	7.0	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	V_{GE}=15 V, I_C=50A	--	1.65	2.2	V
Dynamic Characteristics						
C_{ies}	Input Capacitance	V_{CE}=30V,V_{GE}=0V, f=1.0MHz	--	2723	--	pF
C_{oes}	Output Capacitance		--	230	--	pF
C_{res}	Reverse Transfer Capacitance		--	55	--	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{CE} = 400 V, I_C = 50 A, R_G = 10 Ω,V_{GE} =15 V, Inductive Load	--	37	--	ns
t_r	Turn-On Rise Time		--	133	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	125	--	ns
t_f	Turn-Off Fall Time		--	121	--	ns
E_{on}	Turn-On Energy		--	3.0	--	mJ
E_{off}	Turn-off Energy		--	1.1	--	mJ
E_{ts}	Total Switching Energy		--	4.1	--	mJ
Q_g	Total Gate Charge	V_{CE} = 400 V, I_C =50 A, V_{GE} = 15 V	--	123	--	nC
Q_{ge}	Gate-Emitter Charge		--	31	--	nC
Q_{gc}	Gate-Collector Charge		--	48	--	nC
Anti-Parallel Diode Characteristics and Maximum Ratings						
V_F	Collector-Emitter Diode Forward Voltage	I_F=50A,Tc=25°C	--	1.7	2.3	V
		I_F=50A,Tc=125°C	--	1.55	--	V
t_{rr}	Diode Reverse Recovery Time	I_{EC} =50A dI_{EC} /dt=200A/μs	--	37.5	--	ns
Q_{rr}	Diode Reverse Recovery Charge		--	78	--	nC

Notes:

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

Typical Performance Characteristics

Fig 1. Output Characteristic

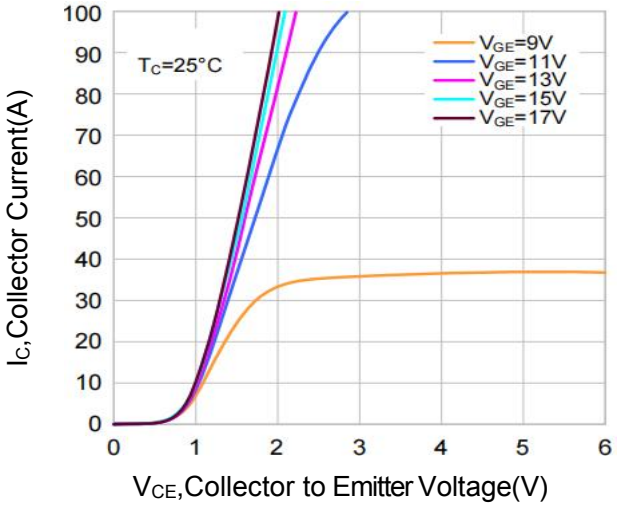


Fig 2. Output Characteristic

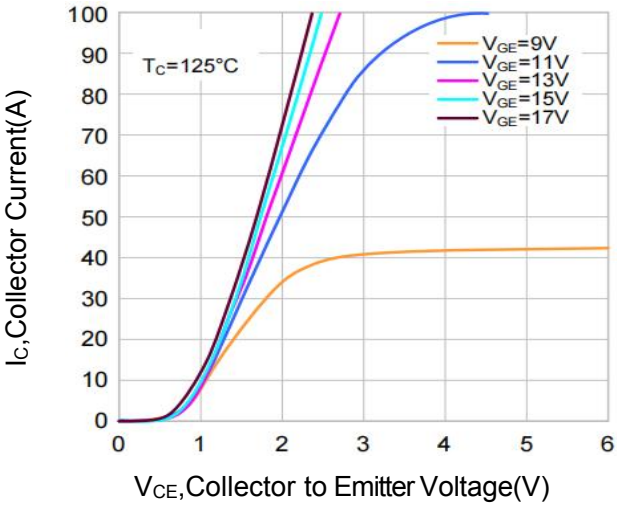


Fig 3. Saturation Voltage Characteristic

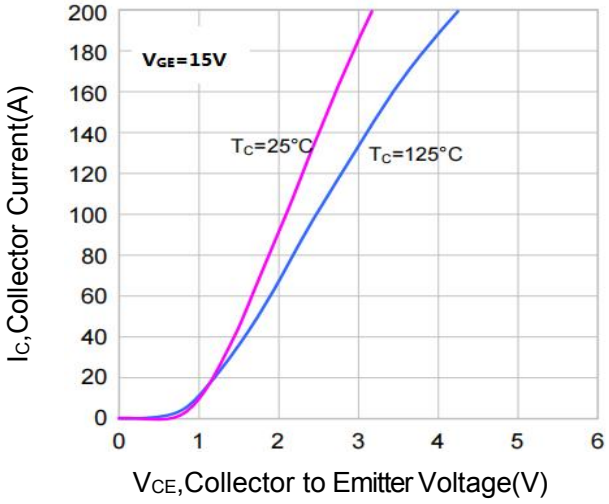


Fig 4. Transfer Characteristic

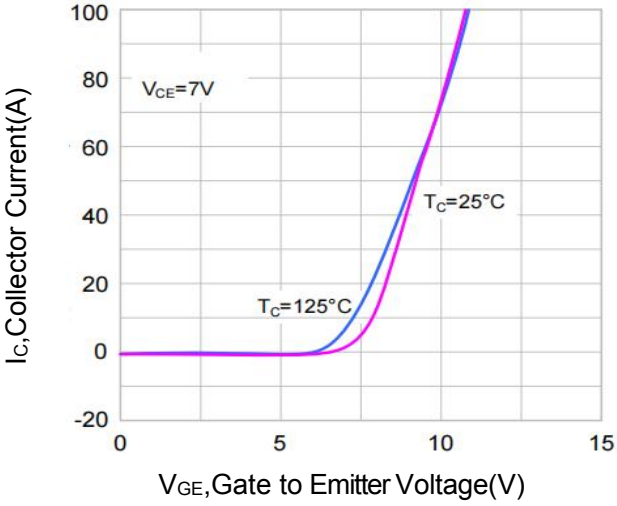


Fig 5. $V_{CE(sat)}$ vs. V_{GE}(V)

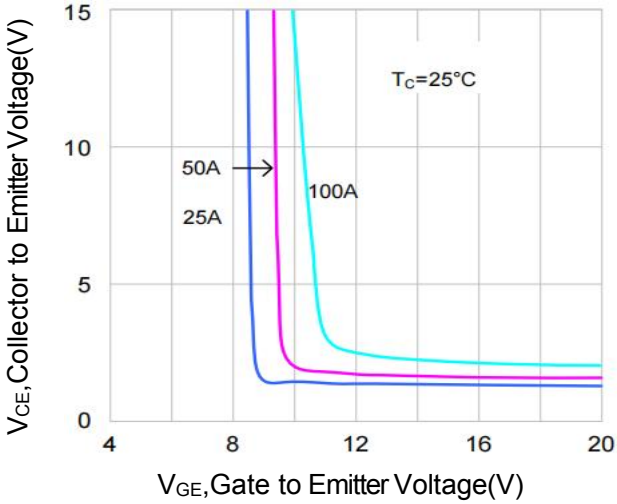


Fig 6. $V_{CE(sat)}$ vs. V_{GE}(V)

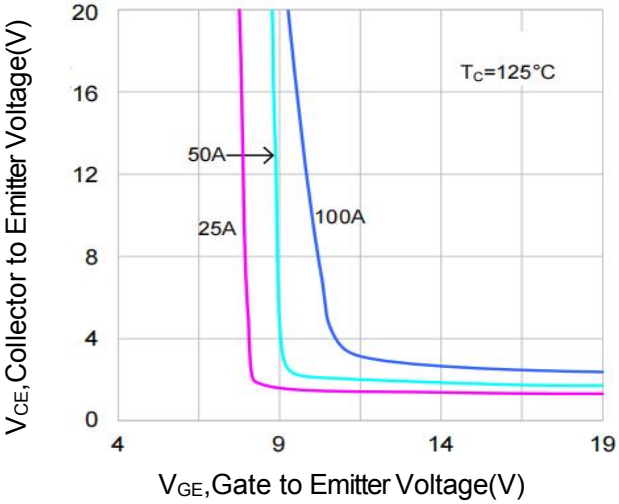


Fig 7. $V_{CE(sat)}$ vs. T_C

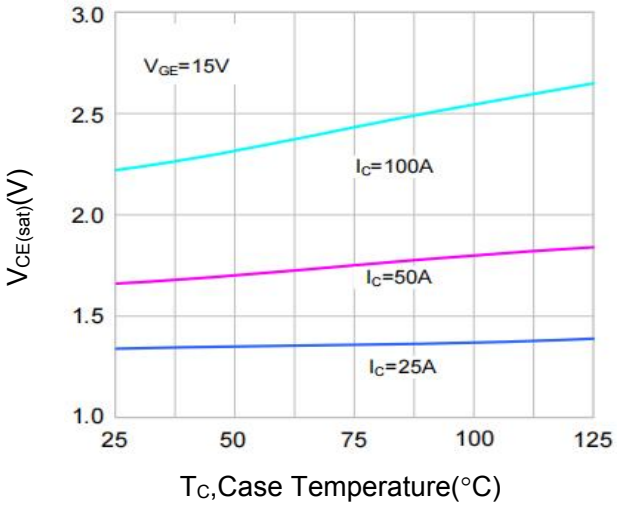


Fig 8. Capacitance Characteristic

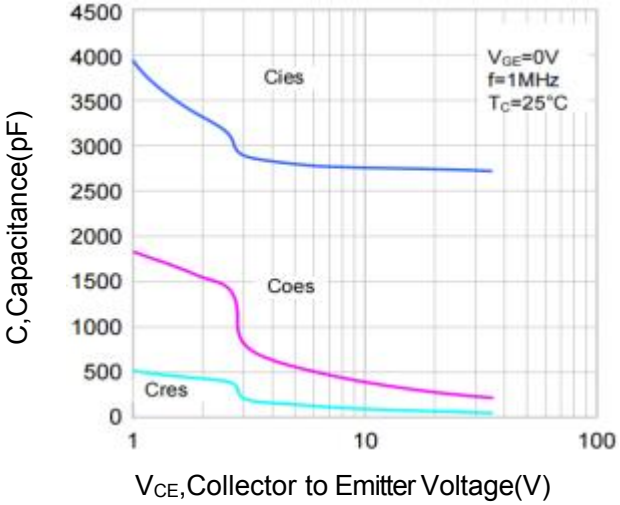


Fig 9. Gate Charge Characteristics

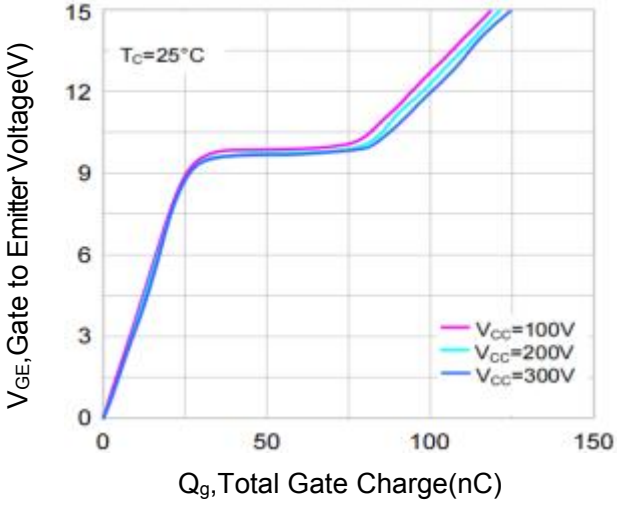


Fig 10. Switching Time vs. Rg

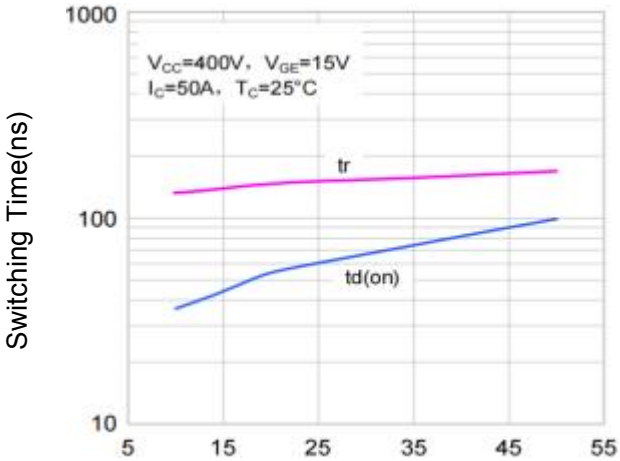


Fig 11. Switching Time vs. Rg

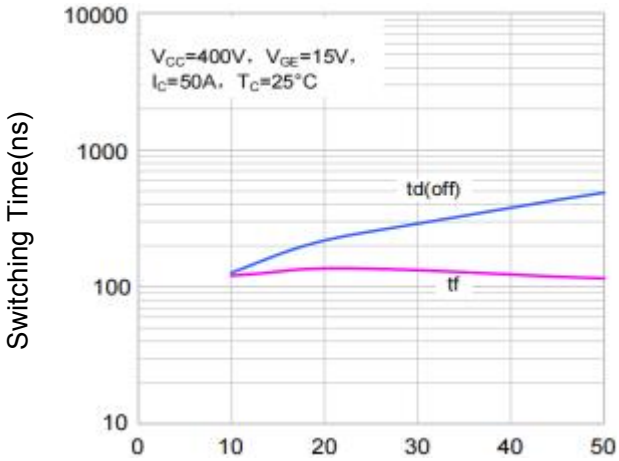


Fig 12. Switching Loss vs. Rg

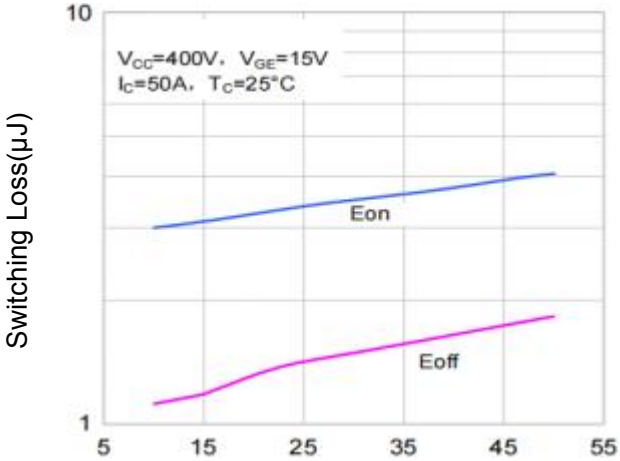


Fig 13. Switching Time vs. I_C

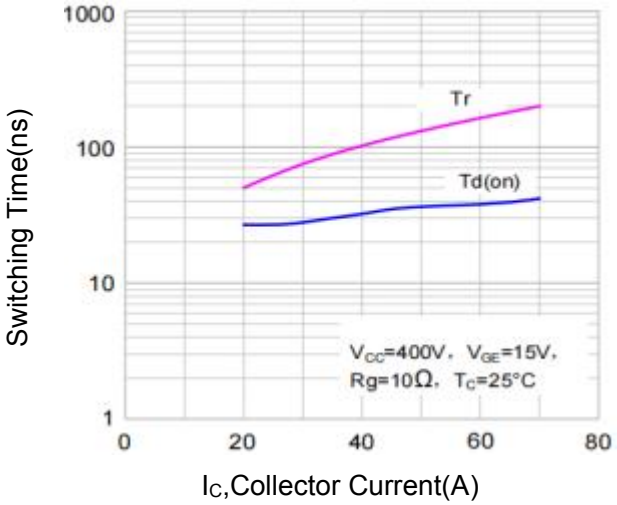


Fig 14. Switching Time vs.I_C

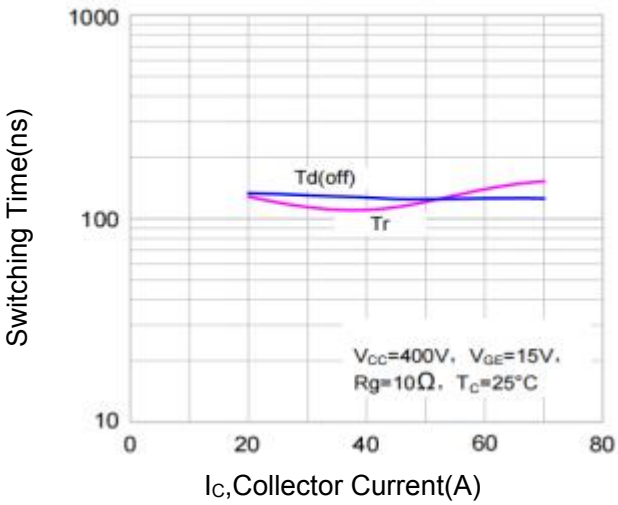


Fig 15. Switching Loss vs. I_C

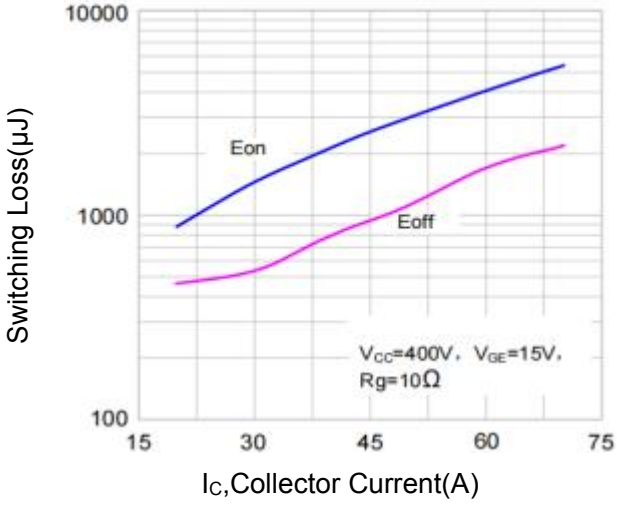


Fig 16. Diode Forward Characteristic

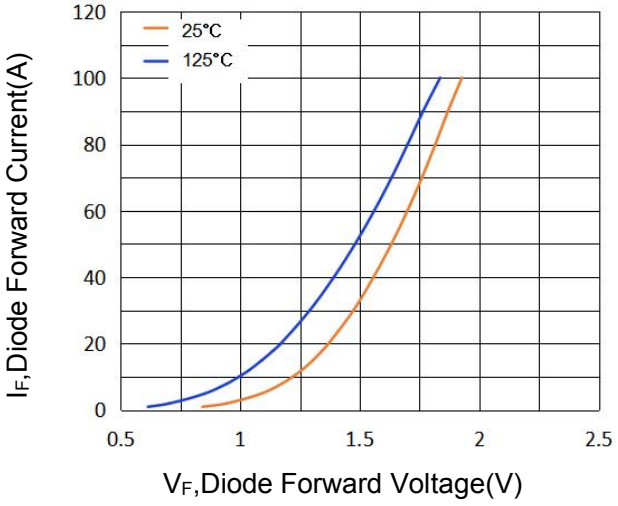


Fig 17. Safe Operating Area

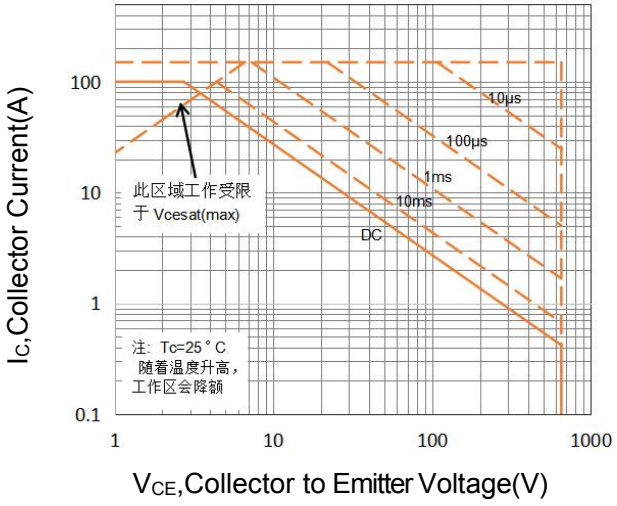
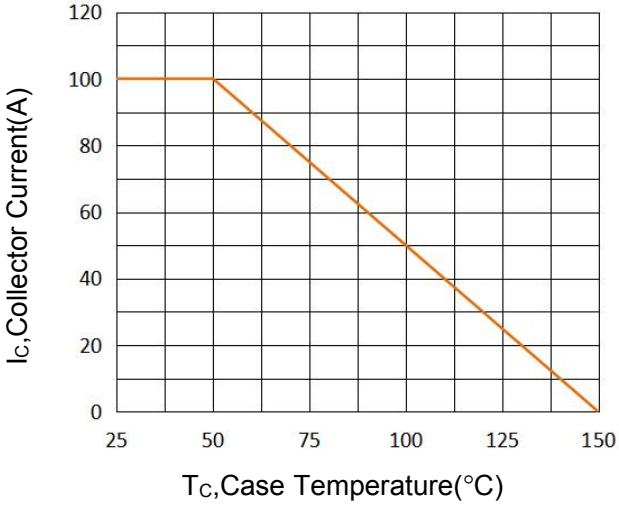


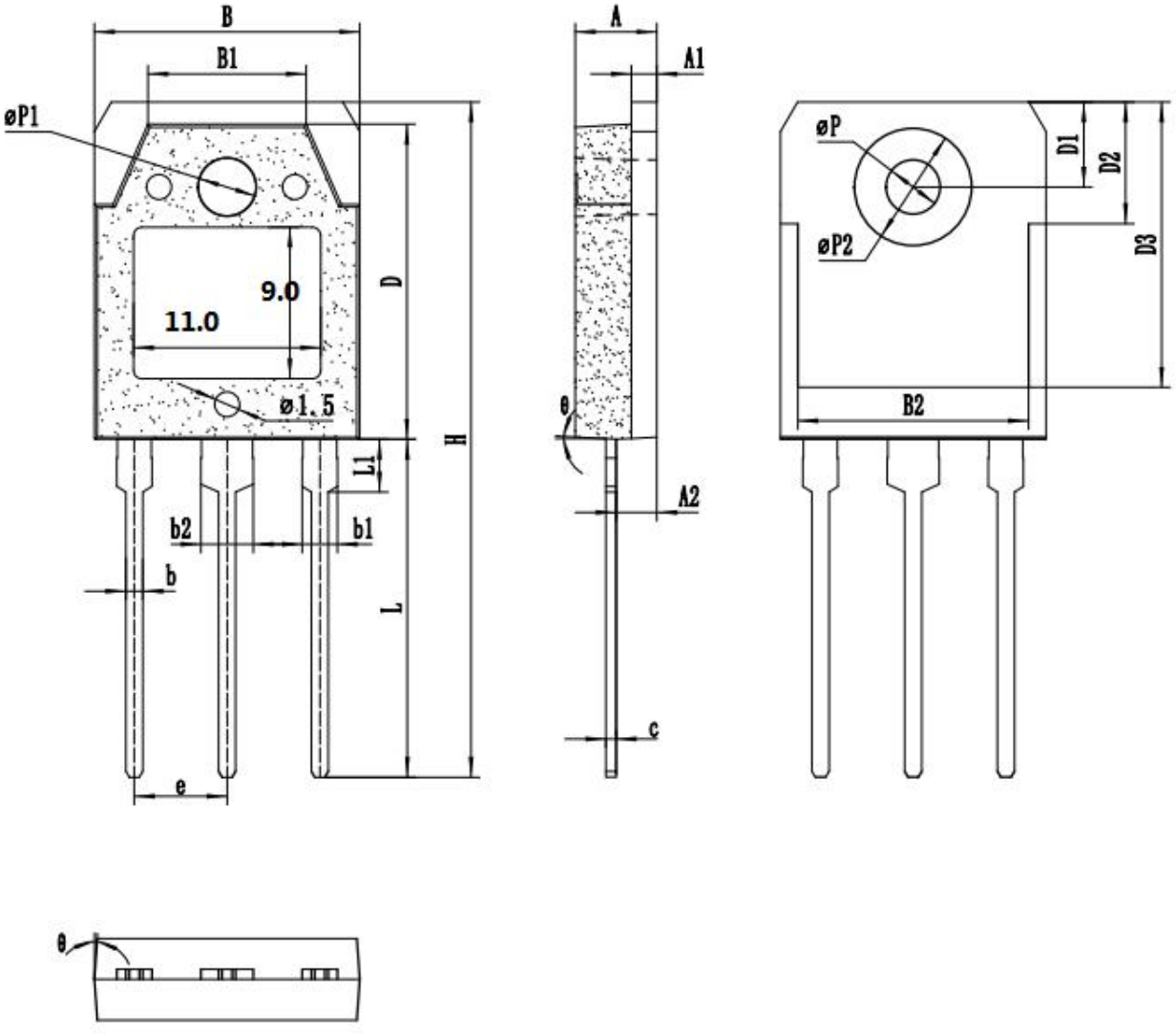
Fig 18. I_C vs T_C



TO-3P Package Dimensions

UNIT：mm

SYMBOL	min	nom	max	SYMBOL	min	nom	max
A	4.50	4.80	5.10	D	18.00	18.50	19.00
A1	1.40	1.50	1.60	D1	4.60	5.00	5.40
A2	2.10	2.40	2.70	D2	6.70	7.10	7.50
b	0.80	1.00	1.20	D3	16.20	16.70	17.20
b1	1.90	2.10	2.30	L1	2.70	3.10	3.50
b2	2.90	3.10	3.30	L	19.20	20.20	21.20
e		5.45		H	38.40	39.90	41.40
B	15.20	15.70	16.20	ΦP	2.90	3.15	3.40
B1	9.10	9.40	9.70	ΦP1	3.15	3.40	3.65
B2	13.20	13.60	14.00	ΦP2	6.70	7.00	7.30
c	0.50	0.60	0.70	θ	3°	5°	7°



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	2023-1-10	首次发行