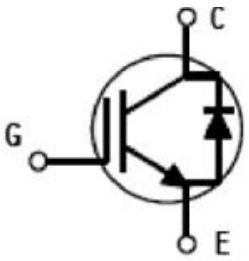
50A 650V Trenchstop Insulated Gate Bipolar Transistor

1 Description

Using DongHai's proprietary Trench design and advance FS technology, the 650V FS IGBT offers superior and switching performances, high avalanche ruggedness easy parallel operation



2 Features

- FS Trench Technology, Positive temperature coefficient
- Low saturation voltage: VCE(sat), typ = 1.8V @ IC =50A and Tj = 25°C
- Extremely enhanced avalanche capability

3 Applications

- Welding
- UPS
- Three-level Inverter

Type	Vce	Ic	Vcesat,Tj=25℃	Tjmax	Package
G50T65LBBW	650V	50A	1.8V	175℃	TO-247

4 Electrical Characteristics

4.1 Absolute Maximum Ratings （Tc=25℃,unless otherwise noted）

Parameter		Symbol	Value	Units
Collector-to-Emitter Voltage		V_{CE}	650	V
Gate-to-Emitter Voltage		V_{GE}	±20	V
DC Collector current	T_j=25℃	I_C	100	A
	T_j=100℃		50	A
Pulsed Collector Current(1)		I_{CM}	150	A
Diode forward current	T_j=25℃	I_F	20	A
	T_j=100℃		10	
Diode Pulsed Current		I_{FM}	40	A
Short circuit withstand time，V_{GE}=15V，V_{CC}=400V，Tj=150℃		T_{SC}	6	μs
Power Dissipation	T_j=25℃	P_{tot}	417	W
	T_j=100℃		208	W
Junction Temperature Range		T_j	-55～175	℃
Storage Temperature Range		T_{stg}	-55～150	℃
Soldering temperature		T_L	260	℃

4.2 Thermal Characteristics

Parameter	Symbol	Rating	Units
IGBT Thermal Resistance,Junction to Case-sink	R_{thJC}	0.36	℃/W
IGBT Thermal Resistance,Junction to Ambient	R_{thJA}	32.58	℃/W

4.3 Electrical Characteristics （Tj=25℃,unless otherwise noted）

Parameter	Symbol	Test Condition	Value			Units
			Min	Typ	Max	
Off Characteristics						
Collector-to-Emitter Breakdown Voltage	Vce	I_C=1mA,V_{GE}=0V	650	--	--	V
Collector-to-Emitter Leakage Current	I_{CES}	V_{CE}=650V,V_{GE}=0V	--	--	1	μA
Gate-to-Emitter Leakage Current	I_{GES}	V_{GE}=±20V,V_{CE}=0V	--	--	±100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GE(th)}$	V_{CE}=V_{GE},I_C=1mA	5	6	7	V
Collector-emitter saturation voltage	Vcesat	V_{GE}=15V,I_C=50A	--	1.8	2.0	V
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{CE}=30V,V_{GE}=0V f=1MHz	--	3248	--	pF
Output Capacitance	C_{oss}		--	134	--	
Reverse Transfer Capacitance	C_{rss}		--	33	--	
Switching Characteristics						
Turn-on delay time	td(on)	V_{CE}=400V,I_C=50A, R_g=10Ω,V_{GE}=15V, 感性负载,Tj=25℃	--	36	--	nS
Rise time	tr		--	102	--	nS
Turn-off delay time	td(off)		--	94	--	nS
Fall time	tf		--	72	--	nS
Turn-on energy	Eon		--	1.55	--	mJ
Turn-off energy	Eoff		--	1.09	--	mJ
Total switching energy	Ets		--	2.64	--	mJ
Turn-on delay time	td(on)	V_{CE}=400V,I_C=50A, R_g=10Ω,V_{GE}=15V, 感性负载,Tj=150℃	--	34	--	nS
Rise time	tr		--	104	--	nS
Turn-off delay time	td(off)		--	96	--	nS
Fall time	tf		--	120	--	nS
Turn-on energy	Eon		--	1.73	--	mJ
Turn-off energy	Eoff		--	1.2	--	mJ
Total switching energy	Ets		--	2.93	--	mJ
Gate charge	Qg	V_{CE}=400V,I_C=50A, V_{GE}=15V	--	104	--	nC

Diode Characteristic						
Diode forward voltage	V_F	I_F=20A	--	1.6	1.8	V
		I_F=40A	--	1.9	2.3	V
Diode reverse recovery time	trr	I_F=20A, di/dt=200A/uS	--	43	--	nS
Diode peak reverse recovery current	Irrm		--	3.1	--	A
Diode reverse recovery charge	Qrr		--	73	--	nC

Notes：

1.Pulse duration is limited bv $T_{j,max}$

5 Typical Characteristic Curves

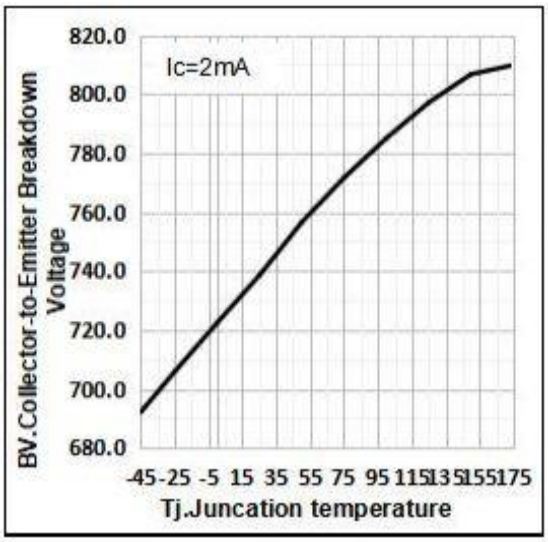


Fig1.**Collector-to-Emitter Breakdown Voltage Temperature characteristic**

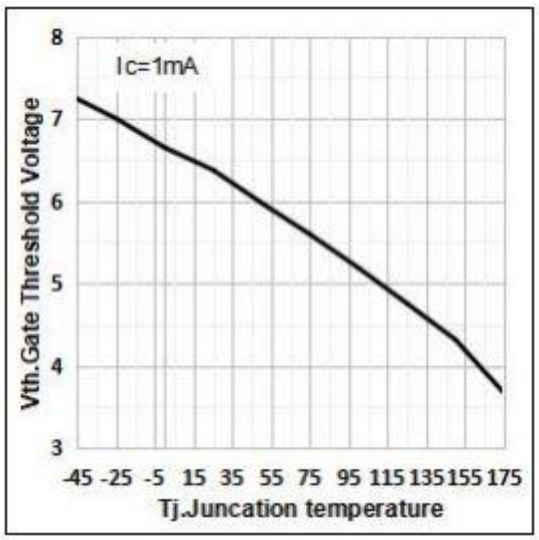


Fig2.**Gate Threshold Voltage Temperature characteristic**

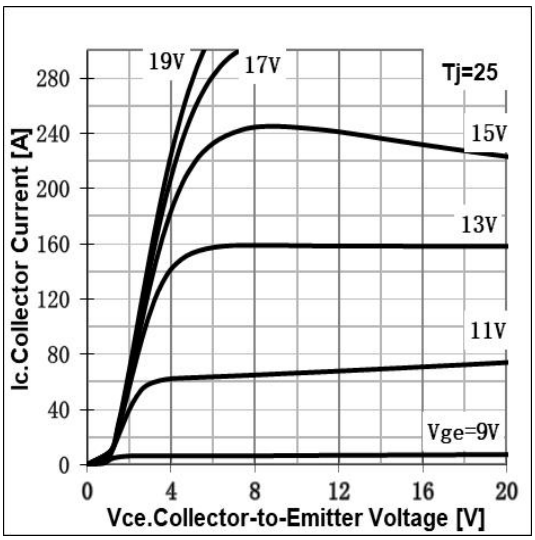


Fig3.**Typical output characteristic**

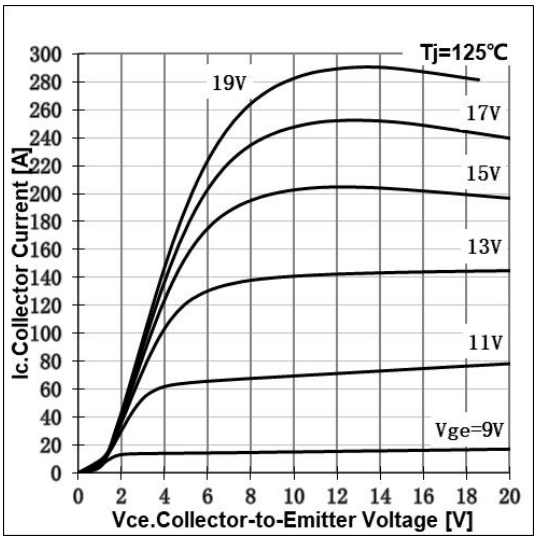


Fig4.**Typical output characteristic**

5 Typical Characteristic Curves(Continue)

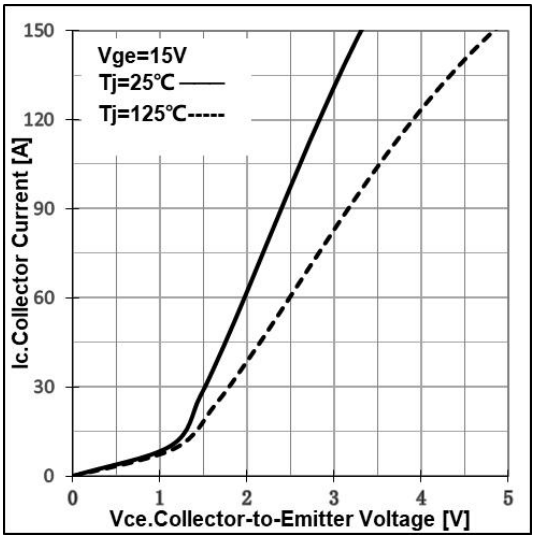


Fig5.**Collector-emitter saturation voltage Characteristic**

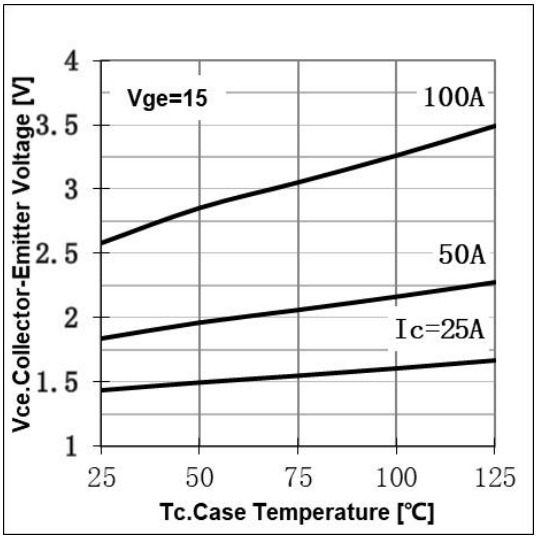


Fig6.**Collector-emitter saturation voltage Temperature Characteristic**

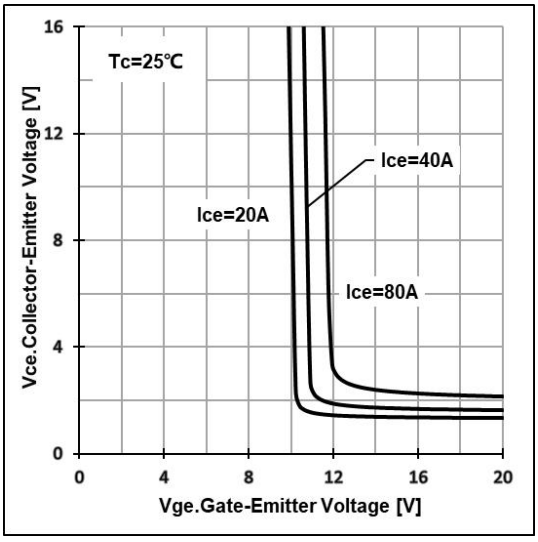


Fig7.**Typical Transfer characteristic curve of Saturation Voltage vs Vge**

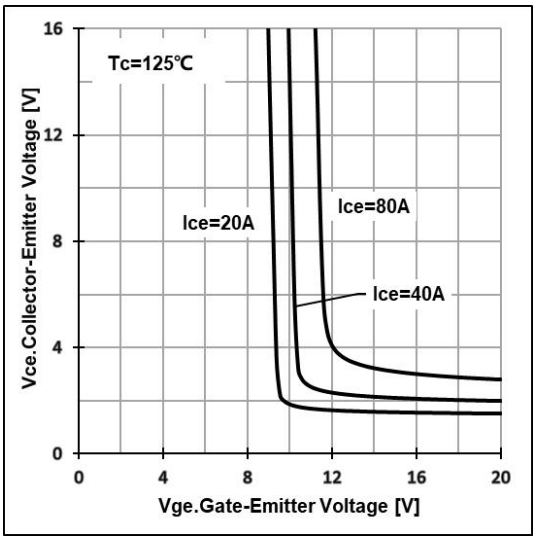


Fig8. **Typical Transfer characteristic curve of Saturation Voltage vs Vge**

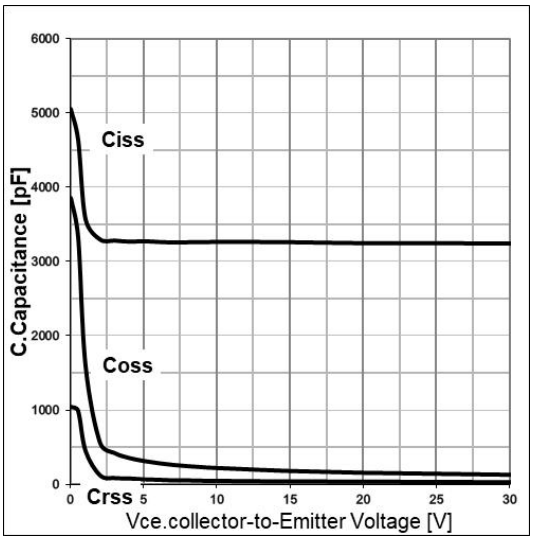


Fig9.**Typical capacitance as a function of collector-emitter voltage**

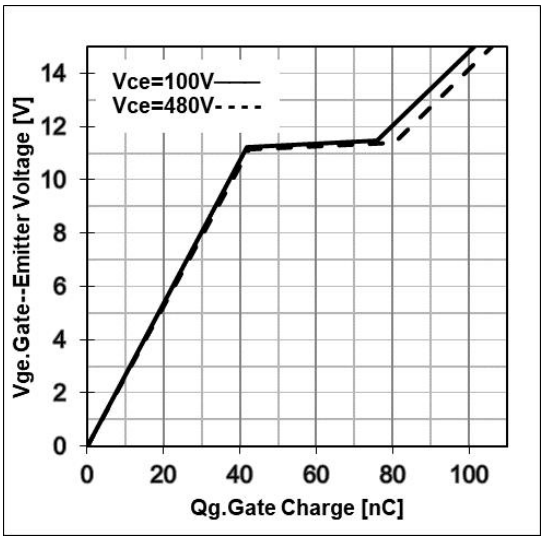


Fig10.**Typical gate charge**

5 Typical Characteristic Curves(Continue)

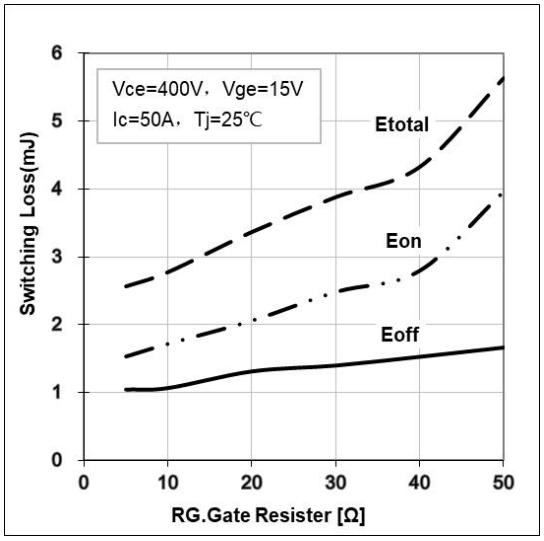


Fig11.**Typical switching energy losses as a function of gate resistor**

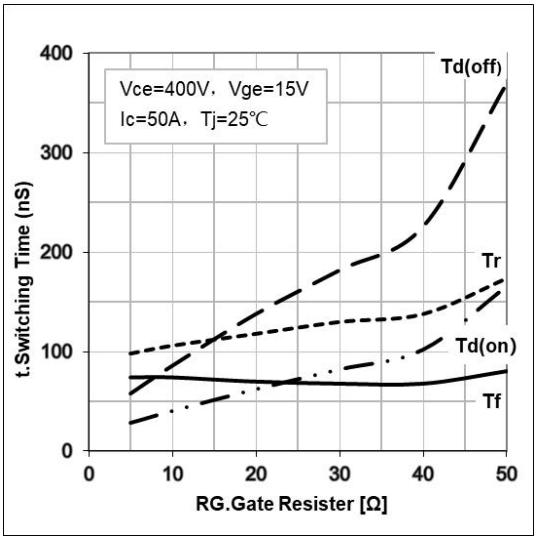


Fig12.**Typical switching times as a function of gate resistor**

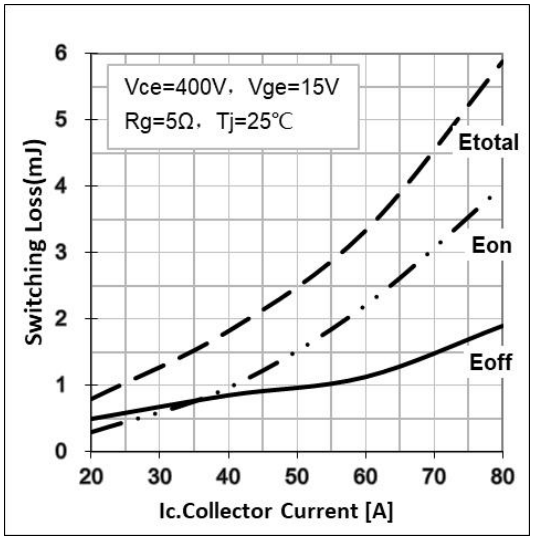


Fig13.**Typical switching energy losses as a function of Collector Current**

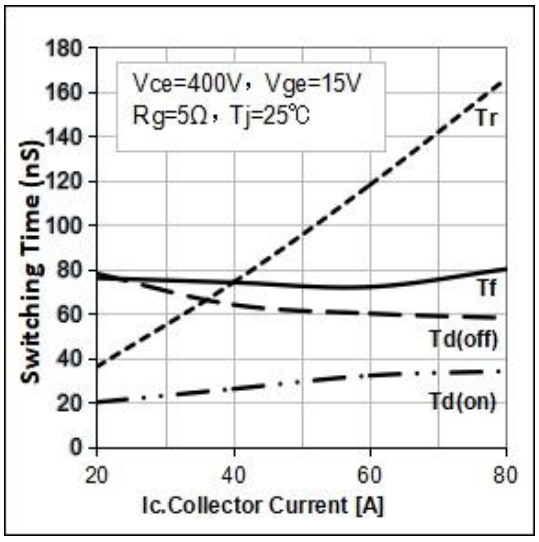


Fig14.**Typical switching times as a function of Collector Current**

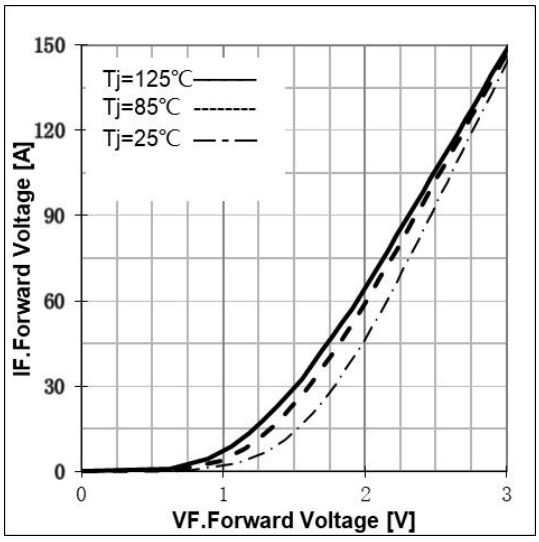


Fig15.**Typical diode forward current as a function of forward voltage**

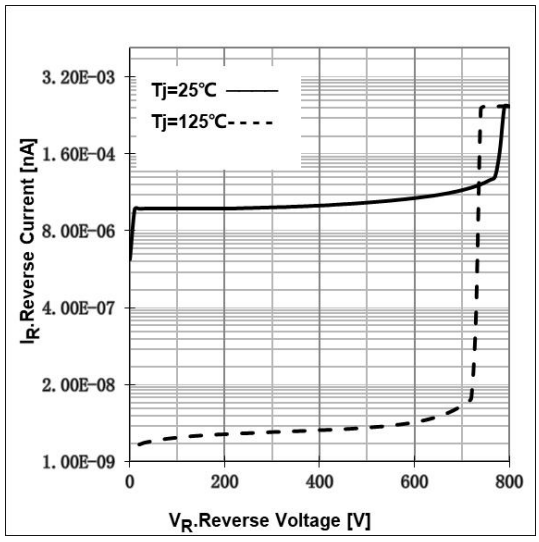


Fig16. **Typical diode reverse current as a function of Reverse Voltage**

5 Typical Characteristic Curves(Continue)

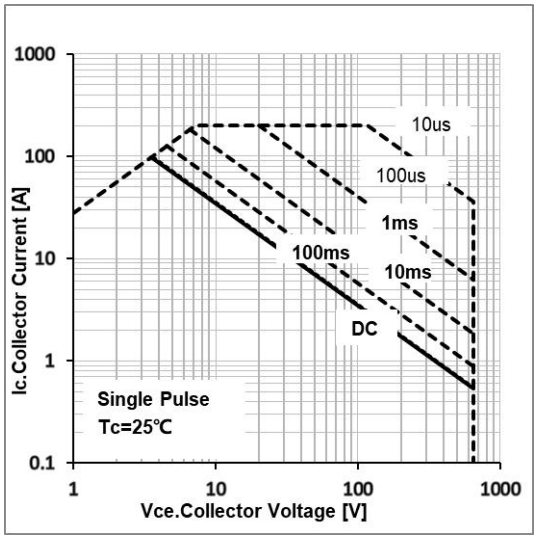


Fig17.**Forward bias safe operating area**

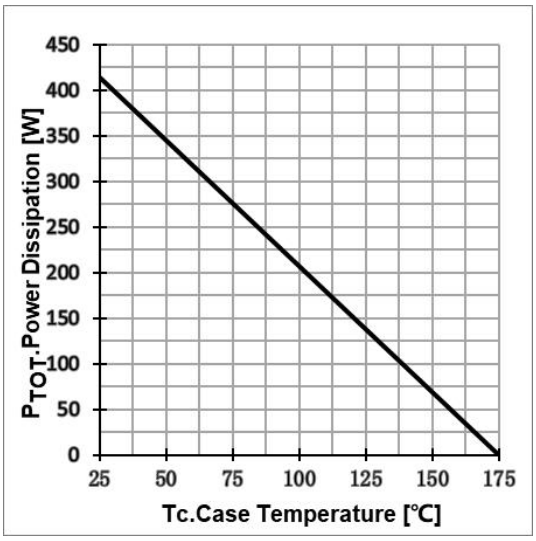


Fig18.**Power dissipation temperature characteristic**

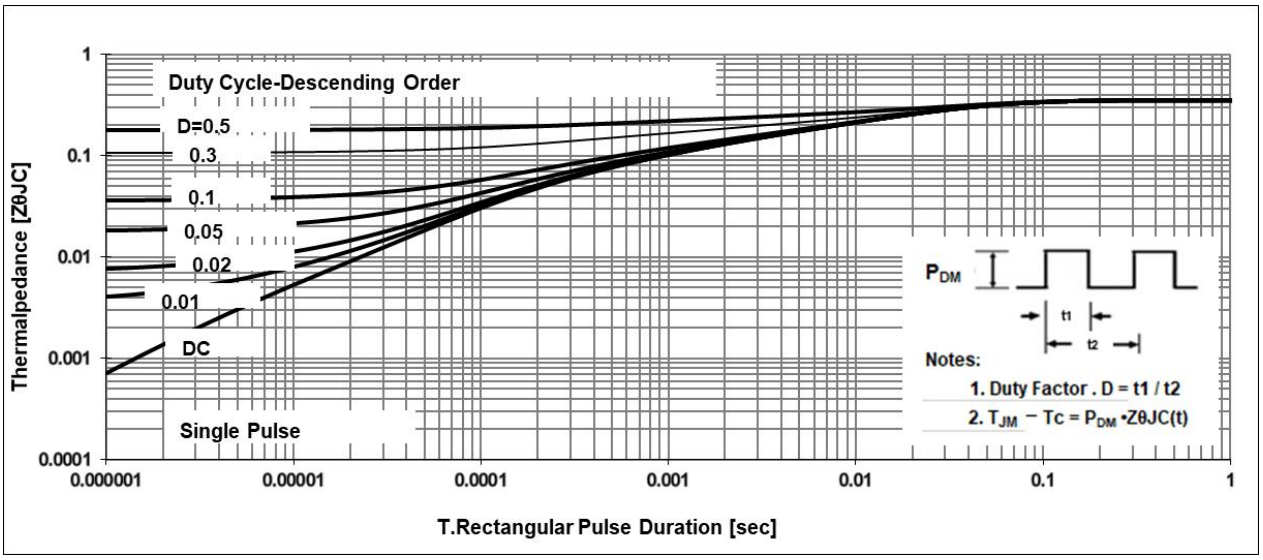
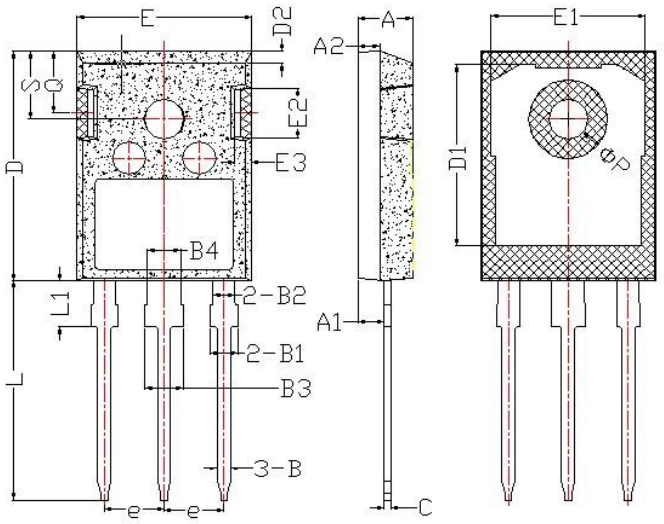


Fig19.**IGBT transient thermal resistance**

6 Dimensions (TO-247)



项　目	规范(mm)		项　目	规范(mm)	
	MIN	MAX		MIN	MAX
A	4.60	5.20	E	15.50	16.10
A1	2.20	2.60	E1	13.00	14.70
B	0.90	1.40	E2	3.80	5.30
B1	1.75	2.35	E3	0.80	2.60
B2	1.75	2.15	e	5.20	5.70
B3	2.80	3.35	L	19.00	20.50
B4	2.80	3.15	L1	3.90	4.60
C	0.50	0.70	ΦP	3.30	3.70
D	20.60	21.30	Q	5.20	6.00
D1	16.00	18.00	S	5.80	6.60

7 Attentions

- Jiangsu Donghai Semiconductor Technology CO.,LTD. reserves the right to change the specification without prior notice! The customer should obtain the latest version of the information before making the order and verify that the information is complete and up to date.
- It is the responsibility of the purchaser for any failure or failure of any semiconductor product under certain conditions. It is the responsibility of the purchaser to comply with safety standards and to take safety measures in the system design and machine manufacturing of Donghai products in order to avoid potential risk of failure. Injury or property damage.
- Product promotion is endless, our company will be dedicated to provide customers with better products.

8 Appendix

Revision history:

Date	REV.	Description	Page
2021.06.02	1.0	Original	