Silicon FS Trench IGBT

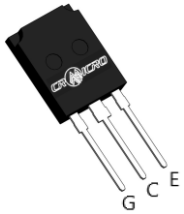
CRG75T120AX3HDQ

General Description：

Using owner proprietary trench design and advanced Field Stop (FS) technology, offering superior conduction and switching performances. RoHS Compliant.

V_{CES}	1200	V
I_C	75	A
P_{tot} （T_C=25℃）	1000	W
$V_{CE(sat)}$	1.94	V

Outline ： TO-247Plus



Features：

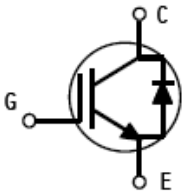
- Qualified to AEC-Q101
- FS Trench Technology, Positive temperature coefficient
- Low saturation voltage：

  $V_{CE(sat)}$,TYP=1.94V @I_C=75A,V_{GE}=15V；

Applications

- Solar Inverter
- OBC
- UPS

Inner Circuit：



Package Parameters

Type	Marking	Package	Packing
CRG75T120AX3HDQ	G75T120AX3HDQ	TO-247Plus	Tube

Absolute Maximum Ratings（T_C= 25℃ unless otherwise specified）:

Symbol	Parameter	Rating	Unit
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate- Emitter Voltage	±20	V
V_{GES}	Gate- Emitter Voltage（tp≤10us,D<0.01）	±30	V
I_C	Collector Current @T_C = 25 ℃	150	A
	Collector Current @T_C = 100 ℃	75	
I_{CM}[a1]	Pulsed Collector Current	300	A
I_F	Diode Continuous Forward Current @T_C =25 ℃	150	A
	Diode Continuous Forward Current @T_C = 100 ℃	75	
I_{FM}	Diode Maximum Forward Current	300	A
P_D	Power Dissipation @ T_C = 25℃	1000	W
	Power Dissipation @ T_C = 100℃	500	W
T_{vjop}[a2]	Operating Junction temperature range	-40～175	℃
T_{stg}	Storage Temperature Range	−55～150	℃
T_L	Maximum Temperature for Soldering	270	℃

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R\theta_{JC}$	Thermal Resistance, Junction to case for IGBT	--	0.15	℃/W
$R\theta_{JC}$	Thermal Resistance, Junction to case for Diode	--	0.43	℃/W
$R\theta_{JA}$	Thermal Resistance, Junction to Ambient	--	40	℃/W

Electrical Characteristics of the IGBT（T_C= 25℃ unless otherwise specified）:

Symbol	Parameter	Conditions	Value			Unit
			Min.	Typ	Max.	
OFF Characteristics						
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	V_{GE}=0V,I_{CE}=250uA	1200	--	--	V
I_{CES}	Collector Cut-off Current	V_{GE}=0V,V_{CE}=1200V	--	--	100	uA
$I_{GES(F)}$	Gate-Emitter Forward Leakage Current	V_{GE}=+20V	--	--	+250	nA
$I_{GES(R)}$	Gate-Emitter Reverse Leakage Current	V_{GE} =-20V	--	--	-250	nA
ON Characteristics						
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C=75A ,V_{GE}=15V @ T_C = 25 ℃	--	1.94	2.4	V
		I_C=75A ,V_{GE}=15V @ T_C =175 ℃	--	2.53	--	V
$V_{GE(th)}$	Gate - Emitter Threshold Voltage	I_C=250uA ,V_{CE}=V_{GE}	4.5	5.6	7.0	V

Pulse width tp≤300μs,δ≤2%						
Dynamic Characteristics						
C_{ies}	Input Capacitance	V_{CE}=30V,V_{GE}=0V f=1MHz	--	13291	--	pF
C_{oes}	Output Capacitance		--	336	--	
C_{res}	Reverse Transfer Capacitance		--	157	--	
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{CE}=600V,I_C=75A, R_g=10Ω,V_{GE}=15V, Inductive Load, T_J=25℃,	--	92.8	--	ns
t_r	Rise Time		--	73.9	--	
$t_{d(off)}$	Turn-Off Delay Time		--	326.7	--	
t_f	Fall Time		--	57.28	--	
E_{on}	Turn-On Switching Loss		--	6.3	--	mJ
E_{off}	Turn-Off Switching Loss		--	2.9	--	
E_{ts}	Total Switching Loss		--	9.2	--	
$t_{d(on)}$	Turn-on Delay Time	V_{CE}=600V,I_C=75A, R_g=10Ω,V_{GE}=15V, Inductive Load, T_J=175℃	--	84.2	--	ns
t_r	Rise Time		--	72	--	
$t_{d(off)}$	Turn-Off Delay Time		--	399.4	--	
t_f	Fall Time		--	125.4	--	
E_{on}	Turn-On Switching Loss		--	6.8	--	mJ
E_{off}	Turn-Off Switching Loss		--	4.2	--	
E_{ts}	Total Switching Loss		--	11	--	
Qg	Total Gate Charge	V_{CE}=600V,I_C=75A, V_{GE}=15V,	--	405	--	nC
Qge	Gate to Emitter Charge		--	98	--	
Qgc	Gate to Collector Charge		--	156	--	
Electrical Characteristics of the DIODE						
V_F	Diode Forward Voltage	I_F=75A TC=25℃	--	2.2	3.2	V
		I_F=75A TC=175℃	--	1.85	--	V
t_{rr}	Reverse Recovery Time	I_F=75A di/dt=100A/μS	--	97	--	ns
I_{rrm}	Reverse Recovery Current		--	5.65	--	A
Q_{rr}	Reverse Recovery Charge		--	274	--	nC

Notes:

a1: Repetitive rating; pulse width limited by maximum junction temperature

a2: Overload condition, it is allowed to operate under the maximum junction temperature Tvjop = 175℃, the maximum duty cycle is less than 20% (lasting for 60s at most)

Typical Performance Characteristics

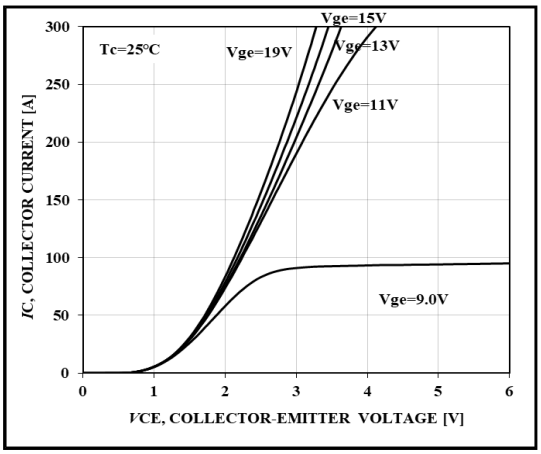


Figure 1. Output Characteristics

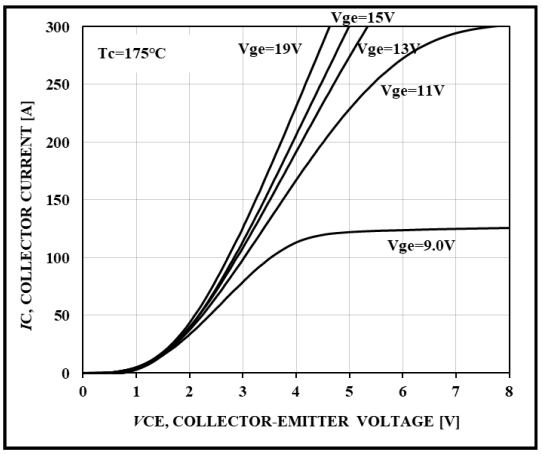


Figure 2. Output Characteristics

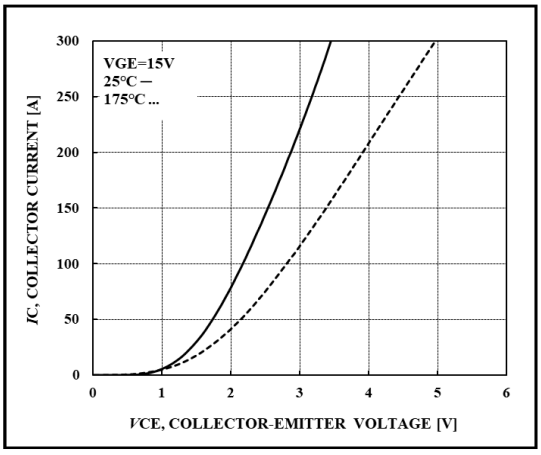


Figure 3. Saturation Voltage Characteristics

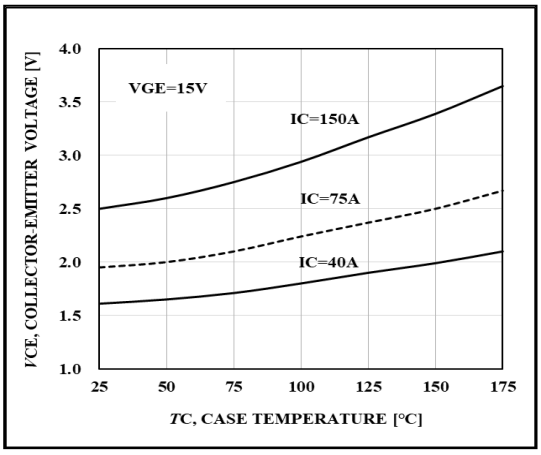


Figure 4. Saturation Voltage -T_C Characteristics

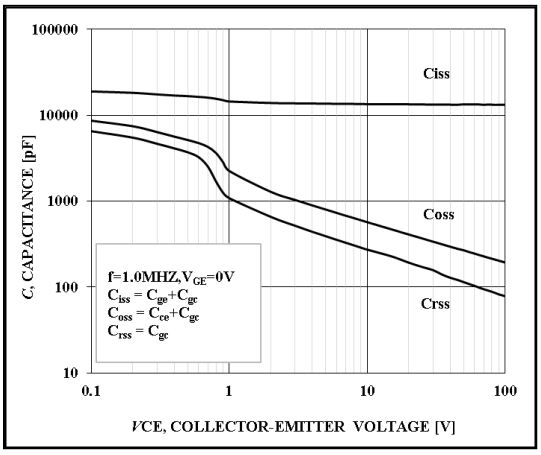


Figure 5. Capacitance Characteristics

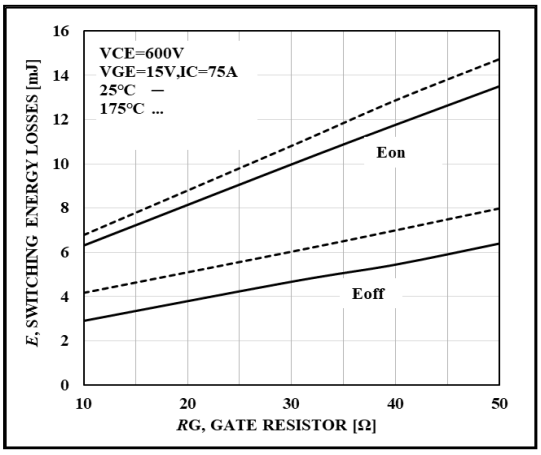


Figure 6. Switching Loss-R_G Characteristics

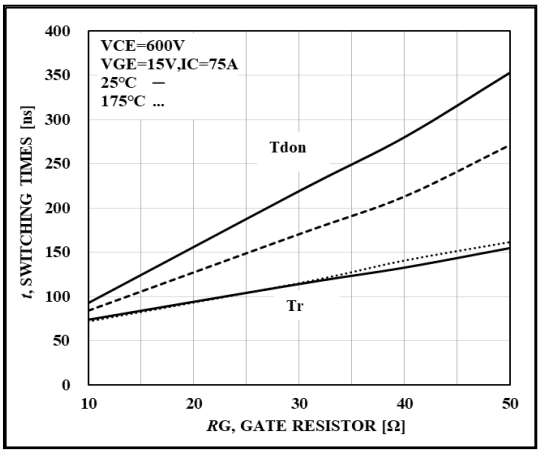


Figure 7. Switching Time-R_G Characteristics

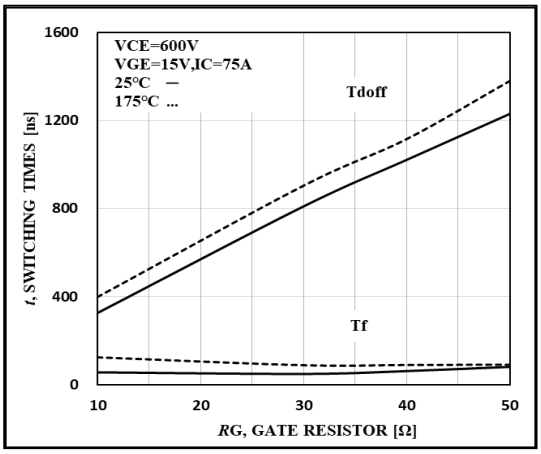


Figure 8. Switching Time-R_G Characteristics

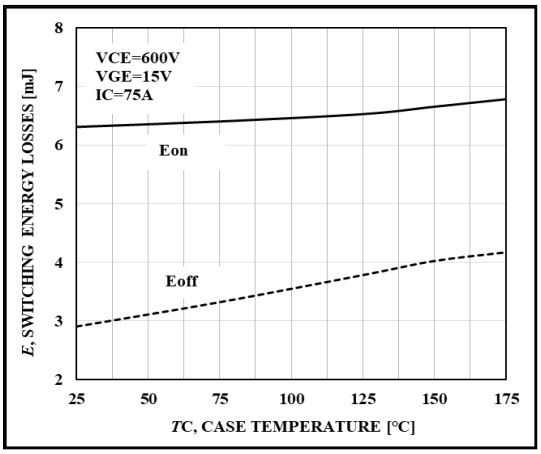


Figure 9. Switching Loss-Tc Characteristics

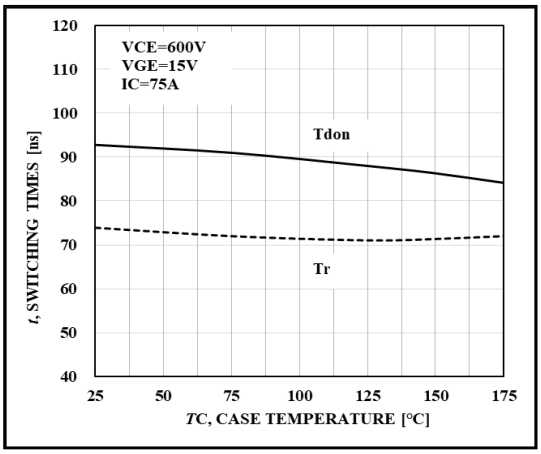


Figure 10. Switching Time-Tc Characteristics

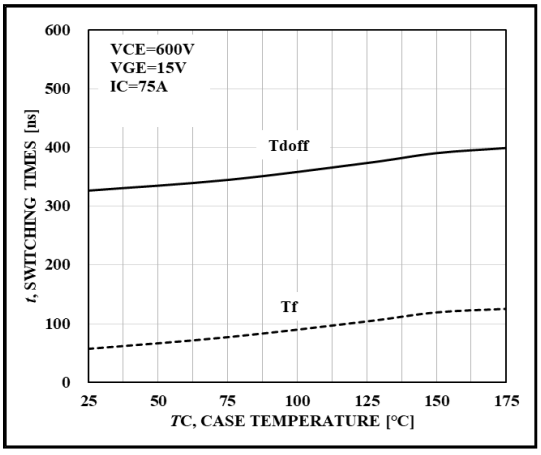


Figure 11. Switching Time-Tc Characteristics

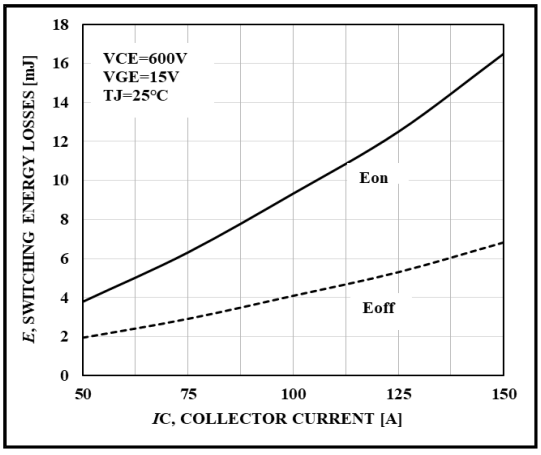


Figure 12. Switching Loss-I_C Characteristics

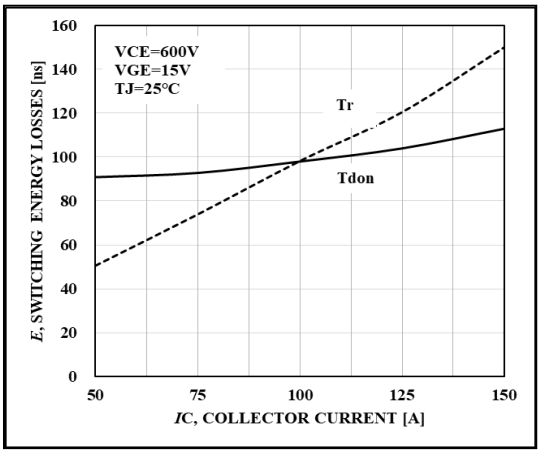


Figure 13. Switching Time-I_C Characteristics

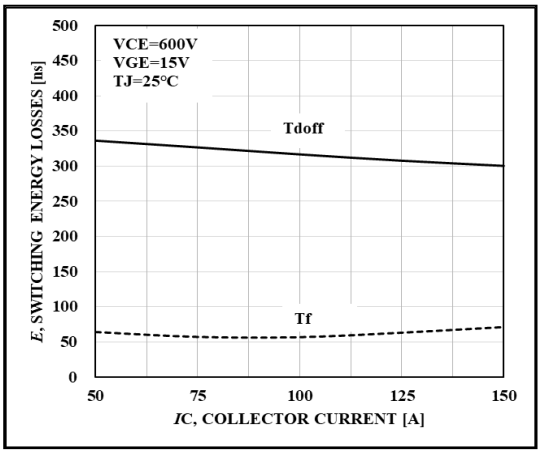


Figure 14. Switching Time-I_C Characteristics

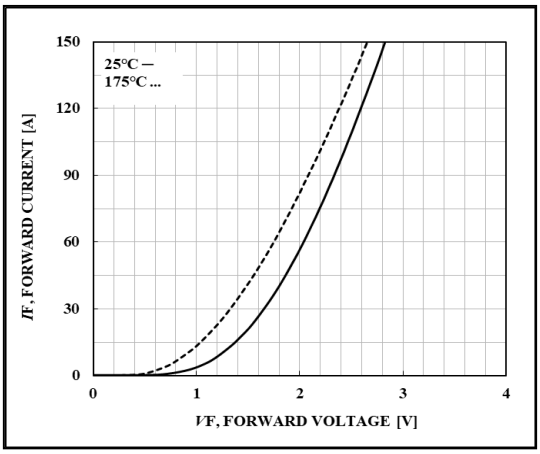


Figure 15. Diode Forward Characteristics

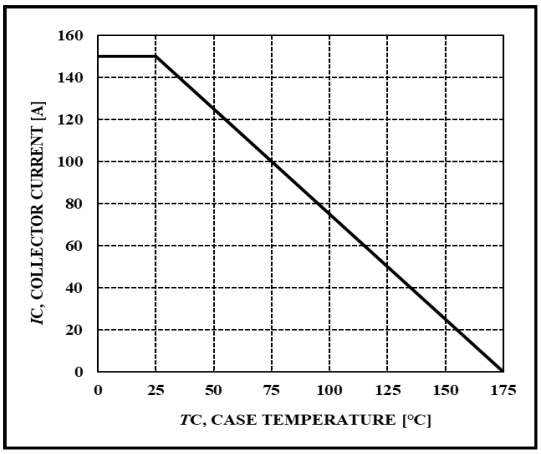


Figure 16. Collector Current-Tc Characteristics

(Tj ≤175℃)

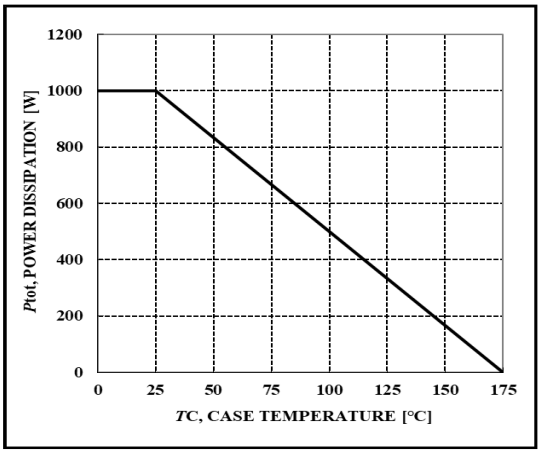


Figure 17. Power Dissipation-Tc Characteristics

(Tj ≤175℃)

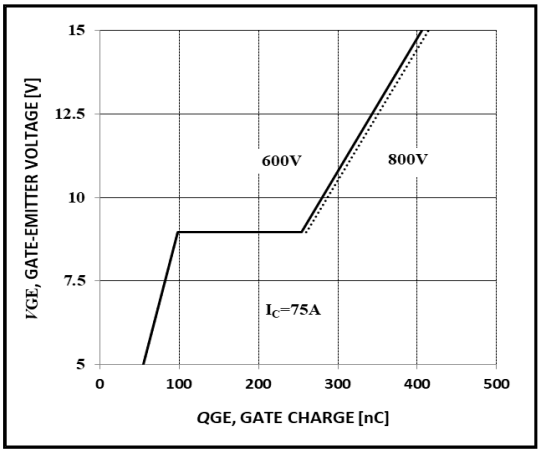


Figure 18. Gate Charge Characteristics

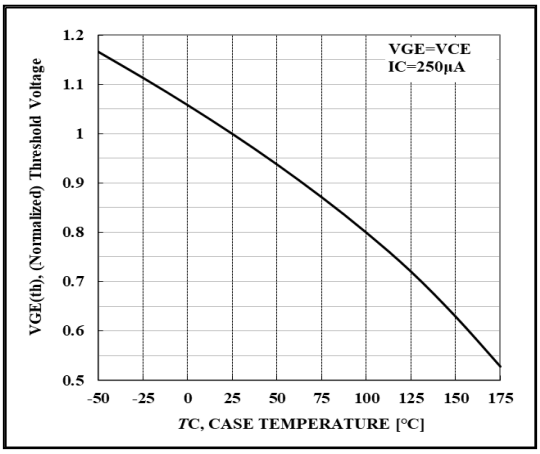


Figure 19. Threshold Voltage -Tc Characteristics

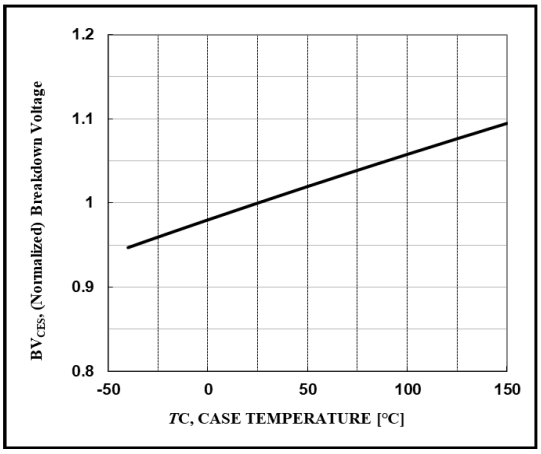


Figure 20. Breakdown Voltage-Tc Characteristics

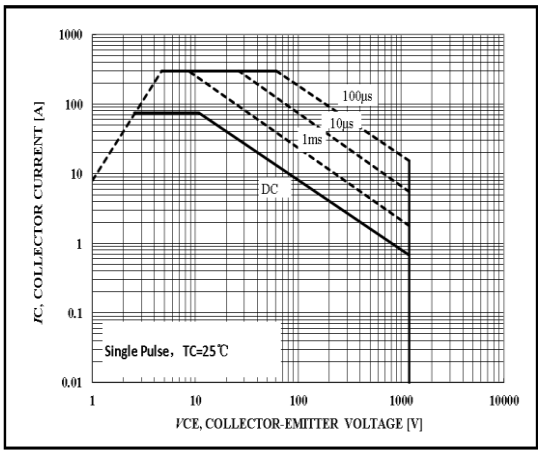


Figure 21. Forward Bias Safe Operating Area

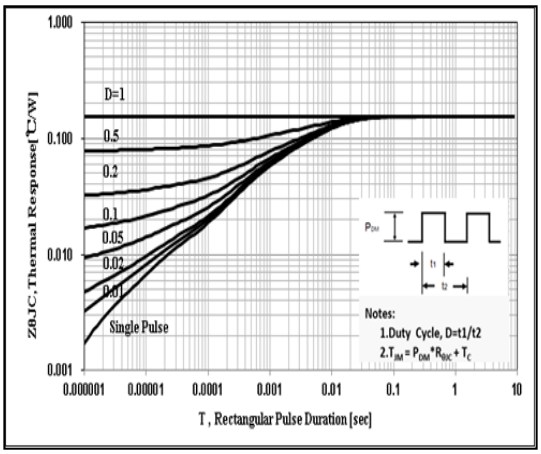
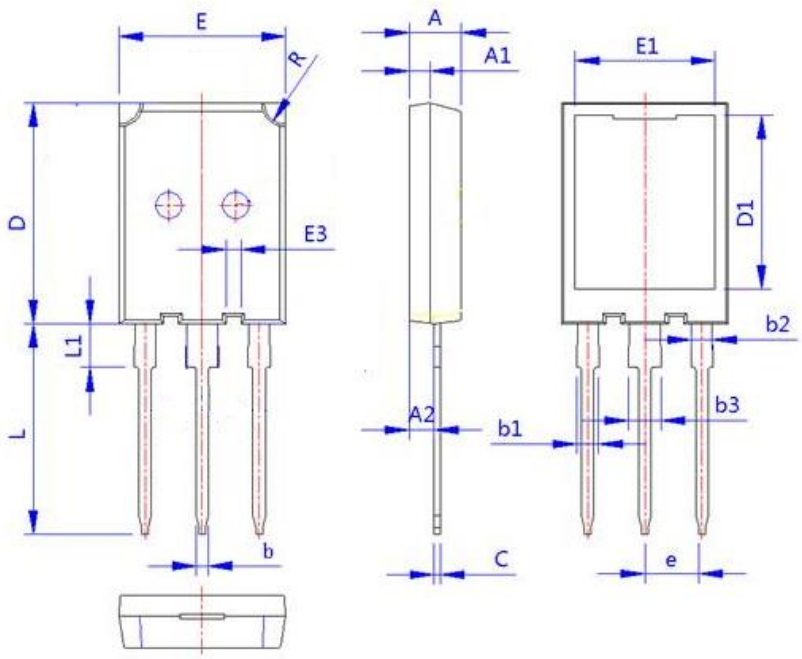


Figure 22. IGBT Transient Thermal Impedance

Package Information



项　目	规范(mm)	
	MIN	MAX
A	4.85	5.15
A1	1.85	2.15
A2	2.15	2.65
b	1.07	1.33
b1	1.90	2.46
b2	1.90	2.16
b3	2.82	3.43
C	0.55	0.70
D	20.75	21.15
D1	16.20	16.90
E	15.50	16.10
E1	13.01	13.51
E3	1.25	1.65
e	5.44(BSC)	
R	1.80	2.20
L	19.60	20.40
L1	4.00	4.48

TO-247Plus　Package

The name and content of poisonous and harmful material in products

Part's Name Limit	Hazardous Substance									
	Pb	Hg	Cd	Cr(VI)	PBB	PBDE	DIBP	DEHP	DBP	BBP
	≤0.1%	≤0.1%	≤0.01%	≤0.1%	≤0.1%	≤0.1%	≤0.1%	≤0.1%	≤0.1%	≤0.1%
Lead Frame	○	○	○	○	○	○	○	○	○	○
Molding	○	○	○	○	○	○	○	○	○	○
Chip	○	○	○	○	○	○	○	○	○	○
Wire Bonding	○	○	○	○	○	○	○	○	○	○
Solder	×	○	○	○	○	○	○	○	○	○
Note	○：Means the hazardous material is under the criterion of 2011/65/EU. ×：Means the hazardous material exceeds the criterion of 2011/65/EU. The plumbum element of solder exist in products presently, but within the allowed range of Eurogroup's RoHS.									

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