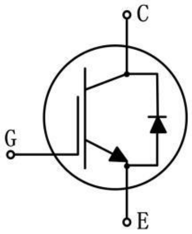
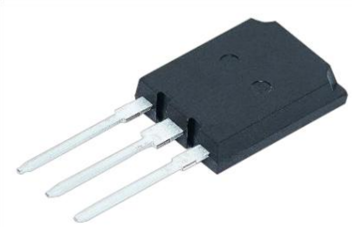
Trench Field-stop IGBT Discrete

Parameter	Value	Unit
V_{CE}	1200	V
I_C	75	A
$V_{CE(sat)}$	2.11	V





TO-247PLUS-3L

Features

- 1200V trench gate/field termination process
- Low switching losses
- Vcesat has a positive temperature coefficient

Applications

- Solar Inverter
- Welding Machine
- Uninterruptible power supplies

Maximum Ratings

Parameter	Symbol	Test condition	Value	Unit
Collector-Emitter voltage	V_{CE}	T_{vj}=25℃	1200	V
Gate to Emitter Voltage	V_{GE}		±20	V
Transient Gate to Emitter Voltage		t_P≤0.5μs,D<0.001	±30	V
collector current	I_C	T_C=25℃ T_C=100℃	150 75	A
Pulsed Collector Current	I_{pulse}	Pulse width limited by max junction temperature	300	A
Diode Forward Current	I_F	T_C=25℃ T_C=100℃	150 75	A
Power dissipation	P_{tot}	T_C=25℃ T_C=100℃	555 280	W
Operating Junction Temperature	T_J		-55 to+175	℃
Storage Temperature Range	T_{stg}		-55 to+150	℃
Thermal resistance junction - ambient	$R_{th(j-a)}$		40	℃/W

Characteristic Values(IGBT)

Parameter	Symbol	Test condition	Value			Unit
			Min.	Typ.	Max.	
Collector-emitter breakdown voltage	$V_{(BR)CES}$	V_{GE}=0V,I_C=0.25mA	1200			V
Collector-Emitter saturation voltage	V_{CEsat}	V_{GE}=15V,I_C=75A T_{vj}=25℃ V_{GE}=15V,I_C=75A T_{vj}=175℃		2.11 3.03	2.60	V
Gate-Emitter threshold voltage	$V_{GE(th)}$	I_C=2.6mA,V_{GE}=V_{CE} T_{vj}=25℃	5.0	5.6	6.5	V
Transconductance	G_{fs}	V_{CE}=20V ,I_C=75A		98.8		S

Gate charge	Q_G	I_C=75A,V_{GE}=15V,V_{CE}=960V T_{vj}=25℃		0.77		μC
Collector-emitter cut-off current	I_{CES}	V_{CE}=1200V,V_{GE}=0V T_{vj}=25℃			450	μA
Gate-emitter leakage current	I_{GES}	V_{CE}=0V,V_{GE}=20 V T_{vj}=25℃			100	nA
Input capacitance	C_{ies}	f=1MHz,V_{CE}=25V,V_{GE}=0V T_{vj}=25℃		7.72		nF
Output capacitance	C_{oes}			0.28		
Reverse transfer capacitance	C_{res}			0.13		
Turn-on delay time	$t_{d\ on}$	I_C=75A,V_{CE}=600V V_{GE}=±15V,R_G=10Ω T_{vj}=25℃ (inductive load)		51		ns
Rise time	t_r			193		
Turn-off delay time	$t_{d\ off}$			180		
Fall time	t_f			98		
Turn-on energy loss per pulse	E_{on}			9.5		mJ
Turn-off energy loss per pulse	E_{off}			2.7		
Total switching energy	E_{tot}			12.2		
Turn-on delay time	t_{don}	I_C=75A,V_{CE}=600V V_{GE}=±15V,R_G=10Ω T_{vj}=175℃ (inductive load)		40		mJ
Rise time	t_r			171		
Turn-off delay time	t_{doff}			202		
Fall time	t_f			119		
Turn-on energy loss per pulse	E_{on}			14.6		
Turn-off energy loss per pulse	E_{off}			3.5		
Total switching energy	E_{tot}			18.1		
IGBT thermal resistance,junction - case	$R_{th(j-C)}$			0.27		K/W

Characteristic Values(Diode)

Parameter	Symbol	Test condition	Value			Unit
			Min.	Typ.	Max.	
Forward voltage	V_F	I_F=75A T_{vj}=25℃ I_F=75A T_{vj}=175℃		1.93 1.67	2.40	V
Peak reverse recovery current	I_{RM}	I_F=75A,-di_F/dt=320A/μs V_R=600V, V_{GE}=-15V T_{vj}=25℃		18		A
Reverse Recovered charge	Q_{rr}			4.21		μC
Reverse Recovery Time	t_{rr}			444		ns
Reverse recovered energy	E_{rec}			1.7		mJ
Peak reverse recovery current	I_{RM}	I_F=75A,-di_F/dt=320A/μs V_R=600V, V_{GE}=-15V T_{vj}=175℃		43		A
Reverse Recovered charge	Q_{rr}			15.36		μC
Reverse Recovery Time	t_{rr}			767		ns
Reverse recovered energy	E_{rec}			6.2		mJ
Diode thermal resistance,junction - case	$R_{th(j-C)}$			0.28		K/W

Typical Characteristics

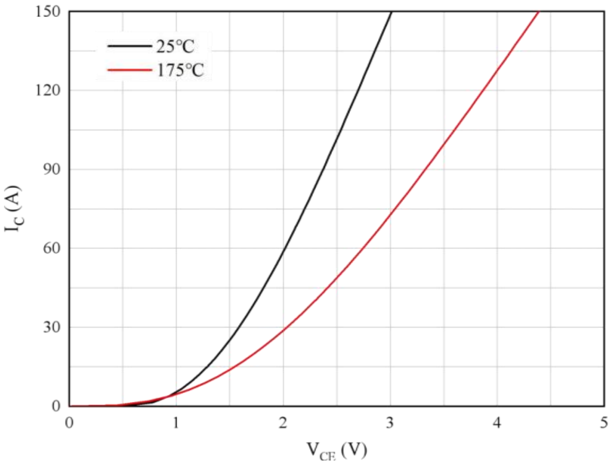


Fig 1.Typical output characteristics(V_{GE}=15V)

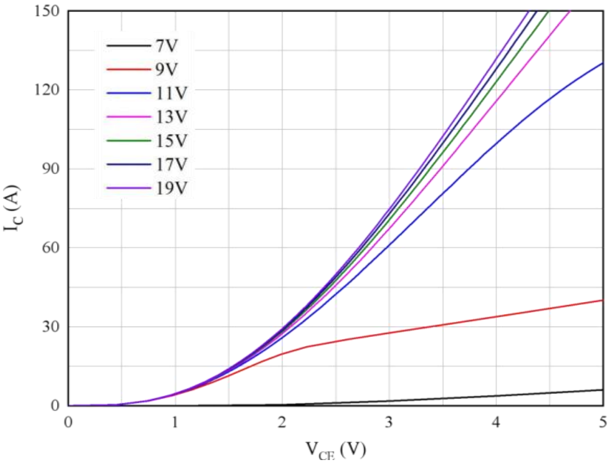


Fig 2.Typical output characteristics(T_{vj}=175℃)

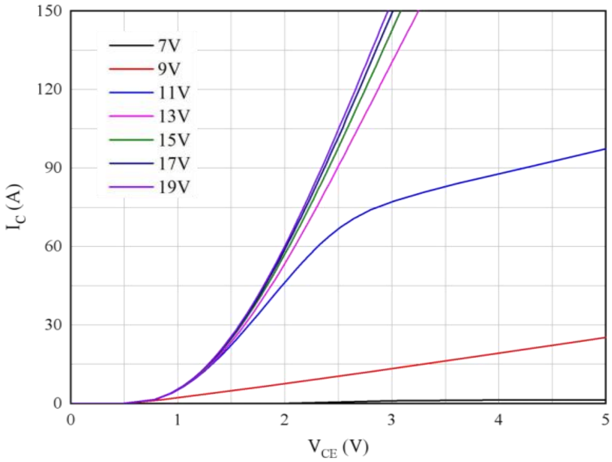


Fig 3.Typical output characteristics(T_{vj}=25℃)

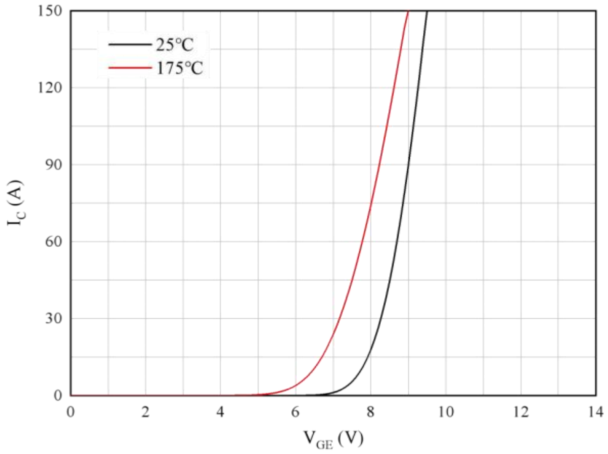


Fig 4.Typical transfer characteristic(V_{CE}=20V)

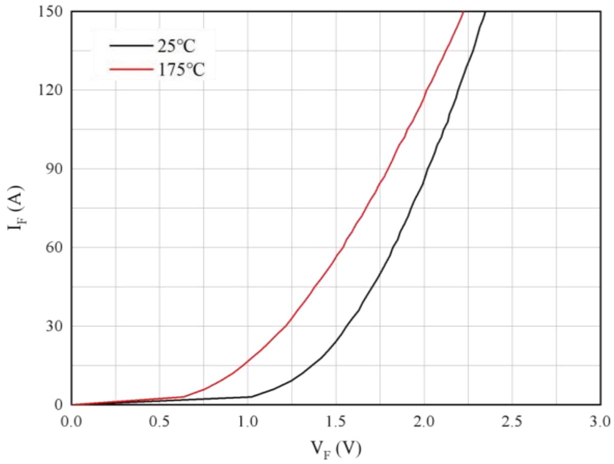


Fig 5.Forward characteristic of Diode

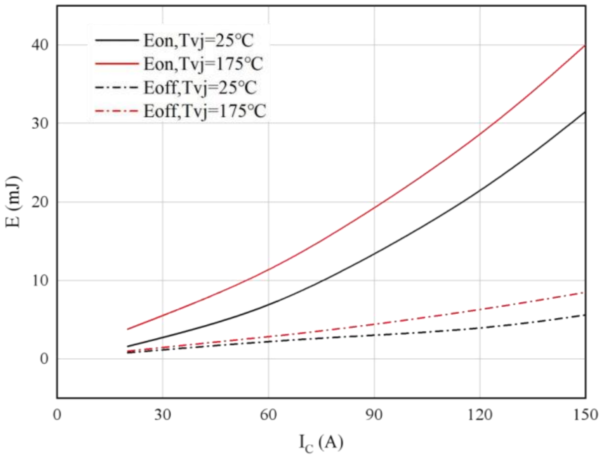


Fig 6.Switching losses of IGBT
V_{GE}=±15V,R_{Gon}=10Ω,R_{goff}=10Ω,V_{CE}=600V

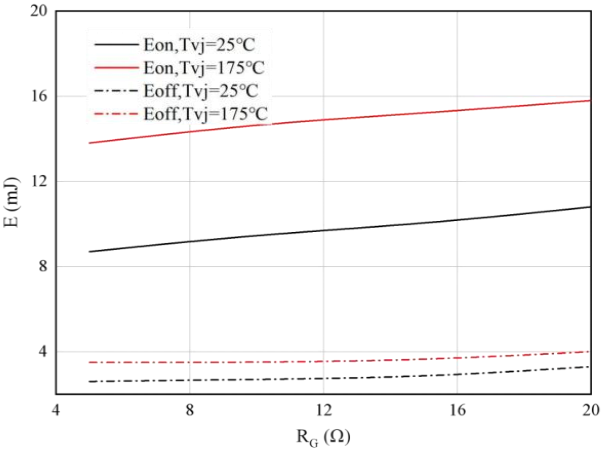


Fig 7.Switching losses of IGBT
V_{GE}=±15V,I_C=75A,V_{CE}=600V

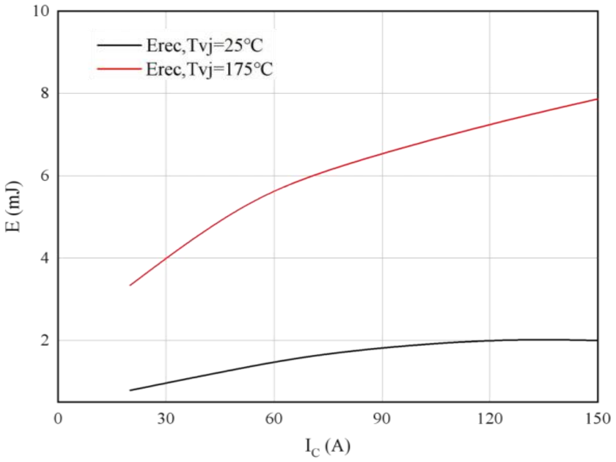


Fig 8.Switching losses of Diode
R_{gon}=10Ω,V_{CE}=600V

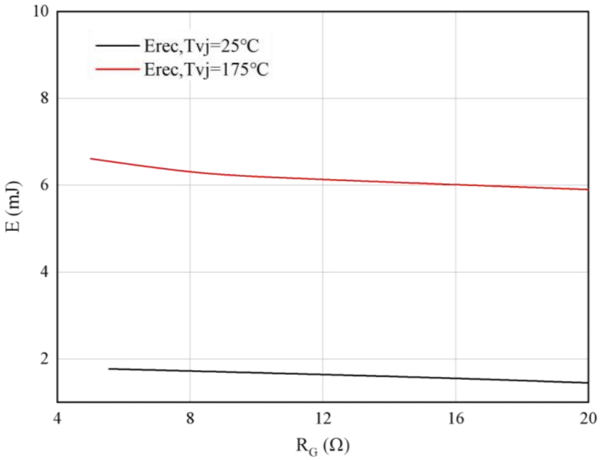


Fig 9.Switching losses of Diode
I_F=75A, V_{CE}=600V

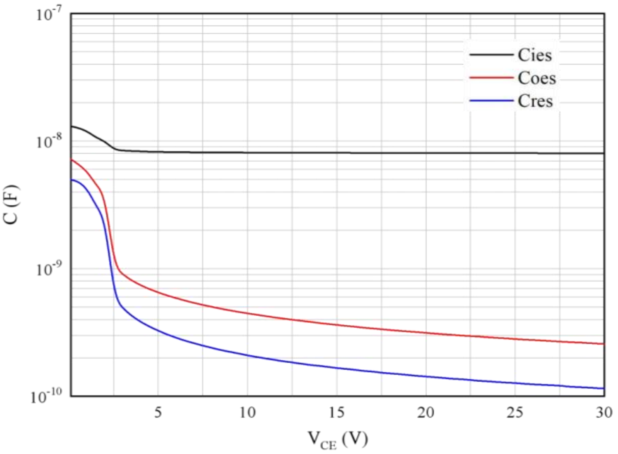


Fig 10.Capacitance characteristic

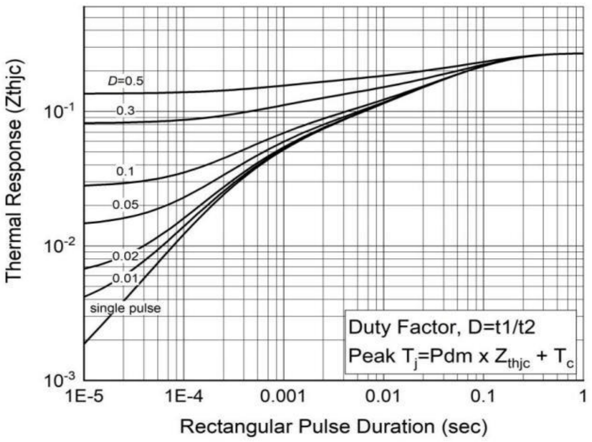


Fig 11.Transient thermal impedance IGBT,
Z_{thJC}=f(t)

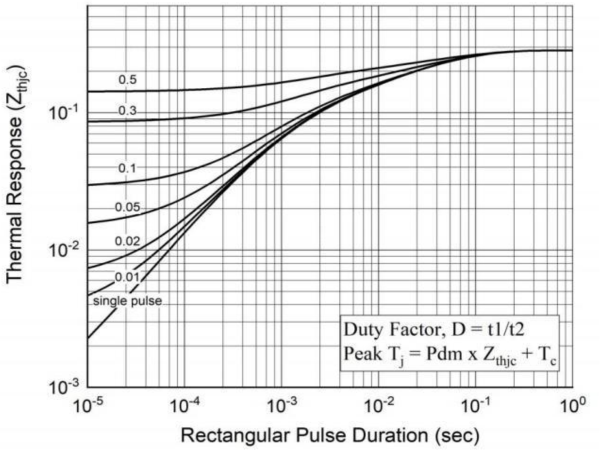
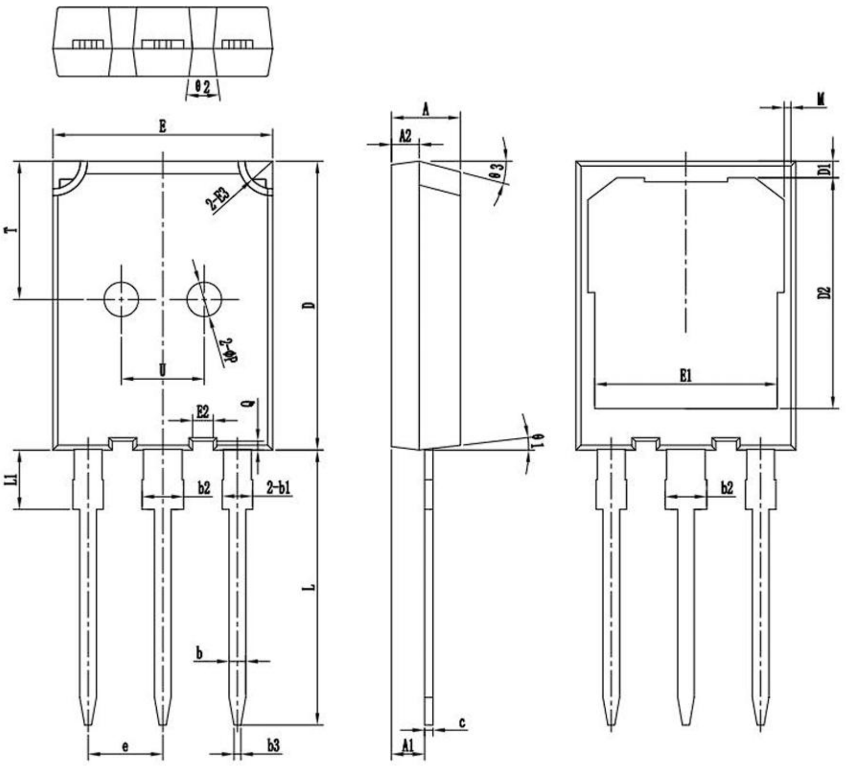


Fig 12.Transient thermal impedance FRD,
Z_{thJC}=f(t)

Package Outline (Unit：mm)

TO-247PLUS-3L



Dim.	Min	Nom	Max
A	4.90	5.00	5.10
A1	2.31	2.41	2.51
A2	1.90	2.00	2.10
b	1.15	1.20	1.25
b1	1.95	2.10	2.25
b2	2.95	3.10	3.25
b3	0.45	0.60	0.75
c	0.55	0.60	0.68
D	20.90	21.00	21.10
D1	1.00	1.20	1.40
D2	15.25	16.55	16.85
D3	0.58	0.68	0.78
E	15.70	15.80	15.90
E1	13.10	13.30	13.50
E2	1.25	1.45	1.65
E3	1.80	2.00	2.20
e	5.40	5.44	5.48
L	19.80	19.92	20.10
L1	-	-	4.30
ΦP	2.30	2.50	2.70
Q	0.50	0.68	0.80
T	9.80	10.00	10.20
U	5.80	6.00	6.20
θ1	5°	7°	9°
θ2	13°	16°	19°
θ3	13°	15°	17°
All Dimensions in millimeter			

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