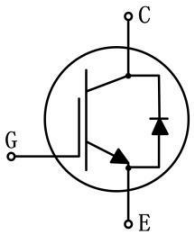
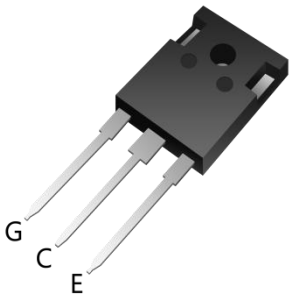
Trench Field-stop IGBT Discrete

Parameter	Value	Unit
V_{CE}	650	V
I_C	75	A
$V_{CE(sat)}$	1.63	V





TO-247-3L

Features

- 650V trench gate/field termination process
- Low switching losses
- Vcesat has a positive temperature coefficient

Applications

- Charging station
- Uninterruptible power supplies
- Inverters

IGBT

Maximum Ratings

Parameter	Symbol	Test condition	Value	Unit
Collector-Emitter Voltage	V_{CES}	T_{vj}=25℃	650	V
Continuous DC collector current	I_C	T_C=25℃, T_{vjmax}=175℃ T_C=100℃, T_{vjmax}=175℃	80 75	A
Pulsed collector current,tp limited by T_{vjmax}	I_{Cpuls}		300	A
Total power dissipation	P_{tot}	T_C =25℃, T_{vjmax}=175℃ T_C =100℃, T_{vjmax}=175℃	440 220	W
Gate emitter Voltage	V_{GE}	t_p≤10μs,D<0.010	±20 ±30	V
Temperature under switching conditions	$T_{vj\ op}$		-40…+175	℃
Storage temperature	T_{stg}		-40…+150	℃

Thermal Characteristics

Parameter	Symbol	Test condition	Value			Unit
			Min.	Typ.	Max.	
Thermal resistance, junction-ambient	$R_{th(j-a)}$				65	℃/W
IGBT thermal resistance, junction - case	$R_{th(j-C)}$			0.34		℃/W
Diode thermal resistance, junction - case	$R_{th(j-C)}$			0.49		℃/W

Characteristic Values

Parameter	Symbol	Test condition	Value			Unit
			Min.	Typ.	Max.	
Collector-emitter breakdown voltage	$V_{(BR)CES}$	V_{GE}=0V,I_C=0.25mA	650			V
Collector-Emitter saturation Voltage	V_{CEsat}	V_{GE}=15V,I_C=75A T_{vj}=25℃ V_{GE}=15V,I_C=75A T_{vj}=125℃ V_{GE}=15V,I_C=75A T_{vj}=150℃		1.63 2.03 2.13	2.10	
Gate-Emitter threshold Voltage	$V_{GE(th)}$	I_C=0.75mA,V_{GE}=V_{CE} T_{vj}=25℃	4.2	5.1	6.0	
Transconductance	G_{fs}	V_{CE}=20V,I_C=75A		91		S
Input capacitance	C_{ies}	f=1MHz,V_{CE}=25V V_{GE}=0V T_{vj}=25℃		7.44		nF
Output capacitance	C_{oes}			0.24		
Reverse transfer capacitance	C_{res}			0.13		
Gate charge	Q_G	I_C=75A,V_{GE}=15V T_{vj}=25℃ V_{CE}=520V		0.74		μC
Collector-emitter cut-off current	I_{CES}	V_{CE}=650V T_{vj}=25℃ V_{CE}=0V T_{vj}=175℃		2400	50	uA
Gate-emitter leakage current	I_{GES}	V_{CE}=0V,V_{GE}=20V T_{vj}=25℃			100	nA
Turn-on delay time	$t_{d\ on}$	I_C=75A,V_{CE}=400V T_{vj}=25℃ V_{GE}=±15V,R_G=8Ω T_{vj}=125℃ (inductive load) T_{vj}=150℃		34 37 40		ns
Rise time	t_r	I_C=75A,V_{CE}=400V T_{vj}=25℃ V_{GE}=±15V,R_G=8Ω T_{vj}=125℃ (inductive load) T_{vj}=150℃		153 157 163		
Turn-off delay time	$t_{d\ off}$	I_C=75A,V_{CE}=400V T_{vj}=25℃ V_{GE}=±15V,R_G=8Ω T_{vj}=125℃ (inductive load) T_{vj}=150℃		183 198 208		
Fall time	t_f	I_C=75A,V_{CE}=400V T_{vj}=25℃ V_{GE}=±15V,R_G=8Ω T_{vj}=125℃ (inductive load) T_{vj}=150℃		67 68 73		
Turn-on energy loss per pulse	E_{on}	I_C=75A,V_{CE}=400V T_{vj}=25℃ V_{GE}=±15V,R_G=8Ω T_{vj}=125℃ (inductive load) T_{vj}=150℃		4.28 4.35 4.57		mJ
Turn-off energy loss per pulse	E_{off}	I_C=75A,V_{CE}=400V T_{vj}=25℃ V_{GE}=±15V,R_G=8Ω T_{vj}=125℃ (inductive load) T_{vj}=150℃		1.08 1.12 1.20		
Total switching energy	E_{ts}	I_C=75A,V_{CE}=400V T_{vj}=25℃ V_{GE}=±15V,R_G=8Ω T_{vj}=125℃ (inductive load) T_{vj}=150℃		5.36 5.47 5.77		

Diode

Maximum Ratings

Parameter	Symbol	Test condition	Value	Unit
Repetitive peak reverse Voltage	V_{RRM}	T_{vj}=25℃	650	V
Continuous DC forward current	I_F	T_C=25℃, $T_{vj\ max}$=175℃ T_C=100℃, $T_{vj\ max}$=175℃	80 75	A
Diode pulsed current,tp limited by $T_{vj\ max}$	I_{Fpuls}		300	A

Characteristic Values

Parameter	Symbol	Test condition		Value			Unit
				Min.	Typ.	Max.	
Forward Voltage	V_F	I_F=75A,V_{GE}=0V I_F=75A,V_{GE}=0V I_F=75A,V_{GE}=0V	T_{vj}=25℃ T_{vj}=125℃ T_{vj}=150℃		1.48 1.61 1.62	2.0	V
Peak reverse recovery current	I_{RM}	I_F=75A, -di_F/dt=460A/μs (T_{vj}=150℃) V_R=400V,V_{GE}=-15V	T_{vj}=25℃ T_{vj}=125℃ T_{vj}=150℃		17 23 25		A
Reverse Recovered charge	Q_{rr}	I_F=75A, -di_F/dt=460A/μs (T_{vj}=150℃) V_R=400V,V_{GE}=-15V	T_{vj}=25℃ T_{vj}=125℃ T_{vj}=150℃		2.43 3.37 3.72		μC
Reverse Recovery Time	t_{rr}	I_F=75A, -di_F/dt=460A/μs (T_{vj}=150℃) V_R=400V,V_{GE}=-15V	T_{vj}=25℃ T_{vj}=125℃ T_{vj}=150℃		200 211 227		ns
Reverse recovered energy	E_{rec}	I_F=75A, -di_F/dt=460A/μs (T_{vj}=150℃) V_R=400V,V_{GE}=-15V	T_{vj}=25℃ T_{vj}=125℃ T_{vj}=150℃		0.68 0.91 0.99		mJ

Typical Characteristics

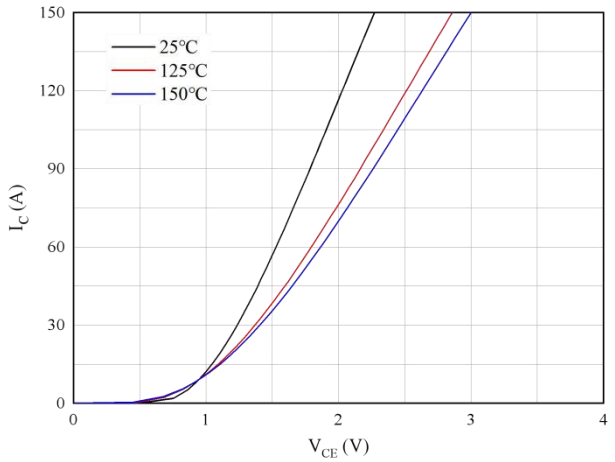


Fig 1. Typical output characteristics (V_{GE}= 15V)

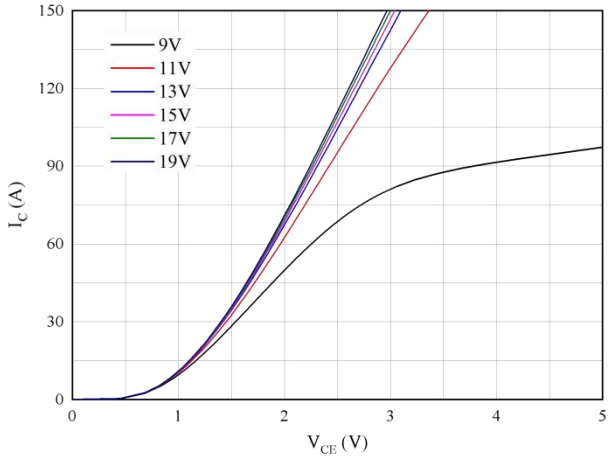


Fig 2. Typical output characteristics (T_{vj}= 150℃)

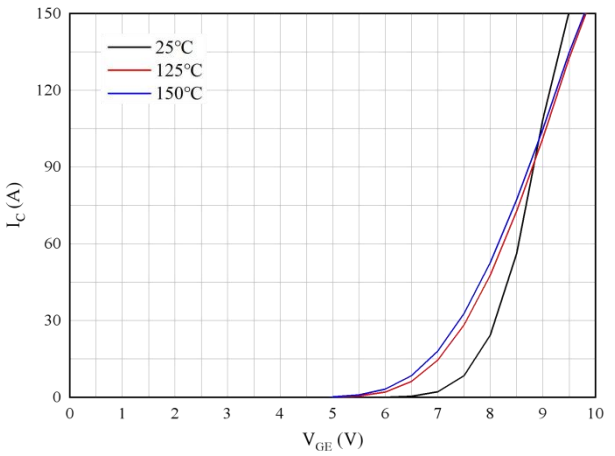


Fig 3. Typical transfer characteristic(V_{CE}=20V)

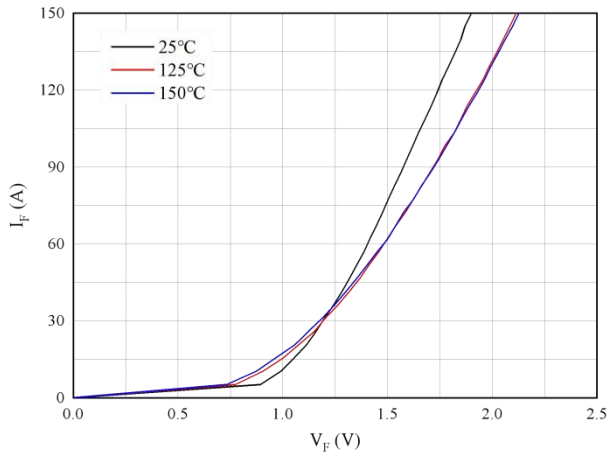


Fig 4. Forward characteristic of Diode

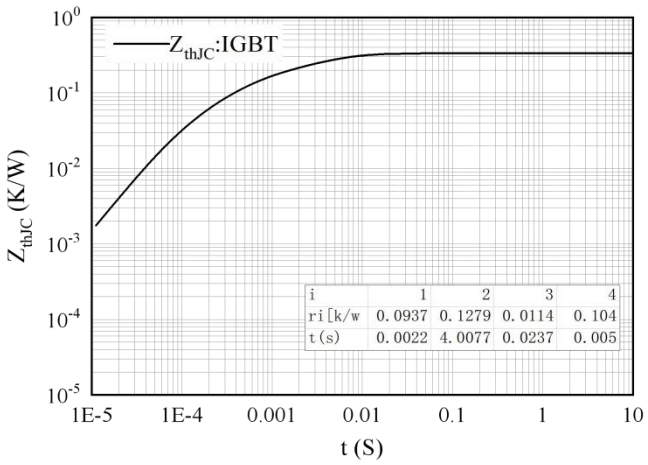


Fig 5.Transient thermal impedance IGBT, $Z_{thJC}=f(t)$

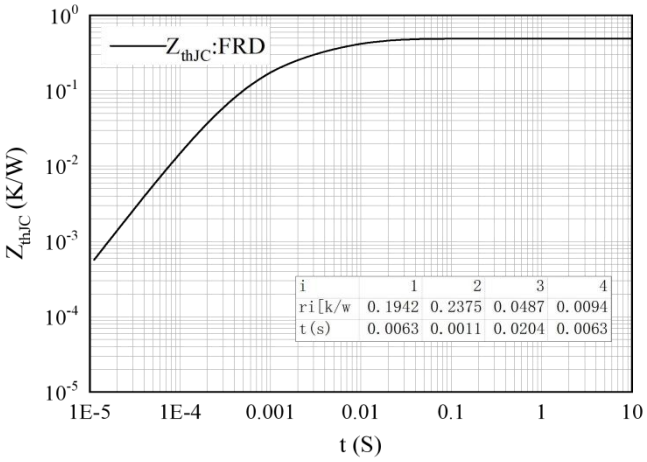


Fig 6.Transient thermal impedance FRD, $Z_{thJC}=f(t)$

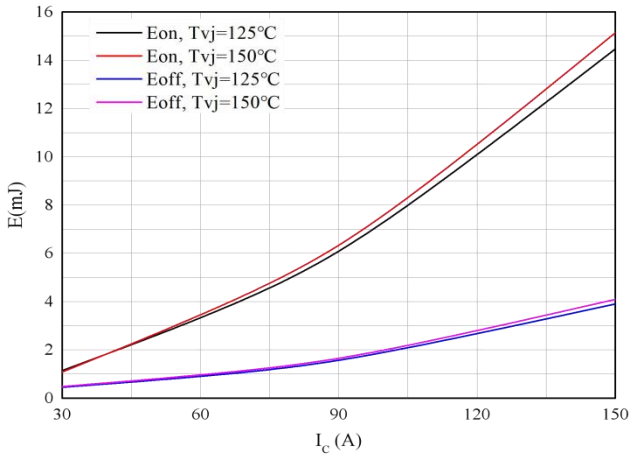


Fig 7.Switching losses of IGBT
V_{GE}=±15V, R_{Gon}=8Ω, R_{goff}=8Ω,V_{CE}=400V

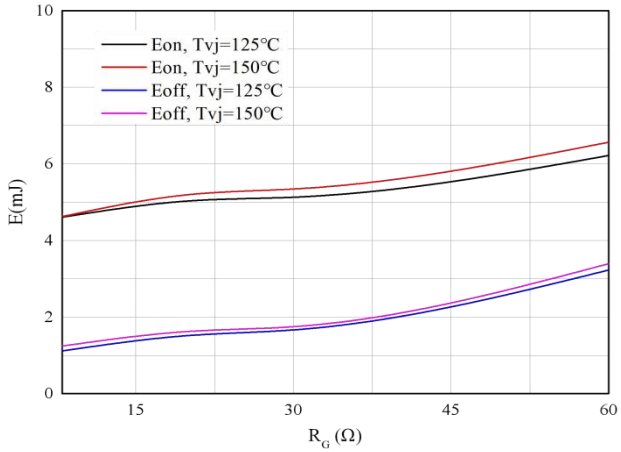


Fig 8.Switching losses of IGBT
V_{GE}=±15V, I_C=75A,V_{CE}=400V

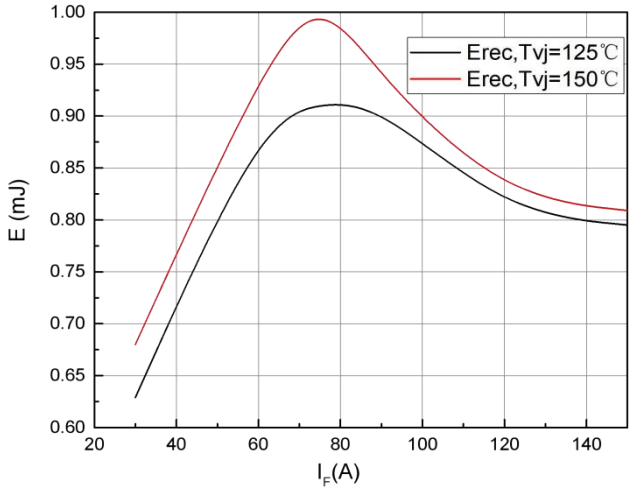


Fig 9.Switching losses of Diode
R_{gon}=8Ω,V_{CE}=400V

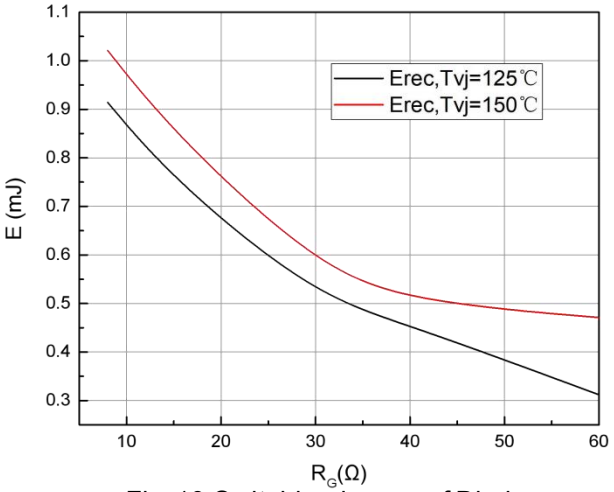


Fig 10.Switching losses of Diode
I_F=75A,V_{CE}=400V

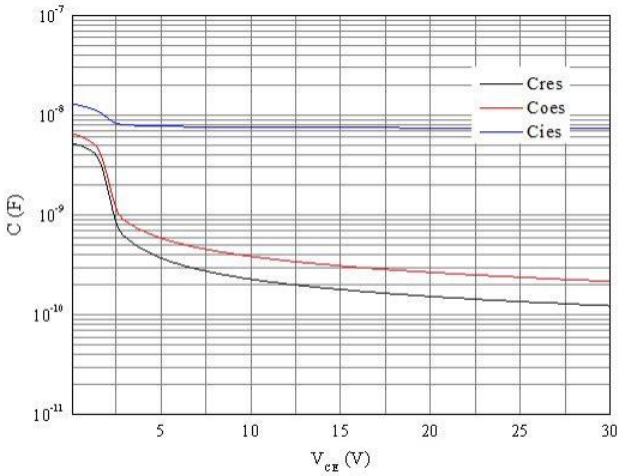
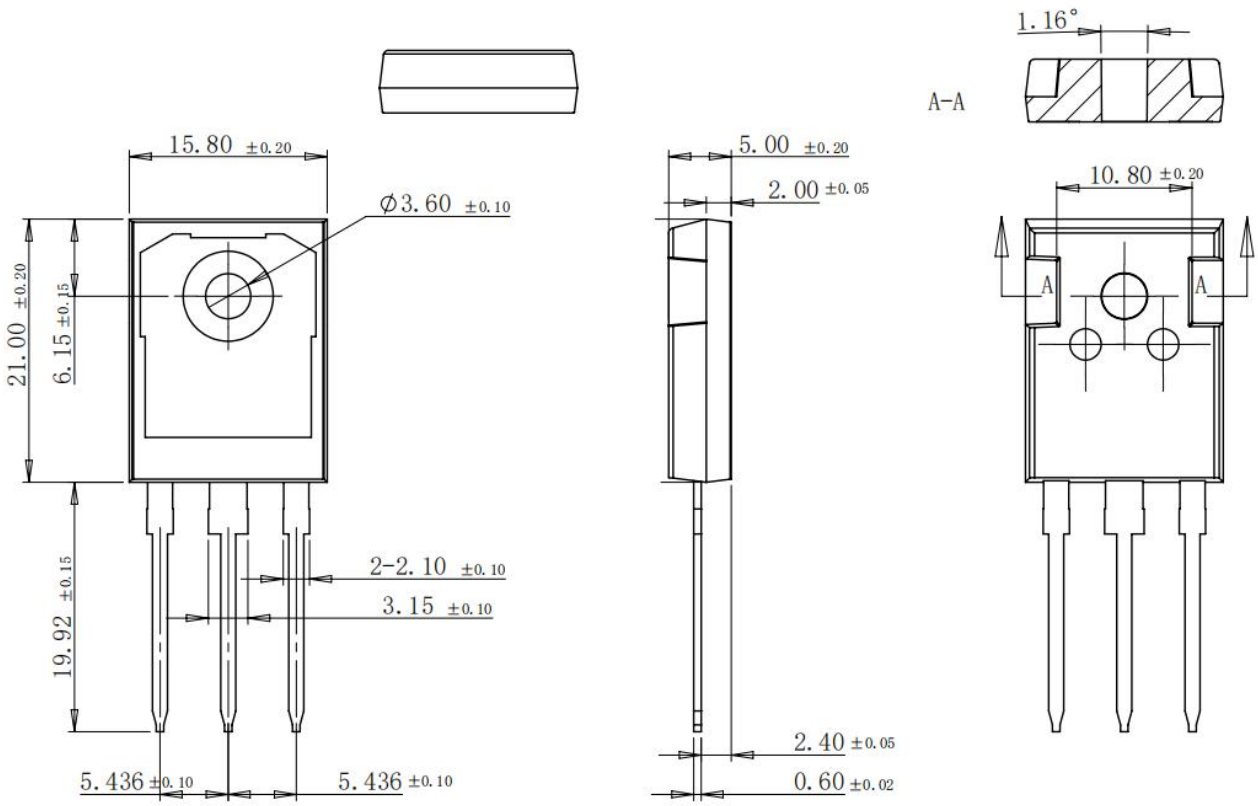


Fig 11. Capacitance characteristic

Package Outline (Unit：mm)

TO-247-3L



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