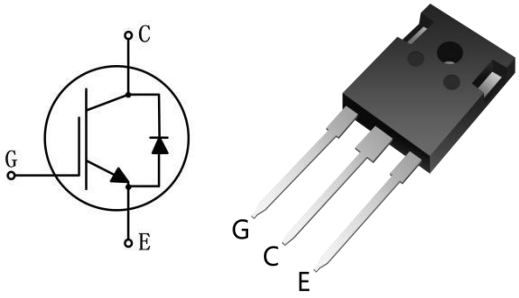
Trench Field-stop IGBT Discrete

Parameter	Value	Unit
V_{CE}	650	V
I_C	75	A
$V_{CE(sat)}$	1.56	V



TO-247-3L

Features

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

Applications

- Charging pile
- Uninterruptible power supplies
- Solar converters

IGBT

Maximum Ratings

Parameter	Symbol	Test condition	Value	Unit
Collector-Emitter voltage	V_{CES}	T_{vj}=25℃	650	V
Continuous DC collector current	$I_{C\ nom}$	T_C=100℃,$T_{vj\ max}$=175℃	75	A
Repetitive peak collector current	I_{CRM}	t_P=1ms	300	A
Gate emitter voltage	V_{GE}	t_p≤10μs,D<0.010	±20 ±30	V
Power dissipation	P_{tot}	T_C=25℃ T_C=100℃	520 260	W
Temperature under switching conditions	$T_{vj\ op}$		-40…+175	℃
Storage temperature	T_{stg}		-40…+150	℃
Soldering temperature			260	℃
Mounting torque	M		0.6	Nm

Thermal Characteristics

Parameter	Symbol	Test condition	Value	Unit
IGBT thermal resistance, junction - case	$R_{th(j-C)}$		0.29	℃/W
Diode thermal resistance, junction - case	$R_{th(j-C)}$		0.35	℃/W

Characteristic Values

Parameter	Symbol	Test condition		Value			Unit
				Min.	Typ.	Max.	
Collector-Emitter saturation Voltage	V_{CEsat}	V_{GE}=15V,I_C=75A V_{GE}=15V,I_C=75A V_{GE}=15V,I_C=75A	T_{vj}=25℃ T_{vj}=150℃ T_{vj}=175℃		1.56 1.86 1.90	2.00	V
Gate-Emitter threshold Voltage	$V_{GE(th)}$	I_C=0.75mA,V_{GE}=V_{CE}	T_{vj}=25℃	3.8	4.4	5.0	
Transconductance	G_{fs}	V_{CE}=20V,I_C=75A			58		S
Input capacitance	C_{ies}	f=100kHz,V_{CE}=25V V_{GE}=0V	T_{vj}=25℃		4472		pF
Output capacitance	C_{oes}				171		
Reverse transfer capacitance	C_{res}				20		
Gate charge	Q_G	I_C=75A,V_{GE}=15V V_{CE}=520V	T_{vj}=25℃		273		nC
Collector-emitter cut-off current	I_{CES}	V_{CE}=650V,V_{GE}=0V	T_{vj}=25℃			1	mA
Gate-emitter leakage current	I_{GES}	V_{CE}=0V,V_{GE}=20V	T_{vj}=25℃			200	nA
Turn-on delay time	$t_{d\ on}$	I_C=75A,V_{CE}=300V V_{GE}=±15V,R_G=8Ω (inductive load)	T_{vj}=25℃ T_{vj}=175℃		25 27		ns
Rise time	t_r	I_C=75A,V_{CE}=300V V_{GE}=±15V,R_G=8Ω (inductive load)	T_{vj}=25℃ T_{vj}=175℃		130 122		
Turn-off delay time	$t_{d\ off}$	I_C=75A,V_{CE}=300V V_{GE}=±15V,R_G=8Ω (inductive load)	T_{vj}=25℃ T_{vj}=175℃		82 112		
Fall time	t_f	I_C=75A,V_{CE}=300V V_{GE}=±15V,R_G=8Ω (inductive load)	T_{vj}=25℃ T_{vj}=175℃		57 87		
Turn-on energy loss per pulse	E_{on}	I_C=75A,V_{CE}=300V V_{GE}=±15V,R_G=8Ω di/dt=500A/us(T_{vj}=175℃) (inductive load)	T_{vj}=25℃ T_{vj}=175℃		2.68 3.24		mJ
Turn-off energy loss per pulse	E_{off}	I_C=75A,V_{CE}=300V V_{GE}=±15V,R_G=8Ω dv/dt=7800V/us(T_{vj}=175℃) (inductive load)	T_{vj}=25℃ T_{vj}=175℃		1.03 1.51		

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= 100℃,$T_{vj\ max}$=175℃	75	A
Repetitive peak forward current	I_{FRM}		300	A

Characteristics 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}=150℃ T_{vj}=175℃		1.55 1.69 1.70	2.0	V

Peak reverse recovery current	I_{RM}	I_F=75A, $-di_F/dt$=500A/μs (T_{vj}=175℃) V_R=300V,V_{GE}=-15V	T_{vj}=25℃ T_{vj}=175℃		16 26		A
Reverse Recovered charge	Q_{rr}	I_F=75A, $-di_F/dt$=500A/μs (T_{vj}=175℃) V_R=300V,V_{GE}=-15V	T_{vj}=25℃ T_{vj}=175℃		1.28 3.18		μC
Reverse Recovery Time	t_{rr}	I_F=75A, $-di_F/dt$=500A/μs (T_{vj}=175℃) V_R=300V,V_{GE}=-15V	T_{vj}=25℃ T_{vj}=175℃		156 226		ns
Reverse recovered energy	E_{rec}	I_F=75A, $-di_F/dt$=500A/μs (T_{vj}=175℃) V_R=300V,V_{GE}=-15V	T_{vj}=25℃ T_{vj}=175℃		0.19 0.54		mJ

Typical Characteristics

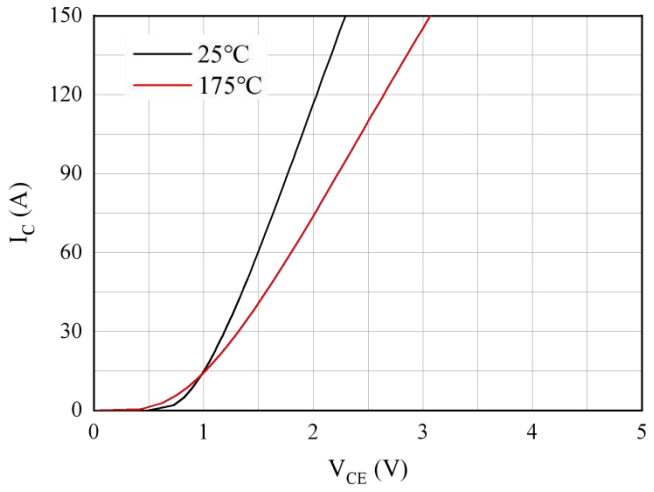


Fig 1. Typical output characteristics (V_{GE}= 15V)

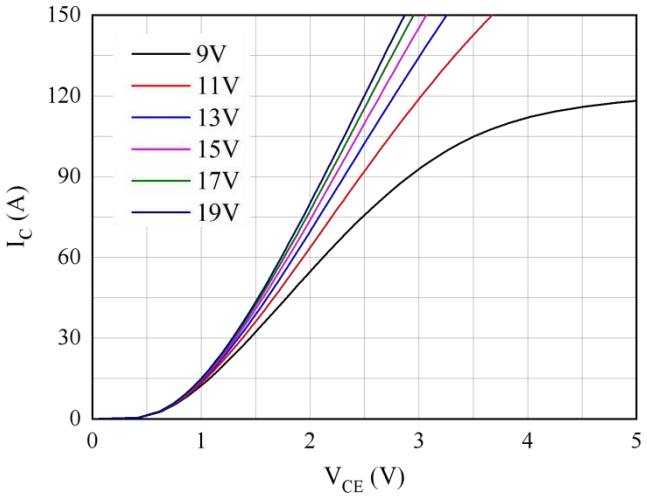


Fig 2.Typical output characteristics (T_{vj}=175℃)

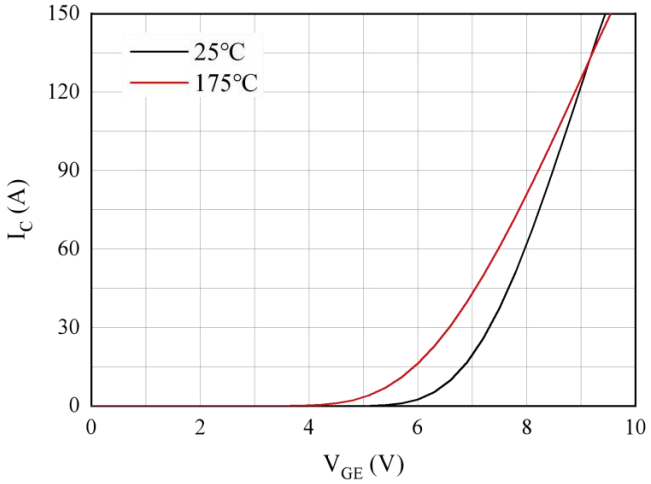


Fig 3.Typical transfer characteristic(V_{CE}=20V)

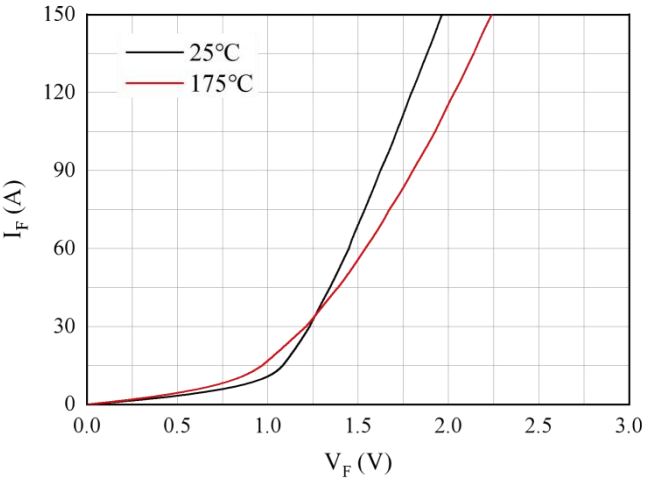


Fig 4.Forward characteristic of Diode

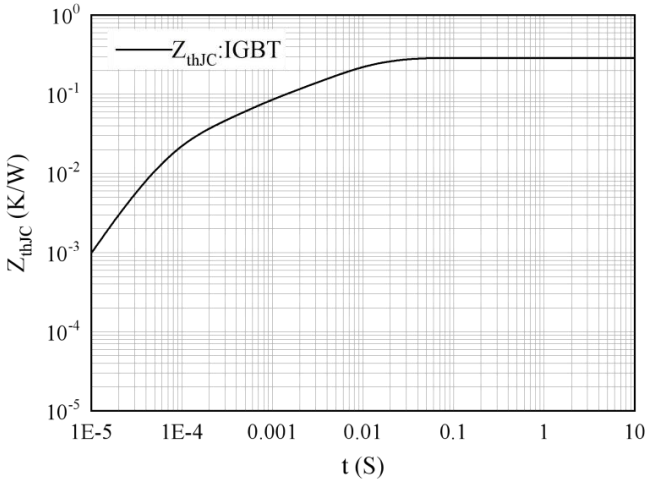


Fig 5.Transient thermal impedance IGBT, $Z_{thJC}=f(t)$

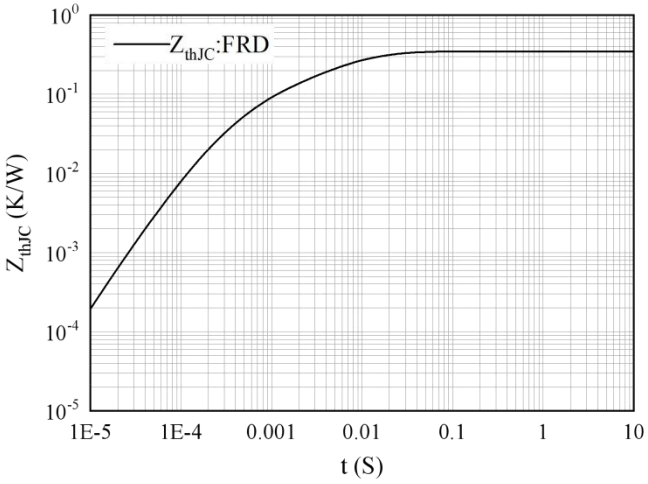


Fig 6.Transient thermal impedance FRD, $Z_{thJC}=f(t)$

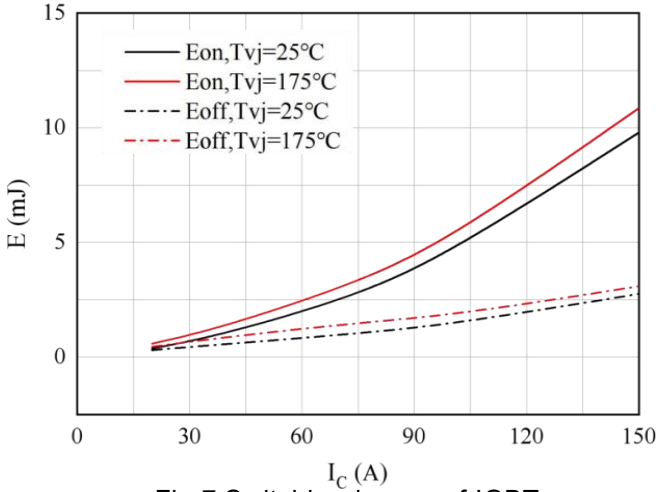


Fig 7.Switching losses of IGBT
V_{GE}=±15V, R_{Gon}=8Ω, R_{goff}=8Ω,V_{CE}=300V

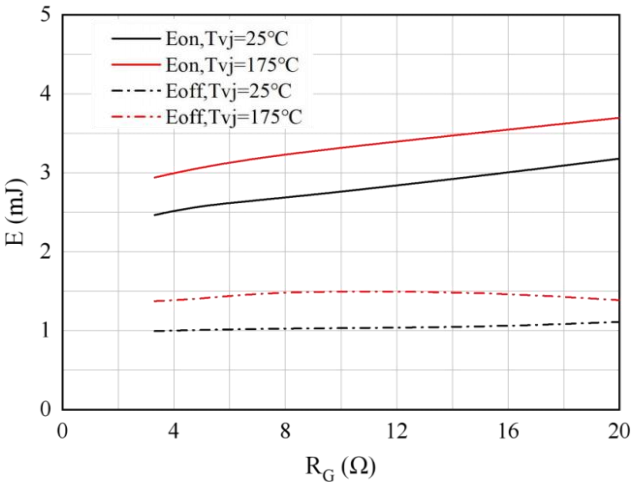


Fig 8.Switching losses of IGBT
V_{GE}=±15V, I_C=75A,V_{CE}=300V

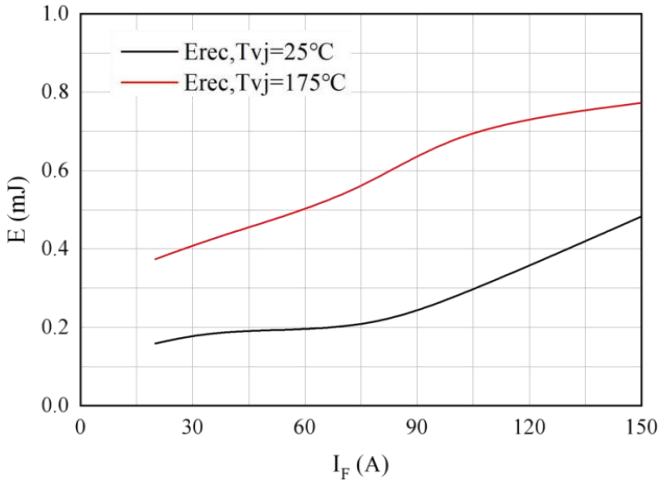


Fig 9.Switching losses of Diode
R_{gon}=8Ω,V_{CE}=300V

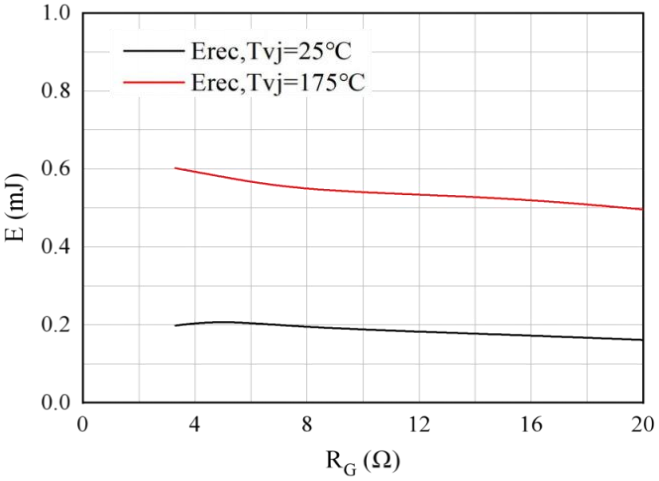


Fig 10.Switching losses of Diode
I_F=75A,V_{CE}=300V

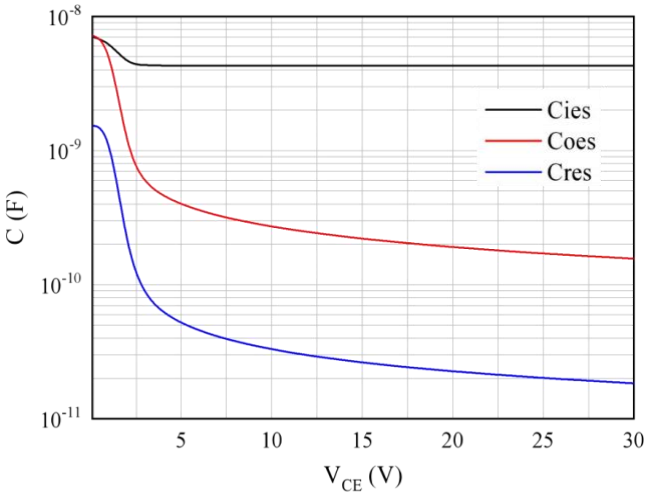
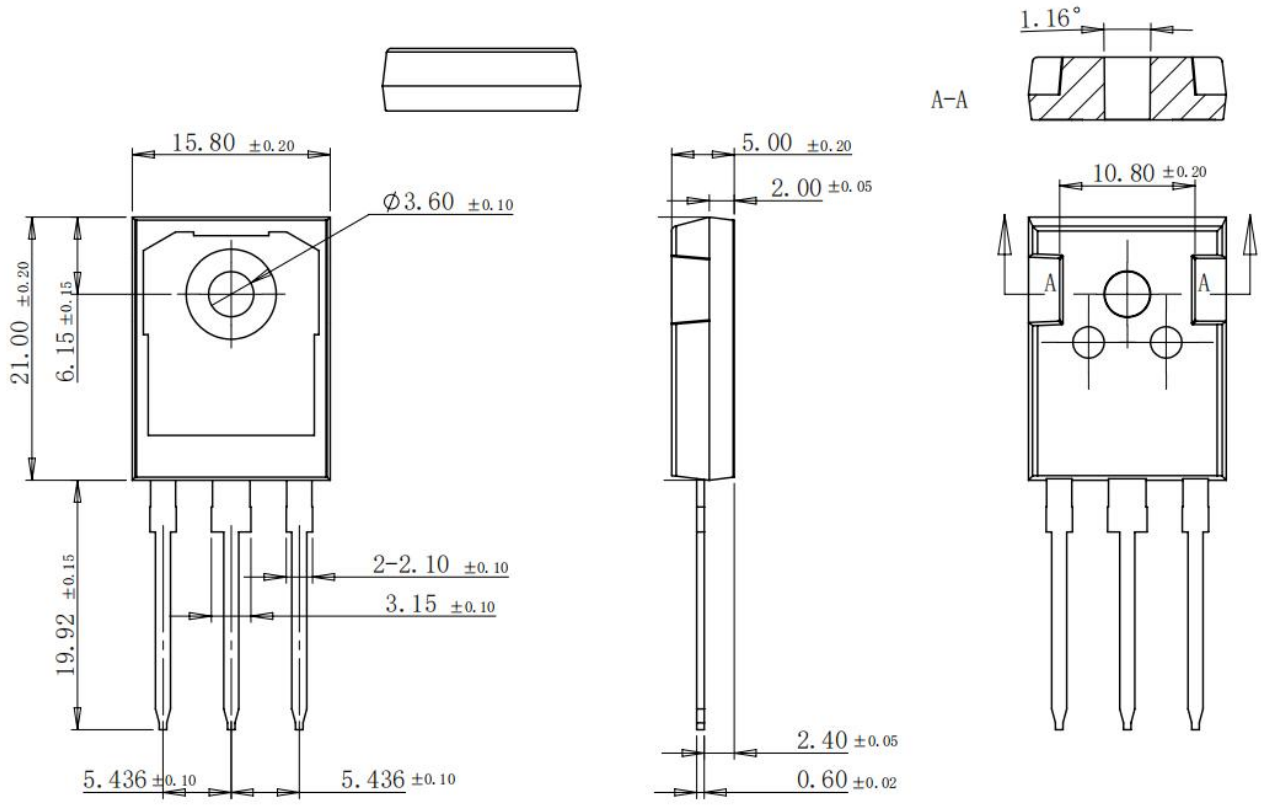


Fig 11. Capacitance characteristic

Package Outlines (Unit：mm)

TO-247-3L



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