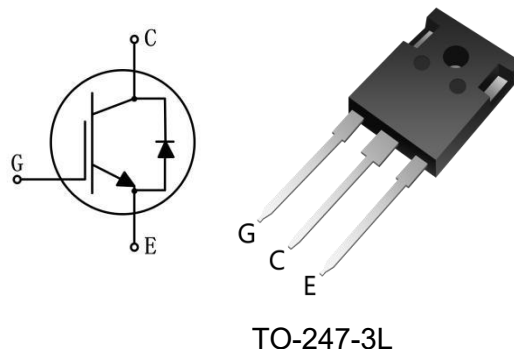


Trench Field-stop IGBT Discrete

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



Features

- 650V trench gate/field termination process
- Low switching losses
- V_{cesat} 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}	$T_{vj}=25^{\circ}\text{C}$	650	V
Continuous DC collector current	$I_{C\ nom}$	$T_C=100^{\circ}\text{C}, T_{vj\ max}=175^{\circ}\text{C}$	75	A
Repetitive peak collector current	I_{CRM}	$t_p=1\text{ms}$	300	A
Gate emitter voltage	V_{GE}	$t_p \leq 10\mu\text{s}, D < 0.010$	± 20 ± 30	V
Power dissipation	P_{tot}	$T_C=25^{\circ}\text{C}$ $T_C=100^{\circ}\text{C}$	520 260	W
Temperature under switching conditions	$T_{vj\ op}$		-40...+175	$^{\circ}\text{C}$
Storage temperature	T_{stg}		-40...+150	$^{\circ}\text{C}$
Soldering temperature			260	$^{\circ}\text{C}$
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	$^{\circ}\text{C/W}$
Diode thermal resistance, junction - case	$R_{th(j-C)}$		0.35	$^{\circ}\text{C/W}$

Characteristic Values

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

Diode
Maximum Ratings

Parameter	Symbol	Test condition	Value	Unit
Repetitive peak reverse Voltage	V_{RRM}	$T_{vj}=25^{\circ}C$	650	V
Continuous DC forward current	I_F	$T_C=100^{\circ}C, T_{vj max}=175^{\circ}C$	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	$I_F=75A, V_{GE}=0V$ $T_{vj}=25^{\circ}C$ $I_F=75A, V_{GE}=0V$ $T_{vj}=150^{\circ}C$ $I_F=75A, V_{GE}=0V$ $T_{vj}=175^{\circ}C$		1.55 1.69 1.70	2.0	V

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

Typical Characteristics

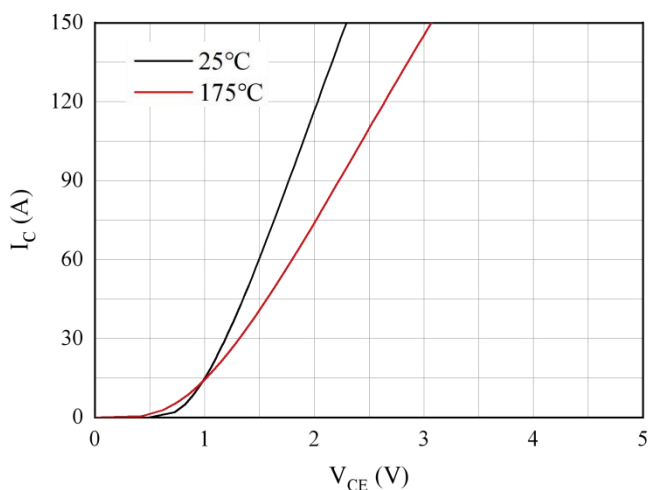


Fig 1. Typical output characteristics ($V_{GE}=15V$)

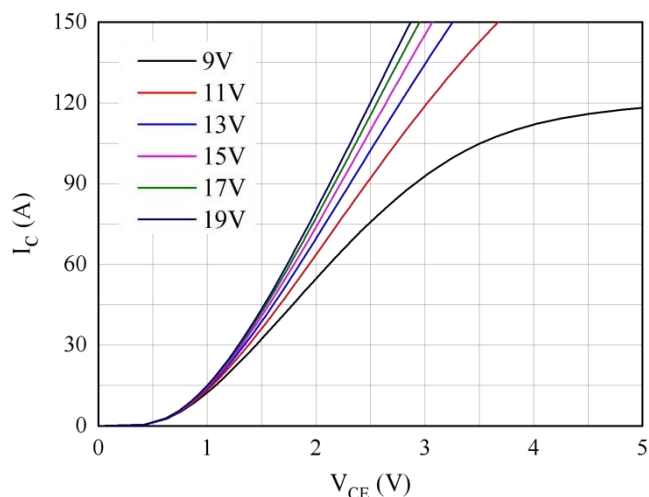


Fig 2. Typical output characteristics ($T_{vj}=175^\circ C$)

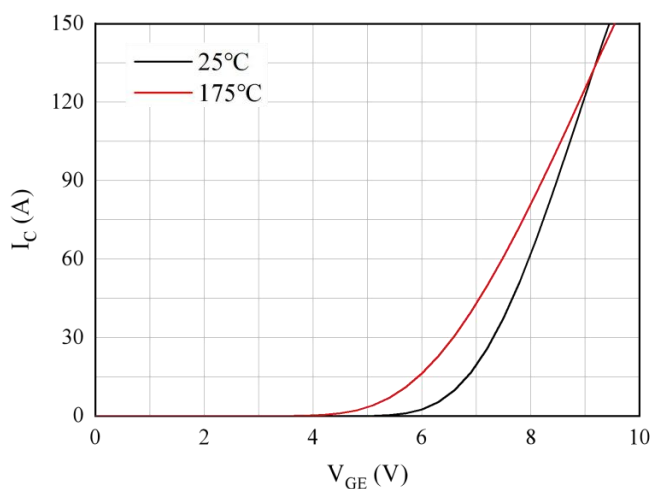


Fig 3. Typical transfer characteristic ($V_{CE}=20V$)

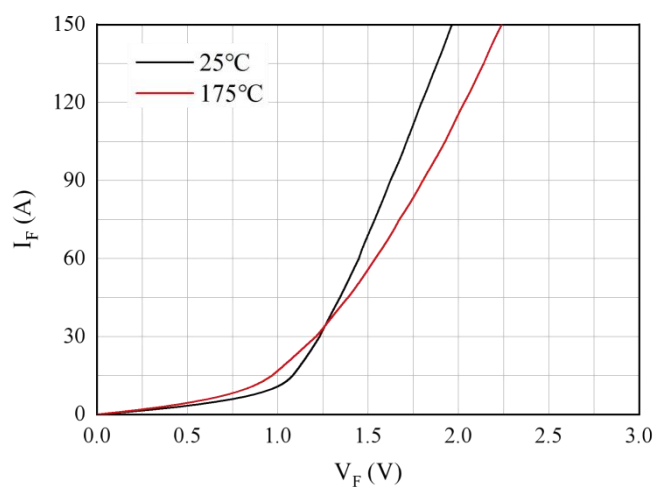


Fig 4. Forward characteristic of Diode

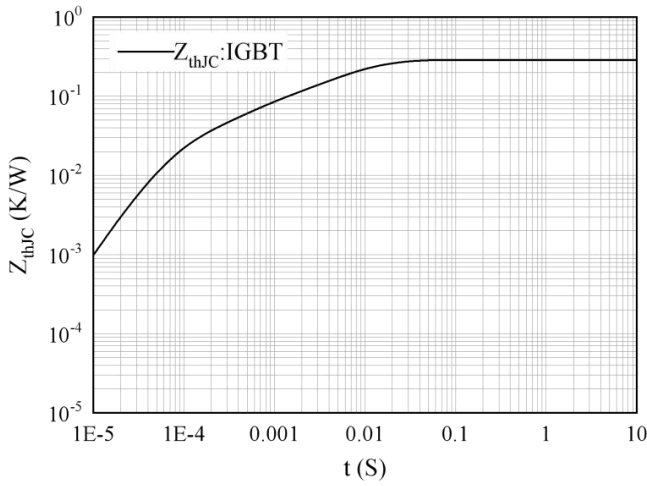


Fig 5. Transient thermal impedance IGBT,
 $Z_{thJC}=f(t)$

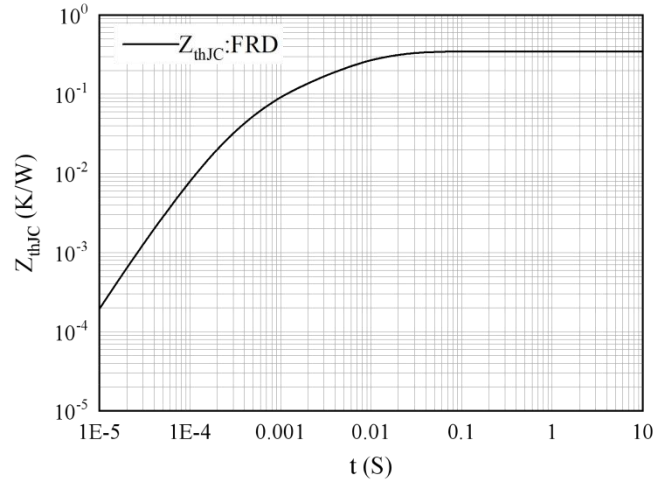


Fig 6. Transient thermal impedance FRD,
 $Z_{thJC}=f(t)$

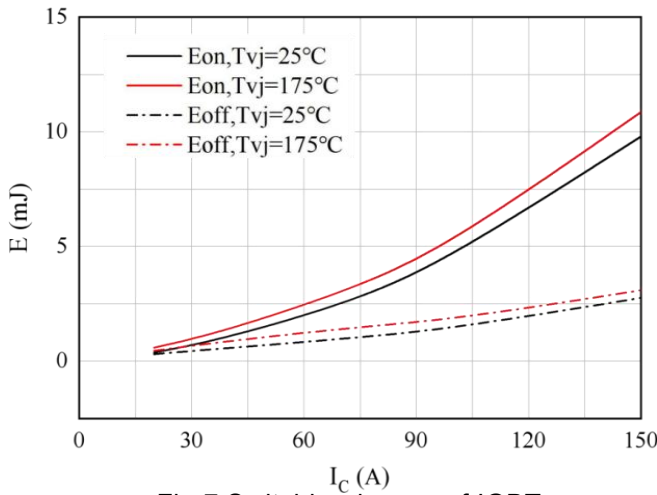


Fig 7. Switching losses of IGBT
 $V_{GE}=\pm 15V$, $R_{Gon}=8\Omega$, $R_{Goff}=8\Omega$, $V_{CE}=300V$

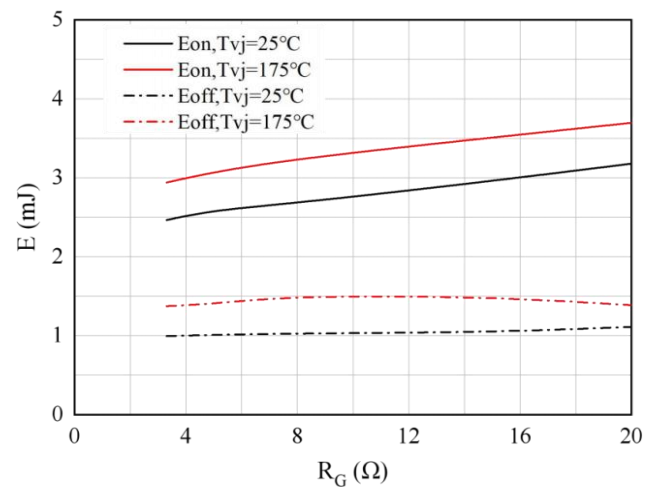


Fig 8. Switching losses of IGBT
 $V_{GE}=\pm 15V$, $I_C=75A$, $V_{CE}=300V$

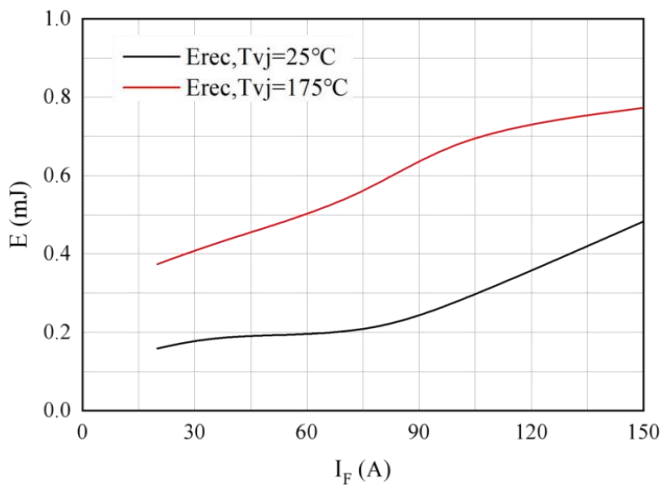


Fig 9. Switching losses of Diode
 $R_{gon}=8\Omega$, $V_{CE}=300V$

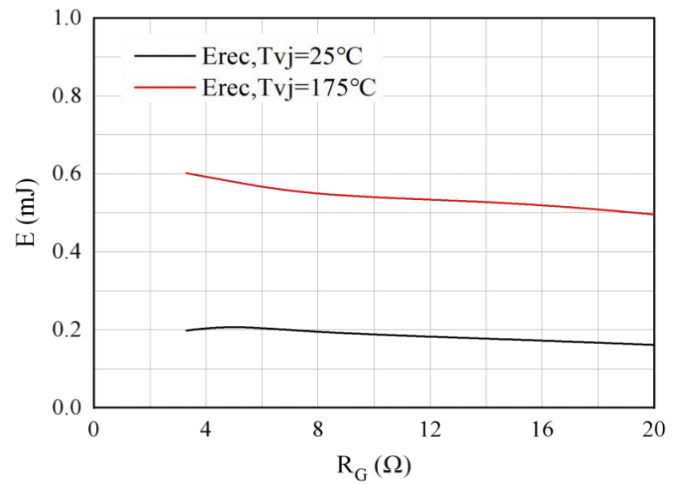


Fig 10. Switching losses of Diode
 $I_F=75A$, $V_{CE}=300V$

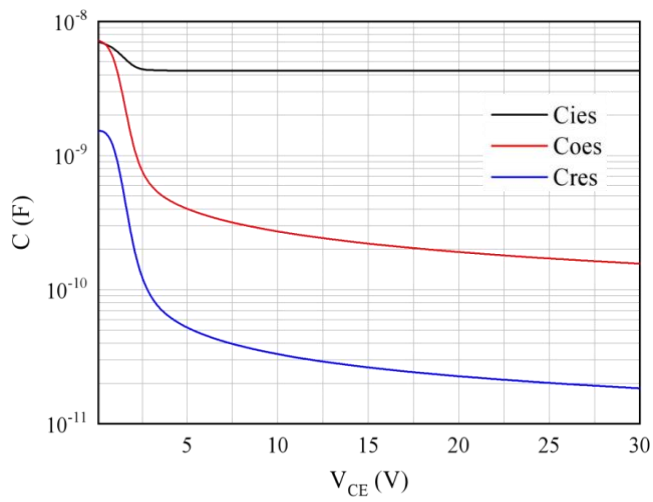
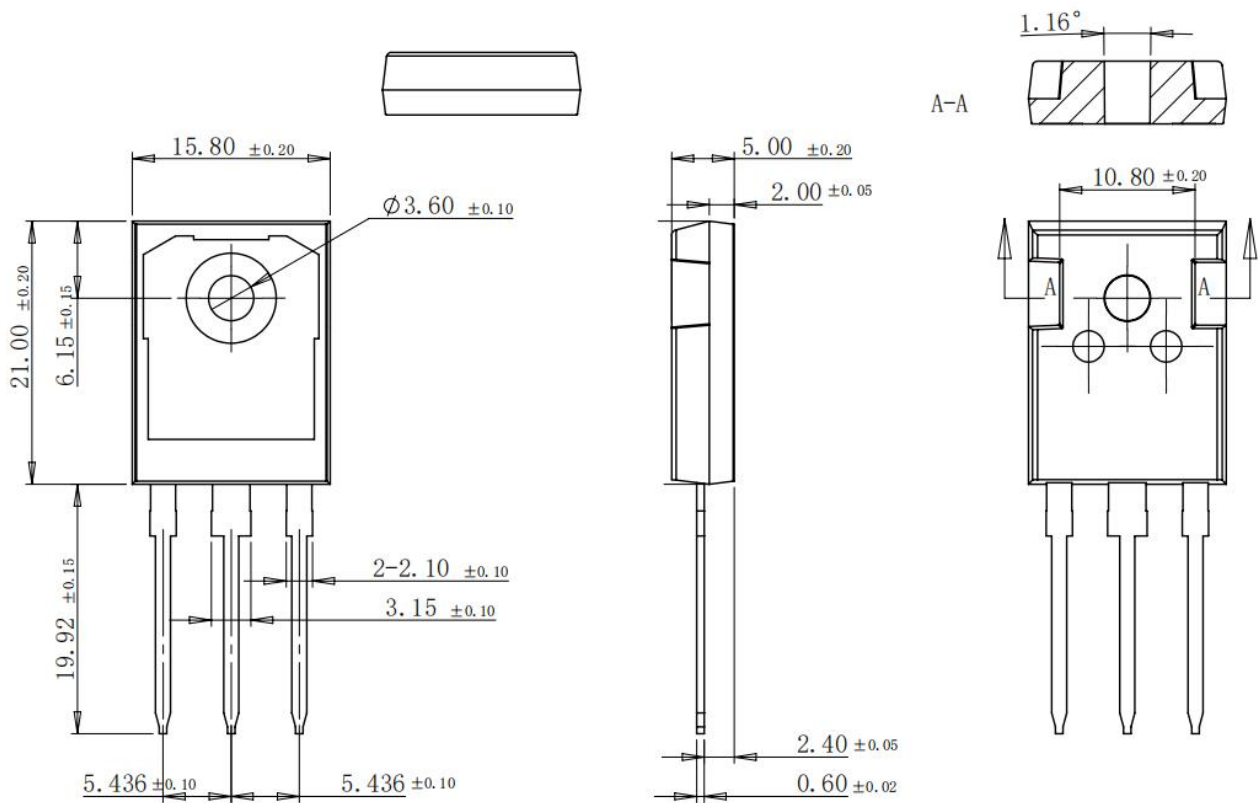


Fig 11. Capacitance characteristic

Package Outlines (Unit: mm)

TO-247-3L



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