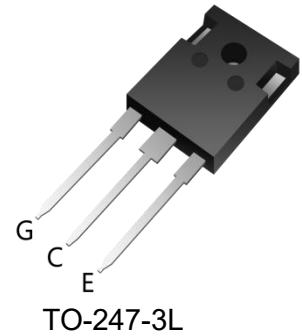
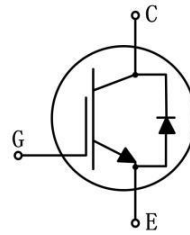


Trench Field-stop IGBT Discrete

Parameter	Value	Unit
V_{CE}	1200	V
I_C	50	A
$V_{CE(sat)}$	2.15	V



Features

- 1200V Trench with Field Stop Technology
- Low switching losses
- V_{cesat} with positive Temperature Coefficient

Applications

- Energy storage inverter
- Uninterruptible power supplies
- Solar inverters

IGBT

Maximum Ratings

Parameter	Symbol	Test condition	Value	Unit
Collector-Emitter Voltage	V_{CES}	$T_{vj}=25^{\circ}C$	1200	V
Continuous DC collector current	$I_{C\ nom}$	$T_C=80^{\circ}C, T_{vj\ max}=175^{\circ}C$	50	A
Repetitive peak collector current	I_{CRM}	$t_p=1ms$	150	A
Gate emitter voltage	V_{GE}	$t_p \le 0.5\mu s, D < 0.001$	± 20 $+30$	V
Short-circuit withstand time	t_{SC}	$V_{CC} \le 600V, V_{GE} = 15V,$ Allowed number of short circuits < 1000, Time between short circuits $\ge 1.0s,$ $T_{vj} = 150^{\circ}C$	10	μs
Total power dissipation	P_{tot}	$T_C=25^{\circ}C, T_{vj\ max}=175^{\circ}C$ $T_C=100^{\circ}C, T_{vj\ max}=175^{\circ}C$	900 500	W
Temperature under switching conditions	T_{vjop}		-40...+175	$^{\circ}C$
Storage temperature	T_{stg}		-40...+150	$^{\circ}C$

Thermal Characteristics

Parameter	Symbol	Test condition	Value			Unit
			Min.	Typ.	Max.	
IGBT thermal resistance, junction - case	$R_{th(j-C)}$			0.138		$^{\circ}C/W$
Diode thermal resistance, junction - case	$R_{th(j-C)}$			0.393		$^{\circ}C/W$

Characteristic Values

Parameter	Symbol	Test condition	Value			Unit	
			Min.	Typ.	Max.		
Collector-emitter breakdown voltage	$V_{(BR)CES}$	$V_{GE}=0V, I_C=0.25mA$	1200			V	
Collector-Emitter saturation Voltage	V_{CESat}	$V_{GE}=15V, I_C=50A$ $V_{GE}=15V, I_C=50A$ $V_{GE}=15V, I_C=50A$		$T_{vj}=25^{\circ}C$ 2.15 $T_{vj}=150^{\circ}C$ 2.80 $T_{vj}=175^{\circ}C$ 2.91	2.40		
Gate-Emitter threshold Voltage	$V_{GE(th)}$	$I_C=0.4mA, V_{GE}=V_{CE}$		$T_{vj}=25^{\circ}C$ 4.9	5.5		6.1
Transconductance	G_{fs}	$V_{CE}=20V, I_C=50A$			30	S	
Internal gate resistor	R_{Gint}	$T_{vj}=25^{\circ}C$			2.3	Ω	
Input capacitance	C_{ies}				3.12	nF	
Output capacitance	C_{oes}	$f=100kHz, V_{CE}=25V, V_{GE}=0V$	$T_{vj}=25^{\circ}C$		0.24		
Reverse transfer capacitance	C_{res}				0.12		
Gate charge	Q_G	$I_C=50A, V_{GE}=15V, V_{CE}=960V$	$T_{vj}=25^{\circ}C$		300	μC	
Collector-emitter cut-off current	I_{CES}	$V_{CE}=1200V, V_{GE}=0V$	$T_{vj}=25^{\circ}C$ $T_{vj}=175^{\circ}C$		3000	1	μA
Gate-emitter leakage current	I_{GES}	$V_{CE}=0V, V_{GE}=20V$	$T_{vj}=25^{\circ}C$			100	nA
Turn-on delay time	t_{don}	$I_C=50A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=10\Omega$ (inductive load)	$T_{vj}=25^{\circ}C$ $T_{vj}=175^{\circ}C$		57 50	ns	
Rise time	t_r	$I_C=50A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=10\Omega$ (inductive load)	$T_{vj}=25^{\circ}C$ $T_{vj}=175^{\circ}C$		134 69		
Turn-off delay time	t_{doff}	$I_C=50A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=10\Omega$ (inductive load)	$T_{vj}=25^{\circ}C$ $T_{vj}=175^{\circ}C$		156 237		
Fall time	t_f	$I_C=50A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=10\Omega$ (inductive load)	$T_{vj}=25^{\circ}C$ $T_{vj}=175^{\circ}C$		136 160		
Turn-on energy loss per pulse	E_{on}	$I_C=50A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=10\Omega$ $di/dt=340A/\mu s$ ($T_{vj}=175^{\circ}C$)	$T_{vj}=25^{\circ}C$ $T_{vj}=175^{\circ}C$		6.50 10.0	mJ	
Turn-off energy loss per pulse	E_{off}	$I_C=50A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=10\Omega$ $dv/dt=5700V/\mu s$ ($T_{vj}=175^{\circ}C$)	$T_{vj}=25^{\circ}C$ $T_{vj}=175^{\circ}C$		2.20 3.70	mJ	

Diode
Maximum Ratings

Parameter	Symbol	Test condition	Value	Unit
Repetitive peak reverse Voltage	V_{RRM}	$T_{vj}=25^{\circ}C$	1200	V
Continuous DC forward current	I_F	$T_C=100^{\circ}C, T_{vjmax}=175^{\circ}C$	40	A
Repetitive peak forward current	I_{FRM}	$t_p=1ms$	120	A
I^2t -value	I^2t	$t_p=10ms, \sin 180^{\circ}, T_j=125^{\circ}C$	310	A

Characteristic Values

Parameter	Symbol	Test condition	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_F	$I_F=40A, V_{GE}=0V$ $T_{vj}=25^\circ C$ $I_F=40A, V_{GE}=0V$ $T_{vj}=150^\circ C$ $I_F=40A, V_{GE}=0V$ $T_{vj}=175^\circ C$		1.82 1.60 1.54	2.40	V
Peak reverse recovery current	I_{RM}	$I_F=50A,$ $-di_F/dt=350A/\mu s$ $T_{vj}=25^\circ C$ ($T_{vj}=175^\circ C$) $T_{vj}=175^\circ C$ $V_R=600V, V_{GE}=-15V$		10.2 30.0		A
Reverse Recovered charge	Q_{rr}	$I_F=50A,$ $-di_F/dt=350A/\mu s$ $T_{vj}=25^\circ C$ ($T_{vj}=175^\circ C$) $T_{vj}=175^\circ C$ $V_R=600V, V_{GE}=-15V$		3.69 11.8		μC
Reverse Recovery Time	t_{rr}	$I_F=50A,$ $-di_F/dt=290A/\mu s$ $T_{vj}=25^\circ C$ ($T_{vj}=175^\circ C$) $T_{vj}=175^\circ C$ $V_R=600V, V_{GE}=-15V$		678 1120		ns
Reverse recovered energy	E_{rec}	$I_F=50A,$ $-di_F/dt=290A/\mu s$ $T_{vj}=25^\circ C$ ($T_{vj}=175^\circ C$) $T_{vj}=175^\circ C$ $V_R=600V, V_{GE}=-15V$		1.53 4.78		mJ

Typical Characteristics

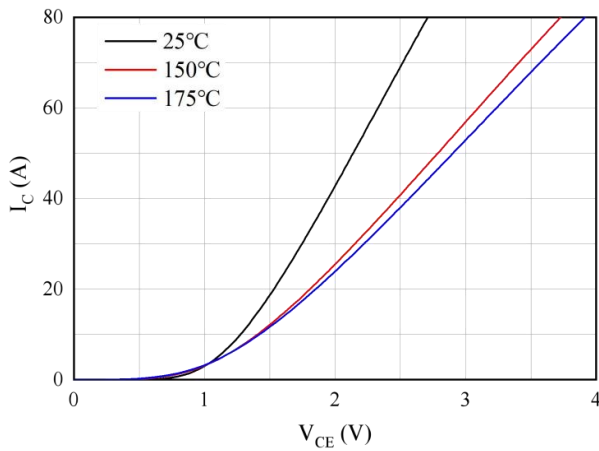


Fig 1. Typical output characteristics ($V_{GE}=15V$)

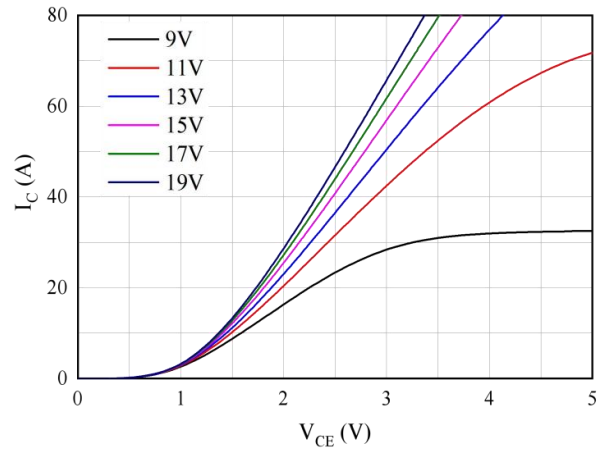


Fig 2. Typical output characteristics ($T_{vj}=150^\circ C$)

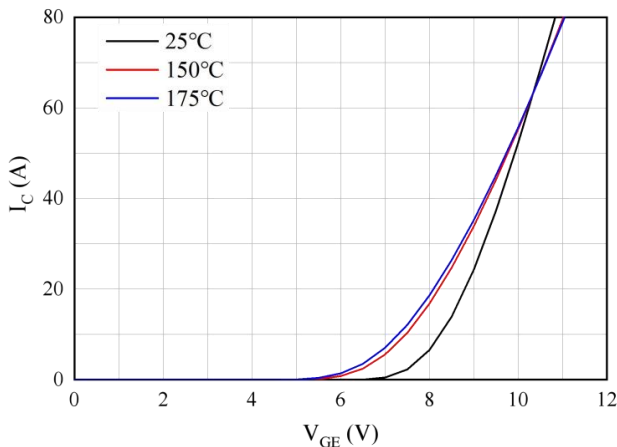


Fig 3. Typical transfer characteristic ($V_{CE}=20V$)

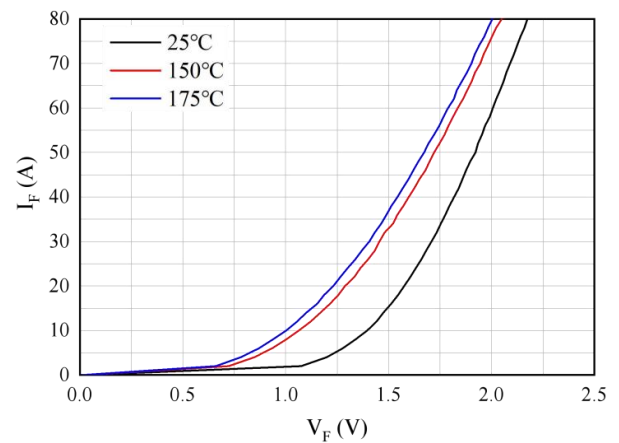


Fig 4. Forward characteristic of Diode

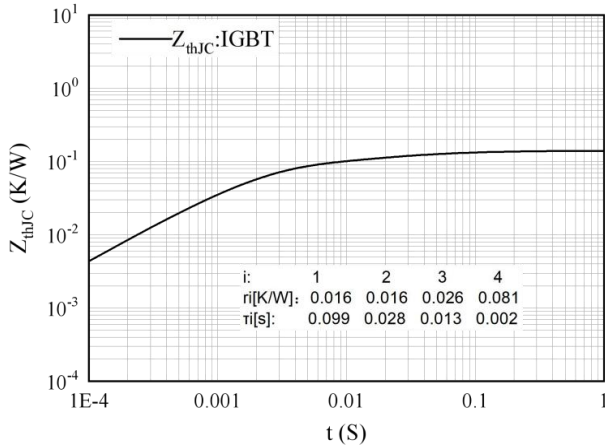


Fig 5. Transient thermal impedance IGBT,
 $Z_{thJC}=f(t)$

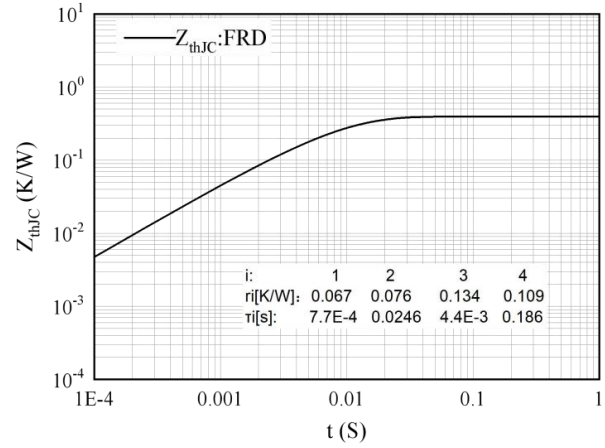


Fig 6. Transient thermal impedance FRD,
 $Z_{thJC}=f(t)$

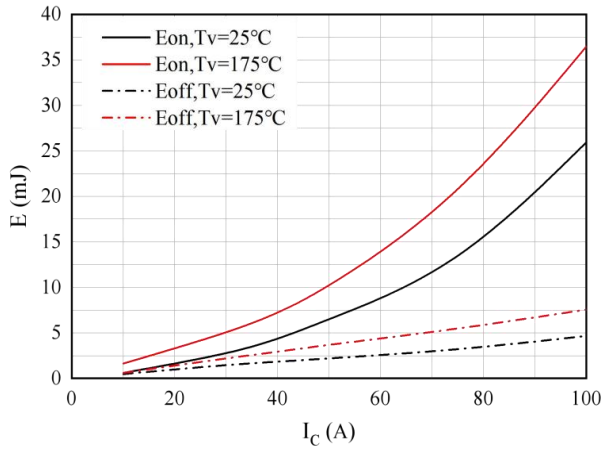


Fig 7. Switching losses of IGBT
 $V_{GE}=\pm 15V, R_G=10\Omega, V_{CE}=600V$

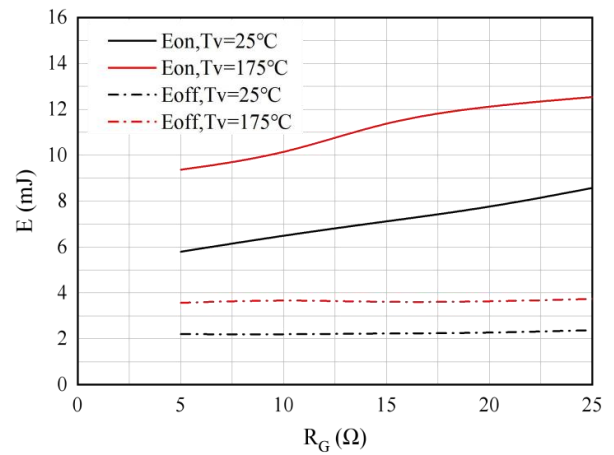


Fig 8. Switching losses of IGBT
 $V_{GE}=\pm 15V, I_C=50A, V_{CE}=600V$

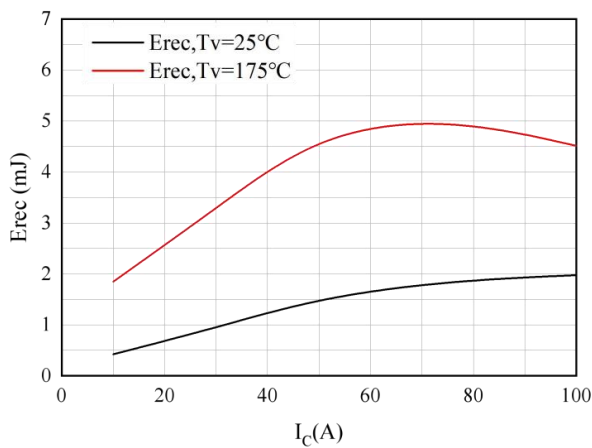


Fig 9. Switching losses of Diode
 $R_G=10\Omega, V_{CE}=600V$

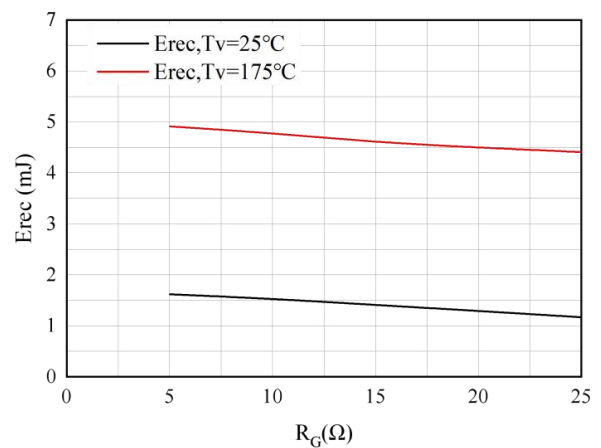


Fig 10. Switching losses of Diode
 $I_F=50A, V_{CE}=600V$

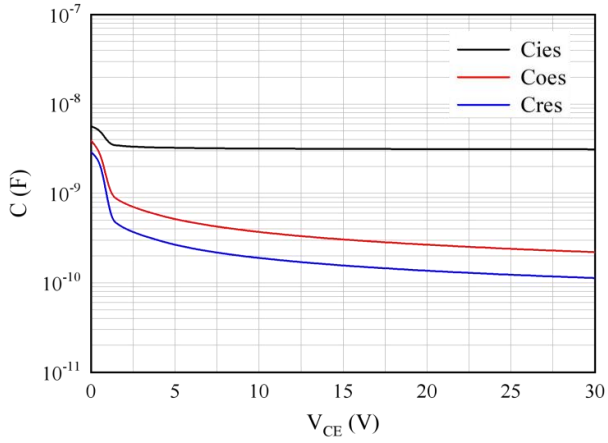
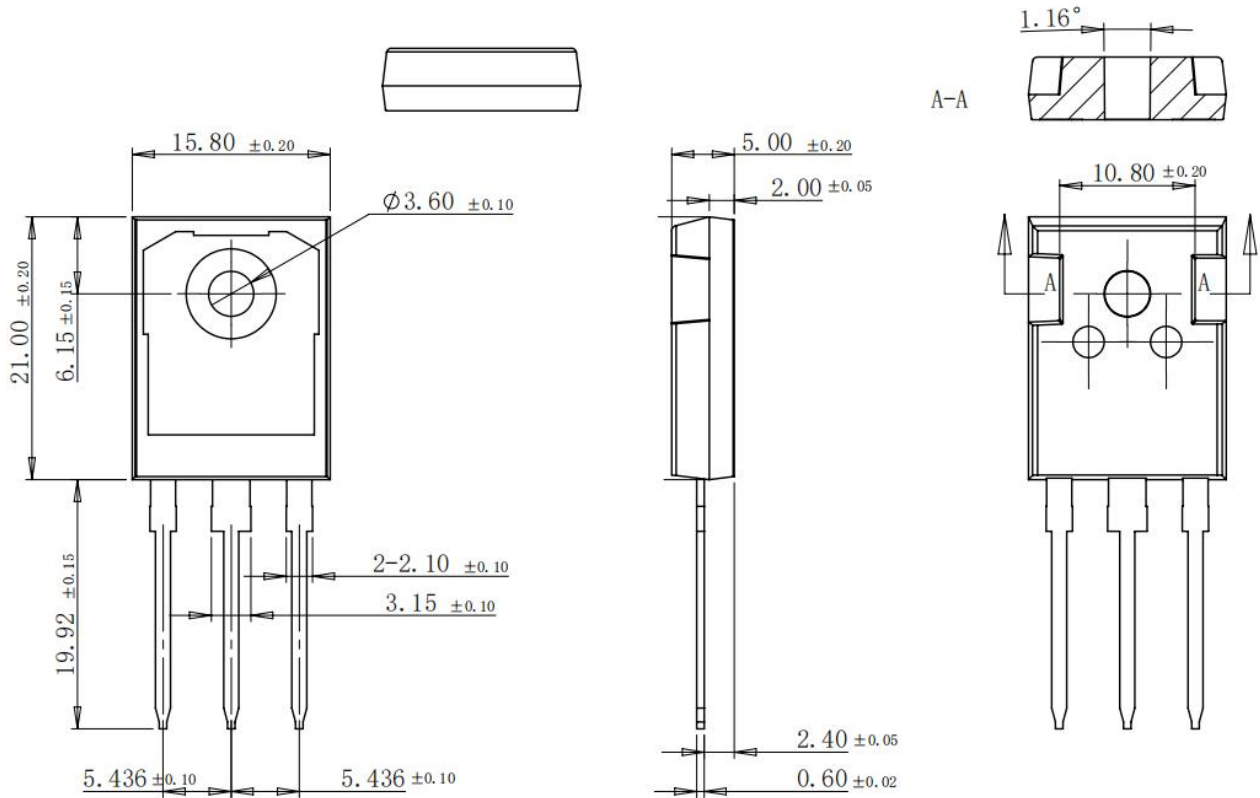


Fig 11. Capacitance characteristic

Package Outlines (Unit: mm)

TO-247-3L



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