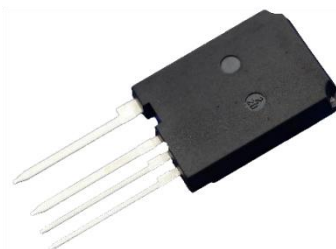
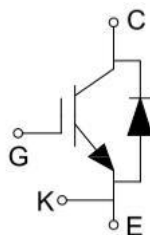


Trench Field-stop IGBT Discrete

Parameter	Value	Unit
V_{CE}	1200	V
I_C	180	A
$V_{CE(sat)}$	1.66	V



TO-247PLUS-4L

Features

- 1200V trench gate/field termination process
- Low switching losses
- V_{cesat} has a 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}	$T_{vj}=25^{\circ}\text{C}$	1200	V
Continuous DC collector current	$I_{C\text{ nom}}$	$T_C=100^{\circ}\text{C}, T_{vj\text{ max}}=175^{\circ}\text{C}$	180	A
Repetitive peak collector current	I_{CRM}	$t_p=1\text{ms}$	540	A
Gate-emitter voltage	V_{GE}		± 20	V
Transient gate-emitter voltage	V_{GE}	$t_p \leq 0.5\mu\text{s}, D < 0.001$	± 25	V
Power dissipation	P_{tot}	$T_C=100^{\circ}\text{C}$	1200	W
Temperature under switching conditions	$T_{vj\text{ op}}$		$-40 \dots +175$	$^{\circ}\text{C}$
Storage temperature	T_{stg}		$-40 \dots +150$	$^{\circ}\text{C}$

Thermal Characteristics

Parameter	Symbol	Test condition	Value	Unit
IGBT thermal resistance, junction - case	$R_{th(j-C)}$		0.061	$^{\circ}\text{C/W}$
Diode thermal resistance, junction - case	$R_{th(j-C)}$		0.123	$^{\circ}\text{C/W}$

Characteristic Values

Parameter	Symbol	Test condition	Value			Unit
			Min.	Typ.	Max.	
Collector-Emitter saturation voltage	V_{CEsat}	$V_{GE}=15V, I_C=180A$ $T_{vj}=25^{\circ}C$ $V_{GE}=15V, I_C=180A$ $T_{vj}=175^{\circ}C$		1.66 2.10	2.10	V
Gate-Emitter threshold voltage	$V_{GE(th)}$	$I_C=2.4mA, V_{GE}=V_{CE}$ $T_{vj}=25^{\circ}C$	4.3	4.9	5.5	V
Transconductance	G_{fs}	$V_{CE}=20V, I_C=180A$		270		S
Internal gate resistor	R_{Gint}			3.3		Ω
Input capacitance	C_{ies}	$f=100kHz, V_{CE}=25V, V_{GE}=0V$ $T_{vj}=25^{\circ}C$		21.7		nF
Output capacitance	C_{oes}			0.42		nF

Reverse transfer capacitance	C_{res}			0.09		nF
Gate charge	Q_G	$I_C=180A, V_{GE}=15V,$ $V_{CE}=960V$	$T_{vj}=25^{\circ}C$	1.34		μC
Collector-emitter cut-off current	I_{CES}	$V_{CE}=1200V, V_{GE}=0V$	$T_{vj}=25^{\circ}C$		100	μA
Gate-emitter leakage current	I_{GES}	$V_{CE}=0V, V_{GE}=20V$	$T_{vj}=25^{\circ}C$		100	nA
Turn-on delay time	$t_{d(on)}$	$I_C=180A, V_{CE}=600V$ $V_{GE}=\pm 15V,$ $R_{Gon}=5\Omega, R_{Goff}=25\Omega$ (inductive load)	$T_{vj}=25^{\circ}C$ $T_{vj}=175^{\circ}C$	116 143		ns
Rise time	t_r	$I_C=180A, V_{CE}=600V$ $V_{GE}=\pm 15V,$ $R_{Gon}=5\Omega, R_{Goff}=25\Omega$ (inductive load)	$T_{vj}=25^{\circ}C$ $T_{vj}=175^{\circ}C$	86 84		ns
Turn-off delay time	$t_{d(off)}$	$I_C=180A, V_{CE}=600V$ $V_{GE}=\pm 15V,$ $R_{Gon}=5\Omega, R_{Goff}=25\Omega$ (inductive load)	$T_{vj}=25^{\circ}C$ $T_{vj}=175^{\circ}C$	680 740		ns
Fall time	t_f	$I_C=180A, V_{CE}=600V$ $V_{GE}=\pm 15V,$ $R_{Gon}=5\Omega, R_{Goff}=25\Omega$ (inductive load)	$T_{vj}=25^{\circ}C$ $T_{vj}=175^{\circ}C$	93 190		ns
Turn-on energy loss per pulse	E_{on}	$I_C=180A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_{Gon}=5\Omega$ $di/dt=1700A/\mu s(T_{vj}=175^{\circ}C)$ (inductive load)	$T_{vj}=25^{\circ}C$ $T_{vj}=175^{\circ}C$	12.3 17.5		mJ
Turn-off energy loss per pulse	E_{off}	$I_C=180A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_{Goff}=25\Omega$ $dv/dt=6400V/\mu s(T_{vj}=175^{\circ}C)$ (inductive load)	$T_{vj}=25^{\circ}C$ $T_{vj}=175^{\circ}C$	9.22 13.7		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	$T_C=100^{\circ}C, T_{vj\max}=175^{\circ}C$	180	A
Repetitive peak forward current	I_{FRM}	$t_p=1ms$	540	A

Characteristic Values

Parameter	Symbol	Test condition	Value			Unit
			Min.	Typ.	Max.	
Forward voltage	V_F	$I_F=180A, V_{GE}=0V$ $I_F=180A, V_{GE}=0V$	$T_{vj}=25^{\circ}C$ $T_{vj}=175^{\circ}C$	2.87 2.63	3.40	V
Peak reverse recovery current	I_{RM}	$I_F=180A,$ $-di_F/dt=1460A/\mu s(T_{vj}=175^{\circ}C)$ $V_R=600V, V_{GE}=-15V$	$T_{vj}=25^{\circ}C$ $T_{vj}=175^{\circ}C$	49 88		A
Reverse Recovered charge	Q_{rr}	$I_F=180A,$ $-di_F/dt=1460A/\mu s(T_{vj}=175^{\circ}C)$ $V_R=600V, V_{GE}=-15V$	$T_{vj}=25^{\circ}C$ $T_{vj}=175^{\circ}C$	8.30 22.6		μC
Reverse Recovery Time	t_{rr}	$I_F=180A,$ $-di_F/dt=1460A/\mu s(T_{vj}=175^{\circ}C)$ $V_R=600V, V_{GE}=-15V$	$T_{vj}=25^{\circ}C$ $T_{vj}=175^{\circ}C$	387 634		ns
Reverse recovered energy	E_{rec}	$I_F=180A,$ $-di_F/dt=1460A/\mu s(T_{vj}=175^{\circ}C)$ $V_R=600V, V_{GE}=-15V$	$T_{vj}=25^{\circ}C$ $T_{vj}=175^{\circ}C$	3.74 10.2		mJ

Typical Characteristics

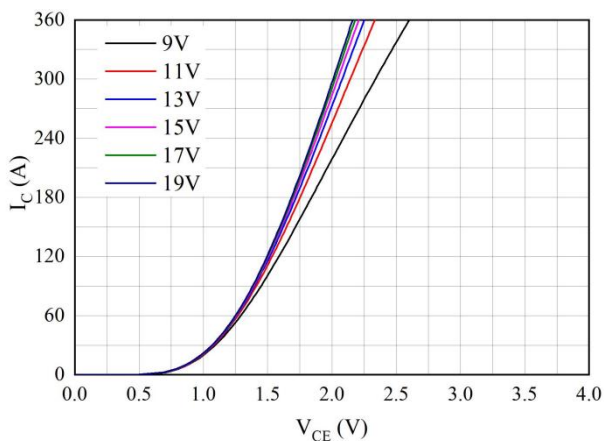


Fig 1. Typical output characteristics($T_{vj}=25^{\circ}\text{C}$)

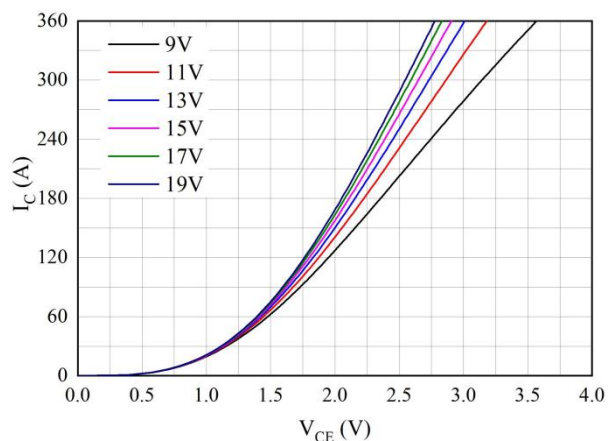


Fig 2. Typical output characteristics($T_{vj}=175^{\circ}\text{C}$)

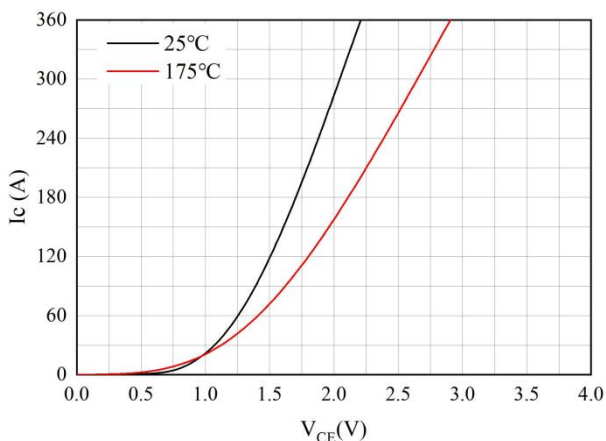


Fig 3. Typical output characteristics($V_{ge}=15\text{V}$)

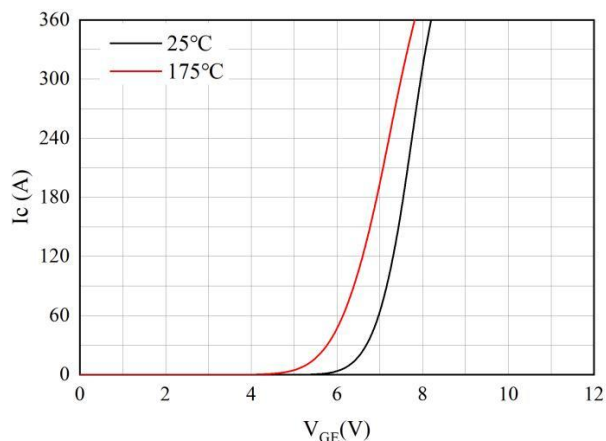


Fig 4. Typical transfer characteristic($V_{ce}=20\text{V}$)

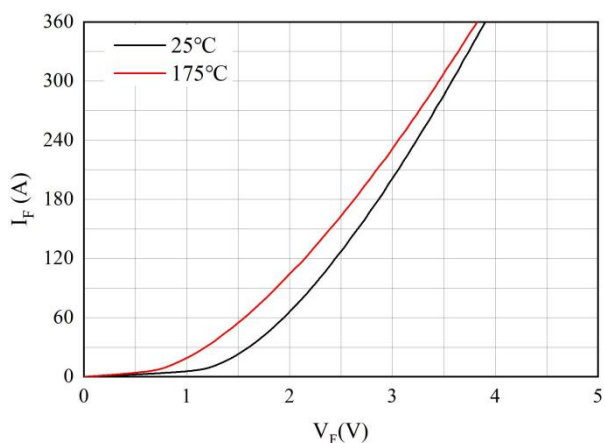


Fig 5. Forward characteristic of Diode

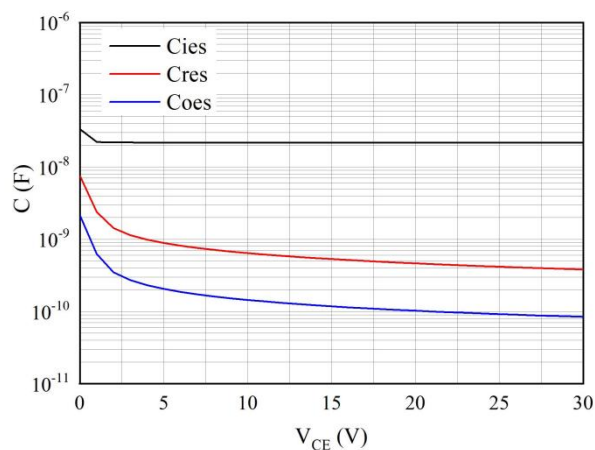


Fig 6. Capacitance characteristic

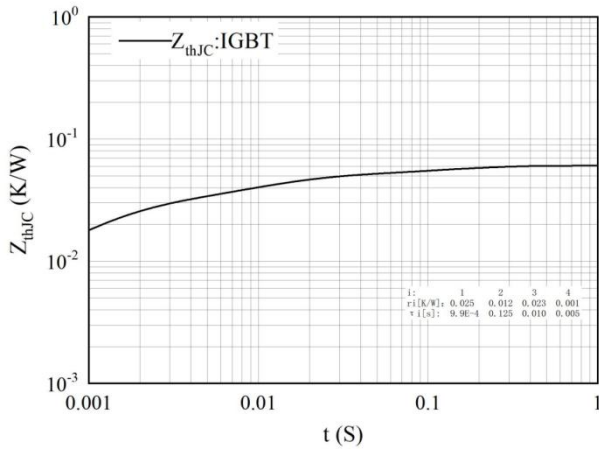


Fig 7. Transient thermal impedance IGBT,
 $Z_{thJC}=f(t)$

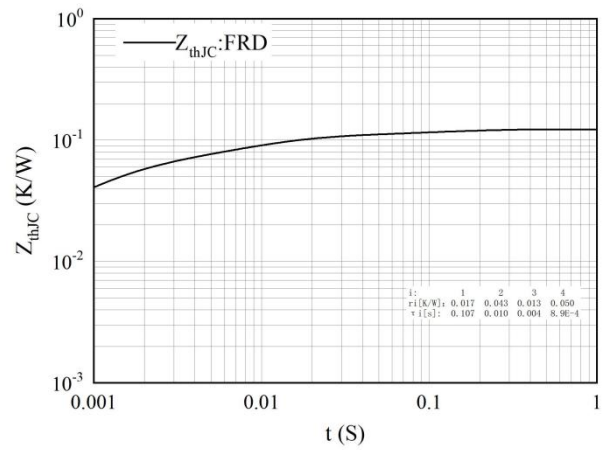


Fig 8. Transient thermal impedance FRD,
 $Z_{thJC}=f(t)$

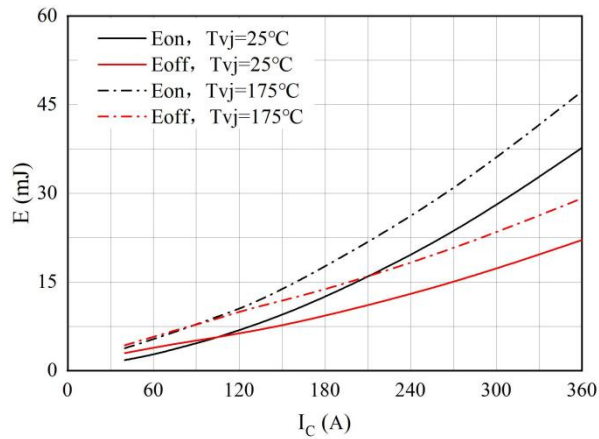


Fig 9. Switching losses of IGBT
 $V_{GE}=\pm 15V, R_{gon}=5\Omega, R_{goff}=25\Omega, V_{CE}=600V$

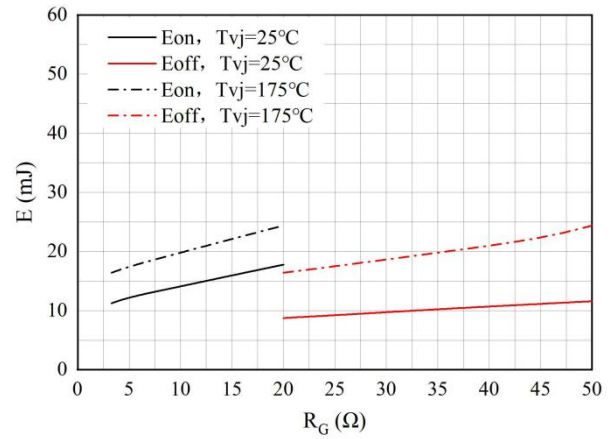


Fig 10. Switching losses of IGBT
 $V_{GE}=\pm 15V, I_C=180A, V_{CE}=600V$

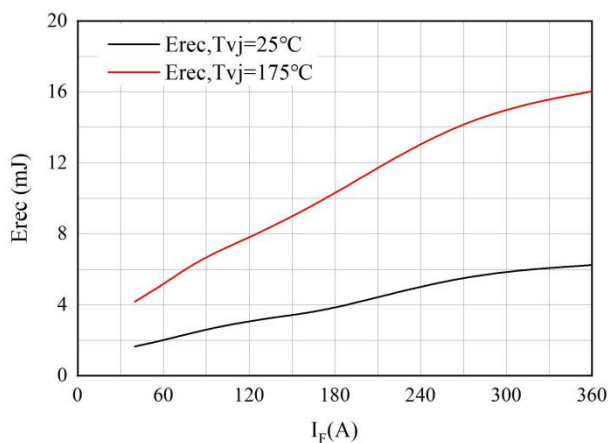


Fig 11. Switching losses of Diode
 $R_{gon}=5\Omega, V_{CE}=600V$

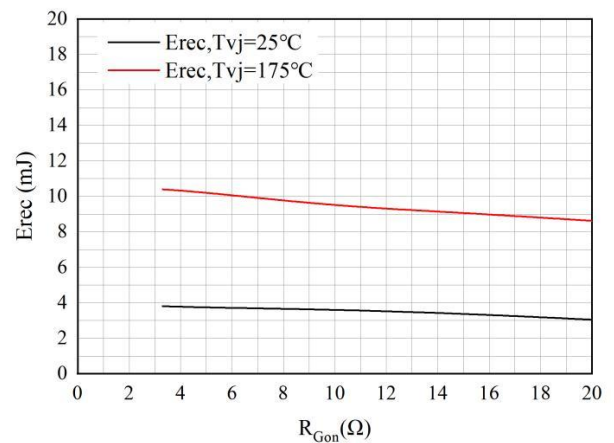
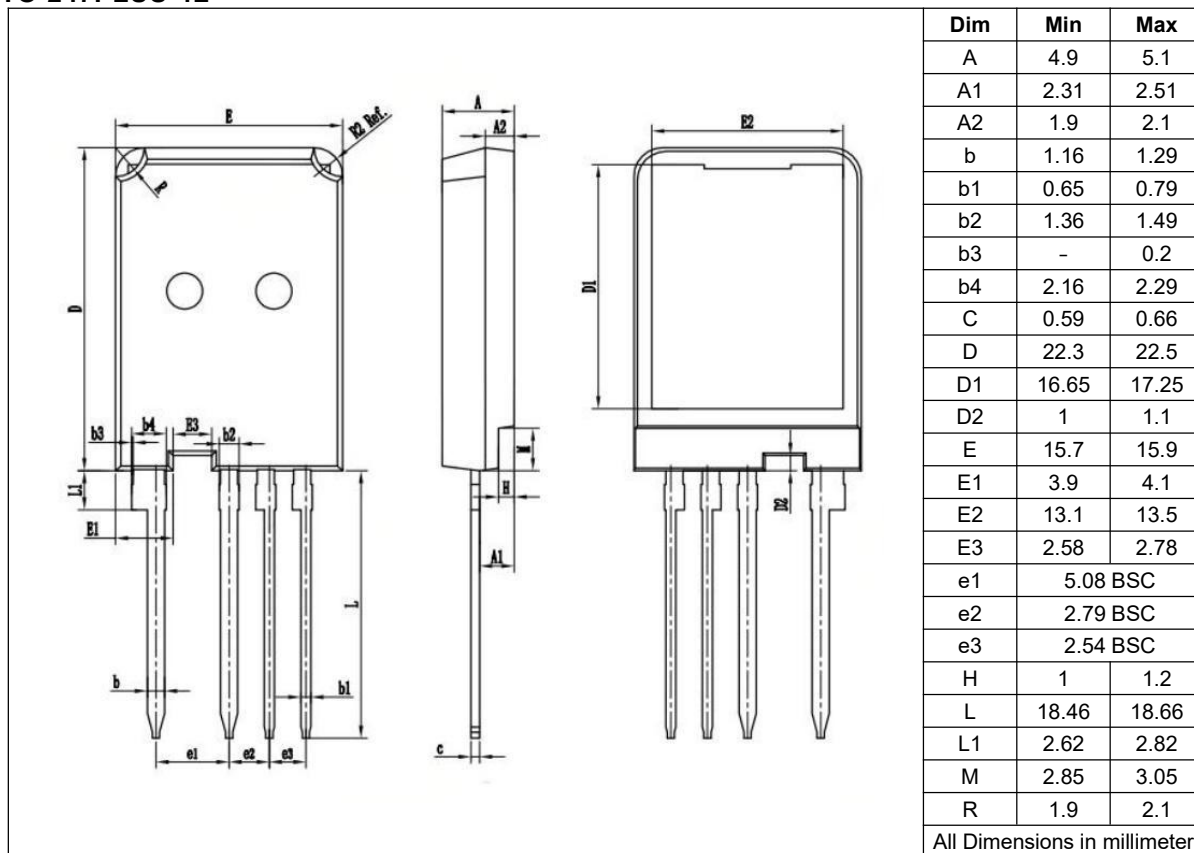


Fig 12. Switching losses of Diode
 $I_F=180A, V_{CE}=600V$

Package Outline (Unit: mm)

TO-247PLUS-4L



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