

JLHF450B120R62E7DN

L62 PACK module with NCE Gen.7 Trench/Fieldstop IGBT and Emitter Controlled diode

Features



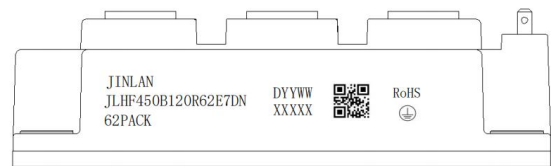
- Electrical features
 - $V_{CES} = 1200\text{ V}$
 - $I_{C\text{ nom}} = 450\text{ A} / I_{CRM} = 900\text{ A}$
 - V_{CESat} with positive temperature coefficient
- Mechanical features
 - Standard housing
 - 4 kV AC 1 min insulation
 - High creepage and clearance distances
 - High power density
 - Isolated base plate
 - Package with CTI >500



L62 Pack

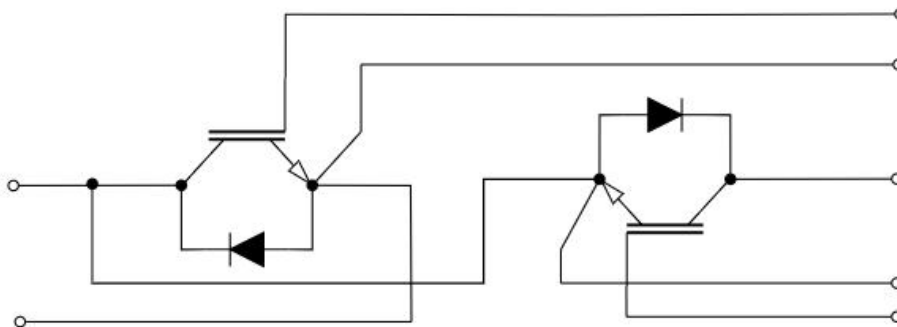
Typical Applications

- Three-level applications
- Commercial agriculture vehicles
- High-power converters
- Motor drives
- Servo drives
- Solar applications
- UPS systems



JINLAN	= Company Name
JLHF450B120R62E7DN	= Specific Device Code
YYWW	= Year and Work Week Code
XXXXX	= Serial Number
QR code	= Custom Assembly Information

Description





Package Insulation coordination

Parameter	Symbol	Note or test condition	Values	Unit
Isolation test voltage	V_{ISOL}	RMS, $f=50\text{Hz}$, $t=60\text{s}$	4.0	kV
Internal isolation		basic insulation(class 1, IEC 61140)	Al_2O_3	
Creepage distance	d_{creep}	terminal to heatsink	29.0	mm
Creepage distance	d_{creep}	terminal to terminal	23.0	mm
Clearance	d_{clear}	terminal to heatsink	23.0	mm
Clearance	d_{clear}	terminal to terminal	11.0	mm
Comparative tracking index (electrical)	CTI		>500	
RTI Elec.	RTI	housing	140	°C

Package Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Stray Inductance	L_{sCE}			--	20	--	nH
Module Lead Resistance, Terminal to Chip	$R_{CC+EE'}$	$T_c=25^\circ\text{C}$, per switch		--	0.5	--	mΩ
Storage Temperature Range	T_{STG}			-40		125	°C
M	M	-Mounting according to valid application note	M5, Screw	3.0	--	6.0	Nm
M	M	-Mounting according to valid application note	M6, Screw	3.0	--	6.0	Nm
Weight	G			--	340	--	g



IGBT

Absolute Maximum Ratings (T_C = 25°C unless otherwise noted)

Symbol	Description	Note or test condition		Value	Unit
V _{CES}	Collector-Emitter Voltage	T _{vj} = 25 °C		1200	V
I _{CDC}	Continuous DC collector current	T _{vj max} = 175 °C	T _C = 90 °C	450	A
I _{CRM}	Repetitive peak collector current	t _p limited by T _{vj op}		900	A
V _{GES}	Gate-emitter peak voltage			±30	V

Characteristics (T_C = 25°C unless otherwise noted)

Symbol	Parameter	Test Condition		Min	Typ	Max	Unit
V _{CE(sat)}	Collector-Emitter Saturation Voltage	I _C = 450 A, V _{GE} = 15 V	T _{vj} = 25 °C	--	1.45	2.25	V
			T _{vj} = 150 °C	--	1.70	--	
			T _{vj} = 175 °C	--	1.75	--	
V _{GE(TH)}	Gate-Emitter Threshold Voltage	V _{GE} = V _{CE} , I _C = 5 mA, T _{vj} = 25°C		5.0	6.0	7.0	V
I _{CES}	Collector-Emitter Cutoff Current	V _{GE} = 0 V, V _{CE} = 1200V, T _{vj} = 25°C		--	--	2	mA
I _{GES}	Gate-Emitter Leakage Current	V _{GE} = ±30V, V _{CE} = 0 V, T _{vj} = 25°C		--	--	±200	nA
R _{Gint}	Internal Gate Resistance	T _{vj} = 25 °C		--	1.34	--	Ω
C _{ies}	Input Capacitance	f = 100 kHz, T _{vj} = 25 °C, V _{CE} = 25 V, V _{GE} = 0 V		--	66.5	--	nF
C _{oes}	Out Capacitance			--	2.29	--	nF
C _{res}	Reverse Transfer Capacitance			--	0.225	--	nF
Q _G	Gate Charge	V _{GE} = ±15 V, V _{CC} = 600 V		--	1.80	--	μC
t _{d(on)}	Turn-On Delay Time	I _C = 450A, V _{CC} = 600 V, V _{GE} = 15 /-5V, R _G = 1.0 Ω	T _{vj} = 25 °C	--	0.331	--	μS
			T _{vj} = 150 °C	--	0.375	--	
			T _{vj} = 175 °C	--	0.380	--	
t _r	Rise Time	I _C = 450A, V _{CC} = 600 V, V _{GE} = 15 /-5V, R _G = 1.0 Ω	T _{vj} = 25 °C	--	0.060	--	μS
			T _{vj} = 150 °C	--	0.072	--	
			T _{vj} = 175 °C	--	0.073	--	
t _{d(off)}	Turn-off Delay Time	I _C = 450 A, V _{CC} = 600 V, V _{GE} = 15 /-5V, R _{Goff} = 1.0 Ω	T _{vj} = 25 °C	--	0.672	--	μS
			T _{vj} = 150 °C	--	0.766	--	
			T _{vj} = 175 °C	--	0.782	--	
t _f	Fall Time	I _C = 450 A, V _{CC} = 600 V, V _{GE} = 15 /-5V, R _G = 1.0 Ω	T _{vj} = 25 °C	--	0.082	--	μS
			T _{vj} = 150 °C	--	0.183	--	
			T _{vj} = 175 °C	--	0.186	--	
E _{on}	Turn-On Switching Loss per Pulse	I _C = 450A, V _{CC} = 600 V, V _{GE} = 15 /-5V, R _G = 1.0 Ω (T _{vj max} = 175 °C)	T _{vj} = 25 °C	--	10.14	--	mJ
			T _{vj} = 150 °C	--	20.21	--	
			T _{vj} = 175 °C	--	22.49	--	
E _{off}	Turn Off Switching Loss per Pulse	I _C = 450A, V _{CC} = 600 V,	T _{vj} = 25 °C	--	44.05	--	mJ



		$V_{GE} = 15 \text{ /-} 5\text{V}$, $R_G = 1.0 \text{ } \Omega$ ($T_{vj \text{ max}} = 175 \text{ } ^\circ\text{C}$)	$T_{vj} = 150 \text{ } ^\circ\text{C}$	--	58.68	--	
			$T_{vj} = 175 \text{ } ^\circ\text{C}$	--	60.63	--	
I_{SC}	SC Data	$V_{GE} \leq 15 \text{ V}$, $V_{CC} = 600 \text{ V}$, $V_{CEmax} = V_{CES} - L_{sCE} \cdot di/dt$	$t_p \leq 10 \text{ } \mu\text{s}$, $T_{vj} = 150 \text{ } ^\circ\text{C}$	--	1900	--	A
R_{thJC}	Thermal resistance	Junction-to-Case (per IGBT)		--	0.076	--	K/W
$T_{vj \text{ op}}$	Temperature under switching conditions			-40	--	$175^{1)}$	$^\circ\text{C}$

¹⁾ $T_{vj \text{ op}} > 150 \text{ } ^\circ\text{C}$ is only allowed for operation at overload conditions.

Diode

Absolute Maximum Ratings ($T_C = 25 \text{ } ^\circ\text{C}$ unless otherwise noted)

Symbol	Description	Note or test condition	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	$T_{vj} = 25 \text{ } ^\circ\text{C}$	1200	V
I_F	Continuous DC forward current		450	A
I_{FRM}	Repetitive peak forward current	$t_p = 1 \text{ ms}$	900	A

Characteristics ($T_C = 25 \text{ } ^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Condition		Value			Unit
				Min	Typ	Max	
V _F	Diode Forward Voltage	I _F = 450 A, V _{GE} = 0 V	T _{vj} = 25 °C	--	1.40	2.80	V
			T _{vj} = 150 °C	--	1.25	--	
Q _r	Recovered Charge	I _C = 450 A, V _{CC} = 600 V, V _{GE} = 15 /-5V, R _G = 1.0 Ω (T _{vj max} = 175 °C)	T _{vj} = 25 °C	--	5.68	--	μC
			T _{vj} = 150 °C	--	18.72	--	
			T _{vj} = 175 °C	--	22.89	--	
I _{RM}	Peak Reverse Recovery Current	I _C = 450A, V _{CC} = 600 V, V _{GE} = 15 /-5V, R _G = 1.0 Ω (T _{vj max} = 175 °C)	T _{vj} = 25 °C	--	194	--	A
			T _{vj} = 150 °C	--	243	--	
			T _{vj} = 175 °C	--	256	--	
E _{rec}	Reverse recovery energy	I _C = 450 A, V _{CC} = 600 V, V _{GE} = 15 /-5V, R _G = 1.0 Ω (T _{vj max} = 175 °C)	T _{vj} = 25 °C	--	6.10	--	mJ
			T _{vj} = 150 °C	--	16.65	--	
			T _{vj} = 175 °C	--	19.42	--	
R _{thJC}	Thermal resistance, junction to case	per diode		--	0.078	--	K/W
T _{vj op}	Temperature under switching conditions			-40	--	175 ²⁾	°C

²⁾ $T_{vj \text{ op}} > 150 \text{ } ^\circ\text{C}$ is only allowed for operation at overload conditions.

Figure1.output characteristic IGBT,Inverter(typical)
 $T_{vj}=25^{\circ}\text{C}$

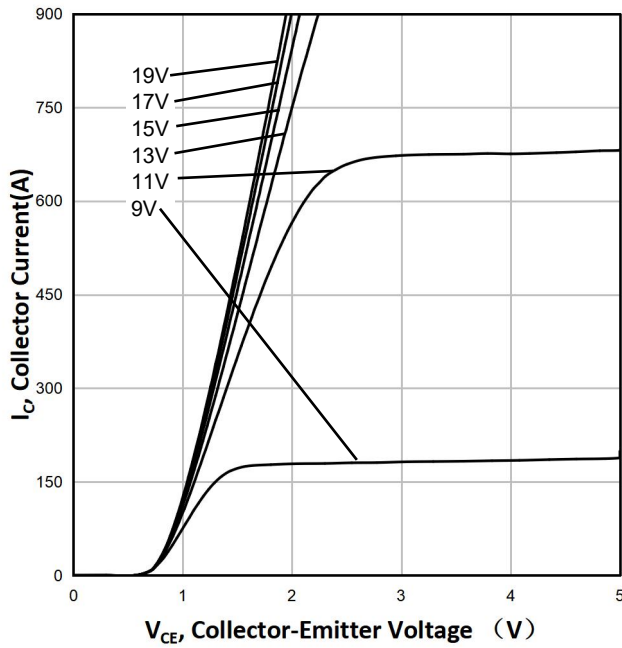


Figure2.output characteristic IGBT,Inverter(typical)
 $T_{vj}=150^{\circ}\text{C}$

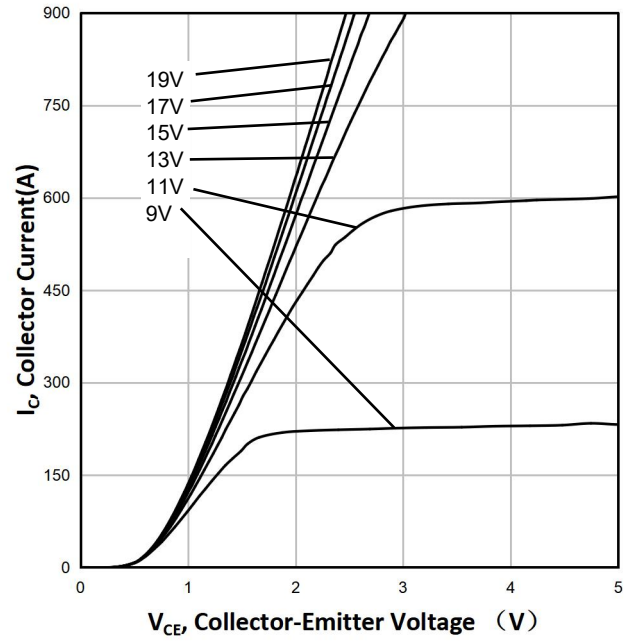


Figure3. $V_{CE(sat)}$ vs. Temperature

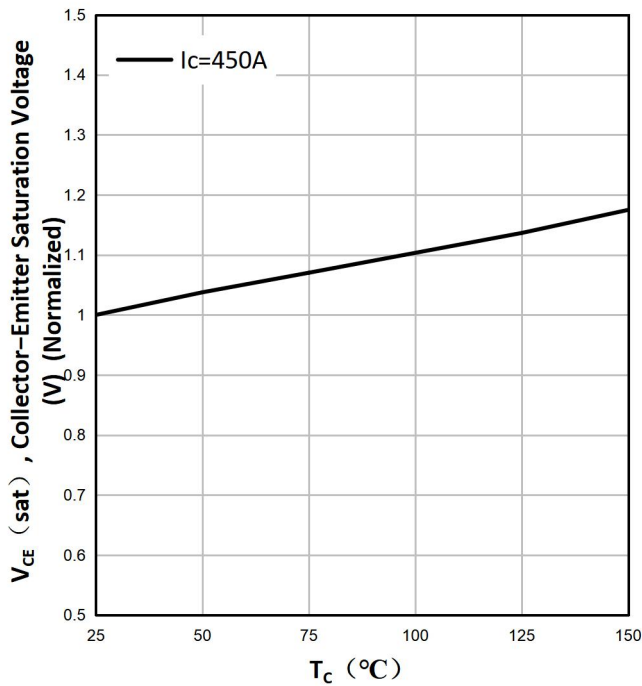


Figure4.transfer characteristic IGBT,Inverter(typical)
 $V_{CE}=20\text{V}$

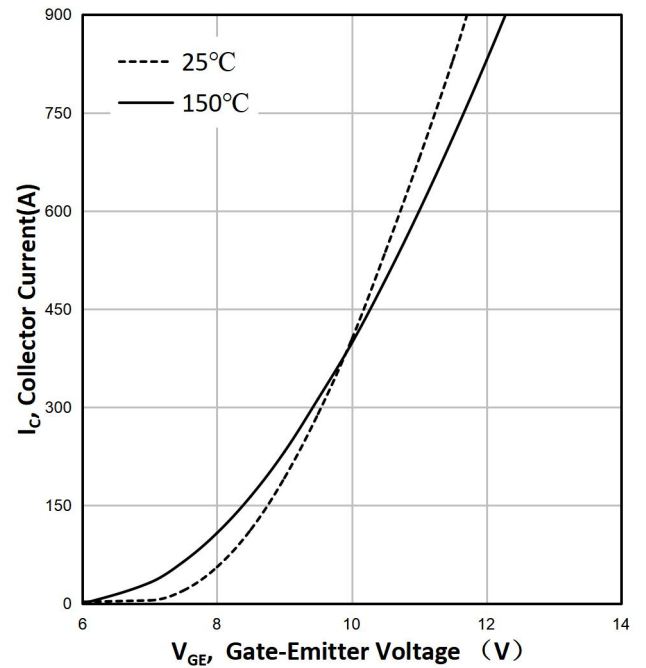


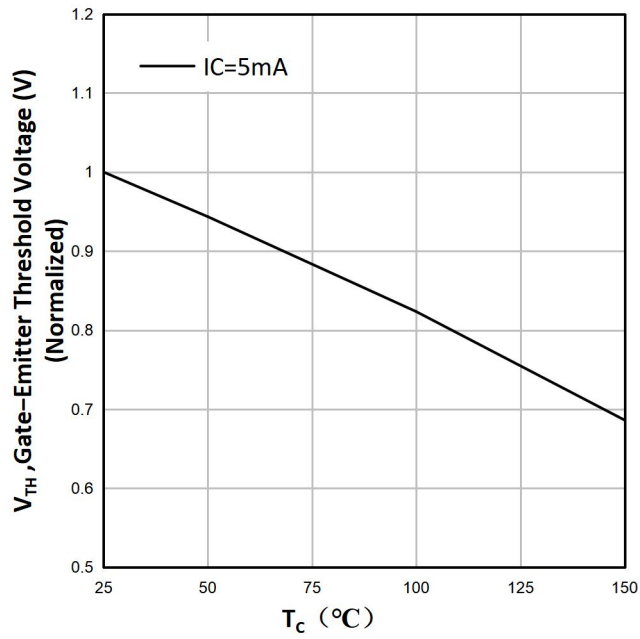
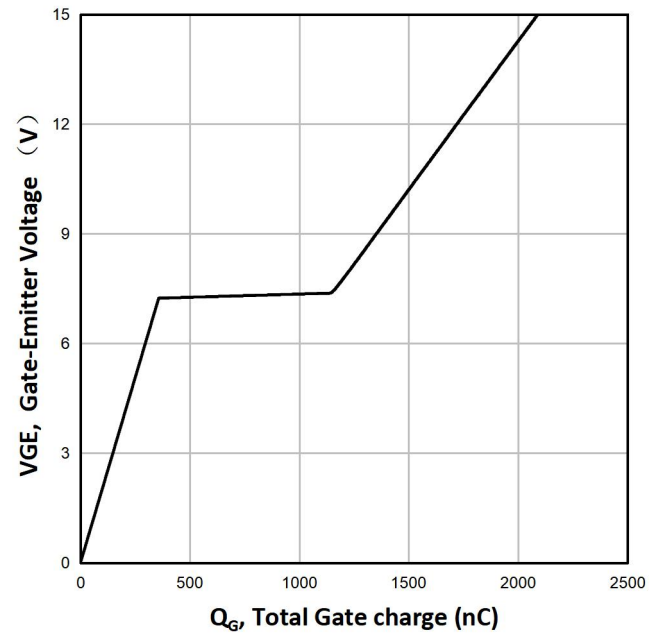
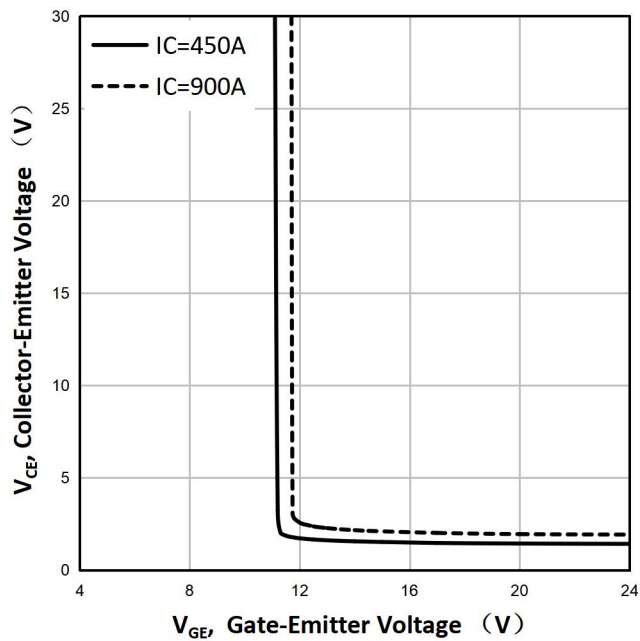
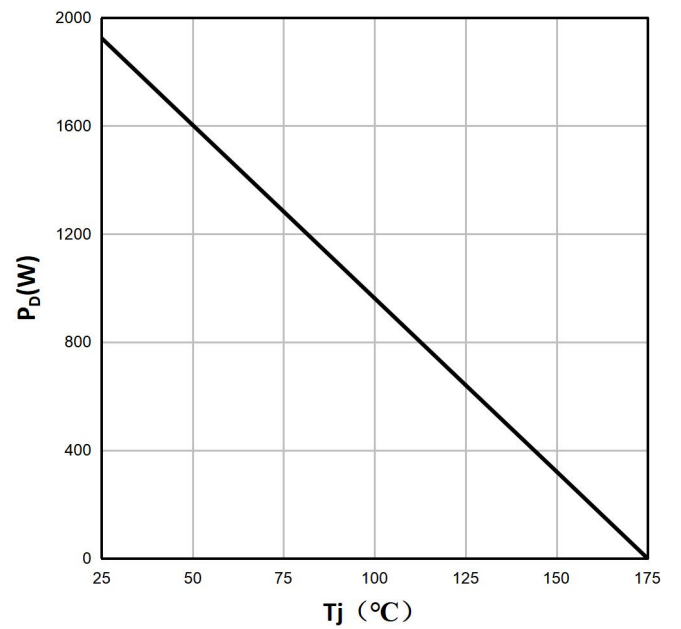
Figure5. V_{TH} vs. Temperature

Figure6. Gate Charge Waveform
 $V_{CC} = 600V$

Figure7. Saturation Voltage vs. V_{GE}

Figure8. P_{tot} vs. Case Temperature


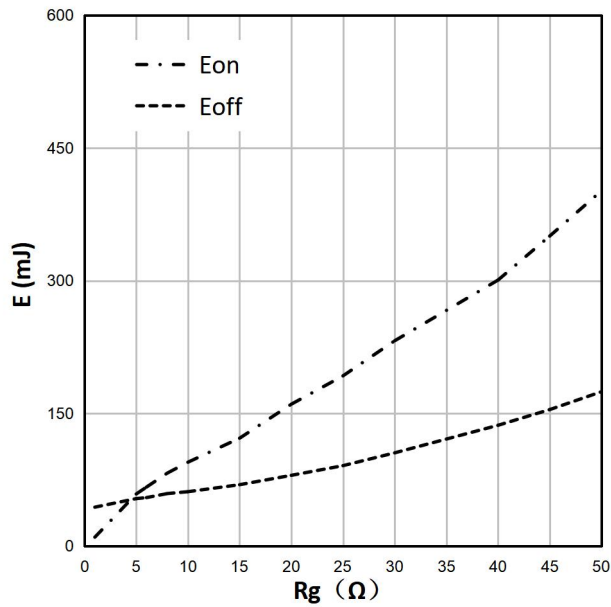
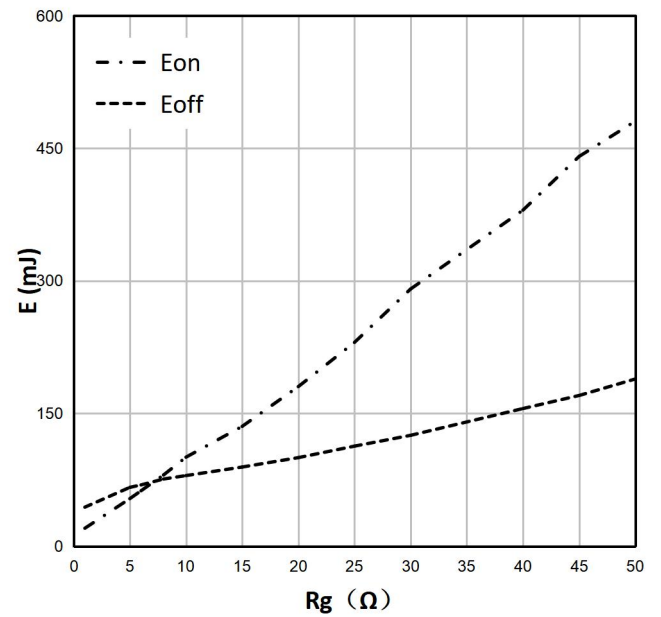
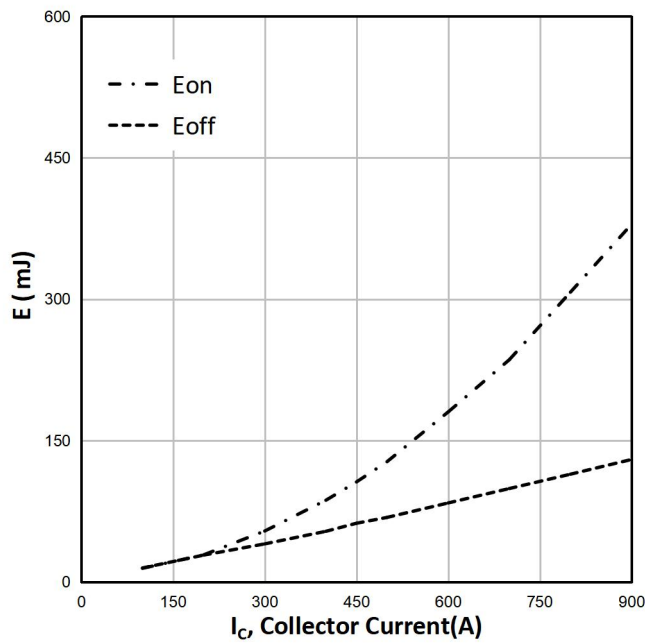
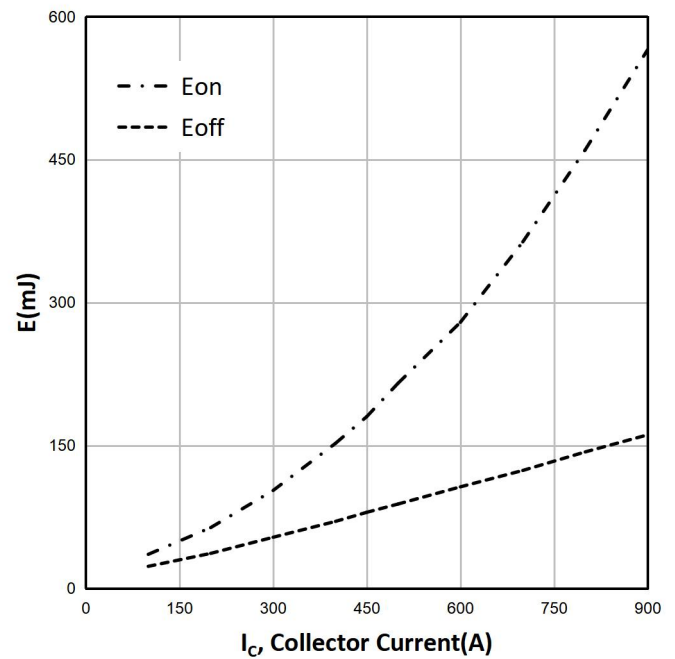
Figure9.switching losses IGBT,Inverter(typical)
 $V_{cc}=600V, I_C=450A, V_{ge}=15V/-5V, T_{vj}=25^{\circ}C$

Figure10.switching losses IGBT,Inverter(typical)
 $V_{cc}=600V, I_C=450A, V_{ge}=15V/-5V, T_{vj}=150^{\circ}C$

Figure11.switching losses IGBT,Inverter(typical)
 $V_{cc}=600V, R_{gon}=10\Omega, R_{goff}=10\Omega, V_{ge}=15V/-5V, T_{vj}=25^{\circ}C$

Figure12.switching losses IGBT,Inverter(typical)
 $V_{cc}=600V, R_{gon}=10\Omega, R_{goff}=10\Omega, V_{ge}=15V/-5V, T_{vj}=150^{\circ}C$


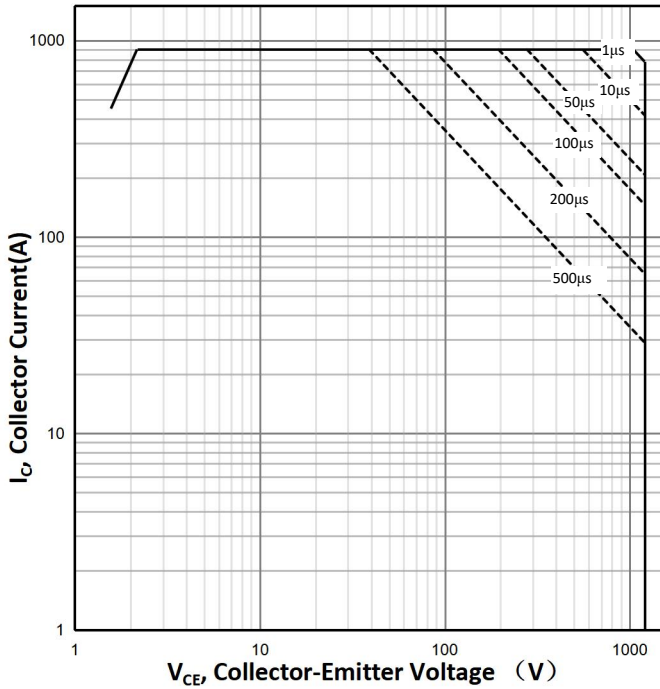
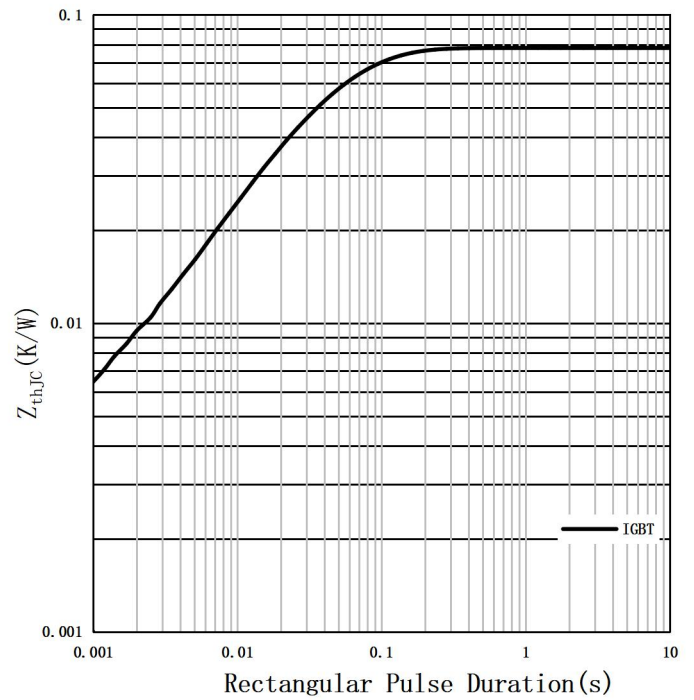
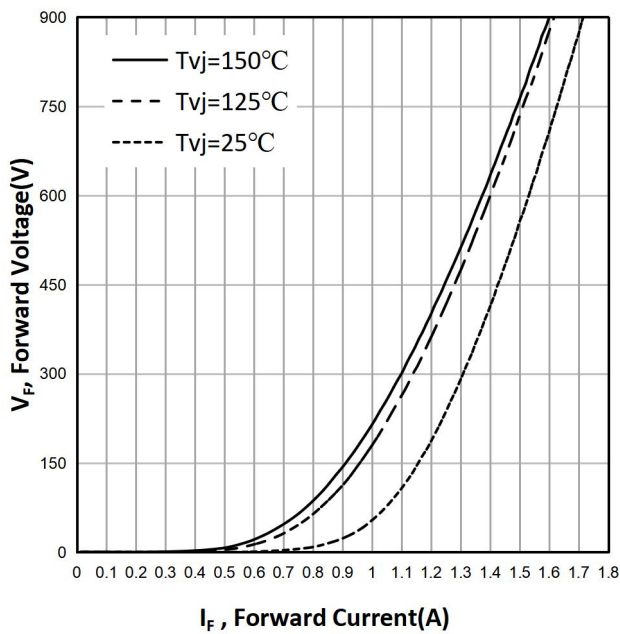
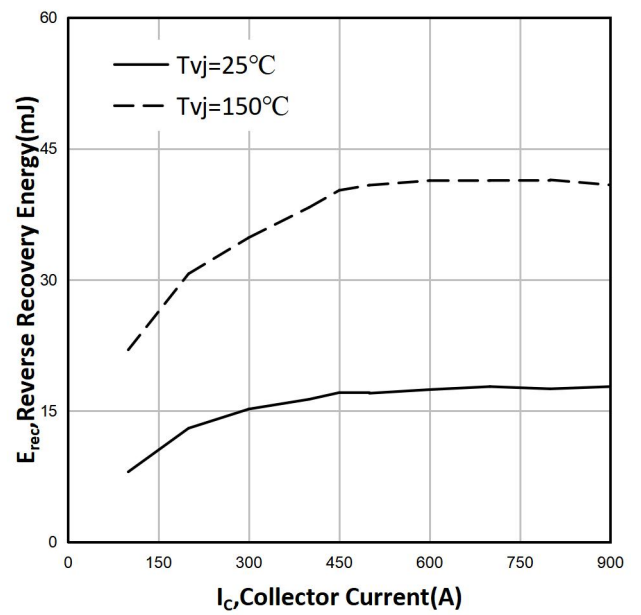
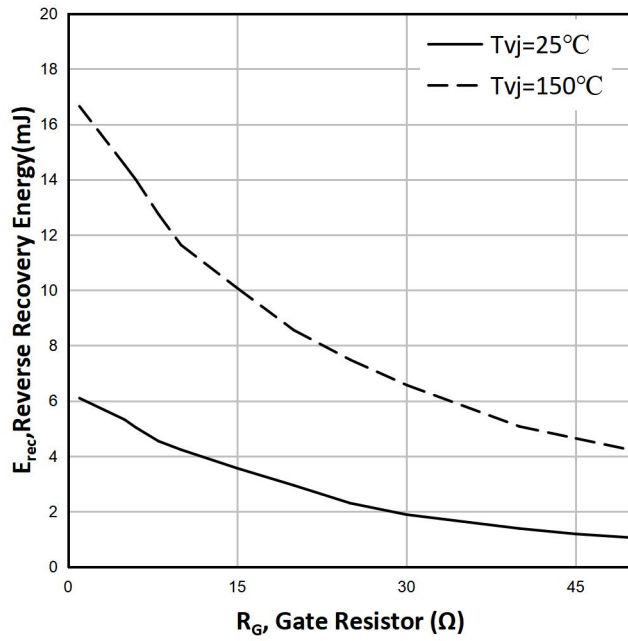
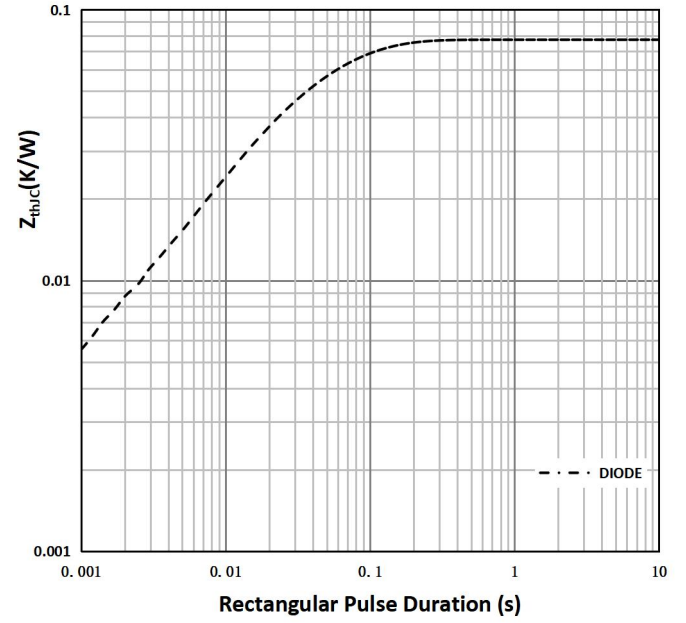
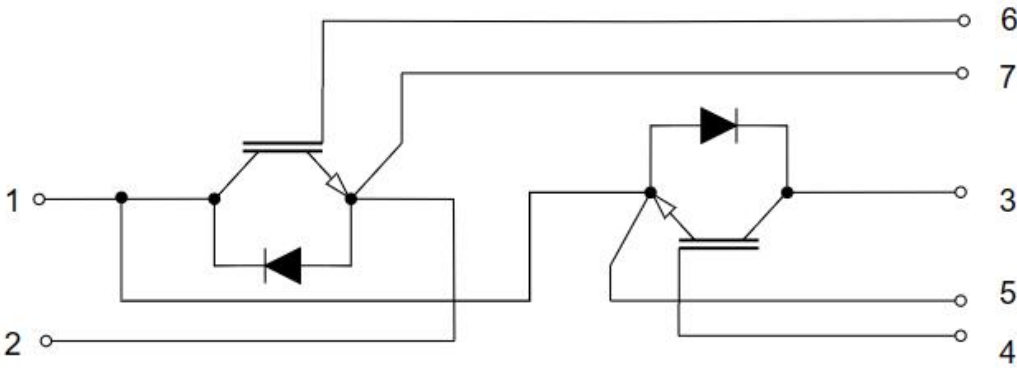
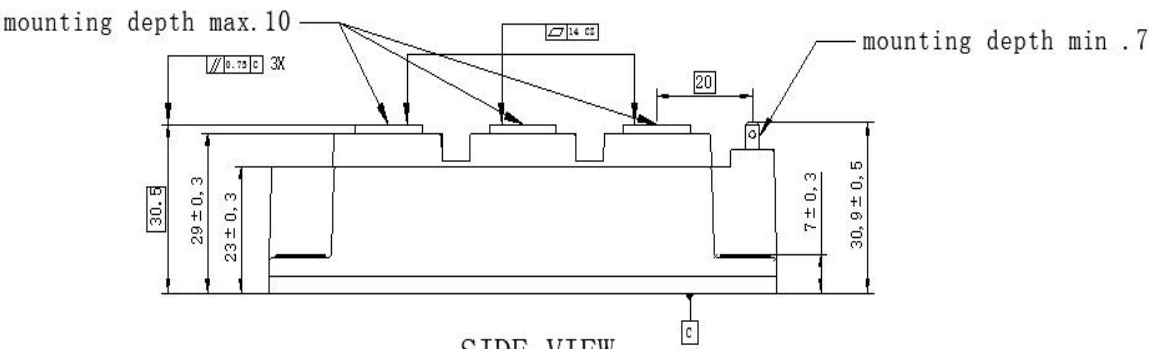
Figure13.FBSOA IGBT
 $D=0$, $T_c=25^{\circ}\text{C}$, $T_j \leq 175^{\circ}\text{C}$, $V_{ge}=15\text{V}$

Figure14.transient thermal impedance-IGBT

Figure15. forward characteristic of Diode,Inverter(typical)
 $V_{GE}=0\text{V}$

Figure 16.Reverse Recovery Energy Loss vs. IC
 $V_{cc}=600\text{V}$, $R_{gon}=10\Omega$, $R_{goff}=10\Omega$, $V_{ge}=15\text{V/-5V}$


Figure 17.Reverse Recovery Energy Loss vs. R_G
 $V_{CC}=600V, I_C=450A, V_{GE}=15V/-5V$

Figure18.transient thermal impedance-FRD


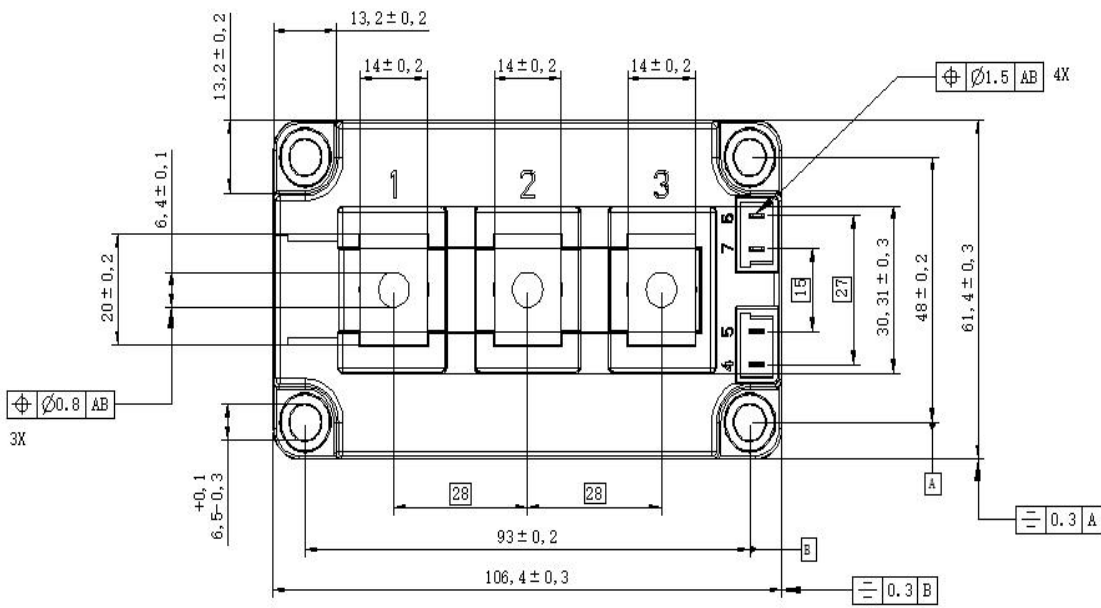
CIRCUIT DIAGRAM



PACKAGE DIMENSION



SIDE VIEW



TOP VIEW



REVISION HISTORY

Document version	Date of release	Description of changes
Rev.00	2024-08-23	Preliminary Data
Rev.01	2024-12-31	Optimized FRD Characteristics data, and add related chart



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