JLHF600B120RD3E7DN

LD3 PACK with NCE Gen.7 Trench/Fieldstop IGBT and Emitter Controlled diode and Press FIT/NTC

RoHS

Features

• Electrical features

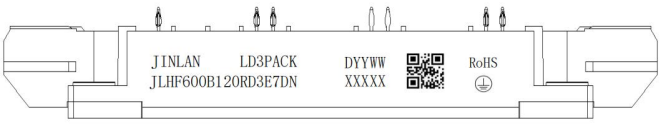
- Low V_{CEsat}
- T_{vjop}=150°C
- V_{CEsat} with positive Temperature Coefficient

• Mechanical features

- High Power and Thermal Cycling Capability
- High Power Density
- Isolated Base Plate
- PressFIT Contact Technology

LD3

MARKING DIAGRAM

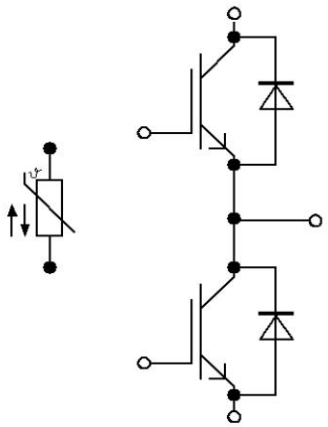


JINLAN	= Company Name
JLHF600B120RD3E7DN	= Specific Device Code
YYWW	= Year and Work Week Code
XXXXX	=Serial Number
QR code	= Custom Assembly Information

Typical Applications

• Construction, Commercial and Agriculture Vehicles
• High Power Converters
• Motor Drives
• Servo Drives

Description



Package Insulation coordination

Symbol	Description	Note or test condition	Values	Unit
V_{ISOL}	Isolation test voltage	RMS,f=50Hz,t=60s	4.0	kV
	Material of module baseplate		Cu	
	Internal isolation	basic insulation(class 1,IEC 61140)	Al_2O_3	
d_{creep}	Creepage distance	terminal to heatsink	14.5	mm
d_{creep}	Creepage distance	terminal to terminal	12.1	mm
d_{clear}	Clearance	terminal to heatsink	12.5	mm
d_{clear}	Clearance	terminal to terminal	10.0	mm
CTI	Comparative tracking index (electrical)		>200	

Package Characteristic values

Symbol	Description	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
L_{CE}	Stray Inductance			--	20	--	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal to Chip	T_C=25°C, per switch		--	0.8	--	mΩ
T_{stg}	Storage temperature			-40	--	125	°C
M	Mounting torque for module mounting	-Mounting according to valid application note	M5, Screw	3.0	--	6.0	Nm
M	Terminal connection torque	-Mounting according to valid application note	M6, Screw	3.0	--	6.0	Nm
G	Weight			--	345	--	g

Absolute Maximum Ratings

IGBT

Symbol	Description	Note or test condition	Value	Unit
V_{CES}	Collector-Emitter Voltage	T_{vj} = 25 °C	1200	V
$I_{C\ nom}$	Continuous DC collector current	T_C =100 °C,$T_{vj\ max}$ = 175 °C	600	A
I_C		T_C =25 °C,$T_{vj\ max}$ = 175 °C	900	A
I_{CRM}	Repetitive peak collector current	t_p =1 ms	1200	A
V_{GES}	Gate-emitter peak voltage		±20	V

Diode

Symbol	Description	Note or test condition		Value	Unit
V_{RRM}	Repetitive peak reverse voltage	T_{vj} = 25 °C		1200	V
I_F	Continuous DC forward current			600	A
I_{FRM}	Repetitive peak forward current	t_P = 1 ms		1200	A
I^2t	I^2t - value	t_P = 10 ms, V_R = 0 V	T_{vj} = 125 °C	30200	A^2s
			T_{vj} = 150 °C	27700	

IGBT Characteristics

Symbol	Parameter	Note or Test Condition		Min	Typ	Max	Unit
$V_{CE(sat)}$	Collector−Emitter Saturation Voltage	I_C = 600 A, V_{GE} = 15 V	T_{vj} = 25 °C	--	1.40	2.00	V
			T_{vj} =150 °C	--	1.60	--	
$V_{GE(TH)}$	Gate−Emitter Threshold Voltage	V_{GE} = V_{CE} , I_C = 12 mA,T_{vj} = 25°C		5.5	--	6.8	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} = 20V , V_{CE} = 0 V， T_{vj} = 25°C		--	--	±200	nA
R_{Gint}	Internal Gate Resistance	T_{vj} = 25 °C		--	1.62	--	Ω
C_{ies}	Input Capacitance	f = 100KHz, T_{vj} = 25 °C, V_{CE} = 25 V, V_{GE} = 0 V		--	101	--	nF
C_{oes}	Out Capacitance			--	2.57	--	nF
C_{res}	Reverse Transfer Capacitance			--	0.372	--	nF
Q_G	Gate Charge	V_{GE} = 15 V， VCE = 600 V		--	2.98	--	μC
$t_{d(on)}$	Turn−On Delay Time	I_C = 600 A,V_{CE} = 600 V, V_{GE} = ±15 V, R_{Gon} = 10 Ω	T_{vj} = 25 °C	--	1.05	--	μs
			T_{vj} = 150 °C	--	1.03	--	
t_r	Rise Time	I_C = 600 A,V_{CE} = 600 V, V_{GE} = ±15 V, R_{Gon} = 10Ω	Tvj = 25 °C	--	0.2	--	μs
			T_{vj} = 150 °C	--	0.33	--	
$t_{d(off)}$	Turn−off Delay Time	I_C = 600 A,V_{CE} = 600 V, V_{GE} = ±15 V,R_{Goff} = 15 Ω	T_{vj} = 25 °C	--	2.69	--	μs
			T_{vj} = 150 °C	--	2.88	--	
t_f	Fall Time	I_C = 600 A,V_{CE} = 600 V, V_{GE} = ±15 V, R_{Goff} = 15 Ω	T_{vj} = 25 °C	--	0.27	--	μs
			T_{vj} = 150 °C	--	0.24	--	
E_{on}	Turn−On Switching Loss per Pulse	I_C = 600 A, V_{CE} = 600 V, V_{GE} = ±15 V, R_{Gon} =10Ω	T_{vj} = 25 °C	--	171	--	mJ
			T_{vj} = 150 °C	--	253	--	
E_{off}	Turn Off Switching Loss per Pulse	I_C = 600 A, V_{CE} = 600 V, V_{GE} = ±15 V, R_{Goff} = 15 Ω	T_{vj} = 25 °C	--	116	--	mJ
			T_{vj} = 150 °C	--	137	--	
I_{SC}	SC Data	V_{GE} ≤ 15 V, V_{CC} = 800 V, V_{CEmax}=V_{CES}-L_{sCE} . di/dt	t_P ≤ 10 μs, T_{vj} = 25°C	--	3370	--	A
			t_P ≤ 10 μs, T_{vj} = 150°C	--	2700	--	
R_{thJC}	Thermal resistance, junction to case	per IGBT		--	0.054	--	K/W
$T_{vj\ op}$		Temperature under switching conditions		-40		175[1)]	℃

[1)] $T_{vj\ op}$ > 150℃ is only allowed for operation at overload conditions.

Diode Characteristics

Symbol	Parameter	Note or Test Condition		Min	Typ	Max	Unit
V_F	Diode Forward Voltage	I_F = 600 A, V_{GE} = 0 V	T_{vj} = 25 °C	--	1.80	2.80	V
			T_{vj} = 150 °C	--	1.70	--	
Q_{rr}	Recovered Charge	V_R = 600 V, I_F = 600 A, V_{GE} = ±15 V	T_{vj} = 25 °C	--	58.01	--	μC
			T_{vj} = 150 °C	--	136.42	--	
I_{RM}	Peak Reverse Recovery Current	V_R = 600 V, I_F = 600 A, V_{GE} = ±15 V	T_{vj} = 25 °C	--	126.92	--	A
			T_{vj} = 150 °C	--	196.83	--	
E_{rec}	Reverse recovery energy	V_R = 600 V, I_F = 600 A, V_{GE} =±15 V	T_{vj} = 25 °C	--	19	--	mJ
			T_{vj} = 150 °C	--	45	--	
R_{thJC}	Thermal resistance, junction to case	per diode		--	0.103	--	K/W
$T_{vj\ op}$		Temperature under switching conditions		-40		175[2)]	℃

[2)] $T_{vj\ op}$ > 150℃ is only allowed for operation at overload conditions.

NTC Characteristics

Symbol	Parameter	Note or Test Condition	Value			Unit
			Min	Typ	Max	
R_{25}	Rated Resistance	T_C = 25°C	--	5	--	kΩ
ΔR/R	Deviation of R100	T_C=100 ℃,R_{100}=493Ω	-5	--	5	%
P_{25}	Power Dissipation	T_C = 25°C	--	--	20	mW
$B_{25/50}$	B-value	$R_2=R_{25}\exp[B_{25/50}(1/T_2- 1/(298.15K))]$	--	3375	--	K
$B_{25/80}$	B-value	$R_2=R_{25}\exp[B_{25/80}(1/T_2- 1/(298.15K))]$	--	3411	--	K
$B_{25/100}$	B-value	$R_2=R_{25}\exp[B_{25/100}(1/T_2- 1/(298.15K))]$	--	3433	--	K

Figure1.Output characteristic IGBT,Inverter(typical)
T_{vj}=25°C

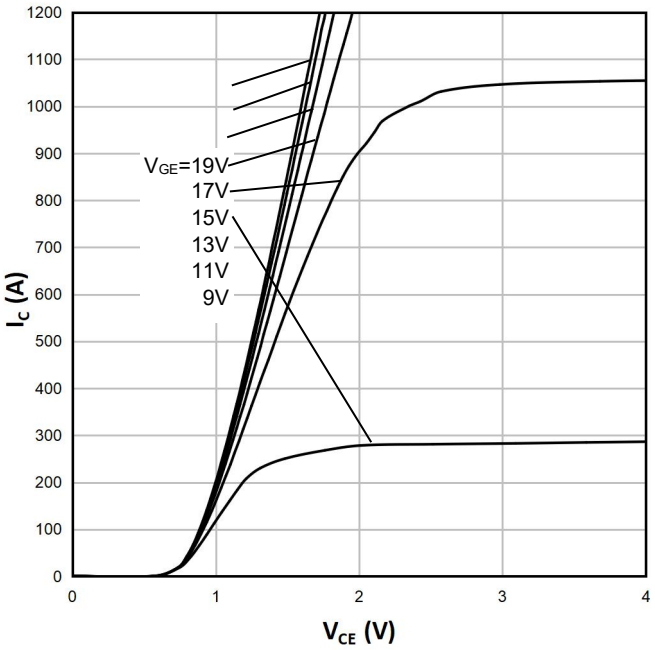


Figure2.Output characteristic IGBT,Inverter(typical)
T_{vj}=150℃

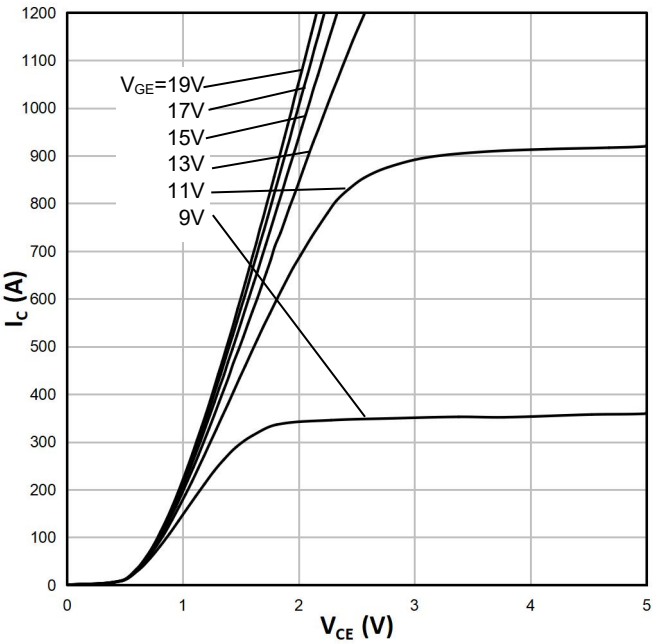


Figure3. $V_{CE(sat)}$ vs. Temperature

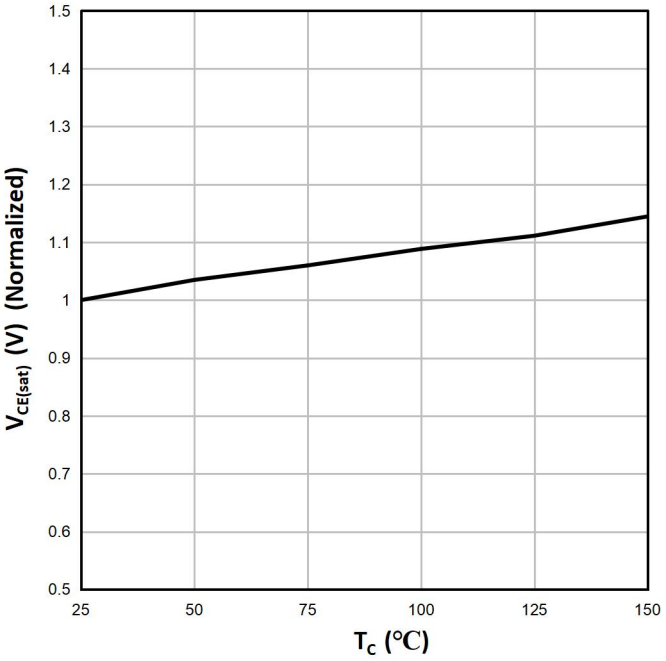


Figure4.transfer characteristic IGBT,Inverter(typical)
V_{CE}=20V

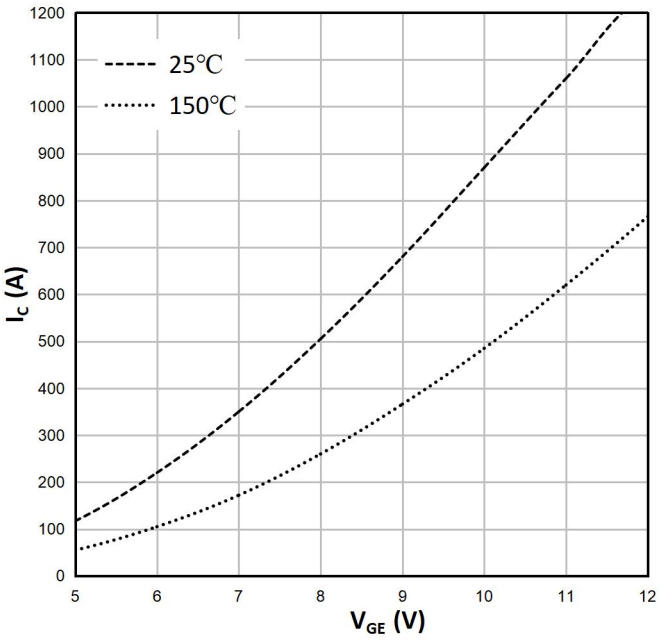


Figure5. V_{TH} vs. Temperature

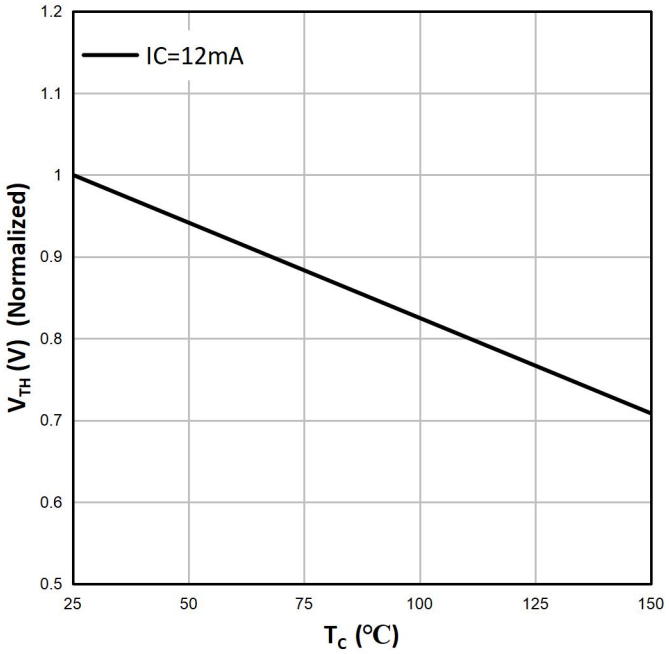


Figure6. Gate Charge Waveform

V_{CC}=600V,V_{GE}=15V,T_{vj}=25°C

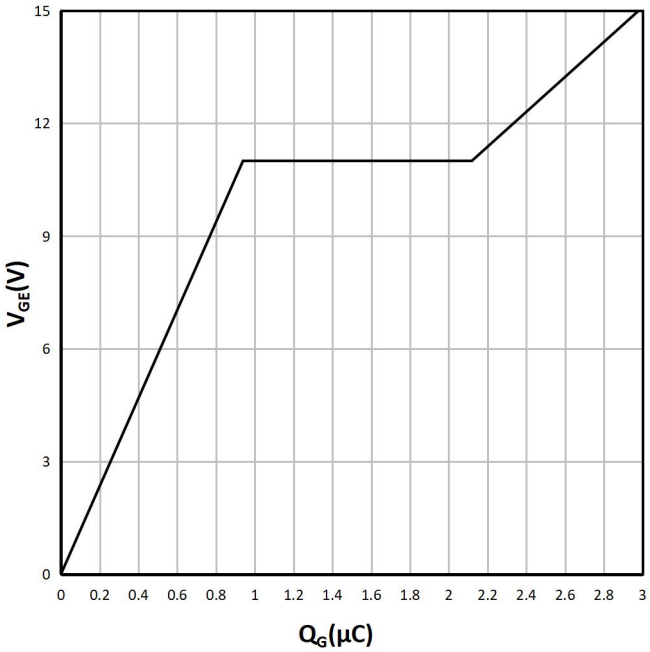


Figure7. Ptot vs. Case Temperature

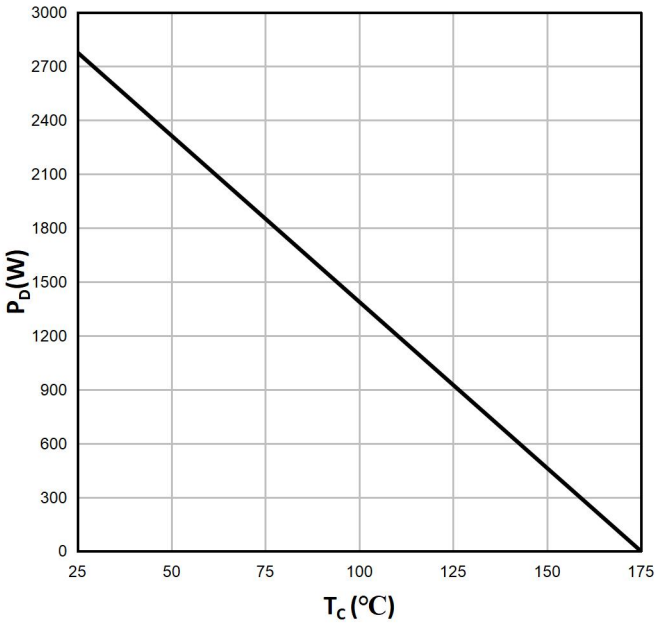


Figure8.FBSOA IGBT

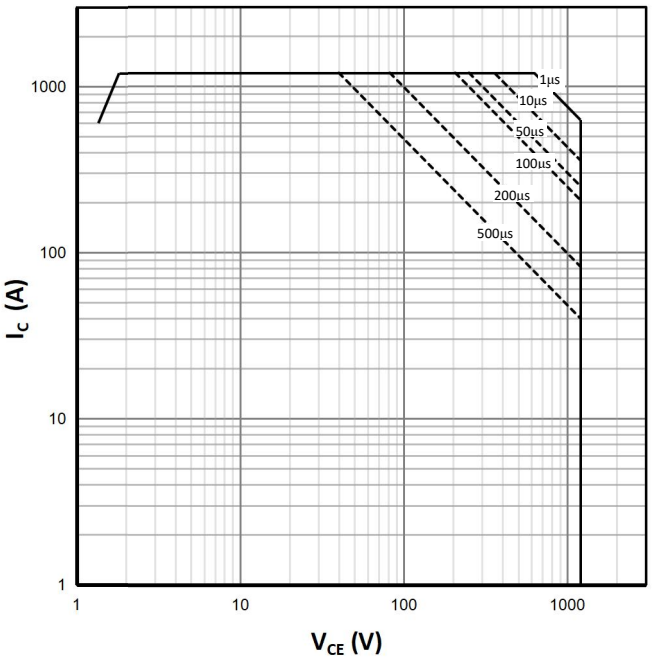


Figure9.RBSOA IGBT

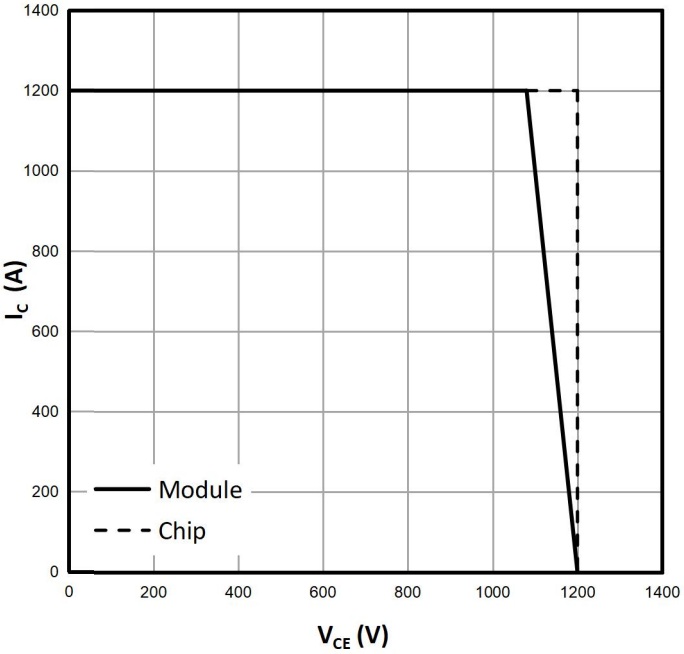


Figure10.switching losses IGBT,Inverter(typical)
Vcc=600V,Rgon=10Ω,Rgoff=15Ω,Vge=±15V

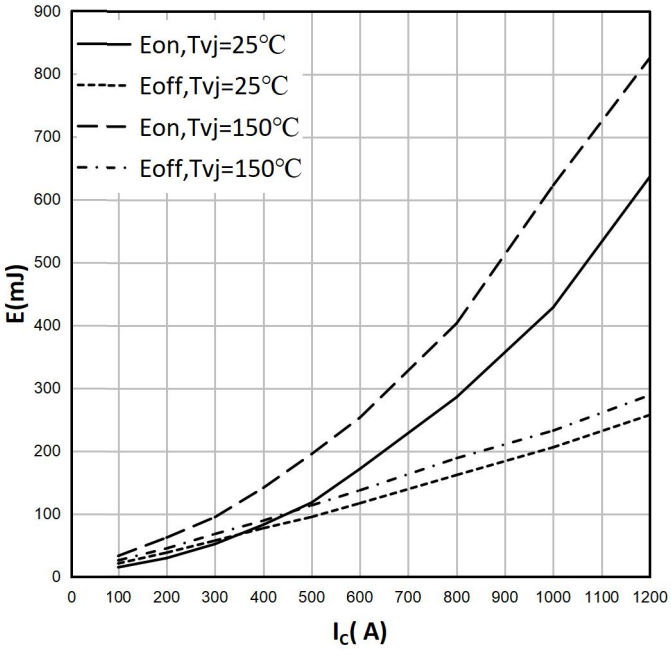


Figure11.switching losses IGBT,Inverter(typical)
Vcc=600V,IC=600A，Vge=±15V

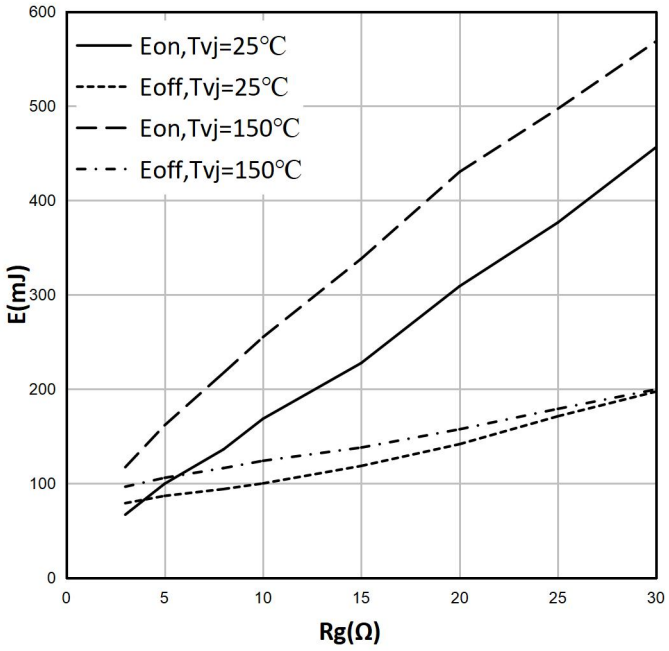


Figure12.transient thermal impedance

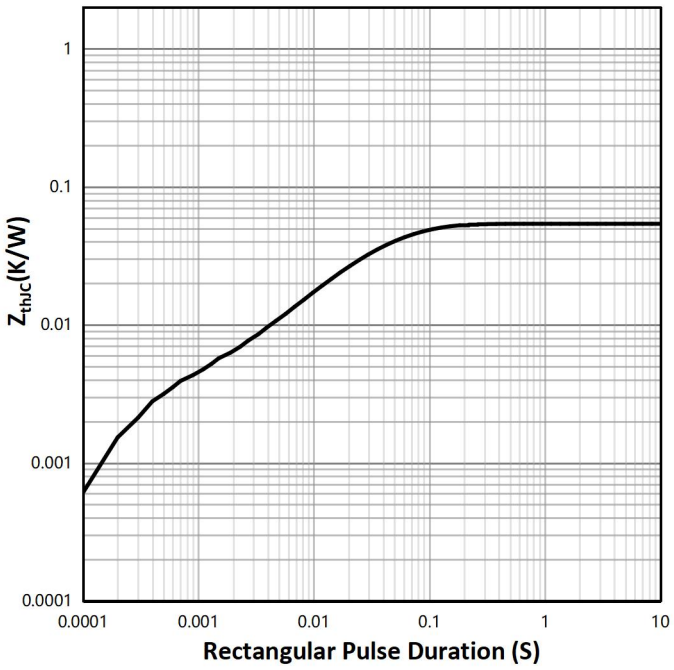


Figure13. forward characteristic of Diode,Inverter(typical)
V_{GE}=0V

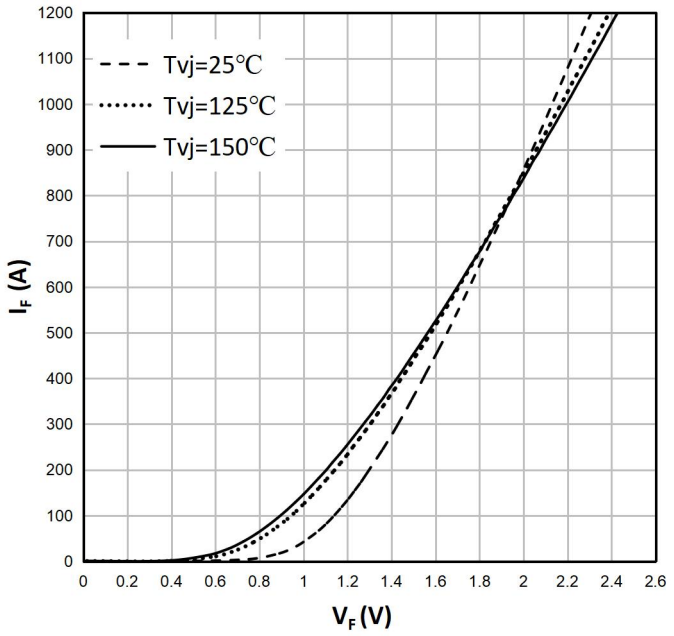


Figure 14.Reverse Recovery Energy Loss vs. IC
Vcc=600V,Rgon=10Ω,Rgoff=15Ω,Vge=±15V

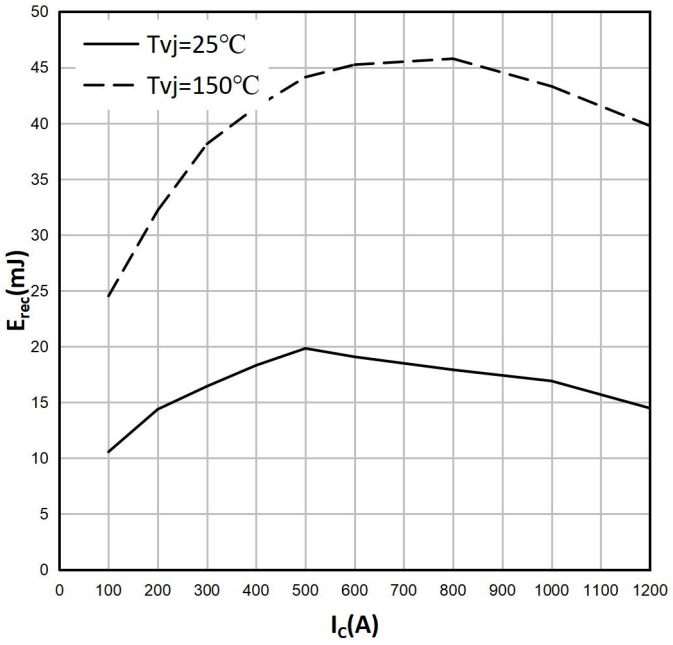


Figure 15.Reverse Recovery Energy Loss vs. RG
Vcc=600V, IC=600A, Vge=±15V

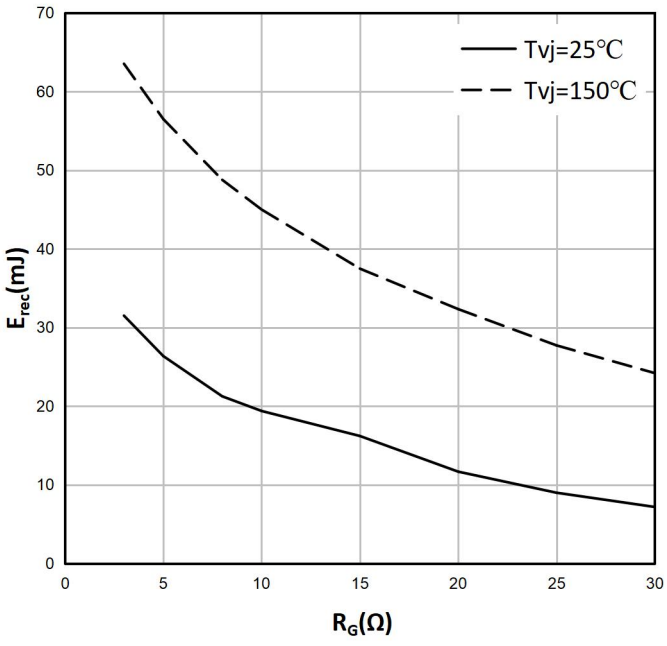
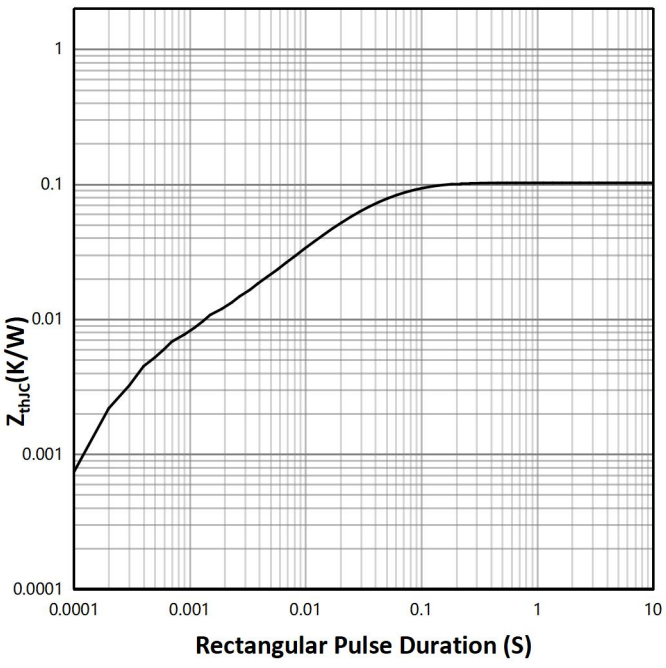
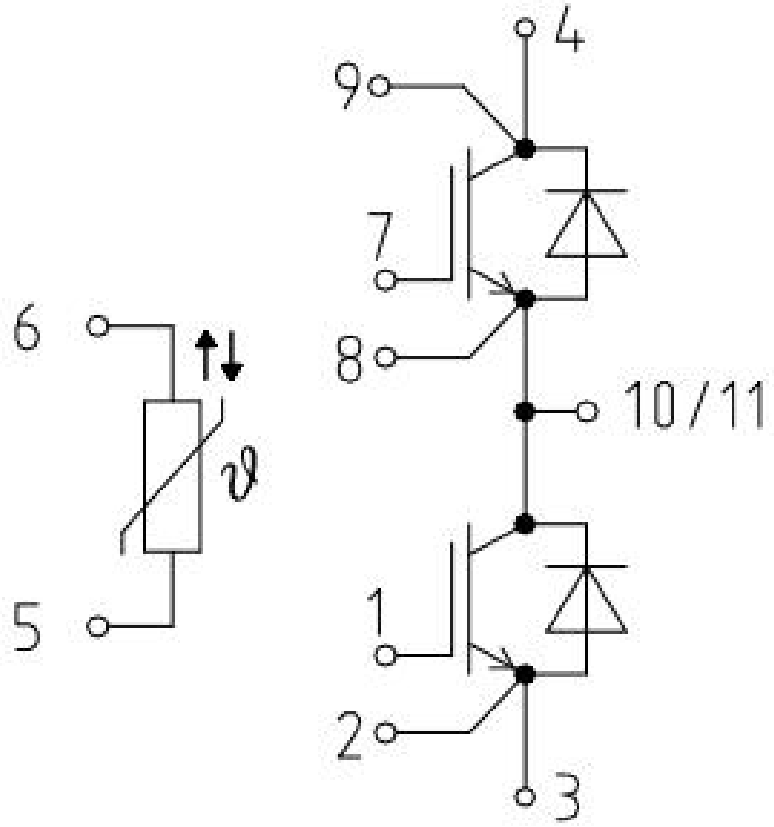


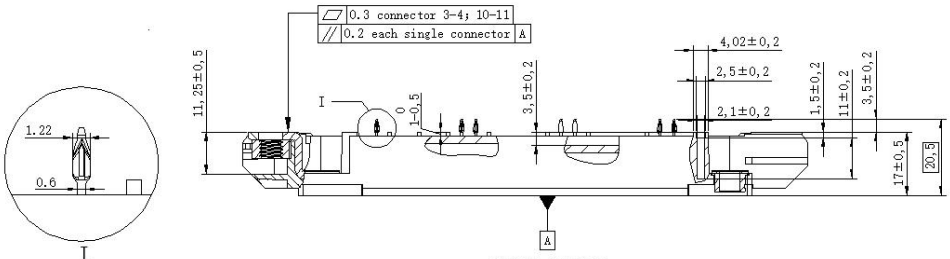
Figure16.transient thermal impedance



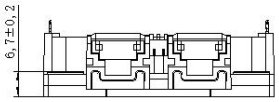
CIRCUIT DIAGRAM



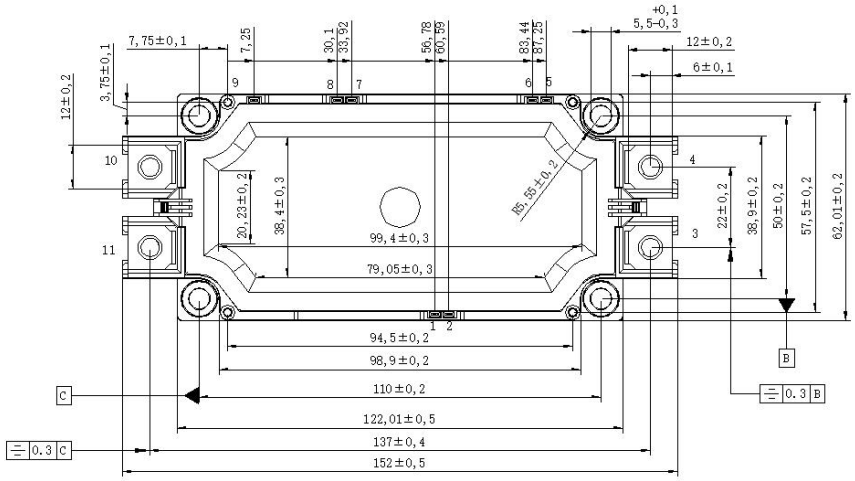
PACKAGE DIMENSION



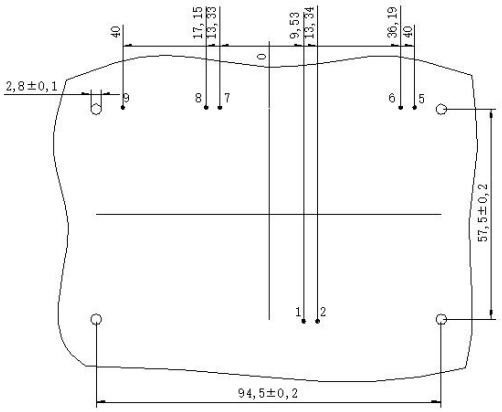
SIDE VIEW



SIDE VIEW



TOP VIEW



PCB孔位图

REVISION HISTORY

Document version	Date of release	Description of changes
Rev.00	2023-11-13	Preview
Rev.01	2024-4-28	Chart updated
Rev.02	2025-2-20	IGBT & FRD optimized

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