JLPI100B120RN3E7SN

LN3 PACK module with Gen.7 Trench/Fieldstop IGBT and Emitter Controlled diode and NTC

RoHS

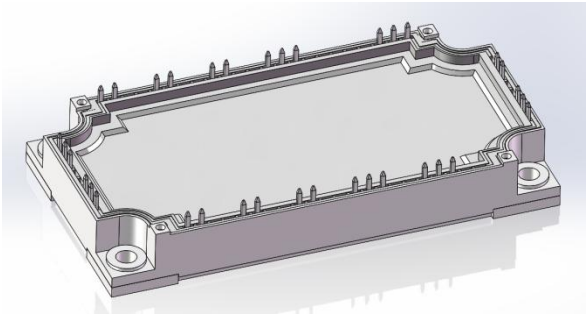
Features

• Electrical features

- V_{CES} = 1200 V
- $I_{C\ nom}$ = 100 A / I_{CRM} = 200 A
- Low V_{CEsat}
- Overload operation up to 175℃

• Mechanical features

- High power and thermal cycling capability
- Integrated NTC temperature sensor
- Copper base plate
- Al_2O_3 substrate with low thermal resistance



LN3 Pack

MARKING DIAGRAM

Typical Applications

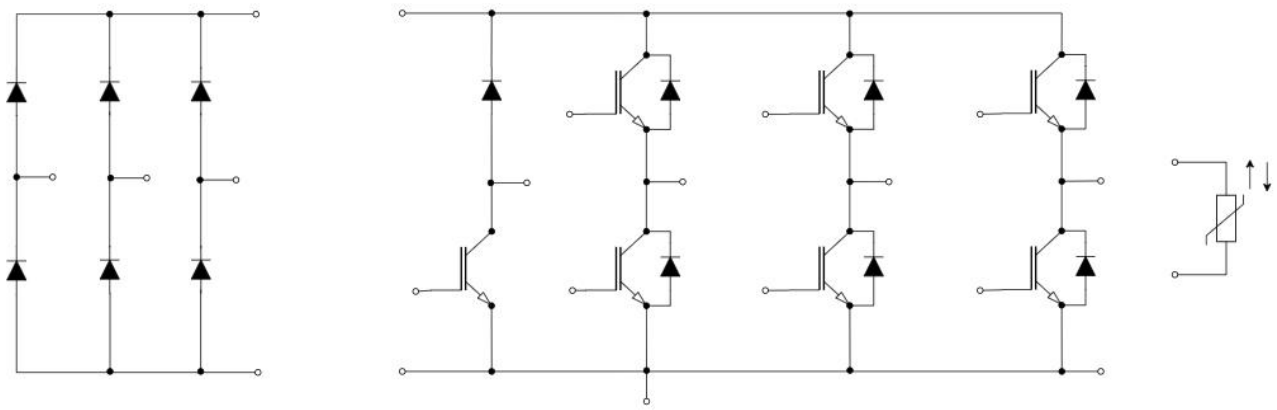
• Auxiliary inverters

• Motor drives

• Servo drives

JINLAN	= Company Name
JLPI100B120RN3E7SN	= Specific Device Code
YYWW	= Year and Work Week Code
XXXXX	= Serial Number
QR code	= Custom Assembly

Description



Package Insulation coordination

Parameter	Symbol	Note or test condition	Values	Unit
Isolation test voltage	V_{ISOL}	RMS,f=50 Hz,t=60s	2.5	kV
Internal isolation		basic insulation(class 1,IEC 61140)	Al_2O_3	
Creepage distance	d_{creep}	terminal to heatsink	10.0	mm
Clearance	d_{clear}	terminal to heatsink	7.5	mm
Comparative tracking index (electrical)	CTI		>200	
RTI Elec.	RTI	housing	140	℃

Package Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Stray Inductance	LCE		--	40	--	nH
Module Lead Resistance, Terminal to Chip	$R_{AA'+CC'}$	T_C=25℃, per switch	--	3	--	mΩ
Module Lead Resistance, Terminal to Chip	$R_{CC'+EE'}$	T_C=25℃, per switch	--	4	--	mΩ
Storage Temperature Range	T_{STG}		-40		125	℃
Mounting Torque, Screw M5	M	M5, Screw	3		6	N.m
Weight	G		--	300	--	g

IGBT, Inverter

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

Symbol	Description	Value	Unit
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	±30	V
I_C	Collector Current @ T_C=25℃	200	A
	Collector Current @ T_C=100℃	100	A
I_{Cpuls}	Pulsed Collector Current，t_p limited by T_{jmax}	300	A

Characteristics (Tc = 25°C unless otherwise noted)

Symbol	Parameter	Test Condition		Min	Typ	Max	Unit
$V_{CE(sat)}$	Collector−Emitter Saturation Voltage	I_C=100A，V_{GE}=15V	T_{vj}=25 °C	--	1.60	2.45	V
			T_{vj}=150 °C	--	1.95	--	
$V_{GE(th)}$	Gate Threshold Voltage	I_C=3 mA,V_{CE}=V_{GE}		5.0	6.0	7.0	V
I_{CES}	Collector-Emitter Leakage Current	V_{GE}=0V,V_{CE}=1200 V		--	--	1	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE}=30V,V_{CE}=0 V		--	--	100	nA
R_{Gint}	Internal Gate Resistance	f=1MHz		--	2.19	--	Ω
C_{ies}	Input Capacitance	V_{CE}=30V,V_{GE}=0 V, f=1MHz		--	12	--	nF
C_{oes}	Out Capacitance			--	0.904	--	nF
C_{res}	Reverse Transfer			--	0.057	--	nF
Q_G	Gate Charge	V_{CE}=600V, I_C=100A,V_{GE}=15V		--	0.384	--	μC
$t_{d(on)}$	Turn−On Delay Time	V_{CE}=600V,I_C=100A, V_{GE}=15V/-5V,R_{gon}=25Ω,R_{goff}=25Ω, Inductive Load		--	0.31	--	μs
t_r	Rise Time			--	0.1	--	
$t_{d(off)}$	Turn−off Delay Time			--	0.6	--	
t_f	Fall Time			--	0.12	--	
E_{on}	Turn−On Switching Loss per Pulse			--	22.3	--	mJ
E_{off}	Turn Off Switching Loss per Pulse			--	8.8	--	
$t_{d(on)}$	Turn−On Delay Time	V_{CE}=600V,I_C=100A, V_{GE}=15V/-5V,R_{gon}=25Ω,R_{goff}=25Ω, Inductive Load,T_{vj}=150°C		--	0.3	--	μs
t_r	Rise Time			--	0.13	--	
$t_{d(off)}$	Turn−off Delay Time			--	0.65	--	
t_f	Fall Time			--	0.22	--	
E_{on}	Turn−on Switching Loss per Pulse			--	30.27	--	mJ
E_{off}	Turn Off Switching Loss per Pulse			--	11.89	--	
I_{SC}	SC Data	V_{GE}=15V,V_{CC}≤800V, t_{SC}≤10us,T_{vj}≤150°C		--	350	--	A
R_{thJC}	Thermal resistance	Junction-to-Case (per IGBT)			0.328		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, Inverter

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

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	100	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	200	A

Characteristics (Tc=25℃ unless otherwise noted)

Symbol	Parameter	Test Condition		Min	Typ	Max	Unit
V_F	Diode Forward Voltage	I_F=100A	T_j=25°C	--	1.60	2.40	V
			T_j=150°C	--	1.52	--	
Q_r	Recovered Charge	V_{CE}=600V,I_C=100A, V_{GE}=15V/-5V,R_{gon}=25Ω,R_{goff}=25Ω, Inductive Load		--	10.73	--	μC
I_{RM}	Peak Reverse Recovery Current			--	60.27	--	A
T_{rr}	Reverse Recovery Time			--	409	--	ns
E_{rec}	Reverse Recovery Energy			--	3.49	--	mJ
Q_r	Recovered Charge	V_{CE}=600V,I_C=100A, V_{GE}=15V/-5V,R_{gon}=25Ω,R_{goff}=25Ω, Inductive Load,T_{vj}=150°C		--	22.59	--	μC
I_{RM}	Peak Reverse Recovery Current			--	63.35	--	A
T_{rr}	Reverse Recovery Time			--	709	--	ns
E_{rec}	Reverse Recovery Energy			--	7.63	--	mJ
R_{thJC}	Thermal resistance	Junction-to-Case (per diode)			0.508		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.

Diode, Rectifier

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

Symbol	Description	Test Condition	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	T_{Vj}=25°C	1600	V
I_F	Diode Continuous Forward Current	T_c=100°C	100	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	T_c=100°C	200	A

Characteristics (Tc=25℃ unless otherwise noted)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
V_F	Diode Forward Voltage	I_F = 100A, T_j = 150 °C	--	1.21	--	V
I_R	Reverse Current	T_j=175°C, V_R=1600V	--	2	--	mA
R_{thJC}	Thermal resistance	Junction-to-Case (per diode)	--	0.364	--	K/W
$T_{vj\ op}$		Temperature under switching conditions	-40		175[3)]	℃

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

IGBT, Chopper

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

Symbol	Description	Value	Unit
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	±30	V
I_C	Collector Current @ T_C=25℃	100	A
	Collector Current @ T_C=80℃	50	A
I_{CM}	Pulsed Collector Current，t_p=1s	150	A

Characteristics (Tc = 25°C unless otherwise noted)

Symbol	Parameter	Test Condition		Min	Typ	Max	Unit
$V_{CE(sat)}$	Collector−Emitter Saturation Voltage	I_C=50A，V_{GE}=15V	T_{vj}=25°C	--	1.45	2.15	V
			T_{vj}= 150°C	--	1.70	--	
$V_{GE(th)}$	Gate Threshold Voltage	I_C=1mA,V_{CE}=V_{GE}		5.0	6.0	7.0	V
I_{CES}	Collector-Emitter Leakage Current	V_{GE}=0V,V_{CE}=1200V		--	--	1	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE}=30V,V_{CE}=0V		--	--	200	nA
R_{Gint}	Internal Gate Resistance	f=1MHz		--	1.2	--	Ω
C_{ies}	Input Capacitance	V_{CE}=25V,V_{GE}=0V, f=1MHz		--	7.38	--	nF
C_{oes}	Out Capacitance			--	0.525	--	nF
C_{res}	Reverse Transfer			--	0.038	--	nF
Q_G	Gate Charge	V_{CE}=600V, I_C=50A,V_{GE}=15V		--	0.28	--	μC
$t_{d(on)}$	Turn−On Delay Time	V_{CE}=600V,I_C=50A, V_{GE}=15V/-5V,R_{gon}=15Ω,R_{goff}=15Ω, Inductive Load		--	0.16	--	μs
t_r	Rise Time			--	0.04	--	
$t_{d(off)}$	Turn−off Delay Time			--	0.3	--	
t_f	Fall Time			--	0.2	--	
E_{on}	Turn−On Switching Loss per Pulse			--	2.95	--	mJ
E_{off}	Turn Off Switching Loss per Pulse			--	4.3	--	
$t_{d(on)}$	Turn−On Delay Time	V_{CE}=600V,I_C=50A, V_{GE}=15V/-5V,R_{gon}=15Ω,R_{goff}=15Ω, Inductive Load,T_{vj}=150°C		--	0.11	--	μs
t_r	Rise Time			--	0.04	--	
$t_{d(off)}$	Turn−off Delay Time			--	0.37	--	
t_f	Fall Time			--	0.32	--	
E_{on}	Turn−on Switching Loss per Pulse			--	5.18	--	mJ
E_{off}	Turn Off Switching Loss per Pulse			--	6.13	--	
I_{SC}	SC Data	V_{GE}=15V,V_{CC}≤600V, t_{SC}≤10us,T_j≤150°C		--	285	--	A
R_{thJC}	Thermal resistance	Junction-to-Case (per IGBT)			0.42		K/W
$T_{vj\ op}$		Temperature under switching conditions		-40		175[4)]	℃

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

Diode, Chopper

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

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	25	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	50	A

Characteristics (Tc=25℃ unless otherwise noted)

Symbol	Parameter	Test Condition		Min	Typ	Max	Unit
V_F	Diode Forward Voltage	I_F=25A	T_j=25°C	--	1.35	2.00	V
			T_j=175°C	--	1.15	--	
Q_r	Recovered Charge	V_{CE}=600V,I_C=50A, V_{GE}=15V/-5V,R_{gon}=15Ω,R_{goff}=15Ω, Inductive Load		--	2.56	--	μC
I_{RM}	Peak Reverse Recovery Current			--	54.5	--	A
T_{rr}	Reverse Recovery Time			--	87	--	ns
E_{rec}	Reverse Recovery Energy			--	1.15	--	mJ
Q_r	Recovered Charge	V_{CE}=600V,I_C=50A, V_{GE}=15V/-5V,R_{gon}=15Ω,R_{goff}=15Ω, Inductive Load,T_{vj}=150°C		--	8.81	--	μC
I_{RM}	Peak Reverse Recovery Current			--	61.2	--	A
T_{rr}	Reverse Recovery Time			--	398	--	ns
E_{rec}	Reverse Recovery Energy			--	4.02	--	mJ
R_{thJC}	Thermal resistance	Junction-to-Case (per diode)			0.66		K/W
$T_{vj\ op}$		Temperature under switching conditions		-40		175[5)]	℃

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

NTC Characteristics (Tc = 25°C unless otherwise noted)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
R_{25}	Rated Resistance		--	5.0	--	kΩ
ΔR/R	Deviation of R100	T_C=100 ℃,R_{100}=493.3Ω	-5	--	5	%
P_{25}	Power Dissipation		--	--	20.0	mW
$B_{25/50}$	B-value	R2=R25exp[B25/50(1/T2- 1/(298.15K))]	--	3375	--	K
$B_{25/80}$	B-value	R2=R25exp[B25/80(1/T2- 1/(298.15K))]	--	3411	--	K
$B_{25/100}$	B-value	R2=R25exp[B25/100(1/T2- 1/(298.15K))]	--	3433	--	K

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

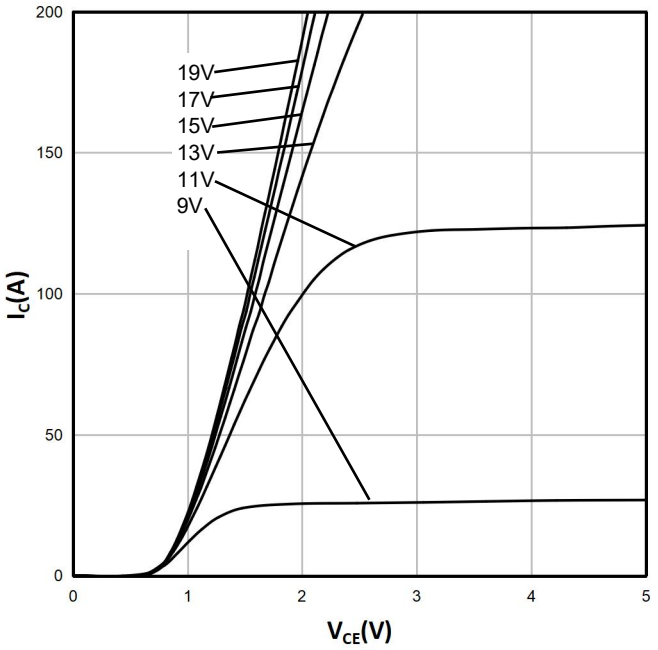


Figure2.output characteristic IGBT,Inverter(typical)
T_{vj}=150°C

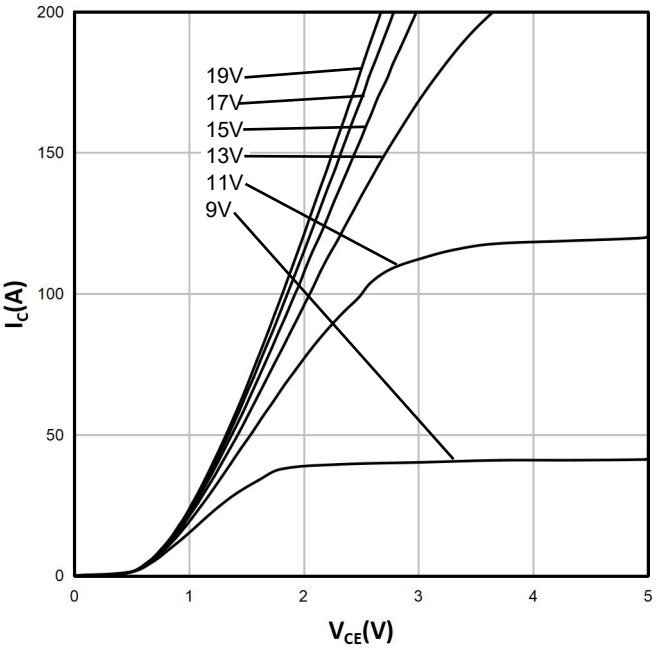


Figure3. $V_{CE(sat)}$ vs. Temperature,Inverter(typical)

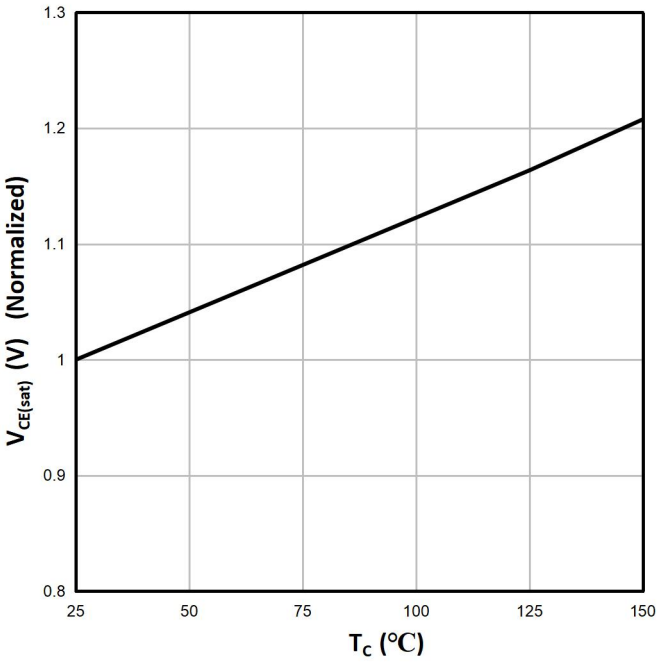


Figure4.transfer characteristic IGBT,Inverter(typical)
V_{CE}=20V

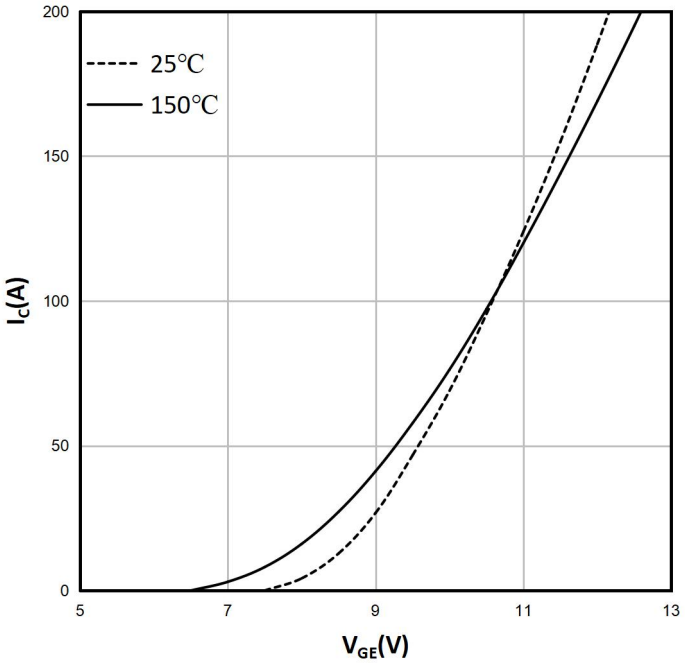


Figure5. V_{TH} vs. Temperature,Inverter(typical)

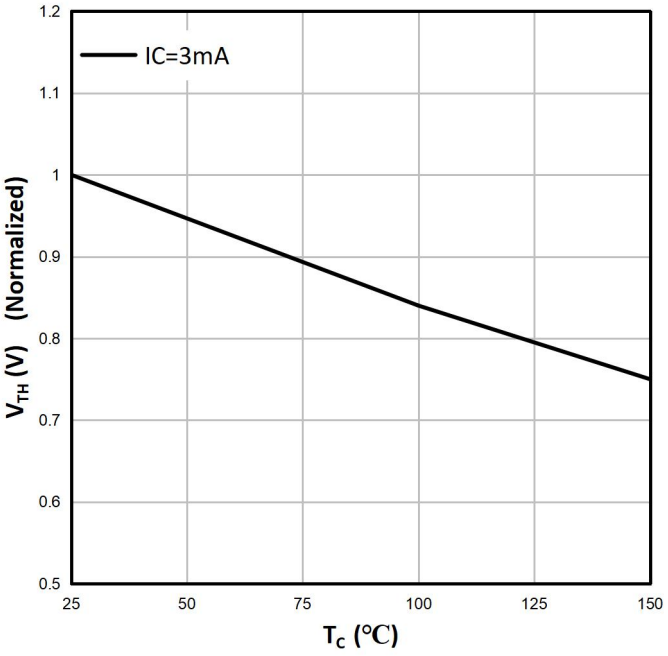


Figure6. Gate Charge Waveform,Inverter(typical)
Vcc=600V

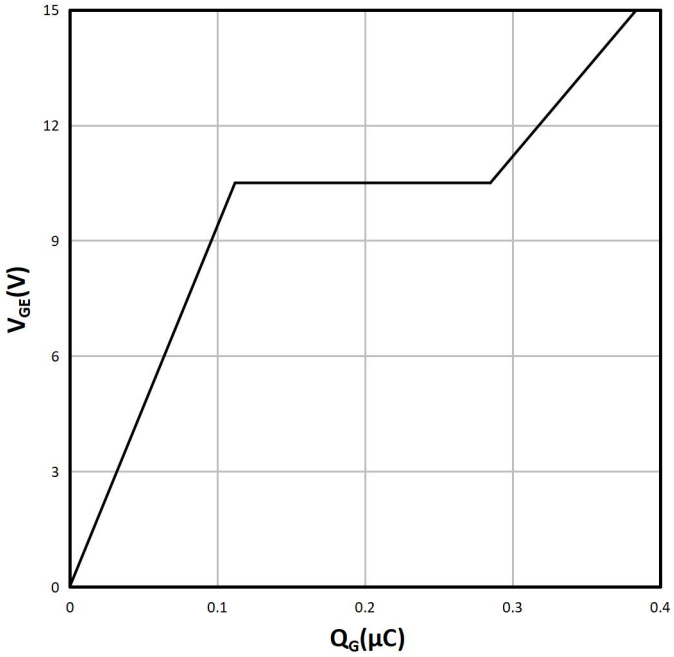


Figure7.switching losses IGBT,Inverter(typical)
Vcc=600V,Rgon=25Ω,Rgoff=25Ω,Vge=15V/-5V

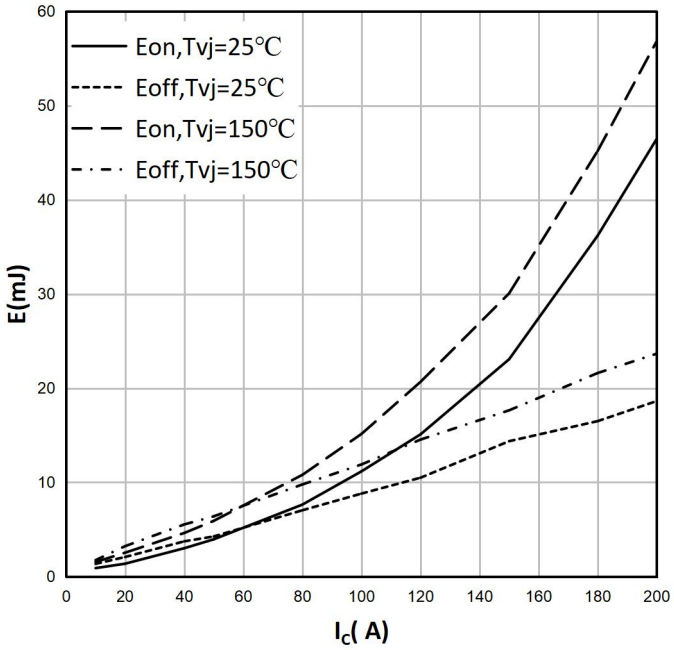


Figure8.switching losses IGBT,Inverter(typical)
Vcc=600V,IC=100A,Vge=15V/-5V

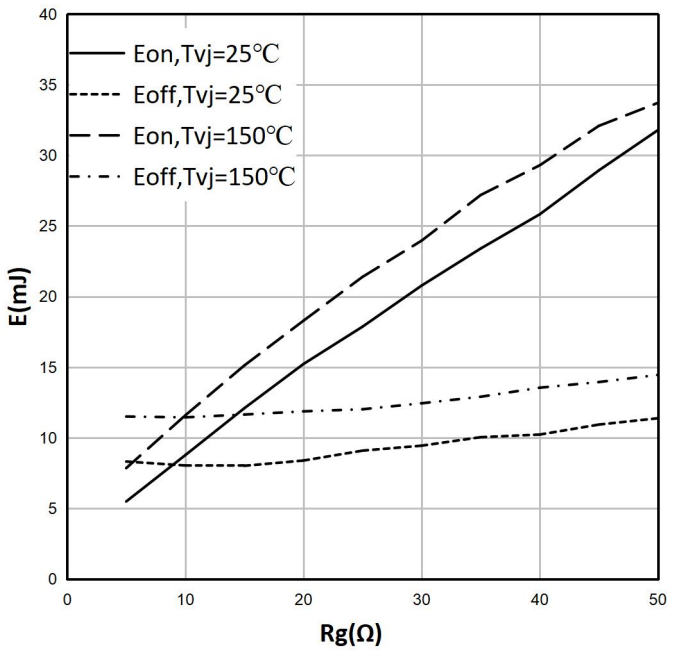


Figure9.FBSOA, IGBT, Inverter (typical)
D=0, Tc=25℃,Tj<=175℃,Vge=15V

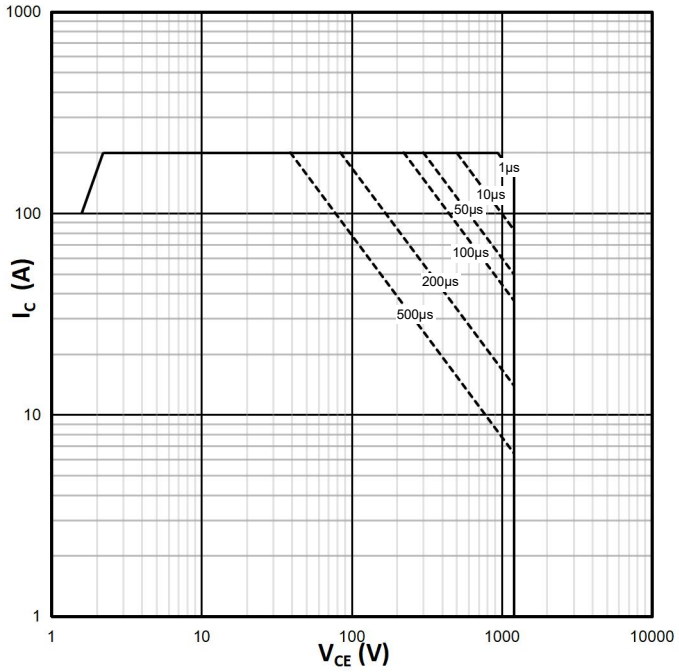


Figure10.transient thermal impedance,IGBT, Inverter (typical)

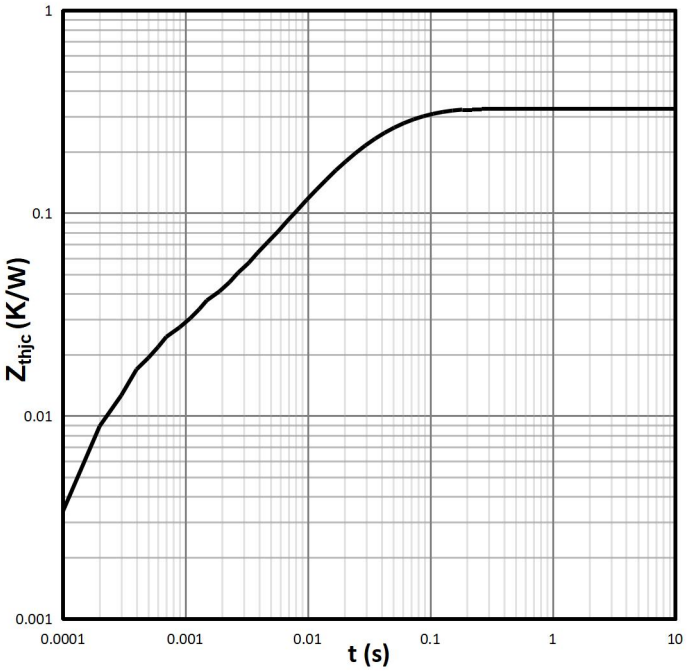


Figure11.forward characteristic of Diode,Inverter (typical)
V_{GE}=0V

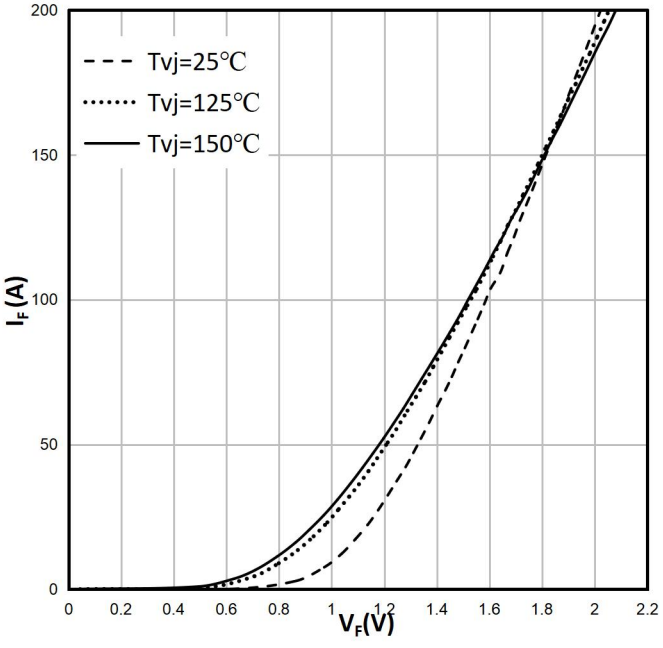


Figure 12.Reverse Recovery Energy Loss vs. IC ,Inverter (typical)
Vcc=600V,Rgon=25Ω,Rgoff=25Ω,Vge=15V/-5V

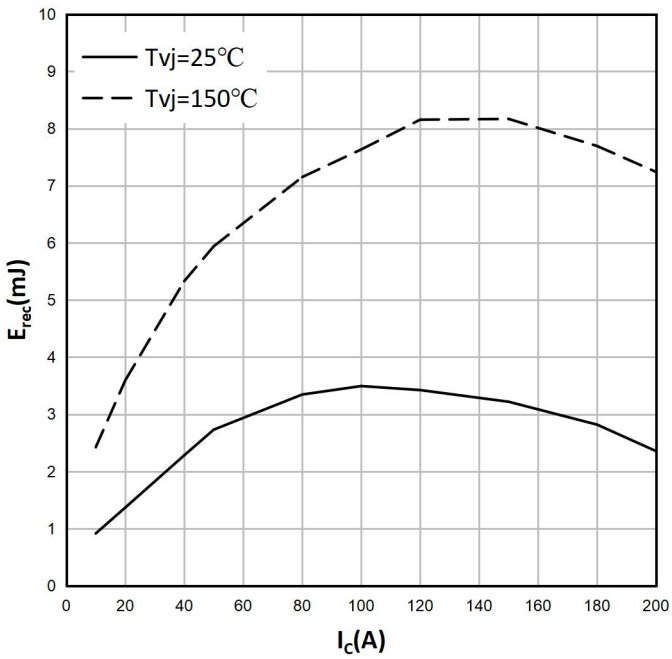


Figure13.Reverse Recovery Energy Loss vs. RG ,Inverter(typical)

Vcc=600V,IC=100A,Vge=15V/-5V

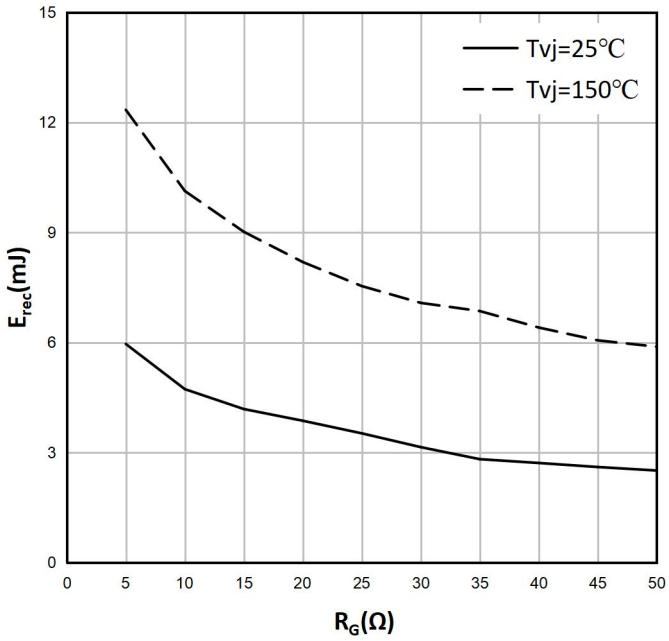


Figure14.transient thermal impedance, Diode,Inverter (typical)

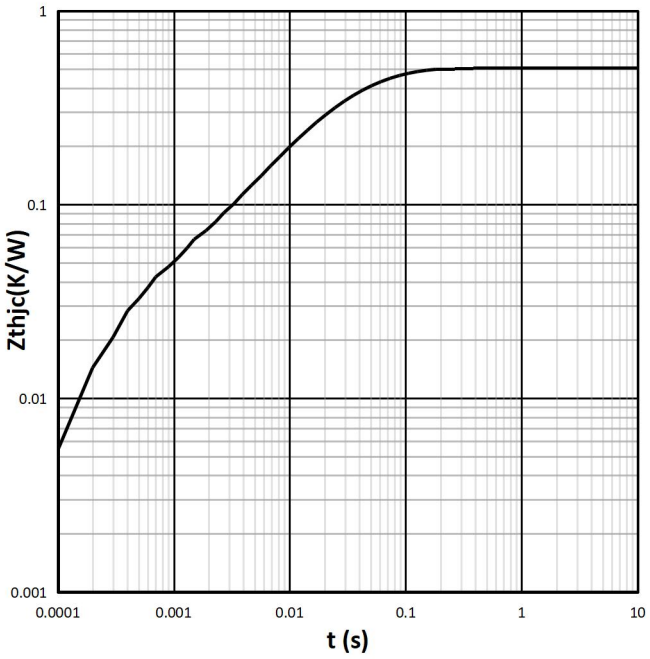


Figure15.forward characteristic of Diode,Rectifier(typical)

V_{GE}=0V

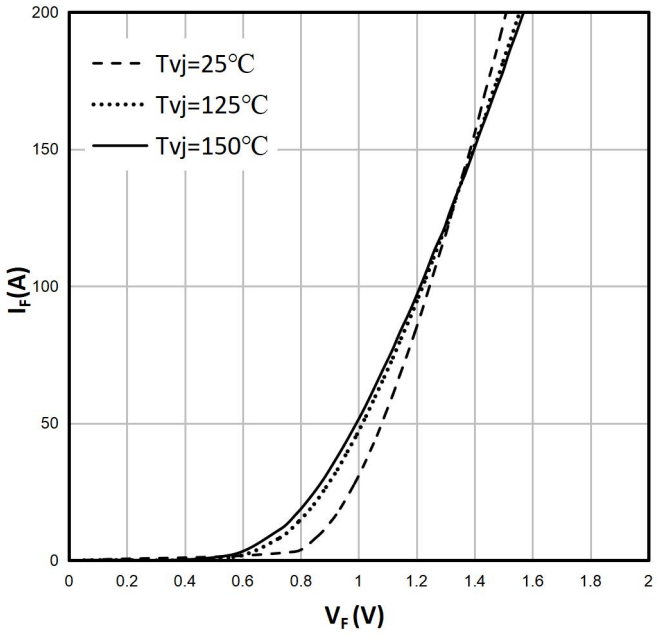


Figure 16.transient thermal impedance,Diode, Rectifier(typical)

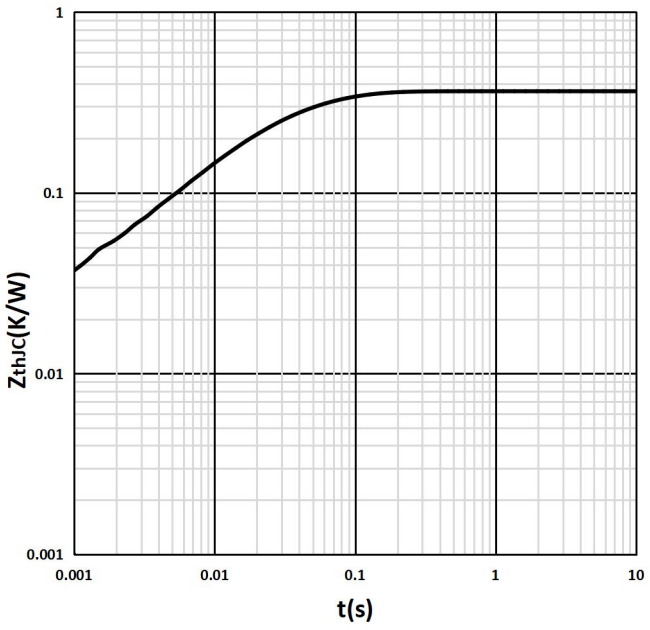


Figure17.output characteristic IGBT,Brake-Chopper (typical)

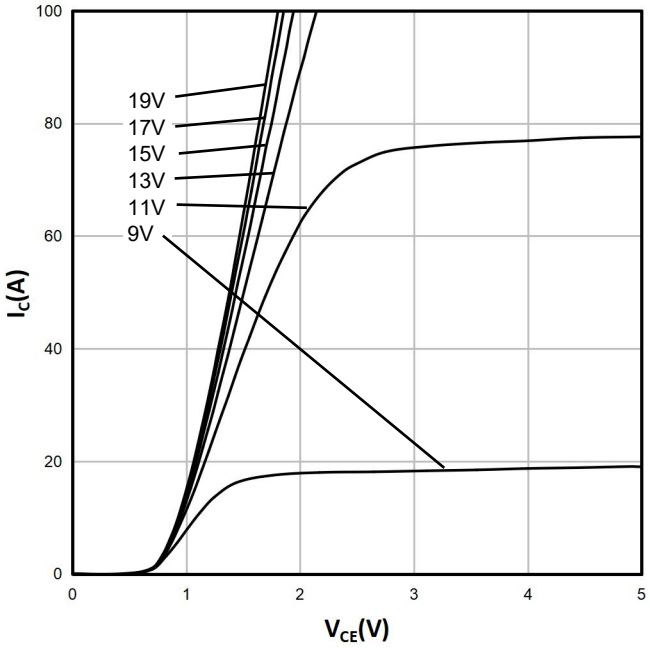


Figure18.output characteristic IGBT,Brake-Chopper (typical)

T_{vj}=150°C

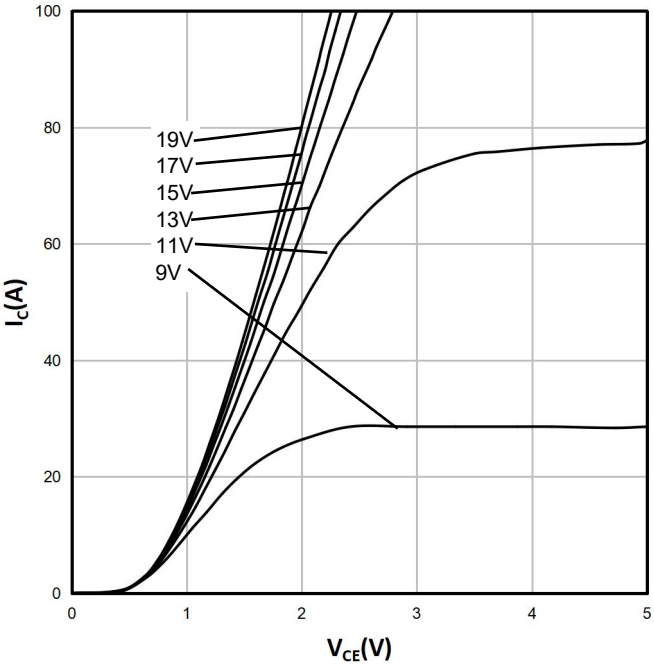


Figure19. $V_{CE(sat)}$ vs. Temperature, IGBT, Brake-Chopper (typical)

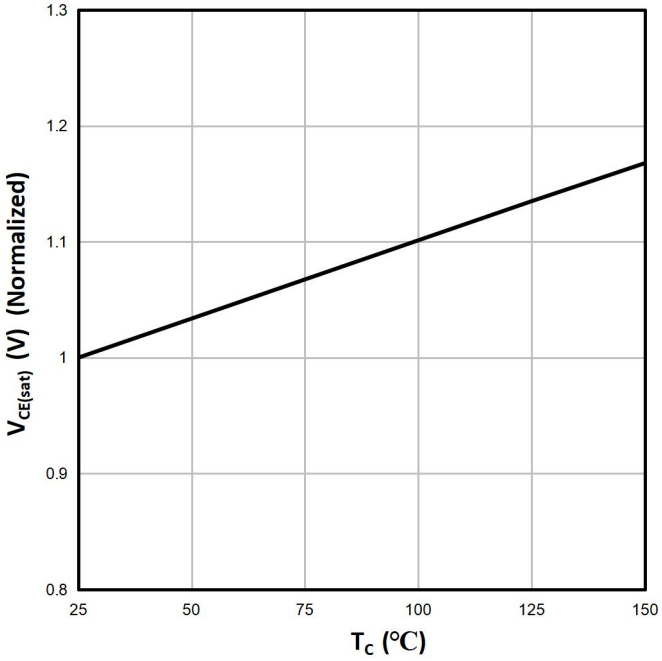
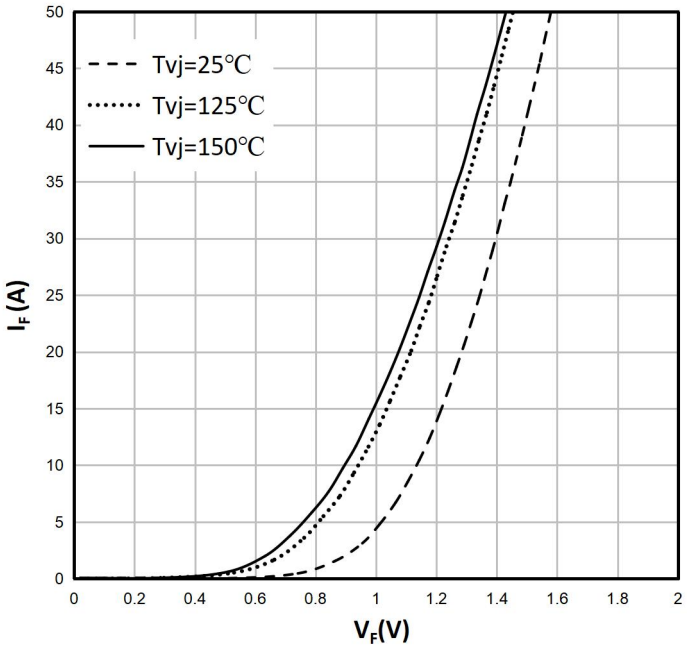
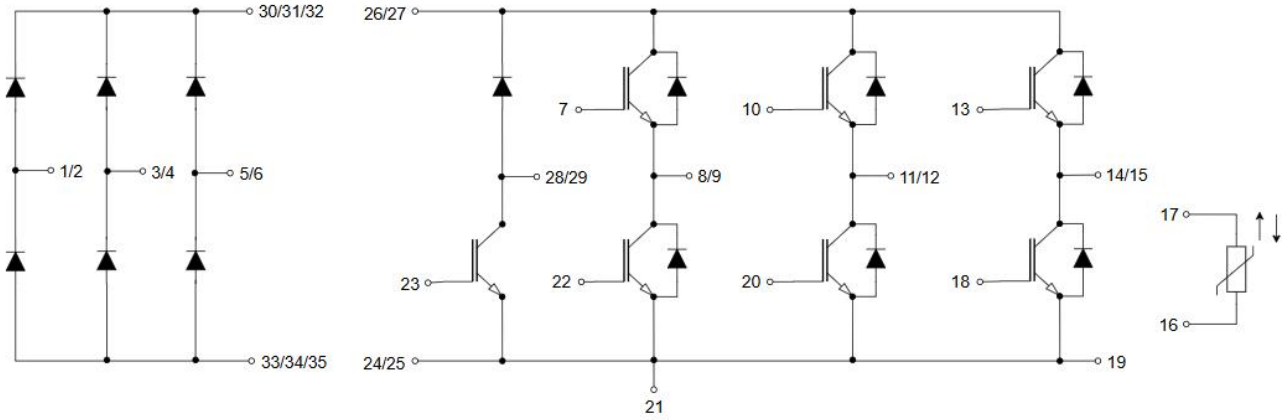


Figure20.forward characteristic of Diode,Brake-Chopper (typical)

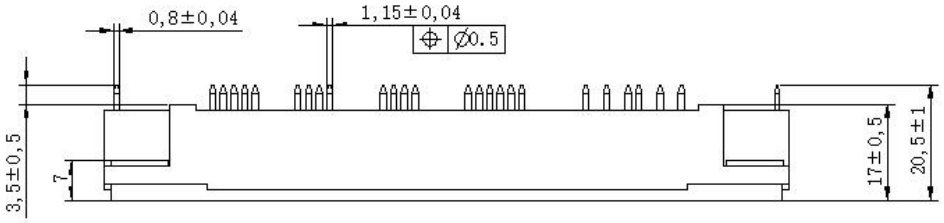
V_{GE}=0V

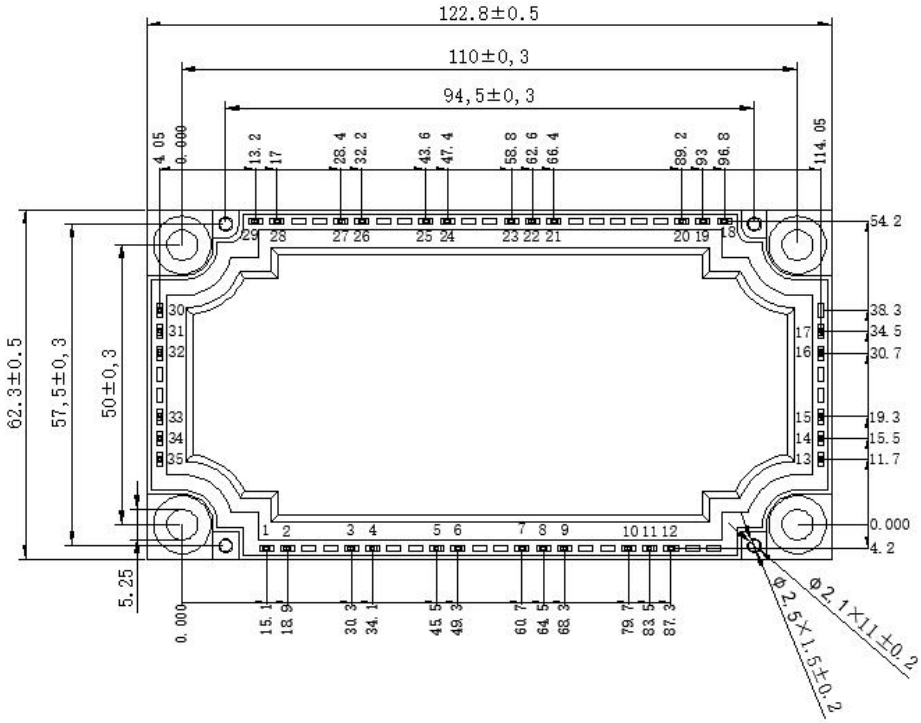


CIRCUIT DIAGRAM



PACKAGE DIMENSION





REVISION HISTORY

Document version	Date of release	Description of changes
Rev.00	2024-09-25	Preview
Rev.01	2025-04-02	Add Chart

ATTENTION

■ Any and all Jinlan power products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your Jinlan Power Semiconductor representative nearest you before using any Jinlan power products described or contained herein in such applications.

■ Jinlan Power Semiconductor assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all Jinlan power modules described or contained herein.

■ Specifications of any and all Jinlan power products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.

■ Jinlan Power Semiconductor (Wuxi).co.,LTD. strives to supply high-quality high-reliability products. However,any and all semiconductor products fail with some probability. It is possible that these probabilistic failures could give rise to accidents or events that could endanger human lives, that could give rise to smoke or fire, or that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.

■ In the event that any or all Jinlan power products(including technical data, services) described or contained herein are controlled under any of applicable local export control laws and regulations,such products must not be exported without obtaining the export license from the authorities concerned in accordance with the above law.

■ Information (including circuit diagrams and circuit parameters) herein is for example only; it is not guaranteed for volume production. Jinlan Power Semiconductor believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.

■ Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. When designing equipment, refer to the "Delivery Specification" for the Jinlan power product that you intend to use.

■ This catalog provides information as of Apr.2025. Specifications and information herein are subject to change without notice.