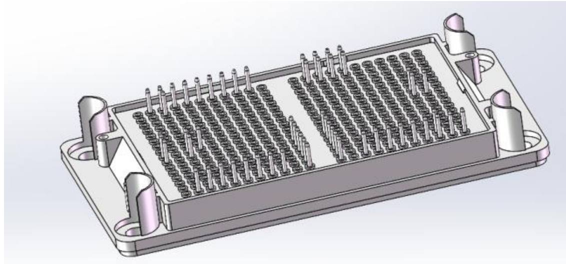
JL3I480V120RE3E7SS

I-NPC Inverter Module with 1200V NCE Gen7 Trench Stop IGBTs

RoHS

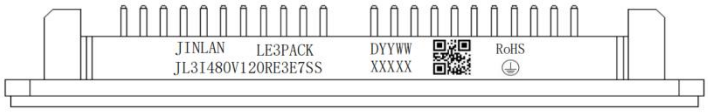
Features

- 1200V Trench Stop IGBTs
- Low Switching Losses
- Low Inductive Design
- Integrated NTC



LE3 Pack

MARKING DIAGRAM

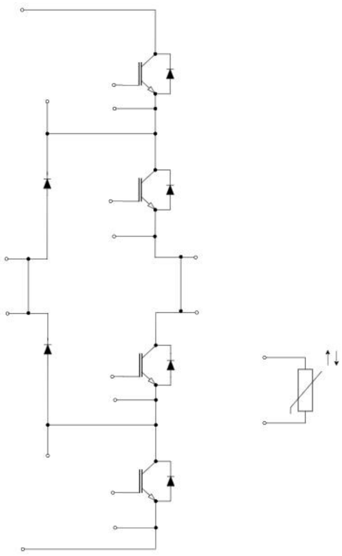


JINLAN	= Company Name
JL3I480V120RE3E7SS	= Specific Device Code
YYWW	= Year and Work Week Code
XXXXX	= Serial Number
QR code	= Custom Assembly Information

Typical Applications

- Solar Applications
- 3-level-applications - Converters
- UPS Systems
- Energy Storage System

Description



Package Insulation coordination

Parameter	Symbol	Note or test condition	Values	Unit
Isolation test voltage	V_{ISOL}	RMS,f=50Hz,t=60s	4	kV
Creepage distance	d_{creep}	terminal to heatsink	11.5	mm
Creepage distance	d_{creep}	terminal to terminal	6.8	mm
Clearance	d_{clear}	terminal to heatsink	9.4	mm
Clearance	d_{clear}	terminal to terminal	5.5	mm
Comparative tracking index (electrical)	*CTI*		⩾500	

Package Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Storage Temperature Range	T_{STG}			-40	--	125	℃
Mounting torque for module mounting	*M*	-Mounting according to valid application note	M5, Screw	3		5	Nm
Flatness of base plate						0.3	mm
Weight	*G*				250		g

IGBT (Q1,Q2,Q3,Q4)

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	±20	V
I_{CDC}	Continuous Collector Current @ T_C = 80°C (T_{JMAX} = 175°C)	480	A
I_{CM}	Pulsed Collector Current，t_p limited by $T_{vj\,max}$	960	A
P_D	Power Dissipation @ T_C = 25°C	2080	W
	Power Dissipation @T_C = 100 °C	833	W

Characteristics （Tc=25℃ unless otherwise noted）

Symbol	Parameter	Test Condition		Min	Typ	Max	Unit
$V_{CE(sat)}$	Collector−Emitter Saturation Voltage	V_{GE} = 15 V, I_C =480 A	T_J = 25°C	--	1.65	2.3	V
			T_J = 150°C	--	2.1	--	
I_{CES}	Collector−Emitter Cutoff Current	V_{GE} = 0 V, V_{CE} =1200V		--	--	800	μA
I_{GES}	Gate-Emitter Leakage Current	V_{GE} = ±20 V, V_{CE} = 0 V		--	--	400	nA
$V_{GE(TH)}$	Gate−Emitter Threshold Voltage	V_{GE} = V_{CE} , I_C =15 mA		4.0	5.0	6.0	V
R_{Gint}	Internal Gate Resistance	T_{vj} = 25 °C		--	1.39	--	Ω
I_{GES}	Gate Leakage Current	V_{GE} = ±20 V, V_{CE} = 0 V		--	--	400	nA
C_{iss}	Input Capacitance	V_{CE} = 25 V, V_{GE} = 0 V, f = 100 kHz		--	46.1	--	nF
C_{oss}	Output Capacitance			--	1.16	--	
C_{rss}	Reverse Transfer Capacitance			--	0.185	--	
Q_g	Total Gate Charge	V_{GE} = ± 15 V		--	1.36	--	μC
$t_{d(on)}$	Turn−On Delay Time	V_{CE} =600V, I_C =200A V_{GE} =±15 V, R_{Gon} = 25Ω, R_{Goff} = 25Ω T_{vj} = 25 °C		--	860	--	ns
t_r	Rise Time			--	100	--	
$t_{d(off)}$	Turn−off Delay Time			--	2700	--	
t_f	Fall Time			--	160	--	
E_{on}	Turn−On Switching Loss per Pulse			--	13.45	--	mJ
E_{off}	Turn Off Switching Loss per Pulse			--	30.35	--	
$t_{d(on)}$	Turn−On Delay Time	V_{CE} =600V, I_C =200A V_{GE} = ±15 V, R_{Gon} = 25Ω, R_{Goff} = 25Ω T_{vj} = 150 °C		--	770	--	ns
t_r	Rise Time			--	90	--	
$t_{d(off)}$	Turn−off Delay Time			--	2900	--	
t_f	Fall Time			--	130	--	
E_{on}	Turn−on Switching Loss per Pulse			--	19.15	--	mJ
E_{off}	Turn Off Switching Loss per Pulse			--	28.67	--	
R_{thJC}	Thermal Resistance − Chip−to−Case			--	0.06	--	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.

INVERSE Diode (D1,D2,D3,D4)

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	480	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	960	A

Characteristics （Tc=25℃ unless otherwise noted）

Symbol	Parameter	Test Condition		Min	Typ	Max	Unit
V_F	Diode Forward Voltage	I_F = 480 A, V_{GE} = 0 V	T_J = 25°C	--	2.15	3.0	V
			T_J = 150°C	--	2.15	--	
T_{rr}	Reverse Recovery Time	V_{CE}=600V, V_{GE}= −5 V to +15 V I_F=200A, R_G=25Ω T_{vj} = 25 °C			490		ns
I_{RM}	Peak Reverse Recovery Current				162.5		A
Q_{rr}	Reverse Recovery Charge			--	24.9	--	μC
E_{rec}	Reverse Recovery Energy			--	10.93	--	mJ
T_{rr}	Reverse Recovery Time	V_{CE}=600V, V_{GE}= −5 V to +15 V I_F=200A, R_G=25Ω, T_{vj} = 150 °C			910		ns
I_{RM}	Peak Reverse Recovery Current				163		A
Q_{rr}	Reverse Recovery Charge			--	52.93	--	μC
E_{rec}	Reverse Recovery Energy			--	20.07	--	mJ
R_{thJC}	Thermal Resistance − Chip−to−Case				0.18		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.

SiC NEUTRAL POINT Diode (D5,D6)

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	200	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	400	A

Characteristics （Tc=25℃ unless otherwise noted）

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
V_F	Diode Forward Voltage	I_F =200A, T_{vj} = 25 °C	--	1.45	2.20	V
		I_F = 200A, T_{vj} =150 °C	--	1.95	--	
T_{rr}	Reverse Recovery Time	V_{CE}=600V, V_{GE}= −5 V to +15 V I_F=200A,R_G=25Ω T_{vj} = 25 °C	--	40	--	ns
I_{RM}	Peak Reverse Recovery Current		--	80.5	--	A
Q_{rr}	Recovered Charge		--	1.87	--	μC
E_{rec}	Reverse Recovery Energy		--	0.65	--	mJ
T_{rr}	Reverse Recovery Time	V_{CE}=600V, V_{GE}= −5 V to +15 V I_F=200A,R_G=25Ω, T_{vj} = 150 °C	--	40	--	ns
IRM	Peak Reverse Recovery Current		--	65	--	A
Q_{rr}	Recovered Charge		--	1.54	--	μC
E_{rec}	Reverse Recovery Energy		--	0.56	--	mJ
R_{thJC}	Thermal resistance	Junction-to-Case (per diode)	--	0.129	--	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.

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

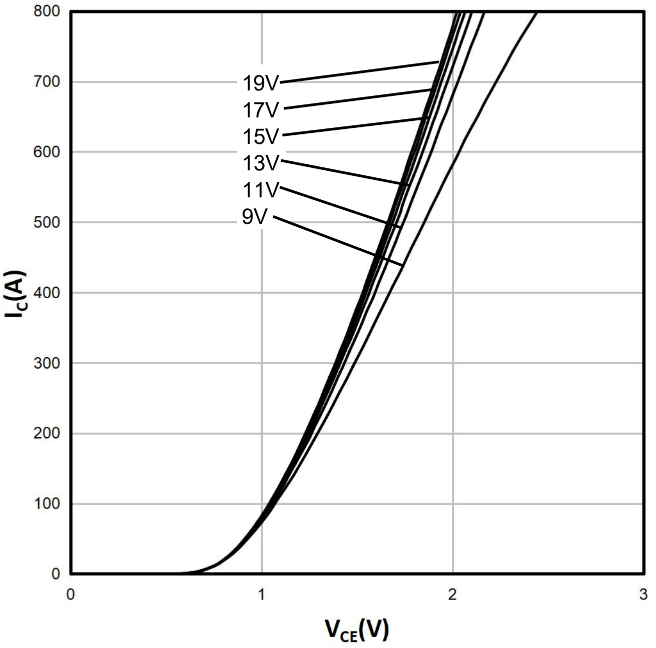


Figure2.output characteristic IGBT,Inverter(typical)
T_{vj}=150°C

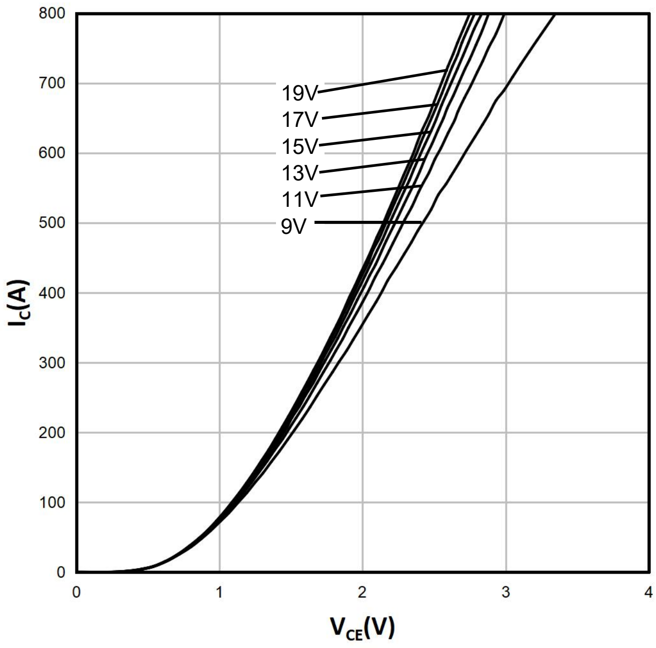


Figure3. $V_{CE(sat)}$ vs. Temperature

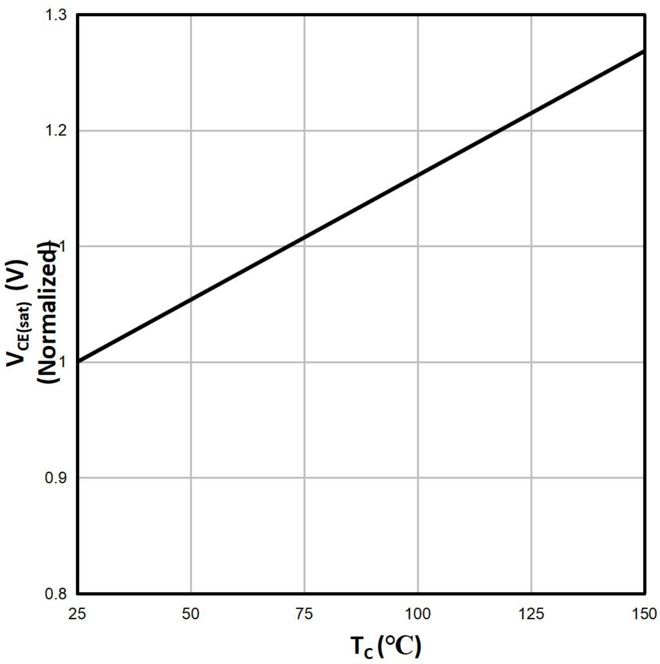


Figure4.transfer characteristic IGBT,Inverter(typical)
V_{CE}=20V

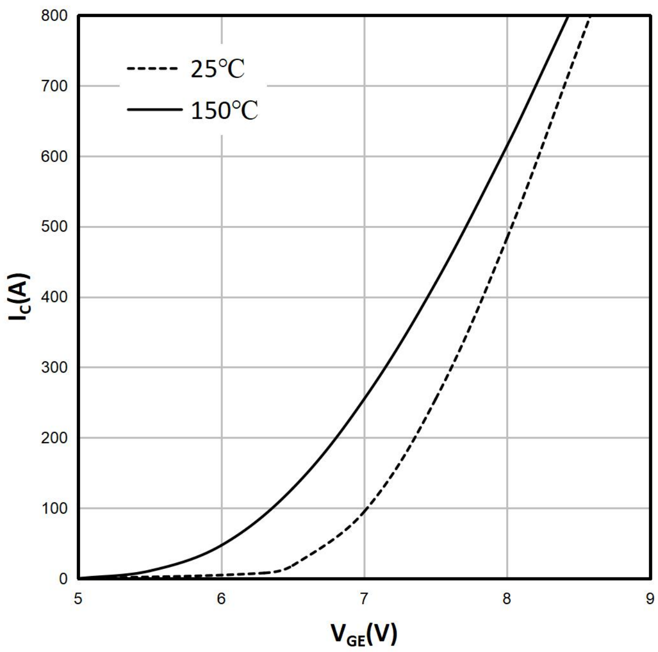


Figure5. V_{TH} vs. Temperature

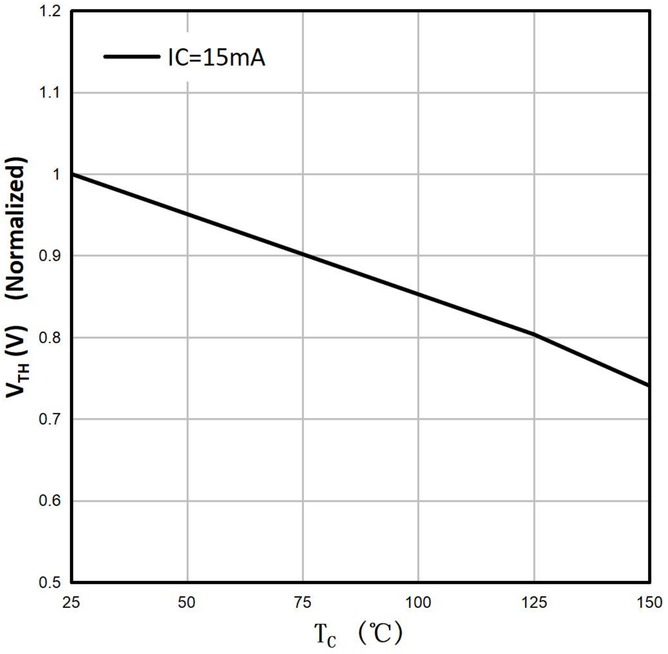


Figure6. Gate Charge Waveform
Vcc=600V

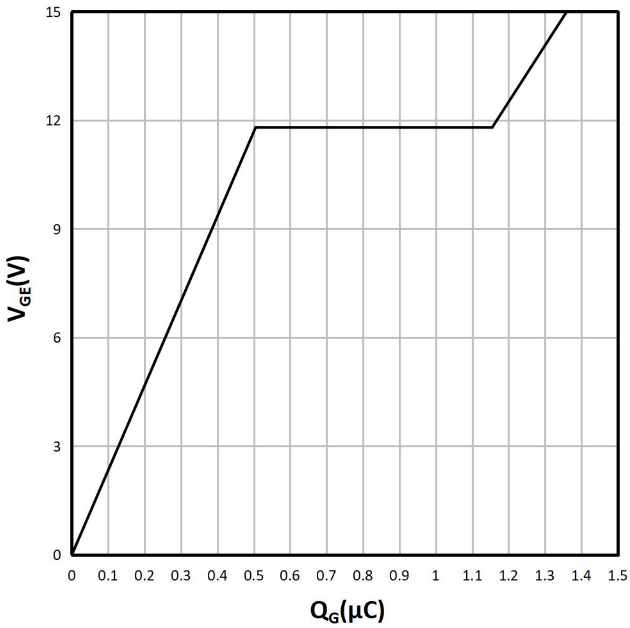


Figure7.switching losses IGBT,Inverter(typical)
Vcc=600V,Rgon=25Ω,Rgoff=25Ω,Vge=15V/-5V

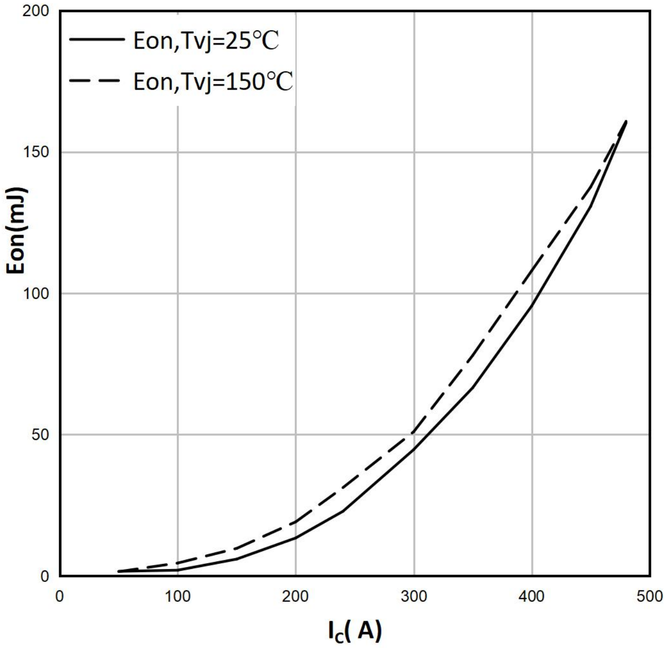


Figure8.switching losses IGBT,Inverter(typical)
Vcc=600V,Rgon=25Ω,Rgoff=25Ω,Vge=15V/-5V

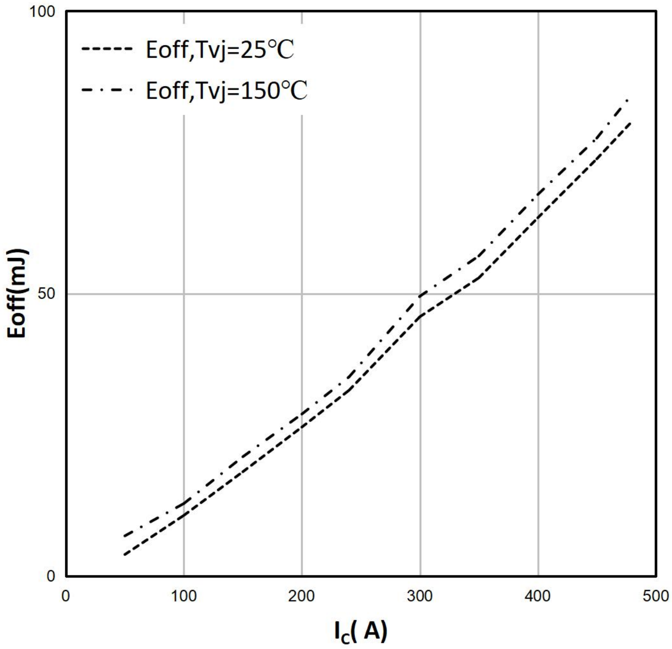


Figure9.switching losses IGBT,Inverter(typical)
Vcc=600V,IC=240A,Vge=15V/-5V

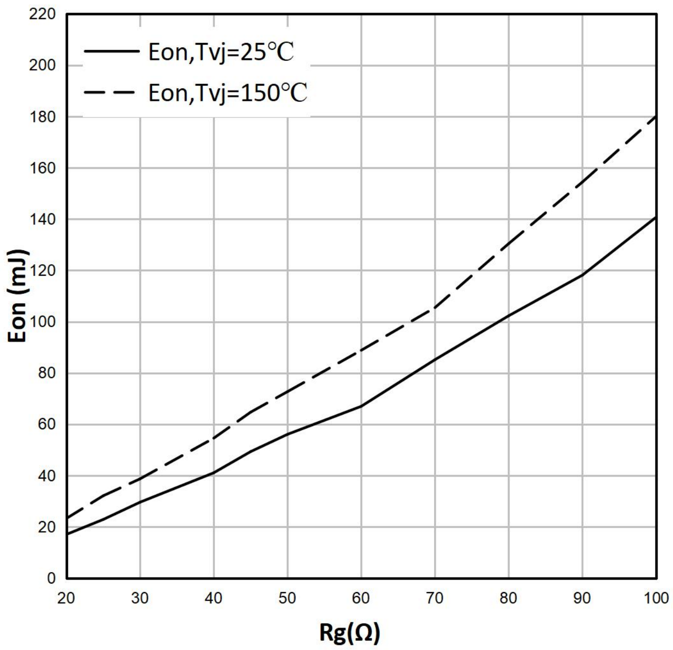


Figure10.switching losses IGBT,Inverter(typical)
Vcc=600V,IC=240A,Vge=15V/-5V

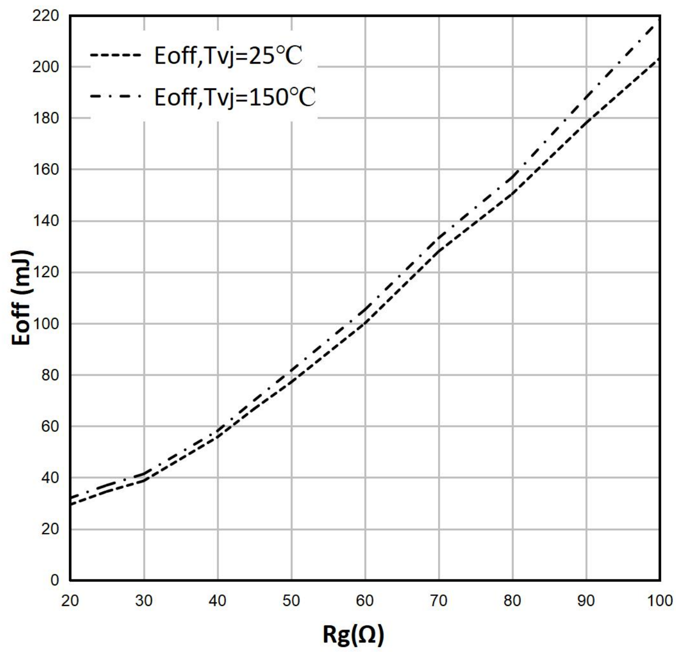


Figure11. FBSOA IGBT,Inverter(typical)
D=0, Tc=25℃,Tj<=175℃,Vge=15V

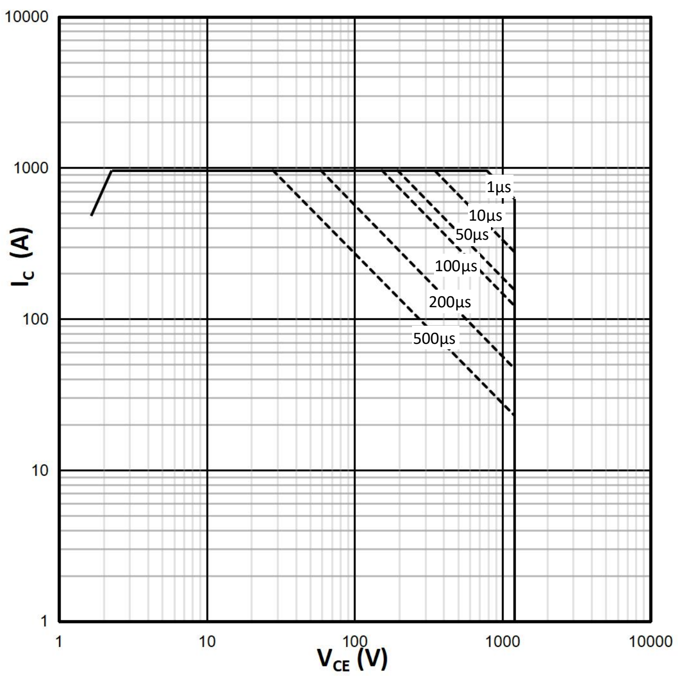


Figure12. transient thermal impedance IGBT,Inverter(typical)（T1，T2，T3，T4）

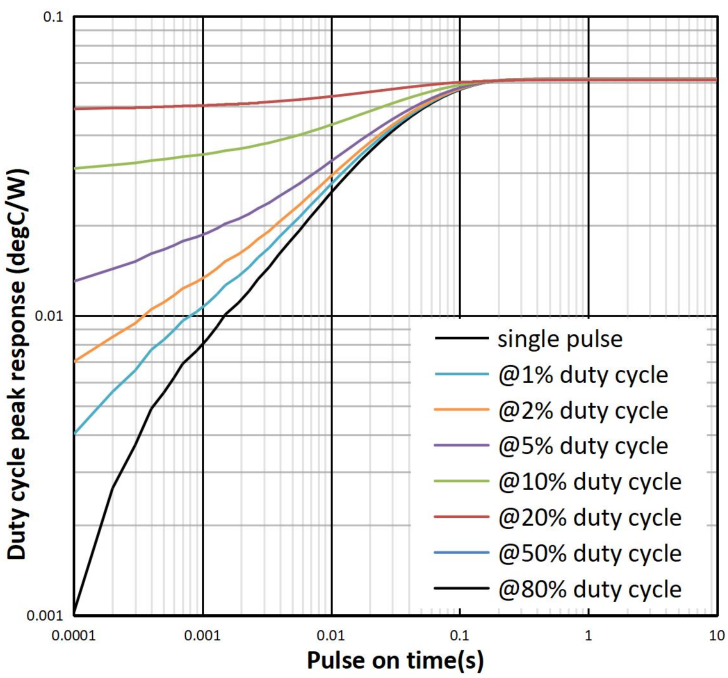


Figure13. forward characteristic of Diode,Inverter(typical)（D1，D2，D3，D4）

V_{GE}=0V

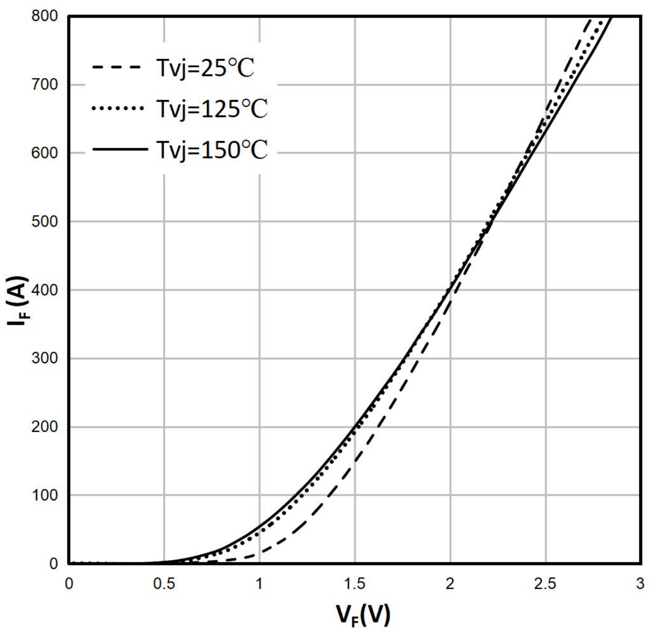


Figure14. forward characteristic of Diode,Inverter(typical)（D5，D6）

V_{GE}=0V

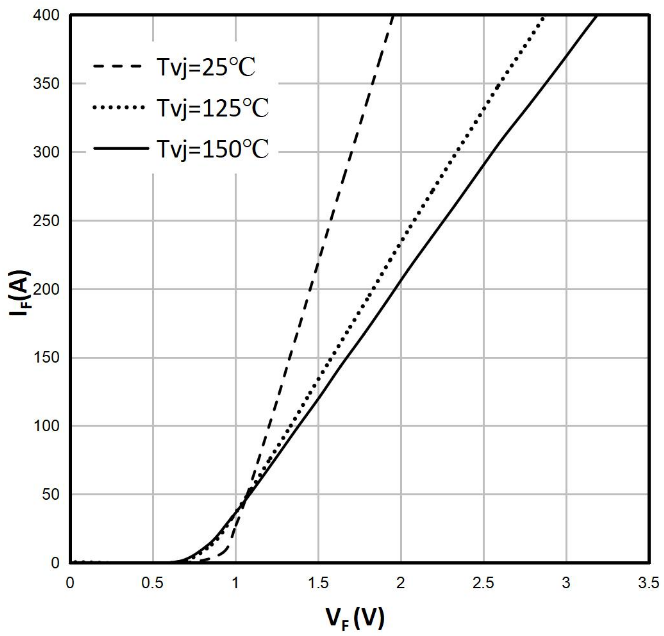


Figure15.Reverse Recovery Energy Loss vs. IC（D1，D2，D3，D4）

Vcc=600V,Rg=25Ω,Vge=15V/-5V

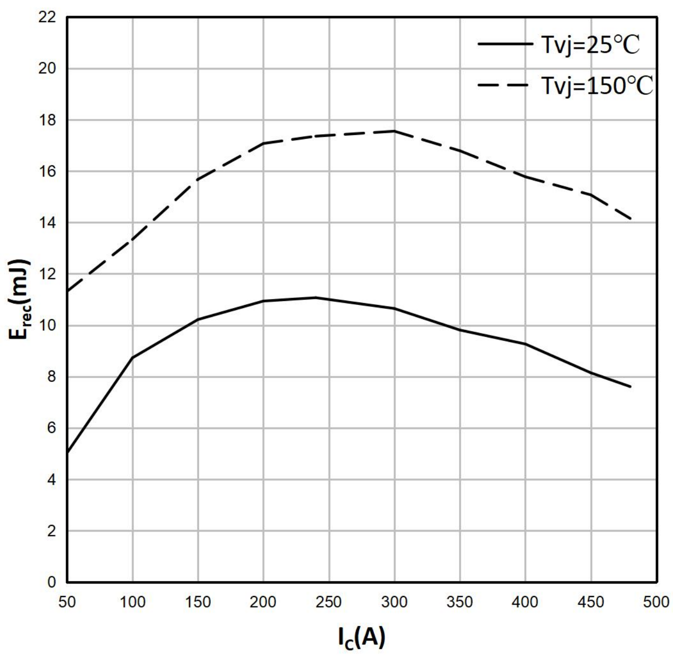


Figure16.Reverse Recovery Energy Loss vs.RG（D1，D2，D3，D4）

Vcc=600V,IC=240A,Vge=15V/-5V

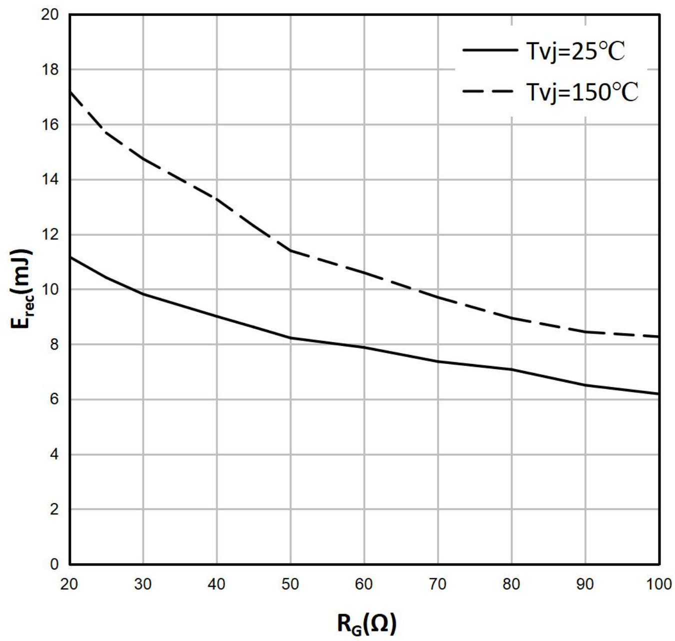


Figure17.Reverse Recovery Energy Loss vs. IC （D5，D6）

Vcc=600V,Rg=25Ω,Vge=15V/-5V

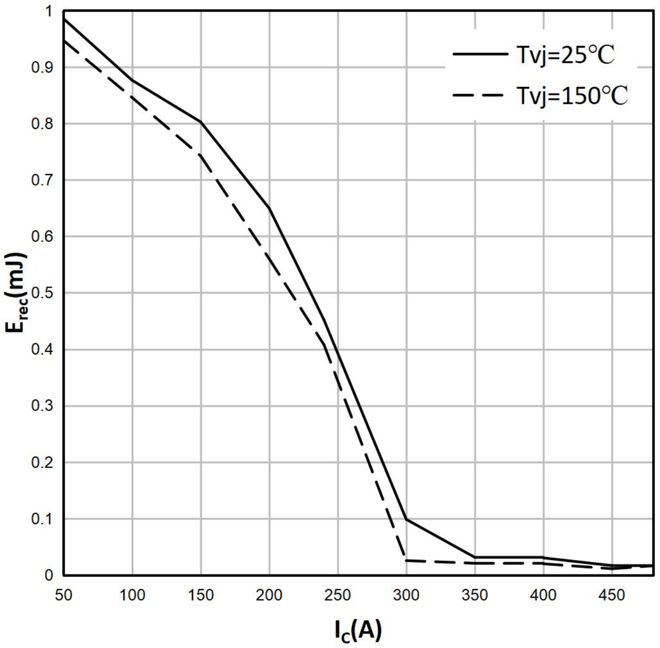


Figure18.Reverse Recovery Energy Loss vs.RG （D5，D6）

Vcc=600V,IC=240A,Vge=15V/-5V

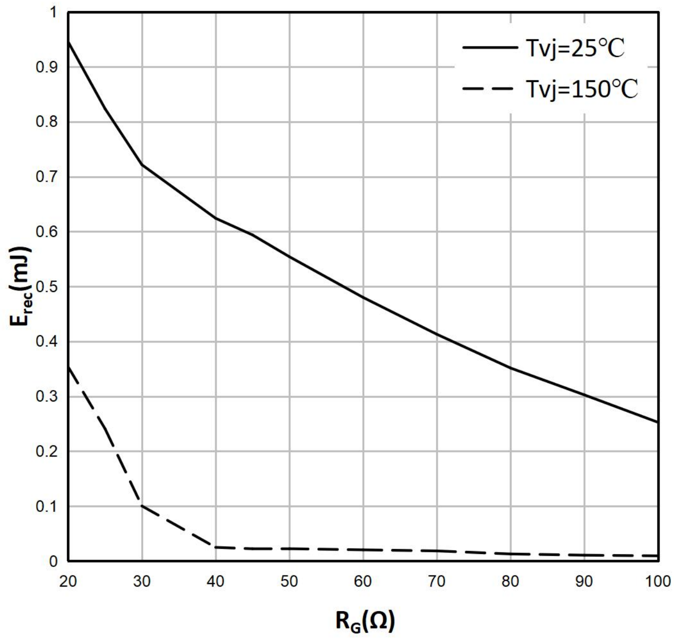


Figure19. transient thermal impedance-FRD （D1，D2，D3，D4）

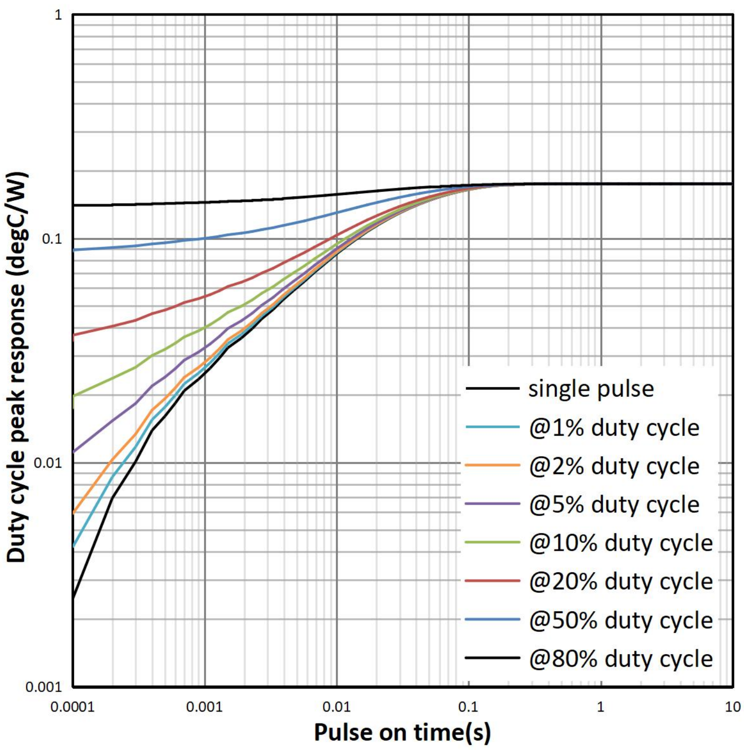
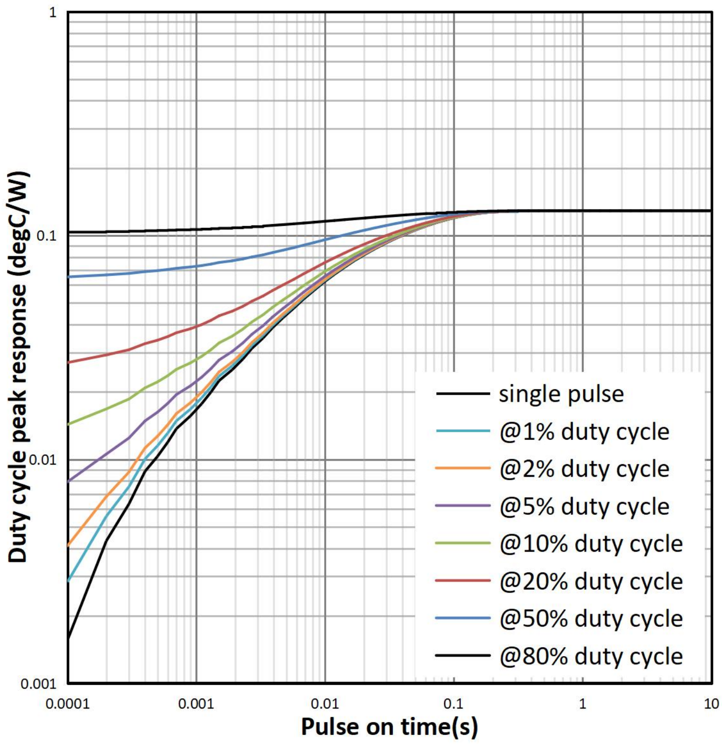
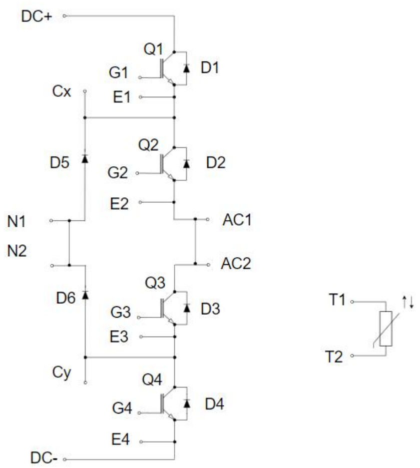


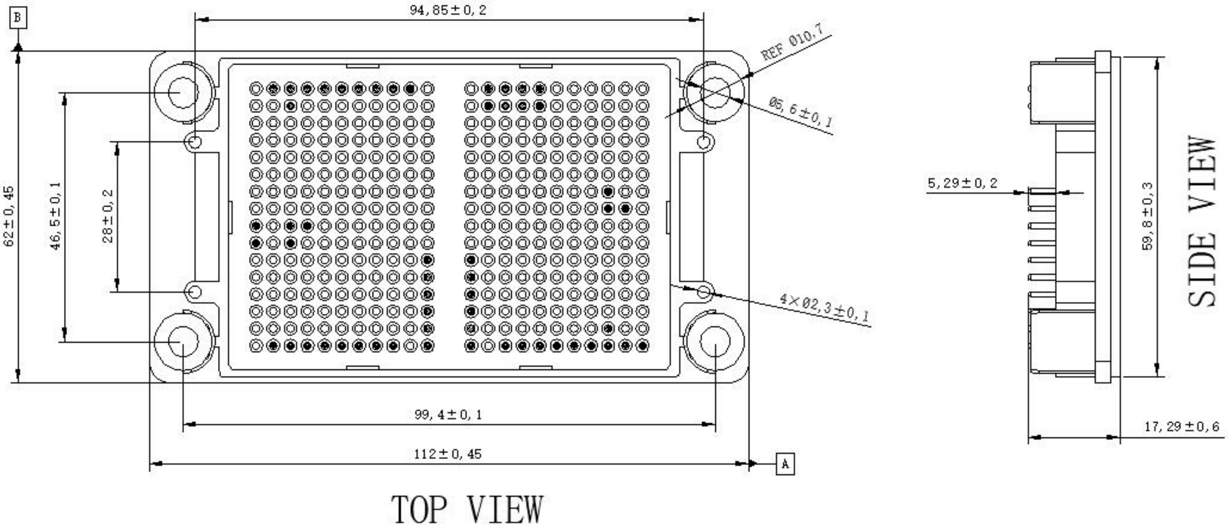
Figure20. transient thermal impedance-FRD （D5，D6）

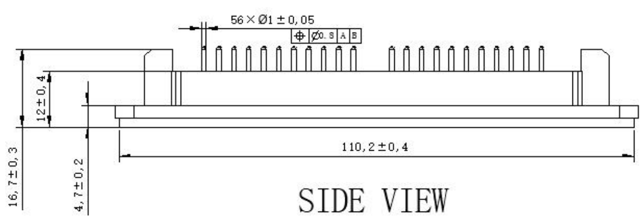


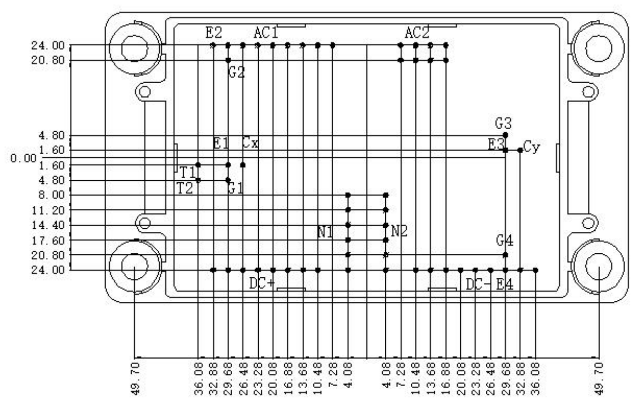
CIRCUIT DIAGRAM



PACKAGE DIMENSIONS







REVISION HISTORY

Document version	Date of release	Description of changes
Rev.00	2025-3-11	Preview
Rev.01	2025-3-28	Updated thermal resistance

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