JL3I600V110SE3E7SN

3-Level INPC Inverter Module with 1100V Trench Stop IGBTs

RoHS

Features

• Electrical features

-Neutral Point Clamped Three−level Inverter Module

-1100V Low $V_{CE(sat)}$ Trench Stop IGBTs

-$V_{CE(sat)}$ with positive temperature coefficient

- Maximum junction temperature 175℃

- Low Inductive Layout

LE3 Pack

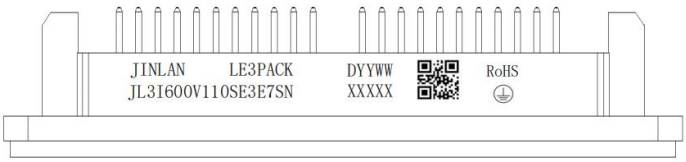
• Mechanical features

- Package with CTI >600

- Solderable Pins

-Isolated copper baseplate using AMB technology

MARKING DIAGRAM



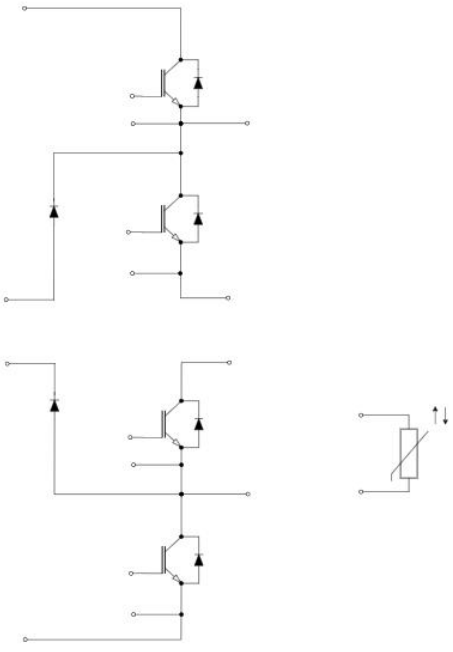
JINLAN	= Company Name
JL3I600V110SE3E7SN	= Specific Device Code
YYWW	= Year and Work Week Code
XXXXX	= Serial Number
QR code	= Custom Assembly Information

Typical Applications

• Solar Inverters

• 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	4.0	kV
Internal isolation		basic insulation(class 1,IEC 61140)	Si_3N_4	
Creepage distance	d_{creep}	terminal to heatsink	14.2	mm
Clearance	d_{clear}	terminal to heatsink	12.4	mm
Comparative tracking index (electrical)	CTI		＞600	

Package Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Stray Inductance	L_{CE}			--	15	--	nH
Storage Temperature Range	T_{STG}			-40		125	℃
Mounting torque for module mounting	*M*	-Mounting according to valid application note	M5, Screw	3		5	Nm
Weight	*G*				250		g

IGBT (T1,T2,T3,T4)

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

Symbol	Description	Value	Unit
V_{CES}	Collector−Emitter Voltage	1100	V
V_{GE}	Gate− Emitter Voltage	±30	V
I_C	Continuous Collector Current @ Tc = 80°C, T_J = 175°C	600	A
$I_{C(RM)}$	T_p=1ms	1200	A

Characteristics (Tc = 25°C unless otherwise noted)

Symbol	Parameter	Note or Test Condition		Min	Typ	Max	Unit
$V_{CE(sat)}$	Collector−Emitter Saturation Voltage	V_{GE} = 15V, I_C =600 A	T_J = 25°C	--	1.65	2.3	V
			T_J = 150°C	--	2.1	--	
$V_{GE(TH)}$	Gate−Emitter Threshold Voltage	V_{GE} = V_{CE} , I_C =15 mA		4.0	5.0	6.0	V
I_{CES}	Collector−Emitter Cutoff Current	V_{GE} = 0 V, V_{CE} =1100V ,T_{vj}= 25°C		--	--	1	mA
I_{GES}	Gate Leakage Current	V_{GE} = ±20 V, V_{CE} = 0 V		--	--	400	nA
R_{Gint}	Internal Gate Resistance			--	1.46	--	Ω
C_{iss}	Input Capacitance	V_{CE} = 25 V, V_{GE} = 0 V, f = 100 kHz		--	45.7	--	nF
C_{oss}	Output Capacitance			--	4.3	--	
C_{rss}	Reverse Transfer Capacitance			--	0.133	--	
Q_g	Total Gate Charge	V_{GE} = ± 15 V		--	1.44	--	μC
$t_{d(on)}$	Turn−On Delay Time	T_J = 25°C V_{CE} =600V, I_C =200A V_{GE} =±15 V, R_{Gon} =10Ω, R_{Goff} =10Ω		--	0.13	--	μs
t_r	Rise Time			--	0.1	--	
$t_{d(off)}$	Turn−off Delay Time			--	0.79	--	
t_f	Fall Time			--	0.04	--	
E_{on}	Turn−On Switching Loss per Pulse			--	10.49	--	mJ
E_{off}	Turn Off Switching Loss per Pulse			--	7.64	--	
$t_{d(on)}$	Turn−On Delay Time	T_J = 150°C V_{CE} =600V, I_C =200A V_{GE} = ±15 V, R_{Gon} =10Ω, R_{Goff} = 10Ω		--	0.13	--	μs
t_r	Rise Time			--	0.09	--	
$t_{d(off)}$	Turn−off Delay Time			--	1.0	--	
t_f	Fall Time			--	0.05	--	
E_{on}	Turn−on Switching Loss per Pulse			--	23.34	--	mJ
E_{off}	Turn Off Switching Loss per Pulse			--	9.76	--	
R_{thJC}	Thermal Resistance − Chip−to−Case			--	0.062	--	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 (D5, D6)

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

Symbol	Description	Value	Unit
V_{RRM}	Peak Repetitive Reverse Voltage	1100	V
I_F	Continuous Forward Current @T_J = 150°C	375	A
I_{FRM}	Repetitive Peak Forward Current @T_J = 150°C	750	A

Characteristics (Tc = 25°C unless otherwise noted)

Symbol	Parameter	Note or Test Condition		Min	Typ	Max	Unit
V_F	Diode Forward Voltage	I_F = 375A, V_{GE} = 0 V	T_J = 25°C	--	1.75	2.95	V
			T_J = 150°C	--	1.68	--	
Q_{rr}	Reverse Recovery Charge	T_J = 25°C V_R =600V, I_F =200A V_{GE} = ±15 V, R_{Gon} = 10Ω, R_{Goff} =10Ω		--	85.3	--	μC
I_{RRM}	Peak Reverse Recovery Current			--	360.53	--	A
E_{REC}	Reverse Recovery Energy			--	10.63	--	mJ
Q_{rr}	Reverse Recovery Charge	T_J = 150°C V_R =600V, I_F =200A V_{GE} = ±15 V, R_{Gon} =10Ω, R_{Goff} =10Ω		--	104.9	--	μC
I_{RRM}	Peak Reverse Recovery Current			--	397.3	--	A
E_{REC}	Reverse Recovery Energy			--	20.12	--	mJ
R_{thJC}	Thermal Resistance − Chip−to−Case				0.129		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 (D1, D2, D3, D4)

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

Symbol	Description	Value	Unit
V_{RRM}	Peak Repetitive Reverse Voltage	1100	V
I_F	Continuous Forward Current @T_J = 150°C	500	A
I_{FRM}	Repetitive Peak Forward Current @T_J = 150°C	1000	A

Characteristics (Tc = 25°C unless otherwise noted)

Symbol	Parameter	Note or Test Condition		Min	Typ	Max	Unit
V_F	Diode Forward Voltage	I_F = 500A, V_{GE} = 0 V	T_J = 25°C	--	1.72	2.55	V
			T_J = 150°C	--	1.63	--	
Q_{rr}	Reverse Recovery Charge	T_J = 25°C V_R =600V, I_F =200A V_{GE} = ±15 V, R_{Gon} =10Ω, R_{Goff} = 10Ω		--	89.6	--	μC
I_{RRM}	Peak Reverse Recovery Current			--	329.6	--	A
E_{REC}	Reverse Recovery Energy			--	9.16	--	mJ
Q_{rr}	Reverse Recovery Charge	T_J = 150°C V_R =600V, I_F =200A V_{GE} = ±15 V, R_{Gon} =10Ω, R_{Goff} = 10Ω		--	115.6	--	μC
I_{RRM}	Peak Reverse Recovery Current			--	362.7	--	A
E_{REC}	Reverse Recovery Energy			--	19.2	--	mJ
R_{thJC}	Thermal Resistance − Chip−to−Case				0.096		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.

THERMISTOR PROPERTIES

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
R_{25}	Rated Resistance	T=25℃	-	5	-	KΩ
R_{100}	Rated Resistance	T=100℃	-	478.5	-	Ω
▲R/R	Deviation of R25		-1	-	1	%
P_{25}	Power Dissipation			210		mW
	Power Dissipation Constant			3.5		mW/K
$B_{25/85}$	B-value	B(25/80),tolerance ±1%	-	3480	-	K
$B_{25/50}$	B-value	B(25/50),tolerance ±1%	-	3473	-	K
$B_{25/100}$	B-value	B(25/100),tolerance ±1%	-	3481	-	K

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

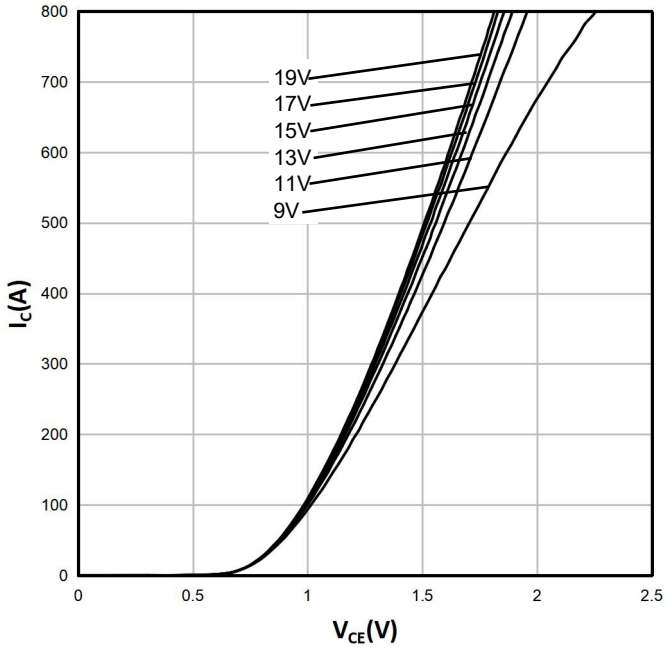


Figure2.output characteristic IGBT(typical)
T_{vj}=150°C

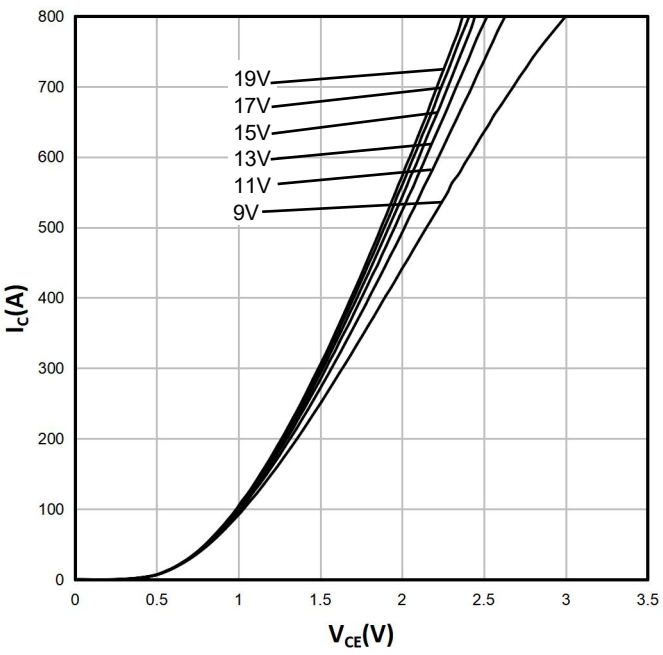


Figure3. $V_{CE(sat)}$ vs. Temperature

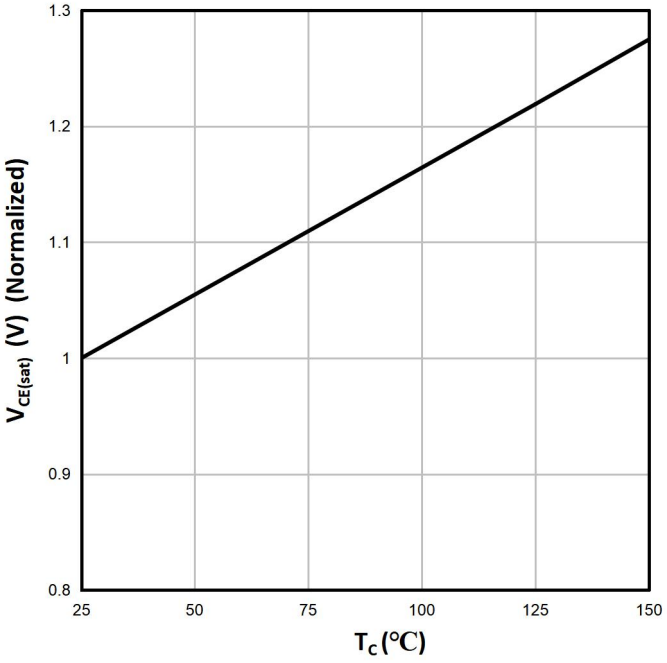


Figure4.transfer characteristic IGBT(typical)
V_{CE}=20V

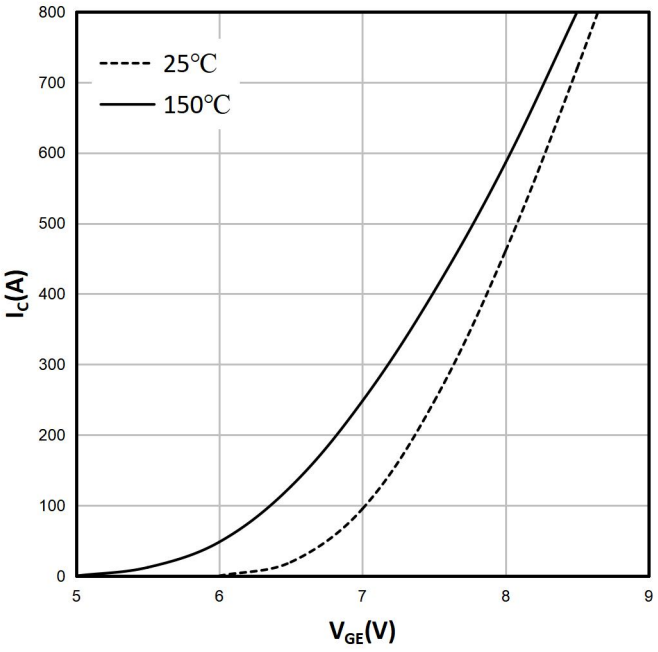


Figure5. FBSOA IGBT(typical)
D=0, Tc=25℃,Tj<=175℃,Vge=15V

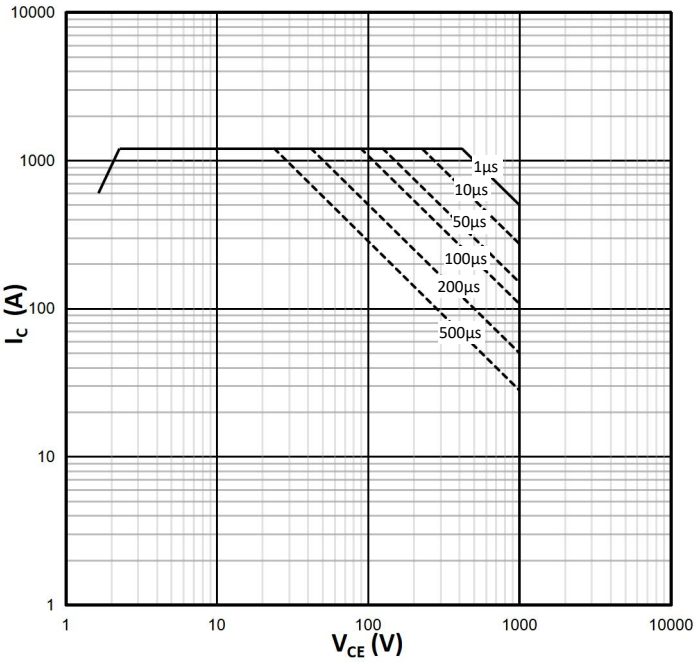


Figure6. Gate Charge Waveform
Vcc=600V

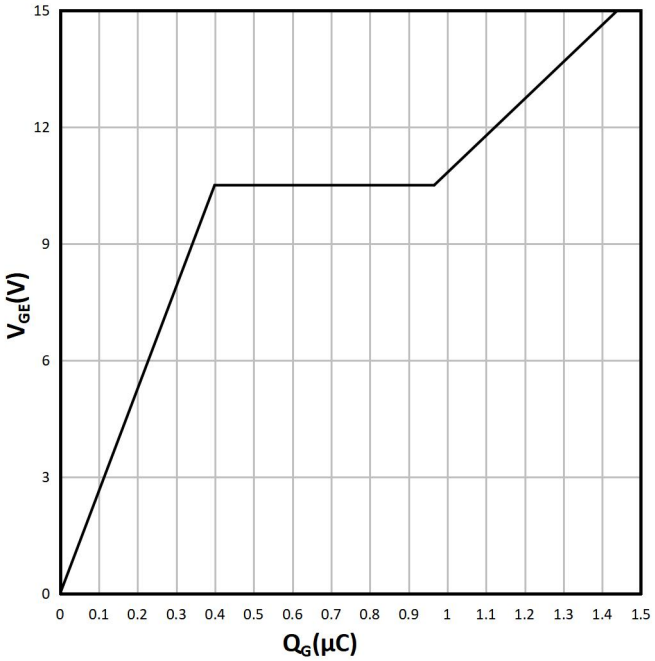


Figure7.switching losses IGBT(typical)
Vcc=600V,R_{Gon} =10Ω, R_{Goff} =10Ω,Vge=±15V

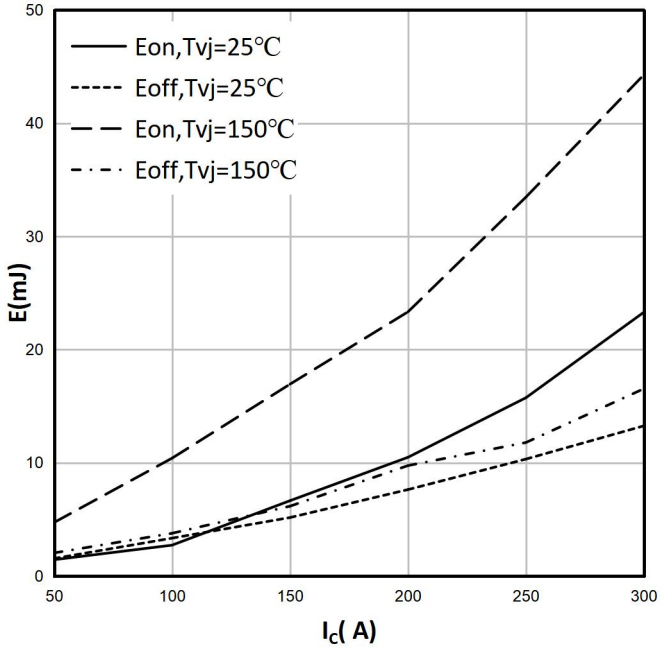


Figure 8.switching losses IGBT,Inverter(typical)
Vcc=600V,Ic=200A,Vge=±15V

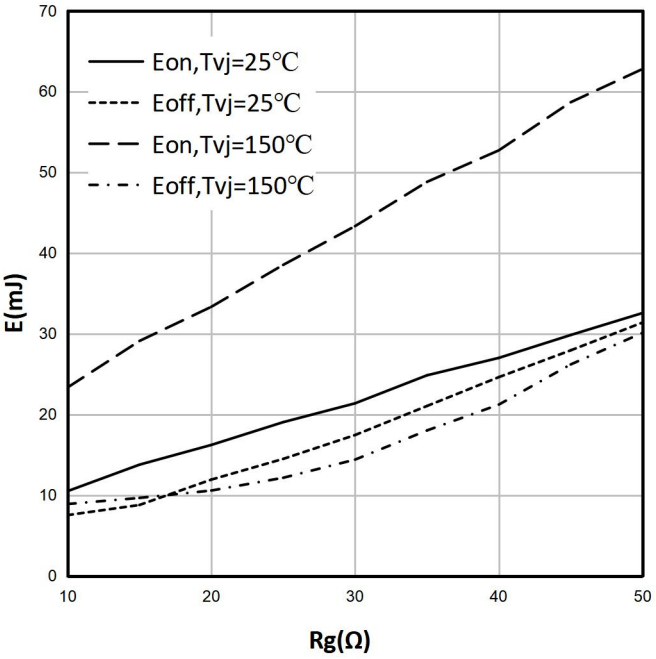


Figure9. transient thermal impedance IGBT（T1，T2，T3，T4）

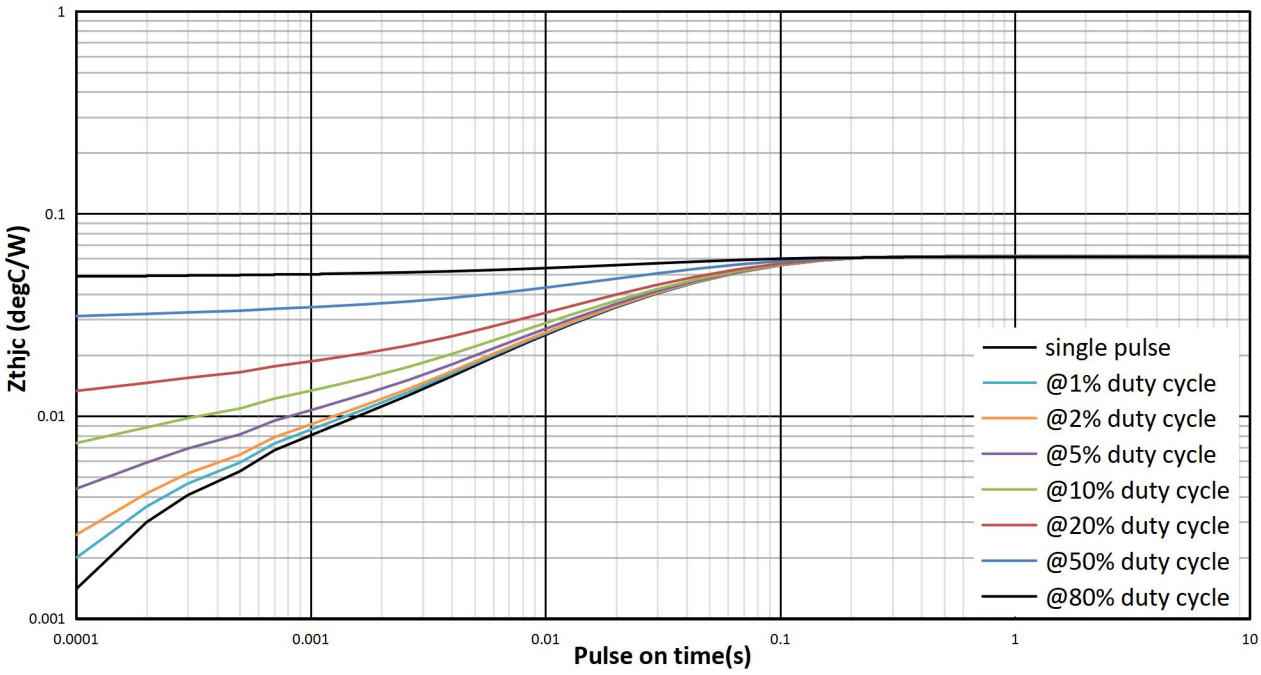


Figure10. forward characteristic of Diode(typical)
（D1，D2，D3，D4）

V_{GF}=0V

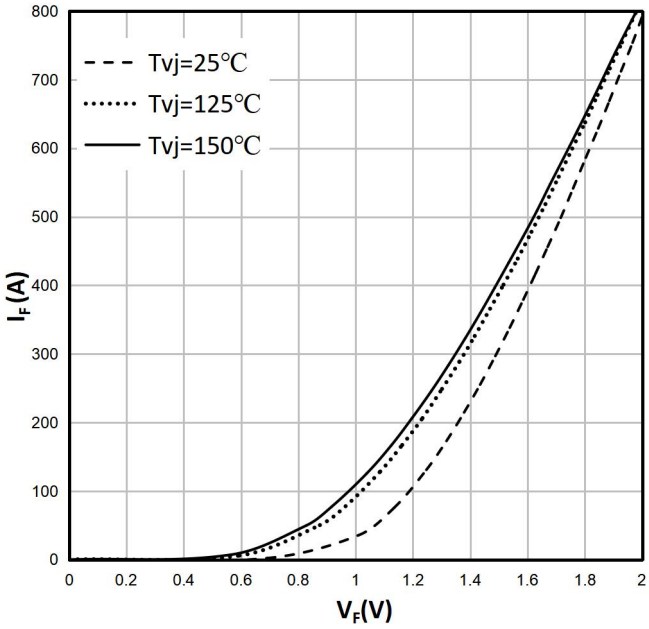


Figure11.Reverse Recovery Energy Loss vs. IC
（D1，D2，D3，D4）

Vcc=600V,,R_{Gon} =10Ω, R_{Goff} =10Ω,Vge=±15V

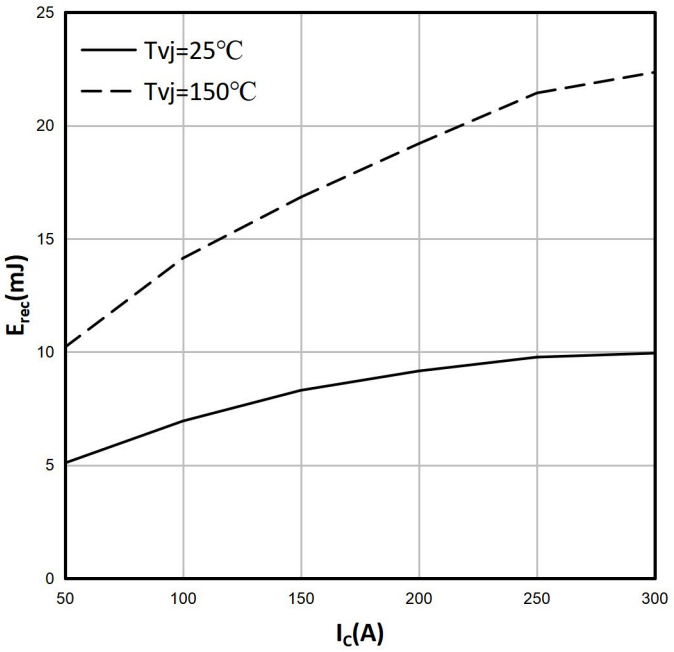


Figure12.Reverse Recovery Energy Loss vs.RG（D1，D2，D3，D4）

Vcc=600V,Ic=200A,Vge=±15V

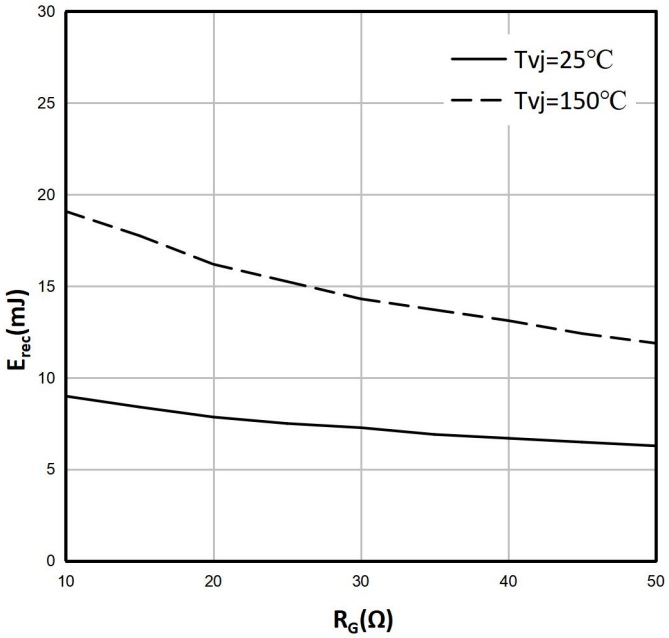


Figure13. forward characteristic of Diode(typical)（D5，D6）

V_{GF}=0V

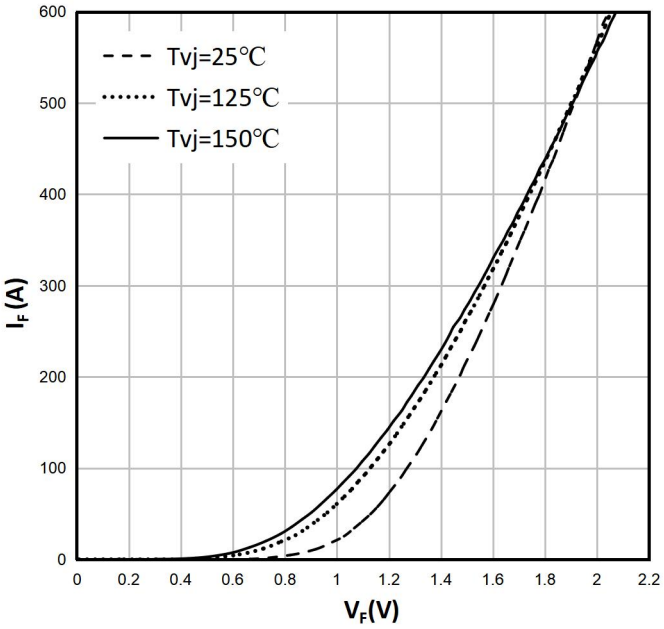


Figure14.Reverse Recovery Energy Loss vs. IC（D5，D6）

Vcc=600V,,R_{Gon} =10Ω, R_{Goff} =10Ω,Vge=±15V

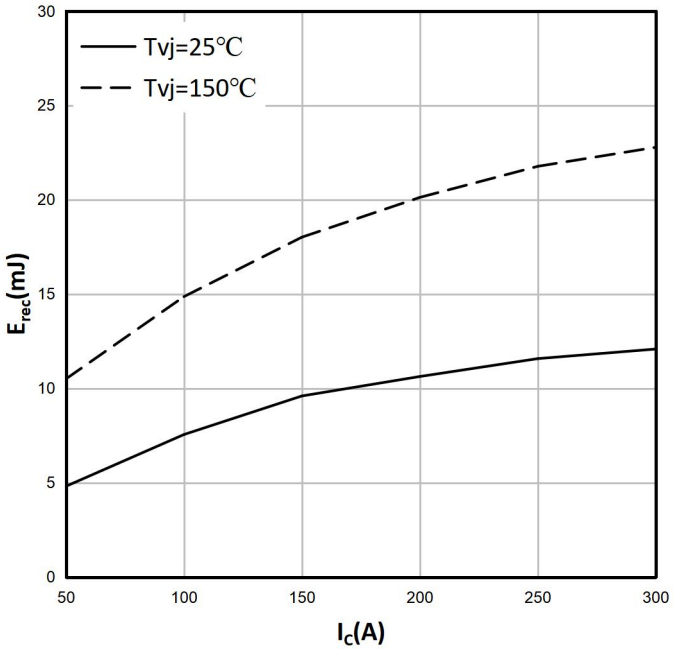


Figure15.Reverse Recovery Energy Loss vs.RG（D5，D6）

Vcc=600V,Ic=200A,Vge=±15V

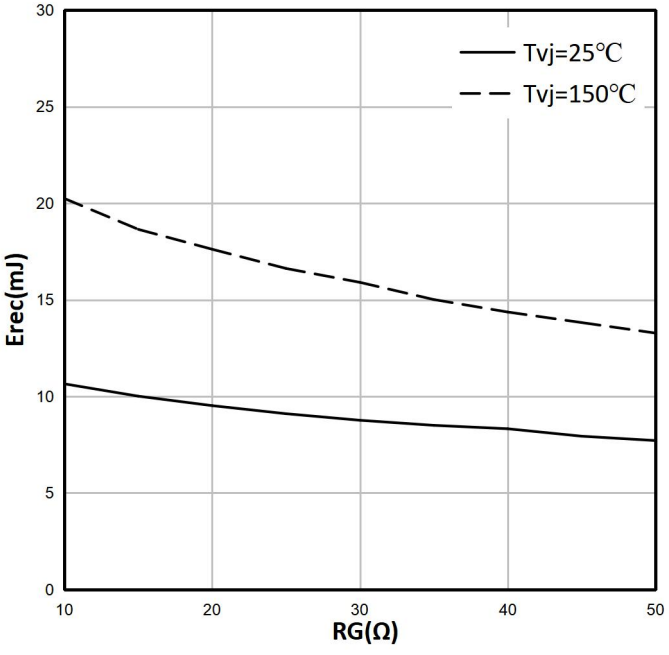


Figure16. transient thermal impedance Diode（D1，D2，D3，D4）

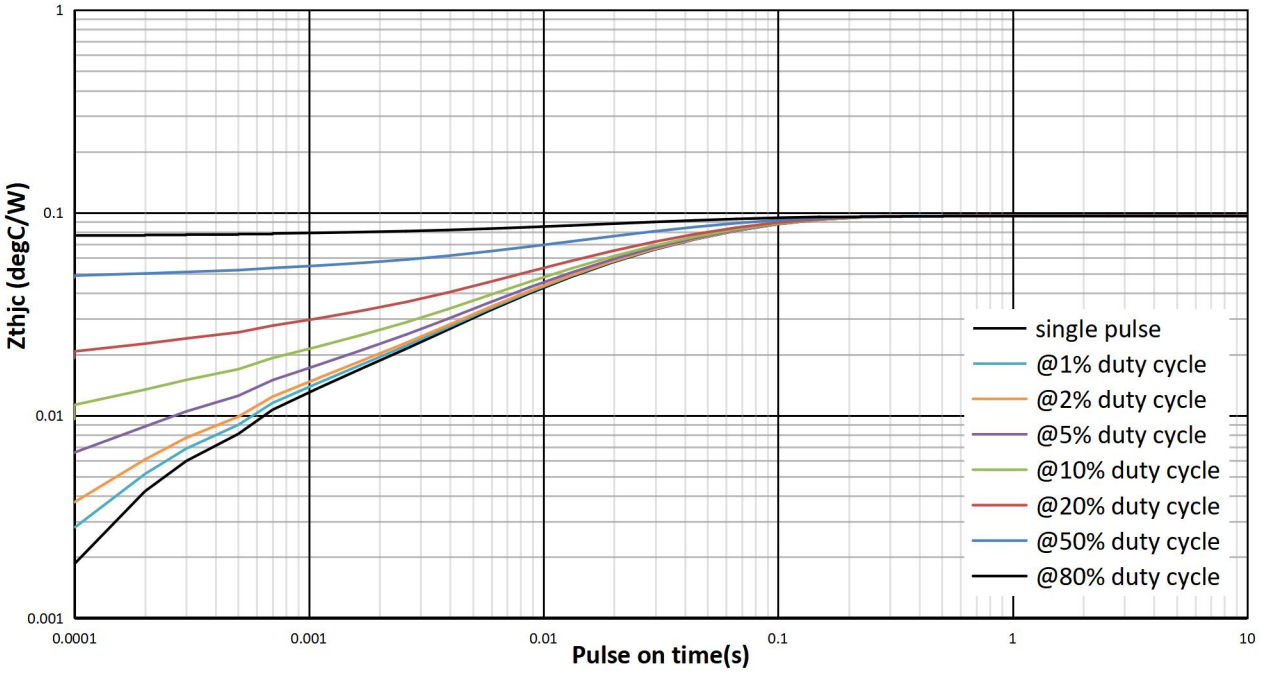
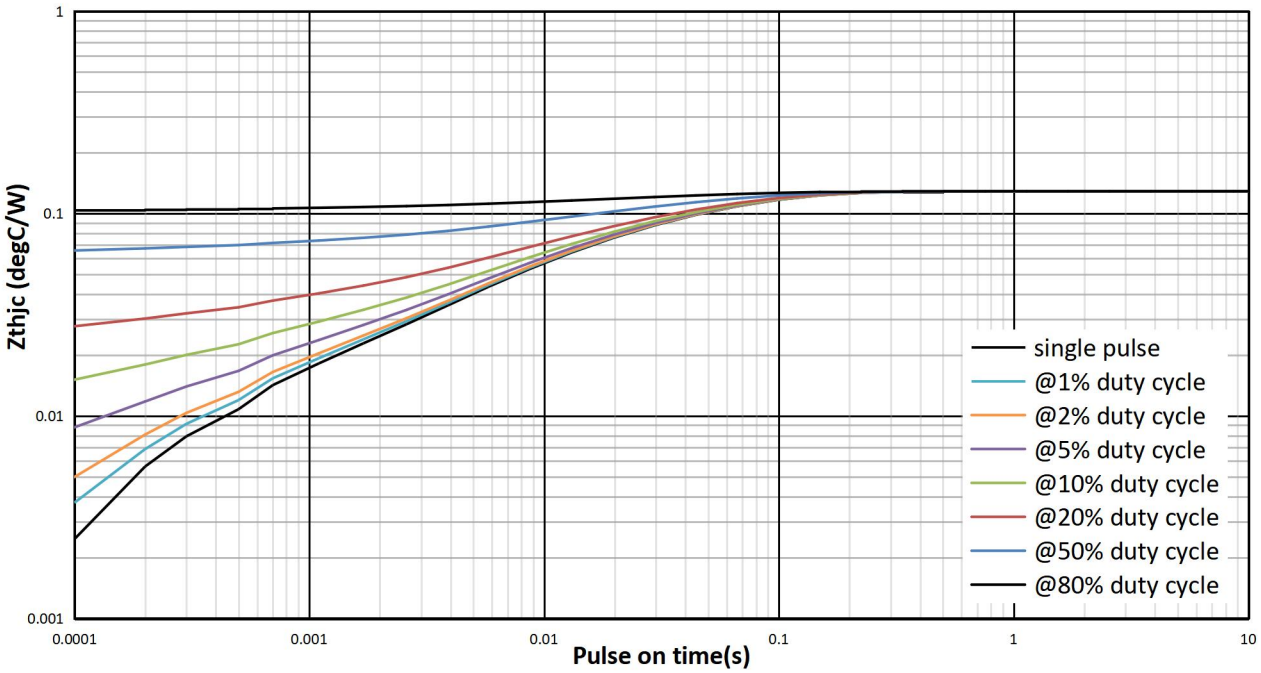
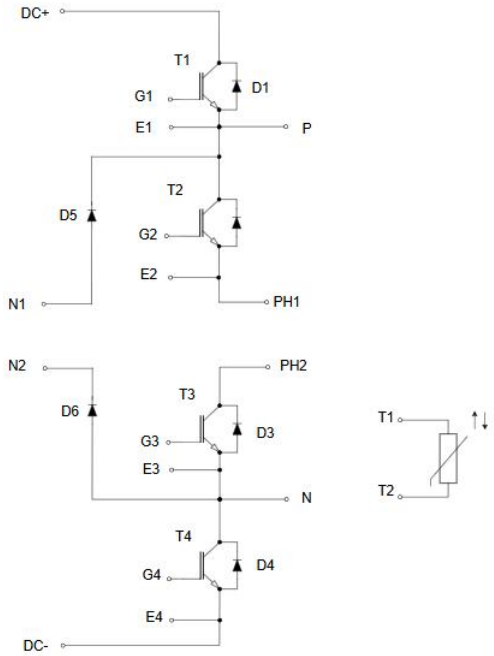


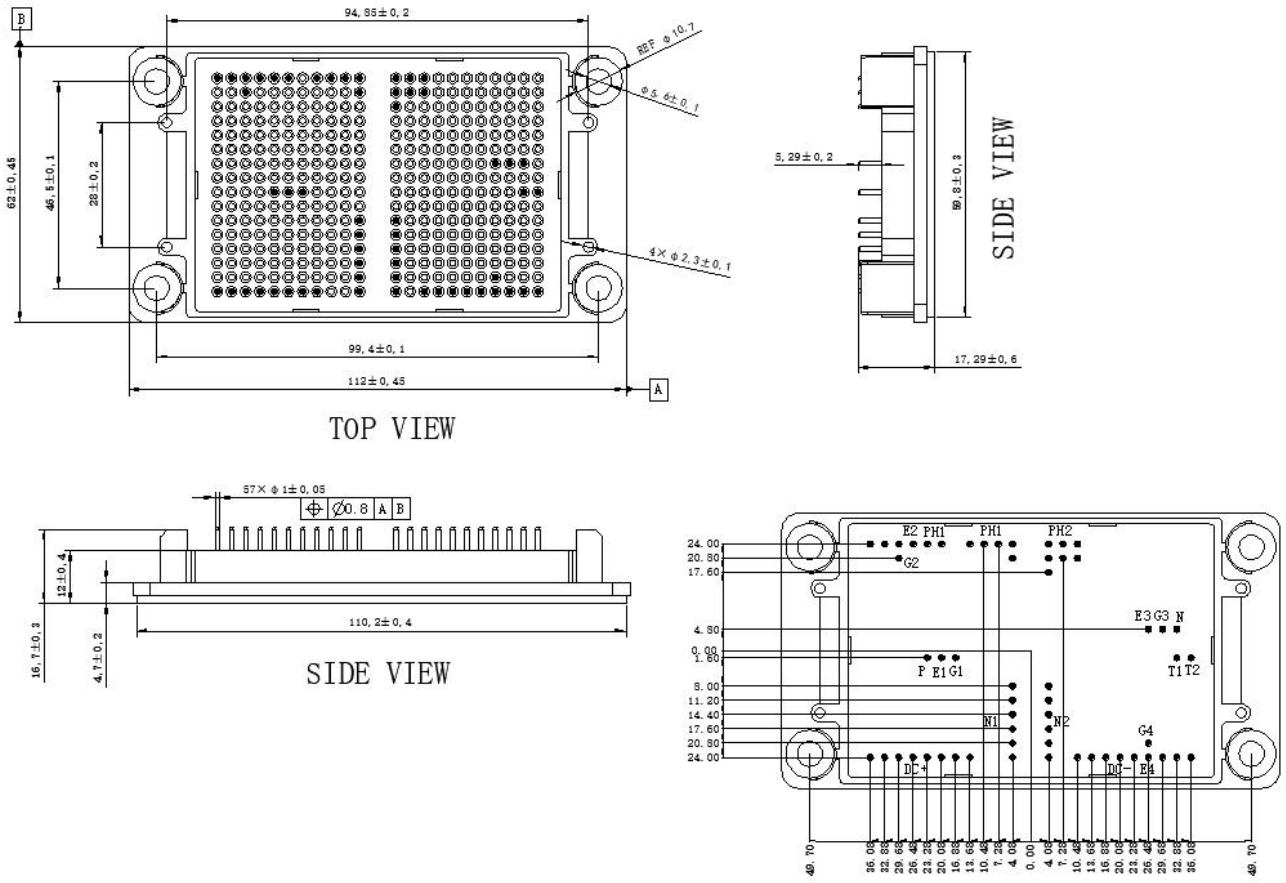
Figure17. transient thermal impedance Diode（D5，D6）



CIRCUIT DIAGRAM



PACKAGE DIMENSIONS



REVISION HISTORY

Document version	Date of release	Description of changes
Rev.00	2024-8-12	Preview
Rev.01	2025-4-5	Add Chart

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