



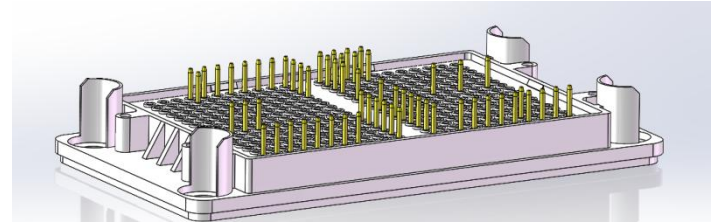
JL3I600V110SE3F7SS

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



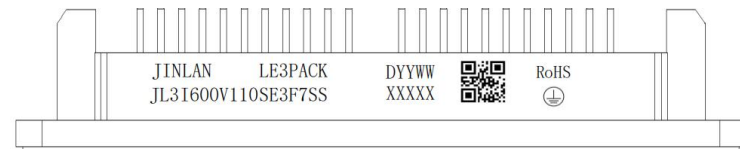
Features

- Electrical features
 - Neutral Point Clamped Three-level Inverter Module
 - 1100V Low VCE(sat) Trench Stop IGBTs
 - VCE(sat) with positive temperature coefficient
 - Maximum junction temperature 175°C
 - Low Inductive Layout
- Mechanical features
 - Package with CTI >600
 - Solderable Pins
 - Isolated copper baseplate using ZTA technology



LE3 Pack

MARKING DIAGRAM



JINLAN

= Company Name

JL3I600V110SE3F7SS

= Specific Device Code

YYWW

= Year and Work Week Code

XXXXX

= Serial Number

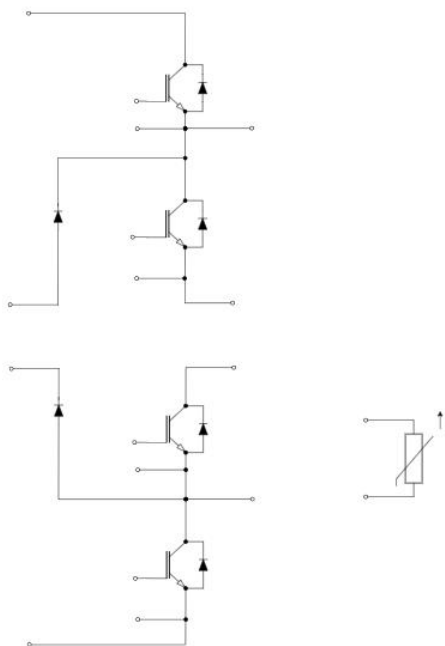
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= Custom Assembly Information

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)	ZTA	
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	LCE			--	15	--	nH
Storage Temperature Range	T_{STG}			-40		125	°C
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 (T_C = 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 @ T _C = 80°C, T _J = 175°C	600	A
I _{C(RM)}	T _p =1ms	1200	A

Characteristics (T_C = 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			T _J = 150°C V _{CE} =600V, I _C =200A V _{GE} = ± 15 V, R _{Gon} =10Ω, R _{Goff} = 10Ω		--	5.25
E _{off}	Turn Off Switching Loss per Pulse	--	7.64			--	
t _{d(on)}	Turn–On Delay Time	--	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			--	11.67	--	mJ
E _{off}	Turn Off Switching Loss per Pulse			--	9.76	--	
R _{thJC}	Thermal Resistance – Chip–to–Case			--	0.092	--	K/W
T _{vj op}		Temperature under switching conditions		-40		175 ¹⁾	°C

¹⁾T_{vj op} > 150°C is only allowed for operation at overload conditions.



SiC Diode(D5, D6)

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

Symbol	Description	Value	Unit
V _{RRM}	Peak Repetitive Reverse Voltage	1200	V
I _F	Continuous Forward Current @T _J = 150°C	200	A
I _{FRM}	Repetitive Peak Forward Current @T _J = 150°C	400	A

Characteristics (T_C = 25°C unless otherwise noted)

Symbol	Parameter	Note or Test Condition		Min	Typ	Max	Unit
V _F	Diode Forward Voltage	I _F = 200A, V _{GE} = 0 V	T _J = 25°C	--	1.60	2.35	V
			T _J = 150°C	--	2.20	--	
Q _{rr}	Reverse Recovery Charge	T _J = 25°C		--	2.85	--	μC
I _{RRM}	Peak Reverse Recovery Current	V _R =600V, I _F =200A		--	67.8	--	A
E _{REC}	Reverse Recovery Energy	V _{GE} = ± 15 V, R _{Gon} =10Ω, R _{Goff} = 10Ω		--	0.44	--	mJ
Q _{rr}	Reverse Recovery Charge	T _J = 150°C		--	1.48	--	μC
I _{RRM}	Peak Reverse Recovery Current	V _R =600 V, I _F =200A		--	55.9	--	A
E _{REC}	Reverse Recovery Energy	V _{GE} = ± 15 V, R _{Gon} =10Ω, R _{Goff} = 10Ω		--	0.31	--	mJ
R _{thJC}	Thermal Resistance – Chip-to–Case				0.225		K/W
T _{vj op}		Temperature under switching conditions		–40		175 ²⁾	°C

²⁾T_{vj op} > 150°C is only allowed for operation at overload conditions.

SiC Diode(D1, D4)

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

Symbol	Description	Value	Unit
V _{RRM}	Peak Repetitive Reverse Voltage	1200	V
I _F	Continuous Forward Current @T _J = 150°C	200	A
I _{FRM}	Repetitive Peak Forward Current @T _J = 150°C	400	A

Characteristics (T_C = 25°C unless otherwise noted)

Symbol	Parameter	Note or Test Condition		Min	Typ	Max	Unit
V _F	Diode Forward Voltage	I _F = 200A, V _{GE} = 0 V	T _J = 25°C	--	1.60	2.35	V
			T _J = 150°C	--	2.20	--	
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		--	2.9	--	μC
I _{RRM}	Peak Reverse Recovery Current			--	67.8	--	A
E _{REC}	Reverse Recovery Energy			--	0.44	--	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		--	1.48	--	μC
I _{RRM}	Peak Reverse Recovery Current			--	55.9	--	A
E _{REC}	Reverse Recovery Energy			--	0.31	--	mJ
R _{thJC}	Thermal Resistance – Chip-to–Case				0.225		K/W
T _{vj op}		Temperature under switching conditions		–40		175 ³⁾	°C

³⁾T_{vj op} > 150°C is only allowed for operation at overload conditions.



DIODE (D2, D3)

Absolute Maximum Ratings (T_C = 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	300	A
I _{FRM}	Repetitive Peak Forward Current @T _J = 150°C	600	A

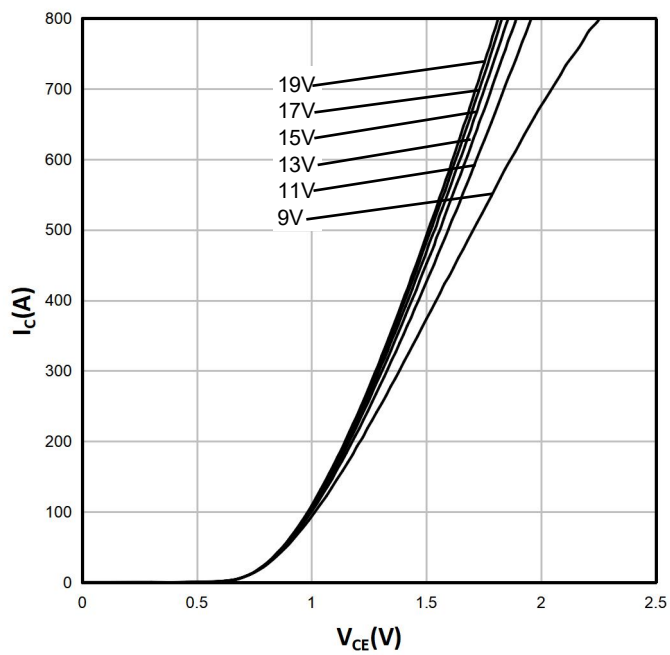
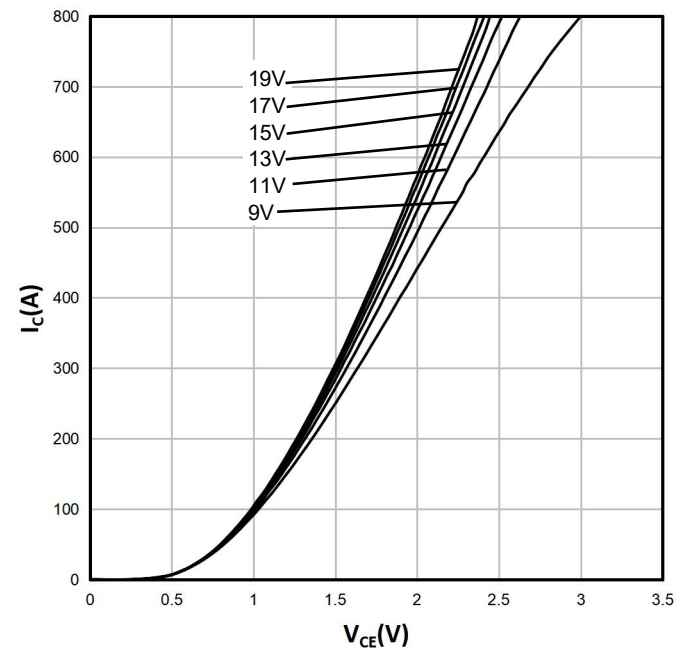
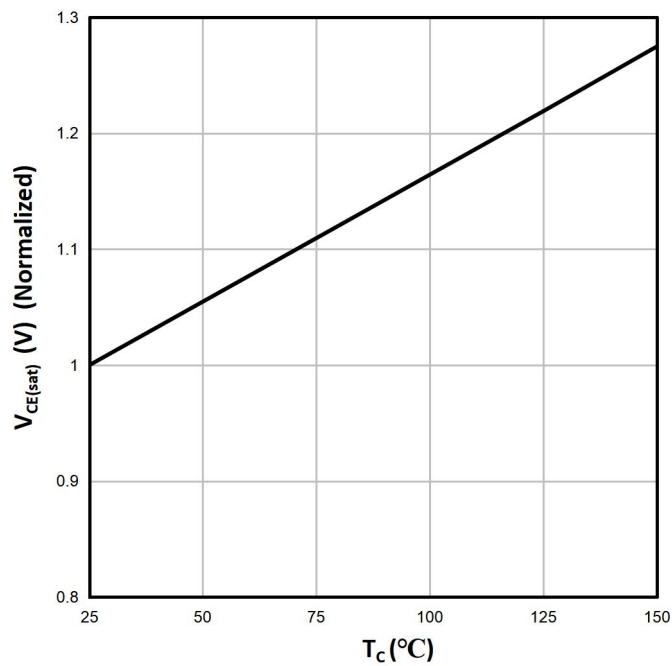
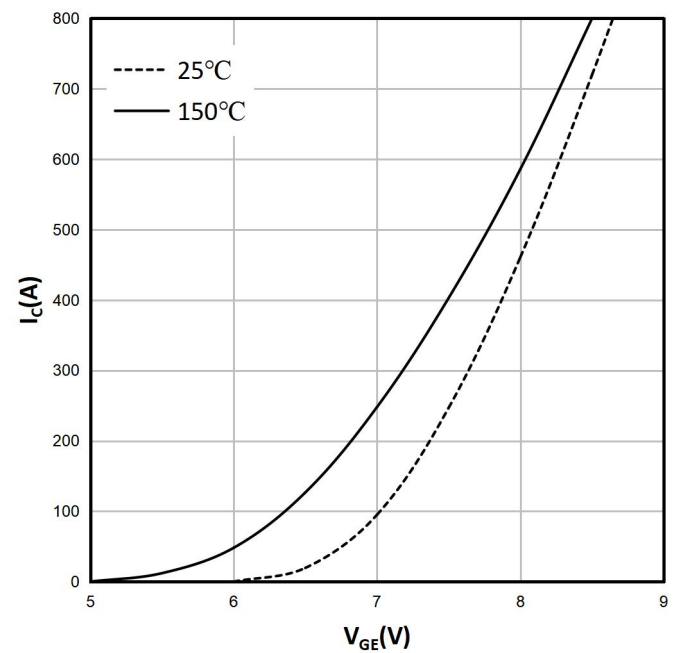
Characteristics (T_C = 25°C unless otherwise noted)

Symbol	Parameter	Note or Test Condition		Min	Typ	Max	Unit
V _F	Diode Forward Voltage	I _F = 300A, V _{GE} = 0 V	T _J = 25°C	--	1.65	2.85	V
			T _J = 150°C	--	1.55	--	
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			--	360.5	--	A
E _{REC}	Reverse Recovery Energy			--	10.6	--	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			--	20.1	--	mJ
R _{thJC}	Thermal Resistance – Chip-to-Case				0.172		K/W
T _{vj op}		Temperature under switching conditions		-40		175 ⁴⁾	°C

⁴⁾T_{vj op} > 150°C is only allowed for operation at overload conditions.

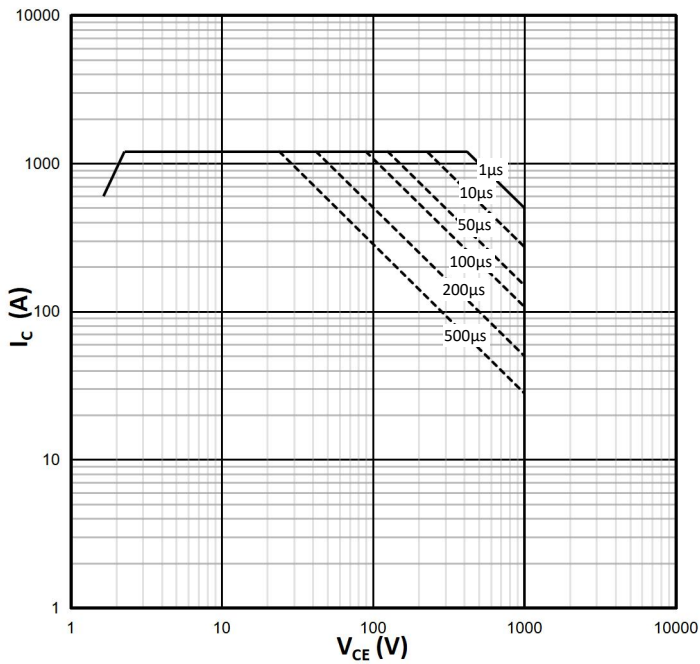
THERMISTOR PROPERTIES

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
R ₂₅	Rated Resistance	T=25°C	-	5	-	KΩ
R ₁₀₀	Rated Resistance	T=100°C	-	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

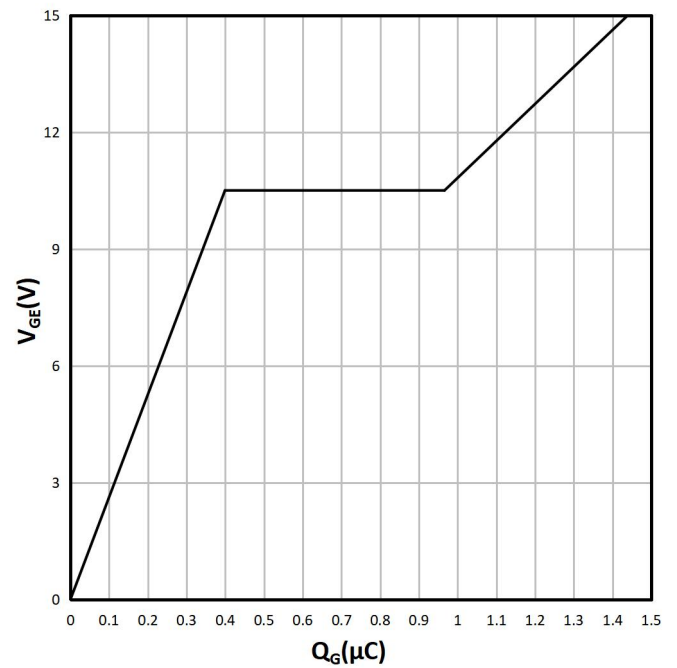
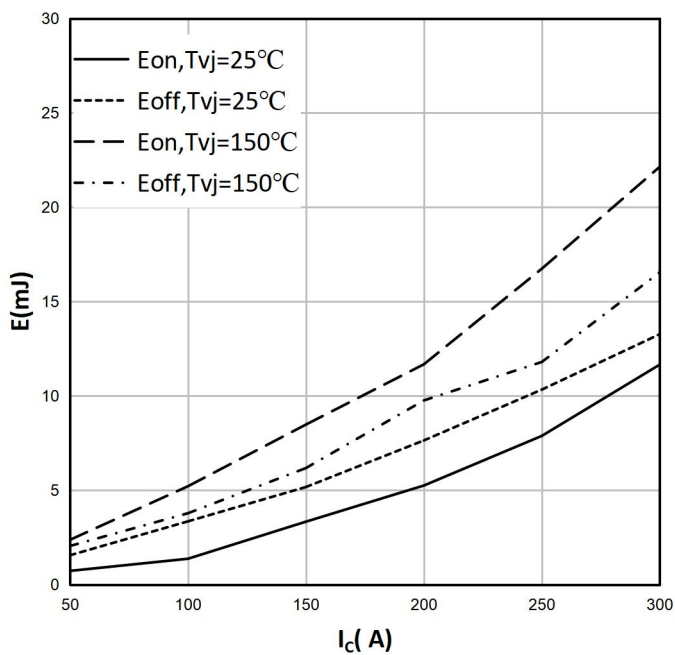
**Figure1.output characteristic IGBT(typical)** $T_{vj}=25^{\circ}\text{C}$ **Figure2.output characteristic IGBT(typical)** $T_{vj}=150^{\circ}\text{C}$ **Figure3. $V_{CE(sat)}$ vs. Temperature****Figure4.transfer characteristic IGBT(typical)** $V_{CE}=20\text{V}$ 

**Figure5. FBSOA IGBT(typical)**

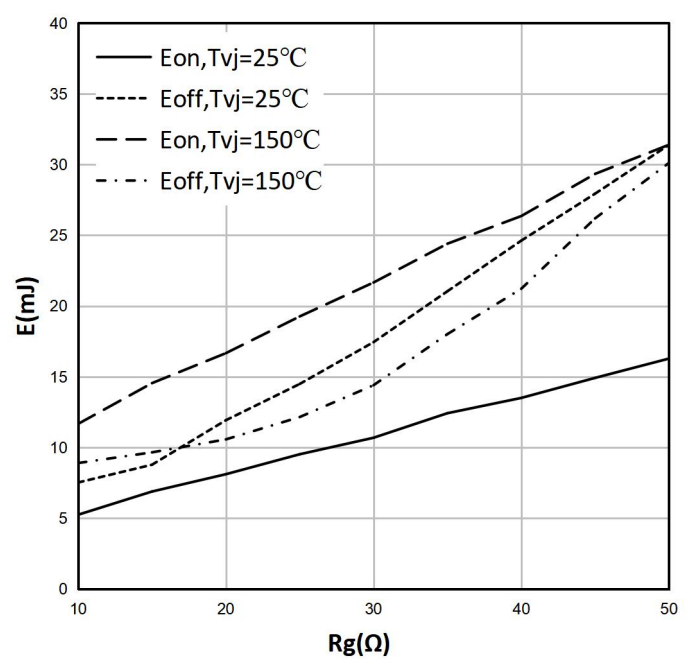
D=0, Tc=25°C, Tj<=175°C, Vge=15V

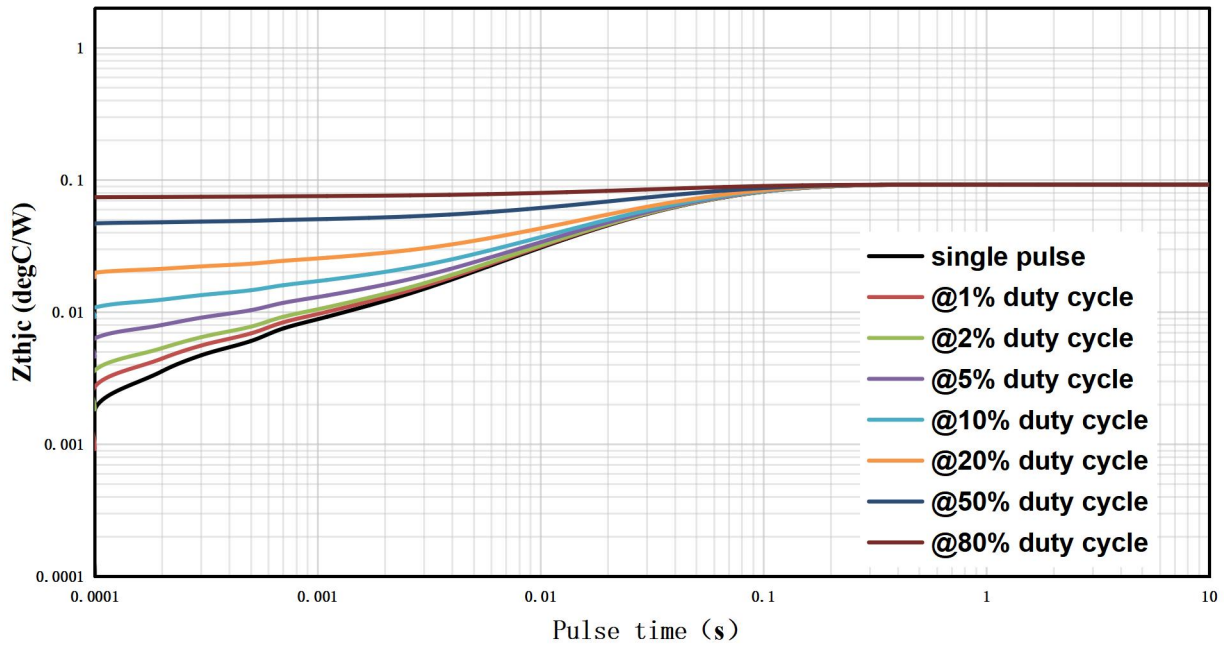
**Figure6. Gate Charge Waveform**

Vcc=600V

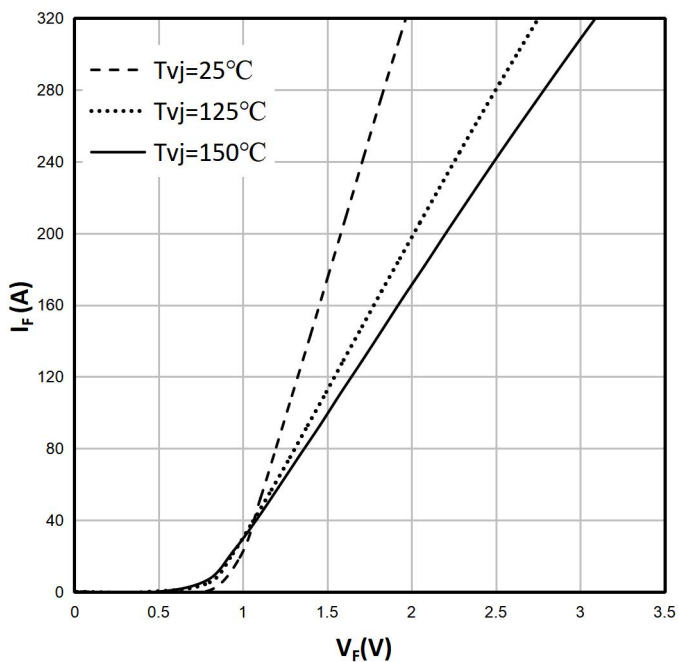
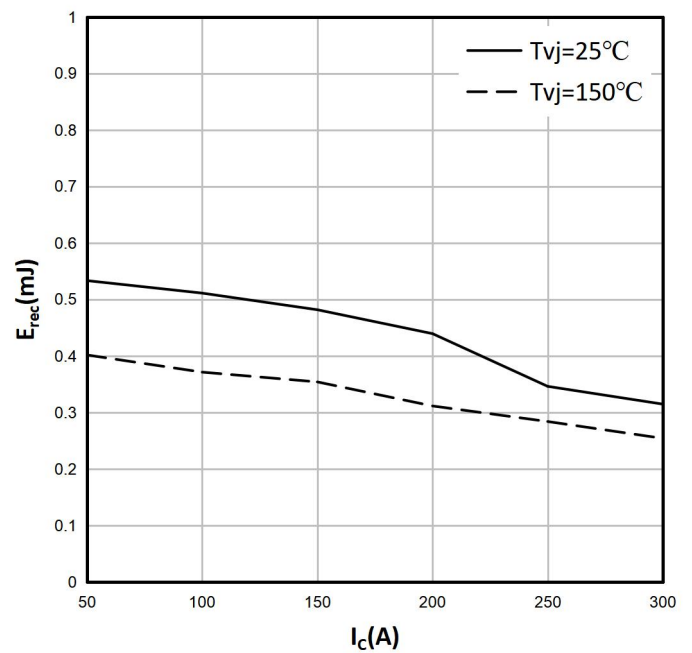
**Figure7. switching losses IGBT(typical)**Vcc=600V, R_{Gon} =10Ω, R_{Goff} =10Ω, Vge=±15V**Figure 8. switching losses IGBT, Inverter (typical)**

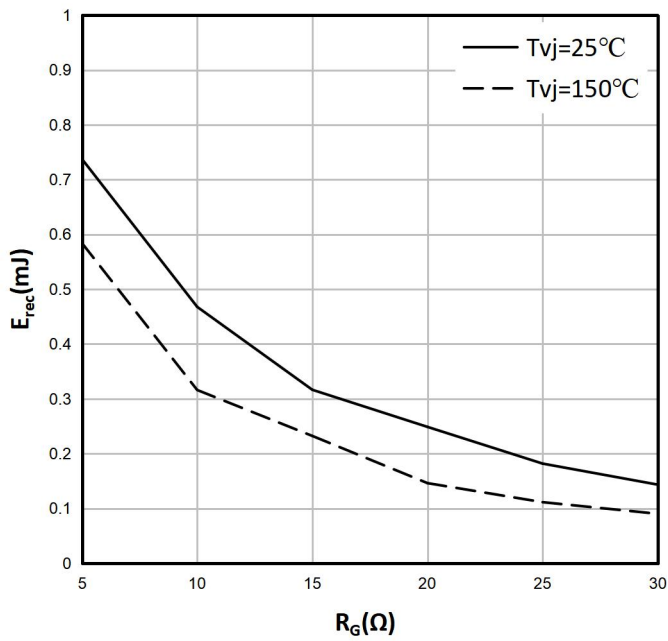
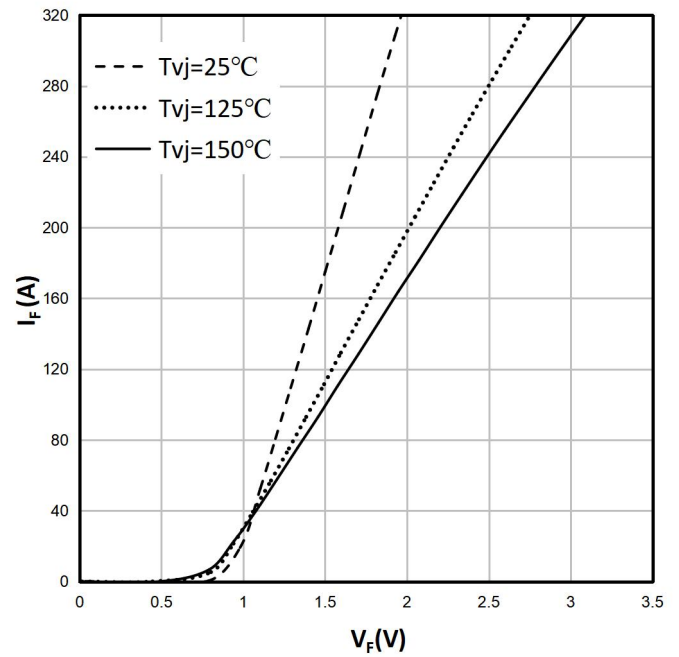
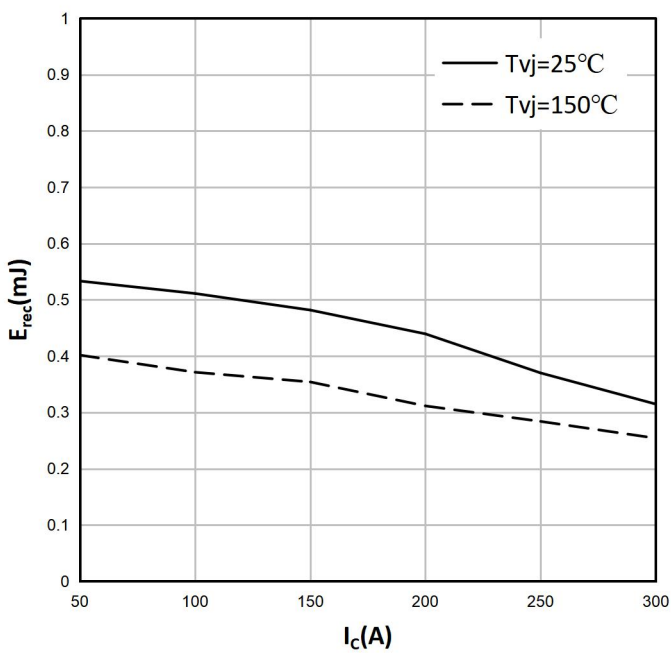
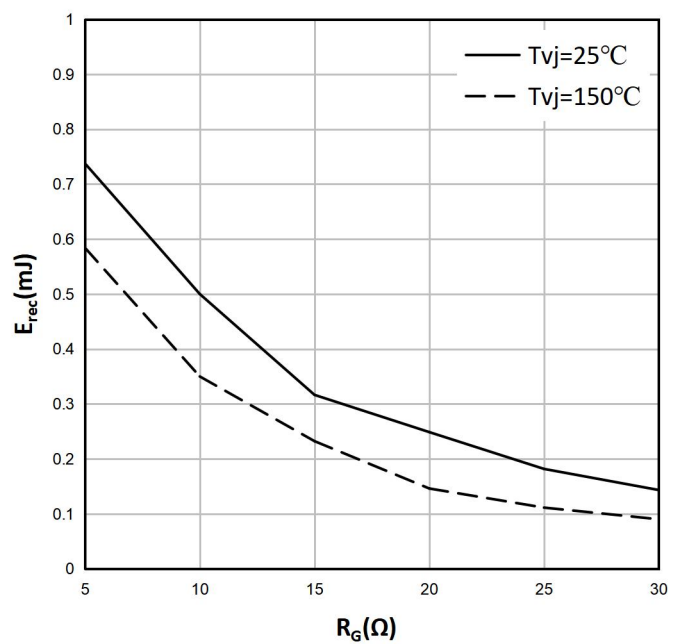
Vcc=600V, Ic=200A, Vge=±15V

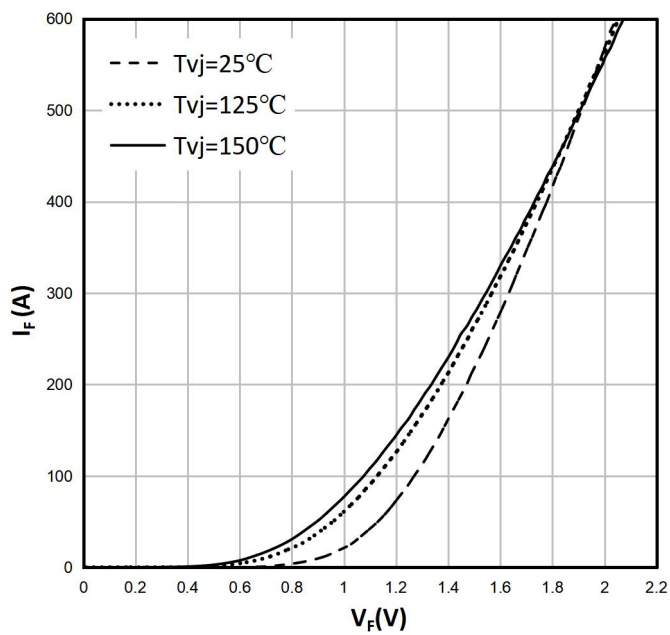
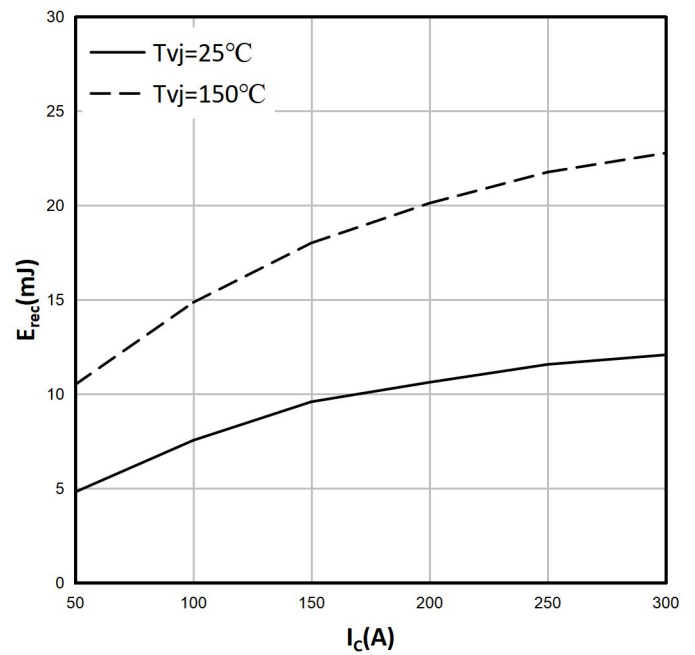
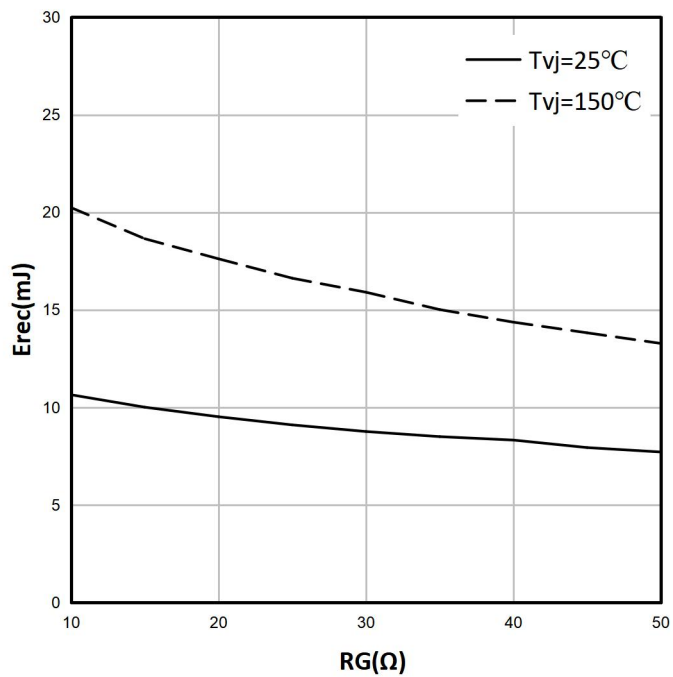


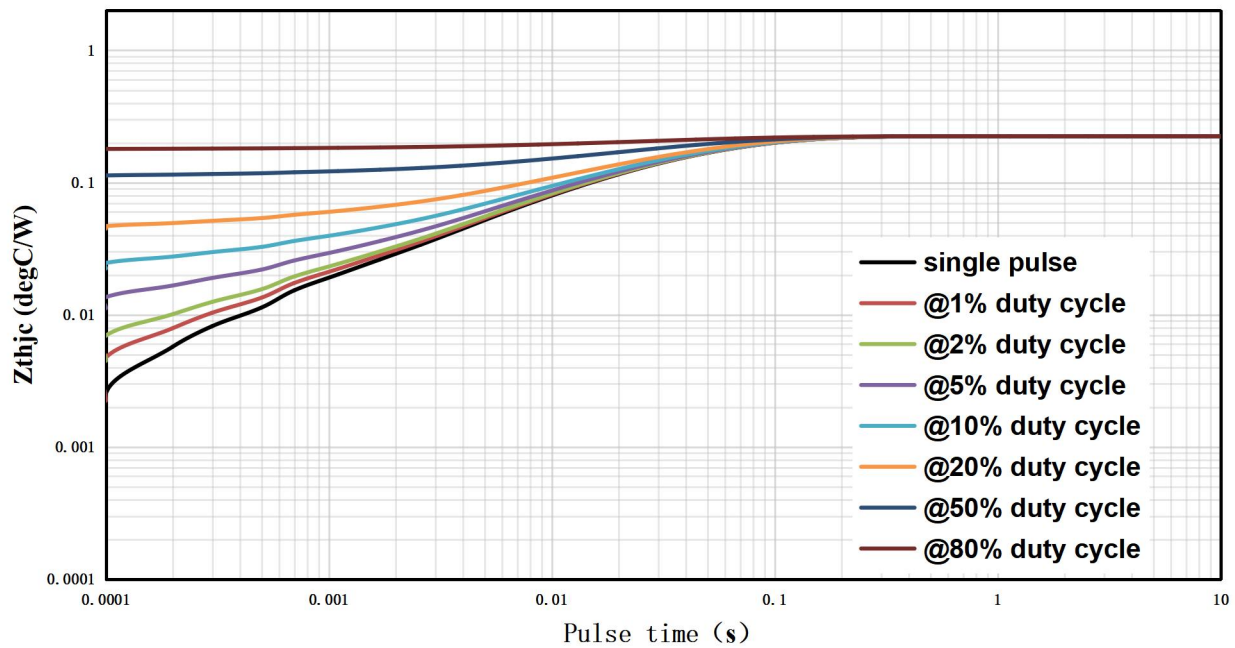
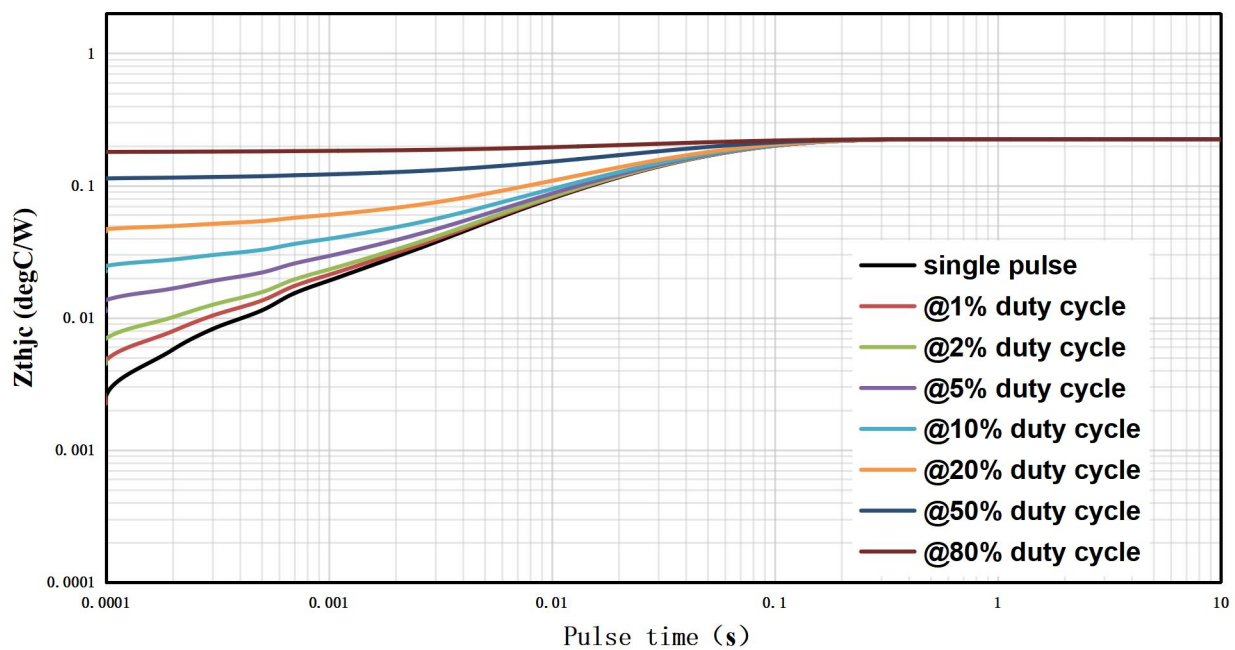
**Figure9. transient thermal impedance IGBT (T1, T2, T3, T4)****Figure10. forward characteristic of SiC Diode(typical) (D5, D6)**

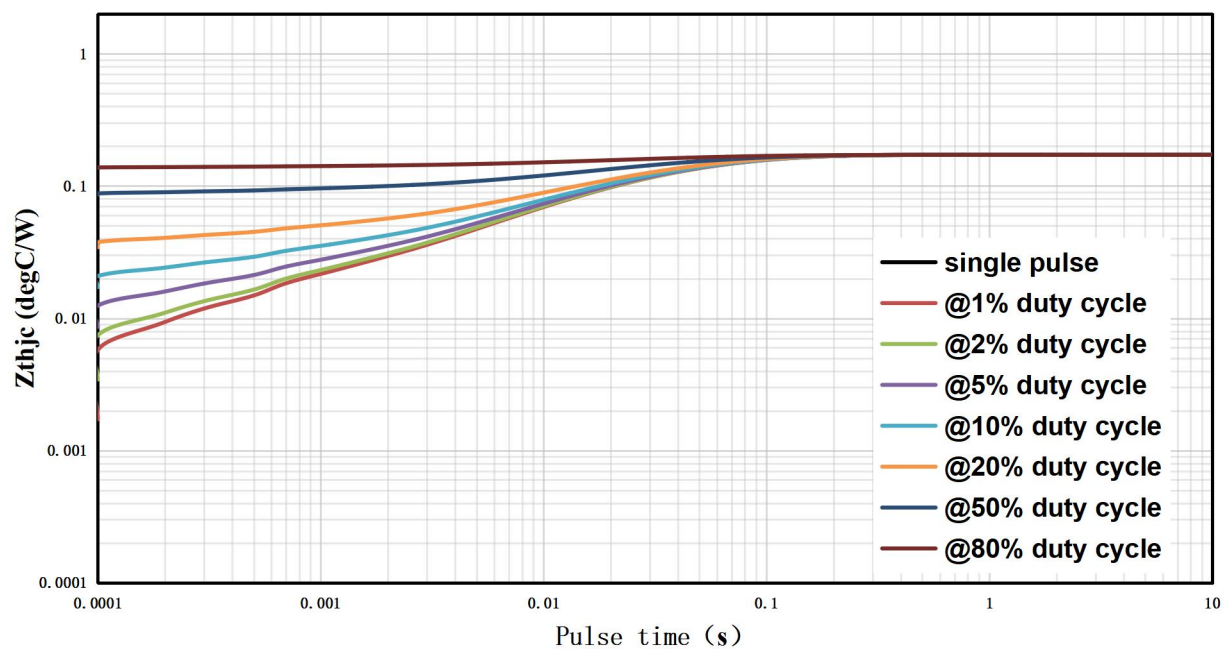
VGF=0V

**Figure11.Reverse Recovery Energy Loss vs. IC (D5, D6)** $V_{CC}=600\text{V}, R_{Gon}=10\Omega, R_{Goff}=10\Omega, V_{ge}=\pm 15\text{V}$ 

**Figure12.Reverse Recovery Energy Loss vs. R_G (D5, D6)** $V_{CC}=600V, I_C=200A, V_{GE}=\pm 15V$ **Figure13. forward characteristic of SiC Diode (typical) (D1, D4)** $V_{GE}=0V$ **Figure14.Reverse Recovery Energy Loss vs. I_C (D1, D4)** $V_{CC}=600V, R_{Gon}=10\Omega, R_{Goff}=10\Omega, V_{GE}=\pm 15V$ **Figure15.Reverse Recovery Energy Loss vs. R_G (D1, D4)** $V_{CC}=600V, I_C=200A, V_{GE}=\pm 15V$ 

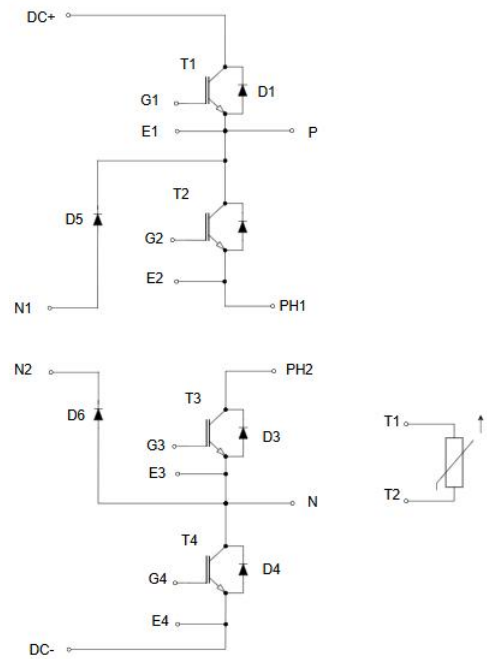
**Figure16. forward characteristic of Diode(typical)
(D2, D3)** $V_{GE}=0V$ **Figure17.Reverse Recovery Energy Loss vs. I_C
(D2, D3)** $V_{CC}=600V, R_{Gon}=10\Omega, R_{Goff}=10\Omega, V_{ge}=\pm 15V$ **Figure18.Reverse Recovery Energy Loss vs. R_G
(D2, D3)** $V_{CC}=600V, I_C=200A, V_{ge}=\pm 15V$ 

**Figure19. transient thermal impedance Diode (D5, D6)****Figure20. transient thermal impedance Diode (D1, D4)**

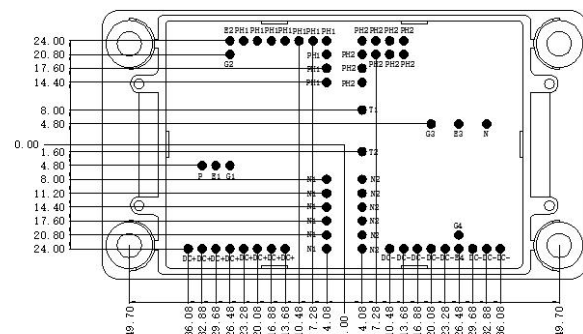
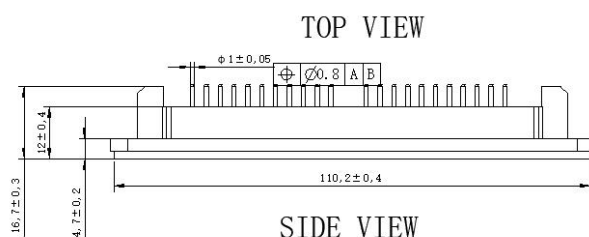
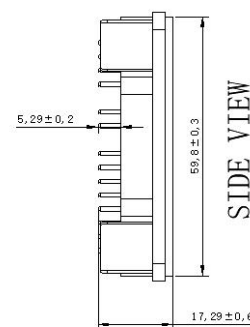
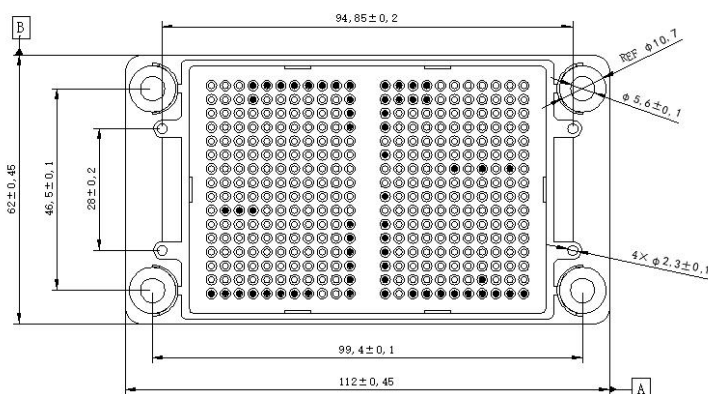
**Figure21. transient thermal impedance Diode (D2, D3)**



CIRCUIT DIAGRAM



PACKAGE DIMENSIONS



**REVISION HISTORY**

Document version	Date of release	Description of changes
Rev.00	2025-4-18	Preview



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