MPFF1000R12MNF1B

1200V 1000A Field stop IGBT Modules

Electrical Features

- Marching Power Trench IGBT7
- $V_{CE(sat)}$ with Positive Temperature Coefficient
- Integrated NTC Thermistor

Typical Applications

- PV Inverter
- Energy Storage Converter
- Hydrogen Production Power Supply
- UPS
- Commercial Vehicals
- Motor Drives

Mechanical Features

- High Power Density
- High Performance Si3N4 Substrates
- Low Thermal Resistance Cu Base Plate
- Standard Housing

IGBT，Inverter

Maximum Rated Values							
Symbol	Item	Conditions		Rating			Unit
IGBT							
V_{CES}	Collector-emitter voltage	T_{vj}=25℃		1200			V
V_{GES}	Gate-emitter voltage	-		±20			V
I_C	Collector current,DC	T_C=95℃,T_{vj}=175℃		1000			A
I_{CRM}	Repetitive peak collector current	t_p=1ms		2000			A
P_{tot}	Total power dissipation	T_C=25℃,T_{vj}=175℃		4545			W
Characteristics Values							
Symbol	Item	Conditions		Values			Unit
IGBT				Min.	Typ.	Max.	
I_{CES}	Collector-emitter cut-off current	V_{CE}=1200V,V_{GE}=0V	T_{vj}=25℃	-	-	1	mA
			T_{vj}=150℃	-	1	2	
			T_{vj}=175℃	-	10	12	
I_{GES}	Gate leakage current	V_{CE}=0V,V_{GE}=20V,T_{vj}=25℃		-	-	100	nA
$V_{GE(th)}$	Gate-emitter threshold voltage	I_C=18mA,V_{CE}=V_{GE},T_{vj}=25℃		5.2	5.6	6.4	V
V_{CEsat}	Collector-emitter saturation voltage	I_C=1000A V_{GE}=15V	T_{vj}=25℃	-	1.81	-	
			T_{vj}=125℃	-	2.14	-	
			T_{vj}=150℃	-	2.24	-	
			T_{vj}=175℃	-	2.43	-	

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C_{ies}	Input capacitance	V_{CE}=25V,V_{GE}=0V		-	42.91	-	nF
C_{res}	Reverse transfer capacitance	f=100kHz,T_{vj}=25℃		-	0.19	-	
Q_G	Gate charge	V_{GE}=±15V,V_{CE}=600V，Ic=1000A		-	8	-	μC
R_g	Internal gate resistance	T_{vj}=25℃		-	0.5	-	Ω
$t_{d(on)}$	Turn-on delay time	V_{CE}=600V I_C=1000A V_{GE}=±15V $R_{G(on)}$=2 Ω $R_{G(off)}$=2 Ω di/dt=6705A/us dv/dt=5351V/us L_S=35nH T_{vj}=175℃	T_{vj}=25℃	-	497	-	ns
			T_{vj}=125℃	-	505	-	
			T_{vj}=150℃	-	506	-	
			T_{vj}=175℃	-	507	-	
t_r	Rise time		T_{vj}=25℃	-	204	-	
			T_{vj}=125℃	-	210	-	
			T_{vj}=150℃	-	248	-	
			T_{vj}=175℃	-	270	-	
$t_{d(off)}$	Turn-off delay time		T_{vj}=25℃	-	585	-	
			T_{vj}=125℃	-	620	-	
			T_{vj}=150℃	-	656	-	
			T_{vj}=175℃	-	667	-	
t_f	Fall time		T_{vj}=25℃	-	89	-	
			T_{vj}=125℃	-	113	-	
			T_{vj}=150℃	-	116	-	
			T_{vj}=175℃	-	121	-	
E_{on}	Turn-on energy (per pulse)		T_{vj}=25℃	-	185.48	-	mJ
			T_{vj}=125℃	-	266.84	-	
			T_{vj}=150℃	-	294.91	-	
			T_{vj}=175℃	-	316.20	-	
E_{off}	Turn-off energy (per pulse)		T_{vj}=25℃	-	113.85	-	
			T_{vj}=125℃	-	131.23	-	
			T_{vj}=150℃	-	141.38	-	
			T_{vj}=175℃	-	148.67	-	
SC data	Short-circuit current	V_{CE}=900V V_{GE}≤15V V_{CES}≤1200V	T_{vj}=25℃,t_P≤10μs	-	3850	-	A
			T_{vj}=150℃,t_P≤8μs	-	3130	-	
			T_{vj}=175℃,t_P≤6μs	-	2990	-	
R_{thJC}	Thermal resistance,junction to case	per IGBT		-	33	-	K/kW
R_{thCH}	Thermalresistance,case to heatsink	per IGBT/ λgrease=1W/(m·K)		-	33	-	K/kW
T_{vjop}	Temperature under switching conditions			-40	-	175	℃

Diode，Inverter

Maximum Rated Values

Symbol	Item	Conditions		Rating	Unit
V_{RRM}	Repetitive peak reverse voltage	T_{vj}=25℃		1200	V
I_F	Diode forward current	DC		1000	A
I_{FRM}	Repetitive peak forward current	t_p=1ms		2000	A
I_{FSM}	Surge Forward Current	t_p=10ms	T_{vj}=175℃	2489	A
I^2t	I^2t-value	V_R=0V,t_p=10ms	T_{vj}=125℃	36000	A^2s
			T_{vj}=150℃	33600	
			T_{vj}=175℃	31000	

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Characteristic Values							
V_F	Continuous forward voltage	I_F=1000A V_{GE}=0V	T_{vj}=25℃	-	2.04	-	V
			T_{vj}=125℃	-	1.84	-	
			T_{vj}=150℃	-	1.77	-	
			T_{vj}=175℃	-	1.70	-	
I_{RM}	Peak reverse recovery current	V_R=600V I_F=1000A -di$_F$/dt=7421A/us L_S=35nH T_{vj}=175℃	T_{vj}=25℃	-	207	-	A
			T_{vj}=125℃	-	240	-	
			T_{vj}=150℃	-	281	-	
			T_{vj}=175℃	-	306	-	
t_{rr}	Reverse recovery time		T_{vj}=25℃	-	495	-	ns
			T_{vj}=125℃	-	908	-	
			T_{vj}=150℃	-	915	-	
			T_{vj}=175℃	-	997	-	
Q_r	Recovered charge		T_{vj}=25℃	-	65	-	μC
			T_{vj}=125℃	-	141	-	
			T_{vj}=150℃	-	162	-	
			T_{vj}=175℃	-	180	-	
E_{rec}	Reverse recovery energy		T_{vj}=25℃	-	23.13	-	mJ
			T_{vj}=125℃	-	48.29	-	
			T_{vj}=150℃	-	54.33	-	
			T_{vj}=175℃	-	60.99	-	
R_{thJC}	Thermal resistance, junction to case	per diode		-	41	-	K/kW
R_{thCH}	Thermalresistance,case to heatsink	per diode/ λgrease=1W/(m·K)		-	30	-	K/kW
T_{vjop}	Temperature under switching conditions			-40	-	175	℃

NTC Thermistor Characteristics

Symbol	Item	Conditions	Values			Unit
			Min.	Typ.	Max.	
R_{25}	Rated resistance	T_C=25℃	-	5	-	kΩ
ΔR/R	Deviation of resistance	T_C=100℃,R_{100}=493Ω	-5	-	5	%
P_{25}	Power dissipation	T_C=25℃	-	-	60	mW
$B_{25/50}$	B-constant	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15K))$	-	3375	-	K
$B_{25/80}$	B-constant	$R_2=R_{25}\exp[B_{25/80}(1/T_2-1/(298.15K))$	-	3411	-	
$B_{25/100}$	B-constant	$R_2=R_{25}\exp[B_{25/100}(1/T_2-1/(298.15K))$	-	3433	-	

Module

Symbol	Item	Conditions	Rating	Unit
V_{ISOL}	Isolation voltage	Terminals to baseplate，RMS,f=50Hz,t=1min	4000	V
-	Material of module baseplate	-	Cu	-
-	Internal isolation	Basic insulation(class 1, IEC 61140)	Si_3N_4	-
CTI	Comperative tracking index	-	＞200	
T_{stg}	Storage temperature	-	-40~125	℃

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Symbol	Item	Conditions	Values			Unit
			Min.	Typ.	Max.	
M	Mounting torque for module mounting	Screw M5	3.0	-	6.0	Nm
	Terminal connection torque	Screw M6	3.0	-	6.0	Nm
$R_{CC'+EE'}$		T_C = 25°C, per switch	-	0.8	-	mΩ
L_{sCE}	Stray inductance module		-	20	-	nH
ds	Creepage distance	Terminal to terminal	-	13.0	-	mm
		Terminal to base plate	-	15.0	-	
da	Clearance	Terminal to terminal	-	10	-	mm
		Terminal to base plate	-	12.5	-	
m	Weight	-	-	367	-	g

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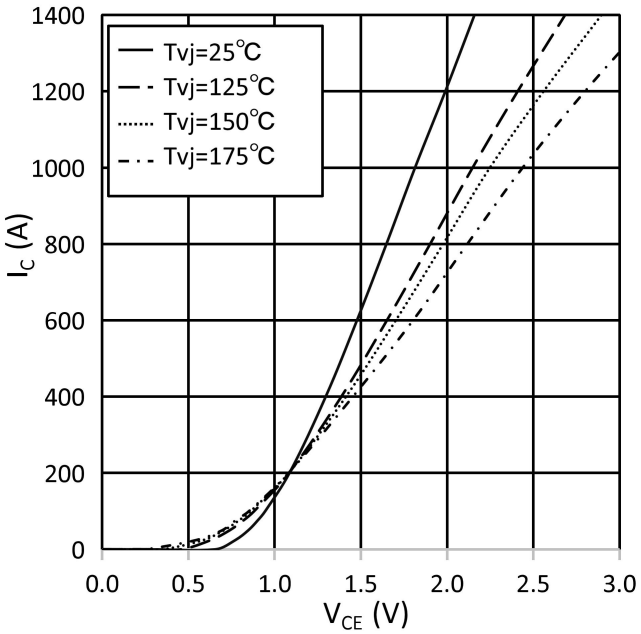
output characteristic IGBT, Inverter (typical)

$I_C = f(V_{CE})$

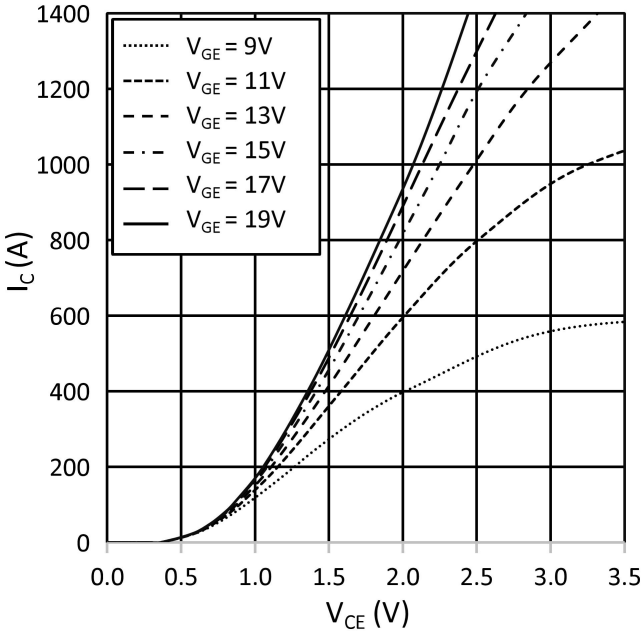
V_{GE} = 15 V



output characteristic IGBT, Inverter (typical)

$I_C = f(V_{CE})$

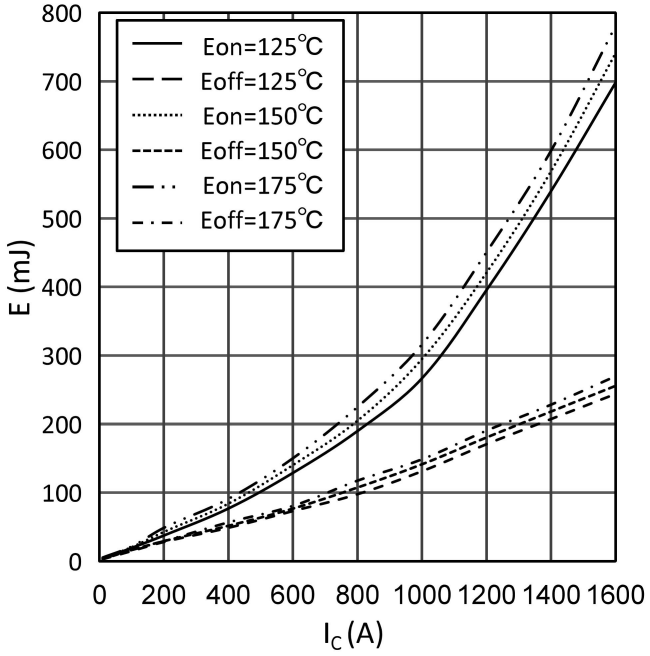
T_{vj} = 150℃



switching losses IGBT,Inverter(typical)

$E_{on} = f(I_C)$, $E_{off} = f(IC)$

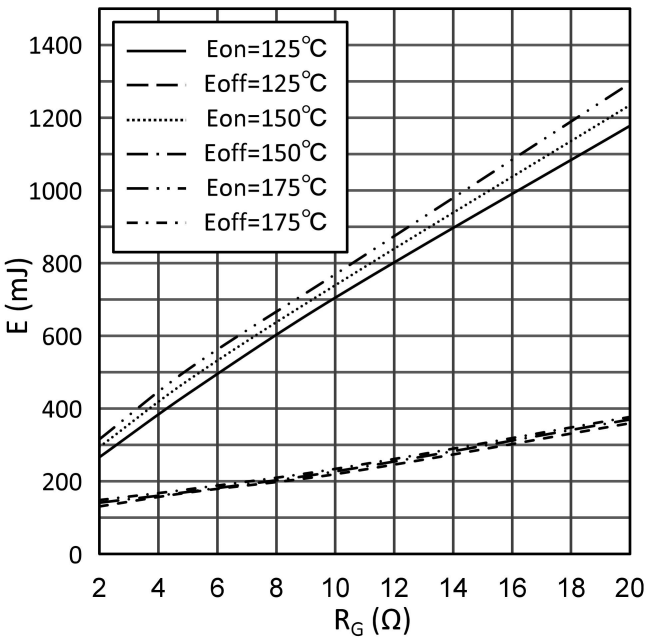
V_{GE} = ±15V, R_{Gon} = 2Ω, R_{Goff} = 2Ω, V_{CE}= 600V



switching losses IGBT,Inverter(typical)

$E_{on} = f(R_G)$, $E_{off} = f(R_G)$

V_{GE} = ±15V, I_C = 1000A, V_{CE}= 600V



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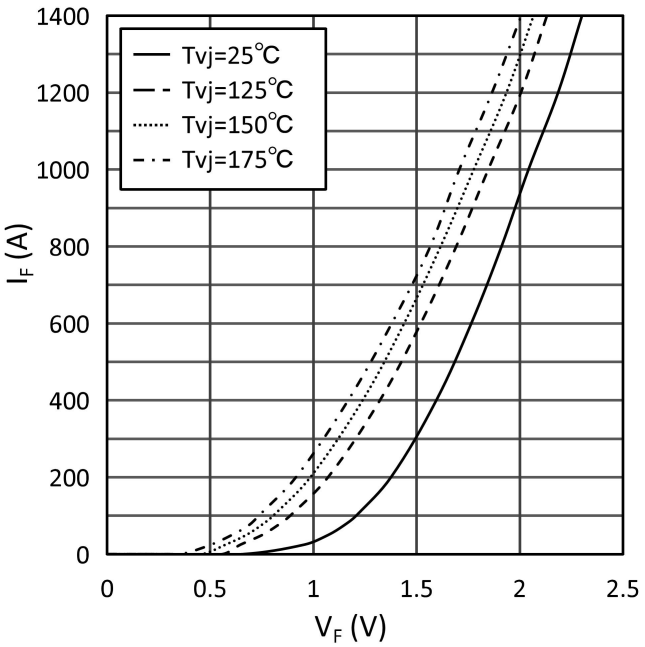
forward characteristic of Diode, Inverter (typical)

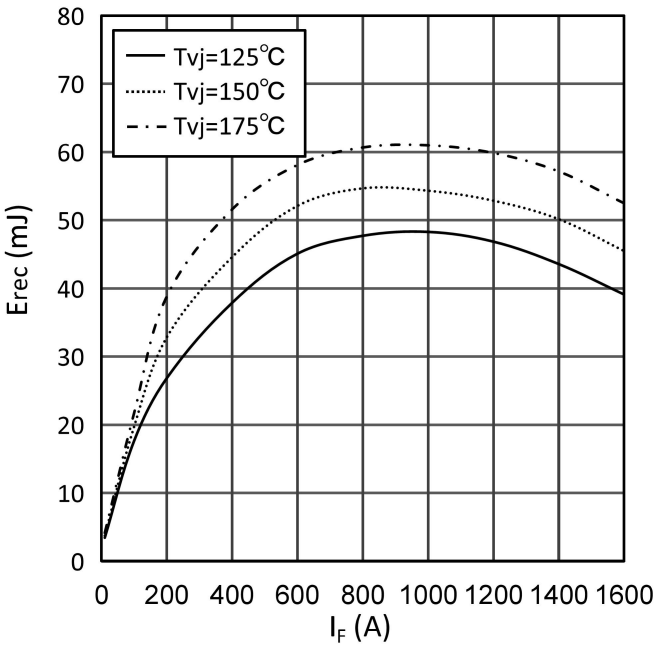
$I_F = f(V_F)$



switching losses Diode, Inverter (typical)

$E_{rec} = f(I_F)$

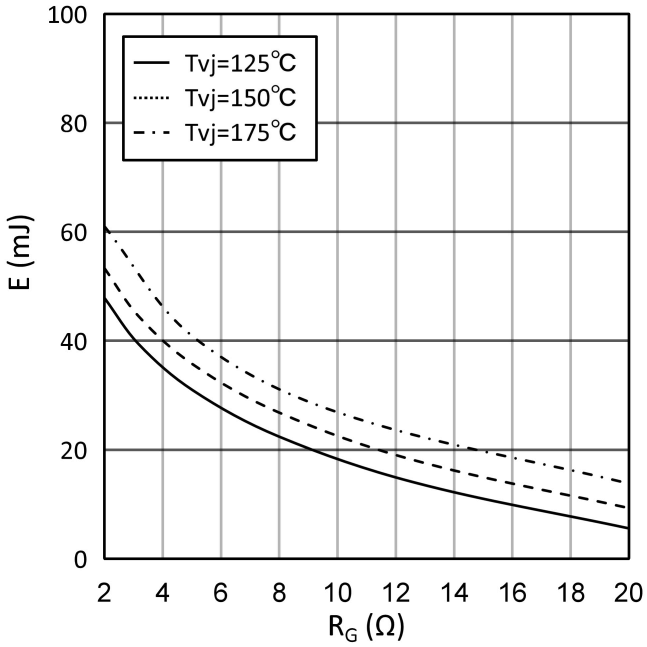
R_{Gon}=2Ω, V_{CE}=600V



switching losses Diode, Inverter (typical)

$E_{rec} = f(R_G)$

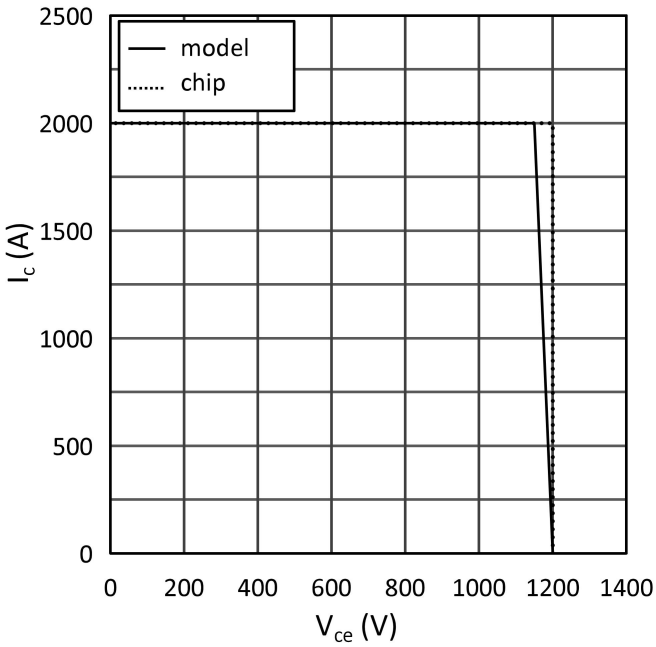
I_F=1000A, V_{CE}=600V



reverse bias safe operating area IGBT,Inverter (RBSOA)

$I_C = f(V_{CE})$

V_{GE} = ±15V, R_{Gon} = 2Ω, R_{Goff} = 2Ω, T_{vj} = 150°C



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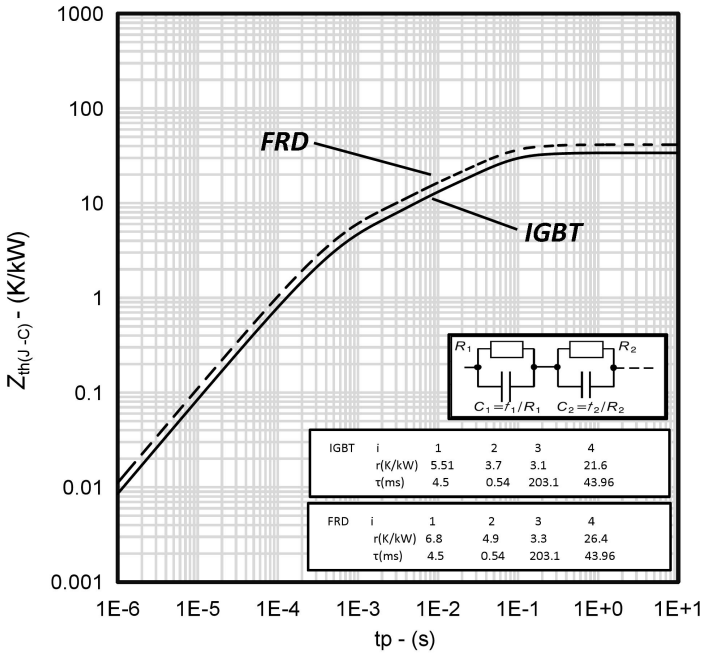
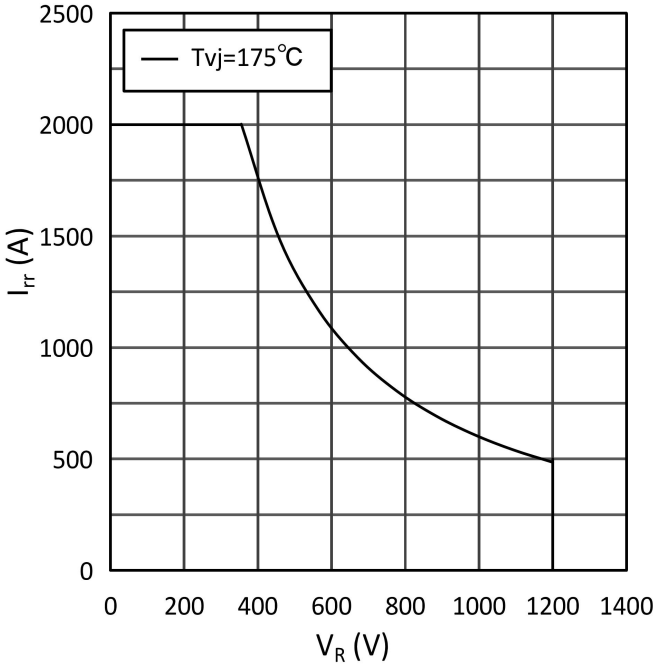
Transient Thermal Impedance

$Z_{th} = f(t)$



reverse bias safe operating area of FRD, Inverter (FRDSOA)

$I_{rr} = f(V_R)$



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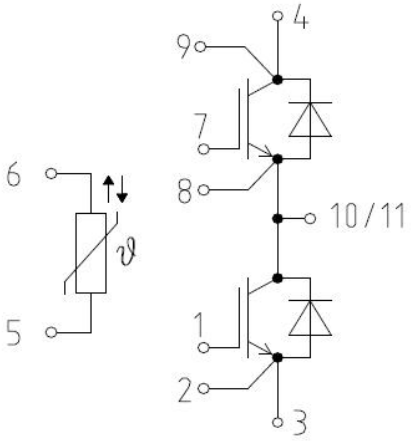
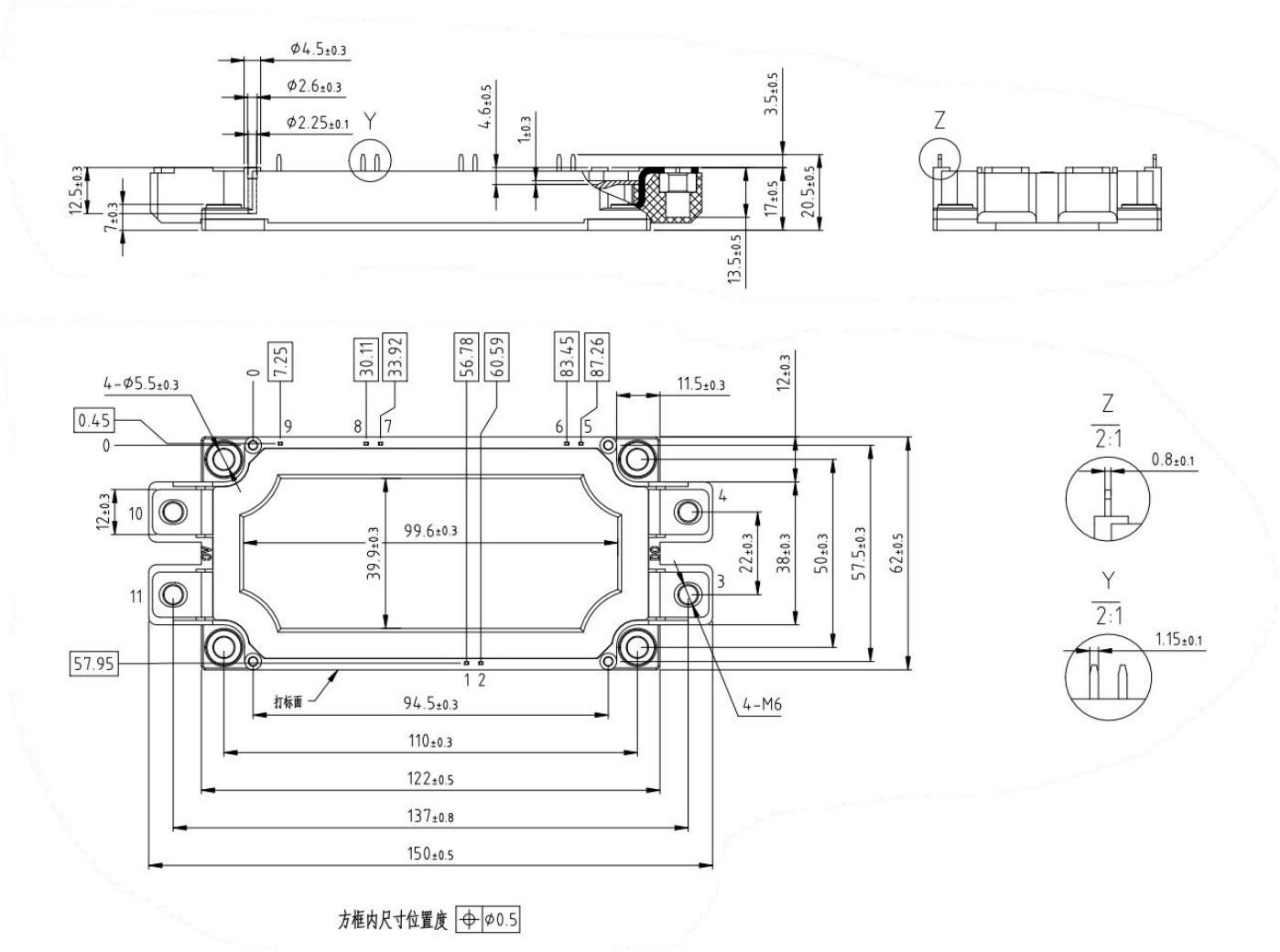
Circuit diagram headline



Package outlines（Unit：mm）



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序号 Item	日期 Date	变更记录及描述 Change History Description	版本序号 Rev. item	经办人 Responsibility
1	2025.11.28	初版规格书发布，版本为V1.0	2025 11 Ver1.0	王祥宇
2	2025.12.23	更新热阻数据，变更为V1.1版本	2025 12 Ver1.1	王祥宇
3	2025.12.30	更新热阻数据曲线，变更为V1.2版本	2025 12 Ver1.2	王祥宇
4	2026.06.04	更新I^2t和温度相关数据，变更为V1.3版本	2026 06 Ver1.3	王祥宇
5	2026.06.30	更新模块常高温动静态数据及曲线、更新热阻、I^2t等数据，变更为V1.4版本	2026 06 Ver1.4	王祥宇
6	2026.07.14	更新模块常高温动静态数据和测试条件，更新FRDSOA曲线图，变更为V1.5版本	2026 07 Ver1.5	王祥宇

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