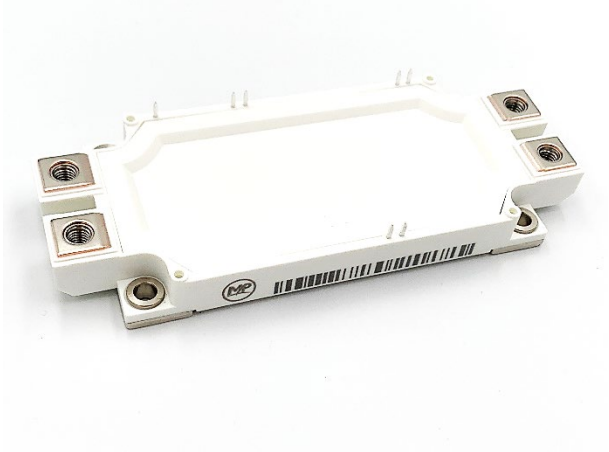
MPFF450R17MBF

1700V450A IGBT Module

Electrical Features

- Trench/Fieldstop IGBT
- Low Vce(sat)
- Vce(sat) with positive temperature coefficient
- 10 μ s short circuit capability
- Fast&soft reverse recovery anti-parallel FWD
- Low inductance case



Typical Applications

- Motor Drives
- High Power Converters
- UPS System
- Servo Drives
- Wind Turbines

IGBT，Inverter

Maximum Rated Values						
Symbol	Item	Conditions		Rating		Unit
IGBT						
V_{CES}	Collector-emitter voltage	T_{vj}=25°C		1700		V
V_{GES}	Gate-emitter voltage	-		±20		V
I_C	Collector current,DC	T_C=100°C,T_{vj}=175°C		450		A
I_{CRM}	Repetitive peak collector current	t_p=1ms		900		A
P_{tot}	Total power dissipation	T_C=25°C,T_{vj}=175°C		2500		W
Characteristics Values						
Symbol	Item	Conditions		Values		Unit
IGBT				Min.	Typ.	Max.	
I_{CES}	Collector-emitter cut-off current	V_{CE}=1700V,V_{GE}=0V,T_{vj}=25°C		-	-	3	mA
I_{GES}	Gate leakage current	V_{CE}=0V,V_{GE}=20V,T_{vj}=25°C		-	-	400	nA
$V_{GE(th)}$	Gate-emitter threshold voltage	I_C=18mA,V_{CE}=V_{GE},T_{vj}=25°C		5.2	5.8	6.4	V
V_{CEsat}	Collector-emitter saturation voltage	I_C=450A V_{GE}=15V	T_{vj}=25°C	-	2.29	-	V
			T_{vj}=125°C	-	2.83	-	
			T_{vj}=150°C	-	-	-	
C_{ies}	Input capacitance	V_{CE}=25V,V_{GE}=0V f=1MHz,T_{vj}=25°C		-	43.8	-	nF
C_{oes}	Output capacitance				1.47		
C_{res}	Reverse transfer capacitance			-	1.32	-	
Q_G	Gate charge	V_{CC}=800V, I_C=450A, V_{GE}=15V		-	3.89	-	μC
R_g	Internal gate resistance	T_{vj}=25°C			1.7		Ω

$t_{d(on)}$	Turn-on delay time	V_{CC}=900V, I_C=450A, V_{GE}=±15V, $R_{G(on)}$=2.4 Ω, $R_{G(off)}$=2.4 Ω, Inductive load	T_{vj}=25°C	-	405	-	ns
			T_{vj}=125°C	-	410	-	
			T_{vj}=150°C	-	-	-	
t_r	Rise time		T_{vj}=25°C	-	188	-	
			T_{vj}=125°C	-	197	-	
			T_{vj}=150°C	-	-	-	
$t_{d(off)}$	Turn-off delay time		T_{vj}=25°C	-	656	-	
			T_{vj}=125°C	-	736	-	
			T_{vj}=150°C	-	-	-	
t_f	Fall time		T_{vj}=25°C	-	588	-	
			T_{vj}=125°C	-	844	-	
			T_{vj}=150°C	-	-	-	
E_{on}	Turn-on energy (per pulse)	V_{CC}=900V，I_C=450 A，V_{GE}=±15V，$R_{G(on)}$=2.4 Ω，$R_{G(off)}$=2.4 Ω，di/dt=4414A/μs(T_{vj}=125°C)	T_{vj}=25°C	-	153.1	-	mJ
			T_{vj}=125°C	-	200.4	-	
			T_{vj}=150°C	-	-	-	
E_{off}	Turn-off energy (per pulse)	V_{CC}=900V，I_C=450 A，V_{GE}=±15V，$R_{G(on)}$=2.4 Ω，$R_{G(off)}$=2.4 Ω，du/dt=5648V/μs(T_{vj}=125°C)	T_{vj}=25°C	-	131.5	-	
			T_{vj}=125°C	-	169.2	-	
			T_{vj}=150°C	-	-	-	
SC data	Short-circuit current	V_{CC}=900V,V_{GE}≤15V,T_{vj}=25°C, t_P≤10μs			2681		A
R_{thJC}	Thermal resistance,junction to case	per IGBT		-	-	0.06	K/W
R_{thCH}	Thermalresistance,case to heatsink	per IGBT/ λgrease=1W/(m·K)		-	0.029	-	K/W
T_{vjop}	Temperature under switching conditions			-40		150	°C

Diode，Inverter

Maximum Rated Values

Symbol	Item	Conditions	Rating	Unit
V_{RRM}	Repetitive peak reverse voltage	T_{vj}=25°C	1700	V
I_F	Forward current,DC		450	A
I_{FRM}	Repetitive peak forward current	t_p=1ms	900	A
I^2t	I^2t-value	V_R=0V, t_p =10ms, T_{vj} =150°C	47002	A^2s

Characteristic Values

				Min.	Typ.	Max.	
V_F	Continuous forward voltage	I_F=450A V_{GE}=0V	T_{vj}=25°C	-	2.22	-	V
			T_{vj}=125°C	-	2.13	-	
			T_{vj}=150°C	-	-	-	
I_{RM}	Peak reverse recovery current	V_R=900V I_F=450A	T_{vj}=25°C	-	235	-	A
			T_{vj}=125°C	-	347	-	

		V_{GE}=-15V -di$_F$/dt=4746A/μs (T_{vj}=125°C)	T_{vj}=150°C	-	-	-	
t_{rr}	Reverse recovery time		T_{vj}=25°C	-	738	-	ns
			T_{vj}=125°C	-	971	-	
			T_{vj}=150°C	-	-	-	
Q_r	Recovered charge		T_{vj}=25°C	-	52	-	μC
			T_{vj}=125°C	-	135	-	
			T_{vj}=150°C	-	-	-	
E_{rec}	Reverse recovered energy		T_{vj}=25°C	-	33.8	-	mJ
			T_{vj}=125°C	-	75.4	-	
			T_{vj}=150°C	-	-	-	
R_{thJC}	Thermal resistance, junction to case	per diode		-	-	0.1	K/W
R_{thCH}	Thermalresistance,case to heatsink	per diode/ λgrease=1W/(m·K)		-	0.05	-	K/W
T_{vjop}	Temperature under switching conditions			-40		150	°C

NTC Thermistor Characteristics

Symbol	Item	Conditions	Values			Unit
			Min.	Typ.	Max.	
R_{25}	Rated resistance	T_C=25°C	-	5	-	kΩ
ΔR/R	Deviation of resistance	T_C=100°C,R_{100}=493Ω	-5	-	5	%
P_{25}	Power dissipation	T_C=25°C	-	-	20	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	-	

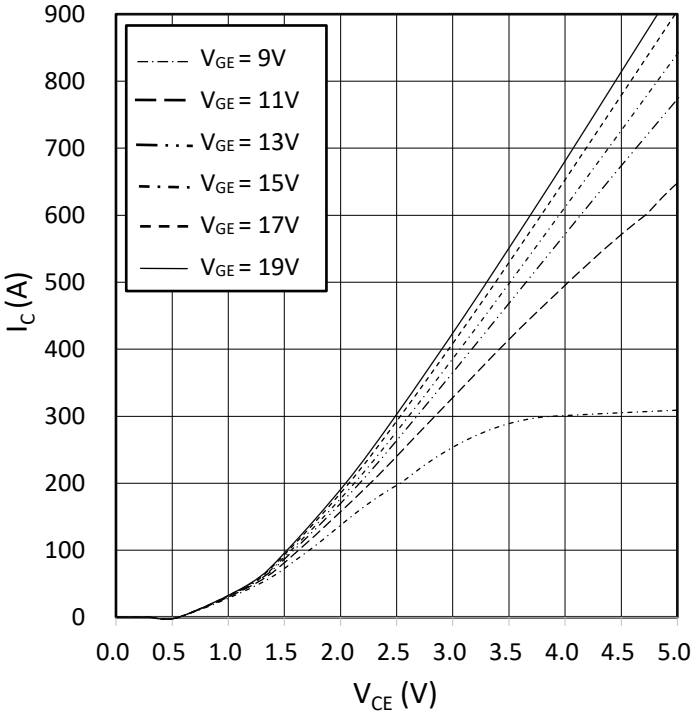
Module

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)	Al_2O_3			-
T_{stg}	Storage temperature	-	-40~125			°C
Symbol	Item	Conditions	Values			Unit
			Min.	Typ.	Max.	
M	Mounting torque for module mounting	Screw M5	3.0	-	5.0	Nm
	Terminal connection torque	Screw M6	2.5	-	5.0	Nm
ds	Creepage distance	Terminal to terminal	-	13	-	mm
		Terminal to base plate	-	14.5	-	
da	Clearance	Terminal to terminal	-	10	-	mm
		Terminal to base plate	-	12.5	-	
m	Weight	-	-	348	-	g

output characteristic IGBT, Inverter (typical)

$I_C = f(V_{CE})$

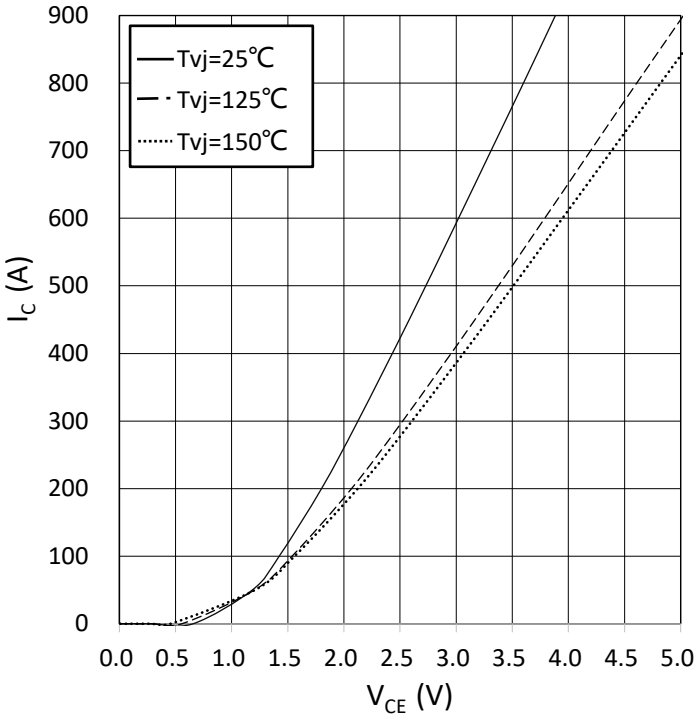
$T_{vj} = 150℃$



output characteristic IGBT, Inverter (typical)

$I_C = f(V_{CE})$

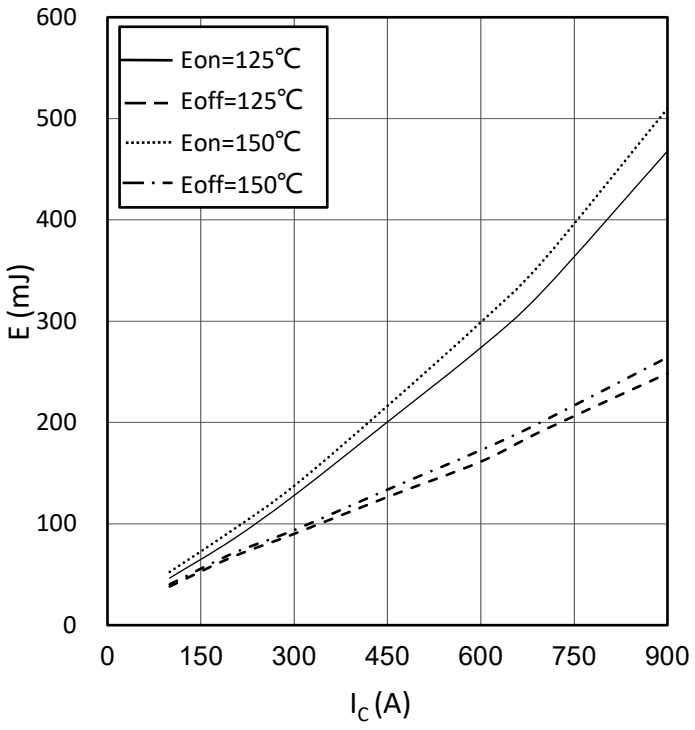
$V_{GE} = 15\ V$



switching losses IGBT,Inverter(typical)

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

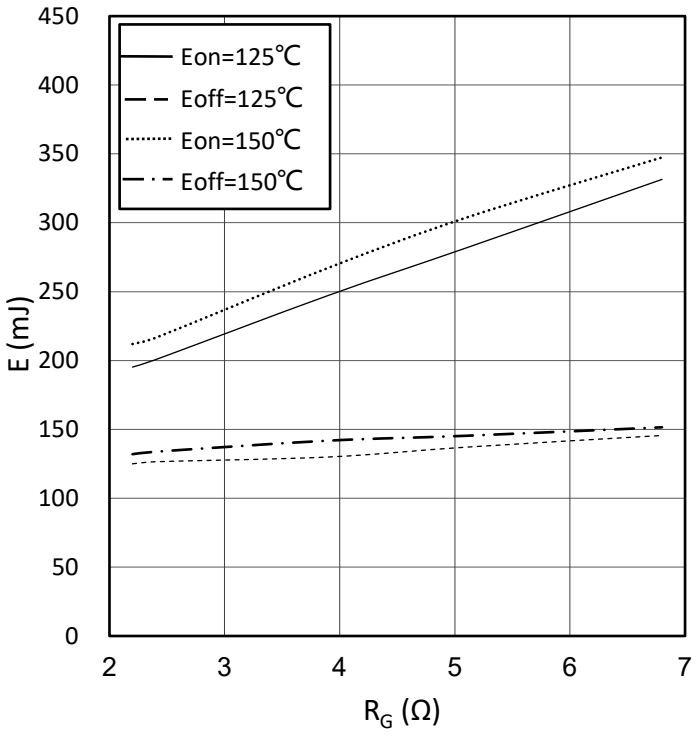
$V_{GE} = \pm 15V$, $R_{Gon} = 2.4\Omega$, $R_{Goff} = 2.4\Omega$, $V_{CE} = 900V$



switching losses IGBT,Inverter(typical)

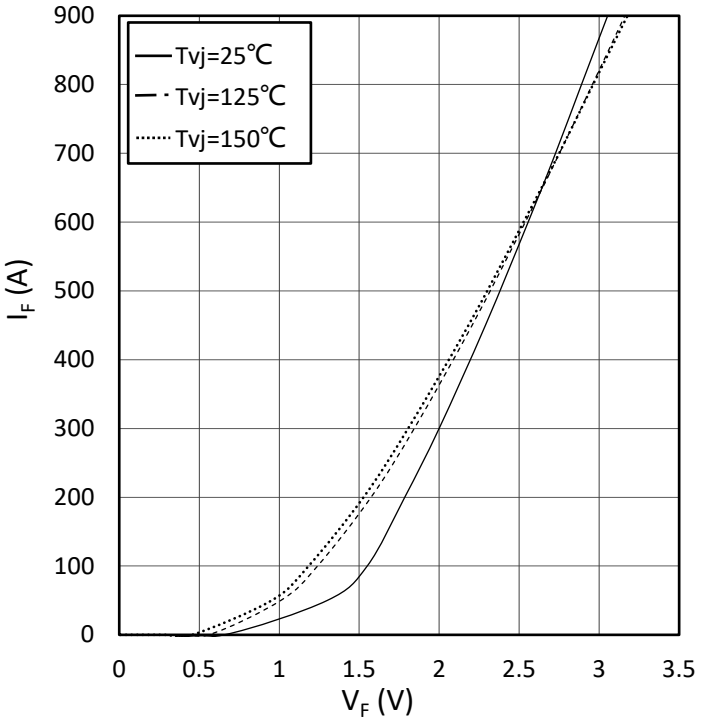
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$

$V_{GE} = \pm 15V$, $I_C = 450A$, $V_{CE} = 900V$



forward characteristic of Diode, Inverter (typical)

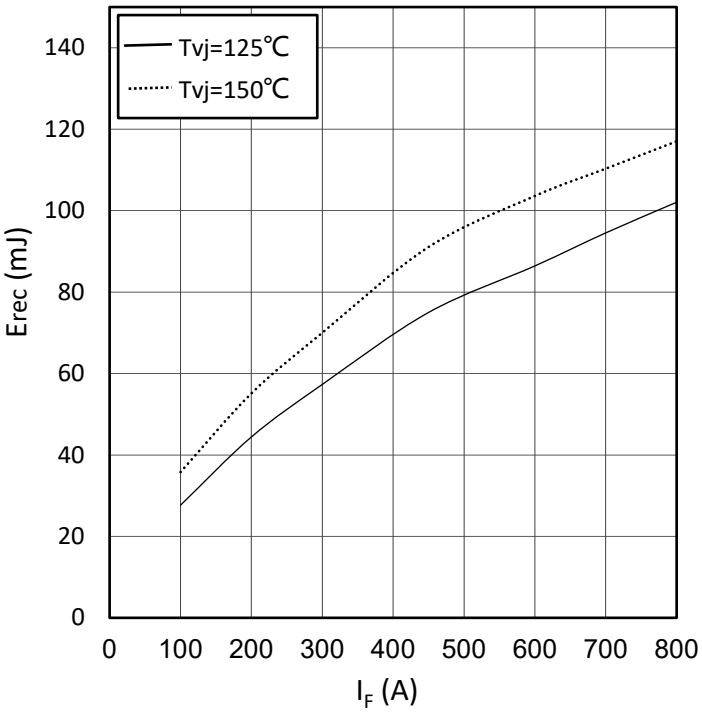
$I_F = f(V_F)$



switching losses Diode, Inverter (typical)

$E_{rec} = f(I_F)$

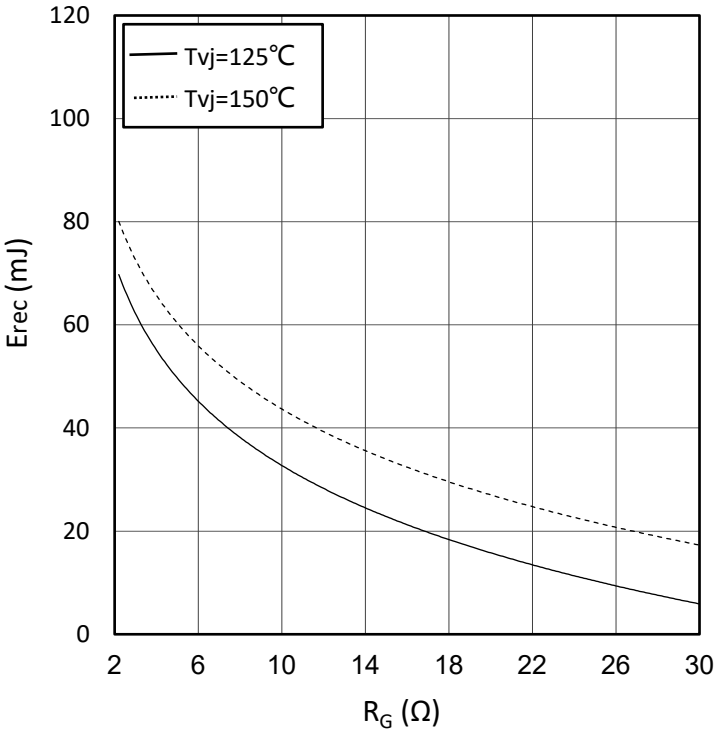
R_{Gon}=2.4Ω, V_{CE}=900V



switching losses Diode, Inverter (typical)

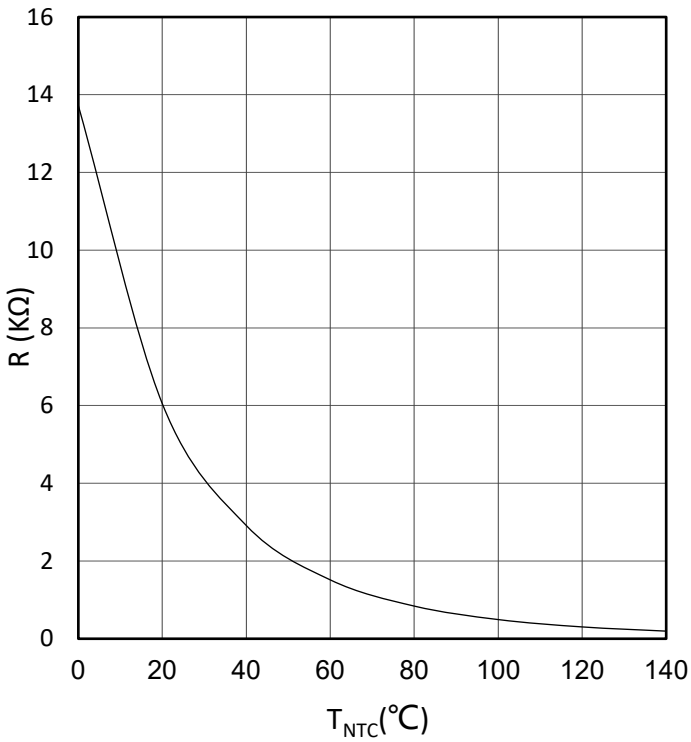
$E_{rec} = f(R_G)$

I_F=450A, V_{CE}=900V



NTC-Thermistor-temperature characteristic(typical)

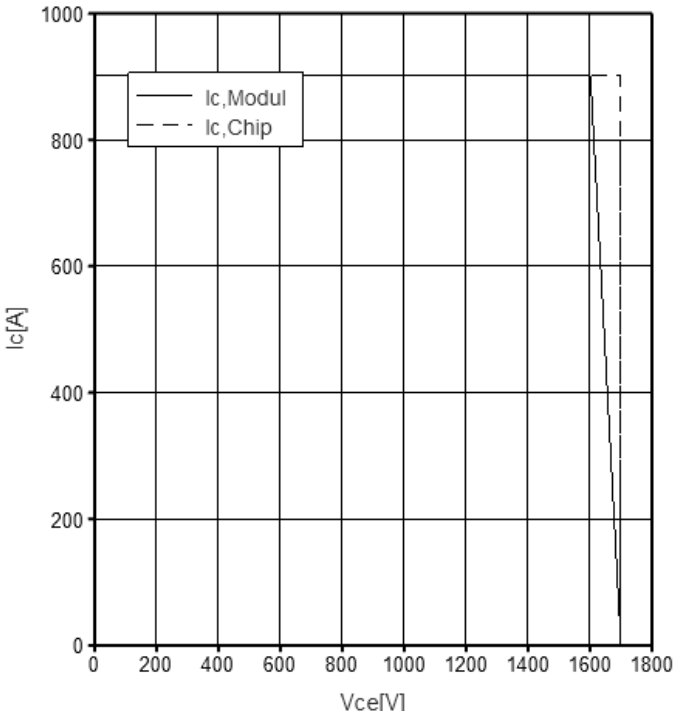
R=f (T)



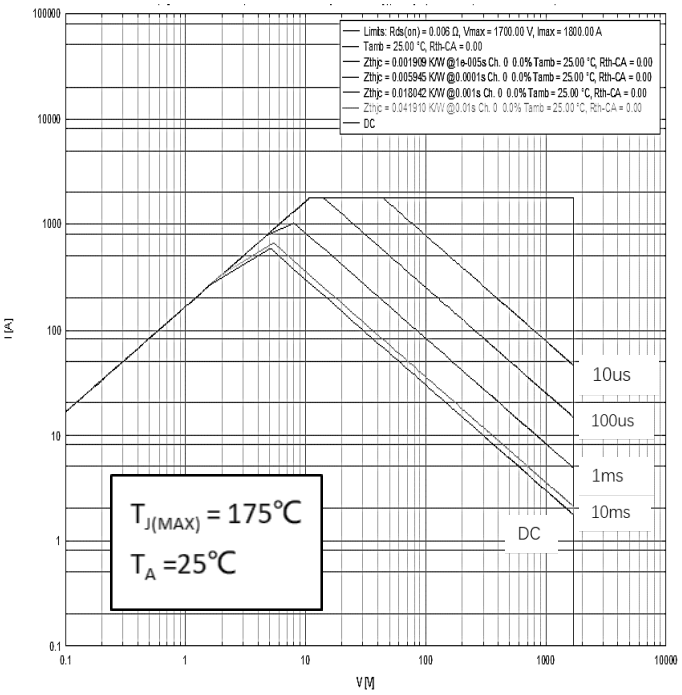
reverse bias safe operating area IGBT,Inverter (RBSOA)

$I_C = f(V_{CE})$

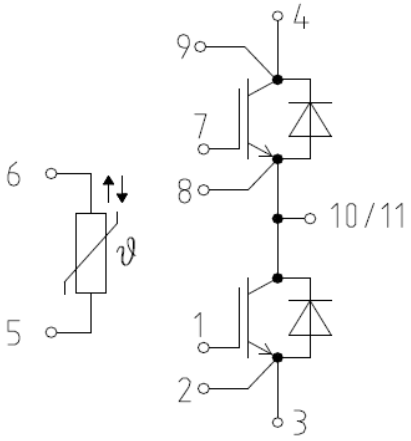
$V_{GE} = \pm 15V$, $R_{Gon} = 2.4\Omega$, $R_{Goff} = 2.4\Omega$, $T_{vj} = 150℃$



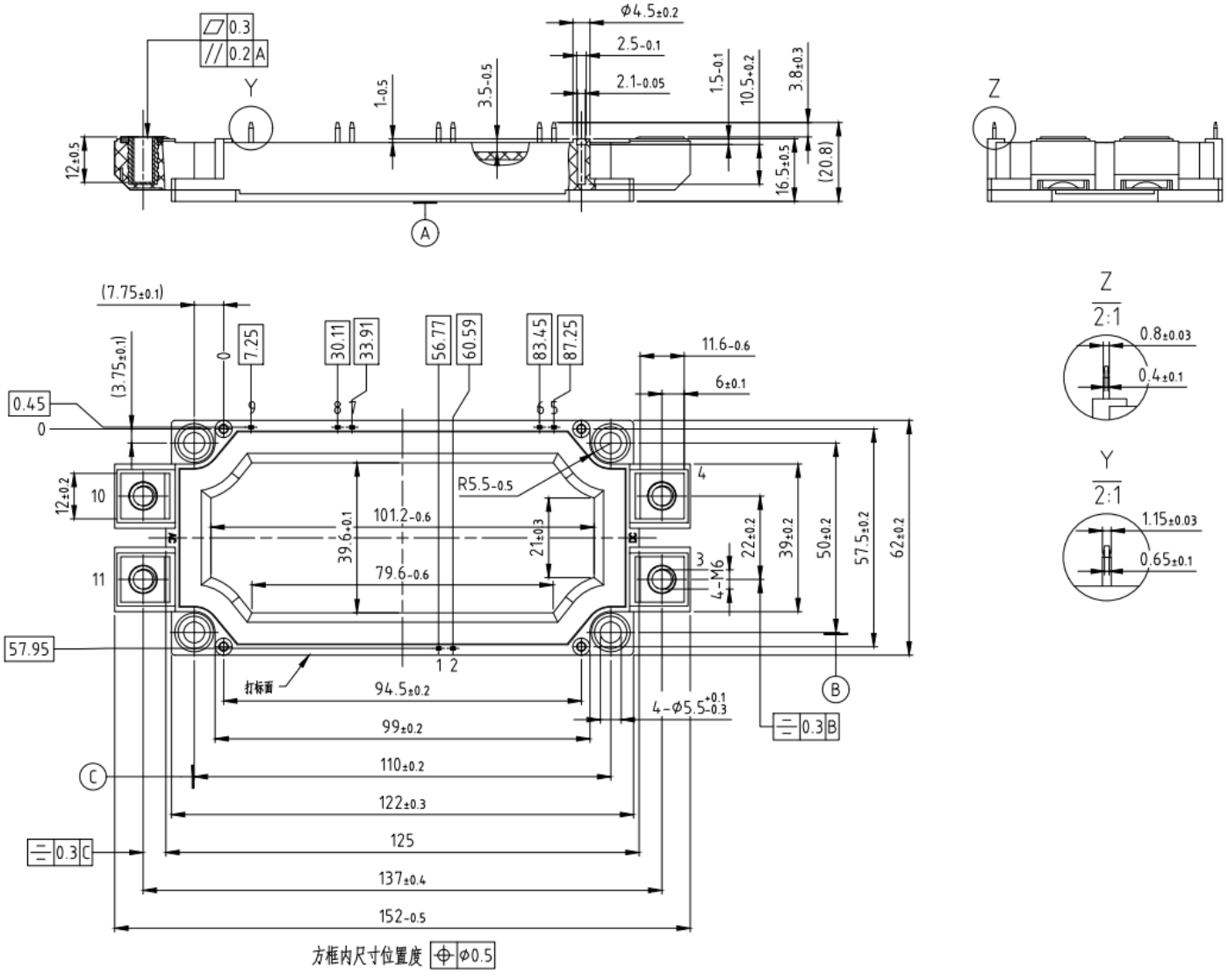
FRD FBSOA



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	2021.12.13	初版规格书发布，版本为V1.0	2021 12 Ver1.0	马慧明
2	2022.08.09	更新曲线，变更为V1.1版本	2022 08 Ver1.1	梁华文
3	2022.11.17	更新Ls和RBSOA曲线，变更为V1.2版本	2022 11 Ver1.2	梁华文
4	2023.03.11	短路优化版,更新25℃和125℃动静态参数，变更为V1.3版本	2023 03 Ver1.3	梁华文
5	2023.9.21	更新I2T、FRD FBSOA。	2023 09 Ver1.4	梁华文
6	2023.10.19	更新外形图，变更为V1.5版本	2023 10 Ver1.5	梁华文