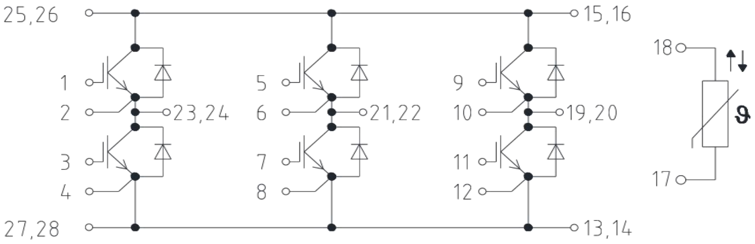
EconoPIM2 SixPack IGBT Module

V_{CES}=1200V, I_C=50A, $V_{CE(sat)}$=2.1V

Features

- IGBT Inverter Short Circuit Rated 10μs
- $V_{CE(Sat)}$ With Positive Temperature Coefficient
- 100% RBSOA Tested
- HI-REL Power Terminals



Applications

- Inverters
- Servo Drives
- UPS Systems

IGBT, Inverter

Maximum Ratings

Parameter	Symbol	Condition	Value	Unit
Collector-emitter voltage	V_{CES}		1200	V
Gate-emitter peak voltage	V_{GES}		±20	V
Continuous DC collector current	I_{Cnom}	T_C=125℃	50	A
		T_C=25℃	100	A
Repetitive peak collector current	I_{CRM}	T_{vj}=150℃	100	A
Short circuit withstand time	t_{sc}	T_{vj}=150℃	>10	us
Maximum power dissipation(IGBT)	P_D	T_C=25℃, T_{vj}=175℃	277	W

Characteristics Values

Parameter	Symbol	Conditions		Value			Unit
				Min.	Typ.	Max.	
Collector-emitter saturation voltage	$V_{CE(sat)}$	I_C=50A, V_{GE}=15V	T_{vj}=25℃		2.1	2.16	V
			T_{vj}=125℃		2.28		V
Gate-emitter threshold voltage	$V_{GE(th)}$	I_C=1mA, V_{CE}=V_{GE}	T_{vj}=25℃	5.4	5.6	6.03	V
Gate charge	Q_G	I_C=50A, V_{CE}=600V, V_{GE}=-15V...+15V			0.185		μC
Input capacitance	C_{ies}	f=1MHz, V_{CE}=25V, V_{GE}=0V	T_{vj}=25℃		10.4		nF
Output capacitance	C_{oes}	f=1MHz, V_{CE}=25V, V_{GE}=0V	T_{vj}=25℃		0.56		nF
Collector-emitter cut-off current	I_{CES}	V_{CE}=V_{CES}, V_{GE}=0V	T_{vj}=25℃			300	uA
			T_{vj}=125℃			1	mA

Gate-emitter leakage current	I_{GES}	V_{CE}=0V, V_{GE}=V_{GES}	T_{vj}=25℃			300	nA
			T_{vj}=125℃			600	nA
Turn-on delay time	$t_{d\ on}$	I_C=50A, V_{CE}=600V, V_{GE}=-15V/+15V,R_G=22Ω, Inductive Load	T_{vj}=25℃		151		ns
Rise time	t_r		T_{vj}=25℃		60		ns
Turn-off delay time	$t_{d\ off}$		T_{vj}=25℃		478		ns
Fall time	t_f		T_{vj}=25℃		266		ns
Turn-on switching loss	E_{on}		T_{vj}=25℃		5.1		mJ
Turn-off switching loss	E_{off}		T_{vj}=25℃		3.0		mJ
Total switching loss	E_{ts}		T_{vj}=25℃		8.1		mJ
Reverse bias safe operating area	RBSOA	I_C=100A, V_{CC}=600V, V_p=1200V, R_g=22Ω, V_{GE}=+15V to 0V,	T_{vj}=150℃	Trapezoid			
Short circuit safe operating area	SCSOA	V_{GE}=15V, V_{CE}=800V	T_{vj}=150℃	10			us

Diode, Inverter

Maximum Ratings

Parameter	Symbol	Conditions		Value	Unit
Repetitive peak reverse voltage	V_{RRM}	T_{vj}=25℃		1200	V
Continuous forward current	I_F			50	A
Repetitive peak forward current	I_{FRM}	t_P= 1ms		100	A
I^2t-value	I^2t	t_P=10ms, V_R=0V	T_{vj}=125℃	1200	A^2s

Characteristics Values

Parameter	Symbol	Conditions		Value			Unit
				Min.	Typ.	Max.	
Forward voltage	V_F	I_F=50A, V_{GE}=0V	T_{vj}=25℃		2.0	2.18	V
			T_{vj}=125℃		2.19		V
Reverse recovery time	t_{rr}	I_F=50A, V_R=600V, V_{GE}=-15V, di/dt=750A/μs	T_{vj}=25℃		159		ns
			T_{vj}=125℃		419		ns
Peak reverse recovery current	I_{rr}		T_{vj}=25℃		38.2		A
			T_{vj}=125℃		43.9		A
Recovered charge	Q_{rr}		T_{vj}=25℃		3.1		μC
			T_{vj}=125℃		6.7		μC
Reverse recovery energy	E_{rec}		T_{vj}=25℃		1.3		mJ
			T_{vj}=125℃		1.7		mJ

NTC-Thermistor

Characteristics Values

Symbol	Condition	Typ.	Max.	Unit
R_{25}	T_C=25℃	5		kΩ
△R/R	T_C=100℃， R_{100}=481Ω		±5	%
P_{25}	T_C=25℃	50		mW
$B_{25/50}$	$R_2=R_{25}\ exp[B_{25/50}(1/T_2-1/(298.15K))]$	3380		K
$B_{25/80}$	$R_2=R_{25}\ exp[B_{25/80}(1/T_2-1/(298.15K))]$	3440		K

Module

Characteristics Values

Parameter	Symbol	Conditions	Value	Unit
Isolation test voltage	V_{ISOL}	RMS, f=50Hz, t=1min	2.5	kV
Operating junction temperature of IGBT	T_{vj}	Inverter& Brake& Rectifier	-40~+175	℃
Operating junction temperature of diode	T_{vj}	Inverter& Brake& Rectifier	-40~+155	℃
Storage temperature	T_{stg}		-40~+125	℃

Thermal Characteristics

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Inverter	$R_{\theta JC}$	Junction-To-Case (IGBT Part, Per Leg)			0.54	℃/W
	$R_{\theta JC}$	Junction-To-Case (Diode Part, Per Leg)			0.81	℃/W
Brake	$R_{\theta JC}$	Junction-To-Case (IGBT Part, Per Leg)			0.95	℃/W
	$R_{\theta JC}$	Junction-To-Case (IGBT Part, Per Leg)			1.5	℃/W
Rectifier	$R_{\theta JC}$	Junction-To-Case (IGBT Part, Per Leg)			0.85	℃/W
Module	$R_{\theta JC}$	Case-To-Sink (conductive grease applied)			0.1	℃/W
	M	Mounting torque for module mounting:M6		4	6	N·m
	G	Weight			180	g

Notes:
(1) Repetitive Rating: Pulse width limited by max. junction temperature

Typical Characteristics

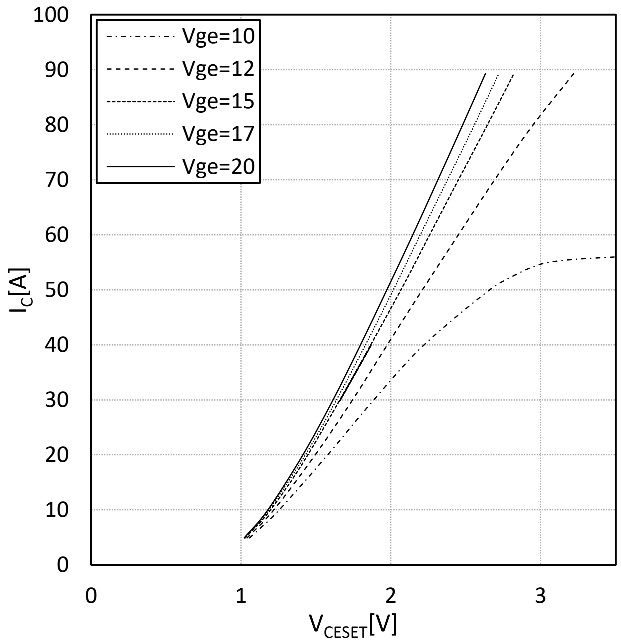


Fig.1 Typical Saturation Voltage Characteristics
T_{vj}=25℃, (IGBT Inverter)

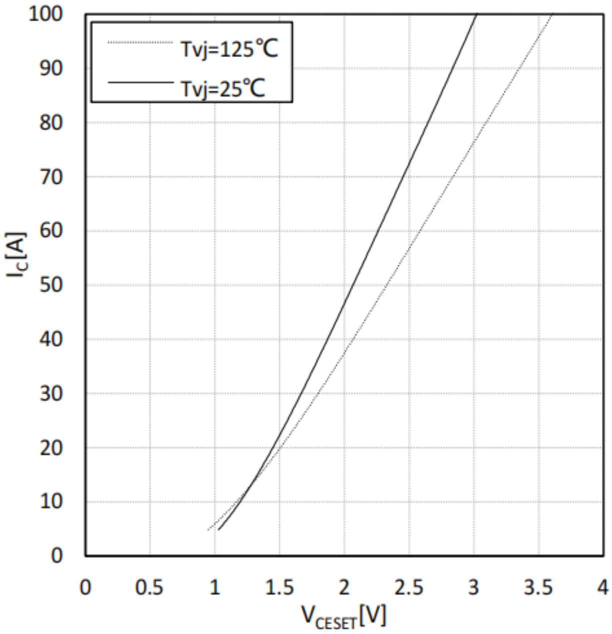


Fig.2 Typical Output Characteristics
V_{CE}=20V, (IGBT Inverter)

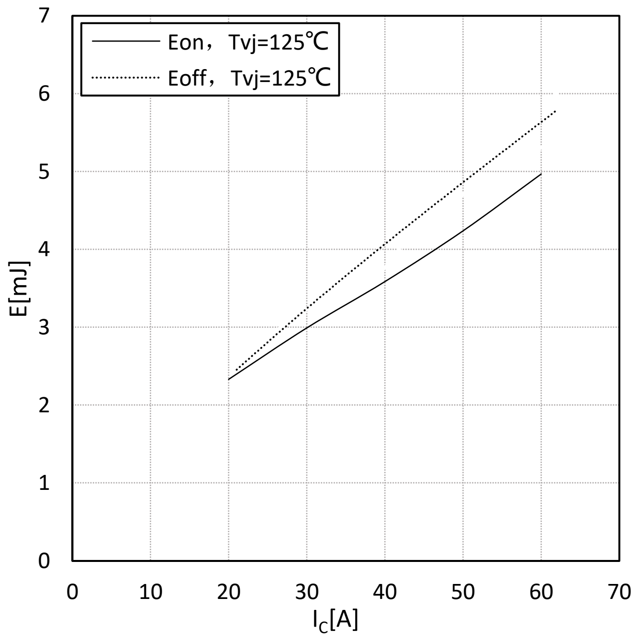


Fig.3 Typical Switching Loss vs. Collector Current
V_{CE}=20V, (IGBT Inverter)

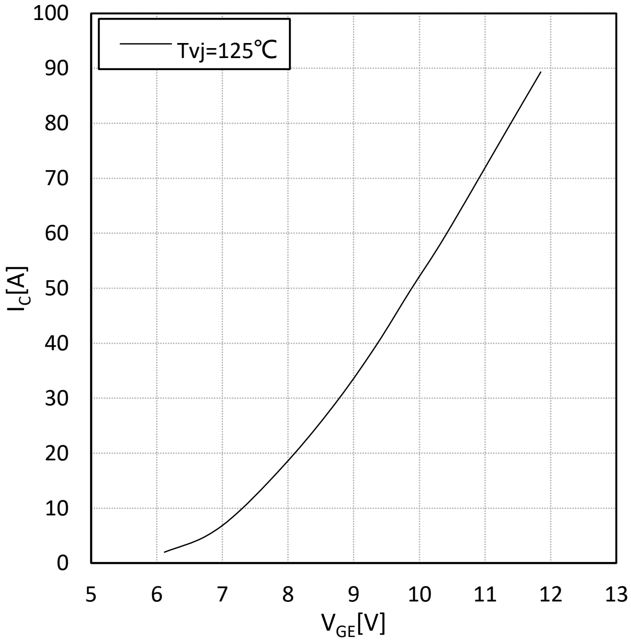


Fig.4 Typical Collector Current vs. Gate Resistance
V_{GE}=±15V，R_{Gon}=R_{Goff}=22Ω，V_{CE}=600V
(IGBT Inverter)

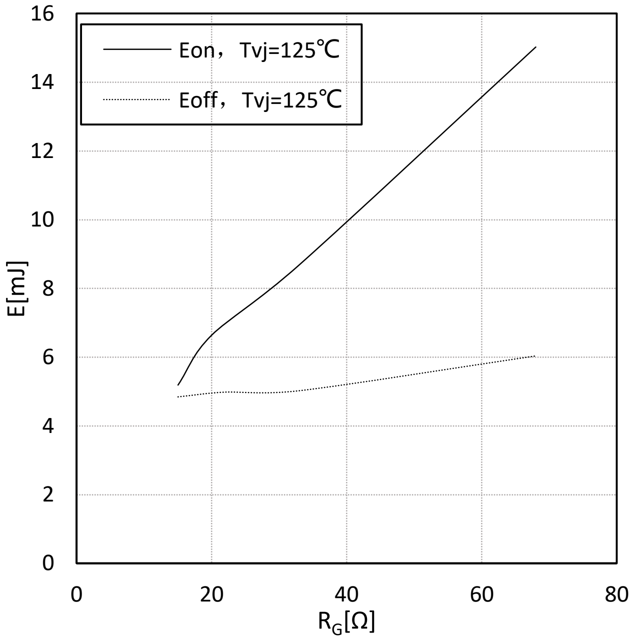


Fig.5 Typical Switching Loss vs. Gate Resistance
V_{GE}=±15V, I_C=50A, V_{CE}=600V (IGBT Inverter)

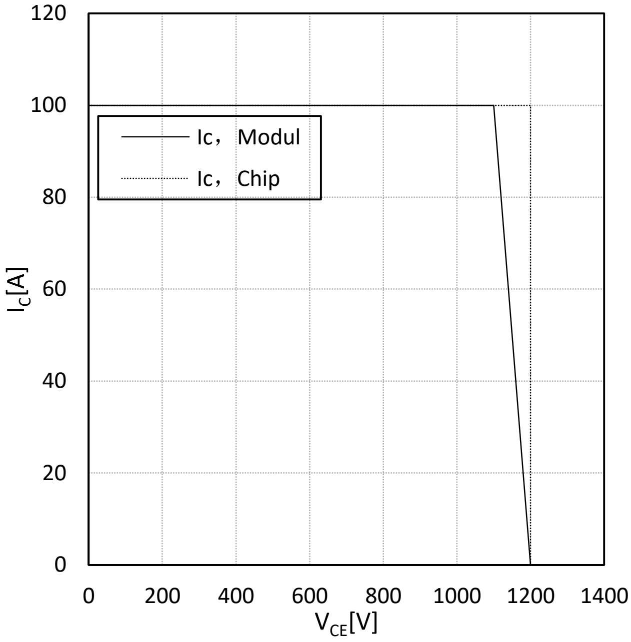


Fig.6 Reverse Bias Safe Operation Area (RBSOA)
(IGBT Inverter)

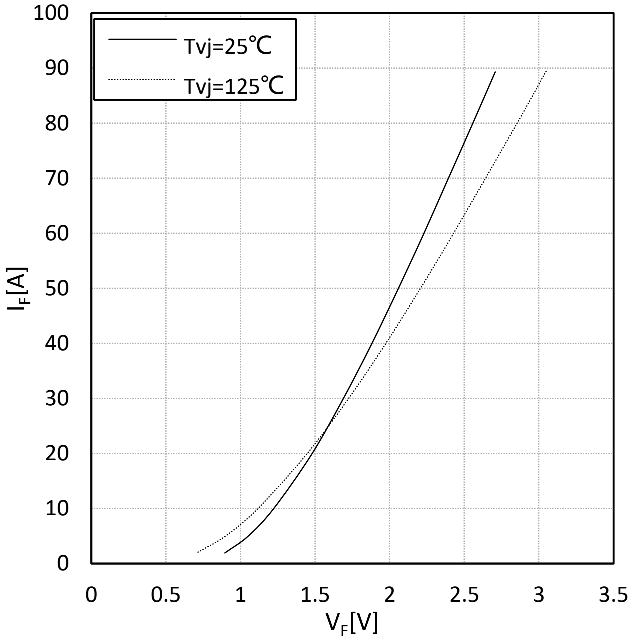


Fig.7 Forward Characteristics of Diode

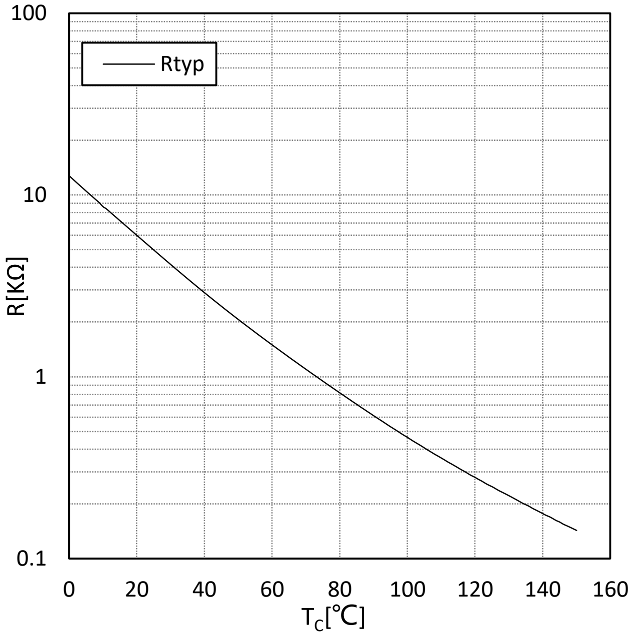


Fig.8 NTC Temperature characteristics

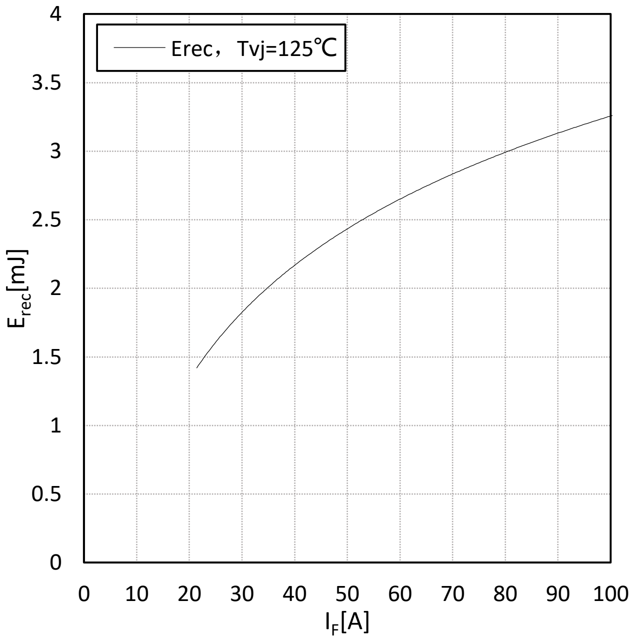


Fig.9 Switching losses Diode
R_{Gon}=R_{Goff}=22Ω，V_{CE}=600V (Diode Inverter)

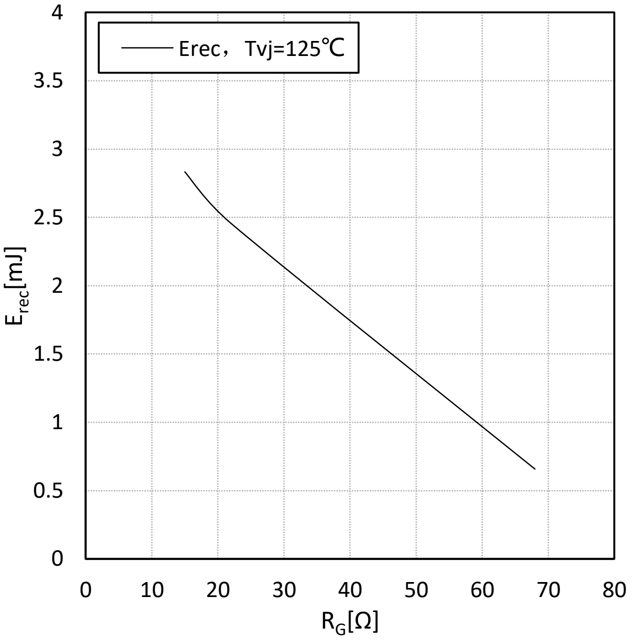
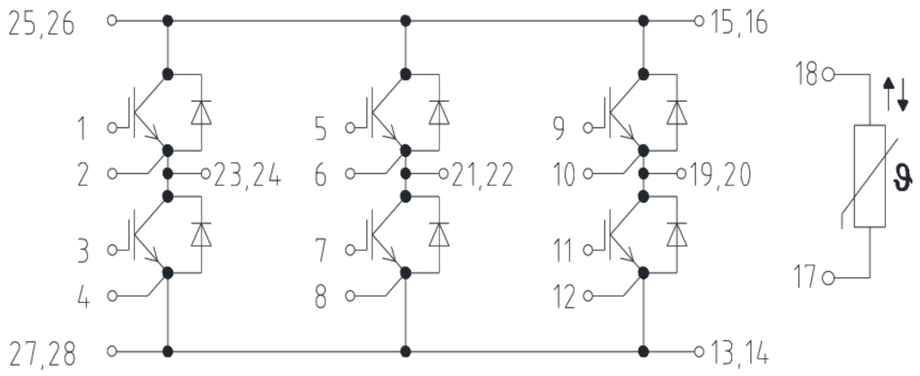
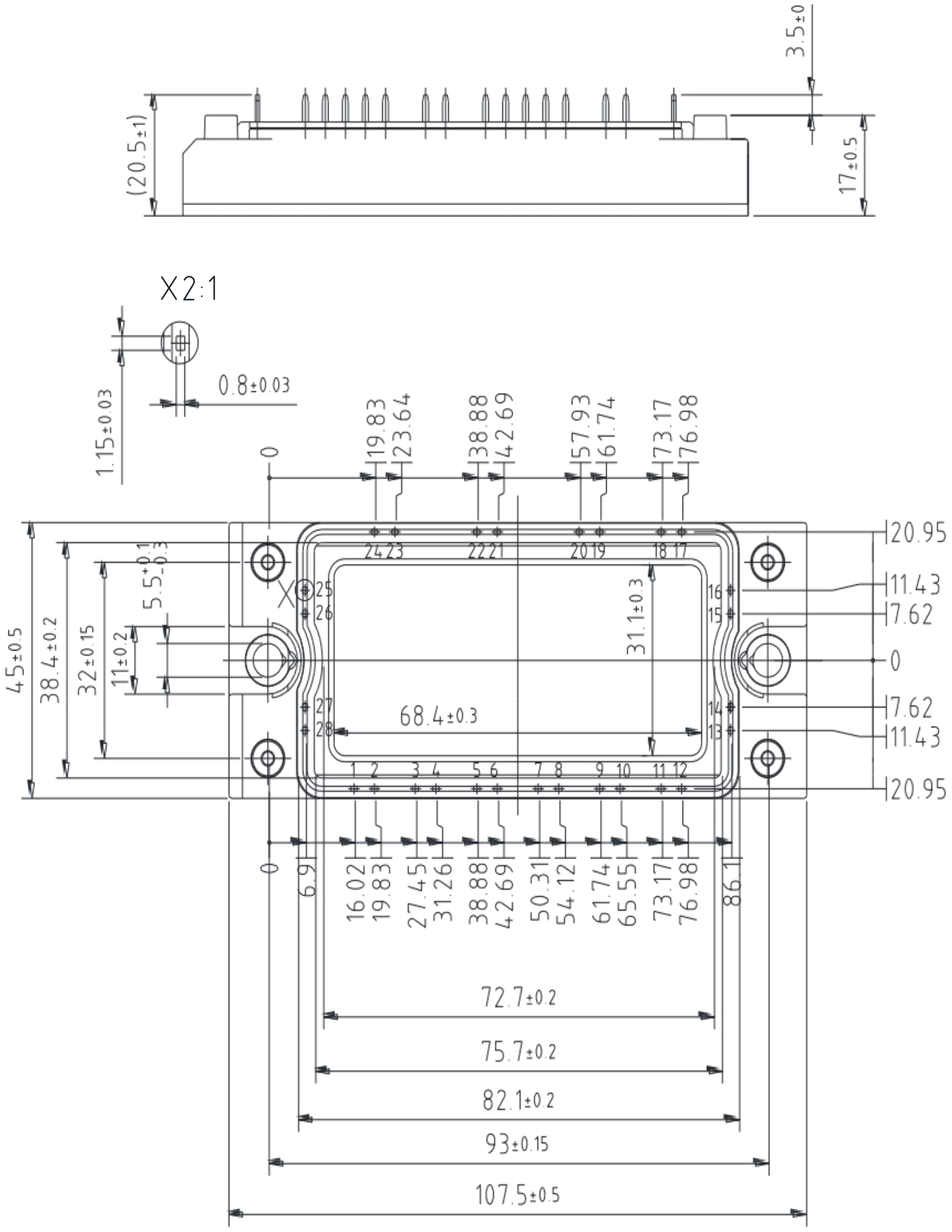


Fig.10 Switching losses Diode vs. Gate Resistance
I_F=50A，V_{CE}=600V (Diode Inverter)

Circuit Diagram



Package Outlines (Unit:mm)



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