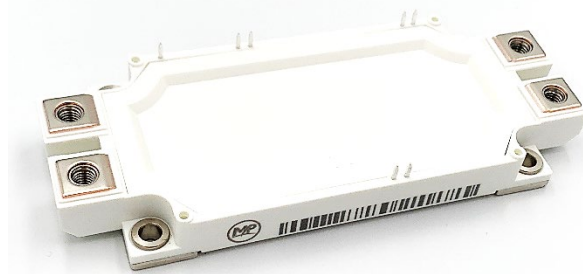


### Electrical Features

- Trench/Fieldstop IGBT
- Low  $V_{CE(sat)}$
- $V_{CE(sat)}$  with positive temperature coefficient
- 10  $\mu$  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	$T_{vj}=25^{\circ}C$	1200	V		
$V_{GES}$	Gate-emitter voltage	-	$\pm 20$	V		
$I_C$	Collector current,DC	$T_C=100^{\circ}C, T_{vj}=175^{\circ}C$	600	A		
$I_{CRM}$	Repetitive peak collector current	$t_p=1ms$	1200	A		
$t_{SC}$	Short circuit withstand time	$V_{GE}=15V, V_{CC}=600V, T_{vj}\leq 150^{\circ}C$	10	$\mu s$		
$P_{tot}$	Total power dissipation	$T_C=25^{\circ}C, T_{vj}=175^{\circ}C$	3750	W		
Characteristics Values						
Symbol	Item	Conditions	Values			Unit
IGBT			Min.	Typ.	Max.	
$I_{CES}$	Collector-emitter cut-off current	$V_{CE}=1200V, V_{GE}=0V, T_{vj}=25^{\circ}C$	-	-	3	mA
$I_{GES}$	Gate leakage current	$V_{CE}=0V, V_{GE}=20V, T_{vj}=25^{\circ}C$	-	-	400	nA
$V_{GE(th)}$	Gate-emitter threshold voltage	$I_C=23mA, V_{CE}=V_{GE}, T_{vj}=25^{\circ}C$	5.0	5.7	6.4	V
$V_{CEsat}$	Collector-emitter saturation voltage	$I_C=600A$ $V_{GE}=15V$ $T_{vj}=25^{\circ}C$	-	2.2	2.4	
		$T_{vj}=125^{\circ}C$	-	2.7	-	
		$T_{vj}=150^{\circ}C$	-	2.9	-	
$C_{ies}$	Input capacitance	$V_{CE}=25V, V_{GE}=0V$ $f=1MHz, T_{vj}=25^{\circ}C$	-	49.77	-	nF
$C_{oes}$	Output capacitance		-	2.28	-	
$C_{res}$	Reverse transfer capacitance		-	2.22	-	
$Q_G$	Gate charge	$V_{GE}=\pm 15V$	-	6.2	-	nC
$R_g$	Internal gate resistance	$T_{vj}=25^{\circ}C$	-	0.28	-	$\Omega$

$t_{d(on)}$	Turn-on delay time	$V_{CC}=600V,$ $I_C=600A,$ $V_{GE}=\pm 15V,$ $R_{G(on)}=5.1 \Omega,$ $R_{G(off)}=5.1 \Omega,$ $L_{load}=50\mu H$	$T_{vj}=25^\circ C$	-	254	-	ns
			$T_{vj}=125^\circ C$	-	228	-	
			$T_{vj}=150^\circ C$	-	227	-	
$t_r$	Rise time		$T_{vj}=25^\circ C$	-	254	-	
			$T_{vj}=125^\circ C$	-	252	-	
			$T_{vj}=150^\circ C$	-	249	-	
$t_{d(off)}$	Turn-off delay time		$T_{vj}=25^\circ C$	-	1049	-	
			$T_{vj}=125^\circ C$	-	1128	-	
			$T_{vj}=150^\circ C$	-	1152	-	
$t_f$	Fall time	$T_{vj}=25^\circ C$	-	126	-		
		$T_{vj}=125^\circ C$	-	188	-		
		$T_{vj}=150^\circ C$	-	212	-		
$E_{on}$	Turn-on energy (per pulse)	$V_{CC}=600V, I_C=600A,$ $V_{GE}=\pm 15V, R_{G(on)}=5.1 \Omega,$ $di/dt=4296A/\mu s(T_{vj}=125^\circ C)$	$T_{vj}=25^\circ C$	-	151.3	-	mJ
			$T_{vj}=125^\circ C$	-	184.5	-	
			$T_{vj}=150^\circ C$	-	193.0	-	
$E_{off}$	Turn-off energy (per pulse)		$T_{vj}=25^\circ C$	-	88.6	-	
			$T_{vj}=125^\circ C$	-	104.4	-	
			$T_{vj}=150^\circ C$	-	108.7	-	
$R_{thJC}$	Thermal resistance, junction to case	per IGBT	-	0.04	-	K/W	
$R_{thCH}$	Thermal resistance, case to heatsink	per IGBT/ $\lambda_{grease}=1W/(m \cdot K)$	-	0.078	-	K/W	
$T_{vjop}$	Temperature under switching conditions		-40		150	$^\circ C$	

**Diode, Inverter**

**Maximum Rated Values**

Symbol	Item	Conditions	Rating	Unit
$V_{RRM}$	Repetitive peak reverse voltage	$T_{vj}=25^\circ C$	1200	V
$I_F$	Forward current, DC	$T_C=100^\circ C, T_{vj}=150^\circ C$	600	A
$I_{FRM}$	Repetitive peak forward current	$t_p=1ms$	1200	A

**Characteristic Values**

			Min.	Typ.	Max.		
$V_F$	Continuous forward voltage	$I_F=600A$ $V_{GE}=0V$	$T_{vj}=25^\circ C$	-	2.19	-	V
			$T_{vj}=125^\circ C$	-	2.18	-	
			$T_{vj}=150^\circ C$	-	2.17	-	
$I_{RM}$	Peak reverse recovery current	$V_R=600V$ $I_F=600A$ $V_{GE}=-15V$ $-di_F/dt=4062A/\mu s$ $(T_{vj}=125^\circ C)$	$T_{vj}=25^\circ C$	-	189	-	A
			$T_{vj}=125^\circ C$	-	321	-	
			$T_{vj}=150^\circ C$	-	361	-	
$t_{rr}$	Reverse recovery time		$T_{vj}=25^\circ C$	-	302	-	ns
			$T_{vj}=125^\circ C$	-	580	-	
			$T_{vj}=150^\circ C$	-	663	-	
$Q_r$	Recovered charge	$T_{vj}=25^\circ C$	-	32	-	$\mu C$	
		$T_{vj}=125^\circ C$	-	89	-		
		$T_{vj}=150^\circ C$	-	112	-		

E <sub>rec</sub>	Reverse recovery energy		T <sub>vj</sub> =25°C	-	9.0	-	mJ
			T <sub>vj</sub> =125°C	-	25.5	-	
			T <sub>vj</sub> =150°C	-	33.0	-	
R <sub>thJC</sub>	Thermal resistance, junction to case	per diode	-	0.076	-	K/W	
R <sub>thCH</sub>	Thermal resistance, case to heatsink	per diode/ λ <sub>grease</sub> =1W/(m·K)	-	0.103	-	K/W	
T <sub>vjop</sub>	Temperature under switching conditions		-40		150	°C	

**NTC Thermistor Characteristics**

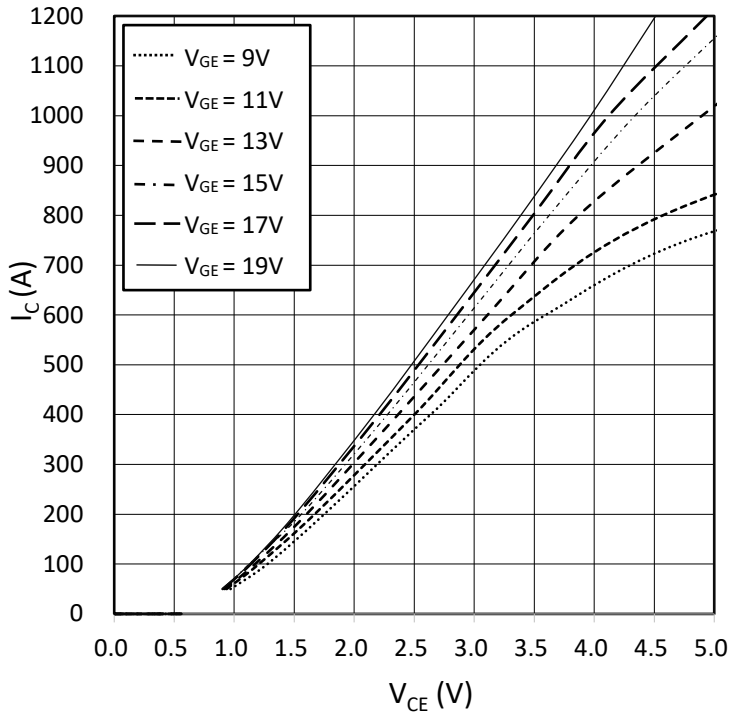
Symbol	Item	Conditions	Values			Unit
			Min.	Typ.	Max.	
R <sub>25</sub>	Rated resistance	T <sub>C</sub> =25°C	-	5	-	kΩ
ΔR/R	Deviation of resistance	T <sub>C</sub> =100°C, R <sub>100</sub> =493Ω	-5	-	5	%
P <sub>25</sub>	Power dissipation	T <sub>C</sub> =25°C	-	-	20	mW
B <sub>25/50</sub>	B-constant	R <sub>2</sub> =R <sub>25</sub> exp[B <sub>25/50</sub> (1/T <sub>2</sub> -1/(298.15K))]	-	3375	-	K
B <sub>25/80</sub>	B-constant	R <sub>2</sub> =R <sub>25</sub> exp[B <sub>25/80</sub> (1/T <sub>2</sub> -1/(298.15K))]	-	3411	-	
B <sub>25/100</sub>	B-constant	R <sub>2</sub> =R <sub>25</sub> exp[B <sub>25/100</sub> (1/T <sub>2</sub> -1/(298.15K))]	-	3433	-	

**Module**

Symbol	Item	Conditions	Rating			Unit
V <sub>ISOL</sub>	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 <sub>2</sub> O <sub>3</sub>			-
T <sub>stg</sub>	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	-	-	340	-	g

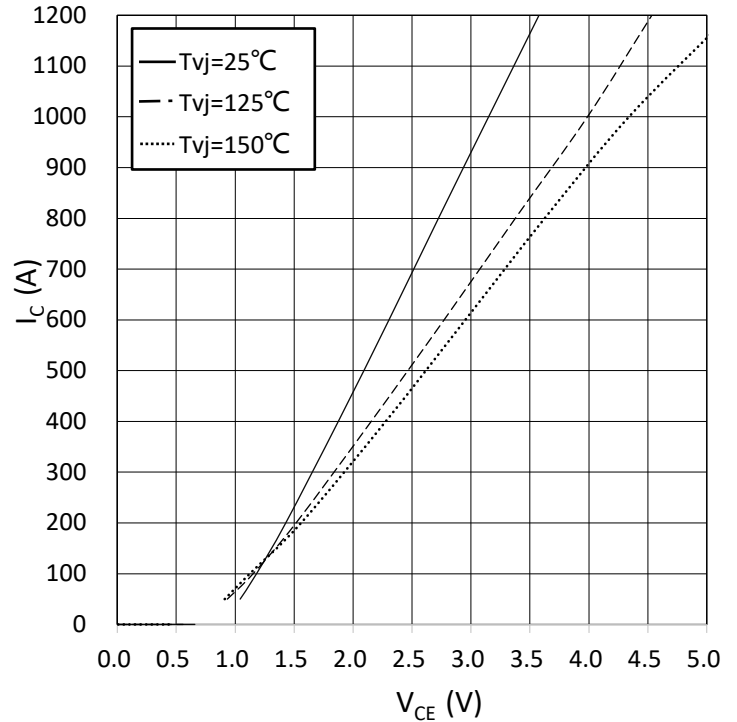
**output characteristic IGBT, Inverter (typical)**

$I_C = f(V_{CE})$   
 $T_{vj} = 150^\circ\text{C}$



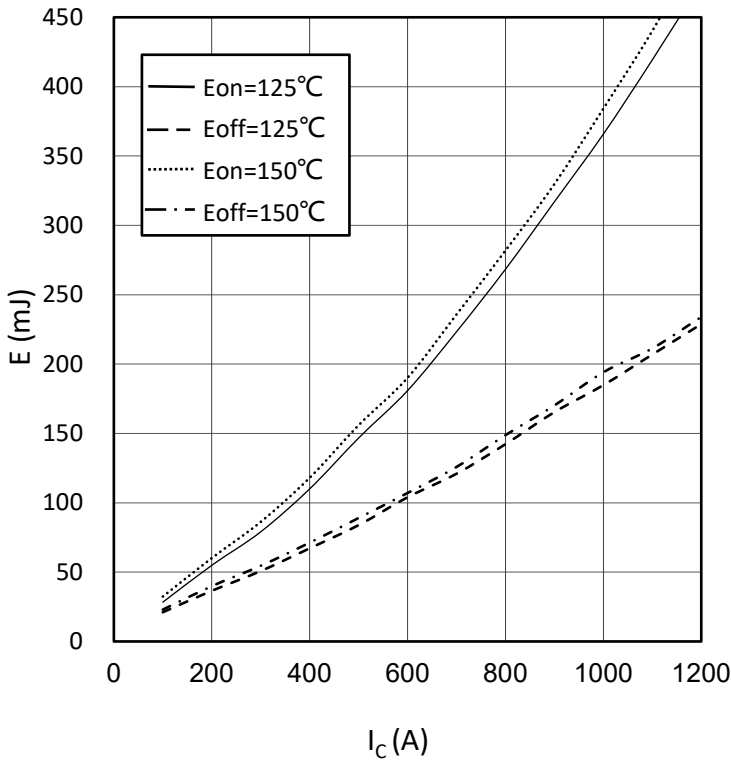
**output characteristic IGBT, Inverter (typical)**

$I_C = f(V_{CE})$   
 $V_{GE} = 15\text{ V}$



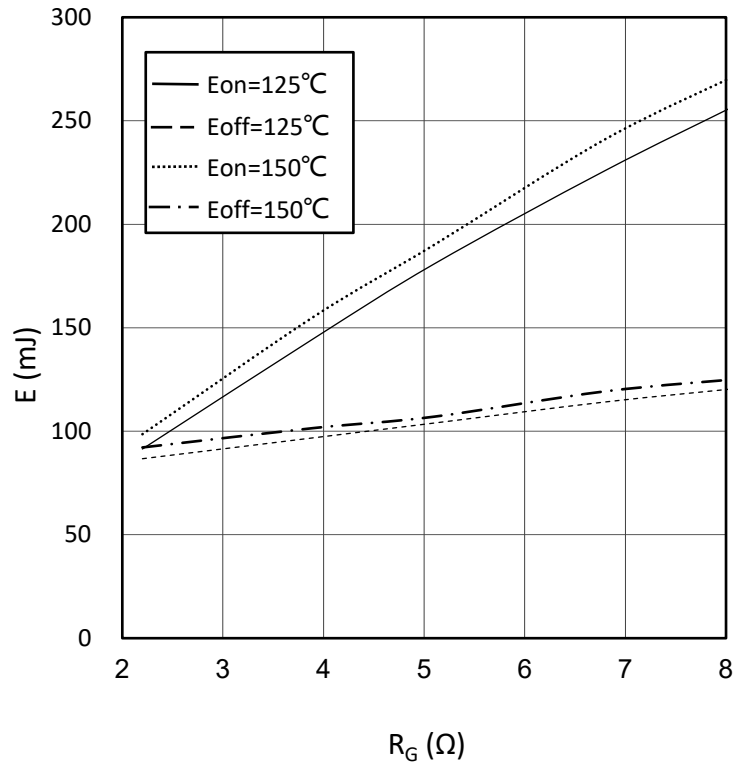
**switching losses IGBT, Inverter (typical)**

$E_{on} = f(I_C)$ ,  $E_{off} = f(I_C)$   
 $V_{GE} = \pm 15\text{V}$ ,  $R_{Gon} = 5.1\Omega$ ,  $R_{Goff} = 5.1\Omega$ ,  $V_{CE} = 600\text{V}$



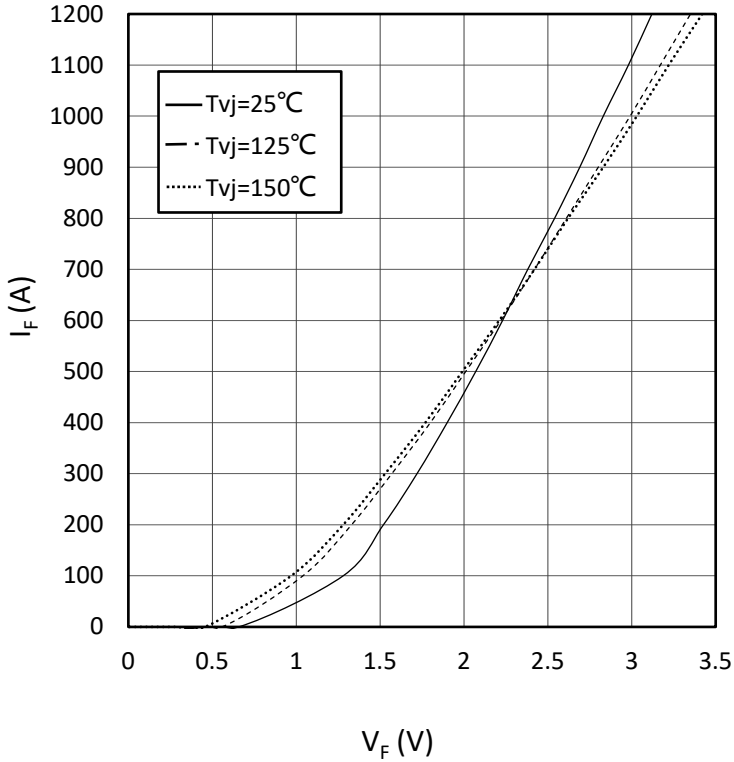
**switching losses IGBT, Inverter (typical)**

$E_{on} = f(R_G)$ ,  $E_{off} = f(R_G)$   
 $V_{GE} = \pm 15\text{V}$ ,  $I_C = 600\text{A}$ ,  $V_{CE} = 600\text{V}$



**forward characteristic of Diode, Inverter (typical)**

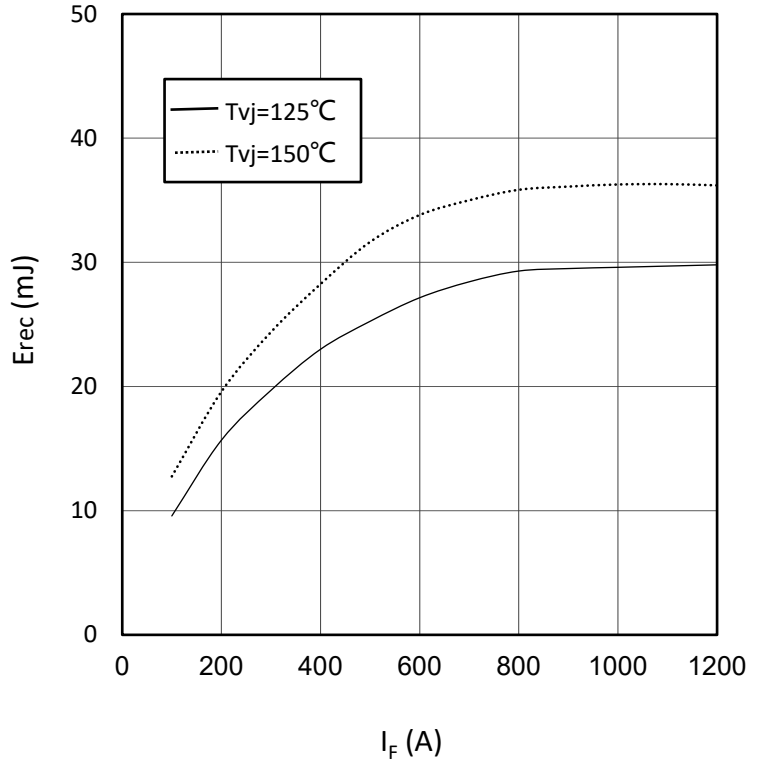
$I_F = f(V_F)$



**switching losses Diode, Inverter (typical)**

$E_{rec} = f(I_F)$

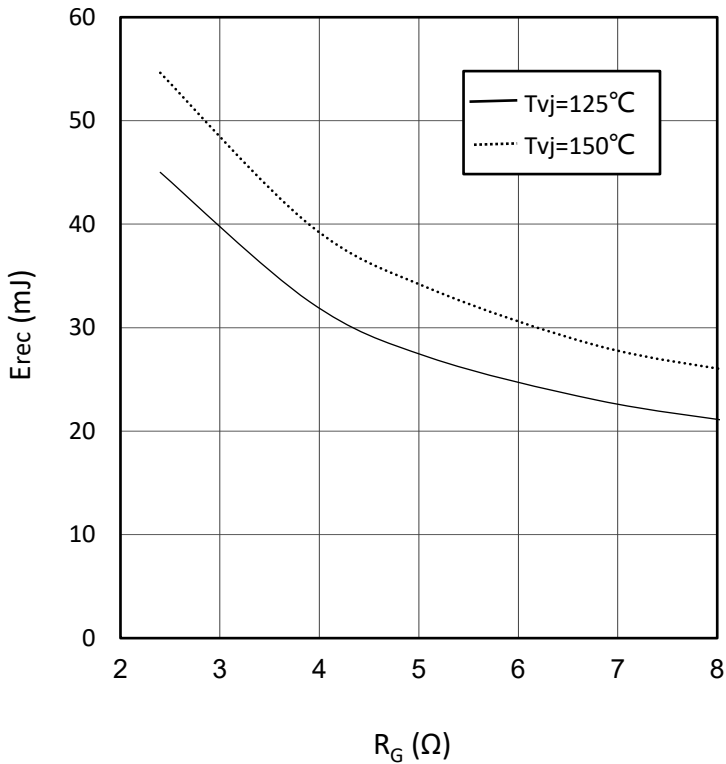
$R_{Gon}=5.1\Omega, V_{CE}=600V$



**switching losses Diode, Inverter (typical)**

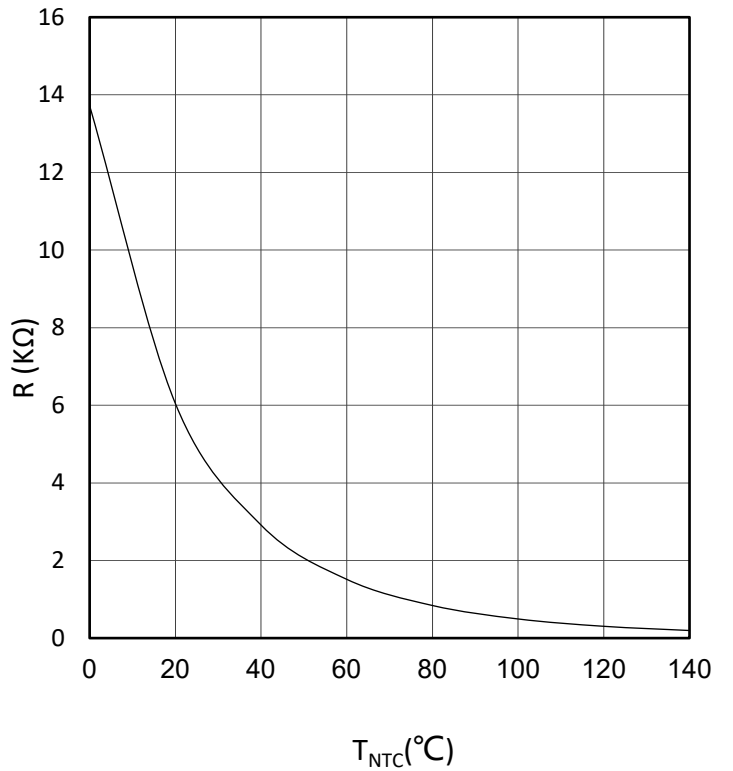
$E_{rec} = f(R_G)$

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

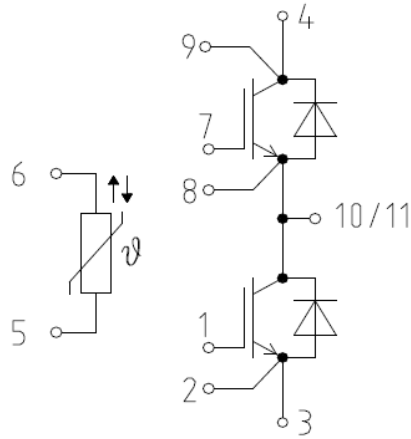


**NTC-Thermistor-temperature characteristic(typical)**

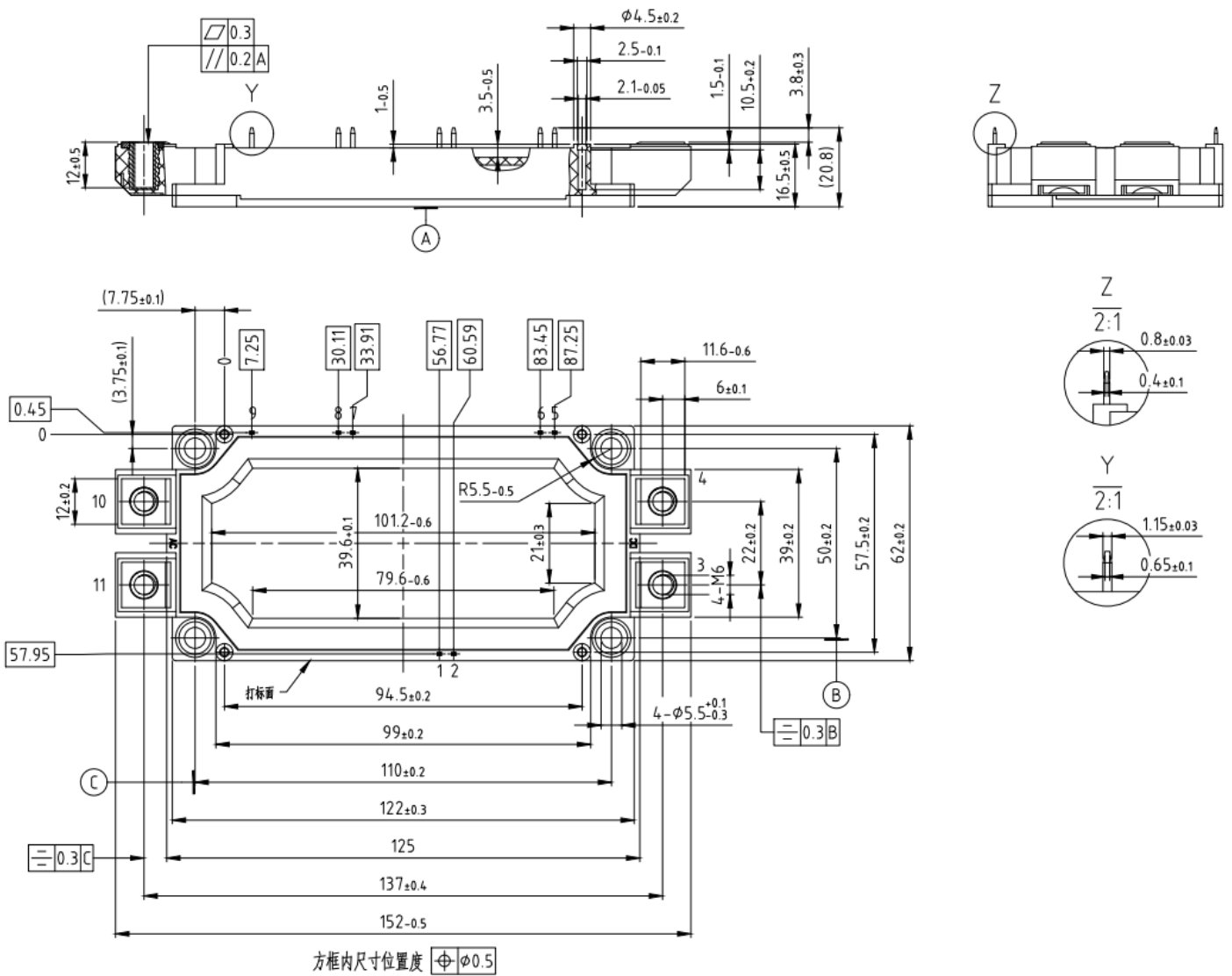
$R=f(T)$



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	2022/7/1	初版规格书发布, 版本为V1.0	2022 07 Ver1.0	马慧明
2	2022/10/6	更新曲线、 $V_{ge(th)}$ 、测试条件 $V_{cc}=600V$ , 变更为V1.1版本	2022 10 Ver1.1	梁华文
3	2022/12/9	更新动态参数, 变更为V1.2版本	2022 12 Ver1.2	梁华文
4	2023/02/13	更新热阻、功率, 变更为V1.3版本	2023 02 Ver1.3	梁华文
5	2023.10.19	更新外形图, 变更为V1.4版本	2023 10 Ver1.4	梁华文