Electrical Features

- Trench/Fieldstop IGBT
- V_{CEsat} with positive Temperature Coefficient
- Low V_{CEsat}

Typical Applications

- Auxiliary inverters
- Motor drives
- Servo drives

Mechanical Features

- High power density
- Integrated NTC temperature sensor
- Copper base plate
- Solder contact technology
- Standard housing

IGBT，Inverter

Maximum Rated Values

Symbol	Item	Conditions	Rating	Unit
IGBT				
V_{CES}	Collector-emitter voltage	T_{vj}=25°C	1200	V
V_{GES}	Gate-emitter voltage	-	±20	V
I_C	Collector current,DC	T_C=100°C,T_{vj}=175°C	100	A
I_{CRM}	Repetitive peak collector current	t_p=1ms	200	A
P_{tot}	Total power dissipation	T_C=25°C,T_{vj}=175°C	342	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°C		-	-	1	mA
I_{GES}	Gate leakage current	V_{CE}=0V,V_{GE}=20V,T_{vj}=25°C		-	-	500	nA
$V_{GE(th)}$	Gate-emitter threshold voltage	I_C=3.8mA,V_{CE}=V_{GE},T_{vj}=25°C		5.2	5.48	6.2	V
V_{CEsat}	Collector-emitter saturation voltage	I_C=100A V_{GE}=15V	T_{vj}=25°C	-	1.93	-	V
			T_{vj}=125°C	-	2.41	-	
			T_{vj}=150°C	-	2.50	-	
C_{ies}	Input capacitance	V_{CE}=25V,V_{GE}=0V f=1MHz,T_{vj}=25°C		-	7.07	-	nF
C_{oes}	Output capacitance			-	0.46	-	
C_{res}	Reverse transfer capacitance			-	0.24	-	
Q_G	Gate charge	V_{CC}=600V, I_C=100A V_{GE}=-15...+15V,T_{vj}=25°C		-	0.64	-	μC
R_g	Internal gate resistance	T_{vj}=25°C		-	1.8	-	Ω

$t_{d(on)}$	Turn-on delay time	V_{CC}=600V I_C=100A V_{GE}=±15V $R_{G(on)}$=30Ω $R_{G(off)}$=30Ω	T_{vj}=25°C	-	240	-	ns
			T_{vj}=125°C	-	211	-	
			T_{vj}=150°C	-	203	-	
t_r	Rise time		T_{vj}=25°C	-	103	-	
			T_{vj}=125°C	-	134	-	
			T_{vj}=150°C	-	139	-	
$t_{d(off)}$	Turn-off delay time		T_{vj}=25°C	-	782	-	
			T_{vj}=125°C	-	830	-	
			T_{vj}=150°C	-	742	-	
t_f	Fall time		T_{vj}=25°C	-	140	-	
			T_{vj}=125°C	-	244	-	
			T_{vj}=150°C	-	345	-	
E_{on}	Turn-on energy (per pulse)		T_{vj}=25°C	-	26.2	-	mJ
			T_{vj}=125°C	-	39.0	-	
			T_{vj}=150°C	-	41.6	-	
E_{off}	Turn-off energy (per pulse)		T_{vj}=25°C	-	8.1	-	
			T_{vj}=125°C	-	10.6	-	
			T_{vj}=150°C	-	10.9	-	
SC data	Short-circuit current	V_{CC}=600V,V_{GE}≤15V,T_{vj}=125°C V_{CES}≤1200V,t_P≤10μs		-	273	-	A
R_{thJC}	Thermal resistance,junction to case	Per IGBT		-	-	0.44	K/W
R_{thCH}	Thermalresistance,case to heatsink	Per IGBT λgrease=1W/(m·K)		-	0.13	-	K/W
Tvjop	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	1200	V
I_F	Forward current,DC		100	A
I_{FRM}	Repetitive peak forward current	t_p=1ms	200	A
I^2t	I^2t-value	V_R=0V,t_p=10ms,T_{vj}=150°C	1500	A^2s

Characteristic Values

V_F	Continuous forward voltage	I_F=100A V_{GE}=0V	T_{vj}=25°C	-	1.96	-	V
			T_{vj}=125°C	-	1.77	-	
			T_{vj}=150°C	-	1.72	-	
I_{RM}	Peak reverse recovery current	V_R=600V I_F=100A V_{GE}=-15V	T_{vj}=25°C	-	49.3	-	A
			T_{vj}=125°C	-	68.8	-	
			T_{vj}=150°C	-	72.7	-	
t_{rr}	Reverse recovery time		T_{vj}=25°C	-	113.6	-	ns
			T_{vj}=125°C	-	800	-	
			T_{vj}=150°C	-	952	-	
Q_r	Recovered charge		T_{vj}=25°C	-	4.01	-	μC
			T_{vj}=125°C	-	15.57	-	
			T_{vj}=150°C	-	22.76	-	

E_{rec}	Reverse recovery energy		T_{vj}=25°C	-	0.6	-	mJ
			T_{vj}=125°C	-	3.4	-	
			T_{vj}=150°C	-	5.1	-	
R_{thJC}	Thermal resistance, junction to case	per diode		-	-	0.5	K/W
R_{thCH}	Thermal resistance, case to heatsink	per diode，λ_{grease}=1 W/(m • K)		-	0.225	-	K/W
Tvjop	Temperature under switching conditions			-40		150	°C

Diode, Rectifier

Maximum Rated Values							
Symbol	Item	Conditions		Rating			Unit
V_{RRM}	Repetitive peak reverse voltage	T_{vj}=25°C		1800			V
I_{FRMSM}	Maximum RMS forward current per chip	T_C=80°C,T_{vj}=175°C		100			A
I_{RMSM}	Maximum RMS current at rectifier output	T_C= 80°C		150			A
I_{FSM}	Surge forward current	tp = 10 ms, Tvj = 150°C		1080			A
I^2t	I^2t-value	V_R=0V,t_p=10ms,T_{vj}=150°C		5032			A^2s
Characteristic Values							
Symbol	Item	Conditions		Values			Unit
				Min.	Typ.	Max.	
V_F	Continuous forward voltage	I_F=100A V_{GE}=0V	T_{vj}=25°C	-	1.24	-	V
			T_{vj}=125°C	-	-	-	
			T_{vj}=150°C	-	-	-	
I_R	Reverse current	V_R=1800V	T_{vj}=25°C	-	-	10	uA
			T_{vj}=125°C	-	-	-	
			T_{vj}=150°C	-	-	-	
T_{vjop}	Temperature under switching conditions			-40		150	°C

IGBT，Brake-Chopper

Maximum Rated Values							
Symbol	Item	Conditions		Values			Unit
V_{CES}	Collector-emitter voltage	T_{vj}=25°C		1200			V
V_{GES}	Gate-emitter voltage	-		±20			V
I_C	Collector current,DC	T_C=100°C,T_{vj}=175°C		50			A
I_{CRM}	Repetitive peak collector current	t_p=1ms		100			A
P_{tot}	Total power dissipation	T_C=25°C,T_{vj}=175°C		250			W
Characteristic 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°C		-	-	1	mA
I_{GES}	Gate leakage current	V_{CE}=0V,V_{GE}=20V,T_{vj}=25°C		-	-	500	nA
$V_{GE(th)}$	Gate-emitter threshold voltage	I_C=3.8mA,V_{CE}=V_{GE},T_{vj}=25°C		5.2	5.66	6.2	V
V_{CEsat}	Collector-emitter saturation voltage	I_C=50A V_{GE}=15V	T_{vj}=25°C	-	2.2	-	
			T_{vj}=125°C	-	2.7	-	

			T_{vj}=150°C	-	2.8	-	
C_{ies}	Input capacitance	V_{CE}=25V,V_{GE}=0V f=1MHz,T_{vj}=25°C		-	3.15	-	nF
C_{oes}	Output capacitance			-	0.18	-	
C_{res}	Reverse transfer capacitance			-	0.103	-	
Q_G	Gate charge	V_{CC}=600V,I_C=50A V_{GE}=-15...+15V,T_{vj}=25°C		-	0.316	-	µC
R_g	Internal gate resistance	T_{vj}=25°C		-	-	-	Ω
$t_{d(on)}$	Turn-on delay time	V_{CC}=600V I_C=50A V_{GE}=±15V $R_{G(on)}$=30Ω $R_{G(off)}$=30Ω	T_{vj}=25°C	-	-	-	ns
			T_{vj}=125°C	-	153	-	
			T_{vj}=150°C	-	141	-	
t_r	Rise time		T_{vj}=25°C	-	-	-	
			T_{vj}=125°C	-	44	-	
			T_{vj}=150°C	-	49	-	
$t_{d(off)}$	Turn-off delay time		T_{vj}=25°C	-	-	-	
			T_{vj}=125°C	-	628	-	
			T_{vj}=150°C	-	612	-	
t_f	Fall time		T_{vj}=25°C	-	-	-	
			T_{vj}=125°C	-	319	-	
			T_{vj}=150°C	-	369	-	
E_{on}	Turn-on energy (per pulse)		T_{vj}=25°C	-	-	-	mJ
			T_{vj}=125°C	-	9.6	-	
			T_{vj}=150°C	-	10.9	-	
E_{off}	Turn-off energy (per pulse)		T_{vj}=25°C	-	-	-	
			T_{vj}=125°C	-	4.4	-	
			T_{vj}=150°C	-	4.7	-	
SC data	Short-circuit current	V_{CC}=600V,V_{GE}≤15V,T_{vj}=125°C V_{CES}≤1200V,t_P≤10µs		-	78	-	A
R_{thJC}	Thermal resistance,junction to case	Per IGBT		-	-	0.6	K/W
R_{thCH}	Thermalresistance,case to heatsink	Per IGBT λgrease=1W/(m·K)		-	0.245	-	K/W
Tvjop	Temperature under switching conditions			-40		150	°C

Diode，Brake-Chopper

Maximum Rated Values

Symbol	Item	Conditions	Rating	Unit
V_{RRM}	Repetitive peak reverse voltage	T_{vj}=25°C	1200	V
I_F	Forward current,DC		25	A
I_{FRM}	Repetitive peak forward current	t_p=1ms	50	A
I^2t	I^2t-value	V_R=0V,t_p=10ms,T_{vj}=125°C	90	A^2s

Characteristic Values

V_F	Continuous forward voltage	I_F=25A V_{GE}=0V	T_{vj}=25°C	-	2.08	-	V
			T_{vj}=125°C	-	1.65	-	
			T_{vj}=150°C	-	1.56	-	

I_{RM}	Peak reverse recovery current	V_R=600V I_F=25A V_{GE}=-15V	T_{vj}=25℃	-	56.7	-	A
			T_{vj}=125℃	-	53.9	-	
			T_{vj}=150℃	-	53.9	-	
t_{rr}	Reverse recovery time		T_{vj}=25℃	-	143	-	ns
			T_{vj}=125℃	-	388	-	
Q_r	Recovered charge		T_{vj}=25℃	-	3.88	-	μC
			T_{vj}=125℃	-	7.69	-	
E_{rec}	Reverse recovery energy		T_{vj}=25℃	-	0.44	-	mJ
			T_{vj}=125℃	-	1.74	-	
R_{thJC}	Thermal resistance, junction to case	per diode		-	-	1.35	K/W
R_{thCH}	Thermal resistance, case to heatsink	per diode，λ_{grease}=1 W/(m • K)		-	0.61	-	K/W
Tvjop	Temperature under switching conditions			-40		150	℃

Note:
IGBT electrical characteristics according to IEC 60747 – 9
Diode electrical characteristics according to IEC 60747 – 2

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℃	-	-	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	-	

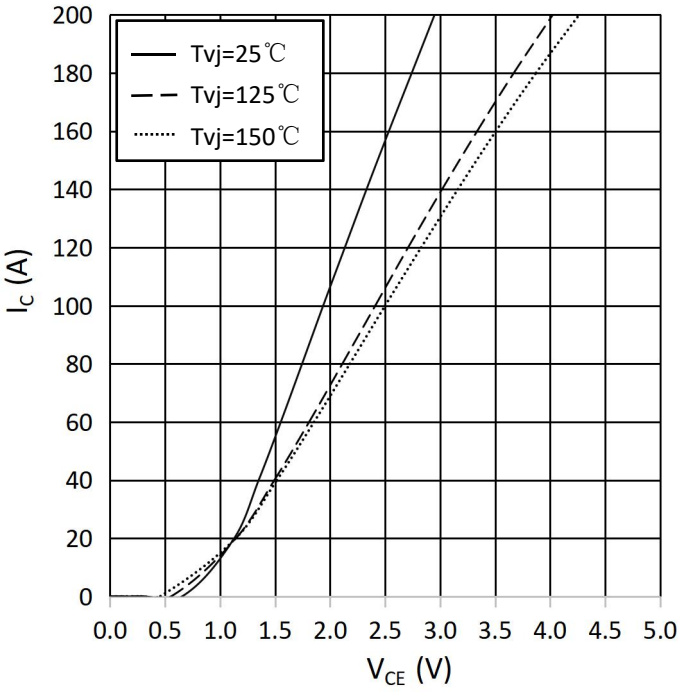
Module

Symbol	Item	Conditions	Rating			Unit
V_{ISOL}	Isolation voltage	Terminals to baseplate，RMS,f=50Hz,t=1min	2500			V
T_{vjmax}	Maximum junction temperature	-	175			℃
T_{vjop}	Operating junction temperature	Continuous operationg(underswitching)	-40~150			℃
T_{stg}	Storage temperature	-	-40~125			℃
Symbol	Item	Conditions	Values			Unit
			Min.	Typ.	Max.	
M	Mountingtorqueformodulmounting	-	3	-	6	Nm
ds	Creepage distance	Terminal to terminal	-	-	-	mm
		Terminal to base plate	-	10	-	
da	Clearance	Terminal to terminal	-	-	-	mm
		Terminal to base plate	-	7.5	-	
m	Weight	-	-	290	-	g

output characteristic IGBT,Inverter (typical)

$I_C = f(V_{CE})$

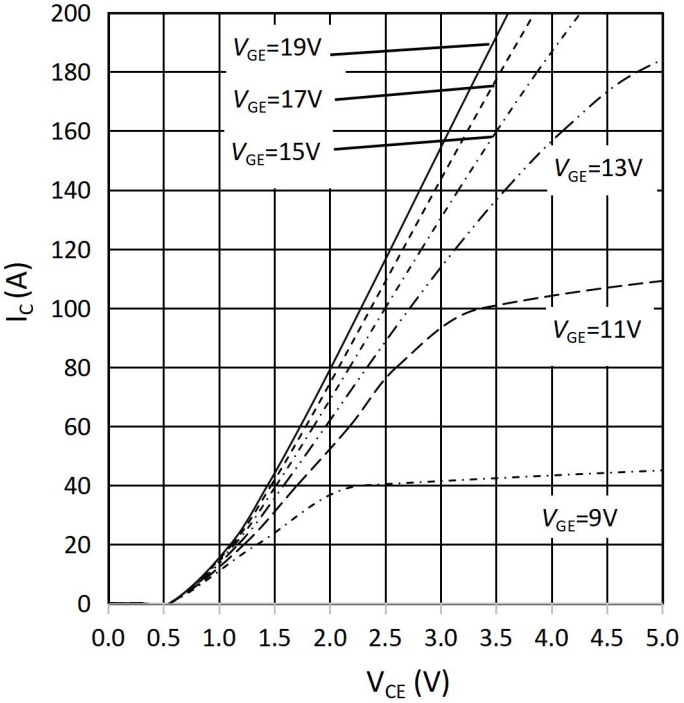
$V_{GE} = 15V$



output characteristic IGBT,Inverter (typical)

$I_C = f(V_{CE})$

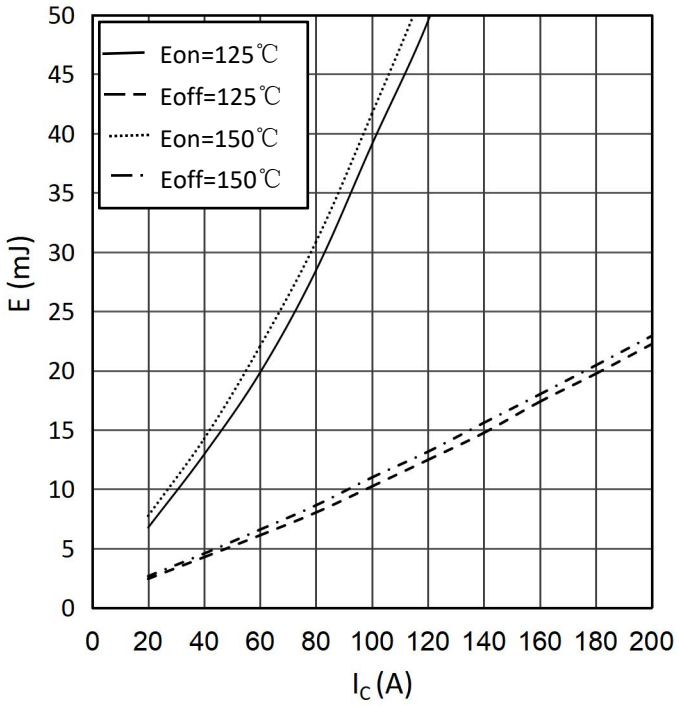
$T_{vj} = 150°C$



switching losses IGBT,Inverter (typical)

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

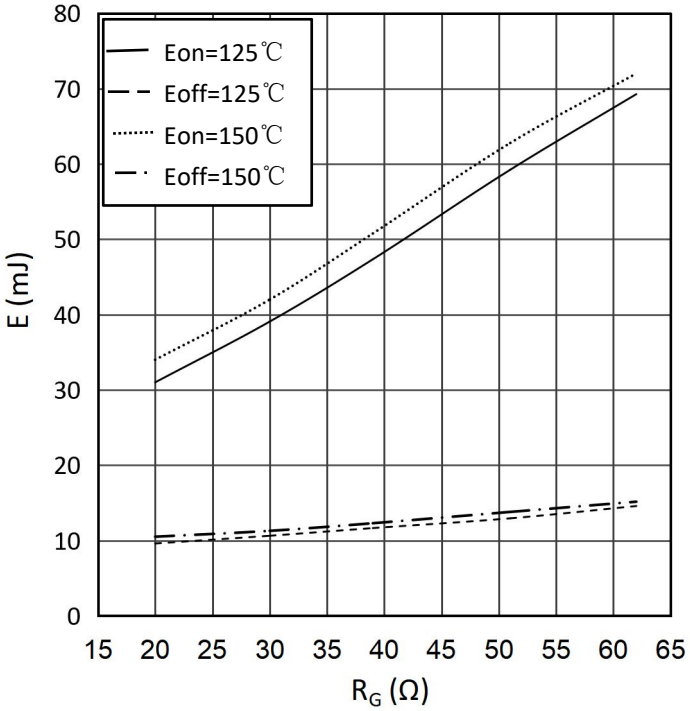
$V_{GE} = \pm 15V$, $R_{Gon} = 30\Omega$, $R_{Goff} = 30\Omega$, $V_{CE} = 600V$



switching losses IGBT,Inverter (typical)

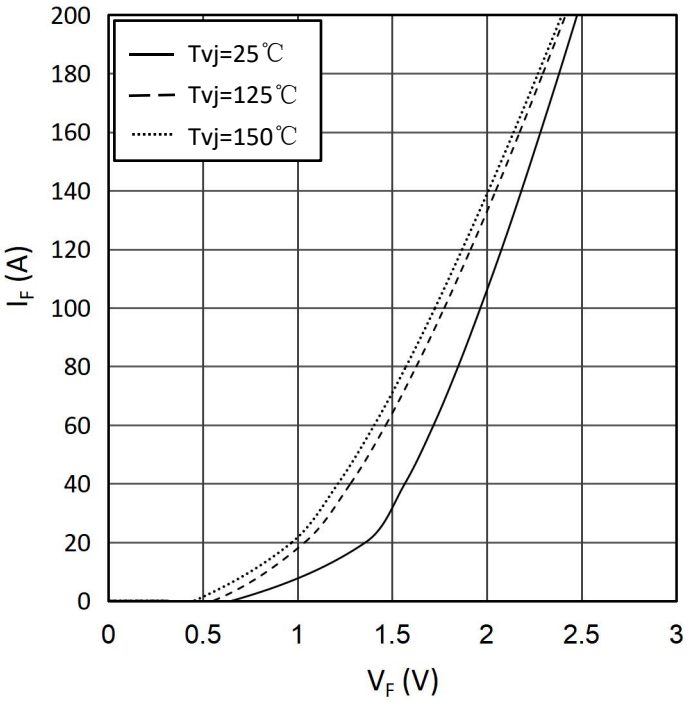
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$

$V_{GE} = \pm 15V$, $I_C = 100A$, $V_{CE} = 600V$



forward characteristic of Diode, Inverter (typical)

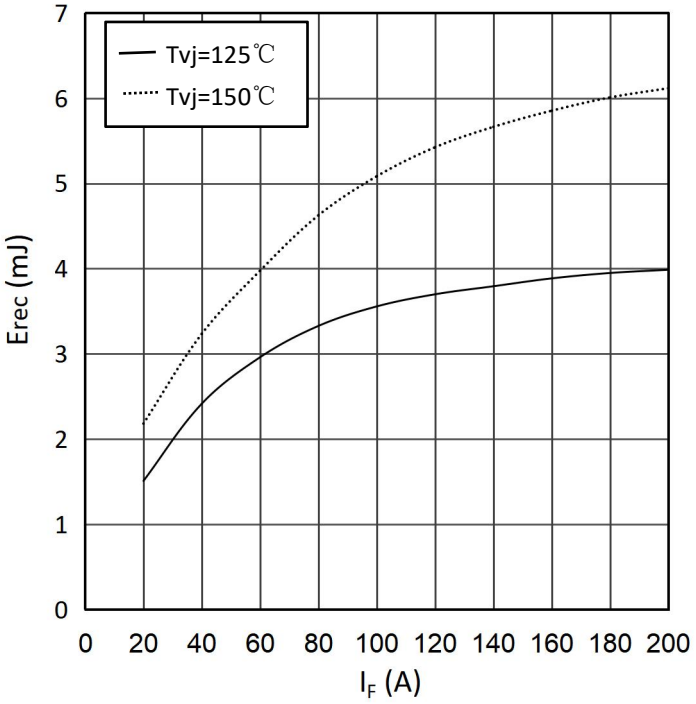
$I_F = f(V_F)$



switching losses Diode, Inverter (typical)

$E_{rec} = f(I_F)$

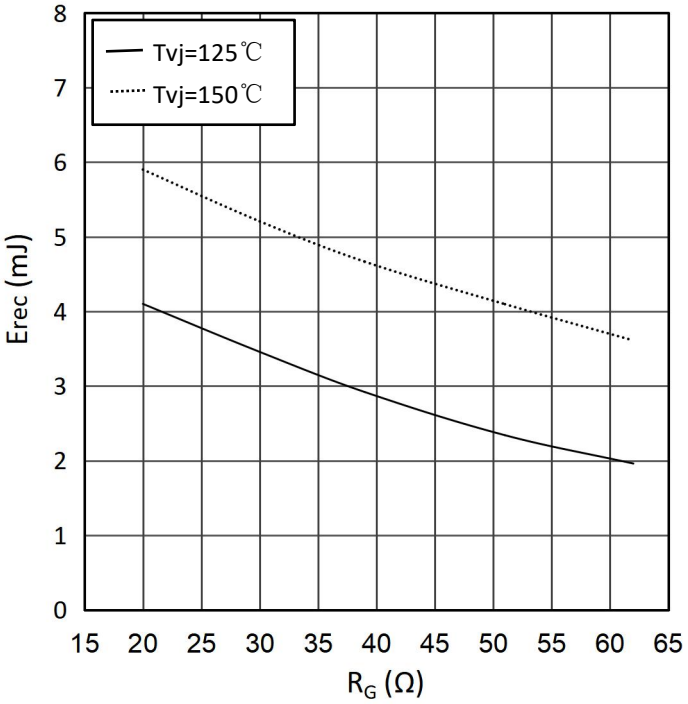
$R_{Gon} = 30\Omega$, $V_{CE} = 600$ V



switching losses Diode, Inverter (typical)

$E_{rec} = f(R_G)$

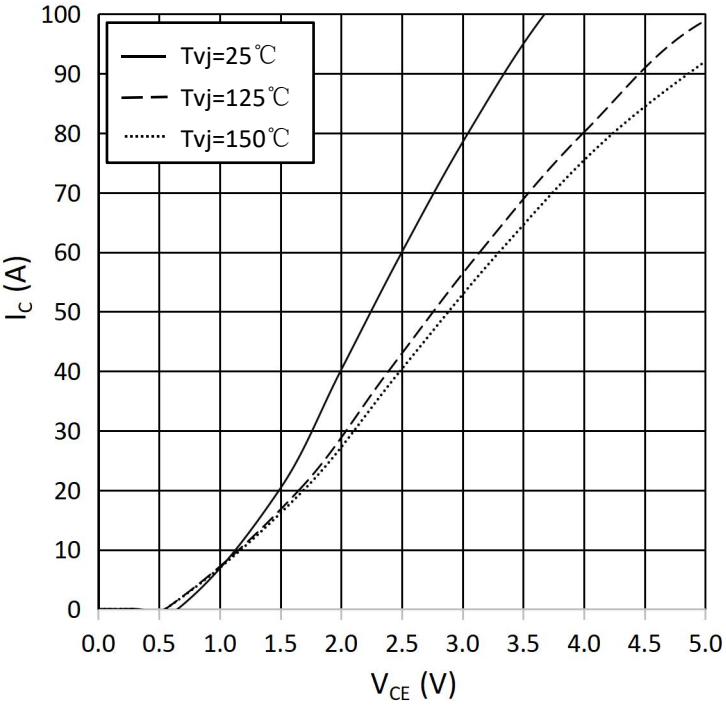
$I_F = 100A$, $V_{CE} = 600V$



output characteristic IGBT, Brake-Chopper (typical)

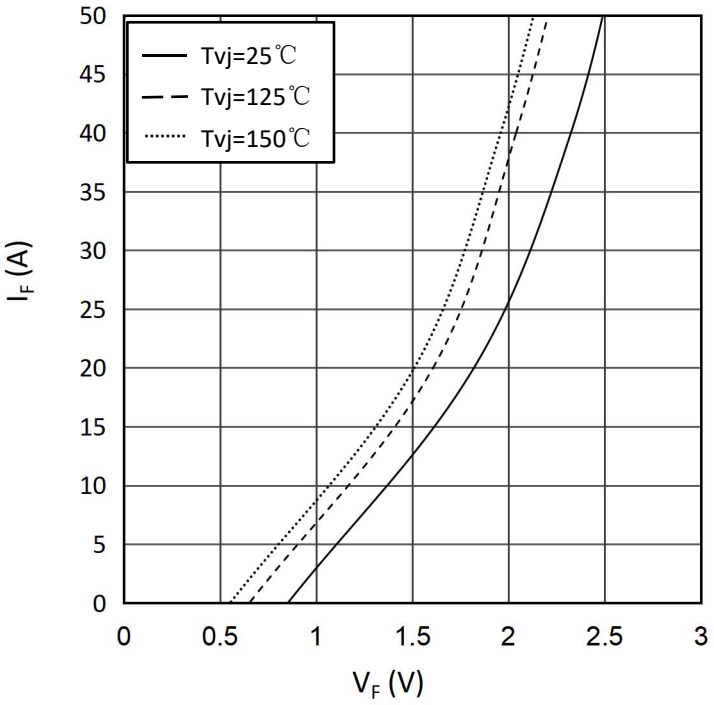
$I_C = f(V_{CE})$

$V_{GE} = 15V$



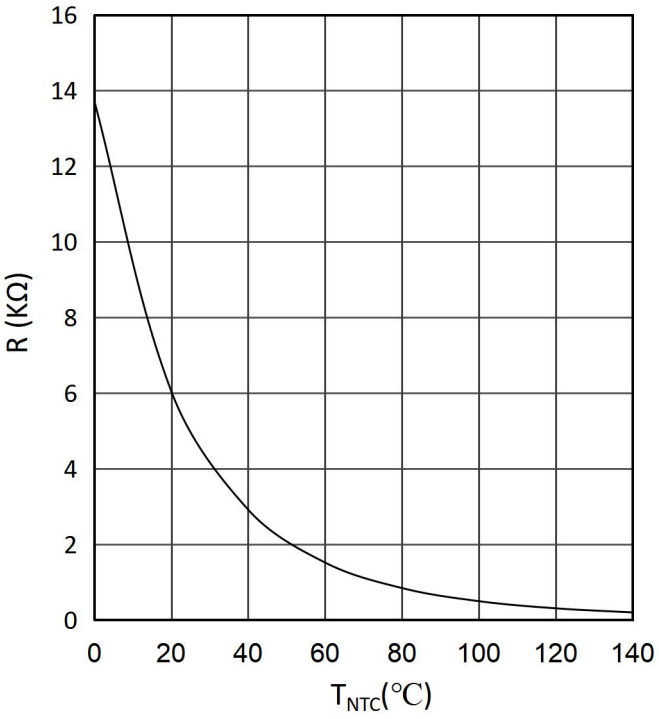
forward characteristic of Diode, Brake-Chopper (typical)

$I_F = f(V_F)$

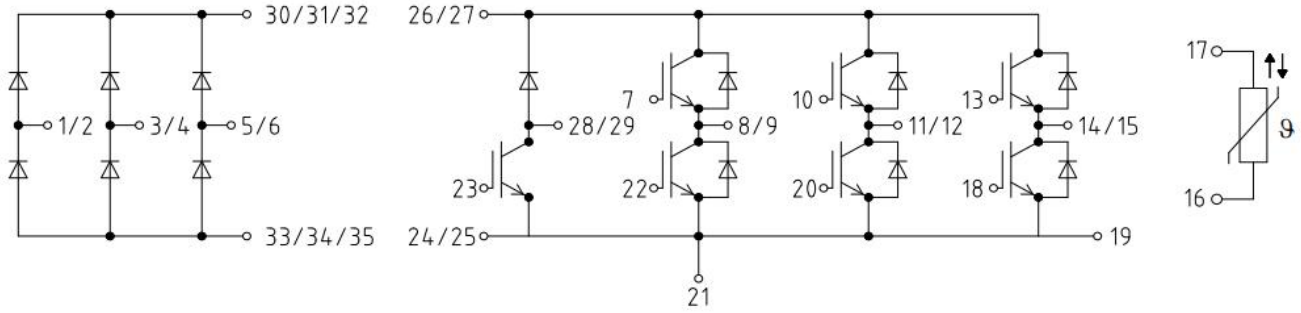


NTC-Thermistor-temperature characteristic(typical)

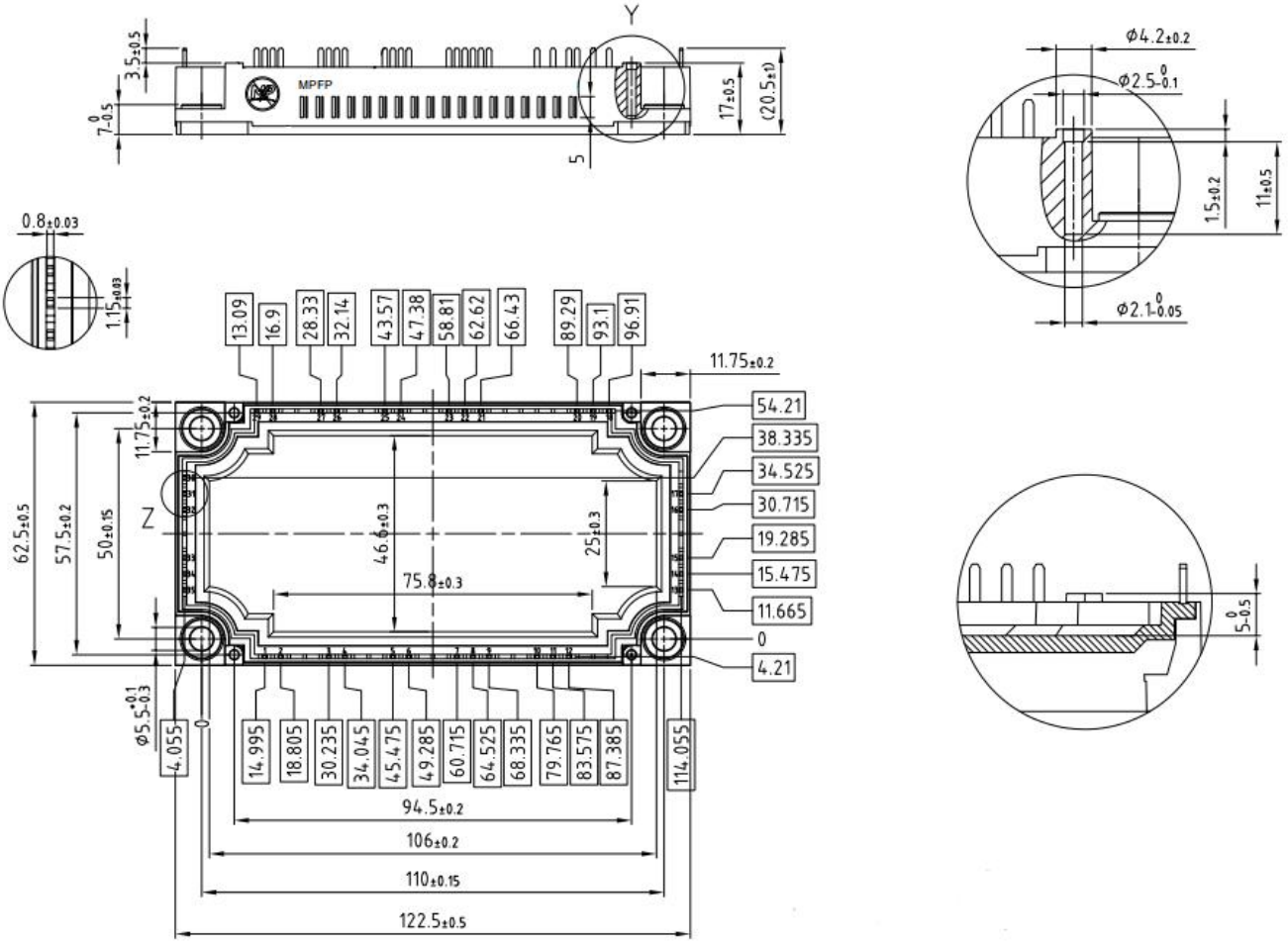
R=f (T)



Cricuit Diagram



Package Outlines



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