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	75	A
I_{CRM}	Repetitive peak collector current	t_p=1ms	150	A
P_{tot}	Total power dissipation	T_C=25°C,T_{vj}=175°C	384	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=2.4mA,V_{CE}=V_{GE},T_{vj}=25°C		5.2	5.60	6.2	V
V_{CEsat}	Collector-emitter saturation voltage	I_C=75A V_{GE}=15V	T_{vj}=25°C	-	1.98	-	V
			T_{vj}=125°C	-	2.4	-	
			T_{vj}=150°C	-	2.5	-	
C_{ies}	Input capacitance	V_{CE}=25V,V_{GE}=0V f=1MHz,T_{vj}=25°C		-	5.30	-	nF
C_{oes}	Output capacitance			-	0.35	-	
C_{res}	Reverse transfer capacitance			-	0.18	-	
Q_G	Gate charge	V_{GE}=-15...+15V,T_{vj}=25°C		-	-	-	uC
R_g	Internal gate resistance	T_{vj}=25°C		-	2.4	-	Ω

$t_{d(on)}$	Turn-on delay time	V_{CC}=600V I_C=75A V_{GE}=±15V $R_{G(on)}$=10Ω $R_{G(off)}$=10Ω	T_{vj}=25°C	-	88.4	-	ns
			T_{vj}=125°C	-	85.8	-	
			T_{vj}=150°C	-	84.2	-	
t_r	Rise time		T_{vj}=25°C	-	57.2	-	
			T_{vj}=125°C	-	55.2	-	
			T_{vj}=150°C	-	61.6	-	
$t_{d(off)}$	Turn-off delay time		T_{vj}=25°C	-	224.1	-	
			T_{vj}=125°C	-	263.2	-	
			T_{vj}=150°C	-	279.2	-	
t_f	Fall time		T_{vj}=25°C	-	248.1	-	
			T_{vj}=125°C	-	295.2	-	
			T_{vj}=150°C	-	303.2	-	
E_{on}	Turn-on energy (per pulse)		T_{vj}=25°C	-	8.2	-	mJ
			T_{vj}=125°C	-	10.5	-	
			T_{vj}=150°C	-	12.2	-	
E_{off}	Turn-off energy (per pulse)		T_{vj}=25°C	-	4.9	-	
			T_{vj}=125°C	-	5.9	-	
			T_{vj}=150°C	-	6.3	-	
SC data	Short-circuit current	V_{CC}=600V,V_{GE}≤15V,T_{vj}=150°C V_{CES}≤1200V,t_P≤10μs		-	451	-	A
R_{thJC}	Thermal resistance,junction to case	Per IGBT		-	-	0.39	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		75	A
I_{FRM}	Repetitive peak forward current	t_p=1ms	150	A
I^2t	I^2t-value	V_R=0V,t_p=10ms,T_{vj}=150°C	960	A^2s

Characteristic Values

V_F	Continuous forward voltage	I_F=75A V_{GE}=0V	T_{vj}=25°C	-	2.13	-	V
			T_{vj}=125°C	-	1.91	-	
			T_{vj}=150°C	-	1.83	-	
I_{RM}	Peak reverse recovery current	V_R=600V I_F=75A V_{GE}=-15V	T_{vj}=25°C	-	58.1	-	A
			T_{vj}=125°C	-	79.6	-	
			T_{vj}=150°C	-	79.7	-	
t_{rr}	Reverse recovery time		T_{vj}=25°C	-	77.6	-	ns
			T_{vj}=125°C	-	219.2	-	
			T_{vj}=150°C	-	554.4	-	
Q_r	Repetitive peak forward current		T_{vj}=25°C	-	2.4	-	μC
			T_{vj}=125°C	-	10.0	-	
			T_{vj}=150°C	-	13.7	-	

E_{rec}	Recovered charge		T_{vj}=25℃	-	0.27	-	mJ
			T_{vj}=125℃	-	2.89	-	
			T_{vj}=150℃	-	5.27	-	
R_{thJC}	Thermal resistance, junction to case	per diode		-	-	0.62	K/W
R_{thCH}	Thermal resistance, case to heatsink	per diode，λ_{grease}=1 W/(m • K)		-	0.205	-	K/W
Tvjop	Temperature under switching conditions			-40		150	℃

Diode, Rectifier

Maximum Rated Values							
Symbol	Item	Conditions		Rating			Unit
V_{RRM}	Repetitive peak reverse voltage	T_{vj}=25℃		1600			V
I_{FRMSM}	Maximum RMS forward current per chip	T_C=80℃,T_{vj}=175℃		75			A
I_{RMSM}	Maximum RMS current at rectifier output	T_C= 80℃		150			A
I_{FSM}	Surge forward current	tp = 10 ms, Tvj = 150° C		470			A
I^2t	I^2t-value	V_R=0V,t_p=10ms,T_{vj}=150℃		1100			A^2s
Characteristic Values							
Symbol	Item	Conditions		Values			Unit
				Min.	Typ.	Max.	
V_F	Continuous forward voltage	I_F=75A V_{GE}=0V	T_{vj}=25℃	-	1.22	-	V
			T_{vj}=125℃	-	-	-	
			T_{vj}=150℃	-	-	-	
I_R	Reverse current	V_R=1600V	T_{vj}=25℃	-	2.61	-	uA
			T_{vj}=125℃	-	-	-	
			T_{vj}=150℃	-	-	-	
Tvjop	Temperature under switching conditions			-40		150	℃

IGBT，Brake-Chopper

Maximum Rated Values							
Symbol	Item	Conditions		Values			Unit
V_{CES}	Collector-emitter voltage	T_{vj}=25℃		1200			V
V_{GES}	Gate-emitter voltage	-		±20			V
I_C	Collector current,DC	T_C=100℃,T_{vj}=175℃		50			A
I_{CRM}	Repetitive peak collector current	t_p=1ms		100			A
P_{tot}	Total power dissipation	T_C=25℃,T_{vj}=175℃		278			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℃		-	-	1	mA
I_{GES}	Gate leakage current	V_{CE}=0V,V_{GE}=20V,T_{vj}=25℃		-	-	500	nA
$V_{GE(th)}$	Gate-emitter threshold voltage	I_C=1.5mA,V_{CE}=V_{GE},T_{vj}=25℃		5.2	5.4	6.2	V
V_{CEsat}	Collector-emitter saturation voltage	I_C=50A	T_{vj}=25℃	-	2.26	-	

		V_{GE}=15V	T_{vj}=125°C	-	2.77	-	
			T_{vj}=150°C	-	2.92	-	
C_{ies}	Input capacitance	V_{CE}=25V,V_{GE}=0V f=1MHz,T_{vj}=25°C		-	3.15	-	pF
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		-	240	-	nC
R_g	Internal gate resistance	T_{vj}=25°C		-	0	-	Ω
$t_{d(on)}$	Turn-on delay time	V_{CC}=600V I_C=50A V_{GE}=±15V $R_{G(on)}$=10Ω $R_{G(off)}$=10Ω	T_{vj}=25°C	-	62.4	-	ns
			T_{vj}=125°C	-	61.6	-	
			T_{vj}=150°C	-	58.4	-	
t_r	Rise time		T_{vj}=25°C	-	36.8	-	
			T_{vj}=125°C	-	38.4	-	
			T_{vj}=150°C	-	39.2	-	
$t_{d(off)}$	Turn-off delay time		T_{vj}=25°C	-	253.6	-	
			T_{vj}=125°C	-	338.4	-	
			T_{vj}=150°C	-	359.2	-	
t_f	Fall time		T_{vj}=25°C	-	216	-	
			T_{vj}=125°C	-	268	-	
			T_{vj}=150°C	-	280	-	
E_{on}	Turn-on energy (per pulse)		T_{vj}=25°C	-	3.5	-	mJ
			T_{vj}=125°C	-	5.2	-	
			T_{vj}=150°C	-	5.9	-	
E_{off}	Turn-off energy (per pulse)		T_{vj}=25°C	-	3.6	-	
			T_{vj}=125°C	-	4.7	-	
			T_{vj}=150°C	-	4.9	-	
SC data	Short-circuit current	V_{CC}=600V,V_{GE}≤15V,T_{vj}=150°C V_{CES}≤1200V,t_P≤10μs		-	223	-	A
R_{thJC}	Thermal resistance,junction to case	Per IGBT		-	-	0.54	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=50A V_{GE}=0V	T_{vj}=25°C	-	2.42	-	V
			T_{vj}=125°C	-	2.13	-	
			T_{vj}=150°C	-	2.04	-	
I_{RM}	Peak reverse recovery current	V_R=600V	T_{vj}=25°C	-	53.9	-	A

		I_F=50A V_{GE}=-15V	T_{vj}=125℃	-	53.9	-	
			T_{vj}=150℃	-	53.9	-	
t_{rr}	Reverse recovery time		T_{vj}=25℃	-	67.2	-	ns
			T_{vj}=125℃	-	291.2	-	
Q_r	Repetitive peak forward current		T_{vj}=25℃	-	2.3	-	μC
			T_{vj}=125℃	-	7.7	-	
E_{rec}	Recovered charge		T_{vj}=25℃	-	0.42	-	mJ
			T_{vj}=125℃	-	2.58	-	
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}=477Ω	-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	$R_2=R_{25}\exp[B_{25/85}(1/T_2-1/(298.15K))$	-	3411	-	
$B_{25/100}$	B-constant	$R_2=R_{25}\exp[B_{25/100}(1/T_2-1/(298.15K))$	-	3433	-	

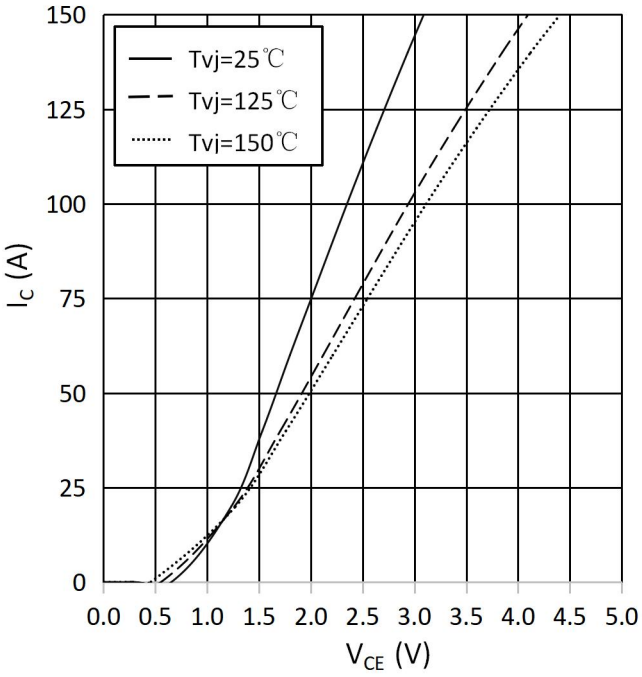
Module

Symbol	Item	Conditions	Rating			Unit
V_{ISOL}	Isolation voltage	Terminals to baseplate，RMS,f=50Hz,t=1min	2500			V
$T_{vj\ max}$	Maximum junction temperature	-	175			℃
$T_{vj\ op}$	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)

$I_C = f(V_{CE})$

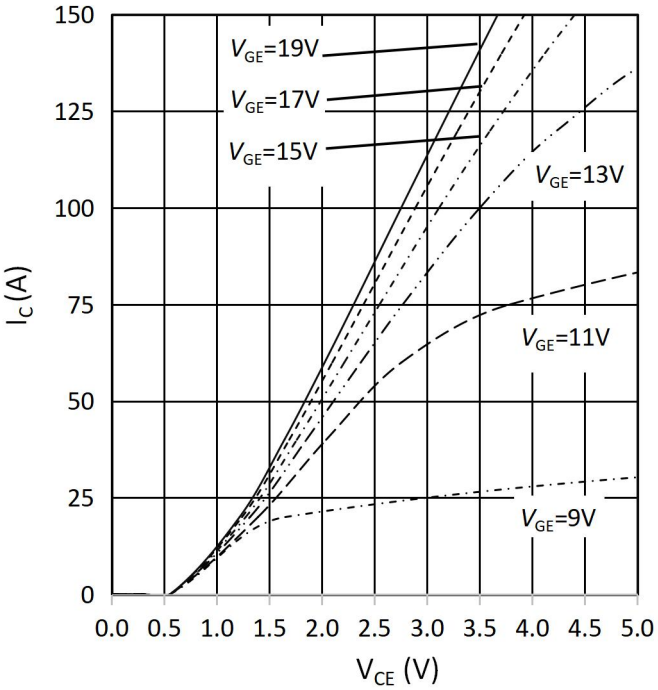
$V_{GE} = 15V$



output characteristic IGBT,Inverter (typical)

$I_C = f(V_{CE})$

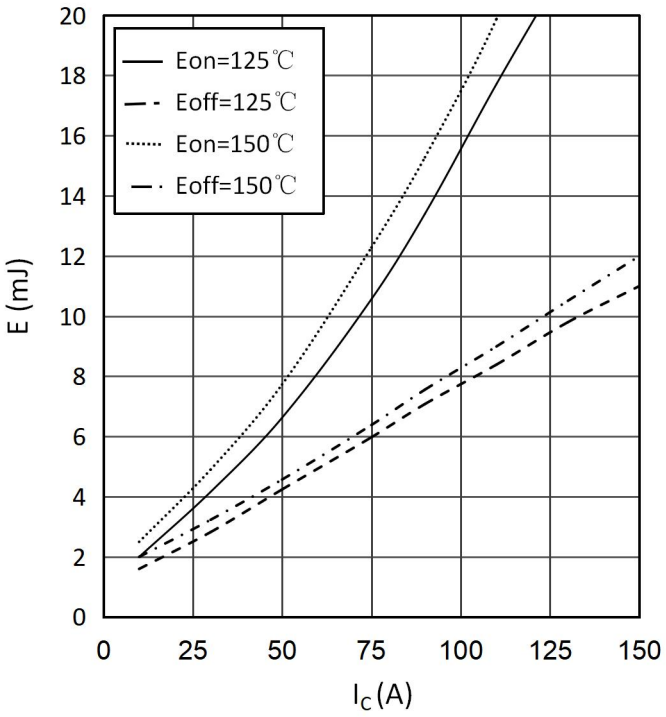
$T_{vj} = 150°C$



switching losses IGBT,Inverter (typical)

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

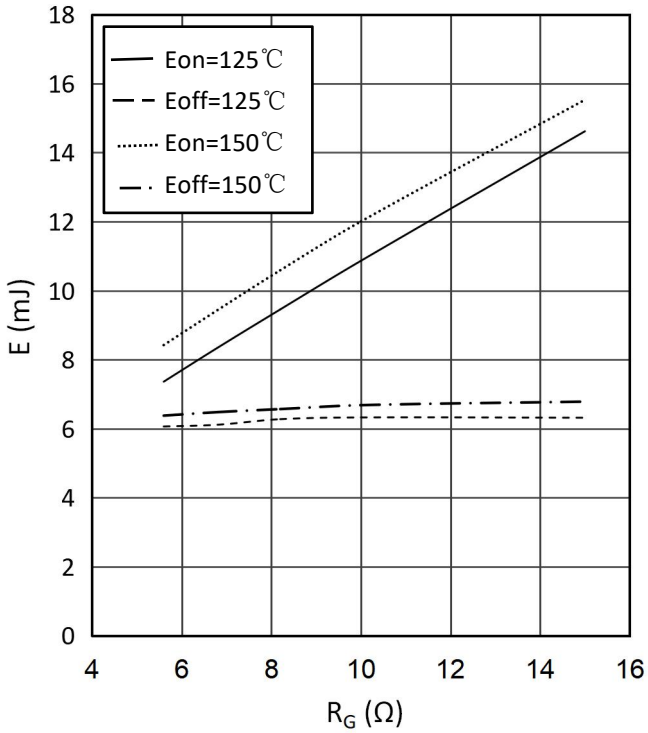
$V_{GE} = \pm 15V$, $R_{Gon} = 10\Omega$, $R_{Goff} = 10\Omega$, $V_{CE} = 600V$



switching losses IGBT,Inverter (typical)

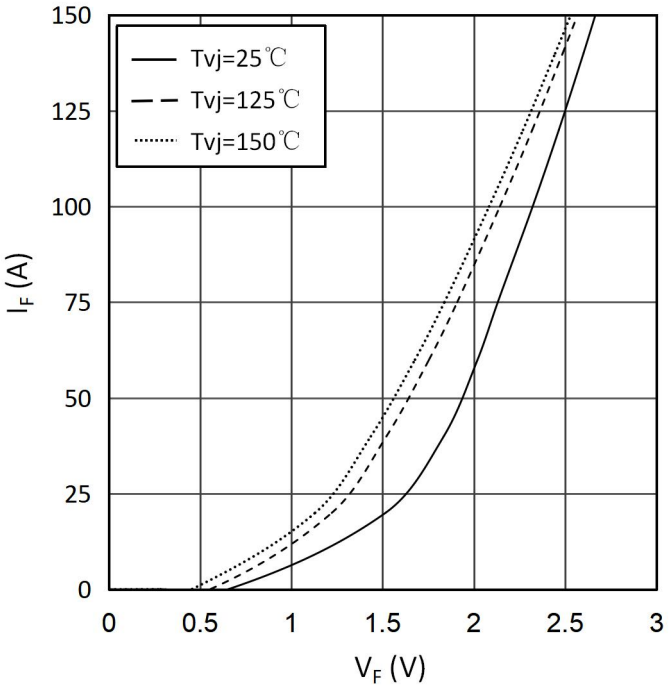
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$

$V_{GE} = \pm 15V$, $I_C = 75A$, $V_{CE} = 600V$



forward characteristic of Diode, Inverter (typical)

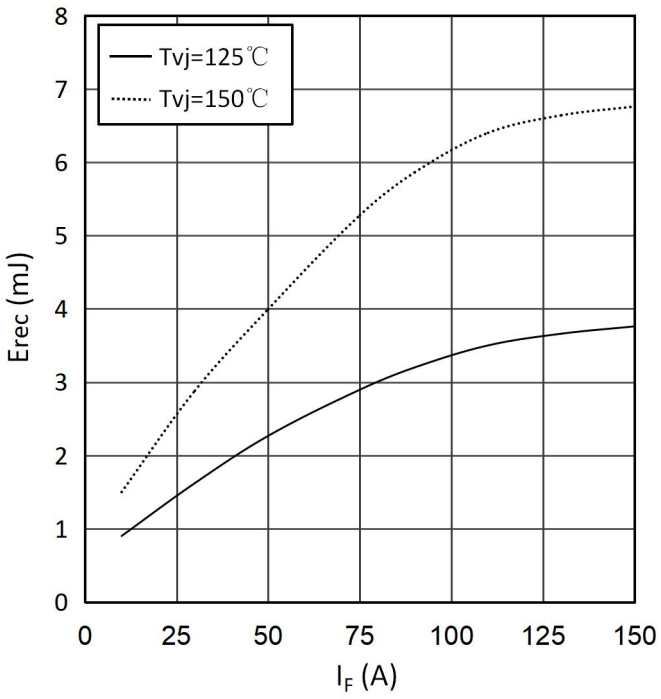
$I_F = f(V_F)$



switching losses Diode, Inverter (typical)

$E_{rec} = f(I_F)$

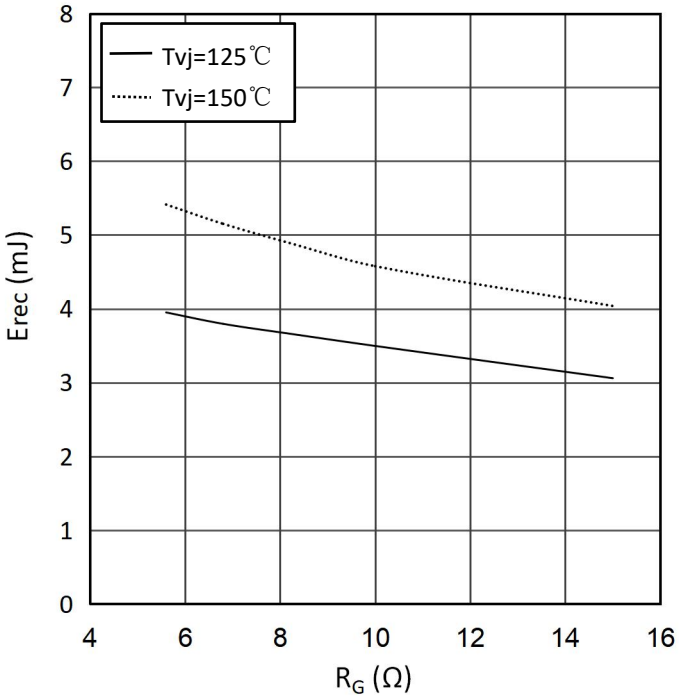
$R_{Gon} = 10\Omega$, $V_{CE} = 600$ V



switching losses Diode, Inverter (typical)

$E_{rec} = f(R_G)$

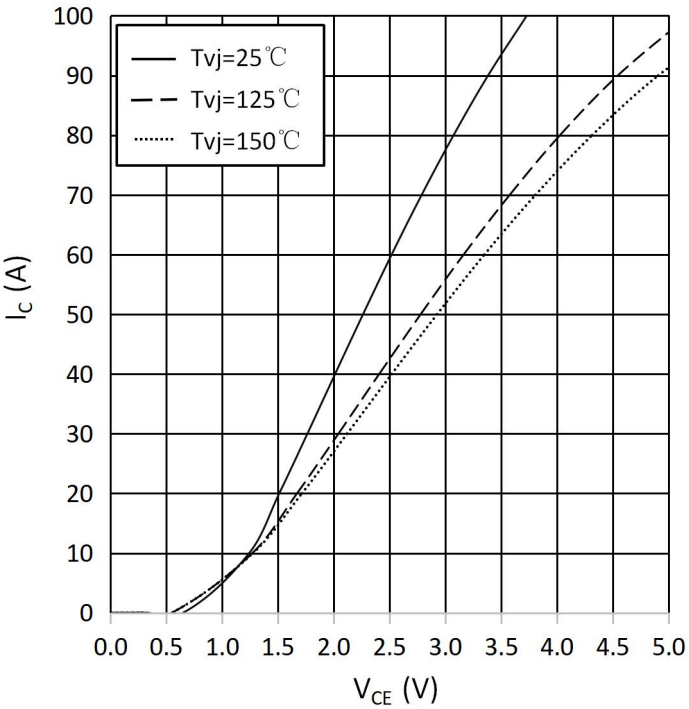
$I_F = 75A$, $V_{CE} = 600V$



output characteristic IGBT, Brake-Chopper (typical)

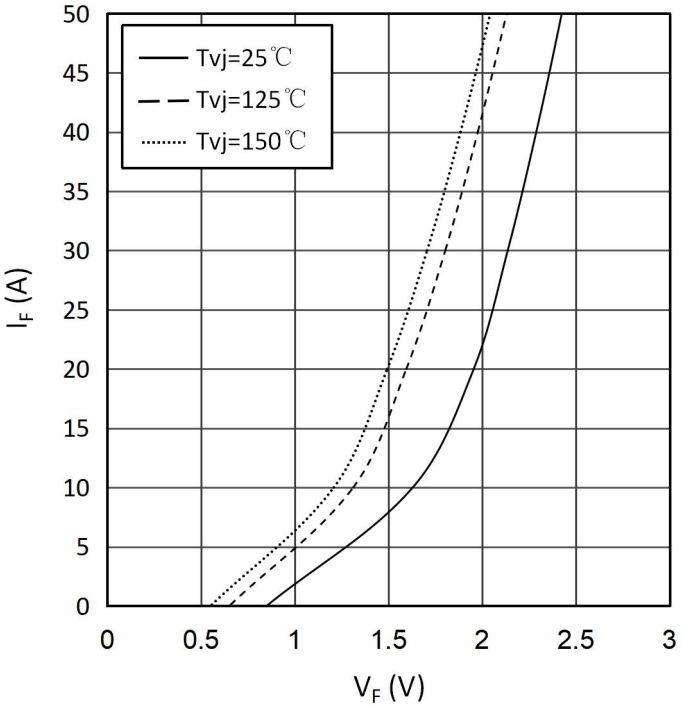
$I_C = f(V_{CE})$

$V_{GE} = 15V$

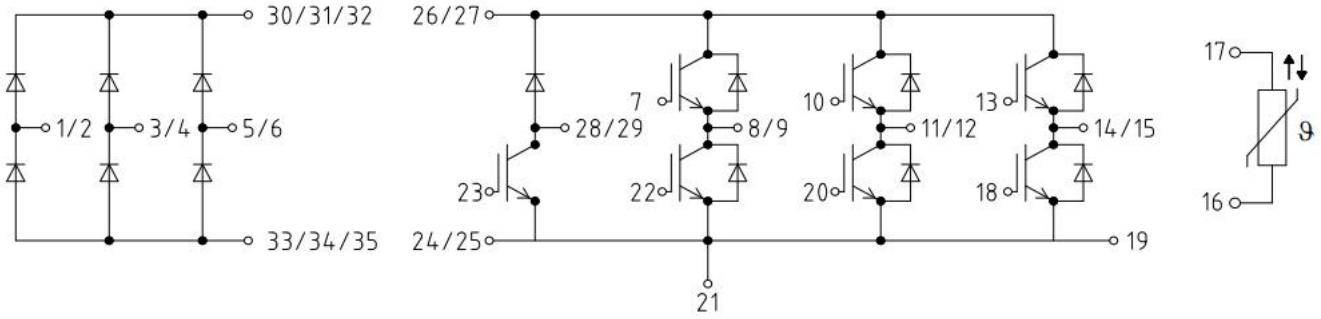


forward characteristic of Diode, Brake-Chopper (typical)

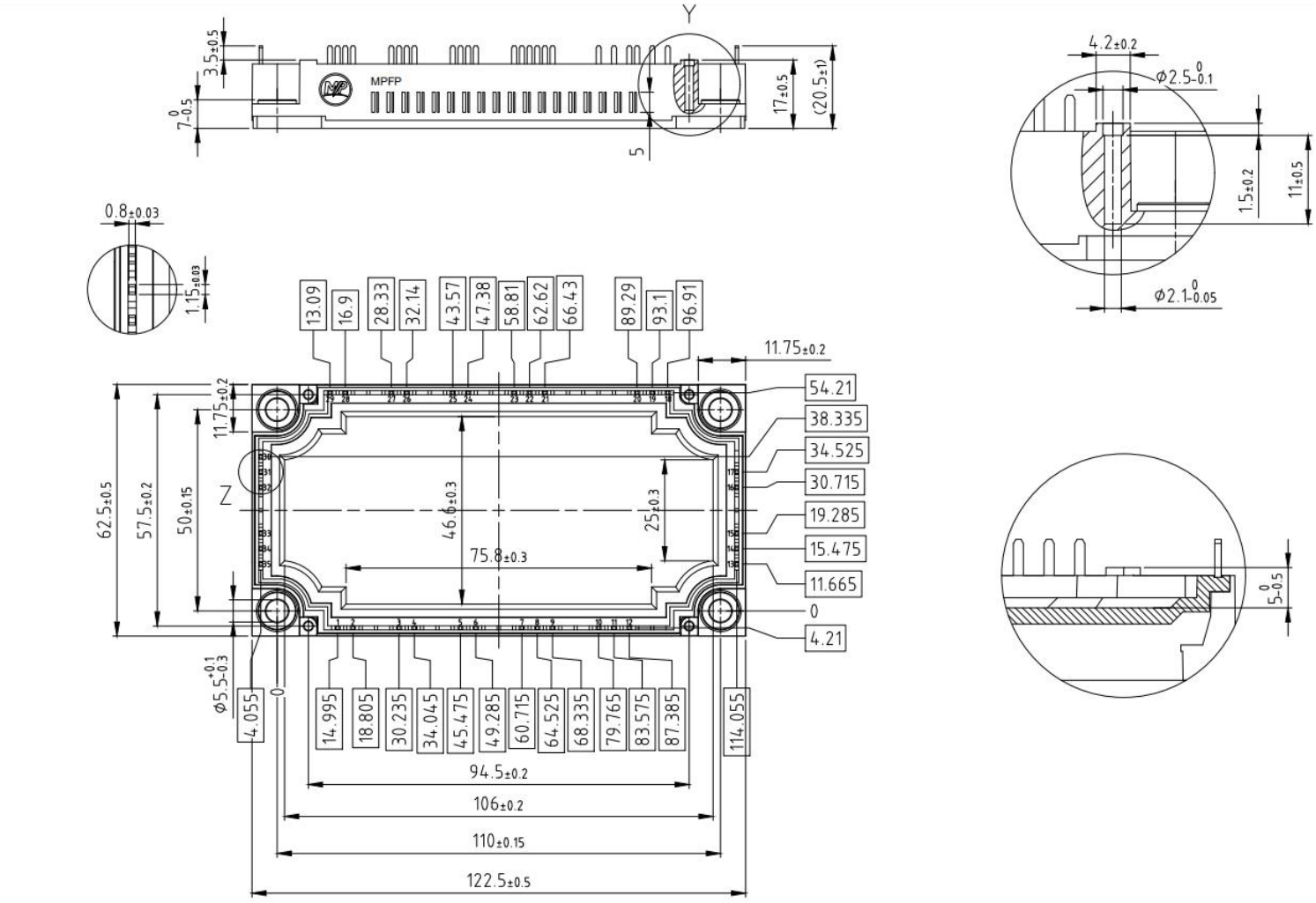
$I_F = f(V_F)$



Cricuit Diagram



Package Outlines



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