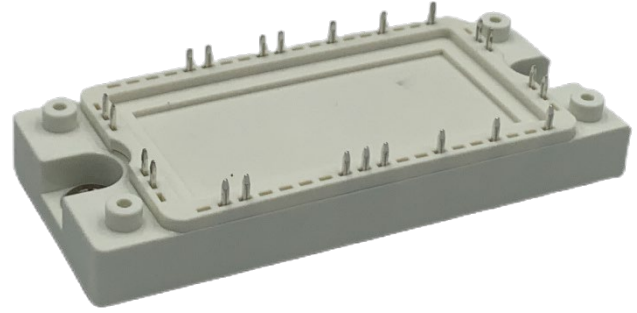


Electrical Features

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

Typical Applications

- Motor Drives
- Servo Drives
- Auxiliary Inverters



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	$T_{vj}=25^{\circ}C$	1200	V		
V_{GES}	Gate-emitter voltage	-	± 20	V		
I_C	Collector current,DC	$T_C=80^{\circ}C, T_{vj}=175^{\circ}C$	25	A		
I_{CRM}	Repetitive peak collector current	$t_p=1ms$	50	A		
P_{tot}	Total power dissipation	$T_C=25^{\circ}C, T_{vj}=175^{\circ}C$	158	W		
Characteristics Values						
Symbol	Item	Conditions	Values			Unit
IGBT			Min.	Typ.	Max.	
I_{CES}	Collector-emitter cut-off current	$V_{CE}=1200V, V_{GE}=0V, T_{vj}=25^{\circ}C$	-	-	1	mA
I_{GES}	Gate leakage current	$V_{CE}=0V, V_{GE}=20V, T_{vj}=25^{\circ}C$	-	-	100	nA
$V_{GE(th)}$	Gate-emitter threshold voltage	$I_C=0.8mA, V_{CE}=V_{GE}, T_{vj}=25^{\circ}C$	5.2	5.6	6.6	V
V_{CEsat}	Collector-emitter saturation voltage	$I_C=25A$ $V_{GE}=15V$ $T_{vj}=25^{\circ}C$	-	2.10	2.5	
		$T_{vj}=125^{\circ}C$	-	2.40	-	
		$T_{vj}=150^{\circ}C$	-	2.49	-	
C_{ies}	Input capacitance	$V_{CE}=25V, V_{GE}=0V$ $f=1MHz, T_{vj}=25^{\circ}C$	-	1.77	-	nF
C_{oes}	Output capacitance		-	0.17	-	
C_{res}	Reverse transfer capacitance		-	0.06	-	
Q_G	Gate charge	$V_{CC}=600V, I_C=25A$ $V_{GE}=-15...+15V, T_{vj}=25^{\circ}C$	-	0.171	-	μC
R_g	Internal gate resistance	$T_{vj}=25^{\circ}C$	-	-	-	Ω

$t_{d(on)}$	Turn-on delay time	$V_{CC}=600V$ $I_C=25A$ $V_{GE}=\pm 15V$ $R_{G(on)}=33\Omega$ $R_{G(off)}=33\Omega$	$T_{vj}=25^\circ C$	-	88.1	-	ns
			$T_{vj}=125^\circ C$	-	96.0	-	
			$T_{vj}=150^\circ C$	-	98.1	-	
t_r	Rise time		$T_{vj}=25^\circ C$	-	60.4	-	
			$T_{vj}=125^\circ C$	-	67.2	-	
			$T_{vj}=150^\circ C$	-	68.6	-	
$t_{d(off)}$	Turn-off delay time		$T_{vj}=25^\circ C$	-	173.4	-	
			$T_{vj}=125^\circ C$	-	224.0	-	
			$T_{vj}=150^\circ C$	-	225.6	-	
t_f	Fall time	$T_{vj}=25^\circ C$	-	246.2	-		
		$T_{vj}=125^\circ C$	-	289.6	-		
		$T_{vj}=150^\circ C$	-	319.2	-		
E_{on}	Turn-on energy (per pulse)	$V_{CC}=600V, I_C=25A$ $V_{GE}=\pm 15V, R_{G(on)}=33\Omega$ $di/dt=900A/\mu s(T_{vj}=150^\circ C)$	$T_{vj}=25^\circ C$	-	4.94	-	mJ
			$T_{vj}=125^\circ C$	-	5.65	-	
			$T_{vj}=150^\circ C$	-	5.90	-	
E_{off}	Turn-off energy (per pulse)		$T_{vj}=25^\circ C$	-	1.50	-	
			$T_{vj}=125^\circ C$	-	1.89	-	
			$T_{vj}=150^\circ C$	-	1.97	-	
SC data	Short-circuit current	$V_{CC}=600V, V_{GE}\leq 15V, T_{vj}=125^\circ C$ $V_{CES}\leq 1200V, t_p\leq 10\mu s$	-	90	-	A	
R_{thJC}	Thermal resistance, junction to case	Per IGBT	-	-	0.95	K/W	
R_{thCH}	Thermal resistance, case to heatsink	Per IGBT $\lambda_{grease}=1W/(m\cdot K)$	-	0.36	-	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	$T_C=80^\circ C, T_{vj}=175^\circ C$			25	A	
I_{FRM}	Repetitive peak forward current	$t_p=1ms$			50	A	
I^2t	I^2t -value	$V_R=0V, t_p=10ms, T_{vj}=125^\circ C$			170	A^2s	
Characteristic Values							
				Min.	Typ.	Max.	
V_F	Continuous forward voltage	$I_F=25A$ $V_{GE}=0V$	$T_{vj}=25^\circ C$	-	1.86	3.0	V
			$T_{vj}=125^\circ C$	-	1.83	-	
			$T_{vj}=150^\circ C$	-	1.80	-	
I_{RM}	Peak reverse recovery current	$V_R=600V$ $I_F=25A$ $V_{GE}=-15V$ $-di_F/dt=900A/\mu s$ $(T_{vj}=150^\circ C)$	$T_{vj}=25^\circ C$	-	22.5	-	A
			$T_{vj}=125^\circ C$	-	24.0	-	
			$T_{vj}=150^\circ C$	-	26.2	-	
t_{rr}	Reverse recovery time		$T_{vj}=25^\circ C$	-	263	-	ns
			$T_{vj}=125^\circ C$	-	619.7	-	
			$T_{vj}=150^\circ C$	-	639.4	-	
Q_r	Recovered charge	$T_{vj}=25^\circ C$	-	2.06	-	μC	
		$T_{vj}=125^\circ C$	-	5.32	-		
		$T_{vj}=150^\circ C$	-	5.95	-		

E _{rec}	Reverse recovery energy		T _{vj} =25°C	-	1.38	-	mJ
			T _{vj} =125°C	-	2.12	-	
			T _{vj} =150°C	-	2.29	-	
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)	-	0.51	-	-	K/W
T _{vjop}	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		50			A
I _{RMSM}	Maximum RMS current at rectifier output	T _C =80°C		80			A
I ² t	I ² t-value	t _p =10ms, T _{vj} =150°C		340			A ² s
Characteristic Values							
Symbol	Item	Conditions	Values			Unit	
			Min.	Typ.	Max.		
V _F	Continuous forward voltage	I _F =25A V _{GE} =0V	T _{vj} =25°C	-	1.22	2.0	V
			T _{vj} =125°C	-	1.07	-	
			T _{vj} =150°C	-	1.05	-	
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		15			A
I _{CRM}	Repetitive peak collector current	t _p =1ms		30			A
P _{tot}	Total power dissipation	T _C =25°C, T _{vj} =175°C		108			W
Characteristic Values							
Symbol	Item	Conditions	Values			Unit	
			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		-	-	100	nA
V _{GE(th)}	Gate-emitter threshold voltage	I _C =0.5mA, V _{CE} =V _{GE} , T _{vj} =25°C		5.2	5.85	6.6	V
V _{CEsat}	Collector-emitter saturation voltage	I _C =15A V _{GE} =15V	T _{vj} =25°C	-	1.91	2.3	
			T _{vj} =125°C	-	2.25	-	
			T _{vj} =150°C	-	2.33	-	

C_{ies}	Input capacitance	$V_{CE}=25V, V_{GE}=0V$ $f=1MHz, T_{vj}=25^{\circ}C$	-	1.19	-	nF	
C_{oes}	Output capacitance		-	0.08	-		
C_{res}	Reverse transfer capacitance		-	0.04	-		
Q_G	Gate charge	$V_{CC}=600V, I_C=15A$ $V_{GE}=-15...+15V, T_{vj}=25^{\circ}C$	-	0.094	-	μC	
R_g	Internal gate resistance	$T_{vj}=25^{\circ}C$	-	-	-	Ω	
$t_{d(on)}$	Turn-on delay time	$V_{CC}=600V$ $I_C=15A$ $V_{GE}=\pm 15V$ $R_{G(on)}=33\Omega$ $R_{G(off)}=33\Omega$	$T_{vj}=25^{\circ}C$	-	33.0	-	ns
			$T_{vj}=125^{\circ}C$	-	84.8	-	
			$T_{vj}=150^{\circ}C$	-	88.1	-	
t_r	Rise time		$T_{vj}=25^{\circ}C$	-	290.0	-	
			$T_{vj}=125^{\circ}C$	-	417.6	-	
			$T_{vj}=150^{\circ}C$	-	423.1	-	
$t_{d(off)}$	Turn-off delay time		$T_{vj}=25^{\circ}C$	-	120.4	-	
			$T_{vj}=125^{\circ}C$	-	145.6	-	
			$T_{vj}=150^{\circ}C$	-	158.1	-	
t_f	Fall time		$T_{vj}=25^{\circ}C$	-	339.8	-	
			$T_{vj}=125^{\circ}C$	-	418.4	-	
			$T_{vj}=150^{\circ}C$	-	460.8	-	
E_{on}	Turn-on energy (per pulse)	$T_{vj}=25^{\circ}C$	-	1.61	-	mJ	
		$T_{vj}=125^{\circ}C$	-	1.96	-		
		$T_{vj}=150^{\circ}C$	-	2.03	-		
E_{off}	Turn-off energy (per pulse)	$T_{vj}=25^{\circ}C$	-	0.85	-		
		$T_{vj}=125^{\circ}C$	-	0.93	-		
		$T_{vj}=150^{\circ}C$	-	0.98	-		
SC data	Short-circuit current	$V_{CC}=600V, V_{GE}\leq 15V, T_{vj}=125^{\circ}C$ $V_{CES}\leq 1200V, t_p\leq 10\mu s$	-	55	-	A	
R_{thJC}	Thermal resistance, junction to case	Per IGBT	-	-	1.4	K/W	
R_{thCH}	Thermal resistance, case to heatsink	Per IGBT $\lambda_{grease}=1W/(m\cdot K)$	-	0.53	-	K/W	
T_{vjop}	Temperature under switching conditions		-40		150	$^{\circ}C$	

Diode, Brake-Chopper
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	$T_C=80^{\circ}C, T_{vj}=175^{\circ}C$	10	A
I_{FRM}	Repetitive peak forward current	$t_p=1ms$	20	A
I^2t	I^2t -value	$V_R=0V, t_p=10ms, T_{vj}=125^{\circ}C$	20	A^2s

Characteristic Values

		Min. Typ. Max.					
V_F	Continuous forward voltage	$I_F=10A$ $V_{GE}=0V$	$T_{vj}=25^{\circ}C$	-	1.22	3.0	V
			$T_{vj}=125^{\circ}C$	-	1.07	-	
			$T_{vj}=150^{\circ}C$	-	1.05	-	

I _{RM}	Peak reverse recovery current	V _R =600V I _F =10A V _{GE} =-15V -di _F /dt=730A/μs (T _{vj} =150°C)	T _{vj} =25°C	-	11.25	-	A
			T _{vj} =125°C	-	12.1	-	
			T _{vj} =150°C	-	12.4	-	
t _{rr}	Reverse recovery time		T _{vj} =25°C	-	101.8	-	ns
			T _{vj} =125°C	-	622.1	-	
			T _{vj} =150°C	-	665.3	-	
Q _r	Recovered charge		T _{vj} =25°C	-	2.21	-	μC
			T _{vj} =125°C	-	3.48	-	
			T _{vj} =150°C	-	3.82	-	
E _{rec}	Reverse recovery energy	T _{vj} =25°C	-	1.26	-	mJ	
		T _{vj} =125°C	-	1.49	-		
		T _{vj} =150°C	-	1.72	-		
R _{thJC}	Thermal resistance, junction to case	per diode	-	-	2.3	K/W	
R _{thCH}	Thermal resistance, case to heatsink	per diode, λ _{grease} =1 W/(m • K)	-	0.875	-	K/W	
T _{vjop}	Temperature under switching conditions			-40		150	°C

Note:

IGBT electrical characteristics according to IEC 60747 – 9

Diode electrical characteristics according to IEC 60747 – 2

NTC Thermistor Characteristics

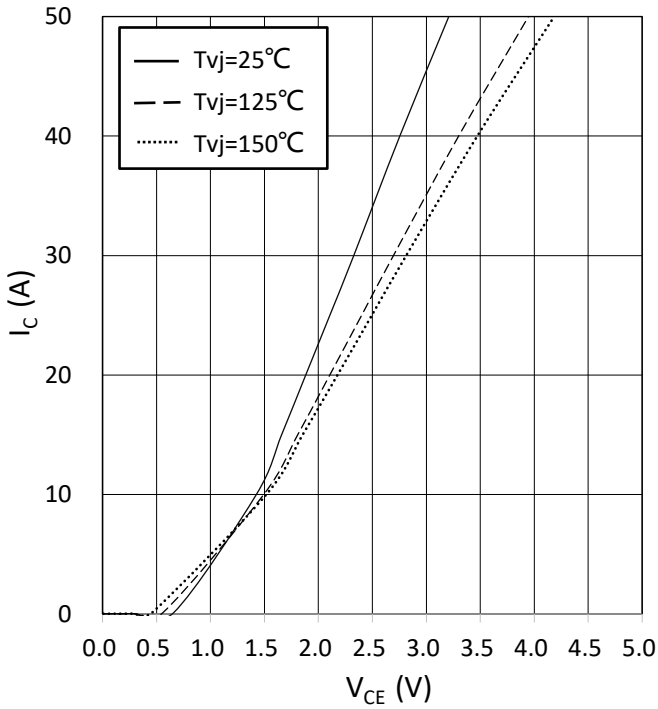
Symbol	Item	Conditions	Values			Unit
			Min.	Typ.	Max.	
R ₂₅	Rated resistance	T _C =25°C	-	5	-	kΩ
ΔR/R	Deviation of resistance	T _C =100°C, R ₁₀₀ =493Ω	-5	-	5	%
P ₂₅	Power dissipation	T _C =25°C	-	-	20	mW
B _{25/50}	B-constant	R ₂ =R ₂₅ exp[B _{25/50} (1/T ₂ -1/(298.15K))]	-	3375	-	K
B _{25/80}	B-constant	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	2500			V
T _{vjmax}	Maximum junction temperature	-	175			°C
T _{vjop}	Operating junction temperature	Continuous operation (under switching)	-40~150			°C
T _{stg}	Storage temperature	-	-40~125			°C
Symbol	Item	Conditions	Values			Unit
			Min.	Typ.	Max.	
Ms	Mounting torque	Mounting to heat sink, M5 screw	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	-	-	180	-	g

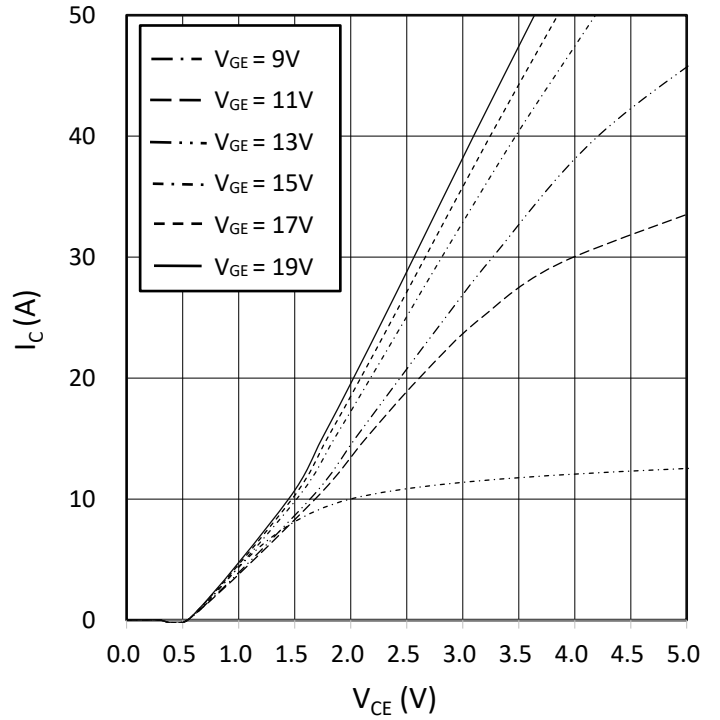
output characteristic IGBT,Inverter (typical)

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



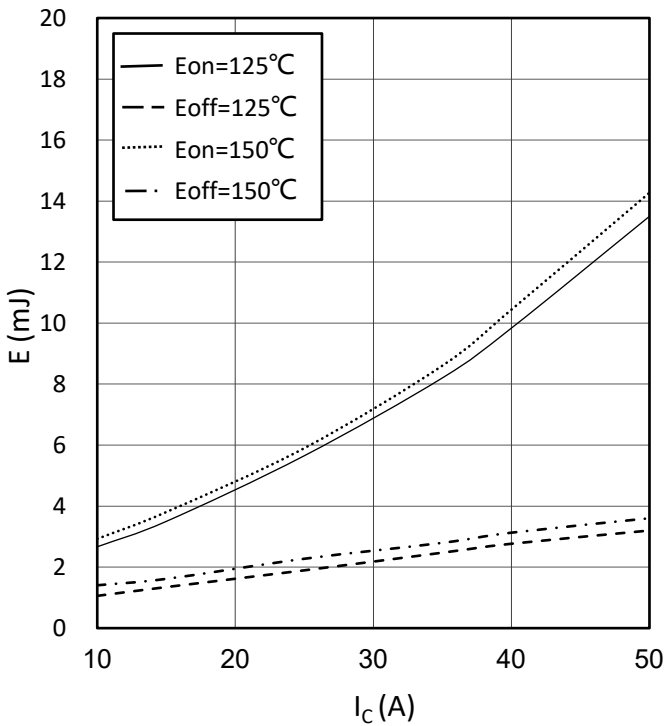
output characteristic IGBT,Inverter (typical)

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



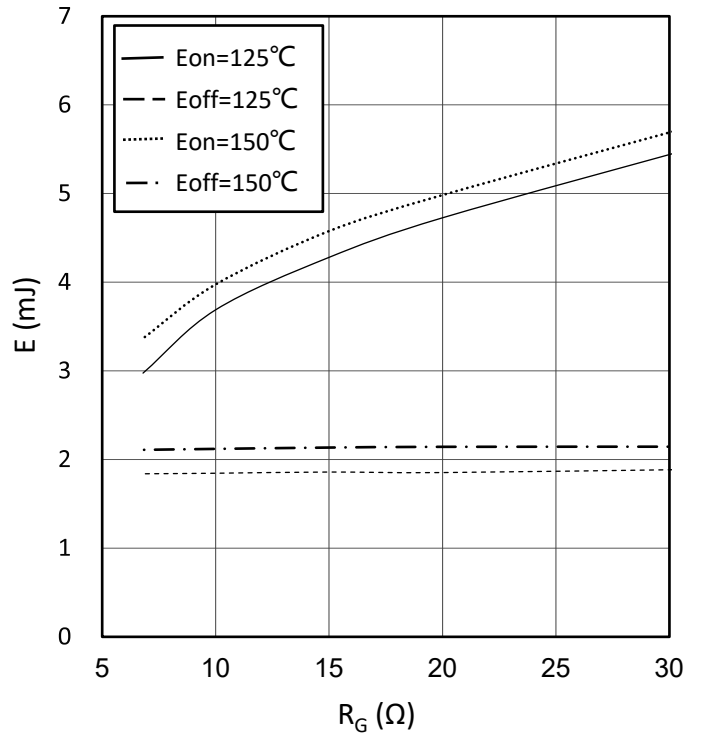
switching losses IGBT,Inverter (typical)

$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
 $V_{GE} = \pm 15V$, $R_{Gon} = 33\Omega$, $R_{Goff} = 33\Omega$, $V_{CE} = 600V$



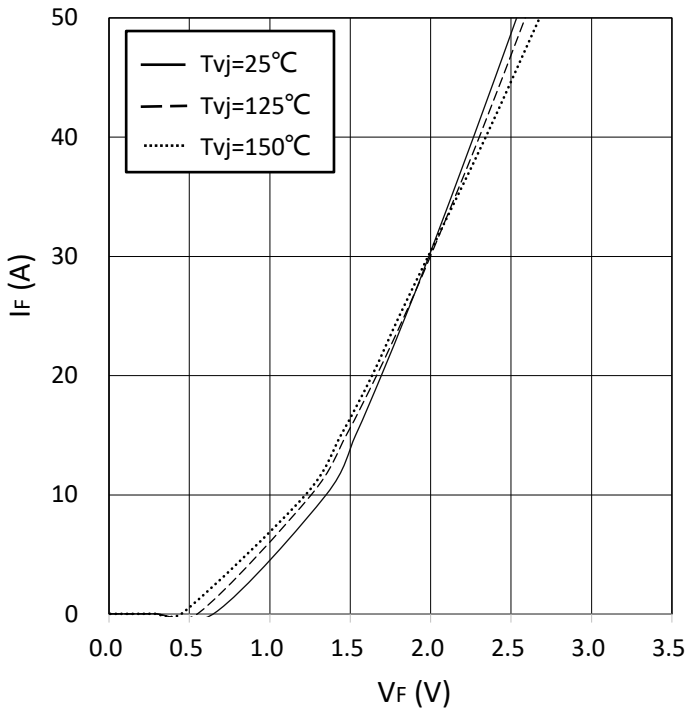
switching losses IGBT,Inverter (typical)

$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
 $V_{GE} = \pm 15V$, $I_C = 25A$, $V_{CE} = 600V$



forward characteristic of Diode, Inverter (typical)

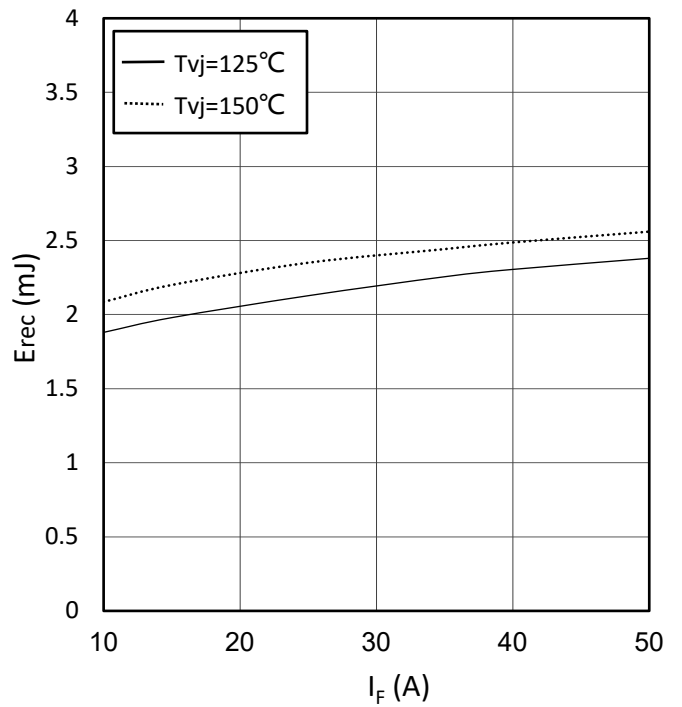
$I_F = f(V_F)$



switching losses Diode, Inverter (typical)

$E_{rec} = f(I_F)$

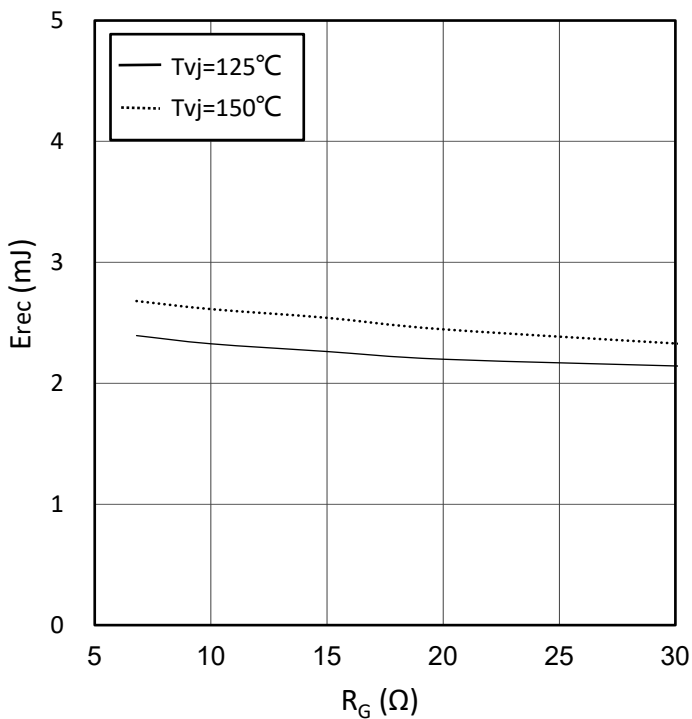
$R_{Gon} = 33\Omega, V_{CE} = 600\text{ V}$



switching losses Diode, Inverter (typical)

$E_{rec} = f(R_G)$

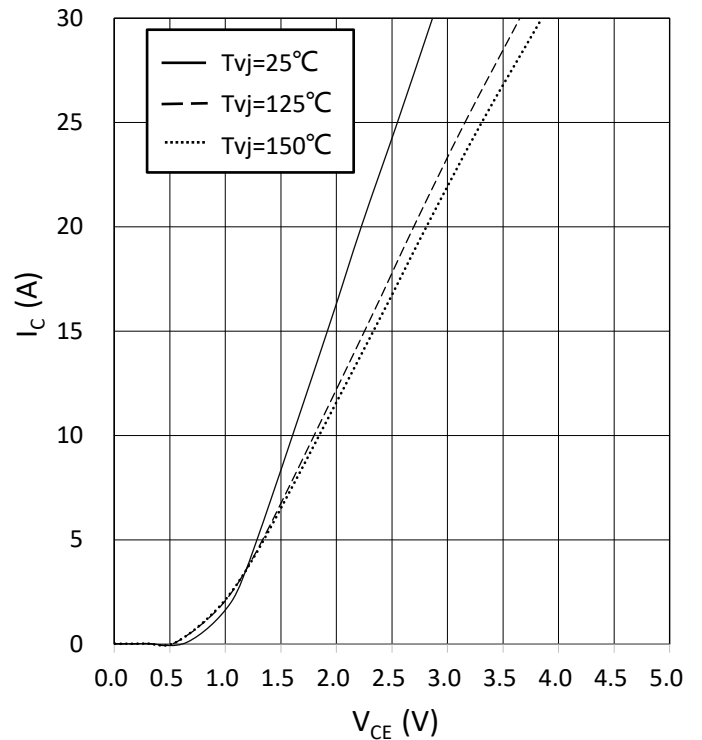
$I_F = 25\text{A}, V_{CE} = 600\text{V}$



output characteristic IGBT, Brake-Chopper (typical)

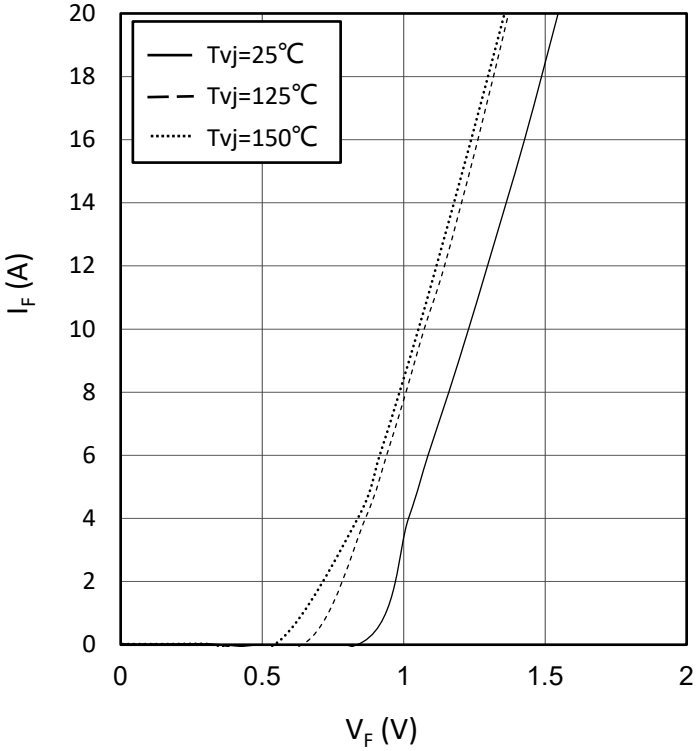
$I_C = f(V_{CE})$

$V_{GE} = 15\text{V}$



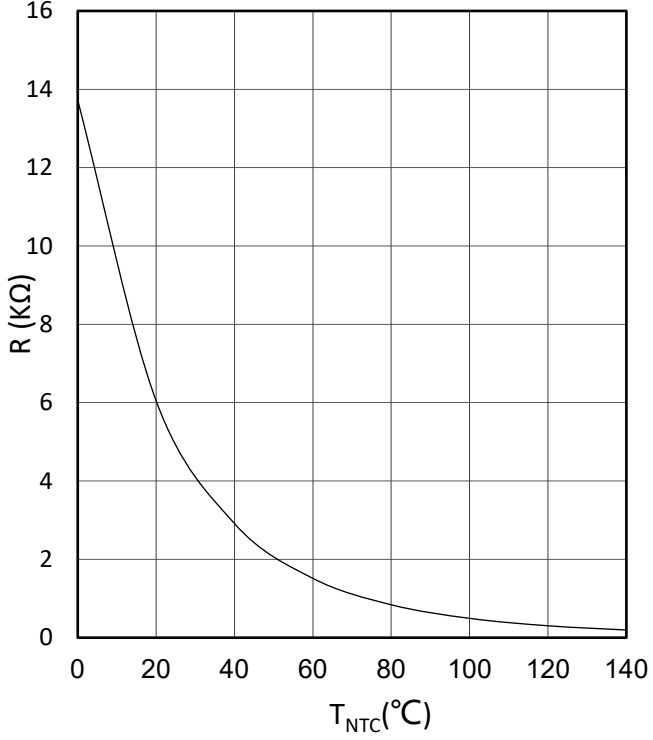
forward characteristic of Diode, Brake-Chopper (typical)

$I_F = f(V_F)$



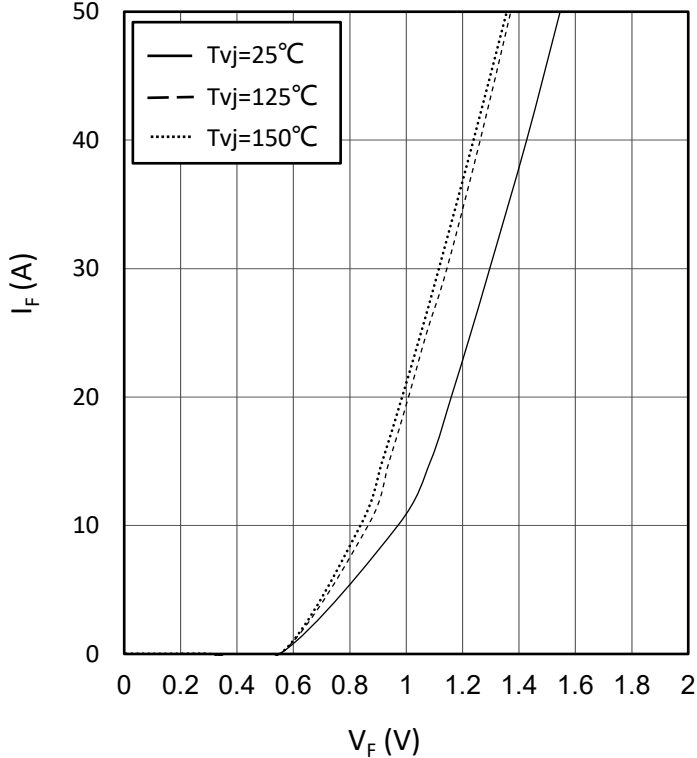
NTC-Thermistor-temperature characteristic(typical)

$R=f(T)$

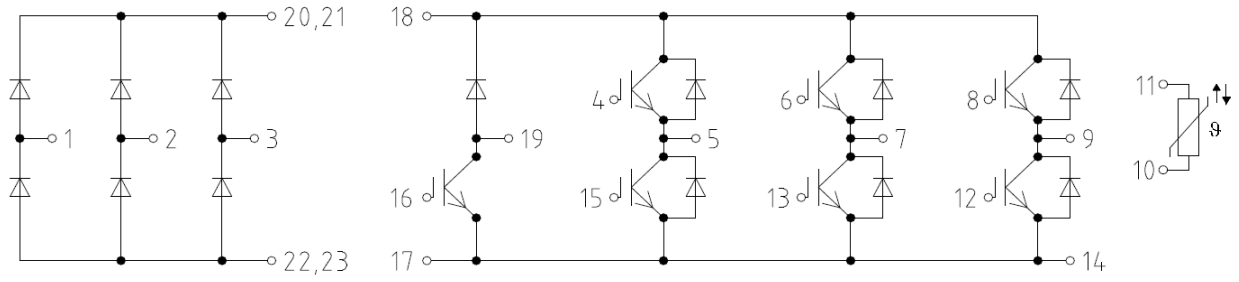


Forward characteristic of Diode, Rectifier(typical)

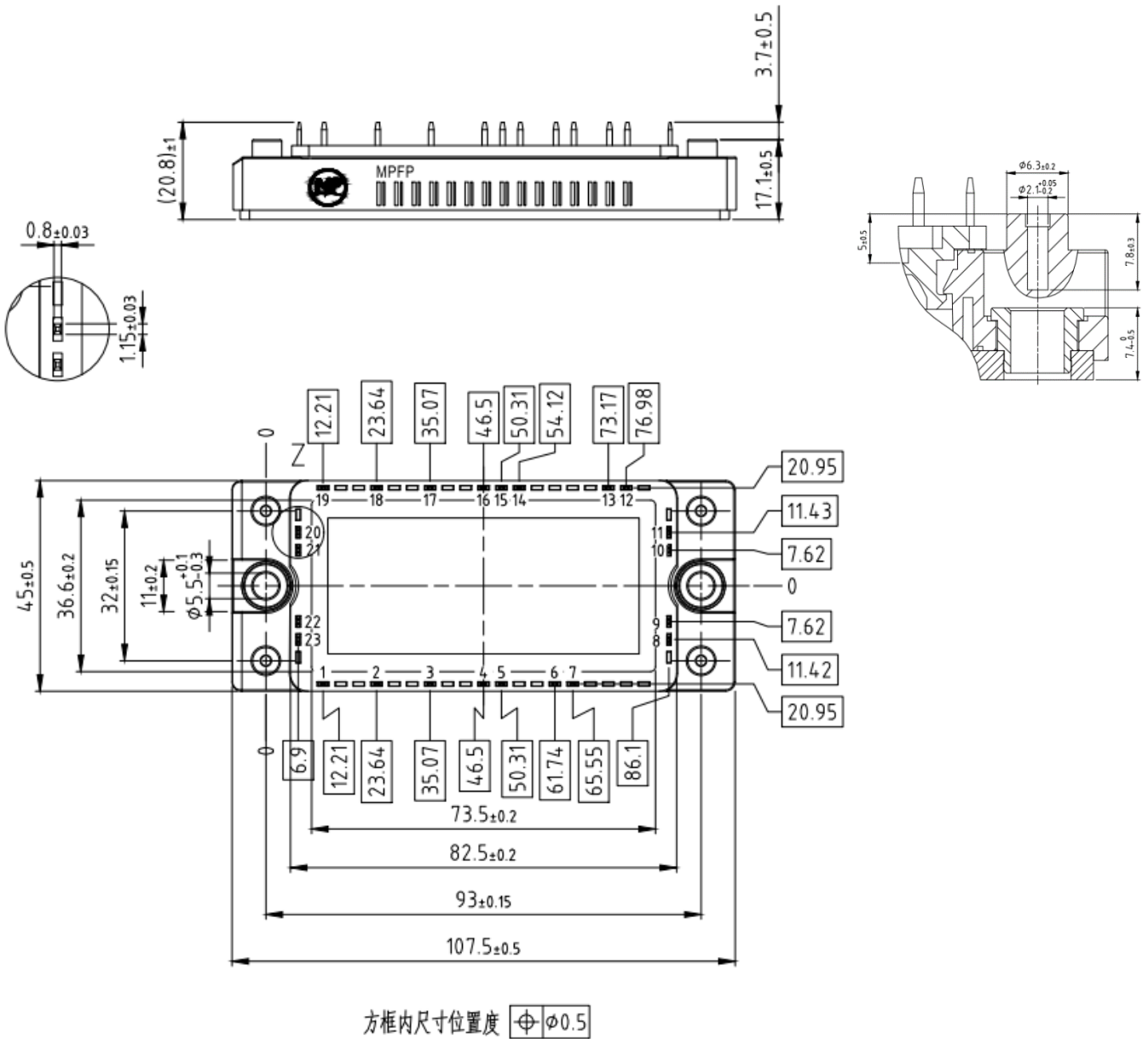
$I_F = f(V_F)$



Circuit Diagram



Package Outlines



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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	2023.4.15	更新实物图、尺寸图。版本变更为1.6。	2023 4 Ver1.6	梁华文