

	MG050PA120N0
---	--------------



MG050PA120N0

1200V50A EconoPIM2 IGBT Module

	MG050PA120N0
---	--------------

IGBT, Inverter

Maximum Rated Values

Collector-emitter voltage	$T_{vj} = 25^{\circ}\text{C}$	V_{CES}	1200	V
Continuous DC collector current	$T_C = 100^{\circ}\text{C}, T_{vj} \text{ max} = 150^{\circ}\text{C}$	$I_{C,nom}$	50	A
Repetitive peak collector current	$t_P = 1 \text{ ms}$	I_{CRM}	100	A
Total power dissipation	$T_C = 25^{\circ}\text{C}, T_{vj} \text{ max} = 150$	P_{tot}	210	W
Gate-emitter peak voltage		V_{GES}	+/- 20	V

Characteristic value				min.	typ.	max.	
Collector-emitter saturation voltage	$I_C = 50 \text{ A}, V_{GE} = 15 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$	$V_{CE,sat}$	1.7	2.1	2.3	V
	$I_C = 50 \text{ A}, V_{GE} = 15 \text{ V}$	$T_{vj} = 125^{\circ}\text{C}$					V
	$I_C = 50 \text{ A}, V_{GE} = 15 \text{ V}$	$T_{vj} = 150^{\circ}\text{C}$			2.6		V
Gate threshold voltage	$I_C = 1 \text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$		$V_{GE,th}$	5.3	6.0	6.3	V
Gate charge	$V_{GE} = -15 \text{ V} \dots +15 \text{ V}$		Q_G		0.44		μC
Internal gate resistor	$T_{vj} = 25^{\circ}\text{C}$		R_{Gint}				Ω
Input capacitance	$f = 1 \text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25 \text{ V}, V_{GE} = 0 \text{ V}$		C_{ies}				nF
Reverse transfer capacitance	$f = 1 \text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25 \text{ V}, V_{GE} = 0 \text{ V}$		C_{res}				nF
Collector-emitter cut-off current	$V_{CE} = 1200 \text{ V}, V_{GE} = 0 \text{ V}, T_{vj} = 25^{\circ}\text{C}$		I_{CES}			1	mA
Gate-emitter leakage current	$V_{CE} = 0 \text{ V}, V_{GE} = 20 \text{ V}, T_{vj} = 25^{\circ}\text{C}$		I_{GES}			100	nA
Turn-on delay time, inductive load	$I_C = 50 \text{ A}, V_{CE} = 600 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$	$T_{d,on}$		0.32		μs
	$V_{GE} = +15/-15 \text{ V}$	$T_{vj} = 125^{\circ}\text{C}$					μs
	$R_{G,on} = 15 \Omega$	$T_{vj} = 150^{\circ}\text{C}$					μs
Rise time, inductive load	$I_C = 50 \text{ A}, V_{CE} = 600 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$	T_r		0.08		μs
	$V_{GE} = +15/-15 \text{ V}$	$T_{vj} = 125^{\circ}\text{C}$					μs
	$R_{G,on} = 15 \Omega$	$T_{vj} = 150^{\circ}\text{C}$					μs
Turn-off delay time, inductive load	$I_C = 50 \text{ A}, V_{CE} = 600 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$	$T_{d,off}$		0.20		μs
	$V_{GE} = +15/-15 \text{ V}$	$T_{vj} = 125^{\circ}\text{C}$					μs
	$R_{G,off} = 15 \Omega$	$T_{vj} = 150^{\circ}\text{C}$					μs
Fall time, inductive load	$I_C = 50 \text{ A}, V_{CE} = 600 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$	T_f		0.28		μs
	$V_{GE} = +15/-15 \text{ V}$	$T_{vj} = 125^{\circ}\text{C}$					μs
	$R_{G,off} = 15 \Omega$	$T_{vj} = 150^{\circ}\text{C}$					μs
Turn-on energy loss per pulse	$I_C = 50 \text{ A}, V_{CE} = 600 \text{ V}, L_S = 20 \text{ nH}$	$T_{vj} = 25^{\circ}\text{C}$	E_{on}		4.5		mJ
	$V_{GE} = +15/-15 \text{ V}, di/dt = 570 \text{ A}/\mu\text{s}$	$T_{vj} = 125^{\circ}\text{C}$					mJ
	$R_{G,on} = 15 \Omega$	$T_{vj} = 150^{\circ}\text{C}$					mJ
Turn-off energy loss per pulse	$I_C = 50 \text{ A}, V_{CE} = 600 \text{ V}, L_S = 20 \text{ nH}$	$T_{vj} = 25^{\circ}\text{C}$	E_{off}		3.2		mJ
	$V_{GE} = +15/-15 \text{ V}, dv/dt = 5400 \text{ V}/\mu\text{s}$	$T_{vj} = 125^{\circ}\text{C}$					mJ
	$R_{G,off} = 15 \Omega$	$T_{vj} = 150^{\circ}\text{C}$					mJ
SC data	$V_{GE} \leq 15 \text{ V}, V_{CC} = 600 \text{ V}, t_P \leq 8 \mu\text{s}, T_{vj} = 25^{\circ}\text{C}, R_G = 10 \Omega, C_{GE} = 0.0 \mu\text{F}, V_{CEmax} = V_{CES} - L_{SCE} \cdot di/dt$		I_{SC}		340		A

	MG050PA120N0
---	--------------

Thermal resistance, junction to case	per IGBT, grease = 1.3 W/(m·K)	R _{th,JC}			0.589	K/W
--------------------------------------	--------------------------------	--------------------	--	--	-------	-----

Diode, Inverter
Maximum Rated Values

Repetitive peak reverse voltage	T _{vj} = 25°C	V _{RRM}	1200	V
Continuous DC forward current		I _F	50	A
Repetitive peak forward current	t _p = 1 ms	I _{FRM}	100	A

Characteristic value			min.	typ.	max.		
Forward voltage	I _F = 50 A, V _{GE} = 0 V	T _{vj} = 25°C	V _F	2.0	2.4	2.5	V
	I _F = 50 A, V _{GE} = 0 V	T _{vj} = 125°C					V
	I _F = 50 A, V _{GE} = 0 V	T _{vj} = 150°C			1.8		V
Peak reverse recovery current	I _F = 50A, V _R = 600V	T _{vj} = 25°C	I _{RM}		50		A
	V _{GE} = -15V	T _{vj} = 125°C					
		T _{vj} = 150°C					
Recovered charge	I _F = 50A, V _R = 600V	T _{vj} = 25°C	Q _r		5.5		μ C
	V _{GE} = -15V	T _{vj} = 125°C					
		T _{vj} = 150°C					
Reverse recovery energy	I _F = 50A, V _R = 600V	T _{vj} = 25°C	E _{rec}		1.5		mJ
	V _{GE} = -15V	T _{vj} = 125°C					
		T _{vj} = 150°C					
Thermal resistance, junction to case	Per diode, grease = 1.3 W/(m·K)		R _{th,JC}			0.69	K/W

Diode, Rectifier
Maximum Rated Values

Repetitive peak reverse voltage	T _{vj} = 25°C	V _{RRM}	1600	V
Average Rectified Output current	V _F = 1.2, T _{vj} = 150°C	I _F	50	A
Surge forward current	t _p = 10 ms, Tvj = 150°C	I _{FSM}	320	A
I²t - value	t _p = 10 ms, Tvj = 150°C	I²t	510	A²s

Characteristic value			min.	typ.	max.	
Forward voltage	T _{vj} = 150°C, I _F = 50 A	V _F		1.2		V
Reverse current	T _{vj} = 150°C, V _R = 1600 V	I _R		1		mA
Thermal resistance, junction to case	per Diode	R _{thJC}			0.74	K/W
Thermal resistance, junction to heatsink	per Diode, λ grease = 1.3 W/(m·K)	R _{thJH}				K/W

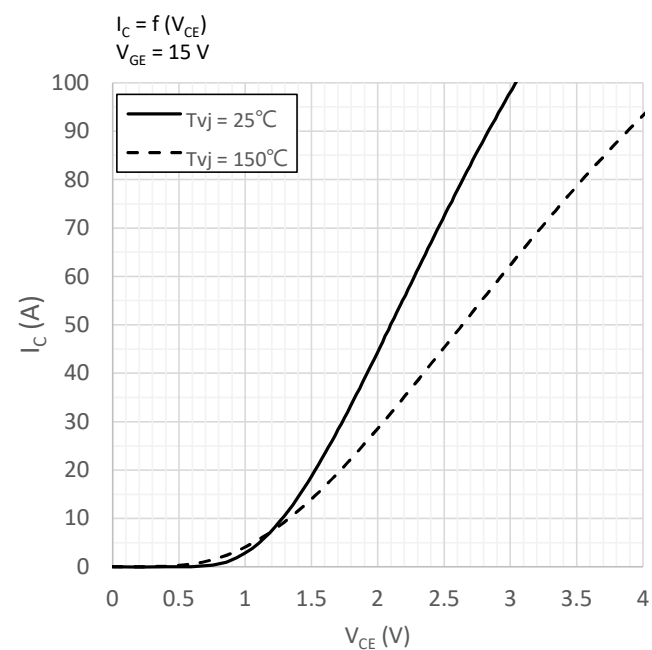
	MG050PA120N0
---	--------------

IGBT, Brake-Chopper
Maximum Rated Values

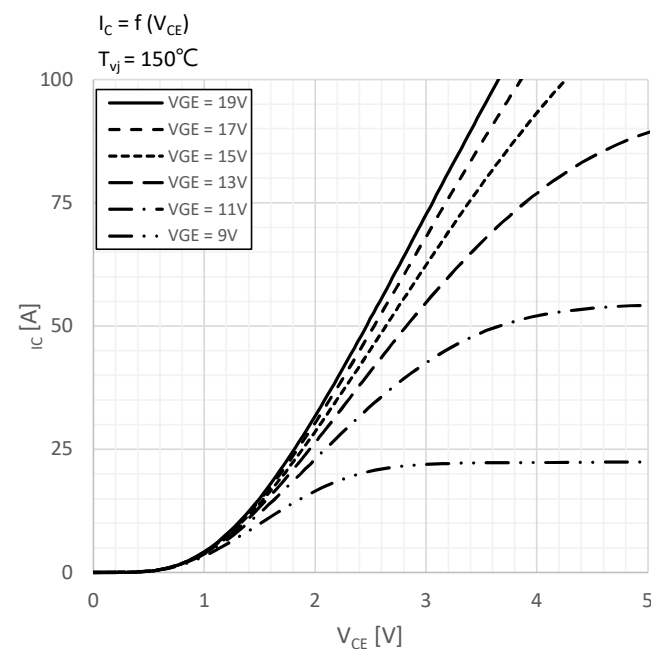
Collector-emitter voltage	T _{vj} = 25°C	V _{CES}	1200	V
Continuous DC collector current	T _C = 100°C, T _{vj} max = 150°C	I _{C nom}	50	A
Repetitive peak collector current	t _p = 1 ms	I _{CRM}	100	A
Total power dissipation	T _C = 25°C, T _{vj} max = 150	P _{tot}	210	W
Gate-emitter peak voltage		V _{GES}	+/- 20	V

Characteristic value				min.	typ.	max.	
Collector-emitter saturation voltage	I _C = 50 A, V _{GE} = 15 V	T _{vj} = 25°C	V _{CE,sat}	1.7	2.1	2.3	V
	I _C = 50 A, V _{GE} = 15 V	T _{vj} = 125°C					V
	I _C = 50 A, V _{GE} = 15 V	T _{vj} = 150°C					V
Gate threshold voltage	I _C = 1mA, V _{CE} = V _{GE} , T _{vj} = 25°C		V _{GE,th}	5.3	6.0	6.3	V
Gate charge	V _{GE} = -15 V ... +15 V		Q _G		0.44		μC
Internal gate resistor	T _{vj} = 25°C		R _{Gint}				Ω
Input capacitance	f=1MHz, T _{vj} =25°C,V _{CE} =25V, V _{GE} =0V		C _{ies}				nF
Reverse transfer capacitance	f=1MHz, T _{vj} =25°C,V _{CE} =25V, V _{GE} =0V		C _{res}				nF
Collector-emitter cut-off current	V _{CE} = 1200 V, V _{GE} = 0 V, T _{vj} = 25°C		I _{CES}			1	mA
Gate-emitter leakage current	V _{CE} = 0 V, V _{GE} = 20 V, T _{vj} = 25°C		I _{GES}			100	nA
Turn-on delay time, inductive load	I _C = 50A, V _{CE} = 600V	T _{vj} = 25°C	T _{d,on}		0.32		us
	V _{GE} = +15/-15V	T _{vj} = 125°C					us
	R _{G,on} = 15Ω	T _{vj} = 150°C					us
Rise time, inductive load	I _C = 50A, V _{CE} = 600V	T _{vj} = 25°C	T _r		0.08		us
	V _{GE} = +15/-15V	T _{vj} = 125°C					us
	R _{G,on} = 15Ω	T _{vj} = 150°C					us
Turn-off delay time, inductive load	I _C = 50A, V _{CE} = 600V	T _{vj} = 25°C	T _{d,off}		0.20		us
	V _{GE} = +15/-15V	T _{vj} = 125°C					us
	R _{G,off} = 15Ω	T _{vj} = 150°C					us
Fall time, inductive load	I _C = 50A, V _{CE} = 600V	T _{vj} = 25°C	T _f		0.28		us
	V _{GE} = +15/-15V	T _{vj} = 125°C					us
	R _{G,off} = 15Ω	T _{vj} = 150°C					us
Turn-on energy loss per pulse	I _C =50A, V _{CE} = 600V, L _S =20 nH	T _{vj} = 25°C	E _{on}		4.5		mJ
	V _{GE} = +15/-15V, di/dt =570A/μs	T _{vj} = 125°C					mJ
	R _{Gon} = 15Ω	T _{vj} = 150°C					mJ
Turn-off energy loss per pulse	I _C = 50A, V _{CE} = 600V, L _S = 20nH	T _{vj} = 25°C	E _{off}		3.2		mJ
	V _{GE} =+15/-15V, dv/dt =5400V/μs	T _{vj} = 125°C					mJ
	R _{Goff} = 15Ω	T _{vj} = 150°C					mJ
SC data	V _{GE} ≤15V, V _{CC} =600 V, t _p ≤ 8 μs, T _{vj} = 25°C , R _G =10Ω , C _{GE} = 0.0uF , V _{CEmax} = V _{CES} -L _{SCE} ·di/dt		I _{SC}		340		A

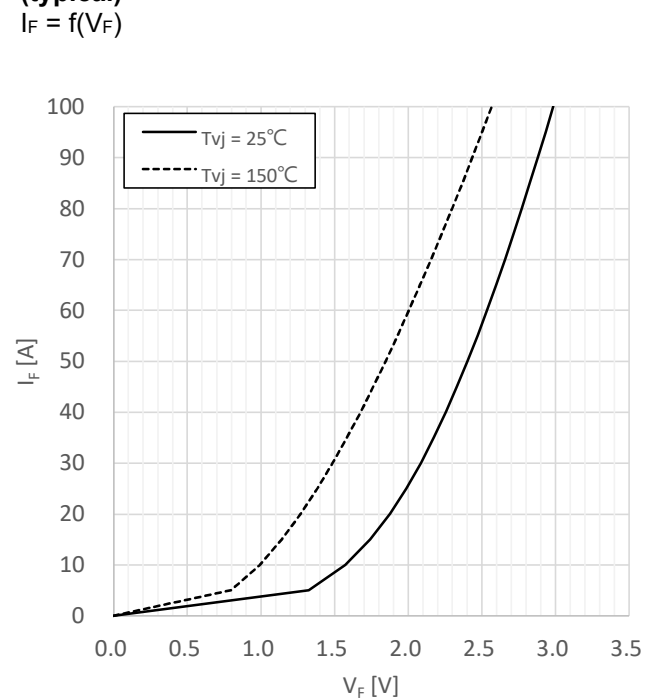
Output characteristic IGBT, Brake-Chopper (typical)



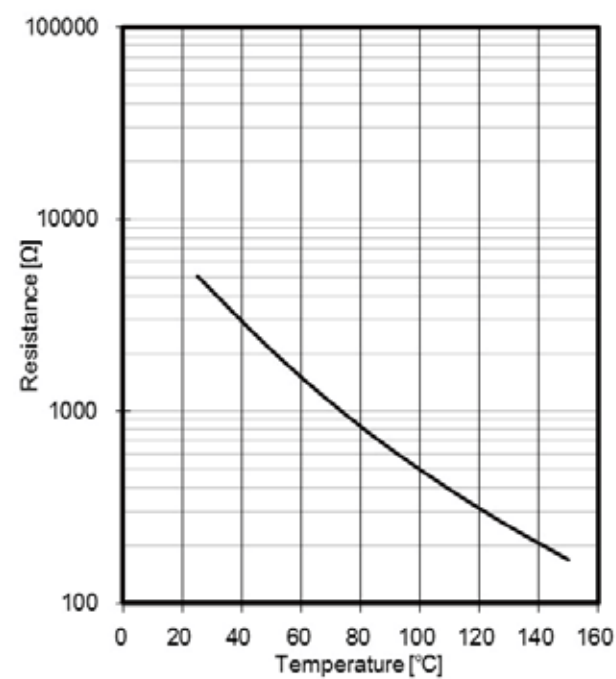
Output characteristic IGBT, Brake-Chopper (typical)



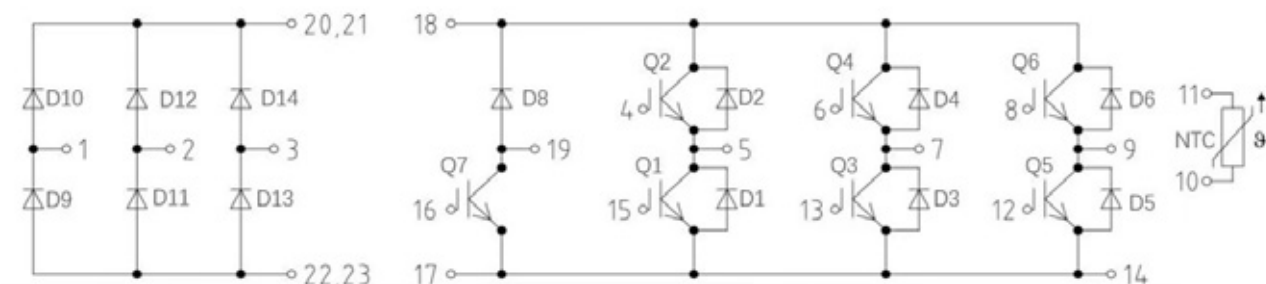
Forward characteristic of Diode, Brake-Chopper (typical)



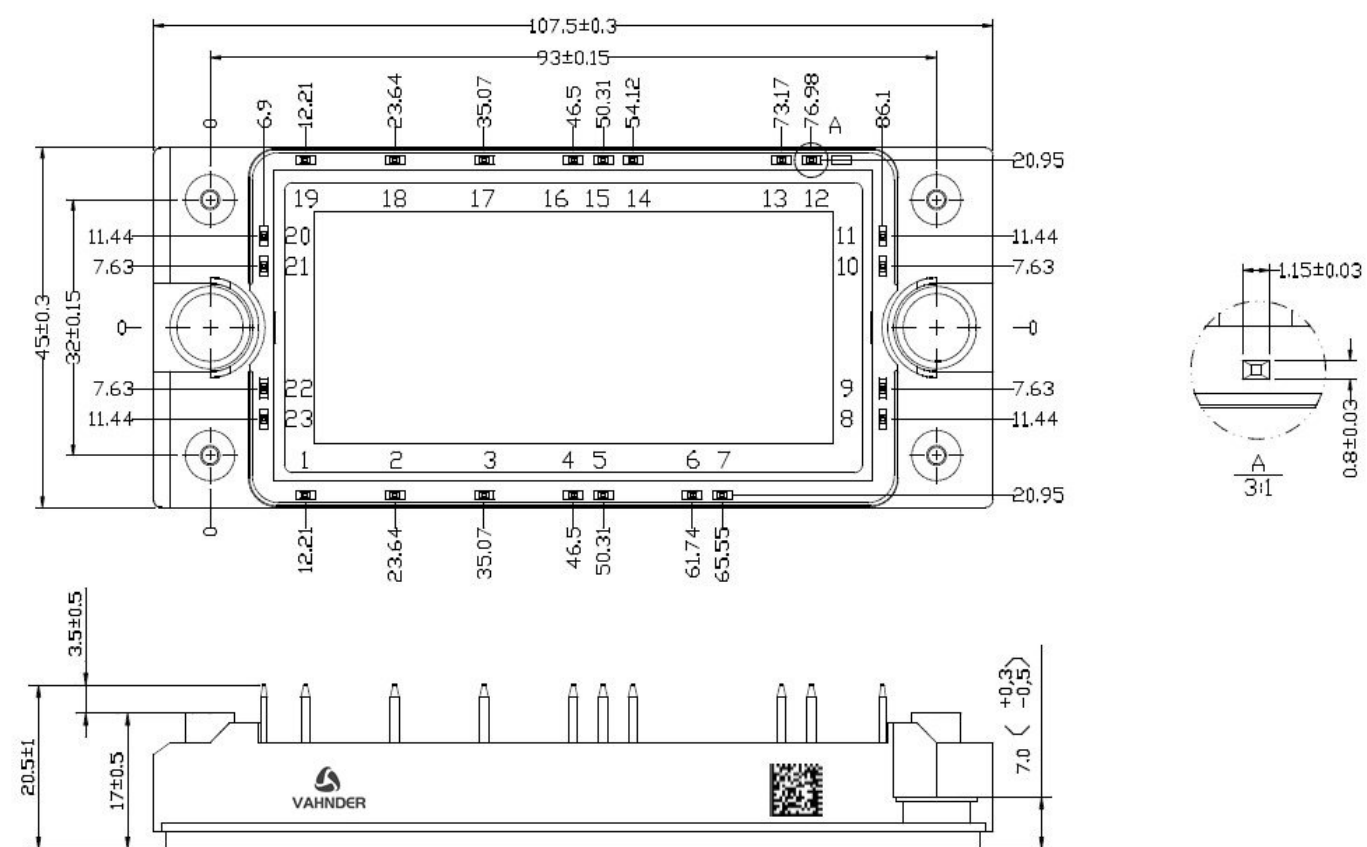
NTC-Thermistor-temperature characteristic (typical) $R=f(T)$



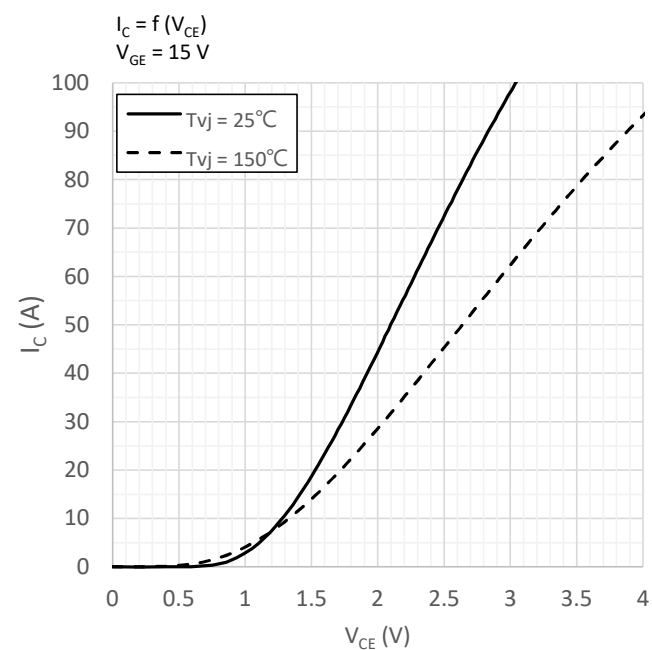
Circuit Diagram



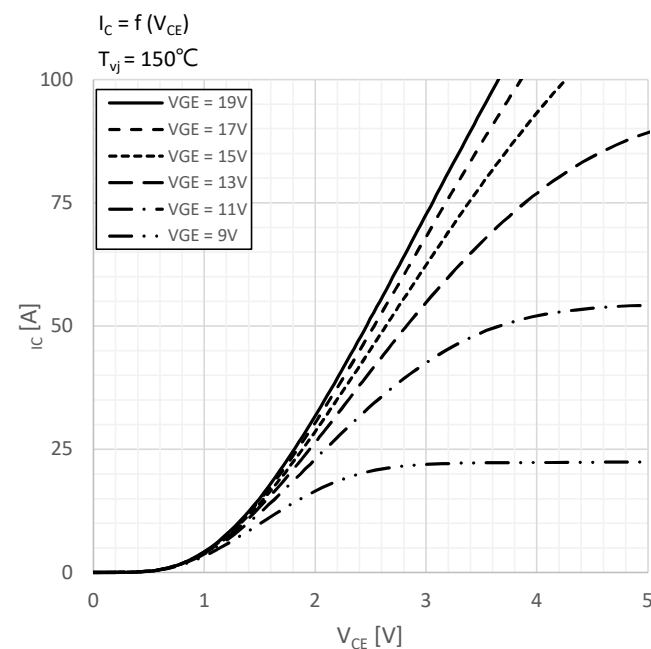
Package outlines



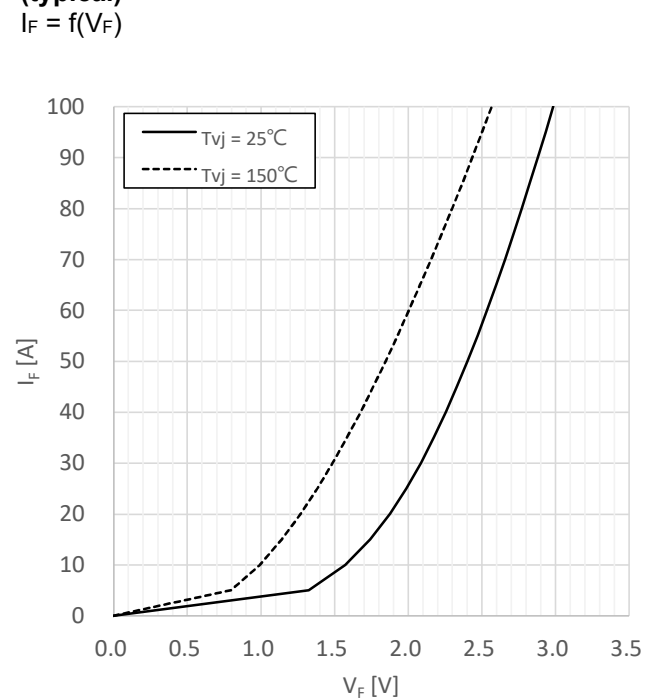
Output characteristic IGBT, Brake-Chopper (typical)



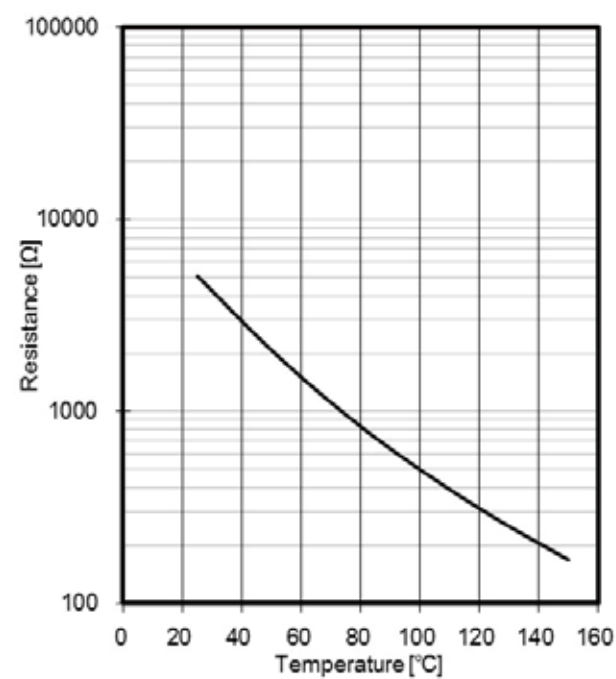
Output characteristic IGBT, Brake-Chopper (typical)



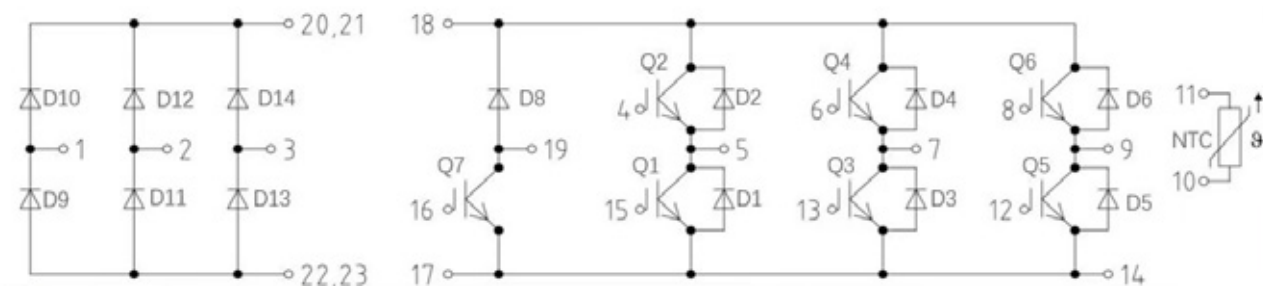
Forward characteristic of Diode, Brake-Chopper (typical)



NTC-Thermistor-temperature characteristic (typical) $R=f(T)$



Circuit Diagram



Package outlines

