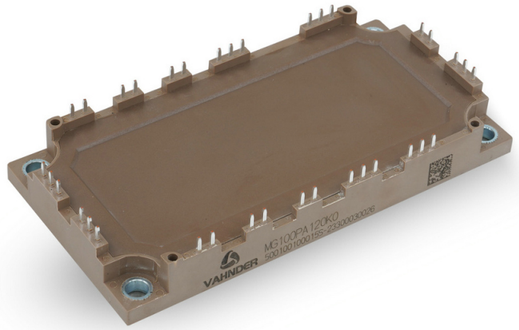

MG100PA120K0

1200V100A EconoPIM3 IGBT Module

NIETZ | MG100PA120K0

IGBT, Inverter

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	$I_{C\ nom}$	100		A
Repetitive peak collector current	t_P = 1 ms	I_{CRM}	200		A
Total power dissipation	T_C = 25°C, T_{vj} max = 150	P_{tot}	480		W
Gate-emitter peak voltage		V_{GES}	+/- 20		V

Characteristic value

				min.	typ.	max.	
Collector-emitter saturation voltage	I_C = 100 A, V_{GE} = 15 V	T_{vj} = 25°C	$V_{CE,sat}$		2.35		V
	I_C = 100 A, V_{GE} = 15 V	T_{vj} = 125°C			2.85		V
	I_C = 100 A, V_{GE} = 15 V	T_{vj} = 150°C			2.99		V
Gate threshold voltage	I_C = 1.0mA, V_{CE} = V_{GE}, T_{vj} = 25°C		$V_{GE,th}$	5.0	5.5	6.0	V
Gate charge	V_{GE} = -15 V ... +15 V		Q_G		0.98		µC
Internal gate resistor	T_{vj} = 25°C		R_{Gint}		3.0		Ω
Input capacitance	f=1MHz, T_{vj}=25°C, V_{CE}=25V, V_{GE}=0V		C_{ies}		27.6		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 = 100A, V_{CE} = 600V	T_{vj} = 25°C	$T_{d,on}$		0.16		us
	V_{GE} = +15/-15V	T_{vj} = 125°C			0.18		us
	$R_{G,on}$ = 6.8Ω	T_{vj} = 150°C			0.21		us
Rise time, inductive load	I_C = 100A, V_{CE} = 600V	T_{vj} = 25°C	T_r		0.05		us
	V_{GE} = +15/-15V	T_{vj} = 125°C			0.06		us
	$R_{G,on}$ = 6.8Ω	T_{vj} = 150°C			0.08		us
Turn-off delay time, inductive load	I_C = 100A, V_{CE} = 600V	T_{vj} = 25°C	$T_{d,off}$		0.32		us
	V_{GE} = +15/-15V	T_{vj} = 125°C			0.34		us
	R_{Goff} = 6.8Ω	T_{vj} = 150°C			0.35		us
Fall time, inductive load	I_C = 100A, V_{CE} = 600V	T_{vj} = 25°C	T_f		0.12		us
	V_{GE} = +15/-15V	T_{vj} = 125°C			0.12		us
	R_{Goff} = 6.8Ω	T_{vj} = 150°C			0.12		us
Turn-on energy loss per pulse	I_C =100A, V_{CE} = 600V, L_S =20 nH	T_{vj} = 25°C	E_{on}		8.81		mJ
	V_{GE} = +15/-15V, di/dt =1300A/µs	T_{vj} = 125°C			14.1		mJ
	R_{Gon} = 6.8Ω, Tj=150°C	T_{vj} = 150°C			18.4		mJ
Turn-off energy loss per pulse	I_C = 100A, V_{CE} = 600V, L_S = 20nH	T_{vj} = 25°C	E_{off}		9.36		mJ
	V_{GE} =+15/-15V, dv/dt =5900V/µs	T_{vj} = 125°C			9.00		mJ

	R_{Goff} = 6.8Ω, Tj=150°C T_{vj} = 150°C			10.3		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}		810		A
Thermal resistance, junction to case	Per IGBT	$R_{th,JC}$			0.26	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	100		A
Repetitive peak forward current	t_P = 1 ms	I_{FRM}	200		A

Characteristic value

				min.	typ.	max.	
Forward voltage	I_F = 100 A, V_{GE} = 0 V	T_{vj} = 25°C	V_F		2.16		V
	I_F = 100 A, V_{GE} = 0 V	T_{vj} = 125°C			2.01		V
	I_F = 100 A, V_{GE} = 0 V	T_{vj} = 150°C			1.96		V
Peak reverse recovery current	I_F = 100A, V_R = 600V	T_{vj} = 25°C	I_{RM}		81.9		A
	V_{GE} = -15V, -dif/dt =470A/µs	T_{vj} = 125°C			112.6		
	R_{Goff} = 6.8Ω, Tj=150°C	T_{vj} = 150°C			117.5		
Recovered charge	I_F = 100A, V_R = 600V	T_{vj} = 25°C	Q_r		5.75		µC
	V_{GE} = -15V, -dif/dt =470A/µs	T_{vj} = 125°C			18.8		
	R_{Goff} = 6.8Ω, Tj=150°C	T_{vj} = 150°C			22.4		
Reverse recovery energy	I_F = 100A, V_R = 600V	T_{vj} = 25°C	E_{rec}		1.29		mJ
	V_{GE} = -15V, -dif /dt =470A/µs	T_{vj} = 125°C			3.67		
	R_{Goff} = 6.8Ω, Tj=150°C	T_{vj} = 150°C			4.61		
Thermal resistance, junction to case	Per Diode		$R_{th,JC}$			0.44	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	100		A
Surge forward current	t_p = 10 ms, Tvj = 150°C	I_{FSM}	990		A
I^2t - value	t_p = 10 ms, Tvj = 150°C	I^2t	4950		A^2s

Characteristic value

				min.	typ.	max.	
Forward voltage	T_{vj} = 150°C, I_F = 100 A		V_F		1.15		V
Reverse current	T_{vj} = 150°C, V_R = 1600 V		I_R		1		mA
Thermal resistance, junction to case	Per Diode		R_{thJC}			0.44	K/W

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	$I_{C\ nom}$	75		A
Repetitive peak collector current	t_P = 1 ms	I_{CRM}	150		A
Total power dissipation	T_C = 25°C, T_{vj} max = 150	P_{tot}	265		W
Gate-emitter peak voltage		V_{GES}	+/- 20		V

Characteristic value

				min.	typ.	max.	
Collector-emitter saturation voltage	I_C = 75 A, V_{GE} = 15 V	T_{vj} = 25°C	$V_{CE,sat}$		1.74		V
	I_C = 75 A, V_{GE} = 15 V	T_{vj} = 125°C			2.15		V
	I_C = 75 A, V_{GE} = 15 V	T_{vj} = 150°C			2.23		V
Gate threshold voltage	I_C = 2.8mA, V_{CE} = V_{GE}, T_{vj} = 25°C		$V_{GE,th}$	5.0	5.8	6.5	V
Gate charge	V_{GE} = -15 V ... +15 V		Q_G		0.8		µC
Internal gate resistor	T_{vj} = 25°C		R_{Gint}		2.7		Ω
Input capacitance	f=1MHz, T_{vj}=25°C,V_{CE}=25V, V_{GE}=0V		C_{ies}		9.80		nF
Reverse transfer capacitance	f=1MHz, T_{vj}=25°C,V_{CE}=25V, V_{GE}=0V		C_{res}		0.12		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 = 75A, V_{CE} = 600V	T_{vj} = 25°C			0.18		us
	V_{GE} = +15/-15V	T_{vj} = 125°C	$T_{d,on}$		0.19		us
	$R_{G,on}$ = 10Ω	T_{vj} = 150°C			0.19		us
Rise time, inductive load	I_C = 75A, V_{CE} = 600V	T_{vj} = 25°C			0.06		us
	V_{GE} = +15/-15V	T_{vj} = 125°C	T_r		0.07		us
	$R_{G,on}$ = 10Ω	T_{vj} = 150°C			0.07		us
Turn-off delay time, inductive load	I_C = 75A, V_{CE} = 600V	T_{vj} = 25°C			0.37		us
	V_{GE} = +15/-15V	T_{vj} = 125°C	$T_{d,off}$		0.41		us
	R_{Goff} = 10Ω	T_{vj} = 150°C			0.42		us
Fall time, inductive load	I_C = 75A, V_{CE} = 600V	T_{vj} = 25°C			0.26		us
	V_{GE} = +15/-15V	T_{vj} = 125°C	T_f		0.36		us
	R_{Goff} = 10Ω	T_{vj} = 150°C			0.44		us
Turn-on energy loss per pulse	I_C =75A, V_{CE} = 600V, L_S =20 nH	T_{vj} = 25°C			9.97		mJ
	V_{GE} = +15/-15V, di/dt =825A/µs	T_{vj} = 125°C	E_{on}		13.72		mJ
	R_{Gon} = 10Ω, Tj=150°C	T_{vj} = 150°C			14.73		mJ

Turn-off energy loss per pulse	I_C =75A, V_{CE} = 600V, L_S =20 nH	T_{vj} = 25°C	E_{off}		7.80		mJ
	V_{GE} = +15/-15V, dv/dt =4300V/µs	T_{vj} = 125°C			10.1		mJ
	R_{Gon} = 10Ω, Tj=150°C	T_{vj} = 150°C			10.6		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}		322		A
Thermal resistance, junction to case	Per IGBT		$R_{th,JC}$			0.47	K/W

Diode, Brake-Chopper

Maximum Rated Values

Repetitive peak reverse voltage	T_{vj} = 25°C	V_{RRM}	1200		V
Continuous DC forward current		I_F	75		A
Repetitive peak forward current	t_P = 1 ms	I_{FRM}	150		A

Characteristic value

				min.	typ.	max.	
Forward voltage	I_F = 75 A, V_{GE} = 0 V	T_{vj} = 25°C	V_F		1.80		V
	I_F = 75 A, V_{GE} = 0 V	T_{vj} = 125°C			1.86		V
	I_F = 75 A, V_{GE} = 0 V	T_{vj} = 150°C			1.81		V
Peak reverse recovery current	I_F = 75A, V_R = 600V	T_{vj} = 25°C	I_{RM}		39.3		A
	V_{GE} = -15V	T_{vj} = 125°C			42.5		
		T_{vj} = 150°C			52.2		
Recovered charge	I_F = 75A, V_R = 600V	T_{vj} = 25°C	Q_r		1.96		µC
	V_{GE} = -15V, -dif /dt =215A/µs	T_{vj} = 125°C			6.31		
	R_{Goff} = 10Ω, Tj=150°C	T_{vj} = 150°C			8.86		
Reverse recovery energy	I_F = 75A, V_R = 600V	T_{vj} = 25°C	E_{rec}		0.30		mJ
	V_{GE} = -15V, -dif /dt =215A/µs	T_{vj} = 125°C			1.05		
	R_{Goff} = 10Ω, Tj=150°C	T_{vj} = 150°C			1.36		
Thermal resistance, junction to case	Per Diode		$R_{th,JC}$			0.56	K/W

NTC-Thermistor

Characteristic value

			min.	typ.	max.	
Rated resistance	Tc = 25°C	R_{25}		5.07		KΩ
Power dissipation	Tc = 25°C	P_{25}			240	mW
B-value	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298, 15K))]$	B_{25}/B_{50}		3412.7		K
B-value	$R_2=R_{25}\exp[B_{25/75}(1/T_2-1/(298, 15K))]$	B_{25}/B_{75}		3454.8		K
B-value	$R_2=R_{25}\exp[B_{25/100}(1/T_2-1/(298, 15K))]$	B_{25}/B_{100}		3442.2		K

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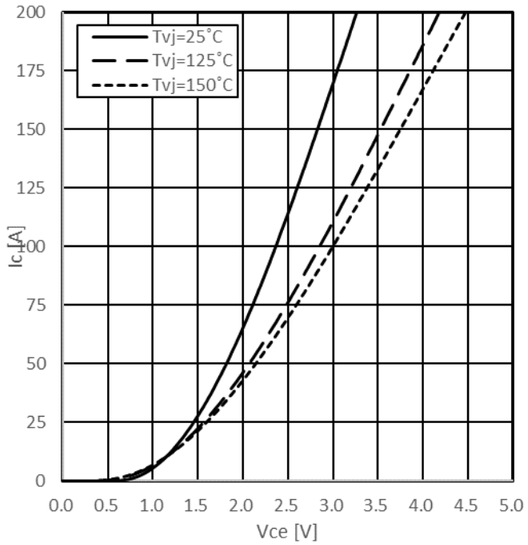
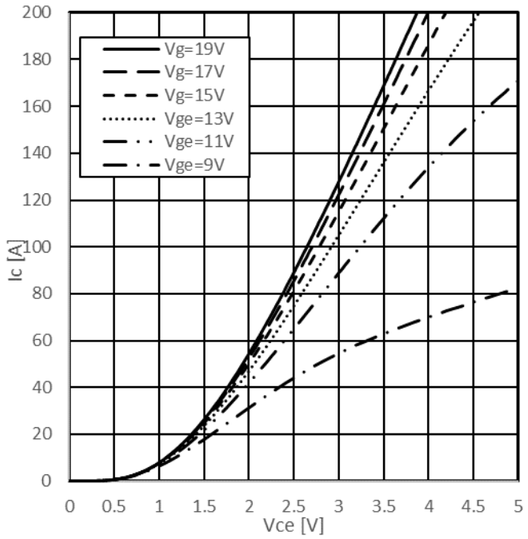
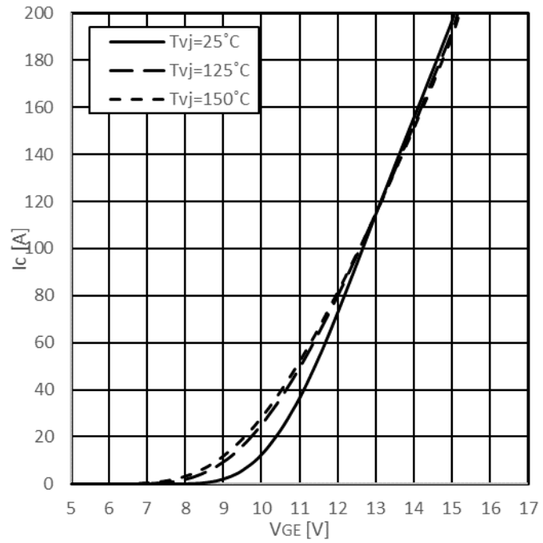
Output characteristic IGBT, Inverter (typical)
Ic=f(VCE)
VGE=15V



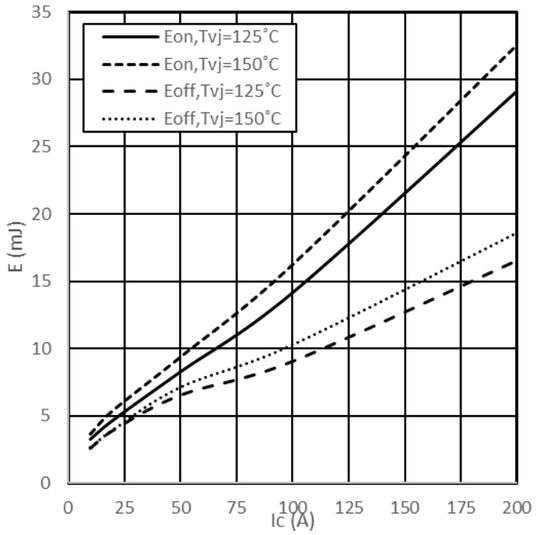
Output characteristic IGBT, Inverter (typical)
Ic=f(VCE)
Tvj=150˚C



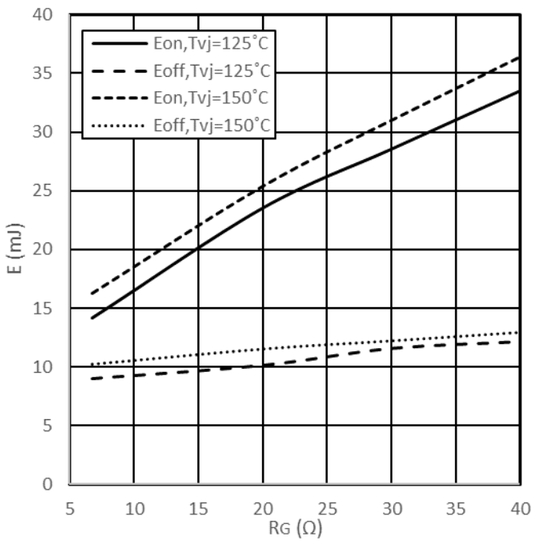
Transfer characteristic IGBT,Inverter (typical)
Ic=f(VGE)
VCE=20V



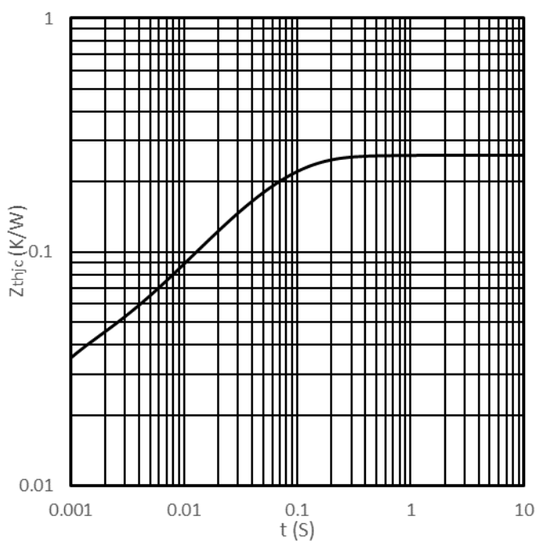
Switching losses IGBT,Inverter (typical)
Eon = f (IC), Eoff = f (IC)
VGE = ±15 V, RGon = 6.8Ω, RGoff = 10Ω, VCE = 600 V



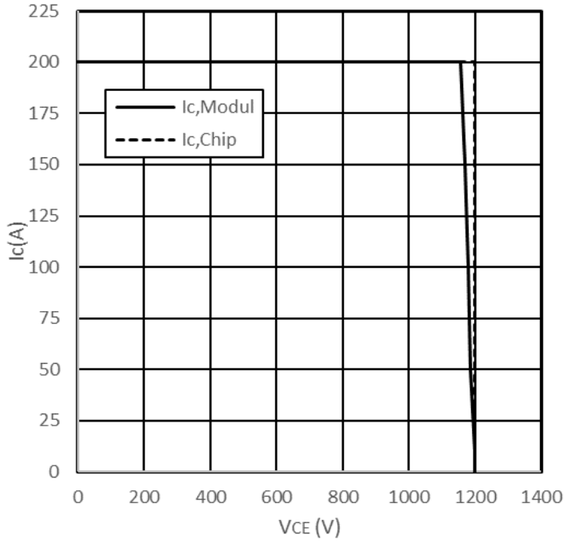
Switching losses IGBT,Inverter (typical)
Eon = f (RG), Eoff = f (RG)
VGE = ±15 V, Ic=75A, VCE = 600 V



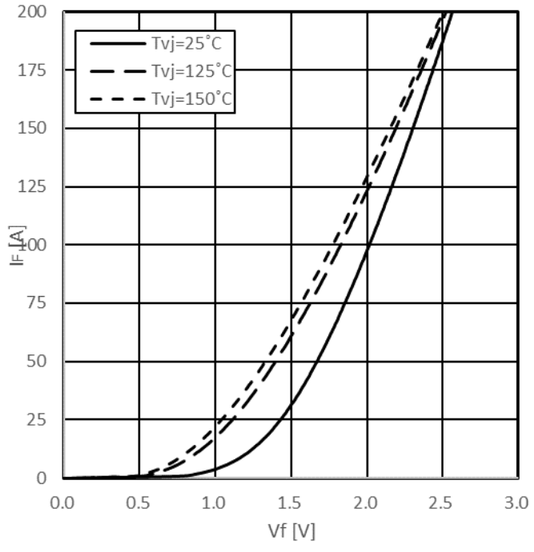
Transient thermal impedance IGBT,Inverter
ZthJC = f (t)



Reverse bias safe operating area IGBT,Inverter (RBSOA)
IC = f (VCE)
VGE = ±15 V, RGoff =10Ω, Tvj = 150°C



Forward characteristic of Diode, Inverter (typical)
IF = f (VF)



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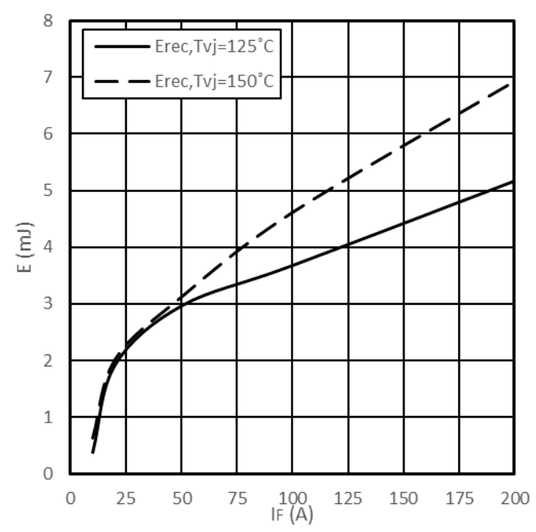
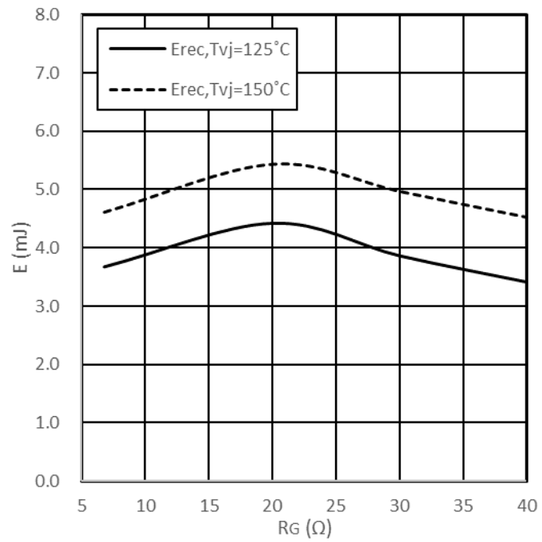
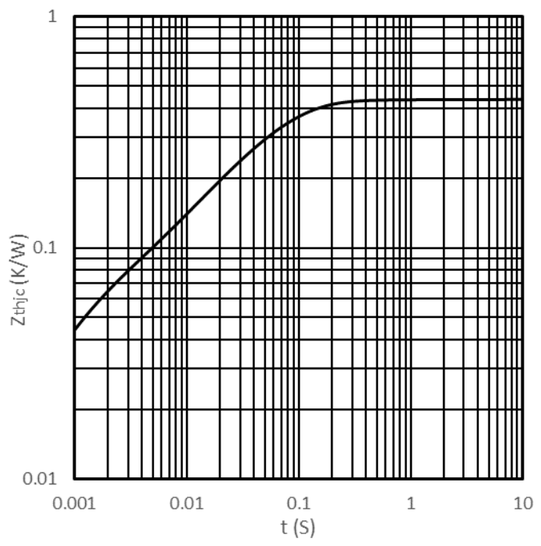
Switching losses Diode, Inverter (typical)
Erec = f (IF)
RGon = 6.8Ω, VCE = 600 V



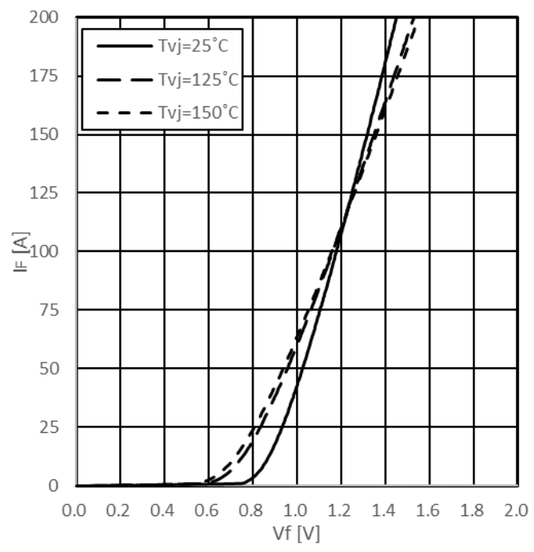
Switching losses Diode, Inverter (typical)
Erec = f (RG)
IF = 100 A, VCE = 600 V



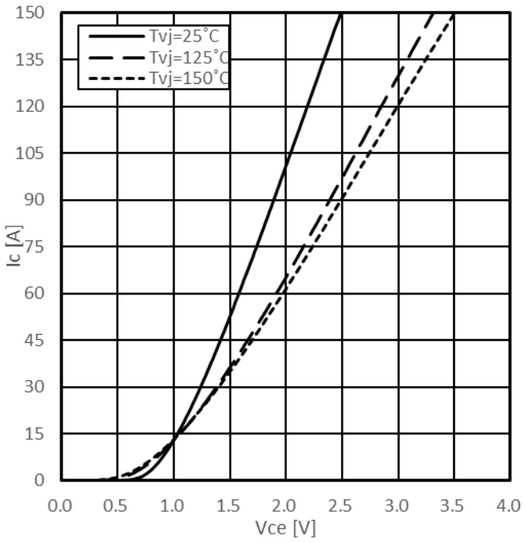
Transient thermal impedance Diode, Inverter
ZthJC = f (t)



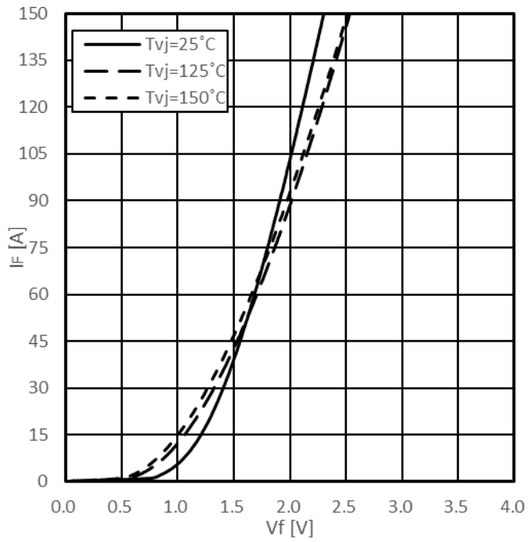
Forward characteristic of Diode, Rectifier (typical)
IF = f(VF)



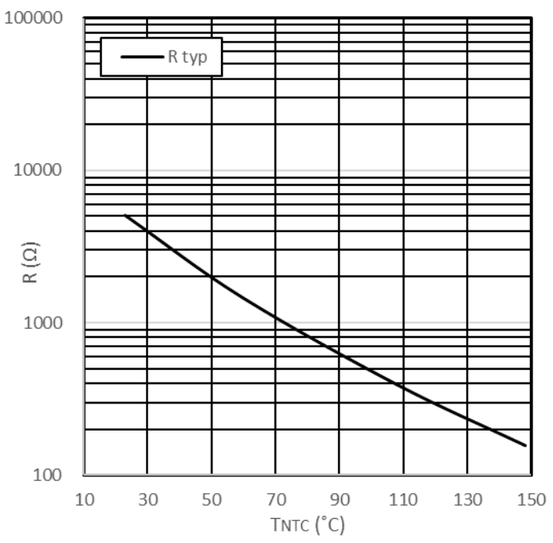
Output characteristic IGBT, Brake-Chopper (typical)
Ic=f(VCE)
VGE=15V



Forward characteristic of Diode, Brake-Chopper (typical)
IF = f(VF)



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



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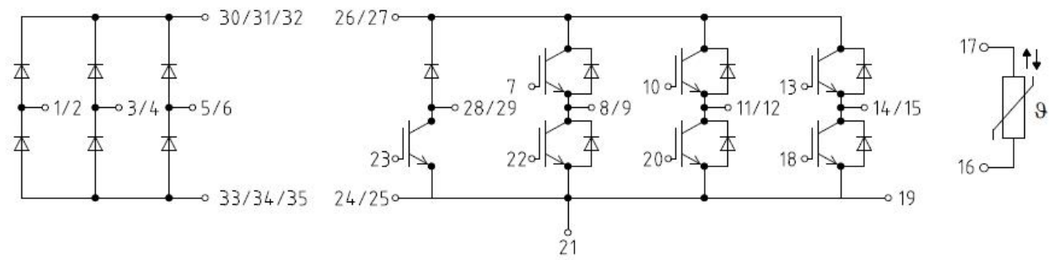
Circuit Diagram



Package outlines