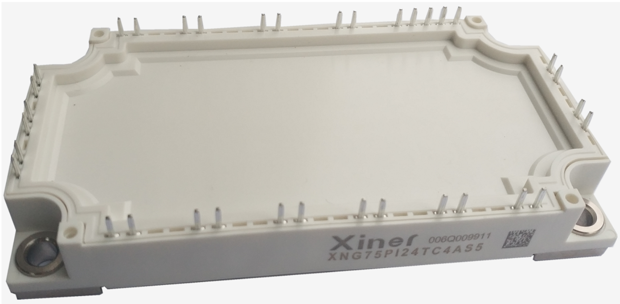
XNG75PI24TC4AS5

IGBT Modules

General Description

Xiner IGBT Power Module XNG75PI24TC4AS5 provides low switching loss as well as high short circuit capability, which introduce the advanced IGBT and improved connection, it is able to take on a perfect performance in various applications up to 20KHz.



Features

- Standard housing
- High short circuit capbility
- Vcesat with positive temperature coefficient

Applications

- Motor drives
- UPS
- Electronic welding
- High power converters

Characteristic values

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Collector-emitter voltage	V_{CES}	T_{vj} = 25℃	1200	V
Gate-emitter peak voltage	V_{GES}		±20	V
Continuous DC collector current	$I_{C\ nom}$		75	A
Repetitive peak collector current	I_{CRM}	t_P = 1 ms	150	A
Total power dissipation	P_{tot}	T_C = 25℃,T_{vj}=150℃	480	W
IGBT short circuit SOA	t_{psc}	V_{CC} = 900 V V_{GE} =15 V,T_{vj} =150℃	10	us

Diode DC forward current	I_F		75	A
Peak forward current	I_{FRM}		150	A
Isolation voltage	V_{isol}	f=50Hz, 1min,	2500	V
Operating Junction	$T_{vj(op)}$		-40 ~ +150	℃
Storage Temperature	T_{stg}		-40 ~ +150	℃
Mounting torque		Screw M5	3.0~5.0	N•M

Characteristics

IGBT,Inverter

Parameter	Symbol	Conditions		Value			Unit
				min	typ	max	
Gate-emitter threshold voltage	$V_{GE(th)}$	I_C=3mA,V_{CE}=V_{GE},T_{vj}=25℃		5		7	V
Collector-emitter cut-off current	I_{CES}	V_{CE}=1200V	T_{vj}= 25℃			1	mA
		V_{GE} = 0 V	T_{vj}=125℃			10	
Gate-emitter cut-off current	I_{GES}	V_{CE} = 0 V, V_{GE}=±20 V T_{vj} = 125℃		-500		500	nA
Collector-emitter saturation voltage	$V_{CE\ sat}$	I_C = 75 A	T_{vj}= 25℃		1.9		V
		V_{GE}=15V	T_{vj}=125℃		2.0		V
Gate charge	Q_G	I_C = 75 A, V_{CE}= 600 V, V_{GE} = ±15 V			780		nC
Input capacitance	C_{ies}	V_{CE}=25V,V_{GE}=0V f=1MHz,T_{vj}=25℃			5.52		nF
Output capacitance	C_{oes}				0.40		
Reverse transfer capacitance	C_{res}				0.26		
Internal gate resistance	RGint				3		Ω
Turn-on delay time, inductive load	$t_{d\ on}$	V_{CC}=600V I_C = 75 A V_{GE} =±15V R_G = 5Ω L=200nH, Inductive load	T_{vj}=25℃		165		nS
			T_{vj}=125℃		175		
Rise time, inductive load	t_r		T_{vj}=25℃		75		
			T_{vj}=125℃		70		
Turn-off delay time, inductive load	$t_{d\ off}$		T_{vj}=25℃		435		nS
			T_{vj}=125℃		500		
Fall time, inductive load	t_f		T_{vj}=25℃		50		
			T_{vj}=125℃		70		
Turn-on energy loss per pulse	E_{on}		T_{vj}=25℃		6		mJ
			T_{vj}=125℃		8		
Turn-off energy loss per pulse	E_{off}		T_{vj}=25℃		4.5		mJ
			T_{vj}=125℃		7.5		
SC data	I_{SC}	t_{psc} ≤ 10 μs, V_{GE} = 15 V, T_{vj}= 125℃,V_{CC} = 900 V			350		A
Thermal resistance, junction to case		per IGBT				0.26	K/W
Thermal resistance, case to heatsink		perIGBT/ λ_{grease}=1W/(m·K)			0.13		K/W

Diode,Inverter

Parameter	Symbol	Conditions		Value			Unit
				Min	typ	max	
Forward voltage	V_F	I_F = 75 A	T_{vj}=25℃		1.8		V
			T_{vj}=125℃		1.9		
Peak reverse recovery current	I_{rr}	V_{CC}=600V	T_{vj}=25℃		65		A
		I_C =75A	T_{vj}=125℃		85		
Recovered charge	Q_{rr}	V_{GE}=±15V	T_{vj}=25℃		11		uC
		R_G = 5Ω	T_{vj}=125℃		19		
Reverse recovery time	t_{rr}	L=200nH,	T_{vj}=25℃		250		nS
		Inductive load	T_{vj}=125℃		360		
Reverse recovery energy	E_{rec}		T_{vj}=25℃		6		mJ
			T_{vj}=125℃		7.5		
Thermal resistance, junction to case	R_{thJC}	per diode				0.62	K/W
Thermal resistance, case to heatsink	R_{thCH}	perdiode/ λ_{grease}=1W/(m•K)			0.21		K/W

Diode,Rectifier

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value			Unit
			Min	typ	max	
Repetitive peak reverse voltage	V_{RRM}	T_{vj}=25℃		1600		V
Maximum RMS forward current per chip	I_{FRMSM}	T_C=80℃		80		A
Maximum RMS current at rectifier output	I_{RMSM}	T_C=80℃		140		A
Surge forward current	I_{FSM}	t_p = 10 ms, T_{vj} = 25℃		600		A
		t_p = 10 ms, T_{vj} = 150℃		470		

Characteristics

Parameter	Symbol	Conditions	Value			Unit
			Min	typ	max	
Forward voltage	V_F	T_{vj} = 150℃, I_F = 75 A		1.2		V
Reverse current	I_R	T_{vj} = 150℃, V_R = 1600 V		1		mA
Thermal resistance, junction to case	R_{thJC}	per diode			0.65	K/W
Thermal resistance, case to heatsink	R_{thCH}	perdiode/ λ_{grease}=1W/(m•K)		0.21		K/W
Operating Junction	$T_{vj\ op}$		-40		150	℃

IGBT,Brake-Chopper

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value			Unit
			Min	typ	max	
Collector-emitter voltage	V_{CES}	T_{vj} = 25℃		1200		V
Continuous DC collector current	$I_{C\ nom}$	T_C = 95℃, $T_{vj\ max}$ = 175℃		50		A
Repetitive peak collector current	I_{CRM}	t_P = 1 ms		100		A
Total power dissipation	P_{tot}	T_C = 25℃,T_{vj}=150℃			380	W
Gate-emitter peak voltage	V_{GES}		-20		20	V

Characteristics

Parameter	Symbol	Conditions		Value			Unit
				Min	typ	max	
Collector-emitter saturation voltage	$V_{CE\ sat}$	I_C = 50 A	T_{vj}=25℃		1.8		V
		V_{GE} = 15 V	T_{vj}=125℃		1.9		
Gate threshold voltage	V_{GEth}	I_C=2mA,V_{CE}=V_{GE},T_{vj}=25℃		5		7	A
Gate charge	Q_G	V_{GE} =±15 V			610		nC
Internal gate resistor	R_{Gint}	T_{vj} = 25℃			10		Ω
Input capacitance	C_{ies}	f = 1 MHz, T_{vj} = 25℃			4.29		nF
Reverse transfer capacitance	C_{res}	V_{CE} = 25 V, V_{GE} = 0 V			0.3		
Collector-emitter cut-off current	I_{CES}	V_{CE} = 1200 V	T_{vj}=25℃			1	mA
		V_{GE} = 0 V	T_{vj}=125℃			10	
Gate-emitter leakage current	I_{GES}	V_{CE} = 0 V, V_{GE} = 20 V T_{vj} = 25℃		-500		500	nA
Turn-on delay time, inductive load	$t_{d\ on}$	V_{CC}=600V	T_{vj}=25℃		230		nS
		I_C =50A	T_{vj}=125℃		250		
Rise time, inductive load	t_r	V_{GE}=±15V	T_{vj}=25℃		35		
		R_G = 3.9Ω	T_{vj}=125℃		44		
Turn-off delay time, inductive load	$t_{d\ off}$	L=200nH,	T_{vj}=25℃		280		nS
		Inductive load	T_{vj}=125℃		330		
Fall time, inductive load	t_f		T_{vj}=25℃		350		
			T_{vj}=125℃		400		
Turn-on energy loss per pulse	E_{on}		T_{vj}=25℃		3.5		mJ
			T_{vj}=125℃		4.5		
Turn-off energy loss per pulse	E_{off}		T_{vj}=25℃		4.5		mJ
			T_{vj}=125℃		5.1		
SC data	I_{SC}	t_{psc} ≤ 10 μs, V_{GE} = 15 V, T_{vj}= 125℃,V_{CC} = 900 V			200		A
Thermal resistance, junction to case	R_{thJC}	per IGBT				0.33	K/W
Thermal resistance, case to heatsink	R_{thCH}	per IGBT/ λ_{grease}=1W/(m·K)			0.245		K/W
Operating Junction	$T_{vj\ op}$			-40		150	℃

Diode,Brake-Chopper

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value			Unit
			Min	typ	max	
Repetitive peak reverse voltage	V_{RRM}	T_{vj} = 25℃		1200		V
Continuous DC forward current	I_F			25		A
Repetitive peak forward current	I_{FRM}	t_P = 1 ms		50		A

Characteristics

Parameter	Symbol	Conditions		Value			Unit
				Min	typ	max	
Forward voltage	V_F	I_F = 25 A	T_{vj}=25℃		1.8		V
		V_{GE} = 0 V	T_{vj}=125℃		1.9		
Peak reverse recovery current	I_{rr}	I_F = 25 A	T_{vj}=25℃		40		A
		di/dt=1000A/	T_{vj}=125℃		55		
Recovered charge	Q_{rr}	μs	T_{vj}=25℃		7.5		uC
		(T_{vj}=150℃)	T_{vj}=125℃		9		
Reverse recovery time	t_{rr}	V_R = 600 V	T_{vj}=25℃		220		nS
			T_{vj}=125℃		255		
Reverse recovery energy	E_{rec}		T_{vj}=25℃		4.5		mJ
			T_{vj}=125℃		5.8		
Thermal resistance, junction to case	R_{thJC}	per diode				0.7	K/W
Thermal resistance, case to heatsink	R_{thCH}	per diode/ λ_{grease}=1W/(m•K)			0.61		K/W
Operating Junction	$T_{vj\ op}$			-40		150	℃

NTC-thermistor

Characteristics

Parameter	Symbol	Conditions	Value			Unit
			Min	typ	max	
Rated resistance	R_{25}	T_C = 25℃		5		KΩ
Deviation of R	ΔR/R	T_C = 25℃	-3		3	%
Power dissipation	P_{25}	T_C = 25℃		20		mW
B-value	$B_{25/50}$	$R_2 = R_{25}$ exp [$B_{25/50}$(1/T_2 - 1/(298,15 K))]		3375		K

Module

Parameter	Symbol	Conditions	Value			Unit
			Min	typ	max	
Thermal resistance, case to heatsink	R_{thCH}	permodule λ $_{grease}$=1W/(m•K)		0.007		K/W
Stray inductance module	L_{sCE}			40		nH
Module lead resistance terminal-chip	$R_{CC'+EE'}$	T_{vj}=25℃		0.7		mΩ
		T_{vj}=125℃		0.8		
Weight	G			300		g

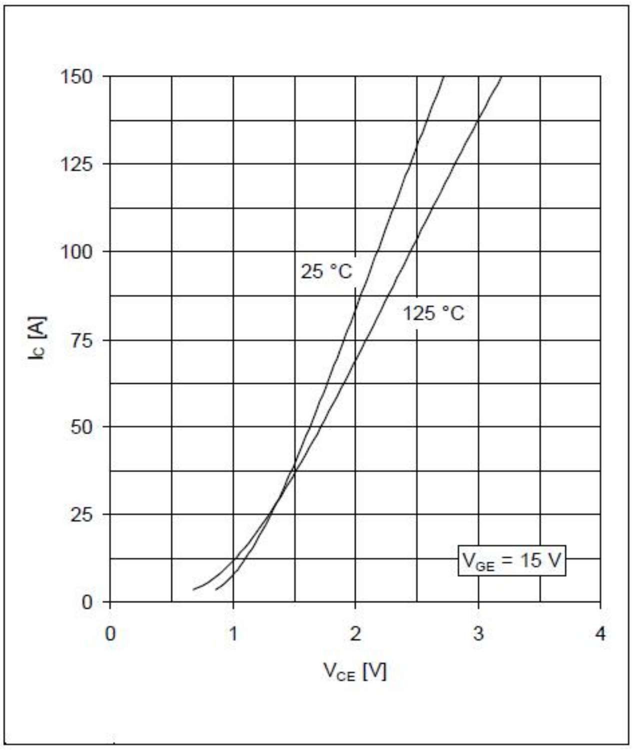


Figure 1: Typical Output Characteristics

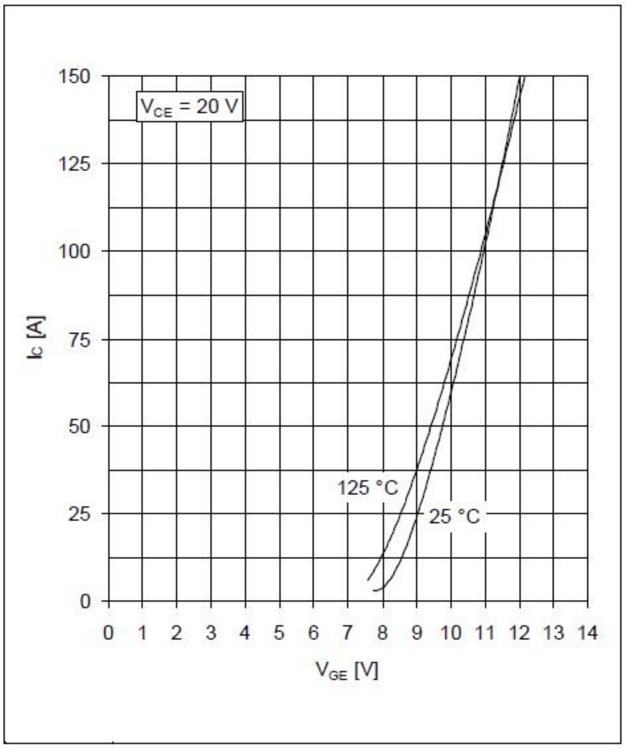


Figure 2: Typical Output Characteristics

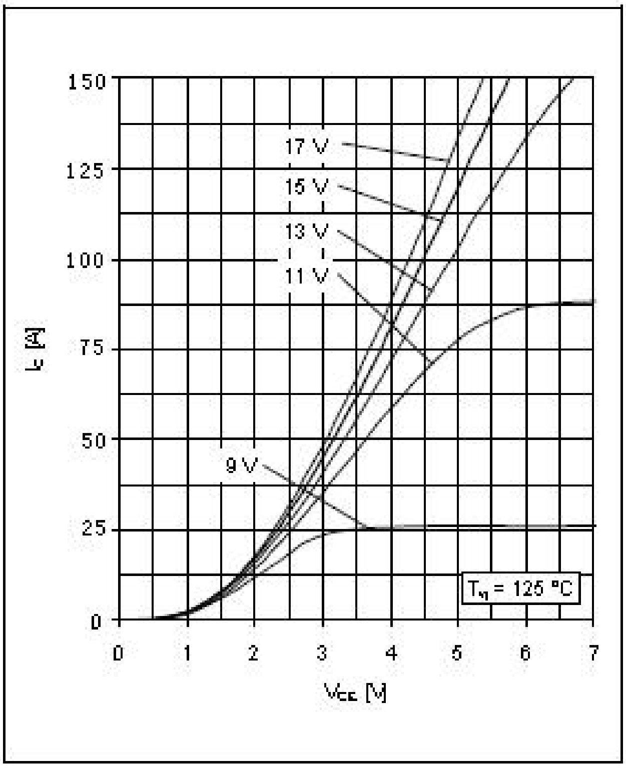


Figure 3:Output characterasitic IGBT(typical)
Ic=f(Vce),Tvj=125℃

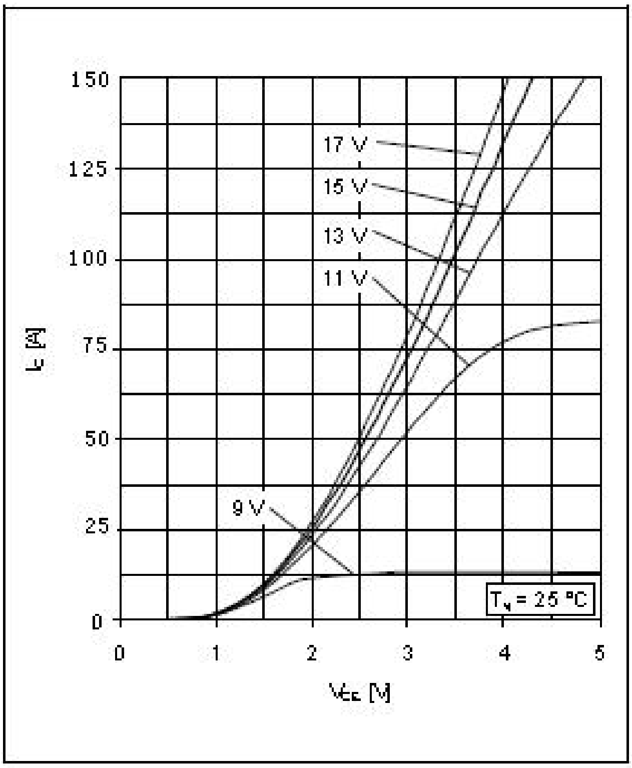


Figure 4: Output characterasitic IGBT(typical)
Ic=f(Vce),Tvj=25℃

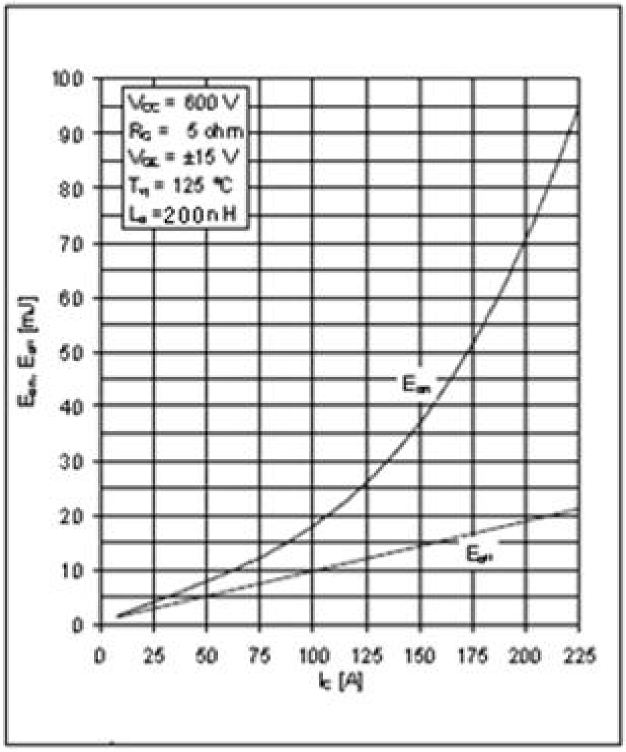


Figure 5: switching losses IGBT,Inverter(typical) Eon=f(Ic),Eoff=f(Ic) Tvj=125℃

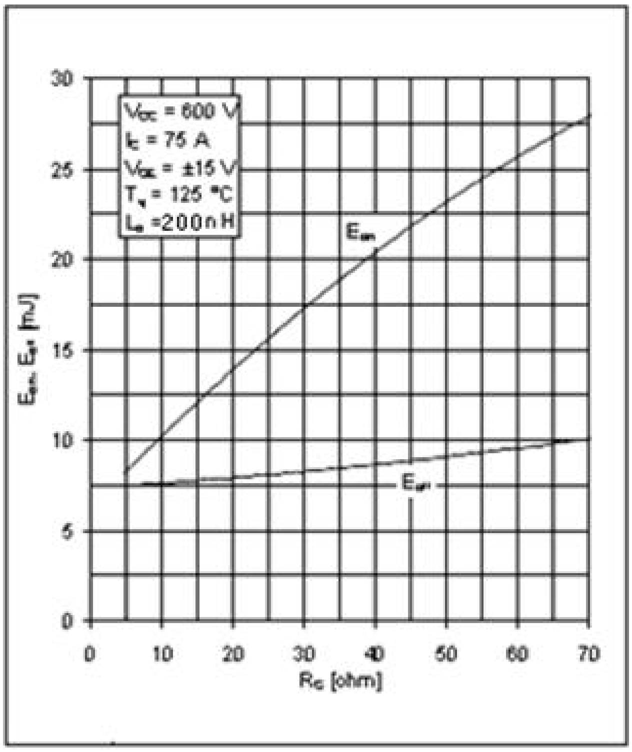


Figure 6: switching losses IGBT,Inverter(typical) Eon=f(Rg),Eoff=f(Rg) Tvj=125℃

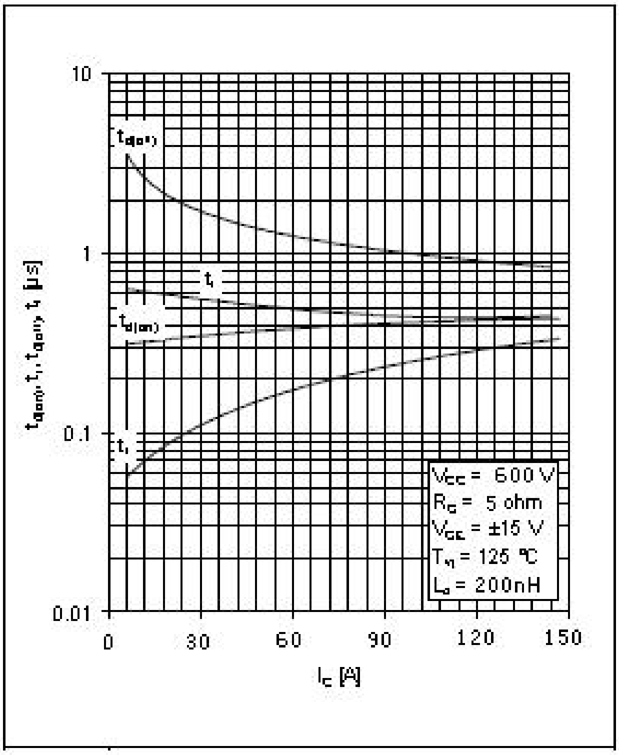


Figure 7: switching losses IGBT,Inverter(typical) Tdon=f(Ic) Tdoff=f(Ic) Tr=f(Ic) Tf=f(Ic)

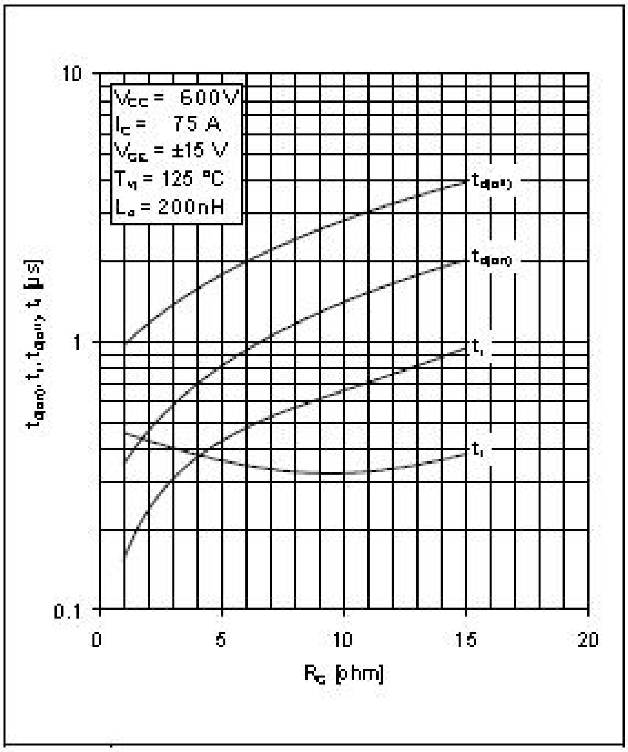


Figure 8: switching losses IGBT,Inverter(typical) Tdon=f(Rg) Tdoff=f(Rg) Tr=f(Rg) Tf=f(Rg)

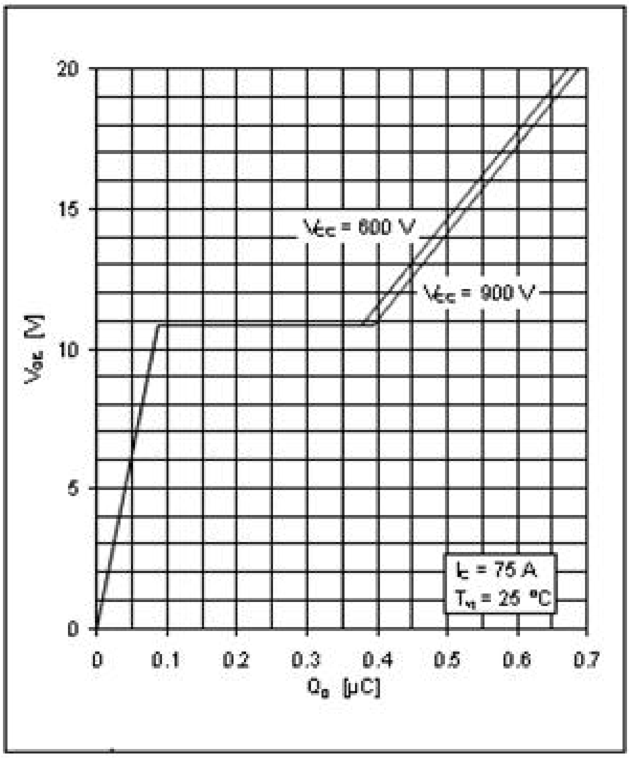


Figure 9: Gate charge,IGBT inverter(typical) VGE=f(Qg)

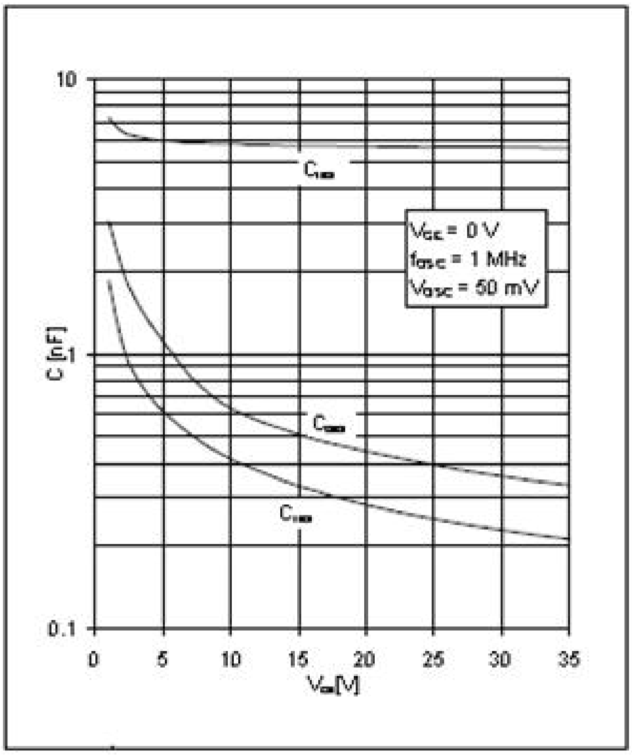


Figure 10: Output capacitance,IGBT

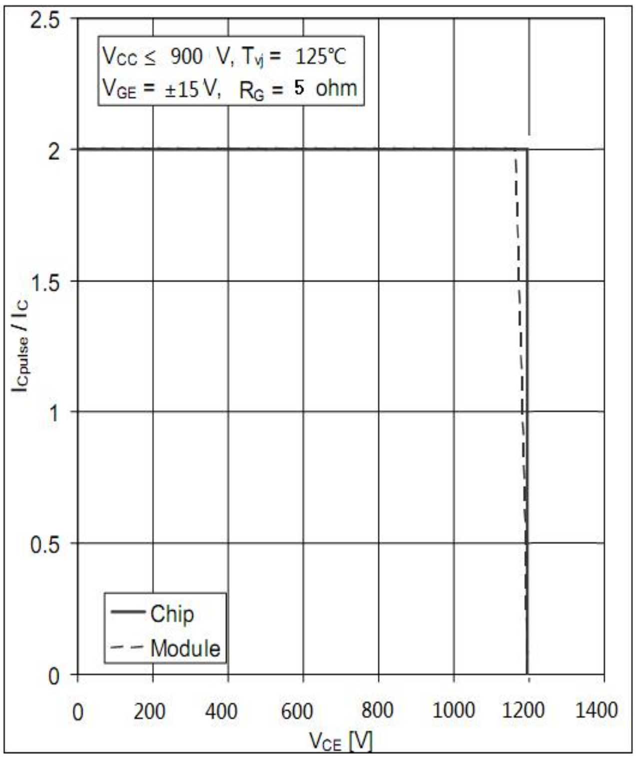


Figure 11: reverse bias safe operating area IGBT inverter (RBSOA) IC = f (VCE)

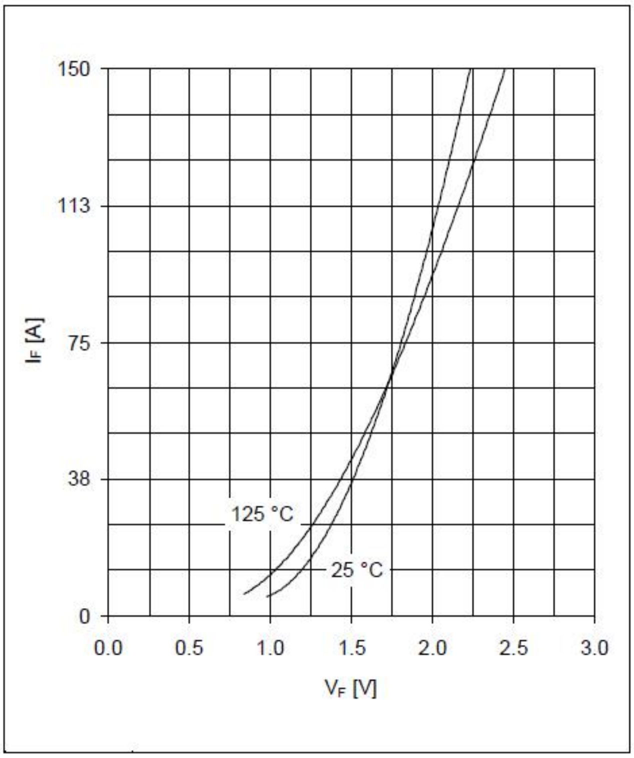


Figure 12: Forward characteristic Diode Inverter (typical)

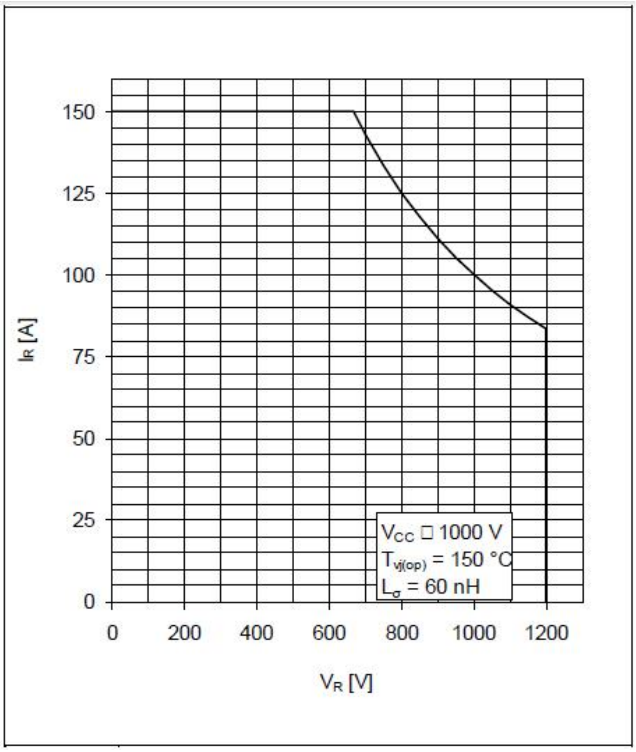


Figure 13: Safe operating area diode(SOA)

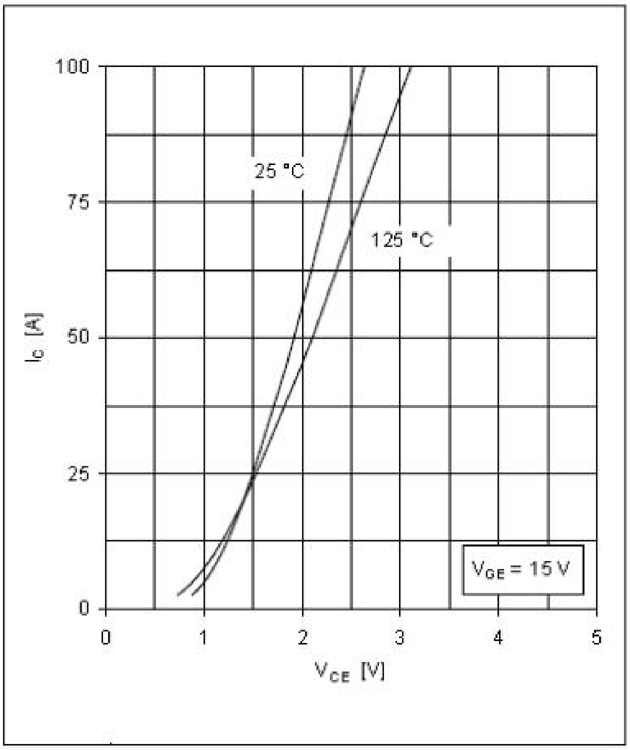


Figure 14: typical output characteristics IGBT, brake-chopper

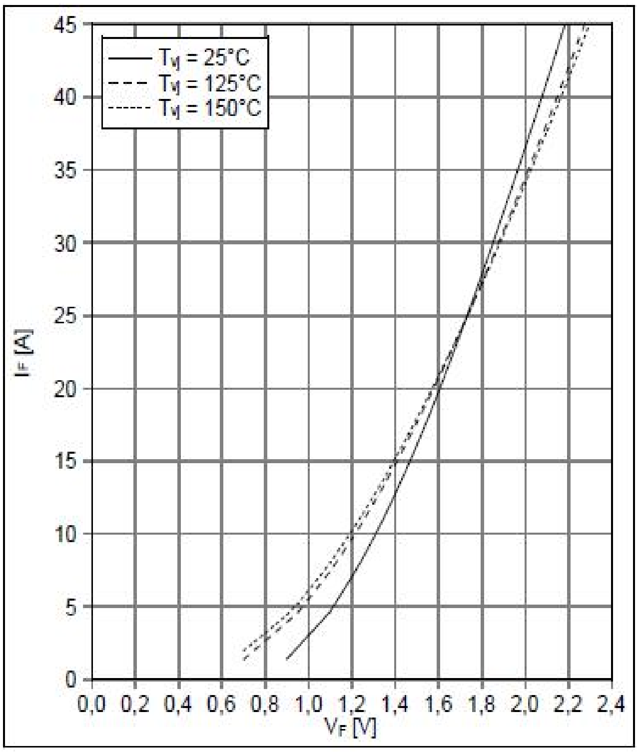


Figure 15: typical output characteristics Diode, brake-chopper

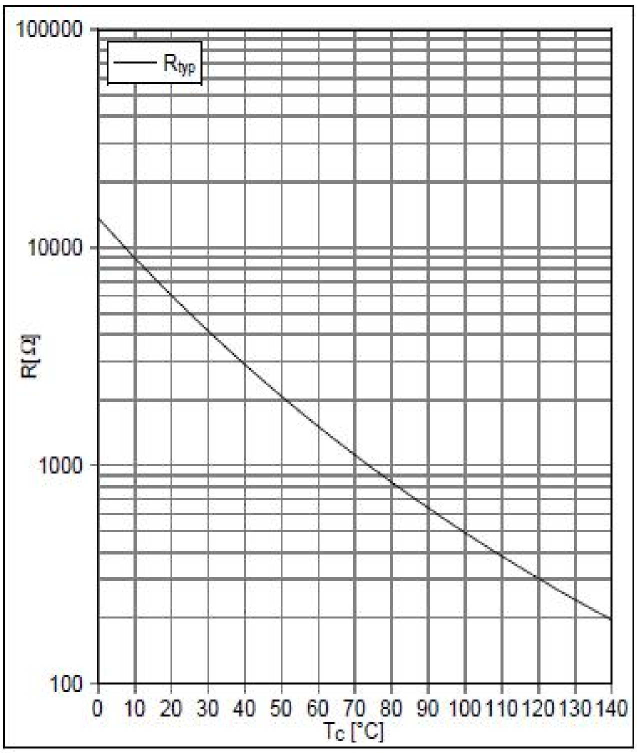
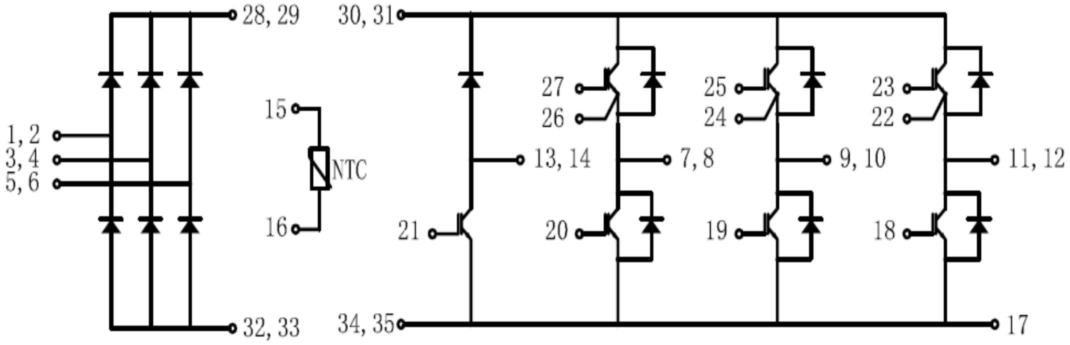
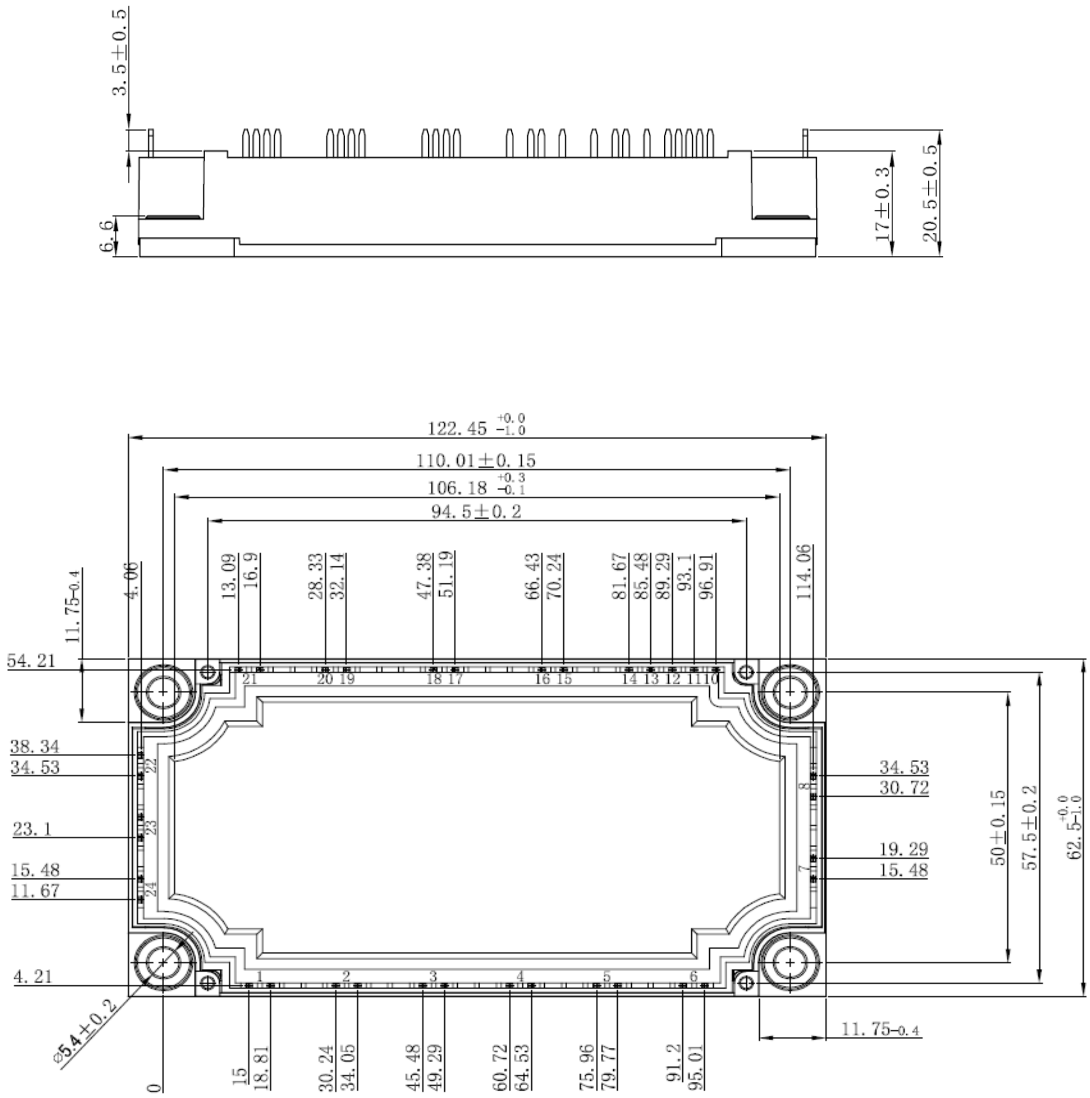


Figure 16: NTC temperature characteristic (typical)

Circuit diagram



Package outlines **dimensions in mm**



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