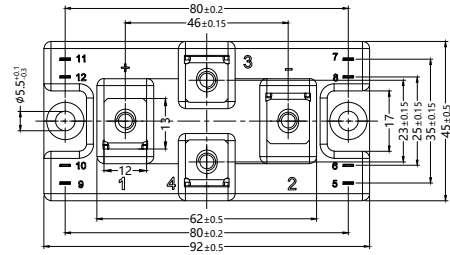
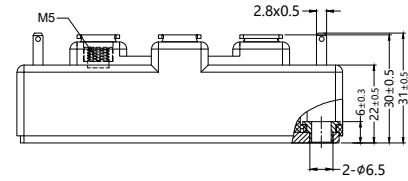


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H bridge IGBT modules



Dimension: mm

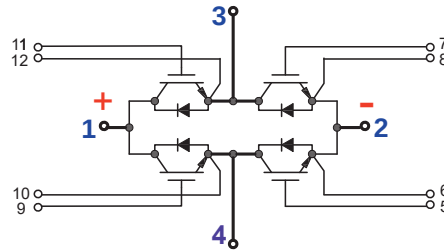


$V_{CES} = 1200V$

$I_{C25} = 4 \times 75A$

$V_{CESat(typ)} = 3.20V$

$E_{off(typ)} = 2.50 \text{ mJ}$



Absolute Maximum Ratings

Symbol	Test Conditions		Values	Unit
IGBT				
V _{CES}	T _j =25°C		1200	V
I _C	T _j = 175 °C	T _C =25°C	75	A
		T _C =100°C	50	A
I _{Cnom}	T _C = 100 °C Every chip		50	A
I _{CRM}	I _{CRM} = 3xI _{Cnom}		150	A
V _{GES}			-20 ... +20	V
tpsc	V _{CC} = 800 V V _{GE} ≤ 15 V V _{CES} ≤ 1200 V	T _j =150°C	10	μs
T _j			-40 ... 175	°C
Inverse diode				
I _F	T _j = 175 °C	T _C =25°C	100	A
		T _C =100°C	50	A
I _{Fnom}			50	A
I _{FRM}	I _{FRM} = 3xI _{Fnom}		150	A
I _{FSM}	t _p = 10 ms, sin 180°, T _j =25°C		150	A
T _j			-40 ... 150	°C
I _{t(RMS)}	T _{terminal} =80°C		100	A
T _{stg}			-40 ... 125	°C
V _{Isol}	AC sinus 50 Hz, t = 1 min		4000	V

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H bridge IGBT modules

Characteristics						
Symbol	Test Conditions		min.	typ.	max.	Unit
IGBT						
V _{CE(sat)}	I _C =50A	T _j =25°C	3.20		3.70	V
	V _{GE} =15V chiplevel	T _j =150°C	3.80		4.30	V
V _{CE0}	chiplevel	T _j =25°C	0.8		0.9	V
		T _j =150°C	0.7		0.8	V
r _{CE}	V _{GE} =15V	T _j =25°C	21.00		24.00	mΩ
	chiplevel	T _j =150°C	30.00		32.00	mΩ
V _{GE(th)}	V _{GE} =V _{CE} , I _C = 1.7 mA		5	5.8	6.5	V
I _{CES}	V _{GE} =0V	T _j =25°C			1	mA
	V _{CE} = 1200 V	T _j =150°C				mA
C _{ies}	V _{CE} =25V	f=1MHz	3.37			nF
C _{oes}	V _{GE} =0V	f=1 MHz	0.20			nF
C _{res}		f=1MHz	0.19			nF
Q _G	V _{GE} = - 8 V...+ 15 V		280			nC
R _{Gint}	T _j =25°C		4.0			Ω
t _{d(on)}	V _{CC} = 600 V I _C =50A V _{GE} =±15V R _{G on} =8.2Ω R _{G off} =8.2 Ω di/dt _{on} = 1700 A/μs di/dt _{off} =670A/μs	T _j =150°C	118			ns
t _r		T _j =150°C	29			ns
E _{on}		T _j =150°C	5.55			mJ
t _{d(off)}		T _j =150°C	355			ns
t _f		T _j =150°C	75			ns
E _{off}		T _j =150°C	2.50			mJ
R _{th(j-c)}	per IGBT				0.53	K/W



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H bridge IGBT modules

Characteristics						
Symbol	Test Conditions		min.	typ.	max.	Unit
Inverse diode						
V _F = V _{EC}	I _F =50A V _{GE} =0V chiplevel	T _j =25°C		2.22	2.54	V
		T _j =150°C		2.18	2.50	V
V _{F0}	chiplevel	T _j =25°C		1.3	1.5	V
		T _j =150°C		0.9	1.1	V
r _F	chiplevel	T _j =25°C		18.4	20.8	mΩ
		T _j =150°C		25.6	28.0	mΩ
I _{RRM}	I _F =50A di/dt _{off} =1380A/μs V _{GE} =±15V V _{CC} = 600 V	T _j =150°C		25		A
Q _{rr}		T _j =150°C		8.7		μC
E _{rr}		T _j =150°C		3.8		mJ
R _{th(j-c)}		per diode			0.84	
Module						
L _{CE}				30		nH
R _{CC'+EE'}	terminal-chip	T _C =25°C		0.65		mΩ
		T _C =125°C		1		mΩ
R _{th(c-s)}	per module			0.04	0.05	K/W
M _s	to heat sink M5		3	5		Nm
M _t		to terminals M5	2.5	5		Nm
					Nm	
Weight				170		g

Features

- NPT Technology IGBT
- Fast Recovery Free Wheeling Diode
- Low Switching Losses
- $V_{ce(sat)}$ with positive temperature coefficient
- Fast Switching and short tail current
- Switched mode power supplies at $f_{SW} > 20KHz$
- Resonant inverters up to 100KHz
- Electronic Welders at $f_{SW} > 20KHz$

Application

- Welding inverters
- Inductive Heating

Advantages

- Space and weight savings
- Reduced protection circuits

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H bridge IGBT modules

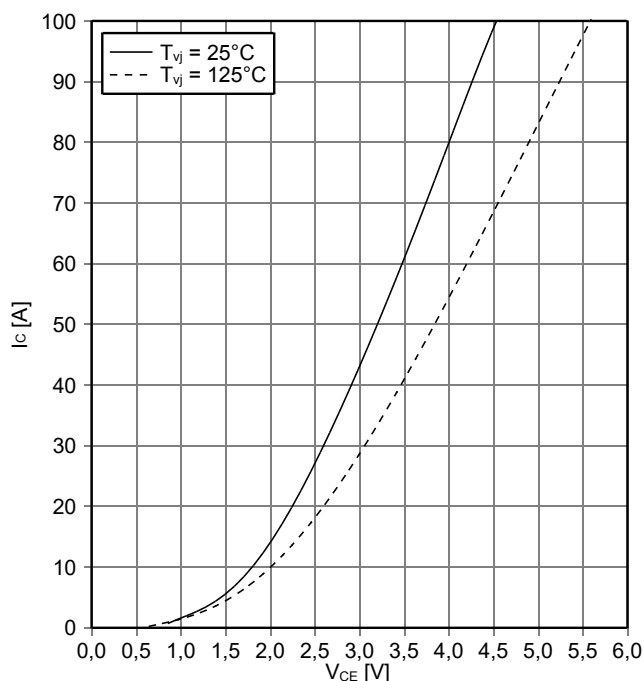


Fig.1 Output characteristic IGBT, Inverter (typical)
 $I_C = f(V_{CE})$
 $V_{GE} = 15\text{ V}$

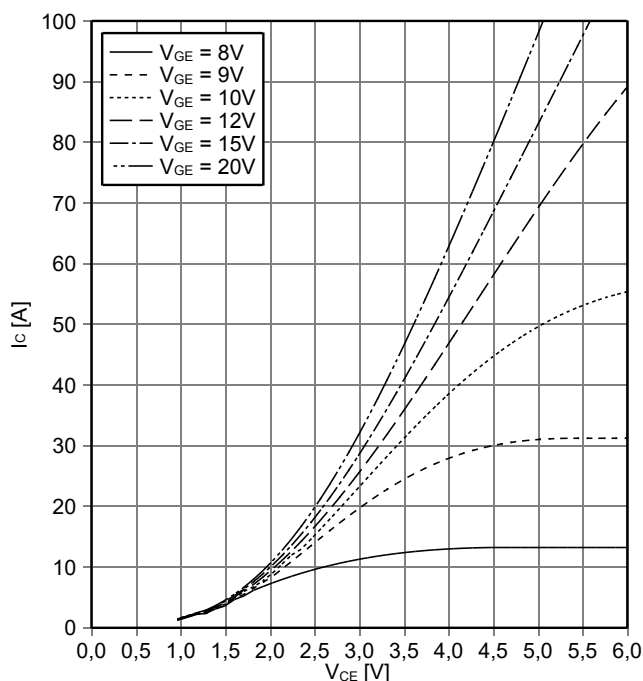


Fig.2 Output characteristic IGBT, Inverter (typical)
 $I_C = f(V_{CE})$
 $T_{vj} = 125^\circ\text{C}$

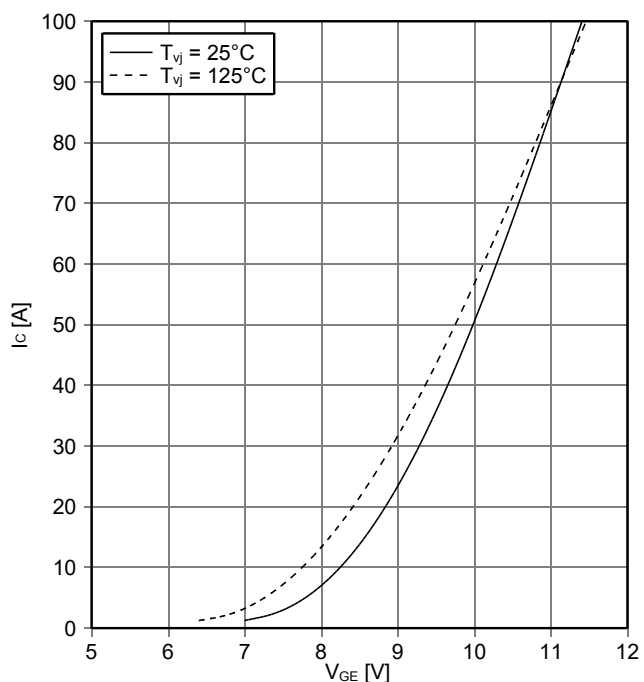


Fig.3 Transfer characteristic IGBT, Inverter (typical)
 $I_C = f(V_{GE})$
 $V_{CE} = 20\text{ V}$

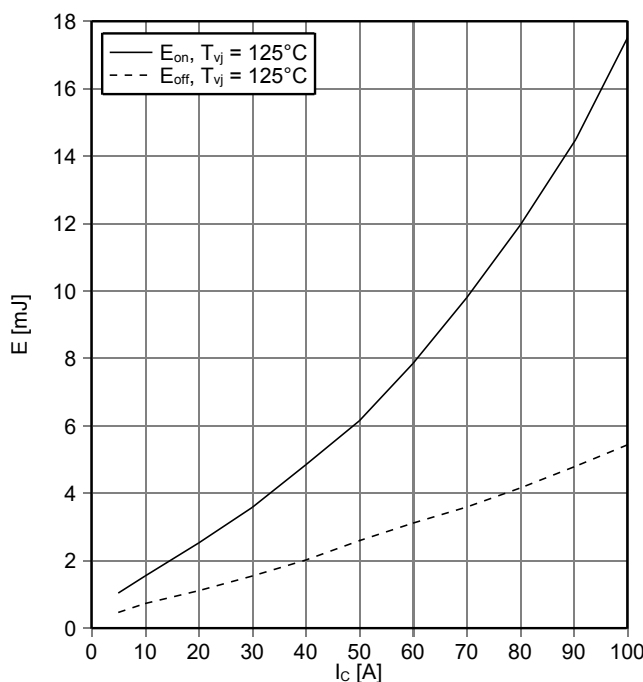


Fig.4 Switching losses IGBT, Inverter (typical)
 $E_{on} = f(I_C)$, $E_{off} = f(I_C)$
 $V_{GE} = \pm 15\text{ V}$, $R_{Gon} = 13\ \Omega$, $R_{Goff} = 13\ \Omega$, $V_{CE} = 600\text{ V}$

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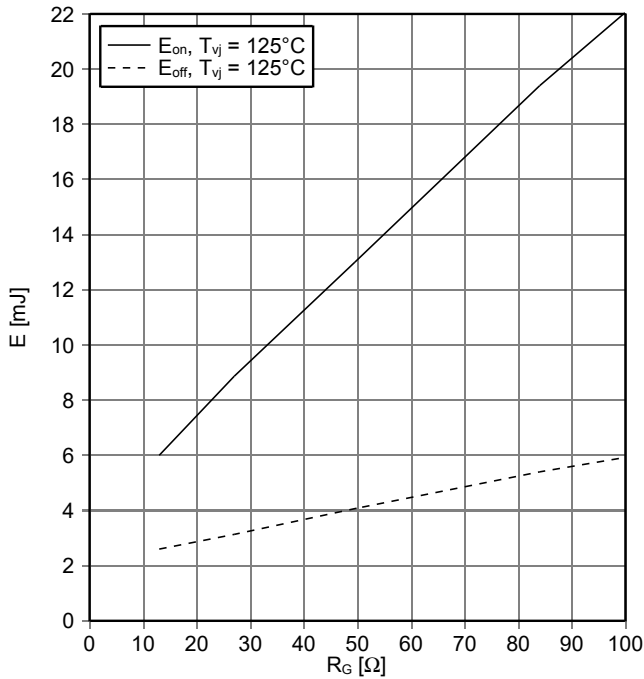


Fig.5 Switching losses IGBT, Inverter (typical)

$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
 $V_{GE} = \pm 15\text{ V}$, $I_C = 50\text{ A}$, $V_{CE} = 600\text{ V}$

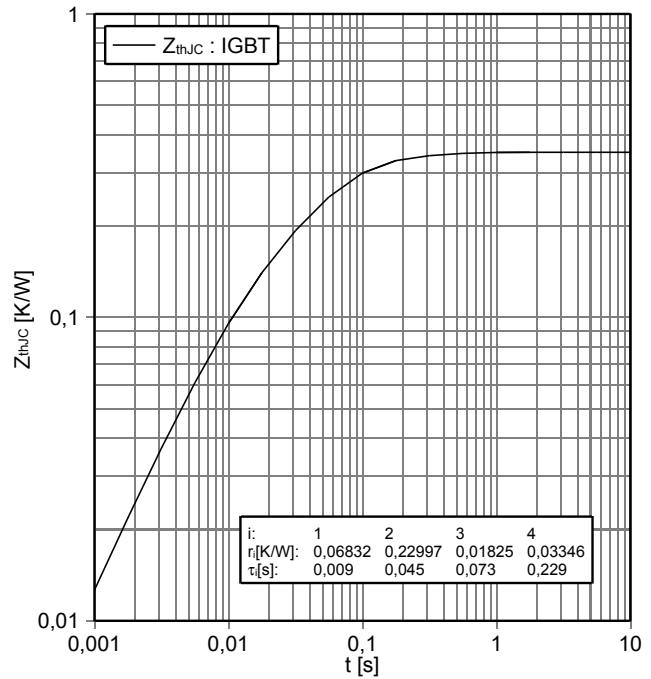


Fig.6 Transient thermal impedance IGBT, Inverter

$Z_{thJC} = f(t)$

i:	1	2	3	4
r_i [K/W]:	0,06832	0,22997	0,01825	0,03346
τ_i [s]:	0,009	0,045	0,073	0,229

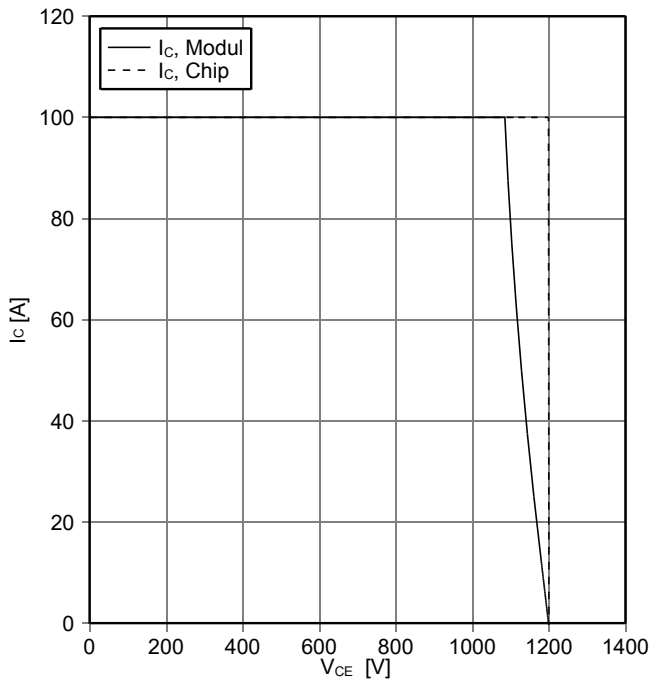


Fig.7 Reverse bias safe operating area IGBT, Inverter (RBSOA)

$I_C = f(V_{CE})$
 $V_{GE} = \pm 15\text{ V}$, $R_{Goff} = 13\ \Omega$, $T_{vj} = 125^\circ\text{C}$

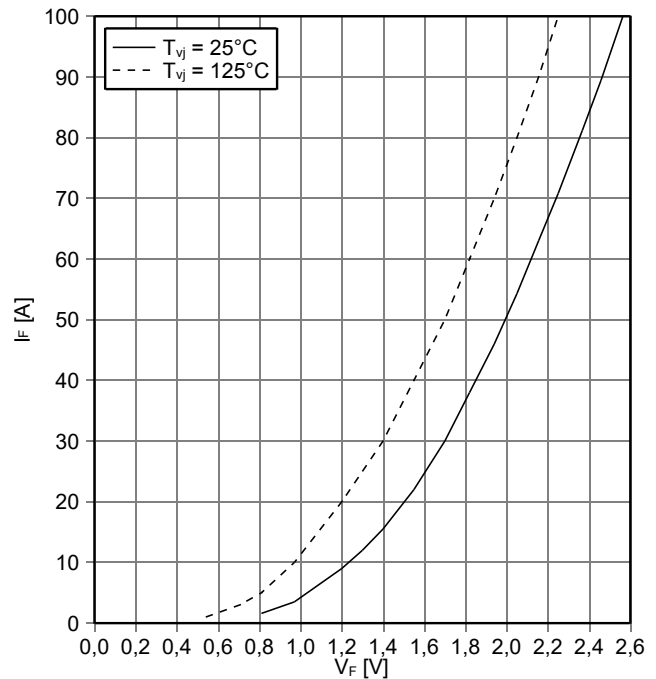


Fig.8 Forward characteristic of Diode, Inverter (typical)

$I_F = f(V_F)$

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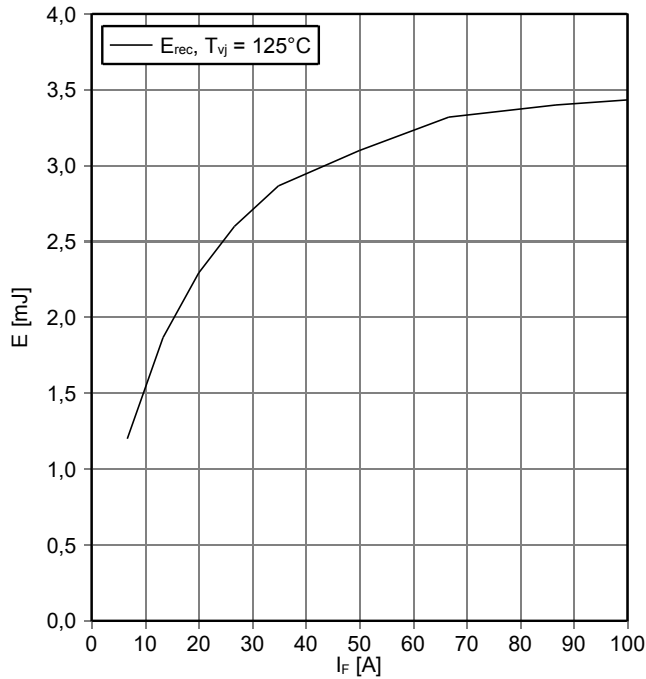


Fig.9 Switching losses Diode, Inverter (typical)

$E_{rec} = f(I_F)$
 $R_{Gon} = 13 \Omega$, $V_{CE} = 600 \text{ V}$

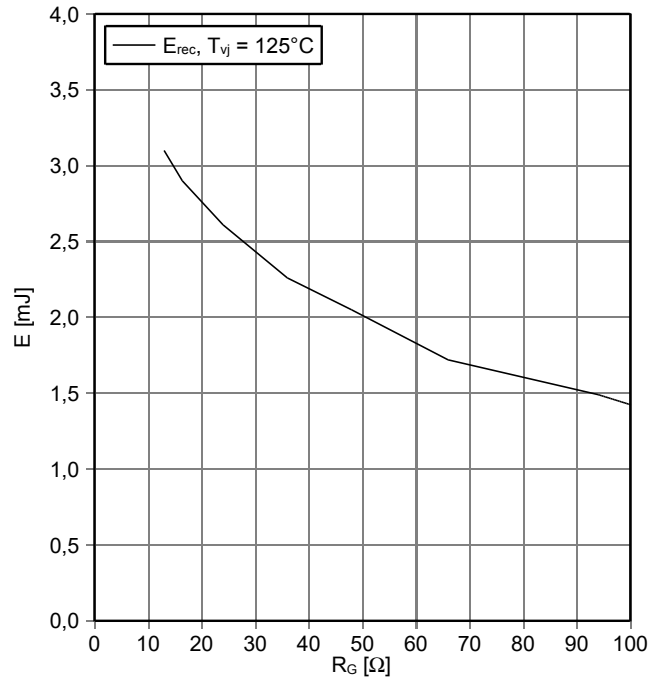


Fig.10 Switching losses Diode, Inverter (typical)

$E_{rec} = f(R_G)$
 $I_F = 50 \text{ A}$, $V_{CE} = 600 \text{ V}$

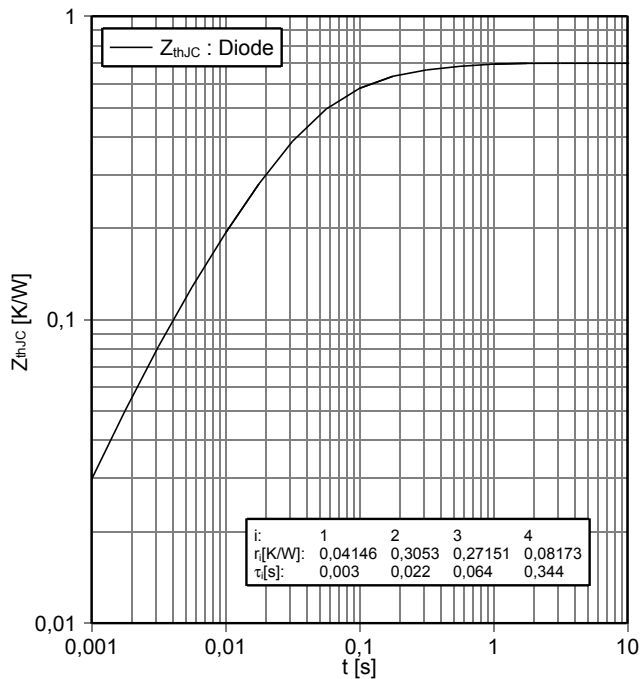


Fig.10 Transient thermal impedance Diode, Inverter

$Z_{thJC} = f(t)$

i:	1	2	3	4
r_i [K/W]:	0,04146	0,3053	0,27151	0,08173
τ_i [s]:	0,003	0,022	0,064	0,344