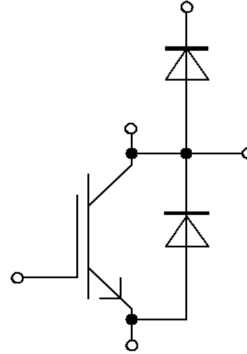


62mm C-Serien Modul mit Trench/Feldstopp IGBT4 und Emitter Controlled Diode und bereits aufgetragenem Thermal Interface Material

62mm C-Series module with Trench/Fieldstop IGBT4 and Emitter Controlled diode and pre-applied Thermal Interface Material

Vorläufige Daten / Preliminary Data



$V_{CES} = 1700V$

$I_{C\ nom} = 300A / I_{CRM} = 600A$

Potentielle Anwendungen

- 3-Level-Applikationen
- Chopper-Anwendungen
- Motorantriebe

Potential Applications

- 3-level-applications
- Chopper applications
- Motor drives

Elektrische Eigenschaften

- Erweiterte Sperrschichttemperatur $T_{vj\ op}$
- Niedriges V_{CEsat}
- Sehr große Robustheit
- V_{CEsat} mit positivem Temperaturkoeffizienten

Electrical Features

- Extended operating temperature $T_{vj\ op}$
- Low V_{CEsat}
- Unbeatable robustness
- V_{CEsat} with positive temperature coefficient

Mechanische Eigenschaften

- 4 kV AC 1min Isolationsfestigkeit
- Gehäuse mit CTI > 400
- Große Luft- und Kriechstrecken
- Thermisches Interface Material bereits aufgetragen

Mechanical Features

- 4 kV AC 1min insulation
- Package with CTI > 400
- High creepage and clearance distances
- Pre-applied Thermal Interface Material

Module Label Code

Barcode Code 128



DMX - Code



Content of the Code

Content of the Code	Digit
Module Serial Number	1 - 5
Module Material Number	6 - 11
Production Order Number	12 - 19
Datecode (Production Year)	20 - 21
Datecode (Production Week)	22 - 23

IGBT, Brems-Chopper / IGBT, Brake-Chopper

Höchstzulässige Werte / Maximum Rated Values

Kollektor-Emitter-Sperrspannung Collector-emitter voltage	$T_{vj} = 25^{\circ}\text{C}$	V_{CES}	1700	V
Kollektor-Dauergleichstrom Continuous DC collector current	$T_H = 80^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$	I_{CDC}	300	A
Periodischer Kollektor-Spitzenstrom Repetitive peak collector current	$t_P = 1\text{ ms}$	I_{CRM}	600	A
Gate-Emitter-Spitzenspannung Gate-emitter peak voltage		V_{GES}	+/-20	V

Charakteristische Werte / Characteristic Values

			min.	typ.	max.		
Kollektor-Emitter-Sättigungsspannung Collector-emitter saturation voltage	$I_C = 300\text{ A}$ $V_{GE} = 15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$V_{CE\text{ sat}}$	1,95 2,35 2,45	2,30	V V V	
Gate-Schwellenspannung Gate threshold voltage	$I_C = 12,0\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$		V_{GEth}	5,20	5,80	6,40	V
Gateladung Gate charge	$V_{GE} = -15 / 15\text{ V}$		Q_G	3,05			μC
Interner Gatewiderstand Internal gate resistor	$T_{vj} = 25^{\circ}\text{C}$		R_{Gint}	2,5			Ω
Eingangskapazität Input capacitance	$f = 1000\text{ kHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$		C_{ies}	24,5			nF
Rückwirkungskapazität Reverse transfer capacitance	$f = 1000\text{ kHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$		C_{res}	0,81			nF
Kollektor-Emitter-Reststrom Collector-emitter cut-off current	$V_{CE} = 1700\text{ V}, V_{GE} = 0\text{ V}, T_{vj} = 25^{\circ}\text{C}$		I_{CES}			1,0	mA
Gate-Emitter-Reststrom Gate-emitter leakage current	$V_{CE} = 0\text{ V}, V_{GE} = 20\text{ V}, T_{vj} = 25^{\circ}\text{C}$		I_{GES}			100	nA
Einschaltverzögerungszeit, induktive Last Turn-on delay time, inductive load	$I_C = 300\text{ A}, V_{CE} = 900\text{ V}$ $V_{GE} = -15 / 15\text{ V}$ $R_{Gon} = 2,4\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	t_{don}	0,24 0,28 0,30			μs μs μs
Anstiegszeit, induktive Last Rise time, inductive load	$I_C = 300\text{ A}, V_{CE} = 900\text{ V}$ $V_{GE} = -15 / 15\text{ V}$ $R_{Gon} = 2,4\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	t_r	0,05 0,055 0,055			μs μs μs
Abschaltverzögerungszeit, induktive Last Turn-off delay time, inductive load	$I_C = 300\text{ A}, V_{CE} = 900\text{ V}$ $V_{GE} = -15 / 15\text{ V}$ $R_{Goff} = 2,4\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	t_{doff}	0,70 0,74 0,78			μs μs μs
Fallzeit, induktive Last Fall time, inductive load	$I_C = 300\text{ A}, V_{CE} = 900\text{ V}$ $V_{GE} = -15 / 15\text{ V}$ $R_{Goff} = 2,4\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	t_f	0,08 0,13 0,15			μs μs μs
Einschaltverlustenergie pro Puls Turn-on energy loss per pulse	$I_C = 300\text{ A}, V_{CE} = 900\text{ V}, L\sigma = 60\text{ nH}$ $di/dt = 4800\text{ A}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$ $V_{GE} = -15 / 15\text{ V}, R_{Gon} = 2,4\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	E_{on}	63,0 86,0 93,0			mJ mJ mJ
Abschaltverlustenergie pro Puls Turn-off energy loss per pulse	$I_C = 300\text{ A}, V_{CE} = 900\text{ V}, L\sigma = 60\text{ nH}$ $du/dt = 3600\text{ V}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$ $V_{GE} = -15 / 15\text{ V}, R_{Goff} = 2,4\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	E_{off}	55,0 90,0 100			mJ mJ mJ
Kurzschlußverhalten SC data	$V_{GE} \leq 15\text{ V}, V_{CC} = 1000\text{ V}$ $V_{CEmax} = V_{CES} - L_{SCE} \cdot di/dt$ $t_P \leq 10\ \mu\text{s}, T_{vj} = 150^{\circ}\text{C}$		I_{SC}	1400			A
Wärmewiderstand, Chip bis Kühlkörper Thermal resistance, junction to heatsink	pro IGBT / per IGBT valid with IFX pre-applied thermal interface material		R_{thJH}			0,114	K/W
Temperatur im Schaltbetrieb Temperature under switching conditions			$T_{vj\text{ op}}$	-40		150	$^{\circ}\text{C}$

Diode, Brems-Chopper / Diode, Brake-Chopper

Höchstzulässige Werte / Maximum Rated Values

Periodische Spitzensperrspannung Repetitive peak reverse voltage	$T_{vj} = 25^{\circ}\text{C}$	V_{RRM}	1700	V
Dauergleichstrom Continuous DC forward current		I_F	300	A
Periodischer Spitzenstrom Repetitive peak forward current	$t_P = 1\text{ ms}$	I_{FRM}	600	A
Grenzlastintegral I^2t - value	$V_R = 0\text{ V}, t_P = 10\text{ ms}, T_{vj} = 125^{\circ}\text{C}$ $V_R = 0\text{ V}, t_P = 10\text{ ms}, T_{vj} = 150^{\circ}\text{C}$	I^2t	14500 14000	A^2s A^2s

Charakteristische Werte / Characteristic Values

			min.	typ.	max.	
Durchlassspannung Forward voltage	$I_F = 300\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 300\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 300\text{ A}, V_{GE} = 0\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	V_F	1,80 1,90 1,95	2,20	V V V
Rückstromspitze Peak reverse recovery current	$I_F = 300\text{ A}, -di_F/dt = 4800\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 900\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	I_{RM}	270 340 360		A A A
Sperrverzögerungsladung Recovered charge	$I_F = 300\text{ A}, -di_F/dt = 4800\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 900\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	Q_r	50,0 105 120		μC μC μC
Abschaltenergie pro Puls Reverse recovery energy	$I_F = 300\text{ A}, -di_F/dt = 4800\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 900\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	E_{rec}	28,0 58,0 68,0		mJ mJ mJ
Wärmewiderstand, Chip bis Kühlkörper Thermal resistance, junction to heatsink	pro Diode / per diode valid with IFX pre-applied thermal interface material		R_{thJH}		0,177	K/W
Temperatur im Schaltbetrieb Temperature under switching conditions			$T_{vj\text{ op}}$	-40	150	$^{\circ}\text{C}$

Diode, Revers / Diode, Reverse

Höchstzulässige Werte / Maximum Rated Values

Periodische Spitzensperrspannung Repetitive peak reverse voltage	$T_{vj} = 25^{\circ}\text{C}$	V_{RRM}	1700	V
Dauergleichstrom Continuous DC forward current		I_F	300	A
Periodischer Spitzenstrom Repetitive peak forward current	$t_P = 1\text{ ms}$	I_{FRM}	600	A
Grenzlastintegral I^2t - value	$V_R = 0\text{ V}, t_P = 10\text{ ms}, T_{vj} = 125^{\circ}\text{C}$ $V_R = 0\text{ V}, t_P = 10\text{ ms}, T_{vj} = 150^{\circ}\text{C}$	I^2t	14500 14000	A^2s A^2s

Charakteristische Werte / Characteristic Values

			min.	typ.	max.	
Durchlassspannung Forward voltage	$I_F = 300\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 300\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 300\text{ A}, V_{GE} = 0\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	V_F	1,80 1,90 1,95	2,20	V V V
Wärmewiderstand, Chip bis Kühlkörper Thermal resistance, junction to heatsink	pro Diode / per diode valid with IFX pre-applied thermal interface material		R_{thJH}		0,177	K/W
Temperatur im Schaltbetrieb Temperature under switching conditions			$T_{vj\text{ op}}$	-40	150	$^{\circ}\text{C}$

Vorläufige Daten
Preliminary Data
Modul / Module

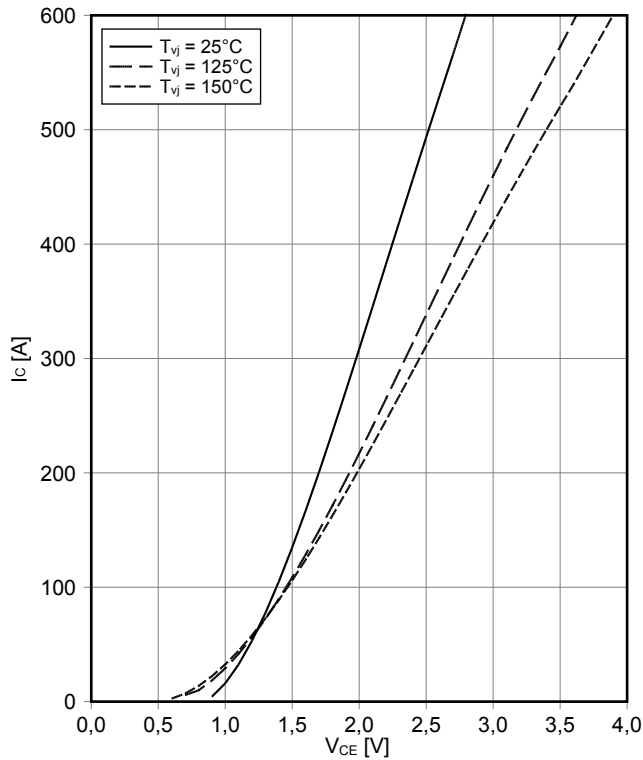
Isolations-Prüfspannung Isolation test voltage	RMS, f = 50 Hz, t = 1 min.	V _{ISOL}	4,0		kV
Material Modulgrundplatte Material of module baseplate			Cu		
Innere Isolation Internal isolation	Basisisolierung (Schutzklasse 1, EN61140) basic insulation (class 1, IEC 61140)		Al ₂ O ₃		
Kriechstrecke Creepage distance	Kontakt - Kühlkörper / terminal to heatsink Kontakt - Kontakt / terminal to terminal		29,0 23,0		mm
Luftstrecke Clearance	Kontakt - Kühlkörper / terminal to heatsink Kontakt - Kontakt / terminal to terminal		23,0 11,0		mm
Vergleichszahl der Kriechwegbildung Comperative tracking index		CTI	> 400		
			min.	typ.	max.
Modulstreuinduktivität Stray inductance module		L _{sCE}		20	nH
Modulleitungswiderstand, Anschlüsse - Chip Module lead resistance, terminals - chip	T _H = 25°C, pro Schalter / per switch	R _{CC'+EE'}		0,70	mΩ
Lagertemperatur Storage temperature		T _{stg}	-40		125 °C
Höchstzulässige Bodenplattenbetriebstemperatur Maximum baseplate operation temperature		T _{BPmax}			125 °C
Anzugsdrehmoment f. Modulmontage Mounting torque for modul mounting	Schraube M6 - Montage gem. gültiger Applikationsschrift Screw M6 - Mounting according to valid application note	M	3,00		6,00 Nm
Anzugsdrehmoment f. elektr. Anschlüsse Terminal connection torque	Schraube M6 - Montage gem. gültiger Applikationsschrift Screw M6 - Mounting according to valid application note	M	2,5	-	5,0 Nm
Gewicht Weight		G		340	g

Lagerung und Transport von Modulen mit TIM => siehe AN 2012-07
 Storage and shipment of modules with TIM => see AN 2012-07

Vorläufige Daten Preliminary Data

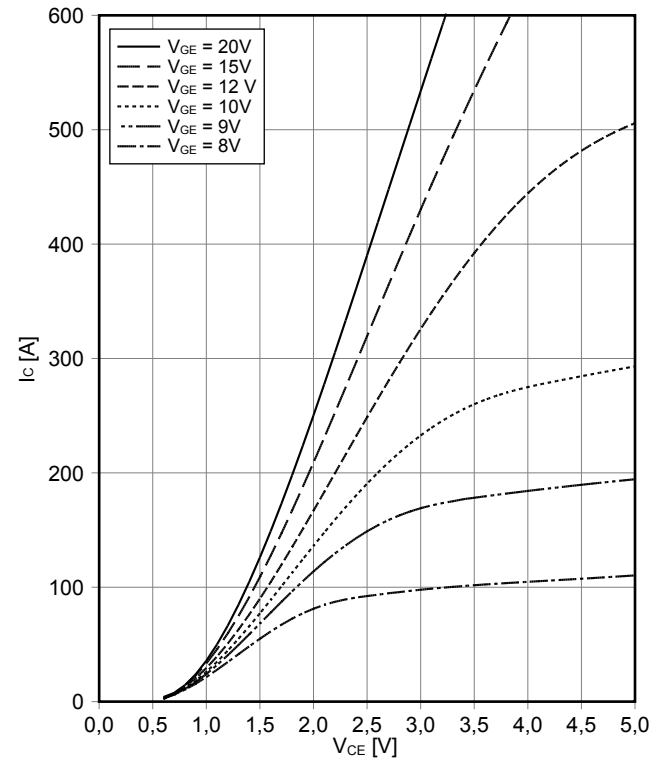
Ausgangskennlinie IGBT, Brems-Chopper (typisch)
output characteristic IGBT, Brake-Chopper (typical)

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



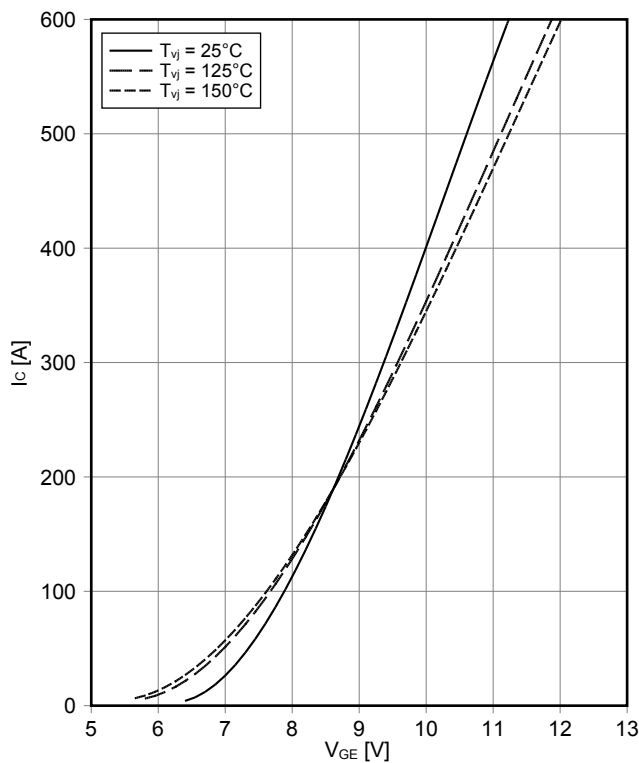
Ausgangskennlinienfeld IGBT, Brems-Chopper (typisch)
output characteristic IGBT, Brake-Chopper (typical)

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



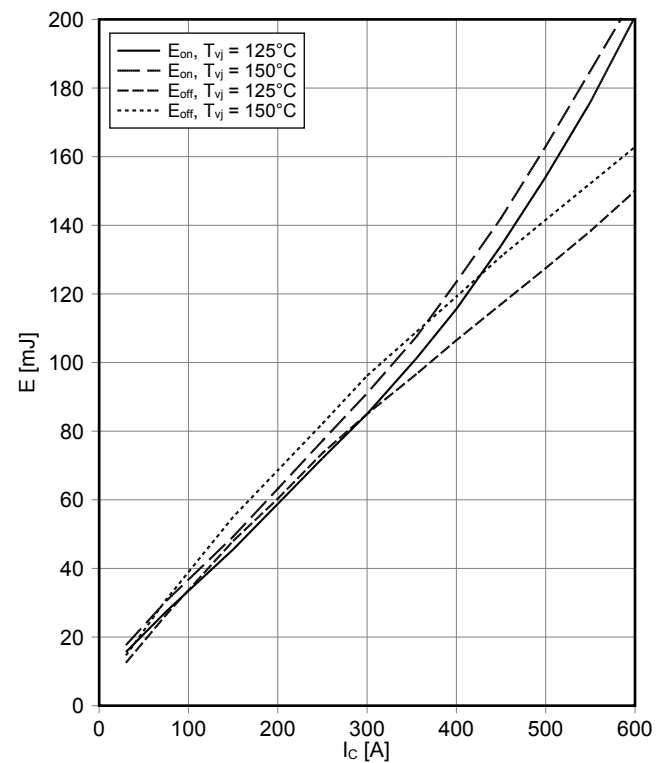
Übertragungscharakteristik IGBT, Brems-Chopper (typisch)
transfer characteristic IGBT, Brake-Chopper (typical)

$I_C = f(V_{GE})$
 $V_{CE} = 20\text{ V}$



Schaltverluste IGBT, Brems-Chopper (typisch)
switching losses IGBT, Brake-Chopper (typical)

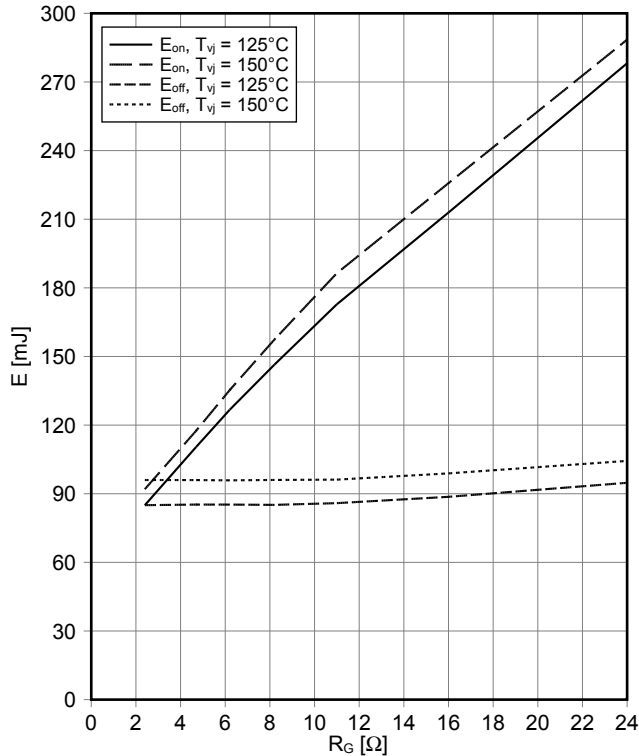
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
 $V_{GE} = \pm 15\text{ V}$, $R_{Gon} = 2.4\ \Omega$, $R_{Goff} = 2.4\ \Omega$, $V_{CE} = 900\text{ V}$



Vorläufige Daten Preliminary Data

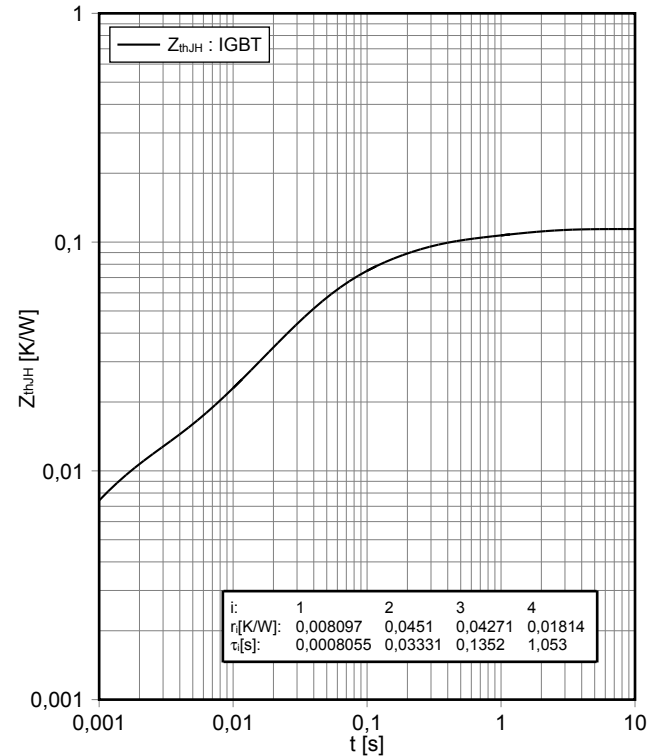
Schaltverluste IGBT, Brems-Chopper (typisch) switching losses IGBT, Brake-Chopper (typical)

$E_{on} = f(R_G), E_{off} = f(R_G)$
 $V_{GE} = \pm 15 \text{ V}, I_C = 300 \text{ A}, V_{CE} = 900 \text{ V}$



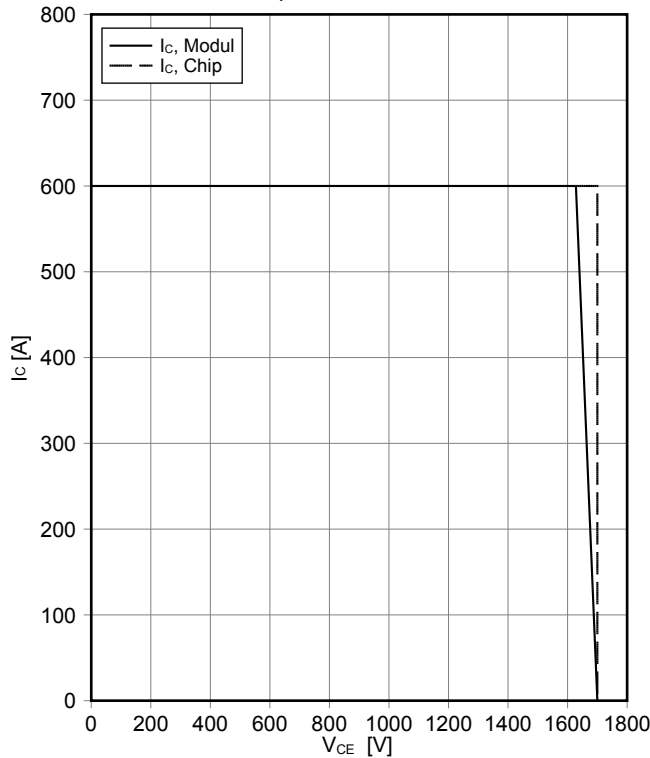
Transienter Wärmewiderstand IGBT, Brems-Chopper transient thermal impedance IGBT, Brake-Chopper

$Z_{thJH} = f(t)$



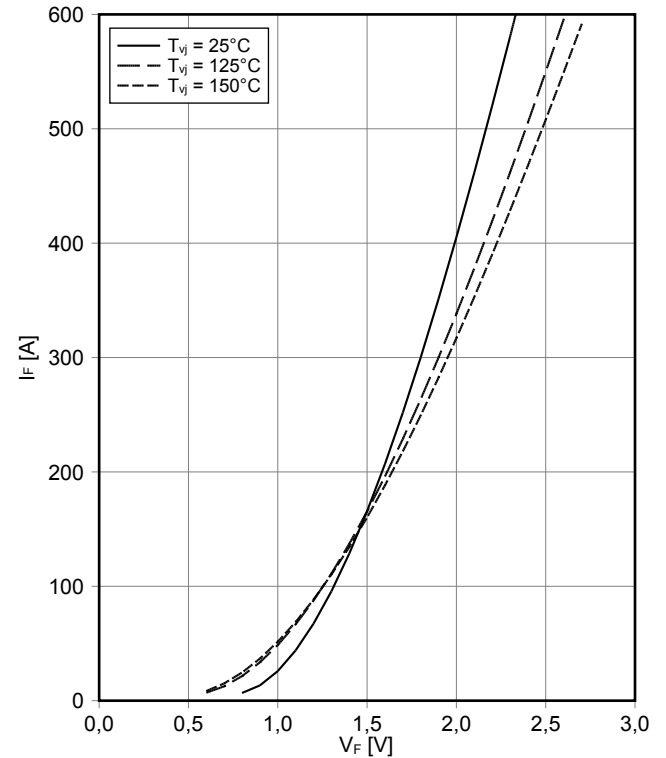
Sicherer Rückw.-Arbeitsber. IGBT, Brems-Chopper (RBSOA) reverse bias safe operating area IGBT, Brake-Chopper (RBSOA)

$I_C = f(V_{CE})$
 $V_{GE} = \pm 15 \text{ V}, R_{Goff} = 2.4 \Omega, T_{vj} = 150^\circ\text{C}$



Durchlasskennlinie der Diode, Brems-Chopper (typisch) forward characteristic of Diode, Brake-Chopper (typical)

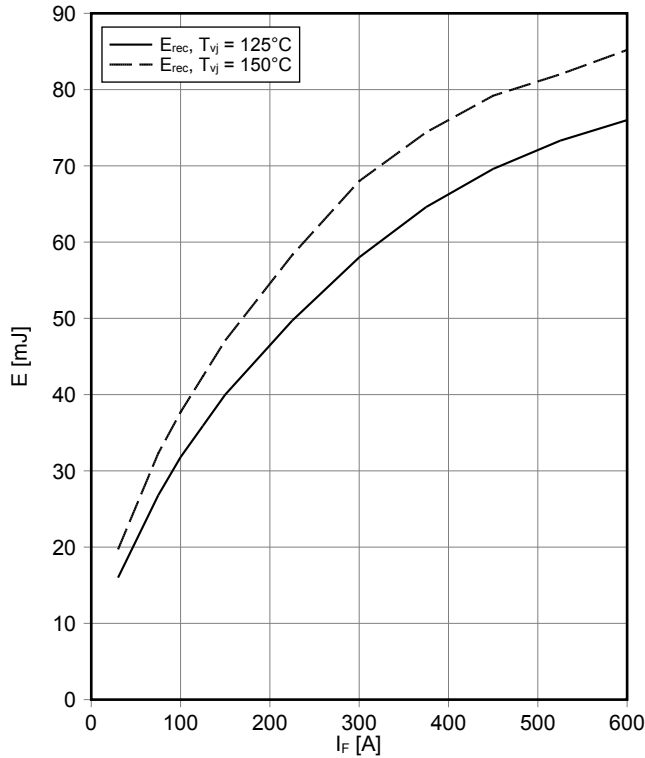
$I_F = f(V_F)$



Vorläufige Daten Preliminary Data

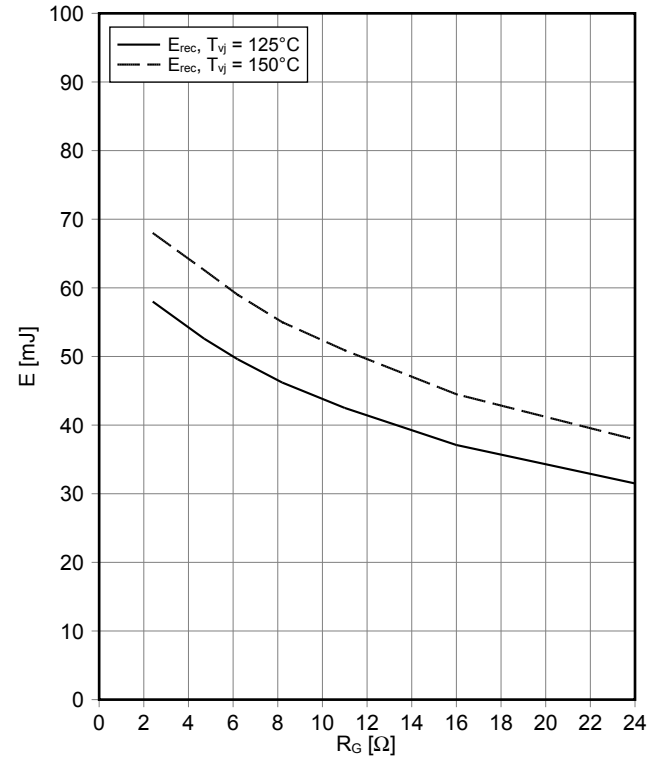
Schaltverluste Diode, Brems-Chopper (typisch) switching losses Diode, Brake-Chopper (typical)

$E_{rec} = f(I_F)$
 $R_{Gon} = 2.4 \Omega, V_{CE} = 900 V$



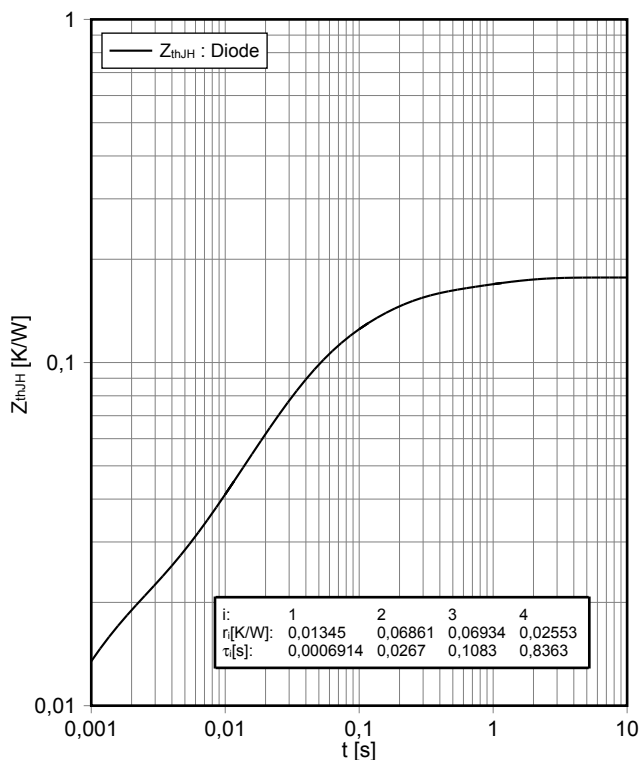
Schaltverluste Diode, Brems-Chopper (typisch) switching losses Diode, Brake-Chopper (typical)

$E_{rec} = f(R_G)$
 $I_F = 300 A, V_{CE} = 900 V$



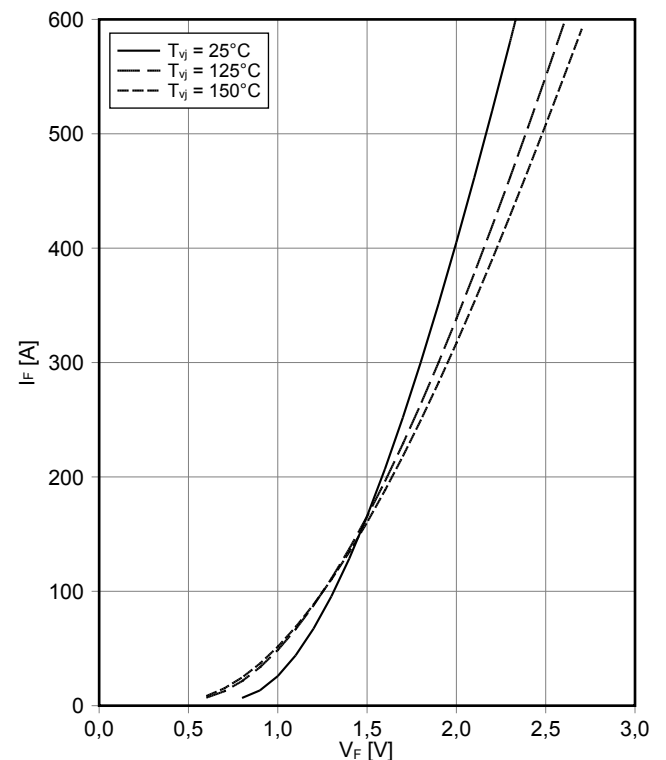
Transienter Wärmewiderstand Diode, Brems-Chopper transient thermal impedance Diode, Brake-Chopper

$Z_{thJH} = f(t)$

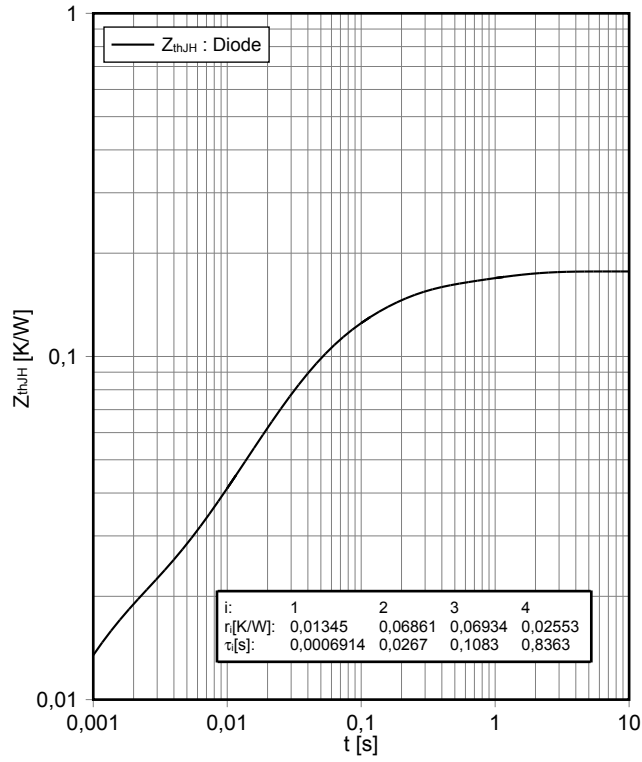


Durchlasskennlinie der Diode, Revers (typisch) forward characteristic of Diode, Reverse (typical)

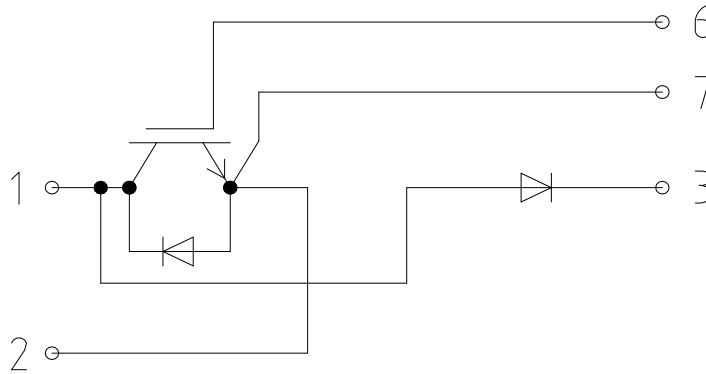
$I_F = f(V_F)$



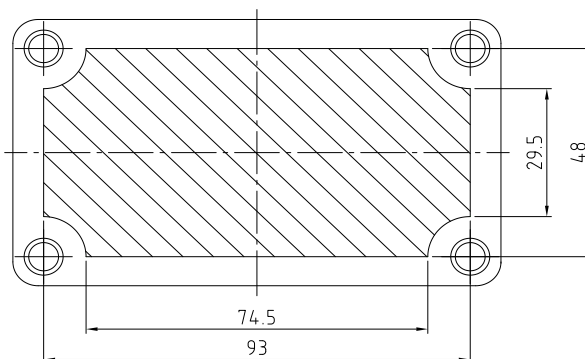
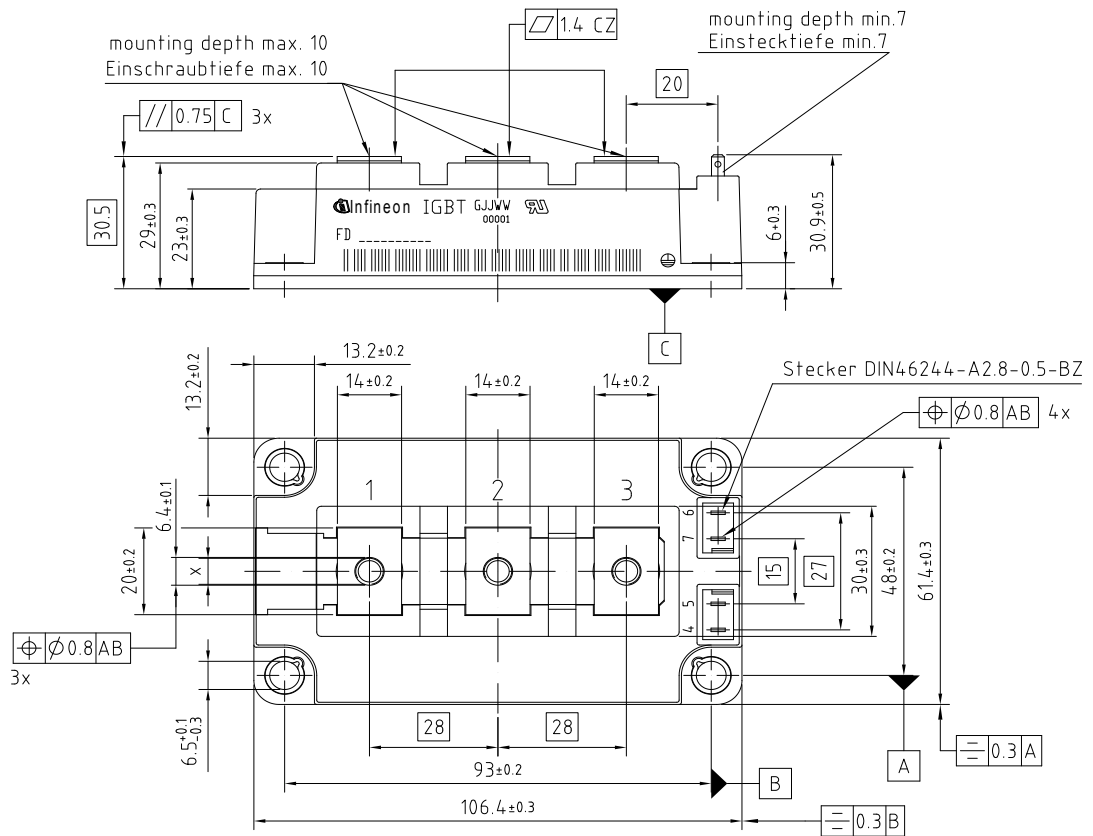
Transienter Wärmewiderstand Diode, Revers
transient thermal impedance Diode, Reverse
 $Z_{thJH} = f(t)$



Schaltplan / Circuit diagram



Gehäuseabmessungen / Package outlines



Sperrfläche für Thermisches Interface Material
restricted area for Thermal Interface Material