



IGBT, Brems-Chopper / IGBT, Brake-Chopper
Höchstzulässige Werte / Maximum Rated Values

Vorläufige Daten
Preliminary Data

Kollektor-Emitter-Sperrspannung Collector-emitter voltage	$T_{vj} = 25^{\circ}\text{C}$	V_{CES}	1700	V
Kollektor-Dauergleichstrom Continuous DC collector current	$T_C = 80^{\circ}\text{C}, T_{vj\text{max}} = 150^{\circ}\text{C}$ $T_C = 25^{\circ}\text{C}, T_{vj\text{max}} = 150^{\circ}\text{C}$	$I_{C\text{nom}}$ I_C	600 950	A A
Periodischer Kollektor-Spitzenstrom Repetitive peak collector current	$t_P = 1\text{ ms}$	I_{CRM}	1200	A
Gesamt-Verlustleistung Total power dissipation	$T_C = 25^{\circ}\text{C}, T_{vj\text{max}} = 150^{\circ}\text{C}$	P_{tot}	4,30	kW
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	$I_C = 600\text{ A}, V_{GE} = 15\text{ V}$ $I_C = 600\text{ A}, V_{GE} = 15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$V_{CE\text{sat}}$	2,00 2,40	2,45	V V
Gate-Schwellenspannung Gate threshold voltage	$I_C = 24,0\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$		$V_{G\text{Eth}}$	5,2	5,8	6,4 V
Gateladung Gate charge	$V_{GE} = -15\text{ V} \dots +15\text{ V}$		Q_G	7,00		μC
Interner Gatewiderstand Internal gate resistor	$T_{vj} = 25^{\circ}\text{C}$		$R_{G\text{int}}$	2,1		Ω
Eingangskapazität Input capacitance	$f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$		C_{ies}	54,0		nF
Rückwirkungskapazität 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}	1,70		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}		5,0	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}		400	nA
Einschaltverzögerungszeit, induktive Last Turn-on delay time, inductive load	$I_C = 600\text{ A}, V_{CE} = 900\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 2,4\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$t_{d\text{on}}$	0,65 0,70		μs μs
Anstiegszeit, induktive Last Rise time, inductive load	$I_C = 600\text{ A}, V_{CE} = 900\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 2,4\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	t_r	0,16 0,20		μs μs
Abschaltverzögerungszeit, induktive Last Turn-off delay time, inductive load	$I_C = 600\text{ A}, V_{CE} = 900\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 3,0\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$t_{d\text{off}}$	1,30 1,60		μs μs
Fallzeit, induktive Last Fall time, inductive load	$I_C = 600\text{ A}, V_{CE} = 900\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 3,0\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	t_f	0,18 0,30		μs μs
Einschaltverlustenergie pro Puls Turn-on energy loss per pulse	$I_C = 600\text{ A}, V_{CE} = 900\text{ V}, L_S = 50\text{ nH}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 2,4\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	E_{on}	125 185		mJ mJ
Abschaltverlustenergie pro Puls Turn-off energy loss per pulse	$I_C = 600\text{ A}, V_{CE} = 900\text{ V}, L_S = 50\text{ nH}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 3,0\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	E_{off}	150 220		mJ mJ
Kurzschlußverhalten SC data	$V_{GE} \leq 15\text{ V}, V_{CC} = 1000\text{ V}$ $V_{CE\text{max}} = V_{CES} - L_{SCE} \cdot di/dt$	$t_P \leq 10\ \mu\text{s}, T_{vj} = 125^{\circ}\text{C}$	I_{SC}	2400		A
Wärmewiderstand, Chip bis Gehäuse Thermal resistance, junction to case	pro IGBT / per IGBT		R_{thJC}		29,0	K/kW
Wärmewiderstand, Gehäuse bis Kühlkörper Thermal resistance, case to heatsink	pro IGBT / per IGBT $\lambda_{\text{Paste}} = 1\text{ W}/(\text{m}\cdot\text{K}) / \lambda_{\text{grease}} = 1\text{ W}/(\text{m}\cdot\text{K})$		R_{thCH}	24,0		K/kW
Temperatur im Schaltbetrieb Temperature under switching conditions			$T_{vj\text{op}}$	-40	125	$^{\circ}\text{C}$

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**Vorläufige Daten
Preliminary Data**

**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	600	A
Periodischer Spitzenstrom Repetitive peak forward current	$t_P = 1\text{ ms}$	I_{FRM}	1200	A
Grenzlastintegral I^2t - value	$V_R = 0\text{ V}, t_P = 10\text{ ms}, T_{vj} = 125^{\circ}\text{C}$	I^2t	125	kA^2s

Charakteristische Werte / Characteristic Values

			min.	typ.	max.	
Durchlassspannung Forward voltage	$I_F = 600\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 600\text{ A}, V_{GE} = 0\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	V_F	1,60 1,70	2,00	V V
Rückstromspitze Peak reverse recovery current	$I_F = 600\text{ A}, -di_F/dt = 3750\text{ A}/\mu\text{s} (T_{vj}=125^{\circ}\text{C})$ $V_R = 900\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	I_{RM}	710 775		A A
Sperrverzögerungsladung Recovered charge	$I_F = 600\text{ A}, -di_F/dt = 3750\text{ A}/\mu\text{s} (T_{vj}=125^{\circ}\text{C})$ $V_R = 900\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	Q_r	180 300		μC μC
Abschaltenergie pro Puls Reverse recovery energy	$I_F = 600\text{ A}, -di_F/dt = 3750\text{ A}/\mu\text{s} (T_{vj}=125^{\circ}\text{C})$ $V_R = 900\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	E_{rec}	120 210		mJ mJ
Wärmewiderstand, Chip bis Gehäuse Thermal resistance, junction to case	pro Diode / per diode		R_{thJC}		55,0	K/kW
Wärmewiderstand, Gehäuse bis Kühlkörper Thermal resistance, case to heatsink	pro Diode / per diode $\lambda_{\text{Paste}} = 1\text{ W}/(\text{m}\cdot\text{K}) / \lambda_{\text{grease}} = 1\text{ W}/(\text{m}\cdot\text{K})$		R_{thCH}	46,0		K/kW
Temperatur im Schaltbetrieb Temperature under switching conditions			$T_{vj\text{ op}}$	-40	125	$^{\circ}\text{C}$

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**Vorläufige Daten
Preliminary Data**

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	600	A
Periodischer Spitzenstrom Repetitive peak forward current	$t_P = 1 \text{ ms}$	I_{FRM}	1200	A
Grenzlastintegral I^2t - value	$V_R = 0 \text{ V}, t_P = 10 \text{ ms}, T_{vj} = 125^{\circ}\text{C}$	I^2t	81,0	kA^2s

Charakteristische Werte / Characteristic Values

			min.	typ.	max.	
Durchlassspannung Forward voltage	$I_F = 600 \text{ A}, V_{GE} = 0 \text{ V}$ $I_F = 600 \text{ A}, V_{GE} = 0 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	V_F	1,80 1,90	2,20	V V
Rückstromspitze Peak reverse recovery current	$I_F = 600 \text{ A}, -di_F/dt = 3750 \text{ A}/\mu\text{s} (T_{vj}=125^{\circ}\text{C})$ $V_R = 900 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	I_{RM}	590 645		A A
Sperrverzögerungsladung Recovered charge	$I_F = 600 \text{ A}, -di_F/dt = 3750 \text{ A}/\mu\text{s} (T_{vj}=125^{\circ}\text{C})$ $V_R = 900 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	Q_r	155 260		μC μC
Abschaltenergie pro Puls Reverse recovery energy	$I_F = 600 \text{ A}, -di_F/dt = 3750 \text{ A}/\mu\text{s} (T_{vj}=125^{\circ}\text{C})$ $V_R = 900 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	E_{rec}	96,0 170		mJ mJ
Wärmewiderstand, Chip bis Gehäuse Thermal resistance, junction to case	pro Diode / per diode		R_{thJC}		51,0	K/kW
Wärmewiderstand, Gehäuse bis Kühlkörper Thermal resistance, case to heatsink	pro Diode / per diode $\lambda_{\text{Paste}} = 1 \text{ W}/(\text{m}\cdot\text{K}) / \lambda_{\text{grease}} = 1 \text{ W}/(\text{m}\cdot\text{K})$		R_{thCH}	16,0		K/kW
Temperatur im Schaltbetrieb Temperature under switching conditions			$T_{vj \text{ op}}$	-40	125	$^{\circ}\text{C}$

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**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			AISiC		
Innere Isolation Internal isolation	Basisisolierung (Schutzklasse 1, EN61140) basic insulation (class 1, IEC 61140)		AIN		
Kriechstrecke Creepage distance	Kontakt - Kühlkörper / terminal to heatsink Kontakt - Kontakt / terminal to terminal		15,0 15,0		mm
Luftstrecke Clearance	Kontakt - Kühlkörper / terminal to heatsink Kontakt - Kontakt / terminal to terminal		10,0 10,0		mm
Vergleichszahl der Kriechwegbildung Comperative tracking index		CTI	> 250		
			min. typ. max.		
Wärmewiderstand, Gehäuse bis Kühlkörper Thermal resistance, case to heatsink	pro Modul / per module $\lambda_{\text{Paste}} = 1 \text{ W/(m}\cdot\text{K)} / \lambda_{\text{grease}} = 1 \text{ W/(m}\cdot\text{K)}$	R _{thCH}	8,00		K/kW
Modulstreuintduktivität Stray inductance module		L _{sCE}	20		nH
Modulleitungswiderstand, Anschlüsse - Chip Module lead resistance, terminals - chip	T _c = 25°C, pro Schalter / per switch	R _{CC+EE'}	0,37		mΩ
Lagertemperatur Storage temperature		T _{stg}	-40	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	4,25	-	5,75 Nm
Anzugsdrehmoment f. elektr. Anschlüsse Terminal connection torque	Schraube M4 - Montage gem. gültiger Applikationsschrift Screw M4 - Mounting according to valid application note Schraube M8 - Montage gem. gültiger Applikationsschrift Screw M8 - Mounting according to valid application note	M	1,8	-	2,1 Nm
			8,0	-	10 Nm
Gewicht Weight		G	1050		g

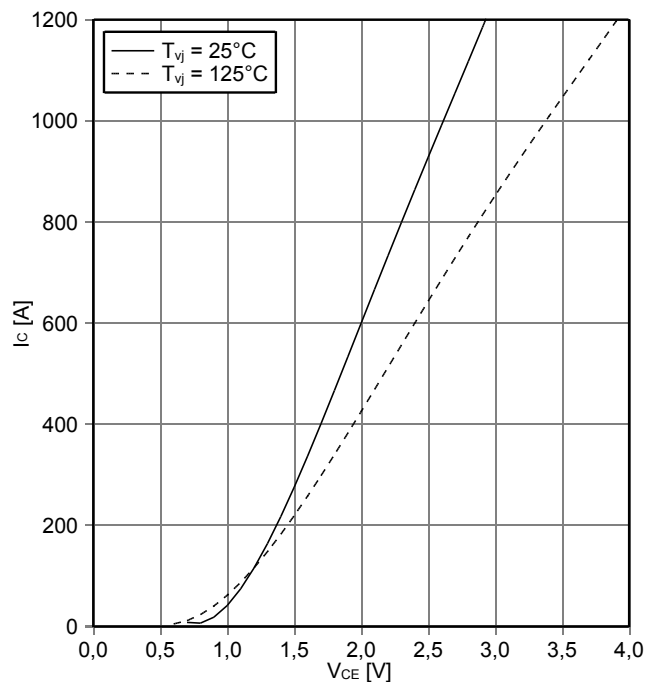
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**Vorläufige Daten
Preliminary Data**

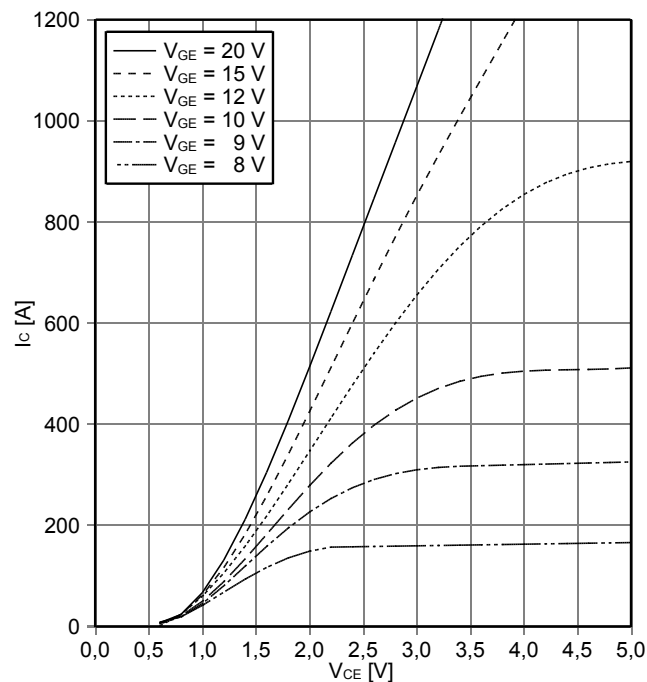
**Ausgangskennlinie IGBT, Brems-Chopper (typisch)
output characteristic IGBT, Brake-Chopper (typical)**

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



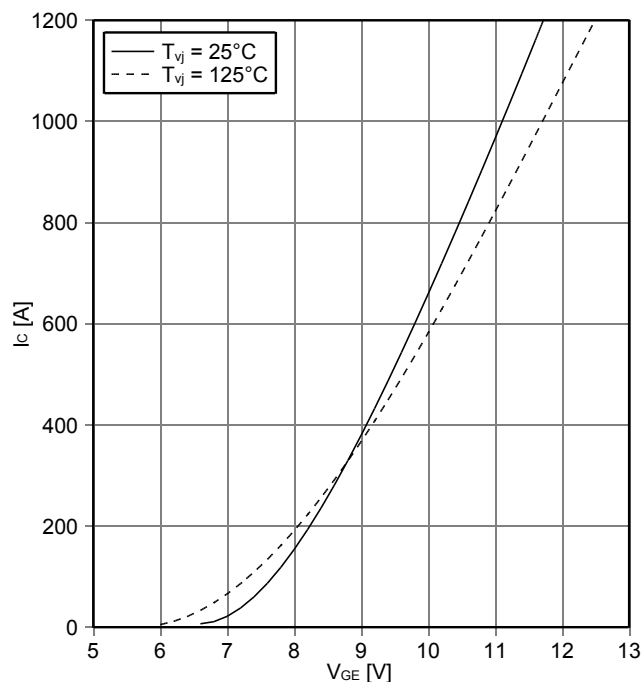
**Ausgangskennlinienfeld IGBT, Brems-Chopper (typisch)
output characteristic IGBT, Brake-Chopper (typical)**

$I_C = f(V_{CE})$
 $T_{vj} = 125^\circ\text{C}$



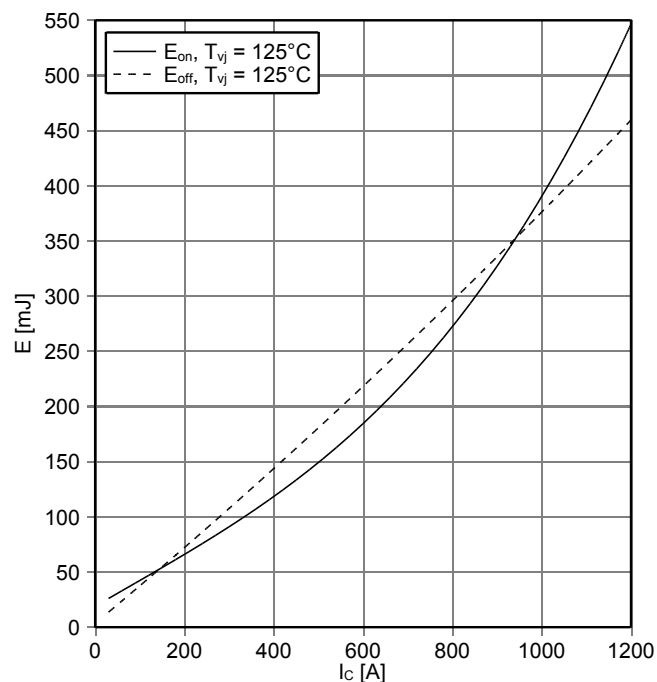
**Übertragungscharakteristik IGBT, Brems-Chopper (typisch)
transfer characteristic IGBT, Brake-Chopper (typical)**

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



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

$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
 $V_{GE} = \pm 15\text{ V}$, $R_{Gon} = 2.4\ \Omega$, $R_{Goff} = 3\ \Omega$, $V_{CE} = 900\text{ V}$



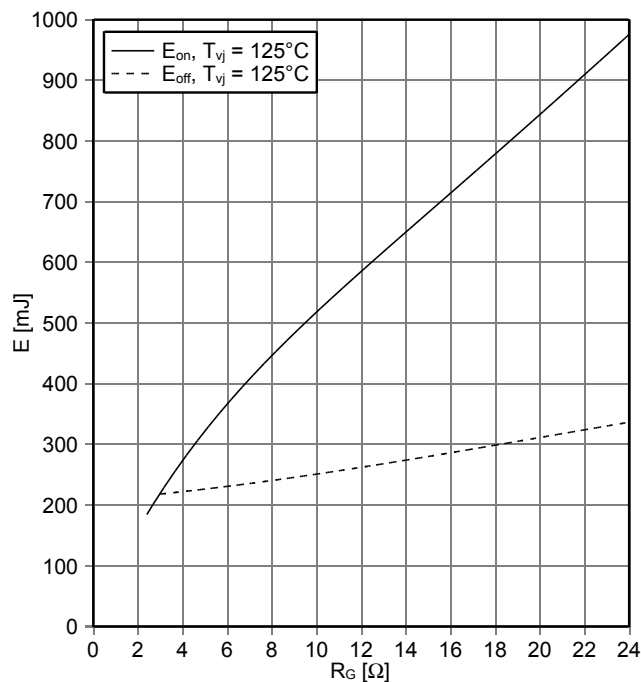
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Preliminary Data**

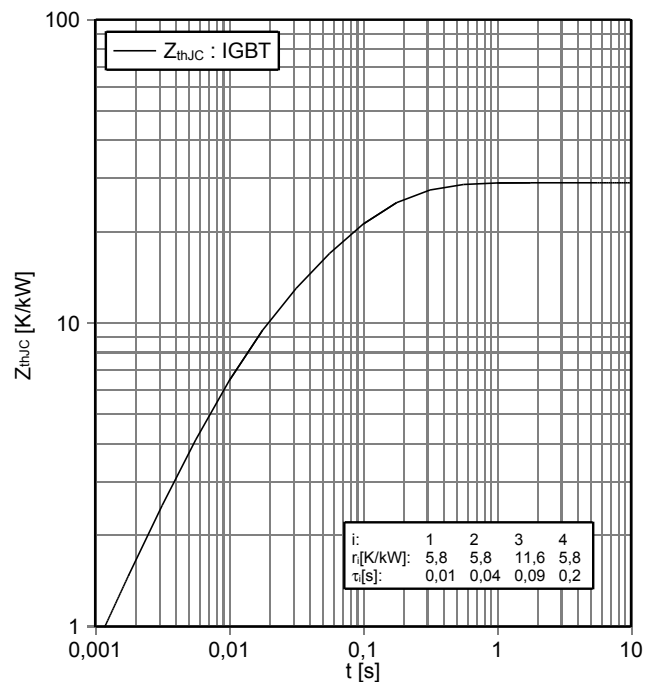
**Schaltverluste IGBT, Brems-Chopper (typisch)
switching losses IGBT, Brake-Chopper (typical)**

$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
 $V_{GE} = \pm 15\text{ V}$, $I_C = 600\text{ A}$, $V_{CE} = 900\text{ V}$



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

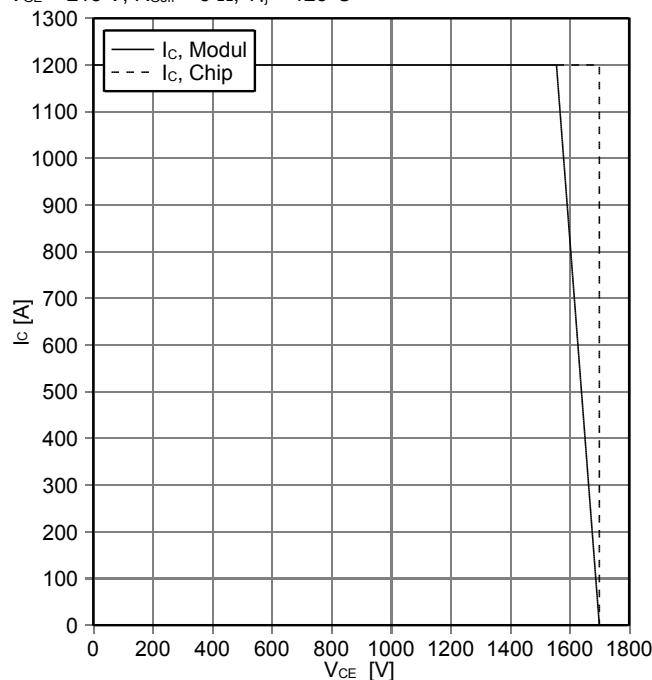
$Z_{thJC} = f(t)$



i :	1	2	3	4
r_i [K/kW]:	5,8	5,8	11,6	5,8
τ_i [s]:	0,01	0,04	0,09	0,2

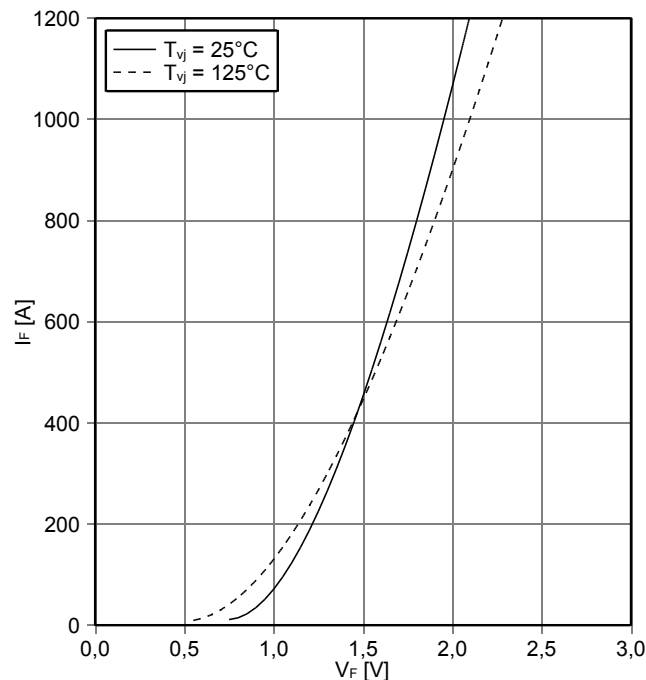
**Sicherer Rückw.-Arbeitsber. IGBT, Brems-Chopper (RBSOA)
reverse bias safe operating area IGBT, Brake-Chopper (RBSOA)**

$I_C = f(V_{CE})$
 $V_{GE} = \pm 15\text{ V}$, $R_{Goff} = 3\ \Omega$, $T_{vj} = 125^\circ\text{C}$



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

$I_F = f(V_F)$



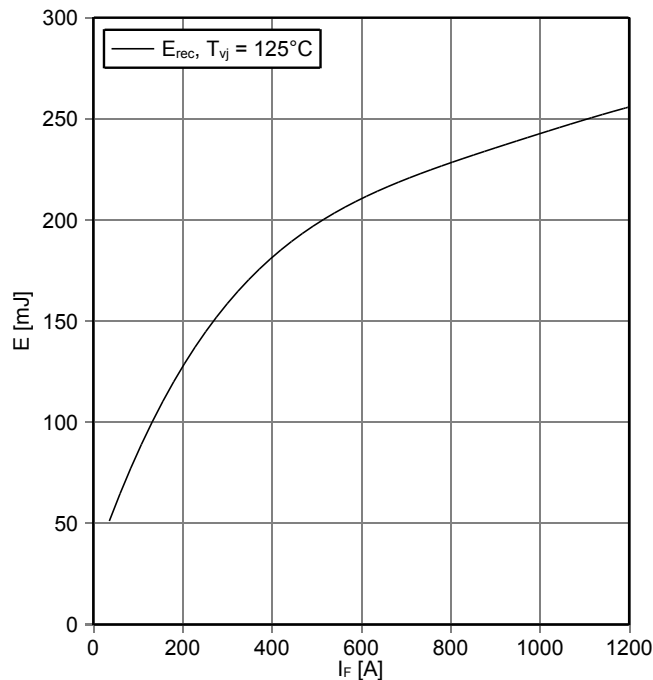
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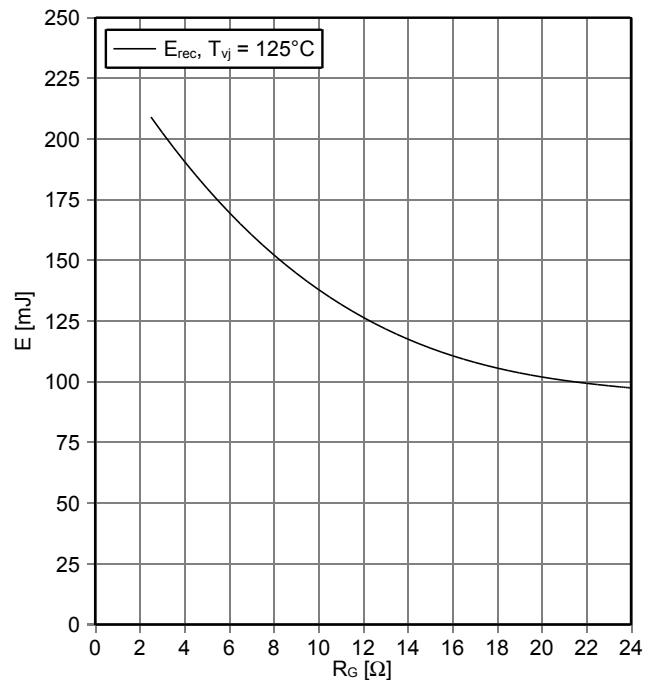
**Schaltverluste Diode, Brems-Chopper (typisch)
switching losses Diode, Brake-Chopper (typical)**

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



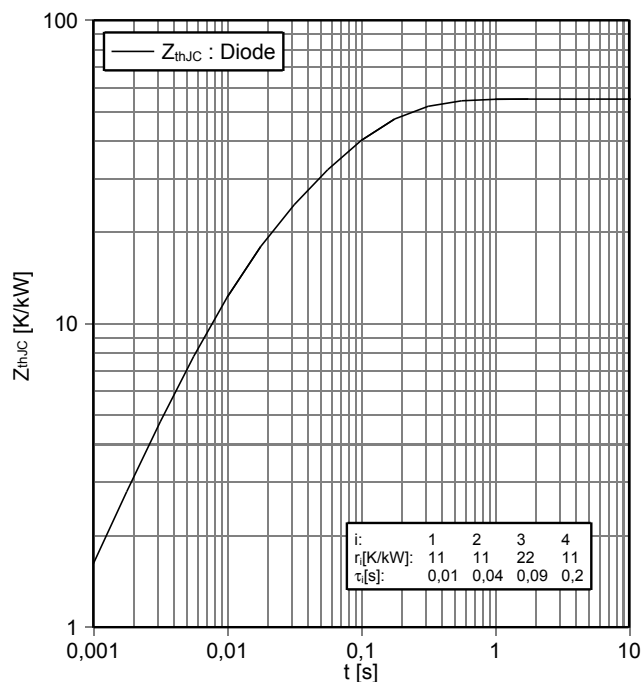
**Schaltverluste Diode, Brems-Chopper (typisch)
switching losses Diode, Brake-Chopper (typical)**

$E_{rec} = f(R_G)$
 $I_F = 600 A, V_{CE} = 900 V$



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

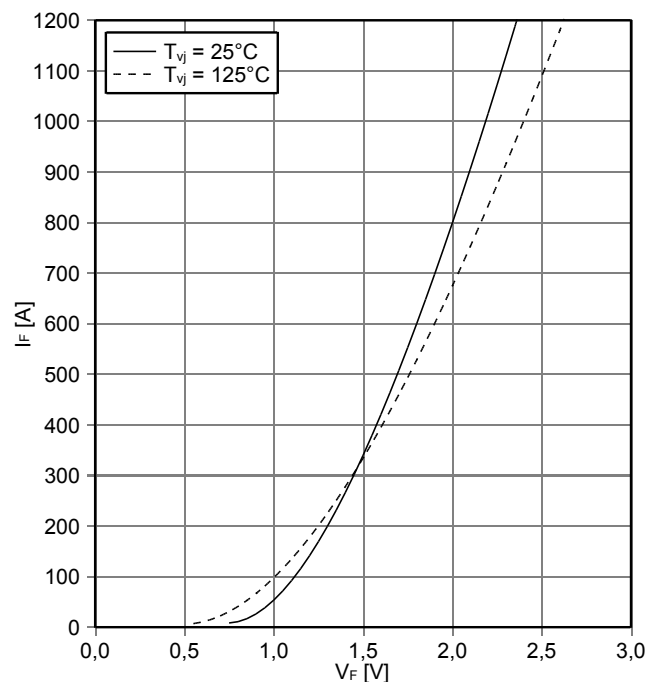
$Z_{thJC} = f(t)$



i:	1	2	3	4
r[K/kW]:	11	11	22	11
τ[s]:	0,01	0,04	0,09	0,2

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

$I_F = f(V_F)$



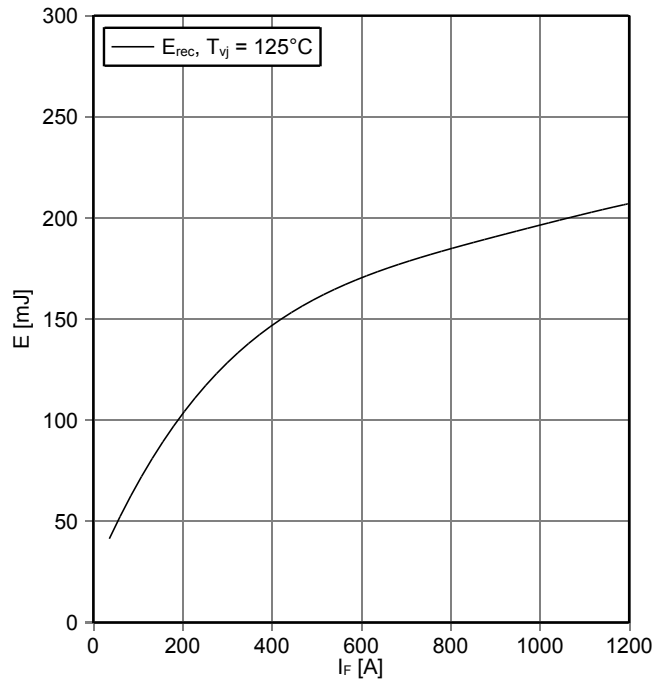
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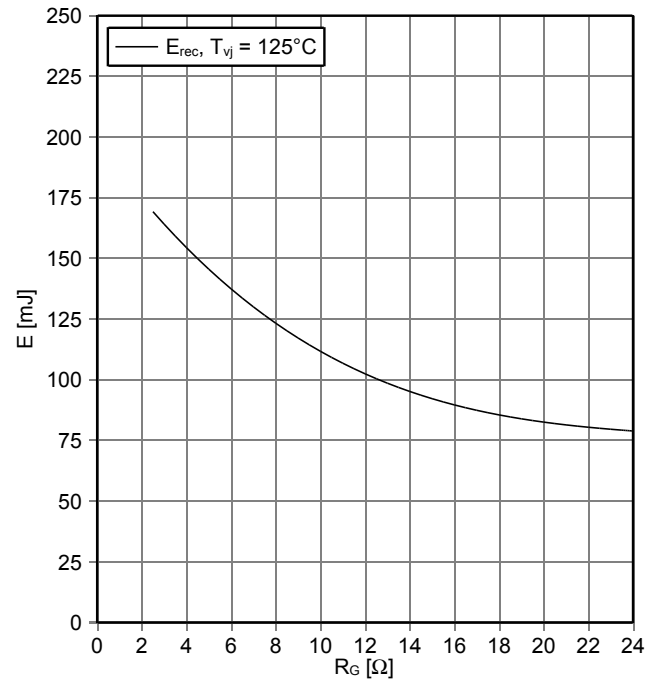
Schaltverluste Diode, Revers (typisch)
switching losses Diode, Reverse (typical)

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



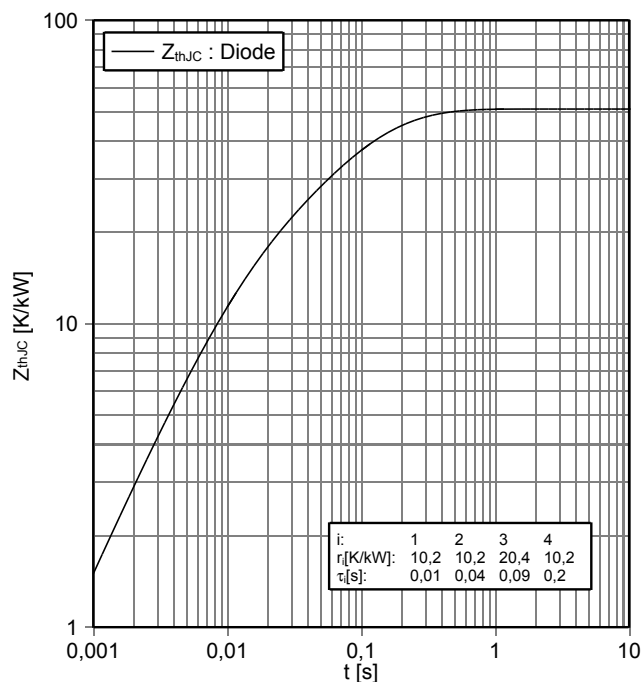
Schaltverluste Diode, Revers (typisch)
switching losses Diode, Reverse (typical)

$E_{rec} = f(R_G)$
 $I_F = 600 A, V_{CE} = 900 V$



Transienter Wärmewiderstand Diode, Revers
transient thermal impedance Diode, Reverse

$Z_{thJC} = f(t)$

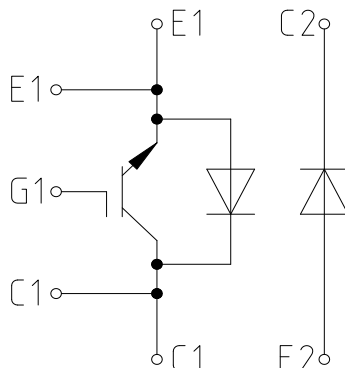


i:	1	2	3	4
r[K/kW]:	10,2	10,2	20,4	10,2
τ[s]:	0,01	0,04	0,09	0,2

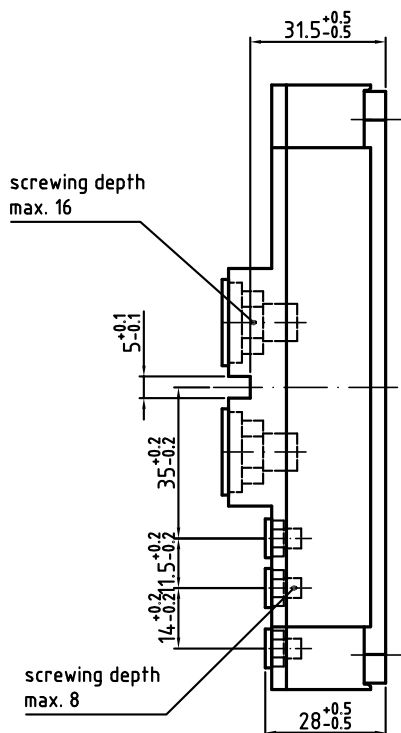
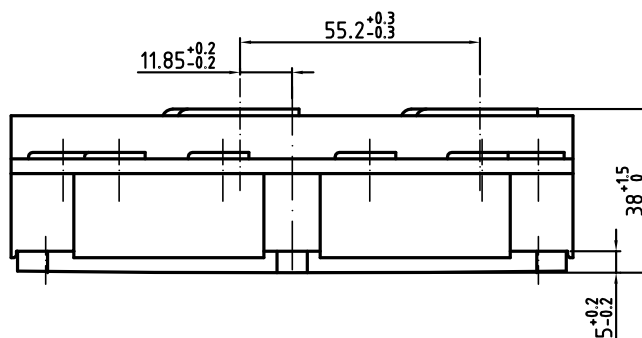
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Preliminary Data

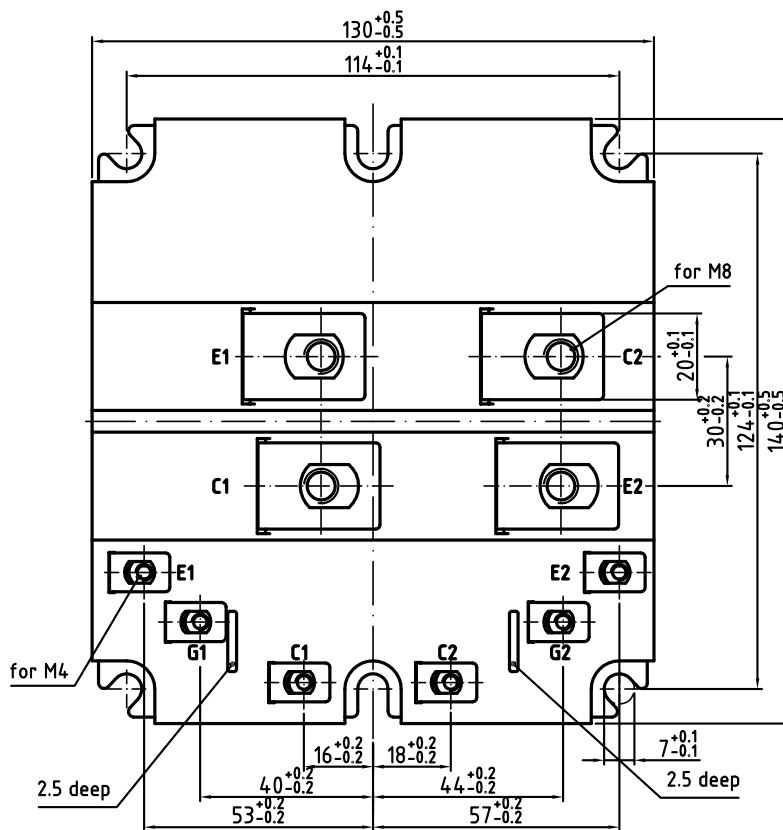
Schaltplan / circuit_diagram_headline



Gehäuseabmessungen / package outlines



IH2



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