



**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	$T_C = 80^{\circ}\text{C}, T_{vj\text{max}} = 150^{\circ}\text{C}$ $T_C = 25^{\circ}\text{C}, T_{vj\text{max}} = 150^{\circ}\text{C}$	$I_{C\text{nom}}$ $I_C$	800 1200	A A
Periodischer Kollektor-Spitzenstrom Repetitive peak collector current	$t_P = 1\text{ ms}$	$I_{CRM}$	1600	A
Gesamt-Verlustleistung Total power dissipation	$T_C = 25^{\circ}\text{C}, T_{vj\text{max}} = 150^{\circ}\text{C}$	$P_{tot}$	5,20	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	$I_C = 800\text{ A}, V_{GE} = 15\text{ V}$ $I_C = 800\text{ A}, V_{GE} = 15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$V_{CE\text{sat}}$	2,00 2,40	2,45	V V
Gate-Schwellenspannung Gate threshold voltage	$I_C = 32,0\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$		$V_{G\text{Eth}}$	5,2	5,8	6,4 V
Gateladung Gate charge	$V_{GE} = -15\text{ V} \dots +15\text{ V}$		$Q_G$	9,30		$\mu\text{C}$
Interner Gatewiderstand Internal gate resistor	$T_{vj} = 25^{\circ}\text{C}$		$R_{G\text{int}}$	1,9		$\Omega$
Eingangskapazität Input capacitance	$f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$		$C_{ies}$	72,0		nF
Rückwirkungskapazität Reverse transfer capacitance	$f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$		$C_{res}$	2,30		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	$I_C = 800\text{ A}, V_{CE} = 900\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 1,8\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$t_{d\text{on}}$	0,65 0,70		$\mu\text{s}$ $\mu\text{s}$
Anstiegszeit, induktive Last Rise time, inductive load	$I_C = 800\text{ A}, V_{CE} = 900\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 1,8\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$t_r$	0,16 0,20		$\mu\text{s}$ $\mu\text{s}$
Abschaltverzögerungszeit, induktive Last Turn-off delay time, inductive load	$I_C = 800\text{ A}, V_{CE} = 900\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 2,2\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$t_{d\text{off}}$	1,30 1,60		$\mu\text{s}$ $\mu\text{s}$
Fallzeit, induktive Last Fall time, inductive load	$I_C = 800\text{ A}, V_{CE} = 900\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 2,2\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$t_f$	0,18 0,30		$\mu\text{s}$ $\mu\text{s}$
Einschaltverlustenergie pro Puls Turn-on energy loss per pulse	$I_C = 800\text{ A}, V_{CE} = 900\text{ V}, L_S = 50\text{ nH}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 1,8\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$E_{on}$	165 240		mJ mJ
Abschaltverlustenergie pro Puls Turn-off energy loss per pulse	$I_C = 800\text{ A}, V_{CE} = 900\text{ V}, L_S = 50\text{ nH}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 2,2\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$E_{off}$	200 295		mJ mJ
Kurzschlußverhalten SC data	$V_{GE} \leq 15\text{ V}, V_{CC} = 1000\text{ V}$ $V_{CE\text{max}} = V_{CES} - L_{SCE} \cdot di/dt$	$t_P \leq 10\ \mu\text{s}, T_{vj} = 125^{\circ}\text{C}$	$I_{SC}$	3200		A
Wärmewiderstand, Chip bis Gehäuse Thermal resistance, junction to case	pro IGBT / per IGBT		$R_{thJC}$		24,0	K/kW
Wärmewiderstand, Gehäuse bis Kühlkörper Thermal resistance, case to heatsink	pro IGBT / per IGBT $\lambda_{\text{Paste}} = 1\text{ W}/(\text{m}\cdot\text{K}) / \lambda_{\text{grease}} = 1\text{ W}/(\text{m}\cdot\text{K})$		$R_{thCH}$	25,0		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		$I_F$	800	A
Periodischer Spitzenstrom Repetitive peak forward current	$t_P = 1\text{ ms}$	$I_{FRM}$	1600	A
Grenzlastintegral $I^2t$ - value	$V_R = 0\text{ V}, t_P = 10\text{ ms}, T_{vj} = 125^{\circ}\text{C}$	$I^2t$	240	$\text{kA}^2\text{s}$

**Charakteristische Werte / Characteristic Values**

			min.	typ.	max.	
Durchlassspannung Forward voltage	$I_F = 800\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 800\text{ A}, V_{GE} = 0\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$V_F$	1,55 1,60	2,00	V V
Rückstromspitze Peak reverse recovery current	$I_F = 800\text{ A}, -di_F/dt = 4900\text{ A}/\mu\text{s} (T_{vj}=125^{\circ}\text{C})$ $V_R = 900\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$I_{RM}$	940 1050		A A
Sperrverzögerungsladung Recovered charge	$I_F = 800\text{ A}, -di_F/dt = 4900\text{ A}/\mu\text{s} (T_{vj}=125^{\circ}\text{C})$ $V_R = 900\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$Q_r$	240 400		$\mu\text{C}$ $\mu\text{C}$
Abschaltenergie pro Puls Reverse recovery energy	$I_F = 800\text{ A}, -di_F/dt = 4900\text{ A}/\mu\text{s} (T_{vj}=125^{\circ}\text{C})$ $V_R = 900\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$E_{rec}$	160 280		mJ mJ
Wärmewiderstand, Chip bis Gehäuse Thermal resistance, junction to case	pro Diode / per diode		$R_{thJC}$		42,0	K/kW
Wärmewiderstand, Gehäuse bis Kühlkörper Thermal resistance, case to heatsink	pro Diode / per diode $\lambda_{\text{Paste}} = 1\text{ W}/(\text{m}\cdot\text{K}) / \lambda_{\text{grease}} = 1\text{ W}/(\text{m}\cdot\text{K})$		$R_{thCH}$	44,0		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		$I_F$	800	A
Periodischer Spitzenstrom Repetitive peak forward current	$t_P = 1 \text{ ms}$	$I_{FRM}$	1600	A
Grenzlastintegral $I^2t$ - value	$V_R = 0 \text{ V}, t_P = 10 \text{ ms}, T_{vj} = 125^{\circ}\text{C}$	$I^2t$	240	$\text{kA}^2\text{s}$

**Charakteristische Werte / Characteristic Values**

			min.	typ.	max.	
Durchlassspannung Forward voltage	$I_F = 800 \text{ A}, V_{GE} = 0 \text{ V}$ $I_F = 800 \text{ A}, V_{GE} = 0 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$V_F$	1,55 1,60	2,00	V V
Rückstromspitze Peak reverse recovery current	$I_F = 800 \text{ A}, -di_F/dt = 4900 \text{ A}/\mu\text{s} (T_{vj}=125^{\circ}\text{C})$ $V_R = 900 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$I_{RM}$	940 1050		A A
Sperrverzögerungsladung Recovered charge	$I_F = 800 \text{ A}, -di_F/dt = 4900 \text{ A}/\mu\text{s} (T_{vj}=125^{\circ}\text{C})$ $V_R = 900 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$Q_r$	240 400		$\mu\text{C}$ $\mu\text{C}$
Abschaltenergie pro Puls Reverse recovery energy	$I_F = 800 \text{ A}, -di_F/dt = 4900 \text{ A}/\mu\text{s} (T_{vj}=125^{\circ}\text{C})$ $V_R = 900 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$E_{rec}$	160 280		mJ mJ
Wärmewiderstand, Chip bis Gehäuse Thermal resistance, junction to case	pro Diode / per diode		$R_{thJC}$		42,0	K/kW
Wärmewiderstand, Gehäuse bis Kühlkörper Thermal resistance, case to heatsink	pro Diode / per diode $\lambda_{\text{Paste}} = 1 \text{ W}/(\text{m}\cdot\text{K}) / \lambda_{\text{grease}} = 1 \text{ W}/(\text{m}\cdot\text{K})$		$R_{thCH}$	44,0		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**

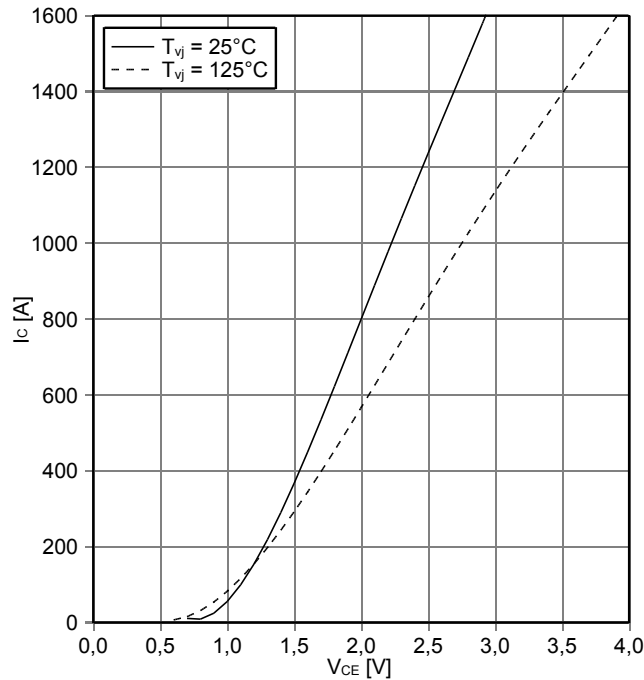
Isolations-Prüfspannung Isolation test voltage	RMS, f = 50 Hz, t = 1 min.	V <sub>ISOL</sub>	4,0		kV
Material Modulgrundplatte Material of module baseplate			AISiC		
Innere Isolation Internal isolation	Basisisolierung (Schutzklasse 1, EN61140) basic insulation (class 1, IEC 61140)		AIN		
Kriechstrecke 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.
Modulstreuintduktivität Stray inductance module		L <sub>sCE</sub>		20	nH
Modulleitungswiderstand, Anschlüsse - Chip Module lead resistance, terminals - chip	T <sub>c</sub> = 25°C, pro Schalter / per switch	R <sub>CC'+EE'</sub> R <sub>AA'+CC'</sub>		0,37 0,37	mΩ
Lagertemperatur Storage temperature		T <sub>stg</sub>	-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	M	1,8	-	2,1 Nm
	Schraube M8 - Montage gem. gültiger Applikationsschrift Screw M8 - Mounting according to valid application note		8,0	-	10 Nm
Gewicht Weight		G		1050	g

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**Preliminary Data**

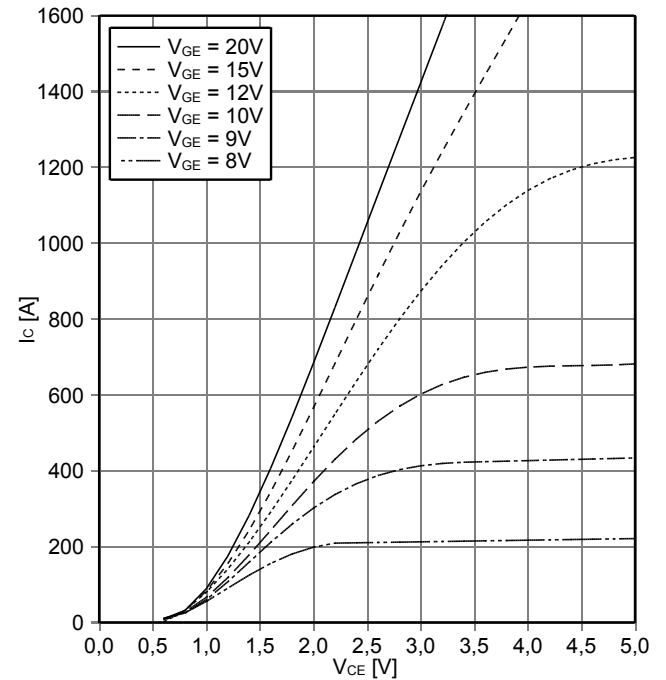
**Ausgangskennlinie IGBT, Brems-Chopper (typisch)**  
**output characteristic IGBT, Brake-Chopper (typical)**

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



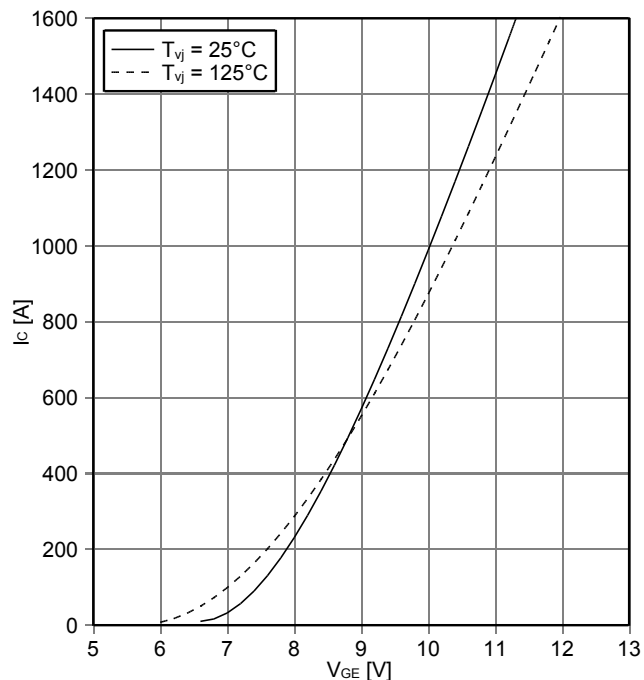
**Ausgangskennlinienfeld IGBT, Brems-Chopper (typisch)**  
**output characteristic IGBT, Brake-Chopper (typical)**

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



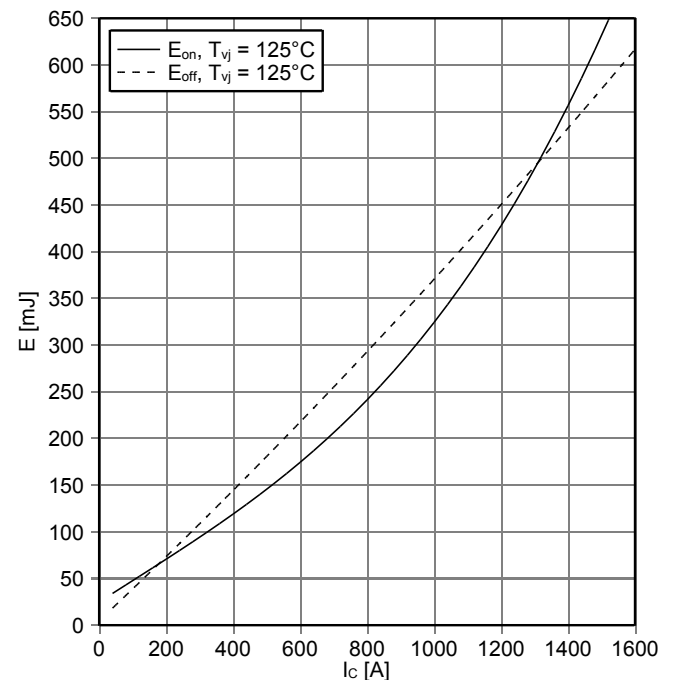
**Übertragungscharakteristik IGBT, Brems-Chopper (typisch)**  
**transfer characteristic IGBT, Brake-Chopper (typical)**

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



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

$E_{on} = f(I_C), E_{off} = f(I_C)$   
 $V_{GE} = \pm 15\text{ V}, R_{Gon} = 1.8\ \Omega, R_{Goff} = 2.2\ \Omega, V_{CE} = 900\text{ V}$



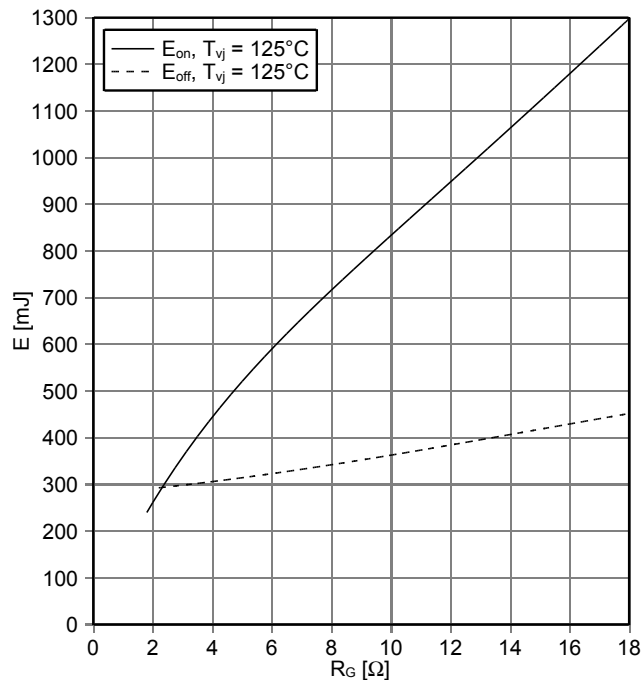
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Preliminary Data

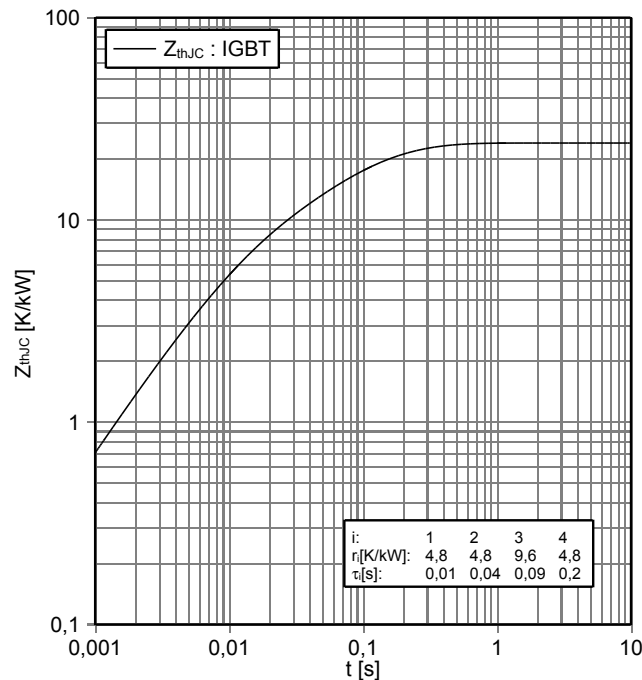
Schaltverluste IGBT, Brems-Chopper (typisch)  
switching losses IGBT, Brake-Chopper (typical)

$E_{on} = f(R_G)$ ,  $E_{off} = f(R_G)$   
 $V_{GE} = \pm 15\text{ V}$ ,  $I_C = 800\text{ A}$ ,  $V_{CE} = 900\text{ V}$



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

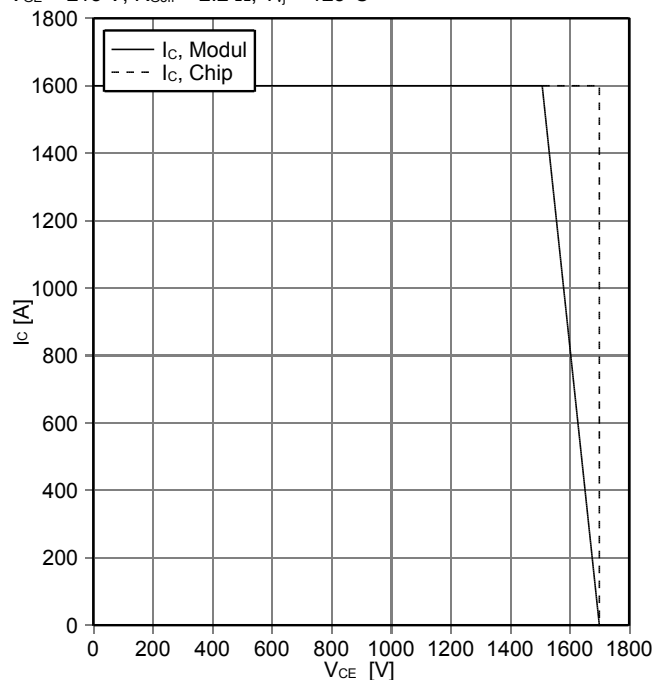
$Z_{thJC} = f(t)$



$i$ :	1	2	3	4
$r_i$ [K/kW]:	4,8	4,8	9,6	4,8
$\tau_i$ [s]:	0,01	0,04	0,09	0,2

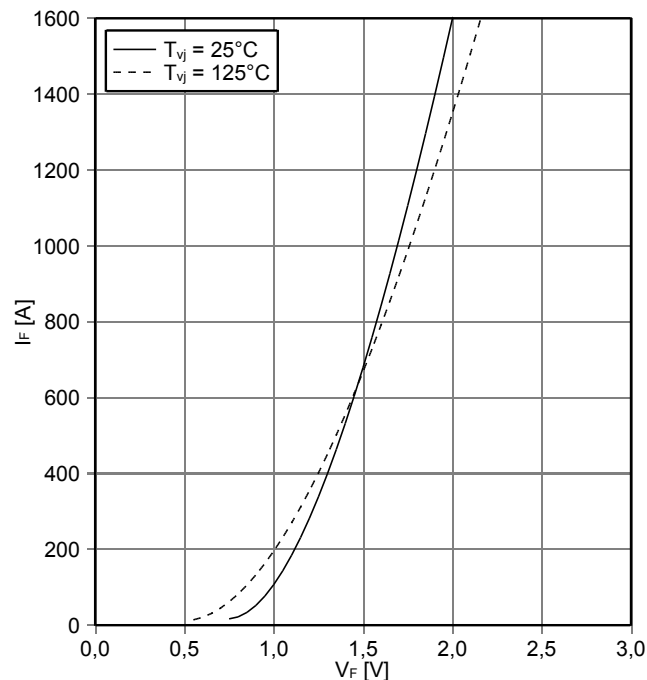
Sicherer Rückw.-Arbeitsber. IGBT, Brems-Chopper (RBSOA)  
reverse bias safe operating area IGBT, Brake-Chopper (RBSOA)

$I_C = f(V_{CE})$   
 $V_{GE} = \pm 15\text{ V}$ ,  $R_{Goff} = 2.2\ \Omega$ ,  $T_{vj} = 125^\circ\text{C}$



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

$I_F = f(V_F)$



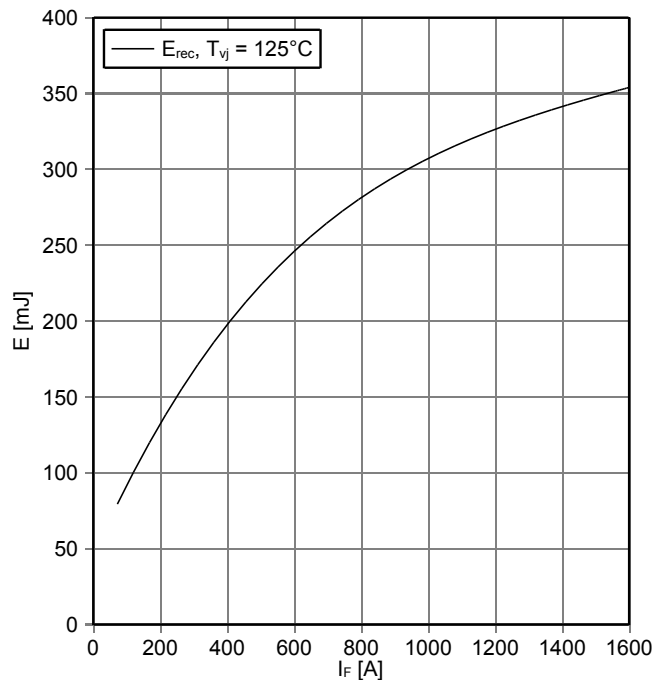
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**Vorläufige Daten  
Preliminary Data**

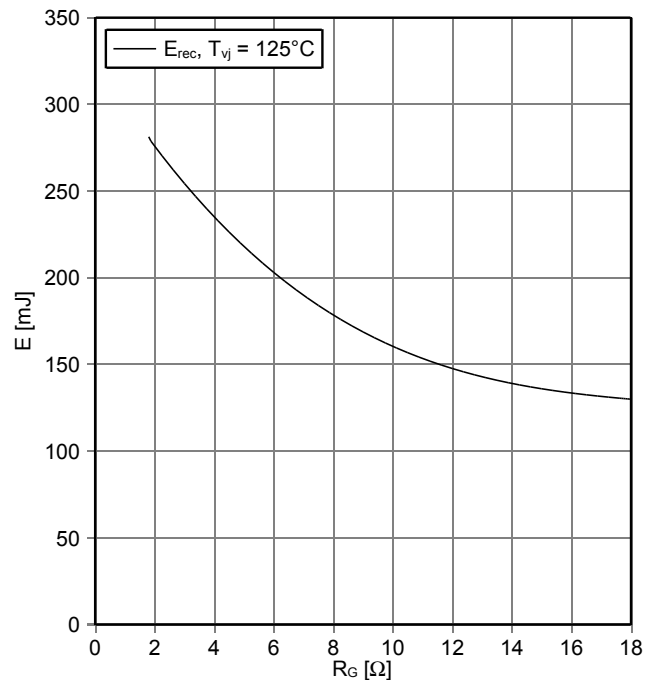
**Schaltverluste Diode, Brems-Chopper (typisch)  
switching losses Diode, Brake-Chopper (typical)**

$E_{rec} = f(I_F)$   
 $R_{Gon} = 1.8 \Omega, V_{CE} = 900 V$



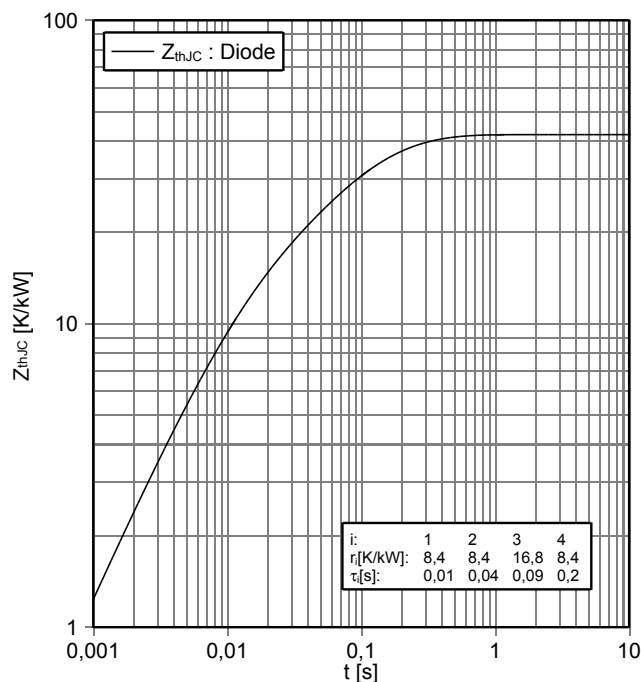
**Schaltverluste Diode, Brems-Chopper (typisch)  
switching losses Diode, Brake-Chopper (typical)**

$E_{rec} = f(R_G)$   
 $I_F = 800 A, V_{CE} = 900 V$



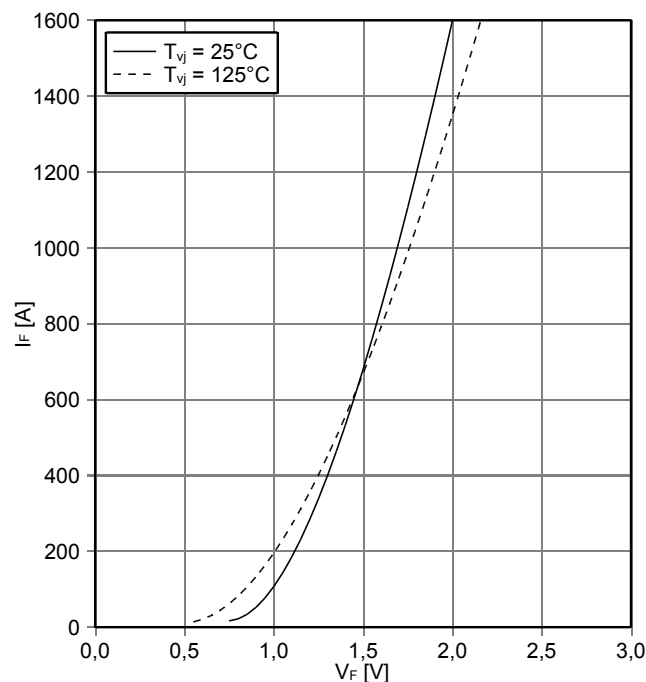
**Transienter Wärmewiderstand Diode, Brems-Chopper  
transient thermal impedance Diode, Brake-Chopper**

$Z_{thJC} = f(t)$



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

$I_F = f(V_F)$

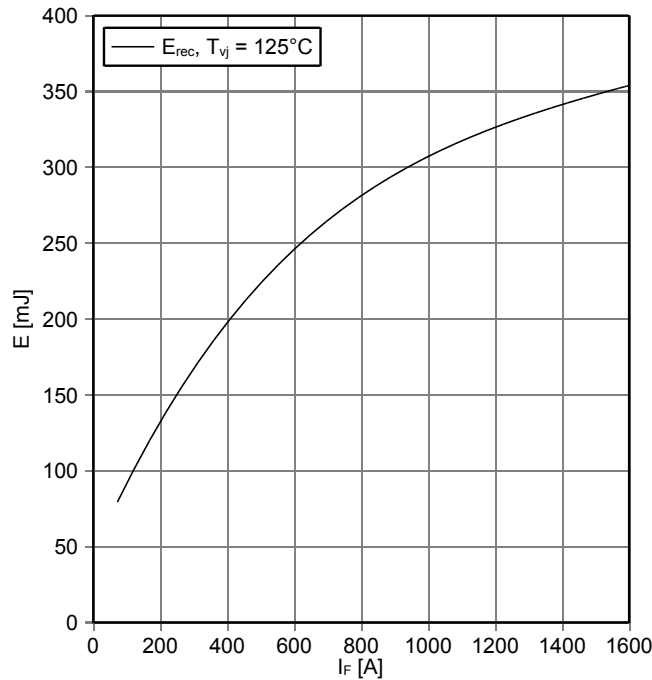


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**Vorläufige Daten  
Preliminary Data**

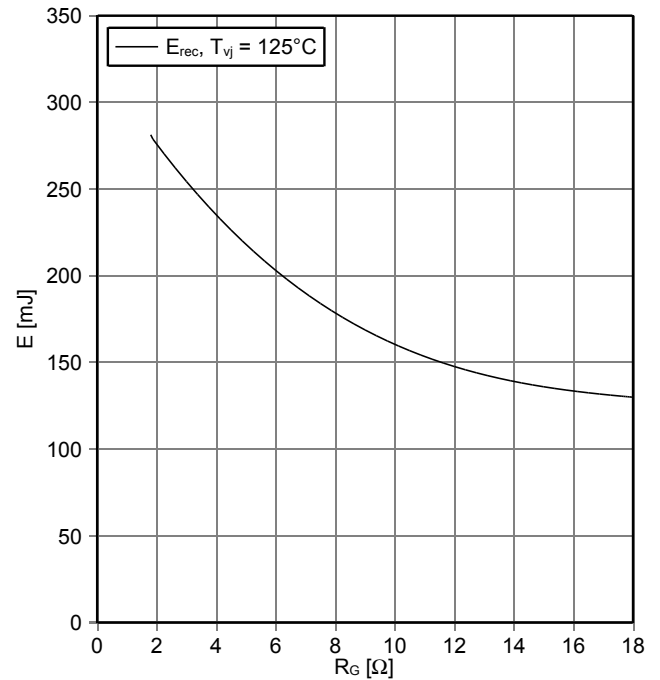
**Schaltverluste Diode, Revers (typisch)  
switching losses Diode, Reverse (typical)**

$E_{rec} = f(I_F)$   
 $R_{Gon} = 1.8 \Omega, V_{CE} = 900 V$



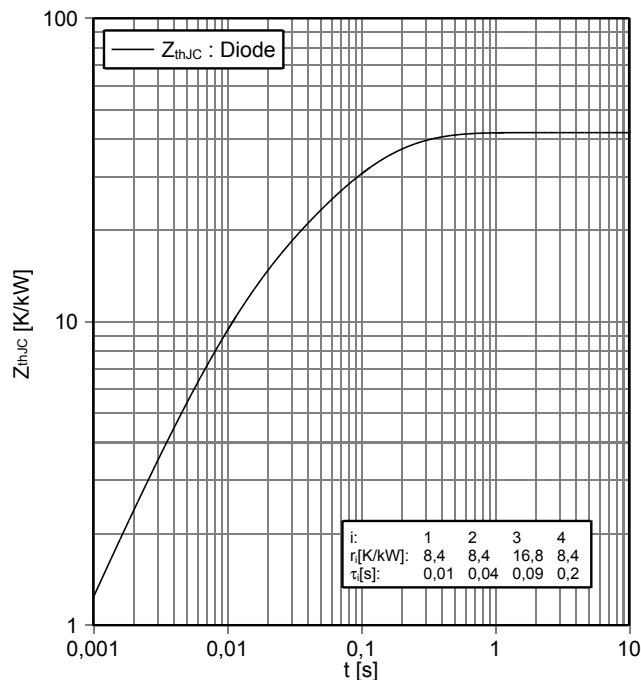
**Schaltverluste Diode, Revers (typisch)  
switching losses Diode, Reverse (typical)**

$E_{rec} = f(R_G)$   
 $I_F = 800 A, V_{CE} = 900 V$



**Transienter Wärmewiderstand Diode, Revers  
transient thermal impedance Diode, Reverse**

$Z_{thJC} = f(t)$



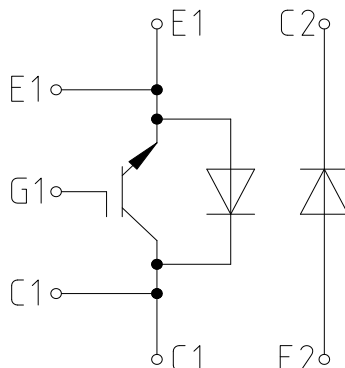
i:	1	2	3	4
r <sub>f</sub> [K/kW]:	8,4	8,4	16,8	8,4
τ <sub>f</sub> [s]:	0,01	0,04	0,09	0,2

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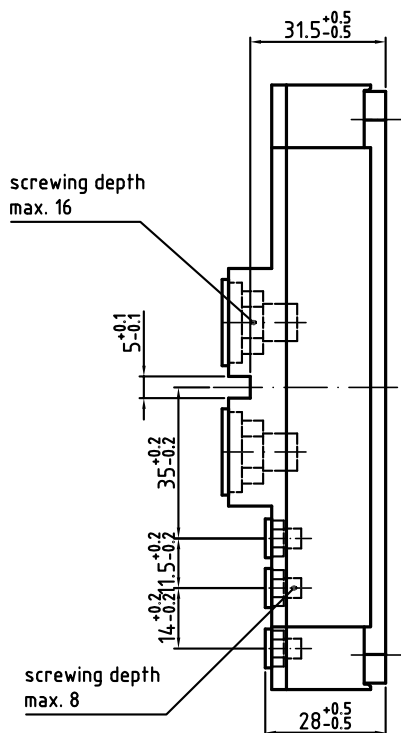
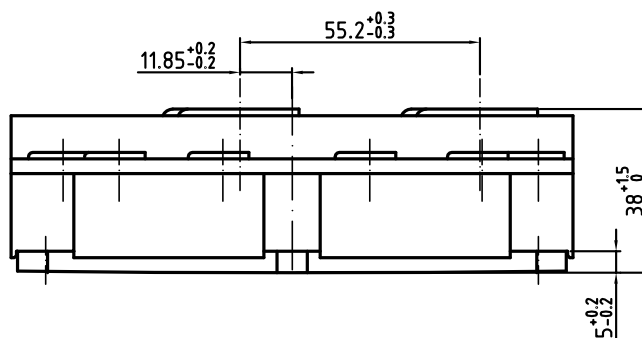


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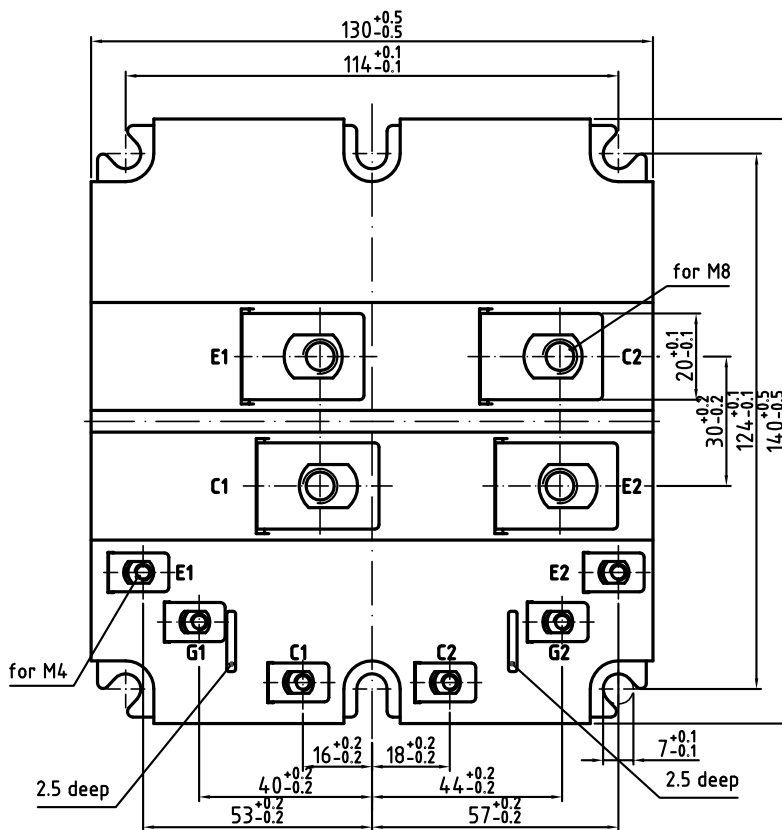
Schaltplan / circuit\_diagram\_headline



Gehäuseabmessungen / package outlines



IH2



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