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With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



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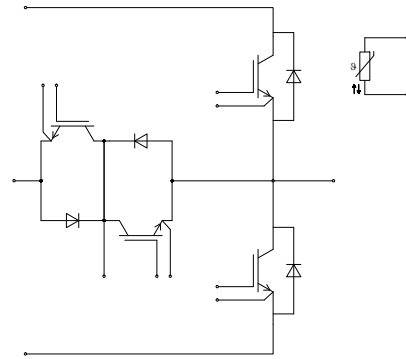
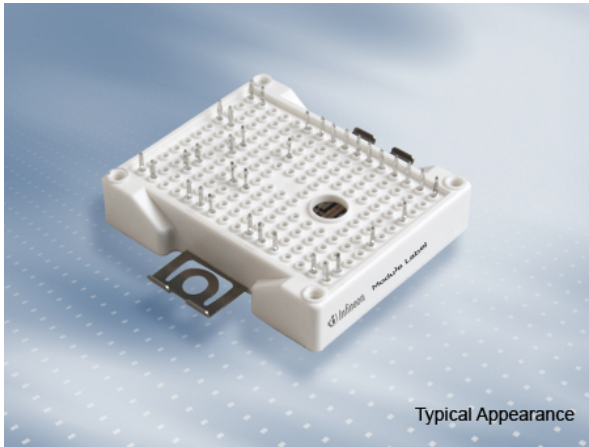
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EasyPACK™ Modul mit aktiver "Neutral Point Clamp 2" Topologie und PressFIT / NTC / TIM  
 EasyPACK™ module with active "Neutral Point Clamp 2" topology and PressFIT / NTC / TIM



$V_{CES} = 650V$   
 $I_{C\ nom} = 125A / I_{CRM} = 250A$

### Typische Anwendungen

- 3-Level-Applikationen
- Motorantriebe
- Solar Anwendungen
- USV-Systeme

### Typical Applications

- 3-level-applications
- Motor drives
- Solar applications
- UPS systems

### Elektrische Eigenschaften

- High Speed IGBT H3
- $T_{vj\ op} = 150^{\circ}C$

### Electrical Features

- High speed IGBT H3
- $T_{vj\ op} = 150^{\circ}C$

### Mechanische Eigenschaften

- 2,5 kV AC 1min Isolationsfestigkeit
- Integrierter NTC Temperatur Sensor
- PressFIT Verbindungstechnik
- RoHS konform
- Thermisches Interface Material bereits aufgetragen

### Mechanical Features

- 2.5 kV AC 1min insulation
- Integrated NTC temperature sensor
- PressFIT contact technology
- RoHS compliant
- 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, T1 / T4 / IGBT, T1 / T4

### Höchstzulässige Werte / Maximum Rated Values

Kollektor-Emitter-Sperrspannung Collector-emitter voltage	$T_{vj} = 25^{\circ}\text{C}$	$V_{CES}$	650	V
Implementierter Kollektor-Strom Implemented collector current		$I_{CN}$	225	A
Kollektor-Dauergleichstrom Continuous DC collector current	$T_H = 95^{\circ}\text{C}, T_{vj\text{ max}} = 175^{\circ}\text{C}$	$I_{C\text{ nom}}$	125	A
Periodischer Kollektor-Spitzenstrom Repetitive peak collector current	$t_p = 1\text{ ms}$	$I_{CRM}$	450	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	$I_C = 125\text{ A}, V_{GE} = 15\text{ V}$ $I_C = 125\text{ A}, V_{GE} = 15\text{ V}$ $I_C = 125\text{ A}, V_{GE} = 15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$V_{CE\text{ sat}}$	1,40 1,45 1,45	1,65	V V V
Gate-Schwellenspannung Gate threshold voltage	$I_C = 3,60\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$		$V_{GETH}$	5,05	5,80	6,45 V
Gateladung Gate charge	$V_{GE} = -15\text{ V} \dots +15\text{ V}$		$Q_G$	2,40		$\mu\text{C}$
Interner Gatewiderstand Internal gate resistor	$T_{vj} = 25^{\circ}\text{C}$		$R_{Gint}$	0,0		$\Omega$
Eingangskapazität Input capacitance	$f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$		$C_{ies}$	14,0		nF
Rückwirkungskapazität Reverse transfer capacitance	$f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$		$C_{res}$	0,42		nF
Kollektor-Emitter-Reststrom Collector-emitter cut-off current	$V_{CE} = 650\text{ V}, V_{GE} = 0\text{ V}, T_{vj} = 25^{\circ}\text{C}$		$I_{CES}$		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	$I_C = 125\text{ A}, V_{CE} = 400\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 10\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_{don}$	0,06 0,07 0,07		$\mu\text{s}$ $\mu\text{s}$ $\mu\text{s}$
Anstiegszeit, induktive Last Rise time, inductive load	$I_C = 125\text{ A}, V_{CE} = 400\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 10\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_r$	0,09 0,10 0,10		$\mu\text{s}$ $\mu\text{s}$ $\mu\text{s}$
Abschaltverzögerungszeit, induktive Last Turn-off delay time, inductive load	$I_C = 125\text{ A}, V_{CE} = 400\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 10\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_{doff}$	0,06 0,07 0,07		$\mu\text{s}$ $\mu\text{s}$ $\mu\text{s}$
Fallzeit, induktive Last Fall time, inductive load	$I_C = 125\text{ A}, V_{CE} = 400\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 10\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_f$	0,03 0,04 0,04		$\mu\text{s}$ $\mu\text{s}$ $\mu\text{s}$
Einschaltverlustenergie pro Puls Turn-on energy loss per pulse	$I_C = 125\text{ A}, V_{CE} = 400\text{ V}, L_S = 25\text{ nH}$ $V_{GE} = \pm 15\text{ V}, di/dt = 1500\text{ A}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$ $R_{Gon} = 10\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$E_{on}$	8,50 10,0 10,5		mJ mJ mJ
Abschaltverlustenergie pro Puls Turn-off energy loss per pulse	$I_C = 125\text{ A}, V_{CE} = 400\text{ V}, L_S = 25\text{ nH}$ $V_{GE} = \pm 15\text{ V}, du/dt = 2900\text{ V}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$ $R_{Goff} = 10\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$E_{off}$	4,40 5,20 5,80		mJ mJ mJ
Kurzschlußverhalten SC data	$V_{GE} \leq 15\text{ V}, V_{CC} = 400\text{ V}$ $V_{CE\text{ max}} = V_{CES} - L_{SCE} \cdot di/dt$ $t_p \leq 0\ \mu\text{s}, T_{vj} = 150^{\circ}\text{C}$		$I_{SC}$	1300		A
Wärmewiderstand, Chip bis Kühlkörper Thermal resistance, junction to heatsink	pro IGBT / per IGBT valid with IFX pre-applied thermal interface material		$R_{thJH}$		0,364	K/W
Temperatur im Schaltbetrieb Temperature under switching conditions			$T_{vj\text{ op}}$	-40	150	$^{\circ}\text{C}$

## Diode, D2 / D3 / Diode, D2 / D3

### Höchstzulässige Werte / Maximum Rated Values

Periodische Spitzensperrspannung Repetitive peak reverse voltage	$T_{vj} = 25^{\circ}\text{C}$	$V_{RRM}$	650	V
Implementierter Durchlassstrom Implemented forward current		$I_{FN}$	100	A
Dauergleichstrom Continuous DC forward current		$I_F$	85	A
Periodischer Spitzenstrom Repetitive peak forward current	$t_p = 1\text{ ms}$	$I_{FRM}$	200	A
Grenzlastintegral $I^2t$ - value	$V_R = 0\text{ V}, t_p = 10\text{ ms}, T_{vj} = 125^{\circ}\text{C}$ $V_R = 0\text{ V}, t_p = 10\text{ ms}, T_{vj} = 150^{\circ}\text{C}$	$I^2t$	850 800	$\text{A}^2\text{s}$ $\text{A}^2\text{s}$

### Charakteristische Werte / Characteristic Values

		min.	typ.	max.	
Durchlassspannung Forward voltage	$I_F = 85\text{ A}, V_{GE} = 0\text{ V}$ $T_{vj} = 25^{\circ}\text{C}$		1,55	2,00	V
	$I_F = 85\text{ A}, V_{GE} = 0\text{ V}$ $T_{vj} = 125^{\circ}\text{C}$		1,50		V
	$I_F = 85\text{ A}, V_{GE} = 0\text{ V}$ $T_{vj} = 150^{\circ}\text{C}$		1,45		V
Rückstromspitze Peak reverse recovery current	$I_F = 85\text{ A}, -di_F/dt = 1300\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $T_{vj} = 25^{\circ}\text{C}$		37,0		A
	$V_R = 400\text{ V}$ $T_{vj} = 125^{\circ}\text{C}$		52,0		A
	$V_{GE} = -15\text{ V}$ $T_{vj} = 150^{\circ}\text{C}$		57,0		A
Sperrverzögerungsladung Recovered charge	$I_F = 85\text{ A}, -di_F/dt = 1300\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $T_{vj} = 25^{\circ}\text{C}$		2,50		$\mu\text{C}$
	$V_R = 400\text{ V}$ $T_{vj} = 125^{\circ}\text{C}$		4,80		$\mu\text{C}$
	$V_{GE} = -15\text{ V}$ $T_{vj} = 150^{\circ}\text{C}$		5,60		$\mu\text{C}$
Abschaltenergie pro Puls Reverse recovery energy	$I_F = 85\text{ A}, -di_F/dt = 1300\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $T_{vj} = 25^{\circ}\text{C}$		0,24		mJ
	$V_R = 400\text{ V}$ $T_{vj} = 125^{\circ}\text{C}$		0,65		mJ
	$V_{GE} = -15\text{ V}$ $T_{vj} = 150^{\circ}\text{C}$		0,79		mJ
Wärmewiderstand, Chip bis Kühlkörper Thermal resistance, junction to heatsink	pro Diode / per diode valid with IFX pre-applied thermal interface material	$R_{thJH}$		0,935	K/W
Temperatur im Schaltbetrieb Temperature under switching conditions		$T_{vj\text{ op}}$	-40	150	$^{\circ}\text{C}$

## IGBT, T2 / T3 / IGBT, T2 / T3

### Höchstzulässige Werte / Maximum Rated Values

Kollektor-Emitter-Sperrspannung Collector-emitter voltage	$T_{vj} = 25^{\circ}\text{C}$	$V_{CES}$	650	V
Implementierter Kollektor-Strom Implemented collector current		$I_{CN}$	100	A
Kollektor-Dauergleichstrom Continuous DC collector current	$T_H = 25^{\circ}\text{C}, T_{vj\text{ max}} = 175^{\circ}\text{C}$	$I_{C\text{ nom}}$	85	A
Periodischer Kollektor-Spitzenstrom Repetitive peak collector current	$t_p = 1\text{ ms}$	$I_{CRM}$	200	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	$I_C = 85\text{ A}, V_{GE} = 15\text{ V}$ $I_C = 85\text{ A}, V_{GE} = 15\text{ V}$ $I_C = 85\text{ A}, V_{GE} = 15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$V_{CE\text{ sat}}$	1,35 1,50 1,55	1,75	V V V
Gate-Schwellenspannung Gate threshold voltage	$I_C = 1,60\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$		$V_{GETH}$	4,95	5,80	6,45 V
Gateladung Gate charge	$V_{GE} = -15\text{ V} \dots +15\text{ V}$		$Q_G$	1,00		$\mu\text{C}$
Interner Gatewiderstand Internal gate resistor	$T_{vj} = 25^{\circ}\text{C}$		$R_{Gint}$	2,0		$\Omega$
Eingangskapazität Input capacitance	$f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$		$C_{ies}$	6,20		nF
Rückwirkungskapazität Reverse transfer capacitance	$f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$		$C_{res}$	0,19		nF
Kollektor-Emitter-Reststrom Collector-emitter cut-off current	$V_{CE} = 650\text{ V}, V_{GE} = 0\text{ V}, T_{vj} = 25^{\circ}\text{C}$		$I_{CES}$		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	$I_C = 85\text{ A}, V_{CE} = 400\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 10\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_{don}$	0,07 0,08 0,08		$\mu\text{s}$ $\mu\text{s}$ $\mu\text{s}$
Anstiegszeit, induktive Last Rise time, inductive load	$I_C = 85\text{ A}, V_{CE} = 400\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 10\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_r$	0,04 0,05 0,05		$\mu\text{s}$ $\mu\text{s}$ $\mu\text{s}$
Abschaltverzögerungszeit, induktive Last Turn-off delay time, inductive load	$I_C = 85\text{ A}, V_{CE} = 400\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 10\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_{doff}$	0,35 0,40 0,40		$\mu\text{s}$ $\mu\text{s}$ $\mu\text{s}$
Fallzeit, induktive Last Fall time, inductive load	$I_C = 85\text{ A}, V_{CE} = 400\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 10\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_f$	0,05 0,10 0,10		$\mu\text{s}$ $\mu\text{s}$ $\mu\text{s}$
Einschaltverlustenergie pro Puls Turn-on energy loss per pulse	$I_C = 85\text{ A}, V_{CE} = 400\text{ V}, L_S = 25\text{ nH}$ $V_{GE} = \pm 15\text{ V}, di/dt = 1300\text{ A}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$ $R_{Gon} = 10\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$E_{on}$	4,80 7,10 7,60		mJ mJ mJ
Abschaltverlustenergie pro Puls Turn-off energy loss per pulse	$I_C = 85\text{ A}, V_{CE} = 400\text{ V}, L_S = 25\text{ nH}$ $V_{GE} = \pm 15\text{ V}, du/dt = 3500\text{ V}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$ $R_{Goff} = 10\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$E_{off}$	2,50 3,80 4,20		mJ mJ mJ
Kurzschlußverhalten SC data	$V_{GE} \leq 15\text{ V}, V_{CC} = 400\text{ V}$ $V_{CE\text{ max}} = V_{CES} - L_{SCE} \cdot di/dt$ $t_p \leq 6\ \mu\text{s}, T_{vj} = 150^{\circ}\text{C}$		$I_{SC}$	500		A
Wärmewiderstand, Chip bis Kühlkörper Thermal resistance, junction to heatsink	pro IGBT / per IGBT valid with IFX pre-applied thermal interface material		$R_{thJH}$		0,802	K/W
Temperatur im Schaltbetrieb Temperature under switching conditions			$T_{vj\text{ op}}$	-40	150	$^{\circ}\text{C}$

## Diode, D1 / D4 / Diode, D1 / D4

### Höchstzulässige Werte / Maximum Rated Values

Periodische Spitzensperrspannung Repetitive peak reverse voltage	$T_{vj} = 25^{\circ}\text{C}$	$V_{RRM}$	650	V
Implementierter Durchlassstrom Implemented forward current		$I_{FN}$	225	A
Dauergleichstrom Continuous DC forward current		$I_F$	125	A
Periodischer Spitzenstrom Repetitive peak forward current	$t_p = 1 \text{ ms}$	$I_{FRM}$	450	A
Grenzlastintegral $I^2t$ - value	$V_R = 0 \text{ V}, t_p = 10 \text{ ms}, T_{vj} = 125^{\circ}\text{C}$ $V_R = 0 \text{ V}, t_p = 10 \text{ ms}, T_{vj} = 150^{\circ}\text{C}$	$I^2t$	3750 3500	$\text{A}^2\text{s}$ $\text{A}^2\text{s}$

### Charakteristische Werte / Characteristic Values

		min.	typ.	max.	
Durchlassspannung Forward voltage	$I_F = 125 \text{ A}, V_{GE} = 0 \text{ V}$ $T_{vj} = 25^{\circ}\text{C}$		1,35	1,55	V
	$I_F = 125 \text{ A}, V_{GE} = 0 \text{ V}$ $T_{vj} = 125^{\circ}\text{C}$		1,25		V
	$I_F = 125 \text{ A}, V_{GE} = 0 \text{ V}$ $T_{vj} = 150^{\circ}\text{C}$		1,20		V
Rückstromspitze Peak reverse recovery current	$I_F = 125 \text{ A}, -di_F/dt = 1500 \text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $T_{vj} = 25^{\circ}\text{C}$		46,0		A
	$V_R = 400 \text{ V}$ $T_{vj} = 125^{\circ}\text{C}$		70,0		A
	$V_{GE} = -15 \text{ V}$ $T_{vj} = 150^{\circ}\text{C}$		76,0		A
Sperrverzögerungsladung Recovered charge	$I_F = 125 \text{ A}, -di_F/dt = 1500 \text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $T_{vj} = 25^{\circ}\text{C}$		6,40		$\mu\text{C}$
	$V_R = 400 \text{ V}$ $T_{vj} = 125^{\circ}\text{C}$		12,5		$\mu\text{C}$
	$V_{GE} = -15 \text{ V}$ $T_{vj} = 150^{\circ}\text{C}$		14,5		$\mu\text{C}$
Abschaltenergie pro Puls Reverse recovery energy	$I_F = 125 \text{ A}, -di_F/dt = 1500 \text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $T_{vj} = 25^{\circ}\text{C}$		1,30		mJ
	$V_R = 400 \text{ V}$ $T_{vj} = 125^{\circ}\text{C}$		2,90		mJ
	$V_{GE} = -15 \text{ V}$ $T_{vj} = 150^{\circ}\text{C}$		3,30		mJ
Wärmewiderstand, Chip bis Kühlkörper Thermal resistance, junction to heatsink	pro Diode / per diode valid with IFX pre-applied thermal interface material	$R_{thJH}$		0,419	K/W
Temperatur im Schaltbetrieb Temperature under switching conditions		$T_{vj\text{ op}}$	-40	150	$^{\circ}\text{C}$

## Modul / Module

Isolations-Prüfspannung Isolation test voltage	RMS, f = 50 Hz, t = 1 min.	V <sub>ISOL</sub>	2,5			kV
Innere Isolation Internal isolation	Basisisolierung (Schutzklasse 1, EN61140) basic insulation (class 1, IEC 61140)		Al <sub>2</sub> O <sub>3</sub>			
Kriechstrecke Creepage distance	Kontakt - Kühlkörper / terminal to heatsink Kontakt - Kontakt / terminal to terminal		11,5 6,3			mm
Luftstrecke Clearance	Kontakt - Kühlkörper / terminal to heatsink Kontakt - Kontakt / terminal to terminal		10,0 5,0			mm
Vergleichszahl der Kriechwegbildung Comperative tracking index		CTI	> 200			
min.    typ.    max.						
Modulstreuintduktivität Stray inductance module		L <sub>sCE</sub>		15		nH
Modulleitungswiderstand, Anschlüsse - Chip Module lead resistance, terminals - chip	T <sub>H</sub> = 25°C, pro Schalter / per switch	R <sub>CC+EE'</sub>		1,25		mΩ
Lagertemperatur Storage temperature		T <sub>stg</sub>	-40		125	°C
Höchstzulässige Bodenplattenbetriebstemperatur Maximum baseplate operation temperature		T <sub>BPmax</sub>			125	°C
Anpresskraft für mech. Bef. pro Feder mounting force per clamp		F	40	-	80	N
Gewicht Weight		G		41		g

Der Strom im Dauerbetrieb ist auf 25A effektiv pro Anschlusspin begrenzt.  
The current under continuous operation is limited to 25A rms per connector pin.  
Lagerung und Transport von Modulen mit TIM => siehe AN2012-07  
Storage and Shipment of modules with TIM => see AN2012-07

## NTC-Widerstand / NTC-Thermistor

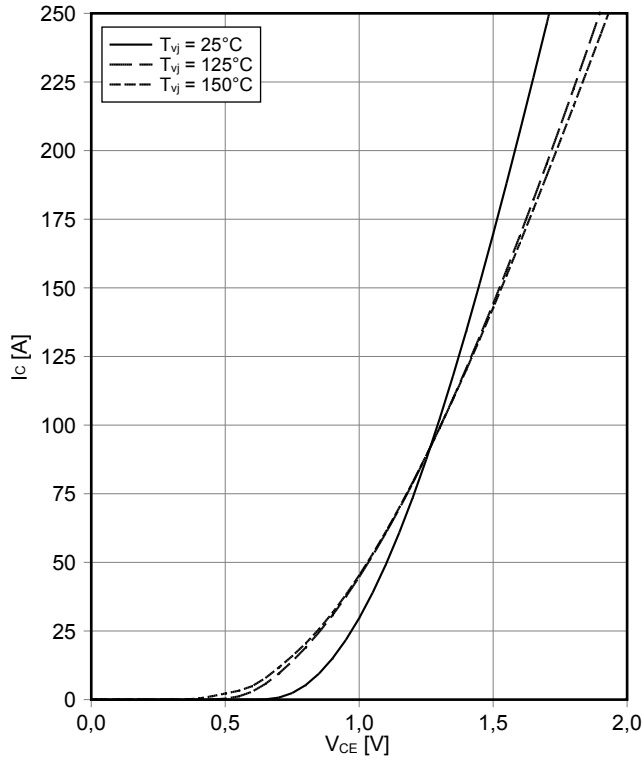
### Charakteristische Werte / Characteristic Values

			min.	typ.	max.	
Nennwiderstand Rated resistance	T <sub>NTC</sub> = 25°C	R <sub>25</sub>		5,00		kΩ
Abweichung von R100 Deviation of R100	T <sub>NTC</sub> = 100°C, R <sub>100</sub> = 493 Ω	ΔR/R	-5		5	%
Verlustleistung Power dissipation	T <sub>NTC</sub> = 25°C	P <sub>25</sub>			20,0	mW
B-Wert B-value	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298,15 K))]$	B <sub>25/50</sub>		3375		K
B-Wert B-value	$R_2 = R_{25} \exp [B_{25/80}(1/T_2 - 1/(298,15 K))]$	B <sub>25/80</sub>		3411		K
B-Wert B-value	$R_2 = R_{25} \exp [B_{25/100}(1/T_2 - 1/(298,15 K))]$	B <sub>25/100</sub>		3433		K

Angaben gemäß gültiger Application Note.  
Specification according to the valid application note.

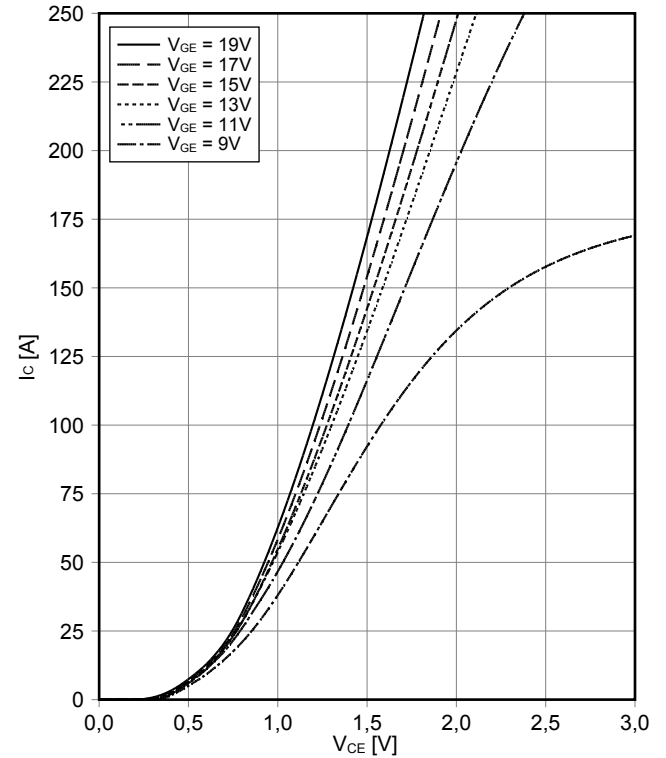
**Ausgangskennlinie IGBT, T1 / T4 (typisch)**  
**output characteristic IGBT, T1 / T4 (typical)**

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



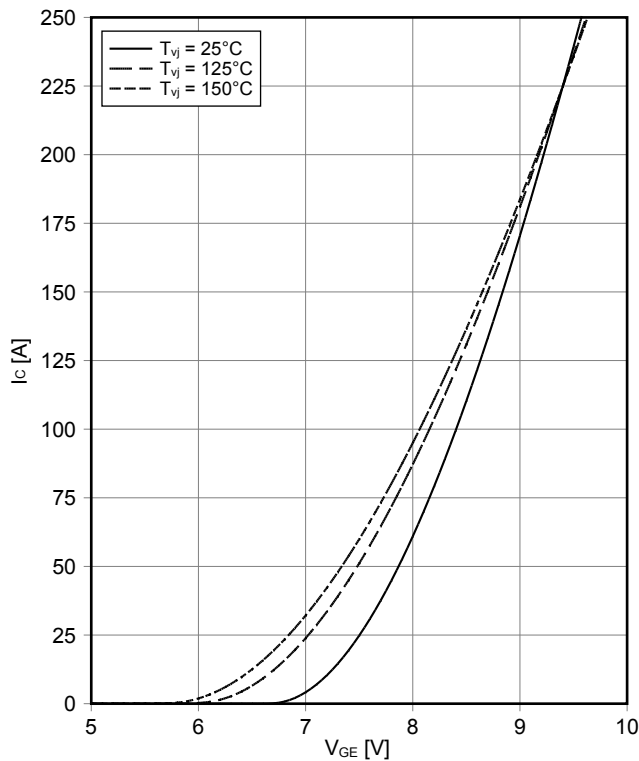
**Ausgangskennlinienfeld IGBT, T1 / T4 (typisch)**  
**output characteristic IGBT, T1 / T4 (typical)**

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



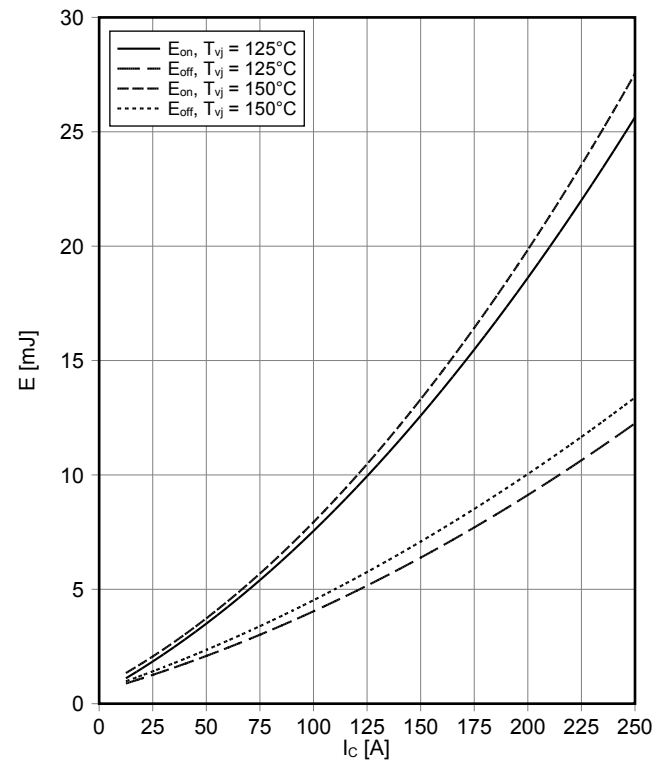
**Übertragungscharakteristik IGBT, T1 / T4 (typisch)**  
**transfer characteristic IGBT, T1 / T4 (typical)**

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



**Schaltverluste IGBT, T1 / T4 (typisch)**  
**switching losses IGBT, T1 / T4 (typical)**

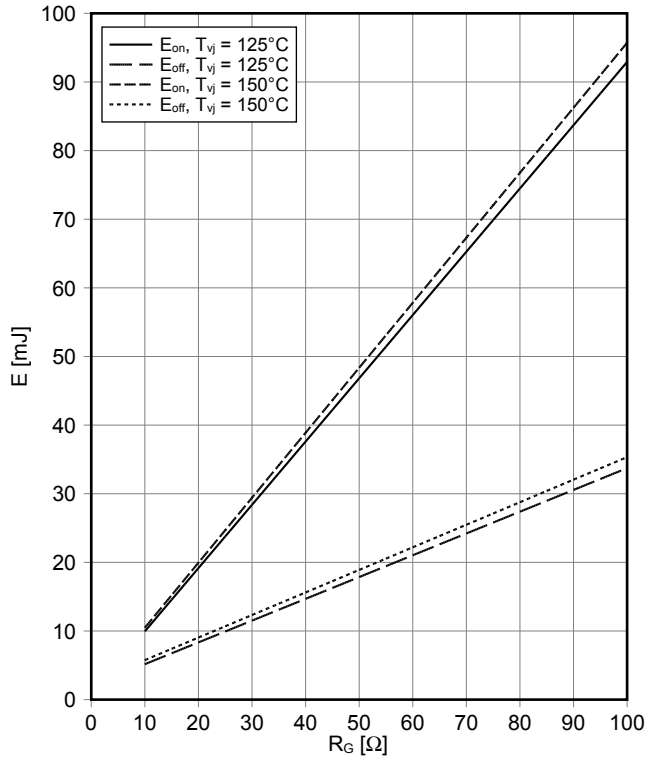
$E_{on} = f(I_C)$ ,  $E_{off} = f(I_C)$   
 $V_{GE} = \pm 15\text{ V}$ ,  $R_{Gon} = 10\ \Omega$ ,  $R_{Goff} = 10\ \Omega$ ,  $V_{CE} = 400\text{ V}$





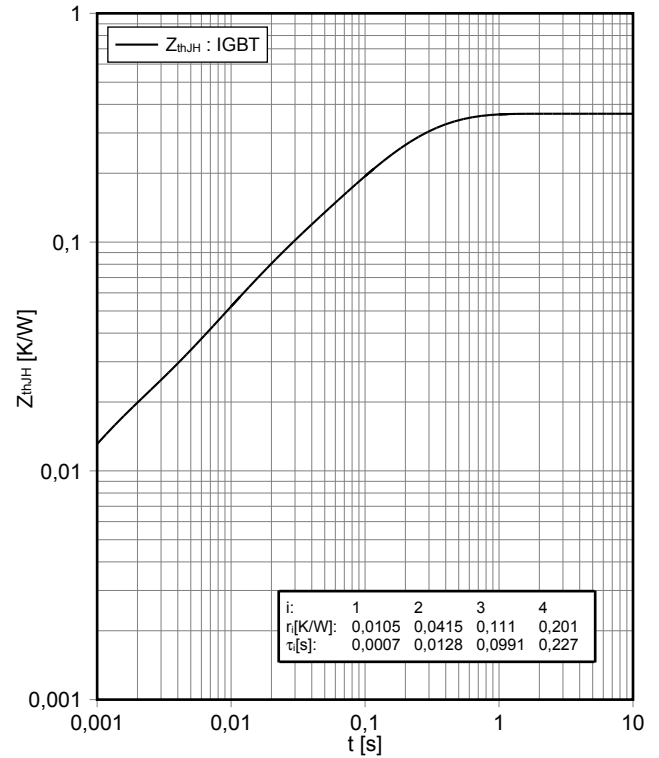
### Schaltverluste IGBT, T1 / T4 (typisch) switching losses IGBT, T1 / T4 (typical)

$E_{on} = f(R_G)$ ,  $E_{off} = f(R_G)$   
 $V_{GE} = \pm 15\text{ V}$ ,  $I_C = 125\text{ A}$ ,  $V_{CE} = 400\text{ V}$



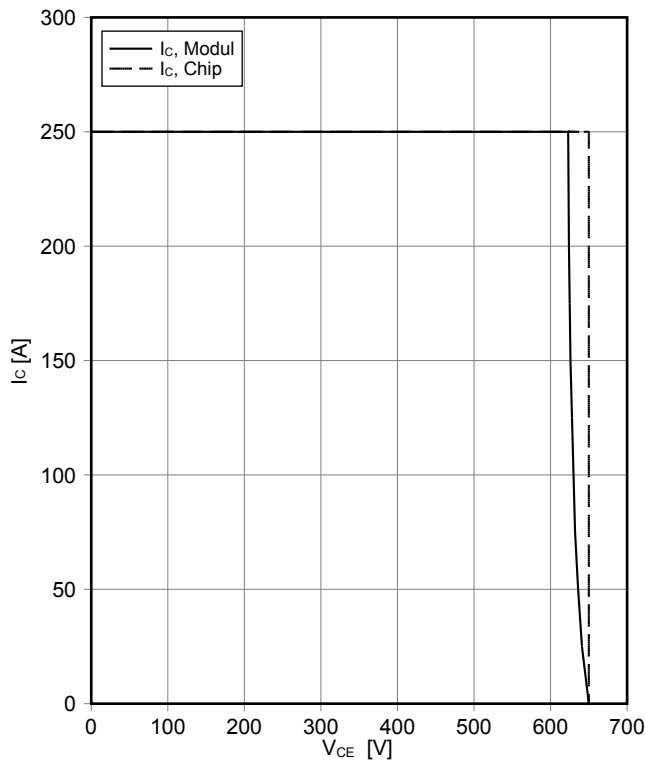
### Transienter Wärmewiderstand IGBT, T1 / T4 transient thermal impedance IGBT, T1 / T4

$Z_{thJH} = f(t)$



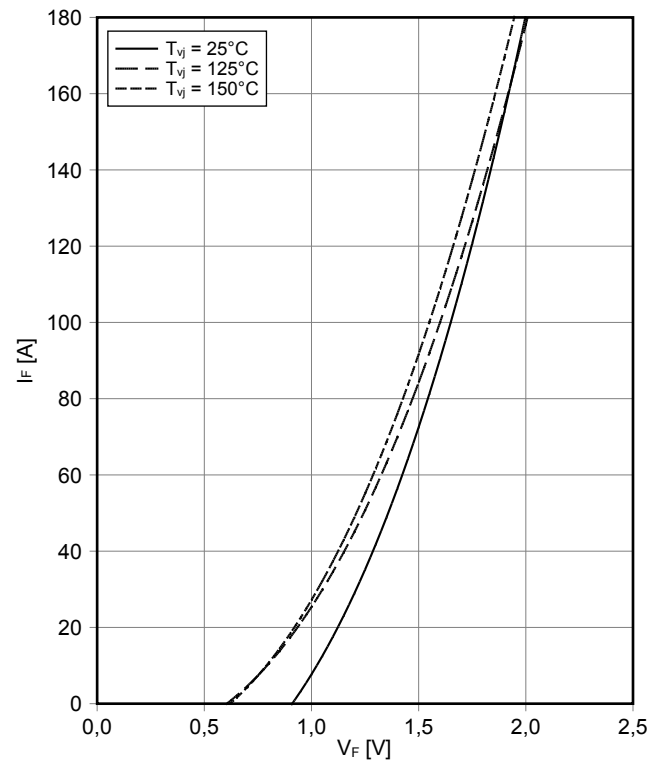
### Sicherer Rückwärts-Arbeitsbereich IGBT, T1 / T4 (RBSOA) reverse bias safe operating area IGBT, T1 / T4 (RBSOA)

$I_C = f(V_{CE})$   
 $V_{GE} = \pm 15\text{ V}$ ,  $R_{Goff} = 10\ \Omega$ ,  $T_{vj} = 150^\circ\text{C}$



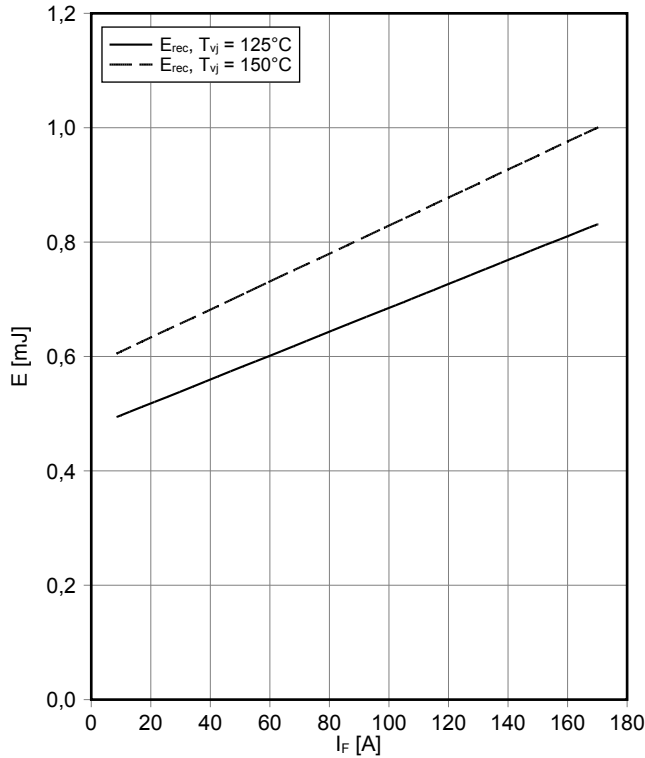
### Durchlasskennlinie der Diode, D2 / D3 (typisch) forward characteristic of Diode, D2 / D3 (typical)

$I_F = f(V_F)$



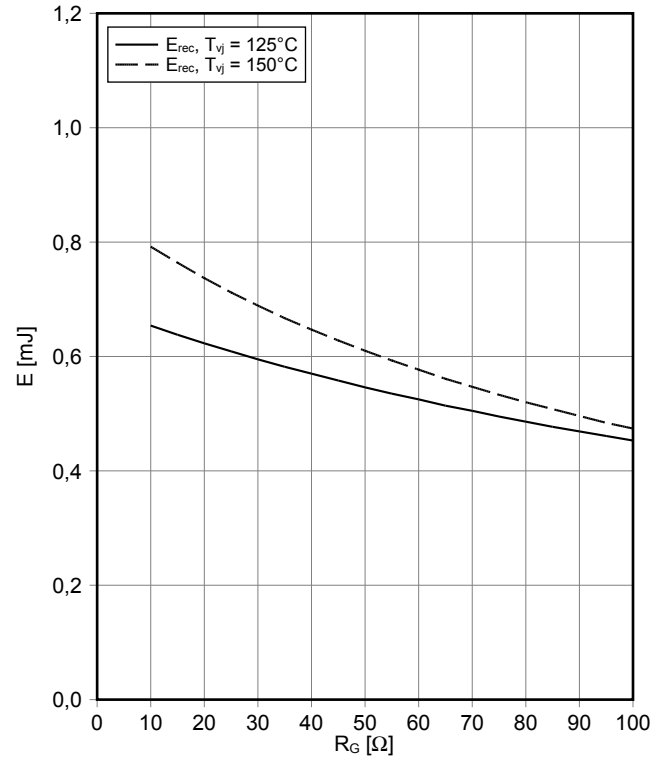
**Schaltverluste Diode, D2 / D3 (typisch)**  
**switching losses Diode, D2 / D3 (typical)**

$E_{rec} = f(I_F)$   
 $R_{Gon} = 10 \Omega, V_{CE} = 400 V$



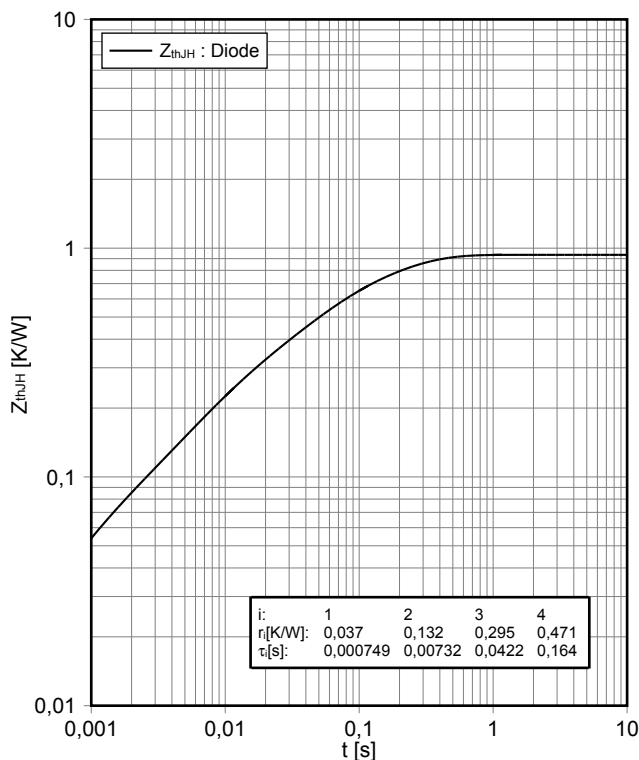
**Schaltverluste Diode, D2 / D3 (typisch)**  
**switching losses Diode, D2 / D3 (typical)**

$E_{rec} = f(R_G)$   
 $I_F = 85 A, V_{CE} = 400 V$



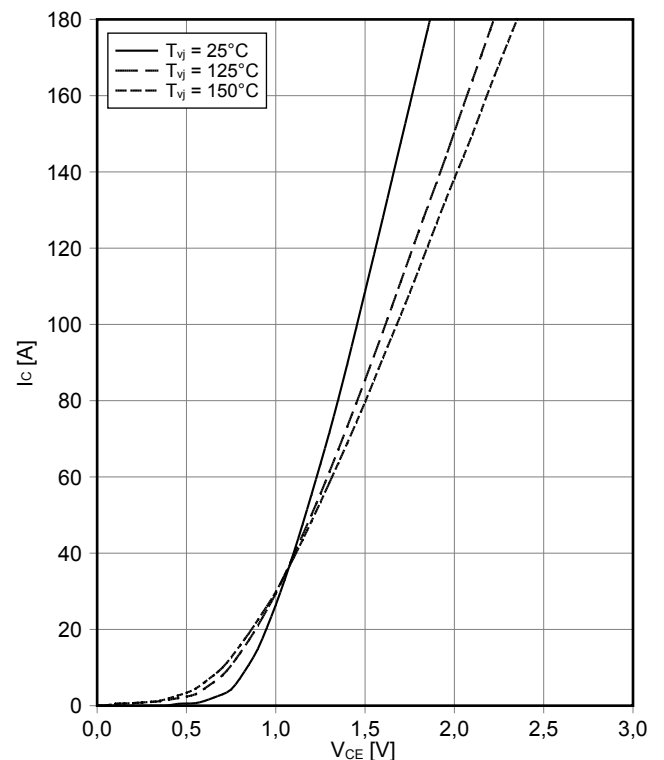
**Transienter Wärmewiderstand Diode, D2 / D3**  
**transient thermal impedance Diode, D2 / D3**

$Z_{thJH} = f(t)$



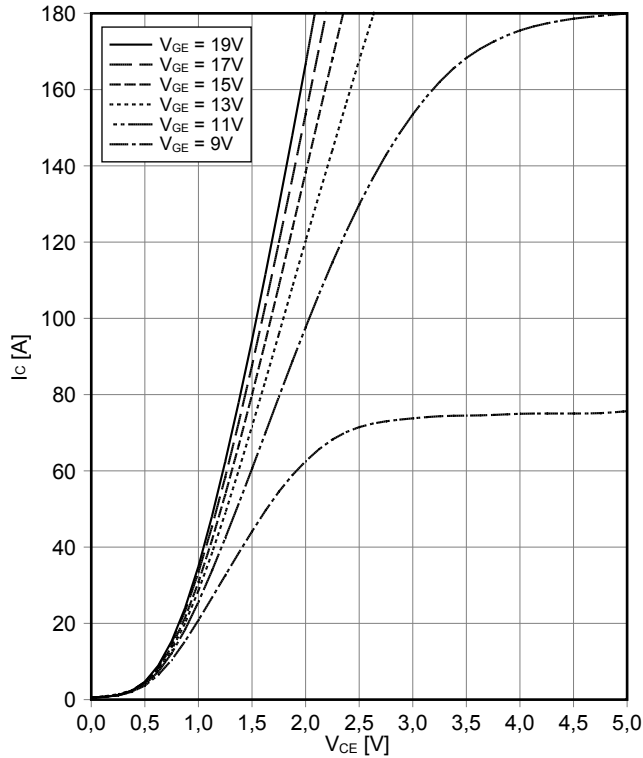
**Ausgangskennlinie IGBT, T2 / T3 (typisch)**  
**output characteristic IGBT, T2 / T3 (typical)**

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



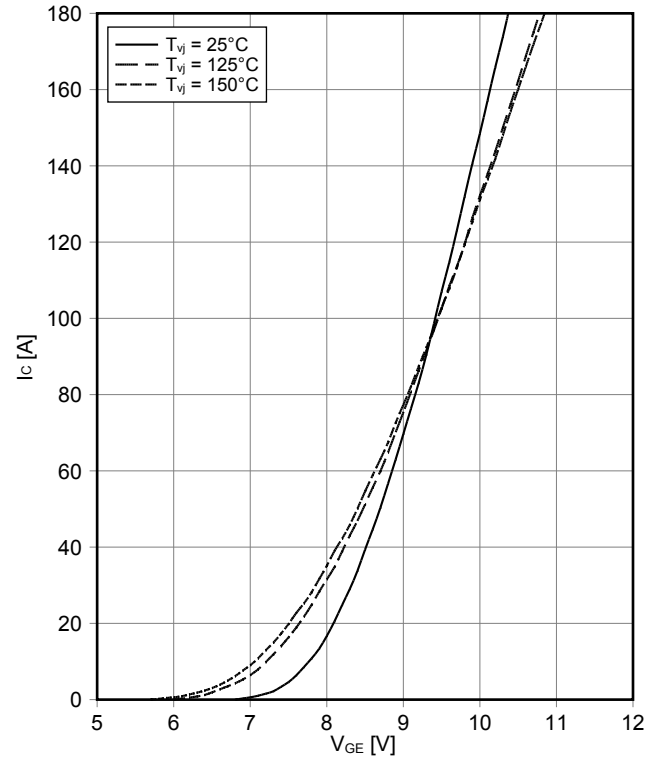
**Ausgangskennlinienfeld IGBT, T2 / T3 (typisch)**  
**output characteristic IGBT, T2 / T3 (typical)**

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



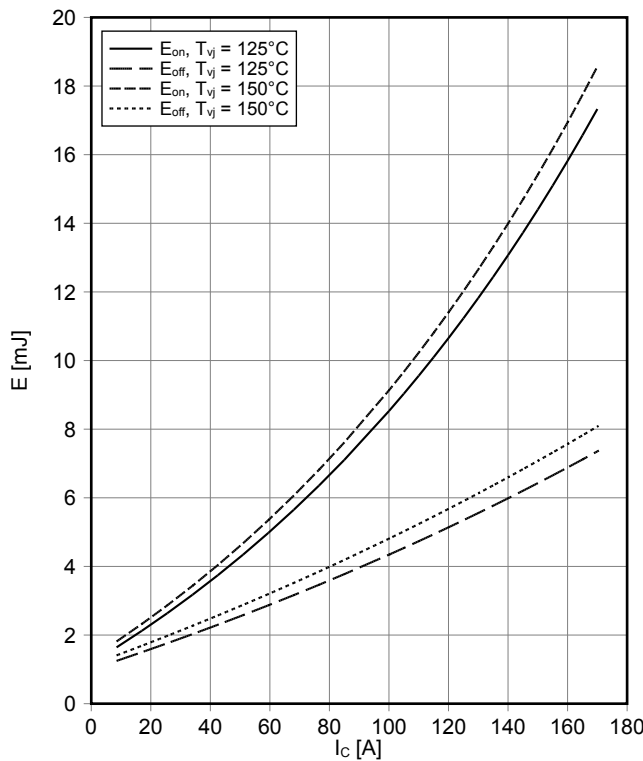
**Übertragungscharakteristik IGBT, T2 / T3 (typisch)**  
**transfer characteristic IGBT, T2 / T3 (typical)**

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



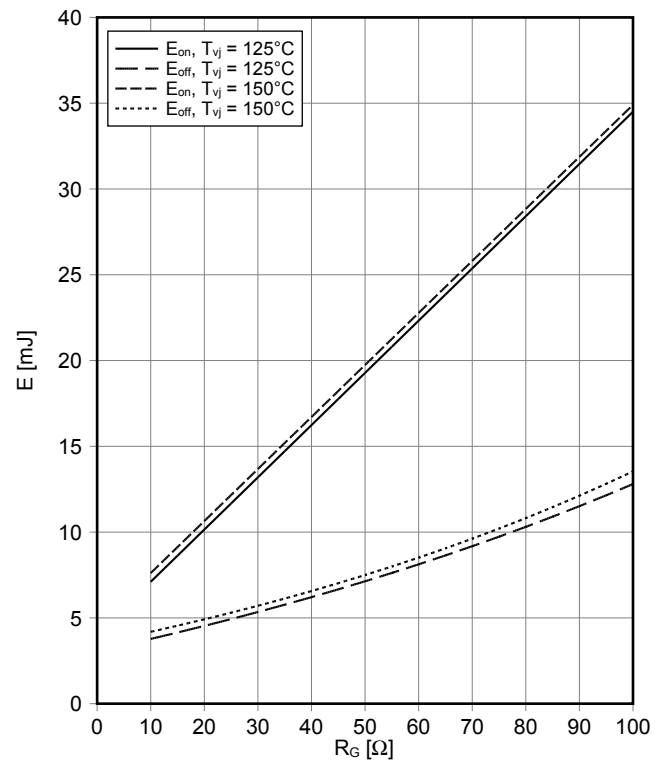
**Schaltverluste IGBT, T2 / T3 (typisch)**  
**switching losses IGBT, T2 / T3 (typical)**

$E_{on} = f(I_C)$ ,  $E_{off} = f(I_C)$   
 $V_{GE} = \pm 15$  V,  $R_{Gon} = 10 \Omega$ ,  $R_{Goff} = 10 \Omega$ ,  $V_{CE} = 400$  V

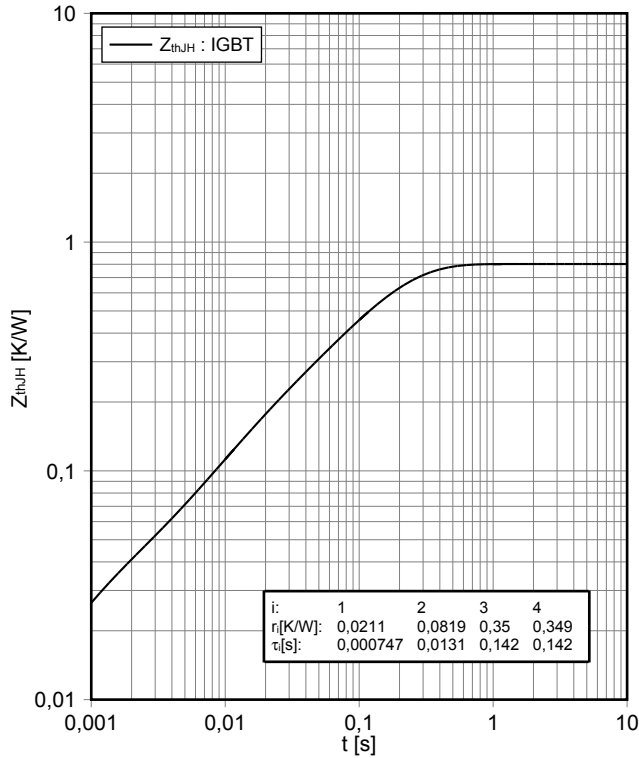


**Schaltverluste IGBT, T2 / T3 (typisch)**  
**switching losses IGBT, T2 / T3 (typical)**

$E_{on} = f(R_G)$ ,  $E_{off} = f(R_G)$   
 $V_{GE} = \pm 15$  V,  $I_C = 85$  A,  $V_{CE} = 400$  V

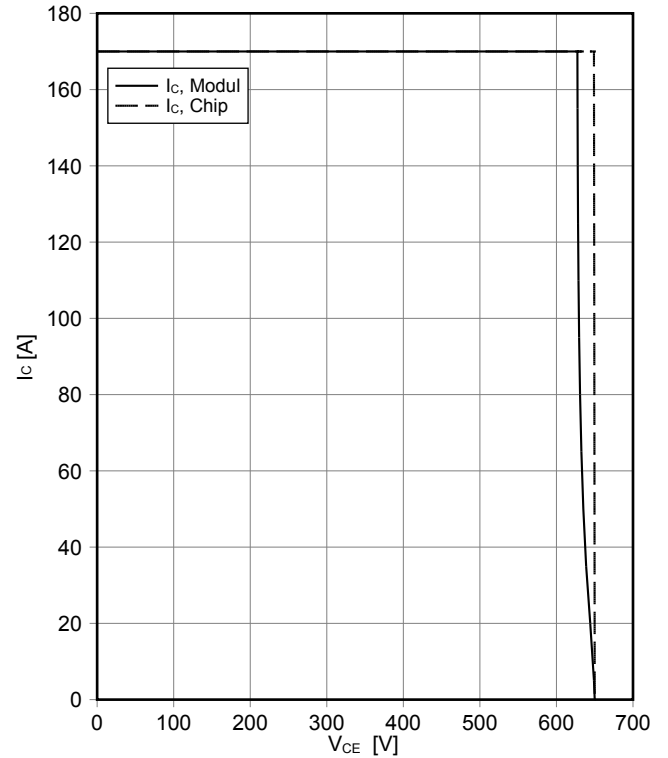


**Transienter Wärmewiderstand IGBT, T2 / T3**  
**transient thermal impedance IGBT, T2 / T3**  
 $Z_{thJH} = f(t)$

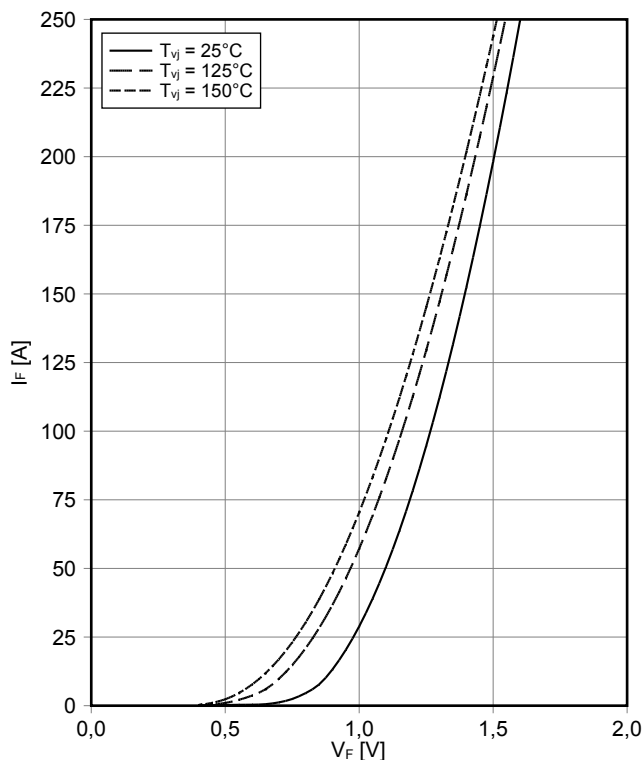


**Sicherer Rückwärts-Arbeitsbereich IGBT, T2 / T3 (RBSOA)**  
**reverse bias safe operating area IGBT, T2 / T3 (RBSOA)**

$I_C = f(V_{CE})$   
 $V_{GE} = \pm 15 \text{ V}, R_{Goff} = 10 \Omega, T_{vj} = 150^\circ\text{C}$

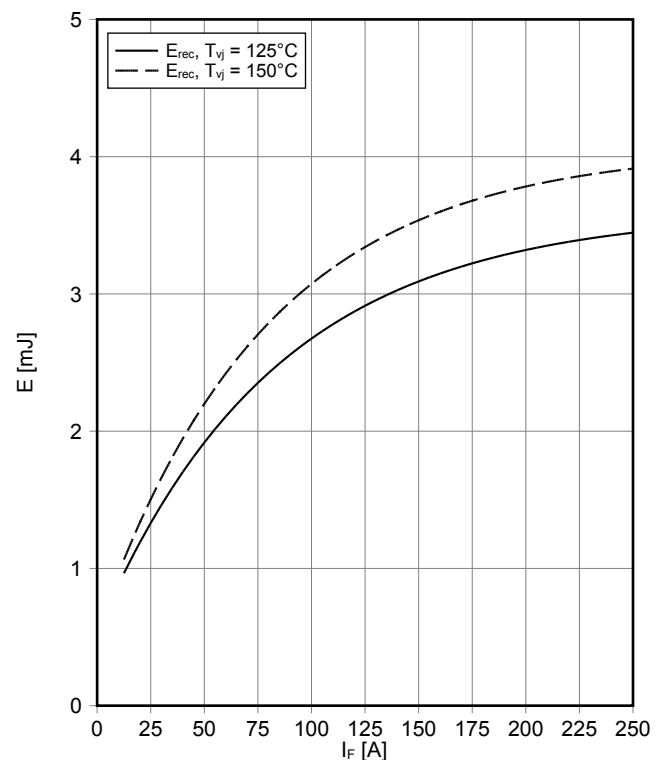


**Durchlasskennlinie der Diode, D1 / D4 (typisch)**  
**forward characteristic of Diode, D1 / D4 (typical)**  
 $I_F = f(V_F)$



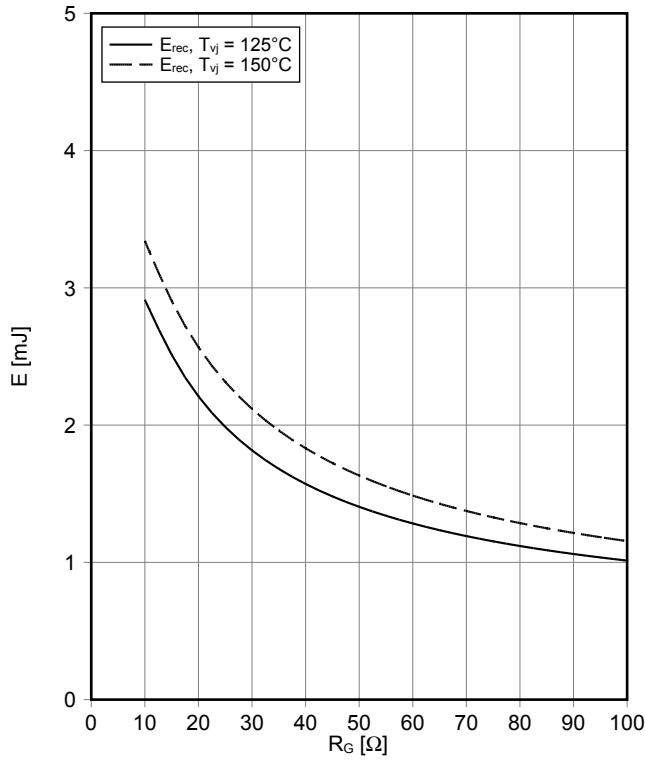
**Schaltverluste Diode, D1 / D4 (typisch)**  
**switching losses Diode, D1 / D4 (typical)**

$E_{rec} = f(I_F)$   
 $R_{Gon} = 10 \Omega, V_{CE} = 400 \text{ V}$



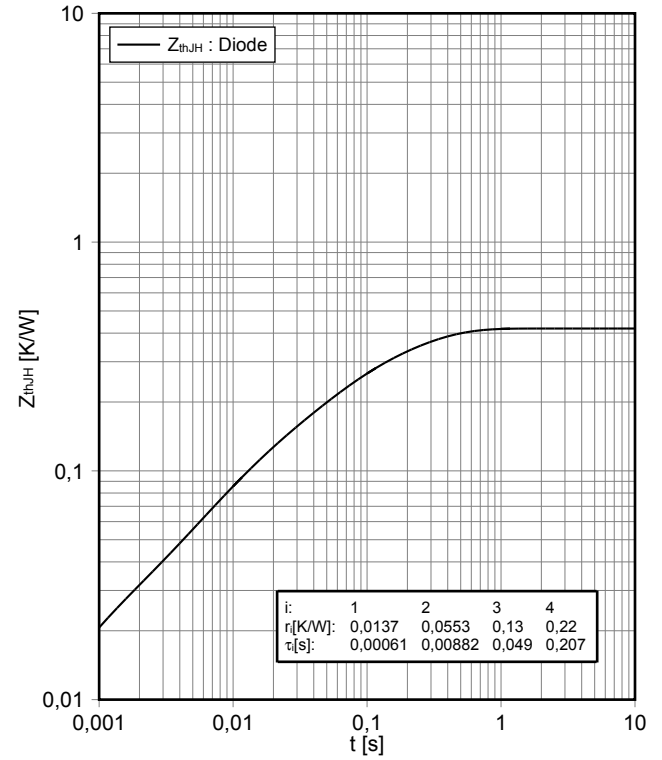
**Schaltverluste Diode, D1 / D4 (typisch)**  
**switching losses Diode, D1 / D4 (typical)**

$E_{rec} = f(R_G)$   
 $I_F = 125\text{ A}, V_{CE} = 400\text{ V}$



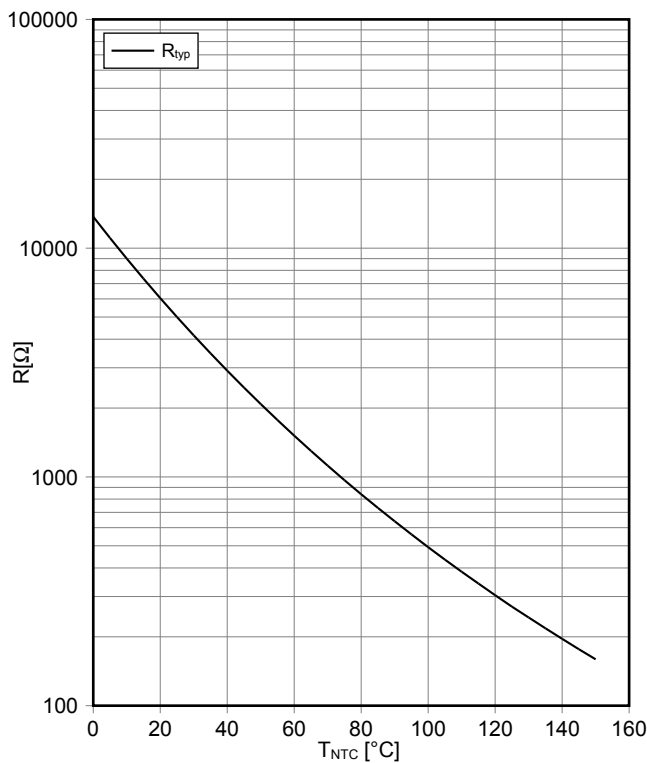
**Transienter Wärmewiderstand Diode, D1 / D4**  
**transient thermal impedance Diode, D1 / D4**

$Z_{thJH} = f(t)$



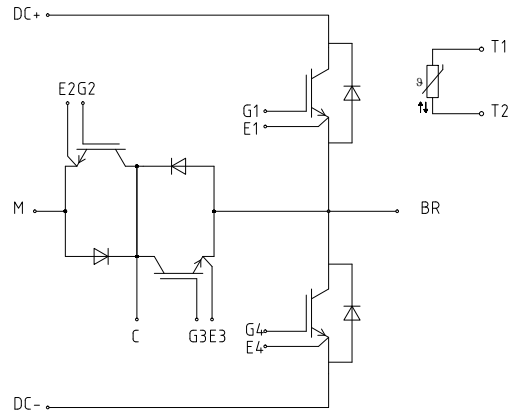
**NTC-Widerstand-Temperaturkennlinie (typisch)**  
**NTC-Thermistor-temperature characteristic (typical)**

$R = f(T)$

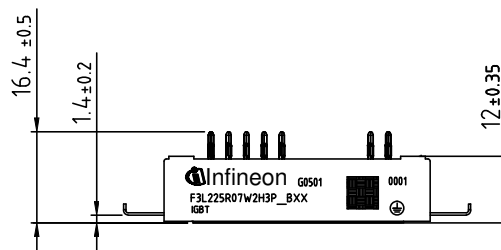
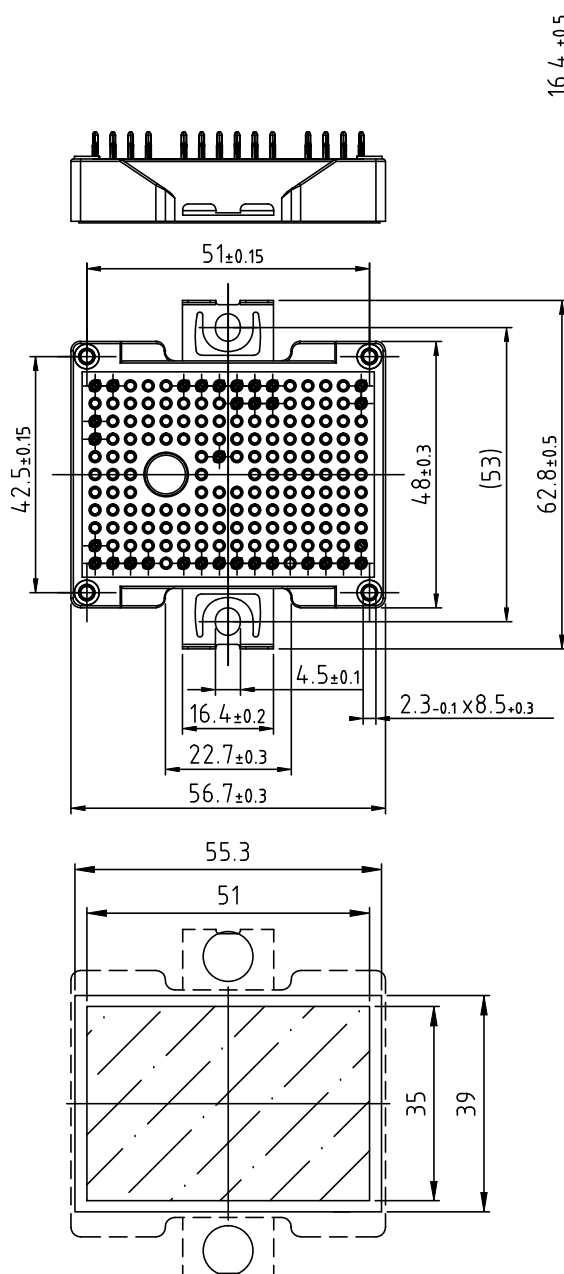




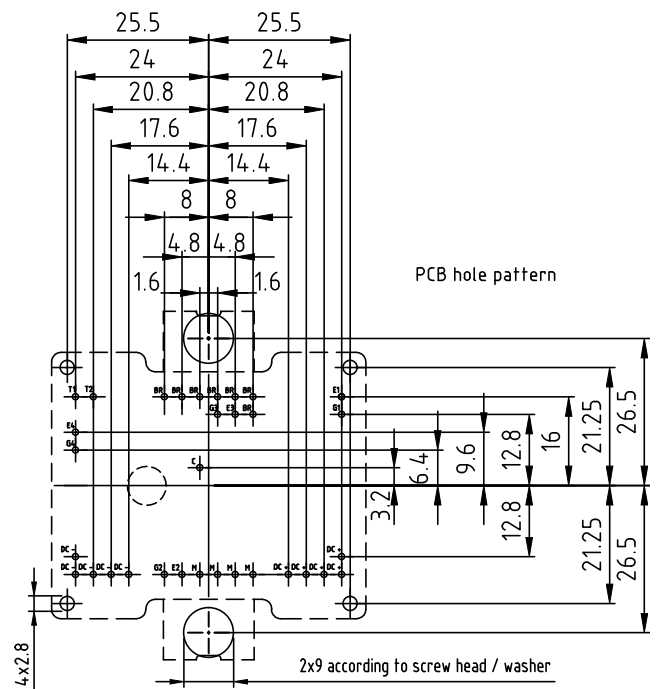
## Schaltplan / Circuit diagram



## Gehäuseabmessungen / Package outlines



- Pin-Grid 3.2mm
- Tolerance of PCB hole pattern  $\begin{matrix} \oplus \\ \ominus \end{matrix} \phi 0.1$
- Hole specification for contacts see AN 2009-01:  
Diameters of drill  $\phi 1.15$ mm  
and copper thickness in hole 25-50 $\mu$ m



restricted area for Thermal Interface Material

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