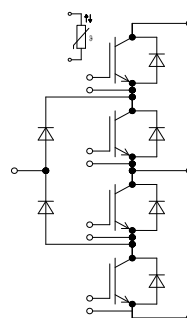
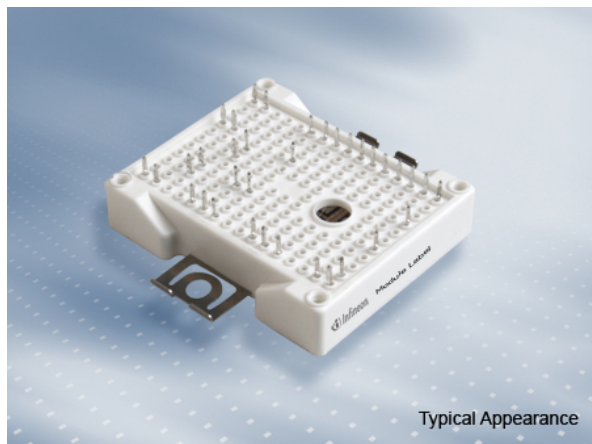


EasyPACK™ Modul mit TRENCHSTOP™ 5 und CoolSiC™ Schottky Diode und PressFIT / NTC  
 EasyPACK™ module with TRENCHSTOP™ 5 and CoolSiC™ Schottky diode and PressFIT / NTC



$V_{CES} = 650V$   
 $I_{C\ nom} = 100A / I_{CRM} = 200A$

### Potentielle Anwendungen

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

### Potential Applications

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

### Elektrische Eigenschaften

- CoolSiC™ Schottky Diode Gen 5
- Erhöhte Sperrspannungsfestigkeit auf 650V
- Niedrige Schaltverluste

### Electrical Features

- CoolSiC™ Schottky diode gen 5
- Increased blocking voltage capability up to 650V
- Low switching losses

### Mechanische Eigenschaften

- Al<sub>2</sub>O<sub>3</sub> Substrat mit kleinem thermischen Widerstand
- Kompaktes Design
- PressFIT Verbindungstechnik
- Robuste Montage durch integrierte Befestigungsklammern

### Mechanical Features

- Al<sub>2</sub>O<sub>3</sub> substrate with low thermal resistance
- Compact design
- PressFIT contact technology
- Rugged mounting due to integrated mounting clamps

## 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		$I_{CN}$	200	A
Kollektor-Dauergleichstrom Continuous DC collector current	$T_H = 65^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$	$I_{CDC}$	95	A
Periodischer Kollektor-Spitzenstrom Repetitive peak collector current	$t_p = 1\text{ ms}$	$I_{CRM}$	400	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	$I_C = 100\text{ A}$ $V_{GE} = 15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$V_{CE\text{ sat}}$	1,17 1,20 1,21	1,38 V V V
Gate-Schwellenspannung Gate threshold voltage	$I_C = 2,00\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$		$V_{GETH}$	3,25 4,00 4,75	V
Gateladung Gate charge	$V_{GE} = -15 / 15\text{ V}, V_{CE} = 400\text{ V}$		$Q_G$	0,84	$\mu\text{C}$
Interner Gatewiderstand Internal gate resistor	$T_{vj} = 25^{\circ}\text{C}$		$R_{Gint}$	0,0	$\Omega$
Eingangskapazität Input capacitance	$f = 100\text{ kHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$		$C_{ies}$	14,3	nF
Rückwirkungskapazität Reverse transfer capacitance	$f = 100\text{ kHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$		$C_{res}$	0,05	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	$I_C = 100\text{ A}, V_{CE} = 300\text{ V}$ $V_{GE} = -15 / 15\text{ V}$ $R_{Gon} = 20\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_{don}$	0,097 0,087 0,082	$\mu\text{s}$ $\mu\text{s}$ $\mu\text{s}$
Anstiegszeit, induktive Last Rise time, inductive load	$I_C = 100\text{ A}, V_{CE} = 300\text{ V}$ $V_{GE} = -15 / 15\text{ V}$ $R_{Gon} = 20\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_r$	0,046 0,05 0,054	$\mu\text{s}$ $\mu\text{s}$ $\mu\text{s}$
Abschaltverzögerungszeit, induktive Last Turn-off delay time, inductive load	$I_C = 100\text{ A}, V_{CE} = 300\text{ V}$ $V_{GE} = -15 / 15\text{ V}$ $R_{Goff} = 39\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_{doff}$	0,654 0,687 0,704	$\mu\text{s}$ $\mu\text{s}$ $\mu\text{s}$
Fallzeit, induktive Last Fall time, inductive load	$I_C = 100\text{ A}, V_{CE} = 300\text{ V}$ $V_{GE} = -15 / 15\text{ V}$ $R_{Goff} = 39\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_f$	0,029 0,033 0,033	$\mu\text{s}$ $\mu\text{s}$ $\mu\text{s}$
Einschaltverlustenergie pro Puls Turn-on energy loss per pulse	$I_C = 100\text{ A}, V_{CE} = 300\text{ V}, L_{\sigma} = 35\text{ nH}$ $di/dt = 1800\text{ A}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$ $V_{GE} = -15 / 15\text{ V}, R_{Gon} = 20\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$E_{on}$	2,79 3,20 3,51	mJ mJ mJ
Abschaltverlustenergie pro Puls Turn-off energy loss per pulse	$I_C = 100\text{ A}, V_{CE} = 300\text{ V}, L_{\sigma} = 35\text{ nH}$ $du/dt = 3700\text{ V}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$ $V_{GE} = -15 / 15\text{ V}, R_{Goff} = 39\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$E_{off}$	1,21 1,48 1,61	mJ mJ mJ
Kurzschlußverhalten SC data	$V_{GE} \leq 15\text{ V}, V_{CC} = 360\text{ V}$ $V_{CE\max} = V_{CES} - L_{SCE} \cdot di/dt$	$t_p \leq 0\ \mu\text{s}, T_{vj} = 150^{\circ}\text{C}$	$I_{SC}$	1600	A
Wärmewiderstand, Chip bis Kühlkörper Thermal resistance, junction to heatsink	pro IGBT / per IGBT		$R_{thJH}$	0,814	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		$I_{CN}$	200	A
Kollektor-Dauergleichstrom Continuous DC collector current	$T_H = 65^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$	$I_{CDC}$	95	A
Periodischer Kollektor-Spitzenstrom Repetitive peak collector current	$t_p = 1\text{ ms}$	$I_{CRM}$	400	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	$I_C = 100\text{ A}$ $V_{GE} = 15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$V_{CE\text{ sat}}$	1,17 1,20 1,21	1,38 V V V
Gate-Schwellenspannung Gate threshold voltage	$I_C = 2,00\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$		$V_{GETH}$	3,25 4,00 4,75	V
Gateladung Gate charge	$V_{GE} = -15 / 15\text{ V}, V_{CE} = 400\text{ V}$		$Q_G$	0,84	$\mu\text{C}$
Interner Gatewiderstand Internal gate resistor	$T_{vj} = 25^{\circ}\text{C}$		$R_{Gint}$	0,0	$\Omega$
Eingangskapazität Input capacitance	$f = 100\text{ kHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$		$C_{ies}$	14,3	nF
Rückwirkungskapazität Reverse transfer capacitance	$f = 100\text{ kHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$		$C_{res}$	0,05	nF
Kollektor-Emitter-Reststrom Collector-emitter cut-off current	$V_{CE} = 650\text{ V}, V_{GE} = 0\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$	$I_{CES}$		0,044 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	$I_C = 100\text{ A}, V_{CE} = 300\text{ V}$ $V_{GE} = -15 / 15\text{ V}$ $R_{Gon} = 20\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_{don}$	0,098 0,087 0,085	$\mu\text{s}$ $\mu\text{s}$ $\mu\text{s}$
Anstiegszeit, induktive Last Rise time, inductive load	$I_C = 100\text{ A}, V_{CE} = 300\text{ V}$ $V_{GE} = -15 / 15\text{ V}$ $R_{Gon} = 20\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_r$	0,037 0,043 0,046	$\mu\text{s}$ $\mu\text{s}$ $\mu\text{s}$
Abschaltverzögerungszeit, induktive Last Turn-off delay time, inductive load	$I_C = 100\text{ A}, V_{CE} = 300\text{ V}$ $V_{GE} = -15 / 15\text{ V}$ $R_{Goff} = 39\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_{doff}$	0,651 0,685 0,695	$\mu\text{s}$ $\mu\text{s}$ $\mu\text{s}$
Fallzeit, induktive Last Fall time, inductive load	$I_C = 100\text{ A}, V_{CE} = 300\text{ V}$ $V_{GE} = -15 / 15\text{ V}$ $R_{Goff} = 39\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_f$	0,018 0,024 0,026	$\mu\text{s}$ $\mu\text{s}$ $\mu\text{s}$
Einschaltverlustenergie pro Puls Turn-on energy loss per pulse	$I_C = 100\text{ A}, V_{CE} = 300\text{ V}, L\sigma = 35\text{ nH}$ $di/dt = 2200\text{ A}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$ $V_{GE} = -15 / 15\text{ V}, R_{Gon} = 20\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$E_{on}$	2,18 2,56 2,79	mJ mJ mJ
Abschaltverlustenergie pro Puls Turn-off energy loss per pulse	$I_C = 100\text{ A}, V_{CE} = 300\text{ V}, L\sigma = 35\text{ nH}$ $du/dt = 3500\text{ V}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$ $V_{GE} = -15 / 15\text{ V}, R_{Goff} = 39\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$E_{off}$	1,28 1,65 1,80	mJ mJ mJ
Kurzschlußverhalten SC data	$V_{GE} \leq 15\text{ V}, V_{CC} = 360\text{ V}$ $V_{CE\max} = V_{CES} - L_{SCE} \cdot di/dt$	$t_p \leq 0\ \mu\text{s}, T_{vj} = 150^{\circ}\text{C}$	$I_{SC}$	1600	A
Wärmewiderstand, Chip bis Kühlkörper Thermal resistance, junction to heatsink	pro IGBT / per IGBT		$R_{thJH}$	0,814	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		$I_{FN}$	120	A
Dauergleichstrom Continuous DC forward current		$I_F$	100	A
Periodischer Spitzenstrom Repetitive peak forward current	$t_p = 1\text{ ms}$	$I_{FRM}$	240	A
Grenzlastintegral $I^2t$ - value	$V_R = 0\text{ V}, t_p = 10\text{ ms}, T_{vj} = 125^{\circ}\text{C}$ $V_R = 0\text{ V}, t_p = 10\text{ ms}, T_{vj} = 150^{\circ}\text{C}$	$I^2t$	700 690	$\text{A}^2\text{s}$ $\text{A}^2\text{s}$

### Charakteristische Werte / Characteristic Values

			min.	typ.	max.	
Durchlassspannung Forward voltage	$I_F = 100\text{ A}, V_{GE} = 0\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$	$V_F$	1,38	1,65	V
	$I_F = 100\text{ A}, V_{GE} = 0\text{ V}$	$T_{vj} = 125^{\circ}\text{C}$		1,49		V
	$I_F = 100\text{ A}, V_{GE} = 0\text{ V}$	$T_{vj} = 150^{\circ}\text{C}$		1,52		V
Rückstromspitze Peak reverse recovery current	$I_F = 100\text{ A}, -di_F/dt = 1800\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 300\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$	$I_{RM}$	58,3		A
		$T_{vj} = 125^{\circ}\text{C}$		74,4		A
		$T_{vj} = 150^{\circ}\text{C}$		77,6		A
Sperrverzögerungsladung Recovered charge	$I_F = 100\text{ A}, -di_F/dt = 1800\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 300\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$	$Q_r$	3,10		$\mu\text{C}$
		$T_{vj} = 125^{\circ}\text{C}$		5,40		$\mu\text{C}$
		$T_{vj} = 150^{\circ}\text{C}$		5,50		$\mu\text{C}$
Abschaltenergie pro Puls Reverse recovery energy	$I_F = 100\text{ A}, -di_F/dt = 1800\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 300\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$	$E_{rec}$	0,50		mJ
		$T_{vj} = 125^{\circ}\text{C}$		0,57		mJ
		$T_{vj} = 150^{\circ}\text{C}$		0,69		mJ
Wärmewiderstand, Chip bis Kühlkörper Thermal resistance, junction to heatsink	pro Diode / per diode	$R_{thJH}$		1,15		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		$I_{FN}$	150	A
Dauergleichstrom Continuous DC forward current		$I_F$	100	A
Periodischer Spitzenstrom Repetitive peak forward current	$t_p = 1\text{ ms}$	$I_{FRM}$	300	A
Grenzlastintegral $I^2t$ - value	$V_R = 0\text{ V}, t_p = 10\text{ ms}, T_{vj} = 125^{\circ}\text{C}$ $V_R = 0\text{ V}, t_p = 10\text{ ms}, T_{vj} = 150^{\circ}\text{C}$	$I^2t$	770 690	$\text{A}^2\text{s}$ $\text{A}^2\text{s}$

### Charakteristische Werte / Characteristic Values

			min.	typ.	max.	
Durchlassspannung Forward voltage	$I_F = 100\text{ A}, V_{GE} = 0\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$	$V_F$	1,33	1,55	V
	$I_F = 100\text{ A}, V_{GE} = 0\text{ V}$	$T_{vj} = 125^{\circ}\text{C}$		1,29		V
	$I_F = 100\text{ A}, V_{GE} = 0\text{ V}$	$T_{vj} = 150^{\circ}\text{C}$		1,26		V
Rückstromspitze Peak reverse recovery current	$I_F = 100\text{ A}, -di_F/dt = 2200\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 300\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$	$I_{RM}$	47,6		A
		$T_{vj} = 125^{\circ}\text{C}$		49,8		A
		$T_{vj} = 150^{\circ}\text{C}$		52,7		A
Sperrverzögerungsladung Recovered charge	$I_F = 100\text{ A}, -di_F/dt = 2200\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 300\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$	$Q_r$	1,90		$\mu\text{C}$
		$T_{vj} = 125^{\circ}\text{C}$		2,00		$\mu\text{C}$
		$T_{vj} = 150^{\circ}\text{C}$		2,10		$\mu\text{C}$
Abschaltenergie pro Puls Reverse recovery energy	$I_F = 100\text{ A}, -di_F/dt = 2200\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 300\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$	$E_{rec}$	0,527		mJ
		$T_{vj} = 125^{\circ}\text{C}$		0,965		mJ
		$T_{vj} = 150^{\circ}\text{C}$		1,11		mJ
Wärmewiderstand, Chip bis Kühlkörper Thermal resistance, junction to heatsink	pro Diode / per diode	$R_{thJH}$		0,953		K/W
Temperatur im Schaltbetrieb Temperature under switching conditions		$T_{vj\text{ op}}$	-40		150	$^{\circ}\text{C}$

## Diode, D5-D6 / Diode, D5-D6

### 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		$I_{FN}$	120	A
Dauergleichstrom Continuous DC forward current		$I_F$	100	A
Periodischer Spitzenstrom Repetitive peak forward current	$t_p = 1\text{ ms}$	$I_{FRM}$	240	A
Grenzlastintegral $I^2t$ - value	$V_R = 0\text{ V}, t_p = 10\text{ ms}, T_{vj} = 125^{\circ}\text{C}$ $V_R = 0\text{ V}, t_p = 10\text{ ms}, T_{vj} = 150^{\circ}\text{C}$	$I^2t$	700 690	$\text{A}^2\text{s}$ $\text{A}^2\text{s}$

### Charakteristische Werte / Characteristic Values

			min.	typ.	max.	
Durchlassspannung Forward voltage	$I_F = 100\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 100\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 100\text{ A}, V_{GE} = 0\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$V_F$	1,38 1,49 1,52	1,65	V V V
Rückstromspitze Peak reverse recovery current	$I_F = 100\text{ A}, -di_F/dt = 1800\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 300\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$I_{RM}$	58,3 74,4 77,6		A A A
Sperrverzögerungsladung Recovered charge	$I_F = 100\text{ A}, -di_F/dt = 1800\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 300\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$Q_r$	3,10 5,40 5,50		$\mu\text{C}$ $\mu\text{C}$ $\mu\text{C}$
Abschaltenergie pro Puls Reverse recovery energy	$I_F = 100\text{ A}, -di_F/dt = 1800\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 300\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$E_{rec}$	0,50 0,57 0,69		mJ mJ mJ
Wärmewiderstand, Chip bis Kühlkörper Thermal resistance, junction to heatsink	pro Diode / per diode		$R_{thJH}$	1,15		K/W
Temperatur im Schaltbetrieb Temperature under switching conditions			$T_{vj\text{ op}}$	-40	150	$^{\circ}\text{C}$

## NTC-Widerstand / NTC-Thermistor

### Charakteristische Werte / Characteristic Values

			min.	typ.	max.	
Nennwiderstand Rated resistance	$T_{NTC} = 25^{\circ}\text{C}$		$R_{25}$	5,00		$\text{k}\Omega$
Abweichung von R100 Deviation of R100	$T_{NTC} = 100^{\circ}\text{C}, R_{100} = 493\ \Omega$		$\Delta R/R$	-5	5	%
Verlustleistung Power dissipation	$T_{NTC} = 25^{\circ}\text{C}$		$P_{25}$		20,0	mW
B-Wert B-value	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298,15\text{ K}))]$		$B_{25/50}$	3375		K
B-Wert B-value	$R_2 = R_{25} \exp [B_{25/80}(1/T_2 - 1/(298,15\text{ K}))]$		$B_{25/80}$	3411		K
B-Wert B-value	$R_2 = R_{25} \exp [B_{25/100}(1/T_2 - 1/(298,15\text{ K}))]$		$B_{25/100}$	3433		K

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

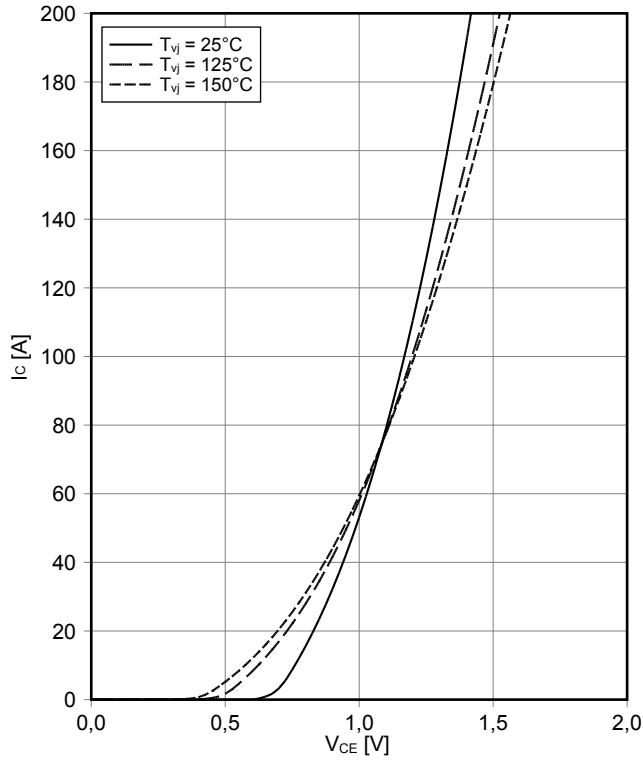
## Modul / Module

Isolations-Prüfspannung Isolation test voltage	RMS, f = 50 Hz, t = 1 min.	V <sub>ISOL</sub>	2,5			kV
Innere Isolation Internal isolation	Basisisolation (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			
Relativer Temperaturindex (elektr.) RTI Elec.	Gehäuse housing	RTI	140			°C
			min.	typ.	max.	
Modulstreuinduktivität Stray inductance module		L <sub>sCE</sub>		20		nH
Lagertemperatur Storage temperature		T <sub>stg</sub>	-40		125	°C
Anpresskraft für mech. Bef. pro Feder mounting force per clamp		F	40	-	80	N
Gewicht Weight		G		39		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.

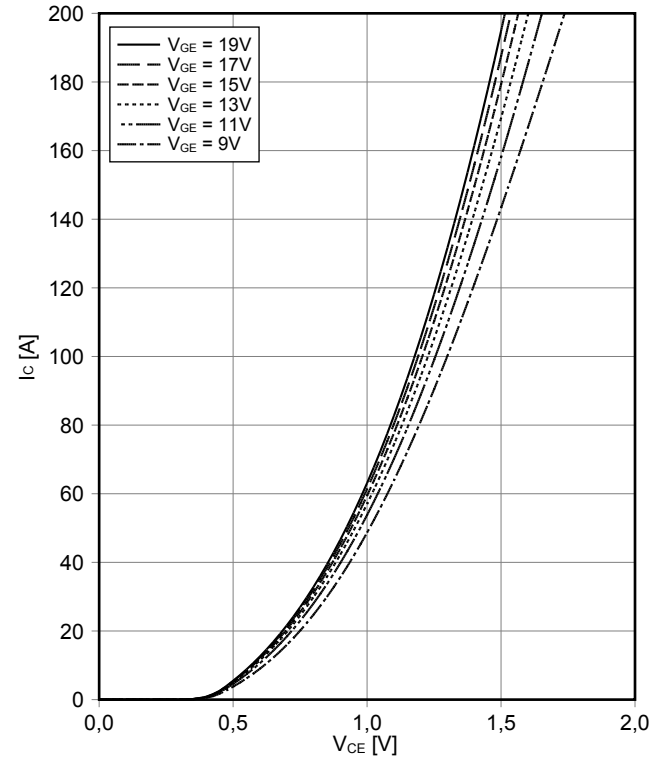
**Ausgangskennlinie IGBT, T1 / T4 (typisch)**  
**output characteristic IGBT, T1 / T4 (typical)**

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



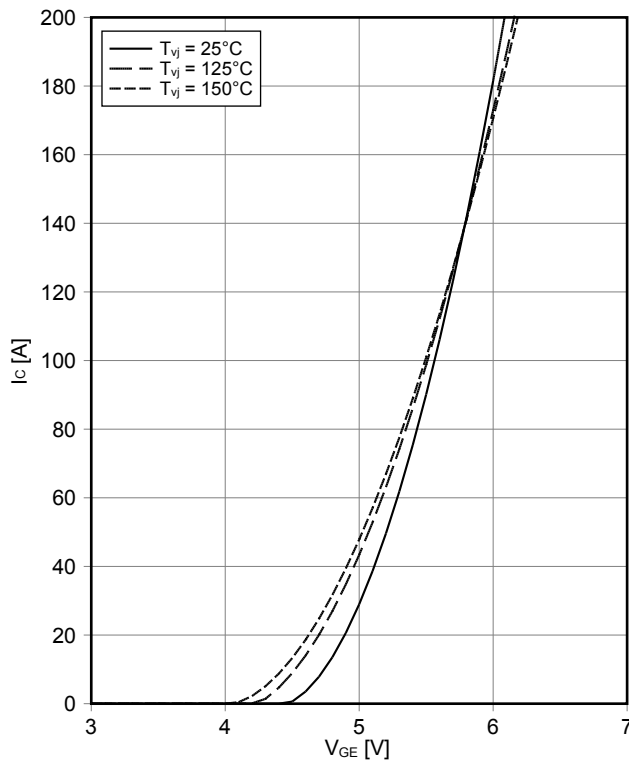
**Ausgangskennlinienfeld IGBT, T1 / T4 (typisch)**  
**output characteristic IGBT, T1 / T4 (typical)**

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



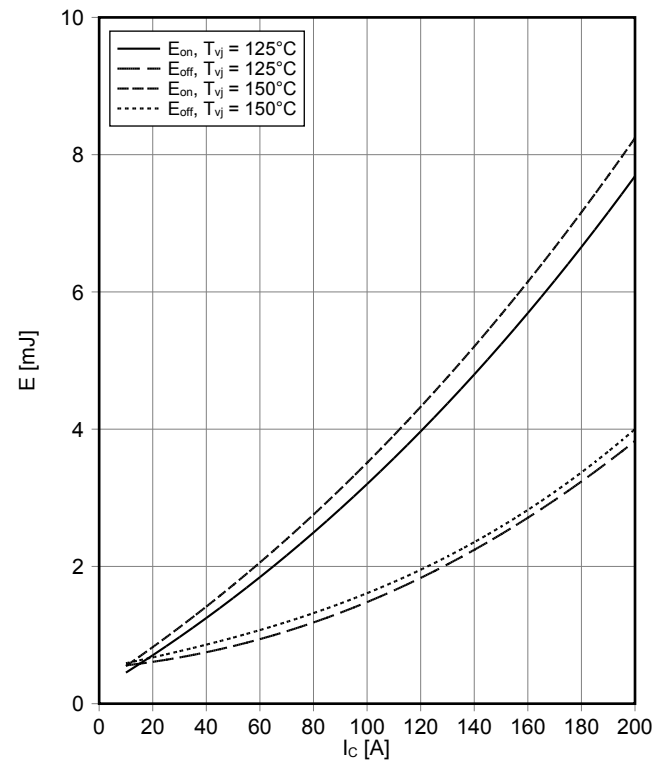
**Übertragungscharakteristik IGBT, T1 / T4 (typisch)**  
**transfer characteristic IGBT, T1 / T4 (typical)**

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



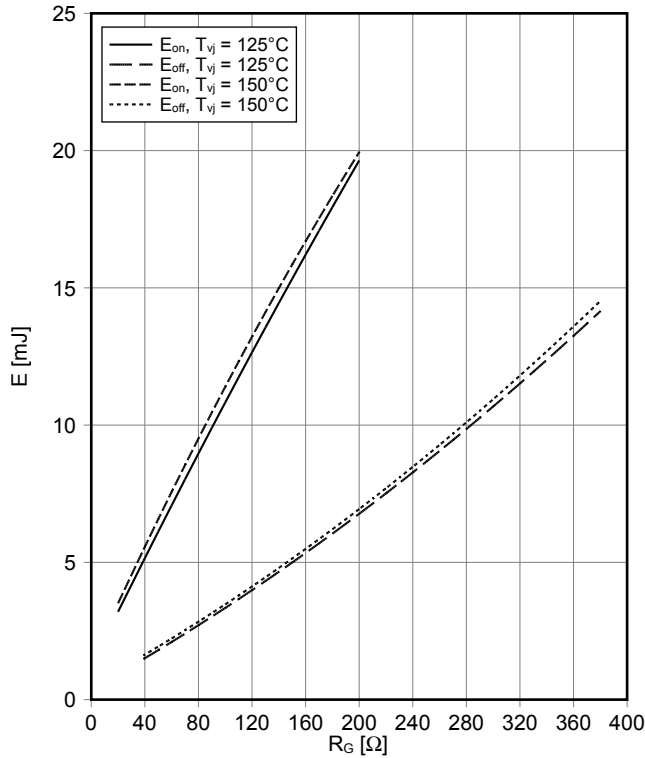
**Schaltverluste IGBT, T1 / T4 (typisch)**  
**switching losses IGBT, T1 / T4 (typical)**

$E_{on} = f(I_C)$ ,  $E_{off} = f(I_C)$   
 $V_{GE} = \pm 15\text{ V}$ ,  $R_{Gon} = 20\ \Omega$ ,  $R_{Goff} = 39\ \Omega$ ,  $V_{CE} = 300\text{ V}$



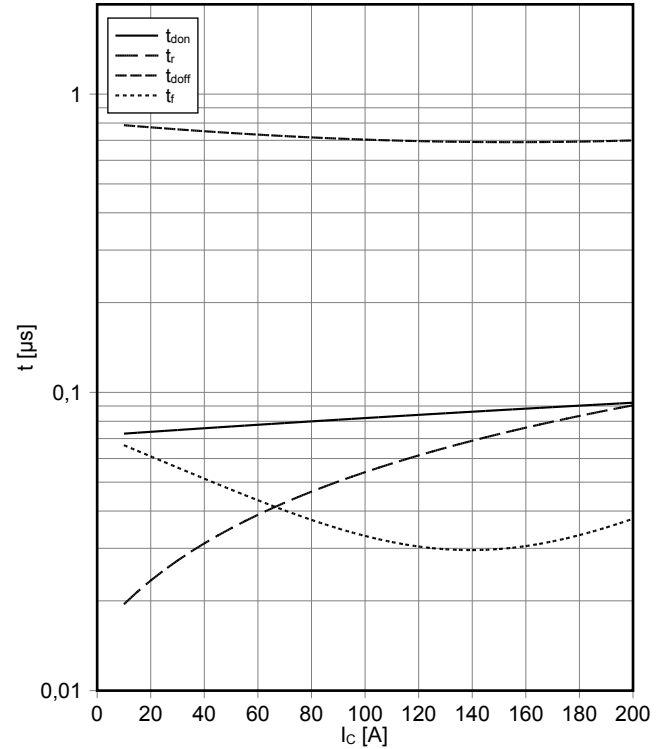
**Schaltverluste IGBT, T1 / T4 (typisch)**  
**switching losses IGBT, T1 / T4 (typical)**

$E_{on} = f(R_G), E_{off} = f(R_G)$   
 $V_{GE} = \pm 15\text{ V}, I_C = 100\text{ A}, V_{CE} = 300\text{ V}$



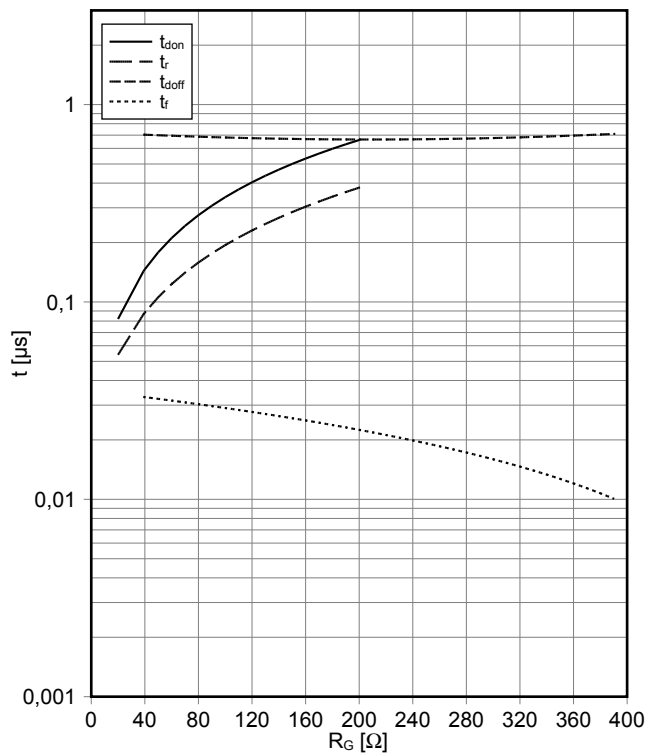
**Schaltzeiten IGBT, T1 / T4 (typisch)**  
**switching times IGBT, T1 / T4 (typical)**

$t_{don} = f(I_C), t_r = f(I_C), t_{doff} = f(I_C), t_f = f(I_C)$   
 $V_{GE} = \pm 15\text{ V}, R_{Gon} = 20\ \Omega, R_{Goff} = 39\ \Omega, V_{CE} = 300\text{ V}, T_{vj} = 150^\circ\text{C}$



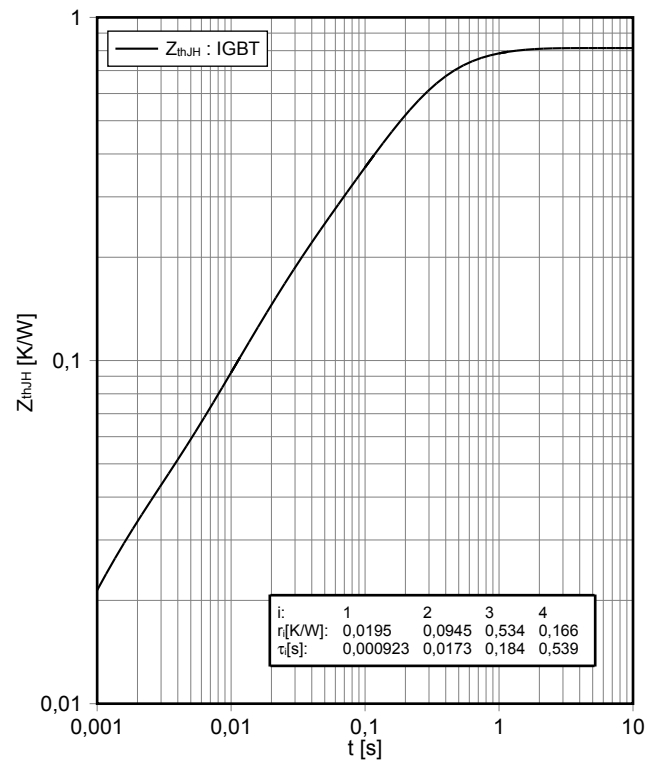
**Schaltzeiten IGBT, T1 / T4 (typisch)**  
**switching times IGBT, T1 / T4 (typical)**

$t_{don} = f(R_G), t_r = f(R_G), t_{doff} = f(R_G), t_f = f(R_G)$   
 $V_{GE} = \pm 15\text{ V}, I_C = 100\text{ A}, V_{CE} = 300\text{ V}, T_{vj} = 150^\circ\text{C}$



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

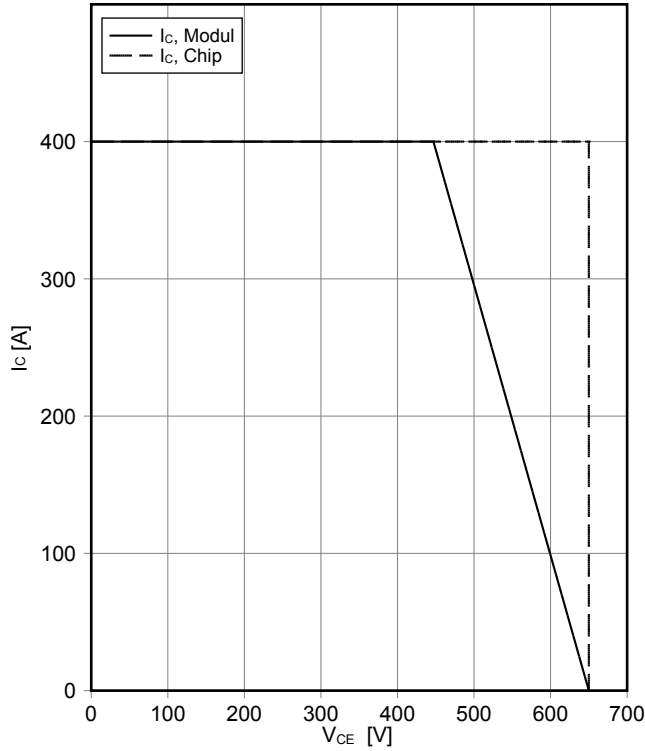
$Z_{thJH} = f(t)$





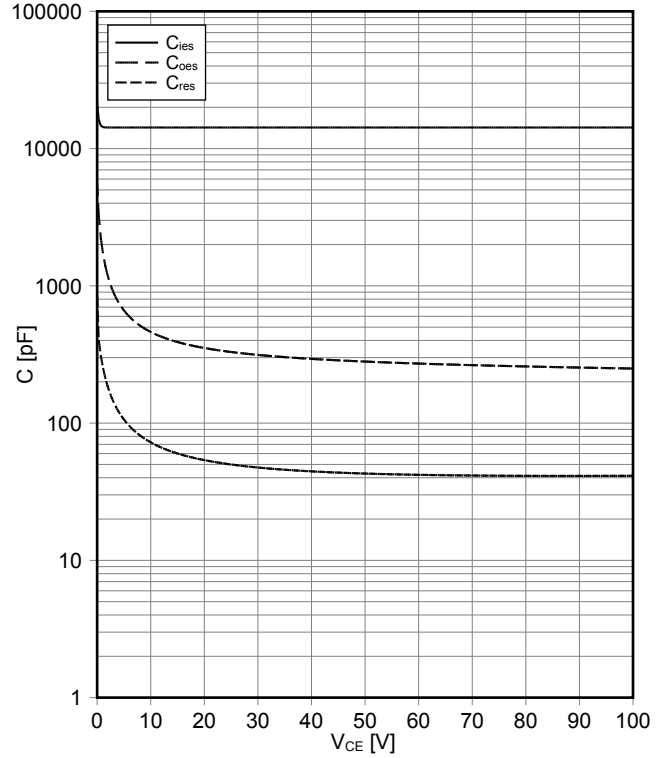
**Sicherer Rückwärts-Arbeitsbereich IGBT, T1 / T4 (RBSOA)**  
**reverse bias safe operating area IGBT, T1 / T4 (RBSOA)**

$I_C = f(V_{CE})$   
 $V_{GE} = \pm 15\text{ V}$ ,  $R_{Goff} = 39\ \Omega$ ,  $T_{vj} = 150^\circ\text{C}$



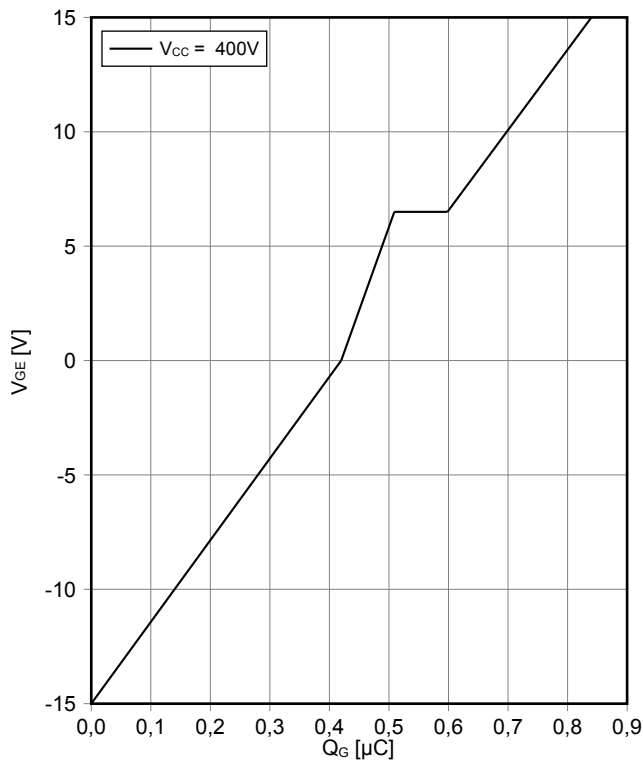
**Kapazitäts Charakteristik IGBT, T1 / T4 (typisch)**  
**capacity characteristic IGBT, T1 / T4 (typical)**

$C = f(V_{CE})$   
 $V_{GE} = 0\text{ V}$ ,  $T_{vj} = 25^\circ\text{C}$ ,  $f = 100\text{kHz}$



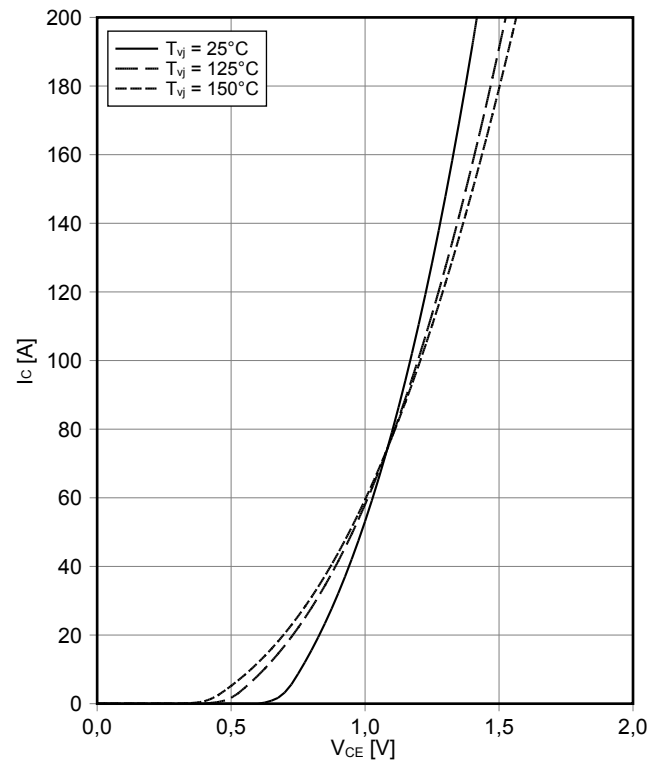
**Gateladungs Charakteristik IGBT, T1 / T4 (typisch)**  
**gate charge characteristic IGBT, T1 / T4 (typical)**

$V_{GE} = f(Q_G)$   
 $I_C = 200\text{ A}$ ,  $T_{vj} = 25^\circ\text{C}$



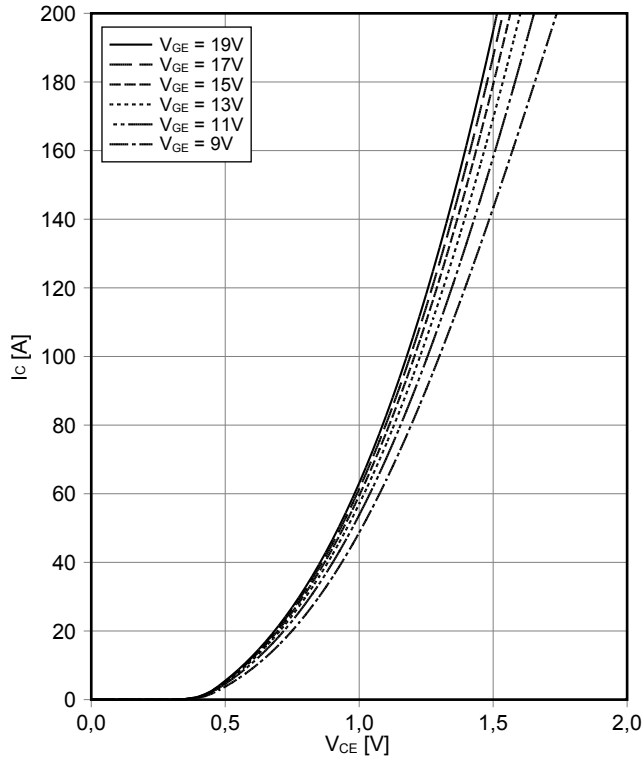
**Ausgangskennlinie IGBT, T2 / T3 (typisch)**  
**output characteristic IGBT, T2 / T3 (typical)**

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



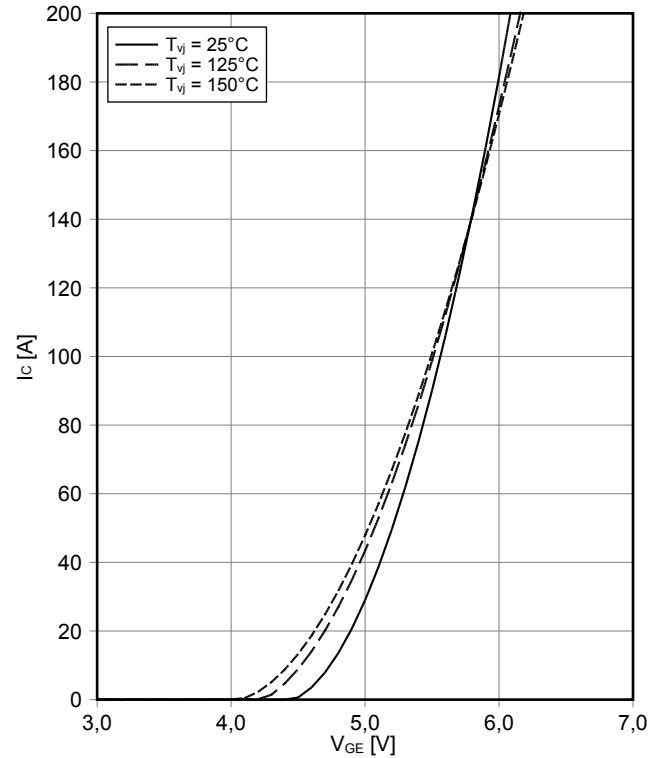
**Ausgangskennlinienfeld IGBT, T2 / T3 (typisch)**  
**output characteristic IGBT, T2 / T3 (typical)**

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



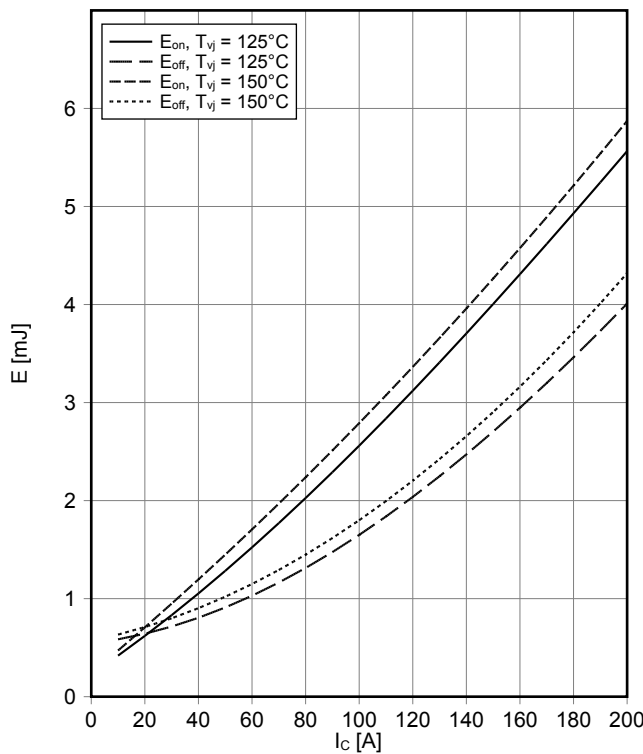
**Übertragungscharakteristik IGBT, T2 / T3 (typisch)**  
**transfer characteristic IGBT, T2 / T3 (typical)**

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



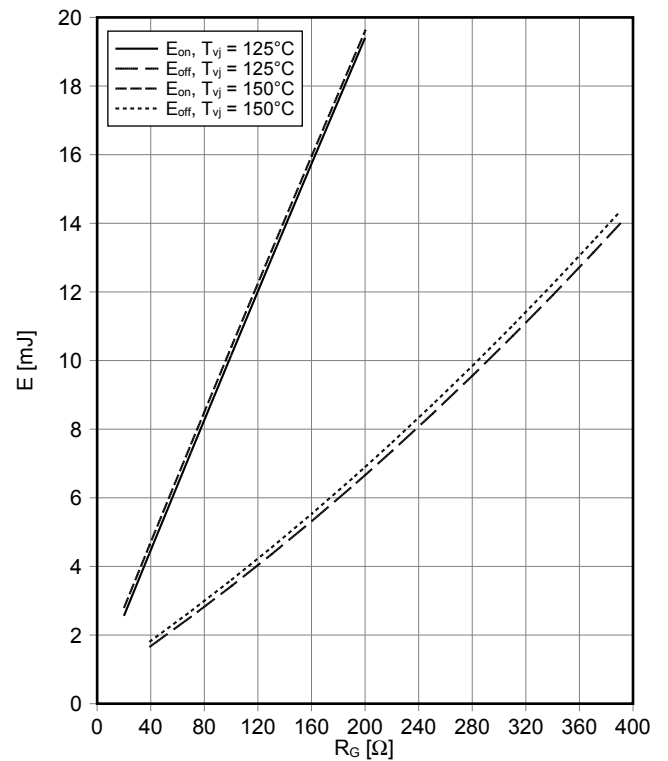
**Schaltverluste IGBT, T2 / T3 (typisch)**  
**switching losses IGBT, T2 / T3 (typical)**

$E_{on} = f(I_C)$ ,  $E_{off} = f(I_C)$   
 $V_{GE} = \pm 15\text{ V}$ ,  $R_{Gon} = 20\ \Omega$ ,  $R_{Goff} = 39\ \Omega$ ,  $V_{CE} = 300\text{ V}$



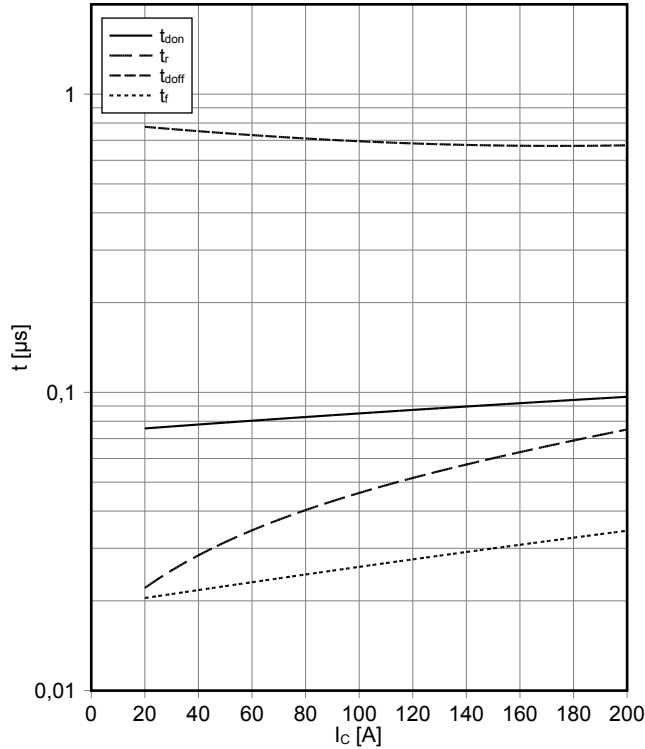
**Schaltverluste IGBT, T2 / T3 (typisch)**  
**switching losses IGBT, T2 / T3 (typical)**

$E_{on} = f(R_G)$ ,  $E_{off} = f(R_G)$   
 $V_{GE} = \pm 15\text{ V}$ ,  $I_C = 100\text{ A}$ ,  $V_{CE} = 300\text{ V}$



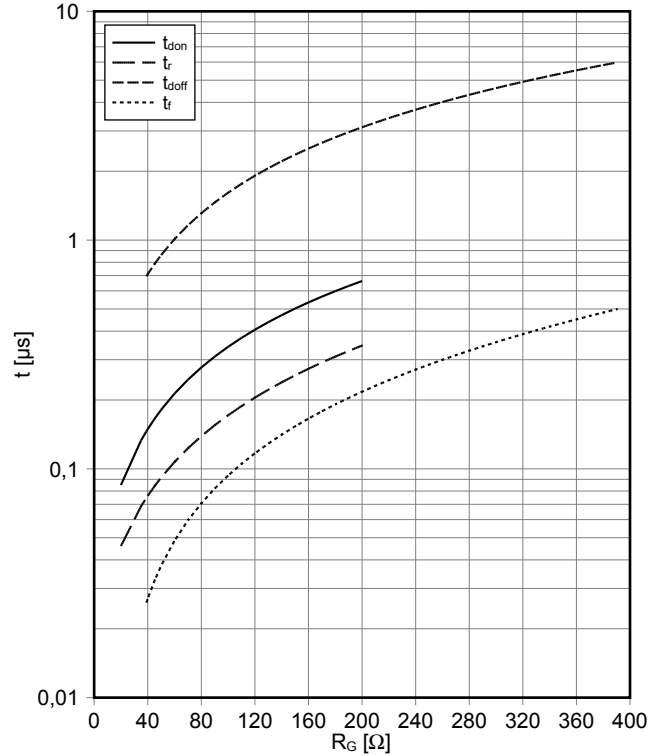
**Schaltzeiten IGBT, T2 / T3 (typisch)**  
**switching times IGBT, T2 / T3 (typical)**

$t_{don} = f(I_C)$ ,  $t_r = f(I_C)$ ,  $t_{doff} = f(I_C)$ ,  $t_f = f(I_C)$   
 $V_{GE} = \pm 15\text{ V}$ ,  $R_{Gon} = 20\ \Omega$ ,  $R_{Goff} = 39\ \Omega$ ,  $V_{CE} = 300\text{ V}$ ,  $T_{vj} = 150^\circ\text{C}$



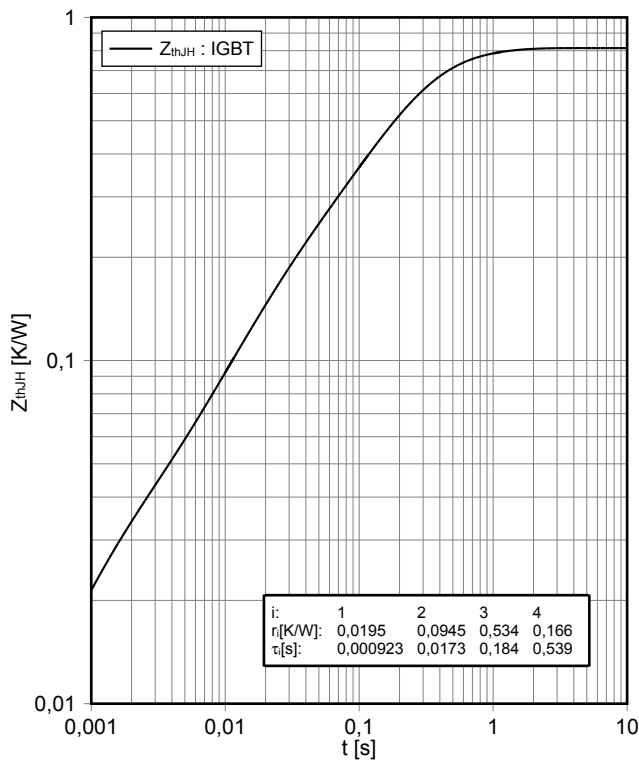
**Schaltzeiten IGBT, T2 / T3 (typisch)**  
**switching times IGBT, T2 / T3 (typical)**

$t_{don} = f(R_G)$ ,  $t_r = f(R_G)$ ,  $t_{doff} = f(R_G)$ ,  $t_f = f(R_G)$   
 $V_{GE} = \pm 15\text{ V}$ ,  $I_C = 100\text{ A}$ ,  $V_{CE} = 300\text{ V}$ ,  $T_{vj} = 150^\circ\text{C}$



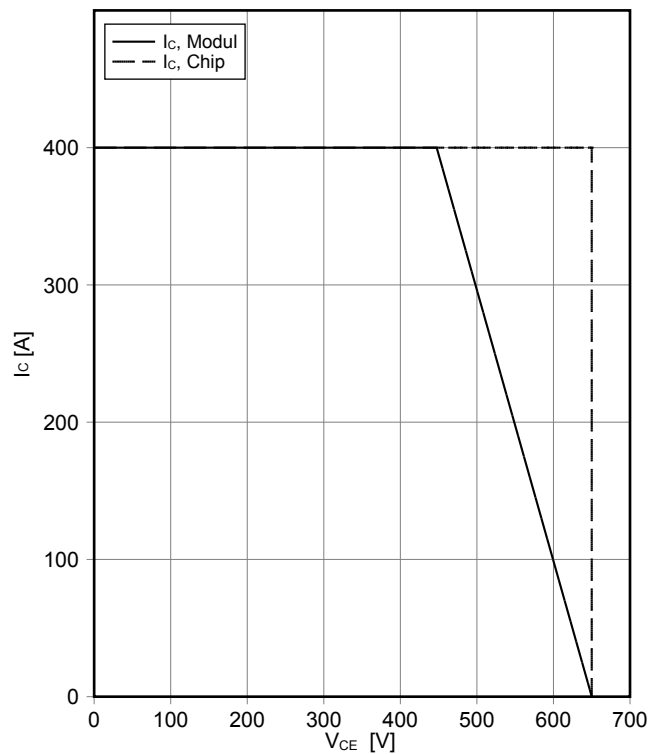
**Transienter Wärmewiderstand IGBT, T2 / T3**  
**transient thermal impedance IGBT, T2 / T3**

$Z_{thJH} = f(t)$



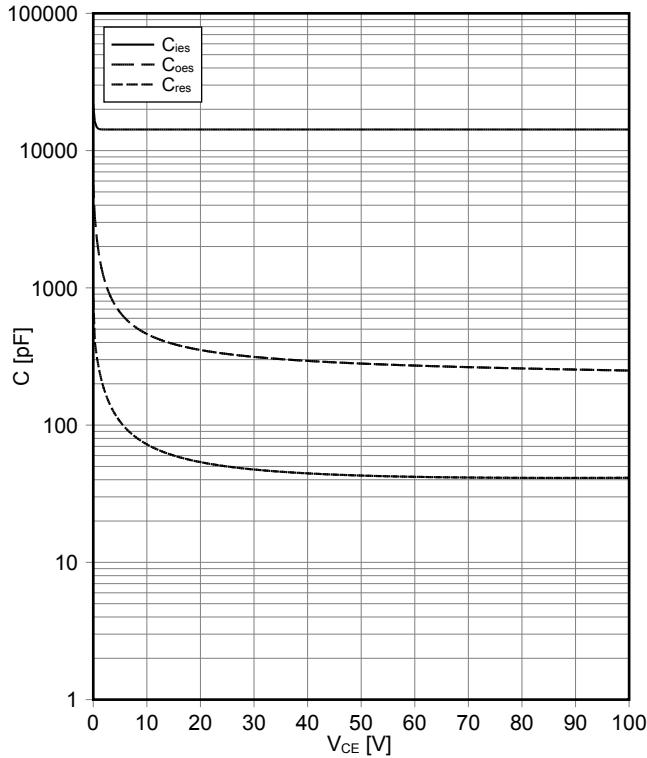
**Sicherer Rückwärts-Arbeitsbereich IGBT, T2 / T3 (RBSOA)**  
**reverse bias safe operating area IGBT, T2 / T3 (RBSOA)**

$I_C = f(V_{CE})$   
 $V_{GE} = \pm 15\text{ V}$ ,  $R_{Goff} = 39\ \Omega$ ,  $T_{vj} = 150^\circ\text{C}$



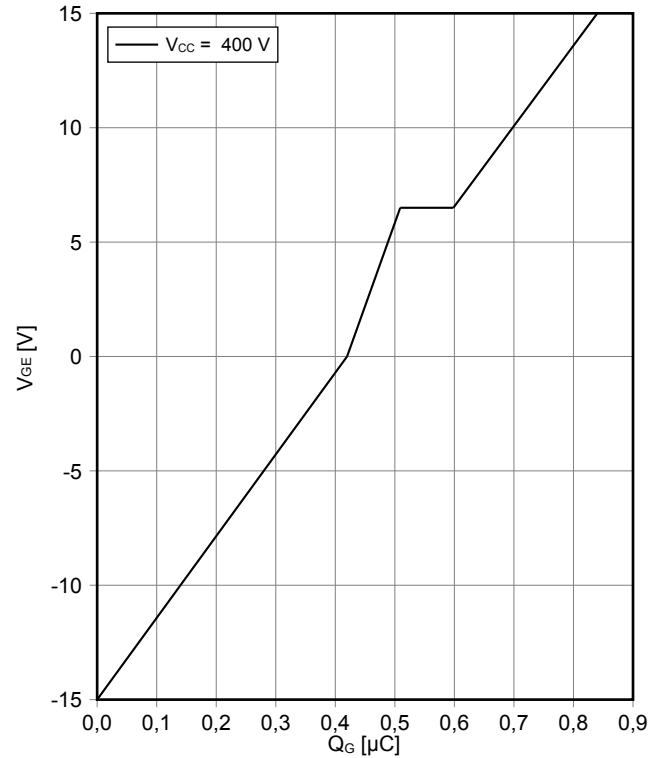
**Kapazitäts Charakteristik IGBT, T2 / T3 (typisch)**  
**capacity characteristic IGBT, T2 / T3 (typical)**

$C = f(V_{CE})$   
 $V_{GE} = 0\text{ V}$ ,  $T_{vj} = 25^\circ\text{C}$ ,  $f = 100\text{kHz}$



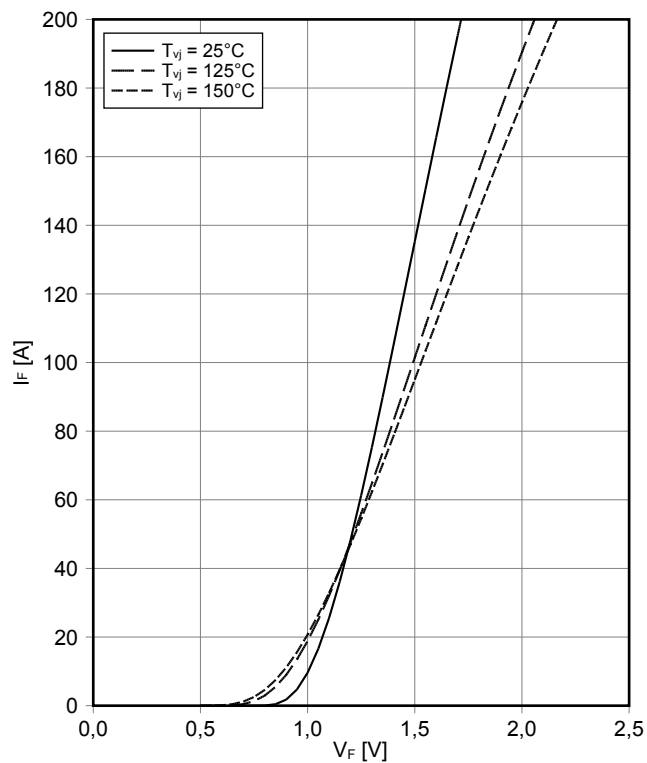
**Gateladungs Charakteristik IGBT, T2 / T3 (typisch)**  
**gate charge characteristic IGBT, T2 / T3 (typical)**

$V_{GE} = f(Q_G)$   
 $I_C = 200\text{ A}$ ,  $T_{vj} = 25^\circ\text{C}$



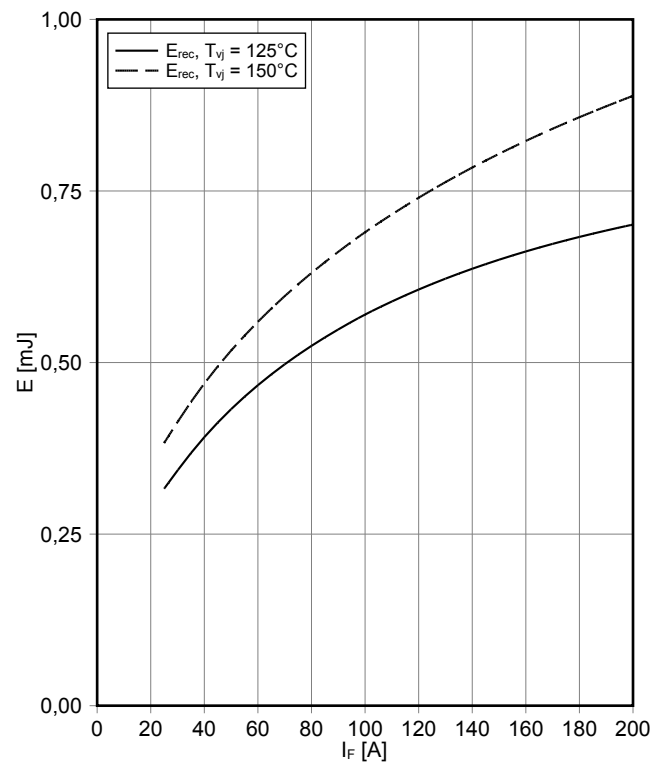
**Durchlasskennlinie der Diode, D1 / D4 (typisch)**  
**forward characteristic of Diode, D1 / D4 (typical)**

$I_F = f(V_F)$



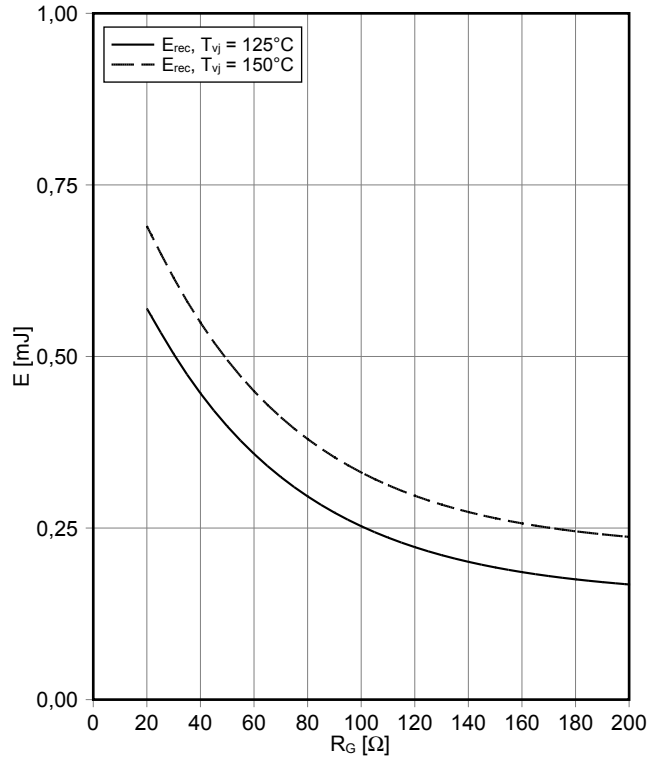
**Schaltverluste Diode, D1 / D4 (typisch)**  
**switching losses Diode, D1 / D4 (typical)**

$E_{rec} = f(I_F)$   
 $R_{Gon} = 20\ \Omega$ ,  $V_{CE} = 300\text{ V}$



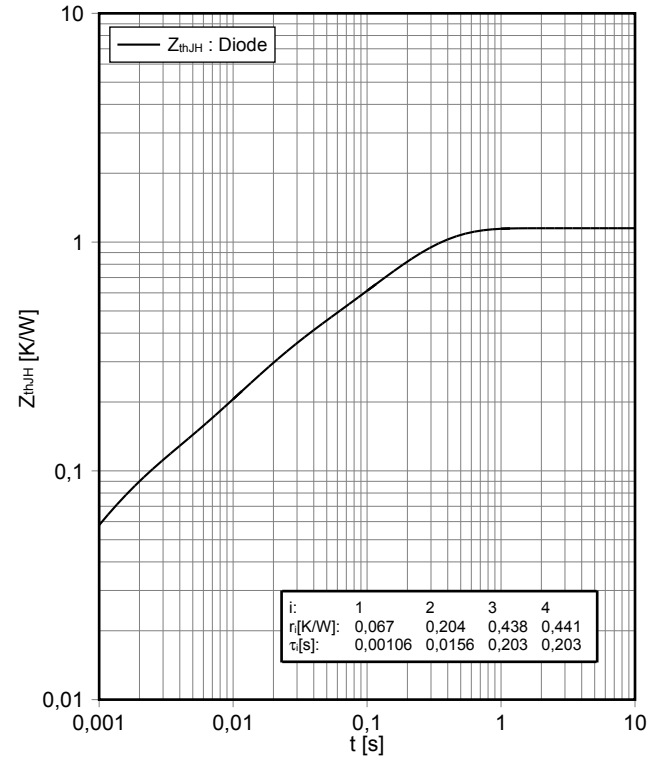
**Schaltverluste Diode, D1 / D4 (typisch)**  
**switching losses Diode, D1 / D4 (typical)**

$E_{rec} = f(R_G)$   
 $I_F = 100\text{ A}, V_{CE} = 300\text{ V}$



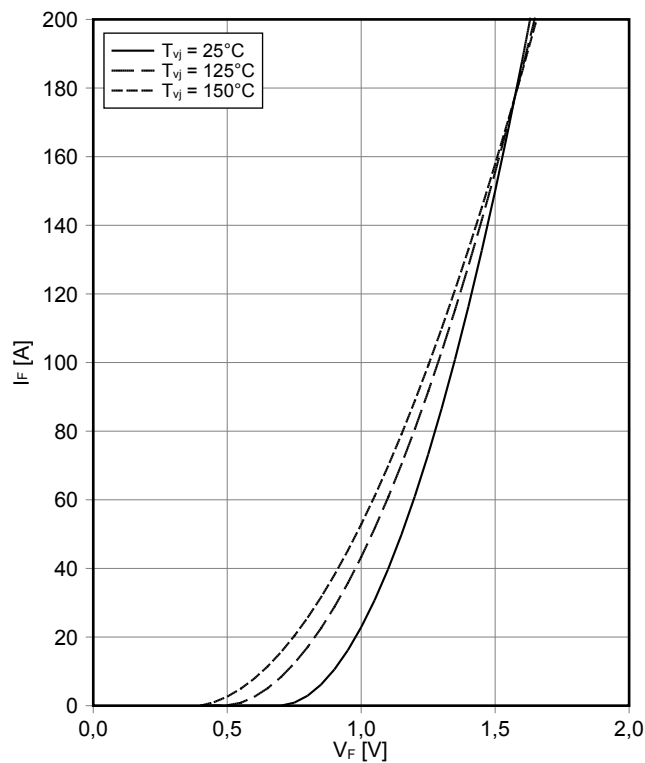
**Transienter Wärmewiderstand Diode, D1 / D4**  
**transient thermal impedance Diode, D1 / D4**

$Z_{thJH} = f(t)$



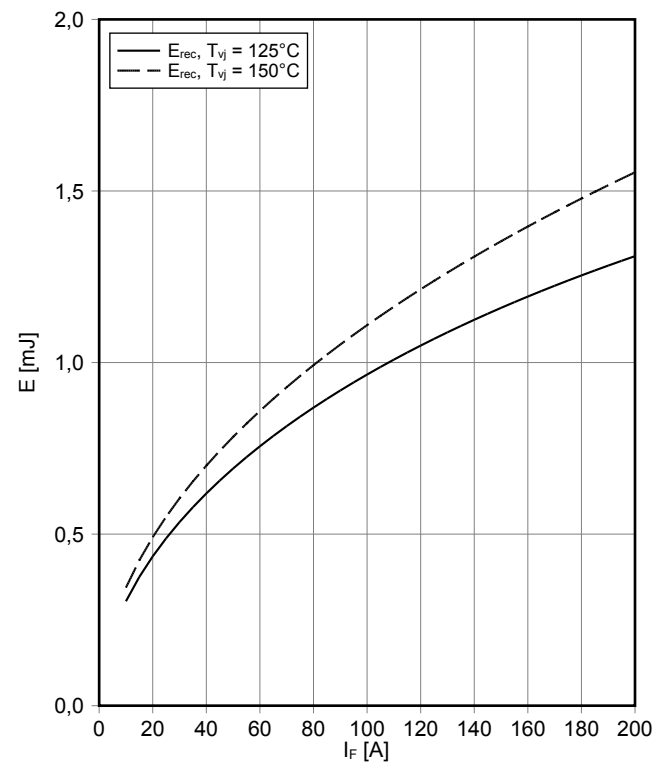
**Durchlasskennlinie der Diode, D2 / D3 (typisch)**  
**forward characteristic of Diode, D2 / D3 (typical)**

$I_F = f(V_F)$



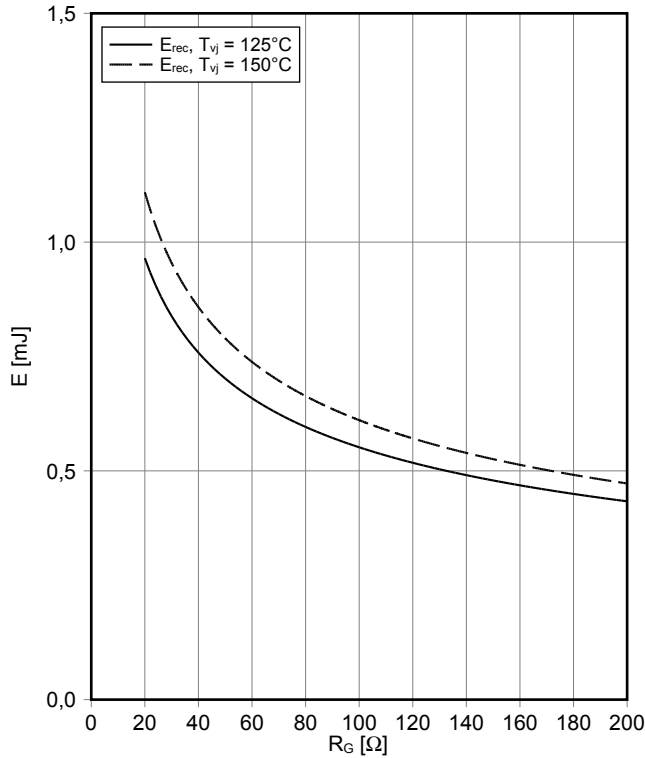
**Schaltverluste Diode, D2 / D3 (typisch)**  
**switching losses Diode, D2 / D3 (typical)**

$E_{rec} = f(I_F)$   
 $R_{Gon} = 20\ \Omega, V_{CE} = 300\text{ V}$



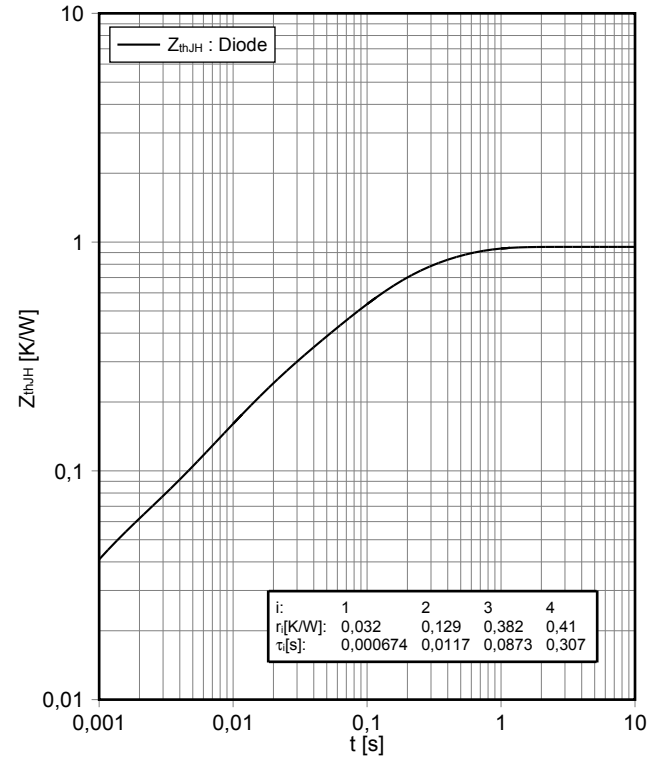
**Schaltverluste Diode, D2 / D3 (typisch)**  
**switching losses Diode, D2 / D3 (typical)**

$E_{rec} = f(R_G)$   
 $I_F = 100\text{ A}, V_{CE} = 300\text{ V}$



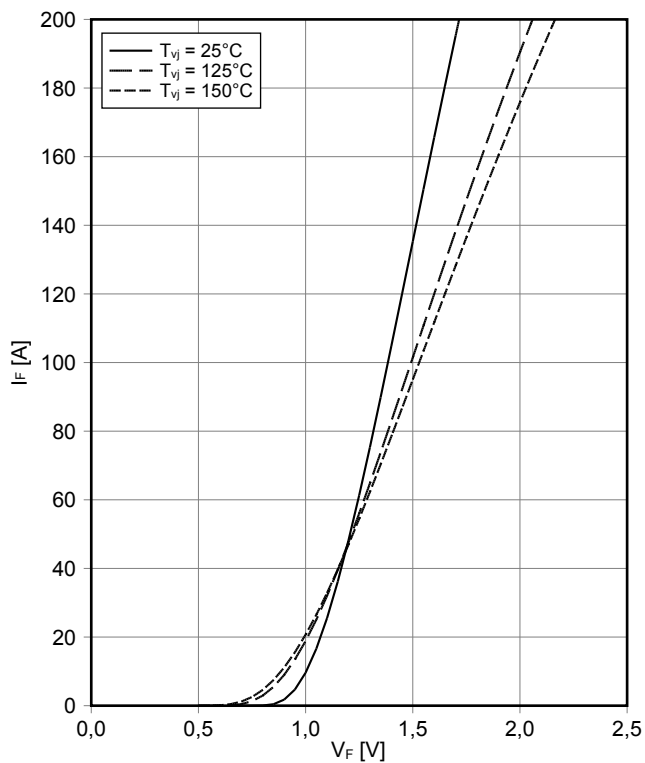
**Transienter Wärmewiderstand Diode, D2 / D3**  
**transient thermal impedance Diode, D2 / D3**

$Z_{thJH} = f(t)$



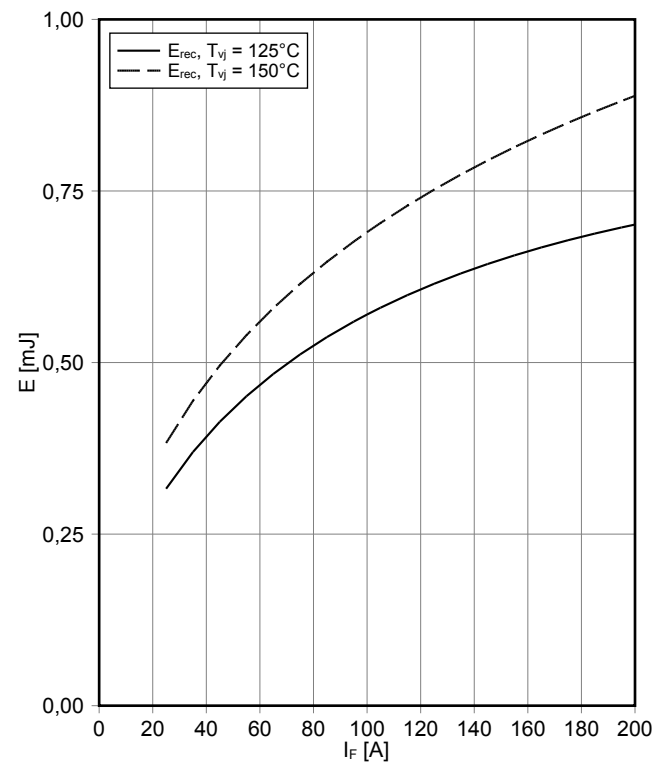
**Durchlasskennlinie der Diode, D5-D6 (typisch)**  
**forward characteristic of Diode, D5-D6 (typical)**

$I_F = f(V_F)$



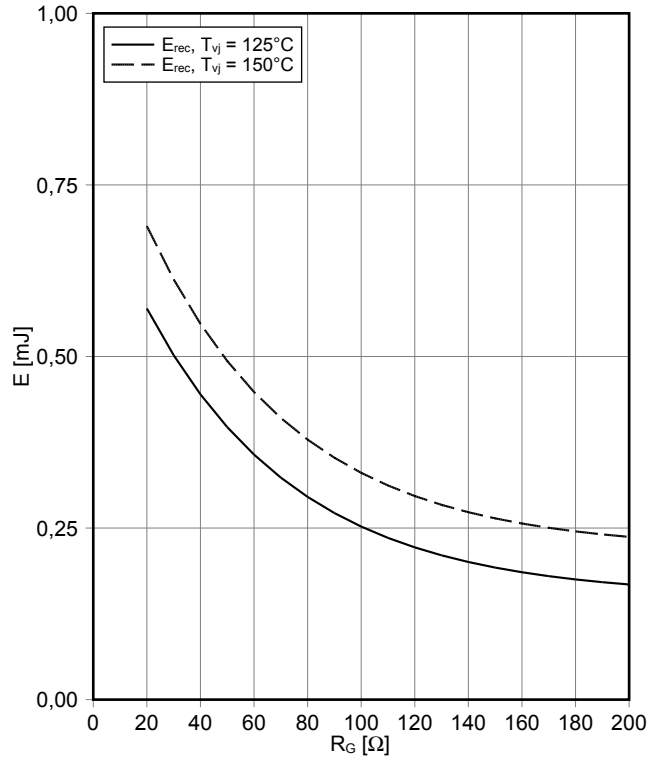
**Schaltverluste Diode, D5-D6 (typisch)**  
**switching losses Diode, D5-D6 (typical)**

$E_{rec} = f(I_F)$   
 $R_{Gon} = 20\ \Omega, V_{CE} = 300\text{ V}$



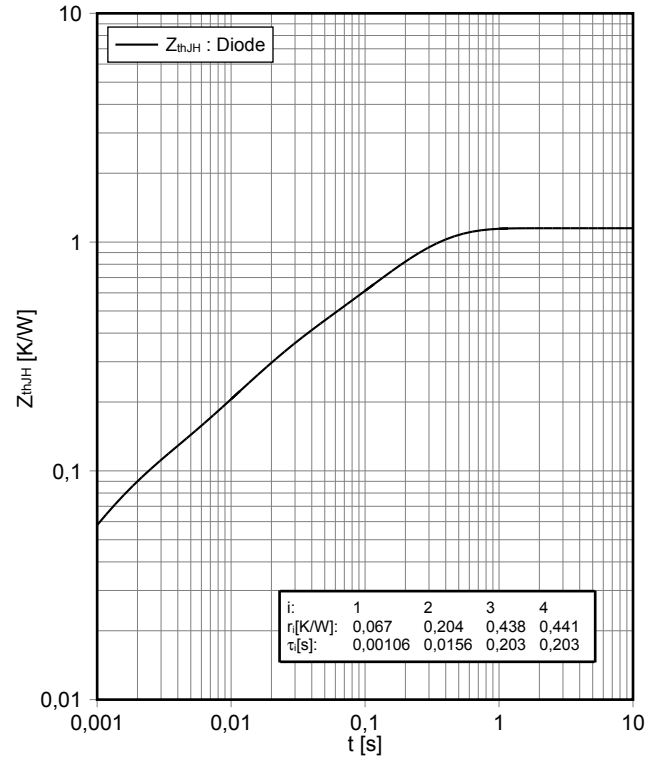
**Schaltverluste Diode, D5-D6 (typisch)**  
**switching losses Diode, D5-D6 (typical)**

$E_{rec} = f(R_G)$   
 $I_F = 100\text{ A}, V_{CE} = 300\text{ V}$



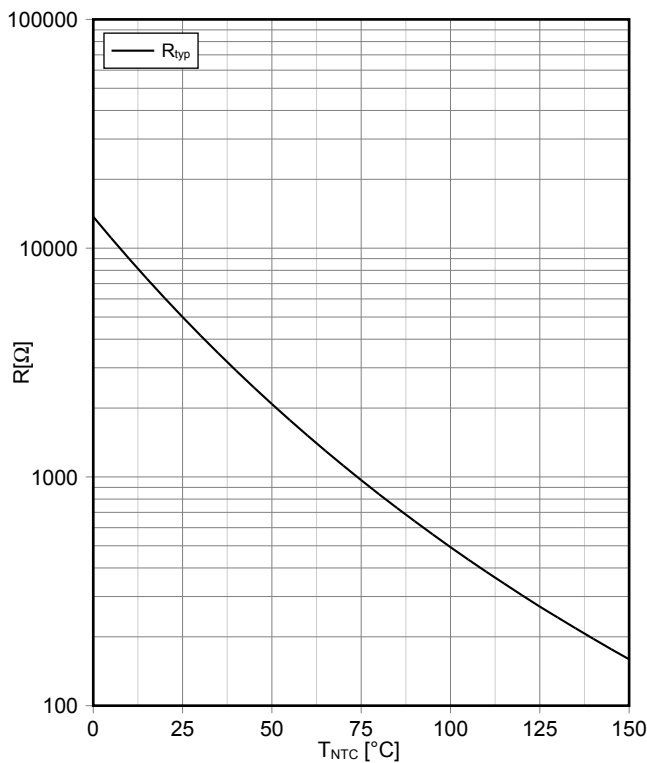
**Transienter Wärmewiderstand Diode, D5-D6**  
**transient thermal impedance Diode, D5-D6**

$Z_{thJH} = f(t)$

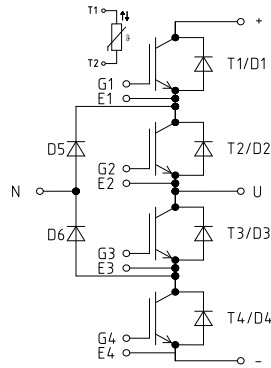


**NTC-Widerstand-Temperaturkennlinie (typisch)**  
**NTC-Thermistor-temperature characteristic (typical)**

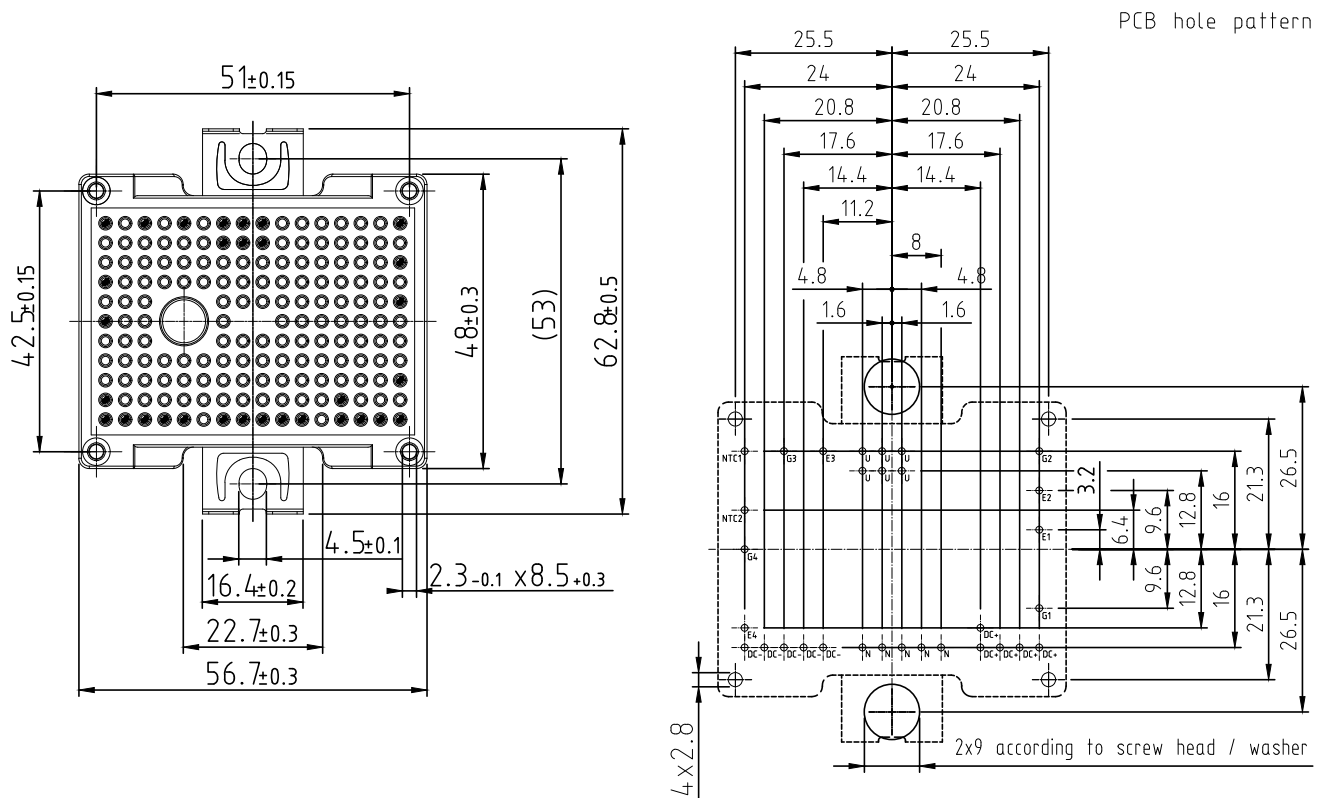
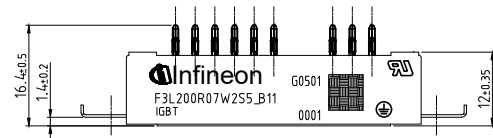
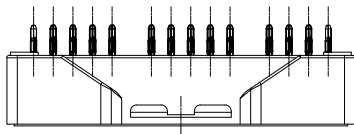
$R = f(T_{NTC})$



## Schaltplan / Circuit diagram



## Gehäuseabmessungen / Package outlines



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