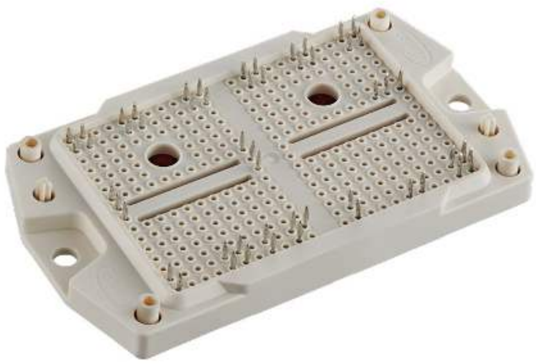
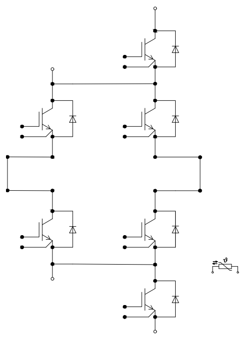
F3L400R10W3S7_B11

EasyPACK™ Modul mit TRENCHSTOP™ IGBT7 und Emitter Controlled 7 Diode und PressFIT / NTC
EasyPACK™ module with TRENCHSTOP™IGBT7 and Emitter Controlled 7 diode and PressFIT / NTC





V_{CES} = 950V
$I_{C\ nom}$ = 400A / I_{CRM} = 800A

Potentielle Anwendungen
- 3-Level-Applikationen
- Solar Anwendungen

Potential Applications
- 3-level-applications
- Solar applications

Elektrische Eigenschaften
- Hohe Stromdichte
- Niedrige Schaltverluste
- Trenchstop^{TM} IGBT7

Electrical Features
- High current density
- Low switching losses
- Trenchstop^{TM} IGBT7

Mechanische Eigenschaften
- Integrierter NTC Temperatur Sensor
- PressFIT Verbindungstechnik

Mechanical Features
- Integrated NTC temperature sensor
- PressFIT contact technology

Module Label Code

Barcode Code 128

00000123456000000000000

DMX - 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°C	V_{CES}	950	V
Implementierter Kollektor-Strom Implemented collector current		I_{CN}	400	A
Kollektor-Dauergleichstrom Continuous DC collector current	T_H = 65°C, $T_{vj\,max}$ = 175°C	I_{CDC}	235	A
Periodischer Kollektor-Spitzenstrom Repetitive peak collector current	t_P = 1 ms	I_{CRM}	800	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 = 150 A V_{GE} = 15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$V_{CE\,sat}$		1,40 1,48 1,50	1,61	V V V
Gate-Schwellenspannung Gate threshold voltage	I_C = 6,50 mA, V_{CE} = V_{GE}, T_{vj} = 25°C		V_{GEth}	4,35	5,10	5,85	V
Gateladung Gate charge	V_{GE} = -15 / 15 V, V_{CE} = 600 V		Q_G		0,90		µC
Interner Gatewiderstand Internal gate resistor	T_{vj} = 25°C		R_{Gint}		0,75		Ω
Eingangskapazität Input capacitance	f = 100 kHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{ies}		25,2		nF
Rückwirkungskapazität Reverse transfer capacitance	f = 100 kHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{res}		0,078		nF
Kollektor-Emitter-Reststrom Collector-emitter cut-off current	V_{CE} = 950 V, V_{GE} = 0 V	T_{vj} = 25°C	I_{CES}			0,07	mA
Gate-Emitter-Reststrom Gate-emitter leakage current	V_{CE} = 0 V, V_{GE} = 20 V, T_{vj} = 25°C		I_{GES}			100	nA
Einschaltverzögerungszeit, induktive Last Turn-on delay time, inductive load	I_C = 150 A, V_{CE} = 500 V V_{GE} = -15 / 15 V R_{Gon} = 3,9 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$t_{d\,on}$		0,089 0,092 0,093		µs µs µs
Anstiegszeit, induktive Last Rise time, inductive load	I_C = 150 A, V_{CE} = 500 V V_{GE} = -15 / 15 V R_{Gon} = 3,9 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	t_r		0,022 0,026 0,027		µs µs µs
Abschaltverzögerungszeit, induktive Last Turn-off delay time, inductive load	I_C = 150 A, V_{CE} = 500 V V_{GE} = -15 / 15 V R_{Goff} = 3,9 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$t_{d\,off}$		0,27 0,34 0,36		µs µs µs
Fallzeit, induktive Last Fall time, inductive load	I_C = 150 A, V_{CE} = 500 V V_{GE} = -15 / 15 V R_{Goff} = 3,9 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	t_f		0,041 0,075 0,088		µs µs µs
Einschaltverlustenergie pro Puls Turn-on energy loss per pulse	I_C = 150 A, V_{CE} = 500 V, L_σ = 35 nH di/dt = 5800 A/µs (T_{vj} = 150°C) V_{GE} = -15 / 15 V, R_{Gon} = 3,9 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{on}		5,00 7,05 7,50		mJ mJ mJ
Abschaltverlustenergie pro Puls Turn-off energy loss per pulse	I_C = 150 A, V_{CE} = 500 V, L_σ = 35 nH du/dt = 4000 V/µs (T_{vj} = 150°C) V_{GE} = -15 / 15 V, R_{Goff} = 3,9 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{off}		4,30 7,16 8,00		mJ mJ mJ
Kurzschlußverhalten SC data	$V_{GE} \leq 15$ V, V_{CC} = 600 V $V_{CEmax} = V_{CES} - L_{sCE} \cdot di/dt$	$t_P \leq 0$ µs, T_{vj} = 150°C	I_{SC}		1200		A
Wärmewiderstand, Chip bis Kühlkörper Thermal resistance, junction to heatsink	pro IGBT / per IGBT		R_{thJH}		0,224		K/W
Temperatur im Schaltbetrieb Temperature under switching conditions			$T_{vj\,op}$	-40		150	°C

IGBT, T2 / T3 / IGBT, T2 / T3

Höchstzulässige Werte / Maximum Rated Values

Kollektor-Emitter-Sperrspannung Collector-emitter voltage	T_{vj} = 25°C	V_{CES}	950	V
Implementierter Kollektor-Strom Implemented collector current		I_{CN}	400	A
Kollektor-Dauergleichstrom Continuous DC collector current	T_H = 65°C, $T_{vj\,max}$ = 175°C	I_{CDC}	380	A
Periodischer Kollektor-Spitzenstrom Repetitive peak collector current	t_P = 1 ms	I_{CRM}	800	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 = 150 A V_{GE} = 15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$V_{CE\,sat}$		1,07 1,04 1,02	1,14	V V V
Gate-Schwellenspannung Gate threshold voltage	I_C = 6,50 mA, V_{CE} = 20 V, T_{vj} = 25°C		V_{GEth}	4,15	4,90	5,65	V
Gateladung Gate charge	V_{GE} = -15 / 15 V, V_{CE} = 600 V		Q_G		4,10		µC
Interner Gatewiderstand Internal gate resistor	T_{vj} = 25°C		R_{Gint}		0,75		Ω
Eingangskapazität Input capacitance	f = 100 kHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{ies}		49,2		nF
Rückwirkungskapazität Reverse transfer capacitance	f = 100 kHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{res}		0,228		nF
Kollektor-Emitter-Reststrom Collector-emitter cut-off current	V_{CE} = 950 V, V_{GE} = 0 V	T_{vj} = 25°C	I_{CES}			0,07	mA
Gate-Emitter-Reststrom Gate-emitter leakage current	V_{CE} = 0 V, V_{GE} = 20 V, T_{vj} = 25°C		I_{GES}			100	nA
Einschaltverzögerungszeit, induktive Last Turn-on delay time, inductive load	I_C = 150 A, V_{CE} = 500 V V_{GE} = -15 / 15 V R_{Gon} = 3,9 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$t_{d\,on}$		0,189 0,191 0,192		µs µs µs
Anstiegszeit, induktive Last Rise time, inductive load	I_C = 150 A, V_{CE} = 500 V V_{GE} = -15 / 15 V R_{Gon} = 3,9 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	t_r		0,026 0,032 0,034		µs µs µs
Abschaltverzögerungszeit, induktive Last Turn-off delay time, inductive load	I_C = 150 A, V_{CE} = 500 V V_{GE} = -15 / 15 V R_{Goff} = 3,9 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$t_{d\,off}$		0,76 0,92 0,94		µs µs µs
Fallzeit, induktive Last Fall time, inductive load	I_C = 150 A, V_{CE} = 500 V V_{GE} = -15 / 15 V R_{Goff} = 3,9 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	t_f		0,23 0,44 0,49		µs µs µs
Einschaltverlustenergie pro Puls Turn-on energy loss per pulse	I_C = 150 A, V_{CE} = 500 V, Lσ = 35 nH di/dt = 5200 A/µs (T_{vj} = 150°C) V_{GE} = -15 / 15 V, R_{Gon} = 3,9 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{on}		3,10 4,00 4,30		mJ mJ mJ
Abschaltverlustenergie pro Puls Turn-off energy loss per pulse	I_C = 150 A, V_{CE} = 500 V, Lσ = 35 nH du/dt = 1200 V/µs (T_{vj} = 150°C) V_{GE} = -15 / 15 V, R_{Goff} = 3,9 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{off}		24,5 35,3 37,9		mJ mJ mJ
Kurzschlußverhalten SC data	$V_{GE} \leq$ 15 V, V_{CC} = 600 V $V_{CEmax} = V_{CES} - L_{sCE} \cdot di/dt$	$t_P \leq$ 0 µs, T_{vj} = 150°C	I_{SC}		1200		A
Wärmewiderstand, Chip bis Kühlkörper Thermal resistance, junction to heatsink	pro IGBT / per IGBT		R_{thJH}		0,200		K/W
Temperatur im Schaltbetrieb Temperature under switching conditions			$T_{vj\,op}$	-40		150	°C

IGBT, T5 / T6 / IGBT, T5 / T6

Höchstzulässige Werte / Maximum Rated Values

Kollektor-Emitter-Sperrspannung Collector-emitter voltage	T_{vj} = 25°C	V_{CES}	950	V
Implementierter Kollektor-Strom Implemented collector current		I_{CN}	200	A
Kollektor-Dauergleichstrom Continuous DC collector current	T_H = 65°C, $T_{vj\,max}$ = 175°C	I_{CDC}	140	A
Periodischer Kollektor-Spitzenstrom Repetitive peak collector current	t_P = 1 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 = 150 A V_{GE} = 15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$V_{CE\,sat}$		1,68 1,88 1,92	1,98	V V V
Gate-Schwellenspannung Gate threshold voltage	I_C = 3,25 mA, V_{CE} = V_{GE}, T_{vj} = 25°C		V_{GEth}	4,35	5,10	5,85	V
Gateladung Gate charge	V_{GE} = -15 / 15 V, V_{CE} = 600 V		Q_G		0,45		µC
Interner Gatewiderstand Internal gate resistor	T_{vj} = 25°C		R_{Gint}		1,5		Ω
Eingangskapazität Input capacitance	f = 100 kHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{ies}		12,6		nF
Rückwirkungskapazität Reverse transfer capacitance	f = 100 kHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{res}		0,039		nF
Kollektor-Emitter-Reststrom Collector-emitter cut-off current	V_{CE} = 950 V, V_{GE} = 0 V	T_{vj} = 25°C	I_{CES}			0,05	mA
Gate-Emitter-Reststrom Gate-emitter leakage current	V_{CE} = 0 V, V_{GE} = 20 V, T_{vj} = 25°C		I_{GES}			100	nA
Einschaltverzögerungszeit, induktive Last Turn-on delay time, inductive load	I_C = 150 A, V_{CE} = 500 V V_{GE} = -15 / 15 V R_{Gon} = 3,9 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$t_{d\,on}$		0,086 0,095 0,096		µs µs µs
Anstiegszeit, induktive Last Rise time, inductive load	I_C = 150 A, V_{CE} = 500 V V_{GE} = -15 / 15 V R_{Gon} = 3,9 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	t_r		0,02 0,022 0,023		µs µs µs
Abschaltverzögerungszeit, induktive Last Turn-off delay time, inductive load	I_C = 150 A, V_{CE} = 500 V V_{GE} = -15 / 15 V R_{Goff} = 3,9 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$t_{d\,off}$		0,18 0,22 0,23		µs µs µs
Fallzeit, induktive Last Fall time, inductive load	I_C = 150 A, V_{CE} = 500 V V_{GE} = -15 / 15 V R_{Goff} = 3,9 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	t_f		0,032 0,089 0,112		µs µs µs
Einschaltverlustenergie pro Puls Turn-on energy loss per pulse	I_C = 150 A, V_{CE} = 500 V, Lσ = 35 nH di/dt = 5300 A/µs (T_{vj} = 150°C) V_{GE} = -15 / 15 V, R_{Gon} = 3,9 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{on}		5,00 6,43 6,79		mJ mJ mJ
Abschaltverlustenergie pro Puls Turn-off energy loss per pulse	I_C = 150 A, V_{CE} = 500 V, Lσ = 35 nH du/dt = 6000 V/µs (T_{vj} = 150°C) V_{GE} = -15 / 15 V, R_{Goff} = 3,9 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{off}		3,73 6,35 7,26		mJ mJ mJ
Kurzschlußverhalten SC data	V_{GE} ≤ 15 V, V_{CC} = 600 V V_{CEmax} = V_{CES} -L_{sCE} ·di/dt	t_P ≤ 0 µs, T_{vj} = 150°C	I_{SC}		600		A
Wärmewiderstand, Chip bis Kühlkörper Thermal resistance, junction to heatsink	pro IGBT / per IGBT		R_{thJH}		0,340		K/W
Temperatur im Schaltbetrieb Temperature under switching conditions			$T_{vj\,op}$	-40		150	°C

Diode, D1 / D4 / Diode, D1 / D4

Höchstzulässige Werte / Maximum Rated Values

Periodische Spitzensperrspannung Repetitive peak reverse voltage	T_{vj} = 25°C	V_{RRM}	950	V
Implementierter Durchlassstrom Implemented forward current		I_{FN}	200	A
Dauergleichstrom Continuous DC forward current		I_F	150	A
Periodischer Spitzenstrom Repetitive peak forward current	t_P = 1 ms	I_{FRM}	400	A
Grenzlastintegral I^2t - value	V_R = 0 V, t_P = 10 ms, T_{vj} = 125°C V_R = 0 V, t_P = 10 ms, T_{vj} = 150°C	I^2t	1620 1530	A²s A²s

Charakteristische Werte / Characteristic Values

				min.	typ.	max.	
Durchlassspannung Forward voltage	I_F = 150 A, V_{GE} = 0 V I_F = 150 A, V_{GE} = 0 V I_F = 150 A, V_{GE} = 0 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	V_F		2,33 2,12 2,08	2,58	V V V
Rückstromspitze Peak reverse recovery current	I_F = 150 A, - di_F/dt = 5300 A/µs (T_{vj}=150°C) V_R = 500 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	I_{RM}		119 173 189		A A A
Sperrverzögerungsladung Recovered charge	I_F = 150 A, - di_F/dt = 5300 A/µs (T_{vj}=150°C) V_R = 500 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	Q_r		5,84 11,6 14,0		µC µC µC
Abschaltenergie pro Puls Reverse recovery energy	I_F = 150 A, - di_F/dt = 5300 A/µs (T_{vj}=150°C) V_R = 500 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{rec}		1,70 3,62 4,53		mJ mJ mJ
Wärmewiderstand, Chip bis Kühlkörper Thermal resistance, junction to heatsink	pro Diode / per diode		R_{thJH}		0,460		K/W
Temperatur im Schaltbetrieb Temperature under switching conditions			$T_{vj\,op}$	-40		150	°C

Diode, D2 / D3 / Diode, D2 / D3

Höchstzulässige Werte / Maximum Rated Values

Periodische Spitzensperrspannung Repetitive peak reverse voltage	T_{vj} = 25°C	V_{RRM}	950	V
Implementierter Durchlassstrom Implemented forward current		I_{FN}	200	A
Dauergleichstrom Continuous DC forward current		I_F	150	A
Periodischer Spitzenstrom Repetitive peak forward current	t_P = 1 ms	I_{FRM}	400	A
Grenzlastintegral I^2t - value	V_R = 0 V, t_P = 10 ms, T_{vj} = 125°C V_R = 0 V, t_P = 10 ms, T_{vj} = 150°C	I^2t	1620 1530	A²s A²s

Charakteristische Werte / Characteristic Values

				min.	typ.	max.	
Durchlassspannung Forward voltage	I_F = 150 A, V_{GE} = 0 V I_F = 150 A, V_{GE} = 0 V I_F = 150 A, V_{GE} = 0 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	V_F		2,33 2,12 2,08	2,58	V V V
Rückstromspitze Peak reverse recovery current	I_F = 150 A, - di_F/dt = 5200 A/µs (T_{vj}=150°C) V_R = 500 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	I_{RM}		154 189 200		A A A
Sperrverzögerungsladung Recovered charge	I_F = 150 A, - di_F/dt = 5200 A/µs (T_{vj}=150°C) V_R = 500 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	Q_r		6,65 14,9 20,0		µC µC µC
Abschaltenergie pro Puls Reverse recovery energy	I_F = 150 A, - di_F/dt = 5200 A/µs (T_{vj}=150°C) V_R = 500 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{rec}		2,39 6,24 7,49		mJ mJ mJ
Wärmewiderstand, Chip bis Kühlkörper Thermal resistance, junction to heatsink	pro Diode / per diode		R_{thJH}		0,552		K/W
Temperatur im Schaltbetrieb Temperature under switching conditions			$T_{vj\,op}$	-40		150	°C

Diode, D5-D6 / Diode, D5-D6

Höchstzulässige Werte / Maximum Rated Values

Periodische Spitzensperrspannung Repetitive peak reverse voltage	T_{vj} = 25°C	V_{RRM}	950	V
Implementierter Durchlassstrom Implemented forward current		I_{FN}	200	A
Dauergleichstrom Continuous DC forward current		I_F	150	A
Periodischer Spitzenstrom Repetitive peak forward current	t_P = 1 ms	I_{FRM}	400	A
Grenzlastintegral I²t - value	V_R = 0 V, t_P = 10 ms, T_{vj} = 125°C V_R = 0 V, t_P = 10 ms, T_{vj} = 150°C	I^2t	1620 1530	A²s A²s

Charakteristische Werte / Characteristic Values

				min.	typ.	max.	
Durchlassspannung Forward voltage	I_F = 150 A, V_{GE} = 0 V I_F = 150 A, V_{GE} = 0 V I_F = 150 A, V_{GE} = 0 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	V_F		2,33 2,12 2,08	2,58	V V V
Rückstromspitze Peak reverse recovery current	I_F = 150 A, - di_F/dt = 5800 A/µs (T_{vj}=150°C) V_R = 500 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	I_{RM}		145 189 205		A A A
Sperrverzögerungsladung Recovered charge	I_F = 150 A, - di_F/dt = 5800 A/µs (T_{vj}=150°C) V_R = 500 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	Q_r		7,70 15,0 18,7		µC µC µC
Abschaltenergie pro Puls Reverse recovery energy	I_F = 150 A, - di_F/dt = 5800 A/µs (T_{vj}=150°C) V_R = 500 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{rec}		2,59 5,01 6,44		mJ mJ mJ
Wärmewiderstand, Chip bis Kühlkörper Thermal resistance, junction to heatsink	pro Diode / per diode		R_{thJH}		0,490		K/W
Temperatur im Schaltbetrieb Temperature under switching conditions			$T_{vj\ op}$	-40		150	°C

NTC-Widerstand / NTC-Thermistor

Charakteristische Werte / Characteristic Values

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

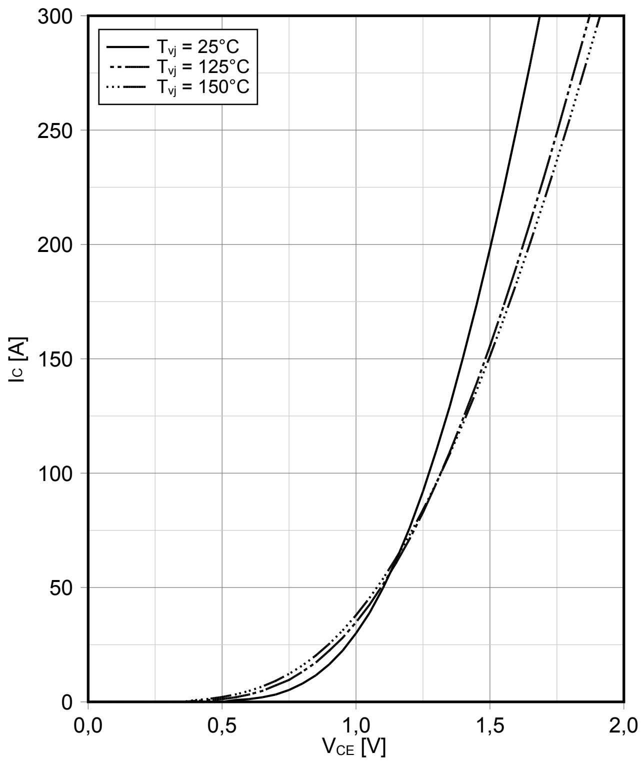
Angaben gemäß gültiger Application Note.
Specification according to the valid application note.

Modul / Module

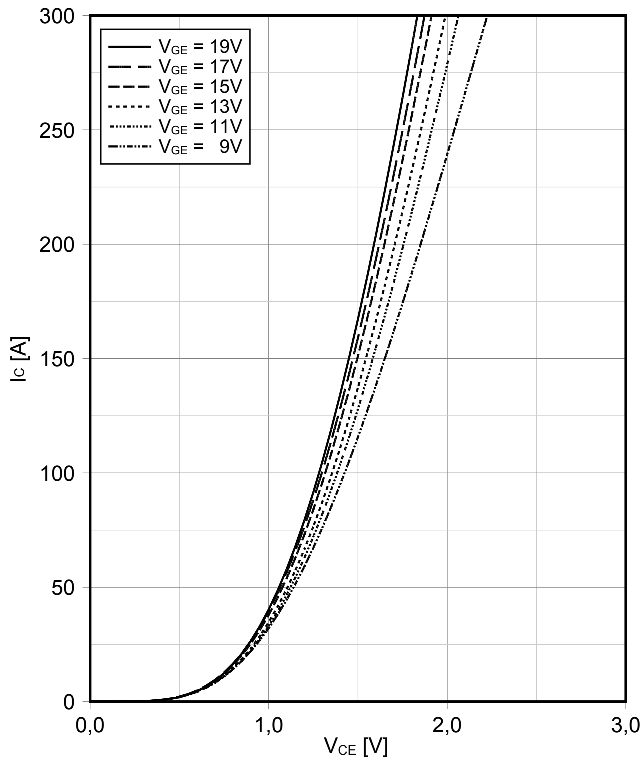
Isolations-Prüfspannung Isolation test voltage	RMS, f = 50 Hz, t = 1 min.	V_{ISOL}		3,2		kV
Innere Isolation Internal isolation	Basisisolierung (Schutzklasse 1, EN61140) basic insulation (class 1, IEC 61140)			Al_2O_3		
Kriechstrecke Creepage distance	Kontakt - Kühlkörper / terminal to heatsink Kontakt - Kontakt / terminal to terminal			9,6 5,8		mm
Luftstrecke Clearance	Kontakt - Kühlkörper / terminal to heatsink Kontakt - Kontakt / terminal to terminal			8,8 4,7		mm
Vergleichszahl der Kriechwegbildung Comperative tracking index		CTI		> 400		
Relativer Temperaturindex (elektr.) RTI Elec.	Gehäuse housing	RTI		140		°C
			min.	typ.	max.	
Modulstreuinduktivität Stray inductance module		L_{sCE}		15		nH
Lagertemperatur Storage temperature		T_{stg}	-40		125	°C
Anzugsdrehmoment f. Modulmontage Mounting torque for modul mounting	Schraube - Montage gem. gültiger Applikationsschrift Screw - Mounting according to valid application note	M	1,30		1,50	Nm
Gewicht Weight		G		78		g

Der Strom im Dauerbetrieb ist auf 25 A effektiv pro Anschlusspin begrenzt.
The current under continuous operation is limited to 25 A rms per connector pin.
IGBT- und Dioden-RthJH-Parameter mit einer Wärmeleitpaste λ_{Paste} = 3.3 W/(m·K) gemessen
IGBT- and diode- RthJH parameters measured with thermal grease of λ_{paste} = 3.3 W/(m·K)

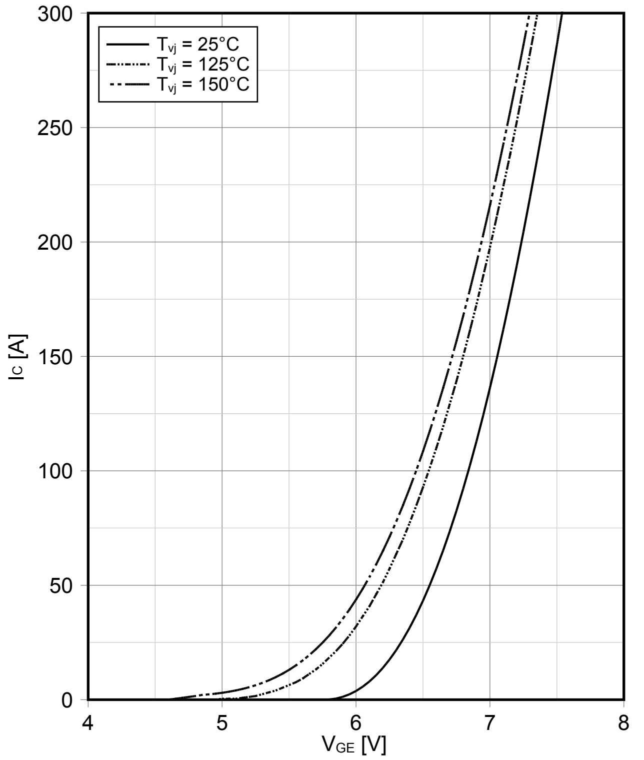
Ausgangskennlinie IGBT, T1 / T4 (typisch)
output characteristic IGBT, T1 / T4 (typical)
$I_C = f(V_{CE})$
$V_{GE} = 15$ V



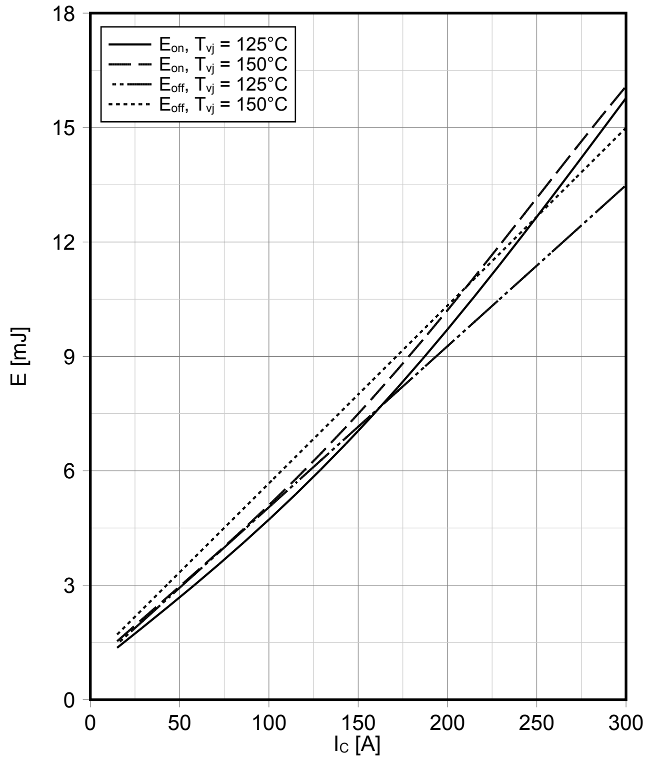
Ausgangskennlinienfeld IGBT, T1 / T4 (typisch)
output characteristic IGBT, T1 / T4 (typical)
$I_C = f(V_{CE})$
$T_{vj} = 150$°C



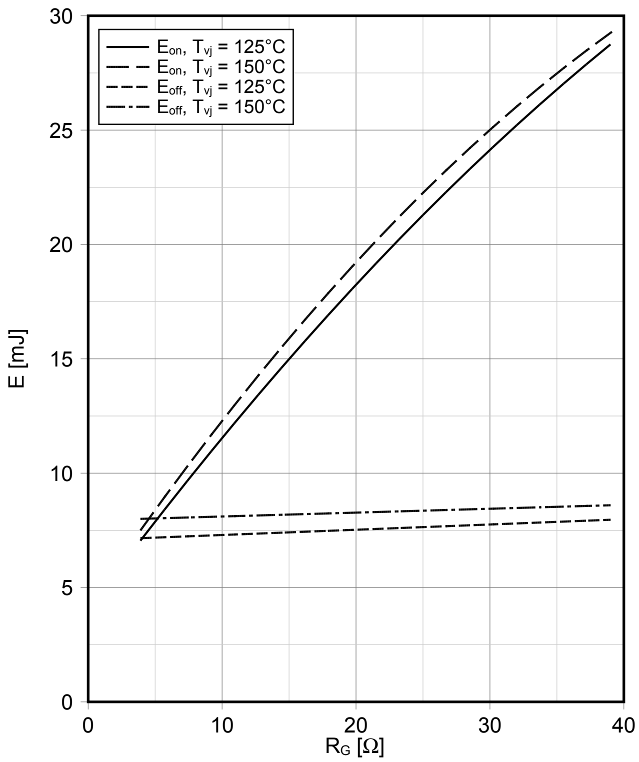
Übertragungscharakteristik IGBT, T1 / T4 (typisch)
transfer characteristic IGBT, T1 / T4 (typical)
$I_C = f(V_{GE})$
$V_{CE} = 20$ V



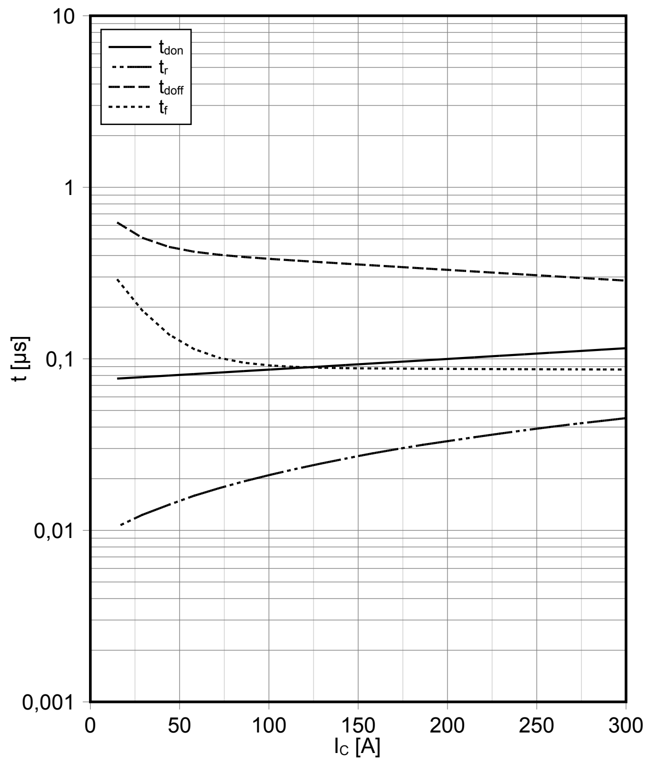
Schaltverluste IGBT, T1 / T4 (typisch)
switching losses IGBT, T1 / T4 (typical)
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
$V_{GE} = \pm 15$ V, $R_{Gon} = 3{,}9\ \Omega$, $R_{Goff} = 3{,}9\ \Omega$, $V_{CE} = 500$ V



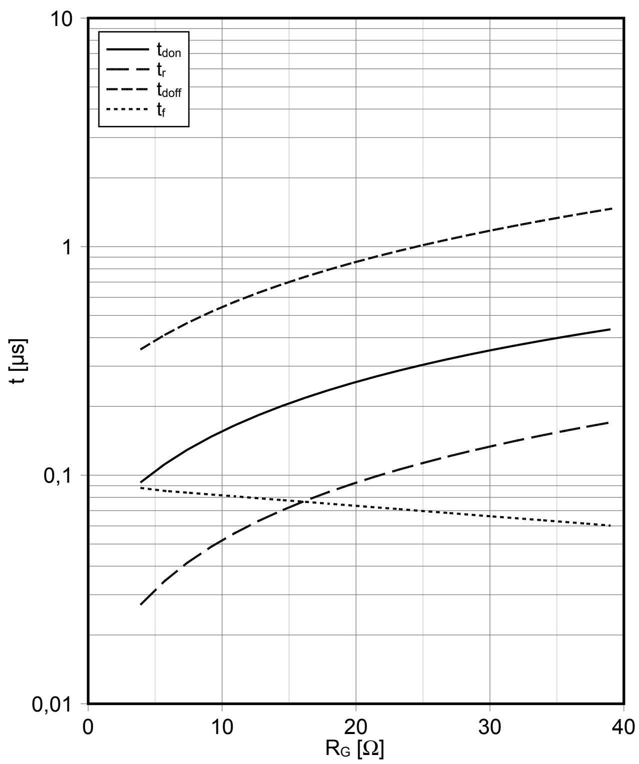
Schaltverluste IGBT, T1 / T4 (typisch)
switching losses IGBT, T1 / T4 (typical)
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
$V_{GE} = \pm 15$ V, $I_C = 150$ A, $V_{CE} = 500$ V



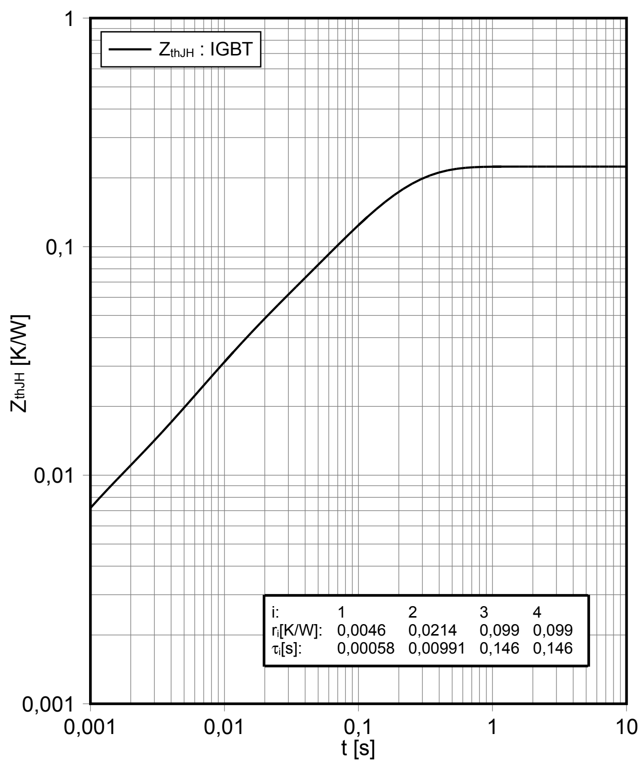
Schaltzeiten IGBT, T1 / T4 (typisch)
switching times IGBT, T1 / T4 (typical)
$t_{don} = f(I_C)$, $t_r = f(I_C)$, $t_{doff} = f(I_C)$, $t_f = f(I_C)$
$V_{GE} = \pm 15$ V, $R_{Gon} = 3{,}9\ \Omega$, $R_{Goff} = 3{,}9\ \Omega$, $V_{CE} = 500$ V, $T_{vj} = 150$ °C



Schaltzeiten IGBT, T1 / T4 (typisch)
switching times IGBT, T1 / T4 (typical)
$t_{don} = f(R_G)$, $t_r = f(R_G)$, $t_{doff} = f(R_G)$, $t_f = f(R_G)$
$V_{GE} = \pm 15$ V, $I_C = 150$ A, $V_{CE} = 500$ V, $T_{vj} = 150$ °C

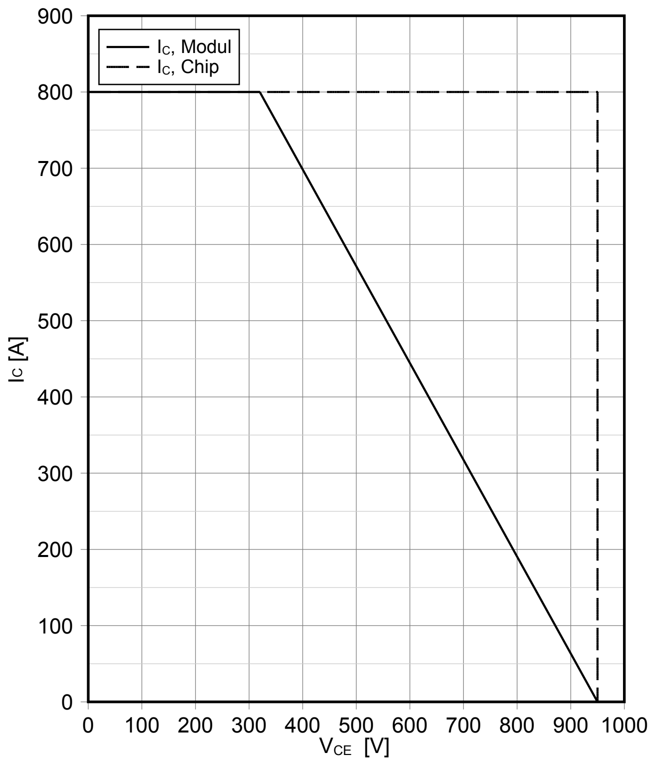


Transienter Wärmewiderstand IGBT, T1 / T4
transient thermal impedance IGBT, T1 / T4
$Z_{thJH} = f(t)$

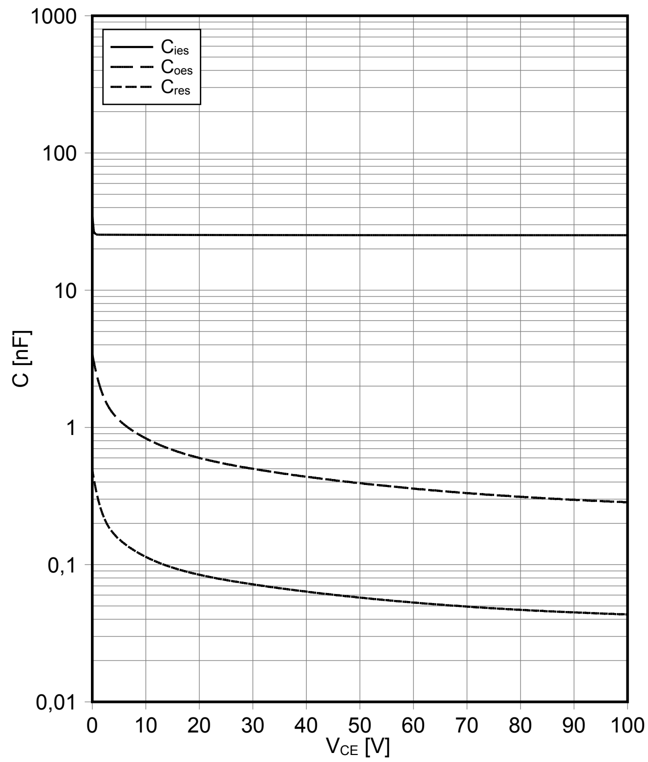


i:	1	2	3	4
r_i[K/W]:	0,0046	0,0214	0,099	0,099
τ_i[s]:	0,00058	0,00991	0,146	0,146

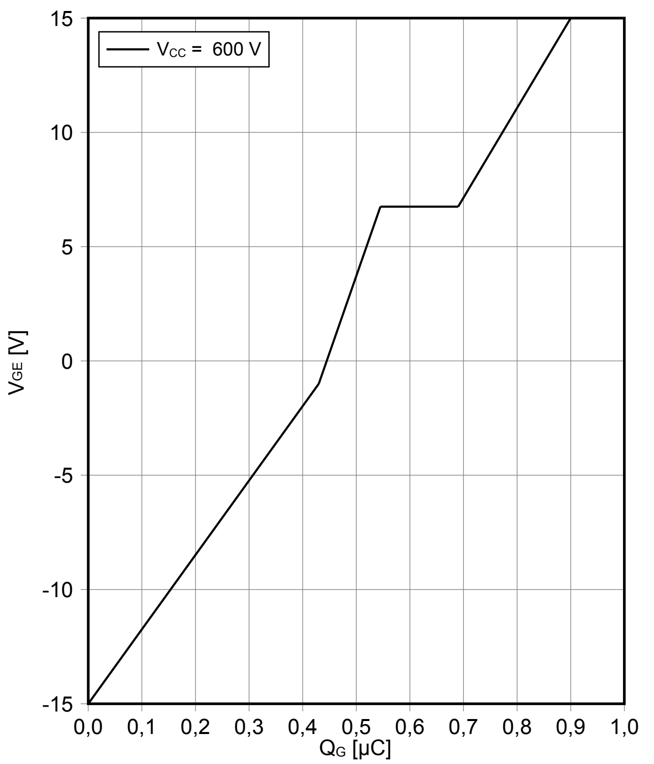
Sicherer Rückwärts-Arbeitsbereich IGBT, T1 / T4 (RBSOA)
reverse bias safe operating area IGBT, T1 / T4 (RBSOA)
$I_C = f(V_{CE})$
$V_{GE} = \pm 15$ V, $R_{Goff} = 3{,}9\ \Omega$, $T_{vj} = 150°C$



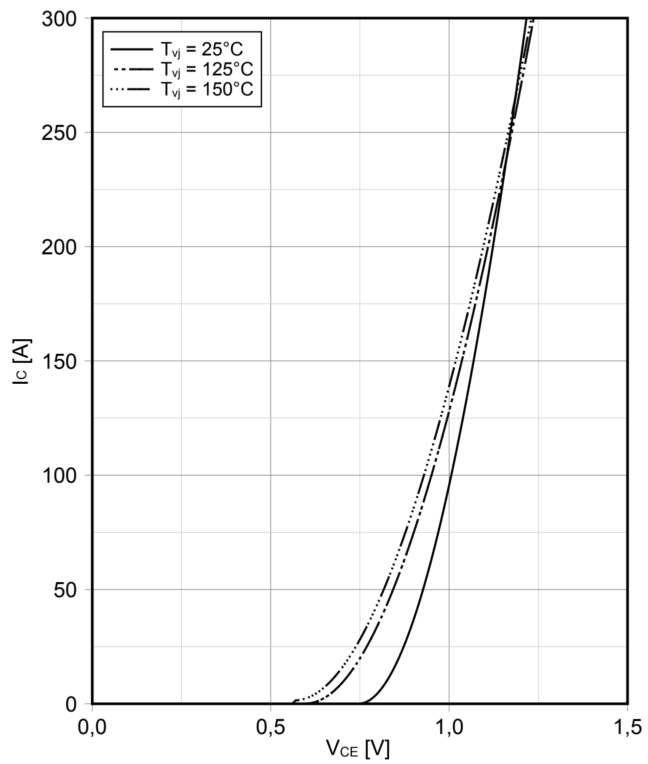
Kapazitäts Charakteristik IGBT, T1 / T4 (typisch)
capacity characteristic IGBT, T1 / T4 (typical)
$C = f(V_{CE})$
$V_{GE} = 0$ V, $T_{vj} = 25°C$, f = 100kHz



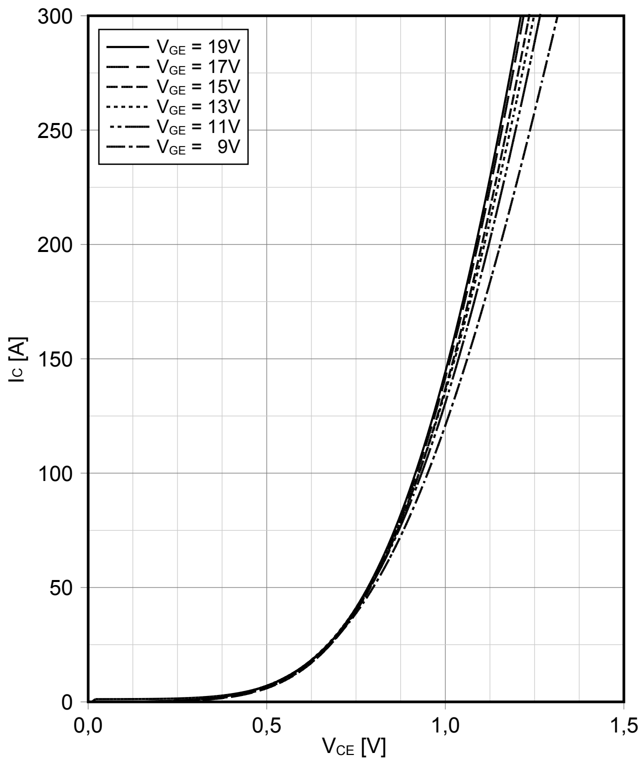
Gateladungs Charakteristik IGBT, T1 / T4 (typisch)
gate charge characteristic IGBT, T1 / T4 (typical)
$V_{GE} = f(Q_G)$
$I_C = 400$ A, $T_{vj} = 25°C$



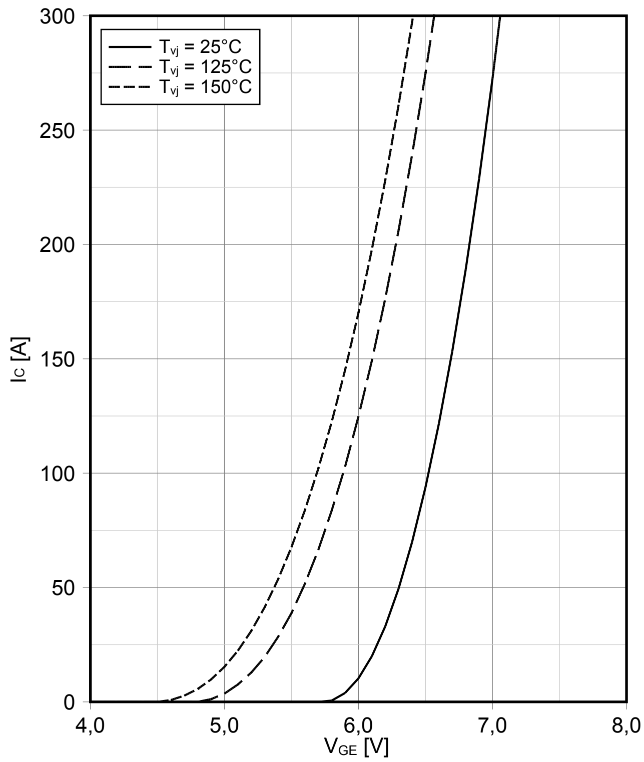
Ausgangskennlinie IGBT, T2 / T3 (typisch)
output characteristic IGBT, T2 / T3 (typical)
$I_C = f(V_{CE})$
$V_{GE} = 15$ V



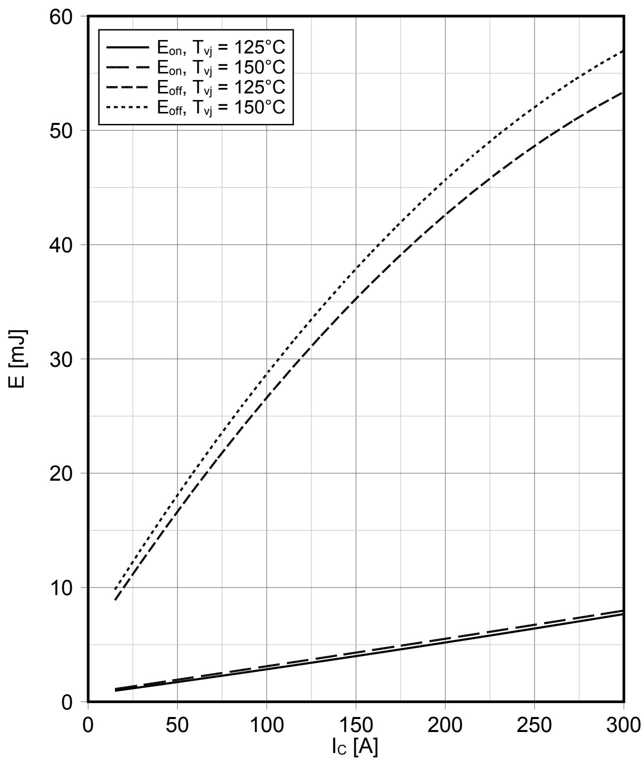
Ausgangskennlinienfeld IGBT, T2 / T3 (typisch)
output characteristic IGBT, T2 / T3 (typical)
$I_C = f(V_{CE})$
$T_{vj} = 150°C$



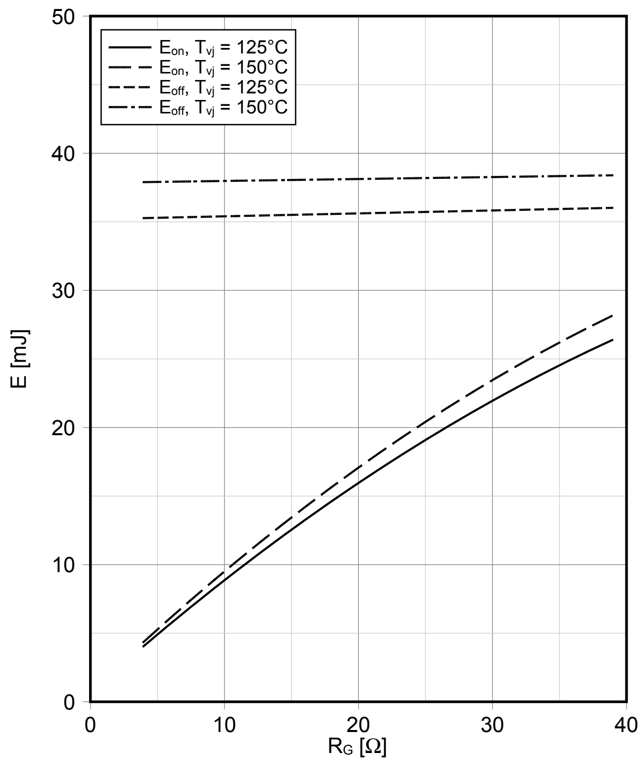
Übertragungscharakteristik IGBT, T2 / T3 (typisch)
transfer characteristic IGBT, T2 / T3 (typical)
$I_C = f(V_{GE})$
$V_{CE} = 20$ V



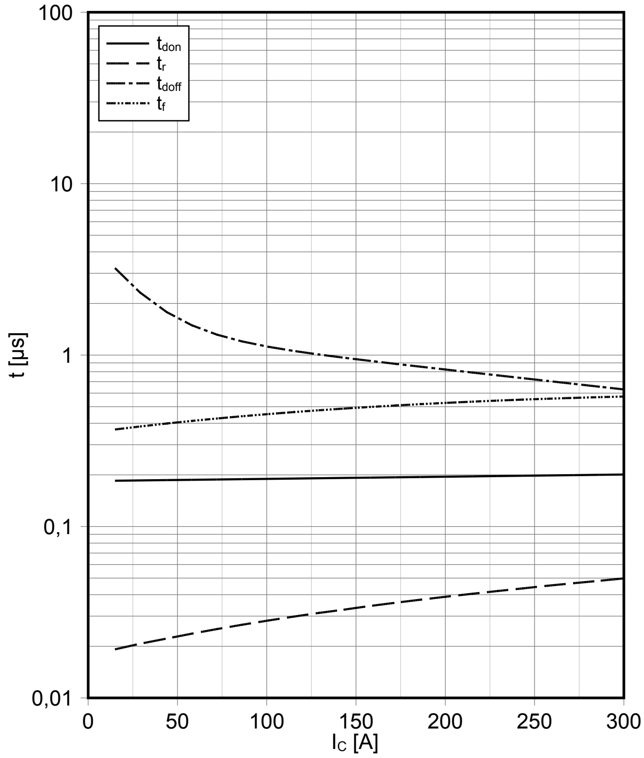
Schaltverluste IGBT, T2 / T3 (typisch)
switching losses IGBT, T2 / T3 (typical)
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
$V_{GE} = \pm15$ V, $R_{Gon} = 3{,}9\ \Omega$, $R_{Goff} = 3{,}9\ \Omega$, $V_{CE} = 500$ V



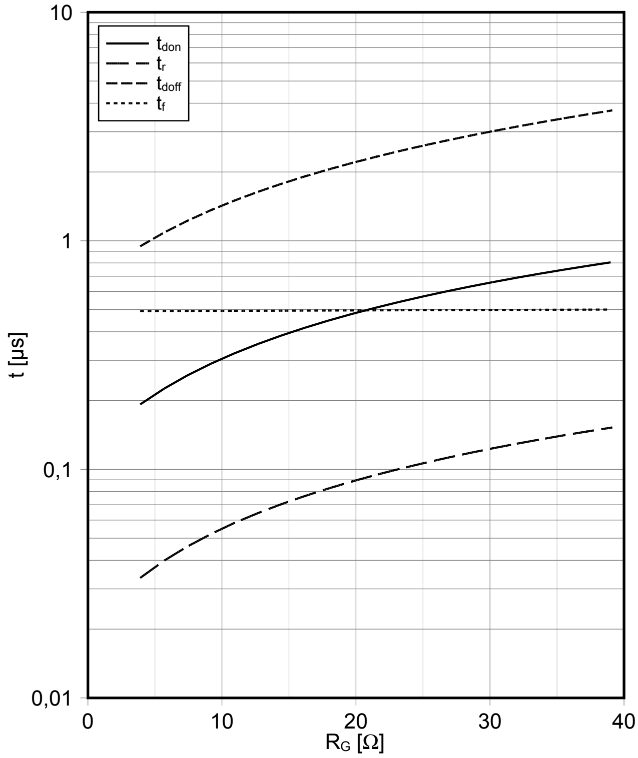
Schaltverluste IGBT, T2 / T3 (typisch)
switching losses IGBT, T2 / T3 (typical)
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
$V_{GE} = \pm15$ V, $I_C = 150$ A, $V_{CE} = 500$ V



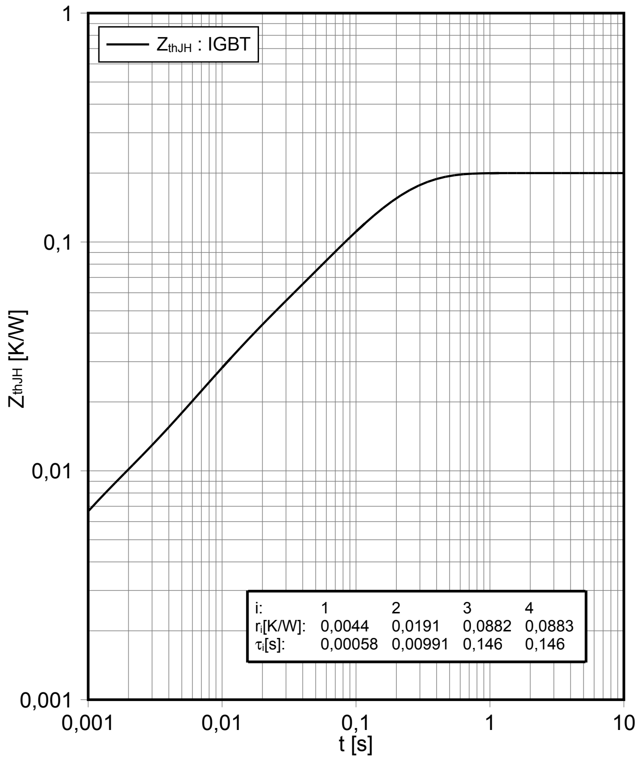
Schaltzeiten IGBT, T2 / T3 (typisch)
switching times IGBT, T2 / T3 (typical)
$t_{don} = f(I_C)$, $t_r = f(I_C)$, $t_{doff} = f(I_C)$, $t_f = f(I_C)$
$V_{GE} = \pm 15$ V, $R_{Gon} = 3{,}9\ \Omega$, $R_{Goff} = 3{,}9\ \Omega$, $V_{CE} = 500$ V, $T_{vj} = 150$ °C



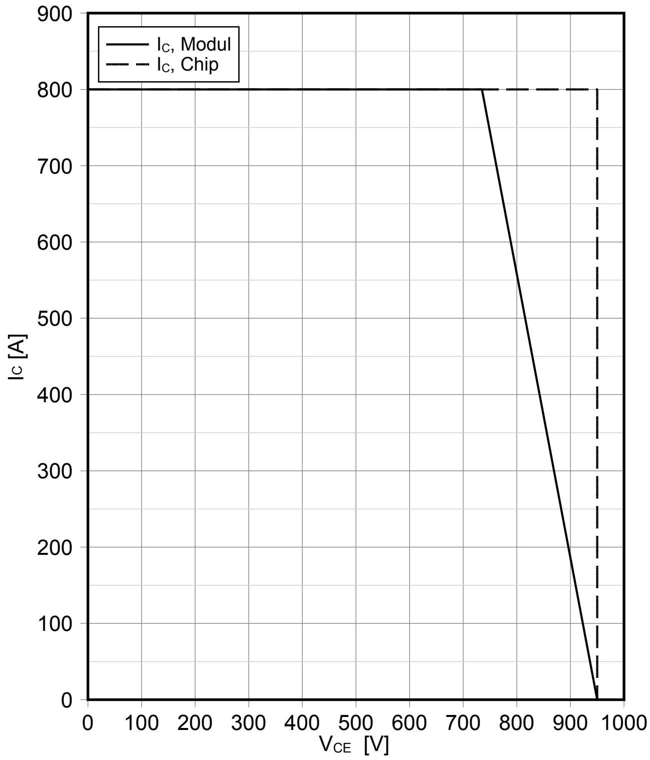
Schaltzeiten IGBT, T2 / T3 (typisch)
switching times IGBT, T2 / T3 (typical)
$t_{don} = f(R_G)$, $t_r = f(R_G)$, $t_{doff} = f(R_G)$, $t_f = f(R_G)$
$V_{GE} = \pm 15$ V, $I_C = 300$ A, $V_{CE} = 500$ V, $T_{vj} = 150$ °C



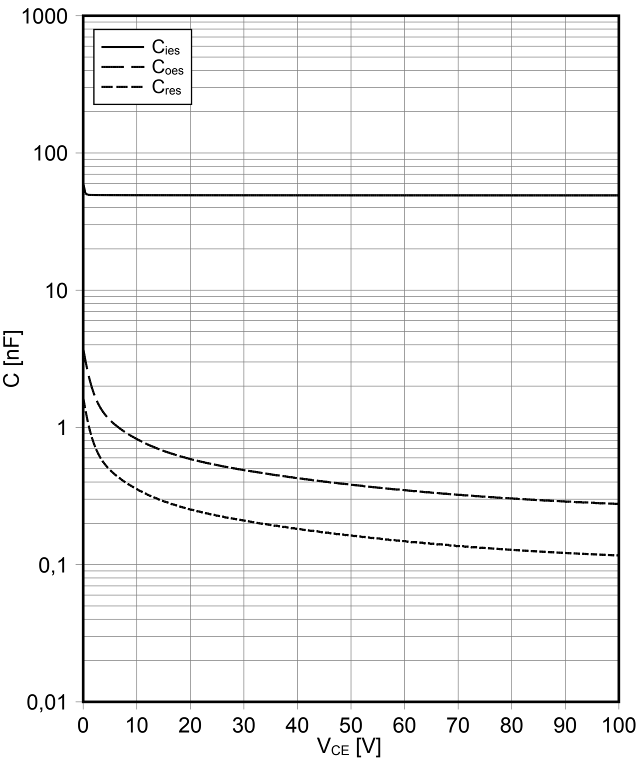
Transienter Wärmewiderstand IGBT, T2 / T3
transient thermal impedance IGBT, T2 / T3
$Z_{thJH} = f(t)$



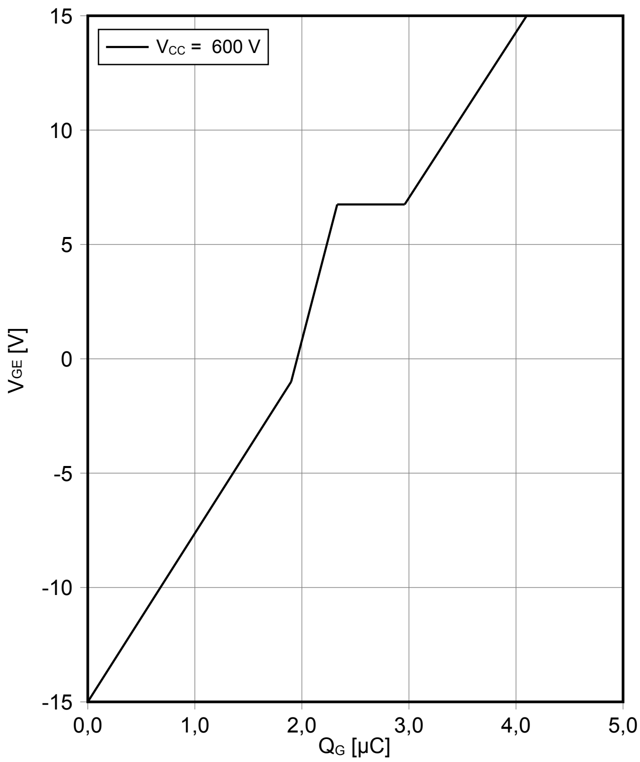
Sicherer Rückwärts-Arbeitsbereich IGBT, T2 / T3 (RBSOA)
reverse bias safe operating area IGBT, T2 / T3 (RBSOA)
$I_C = f(V_{CE})$
$V_{GE} = \pm 15$ V, $R_{Goff} = 3{,}9\ \Omega$, $T_{vj} = 150$°C



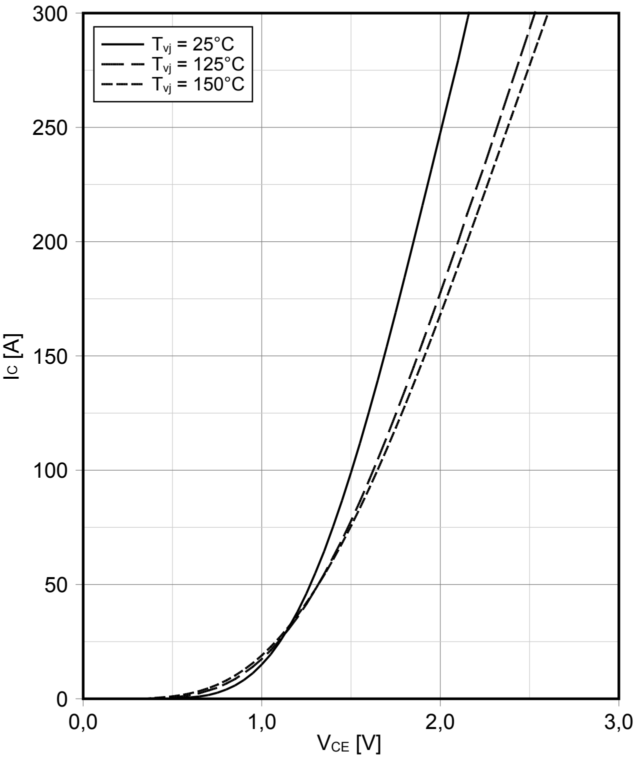
Kapazitäts Charakteristik IGBT, T2 / T3 (typisch)
capacity characteristic IGBT, T2 / T3 (typical)
$C = f(V_{CE})$
$V_{GE} = 0$ V, $T_{vj} = 25°C$, f = 100kHz



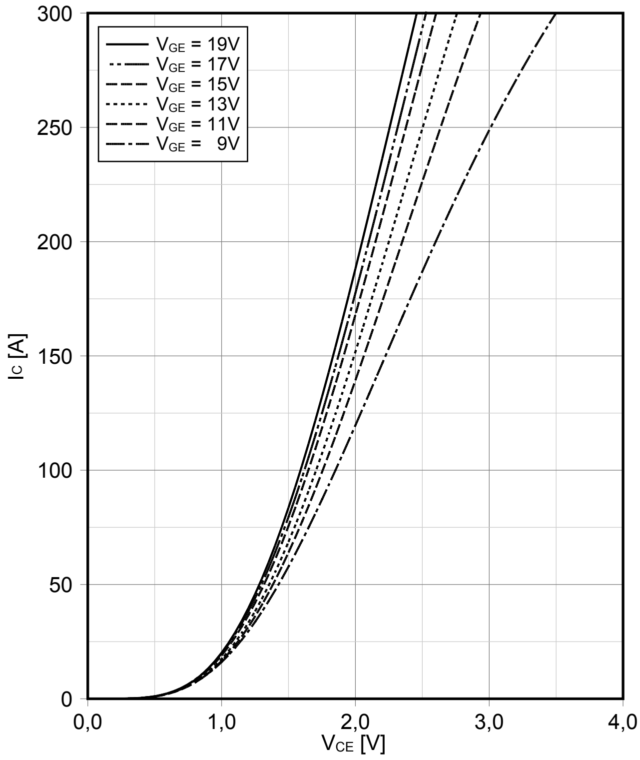
Gateladungs Charakteristik IGBT, T2 / T3 (typisch)
gate charge characteristic IGBT, T2 / T3 (typical)
$V_{GE} = f(Q_G)$
$I_C = 400$ A, $T_{vj} = 25°C$



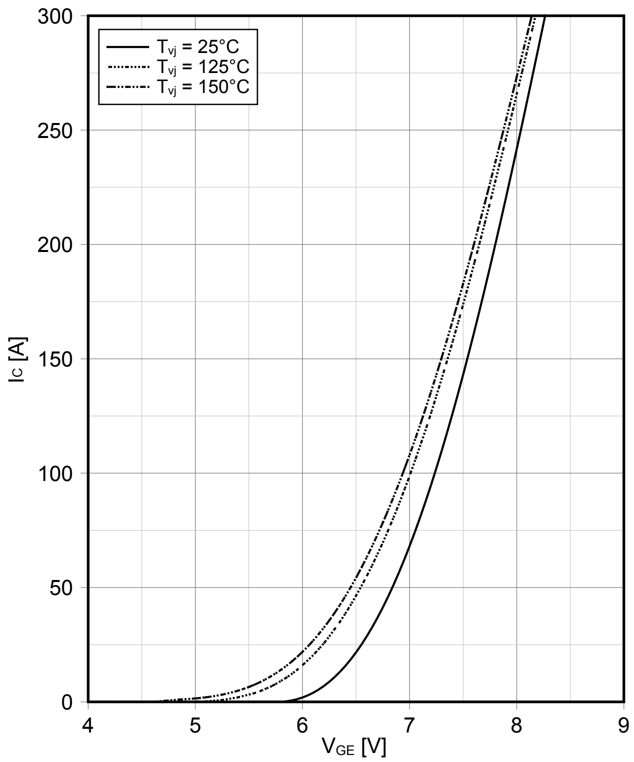
Ausgangskennlinie IGBT, T5 / T6 (typisch)
output characteristic IGBT, T5 / T6 (typical)
$I_C = f(V_{CE})$
$V_{GE} = 15$ V



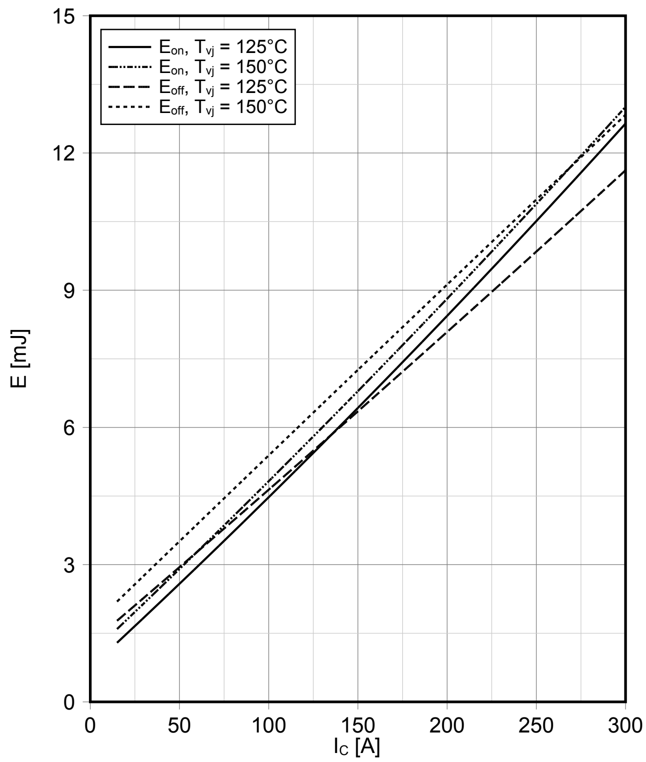
Ausgangskennlinienfeld IGBT, T5 / T6 (typisch)
output characteristic IGBT, T5 / T6 (typical)
$I_C = f(V_{CE})$
$T_{vj} = 150°C$



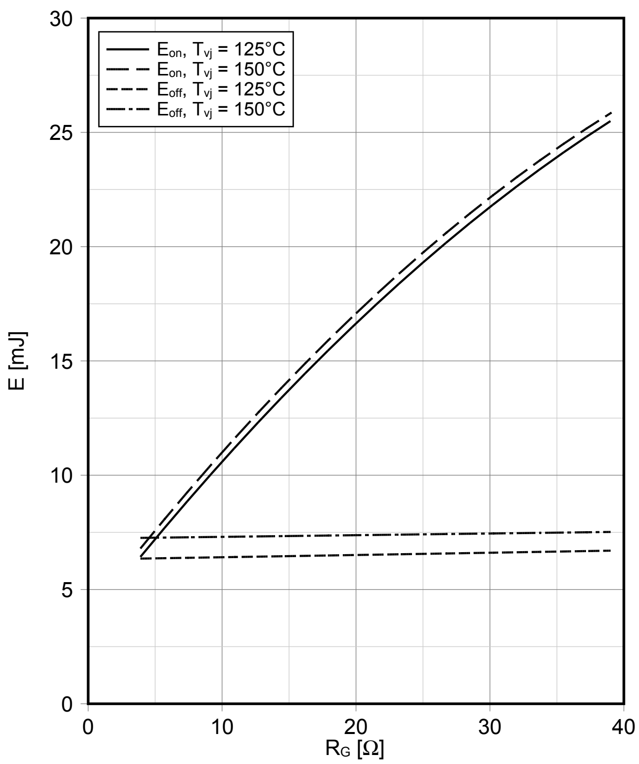
Übertragungscharakteristik IGBT, T5 / T6 (typisch)
transfer characteristic IGBT, T5 / T6 (typical)
$I_C = f(V_{GE})$
$V_{CE} = 20$ V



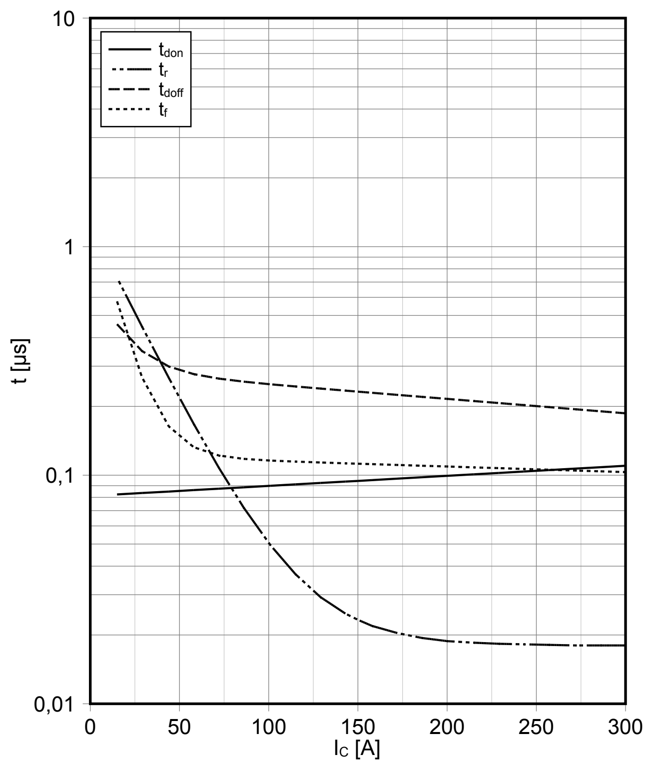
Schaltverluste IGBT, T5 / T6 (typisch)
switching losses IGBT, T5 / T6 (typical)
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
$V_{GE} = \pm15$ V, $R_{Gon} = 3{,}9\ \Omega$, $R_{Goff} = 3{,}9\ \Omega$, $V_{CE} = 500$ V



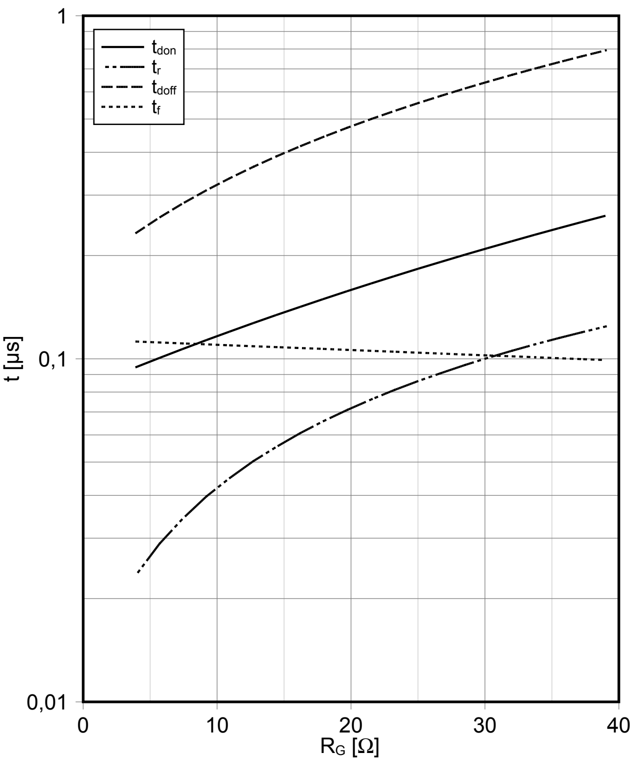
Schaltverluste IGBT, T5 / T6 (typisch)
switching losses IGBT, T5 / T6 (typical)
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
$V_{GE} = \pm15$ V, $I_C = 150$ A, $V_{CE} = 500$ V



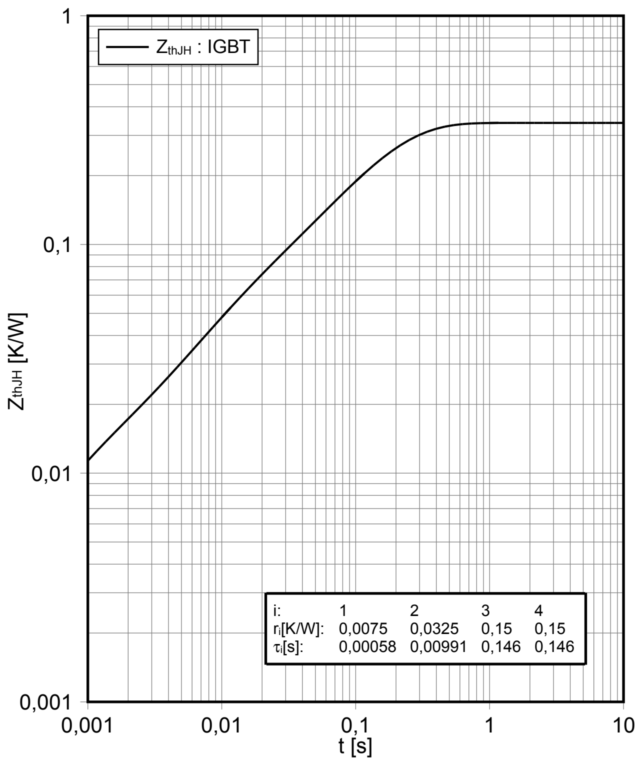
Schaltzeiten IGBT, T5 / T6 (typisch)
switching times IGBT, T5 / T6 (typical)
$t_{don} = f(I_C)$, $t_r = f(I_C)$, $t_{doff} = f(I_C)$, $t_f = f(I_C)$
$V_{GE} = \pm15$ V, $R_{Gon} = 3{,}9\ \Omega$, $R_{Goff} = 3{,}9\ \Omega$, $V_{CE} = 500$ V, $T_{vj} = 150$ °C



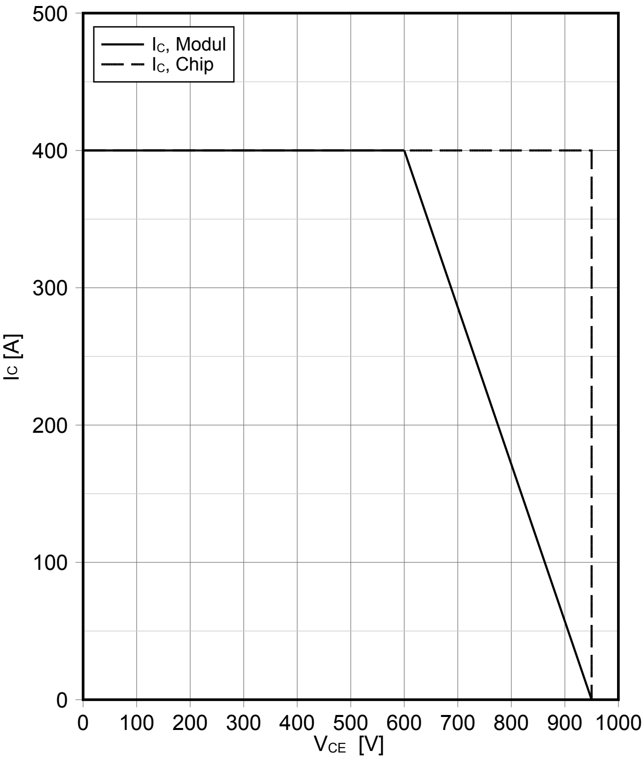
Schaltzeiten IGBT, T5 / T6 (typisch)
switching times IGBT, T5 / T6 (typical)
t_{don} = f (R_G), t_r = f (R_G), t_{doff} = f (R_G), t_f = f (R_G)
V_{GE} = ±15 V, I_C = 150 A, V_{CE} = 500 V, T_{vj} = 150 °C



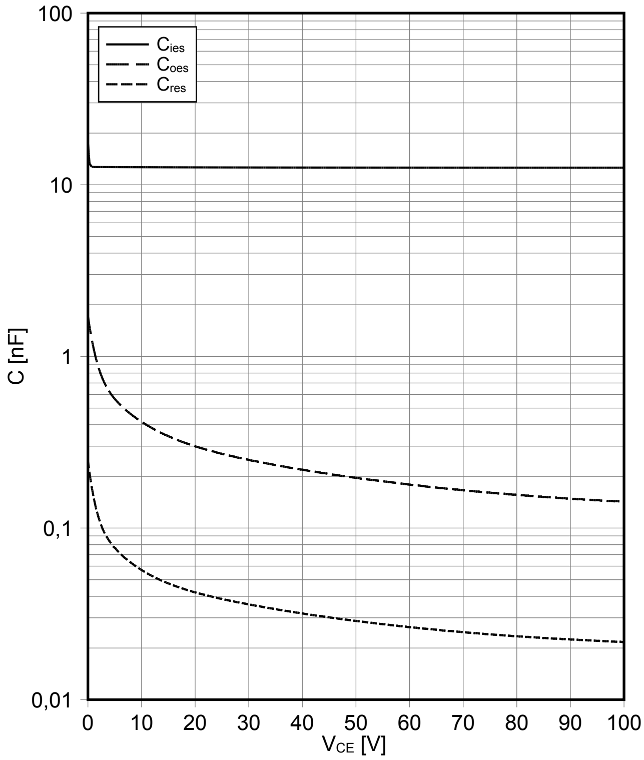
Transienter Wärmewiderstand IGBT, T5 / T6
transient thermal impedance IGBT, T5 / T6
Z_{thJH} = f (t)



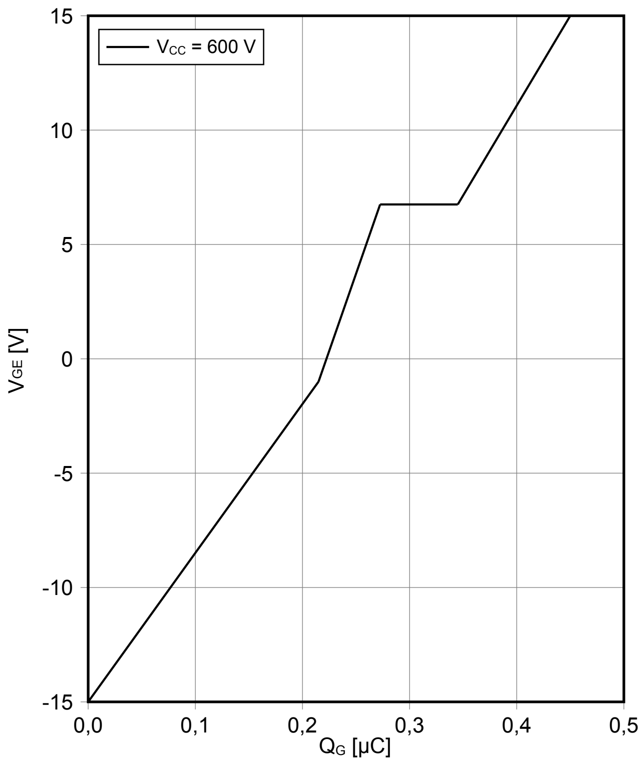
Sicherer Rückwärts-Arbeitsbereich IGBT, T5 / T6 (RBSOA)
reverse bias safe operating area IGBT, T5 / T6 (RBSOA)
I_C = f (V_{CE})
V_{GE} = ±15 V, R_{Goff} = 3,9 Ω, T_{vj} = 150°C



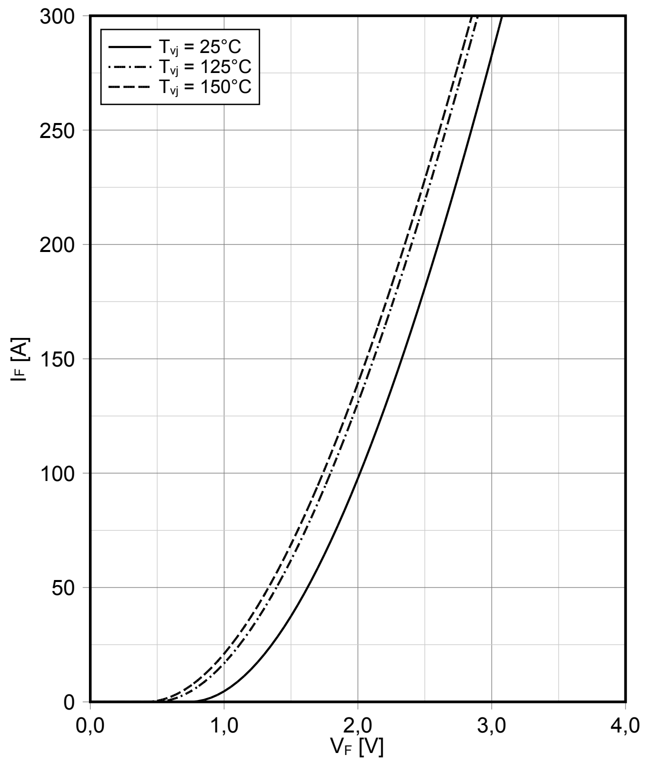
Kapazitäts Charakteristik IGBT, T5 / T6 (typisch)
capacity characteristic IGBT, T5 / T6 (typical)
C = f(V_{CE})
V_{GE} = 0 V, T_{vj} = 25°C, f = 100kHz



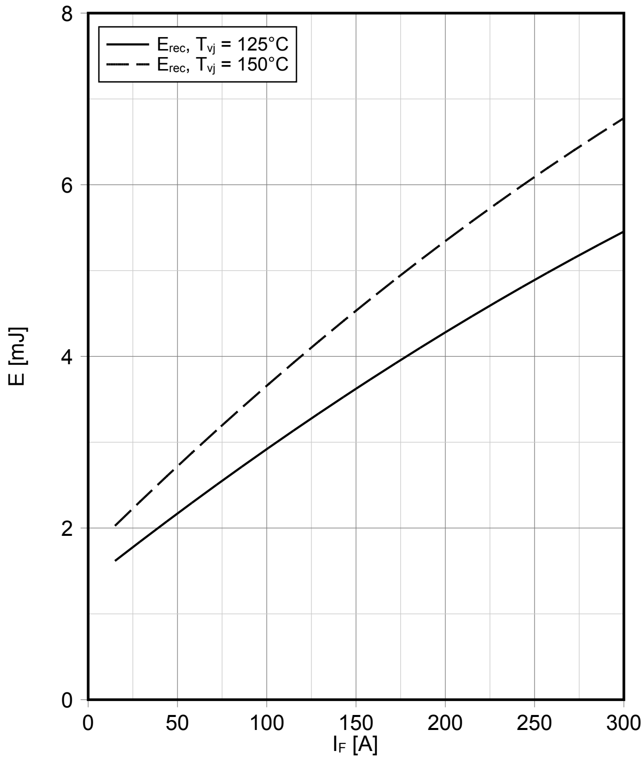
Gateladungs Charakteristik IGBT, T5 / T6 (typisch)
gate charge characteristic IGBT, T5 / T6 (typical)
$V_{GE} = f(Q_G)$
$I_C = 200$ A, $T_{vj} = 25°C$



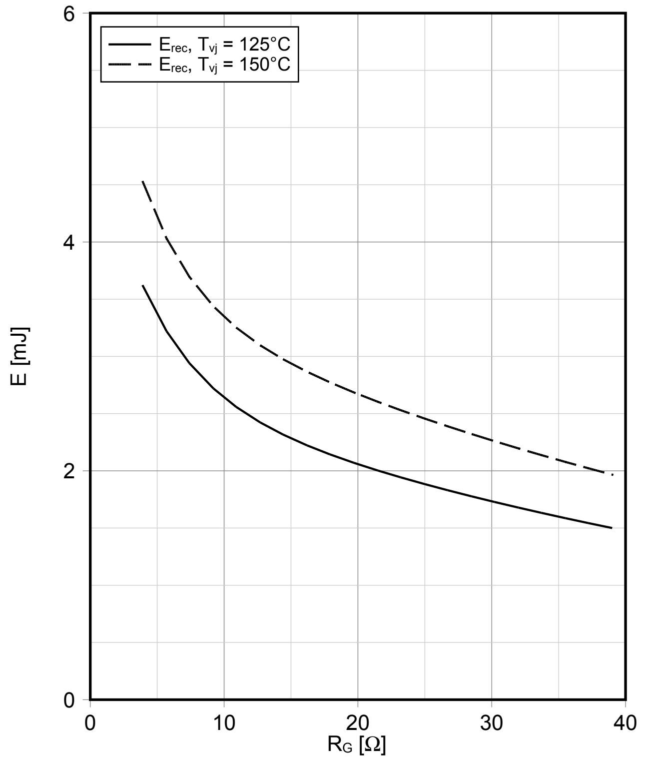
Durchlasskennlinie der Diode, D1 / D4 (typisch)
forward characteristic of Diode, D1 / D4 (typical)
$I_F = f(V_F)$



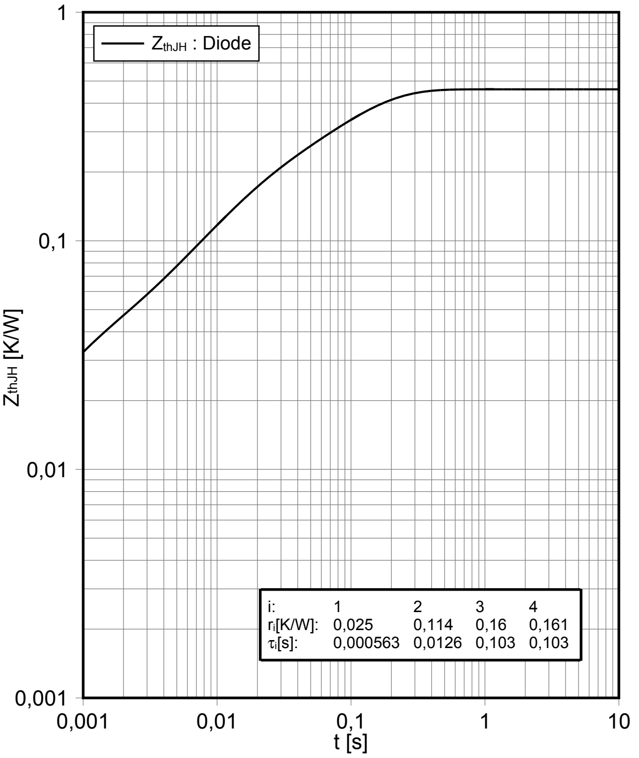
Schaltverluste Diode, D1 / D4 (typisch)
switching losses Diode, D1 / D4 (typical)
$E_{rec} = f(I_F)$
$R_{Gon} = 3{,}9\ \Omega$, $V_{CE} = 500$ V



Schaltverluste Diode, D1 / D4 (typisch)
switching losses Diode, D1 / D4 (typical)
$E_{rec} = f(R_G)$
$I_F = 150$ A, $V_{CE} = 500$ V

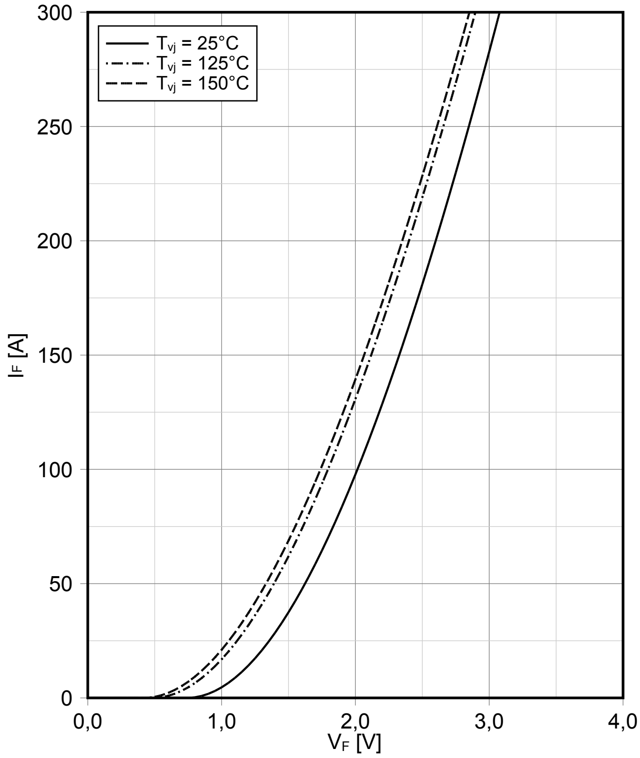


Transienter Wärmewiderstand Diode, D1 / D4
transient thermal impedance Diode, D1 / D4
Z_{thJH} = f (t)

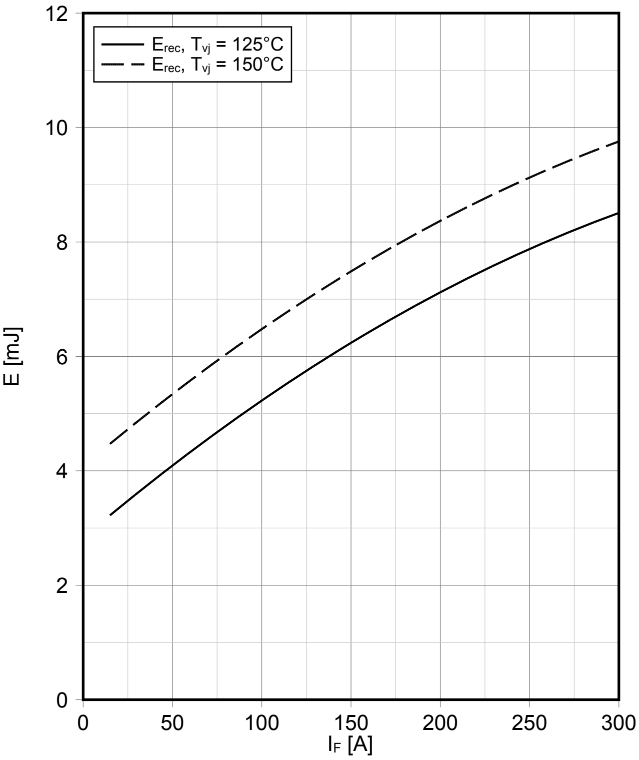


i:	1	2	3	4
r_i[K/W]:	0,025	0,114	0,16	0,161
τ_i[s]:	0,000563	0,0126	0,103	0,103

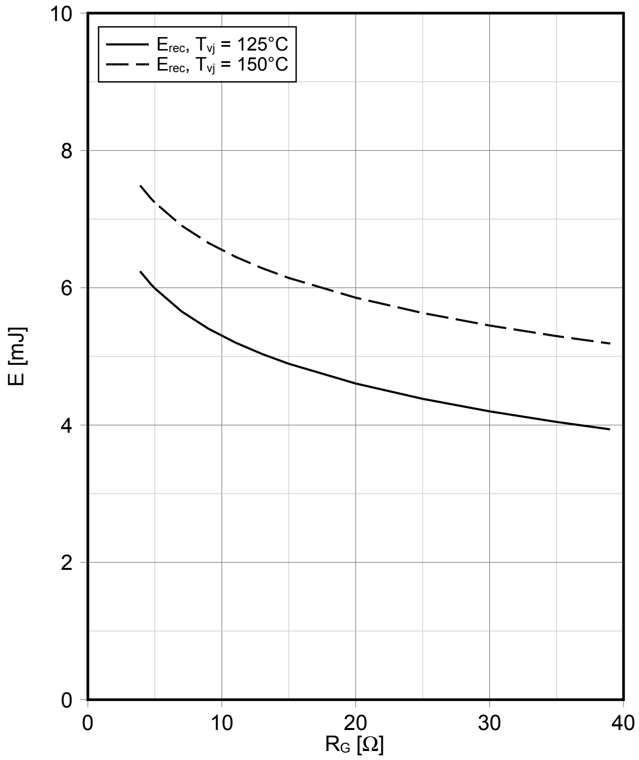
Durchlasskennlinie der Diode, D2 / D3 (typisch)
forward characteristic of Diode, D2 / D3 (typical)
I_F = f (V_F)



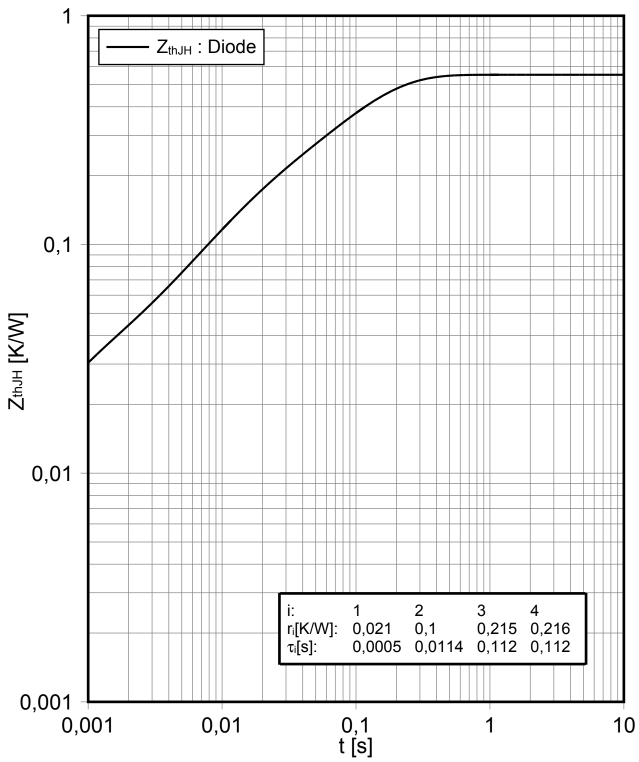
Schaltverluste Diode, D2 / D3 (typisch)
switching losses Diode, D2 / D3 (typical)
E_{rec} = f (I_F)
R_{Gon} = 3,9 Ω, V_{CE} = 500 V



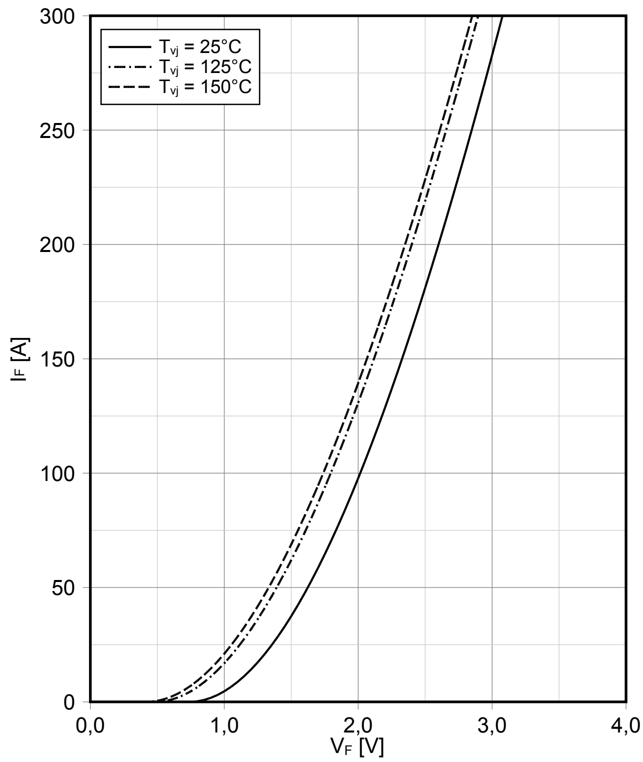
Schaltverluste Diode, D2 / D3 (typisch)
switching losses Diode, D2 / D3 (typical)
E_{rec} = f (R_G)
I_F = 150 A, V_{CE} = 500 V



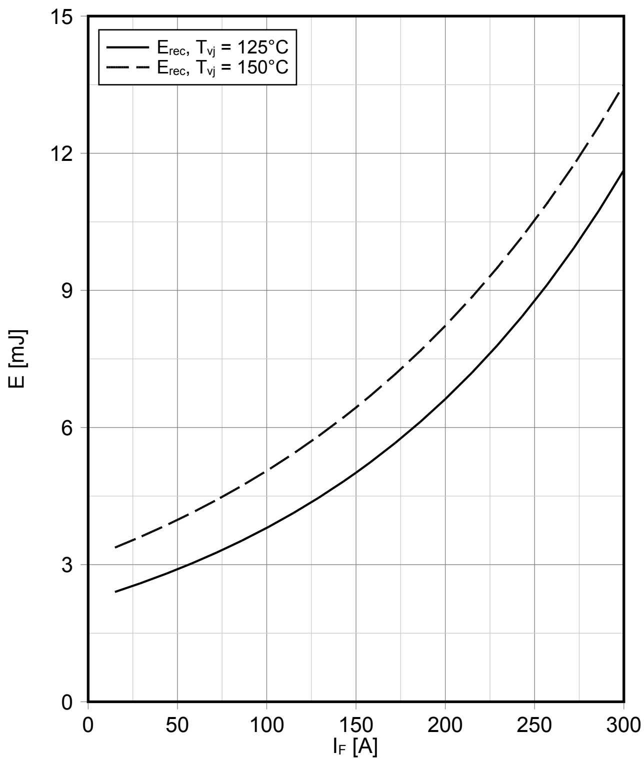
Transienter Wärmewiderstand Diode, D2 / D3
transient thermal impedance Diode, D2 / D3
Z_{thJH} = f (t)



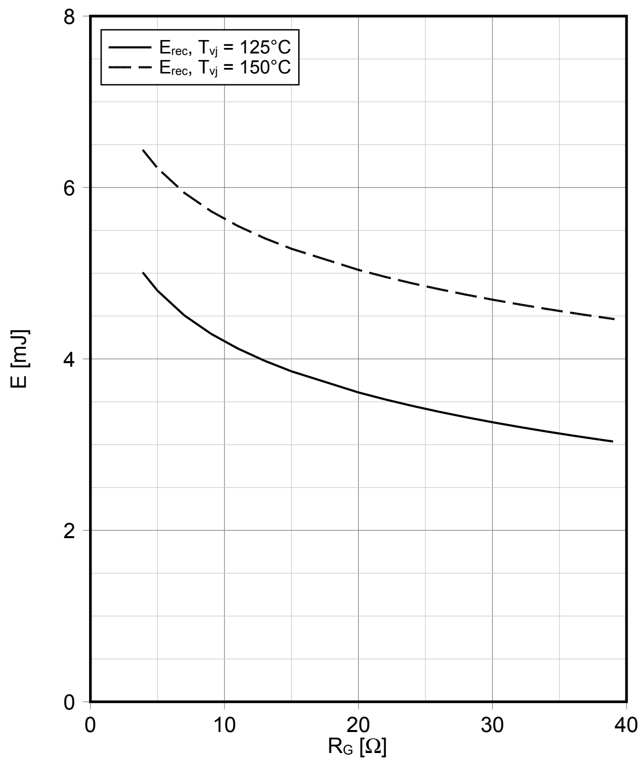
Durchlasskennlinie der Diode, D5-D6 (typisch)
forward characteristic of Diode, D5-D6 (typical)
I_F = f (V_F)



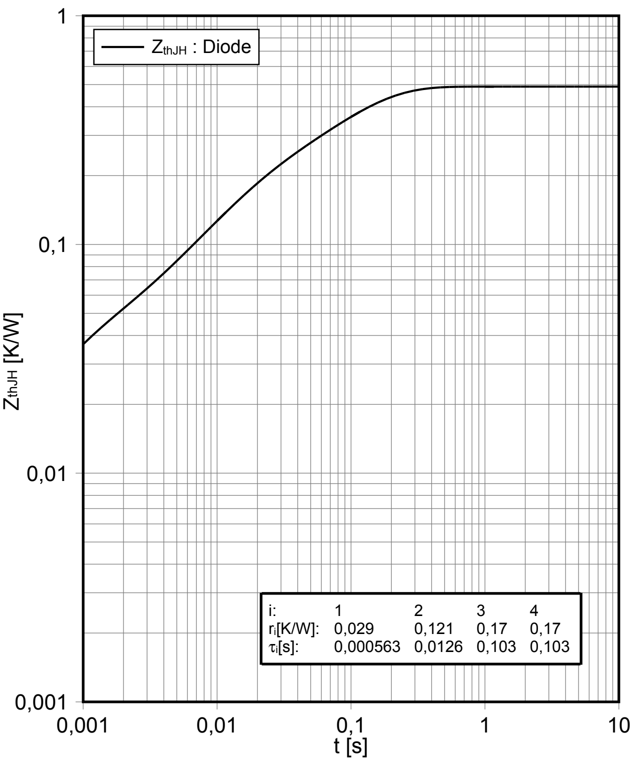
Schaltverluste Diode, D5-D6 (typisch)
switching losses Diode, D5-D6 (typical)
E_{rec} = f (I_F)
R_{Gon} = 3,9 Ω, V_{CE} = 500 V



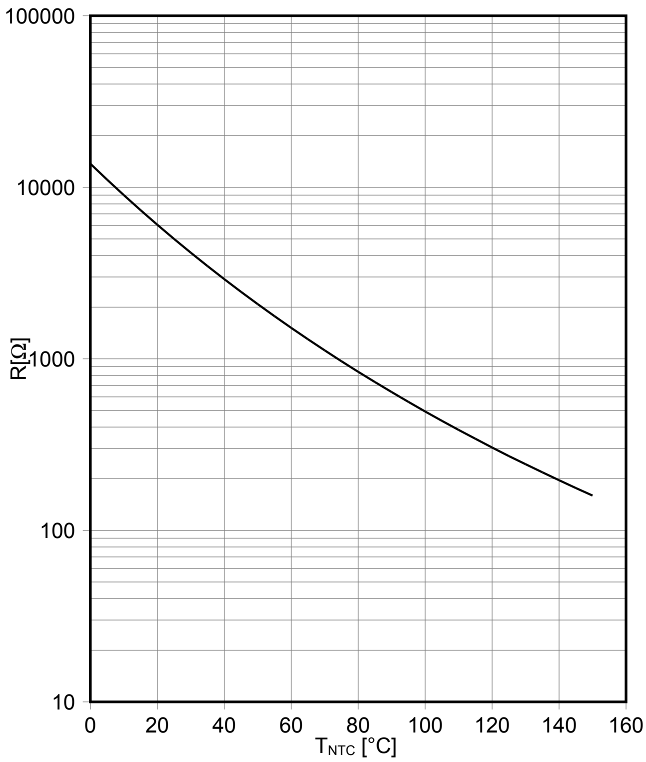
Schaltverluste Diode, D5-D6 (typisch)
switching losses Diode, D5-D6 (typical)
E_{rec} = f (R_G)
I_F = 150 A, V_{CE} = 500 V



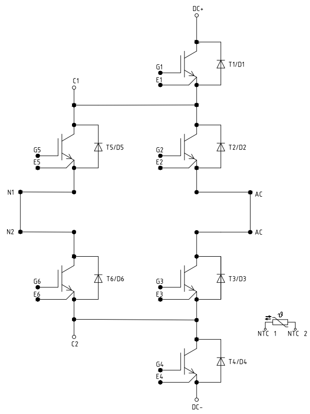
Transienter Wärmewiderstand Diode, D5-D6
transient thermal impedance Diode, D5-D6
$Z_{thJH} = f(t)$



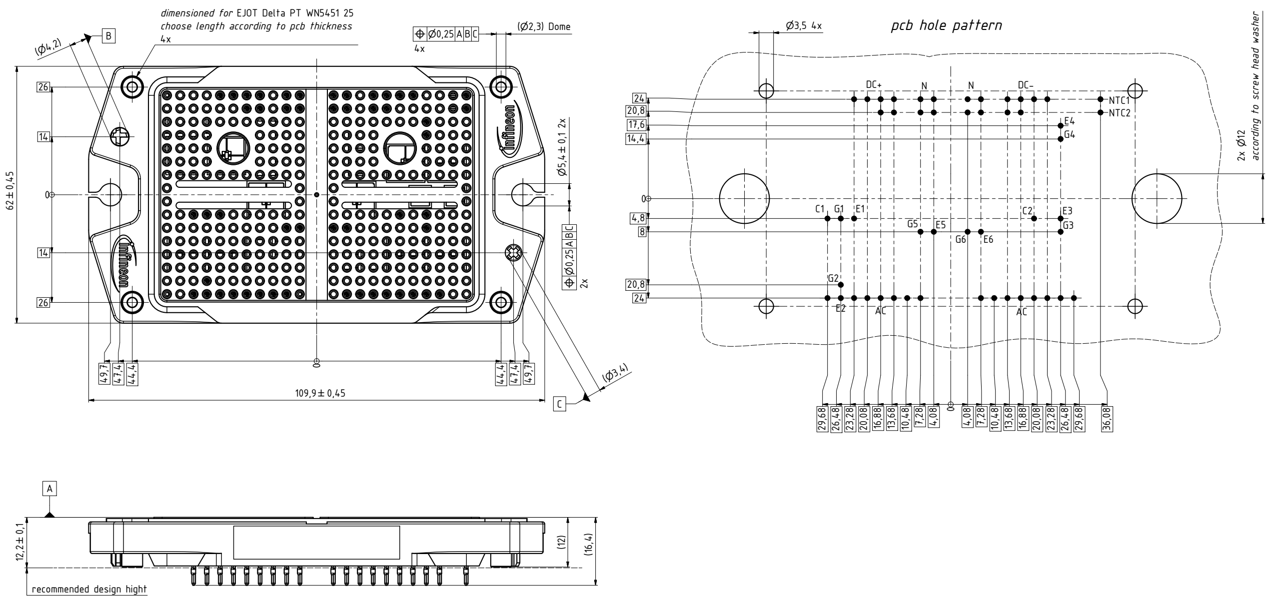
NTC-Widerstand-Temperaturkennlinie (typisch)
NTC-Thermistor-temperature characteristic (typical)
$R = f(T_{NTC})$



Schaltplan / Circuit diagram



Gehäuseabmessungen / Package outlines



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Edition 2020-02-27

Published by
Infineon Technologies AG
81726 München, Germany

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Email: erratum@infineon.com