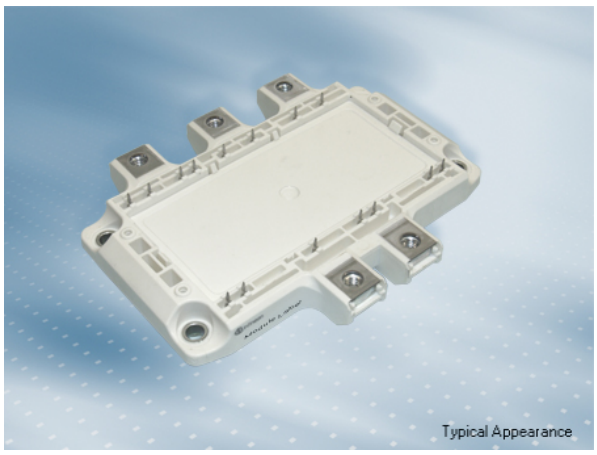
Technische Information / Technical Information

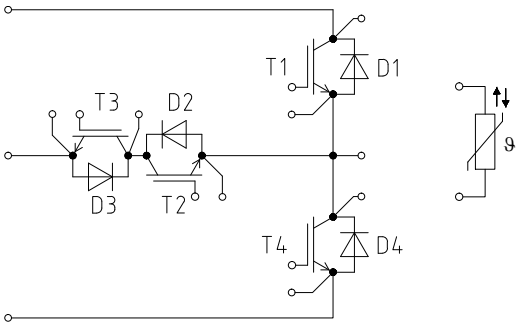
IGBT-Module
IGBT-modules

F3L400R12PT4_B26

EconoPACK™4 Modul mit aktiver "Neutral Point Clamp 2" Topologie und PressFIT / NTC
EconoPACK™4 module with active "Neutral Point Clamp 2" topology and PressFIT / NTC

Vorläufige Daten / Preliminary Data





V_{CES} = 1200V
$I_{C\ nom}$ = 400A / I_{CRM} = 800A

Typische Anwendungen
- Solar Anwendungen
- USV-Systeme

Typical Applications
- Solar Applications
- UPS Systems

Elektrische Eigenschaften
- Erweiterte Sperrschichttemperatur $T_{vj\ op}$
- Niedrige Schaltverluste
- Niedriges V_{CEsat}
- Trench IGBT 4
- $T_{vj\ op}$ = 150°C
- V_{CEsat} mit positivem Temperaturkoeffizienten

Electrical Features
- Extended Operation Temperature $T_{vj\ op}$
- Low Switching Losses
- Low V_{CEsat}
- Trench IGBT 4
- $T_{vj\ op}$ = 150°C
- V_{CEsat} with positive Temperature Coefficient

Mechanische Eigenschaften
- Isolierte Bodenplatte
- Kompaktes Design
- PressFIT Verbindungstechnik
- Standardgehäuse

Mechanical Features
- Isolated Base Plate
- Compact design
- PressFIT Contact Technology
- Standard Housing

Module Label Code

Barcode Code 128

Sample
0000012345600000000000

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

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Vorläufige Daten
Preliminary Data

IGBT, T1 / T4 / IGBT, T1 / T4

Höchstzulässige Werte / Maximum Rated Values

Kollektor-Emitter-Sperrspannung Collector-emitter voltage	T_{vj} = 25°C	V_{CES}	1200	V
Kollektor-Dauergleichstrom Continuous DC collector current	T_C = 100°C, $T_{vj\,max}$ = 175°C T_C = 25°C, $T_{vj\,max}$ = 175°C	$I_{C\,nom}$ I_C	400 600	A A
Periodischer Kollektor-Spitzenstrom Repetitive peak collector current	t_P = 1 ms	I_{CRM}	800	A
Gesamt-Verlustleistung Total power dissipation	T_C = 25°C, $T_{vj\,max}$ = 175°C	P_{tot}	2150	W
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 = 400 A, V_{GE} = 15 V I_C = 400 A, V_{GE} = 15 V I_C = 400 A, V_{GE} = 15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$V_{CE\,sat}$		1,75 2,05 2,10	2,15	V V V
Gate-Schwellenspannung Gate threshold voltage	I_C = 15,0 mA, V_{CE} = V_{GE}, T_{vj} = 25°C		V_{GEth}	5,2	5,8	6,4	V
Gateladung Gate charge	V_{GE} = -15 V ... +15 V		Q_G		3,30		µC
Interner Gatewiderstand Internal gate resistor	T_{vj} = 25°C		R_{Gint}		1,8		Ω
Eingangskapazität Input capacitance	f = 1 MHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{ies}		25,0		nF
Rückwirkungskapazität Reverse transfer capacitance	f = 1 MHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{res}		1,35		nF
Kollektor-Emitter-Reststrom Collector-emitter cut-off current	V_{CE} = 1200 V, V_{GE} = 0 V, T_{vj} = 25°C		I_{CES}			1,0	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 = 400 A, V_{CE} = 300 V V_{GE} = ±15 V R_{Gon} = 1,5 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$t_{d\,on}$		0,20 0,22 0,23		µs µs µs
Anstiegszeit, induktive Last Rise time, inductive load	I_C = 400 A, V_{CE} = 300 V V_{GE} = ±15 V R_{Gon} = 1,5 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	t_r		0,11 0,12 0,12		µs µs µs
Abschaltverzögerungszeit, induktive Last Turn-off delay time, inductive load	I_C = 400 A, V_{CE} = 300 V V_{GE} = ±15 V R_{Goff} = 1,5 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$t_{d\,off}$		0,40 0,48 0,50		µs µs µs
Fallzeit, induktive Last Fall time, inductive load	I_C = 400 A, V_{CE} = 300 V V_{GE} = ±15 V R_{Goff} = 1,5 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	t_f		0,07 0,10 0,11		µs µs µs
Einschaltverlustenergie pro Puls Turn-on energy loss per pulse	I_C = 400 A, V_{CE} = 300 V, L_S = 35 nH V_{GE} = ±15 V, di/dt = 2650 A/µs (T_{vj} = 150°C) R_{Gon} = 1,5 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{on}		8,75 13,0 13,5		mJ mJ mJ
Abschaltverlustenergie pro Puls Turn-off energy loss per pulse	I_C = 400 A, V_{CE} = 300 V, L_S = 35 nH V_{GE} = ±15 V, du/dt = 2300 V/µs (T_{vj} = 150°C) R_{Goff} = 1,5 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{off}		18,0 26,0 28,5		mJ mJ mJ
Kurzschlußverhalten SC data	V_{GE} ≤ 15 V, V_{CC} = 800 V V_{CEmax} = V_{CES} -L_{sCE} ·di/dt	t_P ≤ 10 µs, T_{vj} = 25°C t_P ≤ 10 µs, T_{vj} = 150°C	I_{SC}		2200 1900		A A
Wärmewiderstand, Chip bis Gehäuse Thermal resistance, junction to case	pro IGBT / per IGBT		R_{thJC}			0,07	K/W
Wärmewiderstand, Gehäuse bis Kühlkörper Thermal resistance, case to heatsink	pro IGBT / per IGBT λ_{Paste} = 1 W/(m·K) / λ_{grease} = 1 W/(m·K)		R_{thCH}		0,046		K/W
Temperatur im Schaltbetrieb Temperature under switching conditions			$T_{vj\,op}$	-40		150	°C

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Vorläufige Daten
Preliminary Data

Diode, D2 / D3 / Diode, D2 / D3

Höchstzulässige Werte / Maximum Rated Values

Periodische Spitzensperrspannung Repetitive peak reverse voltage	T_{vj} = 25°C	V_{RRM}	650	V
Dauergleichstrom Continuous DC forward current		I_F	400	A
Periodischer Spitzenstrom Repetitive peak forward current	t_P = 1 ms	I_{FRM}	800	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	6700 6150	A^2s A^2s

Charakteristische Werte / Characteristic Values

				min.	typ.	max.	
Durchlassspannung Forward voltage	I_F = 400 A, V_{GE} = 0 V I_F = 400 A, V_{GE} = 0 V I_F = 400 A, V_{GE} = 0 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	V_F		1,55 1,50 1,45	1,95	V V V
Rückstromspitze Peak reverse recovery current	I_F = 400 A, - di_F/dt = 2650 A/µs (T_{vj}=150°C) V_R = 300 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	I_{RM}		145 205 215		A A A
Sperrverzögerungsladung Recovered charge	I_F = 400 A, - di_F/dt = 2650 A/µs (T_{vj}=150°C) V_R = 300 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	Q_r		13,5 26,0 28,5		µC µC µC
Abschaltenergie pro Puls Reverse recovery energy	I_F = 400 A, - di_F/dt = 2650 A/µs (T_{vj}=150°C) V_R = 300 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{rec}		3,40 6,35 7,15		mJ mJ mJ
Wärmewiderstand, Chip bis Gehäuse Thermal resistance, junction to case	pro Diode / per diode		R_{thJC}			0,22	K/W
Wärmewiderstand, Gehäuse bis Kühlkörper Thermal resistance, case to heatsink	pro Diode / per diode λ_{Paste} = 1 W/(m·K) / λ_{grease} = 1 W/(m·K)		R_{thCH}		0,077		K/W
Temperatur im Schaltbetrieb Temperature under switching conditions			$T_{vj\,op}$	-40		150	°C

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Vorläufige Daten
Preliminary Data

IGBT, T2 / T3 / IGBT, T2 / T3

Höchstzulässige Werte / Maximum Rated Values

Kollektor-Emitter-Sperrspannung Collector-emitter voltage	T_{vj} = 25°C	V_{CES}	650	V
Kollektor-Dauergleichstrom Continuous DC collector current	T_C = 0°C, $T_{vj\,max}$ = 175°C T_C = 25°C, $T_{vj\,max}$ = 175°C	$I_{C\,nom}$ I_C	400 360	A A
Periodischer Kollektor-Spitzenstrom Repetitive peak collector current	t_P = 1 ms	I_{CRM}	800	A
Gesamt-Verlustleistung Total power dissipation	T_C = 25°C, $T_{vj\,max}$ = 175°C	P_{tot}	880	W
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 = 400 A, V_{GE} = 15 V I_C = 400 A, V_{GE} = 15 V I_C = 400 A, V_{GE} = 15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$V_{CE\,sat}$		1,75 2,00 2,10	2,15	V V V
Gate-Schwellenspannung Gate threshold voltage	I_C = 4,80 mA, V_{CE} = V_{GE}, T_{vj} = 25°C		V_{GEth}	4,9	5,8	6,5	V
Gateladung Gate charge	V_{GE} = -15 V ... +15 V		Q_G		3,20		µC
Interner Gatewiderstand Internal gate resistor	T_{vj} = 25°C		R_{Gint}		1,0		Ω
Eingangskapazität Input capacitance	f = 1 MHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{ies}		18,5		nF
Rückwirkungskapazität Reverse transfer capacitance	f = 1 MHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{res}		0,57		nF
Kollektor-Emitter-Reststrom Collector-emitter cut-off current	V_{CE} = 650 V, V_{GE} = 0 V, T_{vj} = 25°C		I_{CES}			1,0	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 = 400 A, V_{CE} = 300 V V_{GE} = ±15 V R_{Gon} = 1,5 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$t_{d\,on}$		0,08 0,10 0,10		µs µs µs
Anstiegszeit, induktive Last Rise time, inductive load	I_C = 400 A, V_{CE} = 300 V V_{GE} = ±15 V R_{Gon} = 1,5 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	t_r		0,09 0,10 0,10		µs µs µs
Abschaltverzögerungszeit, induktive Last Turn-off delay time, inductive load	I_C = 400 A, V_{CE} = 300 V V_{GE} = ±15 V R_{Goff} = 1,5 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$t_{d\,off}$		0,35 0,37 0,38		µs µs µs
Fallzeit, induktive Last Fall time, inductive load	I_C = 400 A, V_{CE} = 300 V V_{GE} = ±15 V R_{Goff} = 1,5 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	t_f		0,08 0,11 0,11		µs µs µs
Einschaltverlustenergie pro Puls Turn-on energy loss per pulse	I_C = 400 A, V_{CE} = 300 V, L_S = 35 nH V_{GE} = ±15 V, di/dt = 3300 A/µs (T_{vj} = 150°C) R_{Gon} = 1,5 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{on}		6,30 9,40 11,0		mJ mJ mJ
Abschaltverlustenergie pro Puls Turn-off energy loss per pulse	I_C = 400 A, V_{CE} = 300 V, L_S = 35 nH V_{GE} = ±15 V, du/dt = 3350 V/µs (T_{vj} = 150°C) R_{Goff} = 1,5 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{off}		20,0 23,5 24,5		mJ mJ mJ
Kurzschlußverhalten SC data	V_{GE} ≤ 15 V, V_{CC} = 360 V V_{CEmax} = V_{CES} -L_{sCE} ·di/dt	t_P ≤ 10 µs, T_{vj} = 25°C t_P ≤ 10 µs, T_{vj} = 150°C	I_{SC}		1800 1400		A A
Wärmewiderstand, Chip bis Gehäuse Thermal resistance, junction to case	pro IGBT / per IGBT		R_{thJC}			0,17	K/W
Wärmewiderstand, Gehäuse bis Kühlkörper Thermal resistance, case to heatsink	pro IGBT / per IGBT λ_{Paste} = 1 W/(m·K) / λ_{grease} = 1 W/(m·K)		R_{thCH}		0,074		K/W
Temperatur im Schaltbetrieb Temperature under switching conditions			$T_{vj\,op}$	-40		150	°C

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Vorläufige Daten
Preliminary Data

Diode, D1 / D4 / Diode, D1 / D4

Höchstzulässige Werte / Maximum Rated Values

Periodische Spitzensperrspannung Repetitive peak reverse voltage	T_{vj} = 25°C	V_{RRM}	1200	V
Dauergleichstrom Continuous DC forward current		I_F	400	A
Periodischer Spitzenstrom Repetitive peak forward current	t_P = 1 ms	I_{FRM}	800	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	15500 11500	A^2s A^2s

Charakteristische Werte / Characteristic Values

				min.	typ.	max.	
Durchlassspannung Forward voltage	I_F = 400 A, V_{GE} = 0 V I_F = 400 A, V_{GE} = 0 V I_F = 400 A, V_{GE} = 0 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	V_F		1,80 1,85 1,90	2,30	V V V
Rückstromspitze Peak reverse recovery current	I_F = 400 A, - di_F/dt = 3300 A/µs (T_{vj}=150°C) V_R = 300 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	I_{RM}		255 310 325		A A A
Sperrverzögerungsladung Recovered charge	I_F = 400 A, - di_F/dt = 3300 A/µs (T_{vj}=150°C) V_R = 300 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	Q_r		29,0 56,0 65,0		µC µC µC
Abschaltenergie pro Puls Reverse recovery energy	I_F = 400 A, - di_F/dt = 3300 A/µs (T_{vj}=150°C) V_R = 300 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{rec}		8,70 16,5 19,0		mJ mJ mJ
Wärmewiderstand, Chip bis Gehäuse Thermal resistance, junction to case	pro Diode / per diode		R_{thJC}			0,16	K/W
Wärmewiderstand, Gehäuse bis Kühlkörper Thermal resistance, case to heatsink	pro Diode / per diode λ_{Paste} = 1 W/(m·K) / λ_{grease} = 1 W/(m·K)		R_{thCH}		0,056		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_C = 25°C	R_{25}		5,00		kΩ
Abweichung von R100 Deviation of R100	T_C = 100°C, R_{100} = 493 Ω	ΔR/R	-5		5	%
Verlustleistung Power dissipation	T_C = 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.

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Vorläufige Daten
Preliminary Data

Modul / Module

Isolations-Prüfspannung Isolation test voltage	RMS, f = 50 Hz, t = 1 min.	V_{ISOL}		2,5		kV
Material Modulgrundplatte Material of module baseplate				Cu		
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			25,0 12,5		mm
Luftstrecke Clearance	Kontakt - Kühlkörper / terminal to heatsink Kontakt - Kontakt / terminal to terminal			11,0 7,0		mm
Vergleichszahl der Kriechwegbildung Comperative tracking index		CTI		> 200		
			min.	typ.	max.	
Modulstreuinduktivität Stray inductance module		L_{sCE}		38		nH
Modulleitungswiderstand, Anschlüsse - Chip Module lead resistance, terminals - chip	T_C = 25°C, pro Schalter / per switch	$R_{CC'+EE'}$		0,75		mΩ
Lagertemperatur Storage temperature		T_{stg}	-40		125	°C
Anzugsdrehmoment f. Modulmontage Mounting torque for modul mounting	Schraube M5 - Montage gem. gültiger Applikationsschrift Screw M5 - Mounting according to valid application note	M	3,00	-	6,00	Nm
Anzugsdrehmoment f. elektr. Anschlüsse Terminal connection torque	Schraube M6 - Montage gem. gültiger Applikationsschrift Screw M6 - Mounting according to valid application note	M	3,0	-	6,0	Nm
Gewicht Weight		G		400		g

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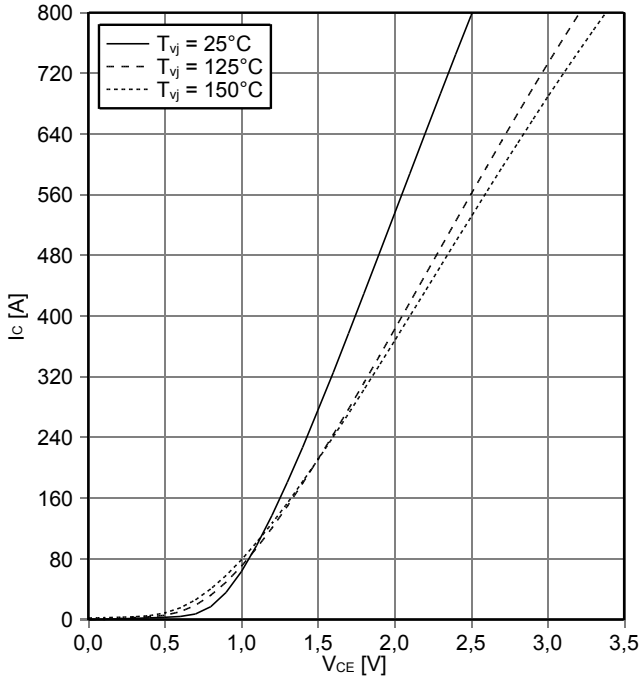
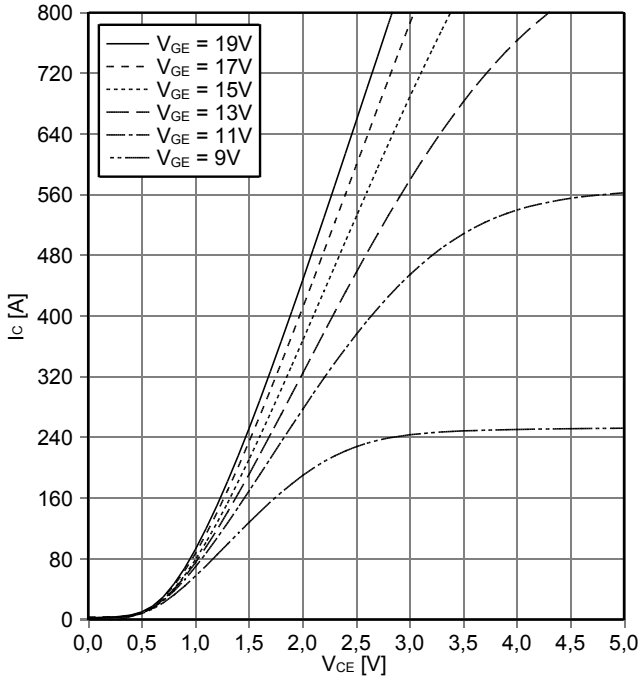
Vorläufige Daten
Preliminary Data

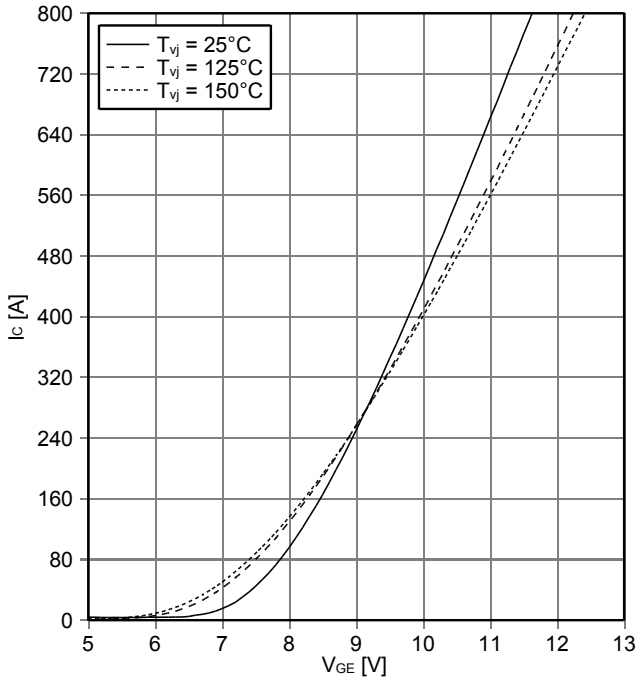
Ausgangskennlinie IGBT, T1 / T4 (typisch)
output characteristic IGBT, T1 / T4 (typical)
$I_C = f(V_{CE})$
$V_{GE} = 15$ V



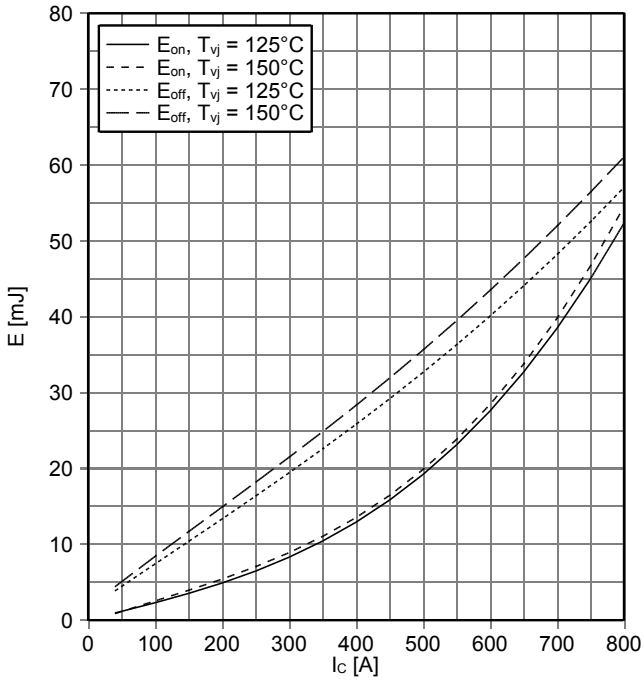
Ausgangskennlinienfeld IGBT, T1 / T4 (typisch)
output characteristic IGBT, T1 / T4 (typical)
$I_C = f(V_{CE})$
$T_{vj} = 150°C$



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, $R_{Gon} = 1.5\ \Omega$, $R_{Goff} = 1.5\ \Omega$, $V_{CE} = 300$ V



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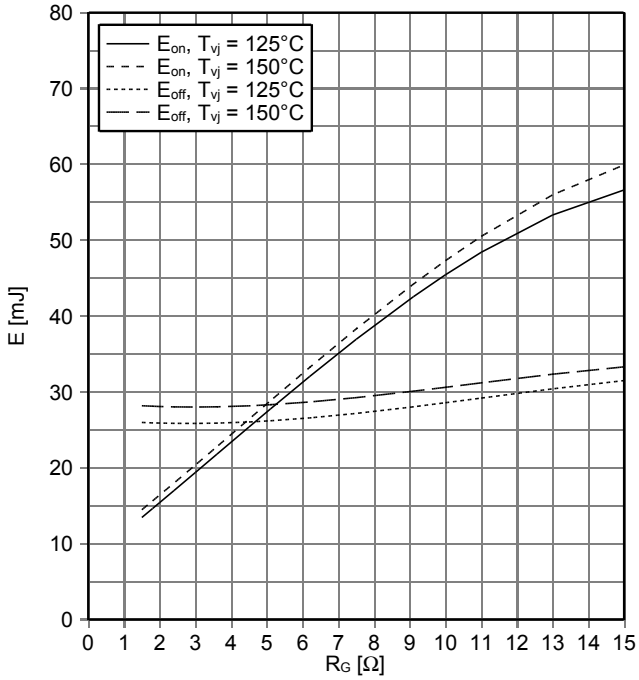
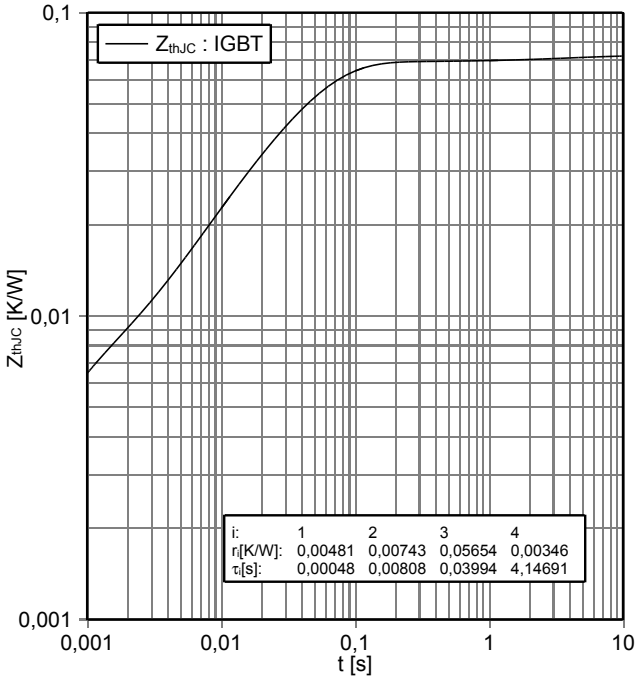
Vorläufige Daten
Preliminary Data

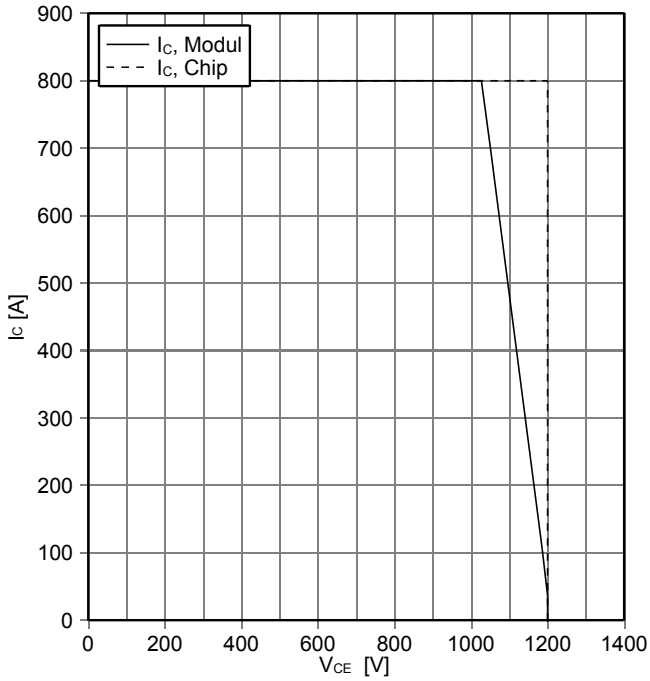
Schaltverluste IGBT, T1 / T4 (typisch)
switching losses IGBT, T1 / T4 (typical)
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
$V_{GE} = \pm 15$ V, $I_C = 400$ A, $V_{CE} = 300$ V



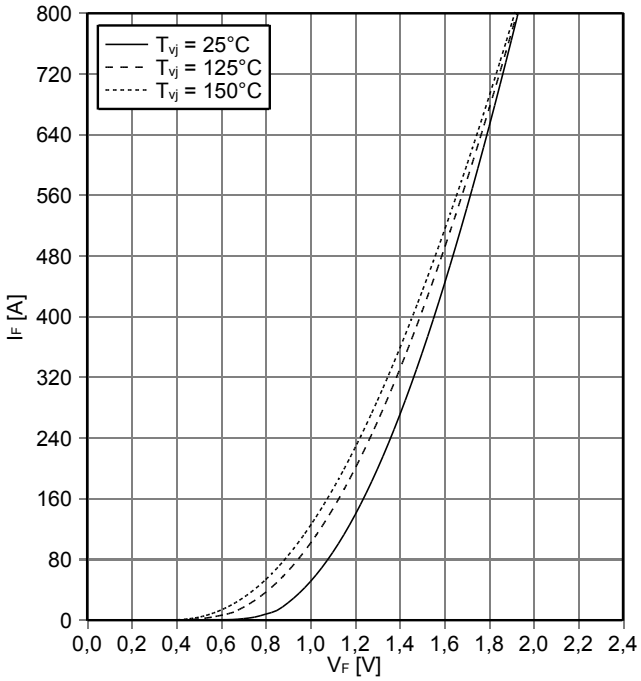
Transienter Wärmewiderstand IGBT, T1 / T4
transient thermal impedance IGBT, T1 / T4
$Z_{thJC} = f(t)$



Sicherer Rückwärts-Arbeitsbereich IGBT, T1 / T4 (RBSOA)
reverse bias safe operating area IGBT, T1 / T4 (RBSOA)
$I_C = f(V_{CE})$
$V_{GE} = \pm 15$ V, $R_{Goff} = 1.5\ \Omega$, $T_{vj} = 150°C$



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



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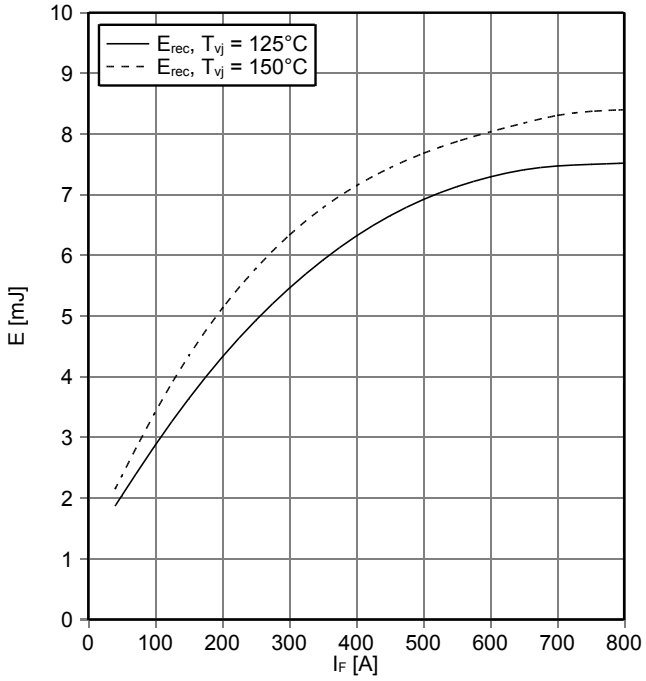
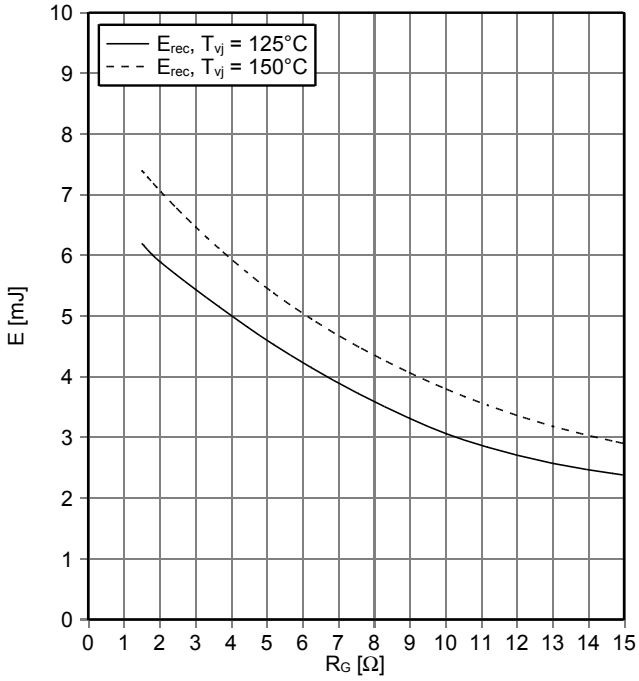
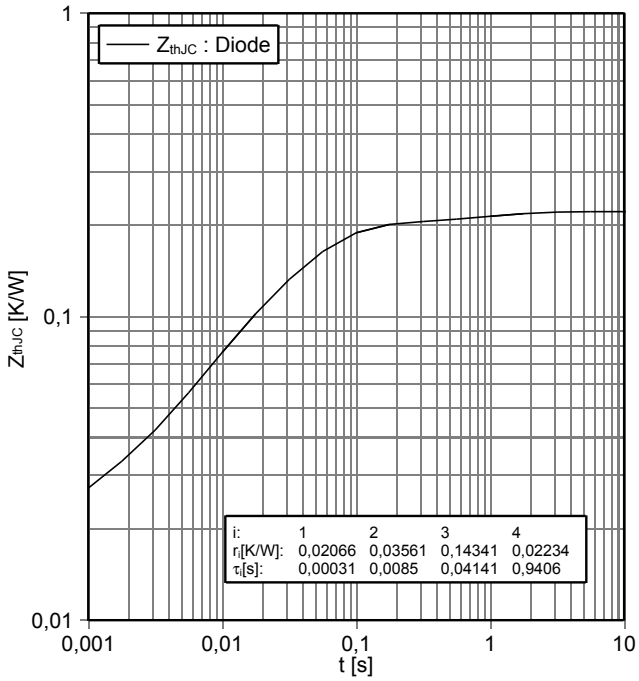
Schaltverluste Diode, D2 / D3 (typisch)
switching losses Diode, D2 / D3 (typical)
$E_{rec} = f(I_F)$
$R_{Gon} = 1.5\ \Omega$, $V_{CE} = 300$ V



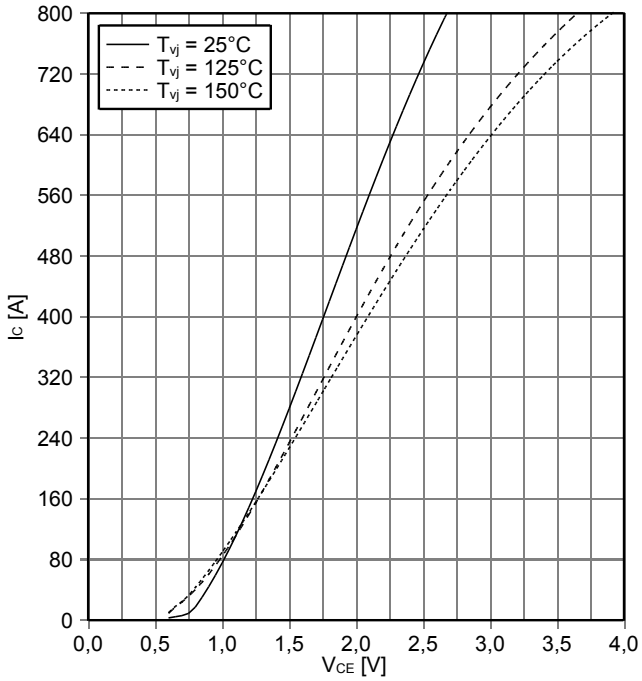
Schaltverluste Diode, D2 / D3 (typisch)
switching losses Diode, D2 / D3 (typical)
$E_{rec} = f(R_G)$
$I_F = 400$ A, $V_{CE} = 300$ V



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



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



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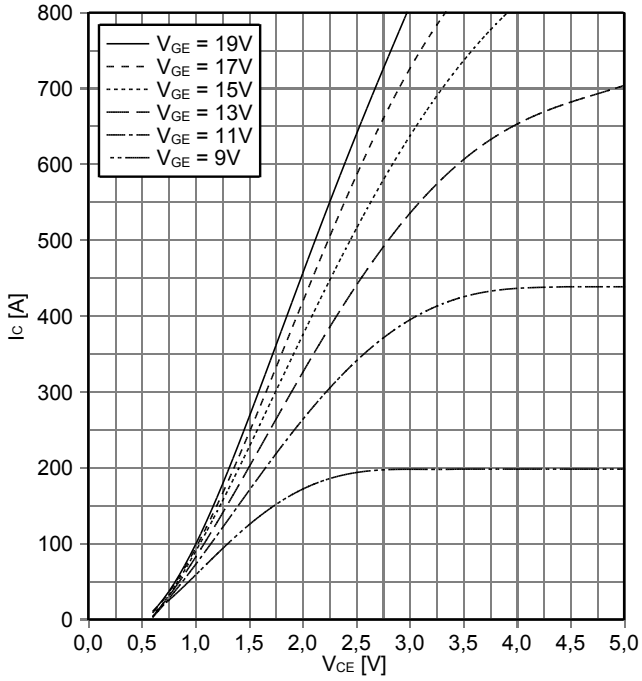
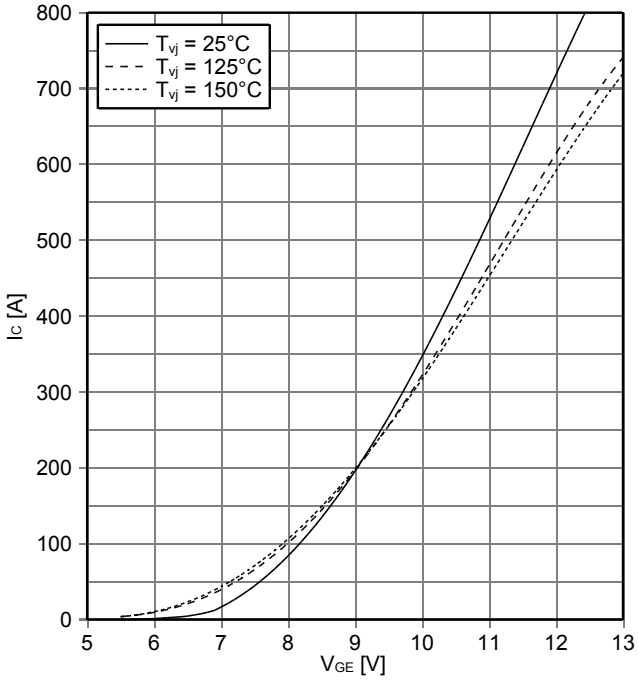
Vorläufige Daten
Preliminary Data

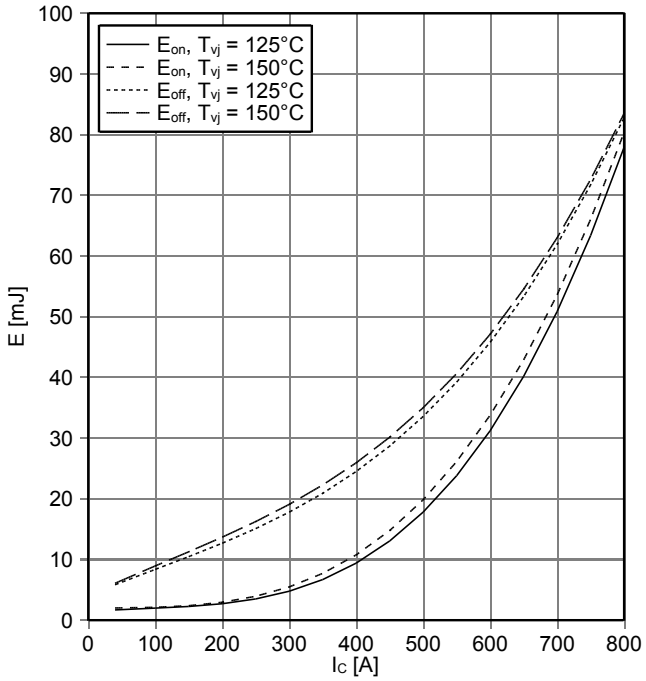
Ausgangskennlinienfeld IGBT, T2 / T3 (typisch)
output characteristic IGBT, T2 / T3 (typical)
$I_C = f(V_{CE})$
$T_{vj} = 150°C$



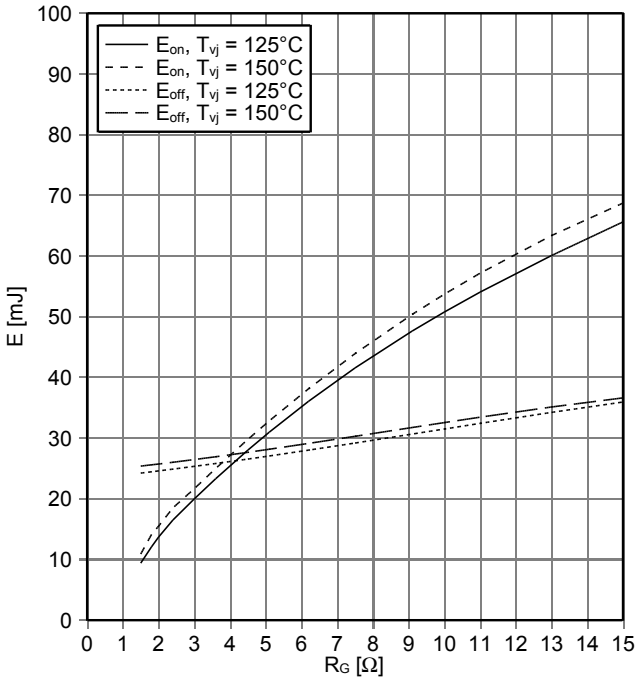
Übertragungscharakteristik IGBT, T2 / T3 (typisch)
transfer characteristic IGBT, T2 / T3 (typical)
$I_C = f(V_{GE})$
$V_{CE} = 20$ V



Schaltverluste IGBT, T2 / T3 (typisch)
switching losses IGBT, T2 / T3 (typical)
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
$V_{GE} = \pm 15$ V, $R_{Gon} = 1.5\ \Omega$, $R_{Goff} = 1.5\ \Omega$, $V_{CE} = 300$ 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, $I_C = 400$ A, $V_{CE} = 300$ V



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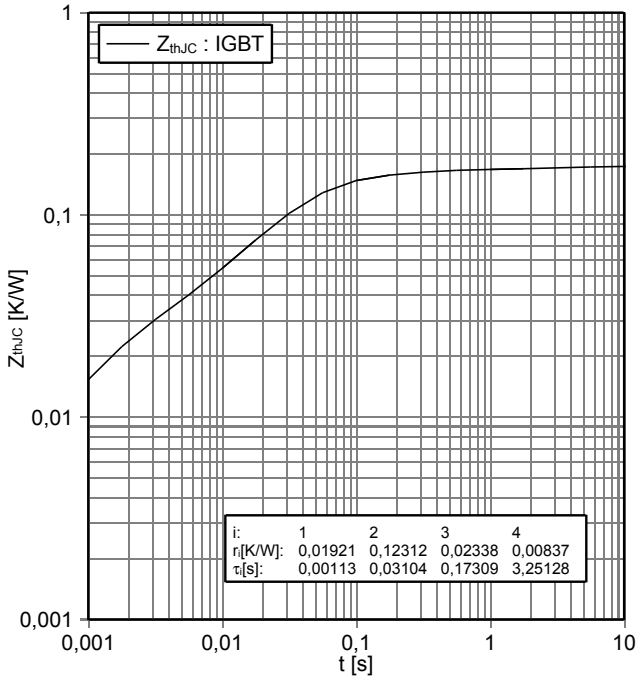
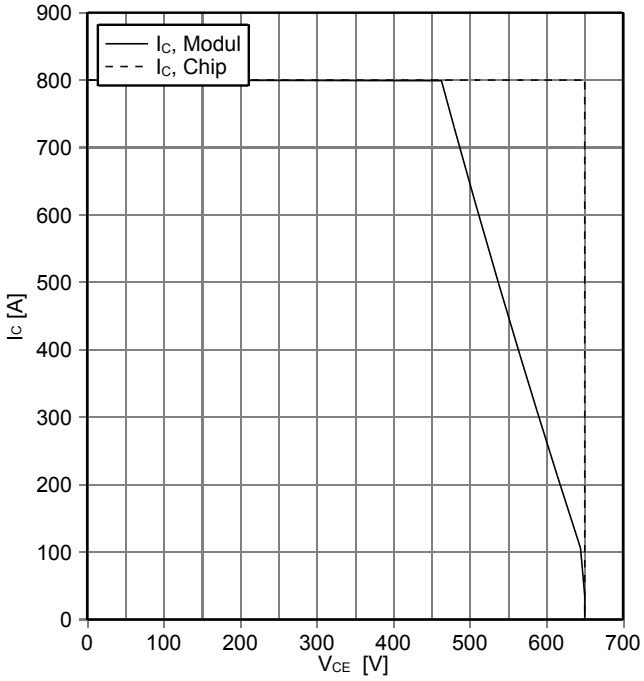
Vorläufige Daten
Preliminary Data

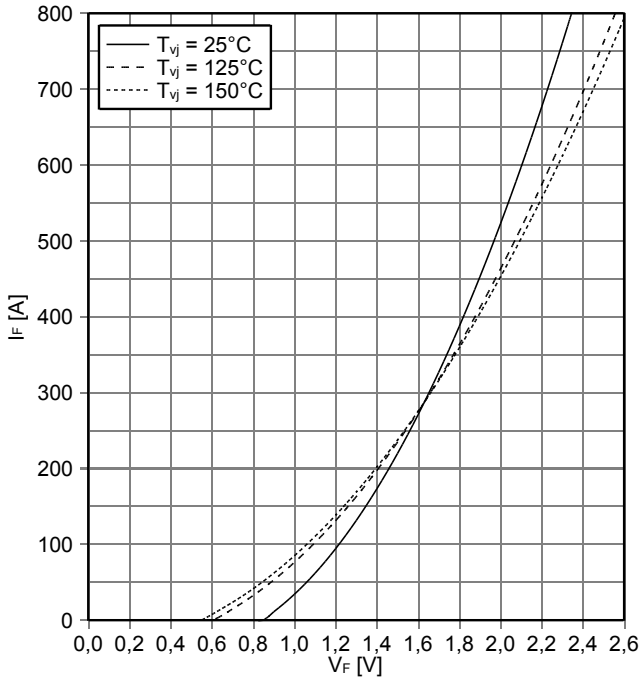
Transienter Wärmewiderstand IGBT, T2 / T3
transient thermal impedance IGBT, T2 / T3
$Z_{thJC} = f(t)$



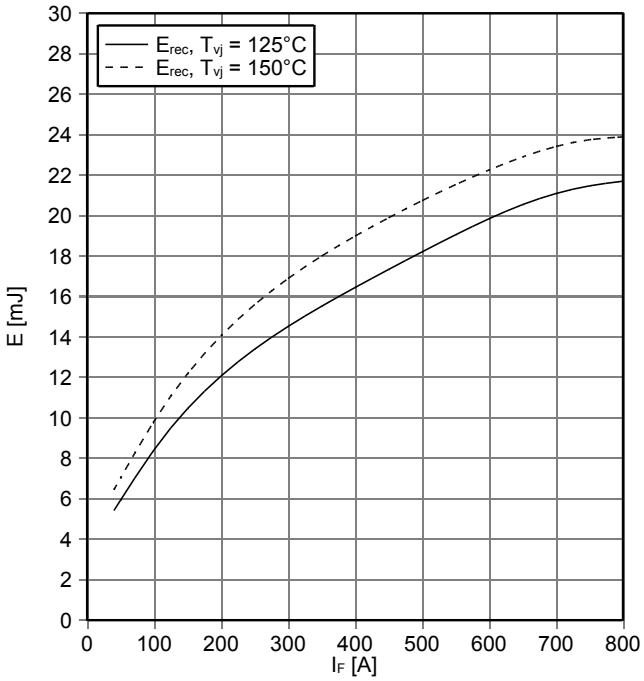
Sicherer Rückwärts-Arbeitsbereich IGBT, T2 / T3 (RBSOA)
reverse bias safe operating area IGBT, T2 / T3 (RBSOA)
$I_C = f(V_{CE})$
$V_{GE} = \pm 15$ V, $R_{Goff} = 1.5\ \Omega$, $T_{vj} = 150°C$



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)
$E_{rec} = f(I_F)$
$R_{Gon} = 1.5\ \Omega$, $V_{CE} = 300$ V



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Vorläufige Daten
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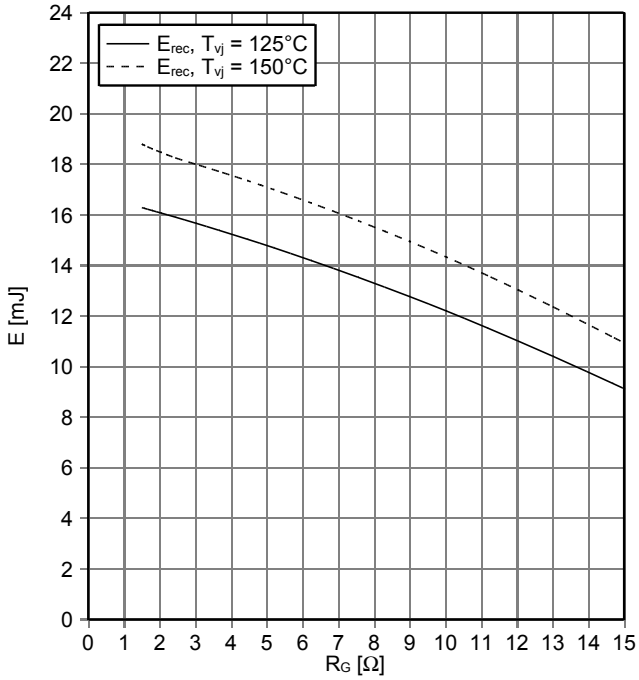
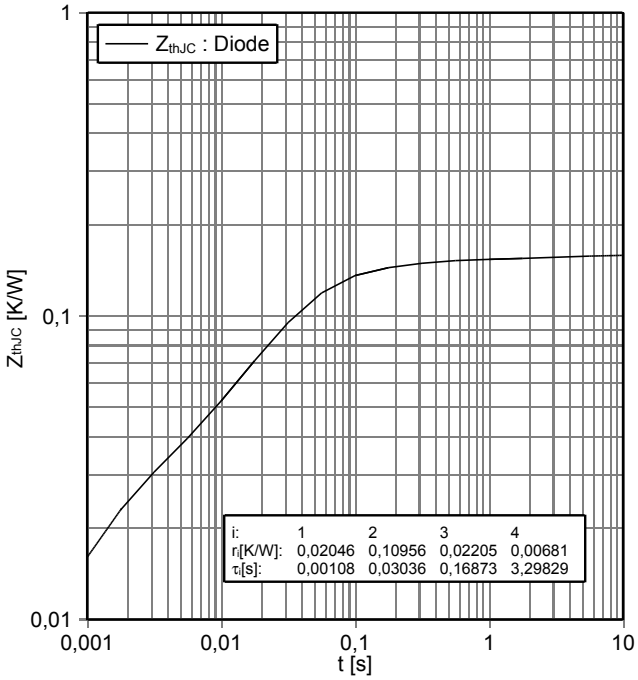
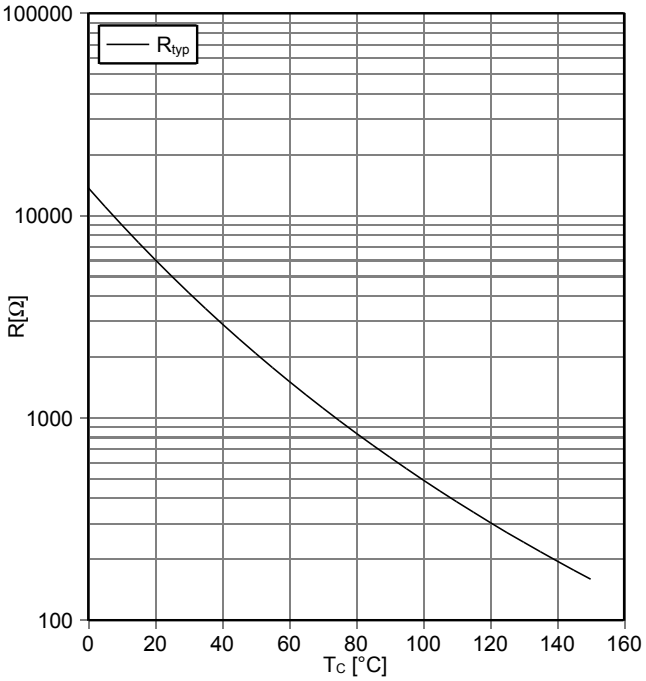
Schaltverluste Diode, D1 / D4 (typisch)
switching losses Diode, D1 / D4 (typical)
$E_{rec} = f(R_G)$
$I_F = 400$ A, $V_{CE} = 300$ V



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



NTC-Widerstand-Temperaturkennlinie (typisch)
NTC-Thermistor-temperature characteristic (typical)
R = f (T)



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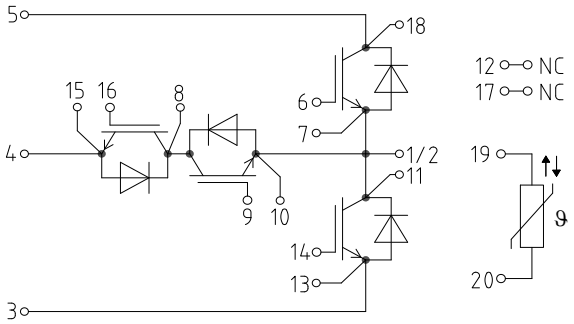
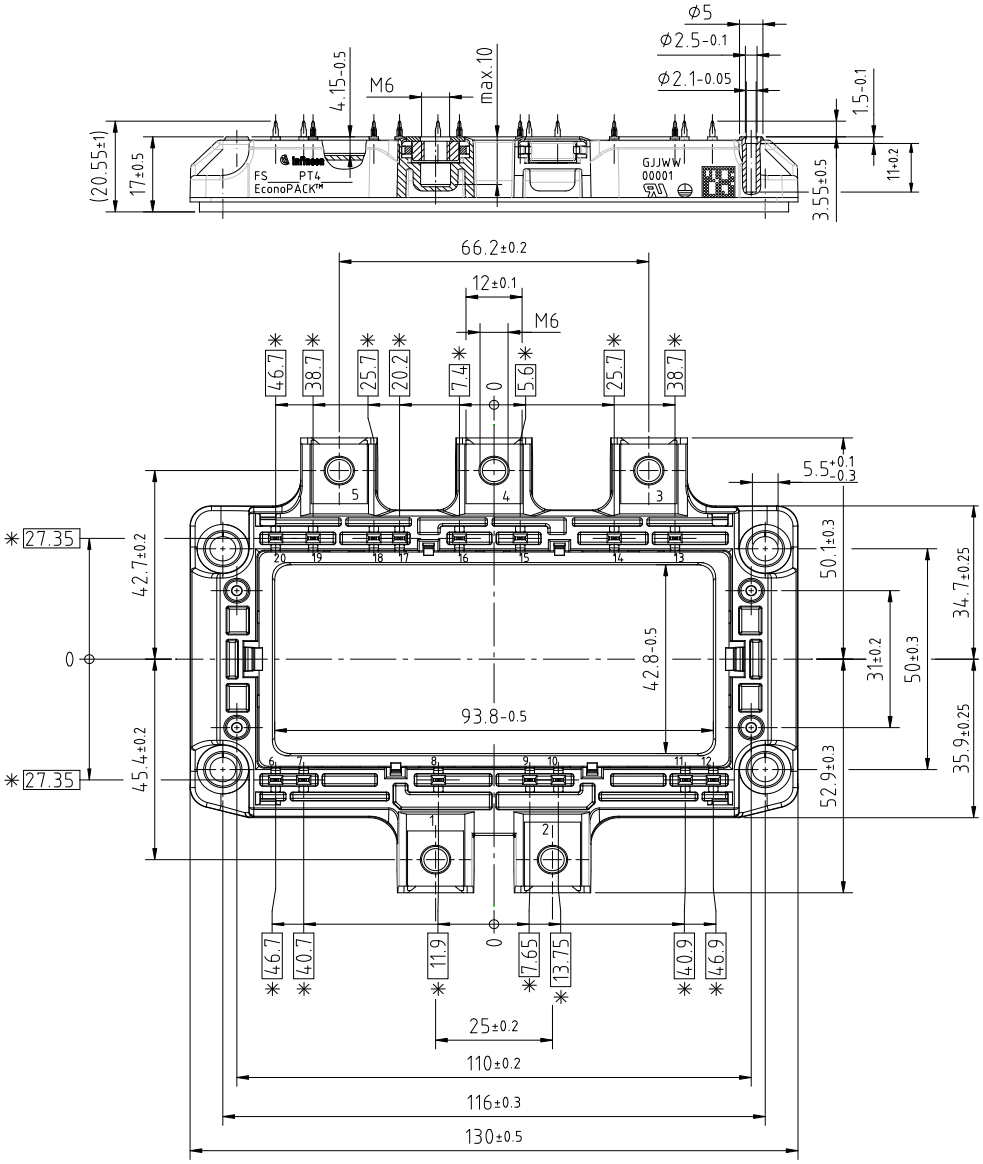
Vorläufige Daten
Preliminary Data

Schaltplan / circuit_diagram_headline



Gehäuseabmessungen / package outlines



✳ = alle Maße mit einer Toleranz von ⊕ Ø0.4

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Vorläufige Daten
Preliminary Data

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- to perform joint Risk and Quality Assessments;
- the conclusion of Quality Agreements;
- to establish joint measures of an ongoing product survey, and that we may make delivery depended on the realization of any such measures.

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