

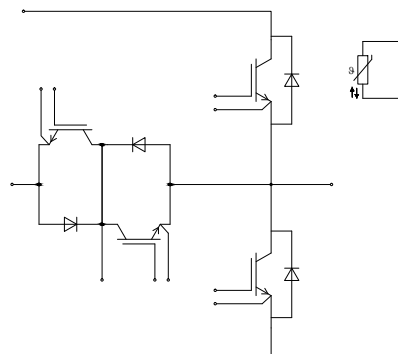
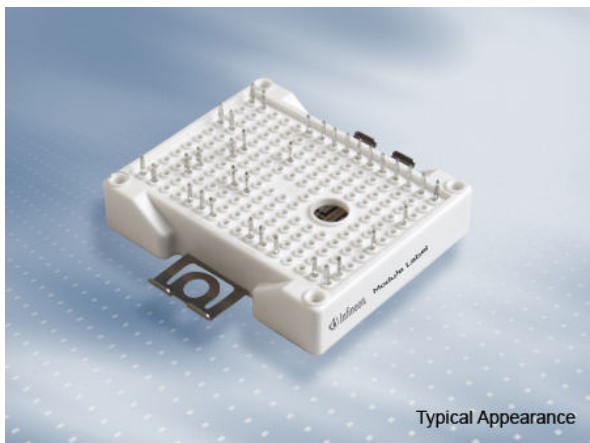
Technische Information / Technical Information

IGBT-Modul
IGBT-Module

F3L200R12W2H3_B11



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



$V_{CES} = 1200V$
 $I_{C\,nom} = 100A / I_{CRM} = 200A$

Typische Anwendungen

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

Elektrische Eigenschaften

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

Mechanische Eigenschaften

- 3 kV AC 1min Isolationsfestigkeit
- PressFIT Verbindungstechnik
- RoHS konform

Typical Applications

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

Electrical Features

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

Mechanical Features

- 3 kV AC 1min insulation
- PressFIT contact technology
- RoHS compliant

Module Label Code

Barcode Code 128



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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approved by: AKDA	revision: V3.1	UL approved (E83335)

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}	1200	V
Implementierter Kollektor-Strom Implemented collector current		I_{CN}	200	A
Kollektor-Dauergleichstrom Continuous DC collector current	$T_C = 100^{\circ}\text{C}$, $T_{vj\text{ max}} = 175^{\circ}\text{C}$	$I_{C\text{ nom}}$	100	A
Periodischer Kollektor-Spitzenstrom Repetitive peak collector current	$t_P = 1\text{ ms}$	I_{CRM}	400	A
Gesamt-Verlustleistung Total power dissipation	$T_C = 25^{\circ}\text{C}$, $T_{vj\text{ max}} = 175^{\circ}\text{C}$	P_{tot}	600	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	$I_C = 100\text{ A}$, $V_{GE} = 15\text{ V}$ $I_C = 100\text{ A}$, $V_{GE} = 15\text{ V}$ $I_C = 100\text{ A}$, $V_{GE} = 15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$V_{CE\text{ sat}}$	1,55 1,70 1,75	1,75	V V V
Gate-Schwellenspannung Gate threshold voltage	$I_C = 7,60\text{ mA}$, $V_{CE} = V_{GE}$, $T_{vj} = 25^{\circ}\text{C}$		$V_{G\text{ eth}}$	5,05	5,80	6,45 V
Gateladung Gate charge	$V_{GE} = -15\text{ V} \dots +15\text{ V}$		Q_G	1,60		μC
Interner Gatewiderstand Internal gate resistor	$T_{vj} = 25^{\circ}\text{C}$		$R_{G\text{ int}}$	3,8		Ω
Eingangskapazität Input capacitance	$f = 1\text{ MHz}$, $T_{vj} = 25^{\circ}\text{C}$, $V_{CE} = 25\text{ V}$, $V_{GE} = 0\text{ V}$		C_{ies}	11,5		nF
Rückwirkungskapazität Reverse transfer capacitance	$f = 1\text{ MHz}$, $T_{vj} = 25^{\circ}\text{C}$, $V_{CE} = 25\text{ V}$, $V_{GE} = 0\text{ V}$		C_{res}	0,70		nF
Kollektor-Emitter-Reststrom Collector-emitter cut-off current	$V_{CE} = 1200\text{ V}$, $V_{GE} = 0\text{ V}$, $T_{vj} = 25^{\circ}\text{C}$		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	$I_C = 100\text{ A}$, $V_{CE} = 400\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 1,1\text{ }\Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_{d\text{ on}}$	0,14 0,155 0,16		μs μs μs
Anstiegszeit, induktive Last Rise time, inductive load	$I_C = 100\text{ A}$, $V_{CE} = 400\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 1,1\text{ }\Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	t_r	0,025 0,03 0,03		μs μs μs
Abschaltverzögerungszeit, induktive Last Turn-off delay time, inductive load	$I_C = 100\text{ A}$, $V_{CE} = 400\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 1,1\text{ }\Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_{d\text{ off}}$	0,32 0,40 0,42		μs μs μs
Fallzeit, induktive Last Fall time, inductive load	$I_C = 100\text{ A}$, $V_{CE} = 400\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 1,1\text{ }\Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	t_f	0,03 0,055 0,06		μs μs μs
Einschaltverlustenergie pro Puls Turn-on energy loss per pulse	$I_C = 100\text{ A}$, $V_{CE} = 400\text{ V}$, $L_S = 25\text{ nH}$ $V_{GE} = \pm 15\text{ V}$, $di/dt = 3700\text{ A}/\mu\text{s}$ ($T_{vj} = 150^{\circ}\text{C}$) $R_{Gon} = 1,1\text{ }\Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	E_{on}	1,20 2,00 2,25		mJ mJ mJ
Abschaltverlustenergie pro Puls Turn-off energy loss per pulse	$I_C = 100\text{ A}$, $V_{CE} = 400\text{ V}$, $L_S = 25\text{ nH}$ $V_{GE} = \pm 15\text{ V}$, $du/dt = 2700\text{ V}/\mu\text{s}$ ($T_{vj} = 150^{\circ}\text{C}$) $R_{Goff} = 1,1\text{ }\Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	E_{off}	3,50 5,30 5,90		mJ mJ mJ
Kurzschlußverhalten SC data	$V_{GE} \leq 15\text{ V}$, $V_{CC} = 800\text{ V}$ $V_{CE\text{ max}} = V_{CES} - L_{SCE} \cdot di/dt$ $t_P \leq 10\text{ }\mu\text{s}$, $T_{vj} = 150^{\circ}\text{C}$		I_{SC}	800		A
Wärmewiderstand, Chip bis Gehäuse Thermal resistance, junction to case	pro IGBT / per IGBT		R_{thJC}	0,200	0,250	K/W

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Wärmewiderstand, Gehäuse bis Kühlkörper Thermal resistance, case to heatsink	pro IGBT / per IGBT $\lambda_{\text{Paste}} = 1 \text{ W/(m}\cdot\text{K)}$ / $\lambda_{\text{grease}} = 1 \text{ W/(m}\cdot\text{K)}$	R_{thCH}		0,200		K/W
Temperatur im Schaltbetrieb Temperature under switching conditions		$T_{\text{vj op}}$	-40		150	°C

Diode, D2 / D3 / Diode, D2 / D3

Höchstzulässige Werte / Maximum Rated Values

Periodische Spitzensperrspannung Repetitive peak reverse voltage	$T_{\text{vj}} = 25^\circ\text{C}$	V_{RRM}	650	V
Implementierter Durchlassstrom Implemented forward current		I_{FN}	125	A
Dauergleichstrom Continuous DC forward current		I_{F}	100	A
Periodischer Spitzenstrom Repetitive peak forward current	$t_{\text{p}} = 1 \text{ ms}$	I_{FRM}	250	A
Grenzlastintegral I^2t - value	$V_{\text{R}} = 0 \text{ V}, t_{\text{p}} = 10 \text{ ms}, T_{\text{vj}} = 125^\circ\text{C}$ $V_{\text{R}} = 0 \text{ V}, t_{\text{p}} = 10 \text{ ms}, T_{\text{vj}} = 150^\circ\text{C}$	I^2t	1450 1400	A^2s A^2s

Charakteristische Werte / Characteristic Values

			min.	typ.	max.	
Durchlassspannung Forward voltage	$I_{\text{F}} = 100 \text{ A}, V_{\text{GE}} = 0 \text{ V}$ $I_{\text{F}} = 100 \text{ A}, V_{\text{GE}} = 0 \text{ V}$ $I_{\text{F}} = 100 \text{ A}, V_{\text{GE}} = 0 \text{ V}$	$T_{\text{vj}} = 25^\circ\text{C}$ $T_{\text{vj}} = 125^\circ\text{C}$ $T_{\text{vj}} = 150^\circ\text{C}$	V_{F}	1,55 1,50 1,45	1,70	V V V
Rückstromspitze Peak reverse recovery current	$I_{\text{F}} = 100 \text{ A}, -di_{\text{F}}/dt = 3700 \text{ A}/\mu\text{s} (T_{\text{vj}}=150^\circ\text{C})$ $V_{\text{R}} = 400 \text{ V}$ $V_{\text{GE}} = -15 \text{ V}$	$T_{\text{vj}} = 25^\circ\text{C}$ $T_{\text{vj}} = 125^\circ\text{C}$ $T_{\text{vj}} = 150^\circ\text{C}$	I_{RM}	90,0 100 100		A A A
Sperrverzögerungsladung Recovered charge	$I_{\text{F}} = 100 \text{ A}, -di_{\text{F}}/dt = 3700 \text{ A}/\mu\text{s} (T_{\text{vj}}=150^\circ\text{C})$ $V_{\text{R}} = 400 \text{ V}$ $V_{\text{GE}} = -15 \text{ V}$	$T_{\text{vj}} = 25^\circ\text{C}$ $T_{\text{vj}} = 125^\circ\text{C}$ $T_{\text{vj}} = 150^\circ\text{C}$	Q_{r}	3,25 5,90 6,40		μC μC μC
Abschaltenergie pro Puls Reverse recovery energy	$I_{\text{F}} = 100 \text{ A}, -di_{\text{F}}/dt = 3700 \text{ A}/\mu\text{s} (T_{\text{vj}}=150^\circ\text{C})$ $V_{\text{R}} = 400 \text{ V}$ $V_{\text{GE}} = -15 \text{ V}$	$T_{\text{vj}} = 25^\circ\text{C}$ $T_{\text{vj}} = 125^\circ\text{C}$ $T_{\text{vj}} = 150^\circ\text{C}$	E_{rec}	0,95 1,55 1,65		mJ mJ mJ
Wärmewiderstand, Chip bis Gehäuse Thermal resistance, junction to case	pro Diode / per diode		R_{thJC}	0,550	0,650	K/W
Wärmewiderstand, Gehäuse bis Kühlkörper Thermal resistance, case to heatsink	pro Diode / per diode $\lambda_{\text{Paste}} = 1 \text{ W/(m}\cdot\text{K)}$ / $\lambda_{\text{grease}} = 1 \text{ W/(m}\cdot\text{K)}$		R_{thCH}	0,600		K/W
Temperatur im Schaltbetrieb Temperature under switching conditions			$T_{\text{vj op}}$	-40	150	°C

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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
Kollektor-Dauergleichstrom Continuous DC collector current	$T_C = 100^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$	$I_{C\text{ nom}}$	100	A
Periodischer Kollektor-Spitzenstrom Repetitive peak collector current	$t_P = 1\text{ ms}$	I_{CRM}	200	A
Gesamt-Verlustleistung Total power dissipation	$T_C = 25^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$	P_{tot}	250	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	$I_C = 100\text{ A}, V_{GE} = 15\text{ V}$ $I_C = 100\text{ A}, V_{GE} = 15\text{ V}$ $I_C = 100\text{ A}, V_{GE} = 15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$V_{CE\text{ sat}}$	1,45 1,60 1,70	1,90	V V V
Gate-Schwellenspannung Gate threshold voltage	$I_C = 1,60\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$		V_{GEth}	4,95	5,80 6,45	V
Gateladung Gate charge	$V_{GE} = -15\text{ V} \dots +15\text{ V}$		Q_G	1,00		μC
Interner Gatewiderstand Internal gate resistor	$T_{vj} = 25^{\circ}\text{C}$		R_{Gint}	2,0		Ω
Eingangskapazität Input capacitance	$f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$		C_{ies}	6,20		nF
Rückwirkungskapazität Reverse transfer capacitance	$f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$		C_{res}	0,19		nF
Kollektor-Emitter-Reststrom Collector-emitter cut-off current	$V_{CE} = 650\text{ V}, V_{GE} = 0\text{ V}, T_{vj} = 25^{\circ}\text{C}$		I_{CES}		1,0	mA
Gate-Emitter-Reststrom Gate-emitter leakage current	$V_{CE} = 0\text{ V}, V_{GE} = 20\text{ V}, T_{vj} = 25^{\circ}\text{C}$		I_{GES}		100	nA
Einschaltverzögerungszeit, induktive Last Turn-on delay time, inductive load	$I_C = 100\text{ A}, V_{CE} = 400\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 3,3\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_{d\text{ on}}$	0,055 0,06 0,065		μs μs μs
Anstiegszeit, induktive Last Rise time, inductive load	$I_C = 100\text{ A}, V_{CE} = 400\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 3,3\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	t_r	0,025 0,03 0,03		μs μs μs
Abschaltverzögerungszeit, induktive Last Turn-off delay time, inductive load	$I_C = 100\text{ A}, V_{CE} = 400\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 3,3\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_{d\text{ off}}$	0,25 0,27 0,28		μs μs μs
Fallzeit, induktive Last Fall time, inductive load	$I_C = 100\text{ A}, V_{CE} = 400\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 3,3\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	t_f	0,035 0,05 0,06		μs μs μs
Einschaltverlustenergie pro Puls Turn-on energy loss per pulse	$I_C = 100\text{ A}, V_{CE} = 400\text{ V}, L_S = 25\text{ nH}$ $V_{GE} = \pm 15\text{ V}, di/dt = 3800\text{ A}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$ $R_{Gon} = 3,3\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	E_{on}	1,85 2,80 3,30		mJ mJ mJ
Abschaltverlustenergie pro Puls Turn-off energy loss per pulse	$I_C = 100\text{ A}, V_{CE} = 400\text{ V}, L_S = 25\text{ nH}$ $V_{GE} = \pm 15\text{ V}, du/dt = 4600\text{ V}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$ $R_{Goff} = 3,3\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	E_{off}	3,10 4,10 4,60		mJ mJ mJ
Kurzschlußverhalten SC data	$V_{GE} \leq 15\text{ V}, V_{CC} = 360\text{ V}$ $V_{CE\text{ max}} = V_{CES} - L_{SCE} \cdot di/dt$	$t_P \leq 8\ \mu\text{s}, T_{vj} = 25^{\circ}\text{C}$ $t_P \leq 6\ \mu\text{s}, T_{vj} = 150^{\circ}\text{C}$	I_{SC}	700 500		A A
Wärmewiderstand, Chip bis Gehäuse Thermal resistance, junction to case	pro IGBT / per IGBT		R_{thJC}	0,500	0,600	K/W
Wärmewiderstand, Gehäuse bis Kühlkörper Thermal resistance, case to heatsink	pro IGBT / per IGBT $\lambda_{\text{Paste}} = 1\text{ W}/(\text{m} \cdot \text{K}) / \lambda_{\text{grease}} = 1\text{ W}/(\text{m} \cdot \text{K})$		R_{thCH}	0,500		K/W
Temperatur im Schaltbetrieb Temperature under switching conditions			$T_{vj\text{ op}}$	-40	150	$^{\circ}\text{C}$

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IGBT-Modul
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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}	1200	V
Dauergleichstrom Continuous DC forward current		I_F	75	A
Periodischer Spitzenstrom Repetitive peak forward current	$t_P = 1\text{ ms}$	I_{FRM}	150	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	1050 985	A^2s A^2s

Charakteristische Werte / Characteristic Values

			min.	typ.	max.	
Durchlassspannung Forward voltage	$I_F = 75\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 75\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 75\text{ A}, V_{GE} = 0\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	V_F	1,65 1,65 1,65	2,15	V V V
Rückstromspitze Peak reverse recovery current	$I_F = 75\text{ A}, -di_F/dt = 3500\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 400\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	I_{RM}	120 140 150		A A A
Sperrverzögerungsladung Recovered charge	$I_F = 75\text{ A}, -di_F/dt = 3500\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 400\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	Q_r	8,50 17,0 19,0		μC μC μC
Abschaltenergie pro Puls Reverse recovery energy	$I_F = 75\text{ A}, -di_F/dt = 3500\text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 400\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	E_{rec}	2,85 5,70 6,30		mJ mJ mJ
Wärmewiderstand, Chip bis Gehäuse Thermal resistance, junction to case	pro Diode / per diode		R_{thJC}	0,550	0,600	K/W
Wärmewiderstand, Gehäuse bis Kühlkörper Thermal resistance, case to heatsink	pro Diode / per diode $\lambda_{Paste} = 1\text{ W}/(\text{m}\cdot\text{K})$ / $\lambda_{grease} = 1\text{ W}/(\text{m}\cdot\text{K})$		R_{thCH}	0,500		K/W
Temperatur im Schaltbetrieb Temperature under switching conditions			$T_{vj\text{ op}}$	-40	150	$^{\circ}\text{C}$

Modul / Module

Isolations-Prüfspannung Isolation test voltage	RMS, f = 50 Hz, t = 1 min.	V _{ISOL}	3,0	kV		
Innere Isolation Internal isolation	Basisisolierung (Schutzklasse 1, EN61140) basic insulation (class 1, IEC 61140)		Al ₂ O ₃			
Kriechstrecke Creepage distance	Kontakt - Kühlkörper / terminal to heatsink Kontakt - Kontakt / terminal to terminal		11,5 6,3	mm		
Luftstrecke Clearance	Kontakt - Kühlkörper / terminal to heatsink Kontakt - Kontakt / terminal to terminal		10,0 5,0	mm		
Vergleichszahl der Kriechwegbildung Comperative tracking index		CTI	> 200			
min. typ. max.						
Modulstreuinduktivität Stray inductance module		L _{sCE}		14		nH
Lagertemperatur Storage temperature		T _{stg}	-40		125	°C
Anpresskraft für mech. Bef. pro Feder mounting force per clamp		F	40	-	80	N
Gewicht Weight		G		36		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.

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NTC-Widerstand / NTC-Thermistor**Charakteristische Werte / Characteristic Values**

			min.	typ.	max.	
Nennwiderstand Rated resistance	$T_{NTC} = 25^{\circ}\text{C}$	R_{25}		5,00		k Ω
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.

prepared by: CM

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Technische Information / Technical Information

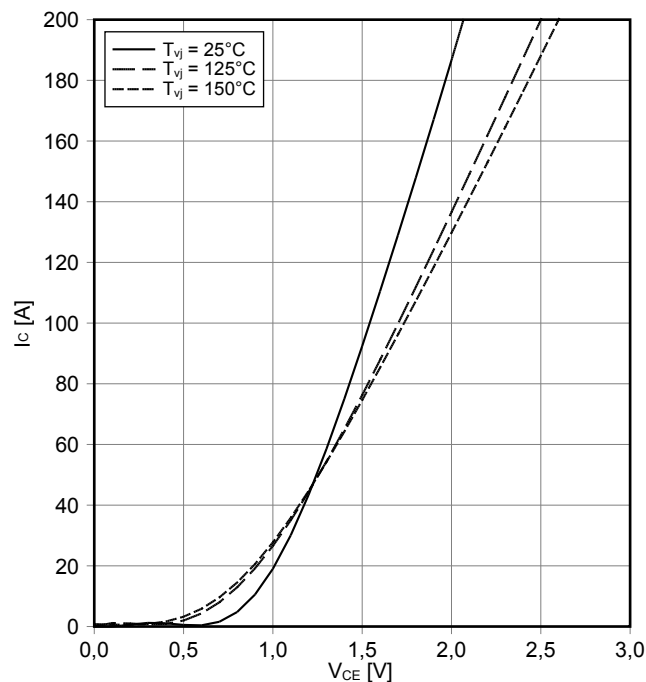
IGBT-Modul
IGBT-Module

F3L200R12W2H3_B11



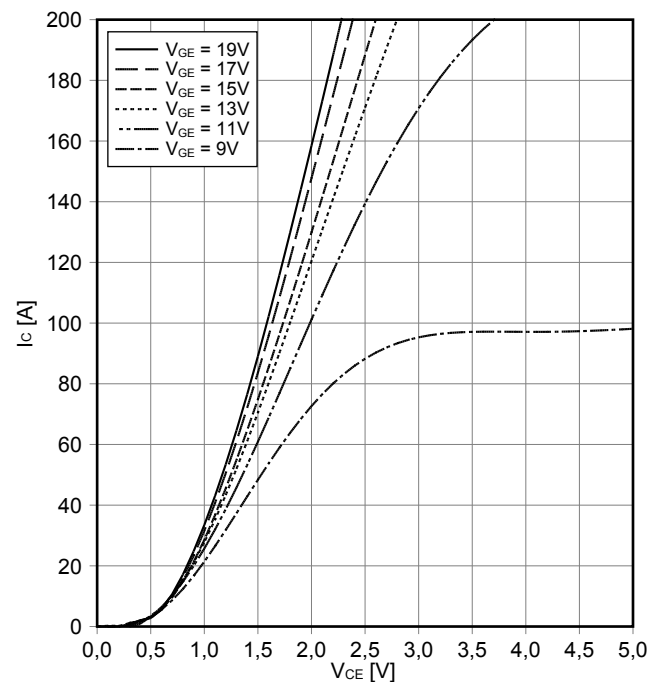
Ausgangskennlinie IGBT, T1 / T4 (typisch)
output characteristic IGBT, T1 / T4 (typical)

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



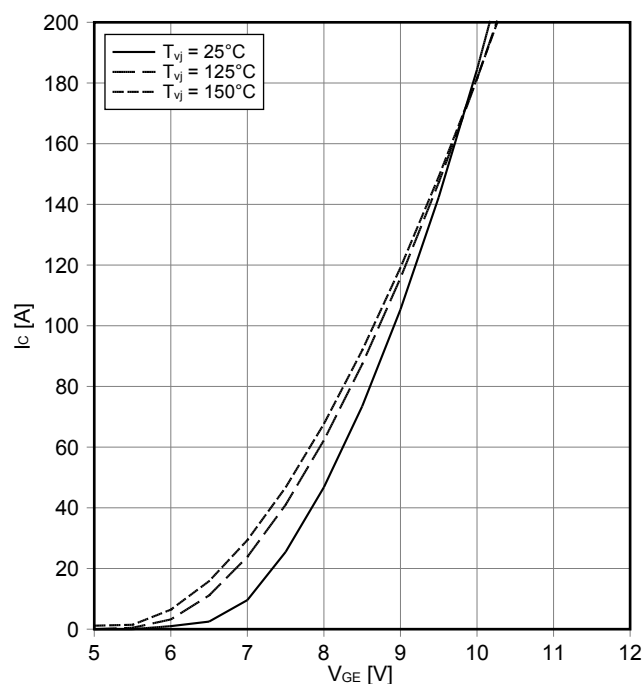
Ausgangskennlinienfeld IGBT, T1 / T4 (typisch)
output characteristic IGBT, T1 / T4 (typical)

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



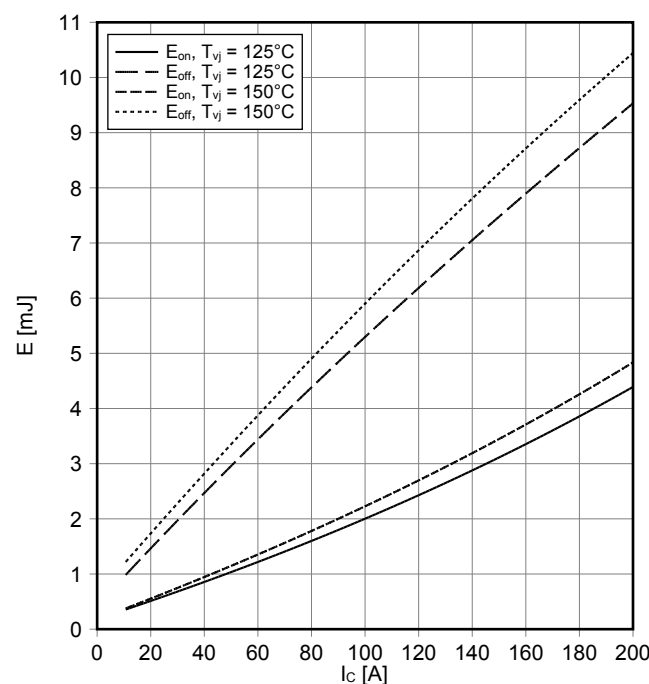
Übertragungscharakteristik IGBT, T1 / T4 (typisch)
transfer characteristic IGBT, T1 / T4 (typical)

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



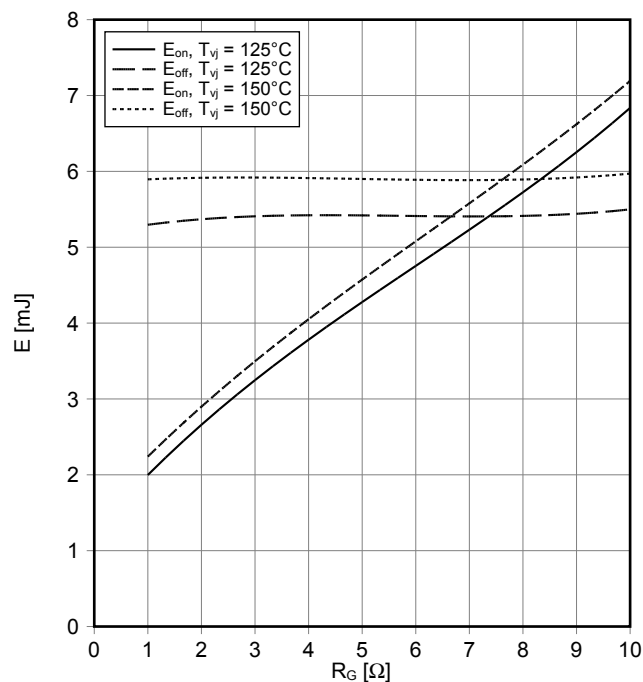
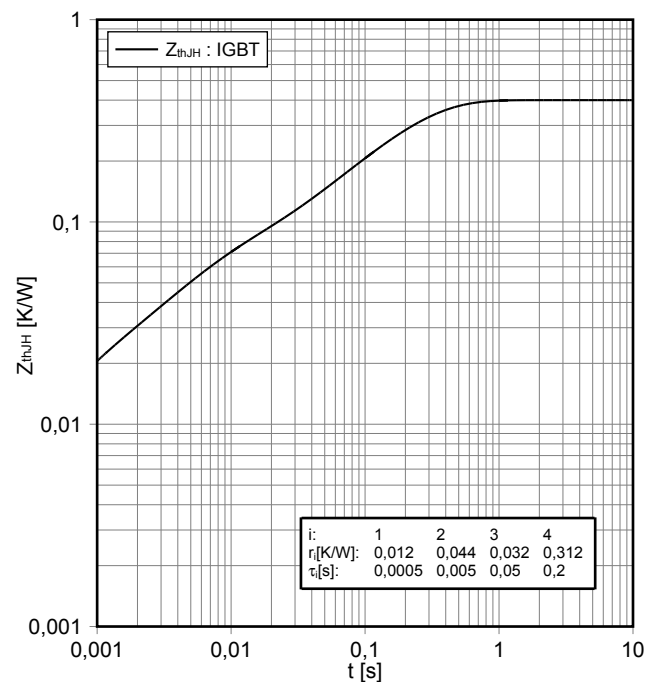
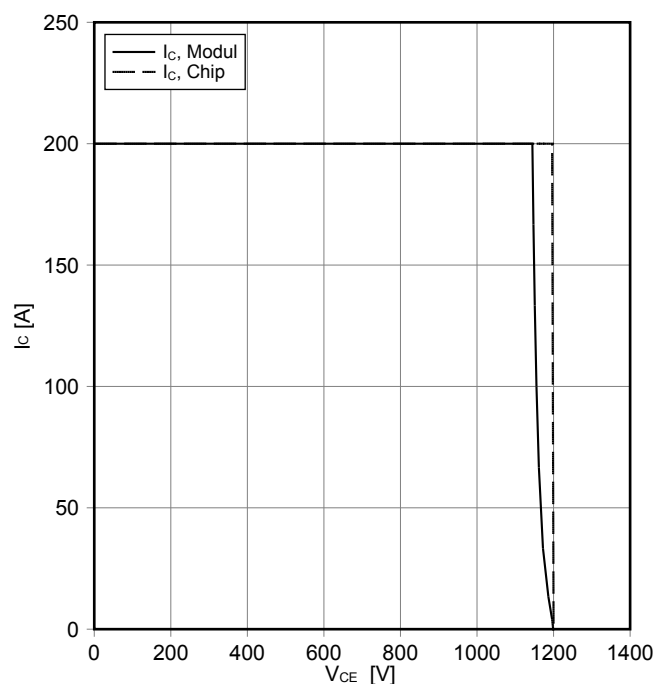
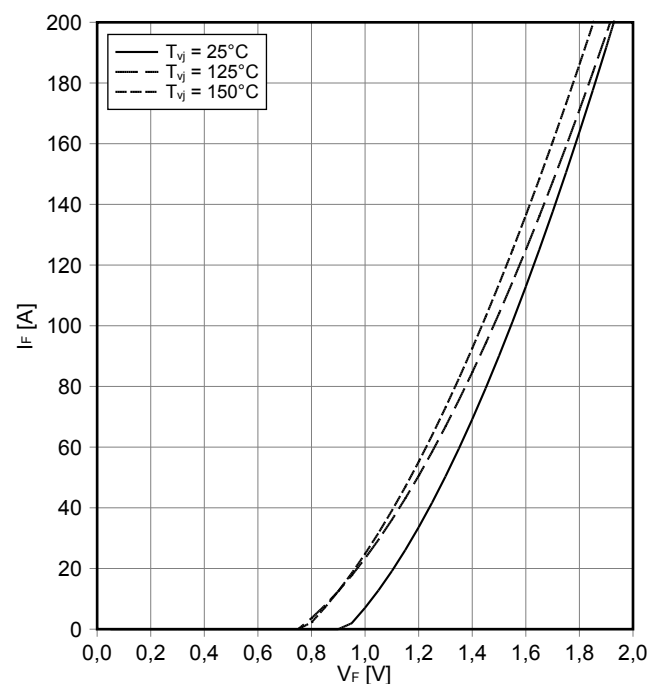
Schaltverluste IGBT, T1 / T4 (typisch)
switching losses IGBT, T1 / T4 (typical)

$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
 $V_{GE} = \pm 15 \text{ V}$, $R_{Gon} = 1.1 \Omega$, $R_{Goff} = 1.1 \Omega$, $V_{CE} = 400 \text{ V}$



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Schaltverluste IGBT, T1 / T4 (typisch)
switching losses IGBT, T1 / T4 (typical)
 $E_{on} = f(R_G)$, $E_{off} = f(R_G)$
 $V_{GE} = \pm 15 \text{ V}$, $I_C = 100 \text{ A}$, $V_{CE} = 400 \text{ V}$

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

Sicherer Rückwärts-Arbeitsbereich IGBT, T1 / T4 (RBSOA)
reverse bias safe operating area IGBT, T1 / T4 (RBSOA)
 $I_C = f(V_{CE})$
 $V_{GE} = \pm 15 \text{ V}$, $R_{Goff} = 1.1 \Omega$, $T_{vj} = 150^\circ\text{C}$

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


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Technische Information / Technical Information

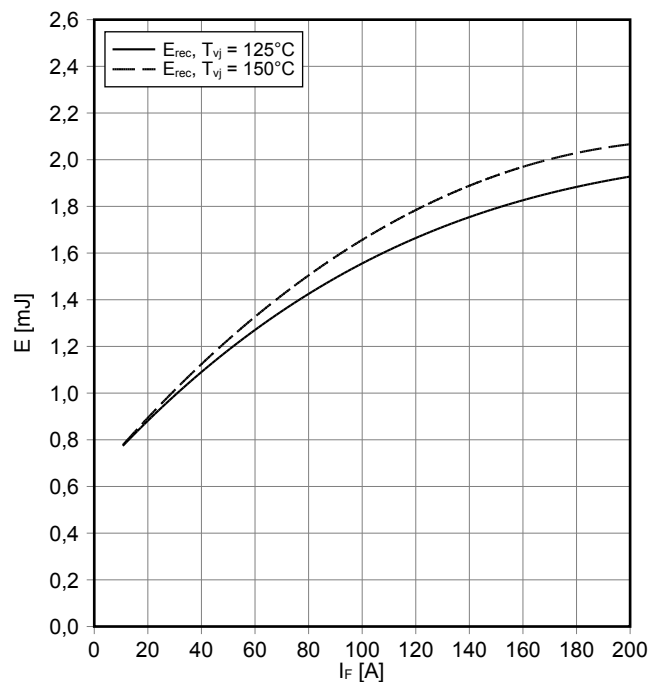
IGBT-Modul
IGBT-Module

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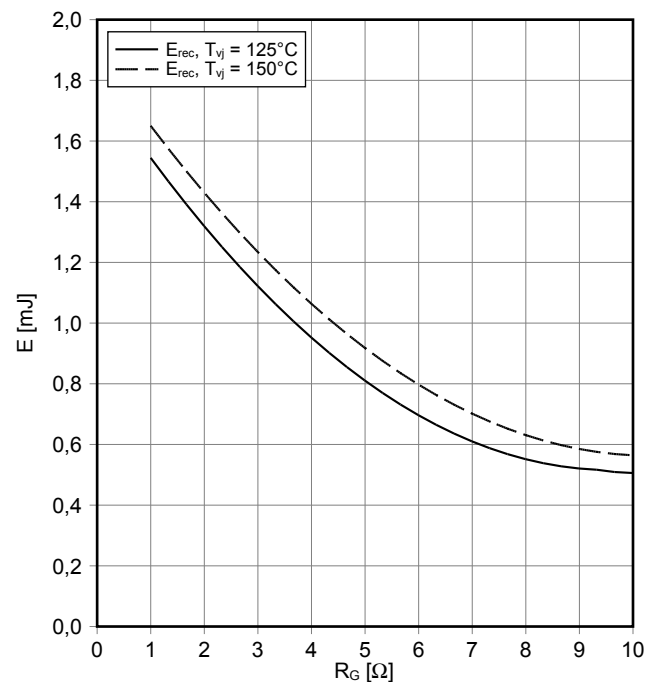
Schaltverluste Diode, D2 / D3 (typisch) switching losses Diode, D2 / D3 (typical)

$E_{rec} = f(I_F)$
 $R_{Gon} = 1.1 \Omega$, $V_{CE} = 400 V$



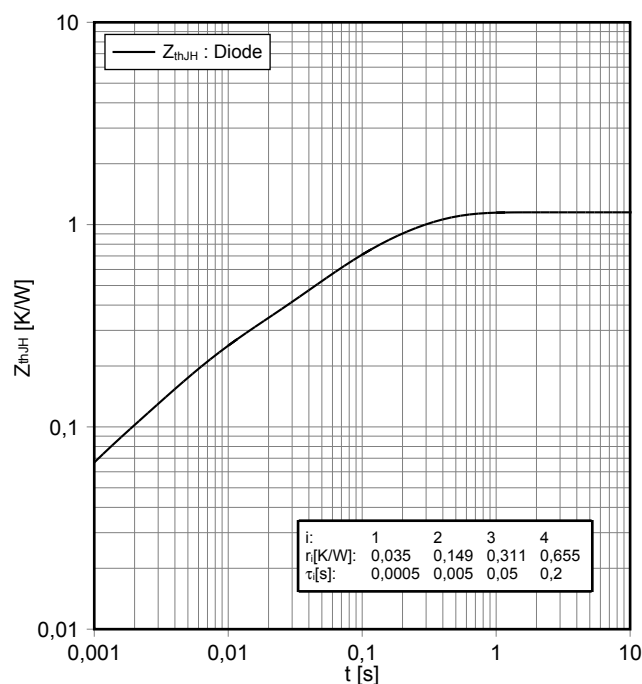
Schaltverluste Diode, D2 / D3 (typisch) switching losses Diode, D2 / D3 (typical)

$E_{rec} = f(R_G)$
 $I_F = 100 A$, $V_{CE} = 400 V$



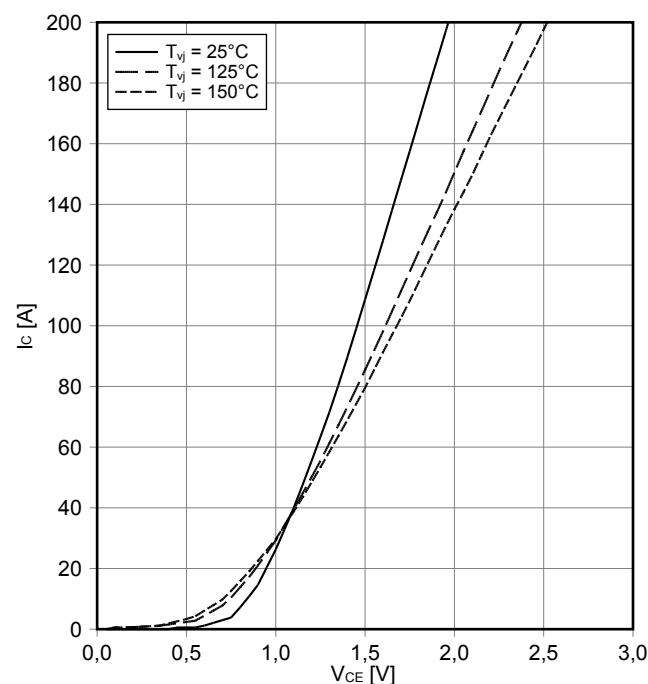
Transienter Wärmewiderstand Diode, D2 / D3 transient thermal impedance Diode, D2 / D3

$Z_{thJH} = f(t)$



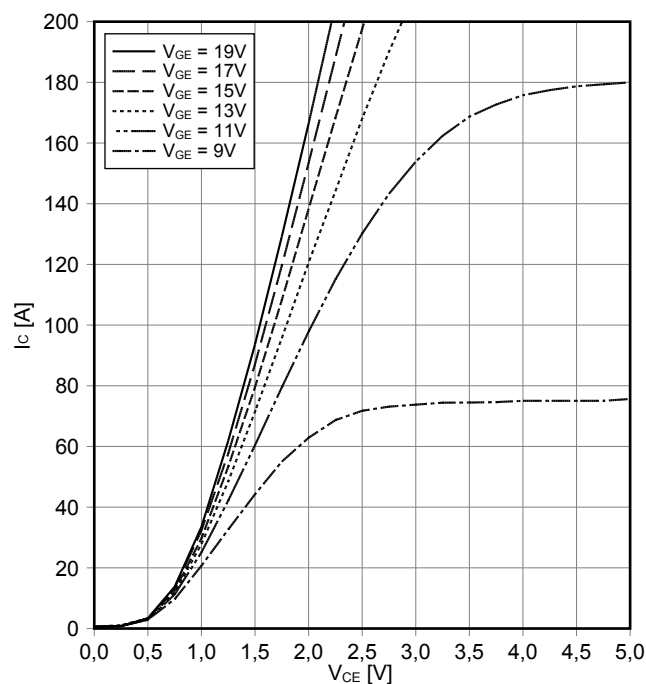
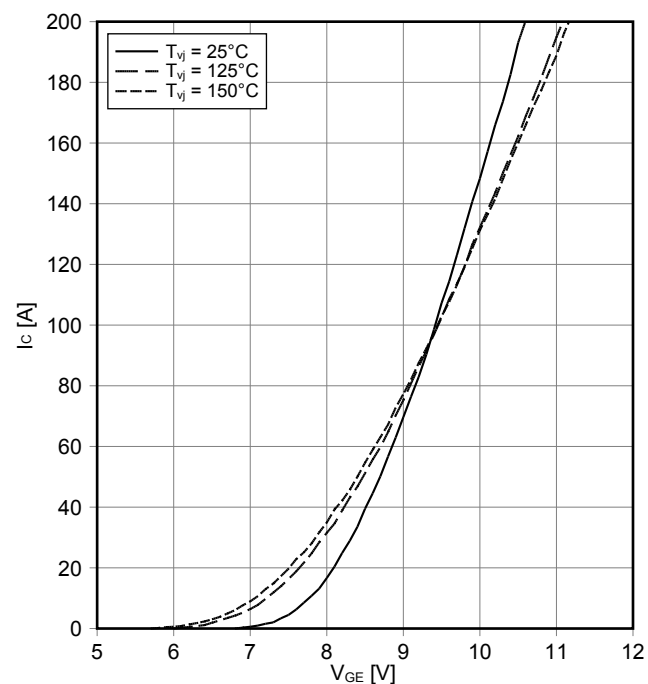
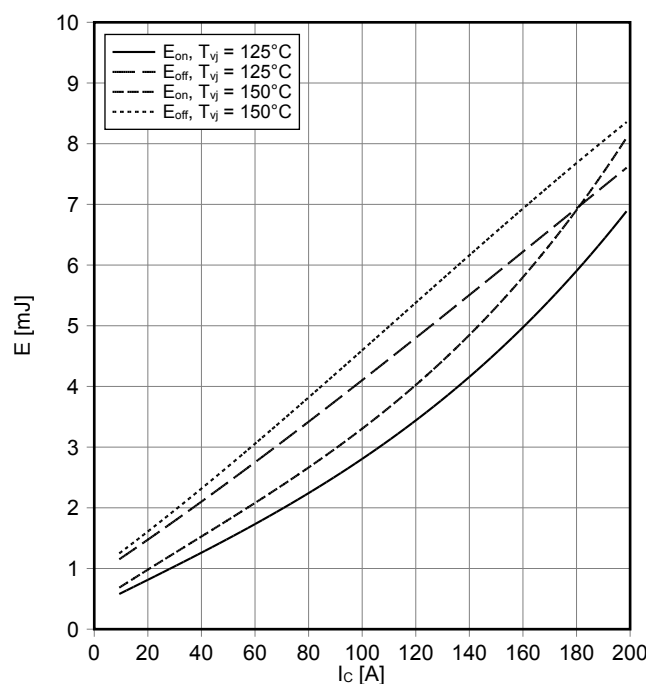
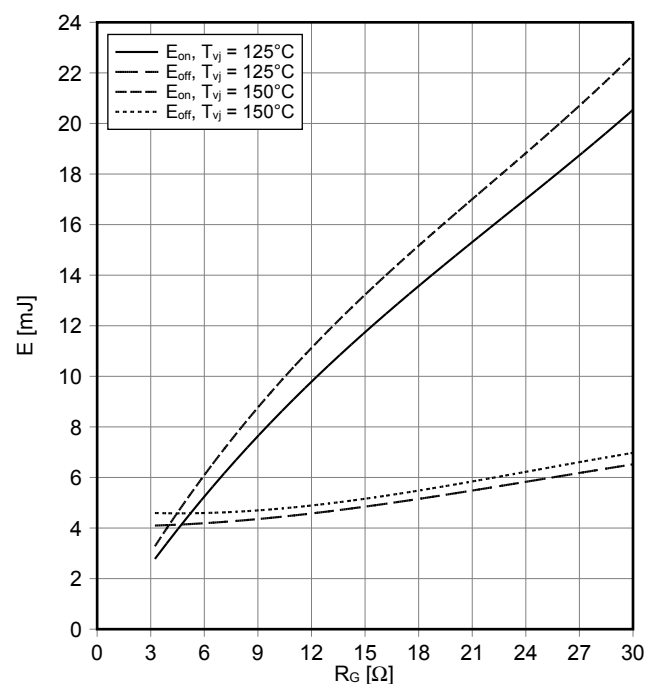
Ausgangskennlinie IGBT, T2 / T3 (typisch) output characteristic IGBT, T2 / T3 (typical)

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



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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)
 $E_{on} = f(I_C)$, $E_{off} = f(I_C)$
 $V_{GE} = \pm 15\text{ V}$, $R_{Gon} = 3.3\ \Omega$, $R_{Goff} = 3.3\ \Omega$, $V_{CE} = 400\text{ V}$

Schaltverluste IGBT, T2 / T3 (typisch)
switching losses IGBT, T2 / T3 (typical)
 $E_{on} = f(R_G)$, $E_{off} = f(R_G)$
 $V_{GE} = \pm 15\text{ V}$, $I_C = 100\text{ A}$, $V_{CE} = 400\text{ V}$


Technische Information / Technical Information

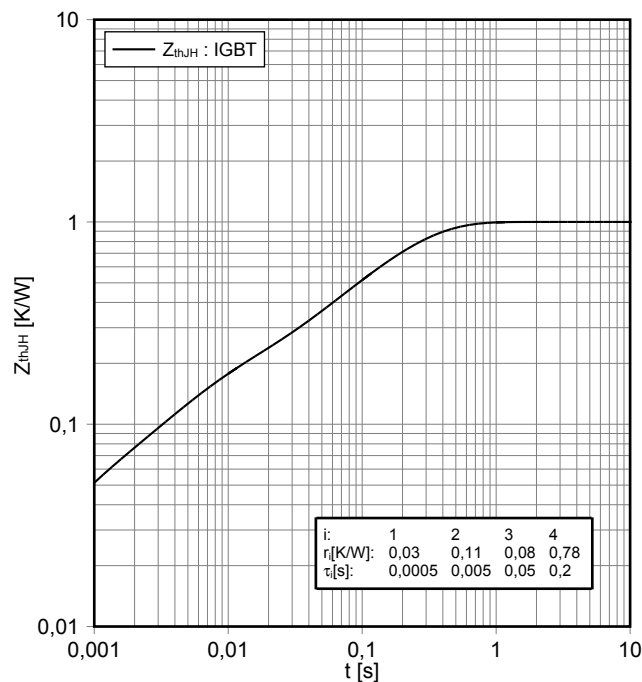
IGBT-Modul
IGBT-Module

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

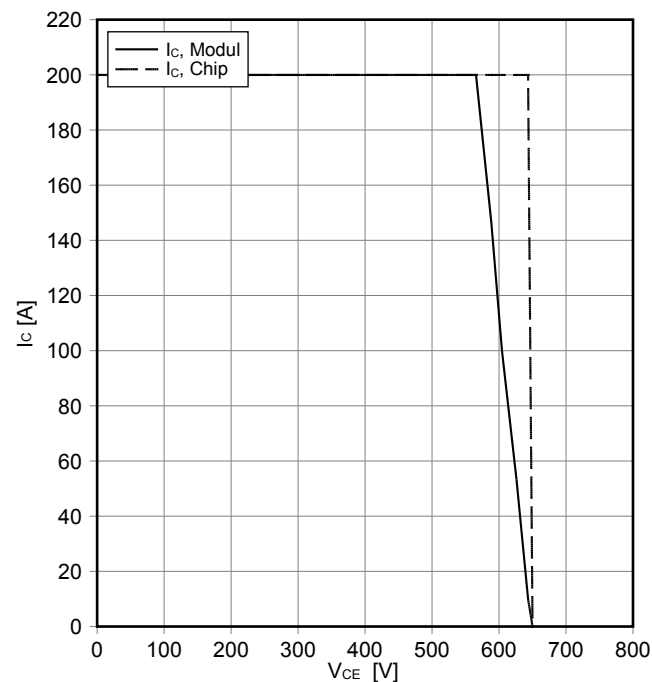
$Z_{thJH} = f(t)$



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

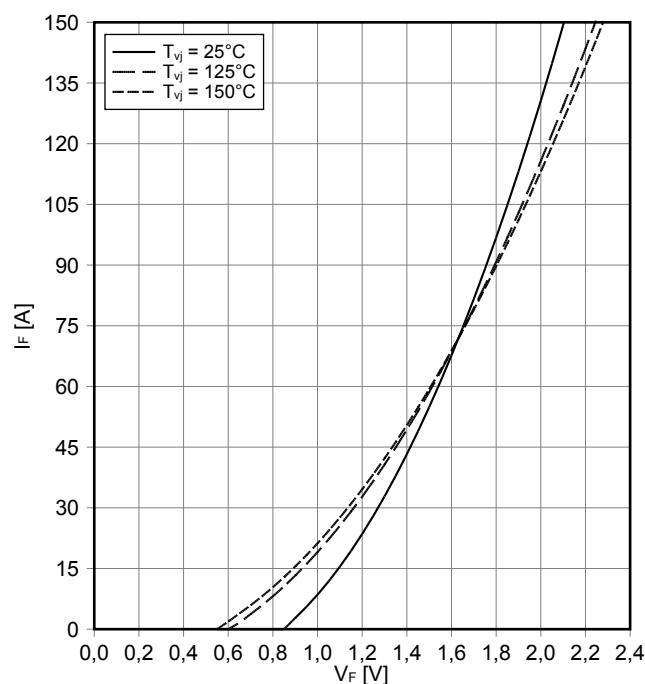
$I_C = f(V_{CE})$

$V_{GE} = \pm 15 V$, $R_{Goff} = 3.3 \Omega$, $T_{vj} = 150^\circ C$



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

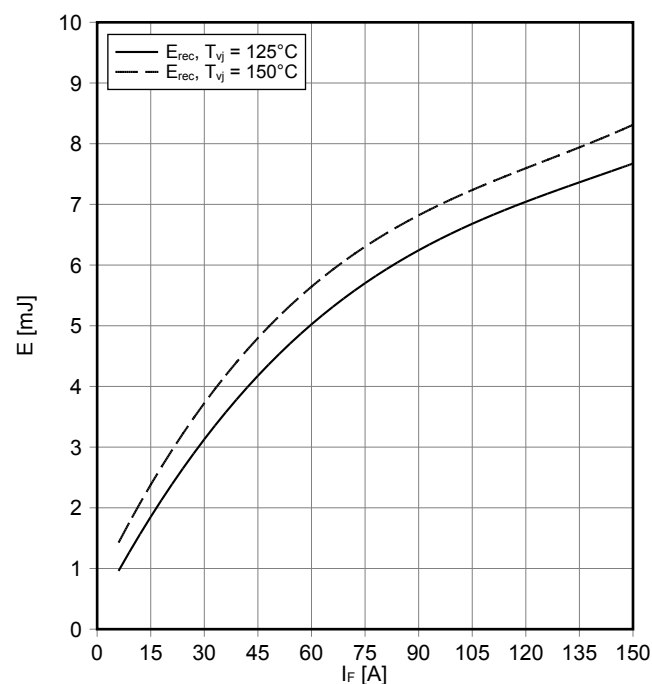
$I_F = f(V_F)$



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

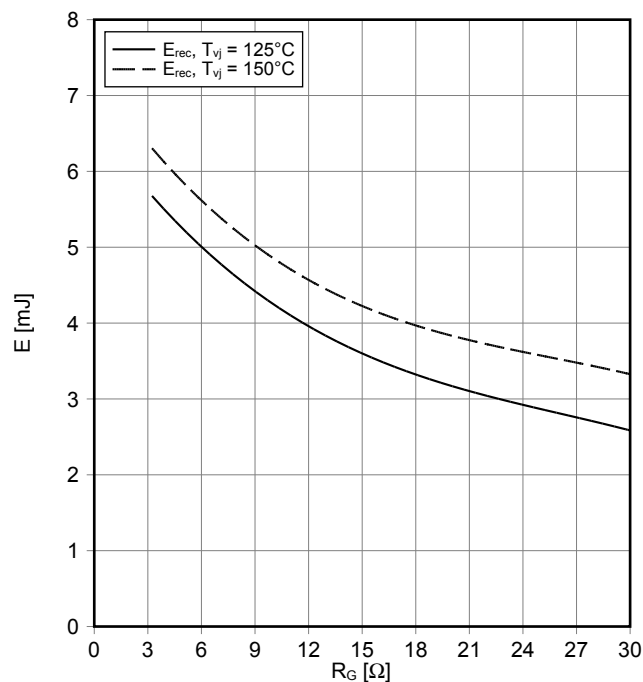
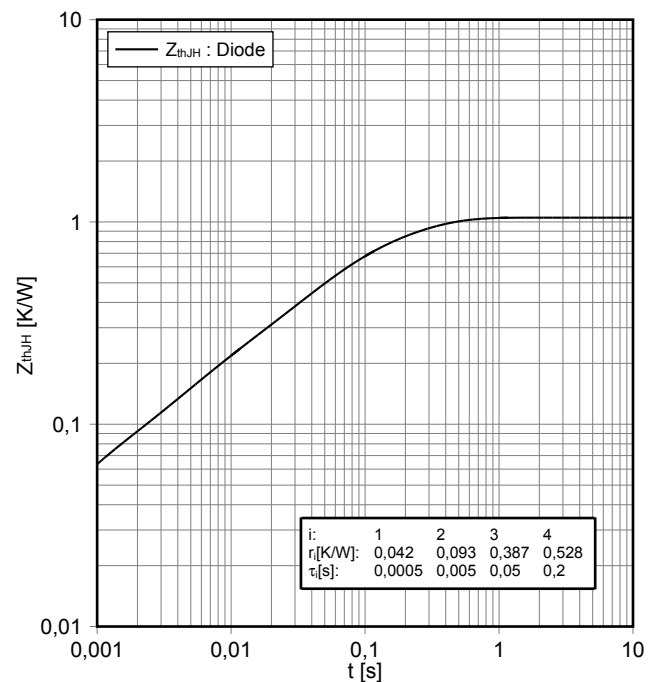
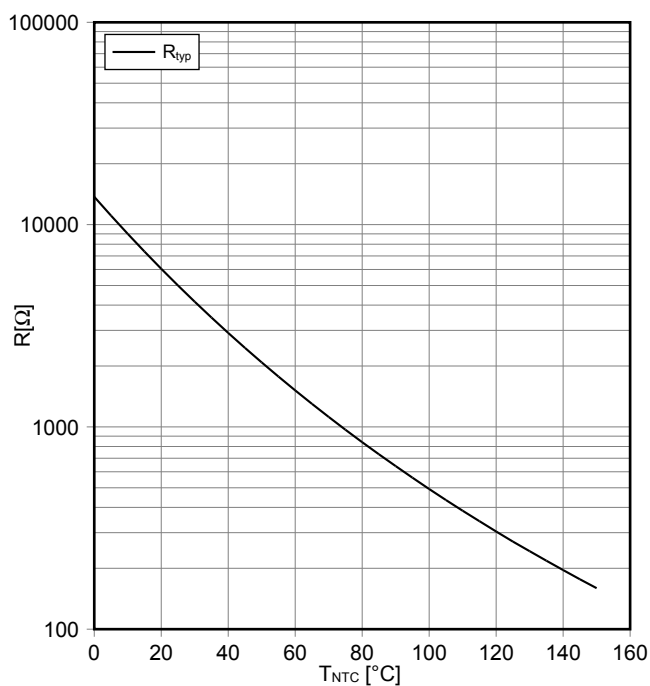
$E_{rec} = f(I_F)$

$R_{Gon} = 3.3 \Omega$, $V_{CE} = 400 V$



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Schaltverluste Diode, D1 / D4 (typisch)
switching losses Diode, D1 / D4 (typical)
 $E_{rec} = f(R_G)$ $I_F = 75\text{ A}, V_{CE} = 400\text{ V}$ 
Transienter Wärmewiderstand Diode, D1 / D4
transient thermal impedance Diode, D1 / D4
 $Z_{thJH} = f(t)$ 
NTC-Widerstand-Temperaturkennlinie (typisch)
NTC-Thermistor-temperature characteristic (typical)
 $R = f(T)$ 

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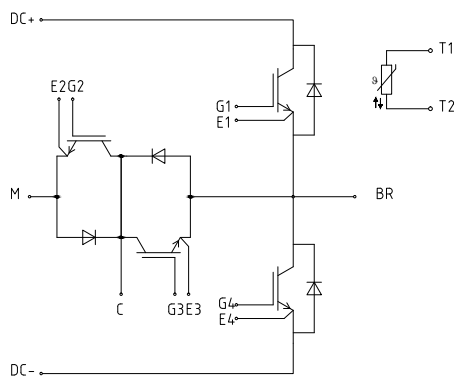
Technische Information / Technical Information

IGBT-Modul
IGBT-Module

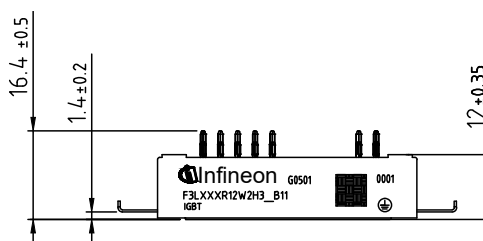
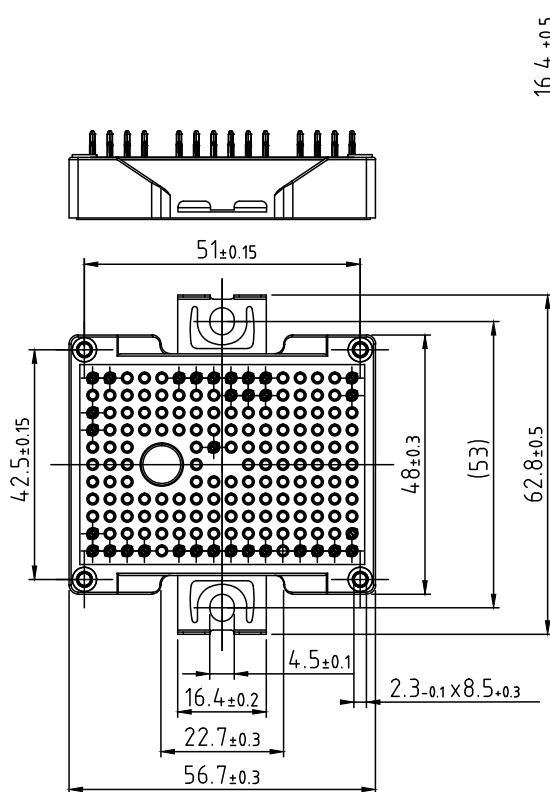
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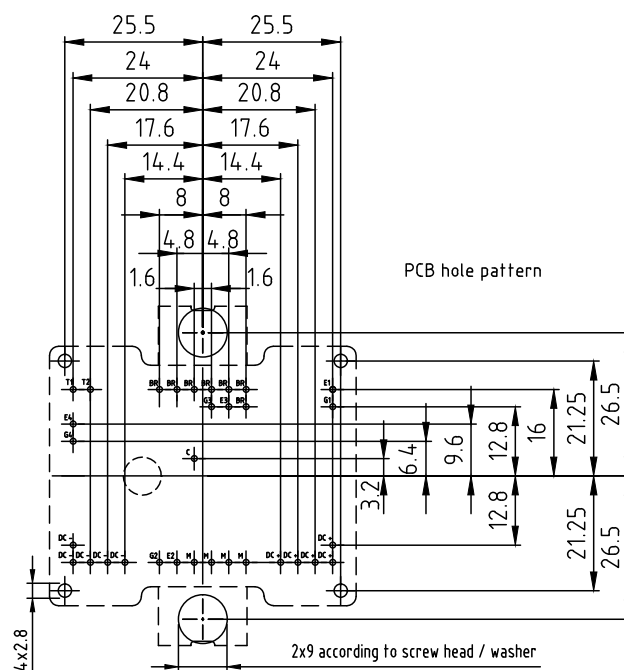
Schaltplan / Circuit diagram



Gehäuseabmessungen / Package outlines



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



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