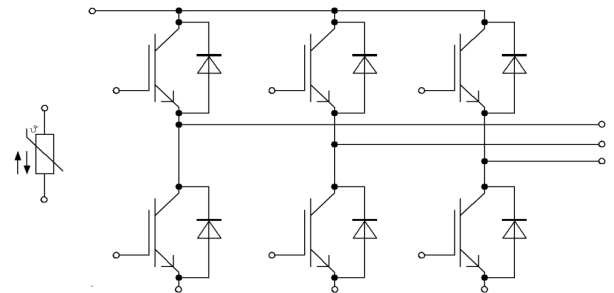
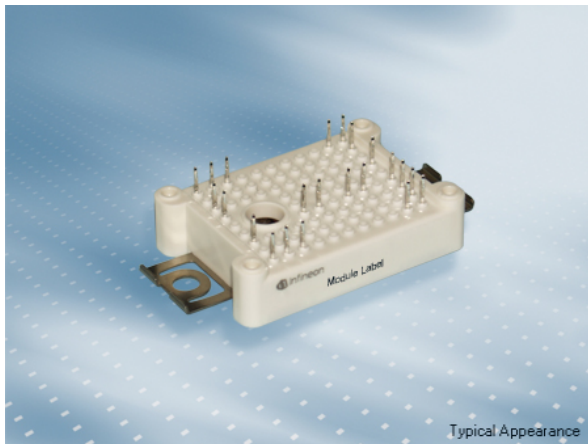


EasyPACK™ Modul mit TRENCHSTOP™ IGBT7 und Emitter Controlled 7 Diode und PressFIT / NTC / TIM
 EasyPACK™ module with TRENCHSTOP™ IGBT7 and Emitter Controlled 7 diode and PressFIT / NTC / TIM

Vorläufige Daten / Preliminary Data



$V_{CES} = 1200V$
 $I_{C\ nom} = 25A / I_{CRM} = 50A$

Potentielle Anwendungen

- Hilfsumrichter
- Klimaanlage
- Motorantriebe
- Servoumrichter
- USV-Systeme

Potential Applications

- Auxiliary inverters
- Air conditioning
- Motor drives
- Servo drives
- UPS systems

Elektrische Eigenschaften

- Niedriges V_{CEsat}
- Trenchstop™ IGBT7
- Überlastbetrieb bis zu 175°C

Electrical Features

- LOW V_{CEsat}
- Trenchstop™ IGBT7
- Overload operation up to 175°C

Mechanische Eigenschaften

- 2,5 kV AC 1min Isolationsfestigkeit
- Al₂O₃ Substrat mit kleinem thermischen Widerstand
- Hohe Leistungsdichte
- Kompaktes Design
- PressFIT Verbindungstechnik
- Thermisches Interface Material bereits aufgetragen

Mechanical Features

- 2.5 kV AC 1min insulation
- Al₂O₃ substrate with low thermal resistance
- High power density
- Compact design
- PressFIT contact technology
- Pre-applied Thermal Interface Material

Module Label Code

Barcode Code 128



DMX - Code



Content of the Code

Content of the Code	Digit
Module Serial Number	1 - 5
Module Material Number	6 - 11
Production Order Number	12 - 19
Datecode (Production Year)	20 - 21
Datecode (Production Week)	22 - 23

IGBT, Wechselrichter / IGBT, Inverter
Höchstzulässige Werte / Maximum Rated Values

Kollektor-Emitter-Sperrspannung Collector-emitter voltage	$T_{vj} = 25^{\circ}\text{C}$	V_{CES}	1200	V
Kollektor-Dauergleichstrom Continuous DC collector current	$T_H = 65^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$	I_{CDC}	25	A
Periodischer Kollektor-Spitzenstrom Repetitive peak collector current	$t_P = 1\text{ ms}$	I_{CRM}	50	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	$I_C = 25\text{ A}$ $V_{GE} = 15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 175^{\circ}\text{C}$	$V_{CE\text{ sat}}$	1,60 1,74 1,82	t.b.d.	V V V
Gate-Schwellenspannung Gate threshold voltage	$I_C = 0,525\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$		V_{GEth}	5,15 5,80 6,45		V
Gateladung Gate charge	$V_{GE} = -15 / 15\text{ V}, V_{CE} = 600\text{ V}$		Q_G	0,395		μC
Interner Gatewiderstand Internal gate resistor	$T_{vj} = 25^{\circ}\text{C}$		R_{Gint}	0,0		Ω
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}	4,77		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}	0,017		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}		0,0056	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	$I_C = 25\text{ A}, V_{CE} = 600\text{ V}$ $V_{GE} = -15 / 15\text{ V}$ $R_{Gon} = 6,2\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 175^{\circ}\text{C}$	t_{don}	0,035 0,036 0,043		μs μs μs
Anstiegszeit, induktive Last Rise time, inductive load	$I_C = 25\text{ A}, V_{CE} = 600\text{ V}$ $V_{GE} = -15 / 15\text{ V}$ $R_{Gon} = 6,2\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 175^{\circ}\text{C}$	t_r	0,021 0,026 0,031		μs μs μs
Abschaltverzögerungszeit, induktive Last Turn-off delay time, inductive load	$I_C = 25\text{ A}, V_{CE} = 600\text{ V}$ $V_{GE} = -15 / 15\text{ V}$ $R_{Goff} = 6,2\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 175^{\circ}\text{C}$	t_{doff}	0,19 0,26 0,38		μs μs μs
Fallzeit, induktive Last Fall time, inductive load	$I_C = 25\text{ A}, V_{CE} = 600\text{ V}$ $V_{GE} = -15 / 15\text{ V}$ $R_{Goff} = 6,2\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 175^{\circ}\text{C}$	t_f	0,19 0,27 0,29		μs μs μs
Einschaltverlustenergie pro Puls Turn-on energy loss per pulse	$I_C = 25\text{ A}, V_{CE} = 600\text{ V}, L\sigma = 35\text{ nH}$ $di/dt = 650\text{ A}/\mu\text{s} (T_{vj} = 175^{\circ}\text{C})$ $V_{GE} = -15 / 15\text{ V}, R_{Gon} = 6,2\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 175^{\circ}\text{C}$	E_{on}	1,78 2,57 3,18		mJ mJ mJ
Abschaltverlustenergie pro Puls Turn-off energy loss per pulse	$I_C = 25\text{ A}, V_{CE} = 600\text{ V}, L\sigma = 35\text{ nH}$ $du/dt = 3000\text{ V}/\mu\text{s} (T_{vj} = 175^{\circ}\text{C})$ $V_{GE} = -15 / 15\text{ V}, R_{Goff} = 6,2\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 175^{\circ}\text{C}$	E_{off}	1,68 2,67 3,20		mJ mJ mJ
Kurzschlußverhalten SC data	$V_{GE} \leq 15\text{ V}, V_{CC} = 800\text{ V}$ $V_{CEmax} = V_{CES} - L_{SCE} \cdot di/dt$	$t_P \leq 8\ \mu\text{s}, T_{vj} = 150^{\circ}\text{C}$ $t_P \leq 7\ \mu\text{s}, T_{vj} = 175^{\circ}\text{C}$	I_{SC}	80 75		A A
Wärmewiderstand, Chip bis Kühlkörper Thermal resistance, junction to heatsink	pro IGBT / per IGBT valid with IFX pre-applied thermal interface material		R_{thJH}		1,48	K/W
Temperatur im Schaltbetrieb Temperature under switching conditions			$T_{vj\text{ op}}$	-40	175	$^{\circ}\text{C}$

Vorläufige Daten Preliminary Data

Diode, Wechselrichter / Diode, Inverter Höchstzulässige Werte / Maximum Rated Values

Periodische Spitzensperrenspernung Repetitive peak reverse voltage	$T_{vj} = 25^{\circ}\text{C}$	V_{RRM}	1200	V
Dauergleichstrom Continuous DC forward current		I_F	35	A
Periodischer Spitzenstrom Repetitive peak forward current	$t_p = 1\text{ ms}$	I_{FRM}	50	A
Grenzlastintegral I^2t - value	$V_R = 0\text{ V}, t_p = 10\text{ ms}, T_{vj} = 125^{\circ}\text{C}$	I^2t	150	A^2s
	$V_R = 0\text{ V}, t_p = 10\text{ ms}, T_{vj} = 175^{\circ}\text{C}$		140	A^2s

Charakteristische Werte / Characteristic Values

			min.	typ.	max.	
Durchlassspannung Forward voltage	$I_F = 35\text{ A}, V_{GE} = 0\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$	V_F	1,72	t.b.d.	V
	$I_F = 35\text{ A}, V_{GE} = 0\text{ V}$	$T_{vj} = 125^{\circ}\text{C}$		1,59		V
	$I_F = 35\text{ A}, V_{GE} = 0\text{ V}$	$T_{vj} = 175^{\circ}\text{C}$		1,52		V
Rückstromspitze Peak reverse recovery current	$I_F = 35\text{ A}, -di_F/dt = 750\text{ A}/\mu\text{s} (T_{vj}=175^{\circ}\text{C})$	$T_{vj} = 25^{\circ}\text{C}$	I_{RM}	22,5		A
	$V_R = 600\text{ V}$	$T_{vj} = 125^{\circ}\text{C}$		29,8		A
	$V_{GE} = -15\text{ V}$	$T_{vj} = 175^{\circ}\text{C}$		33,8		A
Sperrverzögerungsladung Recovered charge	$I_F = 35\text{ A}, -di_F/dt = 750\text{ A}/\mu\text{s} (T_{vj}=175^{\circ}\text{C})$	$T_{vj} = 25^{\circ}\text{C}$	Q_r	2,84		μC
	$V_R = 600\text{ V}$	$T_{vj} = 125^{\circ}\text{C}$		5,22		μC
	$V_{GE} = -15\text{ V}$	$T_{vj} = 175^{\circ}\text{C}$		6,84		μC
Abschaltenergie pro Puls Reverse recovery energy	$I_F = 35\text{ A}, -di_F/dt = 750\text{ A}/\mu\text{s} (T_{vj}=175^{\circ}\text{C})$	$T_{vj} = 25^{\circ}\text{C}$	E_{rec}	1,08		mJ
	$V_R = 600\text{ V}$	$T_{vj} = 125^{\circ}\text{C}$		1,99		mJ
	$V_{GE} = -15\text{ V}$	$T_{vj} = 175^{\circ}\text{C}$		2,60		mJ
Wärmewiderstand, Chip bis Kühlkörper Thermal resistance, junction to heatsink	pro Diode / per diode valid with IFX pre-applied thermal interface material		R_{thJH}		1,74	K/W
Temperatur im Schaltbetrieb Temperature under switching conditions			$T_{vj\text{ op}}$	-40	175	$^{\circ}\text{C}$

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.

Vorläufige Daten Preliminary Data

Modul / Module

Isolations-Prüfspannung Isolation test voltage	RMS, f = 50 Hz, t = 1 min.	V _{ISOL}	2,5			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			
Relativer Temperaturindex (elektr.) RTI Elec.	Gehäuse housing	RTI	140			°C
			min.	typ.	max.	
Modulstreuinduktivität Stray inductance module		L _{sCE}		30		nH
Lagertemperatur Storage temperature		T _{stg}	-40		125	°C
Höchstzulässige Bodenplattenbetriebstemperatur Maximum baseplate operation temperature		T _{BPmax}			125	°C
Anpresskraft für mech. Bef. pro Feder mounting force per clamp		F	40	-	80	N
Gewicht Weight		G		24		g

The current under continuous operation is limited to 25 A rms per connector pin.

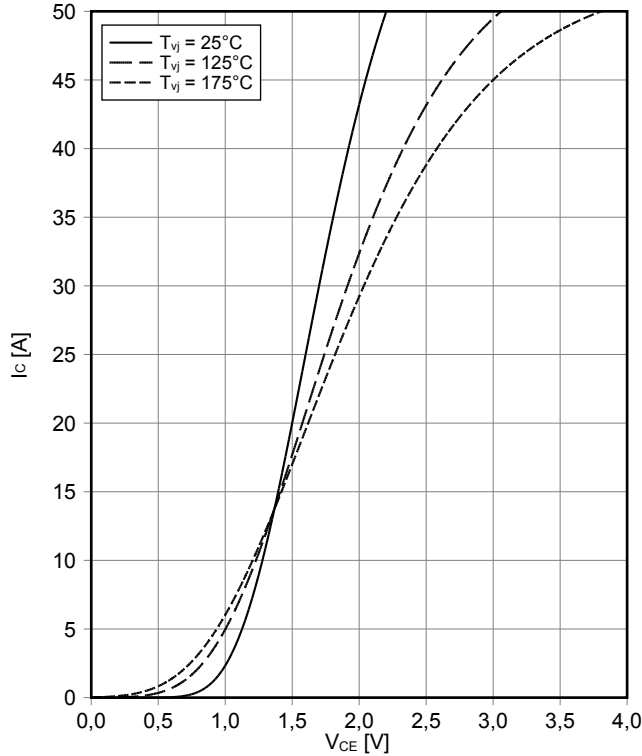
T_{vj op} > 150°C is allowed for operation at overload conditions. For detailed specifications, please refer to AN 2018-14.

Storage and shipment of modules with TIM => see AN 2012-07

Vorläufige Daten Preliminary Data

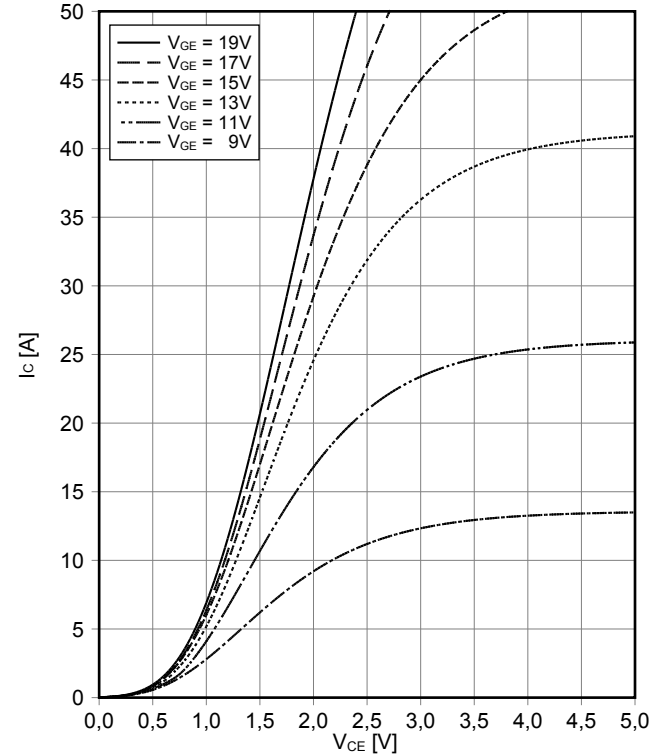
Ausgangskennlinie IGBT, Wechselrichter (typisch)
output characteristic IGBT, Inverter (typical)

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



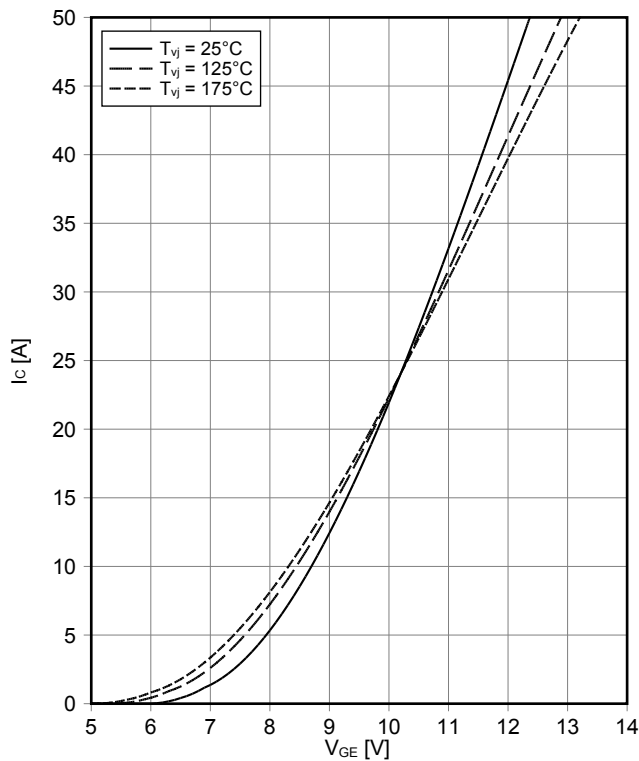
Ausgangskennlinienfeld IGBT, Wechselrichter (typisch)
output characteristic IGBT, Inverter (typical)

$I_C = f(V_{CE})$
 $T_{vj} = 175^\circ\text{C}$



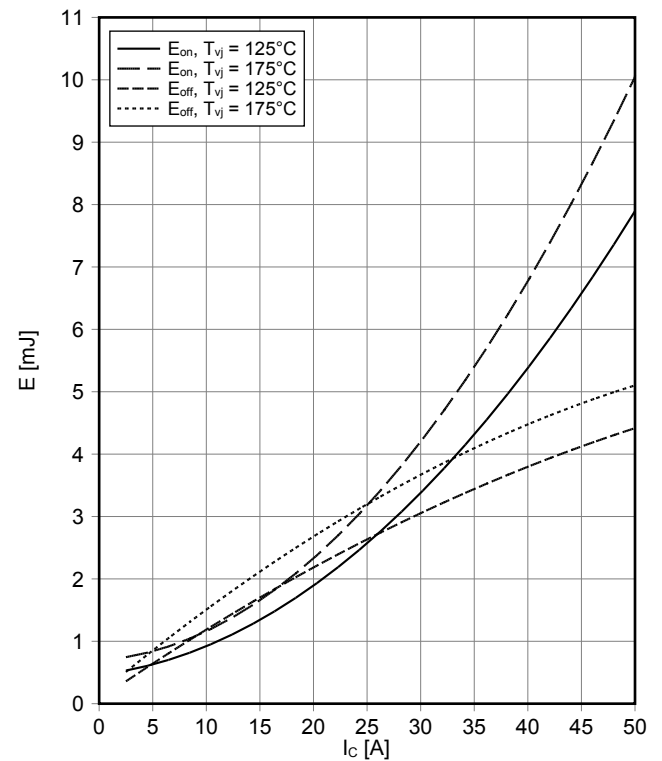
Übertragungscharakteristik IGBT, Wechselrichter (typisch)
transfer characteristic IGBT, Inverter (typical)

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



Schaltverluste IGBT, Wechselrichter (typisch)
switching losses IGBT, Inverter (typical)

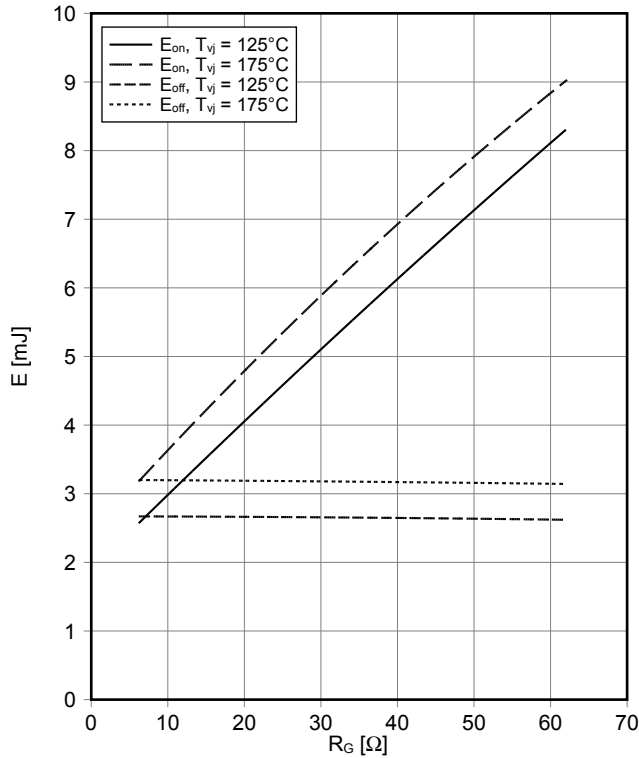
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
 $V_{GE} = \pm 15\text{ V}$, $R_{Gon} = 6.2\ \Omega$, $R_{Goff} = 6.2\ \Omega$, $V_{CE} = 600\text{ V}$



Vorläufige Daten Preliminary Data

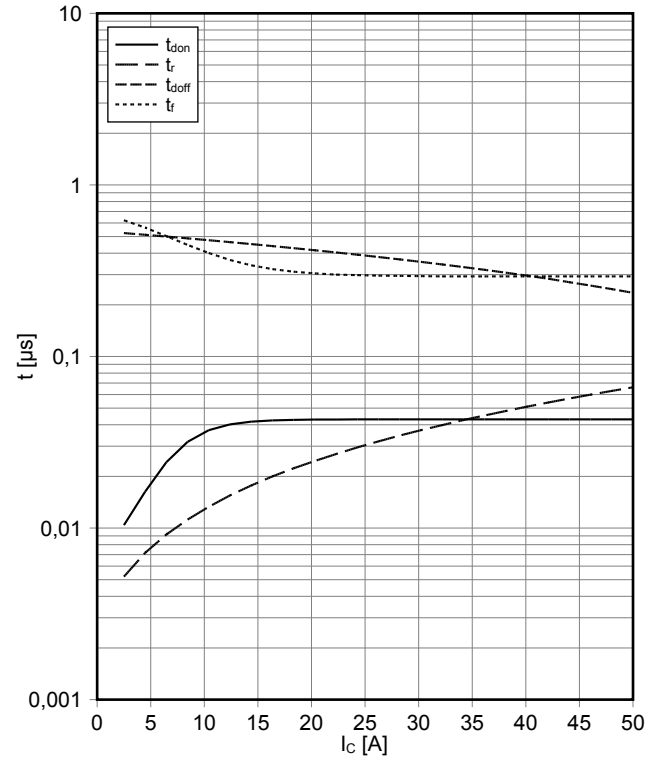
Schaltverluste IGBT, Wechselrichter (typisch) switching losses IGBT, Inverter (typical)

$E_{on} = f(R_G), E_{off} = f(R_G)$
 $V_{GE} = \pm 15 \text{ V}, I_C = 25 \text{ A}, V_{CE} = 600 \text{ V}$



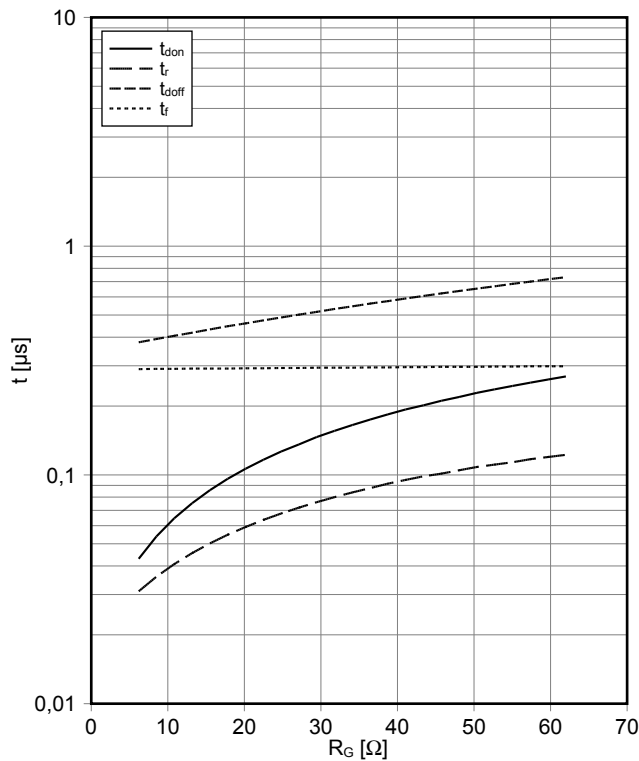
Schaltzeiten IGBT, Wechselrichter (typisch) switching times IGBT, Inverter (typical)

$t_{don} = f(I_C), t_r = f(I_C), t_{doff} = f(I_C), t_f = f(I_C)$
 $V_{GE} = \pm 15 \text{ V}, R_{Gon} = 6.2 \Omega, R_{Goff} = 6.2 \Omega, V_{CE} = 600 \text{ V}, T_{vj} = 175^\circ\text{C}$



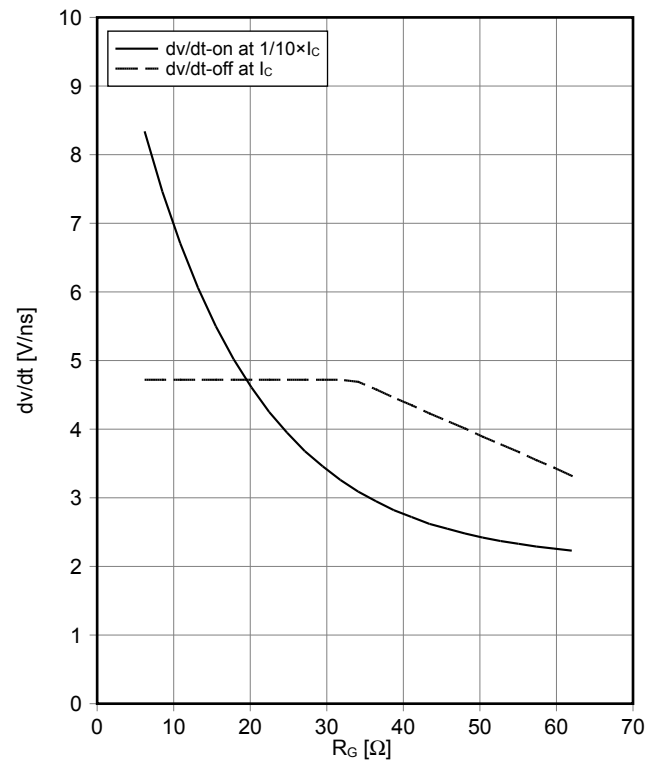
Schaltzeiten IGBT, Wechselrichter (typisch) switching times IGBT, Inverter (typical)

$t_{don} = f(R_G), t_r = f(R_G), t_{doff} = f(R_G), t_f = f(R_G)$
 $V_{GE} = \pm 15 \text{ V}, I_C = 25 \text{ A}, V_{CE} = 600 \text{ V}, T_{vj} = 175^\circ\text{C}$



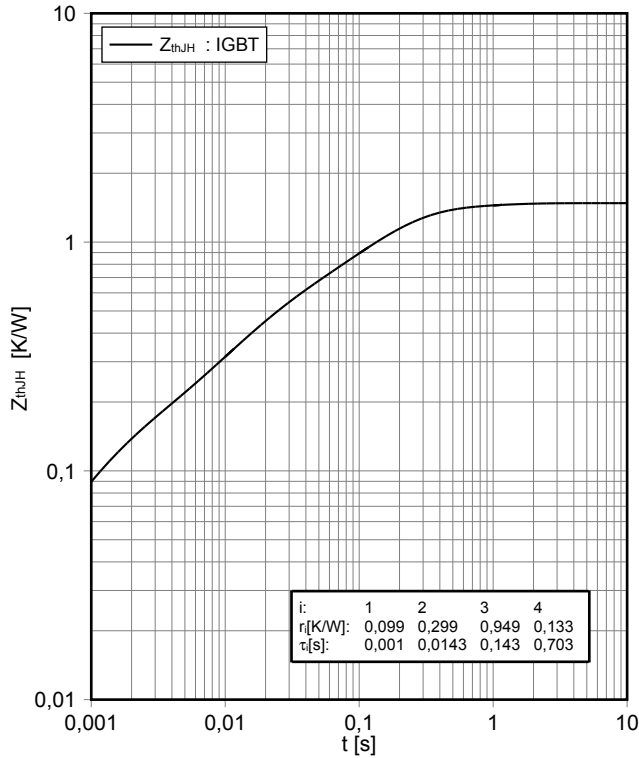
dv/dt IGBT, Wechselrichter (typisch) dv/dt IGBT, Inverter (typical)

$dv/dt = f(R_G)$
 $V_{GE} = \pm 15 \text{ V}, I_C = 25 \text{ A}, V_{CE} = 600 \text{ V}, T_{vj} = 25^\circ\text{C}$

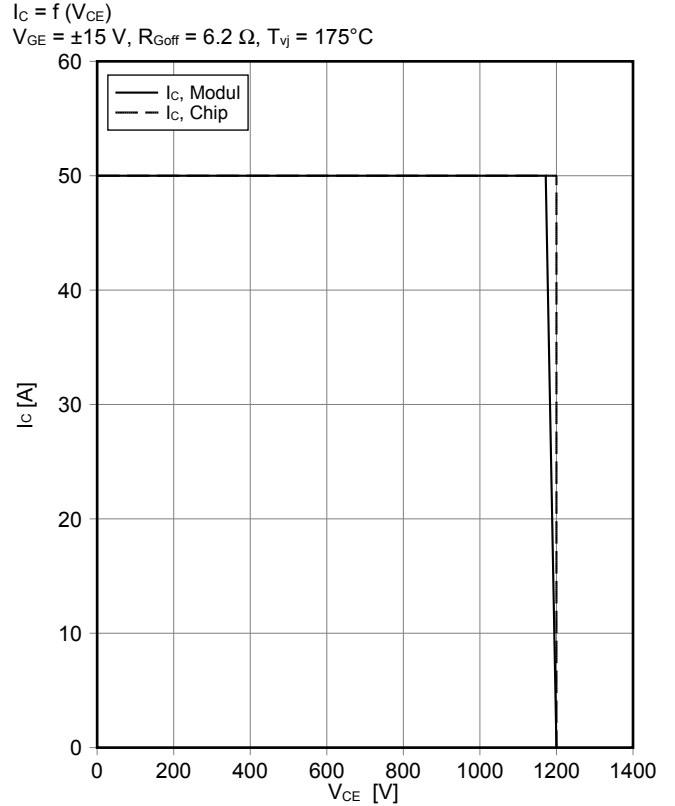


Vorläufige Daten Preliminary Data

Transienter Wärmewiderstand IGBT, Wechselrichter
transient thermal impedance IGBT, Inverter
 $Z_{thJH} = f(t)$

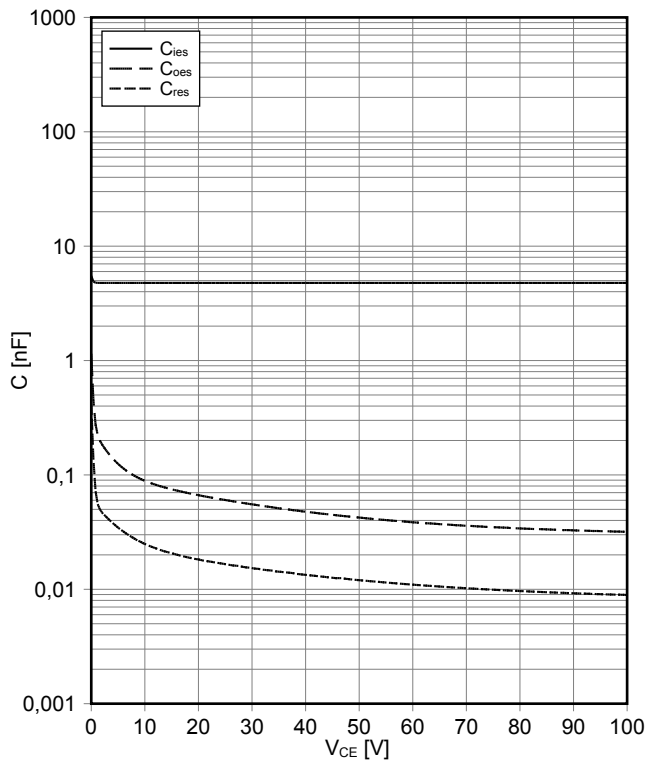


Sicherer Rückwärts-Arbeitsbereich IGBT, Wechselrichter (RBSOA)
reverse bias safe operating area IGBT, Inverter (RBSOA)
 $I_C = f(V_{CE})$
 $V_{GE} = \pm 15\text{ V}$, $R_{Goff} = 6.2\ \Omega$, $T_{vj} = 175^\circ\text{C}$



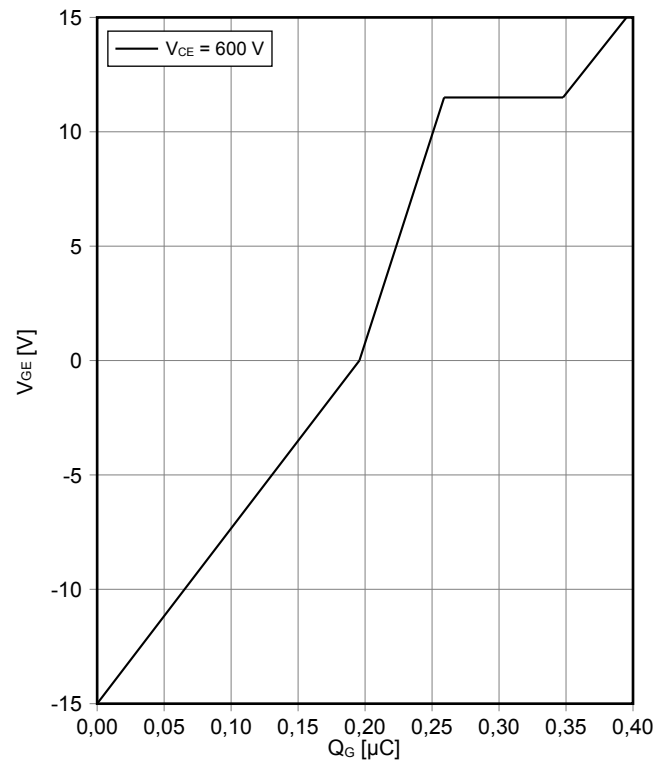
Kapazitäts Charakteristik IGBT, Wechselrichter (typisch)
capacity characteristic IGBT, Inverter (typical)
 $C = f(V_{CE})$

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



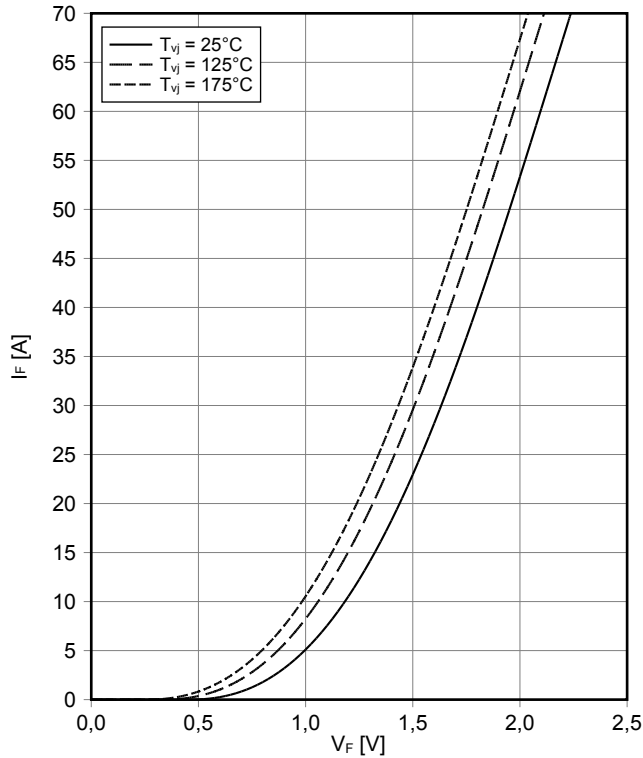
Gateladungs Charakteristik IGBT, Wechselrichter (typisch)
gate charge characteristic IGBT, Inverter (typical)
 $V_{GE} = f(Q_G)$

$I_C = 25\text{ A}$, $T_{vj} = 25^\circ\text{C}$

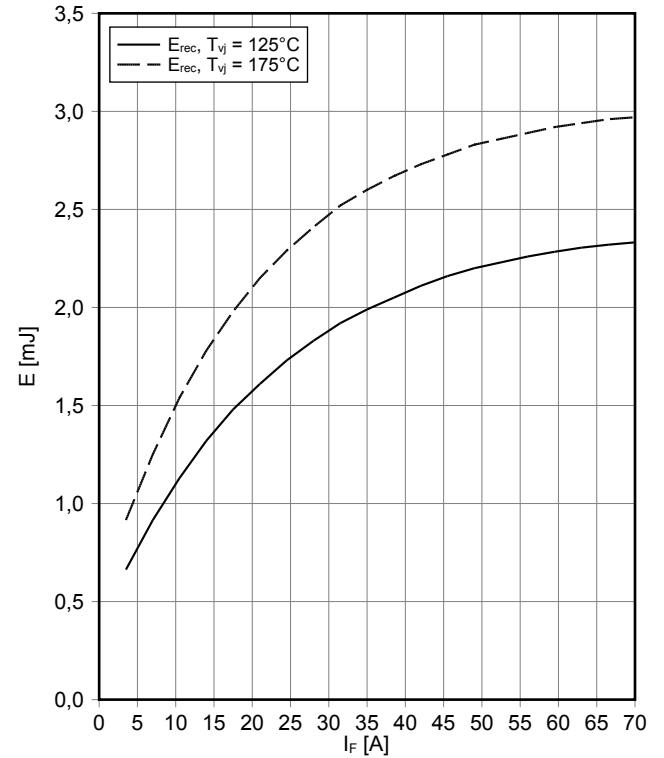


Vorläufige Daten Preliminary Data

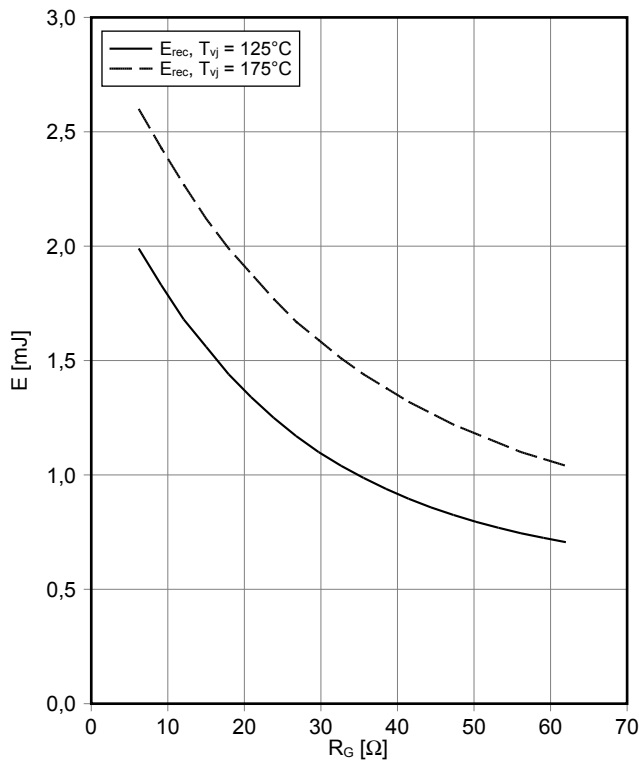
Durchlasskennlinie der Diode, Wechselrichter (typisch)
forward characteristic of Diode, Inverter (typical)
 $I_F = f(V_F)$



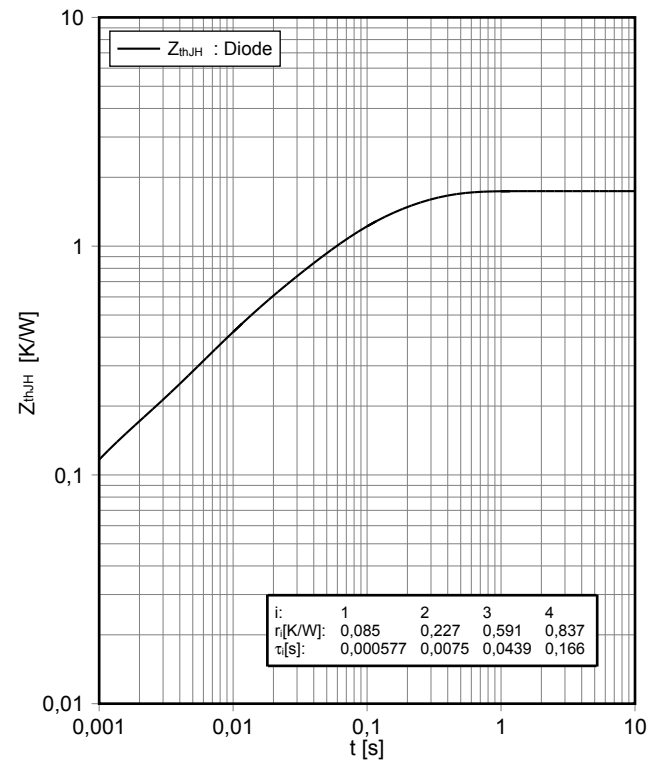
Schaltverluste Diode, Wechselrichter (typisch)
switching losses Diode, Inverter (typical)
 $E_{rec} = f(I_F)$
 $R_{Gon} = 6.2 \Omega$, $V_{CE} = 600 \text{ V}$



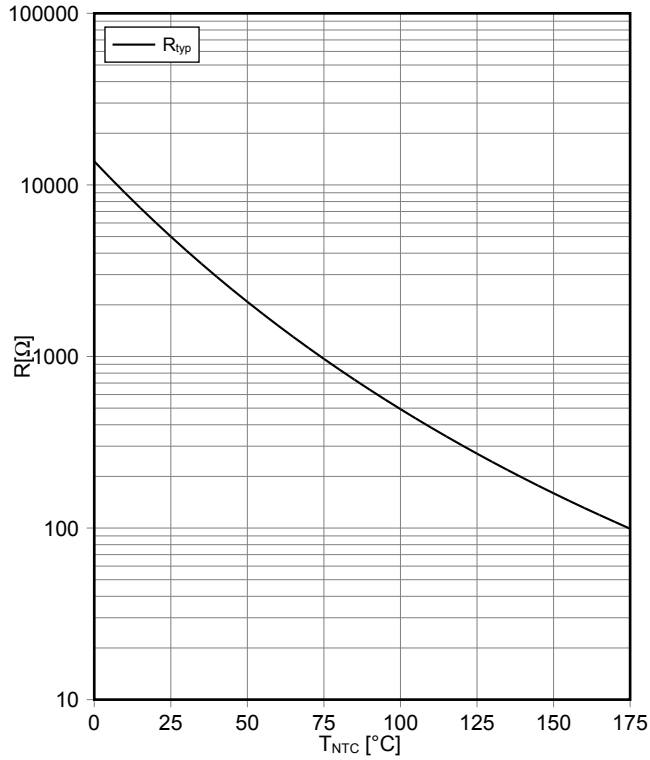
Schaltverluste Diode, Wechselrichter (typisch)
switching losses Diode, Inverter (typical)
 $E_{rec} = f(R_G)$
 $I_F = 35 \text{ A}$, $V_{CE} = 600 \text{ V}$



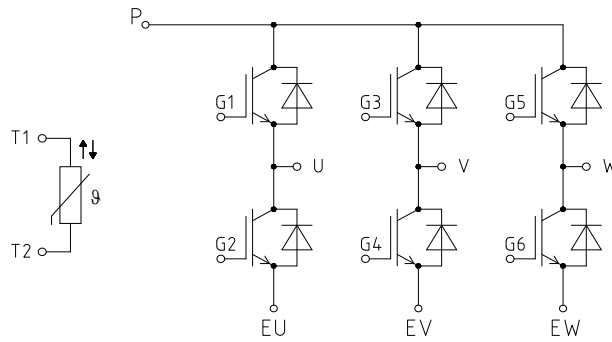
Transienter Wärmewiderstand Diode, Wechselrichter
transient thermal impedance Diode, Inverter
 $Z_{thJH} = f(t)$



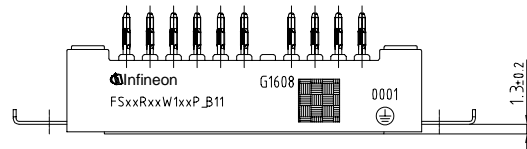
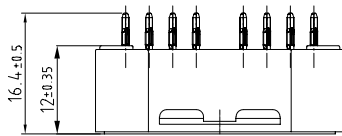
NTC-Widerstand-Temperaturkennlinie (typisch)
NTC-Thermistor-temperature characteristic (typical)
 $R = f(T_{NTC})$



Schaltplan / Circuit diagram



Gehäuseabmessungen / Package outlines



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

