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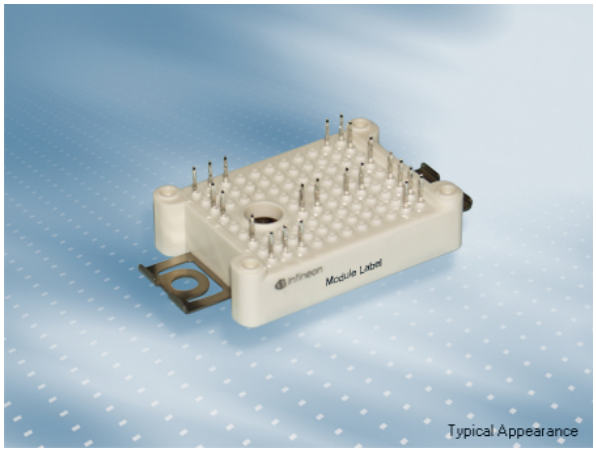
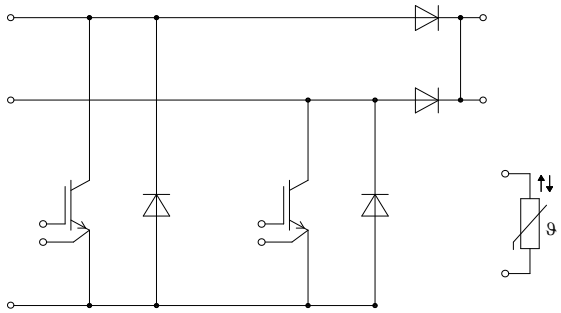
EasyPACK Modul mit schnellem Trench/Feldstopp High-Speed 3 IGBT und SiC Diode und PressFIT / NTC
EasyPACK module with fast Trench/Fieldstop High-Speed 3 IGBT and SiC diode and PressFIT / NTC





V_{CES} = 1200V
$I_{C\ nom}$ = 30A / I_{CRM} = 60A

Typische Anwendungen
- Solar Anwendungen

Typical Applications
- Solar applications

Elektrische Eigenschaften
- CoolSiC (TM) Schottky Diode Gen 5
- High Speed IGBT H3
- Niedrige Schaltverluste

Electrical Features
- CoolSiC (TM) Schottky diode gen 5
- High speed IGBT H3
- Low switching losses

Mechanische Eigenschaften
- Al_2O_3 Substrat mit kleinem thermischen Widerstand
- Integrierter NTC Temperatur Sensor
- Kompaktes Design
- PressFIT Verbindungstechnik

Mechanical Features
- Al_2O_3 substrate with low thermal resistance
- Integrated NTC temperature sensor
- Compact design
- PressFIT contact technology

Module Label Code

Barcode Code 128

Sample
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

Verpolschutz Diode A / Inverse-polarity protection diode A

Höchstzulässige Werte / Maximum Rated Values

Periodische Spitzensperrspannung Repetitive peak reverse voltage	T_{vj} = 25°C	V_{RRM}	1200	V
Durchlassstrom Grenzeffektivwert pro Chip Maximum RMS forward current per chip	T_H = 60°C	I_{FRMSM}	50	A
Gleichrichter Ausgang Grenzeffektivstrom Maximum RMS current at rectifier output	T_H = 60°C	I_{RMSM}	60	A
Stoßstrom Grenzwert Surge forward current	t_p = 10 ms, T_{vj} = 25°C t_p = 10 ms, T_{vj} = 150°C	I_{FSM}	360 290	A A
Grenzlastintegral I²t - value	t_p = 10 ms, T_{vj} = 25°C t_p = 10 ms, T_{vj} = 150°C	I²t	650 420	A²s A²s

Charakteristische Werte / Characteristic Values

			min.	typ.	max.	
Durchlassspannung Forward voltage	T_{vj} = 150°C, I_F = 30 A	V_F		0,95		V
Ersatzwiderstand Slope resistance	T_{vj} = 150°C	r_T		0,10		mΩ
Sperrstrom Reverse current	T_{vj} = 150°C, V_R = 1200 V	I_R		0,10		mA
Wärmewiderstand, Chip bis Kühlkörper Thermal resistance, junction to heatsink	pro Diode / per diode	R_{thJH}		1,60		K/W
Temperatur im Schaltbetrieb Temperature under switching conditions		$T_{vj\,op}$	-40		150	°C

IGBT-Chopper / IGBT-Chopper

Höchstzulässige Werte / Maximum Rated Values

Kollektor-Emitter-Sperrspannung Collector-emitter voltage	T_{vj} = 25°C	V_{CES}	1200	V
Implementierter Kollektor-Strom Implemented collector current		I_{CN}	100	A
Kollektor-Dauergleichstrom Continuous DC collector current	T_H = 100°C, $T_{vj\,max}$ = 175°C	$I_{C\,nom}$	30	A
Periodischer Kollektor-Spitzenstrom Repetitive peak collector current	t_P = 1 ms	I_{CRM}	200	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 = 30 A, V_{GE} = 15 V, T_{vj} = 25°C I_C = 30 A, V_{GE} = 15 V, T_{vj} = 125°C I_C = 30 A, V_{GE} = 15 V, T_{vj} = 150°C	$V_{CE\,sat}$		1,30 1,35 1,35	1,45	V V V
Gate-Schwellenspannung Gate threshold voltage	I_C = 3,80 mA, V_{CE} = V_{GE}, T_{vj} = 25°C	V_{GEth}	5,05	5,80	6,45	V
Gateladung Gate charge	V_{GE} = -15 V ... +15 V	Q_G		0,80		µC
Interner Gatewiderstand Internal gate resistor	T_{vj} = 25°C	R_{Gint}		0,0		Ω
Eingangskapazität Input capacitance	f = 1 MHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V	C_{ies}		6,15		nF
Rückwirkungskapazität Reverse transfer capacitance	f = 1 MHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V	C_{res}		0,345		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 = 30 A, V_{CE} = 600 V, T_{vj} = 25°C V_{GE} = ±15 V, T_{vj} = 125°C R_{Gon} = 4,7 Ω, T_{vj} = 150°C	$t_{d\,on}$		0,018 0,017 0,017		µs µs µs
Anstiegszeit, induktive Last Rise time, inductive load	I_C = 30 A, V_{CE} = 600 V, T_{vj} = 25°C V_{GE} = ±15 V, T_{vj} = 125°C R_{Gon} = 4,7 Ω, T_{vj} = 150°C	t_r		0,01 0,01 0,01		µs µs µs
Abschaltverzögerungszeit, induktive Last Turn-off delay time, inductive load	I_C = 30 A, V_{CE} = 600 V, T_{vj} = 25°C V_{GE} = ±15 V, T_{vj} = 125°C R_{Goff} = 4,7 Ω, T_{vj} = 150°C	$t_{d\,off}$		0,30 0,40 0,44		µs µs µs
Fallzeit, induktive Last Fall time, inductive load	I_C = 30 A, V_{CE} = 600 V, T_{vj} = 25°C V_{GE} = ±15 V, T_{vj} = 125°C R_{Goff} = 4,7 Ω, T_{vj} = 150°C	t_f		0,014 0,03 0,035		µs µs µs
Einschaltverlustenergie pro Puls Turn-on energy loss per pulse	I_C = 30 A, V_{CE} = 600 V, L_S = 40 nH, T_{vj} = 25°C V_{GE} = ±15 V, di/dt = 2200 A/µs (T_{vj} = 150°C), T_{vj} = 125°C R_{Gon} = 4,7 Ω, T_{vj} = 150°C	E_{on}		0,73 0,78 0,80		mJ mJ mJ
Abschaltverlustenergie pro Puls Turn-off energy loss per pulse	I_C = 30 A, V_{CE} = 600 V, L_S = 40 nH, T_{vj} = 25°C V_{GE} = ±15 V, du/dt = 2800 V/µs (T_{vj} = 150°C), T_{vj} = 125°C R_{Goff} = 4,7 Ω, T_{vj} = 150°C	E_{off}		1,30 2,00 2,40		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} = 150°C	I_{SC}		360		A
Wärmewiderstand, Chip bis Kühlkörper Thermal resistance, junction to heatsink	pro IGBT / per IGBT	R_{thJH}		0,700		K/W
Temperatur im Schaltbetrieb Temperature under switching conditions		$T_{vj\,op}$	-40		150	°C

Diode-Chopper / Diode-Chopper

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	30	A
Periodischer Spitzenstrom Repetitive peak forward current	t_P = 1 ms		I_{FRM}	30	A
Grenzlastintegral I²t - value	V_R = 0 V, t_P = 10 ms, T_{vj} = 25°C V_R = 0 V, t_P = 10 ms, T_{vj} = 125°C		I²t	295 215	A²s A²s

Charakteristische Werte / Characteristic Values

				min.	typ.	max.	
Durchlassspannung Forward voltage	I_F = 30 A, V_{GE} = 0 V I_F = 30 A, V_{GE} = 0 V I_F = 30 A, V_{GE} = 0 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	V_F		1,45 1,75 1,85	1,75	V V V
Rückstromspitze Peak reverse recovery current	I_F = 30 A, - di_F/dt = 2200 A/µs (T_{vj}=150°C) V_R = 600 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	I_{RM}		10,0 10,0 10,0		A A A
Sperrverzögerungsladung Recovered charge	I_F = 30 A, - di_F/dt = 2200 A/µs (T_{vj}=150°C) V_R = 600 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	Q_r		0,30 0,50 0,50		µC µC µC
Abschaltenergie pro Puls Reverse recovery energy	I_F = 30 A, - di_F/dt = 2200 A/µs (T_{vj}=150°C) V_R = 600 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{rec}		0,06 0,06 0,06		mJ mJ mJ
Wärmewiderstand, Chip bis Kühlkörper Thermal resistance, junction to heatsink	pro Diode / per diode		R_{thJH}		0,872		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

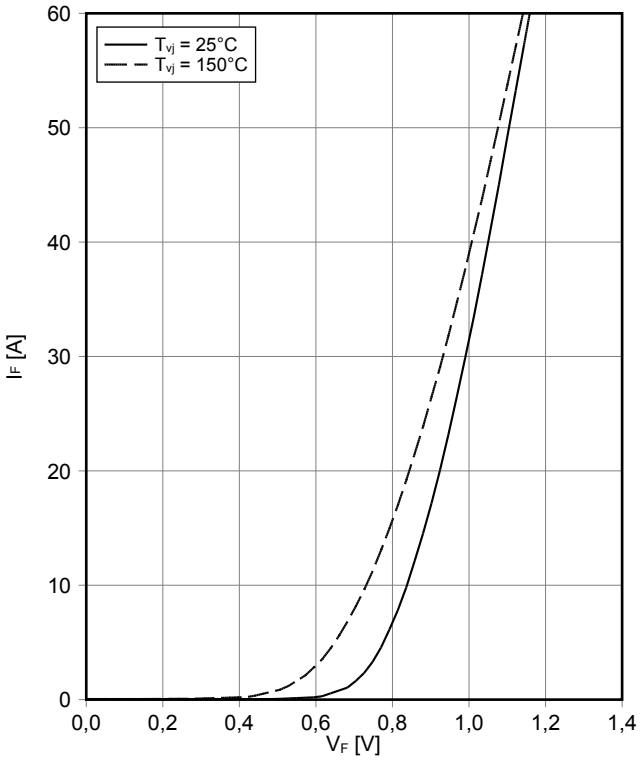
Angaben gemäß gültiger Application Note.
Specification according to the valid application note.

Modul / Module

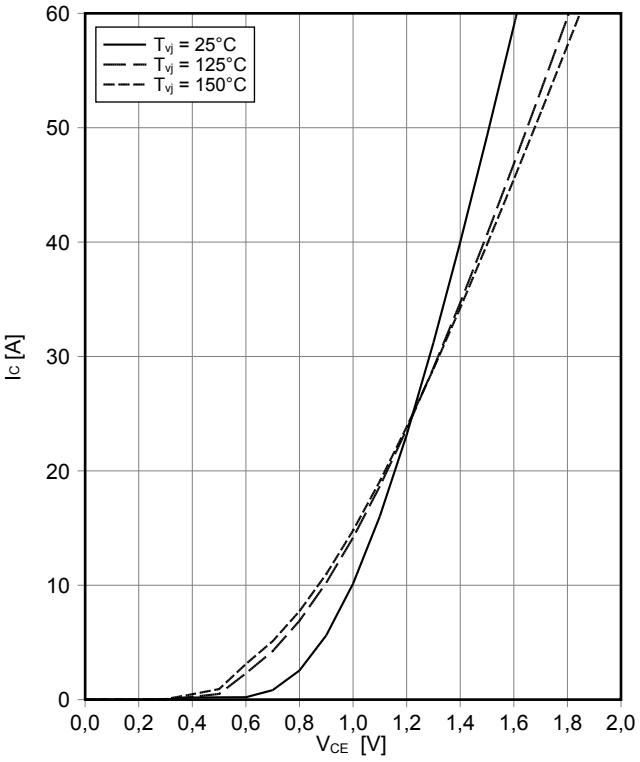
Isolations-Prüfspannung Isolation test voltage	RMS, f = 50 Hz, t = 1 min.	V_{ISOL}		2,5		kV
Innere Isolation Internal isolation	Basisisolierung (Schutzklasse 1, EN61140) basic insulation (class 1, IEC 61140)			Al_2O_3		
Kriechstrecke Creepage distance	Kontakt - Kühlkörper / terminal to heatsink Kontakt - Kontakt / terminal to terminal			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}		30		nH
Modulleitungswiderstand, Anschlüsse - Chip Module lead resistance, terminals - chip	T_H = 25°C, pro Schalter / per switch	$R_{CC'+EE'}$		5,00		mΩ
Lagertemperatur Storage temperature		T_{stg}	-40		125	°C
Gewicht Weight		G		24		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.

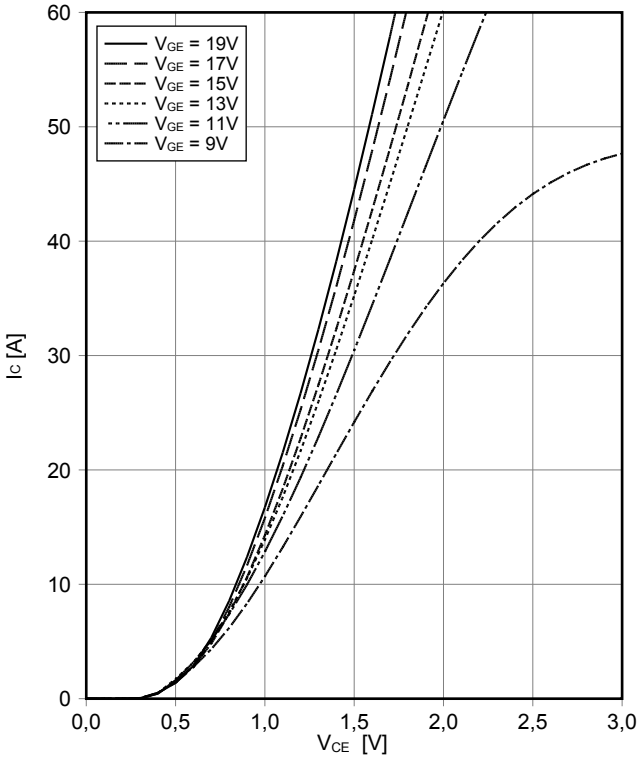
Durchlasskennlinie der Verpolschutz Diode A (typisch)
forward characteristic of Inverse-polarity protection diode A (typical)
$I_F = f(V_F)$



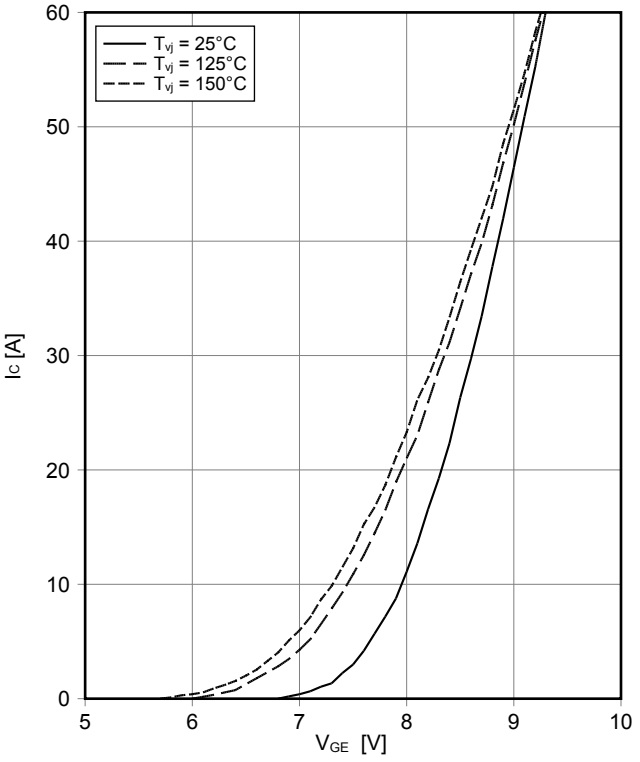
Ausgangskennlinie IGBT-Chopper (typisch)
output characteristic IGBT-Chopper (typical)
$I_C = f(V_{CE})$
$V_{GE} = 15\ V$



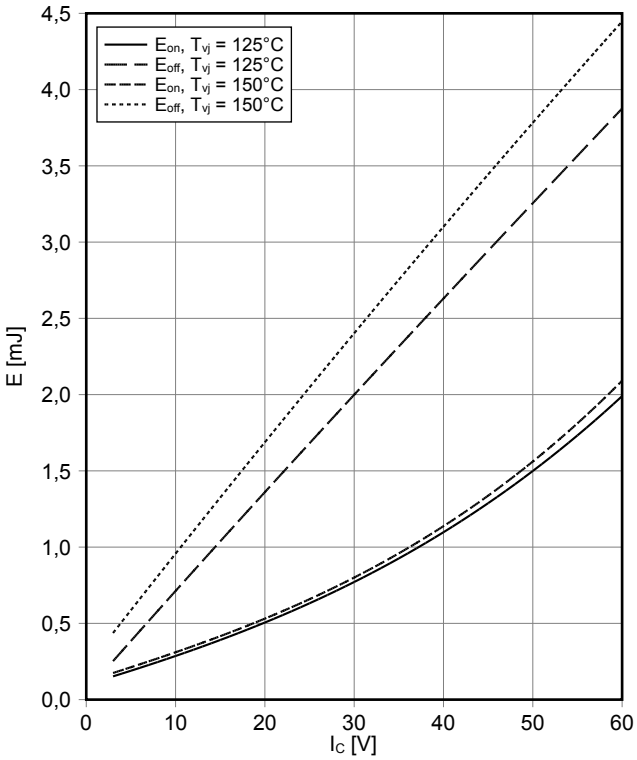
Ausgangskennlinienfeld IGBT-Chopper (typisch)
output characteristic IGBT-Chopper (typical)
$I_C = f(V_{CE})$
$T_{vj} = 150°C$



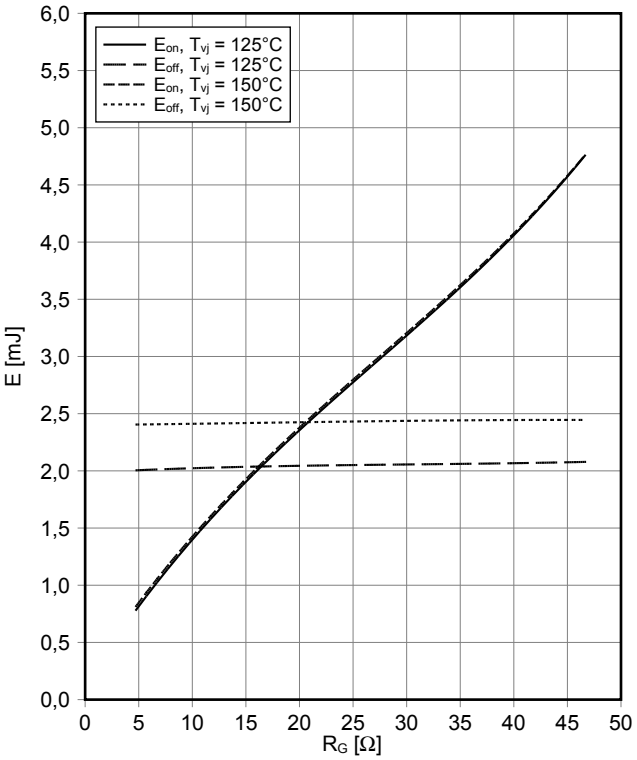
Übertragungscharakteristik IGBT-Chopper (typisch)
transfer characteristic IGBT-Chopper (typical)
$I_C = f(V_{GE})$
$V_{CE} = 20\ V$



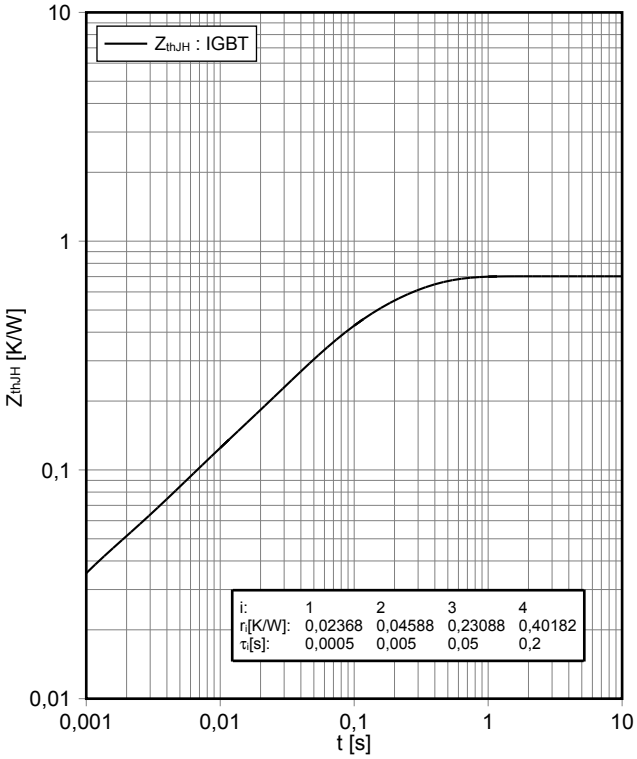
Schaltverluste IGBT-Chopper (typisch)
switching losses IGBT-Chopper (typical)
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
V_{GE} = ±15 V, R_{Gon} = 4.7 Ω, R_{Goff} = 4.7 Ω, V_{CE} = 600 V



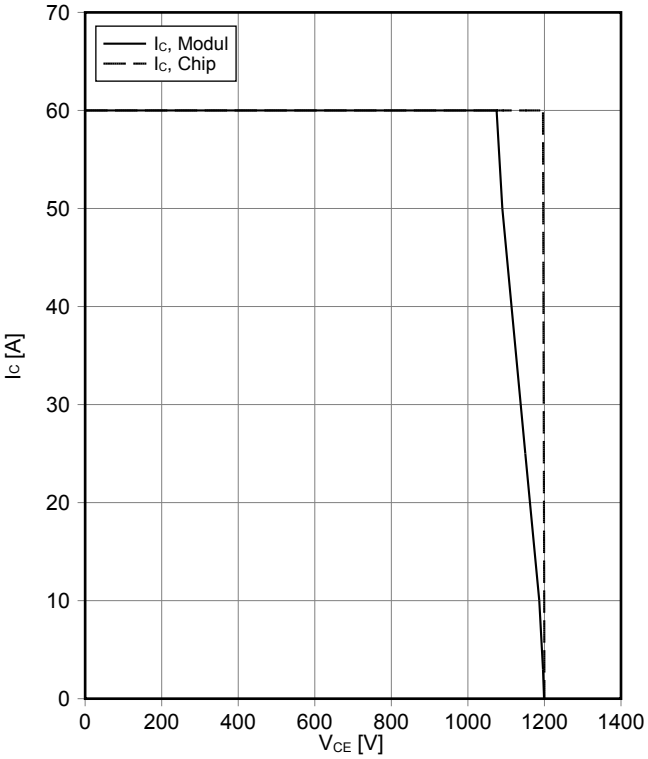
Schaltverluste IGBT-Chopper (typisch)
switching losses IGBT-Chopper (typical)
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
V_{GE} = ±15 V, I_C = 30 A, V_{CE} = 600 V



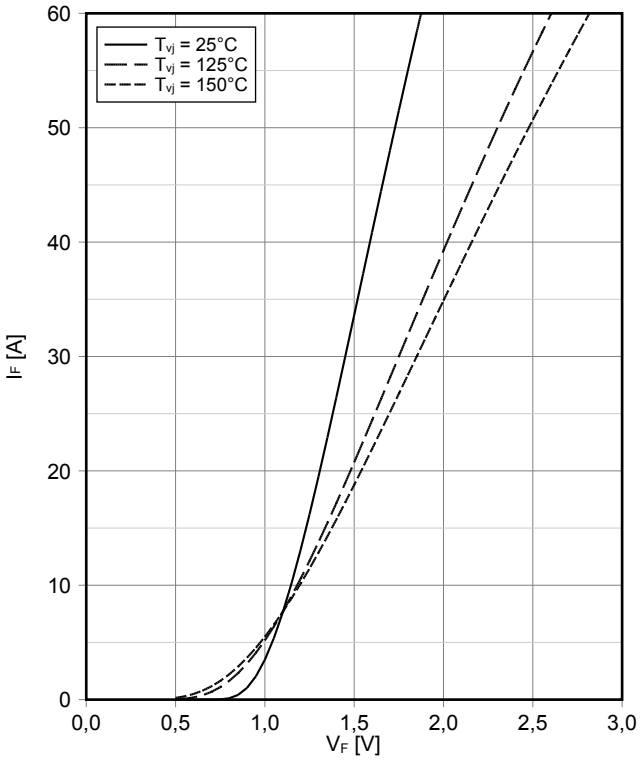
Transienter Wärmewiderstand IGBT-Chopper
transient thermal impedance IGBT-Chopper
$Z_{thJH} = f(t)$



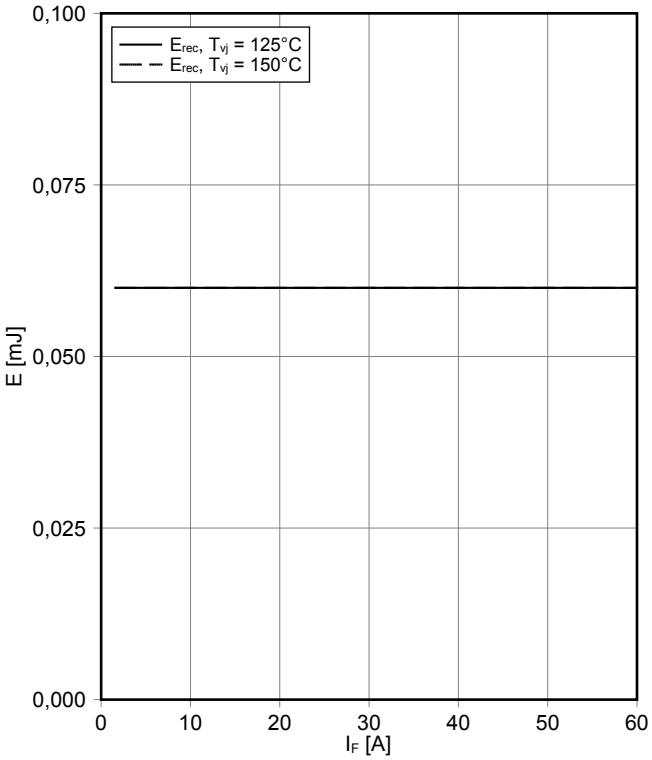
Sicherer Rückwärts-Arbeitsbereich IGBT-Chopper (RBSOA)
reverse bias safe operating area IGBT-Chopper (RBSOA)
$I_C = f(V_{CE})$
V_{GE} = ±15 V, R_{Goff} = 4.7 Ω, T_{vj} = 150°C



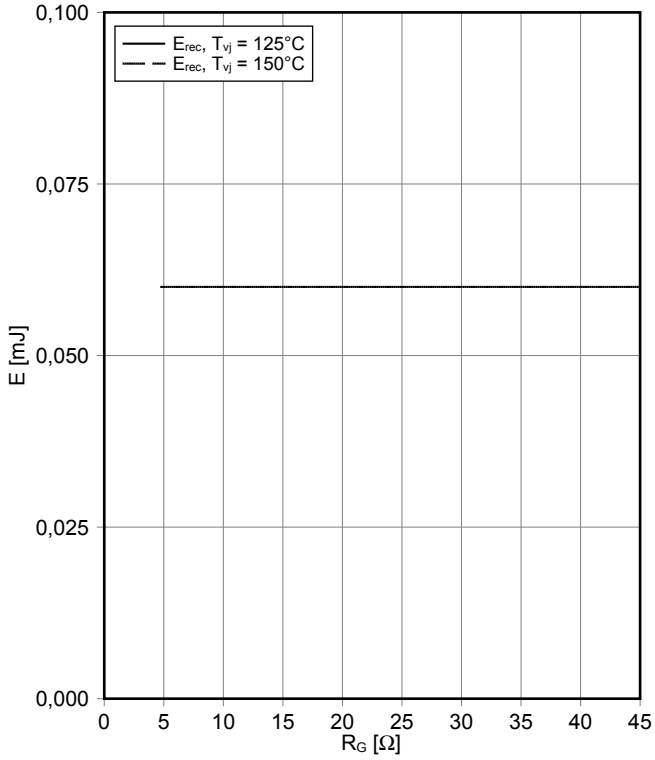
Durchlasskennlinie der Diode-Chopper (typisch)
forward characteristic of Diode-Chopper (typical)
$I_F = f(V_F)$



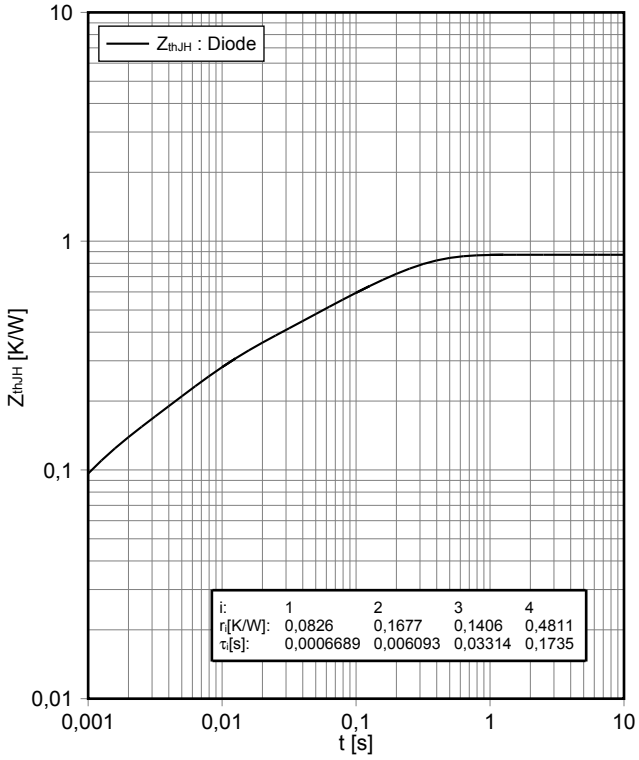
Schaltverluste Diode-Chopper (typisch)
switching losses Diode-Chopper (typical)
$E_{rec} = f(I_F)$
$R_{Gon} = 4.7\ \Omega$, $V_{CE} = 600$ V



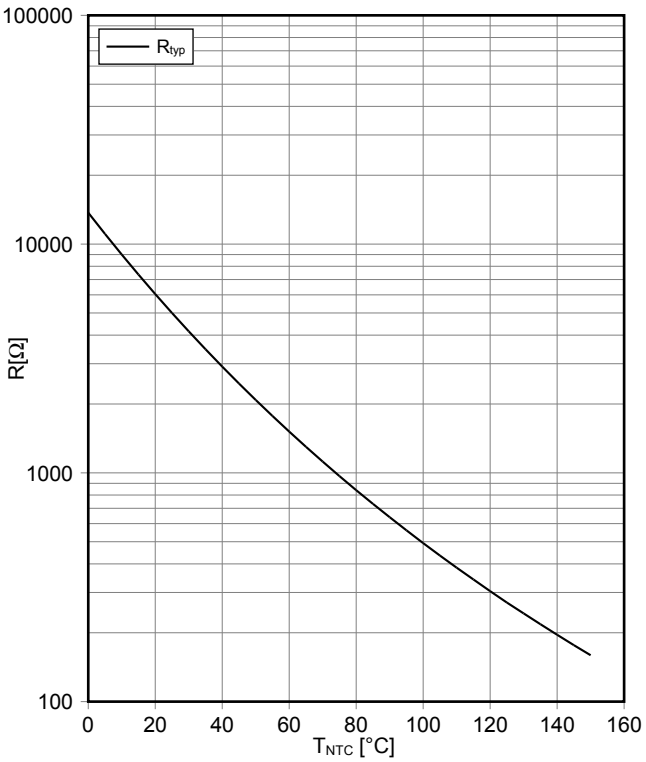
Schaltverluste Diode-Chopper (typisch)
switching losses Diode-Chopper (typical)
$E_{rec} = f(R_G)$
$I_F = 30$ A, $V_{CE} = 600$ V



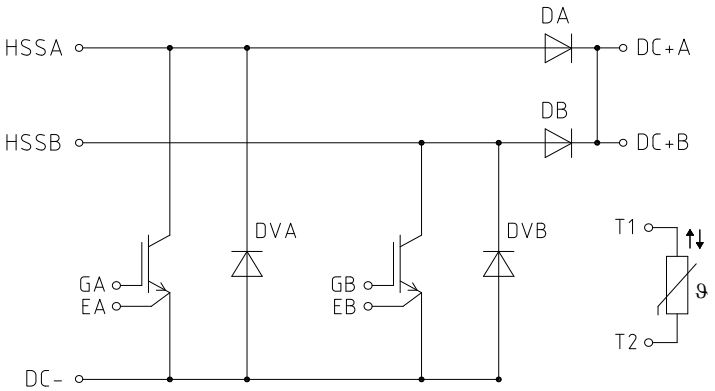
Transienter Wärmewiderstand Diode-Chopper
transient thermal impedance Diode-Chopper
$Z_{thJH} = f(t)$



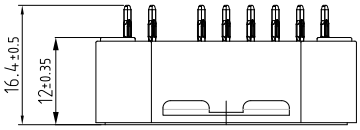
NTC-Widerstand-Temperaturkennlinie (typisch)
NTC-Thermistor-temperature characteristic (typical)
R = f (T)

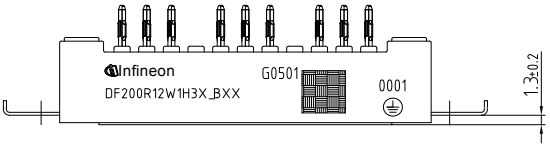


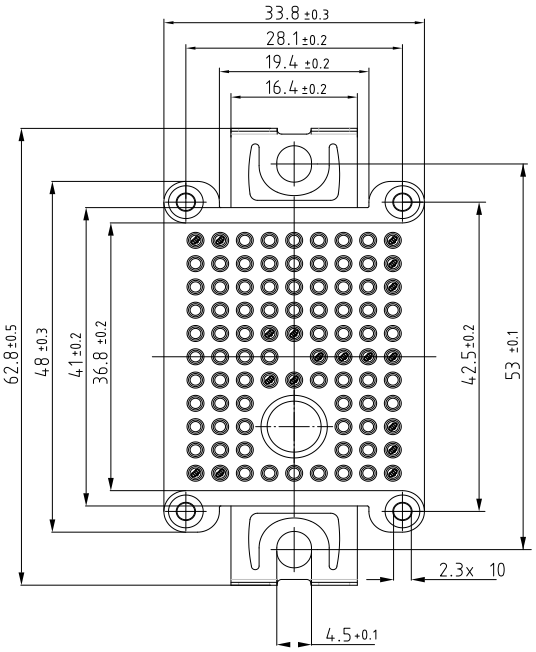
Schaltplan / Circuit diagram



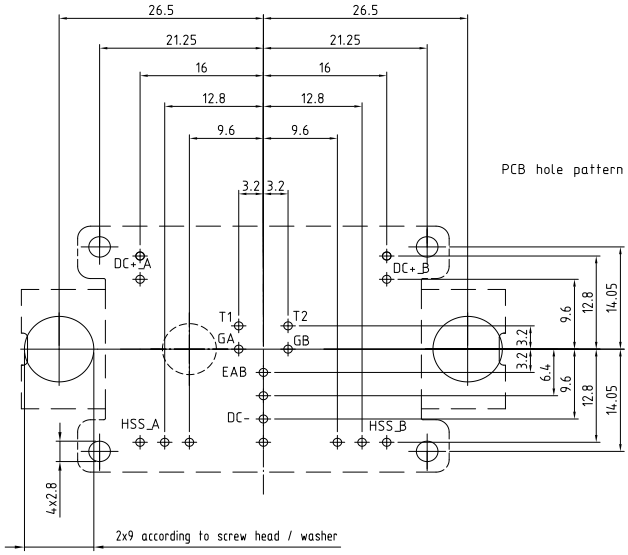
Gehäuseabmessungen / Package outlines







- Pin-Grid 3.2mm
- Tolerance of PCB hole pattern ⌖ ⌀0.1
- Hole specification for contacts see AN 2009-01
- Diameters of drill ⌀ 1.15mm
  and copper thickness in hole 25-50µm



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