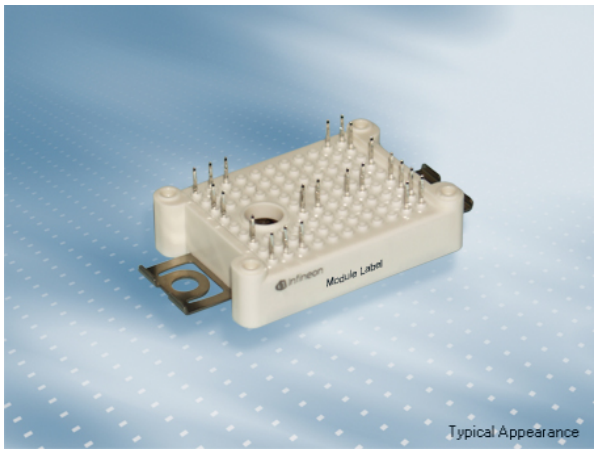
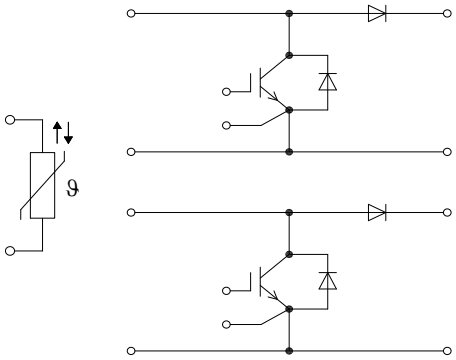
DF80R07W1H5FP_B11

EasyPACK™ Modul mit TRENCHSTOP™ 5 H5 und CoolSiC™ Schottky Diode und PressFIT / bereits aufgetragenem Thermal Interface Material

EasyPACK™ module with TRENCHSTOP™ 5 H5 and CoolSiC™ Schottky diode and PressFIT / pre-applied Thermal Interface Material





V_{CES} = 650V
$I_{C\ nom}$ = 40A / I_{CRM} = 80A

Potentielle Anwendungen
- Solar Anwendungen

Potential Applications
- Solar applications

Elektrische Eigenschaften
- CoolSiC™ Schottky Diode Gen 5
- Erhöhte Sperrspannungsfestigkeit auf 650V
- Niederinduktives Design
- Niedrige Schaltverluste

Electrical Features
- CoolSiC™ Schottky diode gen 5
- Increased blocking voltage capability up to 650V
- Low inductive design
- Low switching losses

Mechanische Eigenschaften
- Al_2O_3 Substrat mit kleinem thermischen Widerstand
- Integrierter NTC Temperatur Sensor
- PressFIT Verbindungstechnik
- Thermisches Interface Material bereits aufgetragen

Mechanical Features
- Al_2O_3 substrate with low thermal resistance
- Integrated NTC temperature sensor
- PressFIT contact technology
- Pre-applied Thermal Interface Material

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

IGBT,Wechselrichter / IGBT,Inverter

Höchstzulässige Werte / Maximum Rated Values

Kollektor-Emitter-Sperrspannung Collector-emitter voltage	T_{vj} = 25°C	V_{CES}	650	V
Implementierter Kollektor-Strom Implemented collector current		I_{CN}	40	A
Kollektor-Dauergleichstrom Continuous DC collector current	T_H = 100°C, $T_{vj\,max}$ = 175°C	I_{CDC}	20	A
Periodischer Kollektor-Spitzenstrom Repetitive peak collector current	t_P = 1 ms	I_{CRM}	80	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 = 20 A, V_{GE} = 15 V T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$V_{CE\,sat}$		1,40 1,45 1,50	1,72	V V V
Gate-Schwellenspannung Gate threshold voltage	I_C = 0,35 mA, V_{CE} = V_{GE}, T_{vj} = 25°C	V_{GEth}	3,25	4,00	4,75	V
Gateladung Gate charge	V_{GE} = -15 / 15 V, V_{CE} = 400 V	Q_G		0,165		µC
Interner Gatewiderstand Internal gate resistor	T_{vj} = 25°C	R_{Gint}		0,0		Ω
Eingangskapazität Input capacitance	f = 1000 kHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V	C_{ies}		2,00		nF
Rückwirkungskapazität Reverse transfer capacitance	f = 1000 kHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V	C_{res}		0,008		nF
Kollektor-Emitter-Reststrom Collector-emitter cut-off current	V_{CE} = 650 V, V_{GE} = 0 V, T_{vj} = 25°C	I_{CES}			0,012	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 = 20 A, V_{CE} = 400 V, V_{GE} = -15 / 15 V, R_{Gon} = 2,7 Ω T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$t_{d\,on}$		0,012 0,013 0,013		µs µs µs
Anstiegszeit, induktive Last Rise time, inductive load	I_C = 20 A, V_{CE} = 400 V, V_{GE} = -15 / 15 V, R_{Gon} = 2,7 Ω T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	t_r		0,003 0,004 0,004		µs µs µs
Abschaltverzögerungszeit, induktive Last Turn-off delay time, inductive load	I_C = 20 A, V_{CE} = 400 V, V_{GE} = -15 / 15 V, R_{Goff} = 2,7 Ω T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$t_{d\,off}$		0,072 0,09 0,095		µs µs µs
Fallzeit, induktive Last Fall time, inductive load	I_C = 20 A, V_{CE} = 400 V, V_{GE} = -15 / 15 V, R_{Goff} = 2,7 Ω T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	t_f		0,018 0,028 0,029		µs µs µs
Einschaltverlustenergie pro Puls Turn-on energy loss per pulse	I_C = 20 A, V_{CE} = 400 V, Lσ = 25 nH, di/dt = 6300 A/µs (T_{vj} = 150°C), V_{GE} = -15 / 15 V, R_{Gon} = 2,7 Ω T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{on}		0,091 0,12 0,127		mJ mJ mJ
Abschaltverlustenergie pro Puls Turn-off energy loss per pulse	I_C = 20 A, V_{CE} = 400 V, Lσ = 25 nH, du/dt = 7500 V/µs (T_{vj} = 150°C), V_{GE} = -15 / 15 V, R_{Goff} = 2,7 Ω T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{off}		0,076 0,167 0,195		mJ mJ mJ
Kurzschlußverhalten SC data	$V_{GE} \leq$ 15 V, V_{CC} = 400 V $V_{CEmax} = V_{CES} - L_{sCE} \cdot di/dt$, $t_P \leq$ 0 µs, T_{vj} = 150°C	I_{SC}		180		A
Wärmewiderstand, Chip bis Kühlkörper Thermal resistance, junction to heatsink	pro IGBT / per IGBT valid with IFX pre-applied thermal interface material	R_{thJH}			1,85	K/W
Temperatur im Schaltbetrieb Temperature under switching conditions		$T_{vj\,op}$	-40		150	°C

Diode, Wechselrichter / Diode, Inverter

Höchstzulässige Werte / Maximum Rated Values

Periodische Spitzensperrspannung Repetitive peak reverse voltage	T_{vj} = 25°C	V_{RRM}	650	V
Implementierter Durchlassstrom Implemented forward current		I_{FN}	30	A
Dauergleichstrom Continuous DC forward current		I_F	30	A
Periodischer Spitzenstrom Repetitive peak forward current	t_P = 1 ms	I_{FRM}	60	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	I²t	90,0 82,0	A²s A²s

Charakteristische Werte / Characteristic Values

			min.	typ.	max.	
Durchlassspannung Forward voltage	I_F = 30 A, V_{GE} = 0 V, T_{vj} = 25°C I_F = 30 A, V_{GE} = 0 V, T_{vj} = 125°C I_F = 30 A, V_{GE} = 0 V, T_{vj} = 150°C	V_F		1,60 1,55 1,50	2,00	V V V
Wärmewiderstand, Chip bis Kühlkörper Thermal resistance, junction to heatsink	pro Diode / per diode valid with IFX pre-applied thermal interface material	R_{thJH}			2,37	K/W
Temperatur im Schaltbetrieb Temperature under switching conditions		$T_{vj\,op}$	-40		150	°C

Diode, Hochsetzsteller / Diode, Boost

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	20	A
Periodischer Spitzenstrom Repetitive peak forward current	t_P = 1 ms	I_{FRM}	40	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	I²t	18,0 15,0	A²s A²s

Charakteristische Werte / Characteristic Values

			min.	typ.	max.	
Durchlassspannung Forward voltage	I_F = 20 A, V_{GE} = 0 V, T_{vj} = 25°C I_F = 20 A, V_{GE} = 0 V, T_{vj} = 125°C I_F = 20 A, V_{GE} = 0 V, T_{vj} = 150°C	V_F		1,45 1,60 1,65	1,85	V V V
Rückstromspitze Peak reverse recovery current	I_F = 20 A, - di_F/dt = 6300 A/µs (T_{vj}=150°C), T_{vj} = 25°C V_R = 400 V, T_{vj} = 125°C T_{vj} = 150°C	I_{RM}		35,2 32,6 31,9		A A A
Sperrverzögerungsladung Recovered charge	I_F = 20 A, - di_F/dt = 6300 A/µs (T_{vj}=150°C), T_{vj} = 25°C V_R = 400 V, T_{vj} = 125°C T_{vj} = 150°C	Q_r		0,31 0,29 0,29		µC µC µC
Abschaltenergie pro Puls Reverse recovery energy	I_F = 20 A, - di_F/dt = 6300 A/µs (T_{vj}=150°C), T_{vj} = 25°C V_R = 400 V, T_{vj} = 125°C T_{vj} = 150°C	E_{rec}		0,044 0,039 0,038		mJ mJ mJ
Wärmewiderstand, Chip bis Kühlkörper Thermal resistance, junction to heatsink	pro Diode / per diode valid with IFX pre-applied thermal interface material	R_{thJH}			2,15	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.

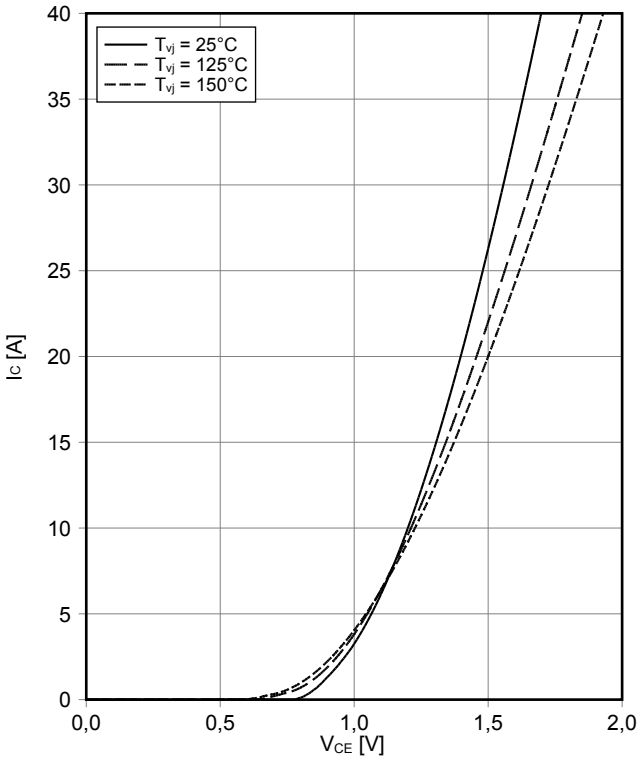
Modul / Module

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		
Relativer Temperaturindex (elektr.) RTI Elec.	Gehäuse housing	RTI	140		°C

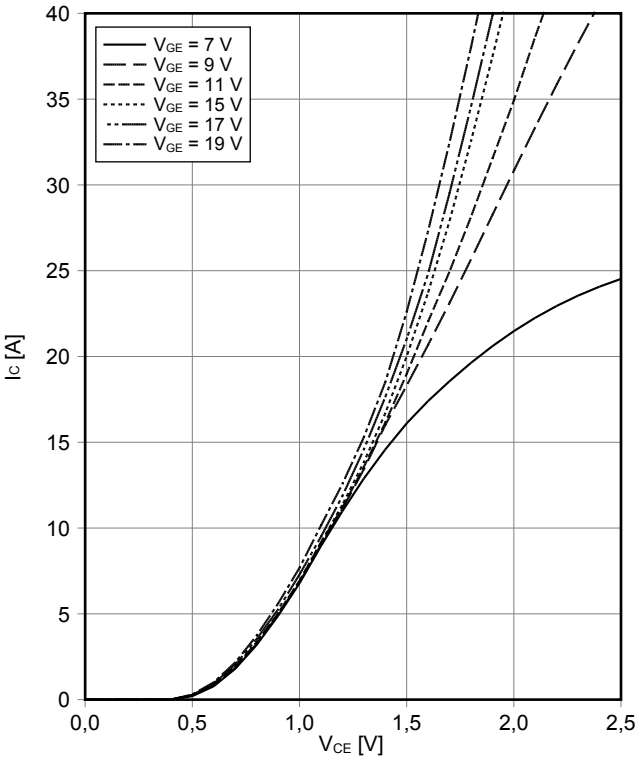
			min.	typ.	max.	
Modulstreuinduktivität Stray inductance module		L_{sCE}		16		nH
Lagertemperatur Storage temperature		T_{stg}	-40		125	°C
Höchstzulässige Bodenplattenbetriebstemperatur Maximum baseplate operation temperature		T_{BPmax}			125	°C
Anpresskraft für mech. Bef. pro Feder mountig force per clamp		F	20	-	50	N
Gewicht Weight		G		23		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.
Lagerung und Transport von Modulen mit TIM => siehe AN2012-07
Storage and shipment of modules with TIM => see AN2012-07

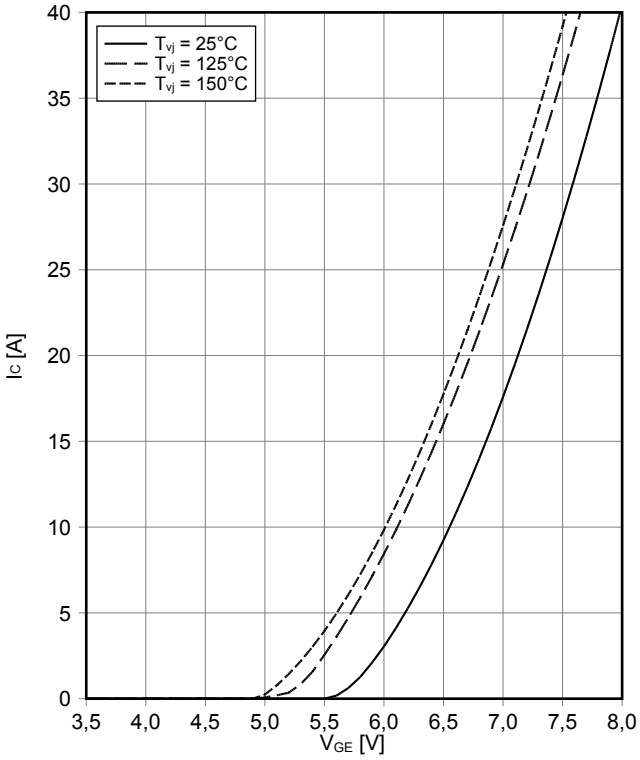
Ausgangskennlinie IGBT,Wechselrichter (typisch)
output characteristic IGBT,Inverter (typical)
$I_C = f(V_{CE})$
V_{GE} = 15 V



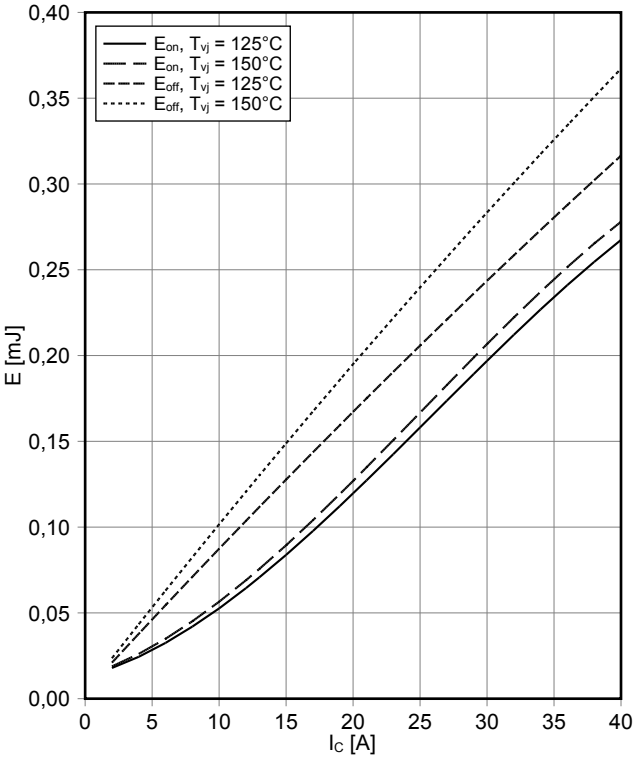
Ausgangskennlinienfeld IGBT,Wechselrichter (typisch)
output characteristic IGBT,Inverter (typical)
$I_C = f(V_{CE})$
T_{vj} = 150°C



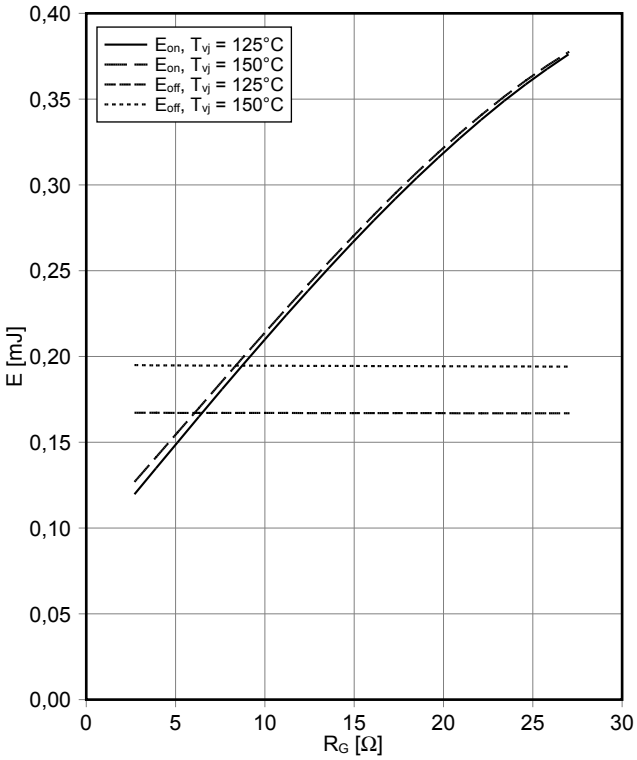
Übertragungscharakteristik IGBT,Wechselrichter (typisch)
transfer characteristic IGBT,Inverter (typical)
$I_C = f(V_{GE})$
V_{CE} = 20 V



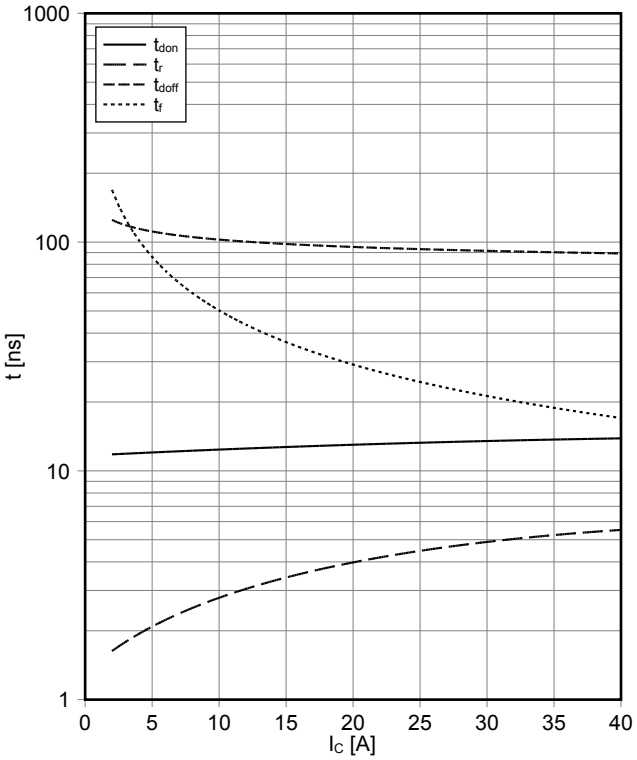
Schaltverluste IGBT,Wechselrichter (typisch)
switching losses IGBT,Inverter (typical)
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
V_{GE} = ±15 V, R_{Gon} = 2.7 Ω, R_{Goff} = 2.7 Ω, V_{CE} = 400 V



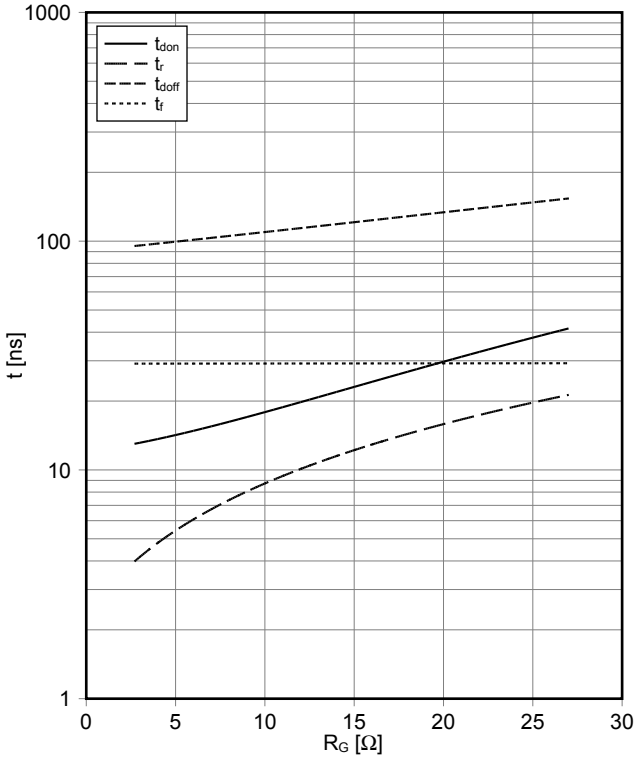
Schaltverluste IGBT,Wechselrichter (typisch)
switching losses IGBT,Inverter (typical)
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
V_{GE} = ±15 V, I_C = 20 A, V_{CE} = 400 V



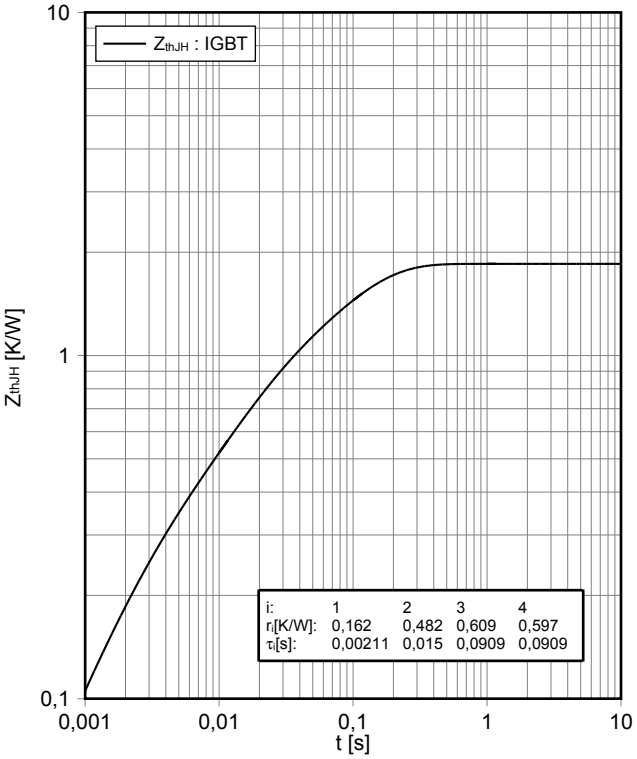
Schaltzeiten IGBT,Wechselrichter (typisch)
switching times IGBT,Inverter (typical)
$t_{don} = f(I_C)$, $t_r = f(I_C)$, $t_{doff} = f(I_C)$, $t_f = f(I_C)$
V_{GE} = ±15 V, R_{Gon} = 2.7 Ω, R_{Goff} = 2.7 Ω, V_{CE} = 400 V, T_{vj} = 150°C



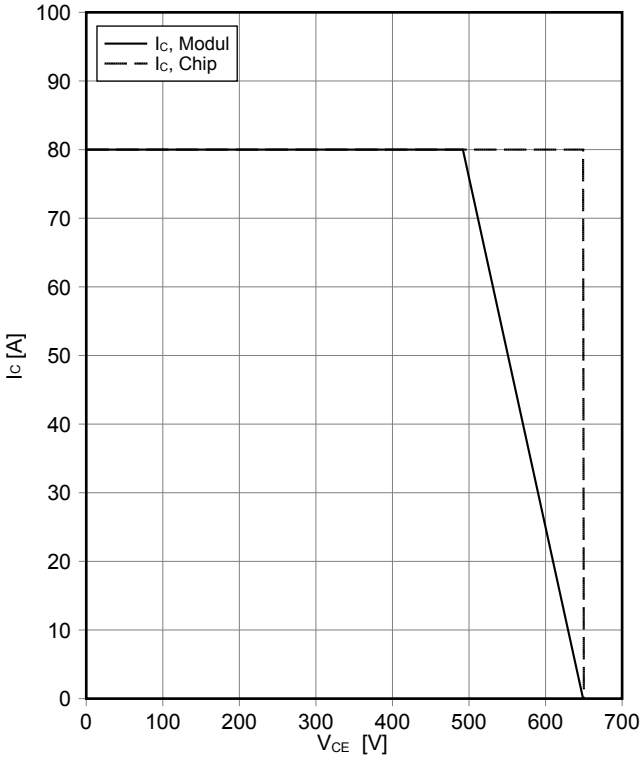
Schaltzeiten IGBT,Wechselrichter (typisch)
switching times IGBT,Inverter (typical)
$t_{don} = f(R_G)$, $t_r = f(R_G)$, $t_{doff} = f(R_G)$, $t_f = f(R_G)$
V_{GE} = ±15 V, I_C = 20 A, V_{CE} = 400 V, T_{vj} = 150°C



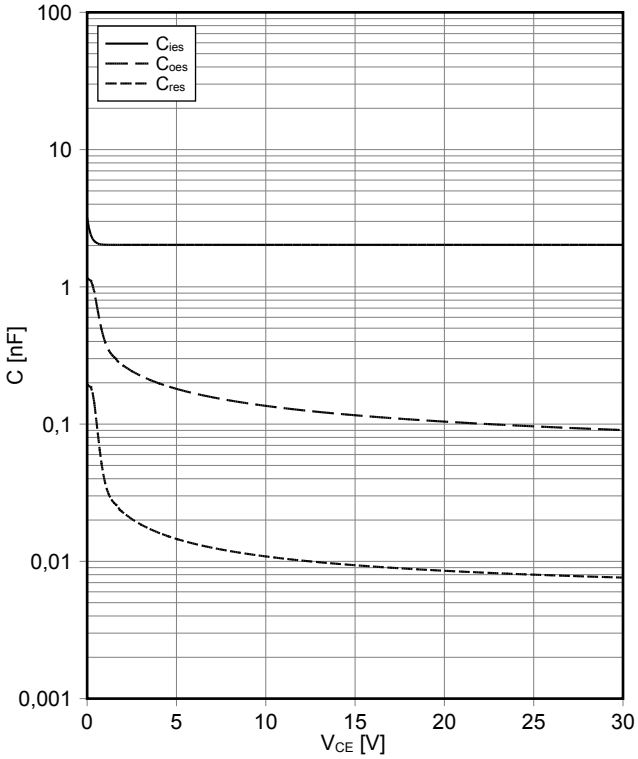
Transienter Wärmewiderstand IGBT,Wechselrichter
transient thermal impedance IGBT,Inverter
$Z_{thJH} = f(t)$



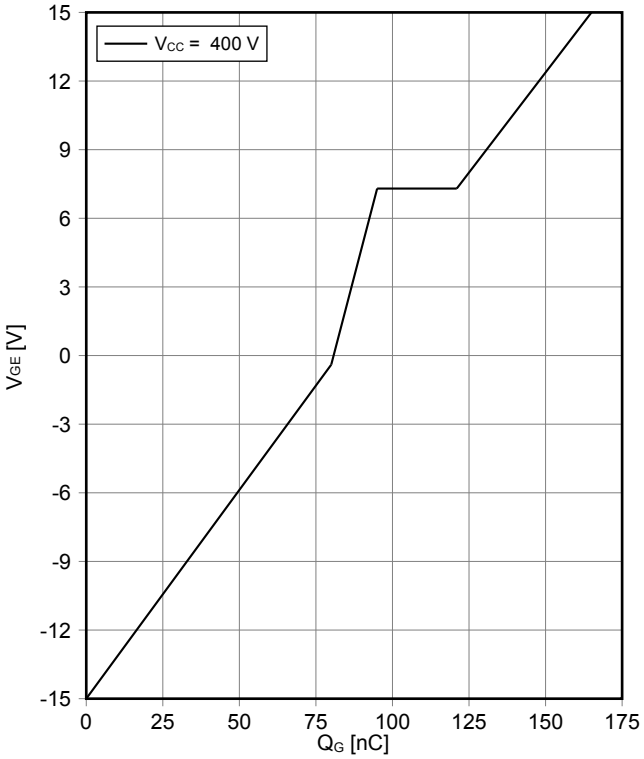
Sicherer Rückwärts-Arbeitsbereich IGBT,Wechselrichter (RBSOA)
reverse bias safe operating area IGBT,Inverter (RBSOA)
$I_C = f(V_{CE})$
$V_{GE} = \pm 15$ V, $R_{Goff} = 2.7\ \Omega$, $T_{vj} = 150°C$



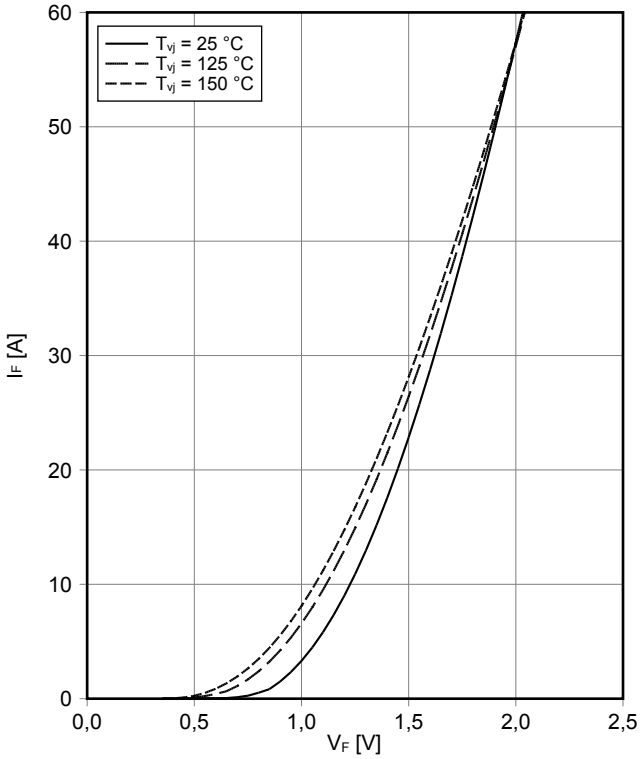
Kapazitäts Charakteristik IGBT,Wechselrichter (typisch)
capacity characteristic IGBT,Inverter (typical)
$C = f(V_{CE})$
$V_{GE} = 0$ V, $T_{vj} = 25°C$, f = 1MHz



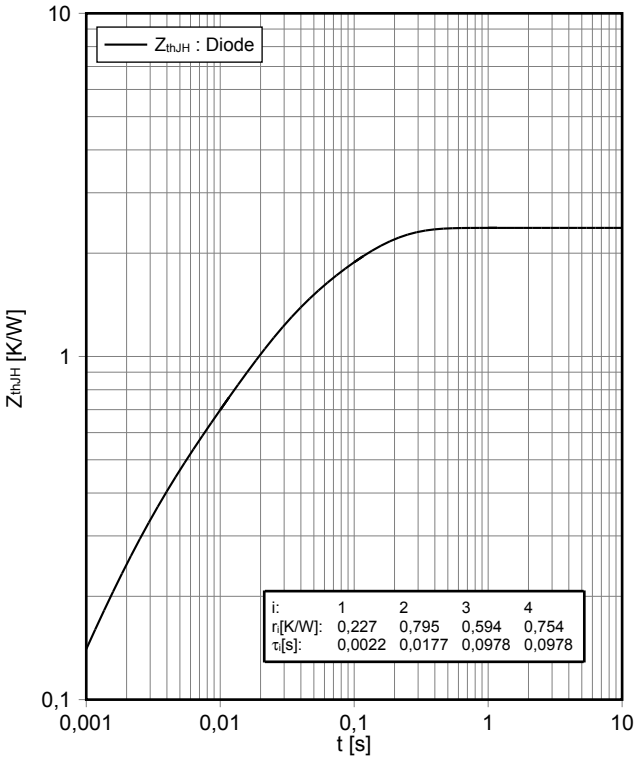
Gateladungs Charakteristik IGBT,Wechselrichter (typisch)
gate charge characteristic IGBT,Inverter (typical)
$V_{GE} = f(Q_G)$
$I_C = 20$ A, $T_{vj} = 25°C$



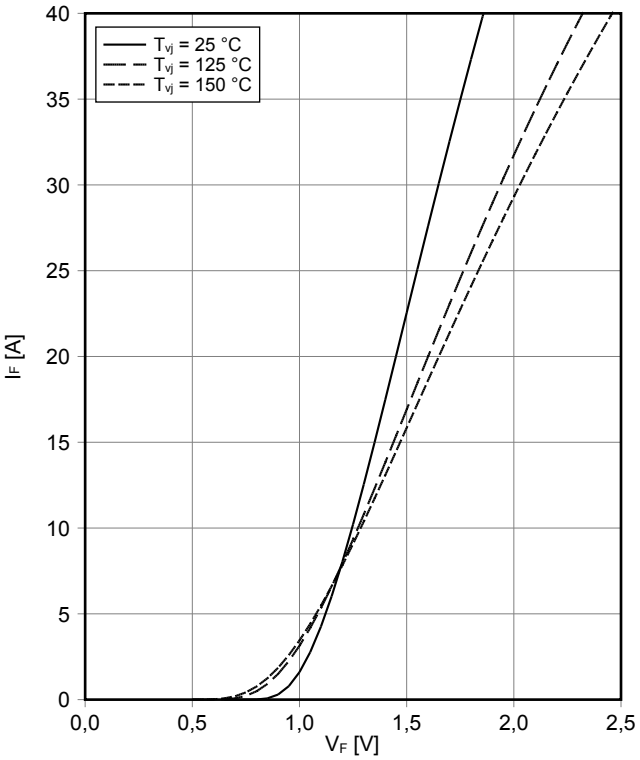
Durchlasskennlinie der Diode, Wechselrichter (typisch)
forward characteristic of Diode, Inverter (typical)
$I_F = f(V_F)$



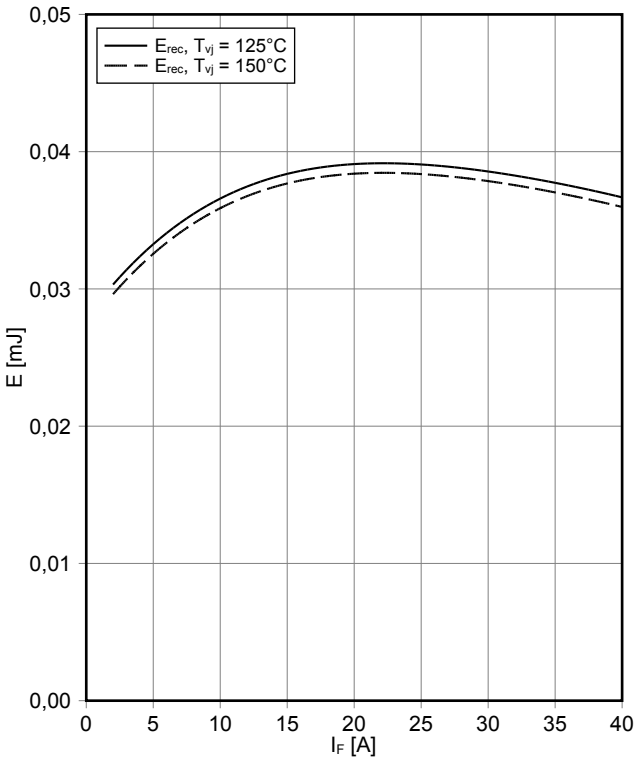
Transienter Wärmewiderstand Diode, Wechselrichter
transient thermal impedance Diode, Inverter
Z_{thJH}= f (t)



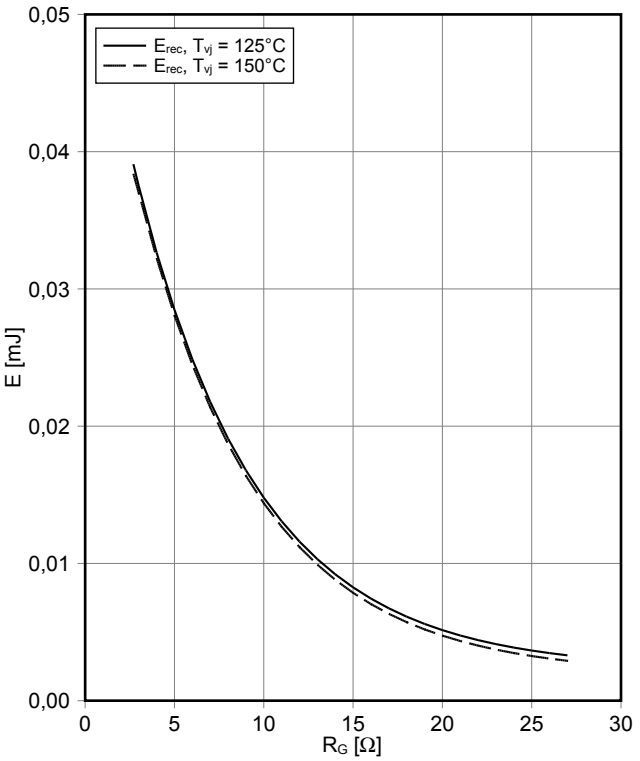
Durchlasskennlinie der Diode, Hochsetzsteller (typisch)
forward characteristic of Diode, Boost (typical)
$I_F = f(V_F)$



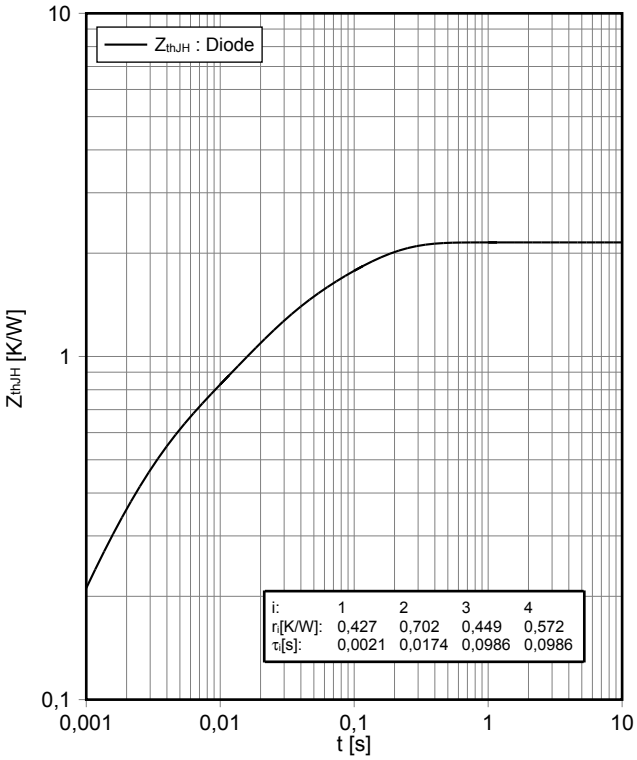
Schaltverluste Diode, Hochsetzsteller (typisch)
switching losses Diode, Boost (typical)
$E_{rec} = f(I_F)$
R_{Gon} = 2.7 Ω, V_{CE} = 400 V



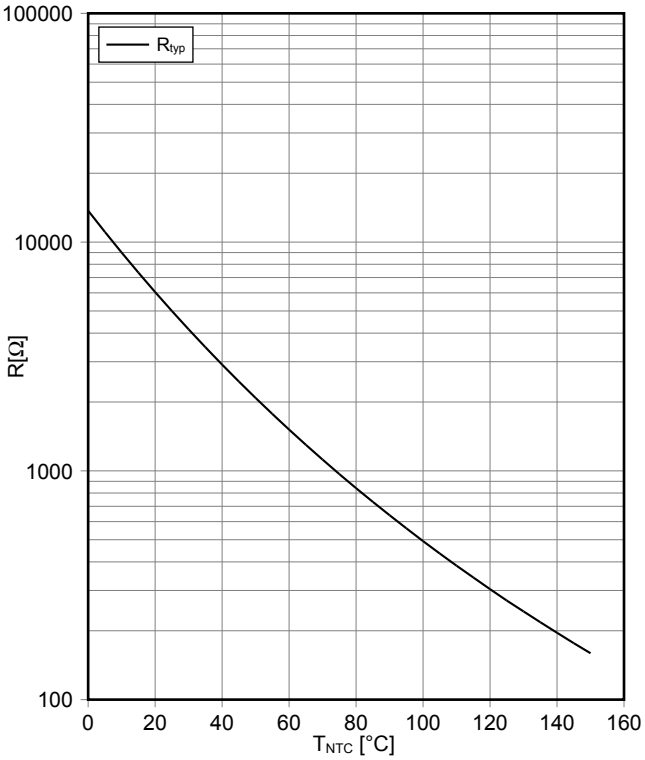
Schaltverluste Diode, Hochsetzsteller (typisch)
switching losses Diode, Boost (typical)
$E_{rec} = f(R_G)$
I_F = 20 A, V_{CE} = 400 V



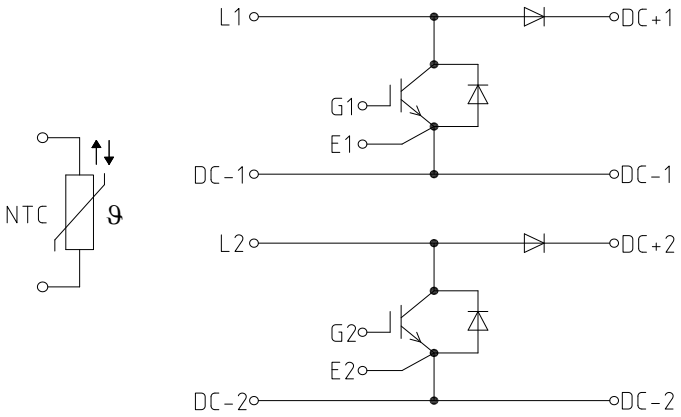
Transienter Wärmewiderstand Diode, Hochsetzsteller
transient thermal impedance Diode, Boost
$Z_{thJH} = f(t)$



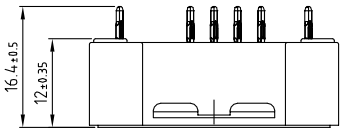
NTC-Widerstand-Temperaturkennlinie (typisch)
NTC-Thermistor-temperature characteristic (typical)
$R = f(T)$

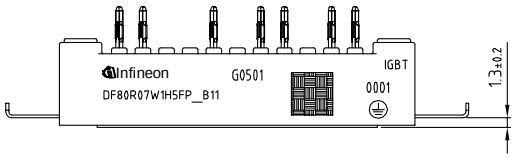


Schaltplan / Circuit diagram

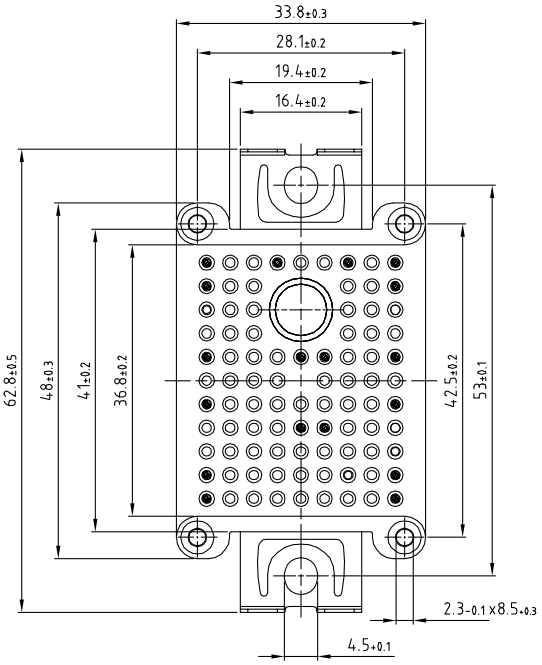


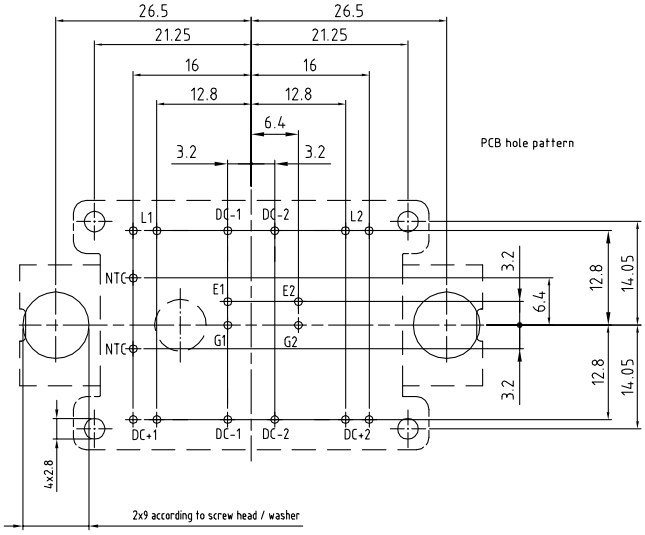
Gehäuseabmessungen / Package outlines

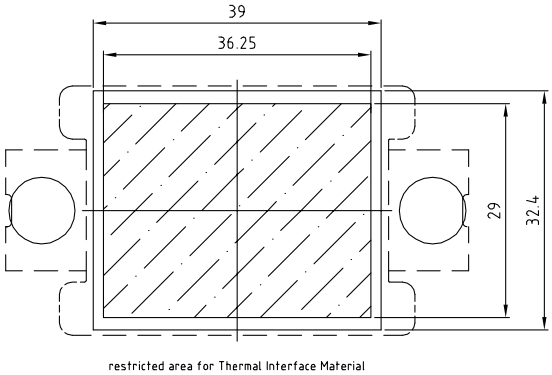




- Pin-Grid 3.2mm
- Tolerance of PCB hole pattern ⌖ ø0.1
- Hole specification for contacts see AN 2009-01:
  Diameters of drill Ø 1.15mm
  and copper thickness in hole 25-50µm







restricted area for Thermal Interface Material