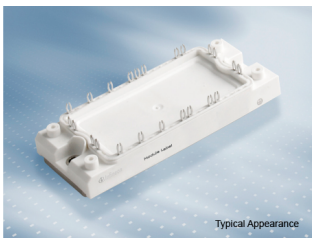
Preliminary datasheet
EconoPACK™2 module and NTC / pre-applied Thermal Interface Material



Features

- Electrical features
  - V_{CES} = 1700 V
  - $I_{C\ nom}$ = 150 A / I_{CRM} = 300 A
  - High surge current capability
- Mechanical features
  - RoHS compliant
  - PressFIT contact technology
  - Pre-applied Thermal Interface Material
  - High power density
  - Al_2O_3 substrate with low thermal resistance

Potential applications

- Active rectifier
- Half-controlled B6-bridge

Product validation

- Qualified for industrial applications according to the relevant tests of IEC 60747, 60749 and 60068

Description

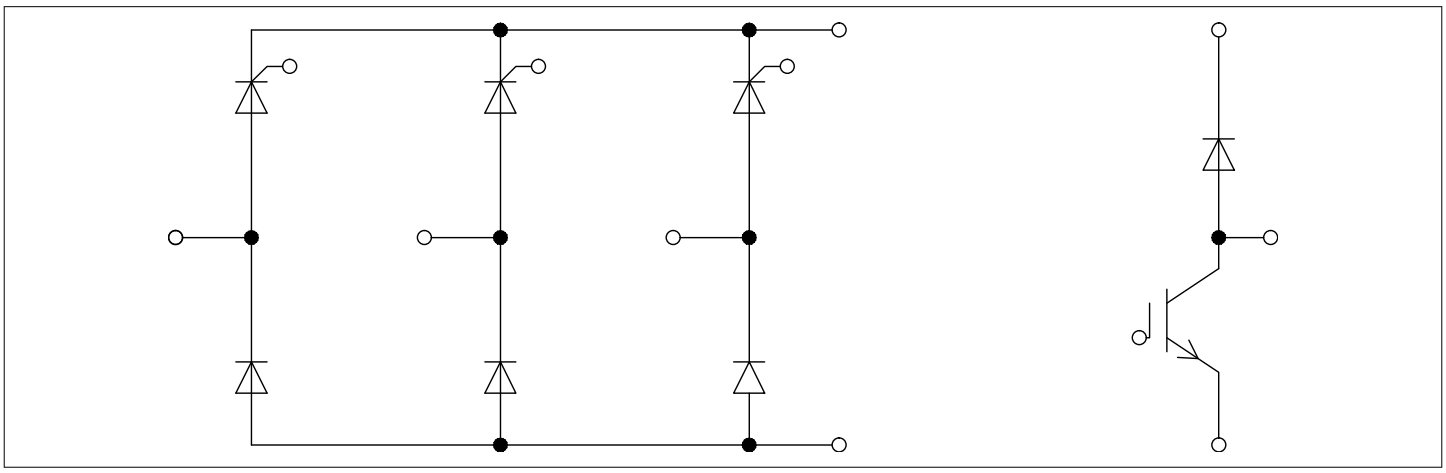


Table of contents

1 Package

Table 1 Insulation coordination

Parameter	Symbol	Note or test condition	Values	Unit
Isolation test voltage	V_{ISOL}	RMS, f = 50 Hz, *t* = 60 s	3.4	kV
Material of module baseplate			Cu	
Internal Isolation		basic insulation (class 1, IEC 61140)	Al_2O_3	
Creepage distance	d_{Creep}	terminal to heatsink	10.0	mm
Clearance	d_{Clear}	terminal to heatsink	7.5	mm
Comparative tracking index	*CTI*		> 200	
RTI Elec.	*RTI*	housing	140	°C

Table 2 Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Stray inductance module	L_{sCE}				50		nH
Storage temperature	T_{stg}			-40		125	°C
Maximum baseplate operation temperature	T_{BPmax}					125	°C
Mounting torque for modul mounting	*M*	- Mounting according to valid application note	M5, Screw	3		6	Nm
Weight	*G*				180		g

Note: Storage and shipment of modules with TIM => see AN2012-07

2 IGBT, Brake-Chopper

Table 3 Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Collector-emitter voltage	V_{CES}		T_{vj} = 25 °C	1700	V
Implemented collector current	I_{CN}			100	A
Continous DC collector current	I_{CDC}	$T_{vj\,max}$ = 150 °C	T_H = 65 °C	77	A
Repetitive peak collector current	I_{CRM}	t_P = 1 ms		200	A
Gate-emitter peak voltage	V_{GES}			±20	V

Table 4 Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Collector-emitter saturation voltage	$V_{CE\,sat}$	I_C = 100 A, V_{GE} = 15 V	T_{vj} = 25 °C		1.95	2.30	V
			T_{vj} = 125 °C		2.35		
			T_{vj} = 150 °C		2.45		
Gate threshold voltage	V_{GEth}	I_C = 4 mA, V_{CE} = V_{GE}, T_{vj} = 25 °C		5.20	5.80	6.40	V
Gate charge	Q_G				1.2		µC
Internal gate resistor	R_{Gint}	T_{vj} = 25 °C			7.5		Ω
Input capacitance	C_{ies}	f = 1000 kHz, T_{vj} = 25 °C, V_{CE} = 25 V, V_{GE} = 0 V			9		nF
Reverse transfer capacitance	C_{res}	f = 1000 kHz, T_{vj} = 25 °C, V_{CE} = 25 V, V_{GE} = 0 V			0.29		nF
Collector-emitter cut-off current	I_{CES}	V_{CE} = 1700 V, V_{GE} = 0 V	T_{vj} = 25 °C			1	mA
Gate-emitter leakage current	I_{GES}	V_{CE} = 0 V, V_{GE} = 20 V, T_{vj} = 25 °C				100	nA
Turn-on delay time (inductive load)	t_{don}	I_C = 100 A, V_{CE} = 900 V, R_{Gon} = 0.91 Ω	T_{vj} = 25 °C		0.187		µs
			T_{vj} = 125 °C		0.214		
			T_{vj} = 150 °C		0.219		
Rise time (inductive load)	t_r	I_C = 100 A, V_{CE} = 900 V, R_{Gon} = 0.91 Ω	T_{vj} = 25 °C		0.050		µs
			T_{vj} = 125 °C		0.050		
			T_{vj} = 150 °C		0.050		
Turn-off delay time (inductive load)	t_{doff}	I_C = 100 A, V_{CE} = 900 V, R_{Goff} = 0.91 Ω	T_{vj} = 25 °C		0.430		µs
			T_{vj} = 125 °C		0.580		
			T_{vj} = 150 °C		0.610		
Fall time (inductive load)	t_f	I_C = 100 A, V_{CE} = 900 V, R_{Goff} = 0.91 Ω	T_{vj} = 25 °C		0.260		µs
			T_{vj} = 125 °C		0.500		
			T_{vj} = 150 °C		0.590		
Turn-on energy loss per pulse	E_{on}	I_C = 100 A, V_{CE} = 900 V, L_σ = 50 nH, R_{Gon} = 0.91 Ω, di/dt = 1600 A/µs (T_{vj} = 150 °C)	T_{vj} = 25 °C		20.3		mJ
			T_{vj} = 125 °C		23		
			T_{vj} = 150 °C		24.2		
Turn-off energy loss per pulse	E_{off}	I_C = 100 A, V_{CE} = 900 V, L_σ = 50 nH, R_{Goff} = 0.91 Ω, dv/dt = 3000 V/µs (T_{vj} = 150 °C)	T_{vj} = 25 °C		18.8		mJ
			T_{vj} = 125 °C		30.7		
			T_{vj} = 150 °C		34.5		
SC data	I_{SC}	V_{GE} ≤ 15 V, V_{CC} = 1000 V, V_{CEmax}=V_{CES}-L_{sCE}*di/dt	t_P ≤ 10 µs, T_{vj} ≤ 150 °C		450		A
Thermal resistance, junction to heatsink	R_{thJH}	per IGBT, Valid with IFX pre-applied Thermal Interface Material				0.445	K/W

Table 4 Characteristic values (continued)

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Temperature under switching conditions	$T_{vj\,op}$		-40		150	°C

3 Diode, Brake-Chopper

Table 5 Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Repetitive peak reverse voltage	V_{RRM}		T_{vj} = 25 °C	1700	V
Continous DC forward current	I_F			50	A
Repetitive peak forward current	I_{FRM}	t_P = 1 ms		100	A
I^2t - value	I^2t	V_R = 0 V, t_P = 10 ms	T_{vj} = 125 °C	310	A^2s
			T_{vj} = 150 °C	260	

Table 6 Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Forward voltage	V_F	I_F = 50 A	T_{vj} = 25 °C		1.80	2.35	V
			T_{vj} = 125 °C		1.90		
			T_{vj} = 150 °C		1.95		
Peak reverse recovery current	I_{RM}	I_F = 50 A, V_R = 900 V, V_{GE} = -15 V, -di$_F$/dt = 1600 A/µs (T_{vj} = 150 °C)	T_{vj} = 25 °C		52.6		A
			T_{vj} = 125 °C		60.5		
			T_{vj} = 150 °C		63.7		
Recovered charge	Q_r	I_F = 50 A, V_R = 900 V, V_{GE} = -15 V, -di$_F$/dt = 1600 A/µs (T_{vj} = 150 °C)	T_{vj} = 25 °C		10		µC
			T_{vj} = 125 °C		17		
			T_{vj} = 150 °C		19.5		
Reverse recovery energy	E_{rec}	I_F = 50 A, V_R = 900 V, V_{GE} = -15 V, -di$_F$/dt = 1600 A/µs (T_{vj} = 150 °C)	T_{vj} = 25 °C		5.9		mJ
			T_{vj} = 125 °C		10.2		
			T_{vj} = 150 °C		11.9		
Thermal resistance, junction to heatsink	R_{thJH}	per diode, Valid with IFX pre-applied Thermal Interface Material				0.879	K/W
Temperature under switching conditions	$T_{vj\,op}$			-40		150	°C

4 Thyristor, Rectifier

Table 7 Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Repetitive peak reverse voltage	V_{RRM}		T_{vj} = 25 °C	2200	V
Repetitive peak off-state voltage	V_{DRM}		T_{vj} = 25 °C	2200	V
Maximum RMS current at rectifier output	I_{RMSmax}	T_H = 90 °C		150	A
Maximum RMS forward current per chip	I_{FRMSM}	T_H = 90 °C		87	A
Surge forward current	I_{FSM}	t_P = 10 ms	T_{vj} = 25 °C	870	A
			T_{vj} = 125 °C	800	
			T_{vj} = 150 °C	770	
I^2t - value	I^2t	t_P = 10 ms	T_{vj} = 25 °C	3780	A^2s
			T_{vj} = 125 °C	3200	
			T_{vj} = 150 °C	2960	
Critical rate of rise of on-state current	$(di/dt)_{cr}$	DIN IEC 60 754-6, f = 50 Hz, i_{GM} = 0.5 A, di_G/dt = 0.5 A/µs	T_{vj} = 150 °C	150	A/µs
Critical rate of rise of off-state voltage	$(dv/dt)_{cr}$	V_D/V_{DRM} = 0.67	T_{vj} = 150 °C	1000	V/µs

Table 8 Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Forward voltage	V_T	I_T = 100 A	T_{vj} = 25 °C		1.3		V
			T_{vj} = 125 °C		1.3		
			T_{vj} = 150 °C		1.35		
Gate trigger current	I_{gt}	V_d = 6 V	T_{vj} = 25 °C			70	mA
Gate trigger voltage	V_{gt}	V_d = 6 V	T_{vj} = 25 °C			1.5	V
Gate non-trigger current	I_{gd}	v_D/V_{DRM} = 0.67	T_{vj} = 150 °C			5.0	mA
Gate non-trigger voltage	V_{gd}	v_D/V_{DRM} = 0.67	T_{vj} = 150 °C			0.2	V
Holding current	I_H	V_d = 6 V	T_{vj} = 25 °C			100	mA
Latching current	I_L	$R_{GK} \geq$ 20 Ω, i_{GM} = 0.5 A, t_g = 10 µs	T_{vj} = 25 °C			250	mA
Gate controlled delay time	t_{gd}	DIN IEC 747-6, i_{GM} = 0.5 A, di_G/dt = 0.5 A/µs	T_{vj} = 25 °C			2.0	µs

Table 8 Characteristic values (continued)

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Circuit commutated turn-off time	t_q	I_{TM} = 144 A, v_{RM} = 100 V, V_{DM}/V_{DRM} = 0.50, dv_D/dt = 20 V/µs, $-di_T/dt$ = 10 A/µs	T_{vj} = 150 °C		150		µs
Reverse current	I_r		T_{vj} = 25 °C, V_R = 2200 V			0.5	mA
			T_{vj} = 150 °C, V_R = 1250 V			10	
Thermal resistance, junction to heatsink	R_{thJH}	per Thyristor, Valid with IFX pre-applied Thermal Interface Material				0.592	K/W
Temperature under switching conditions	$T_{vj, op}$			-40		150	°C

Note: Thyristors are qualified to only operate for a short time in forward blocking mode according to standard IEC60747-2 for diodes.

5 Diode, Rectifier

Table 9 Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Repetitive peak reverse voltage	V_{RRM}	T_{vj} = 25 °C		2200	V
Maximum RMS forward current per chip	I_{FRMSM}	T_H = 90 °C		87	A
Maximum RMS current at rectifier output	I_{RMSM}	T_H = 90 °C		150	A
Surge forward current	I_{FSM}	t_P = 10 ms	T_{vj} = 25 °C	1450	A
			T_{vj} = 125 °C	1160	
			T_{vj} = 150 °C	1150	
I^2t - value	I^2t	t_P = 10 ms	T_{vj} = 25 °C	10500	A^2s
			T_{vj} = 125 °C	6730	
			T_{vj} = 150 °C	6610	

Table 10 Characteristic values

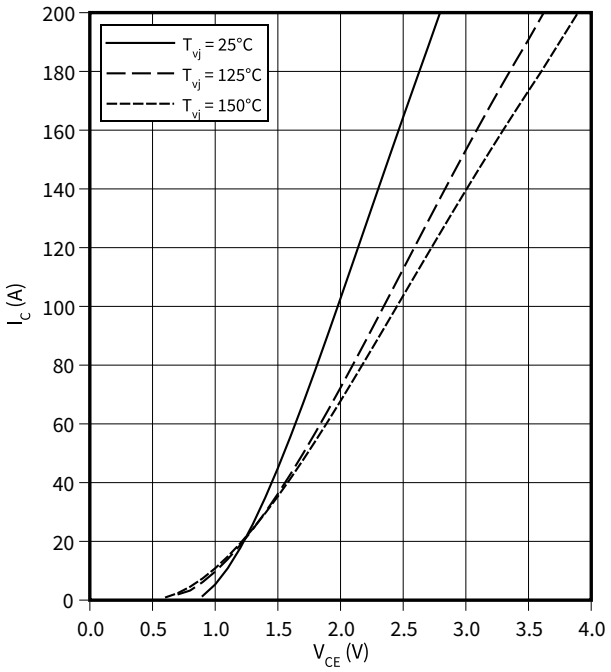
Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Forward voltage	V_F	I_F = 110 A	T_{vj} = 25 °C		1.10		V
			T_{vj} = 125 °C		1.00		
			T_{vj} = 150 °C		1.00		
Reverse current	I_r	T_{vj} = 150 °C, V_R = 1760 V			0.3		mA
Thermal resistance, junction to heatsink	R_{thJH}	per diode, Valid with IFX pre-applied Thermal Interface Material				0.548	K/W
Temperature under switching conditions	$T_{vj, op}$			-40		150	°C

6 Characteristics diagrams

output characteristic (typical), IGBT, Brake-Chopper

$I_C = f(V_{CE})$

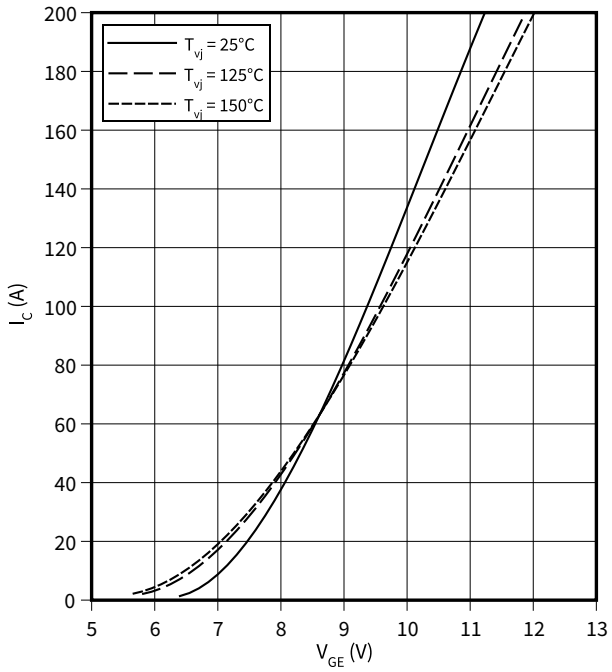
$V_{GE} = 15$ V



transfer characteristic (typical), IGBT, Brake-Chopper

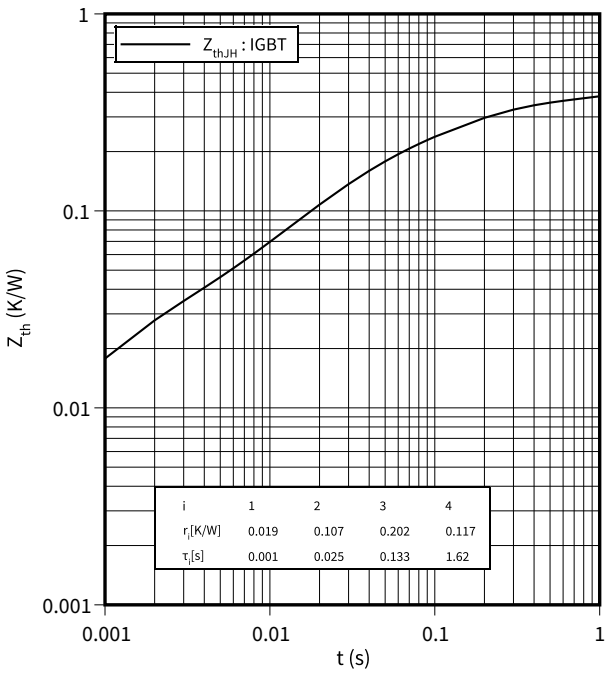
$I_C = f(V_{GE})$

$V_{CE} = 20$ V



transient thermal impedance , IGBT, Brake-Chopper

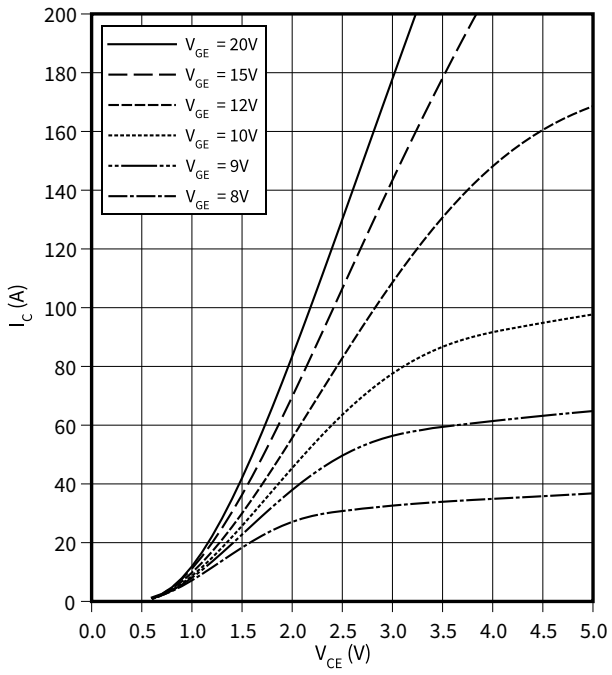
$Z_{th} = f(t)$



output characteristic (typical), IGBT, Brake-Chopper

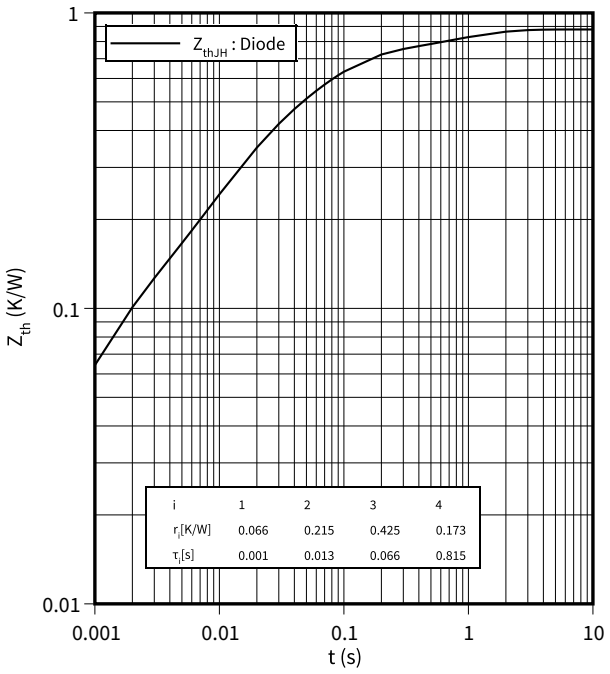
$I_C = f(V_{CE})$

$T_{vj} = 150$ °C



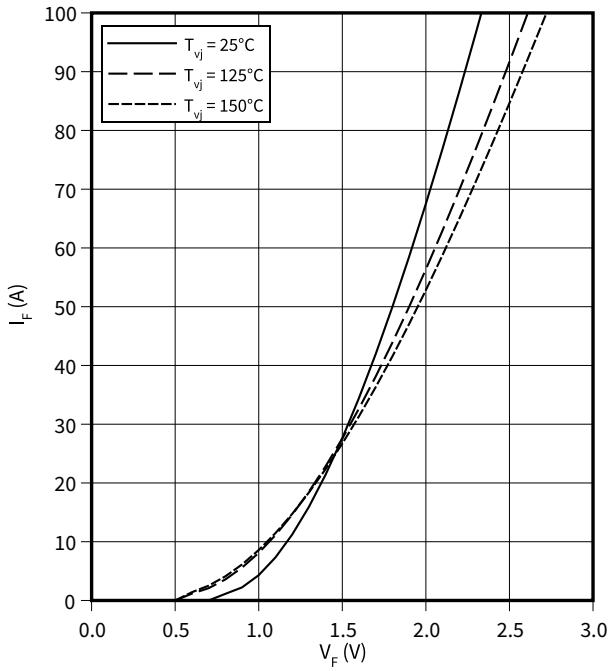
transient thermal impedance , Diode, Brake-Chopper

$Z_{th} = f(t)$



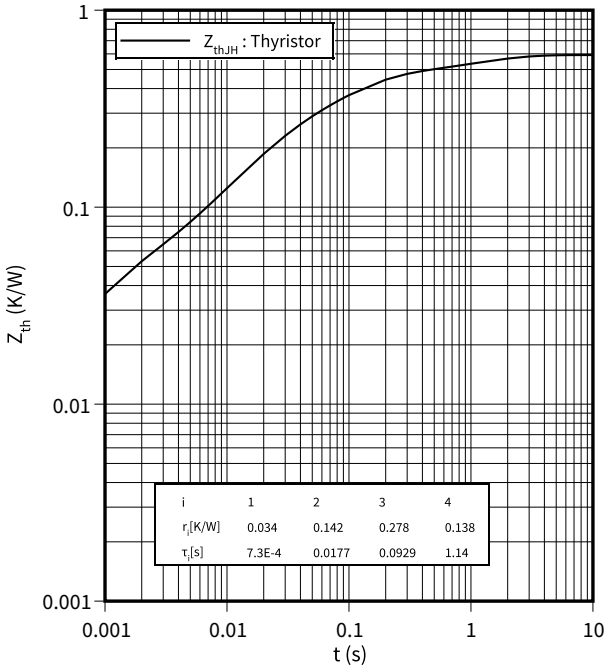
forward characteristic of (typical), Diode, Brake-Chopper

$I_F = f(V_F)$



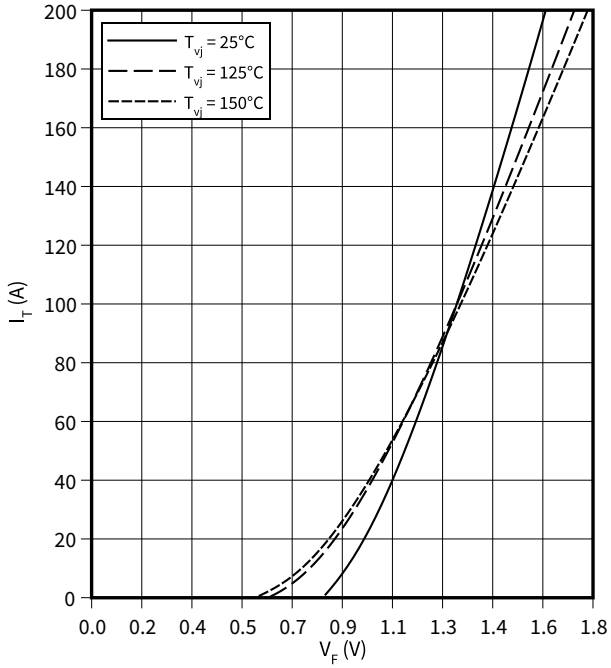
Transient thermal impedance, Thyristor, Rectifier

$Z_{th} = f(t)$



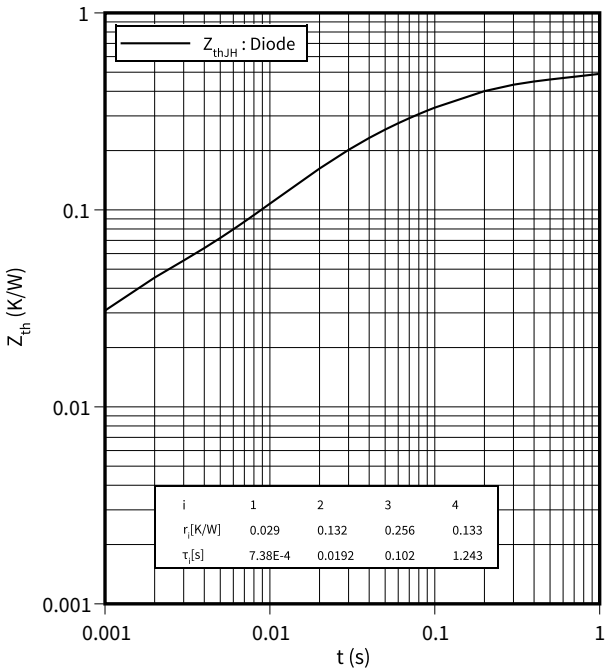
Forward characteristic (typical), Thyristor, Rectifier

$I_T = f(V_F)$



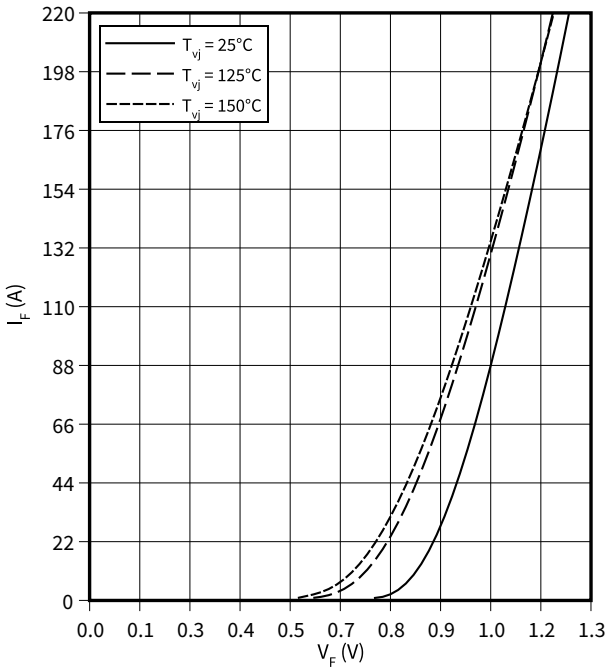
Transient thermal impedance, Diode, Rectifier

$Z_{th} = f(t)$



Forward characteristic (typical), Diode, Rectifier

$I_F = f(V_F)$



7 Circuit diagram

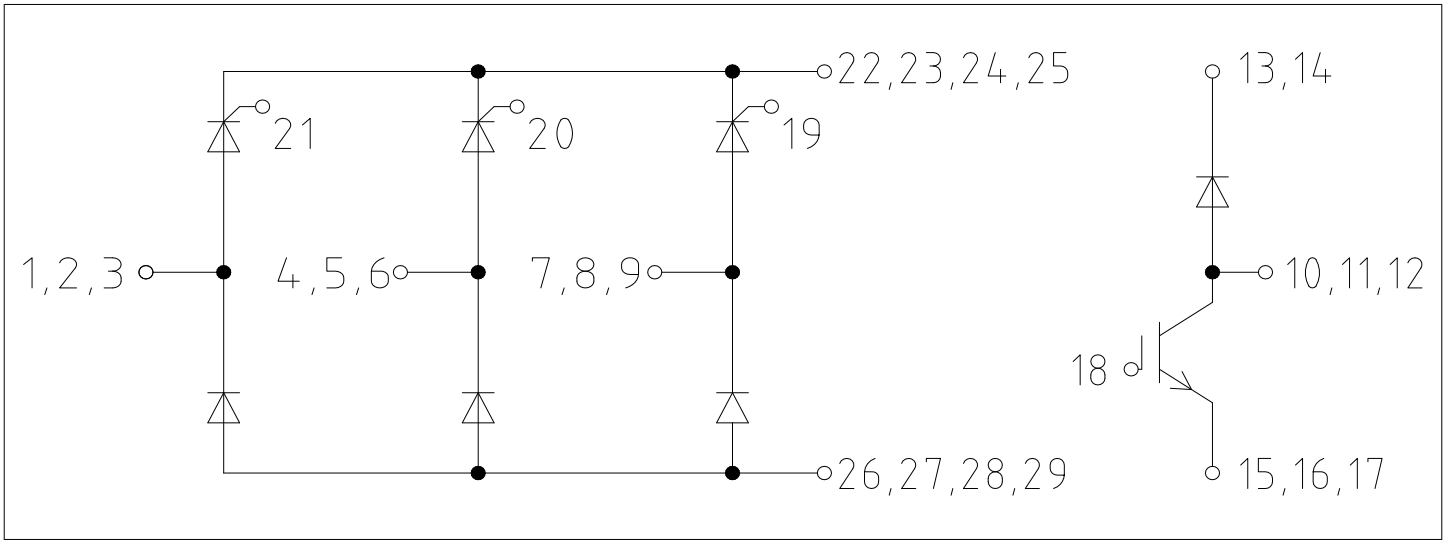


Figure 2

8 Package outlines

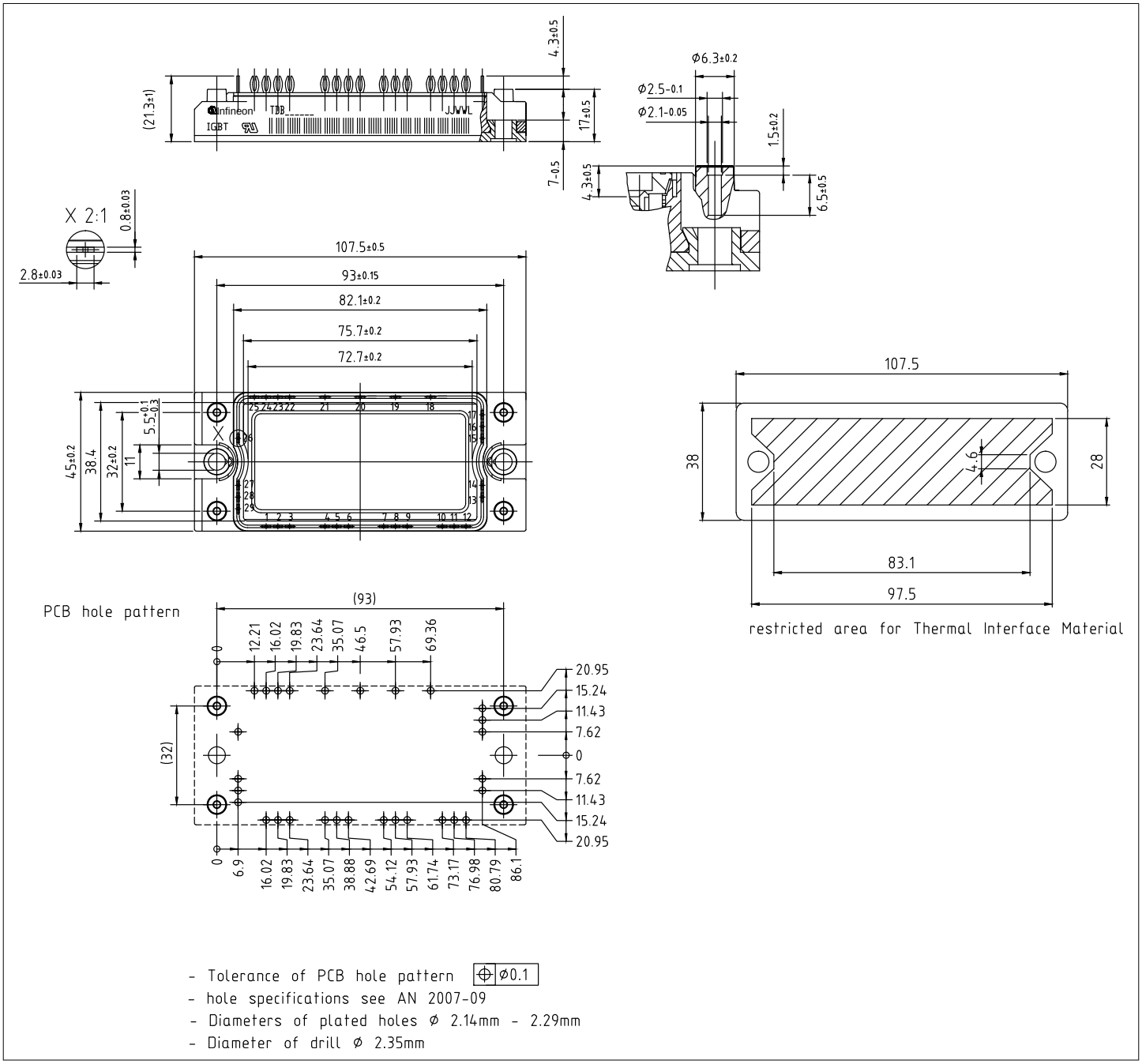


Figure 3

9 Module label code

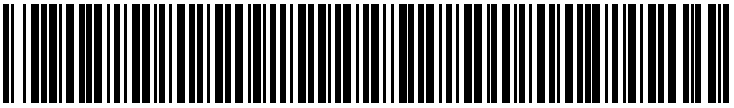
Module label code			
Code format	Data Matrix		Barcode Code128
Encoding	ASCII text		Code Set A
Symbol size	16x16		23 digits
Standard	IEC24720 and IEC16022		IEC8859-1
Code content	*Content* Module serial number Module material number Production order number Date code (production year) Date code (production week)	*Digit* 1 – 5 6 - 11 12 - 19 20 – 21 22 – 23	*Example* 71549 142846 55054991 15 30
Example	 7154914284655054991530	 7154914284655054991530	

Figure 4

Revision history

Document revision	Date of release	Description of changes
0.10	2021-06-17	Target datasheet
0.20	2021-07-16	Preliminary datasheet

Trademarks

All referenced product or service names and trademarks are the property of their respective owners.

Edition 2021-07-16

Published by

Infineon Technologies AG

81726 Munich, Germany

Do you have a question about any aspect of this document?

Email: erratum@infineon.com

Document reference
IFX-ABA787-002

IMPORTANT NOTICE

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics ("Beschaffenheitsgarantie").

With respect to any examples, hints or any typical values stated herein and/or any information regarding the application of the product, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

In addition, any information given in this document is subject to customer's compliance with its obligations stated in this document and any applicable legal requirements, norms and standards concerning customer's products and any use of the product of Infineon Technologies in customer's applications.

The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer's technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

Please note that this product is not qualified according to the AEC Q100 or AEC Q101 documents of the Automotive Electronics Council.

WARNINGS

Due to technical requirements products may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies office.

Except as otherwise explicitly approved by Infineon Technologies in a written document signed by authorized representatives of Infineon Technologies, Infineon Technologies' products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury.