

Highly insulated module

Features

- Electrical features
 - $V_{CES} = 6500\text{ V}$
 - $I_{C\text{ nom}} = 500\text{ A} / I_{CRM} = 1000\text{ A}$
- Mechanical features
 - AlSiC base plate for increased thermal cycling capability
 - Extended storage temperature down to $T_{stg} = -55\text{ °C}$
 - High creepage and clearance distances
 - Package with CTI > 600
 - Package with enhanced insulation of 10.4 kV AC 60 s



Potential applications

- Traction drives
- Medium-voltage converters

Product validation

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

Description

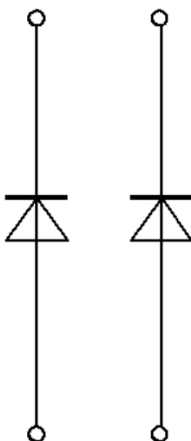


Table of contents

	Description	1
	Features	1
	Potential applications	1
	Product validation	1
	Table of contents	2
1	Package	3
2	Diode, Inverter	3
3	Characteristics diagrams	5
4	Circuit diagram	7
5	Package outlines	8
6	Module label code	9
	Revision history	10
	Disclaimer	11

1 Package

Table 1 Insulation coordination

Parameter	Symbol	Note or test condition	Values	Unit
Isolation test voltage	V_{ISOL}	RMS, $f = 50 \text{ Hz}$, $t = 60 \text{ s}$	10.4	kV
Partial discharge extinction voltage	V_{isol}	RMS, $f = 50 \text{ Hz}$, Q_{PD} typ. 10 pC	5.1	kV
DC stability	$V_{CE(D)}$	$T_{vj}=25^{\circ}\text{C}$, 100 Fit	3800	V
Material of module baseplate			AlSiC	
Internal isolation		basic insulation (class 1, IEC 61140)	AlN	
Creepage distance	d_{Creep}	terminal to heatsink	64.0	mm
Creepage distance	d_{Creep}	terminal to terminal	56.0	mm
Clearance	d_{Clear}	terminal to heatsink	40.0	mm
Clearance	d_{Clear}	terminal to terminal	26.0	mm
Comparative tracking index	CTI		> 600	

Table 2 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Stray inductance module	L_{sCE}			25		nH
Module lead resistance, terminals - chip	$R_{AA'+CC'}$	$T_C=25^{\circ}\text{C}$, per switch		0.37		mΩ
Storage temperature	T_{stg}		-55		125	°C
Mounting torque for module mounting	M	- Mounting according to valid application note	M6, Screw	4.25	5.75	Nm
Terminal connection torque	M	- Mounting according to valid application note	M8, Screw	8	10	Nm
Weight	G			1000		g

Note: Dynamic Data valid in conjunction with FZ500R65KE3 module

2 Diode, Inverter

Table 3 Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Repetitive peak reverse voltage	V_{RRM}		$T_{vj} = -50^{\circ}\text{C}$	5900	V
			$T_{vj} = 25^{\circ}\text{C}$	6500	
			$T_{vj} = 125^{\circ}\text{C}$	6500	

(table continues...)

Table 3 (continued) Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Continuous DC forward current	I_F			500	A
Repetitive peak forward current	I_{FRM}	$t_P = 1 \text{ ms}$		1000	A
I^2t - value	I^2t	$t_P = 10 \text{ ms}$, $V_R = 0 \text{ V}$	$T_{vj} = 125 \text{ °C}$	210	kA^2s
Maximum power dissipation	P_{RQM}		$T_{vj} = 125 \text{ °C}$	2000	kW
Minimum turn-on time	t_{onmin}			10	μs

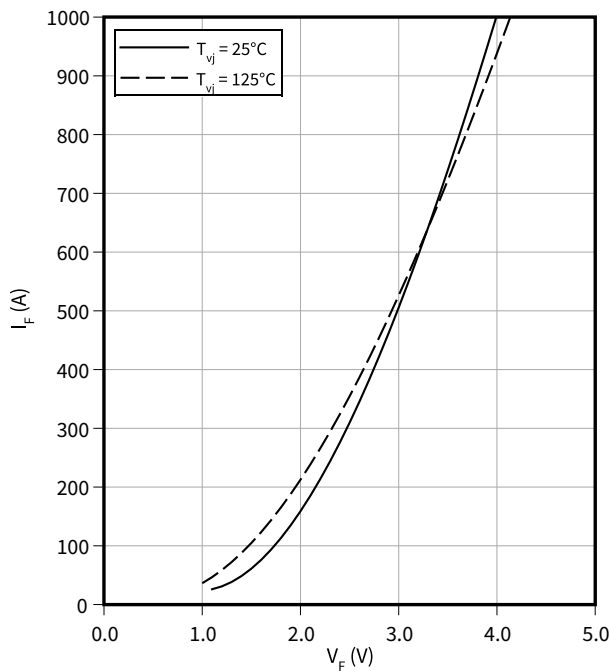
Table 4 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	V_F	$I_F = 500 \text{ A}$, $V_{GE} = 0 \text{ V}$		3.00	3.50	V
				2.95	3.50	
Peak reverse recovery current	I_{RM}	$V_R = 3600 \text{ V}$, $I_F = 500 \text{ A}$, $V_{GE} = -15 \text{ V}$, $-di_F/dt = 2000 \text{ A}/\mu\text{s}$ ($T_{vj} = 125 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	730		A
			$T_{vj} = 125 \text{ °C}$	800		
Recovered charge	Q_r	$V_R = 3600 \text{ V}$, $I_F = 500 \text{ A}$, $V_{GE} = -15 \text{ V}$, $-di_F/dt = 2000 \text{ A}/\mu\text{s}$ ($T_{vj} = 125 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	570		μC
			$T_{vj} = 125 \text{ °C}$	1050		
Reverse recovery energy	E_{rec}	$V_R = 3600 \text{ V}$, $I_F = 500 \text{ A}$, $V_{GE} = -15 \text{ V}$, $-di_F/dt = 2000 \text{ A}/\mu\text{s}$ ($T_{vj} = 125 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	930		mJ
			$T_{vj} = 125 \text{ °C}$	2000		
Thermal resistance, junction to case	R_{thJC}	per diode			27.9	K/kW
Thermal resistance, case to heat sink	R_{thCH}	per diode, $\lambda_{grease} = 1 \text{ W}/(\text{m}^2\text{K})$		23.0		K/kW
Temperature under switching conditions	$T_{vj op}$		-50		125	$^{\circ}\text{C}$

3 Characteristics diagrams

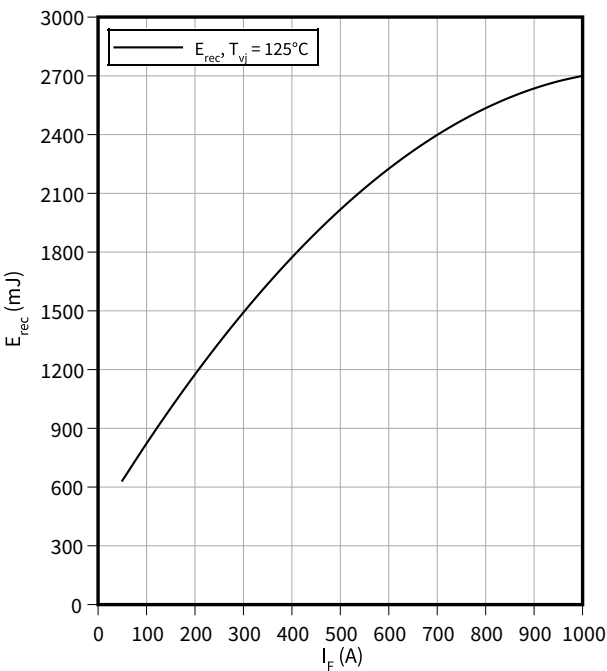
Forward characteristic (typical), Diode, Inverter

$I_F = f(V_F)$



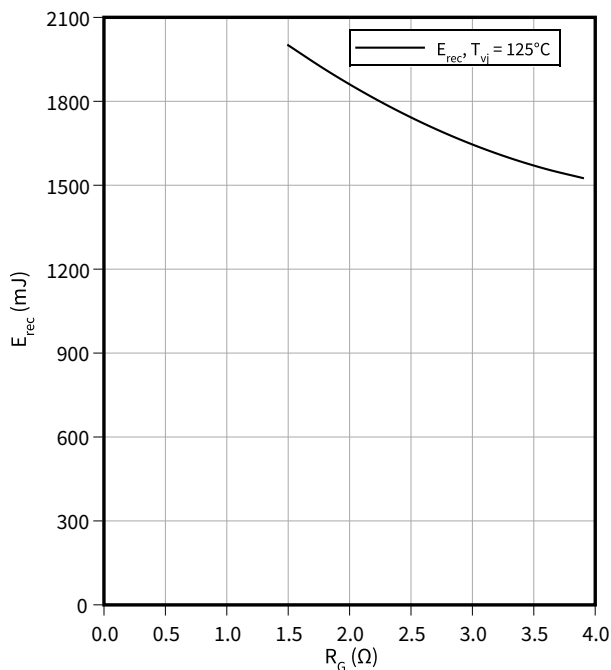
Switching losses (typical), Diode, Inverter

$E_{rec} = f(I_F)$
 $V_{CE} = 3600\text{ V}, R_{Gon} = R_{Gon}(\text{IGBT})$



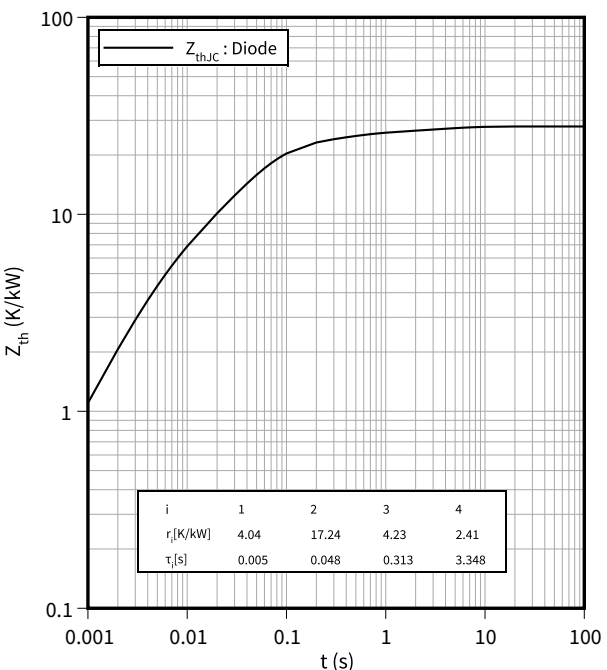
Switching losses (typical), Diode, Inverter

$E_{rec} = f(R_G)$
 $V_{CE} = 3600\text{ V}, I_F = 500\text{ A}$



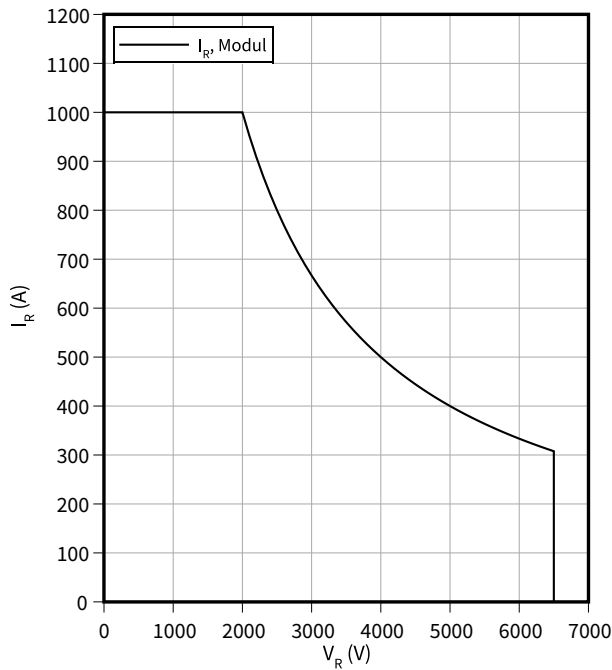
Transient thermal impedance, Diode, Inverter

$Z_{th} = f(t)$



Safe operating area (SOA), Diode, Inverter

$I_R = f(V_R)$
 $T_{vj} = 125\text{ °C}$



4 **Circuit diagram**

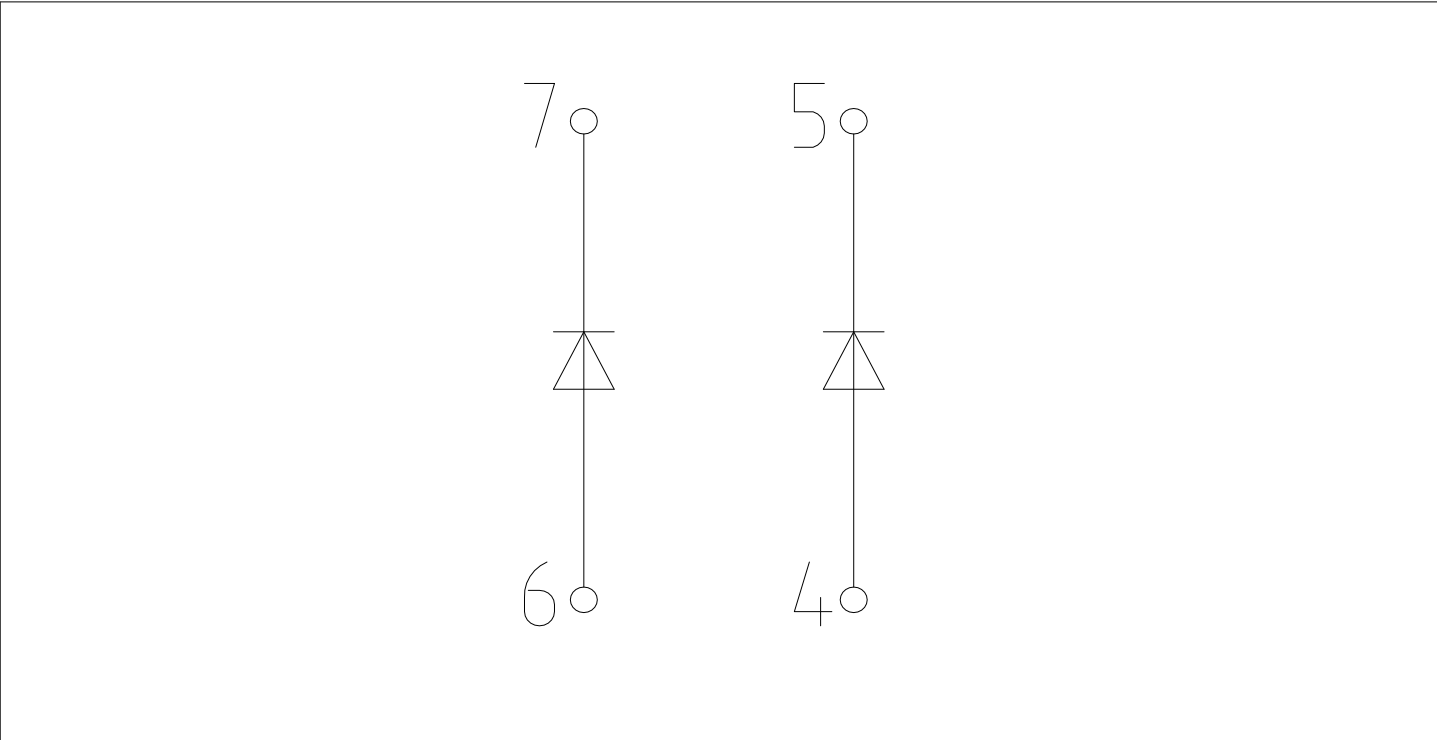


Figure 1

5 Package outlines

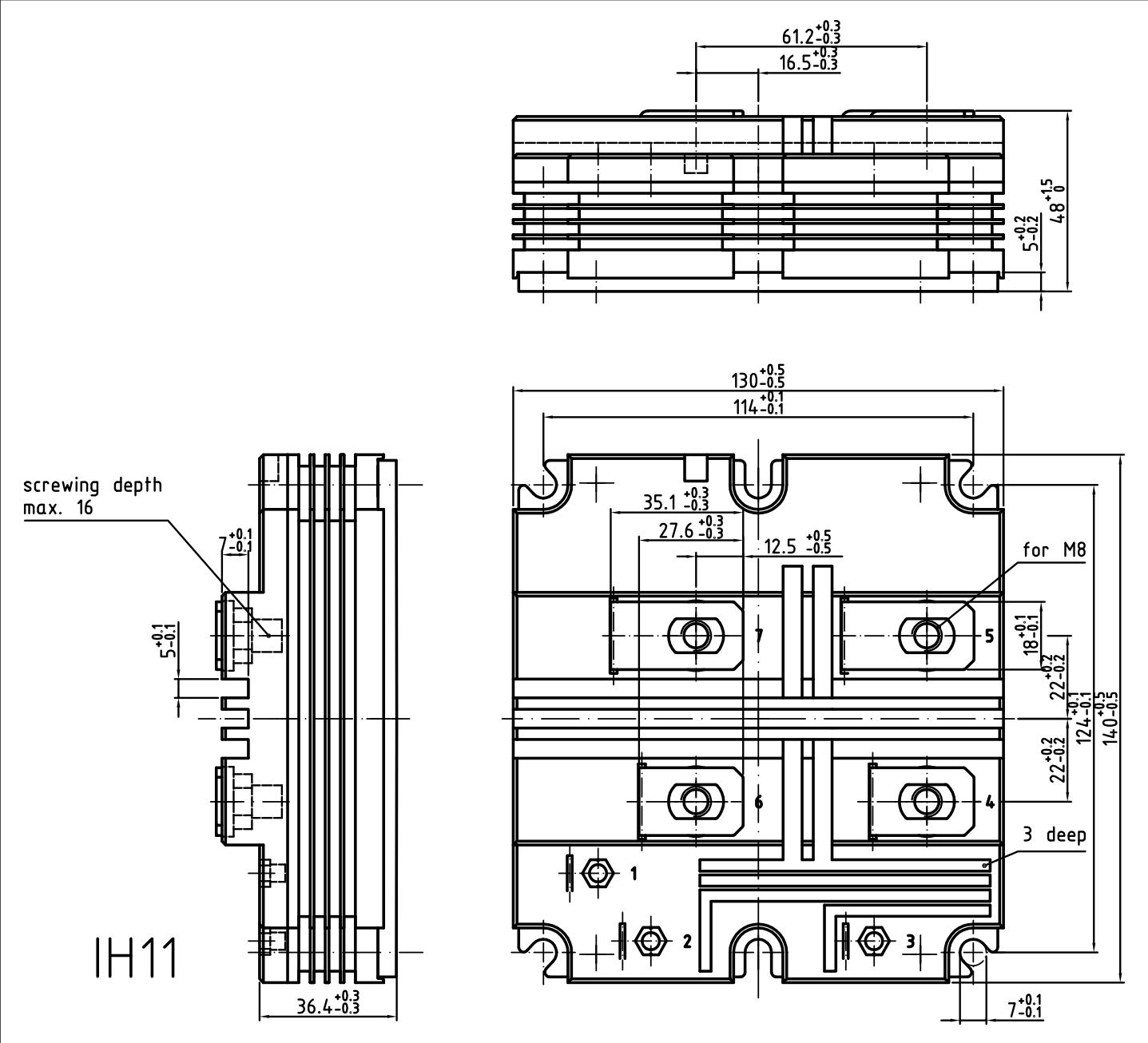


Figure 2

6 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	<i>Content</i>	<i>Digit</i>	<i>Example</i>
	Module serial number	1 – 5	71549
	Module material number	6 - 11	142846
	Production order number	12 - 19	55054991
	Date code (production year)	20 – 21	15
	Date code (production week)	22 – 23	30
Example	 7154914284655054991153071549142846550549911530		

Figure 3

Revision history

Document revision	Date of release	Description of changes
V2.0	2012-08-07	Preliminary datasheet
V3.0	2014-06-16	Final datasheet
V3.1	2014-06-17	Final datasheet
V3.2	2018-01-15	Final datasheet
n/a	2020-09-01	Datasheet migrated to a new system with a new layout and new revision number schema: target or preliminary datasheet = 0.xy; final datasheet = 1.xy
1.10	2022-04-04	Final datasheet

Trademarks

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

Edition 2022-04-04

Published by

**Infineon Technologies AG
81726 Munich, Germany**

**© 2022 Infineon Technologies AG
All Rights Reserved.**

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

Email: erratum@infineon.com

**Document reference
IFX-AAX218-005**

IMPORTANT NOTICE

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

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.

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.