Preliminary datasheet

EconoPACK™2 module with the fast IGBT2 for high-frequency switching and PressFIT / NTC

Features

Typical appearance

- Electrical features
  - V_{CES} = 1200 V
  - $I_{C\ nom}$ = 75 A / I_{CRM} = 150 A
  - High short-circuit capability
  - Low switching losses
- Mechanical features
  - Isolated base plate
  - Copper base plate
  - PressFIT contact technology
  - RoHS compliant
  - Standard housing

Potential applications

- Inductive heating and welding
- UPS systems

Product validation

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

Description

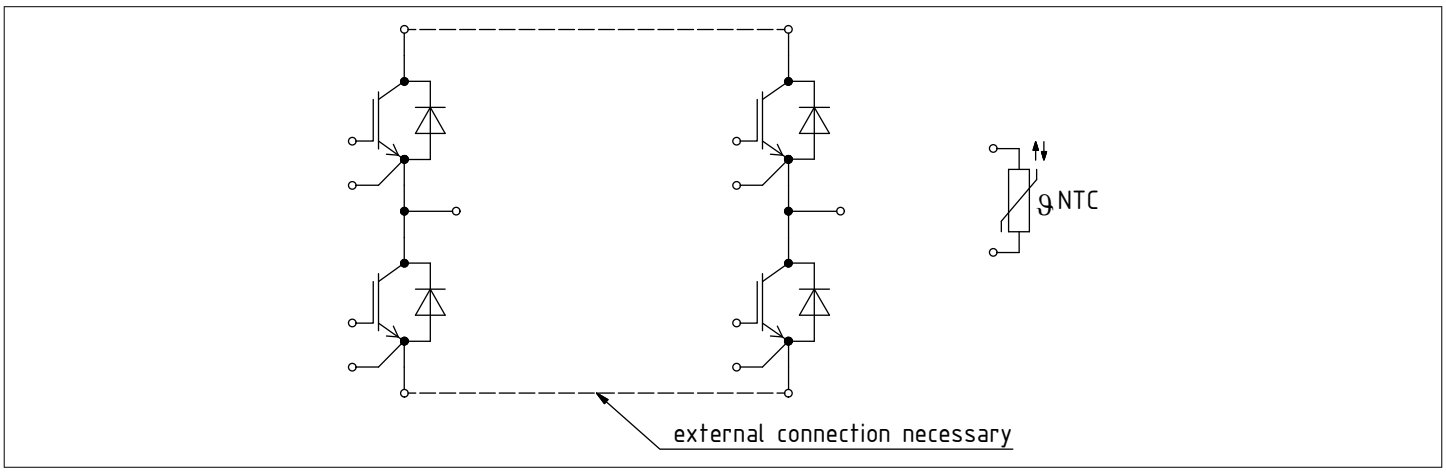


Table of contents

1 Package

Table 1 Insulation coordination

Parameter	Symbol	Note or test condition	Values	Unit
Isolation test voltage	V_{ISOL}	RMS, f = 50 Hz, *t* = 1 min	2.5	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	
Relative thermal index (electrical)	*RTI*	housing	140	°C

Table 2 Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Stray inductance module	L_{sCE}				30		nH
Module lead resistance, terminals - chip	$R_{CC'+EE'}$	T_C=25°C, per switch			2.2		mΩ
Storage temperature	T_{stg}			-40		125	°C
Mounting torque for module mounting	*M*	- Mounting according to valid application note	M5, Screw	3		6	Nm
Weight	*G*				180		g

***Note**: The current under continuous operation is limited to 50 A rms per connector pin.*

2 IGBT, Inverter

Table 3 Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Collector-emitter voltage	V_{CES}		T_{vj} = 25 °C	1200	V
Continuous DC collector current	I_{CDC}	$T_{vj\,max}$ = 150 °C	T_C = 65 °C	75	A
Repetitive peak collector current	I_{CRM}	t_p limited by $T_{vj\,op}$		150	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 = 75 A, V_{GE} = 15 V	T_{vj} = 25 °C		3.20	3.75	V
			T_{vj} = 125 °C		3.85		
Gate threshold voltage	V_{GEth}	I_C = 3 mA, V_{CE} = V_{GE}, T_{vj} = 25 °C		4.5	5.5	6.5	V
Gate charge	Q_G	V_{GE} = ±15 V			0.8		µC
Internal gate resistor	R_{Gint}	T_{vj} = 25 °C			5		Ω
Input capacitance	C_{ies}	f = 1000 kHz, T_{vj} = 25 °C, V_{CE} = 25 V, V_{GE} = 0 V			5.1		nF
Reverse transfer capacitance	C_{res}	f = 1000 kHz, T_{vj} = 25 °C, V_{CE} = 25 V, V_{GE} = 0 V			0.3		nF
Collector-emitter cut-off current	I_{CES}	V_{CE} = 1200 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 = 75 A, V_{CC} = 600 V, V_{GE} = ±15 V, R_{Gon} = 7.5 Ω	T_{vj} = 25 °C		0.120		µs
			T_{vj} = 125 °C		0.130		
Rise time (inductive load)	t_r	I_C = 75 A, V_{CC} = 600 V, V_{GE} = ±15 V, R_{Gon} = 7.5 Ω	T_{vj} = 25 °C		0.050		µs
			T_{vj} = 125 °C		0.060		
Turn-off delay time (inductive load)	t_{doff}	I_C = 75 A, V_{CC} = 600 V, V_{GE} = ±15 V, R_{Goff} = 7.5 Ω	T_{vj} = 25 °C		0.310		µs
			T_{vj} = 125 °C		0.360		
Fall time (inductive load)	t_f	I_C = 75 A, V_{CC} = 600 V, V_{GE} = ±15 V, R_{Goff} = 7.5 Ω	T_{vj} = 25 °C		0.020		µs
			T_{vj} = 125 °C		0.030		
Turn-on energy loss per pulse	E_{on}	I_C = 75 A, V_{CC} = 600 V, L_σ = 30 nH, V_{GE} = ±15 V, R_{Gon} = 7.5 Ω, di/dt = 2000 A/µs (T_{vj} = 125 °C)	T_{vj} = 25 °C		5		mJ
			T_{vj} = 125 °C		9		
Turn-off energy loss per pulse	E_{off}	I_C = 75 A, V_{CC} = 600 V, L_σ = 30 nH, V_{GE} = ±15 V, R_{Goff} = 7.5 Ω, dv/dt = 7000 V/µs (T_{vj} = 125 °C)	T_{vj} = 25 °C		2.6		mJ
			T_{vj} = 125 °C		3.8		
SC data	I_{SC}	V_{GE} ≤ 15 V, V_{CC} = 900 V, V_{CEmax}=V_{CES}-L_{sCE}*di/dt	t_P ≤ 10 µs, T_{vj}=125 °C		450		A
Thermal resistance, junction to case	R_{thJC}	per IGBT				0.250	K/W
Thermal resistance, case to heat sink	R_{thCH}	per IGBT, λ_{grease} = 1 W/(m·K)			0.120		K/W
Temperature under switching conditions	$T_{vj\,op}$			-40		125	°C

3 Diode, Inverter

Table 5 Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Repetitive peak reverse voltage	V_{RRM}		T_{vj} = 25 °C	1200	V
Continuous DC forward current	I_F			75	A
Repetitive peak forward current	I_{FRM}	t_P = 1 ms		150	A
I^2t - value	I^2t	t_P = 10 ms, V_R = 0 V	T_{vj} = 125 °C	2450	A^2s

Table 6 Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Forward voltage	V_F	I_F = 75 A, V_{GE} = 0 V	T_{vj} = 25 °C		2.00	2.55	V
			T_{vj} = 125 °C		1.70		
Peak reverse recovery current	I_{RM}	V_{CC} = 600 V, I_F = 75 A, V_{GE} = -15 V, -di$_F$/dt = 2000 A/µs (T_{vj} = 125 °C)	T_{vj} = 25 °C		43		A
			T_{vj} = 125 °C		62		
Recovered charge	Q_r	V_{CC} = 600 V, I_F = 75 A, V_{GE} = -15 V, -di$_F$/dt = 2000 A/µs (T_{vj} = 125 °C)	T_{vj} = 25 °C		4.5		µC
			T_{vj} = 125 °C		13		
Reverse recovery energy	E_{rec}	V_{CC} = 600 V, I_F = 75 A, V_{GE} = -15 V, -di$_F$/dt = 2000 A/µs (T_{vj} = 125 °C)	T_{vj} = 25 °C		1.7		mJ
			T_{vj} = 125 °C		4.7		
Thermal resistance, junction to case	R_{thJC}	per diode				0.550	K/W
Thermal resistance, case to heat sink	R_{thCH}	per diode, λ_{grease} = 1 W/(m·K)			0.260		K/W
Temperature under switching conditions	$T_{vj\,op}$			-40		125	°C

4 NTC-Thermistor

Table 7 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Rated resistance	R_{25}	T_{NTC} = 25 °C		5		kΩ
Deviation of R_{100}	$\Delta R/R$	T_{NTC} = 100 °C, R_{100} = 493 Ω	-5		5	%
Power dissipation	P_{25}	T_{NTC} = 25 °C			20	mW

(table continues...)

Table 7 (continued) Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
B-value	$B_{25/50}$	$R_2 = R_{25} \exp[B_{25/50}(1/T_2-1/(298{,}15\ K))]$		3375		K
B-value	$B_{25/80}$	$R_2 = R_{25} \exp[B_{25/80}(1/T_2-1/(298{,}15\ K))]$		3411		K
B-value	$B_{25/100}$	$R_2 = R_{25} \exp[B_{25/100}(1/T_2-1/(298{,}15\ K))]$		3433		K

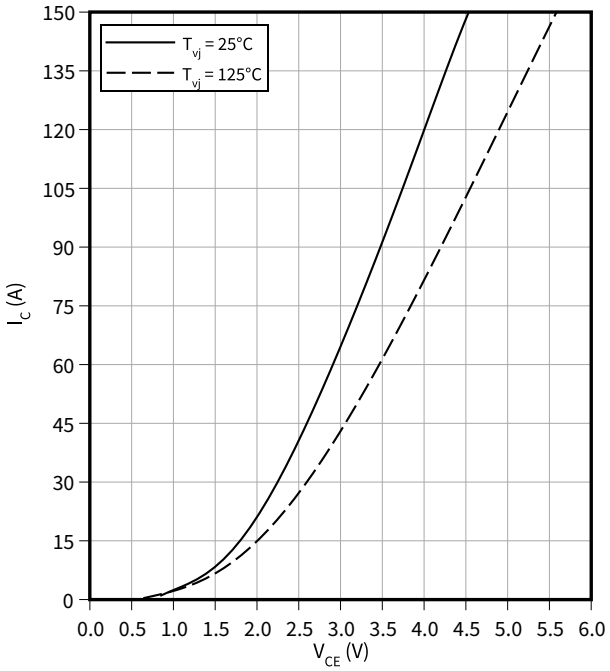
***Note**: Specification according to the valid application note.*

5 Characteristics diagrams

Output characteristic (typical), IGBT, Inverter

$I_C = f(V_{CE})$

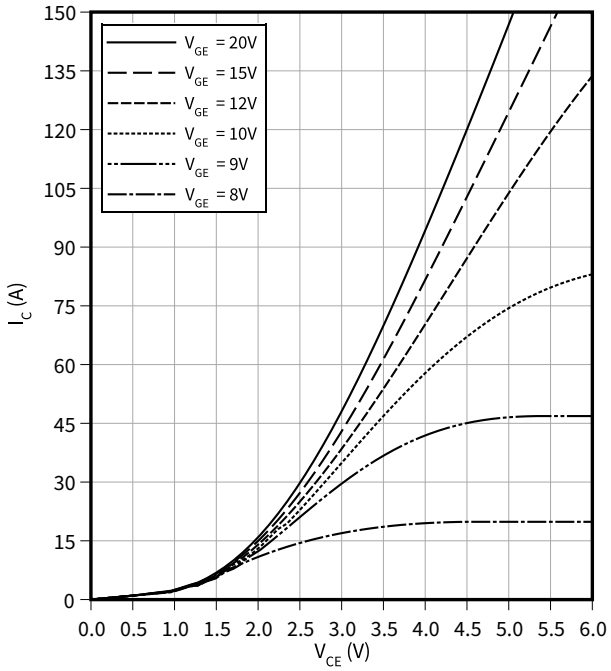
$V_{GE} = 15$ V



Output characteristic field (typical), IGBT, Inverter

$I_C = f(V_{CE})$

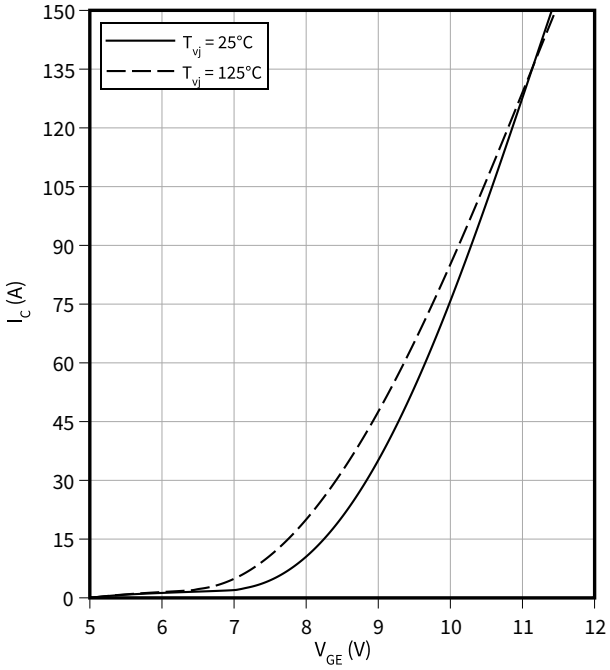
$T_{vj} = 125$ °C



Transfer characteristic (typical), IGBT, Inverter

$I_C = f(V_{GE})$

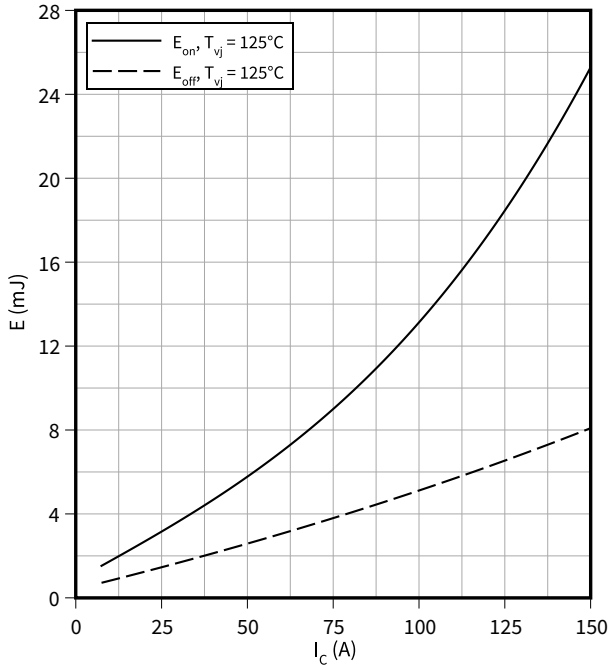
$V_{CE} = 20$ V



Switching losses (typical), IGBT, Inverter

$E = f(I_C)$

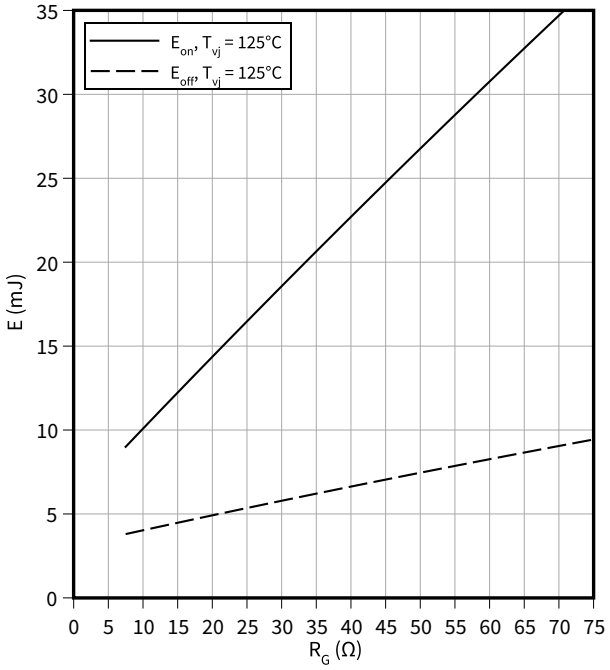
$R_{Goff} = 7.5\ \Omega$, $R_{Gon} = 7.5\ \Omega$, $V_{GE} = \pm 15$ V, $V_{CC} = 600$ V



Switching losses (typical), IGBT, Inverter

$E = f(R_G)$

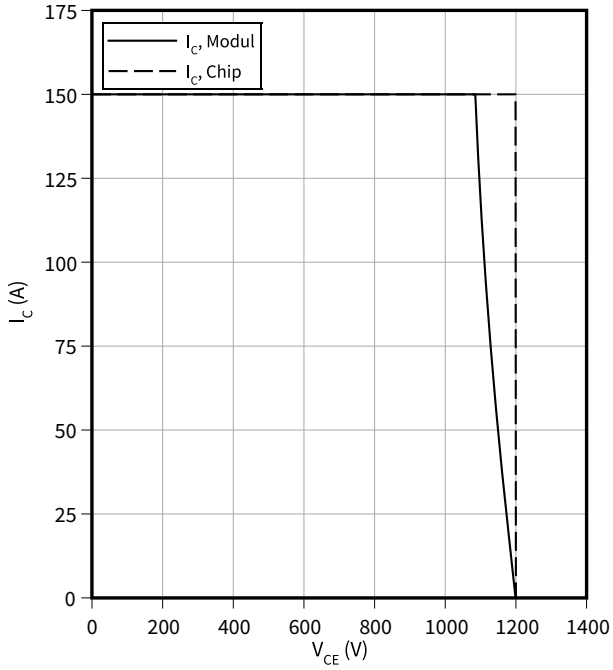
$V_{GE} = \pm 15$ V, $I_C = 75$ A, $V_{CC} = 600$ V



Reverse bias safe operating area (RBSOA), IGBT, Inverter

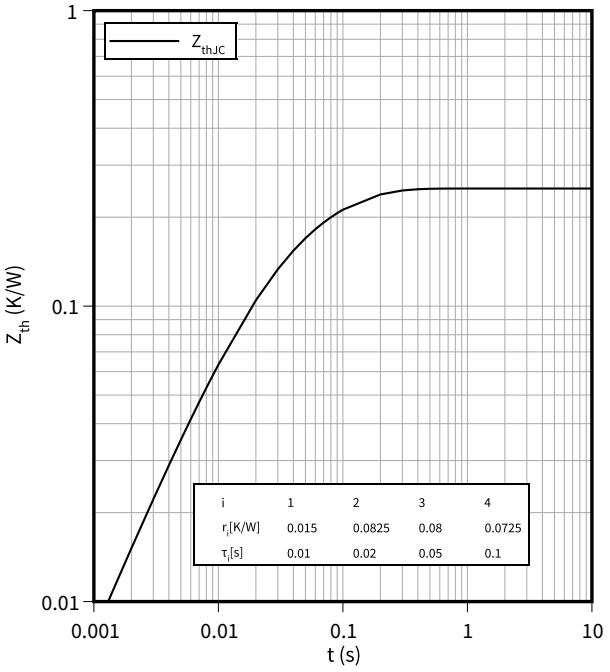
$I_C = f(V_{CE})$

$R_{Goff} = 7.5\ \Omega$, $V_{GE} = \pm 15$ V, $T_{vj} = 125$ °C



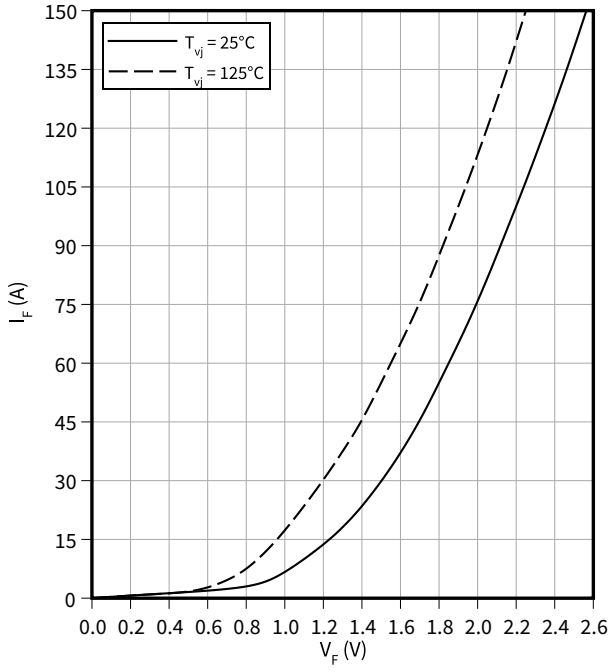
Transient thermal impedance, IGBT, Inverter

$Z_{th} = f(t)$



Forward characteristic (typical), Diode, Inverter

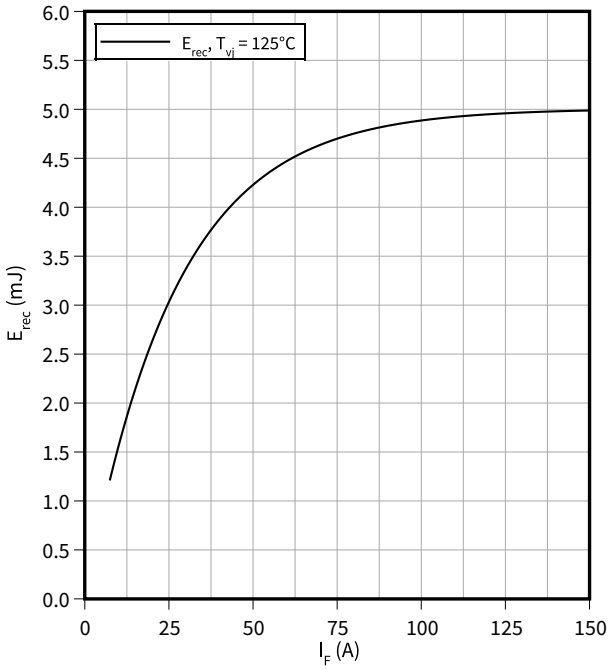
$I_F = f(V_F)$



Switching losses (typical), Diode, Inverter

$E_{rec} = f(I_F)$

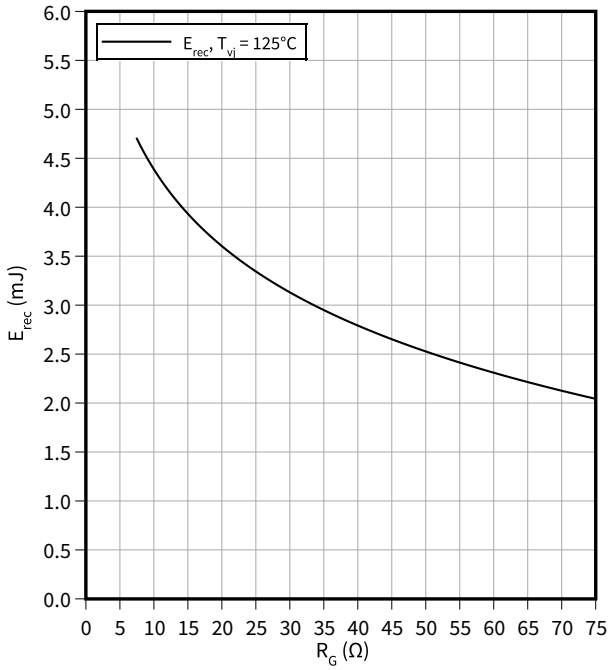
$R_{Gon} = 7.5\ \Omega$, $V_{CC} = 600\ V$



Switching losses (typical), Diode, Inverter

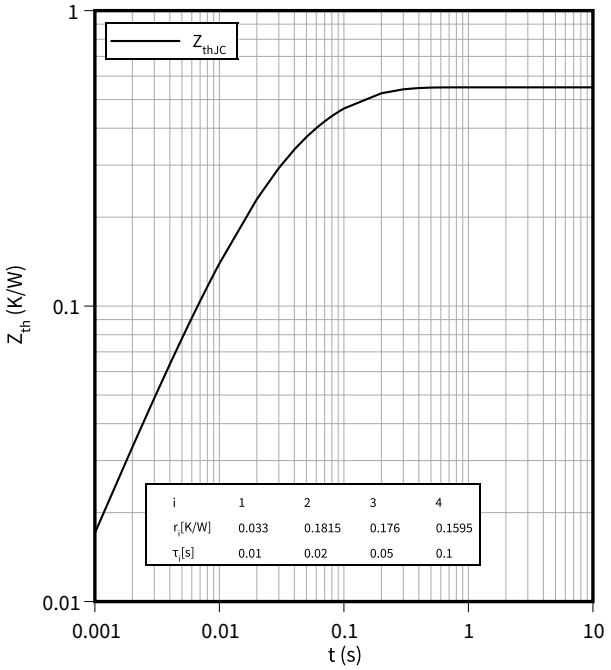
$E_{rec} = f(R_G)$

$I_F = 75\ A$, $V_{CC} = 600\ V$



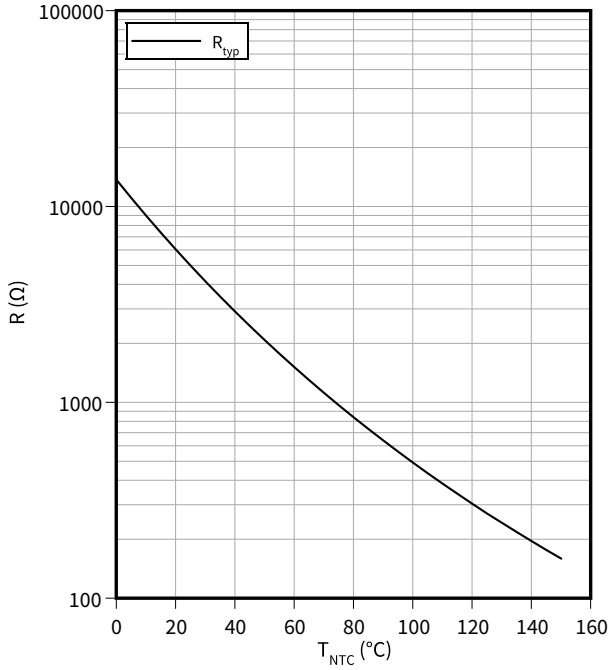
Transient thermal impedance, Diode, Inverter

$Z_{th} = f(t)$



Temperature characteristic (typical), NTC-Thermistor

$R = f(T_{NTC})$



6 Circuit diagram

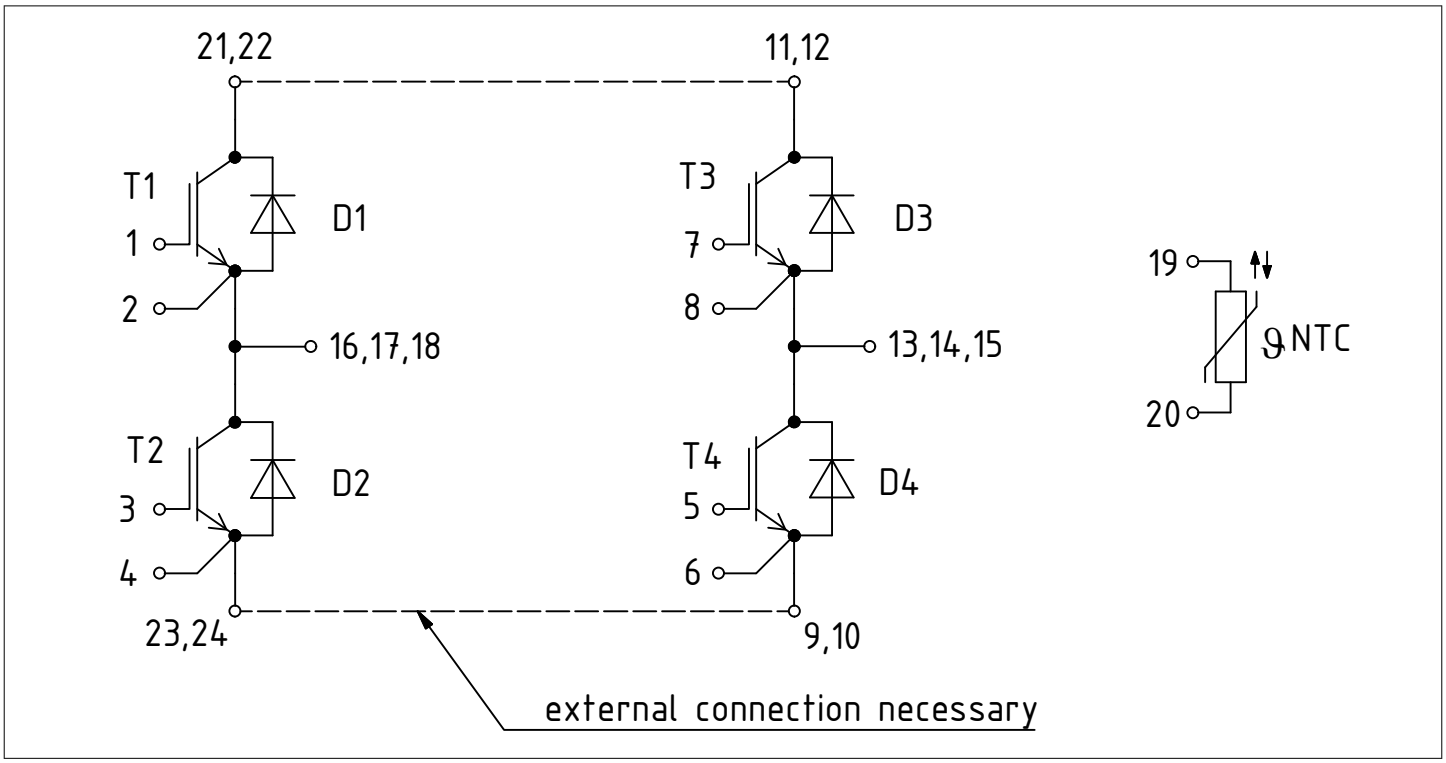


Figure 1

7 Package outlines

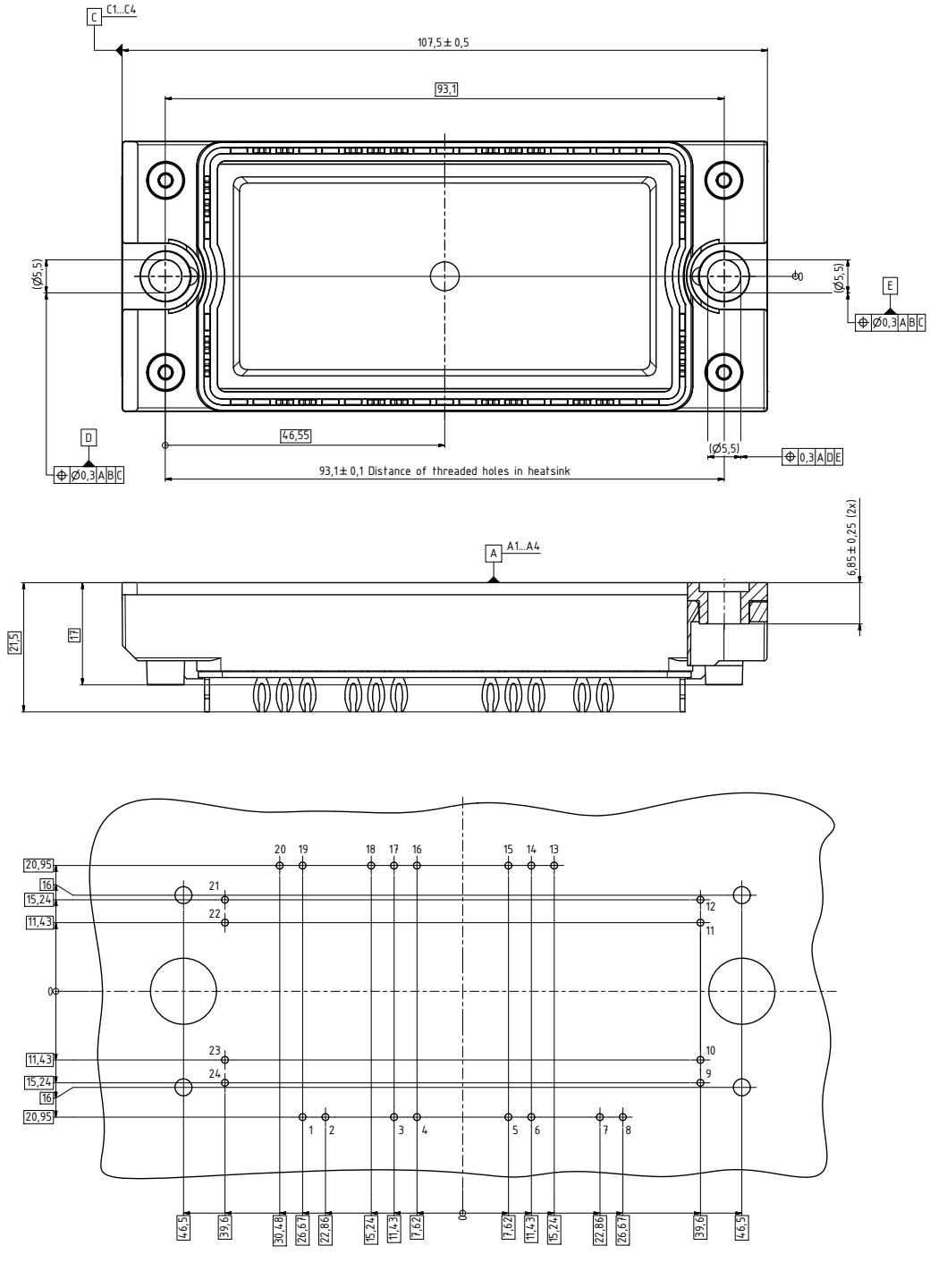


Figure 2

8 Module label code

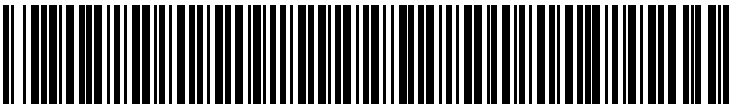
Module label code			
Code format	Data Matrix		Barcode Code128
Encoding	ASCII text		Code Set A
Symbol size	16x16		23 digits
Standard	IEC24720 and IEC16022		IEC8859-1
Code content	*Content* Module serial number Module material number Production order number Date code (production year) Date code (production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

Figure 3

Revision history

Document revision	Date of release	Description of changes
V1.0	2011-07-19	Target datasheet
V2.0	2011-10-18	Preliminary 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
0.20	2024-01-25	Preliminary datasheet

Trademarks

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

Edition 2024-01-25

Published by

Infineon Technologies AG

81726 Munich, Germany

© 2024 Infineon Technologies AG

All Rights Reserved.

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

Email: erratum@infineon.com

Document reference
IFX-AAW924-003

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.

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.