Preliminary datasheet
62 mm C-Series module with Trench/Fieldstop IGBT4 and Emitter Controlled 4 diode

Features

- Electrical features
  - V_{CES} = 1200 V
  - $I_{C\ nom}$ = 600 A / I_{CRM} = 1200 A
  - Unbeatable robustness
  - Extended operating temperature $T_{vj\ op}$
  - Low switching losses
  - Low V_{CEsat}
  - V_{CEsat} with positive temperature coefficient
- Mechanical features
  - 4 kV AC 1 min insulation
  - Package with CTI > 400
  - High creepage and clearance distances
  - High power density
  - Isolated base plate
  - Standard housing

Potential applications

- High power converters
- Motor drives
- UPS systems
- Wind turbines

Product validation

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

Description

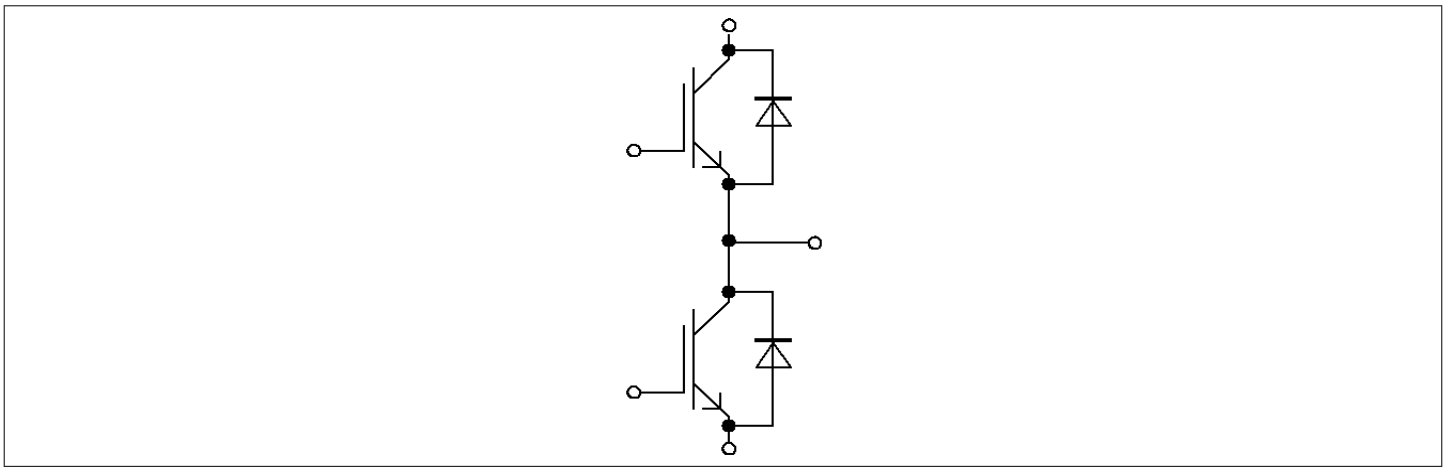


Table of contents

1 Package

Table 1 Insulation coordination

Parameter	Symbol	Note or test condition	Values	Unit
Material of module baseplate			Cu	
Internal Isolation		basic insulation (class 1, IEC 61140)	Al2O3	
Comparative tracking index	*CTI*		> 400	
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}			20		nH
Storage temperature	T_{stg}		-40		125	°C
Mounting torque for modul mounting	*M*	- Mounting according to valid application note M6, Screw	3		6	Nm
Terminal connection torque	*M*	- Mounting according to valid application note M6, Screw	2.5		5	Nm

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
Continous DC collector current	I_{CDC}	$T_{vj\,max}$ = 175 °C	T_C = 100 °C	600	A
Repetitive peak collector current	I_{CRM}	t_P = 1 ms		1200	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 = 600 A, V_{GE} = 15 V	T_{vj} = 25 °C		1.75	2.20	V
			T_{vj} = 125 °C		2.00		
			T_{vj} = 150 °C		2.05		
Gate threshold voltage	V_{GEth}	I_C = 22.8 mA, V_{CE} = V_{GE}, T_{vj} = 25 °C		5.25	5.80	6.35	V
Gate charge	Q_G	V_{GE} = ±15 V, V_{CE} = 600 V			5		µC
Internal gate resistor	R_{Gint}	T_{vj} = 25 °C			1.3		Ω

Table 4 Characteristic values (continued)

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Input capacitance	C_{ies}	f = 1000 kHz, T_{vj} = 25 °C, V_{CE} = 25 V, V_{GE} = 0 V			38		nF
Reverse transfer capacitance	C_{res}	f = 1000 kHz, T_{vj} = 25 °C, V_{CE} = 25 V, V_{GE} = 0 V			1.4		nF
Collector-emitter cut-off current	I_{CES}	V_{CE} = 1200 V, V_{GE} = 0 V	T_{vj} = 25 °C			5	mA
Gate-emitter leakage current	I_{GES}	V_{CE} = 0 V, V_{GE} = 20 V, T_{vj} = 25 °C				400	nA
Turn-on delay time (inductive load)	t_{don}	I_C = 600 A, V_{CE} = 600 V, V_{GE} = ±15 V, R_{Gon} = 0.62 Ω	T_{vj} = 25 °C		0.170		µs
			T_{vj} = 125 °C		0.180		
			T_{vj} = 150 °C		0.180		
Rise time (inductive load)	t_r	I_C = 600 A, V_{CE} = 600 V, V_{GE} = ±15 V, R_{Gon} = 0.62 Ω	T_{vj} = 25 °C		0.046		µs
			T_{vj} = 125 °C		0.048		
			T_{vj} = 150 °C		0.052		
Turn-off delay time (inductive load)	t_{doff}	I_C = 600 A, V_{CE} = 600 V, V_{GE} = ±15 V, R_{Goff} = 0.62 Ω	T_{vj} = 25 °C		0.400		µs
			T_{vj} = 125 °C		0.500		
			T_{vj} = 150 °C		0.530		
Fall time (inductive load)	t_f	I_C = 600 A, V_{CE} = 600 V, V_{GE} = ±15 V, R_{Goff} = 0.62 Ω	T_{vj} = 25 °C		0.070		µs
			T_{vj} = 125 °C		0.160		
			T_{vj} = 150 °C		0.190		
Turn-on energy loss per pulse	E_{on}	I_C = 600 A, V_{CE} = 600 V, L_σ = 35 nH, V_{GE} = ±15 V, R_{Gon} = 0.62 Ω, di/dt = 11000 A/µs (T_{vj} = 150 °C)	T_{vj} = 25 °C		16		mJ
			T_{vj} = 125 °C		29.5		
			T_{vj} = 150 °C		35.5		
Turn-off energy loss per pulse	E_{off}	I_C = 600 A, V_{CE} = 600 V, L_σ = 35 nH, V_{GE} = ±15 V, R_{Goff} = 0.62 Ω, dv/dt = 3600 V/µs (T_{vj} = 150 °C)	T_{vj} = 25 °C		50		mJ
			T_{vj} = 125 °C		74		
			T_{vj} = 150 °C		82		
SC data	I_{SC}	$V_{GE} \leq$ 15 V, V_{CC} = 800 V, V_{CEmax}=V_{CES}-L_{sCE}*di/dt	$t_P \leq$ 10 µs, T_{vj} = 150 °C		2600		A
Thermal resistance, junction to case	R_{thJC}	per IGBT				0.0460	K/W
Thermal resistance, case to heatsink	R_{thCH}	per IGBT, λ_{grease}= 1 W/(m*K)			0.0226		K/W
Temperature under switching conditions	$T_{vj\,op}$			-40		150	°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
Continous DC forward current	I_F			600	A
Repetitive peak forward current	I_{FRM}	t_P = 1 ms		1200	A
I^2t - value	I^2t	t_P = 10 ms, V_R = 0 V	T_{vj} = 125 °C	35000	A^2s
			T_{vj} = 150 °C	33000	

Table 6 Characteristic values

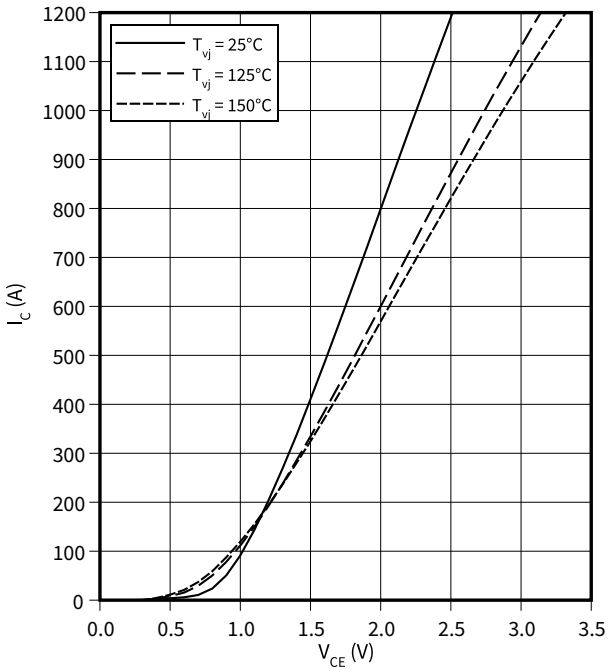
Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Forward voltage	V_F	I_F = 600 A, V_{GE} = 0 V	T_{vj} = 25 °C		1.85	2.45	V
			T_{vj} = 125 °C		1.80		
			T_{vj} = 150 °C		1.75		
Peak reverse recovery current	I_{RM}	V_R = 600 V, I_F = 600 A, V_{GE} = -15 V, -di$_F$/dt = 11000 A/µs (T_{vj} = 150 °C)	T_{vj} = 25 °C		535		A
			T_{vj} = 125 °C		655		
			T_{vj} = 150 °C		680		
Recovered charge	Q_r	V_R = 600 V, I_F = 600 A, V_{GE} = -15 V, -di$_F$/dt = 11000 A/µs (T_{vj} = 150 °C)	T_{vj} = 25 °C		50.5		µC
			T_{vj} = 125 °C		94		
			T_{vj} = 150 °C		110		
Reverse recovery energy	E_{rec}	V_R = 600 V, I_F = 600 A, V_{GE} = -15 V, -di$_F$/dt = 11000 A/µs (T_{vj} = 150 °C)	T_{vj} = 25 °C		27		mJ
			T_{vj} = 125 °C		48.5		
			T_{vj} = 150 °C		54.5		
Thermal resistance, junction to case	R_{thJC}	per diode				0.0929	K/W
Thermal resistance, case to heatsink	R_{thCH}	per diode, λ_{grease}= 1 W/(m*K)			0.0303		K/W
Temperature under switching conditions	$T_{vj\,op}$			-40		150	°C

4 Characteristics diagrams

output characteristic (typical), IGBT, Inverter

$I_C = f(V_{CE})$

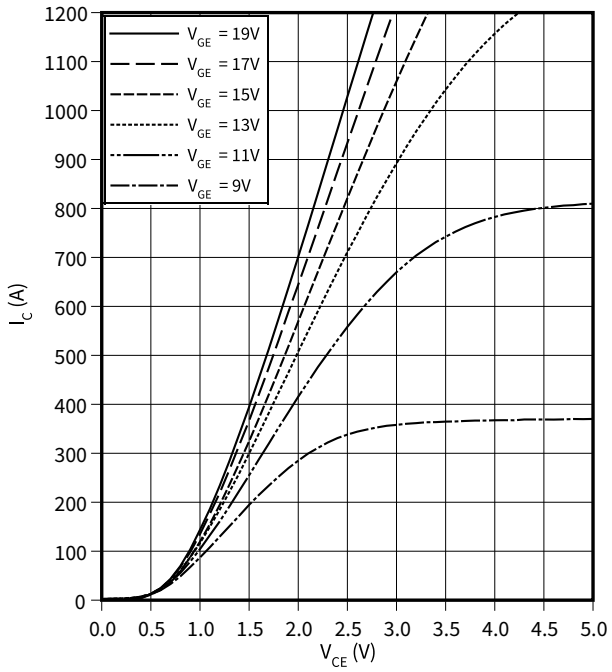
V_{GE} = 15 V



output characteristic (typical), IGBT, Inverter

$I_C = f(V_{CE})$

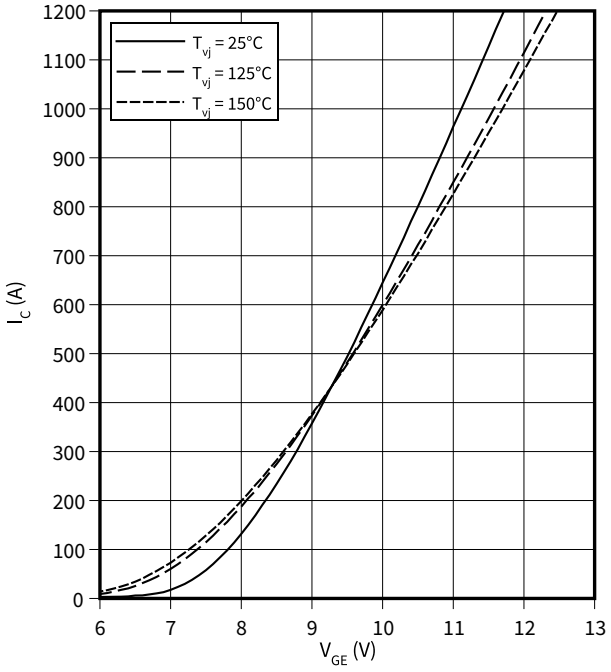
T_{vj} = 150 °C



transfer characteristic (typical), IGBT, Inverter

$I_C = f(V_{GE})$

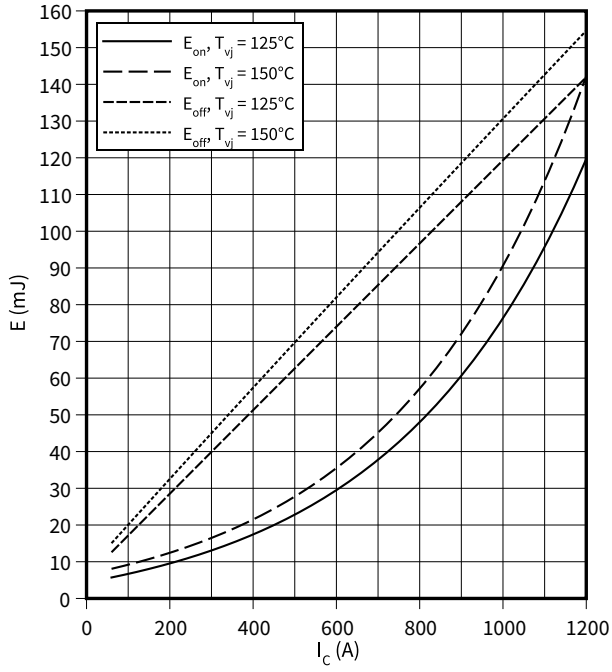
V_{CE} = 20 V



switching losses (typical), IGBT, Inverter

$E = f(I_C)$

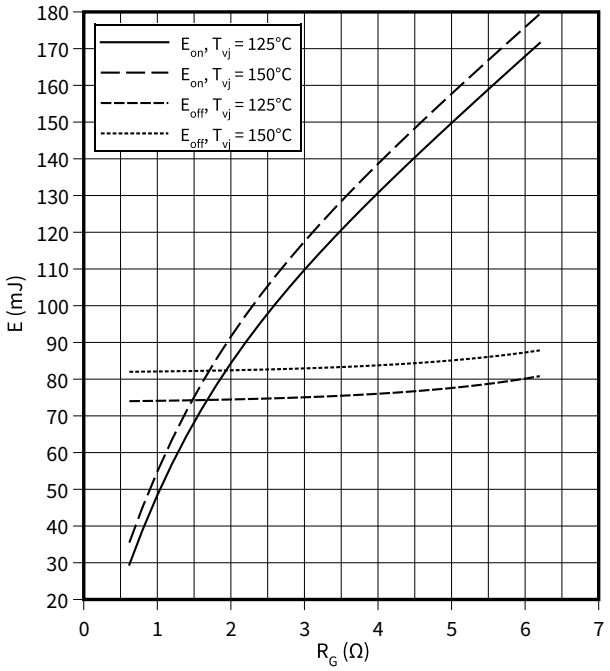
R_{Goff} = 0.62 Ω, R_{Gon} = 0.62 Ω, V_{CE} = 600 V, V_{GE} = ± 15 V



switching losses (typical), IGBT, Inverter

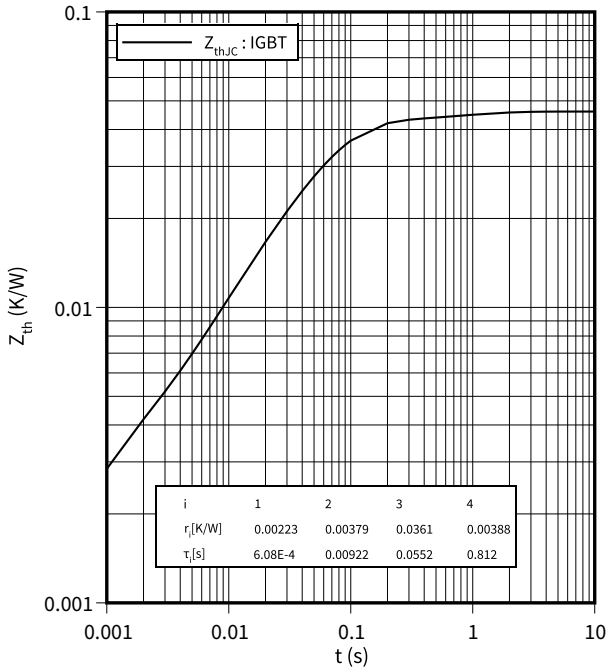
$E = f(R_G)$

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



transient thermal impedance , IGBT, Inverter

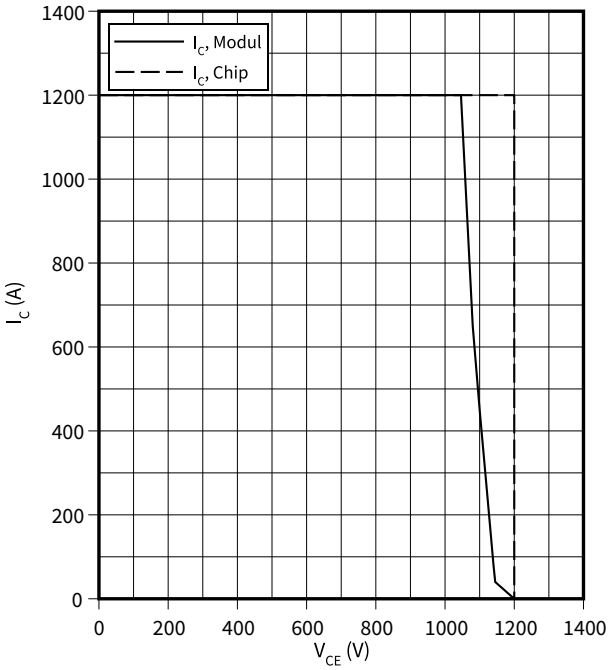
$Z_{th} = f(t)$



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

$I_C = f(V_{CE})$

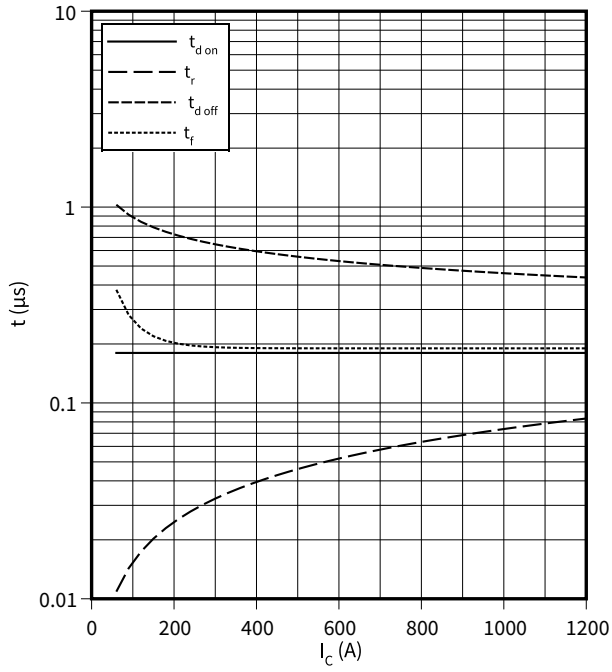
$R_{Goff} = 0.62\ \Omega$, $V_{GE} = \pm 15.0\ V$, $T_{vj} = 150\ °C$



switching times (typical), IGBT, Inverter

$t = f(I_C)$

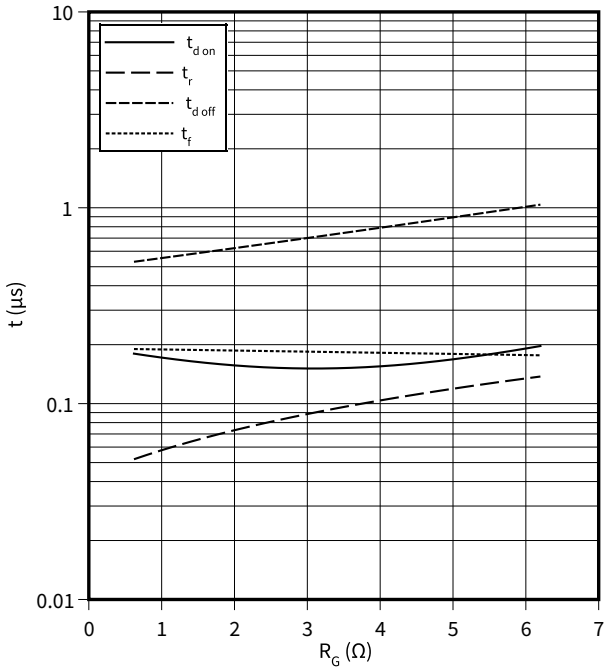
$R_{Goff} = 0.62\ \Omega$, $R_{Gon} = 0.62\ \Omega$, $V_{CE} = 600\ V$, $V_{GE} = \pm 15\ V$, $T_{vj} = 150\ °C$



switching times (typical), IGBT, Inverter

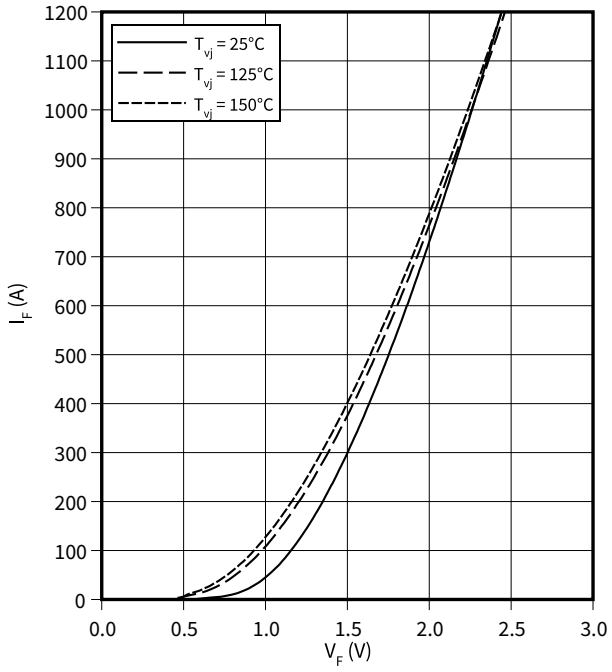
$t = f(R_G)$

$I_C = 600\ A$, $V_{CE} = 600\ V$, $V_{GE} = \pm 15\ V$, $T_{vj} = 150\ °C$



forward characteristic (typical), Diode, Inverter

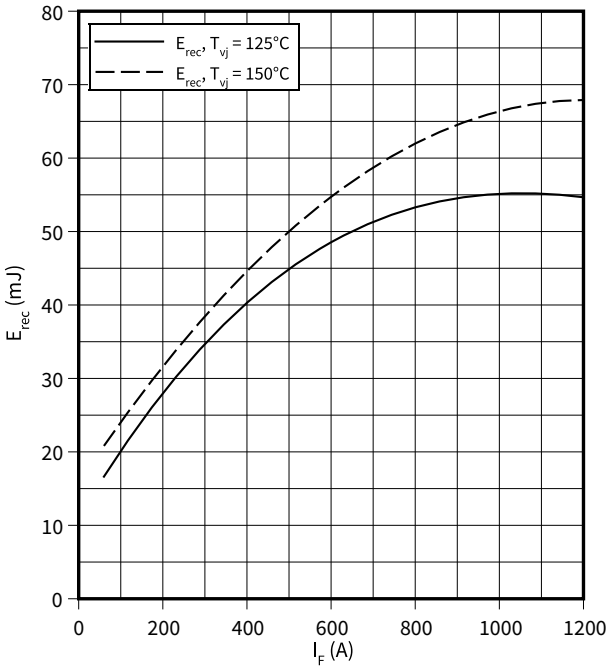
$I_F = f(V_F)$



switching losses (typical), Diode, Inverter

$E_{rec} = f(I_F)$

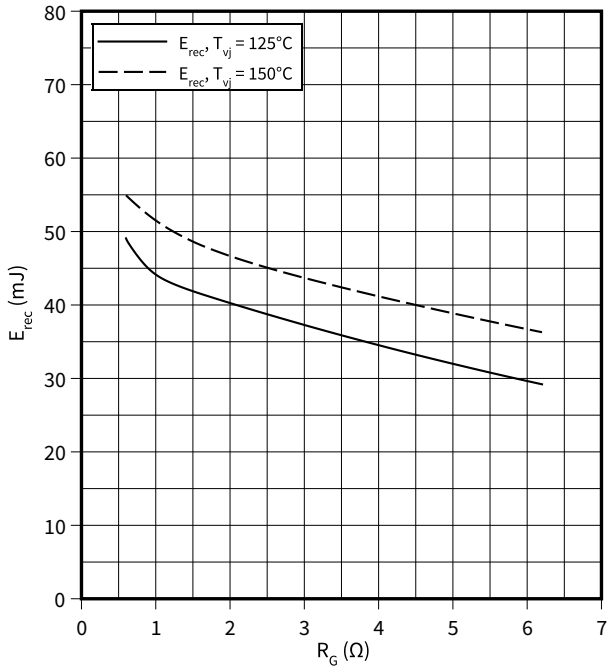
$V_{CE} = 600\ V$, $R_{Gon} = R_{Gon}(IGBT)$



switching losses (typical), Diode, Inverter

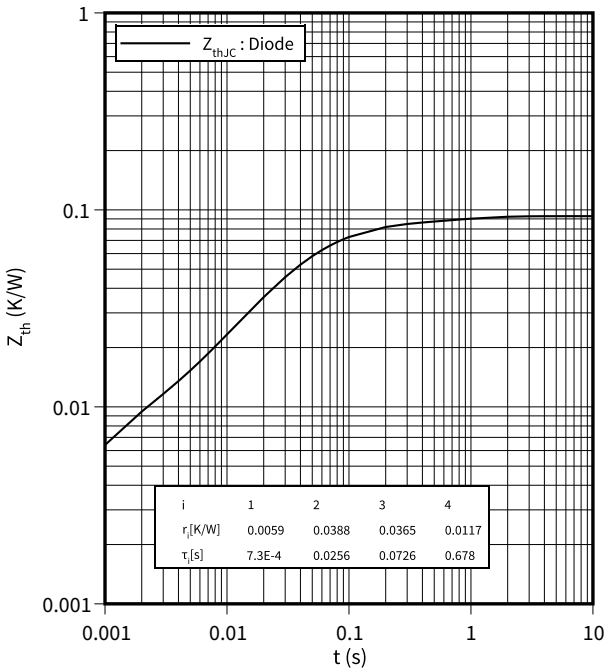
$E_{rec} = f(R_G)$

$V_{CE} = 600\ V$, $I_F = 600\ A$



transient thermal impedance , Diode, Inverter

$Z_{th} = f(t)$



5 Circuit diagram

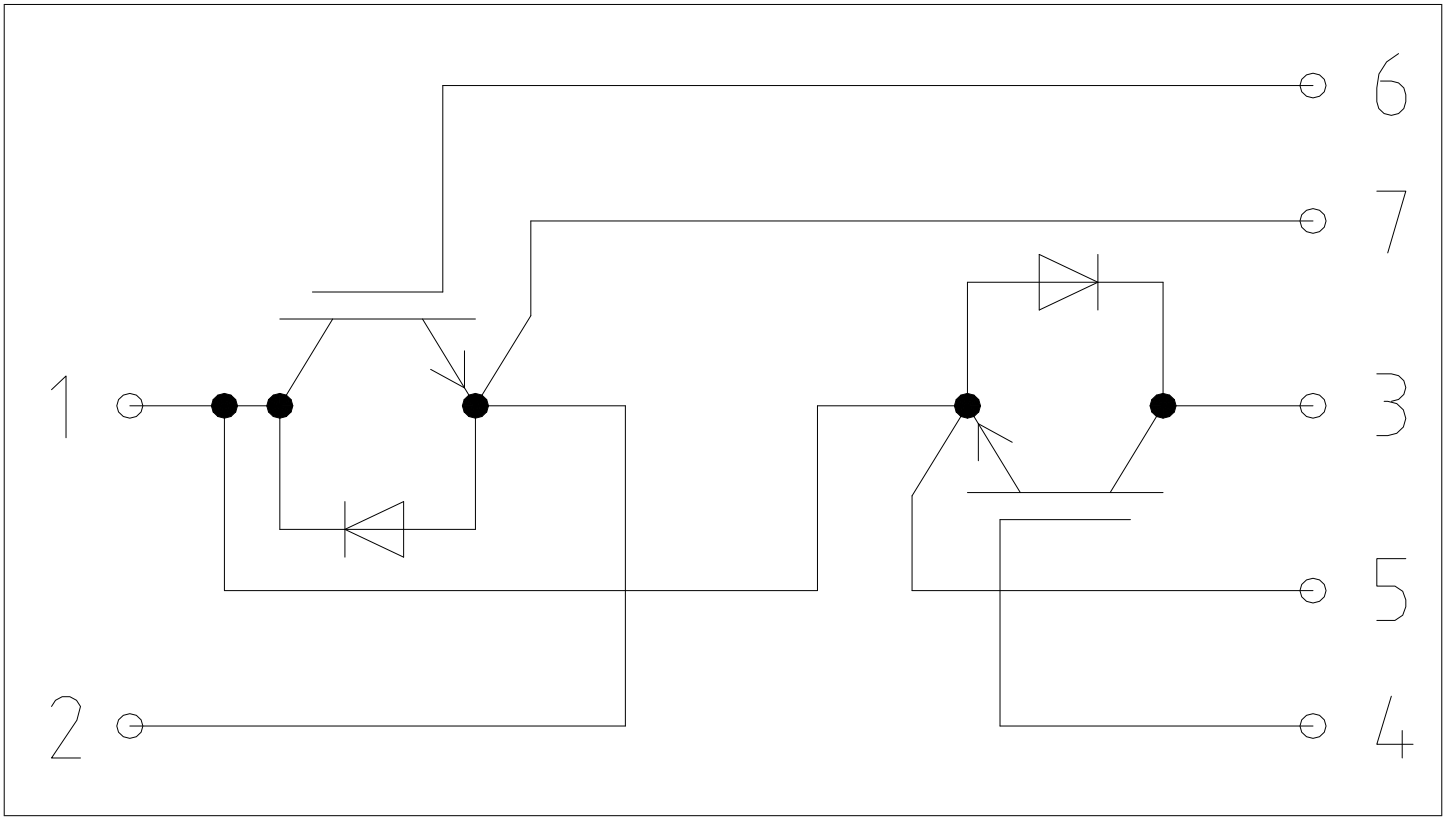


Figure 2

6 Package outlines

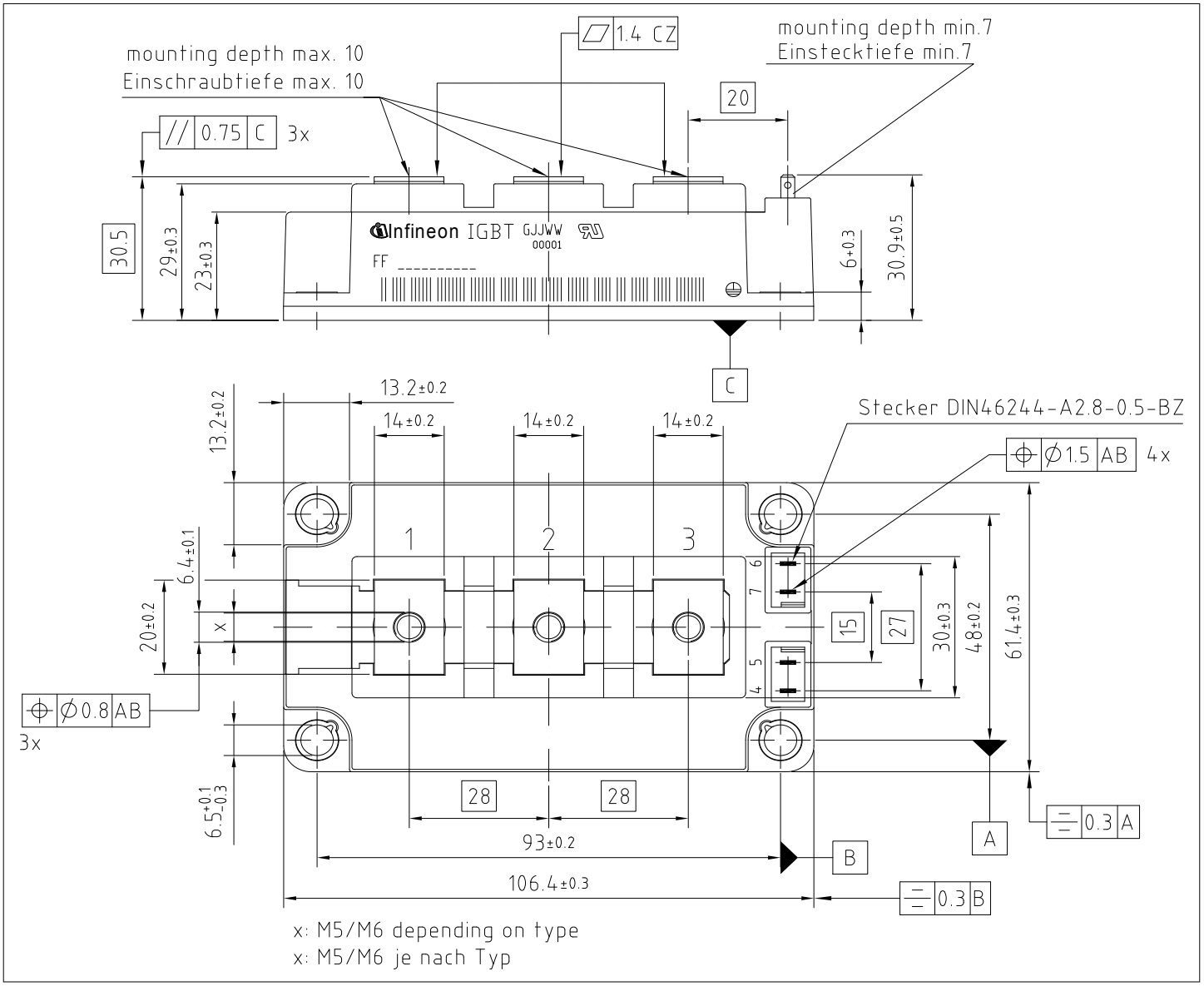


Figure 3

7 Module label code

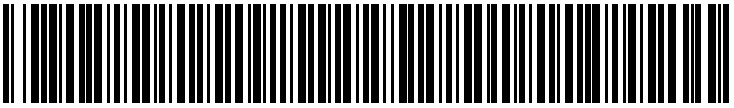
Module label code			
Code format	Data Matrix		Barcode Code128
Encoding	ASCII text		Code Set A
Symbol size	16x16		23 digits
Standard	IEC24720 and IEC16022		IEC8859-1
Code content	*Content* Module serial number Module material number Production order number Date code (production year) Date code (production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

Figure 4

Trademarks

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

Edition 2021-02-26

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-

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.