Information note

N° 074/22

Dear customer,

With this Infineon Technologies AG information note, we would like to inform you about the following

Datasheet update for product FF08MR12W1MA1_B11A

On 16 April 2020, Infineon acquired Cypress.
We are now in the process of merging and consolidating our tools and processes for PCN, Information Notes, Errata and Product Discontinuance.
For further details, please visit our website:
https://www.infineon.com/cms/en/about-infineon/company/cypress-acquisition/

Infineon Technologies AG
Postal address D-81726 München Internet www.infineon.com Headquarters Am Campeon 1-15, D-85579 Neubiberg Phone +49 (0)89 234-0
Chairman of the Supervisory Board Dr. Wolfgang Eder
Management Board Jochen Hanebeck (CEO), Constanze Hufenbecher, Dr. Sven Schneider, Andreas Urschitz, Dr. Rutger Wijburg
Registered office Neubiberg Commercial register Amtsgericht München HRB 126492

Information note

N° 074/22

▶ **Products affected**	Please refer to attached affected product list "INF_074-22_[*customer-no*].pdf"

▶ **Detailed change information**

Subject	Datasheet update for product FF08MR12W1MA1_B11A	
Reason	Adding information into graphs.	
Description	**Old**	**New**
Datasheet update	■ Rev.: 3.10	■ Rev.: 1.10 Additional curves for maximum allowed drain-source voltage and reverse bias safe operating area (RBSOA).
Datasheet update	■ Rev.: 1.10	■ Rev.: 1.11 corrected scaling of diagram of RDS,on-Tvj-characteristics (cf. section 5), various typos corrected. For details, refer to 4_cip07422.

▶ **Product identification**	Not applicable (documentation update only)
▶ **Impact of change**	Not applicable (documentation update only)
▶ **Attachments**	INF_074-22_[*customer-no*].pdf affected product list 3_cip07422 additional information (provided upon request) 4_cip07422 datasheet revision 1.11
▶ **Intended start of delivery**	Valid with immediate effect (documentation update)

If you have any questions, please do not hesitate to contact your local sales office.

EasyPACK™ module with CoolSiC™ Automotive MOSFET and PressFIT / NTC

Features

- Electrical features
  - V_{DSS} = 1200 V
  - I_{DN} = 150 A
  - New semiconductor material - silicon carbide
  - Blocking voltage 1200 V
  - Low $R_{DS,on}$
  - Low switching losses
  - Low Q_g and C_{rss}
  - Low inductive design
  - $T_{vj,op}$ = 150°C
- Mechanical features
  - 5.1 kV DC 1 second Insulation
  - Compact design
  - High power density
  - Integrated NTC temperature sensor
  - PressFIT contact technology
  - RoHS compliant

Potential applications

- Automotive applications
- Auxiliary inverters
- DC/DC converter
- (Hybrid) electrical vehicles (H)EV

Product validation

- Qualified according to AQG 324, release no.: 02.1/2019

Description

The Automotive CoolSiC™ EasyPACK™1B is a half bridge module which combines the benefits of Infineon's robust silicon carbide technology with a very compact and flexible package for hybrid and (fuel cell) electric vehicles. The power module implements the new CoolSiC™ Automotive MOSFET 1200V Gen1, optimized for high voltage applications like DC/DC converter and Auxiliary inverter. The chipset offers benchmark current density, high block voltage and reduced switching losses, which allows compact designs and helps to improve system efficiency, as well as allows a reliable operation under harsh environmental conditions.

The Automotive CoolSiC™ EasyPACK™1B power module family comes with mechanical guiding elements and mounting clamps supporting easy assembly processes for customers. Furthermore, the press-fit pins for the signal terminals avoid additional time consuming selective solder processes, which provides cost savings on system level and increases system reliability. The Automotive CoolSiC™ EasyPACK™1B allows a flexible cooler and application construction.

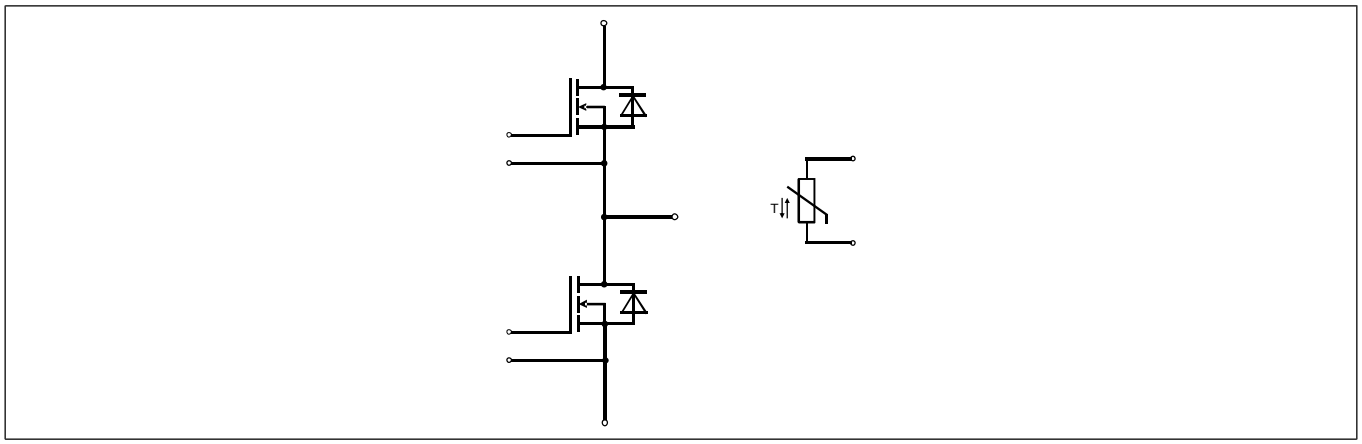


Table of contents

1 Package

Table 1 Insulation coordination

Parameter	Symbol	Note or test condition	Values	Unit
Isolation test voltage	V_{ISOL}	RMS, f = 0 Hz, t = 1 sec	5.10	kV
Internal isolation		basic insulation (class 1, IEC 61140)	Al_2O_3	
Creepage distance	d_{creep}	terminal to heatsink	11.5	mm
Creepage distance	d_{creep}	terminal to terminal	8.0	mm
Clearance	d_{clear}	terminal to heatsink	10.0	mm
Clearance	d_{clear}	terminal to terminal	5.5	mm
Comparative tracking index	*CTI*		> 200	

Table 2 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Stray inductance module	$L_{s,CE}$			5.0		nH
Module lead resistance, terminals - chip	$R_{AA'+CC'}$	T_c = 25 °C, per switch		1.00		mΩ
Storage temperature	T_{stg}		-40		150	°C
Weight	*G*			24		g
Mounting force per clamp	*F*		20		50	N

2 MOSFET

Table 3 Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Drain-source voltage	V_{DSS}		T_{vj} = 25 °C	1200	V
DC drain current	$I_{D,nom}$	V_{GS} = 15 V, T_h = 65 °C	$T_{vj,max}$ = 175 °C	150	A
Pulsed drain current	$I_{D,pulse}$	verified by design, t_p limited by T_{vjmax}		300	A
Gate-source voltage	V_{GSS}			-10/20	V

Table 4 Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Drain-source on-resistance	$R_{DS,on}$	I_D = 150 A, V_{GS} = 15 V	T_{vj} = 25 °C		7.33	9.80	mΩ
			T_{vj} = 125 °C		10.60		
			T_{vj} = 150 °C		12.10		

(table continues...)

Table 4 (continued) Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Gate threshold voltage	$V_{GS,th}$	I_D = 90 mA, V_{GS} = V_{DS}, (tested after 1ms pulse at V_{GS} = +20 V)	T_{vj} = 25 °C	3.25	4.40	5.55	V
Total gate charge	Q_G	V_{DS} = 600 V, V_{GS} = -5/15 V			0.49		µC
Internal gate resistor	$R_{G,int}$		T_{vj} = 25 °C		0.6		Ω
Input capacitance	C_{iss}	f = 1 MHz, V_{DS} = 600 V, V_{GS} = 0 V	T_{vj} = 25 °C		16		nF
Output capacitance	C_{oss}	f = 1 MHz, V_{DS} = 600 V, V_{GS} = 0 V	T_{vj} = 25 °C		0.70		nF
Reverse transfer capacitance	C_{rss}	f = 1 MHz, V_{DS} = 600 V, V_{GS} = 0 V	T_{vj} = 25 °C		0.06		nF
C_{OSS} stored energy	E_{oss}	V_{DS} = 600 V, V_{GS} = -5/15 V	T_{vj} = 25 °C		164		µJ
Drain-source leakage current	I_{DSX}	V_{GS} = -5 V, V_{DSS} = 1200 V	T_{vj} = 25 °C			100	µA
Gate-source leakage current	I_{GSS}	V_{GS} = 20 V, V_{DS} = 0 V	T_{vj} = 25 °C			400	nA
Turn-on delay time, inductive load	$t_{d,on}$	I_D = 150 A, $R_{G,on}$ = 5.1 Ω, V_{GS} = -5/15 V, V_{DS} = 600 V	T_{vj} = 25 °C		53		ns
			T_{vj} = 125 °C		48		
			T_{vj} = 150 °C		46		
Rise time (inductive load)	t_r	I_D = 150 A, $R_{G,on}$ = 5.1 Ω, V_{GS} = -5/15 V	T_{vj} = 25 °C		35		ns
			T_{vj} = 125 °C		34		
			T_{vj} = 150 °C		33		
Turn-off delay time, inductive load	$t_{d,off}$	I_D = 150 A, $R_{G,off}$ = 5.1 Ω, V_{GS} = -5/15 V, V_{DS} = 600 V	T_{vj} = 25 °C		146		ns
			T_{vj} = 125 °C		148		
			T_{vj} = 150 °C		149		
Fall time (inductive load)	t_f	I_D = 150 A, $R_{G,off}$ = 5.1 Ω, V_{GS} = -5/15 V, V_{DS} = 600 V	T_{vj} = 25 °C		38		ns
			T_{vj} = 125 °C		38		
			T_{vj} = 150 °C		39		
Turn-on energy loss per pulse	E_{on}	I_D = 150 A, $R_{G,on}$ = 5.1 Ω, V_{GS} = -5/15 V, V_{DS} = 600 V, L_σ = 20 nH	T_{vj} = 25 °C		4.26		mJ
			T_{vj} = 125 °C		5.01		
			T_{vj} = 150 °C, di/dt = 4.9 kA/µs		5.29		
Turn-off energy loss per pulse	E_{off}	I_D = 150 A, $R_{G,off}$ = 5.1 Ω, V_{GS} = -5/15 V, V_{DS} = 600 V, L_σ = 20 nH	T_{vj} = 25 °C		2.67		mJ
			T_{vj} = 125 °C		2.73		
			T_{vj} = 150 °C, du/dt = 15.5 kV/µs		2.76		

(table continues...)

Table 4 (continued) Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Short circuit data	I_{SC}	V_{DD} = 800 V, V_{GS} = -5/15 V, R_G = 5.1 Ω, V_{DSmax} = V_{DSS}-L_{sDS}·di/dt	t_{SC} ≤ 3 µs, T_{vj} = 150 °C		2000		A
			t_{SC} ≤ 3 µs, T_{vj} = 25 °C		2200		
Thermal resistance, junction to heat sink	$R_{th,j-h}$	per MOSFET			0.46	0.55	K/W
Temperature under switching conditions	$T_{vj,op}$			-40		150	°C

3 Body diode

Table 5 Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
DC body diode forward current	$I_{F,S}$	V_{GS} = -5 V	T_h = 65 °C	60	A
Pulsed body diode current	$I_{F,S,pulse}$	verified by design, t_p limited by T_{vjmax}		300	A

Table 6 Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Forward voltage	$V_{F,SD}$	$I_{F,S}$ = 150 A, V_{GS} = -5 V	T_{vj} = 25 °C		4.40	5.95	V
			T_{vj} = 125 °C		4.18		
			T_{vj} = 150 °C		4.12		
Peak reverse recovery current	I_{rrm}	$I_{F,S}$ = 150 A, V_{GS} = -5 V, $V_{R,DS}$ = 600 V	T_{vj} = 25 °C		75		A
			T_{vj} = 125 °C		135		
			-*di/dt* = 6.1 kA/µs, T_{vj} = 150 °C		158		
Recovered charge	Q_{rr}	$I_{F,S}$ = 150 A, V_{GS} = -5 V, $V_{R,DS}$ = 600 V	T_{vj} = 25 °C		2.58		µC
			T_{vj} = 125 °C		4.10		
			-*di/dt* = 6.1 kA/µs, T_{vj} = 150 °C		5.13		
Reverse recovery energy	E_{rec}	$I_{F,S}$ = 150 A, V_{GS} = -5 V, $V_{R,DS}$ = 600 V	T_{vj} = 25 °C		0.5		mJ
			T_{vj} = 125 °C		0.9		
			T_{vj} = 150 °C, -*di/dt* = 6.1 kA/µs		1.4		

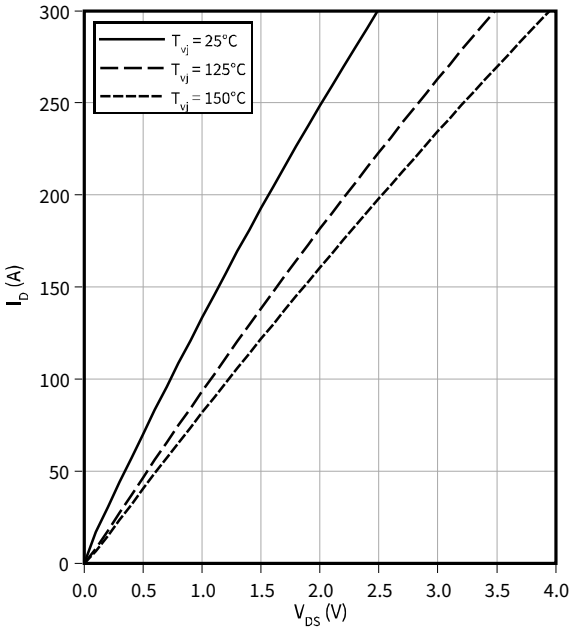
4 NTC-Thermistor

Table 7 Characteristic values

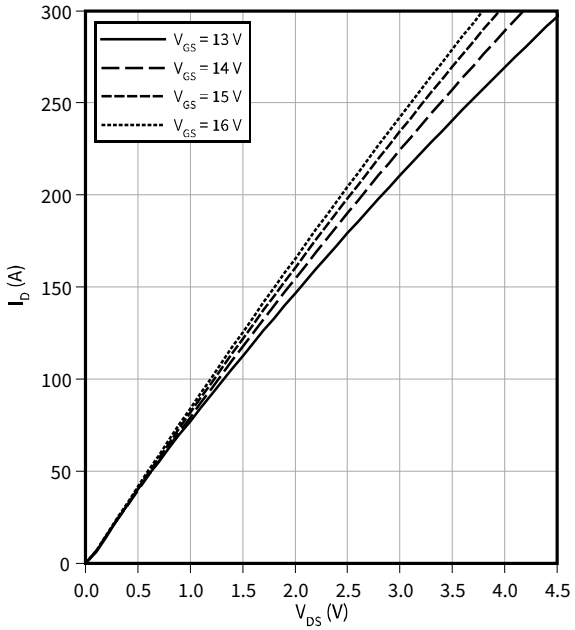
Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Rated resistance	R_{25}	T_{NTC} = 25 °C		5		kΩ
Deviation of R_{100}	$\Delta R/R$	T_{NTC} = 100 °C, R_{100} = 493 Ω	-5		5	%
Power dissipation	P_{25}	T_{NTC} = 25 °C			20	mW
B-value	$B_{25/50}$	$R_2 = R_{25} \exp[B_{25/50}(1/T_2\text{-}1/(298{,}15\ K))]$		3375		K
B-value	$B_{25/80}$	$R_2 = R_{25} \exp[B_{25/80}(1/T_2\text{-}1/(298{,}15\ K))]$		3411		K
B-value	$B_{25/100}$	$R_2 = R_{25} \exp[B_{25/100}(1/T_2\text{-}1/(298{,}15\ K))]$		3433		K

5 Characteristics diagrams

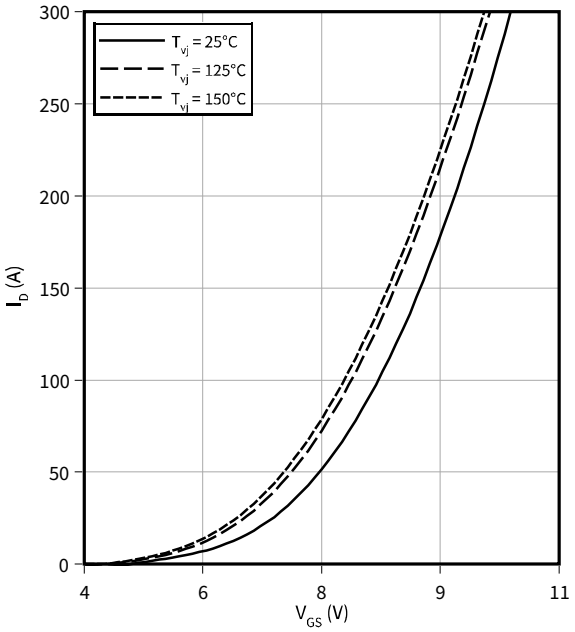
Output characteristic (typical), MOSFET
$I_D = f(V_{DS})$
V_{GS} = 15 V



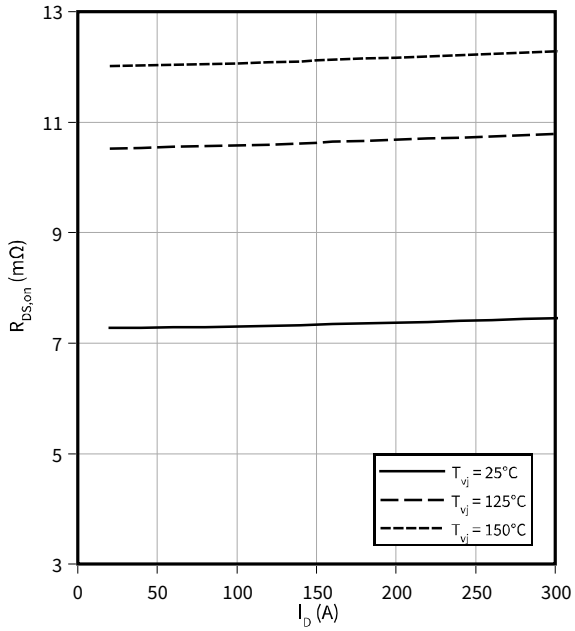
Output characteristic (typical), MOSFET
$I_D = f(V_{DS})$
T_{vj} = 150 °C



Transfer characteristic (typical), MOSFET
$I_D = f(V_{GS})$
V_{DS} = 20 V



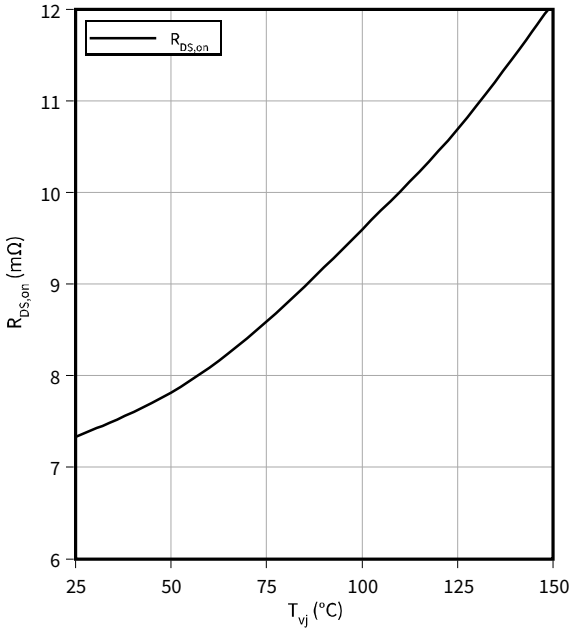
Drain-source on-resistance (typical), MOSFET
$R_{DS,on} = f(I_D)$
V_{GS} = 15 V



Drain-source on-resistance (typical), MOSFET

$R_{DS,on} = f(T_{vj})$

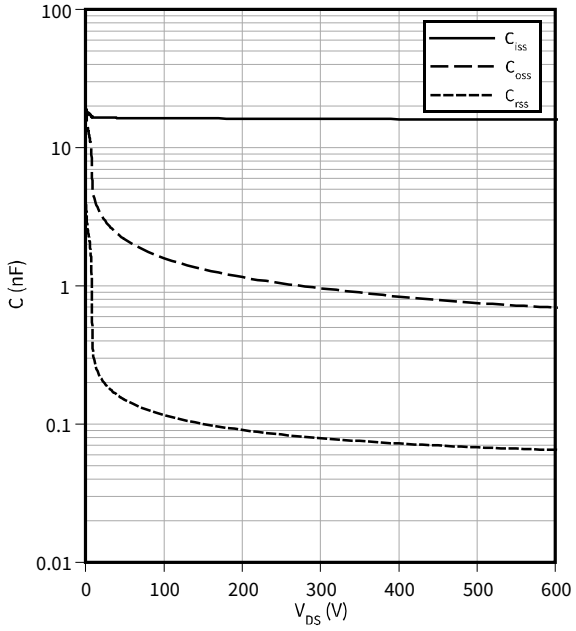
$I_D = 150\ A$, $V_{GS} = 15\ V$



Capacity characteristic (typical), MOSFET

$C = f(V_{DS})$

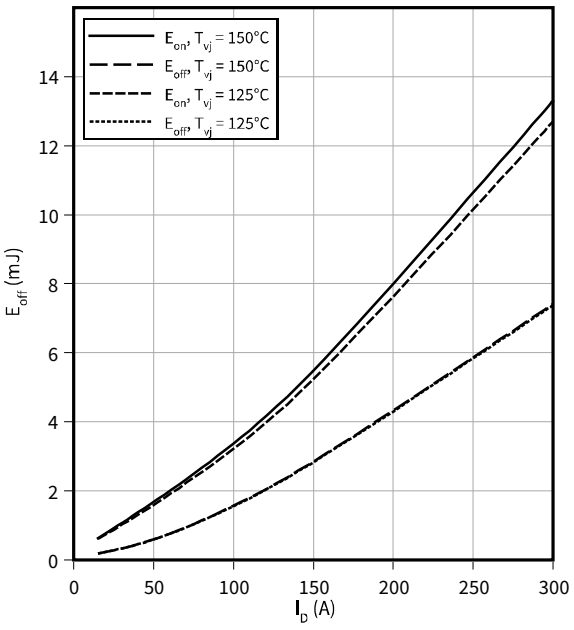
$f = 100\ kHz$, $V_{GS} = 0\ V$, $T_{vj} = 25\ °C$



Switching losses (typical), MOSFET

$E_{off} = f(I_D)$, $E_{on} = f(I_D)$

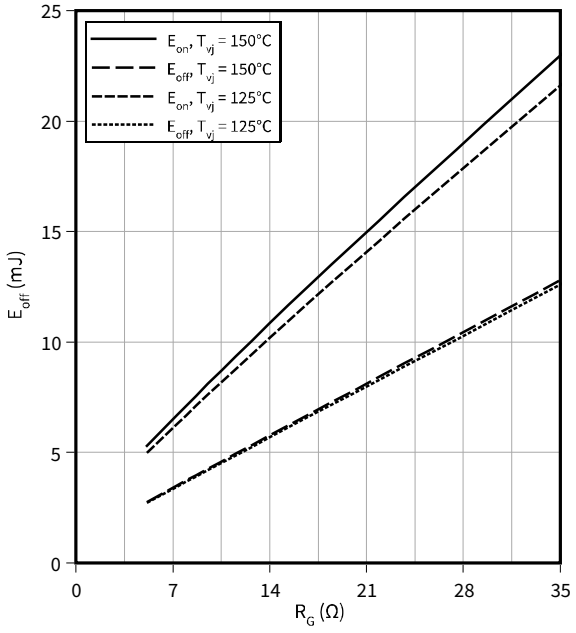
$V_{DS} = 600\ V$, $R_{G,off} = 5.1\ \Omega$, $R_{G,on} = 5.1\ \Omega$, $V_{GS} = \pm 15\ V$



Switching losses (typical), MOSFET

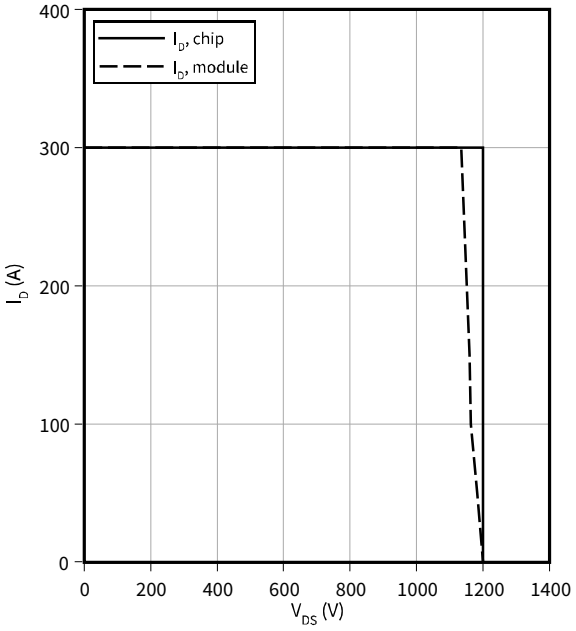
$E_{off} = f(R_G)$, $E_{on} = f(R_G)$

$I_D = 150\ A$, $V_{DS} = 600\ V$, $V_{GS} = -5/15\ V$



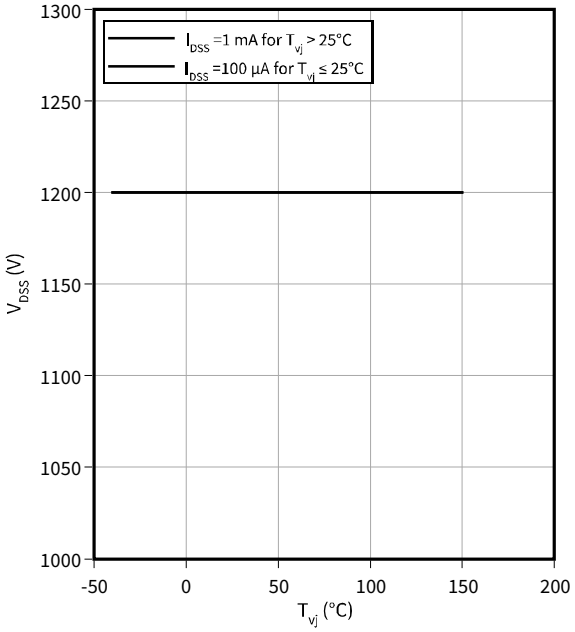
Reverse bias safe operating area (RBSOA), MOSFET

$I_D = f(V_{DS})$
V_{GS} = -5/15 V, T_{vj} = 150 °C



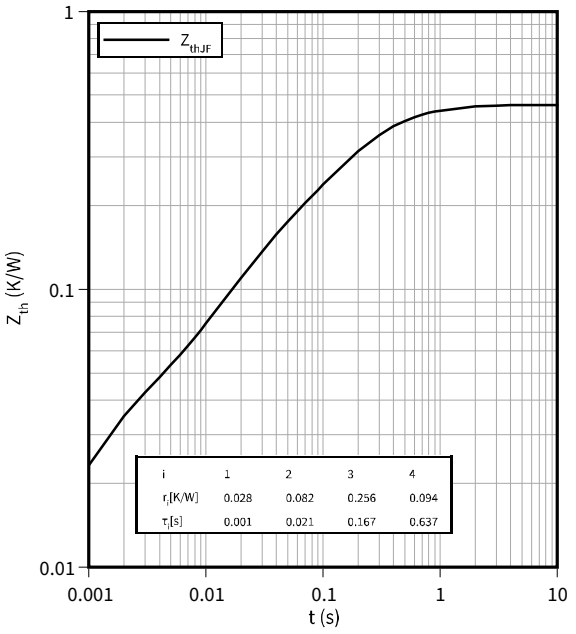
Maximum allowed drain-source voltage, MOSFET

$V_{DSS} = f(T_{vj})$
verified by characterization / design not by test



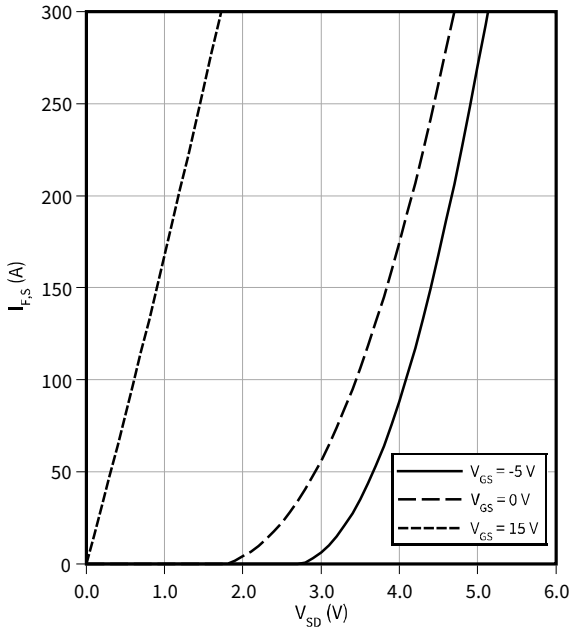
Transient thermal impedance , MOSFET

$Z_{th} = f(t)$



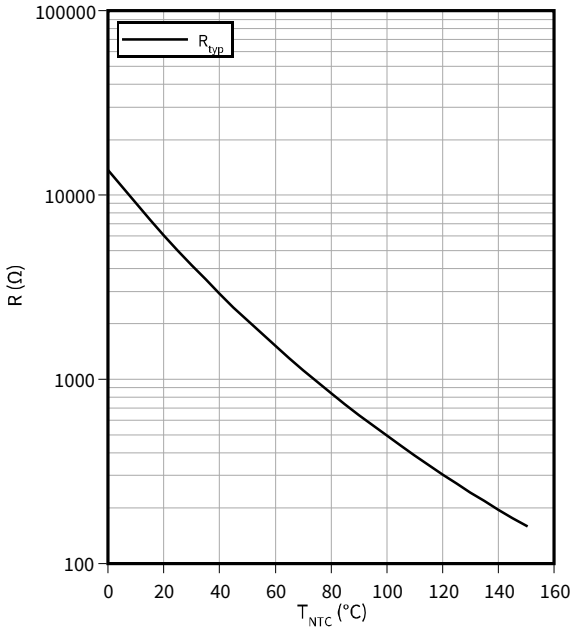
Forward characteristic body diode (typical), MOSFET

$I_{F,S} = f(V_{SD})$
T_{vj} = 25 °C



Temperature characteristic (typical), NTC-Thermistor

$R = f(T_{NTC})$



6 Circuit diagram

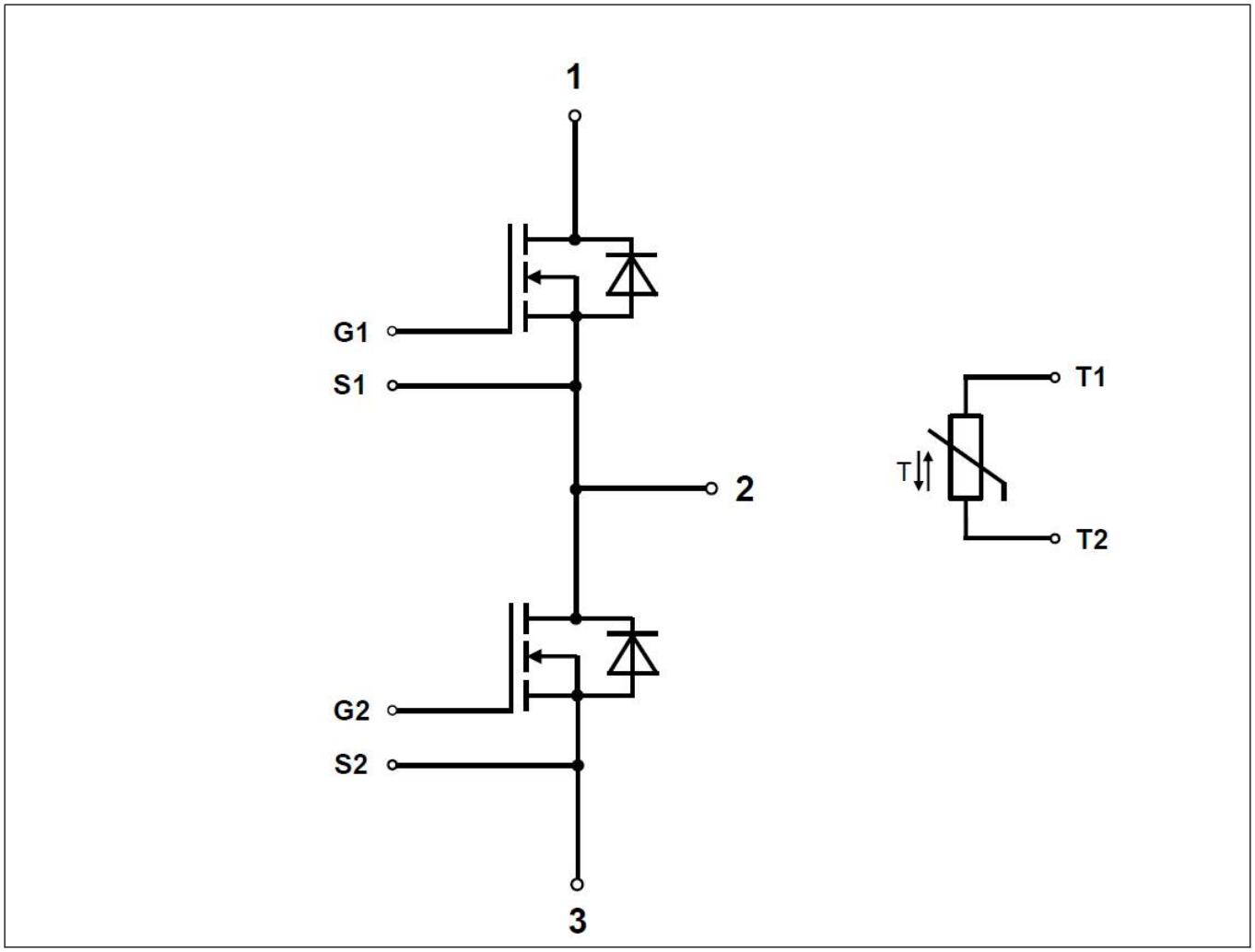


Figure 1

7 Package outlines

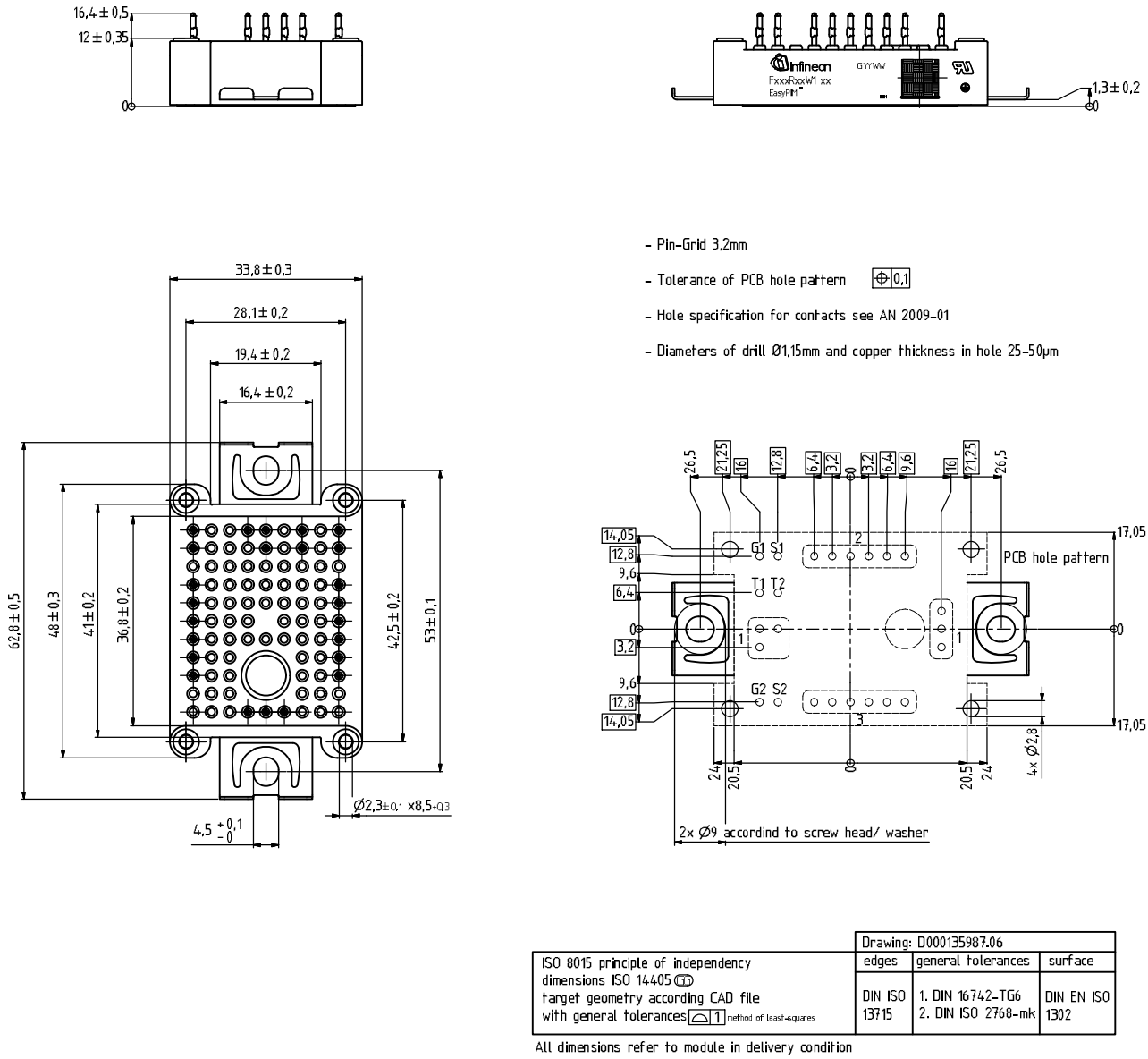


Figure 2

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	

Packing label code				
Code format	Barcode Code128			
Encoding	Code Set A			
Symbol size	34 digits			
Standard	IEC8859-1			
Code content	*Content* Module serial number Module material number Production order number Date code (production year) Date code (production week)	*Identifier* X 1T S 9D Q	*Digit* 2 – 9 12 – 19 21 – 25 28 – 31 33 – 34	*Example* 95056609 2X0003E0 754389 1139 15
Example	X950566091T2X0003E0S754389D1139Q15			

Figure 3

Revision history

Document revision	Date of release	Description of changes
V1.0	2018-11-21	Target datasheet
V1.1	2018-11-27	Correction of pin designation in circuit diagram
V2.0	2019-08-13	Target datasheet 1.1, New data for preliminary datasheet
V3.0	2020-03-25	Final datasheet
V3.1	2020-09-15	Correction of Erec energy and du/dt value
n/a	2020-10-05	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
1.11	2022-09-16	Fixed various typos

Trademarks

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

Edition 2022-09-16

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-AAD300-007

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.

INF 074/22

Datasheet update for product FF08MR12W1MA1_B11A

Affected products sold to FUTURE ELECTRONICS INC. (4000624)

Sales name	SP number	OPN	Package	Customer part number
FF08MR12W1MA1_B11A	SP002314006	FF08MR12W1MA1B11ABPSA1	AG-EASY1BA-3211/133-1	