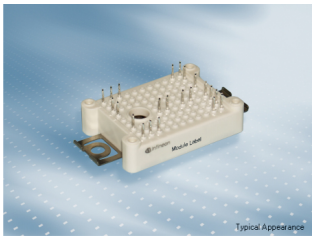
Preliminary datasheet
EasyPACK™ module with CoolSiC™ Trench MOSFET and PressFIT / NTC

Features



- Electrical features
  - V_{DSS} = 1200 V
  - I_{DN} = 50 A / I_{DRM} = 100 A
  - Low switching losses
  - High current density
  - Low inductive design
- Mechanical features
  - Integrated NTC temperature sensor
  - PressFIT contact technology
  - Rugged mounting due to integrated mounting clamps

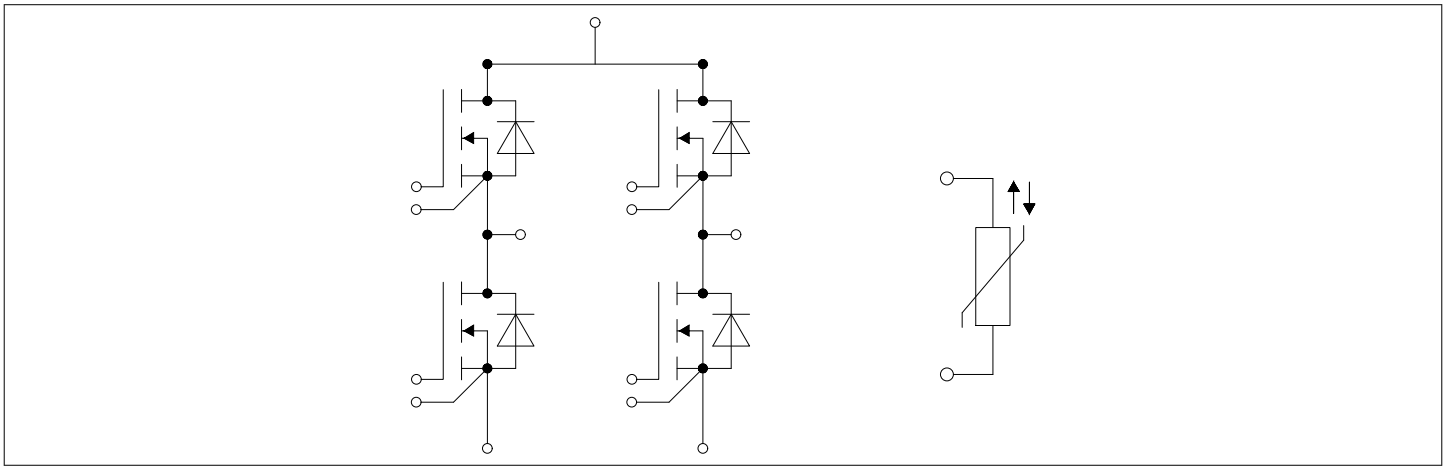
Potential applications

- Welding
- DC charger for EV
- DC/DC converter
- High Frequency Switching application

Product validation

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

Description



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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	3.0	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	6.3	mm
Clearance	d_{Clear}	terminal to heatsink	10.0	mm
Clearance	d_{Clear}	terminal to terminal	5.0	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}			14		nH
Storage temperature	T_{stg}		-40		125	°C
Mounting force per clamp	*F*		20		50	N
Weight	*G*			24		g

Note: The current under continuous operation is limited to 25 A rms per connector pin.

Important note: The selection of positive and negative gate-source voltages impacts the long-term behavior of the device. The design guidelines described in Application Note AN 2018-09 must be considered to ensure sound operation of the device over the planned lifetime.

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
Implemented drain current	I_{DN}		50	A
Continuous DC drain current	I_{DDC}	T_{vj} = 175 °C, V_{GS} = 15 V T_H = 65 °C	45	A
Repetitive peak drain current	I_{DRM}	verified by design, t_p limited by T_{vjmax}	100	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 = 50 A, V_{GS} = 15 V	T_{vj} = 25 °C		22.5		mΩ
			T_{vj} = 125 °C		29.5		
			T_{vj} = 150 °C		33		
Gate threshold voltage	$V_{GS(th)}$	I_D = 20 mA, V_{DS} = V_{GS}, T_{vj} = 25 °C, (tested after 1ms pulse at V_{GS} = +20 V)		3.45	4.5	5.55	V
Total gate charge	Q_G	V_{DS} = 800 V, V_{GS} = -5/+15 V			0.124		µC
Internal gate resistor	R_{Gint}	T_{vj} = 25 °C			2		Ω
Input capacitance	C_{ISS}	f = 1 MHz, V_{DS} = 800 V, V_{GS} = 0 V	T_{vj} = 25 °C		3.68		nF
Output capacitance	C_{OSS}	f = 1 MHz, V_{DS} = 800 V, V_{GS} = 0 V	T_{vj} = 25 °C		0.22		nF
Reverse transfer capacitance	C_{rss}	f = 1 MHz, V_{DS} = 800 V, V_{GS} = 0 V	T_{vj} = 25 °C		0.028		nF
C_{OSS} stored energy	E_{OSS}	V_{DS} = 800 V, V_{GS} = -5/+15 V, T_{vj} = 25 °C			88		µJ
Drain-source leakage current	I_{DSS}	V_{DS} = 1200 V, V_{GS} = -5 V	T_{vj} = 25 °C		0.2	210	µA
Gate-source leakage current	I_{GSS}	V_{DS} = 0 V, T_{vj} = 25 °C	V_{GS} = 20 V			400	nA
Turn-on delay time (inductive load)	$t_{d\,on}$	I_D = 50 A, R_{Gon} = 8.2 Ω, V_{DS} = 600 V, V_{GS} = -5/+15 V	T_{vj} = 25 °C		23		ns
			T_{vj} = 125 °C		22		
			T_{vj} = 150 °C		22		
Rise time (inductive load)	t_r	I_D = 50 A, R_{Gon} = 8.2 Ω, V_{DS} = 600 V, V_{GS} = -5/+15 V	T_{vj} = 25 °C		15		ns
			T_{vj} = 125 °C		14		
			T_{vj} = 150 °C		14		
Turn-off delay time (inductive load)	$t_{d\,off}$	I_D = 50 A, R_{Goff} = 3.9 Ω, V_{DS} = 600 V, V_{GS} = -5/+15 V	T_{vj} = 25 °C		48		ns
			T_{vj} = 125 °C		52		
			T_{vj} = 150 °C		52		
Fall time (inductive load)	t_f	I_D = 50 A, R_{Goff} = 3.9 Ω, V_{DS} = 600 V, V_{GS} = -5/+15 V	T_{vj} = 25 °C		19		ns
			T_{vj} = 125 °C		18		
			T_{vj} = 150 °C		18		
Turn-on energy loss per pulse	E_{on}	I_D = 50 A, V_{DS} = 600 V, L_σ = 35 nH, V_{GS} = -5/+15 V, R_{Gon} = 8.2 Ω, di/dt = 3 kA/µs (T_{vj} = 150 °C)	T_{vj} = 25 °C		0.717		mJ
			T_{vj} = 125 °C		0.793		
			T_{vj} = 150 °C		0.825		

Table 4 Characteristic Values (continued)

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Turn-off energy loss per pulse	E_{off}	I_D = 50 A, V_{DS} = 600 V, L_σ = 35 nH, V_{GS} = -5/+15 V, R_{Goff} = 3.9 Ω, dv/dt = 37.2 kV/µs (T_{vj} = 150 °C)	T_{vj} = 25 °C		0.192		mJ
			T_{vj} = 125 °C		0.194		
			T_{vj} = 150 °C		0.194		
Thermal resistance, junction to heatsink	R_{thJH}	per MOSFET			1.09		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_{SD}	T_{vj} = 175 °C, V_{GS} = -5 V	T_H = 65 °C	16	A

Table 6 Characteristic Values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Forward voltage	V_{SD}	I_{SD} = 50 A, V_{GS} = -5 V	T_{vj} = 25 °C		4.6	5.65	V
			T_{vj} = 125 °C		4.35		
			T_{vj} = 150 °C		4.3		

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

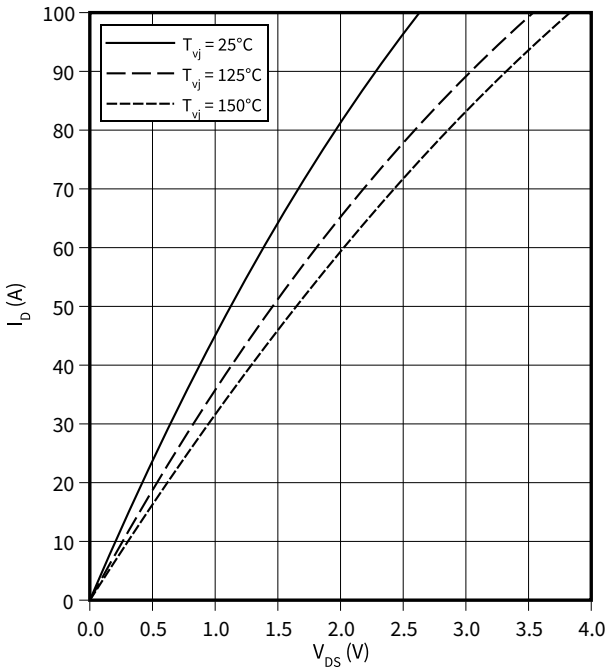
Note: Specification according to the valid application note.

5 Characteristics diagrams

output characteristic (typical), MOSFET

$I_D = f(V_{DS})$

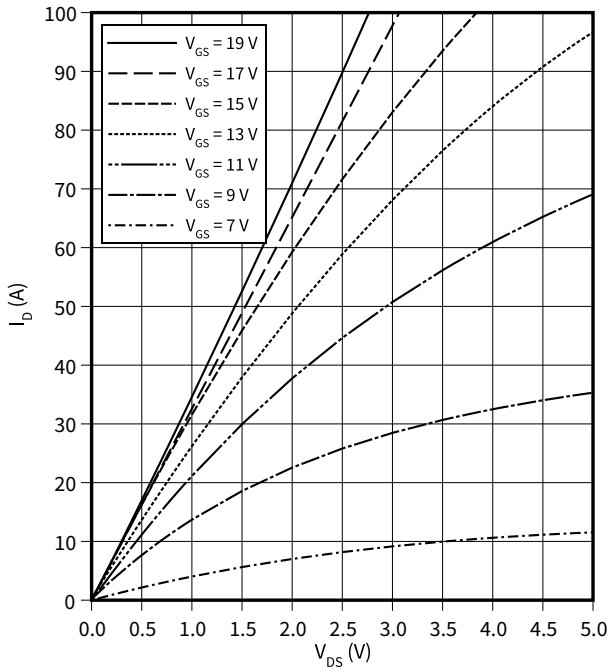
$V_{GS} = 15$ V



output characteristic (typical), MOSFET

$I_D = f(V_{DS})$

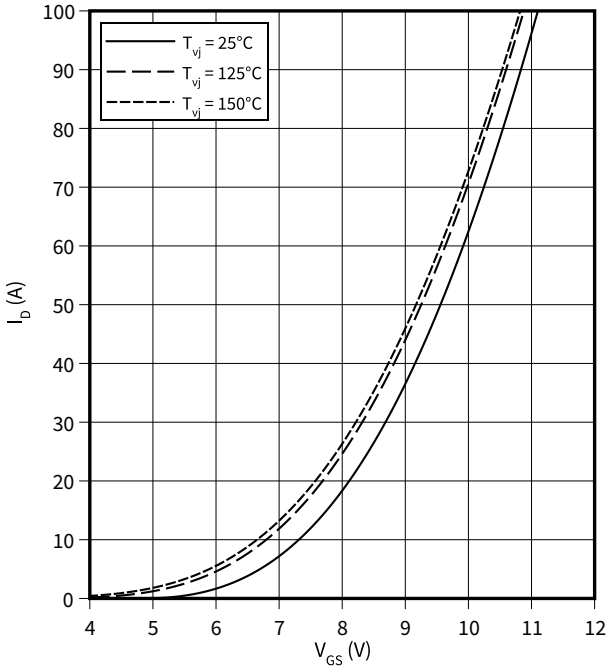
$T_{vj} = 150$ °C



transfer characteristic (typical), MOSFET

$I_D = f(V_{GS})$

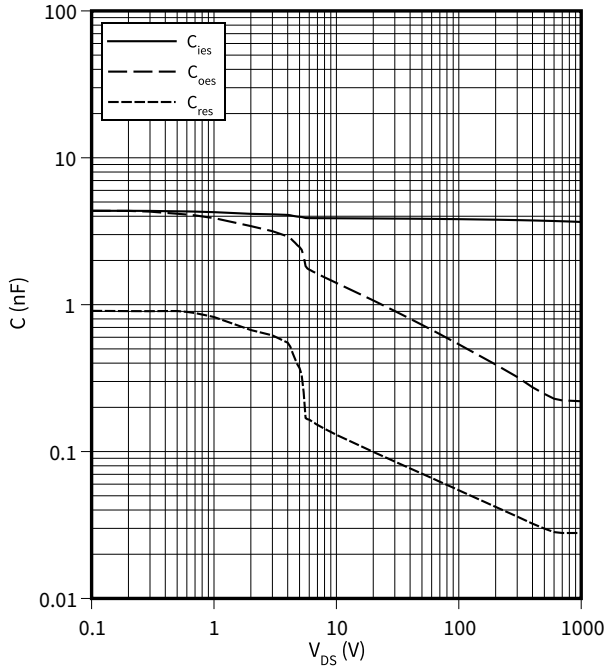
$V_{DS} = 20$ V



capacity characteristic (typical), MOSFET

$C = f(V_{DS})$

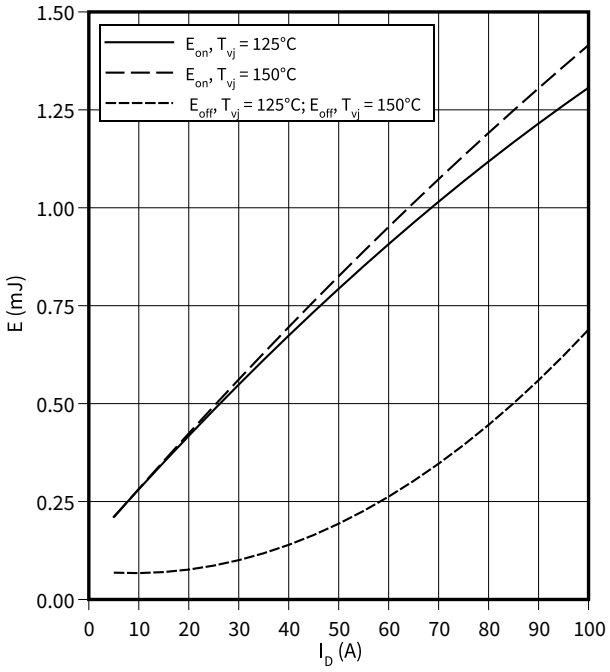
$f = 1$ MHz, $T_{vj} = 25$ °C, $V_{GS} = 0$ V



switching losses (typical), MOSFET

$E = f(I_D)$

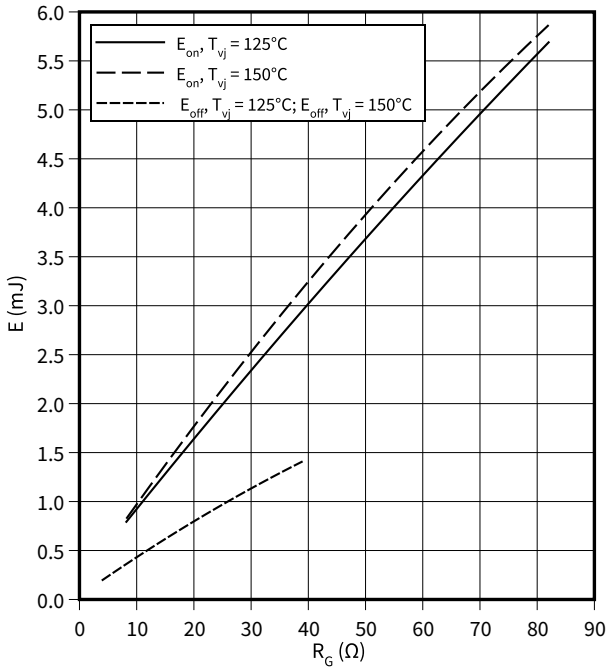
$R_{Goff} = 3.9\ \Omega$, $R_{Gon} = 8.2\ \Omega$, $V_{DS} = 600$ V, $V_{GS} = -5/15$ V



switching losses (typical), MOSFET

$E = f(R_G)$

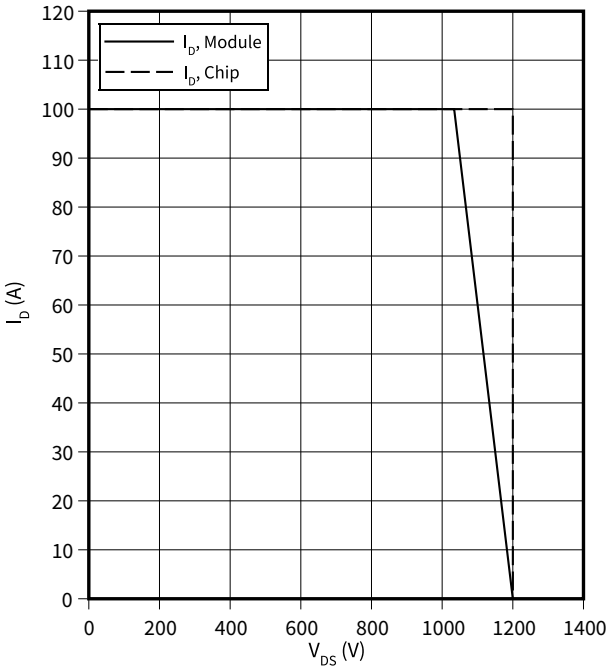
$V_{DS} = 600$ V, $I_D = 50$ A, $V_{GS} = -5/15$ V



reverse bias safe operating area (RBSOA), MOSFET

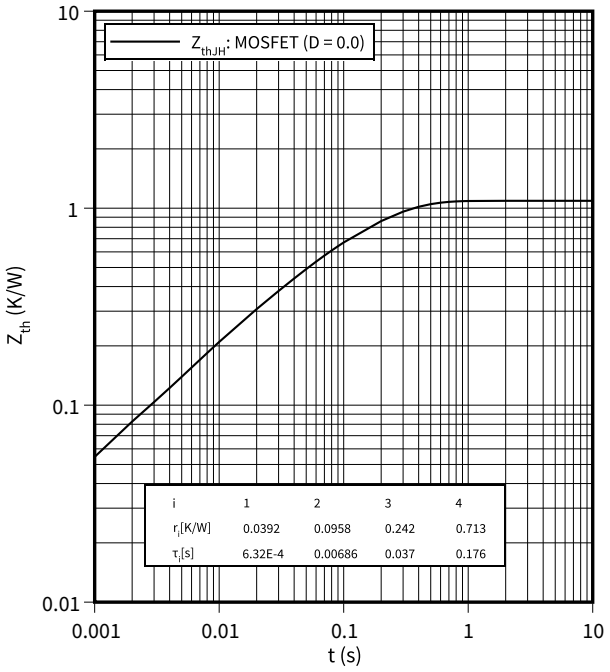
$I_D = f(V_{DS})$

$R_{Goff} = 3.9\ \Omega$, $T_{vj} = 150$ °C, $V_{GS} = -5/15$ V



transient thermal impedance , MOSFET

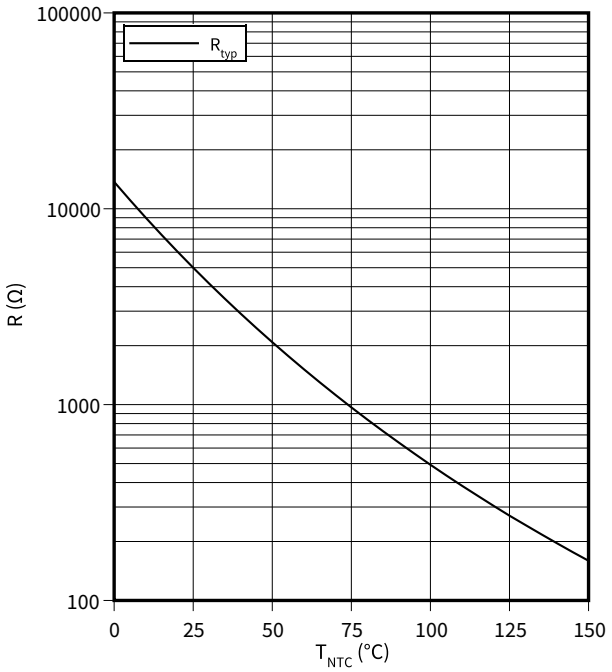
$Z_{th} = f(t)$



5 Characteristics diagrams

temperature characteristic (typical), NTC-Thermistor

$R = f(T_{NTC})$



6 Circuit diagram

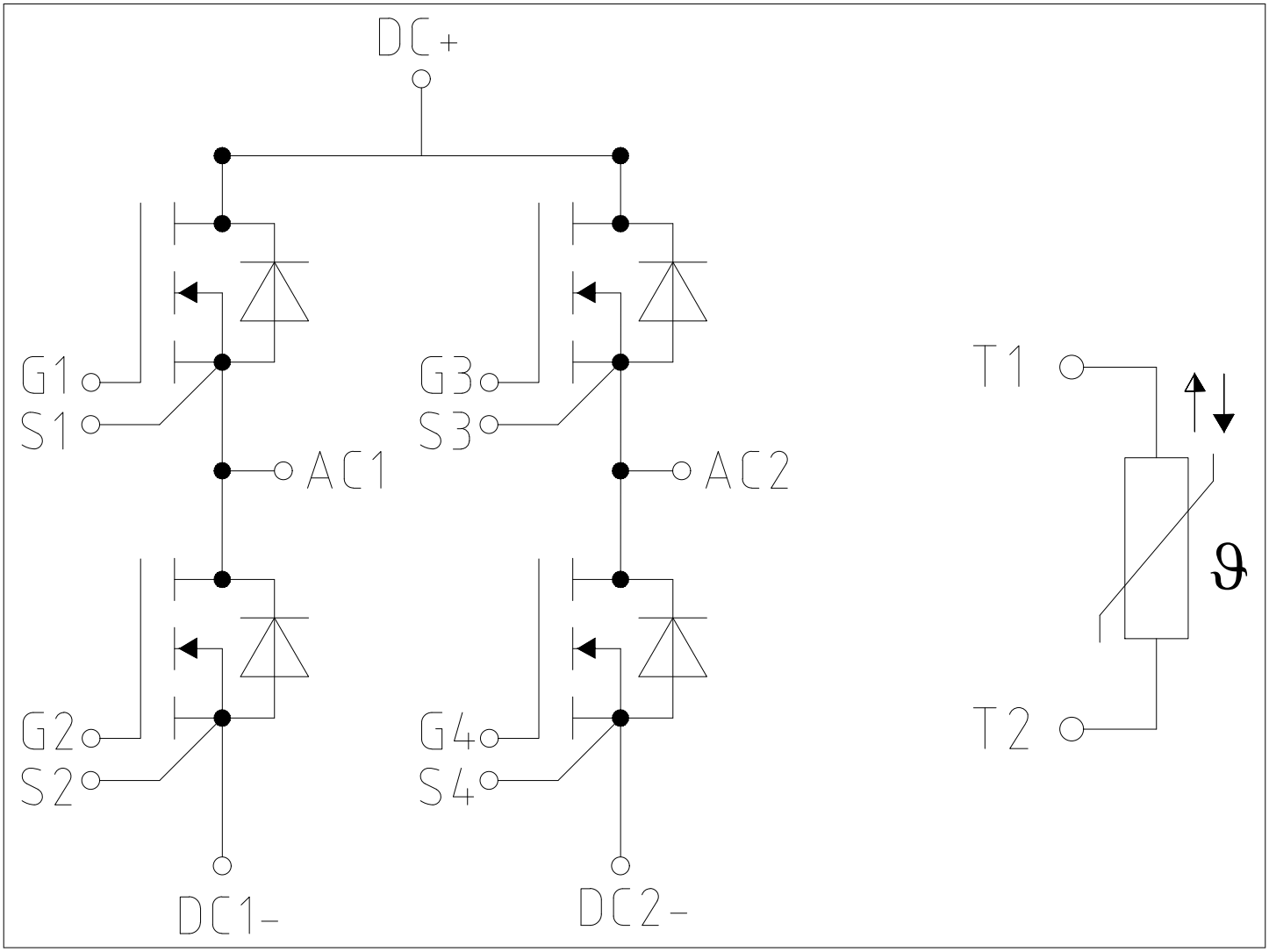


Figure 2

7 Package outlines

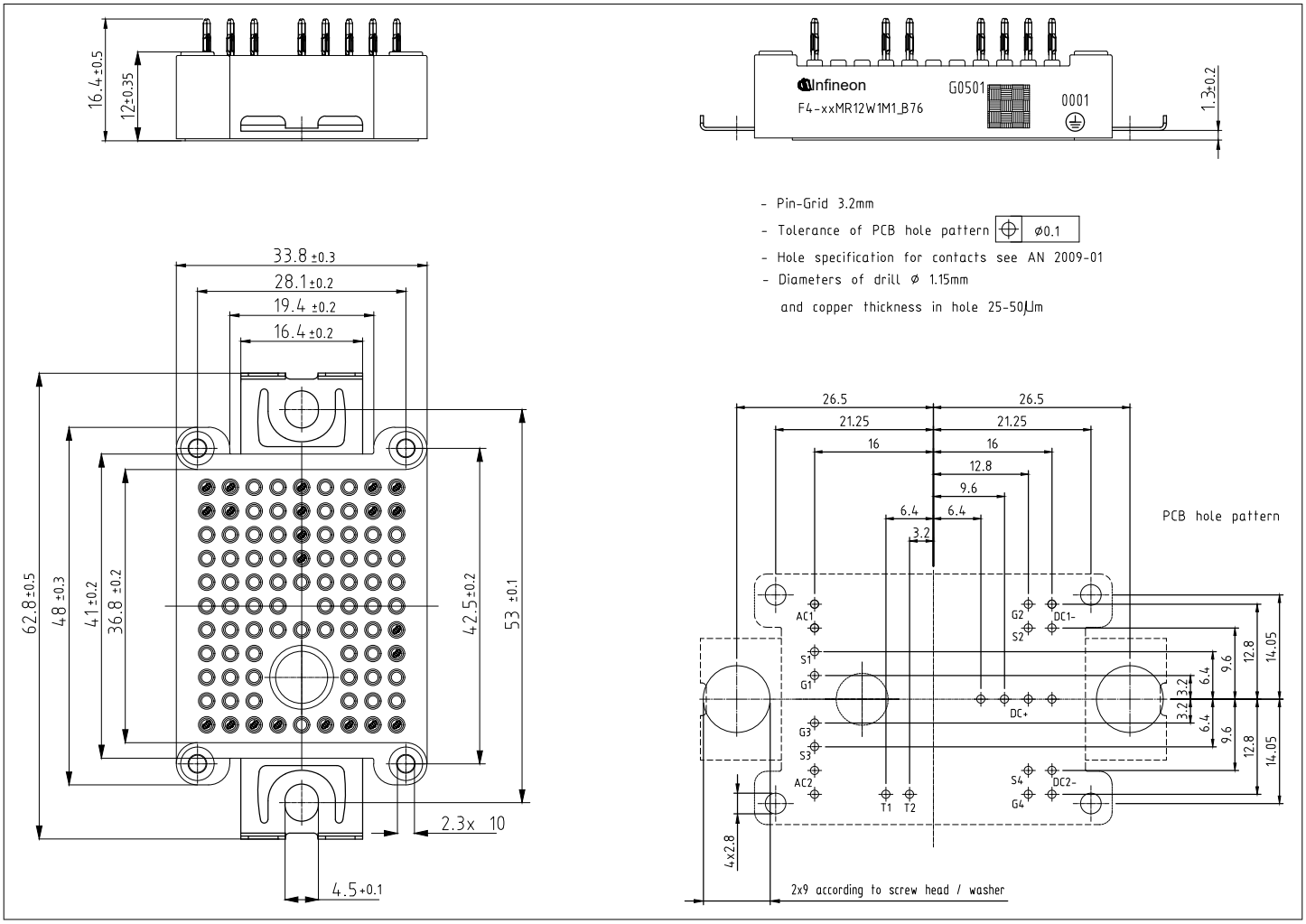


Figure 3

8 Module label code

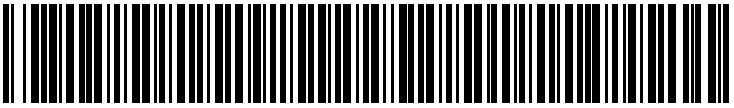
Module label code			
Code format	Data Matrix		Barcode Code128
Encoding	ASCII text		Code Set A
Symbol size	16x16		23 digits
Standard	IEC24720 and IEC16022		IEC8859-1
Code content	*Content* Module serial number Module material number Production order number Date code (production year) Date code (production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

Figure 4

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Edition 2021-02-12

Published by

Infineon Technologies AG

81726 Munich, Germany

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