

## Preliminary datasheet

### EasyPACK™ 2B module with CoolSiC™ Trench MOSFET and PressFIT / NTC

#### Features

- Electrical features
  - $V_{DS} = 1200\text{ V}$
  - $I_{DN} = 50\text{ A}$  /  $I_{DRM} = 100\text{ A}$
  - Suitable Infineon gate drivers can be found under <https://www.infineon.com/gdfinder>
- Mechanical features
  - PressFIT contact technology
  - High power density
  - Compact design
  - $\text{Al}_2\text{O}_3$  substrate with low thermal resistance
  - 2.5 kV AC 1 minute insulation



Typical appearance

#### Potential applications

- (Hybrid) electrical vehicles (H)EV
- Auxiliary inverters
- EV Auxiliaries

#### Product validation

- Qualified according to AQG 324, release no.: 03.1/2021

#### Description

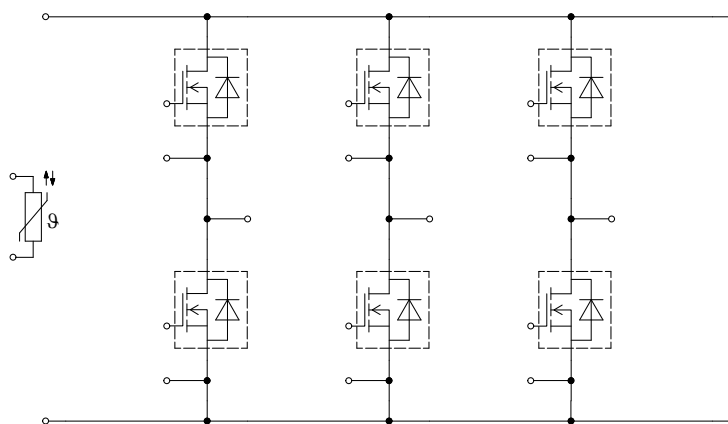


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## 1 Package

**Table 1** Insulation coordination

Parameter	Symbol	Note or test condition	Values	Unit
Isolation test voltage	$V_{ISOL}$	RMS, $f = 50 \text{ Hz}$ , $t = 1 \text{ min}$	2.5	kV
Isolation test voltage NTC	$V_{ISOL(NTC)}$	RMS, $f = 50 \text{ Hz}$ , $t = 1 \text{ min}$	2.5	kV
Internal isolation		basic insulation (class 1, IEC 61140)	$Al_2O_3$	
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	$L_{SCE}$			17		nH
Module lead resistance, terminals - chip	$R_{CC'+EE'}$	$T_H = 25 \text{ °C}$ , per switch		2.7		mΩ
Storage temperature	$T_{stg}$		-40		125	°C
Mounting force per clamp	$F$		40		80	N
Weight	$G$			39		g

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

## 2 MOSFET

**Table 3** Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Drain-source voltage	$V_{DSS}$		$T_{vj} = 25 \text{ °C}$	1200	V
Implemented drain current	$I_{DN}$			50	A
Continuous DC drain current	$I_{DDC}$	$T_{vj} = 150 \text{ °C}$ , $V_{GS} = 18 \text{ V}$	$T_H = 65 \text{ °C}$	40	A
Repetitive peak drain current	$I_{DRM}$	verified by design, $t_p$ limited by $T_{vjmax}$		100	A
Gate-source voltage, max. transient voltage	$V_{GS}$	$D < 0.01$		-10/23	V
Gate-source voltage, max. static voltage	$V_{GS}$			-7/20	V

**Table 4 Recommended values**

Parameter	Symbol	Note or test condition	Values	Unit
On-state gate voltage	$V_{GS(on)}$		15...18	V
Off-state gate voltage	$V_{GS(off)}$		-5...0	V

**Table 5 Characteristic values**

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Drain-source on-resistance	$R_{DS(on)}$	$I_D = 50\text{ A}$	$V_{GS} = 18\text{ V}, T_{vj} = 25\text{ °C}$		16.2	TBD	mΩ
			$V_{GS} = 18\text{ V}, T_{vj} = 125\text{ °C}$		26.1		
			$V_{GS} = 18\text{ V}, T_{vj} = 150\text{ °C}$		30.1		
			$V_{GS} = 15\text{ V}, T_{vj} = 25\text{ °C}$		19.4		
Gate threshold voltage	$V_{GS(th)}$	$I_D = 20\text{ mA}, V_{DS} = V_{GS}, T_{vj} = 25\text{ °C},$ (tested after 1ms pulse at $V_{GS} = +20\text{ V}$ )		3.45	4.3	5.15	V
Total gate charge	$Q_G$	$V_{DD} = 800\text{ V}, V_{GS} = -3/18\text{ V}, T_{vj} = 25\text{ °C}$			0.149		μC
Internal gate resistor	$R_{Gint}$	$T_{vj} = 25\text{ °C}$			4.1		Ω
Input capacitance	$C_{ISS}$	$f = 100\text{ kHz}, V_{DS} = 800\text{ V}, V_{GS} = 0\text{ V}$	$T_{vj} = 25\text{ °C}$		4.4		nF
Output capacitance	$C_{OSS}$	$f = 100\text{ kHz}, V_{DS} = 800\text{ V}, V_{GS} = 0\text{ V}$	$T_{vj} = 25\text{ °C}$		0.21		nF
Reverse transfer capacitance	$C_{rSS}$	$f = 100\text{ kHz}, V_{DS} = 800\text{ V}, V_{GS} = 0\text{ V}$	$T_{vj} = 25\text{ °C}$		0.014		nF
$C_{OSS}$ stored energy	$E_{OSS}$	$V_{DS} = 800\text{ V}, V_{GS} = -3/18\text{ V}, T_{vj} = 25\text{ °C}$			86		μJ
Drain-source leakage current	$I_{DSS}$	$V_{DS} = 1200\text{ V}, V_{GS} = -3\text{ V}$	$T_{vj} = 25\text{ °C}$		0.03	210	μA
Gate-source leakage current	$I_{GSS}$	$V_{DS} = 0\text{ V}, T_{vj} = 25\text{ °C}$	$V_{GS} = 20\text{ V}$			400	nA
Turn-on delay time (inductive load)	$t_{d\ on}$	$I_D = 50\text{ A}, R_{Gon} = 3.3\text{ Ω}, V_{DD} = 600\text{ V}, V_{GS} = -3/18\text{ V}, t_{dead} = 1000\text{ ns}$	$T_{vj} = 25\text{ °C}$		32		ns
			$T_{vj} = 125\text{ °C}$		32		
			$T_{vj} = 150\text{ °C}$		32		
Rise time (inductive load)	$t_r$	$I_D = 50\text{ A}, R_{Gon} = 3.3\text{ Ω}, V_{DD} = 600\text{ V}, V_{GS} = -3/18\text{ V}, t_{dead} = 1000\text{ ns}$	$T_{vj} = 25\text{ °C}$		29		ns
			$T_{vj} = 125\text{ °C}$		29		
			$T_{vj} = 150\text{ °C}$		29		

**(table continues...)**

**Table 5** (continued) Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Turn-off delay time (inductive load)	$t_{d\ off}$	$I_D = 50\ A, R_{Goff} = 0.22\ \Omega,$ $V_{DD} = 600\ V, V_{GS} = -3/18\ V$	$T_{vj} = 25\ ^\circ C$	39		ns
			$T_{vj} = 125\ ^\circ C$	43		
			$T_{vj} = 150\ ^\circ C$	44		
Fall time (inductive load)	$t_f$	$I_D = 50\ A, R_{Goff} = 0.22\ \Omega,$ $V_{DD} = 600\ V, V_{GS} = -3/18\ V$	$T_{vj} = 25\ ^\circ C$	12		ns
			$T_{vj} = 125\ ^\circ C$	12		
			$T_{vj} = 150\ ^\circ C$	12		
Turn-on energy loss per pulse	$E_{on}$	$I_D = 50\ A, V_{DD} = 600\ V,$ $L_\sigma = 15\ nH, V_{GS} = -3/18\ V,$ $R_{Gon} = 3.3\ \Omega, di/dt =$ $7.9\ kA/\mu s (T_{vj} = 150\ ^\circ C),$ $t_{dead} = 1000\ ns$	$T_{vj} = 25\ ^\circ C$	644		$\mu J$
			$T_{vj} = 125\ ^\circ C$	763		
			$T_{vj} = 150\ ^\circ C$	816		
Turn-on energy loss per pulse, optimized	$E_{on,o}$	$I_D = 50\ A, V_{DD} = 600\ V,$ $L_\sigma = 15\ nH, V_{GS} = -3/18\ V,$ $R_{Gon,o} = 0\ \Omega, di/dt =$ $12\ kA/\mu s (T_{vj} = 150\ ^\circ C),$ $t_{dead} = 100\ ns$	$T_{vj} = 25\ ^\circ C$	397		$\mu J$
			$T_{vj} = 125\ ^\circ C$	414		
			$T_{vj} = 150\ ^\circ C$	428		
Turn-off energy loss per pulse	$E_{off}$	$I_D = 50\ A, V_{DD} = 600\ V,$ $L_\sigma = 15\ nH, V_{GS} = -3/18\ V,$ $R_{Goff} = 0.22\ \Omega, dv/dt = 40$ $kV/\mu s (T_{vj} = 150\ ^\circ C)$	$T_{vj} = 25\ ^\circ C$	90		$\mu J$
			$T_{vj} = 125\ ^\circ C$	91		
			$T_{vj} = 150\ ^\circ C$	104		
Thermal resistance, junction to heat sink	$R_{thJH}$	per MOSFET, $\lambda_{grease} = 1\ W/(m\cdot K)$		1.17	1.37	K/W
Temperature under switching conditions	$T_{vj\ op}$		-40		150	$^\circ C$

**Note:** The selection of positive and negative gate-source voltages impacts losses and the long-term behavior of the MOSFET and body diode. The design guidelines described in Application Notes AN 2018-09 and AN 2021-13 must be considered to ensure sound operation of the device over the planned lifetime.  
EoL criteria see AQG324, verified by characterisation with 4.5 sigma.

### 3 Body diode (MOSFET)

**Table 6** Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
DC body diode forward current	$I_{SD}$	$T_{vj} = 150\ ^\circ C, V_{GS} = -3\ V$	$T_H = 65\ ^\circ C$	16	A

**Table 7** Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	$V_{SD}$	$I_{SD} = 50 \text{ A}$ , $V_{GS} = -3 \text{ V}$	$T_{vj} = 25 \text{ }^{\circ}\text{C}$	4.2	TBD	V
			$T_{vj} = 125 \text{ }^{\circ}\text{C}$	3.9		
			$T_{vj} = 150 \text{ }^{\circ}\text{C}$	3.8		
Peak reverse recovery current	$I_{rrm}$	$I_{SD} = 50 \text{ A}$ , $di_s/dt = 7.9 \text{ kA}/\mu\text{s}$ , $V_{DD} = 600 \text{ V}$ , $V_{GS} = -3 \text{ V}$ , $t_{dead} = 1000 \text{ ns}$	$T_{vj} = 25 \text{ }^{\circ}\text{C}$	64		A
			$T_{vj} = 125 \text{ }^{\circ}\text{C}$	81		
			$T_{vj} = 150 \text{ }^{\circ}\text{C}$	87		
Recovered charge	$Q_{rr}$	$I_{SD} = 50 \text{ A}$ , $di_s/dt = 7.9 \text{ kA}/\mu\text{s}$ , $V_{DD} = 600 \text{ V}$ , $V_{GS} = -3 \text{ V}$ , $t_{dead} = 1000 \text{ ns}$	$T_{vj} = 25 \text{ }^{\circ}\text{C}$	0.9		$\mu\text{C}$
			$T_{vj} = 125 \text{ }^{\circ}\text{C}$	1.2		
			$T_{vj} = 150 \text{ }^{\circ}\text{C}$	1.3		
Reverse recovery energy	$E_{rec}$	$I_{SD} = 50 \text{ A}$ , $di_s/dt = 7.9 \text{ kA}/\mu\text{s}$ ( $T_{vj} = 150 \text{ }^{\circ}\text{C}$ ), $V_{DD} = 600 \text{ V}$ , $V_{GS} = -3 \text{ V}$ , $t_{dead} = 1000 \text{ ns}$	$T_{vj} = 25 \text{ }^{\circ}\text{C}$	119		$\mu\text{J}$
			$T_{vj} = 125 \text{ }^{\circ}\text{C}$	226		
			$T_{vj} = 150 \text{ }^{\circ}\text{C}$	280		
Reverse recovery energy, optimized	$E_{rec,o}$	$I_{SD} = 50 \text{ A}$ , $di_s/dt = 12 \text{ kA}/\mu\text{s}$ ( $T_{vj} = 150 \text{ }^{\circ}\text{C}$ ), $V_{DD} = 600 \text{ V}$ , $V_{GS} = -3 \text{ V}$ , $t_{dead} = 100 \text{ ns}$	$T_{vj} = 25 \text{ }^{\circ}\text{C}$	256		$\mu\text{J}$
			$T_{vj} = 125 \text{ }^{\circ}\text{C}$	313		
			$T_{vj} = 150 \text{ }^{\circ}\text{C}$	326		

## 4 NTC-Thermistor

**Table 8** Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Rated resistance	$R_{25}$	$T_{NTC} = 25 \text{ }^{\circ}\text{C}$	9.7	10	10.3	k $\Omega$
Power dissipation	$P_{25}$	$T_{NTC} = 25 \text{ }^{\circ}\text{C}$			20	mW
B-value	$B_{25/50}$	$R_2 = R_{25} \exp[B_{25/50}(1/T_2 - 1/(298,15 \text{ K}))]$		3447		K
B-value	$B_{25/80}$	$R_2 = R_{25} \exp[B_{25/80}(1/T_2 - 1/(298,15 \text{ K}))]$		3487		K
B-value	$B_{25/100}$	$R_2 = R_{25} \exp[B_{25/100}(1/T_2 - 1/(298,15 \text{ K}))]$		3510		K

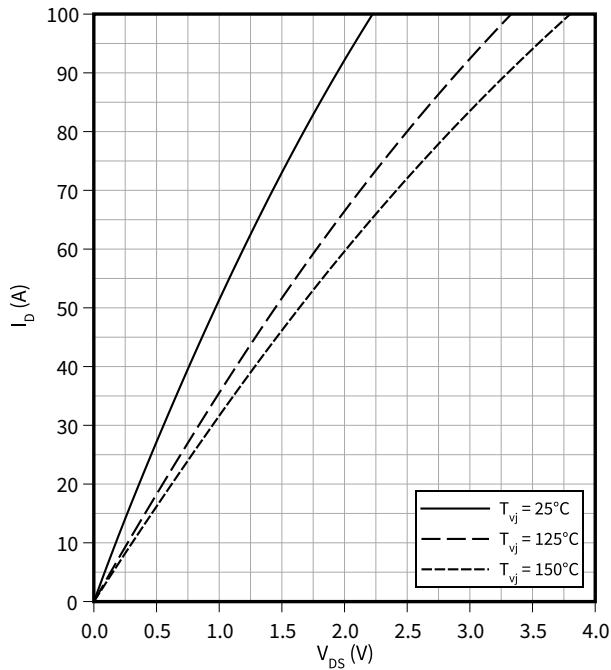
**Note:** Specification according to the valid application note AN2009-10.

5 Characteristics diagrams

Output characteristic (typical), MOSFET

$I_D = f(V_{DS})$

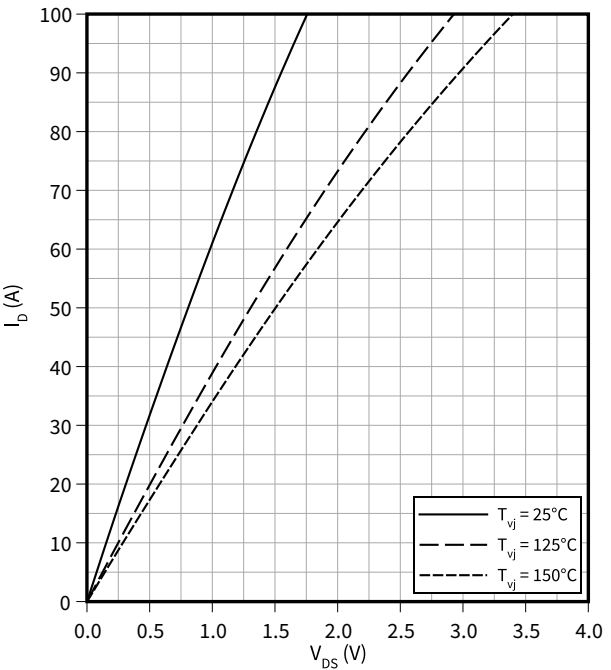
$V_{GS} = 15\text{ V}$



Output characteristic (typical), MOSFET

$I_D = f(V_{DS})$

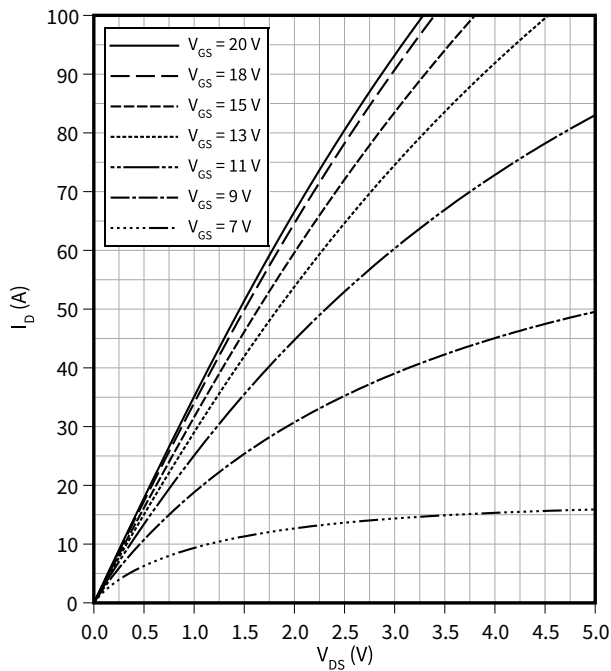
$V_{GS} = 18\text{ V}$



Output characteristic field (typical), MOSFET

$I_D = f(V_{DS})$

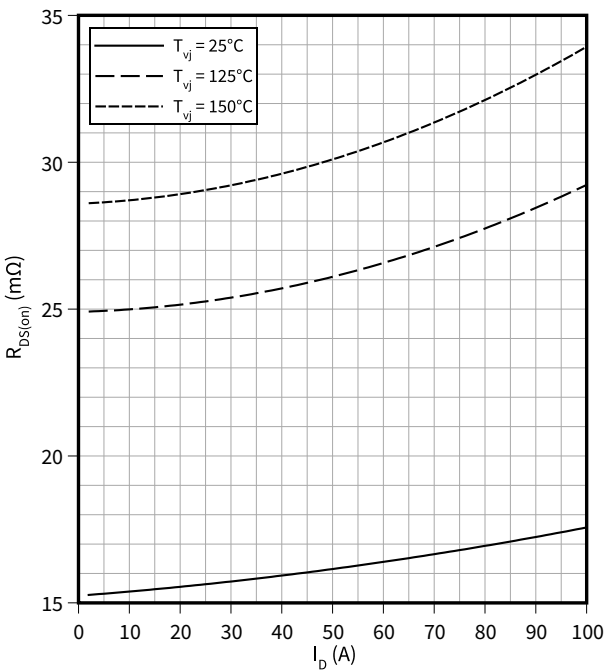
$T_{vj} = 150\text{ °C}$



Drain source on-resistance (typical), MOSFET

$R_{DS(on)} = f(I_D)$

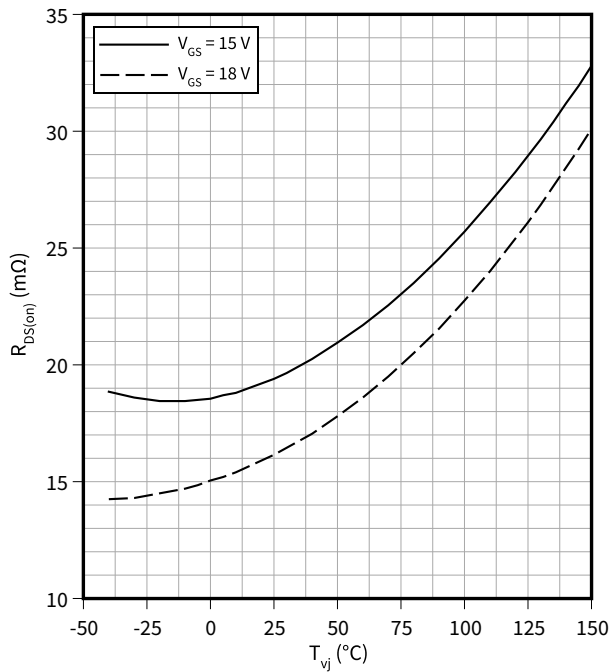
$V_{GS} = 18\text{ V}$



5 Characteristics diagrams

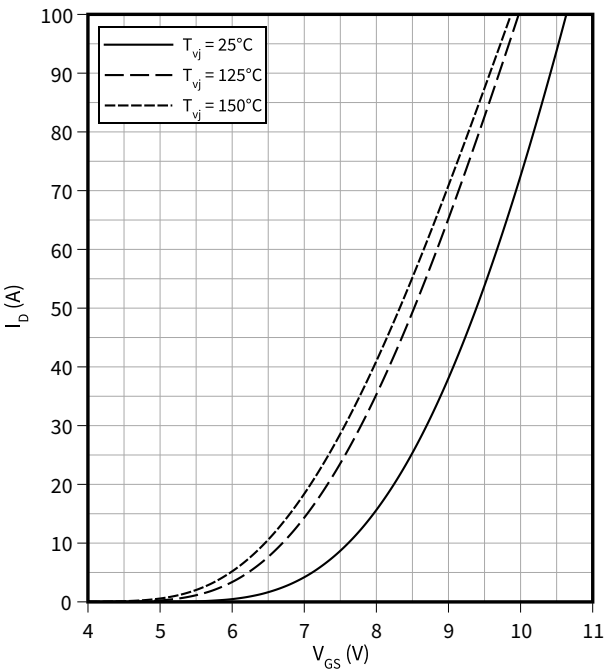
Drain source on-resistance (typical), MOSFET

$R_{DS(on)} = f(T_{vj})$   
 $V_{GS} = V_{DS}$ ,  $I_D = 50\text{ A}$



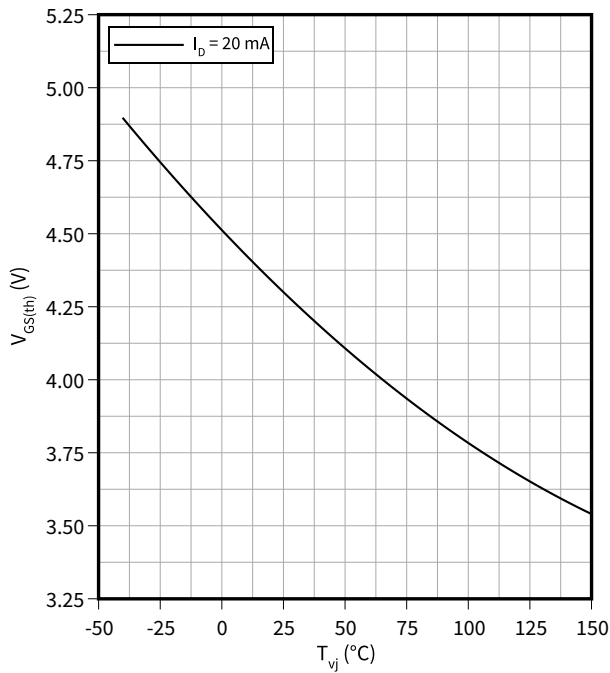
Transfer characteristic (typical), MOSFET

$I_D = f(V_{GS})$   
 $V_{DS} = 20\text{ V}$



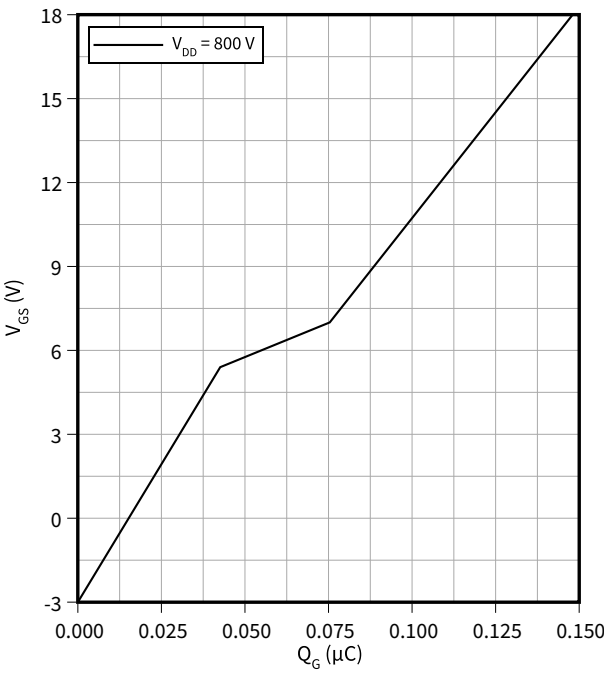
Gate-source threshold voltage (typical), MOSFET

$V_{GS(th)} = f(T_{vj})$   
 $V_{GS} = V_{DS}$



Gate charge characteristic (typical), MOSFET

$V_{GS} = f(Q_G)$   
 $I_D = 50\text{ A}$ ,  $T_{vj} = 25\text{ °C}$



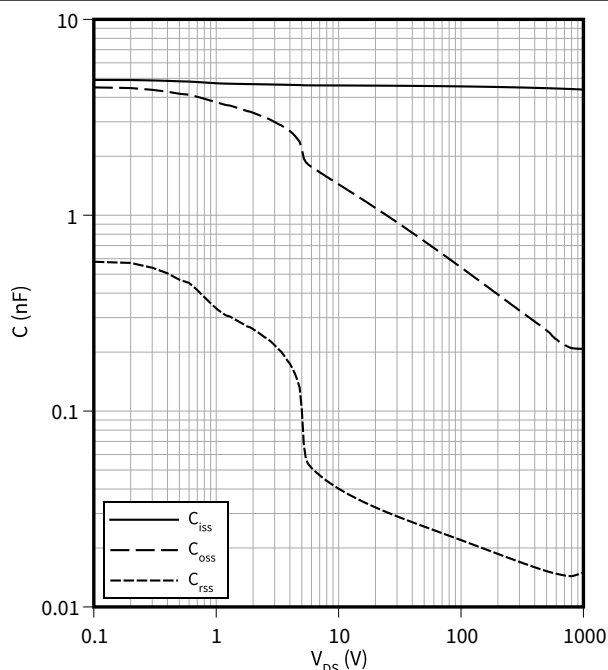


**5 Characteristics diagrams**

**Capacity characteristic (typical), MOSFET**

$$C = f(V_{DS})$$

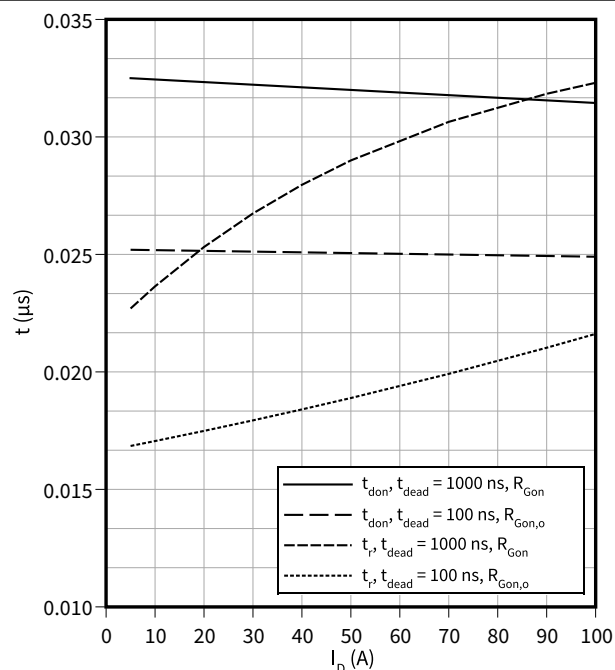
$f = 100 \text{ kHz}$ ,  $T_{vj} = 25^\circ\text{C}$ ,  $V_{GS} = 0 \text{ V}$



**Switching times (typical), MOSFET**

$$t = f(I_D)$$

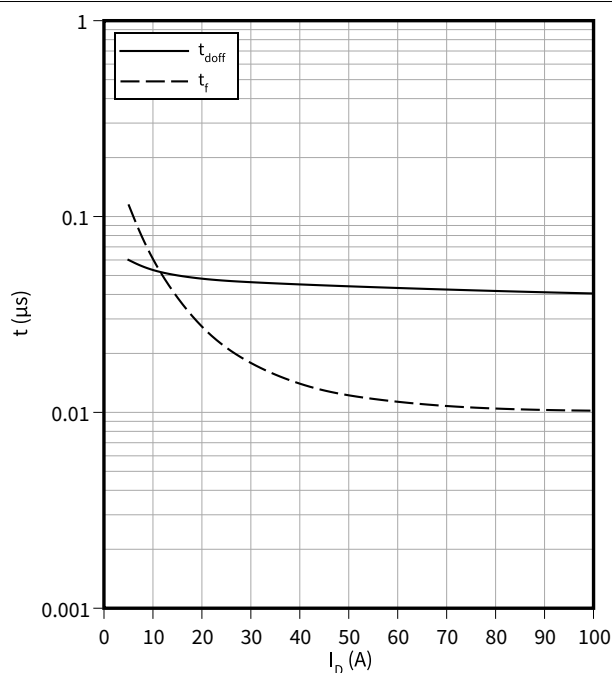
$R_{Gon} = 3.3 \Omega$ ,  $V_{DD} = 600 \text{ V}$ ,  $R_{Gon,o} = 0 \Omega$ ,  $T_{vj} = 150^\circ\text{C}$ ,  $V_{GS} = -3/18 \text{ V}$



**Switching times (typical), MOSFET**

$$t = f(I_D)$$

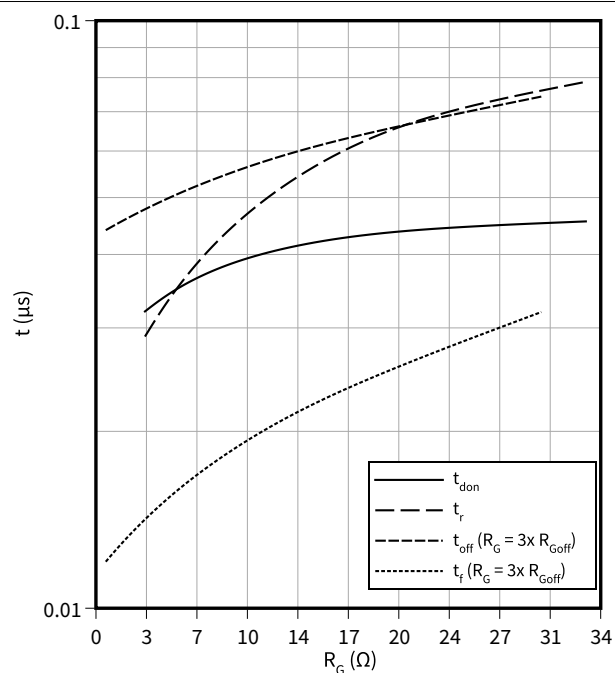
$R_{Goff} = 0.22 \Omega$ ,  $V_{DD} = 600 \text{ V}$ ,  $T_{vj} = 150^\circ\text{C}$ ,  $V_{GS} = -3/18 \text{ V}$



**Switching times (typical), MOSFET**

$$t = f(R_G)$$

$V_{DD} = 600 \text{ V}$ ,  $t_{dead} = 1000 \text{ ns}$ ,  $I_D = 50 \text{ A}$ ,  $T_{vj} = 150^\circ\text{C}$ ,  $V_{GS} = -3/18 \text{ V}$

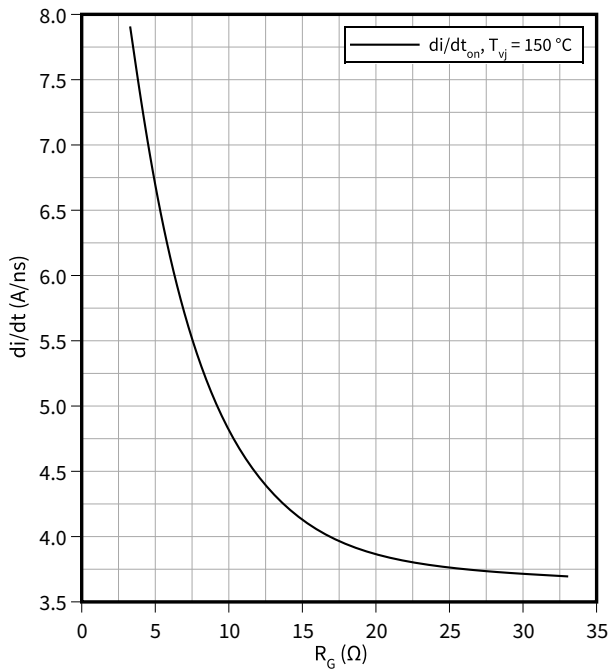


5 Characteristics diagrams

Current slope (typical), MOSFET

$di/dt = f(R_G)$

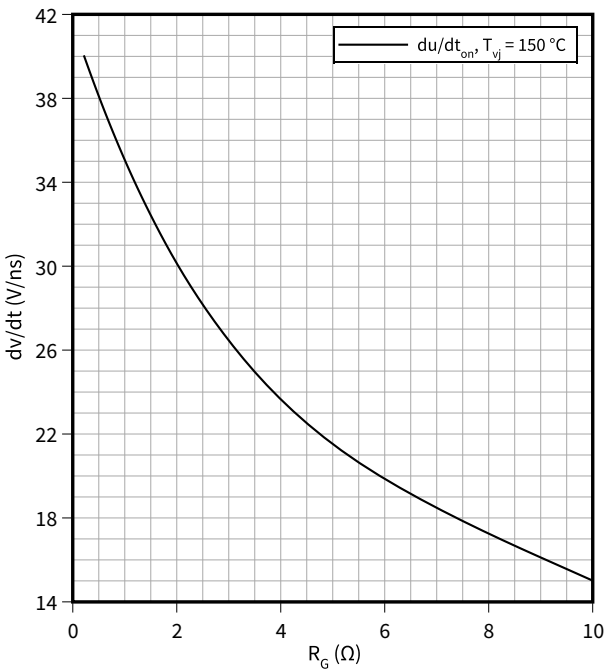
$V_{DD} = 600\text{ V}$ ,  $t_{dead} = 1000\text{ ns}$ ,  $I_D = 50\text{ A}$ ,  $V_{GS} = -3/18\text{ V}$



Voltage slope (typical), MOSFET

$dv/dt = f(R_G)$

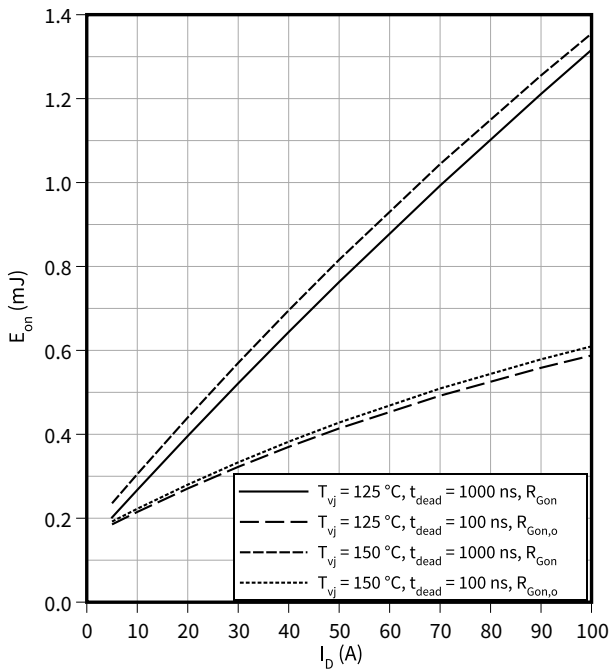
$V_{DD} = 600\text{ V}$ ,  $I_D = 50\text{ A}$ ,  $V_{GS} = -3/18\text{ V}$



Switching losses (typical), MOSFET

$E_{on} = f(I_D)$

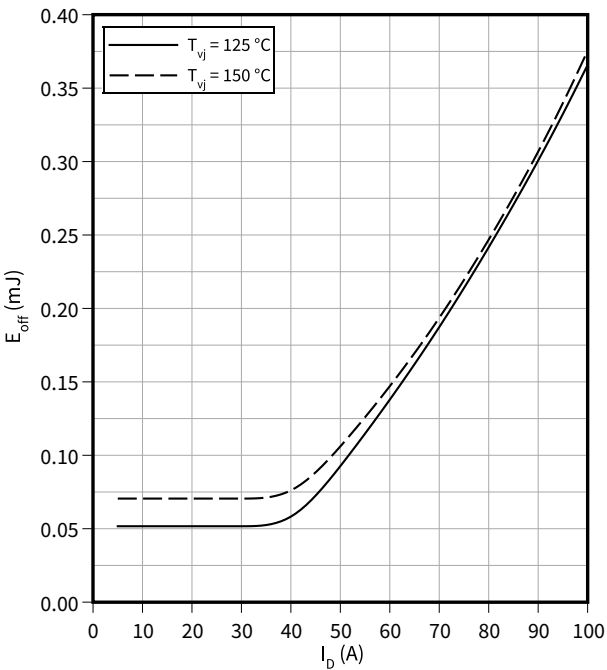
$R_{Gon} = 3.3\text{ }\Omega$ ,  $V_{DD} = 600\text{ V}$ ,  $R_{Gon,o} = 0\text{ }\Omega$ ,  $V_{GS} = -3/18\text{ V}$



Switching losses (typical), MOSFET

$E_{off} = f(I_D)$

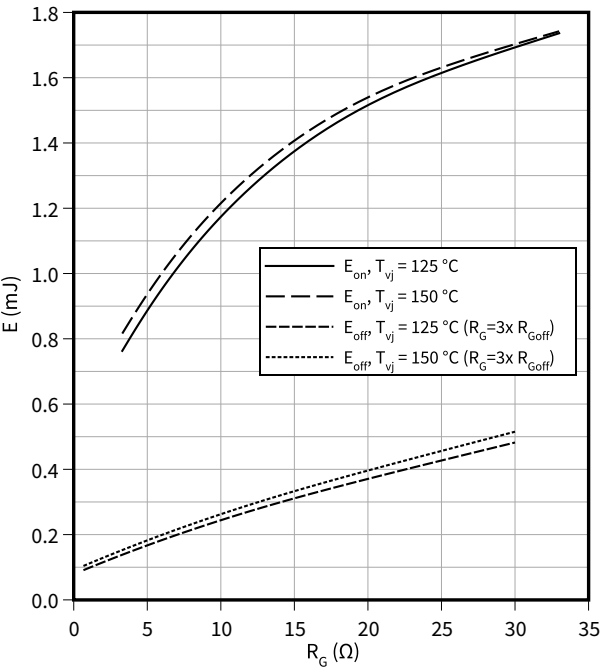
$R_{Goff} = 0.22\text{ }\Omega$ ,  $V_{DD} = 600\text{ V}$ ,  $V_{GS} = -3/18\text{ V}$



5 Characteristics diagrams

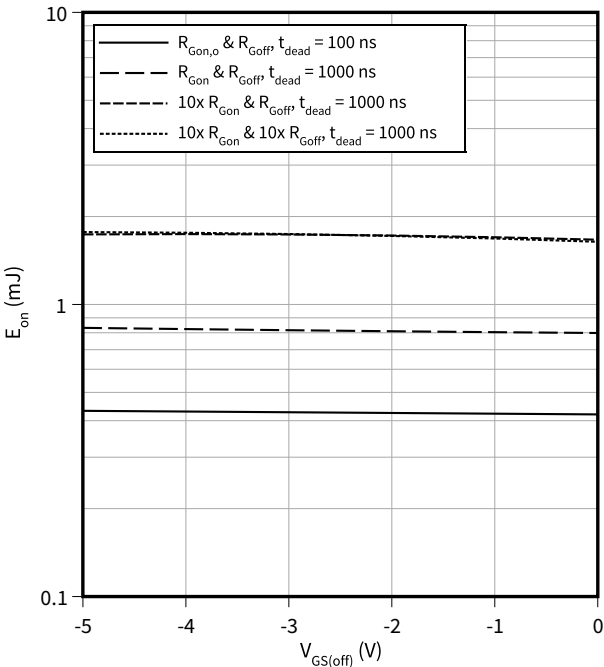
Switching losses (typical), MOSFET

$E = f(R_G)$   
 $V_{DD} = 600\text{ V}$ ,  $t_{dead} = 1000\text{ ns}$ ,  $I_D = 50\text{ A}$ ,  $V_{GS} = -3/18\text{ V}$



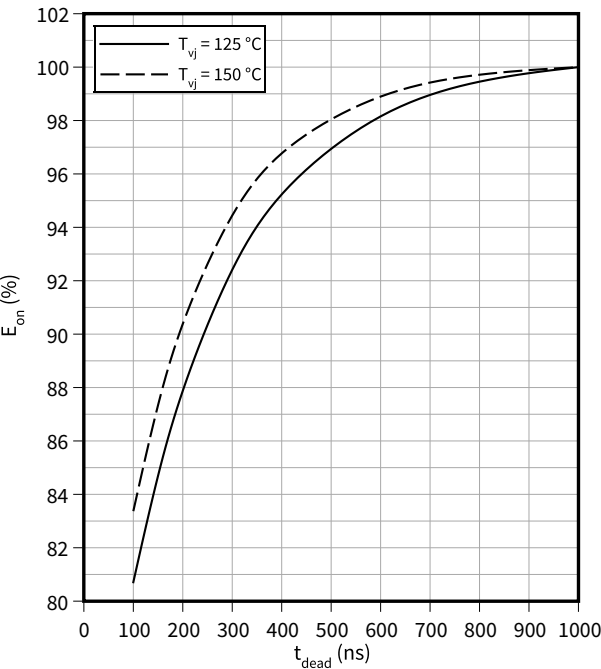
Switching losses (typical), MOSFET

$E_{on} = f(V_{GS(off)})$   
 $R_{Goff} = 0.22\text{ }\Omega$ ,  $V_{DD} = 600\text{ V}$ ,  $R_{Gon} = 3.3\text{ }\Omega$ ,  $V_{GS(on)} = 18\text{ V}$ ,  $I_D = 50\text{ A}$ ,  $R_{Gon,o} = 0\text{ }\Omega$ ,  $T_{vj} = 150\text{ }^\circ\text{C}$



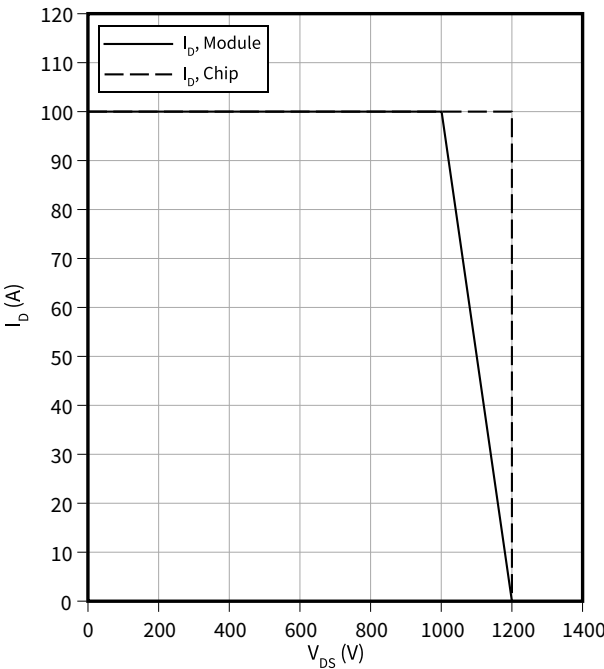
Switching losses (typical), MOSFET

$E_{on} = f(t_{dead})$   
 $R_{Gon} = 3.3\text{ }\Omega$ ,  $I_D = 50\text{ A}$ ,  $V_{DD} = 600\text{ V}$ ,  $V_{GS} = -3/18\text{ V}$



Reverse bias safe operating area (RBSOA), MOSFET

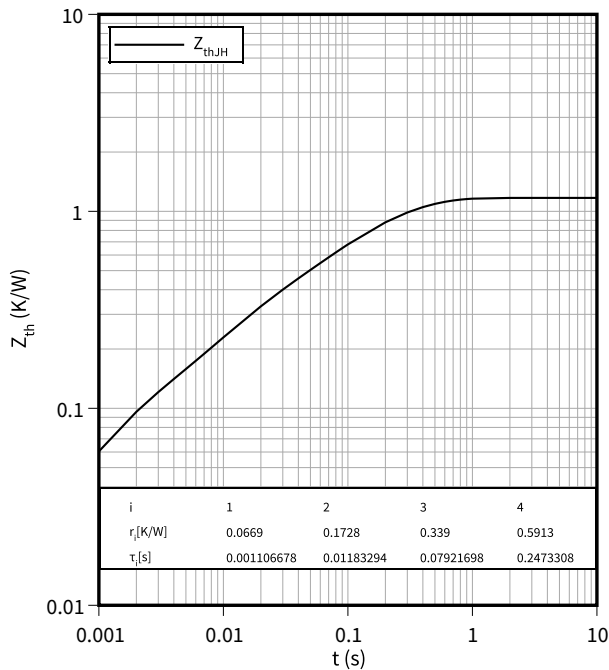
$I_D = f(V_{DS})$   
 $R_{Goff} = 0.22\text{ }\Omega$ ,  $T_{vj} = 150\text{ }^\circ\text{C}$ ,  $V_{GS} = -3/18\text{ V}$



5 Characteristics diagrams

Transient thermal impedance, MOSFET

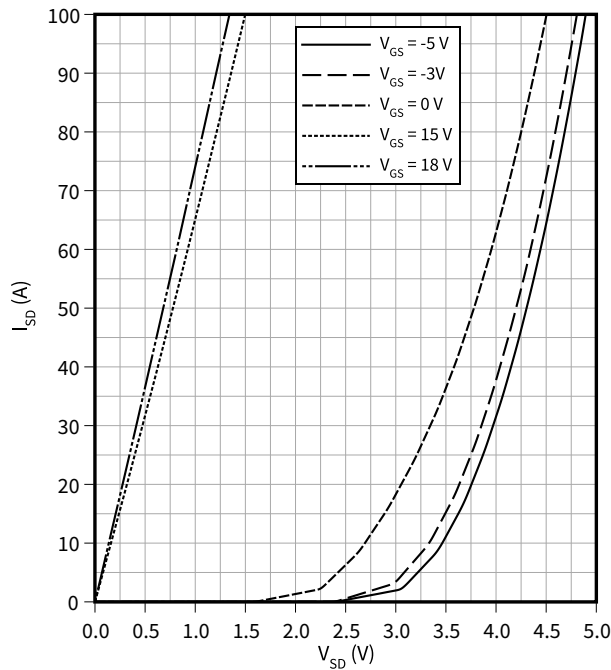
$Z_{th} = f(t)$



Forward characteristic body diode (typical), MOSFET

$I_{SD} = f(V_{SD})$

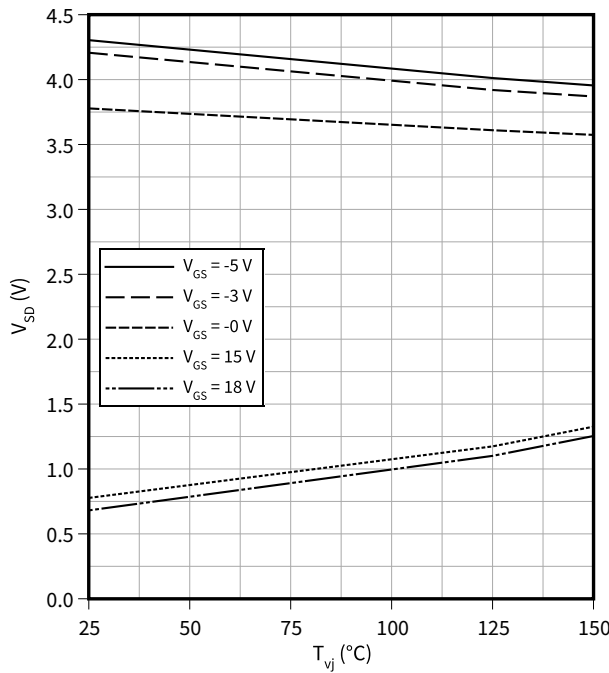
$T_{vj} = 25\text{ }^{\circ}\text{C}$



Forward voltage of body diode (typical), MOSFET

$V_{SD} = f(T_{vj})$

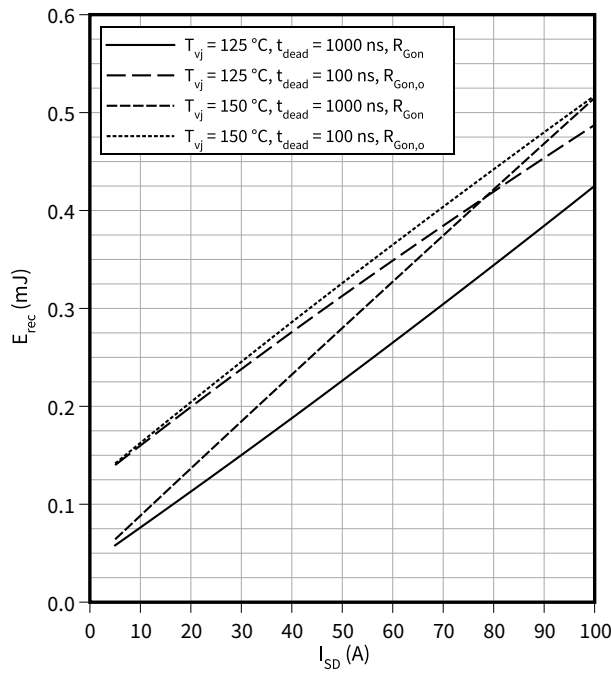
$I_{SD} = 50\text{ A}$



Switching losses body diode (typical), MOSFET

$E_{rec} = f(I_{SD})$

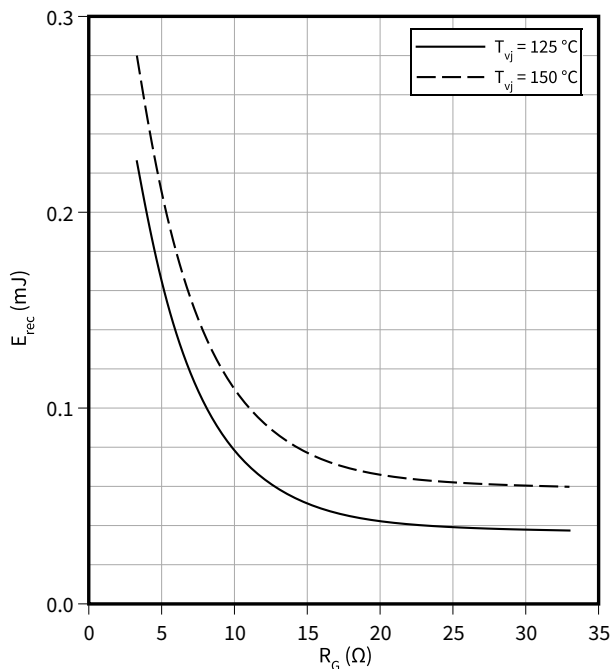
$R_{Gon} = 3.3\text{ }\Omega$ ,  $R_{Gon,o} = 0\text{ }\Omega$ ,  $V_{DD} = 600\text{ V}$



5 Characteristics diagrams

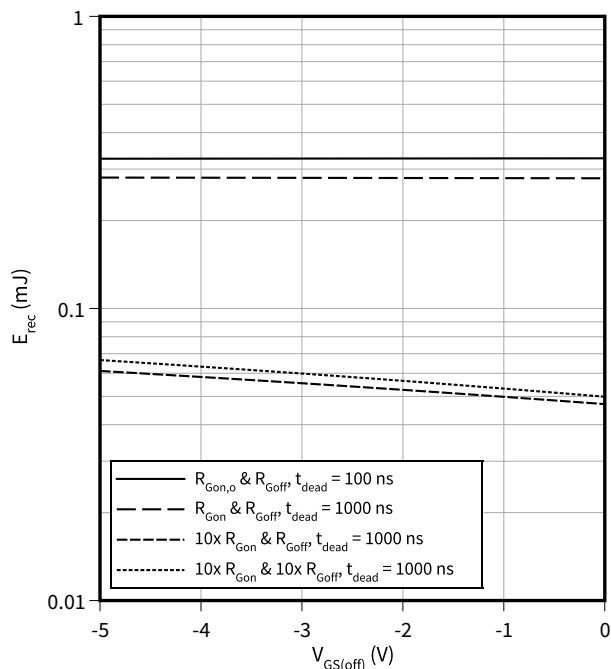
Switching losses body diode (typical), MOSFET

$E_{rec} = f(R_G)$   
 $t_{dead} = 1000\text{ ns}$ ,  $I_{SD} = 50\text{ A}$ ,  $V_{DD} = 600\text{ V}$



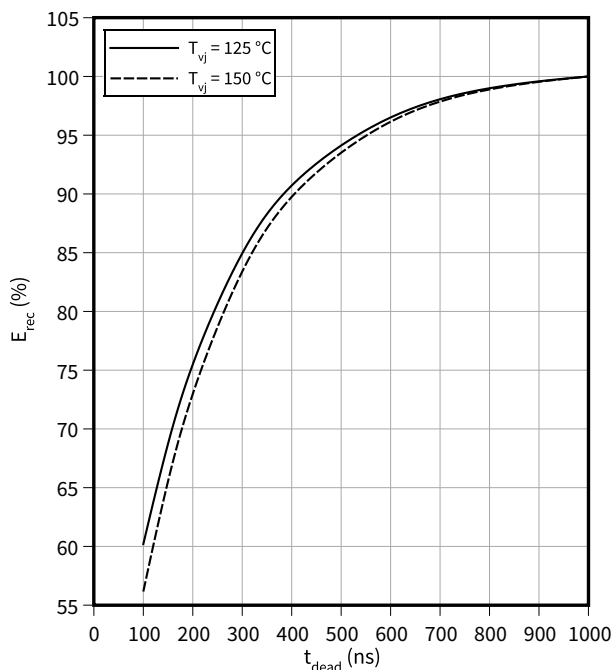
Switching losses body diode (typical), MOSFET

$E_{rec} = f(V_{GS(off)})$   
 $R_{Goff} = 0.22\text{ }\Omega$ ,  $R_{Gon} = 3.3\text{ }\Omega$ ,  $V_{GS(on)} = 18\text{ V}$ ,  $I_{SD} = 50\text{ A}$ ,  $R_{Gon,o} = 0\text{ }\Omega$ ,  $V_{DD} = 600\text{ V}$ ,  $T_{vj} = 150\text{ }^\circ\text{C}$



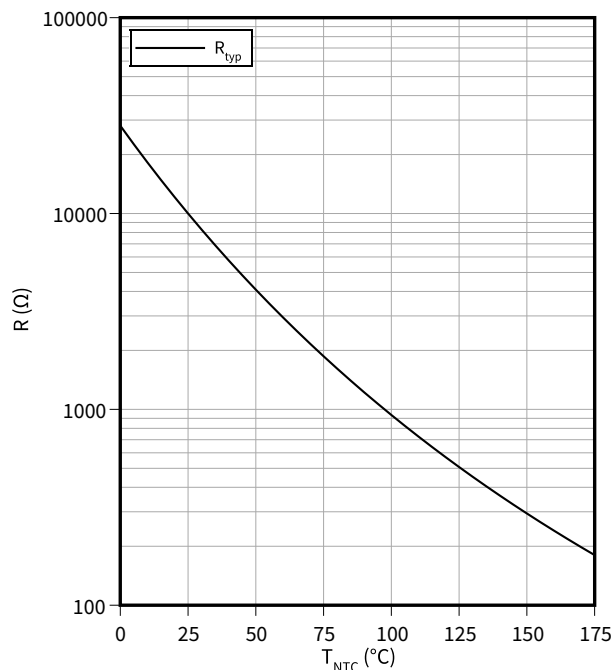
Switching losses body diode (typical), MOSFET

$E_{rec} = f(t_{dead})$   
 $R_{Gon} = 3.3\text{ }\Omega$ ,  $I_D = 50\text{ A}$ ,  $V_{DD} = 600\text{ V}$ ,  $V_{GS} = -3/18\text{ V}$



Temperature characteristic (typical), NTC-Thermistor

$R = f(T_{NTC})$



6 Circuit diagram

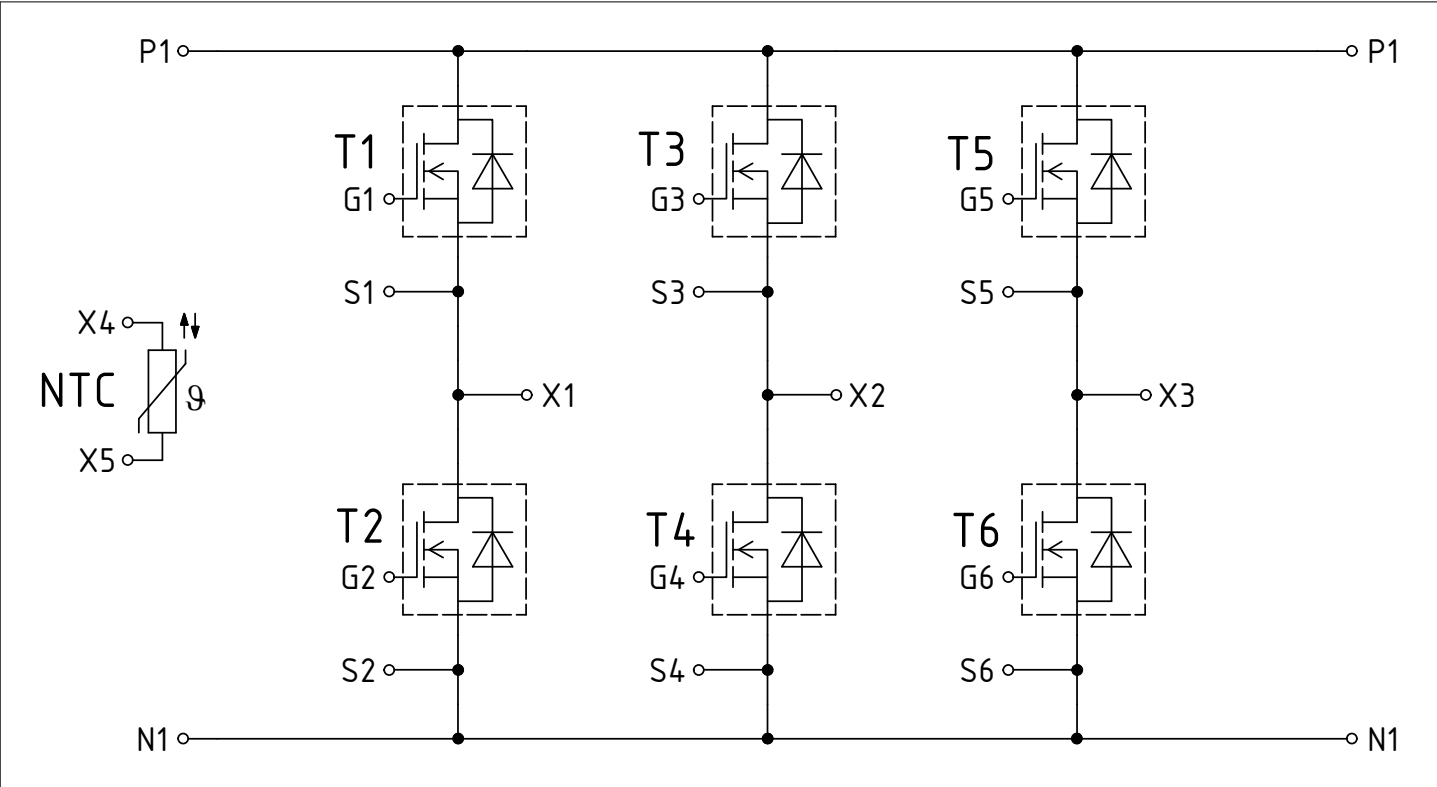


Figure 1

## 7 Package outlines

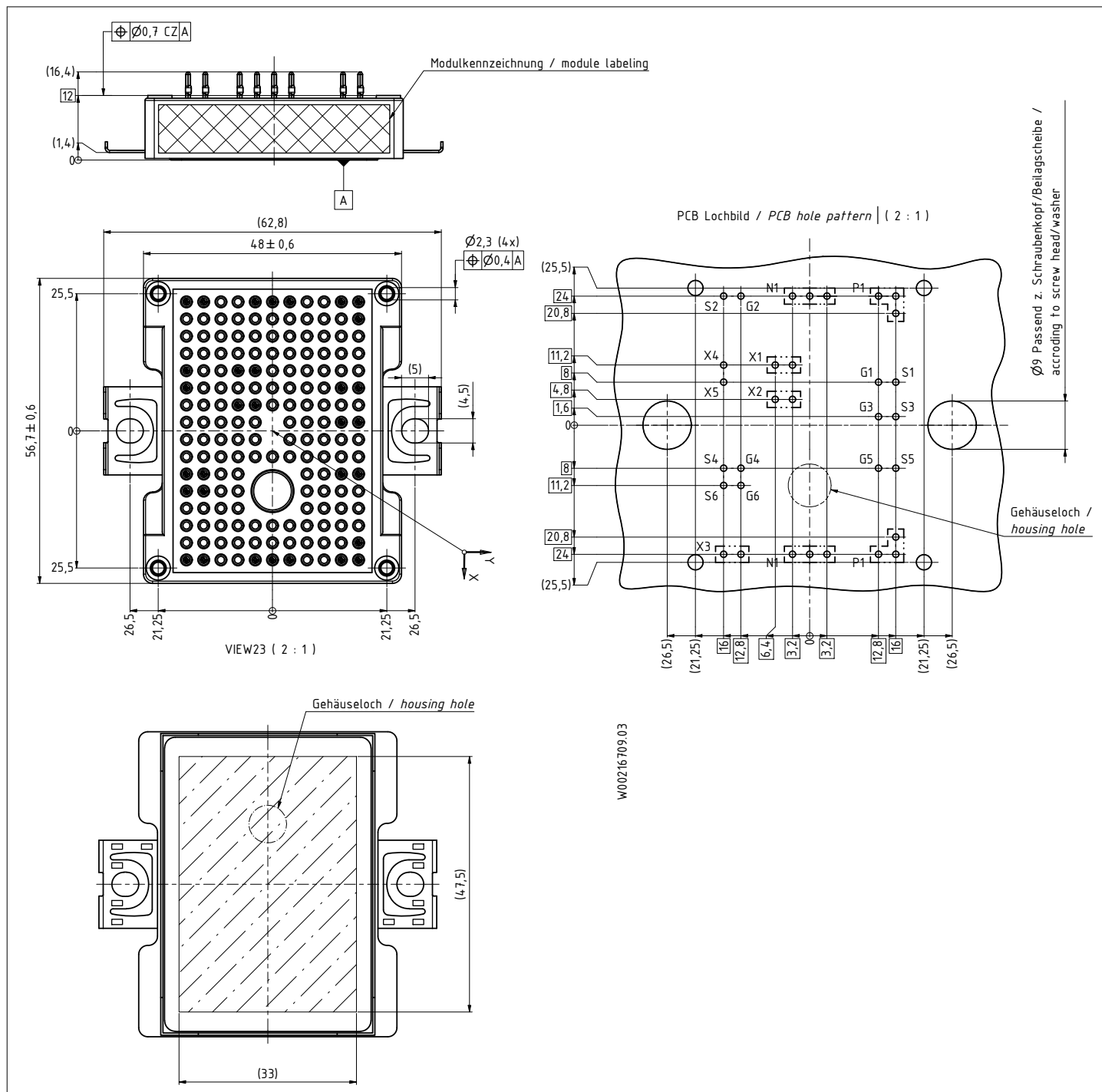


Figure 2

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	<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			
			
71549142846550549911530		71549142846550549911530	

Figure 3





Revision history

Revision history

Document revision	Date of release	Description of changes
0.10	2023-05-08	Initial version
0.20	2025-03-24	Preliminary datasheet

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