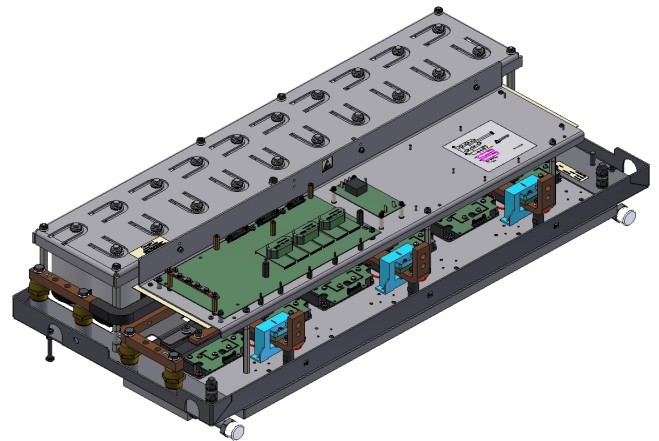


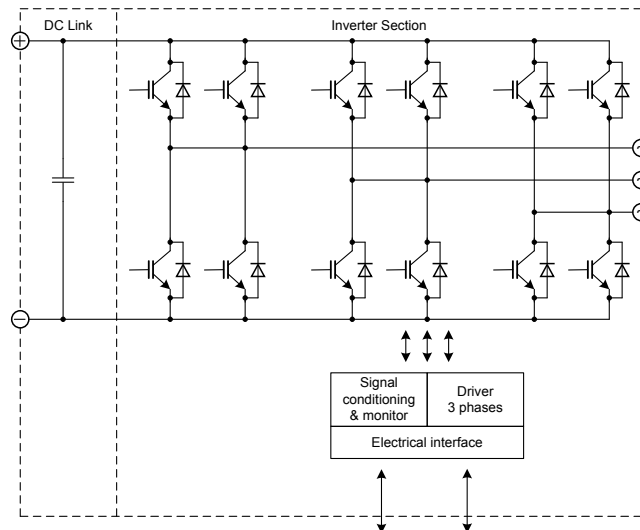
**General information**

**IGBT Stack for typical voltages of up to 690 V<sub>RMS</sub>**  
**Rated output current 880 A<sub>RMS</sub>**

- High power converter
- Wind power
- Motor drives
  
- IHM module with IGBT4
- AlSiC baseplate



Topology	B6I
Application	Inverter
Load type	Resistive, inductive
Semiconductor (Inverter Section)	6x FF800R17KP4_B2
DC Link	8 mF
Heatsink	Water cooled
Implemented sensors	Current, voltage, temperature
Driver signals IGBT	Electrical
Sales - name	6MS16017P43W40382
SP - No.	SP001201420



prepared by: OW	date of publication: 2017-06-26
approved by: YZ	revision: 3.1

### Absolute maximum rated values

Collector-emitter voltage	IGBT; $T_{vj} = 25^{\circ}\text{C}$	$V_{CES}$	1700	V
Repetitive peak reverse voltage	Diode; $T_{vj} = 25^{\circ}\text{C}$	$V_{RRM}$	1700	V
DC link voltage	No switching, $t = 5\text{s}$ , once a day	$V_{DC}$	1500	V
Insulation management	according to installation height of 2000 m	$V_{line}$	690	$V_{RMS}$
Insulation test voltage	according to EN 50178, $f = 50\text{ Hz}$ , $t = 1\text{ s}$	$V_{ISOL}$	2.5	$kV_{RMS}$
Repetitive peak collector current inverter section (IGBT)	$t_p = 1\text{ ms}$	$I_{CRM2}$	2850	A
Repetitive peak forward current inverter section (Diode)	$t_p = 1\text{ ms}$	$I_{FRM2}$	2850	A
Continuous current inverter section		$I_{AC2}$	980	$A_{RMS}$
Junction temperature	under switching conditions	$T_{vjop}$	125	$^{\circ}\text{C}$
Switching frequency inverter section		$f_{sw2}$	5	kHz

#### Notes

Further maximum ratings are specified in the following dedicated sections

### Characteristic values

#### DC Link

			min.	typ.	max.	
Rated voltage		$V_{DC}$		1100	1216	V
Over voltage shutdown	within 150 $\mu\text{s}$			1250		V
Capacitor	1 s, 20 p, rated tol. $\pm 10\%$	$C_{DC}$		8		mF
		type	Foil			
Maximum ripple current	per device, $T_{amb} = 55^{\circ}\text{C}$	$I_{ripple}$			49	$A_{RMS}$
Balance or discharge resistor	per DC link unit	$R_b$		6		$k\Omega$

#### Notes

Operation above 1100 V subject to reduced operating time according to EN 61071

#### Inverter Section

			min.	typ.	max.	
Rated continuous current	$V_{DC} = 1100\text{ V}$ , $V_{AC} = 690\text{ V}_{RMS}$ , $\cos(\varphi) = 0.85$ , $f_{AC\ sine} = 50\text{ Hz}$ , $f_{sw} = 2000\text{ Hz}$ , $T_{inlet} = 40^{\circ}\text{C}$ , $T_j \leq 125^{\circ}\text{C}$	$I_{AC}$			880	$A_{RMS}$
Continuous current at low frequency	$V_{DC} = 1100\text{ V}$ , $f_{AC\ sine} = 0\text{ Hz}$ , $f_{sw} = 2000\text{ Hz}$ , $T_{inlet} = 40^{\circ}\text{C}$ , $T_j \leq 125^{\circ}\text{C}$	$I_{AC\ low}$			440	$A_{RMS}$
Rated continuous current for 150% overload capability	$I_{AC\ 150\%} = 590\text{ A}_{RMS}$ , $t_{on\ over} = 60\text{ s}$ , $T_j \leq 125^{\circ}\text{C}$	$I_{AC\ over1}$			890	$A_{RMS}$
Rated continuous current for 150% overload capability	$I_{AC\ 150\%} = 685\text{ A}_{RMS}$ , $t_{on\ over} = 3\text{ s}$ , $T_j \leq 125^{\circ}\text{C}$	$I_{AC\ over2}$			980	$A_{RMS}$
Over current shutdown	within 15 $\mu\text{s}$	$I_{AC\ OC}$		2500		$A_{peak}$
Power losses	$I_{AC} = 880\text{ A}$ , $V_{DC} = 1100\text{ V}$ , $V_{AC} = 690\text{ V}_{RMS}$ , $\cos(\varphi) = 0.85$ , $f_{AC\ sine} = 50\text{ Hz}$ , $f_{sw} = 2000\text{ Hz}$ , $T_{inlet} = 40^{\circ}\text{C}$ , $T_j \leq 125^{\circ}\text{C}$	$P_{loss}$		11500		W

#### Inverter Section (specific condition)

			min.	typ.	max.	
Specific continuous current	$V_{DC} = 1050\text{ V}$ , $\cos(\varphi) = -0.85$ , $f_{AC\ sine} = 13\text{ Hz}$ , $f_{sw} = 2100\text{ Hz}$ , $T_{inlet} = 45^{\circ}\text{C}$ , $T_j \leq 125^{\circ}\text{C}$	$I_{ACsp}$			850	$A_{RMS}$

prepared by: OW

date of publication: 2017-06-26

approved by: YZ

revision: 3.1

**Controller interface**

Driver and interface board	ref. to separate Application Note		DR110			
			min.	typ.	max.	
Auxiliary voltage		$V_{aux}$	18	24	30	V
Auxiliary power requirement	$V_{aux} = 24\text{ V}$	$P_{aux}$		40		W
Digital input level	resistor to GND 1.8 k $\Omega$ , capacitor to GND 4 nF, logic high = on, min. 15 mA	$V_{in\ low}$	0		4	V
		$V_{in\ high}$	11		15	V
Digital output level	open collector, logic low = no fault, max. 15 mA	$V_{out\ low}$	0		1.5	V
		$V_{out\ high}$		15		V
Analog current sensor output inverter section	load max 1 mA, @ 880 A <sub>RMS</sub>	$V_{IU\ ana2}$ $V_{IV\ ana2}$ $V_{IW\ ana2}$	4.3	4.4	4.5	V
Analog DC link voltage sensor output	load max 1 mA, @ 1100 V	$V_{DC\ ana}$	7.7	7.9	8.1	V
Analog temperature sensor output inverter section (NTC)	load max 1 mA, @ $T_{NTC} = 64\text{ }^{\circ}\text{C}$ , corresponds to $T_j = 122\text{ }^{\circ}\text{C}$ at rated conditions	$V_{Theta\ NTC2}$		7.5		V
Analog temperature sensor output inverter section (Simulated)	load max 1 mA, @ $T_{NTC} = 64\text{ }^{\circ}\text{C}$ , corresponds to $T_j = 122\text{ }^{\circ}\text{C}$ at rated conditions	$V_{Theta\ sim2}$		9.5		V
Over temperature shutdown inverter section		$V_{Error\ OT2}$		10		V

**System data**

			min.	typ.	max.	
EMC robustness	according to IEC 61800-3 at named interfaces	power	$V_{Burst}$	2		kV
		control	$V_{Burst}$	1		kV
		aux (24V)	$V_{surge}$	1		kV
Storage temperature		$T_{stor}$	-40		65	$^{\circ}\text{C}$
Operational ambient temperature	PCB, DC link capacitor, bus bar, excluding cooling medium	$T_{op\ amb}$	-25		55	$^{\circ}\text{C}$
Cooling air velocity	PCB, DC link capacitor, bus bar, standard atmosphere	$V_{air}$	2			m/s
Humidity	no condensation	Rel. F	0		95	%
Vibration	according to IEC 60721				10	m/s <sup>2</sup>
Shock	according to IEC 60721				100	m/s <sup>2</sup>
Protection degree				IP00		
Pollution degree				2		
Dimensions	width x depth x height		1090	496	273	mm
Weight				78		kg

**Heatsink water cooled**

			min.	typ.	max.	
Water flow	according to coolant specification from Infineon	$\Delta V/\Delta t$	12	15		dm <sup>3</sup> /min
Water pressure					8	bar
Water pressure drop	at 12 dm <sup>3</sup> /min water flow	$\Delta p$		550		mbar
Coolant inlet temperature		$T_{inlet}$	-40		55	$^{\circ}\text{C}$
Thermal resistance heatsink to ambient	per switch	$R_{th,ha}$		0.046		K/W
Cooling channel material			Aluminum			

**Notes**

Composition of coolant: Water and 52 vol. % Antifrogen N

prepared by: OW	date of publication: 2017-06-26
approved by: YZ	revision: 3.1



**Overview of optional components**

	Unit 1 (not installed)	Inverter Section	Unit 3 (not installed)
Parallel interface board			
Voltage sensor		x	
Current sensor		x	
Temperature sensor		x	
Temperature simulation		x	
DC link capacitors		x	
Collector-emitter Active Clamping		x	

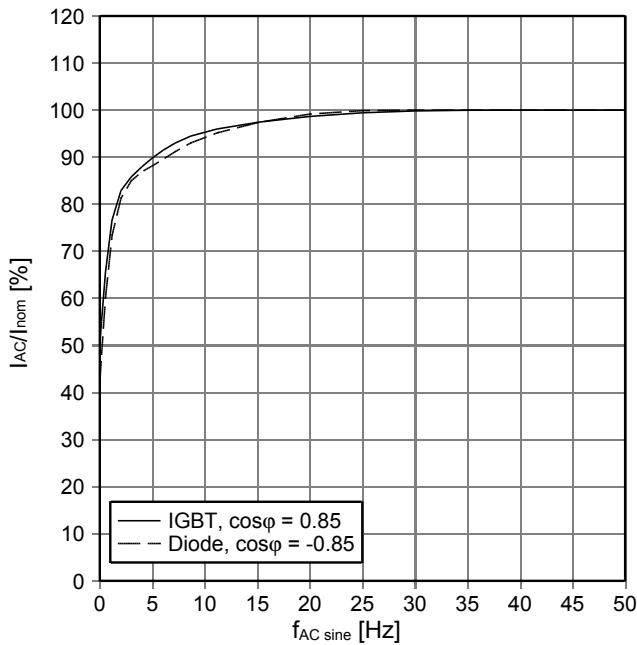
**Notes**

Setting of Active Clamping TVS-Diodes:  $V_z = 1280\text{ V}$

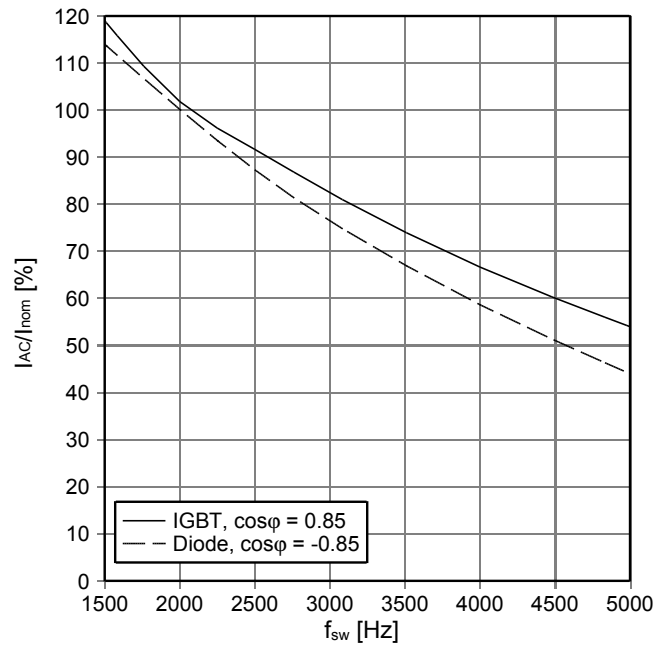
prepared by: OW	date of publication: 2017-06-26
approved by: YZ	revision: 3.1



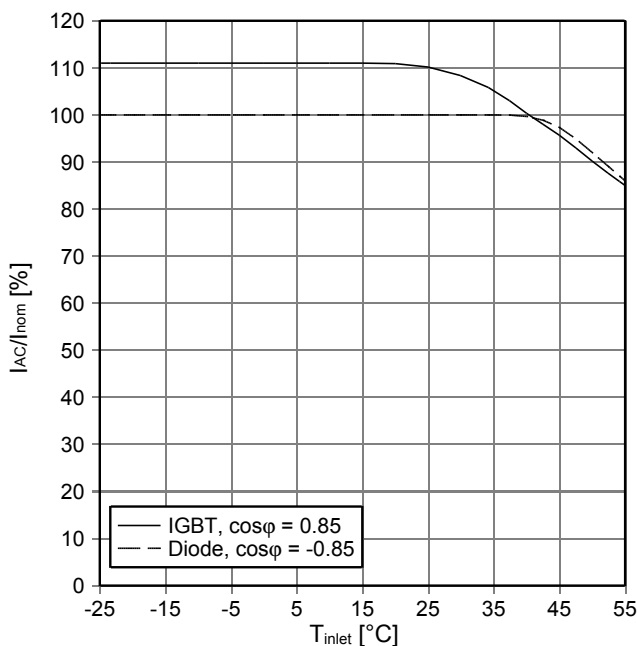
$f_{AC\ sine}$  - derating curve IGBT (motor), Diode (generator)  
 $V_{DC} = 1100\text{ V}$ ,  $V_{AC} = 690\text{ V}_{RMS}$ ,  $f_{sw} = 2\text{ kHz}$ ,  $\cos\phi = \pm 0.85$ ,  
 $T_{inlet} = 40\text{ }^\circ\text{C}$  and nom. cooling conditions



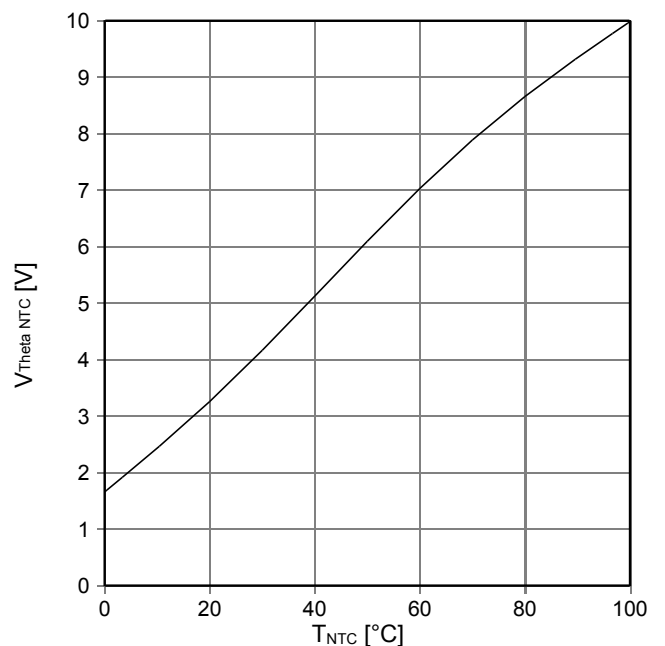
$f_{sw}$  - derating curve IGBT (motor), Diode (generator)  
 $V_{DC} = 1100\text{ V}$ ,  $V_{AC} = 690\text{ V}_{RMS}$ ,  $f_{AC\ sine} = 50\text{ Hz}$ ,  $\cos\phi = \pm 0.85$ ,  
 $T_{inlet} = 40\text{ }^\circ\text{C}$  and nom. cooling conditions



$T_{inlet}$  - derating curve IGBT (motor), Diode (generator)  
 $V_{DC} = 1100\text{ V}$ ,  $V_{AC} = 690\text{ V}_{RMS}$ ,  $f_{sw} = 2\text{ kHz}$ ,  $f_{AC\ sine} = 50\text{ Hz}$ ,  
 $\cos\phi = \pm 0.85$  and nom. cooling conditions

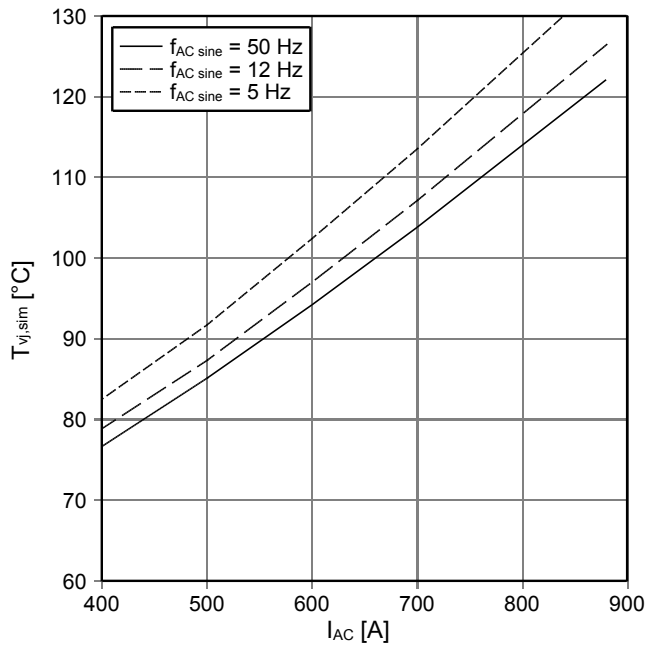


Analog temperature sensor output  $V_{Theta\ NTC}$   
 Sensing NTC of IGBT module

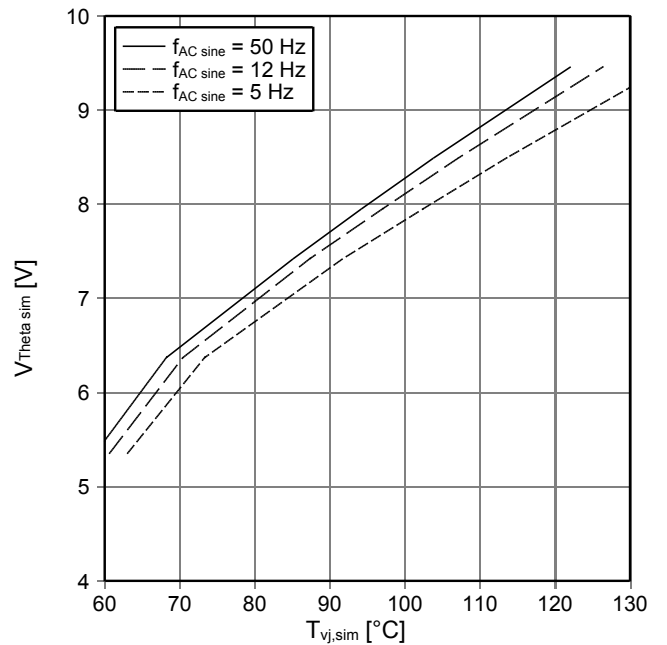


prepared by: OW	date of publication: 2017-06-26
approved by: YZ	revision: 3.1

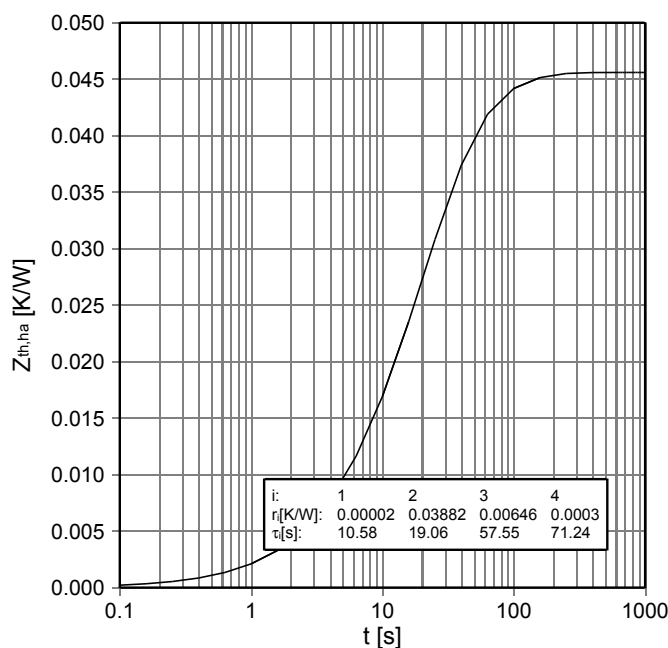
$T_{vj, sim}$  vs.  $I_{AC}$  - Simulated junction temperatur  
 $V_{DC} = 1100\text{ V}$ ,  $V_{AC} = 690\text{ V}_{RMS}$ ,  $f_{sw} = 2\text{ kHz}$ ,  
 $T_{inlet} = 40\text{ }^{\circ}\text{C}$  and nom. cooling conditions



Analog temperature sensor output  $V_{Theta, sim}$   
 $V_{DC} = 1100\text{ V}$ ,  $V_{AC} = 690\text{ V}_{RMS}$ ,  $f_{sw} = 2\text{ kHz}$ ,  
 nom. cooling conditions



$Z_{th, ha}$  - thermal impedance heatsink to ambient per switch  
 nom. cooling conditions

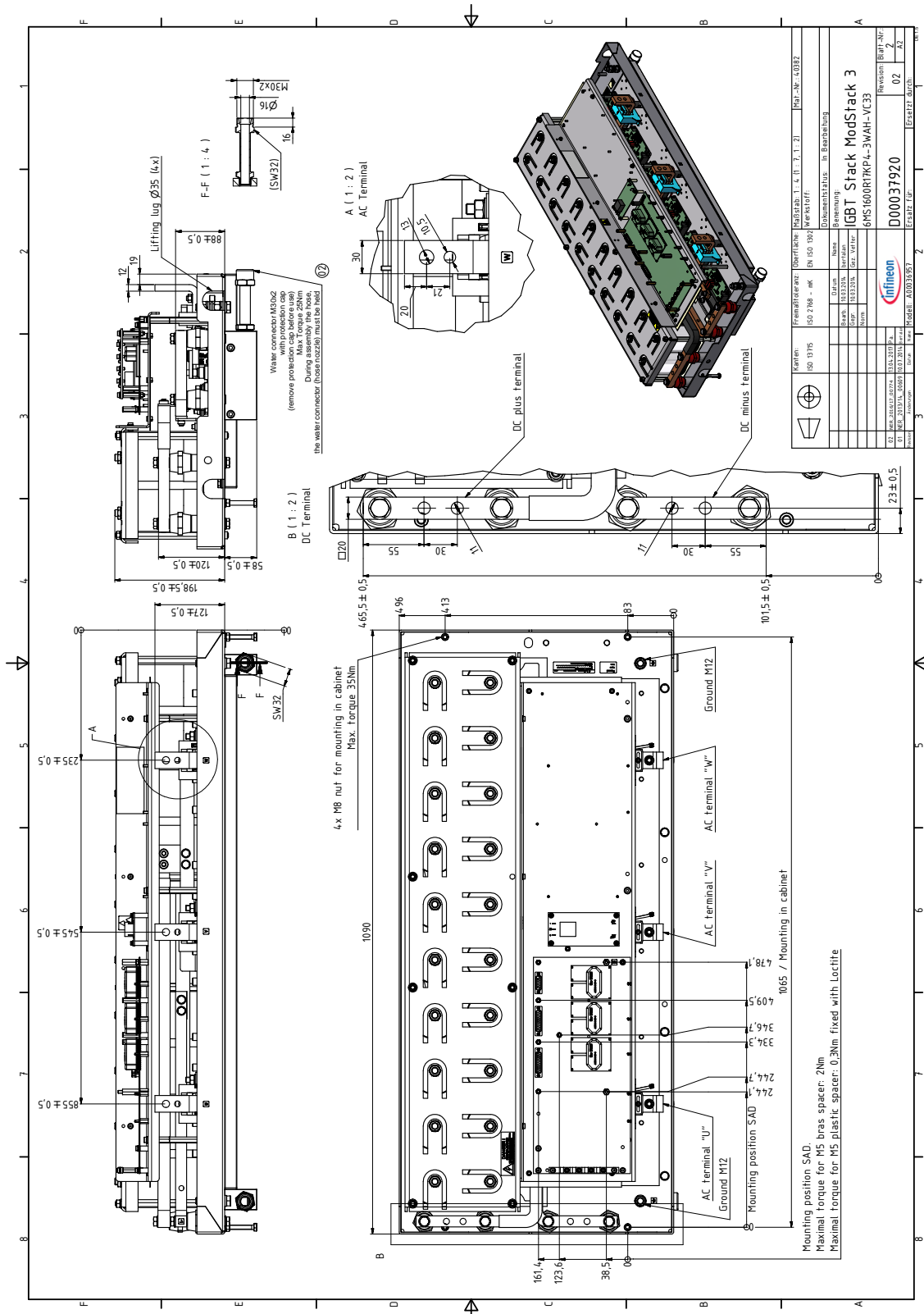


prepared by: OW	date of publication: 2017-06-26
approved by: YZ	revision: 3.1

Technical Information  
6MS16017P43W40382

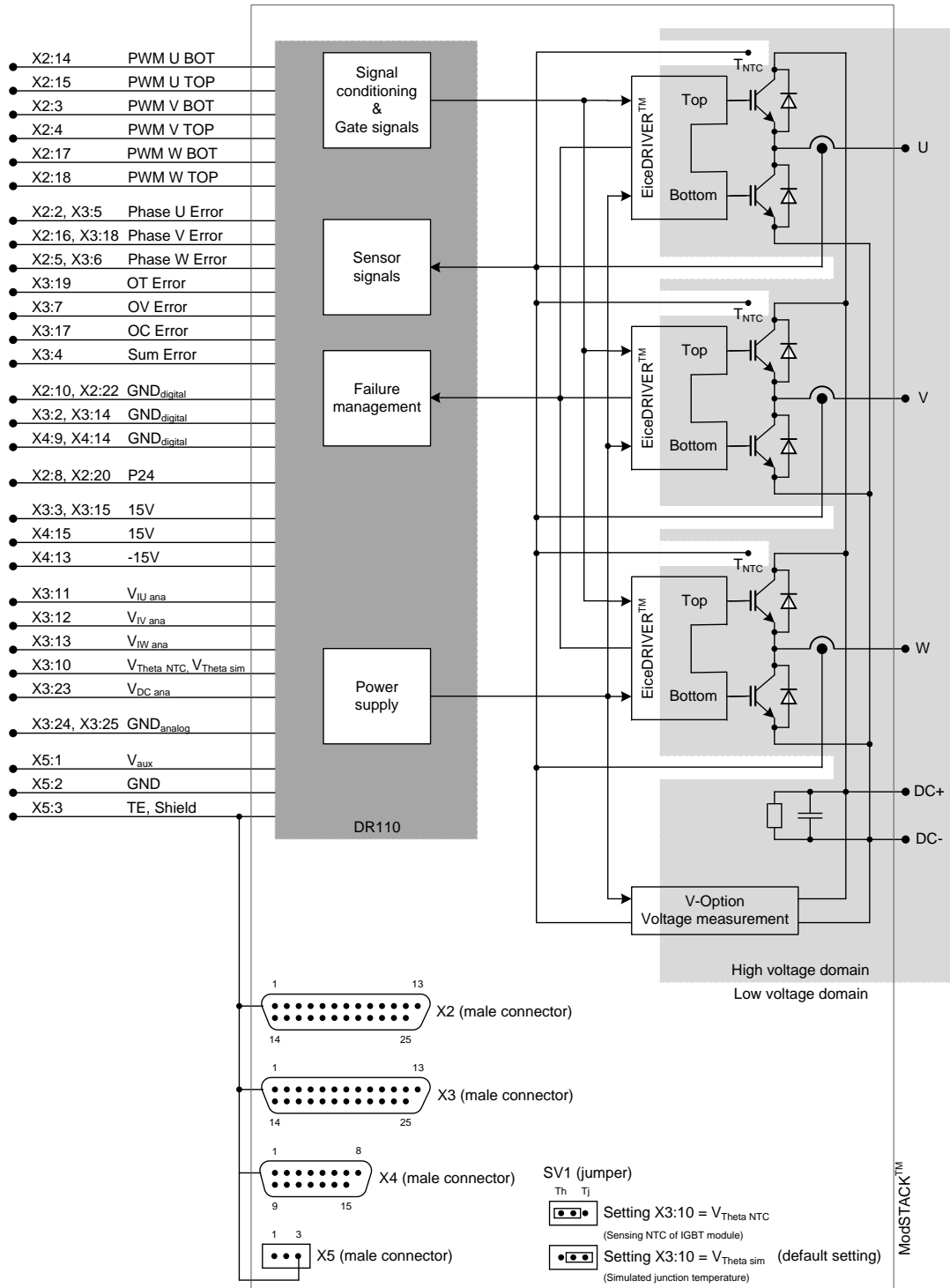


Mechanical drawing



prepared by: OW	date of publication: 2017-06-26
approved by: YZ	revision: 3.1

Circuit diagram



prepared by: OW	date of publication: 2017-06-26
approved by: YZ	revision: 3.1





Terms & Conditions of usage

The data contained in this product data sheet is exclusively intended for technically trained staff. You and your technical departments will have to evaluate the suitability of the product for the intended application and the completeness of the product data with respect to such application.

This product data sheet is describing the characteristics of this product for which a warranty is granted. Any such warranty is granted exclusively pursuant the terms and conditions of the supply agreement. There will be no guarantee of any kind for the product and its characteristics.

Should you require product information in excess of the data given in this product data sheet or which concerns the specific application of our product, please contact the sales office, which is responsible for you (See [www.infineon.com](http://www.infineon.com), sales&contact). For those that are specifically interested we may provide application notes.

Due to technical requirements our product may contain dangerous substances. For information on the types in question please contact the sales office, which is responsible for you.

Should you intend to use the Product in aviation applications, in health or life endangering or life support applications, please notify. Please note, that for any such applications we urgently recommend

- to perform joint Risk and Quality Assessments;
- the conclusion of Quality Agreements;
- to establish joint measures of an ongoing product survey, and that we may make delivery depended on the realization of any such measures.

If and to the extent necessary, please forward equivalent notices to your customers.

Changes of this product data sheet are reserved.

Safety Instructions

Prior to installation and operation, all safety notices and warnings and all warning signs attached to the equipment have to be carefully read. Make sure that all warning signs remain in a legible condition and that missing or damaged signs are replaced. To installation and operation, all safety notices and warnings and all warning signs attached to the equipment have to be carefully read. Make sure that all warning signs remain in a legible condition and that missing or damaged signs are replaced.

prepared by: OW	date of publication: 2017-06-26
approved by: Z	revision: 31