Technical Information

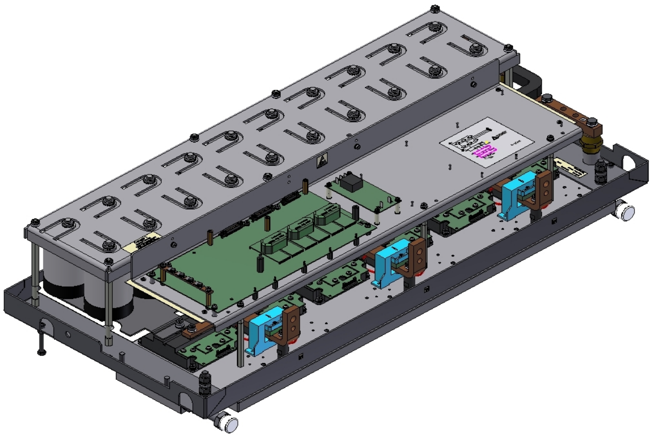
6MS16017P43W40383

General information

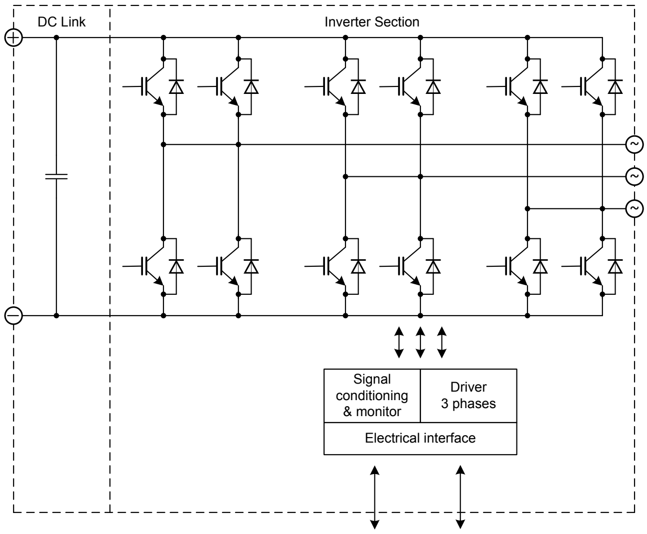
IGBT Stack for typical voltages of up to 690 V_{RMS}
Rated output current 880 A_{RMS}

· 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	6MS16017P43W40383
SP - No.	SP001201428



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Absolute maximum rated values

Collector-emitter voltage	IGBT; T_{vj} = 25°C	V_{CES}	1700	V
Repetitive peak reverse voltage	Diode; T_{vj} = 25°C	V_{RRM}	1700	V
DC link voltage	No switching, t= 5s, 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 Hz, t = 1 s	V_{ISOL}	2.5	kV_{RMS}
Repetitive peak collector current inverter section (IGBT)	t_p = 1 ms	I_{CRM2}	2850	A
Repetitive peak forward current inverter section (Diode)	t_p = 1 ms	I_{FRM2}	2850	A
Continuous current inverter section		I_{AC2}	980	A_{RMS}
Junction temperature	under switching conditions	T_{vjop}	125	°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 µs			1250		V
Capacitor	1 s, 20 p, rated tol. ±10 %	C_{DC}		8		mF
		type		Foil		
Maximum ripple current	per device, T_{amb} = 55 °C	I_{ripple}			49	A_{RMS}
Balance or discharge resistor	per DC link unit	R_b		6		kΩ

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

Inverter Section (specific condition)

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

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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 V	P_{aux}		40		W
Digital input level	resistor to GND 1.8 kΩ, 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_{RMS}	$V_{IU\ ana2}$ $V_{IV\ ana2}$ $V_{IW\ ana2}$	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 °C, corresponds to T_j = 122 °C at rated conditions	$V_{Theta\ NTC2}$		7.5		V
Analog temperature sensor output inverter section (Simulated)	load max 1 mA, @T_{NTC} = 64 °C, corresponds to T_j = 122 °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	°C
Operational ambient temperature	PCB, DC link capacitor, bus bar, excluding cooling medium		$T_{op\ amb}$	-25		55	°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/s²
Shock	according to IEC 60721					100	m/s²
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		dm³/min
Water pressure					8	bar
Water pressure drop	at 12 dm³/min water flow	Δp		550		mbar
Coolant inlet temperature		T_{inlet}	-40		55	°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

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Overview of optional components

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

Notes
Setting of Active Clamping TVS-Diodes: V_Z = 1280 V

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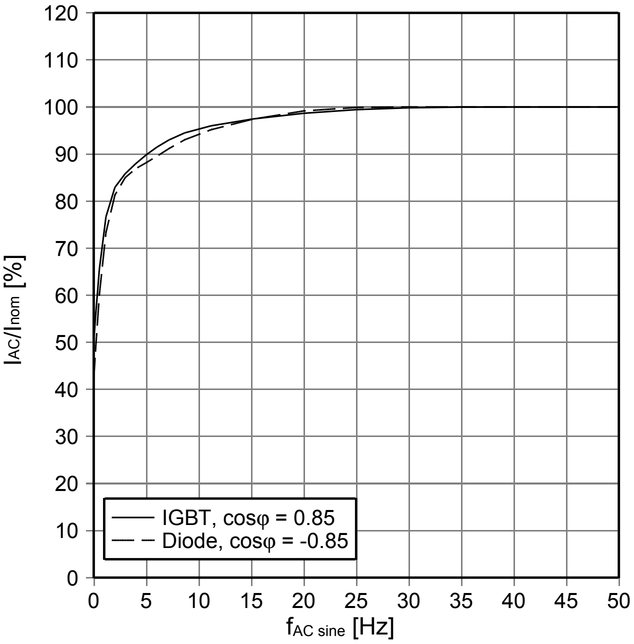
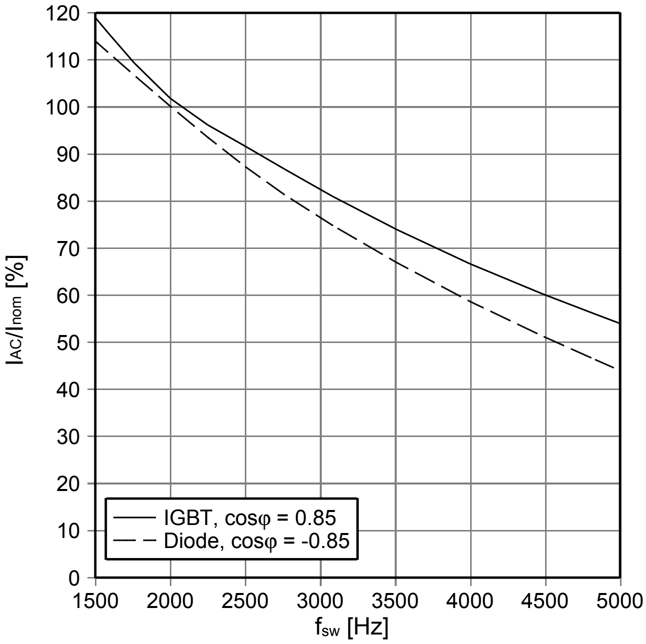
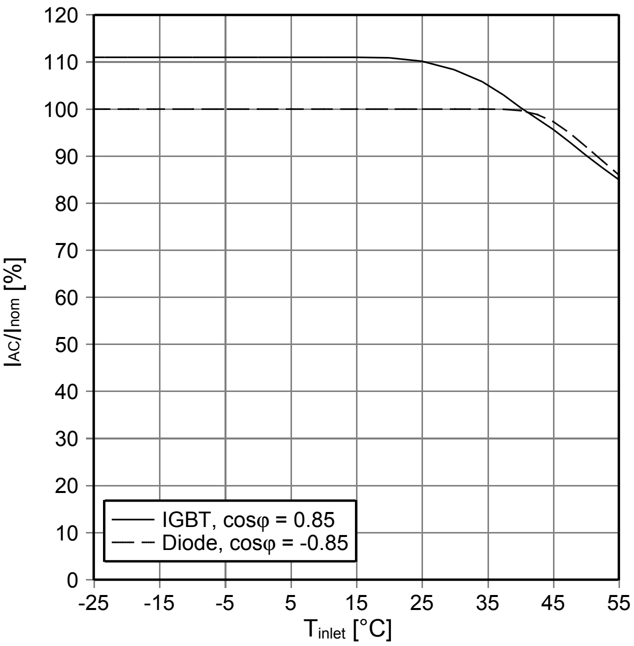
$f_{AC\ sine}$ - derating curve IGBT (motor), Diode (generator)
V_{DC} = 1100 V, V_{AC} = 690 V_{RMS}, f_{sw} = 2 kHz, cosφ = ±0.85,
T_{inlet} = 40 °C and nom. cooling conditions



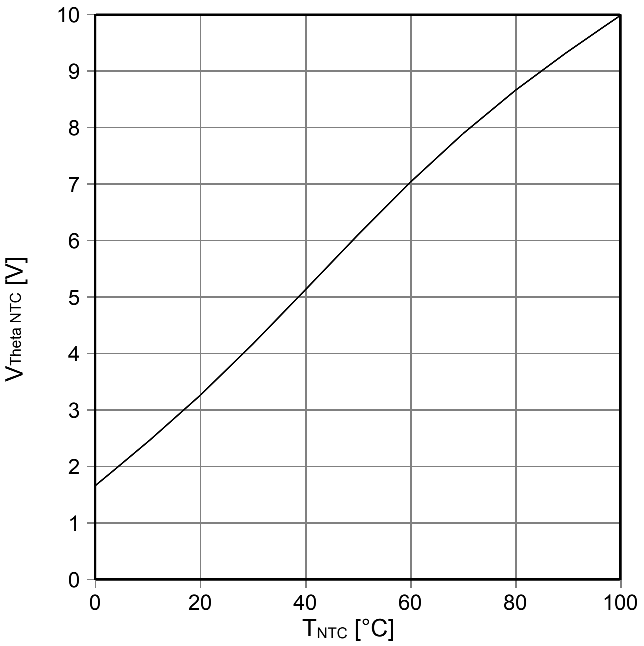
f_{sw} - derating curve IGBT (motor), Diode (generator)
V_{DC} = 1100 V, V_{AC} = 690 V_{RMS}, $f_{AC\ sine}$ = 50 Hz, cosφ = ±0.85,
T_{inlet} = 40 °C and nom. cooling conditions



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



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



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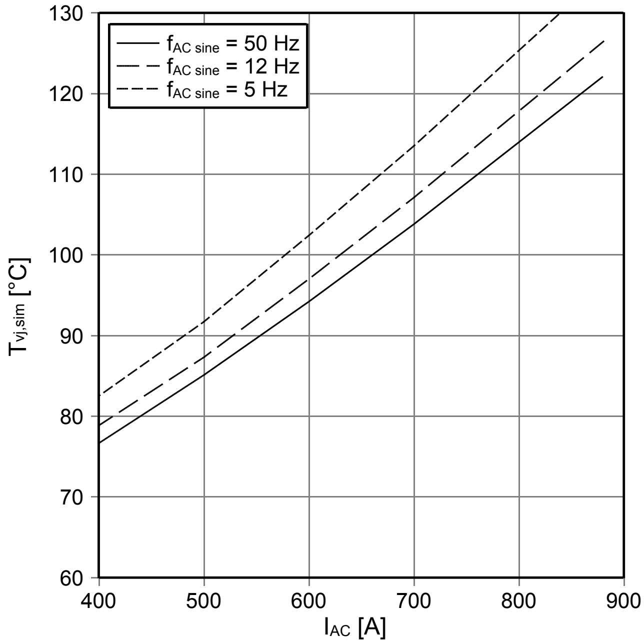
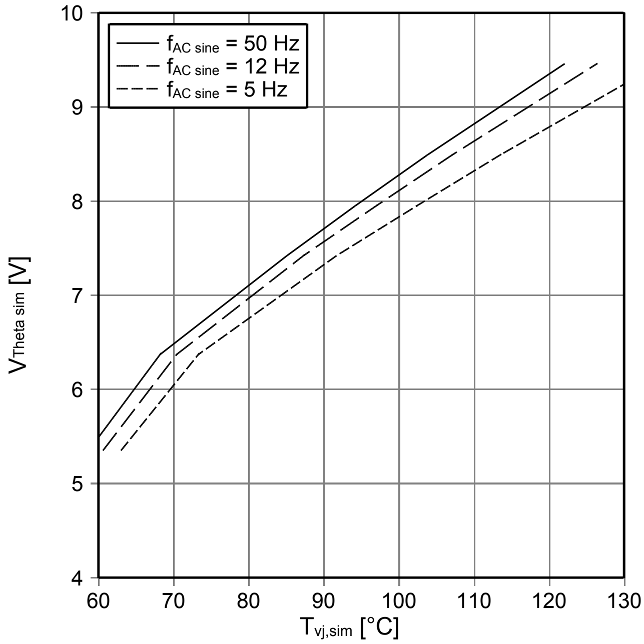
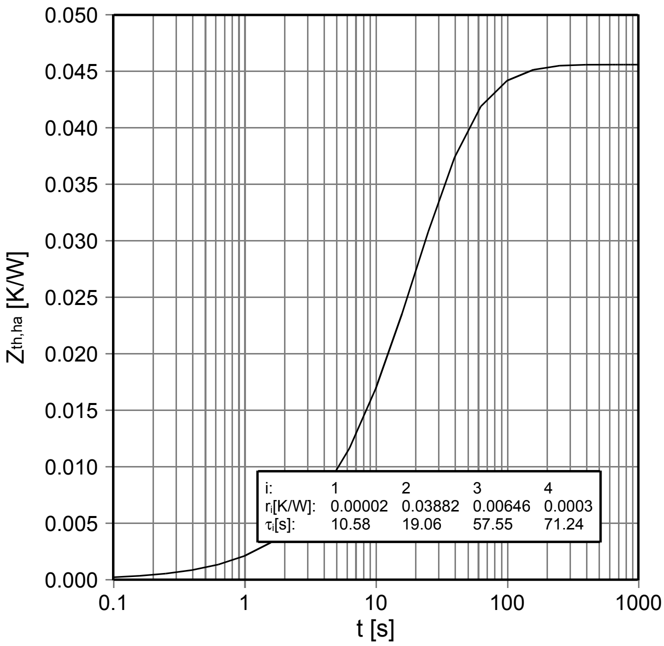
$T_{vj,sim}$ vs. I_{AC} - Simulated junction temperatur
V_{DC} = 1100 V, V_{AC} = 690 V_{RMS}, f_{sw} = 2 kHz,
T_{inlet} = 40 °C and nom. cooling conditions



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



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



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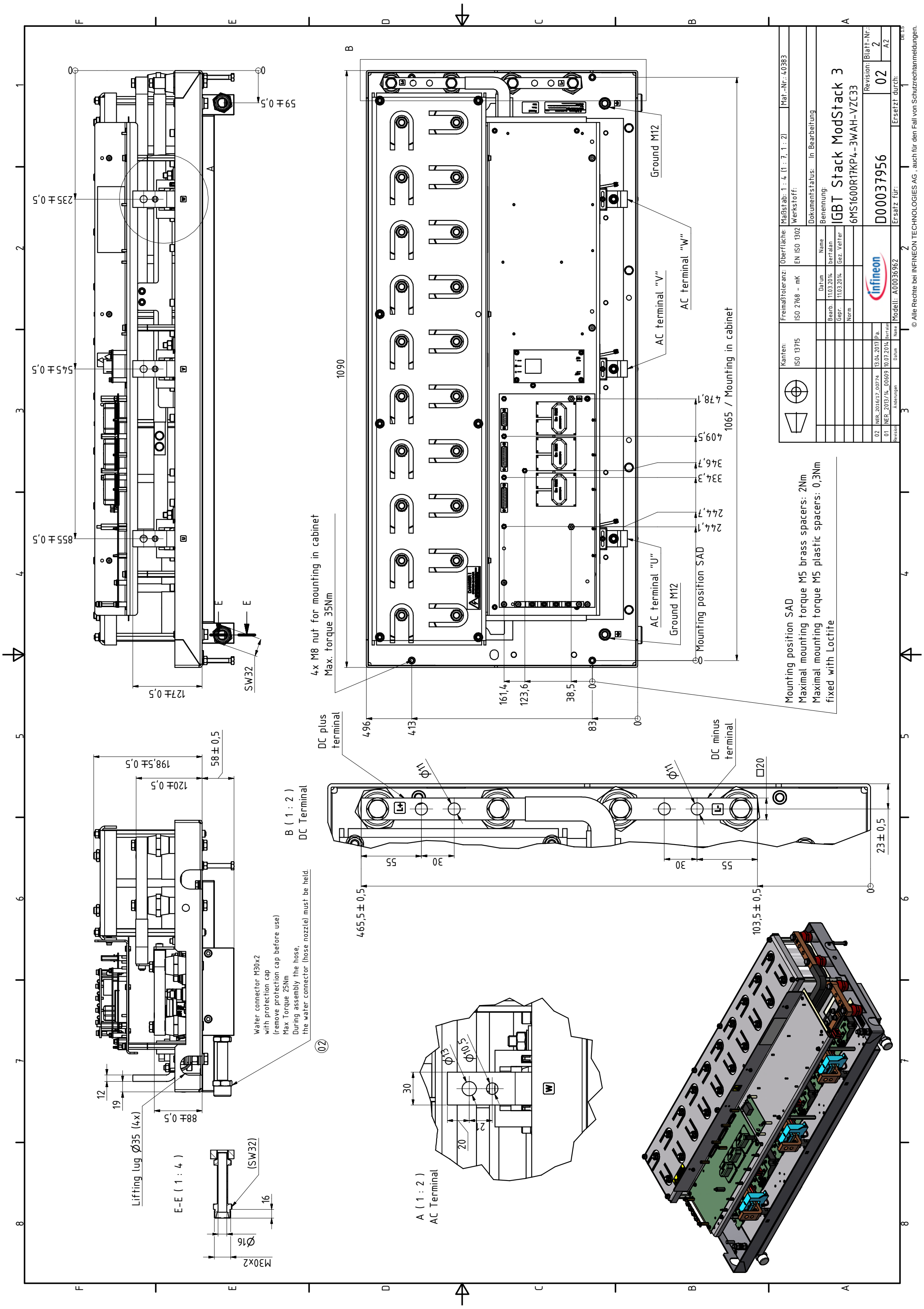
Mechanical drawing



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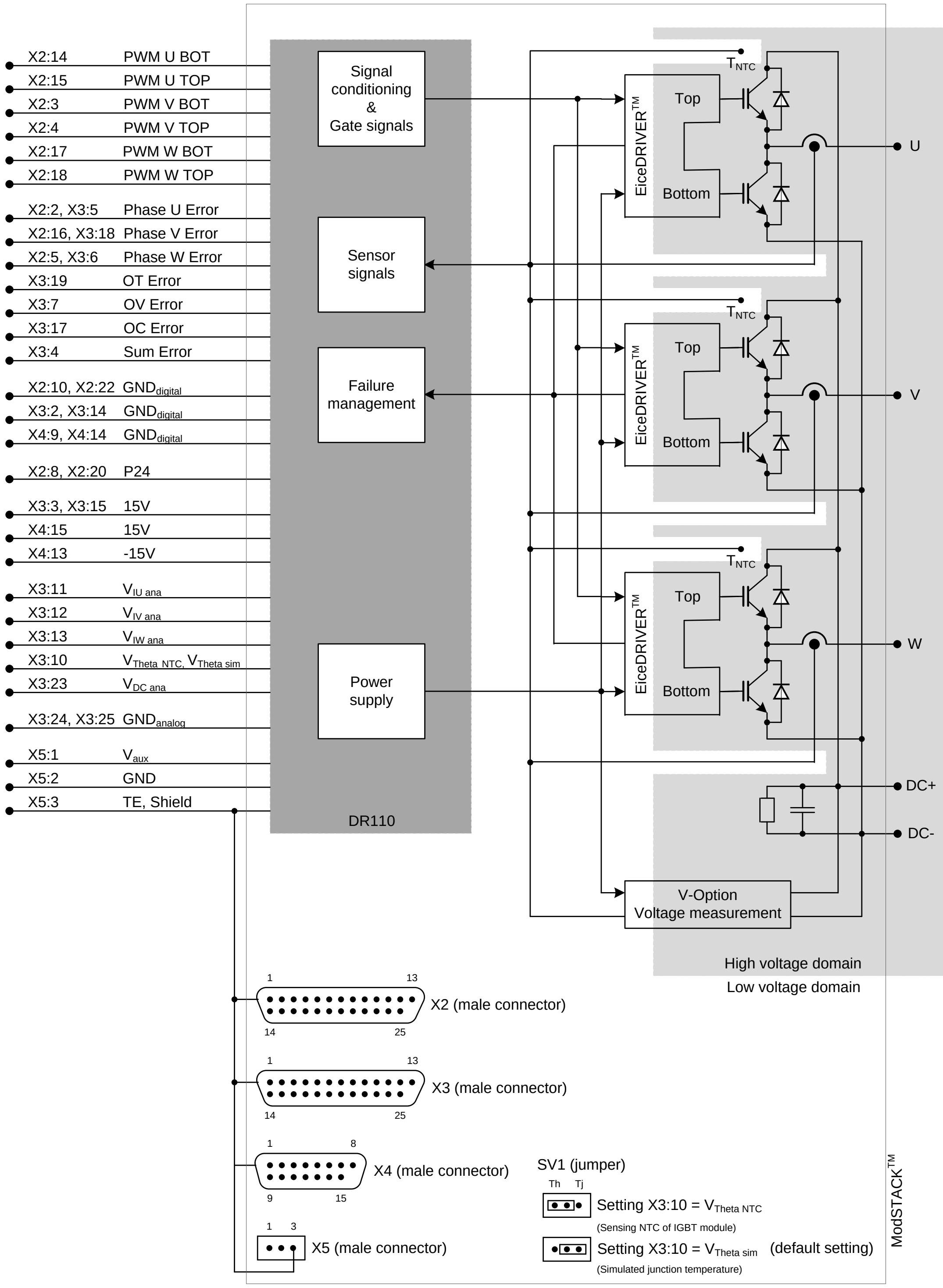
Circuit diagram



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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.

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