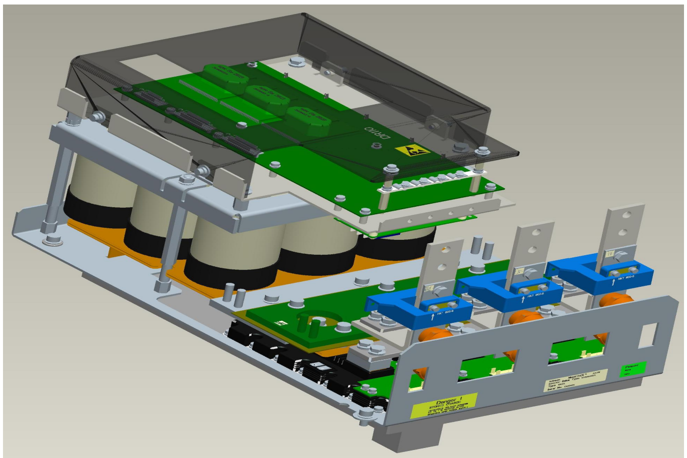
General information

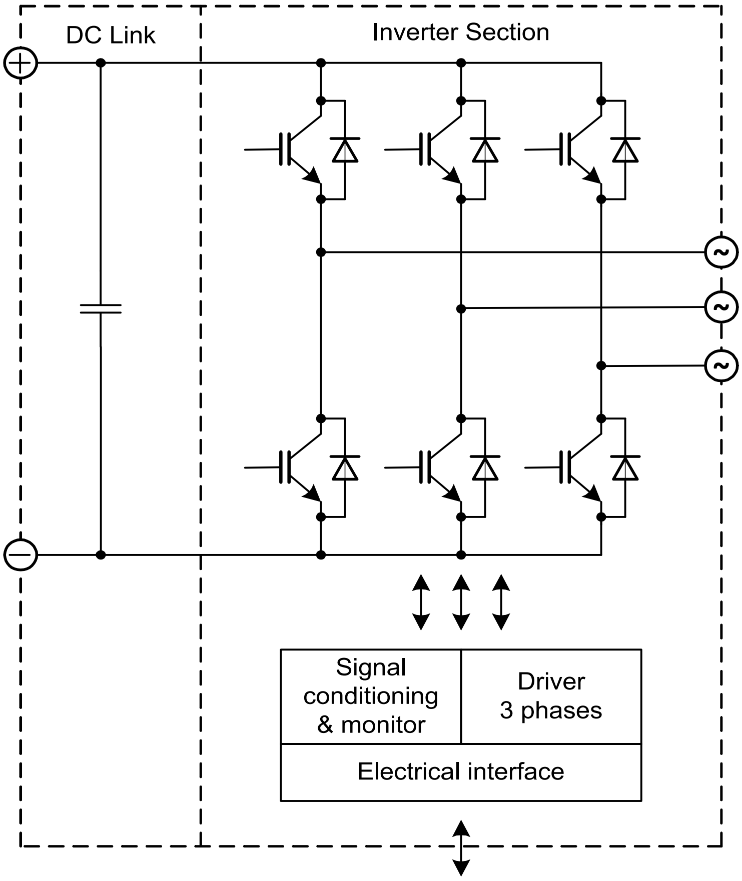
IGBT Stack for typical voltages of up to 690 V_{RMS}
Rated output current 600 A_{RMS}

· High power converter
· Wind power
· Motor drives

· PrimePACK™3 module with integrated NTC
· Extended operational temperature
· Low V_{cesat}



Topology	B6I
Application	Inverter
Load type	Resistive, inductive
Semiconductor (Inverter Section)	3x FF1000R17IE4
DC Link	3.6 mF
Heatsink	Water cooled
Implemented sensors	Current, voltage, temperature
Driver signals IGBT	Electrical
Sales - name	6MS10017E41W36460
SP - No.	SP000939300



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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		V_{DC}	1250	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}	1250	A
Repetitive peak forward current inverter section (Diode)	t_p = 1 ms	I_{FRM2}	1250	A
I^2t-value inverter section (Diode)		I^2t	140	kA^2s
Continuous current inverter section		I_{AC2}	710	A_{RMS}
Junction temperature	under switching conditions	T_{vjop}	150	°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	1250	V
Over voltage shutdown	within 150 µs			1250		V
Capacitor	1 s, 9 p, rated tol. +/- 10 %	C_{DC}		3.6		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		47		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} = 3000 Hz, T_{inlet} = 40°C, $T_j \leq$ 150 °C	I_{AC}			600	A_{RMS}
Continuous current at low frequency	V_{DC} = 1100 V, V_{AC} = 690 V_{RMS}, $f_{AC\ sine}$ = 0 Hz, f_{sw} = 3000 Hz, T_{inlet} = 40 °C, $T_j \leq$ 150 °C	$I_{AC\ low}$			295	A_{RMS}
Rated continuous current for 150% overload capability	$I_{AC\ 150\%}$ = 610 A_{RMS}, $t_{on\ over}$ = 60 s, $T_j \leq$ 150 °C	$I_{AC\ over1}$			405	A_{RMS}
Rated continuous current for 150% overload capability	$I_{AC\ 150\%}$ = 670 A_{RMS}, $t_{on\ over}$ = 3 s, $T_j \leq$ 150 °C	$I_{AC\ over2}$			445	A_{RMS}
Over current shutdown	within 15 µs	$I_{AC\ OC}$		1250		A_{peak}
Power losses	I_{AC} = 600 A, V_{DC} = 1100 V, V_{AC} = 690 V_{RMS}, cos(φ) = 0.85, $f_{AC\ sine}$ = 50 Hz, f_{sw} = 3000 Hz, T_{inlet} = 40 °C, $T_j \leq$ 150 °C	P_{loss}		9800		W

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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, @ 600 A_{RMS}	$V_{IU\ ana2}$ $V_{IV\ ana2}$ $V_{IW\ ana2}$	3.4	3.5	3.6	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} = 72 °C, corresponds to T_j = 148 °C at rated conditions	$V_{Theta\ NTC2}$		8.4		V
Analog temperature sensor output inverter section (Simulated)	load max 1 mA, @T_{NTC} = 72 °C, corresponds to T_j = 148 °C at rated conditions	$V_{Theta\ sim2}$		9		V
Over temperature shutdown inverter section		$V_{Error\ OT2}$		9.3		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		80	°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					5	m/s²
Shock	according to IEC 60721					40	m/s²
Protection degree					IP00		
Pollution degree					2		
Dimensions	width x depth x height			590	338	366	mm
Weight					65		kg

Heatsink water cooled

			min.	typ.	max.	
Water flow	according to coolant specification from Infineon	ΔV/Δt	15			dm³/min
Water pressure					8	bar
Water pressure drop	at 15 dm³/min water flow	Δp		200		mbar
Coolant inlet temperature		T_{inlet}	-40		55	°C
Thermal resistance heatsink to ambient	per switch	$R_{th,ha}$		0.038		K/W
Cooling channel material				Copper		

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

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Preliminary data

Overview of optional components

	Unit 1	Inverter Section	Unit 3
Parallel interface board			
Optical 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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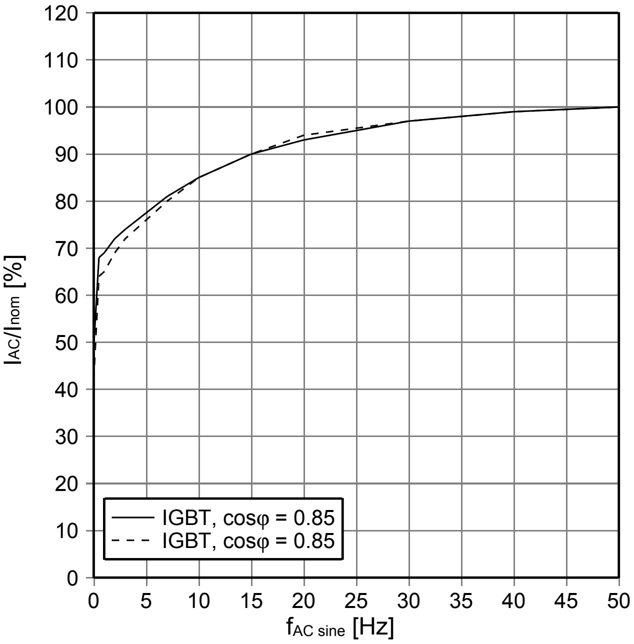
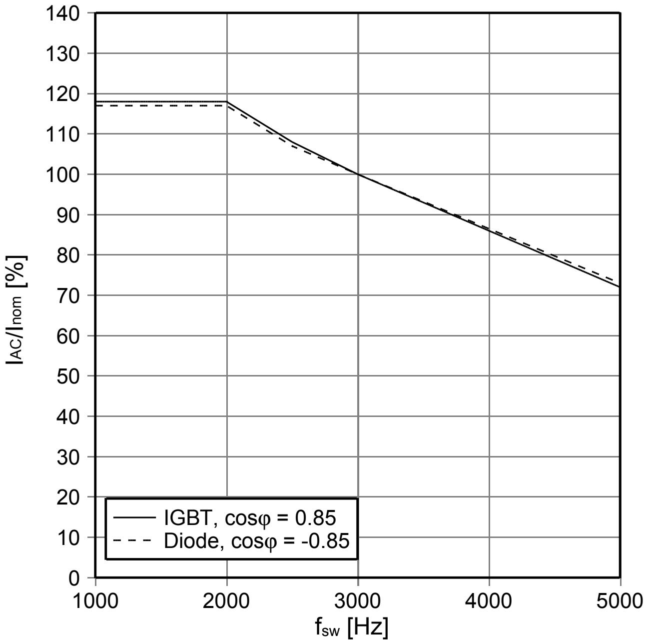
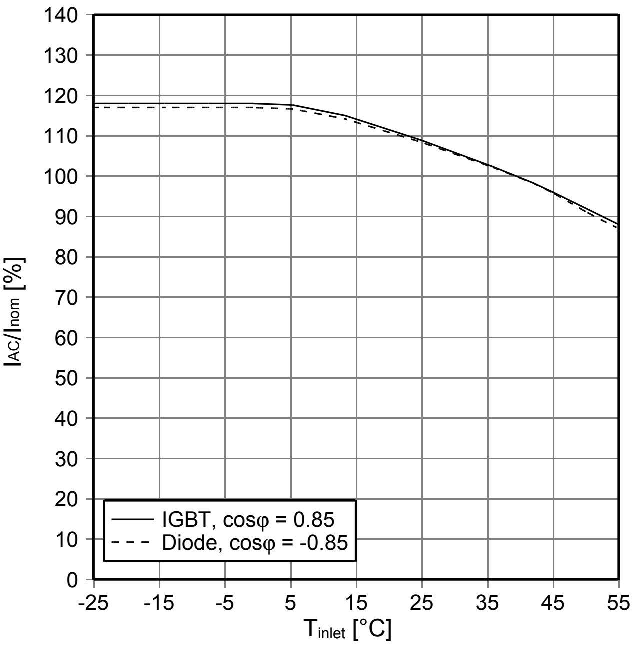
$f_{AC\ sine}$ - derating curve IGBT (motor), Diode (generator)
V_{DC} = 1100 V, V_{AC} = 690 V_{RMS}, f_{sw} = 3 kHz, cosφ = ±0.85
T_{inlet} = 40°C and nom. cooling conditions



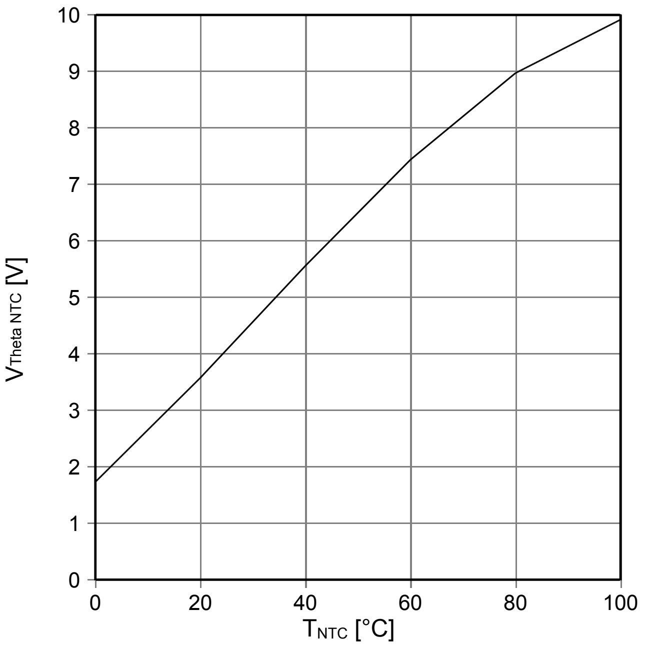
f_{sw} - derating curve IGBT (motor), Diode (generator)
V_{DC} = 1100 V, V_{AC} = 690 V_{RMS}, $f_{AC\ sine}$ = 50 Hz, cosφ = ±0.85
T_{inlet} = 40°C and nom. cooling conditions



T_{inlet} - derating curve IGBT (motor), Diode (generator)
V_{DC} = 1100 V, V_{AC} = 690 V_{RMS}, $f_{AC\ sine}$ = 3 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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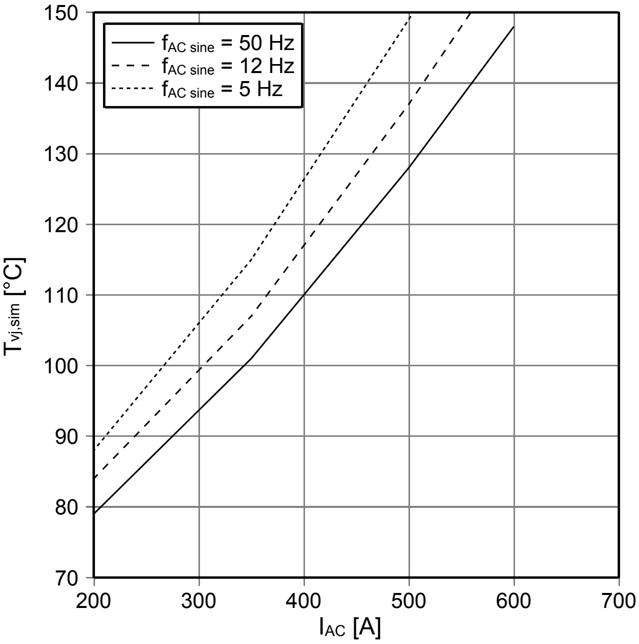
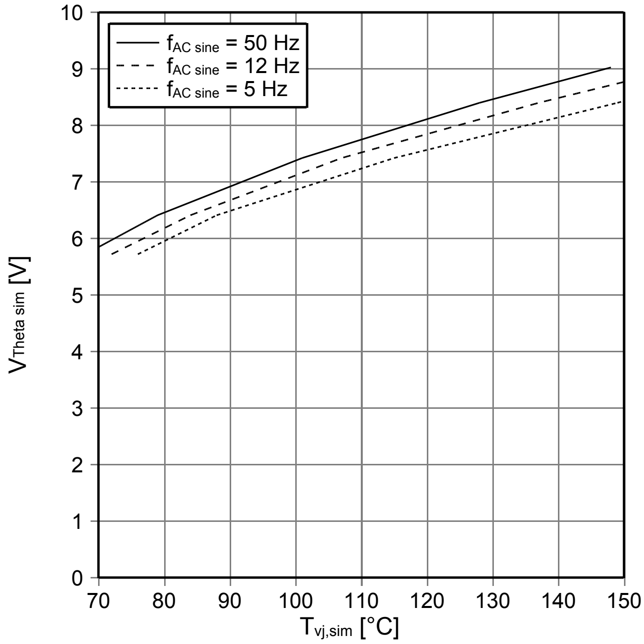
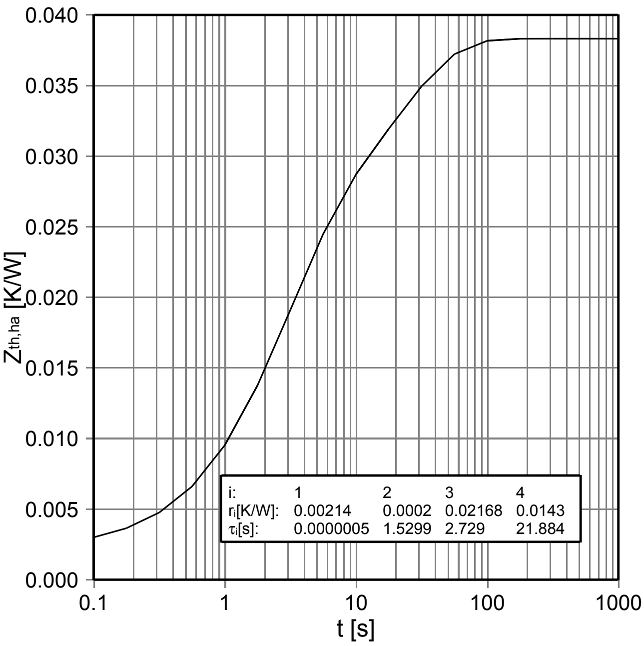
$T_{vj,sim}$ vs. I_{AC} - Simulated junction temperature
V_{DC} = 1100 V, V_{AC} = 690 V_{RMS}, f_{sw} = 3 kHz
T_{inlet} = 40°C and nom. cooling conditions



Analog temperature sensor output $V_{Theta\ sim}$
V_{DC} = 1100 V, V_{AC} = 690 V_{RMS}, f_{sw} = 3 kHz,
T_{inlet} = 40°C and nom. cooling conditions



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



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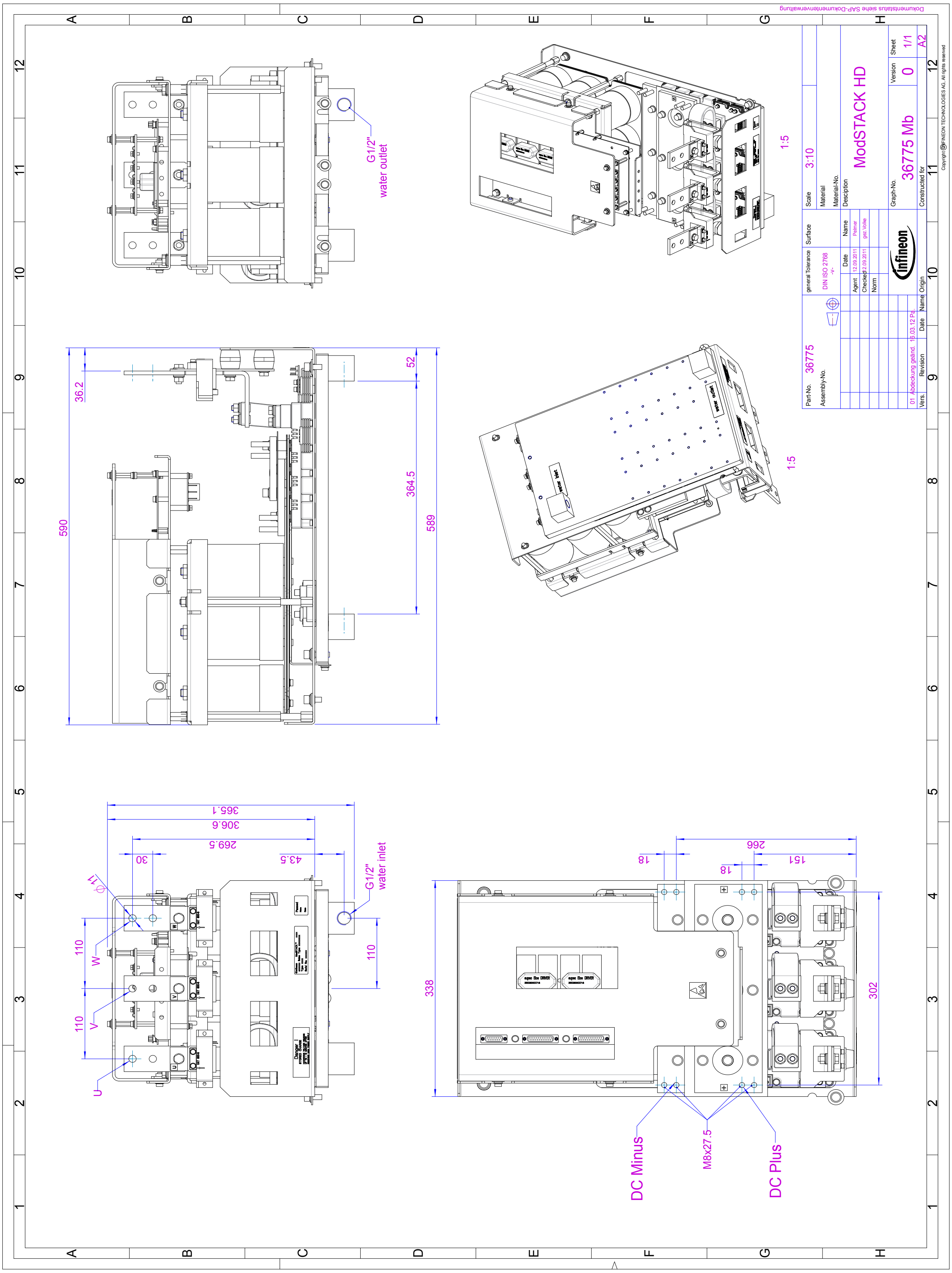
Technical Information

ModSTACK™ 6MS10017E41W36460

Preliminary data

Mechanical drawing



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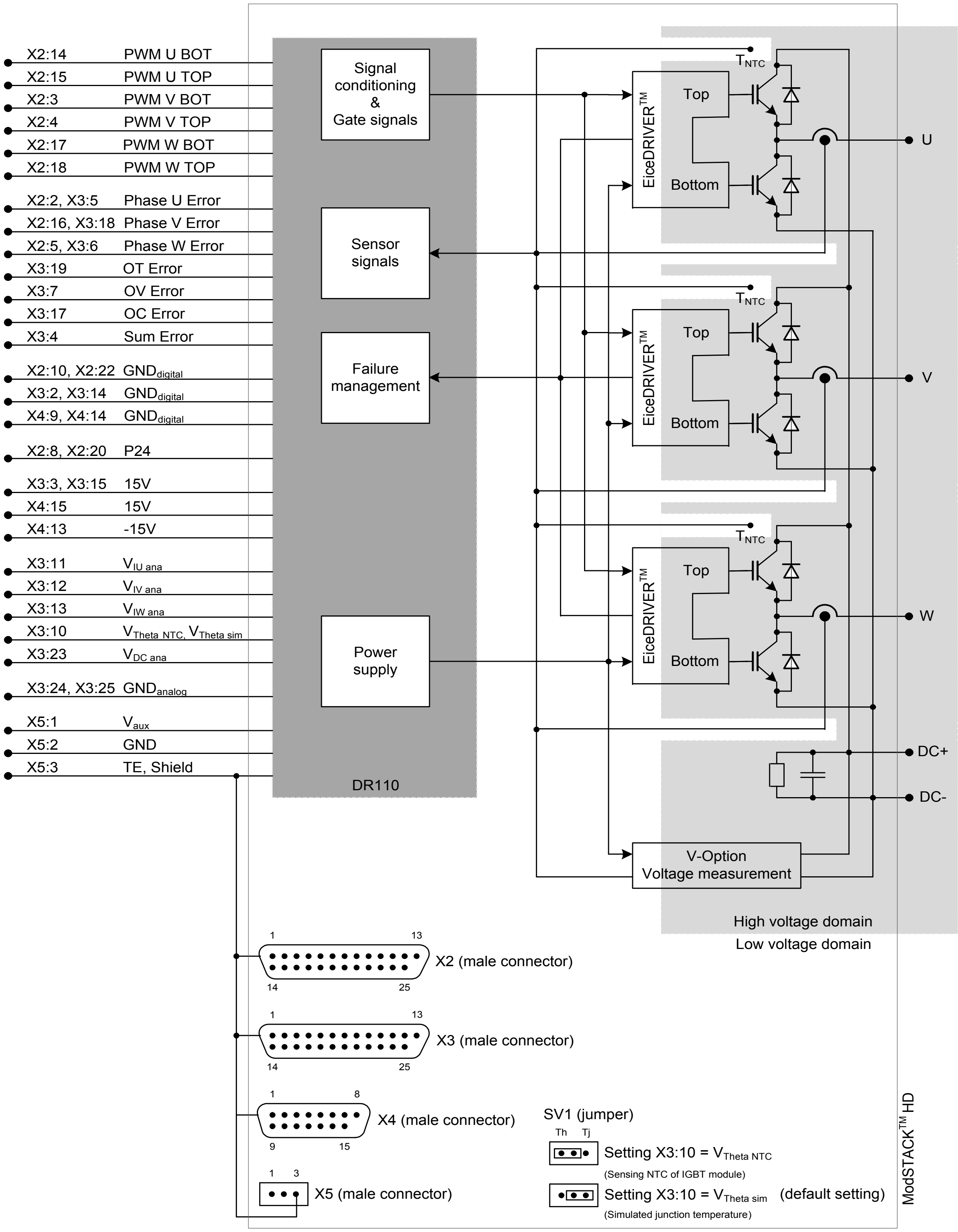
Circuit diagram



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