Technical Information

PrimeSTACK™ **2PS13512E43W35222**

Preliminary data

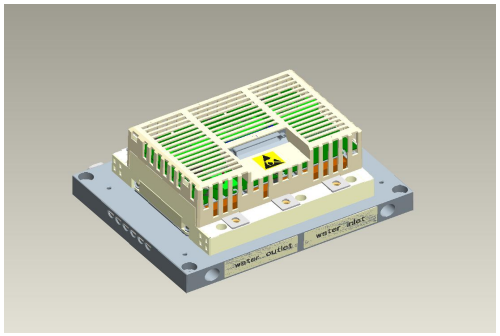
Key data

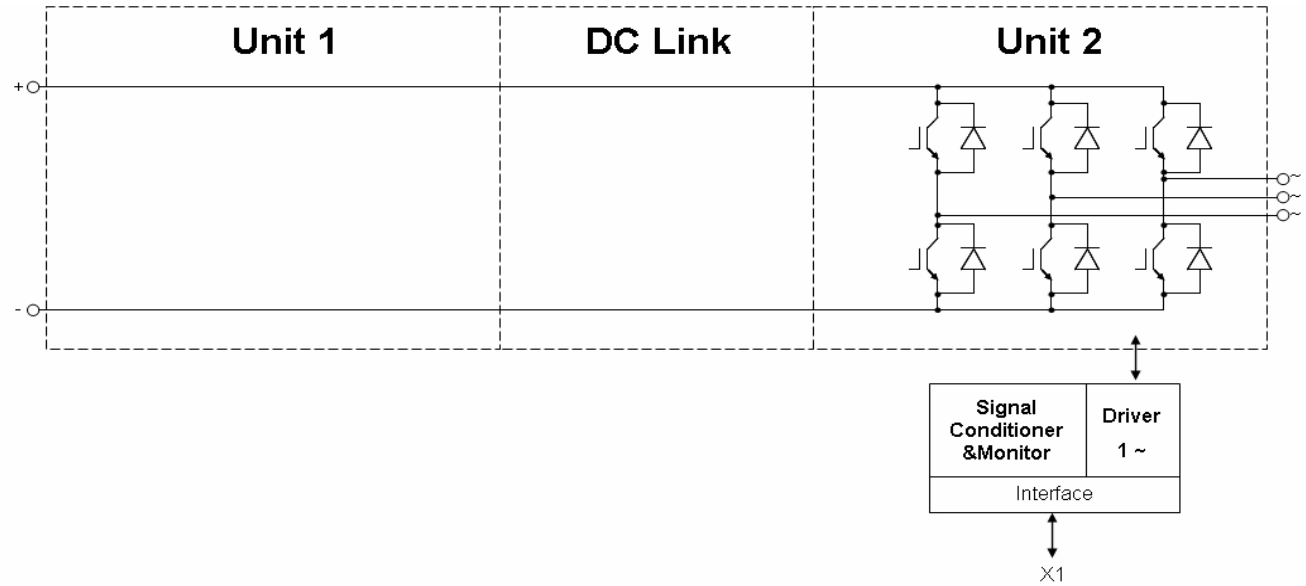
1x 900A rms at 400V rms, water cooled

General information

Stacks for various inverter application. Semiconductors, heat sinks, drivers and sensors included.
These are only technical data!
Please read carefully the complete documentation and maintain the proper design environment!
Especially note the EMC environment and the controller's functionality.

Topology		1/2 B2I
Application / Modulation		Inverter / Sine
Load type		resistive, inductive
Cooling		water cooled
Implemented sensors		current, voltage, temperature
Semicond. (Unit 1)		none
DC Link		none
Semicond. (Unit 2)	IGBT	3x FF450R12KE4
Driver signals IGBT		electrical CMOS 0 .. 15V
Standards		EN50178, UL94, prepared for UL508C
Sales - name		2PS13512E43W35222
Internal ID		35222
Mechanical drawing number		34482_MB
Electrical drawing number		2PS-C3-V





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Note

The inverter current is limited by the current sensor.
Heat sink with aluminum cooling channel.
Composites of fluid: Water and 52 vol. % Antifrogen N.
Alignment over temperature shutdown for water inlet temperatures up to 70Ω°C.

Electrical data

DC Link			min	typ	max	units
Voltage		V_{DC}		650	850	V
Overvoltage shutdown	within 600µs			850		V

Unit 2 AC			min	typ	max	units
Voltage	depending on controller	V_{Unit2}		400		V_{RMS}
Continuous current	V_{Unit2} = 400V_{RMS}, V_{DC} = 650V, T_{inlet} = 40°C, $T_J \leq$ 125°C, f_{Unit2} = 50Hz, f_{sw2} = 5000Hz, cos(phi) = 0,85	I_{Unit2}			900	A_{RMS}
Continuous current overload cap.	T_{inlet} = 40°C, for overload capability 150% for 60s			727		A_{RMS}
DC current	no rotating field, T_{inlet} = 40°C	$I_{Unit2\ DC}$			547,0	A_{av}
Overcurrent shutdown	within 15µs			1860		A_{peak}
Switching frequency		f_{sw2}			8000	Hz
Power losses	V_{Unit2} = 400V, V_{DC} = 650V, T_{inlet} = 40°C, $T_J \leq$ 125°C, f_{Unit2} = 50Hz, f_{sw2} = 5000Hz, cos(phi) = 0,85, I_{Unit2} = 900A_{RMS}	P_{loss2}		2940		W
Power factor		$cos(phi)_{Unit2}$	-1,00		1,00	

General data				min	typ	max	units
Power losses (PCB)			$P_{loss\ aux}$			40	W
EMC test	according to IEC61800-3 at named interfaces	power	V_{Burst}		2		kV
		control	V_{Burst}		1		kV
		aux (24V)	V_{Surge}		1		kV
Insulation management is designed for			V_{Line}		500		V_{RMS}
Insulation test voltage	according to EN50178, f = 50Hz, t = 60s		V_{isol}		2,5		kV_{RMS}

Controller interface data			min	typ	max	units
Auxiliary voltage		V_{aux}	13	24	30	V_{av}
Auxiliary power requirement	V_{aux} = 24V_{av}	P_{aux}		40		W
Driver and interface board	see separate technical information			DR240		
Driver core				EiceDRIVER 2ED300C17-ST		
Digital input level	resistor to GND 10,0kΩ, capacitor to GND 1nF	V_{in}	0,0		15,0	V
Digital output level	open collector, low = ok, max 15mA	V_{out}	0,0		30,0	V
Analog current outputs Unit 2	load max 1mA; at 900A	$V_{ana\ out}$	4,80	4,90	5,00	V
Analog DC Link voltage output	load max 1mA; at 850V	$V_{DC\ out}$	8,33	8,50	8,67	V
Analog temperature output	load max 1mA; at T_{NTC} = 55°C correspond to T_j = 125°C	$V_{T\ out}$	4,47	4,56	4,65	V
Overtemperature shutdown	at T_{NTC} = 81°C	$V_{T\ out\ OT}$		10		V

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Heat sink water cooled / Thermal data			min	typ	max	units
Water flow	according cooling water specification from infineon	$\Delta V/\Delta t_{Water}$	10			dm³/min
Water pressure drop		Δp_{Water}		30		mbar
Water pressure					8	bar
Cooling water inlet temperature		T_{inlet}	-40		70	°C
Water connection				3/4		in

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IGBT data unit 2

			min	typ	max	units
Type	assumed					
collector-emitter saturation voltage	I_c = 450A; V_{ge} = 15V; T_{vj} = 150°C	$V_{CE\ sat}$		2,05		V
parameter for linear model	T_{vj} = 25°C	V_{ce1}		0,922		V
parameter for linear model	T_{vj} = 25°C	r_{ce1}		1,84		mΩ
parameter for linear model	T_{vj} = 150°C	V_{ce2}		0,79		V
parameter for linear model	T_{vj} = 150°C	r_{ce2}		2,8		mΩ
turn-on / turn-off energy loss per pulse	T_{vj} = 25°C	E_1		19 / 33		mJ
turn-on / turn-off energy loss per pulse	T_{vj} = 150°C	E_2		36 / 56		mJ
thermal resistance, junction to case	per IGBT	R_{thjc}		0,062		K/W
thermal resistance, case to heatsink	per IGBT	R_{thch}		0,031		K/W

Diode data unit 2

			min	typ	max	units
Type	assumed					
forward voltage	I_F = 450A; V_{ge} = 0V; T_{vj} = 150°C	V_F		1,75		V
parameter for linear model	T_{vj} = 25°C	V_{F1}		1,05		V
parameter for linear model	T_{vj} = 25°C	r_{F1}		1,444		mΩ
parameter for linear model	T_{vj} = 150°C	V_{F2}		0,833		V
parameter for linear model	T_{vj} = 150°C	r_{F2}		2,037		mΩ
reverse recovery energy	T_{vj} = 25°C	E_{rec1}		19		mJ
reverse recovery energy	T_{vj} = 150°C	E_{rec2}		39		mJ
thermal resistance, junction to case	per Diode	R_{thjc}		0,11		K/W
thermal resistance, case to heatsink	per Diode	R_{thch}		0,055		K/W

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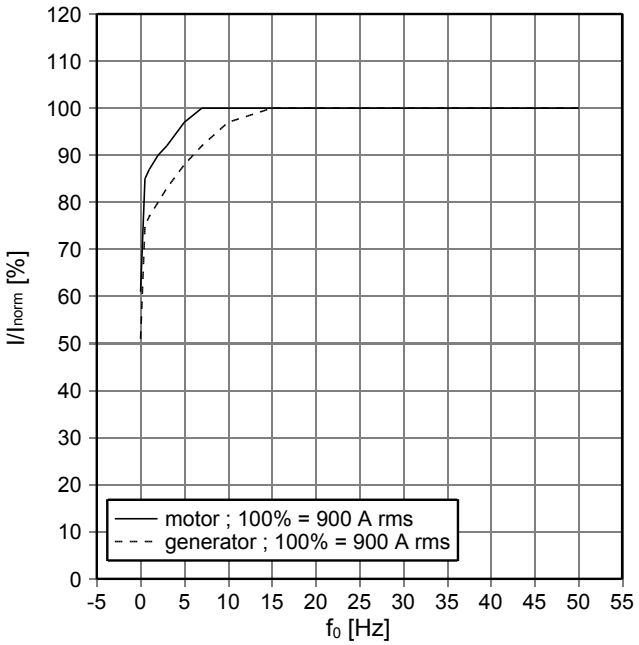
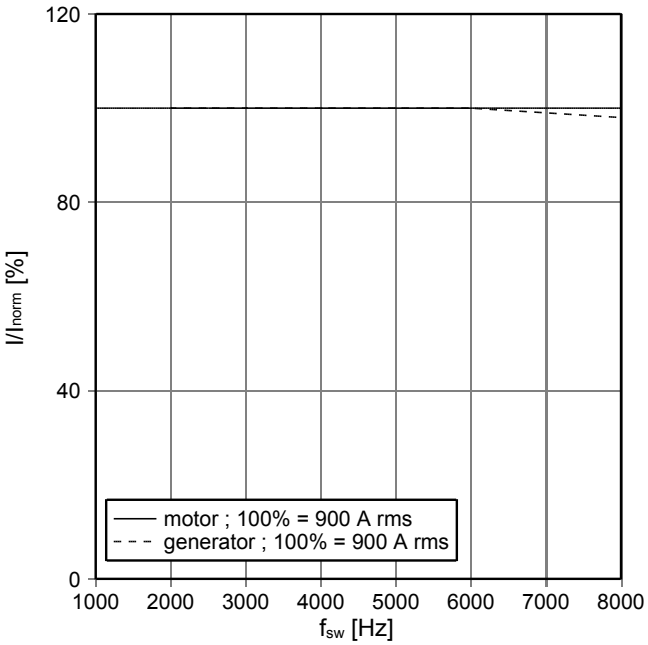
Environmental conditions			min	typ	max	units
Storage temperature		T_{stor}	-40		85	°C
Ambient temperature		T_{amb}	-25		55	°C
Operating temperature	see chapter Heat sink water cooled / Thermal data					
Cooling air velocity (PCB)		$V_{Air\ PCB}$	0,3			m/s
Air pressure	standard atmosphere	p_{Air}	900		1100	hPa
Humidity	no condensation	Rel. F	5		85	%
Installation height			0		1000	m
Vibration	according to IEC60721				5	m/s²
Shock	according to IEC60721				40	m/s²
Protection degree			IP00			
Pollution degree			2			
Torque at DC Terminals		M_{DC}	6,0		10,0	Nm
Torque at AC Terminals		M_{AC}	16,0		20,0	Nm
Dimensions	width × depth × height		260	280	120	mm
Weight with heat sink	approximation			7,7		kg
Weight without heat sink	approximation			2,9		kg

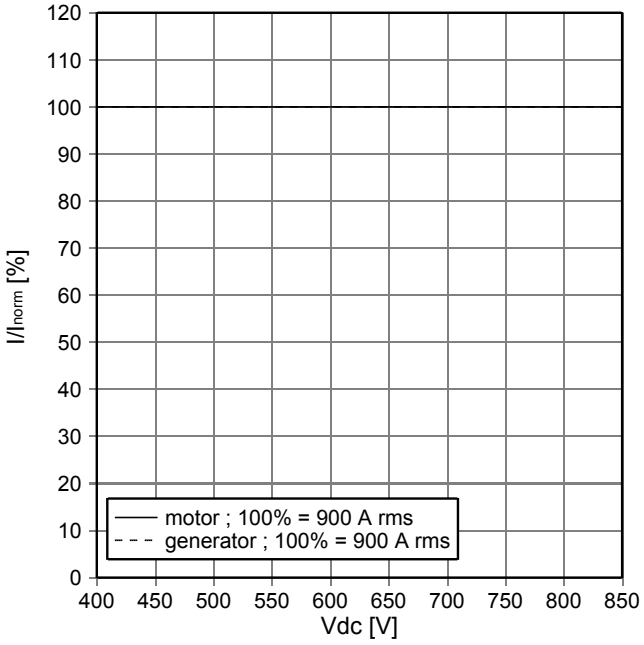
fo - derating curve IGBT (motor), Diode (generator)
cos(phi) = ± 0,85
$T_{cool\ medium}$ = 40°C



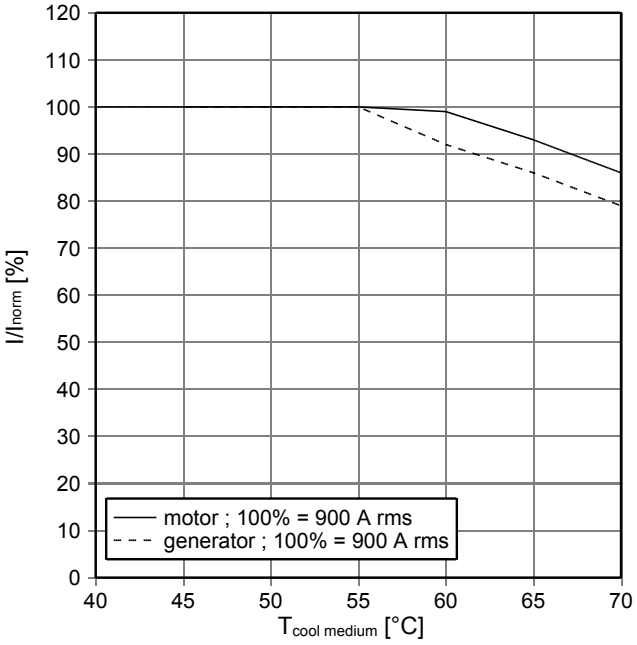
fsw - derating curve IGBT (motor), Diode (generator)
cos(phi) = ± 0,85
$T_{cool\ medium}$ = 40°C



Continuous current derating curves vs. dc link voltage
cos(phi) = ± 0,85
$T_{cool\ medium}$ = 40°C



Continuous current derating curves vs. Tcool medium
cos(phi) = ± 0,85



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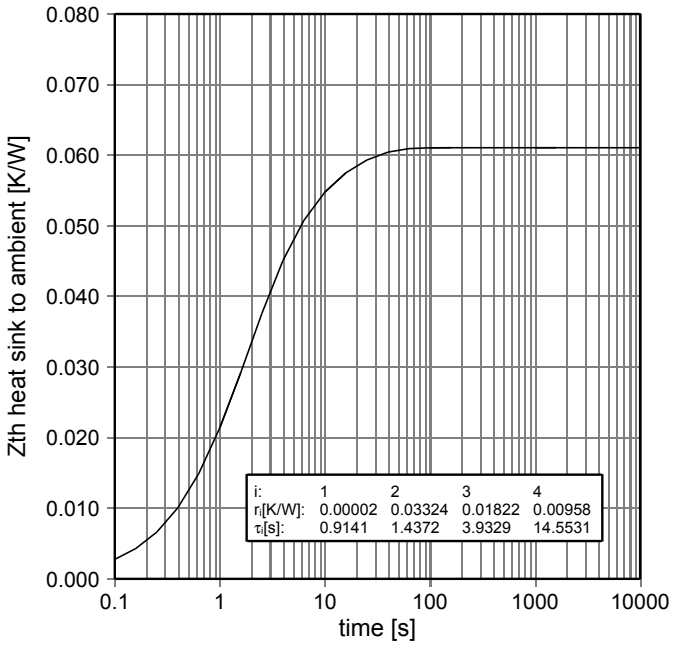
Transient thermal impedance per switch



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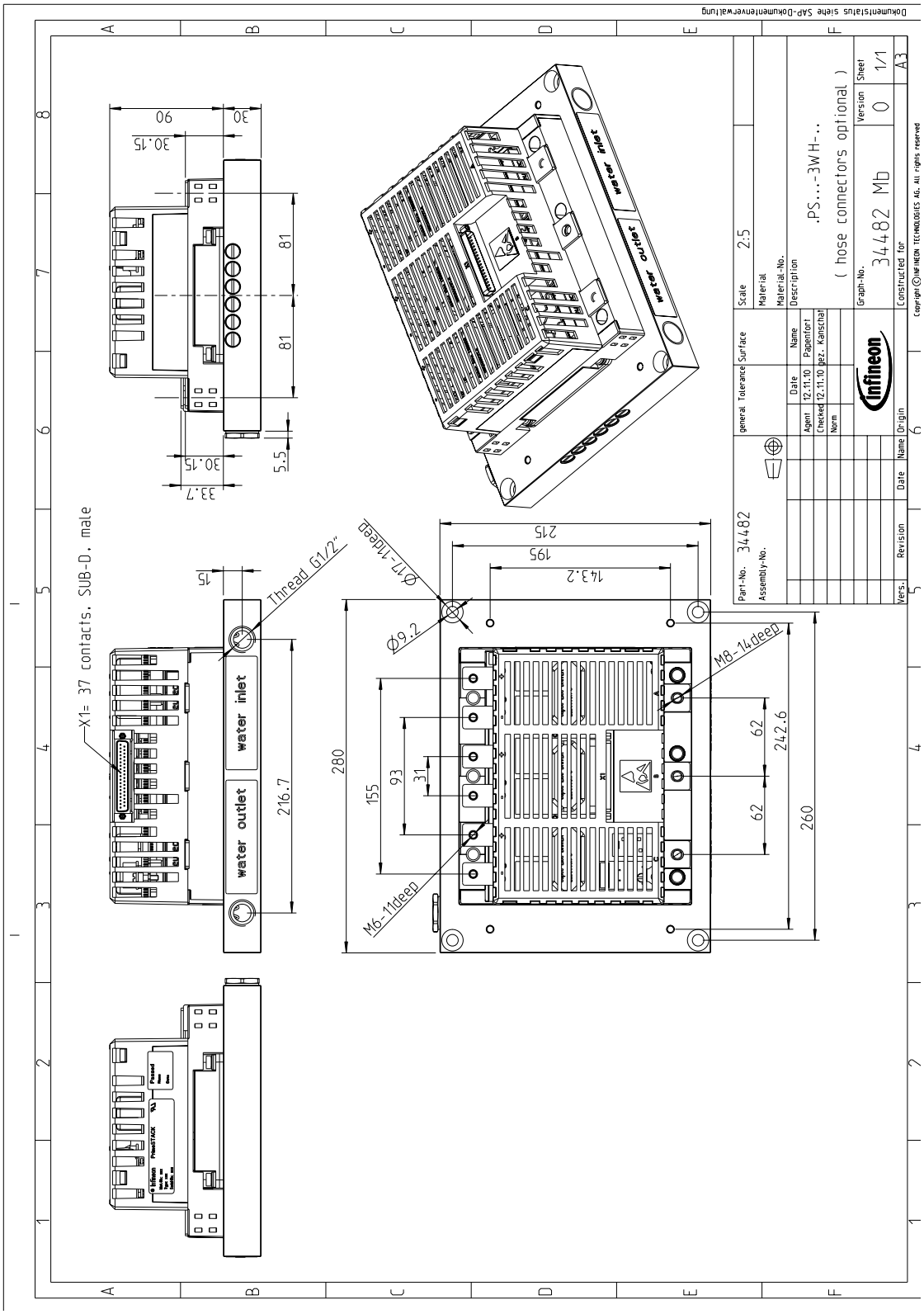
Mechanical drawing



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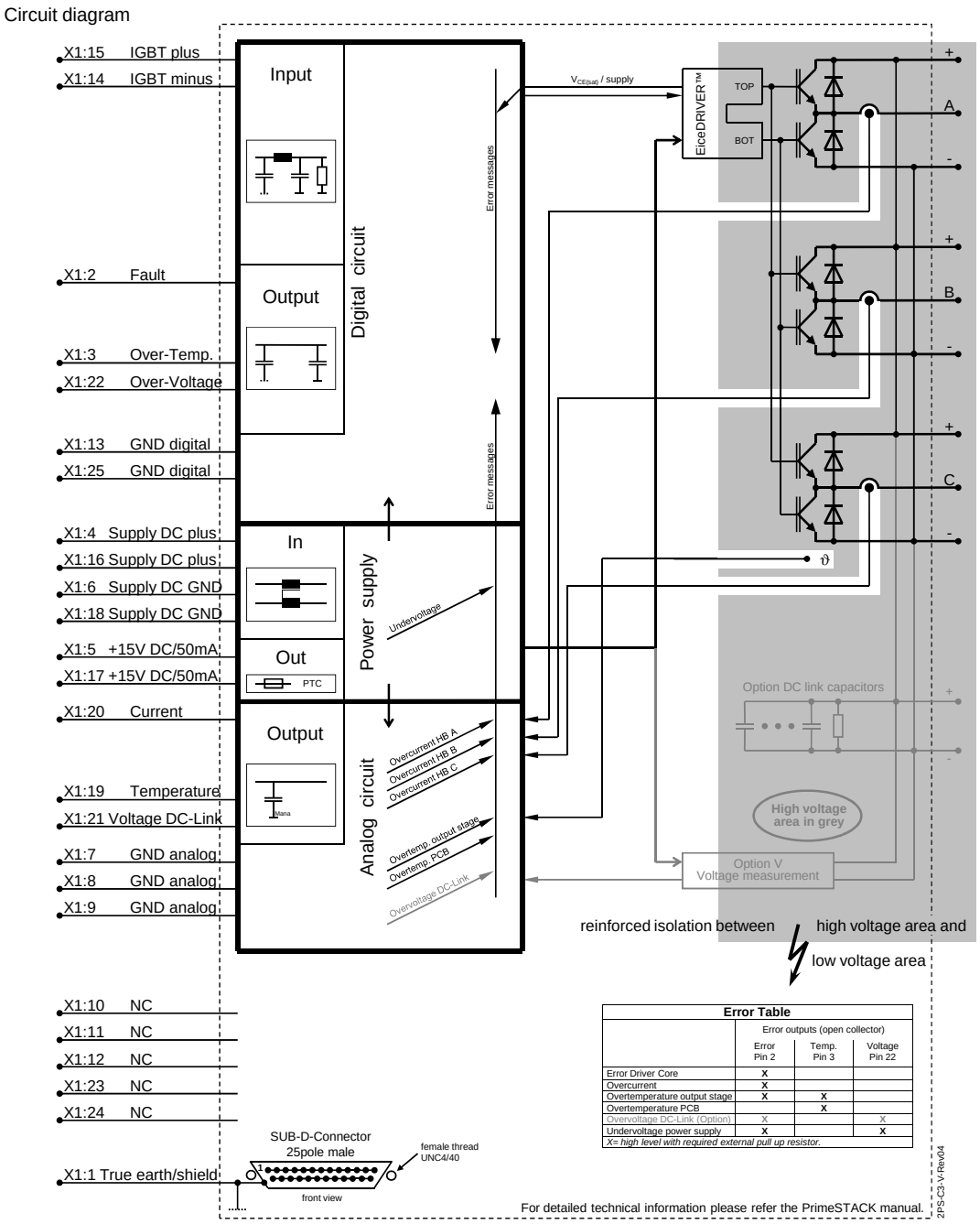
Circuit diagram



Error Table

	Error outputs (open collector)		
	Error Pin 2	Temp. Pin 3	Voltage Pin 22
Error Driver Core	X		
Overcurrent	X		
Overtemperature output stage	X	X	
Overtemperature PCB		X	
Overvoltage DC-Link (Option)	X		X
Undervoltage power supply	X		X

X= high level with required external pull up resistor.

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- **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.

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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.

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