Technical Information

PrimeSTACK™

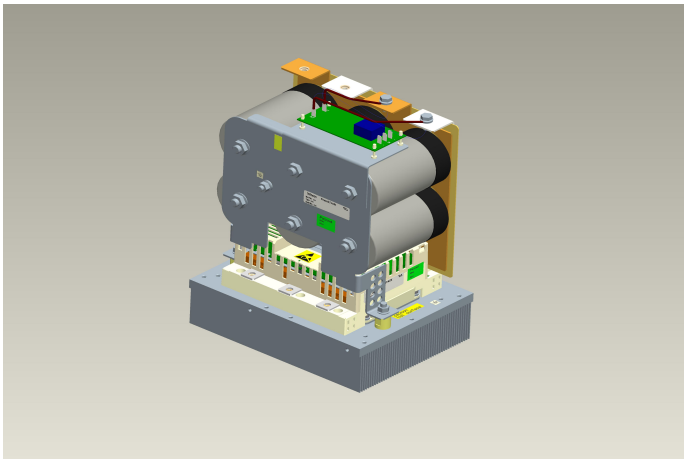
6PS04512E43G37986

Preliminary data

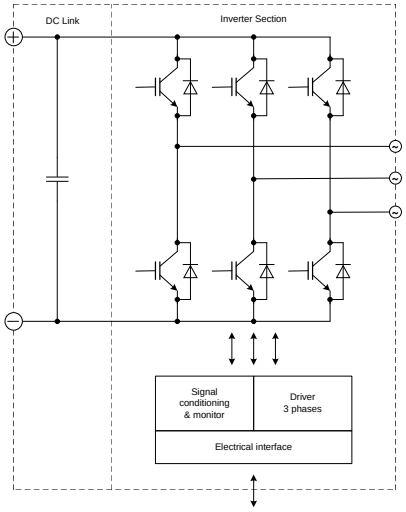
General information

IGBT STACK for typical voltage of up to 400V
Rated output current 217A

- Solar power
- Motor drivers
- 62mm IGBT power module
· Trenchstop™IGBT 4



Topology	B6I
Application	Inverter
Load type	Resistive, inductive
Semiconductor (Inverter Section)	3 x FF450R12KE4
DC Link	2.4 mF
Heatsink	Forced air colled (fan not included)
Implemented sensors	Current,voltage, temperature
Driver signals IGBT	Electrical
Design standards	EN 50178
Sales - name	6PS04512E43G37986
SP - No.	SP001046792



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Absolute maximum rated values

Collector-emitter voltage	IGBT; T_{vj} = 25°C	V_{CES}	1200	V
Repetitive peak reverse voltage	Diode; T_{vj} = 25°C	V_{RRM}	1200	V
DC link voltage	IGBT not swtiching	V_{DC}	900	V
Insulation management	according to installation height of 2000 m	V_{line}	500	V_{RMS}
Insulation test voltage	according to EN 50178, f = 50 Hz, t = 1 s	V_{ISOL}	2	kV_{RMS}
Repetitive peak collector current inverter section (IGBT)	t_p = 1 ms	I_{CRM2}	900	A
Repetitive peak forward current inverter section (Diode)	t_p = 1 ms	I_{FRM2}	900	A
Continuous current inverter section		I_{AC2}	270	A_{RMS}
Junction temperature	under switching conditions	T_{vjop}	150	°C
Switching frequency inverter section		f_{sw2}	14	kHz

Notes
Further maximun ratings are specified in the following dedicated sections

Characteristic values

DC Link

			min.	typ.	max.	
Rated voltage		V_{DC}		600	850	V
Over voltage shutdown	within 1000 µs			850		V
Capacitor	1 s, 6 p	C_{DC}		2.4		mF
Maximum ripple current	per device, T_{amb} = 55 °C	I_{ripple}		49		A_{RMS}
Balance or discharge resistor	per DC link unit	R_b		164		kΩ

Inverter Section

			min.	typ.	max.	
Rated continuous current	V_{DC} = 600 V, V_{AC} = 400 V_{RMS}, cos(φ) = 0.85, $f_{AC\ sine}$ = 50 Hz, f_{sw} = 5000 Hz, T_{inlet} = 40°C, $T_j \leq$ 125 °C	I_{AC}		265		A_{RMS}
Over current shutdown	within 15 µs	$I_{AC\ OC}$		626		A_{peak}
Power losses	I_{AC} = 265 A, V_{DC} = 600 V, V_{AC} = 400 V_{RMS}, cos(φ) = 0.85, $f_{AC\ sine}$ = 50 Hz, f_{sw} = 5000 Hz, T_{inlet} = 40 °C, $T_j \leq$ 125 °C	P_{loss}		2275		W

Inverter Section (specific condition)

			min.	typ.	max.	
Specific continuous current	V_{DC} = 750 V, V_{AC} = 400 V_{RMS}, cos(φ) = 0.8, $f_{AC\ sine}$ = 50 Hz, f_{sw} = 5000 Hz, T_{inlet} = 40 °C, $T_j \leq$ 125 °C	I_{ACsp}		217		A_{RMS}
Continuous current at low frequency	V_{DC} = 750 V, V_{AC} = 400 V_{RMS}, cos(φ) = 0.8, $f_{AC\ sine}$ = 0 Hz, f_{sw} = 5000 Hz, T_{inlet} = 40 °C, $T_j \leq$ 125 °C	I_{ACsp}		105		A_{RMS}
Specific continuous current for 150% overload capability	$I_{AC\ 150\%}$ = 263 A_{RMS}, $t_{on\ over}$ = 3 s, $T_j \leq$ 125 °C	$I_{ACsp\ over1}$		175		A_{RMS}
Specific continuous current for 150% overload capability	$I_{AC\ 150\%}$ = 229 A_{RMS}, $t_{on\ over}$ = 60 s, $T_j \leq$ 125 °C	$I_{ACsp\ over2}$		152		A_{RMS}
Power losses	I_{AC} = 217 A, V_{DC} = 750 V, V_{AC} = 400 V_{RMS}, cos(φ) = 0.8, $f_{AC\ sine}$ = 50 Hz, f_{sw} = 5000 Hz, T_{inlet} = 40 °C, $T_j \leq$ 125 °C	P_{loss}		1975		W

Notes
Maximum junction temperature limited to 125°C under all operating conditions

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Controller interface

Driver and interface board	ref. to separate Application Note			DR210		
			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 10 kΩ, capacitor to GND 1 nF, logic high = on	$V_{in\ low}$	0		1.5	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 5 mA, @ 217 A_{RMS}	$V_{IU\ ana2}$ $V_{IV\ ana2}$ $V_{IW\ ana2}$	3.3	3.5	3.7	V
Analog DC link voltage sensor output	load max 5 mA, @ 850 V	$V_{DC\ ana}$	8.3	8.5	8.7	V
Analog temperature sensor output unit 1 (NTC)	load max 5 mA, @T_{NTC} = 85 °C, corresponds to T_j = 115 °C at rated conditions	$V_{Theta\ NTC1}$	10.7	10.9	11.1	V
Over temperature shutdown inverter section	load max 5 mA, @T_{NTC} = 87 °C	$V_{Error\ OT2}$		11		V

System data

				min.	typ.	max.	
EMC robustness	according to EN 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		85	%
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			216	335	376	mm
Weight					18		kg

Notes
Dimension "depth" does not include the data cables

Heatsink air cooled

			min.	typ.	max.	
Air flow	T_{air} = 25 °C, P_{air} = 1013 hPa, dry and dust free, measured at the side of the heat sink according to DIN 41882	ΔV/Δt		500		m³/h
Air pressure drop	at min. air flow	Δp		190		Pa
Air inlet temperature		T_{inlet}	-40		55	°C

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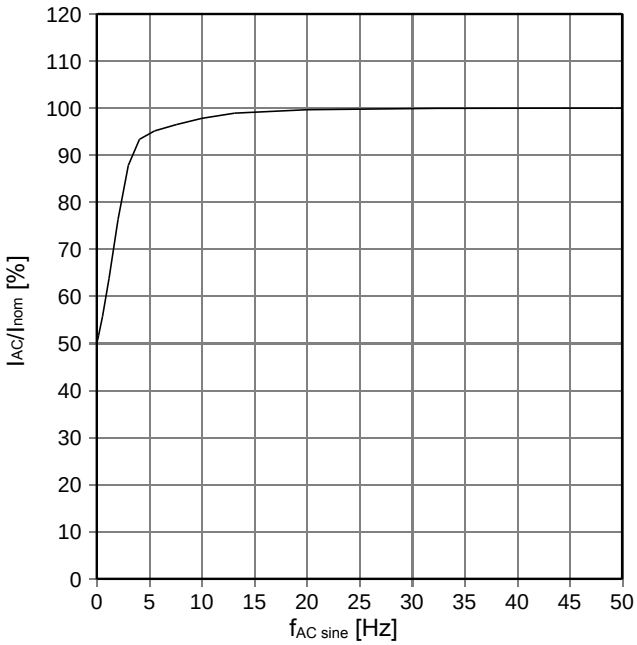
Overview of optional components

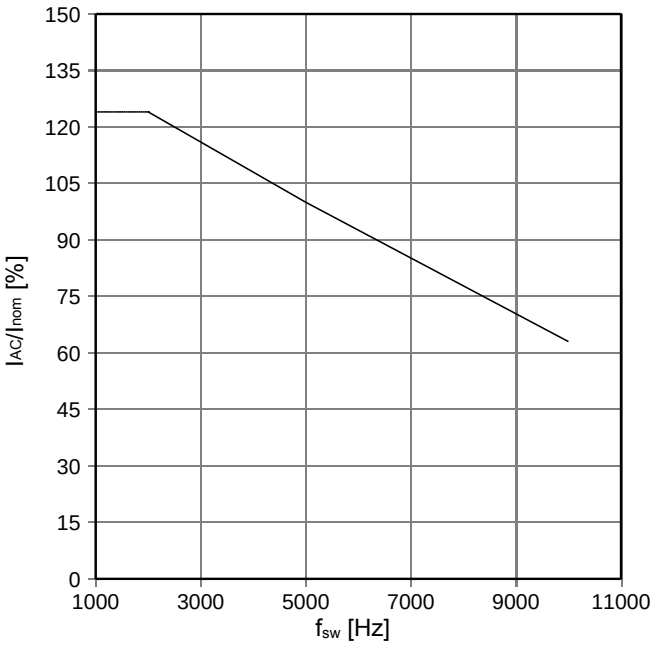
	Unit 1	Inverter Section	Unit 3
Parallel interface board			
Optical interface board			
Chopper controller			
Voltage sensor		×	
Current sensor		×	
Temperature sensor		×	
Temperature simulation			
DC link capacitors		×	
Data cable for control signals			
Fan			
Collector-emitter Active Clamping		×	

Notes
Setting of Active Clamping TVS-Diodes: V_Z = 824 V

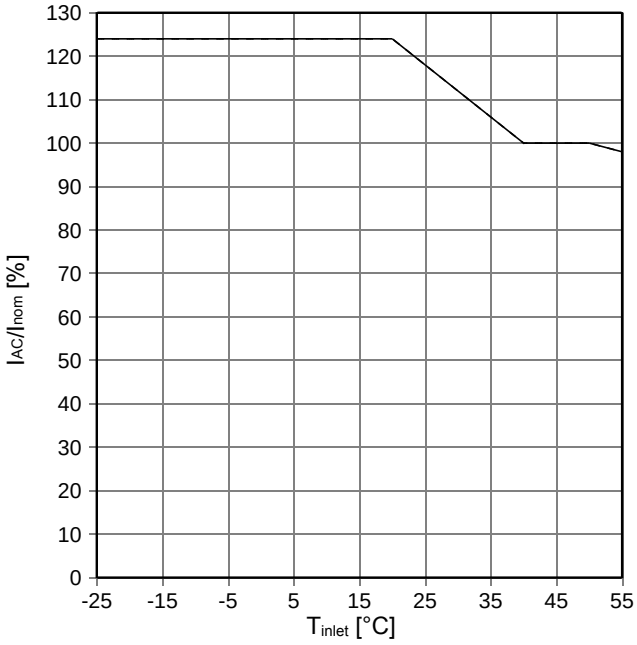
$f_{AC\ sine}$ - derating curve IGBT (motor), Diode (generator)
V_{DC} = 750 V, V_{AC} = 400 V_{RMS}, f_{sw} = 5 kHz, cosφ = ±0.8,
T_{inlet} = 40 °C and nom. cooling conditions



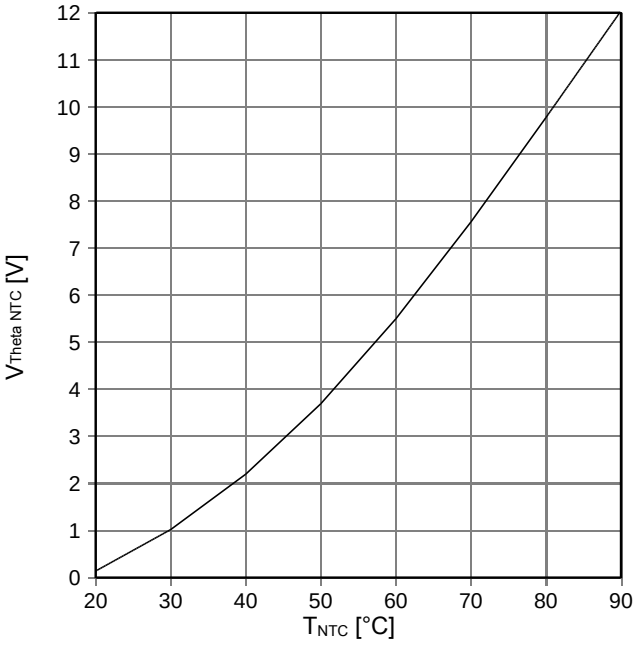
f_{sw} - derating curve IGBT (motor), Diode (generator)
V_{DC} = 750 V, V_{AC} = 400 V_{RMS}, $f_{AC\ sine}$ = 50 Hz, cosφ = ±0.8,
T_{inlet} = 40 °C and nom. cooling conditions



T_{inlet} - derating curve IGBT (motor), Diode (generator)
V_{DC} = 750 V, V_{AC} = 400 V_{RMS}, f_{sw} = 5 kHz, $f_{AC\ sine}$ = 50 Hz,
cosφ = ±0.8 and nom. cooling conditions



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



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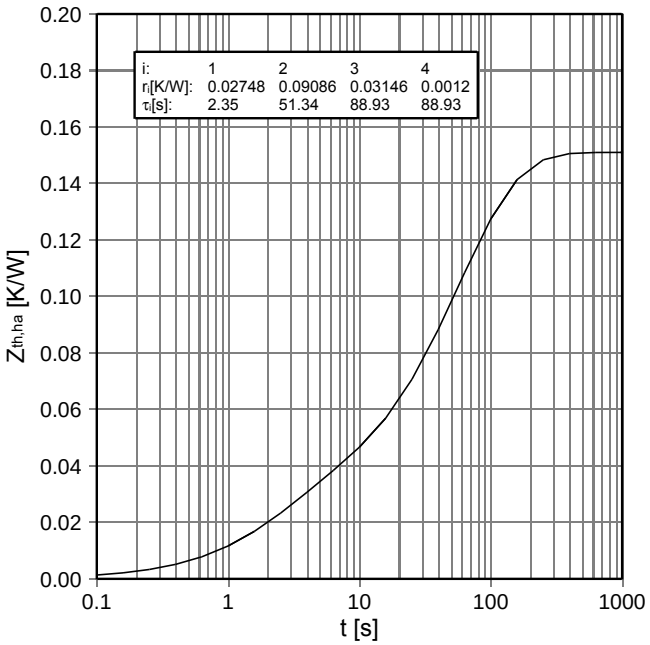
$Z_{th,ha}$ - thermal impedance heatsink to ambient per switch
nom. cooling conditions



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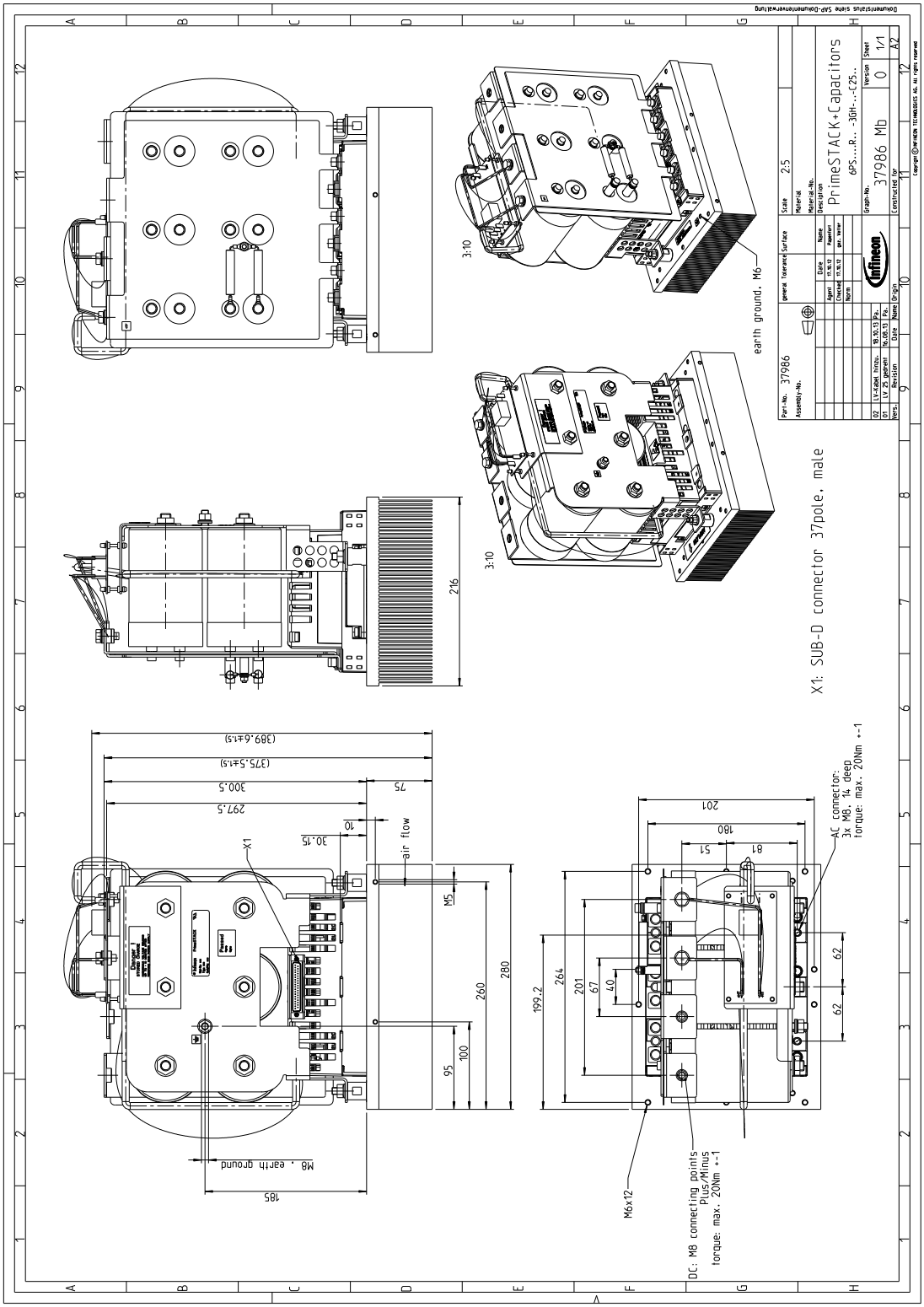
Mechanical drawing



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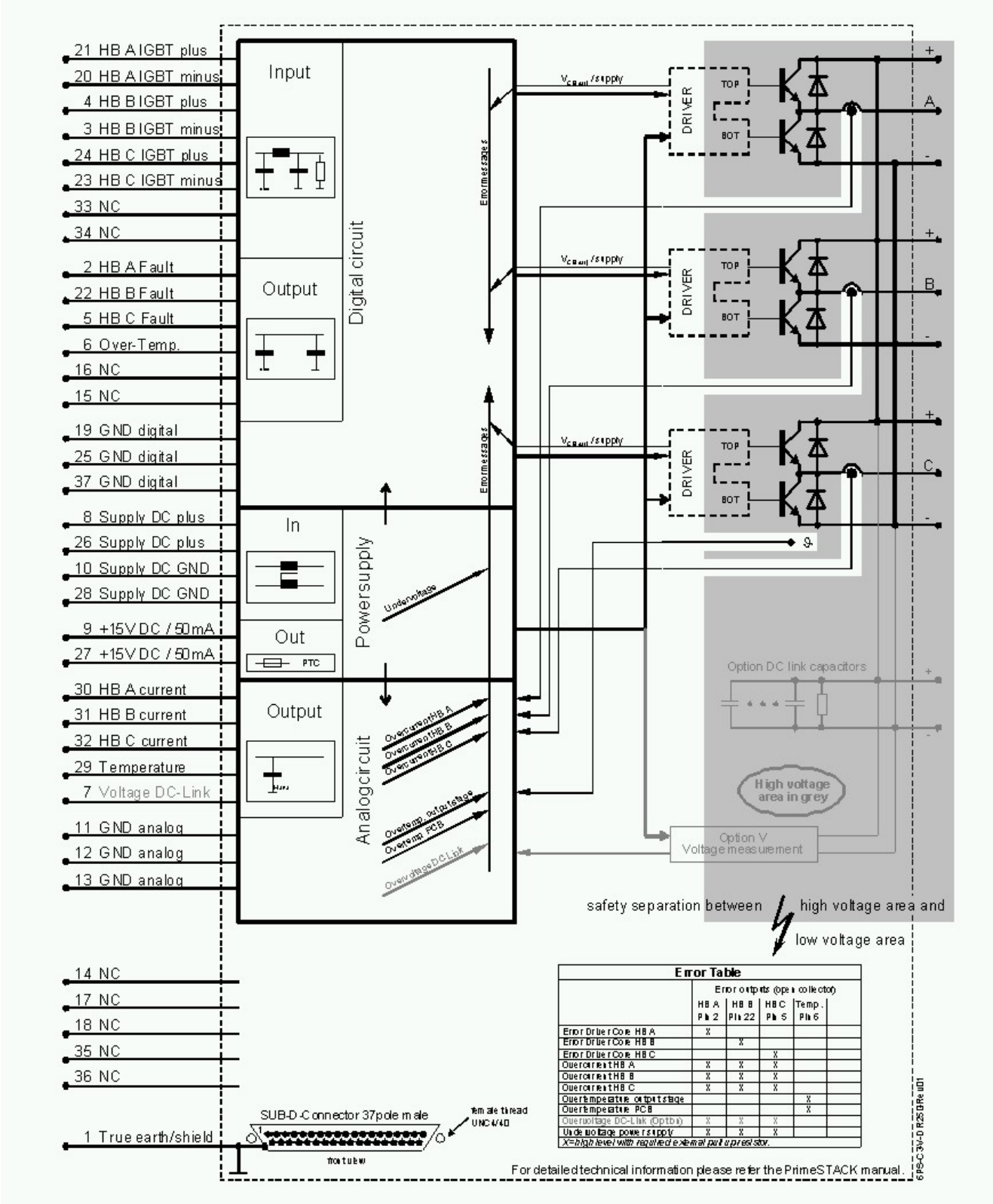
Circuit diagram



Error Table

	Error outputs (open collector)				
	HB A Pin 2	HB B Pin 22	HB C Pin 5	Temp. Pin 6	
Error Driver Core HB A	X				
Error Driver Core HB B		X			
Error Driver Core HB C			X		
Overcurrent HB A	X	X	X		
Overcurrent HB B	X	X	X		
Overcurrent HB C	X	X	X		
Overtemperature output stage				X	
Overtemperature PCB				X	
Overvoltage DC-Link (Optbl)	X	X	X		
Undervoltage power supply	X	X	X		

X= high level with required external pull up resistor.

For detailed technical information please refer the PrimeSTACK manual.

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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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