Technical Information

PrimeSTACK™

6PS18012E4FG38393

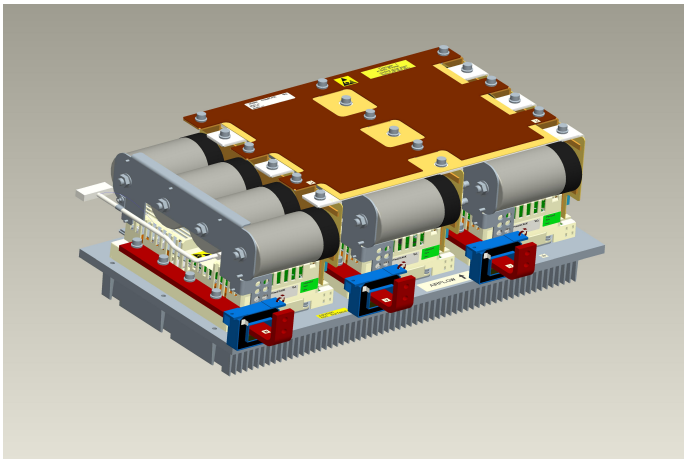
Preliminary data

General information

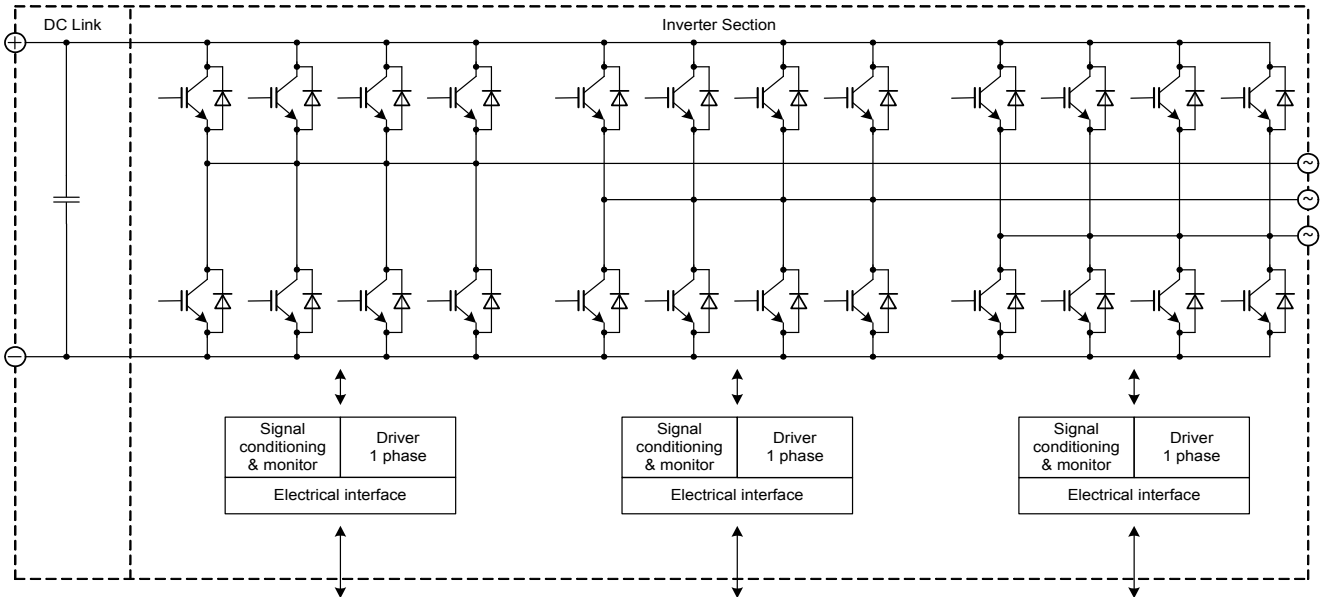
IGBT Stack for typical voltages of up to 400 V_{RMS}
Rated output current 800 A_{RMS}

· Solar power
· Motor drives
· High power converter

· 62mm power module
· Trenchstop™ IGBT4



Topology	B6I
Application	Inverter
Load type	Resistive, inductive
Semiconductor (Inverter Section)	12x FF450R12KE4
DC Link	4.8 mF
Heatsink	Forced air cooled (fan not included)
Implemented sensors	Current, temperature
Driver signals IGBT	Electrical
Approvals	UL 508C
Sales - name	6PS18012E4FG38393
SP - No.	SP001054242



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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		V_{DC}	1000	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}	2.5	kV_{RMS}
Repetitive peak collector current inverter section (IGBT)	t_p = 1 ms	I_{CRM2}	2560	A
Repetitive peak forward current inverter section (Diode)	t_p = 1 ms	I_{FRM2}	2440	A
Continuous current inverter section		I_{AC2}	820	A_{RMS}
Junction temperature	under switching conditions	T_{vjop}	150	°C
Switching frequency inverter section	limited due to snubber caps	f_{sw2}	3	kHz

Notes
Further maximum ratings are specified in the following dedicated sections

Characteristic values

DC Link

			min.	typ.	max.	
Rated voltage		V_{DC}		650	1000	V
Capacitor	1 s, 12 p, rated tol. 10 %	C_{DC}		4.8		mF
Maximum ripple current	per device, T_{amb} = 55 °C	I_{ripple}			49	A_{RMS}

Notes
Activ clamping diodes not implemented, max. DC link voltage for short circuit protection 500V
Max. DC link voltage under switching conditions 1000V up to 300A

Inverter Section

			min.	typ.	max.	
Rated continuous current	V_{DC} = 650 V, V_{AC} = 400 V_{RMS}, cos(φ) = 0.85, $f_{AC\ sine}$ = 50 Hz, f_{sw} = 3000 Hz, T_{inlet} = 40°C, $T_j \leq$ 125 °C	I_{AC}			800	A_{RMS}
Continuous current at low frequency	V_{DC} = 650 V, $f_{AC\ sine}$ = 0 Hz, f_{sw} = 3000 Hz, T_{inlet} = 40 °C, $T_j \leq$ 125 °C	$I_{AC\ low}$			360	A_{RMS}
Rated continuous current for 150% overload capability	$I_{AC\ 150\%}$ = 826 A_{RMS}, $t_{on\ over}$ = 60 s, $T_j \leq$ 125 °C	$I_{AC\ over1}$			550	A_{RMS}
Rated continuous current for 150% overload capability	$I_{AC\ 150\%}$ = 950 A_{RMS}, $t_{on\ over}$ = 3 s, $T_j \leq$ 125 °C	$I_{AC\ over2}$			630	A_{RMS}
Over current shutdown	within 15 µs	$I_{AC\ OC}$		1790		A_{peak}
Power losses	I_{AC} = 400 A, V_{DC} = 650 V, cos(φ) = 0.85, $f_{AC\ sine}$ = 50 Hz, f_{sw} = 3000 Hz, T_{inlet} = 40 °C, $T_j \leq$ 120 °C	P_{loss}		5900		W

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

Inverter Section (specific condition)

			min.	typ.	max.	
Specific continuous current	V_{DC} = 800 V, V_{AC} = 440 V_{RMS}, $f_{AC\ sine}$ = 50 Hz, f_{sw} = 2667 Hz, T_{inlet} = 40 °C, $T_j \leq$ 125 °C	I_{ACsp}		800		A_{RMS}

Notes
With optimized cooling condition higher load current is possible. Details see customized application note.

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Controller interface

Driver and interface board	ref. to separate Application Note			DR240		
				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	$V_{in\ low}$	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 5 mA, @ 800 A_{RMS}	$V_{IU\ ana2}$ $V_{IV\ ana2}$ $V_{IW\ ana2}$	4.3	4.4	4.5	V
Over temperature shutdown inverter section	load max 5 mA, @T_{NTC} = 94 °C	$V_{Error\ OT2}$		12.5		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		60	°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					50	m/s²
Protection degree					IP00		
Pollution degree					2		
Dimensions	width x depth x height			664	438	299	mm
Weight					53		kg

Notes
System data valid for continuous operation

Heatsink air cooled

			min.	typ.	max.	
Air flow	T_{air} = 20 °C, P_{air} = 1013 hPa, dry and dust free, measured at the side of the heat sink according to DIN 41882	$\Delta V/\Delta t$	1500			m³/h
Air pressure drop	at min. air flow	Δp		200		Pa
Air inlet temperature		T_{inlet}	-30		60	°C

Notes
Conditions are standard Infineon characterization for heatsinks.

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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		×	
Data cable for control signals		×	
Fan			
Collector-emitter Active Clamping			
Snubber capcitors		×	

Notes
Datacable not specified for the STACK permitted temperature range.The included cables are standard computer cable.

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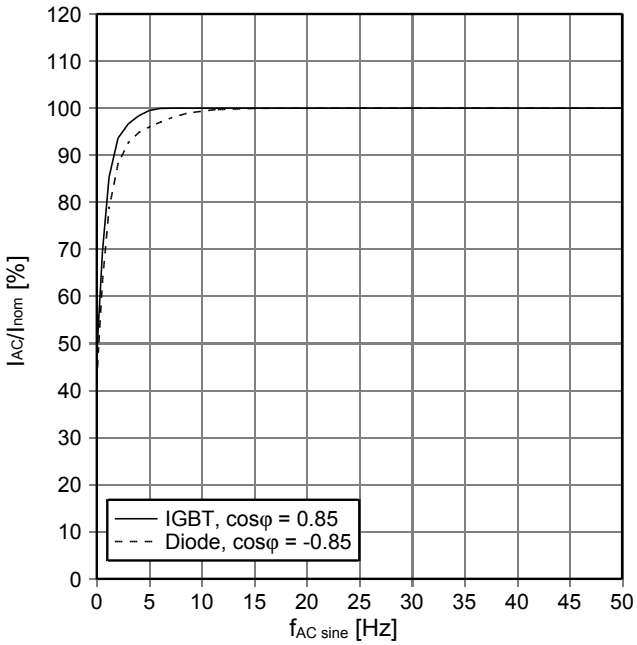
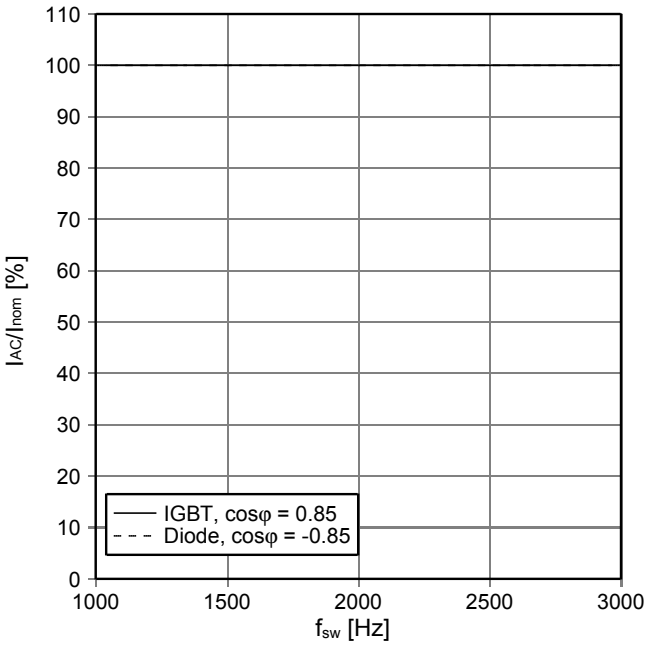
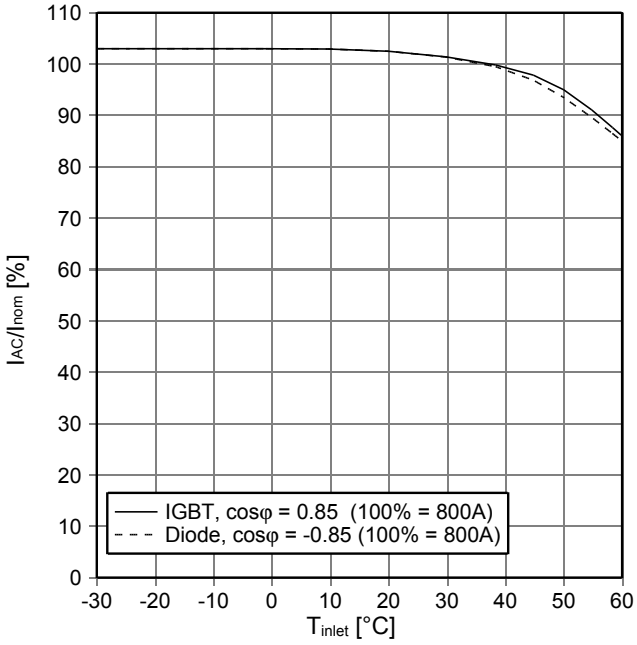
$f_{AC\ sine}$ - derating curve IGBT (motor), Diode (generator)
V_{DC} = 650 V, V_{AC} = 400 V_{RMS}, f_{sw} = 3 kHz, cosφ = ±0.85,
T_{inlet} = 40 °C and nom. cooling conditions



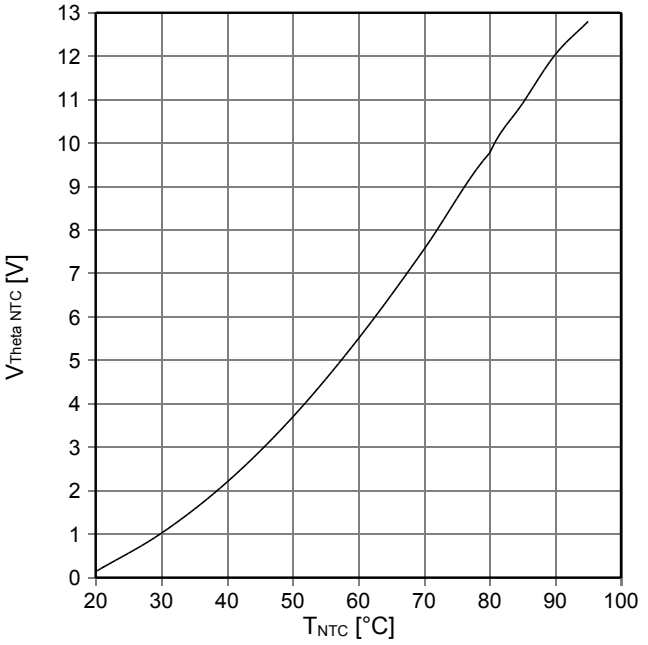
f_{sw} - derating curve IGBT (motor), Diode (generator)
V_{DC} = 650 V, V_{AC} = 400 V_{RMS}, $f_{AC\ sine}$ = 50 Hz, cosφ = ±0.85,
T_{inlet} = 40 °C and nom. cooling conditions



T_{inlet} - derating curve IGBT (motor), Diode (generator)
V_{DC} = 650 V, V_{AC} = 400 V_{RMS}, $f_{AC\ sine}$ = 50 Hz, cosφ = ±0.85,
T_{inlet} = 40 °C and nom. cooling conditions



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



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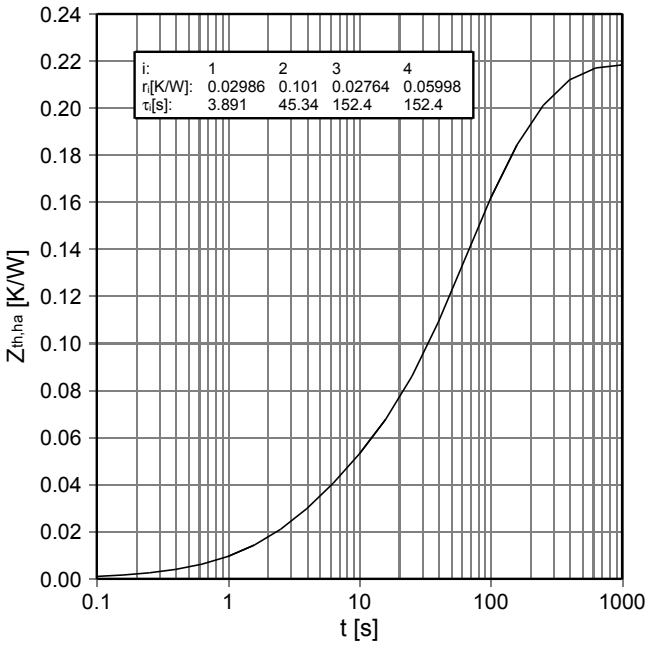
$Z_{th,ha}$ - thermal impedance heatsink to ambient per switch
nom. cooling conditions



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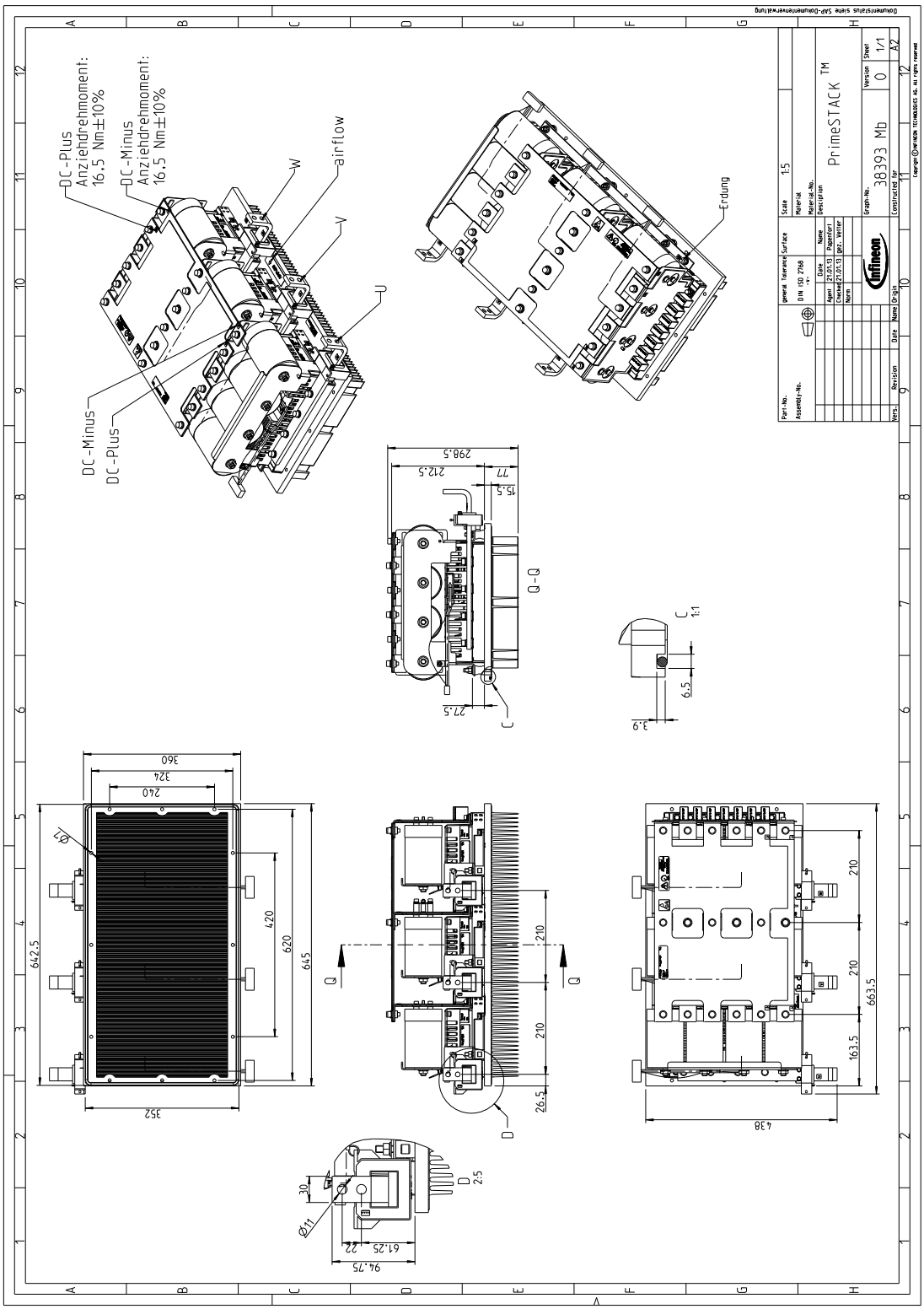
Mechanical drawing



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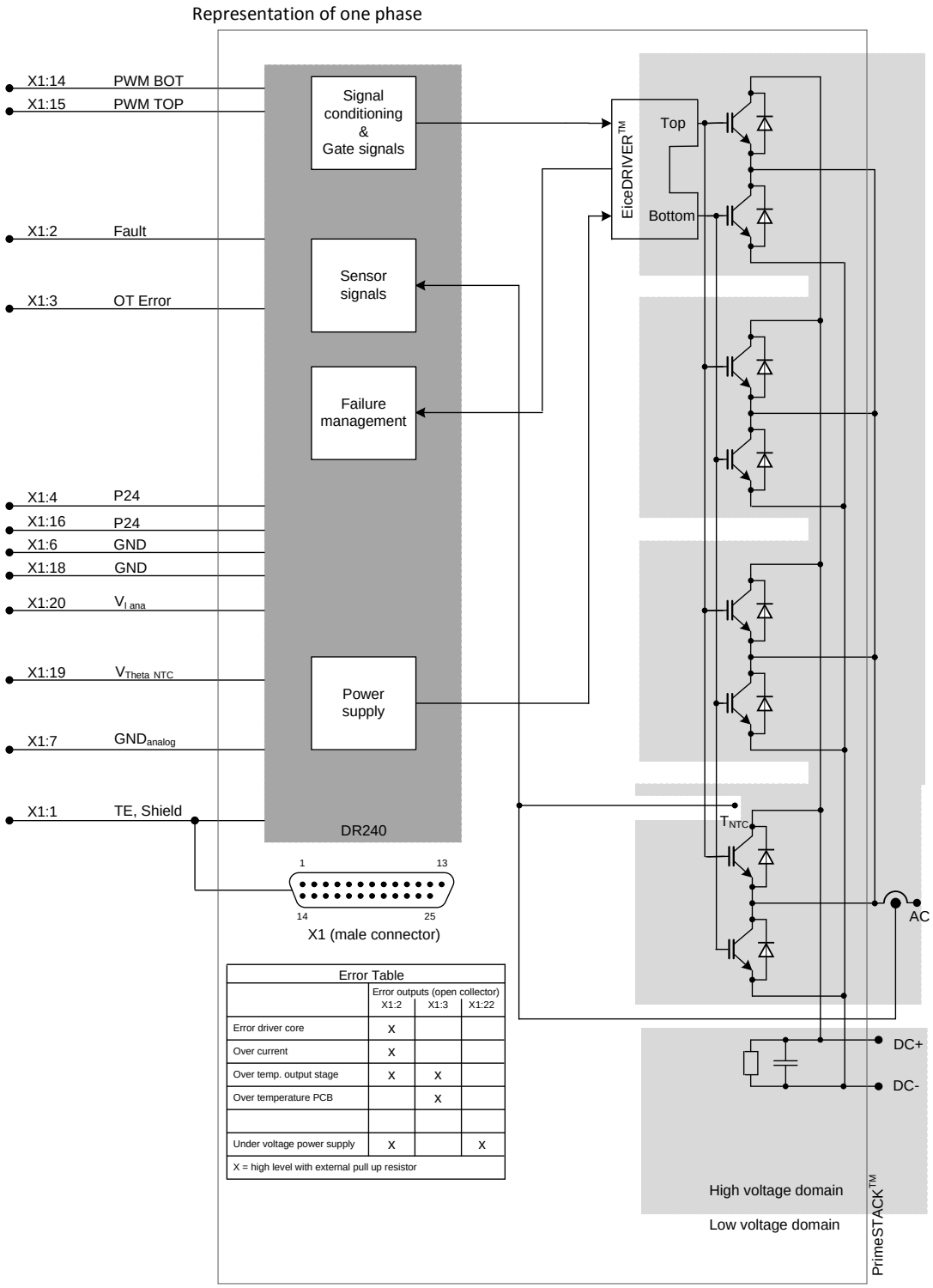
Circuit diagram



Error Table			
	Error outputs (open collector)		
	X1:2	X1:3	X1:22
Error driver core	X		
Over current	X		
Over temp. output stage	X	X	
Over temperature PCB		X	
Under voltage power supply	X		X
X = high level with external pull up resistor			

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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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