

# Technical Information

PrimeSTACK™

# 6PS18012E4FG35689

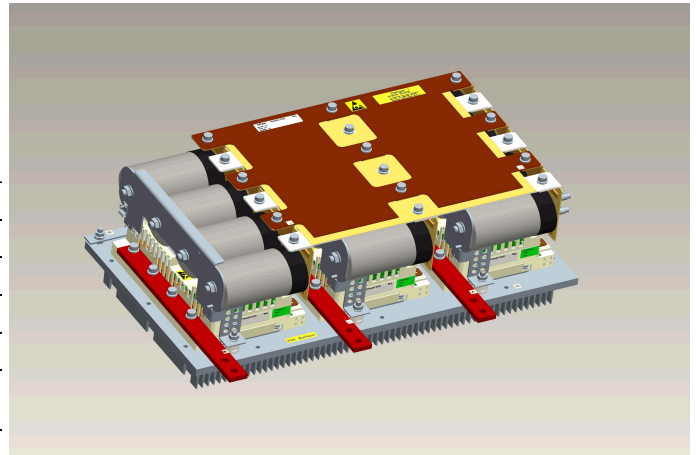


Preliminary data

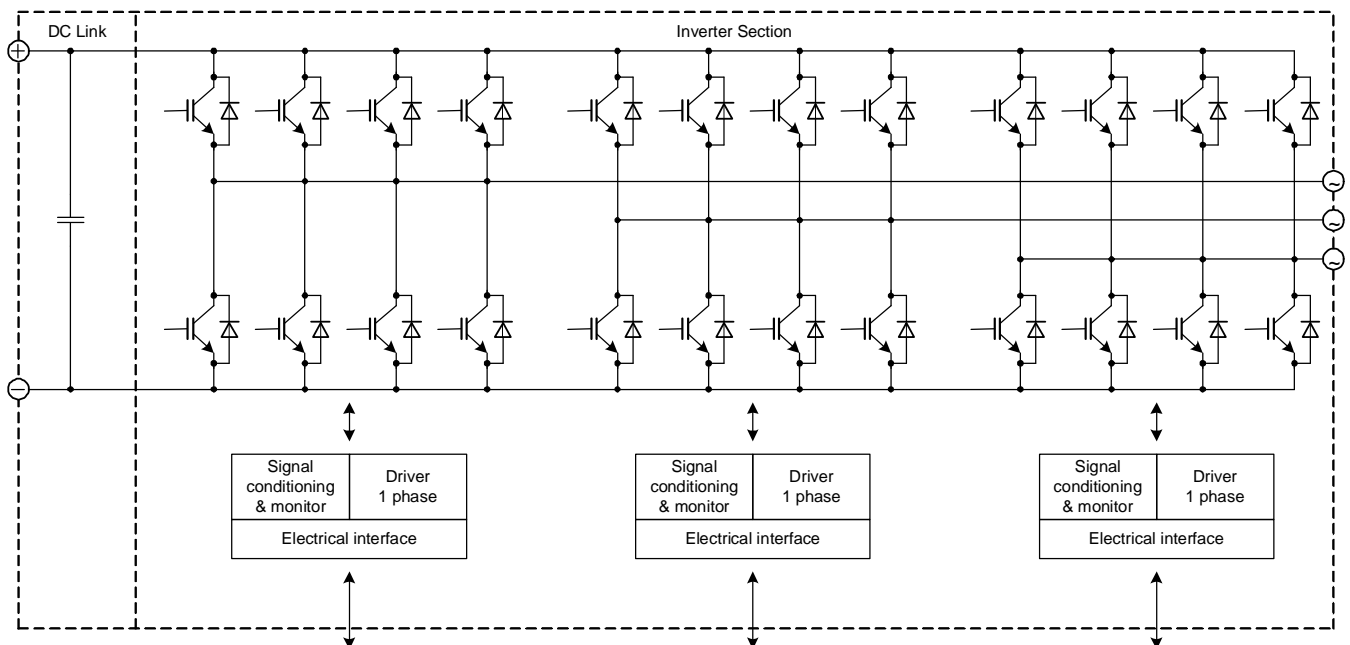
## General information

**IGBT Stack for typical voltages of up to 400 V<sub>RMS</sub>**  
**Rated output current 729 A<sub>RMS</sub>**

- High power converter
- Solar power
- Motor drives
- 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, voltage, temperature
Design standards	UL 94, prepared for UL 508C
Sales - name	6PS18012E4FG35689
SP - No.	SP000885246



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**Absolute maximum rated values**

Collector-emitter voltage	IGBT; $T_{vj} = 25^{\circ}\text{C}$	$V_{CES}$	1200	V
Repetitive peak reverse voltage	Diode; $T_{vj} = 25^{\circ}\text{C}$	$V_{RRM}$	1200	V
DC link voltage		$V_{DC}$	850	V
Insulation management	according to installation height of 2000 m	$V_{line}$	500	$V_{RMS}$
Insulation test voltage	according to EN 50178, $f = 50\text{ Hz}$ , $t = 1\text{ s}$	$V_{ISOL}$	2.5	$kV_{RMS}$
Repetitive peak collector current inverter section (IGBT)	$t_p = 1\text{ ms}$	$I_{CRM2}$	2500	A
Repetitive peak forward current inverter section (Diode)	$t_p = 1\text{ ms}$	$I_{FRM2}$	2440	A
$I^2t$ -value inverter section (Diode)	$V_R = 0\text{ V}$ , $t_p = 10\text{ ms}$ , $T_{vj} = 125^{\circ}\text{C}$	$I^2t$	122	$kA^2s$
Continuous current inverter section		$I_{AC2}$	800	$A_{RMS}$
Junction temperature	under switching conditions	$T_{vjop}$	150	$^{\circ}\text{C}$

**Notes**

Further maximum ratings are specified in the following dedicated sections

**Characteristic values**

**DC Link**

			min.	typ.	max.	
Rated voltage		$V_{DC}$		650	800	V
Over voltage shutdown	within 5000 $\mu\text{s}$			850		V
Capacitor	1 s, 12 p	$C_{DC}$		4.8		mF
		type	Foil			
Maximum ripple current	per device, $T_{amb} = 55^{\circ}\text{C}$	$I_{ripple}$			49	$A_{RMS}$
Balance or discharge resistor	per DC link unit	$R_b$		82		k $\Omega$

**Inverter Section**

			min.	typ.	max.	
Rated continuous current	$V_{DC} = 650\text{ V}$ , $V_{AC} = 400\text{ V}_{RMS}$ , $\cos(\varphi) = 0.85$ , $f_{AC\ sine} = 50\text{ Hz}$ , $f_{sw} = 5000\text{ Hz}$ , $T_{inlet} = 40^{\circ}\text{C}$ , $T_j \leq 125^{\circ}\text{C}$	$I_{AC}$		729		$A_{RMS}$
Continuous current at low frequency	$V_{DC} = 650\text{ V}$ , $V_{AC} = 400\text{ V}_{RMS}$ , $\cos(\varphi) = 0.85$ , $f_{AC\ sine} = 0\text{ Hz}$ , $f_{sw} = 5000\text{ Hz}$ , $T_{inlet} = 40^{\circ}\text{C}$ , $T_j \leq 125^{\circ}\text{C}$	$I_{AC\ low}$		360		$A_{RMS}$
Rated continuous current for 150% overload capability	$I_{AC\ 150\%} = 925\text{ A}_{RMS}$ , $t_{on\ over} = 3\text{ s}$ , $T_j \leq 125^{\circ}\text{C}$	$I_{AC\ over1}$		617		$A_{RMS}$
Rated continuous current for 150% overload capability	$I_{AC\ 150\%} = 803\text{ A}_{RMS}$ , $t_{on\ over} = 60\text{ s}$ , $T_j \leq 125^{\circ}\text{C}$	$I_{AC\ over2}$		535		$A_{RMS}$
Over current shutdown	within 15 $\mu\text{s}$	$I_{AC\ OC}$		2500		$A_{peak}$
Power losses	$I_{AC} = 729\text{ A}$ , $V_{DC} = 650\text{ V}$ , $V_{AC} = 400\text{ V}_{RMS}$ , $\cos(\varphi) = 0.85$ , $f_{AC\ sine} = 50\text{ Hz}$ , $f_{sw} = 5000\text{ Hz}$ , $T_{inlet} = 40^{\circ}\text{C}$ , $T_j \leq 125^{\circ}\text{C}$	$P_{loss}$		6790		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		DR240			
			min.	typ.	max.	
Auxiliary voltage		$V_{aux}$	18	24	30	V
Auxiliary power requirement	$V_{aux} = 24\text{ V}$	$P_{aux}$			120	W
Digital input level	resistor to GND 10 k $\Omega$ , 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 1 mA, @ 729 A <sub>RMS</sub>	$V_{IU\ ana2}$ $V_{IV\ ana2}$ $V_{IW\ ana2}$	2.9	3	3.1	V
Analog DC link voltage sensor output	load max 1 mA, @ 850 V	$V_{DC\ ana}$	8.3	8.5	8.7	V
Analog temperature sensor output inverter section (NTC)	load max 1 mA, @ $T_{NTC} = 81\text{ }^{\circ}\text{C}$	$V_{\Theta\ NTC2}$		10		V
Over temperature shutdown inverter section	load max 1 mA, @ $T_{NTC} = 86\text{ }^{\circ}\text{C}$	$V_{Error\ OT2}$		10.9		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	$^{\circ}\text{C}$
Operational ambient temperature	PCB, DC link capacitor, bus bar, excluding cooling medium	$T_{op\ amb}$	-25		55	$^{\circ}\text{C}$
Cooling air velocity	PCB, DC link capacitor, bus bar, standard atmosphere	$V_{air}$	2			m/s
Humidity	no condensation	Rel. F	5		85	%
Protection degree			IP00			
Pollution degree			2			
Dimensions	width x depth x height		658	438	302	mm
Weight				50		kg

### Heatsink air cooled

			min.	typ.	max.	
Air flow	$T_{air} = 20\text{ }^{\circ}\text{C}$ , $P_{air} = 1013\text{ hPa}$ , dry and dust free, measured at the side of the heat sink according to DIN 41882	$\Delta V/\Delta t$	1500			m <sup>3</sup> /h
Air pressure drop	at min. air flow	$\Delta p$		200		Pa
Air inlet temperature		$T_{inlet}$	-40		55	$^{\circ}\text{C}$

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### Overview of optional components

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

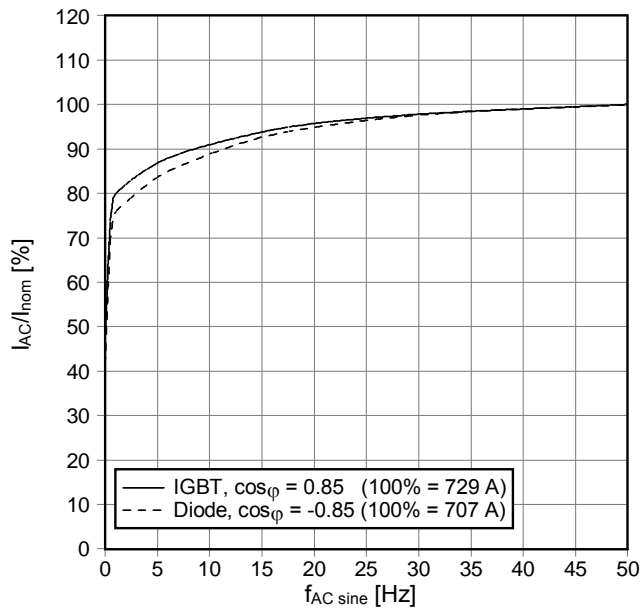
#### Notes

Setting of Active Clamping TVS-Diodes:  $V_z = 824 \text{ V}$

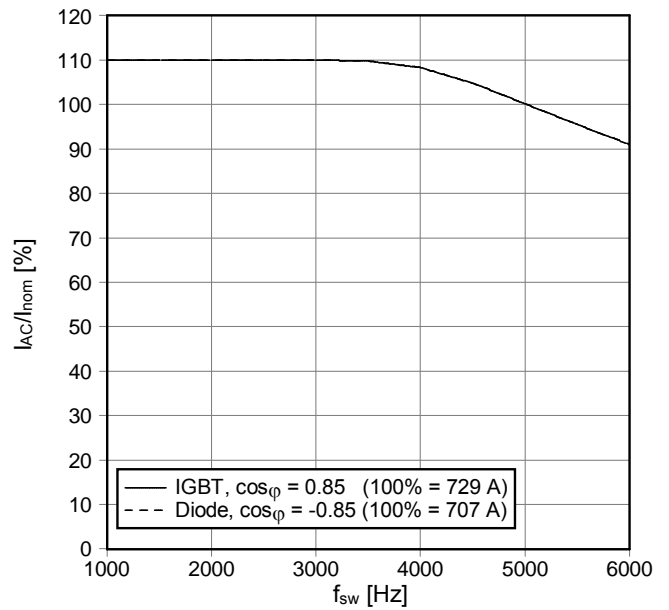
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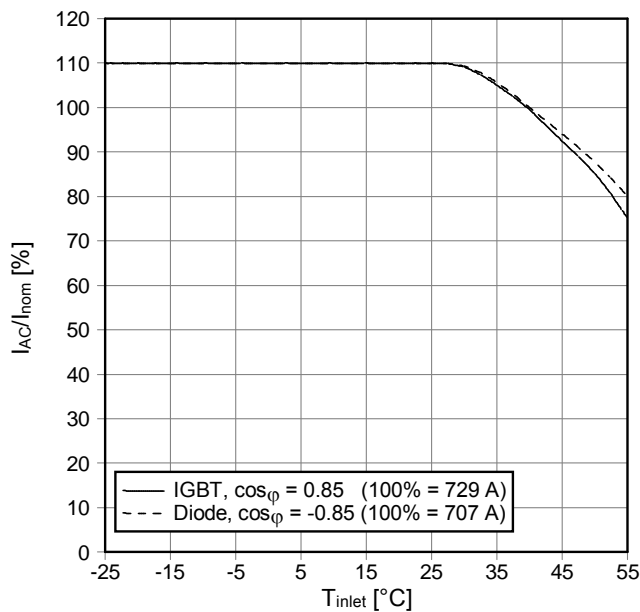
$f_{AC\ sine}$  - derating curve IGBT (motor), Diode (generator)  
 $V_{DC} = 650\ V$ ,  $V_{AC} = 400\ V_{RMS}$ ,  $f_{sw} = 5\ kHz$ ,  $\cos\phi = \pm 0.85$ ,  
 $T_{inlet} = 40\ ^\circ C$  and nom. cooling conditions



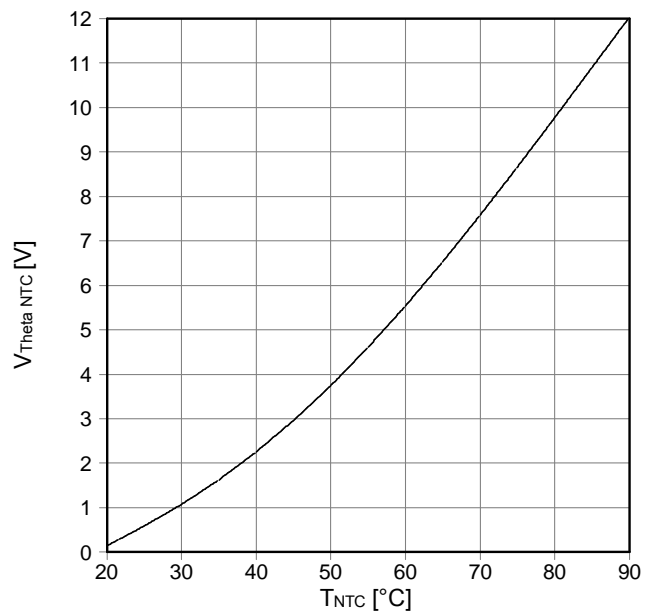
$f_{sw}$  - derating curve IGBT (motor), Diode (generator)  
 $V_{DC} = 650\ V$ ,  $V_{AC} = 400\ V_{RMS}$ ,  $f_{AC\ sine} = 50\ Hz$ ,  $\cos\phi = \pm 0.85$ ,  
 $T_{inlet} = 40\ ^\circ C$  and nom. cooling conditions



$T_{inlet}$  - derating curve IGBT (motor), Diode (generator)  
 $V_{DC} = 650\ V$ ,  $V_{AC} = 400\ V_{RMS}$ ,  $f_{sw} = 5\ kHz$ ,  $f_{AC\ sine} = 50\ Hz$ ,  
 $\cos\phi = \pm 0.85$  and nom. cooling conditions

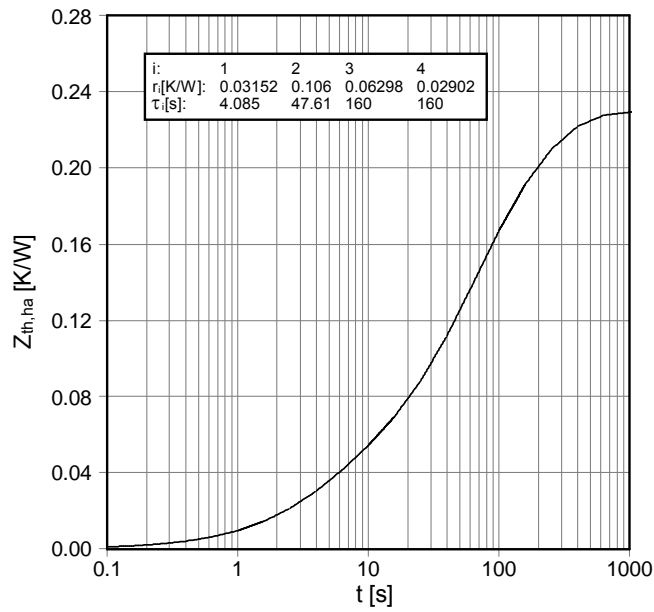


Analog temperature sensor output  $V_{Theta\ NTC}$   
 Sensing NTC of heatsink



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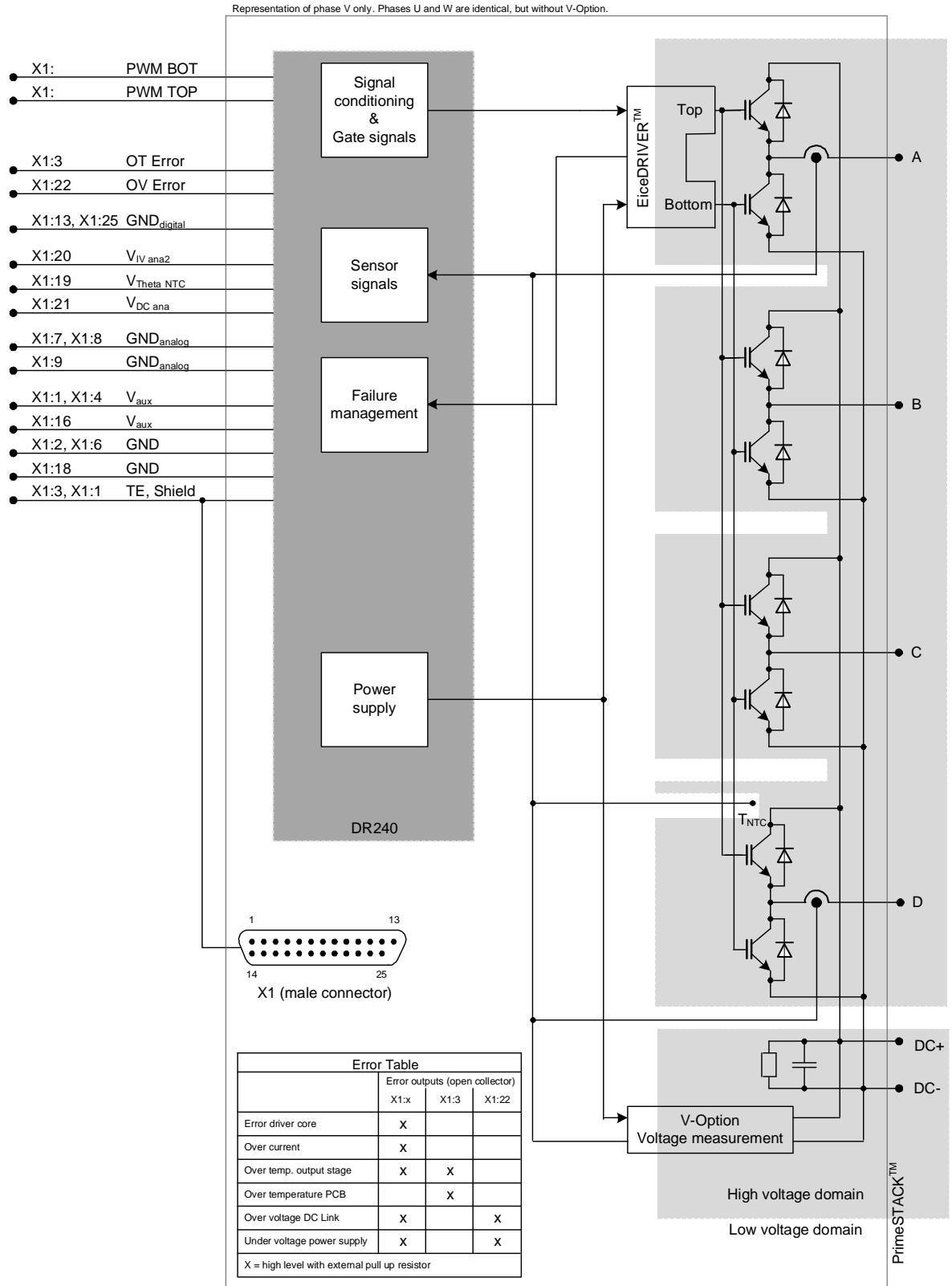
$Z_{th,ha}$  - thermal impedance heatsink to ambient per switch  
nom. cooling conditions



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Circuit diagram



	Error outputs (open collector)		
	X1:x	X1:3	X1:22
Error driver core	X		
Over current	X		
Over temp. output stage	X	X	
Over temperature PCB		X	
Over voltage DC Link	X		X
Under voltage power supply	X		X

X = high level with external pull up resistor

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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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