

# Technical Information

PrimeSTACK 2PS1200R17KE3-4WH-C8VTIO



Vorläufige Daten  
preliminary data

## Key data

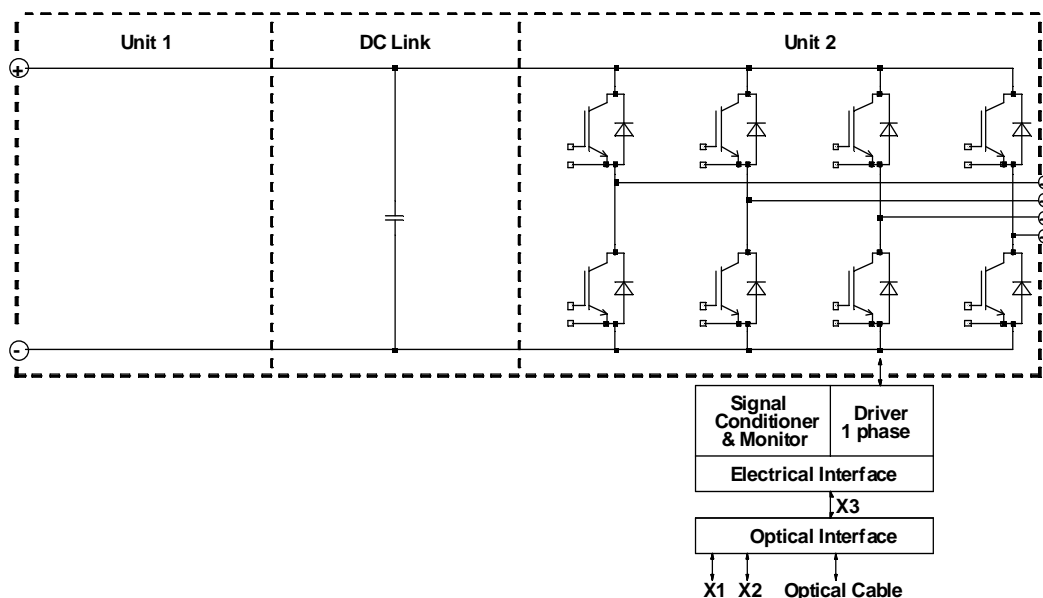
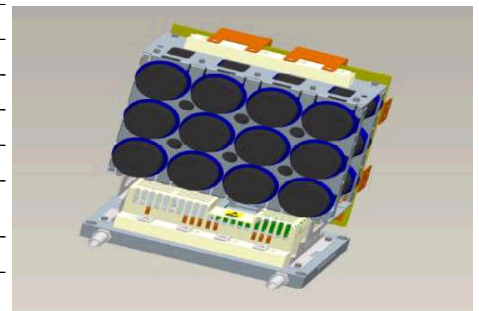
1x 824A rms at 690V rms, water cooled

## General information

Stacks for various inverter application. IGBT's, heat sinks, capacitors, drivers and sensors included. These are only technical data!

Please read carefully the complete document 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                   |      | 7.46mF                             |
| Semicond. (Unit 2)        | IGBT | 4x FF300R17KE3                     |
| Driver signals IGBT       |      | optical<br>HFBR-15X1 / HFBR-25X1   |
| Standards                 |      | EN50178, UL94, prepared for UL508C |
| Sales - name              |      | 2PS12017E34W33908                  |
| Internal ID               |      | 33908                              |
| Mechanical drawing number |      | 33908_MB                           |
| Electrical drawing number |      | 2PS-C4-V-IO                        |
| Weight                    |      | 30 kg                              |



|                            |                                 |
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### Notes

Heat sink with aluminum cooling channel.  
Composites of fluid: Water and 52 vol. % Antifrogen N.  
The typical water flow rate is 11 dm<sup>3</sup>/min.  
Test pressure 10 bar, operating pressure is maximally 70 percent of test pressure.  
The Inverter current is limited by the dc link capacitor.  
Examine the capacitor current in your application!

### Electrical data

| DC Link              |               |                 | min | typ  | max  | units |
|----------------------|---------------|-----------------|-----|------|------|-------|
| Voltage              |               | V <sub>DC</sub> |     | 1100 | 1200 | V     |
| Overvoltage shutdown | within 5000µs |                 |     | 1300 |      | V     |

| Unit 2 AC                        |  |                           | min   | typ  | max   | units             |
|----------------------------------|--|---------------------------|-------|------|-------|-------------------|
| Voltage                          | depending on controller  | V <sub>Unit2</sub>        |       | 690  |       | V <sub>RMS</sub>  |
| Continuous current               | V <sub>Unit2</sub> = 715V <sub>RMS</sub> , V <sub>DC</sub> = 1100V, T <sub>inlet</sub> = 50°C,<br>T <sub>J</sub> ≤ 125°C, f <sub>Unit2</sub> = 50Hz, f <sub>sw2</sub> = 2000Hz,<br>cos(phi) = 1,00                           | I <sub>Unit2</sub>        |       |      | 824   | A <sub>RMS</sub>  |
| Continuous current overload cap. | T <sub>inlet</sub> = 50°C, for overload capability 150% for 60s  |                           |       | 549  |       | A <sub>RMS</sub>  |
| Short time current               | T <sub>inlet</sub> = 50°C, 10s, every 180s, initial load = 659A <sub>RMS</sub>   | I <sub>Unit2</sub>        |       |      | 824   | A <sub>RMS</sub>  |
| DC current                       | no rotating field, T <sub>inlet</sub> = 50°C   | I <sub>Unit2</sub> DC     |       |      | 354,0 | A <sub>av</sub>   |
| Overcurrent shutdown             | within 15µs  |                           |       | 2500 |       | A <sub>peak</sub> |
| Switching frequency              |  | f <sub>sw2</sub>          |       |      | 6000  | Hz                |
| Power losses                     | V <sub>Unit2</sub> = 715V, V <sub>DC</sub> = 1100V, T <sub>inlet</sub> = 50°C,<br>T <sub>J</sub> ≤ 125°C, f <sub>Unit2</sub> = 50Hz, f <sub>sw2</sub> = 2000Hz,<br>cos(phi) = 1,00, I <sub>Unit2</sub> = 824A <sub>RMS</sub> | P <sub>loss2</sub>        |       | 3280 |       | W                 |
| Power factor                     |  | cos(phi) <sub>Unit2</sub> | -1,00 |      | 1,00  |                   |

| General data                          |   |                       | min                | typ | max | units             |
|---------------------------------------|---|-----------------------|--------------------|-----|-----|-------------------|
| Power losses (PCB)                    |   | P <sub>loss aux</sub> |                    |     | 40  | W                 |
| EMC test                              | according to IEC61800-3 at named interfaces | power                 | V <sub>Burst</sub> | 2   |     | kV                |
|                                       |   | control               | V <sub>Burst</sub> | 1   |     | kV                |
|                                       |   | aux (24V)             | V <sub>Surge</sub> | 1   |     | kV                |
| Insulation management is designed for |   | V <sub>Line</sub>     |                    | 690 |     | V <sub>RMS</sub>  |
| Insulation test voltage               | according to EN50178, f = 50Hz, t = 60s     | V <sub>isol</sub>     |                    | 2,5 |     | kV <sub>RMS</sub> |

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### Important component data

|                                |   |            | min                    | typ  | max | units      |
|--------------------------------|---|------------|------------------------|------|-----|------------|
| DC Link capacitor              |   | $C_{DC}$   |                        | 7,46 |     | mF         |
|                                |   | type       | Electrolytic Capacitor |      |     |            |
| Temperature range              |   |            | -40                    |      | +85 | °C         |
| Rated voltage                  | per device  | $U_R$      | 450                    |      |     | $V_{DC}$   |
| Rated capacitance              | per device  | $C_R$      | 5600                   |      |     | $\mu F$    |
| Capacitance tolerance          | per device  | Tol        | -20                    |      | +20 | %          |
| Maximum ripple current         | per device, $T_{amb} = 40^\circ C$ , $f = 120 Hz$ | $I_{Rmax}$ |                        |      | 44  | $A_{RMS}$  |
| wiring system                  | series, parallel                                  |            | 3s, 4p                 |      |     |            |
| Balance or discharge resistors | per DC Link unit                                  | $R_b$      | 16,5                   |      |     | k $\Omega$ |

### 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<br>2ED300C17-S |      |      |          |
| Digital input level           | resistor to GND 10,0k $\Omega$ , capacitor to GND 1nF, high = on, min 15mA | $V_{in}$       | 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 824A  | $V_{ana out}$  | 3,31                      | 3,38 | 3,45 | V        |
| Analog DC Link voltage output | load max 1mA; at 1200V   | $V_{DC out}$   | 8,07                      | 8,23 | 8,39 | V        |
| Analog temperature output     | load max 1mA; at $T_{NTC} = 56^\circ C$ correspond to $T_j = 120^\circ C$  | $V_{T out}$    | 8,95                      | 9,13 | 9,31 | V        |
| Overtemperature shutdown      | at $T_{NTC} = 57^\circ C$ correspond to $T_j = 125^\circ C$                | $V_{T out OT}$ |                           | 10   |      | V        |
| Optical input power           |  |                |                           | 12   |      | $\mu W$  |
| Optical output power          |  |                |                           |      | 60   | $\mu W$  |

### Heat sink water cooled / Thermal data

|                                 |   |                               | min | typ | max | units                |
|---------------------------------|---|-------------------------------|-----|-----|-----|----------------------|
| Water flow                      | according cooling water specification from infineon | $\Delta V / \Delta t_{Water}$ | 10  |     |     | dm <sup>3</sup> /min |
| Water pressure drop             |   | $\Delta p_{Water}$            |     | 50  |     | mbar                 |
| Water pressure                  |   |                               |     |     | 8   | bar                  |
| Cooling water inlet temperature |   | $T_{inlet}$                   | -40 |     | 40  | °C                   |
| Water connection                |   |                               |     | 3/4 |     | in                   |

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### IGBT data unit 2

| Type                                     | assumed  |               | min | typ      | max | units |
|--|--|---------------|-----|----------|-----|-------|
| collector-emitter saturation voltage     | $I_c = 300A; V_{ge} = 15V; T_{vj} = 125^\circ C$ | $V_{CE\ sat}$ |     | 2,4      |     | V     |
| parameter for linear model               | $T_{vj} = 25^\circ C$                            | $V_{ce1}$     |     | 1,025    |     | V     |
| parameter for linear model               | $T_{vj} = 25^\circ C$                            | $r_{ce1}$     |     | 3,25     |     | mΩ    |
| parameter for linear model               | $T_{vj} = 125^\circ C$                           | $V_{ce2}$     |     | 0,975    |     | V     |
| parameter for linear model               | $T_{vj} = 125^\circ C$                           | $r_{ce2}$     |     | 4,75     |     | mΩ    |
| turn-on / turn-off energy loss per pulse | $T_{vj} = 25^\circ C$                            | $E_1$         |     | 71 / 64  |     | mJ    |
| turn-on / turn-off energy loss per pulse | $T_{vj} = 125^\circ C$                           | $E_2$         |     | 105 / 94 |     | mJ    |
| thermal resistance, junction to case     | per IGBT   | $R_{thjc}$    |     | 0,085    |     | K/W   |
| thermal resistance, case to heatsink     | per IGBT   | $R_{thch}$    |     | 0,033    |     | K/W   |

### Diode data unit 2

| Type                                 | assumed   |            | min | typ   | max | units |
|--------------------------------------|---|------------|-----|-------|-----|-------|
| forward voltage                      | $I_F = 300A; V_{ge} = 0V; T_{vj} = 125^\circ C$ | $V_F$      |     | 1,9   |     | V     |
| parameter for linear model           | $T_{vj} = 25^\circ C$                           | $V_{F1}$   |     | 1,035 |     | V     |
| parameter for linear model           | $T_{vj} = 25^\circ C$                           | $r_{F1}$   |     | 2,55  |     | mΩ    |
| parameter for linear model           | $T_{vj} = 125^\circ C$                          | $V_{F2}$   |     | 0,925 |     | V     |
| parameter for linear model           | $T_{vj} = 125^\circ C$                          | $r_{F2}$   |     | 3,25  |     | mΩ    |
| reverse recovery energy              | $T_{vj} = 25^\circ C$                           | $E_{rec1}$ |     | 40    |     | mJ    |
| reverse recovery energy              | $T_{vj} = 125^\circ C$                          | $E_{rec2}$ |     | 72    |     | mJ    |
| thermal resistance, junction to case | per Diode                                       | $R_{thjc}$ |     | 0,13  |     | K/W   |
| thermal resistance, case to heatsink | per Diode                                       | $R_{thch}$ |     | 0,051 |     | K/W   |

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## Vorläufige Daten preliminary data

### Environmental conditions

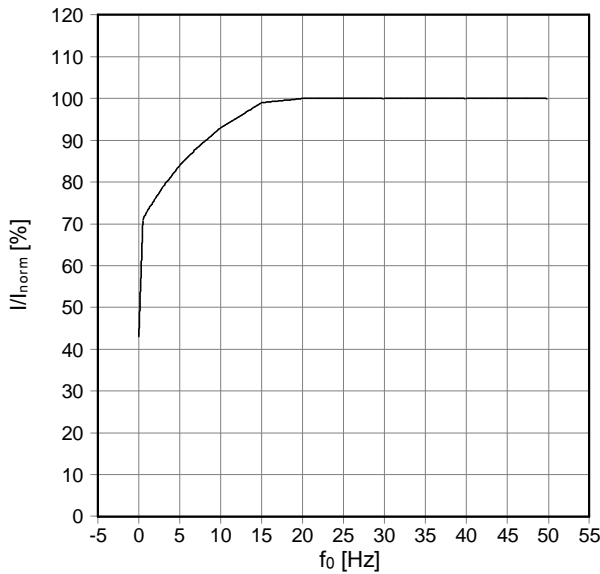
|                            |   |               | min  | typ  | max  | units            |
|----------------------------|---|---------------|------|------|------|------------------|
| Storage temperature        |   | $T_{stor}$    | -40  |      | 85   | °C               |
| Ambient temperature        | minimum 0°C for optional optical interface        | $T_{amb}$     | -25  |      | 55   | °C               |
| Operating temperature      | see chapter Heat sink water cooled / Thermal data |               |      |      |      |                  |
| Cooling air velocity (PCB) |   | $V_{Air PCB}$ | 2,0  |      |      | 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/s <sup>2</sup> |
| Shock                      | according to IEC60721                             |               |      |      | 40   | m/s <sup>2</sup> |
| 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                            |               | 264  | 400  | 450  | mm               |
| Weight with heat sink      | approximation                                     |               |      | 30,0 |      | kg               |

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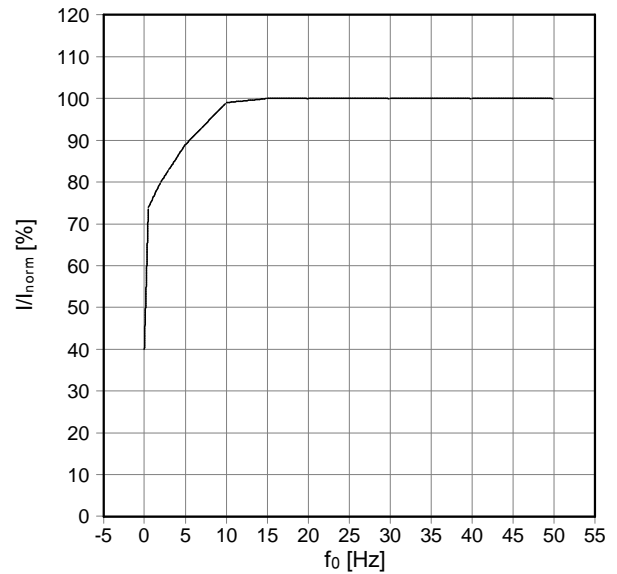


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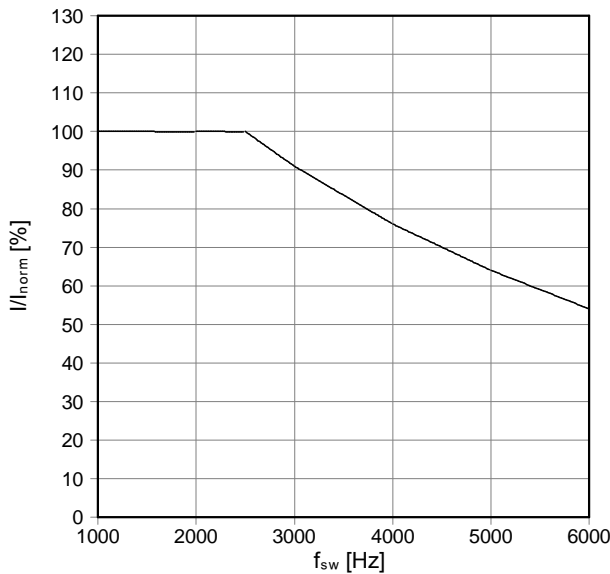
**fo - derating curve IGBT (motor)**  
 $\cos(\phi) = 1$   
 $T_{cool\ medium} = 50^{\circ}C ; 100\% = 824\ A\ rms$



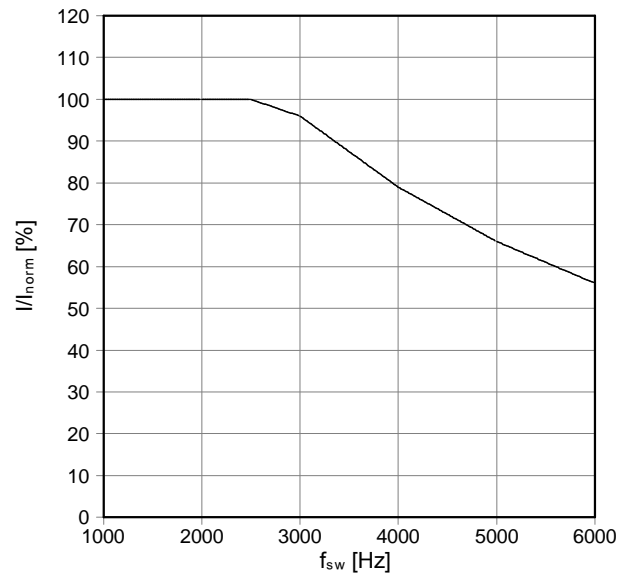
**fo - derating curves Diode (generator)**  
 $\cos(\phi) = -1$   
 $T_{cool\ medium} = 50^{\circ}C ; 100\% = 824\ A\ rms$



**fsw - derating curve IGBT (motor)**  
 $\cos(\phi) = 1$   
 $T_{cool\ medium} = 50^{\circ}C ; 100\% = 824\ A\ rms$



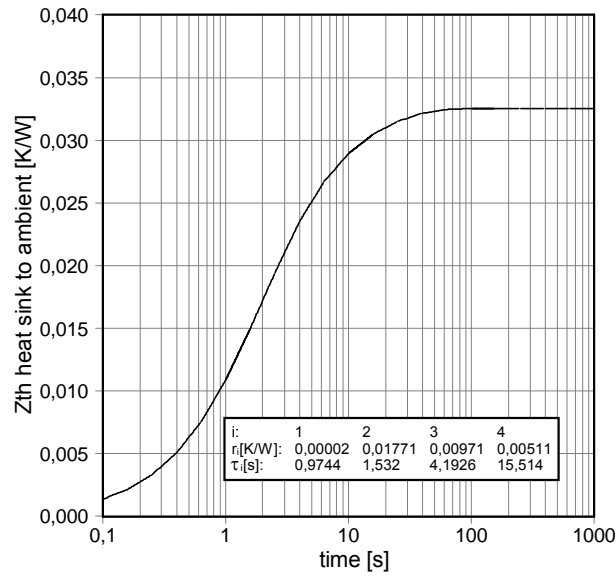
**fsw - derating curve Diode (generator)**  
 $\cos(\phi) = -1$   
 $T_{cool\ medium} = 50^{\circ}C ; 100\% = 824\ A\ rms$



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Transient thermal impedance per module  
 $T_{cool\ medium} = 50^{\circ}C$



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### Nutzungsbedingungen

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- die gemeinsame Durchführung eines Risiko- und Qualitätsassessments;
- den Abschluss von speziellen Qualitätssicherungsvereinbarungen;
- die gemeinsame Einführung von Maßnahmen zu einer laufenden Produktbeobachtung dringend empfehlen und gegebenenfalls die Belieferung von der Umsetzung solcher Maßnahmen abhängig machen.

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Should you require product information in excess of the data given in this product data sheet or which concerns the specific application of our product, please contact the sales office, which is responsible for you (see [www.infineon.com](http://www.infineon.com), sales&contact). For those that are specifically interested we may provide application notes.

Due to technical requirements our product may contain dangerous substances. For information on the types in question please contact the sales office, which is responsible for you.

Should you intend to use the Product in aviation applications, in health or live endangering or life support applications, please notify. Please note, that for any such applications we urgently recommend

- to perform joint Risk and Quality Assessments;
- 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.

If and to the extent necessary, please forward equivalent notices to your customers.

Changes of this product data sheet are reserved.

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**Sicherheitshinweise**

Bevor Sie mit der Installation und dem Betrieb der Baugruppe beginnen, lesen Sie bitte sorgfältig alle Sicherheitshinweise, Warnungen und beachten Sie die angebrachten Warnschilder. Vergewissern Sie sich, dass alle Warnschilder in leserlichem Zustand verbleiben und fehlende oder beschädigte Schilder ersetzt werden.

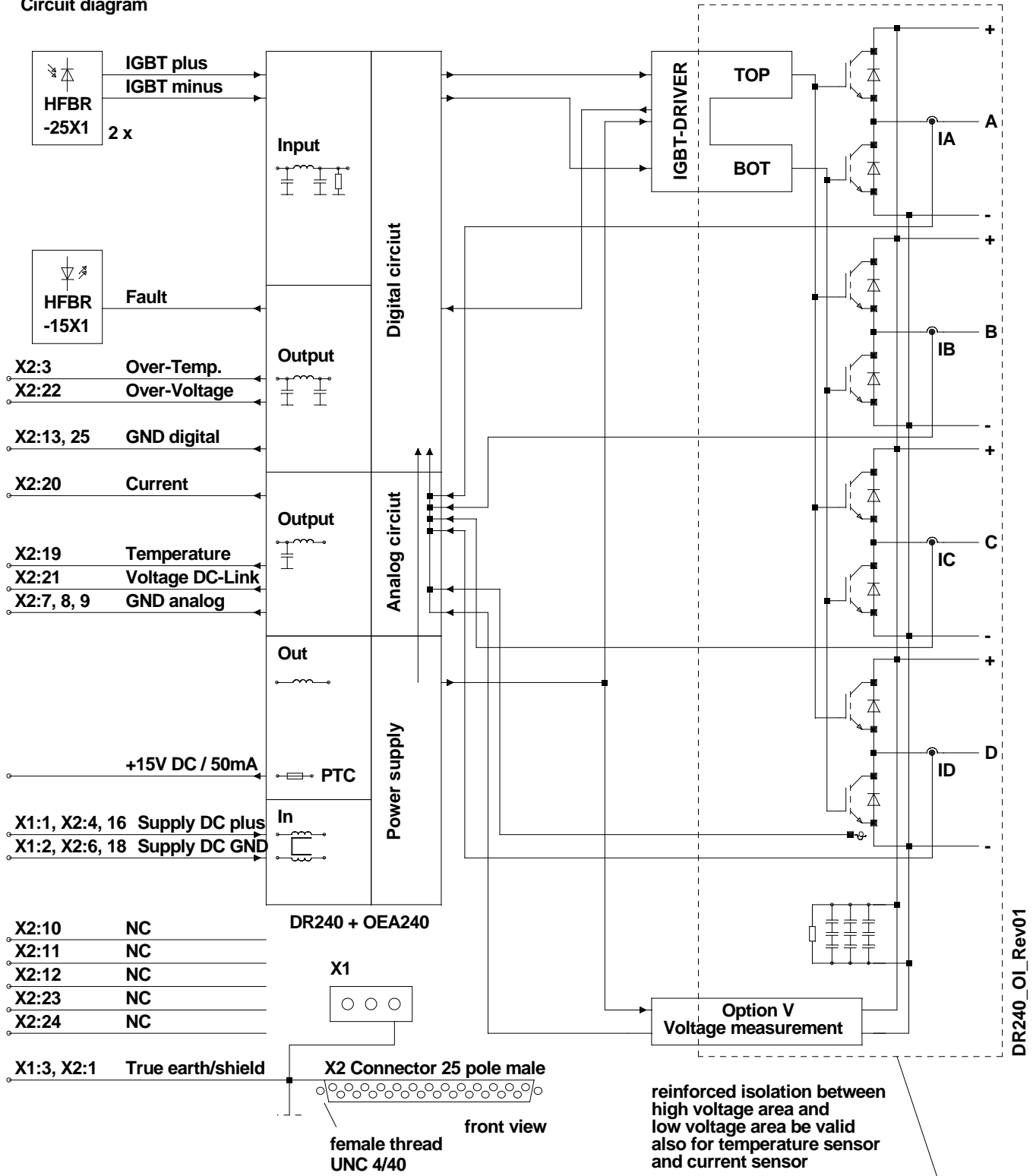
**Safety Instructions**

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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Circuit diagram



DR240\_OI\_Rev01

| Error Table DR240 + OEA240   | Error outputs (open collector) |             |                |
|------------------------------|--------------------------------|-------------|----------------|
|                              | Error optical                  | 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 respectively light off

For detailed technical information please refer the PrimeSTACK manual.