Technical Information

PrimeSTACK

# 2PS0400R12KS4-2W-V-IN

**Vorläufige Daten**
**preliminary data**

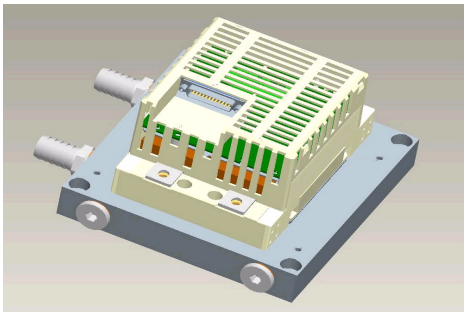
## Key data

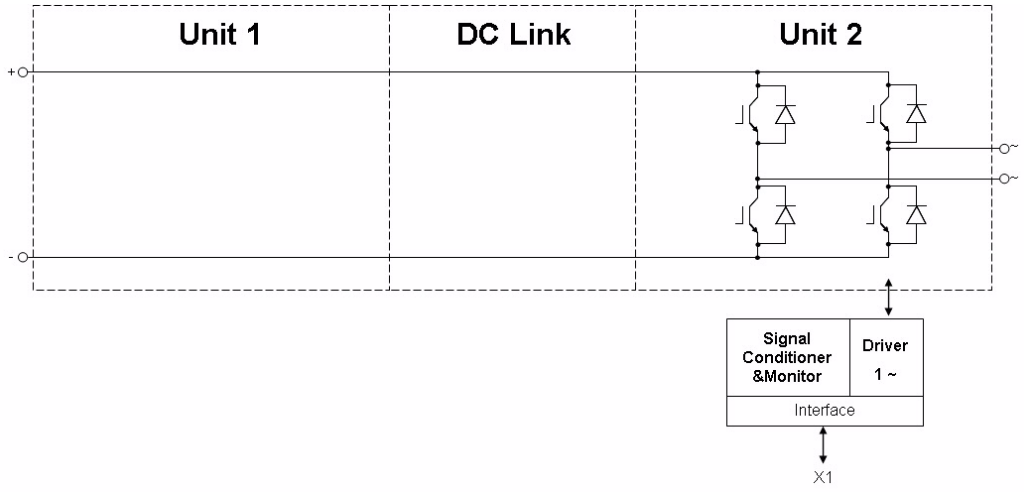
**1x 250A rms at 400V rms, water cooled**

## 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 |
| Market | | common industrial, drives, power supply |
| Implemented sensors | | voltage, temperature |
| Semicond. (Unit 1) | | none |
| DC Link | | none |
| Semicond. (Unit 2) | IGBT | 2x FF200R12KS4 |
| Driver signals IGBT | | electrical CMOS 0 .. 15V |
| Standards | | EN50178, UL94, prepared for UL508C |
| Sales - name | | 2PS4012S42W35603 |
| Internal ID | | 35603 |
| Mechanical drawing number | | 38000041 |
| Electrical drawing number | | 2PS-C2-V-IN |
| Dimensions (width x depth x height) | | 226 mm x 200 mm x 120 mm |
| Weight | | 5.3 kg |



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## Notes

**Heat sink with aluminum cooling channel. Composites of fluid: Water and 52 vol. % Antifrogen N.**
**Without current sensor and without external interlock delay time capacitor.**

## Electrical data

| DC Link | | | | min | typ | max | units |
|---|---|---|---|---|---|---|---|
| Voltage | | | $V_{DC}$ | | 650 | 850 | V |
| Overvoltage shutdown | within 5000µs | | | | 850 | | V |

| Unit 2 AC | | | | min | typ | max | units |
|---|---|---|---|---|---|---|---|
| Voltage | depending on controller | | $V_{Unit2}$ | | 400 | | $V_{RMS}$ |
| Continuous current | $V_{Unit2}$ = 400$V_{RMS}$, $V_{DC}$ = 650V, $T_{inlet}$ = 40°C, $T_J \leq$ 125°C, $f_{Unit2}$ = 50Hz, $f_{sw2}$ = 18000Hz, cos(phi) = 0,85 | | $I_{Unit2}$ | | | 250 | $A_{RMS}$ |
| Continuous current overload cap. | $T_{inlet}$ = 40°C, for overload capability 150% for 60s | | | | 168 | | $A_{RMS}$ |
| Short time current | $T_{inlet}$ = 40°C, 10s, every 180s, initial load = 205$A_{RMS}$ | | $I_{Unit2}$ | | | 256 | $A_{RMS}$ |
| DC current | no rotating field, $T_{inlet}$ = 40°C | | $I_{Unit2\ DC}$ | | | 117,0 | $A_{av}$ |
| Switching frequency | | | $f_{sw2}$ | | | 20000 | Hz |
| Power losses | $V_{Unit2}$ = 400V, $V_{DC}$ = 650V, $T_{inlet}$ = 40°C, $T_J \leq$ 125°C, $f_{Unit2}$ = 50Hz, $f_{sw2}$ = 18000Hz, cos(phi) = 0,85, $I_{Unit2}$ = 250$A_{RMS}$ | | $P_{loss2}$ | | 1690 | | 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 | $V_{aux}$ = 24$V_{av}$ | $P_{aux}$ | | 40 | | W |
| Driver and interface board | see separate technical information | | | DR240 | | |
| Driver core | | | | EiceDRIVER 2ED300C17-S | | |
| Digital input level | resistor to GND 10,0kΩ, 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 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 $T_{NTC}$ = 57°C correspond to $T_j$ = 125°C | $V_{T\ out}$ | 4,83 | 4,93 | 5,03 | V |
| Overtemperature shutdown | at $T_{NTC}$ = 59°C correspond to $T_j$ = 130°C | $V_{T\ out\ OT}$ | | 5,3 | | V |

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## Heat sink water cooled / Thermal data

| | | | min | typ | max | units |
|---|---|---|---|---|---|---|
| Water flow | according cooling water specification from infineon | $\Delta V/\Delta t_{Water}$ | 8 | | | dm³/min |
| Water pressure drop | | $\Delta p_{Water}$ | | 200 | | mbar |
| Water pressure | | | | | 8 | bar |
| Cooling water inlet temperature | | $T_{inlet}$ | -25 | | 40 | °C |
| Water connection | | | | 3/4 | | in |

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## IGBT data unit 2

| | | | min | typ | max | units |
|---|---|---|---|---|---|---|
| Type | assumed | | | | | |
| collector-emitter saturation voltage | $I_c$ = 200A; $V_{ge}$ = 15V; $T_{vj}$ = 125°C | $V_{CE\ sat}$ | | 3,85 | | V |
| parameter for linear model | $T_{vj}$ = 25°C | $V_{ce1}$ | | 1,62 | | V |
| parameter for linear model | $T_{vj}$ = 25°C | $r_{ce1}$ | | 7,9 | | mΩ |
| parameter for linear model | $T_{vj}$ = 125°C | $V_{ce2}$ | | 1,83 | | V |
| parameter for linear model | $T_{vj}$ = 125°C | $r_{ce2}$ | | 10,1 | | mΩ |
| turn-on / turn-off energy loss per pulse | $T_{vj}$ = 125°C | $E_2$ | | 19 / 15 | | mJ |
| thermal resistance, junction to case | per IGBT | $R_{thjc}$ | | 0,09 | | K/W |
| thermal resistance, case to heatsink | per IGBT | $R_{thch}$ | | 0,03 | | K/W |

## Diode data unit 2

| | | | min | typ | max | units |
|---|---|---|---|---|---|---|
| Type | assumed | | | | | |
| forward voltage | $I_F$ = 200A; $V_{ge}$ = 0V; $T_{vj}$ = 125°C | $V_F$ | | 1,7 | | V |
| parameter for linear model | $T_{vj}$ = 25°C | $V_{F1}$ | | 1,3 | | V |
| parameter for linear model | $T_{vj}$ = 25°C | $r_{F1}$ | | 3,5 | | mΩ |
| parameter for linear model | $T_{vj}$ = 125°C | $V_{F2}$ | | 0,9 | | V |
| parameter for linear model | $T_{vj}$ = 125°C | $r_{F2}$ | | 4 | | mΩ |
| reverse recovery energy | $T_{vj}$ = 25°C | $E_{rec1}$ | | 4,2 | | mJ |
| reverse recovery energy | $T_{vj}$ = 125°C | $E_{rec2}$ | | 11 | | mJ |
| thermal resistance, junction to case | per Diode | $R_{thjc}$ | | 0,18 | | K/W |
| thermal resistance, case to heatsink | per Diode | $R_{thch}$ | | 0,06 | | 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 air 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 | | 226 | 200 | 120 | mm |
| Weight with heat sink | approximation | | | 5,3 | | kg |
| Weight without heat sink | approximation | | | 1,9 | | kg |

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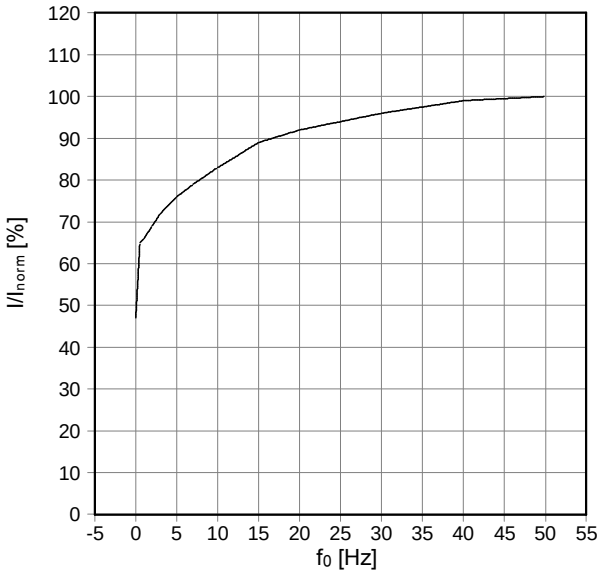
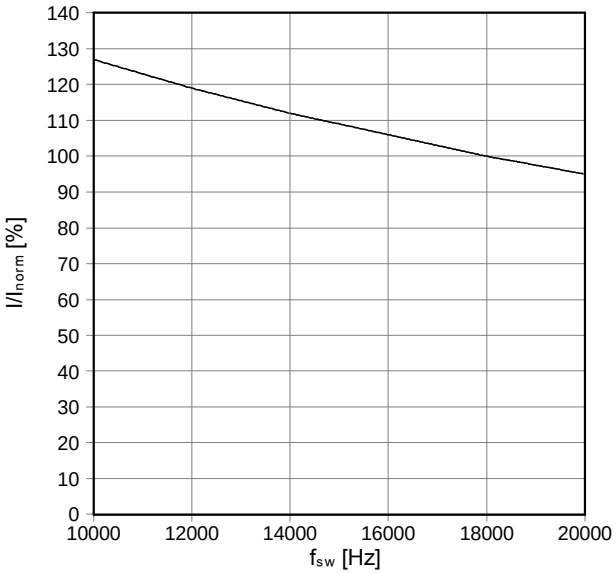
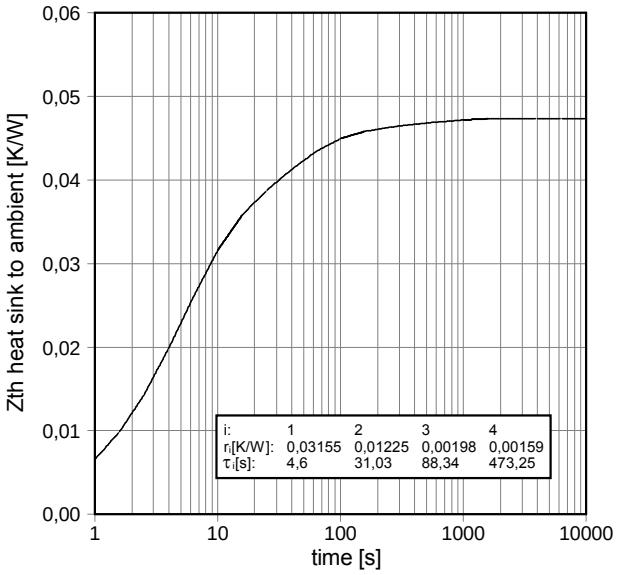
**fo - derating curve IGBT (motor)**
**cos(phi) = 0,85**
**$T_{cool\ medium}$ = 40°C**




**fsw - derating curve IGBT (motor)**
**cos(phi) = 0.85**
**$T_{cool\ medium}$ = 40**




**Transient thermal impedance per module**
**$T_{cool\ medium}$ = 40°C**

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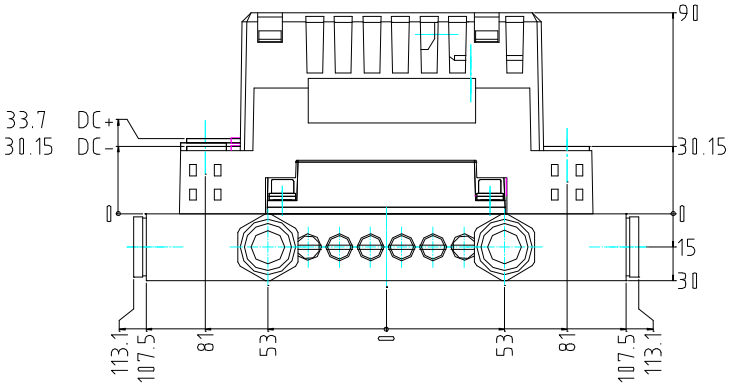
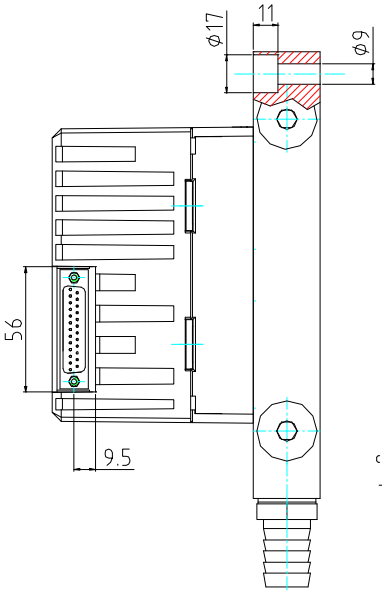
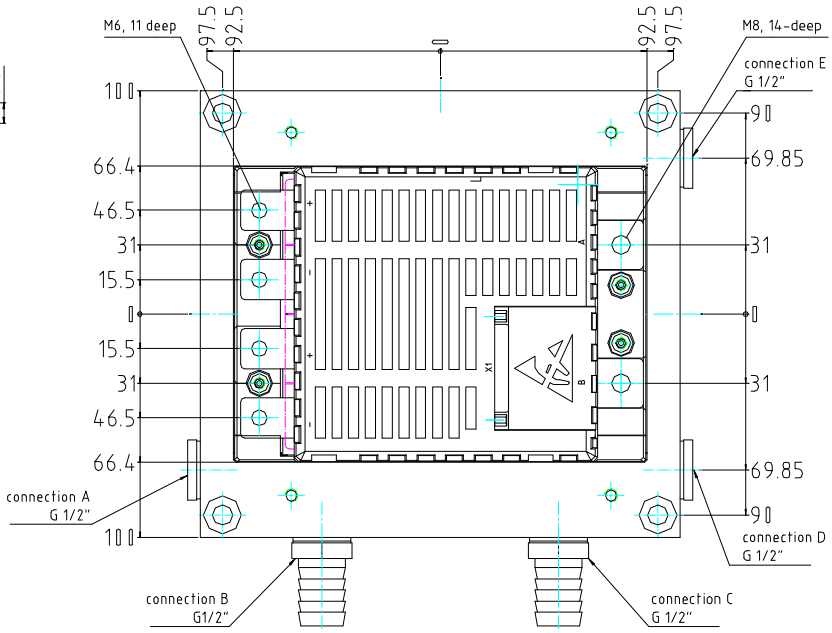
## Mechanical drawing

2PS...-2...
4PS...-2...
PrimeSTACK C2
38000041




X1:
2PS : SUB-D-Connector 25 pole, male
4PS : SUB-D-Connector 25 pole, male

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## Nutzungsbedingungen

**Die in diesem Produktdatenblatt enthaltenen Daten sind ausschließlich für technisch geschultes Fachpersonal bestimmt. Die Beurteilung der Eignung dieses Produktes für Ihre Anwendung sowie die Beurteilung der Vollständigkeit der bereitgestellten Produktdaten für diese Anwendung obliegt Ihnen bzw. Ihren technischen Abteilungen.**

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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.**

**Soweit erforderlich, bitten wir Sie, entsprechende Hinweise an Ihre Kunden zu geben.**

**Inhaltliche Änderungen dieses Produktdatenblatts bleiben vorbehalten.**

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**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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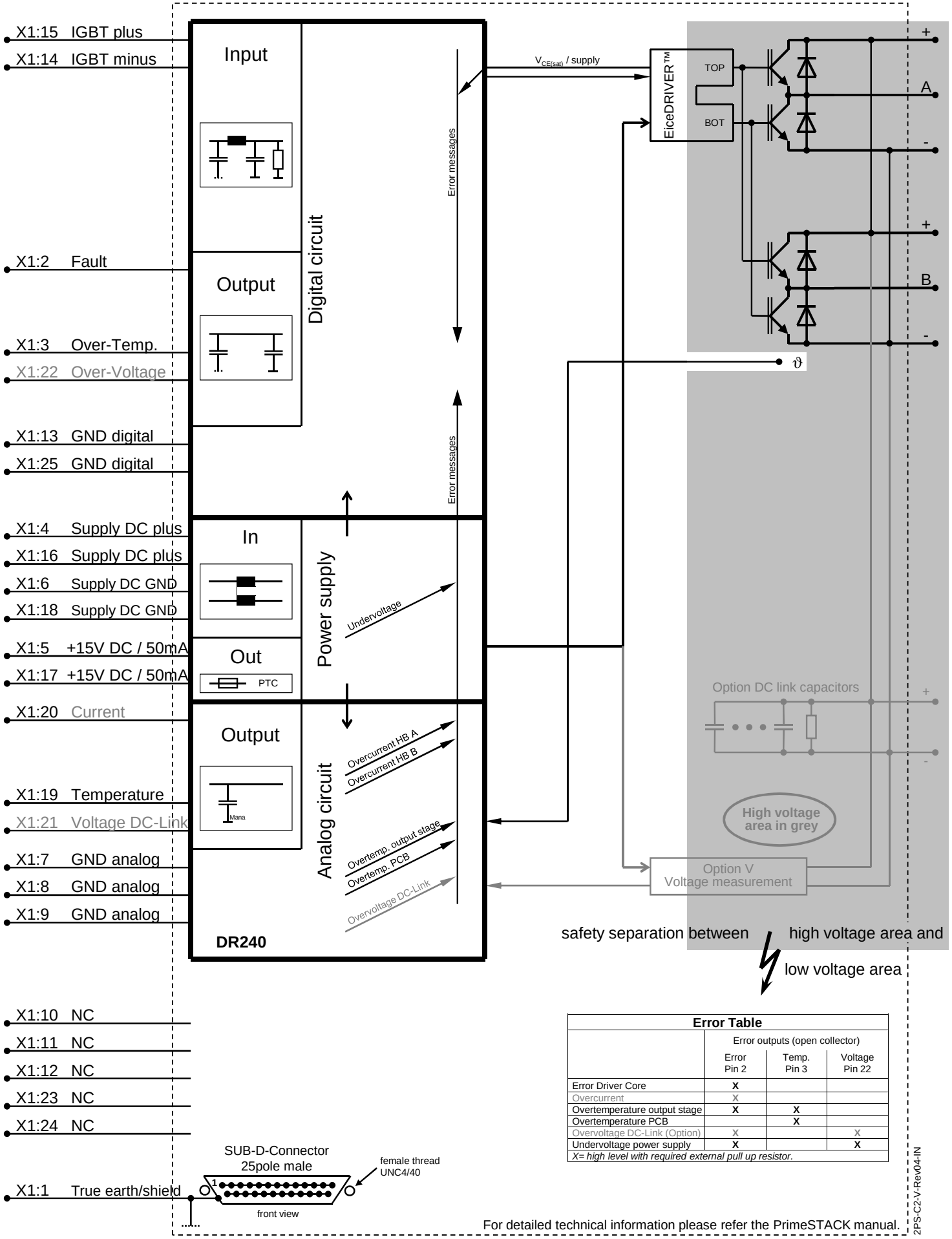


**Error Table**

| | 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.*

For detailed technical information please refer the PrimeSTACK manual.

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