Technical Information

PrimeSTACK™

# 6PS18012E4FG38393

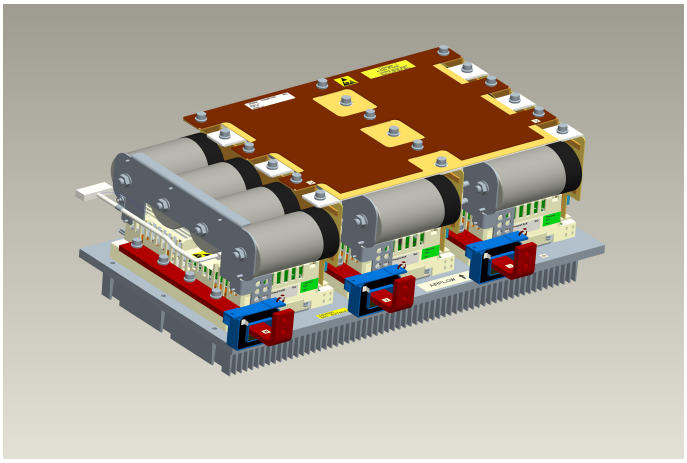
**Preliminary data**

## General information

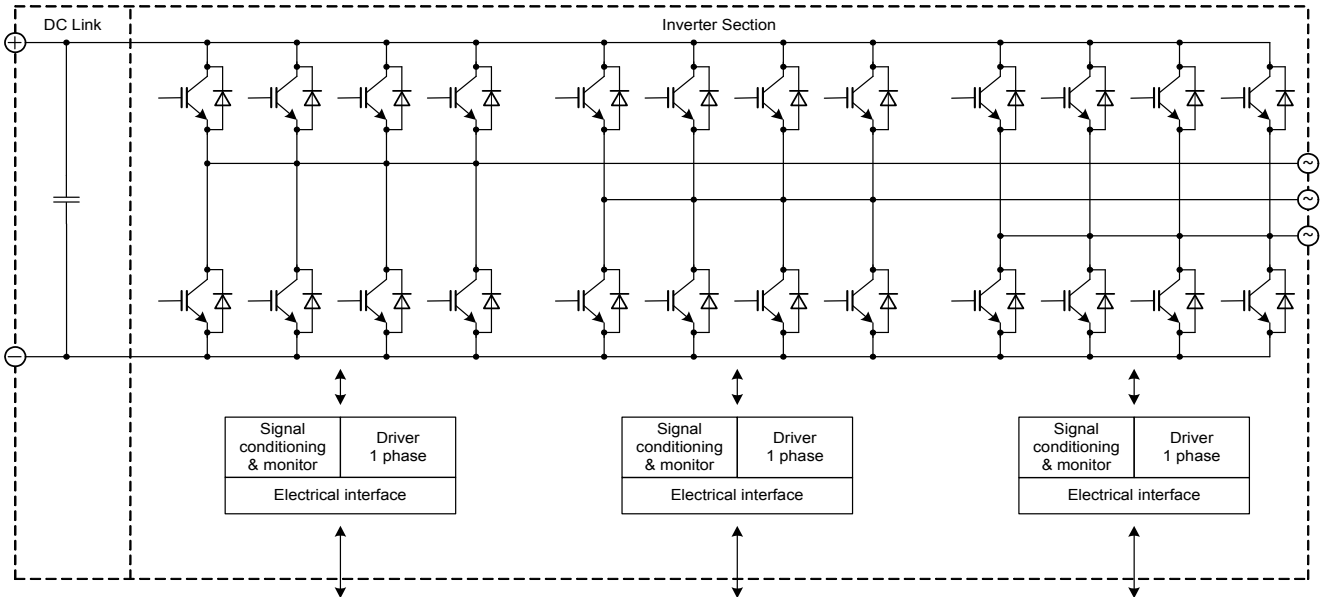
### IGBT Stack for typical voltages of up to 400 $V_{RMS}$
### Rated output current 800 $A_{RMS}$

· 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

| | | | DR240 | | | |
|---|---|---|---|---|---|---|
| | | | min. | typ. | max. | |
| Driver and interface board | ref. to separate Application Note | | | | | |
| 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 | $\Delta p$ | | 200 | | Pa |
| Air inlet temperature | | $T_{inlet}$ | -30 | | 60 | °C |

**Notes**
Conditions are standard Infineon characterization for heatsinks.

**Preliminary data**

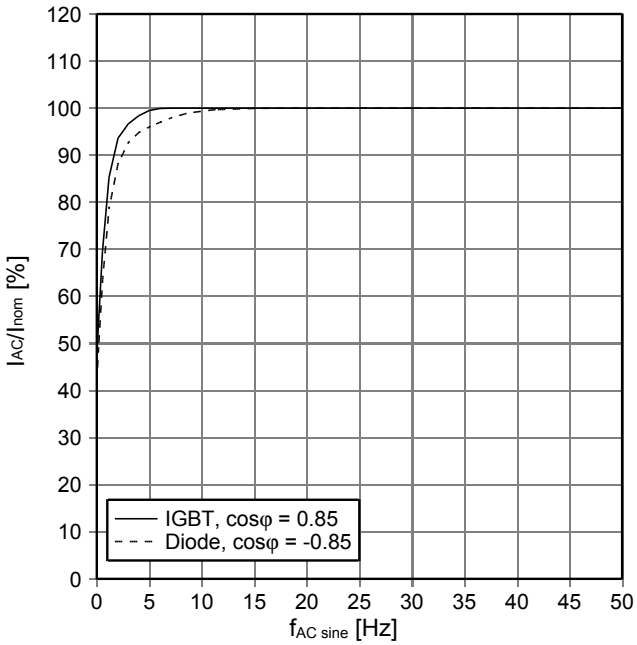
## Overview of optional components

| | 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 | | × | |

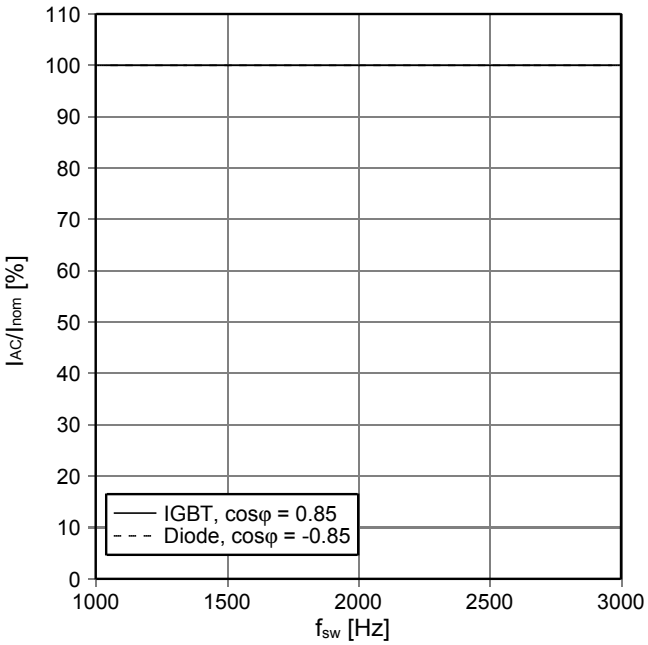
**Notes**
Datacable not specified for the STACK permitted temperature range.The included cables are standard computer cable.

**Preliminary data**

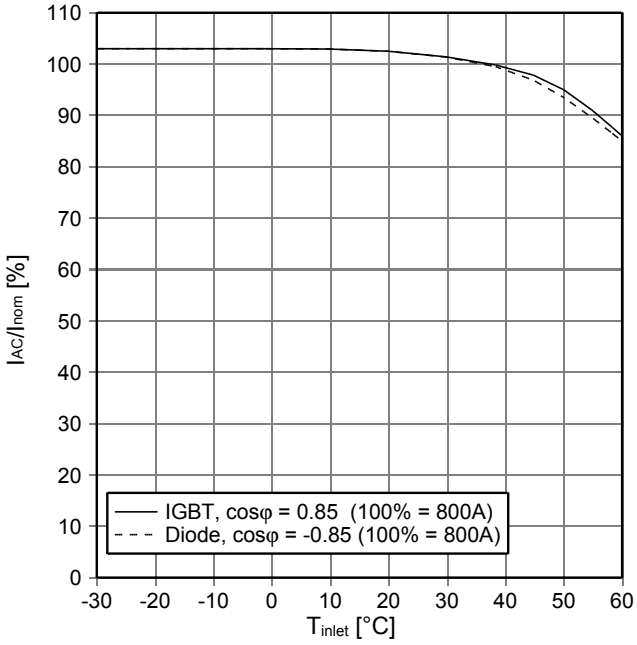
$f_{AC\ sine}$ - derating curve IGBT (motor), Diode (generator)
$V_{DC}$ = 650 V, $V_{AC}$ = 400 $V_{RMS}$, $f_{sw}$ = 3 kHz, cosφ = ±0.85,
$T_{inlet}$ = 40 °C and nom. cooling conditions



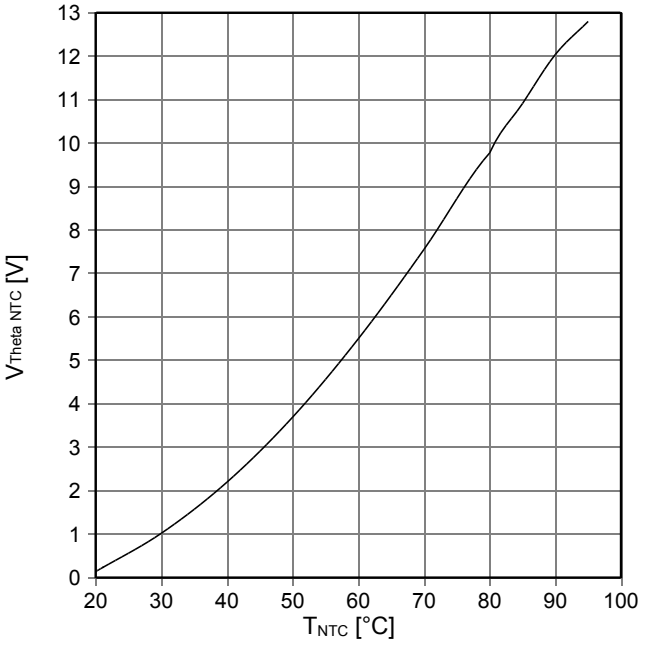

$f_{sw}$ - derating curve IGBT (motor), Diode (generator)
$V_{DC}$ = 650 V, $V_{AC}$ = 400 $V_{RMS}$, $f_{AC\ sine}$ = 50 Hz, cosφ = ±0.85,
$T_{inlet}$ = 40 °C and nom. cooling conditions




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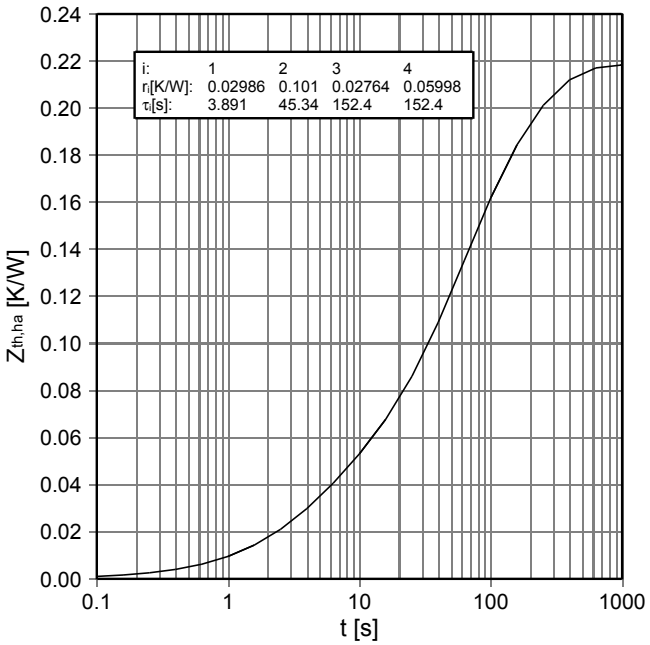
$Z_{th,ha}$ - thermal impedance heatsink to ambient per switch
nom. cooling conditions

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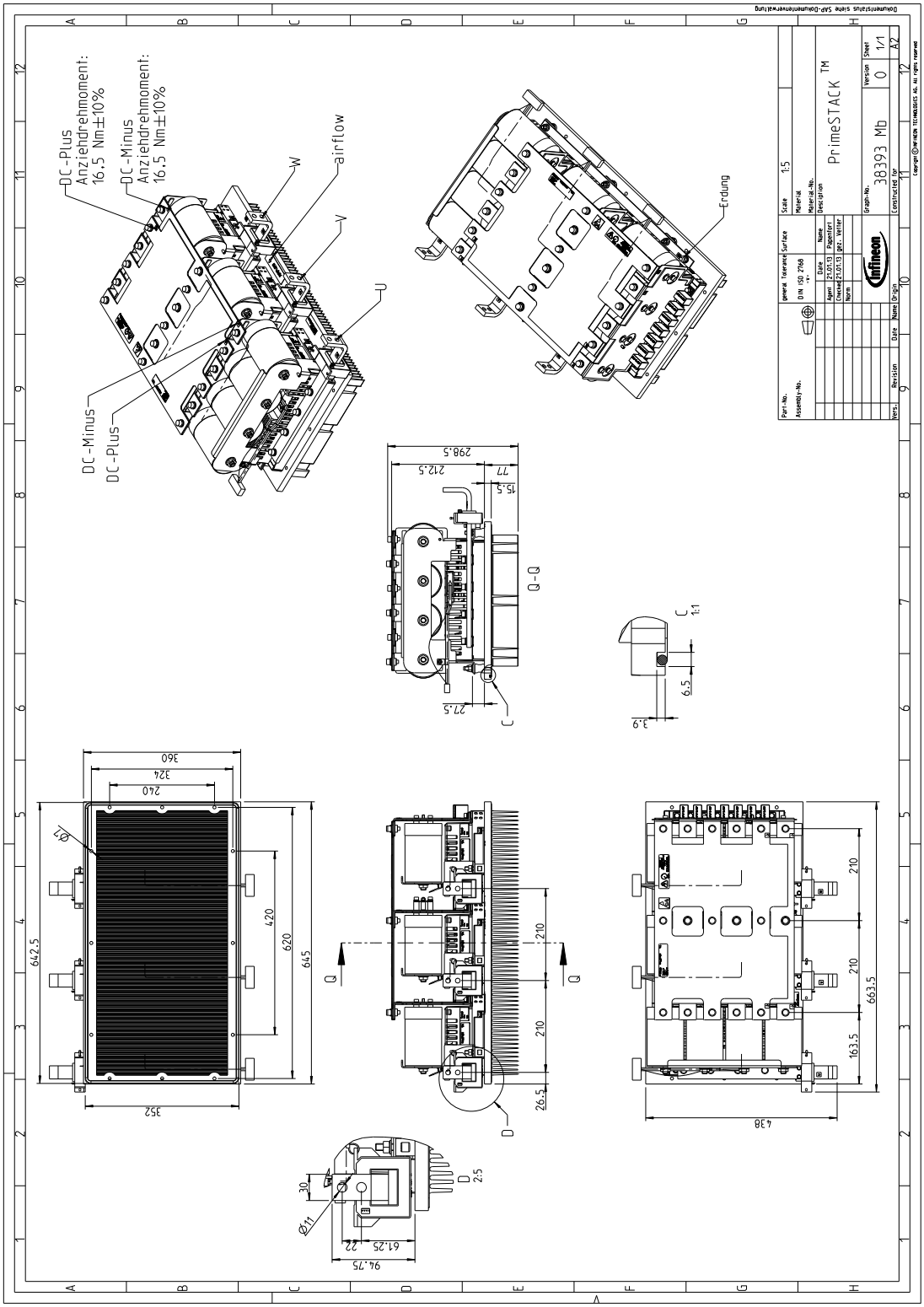
## Mechanical drawing

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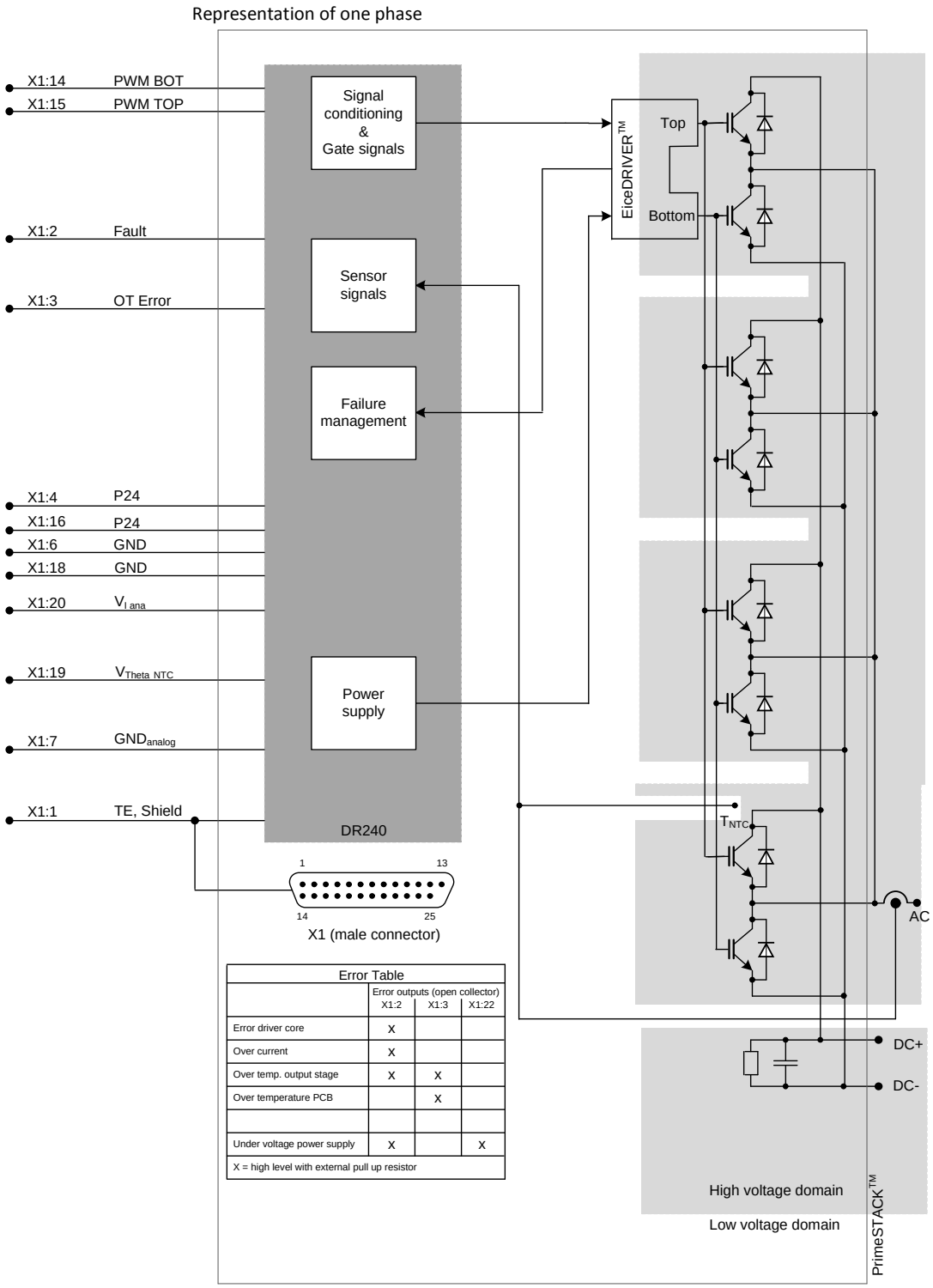
## Circuit diagram




| 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 | | | |

## Terms & Conditions of usage

The data contained in this product data sheet is exclusively intended for technically trained staff. You and your technical departments will have to evaluate the suitability of the product for the intended application and the completeness of the product data with respect to such application.

This product data sheet is describing the characteristics of this product for which a warranty is granted. Any such warranty is granted exclusively pursuant the terms and conditions of the supply agreement. There will be no guarantee of any kind for the product and its characteristics.

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, 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.

## 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.