

# Technical Information

ModSTACK™ 6MS2400R17KE3-3G-C20MVTIOIN



Vorläufige Daten  
preliminary data

## Key data

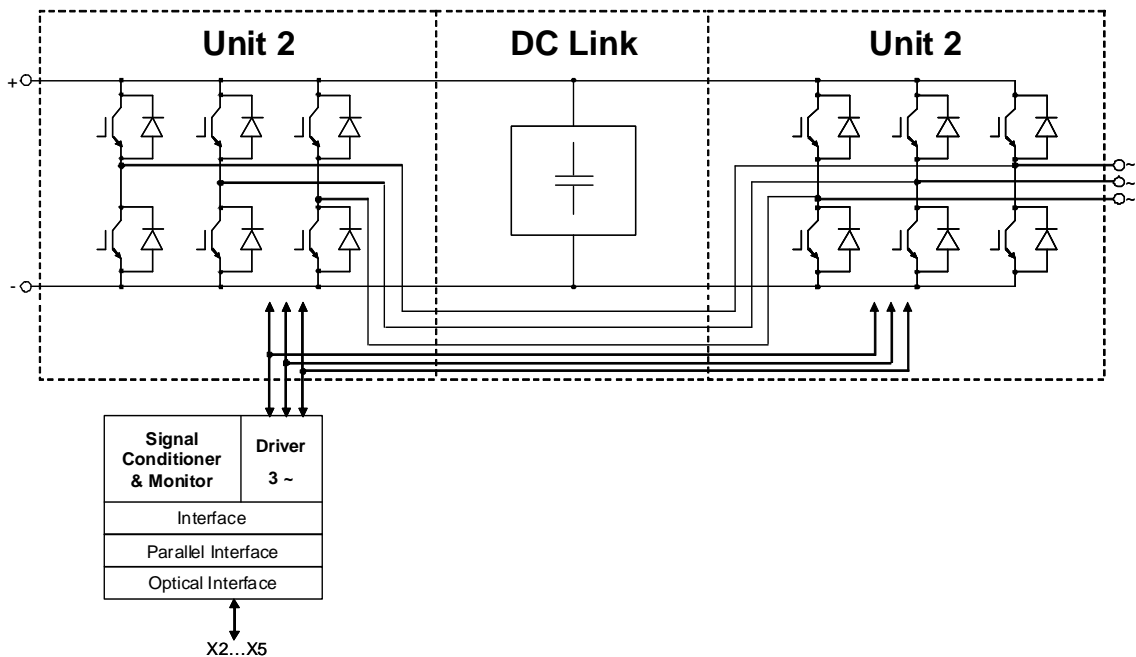
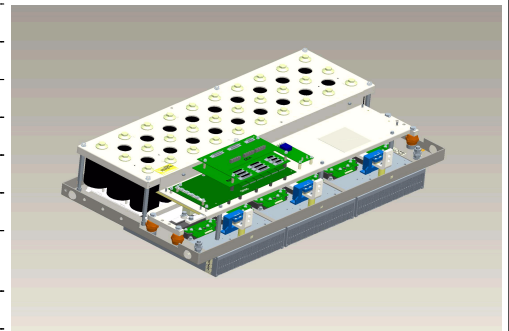
3x 800A rms at 400V rms, forced air (fan not implemented)

## General information

Stacks for various inverter application. Semiconductors, heat sinks, capacitors, 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                  |      | DC Link + B6I                           |
| Application / Modulation  |      | Inverter / Sine                         |
| Load type                 |      | resistive, inductive                    |
| Cooling                   |      | forced air (fan not implemented)        |
| Market                    |      | common industrial, drives, power supply |
| Implemented sensors       |      | current, voltage, temperature           |
| Semicond. (Unit 1)        |      | none                                    |
| DC Link                   |      | 18.8mF                                  |
| Semicond. (Unit 2)        | IGBT | 6x FF1200R17KE3_B2                      |
| Driver signals IGBT       |      | optical                                 |
| Standards                 |      | EN50178                                 |
| Sales - name              |      | 6MS24017E33G32859                       |
| Internal ID               |      | 32859                                   |
| Mechanical drawing number |      | 32859_MB                                |
| Electrical drawing number |      | ModSTACK B6_01_OEA101_Rev02             |



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### Electrical data

| DC Link              |              |          | min | typ  | max  | units |
|----------------------|--------------|----------|-----|------|------|-------|
| Voltage              |              | $V_{DC}$ |     | 932  | 1200 | V     |
| Overvoltage shutdown | within 150µs |          |     | 1250 |      | V     |

| Unit 2 AC                        |  |                      | min   | typ  | max   | units      |
|----------------------------------|--|----------------------|-------|------|-------|------------|
| Voltage                          | depending on controller  | $V_{Unit2}$          |       | 400  |       | $V_{RMS}$  |
| Continuous current               | $V_{Unit2} = 400V_{RMS}$ , $V_{DC} = 932V$ , $T_{inlet} = 25^{\circ}C$ ,<br>$T_J \leq 125^{\circ}C$ , $f_{Unit2} = 2Hz$ , $f_{sw2} = 2500Hz$ ,<br>$\cos(\phi) = 0,87$                      | $I_{Unit2}$          |       |      | 800   | $A_{RMS}$  |
| Continuous current overload cap. | $T_{inlet} = 25^{\circ}C$ , for overload capability 150% for 60s   |                      |       | 573  |       | $A_{RMS}$  |
| Short time current               | $T_{inlet} = 25^{\circ}C$ , 10s, every 180s, initial load = 717 $A_{RMS}$  | $I_{Unit2}$          |       |      | 896   | $A_{RMS}$  |
| DC current                       | no rotating field, $T_{inlet} = 25^{\circ}C$   | $I_{Unit2 DC}$       |       |      | 350,0 | $A_{av}$   |
| Overcurrent shutdown             | within 15µs  |                      |       | 3800 |       | $A_{peak}$ |
| Switching frequency              |  | $f_{sw2}$            |       |      | 2500  | Hz         |
| Power losses                     | $V_{Unit2} = 400V$ , $V_{DC} = 932V$ , $T_{inlet} = 25^{\circ}C$ ,<br>$T_J \leq 125^{\circ}C$ , $f_{Unit2} = 2Hz$ , $f_{sw2} = 2500Hz$ ,<br>$\cos(\phi) = 0,87$ , $I_{Unit2} = 800A_{RMS}$ | $P_{loss2}$          |       | 9980 |       | W          |
| Power factor                     |  | $\cos(\phi)_{Unit2}$ | -1,00 |      | 1,00  |            |

| General data                          |  |                | min         | typ | max | units      |
|---------------------------------------|--|----------------|-------------|-----|-----|------------|
| Power losses (PCB and capacitor)      |  | $P_{loss aux}$ |             |     | 220 | 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 |  | $V_{Line}$     |             | 690 |     | $V_{RMS}$  |
| Insulation test voltage               | according to EN50178, $f = 50Hz$ , $t = 60s$ | $V_{isol}$     |             | 2,5 |     | $kV_{RMS}$ |

| Important component data |  |          | min                    | typ   | max | units |
|--------------------------|--|----------|------------------------|-------|-----|-------|
| DC Link capacitor        |  | $C_{DC}$ |                        | 18,80 |     | mF    |
|                          |  | type     | Electrolytic Capacitor |       |     |       |

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### Controller interface data

|                                    |   |                  | min                       | typ  | max  | units    |
|------------------------------------|---|------------------|---------------------------|------|------|----------|
| Auxiliary voltage                  |   | $V_{aux}$        | 18                        | 24   | 30   | $V_{av}$ |
| Auxiliary power requirement        | $V_{aux} = 24V_{av}$  | $P_{aux}$        | 40                        |      |      | W        |
| Driver and interface board         | see separate technical information  |                  | TR110 / DR110             |      |      |          |
| Driver core                        |   |                  | EiceDRIVER<br>2ED300C17-S |      |      |          |
| Parallel interface board           | see separate technical information  |                  | SAD101                    |      |      |          |
| Digital input level                | resistor to GND 1,8k $\Omega$ , capacitor to GND 4nF, high = on, min 15mA   | $V_{in}$         | 0,0                       |      | 15,0 | V        |
| Digital output level               | open collector, low = ok, max 15mA  | $V_{out}$        | 0,0                       |      | 15,0 | V        |
| Analog current outputs Unit 2      | load max 1mA; at 800A   | $V_{ana\ out}$   | 3,99                      | 4,07 | 4,15 | V        |
| Analog DC Link voltage output      | load max 1mA; at 932V   | $V_{DC\ out}$    | 6,56                      | 6,69 | 6,82 | V        |
| Analog temperature output          | load max 1mA; at $T_{NTC} = 62^{\circ}C$ correspond to $T_j = 125^{\circ}C$ | $V_{T\ out}$     | 9,21                      | 9,40 | 9,59 | V        |
| Overtemperature shutdown           | at $T_{NTC} = 66^{\circ}C$ correspond to $T_j = 135^{\circ}C$               | $V_{T\ out\ OT}$ |                           | 10   |      | V        |
| Overvoltage shutdown reaction time | after overvoltage message by ModSTACK™ interface                            |                  |                           |      | 50   | $\mu s$  |
| Overcurrent shutdown reaction time | after overcurrent message by ModSTACK™ interface                            |                  |                           |      | 10   | $\mu s$  |
| Optical interface board            | see separate technical information  |                  | OEA101                    |      |      |          |
| Optical input power                |   |                  |                           | 12   |      | $\mu W$  |
| Optical output power               |   |                  |                           |      | 60   | $\mu W$  |

### Heat sink air cooled / Thermal data

|                               |   |                             | min  | typ | max | units       |
|-------------------------------|---|-----------------------------|------|-----|-----|-------------|
| Airflow                       | $T_{Air} = 20^{\circ}C$ , $P_{air} = 1013hPa$ , dry- and dust free, measured on side of heat sink. according to DIN 41882 | $\Delta V / \Delta t_{Air}$ | 3800 |     |     | $m^3/h$     |
| Air pressure drop             |   | $\Delta p_{Air}$            |      | 520 |     | Pa          |
| Cooling air inlet temperature | heat sink temperature $> -25^{\circ}C$  | $T_{inlet}$                 | -25  |     | 25  | $^{\circ}C$ |

### IGBT data unit 2

|  |  |               | min | typ       | max | units      |
|--|--|---------------|-----|-----------|-----|------------|
| Type                                     | assumed  |               |     |           |     |            |
| collector-emitter saturation voltage     | $I_c = 1200A$ ; $V_{ge} = 15V$ ; $T_{vj} = 125^{\circ}C$ | $V_{CE\ sat}$ |     | 2,4       |     | V          |
| parameter for linear model               | $T_{vj} = 25^{\circ}C$                                   | $V_{ce1}$     |     | 1,1       |     | V          |
| parameter for linear model               | $T_{vj} = 125^{\circ}C$                                  | $r_{ce1}$     |     | 0,75      |     | m $\Omega$ |
| parameter for linear model               | $T_{vj} = 25^{\circ}C$                                   | $V_{ce2}$     |     | 1         |     | V          |
| parameter for linear model               | $T_{vj} = 125^{\circ}C$                                  | $r_{ce2}$     |     | 1,167     |     | m $\Omega$ |
| turn-on / turn-off energy loss per pulse | $T_{vj} = 25^{\circ}C$                                   | $E_1$         |     | 240 / 305 |     | mJ         |
| turn-on / turn-off energy loss per pulse | $T_{vj} = 125^{\circ}C$                                  | $E_2$         |     | 350 / 445 |     | mJ         |
| thermal resistance, junction to case     | per IGBT   | $R_{thjc}$    |     | 0,019     |     | K/W        |
| thermal resistance, case to heatsink     | per IGBT   | $R_{thch}$    |     | 0,023     |     | K/W        |

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### Diode data unit 2

|                                      |  |            | min | typ   | max | units |
|--------------------------------------|--|------------|-----|-------|-----|-------|
| Type                                 | assumed  |            |     |       |     |       |
| forward voltage                      | $I_F = 1200A; V_{ge} = 0V; T_{vj} = 125^\circ C$ | $V_F$      |     | 1,9   |     | V     |
| parameter for linear model           | $T_{vj} = 25^\circ C$                            | $V_{F1}$   |     | 1,15  |     | V     |
| parameter for linear model           | $T_{vj} = 25^\circ C$                            | $r_{F1}$   |     | 0,542 |     | mΩ    |
| parameter for linear model           | $T_{vj} = 125^\circ C$                           | $V_{F2}$   |     | 1     |     | V     |
| parameter for linear model           | $T_{vj} = 125^\circ C$                           | $r_{F2}$   |     | 0,75  |     | mΩ    |
| reverse recovery energy              | $T_{vj} = 25^\circ C$                            | $E_{rec1}$ |     | 190   |     | mJ    |
| reverse recovery energy              | $T_{vj} = 125^\circ C$                           | $E_{rec2}$ |     | 340   |     | mJ    |
| thermal resistance, junction to case | per Diode  | $R_{thjc}$ |     | 0,042 |     | K/W   |
| thermal resistance, case to heatsink | per Diode  | $R_{thch}$ |     | 0,052 |     | K/W   |

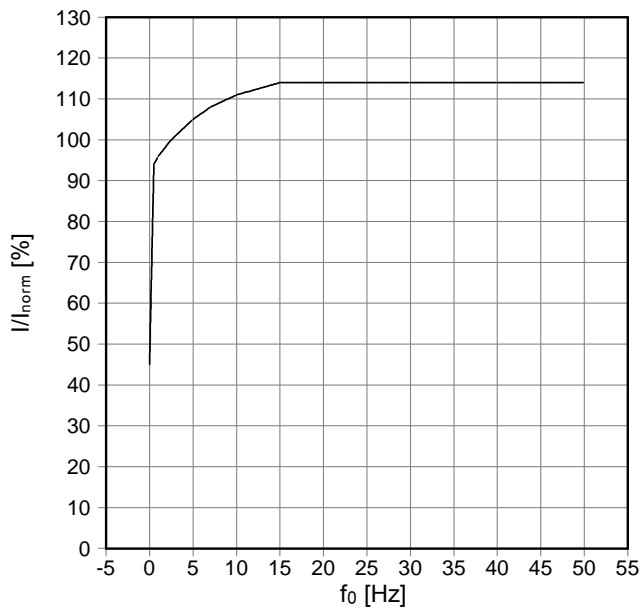
### Environmental conditions

|  |   |               | min  | typ   | max  | units            |
|--|---|---------------|------|-------|------|------------------|
| Storage temperature                      |   | $T_{stor}$    | -40  |       | 65   | °C               |
| Ambient temperature                      | minimum 0°C for optional optical interface      | $T_{amb}$     | -25  |       | 55   | °C               |
| Operating temperature                    | see chapter Heat sink air cooled / Thermal data |               |      |       |      |                  |
| Cooling air velocity (PCB and capacitor) |   | $V_{Air PCB}$ | 2,0  |       |      | m/s              |
| Air pressure                             | standard atmosphere                             | $p_{Air}$     | 900  |       | 1100 | hPa              |
| Humidity                                 | no condensation                                 | Rel. F        | 0    |       | 95   | %                |
| Installation height                      |   |               | 0    |       | 1000 | m                |
| Vibration                                | according to EN60068                            |               |      |       | 10   | m/s <sup>2</sup> |
| Continuous vibration                     | according to EN60068                            |               |      |       | 20   | m/s <sup>2</sup> |
| Shock                                    | according to EN60068                            |               |      |       | 100  | m/s <sup>2</sup> |
| Protection degree                        |   |               |      | IP00  |      |                  |
| Pollution degree                         |   |               |      | 2     |      |                  |
| Dimensions                               | width × depth × height                          |               | 1090 | 596   | 330  | mm               |
| Weight with heat sink                    | approximation                                   |               |      | 110,0 |      | kg               |

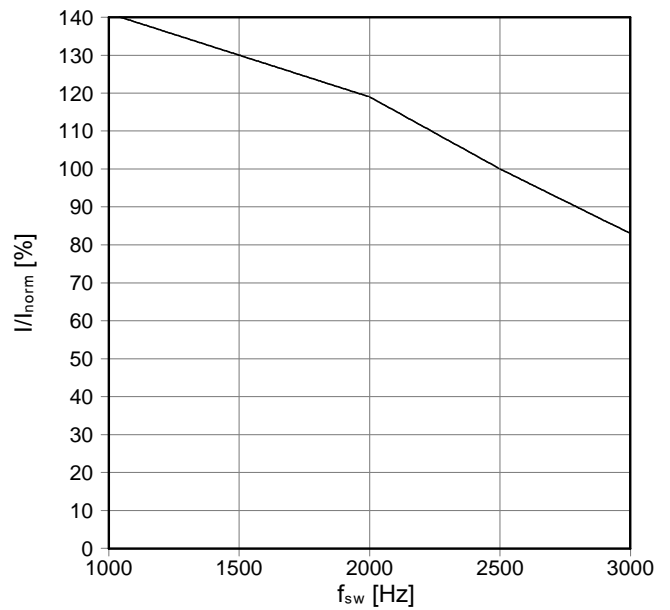
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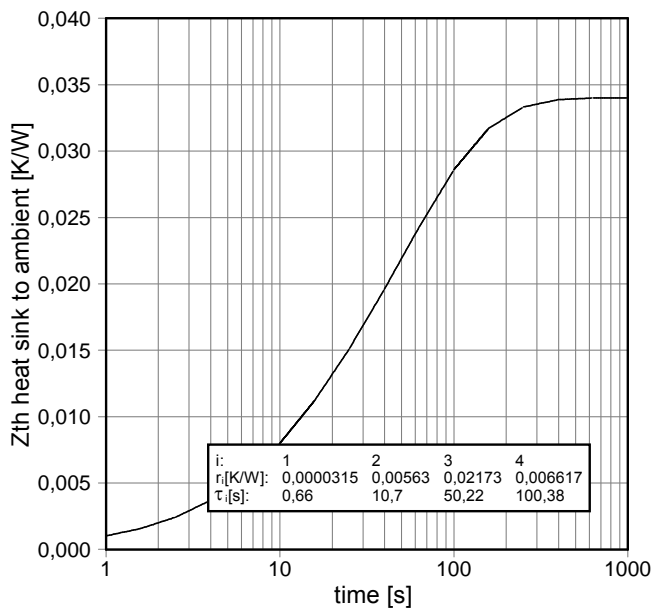
fo - derating curve IGBT (motor)  
cos(phi) = 0,87  
T<sub>cool medium</sub> = 25°C



fsw - derating curve IGBT (motor)  
cos(phi) = 0,87  
T<sub>cool medium</sub> = 25°C



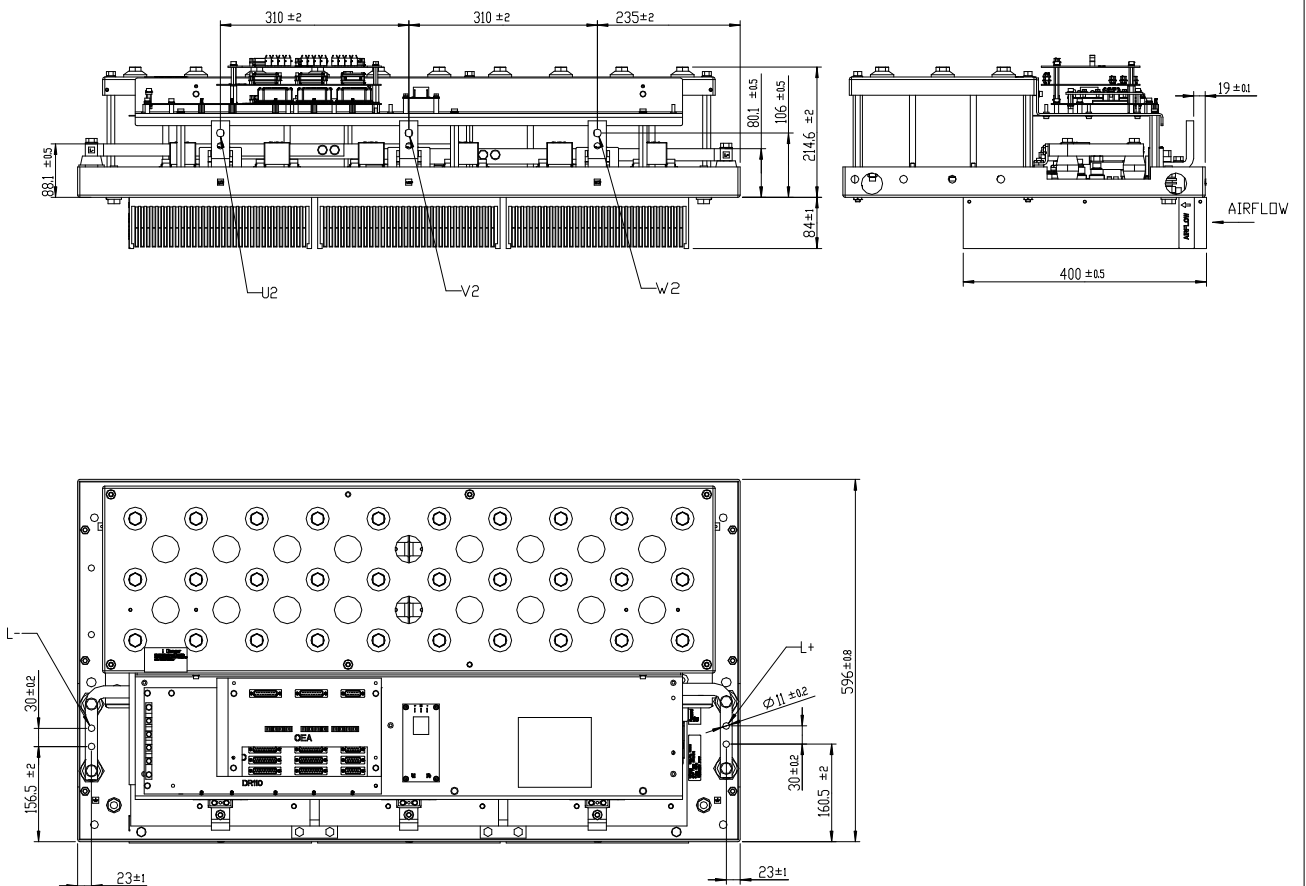
Transient thermal impedance per module  
T<sub>cool medium</sub> = 25°C



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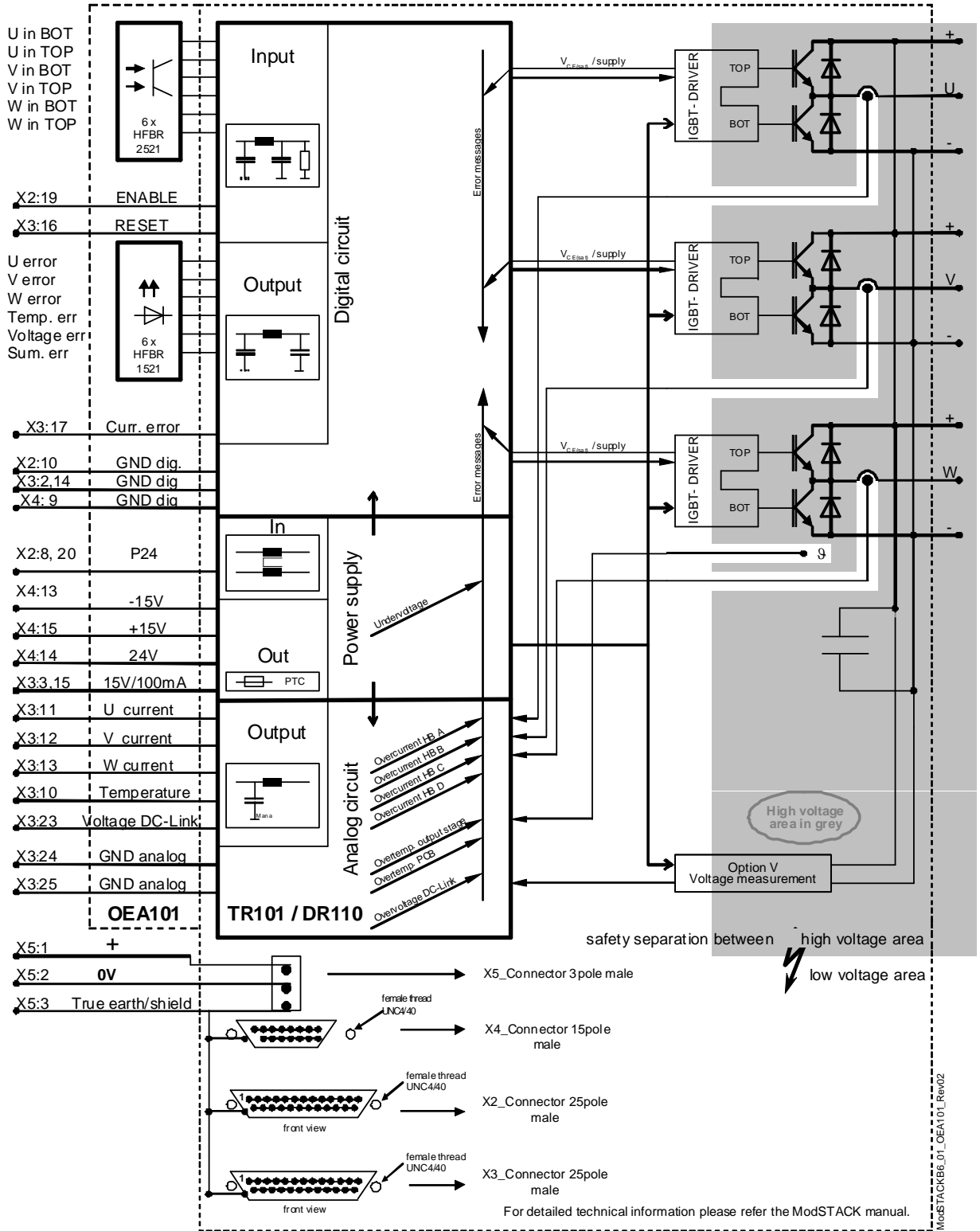
Mechanical drawing

6MS...-3G-Cx...  
ModSTACK  
32859 MB



|                             |                                 |
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Circuit diagram



ModSTACK66\_01\_OEA101\_Rev02

|                             |                                 |
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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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