

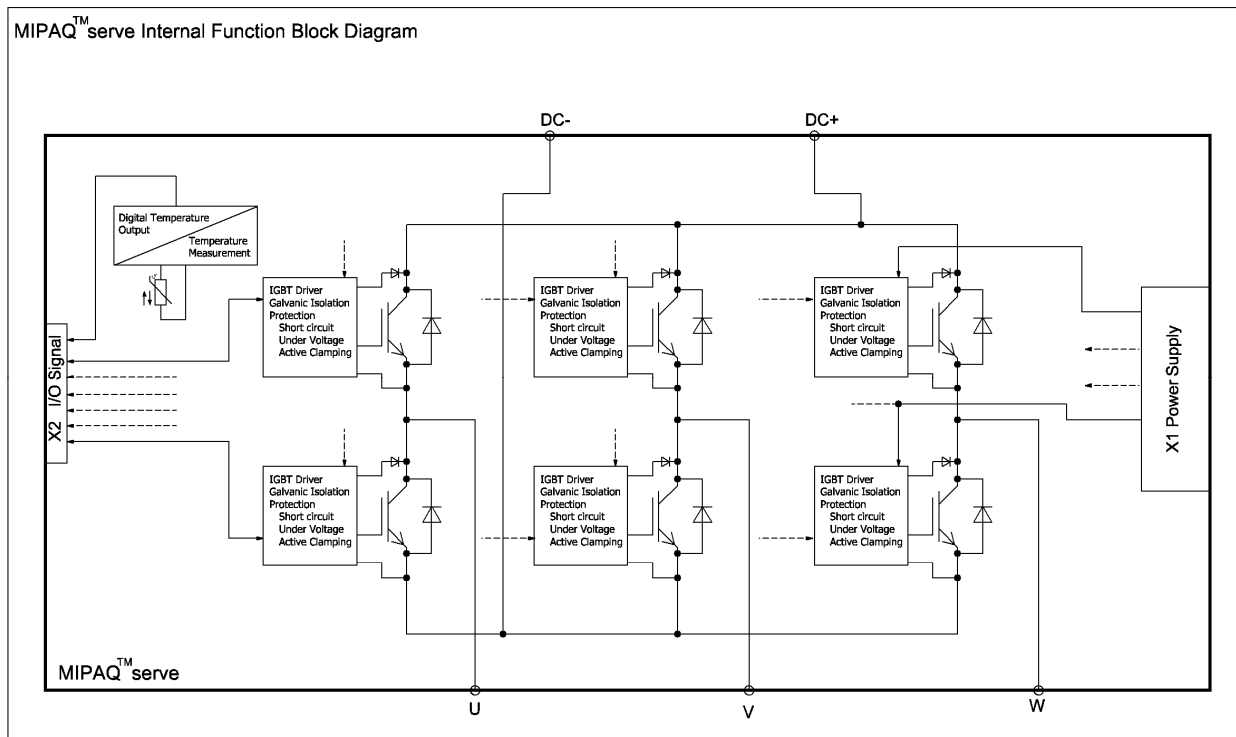
#### Key data

Power module using IGBT4 technology in sixpack configuration.  
Isolated IGBT driver, protection and temperature sensor included.

|                          |  |
|--------------------------|--|
| Topology                 | B6I  |
| Rated semiconductor data | 1200V, 100A  |
| Load type                | Inductive, resistive   |
| Target application       | Industrial drives, UPS   |
| Sensors and protection   | temperature, short circuit, signal transmission, UVLO for all power supplies |
| Interface IGBT           | Electrical, 5V-CMOS, Galvanic Isolation according to IEC61800-5-1            |
| Standards                | IEC61800-5-1, UL94, RoHS   |



MIPAQ™ serve Internal Function Block Diagram



Note: *tbd = to be defined*  
If not otherwise specified, use typical values for  $U_{GSNx}$  and  $U_{GSPx}$

|                               |                                 |
|-------------------------------|---------------------------------|
| prepared by: Marco Bohlländer | date of publication: 08.06.2010 |
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### Electrical data – power part

|   |  |                     | min | typ          | max  |    |
|---|--|---------------------|-----|--------------|------|----|
| DC link voltage                           | $L_s = \text{tbd}$<br>$-40 < T_{vj} < 150^\circ\text{C}$<br>$0 < I_{C, \text{turn off}} < 2 \cdot I_{C, \text{max}}$     | $U_{DC}$            |     |              | 900  | V  |
| DC continuous current                     | $T_{\text{case}} = 100^\circ\text{C}$<br>$T_{vj} = T_{vj, \text{op max}}$  | $I_{C, \text{nom}}$ |     |              | 100  | A  |
| IGBT collector emitter voltage            | $T_{vj} = 25^\circ\text{C}$  | $U_{CES}$           |     |              | 1200 | V  |
| IGBT collector emitter saturation voltage | $T_{vj} = 25^\circ\text{C} @ I_C = 100\text{A}$<br>$T_{vj} = 150^\circ\text{C} @ I_C = 100\text{A}$                      | $U_{CEsat}$         |     | 1,75<br>2,10 | 2,15 | V  |
| Diode repetitive peak reverse voltage     | $T_{vj} = 25^\circ\text{C}$  | $U_{RRM}$           |     |              | 1200 | V  |
| Diode forward voltage                     | $T_{vj} = 25^\circ\text{C} @ I_C = 100\text{A}$<br>$T_{vj} = 150^\circ\text{C} @ I_C = 100\text{A}$                      | $U_F$               |     | 1,70<br>1,65 | 2,15 | V  |
| Operating junction temperature            | IGBT and Diode   | $T_{vj, \text{op}}$ |     |              | 150  | °C |
| Turn on energy loss per puls              | IGBT, $U_{DC} = 600\text{V}$ , $I_C = 100\text{A}$<br>$T_{vj} = 150^\circ\text{C}$ , $di/dt = 1,8\text{kA}/\mu\text{s}$  | $E_{\text{on}}$     |     | 10,2         |      | mJ |
| Turn off energy loss per puls             | IGBT, $U_{DC} = 600\text{V}$ , $I_C = 100\text{A}$<br>$T_{vj} = 150^\circ\text{C}$ , $du/dt = 3,6\text{kV}/\mu\text{s}$  | $E_{\text{off}}$    |     | 8,0          |      | mJ |
| Reverse recovery energy                   | Diode, $U_{DC} = 600\text{V}$ , $I_F = 100\text{A}$<br>$T_{vj} = 150^\circ\text{C}$ , $di/dt = 1,8\text{kA}/\mu\text{s}$ | $E_{\text{rec}}$    |     | 8            |      | mJ |

### Electrical data – control part

| Auxiliary power supply: IGBT Gate (on X1)   |  |                   | min  | typ | max  |    |
|---|--|-------------------|------|-----|------|----|
| IGBT driver positive supply                 | Voltage  | $U_{GS P1,2,3,4}$ | 13   | 16  | 18   | V  |
|   | Current at $f_{\text{sw}} = 20\text{kHz}$ ,<br>$U_{GSP1,2,3} = +15\text{V}$ ,<br>$T_{vj} = 25^\circ\text{C}$ | $I_{GS P1,2,3}$   |      |     | 14   | mA |
|   |  | $I_{GS P4}$       |      |     | 26   | mA |
| IGBT driver negative supply                 | Voltage  | $U_{GS N1,2,3,4}$ | -10  | -8  | -5   | V  |
|   | Current @ $f_{\text{sw}} = 20\text{kHz}$ ,<br>$U_{GSN} = -8\text{V}$ ,<br>$T_{vj} = 25^\circ\text{C}$        | $ I_{GS N1,2,3} $ |      |     | 13   | mA |
|   |  | $ I_{GS N4} $     |      |     | 18   | mA |
| IGBT driver undervoltage lockout threshold  | For each channel   | $U_{GS\_UVLO}$    | 10,4 |     | 12,6 | V  |
| IGBT driver undervoltage lockout hysteresis | For each channel   | $U_{GS\_UVLO\_H}$ | 0,7  |     |      | V  |

| Auxiliary power supply: Logic (on X2)              |   |                   | min | typ | max |    |
|--|---|-------------------|-----|-----|-----|----|
| Logic power supply                                 | Voltage   | $U_{LS}$          | 4,5 | 5   | 5,5 | V  |
|  | Current @ $f_{\text{sw}} = 20\text{kHz}$ ,<br>$U_{LS} = +5\text{V}$ | $I_{LS}$          |     |     | 55  | mA |
| Logic power supply undervoltage lockout threshold  |   | $U_{LS\_UVLO}$    | 3,5 |     | 4,3 | V  |
| Logic power supply undervoltage lockout hysteresis |   | $U_{LS\_UVLO\_H}$ | 0,3 |     |     | V  |

# Technical Information

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IFS100V12PT4



preliminary data

| Driver logic input/output, protection and sensors (on X2) |   |   | min  | typ | max      |         |
|---|---|---|------|-----|----------|---------|
| Digital input<br>(IGBT turn-on/off and RESET)             | High level voltage  | $U_{IN\_H}$   | 3,5  |     | 5,5      | V       |
|   | Low level voltage   | $U_{IN\_L}$   | -0,3 |     | 1,5      | V       |
|   | Input current per input   | $I_{IN}$  |      | 100 | 400      | $\mu$ A |
|   | Minimum pulse width on /RST for ENABLE/SHUTDOWN                                     | $t_{min\_RST1}$   |      | 40  |          | ns      |
|   | Minimum pulse width on /RST for resetting /FLT <sub>BOT</sub> , /FLT <sub>TOP</sub> | $t_{min\_RST2}$   |      | 500 |          | ns      |
| Digital output level                                      | Open drain, internally pulled up, max. tbd mA                                       | $U_{RDYT}$ ,<br>$U_{RDYB}$ ,<br>$U_{FLTT}$ ,<br>$U_{FLTB}$ ,<br>$U_{TMP}$ | 0    |     | $U_{LS}$ | V       |
| Digital temperature output                                | Frequency depends on measured temperature   | $f_{TMP}$   | 0,2  |     | 18       | kHz     |
|   | Pulses counted in 100ms   | N   | 20   |     | 1800     |         |
| Minimum pulse width                                       | IGBT-turn-on signal (=high) on each channel @ $U_{DC\_max}$                         | $t_{PW\_min}$   | 1    |     |          | $\mu$ s |
| Minimum dead time   | Between TOP IGBT and BOT IGBT   | $t_{dead}$  | 1    |     |          | $\mu$ s |
| Switching frequency                                       | Each driver channel   | $f_{sw}$  | 0    |     | 20       | kHz     |
| Short circuit protection                                  | Desaturation threshold. Shutdown when exceeded. Each channel                        | $U_{CE\_desat}$   | 8,5  | 9   | 9,5      | V       |
|   | Reaction time. Shutdown after short circuit was detected. Each channel              | $t_{desat}$   |      |     | 8        | $\mu$ s |
| Propagation delay   | Each channel  | $t_{prop\_delay}$   |      | 320 |          | ns      |
| Propagation delay deviation                               | Between two channels  | $t_{prop\_delay\_dev}$  |      |     | 15       | ns      |

## Isolation Management

|   |   |            | min | typ | max |            |
|---|---|------------|-----|-----|-----|------------|
| Isolation management designed for   |   | $U_{Line}$ |     | 480 |     | $V_{RMS}$  |
| Isolation test voltage  | Logic to power side<br>$f=50\text{Hz}$ , $t=1\text{s}$        | $V_{isol}$ |     | 2,5 |     | $kV_{RMS}$ |
|   | Life parts to base plate<br>$F=50\text{Hz}$ , $1=1\text{min}$ | $V_{isol}$ |     | 2,5 |     | $kV_{RMS}$ |
| Comparative tracking index  |   | CTI        |     | 225 |     |            |
| Clearance distance, including internal clearance<br>DIN7984 with flat head,<br>SKS-5 spring washer,<br>DIN125 flat washer,    | terminal – terminal<br>(AC-DC, AC-AC, DC-DC)                  | $l_{cl1}$  |     | 11  |     | mm         |
|   | power side – heat sink  | $l_{cl2}$  |     | 11  |     | mm         |
|   | Logic side - heatsink   | $l_{cl3}$  |     | 4,5 |     | mm         |
|   | Logic side - power side                                       | $l_{cl4}$  |     | 8   |     | mm         |
| Creepage distance<br>Under usage of screws according<br>DIN7984 with flat head,<br>SKS-5 spring washer,<br>DIN125 flat washer | terminal – terminal<br>(AC-DC, AC-AC, DC-DC)                  | $l_{cr1}$  |     | 25  |     | mm         |
|   | terminal – heat sink  | $l_{cr2}$  |     | 20  |     | mm         |
|   | Logic side - heatsink   | $l_{cr3}$  |     | 8,5 |     | mm         |
|   | Logic side - power side                                       | $l_{cr4}$  |     | 8   |     | mm         |

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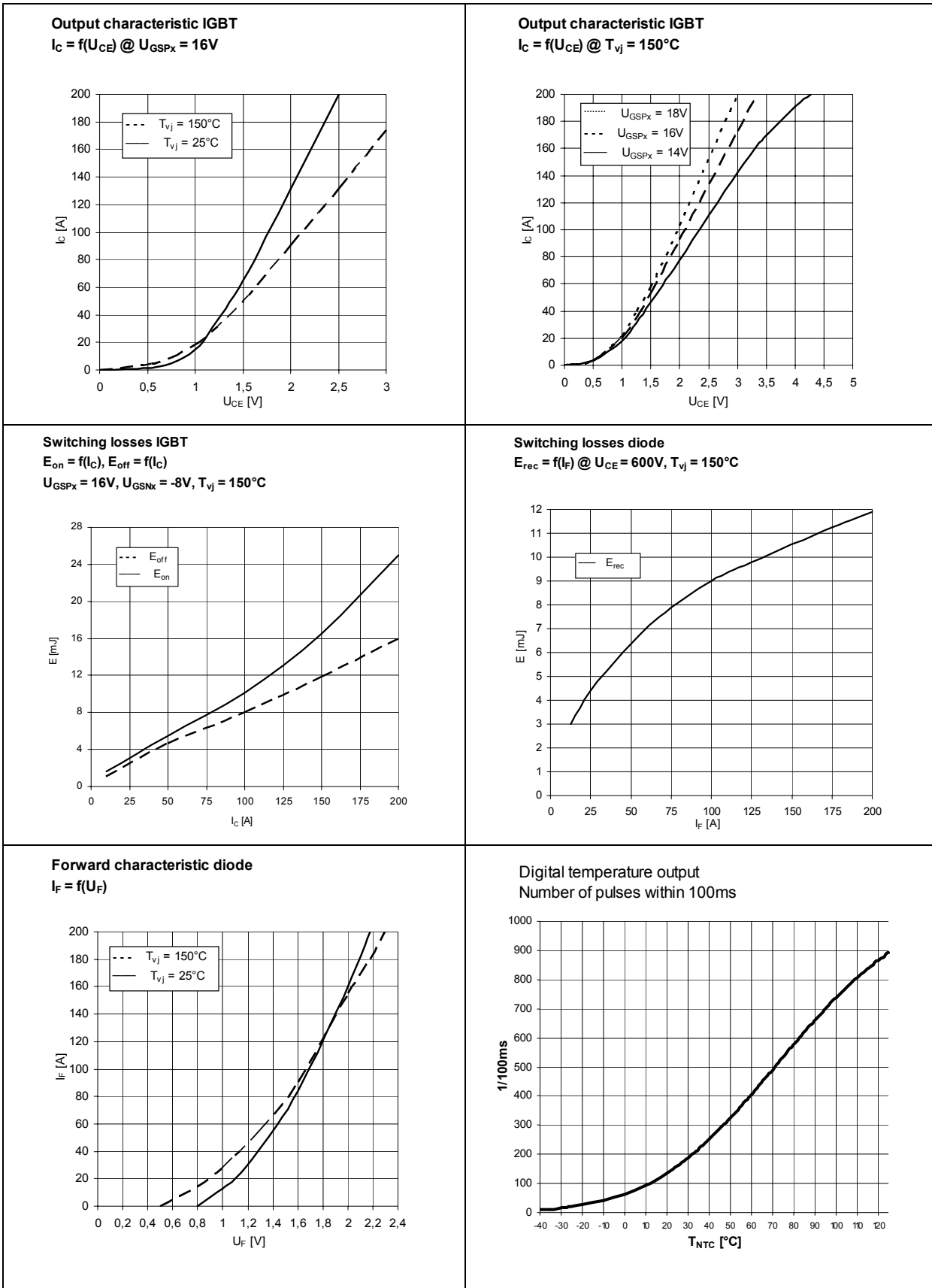
## preliminary data

| Environmental conditions      |                         |           | min              | typ | max  |                 |
|-------------------------------|-------------------------|-----------|------------------|-----|------|-----------------|
| Storage temperature           |                         | $T_{stg}$ | -40              |     | +125 | °C              |
| Operating ambient temperature | $f_{sw} \leq 20kHz$     |           | -40              |     | +65  | °C              |
| Humidity                      | no condensation         | Rel. H.   | 5                |     | 85   | %               |
| Installation height           |                         |           |                  |     | 1000 | m               |
| Vibration                     | according to IEC60721   |           |                  |     | 12   | g               |
| Shock                         | according to IEC60721   |           |                  |     | 10   | g               |
| Protection degree             |                         |           | IP00             |     |      |                 |
| Pollution degree              |                         |           | 2                |     |      |                 |
| Terminal connection torque    | Screw M6                | $M_{M6}$  | 3,0              |     | 6,0  | Nm              |
| Mounting torque               | Screw M5                | $M_{M5}$  | 3,0              |     | 6,0  | Nm              |
| Insertion force connector X1  |                         | $F_{X1}$  |                  | tbd |      | N               |
| Insertion force connector X2  |                         | $F_{X2}$  |                  | tbd |      | N               |
| Dimensions                    | length x width x height |           | 130 x 103 x 28,5 |     |      | mm <sup>3</sup> |
| Weight                        |                         |           |                  | 419 |      | g               |

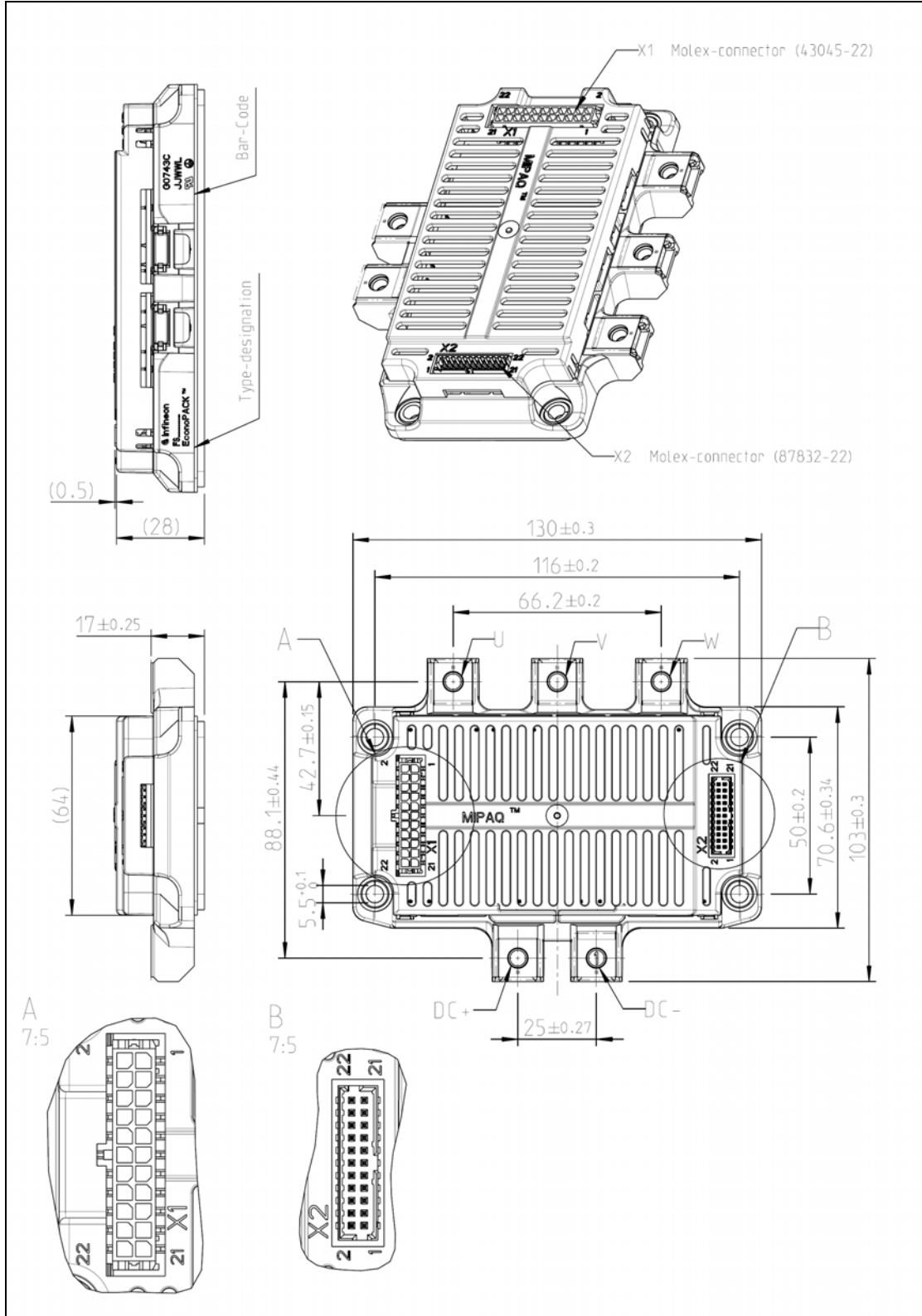
| Thermal data                        |                 |                    | min | typ | max   |     |
|-------------------------------------|-----------------|--------------------|-----|-----|-------|-----|
| Thermal resistance junction to case | Each IGBT       | $R_{thjc\_IGBT}$   |     |     | 0,3   | K/W |
| Thermal resistance junction to case | Each Diode      | $R_{thjc\_FWD}$    |     |     | 0,55  | K/W |
| Thermal resistance case to heatsink | Complete module | $R_{thch\_Module}$ |     |     | 0,009 | K/W |

| Modul /module                |  |           | min | typ | max |    |
|------------------------------|--|-----------|-----|-----|-----|----|
| Stray inductance module      |  | $L_{sCE}$ |     | 20  |     | nH |
| Material of module baseplate |  |           |     | Cu  |     |    |

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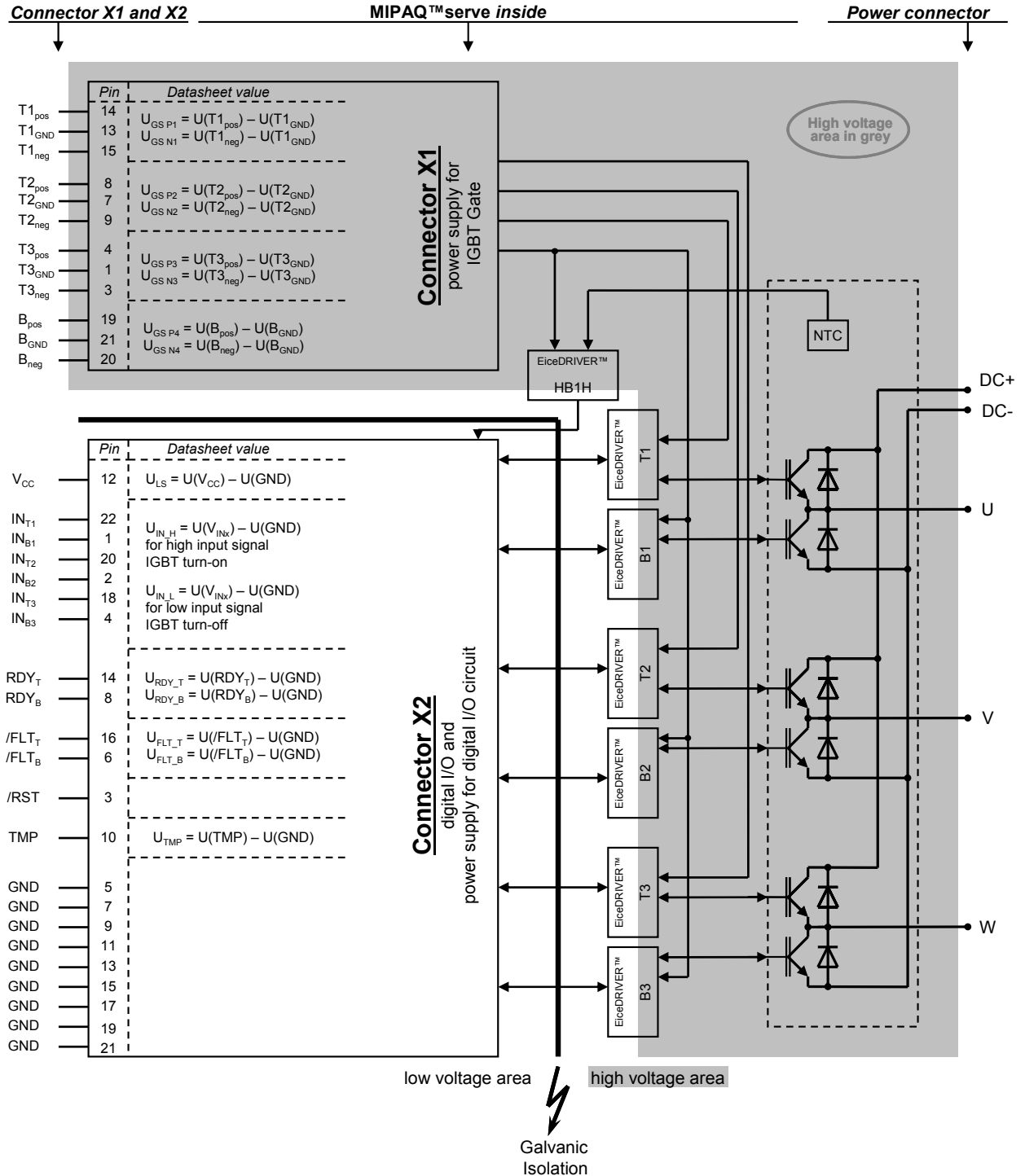


### Mechanical drawing



|                               |                                 |
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### Circuit diagram



### Further information

X1: Molex Microfit 22 pins  
X2: Molex Milligrd 22 pins

All information regarding connectors can be found in AN2009-07

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