

**4.3 Modifications before the tests / Modifications apportées avant les essais / Vor den Prüfungen angebrachte Änderungen**

|      |
|------|
| none |
|------|

**4.4 Pictures of the EUT / Photos de l'EST / Fotos des Prüflings**

Equipment under test / Equipment sous test / Prüfling



Equipment under test / Equipment sous test / Prüfling

**4.5 Classification / Classification / Klassierung**

- |  |
|--|
| <ul style="list-style-type: none"> <li>Intentional radiator</li> </ul> |
|--|

**5. Test conditions / Conditions d'essai / Testbedingungen****5.1 Climatic conditions / conditions climatiques / klimatologische Bedingungen**

|  |             |     |
|--|-------------|-----|
| Temperature / Température / Temperatur:                            | 20 - 25     | °C  |
| Pressure / Pression / Druck:                                       | 1001 - 1012 | hPa |
| Relative humidity / Humidité relative / Relative Luftfeuchtigkeit: | 36 - 45     | %   |

**5.2 Location and Date / Lieu et date / Ort und Datum**

|  |  |
|--|--|
| Test period / Date des essais / Datum der Prüfungen: | <i>December 19, 2002<br/>and July 1 to 2, 2003</i> |
| Location / Lieu / Ort:                               | <i>Rossens</i>                                     |

**5.3 Persons present / Personnes présentes / Anwesende Personen****Test Engineer(s) / Ingénieur(s) d'essai / Prüflingenieur(e) :***Erich Staub***Other(s) / Autre(s) / Andere :**

|                    |                           |
|--------------------|---------------------------|
| Name / Nom / Name  | Company / Société / Firma |
| <i>Roger Meier</i> | <i>Shockfish SA</i>       |

**5.4 Test configuration / Configuration d'essai / Prüfkonfiguration****5.5 Operating conditions / Conditions de fonctionnement / Betriebszustand**

Normal mode of operation, modulated transmitter at lowest and highest operating frequencies.

**5.6 Auxillary equipment / Matériel auxiliaire / Zusatzgeräte**

The following pieces of equipment are used for the monitoring of the EUT or are necessary for the EUT but they are not tested with the EUT / Les équipements suivants servent à la surveillance de l'EST ou sont indispensable au fonctionnement de celui-ci mais ne font pas partie de l'essai / Folgende Geräte werden für die Überwachung des Prüflings gebraucht oder sind notwendig für die korrekte Funktion. Sie gehören jedoch nicht zum Prüfling.

| Product / Produit / Produkt | Brand / Marque / Marke | Model number | ID  | Remark / Remarque / Bemerkung |
|-----------------------------|------------------------|--------------|-----|-------------------------------|
| ---                         | ---                    | ---          | --- | ---                           |

**6.1 Carrier measurement**

Test site: ☒ anechoic chamber (foam) ☐ open test site  
☐ anechoic chamber (ferrites) ☐ .....

Distance: ☐ 30 m ☐ 10 m ☒ 3 m ☐ .....

Position of EUT: 0.8 m (height of the equipment under test above floor)

Test precision:  $\pm 6$  dB (30 - 300 MHz) /  $\pm 5.4$  dB (300 - 1000 MHz)

Test method: The electromagnetic disturbance radiated by the equipment is measured using a spectrum analyser and a wide band antenna. The antenna is moved from 1 to 4 m in height successively with horizontal and vertical polarisations. The turning table is operated through 360° during the measurements. The recordings are carried out taking into account the maximum value of all the disturbance appearing while the apparatus is under test. The peak values are recorded continuously on the graph. The values exceeding the limits are remeasured manually giving quasi-peak values and average values using a receiver and these measurements are indicated under the graph. The limit must be respected in quasi-peak values (QP).

Test set-up:



Remarks:

- Maximum field strength measured from 1 to 3 m.
- During this measurement the resolution bandwidth was 120 kHz and the video bandwidth 100 kHz. The theoretical error for broad band signals will be smaller than 0.8 dB. For narrow band signals the level does not change.
- EUT measured in position which showed the highest emission on the first prototype

Test equipment:

|   |   |   |                                |   |                                |
|---|---|---|--------------------------------|---|--------------------------------|
| <input checked="" type="checkbox"/> Spectrum analyser | <input checked="" type="checkbox"/> 88-14 | <input type="checkbox"/> 90-26            | <input type="checkbox"/> 94-24 |   |                                |
| <input checked="" type="checkbox"/> Receiver          | <input type="checkbox"/> 85-04            | <input checked="" type="checkbox"/> 90-43 | <input type="checkbox"/> 94-35 |   |                                |
| <input checked="" type="checkbox"/> Preamplifier      | <input type="checkbox"/> 88-05            | <input type="checkbox"/> 90-01            | <input type="checkbox"/> 90-42 | <input checked="" type="checkbox"/> 95-86 | <input type="checkbox"/> 92-39 |
| <input type="checkbox"/> Antenna (biconical)          | <input type="checkbox"/> 82-02            | <input type="checkbox"/> 87-05            | <input type="checkbox"/> 87-16 | <input type="checkbox"/> 91-05            | <input type="checkbox"/> 94-37 |
| <input checked="" type="checkbox"/> Antenna (log-per) | <input type="checkbox"/> 88-20            | <input type="checkbox"/> 90-30            | <input type="checkbox"/> 91-35 | <input checked="" type="checkbox"/> 94-64 |                                |
| <input checked="" type="checkbox"/> Attenuators       |   |   |                                |   |                                |

**Result:** ☒ pass ☐ fail ☐ not applicable ☐ not tested

**6.2 Radiated electromagnetic field 30 - 1000 MHz**

Test site: ☒ anechoic chamber (foam) ☐ open test site  
☐ anechoic chamber (ferrites) ☐ .....

Distance: ☐ 30 m ☐ 10 m ☒ 3 m ☐ .....

Position of EUT: 0.8 m (height of the equipment under test above floor)

Test precision:  $\pm 6$  dB (30 - 300 MHz) /  $\pm 5.4$  dB (300 - 1000 MHz)

Test method: The electromagnetic disturbance radiated by the equipment is measured from 30 to 1000 MHz using a spectrum analyser and a wide band antenna. The antenna is moved from 1 to 4 m in height successively with horizontal and vertical polarisations. The turning table is operated through 360° during the measurements. The recordings are carried out taking into account the maximum value of all the disturbance appearing while the apparatus is under test. The peak values are recorded continuously on the graph. The values exceeding the limits are remeasured manually giving quasi-peak values and average values using a receiver and these measurements are indicated under the graph. The limit must be respected in quasi-peak values (QP).

Test set-up:



Remarks:

- Maximum field strength measured from 1 to 3 m.
- EUT measured in position which showed the highest emission on the first prototype
- With notch filter at transmitting frequency, for values around carrier see §6.1

Test equipment:

|   |   |   |                                |   |   |
|---|---|---|--------------------------------|---|---|
| <input checked="" type="checkbox"/> Spectrum analyser   | <input checked="" type="checkbox"/> 88-14 | <input type="checkbox"/> 90-26            | <input type="checkbox"/> 94-24 |   |   |
| <input checked="" type="checkbox"/> Receiver            | <input type="checkbox"/> 85-04            | <input checked="" type="checkbox"/> 90-43 | <input type="checkbox"/> 94-35 |   |   |
| <input checked="" type="checkbox"/> Preamplifier        | <input type="checkbox"/> 88-05            | <input type="checkbox"/> 90-01            | <input type="checkbox"/> 90-42 | <input checked="" type="checkbox"/> 95-86 | <input type="checkbox"/> 92-39            |
| <input checked="" type="checkbox"/> Antenna (biconical) | <input type="checkbox"/> 82-02            | <input type="checkbox"/> 87-05            | <input type="checkbox"/> 87-16 | <input type="checkbox"/> 91-05            | <input checked="" type="checkbox"/> 94-37 |
| <input checked="" type="checkbox"/> Antenna (log-per)   | <input type="checkbox"/> 88-20            | <input type="checkbox"/> 90-30            | <input type="checkbox"/> 91-35 | <input checked="" type="checkbox"/> 94-64 |   |
| <input type="checkbox"/> Antenna (horn)                 | <input type="checkbox"/> 90-24            | <input type="checkbox"/> 90-29            | <input type="checkbox"/> 98-12 | <input type="checkbox"/> 98-13            | <input type="checkbox"/> .....            |
| <input checked="" type="checkbox"/> Notch filter        | .....                                     |   |                                |   |   |

**Result:** ☒ pass ☐ fail ☐ not applicable ☐ not tested

**6.3 Radiated electromagnetic field 1 - 10 GHz**

Test site: ☒ anechoic chamber (foam) ☐ open test site  
☐ anechoic chamber (ferrites) ☐ .....

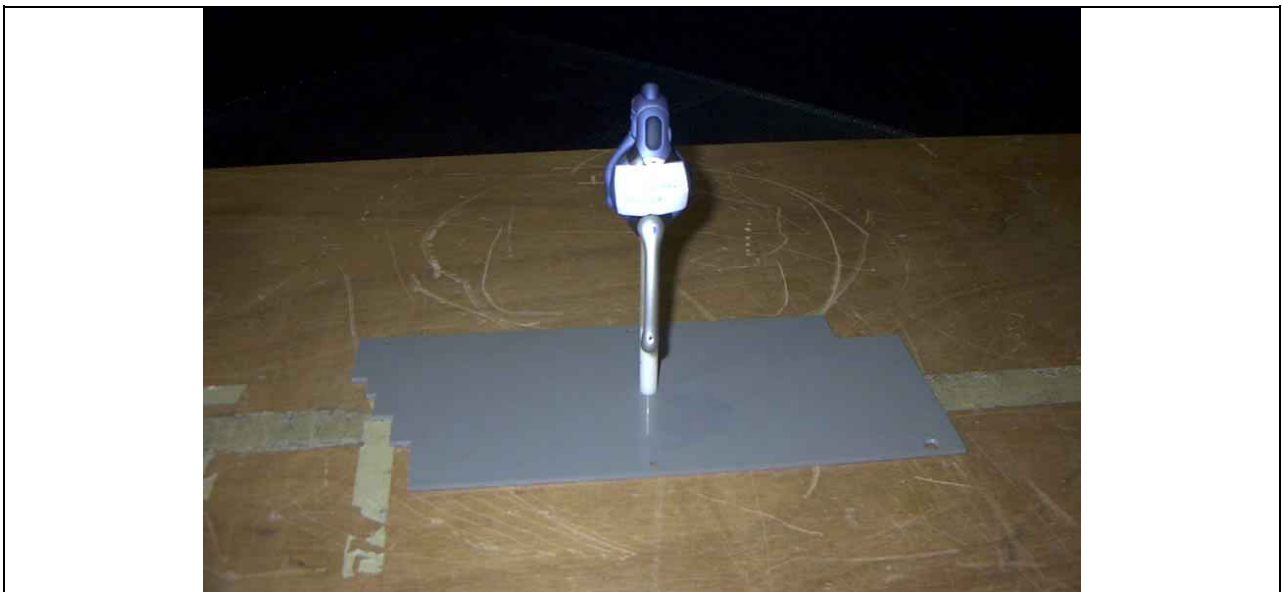
Distance: ☐ 30 m ☐ 10 m ☐ 3 m ☒ 1 m

Position of EUT: 0.8 m (height of the equipment under test above floor)

Test precision:  $\pm 6$  dB (30 - 300 MHz) /  $\pm 5.4$  dB (300 - 1000 MHz)

Test method: The electromagnetic disturbance radiated by the equipment is measured using a spectrum analyser and a wide band antenna. The turning table is operated through 360° during the measurements. The recordings are carried out taking into account the maximum value of all the disturbance appearing while the apparatus is under test. The peak values are recorded continuously on the graph.

Test set-up:



Remarks:

- As the noise level of the measuring system was close to the limit, the RBW has been reduced for some frequency ranges. Any emission exceeding the limit would be measured with a receiver with 1 MHz bandwidth
- EUT measured in position which showed the highest emission on the first prototype

Test equipment:

|  |   |   |                                |   |   |
|--|---|---|--------------------------------|---|---|
| <input checked="" type="checkbox"/> Spectrum analyser          | <input checked="" type="checkbox"/> 88-14 | <input type="checkbox"/> 90-26            | <input type="checkbox"/> 94-24 |   |   |
| <input checked="" type="checkbox"/> Receiver                   | <input type="checkbox"/> 85-04            | <input checked="" type="checkbox"/> 90-43 | <input type="checkbox"/> 94-35 |   |   |
| <input checked="" type="checkbox"/> Preamplifier               | <input type="checkbox"/> 88-05            | <input type="checkbox"/> 90-01            | <input type="checkbox"/> 90-42 | <input checked="" type="checkbox"/> 95-86 | <input checked="" type="checkbox"/> 92-39 |
| <input type="checkbox"/> Antenna (biconical)                   | <input type="checkbox"/> 82-02            | <input type="checkbox"/> 87-05            | <input type="checkbox"/> 87-16 | <input type="checkbox"/> 91-05            | <input type="checkbox"/> 94-37            |
| <input type="checkbox"/> Antenna (log-per)                     | <input type="checkbox"/> 88-20            | <input type="checkbox"/> 90-30            | <input type="checkbox"/> 91-35 | <input type="checkbox"/> 94-64            |   |
| <input checked="" type="checkbox"/> Antenna (horn)             | <input checked="" type="checkbox"/> 90-24 | <input type="checkbox"/> 90-29            | <input type="checkbox"/> 98-12 | <input type="checkbox"/> 98-13            | <input type="checkbox"/> .....            |
| <input checked="" type="checkbox"/> Notch and high-pass filter | .....                                     |   |                                |   |   |

**Result:** ☒ pass ☐ fail ☐ not applicable ☐ not tested

**7.1 Radiated electromagnetic field 30 - 1000 MHz**

Test site: ☐ anechoic chamber (foam) ☐ open test site  
☒ anechoic chamber (ferrites) ☐ .....

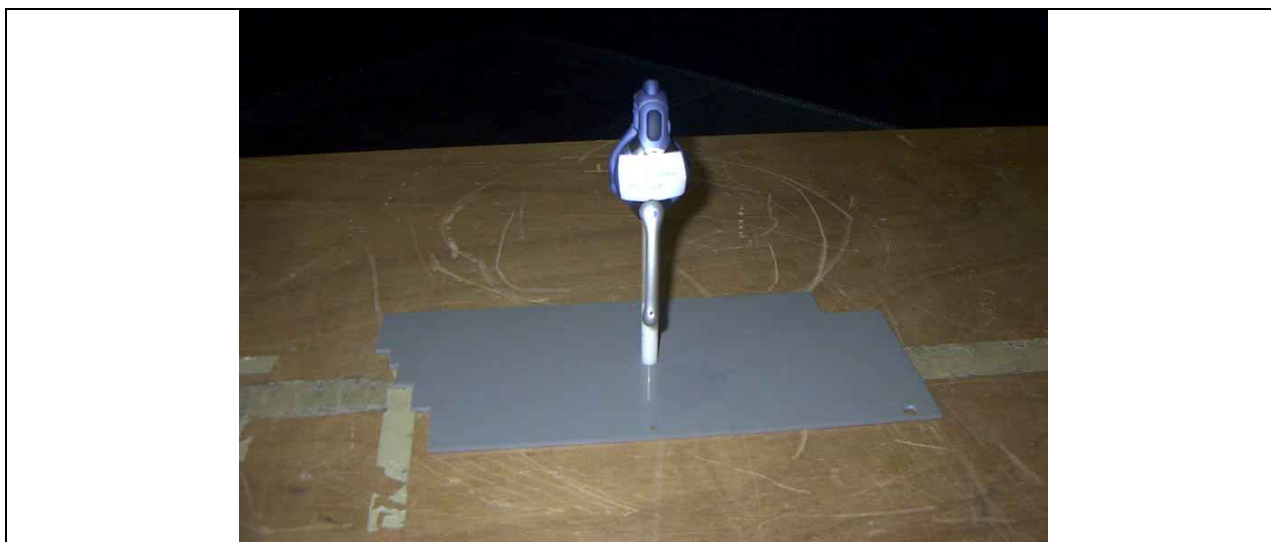
Distance: ☐ 30 m ☐ 10 m ☒ 3 m ☐ .....

Position of EUT: 0.8 m (height of the equipment under test above floor)

Test precision:  $\pm 6$  dB (30 - 300 MHz) /  $\pm 5.4$  dB (300 - 1000 MHz)

Test method: The electromagnetic disturbance radiated by the equipment is measured from 30 to 1000 MHz using a spectrum analyser and a wide band antenna. The antenna is moved from 1 to 4 m in height successively with horizontal and vertical polarisations. The turning table is operated through 360° during the measurements. The recordings are carried out taking into account the maximum value of all the disturbance appearing while the apparatus is under test. The peak values are recorded continuously on the graph. The values exceeding the limits are remeasured manually giving quasi-peak values and average values using a receiver and these measurements are indicated under the graph. The limit must be respected in quasi-peak values (QP).

Test set-up:



Remarks:

- Maximum field strength measured from 1 to 3 m.
- Radiated emissions measurements were maximized through orientation of EUT in three orthogonal axes

Test equipment:

|   |   |                                |   |                                |                                |
|---|---|--------------------------------|---|--------------------------------|--------------------------------|
| <input checked="" type="checkbox"/> Spectrum analyser | <input type="checkbox"/> 88-14            | <input type="checkbox"/> 90-26 | <input checked="" type="checkbox"/> 94-24 |                                |                                |
| <input checked="" type="checkbox"/> Receiver          | <input type="checkbox"/> 85-04            | <input type="checkbox"/> 90-43 | <input checked="" type="checkbox"/> 94-35 |                                |                                |
| <input checked="" type="checkbox"/> Preamplifier      | <input type="checkbox"/> 88-05            | <input type="checkbox"/> 90-01 | <input checked="" type="checkbox"/> 90-42 | <input type="checkbox"/> 95-86 | <input type="checkbox"/> 92-39 |
| <input type="checkbox"/> Antenna (horn)               | <input type="checkbox"/> 90-24            | <input type="checkbox"/> 90-29 | <input type="checkbox"/> 98-12            | <input type="checkbox"/> 98-13 | <input type="checkbox"/> ..... |
| <input checked="" type="checkbox"/> Antenna           | <input checked="" type="checkbox"/> 94-03 |                                |   |                                |                                |
| <input type="checkbox"/> Notch filter                 | .....                                     |                                |   |                                |                                |

|                |  |                               |   |                                     |
|----------------|--|-------------------------------|---|-------------------------------------|
| <b>Result:</b> | <input checked="" type="checkbox"/> pass | <input type="checkbox"/> fail | <input type="checkbox"/> not applicable | <input type="checkbox"/> not tested |
|----------------|--|-------------------------------|---|-------------------------------------|



**7.2 Radiated electromagnetic field 1 - 5 GHz**

Test site: ☐ anechoic chamber (foam) ☐ open test site  
☒ anechoic chamber (ferrites) ☐ .....

Distance: ☐ 30 m ☐ 10 m ☐ 3 m ☒ 1 m

Position of EUT: 0.8 m (height of the equipment under test above floor)

Test precision:  $\pm 6$  dB (30 - 300 MHz) /  $\pm 5.4$  dB (300 - 1000 MHz)

Test method: The electromagnetic disturbance radiated by the equipment is measured using a spectrum analyser and a wide band antenna. The turning table is operated through 360° during the measurements. The recordings are carried out taking into account the maximum value of all the disturbance appearing while the apparatus is under test. The peak values are recorded continuously on the graph.

Test set-up:



Remarks: • Radiated emissions measurements were maximized through orientation of EUT in three orthogonal axes

Test equipment:

|   |   |   |                                |   |   |
|---|---|---|--------------------------------|---|---|
| <input checked="" type="checkbox"/> Spectrum analyser | <input checked="" type="checkbox"/> 88-14 | <input type="checkbox"/> 90-26            | <input type="checkbox"/> 94-24 |   |   |
| <input type="checkbox"/> Receiver                     | <input type="checkbox"/> 85-04            | <input type="checkbox"/> 90-43            | <input type="checkbox"/> 94-35 |   |   |
| <input checked="" type="checkbox"/> Preamplifier      | <input type="checkbox"/> 88-05            | <input type="checkbox"/> 90-01            | <input type="checkbox"/> 90-42 | <input checked="" type="checkbox"/> 95-86 | <input checked="" type="checkbox"/> 92-39 |
| <input type="checkbox"/> Antenna (biconical)          | <input type="checkbox"/> 82-02            | <input type="checkbox"/> 87-05            | <input type="checkbox"/> 87-16 | <input type="checkbox"/> 91-05            | <input type="checkbox"/> 94-37            |
| <input type="checkbox"/> Antenna (log-per)            | <input type="checkbox"/> 88-20            | <input type="checkbox"/> 90-30            | <input type="checkbox"/> 91-35 | <input type="checkbox"/> 94-64            |   |
| <input checked="" type="checkbox"/> Antenna (horn)    | <input type="checkbox"/> 90-24            | <input checked="" type="checkbox"/> 90-29 | <input type="checkbox"/> 98-12 | <input type="checkbox"/> 98-13            | <input type="checkbox"/> .....            |
| <input type="checkbox"/> Notch and high-pass filter   | .....                                     |   |                                |   |   |

**Result:** ☒ pass ☐ fail ☐ not applicable ☐ not tested