



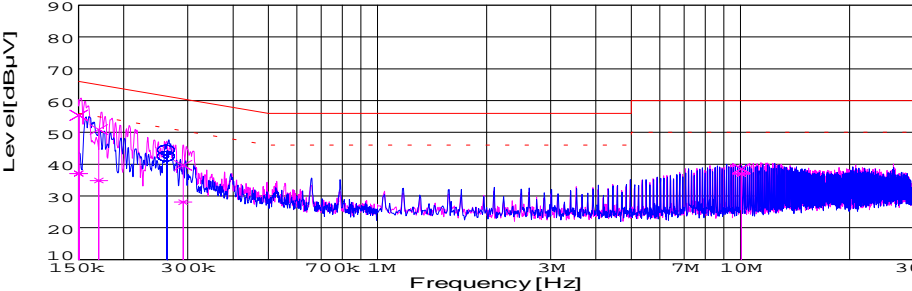
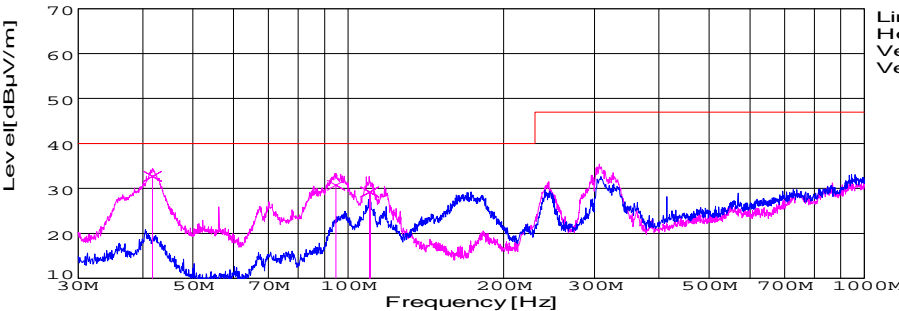
## PBA50F EMI/EMS Test result

October 8, 2004  
Design engineering dep.

Approved : *Takahiro Yamada*

Prepared : *Azumi Yoshiyama*

| No. | Test item   | Conditions   | Conditions of Acceptability  | Result |
|-----|---|--|--|--------|
| 1   | Line conduction   | (1) Rated input(AC100V,120V,230V)<br>(2) Rated load<br>(3) Ambient temp. $25 \pm 10^{\circ}\text{C}$   | (1)Meets the undermentioned standard.<br>FCC Part15 classB , VCCI classB<br>CISPR22 classB , EN55022-B,<br>EN55011-B                                       | OK     |
| 2   | Radiated emission   | (1) Rated input(AC100V,120V,230V)<br>(2) Rated load<br>(3) Ambient temp. $25 \pm 10^{\circ}\text{C}$   | (1)Meets the undermentioned standard.<br>FCC Part15 classB , VCCI classB<br>CISPR22 classB , EN55022-B,<br>EN55011-B                                       | OK     |
| 3   | Harmonic current<br>(EN61000-3-2)   | (1) Rated input (AC100V,230V)<br>(2) Load 0 - Rated load<br>(3) Ambient temp. $25 \pm 10^{\circ}\text{C}$  | (1)Meets the undermentioned standard.<br>EN61000-3-2 classA  | OK     |
| 4   | Static electricity immunity test<br>(EN61000-4-2)   | (1) Rated input (AC230V)<br>(2) Rated load<br>(3) Ambient temp. $25 \pm 10^{\circ}\text{C}$<br>(4) Contact discharge voltage 8[kV]<br>(Level 4)  | (1)No protection circuit failure.<br>(2)No output voltage drop with control<br>circuit failure.<br>(3)No any other function failure                        | OK     |
| 5   | Radiated, radio-frequency,<br>electromagnetic field immunity test<br>(EN61000-4-3)          | (1) Rated input (AC230V)<br>(2) Rated load<br>(3) Ambient temp. $25 \pm 10^{\circ}\text{C}$<br>(4)Testing field strength 10[V/m]<br>(Level 3)  | (1)No protection circuit failure.<br>(2)No output voltage drop with control<br>circuit failure.<br>(3)No any other function failure                        | OK     |
| 6   | Electrical fast transient/<br>burst immunity test<br>(EN61000-4-4)                          | (1) Rated input (AC230V)<br>(2) Rated load<br>(3) Ambient temp. $25 \pm 10^{\circ}\text{C}$<br>(4) Test peak voltage 4[kV]<br>(Level 4)  | (1)No protection circuit failure.<br>(2)No output voltage drop with control<br>circuit failure.<br>(3)No any other function failure                        | OK     |
| 7   | Surge immunity test<br>(EN61000-4-5)  | (1) Rated input (AC230V)<br>(2) Rated load<br>(3) Ambient temp. $25 \pm 10^{\circ}\text{C}$<br>(4) Test voltage<br>Line to line 2[kV] (Level 3)<br>Line to earth 4[kV] (Level 4)   | (1)The power supply is not stop<br>(2)Circuit does not malfunction.<br>(3)No abnormality of the insulation<br>destruction etc.<br>(4)Parts are no damaged. | OK     |
| 8   | Immunity to conducted disturbances,<br>induced by radio-frequency fields<br>(EN61000-4-6)   | (1) Rated input (AC230V)<br>(2) Rated load<br>(3) Ambient temp. $25 \pm 10^{\circ}\text{C}$<br>(4) Voltage level (e.m.f.) 10[V]<br>(Level 3)   | (1)No protection circuit failure.<br>(2)No output voltage drop with control<br>circuit failure.<br>(3)No any other function failure                        | OK     |
| 9   | Power frequency magnetic field<br>immunity test<br>(EN61000-4-8)                            | (1) Rated input (AC230V)<br>(2) Rated load<br>(3) Ambient temp. $25 \pm 10^{\circ}\text{C}$<br>(4) Magnetic field 30A/m<br>(Level 4)   | (1)No protection circuit failure.<br>(2)No output voltage drop with control<br>circuit failure.<br>(3)No any other function failure                        | OK     |
| 10  | Voltage dips, short interruptions<br>and voltage variations immunity test<br>(EN61000-4-11) | (1) Rated input (AC230V)<br>-30% reduction at 10mS min.<br>-60% reduction at 100mS min<br>-95% reduction at 5S min.<br>- $\pm 10\%$ variation at 15 minutes<br>(2) Rated load<br>(3) Ambient temp. $25 \pm 10^{\circ}\text{C}$ | (1)No protection circuit failure.<br>(2)No output voltage drop with control<br>circuit failure.<br>(3)No any other function failure                        | OK     |

| DATA SHEET   |  |                           |                       |                     |                    |           | Date                     | 07-Feb-04        |                   |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
|--|--|---------------------------|-----------------------|---------------------|--------------------|-----------|--------------------------|------------------|-------------------|-----------------|-----------------|-----------------------------|---------------------------|-----------------------|---------------------|--------------------|-----------|--------------------|------------------|-------------------|-----------------|--------|------|------|------|-------|------|-----|------|-------|------|-----|--------|------|----|-----|------|------|-----|-----|-------|------|-----|---------|------|----|------|-------|------|-----|-----|-------|----|------|
| Model  | PBA50F-24                                  |                           |                       |                     |                    |           | Temp.                    | 25 degreeC       |                   |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
| Test   | EMI<br>Line conduction & Radiated emission |                           |                       |                     |                    |           | Humid.                   | 44 %RH           |                   |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
|  |  |                           |                       |                     |                    |           | Tested by                | A.Yoshiyama      |                   |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
| LINE CONDUCTION  |  |                           |                       |                     |                    |           |                          |                  |                   |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
| Model Name   |  |                           | PBA50F-24             |                     | Temp.              |           | 25 degreeC               |                  |                   |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
| Model No.  |  |                           |                       |                     | Humi.              |           | 44 %                     |                  |                   |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
| Serial No.   |  |                           |                       |                     | Date               |           | 2004/2/7 13:06           |                  |                   |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
| Points   |  |                           | 5                     |                     | Test Equip.        |           | R3132,ESPC               |                  |                   |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
| Detector   |  |                           | PEAK/QP/Ave.          |                     | Load Line          |           | 150 mm                   |                  |                   |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
| Line Mode  |  |                           | VA/VB                 |                     | Comment            |           |                          |                  |                   |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
| Power Supply   |  |                           | AC230V 50Hz           |                     |                    |           |                          |                  |                   |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
| Limit1: [EN 55022] Class B(Ave.)   |  |                           |                       |                     |                    |           |                          |                  |                   |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
| Limit2: [EN 55022] Class B(QP)   |  |                           |                       |                     |                    |           |                          |                  |                   |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
|    |  |                           |                       |                     |                    |           | Limit1(Ave.)             |                  | - - -             |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
|  |  |                           |                       |                     |                    |           | Limit2(QP)               |                  | —                 |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
|  |  |                           |                       |                     |                    |           | VA(PEAK)                 |                  | —                 |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
|  |  |                           |                       |                     |                    |           | VB(PEAK)                 |                  | —                 |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
|  |  |                           |                       |                     |                    |           | VA(QP)                   |                  | o                 |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
|  |  |                           |                       |                     |                    |           | VA(Ave.)                 |                  | x                 |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
|  |  |                           |                       |                     |                    |           | VB(QP)                   |                  | o                 |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
|  |  |                           |                       |                     |                    |           | VB(Ave.)                 |                  | x                 |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
|  |  |                           |                       |                     |                    |           | AC230V 50Hz<br>+24V 2.2A |                  |                   |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
| <table><tr><th>Frequency [MHz]</th><th>Meter Reading (Ave.) [dBuV]</th><th>Meter Reading (QP) [dBuV]</th><th>Factor [dB]</th><th>Level(Ave.) [dBuV]</th><th>Level(QP) [dBuV]</th><th>Line</th><th>Limit(Ave.) [dBuV]</th><th>Limit(QP) [dBuV]</th><th>Margin(Ave.) [dB]</th><th>Margin(QP) [dB]</th></tr><tr><td>0.2632</td><td>34.2</td><td>32.2</td><td>10</td><td>44.2</td><td>42.2</td><td>VA</td><td>61.3</td><td>51.3</td><td>17.1</td><td>9.1</td></tr><tr><td>0.1502</td><td>45.4</td><td>27</td><td>10</td><td>55.4</td><td>37</td><td>VB</td><td>66</td><td>56</td><td>10.6</td><td>19</td></tr></table>   |  |                           |                       |                     |                    |           |                          |                  |                   |                 | Frequency [MHz] | Meter Reading (Ave.) [dBuV] | Meter Reading (QP) [dBuV] | Factor [dB]           | Level(Ave.) [dBuV]  | Level(QP) [dBuV]   | Line      | Limit(Ave.) [dBuV] | Limit(QP) [dBuV] | Margin(Ave.) [dB] | Margin(QP) [dB] | 0.2632 | 34.2 | 32.2 | 10   | 44.2  | 42.2 | VA  | 61.3 | 51.3  | 17.1 | 9.1 | 0.1502 | 45.4 | 27 | 10  | 55.4 | 37   | VB  | 66  | 56    | 10.6 | 19  |         |      |    |      |       |      |     |     |       |    |      |
| Frequency [MHz]  | Meter Reading (Ave.) [dBuV]                | Meter Reading (QP) [dBuV] | Factor [dB]           | Level(Ave.) [dBuV]  | Level(QP) [dBuV]   | Line      | Limit(Ave.) [dBuV]       | Limit(QP) [dBuV] | Margin(Ave.) [dB] | Margin(QP) [dB] |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
| 0.2632   | 34.2                                       | 32.2                      | 10                    | 44.2                | 42.2               | VA        | 61.3                     | 51.3             | 17.1              | 9.1             |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
| 0.1502   | 45.4                                       | 27                        | 10                    | 55.4                | 37                 | VB        | 66                       | 56               | 10.6              | 19              |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
| RADIATED EMISSION  |  |                           |                       |                     |                    |           |                          |                  |                   |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
| Model Name   |  |                           | PBA50F-24             |                     | Temp.              |           | 25 degreeC               |                  |                   |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
| Model No.  |  |                           |                       |                     | Humi.              |           | 44 %                     |                  |                   |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
| Serial No.   |  |                           |                       |                     | Date               |           | 2004/2/7 11:15           |                  |                   |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
| Points   |  |                           | 3                     |                     | Test Equip.        |           | R3132,ESPC               |                  |                   |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
| Detector   |  |                           | PEAK/QP               |                     | Load Line          |           | 150 mm                   |                  |                   |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
| Polarization   |  |                           | Vertical              |                     | Comment            |           |                          |                  |                   |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
| Power Supply   |  |                           | AC230V 50Hz           |                     |                    |           |                          |                  |                   |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
| Limit: [EN 55022] Class B<3m>  |  |                           |                       |                     |                    |           |                          |                  |                   |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
|    |  |                           |                       |                     |                    |           | Limit(QP)                |                  | —                 |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
|  |  |                           |                       |                     |                    |           | Horizontal(PEAK)         |                  | —                 |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
|  |  |                           |                       |                     |                    |           | Vertical(PEAK)           |                  | —                 |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
|  |  |                           |                       |                     |                    |           | Vertical(QP)             |                  | x                 |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
|  |  |                           |                       |                     |                    |           | AC230V 50Hz<br>+24V 2.2A |                  |                   |                 |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
| <table><tr><th>Frequency [MHz]</th><th>MeterReading (QP) [dBuV]</th><th>Ant. Type</th><th>Antenna Factor [dB/m]</th><th>Cable &amp; Preamp [dB]</th><th>Level(QP) [dBuV/m]</th><th>Angle [°]</th><th>Height [cm]</th><th>Polar.</th><th>Limit [dBuV/m]</th><th>Margin [dB]</th></tr><tr><td>41.774</td><td>46.6</td><td>BL</td><td>11.5</td><td>-25.4</td><td>32.7</td><td>139</td><td>101</td><td>Vert.</td><td>40</td><td>7.3</td></tr><tr><td>94.757</td><td>47</td><td>BL</td><td>8.7</td><td>-25</td><td>30.7</td><td>321</td><td>141</td><td>Vert.</td><td>40</td><td>9.3</td></tr><tr><td>110.049</td><td>44.9</td><td>BL</td><td>10.5</td><td>-26.2</td><td>29.2</td><td>338</td><td>132</td><td>Vert.</td><td>40</td><td>10.8</td></tr></table> |  |                           |                       |                     |                    |           |                          |                  |                   |                 | Frequency [MHz] | MeterReading (QP) [dBuV]    | Ant. Type                 | Antenna Factor [dB/m] | Cable & Preamp [dB] | Level(QP) [dBuV/m] | Angle [°] | Height [cm]        | Polar.           | Limit [dBuV/m]    | Margin [dB]     | 41.774 | 46.6 | BL   | 11.5 | -25.4 | 32.7 | 139 | 101  | Vert. | 40   | 7.3 | 94.757 | 47   | BL | 8.7 | -25  | 30.7 | 321 | 141 | Vert. | 40   | 9.3 | 110.049 | 44.9 | BL | 10.5 | -26.2 | 29.2 | 338 | 132 | Vert. | 40 | 10.8 |
| Frequency [MHz]  | MeterReading (QP) [dBuV]                   | Ant. Type                 | Antenna Factor [dB/m] | Cable & Preamp [dB] | Level(QP) [dBuV/m] | Angle [°] | Height [cm]              | Polar.           | Limit [dBuV/m]    | Margin [dB]     |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
| 41.774   | 46.6                                       | BL                        | 11.5                  | -25.4               | 32.7               | 139       | 101                      | Vert.            | 40                | 7.3             |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
| 94.757   | 47   | BL                        | 8.7                   | -25                 | 30.7               | 321       | 141                      | Vert.            | 40                | 9.3             |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |
| 110.049  | 44.9                                       | BL                        | 10.5                  | -26.2               | 29.2               | 338       | 132                      | Vert.            | 40                | 10.8            |                 |                             |                           |                       |                     |                    |           |                    |                  |                   |                 |        |      |      |      |       |      |     |      |       |      |     |        |      |    |     |      |      |     |     |       |      |     |         |      |    |      |       |      |     |     |       |    |      |