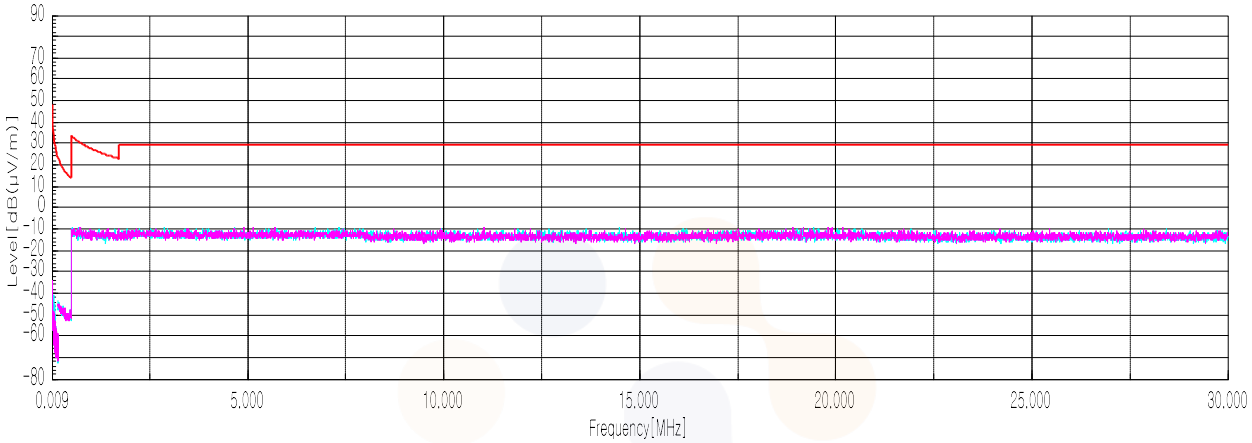
**[DC 12 V]**

**Test results (Below 30 ㎒) –Worst case: 1 MBits/s(37 Bytes) 2 402 ㎒**

| Frequency | Pol. | Reading | Antenna Factor | Amp. + Cable | Distance factor | Result | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| (㎒) | (V/H) | (dB(㎶)) | (dB) | (dB) | (dB) | (dB(㎶/m)) | (dB(㎶/m)) | (dB) |
| **Quasi peak data** | | | | | | | | |
| No spurious emissions were detected within 20 ㏈ of the limit | | | | | | | | |

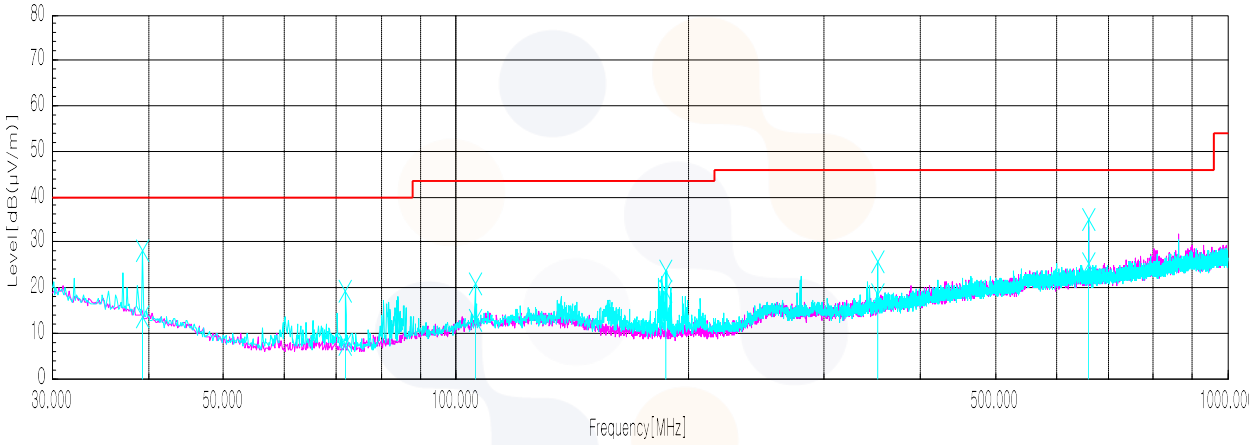
**Horizontal/Vertical**



**Test results (Below 1 000 ㎒) – Worst case: 1 MBits/s(37 Bytes) 2 402 ㎒**

| Frequency | Pol. | Reading | Antenna Factor | Amp. + Cable | Distance factor | Result | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| (㎒) | (V/H) | (dB(㎶)) | (dB) | (dB) | (dB) | (dB(㎶/m)) | (dB(㎶/m)) | (dB) |
| **Quasi peak data** | | | | | | | | |
| 39.34 | V | 23.70 | 19.66 | -29.82 | - | 13.54 | 40.00 | 26.46 |
| 71.95 | V | 24.50 | 12.30 | -29.24 | - | 7.56 | 40.00 | 32.44 |
| 106.02 | V | 24.00 | 17.40 | -28.57 | - | 12.83 | 43.50 | 30.67 |
| 187.02 | V | 31.50 | 14.90 | -27.38 | - | 19.02 | 43.50 | 24.48 |
| 351.80 | V | 23.70 | 20.17 | -25.54 | - | 18.33 | 46.00 | 27.67 |
| 660.02 | V | 23.10 | 24.90 | -22.75 | - | 25.25 | 46.00 | 20.75 |

**Horizontal/Vertical**

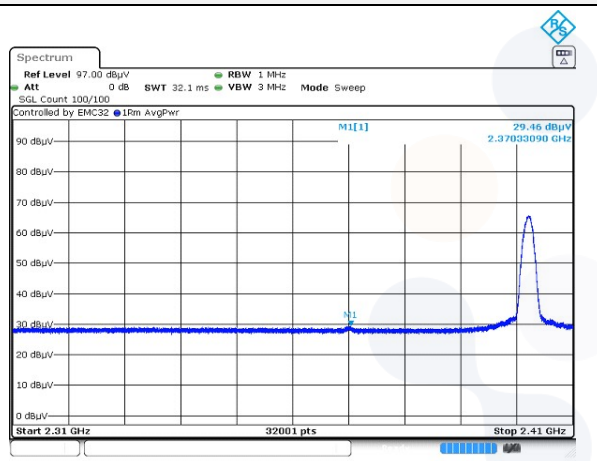


## Test results (Above 1 000 ㎒)_1 MBits/s(37 Bytes)

**2 402 ㎒**

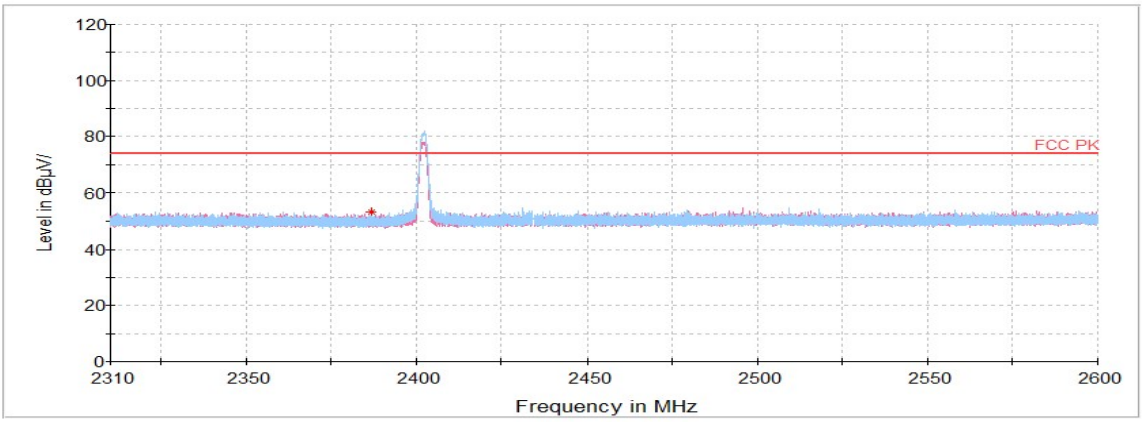
| Frequency | Pol. | Reading | Antenna Factor | Amp. + Cable | DCF | Result | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| [㎒] | [V/H] | [dB(μV)] | [dB] | [dB] | [dB] | [dB(μV/m)] | [dB(μV/m)] | [dB] |
| **Peak data** | | | | | | | | |
| 2 370.33[1)] | H | 39.79 | 32.11 | -18.38 | - | 53.52 | 74.00 | 20.48 |
| 4 249.92[1)] | V | 66.81 | 33.65 | -56.58 | - | 43.88 | 74.00 | 30.12 |
| 4 803.64[1)] | H | 67.43 | 33.70 | -55.95 | - | 45.18 | 74.00 | 28.82 |
| 7 205.66 | H | 74.55 | 35.14 | -51.96 | - | 57.73 | 74.00 | 16.27 |
| **Average Data** | | | | | | | | |
| 2 370.33[1)] | H | 29.46 | 32.11 | -18.38 | 2.04 | 45.23 | 54.00 | 8.77 |

**Average Data**

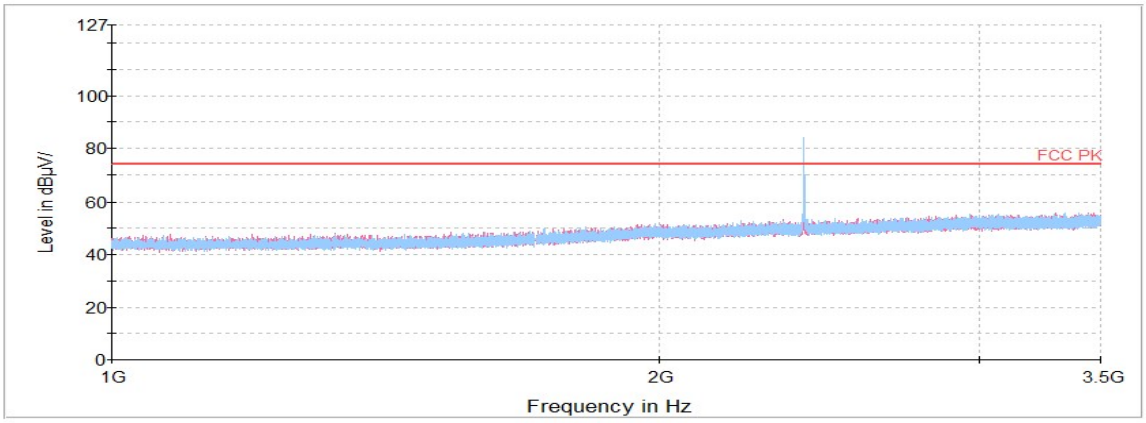



Blank

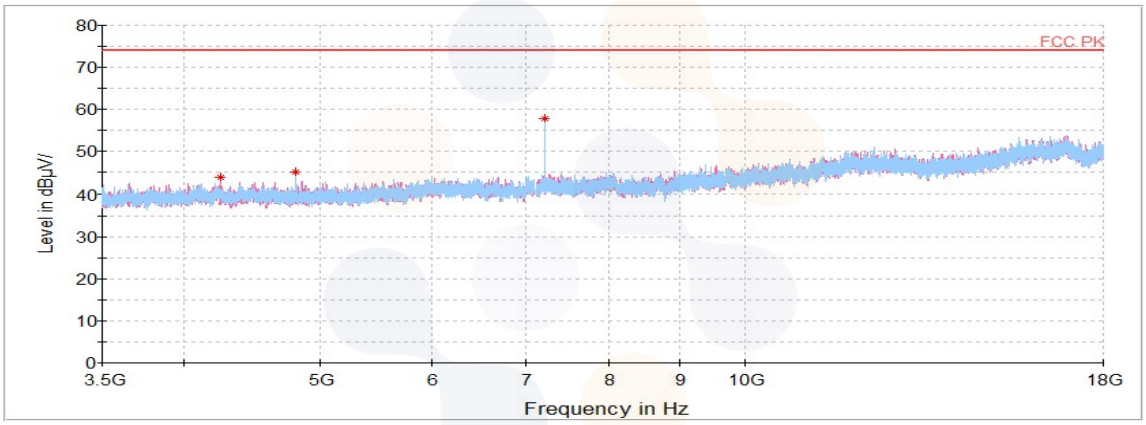
**Horizontal/Vertical for Band-edge**



**Horizontal/Vertical for 1 ㎓ ~ 3.5 ㎓**

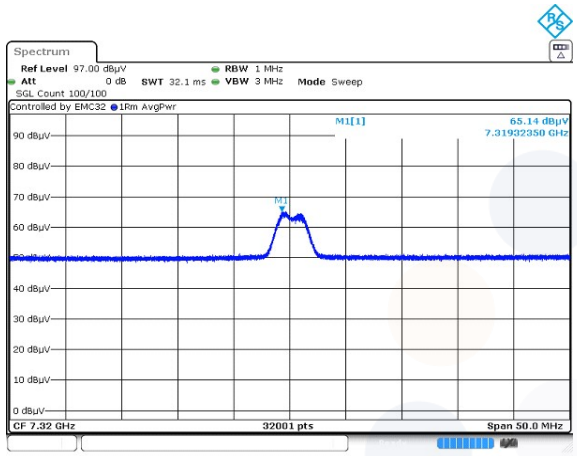



**Horizontal/Vertical for 3.5 ㎓ ~ 18 ㎓**

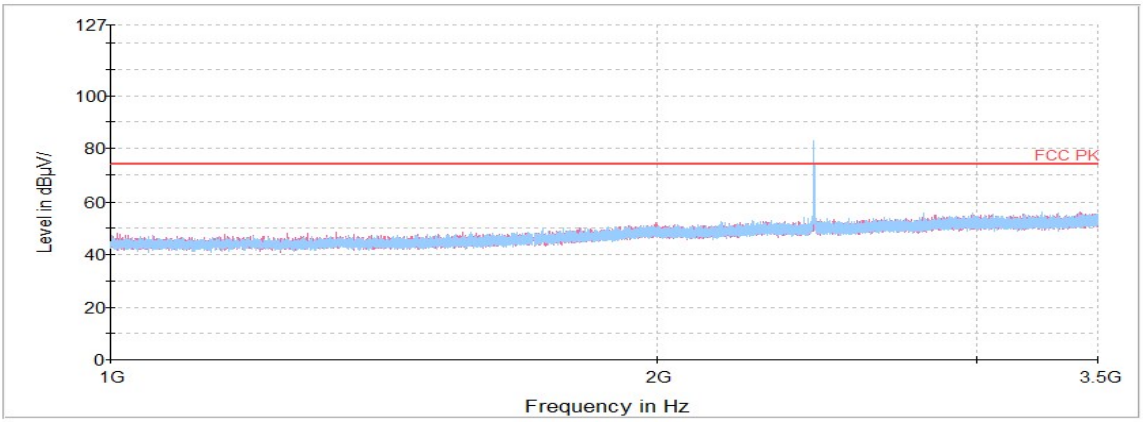


**2 440 ㎒**

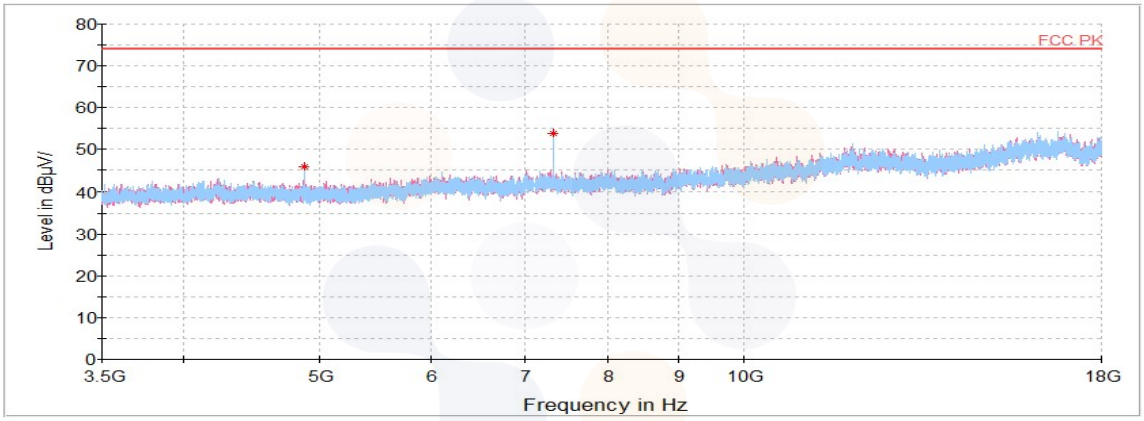
| Frequency | Pol. | Reading | Antenna Factor | Amp. + Cable | DCF | Result | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| [㎒] | [V/H] | [dB(㎶)] | [dB] | [dB] | [dB] | [dB(㎶/m)] | [dB(㎶/m)] | [dB] |
| **Peak data** | | | | | | | | |
| 4 880.67[1)] | H | 67.84 | 33.70 | -55.76 | - | 45.78 | 74.00 | 28.22 |
| 7 319.32[1)] | H | 70.65 | 35.16 | -51.96 | - | 53.85 | 74.00 | 20.15 |
| **Average Data** | | | | | | | | |
| 7 319.32[1)] | H | 65.14 | 35.16 | -51.96 | 2.04 | 50.38 | 54.00 | 3.62 |

| Average Data | |
|---|---|
|  | Blank |

**Horizontal/Vertical for 1 ㎓ ~ 3.5 ㎓**



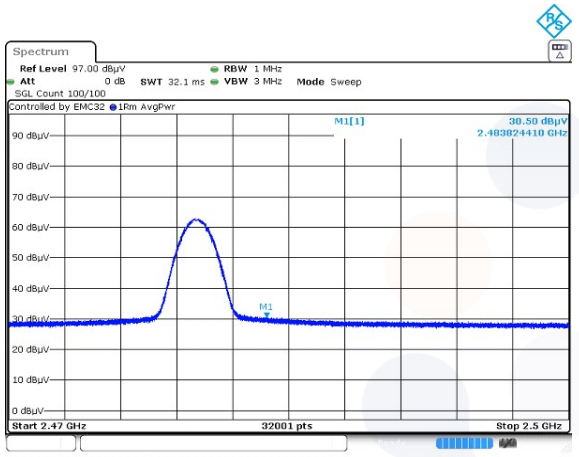

**Horizontal/Vertical for 3.5 ㎓ ~ 18 ㎓**



**2 480 ㎒**

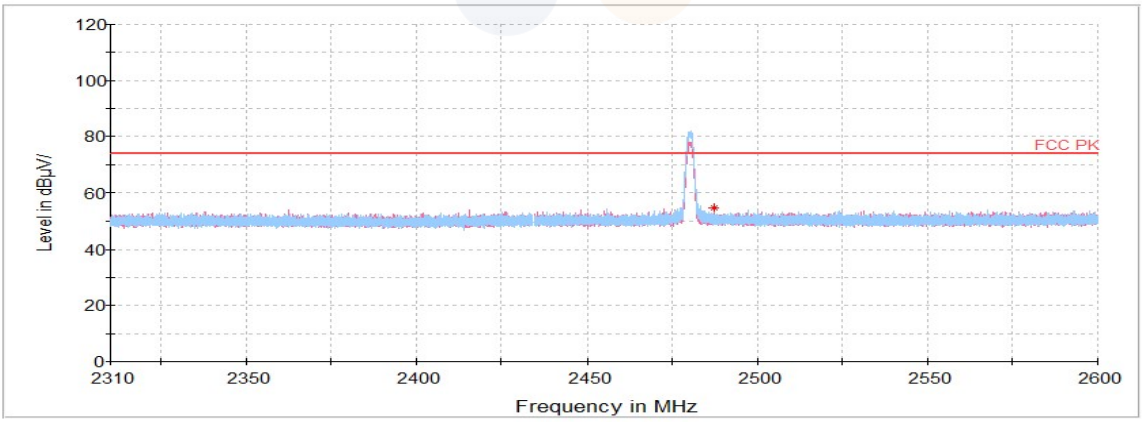
| Frequency | Pol. | Reading | Antenna Factor | Amp. + Cable | DCF | Result | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| [㎒] | [V/H] | [dB(㎶)] | [dB] | [dB] | [dB] | [dB(㎶/m)] | [dB(㎶/m)] | [dB] |
| **Peak data** | | | | | | | | |
| 2 483.82[1)] | H | 40.77 | 32.36 | -18.11 | - | 55.02 | 74.00 | 18.98 |
| 4 959.52[1)] | V | 66.83 | 33.70 | -55.59 | - | 44.94 | 74.00 | 29.06 |
| 7 439.47[1)] | H | 63.91 | 35.19 | -51.95 | - | 47.15 | 74.00 | 26.85 |
| **Average Data** | | | | | | | | |
| 2 483.82[1)] | H | 30.50 | 32.36 | -18.11 | 2.04 | 46.79 | 54.00 | 7.21 |

**Average Data**

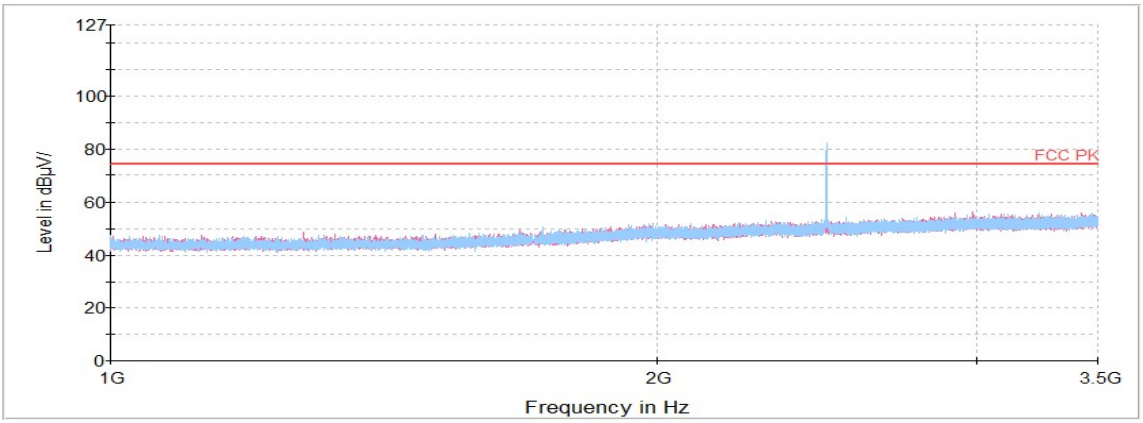



Blank

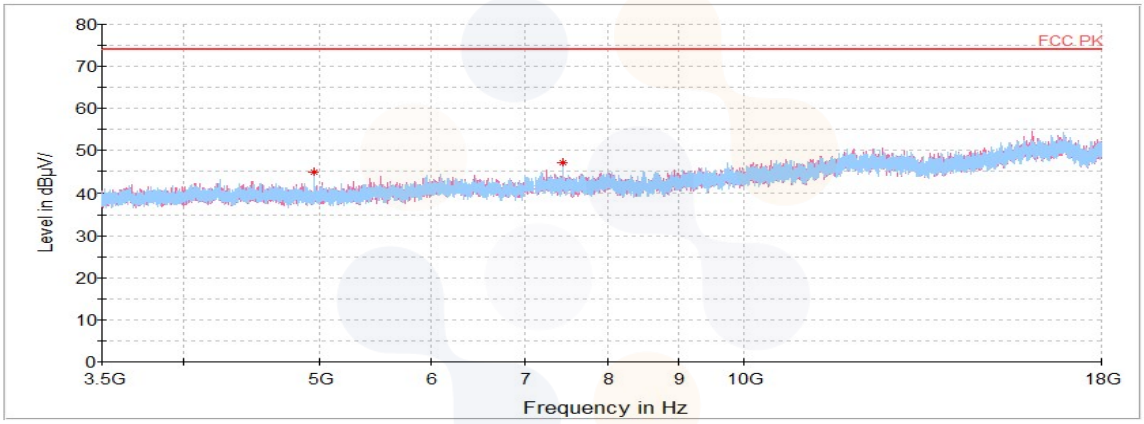
**Horizontal/Vertical for Band-edge**



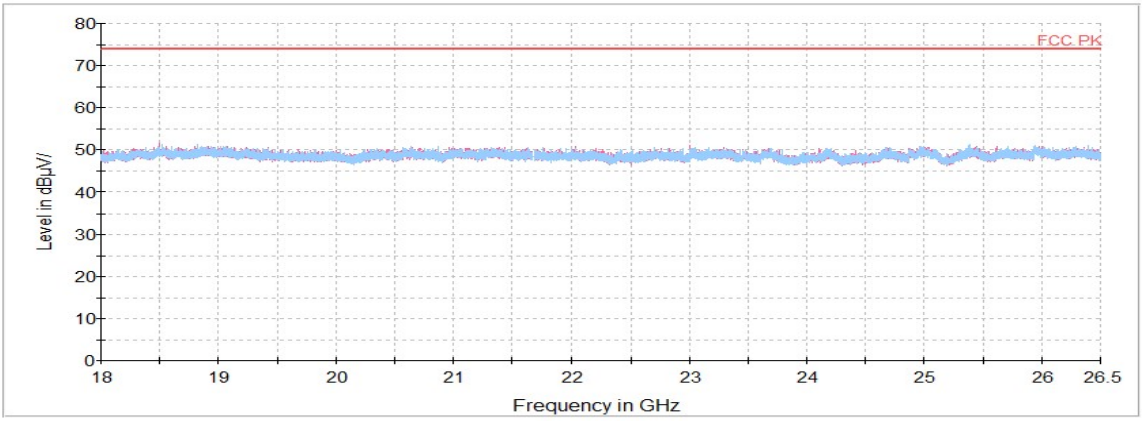
**Horizontal/Vertical for 1 ㎓ ~ 3.5 ㎓**




**Horizontal/Vertical for 3.5 ㎓ ~ 18 ㎓**



**Test results (Above 18 ㎓) – Worst Case : 1 MBits/s(37 Bytes) 2 440 ㎒**

| Horizontal/Vertical for 18 ㎓ ~ 26.5 ㎓ |
|---|
|  |



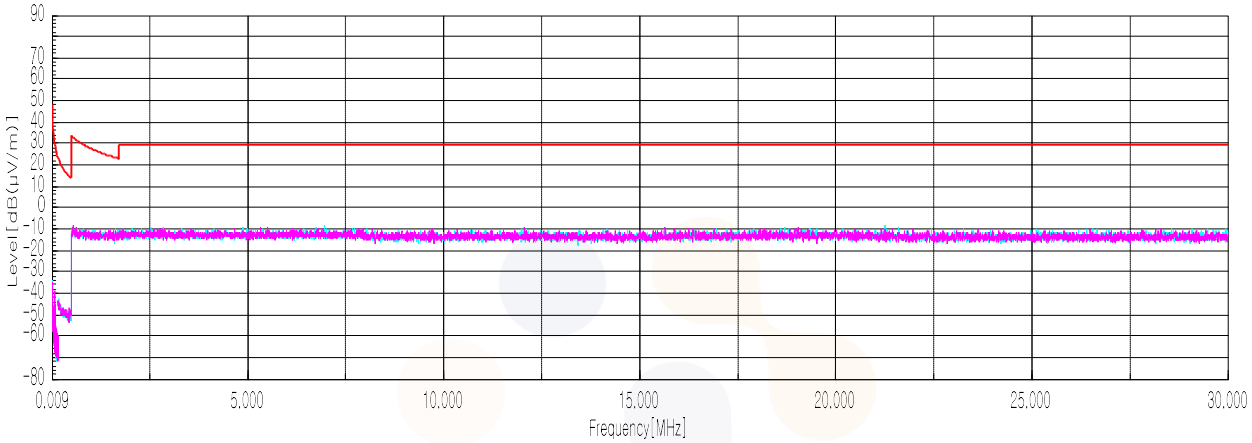
**Note:** The Worst case was based on the lowest margin condition considering Harmonic and Spurious Emission.

**[DC 24 V]**

**Test results (Below 30 ㎒) –Worst case: 1 MBits/s(37 Bytes) 2 402 ㎒**

| Frequency | Pol. | Reading | Antenna Factor | Amp. + Cable | Distance factor | Result | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| (㎒) | (V/H) | (dB(㎶)) | (dB) | (dB) | (dB) | (dB(㎶/m)) | (dB(㎶/m)) | (dB) |
| **Quasi peak data** | | | | | | | | |
| No spurious emissions were detected within 20 ㏈ of the limit | | | | | | | | |

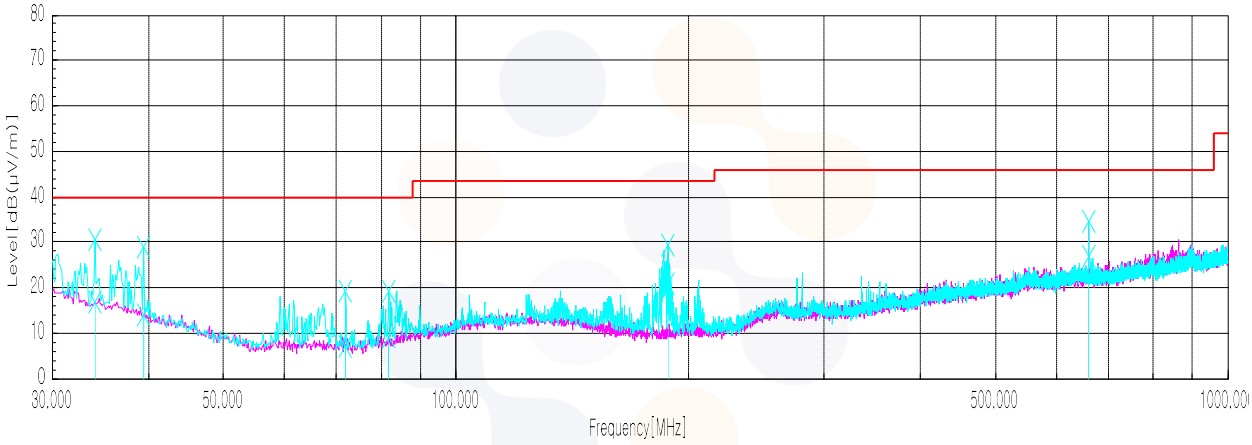
**Horizontal/Vertical**



**Test results (Below 1 000 ㎒) – Worst case: 1 MBits/s(37 Bytes) 2 402 ㎒**

| Frequency | Pol. | Reading | Antenna Factor | Amp. + Cable | Distance factor | Result | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| (㎒) | (V/H) | (dB(㎶)) | (dB) | (dB) | (dB) | (dB(㎶/m)) | (dB(㎶/m)) | (dB) |
| **Quasi peak data** | | | | | | | | |
| 34.12 | V | 24.30 | 22.55 | -30.05 | - | 16.80 | 40.00 | 23.20 |
| 39.46 | V | 24.10 | 19.58 | -29.82 | - | 13.86 | 40.00 | 26.14 |
| 71.95 | V | 23.90 | 12.30 | -29.24 | - | 6.96 | 40.00 | 33.04 |
| 81.90 | V | 24.80 | 13.19 | -28.89 | - | 9.10 | 40.00 | 30.90 |
| 188.47 | V | 33.40 | 14.85 | -27.39 | - | 20.86 | 43.50 | 22.64 |
| 660.02 | V | 24.90 | 24.90 | -22.75 | - | 27.05 | 46.00 | 18.95 |

**Horizontal/Vertical**

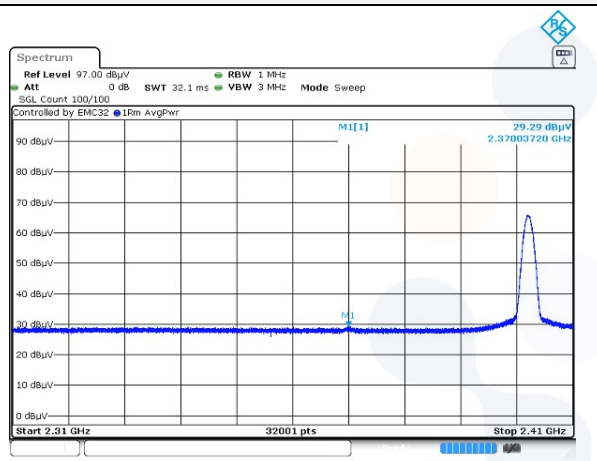


## Test results (Above 1 000 ㎒)_1 MBits/s(37 Bytes)

**2 402 ㎒**

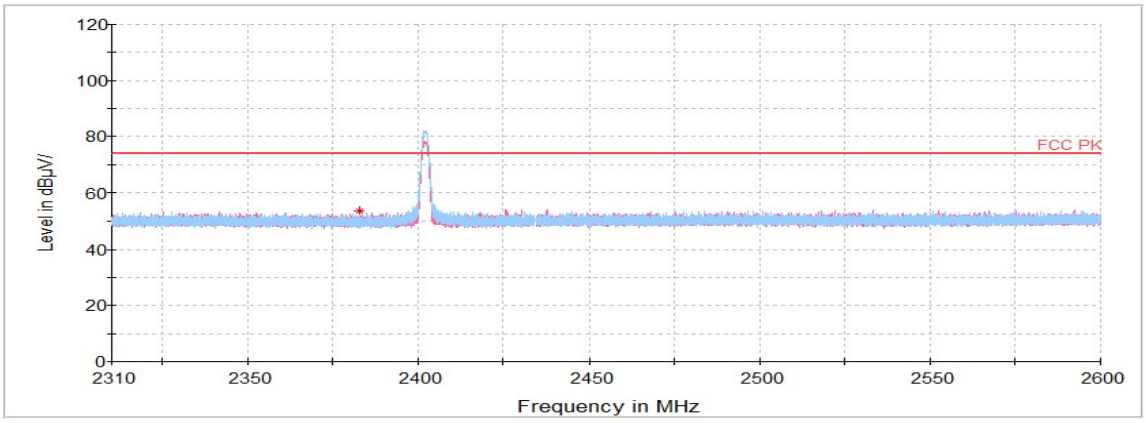
| Frequency | Pol. | Reading | Antenna Factor | Amp. + Cable | DCF | Result | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| [㎒] | [V/H] | [dB(μV)] | [dB] | [dB] | [dB] | [dB(μV/m)] | [dB(μV/m)] | [dB] |
| **Peak data** | | | | | | | | |
| 2 370.04[1)] | H | 39.89 | 32.11 | -18.38 | - | 53.62 | 74.00 | 20.38 |
| 4 061.42[1)] | H | 66.22 | 33.61 | -56.58 | - | 43.25 | 74.00 | 30.75 |
| 4 804.55[1)] | H | 67.03 | 33.70 | -55.94 | - | 44.79 | 74.00 | 29.21 |
| 7 205.20 | H | 73.15 | 35.14 | -51.96 | - | 56.33 | 74.00 | 17.67 |
| **Average Data** | | | | | | | | |
| 2 370.04[1)] | H | 29.29 | 32.11 | -18.38 | 2.06 | 45.08 | 54.00 | 8.92 |

**Average Data**

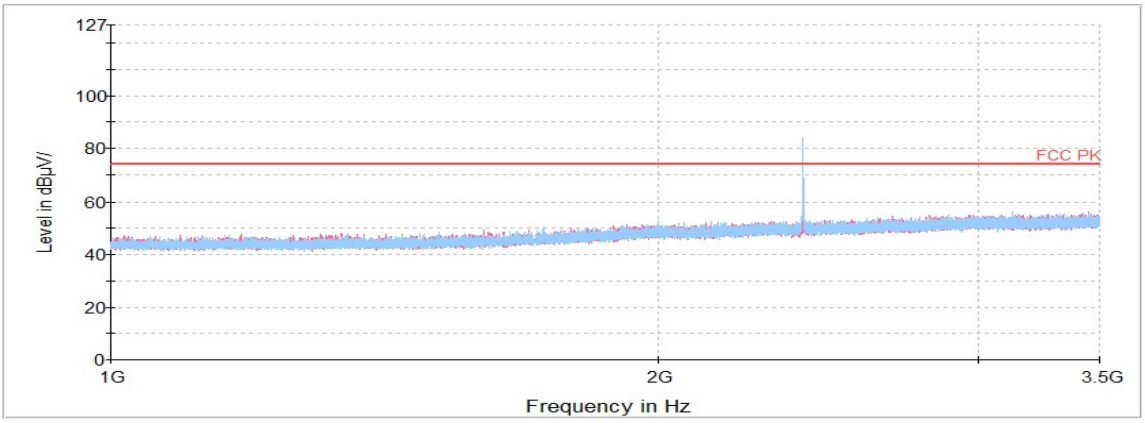



Blank

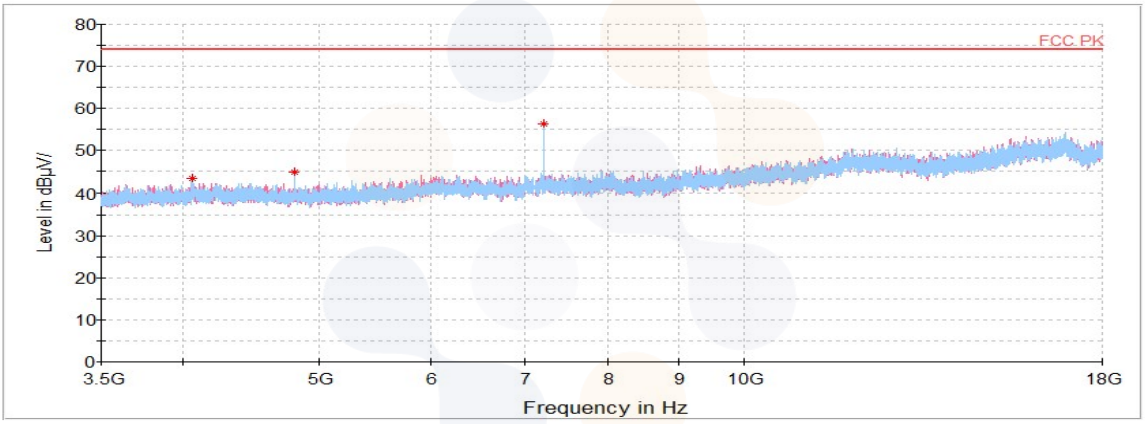
**Horizontal/Vertical for Band-edge**



**Horizontal/Vertical for 1 ㎓ ~ 3.5 ㎓**

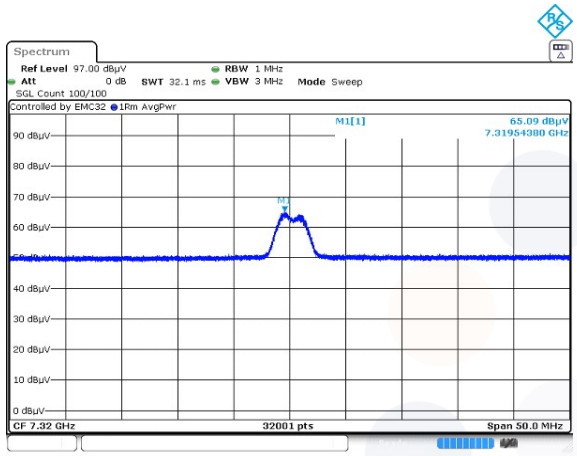



**Horizontal/Vertical for 3.5 ㎓ ~ 18 ㎓**

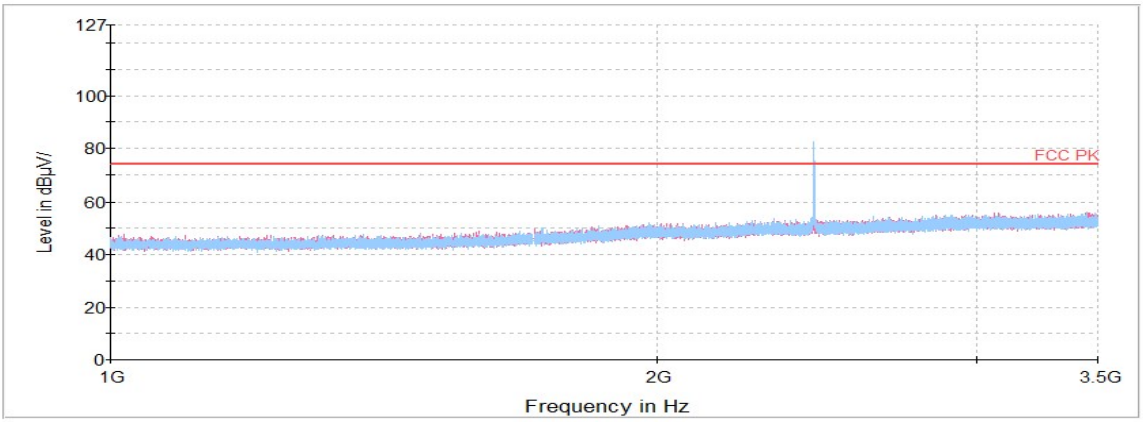


**2 440 ㎒**

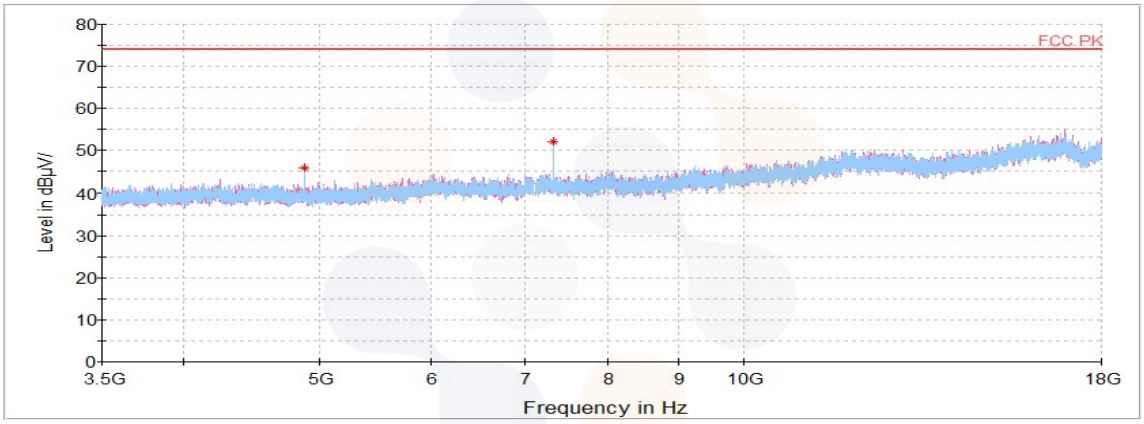
| Frequency | Pol. | Reading | Antenna Factor | Amp. + Cable | DCF | Result | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| [㎒] | [V/H] | [dB(㎶)] | [dB] | [dB] | [dB] | [dB(㎶/m)] | [dB(㎶/m)] | [dB] |
| **Peak data** | | | | | | | | |
| 4 879.31[1)] | H | 67.86 | 33.70 | -55.76 | - | 45.80 | 74.00 | 28.20 |
| 7 319.54[1)] | H | 69.00 | 35.16 | -51.96 | - | 52.20 | 74.00 | 21.80 |
| **Average Data** | | | | | | | | |
| 7 319.54[1)] | H | 65.09 | 35.16 | -51.96 | 2.06 | 50.35 | 54.00 | 3.65 |

| Average Data | |
|---|---|
|  | Blank |

**Horizontal/Vertical for 1 ㎓ ~ 3.5 ㎓**

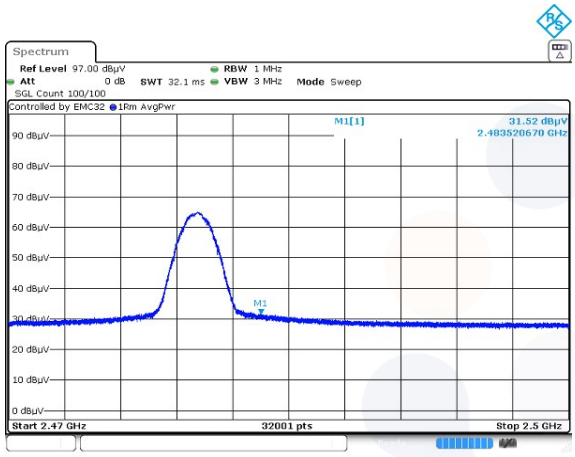


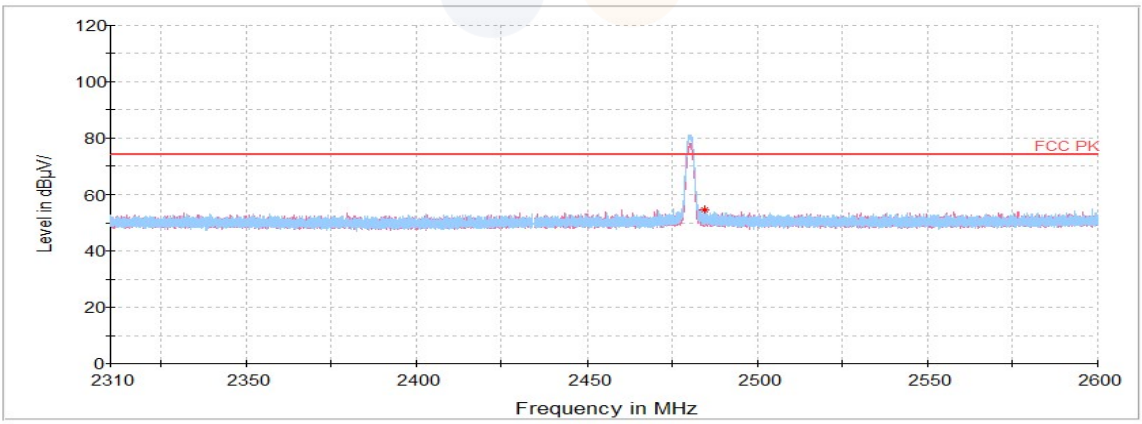

**Horizontal/Vertical for 3.5 ㎓ ~ 18 ㎓**



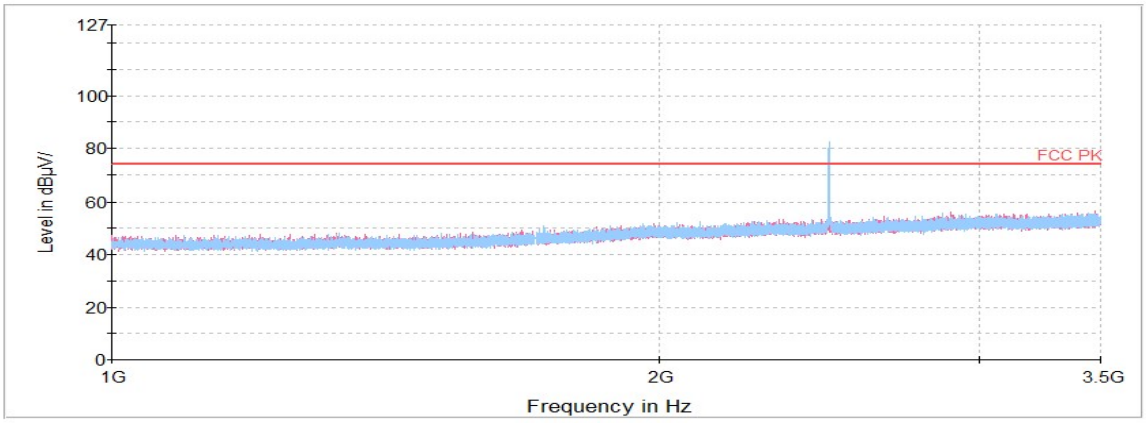
**2 480 ㎒**

| Frequency | Pol. | Reading | Antenna Factor | Amp. + Cable | DCF | Result | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| [㎒] | [V/H] | [dB(㎶)] | [dB] | [dB] | [dB] | [dB(㎶/m)] | [dB(㎶/m)] | [dB] |
| **Peak data** | | | | | | | | |
| 2 483.52[1)] | H | 40.29 | 32.36 | -18.11 | - | 54.54 | 74.00 | 19.46 |
| 4 960.42[1)] | V | 66.51 | 33.70 | -55.58 | - | 44.63 | 74.00 | 29.37 |
| 7 439.47[1)] | H | 62.66 | 35.19 | -51.95 | - | 45.90 | 74.00 | 28.10 |
| **Average Data** | | | | | | | | |
| 2 483.52[1)] | H | 31.52 | 32.36 | -18.11 | 2.06 | 47.83 | 54.00 | 6.17 |

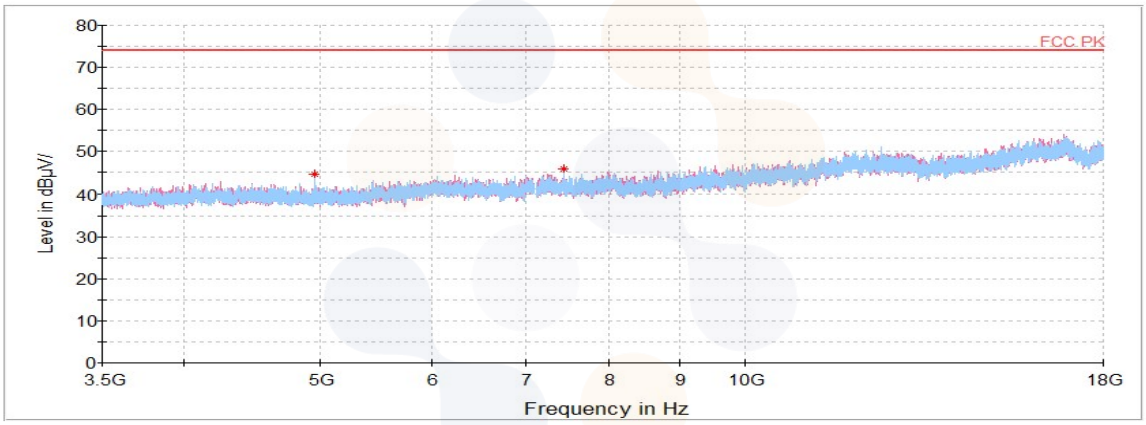
| Average Data | |
|---|---|
|  | Blank |

| Horizontal/Vertical for Band-edge |
|---|
|  |

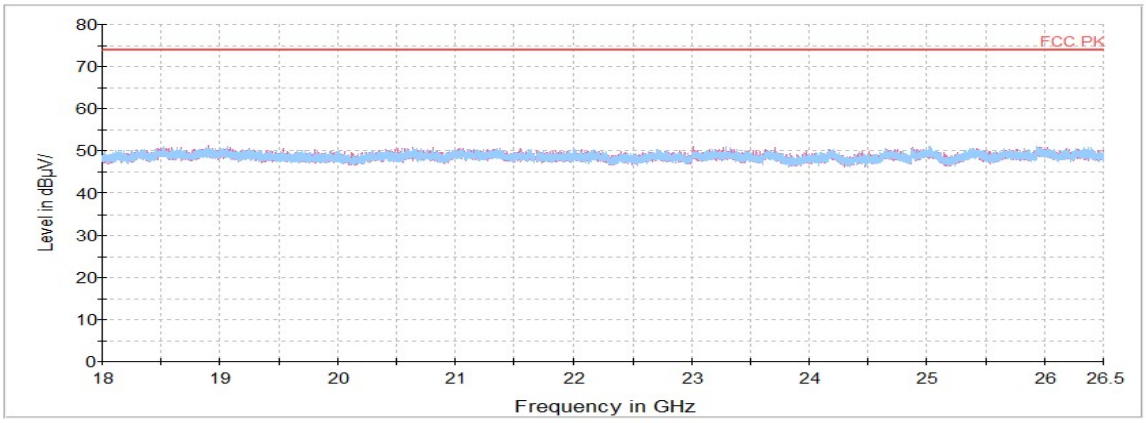
**Horizontal/Vertical for 1 ㎓ ~ 3.5 ㎓**




**Horizontal/Vertical for 3.5 ㎓ ~ 18 ㎓**



**Test results (Above 18 ㎓) – Worst Case : 1 MBits/s(37 Bytes) 2 440 ㎒**

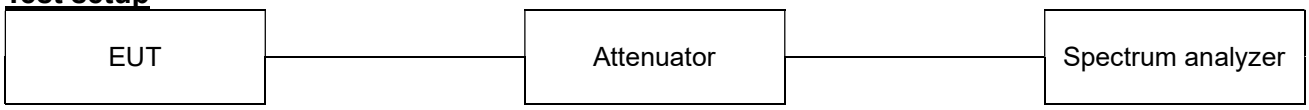
| Horizontal/Vertical for 18 ㎓ ~ 26.5 ㎓ |
|---|
|  |



**Note:** The Worst case was based on the lowest margin condition considering Harmonic and Spurious Emission.

## 7.5. Conducted Spurious Emission

**Test setup**




**Limit**

According to §15.247(d), In any 100 ㎑ bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operation, the radio frequency power that is produced by the intentional radiator shall be at least 20 ㏈ below that in the 100 ㎑ bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation specified in §15.209(a) is not required. In addition, radiated emission limits specified in §15.209(a) (see §15.205(c)).
Limit : 20 ㏈c

**Test procedure**

ANSI C63.10-2013 - Section 11.11.3
KDB 558074 D01 v05 - Section 8.5
KDB 662911 D01 v02r01 – section (E)(3)(b)

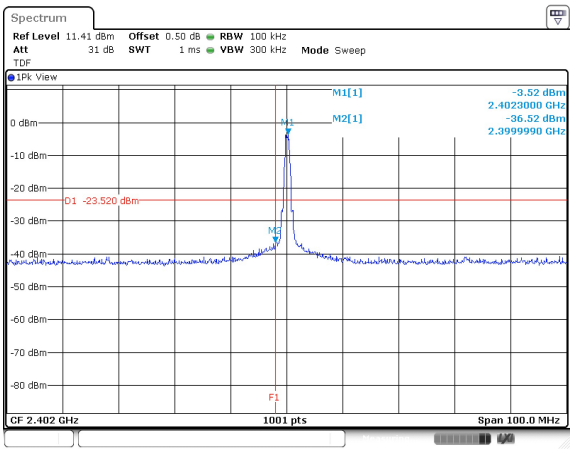
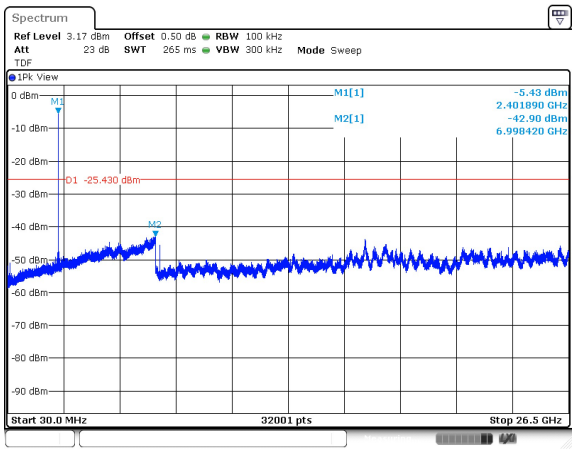
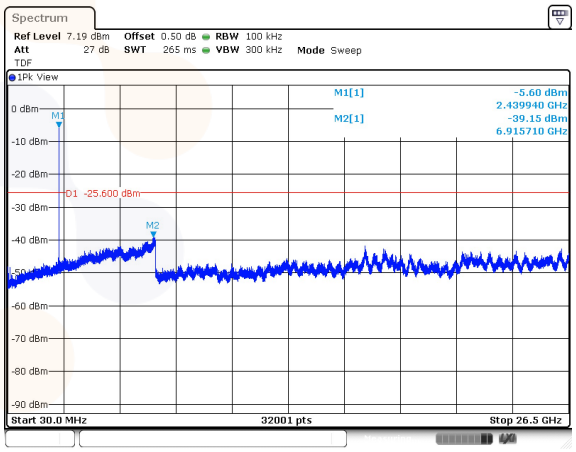
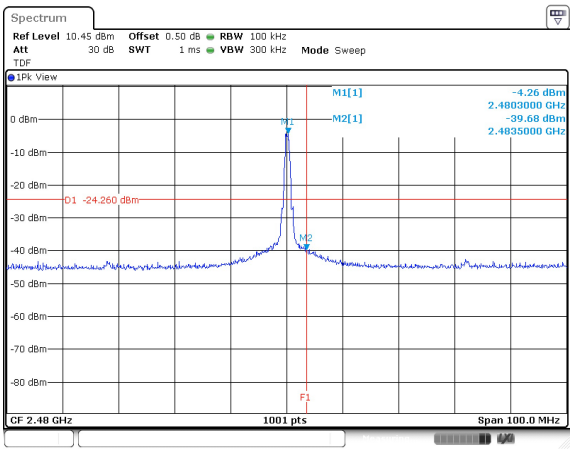
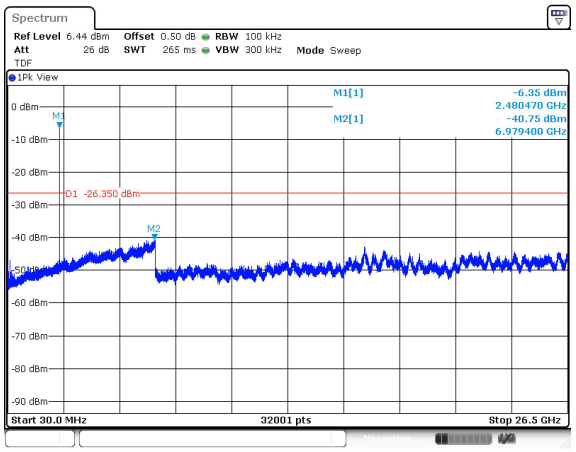
**Test settings**

Establish an emission level by using the following procedure:

1) Set the center frequency and span to encompass frequency range to be measured.
2) Set the RBW = 100 ㎑
3) Set the VBW ≥ [3 x RBW]
4) Detector = peak
5) Sweep time = auto couple
6) Trace mode = max hold
7) Allow trace to fully stabilize.
8) Use the peak marker function to determine the maximum amplitude level.

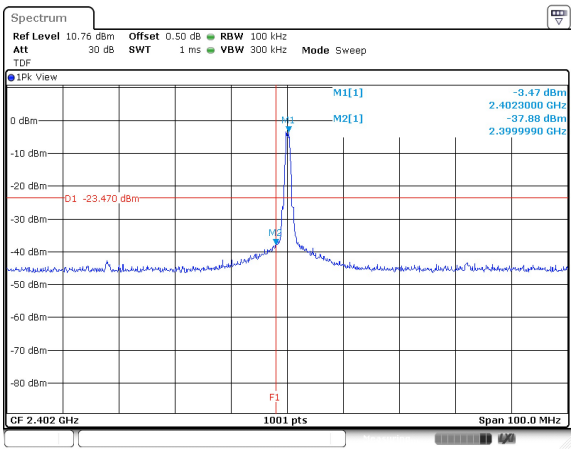
Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11. Report the three highest emissions relative to the limit.

## Test results
## [1 MBits/s(37 Bytes)_DC 12 V]

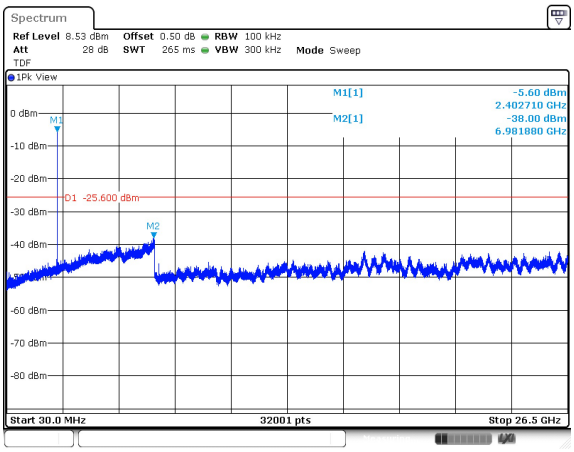
| Conducted band-edge / Low ch. | Conducted spurious / Low ch. |
|---|---|
|  |  |
| **Conducted band-edge / Mid ch.** | **Conducted spurious / Mid ch.** |
| Blank |  |
| **Conducted band-edge / High ch.** | **Conducted spurious / High ch.** |
|  |  |

## [1 MBits/s(37 Bytes)_DC 24 V]

### Conducted band-edge / Low ch.



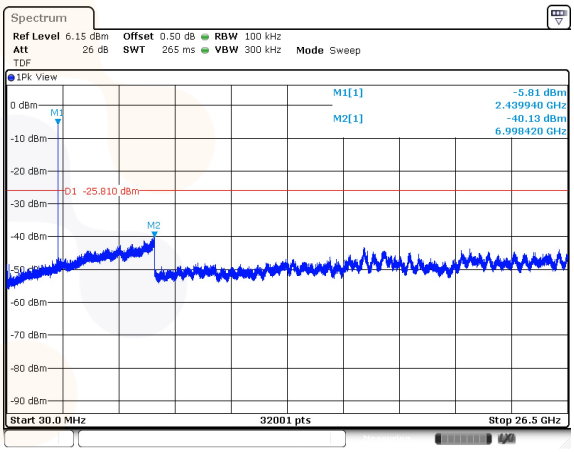

### Conducted spurious / Low ch.



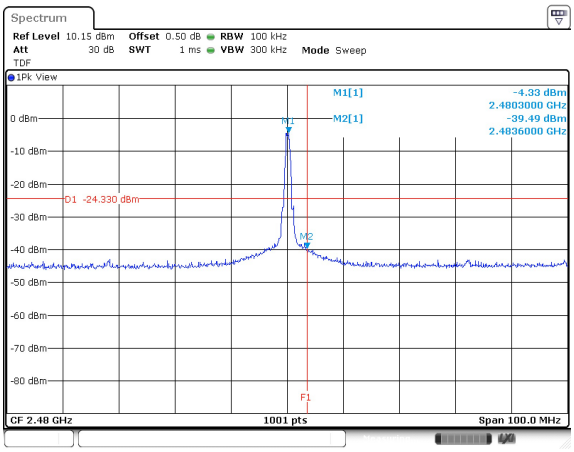

### Conducted band-edge / Mid ch.

Blank

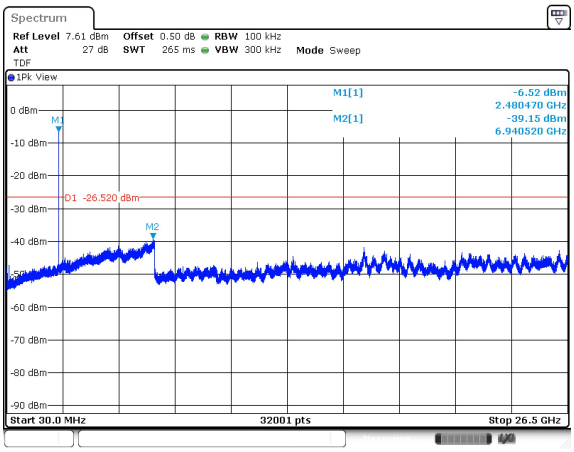
### Conducted spurious / Mid ch.




### Conducted band-edge / High ch.




### Conducted spurious / High ch.



## 8. Measurement equipment

| Equipment Name | Manufacturer | Model No. | Serial No. | Next Cal. Date |
|---|---|---|---|---|
| Spectrum Analyzer | R&S | FSV30 | 100808 | 23.07.11* |
| DC Power Supply | AGILENT | E3632A | MY40004791 | 23.09.14 |
| Attenuator | R&S | DNF Dämpfungsglied 10 dB in N-50 Ohm | 0008 | 24.01.19 |
| Power Sensor | R&S | NRP-Z81 | 1137.9009.02-106223-bB | 24.04.25 |
| Vector Signal Generator | R&S | SMBV100A | 257566 | 23.07.04* |
| Signal Generator | R&S | SMB100A | 176206 | 24.01.19 |
| Spectrum Analyzer | R&S | FSV40 | 100989 | 23.10.14 |
| Horn antenna | ETS.lindgren | 3117 | 155787 | 23.09.29 |
| Horn antenna | ETS.lindgren | 3116 | 86632 | 24.01.25 |
| Attenuator | API Inmet | 40AH2W-10 | 12 | 24.05.03 |
| AMPLIFIER | B&Z Technologies | BZRT-00504000-481055-382525 | 26299-27735 | 23.09.19 |
| AMPLIFIER | B&Z Technologies | BZR-0050400-551028-252525 | 27736 | 23.09.19 |
| High pass Filter | Qotana | DBHF058004000A | 20070100016 | 23.07.04* |
| High pass Filter | WT | WT-A1698-HS | WT160411001 | 24.04.25 |
| EMI TEST RECEIVER | R&S | ESCI7 | 100732 | 24.03.03 |
| Bi-Log Antenna | TESEQ | CBL 6112D | 62438 | 24.08.24 |
| Amplifier | SONOMA INSTRUMENT | 310N | 284608 | 23.08.18 |
| ATTENUATOR | KEYSIGHT | 8491B-6dB | MY39271060 | 24.04.27 |
| ISOLATION TRANSFORMER | ONETECH CO., LTD | OT-IT500VA | OTR1-16026 | 24.03.23 |
| LOOP Antenna | R&S | HFH2-Z2 | 100355 | 24.08.10 |
| Antenna Mast | Innco Systems | MA4000-EP | 303 | - |
| Turn Table | Innco Systems | CO3000 | 1175/45850319/P | - |
| Antenna Mast | Innco Systems | MA4640-XP-ET | - | - |
| Controller | Innco Systems | CO3000 | 1175/45850319/P | - |

* Tests related to this equipment were carried out prior to the calibration due date.

**End of test report**