

# **TEST REPORT**

| Eurofins KCTL Co.,Ltd.<br>65, Sinwon-ro, Yeongtong-gu,<br>Suwon-si, Gyeonggi-do, 16677, Korea<br>TEL: 82-31-285-0894 FAX: 82-505-299-8311<br><u>www.kctl.co.kr</u> |  | Report No.:<br>KR23-SRF0074<br>Page (1) of (19) | CTL   |  |  |  |  |  |
|--|--|---|---|--|--|--|--|--|
| 1. Client  |  |   |   |  |  |  |  |  |
| ∘ Name   | : SUPREMA INC  |   |   |  |  |  |  |  |
| <ul> <li>Address</li> <li>17F-5, Parkview officetower, 248, Jeongjail-ro, Bundang-gu,<br/>Seongnam-si, Gyeonggi-do 13554 Korea (Republic Of)</li> </ul>            |  |   |   |  |  |  |  |  |
| ∘ Date of  | Receipt : 2022-11-22   |   |   |  |  |  |  |  |
| 2. Use of Re   | oort : FCC Class II pe   | ermissive change                                |   |  |  |  |  |  |
| 3. Name of P   | roduct / Model : Fa  | aceStation F2 / FSF2-OE                         | DB  |  |  |  |  |  |
| 4. Manufactu   | rer / Country of Origin : St   | JPREM <mark>A INC /</mark> Korea                |   |  |  |  |  |  |
| 5. FCC ID  | : TKW <mark>FSF2-</mark> ODE   | 3   |   |  |  |  |  |  |
| 6. IC Certific   | ate No. : 2308 <mark>0-FSF</mark> 2OE  | ов  |   |  |  |  |  |  |
| 7. Date of Te  | st : 2023-01-27 to 2   | 2023-02-17                                      |   |  |  |  |  |  |
| 8. Location of 9. Test method  | FCC Part 15 Super Stress Contract Contr | ubpart <mark>C, 15.2</mark> 25                  | Festing<br>n-si, Gyeonggi-do, 16677, Korea) |  |  |  |  |  |
| 10. Test Res   | ult : Refer to the tes   | t result in the test repo                       | rt  |  |  |  |  |  |
|  | Tested by  | Technical M                                     | lanager                                     |  |  |  |  |  |
| Affirmation  | Name : Eunseong Lim (  | Signature) Name : Hee                           | esu Ahn (Signature)                         |  |  |  |  |  |
| 2023-03-06   |  |   |   |  |  |  |  |  |
|  | Eurofine   | s KCTL Co.,Ltd.                                 |   |  |  |  |  |  |
| ntee the who   | sult of the sample which was<br>le product quality. This test<br>Eurofins KCTL Co.,Ltd.  |   |   |  |  |  |  |  |
| KCTL-TIR001-00   | 3/7 (220705)   |   | KP22-06891                                  |  |  |  |  |  |

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**REPORT REVISION HISTORY** 

| Date       | Revision                   | Page No |  |  |
|------------|----------------------------|---------|--|--|
| 2023-03-06 | 23-03-06 Originally issued |         |  |  |
|            |                            |         |  |  |
|            |                            |         |  |  |
|            |                            |         |  |  |
|            |                            |         |  |  |

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#### General remarks for test reports

Statement concerning the uncertainty of the measurement systems used for the tests

(may be required by the product standard or client)

Internal procedure used for type testing through which traceability of the measuring uncertainty has been established:

#### Procedure number, issue date and title:

Calculations leading to the reported values are on file with the testing laboratory that conducted the testing.

Statement not required by the standard or client used for type testing

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## 1. General information

| Client         | : SUPREMA INC   |
|----------------|---|
| Address        | : 17F-5, Parkview officetower,, 248, Jeongjail-ro, Bundang-gu, Seongnam-si, Gyeonggi-do 13554 Korea (Republic Of) |
| Manufacturer   | : SUPREMA INC   |
| Address        | : 17F-5, Parkview officetower, 248, Jeongjail-ro, Bundang-gu, Seongnam-si, Gyeonggi-do 13554 Korea (Republic Of)  |
| Laboratory     | : Eurofins KCTL Co.,Ltd.  |
| Address        | : 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea  |
| Accreditations | : FCC Site Designation No: KR0040, FCC Site Registration No: 687132   |
|                | VCCI Registration No. : R-20080, G-20078, C-20059, T-20056  |
|                | CAB Identifier: KR0040, ISED Number: 8035A  |
|                | KOLAS No.: KT231  |

## 2. Device information

| Equipment under test   |   | FaceStation F2                                 |
|------------------------|---|--|
|                        | • |  |
| Model                  | : | FSF2-ODB                                       |
| Derivative Model       | : | FSF2-ODBT10                                    |
| Frequency range        | : | 13. <mark>56 Mz</mark> (NFC)                   |
|                        |   | 125 🗤 (RFID)                                   |
|                        |   | 2 402 Mz ~ 2 480 Mz (Bluetooth Low Energy)     |
| Modulation technique   | : | ASK (NFC,RFID), GFSK (Bluetooth Low Energy)    |
| Number of channels     | : | 40 ch (Bluetooth Low Energy), 1 ch (NFC, RFID) |
| Power source           | : | DC 12 V, DC 24 V                               |
| Antenna specification  | : | PCB Loop antenna ( <mark>NFC)</mark>           |
|                        |   | Coil antenna (RFID)                            |
|                        |   | PCB Pattern antenna (Bluetooth Low Energy)     |
| Antenna gain           | : | 5.02 dBi (Bluetooth Low Energy)                |
| Software version       | : | V2.0.0   |
| Hardware version       | : | V2.1.1   |
| Operation temperature  | : | -20 °C ~ 50 °C                                 |
| Test device serial No. | : | Conducted : 547835978                          |
|                        |   | Radiated : 547835870                           |
|                        |   |  |

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## 2.1. Information about derivative model

The difference between basic model and derivative models is:

- Radio Hardware such as circuits and electrical components and Software are the same.

| Components          | Basic model          | Derivative model   |
|---------------------|----------------------|--------------------|
| LED board           | FSF2_WHITE-LED_PS1   | FSF2_WHITE-LED_V02 |
| IR LED board        | FSF2_IR LED_PS1      | FSF2_IR LED_V01    |
| Main board          | FSF2_MAIN_PS1        | FSF2_MAIN_V04      |
| RF board            | FSF2_ODB-RFBD_DB_PS1 | FSF2-ODB-RFBD-V01  |
| USB board           | FSF2_ODB_USB_PS1     | FSF2_ODB_USB_V01   |
| Camera 1 module     | SV-SUE1-ET020S       | SV-SUE1-ET020S     |
| Camera 2 module     | SV-SUE1L-ET020S      | SV-SUE1L-ET020S    |
| Finger print module | SFMSLIM-MAIN_02A     | SFMSLIM-MAIN_V02A  |

### 2.2. Frequency/channel operations

This device contains the following capabilities: NFC, RFID(125 ㎢), Bluetooth Low Energy

#### Frequency (Mb)

13.56

Table 2.2.1. NFC mode

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#### Requirement of FCC part section 15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

#### Requirement of RSS-Gen Section 6.8:

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer.

The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type.

-The transmitter has permanently attached PCB Loop antenna (internal antenna) on board.

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| Summary of tests    |  |                               |                   |                        |  |  |  |
|---------------------|--|-------------------------------|-------------------|------------------------|--|--|--|
| FCC Part section(s) | IC Rule<br>reference                           | Parameter                     | Test<br>Condition | Test results           |  |  |  |
| 15.225(a)           | RSS-210<br>B.6(Ⅰ)                              | In-band Fundamental Emission  |                   | Pass                   |  |  |  |
| 15.225(b),<br>(c)   | RSS-210<br>B.6 (    ), (     )                 | In-band Spurious Emission     | Radiated          | Pass                   |  |  |  |
| 15.225(d)<br>15.209 | RSS-210<br>B.6 (Ⅳ)<br>RSS-Gen<br>Issue 9 (8.9) | Out-of-band Spurious Emission | Taulateu          | Pass                   |  |  |  |
| 15.225(e)           | RSS-210<br>B.6 (b)                             | Frequency Stability Tolerance |                   | N/T <sup>(Note1)</sup> |  |  |  |
| 15.215(c)           | -  | 20dB Bandwidth                |                   | N/T <sup>(Note1)</sup> |  |  |  |
| -                   | RSS-Gen<br>Issue 5 (6.7)                       | Occupied Bandwidth            | Conducted         | N/T <sup>(Note1)</sup> |  |  |  |
| 15.207(a)           | RSS-Gen<br>Issue 5 (8.8)                       | AC Conducted emissions        |                   | N/A <sup>(Note2)</sup> |  |  |  |

Notes: (N/T: Not Tested, N/A: Not Applicable)

- This is a FCC Class II Permissive Change report. These test items were performed. (FCC ID: TKWFSF2-ODB, Test Report No. KR20-SRF0241-A issued on 14, October, 2020 by KCTL Inc. Test Report No. KR21-SRF0003-A issued on 28, January, 2021 by KCTL Inc.)
- 2. This test is not applicable because the EUT only connects DC power line.
- 3. All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- 4. These tests were performed other than open field site, adequate comparison measurements were confirmed against 30 m open field site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.
- 5. The fundamental of the EUT was investigated in three orthogonal orientations X, Y, Z It was determined that **Y** orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in **Y** orientation
- 6. The test procedure(s) in this report were performed in accordance as following.
  - ANSI C63.10-2013
- 7. The radiated test was performed with and without passive tag. The test results shown in the following sections represent the worst case emissions.
  - Worst Case : Without passive tag

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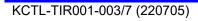


#### 5. Measurement uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013.

All measurement uncertainty values are shown with a coverage factor of k=2 to indicated a 95 % level of confidence. The measurement data shown herein meets of exceeds the  $U_{\text{CISPR}}$  measurement uncertainty values specified in CISPR 16-4-2 and thus, can be compared directly to specified limits to determine compliance.

| Parameter                   | Expanded uncertainty (±) |               |  |  |
|-----------------------------|--------------------------|---------------|--|--|
|                             | 9 kHz ~ 30 MHz           | <b>2.3</b> dB |  |  |
| Radiated spurious emissions | 30 MHz ~ 1 000 MHz       | <b>2.5</b> dB |  |  |
| Radiated spundus emissions  | 1 000 MHz ~ 18 000 MHz   | <b>4.7</b> dB |  |  |
|                             | Above 18 000 Mb          | <b>4.8</b> dB |  |  |
| Conducted Emissions         | 9 kHz ~ 150 kHz          | <b>0.9</b> dB |  |  |
|                             | 150 kHz ~ 30 MHz         | <b>1.3</b> dB |  |  |



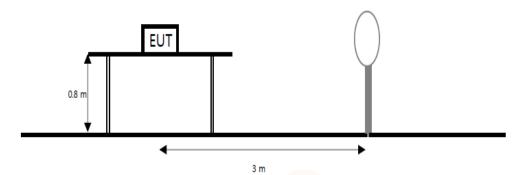
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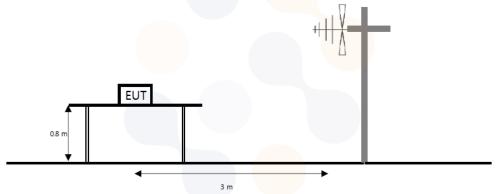
## Test results Radiated spurious emissions

#### <u>Test setup</u>

The diagram below shows the test setup that is utilized to make the measurements for emission from 9 kHz to 30 MHz Emissions



The diagram below shows the test setup that is utilized to make the measurements for emission from 30 Mz to 1 Gz emissions.



#### <u>Limit</u>

15.225 (a), RSS-210 B.6.(a).( i ) The field strength of any emission within the band 13.553-13.567 Mb shall not exceed 15, 848 microvolts/meter at 30 meters.

15.225 (b), RSS-210 B.6.(a).(ii) With in the bands 13.410-13.553 Mz and 13.567-13.710 Mz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

15.225 (c), RSS-210 B.6 (a).(iii) With in the bands 13.110-13.410 Mz and 13.710-14.010 Mz, the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

15.225 (d), RSS-210 B.6.(a).(iv) RSS-Gen Issue 9 (8.9) The Field Strength of any emissions appearing outside of the 13.110-14.010 Mb band shall not exceed the general radiated emission limits in 15.209.

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| Frequency<br>( <sup>M⊉</sup> ) | Field Strength<br>(⊮/m)   | Measurement distance<br>(meters) |  |  |
|--------------------------------|---------------------------|----------------------------------|--|--|
| 0.009-0.490                    | 2400/F( <sup>kHz</sup> )  | 300                              |  |  |
| 0.490-1.705                    | 24000/F( <sup>kHz</sup> ) | 30                               |  |  |
| 1.705-30.0                     | 30(29.54 dB µV/m)         | 30                               |  |  |
| 30.0-88.0                      | 100(40 dB µ//m)           | 3                                |  |  |
| 88-216                         | 150(43.5 dB,///m)         | 3                                |  |  |
| 216-960                        | 200 (46 dB µV/m)          | 3                                |  |  |
| Above 960                      | 500 (53.98 dB µV/m)       | 3                                |  |  |

#### Test procedure

ANSI C63.10-2013 - Section 6.4, 6.5

#### <u>Test settings</u>

- 1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
- 2. RBW = as specified in table
- 3. VBW ≥ 3 x RBW
- 4. Detector = peak
- 5. Sweep time = auto couple
- 6. Trace mode = max hold
- 7. Trace was allowed to stabilize

#### Table. RBW as a function of frequency

| Frequency           | RBW                       |
|---------------------|---------------------------|
| 9 kHz to 150 kHz    | 200 Hz to 300 Hz          |
| 0.15 MHz to 30 MHz  | 9 kHz to 10 kHz           |
| 30 MHz to 1 000 MHz | <b>100</b> kHz to 120 kHz |
| > 1 000 M±z         | 1 MHz                     |

#### Notes:

- 1. f < 30 Mb, extrapolation factor of 40 dB/decade of distance.  $F_d = 40\log(D_m/D_s)$  $f \ge 30$  Mb, extrapolation factor of 20 dB/decade of distance.  $F_d = 20\log(D_m/D_s)$ 
  - Where:
    - $F_d$ = Distance factor in dB
    - D<sub>m</sub>= Measurement distance in meters
    - D<sub>s</sub>= Specification distance in meters
- 2. Measurements were performed at 3m and the data was extrapolated to the specified measurement distance of 30m using the square of an inverse linear distance extrapolation factor (40 dB/decade) as specified in \$ 15.31(f)(2). Extrapolation Factor = 40 log10(30/3) = 40 dB.
- 3. (dB) = Antenna factor(dB/m) + Cable loss(dB) + or Amp. gain(dB) or  $F_d(dB)$
- 4. Result = Reading + Cable loss + Amp gain + Ant. factor Distance factor
- 5. The worst-case emissions are reported however emissions whose levels were not within 20 dB of respective limits were not reported.
- 6. All measurements were recorded using a spectrum analyzer employing a quasi-peak detector.
- 7. Below 30 Mb frequency range, all orientations about parallel, perpendicular, and ground-parallel were investigated then reported and the worse orientations of Face-on and Face-off were set for final test.
- 8. Face-on = Parallel, Face-off = Perpendicular

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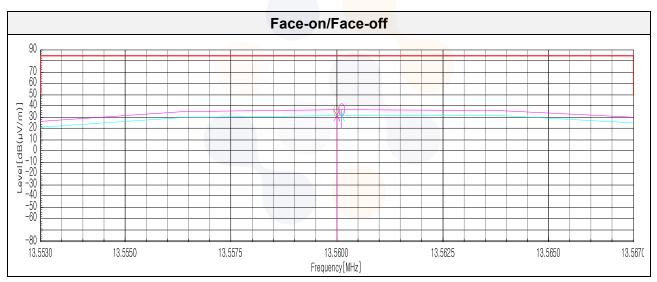
#### [DC 12V] <u>Test results for fundamental</u> 15.225 (a) 13.553-13.567 ₩2

[Face-on]

| Frequency       | Reading  | Antenna<br>Factor | Amp. + Cable | Distance<br>Factor | Result                       | Limit                        | Margin |
|-----------------|----------|-------------------|--------------|--------------------|------------------------------|------------------------------|--------|
| (MHz)           | (dB(µV)) | (dB)              | (dB)         | (dB)               | (dB( <i>µ</i> V/ <b>m</b> )) | (dB( <i>µ</i> N/ <b>m</b> )) | (dB)   |
| Quasi peak data |          |                   |              |                    |                              |                              |        |
| 13.56           | 86.70    | 20.2              | -31.33       | 40.00              | 35.57                        | 84.00                        | 48.43  |

[Face-off]

| Frequency       | Reading  | Antenna<br>Factor | Amp. + Cable | Distance<br>Factor | Result                       | Limit                        | Margin |
|-----------------|----------|-------------------|--------------|--------------------|------------------------------|------------------------------|--------|
| (MHz)           | (dB(µV)) | (dB)              | (dB)         | (dB)               | (dB( <i>µ</i> V/ <b>m</b> )) | (dB( <i>µ</i> V/ <b>m</b> )) | (dB)   |
| Quasi peak data |          |                   |              |                    |                              |                              |        |
| 13.56           | 82.10    | 20.2              | -31.33       | 40.00              | 30.97                        | 84.00                        | 53.03  |



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#### Test results for in-band & out-band (9 kt to 30 Mz)

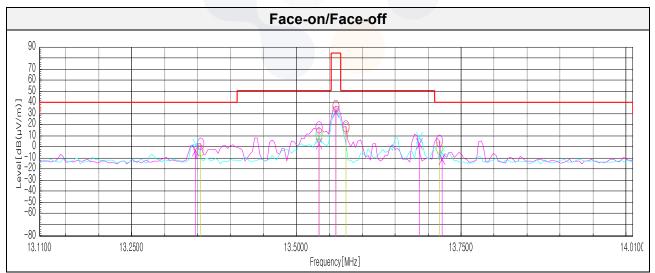
#### 15.225 (b,c) 13.110-14.010 Mtz

[Face-on]

| Frequency | Reading  | Antenna<br>Factor | Amp. + Cable | Distance<br>Factor | Result     | Limit                        | Margin |
|-----------|----------|-------------------|--------------|--------------------|------------|------------------------------|--------|
| (MHz)     | (dB(#V)) | (dB)              | (dB)         | (dB)               | (dB(µV/m)) | (dB( <i>µ</i> V/ <b>m</b> )) | (dB)   |
|           |          |                   | Quasi p      | eak data           |            |                              |        |
| 13.35     | 47.50    | 20.20             | -31.34       | 40.00              | -3.64      | 40.50                        | 44.14  |
| 13.53     | 53.10    | 20.20             | -31.33       | 40.00              | 1.97       | 50.50                        | 48.53  |
| 13.58     | 67.10    | 20.20             | -31.33       | 40.00              | 15.97      | 40.50                        | 24.53  |
| 13.72     | 50.20    | 20.20             | -31.33       | 40.00              | -0.93      | 50.50                        | 51.43  |

#### [Face-off]

| Frequency       | Reading  | Antenna<br>Factor   | Amp. + Cable | Distance<br>Factor | Result                       | Limit                        | Margin |
|-----------------|----------|---------------------|--------------|--------------------|------------------------------|------------------------------|--------|
| (MHz)           | (dB(µV)) | (dB)                | (dB)         | (dB)               | (dB( <i>µ</i> V/ <b>m</b> )) | (dB( <i>µ</i> V/ <b>m</b> )) | (dB)   |
| Quasi peak data |          |                     |              |                    |                              |                              |        |
| 13.36           | 47.80    | 20.2 <mark>0</mark> | -31.34       | 40.00              | <mark>-3.</mark> 34          | 50.50                        | 53.84  |
| 13.53           | 62.10    | 20.2 <mark>0</mark> | -31.33       | 40.00              | 10.97                        | 40.50                        | 29.53  |
| 13.69           | 53.90    | 20.20               | -31.33       | 40.00              | 2.77                         | 50.50                        | 47.73  |
| 13.72           | 39.60    | 20.20               | -31.33       | 40.00              | -11.53                       | 40.50                        | 52.03  |



Note. The limits in CFR 47, Part 15, Subpart C, paragraph 15.209 (a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377Ω. For example, the measurement frequency X klz resulted in a level of Y dBµV/m, which is equivalent to Y-51.5 = Z dBµA/m, which has the same margin, W dB, to the corresponding RSS-GEN Table 6 limit as it has to the 15.209(a) limit.

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Test results (9 kHz to 30 MHz)

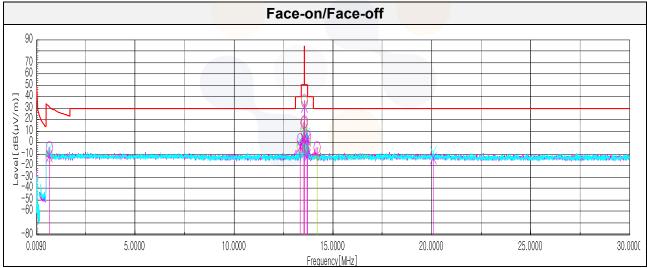
#### 15.225 (d) 0.009-30 Mtz

[Face-on]

| Frequency | Reading         | Antenna<br>Factor | Amp. + Cable | Distance<br>Factor | Result                       | Limit                        | Margin |  |  |  |
|-----------|-----------------|-------------------|--------------|--------------------|------------------------------|------------------------------|--------|--|--|--|
| (MHz)     | (dB(µV))        | (dB)              | (dB)         | (dB)               | (dB( <i>µ</i> V/ <b>m</b> )) | (dB( <i>µ</i> V/ <b>m</b> )) | (dB)   |  |  |  |
|           | Quasi peak data |                   |              |                    |                              |                              |        |  |  |  |
| 0.65      | 41.10           | 20.20             | -31.31       | 40.00              | -10.01                       | 29.54                        | 39.55  |  |  |  |
| 14.20     | 41.10           | 20.20             | -31.30       | 40.00              | -10.00                       | 29.54                        | 39.54  |  |  |  |

#### [Face-off]

| Frequency | Reading         | Antenna<br>Factor Amp. + Cable |        | Distance<br>Factor | Result                      | Limit                        | Margin |  |  |  |
|-----------|-----------------|--------------------------------|--------|--------------------|-----------------------------|------------------------------|--------|--|--|--|
| (MHz)     | (dB(µV))        | (dB) (dB)                      |        | (dB)               | (dB( <i>µ</i> V/ <b>m))</b> | (dB( <i>µ</i> V/ <b>m</b> )) | (dB)   |  |  |  |
|           | Quasi peak data |                                |        |                    |                             |                              |        |  |  |  |
| 0.65      | 40.10           | 20.15                          | -31.68 | 40.00              | -11.43                      | 29.54                        | 40.97  |  |  |  |
| 20.09     | 36.20           | 20.60                          | -30.99 | 40.00              | -14.19                      | 29.54                        | 43.73  |  |  |  |



Note. The limits in CFR 47, Part 15, Subpart C, paragraph 15.209 (a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377Ω. For example, the measurement frequency X kt resulted in a level of Y dBµN/m, which is equivalent to Y-51.5 = Z dBµA/m, which has the same margin, W dB, to the corresponding RSS-GEN Table 6 limit as it has to the 15.209(a) limit.

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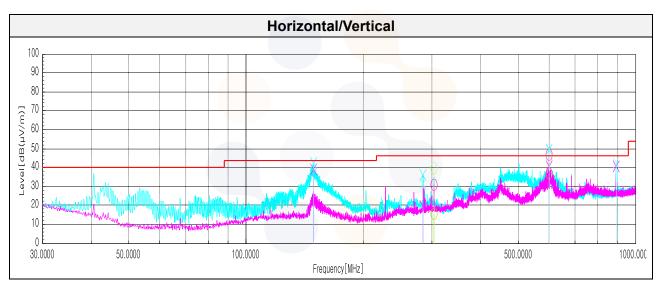


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#### Test results (Below 1 000 Mtz)

#### 15.225 (d) 30-1 000 Mtz

| Frequency       | Pol.  | Reading  | Antenna<br>Factor | Amp. + Cable | Distance<br>Factor | Result                       | Limit                        | Margin |
|-----------------|-------|----------|-------------------|--------------|--------------------|------------------------------|------------------------------|--------|
| (MHz)           | (V/H) | (dB(µV)) | (dB)              | (dB)         | (dB)               | (dB( <i>µ</i> V/ <b>m</b> )) | (dB( <i>µ</i> V/ <b>m</b> )) | (dB)   |
| Quasi peak data |       |          |                   |              |                    |                              |                              |        |
| 149.13          | V     | 50.30    | 16.69             | -27.90       | -                  | 39.09                        | 43.50                        | 4.41   |
| 285.00          | V     | 27.10    | 18.80             | -26.15       | -                  | 19.75                        | 46.00                        | 26.25  |
| 303.98          | Н     | 22.50    | 19.18             | -26.05       | -                  | 15.63                        | 46.00                        | 30.37  |
| 599.99          | Н     | 35.80    | 24.50             | -23.31       | -                  | 36.99                        | 46.00                        | 9.01   |
| 599.99          | V     | 39.50    | 24.50             | -23.31       | -                  | 40.69                        | 46.00                        | 5.31   |
| 891.00          | V     | 34.50    | 26.52             | -20.29       | -                  | 40.73                        | 46.00                        | 5.27   |



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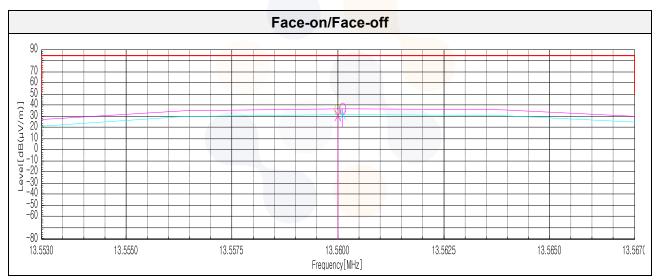
#### [DC 24V] <u>Test results for fundamental</u> <u>15.225 (a) 13.553-13.567</u> ₩2

[Face-on]

| Frequency | Reading  | Antenna<br>Factor | Amp. + Cable | Distance<br>Factor | Result                       | Limit                        | Margin |
|-----------|----------|-------------------|--------------|--------------------|------------------------------|------------------------------|--------|
| (MHz)     | (dB(µV)) | (dB)              | (dB)         | (dB)               | (dB( <i>µ</i> V/ <b>m</b> )) | (dB( <i>µ</i> N/ <b>m</b> )) | (dB)   |
|           |          |                   | Quasi p      | eak data           |                              |                              |        |
| 13.56     | 86.80    | 20.2              | -31.33       | 40.00              | 35.67                        | 84.00                        | 48.33  |

[Face-off]

| Frequency | Reading  | Antenna<br>Factor | Amp. + Cable | Distance<br>Factor | Result                       | Limit                        | Margin |
|-----------|----------|-------------------|--------------|--------------------|------------------------------|------------------------------|--------|
| (MHz)     | (dB(µV)) | (dB)              | (dB)         | (dB)               | (dB( <i>µ</i> V/ <b>m</b> )) | (dB( <i>µ</i> V/ <b>m</b> )) | (dB)   |
|           |          |                   | Quasi p      | eak data           |                              |                              |        |
| 13.56     | 81.10    | 20.2              | -31.33       | 40.00              | 29.97                        | 84.00                        | 54.03  |





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#### Test results for in-band & out-band (9 kt to 30 Mt)

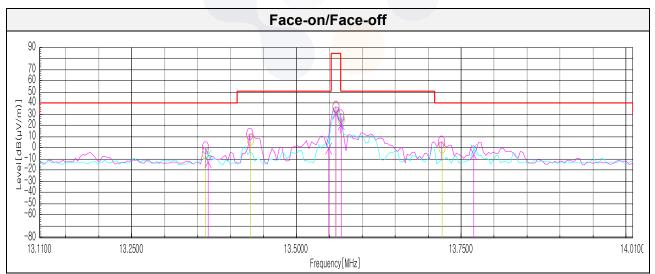
#### 15.225 (b,c) 13.110-14.010 Mtz

[Face-on]

| Frequency       | Reading  | Antenna<br>Factor | Amp. + Cable | Distance<br>Factor | Result                       | Limit                        | Margin |
|-----------------|----------|-------------------|--------------|--------------------|------------------------------|------------------------------|--------|
| (MHz)           | (dB(µV)) | (dB)              | (dB)         | (dB)               | (dB( <i>µ</i> V/ <b>m</b> )) | (dB( <i>µ</i> V/ <b>m</b> )) | (dB)   |
| Quasi peak data |          |                   |              |                    |                              |                              |        |
| 13.36           | 45.70    | 20.20             | -31.34       | 40.00              | -5.44                        | 40.50                        | 45.94  |
| 13.43           | 57.80    | 20.20             | -31.33       | 40.00              | 6.67                         | 50.50                        | 43.83  |
| 13.57           | 76.20    | 20.20             | -31.33       | 40.00              | 25.07                        | 40.50                        | 15.43  |
| 13.72           | 51.30    | 20.20             | -31.33       | 40.00              | 0.17                         | 50.50                        | 50.33  |

#### [Face-off]

| Frequency       | Reading  | Antenna<br>Factor   | Amp. + Cable | Distance<br>Factor | Result                       | Limit                        | Margin |
|-----------------|----------|---------------------|--------------|--------------------|------------------------------|------------------------------|--------|
| (MHz)           | (dB(µV)) | (dB)                | (dB)         | (dB)               | (dB( <i>µ</i> V/ <b>m</b> )) | (dB( <i>µ</i> V/ <b>m</b> )) | (dB)   |
| Quasi peak data |          |                     |              |                    |                              |                              |        |
| 13.37           | 37.80    | 20.2 <mark>0</mark> | -31.34       | 40.00              | <mark>-13.</mark> 34         | 50.50                        | 63.84  |
| 13.55           | 49.70    | 20.2 <mark>0</mark> | -31.33       | 40.00              | <mark>-1.</mark> 43          | 40.50                        | 41.93  |
| 13.57           | 71.80    | 20.20               | -31.33       | 40.00              | 20.67                        | 50.50                        | 29.83  |
| 13.77           | 44.50    | 20.20               | -31.32       | 40.00              | -6.62                        | 40.50                        | 47.12  |



Note. The limits in CFR 47, Part 15, Subpart C, paragraph 15.209 (a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377Ω. For example, the measurement frequency X klz resulted in a level of Y dBµV/m, which is equivalent to Y-51.5 = Z dBµA/m, which has the same margin, W dB, to the corresponding RSS-GEN Table 6 limit as it has to the 15.209(a) limit.

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Test results (9 kHz to 30 MHz)

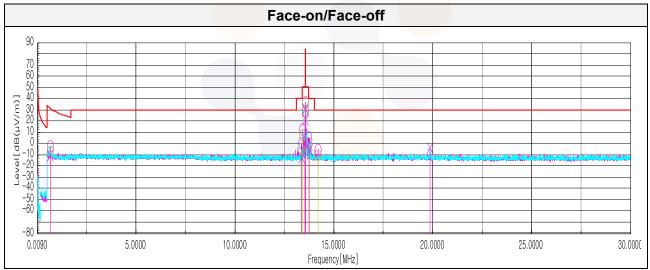
#### 15.225 (d) 0.009-30 Mtz

[Face-on]

| Frequency | Reading         | Antenna<br>Factor | Amp. + Cable | Distance<br>Factor | Result     | Limit                        | Margin |  |  |  |
|-----------|-----------------|-------------------|--------------|--------------------|------------|------------------------------|--------|--|--|--|
| (MHz)     | (dB(µV))        | (dB)              | (dB)         | (dB)               | (dB(µV/m)) | (dB( <i>µ</i> V/ <b>m</b> )) | (dB)   |  |  |  |
|           | Quasi peak data |                   |              |                    |            |                              |        |  |  |  |
| 0.65      | 41.20           | 19.90             | -32.33       | 40.00              | -11.23     | 29.54                        | 40.77  |  |  |  |
| 14.20     | 40.10           | 20.20             | -31.30       | 40.00              | -11.00     | 29.54                        | 40.54  |  |  |  |

#### [Face-off]

| Frequency | Reading         | Antenna<br>Factor Amp. + Cable |              | Distance<br>Factor | Result                      | Limit                        | Margin |  |  |  |
|-----------|-----------------|--------------------------------|--------------|--------------------|-----------------------------|------------------------------|--------|--|--|--|
| (MHz)     | (dB(µV))        | (dB)                           | (dB) (dB) (d |                    | (dB( <i>µ</i> V/ <b>m))</b> | (dB( <i>µ</i> V/ <b>m</b> )) | (dB)   |  |  |  |
|           | Quasi peak data |                                |              |                    |                             |                              |        |  |  |  |
| 0.65      | 44.60           | 19.90                          | -32.33       | 40.00              | -7.83                       | 29.54                        | 37.37  |  |  |  |
| 19.86     | 45.80           | 20.59                          | -31.00       | 40.00              | -4.61                       | 29.54                        | 34.15  |  |  |  |



Note. The limits in CFR 47, Part 15, Subpart C, paragraph 15.209 (a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377Ω. For example, the measurement frequency X kt resulted in a level of Y dBµN/m, which is equivalent to Y-51.5 = Z dBµA/m, which has the same margin, W dB, to the corresponding RSS-GEN Table 6 limit as it has to the 15.209(a) limit.

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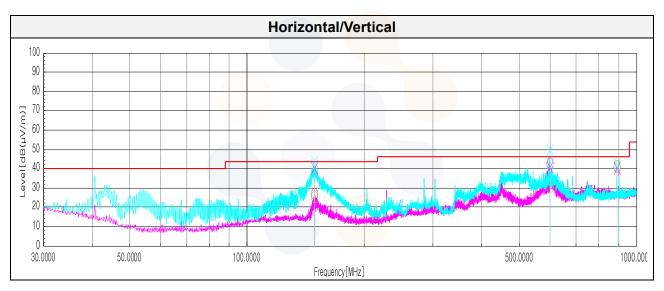


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Test results (Below 1 000 Mtz)

#### 15.225 (d) 30-1 000 Mtz

| Frequency       | Pol.  | Reading  | Antenna<br>Factor | Amp. + Cable | Distance<br>Factor | Result                       | Limit                        | Margin |
|-----------------|-------|----------|-------------------|--------------|--------------------|------------------------------|------------------------------|--------|
| (MHz)           | (V/H) | (dB(µV)) | (dB)              | (dB)         | (dB)               | (dB( <i>µ</i> V/ <b>m</b> )) | (dB( <i>µ</i> V/ <b>m</b> )) | (dB)   |
| Quasi peak data |       |          |                   |              |                    |                              |                              |        |
| 149.12          | V     | 51.50    | 18.85             | -28.68       | -                  | 41.67                        | 46.00                        | 4.33   |
| 149.14          | Н     | 36.70    | 18.85             | -28.68       | -                  | 26.87                        | 43.50                        | 16.63  |
| 599.98          | V     | 39.40    | 25.70             | -24.18       | -                  | 40.92                        | 43.50                        | 2.58   |
| 599.99          | Н     | 28.90    | 25.70             | -24.18       | -                  | 30.42                        | 46.00                        | 15.58  |
| 891.01          | Н     | 34.70    | 29.30             | -21.52       | -                  | 42.48                        | 46.00                        | 3.52   |
| 891.01          | V     | 34.00    | 29.30             | -21.52       | -                  | 41.78                        | 46.00                        | 4.22   |



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| 7. Measureme               | nt equipment         |           |                 |                |
|----------------------------|----------------------|-----------|-----------------|----------------|
| Equipment Name             | Manufacturer         | Model No. | Serial No.      | Next Cal. Date |
| Vector Signal<br>Generator | R&S                  | SMBV100A  | 257566          | 23.07.04       |
| Signal Generator           | R&S                  | SMB100A   | 176206          | 24.01.19       |
| Spectrum Analyzer          | R&S                  | FSV30     | 100914          | 23.09.14       |
| DC Power Supply            | AGILENT              | E3632A    | MY40008800      | 23.07.11       |
| EMI TEST RECEIVER          | R&S                  | ESCI7     | 100732          | *24.03.03      |
| Amplifier                  | SONOMA<br>INSTRUMENT | 310N      | 300314          | 24.01.19       |
| Bi-Log Antenna             | TESEQ                | CBL 6112D | 62438           | 24.08.24       |
| LOOP Antenna               | R&S                  | HFH2-Z2   | 100355          | 24.08.10       |
| ATTENUATOR                 | KEYSIGHT             | 8491B-6dB | MY39271082      | 24.04.27       |
| Turn Table                 | Innco Systems        | CO3000    | 1175/45850319/P | -              |
| Antenna Mast               | Innco Systems        | MA4000-EP | 303             | -              |

\*This test was performed prior to calibration.

End of test report