



TEST REPORT

Eurofins KCTL Co.,Ltd.
 65, Sinwon-ro, Yeongtong-gu,
 Suwon-si, Gyeonggi-do, 16677, Korea
 TEL: 82-31-285-0894 FAX: 82-505-299-8311
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Report No.:
 KR23-SRF0074
 Page (1) of (19)



KCTL

1. Client

- Name : SUPREMA INC
- Address : 17F-5, Parkview officetower,, 248, Jeongjail-ro, Bundang-gu,
Seongnam-si, Gyeonggi-do 13554 Korea (Republic Of)
- Date of Receipt : 2022-11-22

2. Use of Report : FCC Class II permissive change

3. Name of Product / Model : FaceStation F2 / FSF2-ODB

4. Manufacturer / Country of Origin : SUPREMA INC / Korea

5. FCC ID : TKWFSF2-ODB

6. IC Certificate No. : 23080-FSF2ODB

7. Date of Test : 2023-01-27 to 2023-02-17

8. Location of Test : ☒ Permanent Testing Lab ☐ On Site Testing
 (Address:65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea)
 FCC Part 15 Subpart C, 15.225

9. Test method used : RSS-210 Issue 10 April 2020
 RSS-Gen Issue 5 February 2021


10. Test Result : Refer to the test result in the test report

Affirmation	Tested by	Technical Manager
	Name : Eunseong Lim (Signature)	Name : Heesu Ahn (Signature)

2023-03-06

Eurofins KCTL Co.,Ltd.

As a test result of the sample which was submitted from the client, this report does not guarantee the whole product quality. This test report should not be used and copied without a written agreement by Eurofins KCTL Co.,Ltd.

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REPORT REVISION HISTORY

Date	Revision	Page No
2023-03-06	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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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 kHz), Bluetooth Low Energy

Frequency (MHz)
13.56

Table 2.2.1. NFC mode

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3. Antenna requirement

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.

4. Summary of tests

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

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.)
- This test is not applicable because the EUT only connects DC power line.
- All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- 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.
- 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
- The test procedure(s) in this report were performed in accordance as following.
 - ◆ ANSI C63.10-2013
- 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

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 or exceeds the U_{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 (\pm)	
Radiated spurious emissions	9 kHz ~ 30 MHz	2.3 dB
	30 MHz ~ 1 000 MHz	2.5 dB
	1 000 MHz ~ 18 000 MHz	4.7 dB
	Above 18 000 MHz	4.8 dB
Conducted Emissions	9 kHz ~ 150 kHz	0.9 dB
	150 kHz ~ 30 MHz	1.3 dB

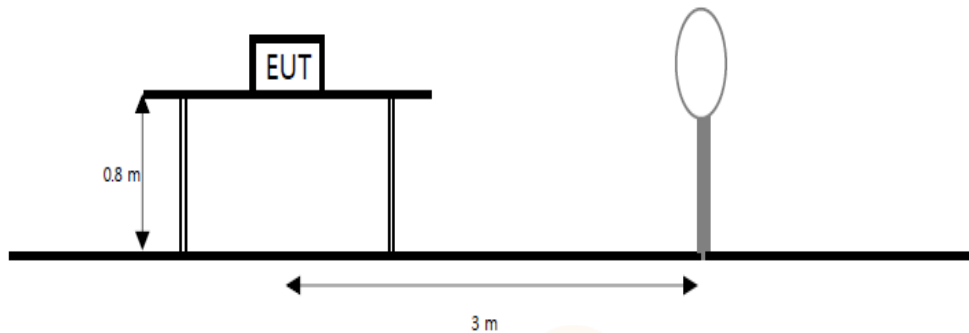


6. Test results

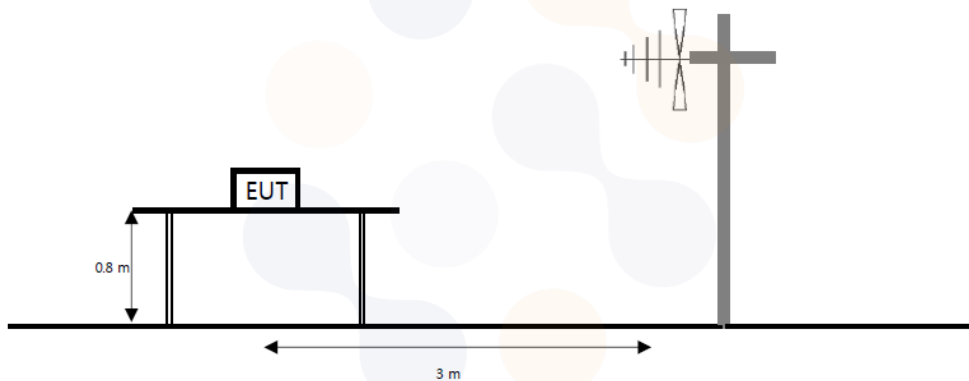
6.1. Radiated spurious emissions

Test setup

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 MHz to 1 GHz emissions.



Limit

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

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

15.225 (c), RSS-210 B.6 (a).(iii) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz, 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 MHz band shall not exceed the general radiated emission limits in 15.209.

Frequency (MHz)	Field Strength ($\mu\text{V}/\text{m}$)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30(29.54 dB $\mu\text{V}/\text{m}$)	30
30.0-88.0	100(40 dB $\mu\text{V}/\text{m}$)	3
88-216	150(43.5 dB $\mu\text{V}/\text{m}$)	3
216-960	200 (46 dB $\mu\text{V}/\text{m}$)	3
Above 960	500 (53.98 dB $\mu\text{V}/\text{m}$)	3

Test procedure

ANSI C63.10-2013 - Section 6.4, 6.5

Test settings

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = as specified in table
3. VBW $\geq 3 \times$ 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	100 kHz to 120 kHz
> 1 000 MHz	1 MHz

Notes:

1. $f < 30$ MHz, extrapolation factor of 40 dB/decade of distance. $F_d = 40 \log(D_m/D_s)$
 $f \geq 30$ MHz, extrapolation factor of 20 dB/decade of distance. $F_d = 20 \log(D_m/D_s)$
Where:
 F_d = Distance factor in dB
 D_m = Measurement distance in meters
 D_s = 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 = $40 \log_{10}(30/3) = 40$ 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 MHz 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

[DC 12V]

Test results for fundamental

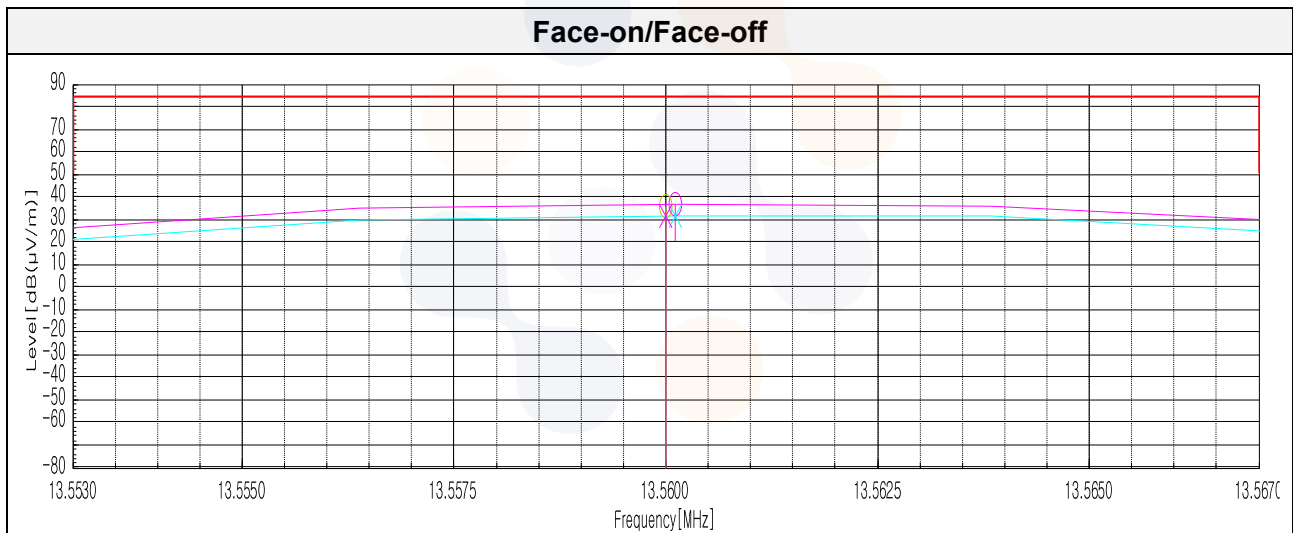
15.225 (a) 13.553-13.567 MHz

[Face-on]

Frequency	Reading	Antenna Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(MHz)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(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 Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(MHz)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Quasi peak data							
13.56	82.10	20.2	-31.33	40.00	30.97	84.00	53.03



Test results for in-band & out-band (9 kHz to 30 MHz)

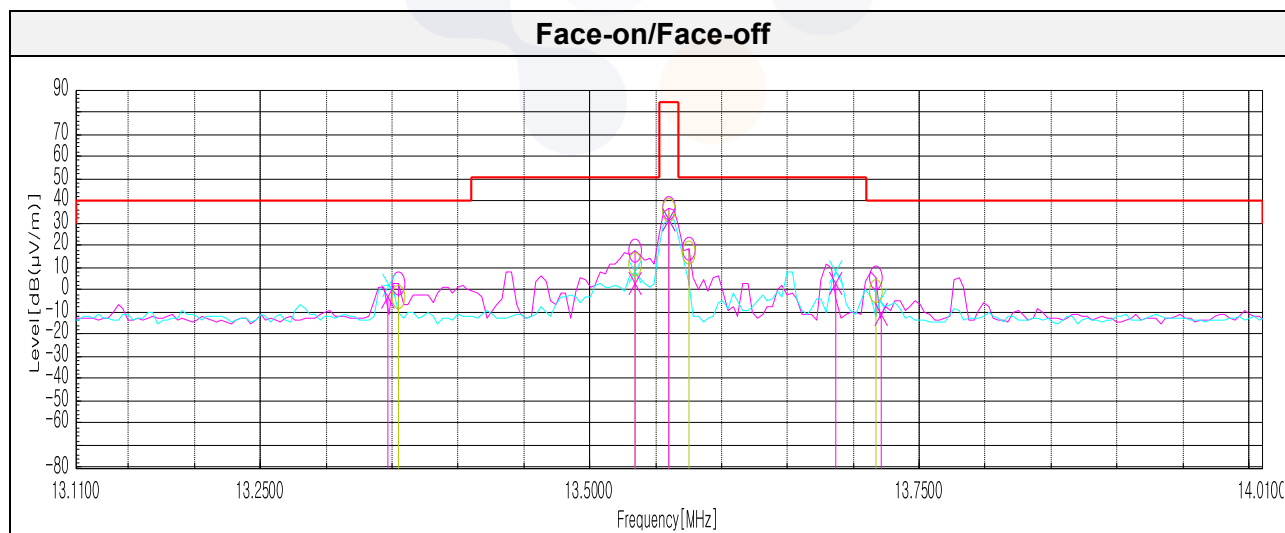
15.225 (b,c) 13.110-14.010 MHz

[Face-on]

Frequency	Reading	Antenna Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(MHz)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Quasi peak 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 Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(MHz)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Quasi peak data							
13.36	47.80	20.20	-31.34	40.00	-3.34	50.50	53.84
13.53	62.10	20.20	-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 kHz 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.

Test results (9 kHz to 30 MHz)

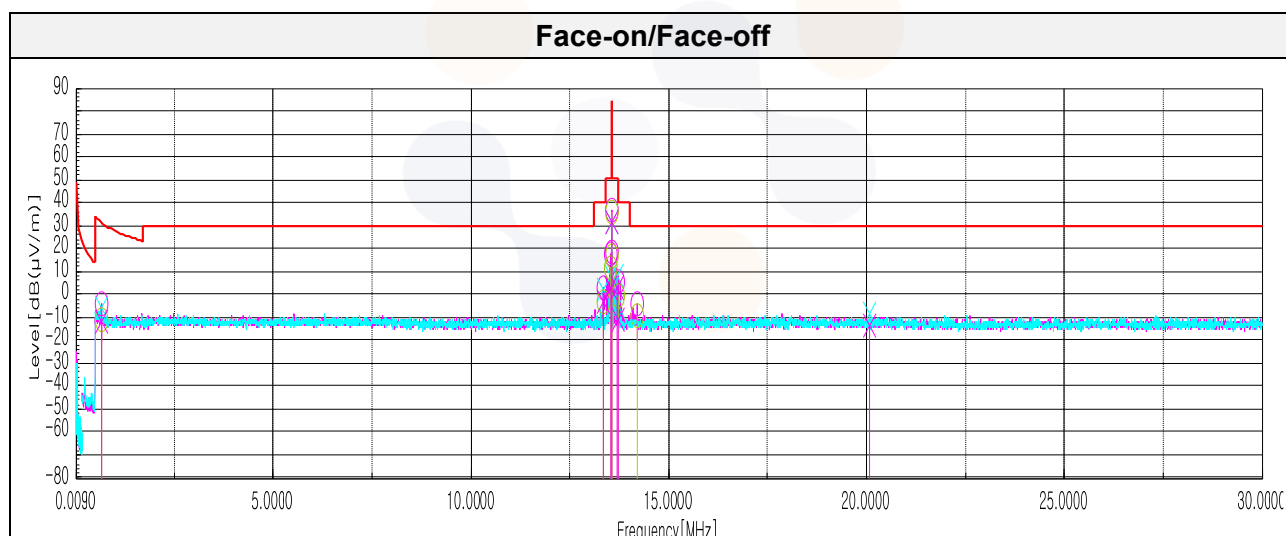
15.225 (d) 0.009-30 MHz

[Face-on]

Frequency	Reading	Antenna Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(MHz)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(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 Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(MHz)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(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

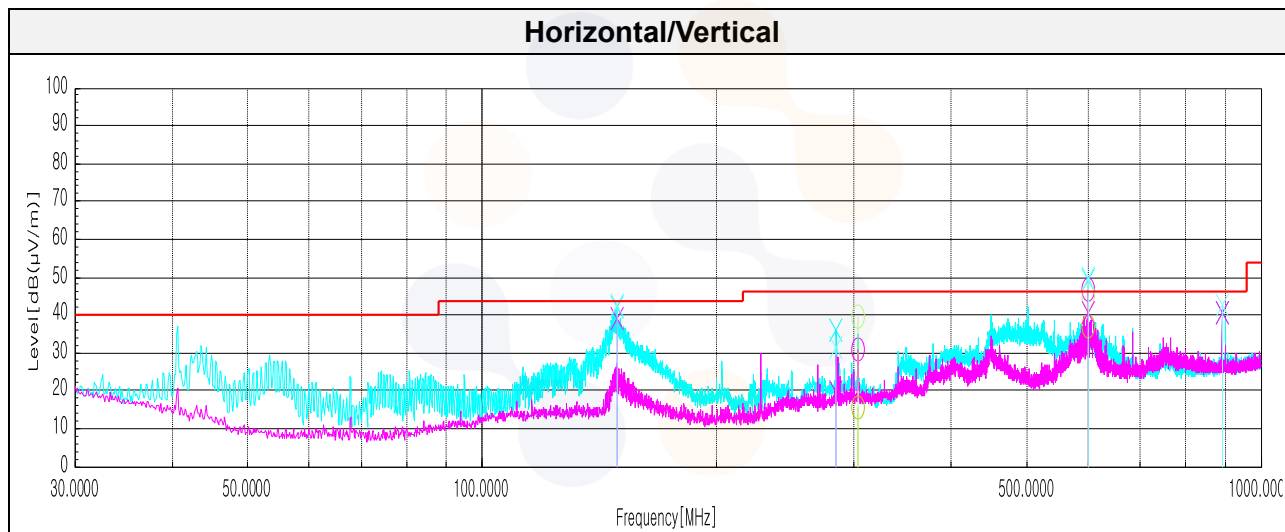


Note. The limits in CFR 47, Part 15, Subpart C, paragraph 15.209 (a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377Ω. For example, the measurement frequency X kHz 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.

Test results (Below 1 000 MHz)

15.225 (d) 30-1 000 MHz

Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(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	H	22.50	19.18	-26.05	-	15.63	46.00	30.37
599.99	H	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



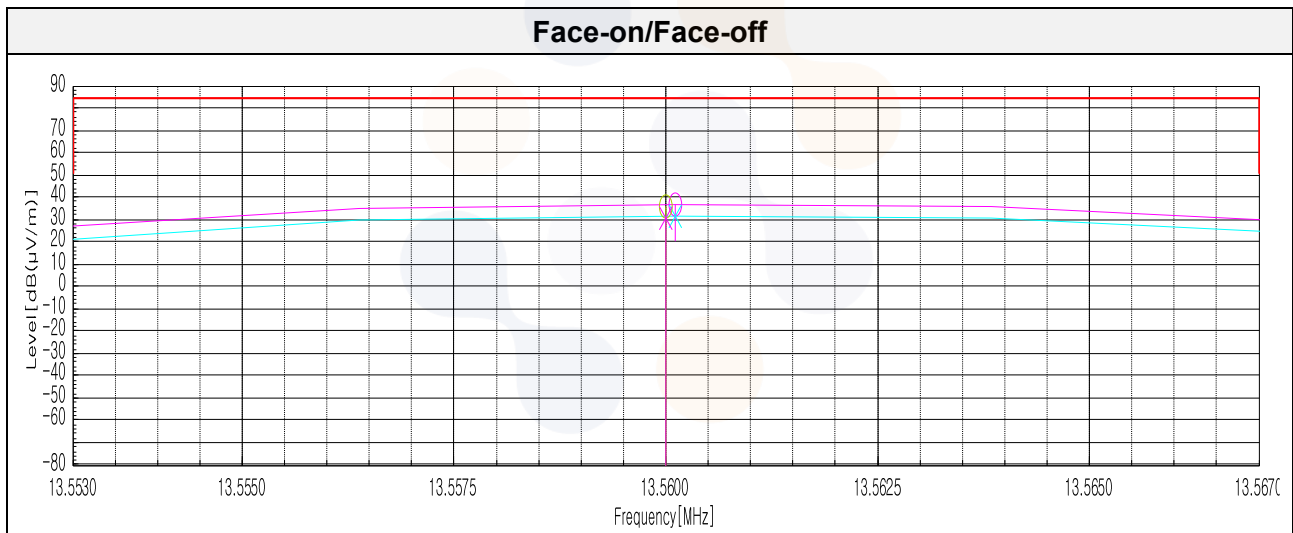
[DC 24V]
Test results for fundamental
15.225 (a) 13.553-13.567 MHz

[Face-on]

Frequency	Reading	Antenna Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(MHz)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Quasi peak data							
13.56	86.80	20.2	-31.33	40.00	35.67	84.00	48.33

[Face-off]

Frequency	Reading	Antenna Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(MHz)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Quasi peak data							
13.56	81.10	20.2	-31.33	40.00	29.97	84.00	54.03



Test results for in-band & out-band (9 kHz to 30 MHz)

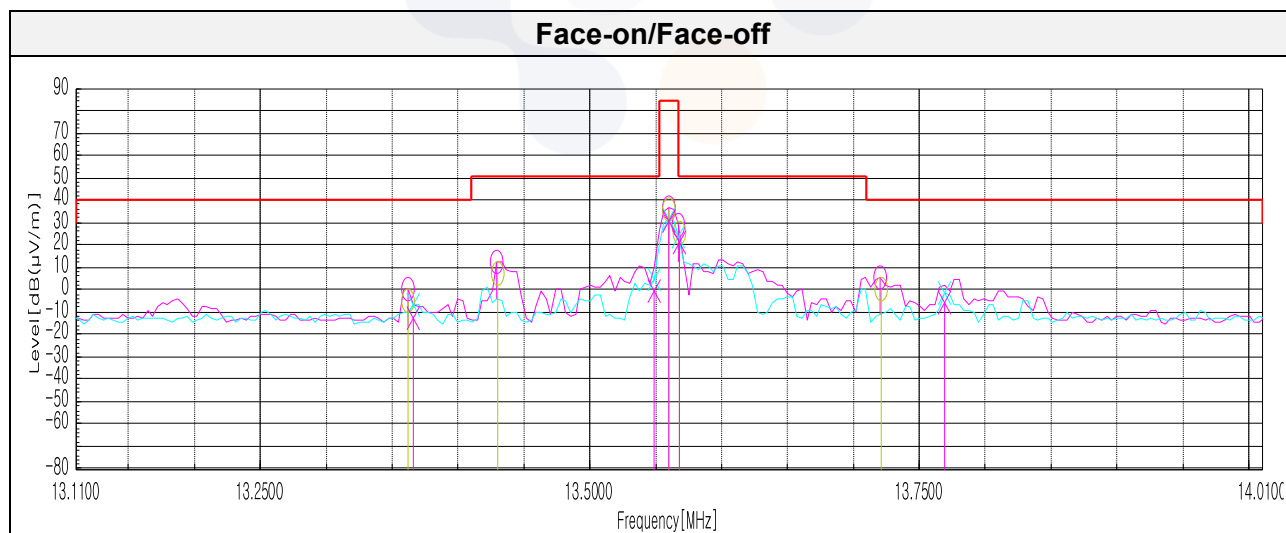
15.225 (b,c) 13.110-14.010 MHz

[Face-on]

Frequency	Reading	Antenna Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(MHz)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(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 Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(MHz)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Quasi peak data							
13.37	37.80	20.20	-31.34	40.00	-13.34	50.50	63.84
13.55	49.70	20.20	-31.33	40.00	-1.43	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 kHz 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.

Test results (9 kHz to 30 MHz)

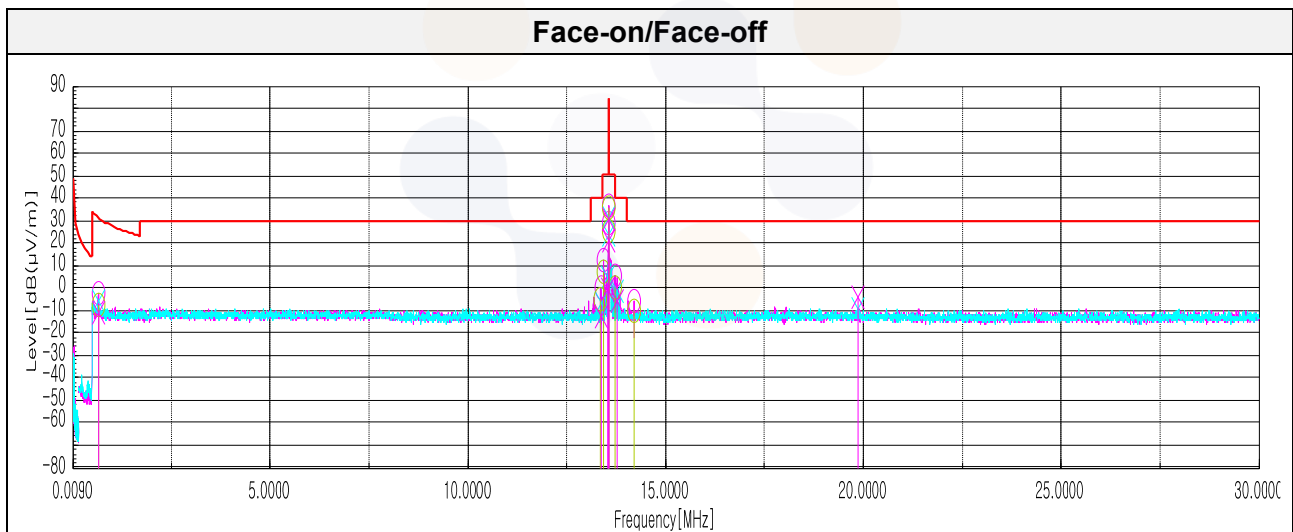
15.225 (d) 0.009-30 MHz

[Face-on]

Frequency	Reading	Antenna Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(MHz)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(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 Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(MHz)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(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

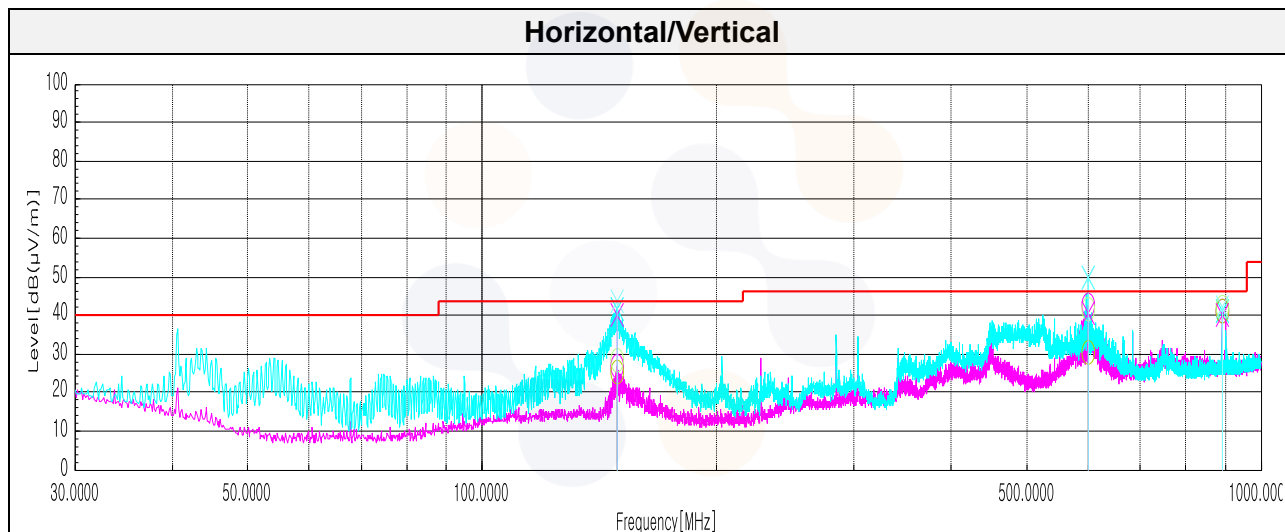


Note. The limits in CFR 47, Part 15, Subpart C, paragraph 15.209 (a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377Ω. For example, the measurement frequency X kHz 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.

Test results (Below 1 000 MHz)

15.225 (d) 30-1 000 MHz

Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Quasi peak data								
149.12	V	51.50	18.85	-28.68	-	41.67	46.00	4.33
149.14	H	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	H	28.90	25.70	-24.18	-	30.42	46.00	15.58
891.01	H	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



7. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Vector Signal 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 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