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 www.kctl.co.kr	Report No.: KR23-SRF0025-A Page (1) of (19)	eurofins | KCTL

1. Client

- Name : Samsung Electronics Co., Ltd.
- Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
- Date of Receipt : 2022-10-17

2. Use of Report : Certification

3. Name of Product / Model : Mobile phone / SM-A346B/DSN

4. Manufacturer / Country of Origin : Samsung Electronics Co., Ltd. / Vietnam

5. FCC ID : A3LSMA346B

6. Date of Test : 2022-11-09 to 2023-01-04

7. Location of Test : ■ Permanent Testing Lab ☐ On Site Testing
(Address:65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea)

8. Test method used : FCC Part 15 Subpart C, 15.247

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

	Tested by	Technical Manager
Affirmation	Name : Sunghyun Yoon (Signature)	Name : Seungyong Kim (Signature)

2023-01-20

Eurofins KCTL Co.,Ltd.

REPORT REVISION HISTORY

Date	Revision	Page No
2023-01-17	Originally issued	-
2023-01-20	Updated to TCB comment	7 ~ 8

Note. The report No. KR23-SRF0025 is superseded by the report No. KR23-SRF0025-A.

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**

CONTENTS

1. General information

Client	:	Samsung Electronics Co., Ltd.
Address	:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
Manufacturer	:	Samsung Electronics Co., Ltd.
Address	:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
Factory	:	Samsung Electronics Vietnam Thai Nguyen Co., Ltd
Address	:	Yen Binh Industrial Park, Dong Tien Ward, Pho Yen Town, Thai Nguyen Province, Vietnam
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	:	Mobile phone
Model	:	SM-A346B/DSN
Modulation technique	:	GFSK, π/4DQPSK, 8DPSK [Bluetooth(BDR/EDR)]
Number of channels	:	79 ch
Power source	:	DC 3.88 V
Antenna specification	:	Metal+LDS Antenna (Antenna 1)
Antenna gain	:	-9.43 dBi
Frequency range	:	2 402 ㎒ ~ 2 480 ㎒
Software version	:	A346B.001
Hardware version	:	REV1.0
Test device serial No.	:	Conducted : R3CTA0N813K
		Radiated : R3CTA0N84EX
Operation temperature	:	-20 ℃ ~ 60 ℃

2.1. Frequency/channel operations

This device contains the following capabilities:
WLAN (11a/b/g/n/ac), Bluetooth (BDR/EDR/BLE), LTE B2/4/5/12/17/26/41/66, GSM 850/1900, WCDMA 850/1700/1900, NFC

Ch.	Frequency (㎒)
00	2 402
. .	. .
39	2 441
. .	. .
78	2 480

Table 2.1-1. Bluetooth(BDR/EDR) mode

15.247 Requirements for Bluetooth transmitter:

- This Bluetooth module has been tested by a Bluetooth Qualification Lab, and we confirm the following:
  1) This system is hopping pseudo-randomly.
  2) Each frequency is used equally on the average by each transmitter.
  3) The receiver input bandwidths that match the hopping channel bandwidths of their corresponding transmitters
  4) The receiver shifts frequencies in synchronization with the transmitted signals.
- 15.247(g): The system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this Section 15.247 should the transmitter be presented with a continuous data (or information) stream.
- 15.247(h): The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

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.

- The transmitter has permanently attached Metal+LDS Antenna (Internal antenna) on board.
- The EUT Complies with the requirement of §15.203, §15.247.

4. Introduction

This report referenced from the FCC ID: A3LSMA346M
Based on their similarity, the FCC Part 15C (equipment class: DSS) reuse the original model's result and do spot-check, following the FCC KDB 484596 D01 v01.
And the applicant takes full responsibility that the test data as referenced in this report represent compliance for this FCC ID.

4.1 Difference

The FCC ID: A3LSMA346B shares the same enclosure and circuit board as FCC ID: A3LSMA346M. The WIFI/BT/BLE/NFC/WCDMA/GSM/LTE antenna and surrounding circuitry and layout are identical between these two units.
As for all bands, they have been verified and the parent model test results under FCC ID: A3LSMA346M shall remain representative of FCC ID: A3LSMA346B.

Note. The difference between the parent and variant is that the RF circuit for NR/LTE Bands (13/n5/n66), ULCA Band 4 and EN-DC for Band 2/66 in the parent model A3LSMA346M is removed from the variant model A3LSMA346B.

4.2 Spot check verification data (Band-edge & Spurious emission)

Test band	Test item	Test mode	Channel	Measured frequency (㎒)	SM-A346M/DSN (dBμV)		SM-A346B/DSN (dBμV)		Deviation (dB)	
					Avg.	Peak	Avg.	Peak	Avg.	Peak
BT	Band edge	DH5	78	2 483.5 ~ 2 500	41.11	54.06	41.18	54.04	0.07	-0.02
	RSE		39	9 764.00	-	50.44	-	47.19	-	-3.25
	Band edge	3DH5	78	2 483.5 ~ 2 500	42.28	54.86	40.97	54.91	-1.31	0.05
	RSE		78	7 439.92	-	46.84	-	45.20	-	-1.64

Notes:

1. FCC ID: A3LSMA346B has been verified the performance as for Bluetooth identical with the FCC ID: A3LSMA346M.
2. Comparison of two models, the variant model emissions are less than 3 ㏈ higher than the parent model, and all test results are under FCC technical limits.
3. The test procedure(s) in this report were performed in accordance as following.
   - ◆ KDB 484596 D01 v01

4.3 Reference Detail

Reference application that contains the reused reference data in the individual test reports.

Equipment Class	Reference FCC ID	Application Type	Reference Test report Number	Exhibit Type	Variant Test Report Number	Date Re-used
DTS	A3LSMA346M	Original	KR23-SRF0005 (802.11b/g/n)	Test report	KR23-SRF0027	All
			KR23-SRF0004 (Bluetooth LE)	Test report	KR23-SRF0026	All
DSS	A3LSMA346M	Original	KR23-SRF0003 (Bluetooth)	Test report	KR23-SRF0025	All
NII	A3LSMA346M	Original	KP23-SRF0006 (802.11a/n/ac)	Test report	KR23-SRF0028	All
DXX	A3LSMA346M	Original	KP23-SRF0012 (NFC)	Test report	KR23-SRF0033	All
PCE	A3LSMA346M	Original	KR23-SRF0008 (2G, 3G)	Test report	KR23-SRF0030	All
			KR23-SRF0009 (LTE)	Test report	KR23-SRF0031	Partial[1),2)]
			KR23-SRF0010 (LTE Part90)	Test report	KR23-SRF0032	All

Notes:

1. This device does not support the LTE Band 13.
2. This device does not support sub antenna for usage of ULCA (LTE B4) and EN-DC (LTE B2/66).
3. This device does not support the 5GNR Bands of n5/n66.

5. Summary of tests

FCC Part section(s)	Parameter	Test Condition	Test results
15.205(a), 15.209(a)	Spurious emission	Radiated	Pass
	Band-edge, restricted band		Pass

Notes:

1. All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
2. According to exploratory test no any obvious emission were detected from 9 ㎑ to 30 ㎒. Although 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.
3. The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z. It was determined that **X** orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in **X** orientation
4. The maximum production power and tolerance are not impacted by the change. So only spot-check test was done against the worst case from the original model.
5. All the radiated tests have been performed several case. (Stand-alone, with accessories (DLC Cable etc.))
   - Worst case: stand-alone
6. The test procedure(s) in this report were performed in accordance as following.
   - ANSI C63.10-2013
   - KDB 558074 D01 v05r02
7. The worst-case data rate were: BDR Packet type DH-5
   EDR Packet type 3DH-5

6. 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_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and thus, can be compared directly to specified limits to determine compliance.

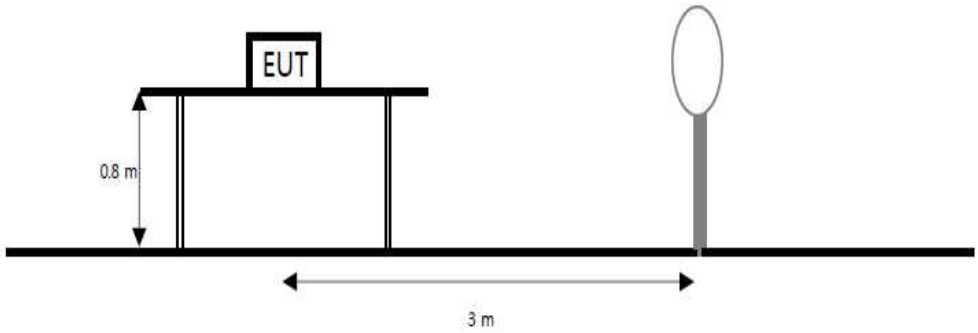
Parameter	Expanded uncertainty (±)	
Radiated spurious emissions	9 ㎑ ~ 30 ㎒:	2.4 ㏈
	30 ㎒ ~ 1 000 ㎒	2.3 ㏈
	1 000 ㎒ ~ 18 000 ㎒	5.6 ㏈
	Above 18 000 ㎒	5.7 ㏈

7 Test results

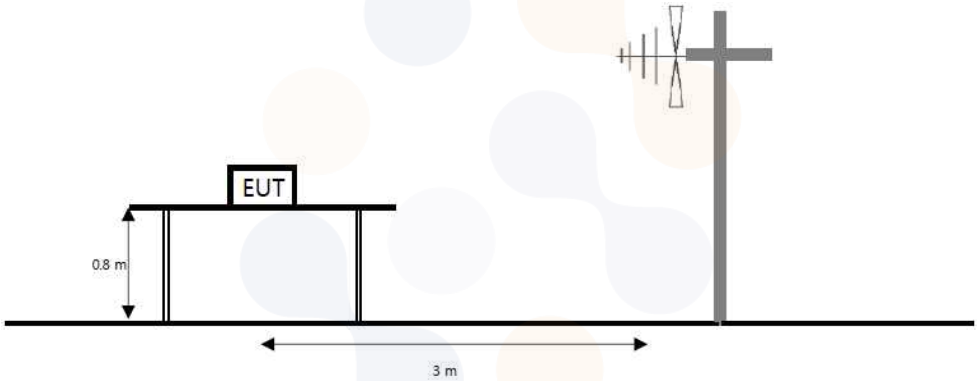
7.1. Radiated spurious emissions & band edge

Test setup

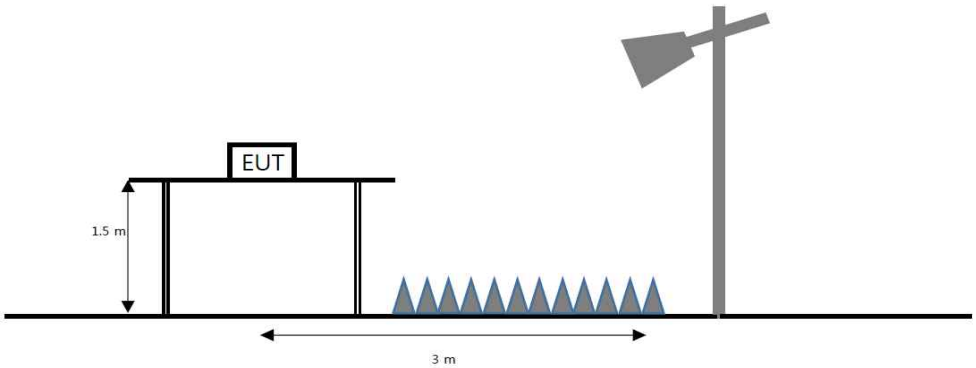
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 ㎑ to 30 ㎒ Emissions



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



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 ㎓ to the tenth harmonic of the highest fundamental frequency or to 40 ㎓ emissions, whichever is lower.



Limit

According to section 15.209(a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (㎒)	Field strength (㎶/m)	Measurement distance (m)
0.009 - 0.490	2 400/F(㎑)	300
0.490 - 1.705	24 000/F(㎑)	30
1.705 - 30	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54–72 ㎒, 76–88 ㎒, 174–216 ㎒ or 470–806 ㎒. However, operation within these frequency bands is permitted under other sections of this part, e.g., Section15.231 and 15.241.

According to section 15.205(a) and (b), only spurious emissions are permitted in any of the frequency bands listed below:

㎒	㎒	㎒	㎓
0.009 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.495 - 0.505	16.694 75 - 16.695 25	608 - 614	5.35 - 5.46
2.173 5 - 2.190 5	16.804 25 - 16.804 75	960 – 1 240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1 300 – 1 427	8.025 - 8.5
4.177 25 - 4.177 75	37.5 - 38.25	1 435 – 1 626.5	9.0 - 9.2
4.207 25 - 4.207 75	73 - 74.6	1 645.5 – 1 646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1 660 – 1 710	10.6 - 12.7
6.267 75 - 6.268 25	108 - 121.94	1 718.8 – 1 722.2	13.25 - 13.4
6.311 75 - 6.312 25	123 - 138	2 200 – 2 300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2 310 – 2 390	15.35 - 16.2
8.362 - 8.366	156.524 75 - 156.525 25	2 483.5 – 2 500	17.7 - 21.4
8.376 25 - 8.386 75	156.7 - 156.9	2 690 – 2 900	22.01 - 23.12
8.414 25 - 8.414 75	162.012 5 - 167.17	3 260 – 3 267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3 332 – 3 339	31.2 - 31.8
12.519 75 - 12.520 25	240 - 285	3 345.8 – 3 358	36.43 - 36.5
12.576 75 - 12.577 25	322 - 335.4	3 600 – 4 400	Above 38.6
13.36 - 13.41			

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in section 15.209. At frequencies equal to or less than 1 000 ㎒, compliance with the limits in section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1 000 ㎒, compliance with the emission limits in section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in section 15.35 apply to these measurements.

Test procedure

ANSI C63.10-2013

Test settings

Peak field strength measurements

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×RBW)
4. Detector = peak
5. Sweep time = auto
6. Trace mode = max hold
7. Allow sweeps to continue until the trace stabilizes

Table. RBW as a function of frequency

Frequency	RBW
9 ㎑ to 150 ㎑	200 ㎐ to 300 ㎐
0.15 ㎒ to 30 ㎒	9 ㎑ to 10 ㎑
30 ㎒ to 1 000 ㎒	100 ㎑ to 120 ㎑
> 1 000 ㎒	1 ㎒

Average field strength measurements

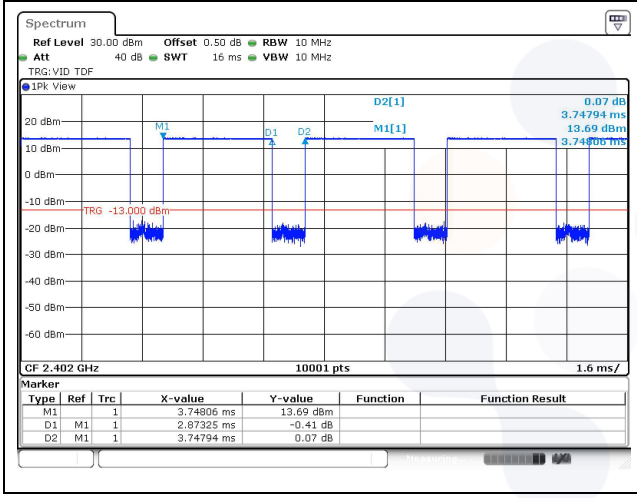
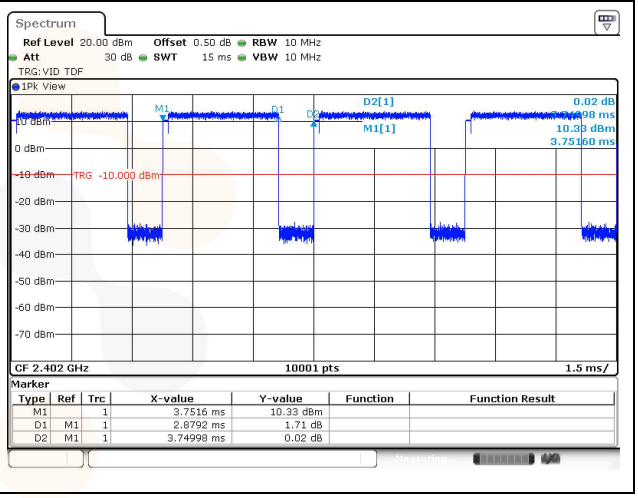
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1 ㎒
3. VBW = 1/T ≥ 1 ㎐
4. Averaging type was set to RMS to ensure that video filtering was applied in the power domain
5. Detector = peak
6. Sweep time = auto
7. Trace mode = max hold
8. Trace was allowed to run for at least 50 times(1/duty cycle) traces

Notes:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 ㎒ for Peak detection and frequency above 1 ㎓. The resolution bandwidth of test receiver/spectrum analyzer is 1 ㎒ and the video bandwidth is 500 ㎐(≥1/T) for Average detection (AV) at frequency above 1 ㎓.

   According to ANSI C63.10-2013, for average measurement during radiation test, Reduced VBW shall be greater than [1/(minimum transmitter on time)] and no less than 1 ㎐.

Test mode	Period (㎳)	On time (㎳)	Reduced VBW (㎐)
GFSK	3.747 9	2.873 3	348.032
8DPSK	3.750 0	2.879 2	347.319

GFSK (DH-5)	8DPSK (3DH-5)
	

2. *f* <30 ㎒, extrapolation factor of 40 ㏈/decade of distance. $F_d = 40\log(D_m/D_s)$
   f ≥30 ㎒, extrapolation factor of 20 ㏈/decade of distance. $F_d = 20\log(D_m/D_s)$
   Where:
   F_d= Distance factor in ㏈
   D_m= Measurement distance in meters
   D_s= Specification distance in meters
3. Factors(㏈) = Antenna factor(㏈/m) + Cable loss(㏈) + or Amp. gain(㏈) + or F_d(㏈)
4. The worst-case emissions are reported however emissions whose levels were not within 20 ㏈ of respective limits were not reported.
5. Average test would be performed if the peak result were greater than the average limit.
6. 1) means restricted band.
7. Below 30 ㎒ frequency range, In order to search for the worst result, all orientations about parallel, perpendicular, and ground-parallel were investigated then reported. when the emission level was higher than 20 ㏈ of the limit, then the following statement shall be made: “No spurious emissions were detected within 20 ㏈ of the limit.”

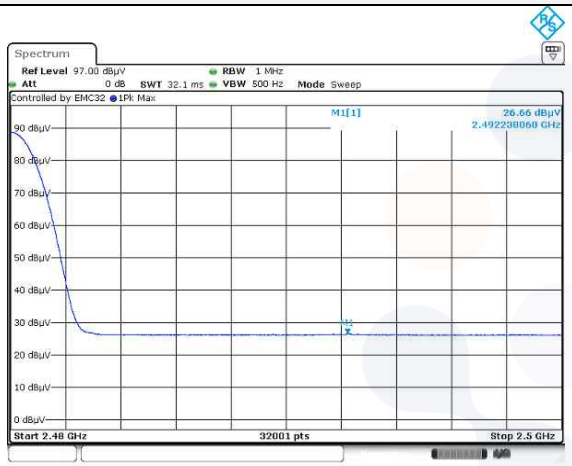
Spot-check Test results

GFSK / Band-edge

Highest Channel

Frequency	Pol.	Reading	Ant. Factor	Amp. + Cable	DCCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
2 492.24[1)]	H	39.52	32.38	-17.86	-	54.04	74.00	19.96
Average Data								
2 492.24[1)]	H	26.66	32.38	-17.86	-	41.18	54.00	12.82

Average data



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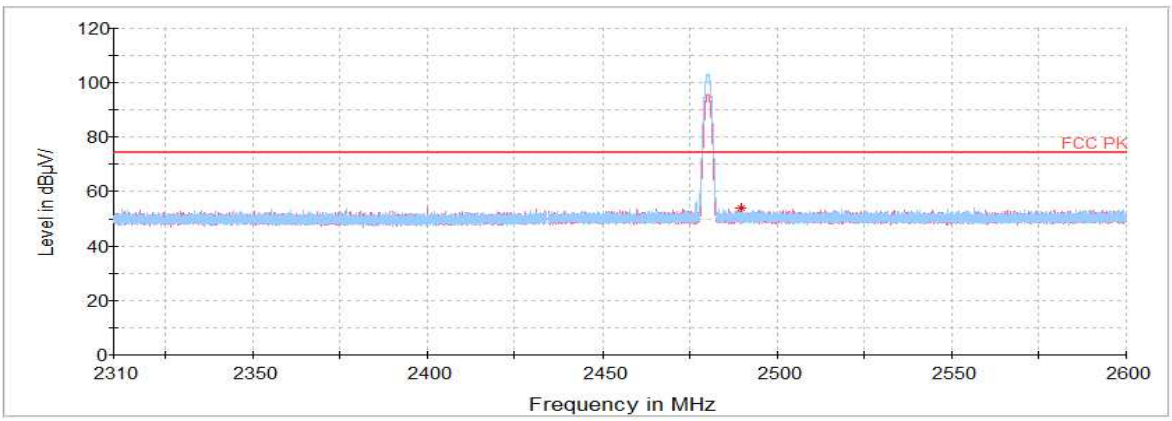
Horizontal/Vertical for Band-edge

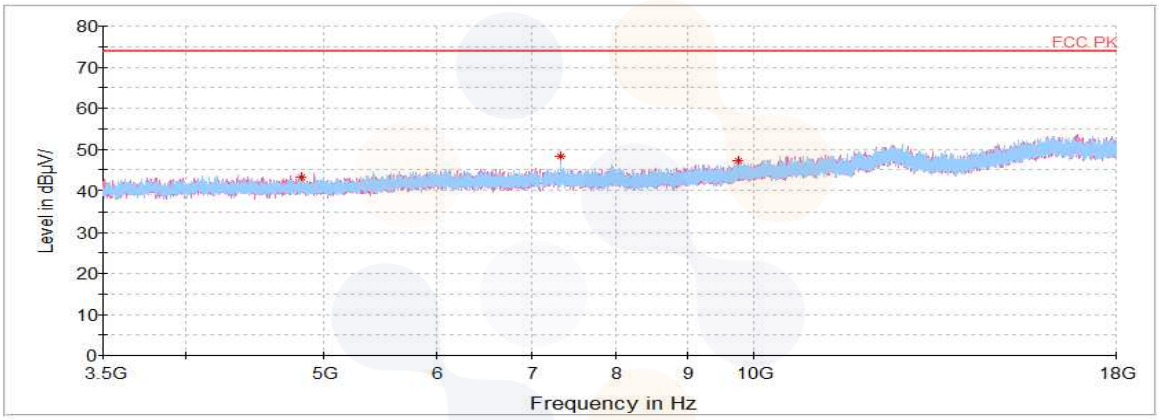


GFSK / Harmonic

Middle Channel

Frequency	Pol.	Reading	Ant. Factor	Amp. + Cable	DCCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
4 823.58[1)]	H	64.77	33.70	-55.14	-	43.33	74.00	30.67
7 323.02[1)]	H	64.79	35.16	-51.58	-	48.37	74.00	25.63
9 764.00	V	59.30	36.56	-48.67	-	47.19	74.00	26.81
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Horizontal/Vertical for 3.5 ㎓ ~ 18 ㎓



8DPSK / Band-edge

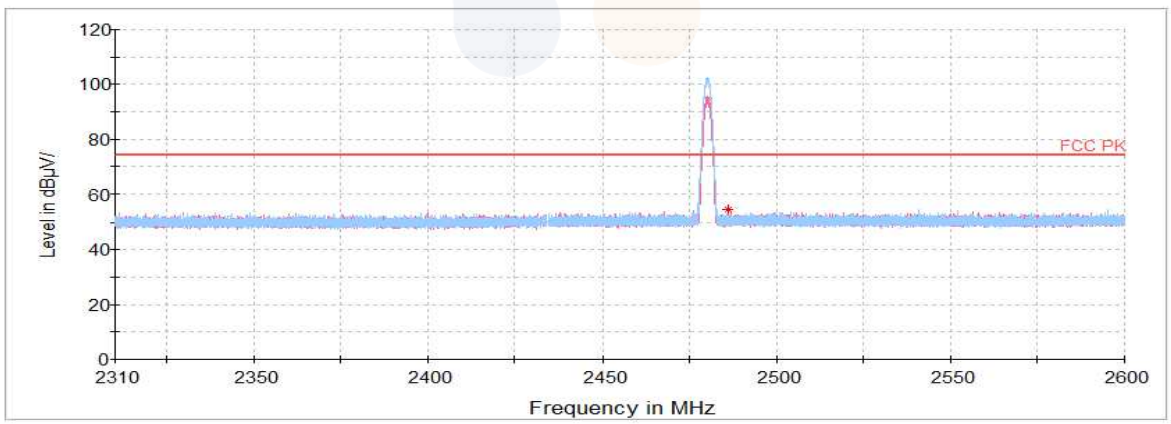
Highest Channel

Frequency	Pol.	Reading	Ant. Factor	Amp. + Cable	DCCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
2 483.64[1)]	H	40.44	32.36	-17.89	-	54.91	74.00	19.09
Average Data								
2 483.64[1)]	H	26.50	32.36	-17.89	-	40.97	54.00	13.03

Average data

Blank

Horizontal/Vertical for Band-edge

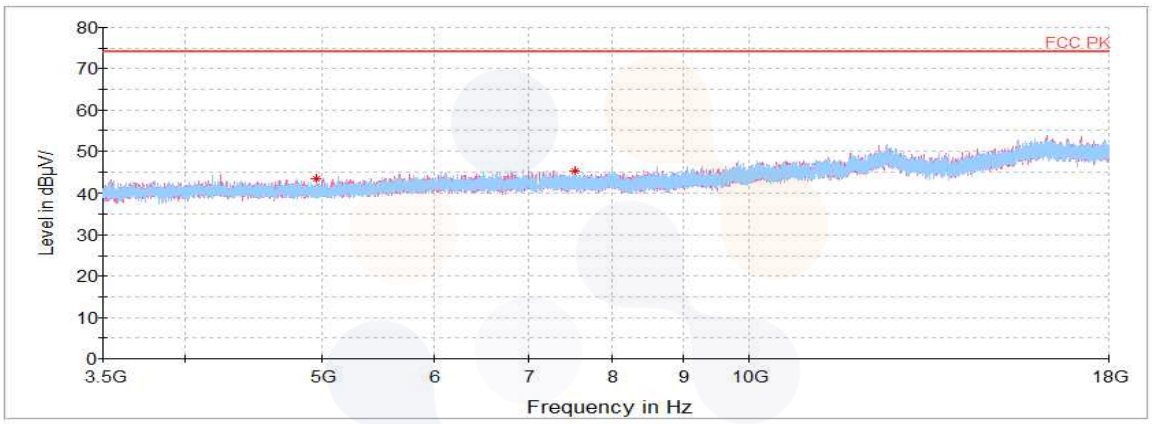


8DPSK / Harmonic

Highest Channel

Frequency	Pol.	Reading	Ant. Factor	Amp. + Cable	DCCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
4 955.89[1)]	H	64.62	33.70	-54.98	-	43.34	74.00	30.66
7 541.42[1)]	V	61.53	35.22	-51.55	-	45.20	74.00	28.80
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Horizontal/Vertical for 3.5 ㎓ ~ 18 ㎓



8. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Spectrum Analyzer	R&S	FSV40	100989	23.10.14
Bluetooth Tester	TESCOM	TC-3000B	3000B640056	23.01.19
Power Sensor	R&S	NRP-Z81	1137.9009.02-106225-JM	23.05.02
Horn antenna	ETS.lindgren	3117	155787	23.09.29
Horn antenna	ETS.lindgren	3116	00086635	23.05.04
Attenuator	API Inmet	40AH2W-10	12	23.05.03
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
Antenna Mast	Innco Systems	MA4640-XP-ET	-	-
Turn Table	Innco Systems	CO3000	1175/45850319/P	-
High pass Filter	WT	WT-A1698-HS	WT160411001	23.05.03
Vector Signal Generator	R&S	SMBV100A	257566	23.07.04
Signal Generator	R&S	SMB100A	176206	23.01.19

End of test report