

# **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

Report No.: KR23-SRF0026-A Page (1) of (21)



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1. Client

: Samsung Electronics Co., Ltd.

Address

Name

: 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 (Single)

Name: Seungyong Kim

2023-01-20

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Report No.: KR23-SRF0026-A Page (2) of (21)



### **REPORT REVISION HISTORY**

Date	Revision	Page No
2023-01-17	Originally issued	-
2023-01-20	Updated to TCB comment	9 ~ 10

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Note. The report No. KR23-SRF0026 is superseded by the report No. KR23-SRF0026-A.

General	General remarks for test reports					
Stateme	nt concerning the uncertainty of the measur <mark>ement systems used for the tests</mark>					
(may be	required by the product standard or client)					
	nal procedure used for type testing through which traceability of the measuring uncertainty nestablished:					
	ons leading to the reported values are on file with the testing laboratory that conducted the testing.					
⊠ State	ement not required by the standard or client used for type testing					

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Report No.: KR23-SRF0026-A Page (3) of (21)



## **CONTENTS**

General information	4
2. Device information	
2.1. Frequency/channel operations	
2.2. Duty Cycle Factor	
3. Antenna requirement	
4. Introduction4.	
4.1 Difference	9
4.2 Spot check verification data (Band-edge & Spurious emission)	g
4.3 Reference Detail	10
5. Summary of tests	11
6. Measurement uncertainty	12
7. Test results	13
7.1. Spurious Emission, Band Edge and Restricted bands	13
8. Measurement equipment	21

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### Report No.: KR23-SRF0026-A Page (4) of (21)



### 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 (Bluetooth Low Energy)

Number of channels : 40 ch

Power source : DC 3.88 V

Antenna specification : Metal+LDS Antenna (Antenna 1)

Antenna gain : -9.43 dBi

Frequency range :  $2402 \text{ Mb} \sim 2480 \text{ Mb}$ 

Software version : A346B.001

Hardware version : REV1.0

Test device serial No. : Conducted : R3CTA0N813K

Radiated: R3CTA0N84EX

Operation temperature : -20 °C ~ 60 °C

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Report No.: KR23-SRF0026-A Page (5) of (21)



### 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 (Mb)
00	2 402
19	2 440
39	2 480

Table 2.1-1. Bluetooth Low Energy



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Report No.: KR23-SRF0026-A Page (6) of (21)

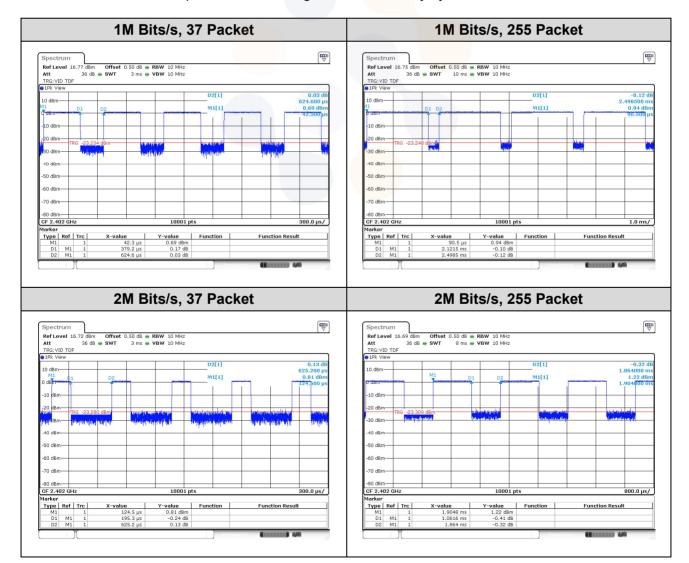


2.2. Duty Cycle Factor

Test mode	Period	On time	Duty o	cycle	<b>Duty Cycle Factor</b>	
rest mode	(ms)	(ms)	(Linear)	(%)	(dB)	
1M Bits/s, 37 Packet	0.625	0.379	0.606 4	60.64	2.17	
1M Bits/s, 255 Packet	2.499	2.122	0.849 1	84.91	0.71	
2M Bits/s, 37 Packet	0.625	0.195	0.312 0	31.20	5.06	
2M Bits/s, 255 Packet	1.864	1.062	0.569 7	56.97	2.44	
125k Bits/s, 37 Packet	3.749	3.091	0.824 5	82.45	0.84	
125k Bits/s, 255 Packet	17.504	17.035	0.973 2	97.32	0.12	
500k Bits/s, 37 Packet	1.863	1.050	0.563 6	56.36	2.49	
500k Bits/s, 255 Packet	5.001	4.547	0.909 2	90.92	0.41	

### Notes.

- 1. Duty cycle (Linear) = Ton time / Period
- 2. DCF(Duty cycle factor) = 10log(1/duty cycle)
- 3. DCF is not compensated to average result if the duty cycle is more than 98%

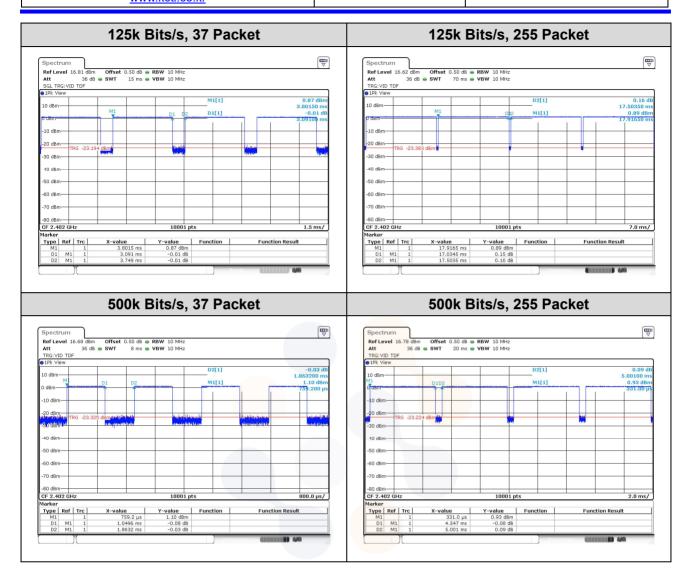


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Report No.: KR23-SRF0026-A Page (7) of (21)





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KR23-SRF0026-A Page (8) of (21) www.kctl.co.kr



### 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.

Report No.:

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



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Report No.: KR23-SRF0026-A Page (9) of (21)



4. Introduction

This report referenced from the FCC ID: A3LSMA346M

Based on their similarity, the FCC Part 15C (equipment class: DTS) 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		6M/DSN βμV)		6B/DSN μV)	Devi	ation B)
Dallu	iteiii	illoue		(MHz)	Avg.	Peak	Avg.	Peak	Avg.	Peak
	Band edge	1Mbps Packet	39	2 483.5 ~ 2 500	46.62	55.03	45.92	53.83	-0.70	-1.20
BLE	RSE	37	0	7 215.17	-	46.21	-	46.51	-	0.30
BLE	Band edge	2Mbps Packet	39	2 483.5 ~ 2 500	50.89	56.16	49.55	54.84	-1.34	-1.32
	RSE	37	0	7 183.00	-	45.69	-	45.63	-	-0.06

### Notes:

- 1. FCC ID: A3LSMA346B has been verified the performance as for Bluetooth LE identical with the FCC ID: A3LSMA346M.
- 2. Comparison of two models, the variant model emissions are less than 3 dB 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

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Report No.: KR23-SRF0026-A Page (10) of (21)



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### 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
DTC	A OL CNAA O A CNA	Ovininal	KR23-SRF0005 (802.11b/g/n)	Test report	KR23-SRF0027	All
DTS	A3LSMA346M	Original	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
	A3LSMA346M Original	KR23-SRF0008 (2G, 3G)	Test report	KR23-SRF0030	All	
PCE		Original	KR23-SRF0009 (LTE)	Test report	KR23-SRF0031	Partial <sup>1),2)</sup>
			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.

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Report No.: KR23-SRF0026-A Page (11) of (21)



Summary of tests

FCC Part section(s)	Parameter	Test Condition	Test results
15.205(a),	Spurious emission	Dodicted	Pass
15.209(a)	Band-edge, restricted band	Radiated	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 kHz to 30 MHz. 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 spotcheck 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: 1M Bits/s, Packet length 37 Bytes 2M Bits/s, Packet length 37 Bytes

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Report No.: KR23-SRF0026-A Page (12) of (21)



### 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>2.4</b> dB	
Radiated spurious emissions	30 MHz ~ 1 000 MHz	<b>2.3</b> dB	
Natiated Spurious emissions	1 000 MHz ~ 18 000 MHz	<b>5.6</b> dB	
	Above 18 000 MHz	<b>5.7</b> dB	



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Report No.: KR23-SRF0026-A Page (13) of (21)

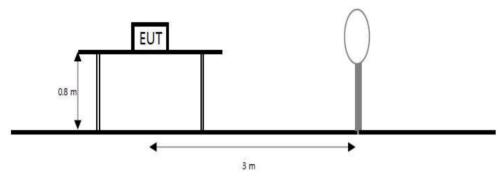


### 7. Test results

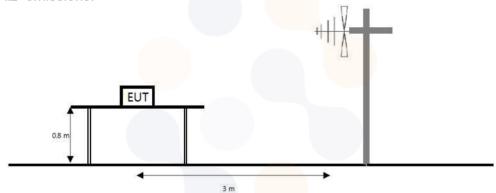
### 7.1. Spurious Emission, Band Edge and Restricted bands

### Test setup

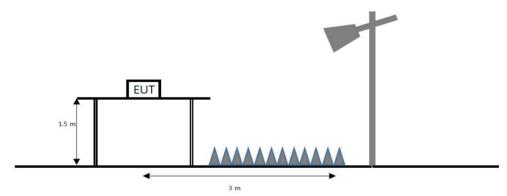
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 \(\mathbb{M}\mu\) to 30 \(\mathbb{M}\mu\) Emissions



The diagram below shows the test setup that is utilized to make the measurements for emission from 30 Mb to 1 Gb 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 to emissions, whichever is lower.



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Report No.: KR23-SRF0026-A Page (14) of (21)



### Limit

#### **FCC**

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

<sup>\*\*</sup>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 Mb, 76-88 Mb, 174-216 Mb or 470-806 Mb. 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:

parius listeu pelow.			
MHz	MHz	MHz	GHz
0.009 - 0.110	16.42 - 16.423	399. <mark>9 - 410</mark>	4.5 - 5.15
0.495 - 0.505	16.694 75 - 16.695 25	608 - <mark>614</mark>	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	<u>1 660 – 1 710</u>	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	2 483.5 – 2 500	17.7 - 21.4
8.376 25 - 8.386 75	25	2 690 – 2 900	22.01 - 23.12
8.414 25 - 8.414 75	156.7 - 156.9	3 260 – 3 267	23.6 - 24.0
12.29 - 12.293	162.012 5 - 167.17	3 332 – 3 339	31.2 - 31.8
12.519 75 - 12.520 25	167.72 - 173.2	3 345.8 – 3 358	36.43 - 36.5
12.576 75 - 12.577 25	240 - 285	3 600 – 4 400	Above 38.6
13.36 - 13.41	322 - 335.4		

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 Mb, compliance with the limits in section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasipeak detector. Above 1 000 Mb, 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.

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Report No.: KR23-SRF0026-A Page (15) of (21)



### **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  $\geq$  (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 kHz to 150 kHz	200 Hz to 300 Hz	
0.15 Mb to 30 Mb	9 kHz to 10 kHz	
30 MHz to 1 000 MHz	100 kHz to 120 kHz	
> 1 000 MHz	1 MHz	

### Average field strength measurements

### Trace averaging with continuous EUT transmission at full power

If the EUT can be configured or modified to transmit continuously (D ≥ 98%), then the average emission levels shall be measured using the following method (with EUT transmitting continuously):

- 1. RBW = 1 Mb (unless otherwise specified).
- 2. VBW  $\geq$  (3×RBW).
- 3. Detector = RMS (power averaging), if [span / (# of points in sweep)] ≤ (RBW / 2). Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied, then the detector mode shall be set to peak.
- 4. Averaging type = power (i.e., rms):
  - 1) As an alternative, the detector and averaging type may be set for linear voltage averaging.
  - 2) Some instruments require linear display mode to use linear voltage averaging. Log or  $\,\mathrm{d}B$  averaging shall not be used.
- 5. Sweep time = auto.
- 6. Perform a trace average of at least 100 traces.

## Trace averaging across ON and OFF times of the EUT transmissions followed by duty cycle correction

If continuous transmission of the EUT (D  $\geq$  98%) cannot be achieved and the duty cycle is constant (duty cycle variations are less than  $\pm 2\%$ ), then the following procedure shall be used:

- 1. The EUT shall be configured to operate at the maximum achievable duty cycle.
- 2. Measure the duty cycle D of the transmitter output signal as described in 11.6.
- 3. RBW = 1 Mb (unless otherwise specified).
- 4. VBW  $\geq$  [3  $\times$  RBW].
- 5. Detector = RMS (power averaging), if [span / (# of points in sweep)] ≤ (RBW / 2). Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied, then the detector mode shall be set to peak.
- 6. Averaging type = power (i.e., rms):

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Report No.: KR23-SRF0026-A Page (16) of (21)



- 1) As an alternative, the detector and averaging type may be set for linear voltage averaging.
- 2) Some instruments require linear display mode to use linear voltage averaging. Log or dB averaging shall not be used.
- 7. Sweep time = auto.
- 8. Perform a trace average of at least 100 traces.
- 9. A correction factor shall be added to the measurement results prior to comparing with the emission limit to compute the emission level that would have been measured had the test been performed at 100% duty cycle. The correction factor is computed as follows:
  - 1) If power averaging (rms) mode was used in step f), then the applicable correction factor is [10 log (1 / D)], where D is the duty cycle.
  - 2) If linear voltage averaging mode was used in step f), then the applicable correction factor is [20 log (1 / D)], where D is the duty cycle.
  - 3) If a specific emission is demonstrated to be continuous (D ≥ 98%) rather than turning ON and OFF with with the transmit cycle, then no duty cycle correction is required for that emission.

### Notes:

1. f <30 Mb, extrapolation factor of 40 dB/decade of distance. F<sub>d</sub> = 40log(D<sub>m</sub>/D<sub>s</sub>) f ≥30 Mb, extrapolation factor of 20 dB/decade of distance. F<sub>d</sub> = 20log(D<sub>m</sub>/D<sub>s</sub>) Where:

F<sub>d</sub>= Distance factor in dB

D<sub>m</sub>= Measurement distance in meters

D<sub>s</sub>= Specification distance in meters

- 2. Factors(dB) = Antenna factor(dB/m) + Cable loss(dB) + or Amp. gain(dB) + or  $F_d(dB)$
- 3. The worst-case emissions are reported however emissions whose levels were not within 20  $\,\mathrm{d}\mathrm{B}$  of respective limits were not reported.
- 4. Average test would be performed if the peak result were greater than the average limit.
- 5. 1) means restricted band.
- 6. Below 30 Mb 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 dB of the limit, then the following statement shall be made: "No spurious emissions were detected within 20 dB of the limit."

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Report No.: KR23-SRF0026-A Page (17) of (21)

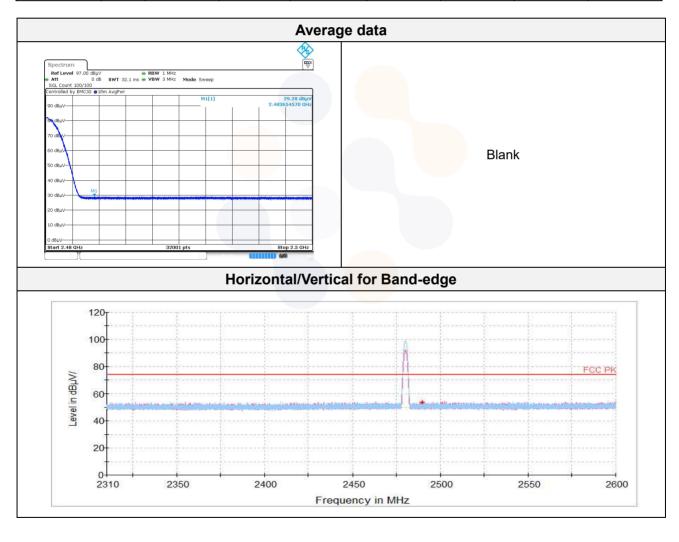


### **Spot-check Test results**

### 1 MBits/s(37 Bytes) / Band-edge

**Highest Channel** 

Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCF	Result	Limit	Margin	
[MHz]	[V/H]	[dB(µV)]	[dB]	[dB]	[dB]	[dB(µV/m)]	[dB(µV/m)]	[dB]	
	Peak data								
2 483.651)	Н	39.36	32.36	-17.89	-	53.83	74.00	20.17	
Average Data									
2 483.651)	Н	29.28	32.36	-17.89	2.17	45.92	54.00	8.08	



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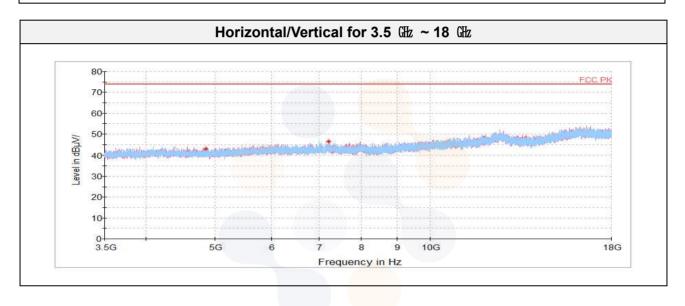
Report No.: KR23-SRF0026-A Page (18) of (21)



### 1 MBits/s(37 Bytes) / Harmonic

#### **Lowest Channel**

Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCF	Result	Limit	Margin
[MHz]	[V/H]	[dB(µV)]	[dB]	[dB]	[dB]	[dB(µV/m)]	[dB(µV/m)]	[dB]
Peak data								
4 860.281)	V	64.37	33.70	-55.11	-	42.96	74.00	31.04
7 205.66	V	62.92	35.14	-51.55	-	46.51	74.00	27.49
	•	•		Average Da	ta			
		No spuriou	us emissions	s were detecte	d within 20	dB of the lim	it.	



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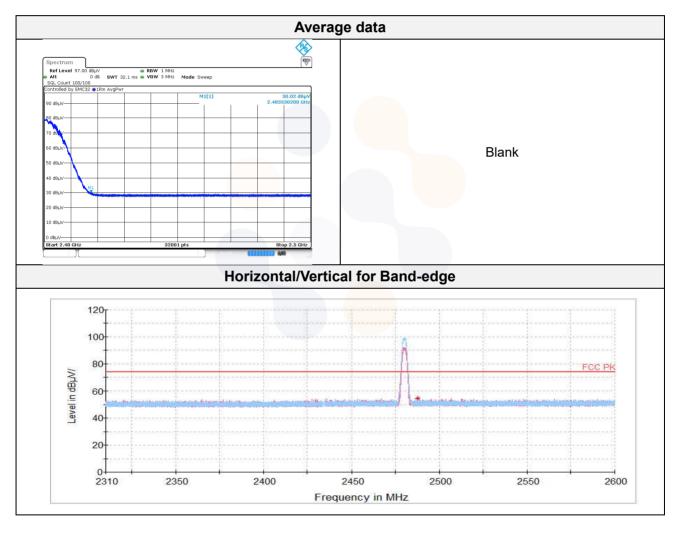
Report No.: KR23-SRF0026-A Page (19) of (21)



### 2 MBits/s(37 Bytes) / Band-edge

**Highest Channel** 

Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCF	Result	Limit	Margin	
[MHz]	[V/H]	[dB(µV)]	[dB]	[dB]	[dB]	[dB(µV/m)]	[dB(µV/m)]	[dB]	
	Peak data								
2 483.531)	Н	40.37	32.36	-17.89	-	54.84	74.00	19.16	
Average Data									
2 483.531)	Н	30.02	32.36	-17.89	5.06	49.55	54.00	4.45	



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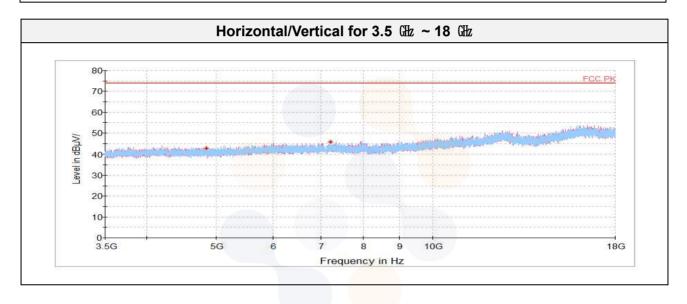
Report No.: KR23-SRF0026-A Page (20) of (21)



### 2 MBits/s(37 Bytes) / Harmonic

#### **Lowest Channel**

Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCF	Result	Limit	Margin
[MHz]	[V/H]	[dB(µV)]	[dB]	[dB]	[dB]	[dB(µV/m)]	[dB(µV/m)]	[dB]
Peak data								
4 843.061)	Н	64.20	33.70	-55.12	-	42.78	74.00	31.22
7 207.92	Н	62.04	35.14	-51.55	-	45.63	74.00	28.37
Average Data								
		No spuriou	ıs emissions	s were detecte	d within 20	dB of the lim	it.	



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Report No.: KR23-SRF0026-A Page (21) of (21)



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8. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Spectrum Analyzer	R&S	FSV40	100989	23.10.14
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	FAS		257566	23.07.04
Signal Generator	R&S	SMB100A	176206	23.01.19

End of test report