

# TEST REPORT

FCC/ISED BT LE Test for NX-3210R-K3

**APPLICANT**  
JVCKENWOOD Corporation

**REPORT NO.**  
HCT-RF-2403-FI001

**DATE OF ISSUE**  
March 7, 2024

**Tested by**  
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**TEST  
REPORT**

**REPORT NO.**  
HCT-RF-2403-FI001-R1

**DATE OF ISSUE**  
March 07, 2024

<b>Applicant</b>	JVCKENWOOD Corporation 1-16-2, Hakusan, Midori-ku, Yokohama-shi, Kanagawa, 226-8525 JAPAN
<b>Eut Type</b>	VHF DIGITAL TRANSCEIVER
<b>FCC ID</b>	K44523700
<b>IC</b>	282F-523700
<b>Max. RF Output Power</b>	-2.371 dBm (0.58 mW)
<b>FCC Classification</b>	Digital Transmission System(DTS)
<b>FCC Rule Part(s)</b>	Part 15.247
<b>ISED Rule Part(s)</b>	RSS-247 Issue 3 (August 2023) RSS-Gen Issue 5_Amendment 2 (February 2021)
<b>Location of Test</b>	<input checked="" type="checkbox"/> Permanent Testing Lab <input type="checkbox"/> On Site Testing Lab (Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Republic of Korea)

## REVISION HISTORY

The revision history for this test report is shown in table.

Revision No.	Date of Issue	Description
0	March 05, 2024	Initial Release
1	March 07, 2024	Revised the pages 2 and 5.

## Notice

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### Content

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Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC/ISED Rules under normal use and maintenance.

The results shown in this test report only apply to the sample(s), as received, provided by the applicant, unless otherwise stated.

The test results have only been applied with the test methods required by the standard(s).

When confirmation of authenticity of this test report is required, please contact [www.hct.co.kr](http://www.hct.co.kr)

The test results in this test report are not associated with the ((KS Q) ISO/IEC 17025) accreditation by KOLAS (Korea Laboratory Accreditation Scheme) / A2LA (American Association for Laboratory Accreditation) that are under the ILAC (International Laboratory Accreditation Cooperation) Mutual Recognition Agreement (MRA).

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## CONTENTS

1. EUT DESCRIPTION	5
2. TEST METHODOLOGY	6
EUT CONFIGURATION	6
EUT EXERCISE	6
GENERAL TEST PROCEDURES	6
DESCRIPTION OF TEST MODES	7
3. INSTRUMENT CALIBRATION	7
4. FACILITIES AND ACCREDITATIONS	7
FACILITIES	7
EQUIPMENT	7
5. ANTENNA REQUIREMENTS	8
6. MEASUREMENT UNCERTAINTY	9
7. DESCRIPTION OF TESTS	10
8. SUMMARY TEST OF RESULTS	28
9. TEST RESULT	30
9.1 DUTY CYCLE	30
9.2 6 dB BANDWIDTH & 99 % BANDWIDTH	31
9.3 OUTPUT POWER	33
9.4 POWER SPECTRAL DENSITY	34
9.5 BAND EDGE/ CONDUCTED SPURIOUS EMISSIONS	36
9.6 RADIATED SPURIOUS EMISSIONS	38
9.7 RADIATED RESTRICTED BAND EDGES	41
9.8 RECEIVER SPURIOUS EMISSIONS	43
9.9 POWERLINE CONDUCTED EMISSIONS	44
10. LIST OF TEST EQUIPMENT	45
11. ANNEX A_ TEST SETUP PHOTO	47

## 1. EUT DESCRIPTION

Model	NX-3210R-K3		
EUT Type	VHF DIGITAL TRANSCEIVER		
Power Supply	DC 7.5 V $\pm$ 20 %		
Frequency Range	2 402 MHz ~ 2 480 MHz		
Max. RF Output Power (Normal)	Peak	1 M Bit/s:	-2.371 dBm (0.58 mW)
	Average	1 M Bit/s:	-2.45 dBm (0.57 mW)
Modulation Type	GFSK		
Bluetooth Version	4.0		
Number of Channels	40 Channels		
Antenna Specification	Type: Sheet metal antenna Peak Gain: 2.53 dBi		
Date(s) of Tests	January 22, 2024 ~ March 05, 2024		
Serial number	Conducted : A1A11003 Radiated : A1A11004		
Battery type	KNB-L1: 2000mAh Li-ion Battery KNB-L2: 2600mAh Li-ion Battery KNB-L3: 3400mAh Li-ion Battery KNB-L11: 3900mAh Li-ion Battery		
PMN (Product Marketing Number)	NX-3210R-K3		
HVIN (Hardware Version Identification Number)	NX-3210R-K3		
FVIN (Firmware Version Identification Number)	N/A		
HMN (Host Marketing Name)	N/A		

## 2. TEST METHODOLOGY

FCC KDB 558074 D01 15.247 Meas Guidance v05r02 dated April 02, 2019 entitled “guidance for compliance measurements on digital transmission system, frequency hopping spread spectrum system, and hybrid system devices and the measurement procedure described in ANSI C63.10(Version : 2013) ‘the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices’.

### EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

### EUT EXERCISE

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C. / RSS-Gen issue 5, RSS-247 issue 3.

### GENERAL TEST PROCEDURES

#### Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2 of ANSI C63.10. (Version :2013) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-peak and average detector modes.

#### Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane below 1 GHz. Above 1 GHz with 1.5 m using absorbers between the EUT and receive antenna. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 6.6.5 of ANSI C63.10. (Version: 2013)

## DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

### 3. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment's, which is traceable to recognized national standards.

Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2017).

### 4. FACILITIES AND ACCREDITATIONS

#### FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA.

The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2014) and CISPR Publication 22.

Detailed description of test facility was submitted to the Commission and accepted dated March 31, 2022 (CAB identifier: KR0032).

For ISED, test facility was accepted dated April 06, 2022 (CAB identifier: KR0032).

#### EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

## 5. ANTENNA REQUIREMENTS

### According to FCC 47 CFR § 15.203

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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.”

- (1) The antennas of this E.U.T are permanently attached.
- (2) The E.U.T Complies with the requirement of § 15.203

### According to RSS-GEN(Issue 5) 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.



## 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 indicate a 95 % level of confidence.

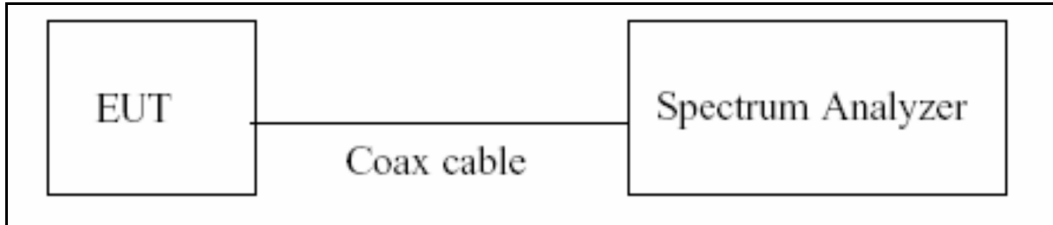
The measurement data shown herein meets or exceeds the  $U_{\text{CISPR}}$  measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.98 ( Confidence level about 95 %, $k=2$ )
Radiated Disturbance (9 kHz ~ 30 MHz)	4.36 ( Confidence level about 95 %, $k=2$ )
Radiated Disturbance (30 MHz ~ 1 GHz)	5.70 ( Confidence level about 95 %, $k=2$ )
Radiated Disturbance (1 GHz ~ 18 GHz)	5.52 ( Confidence level about 95 %, $k=2$ )
Radiated Disturbance (18 GHz ~ 40 GHz)	5.66 ( Confidence level about 95 %, $k=2$ )
Radiated Disturbance (Above 40 GHz)	5.58 ( Confidence level about 95 %, $k=2$ )

## 7. DESCRIPTION OF TESTS

### 7.1. Duty Cycle

#### Test Configuration



#### Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

We tested according to the zero-span measurement method, 6.0)b) in KDB 558074 v05r02.

The largest available value of RBW is 8 MHz and VBW is 50 MHz.

The zero-span method of measuring duty cycle shall not be used if  $T \leq 6.25$  microseconds. ( $50/6.25 = 8$ )

The zero-span method was used because all measured T data are  $> 6.25$  microseconds and both RBW and VBW are  $> 50/T$ .

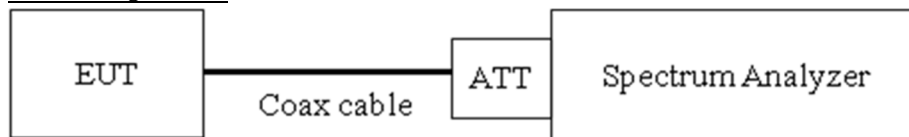
1. RBW = 8 MHz (the largest available value)
2. VBW = 8 MHz ( $\geq$  RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep  $> 100$
6. Trace mode = Clear write
7. Measure  $T_{total}$  and  $T_{on}$
8. Calculate Duty Cycle =  $T_{on}/T_{total}$  and Duty Cycle Factor =  $10\log(1/Duty\ Cycle)$

## 7.2. 6 dB Bandwidth & 99 % Bandwidth

### Limit

The minimum permissible 6 dB bandwidth is 500 kHz.

### Test Configuration



### Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

The Spectrum Analyzer is set to (Procedure 8.2 in KDB 558074 v05r02, Procedure 11.8.1 in ANSI 63.10-2013)

- 1) RBW = 100 kHz
- 2) VBW  $\geq 3 \times$  RBW
- 3) Detector = Peak
- 4) Trace mode = Max hold
- 5) Sweep = auto couple
- 6) Allow the trace to stabilize
- 7) We tested 6 dB bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer. X dB is set 6 dB.

### Test Procedure (Bandwidth for ISED)

The transmitter output is connected to the spectrum analyzer.

RBW = 1 % ~ 5 % of the occupied bandwidth

VBW  $\approx 3 \times$  RBW

Detector = Peak

Trace mode = max hold

Sweep = auto couple

Allow the trace to stabilize

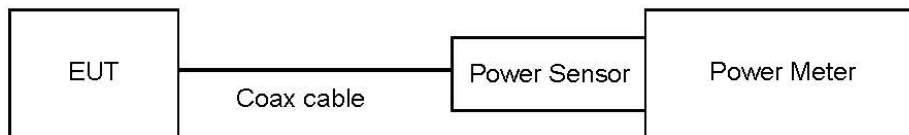
Note : We tested OBW using the automatic bandwidth measurement capability of a spectrum analyzer.

### 7.3. Output Power

#### Limit

The maximum permissible conducted output power is 1 Watt.

#### Test Configuration



#### Test Procedure

The transmitter output is connected to the Power Meter.

- Peak Power (Procedure 11.9.1.3 in ANSI 63.10-2013)  
: Measure the peak power of the transmitter.
  
- Average Power (Procedure 8.3.2.3 in KDB 558074 v05r02, Procedure 11.9.2.3 in ANSI 63.10-2013)
  - 1) Measure the duty cycle.
  - 2) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
  - 3) Add  $10 \log(1/x)$ , where  $x$  is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

#### Sample Calculation

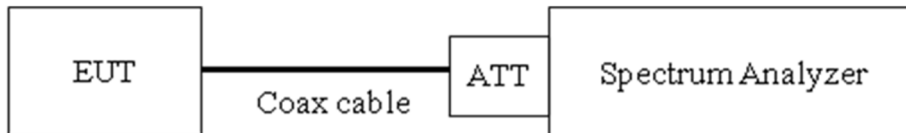
- Conducted Output Power(Peak) = Measured Value + ATT loss + Cable loss
- Conducted Output Power(Average) = Measured Value + ATT loss + Cable loss + Duty Cycle Factor

## 7.4. Power Spectral Density

### Limit

The transmitter power density average over 1-second interval shall not be greater than 8 dBm in any 3 kHz BW.

### Test Configuration



### Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

We tested according to Procedure 8.4 in KDB 558074 v05r02, Procedure 11.10 in ANSI 63.10-2013.

The spectrum analyzer is set to :

- 1) Set analyzer center frequency to DTS channel center frequency.
- 2) Set span to at least 1.5 times the OBW.
- 3)  $RBW = 3 \text{ kHz} \leq RBW \leq 100 \text{ kHz}$ .
- 4)  $VBW \geq 3 \times RBW$ .
- 5) Sweep = auto couple
- 6) Detector = peak.
- 7) Trace mode = max hold.
- 8) Allow trace to fully stabilize
- 9) Use the peak marker function to determine the maximum amplitude level within the RBW.

If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

### Sample Calculation

- Power Spectral Density = Measured Value + ATT loss + Cable loss

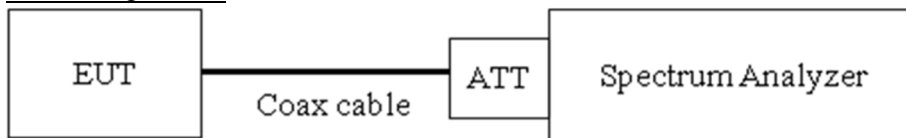
## 7.5. Conducted Band Edge(Out of Band Emissions) & Conducted Spurious Emissions

### Limit

The maximum conducted (Peak) output power was used to demonstrate compliance, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz.

[ Conducted > 20 dBc ]

### Test Configuration



### Test Procedure

The transmitter output is connected to the spectrum analyzer.

(Procedure 8.5 in KDB 558074 v05r02, Procedure 11.11 in ANSI 63.10-2013)

- 1) RBW = 100 kHz
- 2) VBW  $\geq$  3 x RBW
- 3) Set span to encompass the spectrum to be examined
- 4) Detector = Peak
- 5) Trace Mode = max hold
- 6) Sweep time = auto couple
- 7) Ensure that the number of measurement points  $\geq$  2 x Span/VBW
- 8) Allow trace to fully stabilize.
- 9) Use peak marker function to determine the maximum amplitude level.

Measurements are made over the 30 MHz to 25 GHz range with the transmitter set to the lowest, middle, and highest channels.

**Factors for frequency**

Freq(MHz)	Factor(dB)
30	10.10
100	10.11
200	10.15
300	10.18
400	10.19
500	10.26
600	10.25
700	10.28
800	10.29
900	10.30
1000	10.30
2000	10.52
2400	10.60
2500	10.60
3000	10.62
4000	10.67
5000	10.80
6000	10.90
7000	10.90
8000	10.94
9000	11.04
10000	11.14
11000	11.18
12000	11.22
13000	11.28
14000	11.35
15000	11.44
16000	11.49
17000	11.53
18000	11.57
19000	11.63
20000	11.68
21000	11.71
22000	11.80
23000	11.82
24000	11.93
25000	11.95

Note : 1. 2400 ~ 2500 MHz is fundamental frequency range.

2. Factor = Attenuator loss + Cable loss

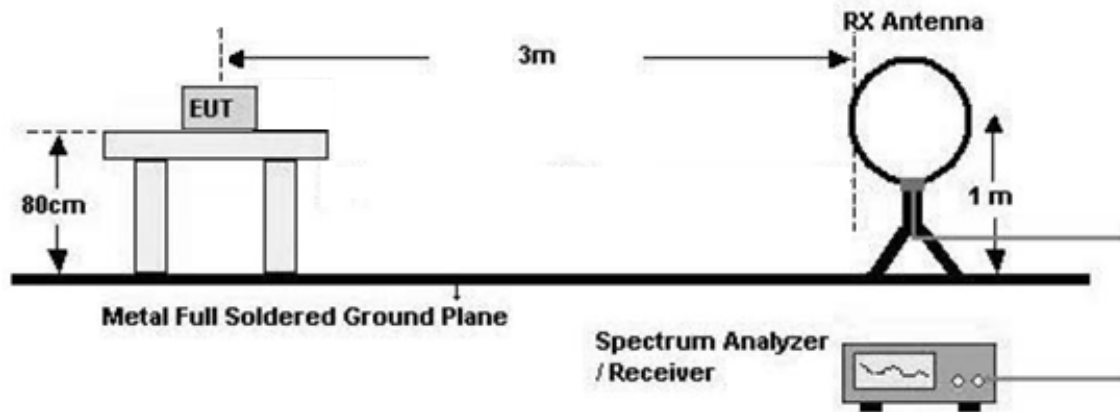
### 7.6. Radiated Test

#### Limit

Frequency (MHz)	Field Strength ( $\mu\text{V}/\text{m}$ )	Measurement Distance (m)
0.009 – 0.490	$2400/F(\text{kHz})$	300
0.490 – 1.705	$24000/F(\text{kHz})$	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

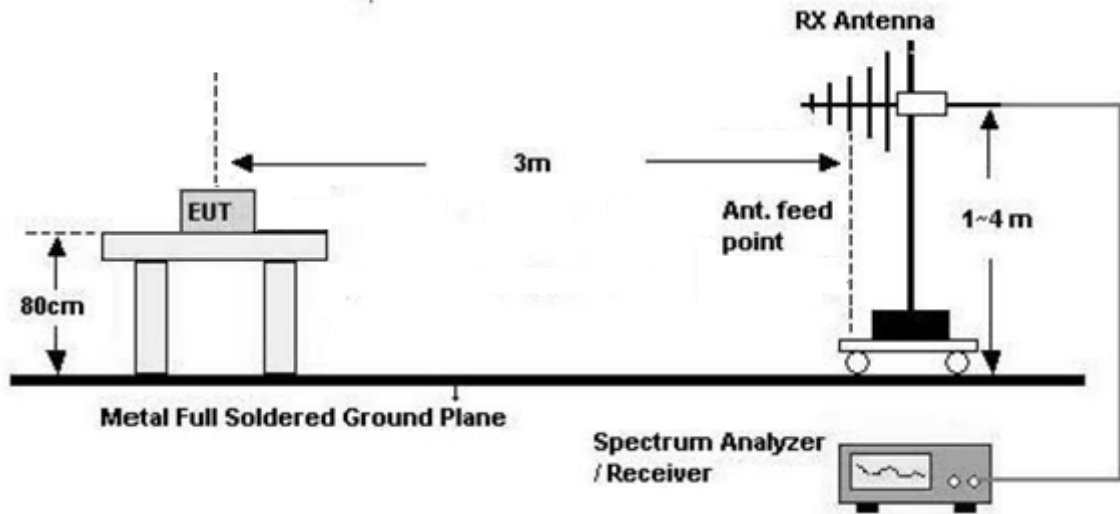
#### Test Configuration

Below 30 MHz

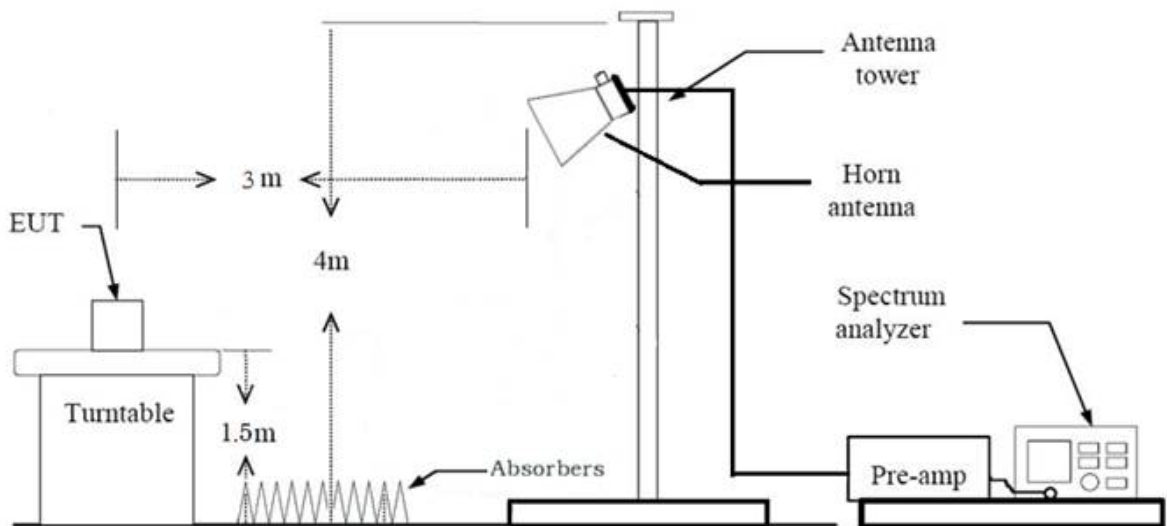




30 MHz - 1 GHz



Above 1 GHz



### **Test Procedure of Radiated spurious emissions(Below 30 MHz)**

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The loop antenna was placed at a location 3 m from the EUT
3. The EUT is placed on a turntable, which is 0.8 m above ground plane.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization and Parallel to the ground plane in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Distance Correction Factor(0.009 MHz – 0.490 MHz) =  $40\log(3\text{ m}/300\text{ m}) = - 80\text{ dB}$   
Measurement Distance : 3 m
7. Distance Correction Factor(0.490 MHz – 30 MHz) =  $40\log(3\text{ m}/30\text{ m}) = - 40\text{ dB}$   
Measurement Distance : 3 m
8. Spectrum Setting
  - Frequency Range = 9 kHz ~ 30 MHz
  - Detector = Peak
  - Trace = Maxhold
  - RBW = 9 kHz
  - VBW  $\geq 3 \times$  RBW
9. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)
10. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

### **KDB 414788 OFS and Chamber Correlation Justification**

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

**Test Procedure of Radiated spurious emissions(Below 1 GHz)**

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The EUT is placed on a turntable, which is 0.8 m above ground plane.
3. The Hybrid antenna was placed at a location 3 m from the EUT, which is varied from 1m to 4 m to find out the highest emissions.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Spectrum Setting

**(1) Measurement Type(Peak):**

- Measured Frequency Range : 30 MHz – 1 GHz
- Detector = Peak
- Trace = Maxhold
- RBW = 100 kHz
- VBW  $\geq$  3 x RBW

**(2) Measurement Type(Quasi-peak):**

- Measured Frequency Range : 30 MHz – 1 GHz
- Detector = Quasi-Peak
- RBW = 120 kHz

In general, (1) is used mainly

7. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L)
8. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

### Test Procedure of Radiated spurious emissions (Above 1 GHz)

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3 m away from the receiving antenna, which is varied from 1 m to 4 m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. The unit was tested with its standard battery.
8. Spectrum Setting (Method 8.6 in KDB 558074 v05r02, Procedure 11.12 in ANSI 63.10-2013)

(1) Measurement Type(Peak):

- Measured Frequency Range : 1 GHz – 25 GHz
- Detector = Peak
- Trace = Max hold
- RBW = 1 MHz
- VBW  $\geq$  3 x RBW

(2) Measurement Type(Average):

- Duty cycle < 98 %, duty cycle variations are less than  $\pm 2$  %
  - Measured Frequency Range : 1 GHz – 25 GHz
  - Detector = RMS
  - Averaging type = power (*i.e.*, RMS)
  - RBW = 1 MHz
  - VBW  $\geq$  3 x RBW
  - Sweep time = auto.
  - Trace mode = average (at least 100 traces).
  - Correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle.
- Duty Cycle Factor (dB) : Please refer to the please refer to section 9.1
9. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
  10. Distance extrapolation factor =  $20\log$  (test distance / specific distance) (dB)
  11. Total (Measurement Type : Peak)
    - = Peak Measured Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(A.G)
    - + Distance Factor(D.F)

Total (Measurement Type : Average)

= Average Measured Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(A.G)  
+ Distance Factor(D.F)

#Note : Used Average measurement method according to KDB 558074 Section 11 Q3

### **Test Procedure of Radiated Restricted Band Edge**

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3 m away from the receiving antenna, which is varied from 1 m to 4 m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. The unit was tested with its standard battery.

#### 8. Spectrum Setting

(1) Measurement Type(Peak):

- Measured Frequency Range : 2310 MHz ~ 2390 MHz/ 2483.5 MHz ~ 2500 MHz
- Detector = Peak
- Trace = Max hold
- RBW = 1 MHz
- VBW  $\geq$  3 x RBW

(2) Measurement Type(Average):

- Duty cycle < 98 %, duty cycle variations are less than  $\pm 2$  %
- Measured Frequency Range : 2310 MHz ~ 2390 MHz/ 2483.5 MHz ~ 2500 MHz
- Detector = RMS
- Averaging type = power (*i.e.*, RMS)
- RBW = 1 MHz
- VBW  $\geq$  3 x RBW
- Sweep time = auto.
- Trace mode = average (at least 100 traces).
- Correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle.
- Duty Cycle Factor (dB) : Please refer to the please refer to section 9.1.

9. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

10. Distance extrapolation factor =  $20\log(\text{test distance} / \text{specific distance})$  (dB)

11. Total(Measurement Type : Peak)

= Peak Measured Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)

Total(Measurement Type : Average)

= Average Measured Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)

#Note : Used Average measurement method according to KDB 558074 Section 11 Q3

## 7.7. AC Power line Conducted Emissions

### Limit

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN).

Frequency Range (MHz)	Limits (dB $\mu$ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56 <sup>(a)</sup>	56 to 46 <sup>(a)</sup>
0.50 to 5	56	46
5 to 30	60	50

<sup>(a)</sup>Decreases with the logarithm of the frequency.

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

### Test Configuration

See test photographs attached in Annex A for the actual connections between EUT and support equipment.

### Test Procedure

1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors : Quasi Peak and Average Detector.

### Sample Calculation

Quasi-peak(Final Result) = Measured Value + Correction Factor

### 7.8. Receiver Spurious Emissions

#### Limit

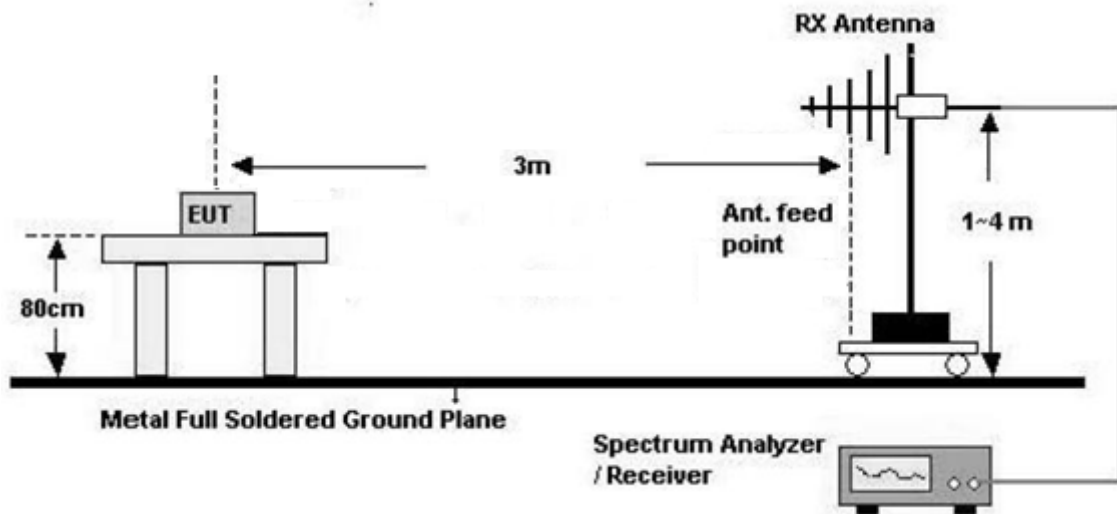
Frequency (MHz)	Field Strength ( $\mu\text{V}/\text{m}$ )	Measurement Distance (m)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

#### Note:

Measurements for compliance with the limits in table may be performed at distances other than 3 metres.

#### Test Configuration

30 MHz - 1 GHz





### Test Procedure of Receiver Spurious Emissions (Below 1GHz)

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The EUT is placed on a turntable, which is 0.8m above ground plane.
3. The Hybrid antenna was placed at a location 3m from the EUT, which is varied from 1m to 4m to find out the highest emissions.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.

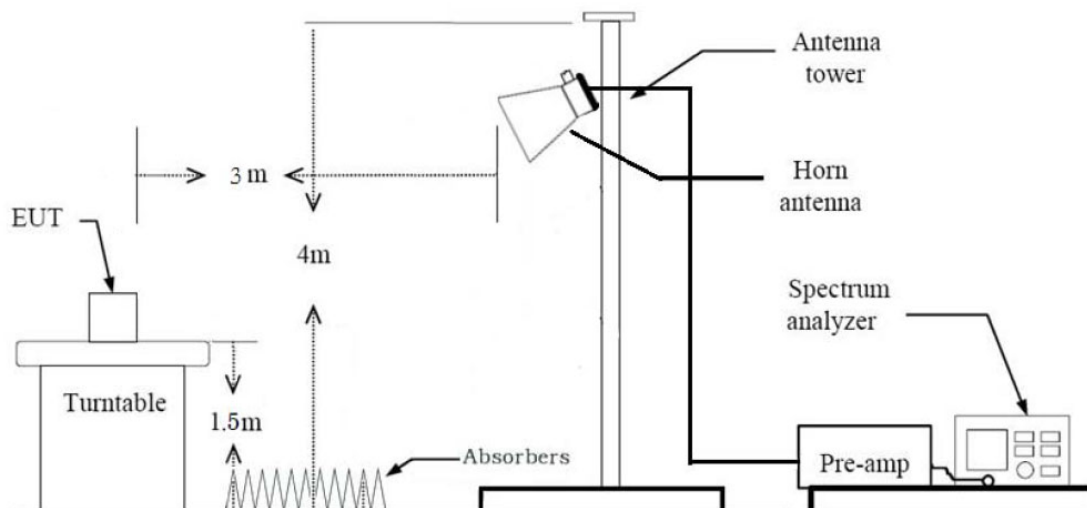
#### 6. Spectrum Setting

##### (1) Measurement Type(Peak):

- Measured Frequency Range : 30 MHz – 1 GHz
- Detector = Peak
- Trace = Maxhold
- RBW = 100 kHz
- VBW  $\geq$  3 x RBW

7. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L) – Amp Gain(A.G)

### **Above 1 GHz**



### Test Procedure of Radiated spurious emissions (Above 1 GHz)

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.

4. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. The unit was tested with its standard battery.
8. Spectrum Setting
  - (1) Measurement Type(Average):
    - RBW = 1 MHz
    - VBW = 3 MHz
    - Detector = Average(RMS)
    - Trace = Average
    - Trace was allowed to stabilize
9. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
10. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(G) + Distance Factor(D.F)

## 7.9. Worst case configuration and mode

### Radiated test

1. All modes of operation were investigated and the worst case configuration results are reported.
  - Mode : Stand alone, Stand alone + Accessories
  - Worstcase : Stand alone
2. EUT Axis:
  - Radiated Spurious Emissions : Y
  - Radiated Restricted Band Edge : Z
3. All position of loop antenna were investigated and the test result is a no critical peak found at all positions.
  - Position : Horizontal, Vertical, Parallel to the ground plane
4. All type of battery were investigated and the worst case configuration results are reported.
  - Type : KNB-L1, KNB-L2, KNB-L3, KNB-L11
  - Worstcase : KNB-L11
5. All transmission of operation were investigated and the worst case results are reported.
  - Mode : VHF+Bluetooth(Simultaneous transmission), Bluetooth
  - Worstcase : Bluetooth

### AC Power line Conducted Emissions

1. All modes of operation were investigated and the worst case configuration results are reported.
  - Mode : Stand alone, Stand alone + Accessories
  - Worstcase : Stand alone

### Conducted test

1. The EUT was configured with packet length of highest power.
  - ALL supported mode tested.
  - Worst Results refer to Notes for each test item

## 8. SUMMARY TEST OF RESULTS

### FCC Part

Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
6 dB Bandwidth	§ 15.247(a)(2)	> 500 kHz	Conducted	PASS
Conducted Maximum Output Power	§ 15.247(b)(3)	< 1 Watt		PASS
Power Spectral Density	§ 15.247(e)	< 8 dBm / 3 kHz Band		PASS
Band Edge (Out of Band Emissions)	§ 15.247(d)	Conducted > 20 dBc		PASS
AC Power line Conducted Emissions	§ 15.207	cf. Section 7.7		PASS
Radiated Spurious Emissions	§ 15.247(d), 15.205, 15.209	cf. Section 7.6	Radiated	PASS
Radiated Restricted Band Edge	§ 15.247(d), 15.205, 15.209	cf. Section 7.6		PASS

**ISED Part**

Test Description	ISED Part Section(s)	Test Limit	Test Condition	Test Result
6 dB Bandwidth	RSS-247, 5.2.(a)	> 500 kHz	Conducted	PASS
99% Bandwidth	RSS-GEN, 6.7	NA		PASS
Conducted Maximum Peak Output Power And e.i.r.p.	RSS-247, 5.4.(d)	< 1 Watt <4 Watt(e.i.r.p.)		PASS
Power Spectral Density	RSS-247, 5.2.(b)	< 8 dBm / 3 kHz Band		PASS
Band Edge(Out of Band Emissions)	RSS-247, 5.5	Conducted > 20 dBc		PASS
AC Power line Conducted Emissions	RSS-GEN, 8.8	cf. Section 7.7		PASS
Radiated Spurious Emissions	RSS-GEN, 8.9	cf. Section 7.6	Radiated	PASS
Receiver Spurious Emissions	RSS-GEN, 5 RSS-GEN, 7.3	cf. Section 7.8		PASS
Radiated Restricted Band Edge	RSS-GEN, 8.9 RSS-GEN, 8.10	cf. Section 7.6		PASS

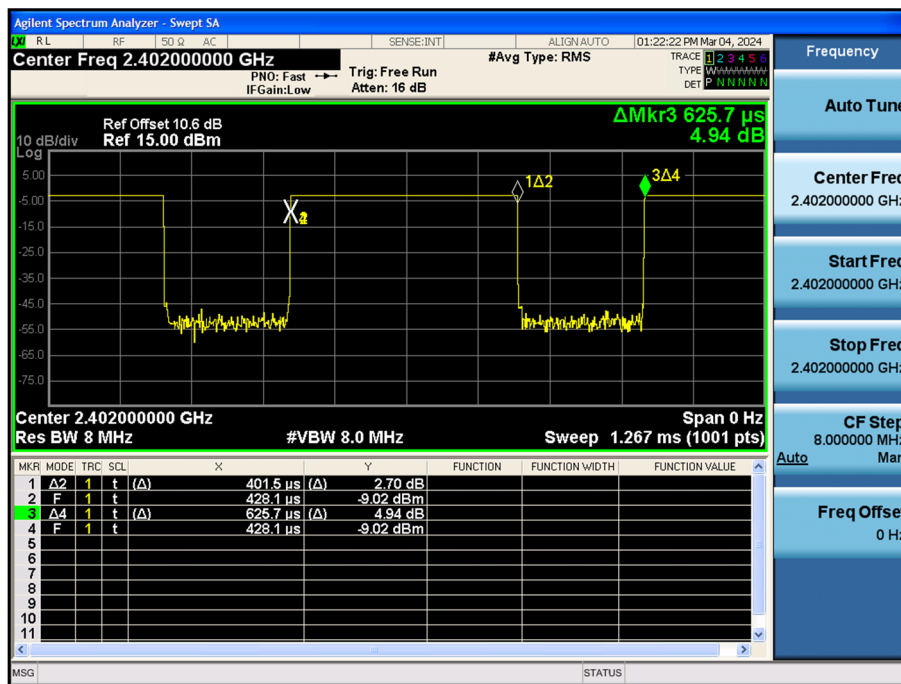
## 9. TEST RESULT

### 9.1 DUTY CYCLE

Data rate (Bit/s)	Packet length (Byte)	T <sub>on</sub> (ms)	T <sub>total</sub> (ms)	Duty Cycle	Duty Cycle Factor (dB)
1M	37	0.402	0.626	0.642	1.927

#### Test Plots

1 M Bit/s (37 Byte) Duty Cycle (Low-CH 0)



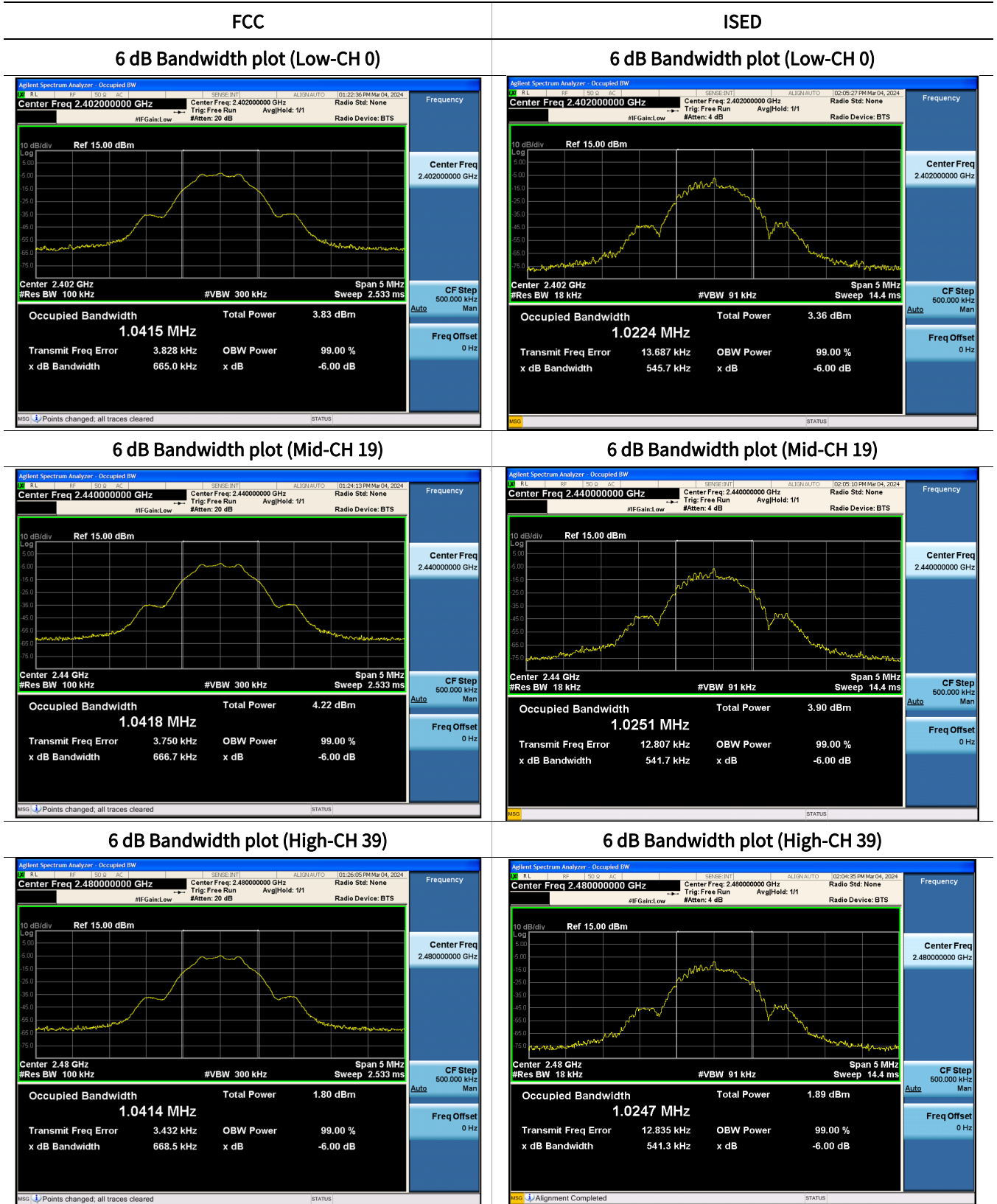
**9.2 6 dB BANDWIDTH & 99 % BANDWIDTH****FCC**

<b>Mode (Bit/s)</b>	<b>Channel</b>	<b>6 dB Bandwidth (kHz)</b>	<b>Limit (kHz)</b>
1M(37)	0	665.0	> 500
	19	666.7	
	39	668.5	

**ISED**

<b>Mode (Bit/s)</b>	<b>Channel</b>	<b>6 dB Bandwidth (kHz)</b>	<b>99 % Bandwidth (MHz)</b>	<b>Limit (kHz)</b>
1M(37)	0	545.7	1.0224	> 500
	19	541.7	1.0251	
	39	541.3	1.0247	

Test Plots





### 9.3 OUTPUT POWER

#### Peak Power

Data rate (Bit/s)	Packet length (Byte)	LE Mode		Measured Power(dBm)	Limit (dBm)
		Frequency [MHz]	Channel		
1M	37	2402	0	-2.788	30
		2440	19	-2.371	
		2480	39	-4.744	

#### Average Power

Data rate (Bit/s)	Packet length (Byte)	LE Mode		Measured Power (dBm)	Duty Cycle Factor	Result	Limit (dBm)
		Frequency [MHz]	Channel		(dB)	(dBm)	
1M	37	2402	0	-4.79	1.93	-2.86	30
		2440	19	-4.38	1.93	-2.45	
		2480	39	-6.79	1.93	-4.86	

#### 9.4 POWER SPECTRAL DENSITY

Frequency (MHz)	Channel No.	Mode	Test Result	
			POWER SPECTRAL DENSITY (dBm/kHz)	Limit
2402	0	1 MBit/s 37 Byte	-2.787	8 dBm / 3 kHz
2440	19		-2.360	
2480	39		-4.419	

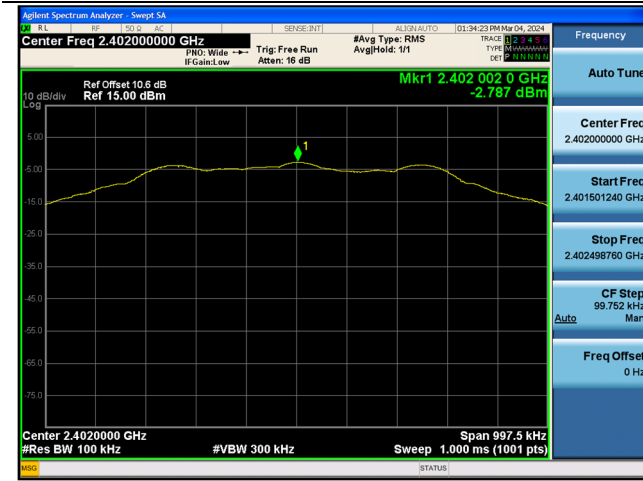
**Note :**

1. Spectrum measured Value not plot data.

The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.

Test Plots

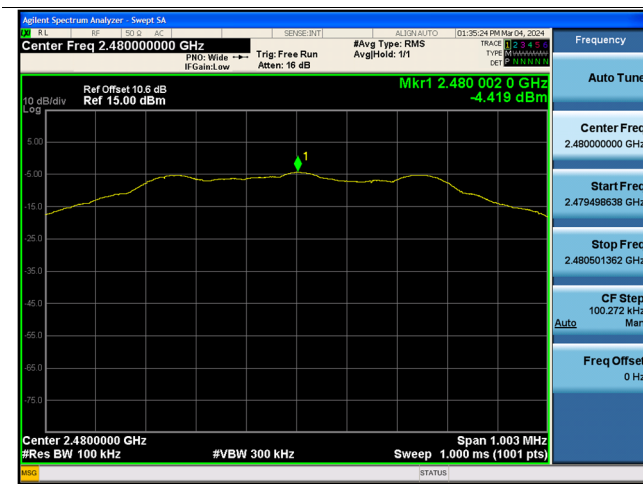
Power Spectral Density (Low-CH 0)



Power Spectral Density (Mid -CH 19)



Power Spectral Density (High -CH 39)



### 9.5 BAND EDGE/ CONDUCTED SPURIOUS EMISSIONS

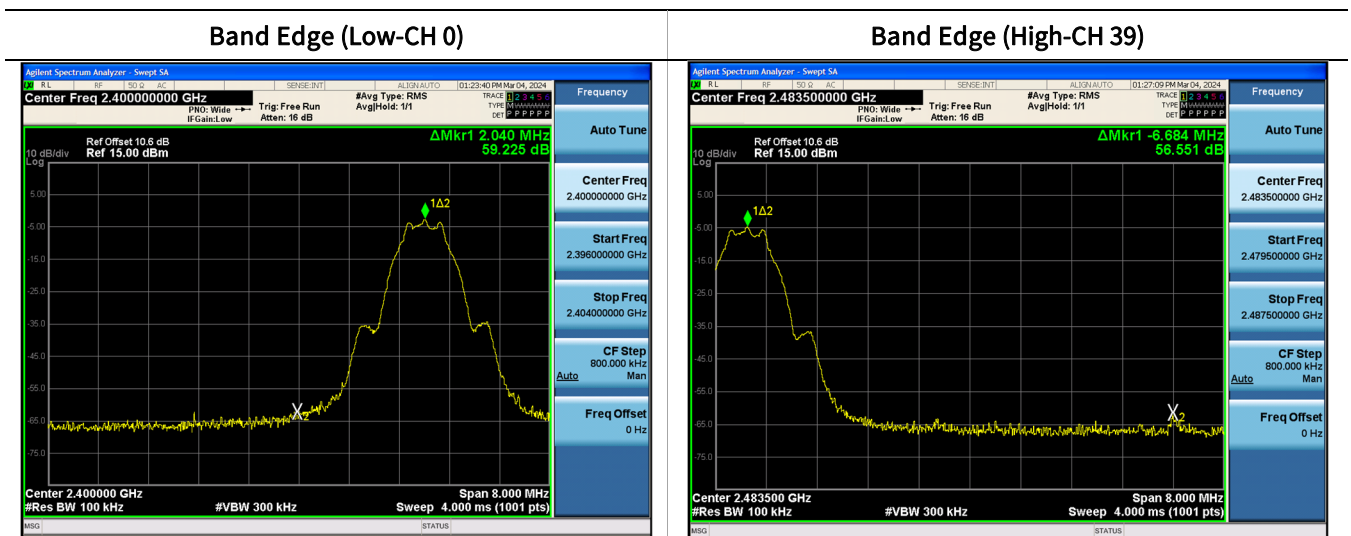
Test Result : please refer to the plot below.

In order to simplify the report, attached plots were only the worst case channel and data rate.

**[BAND EDGE]**

Frequency (MHz)	Mode	Channel No.	Position	Test Result	
				Measured Level (dB)	Limit (dBc)
2402	1M Bit/s 37 Byte	0	Lower	59.225	20
2480		39	Upper	56.551	20

**Test Plots**



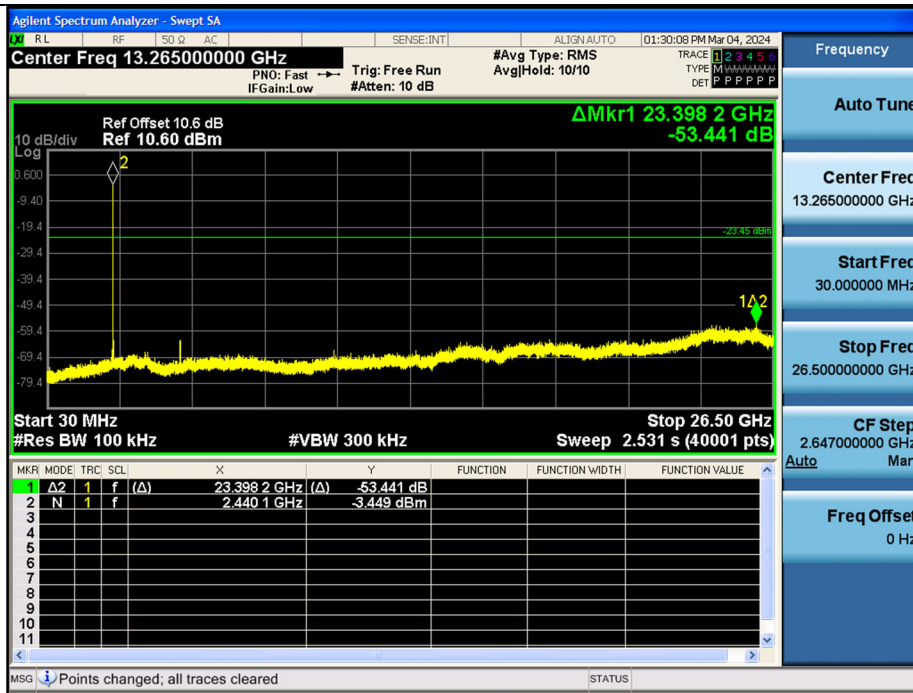
[CONDUCTED SPURIOUS EMISSIONS]

**Note :**

In order to simplify the report, attached plots were only the worst case channel and data rate.

▣ Test Plots - Conducted Spurious Emission (Worst case : 1M Bit/s (37 Byte)\_CH.19)

Spurious Emission (30 MHz – 26.5 GHz)



**Note:**

1. In order to simplify the report, attached plots were only the worst case channel and data rate.
2. Limit: -23.449 dBm

## 9.6 RADIATED SPURIOUS EMISSIONS

### Frequency Range : 9 kHz – 30 MHz

Frequency	Measured Value	A.F+C.L+D.F	POL	Total	Limit	Margin
[MHz]	[dB $\mu$ V]	[dB/m]	[H/V]	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB]

No Critical peaks found

#### Note:

1. The Measured of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.
2. Distance extrapolation factor =  $40\log(\text{specific distance} / \text{test distance})$  (dB)
3. Limit line = specific Limits (dB $\mu$ V) + Distance extrapolation factor

### Frequency Range : Below 1 GHz

Frequency	Measured Value	A.F+C.L	POL	Total	Limit	Margin
[MHz]	[dB $\mu$ V]	[dB/m]	[H/V]	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB]

No Critical peaks found

#### Note:

1. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Quasi peak detector mode.

Frequency Range : Above 1 GHz

Mode : 1 M Bit/s (37 Bytes)

Operation Frequency : 2402 MHz(Ch. 0)

Frequency	Measured Value	A.F+C.L -A.G+D.F	Pol.	Total	Limit	Margin	Measurement Type
[MHz]	[dB $\mu$ V]	[dB/m]	[H/V]	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB]	
4804	42.78	4.46	V	47.24	73.98	26.75	PK
4804	31.20	4.46	V	35.66	53.98	18.33	AV
7206	36.88	13.17	V	50.05	73.98	23.94	PK
7206	24.24	13.17	V	37.41	53.98	16.58	AV
4804	42.93	4.46	H	47.39	73.98	26.60	PK
4804	31.30	4.46	H	35.76	53.98	18.23	AV
7206	37.07	13.17	H	50.24	73.98	23.75	PK
7206	24.75	13.17	H	37.92	53.98	16.07	AV

Operation Frequency : 2440 MHz(Ch. 19)

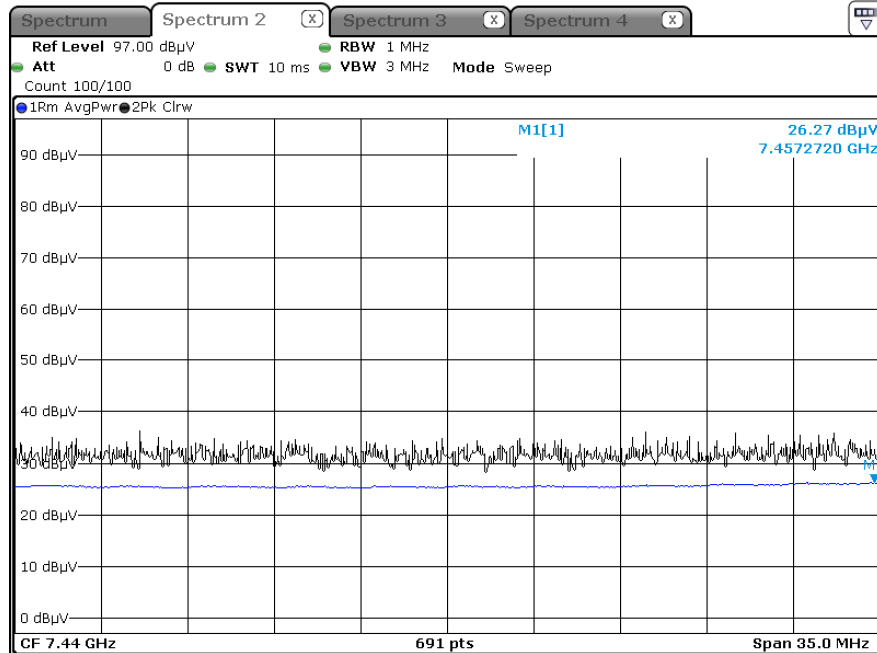
Frequency	Measured Value	A.F+C.L -A.G+D.F	Pol.	Total	Limit	Margin	Measurement Type
[MHz]	[dB $\mu$ V]	[dB/m]	[H/V]	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB]	
4880	43.23	4.51	V	47.74	73.98	26.24	PK
4880	32.27	4.51	V	36.78	53.98	17.20	AV
7320	37.41	12.31	V	49.72	73.98	24.27	PK
7320	25.42	12.31	V	37.73	53.98	16.26	AV
4880	43.92	4.51	H	48.43	73.98	25.55	PK
4880	32.59	4.51	H	37.10	53.98	16.88	AV
7320	37.60	12.31	H	49.91	73.98	24.08	PK
7320	25.53	12.31	H	37.84	53.98	16.15	AV

Operation Frequency : 2480 MHz(Ch. 39)

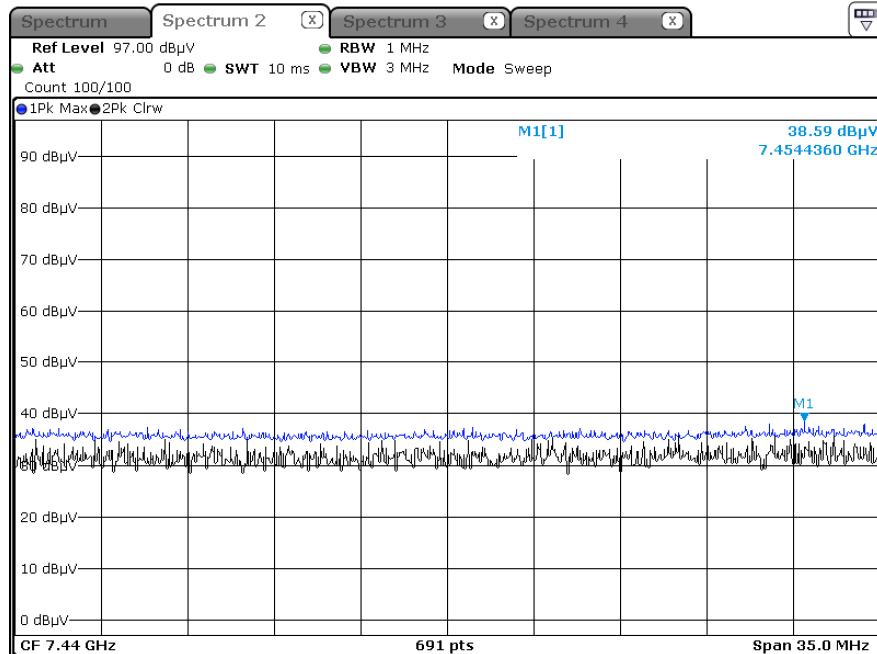
Frequency	Measured Value	A.F+C.L -A.G+D.F	Pol.	Total	Limit	Margin	Measurement Type
[MHz]	[dB $\mu$ V]	[dB/m]	[H/V]	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB]	
4960	42.01	5.29	V	47.30	73.98	26.68	PK
4960	30.64	5.29	V	35.93	53.98	18.05	AV
7440	37.57	12.71	V	50.28	73.98	23.70	PK
7440	26.01	12.71	V	38.72	53.98	15.26	AV
4960	43.00	5.29	H	48.29	73.98	25.69	PK
4960	30.95	5.29	H	36.24	53.98	17.74	AV
7440	38.59	12.71	H	51.30	73.98	22.68	PK
7440	26.27	12.71	H	38.98	53.98	15.00	AV

▣ 1 M Bit/s 37 Bytes Test Plots (Worst case : Y-H)

Radiated Spurious Emissions plot – Average Result (Ch.39 3rd Harmonic)



Radiated Spurious Emissions plot – Peak Result (Ch.39 3rd Harmonic)



**Note:**

Plots of worst case are only reported.



## 9.7 RADIATED RESTRICTED BAND EDGES

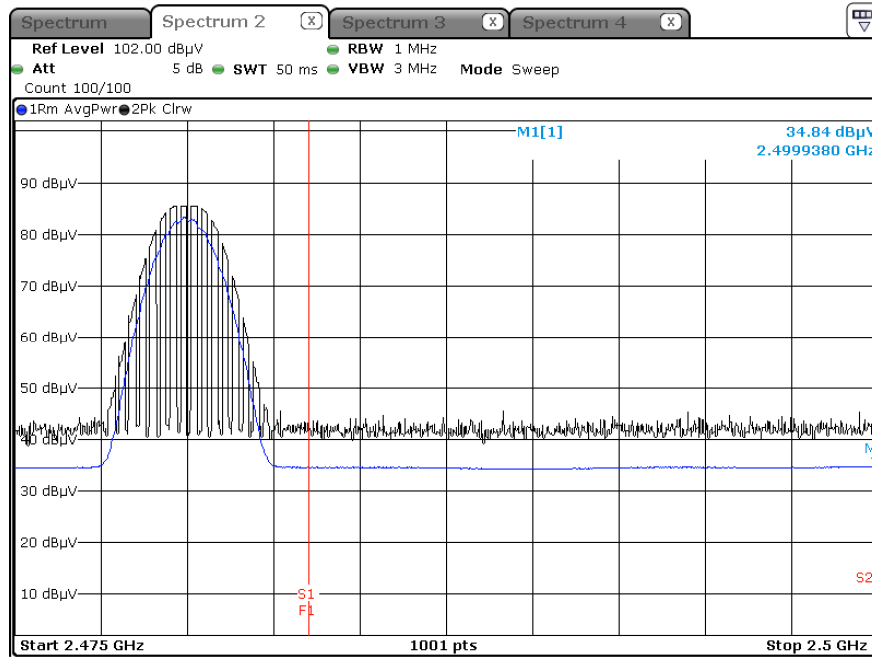
Mode : 1M Bit/s (37 Bytes)

Operating Frequency	2402 MHz, 2480 MHz
Channel No.	0 CH, 39 CH

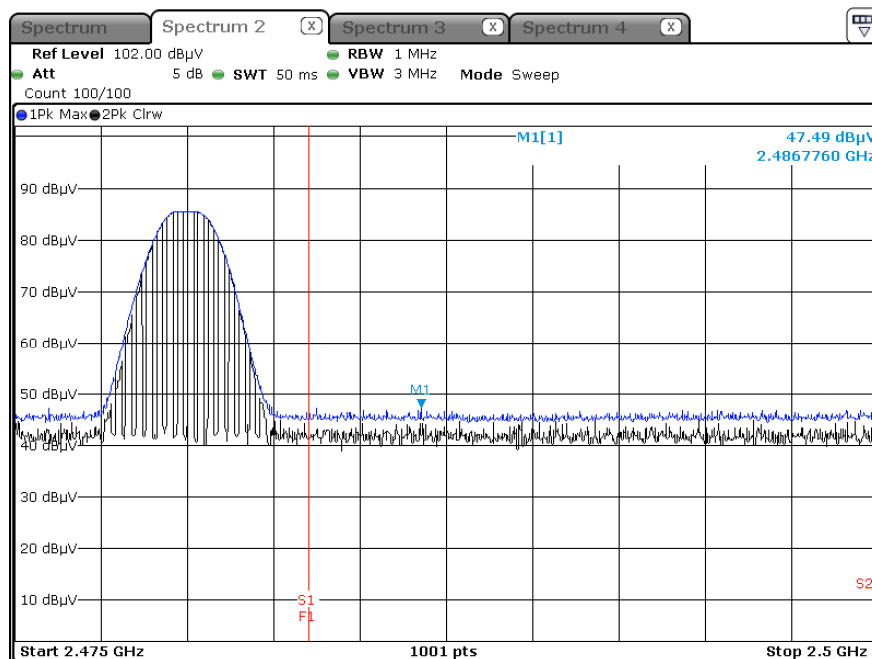
Frequency	Measured Value	A.F+C.L-A.G +ATT+D.F	Ant. Pol.	Total	Limit	Margin	Measurement Type
[MHz]	[dB $\mu$ V]	[dB/m]	[H/V]	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB]	
2390.0	47.14	2.58	H	49.72	73.98	24.27	PK
2390.0	34.78	2.58	H	37.36	53.98	16.63	AV
2390.0	47.41	2.58	V	49.99	73.98	24.00	PK
2390.0	34.89	2.58	V	37.47	53.98	16.52	AV
2483.5	47.03	3.28	H	50.31	73.98	23.67	PK
2483.5	34.82	3.28	H	38.10	53.98	15.88	AV
2483.5	47.49	3.28	V	50.77	73.98	23.21	PK
2483.5	34.84	3.28	V	38.12	53.98	15.86	AV

Mode : 1 M Bit/s (37 Bytes) Test Plots

Radiated Restricted Band Edges plot – Average Result (Ch.39, Z-V)



Radiated Restricted Band Edges plot – Peak Result (Ch.39, Z-V)



**Note:**

In order to simplify the report, Plot of worst case are only reported.

## 9.8 RECEIVER SPURIOUS EMISSIONS

### Frequency Range : Below 1 GHz

Frequency	Measured Value	A.F+C.L	POL	Total	Limit	Margin
[MHz]	[dB $\mu$ V]	[dB/m]	[H/V]	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB]

No Critical peaks found

#### Note:

1. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Quasi peak detector mode.

### Frequency Range : Above 1 GHz

Frequency	Measured Value	A.F+C.L+A.G+D.F	POL	Total	Limit	Margin
[MHz]	[dB $\mu$ V]	[dB/m]	[H/V]	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB]

No Critical peaks found

## 9.9 POWERLINE CONDUCTED EMISSIONS

### Conducted Emissions

Test

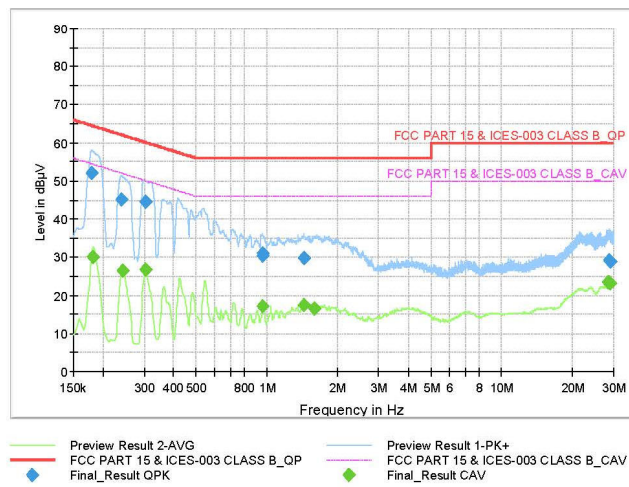
1 / 1

# Test Report

### Common Information

EUT : NX-3210R-K3  
 Operating Conditions : BT LE  
 Comment :

Full Spectrum



### Final Result QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.1793	52.09	64.52	12.44	9.000	N	9.6
0.2400	45.23	62.10	16.86	9.000	N	9.6
0.3053	44.55	60.10	15.55	9.000	L1	9.6
0.9545	30.44	56.00	25.56	9.000	N	9.7
0.9613	30.97	56.00	25.03	9.000	N	9.7
1.4360	29.83	56.00	26.17	9.000	L1	9.7
28.7533	29.18	60.00	30.82	9.000	N	10.8
28.7803	29.06	60.00	30.94	9.000	N	10.8
29.0255	28.76	60.00	31.24	9.000	N	10.8

### Final Result CAV

Frequency (MHz)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.1815	30.17	54.42	24.25	9.000	N	9.6
0.2445	26.53	51.94	25.41	9.000	N	9.6
0.3053	26.66	50.10	23.44	9.000	N	9.6
0.9590	17.27	46.00	28.73	9.000	N	9.7
1.4383	17.44	46.00	28.56	9.000	L1	9.7
1.5958	16.46	46.00	29.54	9.000	L1	9.7
28.3528	23.55	50.00	26.45	9.000	N	10.8
28.5575	23.58	50.00	26.42	9.000	N	10.8
29.0255	23.11	50.00	26.89	9.000	N	10.8

2024-03-04

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## 10. LIST OF TEST EQUIPMENT

### Conducted Test

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
LISN	ENV216	Rohde & Schwarz	102245	08/02/2024	Annual
EMI Test Receiver	ESR	Rohde & Schwarz	101910	05/26/2024	Annual
Temperature Chamber	SU-642	ESPEC	0093008124	02/19/2025	Annual
Signal Analyzer	N9030A	Keysight	MY49431210	12/29/2024	Annual
Power Meter	N1911A	Agilent	MY45100523	02/28/2025	Annual
Power Sensor	N1921A	Agilent	MY57820067	02/22/2025	Annual
Directional Coupler	87300B	Agilent	3116A03621	10/30/2024	Annual
Power Splitter	11667B	Hewlett Packard	10545	02/06/2025	Annual
DC Power Supply	E3632A	Agilent	KR75305528	01/02/2025	Annual
Attenuator(10 dB)	8493C	Hewlett Packard	07560	06/12/2024	Annual
Software	EMC32	Rohde & Schwarz	N/A	N/A	N/A
FCC WLAN&BT&BLE Conducted Test Software v3.0	N/A	HCT CO., LTD.	N/A	N/A	N/A

### Note:

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.

**Radiated Test**

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
Controller(Antenna mast)	CO3000	Innco system	CO3000-4p	N/A	N/A
Antenna Position Tower	MA4640/800-XP-EP	Innco system	N/A	N/A	N/A
Controller	EM1000	Audix	060520	N/A	N/A
Turn Table	N/A	Audix	N/A	N/A	N/A
Loop Antenna	FMZB 1513	Rohde & Schwarz	1513-333	03/17/2024	Biennial
Hybrid Antenna	VULB 9168	Schwarzbeck	760	02/24/2025	Biennial
Horn Antenna	BBHA 9120D	Schwarzbeck	02299	03/24/2024	Biennial
Horn Antenna (15GHz ~ 40 GHz)	BBHA9170	Schwarzbeck	BBHA9170342	09/29/2024	Biennial
Spectrum Analyzer	FSV40	Rohde & Schwarz	100901	03/27/2024	Annual
Signal Analyzer	N9030A	Agilent	MY52350879	04/13/2024	Annual
Band Reject Filter	WRCJV12-4900-5100-5900-6100-50SS	Wainwright Instruments	5	06/12/2024	Annual
Band Reject Filter	WRCJV12-4900-5100-5900-6100-50SS	Wainwright Instruments	6	06/12/2024	Annual
Band Reject Filter	WRCJV2400/2483.5-2370/2520-60/12SS	Wainwright Instruments	2	01/02/2025	Annual
RF Switching System	FMSR-04B (3G HPF+LNA)	T&M SYSTEM	S2L1	12/27/2024	Annual
RF Switching System	FMSR-04B (10dB ATT+LNA)	T&M SYSTEM	S2L2	12/27/2024	Annual
RF Switching System	FMSR-04B (3dB ATT+LNA)	T&M SYSTEM	S2L3	12/27/2024	Annual
RF Switching System	FMSR-04B (LNA)	T&M SYSTEM	S2L4	12/27/2024	Annual
RF Switching System	FMSR-04B (7G HPF+LNA)	T&M SYSTEM	S2L5	12/27/2024	Annual
Power Amplifier	CBL18265035	CERNEX	22966	11/17/2024	Annual
Power Amplifier	CBL26405040	CERNEX	25956	02/26/2025	Annual

**Note:**

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.
3. Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5(Version : 2017).

## 11. ANNEX A\_ TEST SETUP PHOTO

Please refer to test setup photo file no. as follows;

No.	Description
1	HCT-RF-2403-FI001-P