

BUREAU  
VERITAS

Test Report No.: PSU-NQN2504010114RF01



Certificate #6613.01

# FCC TEST REPORT

## (Part 15, Subpart C)

Applicant:	BARROT TECHNOLOGY CO., LTD
Address:	A1009, Block A, Jiahua Building, No. 9 Shangdi Third Street, Haidian District, Beijing, P.R.China


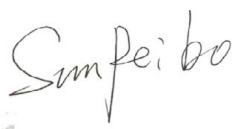
Manufacturer or Supplier:	BARROT TECHNOLOGY CO., LTD
Address:	A1009, Block A, Jiahua Building, No. 9 Shangdi Third Street, Haidian District, Beijing, P.R.China
Product:	BT Module
Brand Name:	BARROT
Model Name:	i2616e-s
FCC ID:	2AOXV-I2616E-S
Date of tests:	Mar.24, 2025 ~ Mar.29, 2025

The tests have been carried out according to the requirements of the following standard:

☒ **FCC Part 15, Subpart C, Section 15.247**

☒ **ANSI C63.10-2020**

**CONCLUSION: The submitted sample was found to COMPLY with the test requirement**

Prepared by Hanwen Xu Engineer / Mobile Department	Approved by Peibo Sun Manager / Mobile Department
 Date: Apr. 02, 2025	 Date: Apr. 02, 2025

This report is governed by, and incorporates by reference, the Conditions of Testing as posted at the date of issuance of this report at <http://www.bureauveritas.com/home/about-us/our-business/cps/about-us/terms-conditions/> and is intended for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. Measurement uncertainty is only provided upon request for accredited tests. Statements of conformity are based on simple acceptance criteria without taking measurement uncertainty into account, unless otherwise requested in writing. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence or if you require measurement uncertainty; provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents.

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Test Report No.: PSU-NQN2504010114RF01

## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
PSU-NQN2504010114RF01	Original release	Apr. 02, 2025



## 1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247)		
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT
15.207	AC Power Conducted Emission	N/A
15.205 15.209	Radiated Emissions	Compliance
15.247(d)	Out of band Emission Measurement	Compliance
15.247(a)(2)	6dB bandwidth	Compliance
15.247(b)	Conducted Output power	Compliance
15.247(e)	Power Spectral Density	Compliance
15.203	Antenna Requirement	Compliance

Note : 1.Except RSE, other data please refer to Appendix 1.

### \*Test Lab Information Reference

#### Lab A:

Huarui 7Layers High Technology (Suzhou) Co., Ltd.

#### Lab Address:

Tower N, Innovation Center, 88 Zuyi Road, High-tech District, Suzhou City, Anhui Province

**Accredited Test Lab Cert 6613.01**

The FCC Site Registration No. is 434559; The Designation No. is CN1325.

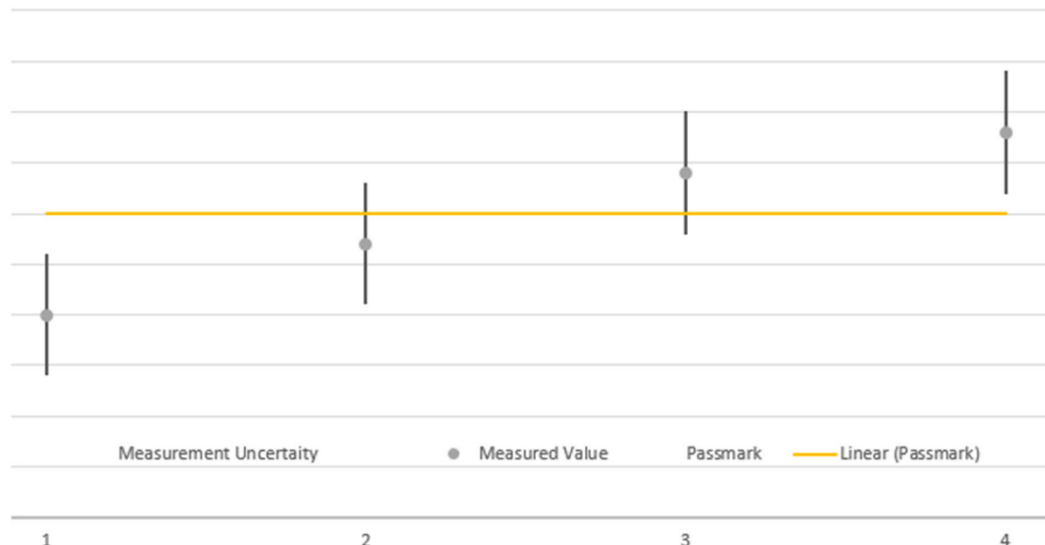


## 1.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	UNCERTAINTY
AC Power Conducted emissions	$\pm 2.70\text{dB}$
Radiated emissions (9kHz~30MHz)	$\pm 2.68\text{dB}$
Radiated emissions (30MHz~1GHz)	$\pm 4.98\text{dB}$
Radiated emissions (1GHz ~6GHz)	$\pm 4.70\text{dB}$
Radiated emissions (6GHz ~18GHz)	$\pm 4.60\text{dB}$
Radiated emissions (18GHz ~40GHz)	$\pm 4.12\text{dB}$
Conducted emissions	$\pm 4.01\text{dB}$
Occupied Channel Bandwidth	$\pm 43.58\text{kHz}$
Conducted Output power	$\pm 2.06\text{dB}$
Power Spectral Density	$\pm 0.85\text{ dB}$

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k = 2$ .



The verdicts in this test report are given according the above diagram:

Case	Measured Value	Uncertainty Range	Verdict
1	below pass mark	below pass mark	Passed
2	below pass mark	within pass mark	Passed
3	above pass mark	within pass mark	Failed
4	above pass mark	above pass mark	Failed

That means, the laboratory applies, as decision rule (see ISO/IEC 17025:2017), the so-called shared risk principle.



## 2 GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT*</b>	BT Module
<b>BRAND NAME*</b>	BARROT
<b>MODEL NAME*</b>	i2616e-s
<b>NOMINAL VOLTAGE*</b>	3.3Vdc (Battery supply)
<b>MODULATION *</b>	GFSK
<b>TRANSMISSION RATE*</b>	BT_LE: 125 kbps /500 kbps /1 Mbps/2 Mbps
<b>OPERATING FREQUENCY*</b>	2402-2480MHz for BT-LE(GFSK)
<b>MAX. OUTPUT POWER</b>	BT-LE: 8.995mW (Maximum)
<b>ANTENNA TYPE*</b>	PCB Antenna with 0dBi gain for BLE
<b>Directional Gain:</b>	For Power/PSD: 0dBi(Uncorrelated) for BLE
<b>Beamforming Directional Gain:</b>	N/A
<b>HW VERSION*</b>	V1.0
<b>SW VERSION*</b>	i2616e_00_250102_r3915
<b>I/O PORTS*</b>	Refer to user's manual
<b>CABLE SUPPLIED*</b>	N/A

**NOTE:**

1. \*Since the above data and/or information is provided by the client relevant results or conclusions of this report are only made for these data and/or information, Test Lab is not responsible for the authenticity, integrity and results of the data and information and/or the validity of the conclusion.
2. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.





3. The EUT incorporates a MIMO function. Physically, the EUT provides one transmitter and one receiver.

MODULATION MODE	TX/RX FUNCTION
BT_LE(1MHz)	1TX /1RX
BT_LE(2MHz)	1TX /1RX
BT_LE(S2)	1TX /1RX
BT_LE(S8)	1TX /1RX

4. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.
5. Antenna gain and EUT conducted cable loss are provided by the customer, and the laboratory will record the results based on these items that involve these two parameters.



## 2.2 DESCRIPTION OF TEST MODES

40 channels are provided for BT-LE (GFSK):

CHANNEL	FREQ. (MHZ)	CHANNEL	FREQ. (MHZ)	CHANNEL	FREQ. (MHZ)	CHANNEL	FREQ. (MHZ)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480



## 2.2.1 CONFIGURATION OF SYSTEM UNDER TEST

Please see section 4 photographs of the test configuration for reference.

## 2.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports.

The worst case was found when positioned on Y axis for radiated emission. Following test modes were selected for the final test, and the final worst case is marked in boldface and recorded in the report:

EUT CONFIGURE MODE	APPLICABLE TO				MODE
	RE<1G	RE≥1G	PLC	APCM	
-	√	√	N/A	√	-

Where **RE<1G**: Radiated Emission below 1GHz

**RE≥1G**: Radiated Emission above 1GHz

**PLC**: Power Line Conducted Emission

**APCM**: Antenna Port Conducted Measurement

**NOTE**: No need to concern of Conducted Emission due to the EUT is powered by battery.

### RADIATED EMISSION TEST (BELOW 1GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ The following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)
BT-LE	0 to 39	39	GFSK	1.0

### RADIATED EMISSION TEST (ABOVE 1GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

- ☒ The following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)
BT-LE	0 to 39	0,19, 39	GFSK	0.125&0.5&1.0
BT-LE	1 to 38	1,19, 38	GFSK	2.0



**BANDEDGE MEASUREMENT:**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ The following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)
BT-LE	0 to 39	0,19, 39	GFSK	0.125&0.5&1.0
BT-LE	1 to 38	1,19, 38	GFSK	2.0

**ANTENNA PORT CONDUCTED MEASUREMENT:**

- ☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ The following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)
BT-LE	0 to 39	0,19, 39	GFSK	0.125&0.5&1.0
BT-LE	1 to 38	1,19, 38	GFSK	2.0

**TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	TEST VOLTAGE	TESTED BY
RE<1G	23deg. C, 70%RH	DC 3.3V By DC Supply	Hanwen Xu
RE≥1G	23deg. C, 70%RH	DC 3.3V By DC Supply	Hanwen Xu
PLC	25deg. C, 52%RH	DC 3.3V By DC Supply	Hanwen Xu
APCM	25deg. C, 60%RH	DC 3.6V By DC Supply	Hanwen Xu

**2.3 DUTY CYCLE OF TEST SIGNAL**

Please Refer to Appendix1 Of this test report.



## 2.4 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC Part 15, Subpart C, Section 15.247**

**KDB 558074 D01 DTS Meas Guidance v05r02**

**ANSI C63.10-2020**

Note :

1. All test items have been performed and recorded as per the above standards.
2. The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (Certification). The test report has been issued separately.

## 2.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Desktop	Lenovo	M73 SFF	PC04GRQV	N/A
2	Desktop	Lenovo	M73 SFF	PC06CS27	N/A
3	Laptop	Lenovo	Thinkpad T450	PC-049PT1	N/A



### 3 TEST TYPES AND RESULTS

#### 3.1 CONDUCTED EMISSION MEASUREMENT

##### 3.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB $\mu$ V)	
	Quasi-peak	Average
0.15 ~ 0.5	66 to 56	56 to 46
0.5 ~ 5	56	46
5 ~ 30	60	50

**NOTE:** 1.The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

##### 3.1.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESR3	102749	Mar.28,24	Mar.27,26
ELEKTRA test software	Rohde&Schwarz	ELEKTRA	NA	N/A	N/A
LISN network	Rohde&Schwarz	ENV216	102640	Mar.28,24	Mar.27,26
CABLE	Rohde&Schwarz	W61.01	N/A	Apr.27,24	Apr.26,25
CABLE	Rohde&Schwarz	W601	N/A	Apr.27,24	Apr.26,25

**NOTE:**

1. The test was performed in CE shielded room.

2. The calibration interval of the above test instruments is 12 /24months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.



### 3.1.3 TEST PROCEDURES

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

**NOTE:** All modes of operation were investigated and the worst-case emissions are reported.

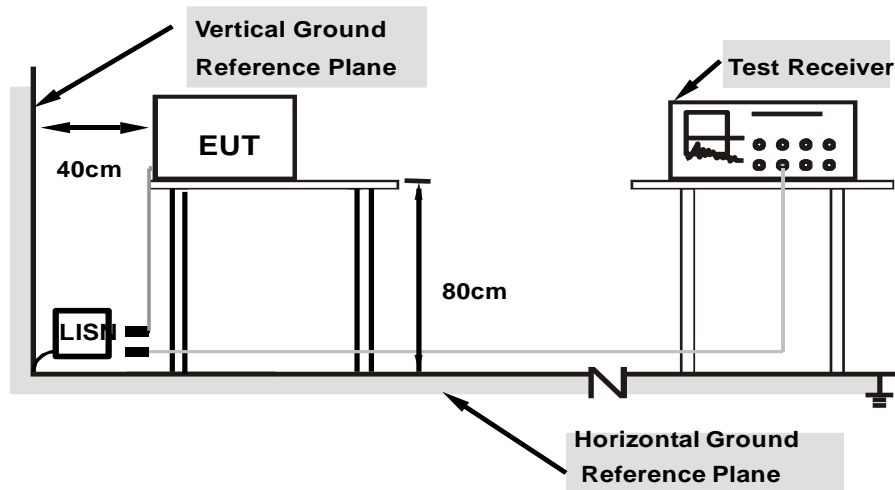
### 3.1.4 DEVIATION FROM TEST STANDARD

No deviation.





### 3.1.5 TEST SETUP



**Note:** 1.Support units were connected to second LISN.  
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

For the actual test configuration, please refer to the attached file (Test Setup Photo).

### 3.1.6 EUT OPERATING CONDITIONS

- Turned on the power and connected of all equipment.
- EUT was operated according to the type used was description in manufacturer's specifications or the User's Manual.

### 3.1.7 TEST RESULTS

N/A.



## 3.2 RADIATED EMISSION MEASUREMENT

### 3.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

FREQUENCIES (MHz)	FIELD STRENGTH (microvolts/meter)	MEASUREMENT DISTANCE (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

**NOTE:**

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.



## 3.2.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Pre-Amplifier	R&S	SCU18F1	100815	Aug.30,23	Aug.29,25
Pre-Amplifier	R&S	SCU08F1	101028	Jan.22,24	Jan.21,26
Signal Generator	R&S	SMB100A	182185	Mar.29,24	Mar.28,26
3m Fully-anechoic Chamber	TDK	9m*6m*6m	HRSW-SZ-EMC-01Chamber	Nov.25,22	Nov.24,25
3m Semi-anechoic Chamber	TDK	9m*6m*6m	HRSW-SZ-EMC-02Chamber	Nov.25,22	Nov.24,25
EMI TEST Receiver	R&S	ESW44	101973	Mar.28,24	Mar.27,26
Bilog Antenna	SCHWARZBECK	VULB 9163	1264	Dec.26,23	Dec.25,25
Horn Antenna	ETS-LINDGREN	3117	227836	Aug.22,23	Aug.21,25
Horn Antenna (18GHz-40GHz)	Steatite Q-par Antennas	QMS 00880	23486	Jul.15,24	Jul.14,26
Horn Antenna	Steatite Q-par Antennas	QMS 00208	23485	Aug.22,23	Aug.21,25
Loop Antenna	SCHWARZ	HFH2-Z2/Z2E	100976	Feb.23,23	Feb.22,25
Loop Antenna	SCHWARZ	HFH2-Z2/Z2E	100976	Feb.22,25	Feb.21,27
WIDEBAND RADIO COMMUNICATION TESTER	R&S	CMW500	169399	Jun.19,24	Jun.18,26
Test Software	ELEKTRA	ELEKTRA4.32	N/A	N/A	N/A
Open Switch and Control Unit	R&S	OSP220	101964	N/A	N/A
DC Source	HYELEC	HY3010B	551016	Aug.31,23	Aug.30,25
Hygrothermograph	DELI	20210528	SZ014	Sep.06,23	Sep.05,25
6DB attenuator	Tonscend Technology Co., Ltd	N/A	23062787	N/A	N/A
PC	LENOVO	E14	HRSW0024	N/A	N/A
TMC-AMI18843A(CABLE)	R&S	HF290-NMNM-7.00M	N/A	N/A	N/A
TMC-AMI18843A(CABLE)	R&S	HF290-NMNM-4.00M	N/A	N/A	N/A
CABLE	R&S	W13.02	N/A	Apr.27,24	Apr.26,25
CABLE	R&S	W12.14	N/A	Apr.27,24	Apr.26,25

**NOTE:** 1. The calibration interval of the above test instruments is 12/ 24/ 36 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

2. The test was performed in 3m Chamber.

3. The FCC Site Registration No. is 434559; The Designation No. is CN1325.



### 3.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters (for below 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, For battery operated equipment, the equipment tests shall be perform using fresh batteries. The turntable was rotated to maximize the emission level.

**Note:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average (Duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor ( $10 \log(1/\text{duty cycle})$ ).
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (Duty cycle  $\geq 98\%$ ) for Average detection (AV) at frequency above 1GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

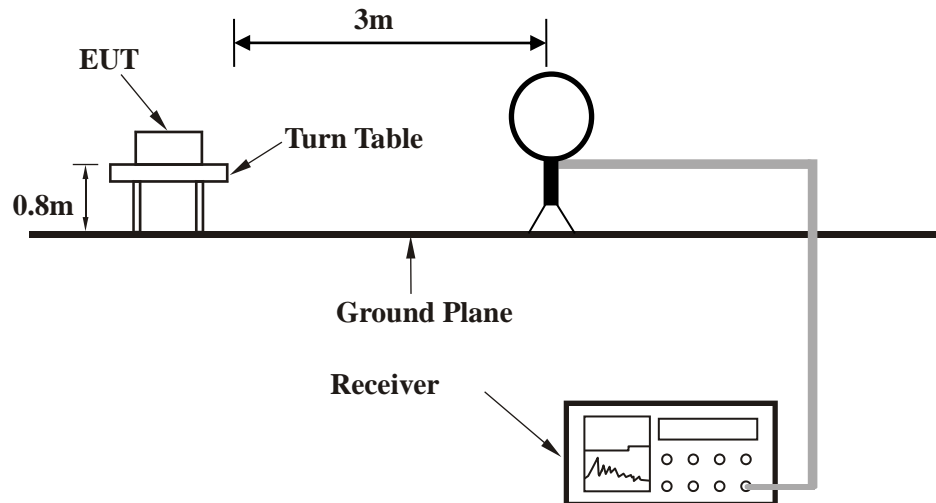
### 3.2.4 DEVIATION FROM TEST STANDARD

No deviation

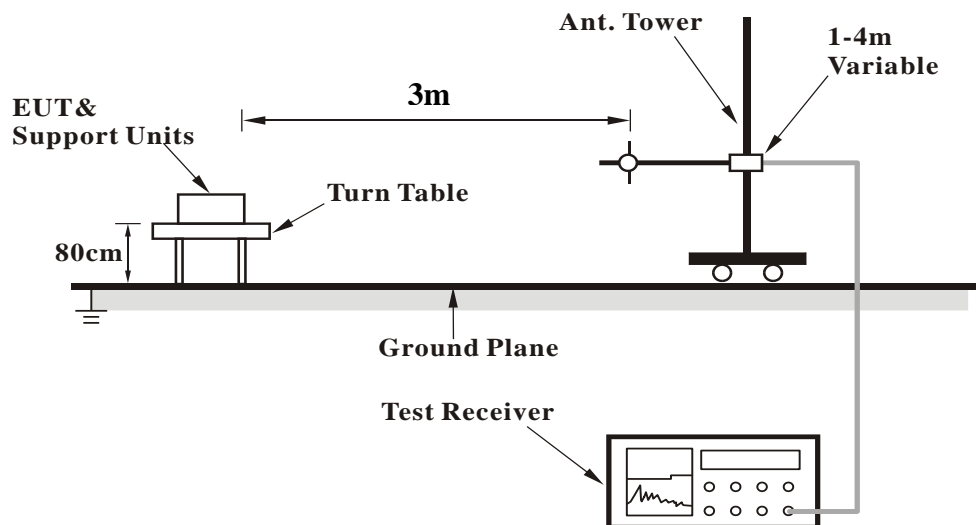


### 3.2.5 TEST SETUP

#### <Frequency Range 9kHz~30MHz >

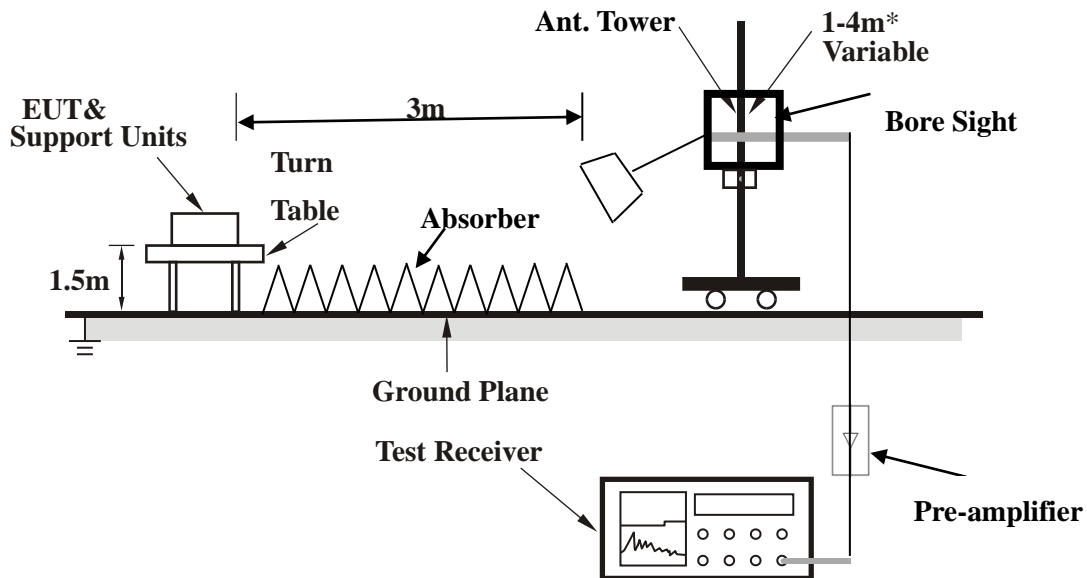


#### < Frequency Range 30MHz~1GHz >





<Frequency Range above 1GHz>



**Note:** Above 1G is a directional antenna

Depends on the EUT height and the antenna 3dB beamwidth both, refer to section 7.3 of CISPR 16-2-3.

For the actual test configuration, please refer to the attached file (Test Setup Photo).

### 3.2.6 EUT OPERATING CONDITIONS

- Set the EUT under full load condition and placed them on a testing table.
- Set the transmitter part of EUT under transmission condition continuously at specific channel frequency.
- The necessary accessories enable the EUT in full functions.



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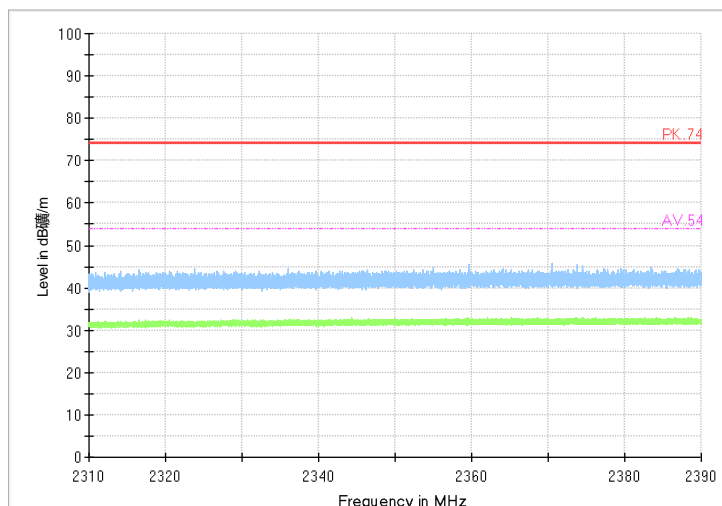
Test Report No.: PSU-NQN2504010114RF01

### 3.2.7 TEST RESULTS

NOTE : The 9K~30MHz amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required in the report.

#### Radiated Emission Band Edge for BLE

Full Spectrum



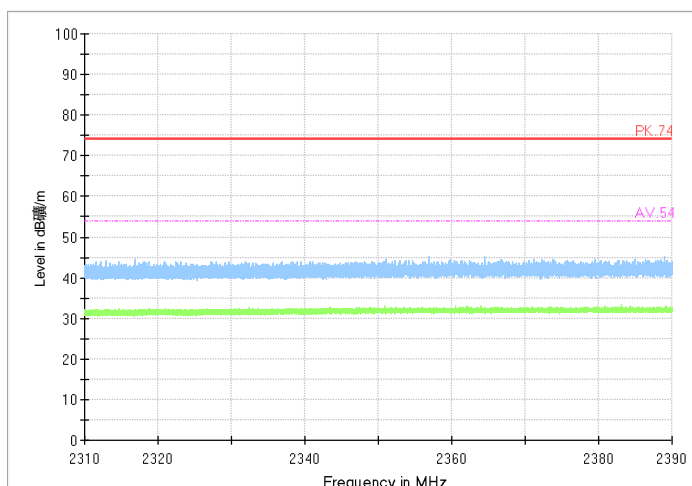
Carrier frequency (MHz): 2402

Channel No.:0

Test Mode: GFSK (LE 1Mbps)

Polarity: Vertical

Full Spectrum



Carrier frequency (MHz): 2402

Channel No.:0

Test Mode: GFSK (LE 1Mbps)

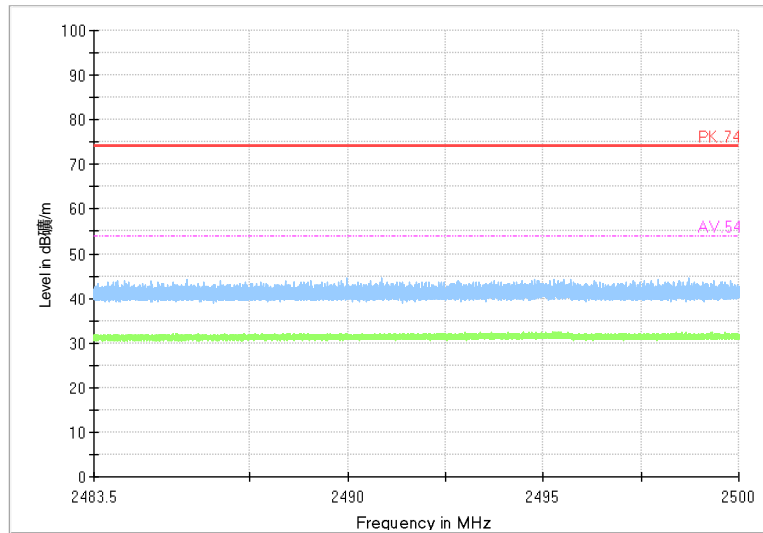
Polarity: Horizontal



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Test Report No.: PSU-NQN2504010114RF01

Full Spectrum



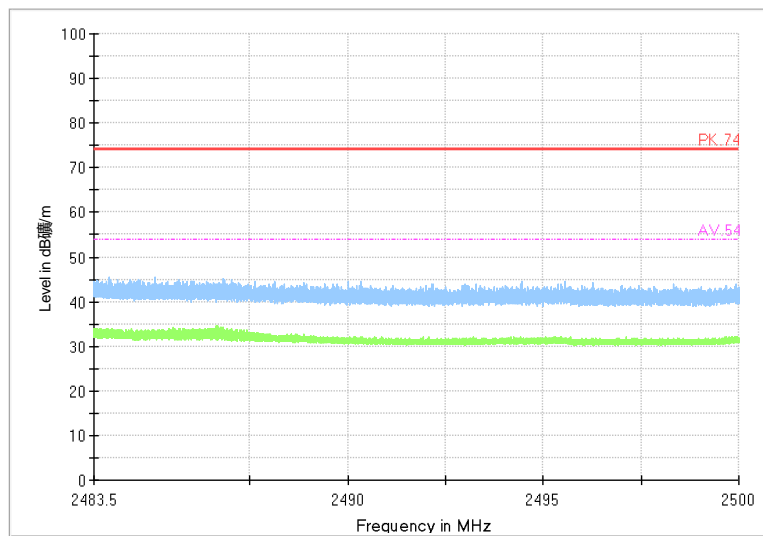
Carrier frequency (MHz): 2480

Channel No.:39

Test Mode: GFSK (LE 1Mbps)

Polarity: Vertical

Full Spectrum



Carrier frequency (MHz): 2480

Channel No.:39

Test Mode: GFSK (LE 1Mbps)

Polarity: Horizontal

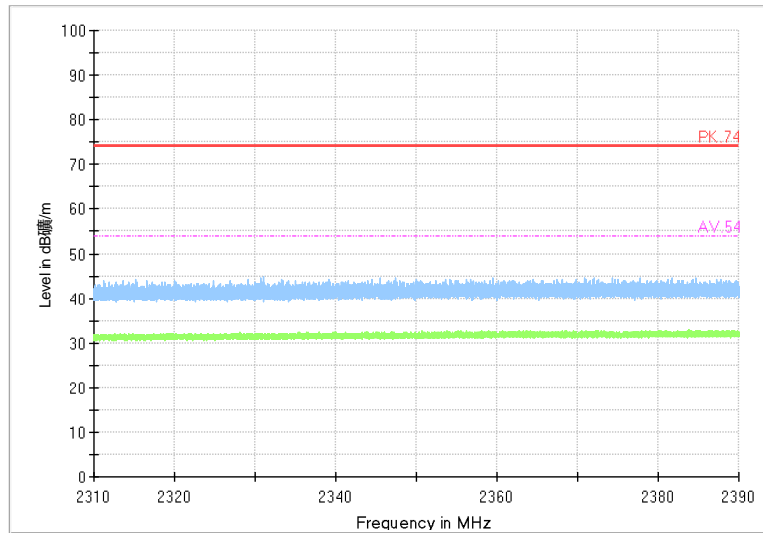




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Test Report No.: PSU-NQN2504010114RF01

Full Spectrum



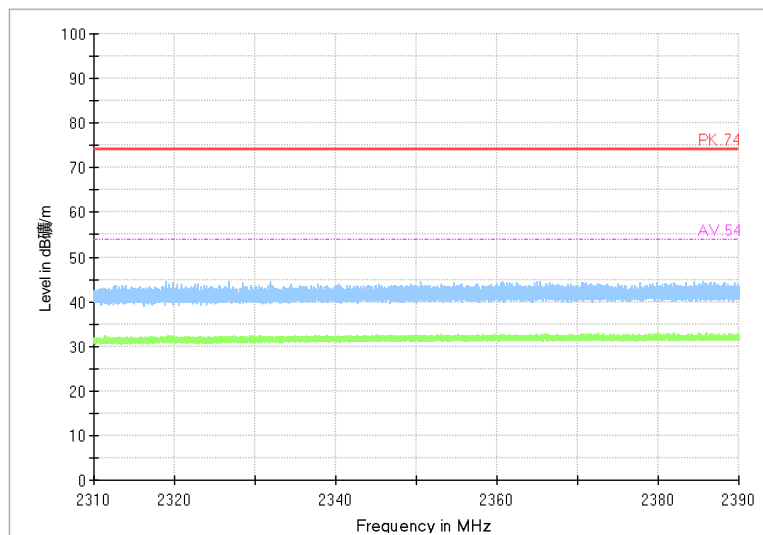
Carrier frequency (MHz): 2402

Channel No.:0

Test Mode: GFSK (LE 2Mbps)

Polarity: Vertical

Full Spectrum



Carrier frequency (MHz): 2402

Channel No.:0

Test Mode: GFSK (LE 2Mbps)

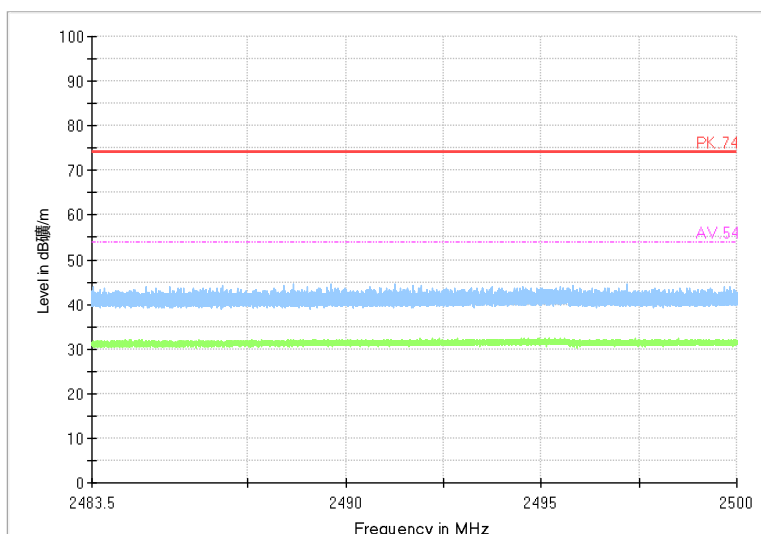
Polarity: Horizontal



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Test Report No.: PSU-NQN2504010114RF01

Full Spectrum



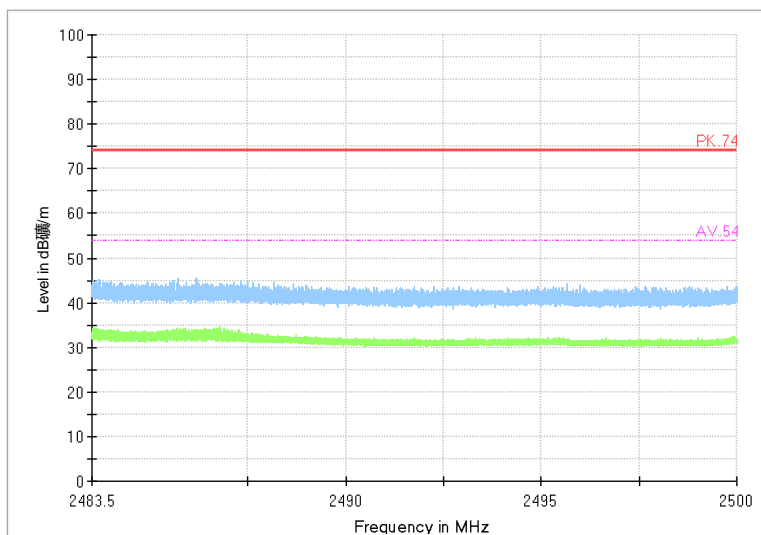
Carrier frequency (MHz): 2480

Channel No.:39

Test Mode: GFSK (LE 2Mbps)

Polarity: Vertical

Full Spectrum



Carrier frequency (MHz): 2480

Channel No.:39

Test Mode: GFSK (LE 2Mbps)

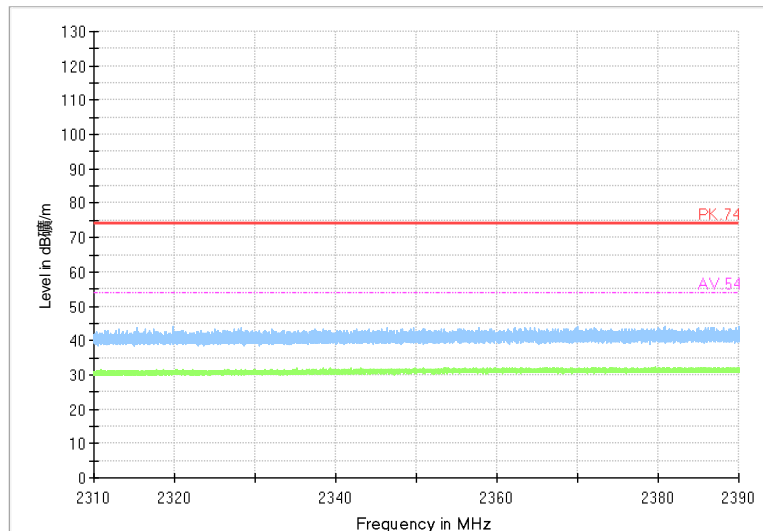
Polarity: Horizontal



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Test Report No.: PSU-NQN2504010114RF01

Full Spectrum



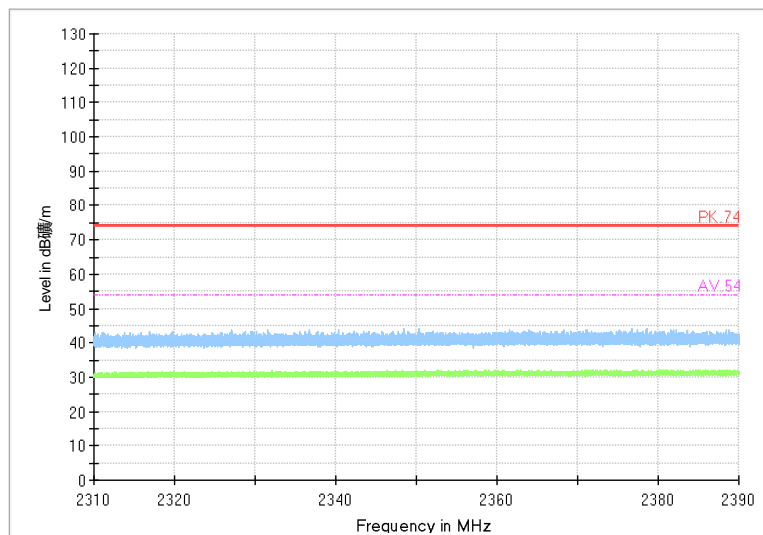
Carrier frequency (MHz): 2402

Channel No.:0

Test Mode: GFSK (BLE Coded(125kHz S=8))

Polarity: Vertical

Full Spectrum



Carrier frequency (MHz): 2402

Channel No.:0

Test Mode: GFSK (BLE Coded(125kHz S=8))

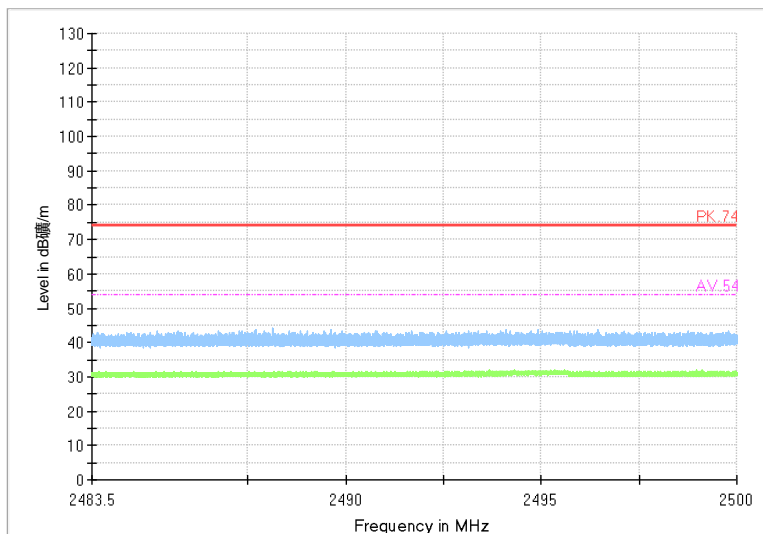
Polarity: Horizontal



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VERITAS

Test Report No.: PSU-NQN2504010114RF01

Full Spectrum



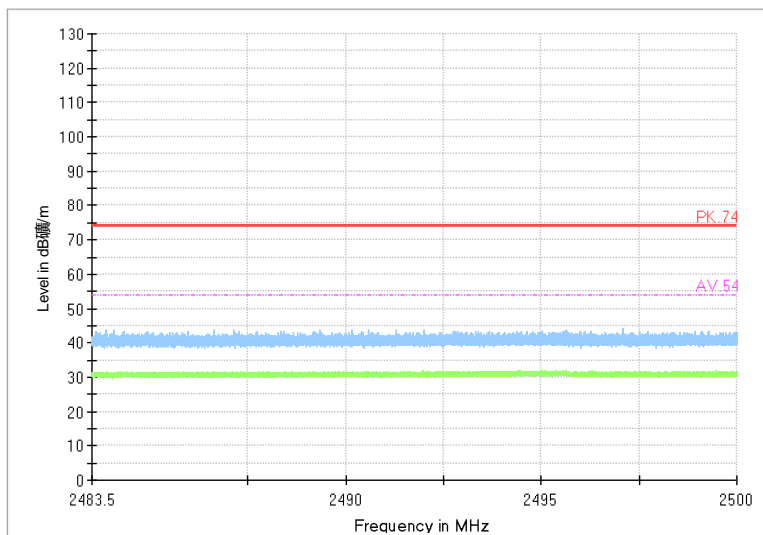
Carrier frequency (MHz): 2480

Channel No.:39

Test Mode: GFSK (BLE Coded(125kHz S=8))

Polarity: Vertical

Full Spectrum



Carrier frequency (MHz): 2480

Channel No.:39

Test Mode: GFSK (BLE Coded(125kHz S=8))

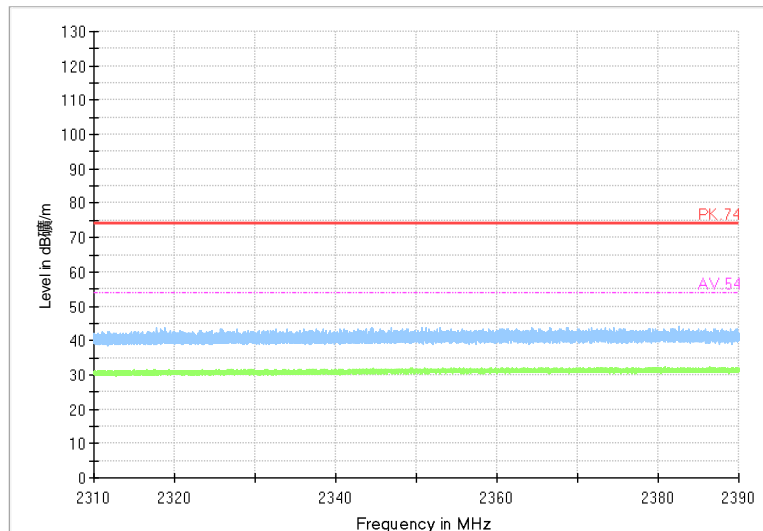
Polarity: Horizontal



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Test Report No.: PSU-NQN2504010114RF01

Full Spectrum



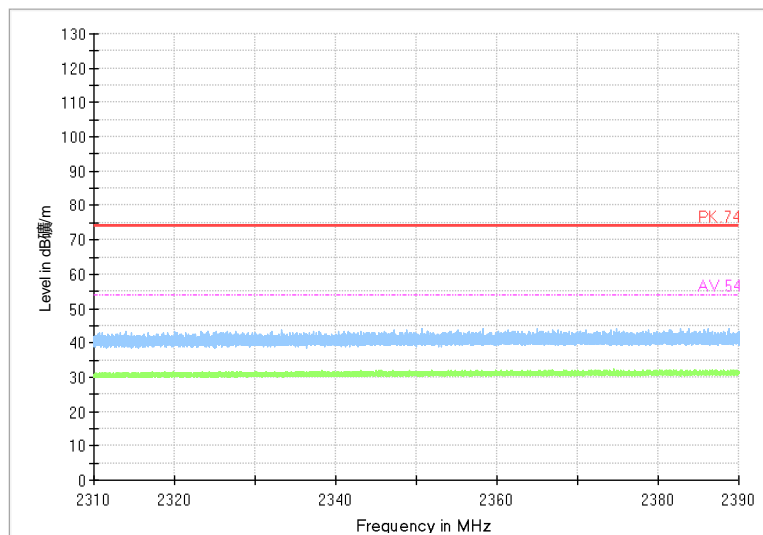
Carrier frequency (MHz): 2402

Channel No.:0

Test Mode: GFSK (BLE Coded(500kHz S=2))

Polarity: Vertical

Full Spectrum



Carrier frequency (MHz): 2402

Channel No.:0

Test Mode: GFSK (BLE Coded(500kHz S=2))

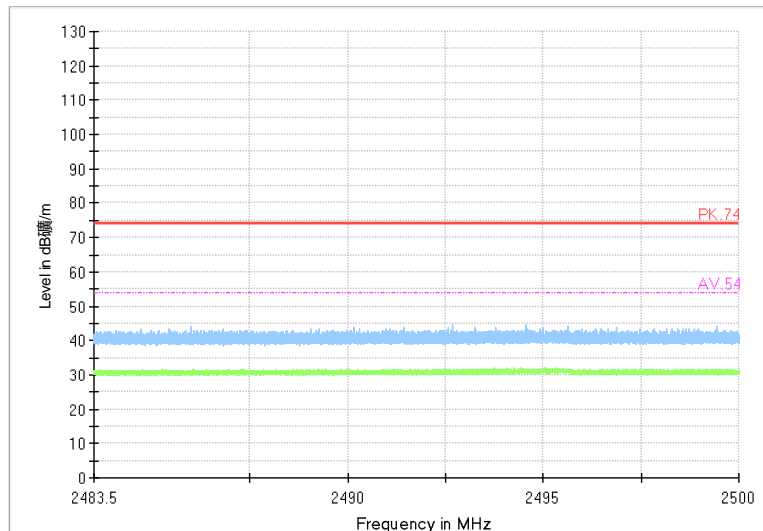
Polarity: Horizontal



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VERITAS

Test Report No.: PSU-NQN2504010114RF01

Full Spectrum



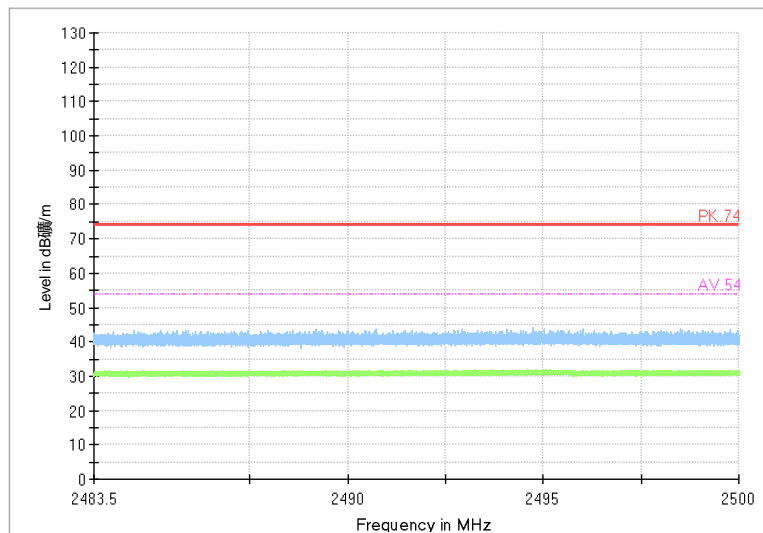
Carrier frequency (MHz): 2480

Channel No.:39

Test Mode: GFSK (BLE Coded(500kHz S=2))

Polarity: Vertical

Full Spectrum



Carrier frequency (MHz): 2480

Channel No.:39

Test Mode: GFSK (BLE Coded(500kHz S=2))

Polarity: Horizontal



## Radiated Emission for BLE

After comparison, the worst case attitude is EUT lay down.

### Determining Spurious Emissions Levels

A “reference path loss” is established and the  $A_{Rpl}$  is the attenuation of “reference path loss”, and including the gain of receive antenna, the gain of the preamplifier, the cable loss.

The measurement results are obtained as described below:

$$\text{Result} = P_{\text{mea}} + A_{Rpl}$$

Sample calculation:  $(30.02\text{dB}\mu\text{V/m}) = (49.02\text{dB}\mu\text{V}) + (-19\text{dB/m})$ , the corresponding frequency is 348.523333MHz.

For GFSK (LE 1Mbps)

Channel No.:0

Frequency (MHz)	Result (dBuV/m)	ARpl (dB)	Pmea (dBuV/m)	Polarity	Limit (dBuV/m)	Margin (dB)
348.523333	30.02	-19	49.02	Vertical	46.00	15.98
419.843000	26.00	-17	43.00	Vertical	46.00	20.00
627.286000	22.58	-13	35.58	Vertical	46.00	23.42
699.161333	20.38	-11	31.38	Horizontal	46.00	25.62
766.761667	23.86	-10	33.86	Horizontal	46.00	22.14
836.368667	24.93	-9	33.93	Horizontal	46.00	21.07

Channel No.:19

Frequency (MHz)	Result (dBuV/m)	ARpl (dB)	Pmea (dBuV/m)	Polarity	Limit (dBuV/m)	Margin (dB)
836.328667	26.07	-9	35.07	Vertical	46.00	19.93
769.657333	25.13	-10	35.13	Vertical	46.00	20.87
932.617333	27.38	-8	35.38	Vertical	46.00	18.62
279.063667	27.18	-21	48.18	Vertical	46.00	18.82
419.810667	26.01	-17	43.01	Vertical	46.00	19.99
348.871333	30.70	-19	49.70	Horizontal	46.00	15.30



Channel No.:39

Frequency (MHz)	Result (dBuV/m)	ARpl (dB)	Pmea (dBuV/m)	Polarity	Limit (dBuV/m)	Margin (dB)
839.659000	26.42	-9	35.42	Vertical	46.00	19.58
769.657333	25.99	-10	35.99	Vertical	46.00	20.01
909.693000	26.27	-8	34.27	Vertical	46.00	19.73
279.581000	24.96	-21	45.96	Vertical	46.00	21.04
418.258667	26.60	-17	43.60	Vertical	46.00	19.40
348.515667	32.53	-19	51.53	Vertical	46.00	13.47

For GFSK (LE 2Mbps)

Channel No.:0

Frequency (MHz)	Result (dBuV/m)	ARpl (dB)	Pmea (dBuV/m)	Polarity	Limit (dBuV/m)	Margin (dB)
836.716667	25.99	-9	34.99	Vertical	46.00	20.01
766.747333	25.59	-10	35.59	Vertical	46.00	20.41
959.971333	25.99	-7	32.99	Vertical	46.00	20.01
278.902000	25.31	-21	46.31	Vertical	46.00	20.69
419.843000	25.76	-17	42.76	Vertical	46.00	20.24
349.259333	28.92	-19	47.92	Vertical	46.00	17.08

Channel No.:19

Frequency (MHz)	Result (dBuV/m)	ARpl (dB)	Pmea (dBuV/m)	Polarity	Limit (dBuV/m)	Margin (dB)
121.729667	20.30	-27	47.30	Vertical	43.50	23.20
279.904333	26.40	-21	47.40	Vertical	46.00	19.60
349.841333	30.56	-19	49.56	Vertical	46.00	15.44
418.161667	26.46	-17	43.46	Vertical	46.00	19.54
766.973667	25.04	-10	35.04	Vertical	46.00	20.96
836.328667	26.40	-9	35.40	Vertical	46.00	19.60





Channel No.:39

Frequency (MHz)	Result (dBuV/m)	ARpl (dB)	Pmea (dBuV/m)	Polarity	Limit (dBuV/m)	Margin (dB)
279.807333	25.77	-21	46.77	Vertical	46.00	20.23
349.873667	28.99	-19	47.99	Vertical	46.00	17.01
418.194000	27.20	-17	44.20	Vertical	46.00	18.80
479.918333	23.56	-16	39.56	Vertical	46.00	22.44
696.972000	24.69	-11	35.69	Vertical	46.00	21.31
767.038333	24.72	-10	34.72	Vertical	46.00	21.28

For GFSK (BLE Coded(125kHz S=8))

Channel No.:0

Frequency (MHz)	Result (dBuV/m)	ARpl (dB)	Pmea (dBuV/m)	Polarity	Limit (dBuV/m)	Margin (dB)
923.143667	25.51	-8	33.51	Vertical	46.00	20.49
839.659000	26.70	-9	35.70	Vertical	46.00	19.30
766.682667	25.42	-10	35.42	Vertical	46.00	20.58
348.968333	29.52	-19	48.52	Vertical	46.00	16.48
419.778333	26.39	-17	43.39	Vertical	46.00	19.61
119.983667	24.05	-27	51.05	Vertical	43.50	19.45

Channel No.:19

Frequency (MHz)	Result (dBuV/m)	ARpl (dB)	Pmea (dBuV/m)	Polarity	Limit (dBuV/m)	Margin (dB)
839.723667	27.78	-9	36.78	Vertical	46.00	18.22
942.996333	25.34	-8	33.34	Vertical	46.00	20.66
768.364000	25.29	-10	35.29	Vertical	46.00	20.71
836.296333	26.35	-9	35.35	Vertical	46.00	19.65
418.194000	25.11	-17	42.11	Vertical	46.00	20.89
348.548000	30.34	-19	49.34	Vertical	46.00	15.66



Channel No.:39

Frequency (MHz)	Result (dBuV/m)	ARpl (dB)	Pmea (dBuV/m)	Polarity	Limit (dBuV/m)	Margin (dB)
927.896667	25.07	-8	33.07	Vertical	46.00	20.93
766.682667	24.90	-10	34.90	Vertical	46.00	21.10
767.814333	24.74	-10	34.74	Vertical	46.00	21.26
119.983667	22.81	-27	49.81	Vertical	43.50	20.69
419.810667	28.33	-17	45.33	Vertical	46.00	17.67
348.677333	29.39	-19	48.39	Vertical	46.00	16.61

For GFSK (BLE Coded(500kHz S=2))

Channel No.:0

Frequency (MHz)	Result (dBuV/m)	ARpl (dB)	Pmea (dBuV/m)	Polarity	Limit (dBuV/m)	Margin (dB)
836.296333	25.81	-9	34.81	Vertical	46.00	20.19
697.004333	25.03	-11	36.03	Vertical	46.00	20.97
822.587000	25.29	-9	34.29	Vertical	46.00	20.71
349.873667	28.80	-19	47.80	Vertical	46.00	17.20
119.983667	22.52	-27	49.52	Vertical	43.50	20.98
956.996667	25.48	-7	32.48	Vertical	46.00	20.52

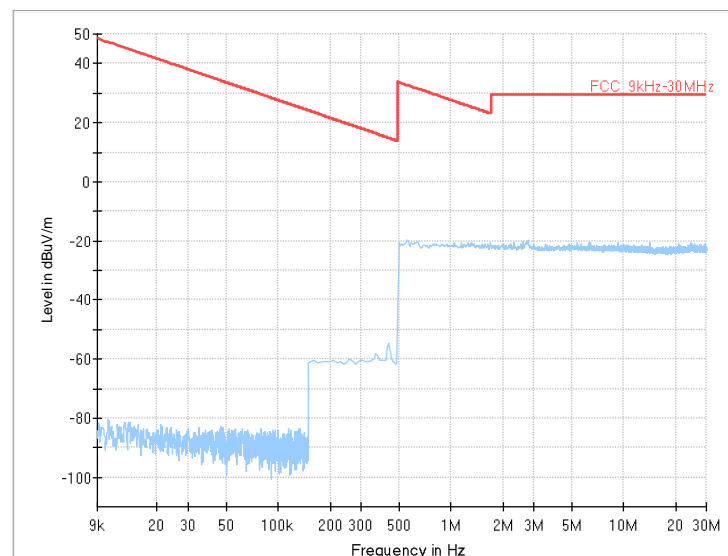
Channel No.:19

Frequency (MHz)	Result (dBuV/m)	ARpl (dB)	Pmea (dBuV/m)	Polarity	Limit (dBuV/m)	Margin (dB)
836.296333	25.12	-9	34.12	Vertical	46.00	20.88
697.004333	25.23	-11	36.23	Vertical	46.00	20.77
822.587000	25.20	-9	34.20	Vertical	46.00	20.80
349.873667	28.81	-19	47.81	Vertical	46.00	17.19
119.983667	22.53	-27	49.53	Vertical	43.50	20.97
956.996667	25.42	-7	32.42	Vertical	46.00	20.58



Channel No.:39

Frequency (MHz)	Result (dBuV/m)	ARpl (dB)	Pmea (dBuV/m)	Polarity	Limit (dBuV/m)	Margin (dB)
839.626667	27.25	-9	36.25	Vertical	46.00	18.75
949.980333	25.98	-7	32.98	Vertical	46.00	20.02
769.722000	24.93	-10	34.93	Vertical	46.00	21.07
348.418667	29.53	-19	48.53	Vertical	46.00	16.47
418.258667	26.56	-17	43.56	Vertical	46.00	19.44
119.983667	25.03	-27	52.03	Vertical	43.50	18.47



Frequency Range: 9kHz -30MHz

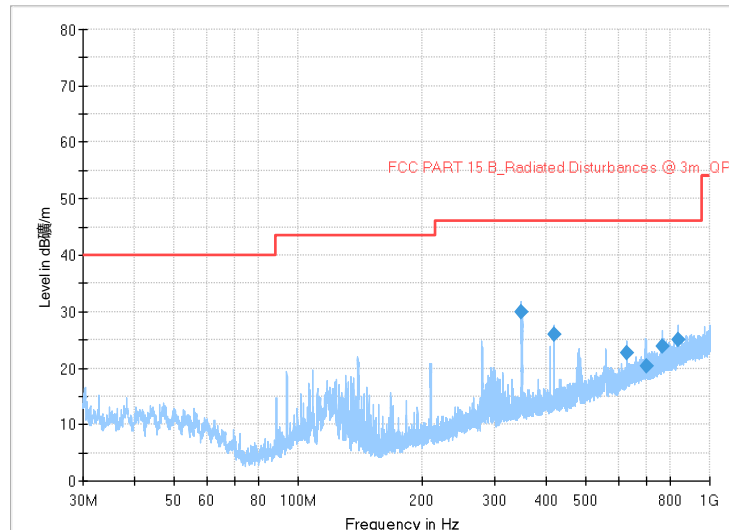
Detector: QP mode

Note: The relevant tests have been performed in order to verify in which mode would have the worst features, the result show above is the worst case.



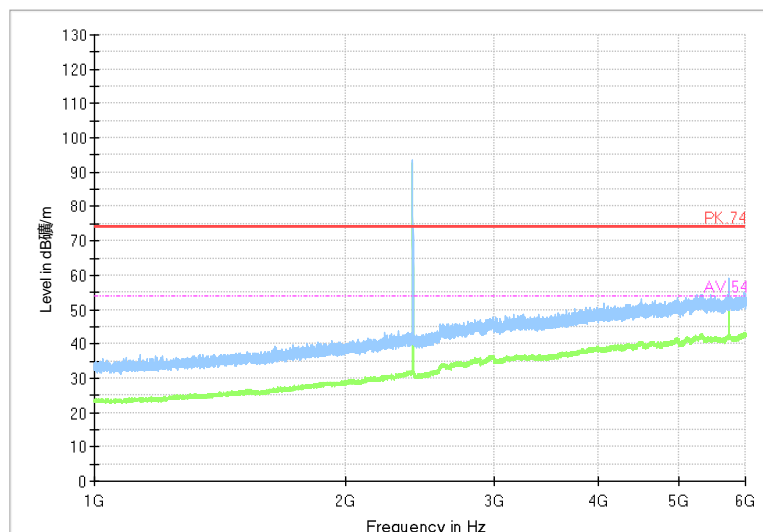
Channel No.:0

Full Spectrum



Frequency Range: 30MHz-1GHz  
Detector: Av mode and PK mode  
Modulation type: GFSK (LE 1Mbps)

Full Spectrum



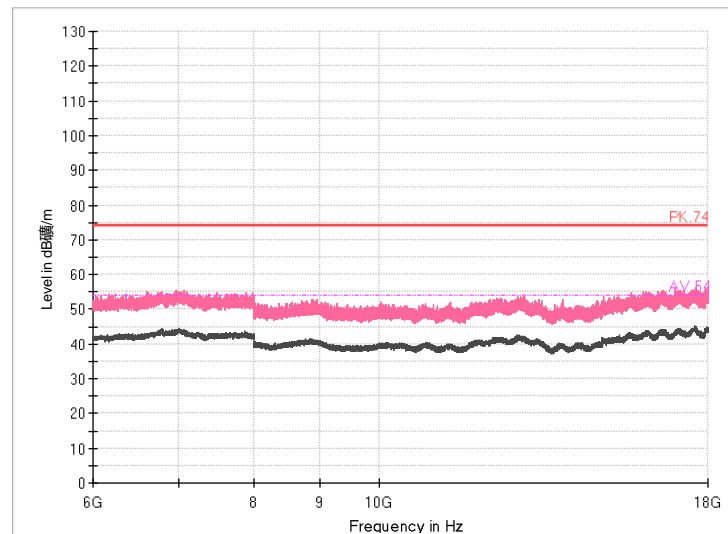
Frequency Range: 1GHz-6GHz  
Detector: Av mode and PK mode  
Modulation type: GFSK (LE 1Mbps)



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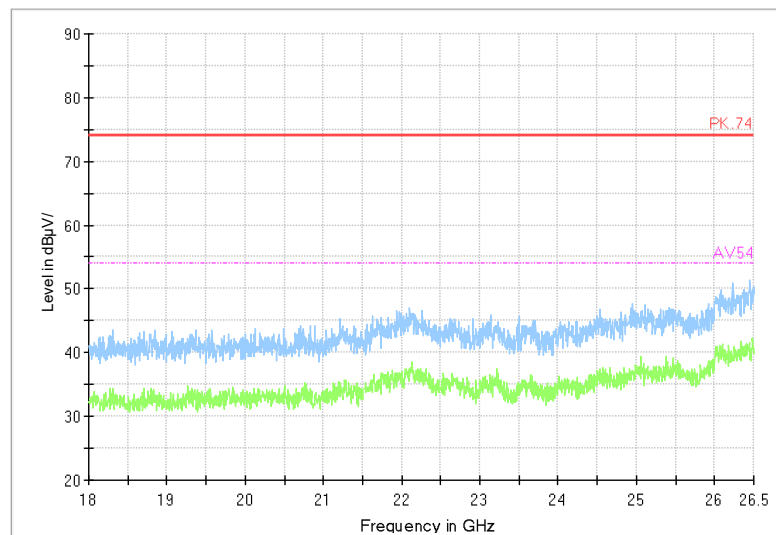
Test Report No.: PSU-NQN2504010114RF01

Full Spectrum



Frequency Range: 6GHz-18GHz  
Detector: Av mode and PK mode  
Modulation type: GFSK (LE 1Mbps)

Full Spectrum



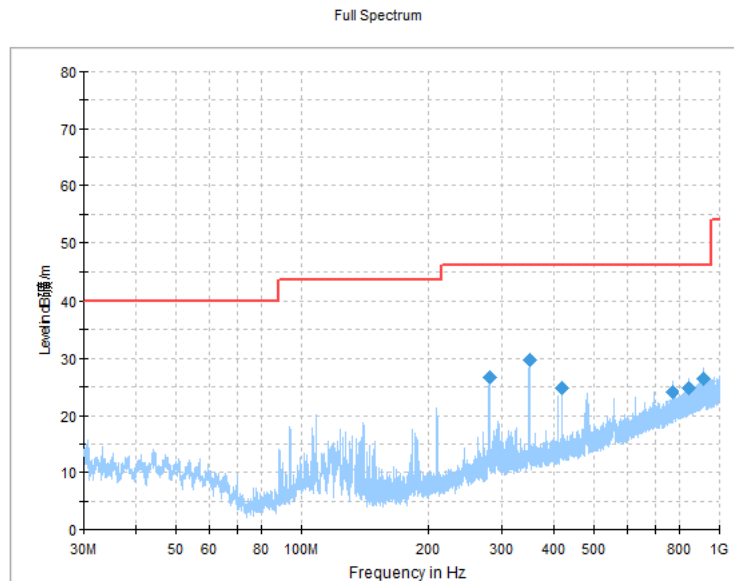
Frequency Range: 18GHz-26GHz  
Detector: Av mode and PK mode  
Modulation type: GFSK (LE 1Mbps)



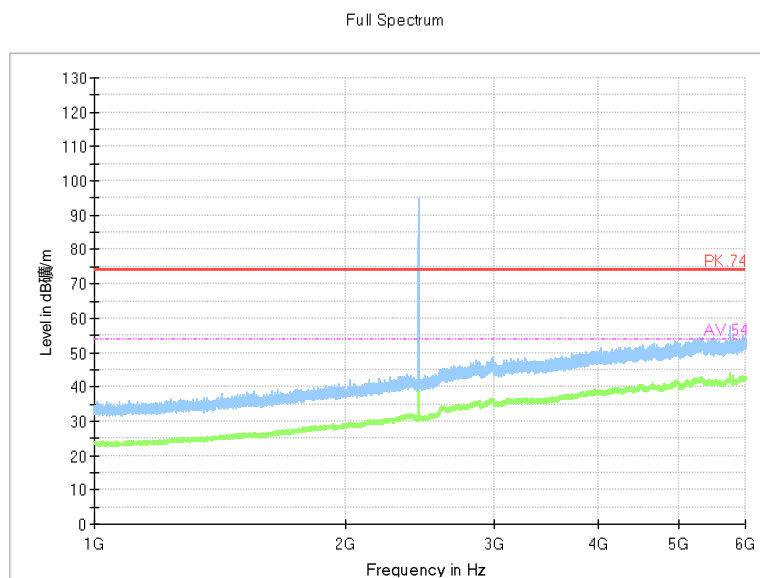
BUREAU  
VERITAS

Test Report No.: PSU-NQN2504010114RF01

Channel No.:19



Frequency Range: 30MHz-1GHz  
Detector: Av mode and PK mode  
Modulation type: GFSK (LE 1Mbps)



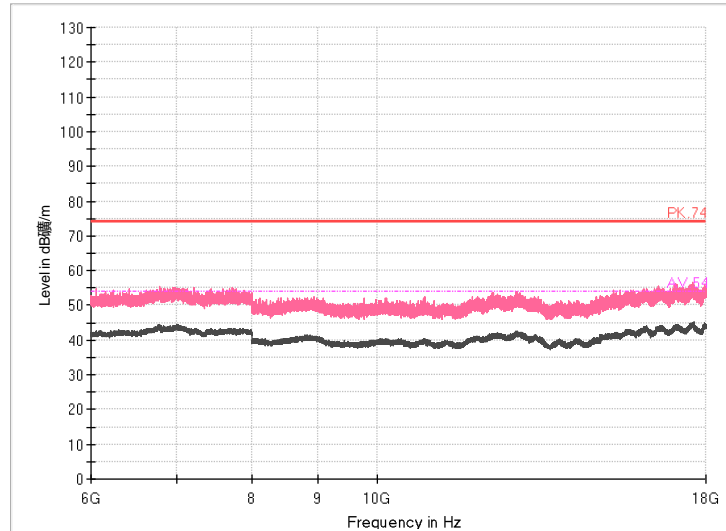
Frequency Range: 1GHz-6GHz  
Detector: Av mode and PK mode  
Modulation type: GFSK (LE 1Mbps)



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VERITAS

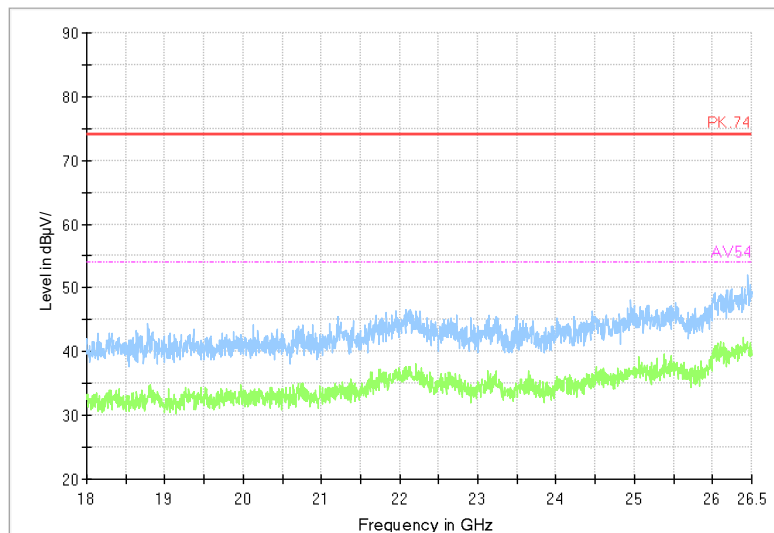
Test Report No.: PSU-NQN2504010114RF01

Full Spectrum



Frequency Range: 6GHz-18GHz  
Detector: Av mode and PK mode  
Modulation type: GFSK (LE 1Mbps)

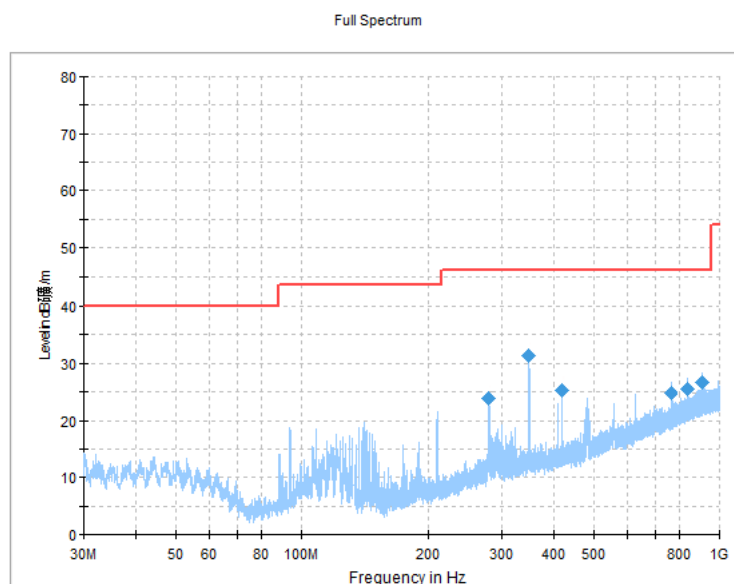
Full Spectrum



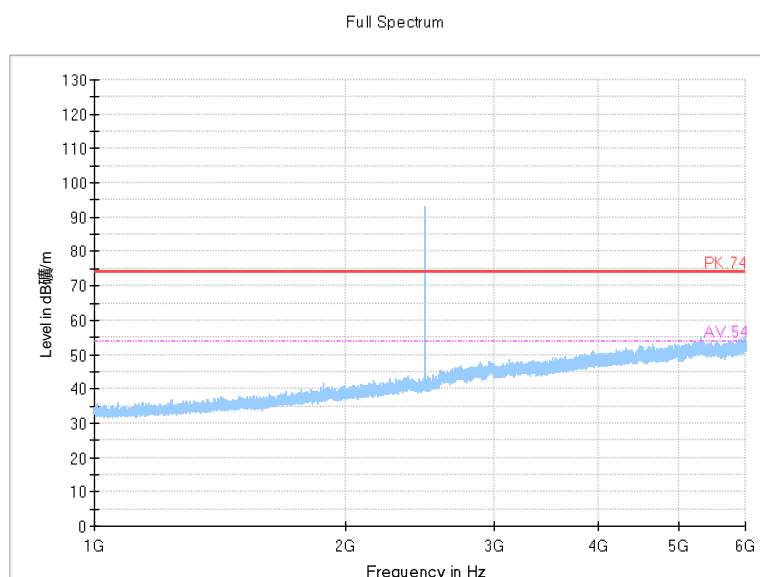
Frequency Range: 18GHz-26GHz  
Detector: Av mode and PK mode  
Modulation type: GFSK (LE 1Mbps)



Channel No.:39



Frequency Range: 30MHz-1GHz  
Detector: Av mode and PK mode  
Modulation type: GFSK (LE 1Mbps)



Frequency Range: 1GHz-6GHz  
Detector: Av mode and PK mode  
Modulation type: GFSK (LE 1Mbps)

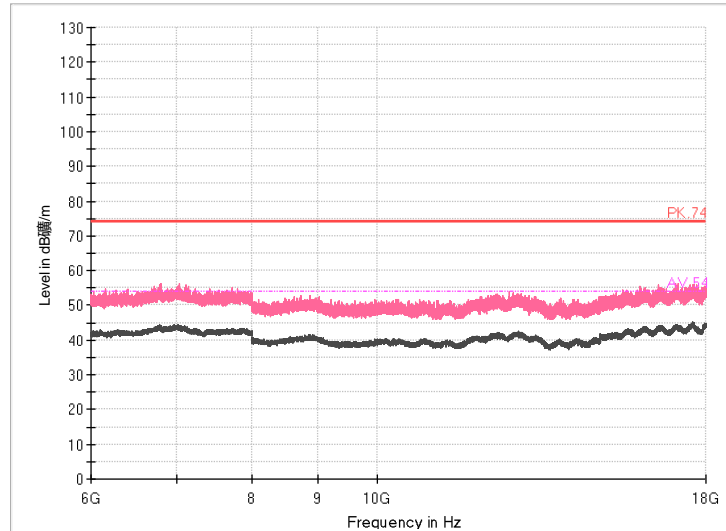




BUREAU  
VERITAS

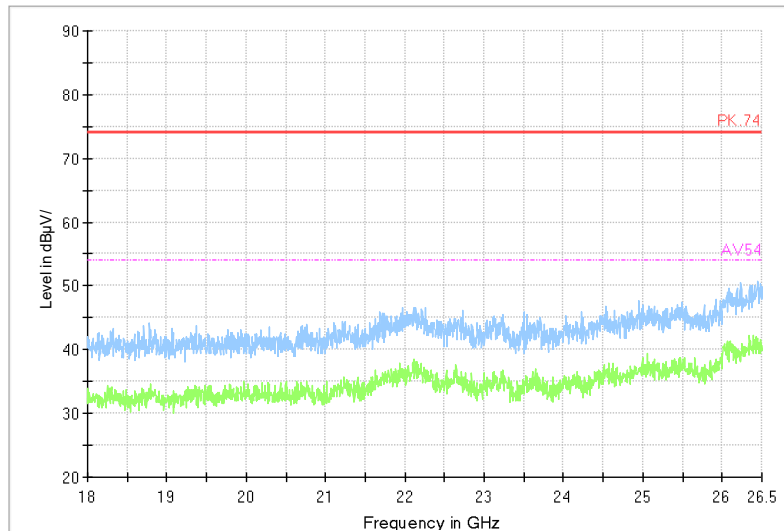
Test Report No.: PSU-NQN2504010114RF01

Full Spectrum



Frequency Range: 6GHz-18GHz  
Detector: Av mode and PK mode  
Modulation type: GFSK (LE 1Mbps)

Full Spectrum



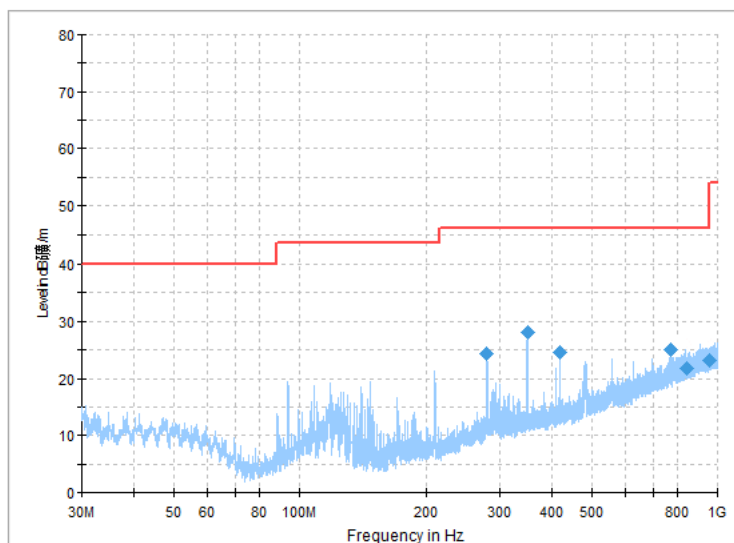
Frequency Range: 18GHz-26GHz  
Detector: Av mode and PK mode  
Modulation type: GFSK (LE 1Mbps)



**BUREAU VERITAS** Test Report No.: PSU-NQN2504010114RF01

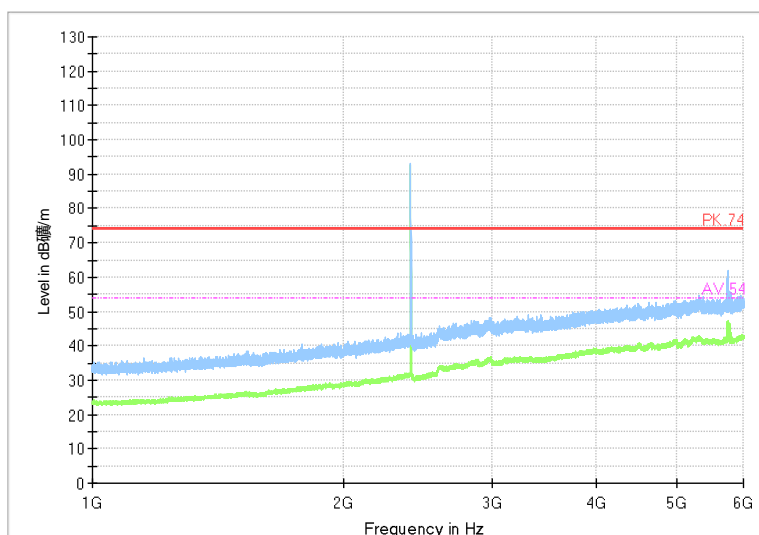
Channel No.:0

Full Spectrum



Frequency Range: 30MHz-1GHz  
Detector: Av mode and PK mode  
Modulation type: GFSK (LE 2Mbps)

Full Spectrum



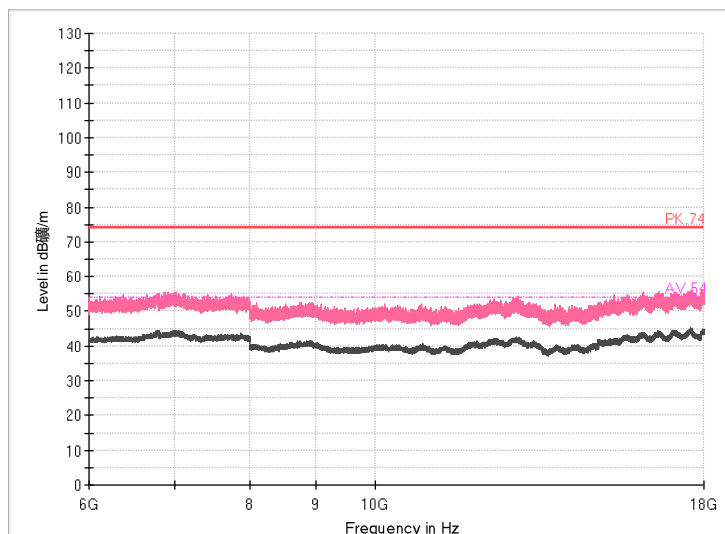
Frequency Range: 1GHz-6GHz  
Detector: Av mode and PK mode  
Modulation type: GFSK (LE2Mbps)



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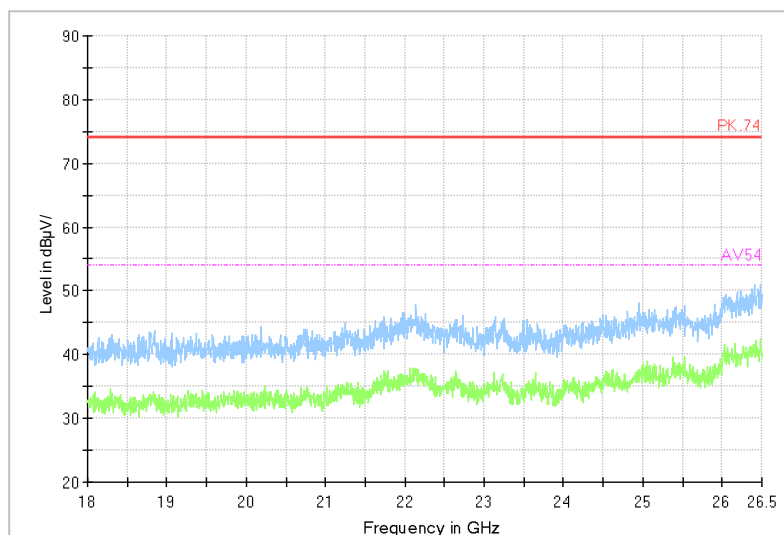
Test Report No.: PSU-NQN2504010114RF01

Full Spectrum



Frequency Range: 6GHz-18GHz  
Detector: Av mode and PK mode  
Modulation type: GFSK (LE2Mbps)

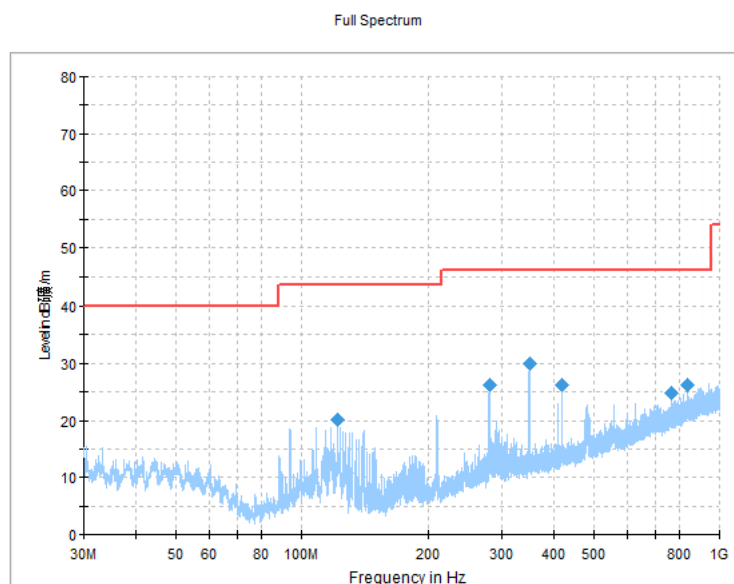
Full Spectrum



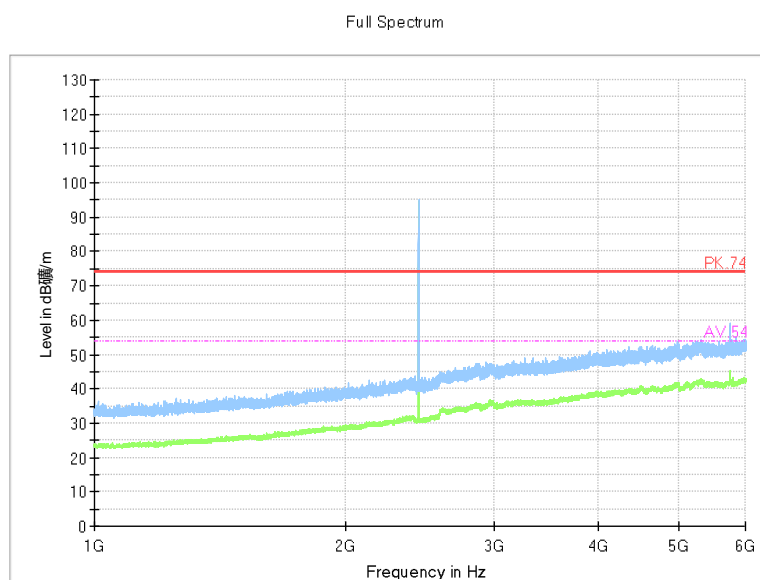
Frequency Range: 18GHz-26GHz  
Detector: Av mode and PK mode  
Modulation type: GFSK (LE2Mbps)



Channel No.:19



Frequency Range: 30MHz-1GHz  
Detector: Av mode and PK mode  
Modulation type: GFSK (LE 2Mbps)



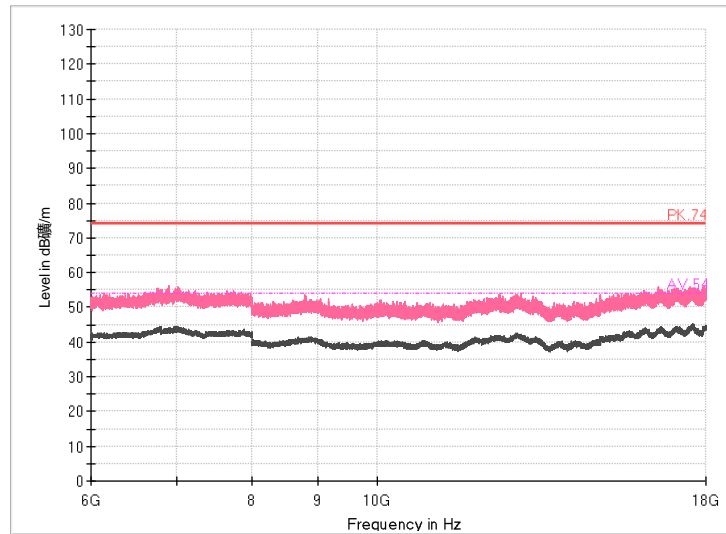
Frequency Range: 1GHz-6GHz  
Detector: Av mode and PK mode  
Modulation type: GFSK (LE 2Mbps)



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VERITAS

Test Report No.: PSU-NQN2504010114RF01

Full Spectrum

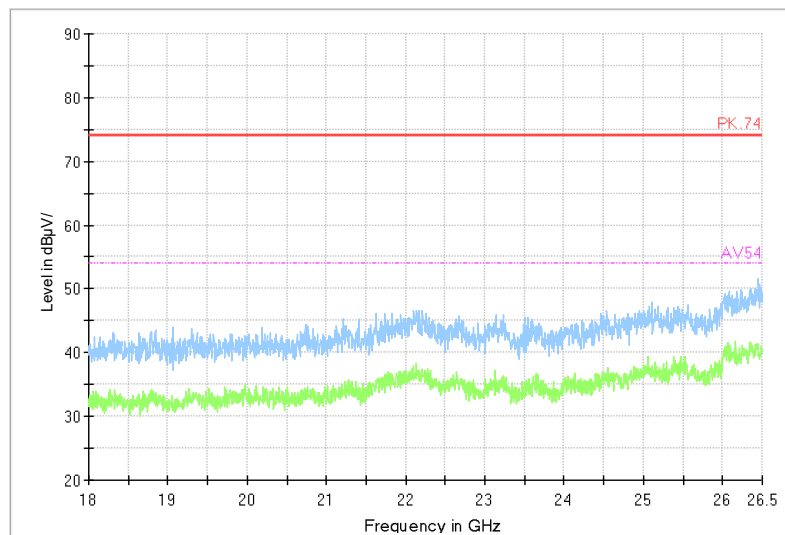


Frequency Range: 6GHz-18GHz

Detector: Av mode and PK mode

Modulation type: GFSK (LE 2Mbps)

Full Spectrum



Frequency Range: 18GHz-26GHz

Detector: Av mode and PK mode

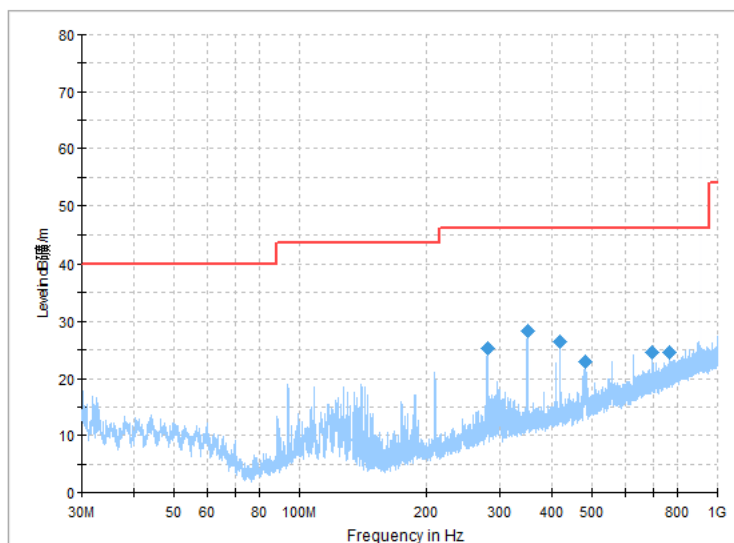
Modulation type: GFSK (LE 2Mbps)



**BUREAU VERITAS** Test Report No.: PSU-NQN2504010114RF01

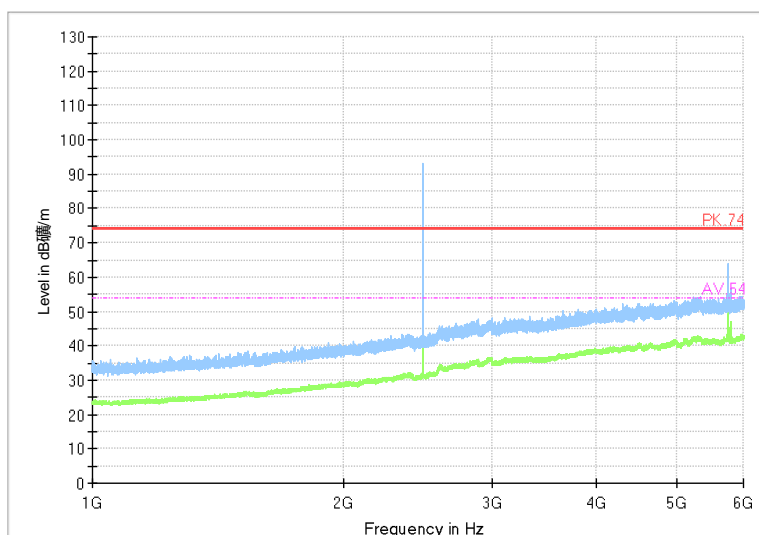
Channel No.:39

Full Spectrum



Frequency Range: 30MHz-1GHz  
Detector: Av mode and PK mode  
Modulation type: GFSK (LE 2Mbps)

Full Spectrum



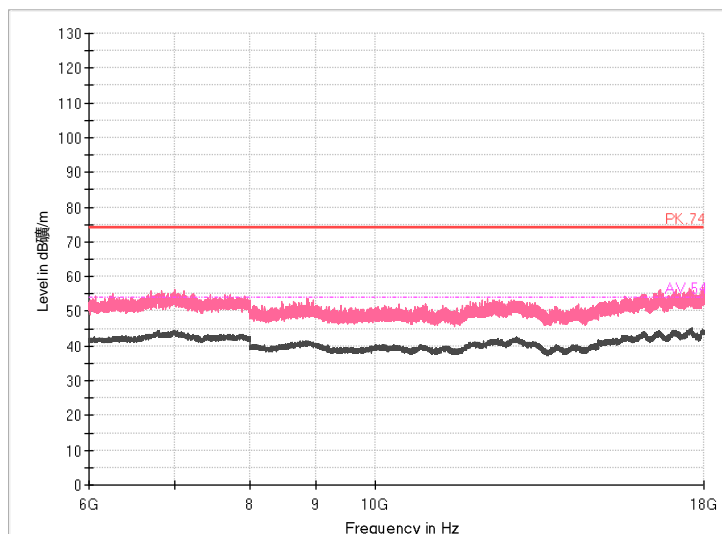
Frequency Range: 1GHz-6GHz  
Detector: Av mode and PK mode  
Modulation type: GFSK (LE 2Mbps)



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VERITAS

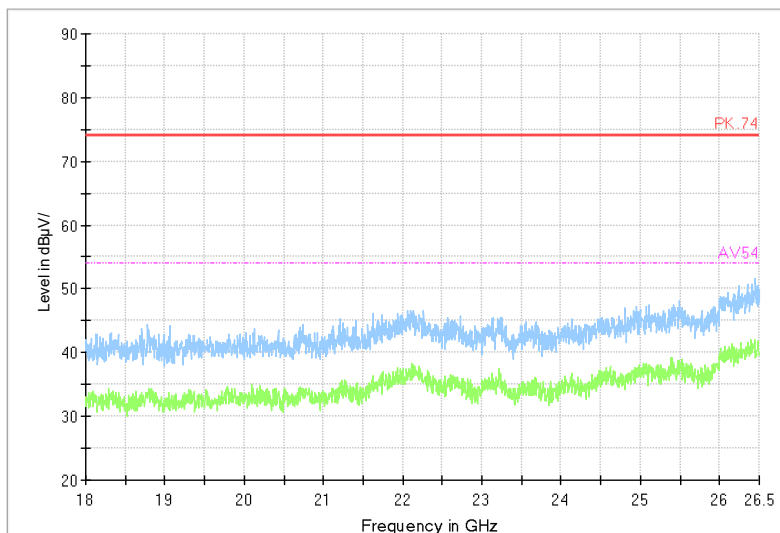
Test Report No.: PSU-NQN2504010114RF01

Full Spectrum



Frequency Range: 6GHz-18GHz  
Detector: Av mode and PK mode  
Modulation type: GFSK (LE 2Mbps)

Full Spectrum



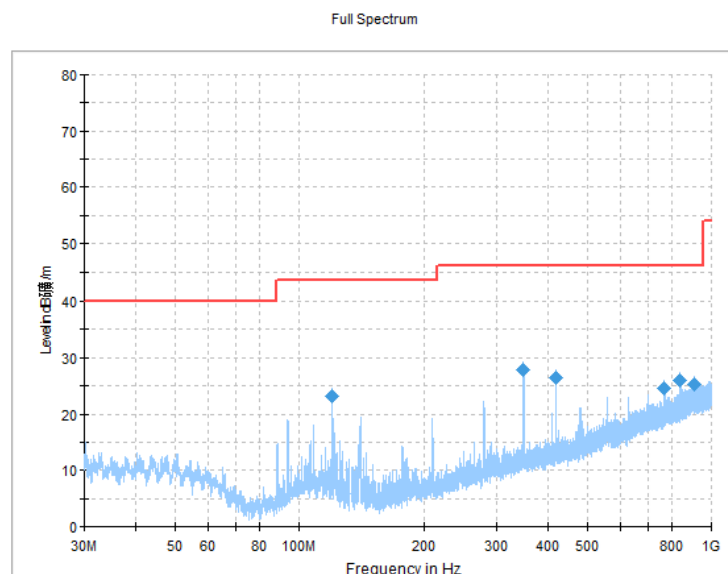
Frequency Range: 18GHz-26GHz  
Detector: Av mode and PK mode  
Modulation type: GFSK (LE 2Mbps)



BUREAU  
VERITAS

Test Report No.: PSU-NQN2504010114RF01

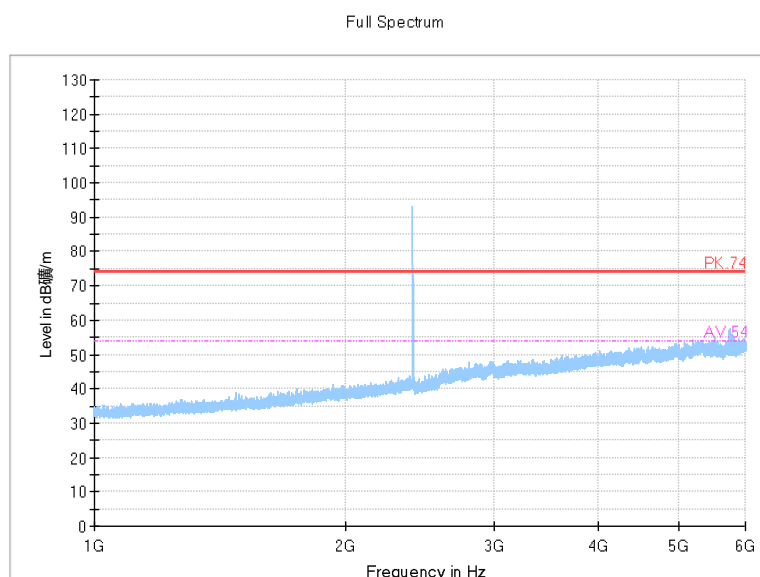
Channel No.:0



Frequency Range: 30MHz-1GHz

Detector: Av mode and PK mode

Modulation type: GFSK (BLE Coded(125kHz S=8))



Frequency Range: 1GHz-6GHz

Detector: Av mode and PK mode

Modulation type: GFSK (BLE Coded(125kHz S=8))

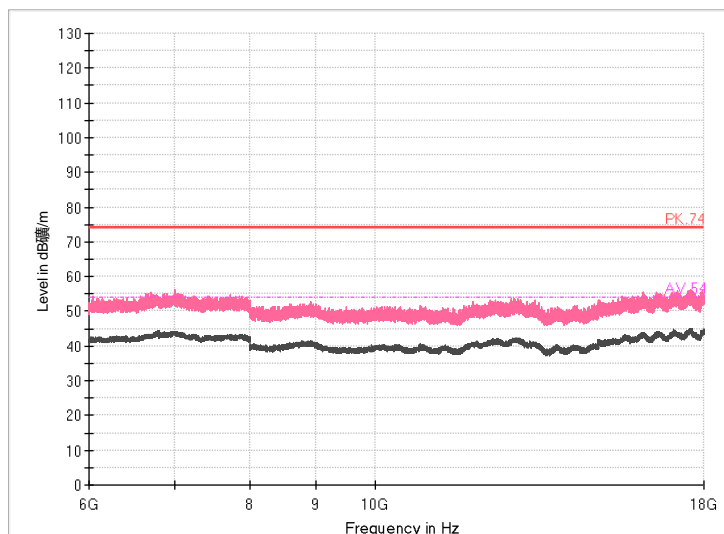




BUREAU  
VERITAS

Test Report No.: PSU-NQN2504010114RF01

Full Spectrum

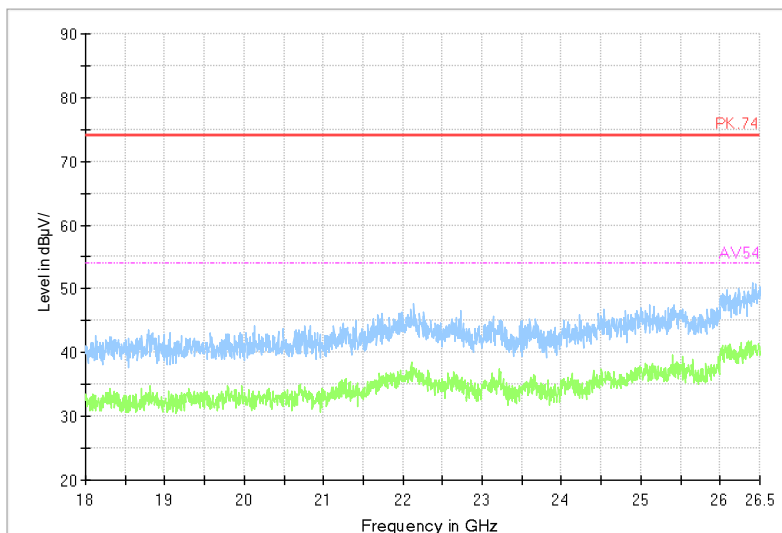


Frequency Range: 6GHz-18GHz

Detector: Av mode and PK mode

Modulation type: GFSK (BLE Coded(125kHz S=8))

Full Spectrum



Frequency Range: 18GHz-26GHz

Detector: Av mode and PK mode

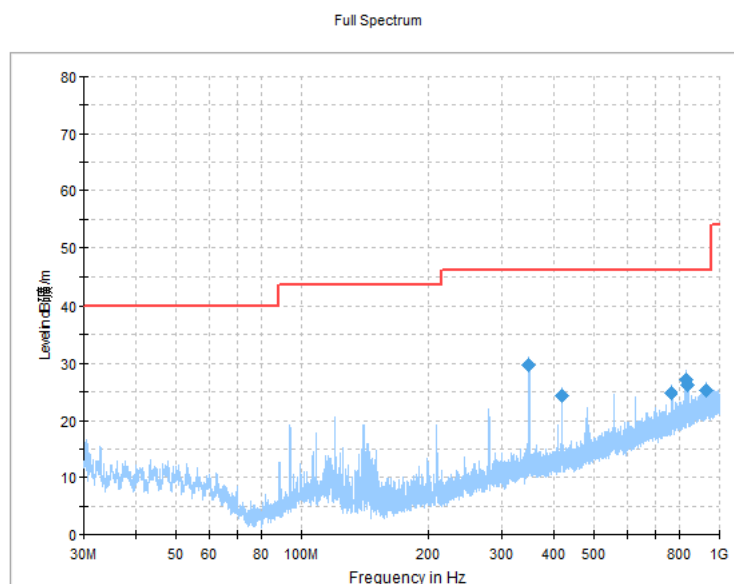
Modulation type: GFSK (BLE Coded(125kHz S=8))



BUREAU  
VERITAS

Test Report No.: PSU-NQN2504010114RF01

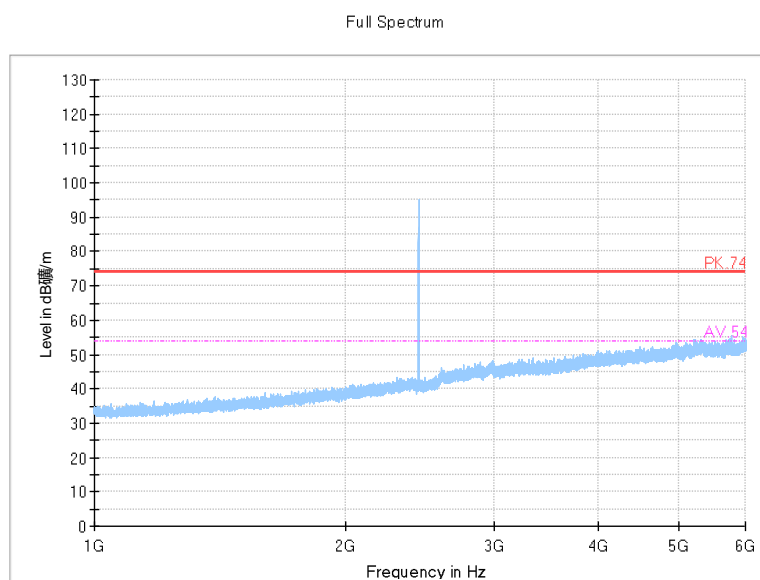
Channel No.:19



Frequency Range: 30MHz-1GHz

Detector: Av mode and PK mode

Modulation type: GFSK (BLE Coded(125kHz S=8))



Frequency Range: 1GHz-6GHz

Detector: Av mode and PK mode

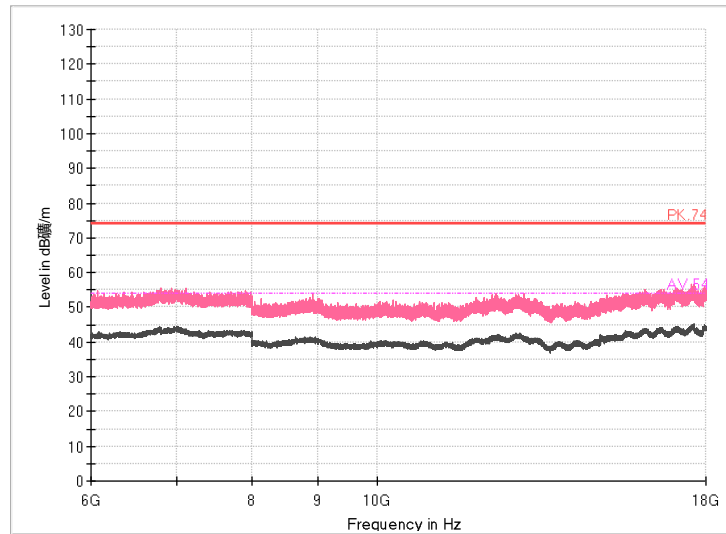
Modulation type: GFSK (BLE Coded(125kHz S=8))



BUREAU  
VERITAS

Test Report No.: PSU-NQN2504010114RF01

Full Spectrum

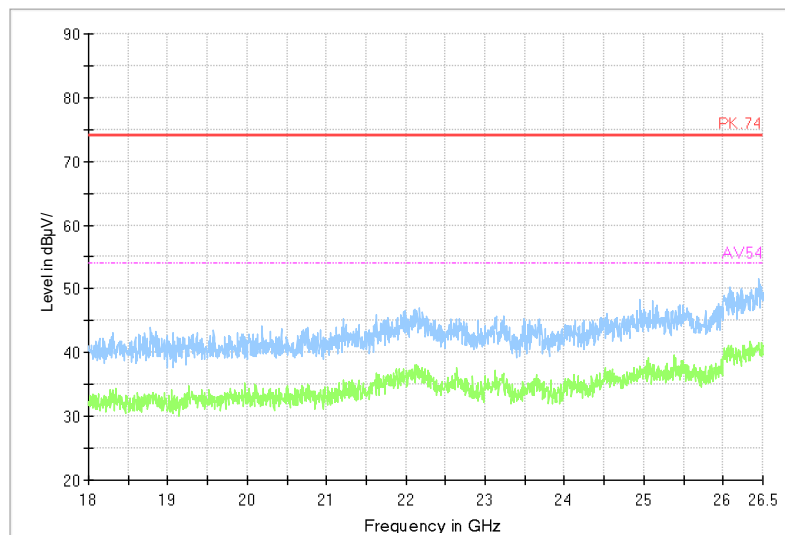


Frequency Range: 6GHz-18GHz

Detector: Av mode and PK mode

Modulation type: GFSK (BLE Coded(125kHz S=8))

Full Spectrum



Frequency Range: 18GHz-26GHz

Detector: Av mode and PK mode

Modulation type: GFSK (BLE Coded(125kHz S=8))

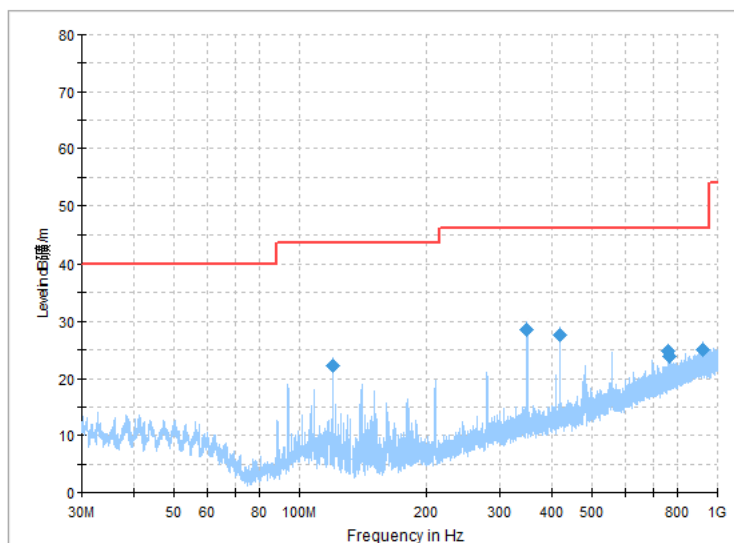


BUREAU  
VERITAS

Test Report No.: PSU-NQN2504010114RF01

Channel No.:39

Full Spectrum

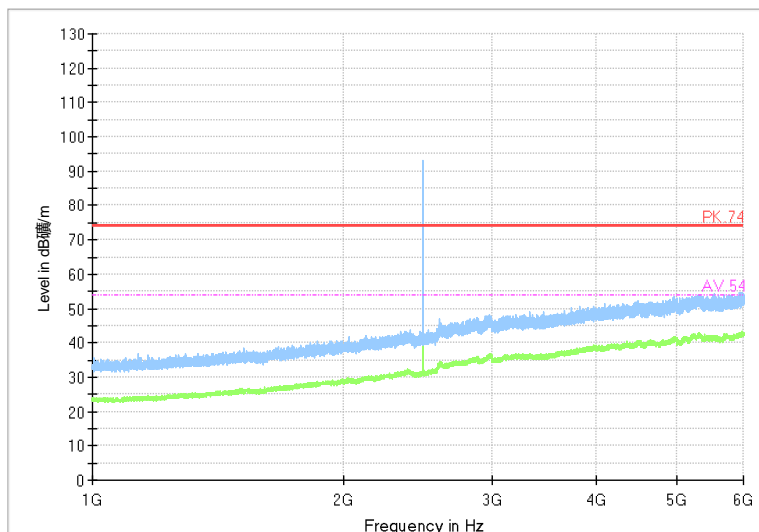


Frequency Range: 30MHz-1GHz

Detector: Av mode and PK mode

Modulation type: GFSK (BLE Coded(125kHz S=8))

Full Spectrum



Frequency Range: 1GHz-6GHz

Detector: Av mode and PK mode

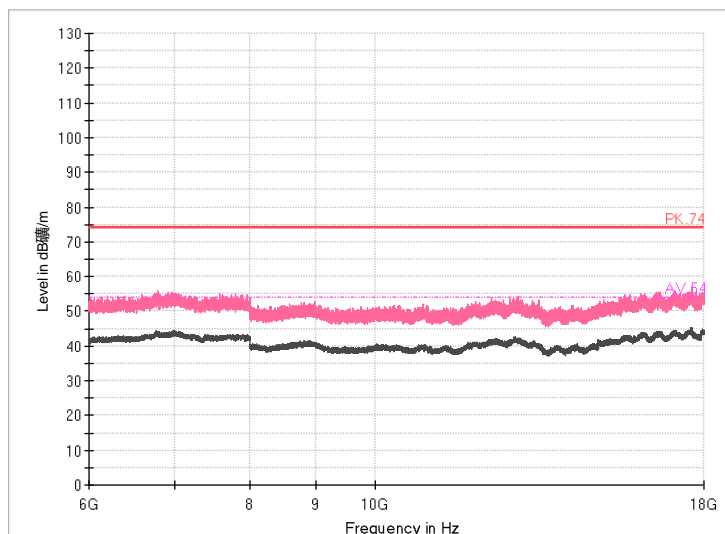
Modulation type: GFSK (BLE Coded(125kHz S=8))



BUREAU  
VERITAS

Test Report No.: PSU-NQN2504010114RF01

Full Spectrum

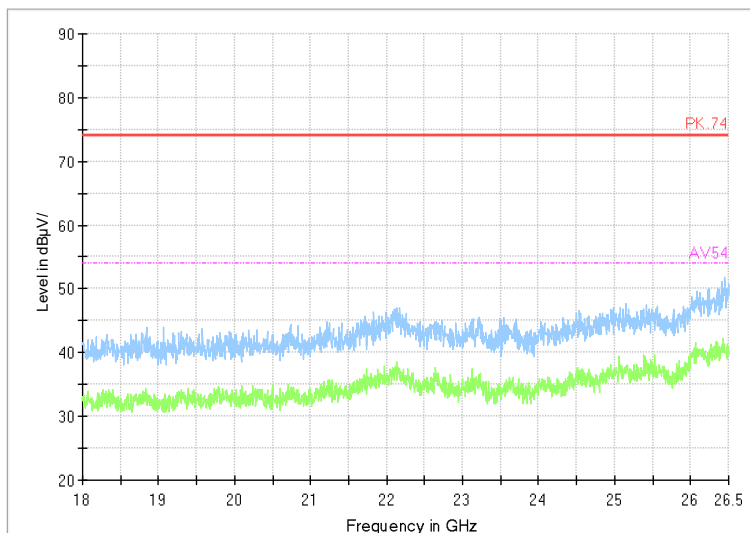


Frequency Range: 6GHz-18GHz

Detector: Av mode and PK mode

Modulation type: GFSK (BLE Coded(125kHz S=8))

Full Spectrum



Frequency Range: 18GHz-26GHz

Detector: Av mode and PK mode

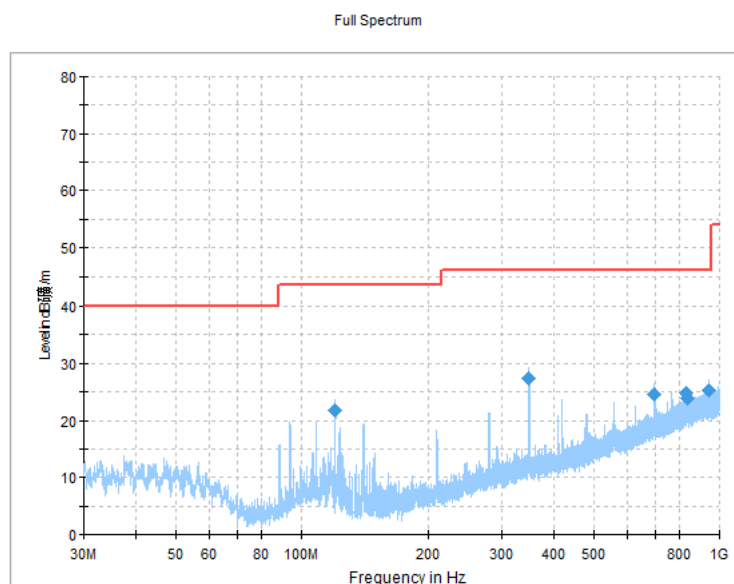
Modulation type: GFSK (BLE Coded(125kHz S=8))



BUREAU  
VERITAS

Test Report No.: PSU-NQN2504010114RF01

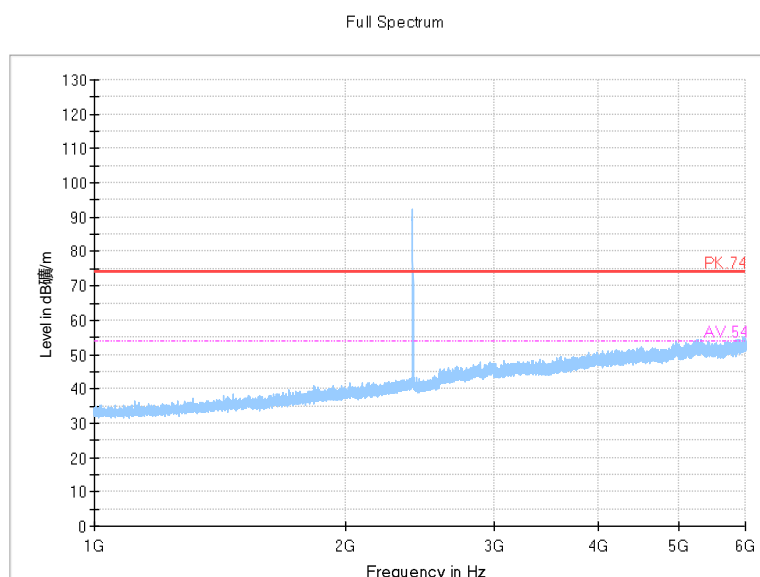
Channel No.:0



Frequency Range: 30MHz-1GHz

Detector: Av mode and PK mode

Modulation type: GFSK (BLE Coded(500kHz S=2))



Frequency Range: 1GHz-6GHz

Detector: Av mode and PK mode

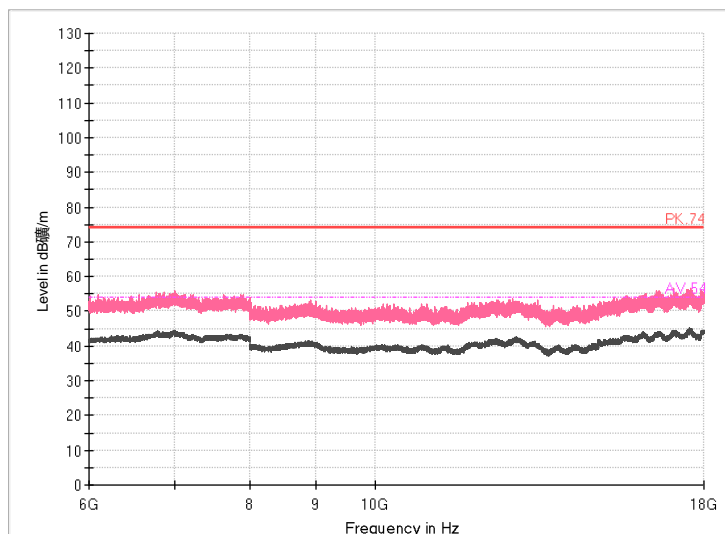
Modulation type: GFSK (BLE Coded(500kHz S=2))



BUREAU  
VERITAS

Test Report No.: PSU-NQN2504010114RF01

Full Spectrum

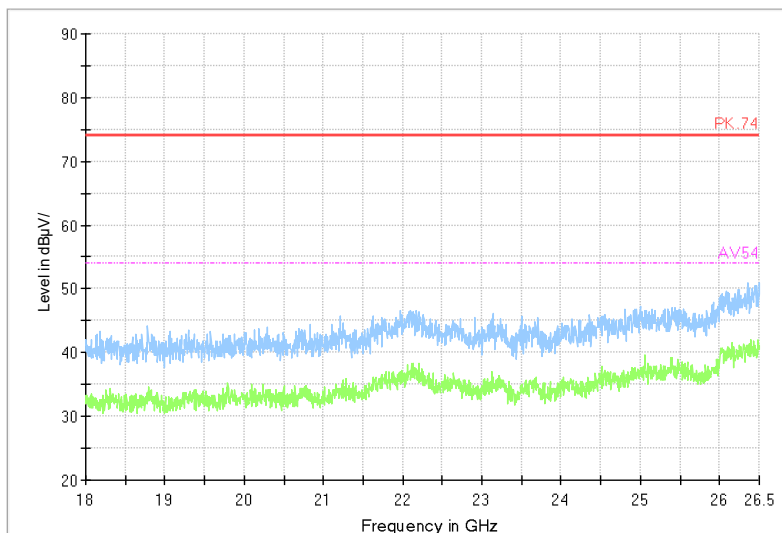


Frequency Range: 6GHz-18GHz

Detector: Av mode and PK mode

Modulation type: GFSK (BLE Coded(500kHz S=2))

Full Spectrum



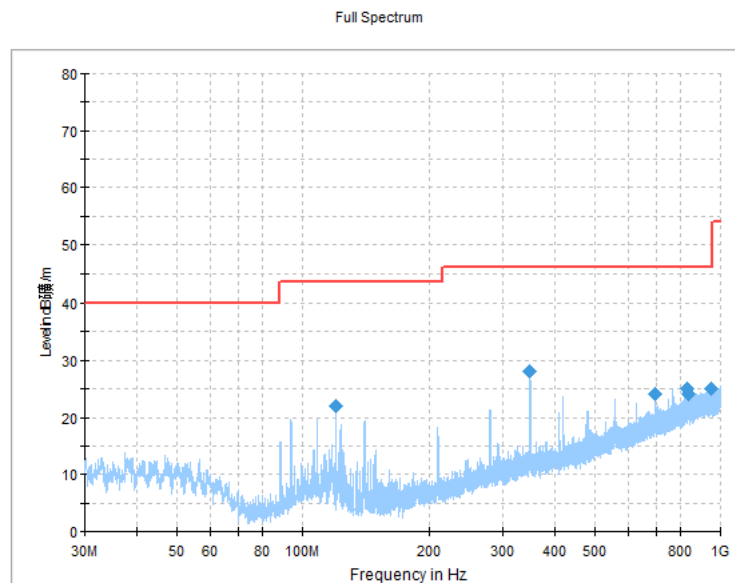
Frequency Range: 18GHz-26GHz

Detector: Av mode and PK mode

Modulation type: GFSK (BLE Coded(500kHz S=2))



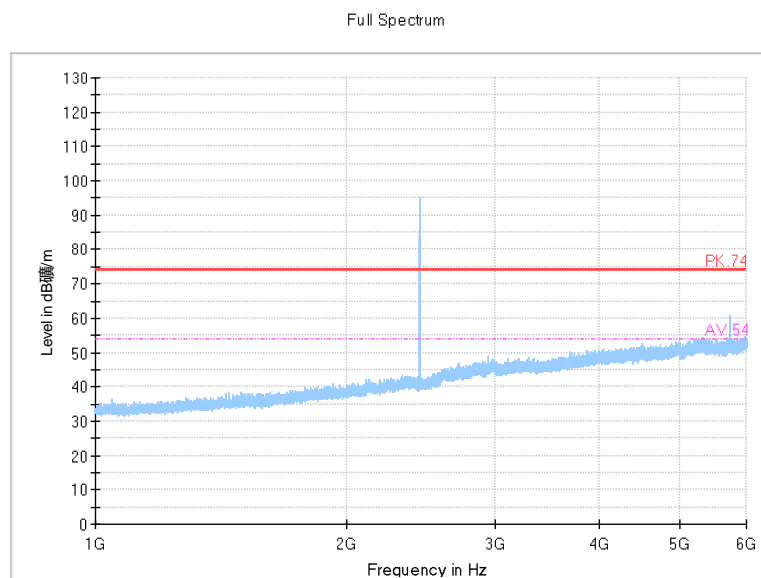
Channel No.:19



Frequency Range: 30MHz-1GHz

Detector: Av mode and PK mode

Modulation type: GFSK (BLE Coded(500kHz S=2))



Frequency Range: 1GHz-6GHz

Detector: Av mode and PK mode

Modulation type: GFSK (BLE Coded(500kHz S=2))

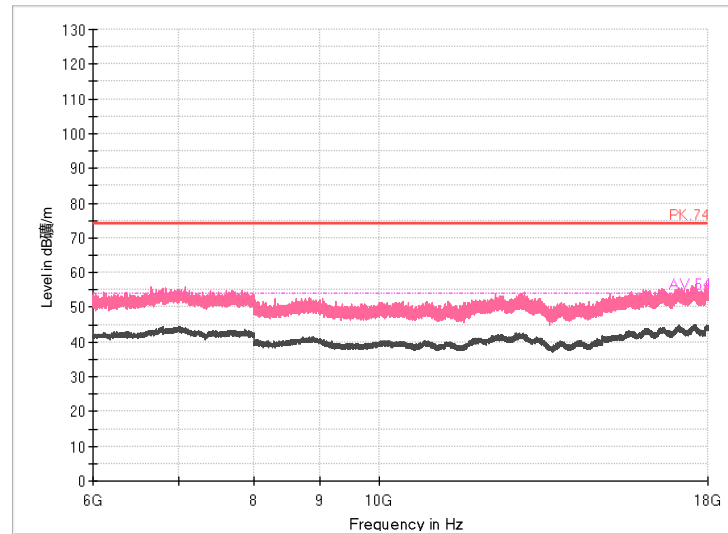




BUREAU  
VERITAS

Test Report No.: PSU-NQN2504010114RF01

Full Spectrum

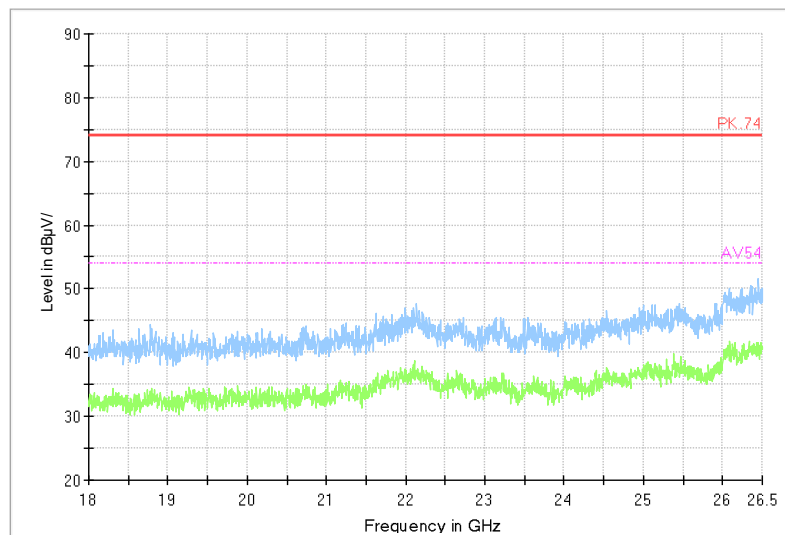


Frequency Range: 6GHz-18GHz

Detector: Av mode and PK mode

Modulation type: GFSK (BLE Coded(500kHz S=2))

Full Spectrum



Frequency Range: 18GHz-26GHz

Detector: Av mode and PK mode

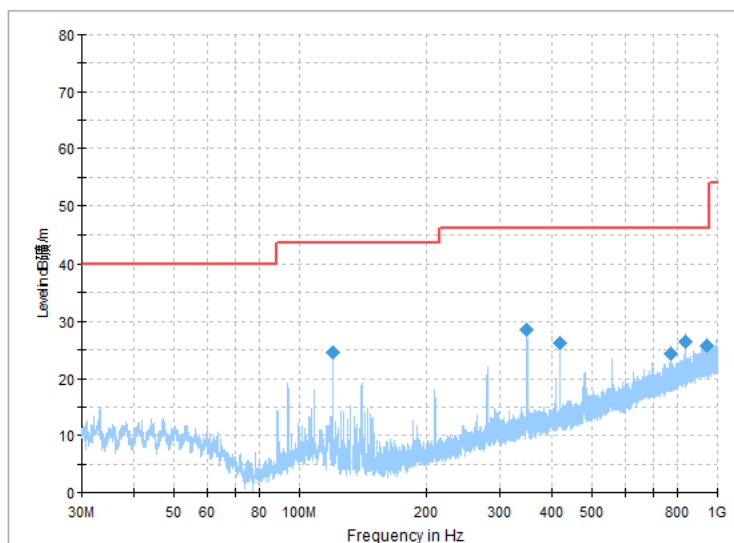
Modulation type: GFSK (BLE Coded(500kHz S=2))



**BUREAU VERITAS** Test Report No.: PSU-NQN2504010114RF01

Channel No.:39

Full Spectrum

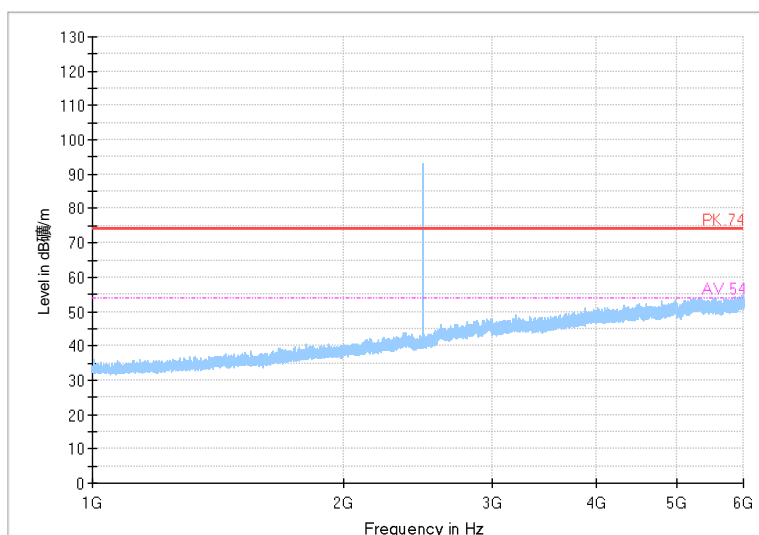


Frequency Range: 30MHz-1GHz

Detector: Av mode and PK mode

Modulation type: GFSK (BLE Coded(500kHz S=2))

Full Spectrum



Frequency Range: 1GHz-6GHz

Detector: Av mode and PK mode

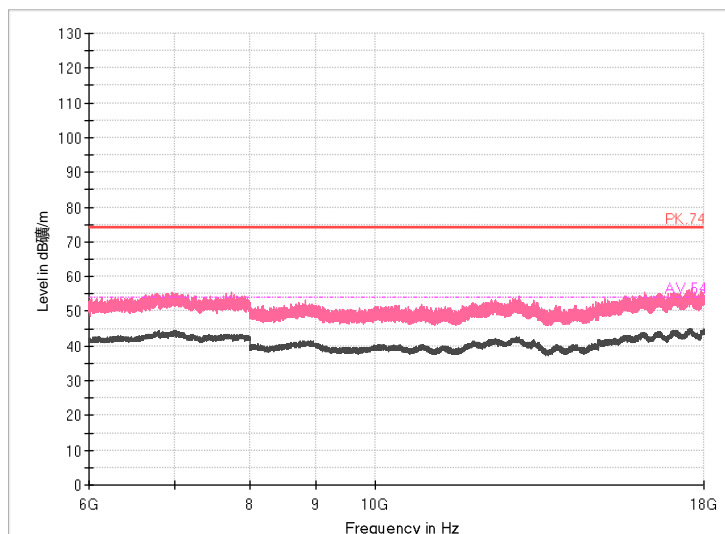
Modulation type: GFSK (BLE Coded(500kHz S=2))



BUREAU  
VERITAS

Test Report No.: PSU-NQN2504010114RF01

Full Spectrum

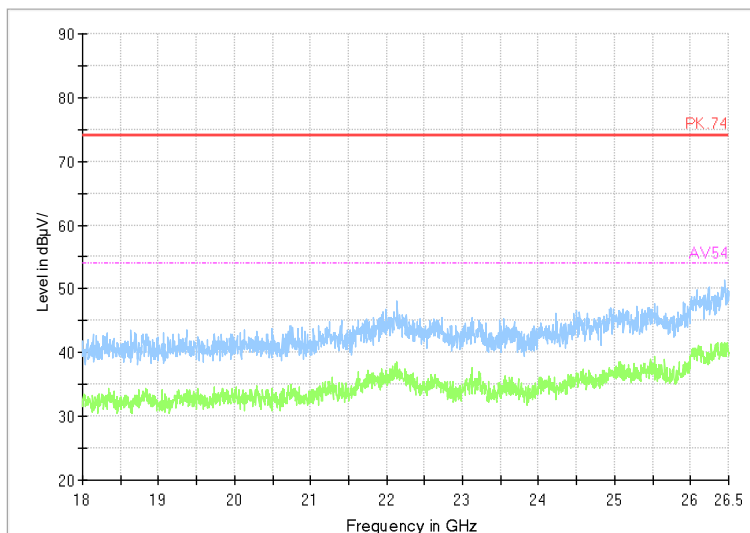


Frequency Range: 6GHz-18GHz

Detector: Av mode and PK mode

Modulation type: GFSK (BLE Coded(500kHz S=2))

Full Spectrum



Frequency Range: 18GHz-26GHz

Detector: Av mode and PK mode

Modulation type: GFSK (BLE Coded(500kHz S=2))



### 3.3 6 dB BANDWIDTH MEASUREMENT

#### 3.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

#### 3.3.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	R&S	ESW 44	101973	Mar.28,24	Mar.27,26
Open Switch and Control Unit	R&S	OSP-B157W8	100836	N/A	N/A
Vector Signal Generator	R&S	SMBV100B	102176	Mar.29,24	Mar.28,26
Signal Generator	R&S	SMB100A03	182185	Mar.29,24	Mar.28,26
WIDEBANDRADIO COMMUNICATION TESTER	R&S	CMW500	169399	Jun.19,24	Jun.18,26
Hygrothermograph	DELI	20210528	SZ015	Sep.06,23	Sep.05,25
PC	LENOVO	E14	HRSW0024	N/A	N/A
CABLE	R&S	J12J103539-00-1	SEP-03-20-069	Apr.27,24	Apr.26,25
CABLE	R&S	J12J103539-00-1	SEP-03-20-070	Apr.27,24	Apr.26,25
Test Software	EMC32	EMC32	N/A	N/A	N/A
Temperature Chamber	votsch	VT4002	58566078100050	May.30,24	May.29,26
Power Meter	R&S	NRX	102380	Mar.28,24	Mar.27,26
Power Meter probe	R&S	NRP6A	102942	Mar.28,24	Mar.27,26

#### NOTE:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
2. The test was performed in RF Oven room.



### 3.3.3 TEST PROCEDURE

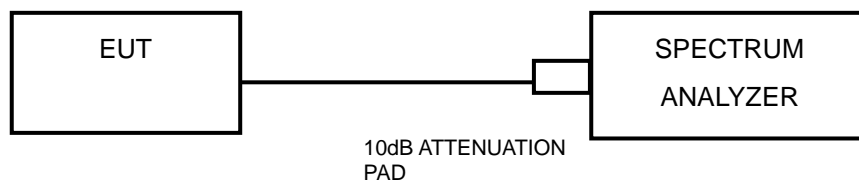
1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW)  $\geq 3$  RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.



### 3.3.4 DEVIATION FROM TEST STANDARD

No deviation.

### 3.3.5 TEST SETUP



### 3.3.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

### 3.3.7 TEST RESULTS

Please Refer to Appendix1 Of this test report.

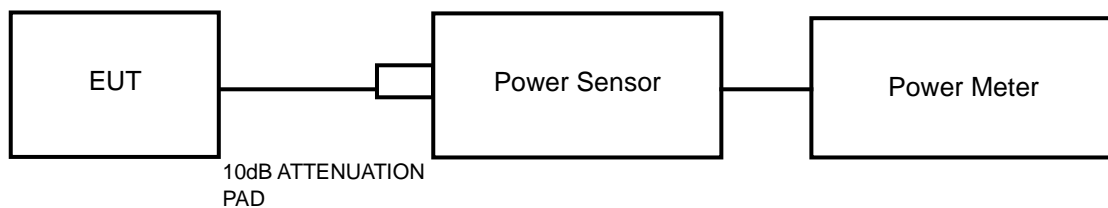


### 3.4 CONDUCTED OUTPUT POWER

#### 3.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

For systems using digital modulation in the 2400–2483.5 MHz band: 1 Watt (30dBm)

#### 3.4.2 TEST SETUP



#### 3.4.3 TEST INSTRUMENTS

Refer to section 3.3.2 to get information of above instrument.

#### 3.4.4 TEST PROCEDURES

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

#### 3.4.5 DEVIATION FROM TEST STANDARD

No deviation.

#### 3.4.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.



### 3.4.7 TEST RESULTS

#### 3.4.7.1 MAXIMUM PEAK OUTPUT POWER

Please Refer to Appendix1 Of this test report.

#### 3.4.7.2 AVERAGE OUTPUT POWER (FOR REFERENCE)

The average power sensor was used on the output port of the EUT. A power meter was used to read the response of the power sensor. Record the power level.

Please Refer to Appendix1 Of this test report.



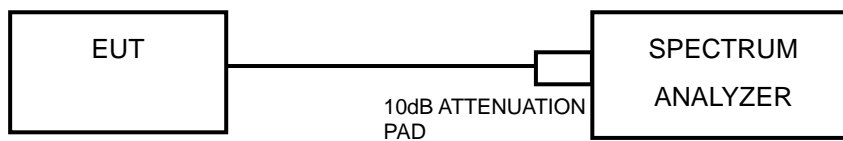


### 3.5 POWER SPECTRAL DENSITY MEASUREMENT

#### 3.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm/3kHz.

#### 3.5.2 TEST SETUP



#### 3.5.3 TEST INSTRUMENTS

Refer to section 3.3.2 to get information of above instrument.

#### 3.5.4 TEST PROCEDURE

1. Set the span to 1.5 times the DTS bandwidth
2. Set the RBW = 3 kHz, VBW  $\geq 3 \times$  RBW, Detector = peak.
3. Sweep time = auto couple, Trace mode = max hold, allow trace to fully stabilize.
4. Use the peak marker function to determine the maximum amplitude level.

#### 3.5.5 DEVIATION FROM TEST STANDARD

No deviation.

#### 3.5.6 EUT OPERATING CONDITION

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.



### 3.5.7 TEST RESULTS

Please Refer to Appendix1 Of this test report.

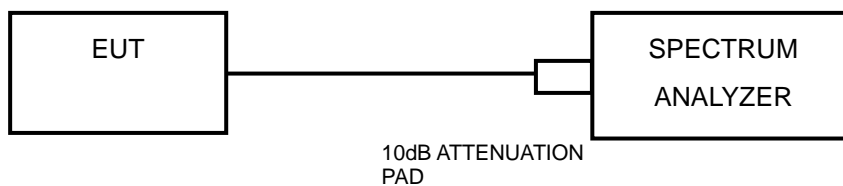


### 3.6 OUT OF BAND EMISSION MEASUREMENT

#### 3.6.1 LIMITS OF OUT OF BAND EMISSION MEASUREMENT

Below –20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

#### 3.6.2 TEST SETUP



#### 3.6.3 TEST INSTRUMENTS

Refer to section 3.3.2 to get information of above instrument.

#### 3.6.4 TEST PROCEDURE

##### MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW  $\geq$  300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.



## **MEASUREMENT PROCEDURE OOB**

1. Set RBW = 100 kHz.
2. Set VBW  $\geq$  300 kHz.
3. Set span to encompass the spectrum to be examined
4. Detector = peak.
5. Trace Mode = max hold.
6. Sweep = auto couple.

### **3.6.5 DEVIATION FROM TEST STANDARD**

No deviation.

### **3.6.6 EUT OPERATING CONDITION**

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

### **3.6.7 TEST RESULTS**

The spectrum plots are attached on the following images. D1 line indicates the highest level. D2 line indicates the 20dB offset below D1. It shows compliance to the requirement.

Please Refer to Appendix1 Of this test report.



### **3.7 ANTENNA REQUIREMENTS**

#### **3.7.1 STANDARD APPLICABLE**

If transmitting antenna directional gain is greater than 6 dBi, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### **3.7.2 ANTENNA CONNECTED CONSTRUCTION**

An embedded-in antenna design is used.

#### **3.7.3 ANTENNA GAIN**

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit and PSD limit.

## **4 PHOTOGRAPHS OF THE TEST CONFIGURATION**

Please refer to the attached file (Test Setup Photo).



## **5 MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB**

No any modifications are made to the EUT by the lab during the test.



## 6 APPENDIX1 BLE

### DTS BANDWIDTH

#### TEST RESULT

Test Mode	Carrier frequency (MHz)	6dB Bandwidth(kHz)
GFSK (LE 1Mbps)	2402	562.2
GFSK (LE 1Mbps)	2440	564.1
GFSK (LE 1Mbps)	2480	561.0

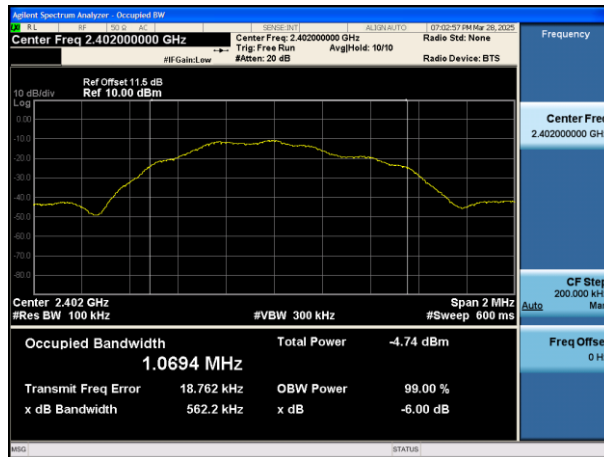
Test Mode	Carrier frequency (MHz)	6dB Bandwidth(kHz)
GFSK (LE 2Mbps)	2402	842.7
GFSK (LE 2Mbps)	2440	841.9
GFSK (LE 2Mbps)	2480	852.6

Test Mode	Carrier frequency (MHz)	6dB Bandwidth(kHz)
Coded 125k	2402	641.8
Coded 125k	2440	633.9
Coded 125k	2480	645.5

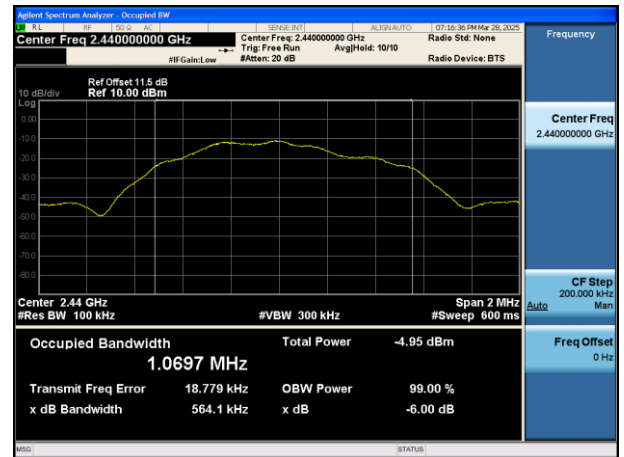
Test Mode	Carrier frequency (MHz)	6dB Bandwidth(kHz)
Coded 500k	2402	634.2
Coded 500k	2440	645.1
Coded 500k	2480	650.2

## TEST GRAPHS

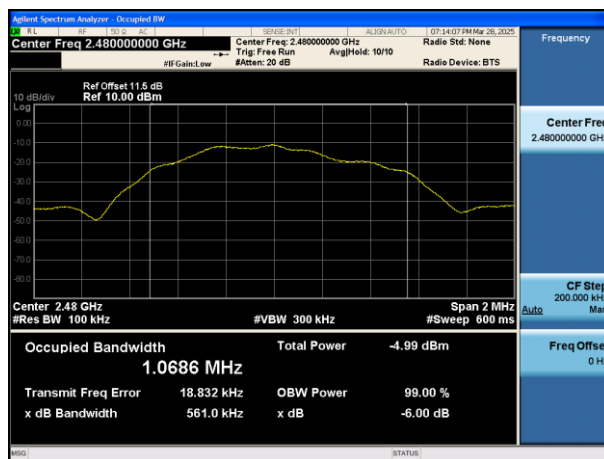
Test Mode: GFSK (LE 1Mbps)



Test Mode: GFSK (LE 1Mbps) 2402MHz



Test Mode: GFSK (LE 1Mbps) 2440MHz



Test Mode: GFSK (LE 1Mbps) 2480MHz

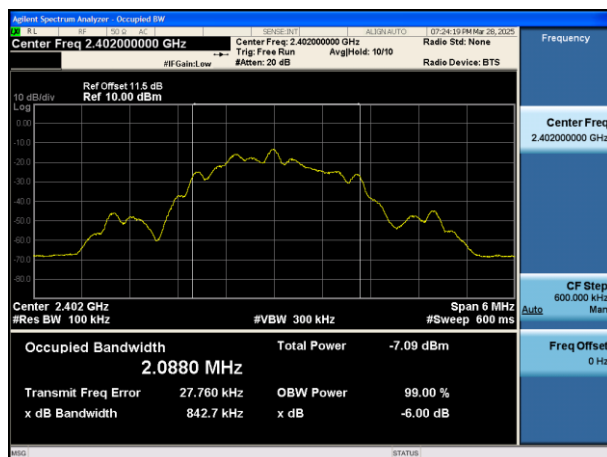




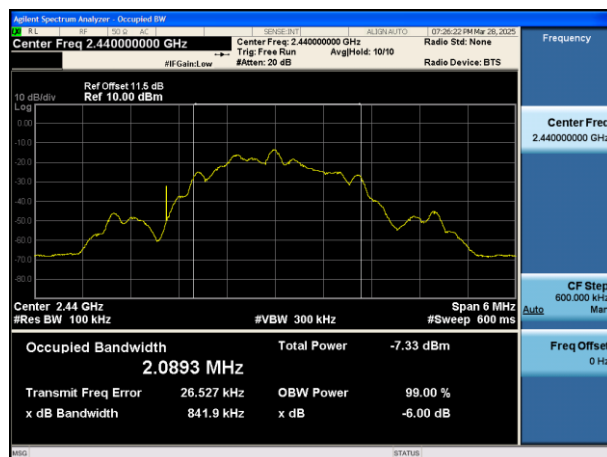
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## Test Report No.: PSU-NQN2504010114RF01

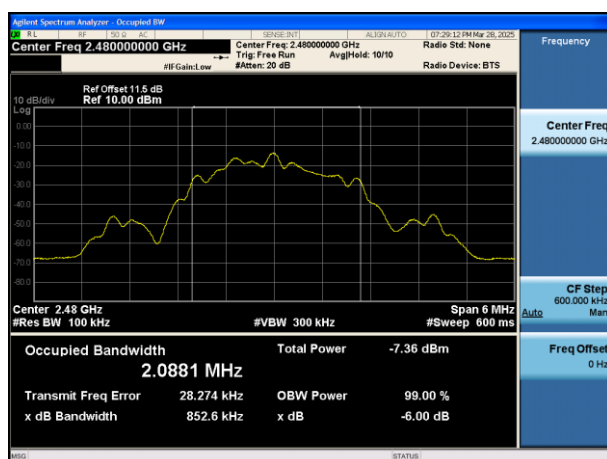
Test Mode: GFSK (LE 2Mbps)



Test Mode: GFSK (LE 2Mbps) 2402MHz



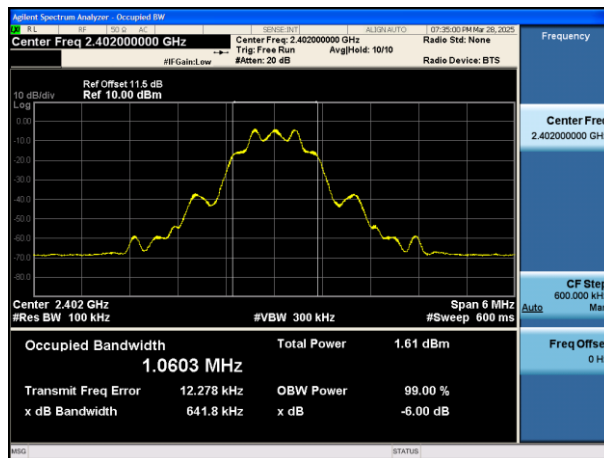
Test Mode: GFSK (LE 2Mbps) 2440MHz



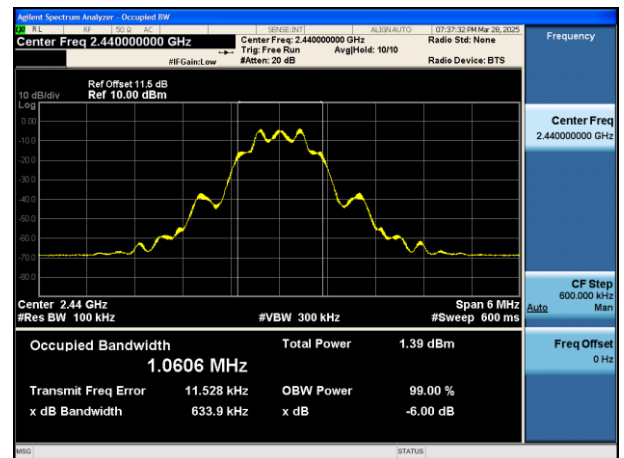
Test Mode: GFSK (LE 2Mbps) 2480MHz



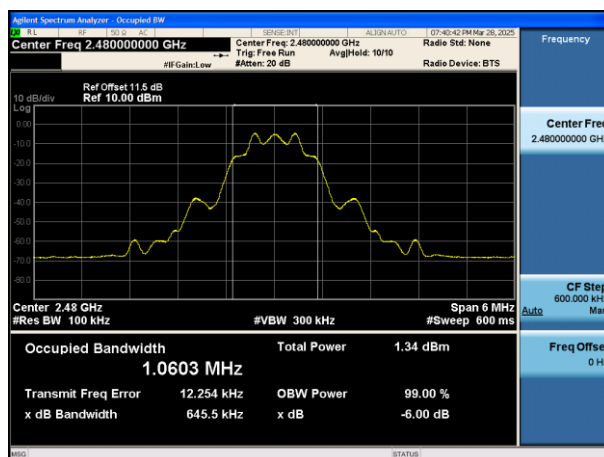
Test Mode: Coded 125k



Test Mode: Coded 125k 2402MHz



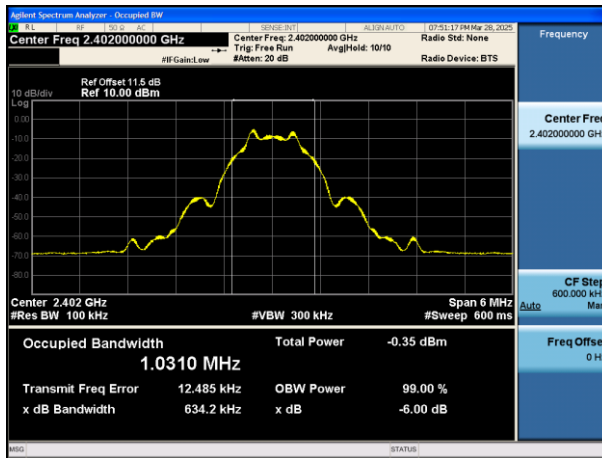
Test Mode: Coded 125k 2440MHz



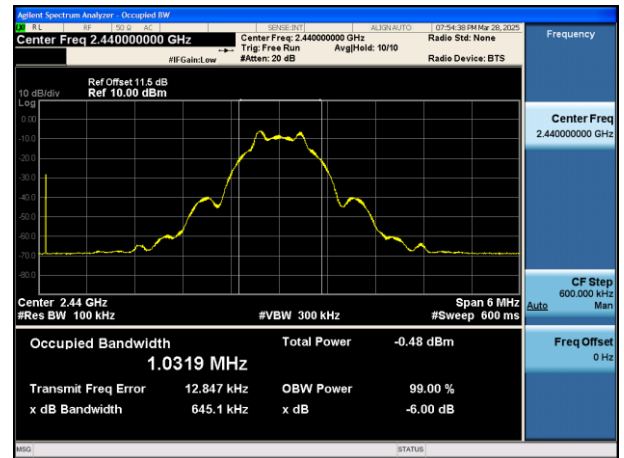
Test Mode: Coded 125k 2480MHz



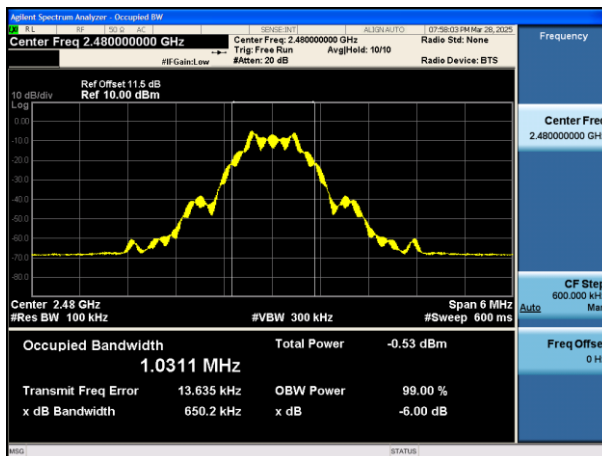
Test Mode: Coded 500k



Test Mode: Coded 500k 2402MHz



Test Mode: Coded 500k 2440MHz



Test Mode: Coded 500k 2480MHz

**OCCUPIED CHANNEL BANDWIDTH****TEST RESULT**

Test Mode	Carrier frequency (MHz)	99% Bandwidth(kHz)
GFSK (LE 1Mbps)	2402	1069.3
GFSK (LE 1Mbps)	2440	1069.1
GFSK (LE 1Mbps)	2480	1069.1

Test Mode	Carrier frequency (MHz)	99% Bandwidth(kHz)
GFSK (LE 2Mbps)	2402	2088.5
GFSK (LE 2Mbps)	2440	2089.2
GFSK (LE 2Mbps)	2480	2088.5

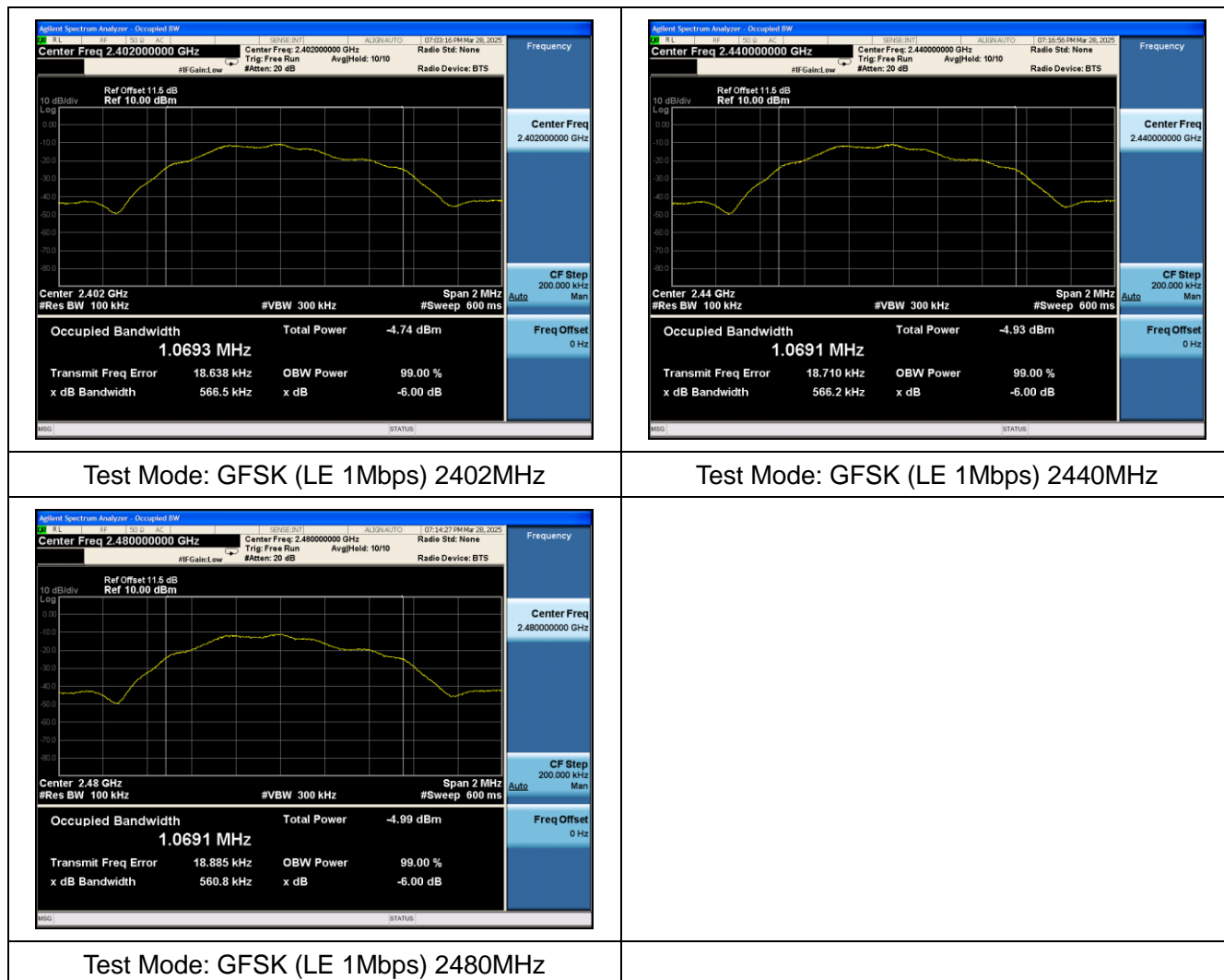
Test Mode	Carrier frequency (MHz)	99% Bandwidth(kHz)
Coded 125k	2402	1059.9
Coded 125k	2440	1060.5
Coded 125k	2480	1060.6

Test Mode	Carrier frequency (MHz)	99% Bandwidth(kHz)
Coded 500k	2402	1029.9
Coded 500k	2440	1030.2
Coded 500k	2480	1030.4



## TEST GRAPHS

Test Mode: GFSK (LE 1Mbps)

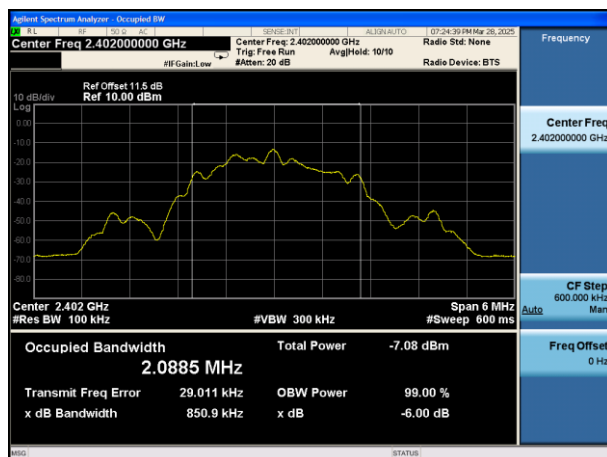




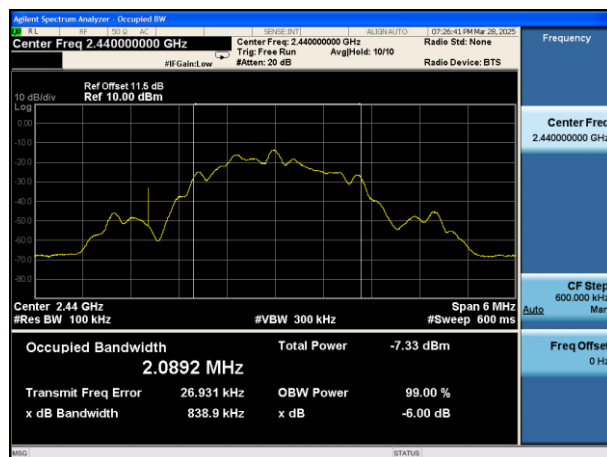
BUREAU  
VERITAS

Test Report No.: PSU-NQN2504010114RF01

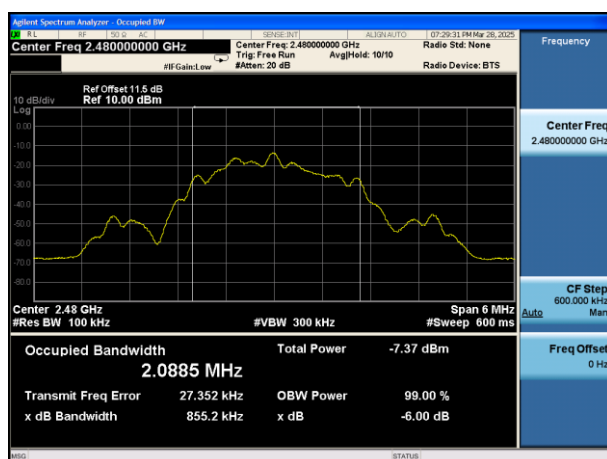
Test Mode: GFSK (LE 2Mbps)



Test Mode: GFSK (LE 2Mbps) 2402MHz



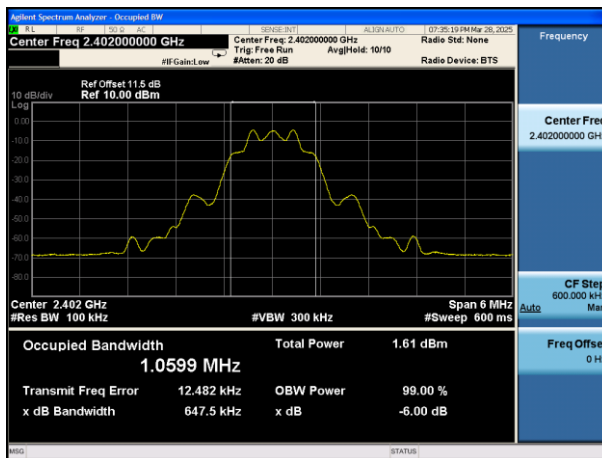
Test Mode: GFSK (LE 2Mbps) 2440MHz



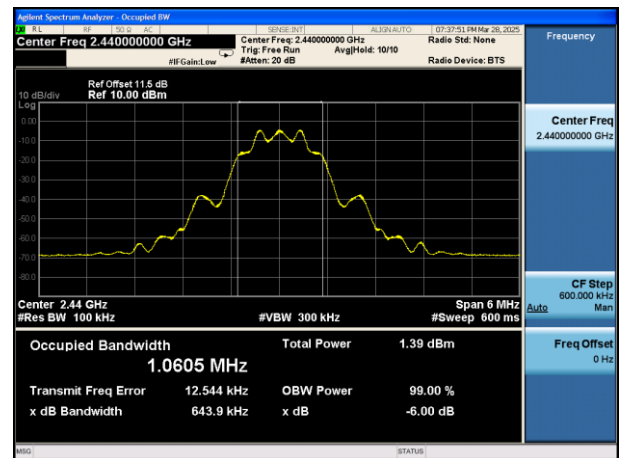
Test Mode: GFSK (LE 2Mbps) 2480MHz



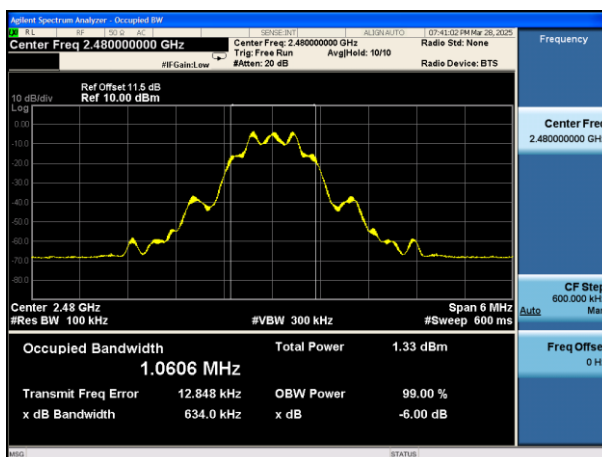
Test Mode: Coded 125k



Test Mode: Coded 125k 2402MHz



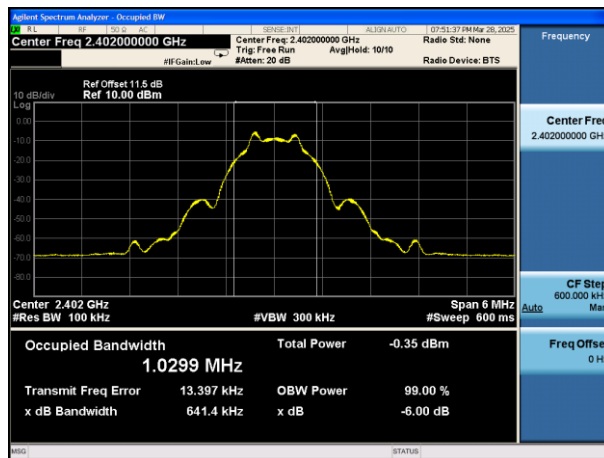
Test Mode: Coded 125k 2440MHz



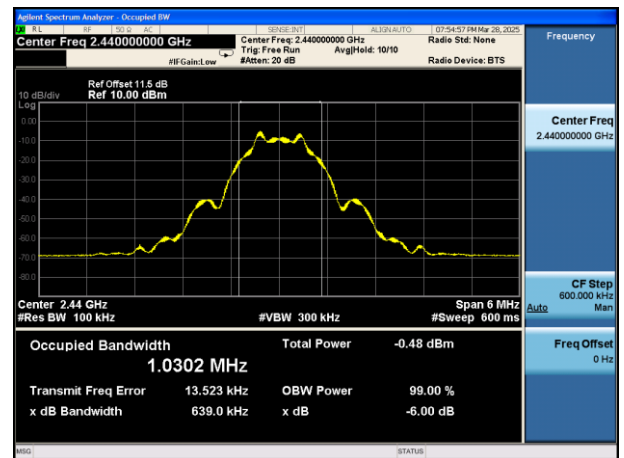
Test Mode: Coded 125k 2480MHz



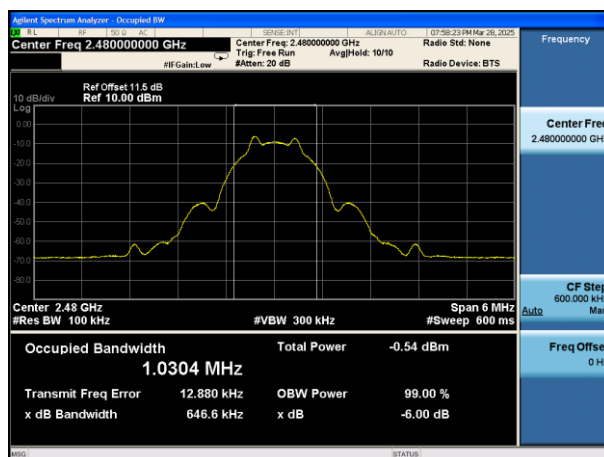
Test Mode: Coded 500k



Test Mode: Coded 500k 2402MHz



Test Mode: Coded 500k 2440MHz



Test Mode: Coded 500k 2480MHz



**MAXIMUM CONDUCTED OUTPUT POWER****TEST RESULT****Conducted Power**

Modulation type	Conducted Peak Power(dBm)		
	2402MHz	2440MHz	2480MHz
GFSK (LE 1Mbps)	9.01	9.34	9.06
GFSK (LE 2Mbps)	8.55	8.68	8.42
Coded 125k	9.11	8.95	8.01
Coded 500k	9.54	8.78	7.99

Modulation type	Conducted Average Power(dBm)		
	2402MHz	2440MHz	2480MHz
GFSK (LE 1Mbps)	8.03	7.88	7.35
GFSK (LE 2Mbps)	8.09	7.92	7.03
Coded 125k	8.06	7.85	7.44
Coded 500k	8.11	7.94	7.18

**EIRP**

Modulation type	Peak EIRP(dBm)		
	2402MHz	2440MHz	2480MHz
GFSK (LE 1Mbps)	9.01	9.34	9.06
GFSK (LE 2Mbps)	8.55	8.68	8.42
Coded 125k	9.11	8.95	8.01
Coded 500k	9.54	8.78	7.99

Modulation type	Average EIRP(dBm)		
	2402MHz	2440MHz	2480MHz
GFSK (LE 1Mbps)	8.03	7.88	7.35
GFSK (LE 2Mbps)	8.09	7.92	7.03
Coded 125k	8.06	7.85	7.44
Coded 500k	8.11	7.94	7.18

EIRP (dBm)=Conducted Power(dBm)+Antenna Gain(dBi)



## MAXIMUM POWER SPECTRAL DENSITY

### TEST RESULT

Test Mode	Carrier frequency (MHz)	Channel No.	Power Density (dBm/3kHz)
GFSK (LE 1Mbps)	2402	0	-15.2
GFSK (LE 1Mbps)	2440	19	-15.2
GFSK (LE 1Mbps)	2480	39	-15.2

Test Mode	Carrier frequency (MHz)	Channel No.	Power Density (dBm/3kHz)
GFSK (LE 2Mbps)	2402	0	-18.7
GFSK (LE 2Mbps)	2440	19	-18.7
GFSK (LE 2Mbps)	2480	39	-18.9

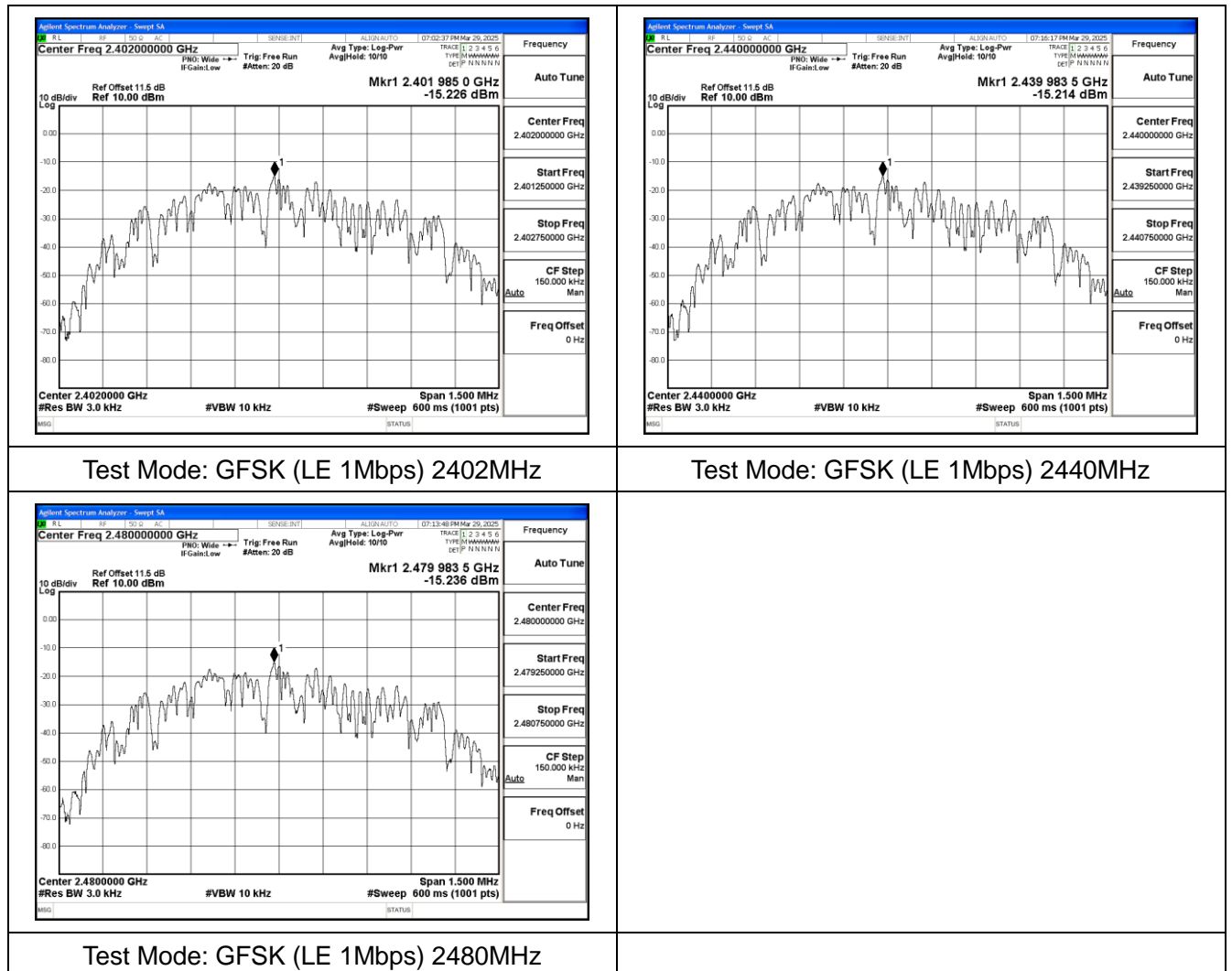
Test Mode	Carrier frequency (MHz)	Channel No.	Power Density (dBm/3kHz)
Coded 125k	2402	0	-2.1
Coded 125k	2440	19	-2.4
Coded 125k	2480	39	-2.4

Test Mode	Carrier frequency (MHz)	Channel No.	Power Density (dBm/3kHz)
Coded 500k	2402	0	-2.4
Coded 500k	2440	19	-2.3
Coded 500k	2480	39	-2.4



## TEST GRAPHS

Test Mode: GFSK (LE 1Mbps)





Test Mode: GFSK (LE 2Mbps)

