



Test Report No.: PSU-QSU2312140113RF09



Certificate #6613.01

# FCC TEST REPORT

## (Part 15, Subpart C)

Applicant:	BARTEC GmbH
Address:	Max-Eyth-Str.16 , 97980 Bad Mergentheim, Germany

Manufacturer or Supplier:	BARTEC GmbH
Address:	Max-Eyth-Str.16 , 97980 Bad Mergentheim, Germany
Product:	Smartscanner / Smartphone
Brand Name:	BARTEC
Model Name:	SP9EX1/SC9EX1/SP9EX2/SC9EX2
FCC ID:	TBUSX9EX
Date of tests:	Jan. 02, 2024~ Jul. 26, 2024

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: Jul. 26, 2024

Date: Jul. 26, 2024

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## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
PSU-QSU2312140113RF09	Original release	Jul. 26, 2024



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## 1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15, Subpart C			
STANDARD	TEST TYPE AND LIMIT	RESULT	Test lab*
15.207	AC Power Conducted Emission	Compliance	A
15.247(a)(1) (iii)	Number of Hopping Frequency Used	Compliance	A
15.247(a)(1) (iii)	Dwell Time on Each Channel	Compliance	A
15.247(a)(1)	1. Hopping Channel Separation 2. Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System	Compliance	A
15.247(b)	Maximum Peak Output Power	Compliance	A
15.247(d)& 15.209	Transmitter Radiated Emissions	Compliance	A
15.247(d)	Out of band Measurement	Compliance	A
15.203	Antenna Requirement	Compliance	A

### NOTE:

1. If the Frequency Hopping System operating in 2400-2483.5MHz band and the output power less than 125mW. The hopping channel carrier frequencies separated by a minimum of 25kHz or two-thirds of the 20dB bandwidth of hopping channel whichever is greater.
2. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.
3. In this report, the test EUT version is EVT, after the test is completed, the customer optimizes the product to DVT, and the final customer's shipment is PVT. For differences between EVT and DVT and PVT, please refer to the documentation provided by the customer (SC9EX1\_SP9EX1 PCBA HW Release Note rev 2\_0).
4. There are no differences on the PCBA between the Model SC9EX1 (FCC ID: TBUSX9EX) and the variants SP9EX1 (FCC ID: TBUSX9EX). All mounted components are the same. No functionality related to any radio interface is affected. The only difference is the presence of the barcode scanner module and the "bump" on the back cover that incorporates the barcode scanner module. Testing has been run on parent product SC9EX1 and the worst cases of power and RSE have been verified also on SP9EX1 variant. Only the worst-case data (SC9EX1) have been reported.



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5. The devices BARTEC SP9EX1 Smartphone and BARTEC SP9EX2 Smartphone share the same hardware and software. The same applies for the devices BARTEC SC9EX1 Smartscanner and BARTEC SC9EX2 Smartscanner. The only difference are the hazardous area marking of the devices, see table for clarification.

BARTEC SP9EX1 Smartphone	BARTEC SP9EX2 Smartphone
<p><b>BARTEC SP9EX1</b> Type: 17-S19P-***** Mfr: BARTEC GmbH Max-Eyth-Straße 16 97980 Bad Mergentheim, DE www.bartec.com</p> <p>UL 24 ATEX 3152X Ex II 1G Ex ia IIC T4 Ga Ex II 2D Ex ia IIC T135°C Db IP64 IECEx UL 24.0004X</p> <p>Class I, Div 1, Groups A, B, C and D; Class II, Div 1, Groups E, F and G; Class III, T4</p> <p>Zone 0, AEx ia IIC T4 Ga Zone 21, AEx ia IIC T135°C Db Zone 0, Ex ia IIC T4 Ga Zone 21, Ex ia IIC T135°C Db -20°C &lt; Ta &lt; +55°C</p> <p>USB port: USB-PD compatible – 5-20 Vdc / max 3 A DC-In port: 12 Vdc / max 1.5 A USB Um = 20 V / DCin Um = 12 V</p> <p><b>WARNING/ATTENTION:</b> Use only replaceable battery pack BARTEC GmbH type: 17-S120-0020/**** Utiliser uniquement la batterie BARTEC GmbH type: 17-S120-0020/**** <b>INTRINSICALLY SAFE/SECURITÉ INTRINSEQUE</b> Warning - Substitution of components may impair intrinsic safety. Avertissement - La substitution des composants peut nuire à la sécurité intrinsèque.</p>	<p><b>BARTEC SP9EX2</b> Type: B7-S29P-***** Mfr: BARTEC GmbH Max-Eyth-Straße 16 97980 Bad Mergentheim, DE www.bartec.com</p> <p>UL 24 ATEX xxxx Ex II 3G Ex ic op is IIC T4 Ga Ex II 3D Ex ic op is IIC T135°C Db IP64 IECEx UL 24.0004X</p> <p>Class I, Div 2, Groups A, B, C and D; Class II, Div 2, Groups E, F and G; Class III, T4</p> <p>Zone 2, AEx ic IIC T4 Ga Zone 22, AEx ic IIC T135°C Db Zone 2, Ex ic IIC T4 Ga Zone 22, Ex ic IIC T135°C Db -20°C &lt; Ta &lt; +55°C</p> <p>USB port: USB-PD compatible – 5-20 Vdc / max 3 A DC-In port: 12 Vdc / max 1.5 A USB Um = 20 V / DCin Um = 12 V</p> <p><b>WARNING/ATTENTION:</b> Use only replaceable battery pack BARTEC GmbH type: B7-A220-0098/**** Utiliser uniquement la batterie BARTEC GmbH type: B7-A220-0098/**** <b>INTRINSICALLY SAFE/SECURITÉ INTRINSEQUE</b> Warning - Substitution of components may impair intrinsic safety. Avertissement - La substitution des composants peut nuire à la sécurité intrinsèque.</p>
<p><b>BARTEC SC9EX1</b> Type: 17-S19C-***** Mfr: BARTEC GmbH Max-Eyth-Straße 16 97980 Bad Mergentheim, DE www.bartec.com</p> <p>UL 24 ATEX 3152X Ex II 1G Ex ia op is IIC T4 Ga Ex II 2D Ex ia op is IIC T135°C Db IP64 IECEx UL 24.0004X</p> <p>Class I, Div 1, Groups A, B, C and D; Class II, Div 1, Groups E, F and G; Class III, T4</p> <p>Zone 0, AEx ia op is IIC T4 Ga Zone 21, AEx ia op is IIC T135°C Db Zone 0, Ex ia op is IIC T4 Ga Zone 21, Ex ia op is IIC T135°C Db -20°C &lt; Ta &lt; +55°C</p> <p>USB port: USB-PD compatible – 5-20 Vdc / max 3 A DC-In port: 12 Vdc / max 1.5 A USB Um = 20 V / DCin Um = 12 V</p> <p><b>WARNING/ATTENTION:</b> Use only replaceable battery pack BARTEC GmbH type: 17-S120-0020/**** Utiliser uniquement la batterie BARTEC GmbH type: 17-S120-0020/**** <b>INTRINSICALLY SAFE/SECURITÉ INTRINSEQUE</b> Warning - Substitution of components may impair intrinsic safety. Avertissement - La substitution des composants peut nuire à la sécurité intrinsèque.</p>	<p><b>BARTEC SC9EX2</b> Type: B7-S29C-***** Mfr: BARTEC GmbH Max-Eyth-Straße 16 97980 Bad Mergentheim, DE www.bartec.com</p> <p>UL 24 ATEX xxxx Ex II 3G Ex ic op is IIC T4 Ga Ex II 3D Ex ic op is IIC T135°C Db IP64 IECEx UL 24.0004X</p> <p>Class I, Div 2, Groups A, B, C and D; Class II, Div 2, Groups E, F and G; Class III, T4</p> <p>Zone 2, AEx ic op is IIC T4 Ga Zone 22, AEx ic op is IIC T135°C Db Zone 2, Ex ic op is IIC T4 Ga Zone 22, Ex ic op is IIC T135°C Db -20°C &lt; Ta &lt; +55°C</p> <p>USB port: USB-PD compatible – 5-20 Vdc / max 3 A DC-In port: 12 Vdc / max 1.5 A USB Um = 20 V / DCin Um = 12 V</p> <p><b>WARNING/ATTENTION:</b> Use only replaceable battery pack BARTEC GmbH type: B7-A220-0098/**** Utiliser uniquement la batterie BARTEC GmbH type: B7-A220-0098/**** <b>INTRINSICALLY SAFE/SECURITÉ INTRINSEQUE</b> Warning - Substitution of components may impair intrinsic safety. Avertissement - La substitution des composants peut nuire à la sécurité intrinsèque.</p>

### \*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.

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

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

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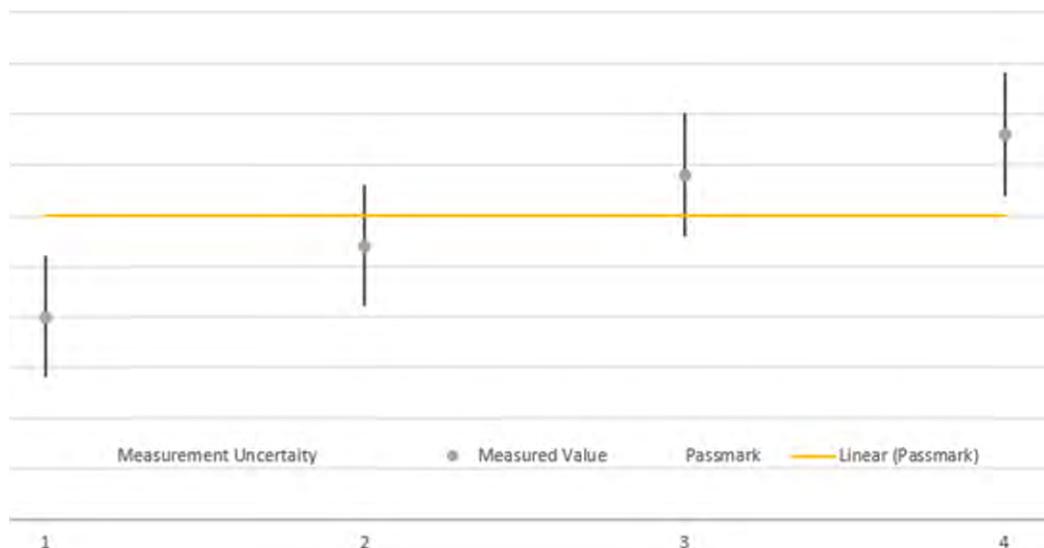
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## 1.1 MEASUREMENT UNCERTAINTY

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	±2.70dB
Radiated emissions (9KHz~30MHz)	±2.68dB
Radiated emissions (30MHz~1GHz)	±4.98dB
Radiated emissions (1GHz ~6GHz)	±4.70dB
Radiated emissions (6GHz ~18GHz)	±4.60dB
Radiated emissions (18GHz ~40GHz)	±4.12dB
Conducted emissions	±4.01dB
Occupied Channel Bandwidth	±43.58KHz
Conducted Output power	±2.06dB
Power Spectral Density	±0.85 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

PRODUCT*	Smartscanner / Smartphone
BRAND NAME*	BARTEC
MODEL NAME*	SP9EX1/SC9EX1/SP9EX2/SC9EX2
NOMINAL VOLTAGE*	5.0V/9.0V/12.0Vdc (adapter) 3.2V/3.8V/4.2V/dc (battery)
MODULATION TECHNOLOGY	FHSS
MODULATION TYPE	GFSK, 8DPSK, $\pi/4$ DQPSK
OPERATING FREQUENCY	2402MHz~2480MHz
NUMBER OF CHANNEL	79
MAX. OUTPUT POWER	12.50mW (Max. Measured)
ANTENNA TYPE*	ANT5 Monopole Antenna with -1.4dBi gain
HW VERSION*	E
SW VERSION*	TWG1.240820.261
I/O PORTS*	Refer to user's manual
CABLE SUPPLIED*	USB cable: non-shielded cable, with w/o ferrite core, 0.8 meter

#### 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. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.
4. 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.



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5. List of Accessory:

ACCESSORIES	BRAND	MANUFACTURER	MODEL	SPECIFICATION
Display(AMOLED)	Xiao Xin	N/A	XX611OLED-A002.1	N/A
Back cover	IV Techmould	N/A	N/A	N/A
Bezel	IV Techmould	N/A	N/A	N/A
Photo/Video Camera 1	Sunny Optical	N/A	F48N03A (Auto focus)	N/A
Photo/Video Camera 2	TrulyOpto	N/A	CSF208-B8BF-E(Fix focus)	N/A
CPU	Qualcomm	N/A	QCM6490	N/A
UFS	Kioxia	N/A	THGJFAT0T44BAIL	N/A
BT/WLAN Module	Murata	N/A	LBEE5QG2CX-830	N/A
NFC chipset	NXP	N/A	SN110TUK1	N/A
Battery	BARTEC	N/A	17-S1Z0-0020/****	4300 mAh, 3.68V
USB-C Cable	BARTEC	N/A	G7-A0Z0-0010	Length: 0.8m



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## 2.2 DESCRIPTION OF TEST MODES

79 channels are provided to this EUT:

CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461		



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## 2.2.1 CONFIGURATION OF SYSTEM UNDER TEST

Please see section 4 photograph 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 X axis for radiated emission. Following channel(s) was (were) selected for the final test as listed below:

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE<1G	RE≥1G	PLC	APCM	
-	√	√	√	√	-

Where    RE<1G: Radiated Emission below 1GHz  
          PLC: Power Line Conducted Emission

RE≥1G: Radiated Emission above 1GHz  
APCM: Antenna Port Conducted Measurement

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

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE
-	0 to 78	39	FHSS	π/4-DQPSK	2DH5

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

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE
-	0 to 78	0, 39, 78	FHSS	GFSK	1DH5
-	0 to 78	0, 39, 78	FHSS	π/4 DQPSK	2DH5
-	0 to 78	0, 39, 78	FHSS	8DPSK	3DH5



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VERITAS

**POWER LINE CONDUCTED EMISSION TEST:**

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE
-	0 to 78	39	FHSS	$\pi/4$ -DQPSK	2DH5

**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, antenna ports (if EUT with antenna diversity architecture), and packet types.
- The following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE
0 to 78	0, 39, 78	FHSS	GFSK	DH1/DH3/DH5
0 to 78	0, 39, 78	FHSS	$\pi/4$ DQPSK	2DH1/2DH3/2DH5
0 to 78	0, 39, 78	FHSS	8DPSK	3DH1/3DH3/3DH5

**TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	TEST VOLTAGE (SYSTEM)	TESTED BY
RE<1G	23deg. C, 70%RH	DC 5.0V/ 9.0V/ 12.0V By Adapter	Hanwen Xu
RE≥1G	23deg. C, 70%RH	DC 5.0V/ 9.0V/ 12.0V By Adapter	Hanwen Xu
PLC	25deg. C, 52%RH	DC 5.0V/ 9.0V/ 12.0V By Adapter	Hanwen Xu
APCM	25deg. C, 60%RH	DC 5.0V/ 9.0V/ 12.0V By Adapter	Hanwen Xu



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## 2.3 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

### 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.

## 2.4 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	Adapter	N/A	N/A	N/A	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	USB Line: Shielded, Detachable 0.8m;



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### 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)	
0.15 ~ 0.5 0.5 ~ 5 5 ~ 30	Quasi-peak	Average
	66 to 56	56 to 46
	56	46
	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	Feb.25,22	Feb.24,24
EMI Test Receiver	Rohde&Schwarz	ESR3	102749	Feb.24,24	Feb.23,26
ELEKTRA test software	Rohde&Schwarz	ELEKTRA	NA	N/A	N/A
LISN network	Rohde&Schwarz	ENV216	102640	Feb.17,22	Feb.16,24
LISN network	Rohde&Schwarz	ENV216	102640	Feb.16,24	Feb.15,26
CABLE	Rohde&Schwarz	W61.01	N/A	Apr.28,23	Apr.27,24
CABLE	Rohde&Schwarz	W61.01	N/A	Apr.27,24	Apr.26,25
CABLE	Rohde&Schwarz	W601	N/A	Apr.28,23	Apr.27,24
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 /24 months and the calibrations are traceable to CEPREI/CHINA, GRRGT/CHINA and NIM/CHINA.



Test Report No.: PSU-QSU2312140113RF09

### 3.1.3 TEST PROCEDURES

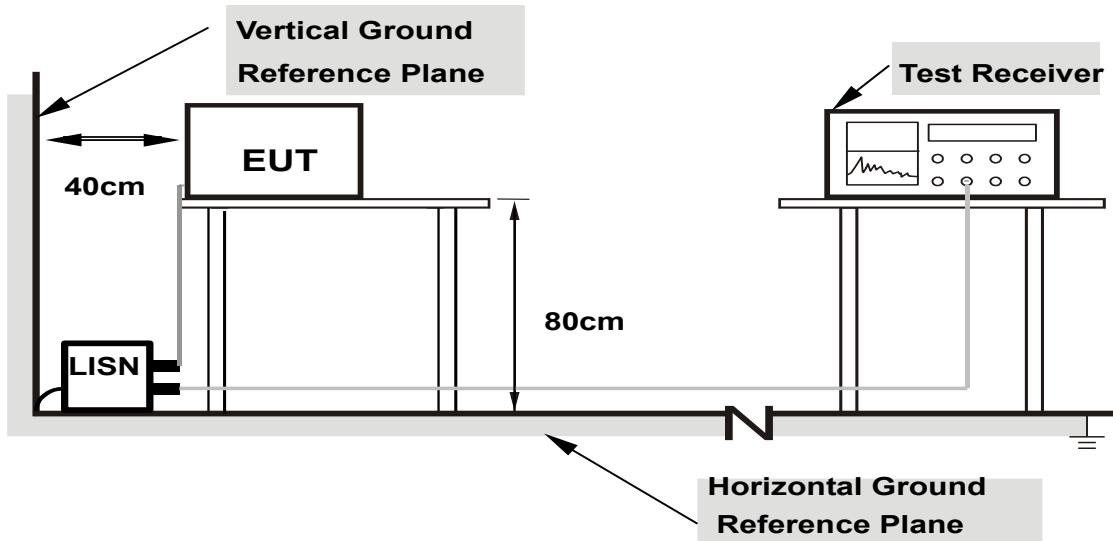
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling 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 cm 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.



Test Report No.: PSU-QSU2312140113RF09

### 3.1.7 TEST RESULTS

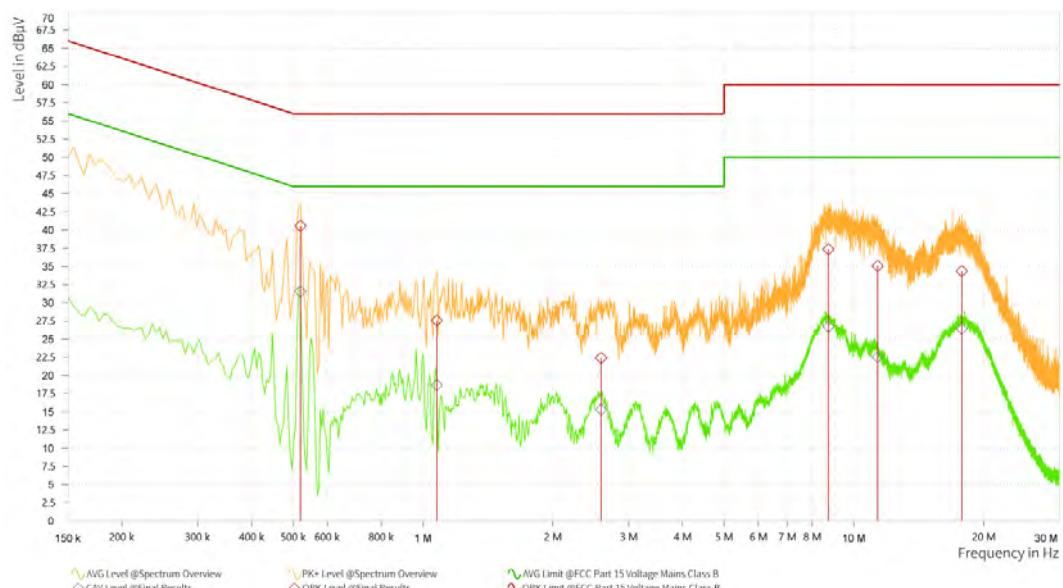
#### CONDUCTED WORST-CASE DATA:

Frequency Range	150KHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120Vac, 60Hz	Environmental Conditions	26deg. C, 51%RH
Tested By	Hanwen Xu		

Rg	Frequency [MHz]	QPK Level [dB $\mu$ V]	QPK Limit [dB $\mu$ V]	QPK Margin [dB]	CAV Level [dB $\mu$ V]	CAV: AVG Limit [dB $\mu$ V]	CAV Margin [dB]	Correction [dB]	Line	Meas. BW [kHz]
1	0.519	40.53	56.00	15.47	31.53	46.00	14.47	11.75	L1	9.000
1	1.077	27.56	56.00	28.44	18.68	46.00	27.32	11.75	L1	9.000
1	2.589	22.40	56.00	33.60	15.31	46.00	30.69	11.77	L1	9.000
1	8.732	37.36	60.00	22.64	26.68	50.00	23.32	11.82	L1	9.000
1	11.355	35.06	60.00	24.94	22.53	50.00	27.47	11.83	L1	9.000
1	17.799	34.37	60.00	25.63	26.41	50.00	23.59	11.86	L1	9.000

**REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.

2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Limit value - Emission level
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.





Test Report No.: PSU-QSU2312140113RF09

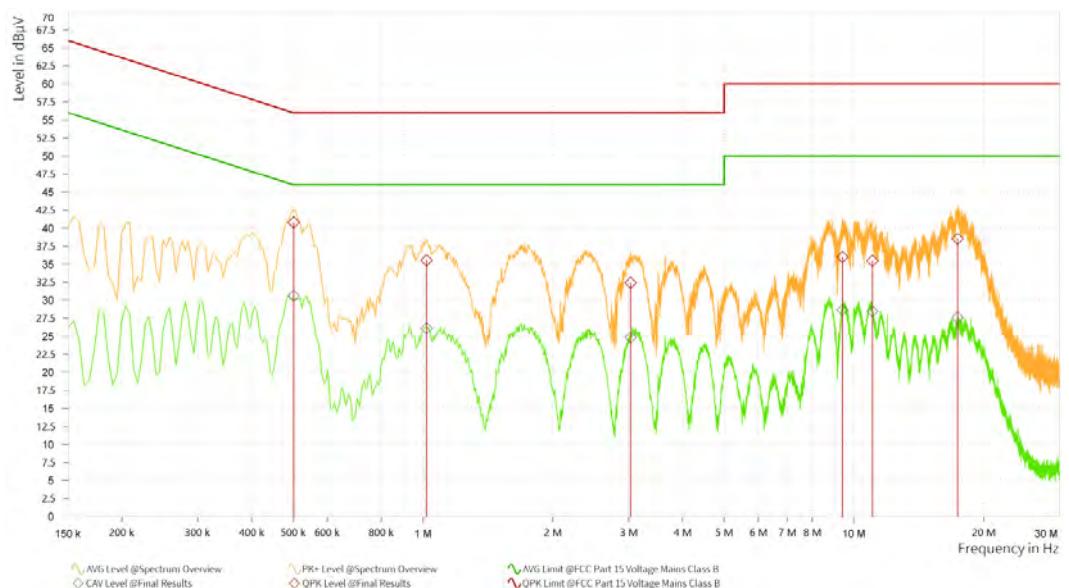
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<b>Frequency Range</b>	150KHz ~ 30MHz	<b>Detector Function &amp; Resolution Bandwidth</b>	Quasi-Peak (QP) / Average (AV), 9 kHz
<b>Input Power</b>	120Vac, 60Hz	<b>Environmental Conditions</b>	26deg. C, 51%RH
<b>Tested By</b>	Hanwen Xu		

Rg	Frequency [MHz]	QPK Level [dB $\mu$ V]	QPK Limit [dB $\mu$ V]	QPK Margin [dB]	CAV Level [dB $\mu$ V]	CAV: AVG Limit [dB $\mu$ V]	CAV Margin [dB]	Correction [dB]	Line	Meas. BW [kHz]
1	0.501	40.77	56.00	15.23	30.61	46.00	15.39	12.78	N	9.000
1	1.019	35.54	56.00	20.46	26.10	46.00	19.90	12.73	N	9.000
1	3.035	32.41	56.00	23.59	24.83	46.00	21.17	12.75	N	9.000
1	9.402	35.98	60.00	24.02	28.64	50.00	21.36	12.79	N	9.000
1	11.040	35.47	60.00	24.53	28.47	50.00	21.53	12.80	N	9.000
1	17.408	38.51	60.00	21.49	27.59	50.00	22.41	12.84	N	9.000

**REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.

2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Limit value - Emission level
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.





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## 3.2 RADIATED EMISSION AND BANDEDGE MEASUREMENT

### 3.2.1 LIMITS OF RADIATED EMISSION AND BANDEDGE 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). Other emissions shall be at least 20dB below the highest level of the desired power.

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 (dB<sub>u</sub>V/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.30,22	Aug.29,24
Pre-Amplifier	R&S	SCU08F1	101028	Sep.16,22	Sep.15,24
Signal Generator	R&S	SMB100A	182185	Feb.16,22	Feb.15,24
Signal Generator	R&S	SMB100A	182185	Feb.15,24	Feb.14,26
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	Feb.25,22	Feb.24,24
EMI TEST Receiver	R&S	ESW44	101973	Feb.24,24	Feb.23,26
Bilog Antenna	SCHWARZBEC K	VULB 9163	1264	Feb.28,22	Feb.27,24
Bilog Antenna	SCHWARZBEC K	VULB 9163	1264	Feb.27,24	Feb.26,26
Horn Antenna	ETS-LINDGREN	3117	227836	Aug.22,22	Aug.21,24
Horn Antenna (18GHz-40GHz)	Steatite Q-par Antennas	QMS 00880	23486	Feb.23,22	Feb.22,24
Horn Antenna (18GHz-40GHz)	Steatite Q-par Antennas	QMS 00880	23486	Feb.22,24	Feb.21,26
Horn Antenna	Steatite Q-par Antennas	QMS 00208	23485	Aug.22,22	Aug.21,24
Loop Antenna	SCHWARZ	HFH2-Z2/Z2E	100976	Feb.23,22	Feb.22,24
Loop Antenna	SCHWARZ	HFH2-Z2/Z2E	100976	Feb.22,24	Feb.21,26
WIDEBANDRADIO COMMUNICATION TESTER	R&S	CMW500	169399	Jun.27,22	Jun.26,24
WIDEBANDRADIO COMMUNICATION TESTER	R&S	CMW500	169399	Jun.26,24	Jun.25,26
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.31,22	Aug.30,24
Hygrothermograph	DELI	20210528	SZ014	Sep.06,22	Sep.05,24
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.28,23	Apr.27,24
CABLE	R&S	W13.02	N/A	Apr.27,24	Apr.26,25

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CABLE	R&S	W12.14	N/A	Apr.28,23	Apr.27,24	
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:

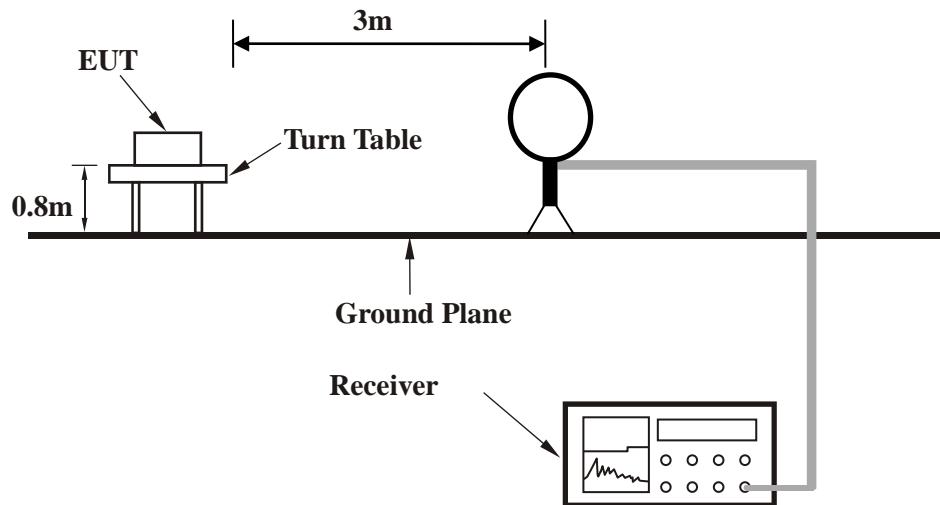
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz for Average detection (AV) at frequency above 1GHz.
4. If the dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a "duty cycle correction factor", derived from  $20\log(\text{dwell time}/100 \text{ ms})$ , in an effort to demonstrate compliance with the 15.209 limit.
5. All modes of operation were investigated and the worst-case emissions are reported.

### 3.2.4 DEVIATION FROM TEST STANDARD

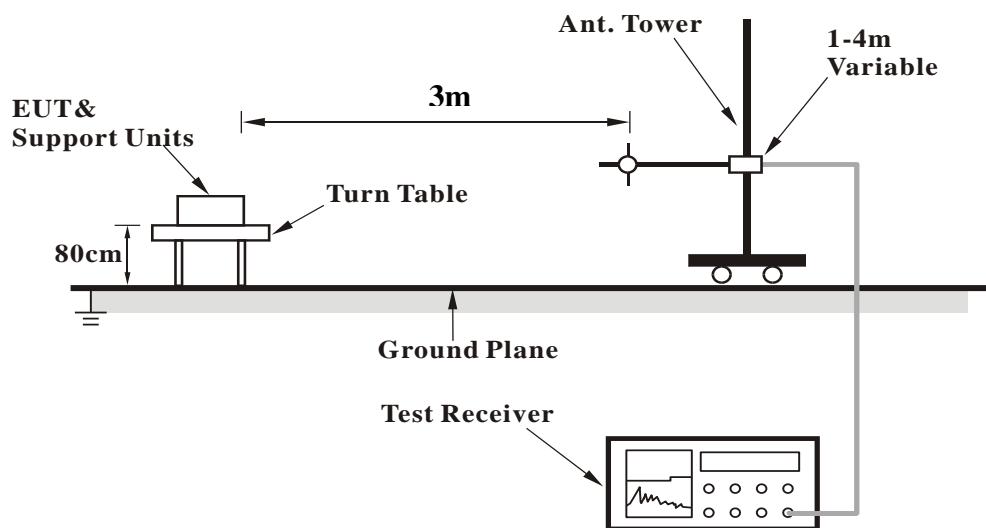
No deviation.

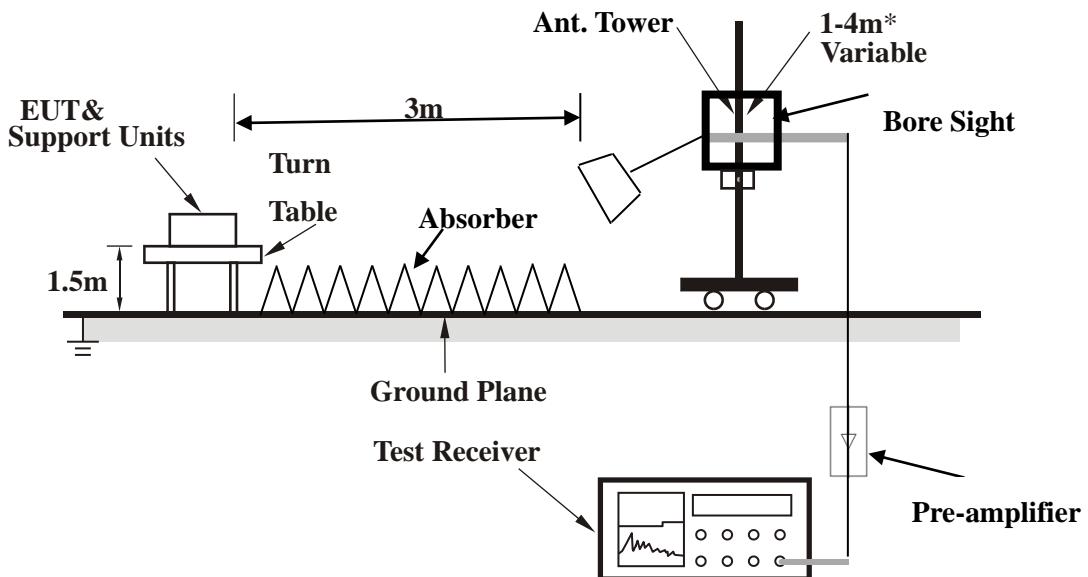
### 3.2.5 TEST SETUP

**<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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### 3.2.1 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.**

#### BELOW 1GHz WORST-CASE DATA:

30 MHz – 1GHz data:

BT\_π/4-DQPSK

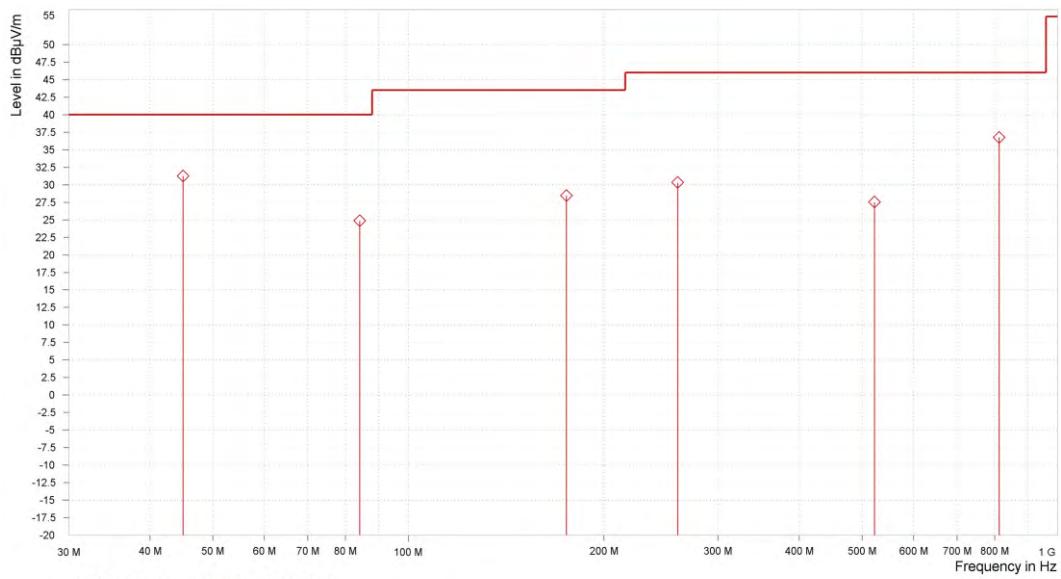
CHANNEL	Channel 39	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

#### ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

Rg	Frequency [MHz]	QPK Level [dBμV/m]	QPK Limit [dBμV/m]	QPK Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]	Meas. BW [kHz]
1	44.987	31.25	40.00	8.75	-3.75	H	0.9	2.00	120.000
1	84.126	24.85	40.00	15.15	-10.02	H	327.1	2.00	120.000
1	175.161	28.44	43.50	15.06	-8.00	H	168.2	2.00	120.000
1	259.987	30.31	46.00	15.69	-2.54	H	168.2	2.00	120.000
1	522.275	27.51	46.00	18.49	2.50	H	327.1	2.00	120.000
1	812.548	36.74	46.00	9.26	5.52	H	143.9	1.00	120.000

#### REMARKS:

1. Emission Level(dBuV/m) = Read Level(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Limit value – Emission level.





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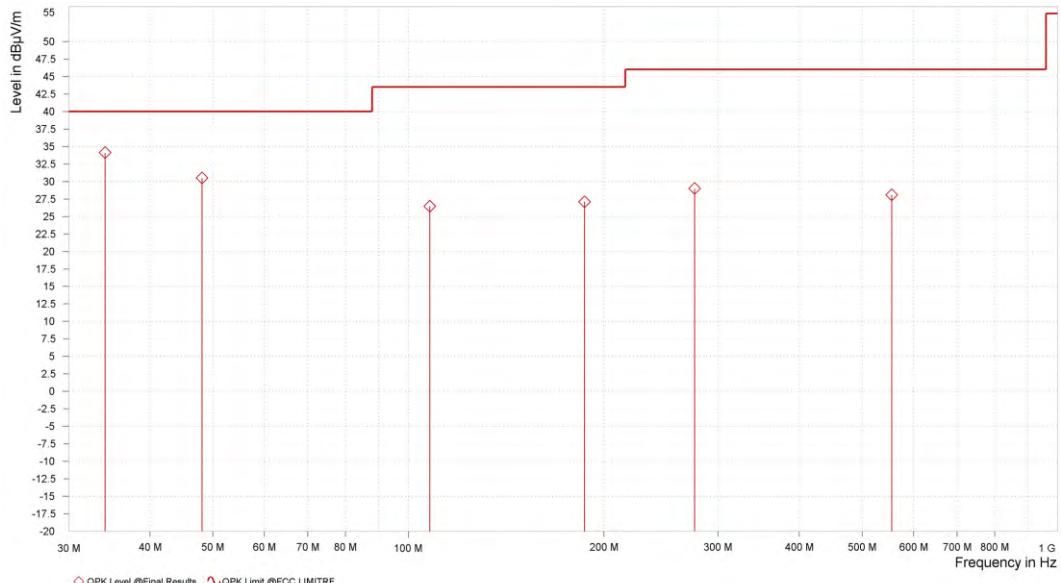
CHANNEL	Channel 39	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

Rg	Frequency [MHz]	QPK Level [dB $\mu$ V/m]	QPK Limit [dB $\mu$ V/m]	QPK Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]	Meas. BW [kHz]
1	34.123	34.10	40.00	5.90	-8.38	V	359	1.00	120.000
1	48.091	30.47	40.00	9.53	-4.54	V	322	1.00	120.000
1	107.940	26.44	43.50	17.06	-5.94	V	322	1.00	120.000
1	186.849	27.07	43.50	16.43	-6.47	V	64.2	2.00	120.000
1	276.089	28.98	46.00	17.02	-2.36	V	353.7	2.00	120.000
1	555.207	28.07	46.00	17.93	1.99	V	322	1.00	120.000

REMARKS:

1. Emission Level(dBuV/m) = Read Level(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Limit value – Emission level.





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### ABOVE 1GHz WORST-CASE DATA:

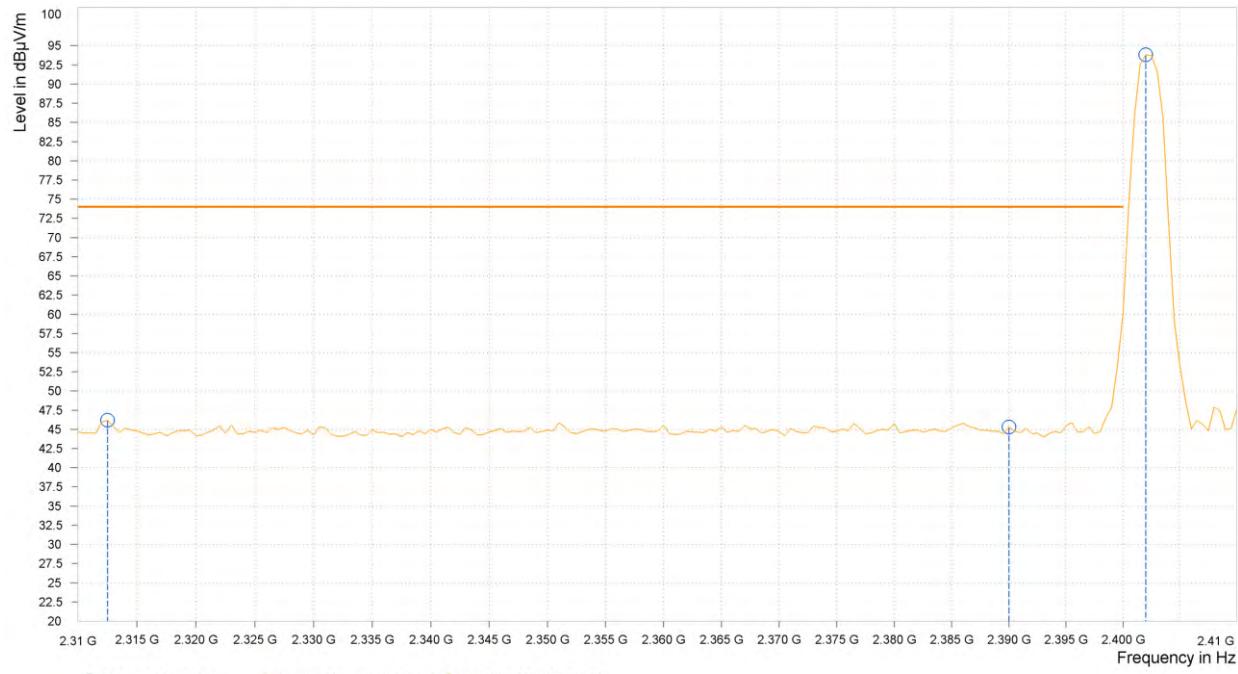
**Note:** All other emissions that greater than 20dB below the limit were not recorded.

#### BT\_GFSK

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

#### ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

Rg	Frequency [MHz]	PK+ Level [dB $\mu$ V/m]	PK+ Limit [dB $\mu$ V/m]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
5	2,312.500	46.18	74.00	27.82	-1.43	H	339	1.00
5	2,390.000	45.29	74.00	28.71	-1.05	H	44	1.00
5	2,402.000	93.82			-0.96	H	171.4	2.00

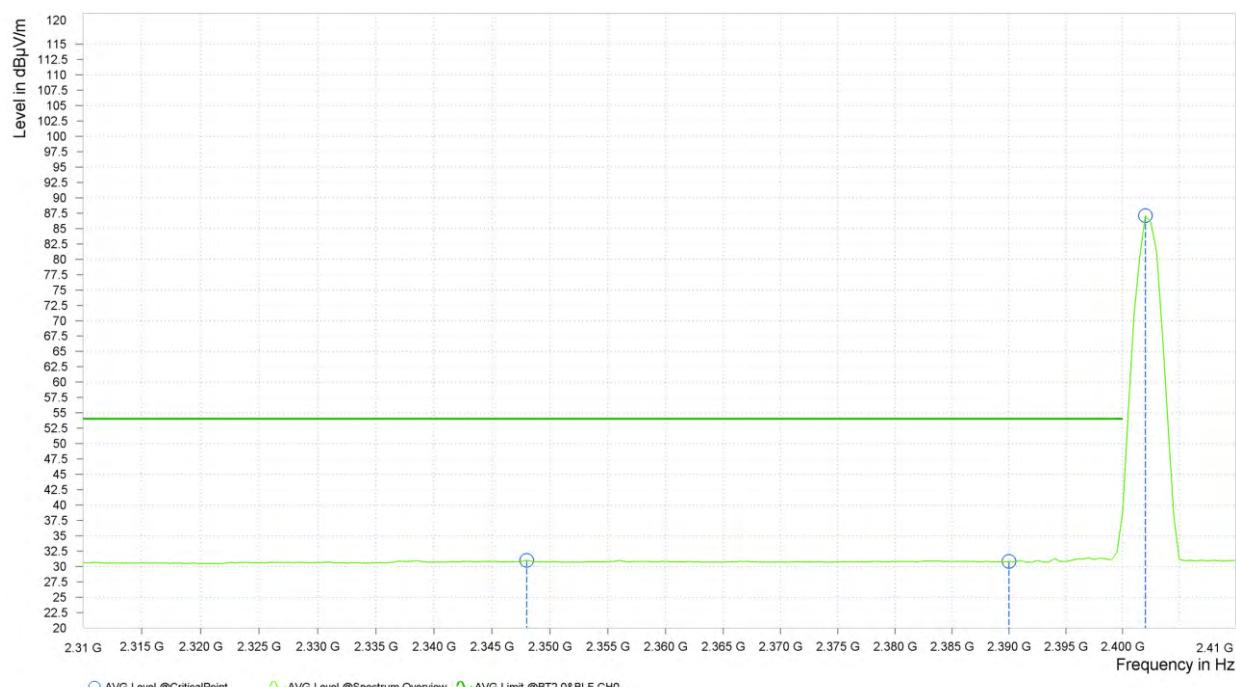




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Rg	Frequency [MHz]	AVG Level [dB $\mu$ V/m]	AVG Limit [dB $\mu$ V/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
5	2,348.000	31.03	54.00	22.97	-1.27	H	265.8	2.00
5	2,390.000	30.82	54.00	23.18	-1.05	H	167.8	2.00
5	2,402.000	87.10			-0.96	H	216.8	2.00



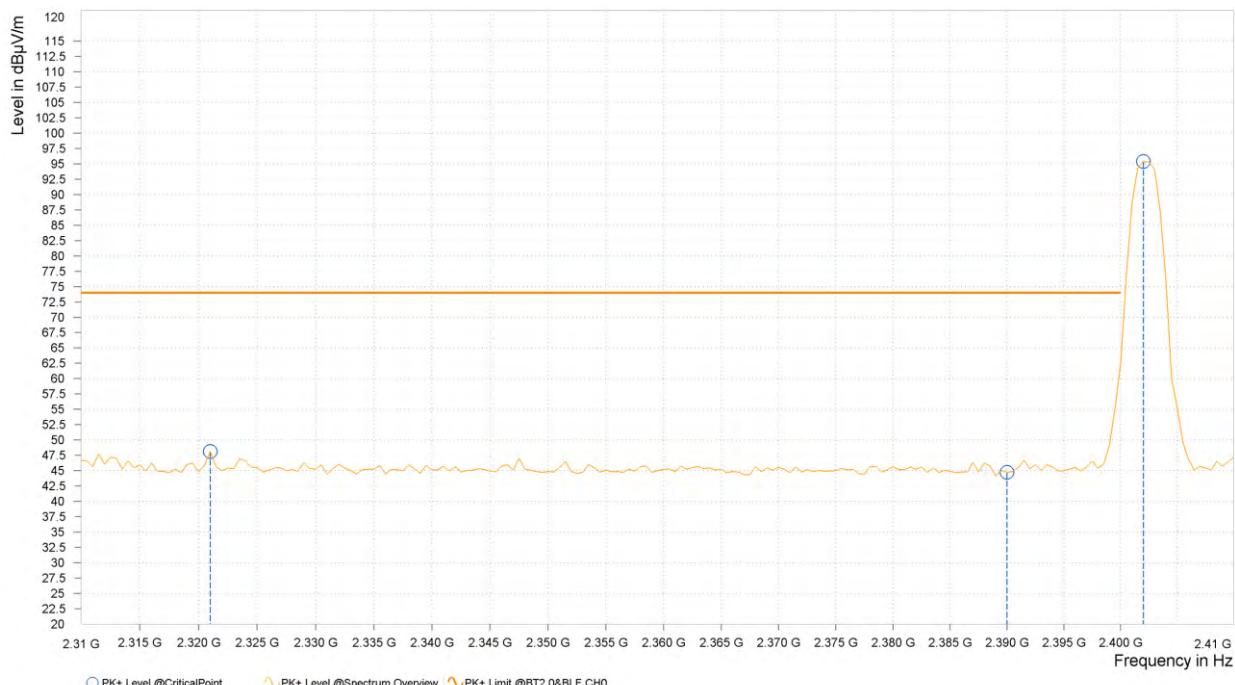


Test Report No.: PSU-QSU2312140113RF09

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ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

Rg	Frequency [MHz]	PK+ Level [dB $\mu$ V/m]	PK+ Limit [dB $\mu$ V/m]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
5	2,321.000	48.14	74.00	25.86	-1.36	V	218.1	2.00
5	2,390.000	44.73	74.00	29.27	-1.05	V	355.9	2.00
5	2,402.000	95.36			-0.96	V	237.8	1.00

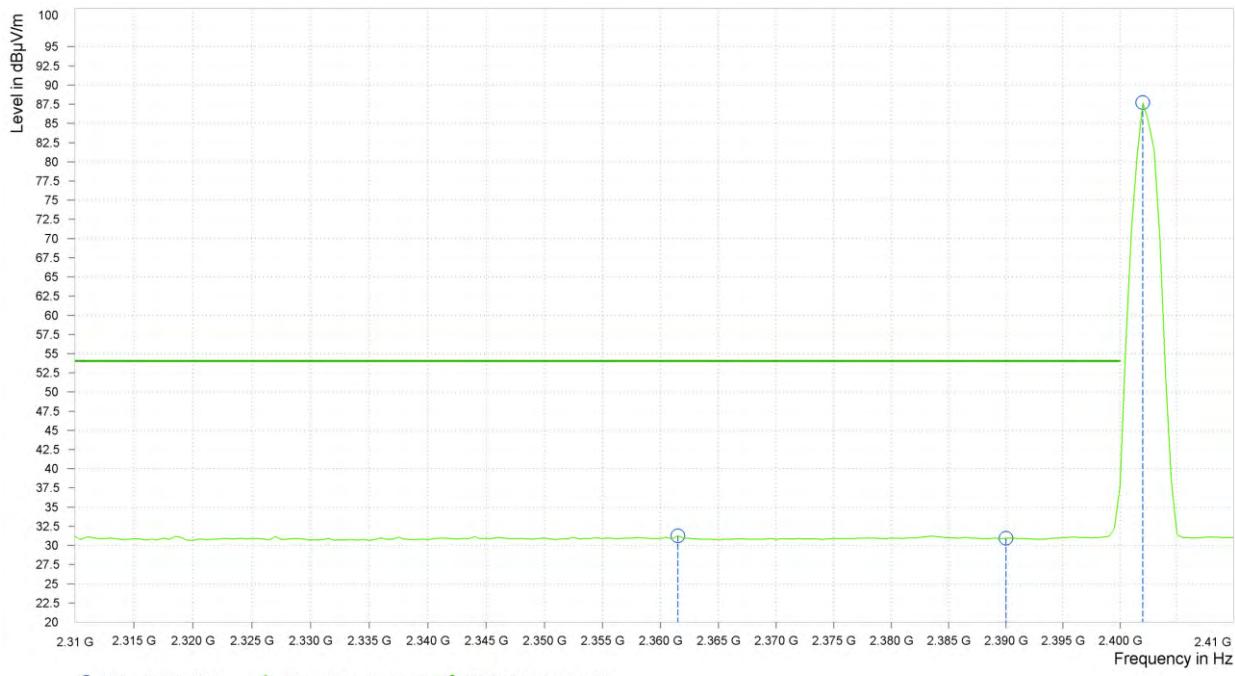




Test Report No.: PSU-QSU2312140113RF09

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Rg	Frequency [MHz]	AVG Level [dB $\mu$ V/m]	AVG Limit [dB $\mu$ V/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
5	2,361.500	31.26	54.00	22.74	-1.23	V	267	2.00
5	2,390.000	30.92	54.00	23.08	-1.05	V	360.1	1.00
5	2,402.000	87.71			-0.96	V	241.3	1.00



#### REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Limit value – Emission level.
2. 2402MHz: Fundamental frequency.



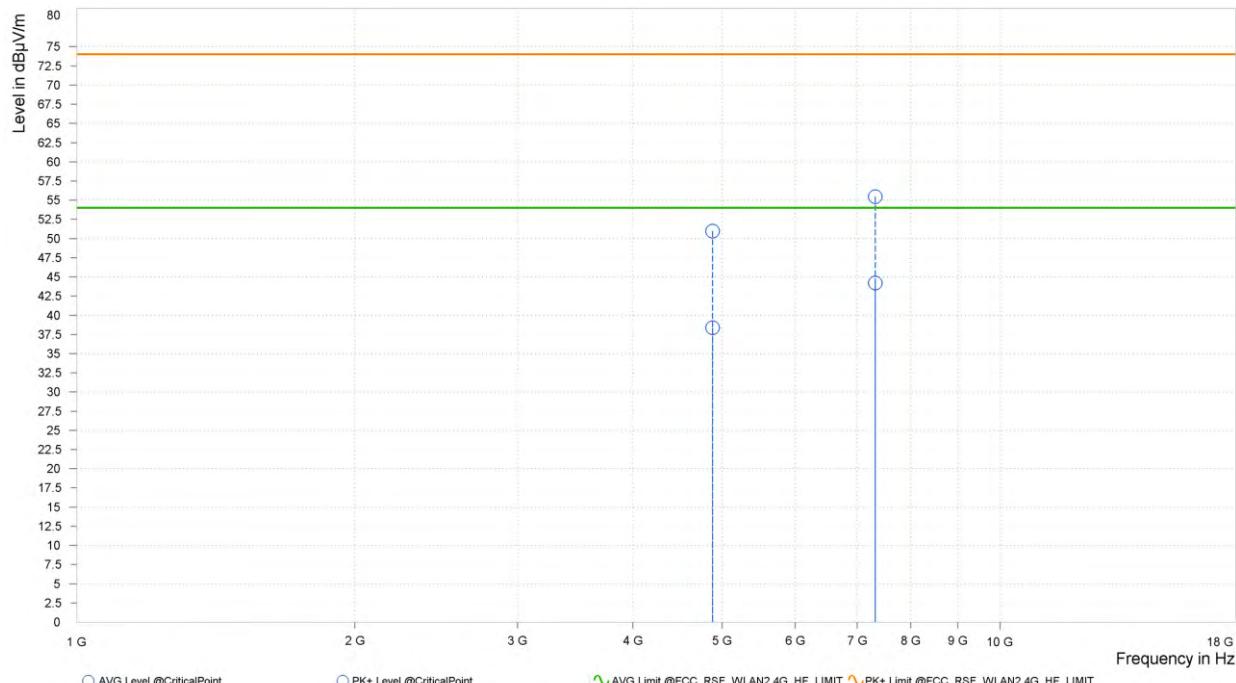
Test Report No.: PSU-QSU2312140113RF09

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<b>CHANNEL</b>	TX Channel 39	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

Rg	Frequency [MHz]	PK+ Level [dB $\mu$ V/m]	PK+ Limit [dB $\mu$ V/m]	PK+ Margin [dB]	AVG Level [dB $\mu$ V/m]	AVG Limit [dB $\mu$ V/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	4,882.000	50.97	74.00	23.03	38.36	54.00	15.64	13.54	H	24.8	2.00
2	7,323.000	55.45	74.00	18.55	44.22	54.00	9.78	18.91	H	359	2.00



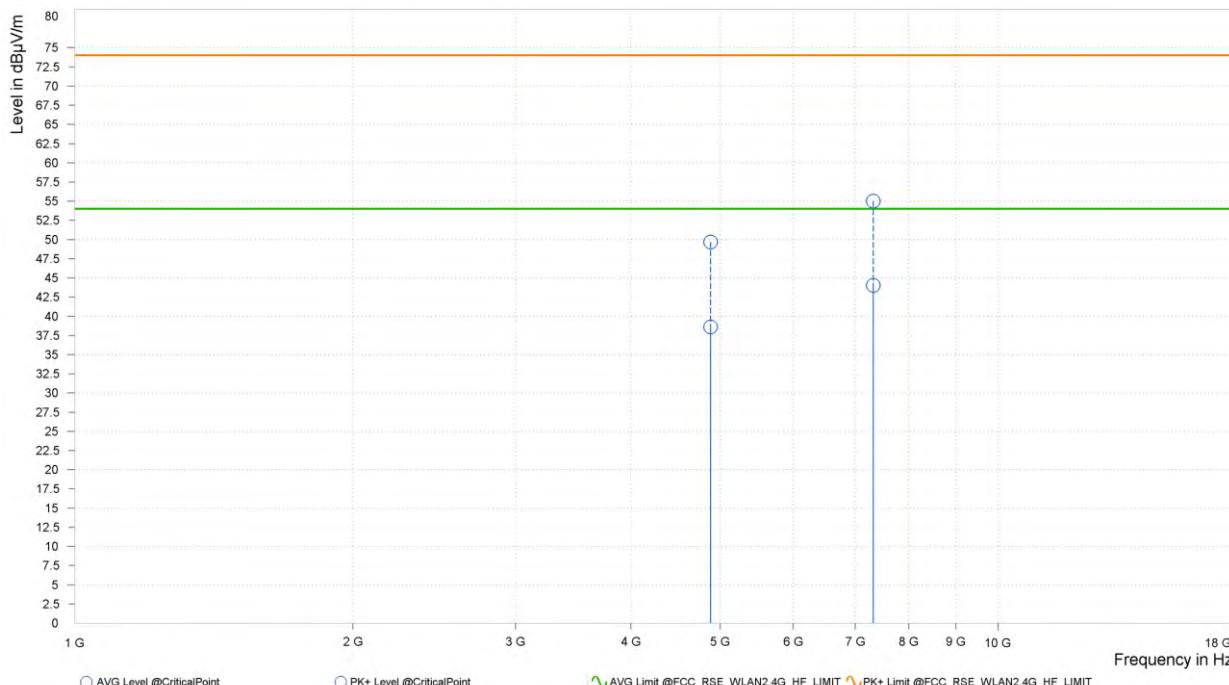


Test Report No.: PSU-QSU2312140113RF09

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VERITAS

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

Rg	Frequency [MHz]	PK+ Level [dB $\mu$ V/m]	PK+ Limit [dB $\mu$ V/m]	PK+ Margin [dB]	AVG Level [dB $\mu$ V/m]	AVG Limit [dB $\mu$ V/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	4,882.000	49.69	74.00	24.31	38.60	54.00	15.40	13.54	V	1	2.00
2	7,323.000	55.01	74.00	18.99	44.04	54.00	9.96	18.91	V	1	2.00



**REMARKS:**

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Limit value – Emission level.
2. 2402MHz: Fundamental frequency.



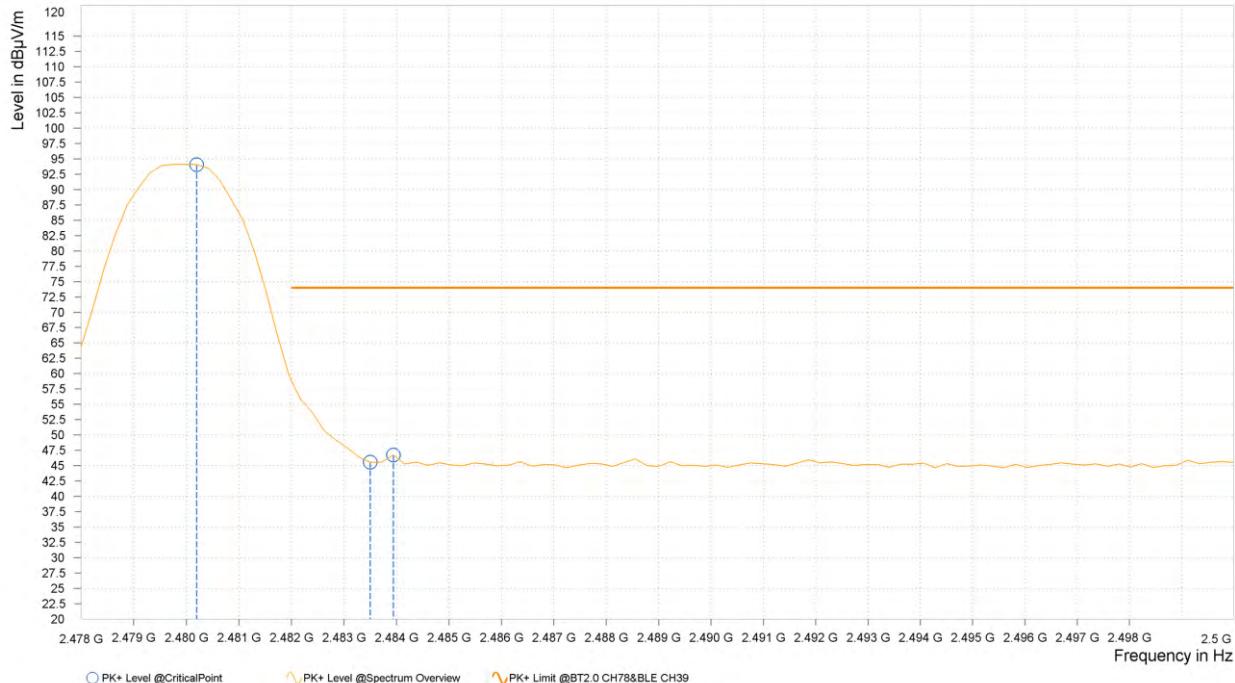
Test Report No.: PSU-QSU2312140113RF09

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VERITAS

CHANNEL	TX Channel 78	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

Rg	Frequency [MHz]	PK+ Level [dB $\mu$ V/m]	PK+ Limit [dB $\mu$ V/m]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
6	2,480.200	94.06			-0.88	H	3.5	1.00
6	2,483.500	45.57	74.00	28.43	-0.87	H	42.7	1.00
6	2,483.940	46.74	74.00	27.26	-0.87	H	291.4	1.00





Test Report No.: PSU-QSU2312140113RF09

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VERITAS

Rg	Frequency [MHz]	AVG Level [dB $\mu$ V/m]	AVG Limit [dB $\mu$ V/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
6	2,479.980	86.79			-0.88	H	109.4	2.00
6	2,483.500	31.03	54.00	22.97	-0.87	H	109.4	2.00
6	2,500.000	32.39	54.00	21.61	-0.82	H	109.4	2.00



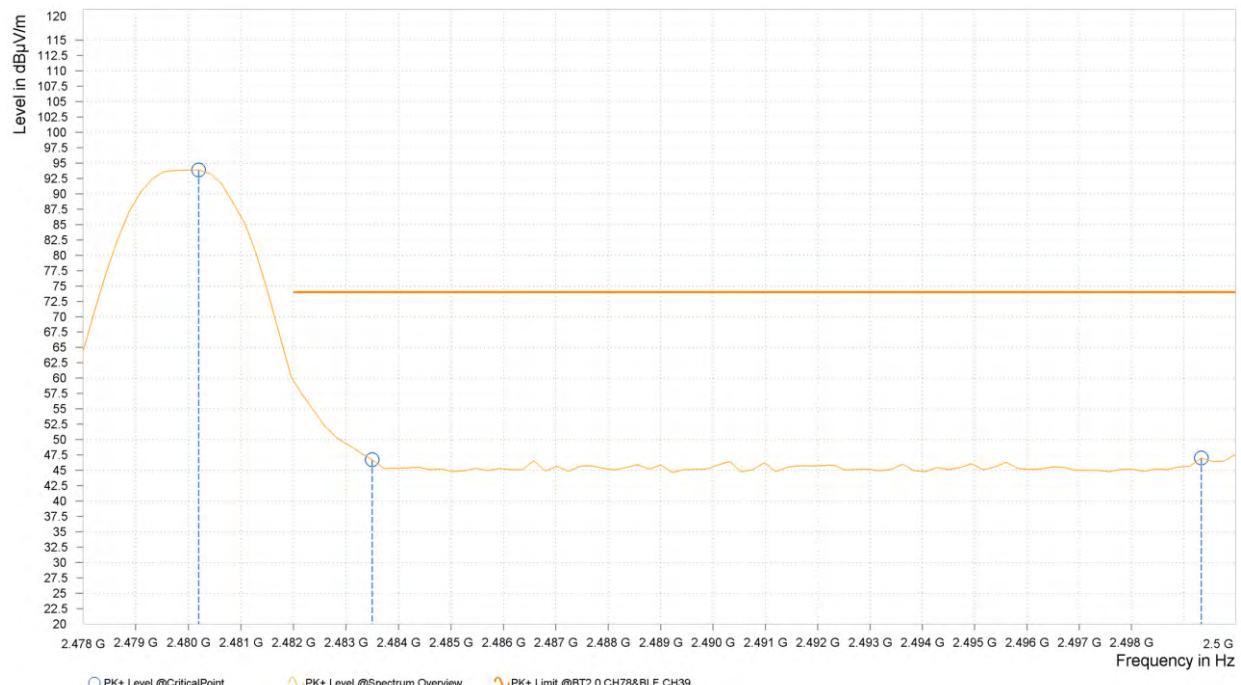


Test Report No.: PSU-QSU2312140113RF09

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VERITAS

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

Rg	Frequency [MHz]	PK+ Level [dB $\mu$ V/m]	PK+ Limit [dB $\mu$ V/m]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
6	2,480.200	93.86			-0.88	V	0	1.00
6	2,483.500	46.75	74.00	27.25	-0.87	V	360	1.00
6	2,499.340	47.03	74.00	26.97	-0.82	V	140.7	1.00





Test Report No.: PSU-QSU2312140113RF09

BUREAU  
VERITAS

Rg	Frequency [MHz]	AVG Level [dB $\mu$ V/m]	AVG Limit [dB $\mu$ V/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
6	2,479.980	85.74			-0.88	V	360	1.00
6	2,483.500	31.08	54.00	22.92	-0.87	V	0	1.00
6	2,500.000	37.09	54.00	16.91	-0.82	V	68.6	2.00



#### REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Limit value – Emission level.
2. 2480MHz: Fundamental frequency.



Test Report No.: PSU-QSU2312140113RF09

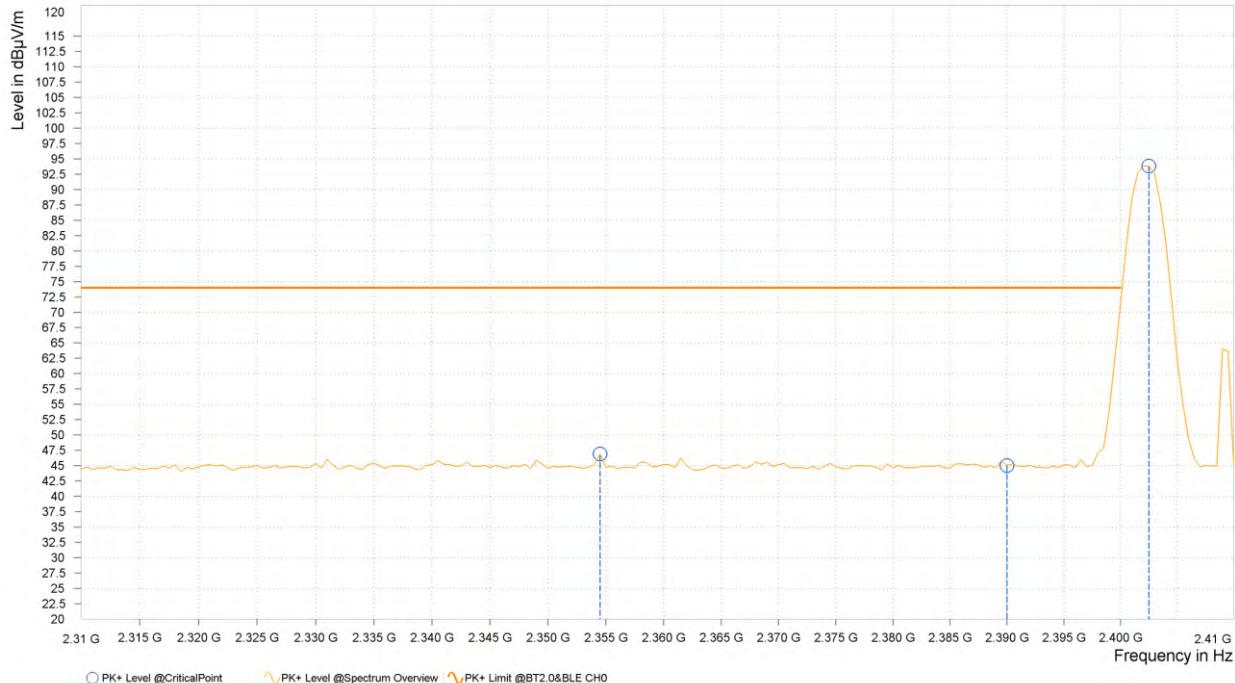
BUREAU  
VERITAS

### BT\_π/4-DQPSK

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

### ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

Rg	Frequency [MHz]	PK+ Level [dBμV/m]	PK+ Limit [dBμV/m]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
5	2,354.500	46.88	74.00	27.12	-1.25	H	267	2.00
5	2,390.000	45.04	74.00	28.96	-1.05	H	356.5	2.00
5	2,402.500	93.82			-0.95	H	218	2.00





Test Report No.: PSU-QSU2312140113RF09

BUREAU  
VERITAS

Rg	Frequency [MHz]	AVG Level [dB $\mu$ V/m]	AVG Limit [dB $\mu$ V/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
5	2,386.000	30.95	54.00	23.05	-1.08	H	0	2.00
5	2,390.000	30.86	54.00	23.14	-1.05	H	117.6	2.00
5	2,402.000	85.68			-0.96	H	67.4	2.00



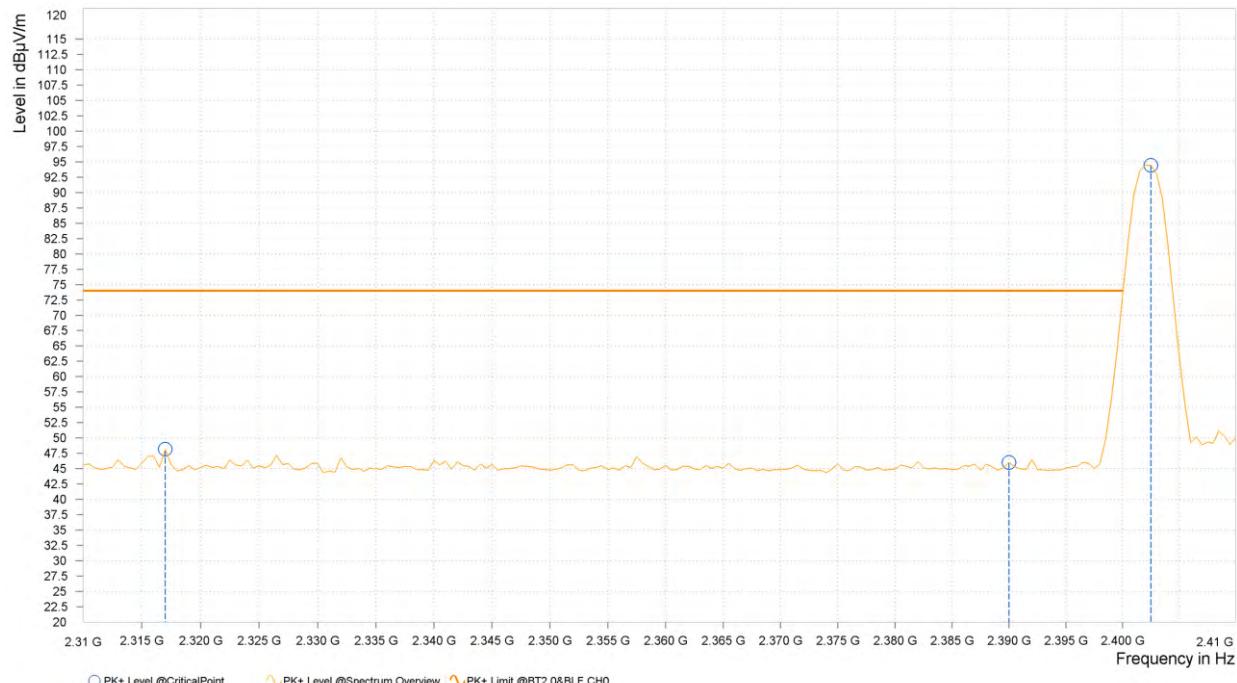


Test Report No.: PSU-QSU2312140113RF09

BUREAU  
VERITAS

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

Rg	Frequency [MHz]	PK+ Level [dB $\mu$ V/m]	PK+ Limit [dB $\mu$ V/m]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
5	2,317.000	48.18	74.00	25.82	-1.39	V	219.2	2.00
5	2,390.000	46.03	74.00	27.97	-1.05	V	41.6	1.00
5	2,402.500	94.44			-0.95	V	0	1.00





Test Report No.: PSU-QSU2312140113RF09

BUREAU  
VERITAS

Rg	Frequency [MHz]	AVG Level [dB $\mu$ V/m]	AVG Limit [dB $\mu$ V/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
5	2,312.500	31.74	54.00	22.26	-1.43	V	216.8	2.00
5	2,390.000	30.96	54.00	23.04	-1.05	V	0	1.00
5	2,402.000	84.75			-0.96	V	242.6	1.00



#### REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Limit value – Emission level.
2. 2402MHz: Fundamental frequency.



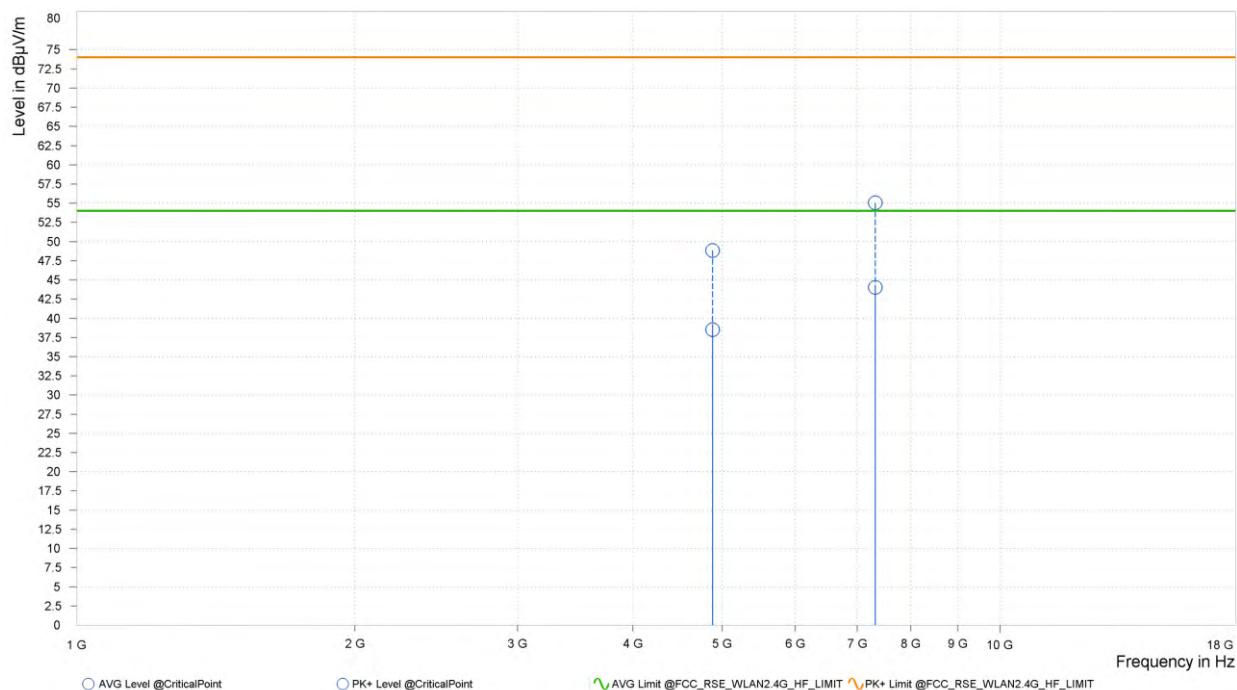
Test Report No.: PSU-QSU2312140113RF09

BUREAU  
VERITAS

CHANNEL	TX Channel 39	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

Rg	Frequency [MHz]	PK+ Level [dB $\mu$ V/m]	PK+ Limit [dB $\mu$ V/m]	PK+ Margin [dB]	AVG Level [dB $\mu$ V/m]	AVG Limit [dB $\mu$ V/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	4,882.000	48.83	74.00	25.17	38.53	54.00	15.47	13.54	H	271	2.00
2	7,323.000	55.05	74.00	18.95	44.01	54.00	9.99	18.91	H	1	2.00



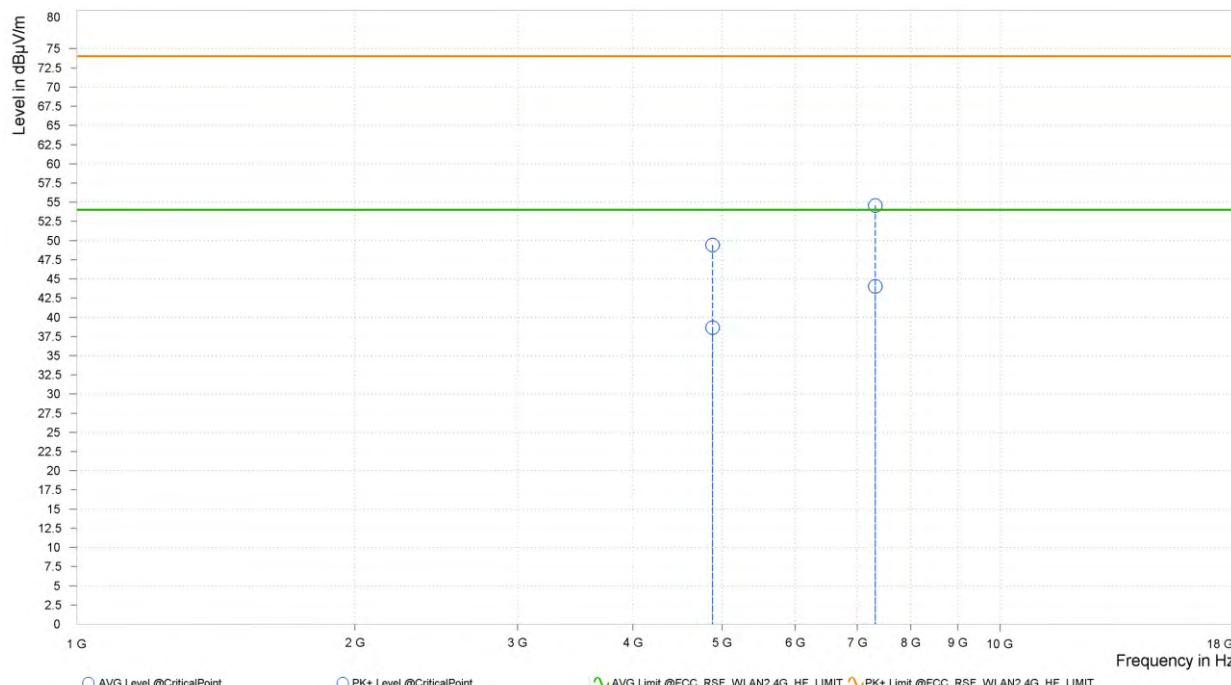


Test Report No.: PSU-QSU2312140113RF09

BUREAU  
VERITAS

### ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

Rg	Frequency [MHz]	PK+ Level [dB $\mu$ V/m]	PK+ Limit [dB $\mu$ V/m]	PK+ Margin [dB]	AVG Level [dB $\mu$ V/m]	AVG Limit [dB $\mu$ V/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	4,882.000	49.41	74.00	24.59	38.63	54.00	15.37	13.54	V	268.7	2.00
2	7,323.000	54.57	74.00	19.43	44.03	54.00	9.97	18.91	V	359.1	1.00



### REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Limit value – Emission level.
2. 2441MHz: Fundamental frequency.



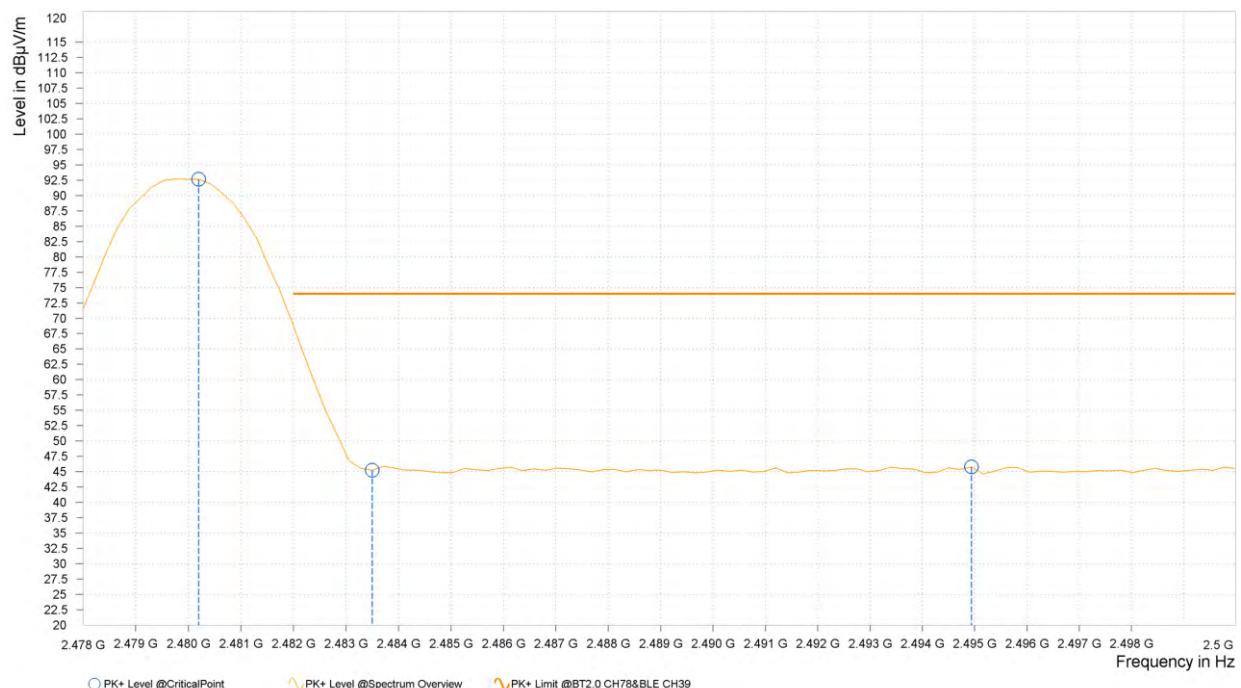
Test Report No.: PSU-QSU2312140113RF09

BUREAU  
VERITAS

CHANNEL	TX Channel 78	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

Rg	Frequency [MHz]	PK+ Level [dB $\mu$ V/m]	PK+ Limit [dB $\mu$ V/m]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
6	2,480.200	92.64			-0.88	H	4.2	1.00
6	2,483.500	45.24	74.00	28.76	-0.87	H	360	2.00
6	2,494.940	45.78	74.00	28.22	-0.84	H	-0.1	2.00





Test Report No.: PSU-QSU2312140113RF09

BUREAU  
VERITAS

Rg	Frequency [MHz]	AVG Level [dB $\mu$ V/m]	AVG Limit [dB $\mu$ V/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
6	2,479.760	83.84			-0.88	H	69.8	2.00
6	2,483.500	31.33	54.00	22.67	-0.87	H	69.8	2.00
6	2,500.000	32.24	54.00	21.76	-0.82	H	231.7	1.00



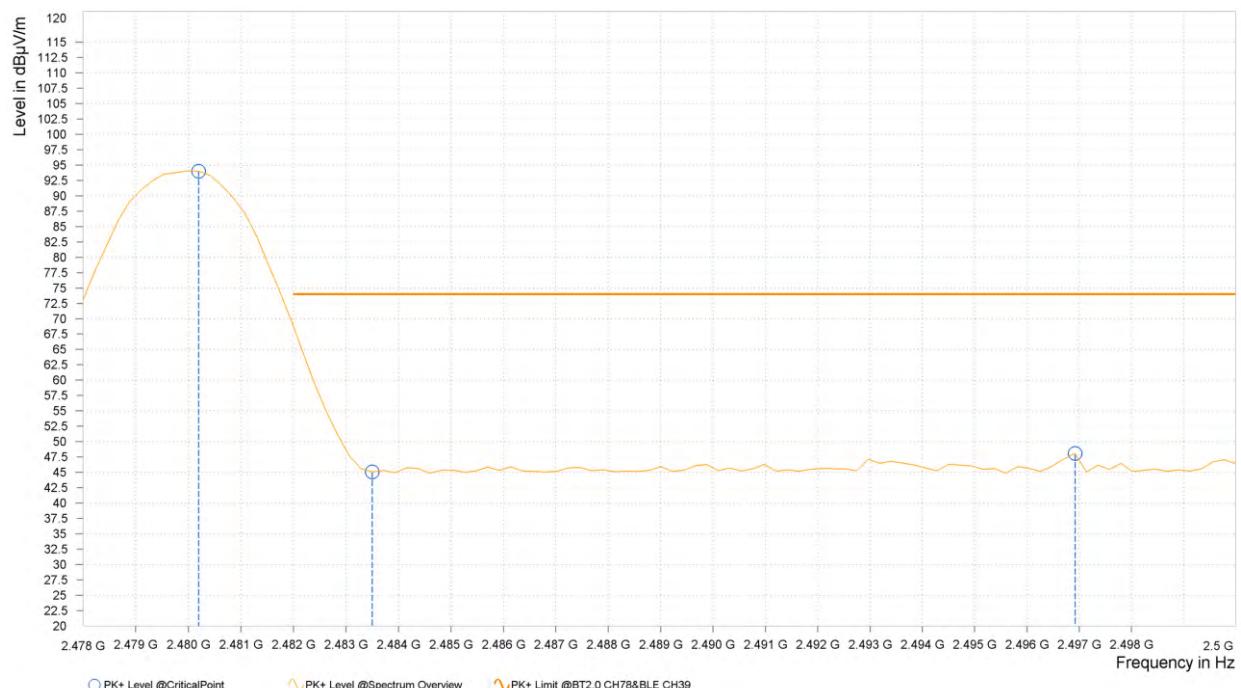


Test Report No.: PSU-QSU2312140113RF09

BUREAU  
VERITAS

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

Rg	Frequency [MHz]	PK+ Level [dB $\mu$ V/m]	PK+ Limit [dB $\mu$ V/m]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
6	2,480.200	94.00			-0.88	V	142	1.00
6	2,483.500	45.09	74.00	28.91	-0.87	V	-0.1	2.00
6	2,496.920	48.06	74.00	25.94	-0.83	V	267	2.00





Test Report No.: PSU-QSU2312140113RF09

BUREAU  
VERITAS

Rg	Frequency [MHz]	AVG Level [dB $\mu$ V/m]	AVG Limit [dB $\mu$ V/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
6	2,479.980	81.85			-0.88	V	360.1	1.00
6	2,483.500	31.28	54.00	22.72	-0.87	V	360.1	1.00
6	2,500.000	37.37	54.00	16.63	-0.82	V	68.6	2.00



## REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Limit value – Emission level.
2. 2480MHz: Fundamental frequency.



Test Report No.: PSU-QSU2312140113RF09

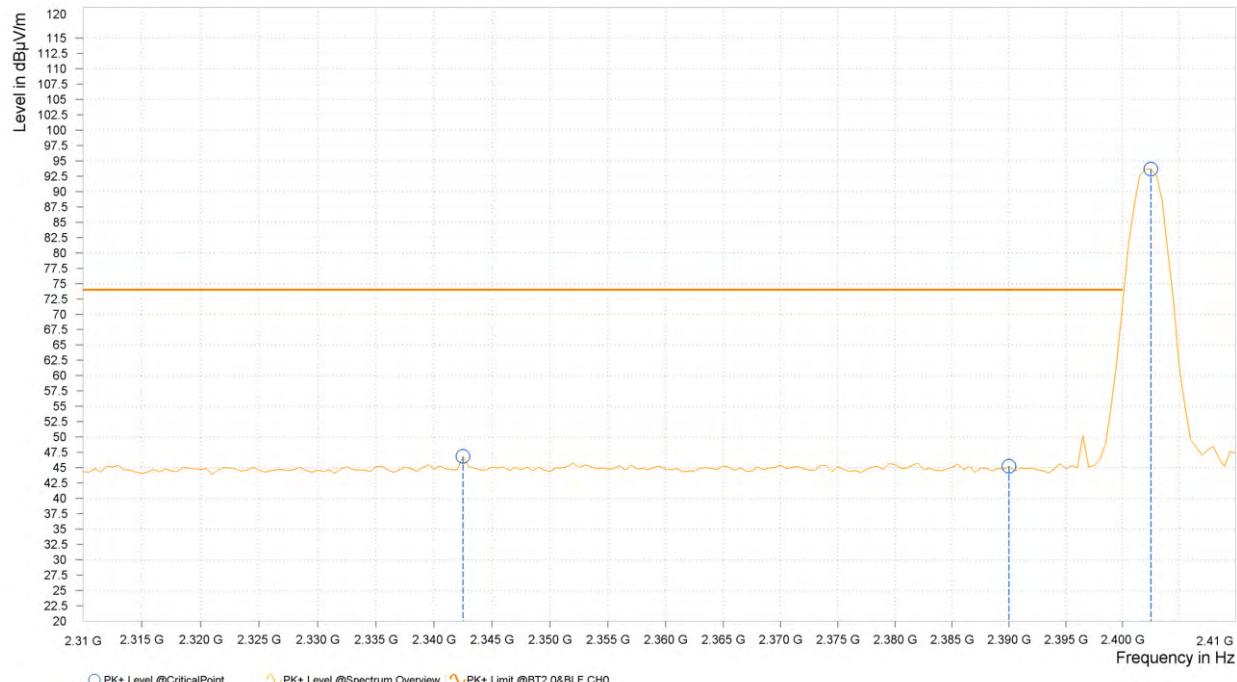
BUREAU  
VERITAS

## BT\_8DPSK

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

Rg	Frequency [MHz]	PK+ Level [dB $\mu$ V/m]	PK+ Limit [dB $\mu$ V/m]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
5	2,342.500	46.83	74.00	27.17	-1.28	H	267	2.00
5	2,390.000	45.22	74.00	28.78	-1.05	H	360	1.00
5	2,402.500	93.66			-0.95	H	218	2.00





Test Report No.: PSU-QSU2312140113RF09

BUREAU  
VERITAS

Rg	Frequency [MHz]	AVG Level [dB $\mu$ V/m]	AVG Limit [dB $\mu$ V/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
5	2,383.000	30.88	54.00	23.12	-1.10	H	145.6	1.00
5	2,390.000	30.78	54.00	23.22	-1.05	H	355.8	2.00
5	2,402.000	82.90			-0.96	H	10.6	2.00



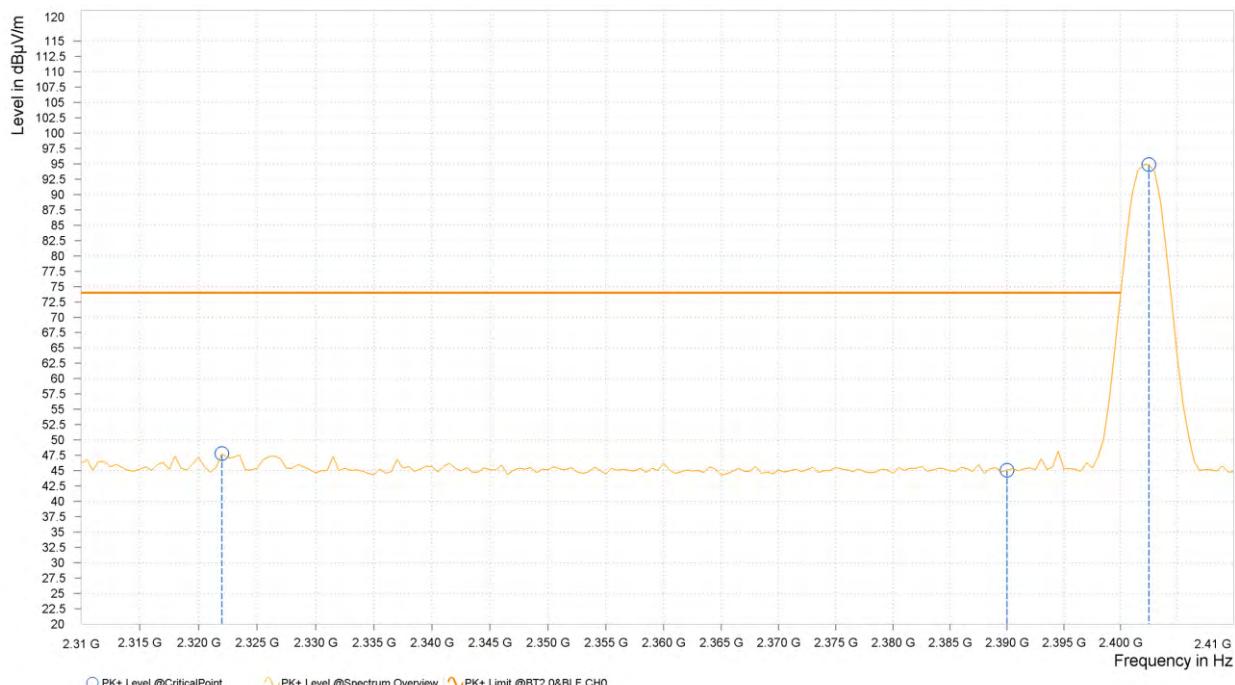


Test Report No.: PSU-QSU2312140113RF09

BUREAU  
VERITAS

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

Rg	Frequency [MHz]	PK+ Level [dB $\mu$ V/m]	PK+ Limit [dB $\mu$ V/m]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
5	2,322.000	47.78	74.00	26.22	-1.36	V	218	2.00
5	2,390.000	45.07	74.00	28.93	-1.05	V	316.2	2.00
5	2,402.500	94.87			-0.95	V	360.1	1.00





Test Report No.: PSU-QSU2312140113RF09

BUREAU  
VERITAS

Rg	Frequency [MHz]	AVG Level [dB $\mu$ V/m]	AVG Limit [dB $\mu$ V/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
5	2,383.500	31.23	54.00	22.77	-1.10	V	360.1	1.00
5	2,390.000	30.90	54.00	23.10	-1.05	V	0	1.00
5	2,402.500	84.28			-0.95	V	0	1.00



#### REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Limit value – Emission level.
2. 2402MHz: Fundamental frequency.



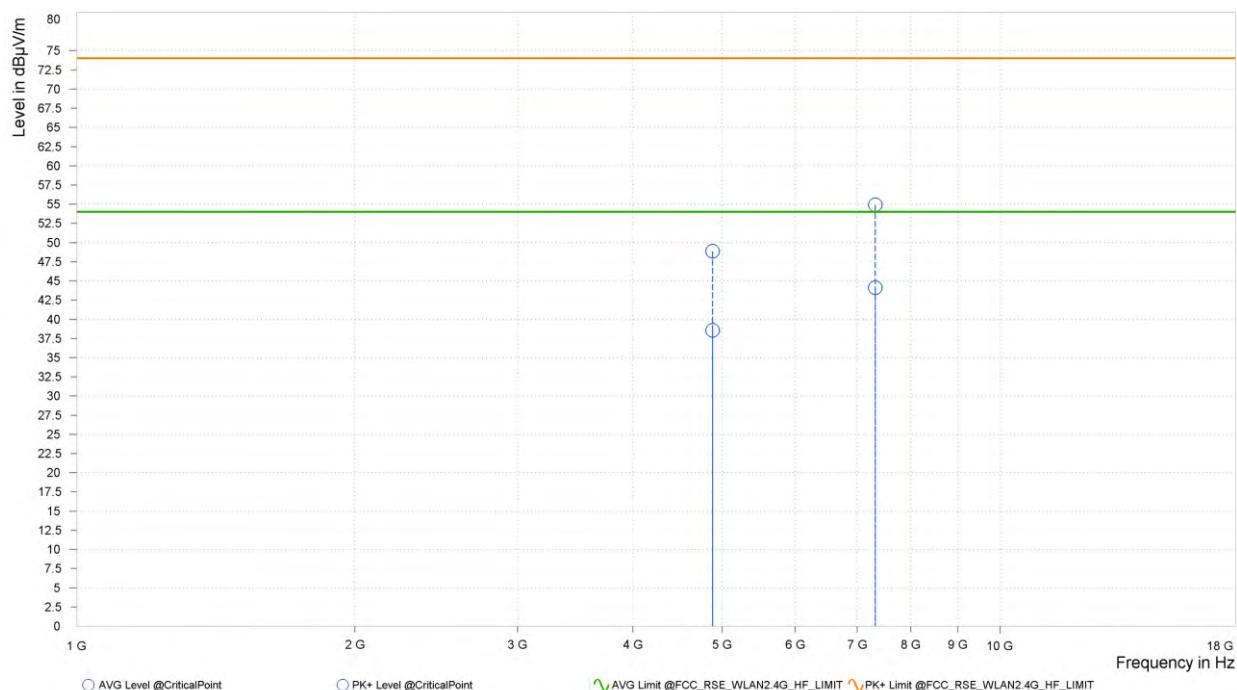
Test Report No.: PSU-QSU2312140113RF09

BUREAU  
VERITAS

<b>CHANNEL</b>	TX Channel 39	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 25GHz		Average (AV)

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

Rg	Frequency [MHz]	PK+ Level [dB $\mu$ V/m]	PK+ Limit [dB $\mu$ V/m]	PK+ Margin [dB]	AVG Level [dB $\mu$ V/m]	AVG Limit [dB $\mu$ V/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	4,882.000	48.85	74.00	25.15	38.57	54.00	15.43	13.54	H	359.1	1.00
2	7,323.000	54.93	74.00	19.07	44.10	54.00	9.90	18.91	H	1	2.00



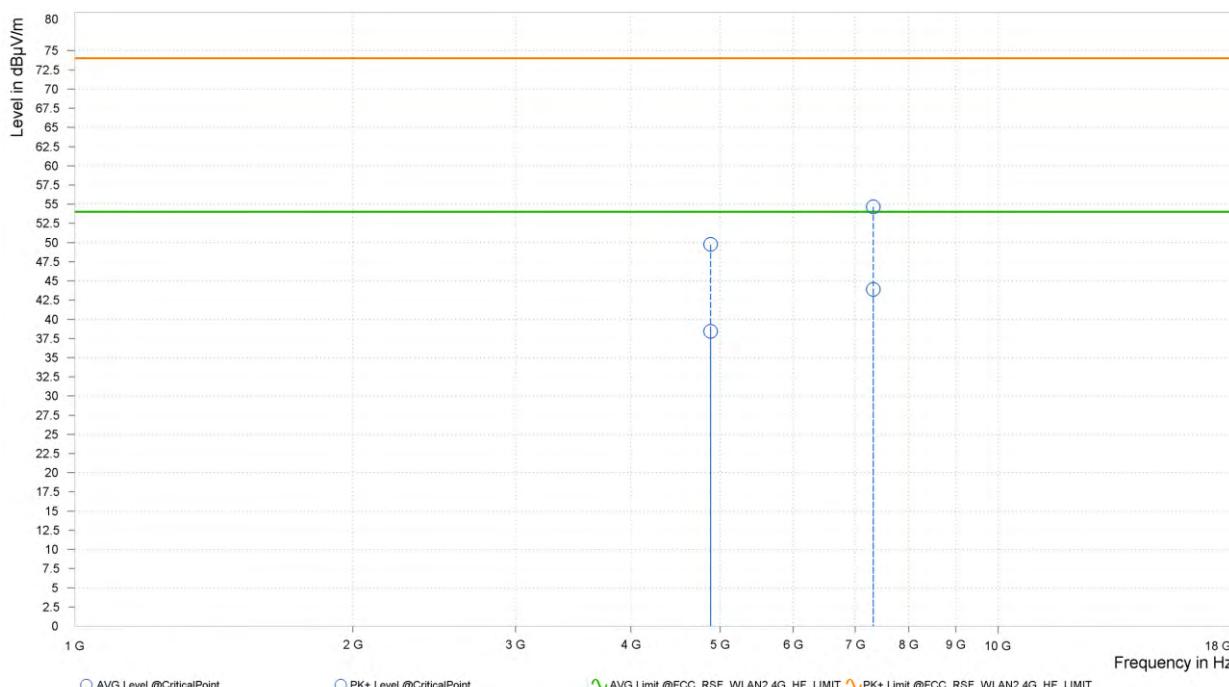


Test Report No.: PSU-QSU2312140113RF09

BUREAU  
VERITAS

### ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

Rg	Frequency [MHz]	PK+ Level [dB $\mu$ V/m]	PK+ Limit [dB $\mu$ V/m]	PK+ Margin [dB]	AVG Level [dB $\mu$ V/m]	AVG Limit [dB $\mu$ V/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	4,882.000	49.75	74.00	24.25	38.43	54.00	15.57	13.54	V	272.3	2.00
2	7,323.000	54.66	74.00	19.34	43.91	54.00	10.09	18.91	V	272.3	2.00



#### REMARKS:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Limit value - Emission level.
2. 2441MHz: Fundamental frequency.



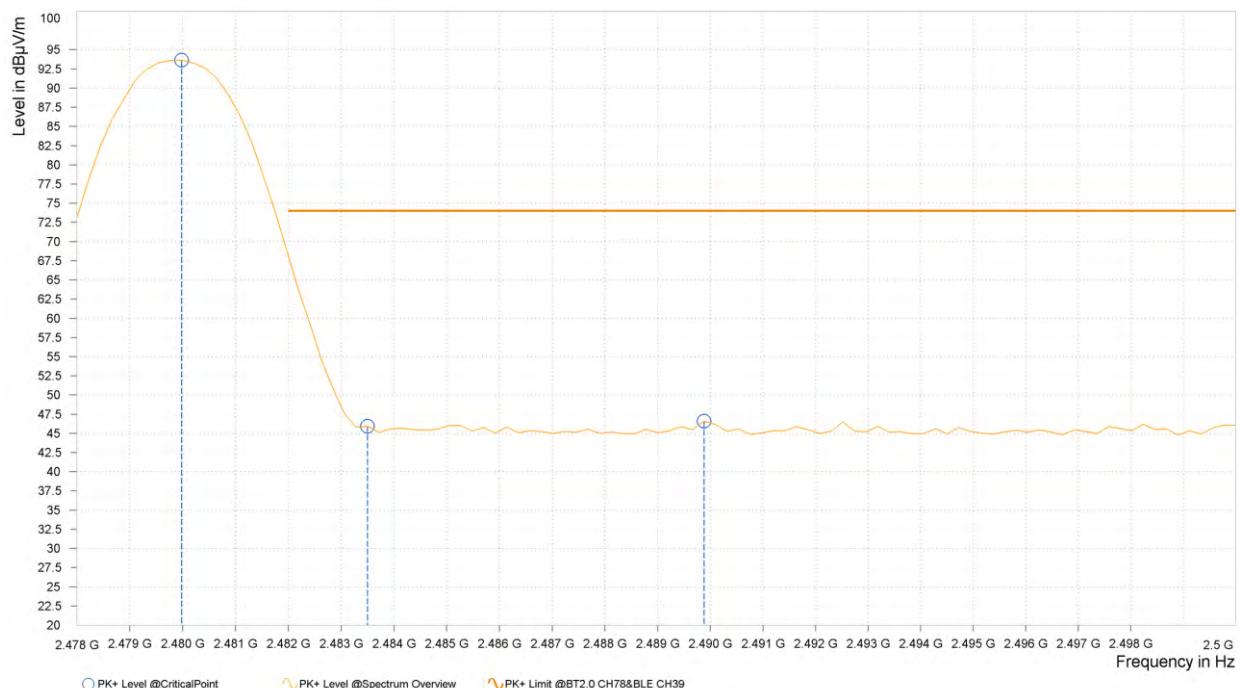
Test Report No.: PSU-QSU2312140113RF09

BUREAU  
VERITAS

CHANNEL	TX Channel 78	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

Rg	Frequency [MHz]	PK+ Level [dB $\mu$ V/m]	PK+ Limit [dB $\mu$ V/m]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
6	2,479.980	93.63			-0.88	H	169	2.00
6	2,483.500	45.93	74.00	28.07	-0.87	H	93	1.00
6	2,489.880	46.59	74.00	27.41	-0.85	H	317.2	2.00

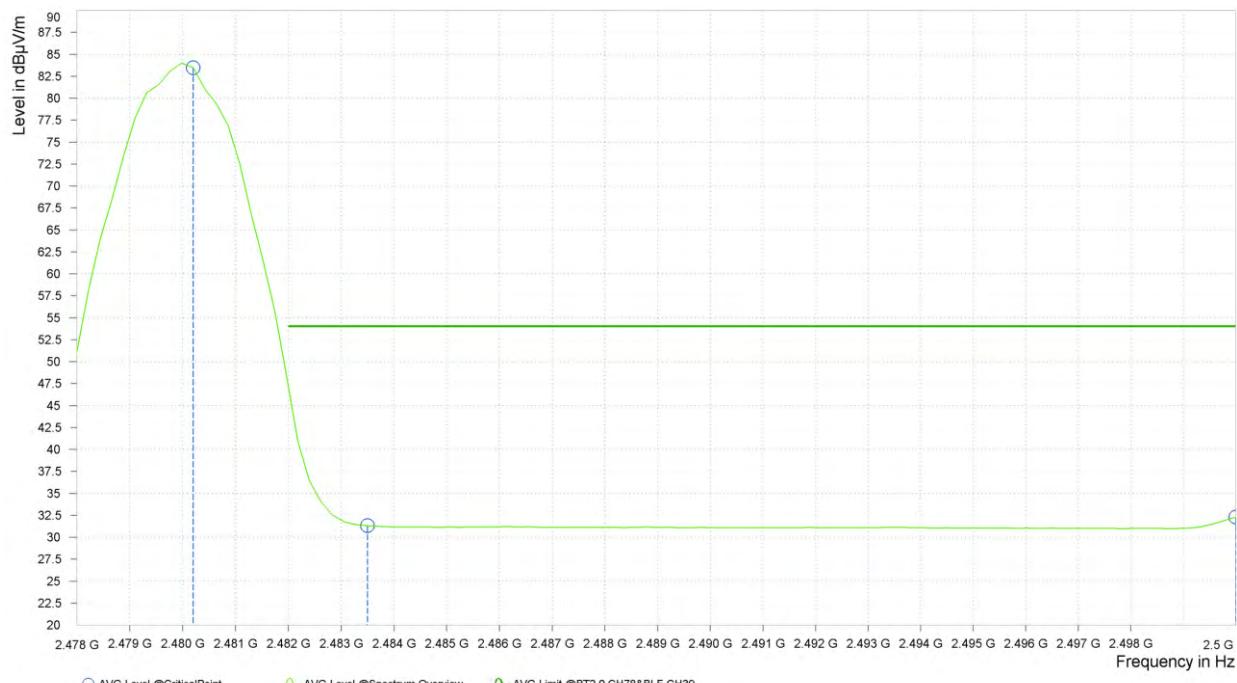




Test Report No.: PSU-QSU2312140113RF09

BUREAU  
VERITAS

Rg	Frequency [MHz]	AVG Level [dB $\mu$ V/m]	AVG Limit [dB $\mu$ V/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
6	2,480.200	83.47			-0.88	H	68.6	2.00
6	2,483.500	31.30	54.00	22.70	-0.87	H	68.6	2.00
6	2,500.000	32.28	54.00	21.72	-0.82	H	360	2.00



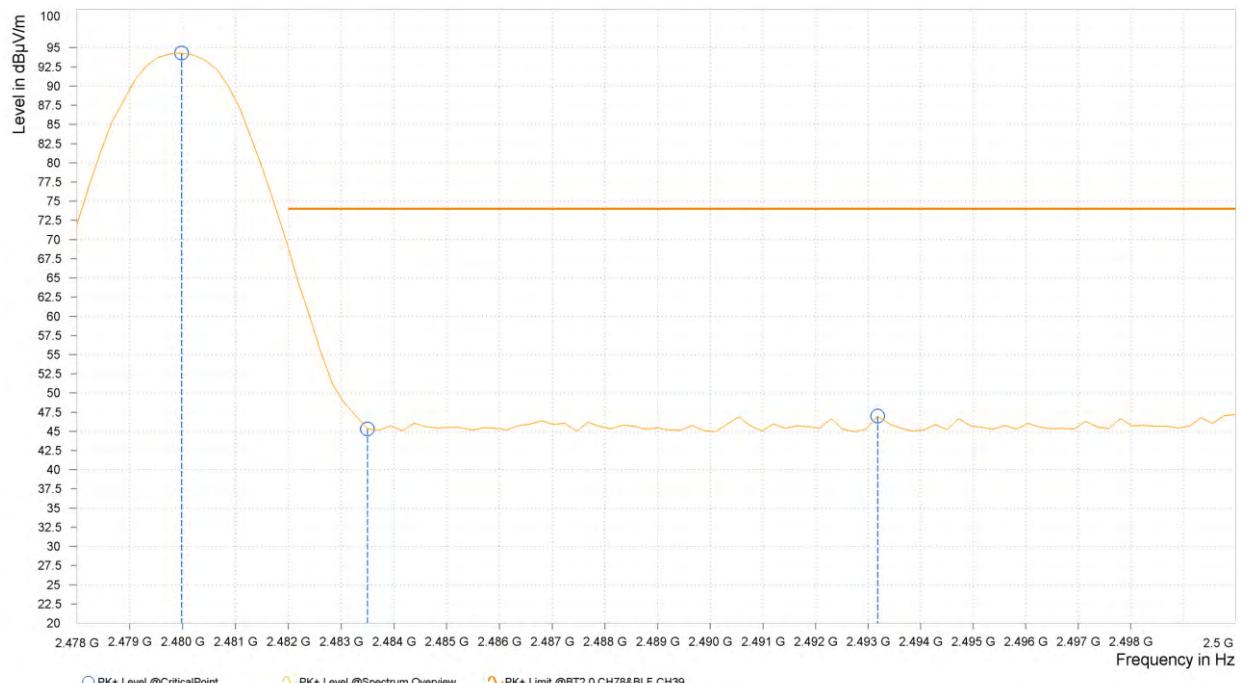


Test Report No.: PSU-QSU2312140113RF09

BUREAU  
VERITAS

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

Rg	Frequency [MHz]	PK+ Level [dB $\mu$ V/m]	PK+ Limit [dB $\mu$ V/m]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
6	2,479.980	94.30			-0.88	V	259.1	1.00
6	2,483.500	45.31	74.00	28.69	-0.87	V	360	1.00
6	2,493.180	46.98	74.00	27.02	-0.84	V	203	1.00





Test Report No.: PSU-QSU2312140113RF09

BUREAU  
VERITAS

Rg	Frequency [MHz]	AVG Level [dB $\mu$ V/m]	AVG Limit [dB $\mu$ V/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
6	2,479.980	81.78			-0.88	V	50	1.00
6	2,483.500	31.43	54.00	22.57	-0.87	V	360.1	1.00
6	2,500.000	37.67	54.00	16.33	-0.82	V	79.4	2.00



## REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Limit value – Emission level.
2. 2480MHz: Fundamental frequency.



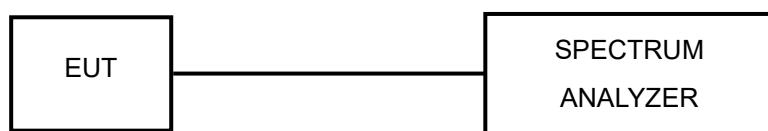
Test Report No.: PSU-QSU2312140113RF09

### 3.3 NUMBER OF HOPPING FREQUENCY USED

#### 3.3.1 LIMIT OF HOPPING FREQUENCY USED

At least 15 channels frequencies, and should be equally spaced.

#### 3.3.2 TEST SETUP





Test Report No.: PSU-QSU2312140113RF09

### 3.3.3 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	R&S	ESW 44	101973	Feb.25,22	Feb.24,24
EMI Test Receiver	R&S	ESW 44	101973	Feb.24,24	Feb.23,26
Open Switch and Control Unit	R&S	OSP-B157W8	100836	N/A	N/A
Vector Signal Generator	R&S	SMBV100B	102176	Feb.16,22	Feb.15,24
Vector Signal Generator	R&S	SMBV100B	102176	Feb.15,24	Feb.14,26
Signal Generator	R&S	SMB100A03	182185	Feb.16,22	Feb.15,24
Signal Generator	R&S	SMB100A03	182185	Feb.15,24	Feb.14,26
WIDEBANDRADIO COMMUNICATION TESTER	R&S	CMW500	169399	Jun.27,22	Jun.26,24
WIDEBANDRADIO COMMUNICATION TESTER	R&S	CMW500	169399	Jun.26,24	Jun.25,26
Hygrothermograph	DELI	20210528	SZ015	Sep.06,22	Sep.05,24
PC	LENOVO	E14	HRSW0024	N/A	N/A
CABLE	R&S	J12J103539-00 -1	SEP-03-20-0 69	Apr.28,23	Apr.27,24
CABLE	R&S	J12J103539-00 -1	SEP-03-20-0 69	Apr.27,24	Apr.26,25
CABLE	R&S	J12J103539-00 -1	SEP-03-20-0 70	Apr.28,23	Apr.27,24
CABLE	R&S	J12J103539-00 -1	SEP-03-20-0 70	Apr.27,24	Apr.26,25
Test Software	EMC32	EMC32	N/A	N/A	N/A
Temperature Chamber	votsch	VT4002	5856607810 0050	May.31,22	May.30,24
Temperature Chamber	votsch	VT4002	5856607810 0050	May.30,24	May.29,26
Power Meter	R&S	NRX	102380	Feb.15,22	Feb.14,24
Power Meter	R&S	NRX	102380	Feb.14,24	Feb.13,25
Power Meter probe	R&S	NRP6A	102942	Feb.15,22	Feb.14,24
Power Meter probe	R&S	NRP6A	102942	Feb.14,24	Feb.13,25

**NOTE:**

1. The calibration interval of the above test instruments is 12 /24 months and the calibrations are traceable to CEPREI/CHINA, GRT/CHINA and NIM/CHINA.
2. The test was performed in RF Oven room.



Test Report No.: PSU-QSU2312140113RF09

### 3.3.4 TEST PROCEDURES

- a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- c. Set the SA on MaxHold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
- d. Set the SA on View mode and then plot the result on SA screen.
- e. Repeat above procedures until all frequencies measured were completed.

### 3.3.5 DEVIATION FROM TEST STANDARD

No deviation.

### 3.3.6 TEST RESULTS

There are 79 hopping frequencies in the hopping mode. Please refer to next two pages for the test result. On the plots, it shows that the hopping frequencies are equally spaced.

Please Refer to Appendix A Of this test report.



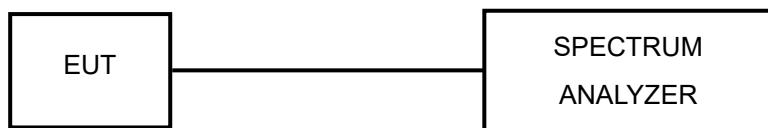
Test Report No.: PSU-QSU2312140113RF09

### 3.4 DWELL TIME ON EACH CHANNEL

#### 3.4.1 LIMIT OF DWELL TIME USED

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

#### 3.4.2 TEST SETUP



#### 3.4.3 TEST INSTRUMENTS

Refer to section 3.3.3 to get information of above instrument.

#### 3.4.4 TEST PROCEDURES

- a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- c. Adjust the center frequency of SA on any frequency to be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
- d. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
- e. Repeat above procedures until all different time-slot modes have been completed.



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### 3.4.5 DEVIATION FROM TEST STANDARD

No deviation.

### 3.4.6 TEST RESULTS

Please Refer to Appendix A Of this test report

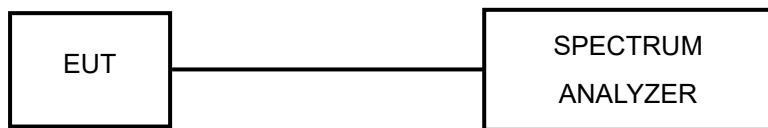


### 3.5 CHANNEL BANDWIDTH

#### 3.5.1 LIMITS OF CHANNEL BANDWIDTH

For frequency hopping system operating in the 2400-2483.5MHz, If the 20dB bandwidth of hopping channel is greater than 25kHz, two-thirds 20dB bandwidth of hopping channel shall be a minimum limit for the hopping channel separation.

#### 3.5.2 TEST SETUP



#### 3.5.3 TEST INSTRUMENTS

Refer to section 3.3.3 to get information of above instrument.

#### 3.5.4 TEST PROCEDURE

- a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- c. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
- d. Repeat above procedures until all frequencies measured were complete.

#### 3.5.5 DEVIATION FROM TEST STANDARD

No deviation.



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### 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 Appendix A Of this test report.

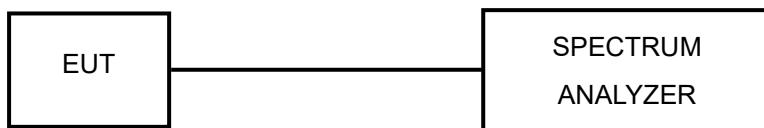


### 3.6 HOPPING CHANNEL SEPARATION

#### 3.6.1 LIMIT OF HOPPING CHANNEL SEPARATION

At least 25kHz or two-third of 20dB hopping channel bandwidth (whichever is greater).

#### 3.6.2 TEST SETUP



#### 3.6.3 TEST INSTRUMENTS

Refer to section 3.3.3 to get information of above instrument.

#### 3.6.4 TEST PROCEDURES

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
3. By using the MaxHold function record the separation of two adjacent channels.
4. Measure the frequency difference of these two adjacent channels by SA MARK function. And then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

#### 3.6.5 DEVIATION FROM TEST STANDARD

No deviation.



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### 3.6.6 TEST RESULTS

Please Refer to Appendix A Of this test report.

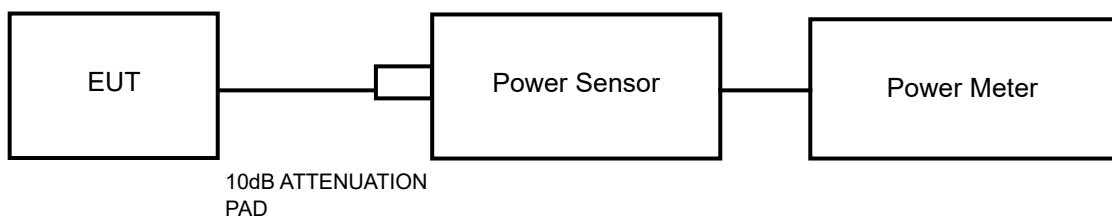


### 3.7 MAXIMUM OUTPUT POWER

#### 3.7.1 LIMITS OF MAXIMUM OUTPUT POWER MEASUREMENT

The Maximum Output Power Measurement is 125mW.

#### 3.7.2 TEST SETUP



#### 3.7.3 TEST INSTRUMENTS

Refer to section 3.3.3 to get information of above instrument.

#### 3.7.4 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.



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### 3.7.5 DEVIATION FROM TEST STANDARD

No deviation.

### 3.7.6 EUT OPERATING CONDITION

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



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## 3.7.7 TEST RESULTS

### 3.7.7.1 MAXIMUM PEAK OUTPUT POWER

Please Refer to Appendix A Of this test report.



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### 3.7.7.2 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 Appendix A Of this test report.



### 3.8 OUT OF BAND MEASUREMENT

#### 3.8.1 LIMITS OF OUT OF BAND MEASUREMENT

Below –20dB of the highest emission level of operating band (in 100KHz RBW).

#### 3.8.2 TEST INSTRUMENTS

Refer to section 3.3.3 to get information of above instrument.

#### 3.8.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low loss cable. Spectrum Analyzer was set RBW to 100 kHz and VBW to 300 kHz with suitable frequency span including 100 MHz bandwidth from band edge. Detector = PEAK and Trace mode = Max Hold. The band edges was measured and recorded.

#### 3.8.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 3.8.5 EUT OPERATING CONDITION

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

#### 3.8.6 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 Appendix A Of this test report.



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## 4 PHOTOGRAPHS OF THE TEST CONFIGURATION

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



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## 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.

--END--