

FCC TEST REPORT

(Part 15, Subpart C)

Applicant:	HMD Global Oy
Address:	Bertel Jungin aukio 9, 02600 Espoo, Finland

Manufacturer or Supplier:	HMD Global Oy
Address:	Bertel Jungin aukio 9, 02600 Espoo, Finland
Product:	Multi-band GSM/WCDMA/LTE phone with Bluetooth&WLAN
Brand Name:	NOKIA
Model Name:	TA-1401
FCC ID:	2AJOTTA-1401
Date of tests:	Nov. 25, 2021 ~ Dec. 17, 2021

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

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

☒ **ANSI C63.10-2013**

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

Prepared by Simon Wang Engineer / Mobile Department	Approved by Luke Lu Manager / Mobile Department
 Date: Dec. 17, 2021	 Date: Dec. 17, 2021

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
W7L-P21100018-4RF01	Original release	Dec. 17, 2021



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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
15.207	AC Power Conducted Emission	Compliance
15.247(a)(1)(iii)	Number of Hopping Frequency Used	Compliance
15.247(a)(1)(iii)	Dwell Time on Each Channel	Compliance
15.247(a)(1)	1. Hopping Channel Separation 2. Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System	Compliance
15.247(b)	Maximum Peak Output Power	Compliance
15.247(d)&15.209	Transmitter Radiated Emissions	Compliance
15.247(d)	Out of band Measurement	Compliance
15.203	Antenna Requirement	Compliance

Note: Except the data of RSE, other data please refer to APPENDIX.

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.

Test Lab Information Reference:

BV 7Layers Communications Technology (Shenzhen) Co. Ltd

Lab Address:

No.B102, Dazu Chuangxin Mansion, North of Beihuan Avenue, North Area, Hi-Tech Industrial Park, Nanshan District, Shenzhen, Guangdong, China

Accredited Test Lab Cert 3939.01

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 (30MHz~1GMHz)	±4.98dB
Radiated emissions (1GMHz ~6GMHz)	±4.70dB
Radiated emissions (6GMHz ~18GMHz)	±4.60dB
Radiated emissions (18GMHz ~40GMHz)	±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.

2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Multi-band GSM/WCDMA/LTE phone with Bluetooth&WLAN
BRAND NAME	NOKIA
MODEL NAME	TA-1401
NOMINAL VOLTAGE	5.0Vdc(adapter or host equipment) 3.85Vdc (Li-ion, battery)
MODULATION TECHNOLOGY	FHSS
MODULATION TYPE	GFSK, 8DPSK, $\pi/4$ DQPSK
OPERATING FREQUENCY	2402MHz~2480MHz
NUMBER OF CHANNEL	79
MAX. OUTPUT POWER	9.23mW (Max. Measured)
ANTENNA TYPE	Fixed Internal Antenna with 1.19dBi gain
HW VERSION	19655-1-11M12
SW VERSION	00WW_0_010
I/O PORTS	Refer to user's manual
CABLE SUPPLIED	USB1 cable: unshielded without ferrite, 1.0meter USB2 cable: unshielded without ferrite, 1.0meter USB3 cable: unshielded without ferrite, 1.0meter Earphone1: non-shielded cable, with w/o ferrite core, 1.2 meter Earphone2: non-shielded cable, with w/o ferrite core, 1.2 meter

NOTE:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

List of Accessory:

ACCESSORIES	BRAND	MANUFACTURER	MODEL	SPECIFICATION
Battery	Nokia	Hunan Gaoyuan Battery Co., Ltd.	WT341	Capacity : 3.85 Vdc, 4900mAh
AC Adapter 1	Nokia	ShenZhenBaiJunDa ElectronicCO.,LTD.	AD-010U	I/P: 100-240Vac, 0.35A, O/P: 5.0Vdc, 2.0A
AC Adapter 2	Nokia	SHENZHEN TIANYIN ELECTRONICS CO., LTD.	CH-21U	I/P: 100-240Vac, 0.3A, O/P: 5.0Vdc, 2.0A
AC Adapter 3	Nokia	YuTong Electronics(HuiZhou) Co.,Ltd	PA-US5V2A-036	I/P: 100-240Vac, 0.5A, O/P: 5.0Vdc, 2.0A
AC Adapter 4	Nokia	Dongguan Aohai Technology Co., Ltd.	A829US	I/P: 100 - 240Vac, 0.5A, O/P:5.0 Vdc,3A/9.0 Vdc, 2.2 3A/12.0 Vdc,1.67A
Earphone 1	Nokia	NEW LEADER INDUSTRY CO.,LTD	HS-34	Signal Line, 1.2meter
Earphone 2	Nokia	Guangdong Wivtak Technology Co., Ltd.	HS-34	Signal Line, 1.2meter
USB Cable 1	Nokia	HUIZHOU WASHIN ELECTRONICS CO.,LTD	CB-36A	Signal Line, 1.0meter
USB Cable 2	Nokia	Shenzhen BRL Technology Co.,Ltd.	CB-36A	Signal Line, 1.0meter
USB Cable 3	Nokia	Saibao(Jiangi) Communication Industial Co.,Ltd	CB-12A	Signal Line, 1.0meter

NOTE:

1. In the finger plate, dial the code for entering Engineer mode: *##83781#*#*
2. EngineerMode->CONNECTIVITY->BT->Tx

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		

2.2.1 CONFIGURATION OF SYSTEM UNDER TEST

Please see section 5 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.
- ☒ 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	8DPSK	3DH5

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.
- ☒ 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	DH5
-	0 to 78	0, 39, 78	FHSS	8DPSK	3DH5



**BUREAU
VERITAS**

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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.
- ☒ 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	8DPSK	3DH5

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.
- ☒ 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 5V By Adapter	Jace Hu
RE≥1G	23deg. C, 70%RH	DC5V By Adapter	Jace Hu
PLC	25deg. C, 52%RH	DC5V By Adapter	James Fu
APCM	25deg. C, 60%RH	DC 3.85V By Battery	James Fu



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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 C63.10-2013

- 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	Desktop	Lenovo	M73 SFF	PC04GRQV	N/A
2	Desktop	Lenovo	M73 SFF	PC06CS27	N/A
3	Laptop	Lenovo	Thnikpad L440	R90FTFKN	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	AC Line: Unshielded, Detachable 1.5m
2	AC Line: Unshielded, Detachable 1.5m
3	AC Line: Unshielded, Detachable 1.5m

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 μ 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	101900	Mar. 03,21	Mar. 02,22
EMC32 test software	Rohde&Schwarz	EMC32	NA	NA	NA
LISN network	Rohde&Schwarz	ENV216	101922	Feb. 25,21	Feb. 24,22

- NOTE:** 1. The test was performed in CE shielded room.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

3.1.3 TEST PROCEDURES

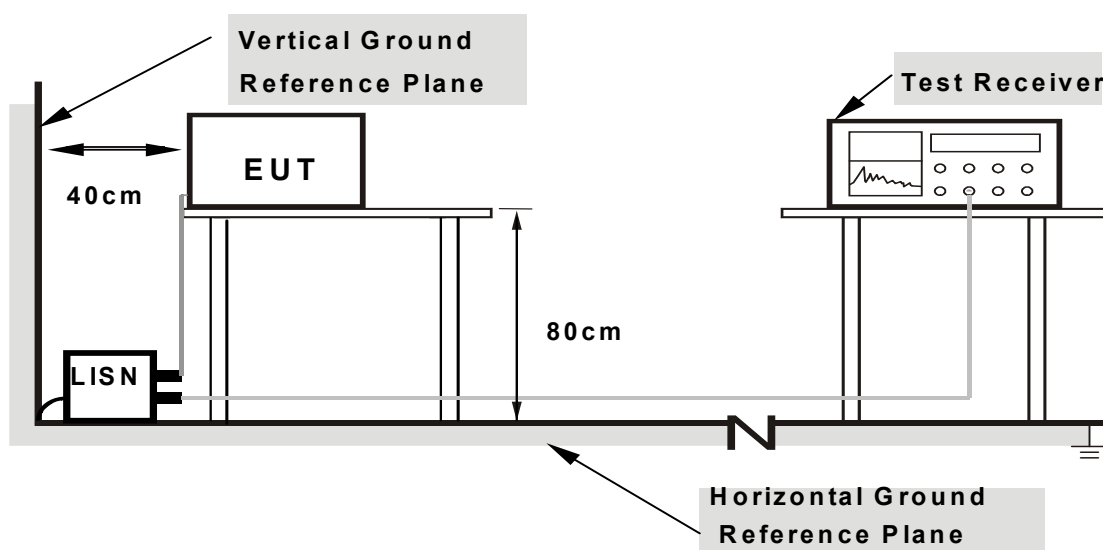
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

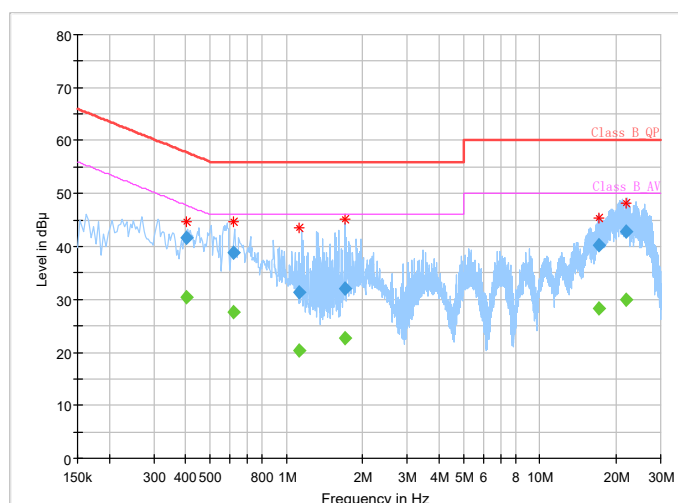
CONDUCTED WORST-CASE DATA:

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	Carl xie		

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.404000	---	30.35	47.77	17.42	L1	ON	9.7
0.404000	41.64	---	57.77	16.13	L1	ON	9.7
0.620000	---	27.66	46.00	18.34	L1	ON	9.7
0.620000	38.78	---	56.00	17.22	L1	ON	9.7
1.120000	---	20.36	46.00	25.64	L1	ON	9.7
1.120000	31.39	---	56.00	24.61	L1	ON	9.7
1.696000	---	22.71	46.00	23.29	L1	ON	9.7
1.696000	32.11	---	56.00	23.89	L1	ON	9.7
17.112000	---	28.32	50.00	21.68	L1	ON	9.8
17.112000	40.22	---	60.00	19.78	L1	ON	9.8
21.984000	---	29.86	50.00	20.14	L1	ON	9.8
21.984000	42.79	---	60.00	17.21	L1	ON	9.8

- 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.

Full Spectrum

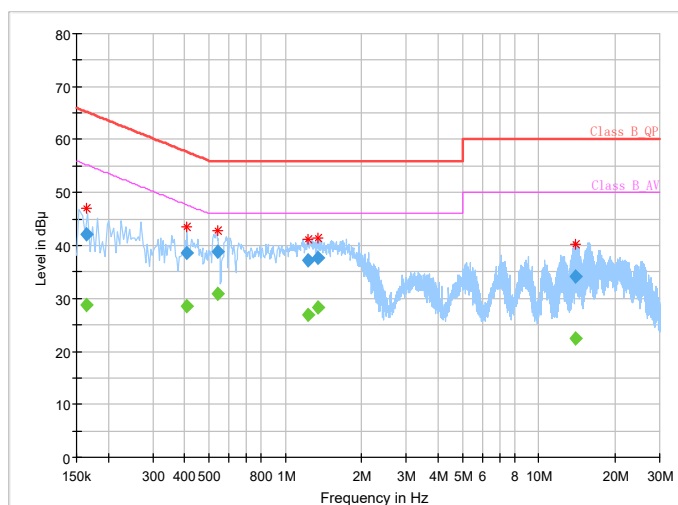


Frequency Range	150KHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120Vac, 60Hz	Environmental Conditions	26deg. C, 51%RH
Tested By	Carl xie		

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.164000	---	28.72	55.26	26.54	N	ON	9.7
0.164000	42.13	---	65.26	23.13	N	ON	9.7
0.408000	---	28.46	47.69	19.23	N	ON	9.7
0.408000	38.66	---	57.69	19.03	N	ON	9.7
0.540000	---	30.86	46.00	15.14	N	ON	9.7
0.540000	38.85	---	56.00	17.15	N	ON	9.7
1.228000	---	26.89	46.00	19.11	N	ON	9.8
1.228000	37.26	---	56.00	18.74	N	ON	9.8
1.352000	---	28.36	46.00	17.64	N	ON	9.8
1.352000	37.58	---	56.00	18.42	N	ON	9.8
14.008000	---	22.46	50.00	27.54	N	ON	9.8
14.008000	34.24	---	60.00	25.76	N	ON	9.8

- 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.

Full Spectrum



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 (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.



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3.2.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
3m Semi-anechoic Chamber	ETS-LINDGREN	9m*6m*6m	Euroshieldpn-CT0001143-1216	May. 19,20	May. 18,23
Bilog Antenna	ETS-LINDGREN	3143B	00161965	Mar. 05,21	Mar. 04,22
Horn Antenna	ETS-LINDGREN	3117	00168728	Apr. 02, 21	Apr. 01, 22
Horn Antenna (18GHz-40GHz)	N/A	QWH-SL-18-40-K-SG/QMS-00361	15433	Aug. 25, 21	Aug. 24, 22
Test Software	E3	V 9.160323	N/A	N/A	N/A
Test Software	ADT	ADT_Radiated_V7.6.15.9.2	N/A	N/A	N/A
10dB Attenuator	JFW/USA	50HF-010-SMA	1505	Jun. 03,21	Jun. 02,22
MXE EMI Receiver	KEYSIGHT	N9038A-544	MY54450026	Apr. 27,21	Apr. 26,22
Signal Pre-Amplifier	EMSI	EMC 9135	980249	Jun. 02,21	Jun. 01,22
Signal Pre-Amplifier	EMSI	EMC 012645B	980257	Jun. 02,21	Jun. 01,22
Signal Pre-Amplifier	EMSI	EMC 184045B	980259	Apr. 30,21	Apr. 29,22
DC Source	Kikusui/JP	PMX18-5A	0000001	Aug. 25,21	Aug. 24,22
Power Meter	Anritsu	ML2495A	1506002	Feb. 25,21	Feb. 24,22
Power Sensor	Anritsu	MA2411B	1339352	Feb. 25,21	Feb. 24,22
Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-051	Feb 14,20	Feb. 13,23

NOTE: 1. The calibration interval of the above test instruments is 12 months or 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 525120; The Designation No. is CN1171.

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 performed using fresh batteries. The turntable was rotated to maximize the emission level.

NOTE:

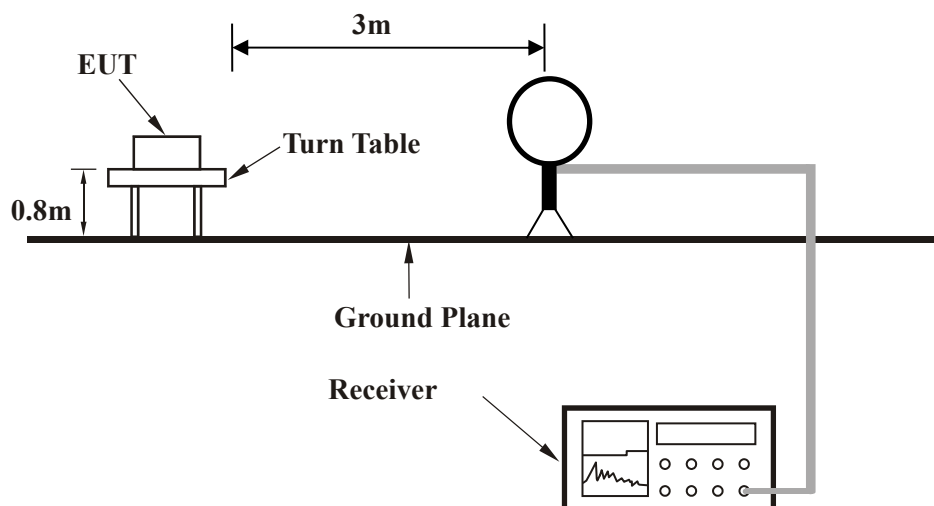
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution 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

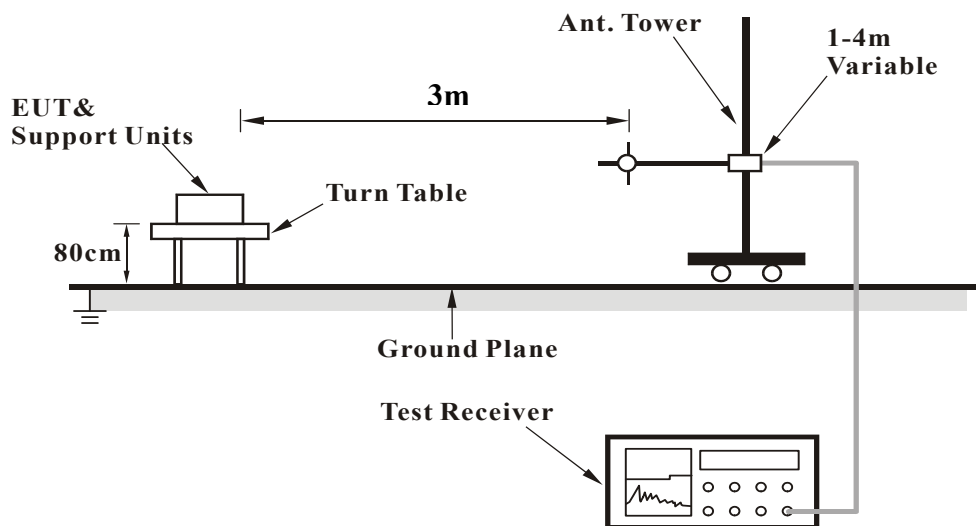
No deviation.

3.2.5 TEST SETUP

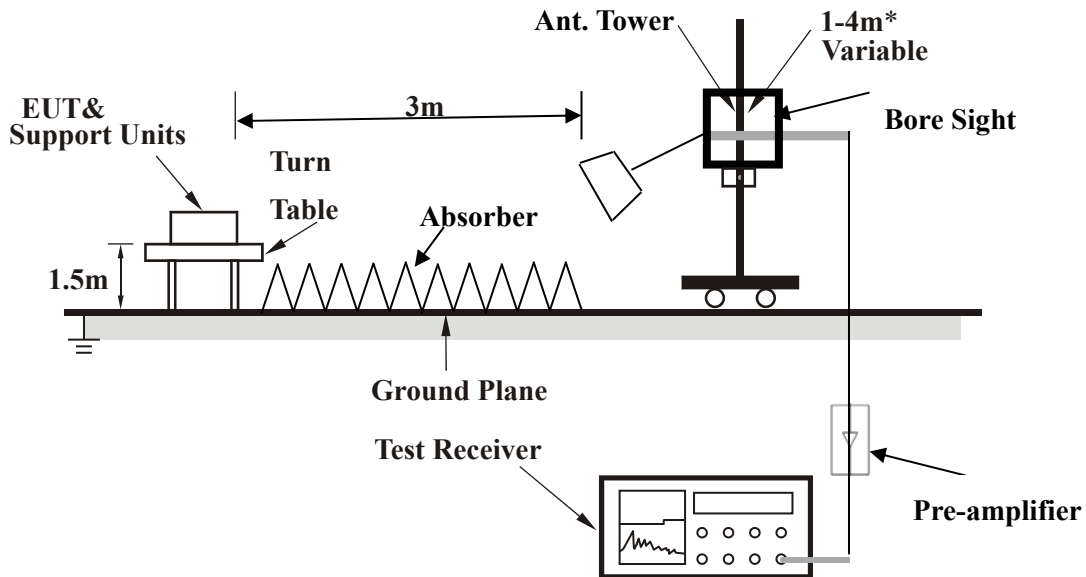
<Frequency Range 9KHz~30MHz >



< 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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3.2.7 TEST RESULTS

BELOW 1GHz WORST-CASE DATA:

Note: For frequency below 30MHz, the emission was tested 20db below the limit so the data not recorded in the sheet.

30 MHz – 1GHz data:

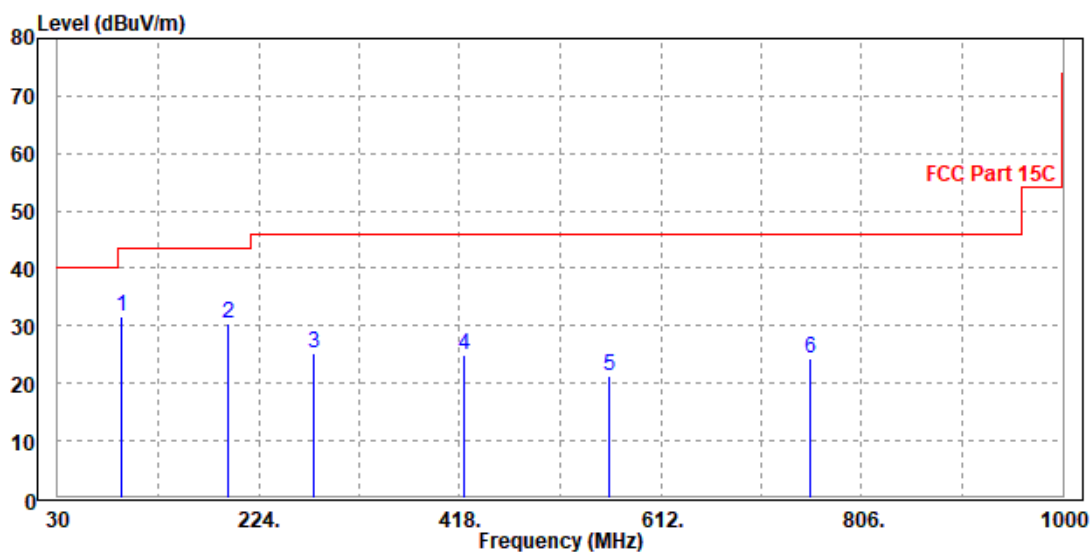
GFSK

CHANNEL	Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
92.08	31.67	60.5	43.5	-11.83	7.88	0.52	37.23	200	0	Peak
194.9	30.42	55.46	43.5	-13.08	10.8	0.73	36.57	200	0	Peak
276.38	25.37	47.58	46	-20.63	13.62	0.87	36.7	200	0	Peak
422.85	24.91	43.36	46	-21.09	17.31	1.11	36.87	200	0	Peak
562.53	21.23	37.2	46	-24.77	19.95	1.31	37.23	200	0	Peak
756.53	24.21	37.2	46	-21.79	23.1	1.54	37.63	200	0	Peak

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 = Emission Level – Limit value

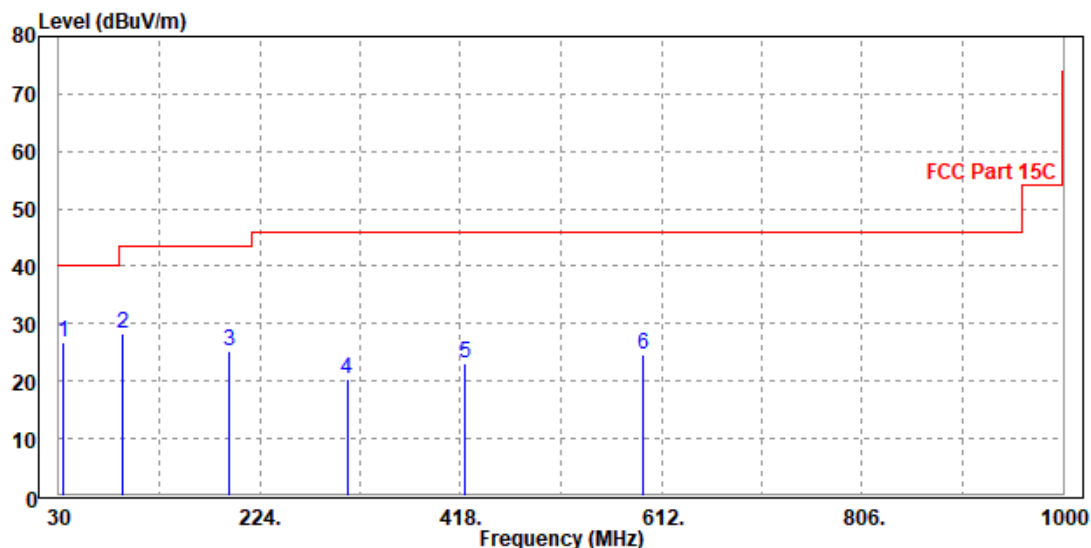


CHANNEL	Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
34.85	26.67	45.86	40	-13.33	18.07	0.33	37.59	300	0	Peak
92.08	28.2	56.43	43.5	-15.3	8.48	0.52	37.23	300	0	Peak
194.9	25.36	50.01	43.5	-18.14	11.19	0.73	36.57	300	0	Peak
308.39	20.4	41.06	46	-25.6	15.18	0.92	36.76	300	0	Peak
422.85	22.99	41.12	46	-23.01	17.63	1.11	36.87	300	0	Peak
594.54	24.79	39.99	46	-21.21	20.8	1.35	37.35	300	0	Peak

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 = Emission Level – Limit value





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ABOVE 1GHz WORST-CASE DATA:

Note: For higher frequency, the emission is too low to be detected.

GFSK

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	51.42	60.18	74	-22.58	31.75	5.86	46.37	130	255	Peak
2390	43.96	52.72	54	-10.04	31.75	5.86	46.37	130	255	Average
2402	99.22	107.92			31.79	5.88	46.37	130	255	Peak
2402	97.81	106.51			31.79	5.88	46.37	130	255	Average
2483.5	52.6	60.93	74	-21.4	32.05	5.99	46.37	130	255	Peak
2483.5	43.94	52.27	54	-10.06	32.05	5.99	46.37	130	255	Average
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	53.81	62.18	74	-20.19	32.14	5.86	46.37	103	145	Peak
2390	44.75	53.12	54	-9.25	32.14	5.86	46.37	103	145	Average
2402	100.97	109.3			32.16	5.88	46.37	103	145	Peak
2402	100.89	109.22			32.16	5.88	46.37	103	145	Average
2483.5	53.31	61.33	74	-20.69	32.36	5.99	46.37	103	145	Peak
2483.5	45.25	53.27	54	-8.75	32.36	5.99	46.37	103	145	Average

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	51.49	60.25	74	-22.51	31.75	5.86	46.37	125	280	Peak
2390	44.39	53.15	54	-9.61	31.75	5.86	46.37	125	280	Average
2441	98.89	107.42			31.91	5.93	46.37	125	280	Peak
2441	98.51	107.04			31.91	5.93	46.37	125	280	Average
2483.5	51.84	60.17	74	-22.16	32.05	5.99	46.37	125	280	Peak
2483.5	44.23	52.56	54	-9.77	32.05	5.99	46.37	125	280	Average

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	51.1	59.47	74	-22.9	32.14	5.86	46.37	103	145	Peak
2390	44.87	53.24	54	-9.13	32.14	5.86	46.37	103	145	Average
2441	100.08	108.26			32.26	5.93	46.37	103	145	Peak
2441	98.32	106.5			32.26	5.93	46.37	103	145	Average
2483.5	51.76	59.78	74	-22.24	32.36	5.99	46.37	103	145	Peak
2483.5	44.37	52.39	54	-9.63	32.36	5.99	46.37	103	145	Average

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	53.36	62.12	74	-20.64	31.75	5.86	46.37	125	280	Peak
2390	43.48	52.24	54	-10.52	31.75	5.86	46.37	125	280	Average
2480	96.93	105.28			32.04	5.98	46.37	125	280	Peak
2480	96.79	105.14			32.04	5.98	46.37	125	280	Average
2483.5	52.25	60.58	74	-21.75	32.05	5.99	46.37	125	280	Peak
2483.5	44.93	53.26	54	-9.07	32.05	5.99	46.37	125	280	Average
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	52.19	60.56	74	-21.81	32.14	5.86	46.37	103	145	Peak
2390	44.88	53.25	54	-9.12	32.14	5.86	46.37	103	145	Average
2480	95.8	103.84			32.35	5.98	46.37	103	145	Peak
2480	95.57	103.61			32.35	5.98	46.37	103	145	Average
2483.5	52.42	60.44	74	-21.58	32.36	5.99	46.37	103	145	Peak
2483.5	45.19	53.21	54	-8.81	32.36	5.99	46.37	103	145	Average

REMARKS:

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



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BT_8DPSK

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	51.62	60.38	74	-22.38	31.75	5.86	46.37	125	255	Peak
2390	44.29	53.05	54	-9.71	31.75	5.86	46.37	125	255	Average
2402	100.14	108.84			31.79	5.88	46.37	125	255	Peak
2402	99.63	108.33			31.79	5.88	46.37	125	255	Average
2483.5	52.91	61.24	74	-21.09	32.05	5.99	46.37	125	255	Peak
2483.5	44.06	52.39	54	-9.94	32.05	5.99	46.37	125	255	Average
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	51.36	59.73	74	-22.64	32.14	5.86	46.37	100	145	Peak
2390	44.53	52.9	54	-9.47	32.14	5.86	46.37	100	145	Average
2402	101.62	109.95			32.16	5.88	46.37	100	145	Peak
2402	101.35	109.68			32.16	5.88	46.37	100	145	Average
2483.5	52.69	60.71	74	-21.31	32.36	5.99	46.37	100	145	Peak
2483.5	44.82	52.84	54	-9.18	32.36	5.99	46.37	100	145	Average

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	51.07	59.83	74	-22.93	31.75	5.86	46.37	123	240	Peak
2390	44.29	53.05	54	-9.71	31.75	5.86	46.37	123	240	Average
2441	98.25	106.78			31.91	5.93	46.37	123	240	Peak
2441	97.63	106.16			31.91	5.93	46.37	123	240	Average
2483.5	52.85	61.18	74	-21.15	32.05	5.99	46.37	123	240	Peak
2483.5	44.57	52.9	54	-9.43	32.05	5.99	46.37	123	240	Average
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	51.65	60.02	74	-22.35	32.14	5.86	46.37	100	145	Peak
2390	44.46	52.83	54	-9.54	32.14	5.86	46.37	100	145	Average
2441	101.7	109.88			32.26	5.93	46.37	100	145	Peak
2441	100.3	108.48			32.26	5.93	46.37	100	145	Average
2483.5	53.09	61.11	74	-20.91	32.36	5.99	46.37	100	145	Peak
2483.5	44.47	52.49	54	-9.53	32.36	5.99	46.37	100	145	Average

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	52.52	61.28	74	-21.48	31.75	5.86	46.37	123	245	Peak
2390	43.11	51.87	54	-10.89	31.75	5.86	46.37	123	245	Average
2480	100.19	108.54			32.04	5.98	46.37	123	245	Peak
2480	99.89	108.24			32.04	5.98	46.37	123	245	Average
2483.5	54.86	63.19	74	-19.14	32.05	5.99	46.37	123	245	Peak
2483.5	44.85	53.18	54	-9.15	32.05	5.99	46.37	123	245	Average
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	51.37	59.74	74	-22.63	32.14	5.86	46.37	100	145	Peak
2390	44.11	52.48	54	-9.89	32.14	5.86	46.37	100	145	Average
2480	100.98	109.02			32.35	5.98	46.37	100	145	Peak
2480	100.56	108.6			32.35	5.98	46.37	100	145	Average
2483.5	53.94	61.96	74	-20.06	32.36	5.99	46.37	100	145	Peak
2483.5	44.51	52.53	54	-9.49	32.36	5.99	46.37	100	145	Average

REMARKS:

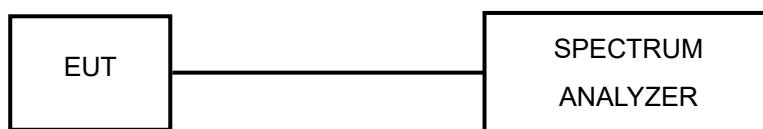
1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
2. 2480MHz: Fundamental frequency.

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



3.3.3 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Power Meter	ANRITSU	ML2495A	1506002	Feb. 25,21	Feb. 24,22
EXA Signal Analyzer	KEYSIGHT	N9010A-526	MY54510322	Apr. 26,21	Apr. 25,22
EXA Signal Analyzer	KEYSIGHT	N9010A-544	MY54510355	Feb. 25,21	Feb. 24,22
Power Sensor	ANRITSU	MA2411B	1339352	Feb. 25,21	Feb. 24,22
CBT32 BLUETOOTH TESTER 4HU	Rohde&Schwarz	CBT32	101176	Mar. 09,21	Mar. 08,22

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.



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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.



Test Report No.: W7L-P21100018-4RF01

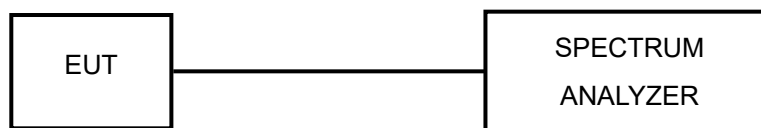
Please Refer to Appendix F Of this test report.

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 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.



Test Report No.: W7L-P21100018-4RF01

3.4.5 DEVIATION FROM TEST STANDARD

No deviation.

3.4.6 TEST RESULTS

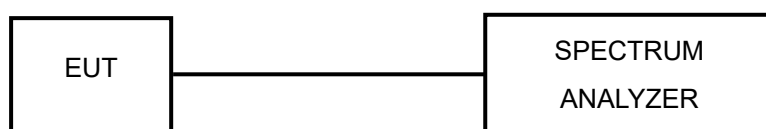
Please Refer to Appendix E Of this test report

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.



Test Report No.: W7L-P21100018-4RF01

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

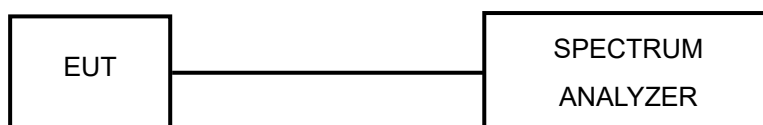
Please Refer to Appendix A Of this test report.

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.

3.6.6 TEST RESULTS

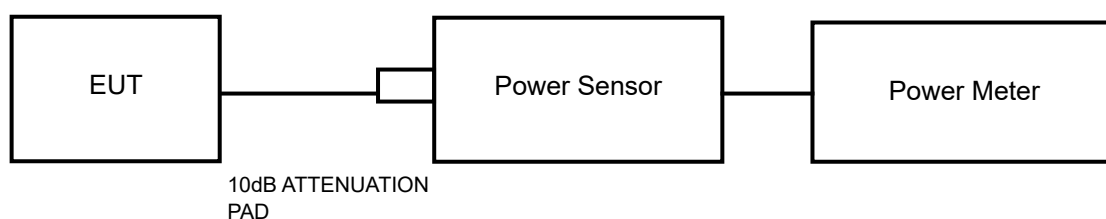
Please Refer to Appendix D Of this test report.

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 C Of this test report.



Test Report No.: W7L-P21100018-4RF01

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 C Of this test report.



Test Report No.: W7L-P21100018-4RF01

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 G Of this test report.



Test Report No.: W7L-P21100018-4RF01

4 PHOTOGRAPHS OF THE TEST CONFIGURATION

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



Test Report No.: W7L-P21100018-4RF01

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 APPENDIX

APPENDIX A: 20DB EMISSION BANDWIDTH

TEST RESULT

TestMode	Antenna	Channel	20db EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	0.939	2401.538	2402.477	---	PASS
		2441	0.954	2440.538	2441.492	---	PASS
		2480	0.894	2479.538	2480.432	---	PASS
2DH5	Ant1	2402	1.311	2401.343	2402.654	---	PASS
		2441	1.311	2440.343	2441.654	---	PASS
		2480	1.296	2479.343	2480.639	---	PASS
3DH5	Ant1	2402	1.302	2401.346	2402.648	---	PASS
		2441	1.293	2440.352	2441.645	---	PASS
		2480	1.281	2479.349	2480.630	---	PASS

TEST GRAPHS



DH5_Ant1_2402



DH5_Ant1_2441



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VERITAS

Test Report No.: W7L-P21100018-4RF01



DH5_Ant1_2480



2DH5_Ant1_2402



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VERITAS

Test Report No.: W7L-P21100018-4RF01



2DH5_Ant1_2441



2DH5_Ant1_2480



BUREAU
VERITAS

Test Report No.: W7L-P21100018-4RF01



3DH5_Ant1_2402



3DH5_Ant1_2441



BUREAU
VERITAS

Test Report No.: W7L-P21100018-4RF01



3DH5_Ant1_2480

APPENDIX B: OCCUPIED CHANNEL BANDWIDTH

TEST RESULT

TestMode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	0.86658	2401.566	2402.432	---	PASS
		2441	0.87248	2440.564	2441.436	---	PASS
		2480	0.85521	2479.568	2480.424	---	PASS
2DH5	Ant1	2402	1.1924	2401.405	2402.597	---	PASS
		2441	1.1896	2440.405	2441.595	---	PASS
		2480	1.1966	2479.400	2480.597	---	PASS
3DH5	Ant1	2402	1.1998	2401.391	2402.591	---	PASS
		2441	1.2034	2440.390	2441.594	---	PASS
		2480	1.1988	2479.390	2480.589	---	PASS

TEST GRAPHS



DH5_Ant1_2402



DH5_Ant1_2441



BUREAU
VERITAS

Test Report No.: W7L-P21100018-4RF01



DH5_Ant1_2480



2DH5_Ant1_2402

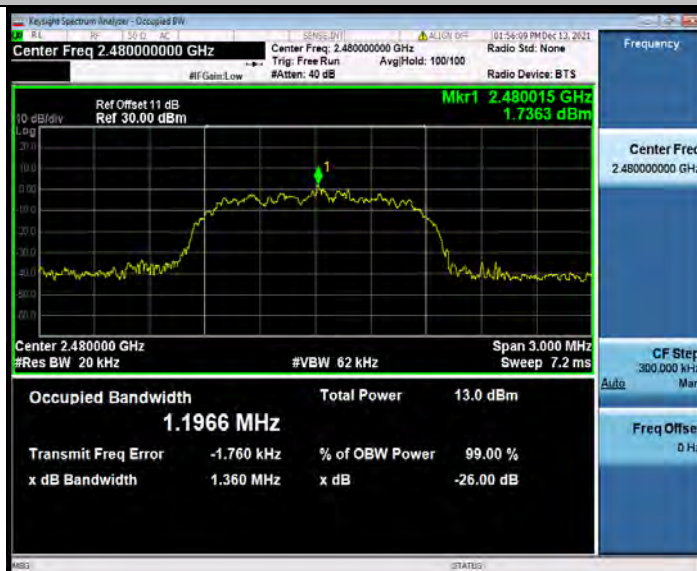


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Test Report No.: W7L-P21100018-4RF01



2DH5_Ant1_2441

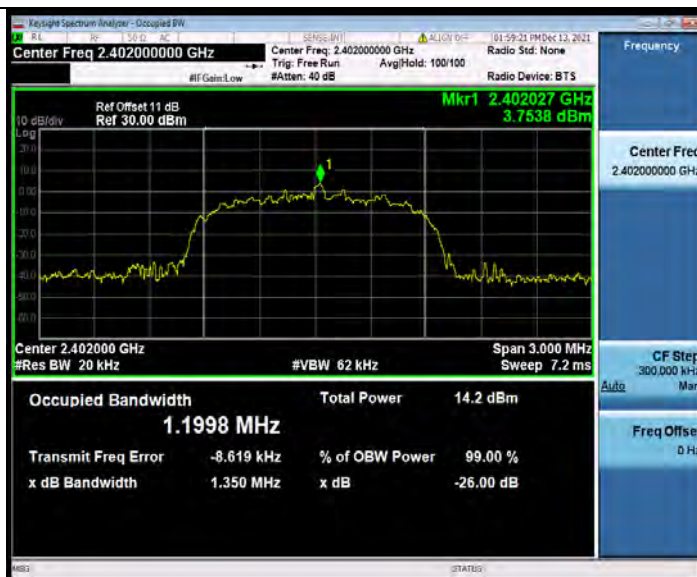


2DH5_Ant1_2480

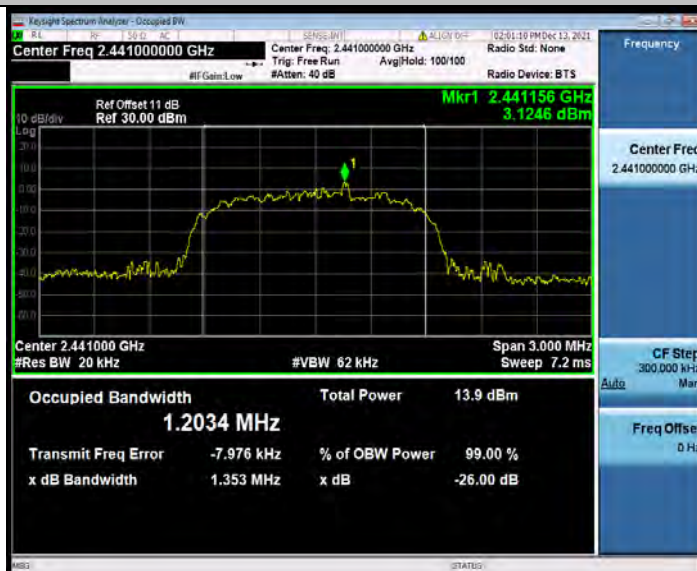


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VERITAS

Test Report No.: W7L-P21100018-4RF01



3DH5_Ant1_2402



3DH5_Ant1_2441



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VERITAS

Test Report No.: W7L-P21100018-4RF01



3DH5_Ant1_2480

APPENDIX C: MAXIMUM CONDUCTED OUTPUT POWER

PEAK POWER TEST RESULT

TestMode	Antenna	Channel	Result[dBm]	Result[mW]	Limit[dBm]	Verdict	Power Setting
DH5	Ant1	2402	8.55	7.16	≤20.97	PASS	Default
		2441	8.14	6.52	≤20.97	PASS	Default
		2480	7.96	6.25	≤20.97	PASS	Default
2DH5	Ant1	2402	9.26	8.43	≤20.97	PASS	Default
		2441	9.36	8.63	≤20.97	PASS	Default
		2480	8.50	7.08	≤20.97	PASS	Default
3DH5	Ant1	2402	9.60	9.12	≤20.97	PASS	Default
		2441	9.65	9.23	≤20.97	PASS	Default
		2480	8.70	7.41	≤20.97	PASS	Default

AVERAGE POWER TEST RESULT

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict	Power Setting
DH5	Ant1	2402	7.02	/	PASS	Default
		2441	6.65	/	PASS	Default
		2480	6.42	/	PASS	Default
2DH5	Ant1	2402	5.85	/	PASS	Default
		2441	5.72	/	PASS	Default
		2480	5.04	/	PASS	Default
3DH5	Ant1	2402	5.86	/	PASS	Default
		2441	5.70	/	PASS	Default
		2480	5.05	/	PASS	Default



Test Report No.: W7L-P21100018-4RF01

APPENDIX D: CARRIER FREQUENCY SEPARATION TEST RESULT

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
DH5	Ant1	Hop	0.996	≥ 0.954	PASS
2DH5	Ant1	Hop	1.006	≥ 0.874	PASS
3DH5	Ant1	Hop	1.01	≥ 0.868	PASS

TEST GRAPHS



DH5_Ant1_Hop



2DH5_Ant1_Hop



VERITAS	



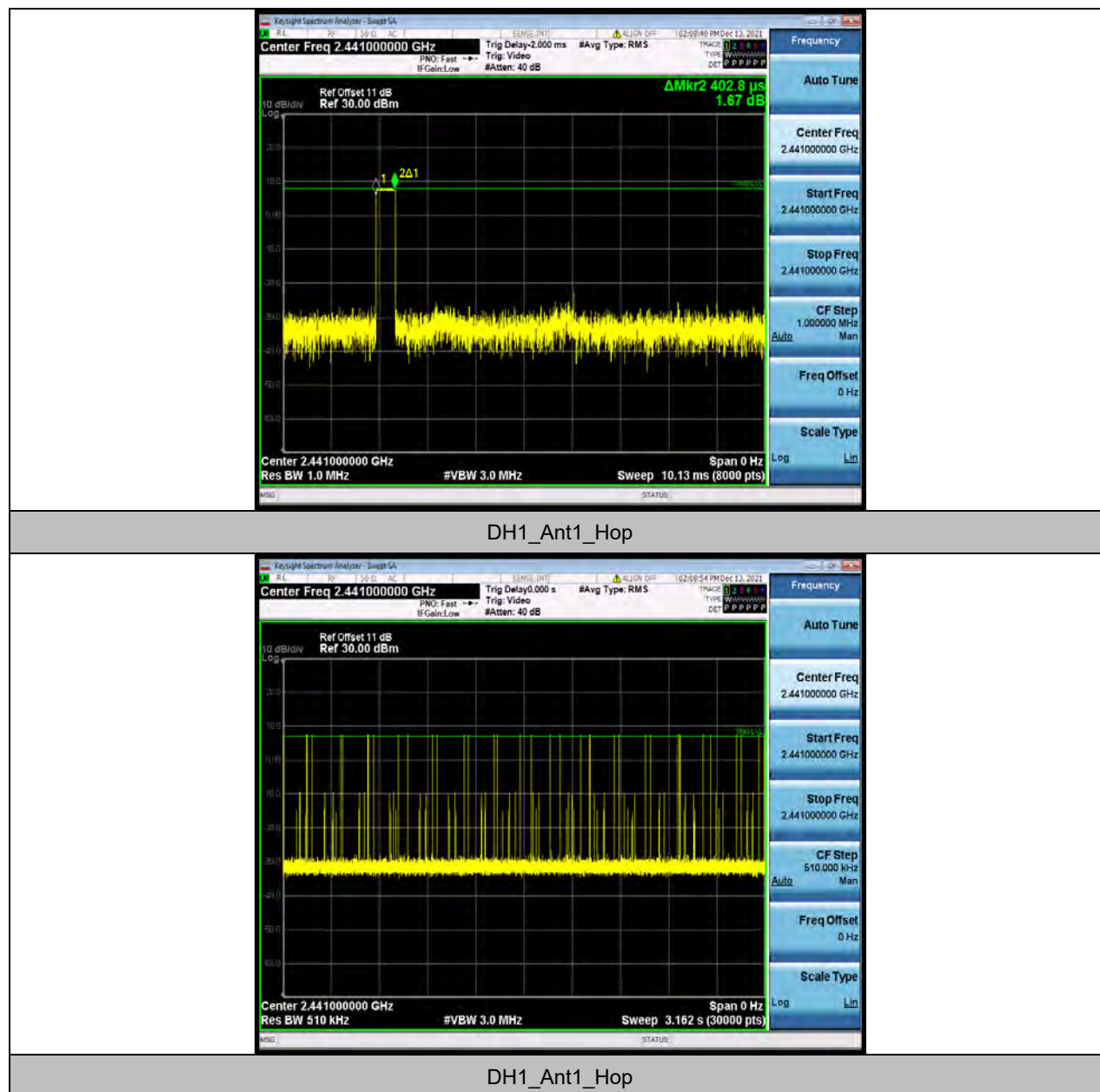
3DH5_Ant1_Hop

APPENDIX E: TIME OF OCCUPANCY

TEST RESULT

TestMode	Antenna	Channel	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH1	Ant1	Hop	0.40	330	0.133	≤0.4	PASS
DH3	Ant1	Hop	1.66	110	0.183	≤0.4	PASS
DH5	Ant1	Hop	2.91	110	0.32	≤0.4	PASS
2DH1	Ant1	Hop	0.40	320	0.127	≤0.4	PASS
2DH3	Ant1	Hop	1.65	190	0.313	≤0.4	PASS
2DH5	Ant1	Hop	2.90	120	0.348	≤0.4	PASS
3DH1	Ant1	Hop	0.40	320	0.126	≤0.4	PASS
3DH3	Ant1	Hop	1.64	180	0.296	≤0.4	PASS
3DH5	Ant1	Hop	2.90	110	0.319	≤0.4	PASS

TEST GRAPHS





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VERITAS

Test Report No.: W7L-P21100018-4RF01



DH3_Ant1_Hop



DH3_Ant1_Hop



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Test Report No.: W7L-P21100018-4RF01



DH5_Ant1_Hop

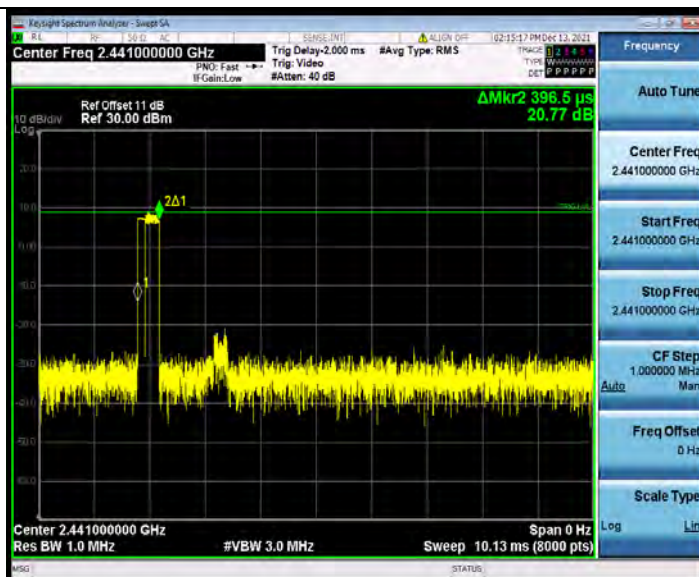


DH5_Ant1_Hop

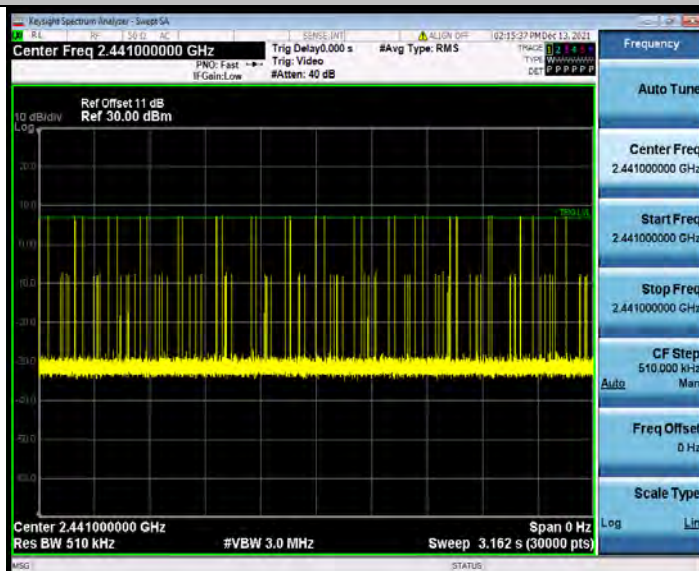


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2DH1_Ant1_Hop

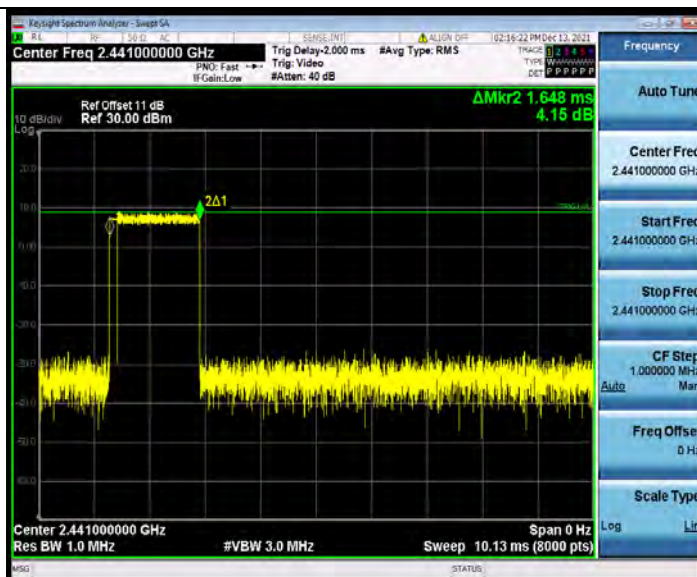


2DH1_Ant1_Hop



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Test Report No.: W7L-P21100018-4RF01



2DH3_Ant1_Hop

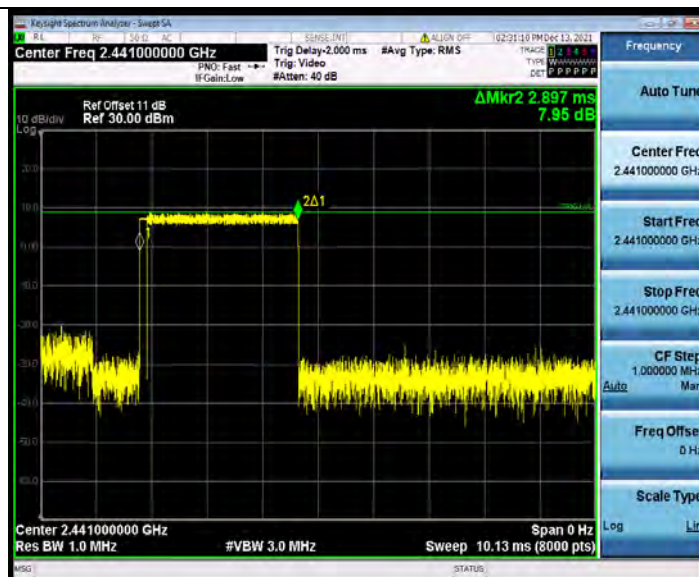


2DH3_Ant1_Hop

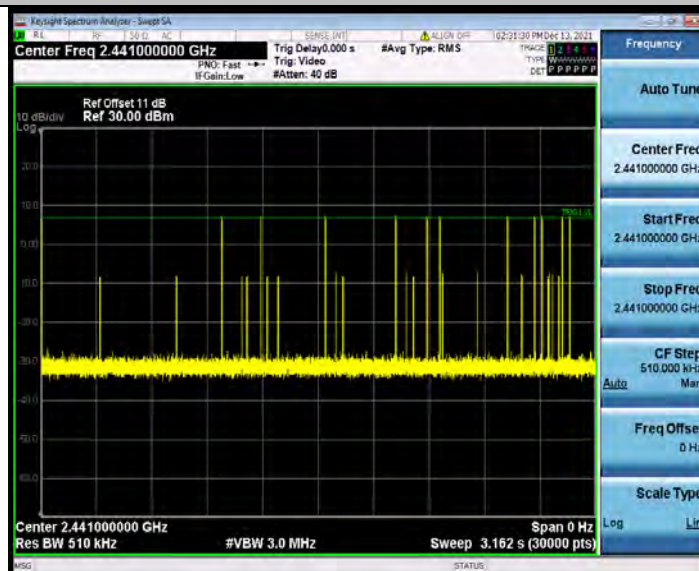


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VERITAS

Test Report No.: W7L-P21100018-4RF01



2DH5_Ant1_Hop

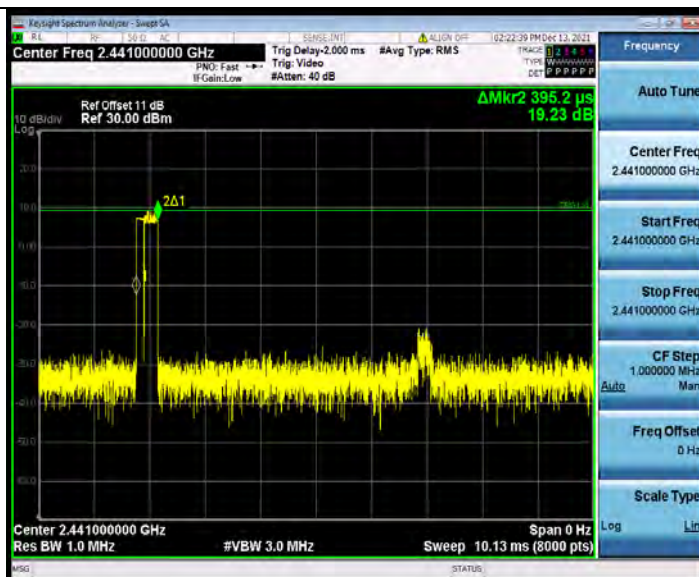


2DH5_Ant1_Hop



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VERITAS

Test Report No.: W7L-P21100018-4RF01



3DH1_Ant1_Hop

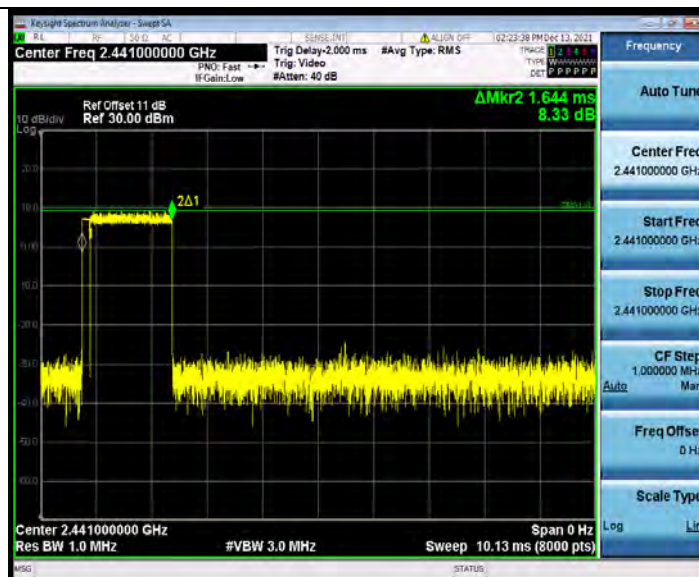


3DH1_Ant1_Hop

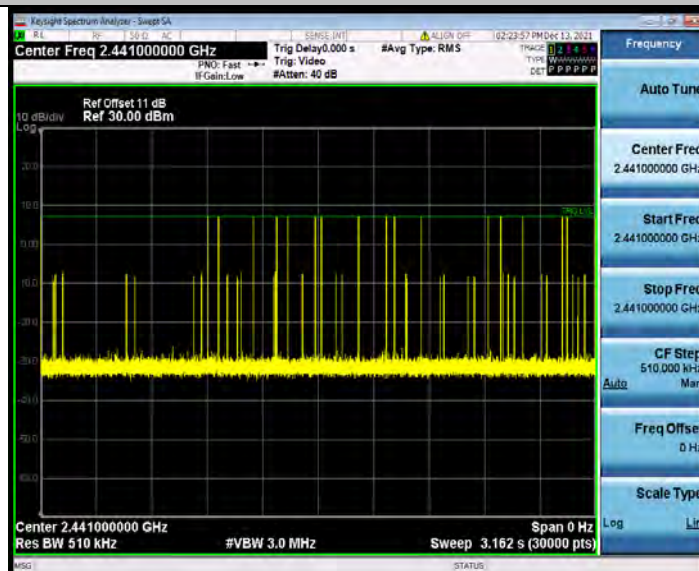


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VERITAS

Test Report No.: W7L-P21100018-4RF01



3DH3_Ant1_Hop

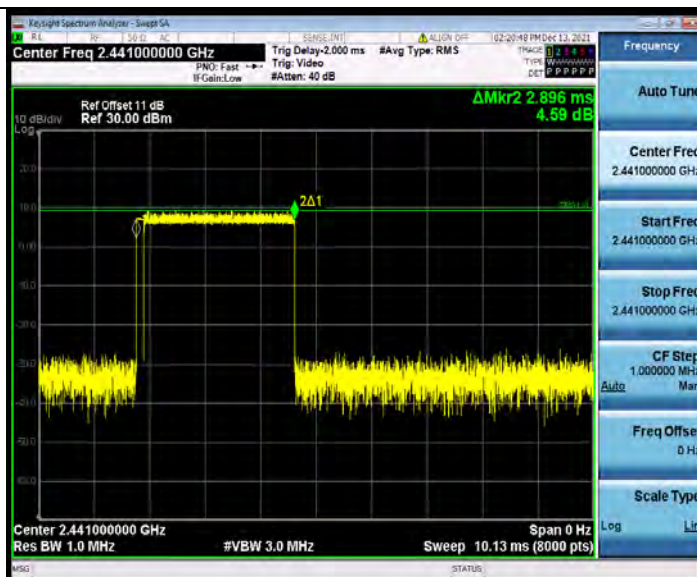


3DH3_Ant1_Hop

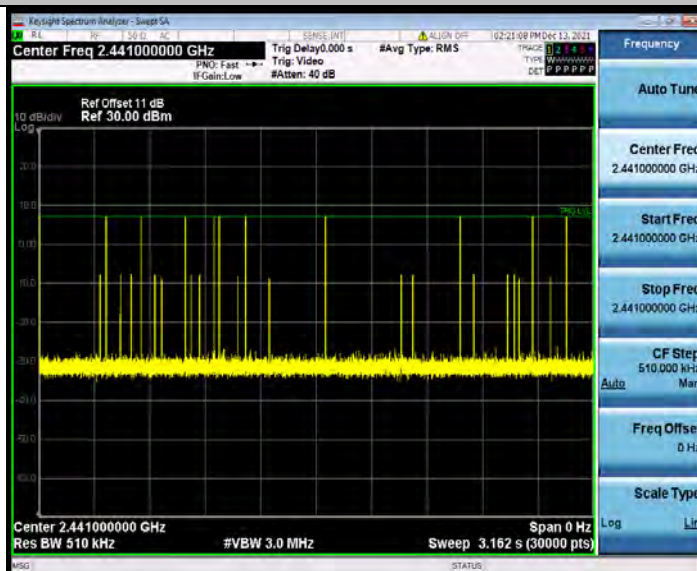


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VERITAS

Test Report No.: W7L-P21100018-4RF01



3DH5_Ant1_Hop



3DH5_Ant1_Hop



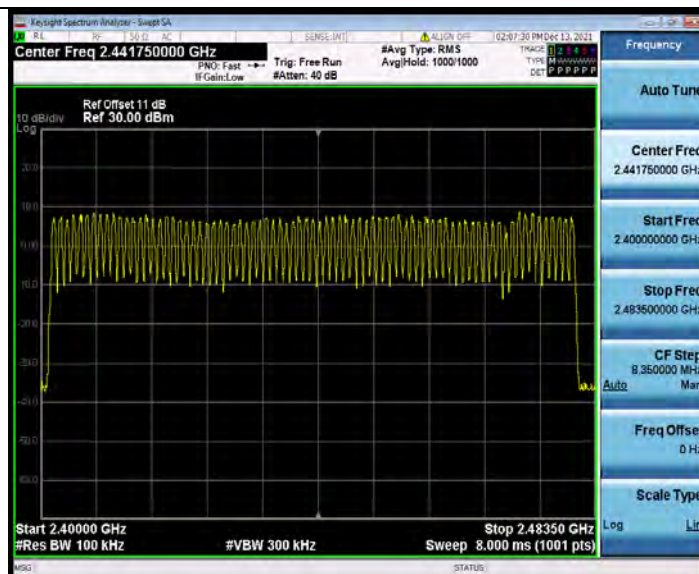
Test Report No.: W7L-P21100018-4RF01

APPENDIX F: NUMBER OF HOPPING CHANNELS

TEST RESULT

TestMode	Antenna	Channel	Result[Num]	Limit[Num]	Verdict
DH5	Ant1	Hop	79	≥ 15	PASS
2DH5	Ant1	Hop	79	≥ 15	PASS
3DH5	Ant1	Hop	79	≥ 15	PASS

TEST GRAPHS



DH5_Ant1_Hop



2DH5_Ant1_Hop



BUREAU
VERITAS

Test Report No.: W7L-P21100018-4RF01



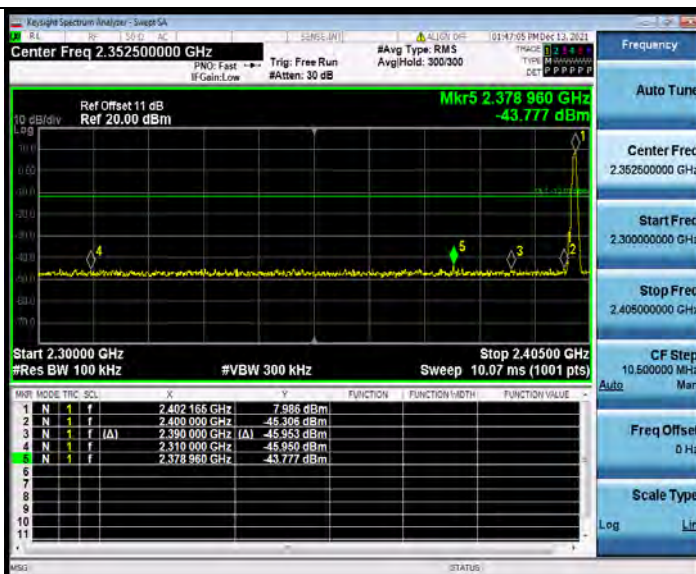
3DH5_Ant1_Hop

APPENDIX G: BAND EDGE MEASUREMENTS

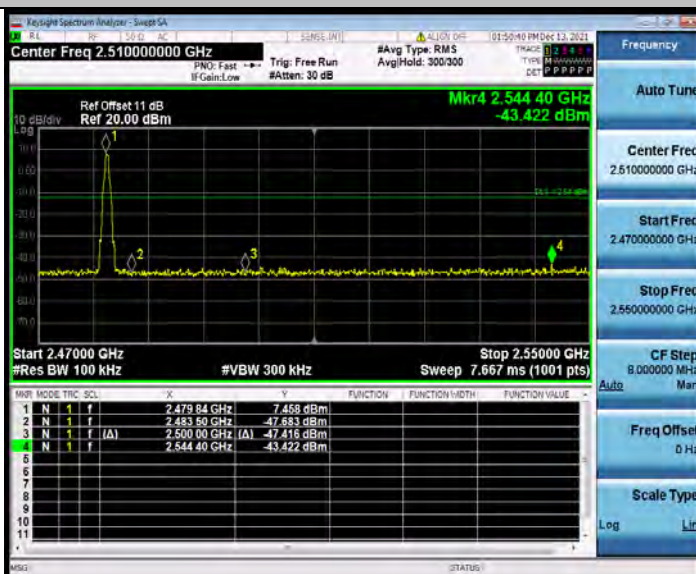
TEST RESULT

TestMode	Antenna	ChName	Channel	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	Low	2402	7.99	-43.78	≤-12.01	PASS
		High	2480	7.46	-43.42	≤-12.54	PASS
		Low	Hop_2402	7.84	-47.3	≤-12.16	PASS
		High	Hop_2480	8.47	-44	≤-11.53	PASS
2DH5	Ant1	Low	2402	6.89	-41.97	≤-13.12	PASS
		High	2480	6.59	-44.18	≤-13.41	PASS
		Low	Hop_2402	4.43	-45.07	≤-15.57	PASS
		High	Hop_2480	7.52	-43.75	≤-12.48	PASS
3DH5	Ant1	Low	2402	7.21	-40.59	≤-12.79	PASS
		High	2480	6.48	-44.04	≤-13.52	PASS
		Low	Hop_2402	4.57	-44.95	≤-15.43	PASS
		High	Hop_2480	7.08	-44.09	≤-12.92	PASS

TEST GRAPHS



DH5_Ant1_Low_2402

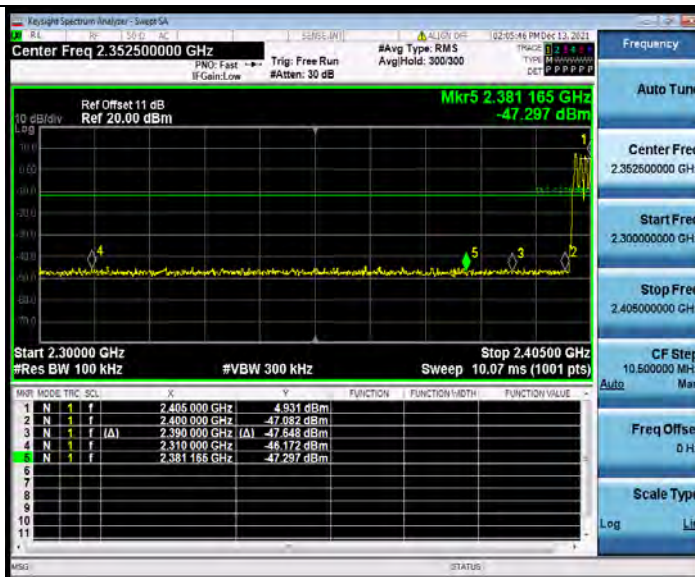


DH5_Ant1_High_2480

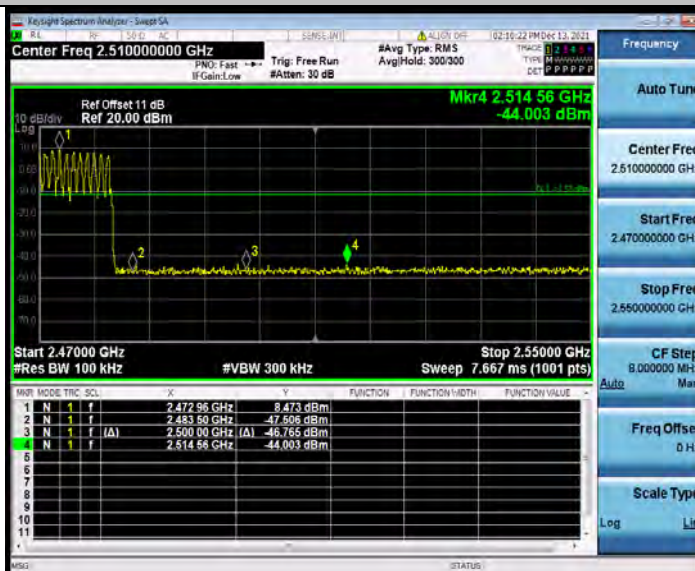


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VERITAS

Test Report No.: W7L-P21100018-4RF01



DH5_Ant1_Low_Hop_2402

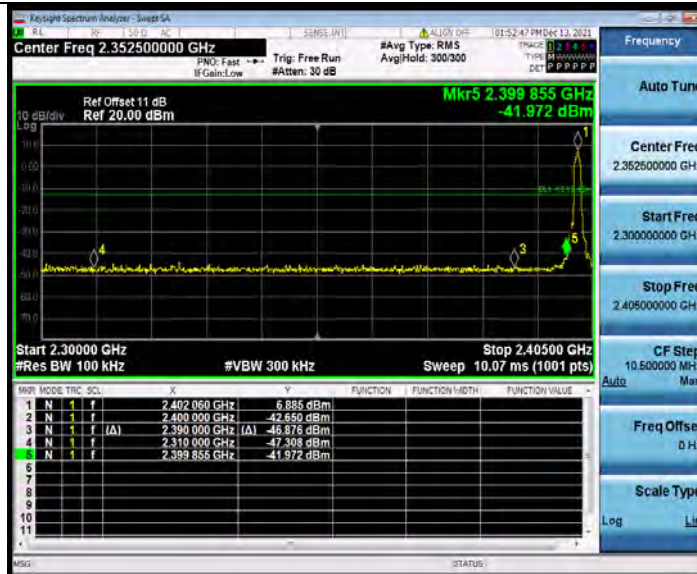


DH5_Ant1_High_Hop_2480

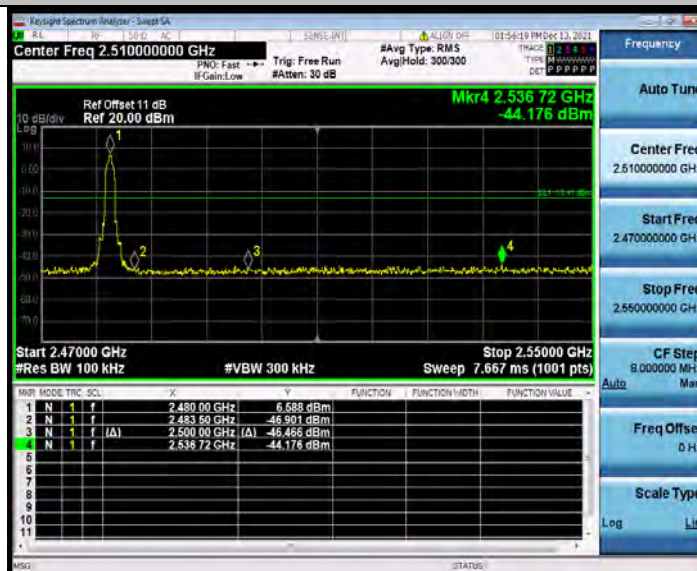


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2DH5_Ant1_Low_2402

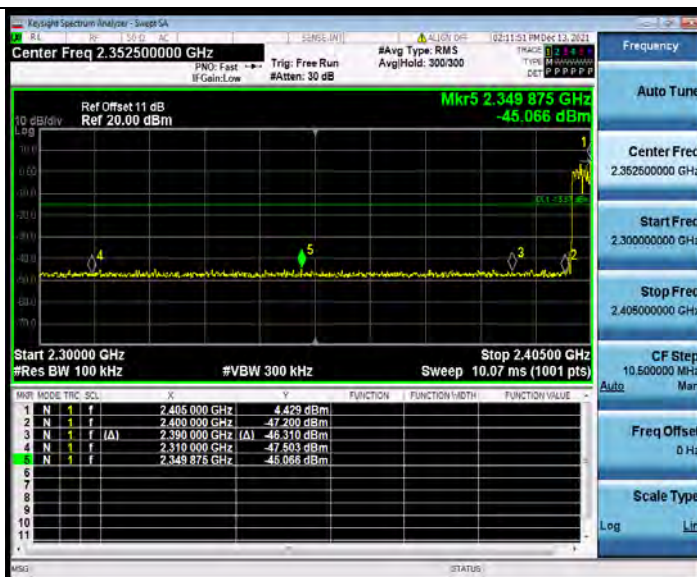


2DH5_Ant1_High_2480



BUREAU
VERITAS

Test Report No.: W7L-P21100018-4RF01



2DH5_Ant1_Low_Hop_2402

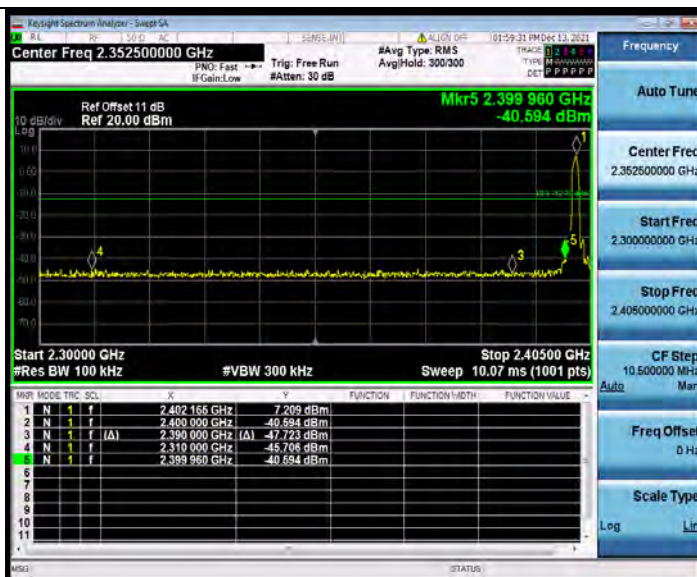


2DH5_Ant1_High_Hop_2480

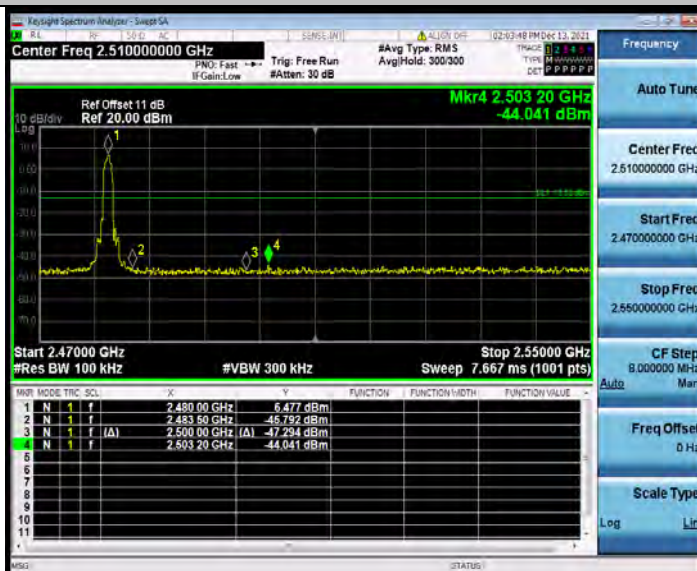


BUREAU
VERITAS

Test Report No.: W7L-P21100018-4RF01



3DH5_Ant1_Low_2402

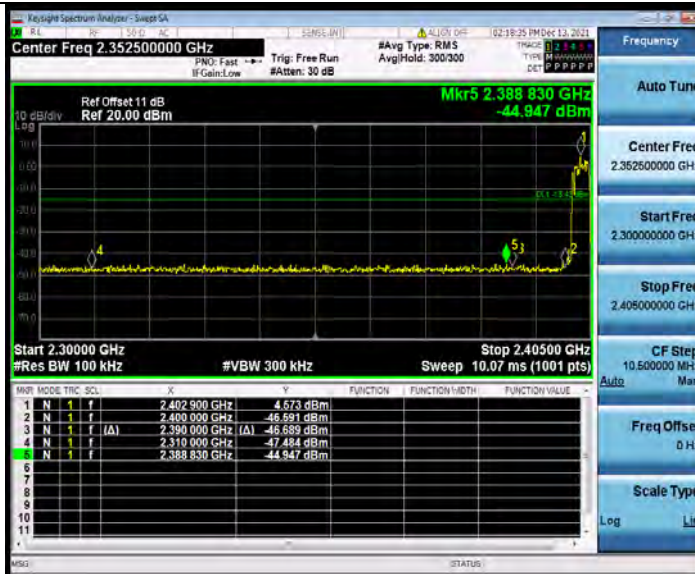


3DH5_Ant1_High_2480

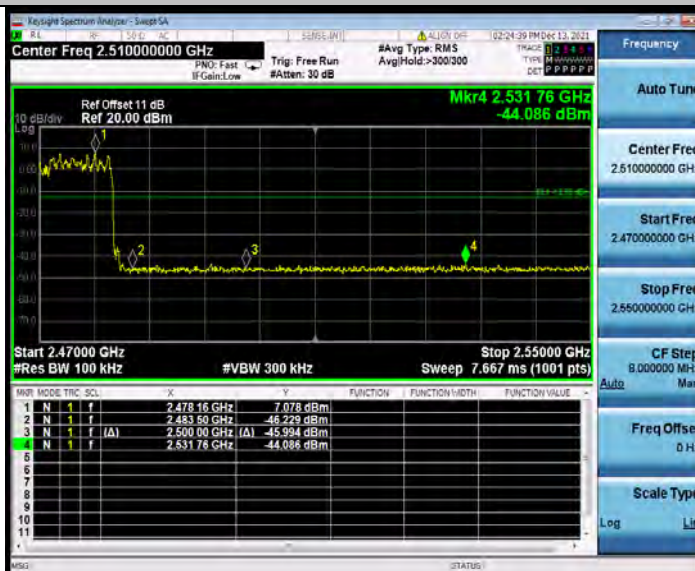


BUREAU
VERITAS

Test Report No.: W7L-P21100018-4RF01



3DH5_Ant1_Low_Hop_2402



3DH5_Ant1_High_Hop_2480

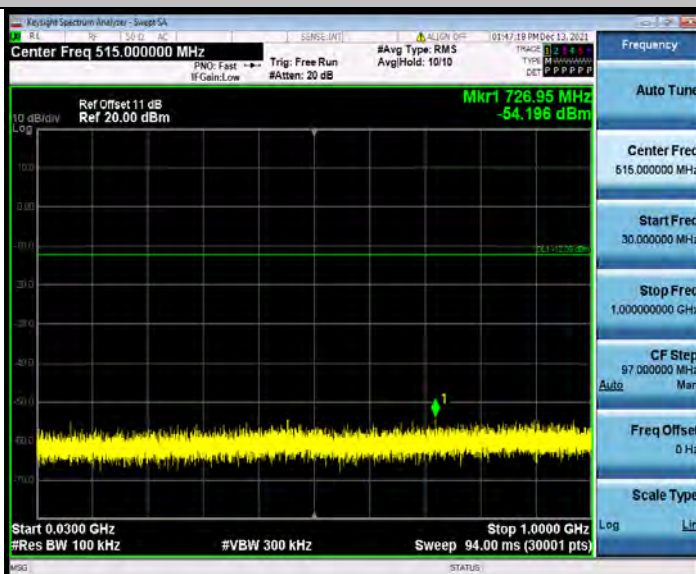
APPENDIX H: CONDUCTED SPURIOUS EMISSION TEST RESULT

TestMode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	2402	Reference	7.61	7.61	---	PASS
			30~1000	7.61	-54.2	≤-12.39	PASS
			1000~26500	7.61	-38.26	≤-12.39	PASS
		2441	Reference	6.90	6.90	---	PASS
			30~1000	6.90	-54.18	≤-13.1	PASS
			1000~26500	6.90	-38.81	≤-13.1	PASS
		2480	Reference	7.25	7.25	---	PASS
			30~1000	7.25	-54.19	≤-12.75	PASS
			1000~26500	7.25	-38.03	≤-12.75	PASS
2DH5	Ant1	2402	Reference	7.08	7.08	---	PASS
			30~1000	7.08	-53.16	≤-12.92	PASS
			1000~26500	7.08	-38.69	≤-12.92	PASS
		2441	Reference	7.01	7.01	---	PASS
			30~1000	7.01	-53.89	≤-12.99	PASS
			1000~26500	7.01	-38.54	≤-12.99	PASS
		2480	Reference	6.04	6.04	---	PASS
			30~1000	6.04	-54.55	≤-13.97	PASS
			1000~26500	6.04	-37.78	≤-13.97	PASS
3DH5	Ant1	2402	Reference	6.02	6.02	---	PASS
			30~1000	6.02	-53.63	≤-13.98	PASS
			1000~26500	6.02	-37.92	≤-13.98	PASS
		2441	Reference	4.29	4.29	---	PASS
			30~1000	4.29	-54.36	≤-15.71	PASS
			1000~26500	4.29	-38.53	≤-15.71	PASS
		2480	Reference	6.23	6.23	---	PASS
			30~1000	6.23	-54.03	≤-13.77	PASS
			1000~26500	6.23	-38.4	≤-13.77	PASS

TEST GRAPHS



DH5_Ant1_2402_0~Reference



DH5_Ant1_2402_30~1000



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Test Report No.: W7L-P21100018-4RF01



DH5_Ant1_2402_1000~26500



DH5_Ant1_2441_0~Reference



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Test Report No.: W7L-P21100018-4RF01



DH5_Ant1_2441_30~1000



DH5_Ant1_2441_1000~26500



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Test Report No.: W7L-P21100018-4RF01



DH5_Ant1_2480_0~Reference



DH5_Ant1_2480_30~1000



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Test Report No.: W7L-P21100018-4RF01



DH5_Ant1_2480_1000~26500

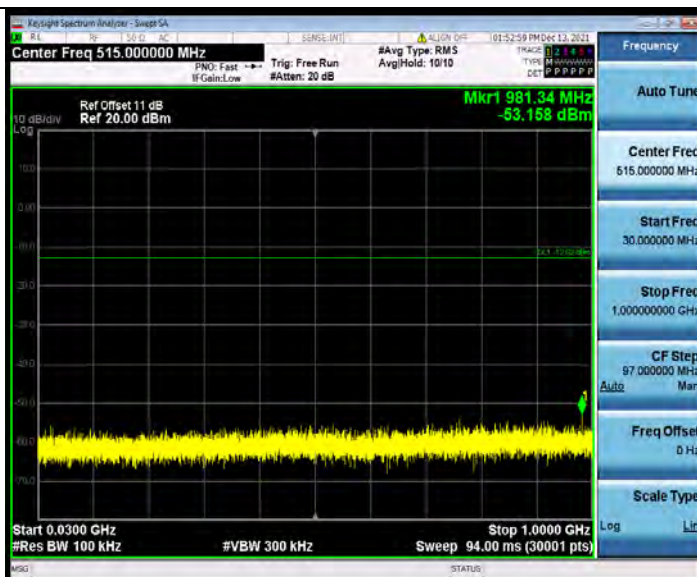


2DH5_Ant1_2402_0~Reference



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VERITAS

Test Report No.: W7L-P21100018-4RF01



2DH5_Ant1_2402_30~1000



2DH5_Ant1_2402_1000~26500



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VERITAS

Test Report No.: W7L-P21100018-4RF01



2DH5_Ant1_2441_0~Reference



2DH5_Ant1_2441_30~1000



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VERITAS

Test Report No.: W7L-P21100018-4RF01



2DH5_Ant1_2441_1000~26500

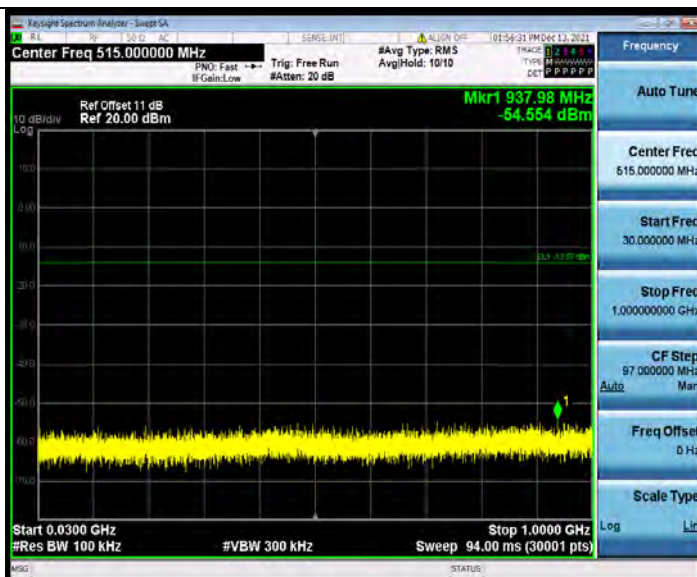


2DH5_Ant1_2480_0~Reference



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VERITAS

Test Report No.: W7L-P21100018-4RF01



2DH5_Ant1_2480_30~1000



2DH5_Ant1_2480_1000~26500



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VERITAS

Test Report No.: W7L-P21100018-4RF01



3DH5_Ant1_2402_0~Reference



3DH5_Ant1_2402_30~1000



BUREAU
VERITAS

Test Report No.: W7L-P21100018-4RF01



3DH5_Ant1_2402_1000~26500

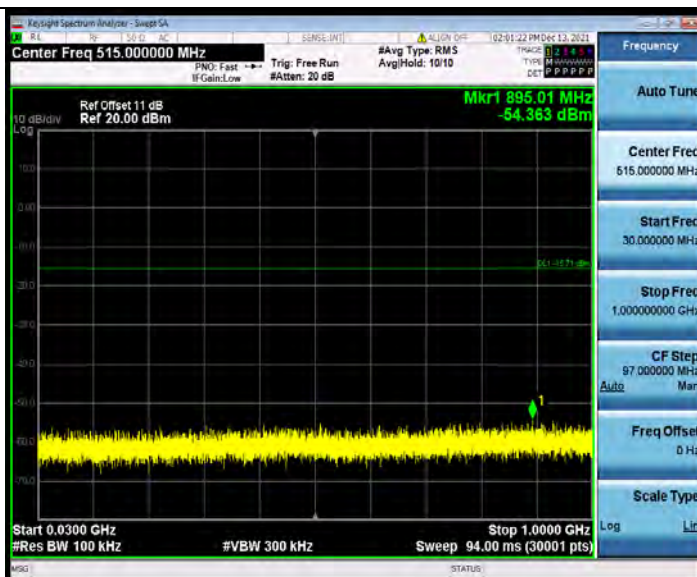


3DH5_Ant1_2441_0~Reference

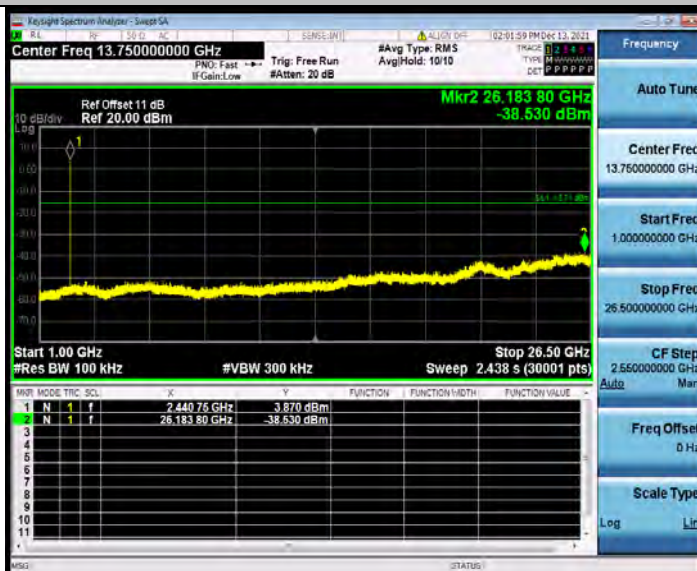


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Test Report No.: W7L-P21100018-4RF01



3DH5_Ant1_2441_30~1000



3DH5_Ant1_2441_1000~26500



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VERITAS

Test Report No.: W7L-P21100018-4RF01



3DH5_Ant1_2480_0~Reference



3DH5_Ant1_2480_30~1000

[illegible]

3DH5_Ant1_2480_1000~26500



Test Report No.: W7L-P21100018-4RF01

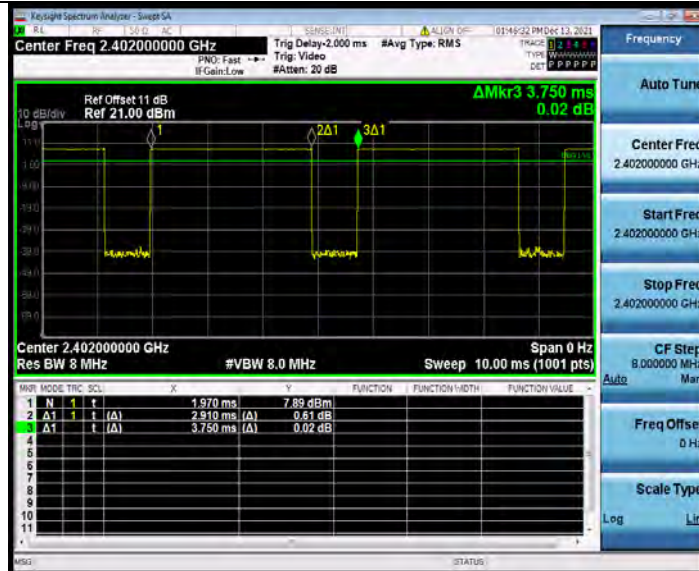


APPENDIX I: DUTY CYCLE

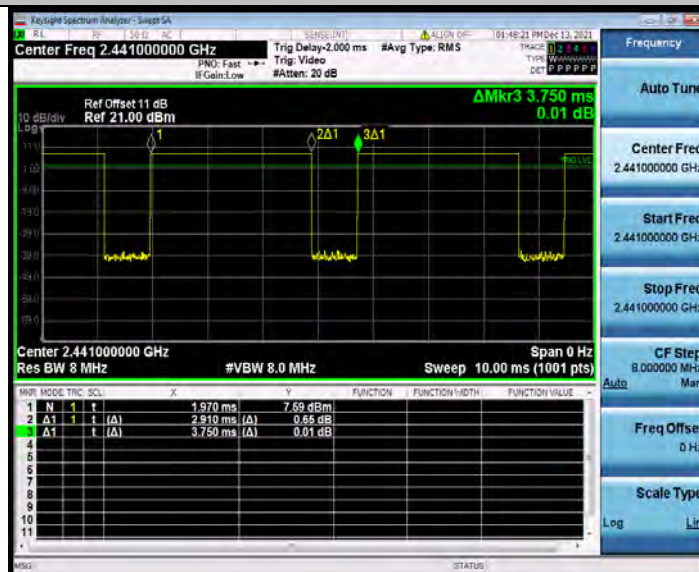
TEST RESULT

TestMode	Antenna	Channel	ON Time [ms]	Period [ms]	X	DC [%]	xFactor	Limit	Verdict
DH5	Ant1	2402	2.91	3.75	0.7760	77.60	1.10	---	PASS
		2441	2.91	3.75	0.7760	77.60	1.10	---	PASS
		2480	2.91	3.75	0.7760	77.60	1.10	---	PASS
2DH5	Ant1	2402	2.90	3.75	0.7733	77.33	1.12	---	PASS
		2441	2.90	3.75	0.7733	77.33	1.12	---	PASS
		2480	2.90	3.75	0.7733	77.33	1.12	---	PASS
3DH5	Ant1	2402	2.90	3.75	0.7733	77.33	1.12	---	PASS
		2441	2.90	3.75	0.7733	77.33	1.12	---	PASS
		2480	2.90	3.75	0.7733	77.33	1.12	---	PASS

TEST GRAPHS



DH5_Ant1_2402

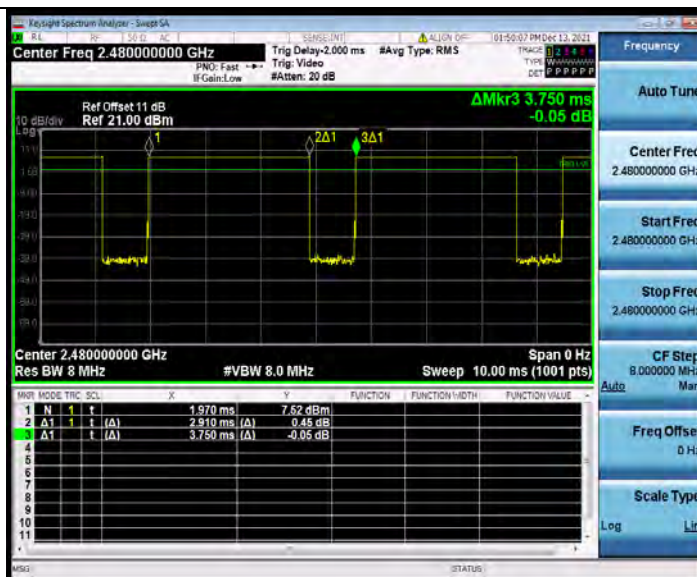


DH5_Ant1_2441

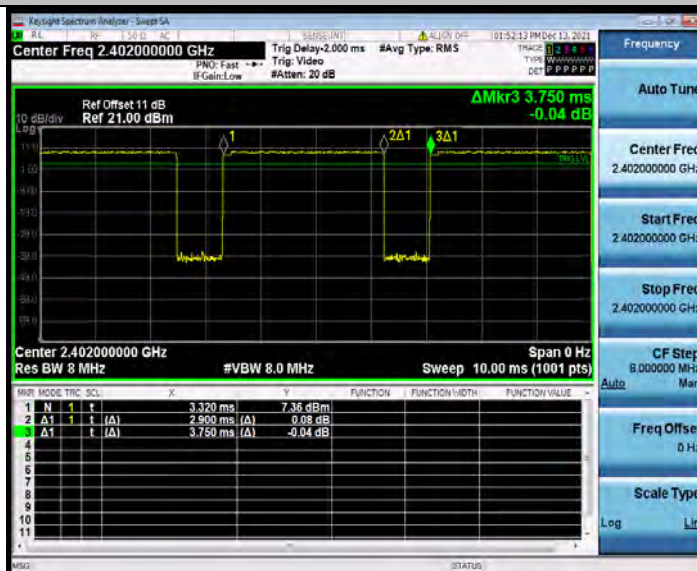


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VERITAS

Test Report No.: W7L-P21100018-4RF01



DH5_Ant1_2480

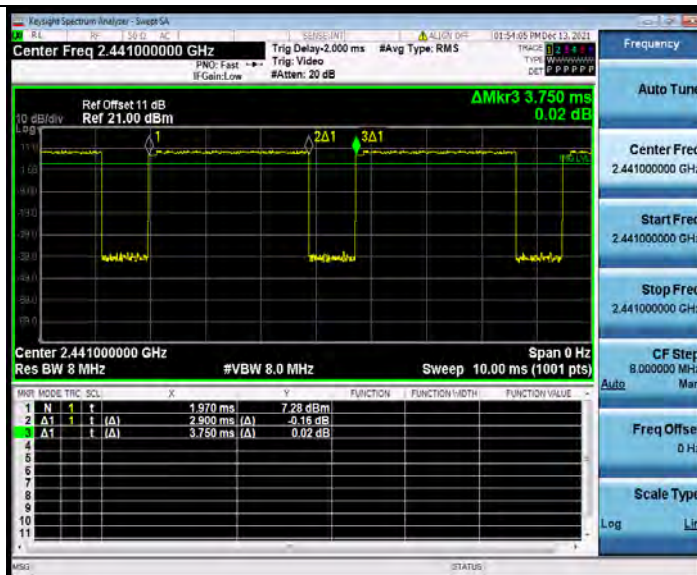


2DH5_Ant1_2402

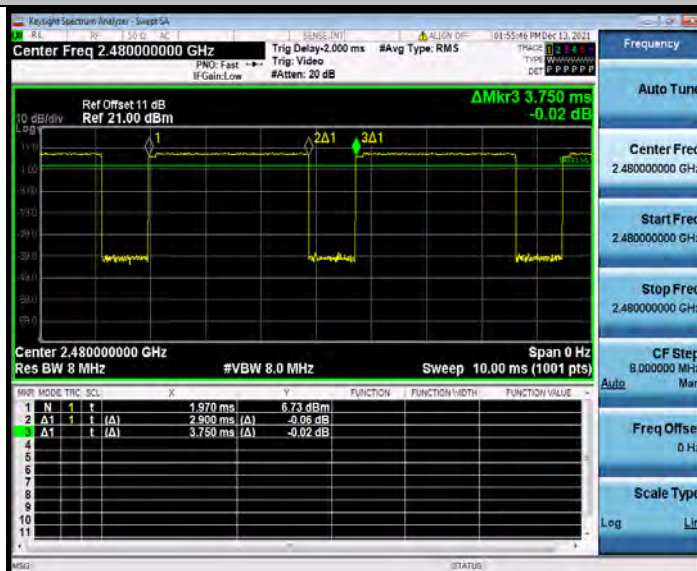


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VERITAS

Test Report No.: W7L-P21100018-4RF01



2DH5_Ant1_2441

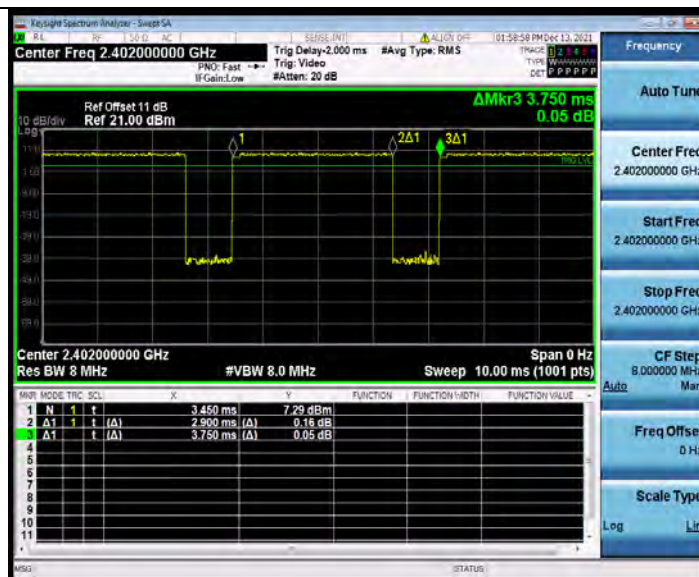


2DH5_Ant1_2480

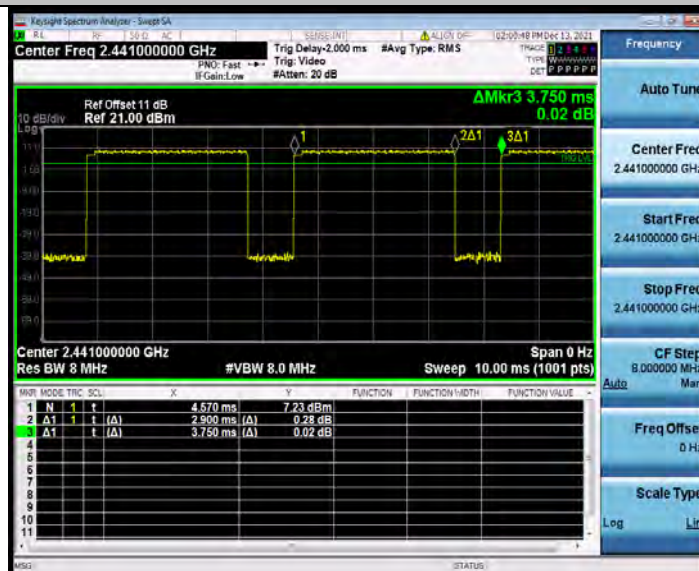


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VERITAS

Test Report No.: W7L-P21100018-4RF01



3DH5_Ant1_2402

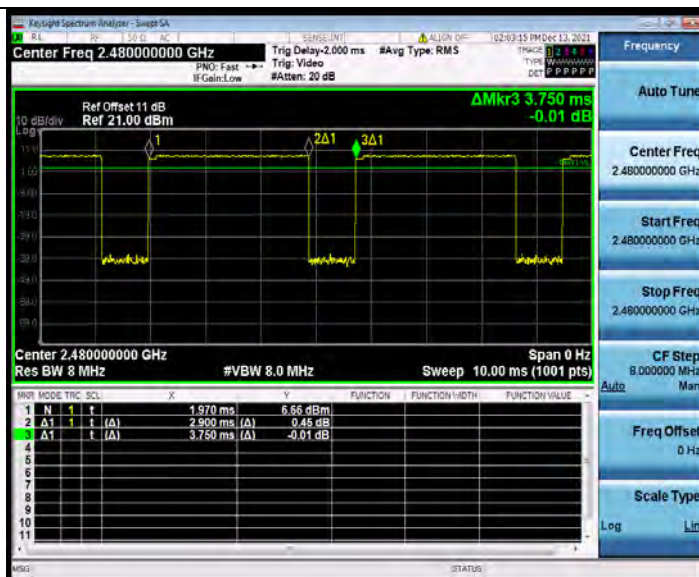


3DH5_Ant1_2441



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VERITAS

Test Report No.: W7L-P21100018-4RF01



3DH5_Ant1_2480