

FCC TEST REPORT

(Part 15, Subpart C)

Applicant:	Marquardt GmbH
Address:	Schloss-str.16,78604 Rietheim-Weilheim,Germany

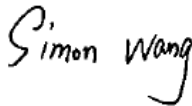
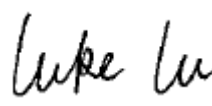
Manufacturer or Supplier:	Marquardt GmbH
Address:	Schloss-str.16,78604 Rietheim-Weilheim,Germany
Product:	BNCM
Brand Name:	Marquardt
Model Name:	GE1
FCC ID:	IYZGE1
Date of tests:	Apr. 24, 2023 ~ May. 17, 2023

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: May. 17, 2023	 Date: May. 17, 2023

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



TABLE OF CONTENTS

RELEASE CONTROL RECORD	4
1 SUMMARY OF TEST RESULTS.....	5
1.1 MEASUREMENT UNCERTAINTY	6
2 GENERAL INFORMATION	7
2.1 GENERAL DESCRIPTION OF EUT	7
2.2 DESCRIPTION OF TEST MODES	8
2.2.1 CONFIGURATION OF SYSTEM UNDER TEST	9
2.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL.....	9
2.3 DUTY CYCLE OF TEST SIGNAL	12
2.4 GENERAL DESCRIPTION OF APPLIED STANDARDS	13
2.5 DESCRIPTION OF SUPPORT UNITS	13
3 TEST TYPES AND RESULTS.....	14
3.1 CONDUCTED EMISSION MEASUREMENT	14
3.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT	14
3.1.2 TEST INSTRUMENTS.....	14
3.1.3 TEST PROCEDURES	15
3.1.4 DEVIATION FROM TEST STANDARD	15
3.1.5 TEST SETUP	16
3.1.6 EUT OPERATING CONDITIONS	16
3.1.7 TEST RESULTS	17
3.2 RADIATED EMISSION MEASUREMENT	19
3.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT	19
3.2.2 TEST INSTRUMENTS.....	20
3.2.3 TEST PROCEDURES	21
3.2.4 DEVIATION FROM TEST STANDARD	21
3.2.5 TEST SETUP	22
3.2.6 EUT OPERATING CONDITIONS	23
3.2.7 TEST RESULTS	24
3.3 6 DB BANDWIDTH MEASUREMENT	36
3.3.1 LIMITS OF 6DB BANDWIDTH MEASUREMENT	36
3.3.2 TEST INSTRUMENTS.....	36
3.3.3 TEST PROCEDURE.....	36
3.3.4 DEVIATION FROM TEST STANDARD	37
3.3.5 TEST SETUP	37



3.3.6	EUT OPERATING CONDITIONS	37
3.3.7	TEST RESULTS	38
3.4	CONDUCTED OUTPUT POWER.....	39
3.4.1	LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT	39
3.4.2	TEST SETUP	39
3.4.3	TEST INSTRUMENTS.....	39
3.4.4	TEST PROCEDURES	39
3.4.5	DEVIATION FROM TEST STANDARD	39
3.4.6	EUT OPERATING CONDITIONS	39
3.4.7	TEST RESULTS	40
3.4.7.1	MAXIMUM PEAK OUTPUT POWER	40
3.4.7.2	AVERAGE OUTPUT POWER (FOR REFERENCE).....	41
3.5	POWER SPECTRAL DENSITY MEASUREMENT	42
3.5.1	LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT	42
3.5.2	TEST SETUP	42
3.5.3	TEST INSTRUMENTS.....	42
3.5.4	TEST PROCEDURE.....	42
3.5.5	DEVIATION FROM TEST STANDARD	42
3.5.6	EUT OPERATING CONDITION	42
3.5.7	TEST RESULTS	43
3.6	OUT OF BAND EMISSION MEASUREMENT	44
3.6.1	LIMITS OF OUT OF BAND EMISSION MEASUREMENT	44
3.6.2	TEST SETUP	44
3.6.3	TEST INSTRUMENTS.....	44
3.6.4	TEST PROCEDURE.....	44
3.6.5	DEVIATION FROM TEST STANDARD	45
3.6.6	EUT OPERATING CONDITION	45
3.6.7	TEST RESULTS	45
3.7	ANTENNA REQUIREMENTS.....	46
3.7.1	STANDARD APPLICABLE	46
3.7.2	ANTENNA CONNECTED CONSTRUCTION	46
3.7.3	ANTENNA GAIN	46
4	PHOTOGRAPHS OF THE TEST CONFIGURATION	47
5	MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB	48
6	APPENDIX.....	49



**BUREAU
VERITAS**

Test Report No.: W7L-P23040024RF01

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
W7L-P23040024RF01	Original release	May. 17, 2023



1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

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



1.1 MEASUREMENT UNCERTAINTY

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

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

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



2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

PRODUCT	BNCM
BRAND NAME	Marquardt
MODEL NAME	GE1
NOMINAL VOLTAGE	DC12V
MODULATION	GFSK
TRANSMISSION RATE	BT_LE: 1 Mbps/2 Mbps
OPERATING FREQUENCY	2402-2480MHz for BT-LE(GFSK)
MAX. OUTPUT POWER	BT-LE: 5.35mW (Maximum)
ANTENNA TYPE	Aux Antenna with 2.2dBi gain
HW VERSION	1014222
SW VERSION	1010923
I/O PORTS	Refer to user's manual
CABLE SUPPLIED	N/A

NOTE:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. The EUT incorporates a SISO function. Physically, the EUT provides one transmitter and one receiver.

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

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



2.2 DESCRIPTION OF TEST MODES

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

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



2.2.1 CONFIGURATION OF SYSTEM UNDER TEST

Please see section 5 photographs of the test configuration for reference.

2.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

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

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

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

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

RE≥1G: Radiated Emission above 1GHz

PLC: Power Line Conducted Emission

APCM: Antenna Port Conducted Measurement

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

RADIATED EMISSION TEST (BELOW 1GHz):

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)
BT-LE	1 to 38	38	GFSK	2.0

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

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

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

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

POWER LINE CONDUCTED EMISSION TEST

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

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)
BT-LE	1 to 38	38	GFSK	2.0

BANDEDGE MEASUREMENT:

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

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

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

ANTENNA PORT CONDUCTED MEASUREMENT:

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.

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

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

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



**BUREAU
VERITAS**

Test Report No.: W7L-P23040024RF01

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	TEST VOLTAGE	TESTED BY
RE<1G	23deg. C, 70%RH	DC12V	Jace Hu
RE≥1G	23deg. C, 70%RH	DC12V	Jace Hu
PLC	25deg. C, 52%RH	DC12V	Carl Xie
APCM	25deg. C, 60%RH	DC12V	James Fu



2.3 DUTY CYCLE OF TEST SIGNAL

Please Refer to Appendix Of this test report.

WORST-CASE DATA:

Measured Duty Cycle		
Mode		Duty Cycle [%]
		ANT1
BT LE	BT4.0	100
	BT5.0	100

Note:

If Duty cycle of test signal < 98%, the duty factor shall be considered.



2.4 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

FCC Part 15, Subpart C, Section 15.247

KDB 558074 D01 DTS Meas Guidance v05r02

ANSI C63.10-2013

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.

2.5 DESCRIPTION OF SUPPORT UNITS

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

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

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)	
	Quasi-peak	Average
0.15 ~ 0.5	66 to 56	56 to 46
0.5 ~ 5	56	46
5 ~ 30	60	50

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

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

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

3.1.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESR3	101900	Feb. 14,23	Feb. 13,24
EMC32 test software	Rohde&Schwarz	EMC32	NA	NA	NA
LISN network	Rohde&Schwarz	ENV216	101922	Mar. 03,23	Mar. 02,24

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. The FCC Site Registration No. is 525120; The Designation No. is CN1171.



3.1.3 TEST PROCEDURES

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

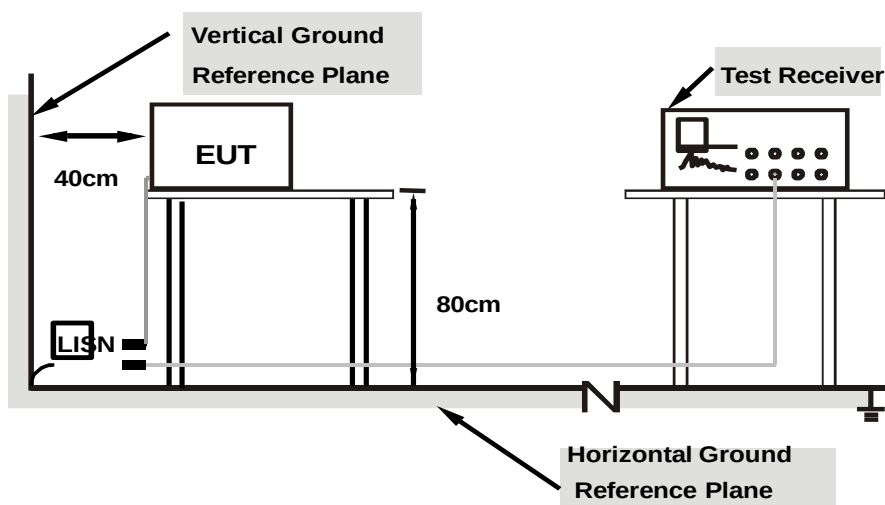
NOTE: All modes of operation were investigated and the worst-case emissions are reported.

3.1.4 DEVIATION FROM TEST STANDARD

No deviation.



3.1.5 TEST SETUP



Note: 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

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

3.1.6 EUT OPERATING CONDITIONS

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



**BUREAU
VERITAS**

Test Report No.: W7L-P23040024RF01

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)
0.158000	---	6.80	55.57	48.77	L1	ON	9.7
0.158000	19.88	---	65.57	45.69	L1	ON	9.7
0.162000	---	6.34	55.36	49.02	L1	ON	9.7
0.162000	19.83	---	65.36	45.53	L1	ON	9.7
0.516000	---	1.91	46.00	44.09	L1	ON	9.7
0.516000	3.68	---	56.00	52.32	L1	ON	9.7
2.556000	---	6.83	46.00	39.17	L1	ON	9.7
2.556000	8.79	---	56.00	47.21	L1	ON	9.7
10.180000	---	21.75	50.00	28.25	L1	ON	9.8
10.180000	21.87	---	60.00	38.13	L1	ON	9.8
18.324000	---	26.06	50.00	23.94	L1	ON	9.8
18.324000	27.19	---	60.00	32.81	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.

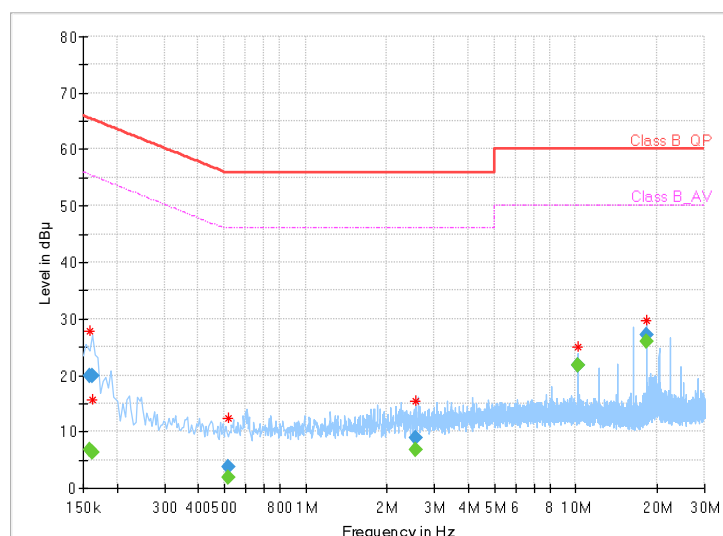
3. The emission levels of other frequencies were very low against the limit.

4. Margin value = Limit value - Emission level

5. Correction factor = Insertion loss + Cable loss

6. Emission Level = Correction Factor + Reading Value.

Full Spectrum





**BUREAU
VERITAS**

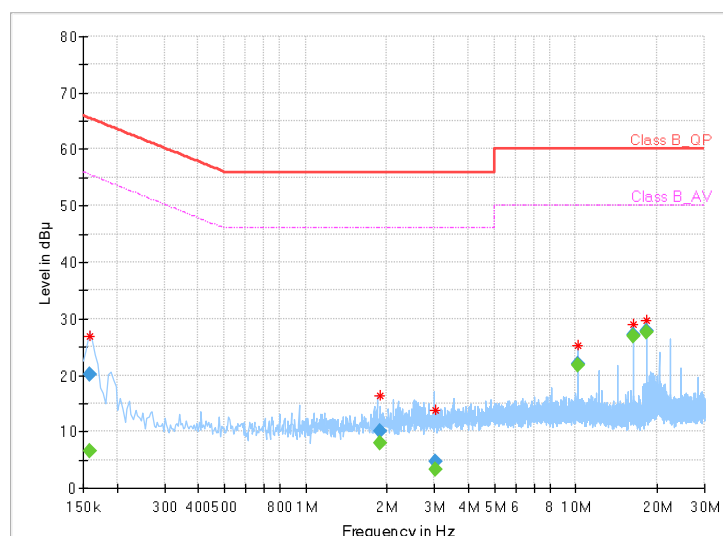
Test Report No.: W7L-P23040024RF01

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)
0.158000	---	6.51	55.57	49.06	N	ON	9.7
0.158000	20.17	---	65.57	45.40	N	ON	9.7
1.882000	---	8.03	46.00	37.97	N	ON	9.8
1.882000	10.07	---	56.00	45.93	N	ON	9.8
3.012000	---	3.23	46.00	42.77	N	ON	9.8
3.012000	4.78	---	56.00	51.22	N	ON	9.8
10.180000	---	21.81	50.00	28.19	N	ON	9.8
10.180000	21.94	---	60.00	38.06	N	ON	9.8
16.288000	---	26.79	50.00	23.21	N	ON	9.8
16.288000	27.20	---	60.00	32.80	N	ON	9.8
18.324000	---	27.60	50.00	22.40	N	ON	9.9
18.324000	27.85	---	60.00	32.15	N	ON	9.9

- 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



BV 7Layers Communications Technology
(Shenzhen) Co., Ltd

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

Tel: +86 755 8869 6566
Fax: +86 755 8869 6577
Email: customerservice.sw@bureauveritas.com



3.2 RADIATED EMISSION MEASUREMENT

3.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

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

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

NOTE:

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



Test Report No.: W7L-P23040024RF01

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. 05,23	Mar. 04,24
Horn Antenna	ETS-LINDGREN	3117	00168692	Mar. 05,23	Mar. 04,24
Horn Antenna (18GHz-40GHz)	N/A	QWH-SL-18-40-K-SG/QMS-00361	15433	Sep.04, 22	Sep.03, 23
Test Software	E3	V 9.160323	N/A	N/A	N/A
Test Software	JS1120-3	3.2.06	N/A	N/A	N/A
10dB Attenuator	JFW/USA	50HF-010-SMA	N/A	May. 12,22	May. 11,23
10dB Attenuator	JFW/USA	50HF-010-SMA	N/A	May. 11,23	May. 10,24
MXE EMI Receiver	KEYSIGHT	N9038A-544	MY54450026	Feb. 20,23	Feb. 19,24
Signal Pre-Amplifier	EMSI	EMC 9135	980249	May.12,22	May.11,23
Signal Pre-Amplifier	EMSI	EMC 9135	980249	May.11,23	May.10,24
Signal Pre-Amplifier	EMSI	EMC 012645B	980257	May.12,22	May.11,23
Signal Pre-Amplifier	EMSI	EMC 012645B	980257	May.11,23	May.10,24
Signal Pre-Amplifier	EMSI	EMC 184045B	980259	Feb. 17,23	Feb. 16,24
DC Source	Kikusui/JP	PMX18-5A	0000001	Aug. 12,22	Aug. 11,23
Power Meter	Anritsu	ML2495A	1506002	Feb. 14,23	Feb. 13,24
Power Sensor	Anritsu	MA2411B	1339352	Feb. 14,23	Feb. 13,24
Loop Antenna	Schwarzbeck	FMZB 1519B	00173	Sep.03,22	Sep.02,23

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

Note:

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

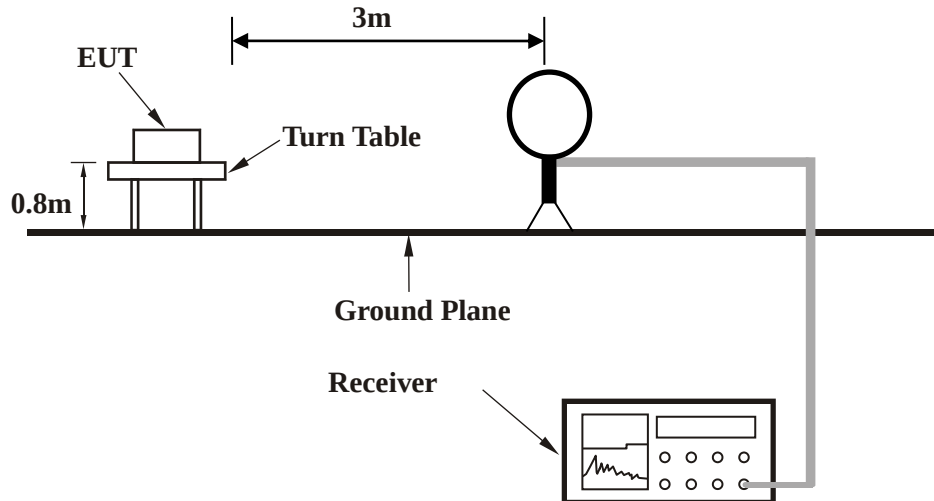
3.2.4 DEVIATION FROM TEST STANDARD

No deviation

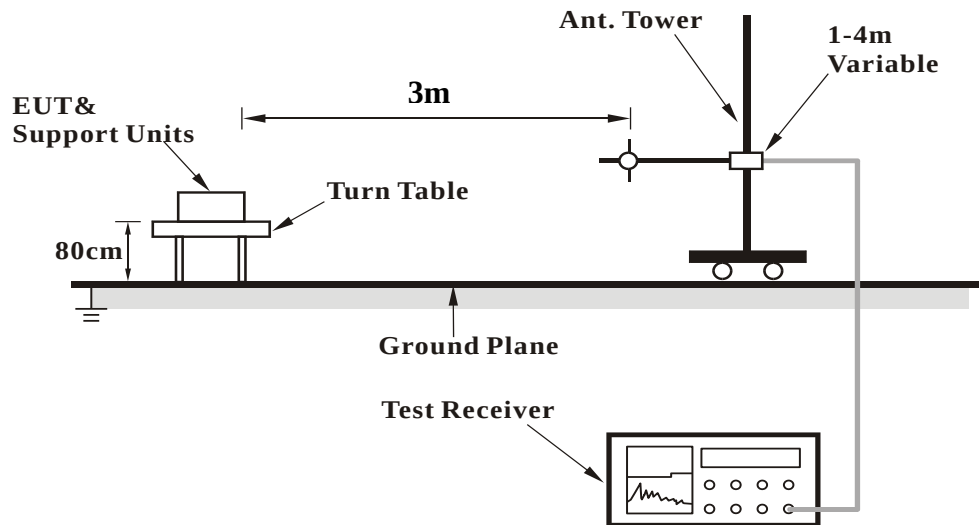


3.2.5 TEST SETUP

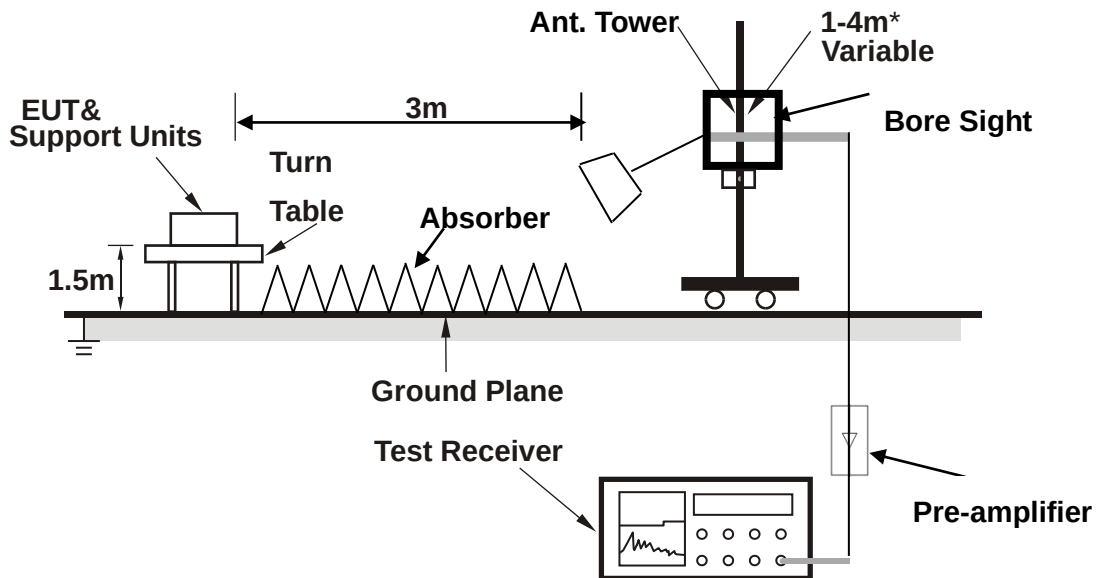
<Frequency Range 9KHz~30MHz >



< Frequency Range 30MHz~1GHz >



<Frequency Range above 1GHz>



Note: Above 1G is a directional antenna

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

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

3.2.6 EUT OPERATING CONDITIONS

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



3.2.7 TEST RESULTS

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

BELOW 1GHz WORST-CASE DATA:

30 MHz – 1GHz data:

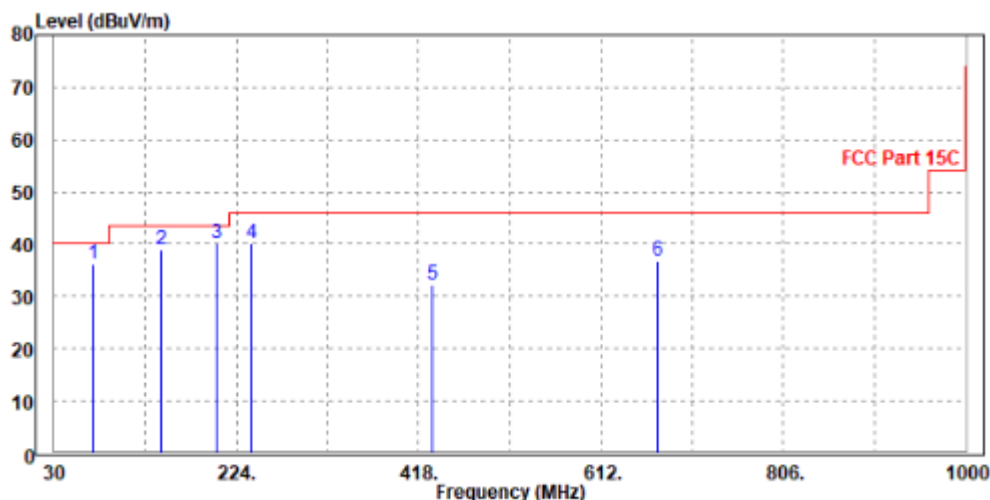
BT-LE _2M

CHANNEL	TX Channel 38	ODETECTOR 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
71.71	36.07	64.86	40	-3.93	7.7	0.47	36.96	106	258	QP
144.46	38.85	65.42	43.5	-4.65	9.37	0.65	36.59	198	205	QP
203.63	40.03	64.12	43.5	-3.47	11.46	0.74	36.29	107	84	QP
240.49	40.06	62.45	46	-5.94	13.08	0.81	36.28	154	211	QP
431.58	32.14	50.7	46	-13.86	16.8	1.12	36.48	186	18	QP
672.14	36.66	51.26	46	-9.34	21.07	1.44	37.11	163	197	QP

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(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





BUREAU
VERITAS

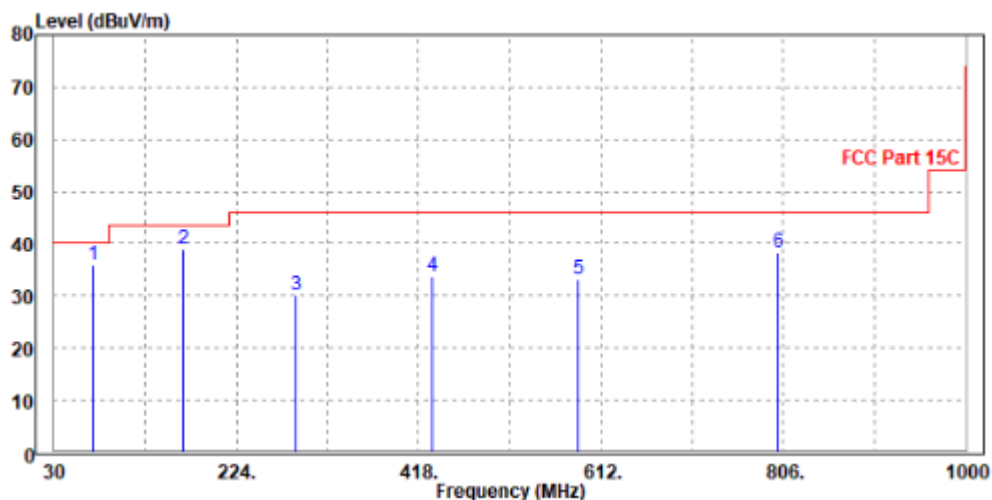
Test Report No.: W7L-P23040024RF01

CHANNEL	TX Channel 38	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
71.71	36.02	64.5	40	-3.98	8.01	0.47	36.96	151	260	QP
167.74	39	63.75	43.5	-4.5	11.02	0.69	36.46	114	101	QP
288.02	30.01	51.72	46	-15.99	13.66	0.89	36.26	123	43	QP
431.58	33.72	52.37	46	-12.28	16.71	1.12	36.48	184	313	QP
587.75	33.09	49.22	46	-12.91	19.35	1.34	36.82	124	18	QP
800.18	38.29	52.31	46	-7.71	21.6	1.58	37.2	160	312	QP

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(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





**BUREAU
VERITAS**

Test Report No.: W7L-P23040024RF01

ABOVE 1GHz TEST DATA:

Note: 1. For radiated emissions testing , the full testing range of different modes have been scanned , only the worst case harmonic data is reported in the sheet.

2. All other emissions were greater than 20dB below the limit was not recorded

BT-LE _1M

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

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	49.28	57.32	74	-24.72	31.75	6.18	45.97	188	318	Peak
2390	41.98	50.02	54	-12.02	31.75	6.18	45.97	188	318	Average
2402	104.31	112.3	/	/	31.79	6.19	45.97	188	318	Peak
2402	104.18	112.17	/	/	31.79	6.19	45.97	188	318	Average
2483.5	49.59	57.16	74	-24.41	32.05	6.31	45.93	188	318	Peak
2483.5	42.79	50.36	54	-11.21	32.05	6.31	45.93	188	318	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	49.73	57.38	74	-24.27	32.14	6.18	45.97	100	195	Peak
2390	43.07	50.72	54	-10.93	32.14	6.18	45.97	100	195	Average
2402	101.96	109.58	/	/	32.16	6.19	45.97	100	195	Peak
2402	101.79	109.41	/	/	32.16	6.19	45.97	100	195	Average
2483.5	50.47	57.73	74	-23.53	32.36	6.31	45.93	100	195	Peak
2483.5	43.04	50.3	54	-10.96	32.36	6.31	45.93	100	195	Average

REMARKS:

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



**BUREAU
VERITAS**

Test Report No.: W7L-P23040024RF01

CHANNEL	TX Channel 19	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	50.62	58.66	74	-23.38	31.75	6.18	45.97	168	245	Peak
2390	42.45	50.49	54	-11.55	31.75	6.18	45.97	168	245	Average
2440	103.58	111.37	/	/	31.91	6.25	45.95	168	245	Peak
2440	103.41	111.2	/	/	31.91	6.25	45.95	168	245	Average
2483.5	49.65	57.22	74	-24.35	32.05	6.31	45.93	168	245	Peak
2483.5	43.52	51.09	54	-10.48	32.05	6.31	45.93	168	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	50.66	58.31	74	-23.34	32.14	6.18	45.97	100	195	Peak
2390	43.02	50.67	54	-10.98	32.14	6.18	45.97	100	195	Average
2440	98.35	105.79	/	/	32.26	6.25	45.95	100	195	Peak
2440	98.25	105.69	/	/	32.26	6.25	45.95	100	195	Average
2483.5	50.4	57.66	74	-23.6	32.36	6.31	45.93	100	195	Peak
2483.5	43.13	50.39	54	-10.87	32.36	6.31	45.93	100	195	Average

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
2. 2440MHz: Fundamental frequency.



**BUREAU
VERITAS**

Test Report No.: W7L-P23040024RF01

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	49.69	57.73	74	-24.31	31.75	6.18	45.97	165	240	Peak
2390	42.2	50.24	54	-11.8	31.75	6.18	45.97	165	240	Average
2480	101.9	109.49	/	/	32.04	6.3	45.93	165	240	Peak
2480	101.77	109.36	/	/	32.04	6.3	45.93	165	240	Average
2483.5	50.97	58.54	74	-23.03	32.05	6.31	45.93	165	240	Peak
2483.5	43.23	50.8	54	-10.77	32.05	6.31	45.93	165	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	51.49	59.14	74	-22.51	32.14	6.18	45.97	123	180	Peak
2390	42.69	50.34	54	-11.31	32.14	6.18	45.97	123	180	Average
2480	96.53	103.81	/	/	32.35	6.3	45.93	123	180	Peak
2480	96.4	103.68	/	/	32.35	6.3	45.93	123	180	Average
2483.5	51.16	58.42	74	-22.84	32.36	6.31	45.93	123	180	Peak
2483.5	42.88	50.14	54	-11.12	32.36	6.31	45.93	123	180	Average

REMARKS:

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



**BUREAU
VERITAS**

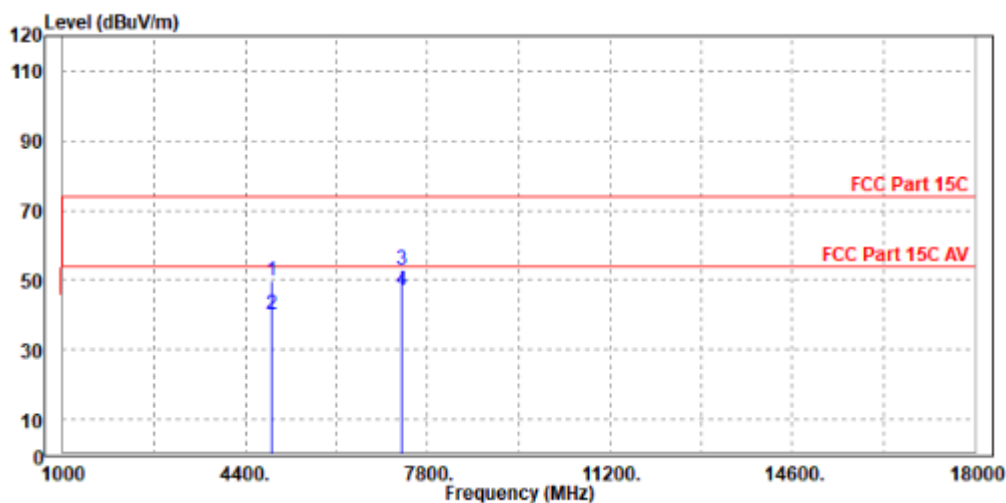
Test Report No.: W7L-P23040024RF01

Worst case harmonic:

CHANNEL	TX Channel 19	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBuV/m	dBuV	dBuV/m	dB	dB/m		
1	4876.000	49.86	51.19	74.00	-24.14	-1.33	Peak	Horizontal
2	4876.000	40.26	41.59	54.00	-13.74	-1.33	Average	Horizontal
3 PK	7320.000	53.11	51.25	74.00	-20.89	1.86	Peak	Horizontal
4 PP	7320.000	46.78	44.92	54.00	-7.22	1.86	Average	Horizontal



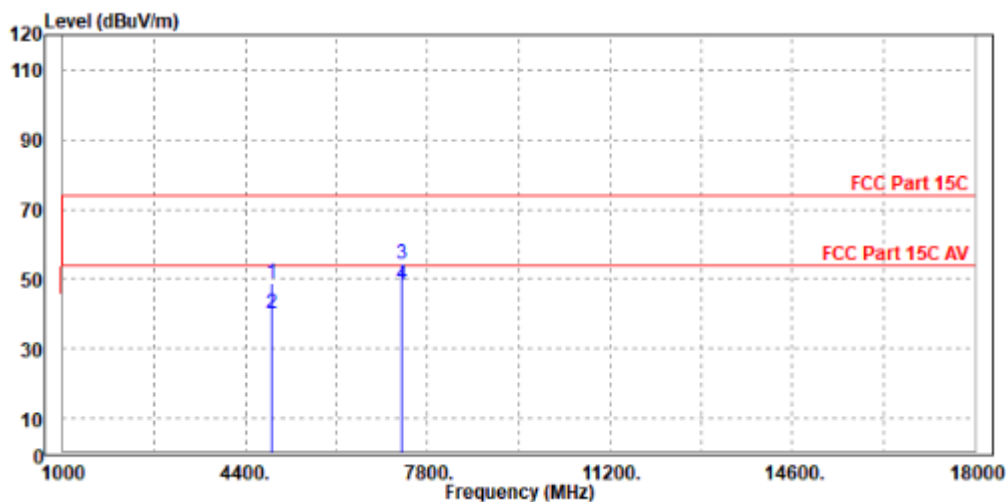


**BUREAU
VERITAS**

Test Report No.: W7L-P23040024RF01

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBuV/m	dBuV	dBuV/m	dB	dB/m		
1	4880.000	48.78	49.90	74.00	-25.22	-1.12	Peak	Vertical
2	4880.000	40.13	41.25	54.00	-13.87	-1.12	Average	Vertical
3 PK	7324.000	54.24	52.31	74.00	-19.76	1.93	Peak	Vertical
4 PP	7324.000	48.25	46.32	54.00	-5.75	1.93	Average	Vertical



REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
2. 2440MHz: Fundamental frequency.
3. For frequency above 18GHz, the emission was tested 20db below the limit so the data not recorded in the sheet



**BUREAU
VERITAS**

Test Report No.: W7L-P23040024RF01

BT-LE _2M

CHANNEL	TX Channel 1	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	49.2	57.24	74	-24.8	31.75	6.18	45.97	318	188	Peak
2390	42.1	50.14	54	-11.9	31.75	6.18	45.97	318	188	Average
2404	104	111.98	/	/	31.79	6.2	45.97	318	188	Peak
2404	102.8	110.78	/	/	31.79	6.2	45.97	318	188	Average
2483.5	49.77	57.34	74	-24.23	32.05	6.31	45.93	318	188	Peak
2483.5	42.48	50.05	54	-11.52	32.05	6.31	45.93	318	188	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	49.53	57.18	74	-24.47	32.14	6.18	45.97	100	180	Peak
2390	43.07	50.72	54	-10.93	32.14	6.18	45.97	100	180	Average
2404	101.14	108.74	/	/	32.17	6.2	45.97	100	180	Peak
2404	99.87	107.47	/	/	32.17	6.2	45.97	100	180	Average
2483.5	51.33	58.59	74	-22.67	32.36	6.31	45.93	100	180	Peak
2483.5	43.24	50.5	54	-10.76	32.36	6.31	45.93	100	180	Average

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
2. 2404MHz: Fundamental frequency.



**BUREAU
VERITAS**

Test Report No.: W7L-P23040024RF01

CHANNEL	TX Channel 19	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	49.82	57.86	74	-24.18	31.75	6.18	45.97	168	245	Peak
2390	42.14	50.18	54	-11.86	31.75	6.18	45.97	168	245	Average
2440	103.38	111.17	/	/	31.91	6.25	45.95	168	245	Peak
2440	102.09	109.88	/	/	31.91	6.25	45.95	168	245	Average
2483.5	49.52	57.09	74	-24.48	32.05	6.31	45.93	168	245	Peak
2483.5	42.51	50.08	54	-11.49	32.05	6.31	45.93	168	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	49.45	57.1	74	-24.55	32.14	6.18	45.97	100	195	Peak
2390	43.04	50.69	54	-10.96	32.14	6.18	45.97	100	195	Average
2440	98.21	105.65	/	/	32.26	6.25	45.95	100	195	Peak
2440	96.93	104.37	/	/	32.26	6.25	45.95	100	195	Average
2483.5	50.46	57.72	74	-23.54	32.36	6.31	45.93	100	195	Peak
2483.5	42.97	50.23	54	-11.03	32.36	6.31	45.93	100	195	Average

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
2. 2440MHz: Fundamental frequency.



**BUREAU
VERITAS**

Test Report No.: W7L-P23040024RF01

CHANNEL	TX Channel 38	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	49.06	57.1	74	-24.94	31.75	6.18	45.97	165	240	Peak
2390	42.22	50.26	54	-11.78	31.75	6.18	45.97	165	240	Average
2478	102.25	109.85	/	/	32.03	6.3	45.93	165	240	Peak
2478	100.91	108.51	/	/	32.03	6.3	45.93	165	240	Average
2483.5	50.67	58.24	74	-23.33	32.05	6.31	45.93	165	240	Peak
2483.5	42.59	50.16	54	-11.41	32.05	6.31	45.93	165	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	49.66	57.31	74	-24.34	32.14	6.18	45.97	127	180	Peak
2390	43.41	51.06	54	-10.59	32.14	6.18	45.97	127	180	Average
2478	97.37	104.65	/	/	32.35	6.3	45.93	127	180	Peak
2478	95.86	103.14	/	/	32.35	6.3	45.93	127	180	Average
2483.5	50.05	57.31	74	-23.95	32.36	6.31	45.93	127	180	Peak
2483.5	43.63	50.89	54	-10.37	32.36	6.31	45.93	127	180	Average

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
2. 2478MHz: Fundamental frequency.



**BUREAU
VERITAS**

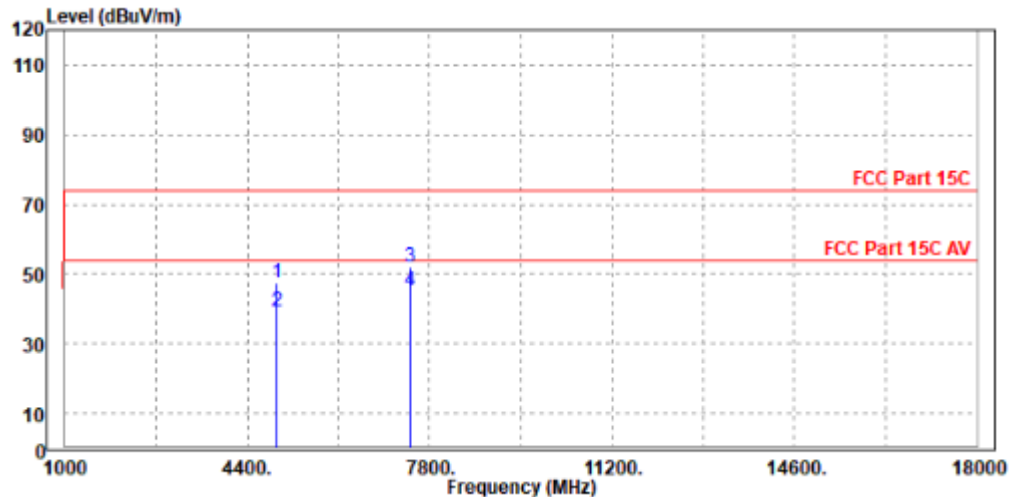
Test Report No.: W7L-P23040024RF01

Worst case harmonic:

CHANNEL	TX Channel 38	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

	Freq	Level	Read	Limit	Over			
	MHz	dBuV/m	Level	Line	Limit	Factor	Remark	Pol/Phase
			dBuV	dBuV/m	dB	dB/m		
1	4956.000	47.61	48.81	74.00	-26.39	-1.20	Peak	Horizontal
2	4956.000	39.35	40.55	54.00	-14.65	-1.20	Average	Horizontal
3 PK	7426.000	52.20	50.23	74.00	-21.80	1.97	Peak	Horizontal
4 PP	7426.000	45.21	43.24	54.00	-8.79	1.97	Average	Horizontal



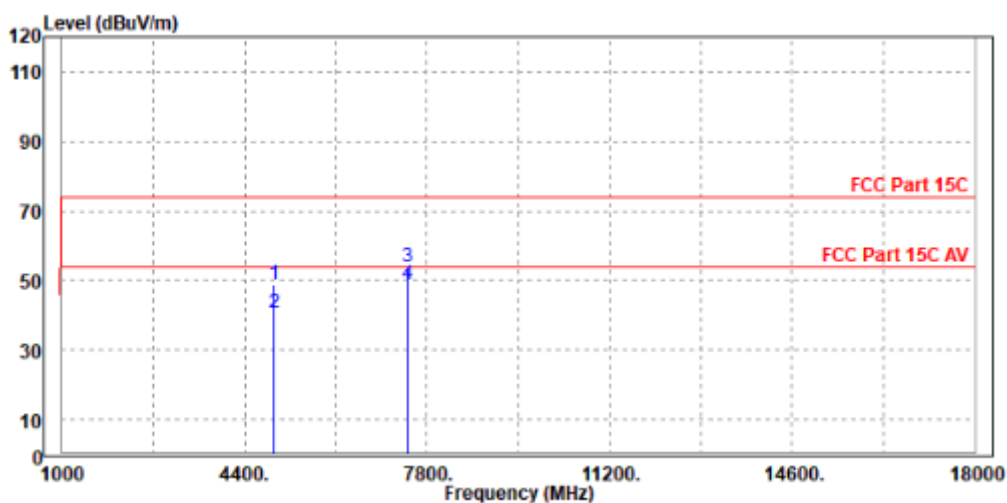


**BUREAU
VERITAS**

Test Report No.: W7L-P23040024RF01

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBuV/m	dBuV	dBuV/m	dB	dB/m		
1	4961.000	48.74	49.73	74.00	-25.26	-0.99	Peak	Vertical
2	4961.000	40.64	41.63	54.00	-13.36	-0.99	Average	Vertical
3	PK 7434.000	53.63	51.63	74.00	-20.37	2.00	Peak	Vertical
4	PP 7434.000	48.94	46.94	54.00	-5.06	2.00	Average	Vertical



REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
2. 2478MHz: Fundamental frequency.
3. For frequency above 18GHz, the emission was tested 20db below the limit so the data not recorded in the sheet



3.3 6 dB BANDWIDTH MEASUREMENT

3.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

3.3.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Power Meter	ANRITSU	ML2495A	1506002	Feb. 14,23	Feb. 13,24
EXA Signal Analyzer	KEYSIGHT	N9010A-526	MY54510322	Feb. 17,23	Feb. 16,24
EXA Signal Analyzer	KEYSIGHT	N9010A-544	MY54510355	May.14,22	May.13,23
EXA Signal Analyzer	KEYSIGHT	N9010A-544	MY54510355	May.13,23	May.12,24
Power Sensor	ANRITSU	MA2411B	1339352	Feb. 14,23	Feb. 13,24

NOTE:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
2. The test was performed in RF Oven room.
3. The FCC Site Registration No. is 525120; The Designation No. is CN1171.

3.3.3 TEST PROCEDURE

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

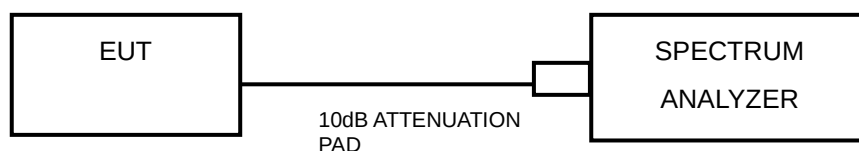


Test Report No.: W7L-P23040024RF01

3.3.4 DEVIATION FROM TEST STANDARD

No deviation.

3.3.5 TEST SETUP



3.3.6 EUT OPERATING CONDITIONS

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



Test Report No.: W7L-P23040024RF01

3.3.7 TEST RESULTS

Please Refer to Appendix Of this test report.

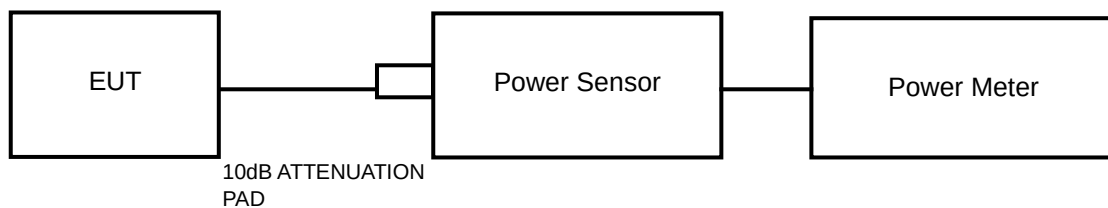


3.4 CONDUCTED OUTPUT POWER

3.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

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

3.4.2 TEST SETUP



3.4.3 TEST INSTRUMENTS

Refer to section 3.3.2 to get information of above instrument.

3.4.4 TEST PROCEDURES

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

3.4.5 DEVIATION FROM TEST STANDARD

No deviation.

3.4.6 EUT OPERATING CONDITIONS

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



Test Report No.: W7L-P23040024RF01

3.4.7 TEST RESULTS

3.4.7.1 MAXIMUM PEAK OUTPUT POWER

Please Refer to Appendix Of this test report.



Test Report No.: W7L-P23040024RF01

3.4.7.2 AVERAGE OUTPUT POWER (FOR REFERENCE)

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

Please Refer to Appendix Of this test report.

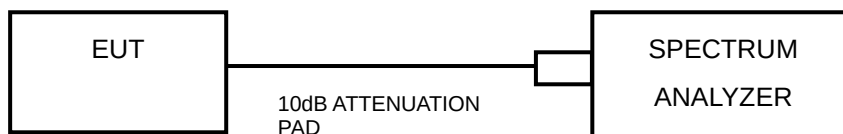


3.5 POWER SPECTRAL DENSITY MEASUREMENT

3.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

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

3.5.2 TEST SETUP



3.5.3 TEST INSTRUMENTS

Refer to section 3.3.2 to get information of above instrument.

3.5.4 TEST PROCEDURE

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

3.5.5 DEVIATION FROM TEST STANDARD

No deviation.

3.5.6 EUT OPERATING CONDITION

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



Test Report No.: W7L-P23040024RF01

3.5.7 TEST RESULTS

Please Refer to Appendix Of this test report.

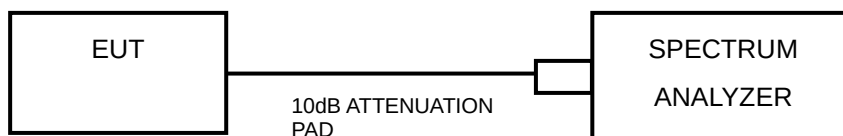


3.6 OUT OF BAND EMISSION MEASUREMENT

3.6.1 LIMITS OF OUT OF BAND EMISSION MEASUREMENT

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

3.6.2 TEST SETUP



3.6.3 TEST INSTRUMENTS

Refer to section 3.3.2 to get information of above instrument.

3.6.4 TEST PROCEDURE

MEASUREMENT PROCEDURE REF

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



MEASUREMENT PROCEDURE OOB

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

3.6.5 DEVIATION FROM TEST STANDARD

No deviation.

3.6.6 EUT OPERATING CONDITION

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

3.6.7 TEST RESULTS

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

Please Refer to Appendix Of this test report.



3.7 ANTENNA REQUIREMENTS

3.7.1 STANDARD APPLICABLE

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

3.7.2 ANTENNA CONNECTED CONSTRUCTION

An embedded-in antenna design is used.

3.7.3 ANTENNA GAIN

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



BUREAU Test Report No.: W7L-P23040024RF01
VERITAS

4 PHOTOGRAPHS OF THE TEST CONFIGURATION

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



Test Report No.: W7L-P23040024RF01

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

DTS BANDWIDTH

TEST RESULT

TestMode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.652	2401.696	2402.348	0.5	PASS
		2440	0.704	2439.664	2440.368	0.5	PASS
		2480	0.660	2479.688	2480.348	0.5	PASS
BLE_2M	Ant1	2404	1.380	2403.344	2404.724	0.5	PASS
		2440	1.296	2439.360	2440.656	0.5	PASS
		2478	1.408	2477.332	2478.740	0.5	PASS

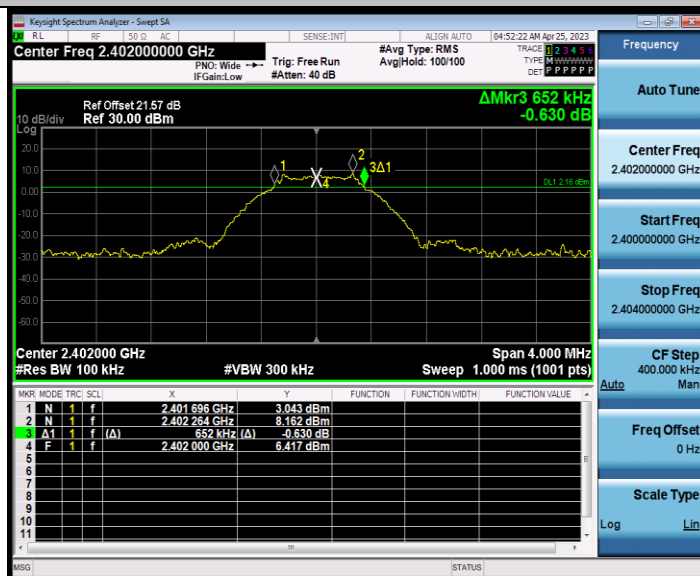


BUREAU
VERITAS

Test Report No.: W7L-P23040024RF01

TEST GRAPHS

BLE_1M_Ant1_2402



BLE_1M_Ant1_2440

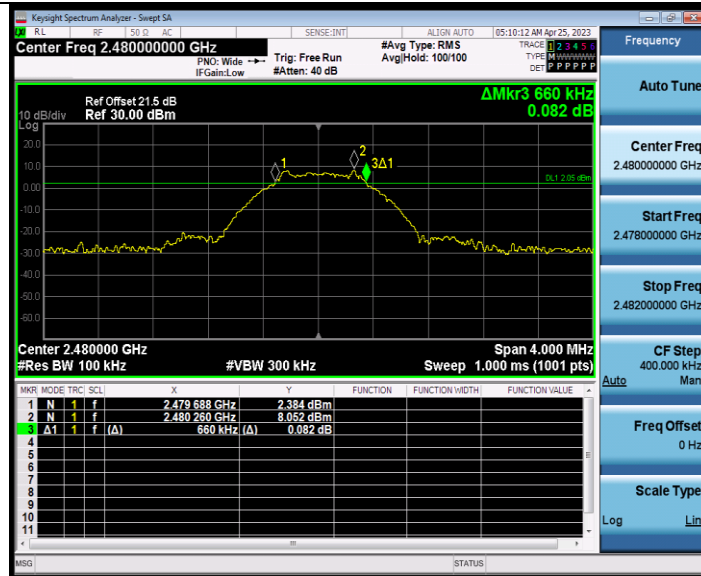


BLE_1M_Ant1_2480



BUREAU
VERITAS

Test Report No.: W7L-P23040024RF01



BLE_2M_Ant1_2404

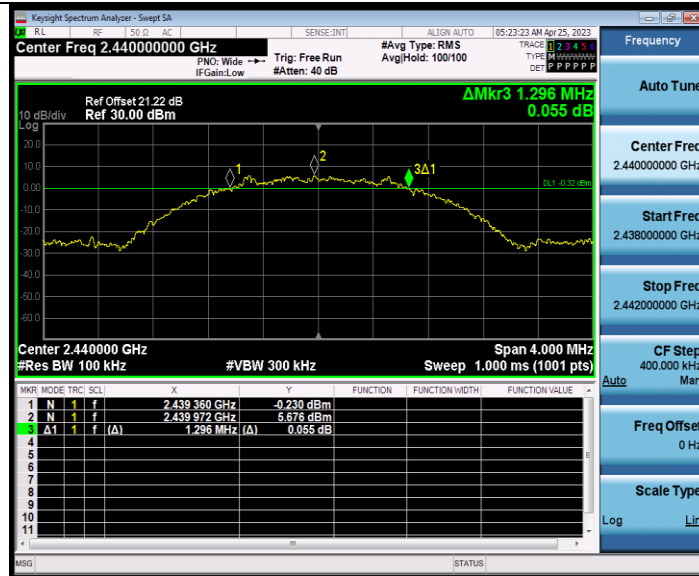


BLE_2M_Ant1_2440

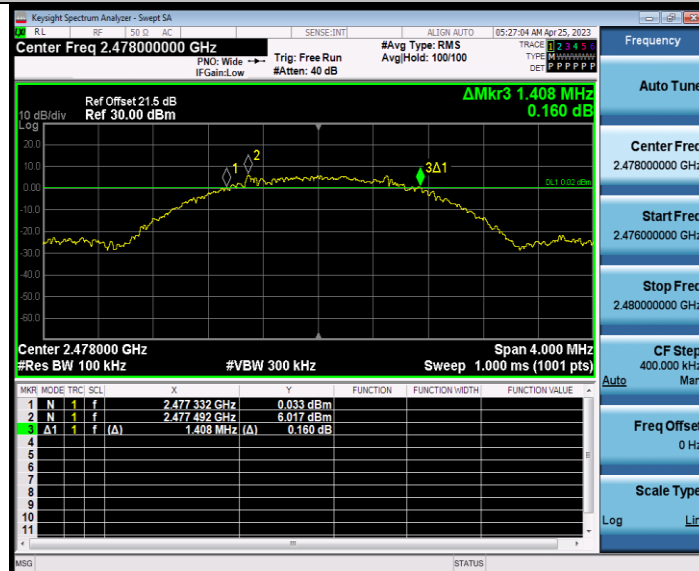


BUREAU
VERITAS

Test Report No.: W7L-P23040024RF01



BLE_2M_Ant1_2478





Test Report No.: W7L-P23040024RF01

OCCUPIED CHANNEL BANDWIDTH

TEST RESULT

TestMode	Antenna	Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	1.0258	2401.4987	2402.5245	---	---
		2440	1.0451	2439.4920	2440.5371	---	---
		2480	1.0523	2479.4927	2480.5450	---	---
BLE_2M	Ant1	2404	2.0458	2402.9933	2405.0391	---	---
		2440	2.0730	2438.9745	2441.0475	---	---
		2478	2.0448	2476.9923	2479.0371	---	---



BUREAU
VERITAS

Test Report No.: W7L-P23040024RF01

TEST GRAPHS

BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480



BUREAU
VERITAS

Test Report No.: W7L-P23040024RF01



BLE_2M_Ant1_2404



BLE_2M_Ant1_2440



BUREAU
VERITAS

Test Report No.: W7L-P23040024RF01



BLE_2M_Ant1_2478



**MAXIMUM CONDUCTED OUTPUT POWER****TEST GRAPHS**

TestMode	Antenna	Channel	Average power [dBm]	Peak power [dBm]	Peak power [mw]	Conducted Limit [dBm]	EIRP [dBm]	EIRP [mw]	EIRP Limit [dBm]	Verdict	Power Setting
BLE_1M	Ant1	2402	7.02	7.16	5.20	≤30	9.46	8.83	≤36	PASS	22
		2440	7.14	7.25	5.31	≤30	9.55	9.02	≤36	PASS	21
		2480	7.11	7.24	5.30	≤30	9.54	8.99	≤36	PASS	21
BLE_2M	Ant1	2404	7.01	7.17	5.21	≤30	9.47	8.85	≤36	PASS	21
		2440	7.16	7.28	5.35	≤30	9.58	9.08	≤36	PASS	21
		2478	7.13	7.25	5.31	≤30	9.55	9.02	≤36	PASS	21

Note:EIRP=Peak Power+Gain



Test Report No.: W7L-P23040024RF01

MAXIMUM POWER SPECTRAL DENSITY

TEST RESULT

TestMode	Antenna	Frequency[MHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-4.26	≤8.00	PASS
		2440	-4.96	≤8.00	PASS
		2480	-4.61	≤8.00	PASS
BLE_2M	Ant1	2404	-7.35	≤8.00	PASS
		2440	-7.55	≤8.00	PASS
		2478	-7.27	≤8.00	PASS

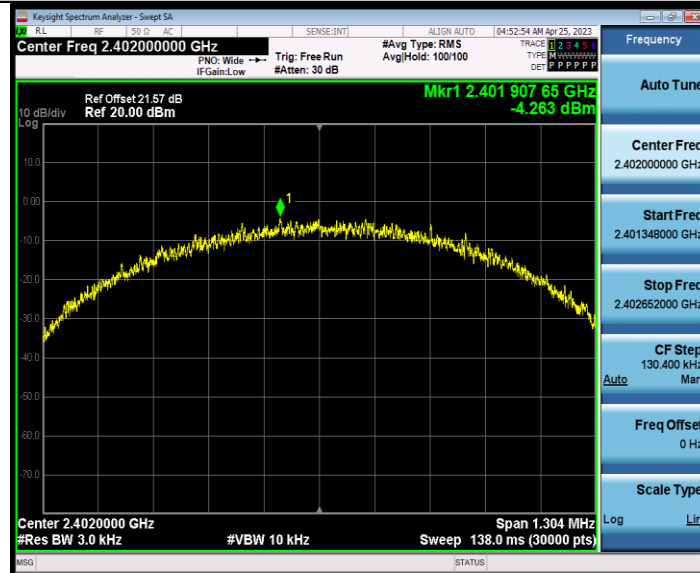


BUREAU
VERITAS

Test Report No.: W7L-P23040024RF01

TEST GRAPHS

BLE_1M_Ant1_2402



BLE_1M_Ant1_2440

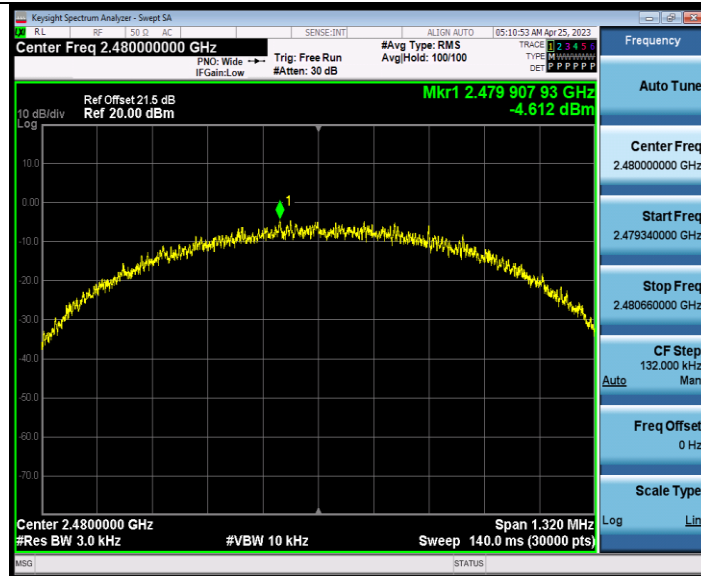


BLE_1M_Ant1_2480



BUREAU
VERITAS

Test Report No.: W7L-P23040024RF01



BLE_2M_Ant1_2404

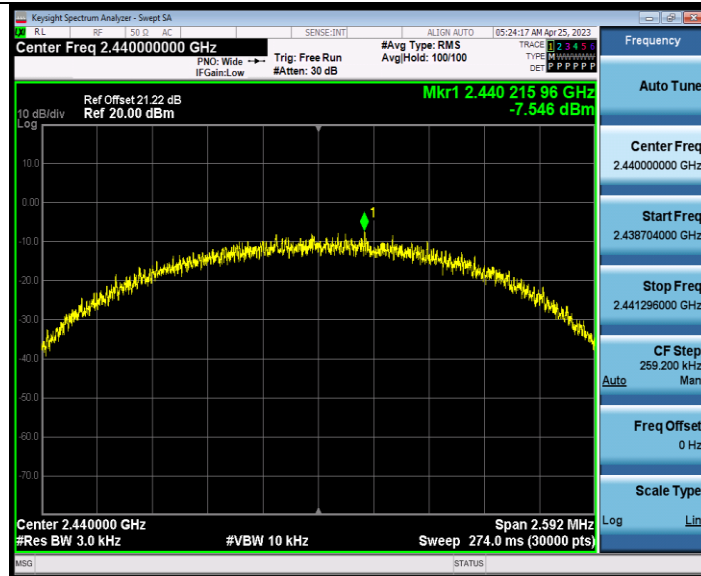


BLE_2M_Ant1_2440



BUREAU
VERITAS

Test Report No.: W7L-P23040024RF01



BLE_2M_Ant1_2478





Test Report No.: W7L-P23040024RF01

BAND EDGE MEASUREMENTS

TEST RESULT

TestMode	Antenna	ChName	Frequency[MHz]	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	7.57	-34.55	≤ -12.43	PASS
		High	2480	7.26	-34.42	≤ -12.74	PASS
BLE_2M	Ant1	Low	2404	6.52	-34.18	≤ -13.48	PASS
		High	2478	5.73	-34.05	≤ -14.27	PASS

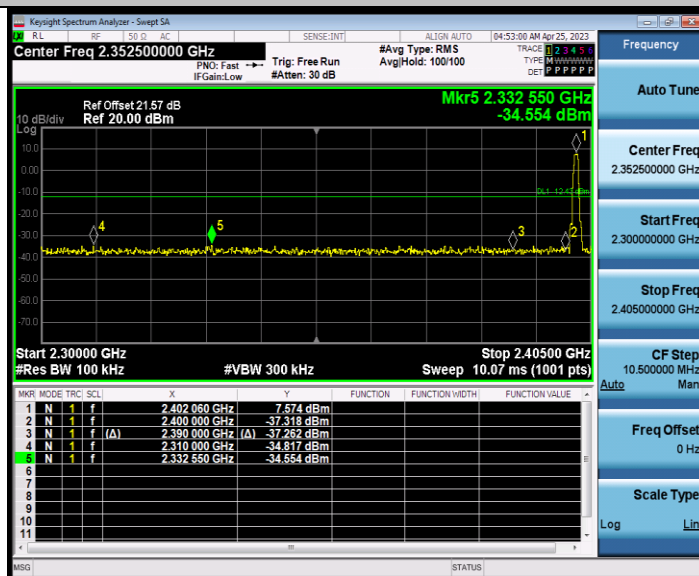


BUREAU
VERITAS

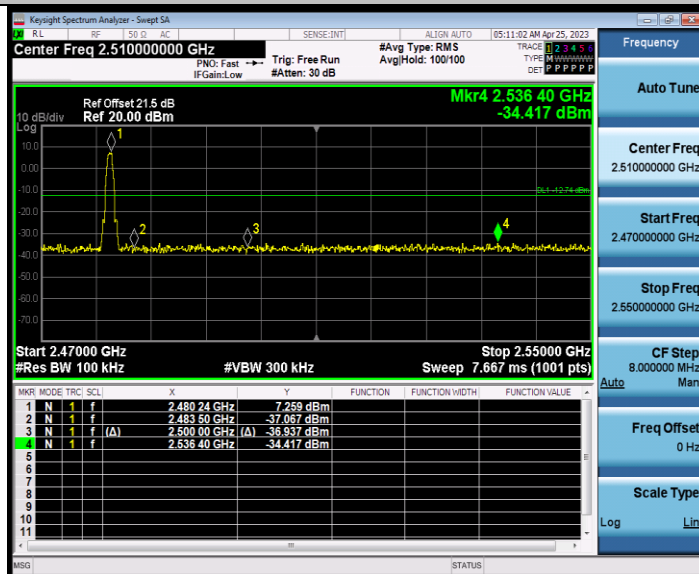
Test Report No.: W7L-P23040024RF01

TEST GRAPHS

BLE_1M_Ant1_Low_2402



BLE_1M_Ant1_High_2480

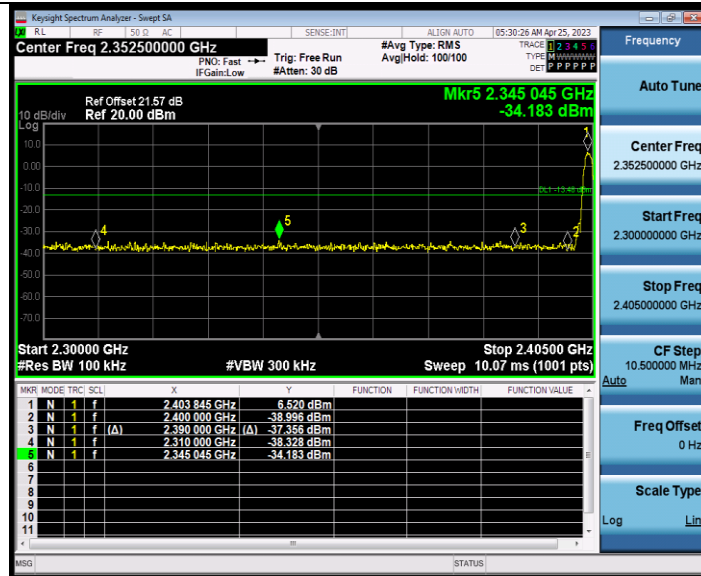


BLE_2M_Ant1_Low_2404

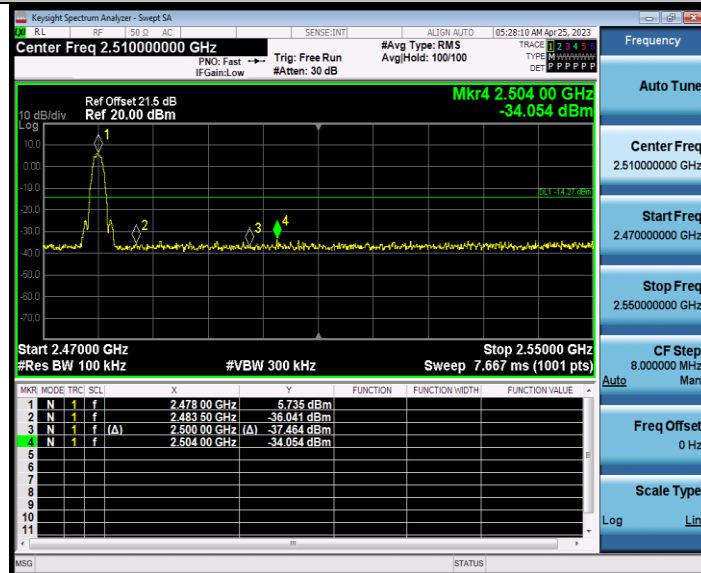


BUREAU
VERITAS

Test Report No.: W7L-P23040024RF01



BLE_2M_Ant1_High_2478



**CONDUCTED SPURIOUS EMISSION****TEST RESULT**

TestMode	Antenna	Frequency[MHz]	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	Reference	7.98	7.98	---	PASS
			30~1000	7.98	-43.48	≤-12.02	PASS
			1000~26500	7.98	-23.53	≤-12.02	PASS
		2440	Reference	7.17	7.17	---	PASS
			30~1000	7.17	-43.06	≤-12.83	PASS
			1000~26500	7.17	-24	≤-12.83	PASS
		2480	Reference	7.17	7.17	---	PASS
			30~1000	7.17	-43.18	≤-12.83	PASS
			1000~26500	7.17	-24.17	≤-12.83	PASS
BLE_2M	Ant1	2404	Reference	5.16	5.16	---	PASS
			30~1000	5.16	-42.34	≤-14.84	PASS
			1000~26500	5.16	-23.94	≤-14.84	PASS
		2440	Reference	4.59	4.59	---	PASS
			30~1000	4.59	-43.58	≤-15.41	PASS
			1000~26500	4.59	-24.21	≤-15.41	PASS
		2478	Reference	5.19	5.19	---	PASS
			30~1000	5.19	-42.83	≤-14.81	PASS
			1000~26500	5.19	-23.72	≤-14.81	PASS



BUREAU
VERITAS

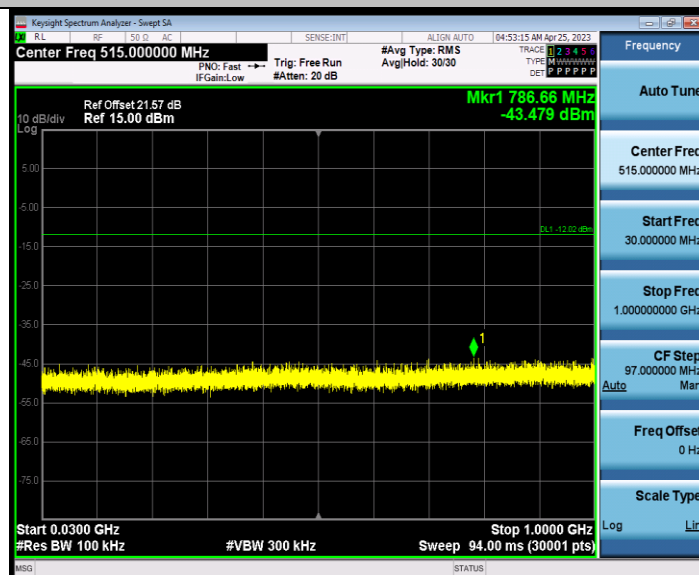
Test Report No.: W7L-P23040024RF01

TEST GRAPHS

BLE_1M_Ant1_2402_0~Reference



BLE_1M_Ant1_2402_30~1000



BLE_1M_Ant1_2402_1000~26500



BUREAU
VERITAS

Test Report No.: W7L-P23040024RF01



BLE_1M_Ant1_2440_0~Reference

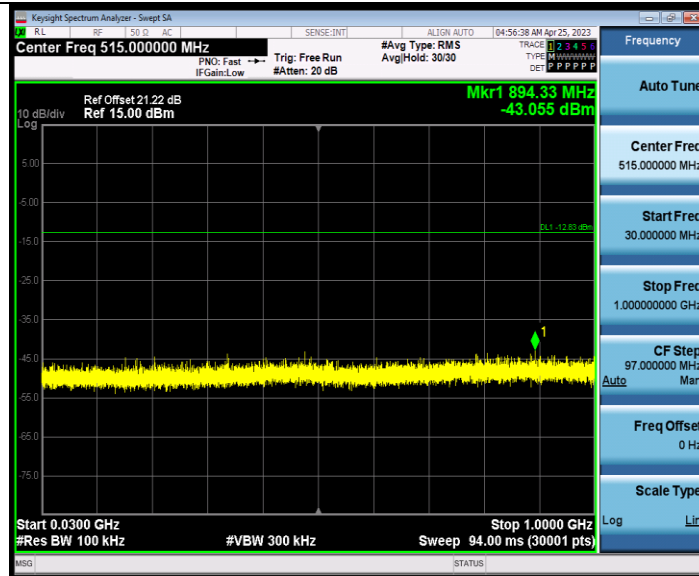


BLE_1M_Ant1_2440_30~1000



BUREAU
VERITAS

Test Report No.: W7L-P23040024RF01



BLE_1M_Ant1_2440_1000~26500



BLE_1M_Ant1_2480_0~Reference

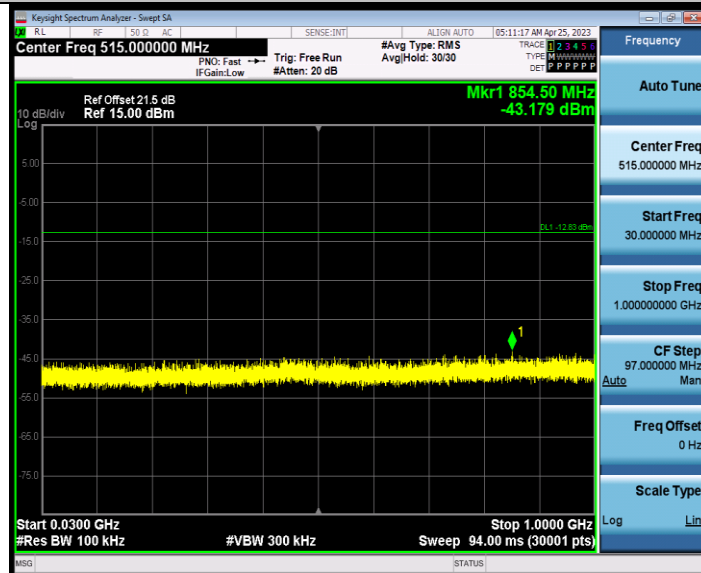


BUREAU
VERITAS

Test Report No.: W7L-P23040024RF01



BLE_1M_Ant1_2480_30~1000



BLE_1M_Ant1_2480_1000~26500



Test Report No.: W7L-P23040024RF01



BLE_2M_Ant1_2404_0~Reference

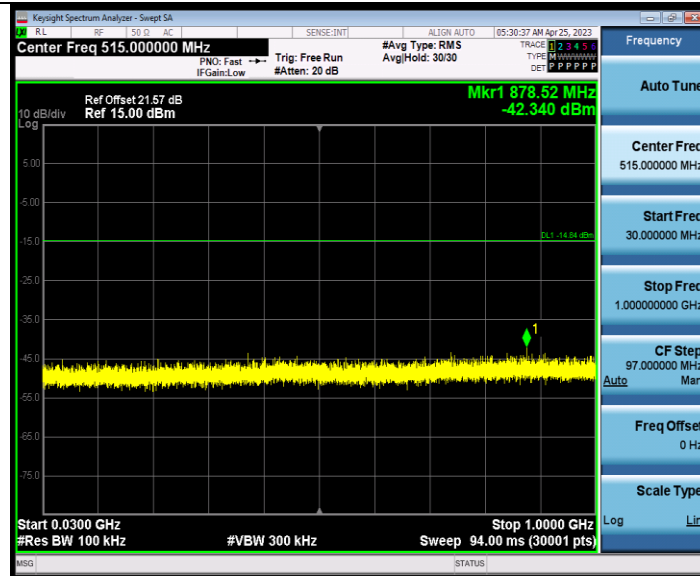


BLE_2M_Ant1_2404_30~1000

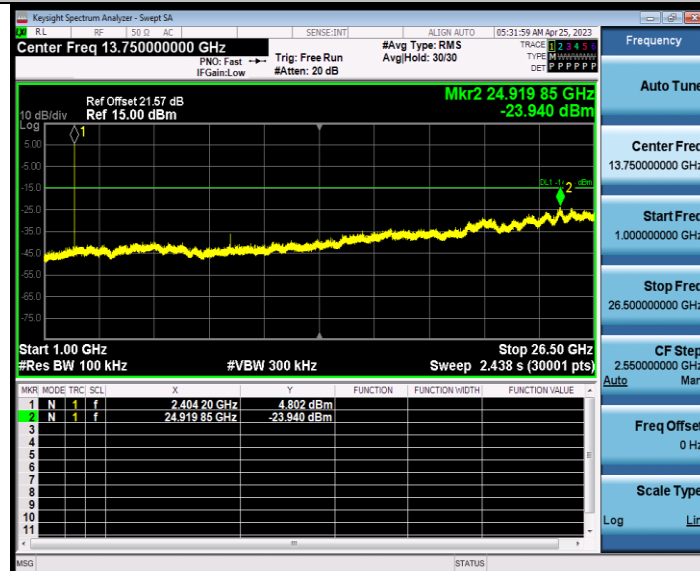


BUREAU
VERITAS

Test Report No.: W7L-P23040024RF01



BLE_2M_Ant1_2404_1000~26500



BLE_2M_Ant1_2440_0~Reference



BUREAU
VERITAS

Test Report No.: W7L-P23040024RF01



BLE_2M_Ant1_2440_30~1000

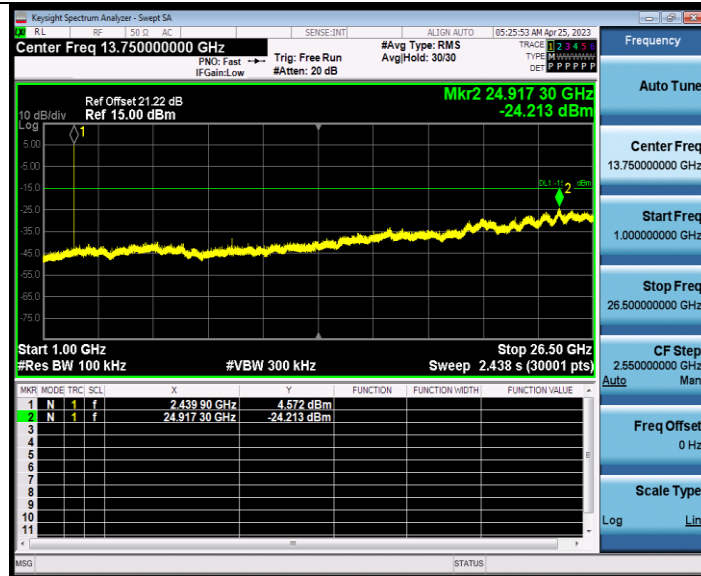


BLE_2M_Ant1_2440_1000~26500



BUREAU
VERITAS

Test Report No.: W7L-P23040024RF01



BLE_2M_Ant1_2478_0~Reference

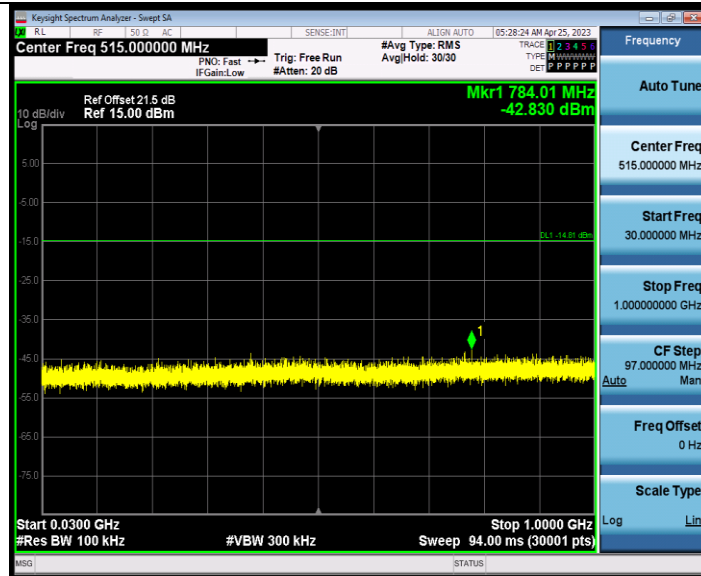


BLE_2M_Ant1_2478_30~1000



BUREAU
VERITAS

Test Report No.: W7L-P23040024RF01



BLE_2M_Ant1_2478_1000~26500





Test Report No.: W7L-P23040024RF01

DUTY CYCLE

TEST RESULT

TestMode	Antenna	Frequency[MHz]	ON Time [ms]	Period [ms]	Duty Cycle [%]	Duty Cycle Factor[dB]
BLE_1M	Ant1	2402	100.00	100.00	100.00	0.00
		2440	100.00	100.00	100.00	0.00
		2480	100.00	100.00	100.00	0.00
BLE_2M	Ant1	2404	100.00	100.00	100.00	0.00
		2440	100.00	100.00	100.00	0.00
		2478	100.00	100.00	100.00	0.00

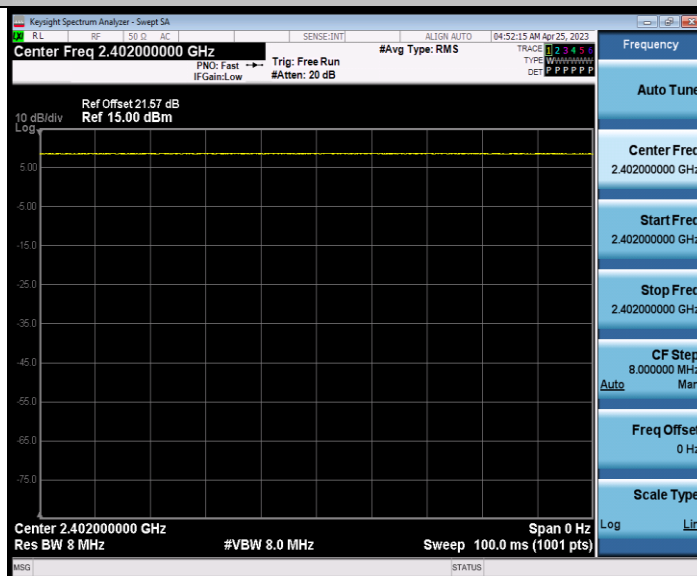


BUREAU
VERITAS

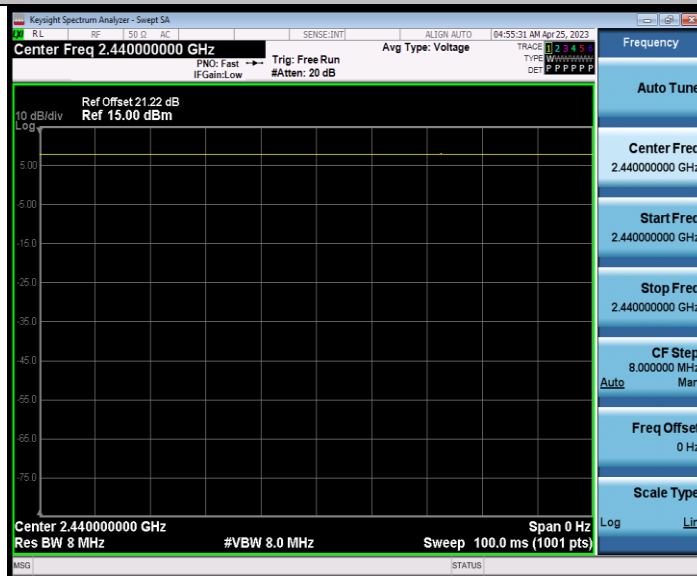
Test Report No.: W7L-P23040024RF01

TEST GRAPHS

BLE_1M_Ant1_2402



BLE_1M_Ant1_2440

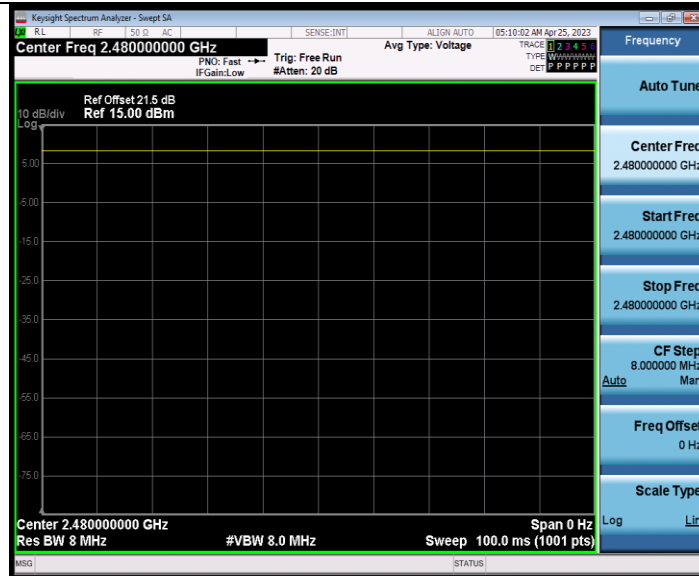


BLE_1M_Ant1_2480

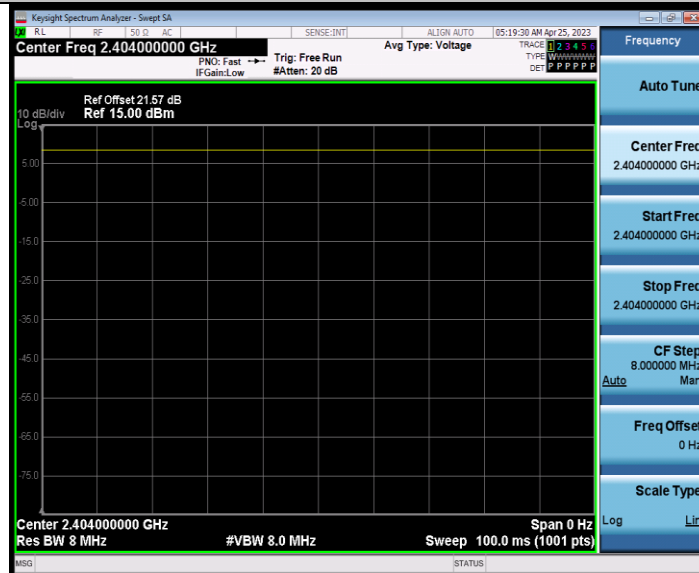


BUREAU
VERITAS

Test Report No.: W7L-P23040024RF01



BLE_2M_Ant1_2404

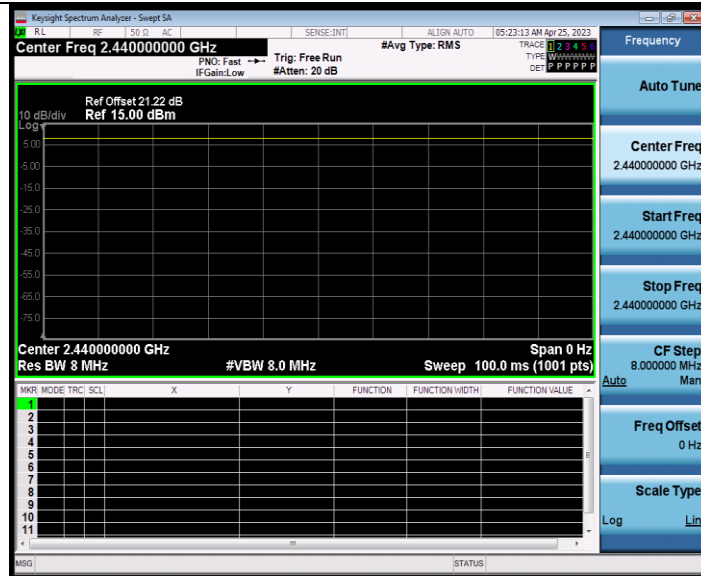


BLE_2M_Ant1_2440

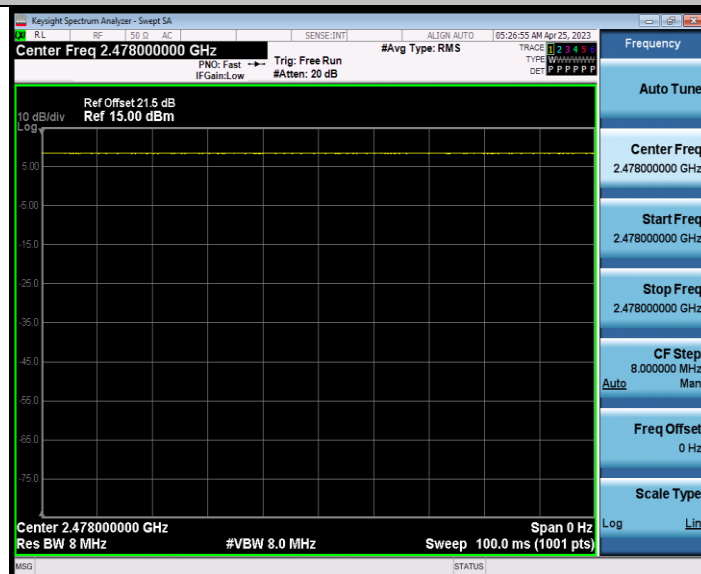


BUREAU
VERITAS

Test Report No.: W7L-P23040024RF01



BLE_2M_Ant1_2478



---END---