

BUREAU
VERITAS

Test Report No.: W7L-P230608W002RF01



Certificate #6613.01

FCC TEST REPORT

(Part 15, Subpart C)

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

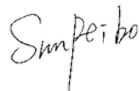
Manufacturer or Supplier:	Marquardt GmbH
Address:	Schloss-str.16,78604 Rietheim-Weilheim,Germany
Product:	Lotus keyfob
Brand Name:	Marquardt
Model Name:	GK1
FCC ID:	IYZGK1
Date of tests:	Jun. 08, 2023 ~ Aug. 19, 2023

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 Chao Wu Engineer / Mobile Department	Approved by Peibo Sun Manager / Mobile Department
 Date: Aug. 19, 2023	 Date: Aug. 19, 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	5
1 SUMMARY OF TEST RESULTS.....	6
1.1 MEASUREMENT UNCERTAINTY	7
2 GENERAL INFORMATION	8
2.1 GENERAL DESCRIPTION OF EUT.....	8
2.2 DESCRIPTION OF TEST MODES.....	9
2.2.1 CONFIGURATION OF SYSTEM UNDER TEST	10
2.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL.....	10
2.3 DUTY CYCLE OF TEST SIGNAL	13
2.4 GENERAL DESCRIPTION OF APPLIED STANDARDS.....	14
2.5 DESCRIPTION OF SUPPORT UNITS.....	14
3 TEST TYPES AND RESULTS.....	15
3.1 RADIATED EMISSION MEASUREMENT	15
3.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT	15
3.1.2 TEST INSTRUMENTS.....	16
3.1.3 TEST PROCEDURES	17
3.1.4 DEVIATION FROM TEST STANDARD	17
3.1.5 TEST SETUP	18
3.1.6 EUT OPERATING CONDITIONS	19
3.1.7 TEST RESULTS	20
3.2 6 DB BANDWIDTH MEASUREMENT.....	32
3.2.1 LIMITS OF 6DB BANDWIDTH MEASUREMENT	32
3.2.2 TEST INSTRUMENTS.....	32
3.2.3 TEST PROCEDURE.....	33
3.2.4 DEVIATION FROM TEST STANDARD	33
3.2.5 TEST SETUP	33
3.2.6 EUT OPERATING CONDITIONS	33
3.2.7 TEST RESULTS	34
3.3 CONDUCTED OUTPUT POWER	35
3.3.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT	35
3.3.2 TEST SETUP	35
3.3.3 TEST INSTRUMENTS.....	35
3.3.4 TEST PROCEDURES	35



3.3.5	DEVIATION FROM TEST STANDARD	35
3.3.6	EUT OPERATING CONDITIONS	35
3.3.7	TEST RESULTS	36
3.3.7.1	MAXIMUM PEAK OUTPUT POWER	36
3.3.7.2	AVERAGE OUTPUT POWER (FOR REFERENCE).....	37
3.4	POWER SPECTRAL DENSITY MEASUREMENT	38
3.4.1	LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT	38
3.4.2	TEST SETUP	38
3.4.3	TEST INSTRUMENTS.....	38
3.4.4	TEST PROCEDURE.....	38
3.4.5	DEVIATION FROM TEST STANDARD	38
3.4.6	EUT OPERATING CONDITION	38
3.4.7	TEST RESULTS	39
3.5	OUT OF BAND EMISSION MEASUREMENT	40
3.5.1	LIMITS OF OUT OF BAND EMISSION MEASUREMENT	40
3.5.2	TEST SETUP	40
3.5.3	TEST INSTRUMENTS.....	40
3.5.4	TEST PROCEDURE.....	40
3.5.5	DEVIATION FROM TEST STANDARD	41
3.5.6	EUT OPERATING CONDITION	41
3.5.7	TEST RESULTS	41
4	PHOTOGRAPHS OF THE TEST CONFIGURATION	42
5	MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB	43
6	APPENDIX BLE	44
	DTS BANDWIDTH.....	44
	TEST RESULT	44
	TEST GRAPHS.....	45
	OCCUPIED CHANNEL BANDWIDTH.....	48
	TEST RESULT	48
	TEST GRAPHS.....	49
	MAXIMUM CONDUCTED OUTPUT POWER.....	52
	TEST RESULT	52
	MAXIMUM POWER SPECTRAL DENSITY	53
	TEST RESULT	53
	TEST GRAPHS.....	54



Test Report No.: W7L-P230608W002RF01

BAND EDGE MEASUREMENTS	57
TEST RESULT	57
TEST GRAPHS	58
CONDUCTED SPURIOUS EMISSION	60
TEST RESULT	60
TEST GRAPHS	61
DUTY CYCLE	70
TEST RESULT	70
TEST GRAPHS	71



Test Report No.: W7L-P230608W002RF01

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
W7L-P230608W002RF01	Original release	Aug. 19, 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	N/A (note)
15.205 15.209	Radiated Emissions	Compliance
15.247(d)	Out of band Emission Measurement	Compliance
15.247(a)(2)	6dB bandwidth	Compliance
15.247(b)	Conducted Output power	Compliance
15.247(e)	Power Spectral Density	Compliance
15.203	Antenna Requirement	Compliance

Note :

1.Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines.



1.1 MEASUREMENT UNCERTAINTY

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

MEASUREMENT	UNCERTAINTY
AC Power Conducted emissions	±2.70dB
Radiated emissions (9KHz~30MHz)	±2.68dB
Radiated emissions (30MHz~1GHz)	±4.98dB
Radiated emissions (1GHz ~6GHz)	±4.70dB
Radiated emissions (6GHz ~18GHz)	±4.60dB
Radiated emissions (18GHz ~40GHz)	±4.12dB
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*	Lotus keyfob
BRAND NAME*	Marquardt
MODEL NAME*	GK1
NOMINAL VOLTAGE*	3.0Vdc (Lithium Battery)
MODULATION *	GFSK
TRANSMISSION RATE*	BT_LE: 1 Mbps/2 Mbps
OPERATING FREQUENCY*	2402-2480MHz for BT-LE(GFSK)
MAX. OUTPUT POWER	BT-LE: 1.25 mW (Maximum)
ANTENNA TYPE*	PCB Antenna with 2.2 dBi gain
HW VERSION*	232605
SW VERSION*	232401
I/O PORTS*	Refer to user's manual
CABLE SUPPLIED*	N/A

NOTE:

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

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

5. List of Accessory:

ACCESSORIES	BRAND	MANUFACTURER	MODEL	SPECIFICATION
Lithium Battery	Panasonic	Panasonic Corporation	CR2032	Capacity:3.0 Vdc, 225mAh



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

**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
BT-LE	1 to 38	1,19, 38	GFSK	2

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
BT-LE	1 to 38	1,19, 38	GFSK	2

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
BT-LE	1 to 38	1,19, 38	GFSK	2



Test Report No.: W7L-P230608W002RF01

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	TEST VOLTAGE	TESTED BY
RE<1G	23deg. C, 56%RH	DC 3V By Battery	Chao Wu
RE≥1G	23deg. C, 56%RH	DC 3V By Battery	Chao Wu
APCM	25deg. C, 60%RH	DC 3V By Battery	Chao Wu



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	100.00
	BT5.0	100.00

Note:

Duty cycle of test signal is > 98%, duty factor needn't to 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	N/A	N/A	N/A	N/A	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	N/A



3 TEST TYPES AND RESULTS

3.1 RADIATED EMISSION MEASUREMENT

3.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT

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

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

NOTE:

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



3.1.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Pre-Amplifier	R&S	SCU18F1	100815	Aug.30,22	Aug.29,24
Pre-Amplifier	R&S	SCU08F1	101028	Sep.16,22	Sep.15,24
Signal Generator	R&S	SMB100A	182185	Feb.16,22	Feb.15,24
3m Fully-anechoic Chamber	TDK	9m*6m*6m	HRSW-SZ-EMC-01Chamber	Nov.25,22	Nov.24,25
3m Semi-anechoic Chamber	TDK	9m*6m*6m	HRSW-SZ-EMC-02Chamber	Nov.25,22	Nov.24,25
EMI TEST Receiver	R&S	ESW44	101973	Feb.25,22	Feb.24,24
Bilog Antenna	SCHWARZBECK	VULB 9163	1264	Feb.28,22	Feb.27,24
Horn Antenna	ETS-LINDGREN	3117	227836	Aug.22,22	Aug.21,24
Horn Antenna (18GHz-40GHz)	Steatite Q-par Antennas	QMS 00880	23486	Feb.23,22	Feb.22,24
Horn Antenna	Steatite Q-par Antennas	QMS 00208	23485	Aug.22,22	Aug.21,24
Loop Antenna	SCHWARZ	HFH2-Z2/Z2E	100976	Feb.23,22	Feb.22,24
WIDEBAND RADIO COMMUNICATION TESTER	R&S	CMW500	169399	Jun.27,22	Jun.26,24
Test Software	ELEKTRA	ELEKTRA4.32	N/A	N/A	N/A
Open Switch and Control Unit	R&S	OSP220	101964	N/A	N/A
DC Source	HYELEC	HY3010B	551016	Aug.31,22	Aug.30,24
Hygrothermograph	DELI	20210528	SZ014	Sep.06,22	Sep.05,24
PC	LENOVO	E14	HRSW0024	N/A	N/A
TMC-AMI18843A(CABLE)	R&S	HF290-NMNM-7.00M	N/A	N/A	N/A
TMC-AMI18843A(CABLE)	R&S	HF290-NMNM-4.00M	N/A	N/A	N/A
CABLE	R&S	W13.02	N/A	Apr.28,23	Oct.27,23
CABLE	R&S	W12.14	N/A	Apr.28,23	Oct.27,23

- NOTE:**
1. The calibration interval of the above test instruments is 6 months or 24 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 434559; The Designation No. is CN1325.



3.1.3 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.

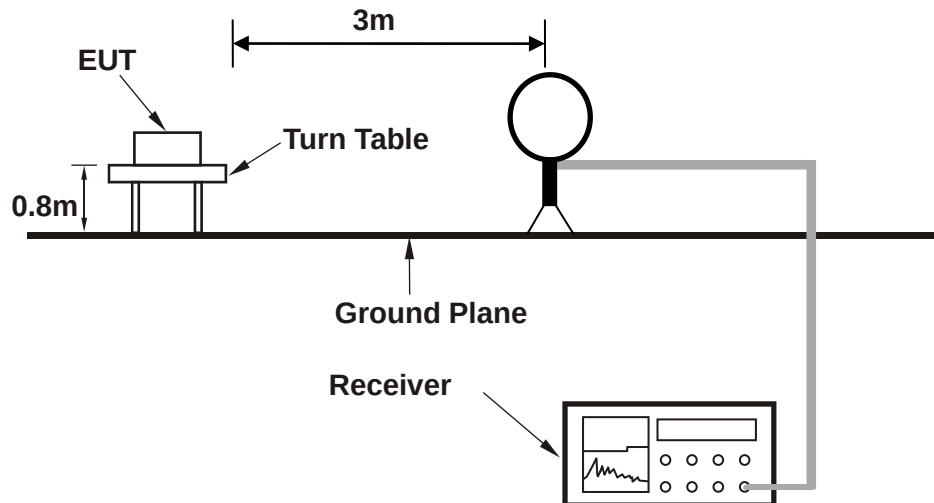
3.1.4 DEVIATION FROM TEST STANDARD

No deviation

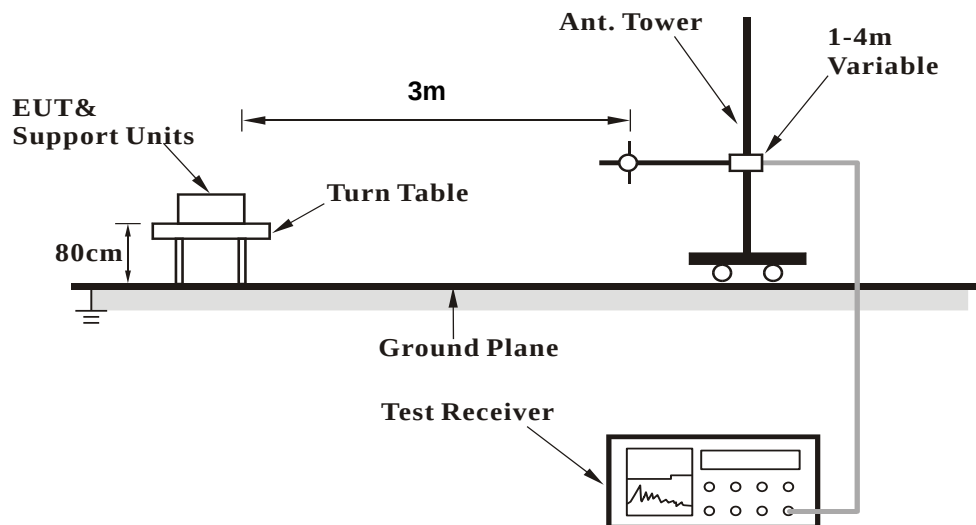


3.1.5 TEST SETUP

<Frequency Range 9KHz~30MHz >

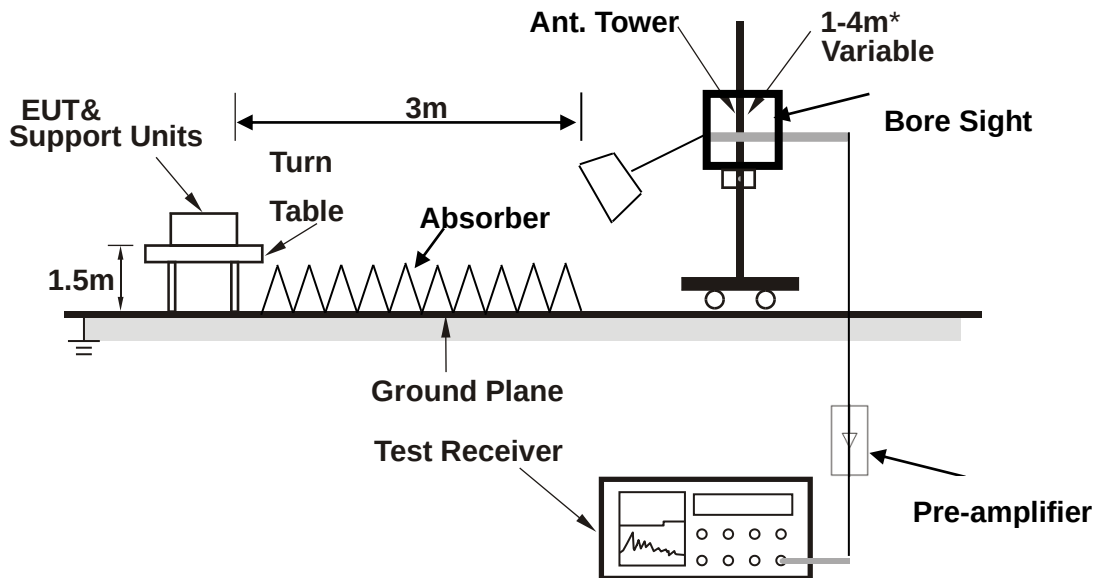


< Frequency Range 30MHz~1GHz >





<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).

3.1.6 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.



**BUREAU
VERITAS**

Test Report No.: W7L-P230608W002RF01

3.1.7 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:

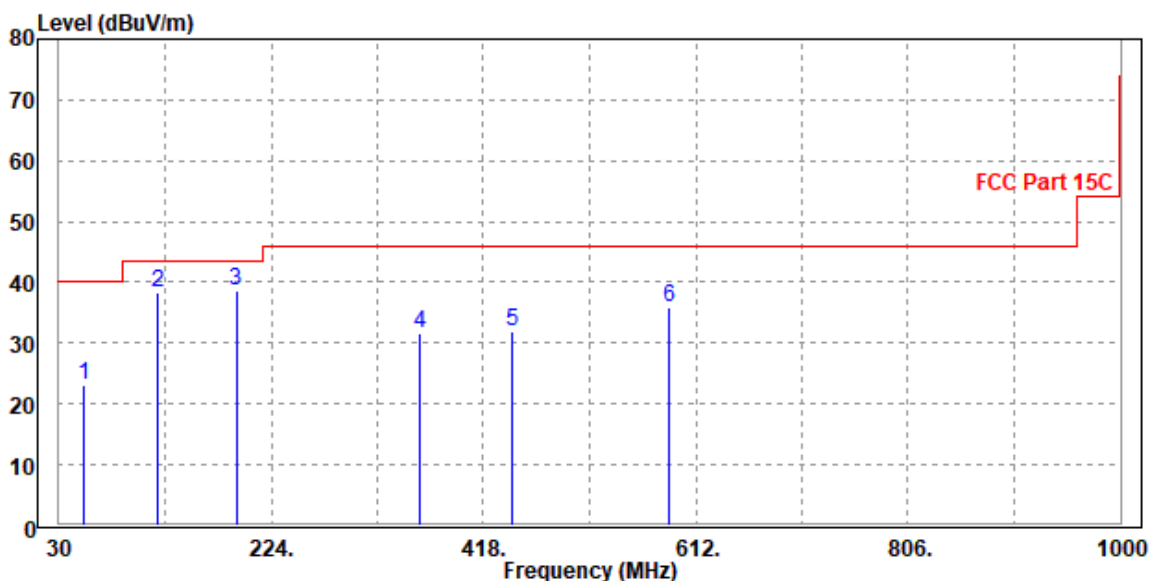
BT-LE_2M

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
52.31	23.12	49.73	40	-16.88	9.97	0.41	36.99	138	244	Peak
120.21	38.4	65.16	43.5	-5.1	9.38	0.58	36.72	171	23	Peak
191.99	38.74	63.01	43.5	-4.76	11.34	0.72	36.33	149	304	Peak
359.8	31.63	51.66	46	-14.37	15.32	1.01	36.36	159	140	Peak
444.19	31.92	50.25	46	-14.08	17.04	1.14	36.51	182	263	Peak
587.75	35.98	51.96	46	-10.02	19.5	1.34	36.82	166	339	Peak

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**

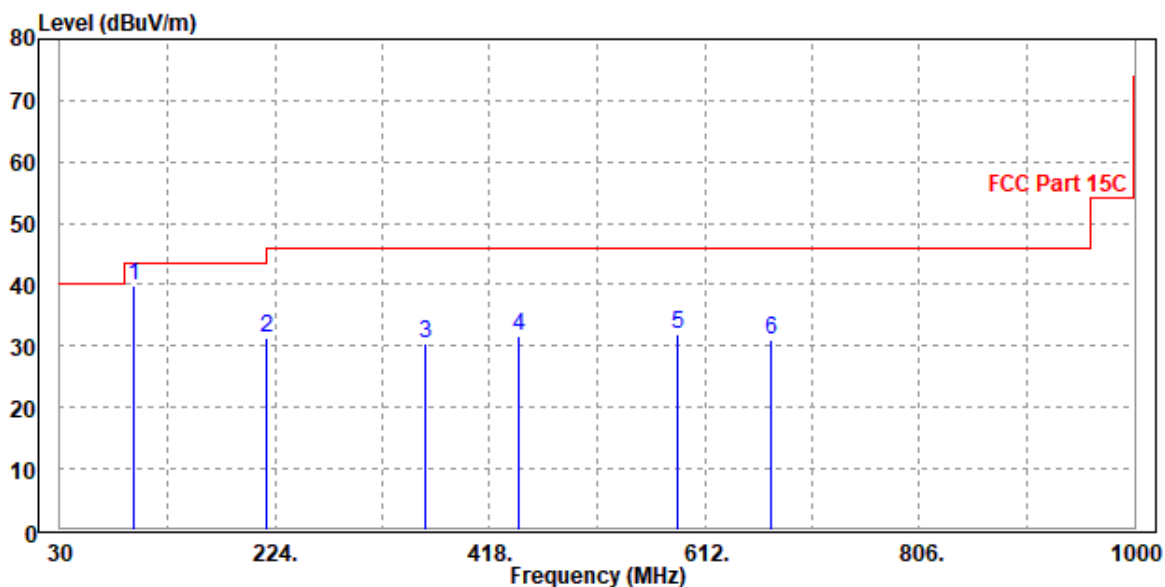
Test Report No.: W7L-P230608W002RF01

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
95.96	39.99	67.44	43.5	-3.51	8.9	0.52	36.87	145	259	Peak
216.24	31.28	54.94	46	-14.72	11.86	0.77	36.29	165	16	Peak
359.8	30.31	50.28	46	-15.69	15.38	1.01	36.36	180	304	Peak
444.19	31.67	50.17	46	-14.33	16.87	1.14	36.51	192	343	Peak
587.75	31.93	48.06	46	-14.07	19.35	1.34	36.82	170	95	Peak
672.14	31.15	46.5	46	-14.85	20.32	1.44	37.11	126	309	Peak

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



**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)
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	52.4	57.14	74	-21.6	35.05	6.18	45.97	175	75	Peak
2390	45.25	49.99	54	-8.75	35.05	6.18	45.97	175	75	Average
2402	94.84	99.53	/	/	35.09	6.19	45.97	175	75	Peak
2402	94.47	99.16	/	/	35.09	6.19	45.97	175	75	Average
2483.5	52.97	57.24	74	-21.03	35.35	6.31	45.93	175	75	Peak
2483.5	45.77	50.04	54	-8.23	35.35	6.31	45.93	175	75	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	50.42	57.35	74	-23.58	32.86	6.18	45.97	125	60	Peak
2390	43.01	49.94	54	-10.99	32.86	6.18	45.97	125	60	Average
2402	85.22	92.12	/	/	32.88	6.19	45.97	125	60	Peak
2402	84.76	91.66	/	/	32.88	6.19	45.97	125	60	Average
2483.5	51.88	58.44	74	-22.12	33.06	6.31	45.93	125	60	Peak
2483.5	43.87	50.43	54	-10.13	33.06	6.31	45.93	125	60	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-P230608W002RF01

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	51.79	56.53	74	-22.21	35.05	6.18	45.97	175	75	Peak
2390	45.51	50.25	54	-8.49	35.05	6.18	45.97	175	75	Average
2440	94.01	98.5	/	/	35.21	6.25	45.95	175	75	Peak
2440	93.45	97.94	/	/	35.21	6.25	45.95	175	75	Average
2483.5	53.62	57.89	74	-20.38	35.35	6.31	45.93	175	75	Peak
2483.5	45.3	49.57	54	-8.7	35.35	6.31	45.93	175	75	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	50.91	57.84	74	-23.09	32.86	6.18	45.97	125	60	Peak
2390	43.28	50.21	54	-10.72	32.86	6.18	45.97	125	60	Average
2440	84.35	91.08	/	/	32.97	6.25	45.95	125	60	Peak
2440	83.76	90.49	/	/	32.97	6.25	45.95	125	60	Average
2483.5	52.28	58.84	74	-21.72	33.06	6.31	45.93	125	60	Peak
2483.5	43.38	49.94	54	-10.62	33.06	6.31	45.93	125	60	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-P230608W002RF01

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	53.16	57.9	74	-20.84	35.05	6.18	45.97	106	88	Peak
2390	45.45	50.19	54	-8.55	35.05	6.18	45.97	106	88	Average
2480	93.95	98.24	/	/	35.34	6.3	45.93	106	88	Peak
2480	93.73	98.02	/	/	35.34	6.3	45.93	106	88	Average
2483.5	52.92	57.19	74	-21.08	35.35	6.31	45.93	106	88	Peak
2483.5	46.29	50.56	54	-7.71	35.35	6.31	45.93	106	88	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	49.83	56.76	74	-24.17	32.86	6.18	45.97	108	35	Peak
2390	43.25	50.18	54	-10.75	32.86	6.18	45.97	108	35	Average
2480	84.56	91.13	/	/	33.06	6.3	45.93	108	35	Peak
2480	84.2	90.77	/	/	33.06	6.3	45.93	108	35	Average
2483.5	51.35	57.91	74	-22.65	33.06	6.31	45.93	108	35	Peak
2483.5	44.01	50.57	54	-9.99	33.06	6.31	45.93	108	35	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

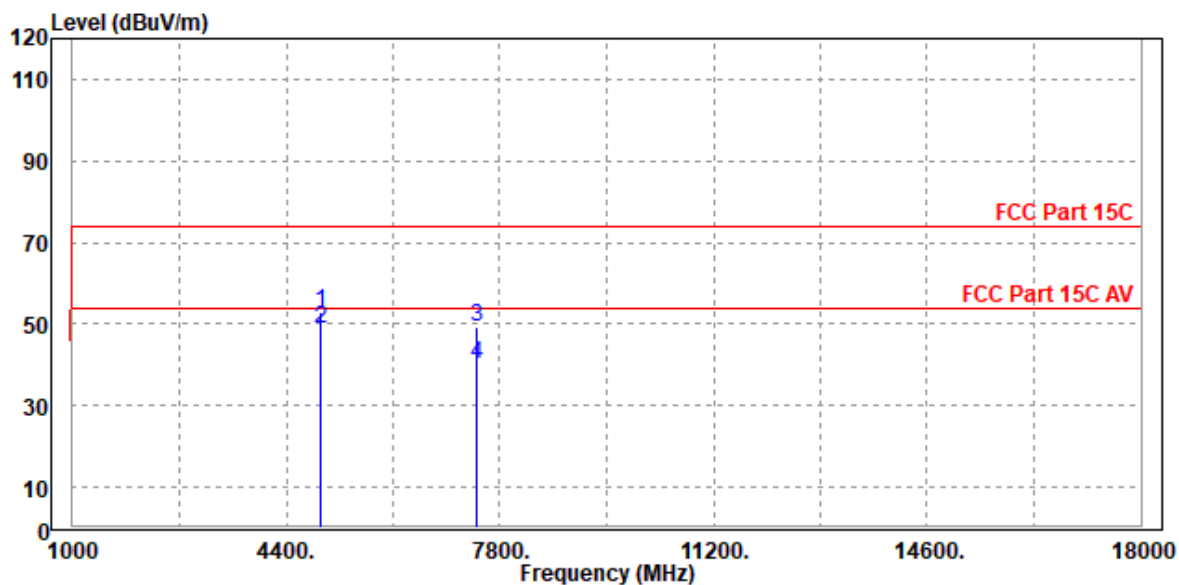
Test Report No.: W7L-P230608W002RF01

Worst case harmonic:

CHANNEL	TX Channel 39	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	PK	4961.000	52.94	51.60	74.00	-21.06	1.34	Peak	Horizontal
2	PP	4961.000	48.88	47.54	54.00	-5.12	1.34	Average	Horizontal
3		7440.000	49.36	44.80	74.00	-24.64	4.56	Peak	Horizontal
4		7440.000	40.23	35.67	54.00	-13.77	4.56	Average	Horizontal



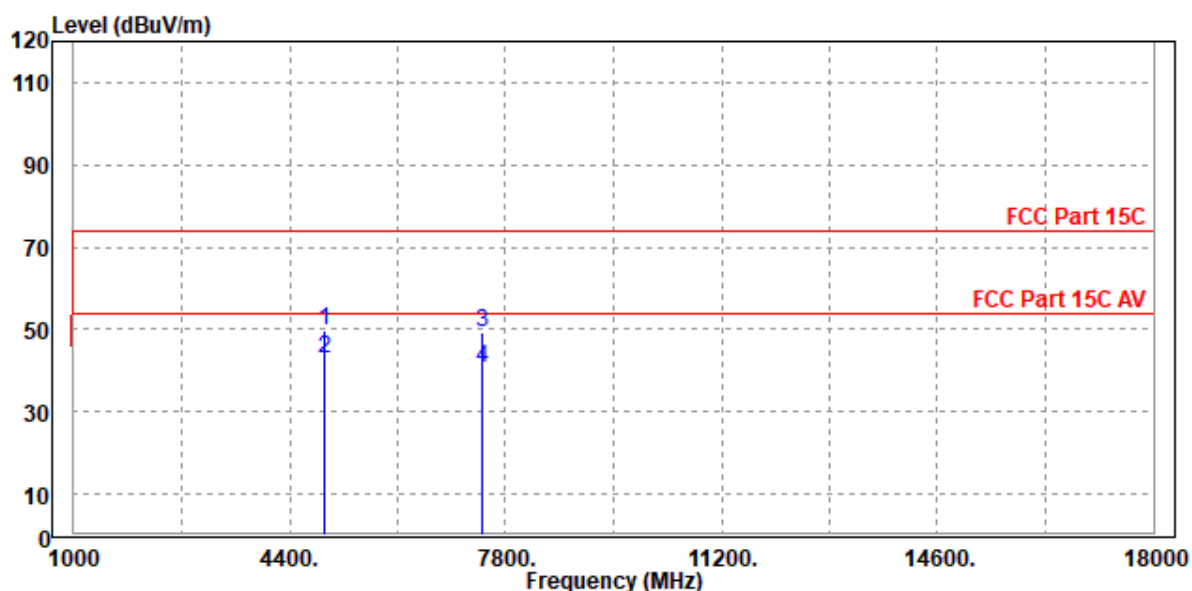


BUREAU
VERITAS

Test Report No.: W7L-P230608W002RF01

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	PK 4960.000	49.90	50.24	74.00	-24.10	-0.34	Peak	Vertical
2	PP 4960.000	42.84	43.18	54.00	-11.16	-0.34	Average	Vertical
3	7443.000	49.30	45.76	74.00	-24.70	3.54	Peak	Vertical
4	7443.000	40.50	36.96	54.00	-13.50	3.54	Average	Vertical



REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
2. 2480MHz: 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-P230608W002RF01

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	52.25	56.99	74	-21.75	35.05	6.18	45.97	105	345	Peak
2390	45.44	50.18	54	-8.56	35.05	6.18	45.97	105	345	Average
2404	95.5	100.18	/	/	35.09	6.2	45.97	105	345	Peak
2404	94.14	98.82	/	/	35.09	6.2	45.97	105	345	Average
2483.5	53.99	58.26	74	-20.01	35.35	6.31	45.93	105	345	Peak
2483.5	45.92	50.19	54	-8.08	35.35	6.31	45.93	105	345	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	50.61	57.54	74	-23.39	32.86	6.18	45.97	100	32	Peak
2390	43.81	50.74	54	-10.19	32.86	6.18	45.97	100	32	Average
2404	86.02	92.9	/	/	32.89	6.2	45.97	100	32	Peak
2404	84.64	91.52	/	/	32.89	6.2	45.97	100	32	Average
2483.5	50.4	56.96	74	-23.6	33.06	6.31	45.93	100	32	Peak
2483.5	44.12	50.68	54	-9.88	33.06	6.31	45.93	100	32	Average

REMARKS:

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



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	52.22	56.96	74	-21.78	35.05	6.18	45.97	105	332	Peak
2390	45.45	50.19	54	-8.55	35.05	6.18	45.97	105	332	Average
2440	97.07	101.56	/	/	35.21	6.25	45.95	105	332	Peak
2440	95.8	100.29	/	/	35.21	6.25	45.95	105	332	Average
2483.5	53.45	57.72	74	-20.55	35.35	6.31	45.93	105	332	Peak
2483.5	46.27	50.54	54	-7.73	35.35	6.31	45.93	105	332	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	51.09	58.02	74	-22.91	32.86	6.18	45.97	100	20	Peak
2390	43.27	50.2	54	-10.73	32.86	6.18	45.97	100	20	Average
2440	85.77	92.5	/	/	32.97	6.25	45.95	100	20	Peak
2440	84.38	91.11	/	/	32.97	6.25	45.95	100	20	Average
2483.5	51.28	57.84	74	-22.72	33.06	6.31	45.93	100	20	Peak
2483.5	43.86	50.42	54	-10.14	33.06	6.31	45.93	100	20	Average

REMARKS:

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



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	51.33	56.07	74	-22.67	35.05	6.18	45.97	105	330	Peak
2390	45.38	50.12	54	-8.62	35.05	6.18	45.97	105	330	Average
2478	94.04	98.34	/	/	35.33	6.3	45.93	105	330	Peak
2478	92.6	96.9	/	/	35.33	6.3	45.93	105	330	Average
2483.5	53.7	57.97	74	-20.3	35.35	6.31	45.93	105	330	Peak
2483.5	46.32	50.59	54	-7.68	35.35	6.31	45.93	105	330	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	50.65	57.58	74	-23.35	32.86	6.18	45.97	103	58	Peak
2390	43.09	50.02	54	-10.91	32.86	6.18	45.97	103	58	Average
2478	83.68	90.26	/	/	33.05	6.3	45.93	103	58	Peak
2478	82.27	88.85	/	/	33.05	6.3	45.93	103	58	Average
2483.5	51.51	58.07	74	-22.49	33.06	6.31	45.93	103	58	Peak
2483.5	44.09	50.65	54	-9.91	33.06	6.31	45.93	103	58	Average

REMARKS:

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



BUREAU
VERITAS

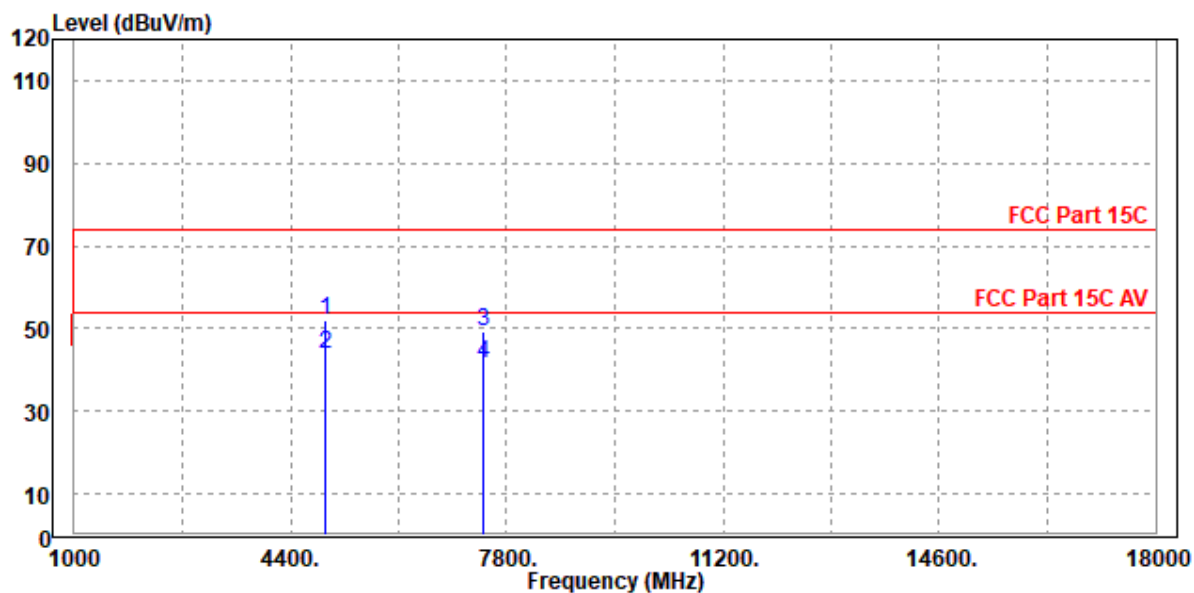
Test Report No.: W7L-P230608W002RF01

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 Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBuV/m	dBuV	dBuV/m	dB	dB/m		
1	PK	4961.000	52.15	50.81	74.00	-21.85	1.34	Peak	Horizontal
2	PP	4961.000	43.98	42.64	54.00	-10.02	1.34	Average	Horizontal
3		7434.000	49.30	44.75	74.00	-24.70	4.55	Peak	Horizontal
4		7434.000	41.52	36.97	54.00	-12.48	4.55	Average	Horizontal



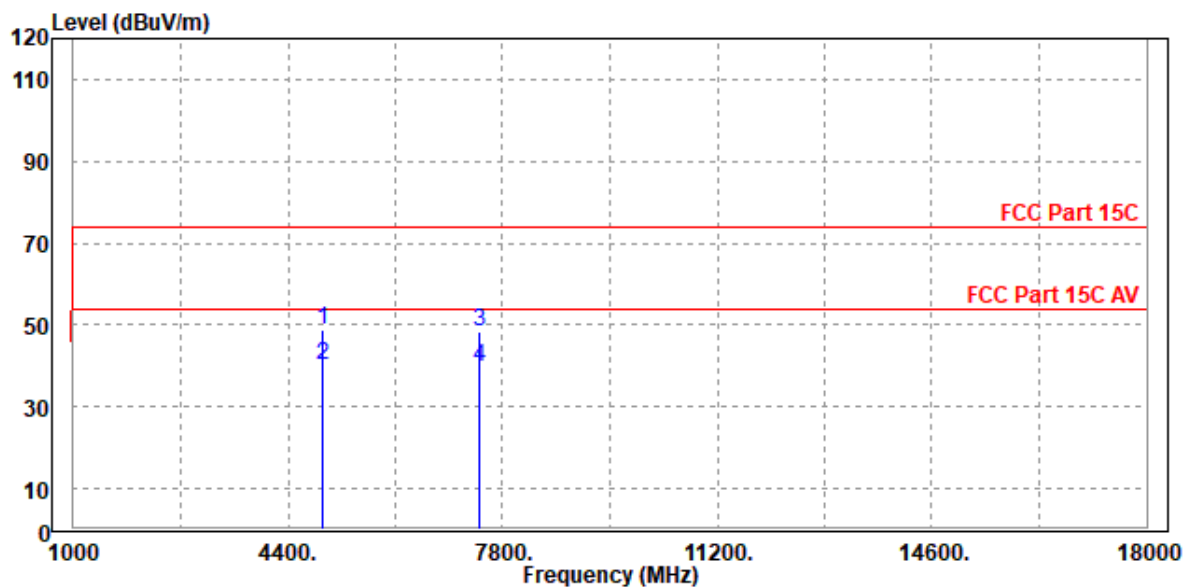


BUREAU
VERITAS

Test Report No.: W7L-P230608W002RF01

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	PK	4956.000	48.87	49.21	74.00	-25.13	-0.34	Peak	Vertical
2	PP	4956.000	40.20	40.54	54.00	-13.80	-0.34	Average	Vertical
3		7426.000	48.16	44.64	74.00	-25.84	3.52	Peak	Vertical
4		7426.000	39.76	36.24	54.00	-14.24	3.52	Average	Vertical



REMARKS:

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



3.2 6 dB BANDWIDTH MEASUREMENT

3.2.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

3.2.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	R&S	ESW 44	101973	Feb.25,22	Feb.24,24
Open Switch and Control Unit	R&S	OSP-B157W8	100836	N/A	N/A
Vector Signal Generator	R&S	SMBV100B	102176	Feb.16,22	Feb.15,24
Signal Generator	R&S	SMB100A03	182185	Feb.16,22	Feb.15,24
Wideband Radio Communication	R&S	CMW500	169399	Jun.26,22	Jun.25,24
Hygrothermograph	DELI	20210528	SZ015	Sep.06,22	Sep.05,24
PC	LENOVO	E14	HRSW0024	N/A	N/A
CABLE	R&S	J12J103539-00-1	SEP-03-20-069	Apr.28,23	Oct.27,23
CABLE	R&S	J12J103539-00-1	SEP-03-20-070	Apr.28,23	Oct.27,23
Test Software	EMC32	EMC32	N/A	N/A	N/A
Temperature Chamber	votsch	VT4002	58566078100050	May.31,22	May.30,24
Power Meter	ANRITSU	ML2495A	1506002	Feb. 14,23	Feb. 13,24
EXA Signal Analyzer	KEYSIGHT	N9010A-526	MY54510523	Feb. 14,23	Feb. 13,24
EXA Signal Analyzer	KEYSIGHT	N9010A-544	MY54510355	May.13,23	May.12,24
Power Sensor	ANRITSU	MA2411B	1339352	Feb. 14,23	Feb. 13,24
10dB Attenuator	JFW/USA	50HF-010-SMA	50HF-010-SMA	May. 06,23	May. 05,24

NOTE:

1. The calibration interval of the above test instruments is 6 months or 24 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
2. The test was performed in RF Oven room.



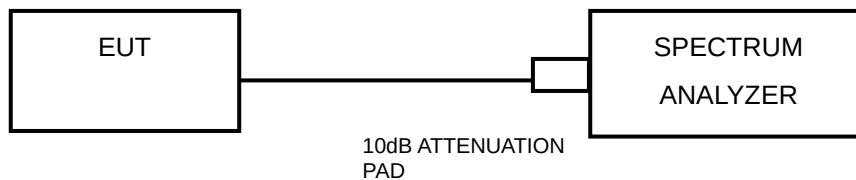
3.2.3 TEST PROCEDURE

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.

3.2.4 DEVIATION FROM TEST STANDARD

No deviation.

3.2.5 TEST SETUP



3.2.6 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-P230608W002RF01

3.2.7 TEST RESULTS

Please Refer to Appendix Of this test report.

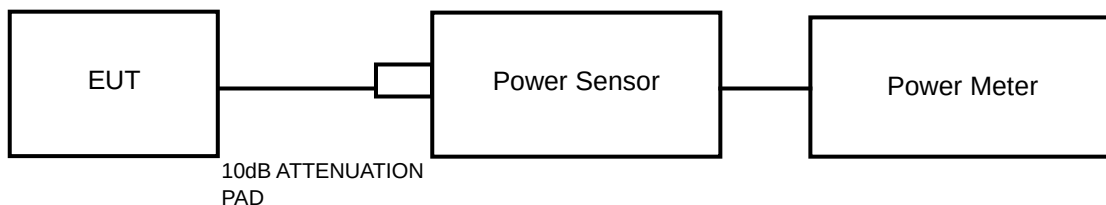


3.3 CONDUCTED OUTPUT POWER

3.3.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

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

3.3.2 TEST SETUP



3.3.3 TEST INSTRUMENTS

Refer to section 3.2.2 to get information of above instrument.

3.3.4 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.

3.3.5 DEVIATION FROM TEST STANDARD

No deviation.

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-P230608W002RF01

3.3.7 TEST RESULTS

3.3.7.1 MAXIMUM PEAK OUTPUT POWER

Please Refer to Appendix Of this test report.



Test Report No.: W7L-P230608W002RF01

3.3.7.2 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.

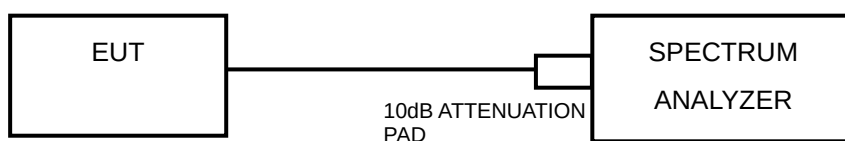
Please Refer to Appendix Of this test report.

3.4 POWER SPECTRAL DENSITY MEASUREMENT

3.4.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

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

3.4.2 TEST SETUP



3.4.3 TEST INSTRUMENTS

Refer to section 3.2.2 to get information of above instrument.

3.4.4 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.

3.4.5 DEVIATION FROM TEST STANDARD

No deviation.

3.4.6 EUT OPERATING CONDITION

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



3.4.7 TEST RESULTS

Please Refer to Appendix Of this test report.

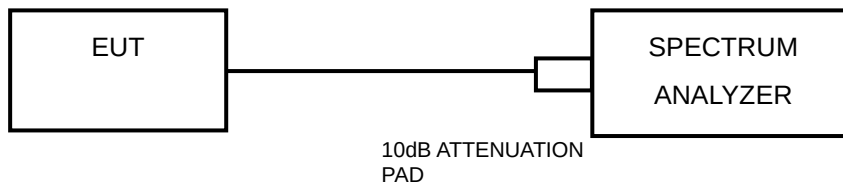


3.5 OUT OF BAND EMISSION MEASUREMENT

3.5.1 LIMITS OF OUT OF BAND EMISSION MEASUREMENT

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

3.5.2 TEST SETUP



3.5.3 TEST INSTRUMENTS

Refer to section 3.2.2 to get information of above instrument.

3.5.4 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.

3.5.5 DEVIATION FROM TEST STANDARD

No deviation.

3.5.6 EUT OPERATING CONDITION

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

3.5.7 TEST RESULTS

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.



Test Report No.: W7L-P230608W002RF01

4 PHOTOGRAPHS OF THE TEST CONFIGURATION

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



Test Report No.: W7L-P230608W002RF01

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 BLE

DTS BANDWIDTH

TEST RESULT

TestMode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.700	2401.684	2402.384	0.5	PASS
		2440	0.652	2439.712	2440.364	0.5	PASS
		2480	0.712	2479.680	2480.392	0.5	PASS
BLE_2M	Ant1	2404	1.320	2403.400	2404.720	0.5	PASS
		2440	1.268	2439.372	2440.640	0.5	PASS
		2478	1.348	2477.360	2478.708	0.5	PASS

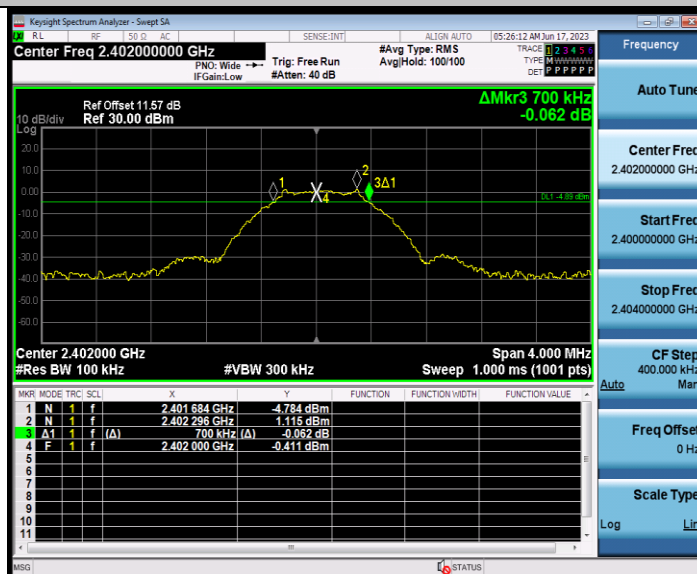


BUREAU
VERITAS

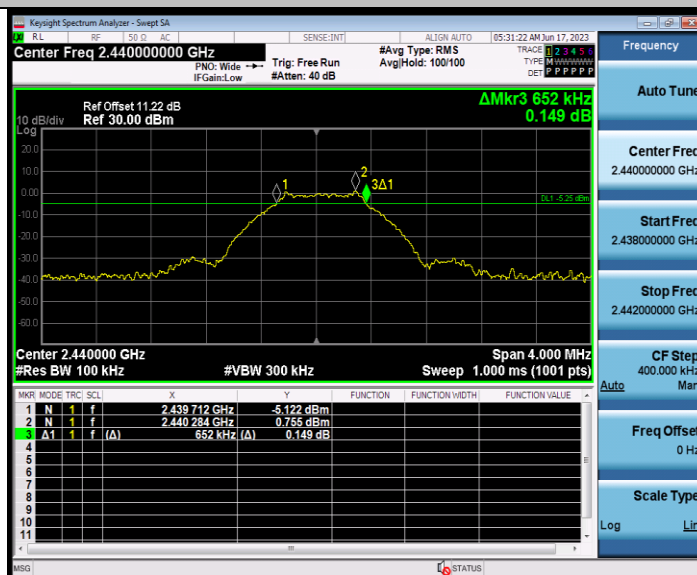
Test Report No.: W7L-P230608W002RF01

TEST GRAPHS

BLE_1M_Ant1_2402



BLE_1M_Ant1_2440

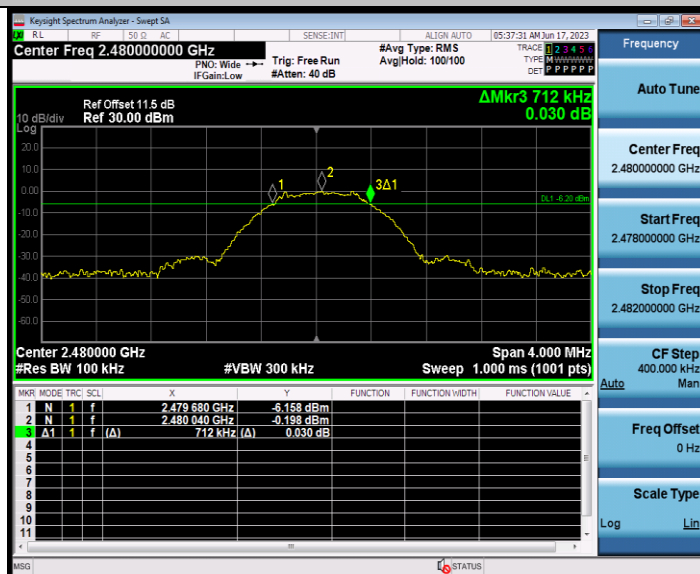




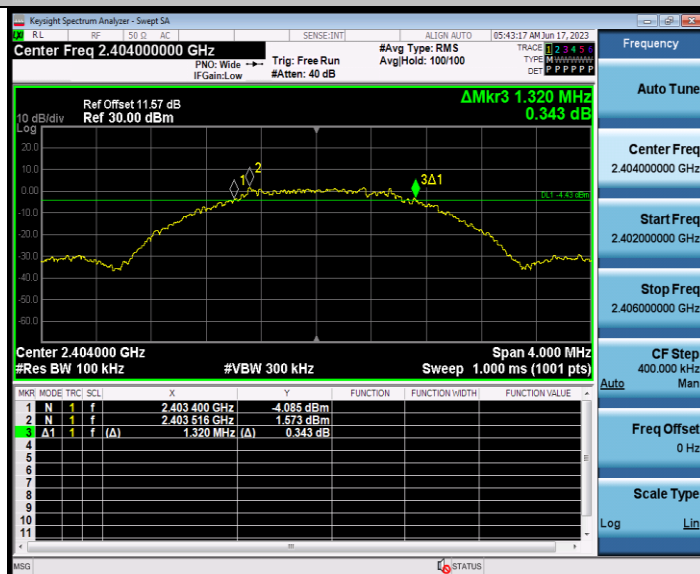
BUREAU
VERITAS

Test Report No.: W7L-P230608W002RF01

BLE_1M_Ant1_2480



BLE_2M_Ant1_2404





Test Report No.: W7L-P230608W002RF01

OCCUPIED CHANNEL BANDWIDTH

TEST RESULT

TestMode	Antenna	Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	1.0344	2401.5109	2402.5453	---	---
		2440	1.0258	2439.5193	2440.5451	---	---
		2480	1.0325	2479.5187	2480.5512	---	---
BLE_2M	Ant1	2404	2.0384	2403.0116	2405.0500	---	---
		2440	2.0306	2439.0178	2441.0484	---	---
		2478	2.0696	2477.0002	2479.0698	---	---



BUREAU
VERITAS

Test Report No.: W7L-P230608W002RF01

TEST GRAPHS

BLE_1M_Ant1_2402



BLE_1M_Ant1_2440





BLE_1M_Ant1_2480



BLE_2M_Ant1_2404





BUREAU
VERITAS

Test Report No.: W7L-P230608W002RF01

BLE_2M_Ant1_2440



BLE_2M_Ant1_2478





MAXIMUM CONDUCTED OUTPUT POWER

TEST RESULT

TestMod e	Antenn a	Channe l	Averag e power [dBm]	Peak powe r [dBm]	Peak powe r [mw]	Conducte d Limit [dBm]	EIRP [dBm]	EIR P [mw]	EIRP Limit [dBm]	Verdic t	Power Settin g
BLE_1M	Ant1	2402	1.27	0.86	1.22	≤30	3.04	2.01	≤36	PASS	Default
		2440	1.25	0.84	1.21	≤30	3.02	2.00	≤36	PASS	Default
		2480	0.26	-0.05	0.99	≤30	2.13	1.63	≤36	PASS	Default
BLE_2M	Ant1	2404	2.98	0.92	1.24	≤30	3.1	2.04	≤36	PASS	Default
		2440	2.97	0.95	1.25	≤30	3.13	2.06	≤36	PASS	Default
		2478	1.99	-0.04	0.99	≤30	2.14	1.64	≤36	PASS	Default
Note:EIRP=Peak Power+Gain											



Test Report No.: W7L-P230608W002RF01

MAXIMUM POWER SPECTRAL DENSITY

TEST RESULT

TestMode	Antenna	Frequency[MHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-11.07	≤ 8.00	PASS
		2440	-12.17	≤ 8.00	PASS
		2480	-12.16	≤ 8.00	PASS
BLE_2M	Ant1	2404	-11.65	≤ 8.00	PASS
		2440	-12.42	≤ 8.00	PASS
		2478	-14.53	≤ 8.00	PASS

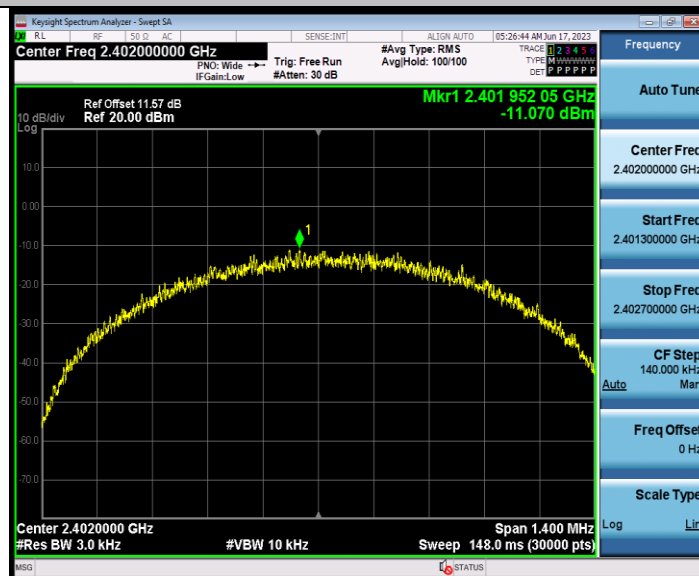


BUREAU
VERITAS

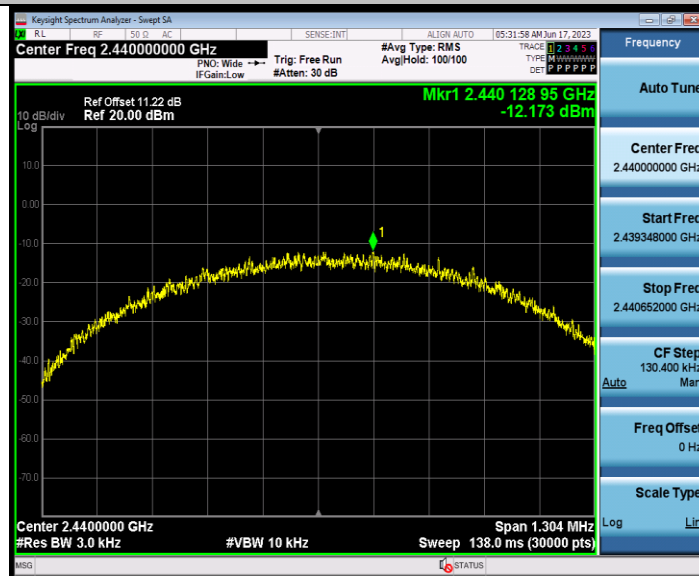
Test Report No.: W7L-P230608W002RF01

TEST GRAPHS

BLE_1M_Ant1_2402



BLE_1M_Ant1_2440

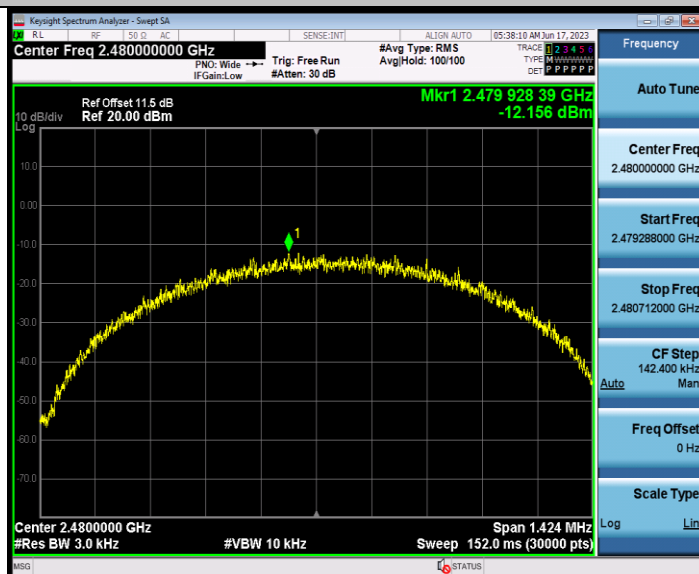




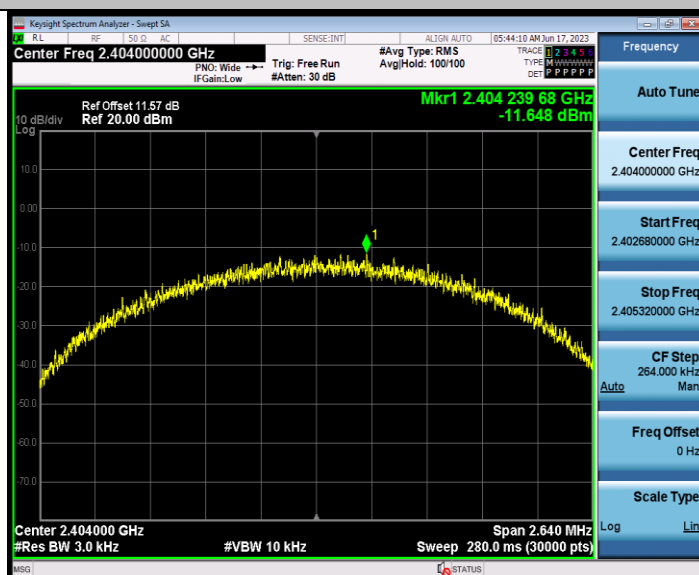
BUREAU
VERITAS

Test Report No.: W7L-P230608W002RF01

BLE_1M_Ant1_2480



BLE_2M_Ant1_2404





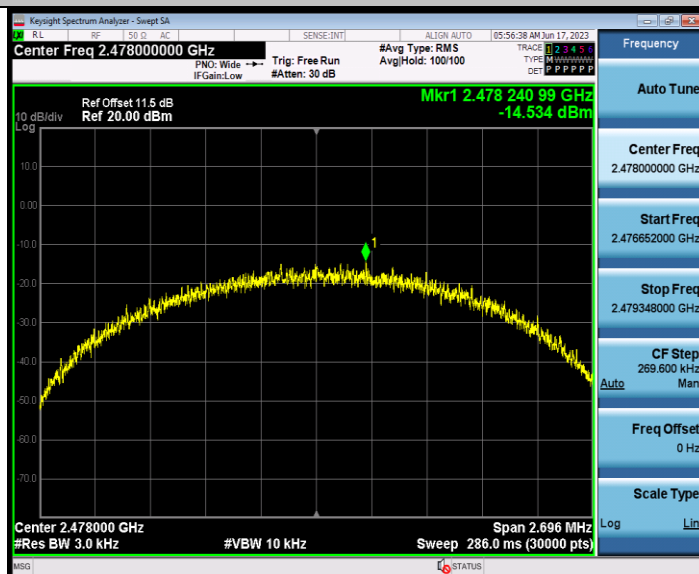
BUREAU
VERITAS

Test Report No.: W7L-P230608W002RF01

BLE_2M_Ant1_2440



BLE_2M_Ant1_2478





Test Report No.: W7L-P230608W002RF01

BAND EDGE MEASUREMENTS

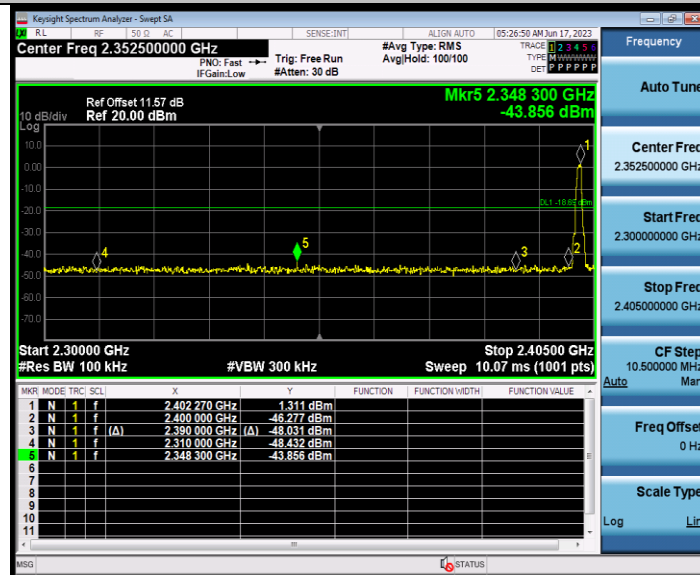
TEST RESULT

TestMode	Antenna	ChName	Frequency[MHz]	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	1.31	-43.86	≤ -18.69	PASS
		High	2480	-0.09	-43.53	≤ -20.09	PASS
BLE_2M	Ant1	Low	2404	1.51	-43.86	≤ -18.49	PASS
		High	2478	-1.29	-43.82	≤ -21.29	PASS

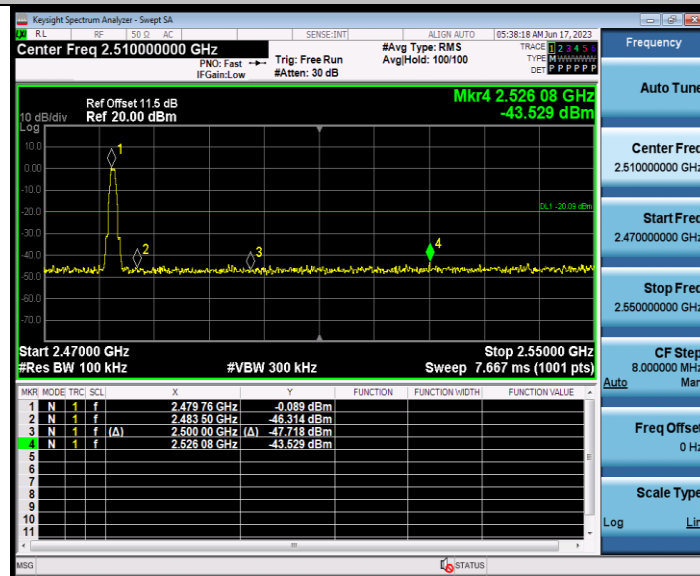


TEST GRAPHS

BLE_1M_Ant1_Low_2402



BLE_1M_Ant1_High_2480

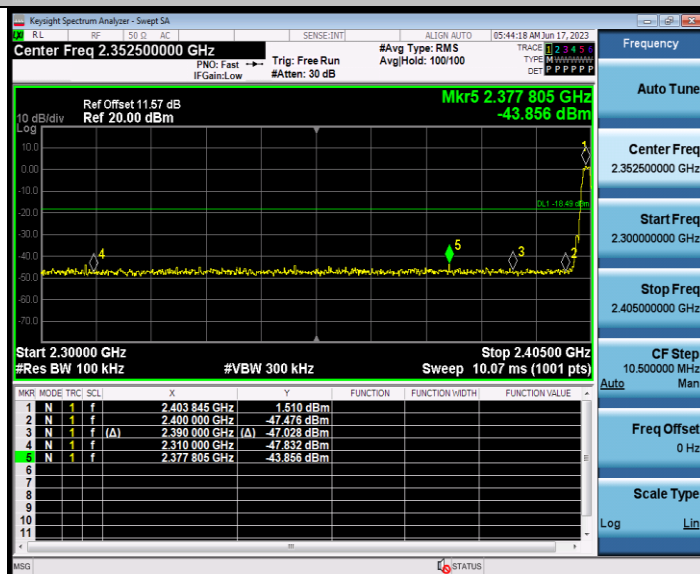




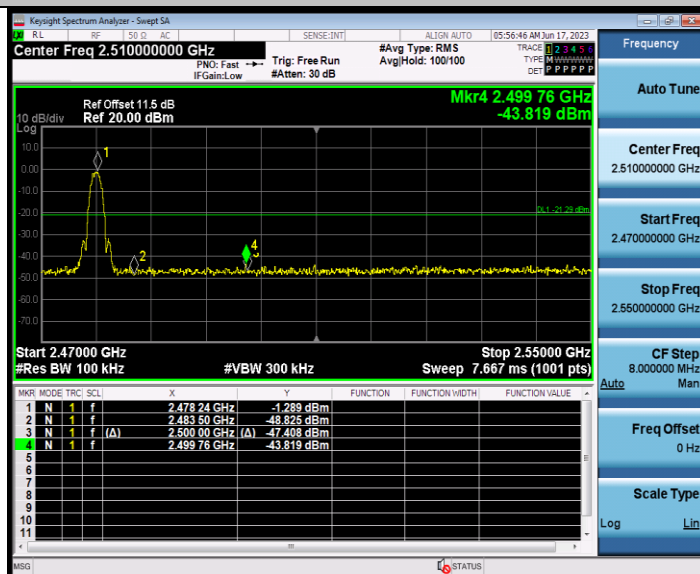
BUREAU
VERITAS

Test Report No.: W7L-P230608W002RF01

BLE_2M_Ant1_Low_2404



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	0.01	0.01	---	PASS
			30~1000	0.01	-52.62	≤-19.99	PASS
			1000~26500	0.01	-33.67	≤-19.99	PASS
		2440	Reference	-0.49	-0.49	---	PASS
			30~1000	-0.49	-51.57	≤-20.49	PASS
			1000~26500	-0.49	-33.97	≤-20.49	PASS
		2480	Reference	-1.00	-1.00	---	PASS
			30~1000	-1.00	-53.39	≤-21	PASS
			1000~26500	-1.00	-32.88	≤-21	PASS
BLE_2M	Ant1	2404	Reference	1.22	1.22	---	PASS
			30~1000	1.22	-52.39	≤-18.78	PASS
			1000~26500	1.22	-32.97	≤-18.78	PASS
		2440	Reference	-0.24	-0.24	---	PASS
			30~1000	-0.24	-53.11	≤-20.24	PASS
			1000~26500	-0.24	-33.91	≤-20.24	PASS
		2478	Reference	-1.92	-1.92	---	PASS
			30~1000	-1.92	-53	≤-21.92	PASS
			1000~26500	-1.92	-33.24	≤-21.92	PASS



BUREAU
VERITAS

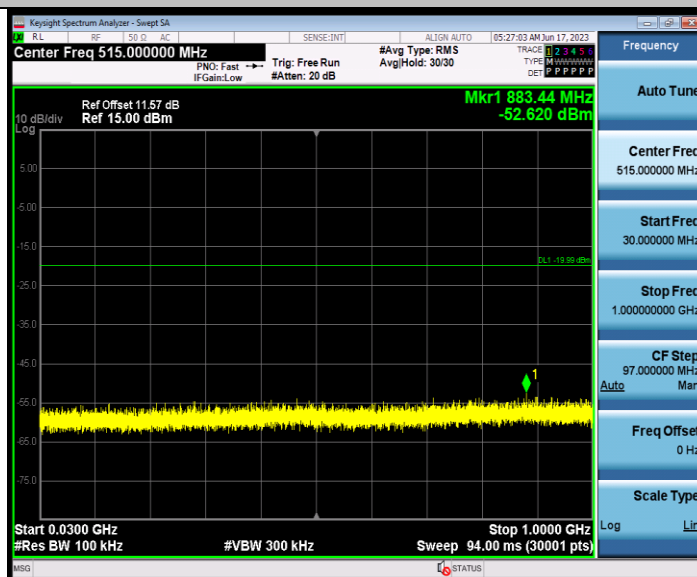
Test Report No.: W7L-P230608W002RF01

TEST GRAPHS

BLE_1M_Ant1_2402_0-Reference



BLE_1M_Ant1_2402_30~1000

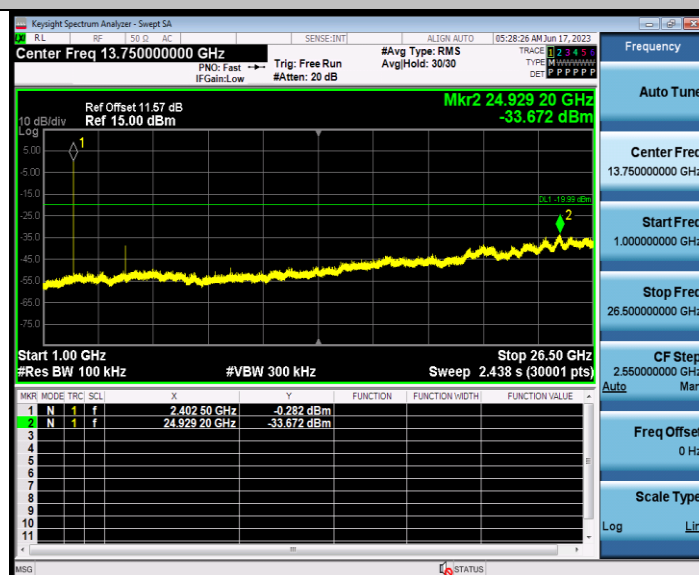




BUREAU
VERITAS

Test Report No.: W7L-P230608W002RF01

BLE_1M_Ant1_2402_1000~26500



BLE_1M_Ant1_2440_0~Reference

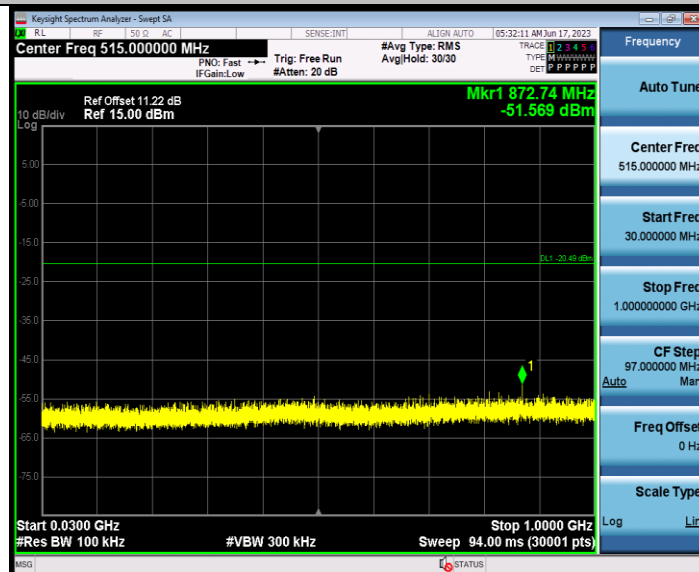




BUREAU
VERITAS

Test Report No.: W7L-P230608W002RF01

BLE_1M_Ant1_2440_30~1000



BLE_1M_Ant1_2440_1000~26500





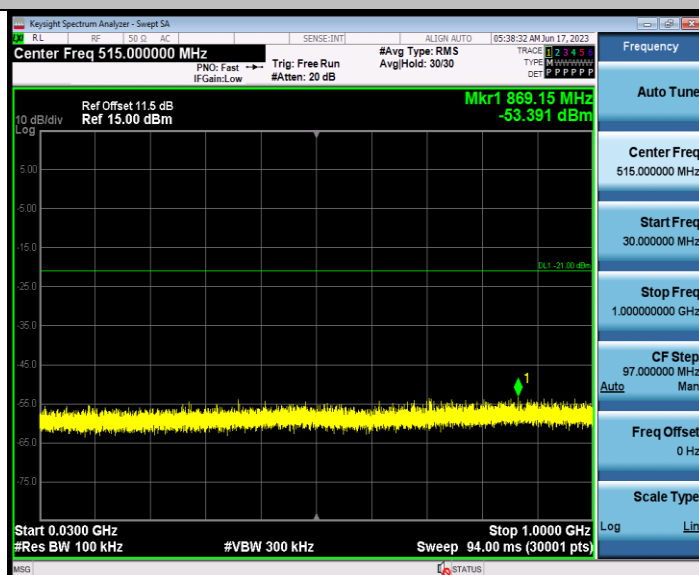
BUREAU
VERITAS

Test Report No.: W7L-P230608W002RF01

BLE_1M_Ant1_2480_0~Reference



BLE_1M_Ant1_2480_30~1000

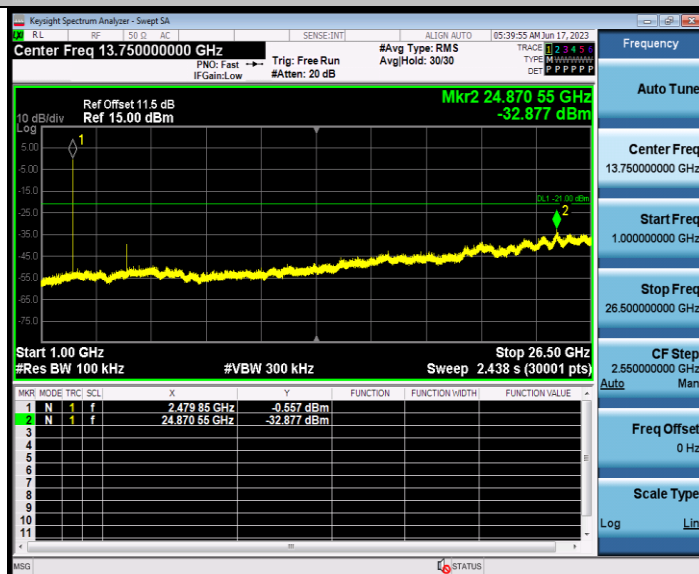




BUREAU
VERITAS

Test Report No.: W7L-P230608W002RF01

BLE_1M_Ant1_2480_1000~26500



BLE_2M_Ant1_2404_0~Reference

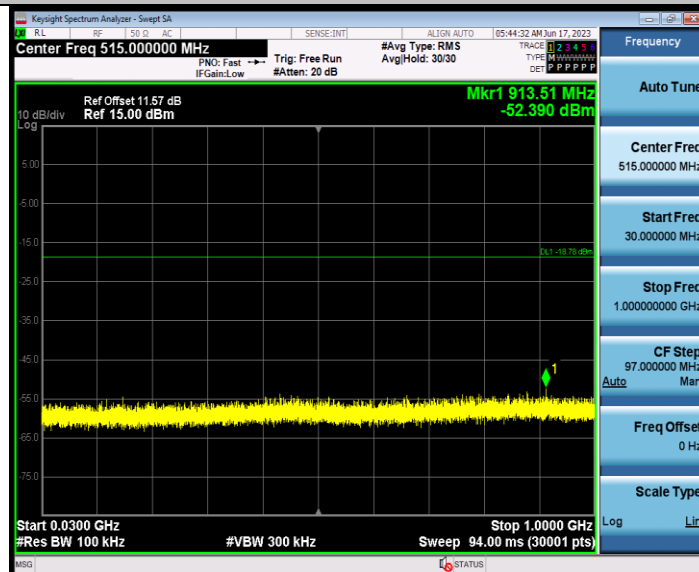




BUREAU
VERITAS

Test Report No.: W7L-P230608W002RF01

BLE_2M_Ant1_2404_30~1000



BLE_2M_Ant1_2404_1000~26500

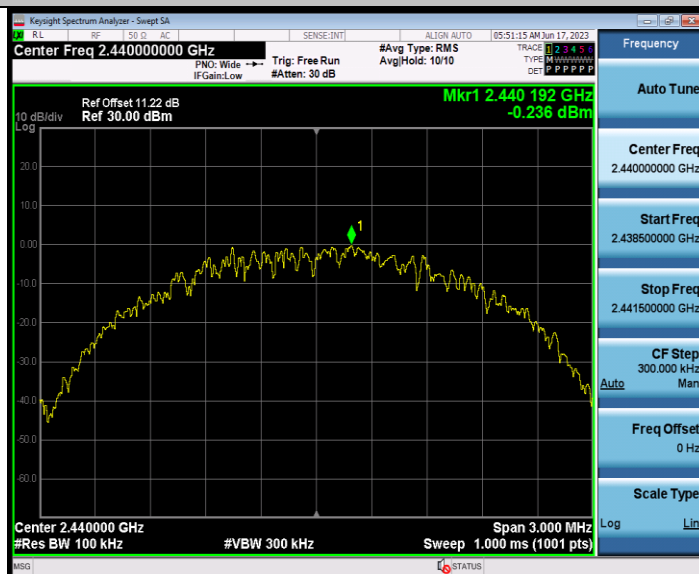




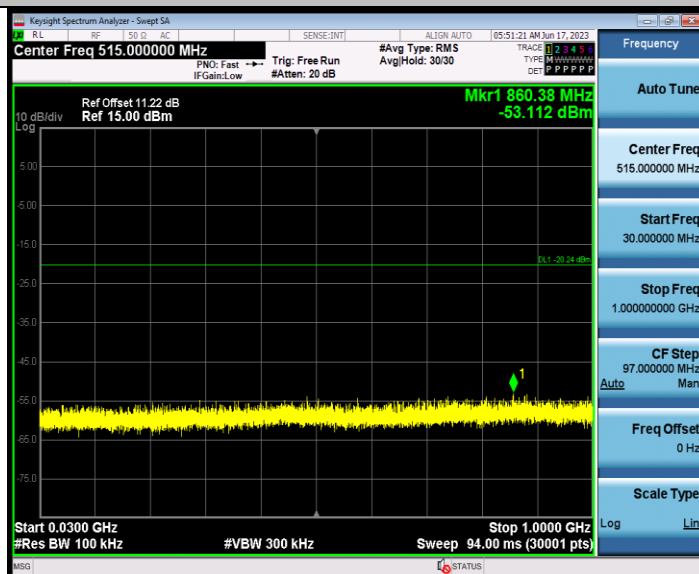
BUREAU
VERITAS

Test Report No.: W7L-P230608W002RF01

BLE_2M_Ant1_2440_0~Reference



BLE_2M_Ant1_2440_30~1000

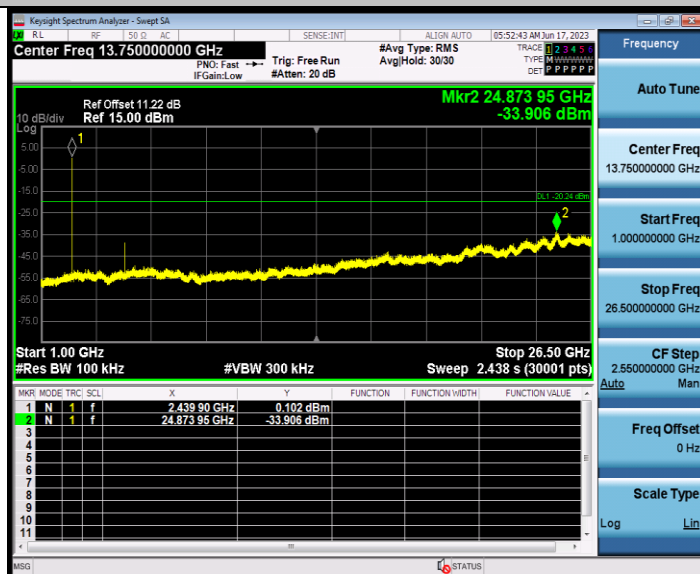




BUREAU
VERITAS

Test Report No.: W7L-P230608W002RF01

BLE_2M_Ant1_2440_1000~26500



BLE_2M_Ant1_2478_0~Reference

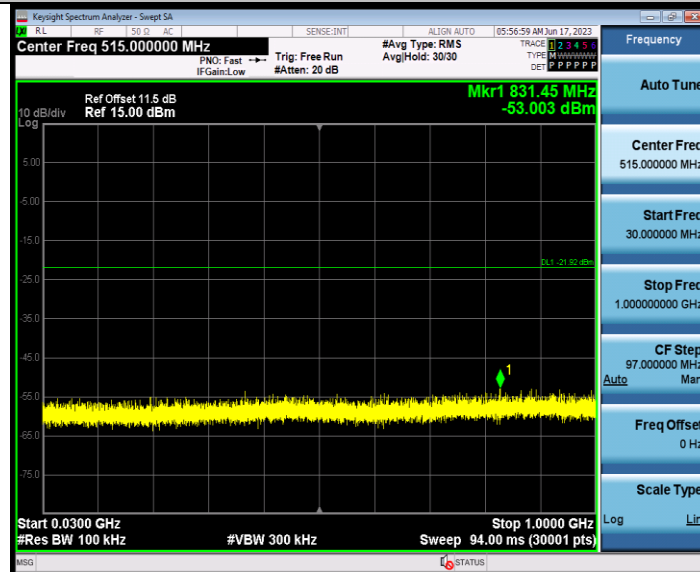




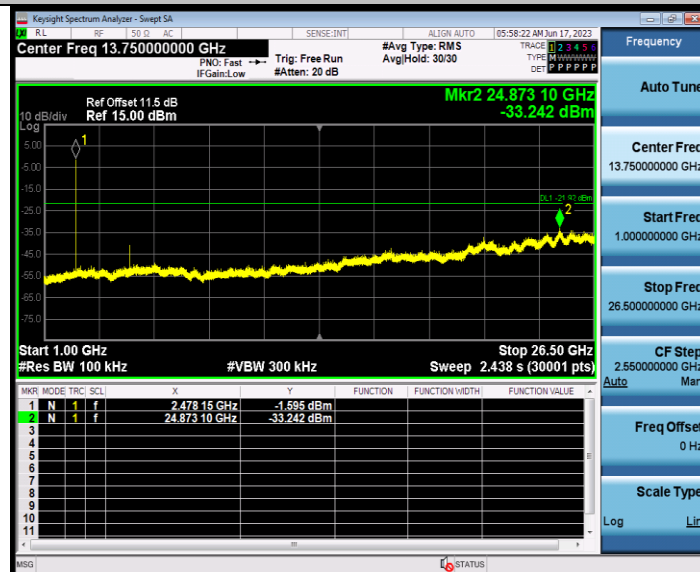
BUREAU
VERITAS

Test Report No.: W7L-P230608W002RF01

BLE_2M_Ant1_2478_30~1000



BLE_2M_Ant1_2478_1000~26500





Test Report No.: W7L-P230608W002RF01

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

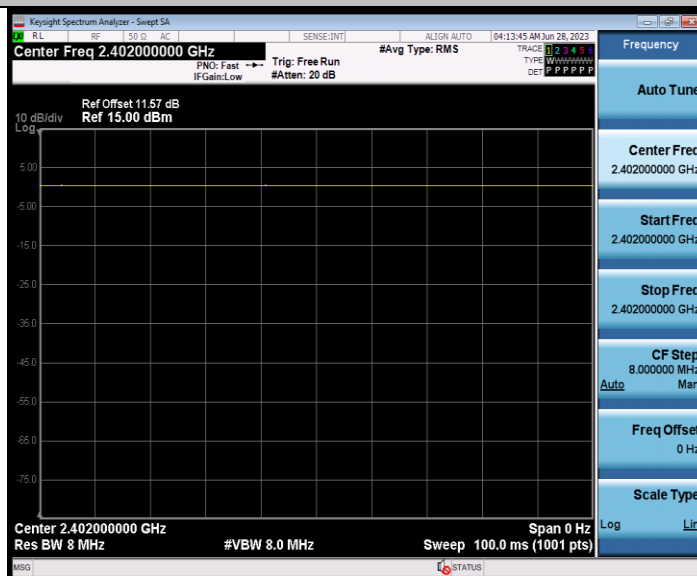


BUREAU
VERITAS

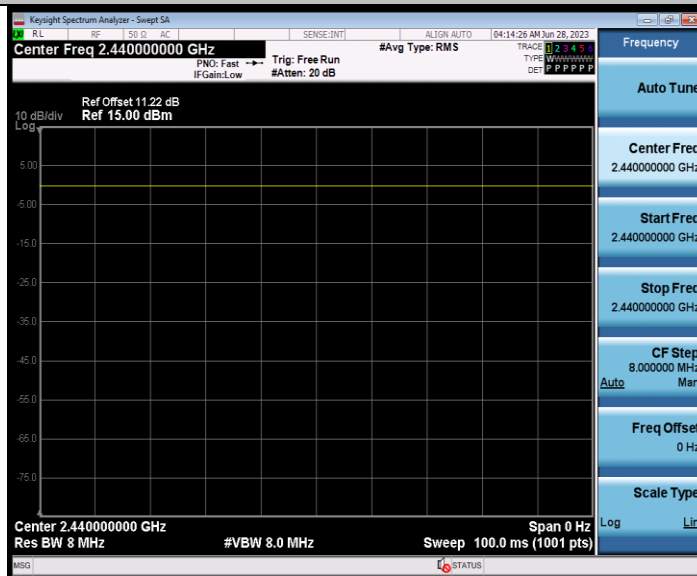
Test Report No.: W7L-P230608W002RF01

TEST GRAPHS

BLE_1M_Ant1_2402



BLE_1M_Ant1_2440

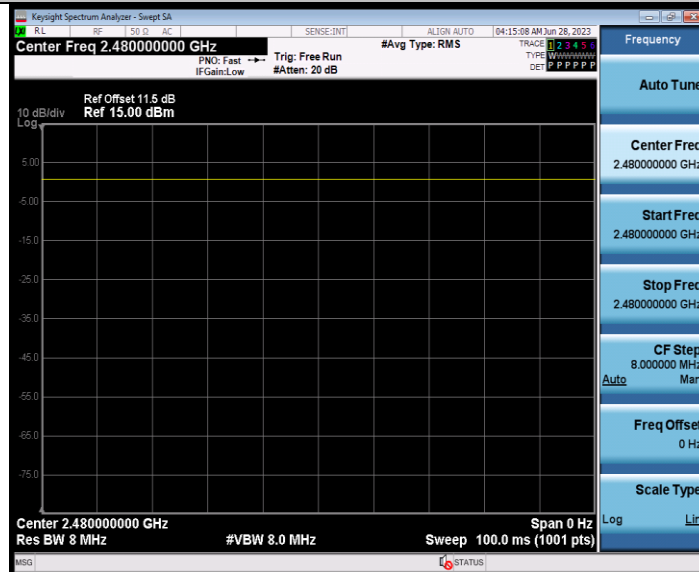




BUREAU
VERITAS

Test Report No.: W7L-P230608W002RF01

BLE_1M_Ant1_2480



BLE_2M_Ant1_2404

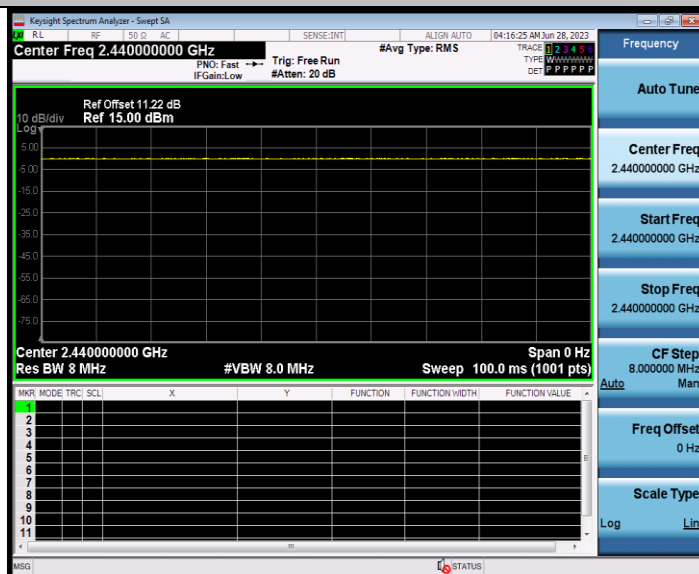




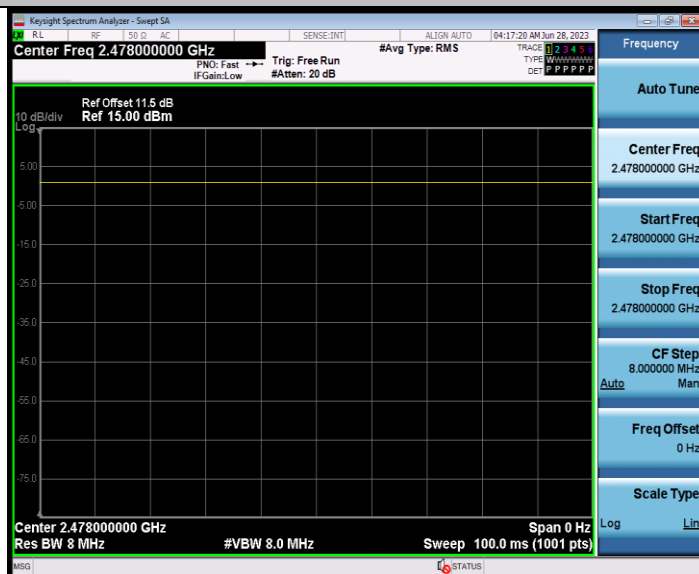
BUREAU
VERITAS

Test Report No.: W7L-P230608W002RF01

BLE_2M_Ant1_2440



BLE_2M_Ant1_2478



---END---