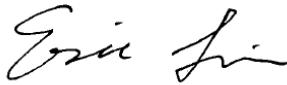


TEST REPORT

Application No.:	C190102R01
FCC ID:	2AR9QLW02-MW02
IC:	24923-LW2MW2
Applicant:	Noerden (Shanghai) Information Technology Co.,Ltd
Address of Applicant:	Room 1101A ,No. 1486 West Nanjing Road , Jing'an District ,Shanghai , P.R.C
Manufacturer:	Noerden (Shanghai) Information Technology Co.,Ltd
Address of Manufacturer:	Room 1101A ,No. 1486 West Nanjing Road , Jing'an District ,Shanghai , P.R.C
Factory:	Noerden (Shanghai) Information Technology Co.,Ltd
Address of Factory:	Room 1101A ,No. 1486 West Nanjing Road , Jing'an District ,Shanghai , P.R.C.
Equipment Under Test (EUT):	
EUT Name:	NOERDEN Smart Watch
Model No.:	LIFE2
Series Model:	LIFE2+ , MATE2, MATE2+
Brand Name:	NOERDEN
Standard(s) :	47 CFR Part 15, Subpart C 15.247 RSS-247 Issue 2, February 2017 RSS-Gen Issue 5, April 2018
Date of Receipt:	2019-01-02
Date of Test:	2019-01-04 and 2019-02-25
Date of Issue:	2019-03-04
Test Result:	Pass*

* In the configuration tested, the EUT complied with the standards specified above.



Eric Lin
EMC Lab Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.



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Attention: To check the authenticity of testing /inspection report & certificate, please contact us at telephone: (86-755) 8307 1443, or email: CN_Doccheck@sgs.com

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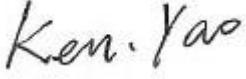
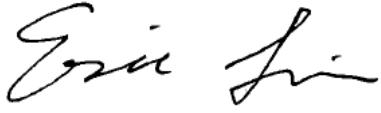


CCSRF

Compliance Certification Services
(Kunshan) Inc.

Report No.: C190102R01-RPB1
Page: 2 of 41

Revision Record			
Version	Description	Date	Remark
00	Original	2019-03-04	/

Authorized for issue by:				
				
		Ken Yao / Project Engineer		
				
		Eric Lin / Reviewer		

2 Test Summary

Radio Spectrum Technical Requirement				
Item	Standard	Method	Requirement	Result
Antenna Requirement	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.203 & 15.247(c)	Customer Declaration

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	N/A
Minimum 6dB Bandwidth	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.8.1	47 CFR Part 15, Subpart C 15.247a(2)	Pass
Conducted Peak Output Power	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.9.1	47 CFR Part 15, Subpart C 15.247(b)(3)	Pass
Power Spectrum Density	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.10.2	47 CFR Part 15, Subpart C 15.247(e)	Pass
Conducted Band Edges Measurement	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.13.3.2	47 CFR Part 15, Subpart C 15.247(d)	Pass
Conducted Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.11	47 CFR Part 15, Subpart C 15.247(d)	Pass
Radiated Emissions which fall in the restricted bands	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.209 & 15.247(d)	Pass
Radiated Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.4,6.5,6.6	47 CFR Part 15, Subpart C 15.209 & 15.247(d)	Pass
99% Bandwidth	RSS-247 Issue 2, February 2017	ANSI C63.10 Section 6.9.3	RSS-Gen Section 6.6	Pass
Frequency Stability	-	RSS-Gen Section 8.11	RSS-Gen Section 6.11	Pass

Remark: Frequency stability requested in RSS GEN S8.11 has been complied since the result of band edge can demonstrate.

*** Model Discrepancy:**

Their electrical circuit design, layout, components used and internal wiring are identical.

The following is their difference:

- 1) The appearance: LIFE2 and LIFE2+ is same; MATE2 and MATE2+ are different.
- 2) The Material of glass: LIFE2 is Common glass , LIFE2+ is Sapphire glass, MATE2 is Sapphire glass,MATE2+ is sapphire glass
- 3) The color of dial plate: LIFE2 are Navy,Blue,White,Black,Red , LIFE2+ are Black ,Grey . Mate2 are black and white , MATE2+ are Black , Grey , Khaki
- 4) The color of watch strap: LIFE2 are Black、White、Red、Blue、Navy, LIFE2+ are black、silver. MATE2 are black and white. MATE2+ are Black, Grey, Khaki
- 5) The Material of watchband: LIFE2 are silicone; LIFE2+ are Stainless steel. Mate2 have silicone.MATE2+ are leather and nylon
- 6) The color of dial: LIFE2 are Navy、Light Blue、dark grey、light grey, LIFE2+ are dark black、Light grey. Mate2 are black and white. MATE2+ are Black, Grey, Khaki
- 7) The color of watch needle: LIFE2 are red,yellow,white,black, LIFE2+ are grey、white. Mate2 are black and grey ,MATE2+ are Black, Grey, Khaki

The EUT (model: LIFE2) had been tested.

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4 General Information

4.1 Details of E.U.T.

Power supply	3.0 VDC button cell
Test voltage	3.0 VDC
Antenna Gain	0.98 dBi
Antenna Type	FPC Antenna
BT Version	LE4.0
Channel Spacing	2MHz
Modulation Type	GFSK
Number of Channels	40
Operation Frequency	2402MHz to 2480MHz

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Notebook	acer	ZQT	/

4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	RF output power, conducted	±1.29dB
2	Unwanted Emissions, conducted	±2.41dB
3	RF Power density, conducted	±2.37dB
4	Conducted emissions	±2.25dB
5	All emissions, radiated (Below 1GHz)	±4.6dB
6	All emissions, radiated (Above 1GHz)	±4.1dB
7	Temperature	±1°C
8	Supply voltages	±0.2%

Note: The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

4.4 Test Location

All measurement facilities used to collect the measurement data are located at
No.10 Weiye Rd, Innovation park, Eco&Tec, Development Zone, Kunshan City, Jiangsu, China.
No tests were sub-contracted.

4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **CNAS (No. CNAS L4354)**

CNAS has accredited Compliance Certification Services (Kunshan) Inc. to ISO/IEC 17025:2005
General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01
Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the
competence in the field of testing.

- **A2LA (Certificate No. 2541.01)**

Compliance Certification Services (Kunshan) Inc. is accredited by the American Association for
Laboratory Accreditation (A2LA). Certificate No. 2541.01.

- **FCC –Designation Number: CN1172**

Compliance Certification Services Inc. has been recognized as an accredited testing laboratory.
Designation Number: CN1172. Test Firm Registration Number: 995260.

- **Industry Canada (IC) – IC Assigned Code: 2324E CAB ID: CN0072**

The 10m and 3m Semi-anechoic chamber of Compliance Certification Services (Kunshan) Inc. has
been registered by Certification and Engineering Bureau of Industry Canada for radio equipment
testing with Registration No.: 2324E-1 for 10m chamber, 2324E-2 for 3m chamber.

- **VCCI (Member No.: 1938)**

The 3m and 10m Semi-anechoic chamber and Shielded Room of Compliance Certification Services
(Kunshan) Inc. has been registered in accordance with the Regulations for Voluntary Control
Measures with Registration No.: R-1600, C-1707, T-1499, G-216 respectively.

4.6 Deviation from Standards

None

5 Equipment List

Conducted Emission at AC Power Line					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
EMI TEST RECEIVER	R&S	ESCI	100781	2019-2-25	2020-2-24
V (V-LISN)	SCHWARZBECK	NNLK 8129	8129-143	2018-10-28	2019-10-27
TWO-LINE V-NETWORK	R&S	ENV216	101604	2018-10-28	2019-10-27
Pulse LIMITER	R&S	ESH3-Z2	100524	2018-12-26	2019-12-25
Cable	Thermax	Cable-02	14	2018-12-26	2019-12-25
Test Software	EZ-EMC ver.3A1				
Conducted Test					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum Analyzer	RS	FSU26	200789	2018-7-13	2019-7-12
Power meter	Anritsu	ML2495A	1445010	2018-4-26	2019-4-25
Power sensor	Anritsu	MA2411B	1339220	2018-4-26	2019-4-25
Power SPLITTER	Mini-Circuits	ZN2PD-9G	SF078500430	2018-12-26	2019-12-25
DC Power Supply	AGILENT	E3632A	MY50340053	2018-12-26	2019-12-25
Cable	N/A	Cable-05	N/A	2018-4-24	2019-4-23
Cable	N/A	Cable-06	N/A	2018-4-24	2019-4-23
6dB Attenuator	N/A	N/A	N/A	2018-4-24	2019-4-23
Temp. / Humidity Gauge	Anymetre	TH603	CCS007	2018-10-30	2019-10-29

Radiated Test					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum Analyzer	R&S	FSV40	101493	2018-12-26	2019-12-25
Spectrum Analyzer	RS	FSU26	200789	2018-7-13	2019-7-12
EMI Test Receiver	R&S	ESCI	101378	2018-12-21	2019-12-20
Amplifier	COM-POWER	PAM-840A	461332	2018-10-28	2019-10-27
Amplifier	COM-POWER	PAM-118A	551044	2018-4-26	2019-4-25
Broad-Band Horn Antenna	SCHWARZBECK	BBHA 9170	9170-515	2018-2-27	2019-2-26
Bilog Antenna	Teseq	CBL6112D	36996	2018-7-7	2019-7-6
Loop Antenna	COM-POWER	AL-130R	10160008	2018-5-8	2019-5-7
Horn-antenna	SCHWARZBECK	9120D	D:266	2019-2-25	2020-2-24
Turn Table	CT	CT123	4165	N.C.R	N.C.R
Antenna Tower	CT	CTERG23	3256	N.C.R	N.C.R
Controller	CT	CT100	95637	N.C.R	N.C.R
Cable	REBES MICROWAVE	Cable-93	N/A	2018-10-28	2019-10-27
Cable	REBES MICROWAVE	Cable-94	N/A	2018-10-28	2019-10-27
Cable	REBES MICROWAVE	Cable-95	N/A	2018-10-28	2019-10-27
Cable	N/A	Cable-03	N/A	2018-4-24	2019-4-23
Cable	N/A	Cable-04	N/A	2018-4-24	2019-4-23
2.4G Filter	N/A	N/A	N/A	2018-4-24	2019-4-23
Test Software	EZ-EMC ver.3A1				

6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203 & 15.247(c)

6.1.2 Conclusion

Standard Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:

The antenna is FPC antenna and no consideration of replacement. The best case gain of the antenna is 0.98dBi.



7 Radio Spectrum Matter Test Results

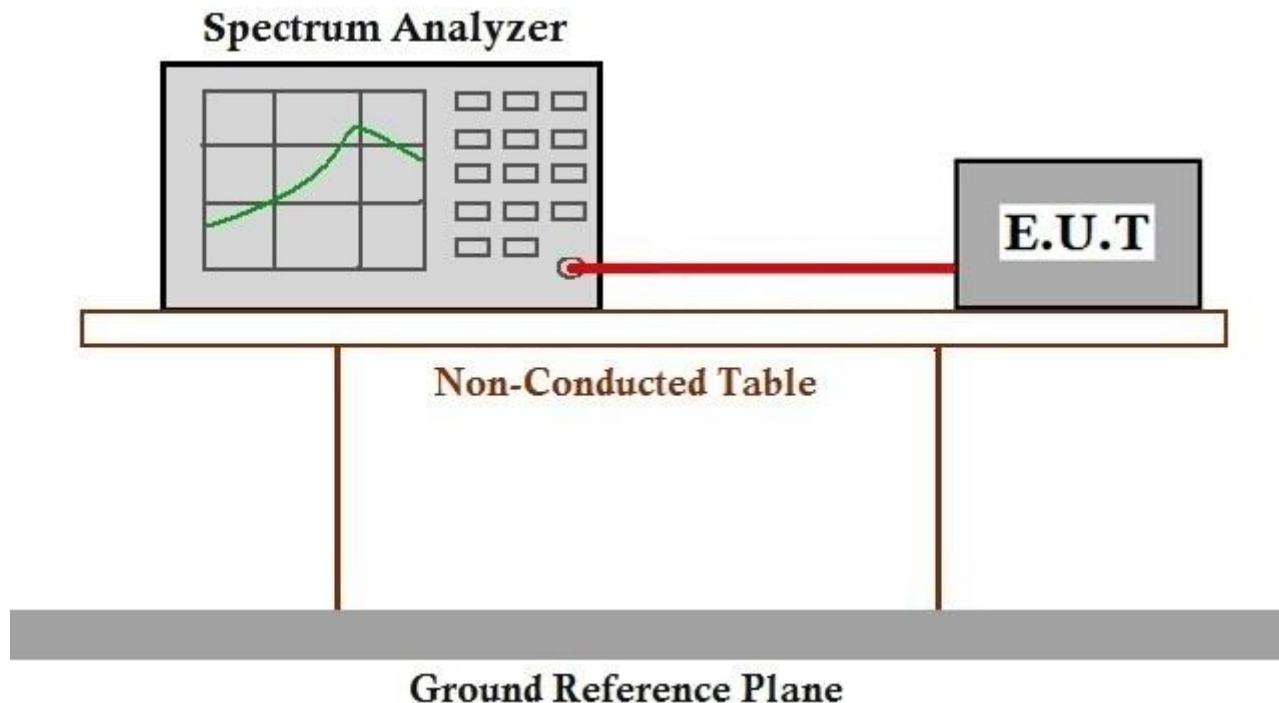
7.1 Minimum 6dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.247a(2)
Test Method: ANSI C63.10 (2013) Section 11.8.1
Limit: ≥ 500 kHz

7.1.1 E.U.T. Operation

Operating Environment:
Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1002 mbar
Test mode a: TX mode_Keep the EUT continuously transmitting mode. Only the data of worst case is recorded in the report.

7.1.2 Test Setup Diagram



7.1.3 Measurement Procedure and Data

The detailed test data see: Appendix A for C190102R01

7.2 Conducted Peak Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.247(b)(3)

Test Method: ANSI C63.10 (2013) Section 11.9.1

Limit:

Frequency range(MHz)	Output power of the intentional radiator(watt)
902-928	1 for ≥ 50 hopping channels
	0.25 for $25 \leq$ hopping channels < 50
	1 for digital modulation
2400-2483.5	1 for ≥ 75 non-overlapping hopping channels
	0.125 for all other frequency hopping systems
	1 for digital modulation
5725-5850	1 for frequency hopping systems and digital modulation

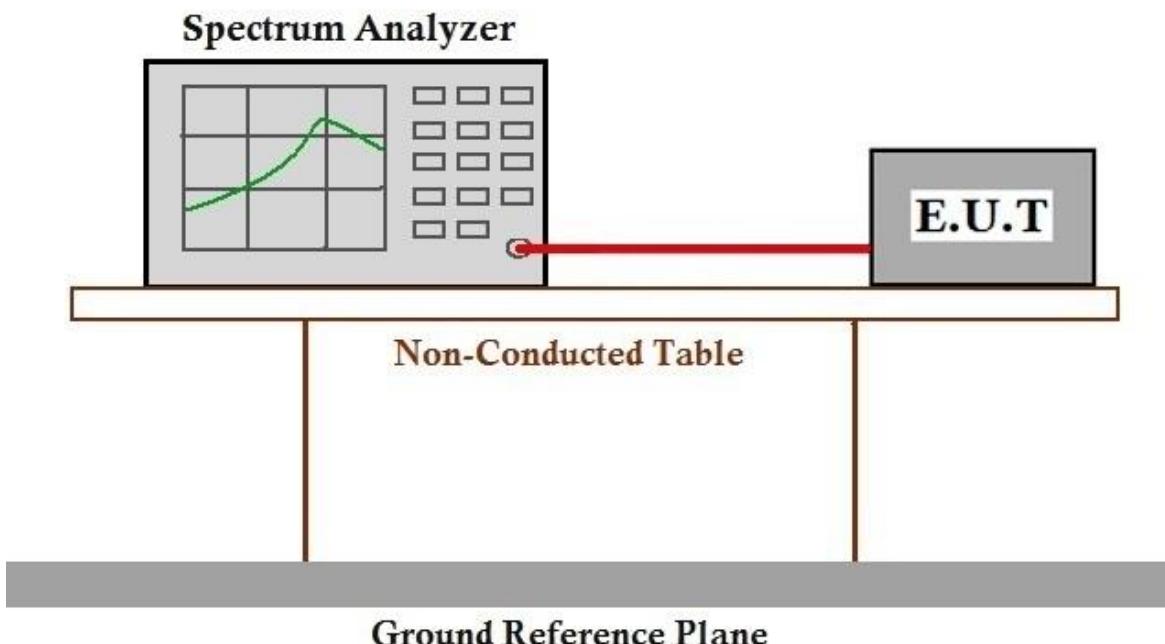
7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1002 mbar

Test mode a:TX mode_Keep the EUT in continuously transmitting mode. Only the data of worst case is recorded in the report.

7.2.2 Test Setup Diagram



7.2.3 Measurement Procedure and Data

The detailed test data see: Appendix A for C190102R01

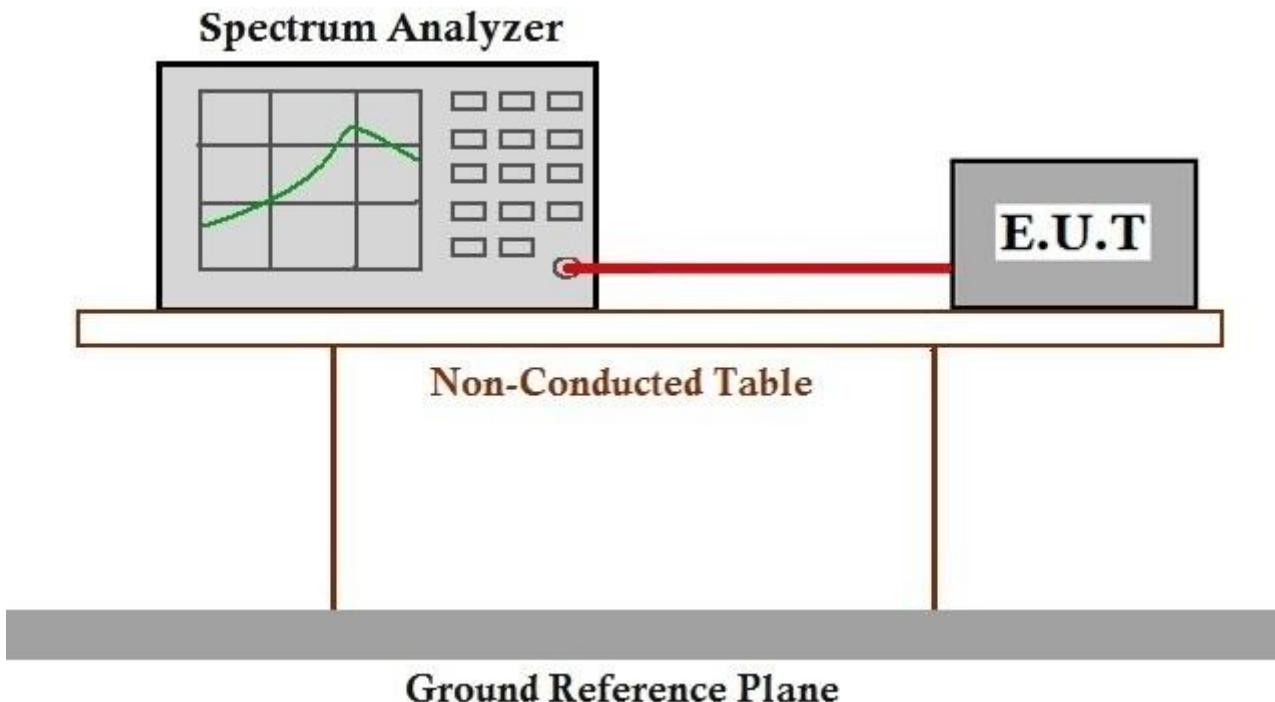
7.3 Power Spectrum Density

Test Requirement 47 CFR Part 15, Subpart C 15.247(e)
Test Method: ANSI C63.10 (2013) Section 11.10.2
Limit: $\leq 8\text{dBm}$ in any 3 kHz band during any time interval of continuous transmission

7.3.1 E.U.T. Operation

Operating Environment:
Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1002 mbar
Test mode a: TX mode_Keep the EUT in continuously transmitting mode. Only the data of worst case is recorded in the report.

7.3.2 Test Setup Diagram



7.3.3 Measurement Procedure and Data

The detailed test data see: Appendix A for C190102R01

7.4 Conducted Band Edges Measurement

Test Requirement	47 CFR Part 15, Subpart C 15.247(d)
Test Method:	ANSI C63.10 (2013) Section 11.13.3.2
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c))

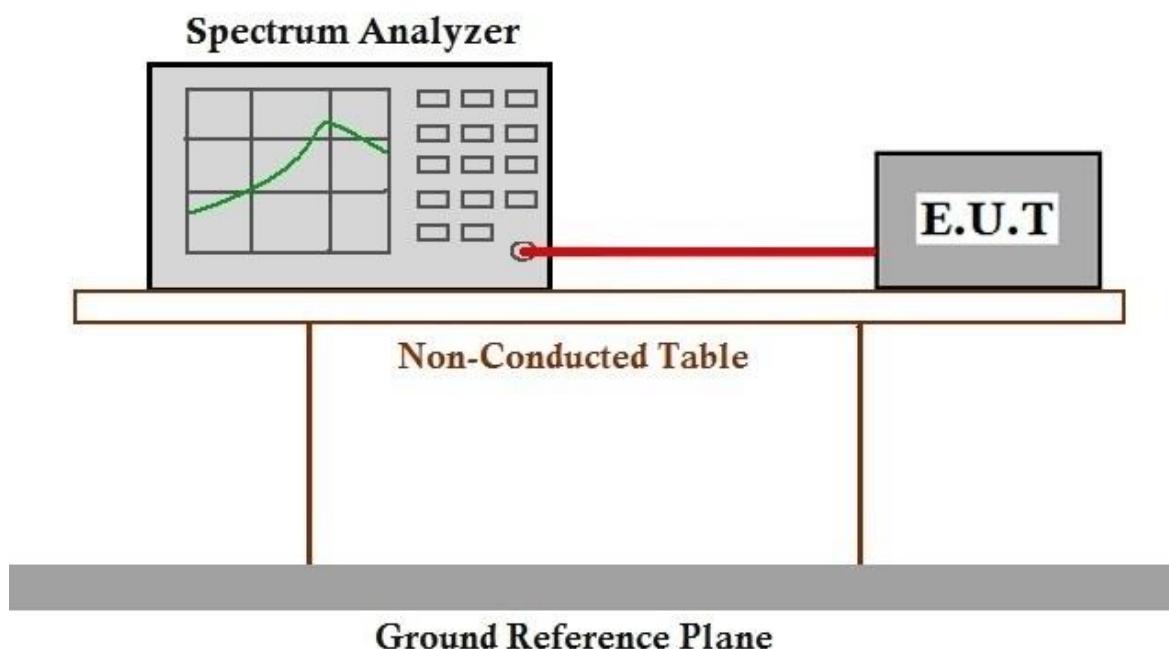
7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1002 mbar

Test mode a: TX mode_Keep the EUT in continuously transmitting mode. Only the data of worst case is recorded in the report.

7.4.2 Test Setup Diagram



7.4.3 Measurement Procedure and Data

The detailed test data see: Appendix A for C190102R01

7.5 Conducted Spurious Emissions

Test Requirement	47 CFR Part 15, Subpart C 15.247(d)
Test Method:	ANSI C63.10 (2013) Section 11.11
Limit:	In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c))

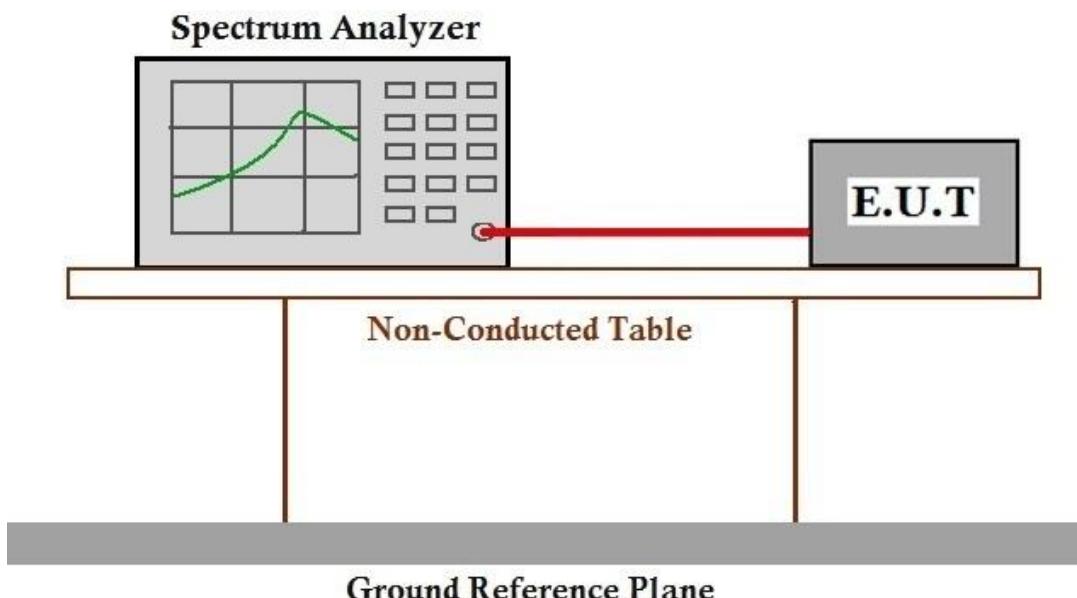
7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1002 mbar

Test mode a: TX mode: Keep the EUT in continuously transmitting mode. Only the data of worst case is recorded in the report.

7.5.2 Test Setup Diagram



7.5.3 Measurement Procedure and Data

The detailed test data see: Appendix A for C190102R01

7.6 Radiated Emissions which fall in the restricted bands

Test Requirement 47 CFR Part 15, Subpart C 15.209 & 15.247(d)

Test Method: ANSI C63.10 (2013) Section 6.10.5

Limit:

Frequency(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

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

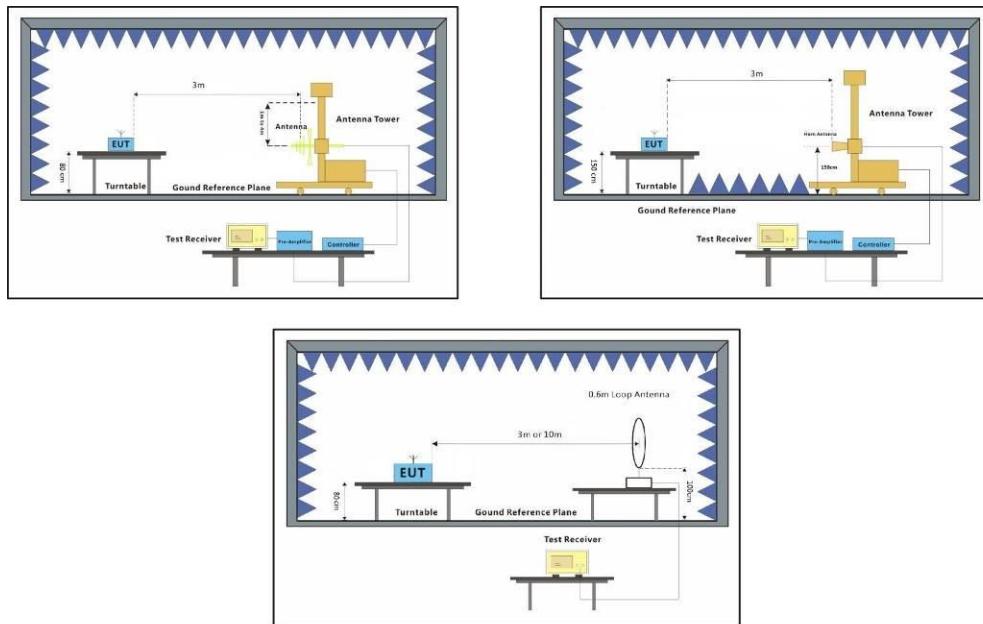
7.6.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 51 % RH Atmospheric Pressure: 1010 mbar

Test mode a: TX mode: Keep the EUT in continuously transmitting mode. Only the data of worst case is recorded in the report.

7.6.2 Test Setup Diagram



7.6.3 Measurement Procedure and Data

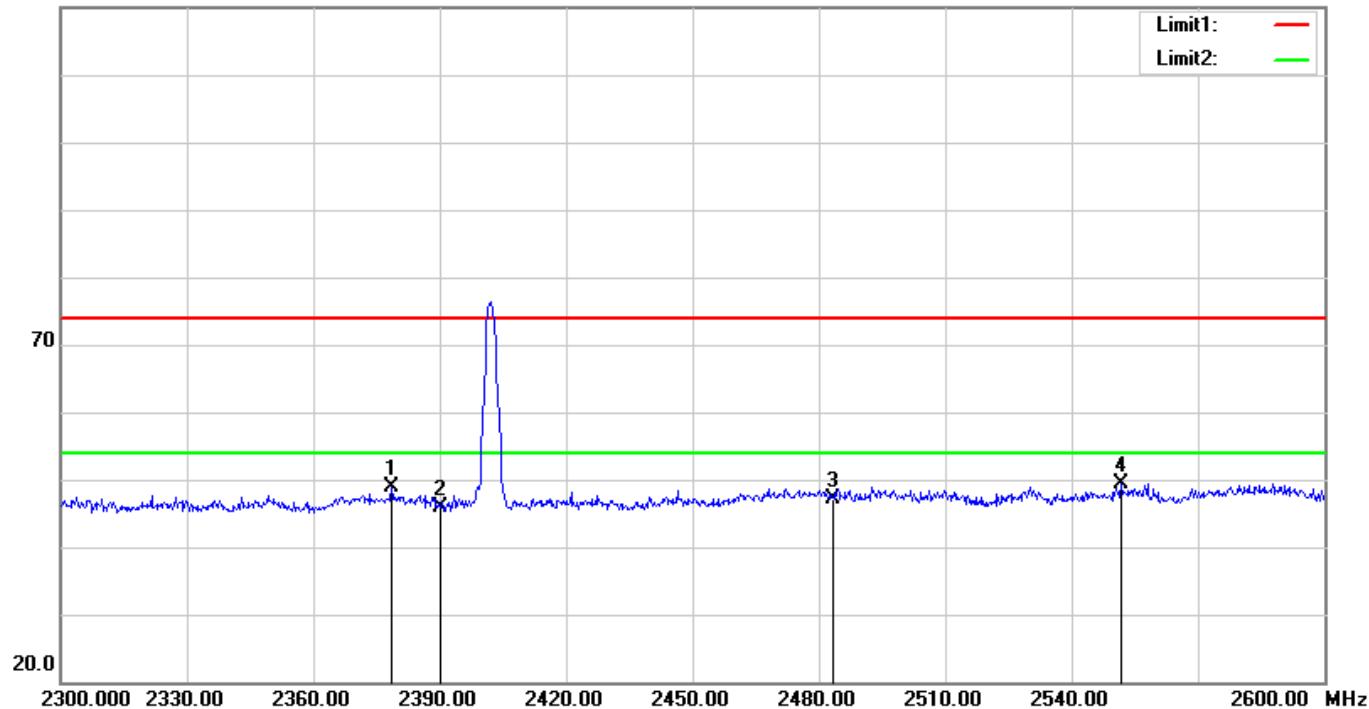
- a. For below 1GHz, the EUT was placed on the top of insulating material 12mm above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna 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.
- e. 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

Mode a; Polarization: Horizontal; Modulation: GFSK; Channel: Low

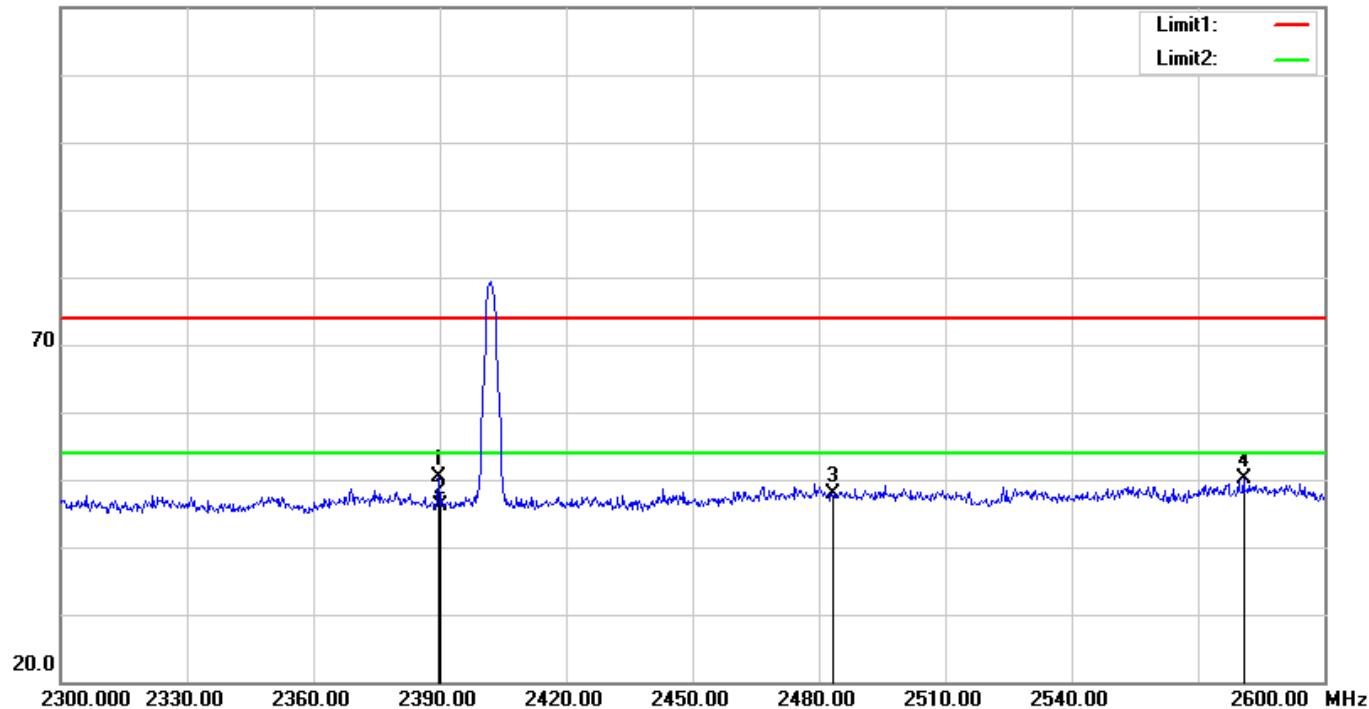
120.0 dBuV/m



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2378.600	57.86	-9.02	48.84	74.00	-25.16	100	250	peak
2	2390.000	54.75	-8.95	45.80	74.00	-28.20	100	361	peak
3	2483.500	55.46	-8.35	47.11	74.00	-26.89	200	361	peak
4	2551.700	57.39	-7.98	49.41	74.00	-24.59	200	136	peak

Mode a; Polarization: Vertical; Modulation: GFSK; Channel: Low

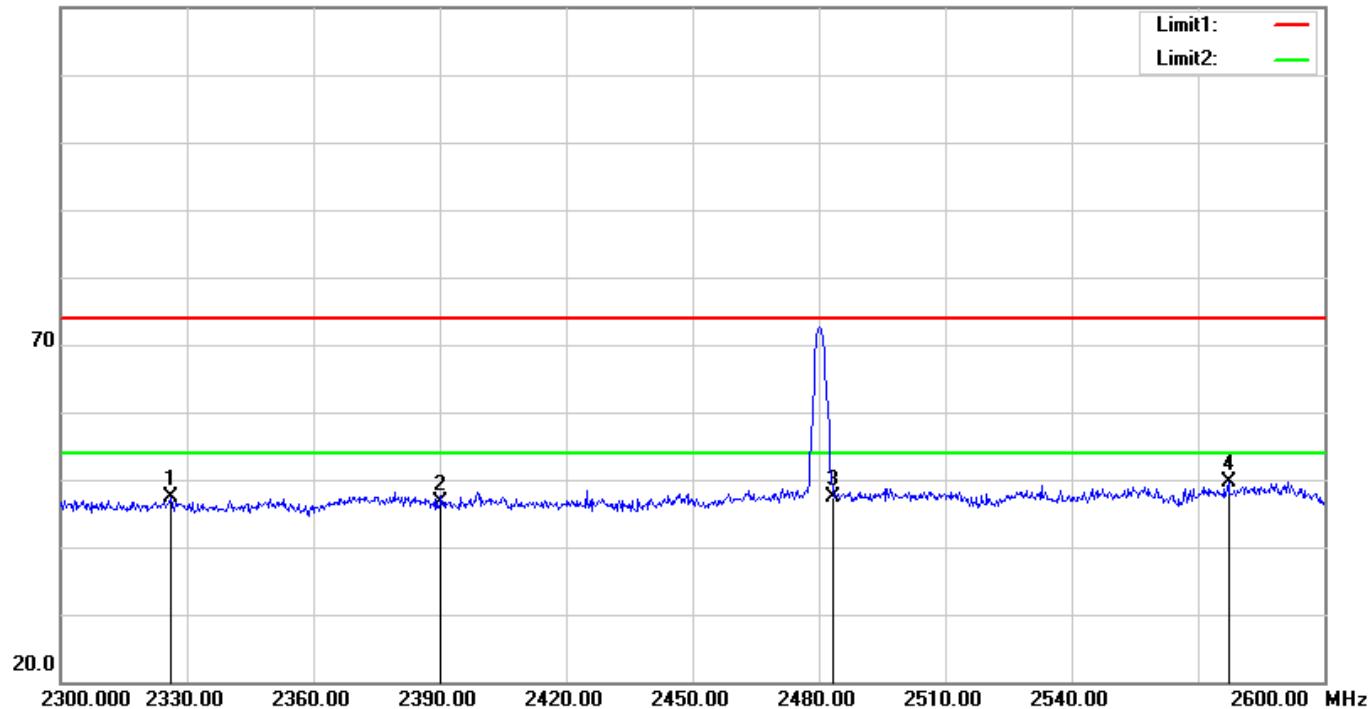
120.0 dBuV/m



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2389.700	59.44	-8.95	50.49	74.00	-23.51	100	90	peak
2	2390.000	55.05	-8.95	46.10	74.00	-27.90	100	90	peak
3	2483.500	56.32	-8.35	47.97	74.00	-26.03	100	90	peak
4	2580.800	58.04	-7.84	50.20	74.00	-23.80	200	312	peak

Mode a; Polarization: Horizontal; Modulation: GFSK; Channel: High

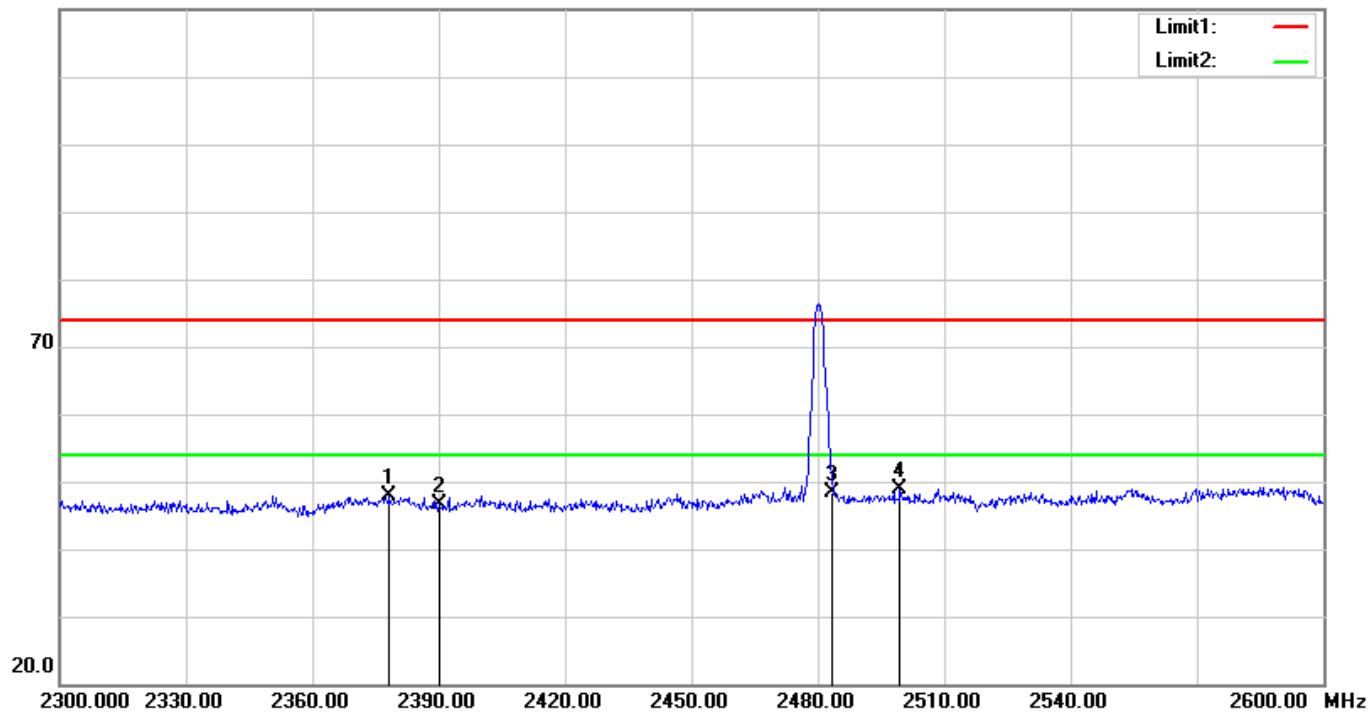
120.0 dBuV/m



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2326.100	56.82	-9.36	47.46	74.00	-26.54	100	361	peak
2	2390.000	55.48	-8.95	46.53	74.00	-27.47	100	250	peak
3	2483.500	55.75	-8.35	47.40	74.00	-26.60	100	250	peak
4	2577.200	57.50	-7.86	49.64	74.00	-24.36	100	126	peak

Mode a; Polarization: Vertical; Modulation: GFSK; Channel: High

120.0 dBuV/m



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	2378.300	56.93	-9.02	47.91	74.00	-26.09	200	83	peak
2	2390.000	55.67	-8.95	46.72	74.00	-27.28	200	83	peak
3	2483.500	56.74	-8.35	48.39	74.00	-25.61	100	0	peak
4	2499.500	57.16	-8.24	48.92	74.00	-25.08	100	360	peak

7.7 Radiated Spurious Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.209 & 15.247(d)

Test Method: ANSI C63.10 (2013) Section 6.4,6.5,6.6

Limit:

Frequency(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

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

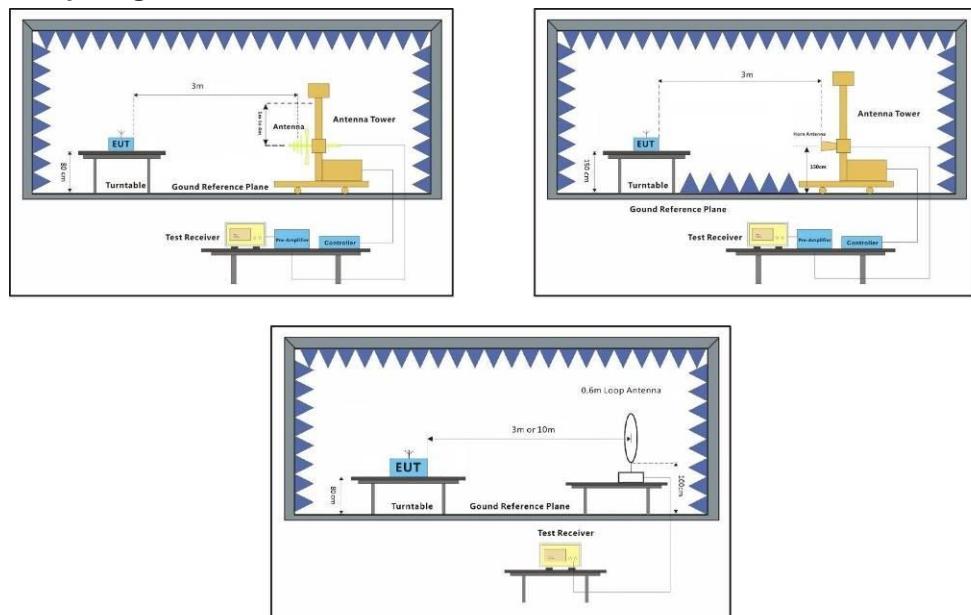
7.7.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 51 % RH Atmospheric Pressure: 1010 mbar

Test mode a: TX mode: Keep the EUT in continuously transmitting mode. Only the data of worst case is recorded in the report.

7.7.2 Test Setup Diagram



7.7.3 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of insulating material 12mm above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna 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.
- e. 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark:

- 1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.
- 2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

- 3) Scan from 9kHz to 25GHz, the disturbance above 18GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

- 4) For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown

BELow 1G

Mode a; Polarization: Horizontal; Modulation: GFSK; Channel: Low

No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	30.0000	5.89	25.76	31.65	40.00	-8.35	101	0	peak
2	345.2500	5.40	25.72	31.12	46.00	-14.88	100	282	peak
3	609.0900	5.41	25.76	31.17	46.00	-14.83	126	0	peak
4	842.8600	5.45	28.35	33.80	46.00	-12.20	200	256	peak
5	884.5700	5.62	28.82	34.44	46.00	-11.56	100	0	peak
6	999.0300	4.55	29.93	34.48	54.00	-19.52	103	0	peak

Mode a; Polarization: Vertical; Modulation: GFSK; Channel: Low

No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	30.9700	8.35	25.09	33.44	40.00	-6.56	100	348	peak
2	360.7700	5.69	25.79	31.48	46.00	-14.52	300	302	peak
3	602.3000	5.33	25.91	31.24	46.00	-14.76	200	181	peak
4	851.5900	5.97	28.50	34.47	46.00	-11.53	200	181	peak
5	922.4000	6.04	28.83	34.87	46.00	-11.13	100	358	peak
6	996.1200	5.27	29.86	35.13	54.00	-18.87	365	0	peak

ABOVE 1G

Mode a; Polarization: Horizontal; Modulation: GFSK; Channel: Low

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4791.000	48.08	1.29	49.37	74.00	-24.63	100	196	peak
2	7205.000	44.20	8.83	53.03	74.00	-20.97	200	218	peak

Mode a; Polarization: Vertical; Modulation: GFSK; Channel: Low

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4804.000	43.06	1.31	44.37	74.00	-29.63	200	31	peak
2	7273.000	41.70	9.00	50.70	74.00	-23.30	100	162	peak

Mode a; Polarization: Horizontal; Modulation: GFSK; Channel: Middle

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4876.000	52.38	1.42	53.80	74.00	-20.20	100	188	peak
2	7324.000	50.27	9.14	59.41	74.00	-14.59	201	275	peak
3	7324.000	42.11	9.14	51.25	54.00	-2.75	201	275	AVG

Mode a; Polarization: Vertical; Modulation: GFSK; Channel: Middle

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4876.000	52.08	1.42	53.50	74.00	-20.50	201	115	peak
2	7320.104	41.25	9.13	50.38	54.00	-3.62	209	240	AVG
3	7324.000	51.19	9.14	60.33	74.00	-13.67	201	302	peak

Mode a; Polarization: Horizontal; Modulation: GFSK; Channel: High

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4961.000	51.44	1.55	52.99	74.00	-21.01	100	189	peak
2	7443.000	47.91	9.44	57.35	74.00	-16.65	201	275	peak
3	7443.000	41.26	9.44	50.70	54.00	-3.30	201	275	AVG

Mode a; Polarization: Vertical; Modulation: GFSK; Channel: High

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	4961.000	50.95	1.55	52.50	74.00	-21.50	200	120	peak
2	7443.000	49.75	9.44	59.19	74.00	-14.81	200	318	peak
3	7443.000	39.81	9.44	49.25	54.00	-4.75	200	318	AVG

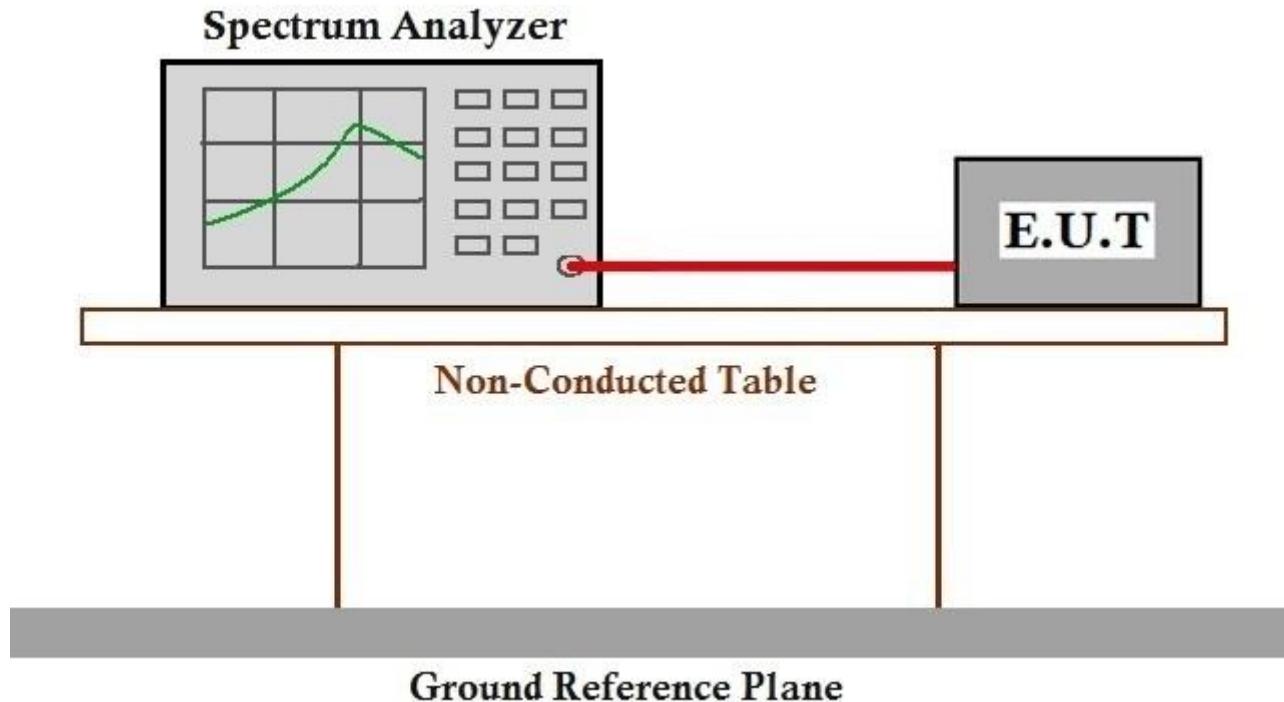
7.8 99% Bandwidth

Test Requirement RSS-Gen Section 6.6
Test Method: ANSI C63.10 Section 6.9.3

7.8.1 E.U.T. Operation

Operating Environment:
Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1002 mbar
Test mode a:TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation

7.8.2 Test Setup Diagram



7.8.3 Measurement Procedure and Data

The detailed test data see: Appendix A for C190102R01

8 Test Setup Photographs

Refer to the <Test Setup Photos>

9 EUT Constructional Details

Refer to the <External Photos>& <Internal Photos>

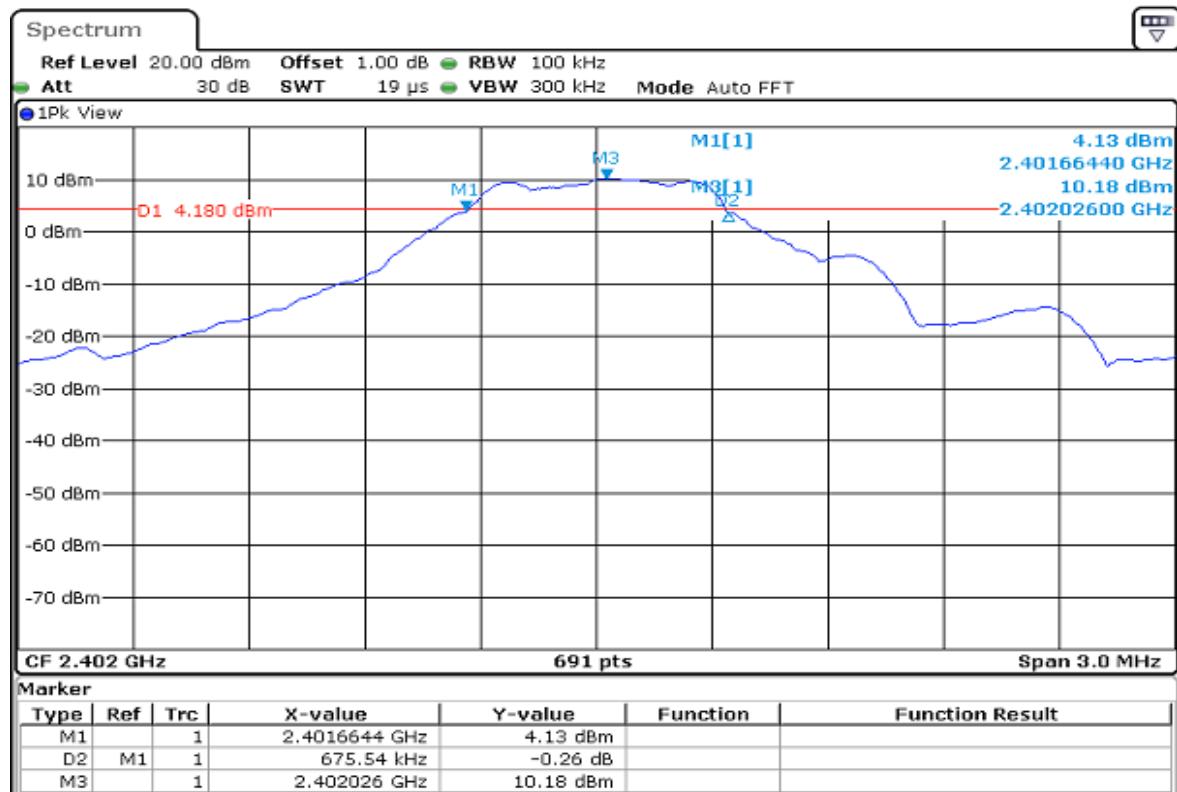
Appendix A for C190102R01

1. 6dB Bandwidth

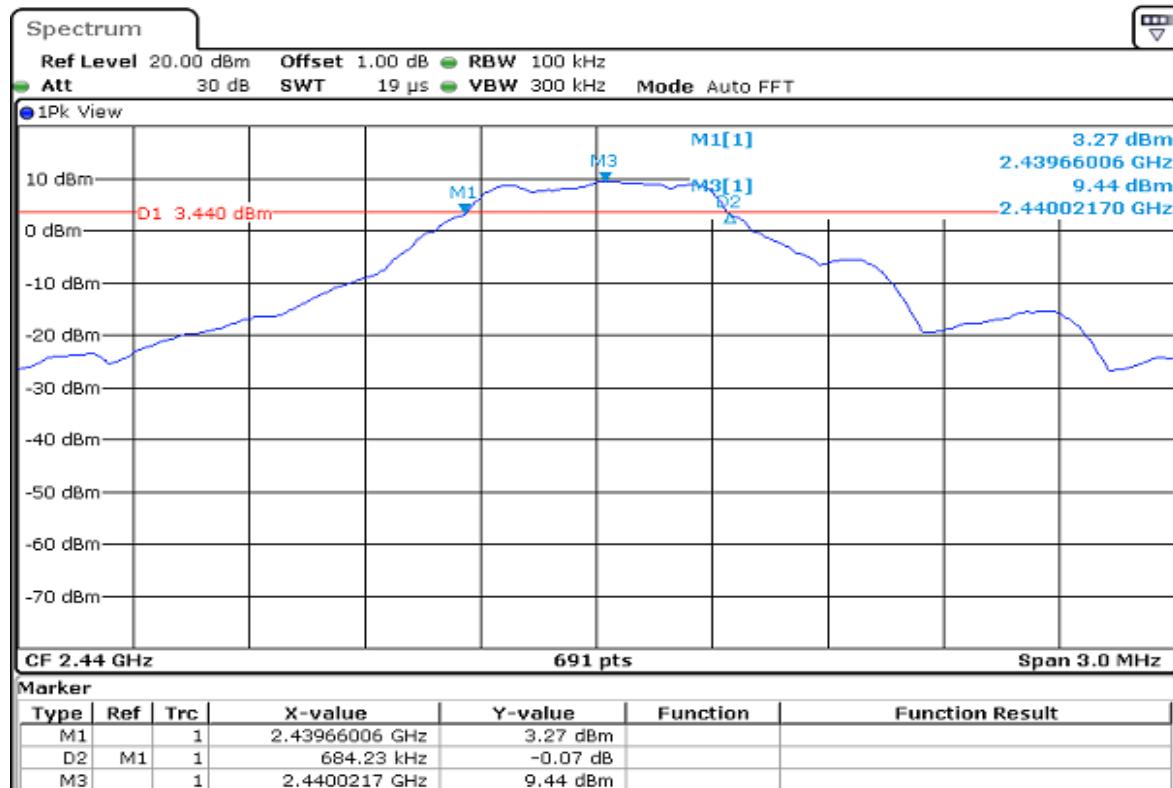
Test mode	Test channel	Freq. [MHz]	EBW[MHz]	Limit[MHz]	Result
BLE	00	2402	0.676	0.5	Pass
BLE	19	2440	0.684	0.5	Pass
BLE	39	2480	0.689	0.5	Pass

Test Plot

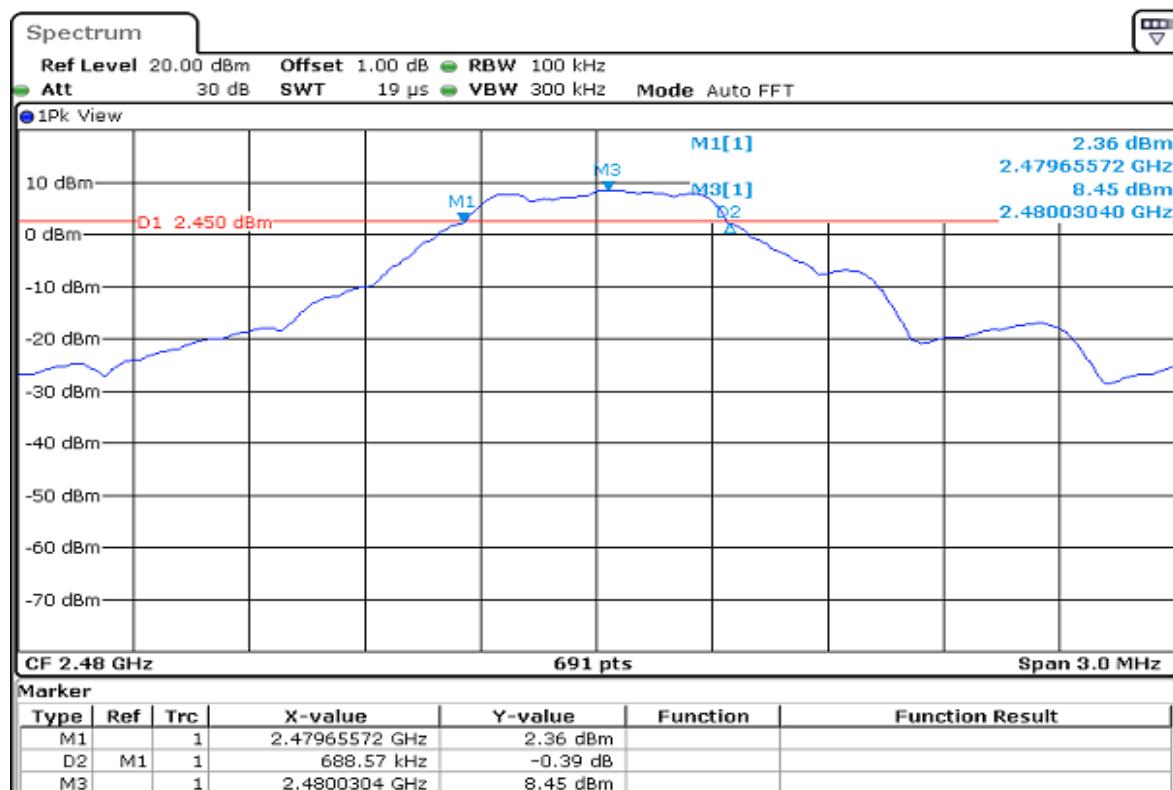
Channel 00



Channel 19



Channel 39

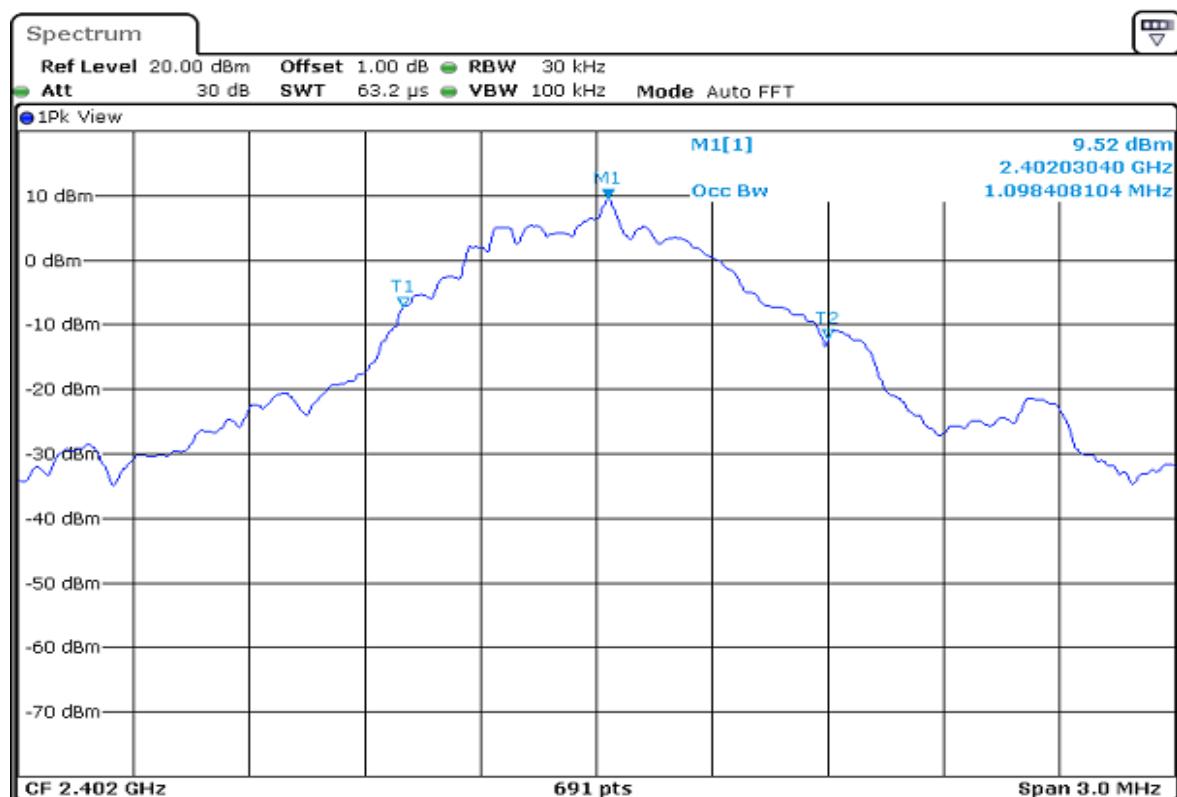


2. 99% Bandwidth

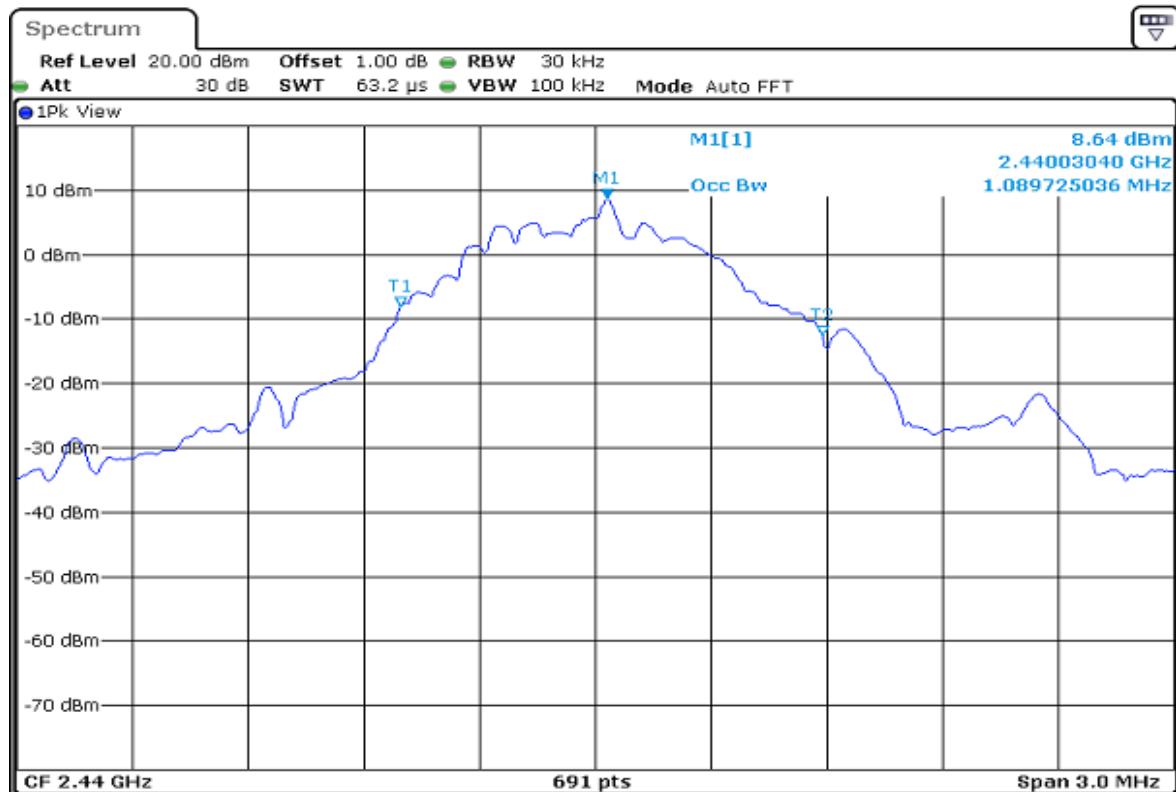
Test Mode	Test Channel	OBW[MHz]	Limit[MHz]	Verdict
BLE	2402	1.10	---	PASS
BLE	2440	1.09	---	PASS
BLE	2480	1.08	---	PASS

Test Plot

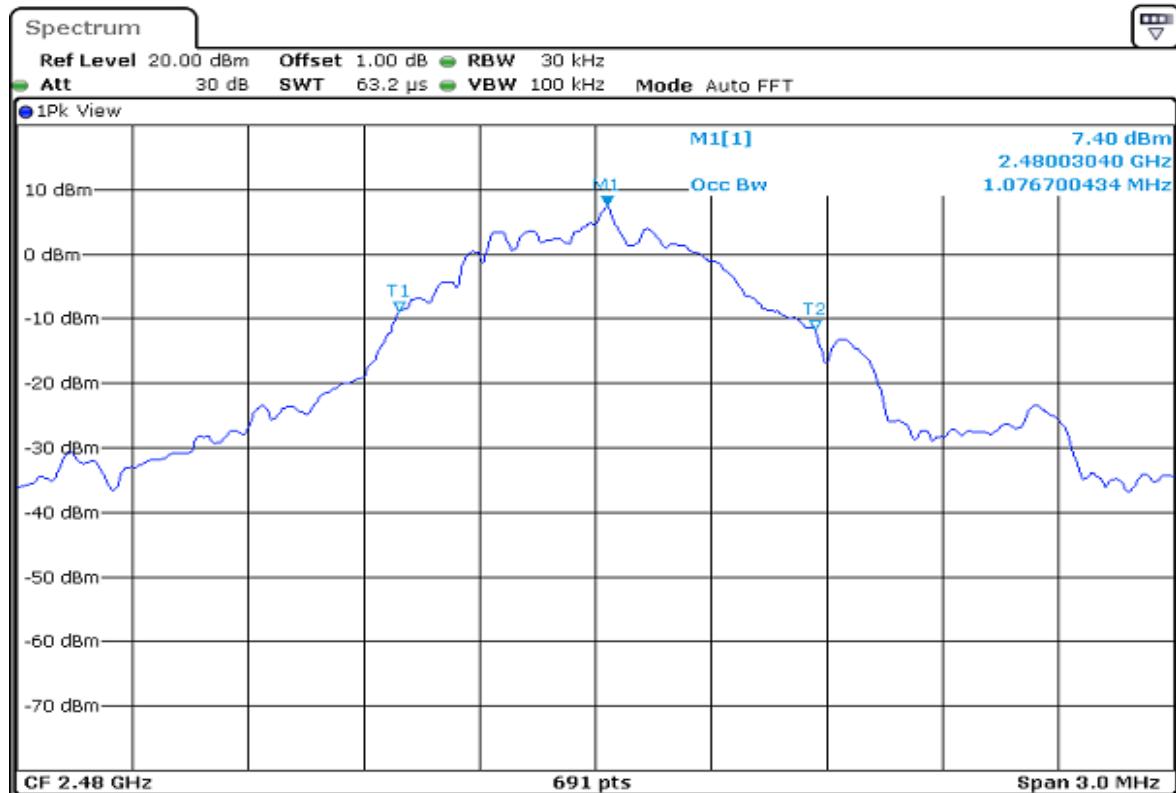
Channel 00



Channel 19



Channel 39



3. Conducted Peak Output Power

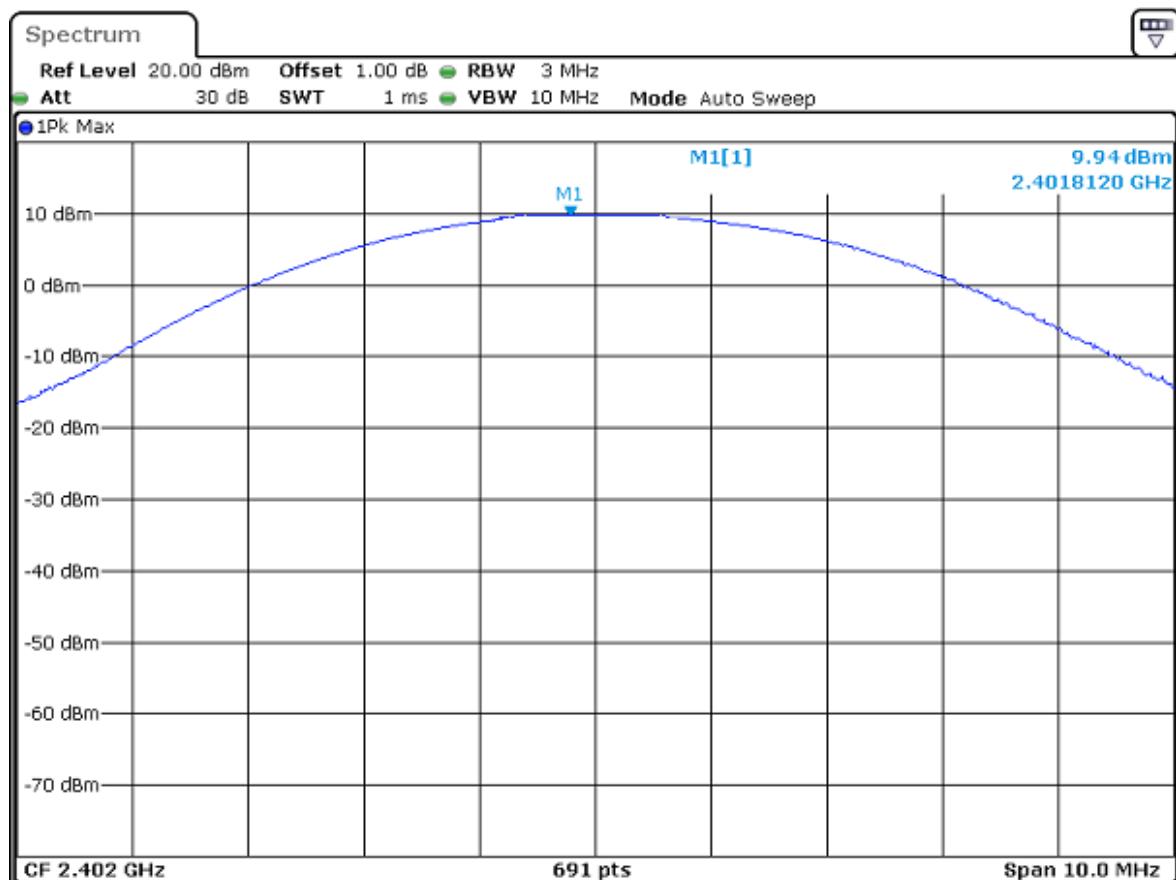
PEAK POWER

Test mode	Test channel	Freq. [MHz]	Power[dBm]	Limit[dBm]	Result
BLE	00	2402	9.94	30	Pass
BLE	19	2440	9.64	30	Pass
BLE	39	2480	8.64	30	Pass

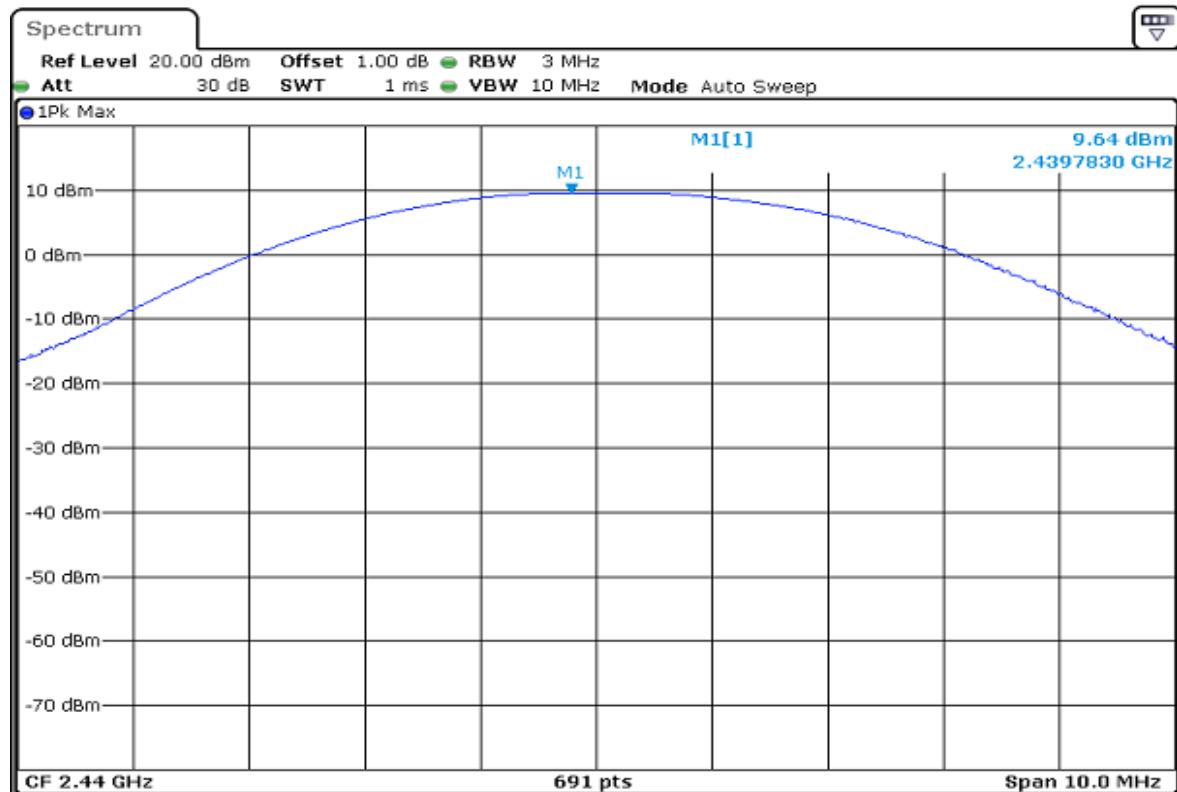
AVG POWER

Test mode	Test channel	Freq. [MHz]	Power[dBm]	e.i.r.p. [dBm]
BLE	00	2402	2.23	3.21
BLE	19	2440	1.80	2.78
BLE	39	2480	0.66	1.64

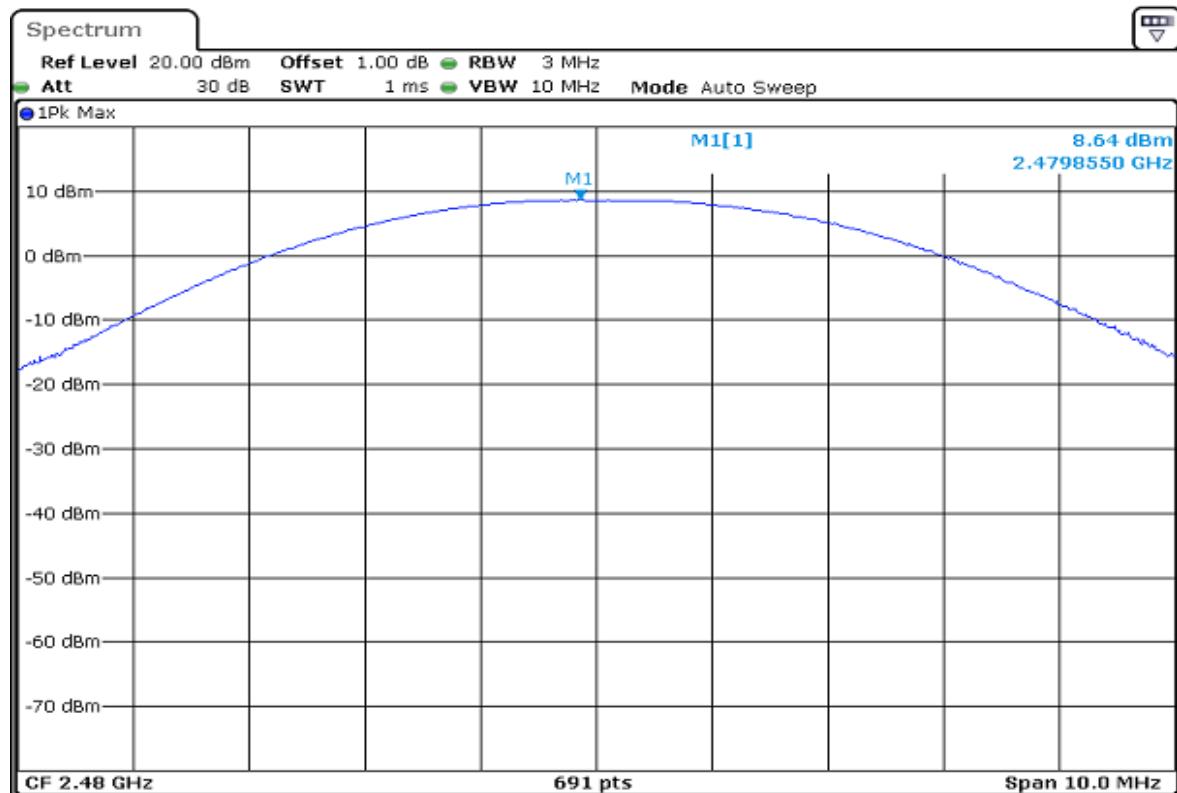
Note: Duty factor has been offset with cable loss

Test Plot
Channel 00


Channel 19



Channel 39

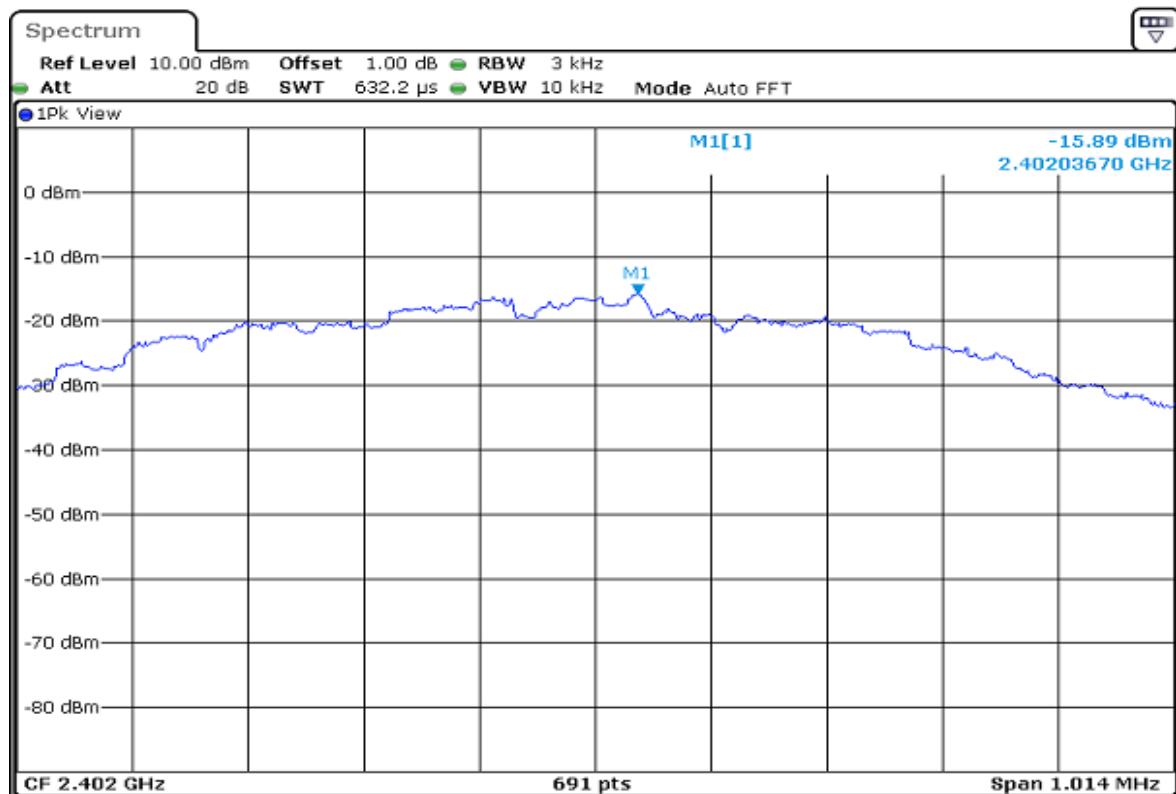


4. Peak Power Spectral Density

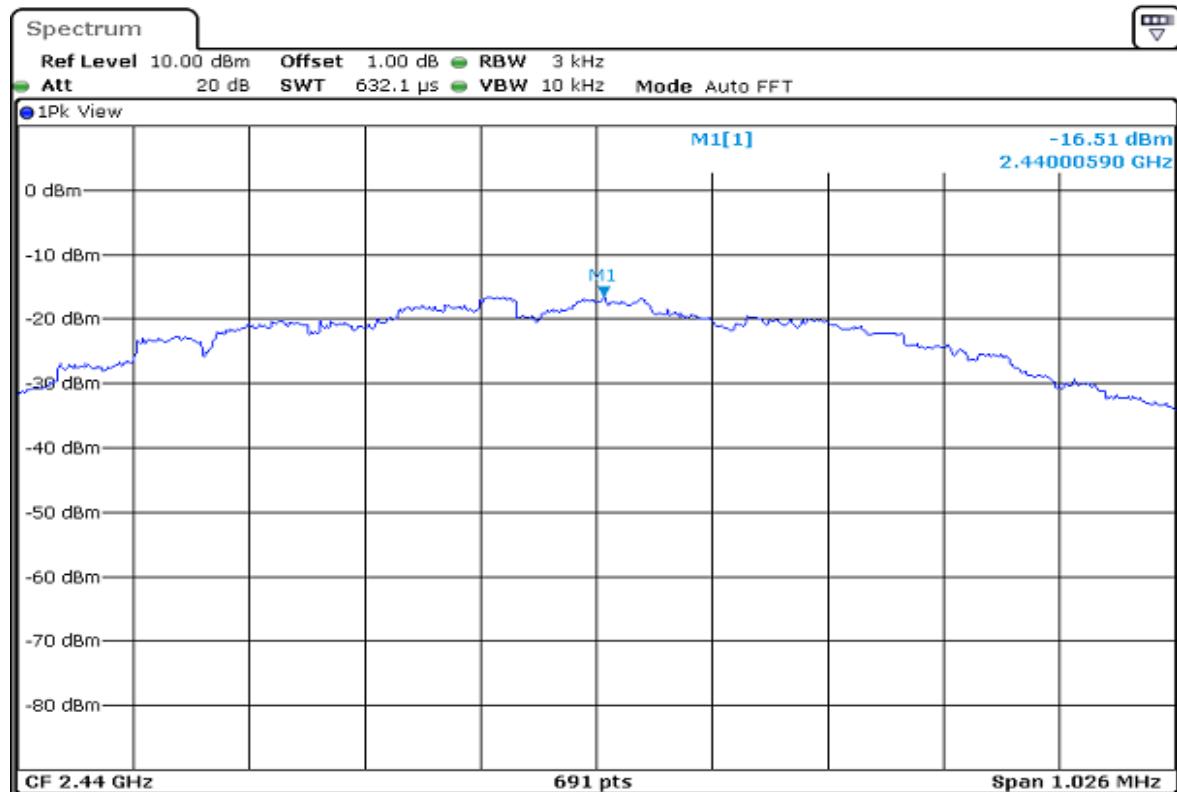
Test mode	Test channel	Freq. [MHz]	PSD[dBm/3KHz]	Limit[dBm/3KHz]	Result
BLE	00	2402	-15.89	8	Pass
BLE	19	2440	-16.51	8	Pass
BLE	39	2480	-17.62	8	Pass

Test Plot

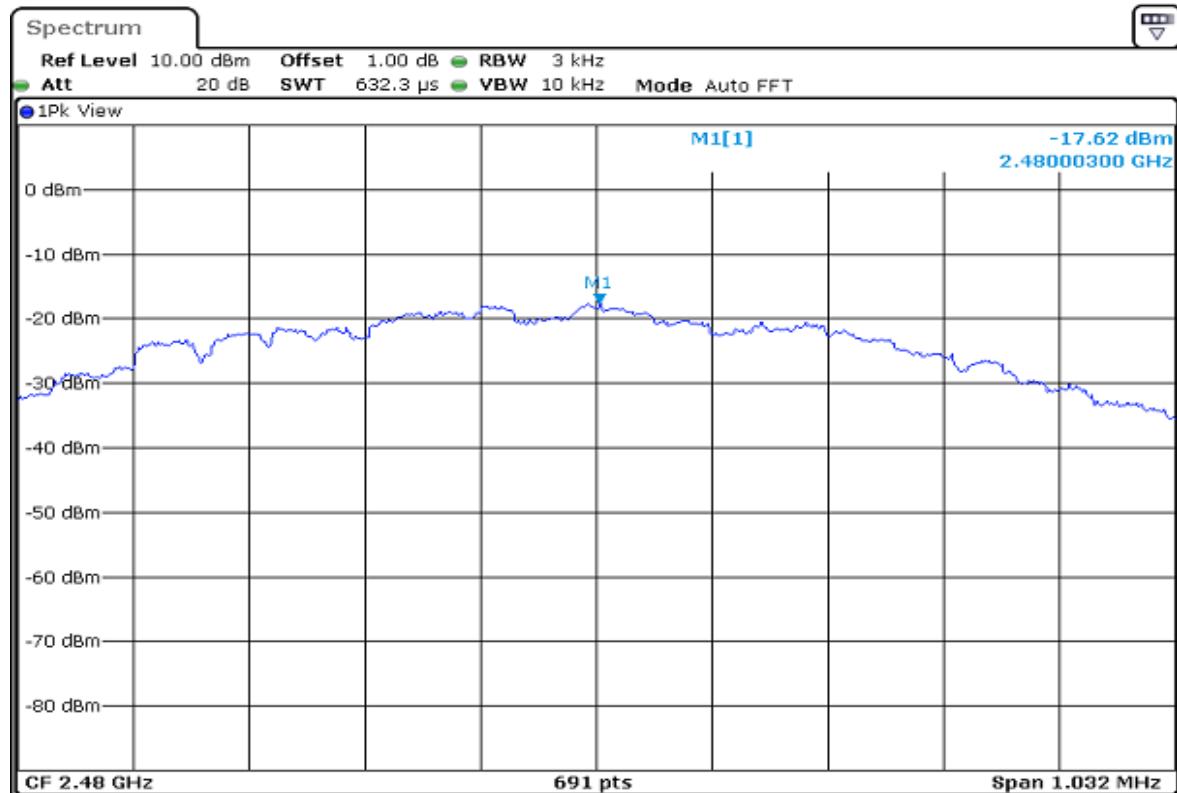
Channel 00



Channel 19

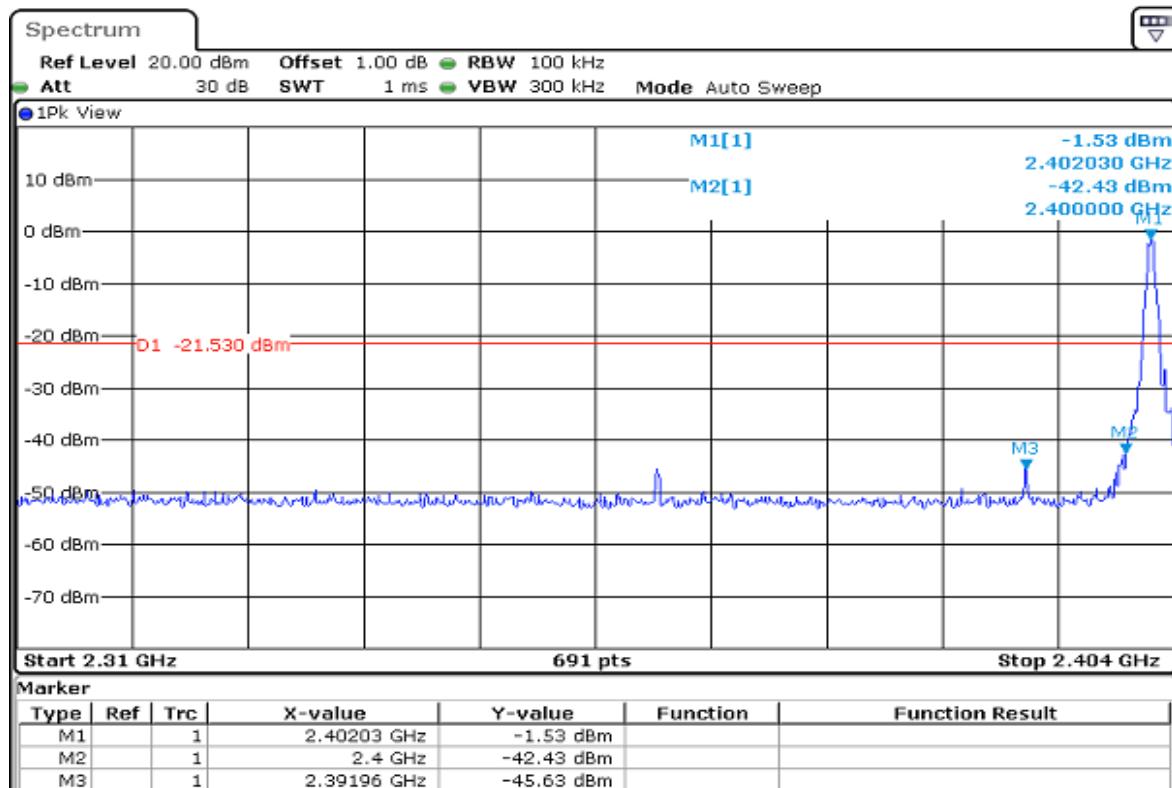


Channel 39

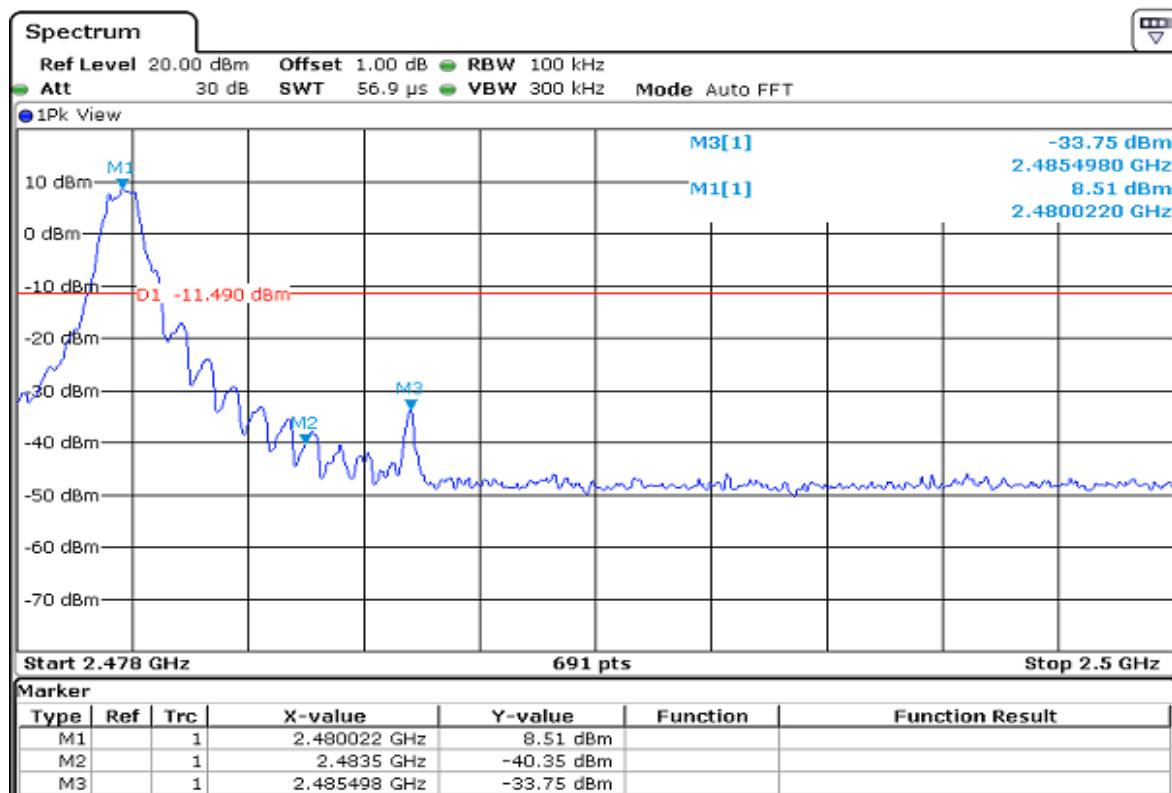


5. Conducted Band Edges

Channel 00

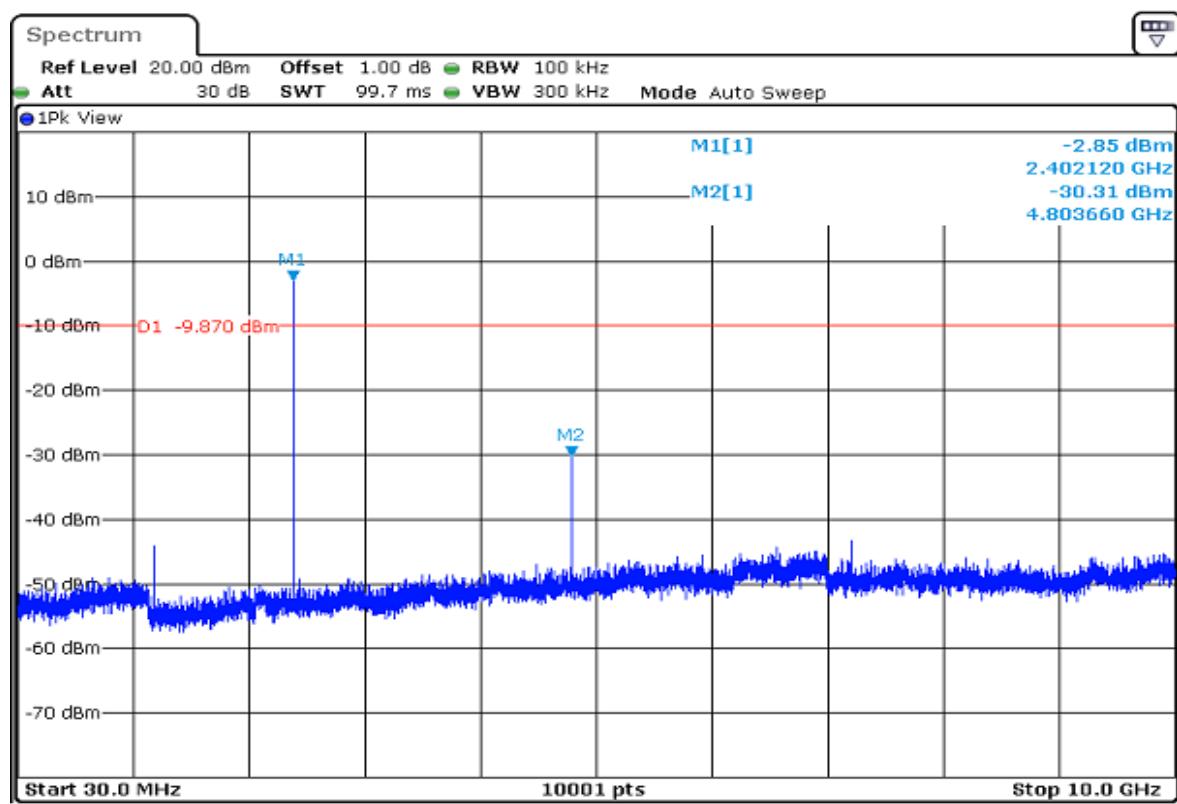
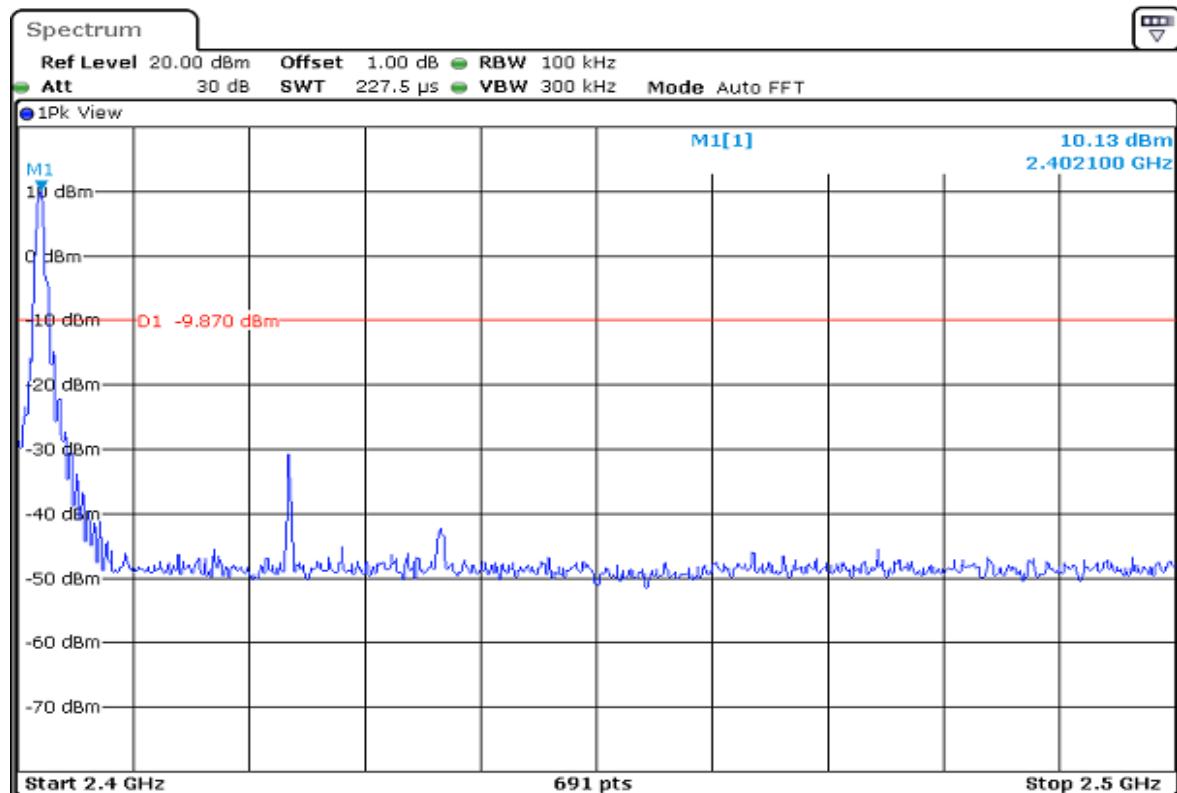


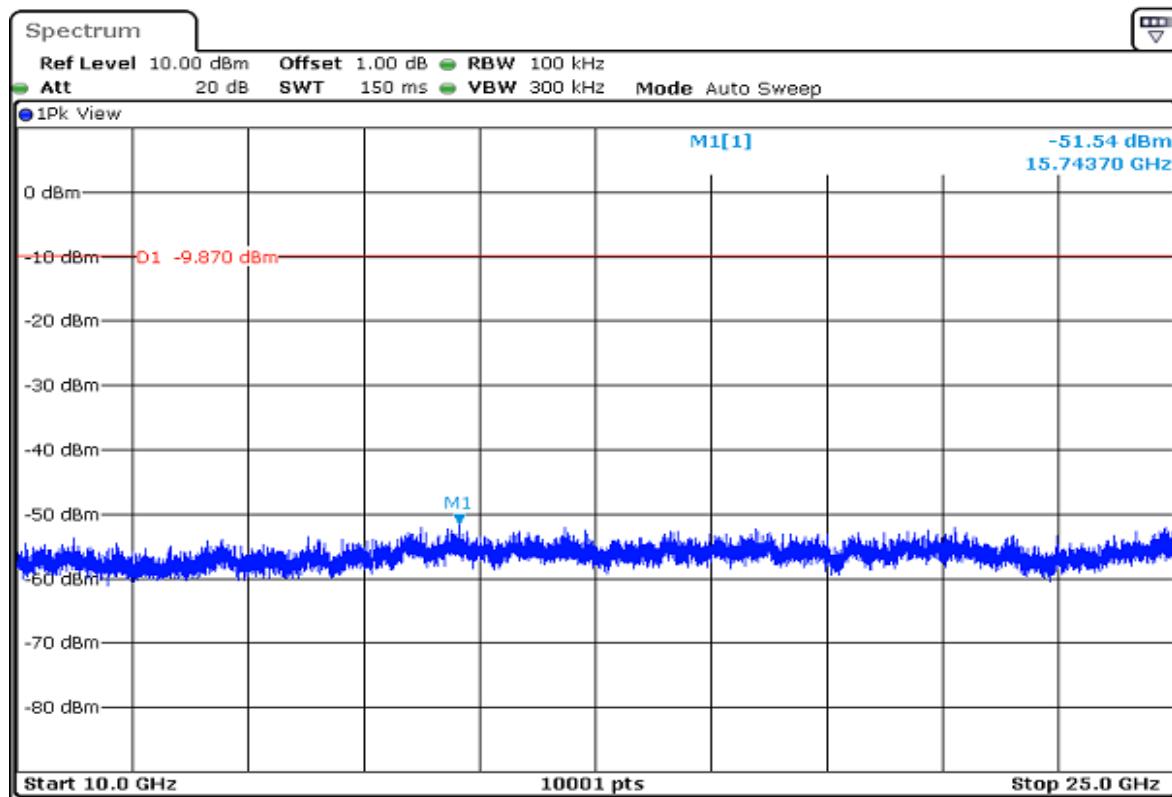
Channel 39



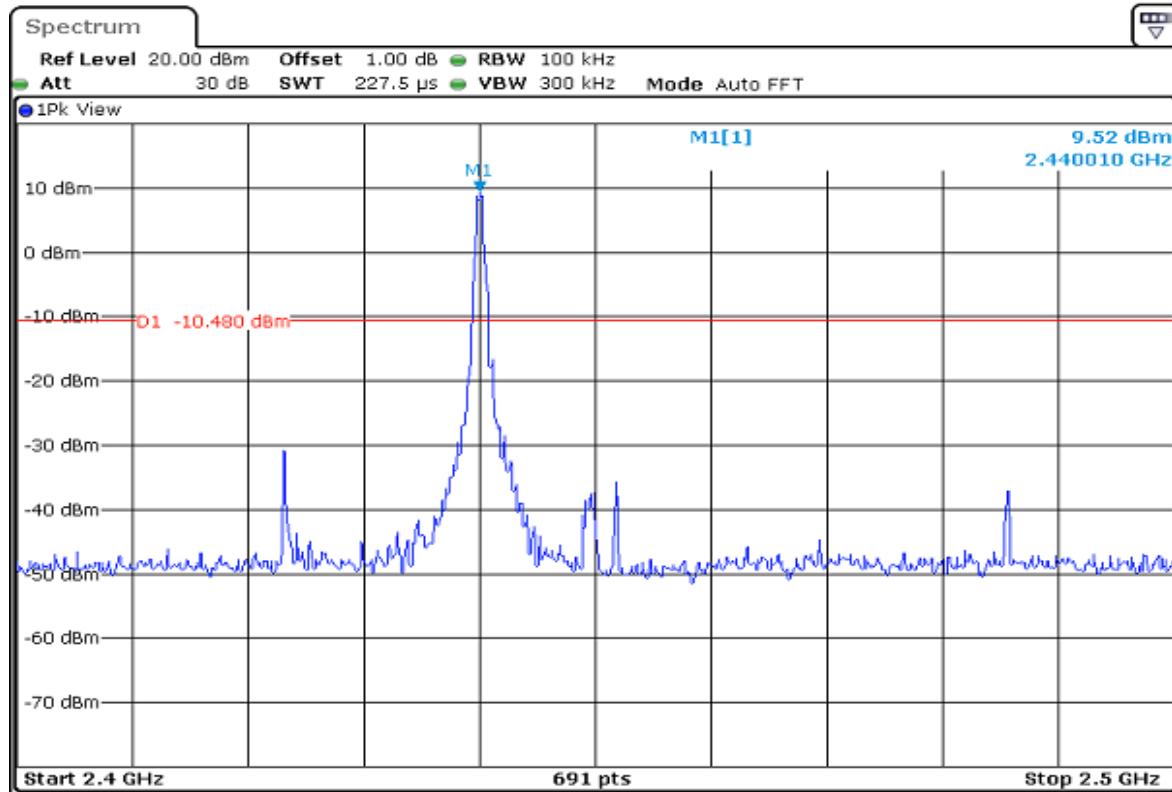
5. Conducted Spurious Emission

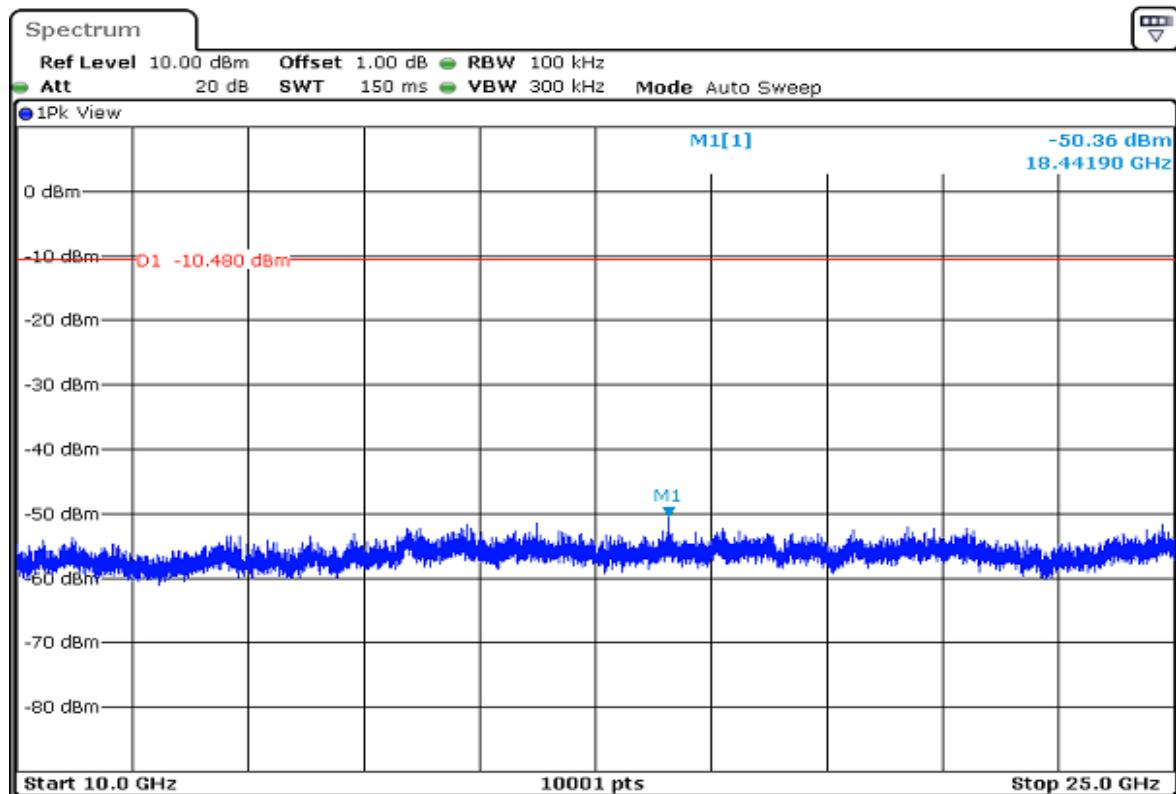
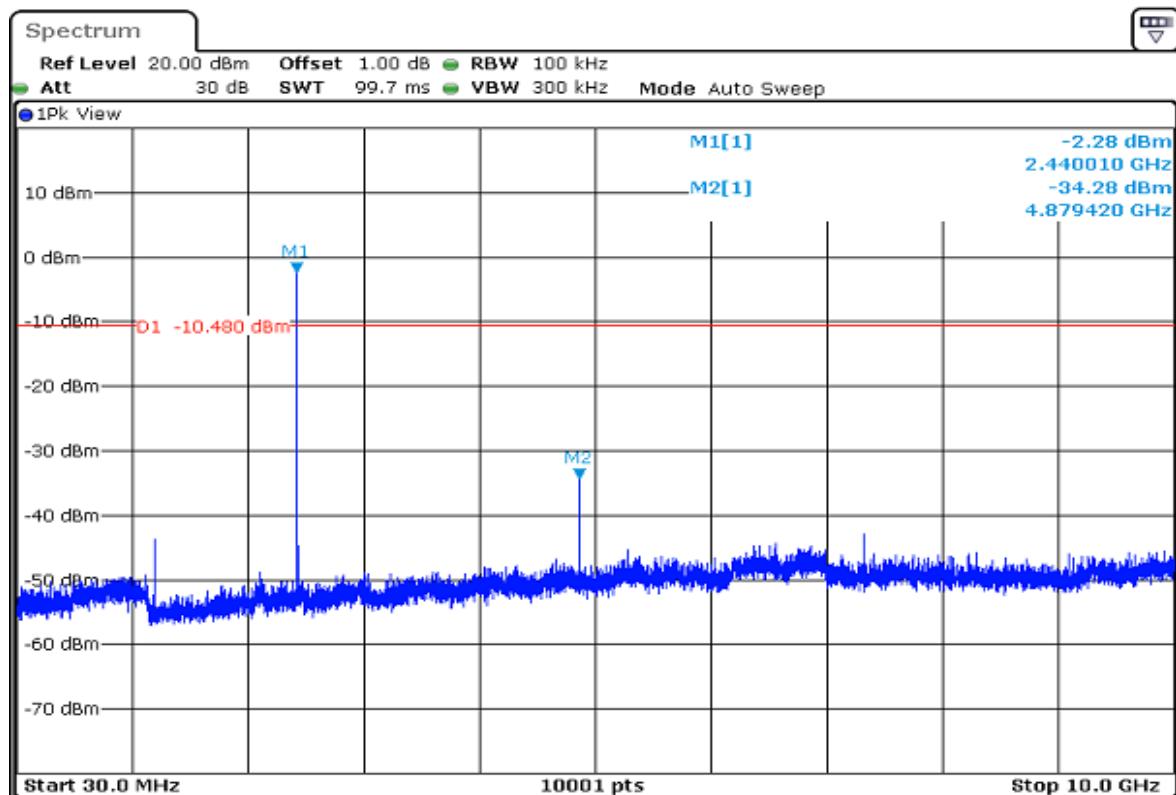
Channel 00



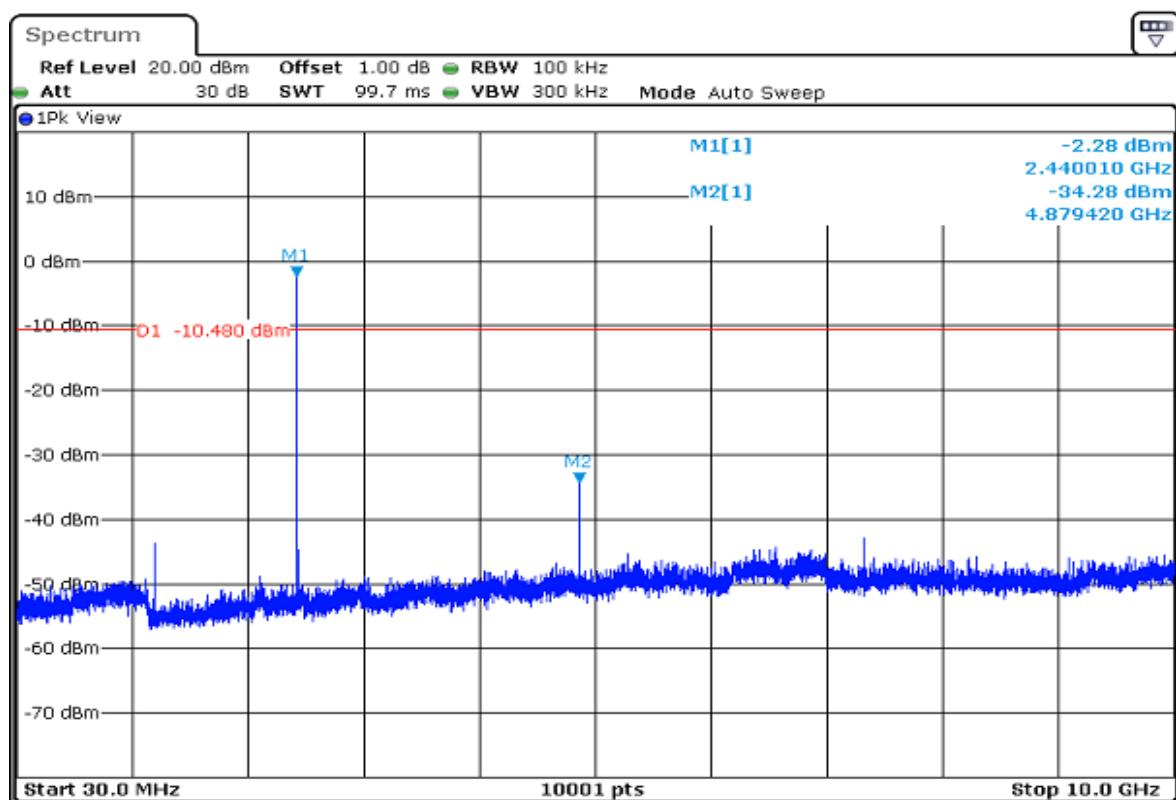
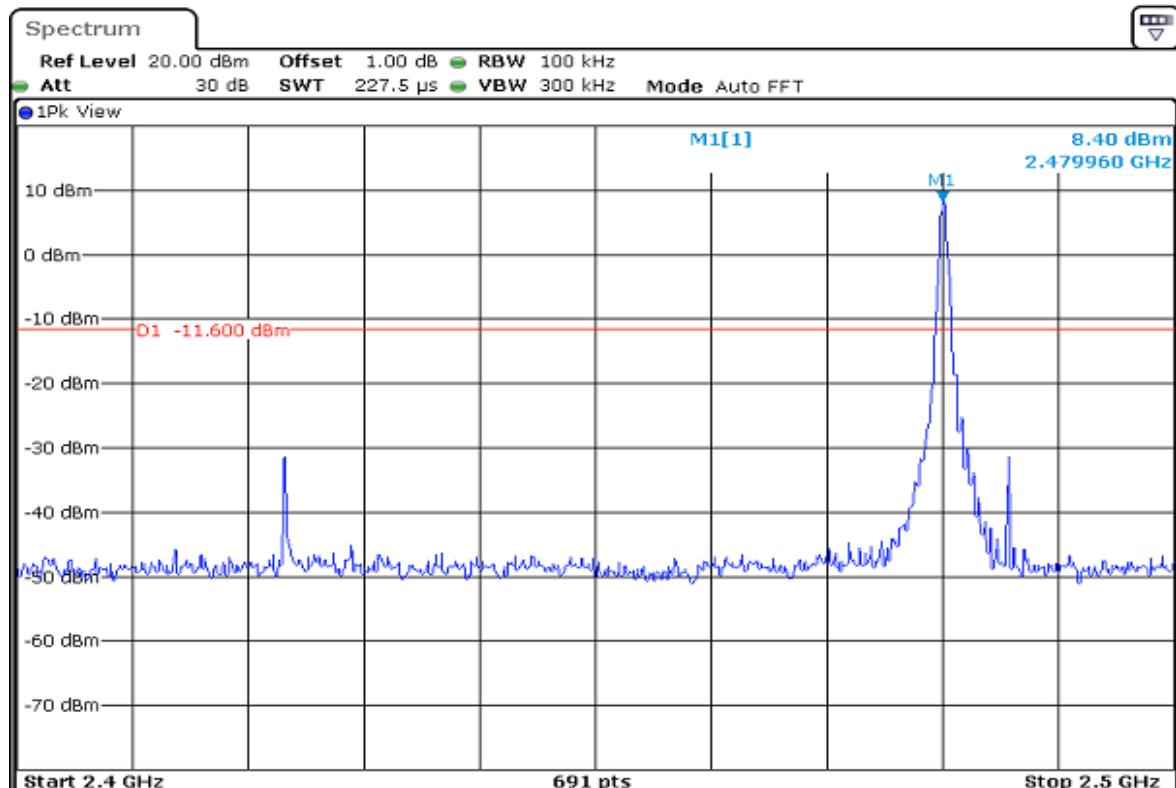


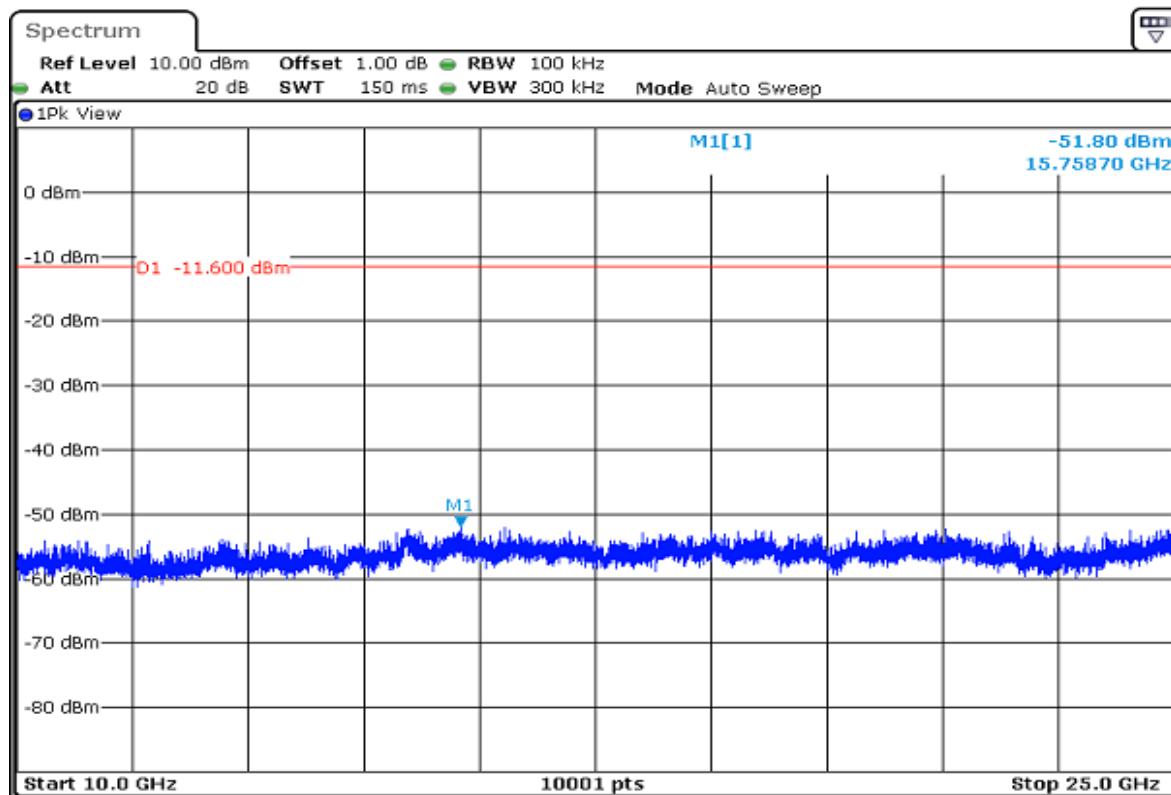
Channel 19





Channel 39





- End of the Report -