

# FCC ID TEST REPORT

Under

FCC 15 Subpart C, Paragraph 15.247

Operation within the bands 902- 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz



☒DTS - Digital Transmission System

Prepared For :

**Moochies Technologies LTD**

159 Wardour Street, London, W1F 8WH, UK

<b>FCC ID: 2AW9Z-MW12</b>
<b>EUT: Kids 4G Smartwatch Phone</b>
<b>Model: MW12</b>

July 17, 2020 <b>Issue Date:</b>
Original Report <b>Report Type:</b>
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 <b>Review By: Apollo Liu / Manager</b>

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## Table of Contents

<b>1. General Information .....</b>	<b>4</b>
1. 1 Notes .....	4
1. 2 Testing Laboratory .....	4
1. 3 Detail 1. 3 Details of Applicant .....	4
1. 4 Application Details .....	4
1. 5 Details of Manufacturer .....	4
1. 6 Test Item .....	4
1. 7 Applicable Standards .....	5
<b>2. Technical Test .....</b>	<b>6</b>
2. 1 Summary of Test Results .....	6
2. 2 Antenna Requirement .....	6
2. 3 Measurement Uncertainty .....	6
<b>3. EUT Modifications .....</b>	<b>6</b>
<b>4. Conducted Power Line Test .....</b>	<b>7</b>
4. 1 Test Equipment .....	7
4. 2 Test Procedure .....	7
4. 3 Test Setup .....	7
4. 4 Configuration of the EUT .....	8
4. 5 EUT Operating Condition .....	9
4. 6 Conducted Power Line Emission Limits .....	9
4. 7 Conducted Power Line Test Result .....	10
<b>5. FCC Part 15.247 Requirements for DTS Systems .....</b>	<b>11</b>
5. 1 Test Equipment .....	11
5. 2 Test Procedure .....	11
5. 3 Test Setup .....	11
5. 4 Configuration of the EUT .....	11
5. 5 EUT Operating Condition .....	11
5. 6 Limit .....	12
5. 7 Test Result .....	13
<b>6. Transmitter Spurious Radiated Emission at 3 Meters .....</b>	<b>14</b>
6. 1 Test Equipment .....	14
6. 2 Test Procedure .....	14
6. 3 Test Setup .....	14
6. 4 Configuration of the EUT .....	16
6. 5 EUT Operating Condition .....	16
6. 6 Limit .....	16
6. 7 Test Result .....	17
<b>7. Photos of Testing .....</b>	<b>20</b>
7.1 EUT Test Photographs .....	21
<b>8. Photographs – EUT .....</b>	<b>21</b>
<b>9. FCC ID Label .....</b>	<b>22</b>
<b>10. Test Equipment .....</b>	<b>23</b>

**Report Revision History**

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KSZ2020032301J05	Rev.01	Initial issue of report	July 17, 2020

## 1. General Information

### 1.1 Notes

The test results of this report relate exclusively to the test item specified in 1.6. The KMO Lab does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the KMO Lab.

### 1.2 Testing Laboratory

<b>Test Firm Name:</b>	<b>Ke Mei Ou Lab Co., Ltd.</b>
<b>Test Firm Address:</b>	2013-2016, 20th Floor, Business Center, Jiahui Xin Cheng, No 3027, Shen Nan Road, Fu Tian, Shen Zhen, Guang Dong, P. R. China
<b>FCC Designation Number:</b>	CN1532
<b>Test Firm Registration Number:</b>	344480
<b>Internet:</b>	<a href="http://www.kmolab.com">www.kmolab.com</a>
<b>Email:</b>	<a href="mailto:kmo@kmolab.com">kmo@kmolab.com</a>
ANSI-ASQ National Accreditation Board/ACLASS ISO/IEC 17025 Accredited Lab for telecommunication standards. The Registration Number is AT-1532. The testing quality system meets with ISO/IEC-17025 requirements, This approval results is accepted by MRA of ILAC.	

### 1.3 Details of Applicant

<b>Name</b>	Moochies Technologies LTD
<b>Address</b>	159 Wardour Street, London, W1F 8WH, UK

### 1.4 Application Details

<b>Date of Receipt of Application</b>	: March 23, 2020
<b>Date of Receipt of Test Item</b>	: May 11, 2020
<b>Date of Test</b>	: May 11 ~ July 17, 2020

### 1.5 Details of Manufacturer

<b>Name</b>	Moochies Technologies LTD
<b>Address</b>	159 Wardour Street, London, W1F 8WH, UK

### 1.6 Test Item

EUT Feature	
<b>EUT Description:</b>	Kids 4G Smartwatch Phone
<b>Brand Name:</b>	Moochies
<b>Model Name:</b>	MW12
<b>EUT RF Technology:</b>	<input type="checkbox"/> Bluetooth v3.0 + EDR <input type="checkbox"/> Bluetooth v4.0 LE <input checked="" type="checkbox"/> Bluetooth v4.2 LE
<b>HW Version:</b>	G4H-MB
<b>SW Version:</b>	G4P EMMC 240 5M COMMON OVERSEA 20190919 17.19.00
<b>EUT Stage:</b>	<input checked="" type="checkbox"/> Identical Prototype <input type="checkbox"/> Production
Note: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.	

#### Additional Information

Standard Product Specification				
Tx/Rx Frequency Range	2402~2480 MHz			
Number of Channels	40 (37 hopping + 3 advertising channel)			
Carrier Frequency of Each Channel	f=2402+k MHz (k=0,2,4,...,39)			
Antenna Type / Gain	Internal PCB Antenna / gain 1.1 dBi			
Type of Modulation	Bluetooth BR 1Mbps: GFSK Bluetooth EDR 2Mbps: $\pi/4$ -DQPSK Bluetooth EDR 3Mbps: 8DPSK			
EUT Operational Condition	<input type="checkbox"/> AC			
	<input checked="" type="checkbox"/> DC → <input checked="" type="checkbox"/> From Battery → <input type="checkbox"/> External AC adapter <input type="checkbox"/> POE			
	<input checked="" type="checkbox"/> Li-ion battery			
Specification of Accessory				
<input checked="" type="checkbox"/> Li-ion Battery	Brand Name	N/A	Model Name	663032V
	Power Rating	3.7V, 700mAh, 2.59Wh		

## 1. 7Applicable Standards

Applicable Standards
<p>According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:</p> <p>FCC Part 15 Subpart C 15.247 FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05r02 FCC KDB 414788 D01 Radiated Test Site v01r01 ANSI C63.10-2013</p>
<p>Note:</p> <ol style="list-style-type: none"><li>1) All test items were verified and recorded according to the standards and without any deviation during the test.</li><li>2) This EUT has also been tested and complied with the requirements of FCC 15 Part 15, Subpart B, recorded in a separate test report.</li></ol>

## 2. Technical Test

### 2.1 Summary of Test Results

The EUT has been tested according to the following specifications:

FCC Rules	Test Type	Limit	Result	Notes
15.247(a)(2)	6dB Bandwidth	$\geq 0.5\text{MHz}$	PASS	Complies.
-	99% Bandwidth	-	PASS	Complies.
15.247(b)(3)	Peak Output Power	$\leq 30\text{dBm}$	PASS	Complies.
15.247(e)	Power Spectral Density	$\leq 8\text{dBm}/3\text{kHz}$	PASS	Complies.
15.247(d)	Conducted Band Edges and Spurious Emission	$\leq 20\text{dBc}$	PASS	Complies.
15.247(d)	Radiated Band Edges and Spurious Emission	FCC 15.209(a) & 15.247(d)	PASS	Complies
15.247(d)	Conducted Band Edges and Spurious Emission	$\leq 20\text{dBc}$	PASS	Complies
15.207	AC Conducted Emission	FCC15.207(a)	PASS	Complies
15.203 & 15.247(b)	Antenna Requirement	N/A	PASS	Complies
15.247(i) & 1.1307(b)(1) & 2.1091	Maximum Permissible Exposure (MPE)	$< 1\text{mW}/\text{cm}^2$	PASS	Complies

### 2.2 Antenna Requirement

#### A. Regulation

Per § 15.203, 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 shall be considered sufficient to comply with the provisions of this section. 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.

#### B. Result

\*Internal antenna version: The EUT uses a SMT chip antenna that is soldered and permanently attached onto the PCB.

\*External antenna version: The EUT has a provision for connection to an external antenna, using a unique U.FL connector, and was tested with a dipole, Whip antennas provided by applicant. No other external antennas are to be used with EUT.

The dipole antenna will be equipped with unique RP-SMA connector. RF cables with unique RP-SMA and U.FL connector will be used to provide connector between antenna and module.

Therefore the EUT complies with Section 15.203 of the FCC rules.

### 2.3 Measurement Uncertainty

Measurement	Frequency	Uncertainty
Conducted emissions	0.15MHz~30MHz	1.72
Radiated emissions	30MHz ~ 300MHz	3.88
Radiated emissions	300MHz ~1000MHz	3.86
Radiated emissions	>1000MHz	4.42
Bandwidth	-	5%
Peak Power	-	1.10
Peak Power Spectral Density	-	1.10
Band Edges Measurement	-	1.10

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

## 3. EUT Modifications

No modification by test lab.

4. Conducted Power Line Test

4. 1 Test Equipment

Please refer to Section 10 this report.

4. 2 Test Procedure

Test Method	
<input checked="" type="checkbox"/>	<p>The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination.</p> <p>Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission., the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement. Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.</p>

4. 3 Test Setup

Test Setup	
AC Line Conducted Emissions	
<p>The diagram illustrates the test setup for AC Line Conducted Emissions. It is performed in a shielded room with a metal ground plane. A PC and EUT (Equipment Under Test) are placed on a stand, 0.4m from the left wall and 0.8m from the ground. A LISN (Line Impedance Stabilization Network) is connected to the EUT and the AC power line. A spectrum analyzer is connected to the LISN to measure the emissions.</p>	
<p>This test is applicable for radio equipment and/or ancillary equipment for fixed use powered by the AC mains. This test shall be performed on a representative configuration of the radio equipment, the associated ancillary equipment, or a representative configuration of the combination of radio and ancillary equipment. This test assesses the level of internally generated electrical noise present on the AC power input/output ports.</p>	

## 4. 4 Configuration of the EUT

### Bluetooth Test Mode

The following summary table is showing all test modes to demonstrate in compliance with the standard.

Summary Tables of Test Mode	
Test Item	Data Rate / Modulation
	BT LE / 1Mbps GFSK
Conducted Cases	Mode 1: CH00_2402 MHz Mode 2: CH19_2440 MHz Mode 3: CH39_2480 MHz
Radiated Cases	Mode 1: CH00_2402 MHz Mode 2: CH19_2440 MHz Mode 3: CH39_2480 MHz
AC Conducted Emission	EUT is power by battery only.

EUT Operation Test Setup	
Pre-Scan has been conducted to determine the worst-case mode from all possible combinations. Only the worst test mode data was reported. For Bluetooth function, the engineering test program was provided and enabled to make EUT connect with Bluetooth base station to continuous transmit/receive. For AC power line conducted emissions, the EUT was set to connect with the PC host under large package sizes transmission.	
Pre-Scan Mode	
Test Mode	Operating Description
1	EUT with 1Mbps GFSK
Conducted Emissions → Final	
Test Mode	Operating Description
1	EUT with 1Mbps GFSK
AC Conducted Emissions → Final	
1	EUT is power by battery only.
Radiated Emissions → Final	
Test Mode	Operating Description
1	EUT with 1Mbps GFSK
Note: The test modes were carried out for all operation modes (include link and idle). The final test mode of the EUT was the worst test mode for Mode 1, and its test data was reported.	

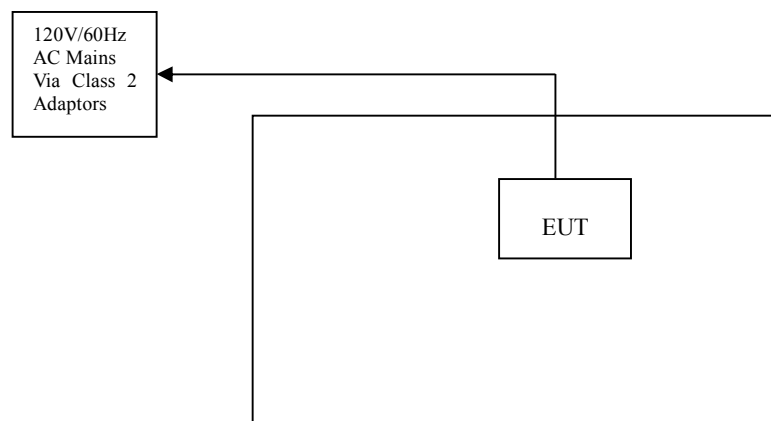
Support Unit				
Device	Manufacturer	Model # Serial #	FCC ID/ DoC	Cable
Notebook	LENOVO	20195	DoC	1.5m unshielded power cord
-	-	-	-	-



## 4. 5 EUT Operating Condition

Operating condition is according to ANSI C63.10:2013.

- Setup the EUT and simulators as shown on follow.
- Enable RF signal and confirm EUT active.
- Modulate output capacity of EUT up to specification.



## 4. 6 Conducted Power Line Emission Limits

FCC Part 15 Paragraph 15.207 (dBuV)	
Frequency Range (MHz)	QP/AV
0.15 – 0.5	66-56/56-46
0.5 – 5.0	56/46
5.0 - 30	60/50

**Note:** In the above table, the tighter limit applies at the band edges.

#### **4. 7 Conducted Power Line Test Result**

The EUT is power by battery only.

## 5. FCC Part 15.247 Requirements for DTS Systems

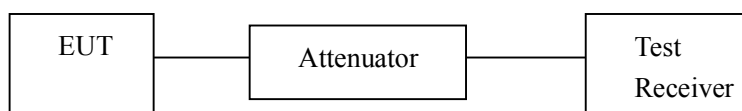
### 5.1 Test Equipment

Please refer to Section 10 this report.

### 5.2 Test Procedure

<b>6 dB &amp; 99% Bandwidth</b>	Refer to FCC 15.247(a)(2), ANSI C63.10:2013
Test Method:	FCC KDB Publication No.558074 D01 DTS Meas Guidance v05r02 – 8.2
a) Set RBW = 100 kHz. b) Set the video bandwidth (VBW) $\geq 3 \times$ RBW. c) Detector = Peak. d) Trace mode = max hold. e) Sweep = auto couple. f) Allow the trace to stabilize.	g) 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. *For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 30kHz and set the Video bandwidth (VBW) = 100kHz.
<b>Peak Power:</b>	Refer to FCC 15.247(b)(3), ANSI C63.10:2013
Test Method:	FCC KDB Publication No.558074 D01 DTS Meas Guidance v05r02 – 8.3 PKPM1 Peak power meter method
The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.	
<b>Peak Power Spectral Density:</b>	Refer to FCC 15.247(e), ANSI C63.10:2013
Test Method:	FCC KDB Publication No.558074 D01 DTS Meas Guidance v05r02 – 8.4 Method PKPSD
a) Set analyzer center frequency to DTS channel center frequency. b) Set the span to 1.5 times the DTS bandwidth. c) Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ . d) Set the VBW $\geq 3 \times$ RBW. e) Detector = peak. f) Sweep time = auto couple.	g) Trace mode = max hold. h) Allow trace to fully stabilize. i) Use the peak marker function to determine the maximum amplitude level within the RBW. j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.
<b>Band Edges Measurement:</b>	Refer to FCC 15.247(d), ANSI C63.10:2013
Test Method:	FCC KDB Publication No.558074 D01 DTS Meas Guidance v05r02 & 15.247
a. The transmitter output was connected to the spectrum analyzer via a low lose cable. b. Set both RBW and VBW of spectrum analyzer to 100kHz with suitable frequency span including 100kHz bandwidth from band edge. c. The band edges was measured and recorded.	

### 5.3 Test Setup



### 5.4 Configuration of the EUT

Same as section 4.4 of this report

### 5.5 EUT Operating Condition

Same as section 4.5 of this report.

## 5.6 Limit

According to §15.247(a)(2), systems using digital modulation techniques may operate in the 902 ~ 928 MHz, 2400 ~ 2483.5 MHz, and 5725 ~ 5850 MHz bands. The minimum 6dB bandwidth shall be at least 500 kHz.

According to §15.247(b)(3), for systems using digital modulation in the bands of 902-928MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 Watt.

According to §15.247(b)(4), 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.

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum 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. 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 Section 15.205(c)).

According to §15.247(e), for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

According to §15.247(f), the digital modulation operation of the hybrid system, with the frequency hopping turned off, shall comply with the power density requirements of paragraph (d) of this section.

## **5. 7 Test Result**

### **A. 6 dB Bandwidth**

Refer to Appendix\_DTS\_BLE.

### **B. Peak Power**

Refer to Appendix\_DTS\_BLE.

### **C. Band Edges Measurement**

Refer to Appendix\_DTS\_BLE.

### **D. Peak Power Spectral Density**

Refer to Appendix\_DTS\_BLE.

## 6. Transmitter Spurious Radiated Emission at 3 Meters

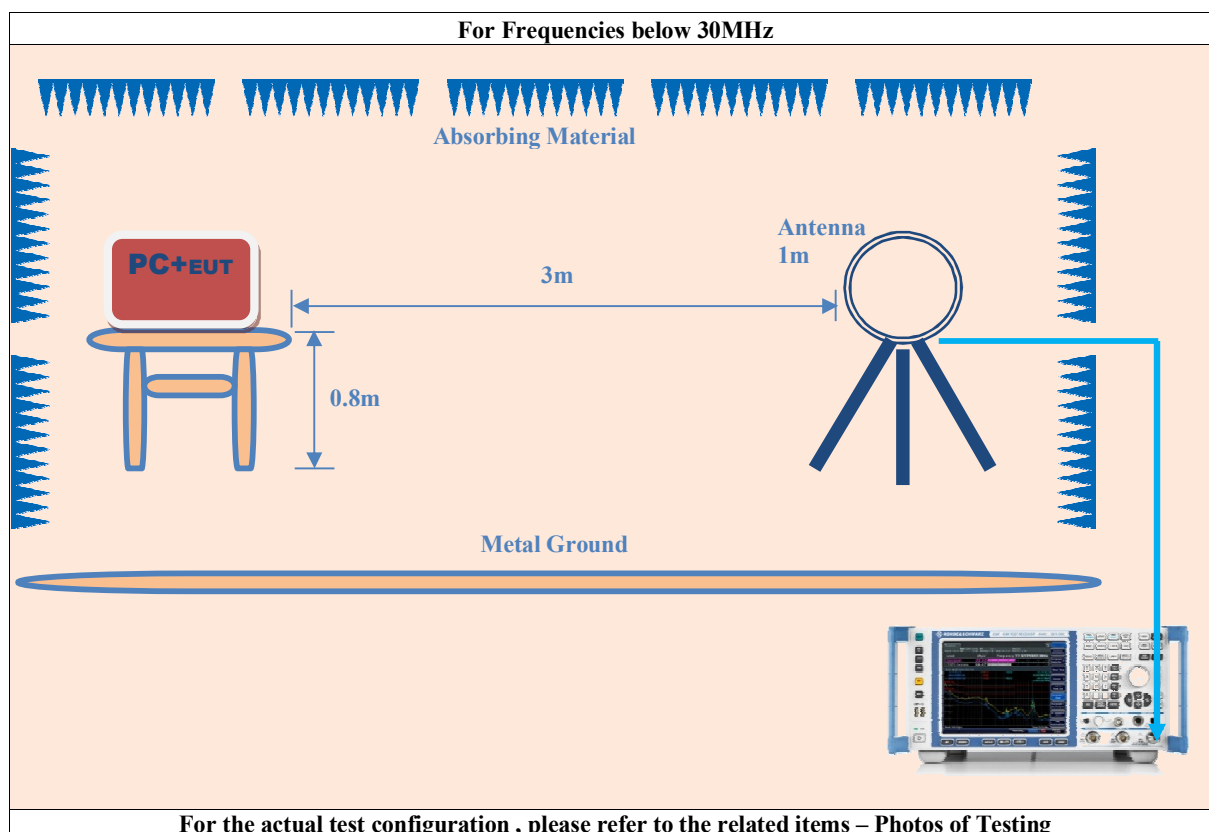
### 6.1 Test Equipment

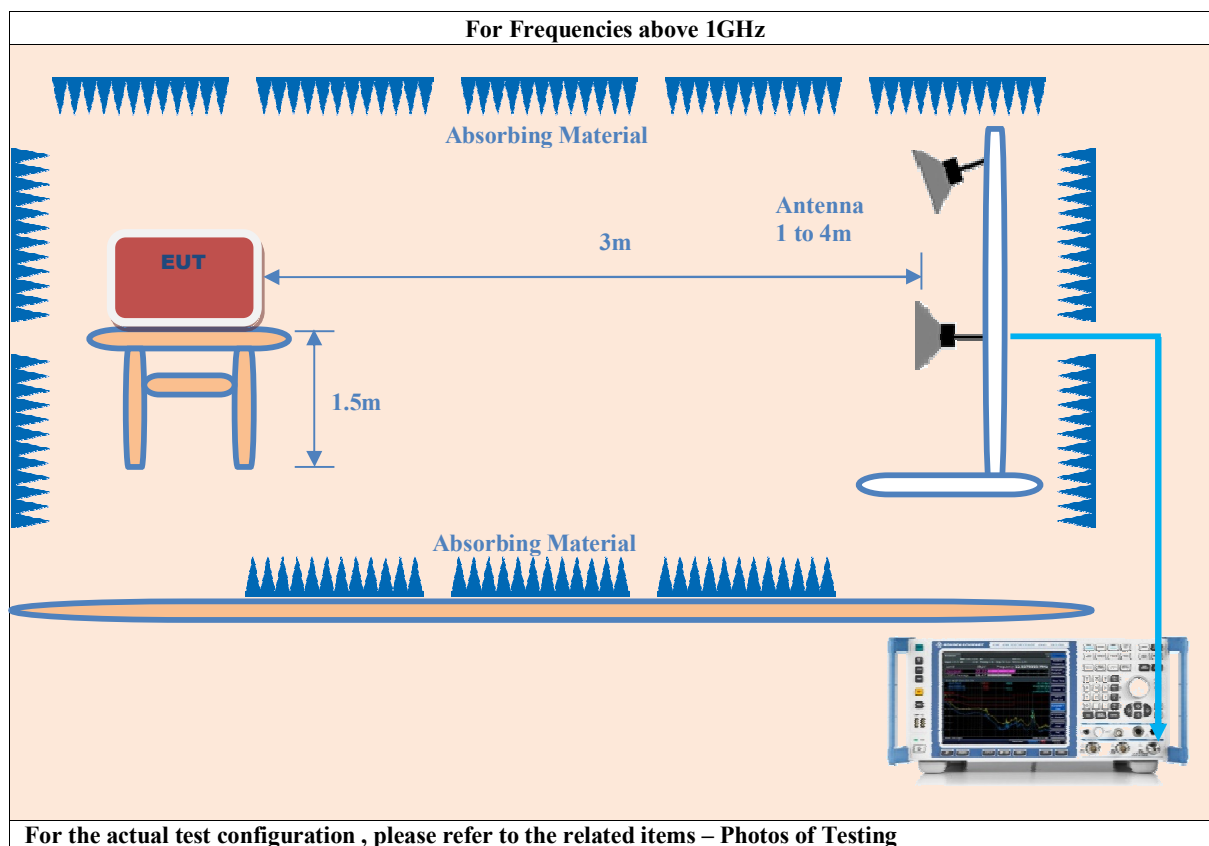
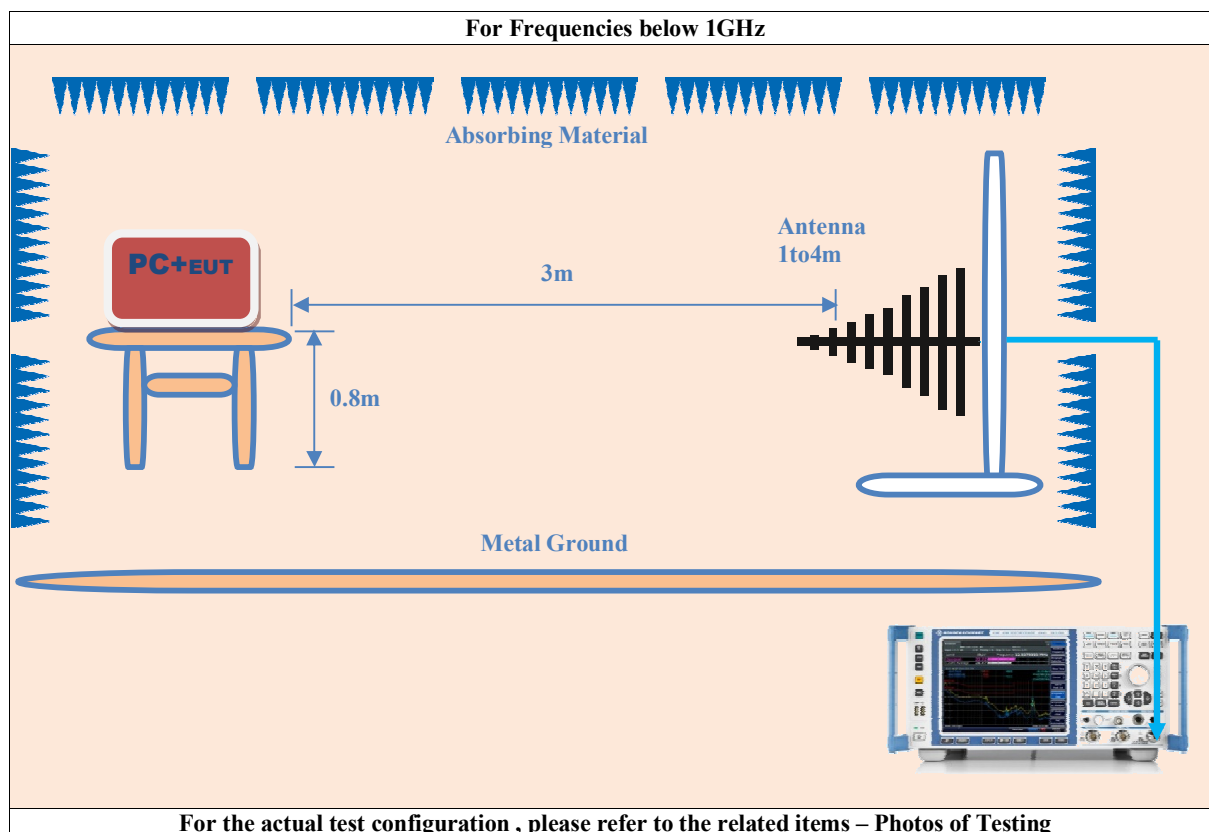
Please refer to Section 10 this report.

### 6.2 Test Procedure

1. The EUT was tested according to ANSI C63.10:2013.
2. The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8m. All set up is according to ANSI C63.10:2013.
3. The frequency spectrum from 9kHz to 25 GHz was investigated. All readings from 9kHz to 150kHz are quasi-peak values with a resolution bandwidth of 200 Hz. All readings from 150kHz to 30MHz are quasi-peak values with a resolution bandwidth of 9 KHz. All readings from 30 MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 KHz. Measurements were made at 3 meters. All readings are above 1 GHz, peak values with a resolution bandwidth of 1 MHz. Measurements were made at 3 meters.
4. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. The Receiving antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency. Emissions below 30MHz were measured with a loop antenna while emission above 30MHz were measured using a broadband E-field antenna.
5. Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limit), and are distinguished with a "QP" in the data table.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 8 and 13 of ANSI C63.10:2013.

### 6.3 Test Setup





## 6.4 Configuration of the EUT

Same as section 4.4 of this report

## 6.5 EUT Operating Condition

Same as section 4.5 of this report.

## 6.6 Limit

In any 100 KHz bandwidth outside the operating frequency band, the radio frequency power that is produced by modulation products of the spreading sequence, the information sequence and the carrier frequency shall be either at least 20 dB below that in any 100 KHz bandwidth within the band that contains the highest level of the desired power or shall not exceed the general levels specified in section 15.209(a), which lesser attenuation.

All other emissions inside restricted bands specified in section 15.205(a) shall not exceed the general radiated emission limits specified in section 15.209(a)

### Note:

Applies to harmonics/spurious emissions that fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

47 CFR § 15.237(c): The emission limits as specified above are based on measurement instrument employing an average detector. The provisions in section 15.35 for limiting peak emissions apply.

FCC CFR 47, Part 15, Subpart C, Para. 15.205(a) – Restricted Frequency Bands

MHz	MHz	MHz	GHz
0.090–0.110.....	16.42–16.423	399.9–410	4.5–5.15
0.495–0.505.....	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905.....	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128.....	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775.....	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775.....	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218.....	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825.....	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225.....	123–138	2200–2300	14.47–14.5
8.291–8.294.....	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366.....	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675.....	156.7–156.9	2690–2900	22.01–23.12
8.41425–8.41475.....	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293.....	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025.....	240–285	3345.8–3358	36.43–36.5
12.57675–12.57725.....	322–335.4	3600–4400	( <sup>2</sup> )
13.36–13.41.....			

<sup>1</sup>Until February 1, 1999, this restricted band shall be 0.490–0.510 MHz.

<sup>2</sup>Above 38.6

FCC 47 CFR, Part 15.209(a) – Field Strength Limits within Restricted Frequency Bands

Frequency(MHz)	Field strength (microvolts/meter)	Measure- ment dis- tance (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



## 6. 7 Test Result

Test Mode 1										
Restricted Frequency Bands Data_BT LE / 1Mbps GFSKCH Low										
Frequency (MHz)	Read Level (dBuV)		Factor (dB)	Emission (dBuV/m)		Horiz./ Vert.	Limit (dBuV/m)		Margin(dB)	
	PK	AV		PK	AV		PK	AV	PK	AV
2390.000	53.03	41.14	0.90	53.93	42.04	Horiz./	74.0	54.0	-20.07	-11.96
2390.000	53.31	41.61	0.90	54.21	42.51	Vert.	74.0	54.0	-19.79	-11.49
Restricted Frequency Bands Data_BT LE / 1Mbps GFSK CH High										
Frequency (MHz)	Read Level (dBuV)		Factor (dB)	Emission (dBuV/m)		Horiz./ Vert.	Limit (dBuV/m)		Margin(dB)	
	PK	AV		PK	AV		PK	AV	PK	AV
2483.500	54.12	43.07	0.90	55.02	43.97	Horiz./	74.0	54.0	-18.98	-10.03
2483.500	56.08	44.33	0.90	56.98	45.23	Vert.	74.0	54.0	-17.02	-8.77

Test Mode 1										
Harmonics Radiated Emission Data_BT LE / 1Mbps GFSK CH Low										
Frequency (MHz)	Read Level (dBuV)		Factor (dB)	Emission (dBuV/m)		Horiz./ Vert.	Limit (dBuV/m)		Margin(dB)	
	PK	AV		PK	AV		PK	AV	PK	AV
4804.200	40.18	31.42	10.10	50.28	41.52	Horiz./	74.0	54.0	-23.72	-12.48
4804.200	40.22	31.41	10.10	50.32	41.51	Vert.	74.0	54.0	-23.68	-12.49
7206.100	40.25	30.01	13.10	53.35	43.11	Horiz./	74.0	54.0	-20.65	-10.89
7206.100	40.38	30.99	13.10	53.48	44.09	Vert.	74.0	54.0	-20.52	-9.91
24020.00	-	-	-	-	-	-	-	-	-	-
24020.00	-	-	-	-	-	-	-	-	-	-
Harmonics Radiated Emission Data_BT LE / 1Mbps GFSK CH Mid										
Frequency (MHz)	Read Level (dBuV)		Factor (dB)	Emission (dBuV/m)		Horiz./ Vert.	Limit (dBuV/m)		Margin(dB)	
	PK	AV		PK	AV		PK	AV	PK	AV
4880.200	41.11	31.55	10.10	51.21	41.65	Horiz./	74.0	54.0	-22.79	-12.35
4880.200	41.32	31.47	10.10	51.42	41.57	Vert.	74.0	54.0	-22.58	-12.43
7320.300	42.01	32.18	13.10	55.11	45.28	Horiz./	74.0	54.0	-18.89	-8.72
7320.300	41.97	32.22	13.10	55.07	45.32	Vert.	74.0	54.0	-18.93	-8.68
24400.00	-	-	-	-	-	-	-	-	-	-
24400.00	-	-	-	-	-	-	-	-	-	-
Harmonics Radiated Emission Data_BT LE / 1Mbps GFSK CH High										
Frequency (MHz)	Read Level (dBuV)		Factor (dB)	Emission (dBuV/m)		Horiz./ Vert.	Limit (dBuV/m)		Margin(dB)	
	PK	AV		PK	AV		PK	AV	PK	AV
4960.100	38.29	30.05	10.10	48.39	40.15	Horiz./	74.0	54.0	-25.61	-13.85
4960.100	38.37	29.71	10.10	48.47	39.81	Vert.	74.0	54.0	-25.53	-14.19
7440.200	41.07	31.79	13.10	54.17	44.89	Horiz./	74.0	54.0	-19.83	-9.11
7440.200	41.84	32.13	13.10	54.94	45.23	Vert.	74.0	54.0	-19.06	-8.77
24800.00	-	-	-	-	-	-	-	-	-	-
24800.00	-	-	-	-	-	-	-	-	-	-

- Note:**
- (1) All Reading Levels below 1GHz are Quasi-Peak, above are peak and average value.
  - (2) Emission Level = Reading Level + Probe Factor + Cable Loss.
  - (3) Span shall wide enough to fully capture the emission being measured;  
Set RBW = 1 MHz, VBW= 3MHz for f > 1 GHz for peak measurement.  
For average measurement: VBW = 10 Hz, when duty cycle is no less than 98 percent.  $VBW \geq 1/T$ , when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
  - (4) The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.
  - (5) Where an emission level is indicated by a -, levels had a margin greater than 20 dB when compared to the limit.

**General Radiated Emission Data**  
**For Frequency below 30MHz**

Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Emission (dBuV/m)	Horiz./ Vert.	Limit (dBuV/m)	Margin (dB)
N/A						
N/A						
N/A						
N/A						
N/A						
N/A						

- Note:**
- (1) All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
  - (2) "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
  - (3) Emission Level = Reading Level + Probe Factor + Cable Loss.

**For Frequency from 30MHz to 1GHz**

Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Emission (dBuV/m)	Horiz./ Vert.	Limit (dBuV/m)	Margin (dB)
N/A						
N/A						
N/A						
N/A						
N/A						
N/A						

- Note:**
- (1) All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
  - (2) "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
  - (3) Emission Level = Reading Level + Probe Factor + Cable Loss.

## **7. Photos of Testing**

Please refer to Exhibits \_External Test Setup Photos

## **8. Photographs – EUT**

Please refer to Exhibits \_External Photos & Internal Photos

## 9. FCC ID Label

Please refer to Exhibits \_ ID Label & Location Info

## 10. Test Equipment

The following test equipment were used during the radiated & conducted emission test:

Equipment/ Facilities	Manufacturer	Model #	Serial No.	Cal/Char Date	Due Date
Turntable	Innco systems GmbH	CT-0801	N/A	NCR	NCR
Antenna Tower	Innco systems GmbH	MA-4640-XP-ET	N/A	NCR	NCR
Controller	Innco systems GmbH	CO3000	955/38850716L	NCR	NCR
Pre-Amplifier	Agilent	87405C	MY47010722	Dec.6, 2019	Dec.6, 2021
EMI Test Receiver	Rohde & Schwarz	ESR7	101091	Nov.21, 2018	Nov.21, 2020
Spectrum Analyzer	Rohde & Schwarz	FSP40	100273	Dec.14, 2019	Dec.14, 2021
Vector Signal Generator	Rohde & Schwarz	SMU200A	101824	Dec.13, 2017	Dec.13, 2020
Signal Generator	Rohde & Schwarz	SMB100A	177847	Dec.13, 2017	Dec.13, 2020
Power Meter	Rohde & Schwarz	OSP-B157	KMO-HK015	Dec.13, 2017	Dec.13, 2020
Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	124004	Jan. 14, 2020	Jan. 14, 2023
Regulatory Test System 30 MHz to 40 GHz	Rohde & Schwarz	TS8997	KMO-HK015	Dec.13, 2017	Dec.13, 2020
Trilog-Super Broadband Antenna	SCHWARZBECK	VULB9161	9161-4079	Nov.27, 2018	Nov.27, 2021
Broad-Band Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-565	Nov.29, 2018	Nov.29, 2021
AMN	Rohde & Schwarz	ESH3-Z5	100197	Dec.25, 2017	Dec.25, 2020
AMN	CYBERTEK	EM5040A	E115040054	Nov.21, 2018	Nov.21, 2021
KMO Shielded Room	KMO	KMO-001	N/A	NCR	NCR
Coaxial Cable with N-Connectors	SCHWARZBECK	AK9515H	95549	Sep.18, 2019	Sep.18, 2021
3m Anechoic Chamber	KMO	KMO-3AC	N/A	Dec.23, 2019	Dec.23, 2021
Temperature Chamber	TABAI	PSL-4GTW	N/A	Feb.10, 2019	Feb.10, 2021

-----End of Report -----



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Appendix A: DTS Bandwidth

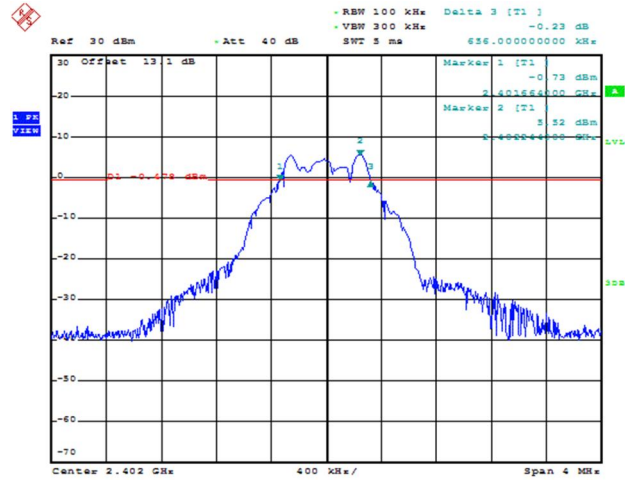
Test Result

TestMode	Antenna	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_BT4.0	Ant1	2402	0.656	2401.664	2402.320	0.5	PASS
		2440	0.660	2439.664	2440.324	0.5	PASS
		2480	0.664	2479.660	2480.324	0.5	PASS



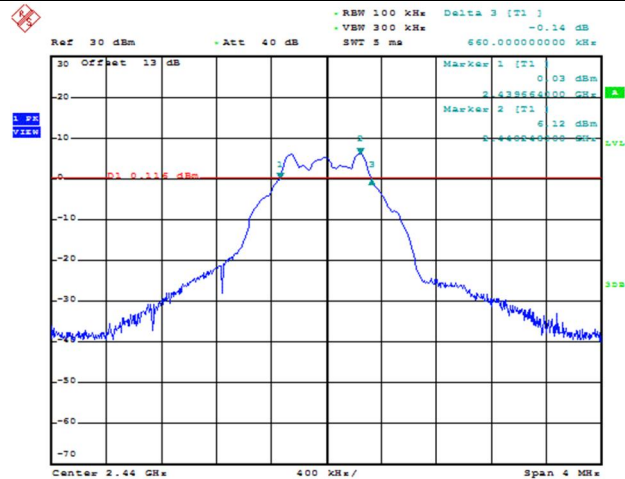
## Test Graphs

BLE\_BT4.0\_Ant1\_2402



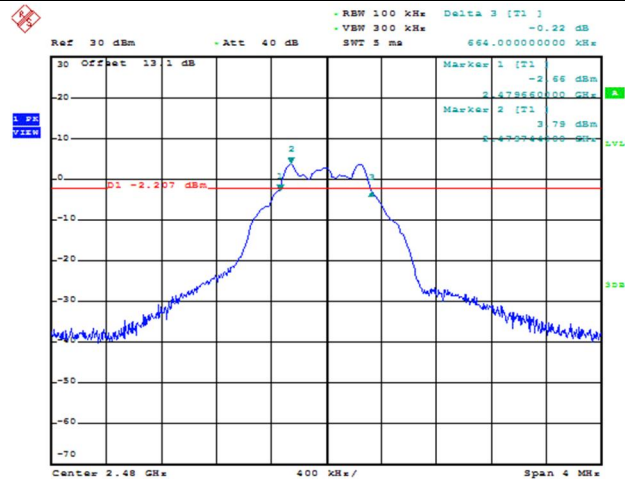
Date: 21.MAY.2020 19:05:17

BLE\_BT4.0\_Ant1\_2440



Date: 21.MAY.2020 19:06:48

BLE\_BT4.0\_Ant1\_2480



Date: 21.MAY.2020 19:07:45

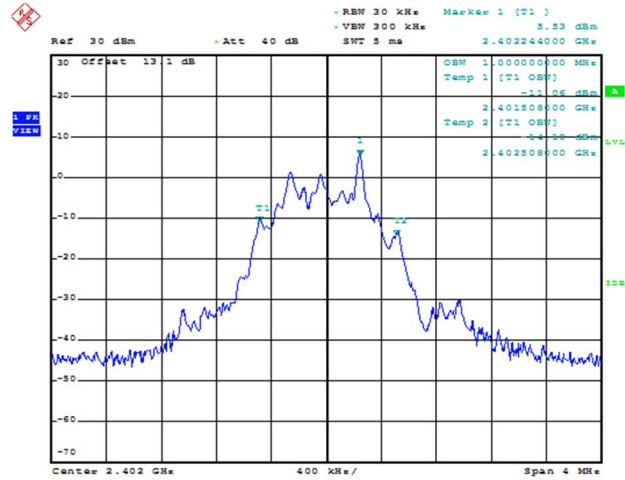
**Appendix B: Occupied Channel Bandwidth**

**Test Result**

TestMode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_BT4.0	Ant1	2402	1	0.000	0.000	---	PASS
		2440	1.004	0.000	0.000	---	PASS
		2480	1	0.000	0.000	---	PASS

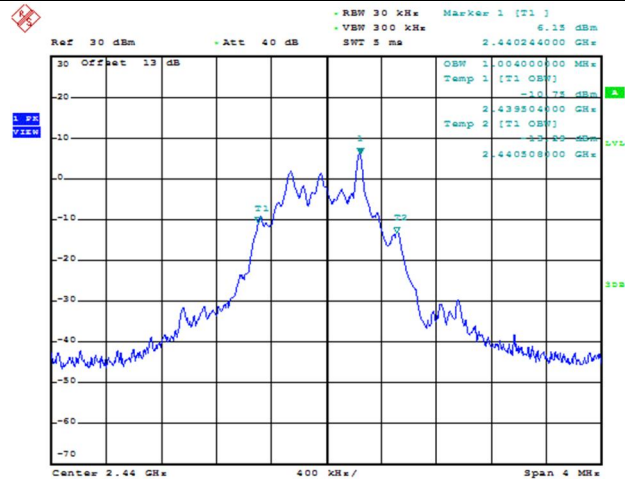
## Test Graphs

BLE\_BT4.0\_Ant1\_2402



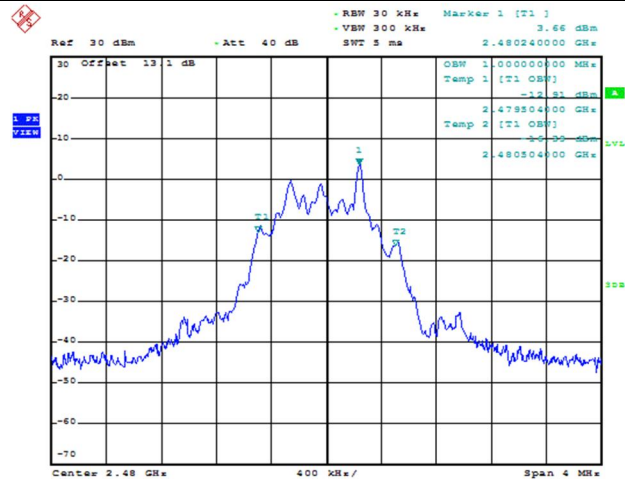
Date: 21.MAY.2020 19:06:17

BLE\_BT4.0\_Ant1\_2440



Date: 21.MAY.2020 19:07:00

BLE\_BT4.0\_Ant1\_2480



Date: 21.MAY.2020 19:07:57

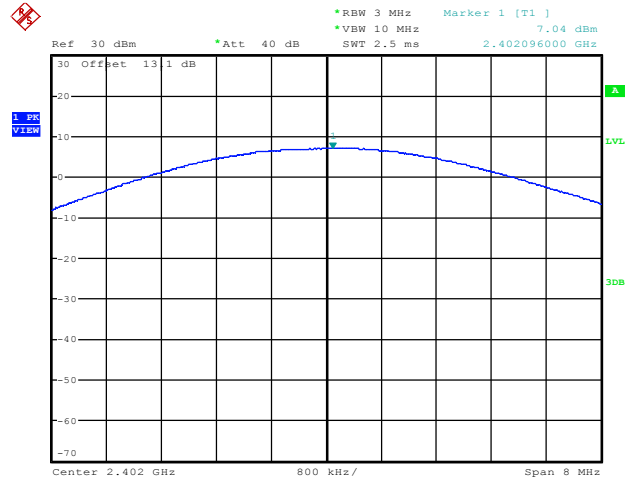
**Appendix C: Maximum conducted output power**

**Test Result**

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
BLE_BT4.0	Ant1	2402	7.04	<=30	PASS
		2440	6.88	<=30	PASS
		2480	4.11	<=30	PASS

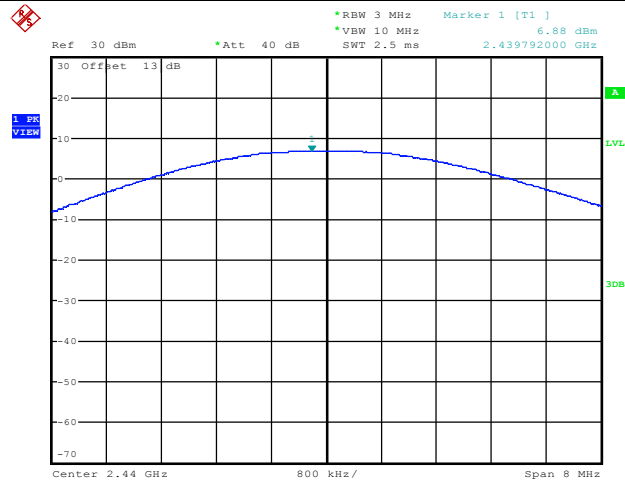
## Test Graphs

BLE\_BT4.0\_Ant1\_2402



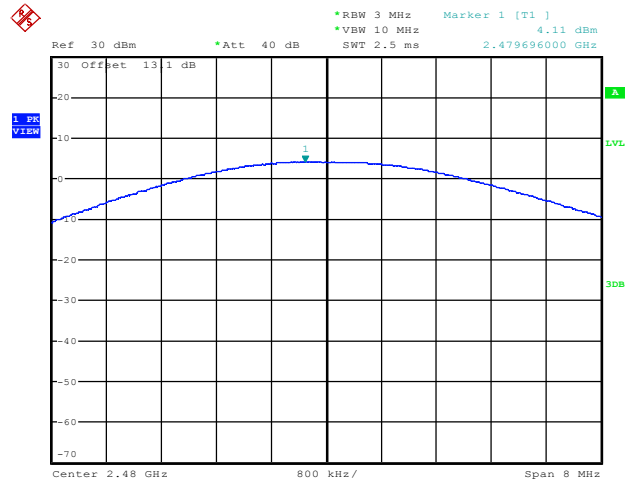
Date: 5.JUL.2020 15:25:05

BLE\_BT4.0\_Ant1\_2440



Date: 5.JUL.2020 15:28:23

BLE\_BT4.0\_Ant1\_2480



Date: 5.JUL.2020 15:34:34

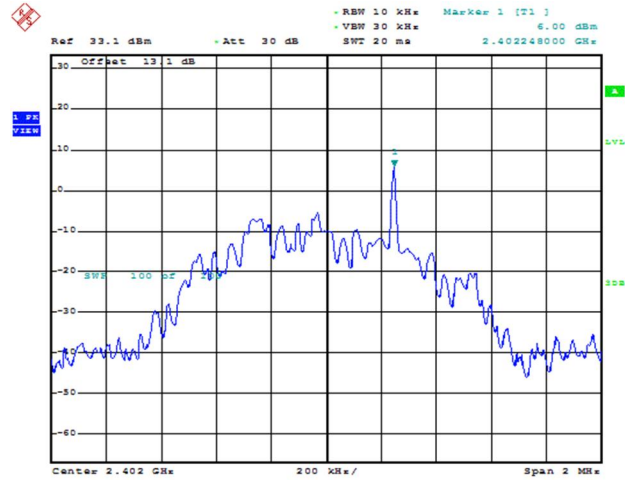
**Appendix D: Maximum power spectral density**

**Test Result**

TestMode	Antenna	Channel	Result[dBm/3-100kHz]	Limit[dBm/3kHz]	Verdict
BLE_BT4.0	Ant1	2402	6	<=8	PASS
		2440	6.4	<=8	PASS
		2480	4	<=8	PASS

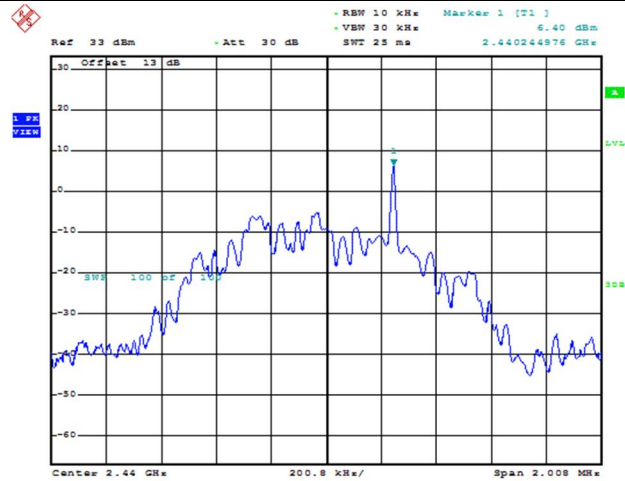
## Test Graphs

BLE\_BT4.0\_Ant1\_2402



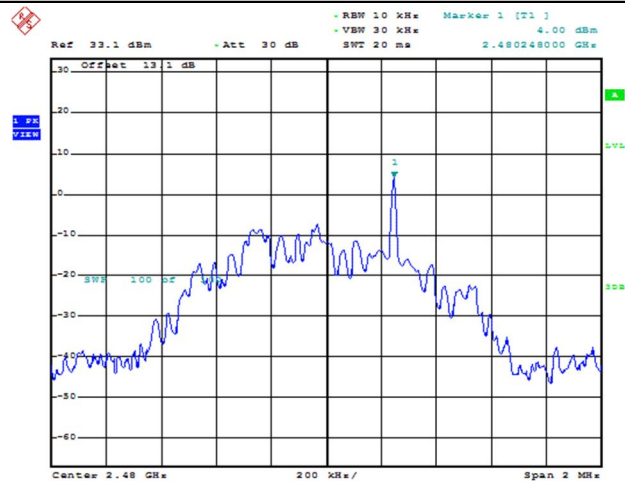
Date: 22.MAY.2020 09:50:32

BLE\_BT4.0\_Ant1\_2440



Date: 22.MAY.2020 09:51:15

BLE\_BT4.0\_Ant1\_2480



Date: 22.MAY.2020 09:52:22

**Appendix E: Band edge measurements**

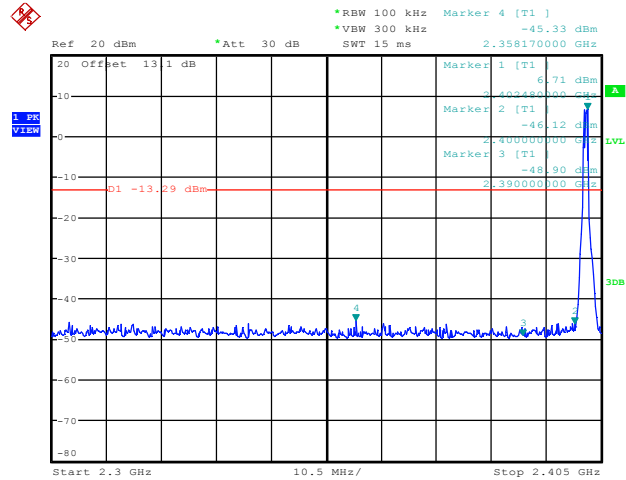
**Test Result**

TestMode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_BT4.0	Ant1	Low	2402	6.71	-45.33	<=-13.29	PASS
		High	2480	3.69	-46.08	<=-16.31	PASS



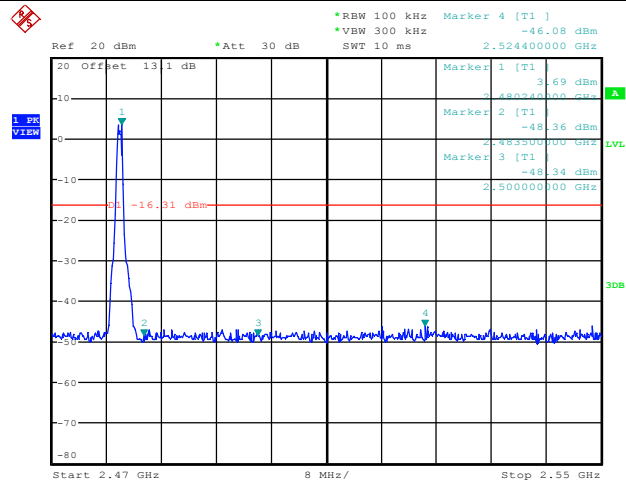
## Test Graphs

BLE\_BT4.0\_Ant1\_Low\_2402



Date: 5.JUL.2020 15:23:25

BLE\_BT4.0\_Ant1\_High\_2480



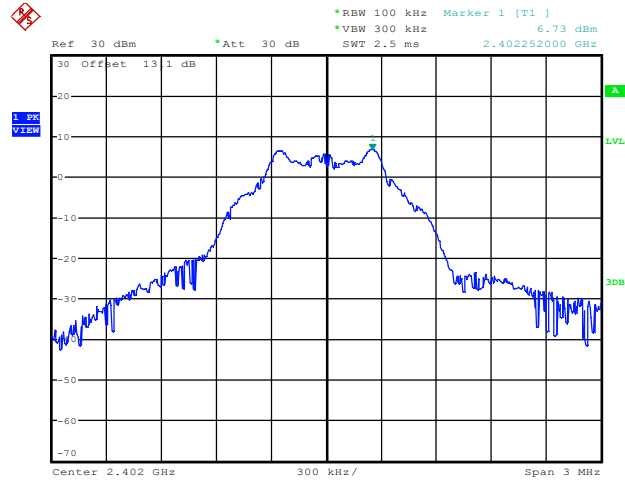
Date: 5.JUL.2020 15:32:55

**Test Result**

TestMode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_BT4.0	Ant1	2402	Reference	6.73	6.73	---	PASS
			30~1000	30~1000	-48.32	<=-13.27	PASS
			1000~26500	1000~26500	<=-13.27	<=-13.27	PASS
		2440	Reference	6.55	6.55	---	PASS
			30~1000	30~1000	-48.17	<=-13.45	PASS
			1000~26500	1000~26500	-30.23	<=-13.45	PASS
		2480	Reference	3.80	3.80	---	PASS
			30~1000	30~1000	-47.96	<=-16.2	PASS
			1000~26500	1000~26500	-30.57	<=-16.2	PASS

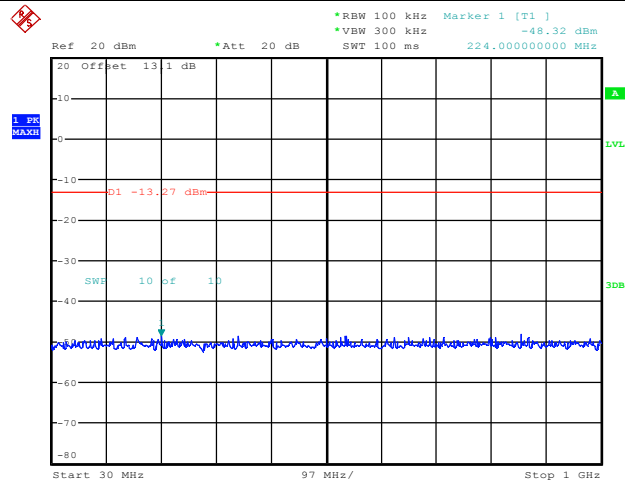
## Test Graphs

BLE\_BT4.0\_Ant1\_2402\_0~Reference



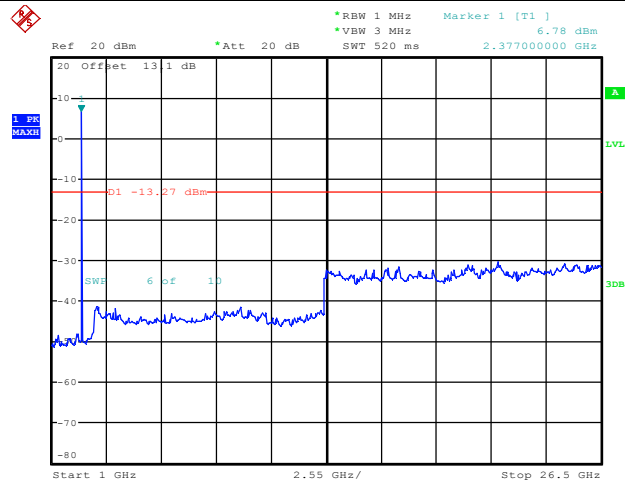
Date: 5.JUL.2020 15:24:31

BLE\_BT4.0\_Ant1\_2402\_30~1000



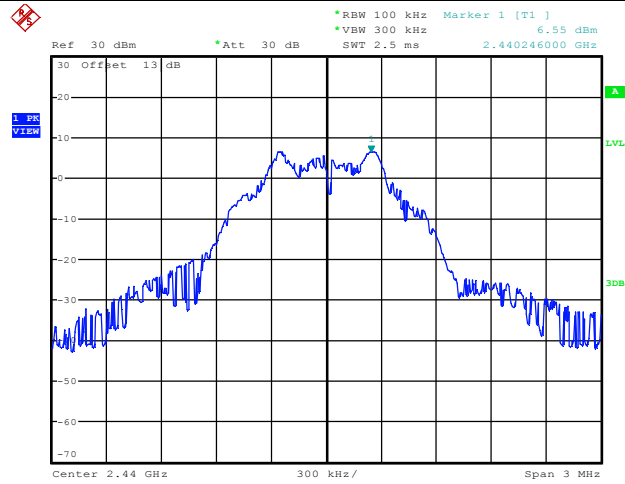
Date: 5.JUL.2020 15:24:41

BLE\_BT4.0\_Ant1\_2402\_1000~26500



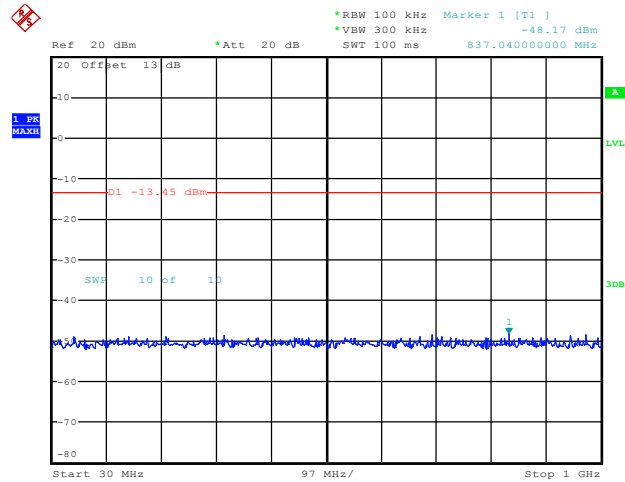
Date: 5.JUL.2020 15:24:56

BLE\_BT4.0\_Ant1\_2440\_0~Reference



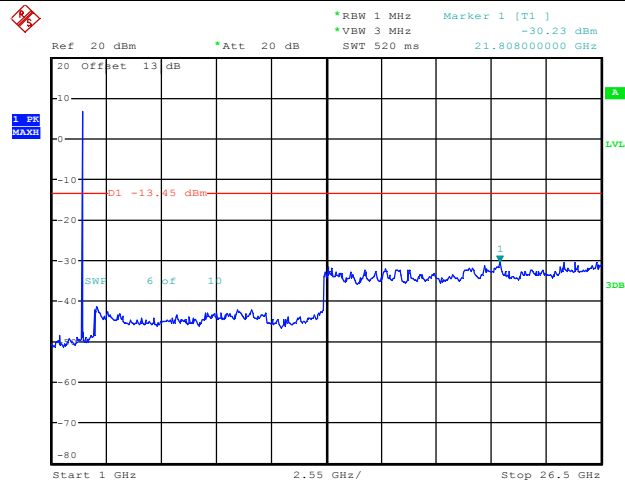
Date: 5.JUL.2020 15:27:49

### BLE\_BT4.0\_Ant1\_2440\_30~1000



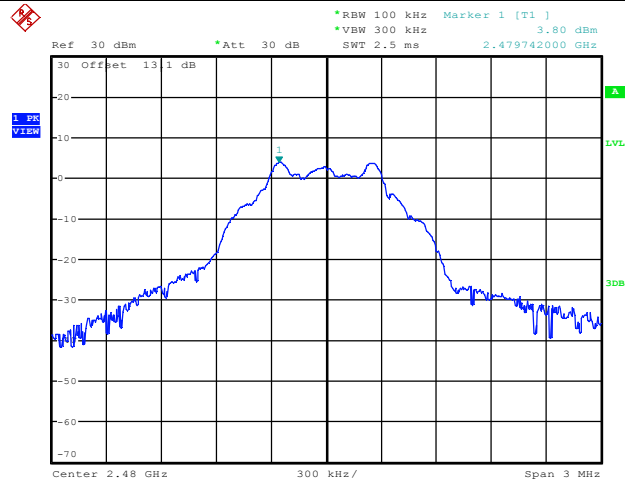
Date: 5.JUL.2020 15:28:00

### BLE\_BT4.0\_Ant1\_2440\_1000~26500



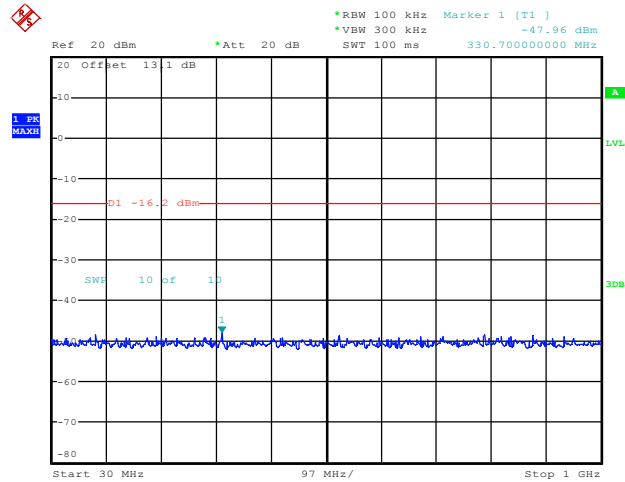
Date: 5.JUL.2020 15:28:15

### BLE\_BT4.0\_Ant1\_2480\_0~Reference



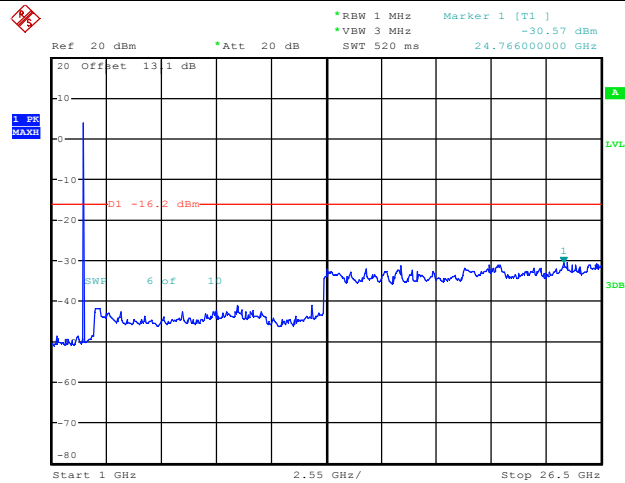
Date: 5.JUL.2020 15:34:00

### BLE\_BT4.0\_Ant1\_2480\_30~1000



Date: 5.JUL.2020 15:34:10

### BLE\_BT4.0\_Ant1\_2480\_1000~26500



Date: 5.JUL.2020 15:34:25



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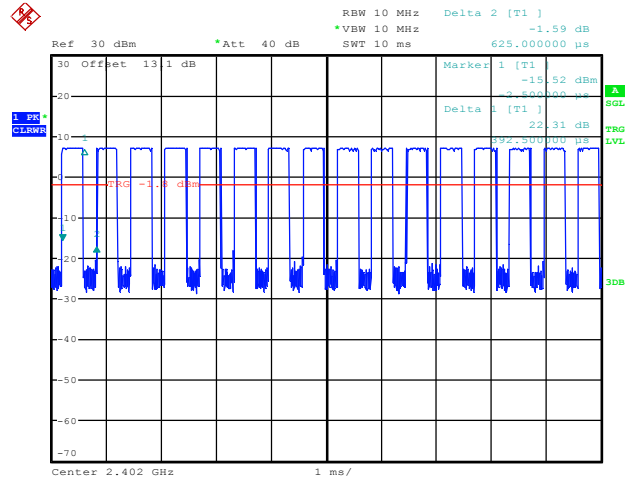
Appendix G: Duty Cycle

Test Result

TestMode	Antenna	Channel	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	Limit	Verdict
BLE_BT4.0	Ant1	2402	0.39	0.63	62.80	---	PASS
		2440	0.39	0.63	62.80	---	PASS
		2480	0.39	0.63	62.80	---	PASS

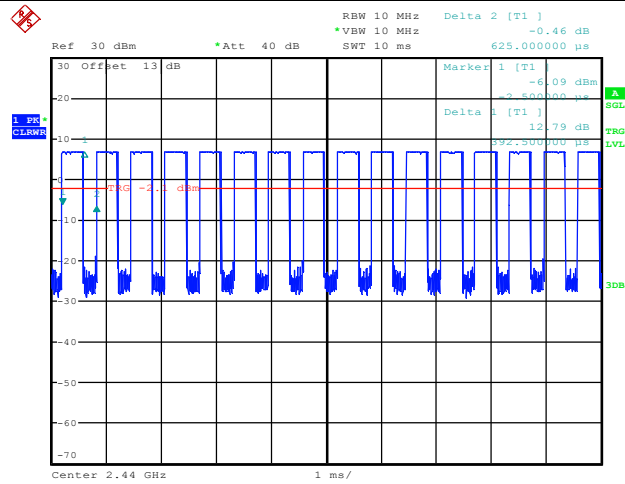
## Test Graphs

BLE\_BT4.0\_Ant1\_2402



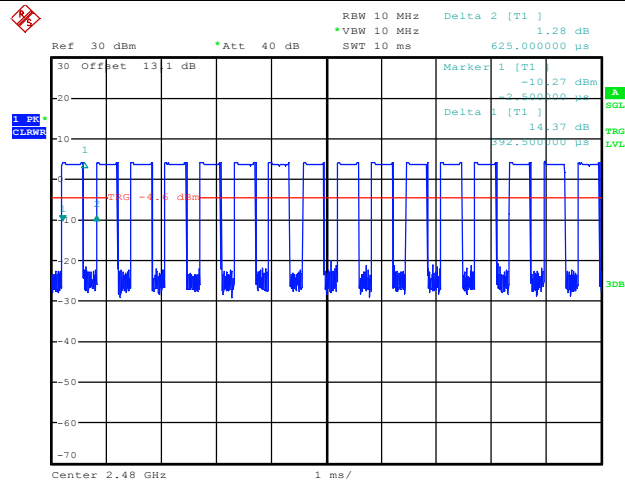
Date: 5.JUL.2020 15:22:38

BLE\_BT4.0\_Ant1\_2440



Date: 5.JUL.2020 15:27:06

BLE\_BT4.0\_Ant1\_2480



Date: 5.JUL.2020 15:32:07