



## FCC / ISED Test Report

FOR:

Crane Payment Innovations

Model Name:

COR151-US102

Product Description:

Modular Data Port

FCC ID: QP8CORABT

Applied Rules and Standards:  
47 CFR Part 15.247 (DTS)

REPORT #: EMC\_MEIGR\_008\_15.247\_DTS

DATE: 2018-10-16



A2LA Accredited

IC recognized #  
3462B-1

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**1 Assessment**

The following device was evaluated against the applicable criteria specified in FCC rules Parts 15.247 of Title 47 of the Code of Federal Regulations.

No deviations were ascertained.

Company	Description	Model #
Crane Payment Innovations	Modular Data Port	COR151-US102

**Responsible for Testing Laboratory:**

2018-10-16	Compliance	Cindy Li (Lab Manager – EMC)	
Date	Section	Name	Signature

**Responsible for the Report:**

2018-10-16	Compliance	Kevin Wang (Senior EMC Engineer)	
Date	Section	Name	Signature

The test results of this test report relate exclusively to the test item specified in Section 3. CETECOM Inc. USA 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 CETECOM Inc. USA.

## 2 Administrative Data

### 2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

<b>Company Name:</b>	CETECOM Inc.
<b>Department:</b>	Compliance
<b>Street Address:</b>	411 Dixon Landing Road
<b>City/Zip Code</b>	Milpitas, CA 95035
<b>Country</b>	USA
<b>Telephone:</b>	+1 (408) 586 6200
<b>Fax:</b>	+1 (408) 586 6299
<b>Lab Manager:</b>	Cindy Li
<b>Responsible Project Leader:</b>	Kevin Wang

### 2.2 Identification of the Client

<b>Applicant's Name:</b>	Crane Payment Innovations
<b>Street Address:</b>	3222 Phoenixville Pike, Suite 200
<b>City/Zip Code</b>	Malvern, PA 19355
<b>Country</b>	United States

### 2.3 Identification of the Manufacturer

<b>Manufacturer's Name:</b>	Same as Applicant
<b>Manufacturers Address:</b>	-----
<b>City/Zip Code</b>	-----
<b>Country</b>	-----

### 3 Equipment Under Test (EUT)

#### 3.1 EUT Specifications

<b>Model No:</b>	CORA151-US102
<b>HW Version :</b>	G1
<b>SW Version :</b>	9.15
<b>FCC-ID :</b>	QP8CORABT
<b>Product Description:</b>	CORA modular data port is a two pcb solution on-line monitoring device that capture transaction activities of bottling and full-service vending machines.
<b>Frequency Range / number of channels:</b>	Nominal band: 2400 MHz – 2483.5 MHz; Center to center: 2402 MHz (ch 0) – 2480 MHz (ch 39), 40 channels
<b>Type(s) of Modulation:</b>	Bluetooth version 4.0, Low Energy, using Dynamic Sequence Spread Spectrum with GFSK modulation.
<b>Modes of Operation:</b>	Bluetooth LE in both advertising and connected mode of operation
<b>Antenna Information as declared:</b>	max gain 3.2 dBi
<b>Max. Peak Output Power:</b>	Conducted Power 9.4 dBm
<b>Power Supply/ Rated Operating Voltage Range:</b>	Vmin: 20 VDC/ Vnom: 24 VDC / Vmax: 42 VDC
<b>Operating Temperature Range</b>	-15°C ~ +60°C
<b>Other Radios included in the device:</b>	Cellular module: Telit Wireless, LE910-SVL FCC ID: RI7LE910SVL Support bands: FDD LTE 4, 13
<b>Sample Revision</b>	<input type="checkbox"/> Prototype Unit; <input type="checkbox"/> Production Unit; <input checked="" type="checkbox"/> Pre-Production

### 3.2 EUT Sample details

EUT #	Serial Number	HW Version	SW Version	Notes/Comments
1	29890100013	G1	9.15	Radiated Sample
2	29890100010	G1	9.15	Conducted Sample

### 3.3 Accessory Equipment (AE) details

AE #	Type	Model	Manufacturer	Serial Number
1	Vending Demo Tester	-	MEI	-
2	AC Adaptor	DSI65-24-U	CUI Inc.	-

### 3.4 Test Sample Configuration

EUT Set-up #	Combination of AE used for test set up	Comments
1	EUT#2 + AE#1 + AE#2	Conducted measurement
2	EUT#1 + AE#1 + AE#2	Radiated measurement

### 3.5 Justification for Worst Case Mode of Operation

During the testing process, the EUT was tested with transmitter sets on low, mid and high channels, and highest possible duty cycle of 62%. For radiated measurements, all data in this report shows the worst case between horizontal and vertical antenna polarizations and for all orientations of the EUT.

#### 4 Subject of Investigation

The objective of the measurements done by CETECOM Inc. was to assess the performance of the EUT according to the relevant requirements specified in FCC rules Part 15.247 of Title 47 of the Code of Federal Regulations.

This test report is to support a request for new equipment authorization under the FCC ID: QP8CORABT

Testing procedures are based on 558074 D01 DTS Meas Guidance v04 – “GUIDANCE FOR PERFORMING COMPLIANCE MEASUREMENTS ON DIGITAL TRANSMISSION SYSTEMS (DTS) OPERATING UNDER SECTION 15.247” - April 5, 2017, by the Federal Communications Commission, Office of Engineering and Technology, Laboratory Division.

#### 5 Measurement Results Summary

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	NA	NP	Result
§15.247(a)(1) RSS-247 5.2(a)	Emission Bandwidth	Nominal	BTLE	■	□	□	Complies
§15.247(e) RSS-247 5.2(b)	Power Spectral Density	Nominal	BTLE	■	□	□	Complies
§15.247(b)(1) RSS-247 5.4(d)	Maximum Conducted Output Power and EIRP	Nominal	BTLE	■	□	□	Complies
§15.247(d) RSS-247 5.5	Band edge compliance Unrestricted Band Edges	Nominal	BTLE	■	□	□	Complies
§15.247; 15.209; 15.205 RSS-Gen 8.9; 8.10	Band edge compliance Restricted Band Edges	Nominal	BTLE	■	□	□	Complies
§15.247(d); §15.209 RSS-Gen 6.13	TX Spurious emissions- Radiated	Nominal	BTLE	■	□	□	Complies
§15.207(a) RSS Gen 8.8	AC Conducted Emissions	Nominal	BTLE	■	□	□	Complies

**Note:** NA= Not Applicable; NP= Not Performed.

## 6 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus, with 95% confidence interval (in dB delta to result), based on a coverage factor  $k=1$ .

### Radiated measurement

9 kHz to 30 MHz	$\pm 2.5$ dB (Magnetic Loop Antenna)
30 MHz to 1000 MHz	$\pm 2.0$ dB (Biconilog Antenna)
1 GHz to 40 GHz	$\pm 2.3$ dB (Horn Antenna)

### Conducted measurement

150 kHz to 30 MHz	$\pm 0.7$ dB (LISN)
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RF conducted measurement	$\pm 0.5$ dB
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According to TR 102 273 a multiplicative propagation of error is assumed for RF measurement systems. For this reason the RMS method is applied to dB values and not to linear values as appropriate for additive propagation of error. Also used: <http://physics.nist.gov/cuu/Uncertainty/typeb.html>. The above calculated uncertainties apply to direct application of the Substitution method. The Substitution method is always used when the EUT comes closer than 3 dB to the limit.

### 6.1 Environmental Conditions During Testing:

The following environmental conditions were maintained during the course of testing:

- Ambient Temperature: 20-25° C
- Relative humidity: 40-60%

### 6.2 Dates of Testing:

08/21/2018 - 08/31/2018

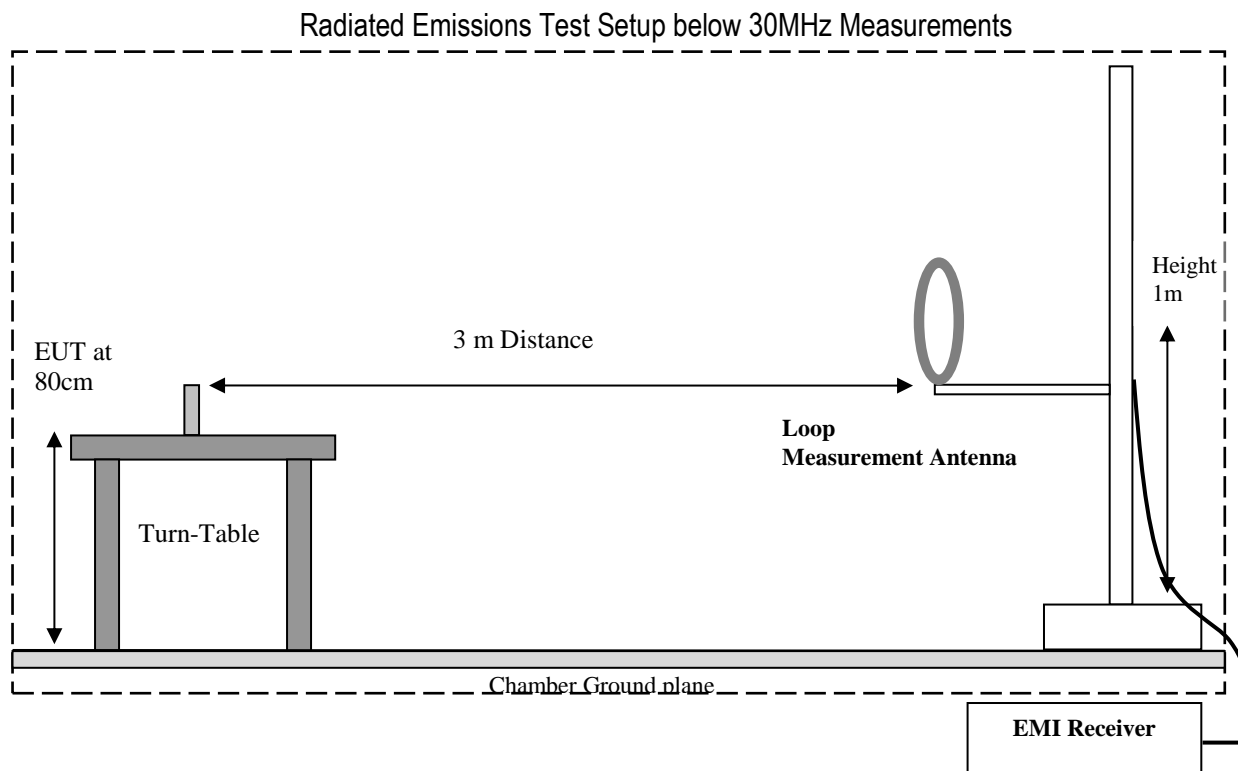


## 7 Measurement Procedures

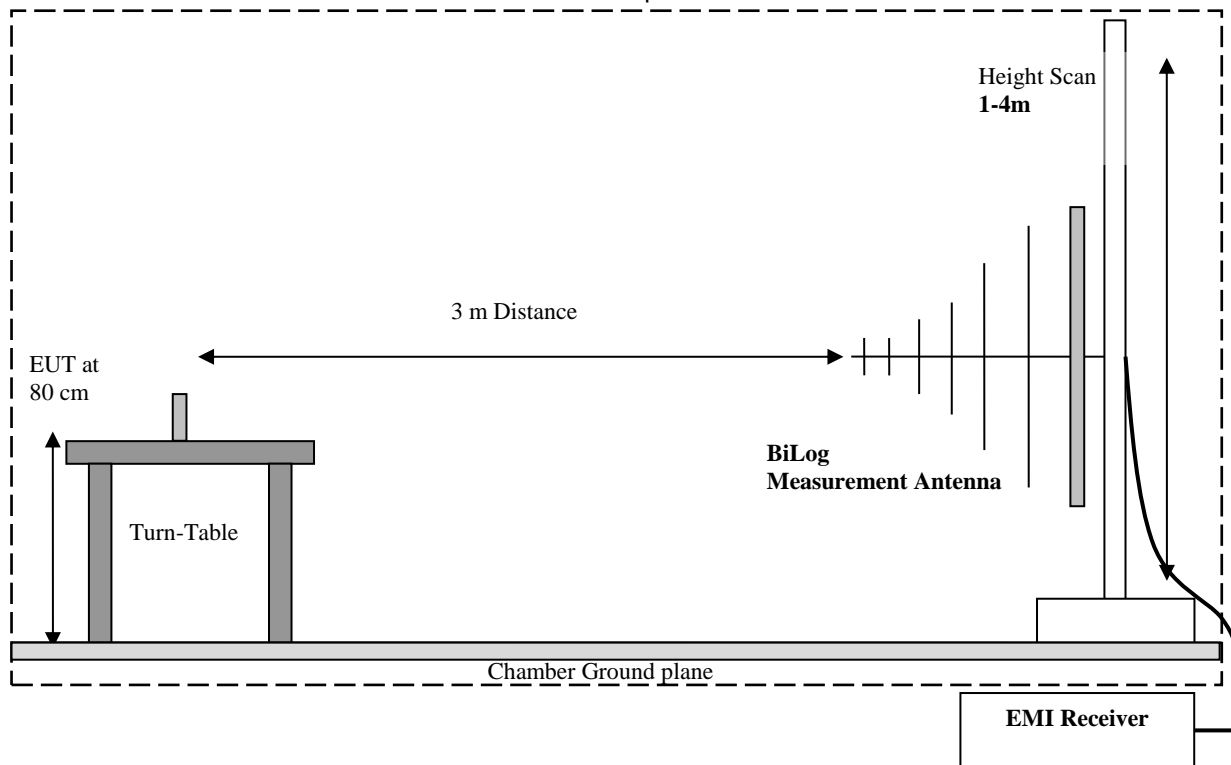
### 7.1 Radiated Measurement

The radiated measurement is performed according to ANSI C63.10 (2013)

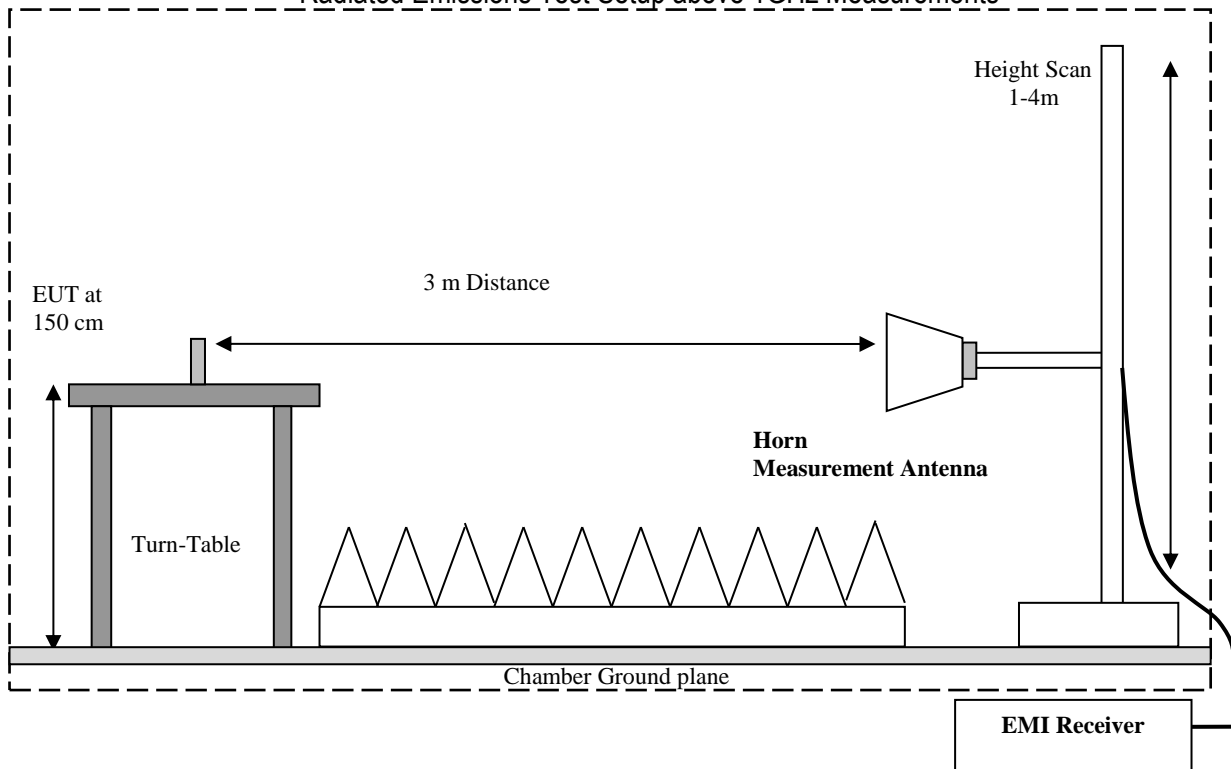
- The exploratory measurement is accomplished by running a matrix of 16 sweeps over the required frequency range with R&S Test-SW EMC32 for 4 positions of the turntable, two orthogonal positions of the EUT and both antenna polarizations. This procedure exceeds the requirement of the above standards to cover the 3 orthogonal axis of the EUT. A max peak detector is utilized during the exploratory measurement. The Test-SW creates an overall maximum trace for all 12 sweeps and saves the settings for each point of this trace. The maximum trace is part of the test report.
- The 10 highest emissions are selected with an automatic algorithm of EMC32 searching for peaks in the noise floor and ensuring that broadband signals are not selected multiple times.
- The maxima are then put through the final measurement and again maximized in a 90deg range of the turntable, fine search in frequency domain and height scan between 1m and 4m.
- The above procedure is repeated for all possible ways of power supply to EUT and for all supported modulations.
- In case there are no emissions above noise floor level only the maximum trace is reported as described above.
- The results are split up into up to 4 frequency ranges due to antenna bandwidth restrictions. A magnetic loop is used from 9 kHz to 30 MHz, a Biconilog antenna is used from 30 MHz to 1 GHz, and two different horn antennas are used to cover frequencies up to 40 GHz.



### Radiated Emissions Test Setup 30MHz-1GHz Measurements



### Radiated Emissions Test Setup above 1GHz Measurements



### 7.1.1 Sample Calculations for Field Strength Measurements

Field Strength is calculated from the Spectrum Analyzer/ Receiver readings, taking into account the following parameters:

1. Measured reading in dB $\mu$ V
2. Cable Loss between the receiving antenna and SA in dB and
3. Antenna Factor in dB/m

All radiated measurement plots in this report are taken from a test SW that calculates the Field Strength based on the following equation:

$$FS \text{ (dB}\mu\text{V/m)} = \text{Measured Value on SA (dB}\mu\text{V)} - \text{Cable Loss (dB)} + \text{Antenna Factor (dB/m)}$$

Example:

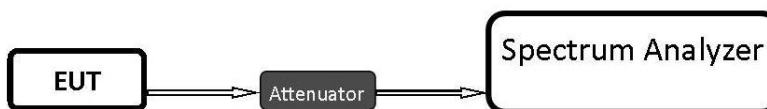
Frequency (MHz)	Measured SA (dB $\mu$ V)	Cable Loss (dB)	Antenna Factor Correction (dB)	Field Strength Result (dB $\mu$ V/m)
1000	80.5	3.5	14	98.0

### 7.2 Power Line Conducted Measurement Procedure

AC Power Line conducted emissions measurements performed according to: ANSI C63.4 (2014)

### 7.3 RF Conducted Measurement Procedure

Testing procedures are based on 558074 D01 DTS Meas Guidance v04 – “GUIDANCE FOR PERFORMING COMPLIANCE MEASUREMENTS ON DIGITAL TRANSMISSION SYSTEMS (DTS) OPERATING UNDER SECTION 15.247” - April 5, 2017, by the Federal Communications Commission, Office of Engineering and Technology, Laboratory Division.



- Connect the equipment as shown in the above diagram.
- Adjust the settings of the SA (Rohde-Schwarz Spectrum Analyzer) to connect the EUT at the required mode of test.
- Measurements are to be performed with the EUT set to the low, middle and high channels and for worst case modulation schemes.

## 8 Test Result Data

### 8.1 Maximum Peak Conducted Output Power

#### 8.1.1 Measurement according to FCC 558074 D01 DTS Meas Guidance v04

##### Spectrum Analyzer settings:

- RBW  $\geq$  DTS bandwidth
- VBW  $\geq$  3 x RBW
- Span  $\geq$  3 x RBW
- Sweep = Auto couple
- Detector function = Peak
- Trace = Max hold
- Use peak marker function to determine the peak amplitude level

#### 8.1.2 Limits:

##### Maximum Peak Output Power:

- FCC §15.247 (b)(1): 1 W
- IC RSS-247: 1 W

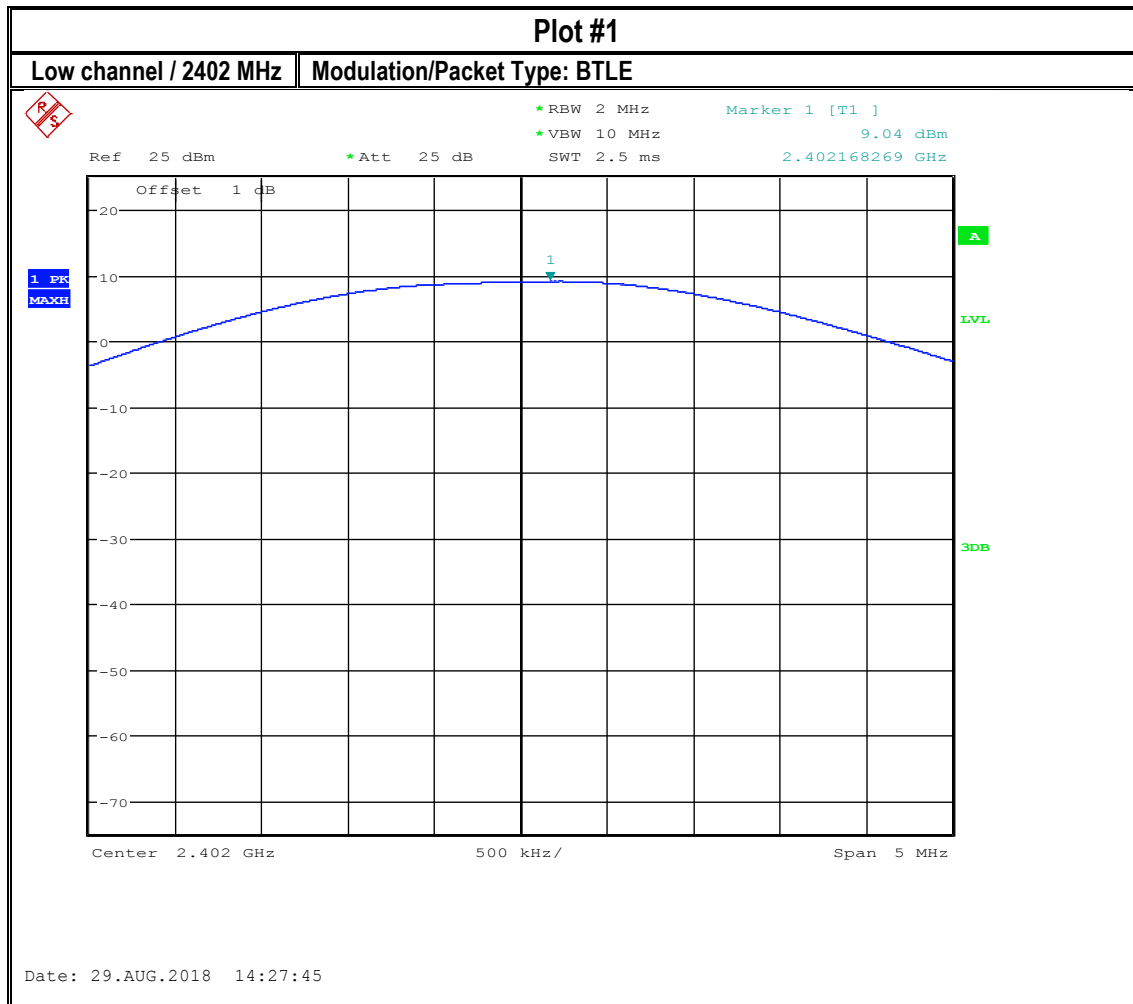
#### 8.1.3 Test conditions and setup:

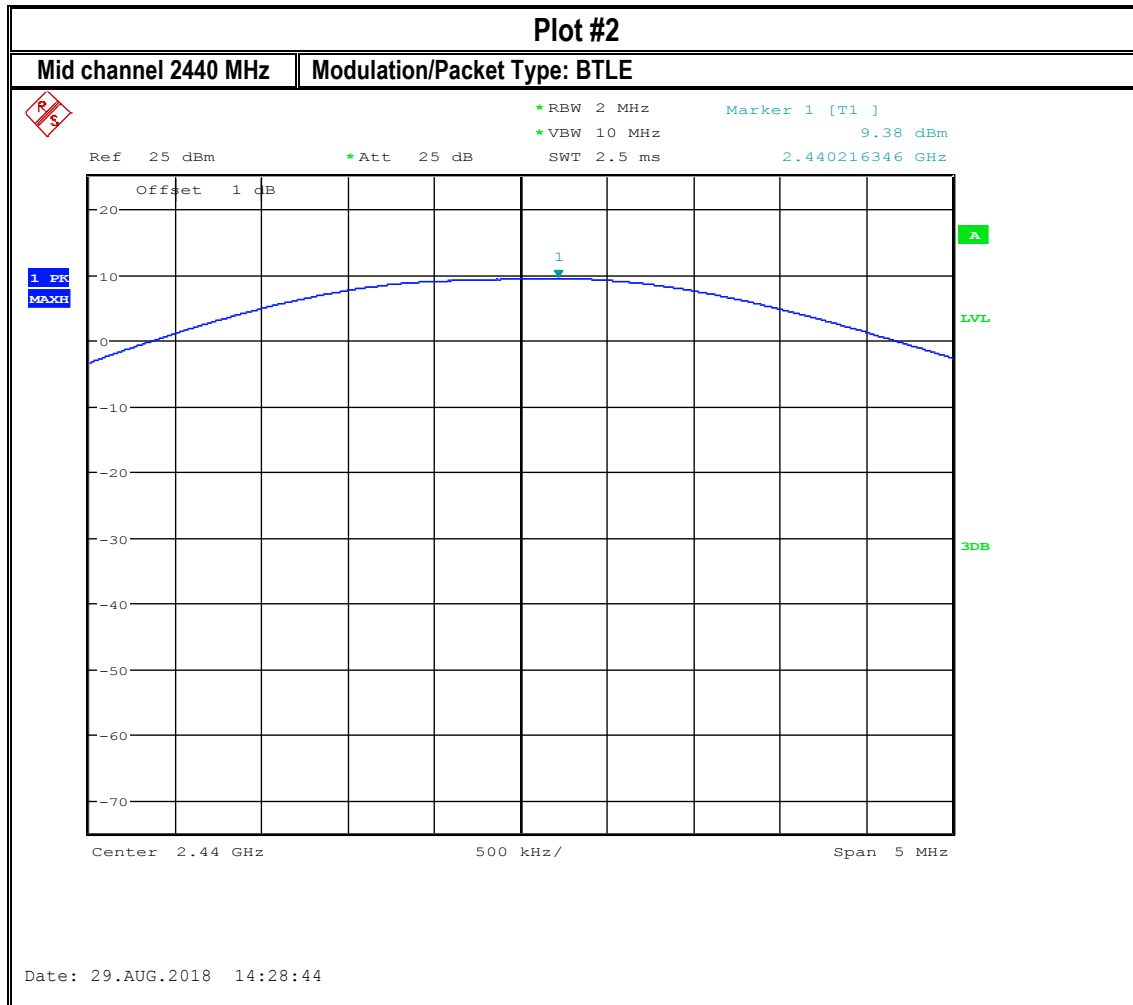
Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input	Antenna Gain
22° C	1	GFSK continuous fixed channel	24 VDC	3.2 dBi

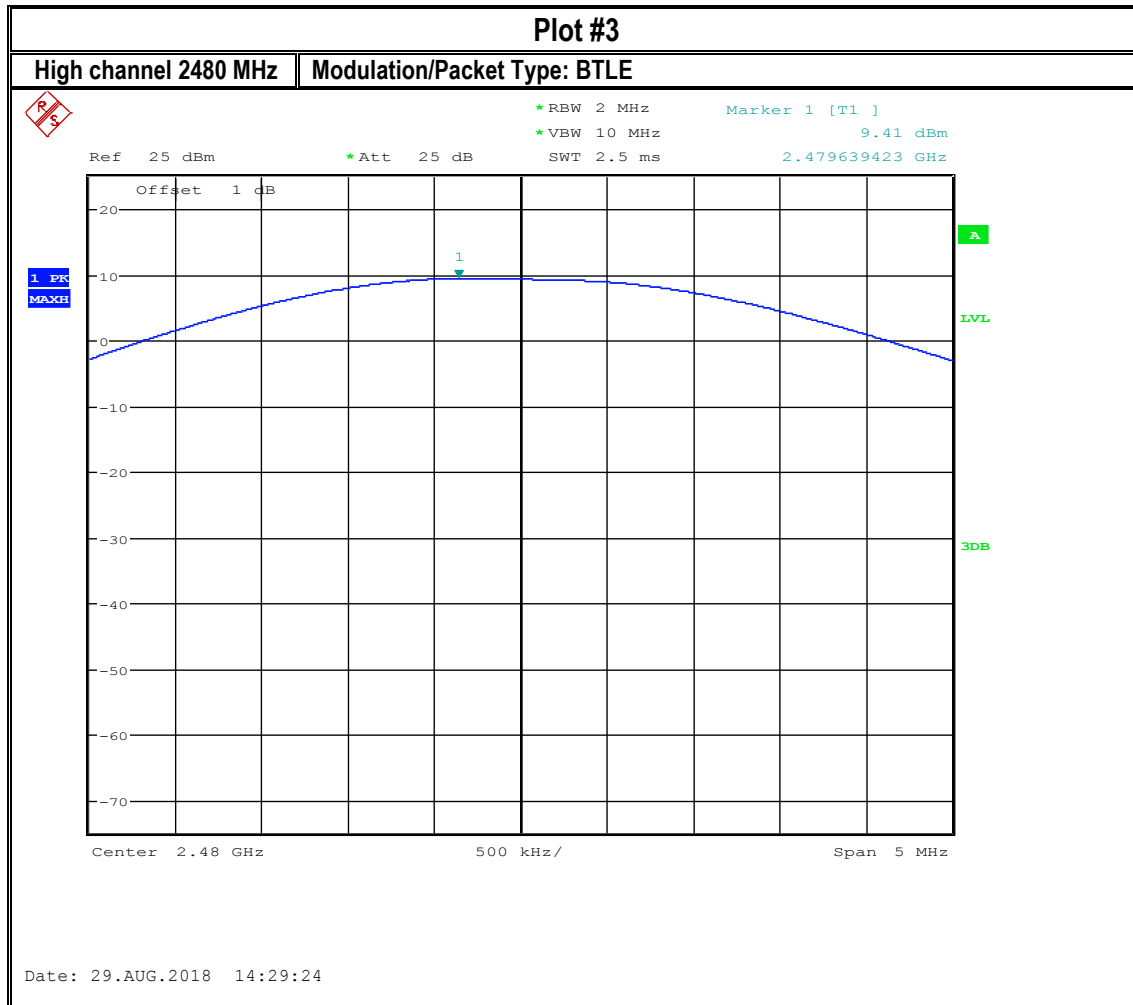
#### 8.1.4 Measurement result:

Plot #	Frequency (MHz)	Maximum Peak Conducted Output Power (dBm)	EIRP (dBm)	Limit (dBm)	Result
1	2402	9.04	12.24	30 (Pk) / 36 (EIRP)	Pass
2	2440	9.38	12.58	30 (Pk) / 36 (EIRP)	Pass
3	2480	9.41	12.61	30 (Pk) / 36 (EIRP)	Pass

### 8.1.5 Measurement Plots:







## 8.2 Power Spectral Density

### 8.2.1 Measurement according to FCC 558074 D01 DTS Meas Guidance v04

#### Spectrum Analyzer settings for Peak PSD method:

- Set analyzer center frequency to DTS channel center frequency
- Set the span to 1.5 x DTS bandwidth
- Set RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$
- Set the VBW  $\geq 3 \times \text{RBW}$
- Detector = Peak
- Sweep time = Auto couple
- Trace mode = Max hold
- Allow trace to fully stabilize
- Use the peak marker function to determine the maximum amplitude level within the RBW
- If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat

### 8.2.2 Limits:

#### FCC§15.247(e) & RSS-247 5.2(2)

- For digitally modulated systems, the peak 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.

### 8.2.3 Test conditions and setup:

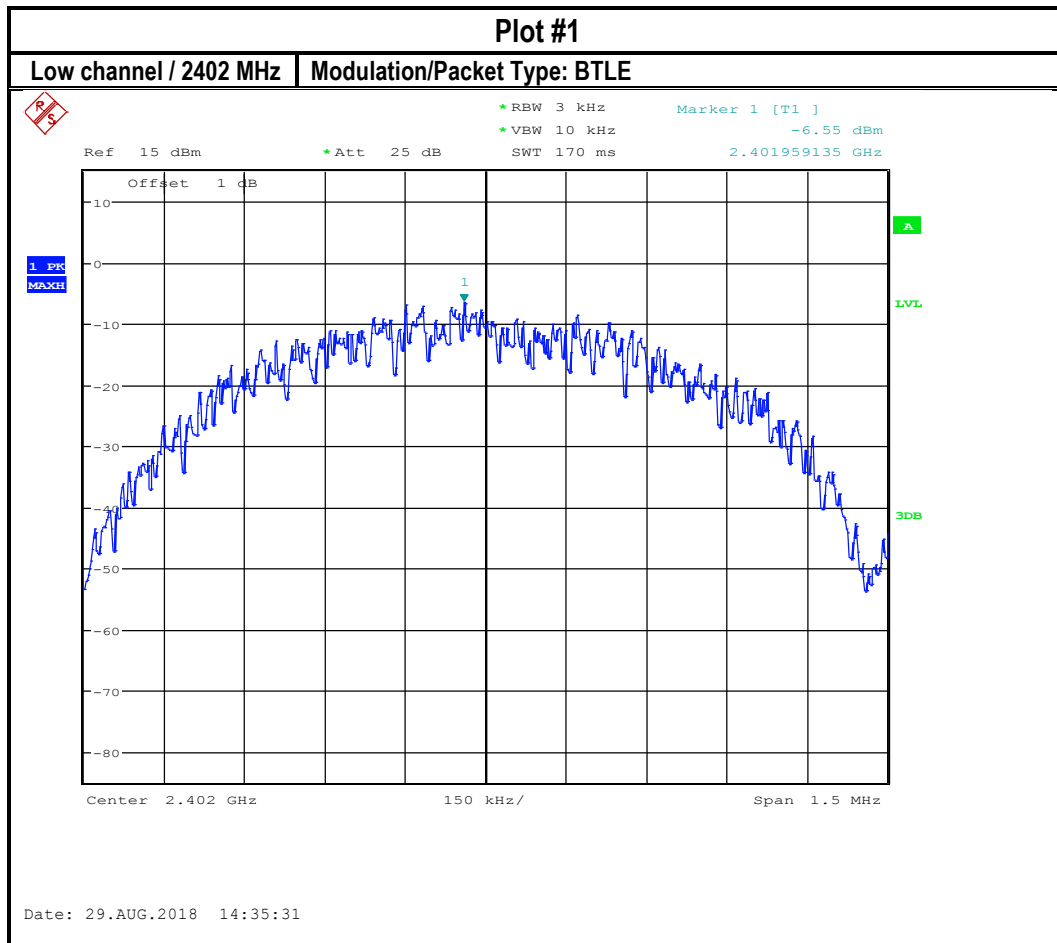
Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input	Antenna Gain
22° C	1	GFSK continuous fixed channel	24 VDC	3.2 dBi

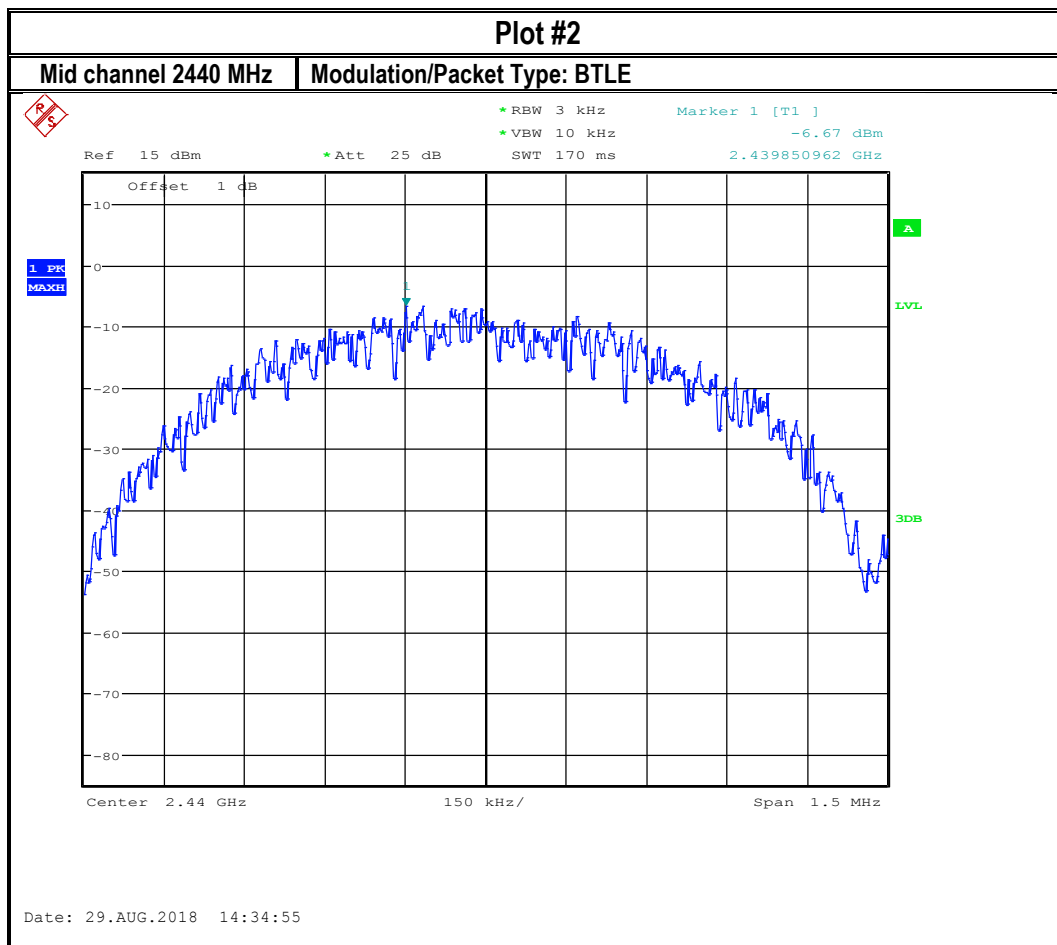
### 8.2.4 Measurement result:

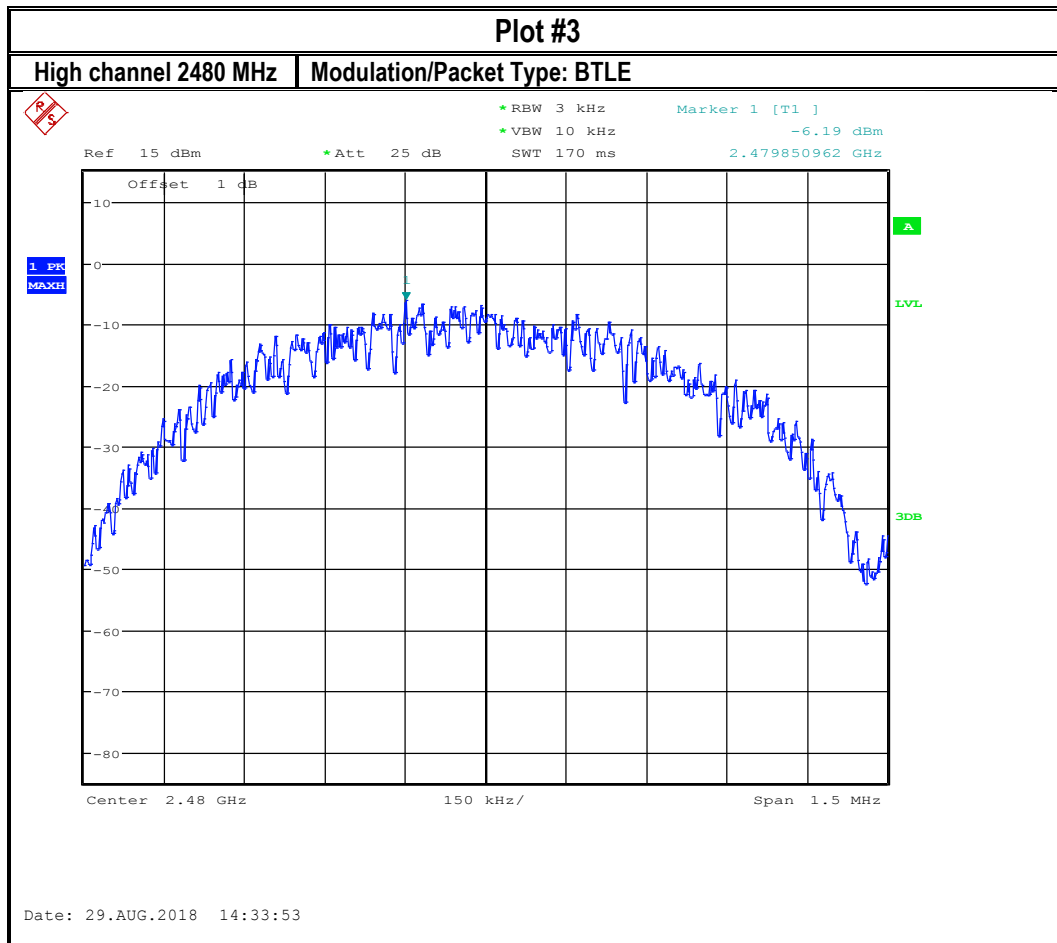
Plot #	Frequency (MHz)	Maximum Power Spectral Density (dBm/3 kHz)	PSD Adjusted for Antenna Gain (dBm/3 kHz)	Limit ( dBm / 3 kHz )	Result
1	2402	-6.55	-3.35	8	Pass
2	2441	-6.67	-3.47	8	Pass
3	2480	-6.19	-2.99	8	Pass



### 8.2.5 Measurement Plots:







### 8.3 Band Edge Compliance

#### 8.3.1 Measurement according to FCC 558074 D01 DTS Meas Guidance v04

##### Spectrum Analyzer settings for band edge:

- Set the center frequency and span to encompass frequency range to be measured
- RBW = 100 kHz
- VBW  $\geq 3 \times$  RBW
- Sweep Time: Auto couple
- Detector = Peak
- Trace = Max hold
- Allow trace to fully stabilize
- Use the peak marker function to determine the maximum amplitude level
- Set the marker on the emission at the band edge, or on the highest modulation product outside of the band, if this level is greater than that at the band edge

#### 8.3.2 Limits non restricted band:

##### FCC§15.247 (d)

- 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)).

##### RSS-247 5/5

- 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 30dB instead of 20dB.

##### Spectrum Analyzer settings for restricted band:

- Peak measurements are made using a peak detector and RBW=1 MHz

**8.3.3 Limits restricted band §15.247/15.209/15.205 and RSS-Gen 8.9/8.10**

- \*PEAK LIMIT= 74 dBµV/m @3m =-21.23 dBm
- \*AVG. LIMIT= 54 dBµV/m @3m =-41.23 dBm
- Start frequency & stop frequency according to frequency range specified in the restricted band table in FCC section 15.205 & RSS-Gen 8.10
- Measurements with a peak detector were used to show compliance to average limits, thus showing compliance to both peak and average limits.

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
10.495-0.505	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	Above 38.6
13.36-13.41			

**8.3.4 Test conditions and setup:**

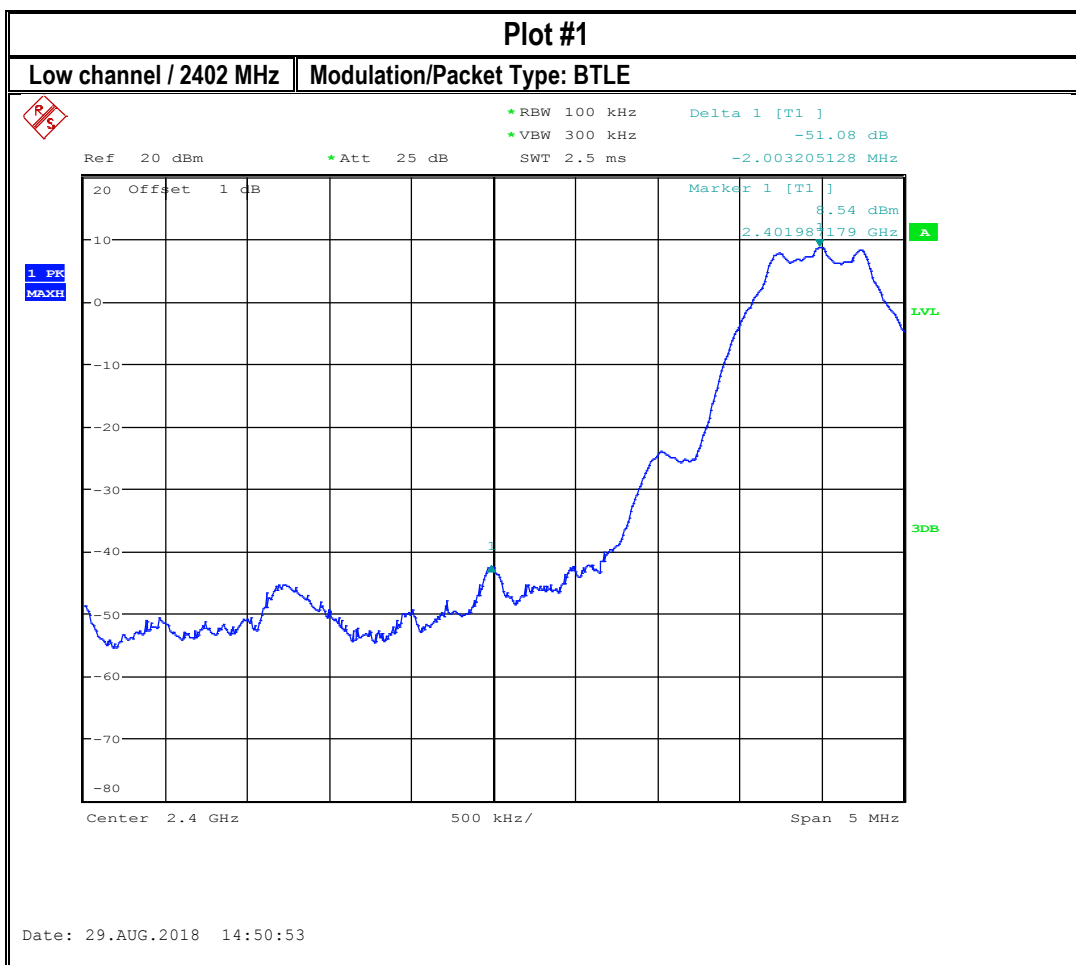
Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input	Antenna Gain
22° C	1	GFSK continuous fixed channel	24 VDC	3.2 dBi

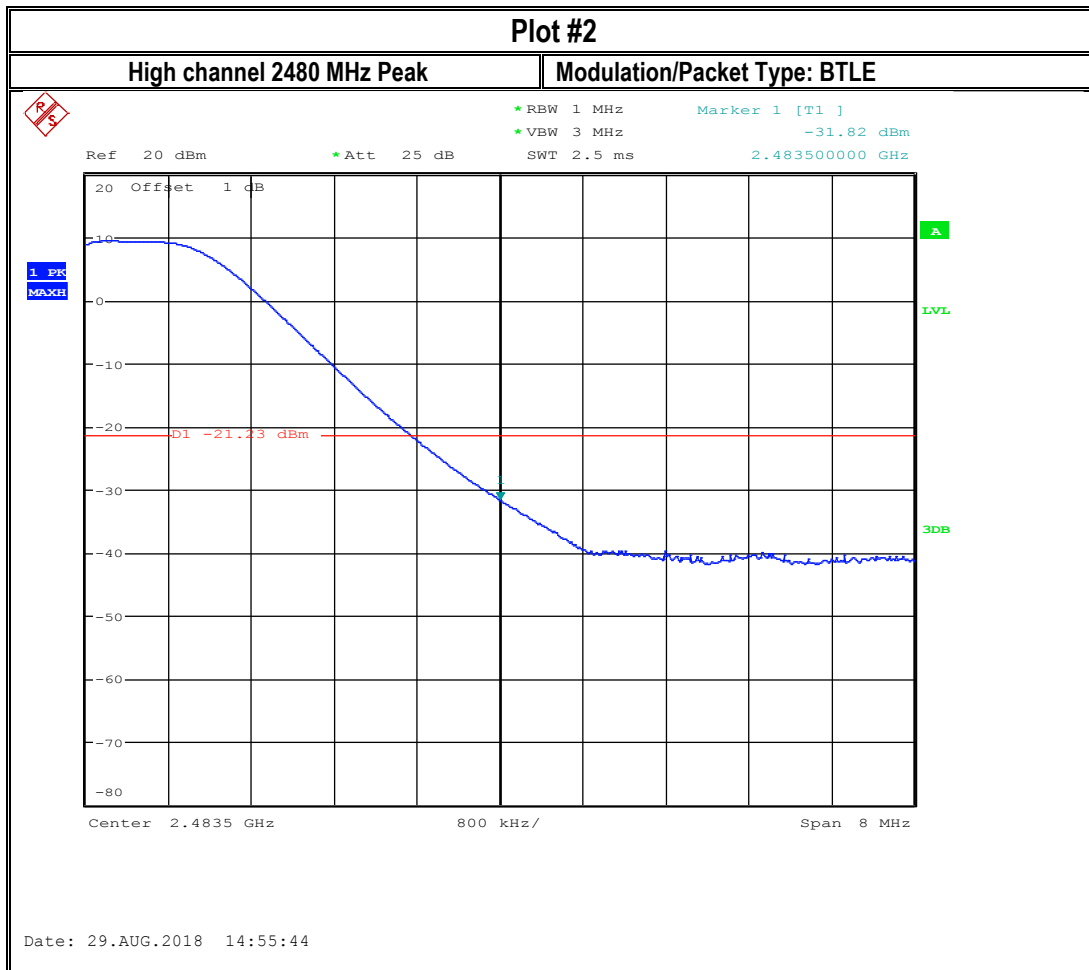
**8.3.5 Measurement result:**

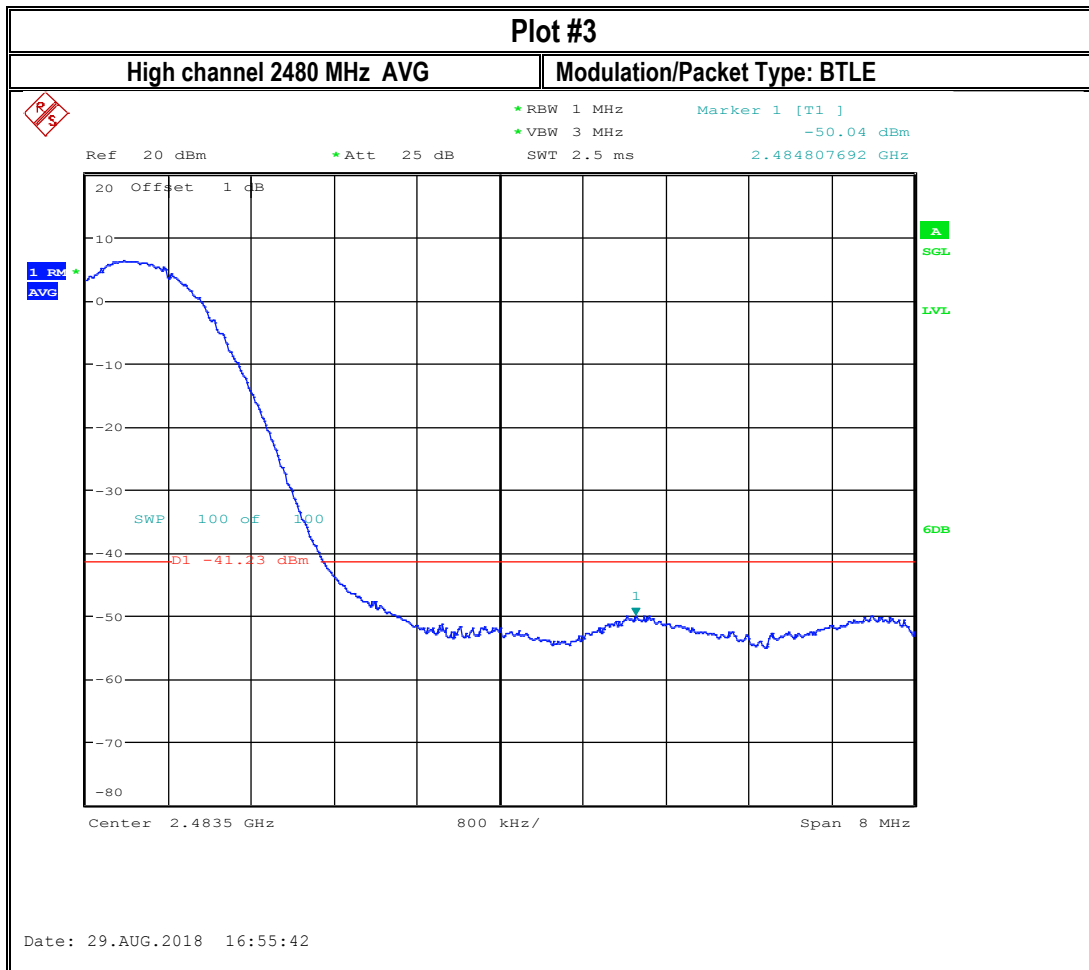
Plot #	EUT operating mode	Band Edge	Band Edge Delta (dBc)	Limit (dBc)	Result
1	GFSK continuous fixed channel	Lower, Non-restricted	-51.08	20	Pass

Plot #	EUT operating mode	Band Edge	Measured Peak Value (dBm)	Corrected by duty cycle	Corrected by Antenna Gain (dBm)	Limit (dBm)	Result
2	GFSK continuous fixed channel	Upper Restricted Peak	-31.82	NA due to peak detector, and trace max hold	-28.62	-21.23 Peak	Pass
3	GFSK continuous fixed channel	Upper Restricted AVG	-50.04	NA due to RMS detector, and trace average	-46.84	-41.23 AVG	Pass

8.3.6 Measurement Plots:









## 8.4 Emission Bandwidth 6dB and 99% Occupied Bandwidth

### 8.4.1 Measurement according to FCC 558074 D01 DTS Meas Guidance v04

#### Spectrum Analyzer settings:

- Set RBW = 100 kHz
- Set the video bandwidth (VBW)  $\geq 3 \times$  RBW
- Detector = Peak
- Trace mode = Max hold
- Sweep = Auto couple
- Allow the trace to stabilize
- 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.

#### 8.4.2 Limits:

FCC §15.247(a)(1) and RSS-247 5.2(1)

- Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

#### 8.4.3 Test conditions and setup:

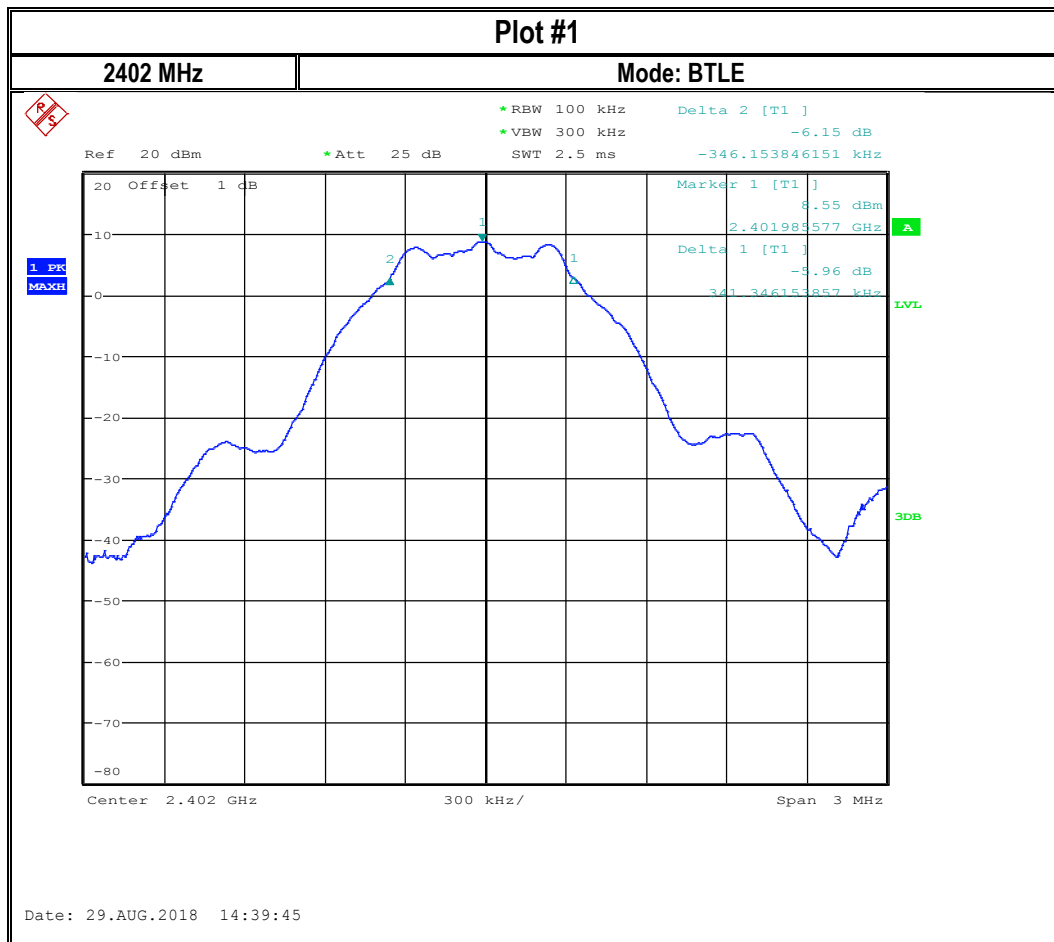
Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input
22° C	1	GFSK continuous fixed channel	24 VDC

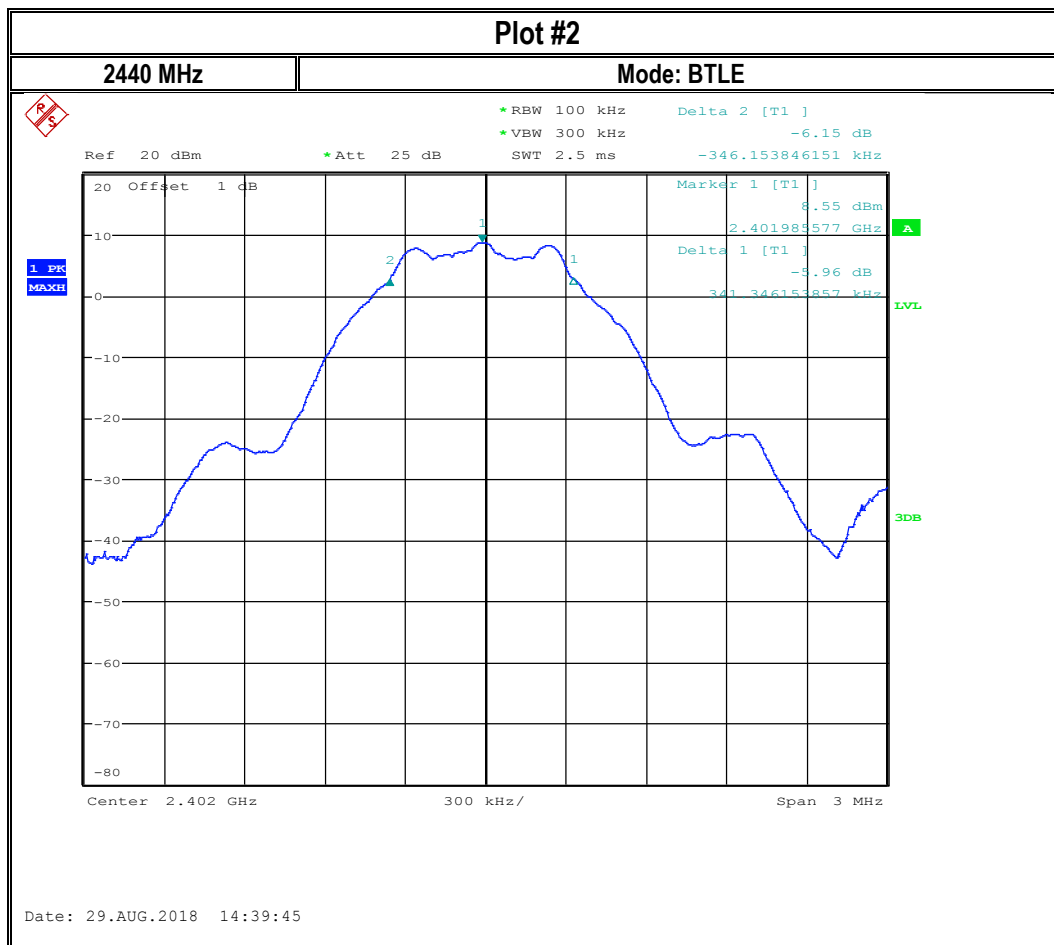
#### 8.4.4 Measurement result:

Plot #	Frequency (MHz)	6dB Emissions Bandwidth (MHz)	Limit (MHz)	Result
1	2402	0.687	> 0.5	Pass
2	2440	0.687	> 0.5	Pass
3	2480	0.687	> 0.5	Pass

Plot #	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Limit (MHz)	Result
4	2402	1.043	> 0.5	Pass
5	2440	1.043	> 0.5	Pass
6	2480	1.043	> 0.5	Pass

### 8.4.5 Measurement Plots:



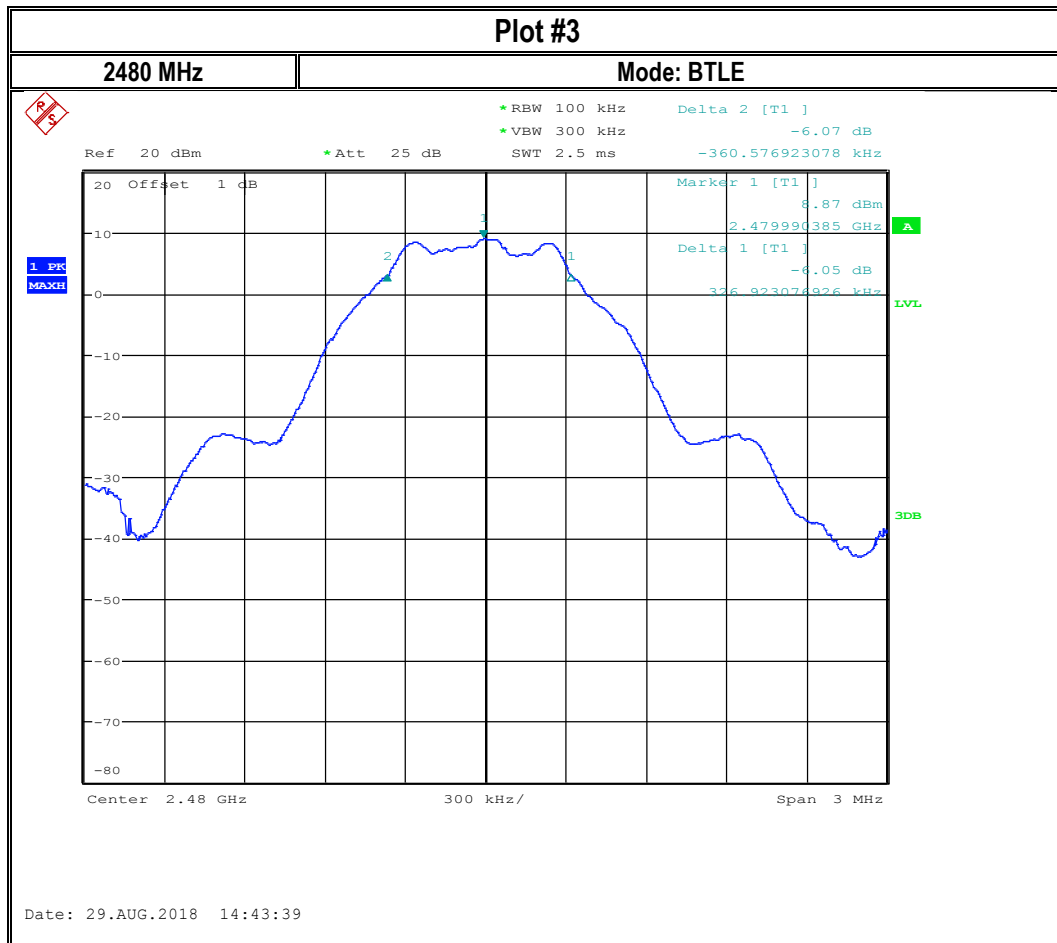


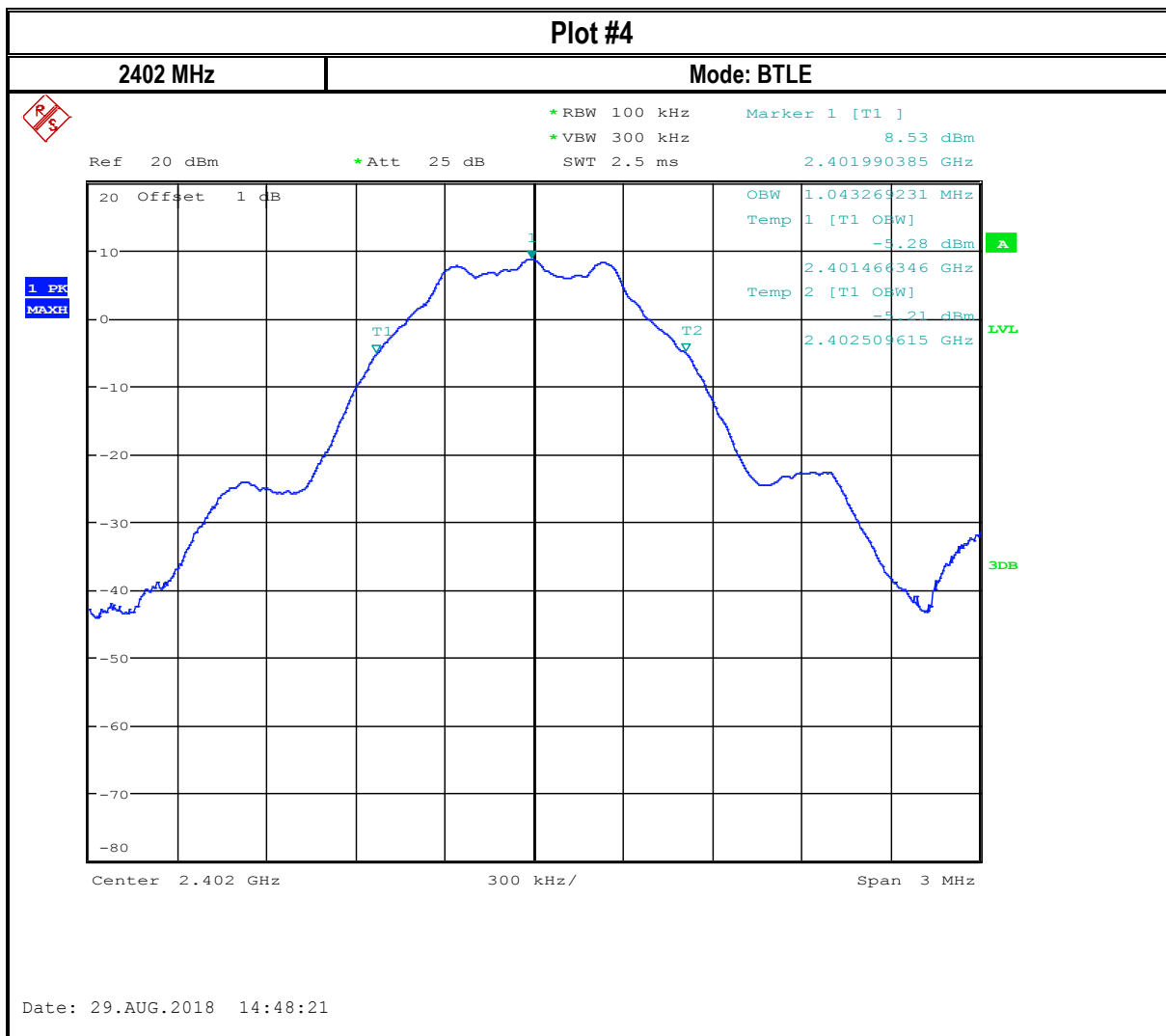
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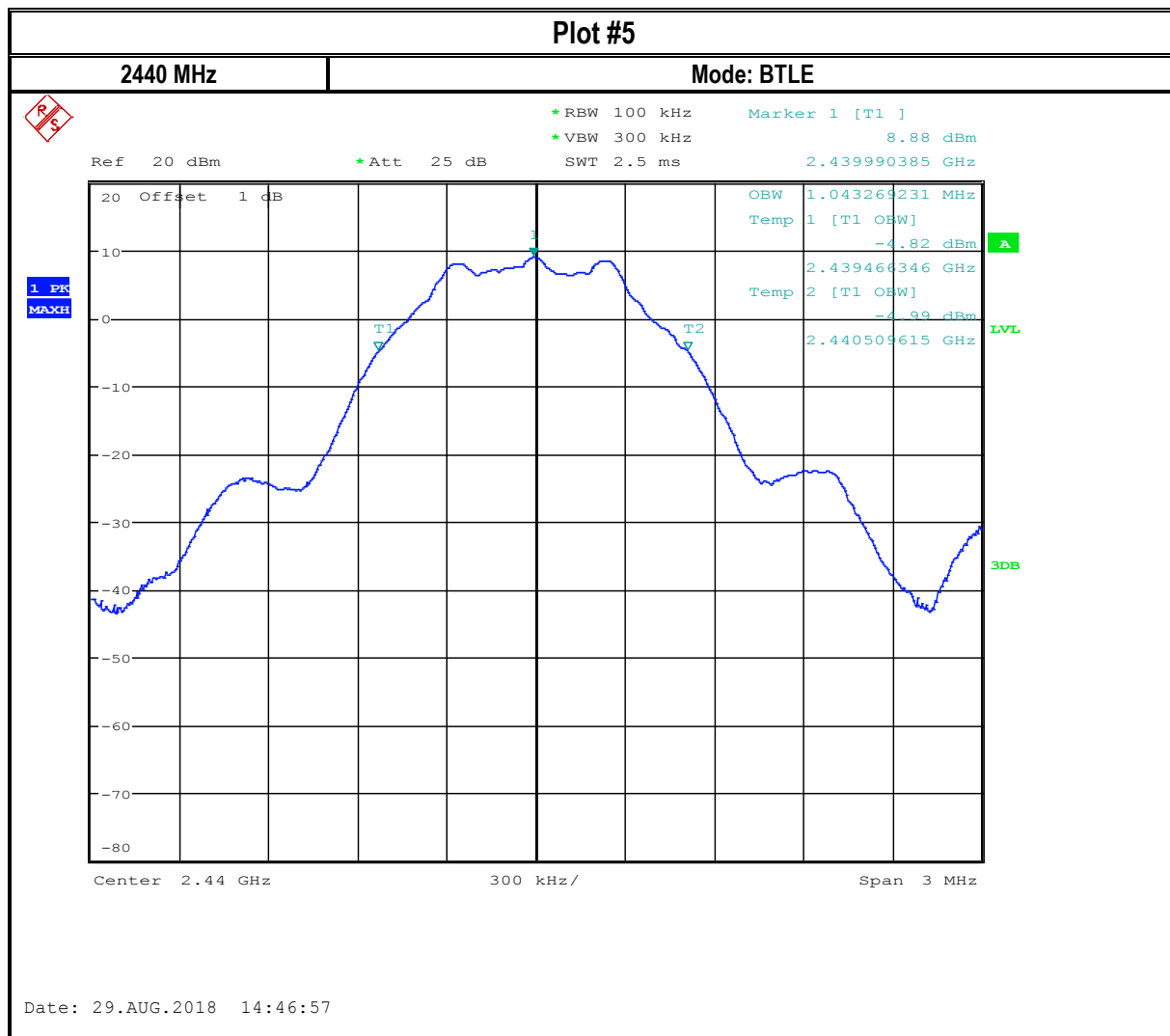
A

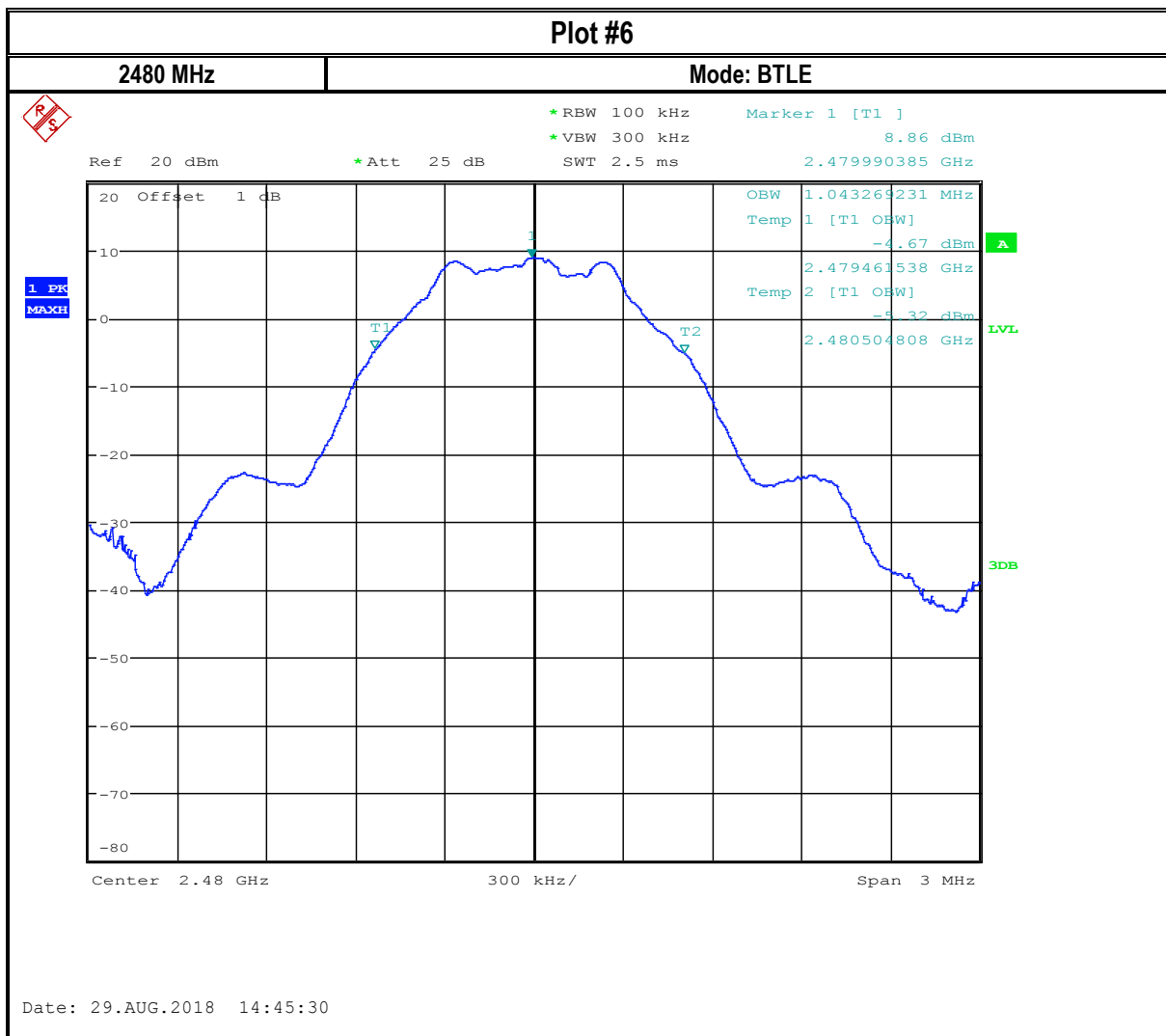
LVL

3dB









## 8.5 Radiated Transmitter Spurious Emissions and Restricted Bands

### 8.5.1 Measurement according to ANSI C63.10 (2013)

#### Spectrum Analyzer Settings:

- Frequency = 9 KHz – 30 MHz
- RBW = 9 KHz
- Detector: Peak
  
- Frequency = 30 MHz – 1 GHz
- Detector = Peak / Quasi-Peak
- RBW= 120 KHz (<1GHz)
  
- Frequency > 1 GHz
- Detector = Peak / Average
- RBW = 1 MHz
  
- Radiated spurious emissions shall be measured for the transmit frequencies, transmit power, and data rate for the lowest, middle and highest channel in each frequency band of operation and for the highest gain antenna for each antenna type, and using the appropriate parameters and test requirements.
- The highest (or worst-case) data rate shall be recorded for each measurement.
- For testing at distance other than the specified in the standard, the limit conversion is calculated by using 40 dB/decade extrapolation factor as follow: Conversion factor (CF) =  $40 \log (D/d) = 40 \log (300m / 3m) = 80dB$

### 8.5.2 Limits:

#### FCC §15.247

- 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)).



FCC §15.209 & RSS-Gen 8.9

- Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency of emission (MHz)	Field strength (µV/m)	Measurement Distance (m)	Field strength @ 3m (dBµV/m)
0.009-0.490	2400/F(kHz) / -----	300	-
0.490-1.705	24000/F(kHz) / -----	30	-
1.705-30.0	30 / (29.5)	30	-
30-88	100	3	40 dBµV/m
88-216	150	3	43.5 dBµV/m
216-960	200	3	46 dBµV/m
Above 960	500	3	54 dBµV/m

FCC §15.205 & RSS-Gen 8.10

- Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
10.495-0.505	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	Above 38.6
13.36-13.41			

- 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)).
  - \*PEAK LIMIT= 74 dBµV/m
  - \*AVG. LIMIT= 54 dBµV/m

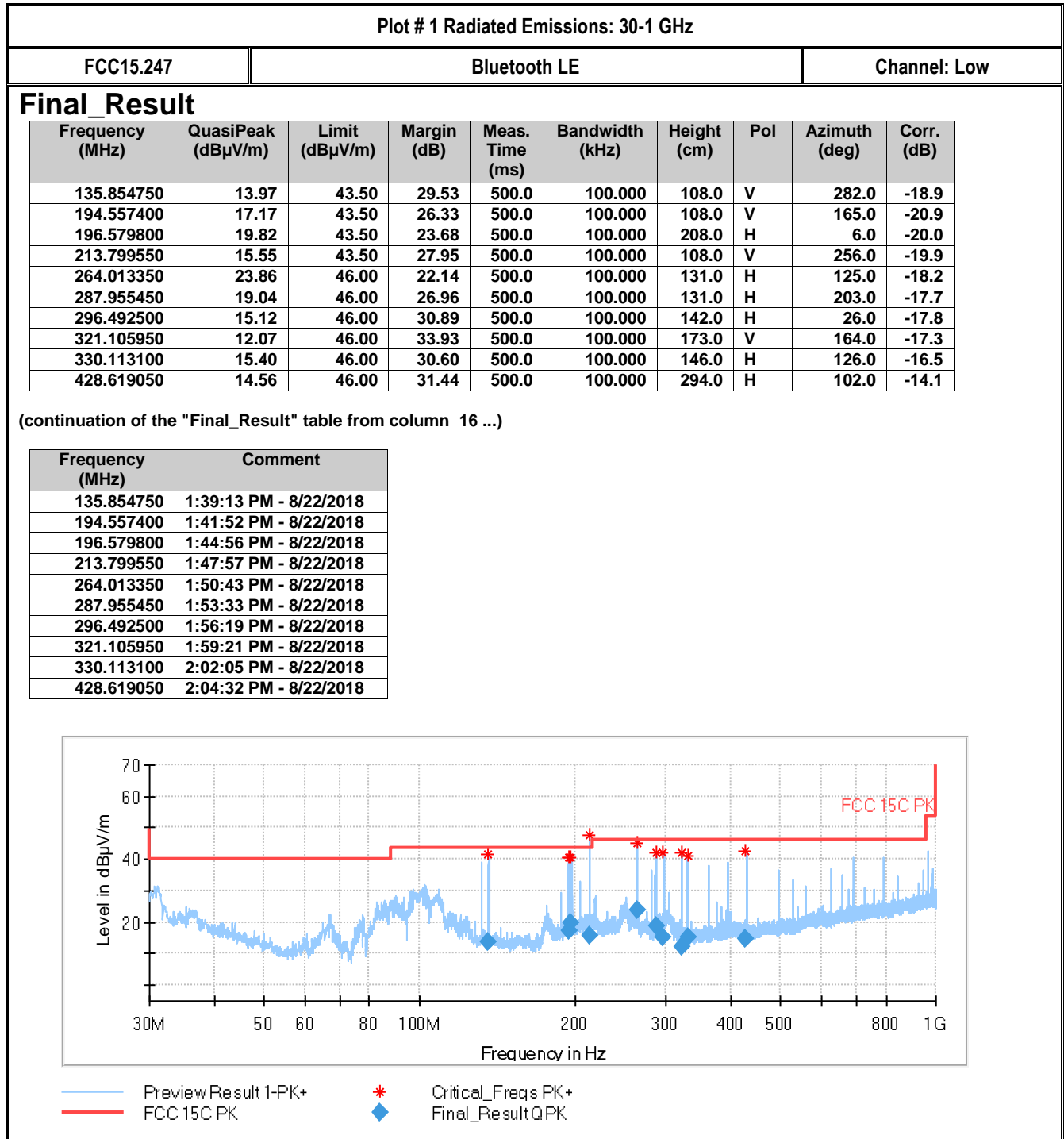
**8.5.3 Test conditions and setup:**

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input
22° C	2	GFSK continuous fixed channel	24 VDC

**8.5.4 Measurement result:**

Plot #	Channel #	Scan Frequency	Limit	Result
1-3	Low	30 MHz – 18 GHz	See section 8.5.2	Pass
4-8	Mid	9 kHz – 26 GHz	See section 8.5.2	Pass
9-11	High	30 MHz – 18 GHz	See section 8.5.2	Pass

### 8.5.5 Measurement Plots:



Plot # 2 Radiated Emissions: 1-3 GHz

FCC15.247

Bluetooth LE

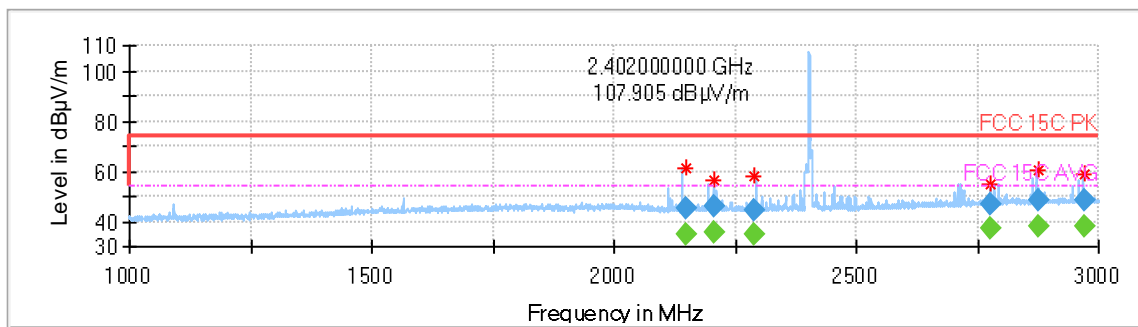
Channel: Low

Final Result

Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
2146.955000	---	35.04	53.98	18.94	10.0	1000.000	199.0	V	104.0
2146.955000	44.91	---	74.00	29.08	10.0	1000.000	199.0	V	104.0
2206.475000	---	35.42	53.98	18.56	10.0	1000.000	198.0	V	139.0
2206.475000	45.91	---	73.99	28.08	10.0	1000.000	198.0	V	139.0
2290.770000	---	34.74	53.98	19.24	10.0	1000.000	121.0	V	158.0
2290.770000	44.73	---	73.99	29.26	10.0	1000.000	121.0	V	158.0
2776.550000	---	37.38	53.98	16.60	10.0	1000.000	163.0	V	30.0
2776.550000	47.20	---	73.99	26.80	10.0	1000.000	163.0	V	30.0
2875.230000	---	37.88	53.98	16.10	10.0	1000.000	194.0	V	340.0
2875.230000	48.00	---	73.99	25.99	10.0	1000.000	194.0	V	340.0
2973.120000	---	38.24	53.98	15.74	10.0	1000.000	100.0	V	33.0
2973.120000	48.61	---	73.99	25.38	10.0	1000.000	100.0	V	33.0

(continuation of the "Final\_Result" table from column 15 ...)

Frequency (MHz)	Corr. (dB)	Comment
2146.955000	8.1	1:35:38 PM - 8/24/2018
2146.955000	8.1	1:35:38 PM - 8/24/2018
2206.475000	7.9	1:37:33 PM - 8/24/2018
2206.475000	7.9	1:37:33 PM - 8/24/2018
2290.770000	7.9	1:39:26 PM - 8/24/2018
2290.770000	7.9	1:39:26 PM - 8/24/2018
2776.550000	10.0	1:41:58 PM - 8/24/2018
2776.550000	10.0	1:41:58 PM - 8/24/2018
2875.230000	10.7	1:44:15 PM - 8/24/2018
2875.230000	10.7	1:44:15 PM - 8/24/2018
2973.120000	11.1	1:46:36 PM - 8/24/2018
2973.120000	11.1	1:46:36 PM - 8/24/2018



- PreviewResult 1-PK+
- FCC 15C AVG
- \* Critical\_Freqs PK+
- ◆ Final\_Result PK+
- FCC 15C PK
- ◆ Final\_Result RMS

Plot # 3 Radiated Emissions: 3-18 GHz

FCC15.247

Bluetooth LE

Channel: Low

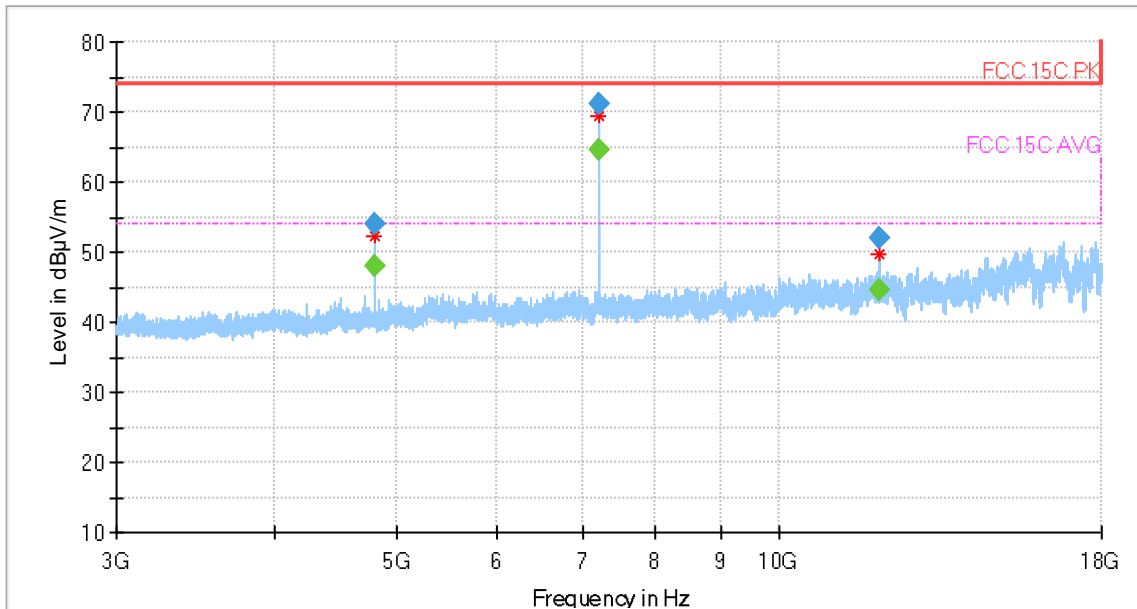
**Final Result**

Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
4803.546167	54.01	---	73.99	19.98	200.0	1000.000	252.0	H	228.0
4803.546167	---	48.03	53.98	5.95	200.0	1000.000	252.0	H	228.0
7206.704100	71.10	---	73.99	2.88	200.0	1000.000	261.0	H	254.0
7206.704100	---	64.65	53.98	-10.67	200.0	1000.000	261.0	H	254.0
12011.409033	---	44.50	53.98	9.47	10.0	1000.000	100.0	H	201.0
12011.409033	52.00	---	73.99	21.98	10.0	1000.000	100.0	H	201.0

(continuation of the "Final\_Result" table from column 15 ...)

Frequency (MHz)	Corr. (dB)	Comment
4803.546167	-33.5	11:56:22 AM - 8/24/2018
4803.546167	-33.5	11:56:22 AM - 8/24/2018
7206.704100	-29.6	11:59:32 AM - 8/24/2018
7206.704100	-29.6	11:59:32 AM - 8/24/2018
12011.409033	-22.4	11:53:11 AM - 8/24/2018
12011.409033	-22.4	11:53:11 AM - 8/24/2018

NOTE: According to FCC 15.35©, a duty cycle correction factor is applied here. For BTLE advertising mode, maximum duty cycle will be 5%, which is 26 dB, Hence this margin could cover the highest spurious above.



— PreviewResult 1-PK+     
 \* Critical\_Freqs PK+     
 — FCC 15C PK  
— FCC 15C AVG     
 ◆ Final\_ResultPK+     
 ◆ Final\_ResultRMS

Plot # 4 Radiated Emissions: 9kHz – 30MHz

FCC15.247

Bluetooth LE

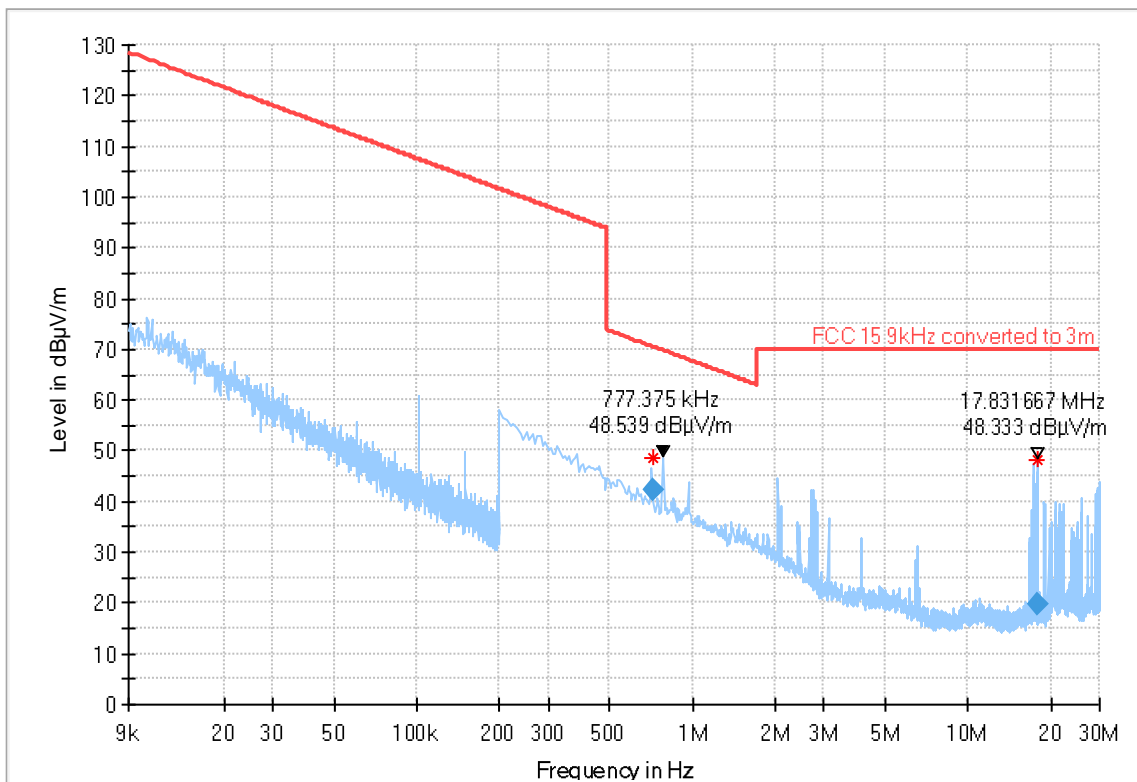
Channel: Mid

Final Result

Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
0.721950	42.40	---	70.44	28.04	500.0	9.000	161.0	H	219.0
17.817417	19.58	---	70.00	50.42	500.0	9.000	175.0	H	270.0

(continuation of the "Final\_Result" table from column 15 ...)

Frequency (MHz)	Corr. (dB)	Comment
0.721950	25.2	3:21:05 PM - 8/24/2018
17.817417	9.6	3:23:15 PM - 8/24/2018



- PreviewResult 1-PK+
- FCC 15.9kHz converted to 3m
- ◆ Final\_ResultRMS
- \* Critical\_Freqs PK+
- ◆ Final\_ResultPK+

Plot # 5 Radiated Emissions: 30-1 GHz

FCC15.247

Bluetooth LE

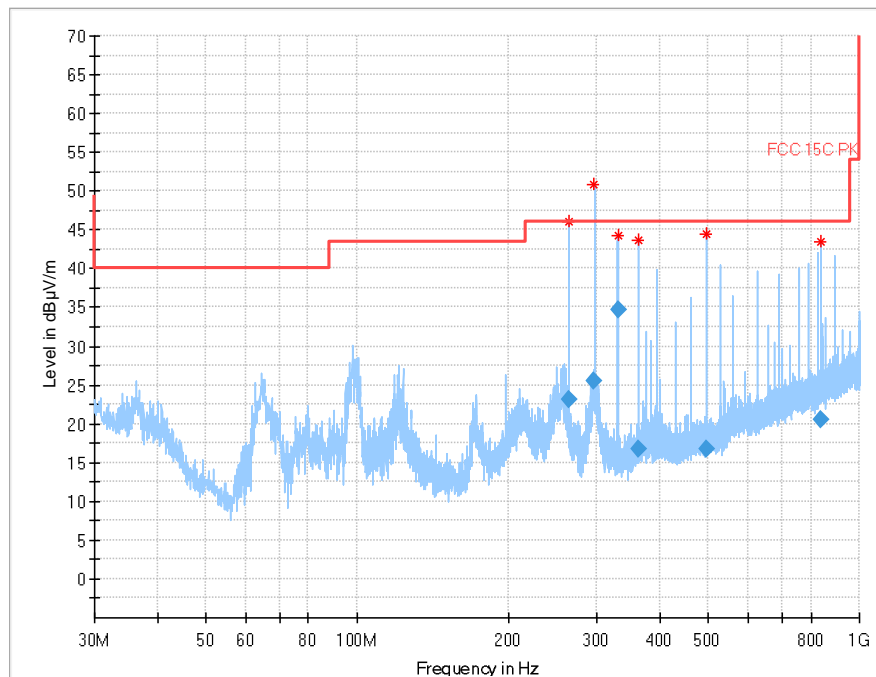
Channel: Mid

Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
263.986900	23.04	46.00	22.96	500.0	100.000	120.0	H	101.0	-18.2
296.700400	25.47	46.00	20.53	500.0	100.000	100.0	H	73.0	-17.8
330.065350	34.70	46.00	11.30	500.0	100.000	100.0	H	154.0	-16.5
362.792900	16.69	46.00	29.31	500.0	100.000	100.0	H	157.0	-15.7
495.383550	16.65	46.00	29.35	500.0	100.000	300.0	H	153.0	-12.5
836.215050	20.55	46.00	25.45	500.0	100.000	130.0	V	-14.0	-6.4

(continuation of the "Final\_Result" table from column 16 ...)

Frequency (MHz)	Comment
263.986900	12:50:39 PM - 8/22/2018
296.700400	12:53:19 PM - 8/22/2018
330.065350	12:55:54 PM - 8/22/2018
362.792900	12:58:13 PM - 8/22/2018
495.383550	1:00:18 PM - 8/22/2018
836.215050	1:03:19 PM - 8/22/2018



— Preview Result 1-PK+      \* Critical\_Freqs PK+  
— FCC 15C PK                      ◆ Final\_Result QPK

Plot # 6 Radiated Emissions: 1-3 GHz

FCC15.247

Bluetooth LE

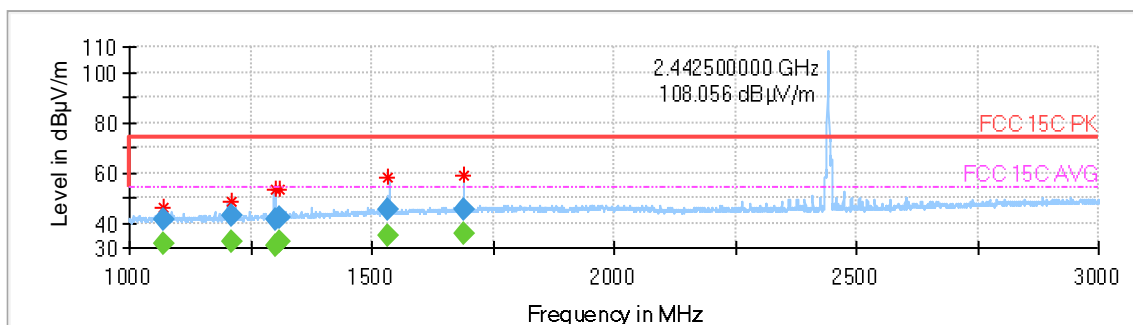
Channel: Mid

Final\_Result

Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
1071.880000	41.54	---	74.00	32.46	10.0	1000.000	207.0	H	155.0
1071.880000	---	31.96	53.98	22.02	10.0	1000.000	207.0	H	155.0
1209.340000	---	32.73	53.98	21.25	10.0	1000.000	128.0	H	179.0
1209.340000	42.59	---	74.00	31.41	10.0	1000.000	128.0	H	179.0
1299.625000	41.32	---	74.00	32.68	10.0	1000.000	210.0	H	127.0
1299.625000	---	30.92	53.98	23.06	10.0	1000.000	210.0	H	127.0
1310.095000	42.30	---	74.00	31.70	10.0	1000.000	136.0	H	167.0
1310.095000	---	32.67	53.98	21.30	10.0	1000.000	136.0	H	167.0
1532.005000	44.88	---	74.00	29.11	10.0	1000.000	210.0	V	29.0
1532.005000	---	34.71	53.98	19.27	10.0	1000.000	210.0	V	29.0
1688.935000	---	35.52	53.98	18.46	10.0	1000.000	158.0	H	100.0
1688.935000	45.26	---	74.00	28.74	10.0	1000.000	158.0	H	100.0

(continuation of the "Final\_Result" table from column 15 ...)

Frequency (MHz)	Corr. (dB)	Comment
1071.880000	4.5	2:00:14 PM - 8/24/2018
1071.880000	4.5	2:00:14 PM - 8/24/2018
1209.340000	5.3	2:02:07 PM - 8/24/2018
1209.340000	5.3	2:02:06 PM - 8/24/2018
1299.625000	5.4	2:03:58 PM - 8/24/2018
1299.625000	5.4	2:03:58 PM - 8/24/2018
1310.095000	5.6	2:05:53 PM - 8/24/2018
1310.095000	5.6	2:05:53 PM - 8/24/2018
1532.005000	7.5	1:58:03 PM - 8/24/2018
1532.005000	7.5	1:58:03 PM - 8/24/2018
1688.935000	8.2	2:07:54 PM - 8/24/2018
1688.935000	8.2	2:07:54 PM - 8/24/2018



— PreviewResult 1-PK+     
 \* Critical\_Freqs PK+     
 — FCC 15C PK  
- - - FCC 15C AVG     
 ◆ Final\_Result PK+     
 ◆ Final\_Result RMS



Plot # 7 Radiated Emissions: 3-18 GHz

FCC15.247

Bluetooth LE

Channel: Mid

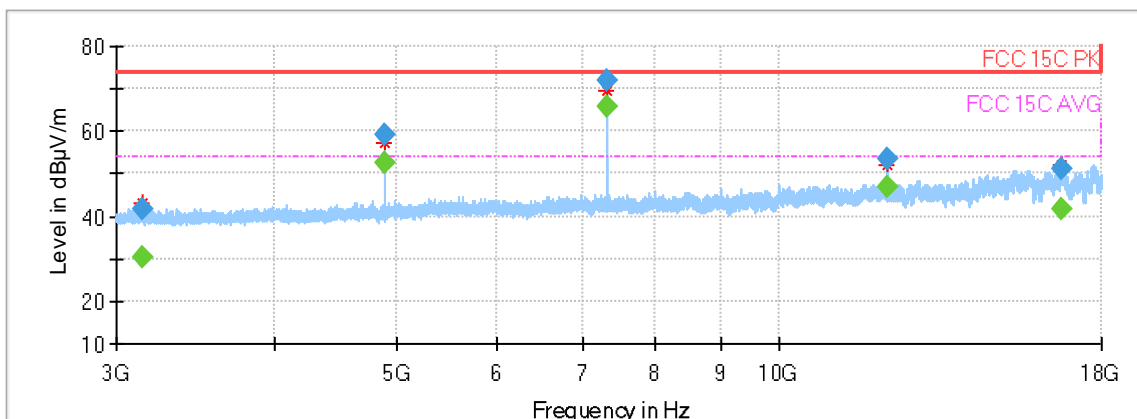
Final\_Result

Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
3140.247033	---	30.56	53.98	23.42	200.0	1000.000	214.0	V	31.0
3140.247033	41.48	---	73.99	32.51	200.0	1000.000	214.0	V	31.0
4884.533067	59.35	---	73.99	14.63	200.0	1000.000	243.0	H	246.0
4884.533067	---	52.76	53.98	1.21	200.0	1000.000	243.0	H	246.0
7326.667433	72.01	---	73.99	1.98	200.0	1000.000	257.0	H	263.0
7326.667433	---	65.66	53.98	-11.68	200.0	1000.000	257.0	H	263.0
12211.050667	53.36	---	73.98	20.62	10.0	1000.000	172.0	H	274.0
12211.050667	---	46.67	53.98	7.31	10.0	1000.000	172.0	H	274.0
16763.405267	51.13	---	73.98	22.85	10.0	1000.000	265.0	V	-18.0
16763.405267	---	41.67	53.98	12.31	10.0	1000.000	265.0	V	-18.0

(continuation of the "Final\_Result" table from column 15 ...)

Frequency (MHz)	Corr. (dB)	Comment
3140.247033	-36.9	10:12:14 AM - 8/24/2018
3140.247033	-36.9	10:12:14 AM - 8/24/2018
4884.533067	-33.4	10:19:10 AM - 8/24/2018
4884.533067	-33.4	10:19:10 AM - 8/24/2018
7326.667433	-29.9	10:22:15 AM - 8/24/2018
7326.667433	-29.9	10:22:16 AM - 8/24/2018
12211.050667	-22.3	10:25:25 AM - 8/24/2018
12211.050667	-22.3	10:25:25 AM - 8/24/2018
16763.405267	-14.8	10:15:30 AM - 8/24/2018
16763.405267	-14.8	10:15:30 AM - 8/24/2018

NOTE: According to FCC 15.35©, a duty cycle correction factor is applied here. For BTLE advertising mode, maximum duty cycle will be 5%, which is 26 dB, Hence this margin could cover the highest spurious above.



— PreviewResult 1-PK+     
 \* Critical\_Freqs PK+     
 — FCC 15C PK  
- - - FCC 15C AVG     
 ◆ Final\_Result PK+     
 ◆ Final\_Result RMS

Plot # 8 Radiated Emissions: 18-26 GHz

FCC15.247

Bluetooth LE

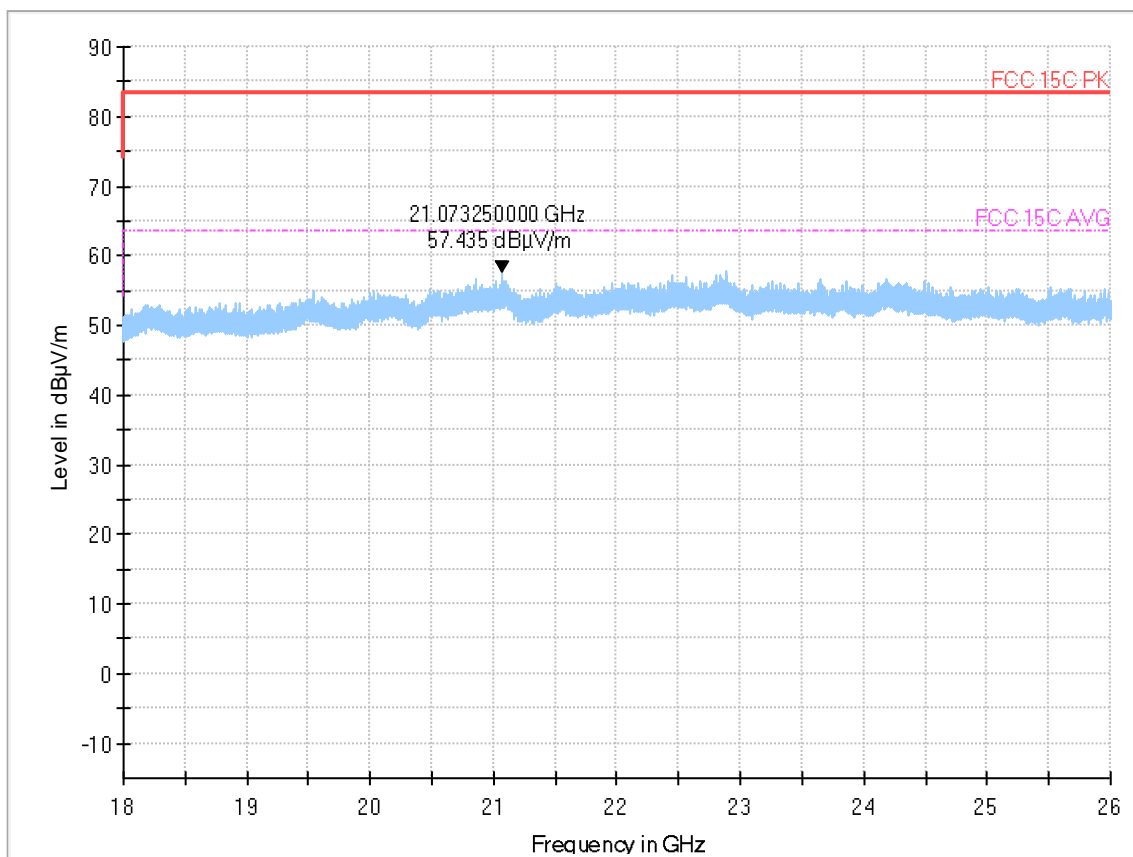
Channel: Mid

Final\_Result

Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
---	---	---	---	---	---	---	---		---

(continuation of the "Final\_Result" table from column 15 ...)

Frequency (MHz)	Corr. (dB)	Comment
---	---	



- PreviewResult 1-PK+
- FCC 15C AVG
- \* Critical\_Freqs PK+
- ◆ Final\_ResultPK+
- FCC 15C PK
- ◆ Final\_ResultRMS

Plot # 9 Radiated Emissions: 30-1 GHz

FCC15.247

Bluetooth LE

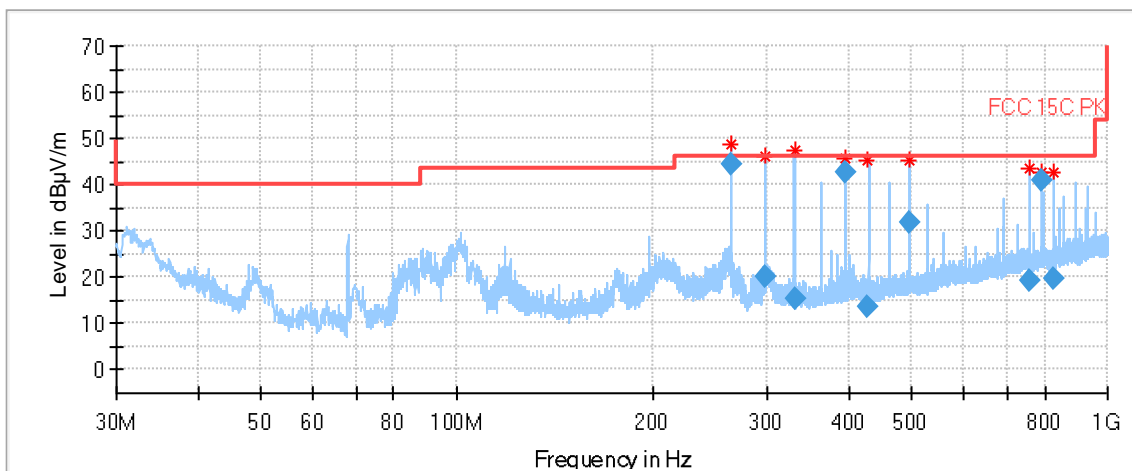
Channel: High

Final\_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
263.985350	44.64	46.00	1.36	500.0	100.000	132.0	H	130.0	-18.2
297.257900	20.31	46.00	25.69	500.0	100.000	108.0	H	168.0	-17.8
330.405950	15.46	46.00	30.54	500.0	100.000	100.0	H	228.0	-16.5
396.007800	42.79	46.00	3.21	500.0	100.000	121.0	H	318.0	-15.2
428.631100	13.76	46.00	32.24	500.0	100.000	100.0	H	26.0	-14.1
494.950050	31.84	46.00	14.16	500.0	100.000	300.0	H	17.0	-12.6
759.299500	19.37	46.00	26.63	500.0	100.000	108.0	H	327.0	-7.6
792.019300	41.09	46.00	4.91	500.0	100.000	100.0	H	193.0	-7.1
825.388550	19.92	46.00	26.08	500.0	100.000	100.0	H	193.0	-7.3

(continuation of the "Final\_Result" table from column 16 ...)

Frequency (MHz)	Comment
263.985350	2:16:52 PM - 8/22/2018
297.257900	2:19:37 PM - 8/22/2018
330.405950	2:22:11 PM - 8/22/2018
396.007800	2:24:41 PM - 8/22/2018
428.631100	2:27:30 PM - 8/22/2018
494.950050	2:30:22 PM - 8/22/2018
759.299500	2:33:24 PM - 8/22/2018
792.019300	2:35:57 PM - 8/22/2018
825.388550	2:38:18 PM - 8/22/2018



— PreviewResult 1-PK+      \* Critical\_Freqs PK+  
— FCC 15C PK                      ◆ Final\_Result QPK

Plot # 10 Radiated Emissions: 1-3 GHz

FCC15.247

Bluetooth LE

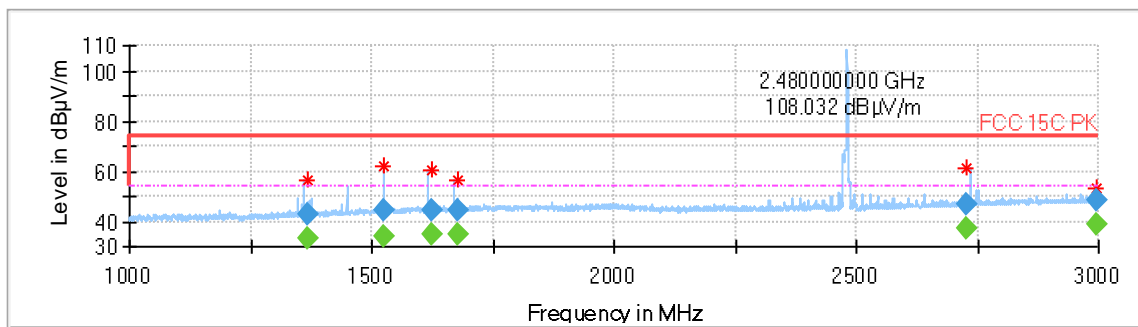
Channel: High

Final Result

Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
1366.595000	---	33.22	53.98	20.76	10.0	1000.000	158.0	V	179.0
1366.595000	42.55	---	74.00	31.45	10.0	1000.000	158.0	V	179.0
1525.020000	---	34.30	53.98	19.68	10.0	1000.000	115.0	V	171.0
1525.020000	44.01	---	74.00	29.99	10.0	1000.000	115.0	V	171.0
1623.890000	---	34.93	53.98	19.05	10.0	1000.000	210.0	V	198.0
1623.890000	44.08	---	74.00	29.92	10.0	1000.000	210.0	V	198.0
1676.450000	---	35.08	53.98	18.90	10.0	1000.000	200.0	V	211.0
1676.450000	44.32	---	74.00	29.68	10.0	1000.000	200.0	V	211.0
2728.255000	47.04	---	73.99	26.95	10.0	1000.000	140.0	H	266.0
2728.255000	---	37.36	53.98	16.62	10.0	1000.000	140.0	H	266.0
2995.268625	48.28	---	73.99	25.71	10.0	1000.000	187.0	V	198.0
2995.268625	---	38.61	53.98	15.37	10.0	1000.000	187.0	V	198.0

(continuation of the "Final\_Result" table from column 15 ...)

Frequency (MHz)	Corr. (dB)	Comment
1366.595000	5.8	1:14:11 PM - 8/24/2018
1366.595000	5.8	1:14:11 PM - 8/24/2018
1525.020000	7.4	1:16:05 PM - 8/24/2018
1525.020000	7.4	1:16:05 PM - 8/24/2018
1623.890000	7.8	1:17:51 PM - 8/24/2018
1623.890000	7.8	1:17:51 PM - 8/24/2018
1676.450000	8.1	1:19:35 PM - 8/24/2018
1676.450000	8.1	1:19:35 PM - 8/24/2018
2728.255000	9.5	1:23:46 PM - 8/24/2018
2728.255000	9.5	1:23:46 PM - 8/24/2018
2995.268625	11.2	1:21:29 PM - 8/24/2018
2995.268625	11.2	1:21:29 PM - 8/24/2018



— PreviewResult 1-PK+      \* Critical\_Freqs PK+      — FCC 15C PK  
— FCC 15C AVG      ◆ Final\_ResultPK+      ◆ Final\_ResultRMS

Plot # 11 Radiated Emissions: 3-18 GHz

FCC15.247

Bluetooth LE

Channel: High

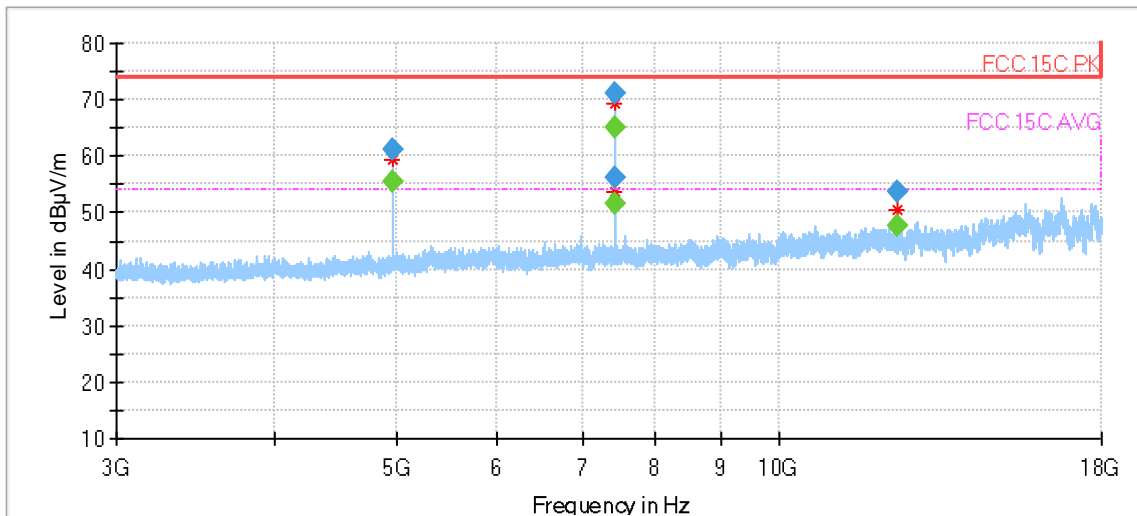
Final\_Result

Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
4959.488000	61.11	---	73.99	12.88	200.0	1000.000	188.0	H	212.0
4959.488000	---	55.59	53.98	-1.61	200.0	1000.000	188.0	H	212.0
7434.061933	56.12	---	73.99	17.87	200.0	1000.000	251.0	H	262.0
7434.061933	---	51.50	53.98	2.48	200.0	1000.000	251.0	H	262.0
7439.141267	71.03	---	73.99	2.96	200.0	1000.000	252.0	H	260.0
7439.141267	---	65.15	53.98	-11.17	200.0	1000.000	252.0	H	260.0
12398.622200	53.74	---	73.98	20.24	10.0	1000.000	300.0	H	188.0
12398.622200	---	47.54	53.98	6.44	10.0	1000.000	300.0	H	188.0

(continuation of the "Final\_Result" table from column 15 ...)

Frequency (MHz)	Corr. (dB)	Comment
4959.488000	-33.1	12:20:57 PM - 8/24/2018
4959.488000	-33.1	12:20:57 PM - 8/24/2018
7434.061933	-29.4	12:24:07 PM - 8/24/2018
7434.061933	-29.4	12:24:07 PM - 8/24/2018
7439.141267	-29.4	12:27:07 PM - 8/24/2018
7439.141267	-29.4	12:27:08 PM - 8/24/2018
12398.622200	-21.9	12:17:32 PM - 8/24/2018
12398.622200	-21.9	12:17:32 PM - 8/24/2018

NOTE: According to FCC 15.35©, a duty cycle correction factor is applied here. For BTLE advertising mode, maximum duty cycle will be 5%, which is 26 dB, Hence this margin could cover the highest spurious above.



- Preview Result 1-PK+
- FCC 15C AVG
- ◆ Critical\_Freqs PK+
- ◆ Final\_Result PK+
- FCC 15C PK
- ◆ Final\_Result RMS

## 8.6 AC Power Line Conducted Emissions

### 8.6.1 Measurement according to ANSI C63.4

#### Analyzer Settings:

- RBW = 9 KHz (CISPR Bandwidth)
- Detector: Peak / Average for Pre-scan
- Quasi-Peak/Average for Final Measurements

### 8.6.2 Limits: §15.207 & RSS-Gen 8.8

#### FCC §15.207(a) & RSS-Gen 8.8

- Except as shown in paragraphs (b) and (c) of this section of the CFR, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table (1), as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between frequency ranges.

Frequency of emission (MHz)	Conducted limit (dBµV)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

\*Decreases with the logarithm of the frequency.

### 8.6.3 Test conditions and setup:

Ambient Temperature ©	EUT Set-Up #	EUT operating mode	Power line (L1, L2, L3, N)	Power Input
22° C	3	BT LE continuous fixed channel	Line & Neutral	110V / 60Hz

### 8.6.4 Measurement Result:

Plot #	Port	EUT Set-Up #:	EUT operating mode	Scan Frequency	Limit	Result
1	AC Mains	2	BT LE continuous fixed channel	150 kHz – 30 MHz	See section 8.6.2	Pass

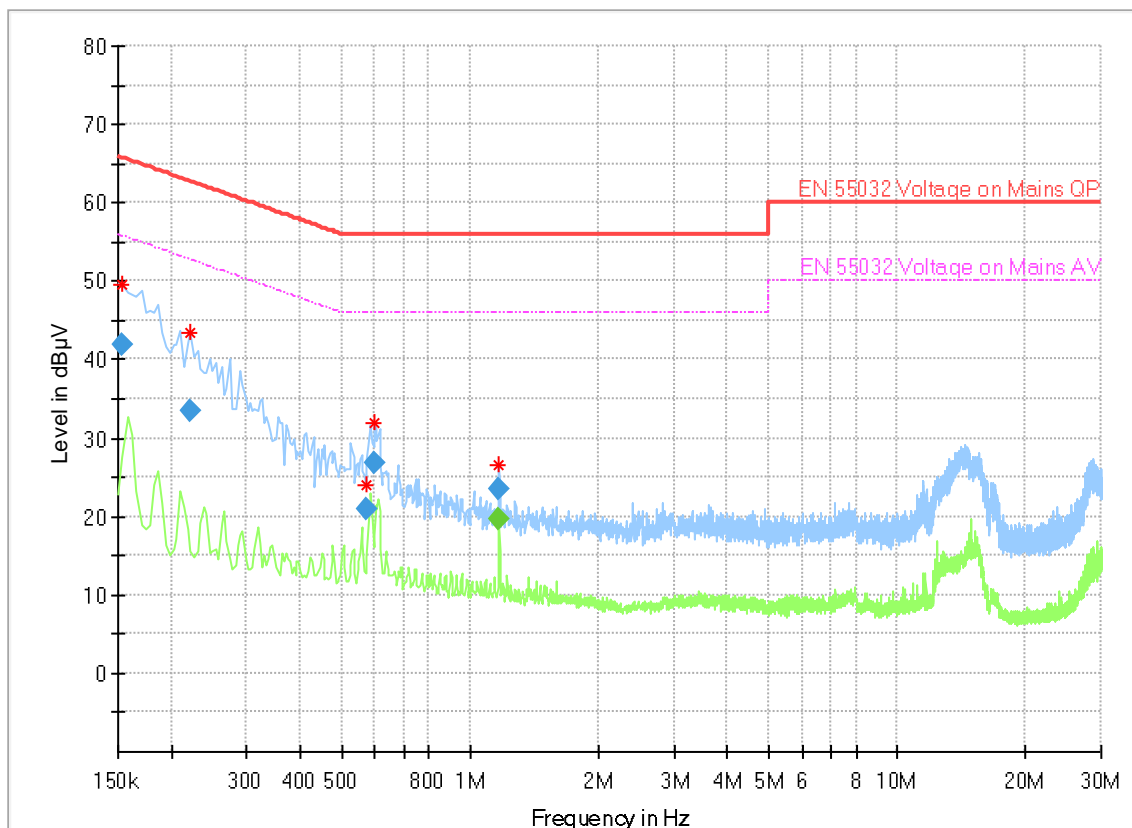
### 8.6.5 Measurement Plots:

#### Final Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)
0.154000	41.95	---	65.78	23.83	500.0	9.000	N	GND	10.7
0.222000	33.48	---	62.74	29.26	500.0	9.000	L1	GND	10.5
0.570000	21.02	---	56.00	34.98	500.0	9.000	N	GND	10.2
0.598000	26.76	---	56.00	29.24	500.0	9.000	L1	GND	10.2
1.170000	---	19.55	46.00	26.45	500.0	9.000	N	GND	10.3
1.170000	23.53	---	56.00	32.47	500.0	9.000	L1	GND	10.3

(continuation of the "Final\_Result" table from column 15 ...)

Frequency (MHz)	Comment
0.154000	4:17:09 PM - 9/5/2018
0.222000	4:17:41 PM - 9/5/2018
0.570000	4:18:11 PM - 9/5/2018
0.598000	4:18:21 PM - 9/5/2018
1.170000	4:18:29 PM - 9/5/2018
1.170000	4:18:25 PM - 9/5/2018



- PreviewResult 2-AVG
- \* Critical\_Freqs AVG
- EN 55032 Voltage on Mains QP
- ◆ Final\_Result QPK
- PreviewResult 1-PK+
- \* Critical\_Freqs PK+
- - - EN 55032 Voltage on Mains AV
- ◆ Final\_Result AVG

## 9 Test setup photos

Setup photos are included in supporting file name: "EMC\_MEIGR\_008\_FCC\_Setup\_Photos.pdf"

## 10 Test Equipment And Ancillaries Used For Testing

Item Name	Equipment Type	Manufacturer	Model	Serial #	Calibration Cycle	Last Calibration Date
Antenna Loop 6507	Active Loop Antenna	ETS Lindgren	6507	161344	3 years	10/26/2017
Antenna Biconilog 3142E	Biconlog Antenna	EMCO	3142E	166067	3 years	06/27/2017
Antenna Horn 3115 SN 35114	Horn Antenna	EMCO	3115	35114	3 years	07/31/2017
Antenna Horn 3117	Horn Antenna	ETS Lindgren	3117-PA	215984	3 years	01/26/2018
Antenna Horn 3116	Horn Antenna	ETS Lindgren	3116	70497	3 years	10/31/2017
EMI Test Receiver	EMI Test Receiver	Rohde & Schwarz	ESU40	100251	3 years	01/31/2018
Digital Barometer	Compact Digital Barometer	Control Company	35519-055	91119547	3 Years	06/08/2017
CMW 500	Base Station Simulator	R&S	CMW 500	127068	2 Years	07/01/2017
Thermometer Humidity TM325	Thermometer Humidity	Dickson	TM325	16253651	1 Year	11/02/2017
Turn table	Turn table	EMCO	2075	N/A	N/A	N/A
MAPS Position Controller	MAPS Position Controller	ETS Lindgren	2092	0004-1510	N/A	N/A
Antenna Mast	Antenna Mast	EMCO	2075	N/A	N/A	N/A
Relay Switch Unit	Relay Switch Unit	R&S	RSU	338964/001	N/A	N/A

Note:

1. Equipment used meets the measurement uncertainty requirements as required per applicable standards for 95% confidence levels. Calibration due dates, unless defined specifically, falls on the last day of the month. Items indicated "N/A" for cal status either do not specifically require calibration or is internally characterized before use.



**11 History**

<b>Date</b>	<b>Report Name</b>	<b>Changes to report</b>	<b>Report prepared by</b>
2018-10-16	EMC_MEIGR_008_15.247_DTS	Initial Version	Kevin Wang