



FCC / IC Test Report

FOR:

Garmin International

Model Name:

AA3111

Product Description:

Tablet device for product shipment tracking in a vehicular environment.

FCC ID: IPH-A3111

IC ID: 1792A-A3111

Applied Rules and Standards:

47 CFR Part 15.247 (DSS)

RSS-247 Issue 1 (FHSs) & RSS-Gen Issue 4

REPORT #: EMC_GARMI-047-17001_15.247_BT_DSS

DATE: 2017-10-09



A2LA Accredited

IC recognized #
3462B-2

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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 and the relevant ISED Canada standard RSS-247.

No deviations were ascertained.

Company	Description	Model #
Garmin International	Tablet device for product shipment tracking in a vehicular environment.	AA3111

Responsible for Testing Laboratory:

Peter Nevermann

2017-10-09 Compliance (Director Radio Communications and EMC)

Date	Section	Name	Signature
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Responsible for the Report:

Elijah Garcia

2017-10-09 Compliance (EMC Engineer)

Date	Section	Name	Signature
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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

Company Name:	CETECOM Inc.
Department:	Compliance
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Country	USA
Telephone:	+1 (408) 586 6200
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Director Radio Com. and EMC:	Peter Nevermann
Responsible Project Leader:	Laith Saman

2.2 Identification of the Client

Applicant's Name:	Garmin International
Street Address:	100 Regency Forest Drive, Suite 350
City/Zip Code	Cary, NC 27518
Country	USA
Contact Person:	Jay Everett
Phone No.	(919) 337-0163
e-mail:	jay.everett@garmin.com

2.3 Identification of the Manufacturer

Manufacturer's Name:	Garmin Corporation
Manufacturers Address:	No. 68, Jangshu 2nd road
City/Zip Code	Xizhi District, New Taipei City 221
Country	Taiwan

3 Equipment Under Test (EUT)

3.1 EUT Specifications

Model No	AA3111
HW Version	0
SW Version	2.30
FCC-ID	IPH-A3111
IC-ID	1792A-A3111
HVIN	AA3111 ¹
PMN	fleet™ 790 xy, fleet™ 780 xy, and fleet™ 770 xy
Product Description	Personal Navigation Device
Frequency Range / number of channels	Nominal band: 2412 MHz (Ch. 1) – 2472 (Ch.13), 13 channels
Type(s) of Modulation	802.11b: DSSS 802.11g/n: OFDM 802.11n: MCS (20 & 40 MHz)
Modes of Operation	802.11b/g/n (Client)
Antenna Information as declared	max gain 1.575 dBi
Max. Output Powers	Peak Conducted Power 16.19dBm
Power Supply/ Rated Operating Voltage Range	4.5 V dc (min) / 5 V dc (nom) / 5.5 V dc (max)
Operating Temperature Range	-10 °C to 55 °C
Other Radios included in the device	Bluetooth Basic / EDR: GFSK, $\pi/4$ DQPSK, 8DPSK Bluetooth Low Energy: GFSK
Sample Revision	<input type="checkbox"/> Prototype Unit <input checked="" type="checkbox"/> Production Unit <input type="checkbox"/> Pre-Production

¹ Fleet™ 790 xy was fully tested and a spot-check was performed on, fleet™ 780 xy, and fleet™ 770 xy, refer to section 3.6

3.2 EUT Sample details

EUT #	Serial Number	HW Version	SW Version	Notes/Comments
1	39F003818	0	2.0	Radiated and AC Conducted Emissions
2	39F003830	0	2.0	Conducted RF

3.3 Accessory Equipment (AE) details

AE #	Type	Model	Manufacturer	Serial Number
1	AC/DC Adapter	PSAF10R-050Q	Phihong	P164604044A1

3.4 Test Sample Configuration

EUT Set-up #	Combination of AE used for test set up	Comments
1	EUT#2 + AE#1	The radio of the EUT was configured to a fixed channel transmission with 100% duty cycle using software that is not available to the end user. The measurement equipment was connected to the 50 ohm RF port of the EUT.
2	EUT#1 + AE#1	The radio of the EUT was configured to a fixed channel transmission with 100% duty cycle using software that is not available to the end user. The internal antenna was connected.

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 100% duty cycle.

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.

For conducted measurements, the highest power and the widest occupied bandwidth mode of operation (8DPSK), was used to evaluate the worst case performance of the EUT, including the band edge compliance and TX radiated spurious emissions testing. Maximum peak conducted output power and spectrum bandwidth, were measured in all supported modulation modes for the EUT.

3.6 Miscellaneous EUT Information

Only Fleet™ 790 xy was fully tested and based on the information that were provided by Garmin about the differences, the lab concluded that only a spot check is needed which was performed on, fleet™ 780 xy, and fleet™ 770 xy.

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 and Radio Standard Specification RSS-247 Issue 1 of ISED Canada.

This test report is to support a request for new equipment authorization under the FCC ID: IPH-A3111 IC ID: 1792A-A3111

Testing procedures are based on ANSI C63.10:2013 including section 7.8 for FHSS systems.

5 Measurement Results Summary

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	NA	NP	Result
§15.247(b)(1) RSS-247 5.4(2)	Maximum Peak Conducted Output Power	Nominal	GFSK DQPSK 8DPSK	■	□	□	Complies
§15.247(d) RSS-247 5.5 RSS-Gen 8.10	Band Edge Compliance	Nominal	8DPSK	■	□	□	Complies
§15.247(a)(1) RSS-247 5.1(1)	Spectrum Bandwidth	Nominal	GFSK DQPSK 8DPSK	■	□	□	Complies
§15.247(d) §15.209 (a) RSS-Gen 6.13	TX Spurious emissions-Radiated	Nominal	8DPSK	■	□	□	Complies
§15.207(a) RSS-Gen 8.8	AC Conducted Emissions	Nominal	8DPSK	■	□	□	Complies

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

6 Measurements

6.1 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	±2.5 dB (Magnetic Loop Antenna)
30 MHz to 1000 MHz	±2.0 dB (Biconilog Antenna)
1 GHz to 40 GHz	±2.3 dB (Horn Antenna)

Conducted measurement

150 kHz to 30 MHz	±0.7 dB (LISN)
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RF conducted measurement	±0.5 dB
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6.2 Environmental Conditions During Testing:

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

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

6.3 Dates of Testing:

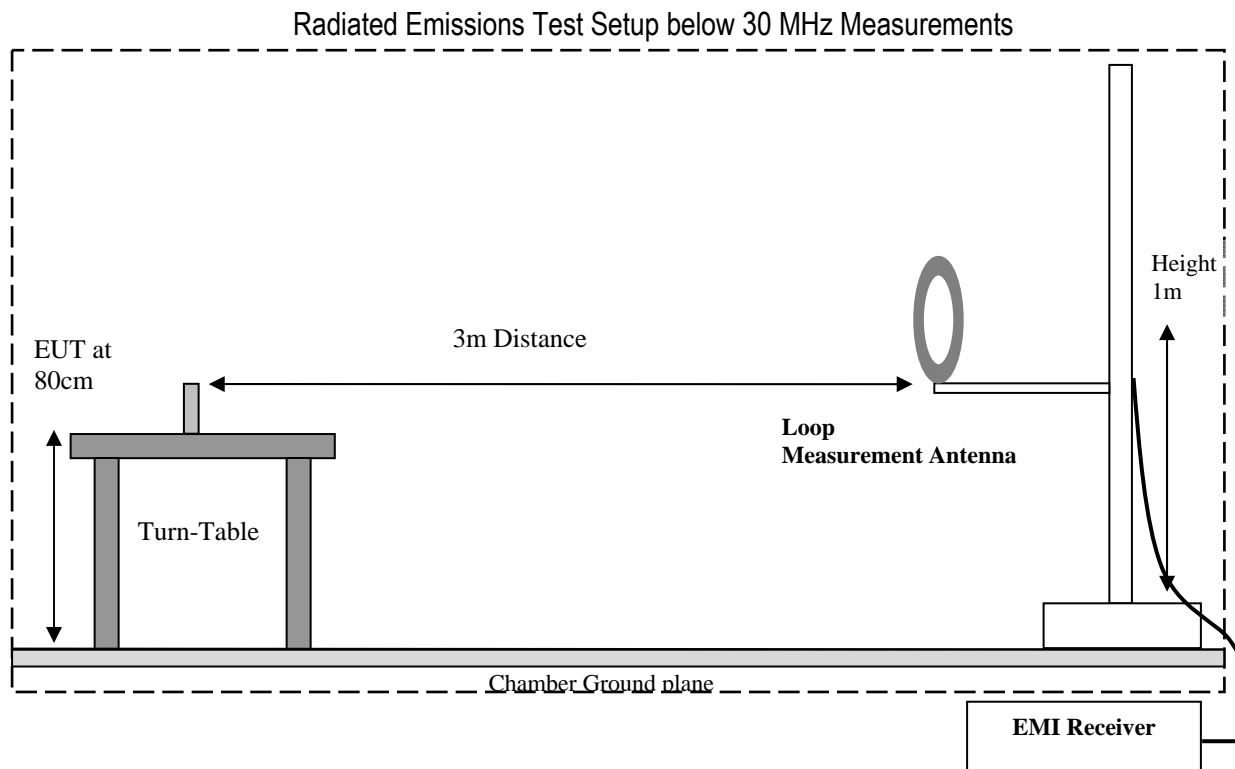
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7 Measurement Procedures

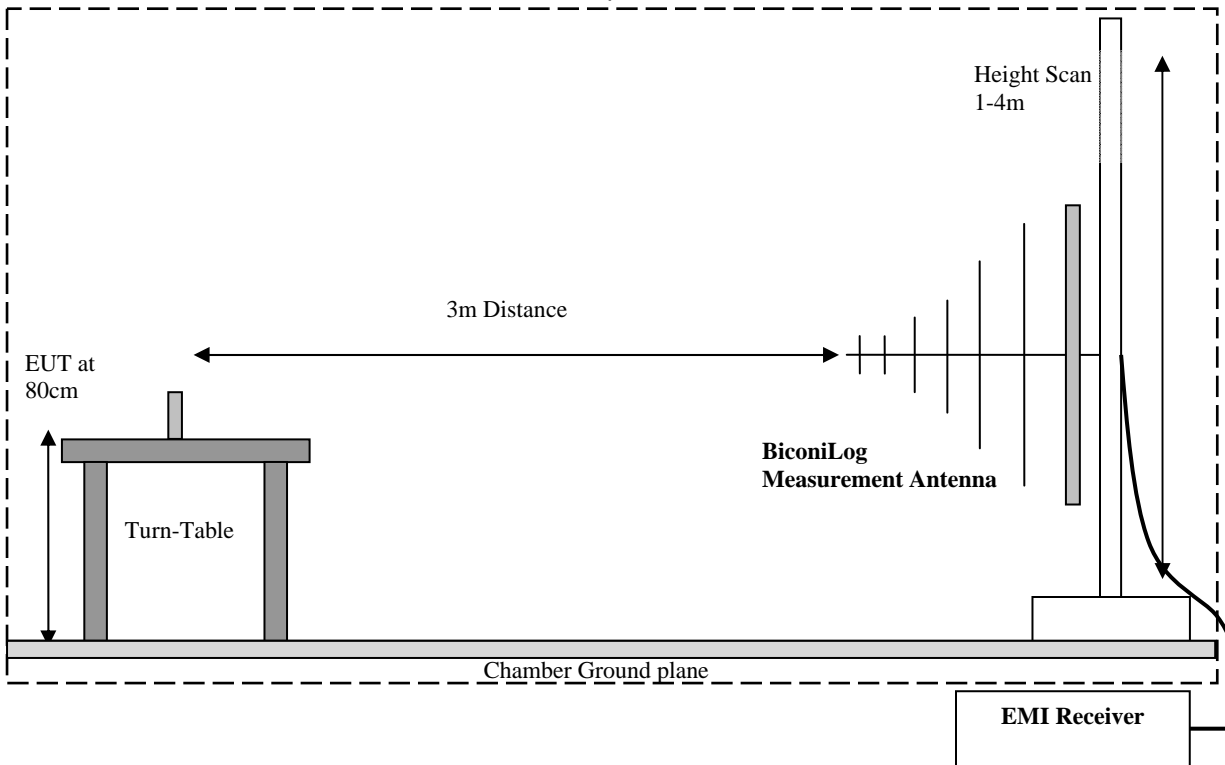
7.1 Radiated Measurement

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

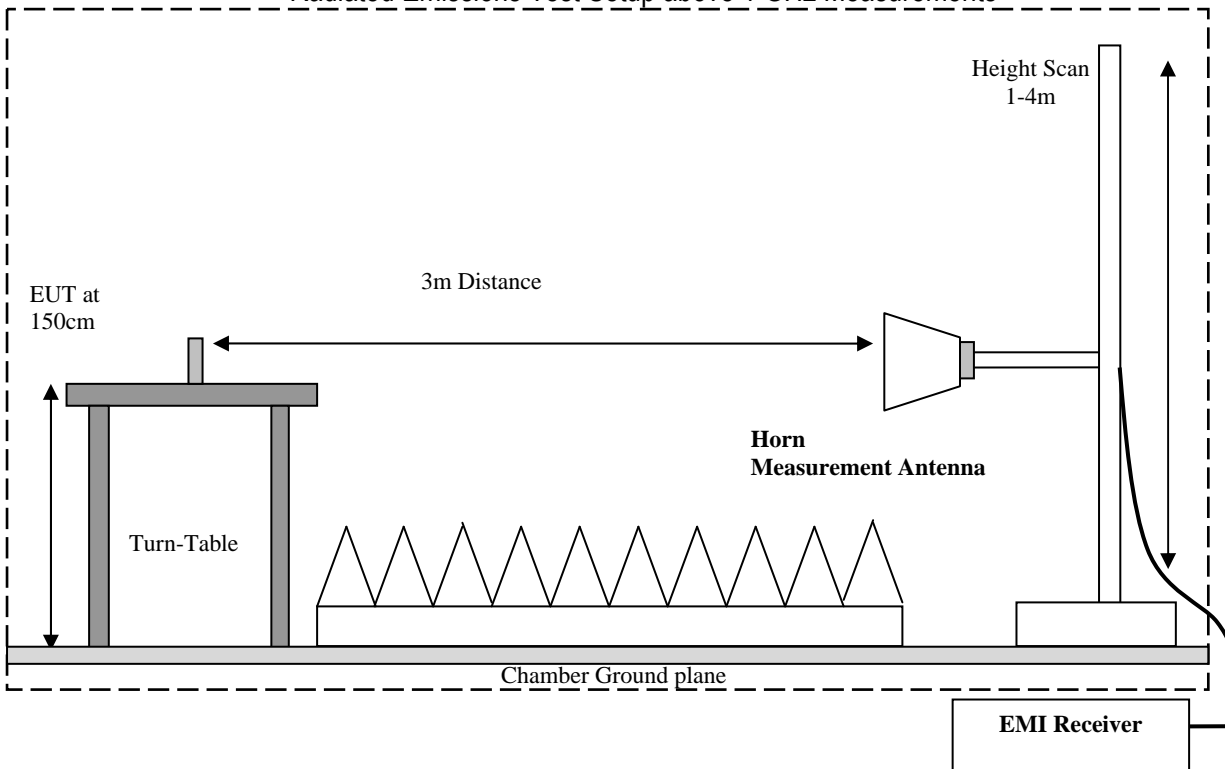
- The exploratory measurement is accomplished by running a matrix of 16 sweeps over the required frequency range with R&S Test-SW EMC32 for 4 positions of the turntable, two orthogonal positions of the EUT and both antenna polarizations. This procedure exceeds the requirement of the above standards to 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 30 MHz-1 GHz Measurements



Radiated Emissions Test Setup above 1 GHz 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 μ V
2. Cable Loss between the receiving antenna and Spectrum Analyzer 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:

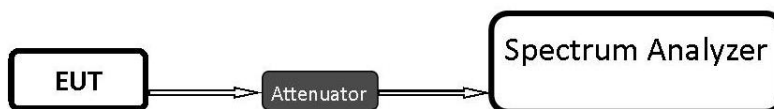
Frequency (MHz)	Measured SA (dB μ V)	Cable Loss (dB)	Antenna Factor Correction (dB)	Field Strength Result (dB μ V/m)
1000	80.5	3.5	14	98.0

7.2 Power Line Conducted Measurement Procedure

AC Power Line conducted emissions measurements performed according to: ANSI C63.10 (2013)

7.3 RF Conducted Measurement Procedure

Reference: ANSI C63.10 (2013) Section 6.9, 6.10, and 7.8



- 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 ANSI C63.10 (2013) Section 7.8

Spectrum Analyzer settings:

- Span = approximately 5 times the 20 dB bandwidth
- RBW > the 20 dB bandwidth of the emission being measured
- VBW \geq RBW
- Sweep = Auto Couple
- Detector function = Peak
- Trace = Max hold
- Use the marker-peak function to set the marker to the peak of the emission.

8.1.2 Limits:

Maximum Peak Output Power:

FCC 15.247 (b)(1): 1 W

IC RSS-247: 1 W

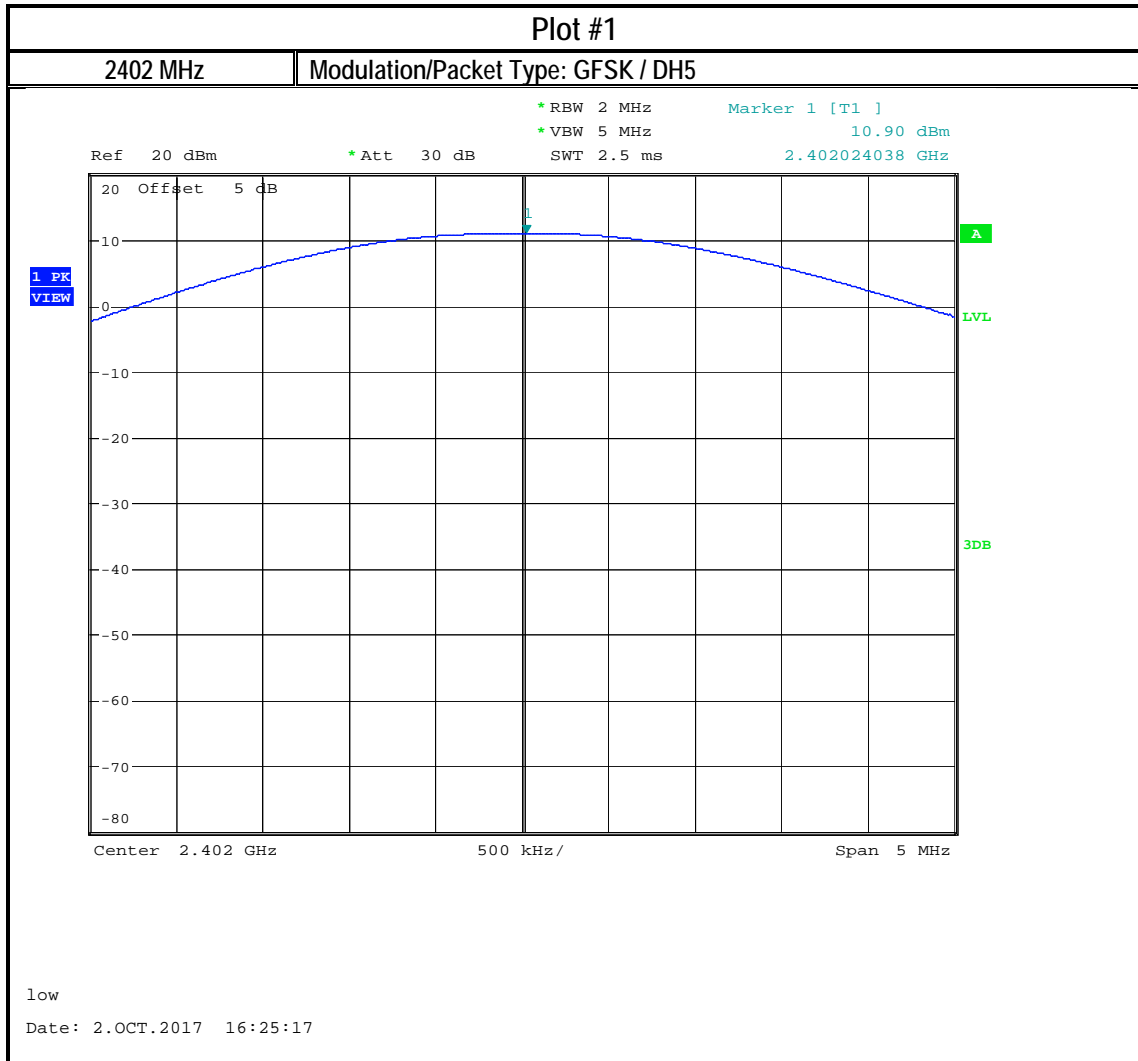
8.1.3 Test conditions and setup:

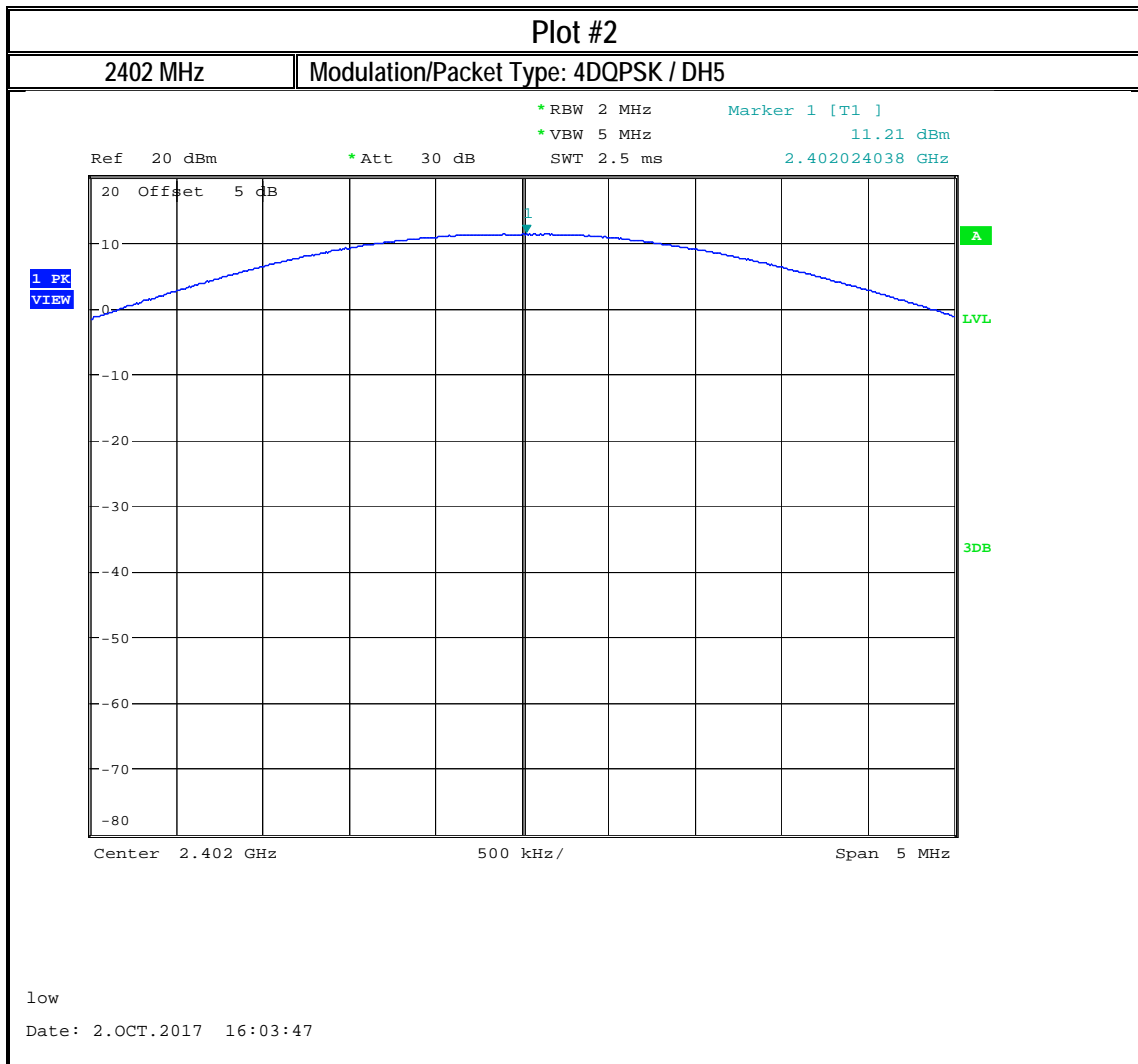
Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input	Antenna Gain
23° C	1	4DQPSK, 8DPFSK, GFSK	5 VDC	1.575 dBi

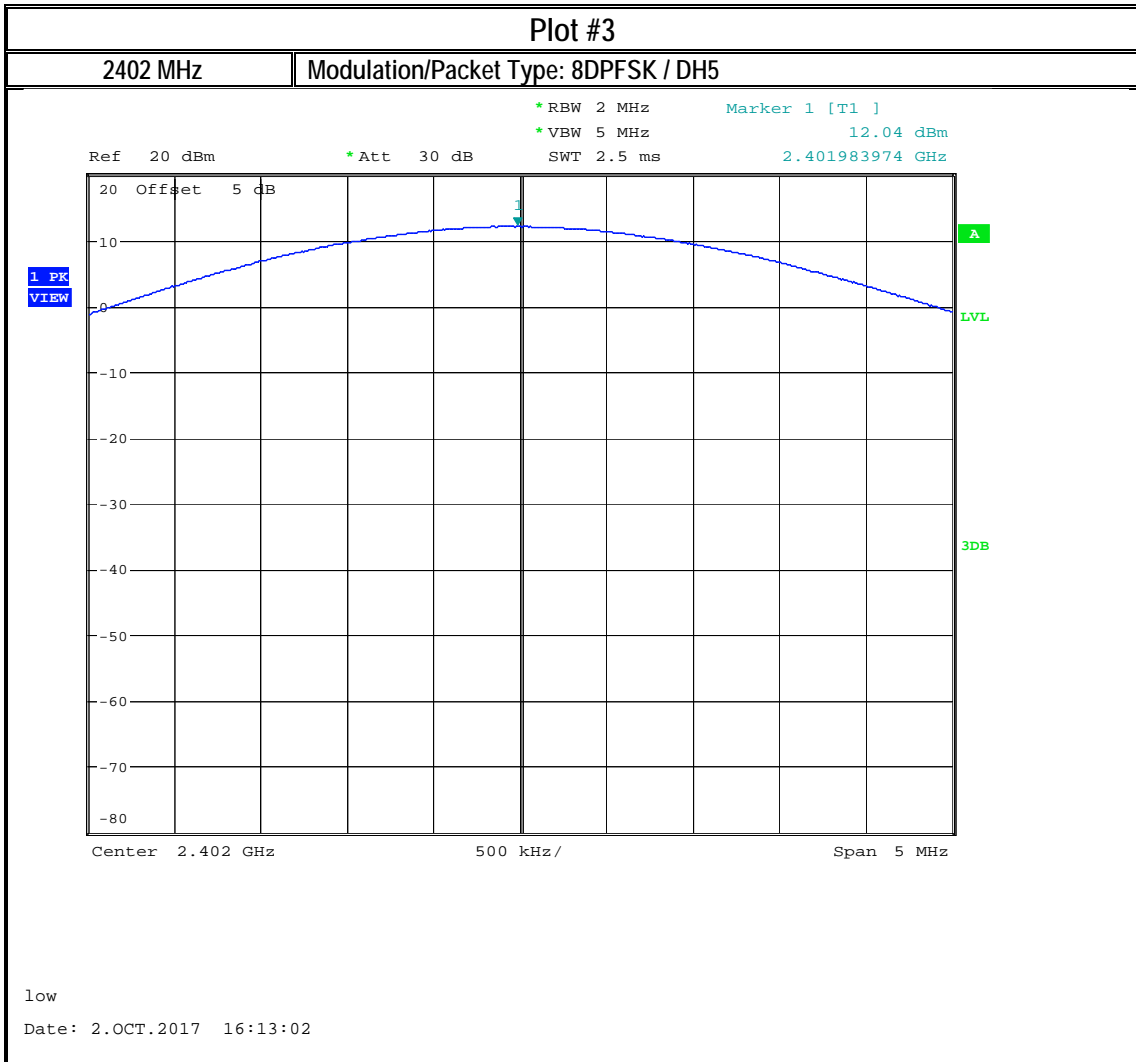
8.1.4 Measurement result:

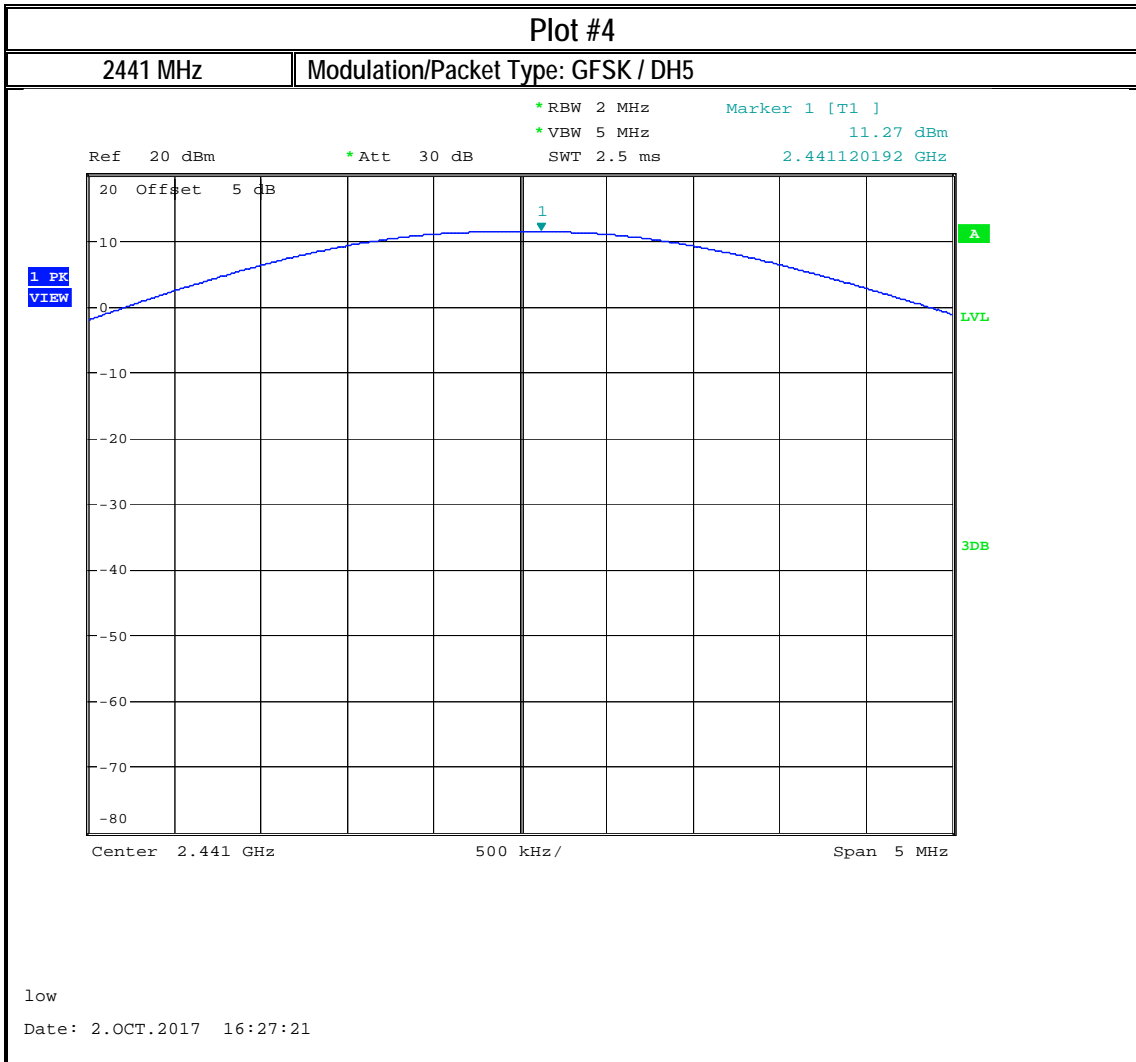
Plot #	Frequency (MHz)	EUT operating mode	Maximum Peak Conducted Output Power (dBm)	EIRP (dBm)	Limit (dBm)	Result
1	2402	GFSK / DH5	10.90	12.48	30(Pk.) / 36(EIRP)	Pass
2	2402	4DQPSK / DH5	11.21	12.79	30(Pk.) / 36(EIRP)	Pass
3	2402	8DPFSK / DH5	12.04	13.62	30(Pk.) / 36(EIRP)	Pass
4	2441	GFSK / DH5	11.27	12.85	30(Pk.) / 36(EIRP)	Pass
5	2441	4DQPSK / DH5	11.72	13.30	30(Pk.) / 36(EIRP)	Pass
6	2441	8DPFSK / DH5	10.90	12.48	30(Pk.) / 36(EIRP)	Pass
7	2480	GFSK / DH5	11.47	13.05	30(Pk.) / 36(EIRP)	Pass
8	2480	4DQPSK / DH5	11.95	13.53	30(Pk.) / 36(EIRP)	Pass
9	2480	8DPFSK / DH5	12.11	13.69	30(Pk.) / 36(EIRP)	Pass

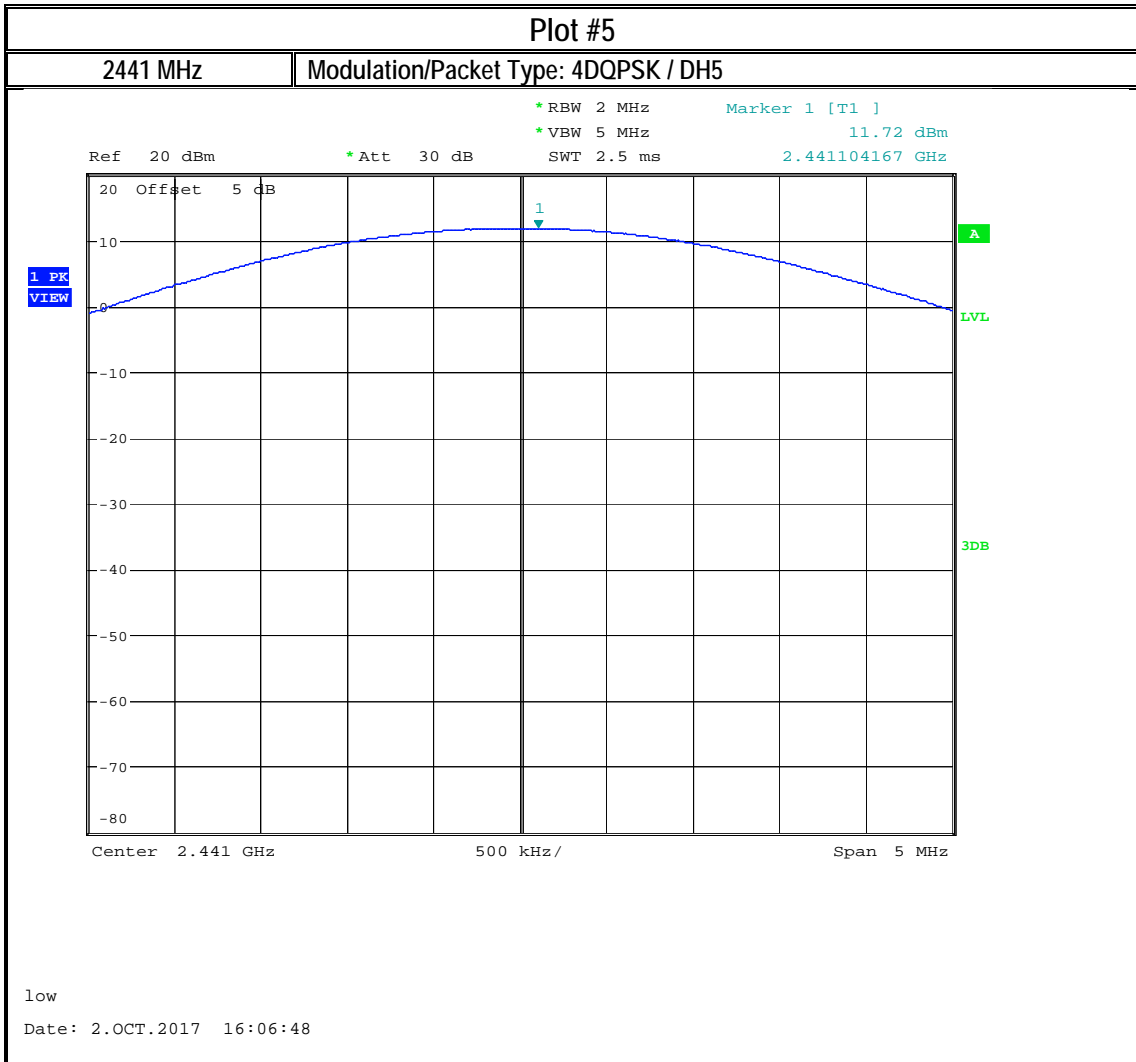
8.1.5 Measurement Plots:



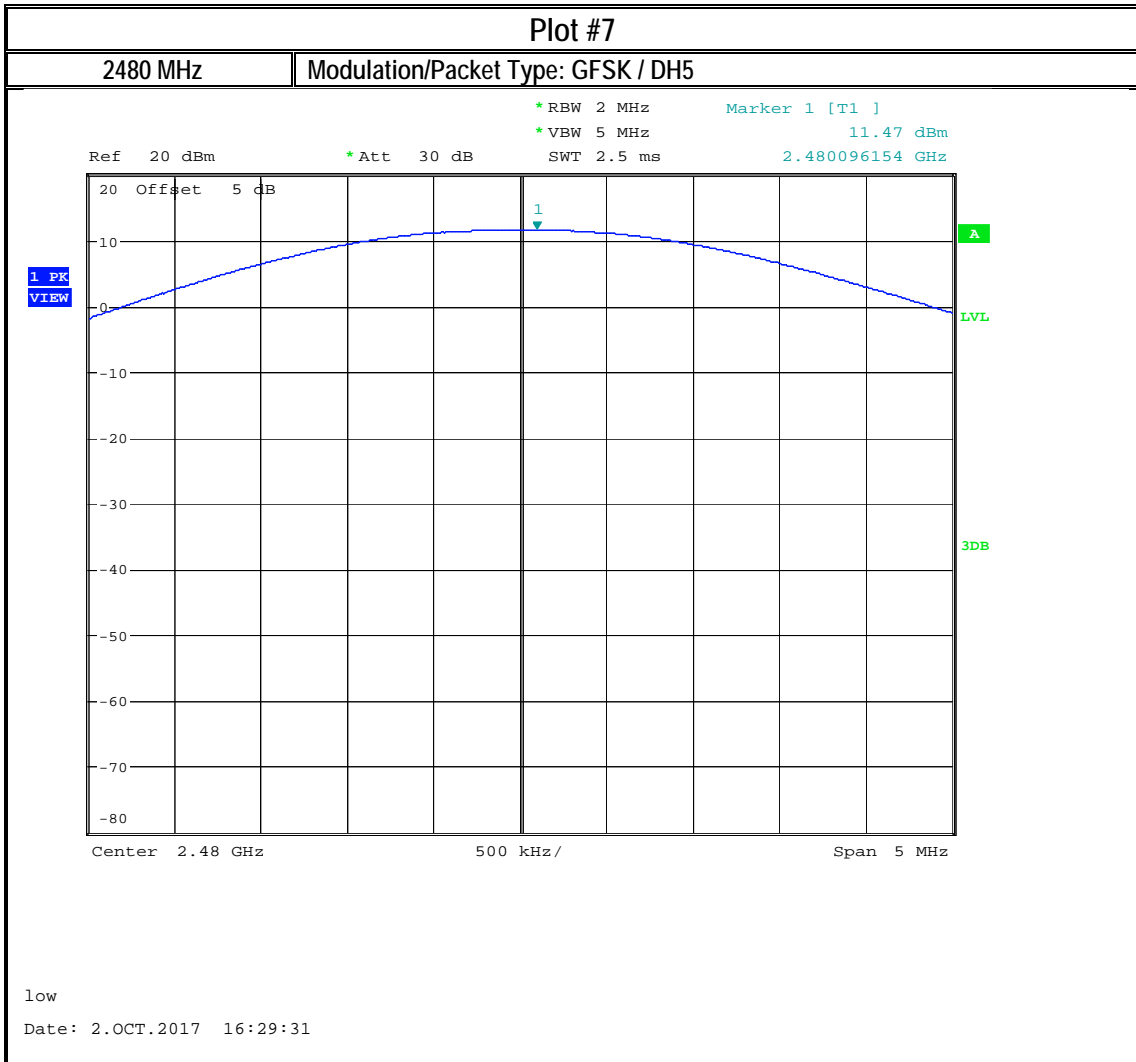


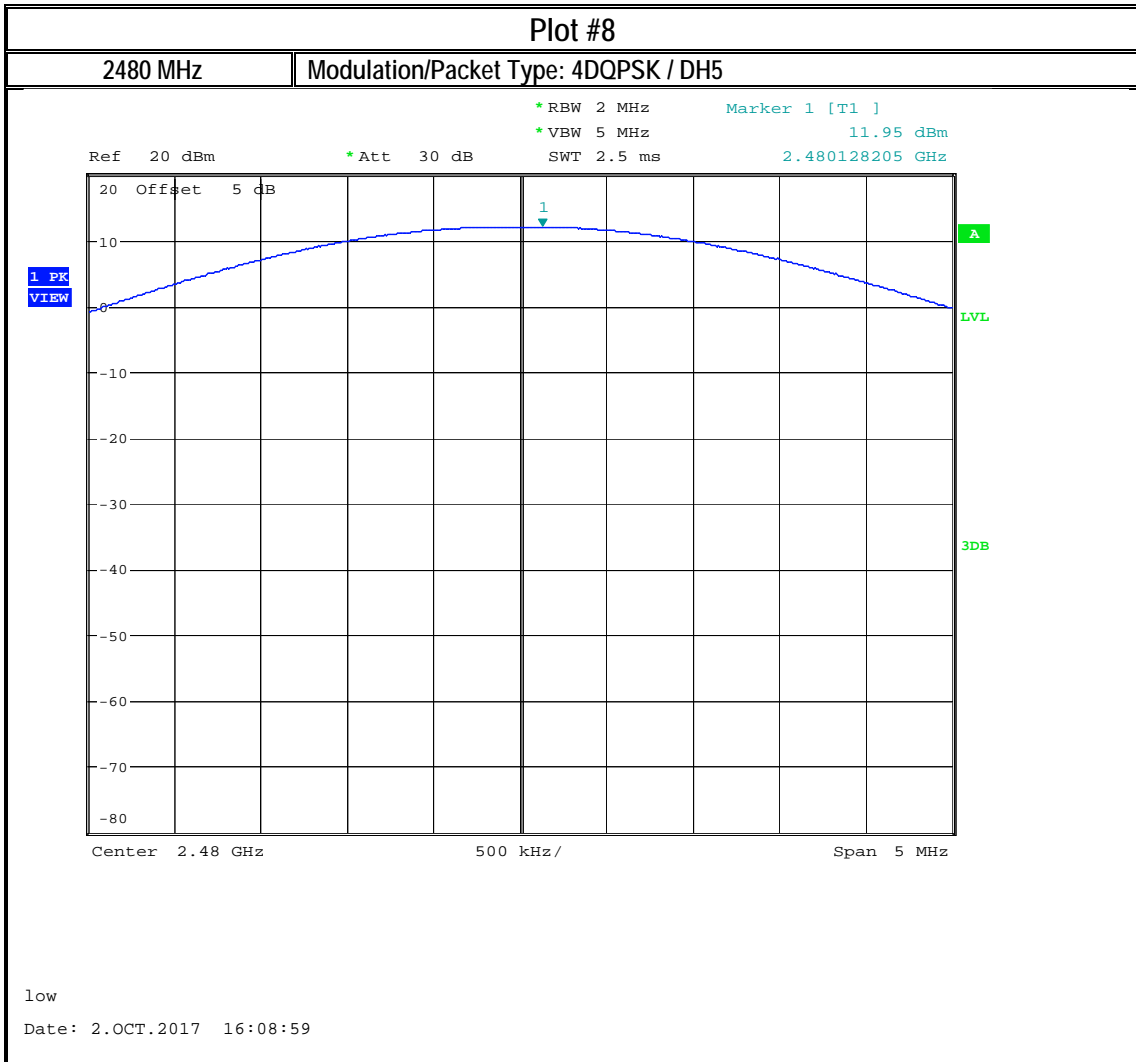


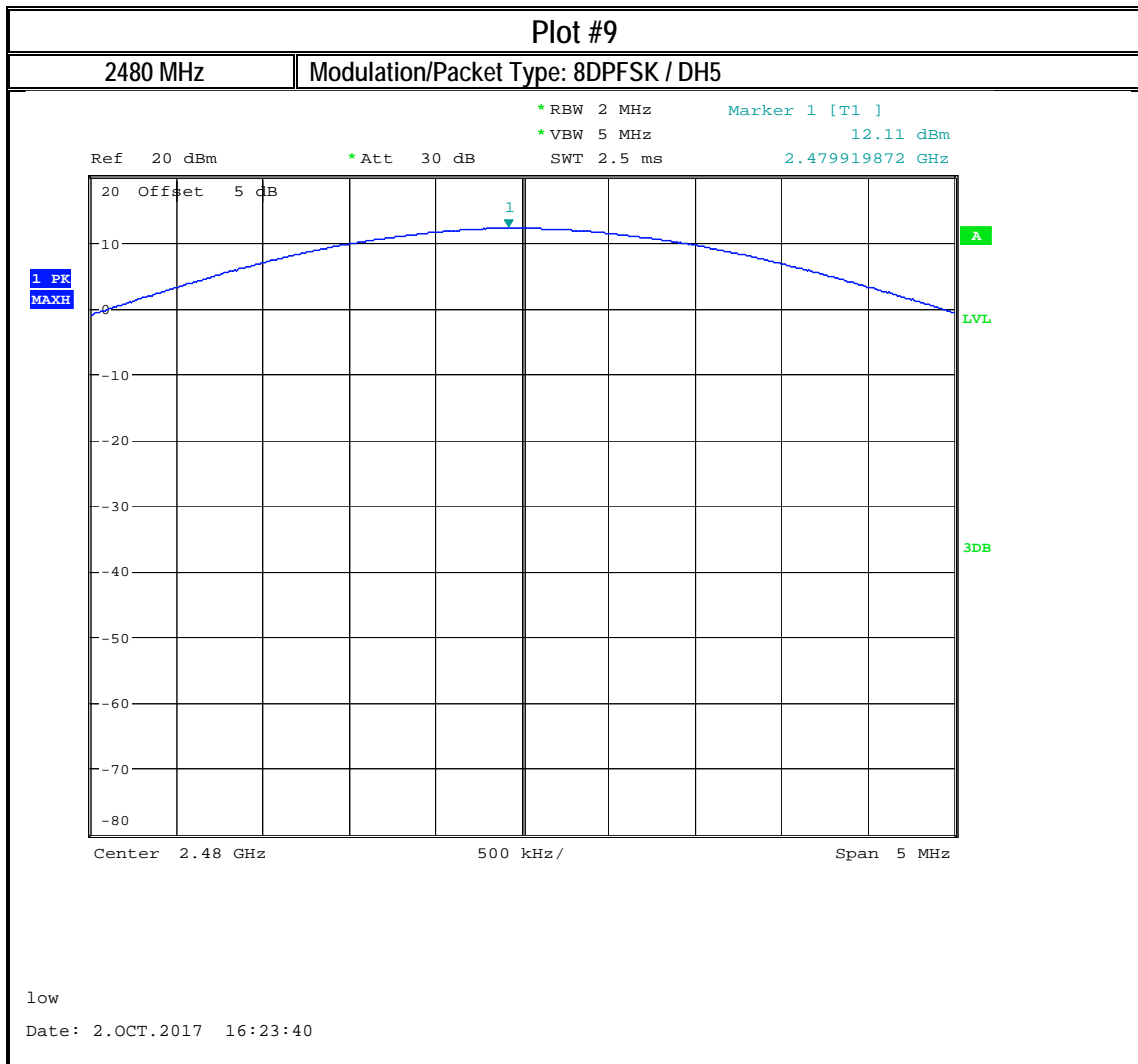












8.2 Band Edge Compliance

8.2.1 Measurement according to ANSI C63.10 (2013) Section 6.10

Spectrum Analyzer settings for non-restricted band edge:

- Span: wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation.
- RBW \geq 1% of the span
- VBW \geq RBW
- Sweep Time: Auto couple
- Detector = Peak
- Trace = Max hold
- Allow the trace to stabilize. 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.
- Enable the marker-delta function, and then use the marker-to-peak function to move the marker to the peak of the in-band emission.
- Now, using the same instrument settings, enable the hopping function of the EUT.
- Allow the trace to stabilize. Follow the same procedure listed above to determine if any spurious emissions caused by the hopping function also comply with the specified limit.

Spectrum Analyzer settings for restricted band:

- Peak measurements are made using a peak detector and RBW=50 kHz

8.2.2 Limits: Restricted Band FCC 15.209 and RSS-Gen 8.10

- PEAK LIMIT= 74 dB μ V/m @3 m =-21.23 dBm
- AVG. LIMIT= 54 dB μ V/m @3 m =-41.23 dBm
- Start frequency & stop frequency according to frequency range specified in the restricted band table in FCC section 15.205

Restricted bands of operation:

- Except as shown in CFR 47 Part 15.205 paragraph (d), 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			

8.2.3 Limits: Non-restricted Band §15.247 and RSS-247 5.5

FCC15.247 (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 30 dB instead of 20 dB.

8.2.4 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input	Antenna gain
22° C	1	8DPSK DH5 - fixed channel 8DPSK DH5 - hopping	5 VDC	1.575 dBi

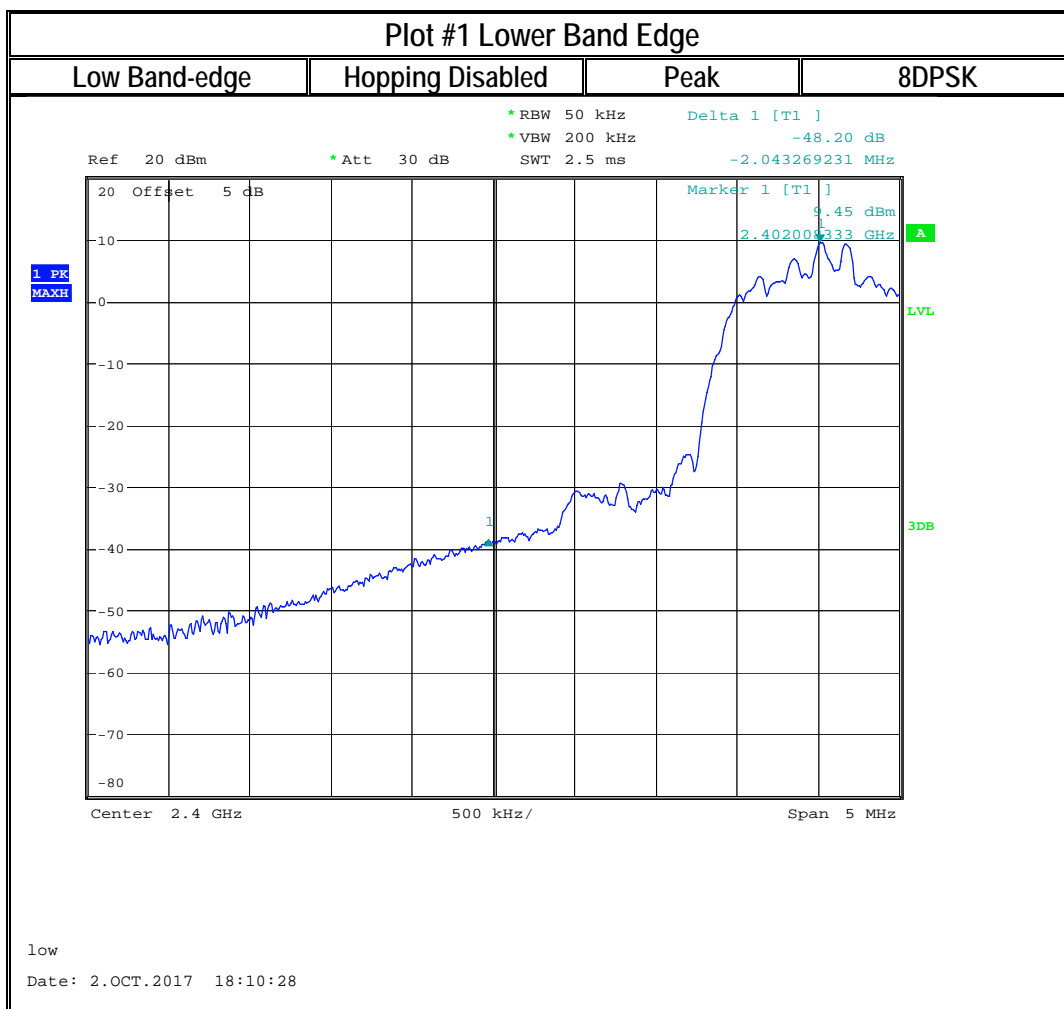
8.2.5 Measurement result:

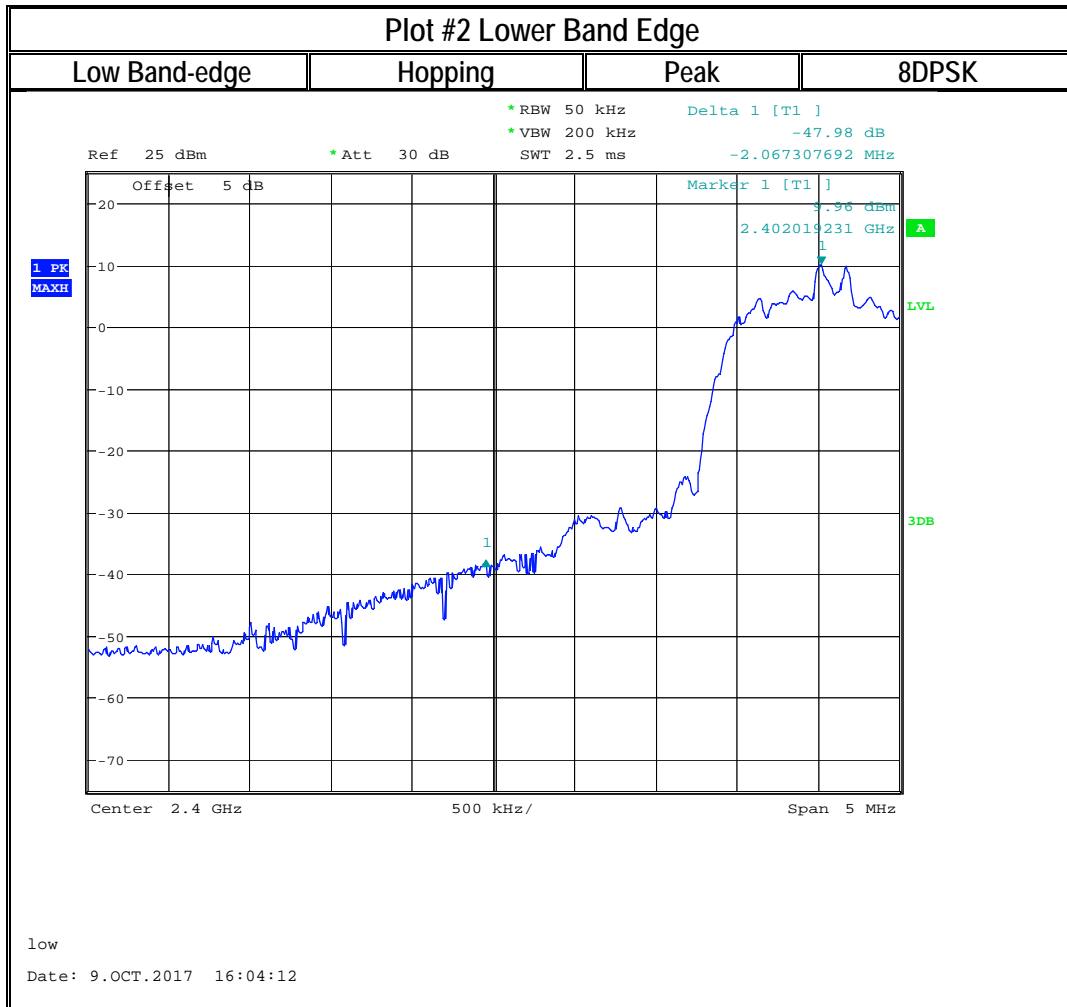
Plot #	EUT operating mode	Band Edge	Band Edge Delta (dBc)	Limit (dBc)	Result
1	8DPSK fixed channel	Lower, non-restricted	48.20	> 20	Pass
2	8DPSK hopping	Lower, non-restricted	47.98	> 20	Pass

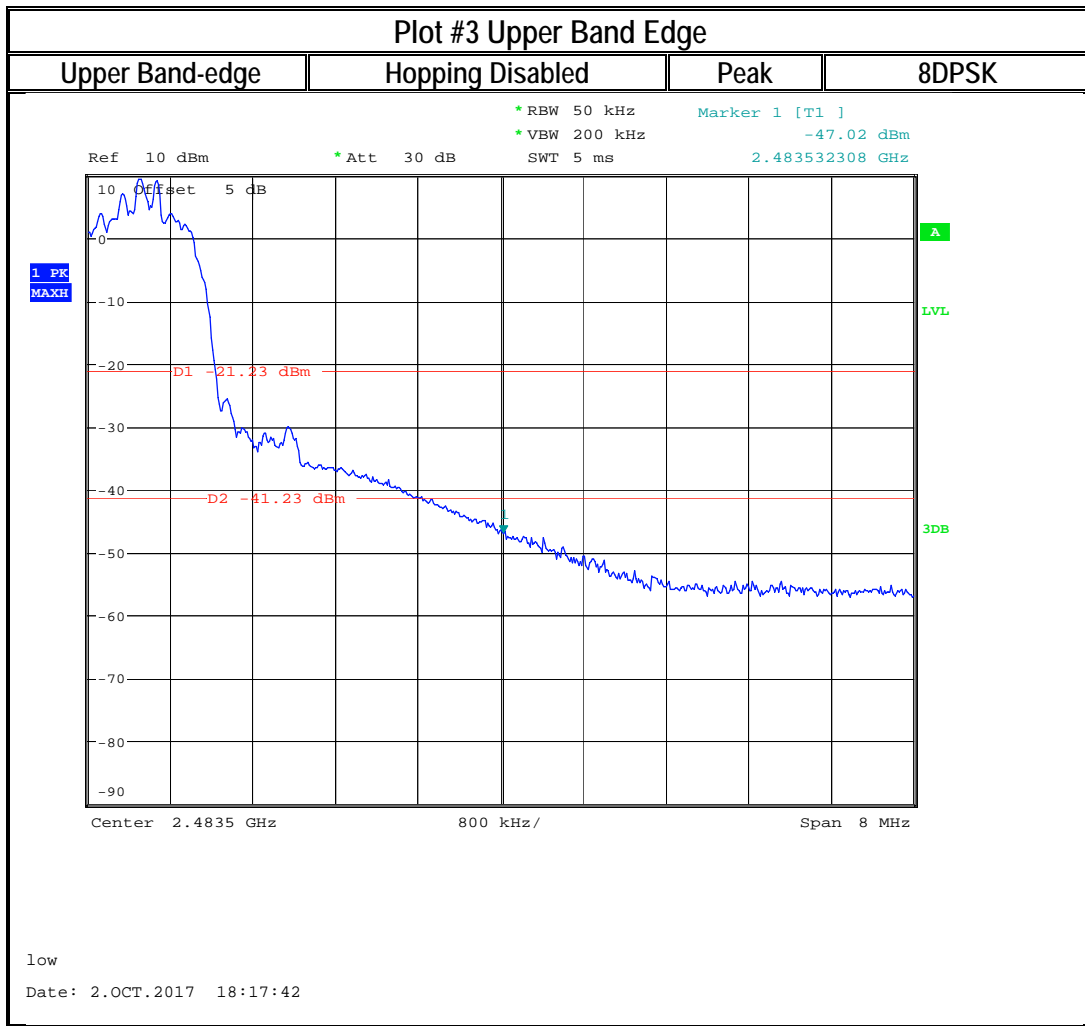
Plot #	EUT operating mode	Band Edge	Measured value	Corrected by duty cycle	Corrected by antenna gain	Limit (dBm)	Result
3	8DPSK fixed channel	Upper restricted peak	-47.02	NA due to peak detector	-45.45	-21.23 Peak -41.23 AVG	Pass
4	8DPSK hopping	Upper restricted peak	-46.14	NA due to peak detector	-44.57	-21.23 Peak -41.23 AVG	Pass

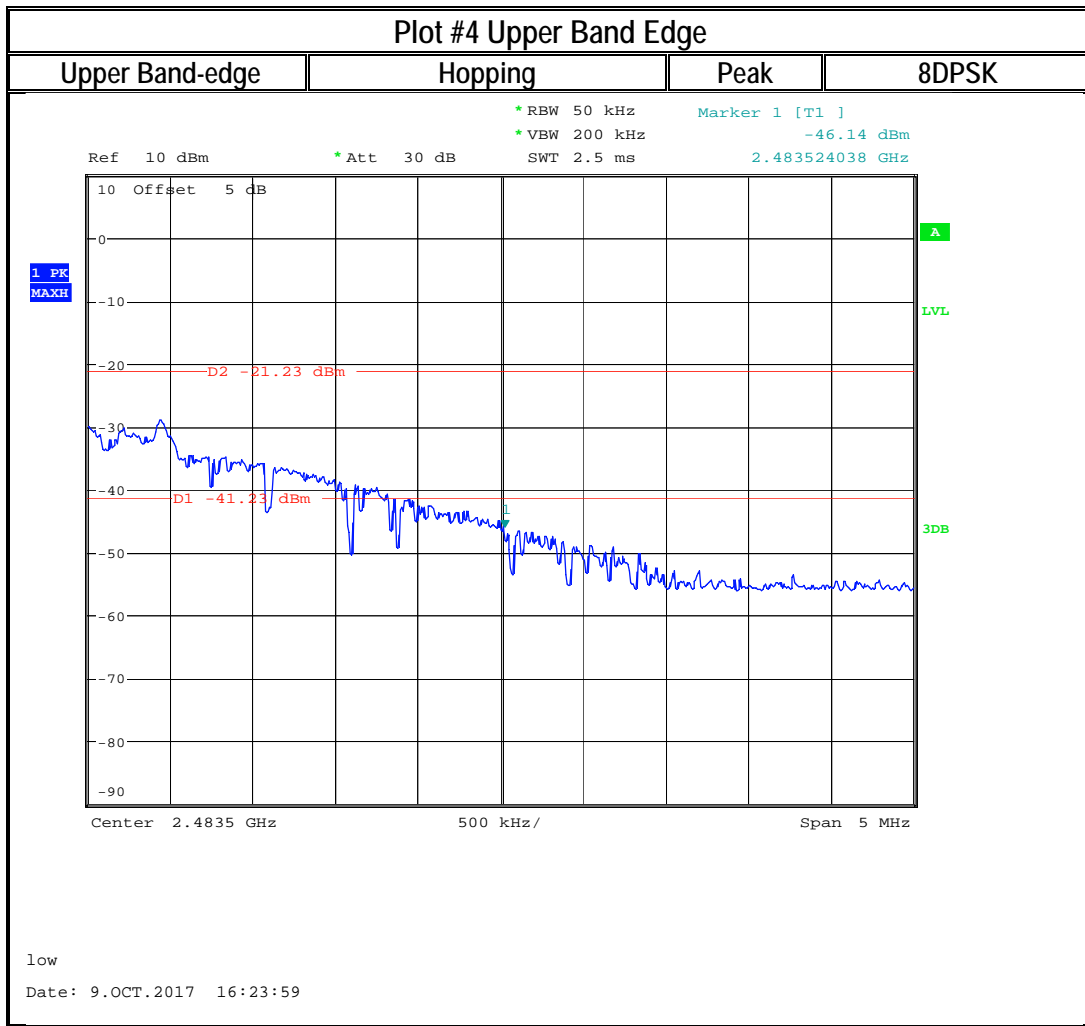
Note: The peak measurement passes both peak and average limits.

8.2.6 Measurement Plots:









8.3 20dB Bandwidth

8.3.1 Measurement according to ANSI C63.10 (2013) Section 6.9

Spectrum Analyzer settings:

- Span: approximately 2 to 3 times the 20 dB bandwidth, centered on the hopping channel
- RBW \geq 1% of the 20 dB bandwidth
- Sweep Time = Auto couple
- Detector = Peak
- Trace = Max hold

8.3.2 Limits: FCC 15.247 (a) (1), RSS-227

Frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125mW.

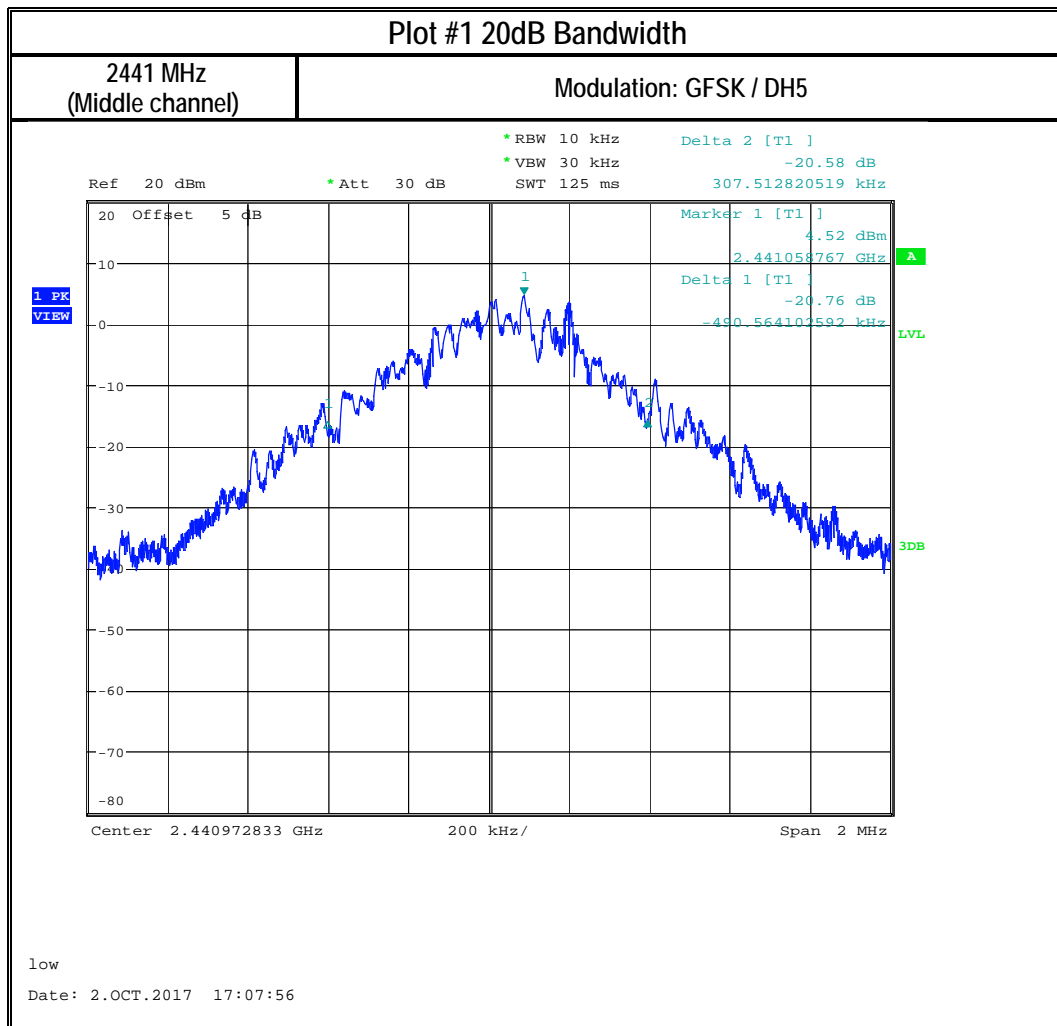
8.3.3 Test conditions and setup:

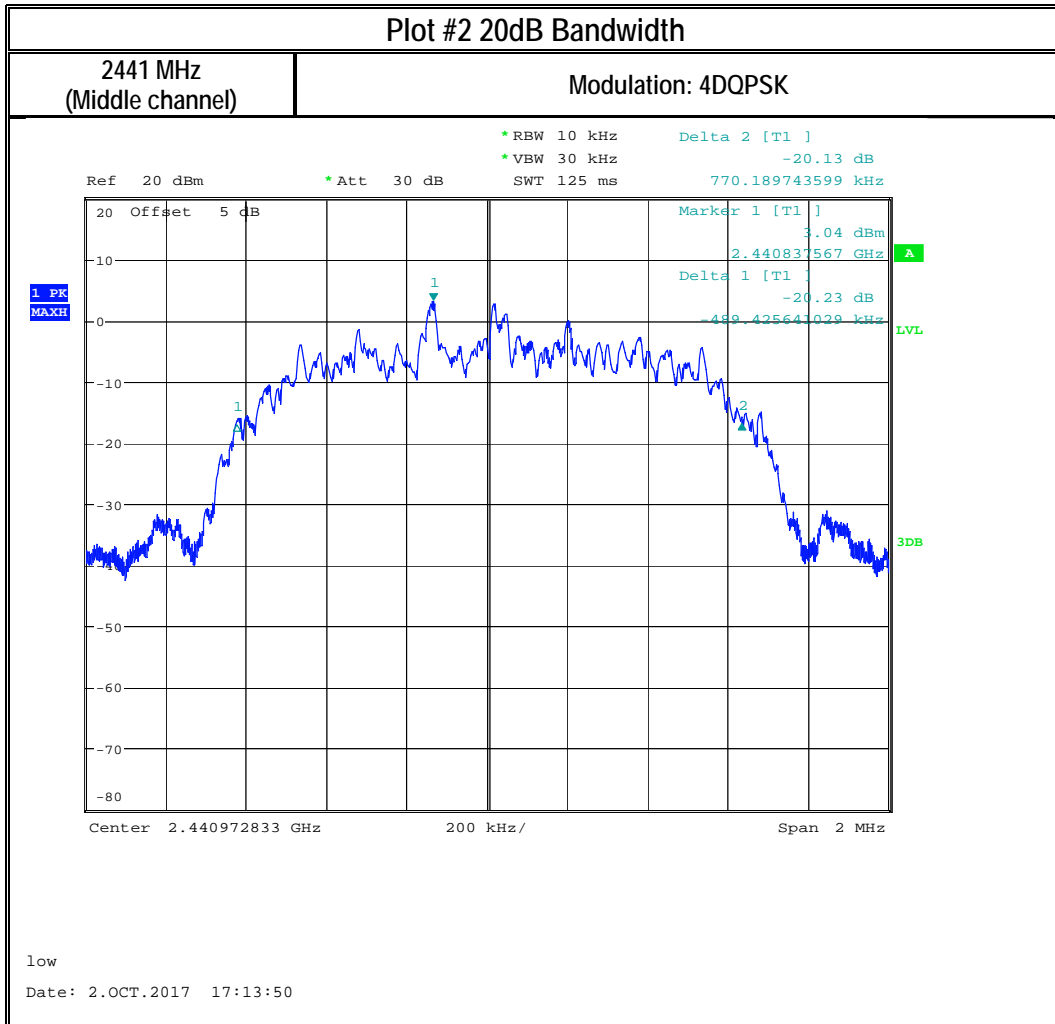
Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input
22° C	1	GFSK, 4DQPSK, 8DPFSK - DH5	5 VDC

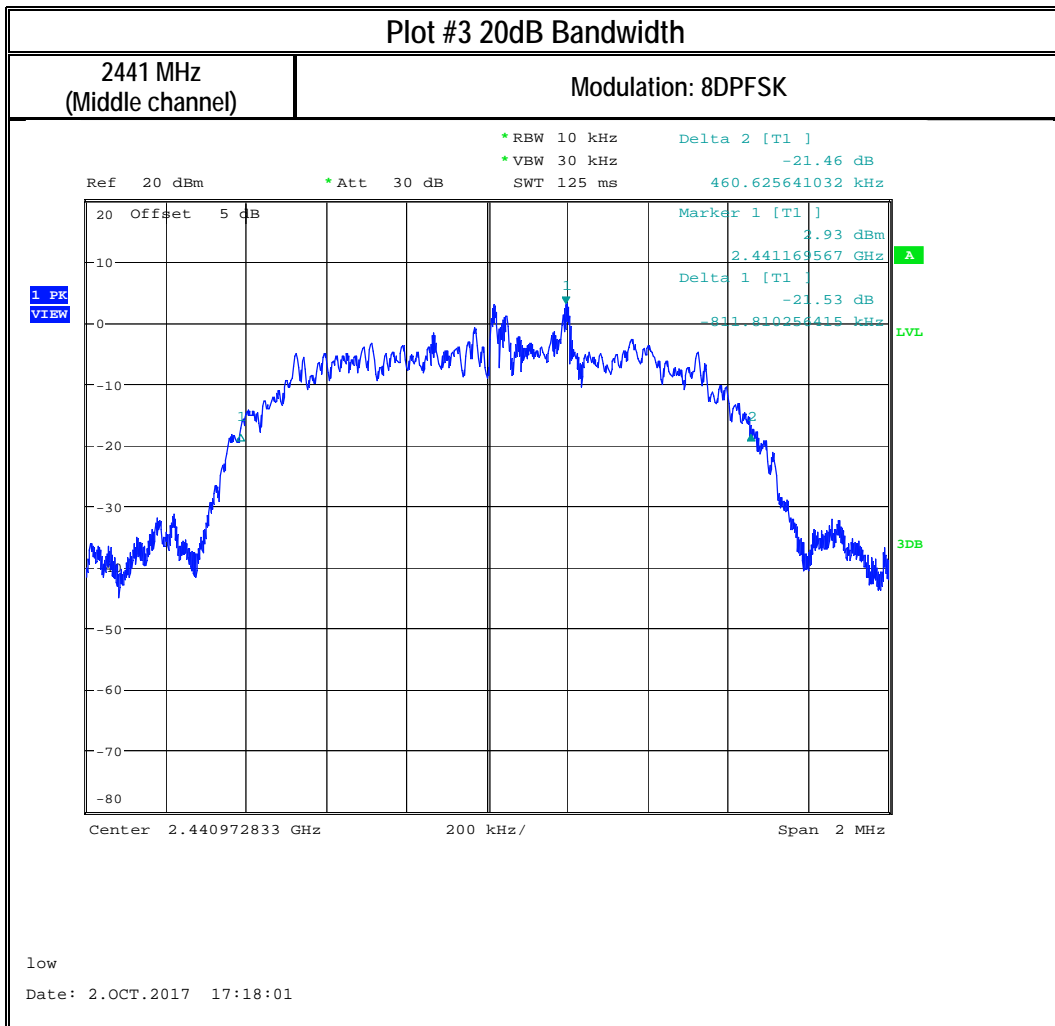
8.3.4 Measurement result:

Plot #	EUT operating mode	20 dB Bandwidth (MHz)
1	GFSK / DH5 fixed channel	0.797
2	4DQPSK / DH5 fixed channel	1.269
3	8DPFSK / DH5 fixed channel	1.390

8.3.5 Measurement Plots:







8.4 Transmitter Spurious Emissions and Restricted Bands

8.4.1 Measurement according to ANSI C63.10 (2013)

Analyzer Settings:

- Frequency = 9 kHz – 30 MHz
- RBW = 9 kHz
- Detector = Peak

- Frequency = 30 MHz – 1 GHz
- Detector = Peak / Quasi-Peak
- RBW = 120 kHz (<1 GHz)

- Frequency > 1 GHz
- Detector = Peak / Average
- RBW = 1 MHz

Plots reported here represent the worst case emissions for horizontal and vertical antenna polarizations and for three orientations of the EUT. Unless mentioned otherwise, the emissions outside the limit lines in the plots are from the transmit signal.

8.4.2 Limits: FCC 15.247(d)/15.209(a)

- Except as shown in CFR 47 Part 15.205 paragraph (d), 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= 74dB μ V/m
- AVG. LIMIT= 54dB μ V/m

Frequency (MHz)	Field strength (μ V/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

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 described in 5.4.

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 as follow:

$$\text{Conversion factor (CF)} = 40 \log (D/d) = 40 \log (300 \text{ m} / 3 \text{ m}) = 80 \text{ dB}$$

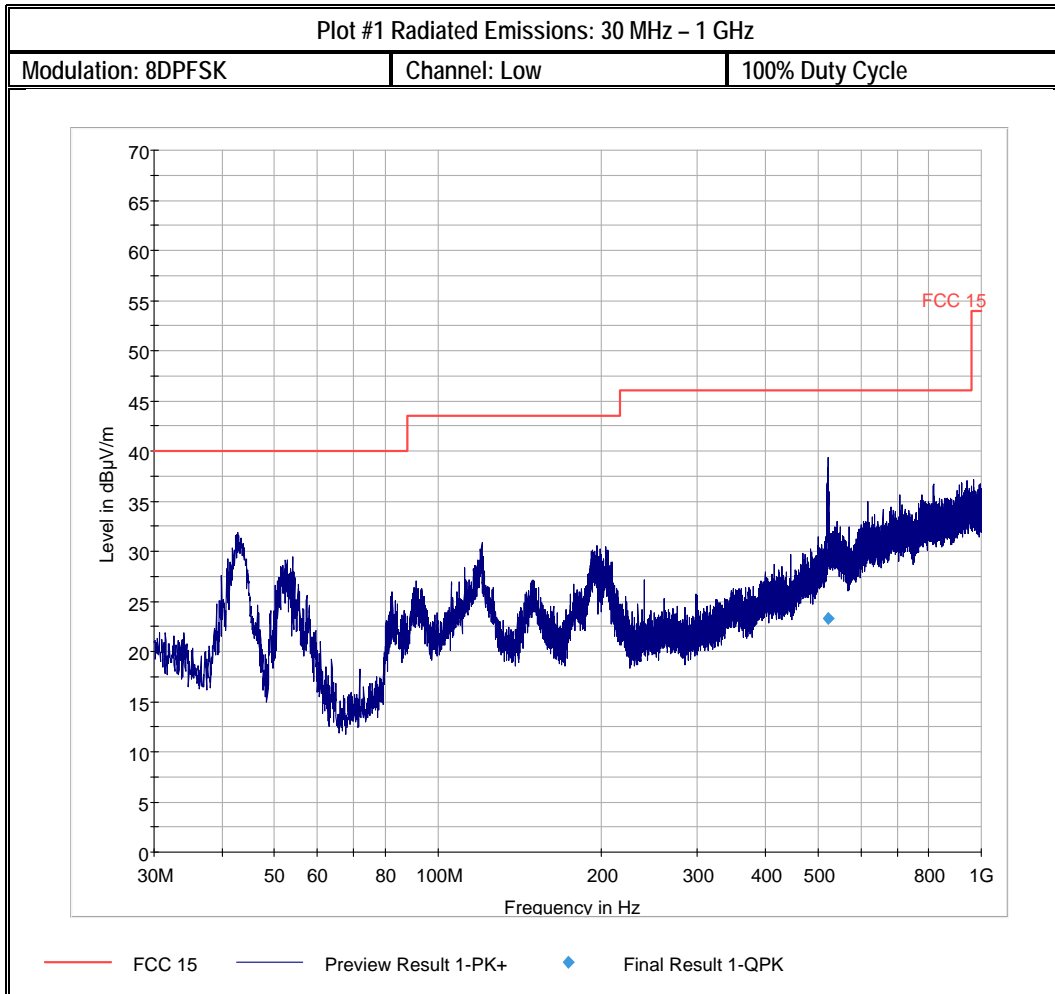
8.4.3 Test conditions and setup:

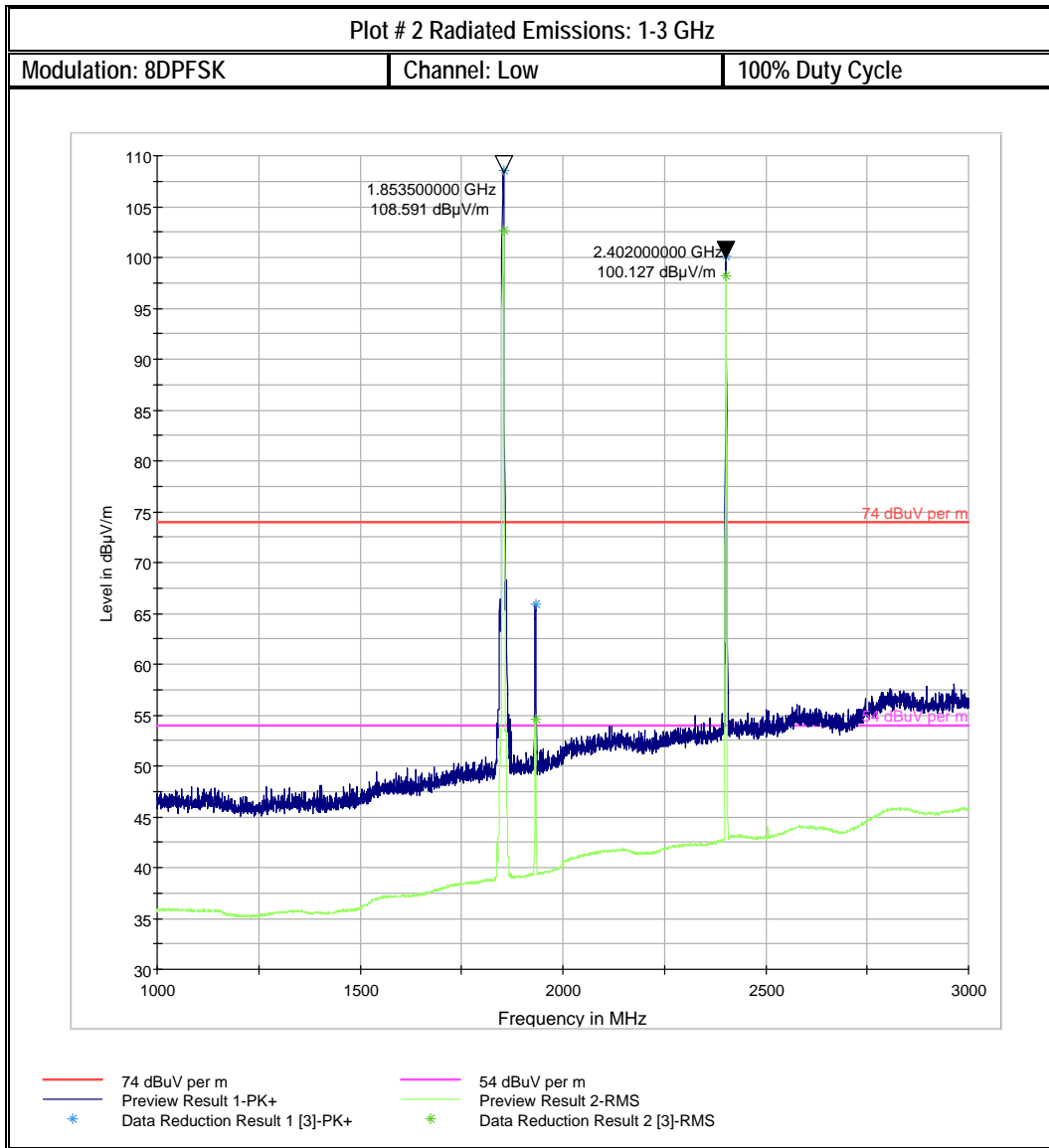
Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input
23° C	2	8DPFSK / DH5 fixed channel	5 VDC

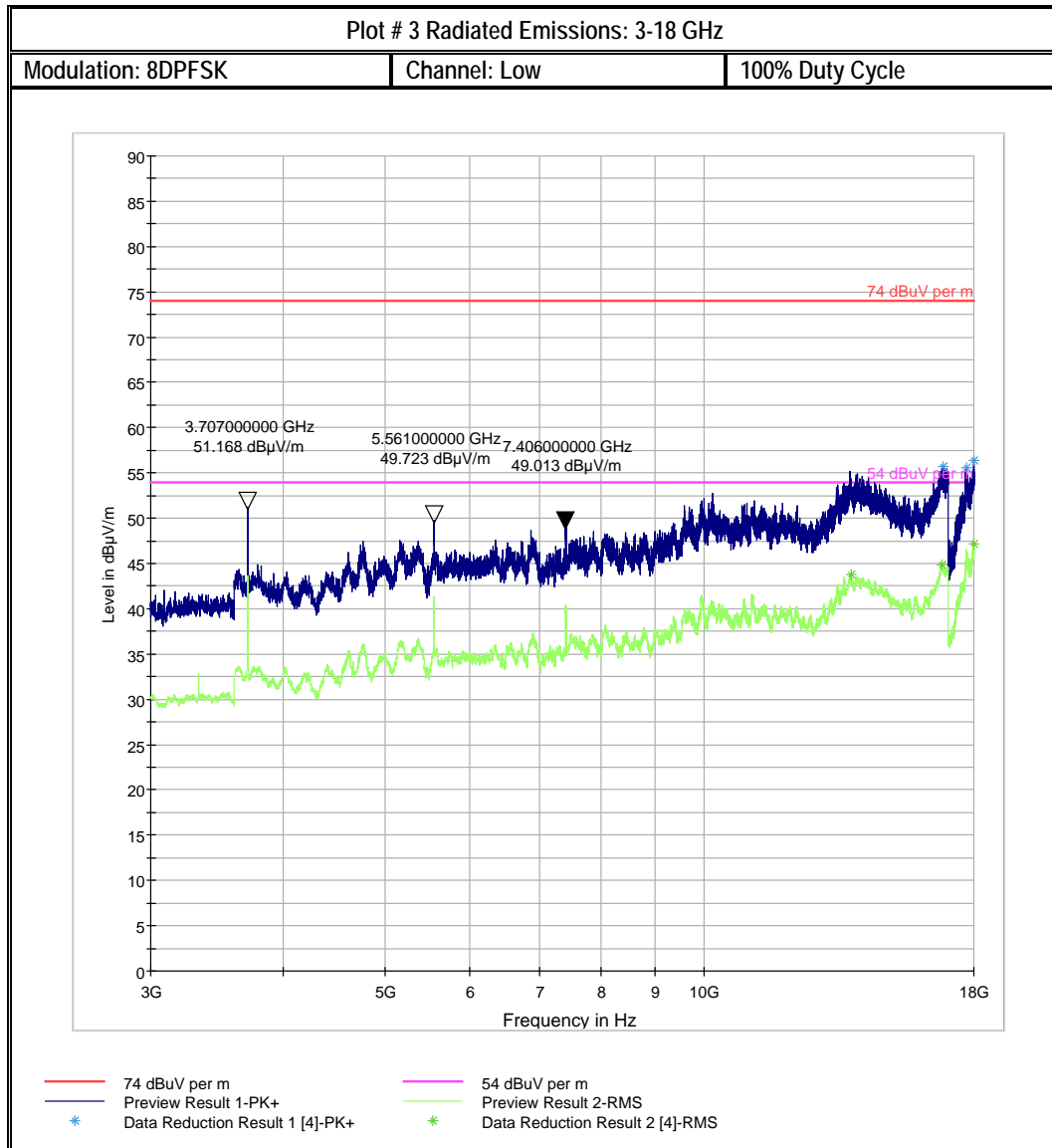
8.4.4 Measurement result:

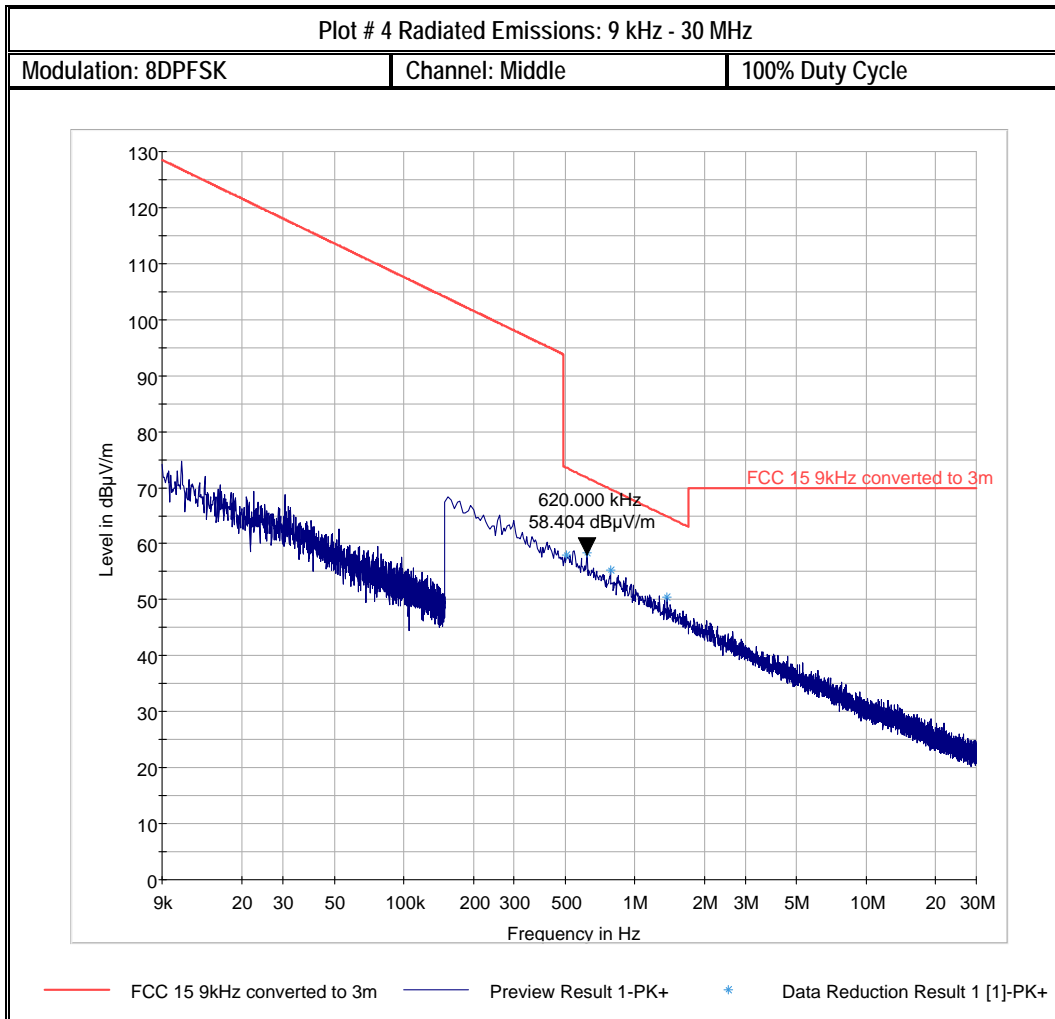
Plot #	Channel	Scan Frequency	Limit	Result
1-3	Low	30 MHz – 18 GHz	See section 8.7.2	Pass
4-8	Middle	9 kHz – 26 GHz	See section 8.7.2	Pass
9-11	High	30 MHz – 18 GHz	See section 8.7.2	Pass

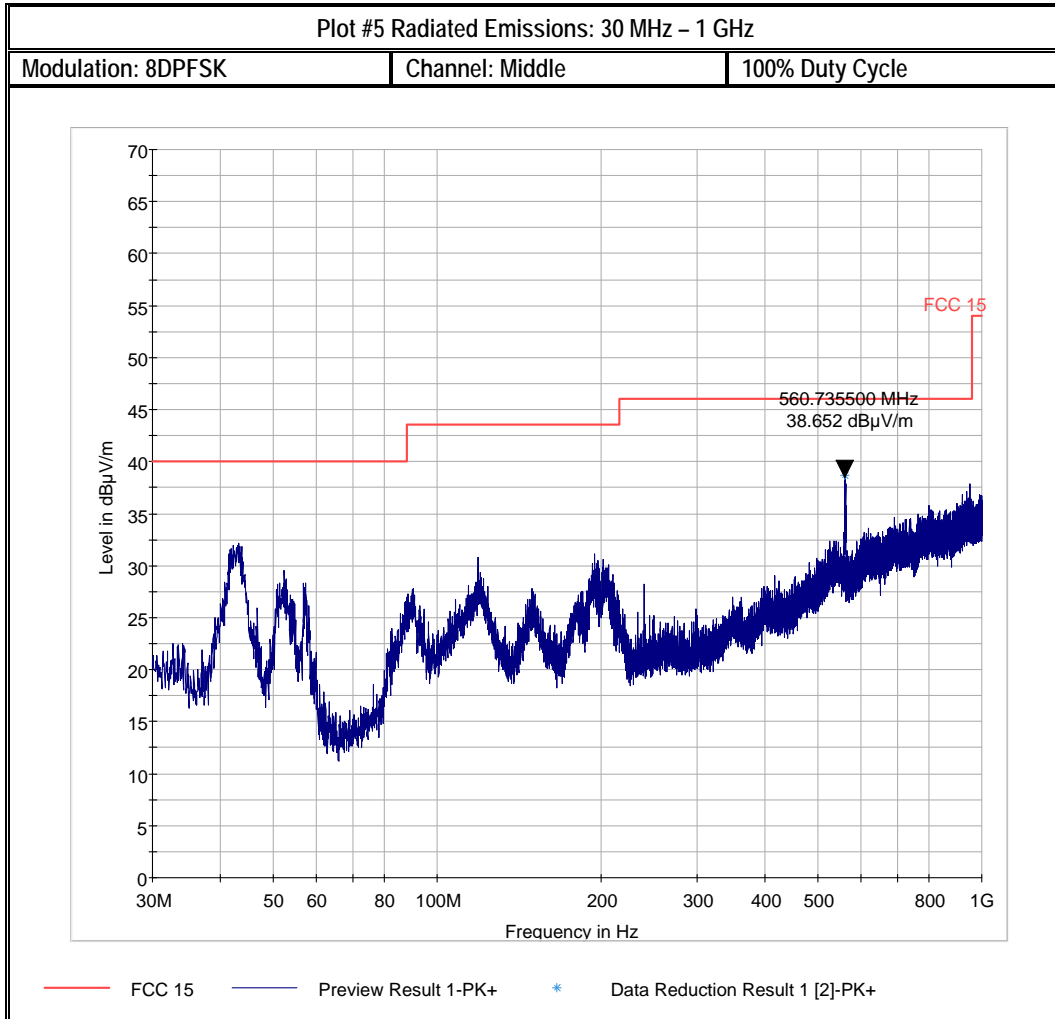
8.4.5 Measurement Plots:

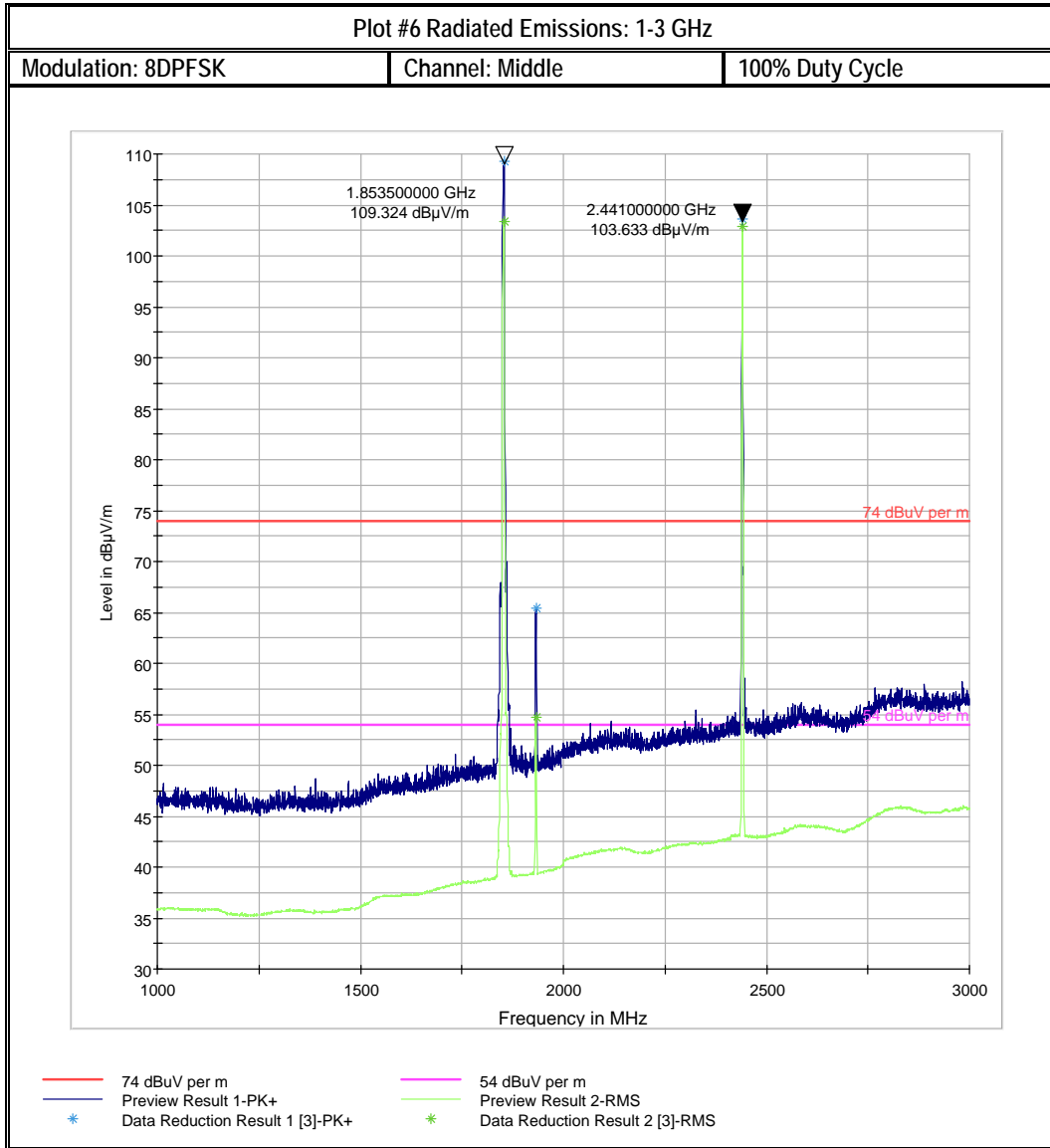


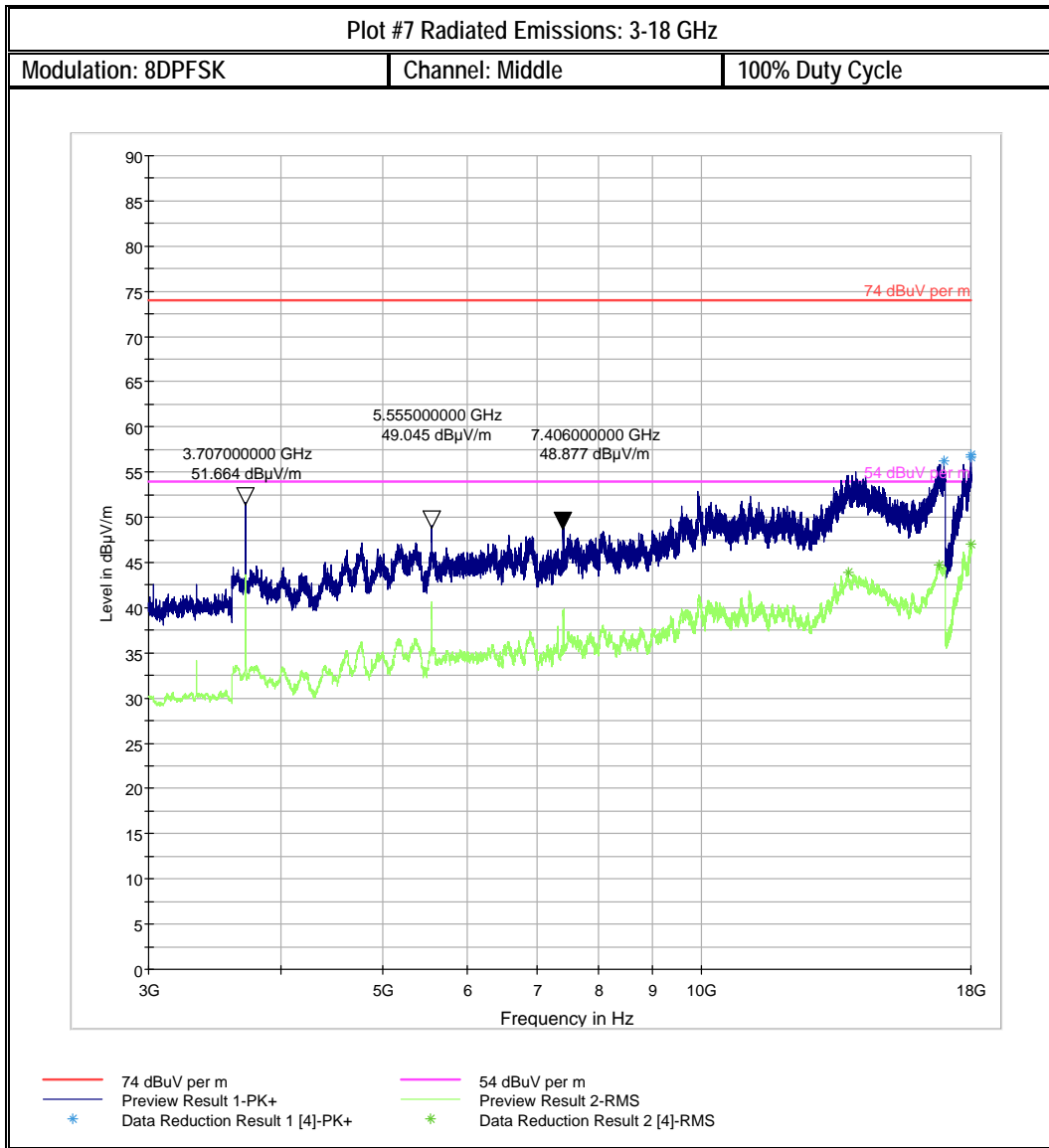


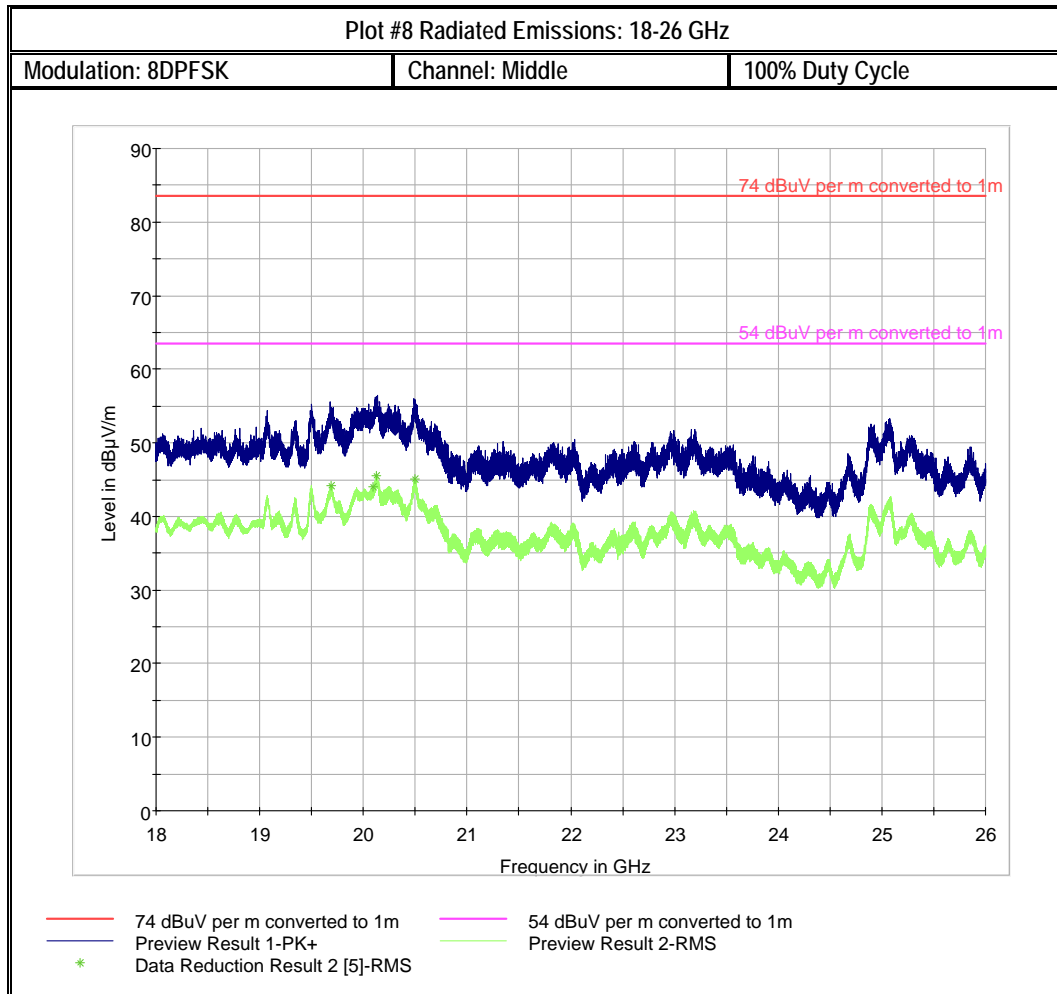


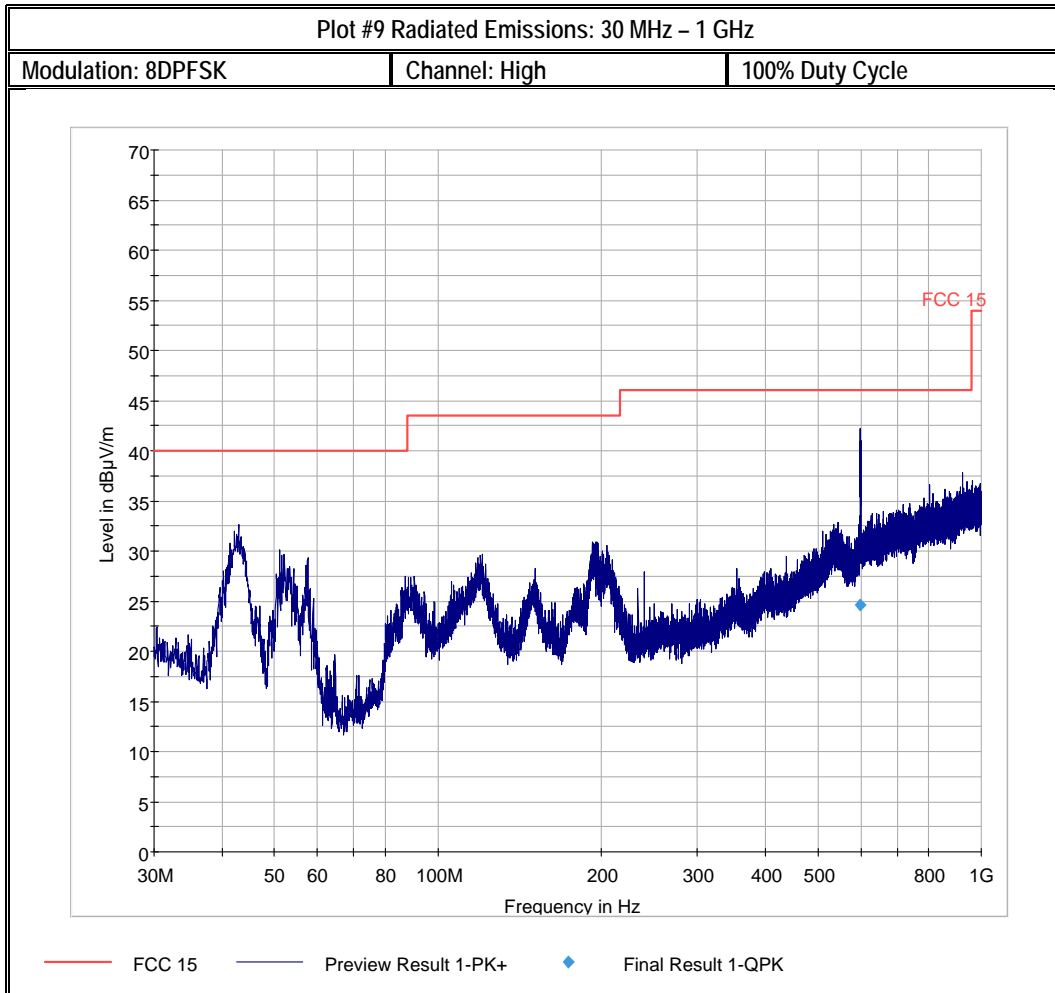


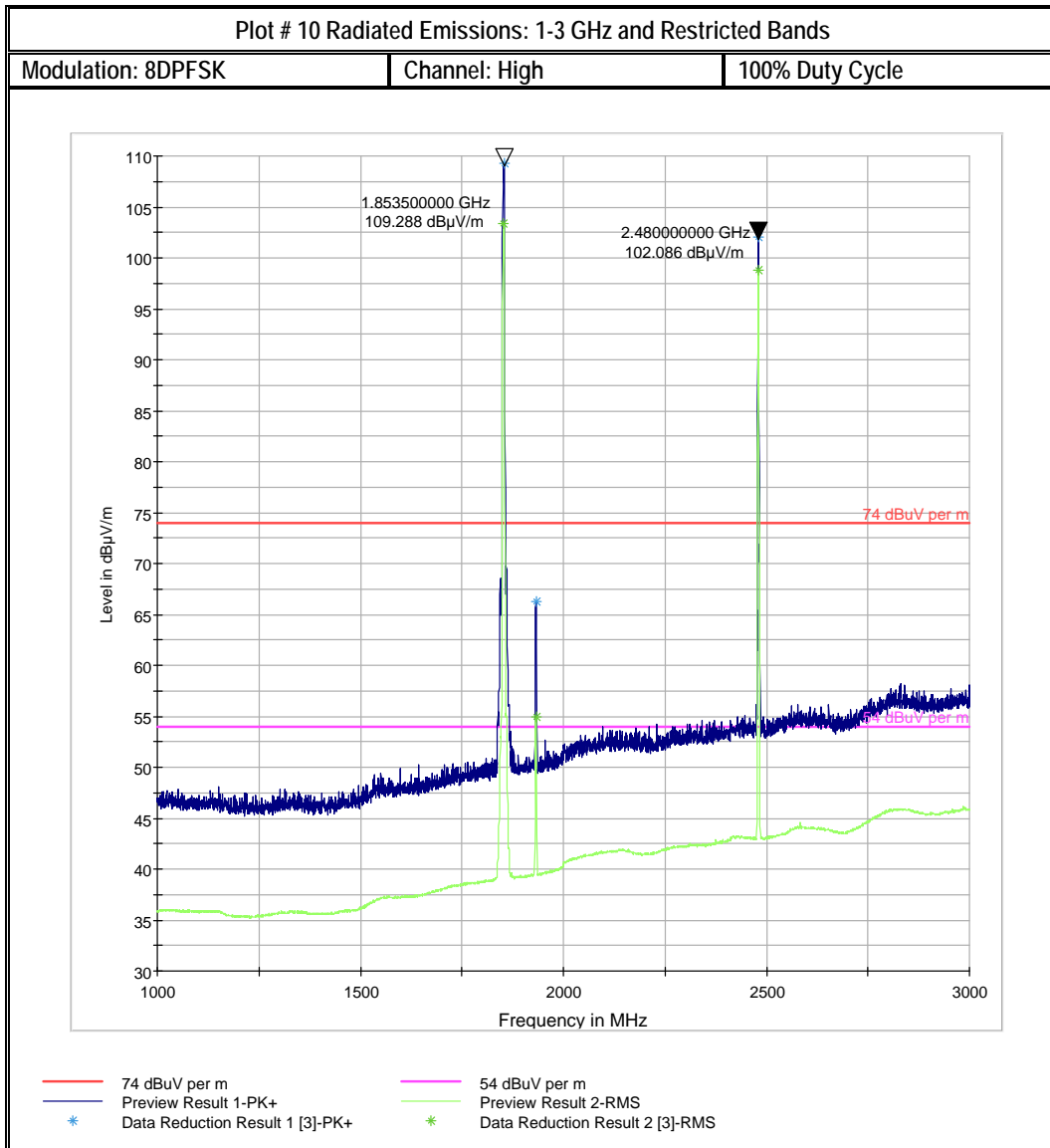


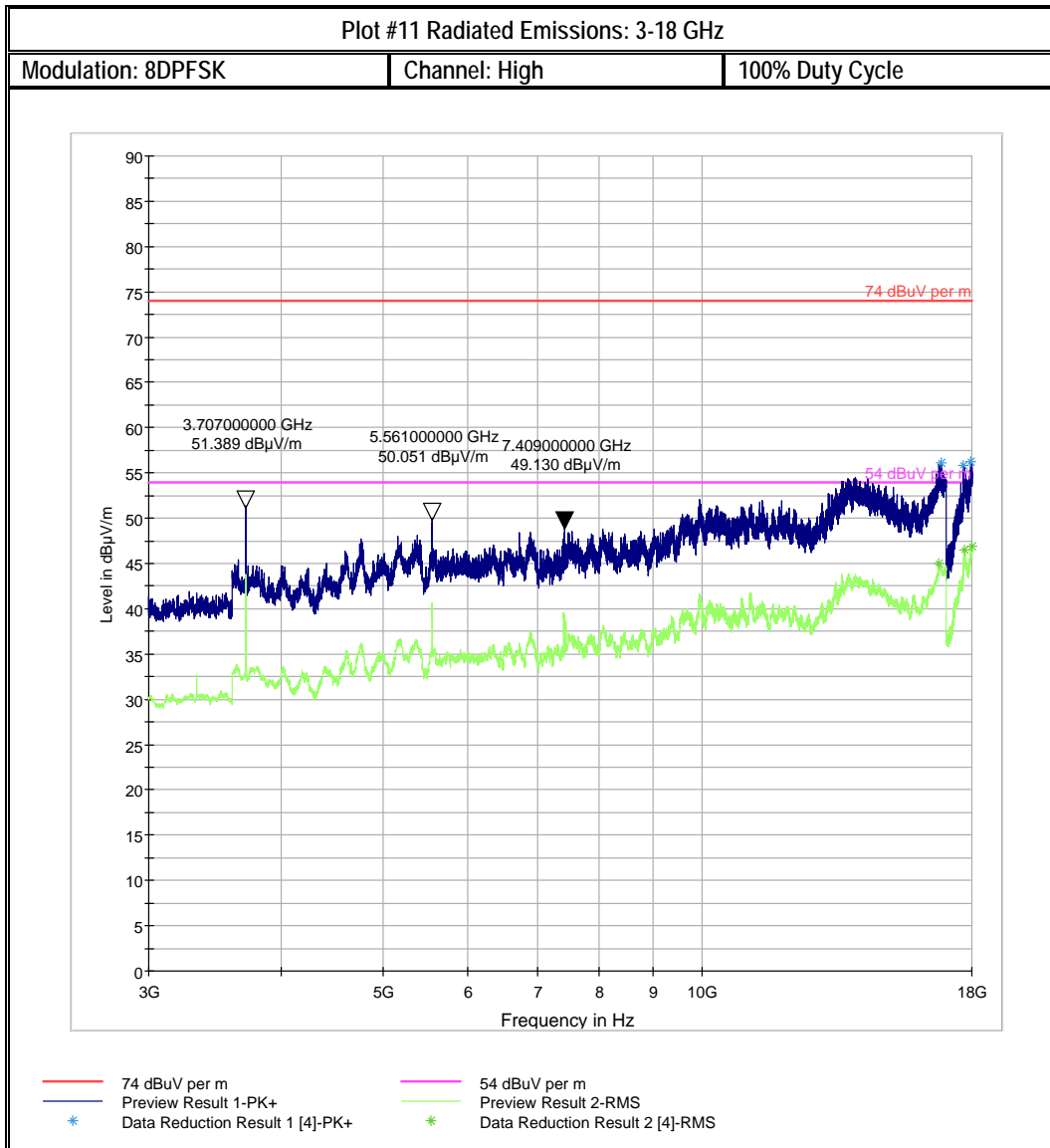












8.5 AC Power Line Conducted Emissions

8.5.1 Measurement according to ANSI C63.10 (2013)

Analyzer Settings:

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

8.5.2 Limits: FCC 15.207 & RSS-Gen 8.8

(a) 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 μ H/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 (dB μ V)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

*Decreases with the logarithm of the frequency.

8.5.3 Test conditions and setup:

Ambient Temperature (C)	EUT Set-Up #	EUT operating mode	Power line (L1, L2, L3, N)	Power Input
22	2	8DPSK continuous fixed channel	Line & Neutral	110 V / 60 Hz

8.5.4 Measurement Result:

Plot #	Port	EUT Set-Up #	EUT operating mode	Scan Frequency	Limit	Result
1	AC Mains	2	8DPSK continuous fixed channel	150 kHz – 30 MHz	See section 8.8.2	Pass

8.5.5 Measurement Plots:

Plot # 1

EUT Information

EUT Serial Number: 39F003818
 Manufacturer: Garmin International
 Comment: 120 V, 60 Hz

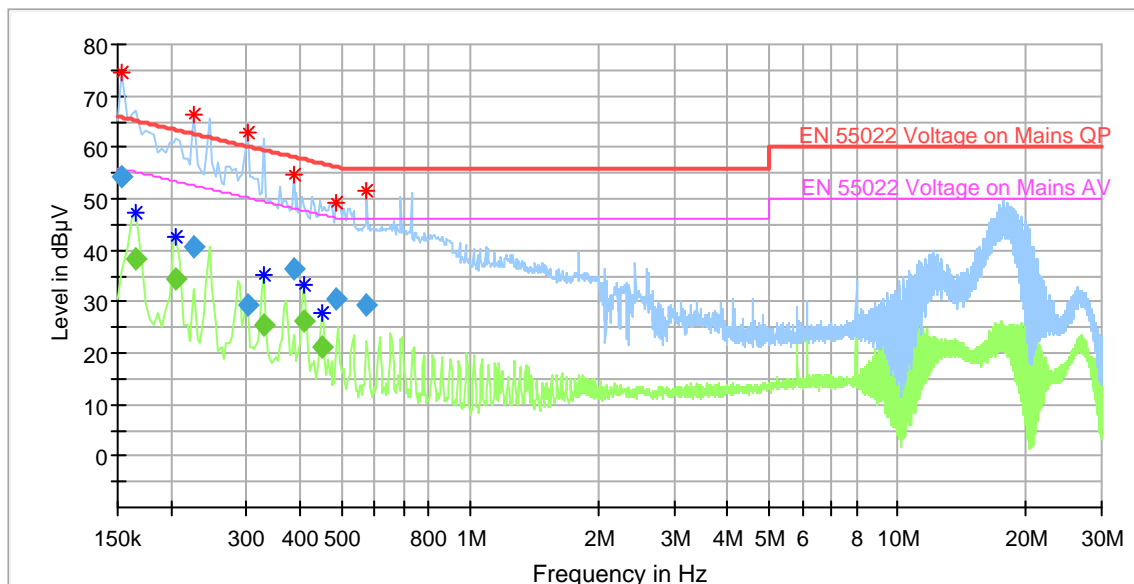
Quasi-peak Measurement Final Result

Frequency (MHz)	Quasi-Peak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.154000	54.41	500.0	9.000	GN	L1	8.5	11.37	65.78	Pass
0.226000	40.69	500.0	9.000	GN	N	6.3	21.90	62.60	Pass
0.302000	29.44	500.0	9.000	GN	L1	4.0	30.75	60.19	Pass
0.386000	36.31	500.0	9.000	GN	N	3.1	21.84	58.15	Pass
0.486000	30.68	500.0	9.000	GN	L1	2.1	25.55	56.24	Pass
0.574000	29.17	500.0	9.000	GN	L1	1.7	26.83	56.00	Pass

Average Measurement Final Result

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.166000	38.34	500.0	9.000	GN	N	8.2	16.82	55.16	Pass
0.206000	34.24	500.0	9.000	GN	N	6.8	19.13	53.37	Pass
0.330000	25.55	500.0	9.000	GN	L1	3.7	23.90	49.45	Pass
0.410000	26.10	500.0	9.000	GN	L1	2.8	21.55	47.65	Pass
0.450000	21.32	500.0	9.000	GN	L1	2.3	25.56	46.88	Pass

Disclaimer: Any measurement data within 2dB from the limit line is conditional PASS/FAIL due to measurement uncertainty considerations.



- ◆— Preview Result 2-AVG
- ◆— Preview Result 1-PK+
- * Critical_Freqs AVG
- * Critical_Freqs PK+
- ◆— EN 55022 Voltage on Mains QP
- ◆— EN 55022 Voltage on Mains AV
- ◆ Final_Result QPK
- ◆ Final_Result AVG

9 Test setup photos

Setup photos are included in supporting file name: "EMC_GARMI-047-17001_15.247_BT_Setup_Photos.pdf"

10 Test Equipment And Ancillaries Used For Testing

Item Name	Equipment Type	Manufacturer	Model	Serial #	Calibration Cycle	Last Calibration Date
Antenna Biconilog 3142E	BiconiLog Antenna	EMCO	3142E	166067	3 years	6/27/2017
Magnetic Loop Antenna	Loop Antenna	ETS Lindgren	6512	00049838	3 years	7/28/2017
Antenna Horn 3115	Horn Antenna	EMCO	3115	35111	3 years	7/24/2015
Antenna Horn 3116	Horn Antenna	ETS Lindgren	3116	70497	3 years	7/22/2015
Digital Barometer, Temperature, Humidity	Compact Digital Barometer	Control Company	35519-055	91119547	1 Years	06/08/2018
FSU26	Spectrum Analyzer	R&S	FSU26	200256	2 years	07/04/2017
LISN	Line Impedance Stabilization Network	FCC	FCC-LISN-50-25-2-08	8014	1 Year	11/10/2017

Note: 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 Revision History

Date	Report Name	Changes to report	Report prepared by