



STC Test Report

Date : 2016-09-14
No. : HM170252

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Applicant: K-MARK INDUSTRIAL LIMITED
FLAT A, 7/F., MAI ON IND. BLDG., 17-21 KUNG YIP STREET,
KWAI CHUNG, HONG KONG

Manufacturer: K-MARK INDUSTRIAL LIMITED
FLAT A, 7/F., MAI ON IND. BLDG., 17-21 KUNG YIP STREET,
KWAI CHUNG, HONG KONG

Description of Sample(s): Product: Simple Relay
Brand Name: Hearing Lab Technology, LLC
Model Number: 150701
FCC ID: VEP-SQC7B00

Date Sample(s) Received: 2016-06-16, 2016-08-17

Date Tested: 2016-06-20 to 2016-08-27

Investigation Requested: Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2015 and ANSI C63.10: 2013 for FCC Certification.

Conclusion(s): The submitted product COMPLIED with the requirements of Federal Communications Commission [FCC] Rules and Regulations Part 15. The tests were performed in accordance with the standards described above and on Section 2.2 in this Test Report.

Remark(s): Bluetooth FHSS (GFSK, Pi/4QPSK, 8DPSK)


Dr. LEE Kam Chuen
Authorized Signatory
ElectroMagnetic Compatibility Department
For and on behalf of
The Hong Kong Standards and Testing Centre Ltd.



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Appendix A

List of Measurement Equipment

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1.0 General Details

1.1 Test Laboratory

The Hong Kong Standards and Testing Centre Ltd.
EMC Laboratory
10 Dai Wang Street, Taipo Industrial Estate

Telephone: (852) 26661888
Fax: (852) 26644353

1.2 Equipment Under Test [EUT] Description of Sample(s)

Product: Simple Relay
Manufacturer: K-MARK INDUSTRIAL LIMITED
FLAT A, 7/F., MAI ON IND. BLDG., 17-21 KUNG YIP
STREET, KWAI CHUNG, HONG KONG
Brand Name: Hearing Lab Technology, LLC
Model Number: 150701
Rating: Adapter Input: 100-240Va.c. 50/60Hz 0.25A;
Output: 5.0Vd.c. 1.0A.
Battery: 3.7Vd.c., 570mAh rechargeable battery

1.2.1 Description of EUT Operation

The Equipment Under Test (EUT) is a r.f. audio device. The r.f. signal was modulated by IC and type of modulation was frequency hopping spread spectrum Modulation.

1.3 Date of Order

2016-06-16, 2016-08-17

1.4 Submitted Sample(s):

2 Samples

1.5 Test Duration

2016-06-20 to 2016-08-27

1.6 Country of Origin

China

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1.7 RF Module Details

Module Model Number:	BT1213
Module FCC ID:	N/A
Module Transmission Type:	Bluetooth V4.0+EDR
Modulation:	FHSS (GFSK / $\pi/4$ -DQPSK/ 8DPSK)
Data Rates:	1Mbps: GFSK 2 Mbps: $\pi/4$ -DQPSK 3 Mbps: 8DPSK
Frequency Range:	2400-2483.5MHz
Carrier Frequencies:	2402MHz – 2480MHz

Module Specification (specification provided by manufacturer)

1.8 Antenna Details

Antenna Type:	PCB Antenna
Antenna Gain:	-0.61 dBi

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2.0 Technical Details

2.1 Investigations Requested

Perform Electromagnetic Interference measurements in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2014 Regulations. ANSI C63.10: 2013 for FCC Certification.

2.2 Test Standards and Results Summary Tables

EMISSION Results Summary						
Test Condition	Test Requirement	Test Method	Class / Severity	Test Result		
				Pass	Fail	N/A
Maximum Peak Conducted Output Power	FCC 47CFR 15.247(b)(1)	ANSI C63.10: 2013	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Radiated Spurious Emissions	FCC 47CFR 15.209	ANSI C63.10: 2013	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
AC Mains Conducted Emissions	FCC 47CFR 15.207	ANSI C63.10: 2013	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Number of Hopping Frequency	FCC 47CFR 15.247 (b)(1)	ANSI C63.10: 2013	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20dB Bandwidth	FCC 47CFR 15.247(a)(2)	ANSI C63.10: 2013	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hopping Channel Separation	FCC 47CFR 15.247(a)(1)	ANSI C63.10: 2013	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Band-edge measurement (Radiated)	FCC 47CFR 15.247(d)	ANSI C63.10: 2013	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pseudorandom Hopping Algorithm	FCC 47CFR 15.247(a)(1)	N/A	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Time of Occupancy (Dwell Time)	FCC 47CFR 15.247(a)(1)(iii)	ANSI C63.10: 2013	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Antenna requirement	FCC 47CFR 15.203	N/A	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
RF Exposure	FCC 47CFR 15.247(i)	N/A	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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2.3 Table for Test Modes

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate in the table below is the worst case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Data Rate
Maximum Peak Conducted Output Power	GFSK / $\pi/4$ -DQPSK / 8DPSK	1MBps / 2MBps / 3MBps
Hopping Channel Separation	GFSK / $\pi/4$ -DQPSK / 8DPSK	1MBps / 2MBps / 3MBps
Number of Hopping Frequency	GFSK / $\pi/4$ -DQPSK / 8DPSK	2MBps
Time of Occupancy(Dwell Time)	8DPSK (DH1 / DH3 / DH5)	2MBps
Radiated Spurious Emissions	GFSK / $\pi/4$ -DQPSK / 8DPSK	1MBps / 2MBps / 3MBps
Band-edge compliance of Conducted Emission	GFSK / $\pi/4$ -DQPSK / 8DPSK	2MBps

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3.0 Test Results

3.1 Emission

3.1.1 Maximum Peak Conducted Output Power

Test Requirement: FCC 47CFR 15.247(b)(2)
Test Method: ANSI C63.10: 2013
Test Date: 2016-08-07
Mode of Operation: Tx mode

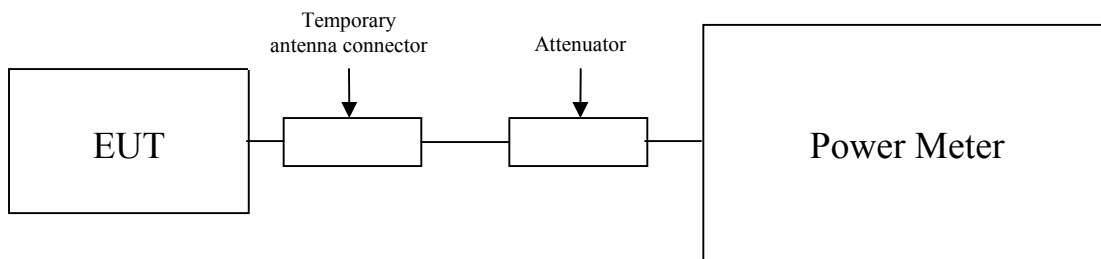
Test Method:

A temporary antenna connector was soldered to the RF output. The RF output of the EUT was connected to the spectrum analyzer. All the attenuation or cable loss will be added to the measured maximum output power. The results are recorded in dBm.

Spectrum Analyzer Setting:

RBW = 3 MHz, VBW = 3MHz, Sweep = Auto, Span = 10MHz
Detector = Peak, Trace = Max. hold

Test Setup:





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Limits for Maximum Peak Conducted Output Power [FCC 47CFR 15.247]:

The maximum peak output power shall not exceeded the following limits:
For frequency hopping systems employing at least 75 hopping channels: 1 Watt
For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 Watts
For Digital Transmission systems in 2400-2483.5 MHz Band: 1 Watt

Results of Bluetooth Communication mode (GFSK) (Fundamental Power): Pass

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2402	0.00045

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2441	0.00076

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2480	0.00071

Results of Bluetooth Communication mode ($\pi/4$ -DQPSK) (Fundamental Power): Pass

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2402	0.00025

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2441	0.00031

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2480	0.00041

Results of Bluetooth Communication mode (8 DPSK) (Fundamental Power): Pass

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2402	0.00048

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2441	0.00037

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2480	0.00046

Calculated measurement uncertainty : 30MHz to 1GHz 1.7dB
1GHz to 18GHz 1.7dB

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3.1.2 Radiated Spurious Emissions

Test Requirement: FCC 47CFR 15.209
Test Method: ANSI C63.10: 2013
Test Date: 2016-07-05 to 2016-08-24
Mode of Operation: Tx mode

Test Method:

The sample was placed 0.8m above the ground plane of semi-anechoic Chamber*. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

* Semi-anechoic chamber located on the G/F of “The Hong Kong Standards and Testing Centre Ltd.” with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 607756.

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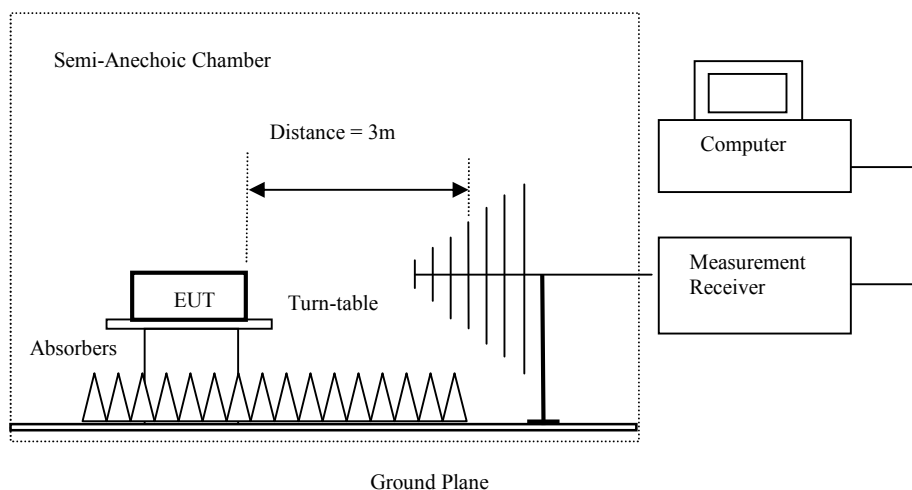
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Spectrum Analyzer Setting:

9KHz – 30MHz (Pk & Av)	RBW: 10kHz VBW: 30kHz Sweep: Auto Span: Fully capture the emissions being measured Trace: Max. hold
30MHz – 1GHz (QP)	RBW: 120kHz VBW: 120kHz Sweep: Auto Span: Fully capture the emissions being measured Trace: Max. hold
Above 1GHz (Pk & Av)	RBW: 1MHz VBW: 3MHz Sweep: Auto Span: Fully capture the emissions being measured Trace: Max. hold

Test Setup:



- Absorbers placed on top of the ground plane are for measurements above 1000MHz only.
- Measurements between 30MHz to 1000MHz made with Bi-log antennas, above 1000MHz horn antennas are used, 9kHz to 30MHz loop antennas are used.

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Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

Frequency Range [MHz]	Quasi-Peak Limits [μ V/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

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Result of Tx mode (2402.0 MHz) (GFSK mode) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level dBuV	Correction Factor dB/m	Field Strength dBuV/m	Field Strength uV/m	Limit uV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2402.0 MHz) (GFSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Limit @3m dBμV/m	Margin dBμV/m	E-Field Polarity
2402.1	62.4	28.9	91.3	N/A	N/A	Vertical
4804.0	13.6	34.7	48.3	74.0	25.7	Vertical
7206.3	5.9	37.4	43.3	71.3	28.0	Vertical

Result of Tx mode (2402.0 MHz) (GFSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Limit @3m dBμV/m	Margin dBμV/m	E-Field Polarity
2402.1	53.5	28.9	82.4	N/A	N/A	Vertical
4804.0	5.0	34.7	39.7	54.0	14.3	Vertical
7206.0	2.8	37.4	40.2	54.0	13.8	Vertical



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Result of Tx mode (2441.0 MHz) (GFSK mode) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions						
Peak Value						
Frequency MHz	Measured Level dBuV	Correction Factor dB/m	Field Strength dBuV/m	Field Strength uV/m	Limit uV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2441.0 MHz) (GFSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions						
Peak Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Limit @3m dBμV/m	Margin dBμV/m	E-Field Polarity
2441.0	63.5	28.9	92.4	N/A	N/A	Vertical
4882.1	12.9	34.7	47.6	74.0	26.4	Vertical
7323.3	4.8	37.5	42.3	74.0	31.7	Vertical

Result of Tx mode (2441.0 MHz) (GFSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Limit @3m dBμV/m	Margin dBμV/m	E-Field Polarity
2441.0	56.0	28.9	84.9	N/A	N/A	Vertical
4882.1	4.4	34.7	39.1	54.0	14.9	Vertical
7323.3	3.2	37.5	40.7	54.0	13.3	Vertical

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Result of Tx mode (2480.0 MHz) (GFSK mode) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions						
Peak Value						
Frequency MHz	Measured Level dBuV	Correction Factor dB/m	Field Strength dBuV/m	Field Strength uV/m	Limit uV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2480.0 MHz) (GFSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions						
Peak Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Limit @3m dBμV/m	Margin dBμV/m	E-Field Polarity
2480.0	63.2	28.9	92.1	N/A	N/A	Vertical
4961.0	11.1	34.7	45.8	74.0	28.2	Vertical
7441.0	4.2	37.5	41.7	74.0	32.3	Vertical

Result of Tx mode (2480.0 MHz) (GFSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Limit @3m dBμV/m	Margin dBμV/m	E-Field Polarity
2480.0	54.7	28.9	83.6	N/A	N/A	Vertical
4961.0	4.6	34.7	39.3	54.0	14.7	Vertical
7441.0	2.8	37.5	40.3	54.0	13.7	Vertical



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Result of Tx mode (2402.0 MHz) ($\pi/4$ -DQPSK mode) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level dBuV	Correction Factor dB/m	Field Strength dBuV/m	Field Strength uV/m	Limit uV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2402.0 MHz) ($\pi/4$ -DQPSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
2402.0	61.4	28.9	90.3	N/A	N/A	Vertical
4804.1	9.5	34.7	44.2	74.0	29.8	Vertical
7206.1	3.7	37.4	41.1	74.0	32.9	Vertical

Result of Tx mode (2402.0 MHz) ($\pi/4$ -DQPSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
2402.0	54.4	28.9	83.3	N/A	N/A	Vertical
4804.1	4.9	34.7	39.6	54.0	14.4	Vertical
7206.1	2.8	37.4	40.2	54.0	13.8	Vertical



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Result of Tx mode (2441.0 MHz) ($\pi/4$ -DQPSK mode) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions						
Peak Value						
Frequency MHz	Measured Level dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Field Strength uV/m	Limit uV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2441.0 MHz) ($\pi/4$ -DQPSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions						
Peak Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
2441.0	62.0	28.9	90.9	N/A	N/A	Vertical
4882.3	9.6	34.7	44.3	74.0	29.7	Vertical
7323.6	5.7	37.5	43.2	74.0	30.8	Vertical

Result of Tx mode (2441.0 MHz) ($\pi/4$ -DQPSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
2441.0	55.0	28.9	83.9	N/A	N/A	Vertical
4882.3	5.2	34.7	39.9	54.0	14.1	Vertical
7323.6	2.6	37.5	40.1	54.0	13.9	Vertical



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Result of Tx mode (2480.0 MHz) ($\pi/4$ -DQPSK mode) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions						
Peak Value						
Frequency	Measured Level	Correction Factor	Field Strength	Field Strength	Limit	E-Field Polarity
MHz	dBuV	dB/m	dBuV/m	uV/m	uV/m	
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2480.0 MHz) ($\pi/4$ -DQPSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions						
Peak Value						
Frequency	Measured Level @3m	Correction Factor	Field Strength	Limit @3m	Margin	E-Field Polarity
MHz	dB μ V	dB/m	dB μ V/m	dB μ V/m	dB μ V/m	
2480.0	61.7	28.9	90.6	N/A	N/A	Vertical
4960.5	9.9	34.7	44.6	74.0	29.4	Vertical
7440.3	3.8	37.5	41.3	74.0	32.7	Vertical

Result of Tx mode (2480.0 MHz) ($\pi/4$ -DQPSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions						
Average Value						
Frequency	Measured Level @3m	Correction Factor	Field Strength	Limit @3m	Margin	E-Field Polarity
MHz	dB μ V	dB/m	dB μ V/m	dB μ V/m	dB μ V/m	
2480.0	54.2	28.9	83.1	N/A	N/A	Vertical
4960.5	5.6	34.7	40.3	54.0	13.7	Vertical
7440.3	2.1	37.5	39.6	54.0	14.4	Vertical



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Result of Tx mode (2402.0 MHz) (8DPSK mode) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions						
Peak Value						
Frequency MHz	Measured Level dBuV	Correction Factor dB/m	Field Strength dBuV/m	Field Strength uV/m	Limit uV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2402.0 MHz) (8DPSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions						
Peak Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Limit @3m dBμV/m	Margin dBμV/m	E-Field Polarity
2402.0	62.0	28.9	90.9	N/A	N/A	Vertical
4804.1	9.6	34.7	44.3	74.0	29.7	Vertical
7206.1	3.6	37.5	41.1	74.0	32.9	Vertical

Result of Tx mode (2402.0 MHz) (8DPSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Limit @3m dBμV/m	Margin dBμV/m	E-Field Polarity
2402.0	54.8	28.9	83.7	N/A	N/A	Vertical
4804.1	5.9	34.7	40.6	54.0	13.4	Vertical
7206.1	2.4	37.5	39.9	54.0	14.1	Vertical



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Result of Tx mode (2441.0 MHz) (8DPSK mode) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions						
Peak Value						
Frequency MHz	Measured Level dBuV	Correction Factor dB/m	Field Strength dBuV/m	Field Strength uV/m	Limit uV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2441.0 MHz) (8DPSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions						
Peak Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Limit @3m dBμV/m	Margin dBμV/m	E-Field Polarity
2441.0	62.4	28.9	91.3	N/A	N/A	Vertical
4882.3	9.9	34.7	44.6	74.0	29.4	Vertical
7323.1	3.7	37.5	41.2	74.0	32.8	Vertical

Result of Tx mode (2441.0 MHz) (8DPSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Limit @3m dBμV/m	Margin dBμV/m	E-Field Polarity
2441.0	55.0	28.9	83.9	N/A	N/A	Vertical
4882.3	6.0	34.7	40.7	54.0	13.3	Vertical
7323.1	2.2	37.5	39.7	54.0	14.3	Vertical

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Result of Tx mode (2480.0 MHz) (8DPSK mode) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions						
Peak Value						
Frequency MHz	Measured Level dBuV	Correction Factor dB/m	Field Strength dBuV/m	Field Strength uV/m	Limit uV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2480.0 MHz) (8DPSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions						
Peak Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Limit @3m dBμV/m	Margin dBμV/m	E-Field Polarity
2480.0	61.7	28.9	90.6	N/A	N/A	Vertical
4960.5	9.9	34.7	44.6	74.0	29.4	Vertical
7440.1	3.6	37.5	41.1	74.0	32.9	Vertical

Result of Tx mode (2480.0 MHz) (8DPSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Limit @3m dBμV/m	Margin dBμV/m	E-Field Polarity
2480.0	54.2	28.9	83.1	N/A	N/A	Vertical
4960.5	5.6	34.7	40.3	54.0	13.7	Vertical
7440.1	2.1	37.5	39.6	54.0	14.4	Vertical

Remarks:

- * Denotes restricted band of operation.
 Measurements were made using a peak detector. Any emission less than 1000MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 and the limits of FCC Rules Part 15 Section 15.209 were applied.

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty: (9kHz - 30MHz): 3.3dB
 (30MHz - 1GHz): 4.6dB
 (1GHz - 26GHz): 4.4dB

Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.

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Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

Frequency Range [MHz]	Quasi-Peak Limits [μ V/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Result of BT communication mode with charging function (30MHz – 1GHz): Pass

Radiated Emissions Quasi-Peak Value						
Frequency MHz	Measured Level @3m dBuV	Correction Factor dB/m	Field Strength dBuV/m	Limit @3m dBuV/m	Margin dBuV/m	E-Field Polarity
54.4	17.7	6.8	24.5	40.0	15.5	Vertical
52.9	23.0	6.8	29.8	40.0	10.2	Vertical
133.8	18.2	7.7	25.9	43.5	17.6	Horizontal
288.0	11.8	13.7	25.5	46.0	20.5	Horizontal
368.0	23.6	16.2	39.8	46.0	6.2	Horizontal
384.0	15.4	16.7	32.1	46.0	13.9	Horizontal

Remarks:

Calculated measurement uncertainty (30MHz – 1GHz): 4.6dB

Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.

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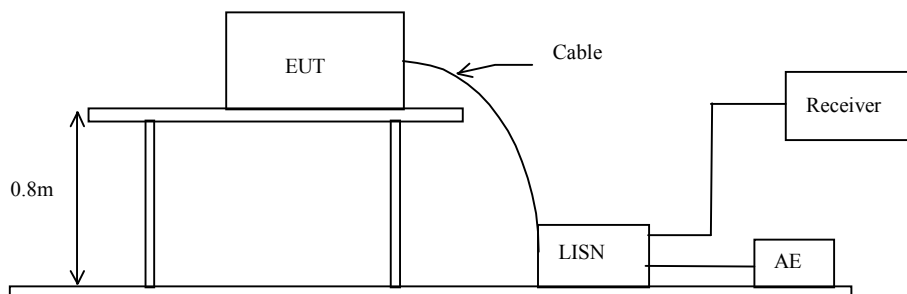
3.1.3 Conducted Emissions (0.15MHz to 30MHz)

Test Requirement: FCC 47CFR 15.207
Test Method: ANSI C63.10: 2013
Test Date: 2016-08-23
Mode of Operation: BT communication mode with charging function
Test Voltage: 120V a.c., 60Hz

Test Method:

The test was performed in accordance with ANSI C63.10: 2013, with the following: an initial measurement was performed in peak and average detection mode on the live line, any emissions recorded within 30dB of the relevant limit line were re-measured using quasi-peak and average detection on the live and neutral lines with the worst case recorded in the table of results.

Test Setup:





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Limit for Conducted Emissions (FCC 47 CFR 15.207):

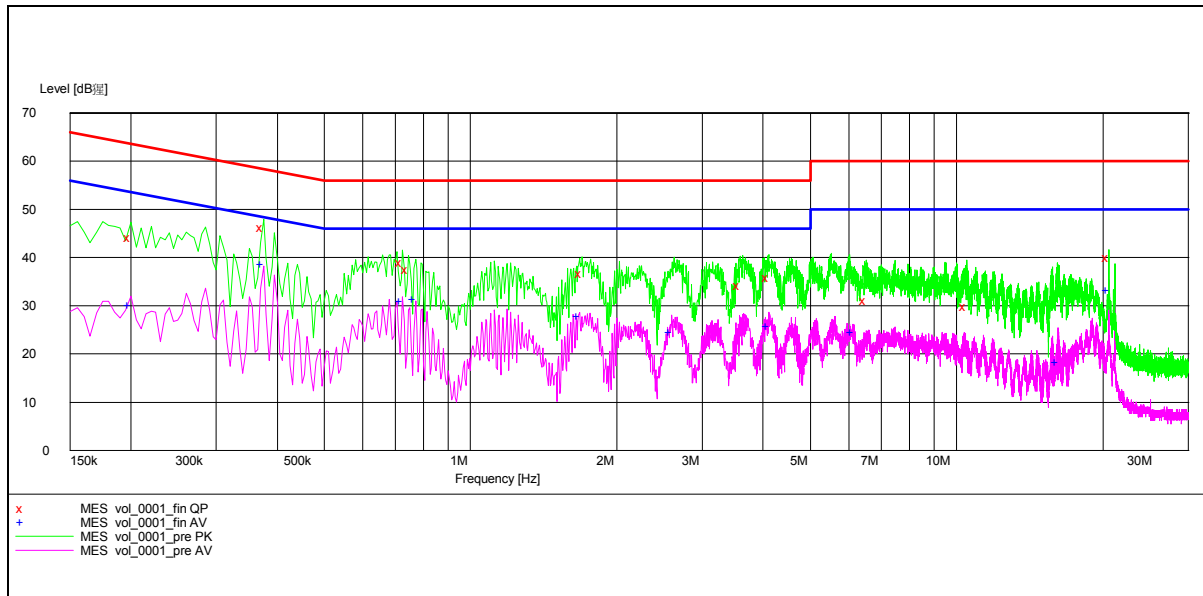
Frequency Range [MHz]	Quasi-Peak Limits [dB μ V]	Average [dB μ V]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

* Decreases with the logarithm of the frequency.

Limits for Conducted Emissions Test, please refer to limit lines (Quasi-Peak and Average) in the following diagram.

Results of BT communication mode with charging function – Live & Neutral: Pass

Please refer to the following diagram for individual results.



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Results of BT communication mode with charging function - Live: Pass

Conductor Live or Neutral	Frequency MHz	Quasi-peak		Average	
		Level dB μ V	Limit dB μ V	Level dB μ V	Limit dB μ V
Live	0.375	46.200	58.000	38.600	48.000
Live	0.745	37.500	56.000	-*-	-*-
Live	1.695	36.700	56.000	-*-	-*-
Live	2.595	-*-	-*-	24.400	46.000
Live	3.590	34.200	56.000	-*-	-*-
Live	4.110	-*-	-*-	25.700	46.000
Live	6.530	31.100	60.000	-*-	-*-
Live	16.180	-*-	-*-	18.200	50.000
Live	20.590	40.100	60.000	33.100	50.000

Results of BT communication mode with charging function - Neutral: Pass

Conductor Live or Neutral	Frequency MHz	Quasi-peak		Average	
		Level dB μ V	Limit dB μ V	Level dB μ V	Limit dB μ V
Neutral	0.200	44.100	64.000	30.000	54.000
Neutral	0.725	39.000	56.000	30.800	46.000
Neutral	0.770	-*-	-*-	31.200	46.000
Neutral	1.675	-*-	-*-	27.800	46.000
Neutral	4.110	35.900	56.000	-*-	-*-
Neutral	6.145	-*-	-*-	24.400	50.000
Neutral	10.505	29.800	60.000	-*-	-*-

Remarks:

Calculated measurement uncertainty (0.15MHz – 30MHz): 3.2dB

-*- Emission(s) that is far below the corresponding limit line.

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3.1.3 Number of Hopping Frequency

Limit of Number of Hopping Frequency

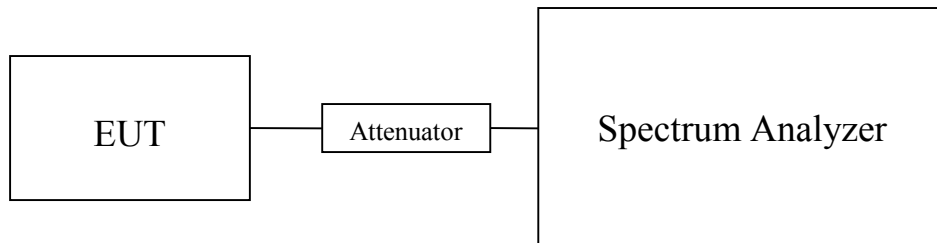
Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels

The RF output of the EUT was connected to the spectrum analyzer by a low loss cable.

Spectrum Analyzer Setting:

RBW = 1MHz, VBW \geq RBW, Sweep = Auto, Span = the frequency band of operation
Detector = Peak, Trace = Max. hold

Test Setup:



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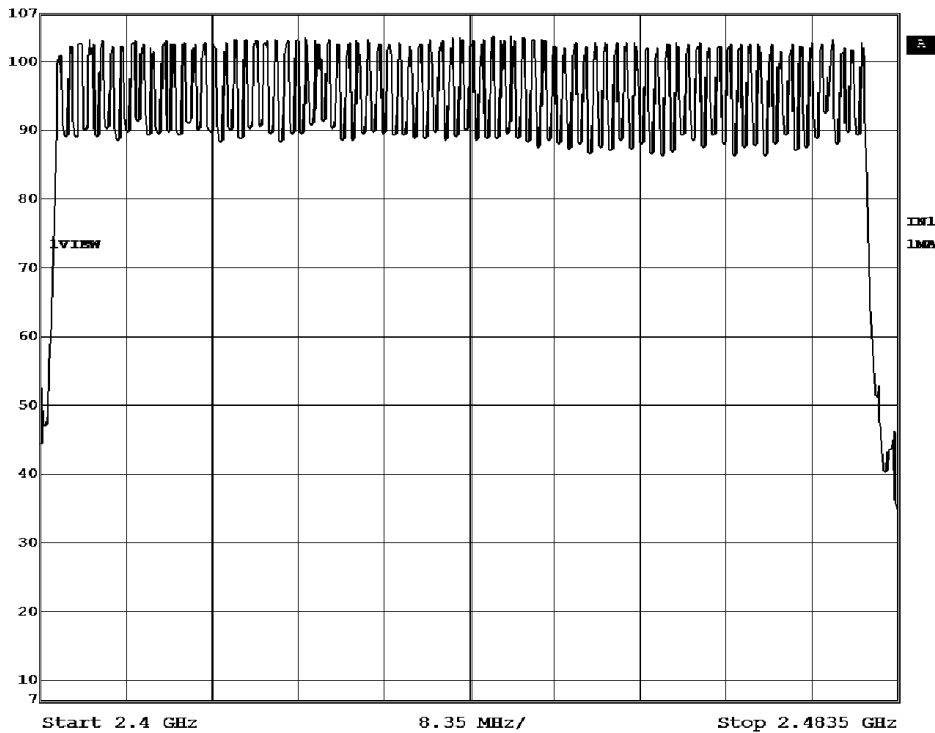
Measurement Data:

GFSK: 79 of 79 Channe



Ref Lvl
107 dBmV

RBW 100 kHz RF Att 10 dB
VBW 300 kHz
SWT 21 ms Unit dBmV



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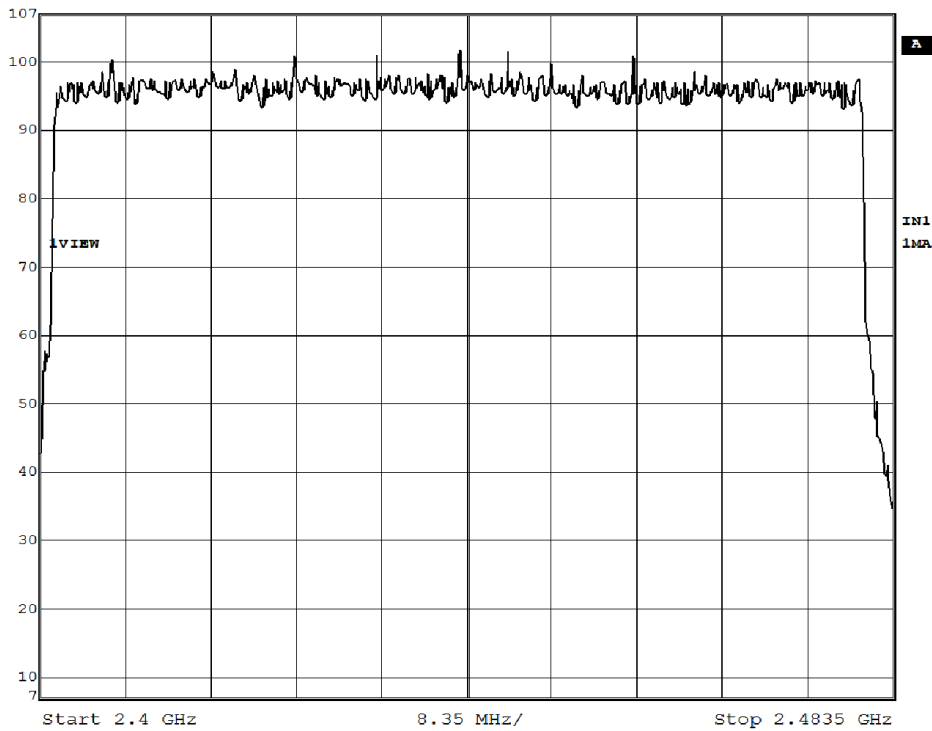
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$\pi/4$ -DQPSK: 79 of 79 Channe



Ref Lvl
107 dB μ V

RBW 100 kHz RF Att 10 dB
VEW 300 kHz
SWT 50 ms Unit dB μ V



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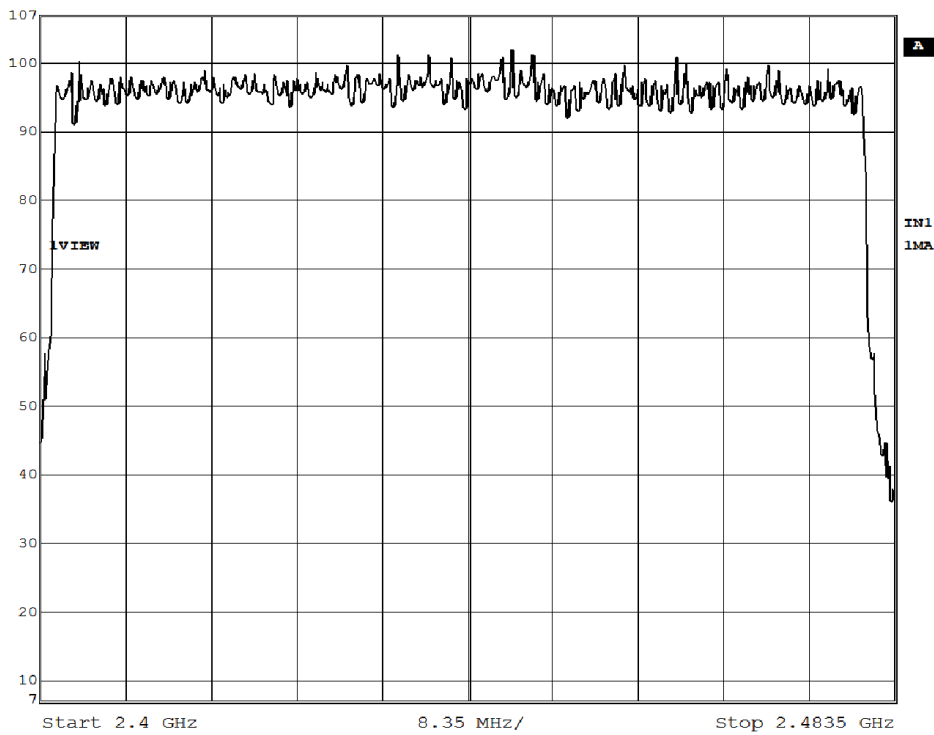
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8DPSK: 79 of 79 Channe



Ref Lvl
107 dBV

RBW 100 kHz RF Att 10 dB
VEW 300 kHz
SWT 50 ms Unit dBV



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3.1.4 20dB Bandwidth

Test Requirement: FCC 47CFR 15.247(a)(1)
Test Method: ANSI C63.10: 2013
Test Date: 2016-08-27
Mode of Operation: BT Communication mode

Remark:

The result has been done on all the possible configurations for searching the worst cases.

Test Method:

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

Test Setup:

As Test Setup of clause 3.1.3 in this test report.

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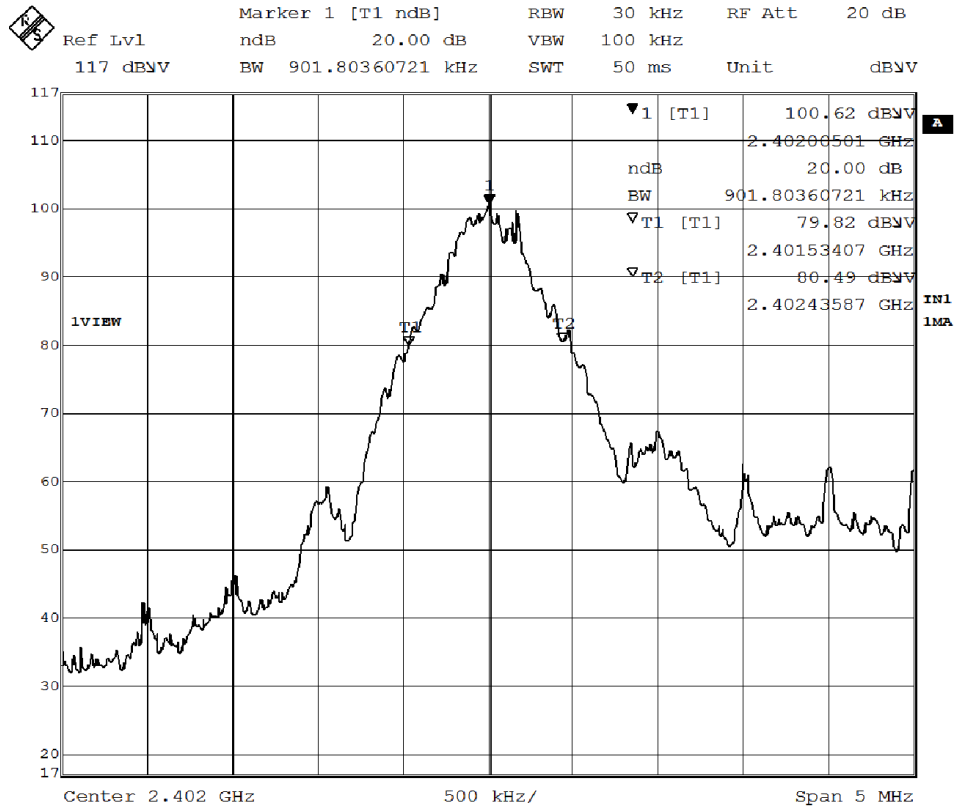
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Fundamental Frequency [MHz]	20dB Bandwidth [kHz]	FCC Limits [MHz]
2402	901.8	Within 2400-2483.5

(Lowest Operating Frequency) - (GFSK)





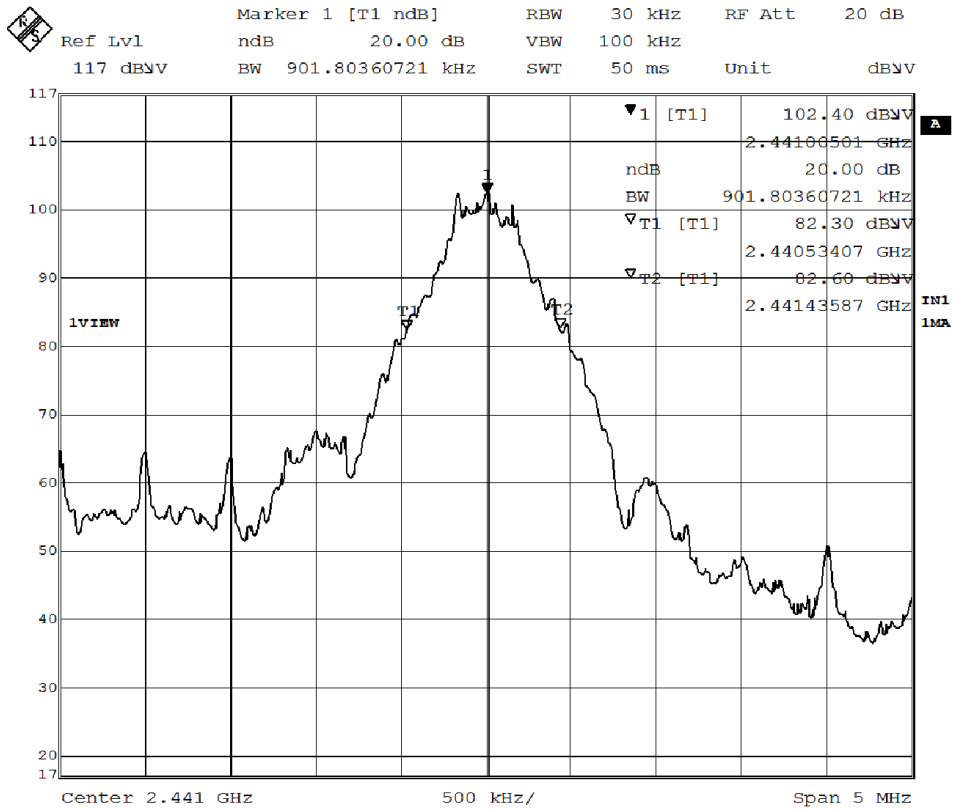
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Fundamental Frequency [MHz]	20dB Bandwidth [kHz]	FCC Limits [MHz]
2441	901.8	Within 2400-2483.5

(Middle Operating Frequency) - (GFSK)





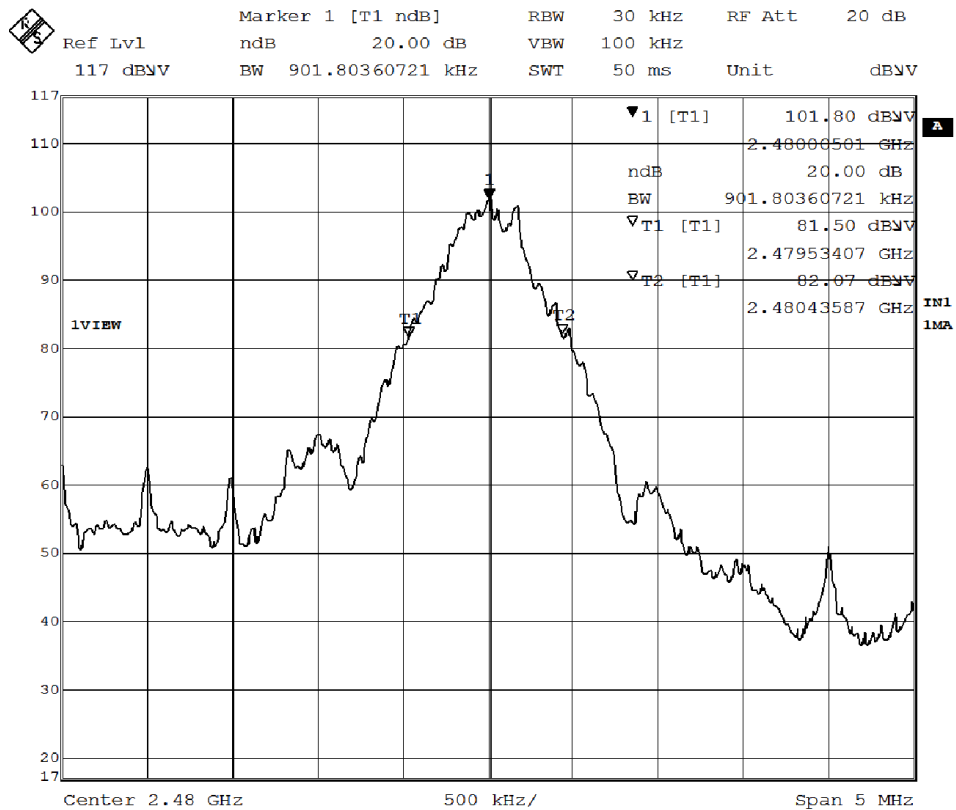
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Fundamental Frequency [MHz]	20dB Bandwidth [kHz]	FCC Limits [MHz]
2480	901.8	Within 2400-2483.5

(Highest Operating Frequency) - (GFSK)





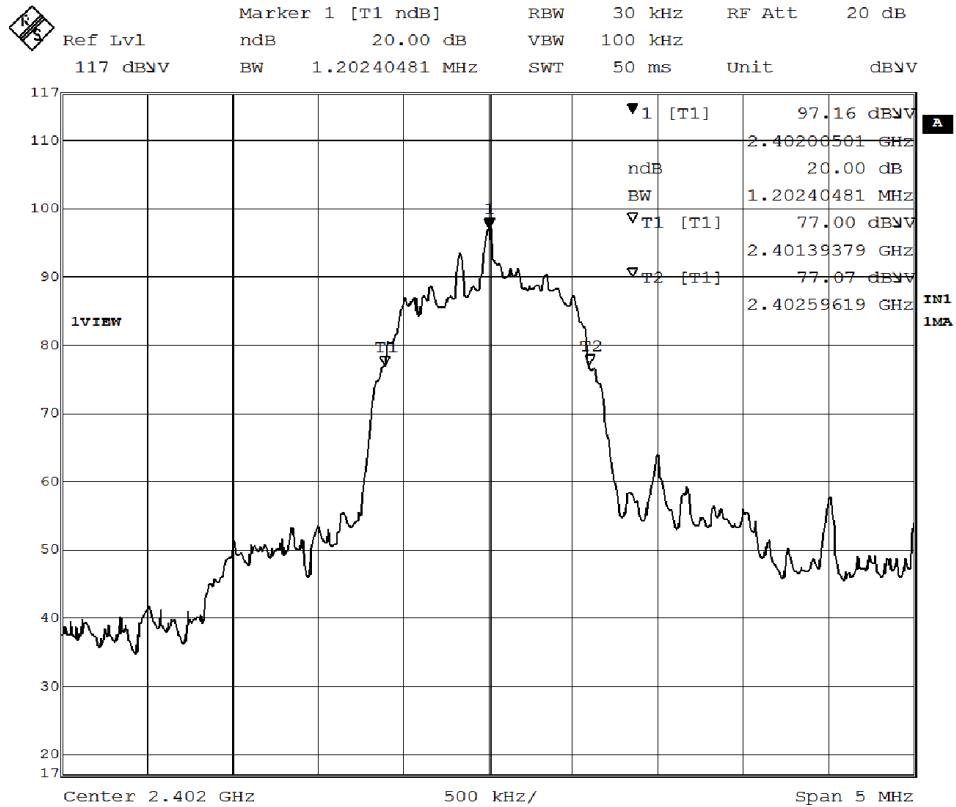
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Fundamental Frequency [MHz]	20dB Bandwidth [MHz]	FCC Limits [MHz]
2402	1.202	Within 2400-2483.5

(Lowest Operating Frequency) - ($\pi/4$ -DQPSK)





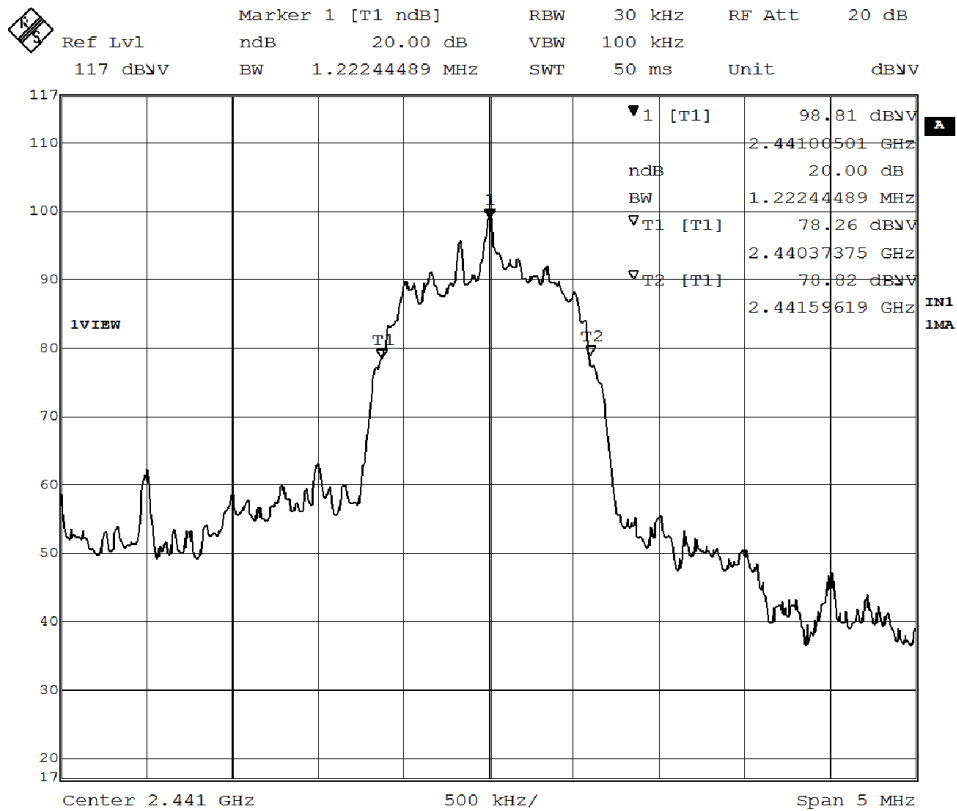
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Fundamental Frequency [MHz]	20dB Bandwidth [MHz]	FCC Limits [MHz]
2441	1.222	Within 2400-2483.5

(Middle Operating Frequency) - ($\pi/4$ -DQPSK)





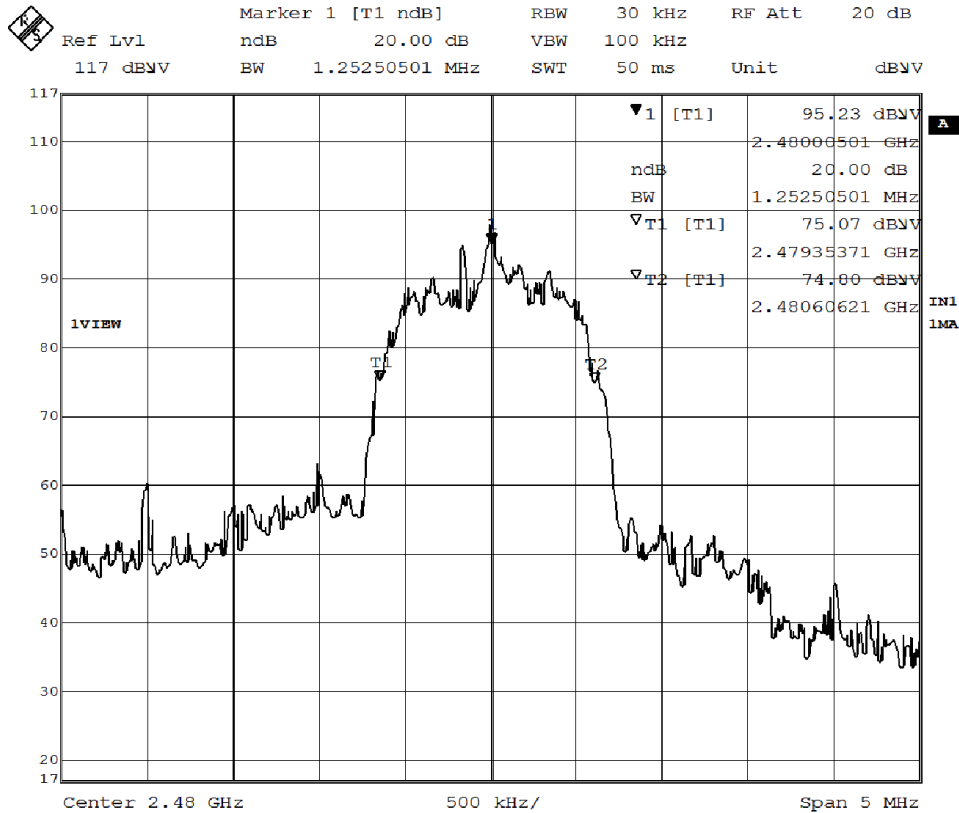
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Fundamental Frequency [MHz]	20dB Bandwidth [MHz]	FCC Limits [MHz]
2480	1.252	Within 2400-2483.5

(Highest Operating Frequency) - ($\pi/4$ -DQPSK)





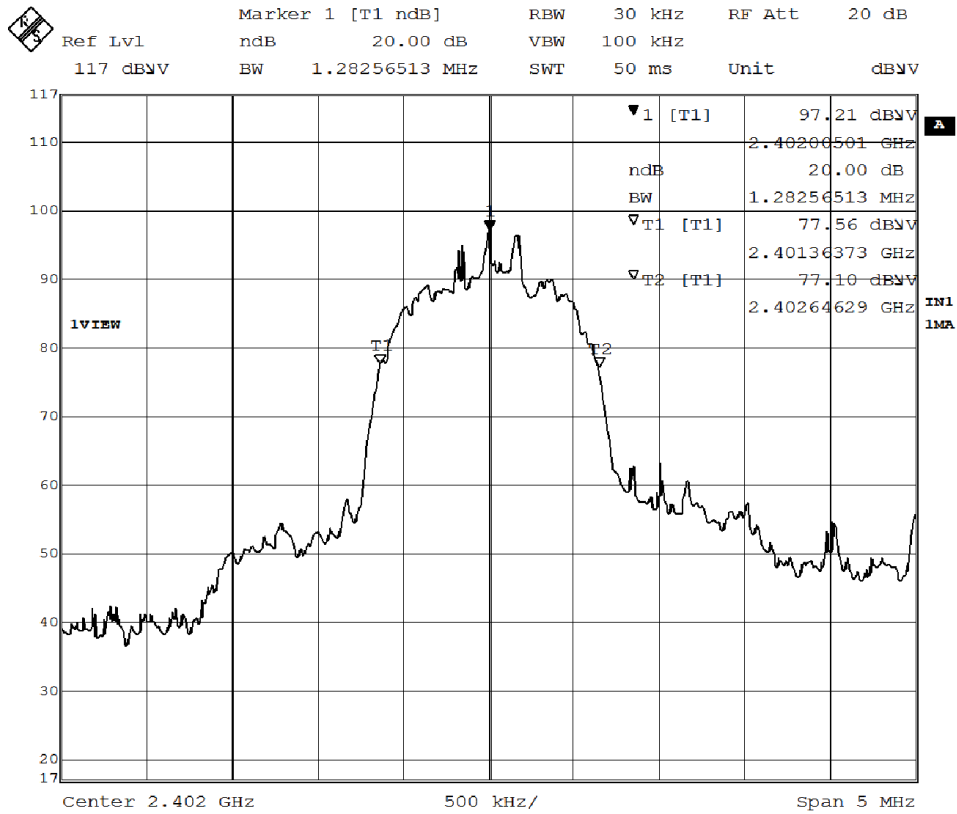
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Fundamental Frequency [MHz]	20dB Bandwidth [MHz]	FCC Limits [MHz]
2402	1.283	Within 2400-2483.5

(Lowest Operating Frequency) - (8DPSK)





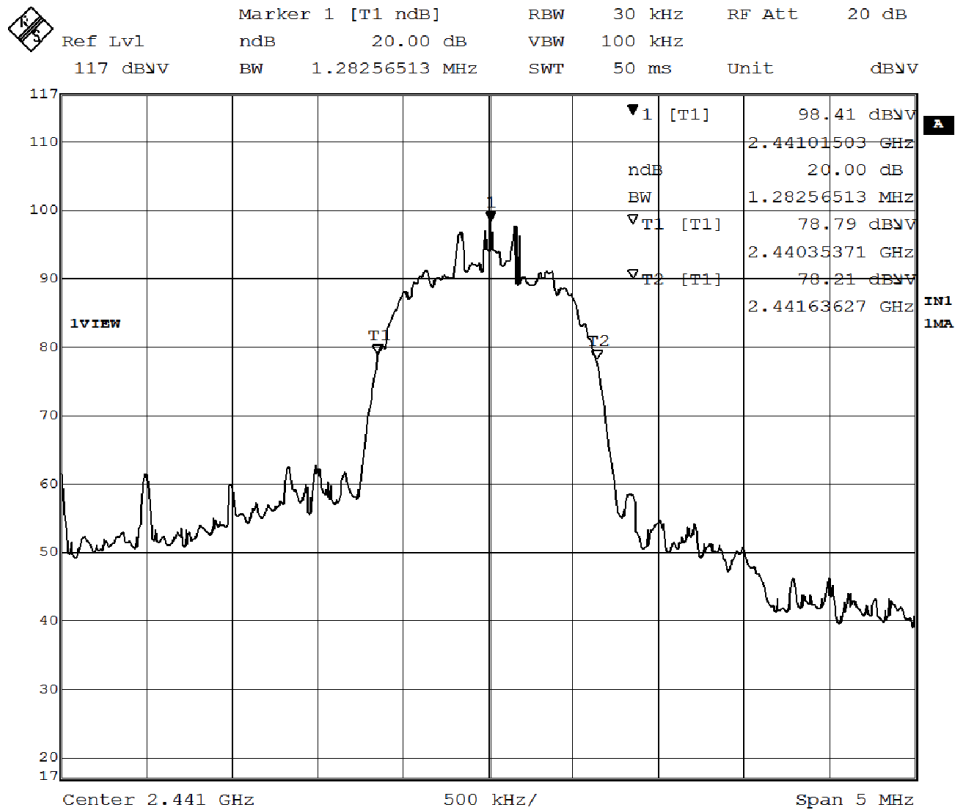
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Fundamental Frequency [MHz]	20dB Bandwidth [MHz]	FCC Limits [MHz]
2441	1.283	Within 2400-2483.5

(Middle Operating Frequency) - (8DPSK)





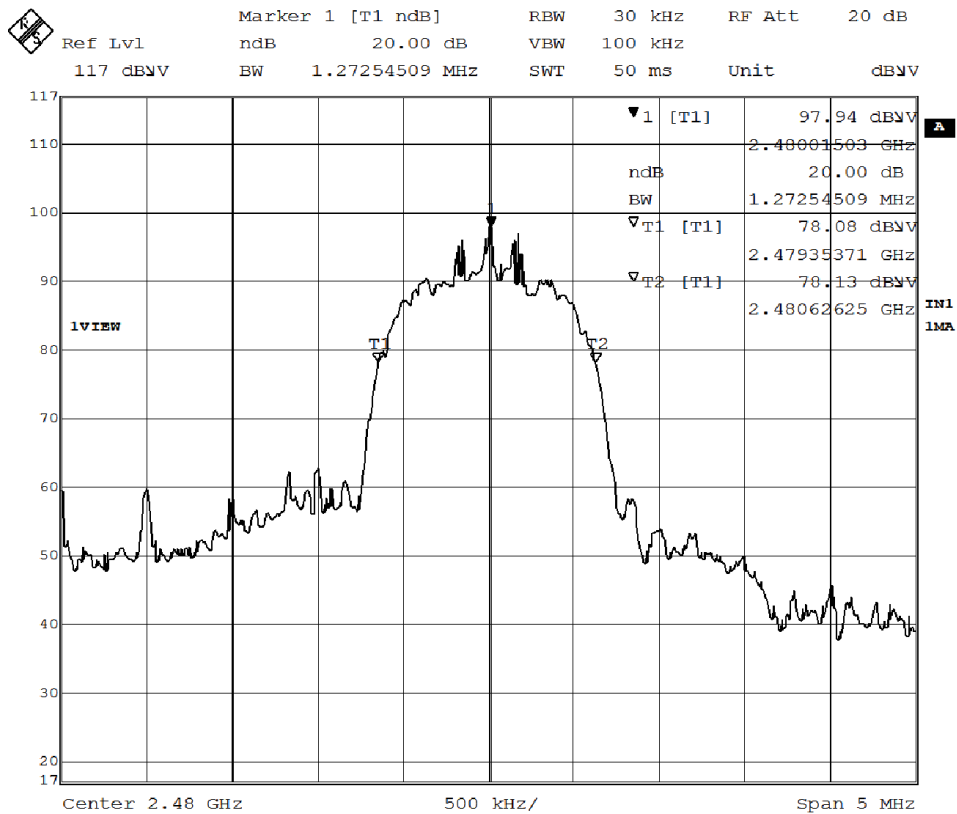
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Fundamental Frequency [MHz]	20dB Bandwidth [MHz]	FCC Limits [MHz]
2480	1.273	Within 2400-2483.5

(Highest Operating Frequency) - (8DPSK)





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3.1.5 Hopping Channel Separation

Requirements:

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 125 mW.

Limit:

The measured maximum bandwidth $\times 2/3 = 1.283\text{MHz} \times 2/3 = 855.3\text{kHz}$

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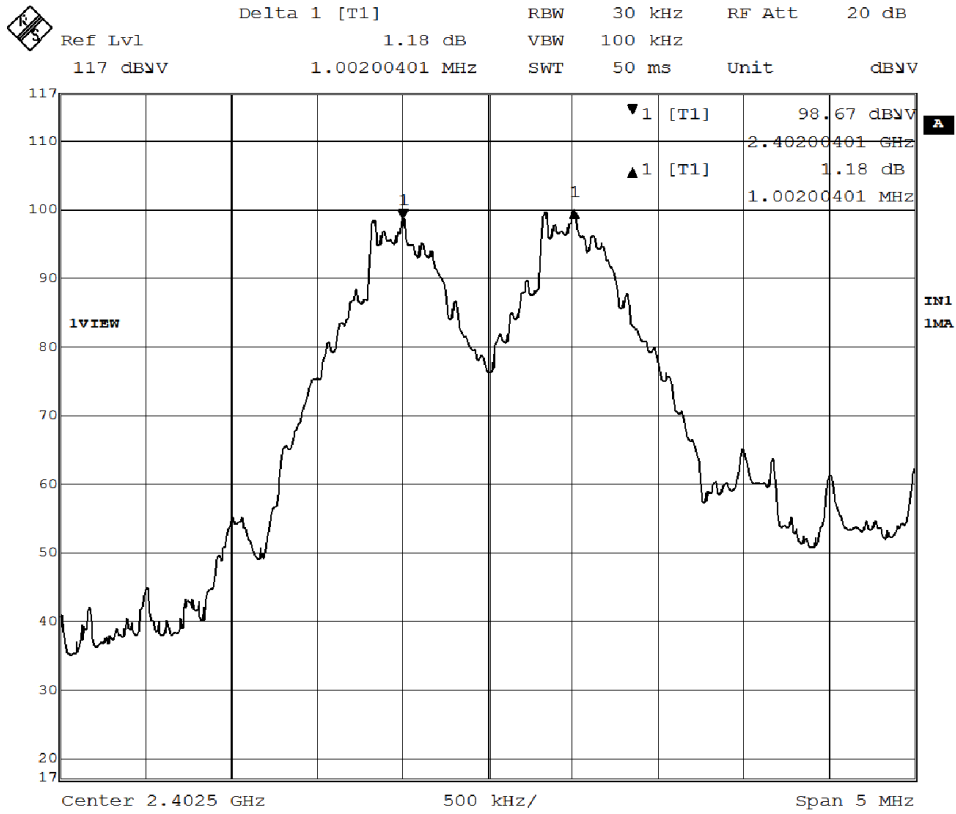


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Channel separation = 1MHz (>855.3kHz) (Lowest) (GFSK)



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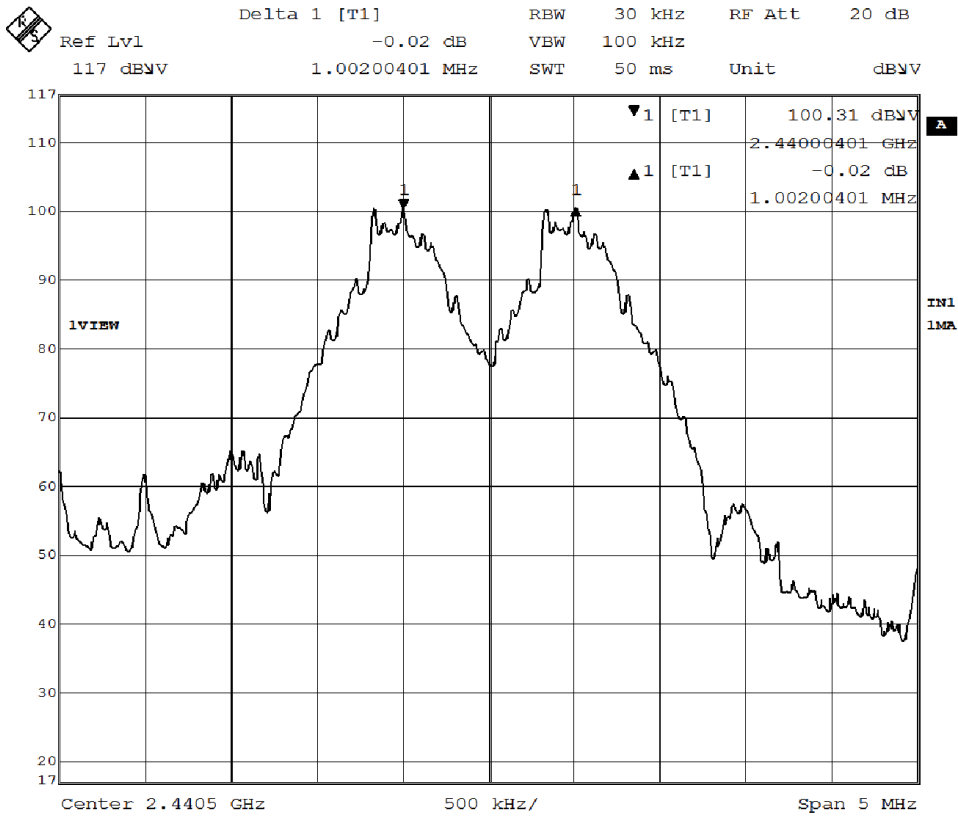


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Channel separation = 1MHz (>855.3kHz) (Mid) (GFSK)



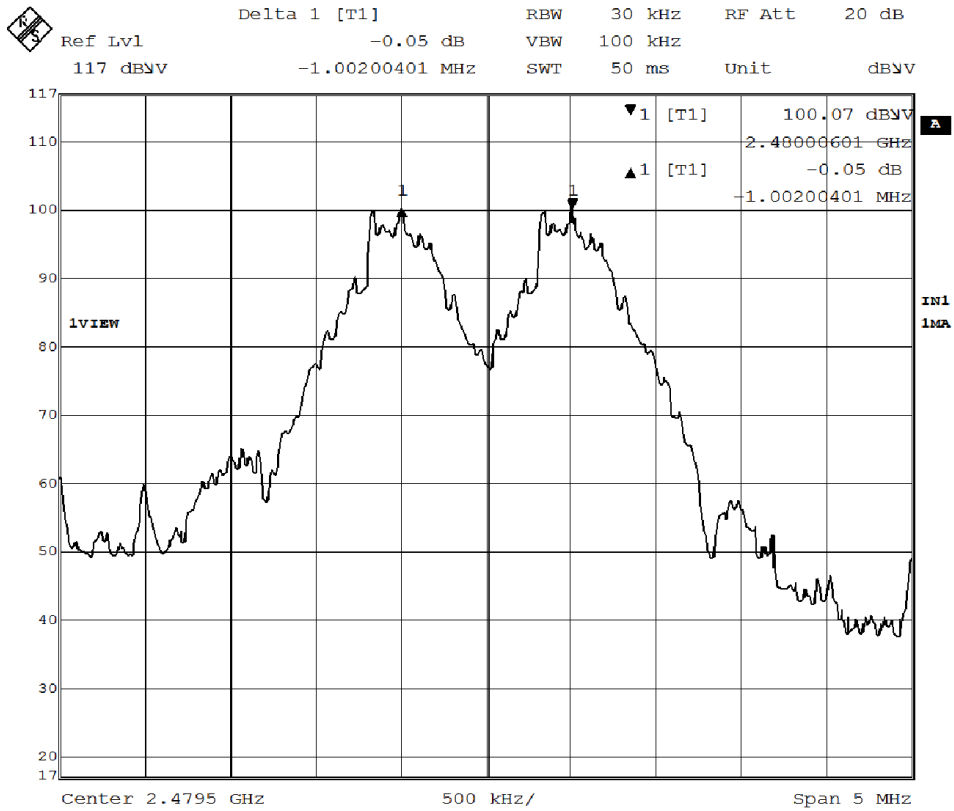


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Channel separation = 1MHz (>855.3kHz) (Highest) (GFSK)



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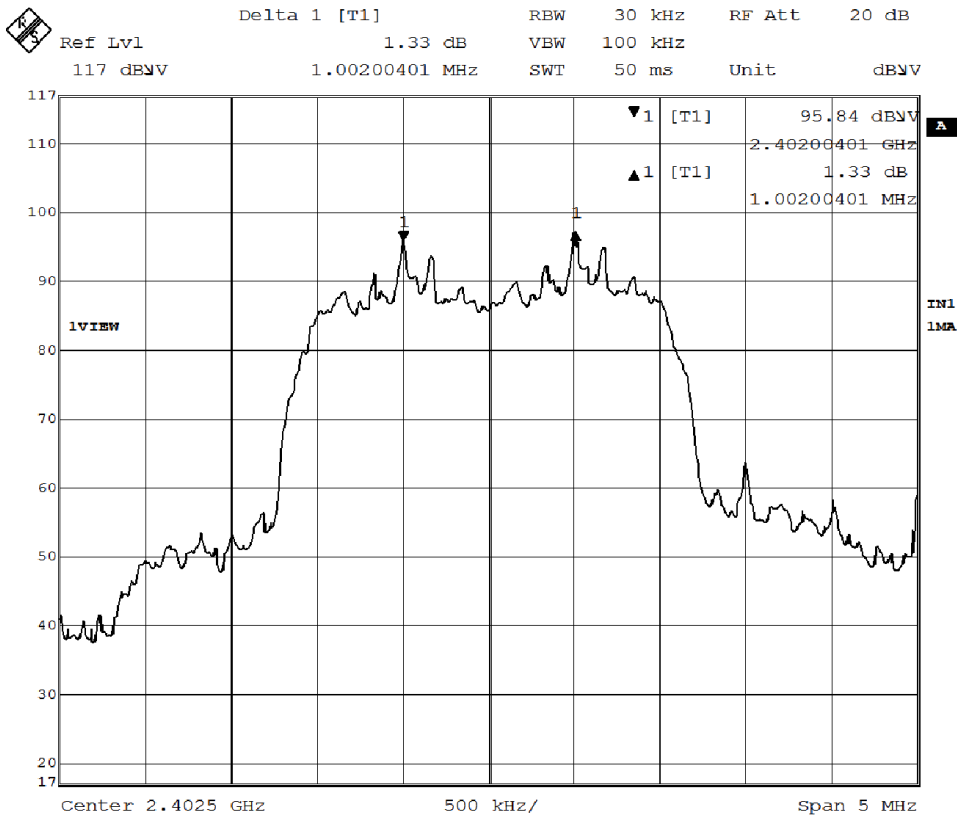


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Channel separation = 1MHz (>855.3kHz) (Lowest) ($\pi/4$ DQPSK)



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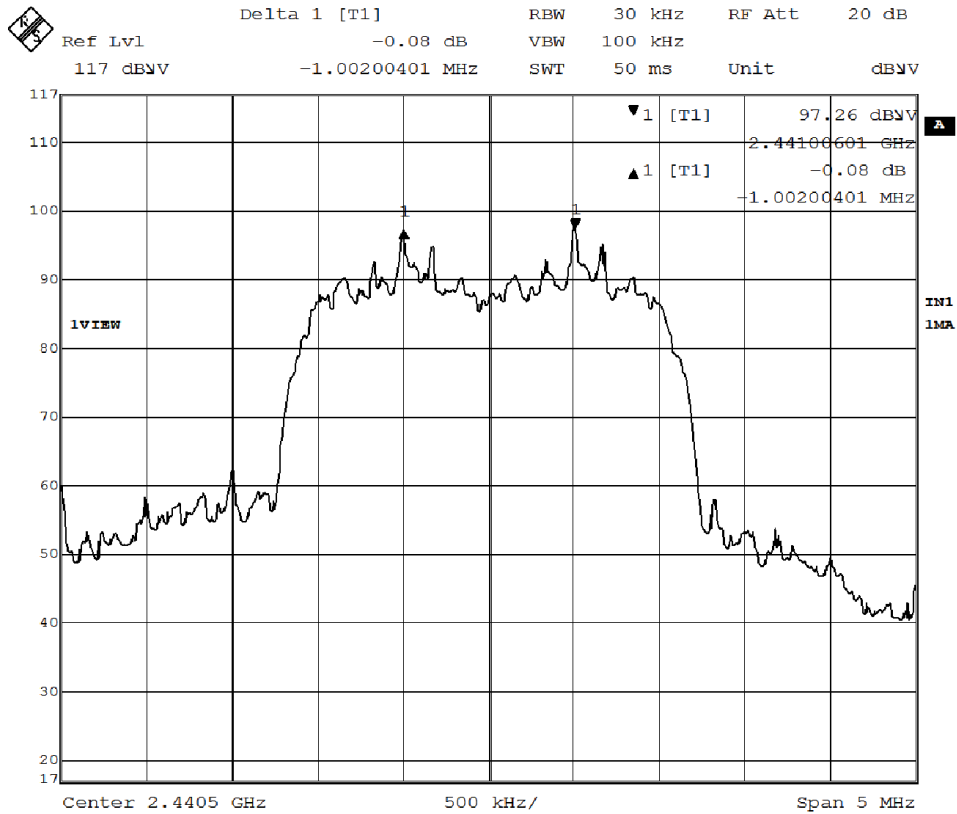


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Channel separation = 1MHz (>855.3kHz) (Mid) ($\pi/4$ DQPSK)



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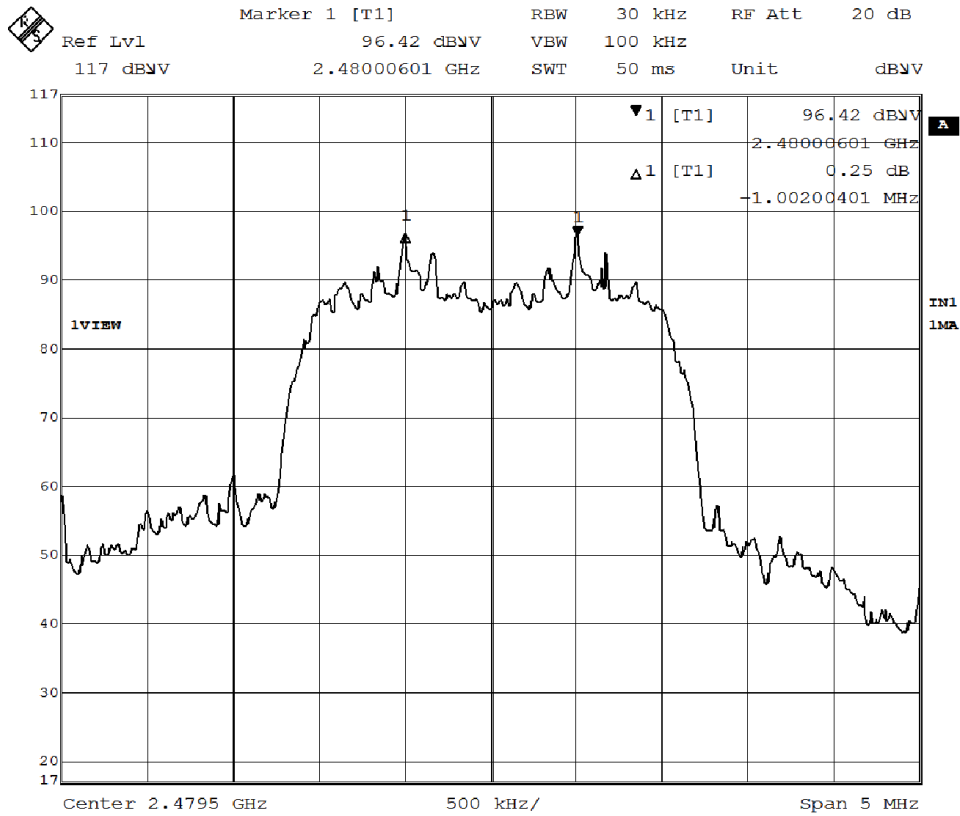


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Channel separation = 1MHz (>855.3kHz) (Highest) ($\pi/4$ DQPSK)



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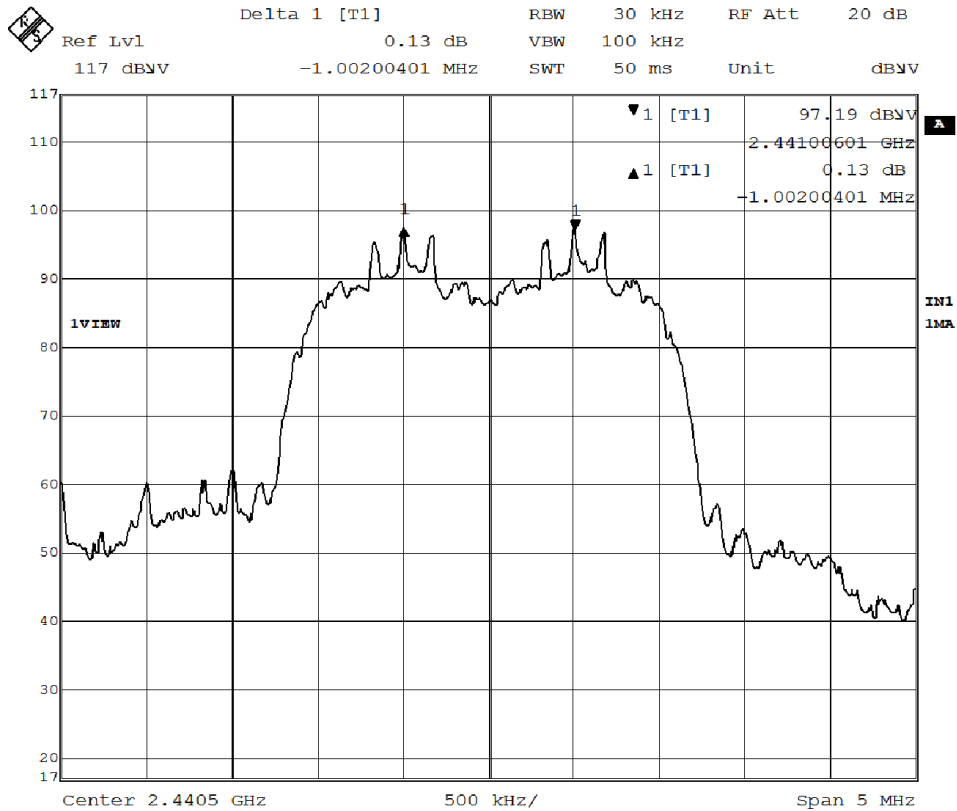


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Channel separation = 1MHz (>855.3kHz) (Mid) (8DPSK)



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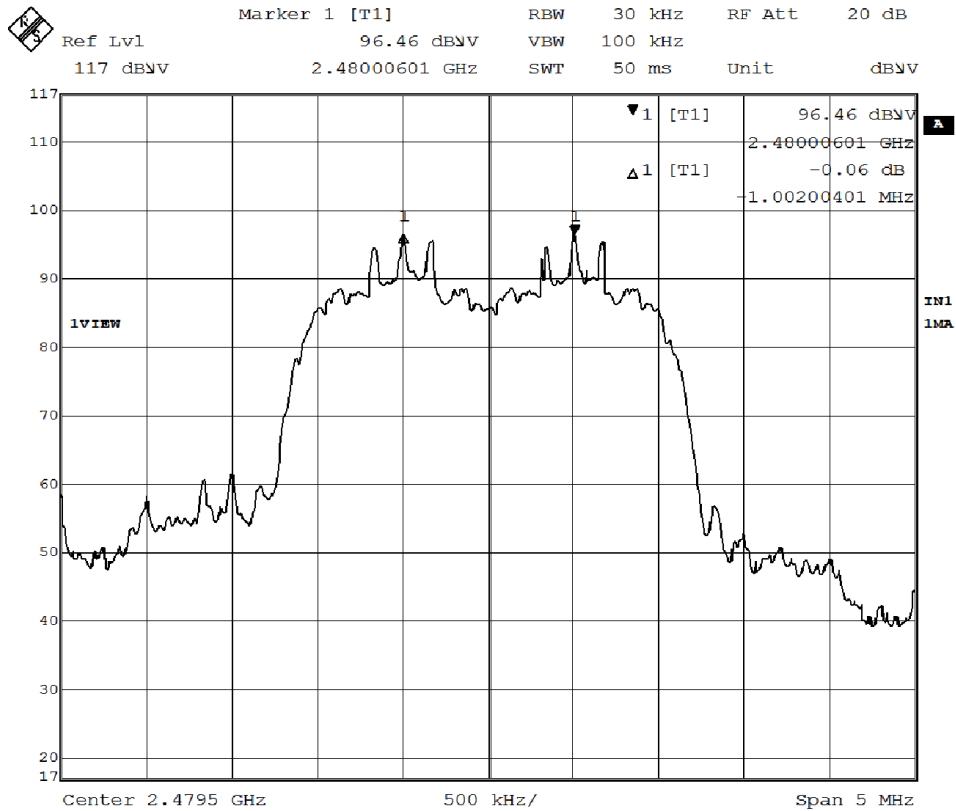


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Channel separation = 1MHz (>855.3kHz) (Highest) (8DPSK)





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3.1.6 Band-edge Compliance of RF Conducted Emissions Measurement:

Limit :

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. According to the test method ANSI C63.10: 2013

Remark: Emissions under the fixed frequency mode and hopping mode have been investigated, the worst-case measurement results were recorded in the test report

Frequency Range [MHz]	Radiated Emission Attenuated below the Fundamental [dB]
2400 – Lowest Fundamental (2402)	38.95

Band-edge Compliance of RF Conducted Emissions (GFSK Lowest)

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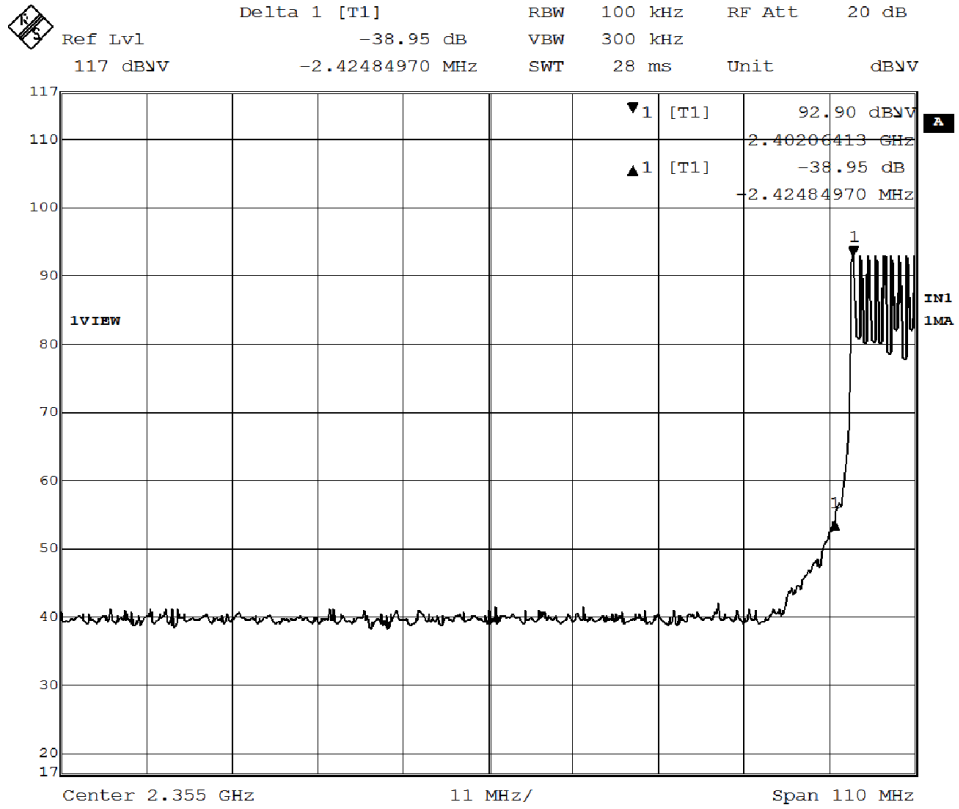
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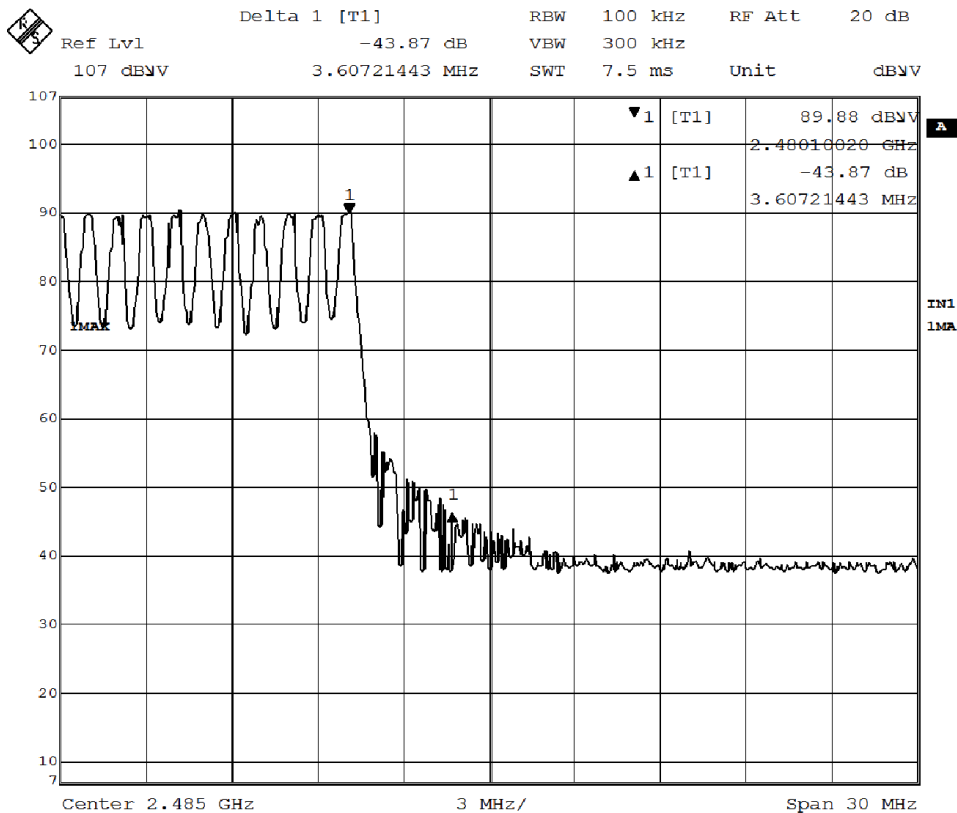
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Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range [MHz]	Radiated Emission Attenuated below the Fundamental [dB]
Highest Fundamental (2480) - 2483.5	43.87

Band-edge Compliance of RF Conducted Emissions (GFSK Highest)





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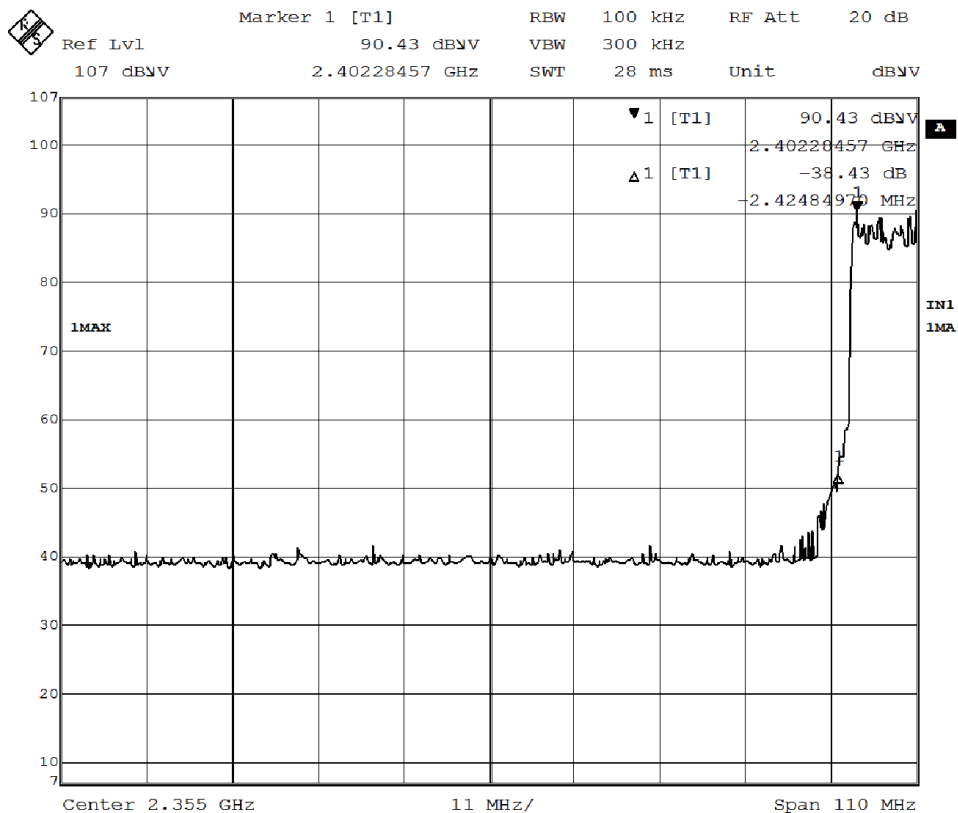
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Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range [MHz]	Radiated Emission Attenuated below the Fundamental [dB]
2400 – Lowest Fundamental (2402)	38.43

Band-edge Compliance of RF Conducted Emissions ($\pi/4$ DQPSK Lowest)





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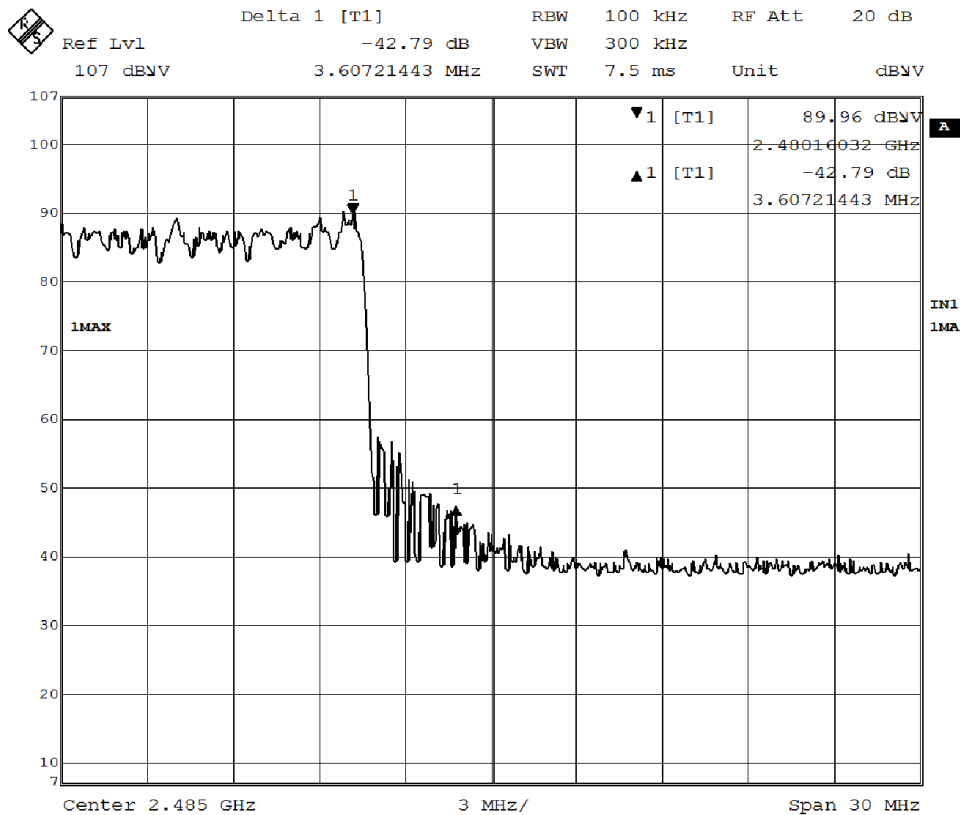
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Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range [MHz]	Radiated Emission Attenuated below the Fundamental [dB]
Highest Fundamental (2480) - 2483.5	42.79

Band-edge Compliance of RF Conducted Emissions ($\pi/4$ DQPSK Highest)





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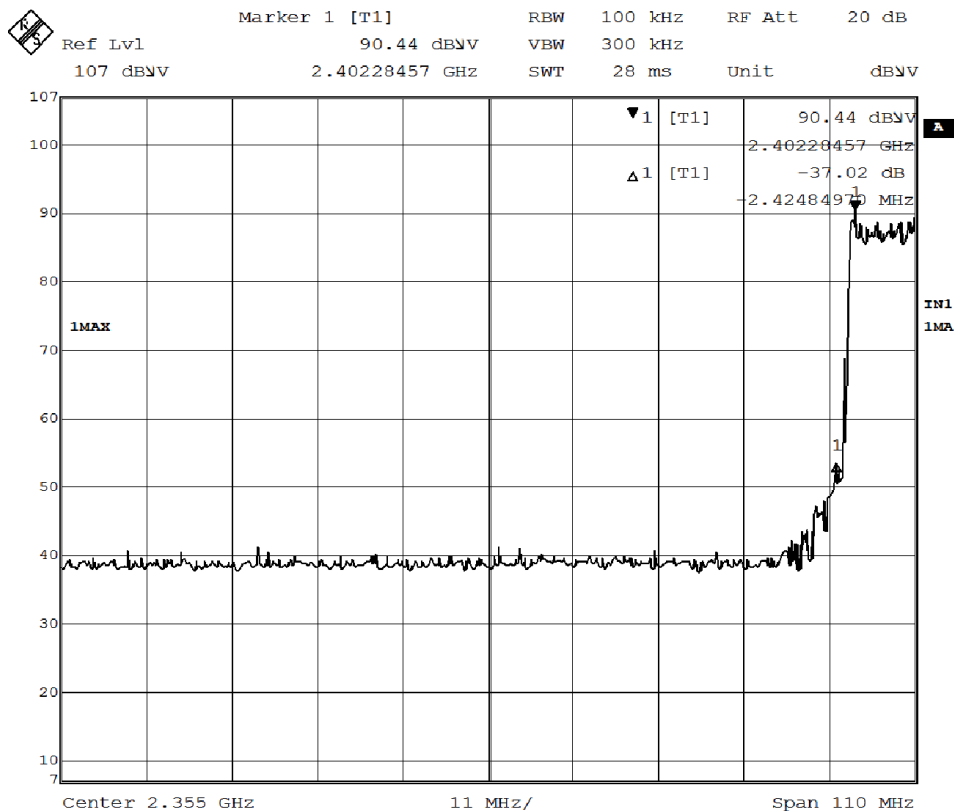
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Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range [MHz]	Radiated Emission Attenuated below the Fundamental [dB]
2400 – Lowest Fundamental (2402)	37.02

Band-edge Compliance of RF Conducted Emissions (8DPSK Lowest)





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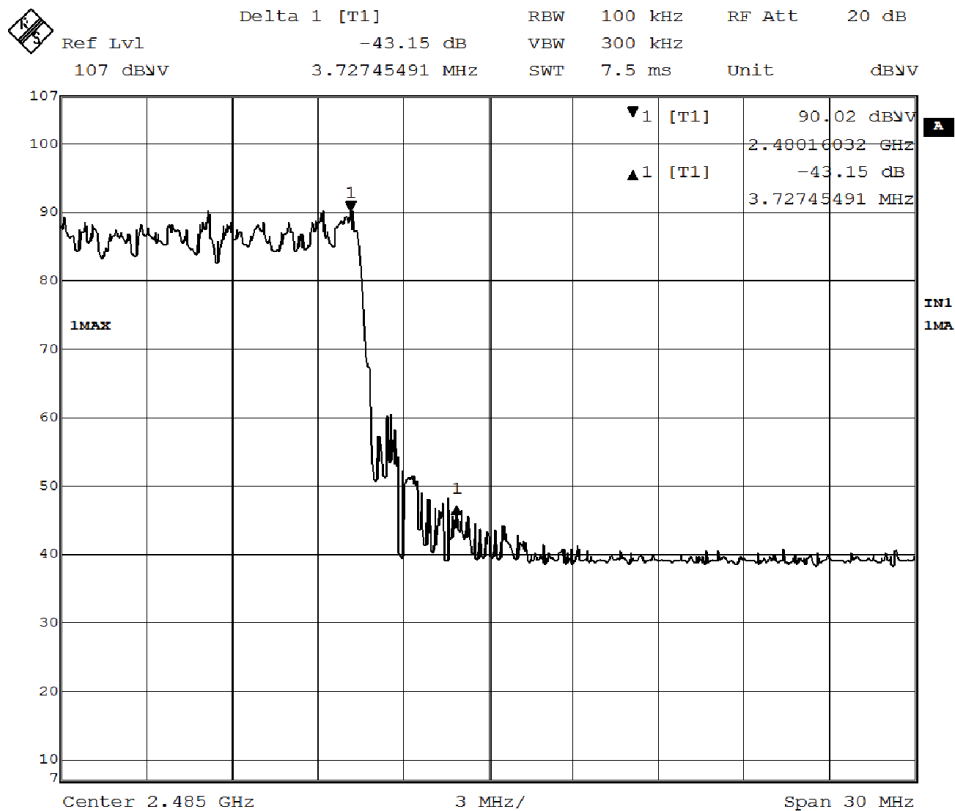
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Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range [MHz]	Radiated Emission Attenuated below the Fundamental [dB]
Highest Fundamental (2480) - 2483.5	43.15

Band-edge Compliance of RF Conducted Emissions (8DPSK Highest)





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Band-edge Compliance of RF Radiated Emissions Measurement:

Limit :

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 5.205(c)).

Result: Band-edge Compliance of RF Radiated Emissions (GFSK Lowest)

Field Strength of Band-edge Compliance Peak Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Limit @3m dBμV/m	Margin dBμV/m	E-Field Polarity
2398.7	25.4	28.9	54.3	74.0	19.7	Vertical

Field Strength of Band-edge Compliance Average Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Limit @3m dBμV/m	Margin dBμV/m	E-Field Polarity
2398.7	11.7	28.9	40.6	54.0	13.4	Vertical

Result: Band-edge Compliance of RF Radiated Emissions (GFSK Highest)

Field Strength of Band-edge Compliance Peak Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Limit @3m dBμV/m	Margin dBμV/m	E-Field Polarity
2490.2	15.3	28.9	44.2	74.0	29.8	Vertical

Field Strength of Band-edge Compliance Average Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Limit @3m dBμV/m	Margin dBμV/m	E-Field Polarity
2490.2	3.8	28.9	32.7	54.0	21.3	Vertical



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Band-edge Compliance of RF Radiated Emissions Measurement:

Limit :

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 5.205(c)).

Result: Band-edge Compliance of RF Radiated Emissions ($\pi/4$ -DQPSK Lowest)

Field Strength of Band-edge Compliance Peak Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
2398.9	22.3	28.9	51.2	74.0	22.8	Vertical

Field Strength of Band-edge Compliance Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
2398.9	10.0	28.9	38.9	54.0	15.1	Vertical

Result: Band-edge Compliance of RF Radiated Emissions ($\pi/4$ -DQPSK Highest)

Field Strength of Band-edge Compliance Peak Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
2498.7	14.4	28.9	43.3	74.0	30.7	Vertical

Field Strength of Band-edge Compliance Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
2498.7	4.9	28.9	33.8	54.0	20.2	Vertical



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Band-edge Compliance of RF Radiated Emissions Measurement:

Limit :

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 5.205(c)).

Result: Band-edge Compliance of RF Radiated Emissions (8DPSK Lowest)

Field Strength of Band-edge Compliance Peak Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
2398.7	22.2	28.9	51.1	74.0	22.9	Vertical

Field Strength of Band-edge Compliance Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
2398.7	11.4	28.9	40.3	54.0	13.7	Vertical

Result: Band-edge Compliance of RF Radiated Emissions (8DPSK Highest)

Field Strength of Band-edge Compliance Peak Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
2489.2	14.7	28.9	43.6	74.0	30.4	Vertical

Field Strength of Band-edge Compliance Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB μ V/m	E-Field Polarity
2489.2	4.3	28.9	33.2	54.0	20.8	Vertical



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3.1.7 Time of Occupancy (Dwell Time)

Requirements:

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channel employed.
No requirements for Digital Transmission System.

Dwell Time = Pulse Duration * hop rate / number of channel * observation duration

Observed duration: 0.4s x 79 = 31.6s

Measurement Data:

Channel Occupied in 8DPSK: 79 of 79 Channel

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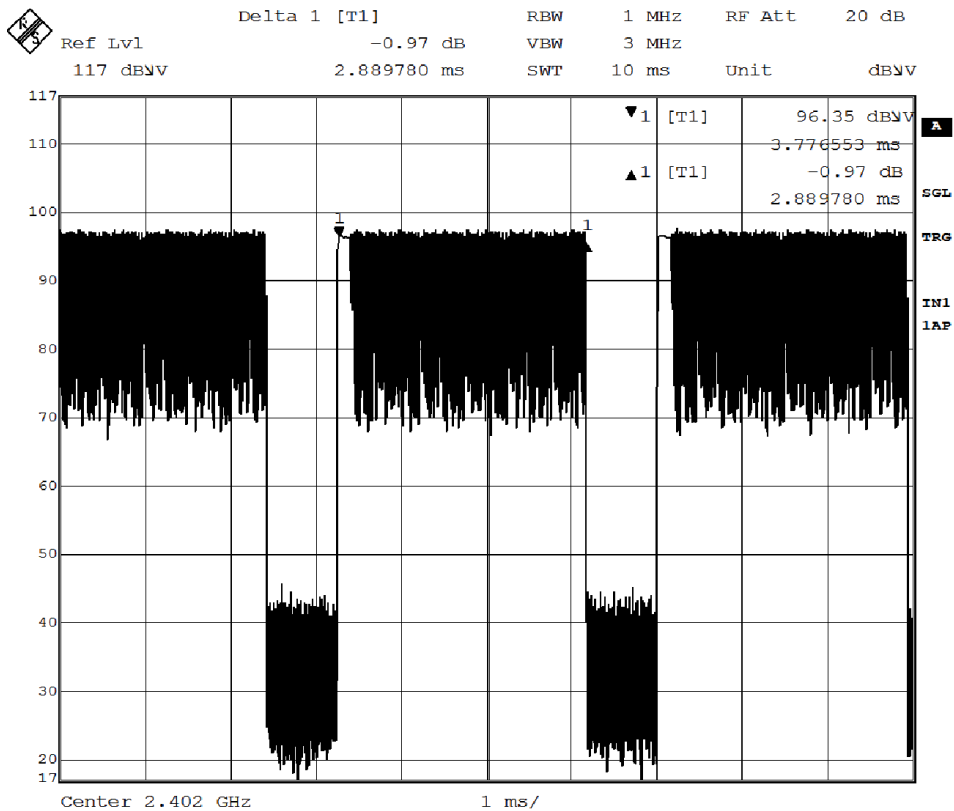
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DH5 Packet:

DH5 Packet permit maximum $1600/79/6 = 3.37$ hops per second in each channel (5 time slots RX, 1 time slot TX). The Dwell time is the time duration of the pulse times $3.37 \times 31.6 = 106.6$ within 31.6 seconds

Fig. A
[Pulse duration of Lowest Channel]



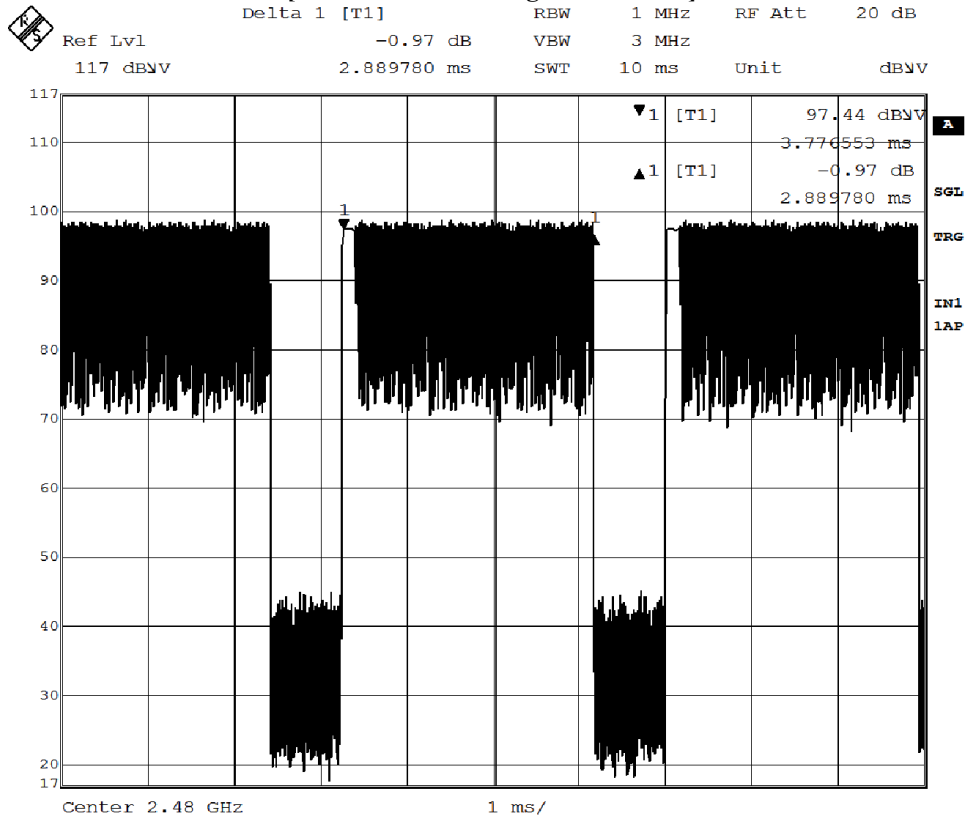


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Fig. C
[Pulse duration of Highest Channel]





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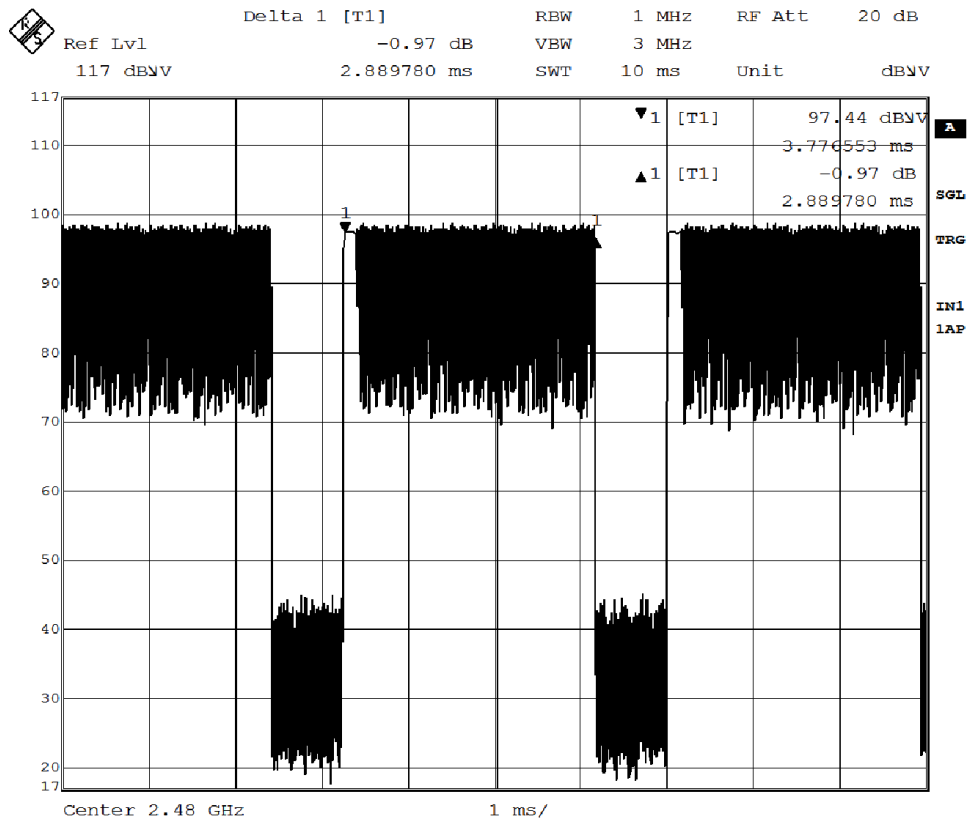
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DH3 Packet:

DH3 Packet permit maximum $1600/79/4 = 5.06$ hops per second in each channel (3 time slots RX, 1 time slot TX). The Dwell time is the time duration of the pulse times $5.06 \times 31.6 = 160$ within 31.6 seconds

Fig. D
[Pulse duration of Lowest Channel]



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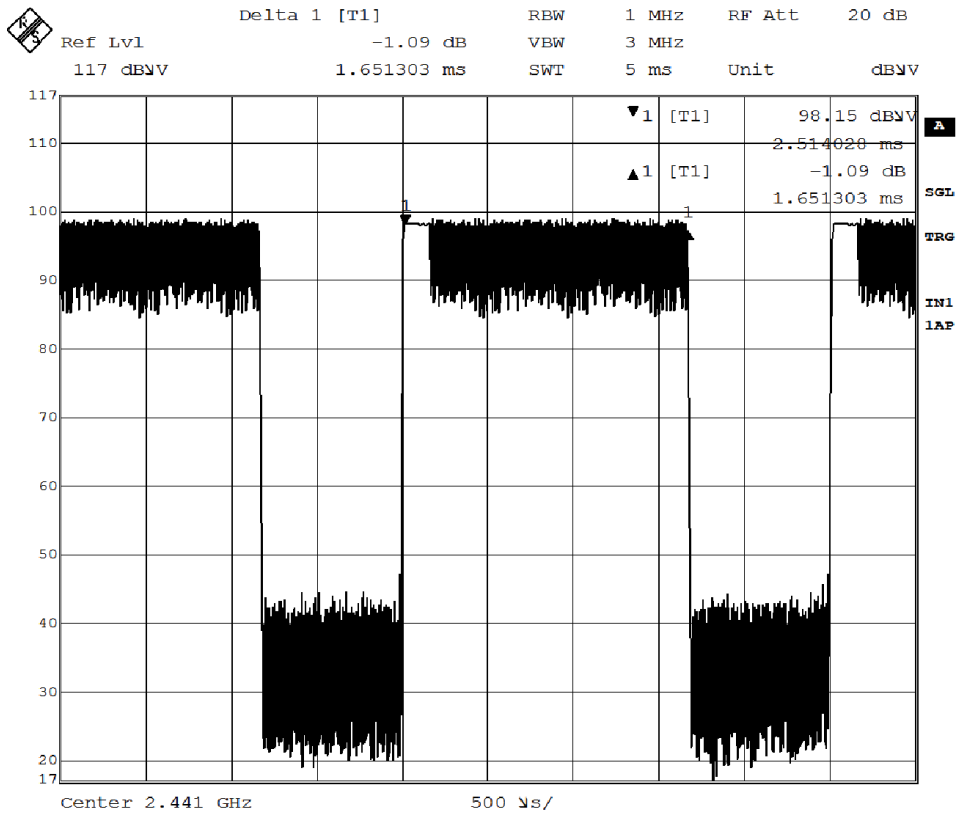


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Fig. E
[Pulse duration of Middle Channel]



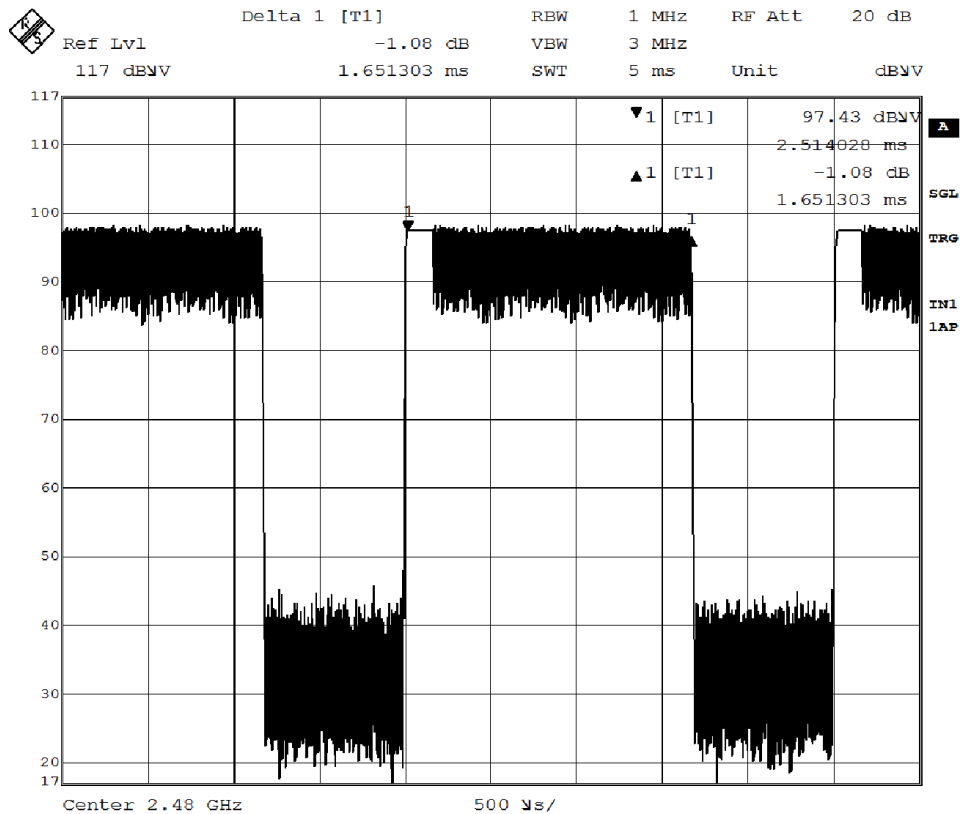


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Fig. F
[Pulse duration of Highest Channel]





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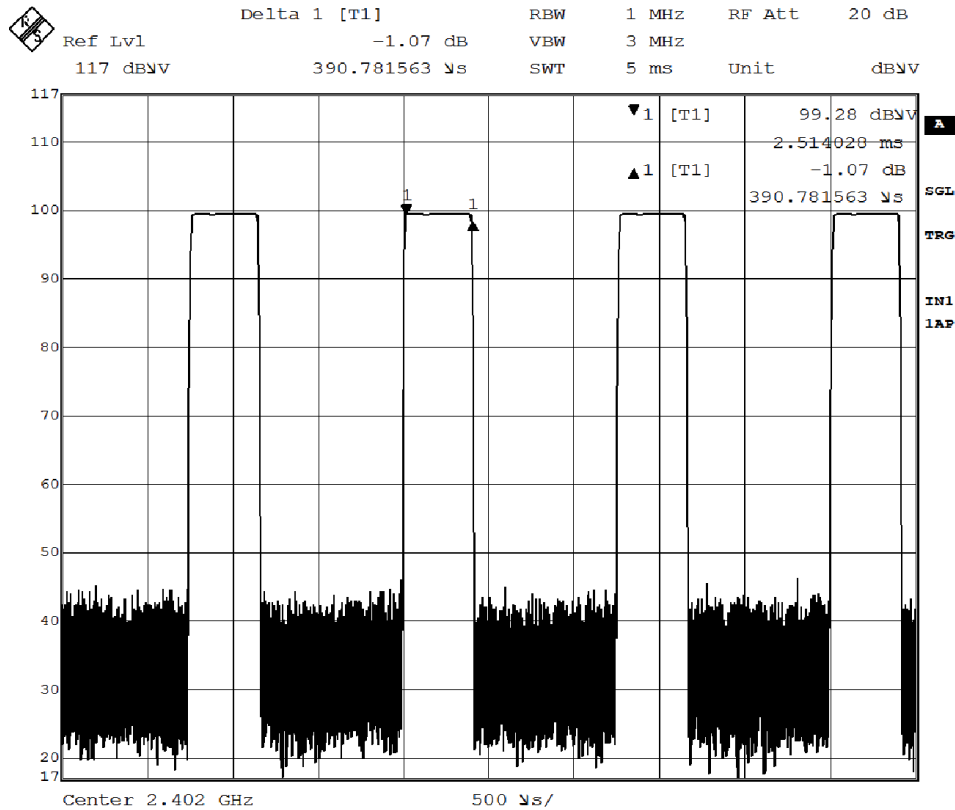
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DH1 Packet:

DH1 Packet permit maximum $1600/79/2 = 10.12$ hops per second in each channel (3 time slots RX, 1 time slot TX). The Dwell time is the time duration of the pulse times $10.12 \times 31.6 = 320$ within 31.6 seconds

Fig. G
[Pulse duration of Lowest Channel]



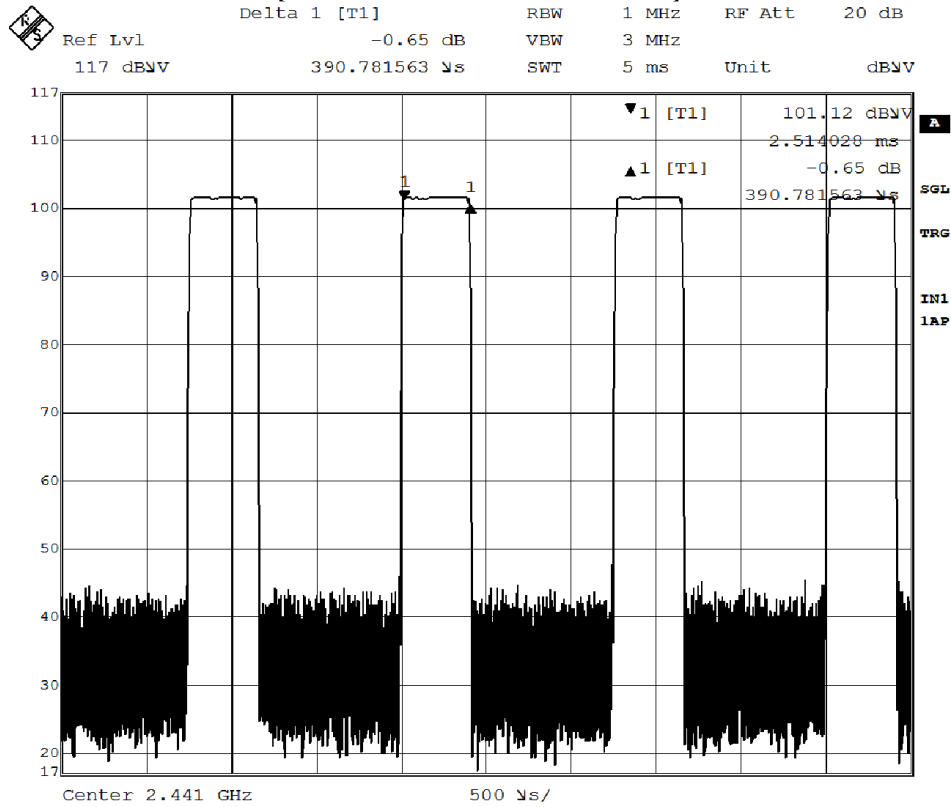


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Fig. H
[Pulse duration of Middle Channel]



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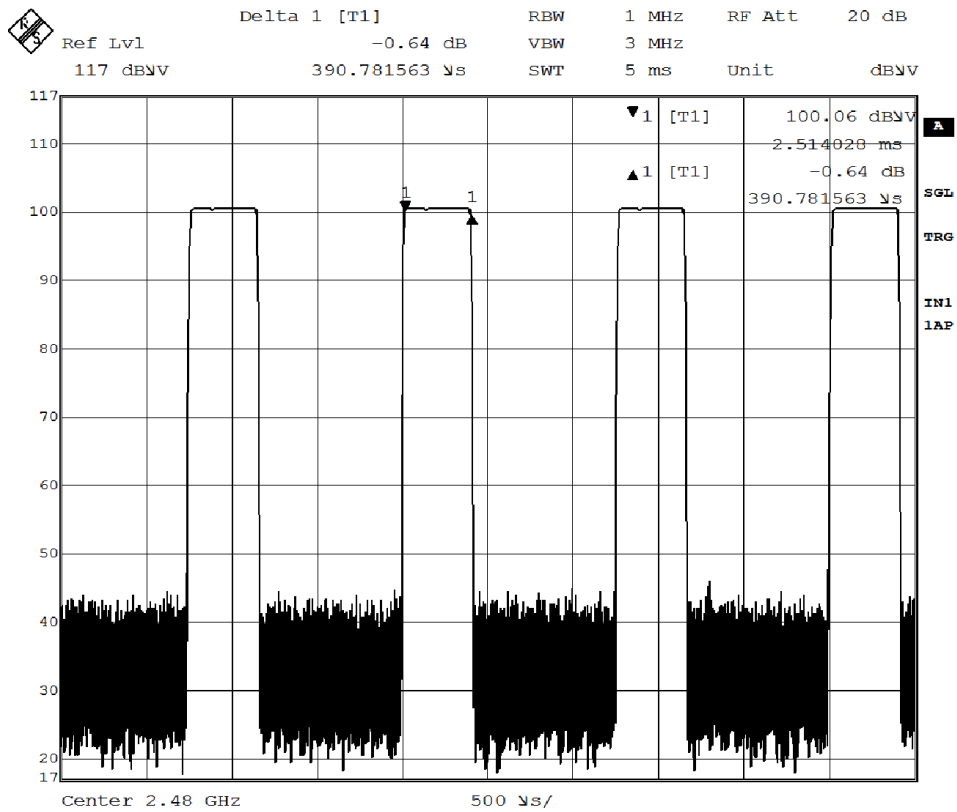


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Fig. I
[Pulse duration of Highest Channel]





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Time of occupancy (Dwell Time):

DH5 Packet permit maximum $1600/79/6 = 3.37$ hops per second in each channel (5 time slots RX, 1 time slot TX). The Dwell time is the time duration of the pulse times $3.37 \times 31.6 = 106.6$ within 31.6 seconds

DH3 Packet permit maximum $1600/79/4 = 5.06$ hops per second in each channel (3 time slots RX, 1 time slot TX). The Dwell time is the time duration of the pulse times $5.06 \times 31.6 = 160$ within 31.6 seconds

DH1 Packet permit maximum $1600/79/2 = 10.12$ hops per second in each channel (3 time slots RX, 1 time slot TX). The Dwell time is the time duration of the pulse times $10.12 \times 31.6 = 320$ within 31.6 seconds

Data Packet	Frequency (MHz)	Pulse Duration (ms)	Dwell Time (s)	Limits (s)	Test Results
DH5	2402	2.890	0.308	0.400	Complies
DH5	2442	2.890	0.308	0.400	Complies
DH5	2480	2.890	0.308	0.400	Complies
DH3	2402	1.651	0.264	0.400	Complies
DH3	2442	1.651	0.264	0.400	Complies
DH3	2480	1.651	0.264	0.400	Complies
DH1	2402	0.391	0.124	0.400	Complies
DH1	2442	0.391	0.124	0.400	Complies
DH1	2480	0.391	0.124	0.400	Complies

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3.1.8 Channel Centre Frequency

Requirements:

Frequency hopping system in the 2400-2483.5MHz band shall use at least 79 (Channel 0 to 78) non-overlapping channels.

The EUT operates in according with the Bluetooth system specification within the 2400 - 2483.5 MHz frequency band.

RF channels for Bluetooth systems are spaced 1 MHz and are ordered in channel number k. In order to comply with out-of-band regulations, a lower frequency guard band of 2.0 MHz and a higher frequency guard band of 3.5MHz is used.

The operating frequencies of each channel are as follows:

First RF channel start from 2400MHz + 2MHz guard band = 2402MHz

Frequency of RF Channel = 2402+k MHz, k = 0,...,78 (Channel separation = 1MHz)



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3.1.9 Pseudorandom Hopping Algorithm

Requirements:

The channel frequencies shall be selected from a pseudorandom ordered list of hopping frequencies. Each frequency must be used equally by the transmitter.

EUT Pseudorandom Hopping Algorithm

The EUT is a Bluetooth device, the Pseudo-random hopping pattern; hopping characteristics and algorithm are based on the Bluetooth specification.



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3.1.10 Antenna Requirement

Test Requirements: § 15.203

Test Specification:

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.

Test Results:

This is PCB meander line antenna. There is no external antenna, the antenna gain = 0dBi. User is unable to remove or changed the Antenna.

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3.1.11 RF Exposure

Test Requirement: FCC 47CFR 15.247(i)
Test Date: 2016-08-07
Mode of Operation: Tx mode

Test Method:

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

Test Results:

The EUT complied with the requirement(s) of this section.
EUT meets the requirements of these sections as proven through MPE calculation
The MPE calculation for EUT @ 20cm

Based on the highest P = 0.76 mW (2441MHz, GFSK)
 $P_d = PG / 4\pi R^2 = (0.76 \times 0.869) / 12.566 \times (20)^2$
 $= (0.66044) / 12.566 \times 400 = 0.66044 / 5026.4$
 $= 0.0001314 \text{ mW/cm}^2$

where:

- *Pd = power density in mW/cm²
- * G = Antenna numeric gain (0.869); Log G = g/10 (g = -0.61dBi).
- * P = Conducted RF power to antenna (0.76 mW).
- * R = Minimum allowable distance.(20 cm)

- **The power density Pd = 0.0001314mW/cm² is less than 1 mW/cm² (listed MPE limit)
- **The SAR evaluation is not needed (this is a desk top device, R> 20 cm)
- **The EUT(antenna) must be 0.2 meters away from the General Population.

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Appendix A

List of Measurement Equipment

LIST OF MEASUREMENT EQUIPMENT

Radiated Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EM299	DOUBLE-RIDGED WAVEGUIDE HORN ANTENNA	ETS-LINDGREN	3115	00114120	2016/04/27	2018/04/27
EM215	MULTIDEVICE CONTROLLER	EMCO	2090	00024676	N/A	N/A
EM216	MINI MAST SYSTEM	EMCO	2075	00026842	N/A	N/A
EM217	ELECTRIC POWERED TURNTABLE	EMCO	2088	00029144	N/A	N/A
EM218	ANECHOIC CHAMBER	ETS-LINDGREN	FACT-3	--	2016/04/24	2017/04/24
EM354	BICONILOG ANTENNA	ETS-LINDGREN	3143B	00142073	2016/02/29	2018/02/29
EM229	EMI TEST RECEIVER	R&S	ESIB40	100248	2016/06/01	2017/06/01
EM353	LOOP ANTENNA	ETS_LINDGREN	6502	00206533	2016/03/16	2018/03/16
EM299	DOUBLE-RIDGED WAVEGUIDE HORN ANTENNA	ETS-LINDGREN	3115	00114120	2016/04/27	2018/04/27
EM302	PRECISION OMNIDIRECTIONAL DIPOLE (1 – 6GHZ)	SEIBERSDORF LABORATORIES	POD 16	161806/L	2016/05/11	2018/05/11
EM303	PRECISION OMNIDIRECTIONAL DIPOLE (6 – 18GHZ)	SEIBERSDORF LABORATORIES	POD 618	6181908/L	2016/05/11	2018/05/11
EM300	PYRAMIDAL STANDARD GAIN HORN ANTENNA	ETS-LINDGREN	3160-09	00130130	2016/05/13	2018/05/13
EM301	PYRAMIDAL STANDARD GAIN HORN ANTENNA	ETS-LINDGREN	3160-10	00130988	2016/05/13	2018/05/13

Line Conducted

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EM119	LISN	R & S	ESH3-Z5	0831.5518.52	2015/10/22	2016/10/22
EM181	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESIB7	100072	2016/06/01	2017/06/01
EM179	IMPULSE LIMITER	ROHDE & SCHWARZ	ESH3-Z2	357-8810.52/54	2016/01/11	2017/01/11
EM154	SHIELDING ROOM	SIEMENS MATSUSHITA COMPONENTS	N/A	803-740-057-99A	2012/02/03	2017/02/03

Remarks:-

CM Corrective Maintenance
N/A Not Applicable or Not Available
TBD To Be Determined

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Appendix C

Photographs of EUT

Front View of the product



Back View of the product



Rear View of the product (Left)



Rear View of the product (Right)



Top View of the product



Bottom View of the product



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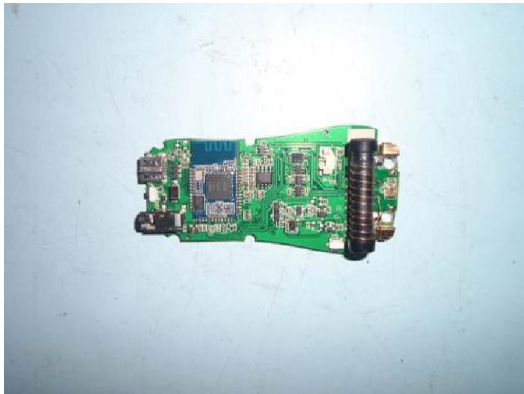
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Photographs of EUT

Inner layout View – All PCBs



PCB front View



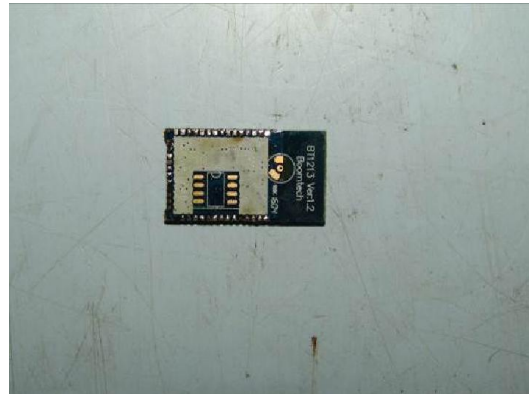
Inner Circuit Back View



RF module Front View



RF module Back View



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Photographs of EUT

Measurement of Radiated Emission Test Set Up (9kHz – 30MHz)



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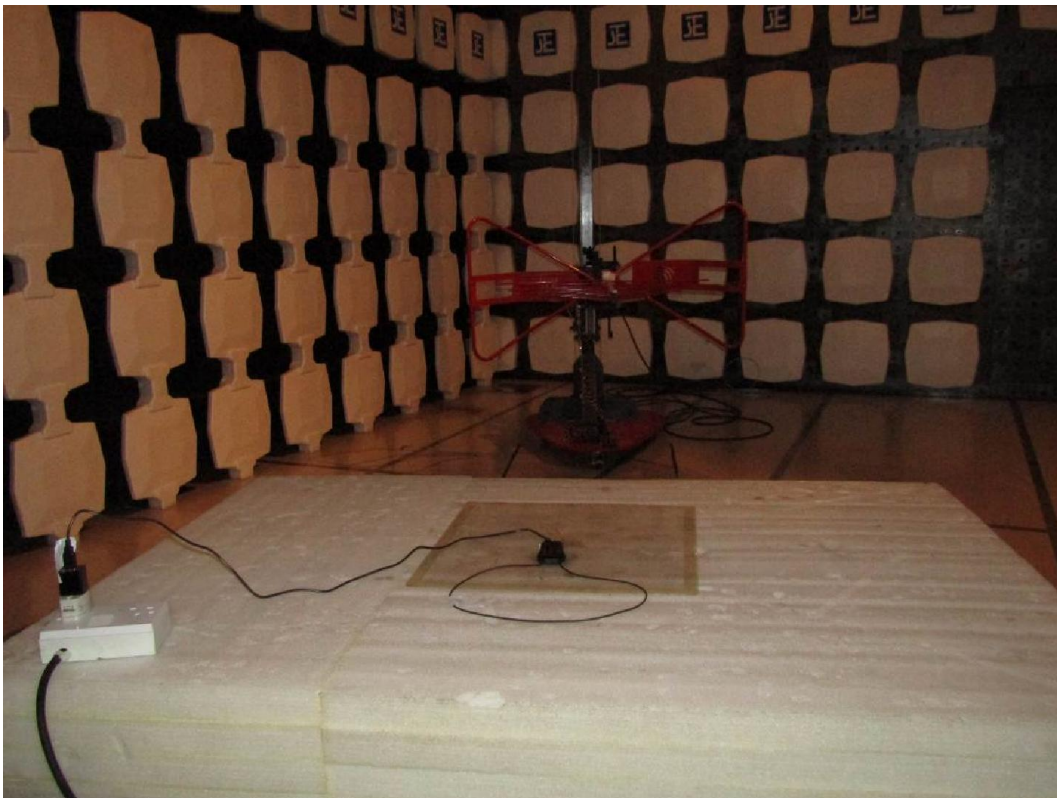
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Photographs of EUT

Measurement of Radiated Emission Test Set Up (30MHz – 1GHz)



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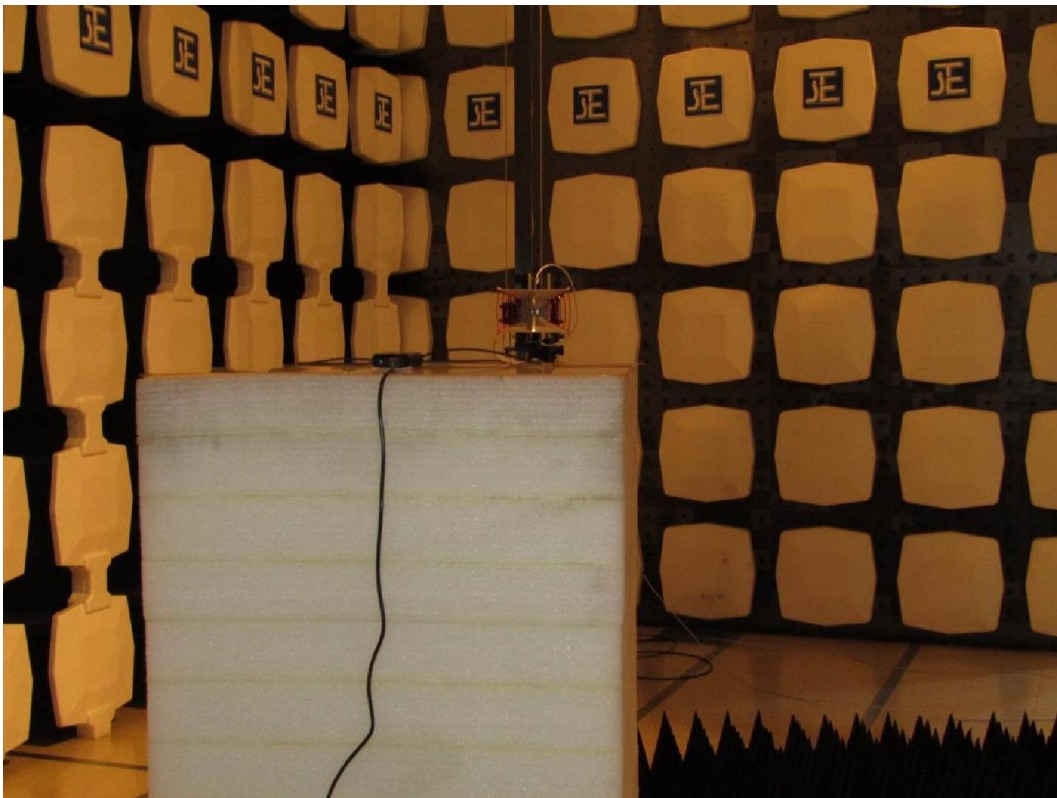
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Photographs of EUT

Measurement of Radiated Emission Test Set Up (Above 1GHz)



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Photographs of EUT

Measurement of Conducted Emission Test Set Up



******* End of Test Report *******

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