FCC PART 15.247

TEST REPORT

For

Atmel Norway AS

Vestre Rosten 79, TRONDHEIM, Norway 7075

FCC ID: VW4A092353

Report Type:	**Product Type:**
Original Report	ATREB215-XPRO-A

Test Engineer:	Hill He
Report Number:	RSZ151231001-00B
Report Date:	2016-03-15
Reviewed By:	Candy Li RF Engineer
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Atmel Norway AS*'s product, model number: *A09-2353 (FCC ID: VW4A092353)* or the "EUT" in this report was an *ATREB215-XPRO-A*, which was measured approximately: 11.0 cm (L) x 3.0 cm (W) x 1.0 cm (H), rated with input voltage: DC 3.3 V from system.

**All measurement and test data in this report was gathered from production sample serial number: 1507586 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2015-12-31.*

Objective

This report is prepared on behalf of *Atmel Norway AS* in accordance with Part 2-Subpart J, Part 15-Subparts A, B and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Related Submittal(s)/Grant(s)

FCC Part 15.249 DXX submissions with FCC ID: VW4A092353.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement uncertainty with RF radiated emission is 5.81 dB for 30MHz-1GHz and 4.88 dB for above 1GHz, 1.95dB for conducted measurement.

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on October 31, 2013. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.10-2013.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in testing mode, which was provided by manufacturer.
2.4GHz:
For O-QPSK mode, 16 channels are provided to testing:
(Note: The channel separation is 5.0MHz, ChipRate 2000, Data rate: 250 kb/s)

Channel	Frequency (MHz)	Channel	Frequency (MHz)
11	2405	19	2445
12	2410	20	2450
13	2415	21	2455
14	2420	22	2460
15	2425	23	2465
16	2430	24	2470
17	2435	25	2475
18	2440	26	2480

EUT was tested with Channel 2405MHz, 2440MHz and 2480MHz.
For OFDM Option1 mode, 64 channels are provided to testing:
(Note: The channel separation is 1.2 MHz, MCS3)

Channel	Frequency (MHz)
0	2401.2
.	.
.	.
31	2438.4
.	.
.	.
63	2476.8

EUT was tested with Channel 2401.2MHz, 2438.4MHz and 2476.8MHz.
For OFDM Option2 mode, 97 channels are provided to testing:
(Note: The channel separation is 800 kHz, MCS3)

Channel	Frequency (MHz)
0	2400.8
.	.
.	.
47	2438.4
.	.
.	.
96	2477.6

EUT was tested with Channel 2400.8MHz, 2438.4MHz and 2477.6 MHz.

900 MHz:

For O-QPSK mode, 12 channels are provided to testing:
(Note: The channel separation is 2.0MHz, ChipRate 1000, RateMode 0)

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	904	6	916
1	906	7	918
2	908	8	920
3	910	9	922
4	912	10	924
5	914	11	926

EUT was tested with Channel 904MHz, 916MHz and 926MHz.

For OFDM Option1 mode, 20 channels are provided to testing:
(Note: The channel separation is 1.2 MHz, MCS3)

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	903.2	10	915.2
1	904.4	11	916.4
2	905.6	12	917.6
3	906.8	13	918.8
4	908.0	14	920.0
5	909.2	15	921.2
6	910.4	16	922.4
7	911.6	17	923.6
8	912.8	18	924.8
9	914.0	19	926.0

EUT was tested with Channel 903.2MHz, 915.2MHz and 926MHz.

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

The software “Atmel Studio 6.2” was used for testing, which was provided by manufacturer. The worst condition (maximum power with 100% duty cycle) was setting by the software as following table:

For 2.4GHz:

Test Software Version	Atmel Studio 6.2		
O-QPSK(11-26) 16 channels(11,18,26)	2405MHz	2440 MHz	2480 MHz
OFDM option1 (0-63) 64 channels(0,31,63)	2401.2 MHz	2438.4 MHz	2476.8 MHz
OFDM option2(0-96) 97 channels(0,47,96)	2400.8 MHz	2438.4 MHz	2477.6 MHz

For 900MHz:

Test Software Version	Atmel Studio 6.2		
O-QPSK(0-11) 16 channels(0,6,11)	904 MHz	916 MHz	926 MHz
OFDM option1 (0-19) 20 channels(0,10,19)	903.2 MHz	915.2 MHz	926 MHz

Support Equipment List and Details

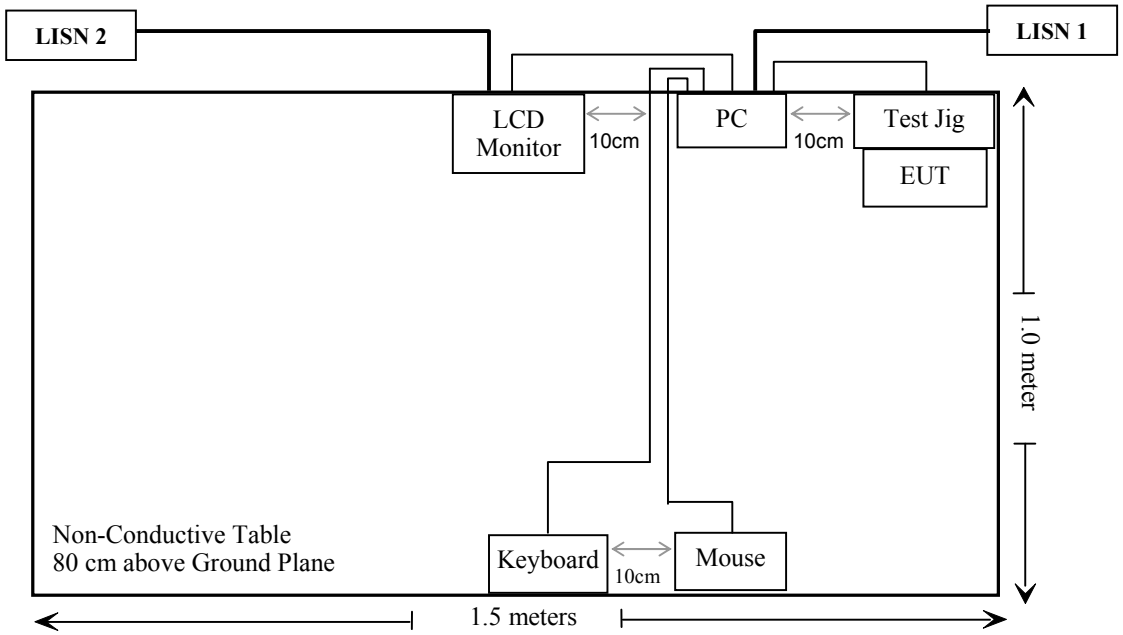
Manufacturer	Description	Model	Serial Number
DELL	PC	VOSTRO 220S	127BP2X
TCL	LCD Monitor	TL710	N/A
DELL	Keyboard	L100	CNORH656658907BL05DC
DELL	Mouse	MOC5UO	G1900NKD / G1B009ZQ

External I/O Cable

Cable Description	Length (m)	From/Port	To
Un-Shielding Detachable USB Cable	1.5	Host PC	Mouse
Un-Shielding Detachable K/B Cable	1.5	Host PC	Keyboard
Un-Shielding Detachable VGA Cable	1.5	Host PC	LCD Monitor
Un-Shielding Detachable USB Cable	1.2	Host PC	Test Jig

Block Diagram of Test Setup

For conducted emission



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.247 (i) & §1.1310 & §2.1091	Maximum Permissible Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247 (a)(2)	6 dB Emission Bandwidth	Compliance
§15.247(b)(3)	Maximum Conducted Output Power	Compliance
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance
§15.247(e)	Power Spectral Density	Compliance

FCC §15.247 (I) & §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 15.247(i) and subpart §1.1310, 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 level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f²)	30
30–300	27.5	0.073	0.2	30
300–1500	/	/	f/1500	30
1500–100,000	/	/	1.0	30

f = frequency in MHz; * = Plane-wave equivalent power density;

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculated Formulary:

Predication of MPE limit at a given distance
$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm^2);
P = power input to the antenna (in appropriate units, e.g., mW);
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

Calculated Data:

For 2.4GHz:

Mode	Frequency (MHz)	Antenna Gain		Max Tune-up Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
O-QPSK	2405-2480	0	1.0	14	25.12	20	0.005	1.0
OFDM Option1	2401.2 - 2476.8	0	1.0	14	25.12	20	0.005	1.0
OFDM Option2	2400.8 - 2477.6	0	1.0	14	25.12	20	0.005	1.0

For 900MHz:

Mode	Frequency (MHz)	Antenna Gain		Max Tune-up Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
O-QPSK	904	0	1.0	14	25.12	20	0.005	0.6
OFDM Option2	903.2	0	1.0	14	25.12	20	0.005	0.6

According to KDB 447498 D01 General RF Exposure Guidance v06, EUT has one 2.4GHz module and one 900MHz module transmitting simultaneously. And the worst case sum of MPE ratio is 0.013 which is less than 1.0, So the collocation exposure exclusion applies.
Note:
sum of MPE ratio=0.005/1.0+0.005/0.6=0.013

Result: The device meet FCC MPE at 20 cm distance

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.
And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT used one 2.4GHz and one 900MHz rubber stubby antenna with RP-SMA female straight arrangement and each antenna gain is 0 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207

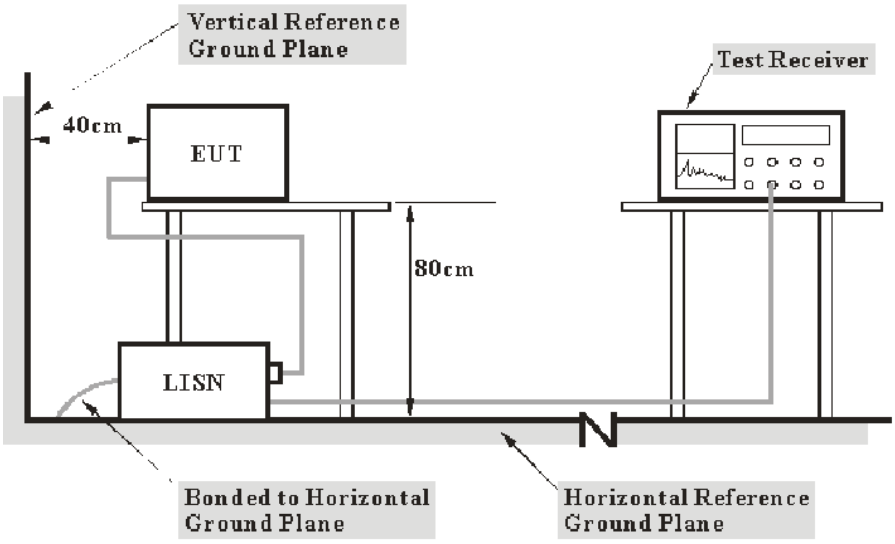
Measurement Uncertainty

Input quantities to be considered for conducted disturbance measurements maybe receiver reading, attenuation of the connection between LISN and receiver, LISN voltage division factor, LISN VDF frequency interpolation and receiver related input quantities, etc.

Based on CISPR 16-4-2:2011, the expended combined standard uncertainty of conducted disturbance test at Bay Area Compliance Laboratories Corp. (Shenzhen) is shown as below. And the uncertainty will not be taken into consideration for the test data recorded in the report.

Port	Expanded Measurement uncertainty
AC Mains	3.34 dB (k=2, 95% level of confidence)
CAT 3	3.72 dB (k=2, 95% level of confidence)
CAT 5	3.74 dB (k=2, 95% level of confidence)
CAT 6	4.54 dB (k=2, 95% level of confidence)

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All final data was recorded in the Quasi-peak and average detection mode.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2015-06-03	2016-06-03
Rohde & Schwarz	LISN	ENV216	3560.6650.12-101613-Yb	2015-12-01	2016-12-01
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2015-05-14	2016-05-13
Ducommun technologies	Conducted Emission Cable	RG-214	CB031	2015-06-15	2016-06-15
Rohde & Schwarz	CE Test software	EMC 32	V8.53	NCR	NCR
Ducommun technologies	Conducted Emission Cable	RG-214	CB031	2015-06-15	2016-06-15

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

Correction Factor = LISN VDF + Cable Loss + Transient Limiter Attenuation

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207, the worst margin reading as below:

10.2 dB at **1.507410 MHz** in the **Neutral** conducted for Transmitting (900MHz) mode

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL, $U_{(Lm)}$ is less than U_{cispr}, if L_m is less than L_{lim}, it implies that the EUT complies with the limit.

Test Data

Environmental Conditions

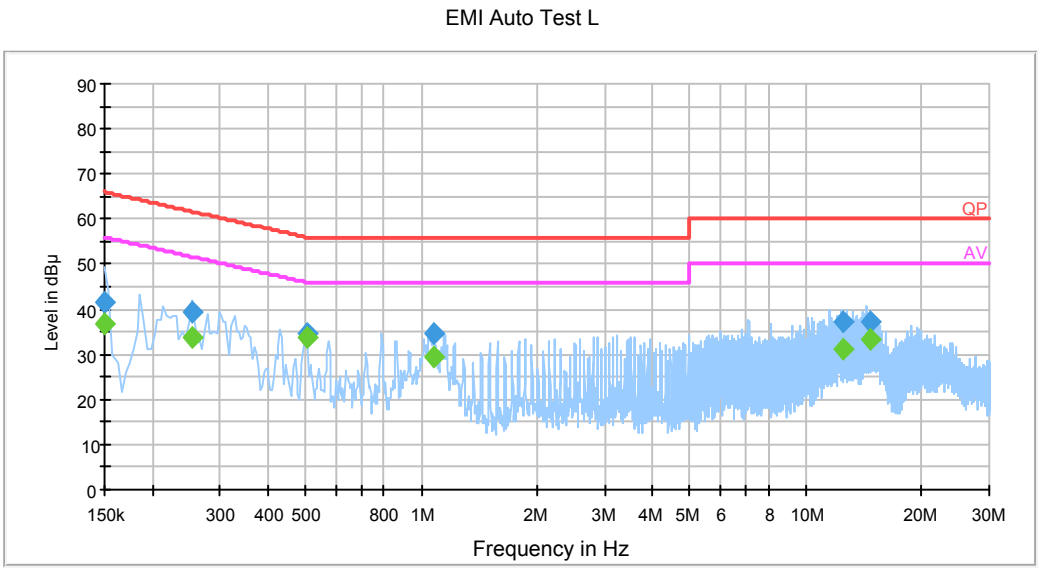
Temperature:	25 ℃
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Hill He on 2016-01-21.

EUT operation mode: Transmitting

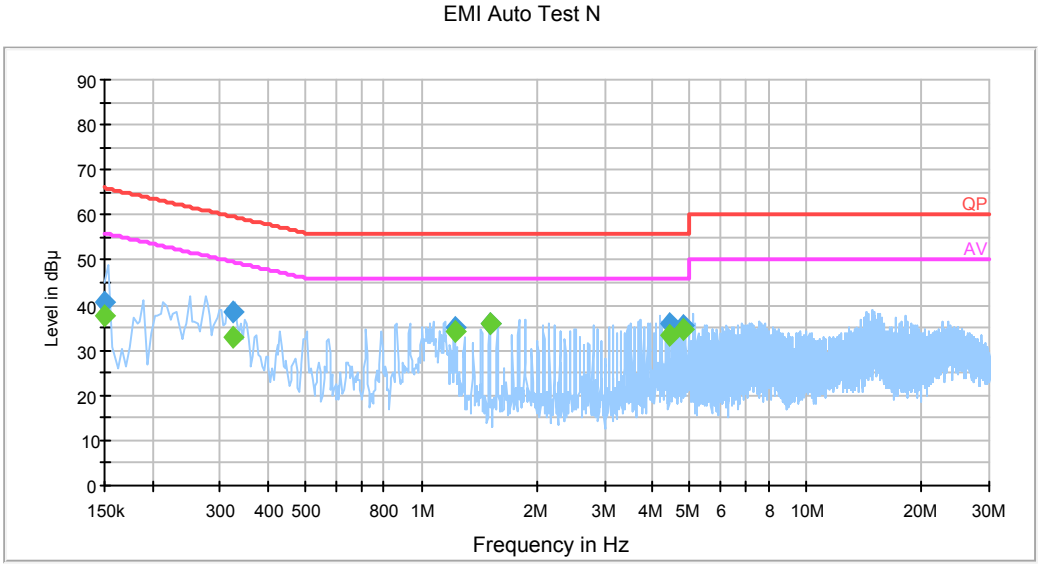
EUT operation mode: Transmitting (900MHz)

AC 120V/60 Hz, Line



Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/Ave./QP)
0.150000	41.4	20.0	66.0	24.6	QP
0.150000	36.7	20.0	56.0	19.3	Ave.
0.253500	39.5	19.9	61.6	22.1	QP
0.253500	34.0	19.9	51.6	17.6	Ave.
0.502470	34.7	19.9	56.0	21.3	QP
0.502470	33.8	19.9	46.0	12.2	Ave.
1.077830	34.6	20.0	56.0	21.4	QP
1.077830	29.6	20.0	46.0	16.4	Ave.
12.483790	37.4	20.1	60.0	22.6	QP
12.483790	31.1	20.1	50.0	18.9	Ave.
14.638330	37.2	20.1	60.0	22.8	QP
14.638330	33.2	20.1	50.0	16.8	Ave.

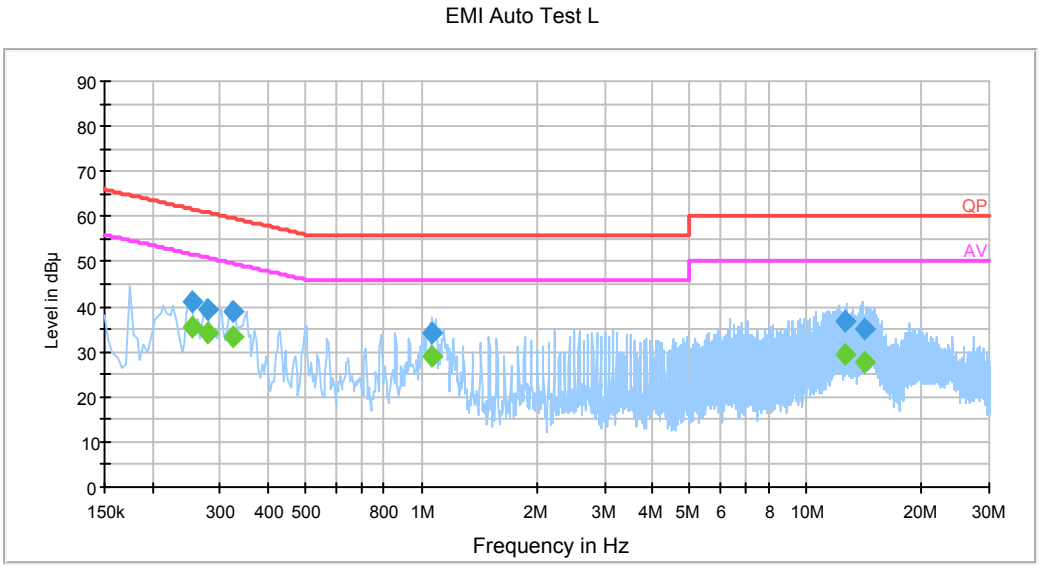
AC 120V/60 Hz, Neutral



Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/Ave./QP)
0.150000	40.9	20.0	66.0	25.1	QP
0.150000	37.8	20.0	56.0	18.2	Ave.
0.325110	38.4	19.9	59.6	21.2	QP
0.325110	32.9	19.9	49.6	16.7	Ave.
1.219730	35.3	20.0	56.0	20.7	QP
1.219730	34.2	20.0	46.0	11.8	Ave.
1.507410	35.7	20.0	56.0	20.3	QP
1.507410	35.8	20.0	46.0	**10.2**	Ave.
4.447250	35.9	20.0	56.0	20.1	QP
4.447250	33.5	20.0	46.0	12.5	Ave.
4.809910	35.7	20.0	56.0	20.3	QP
4.809910	34.8	20.0	46.0	11.2	Ave.

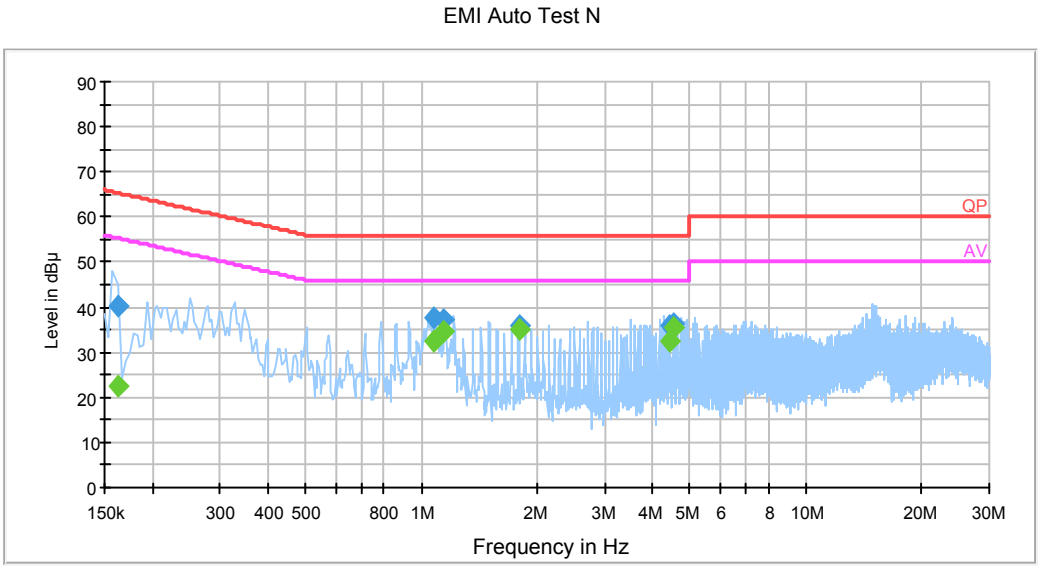
EUT operation mode: Transmitting (2.4GHz)

AC 120V/60 Hz, Line



Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/Ave./QP)
0.253500	41.0	19.9	61.6	20.6	QP
0.253500	35.5	19.9	51.6	16.1	Ave.
0.278501	39.5	19.9	60.9	21.4	QP
0.278501	34.0	19.9	50.9	16.9	Ave.
0.325170	39.0	19.9	59.6	20.6	QP
0.325170	33.3	19.9	49.6	16.3	Ave.
1.065950	34.3	20.0	56.0	21.7	QP
1.065950	28.9	20.0	46.0	17.1	Ave.
12.595050	36.9	20.1	60.0	23.1	QP
12.595050	29.5	20.1	50.0	20.5	Ave.
14.167730	34.9	20.1	60.0	25.1	QP
14.167730	27.8	20.1	50.0	22.2	Ave.

AC 120V/60 Hz, Neutral



Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/Ave./QP)
0.162500	40.3	20.0	65.3	25.0	QP
0.162500	22.4	20.0	55.3	32.9	Ave.
1.077830	37.5	20.0	56.0	18.5	QP
1.077830	32.3	20.0	46.0	13.7	Ave.
1.148810	37.1	20.0	56.0	18.9	QP
1.148810	34.6	20.0	46.0	11.4	Ave.
1.791150	36.0	20.0	56.0	20.0	QP
1.791150	35.2	20.0	46.0	10.8	Ave.
4.439370	36.0	20.0	56.0	20.0	QP
4.439370	32.3	20.0	46.0	13.7	Ave.
4.514350	36.1	20.0	56.0	19.9	QP
4.514350	35.6	20.0	46.0	10.4	Ave.

Note:
1) Correction Factor =LISN VDF (Voltage Division Factor) + Cable Loss + Transient Limiter Attenuation
2) Corrected Amplitude = Reading + Correction Factor
3) Margin = Limit – Corrected Amplitude

FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

FCC §15.247 (d); §15.209; §15.205;

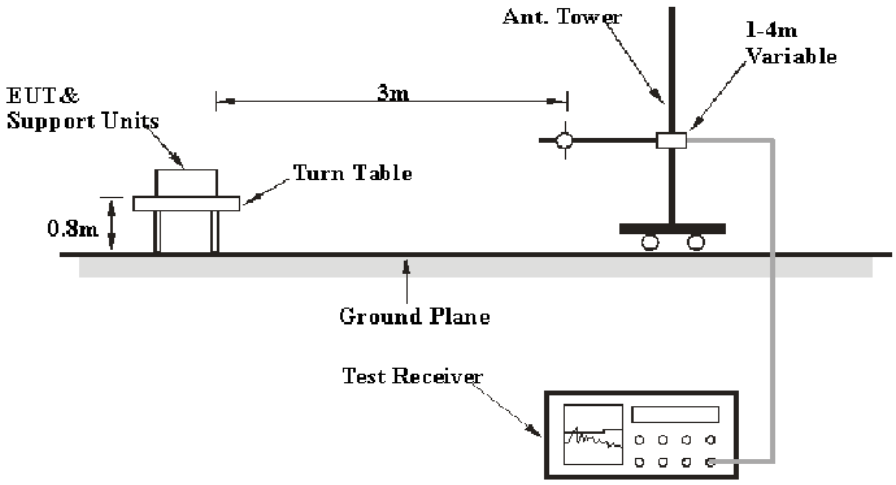
Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

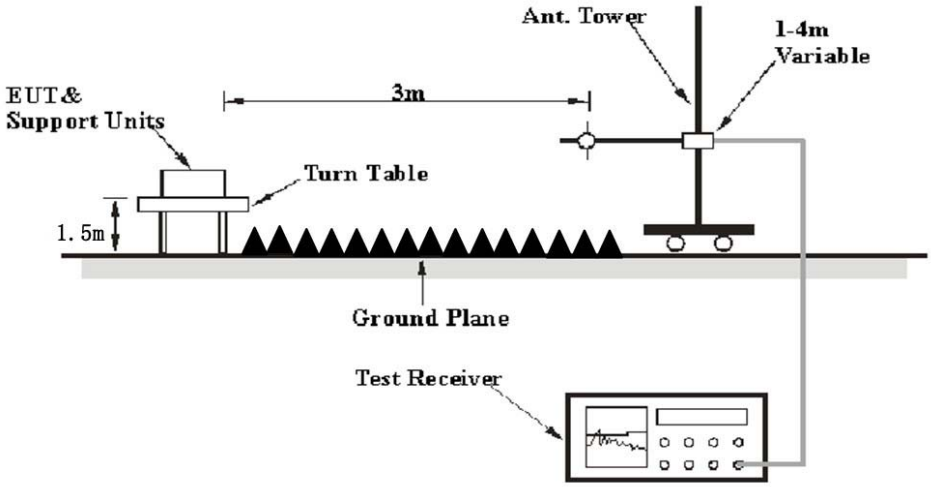
Based on CISPR 16-4-2:2011, the expended combined standard uncertainty of radiation emissions at Bay Area Compliance Laboratories Corp. (Shenzhen) is 5.81 dB for 30MHz-1GHz and 4.88 dB for above 1GHz, 1.95dB for conducted measurement at antenna port. And the uncertainty will not be taken into consideration for the test data recorded in the report

EUT Setup

Below 1 GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

The spacing between the peripherals was 10 cm.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1 GHz, peak and Average detection modes for frequencies above 1 GHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	HP8447E	1937A01046	2015-05-06	2016-05-05
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2015-11-03	2016-11-03
Sunol Sciences	Bi-log Antenna	JB1	A040904-2	2014-12-07	2017-12-06
Mini	Amplifier	ZVA-183-S+	5969001149	2015-04-23	2016-04-22
A.H. System	Horn Antenna	SAS-200/571	135	2015-08-18	2018-08-17
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2015-12-11	2016-12-11
the electro-Mechanics Co.	Horn Antenna	3116	9510-2270	2013-10-14	2016-10-13
TDK	Chamber	Chamber A	2#	2015-10-15	2018-10-15
TDK	Chamber	Chamber B	1#	2015-07-22	2016-07-22
DUCOMMUN	Pre-amplifier	ALN-22093530-01	991373-01	2015-08-03	2016-08-03
Rohde & Schwarz	Auto test Software	EMC32	V9.10	NCR	NCR
Ducommun technologies	RF Cable	UFA210A-1-4724-30050U	MFR64369 223410-001	2015-06-15	2016-06-15
Ducommun technologies	RF Cable	104PEA	218124002	2015-06-15	2016-06-15
Ducommun technologies	RF Cable	RG-214	1	2015-06-15	2016-06-15
Ducommun technologies	RF Cable	RG-214	2	2015-06-15	2016-06-15

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.247.

4.63 dB at **9910.40 MHz** in the **Vertical** polarization for **OFDM OPTION2** Mode
High Channel (2.4GHz)

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL, $U_{(Lm)}$ is less than U_{cispr}, if L_m is less than L_{lim}, it implies that the EUT complies with the limit.

Test Data

Environmental Conditions

Temperature:	20 ℃
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Hill He on 2016-02-19.

EUT operation mode: Transmitting (900MHz)

30 MHz-10 GHz:

OFDM Option1:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel(903.2MHz)									
55.3	44.29	QP	357	2.3	V	-14.1	30.19	40	9.81
903.2	85.36	PK	236	1.3	H	-3.0	82.36	/	/
903.2	82.18	Ave.	236	1.3	H	-3.0	79.18	/	/
903.2	91.45	PK	260	1.5	V	-3.0	88.45	/	/
903.2	87.37	Ave.	260	1.5	V	-3.0	84.37	/	/
1806.4	55.16	PK	52	1.7	V	-11.01	44.15	74	29.85
1806.4	37.56	Ave.	52	1.7	V	-11.01	26.55	54	27.45
2709.6	53.82	PK	276	1.3	V	-4.20	49.62	74	24.38
2709.6	38.56	Ave.	276	1.3	V	-4.20	34.36	54	19.64
3612.8	42.14	PK	53	1.2	H	-1.00	41.14	74	32.86
3612.8	31.16	Ave.	53	1.2	H	-1.00	30.16	54	23.84
4516.0	44.63	PK	184	2.4	V	2.60	47.23	74	26.77
4516.0	26.26	Ave.	184	2.4	V	2.60	28.86	54	25.14
5419.2	41.37	PK	32	2.4	H	4.63	46.00	74	28.00
5419.2	25.15	Ave.	32	2.4	H	4.63	29.78	54	24.22
6322.4	39.57	PK	230	2.2	H	5.20	44.77	74	29.23
6322.4	24.01	Ave.	230	2.2	H	5.20	29.21	54	24.79

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Middle Channel(915.2 MHz)									
55.3	44.23	QP	303	1.9	V	-14.1	30.13	40	9.87
915.2	83.07	PK	161	1.3	H	-3.0	80.07	/	/
915.2	79.69	Ave.	161	1.3	H	-3.0	76.69	/	/
915.2	87.20	PK	126	2	V	-3.0	84.20	/	/
915.2	85.14	Ave.	126	2	V	-3.0	82.14	/	/
1830.4	52.67	PK	318	1.2	V	-11.01	41.66	74	32.34
1830.4	41.99	Ave.	318	1.2	V	-11.01	30.98	54	23.02
2745.6	51.76	PK	264	1.3	V	-4.20	47.56	74	26.44
2745.6	38.08	Ave.	264	1.3	V	-4.20	33.88	54	20.12
3660.8	43.68	PK	236	2.4	V	0.30	43.98	74	30.02
3660.8	30.77	Ave.	236	2.4	V	0.30	31.07	54	22.93
4576.0	44.38	PK	89	1.2	V	2.57	46.95	74	27.05
4576.0	28.31	Ave.	89	1.2	V	2.57	30.88	54	23.12
5491.2	40.96	PK	162	1.2	H	4.12	45.08	74	28.92
5491.2	25.73	Ave.	162	1.2	H	4.12	29.85	54	24.15
6406.4	38.51	PK	282	1.5	V	11.43	49.94	74	24.06
6406.4	24.36	Ave.	282	1.5	V	11.43	35.79	54	18.21
High Channel(926MHz)									
55.3	44.85	QP	109	2.0	V	-14.1	30.75	40	9.25
926.0	81.73	PK	282	1.2	H	-2.6	79.13	/	/
926.0	78.85	Ave.	282	1.2	H	-2.6	76.25	/	/
926.0	85.91	PK	148	2.2	V	-2.6	83.31	/	/
926.0	82.66	Ave.	148	2.2	V	-2.6	80.06	/	/
1852.0	54.30	PK	277	1.2	V	-9.20	45.10	74	28.90
1852.0	40.32	Ave.	277	1.2	V	-9.20	31.12	54	22.88
2778.0	53.91	PK	359	1.2	V	-3.21	50.70	74	23.30
2778.0	39.92	Ave.	359	1.2	V	-3.21	36.71	54	17.29
3704.0	40.81	PK	359	1.2	H	0.30	41.11	74	32.89
3704.0	32.32	Ave.	359	1.2	H	0.30	32.62	54	21.38
4630.0	43.51	PK	96	1.9	V	2.57	46.08	74	27.92
4630.0	27.01	Ave.	96	1.9	V	2.57	29.58	54	24.42
5556.0	39.98	PK	167	1.6	H	5.79	45.77	74	28.23
5556.0	24.33	Ave.	167	1.6	H	5.79	30.12	54	23.88
6482.0	37.16	PK	240	1.2	H	11.93	49.09	74	24.91
6482.0	24.31	Ave.	240	1.2	H	11.93	36.24	54	17.76

O-QPSK Mode:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel(904MHz)									
55.3	44.87	QP	163	1.8	V	-14.1	30.77	40	9.23
904.0	86.87	PK	178	1.2	H	-3.0	83.87	/	/
904.0	84.16	Ave.	178	1.2	H	-3.0	81.16	/	/
904.0	94.52	PK	11	2.4	V	-3.0	91.52	/	/
904.0	91.38	Ave.	11	2.4	V	-3.0	88.38	/	/
1808.0	56.38	PK	135	1.2	V	-11.01	45.37	74	28.63
1808.0	42.81	Ave.	135	1.2	V	-11.01	31.80	54	22.20
2712.0	54.04	PK	85	1.8	V	-4.20	49.84	74	24.16
2712.0	48.36	Ave.	85	1.8	V	-4.20	44.16	54	9.84
3616.0	40.44	PK	207	2.2	H	-1.00	39.44	74	34.56
3616.0	32.31	Ave.	207	2.2	H	-1.00	31.31	54	22.69
4520.0	44.15	PK	299	2.3	V	2.60	46.75	74	27.25
4520.0	26.79	Ave.	299	2.3	V	2.60	29.39	54	24.61
5424.0	41.36	PK	30	2.3	H	4.63	45.99	74	28.01
5424.0	25.31	Ave.	30	2.3	H	4.63	29.94	54	24.06
6328.0	40.75	PK	203	2.5	V	5.20	45.95	74	28.05
6328.0	24.37	Ave.	203	2.5	V	5.20	29.57	54	24.43
Middle Channel(916 MHz)									
55.3	45.19	QP	52	1.1	V	-14.1	31.09	40	8.91
916.0	84.61	PK	328	1.7	H	-3.0	81.61	/	/
916.0	81.83	Ave.	328	1.7	H	-3.0	78.83	/	/
916.0	90.36	PK	205	1.8	V	-3.0	87.36	/	/
916.0	88.07	Ave.	205	1.8	V	-3.0	85.07	/	/
1832.0	53.10	PK	65	1.1	V	-11.01	42.09	74	31.91
1832.0	46.25	Ave.	65	1.1	V	-11.01	35.24	54	18.76
2748.0	54.54	PK	281	2.0	V	-4.20	50.34	74	23.66
2748.0	49.18	Ave.	281	2.0	V	-4.20	44.98	54	9.02
3664.0	41.66	PK	77	2.3	H	0.30	41.96	74	32.04
3664.0	33.15	Ave.	77	2.3	H	0.30	33.45	54	20.55
4580.0	43.97	PK	90	1.9	V	2.57	46.54	74	27.46
4580.0	27.16	Ave.	90	1.9	V	2.57	29.73	54	24.27
5496.0	43.16	PK	184	2.1	H	4.12	47.28	74	26.72
5496.0	26.19	Ave.	184	2.1	H	4.12	30.31	54	23.69
6412.0	41.55	PK	93	2.4	H	11.43	52.98	74	21.02
6412.0	23.16	Ave.	93	2.4	H	11.43	34.59	54	19.41

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
High Channel(926 MHz)									
55.3	45.08	QP	196	2.1	V	-14.1	30.98	40	9.02
926.0	83.79	PK	337	2.1	H	-2.6	81.19	/	/
926.0	81.51	Ave.	337	2.1	H	-2.6	78.91	/	/
926.0	83.79	PK	337	2.1	V	-2.6	81.19	/	/
926.0	80.27	Ave.	337	2.1	V	-2.6	77.67	/	/
1852.0	54.70	PK	331	1.2	V	-9.20	45.50	74	28.50
1852.0	44.54	Ave.	331	1.2	V	-9.20	35.34	54	18.66
2778.0	55.42	PK	37	1.2	V	-3.21	52.21	74	21.79
2778.0	49.29	Ave.	37	1.2	V	-3.21	46.08	54	7.92
3704.0	42.85	PK	268	2.3	V	0.30	43.15	74	30.85
3704.0	33.58	Ave.	268	2.3	V	0.30	33.88	54	20.12
4630.0	44.19	PK	141	2.5	V	2.57	46.76	74	27.24
4630.0	27.79	Ave.	141	2.5	V	2.57	30.36	54	23.64
5556.0	43.97	PK	75	1.5	H	5.79	49.76	74	24.24
5556.0	26.56	Ave.	75	1.5	H	5.79	32.35	54	21.65
6482.0	41.97	PK	321	2.2	H	11.93	53.90	74	20.10
6482.0	23.58	Ave.	321	2.2	H	11.93	35.51	54	18.49

Note:
Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
Corrected Amplitude = Corrected Factor + Reading
Margin = Limit - Corrected. Amplitude

EUT operation mode: Transmitting (2.4GHz)

30 MHz-25 GHz:

O-QPSK Mode:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2405 MHz)									
167.98	41.16	QP	16	2.2	V	-8.4	32.76	43.5	10.74
2405.00	71.03	PK	129	2.4	H	32.61	103.64	/	/
2405.00	66.09	Ave.	129	2.4	H	32.61	98.70	/	/
2405.00	69.89	PK	263	1.3	V	32.61	102.50	/	/
2405.00	65.37	Ave.	263	1.3	V	32.61	97.98	/	/
2376.21	56.73	PK	305	2.1	H	-6.46	50.27	74	23.73
2376.21	35.69	Ave.	305	2.1	H	-6.46	29.23	54	24.77
2483.50	58.31	PK	314	1.4	H	-4.74	53.57	74	20.43
2483.50	36.72	Ave.	314	1.4	H	-4.74	31.98	54	22.02
2486.97	59.31	PK	141	1.4	V	-4.74	54.57	74	19.43
2486.97	32.59	Ave.	141	1.4	V	-4.74	27.85	54	26.15
4810.00	60.31	PK	318	1.6	H	3.79	64.10	74	9.90
4810.00	44.36	Ave.	318	1.6	H	3.79	48.15	54	5.85
7215.00	56.31	PK	306	2.5	H	9.79	66.10	74	7.90
7215.00	37.96	Ave.	306	2.5	H	9.79	47.75	54	6.25
9620.00	53.79	PK	312	1.2	H	11.85	65.64	74	8.36
9620.00	36.77	Ave.	312	1.2	H	11.85	48.62	54	5.38

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Middle Channel (2440 MHz)									
167.98	42.06	QP	332	1.2	V	-8.4	33.66	43.5	9.84
2440.00	72.11	PK	181	1.7	H	32.61	104.72	/	/
2440.00	66.19	Ave.	181	1.7	H	32.61	98.80	/	/
2440.00	69.37	PK	322	1.8	V	32.61	101.98	/	/
2440.00	66.01	Ave.	322	1.8	V	32.61	98.62	/	/
2377.25	55.73	PK	218	2.4	H	-6.46	49.27	74	24.73
2377.25	37.13	Ave.	218	2.4	H	-6.46	30.67	54	23.33
2483.50	59.61	PK	79	1.0	H	-4.74	54.87	74	19.13
2483.50	32.68	Ave.	79	1.0	H	-4.74	27.94	54	26.06
2486.97	57.17	PK	224	1.8	V	-4.74	52.43	74	21.57
2486.97	33.26	Ave.	224	1.8	V	-4.74	28.52	54	25.48
4880.00	59.19	PK	51	2.1	H	3.56	62.75	74	11.25
4880.00	43.16	Ave.	51	2.1	H	3.56	46.72	54	7.28
7320.00	55.71	PK	336	1.2	V	10.11	65.82	74	8.18
7320.00	35.12	Ave.	336	1.2	V	10.11	45.23	54	8.77
9760.00	52.36	PK	16	2.3	H	13.21	65.57	74	8.43
9760.00	33.16	Ave.	207	1.2	H	13.21	46.37	54	7.63
High Channel (2480 MHz)									
167.98	41.53	QP	34	1.9	V	-8.4	33.13	43.5	10.37
2480.00	72.19	PK	48	2.4	H	34.21	106.40	/	/
2480.00	66.03	Ave.	48	2.4	H	34.21	100.24	/	/
2480.00	69.97	PK	13	2.2	V	34.21	104.18	/	/
2480.00	66.31	Ave.	13	2.2	V	34.21	100.52	/	/
2377.84	54.31	PK	323	1.4	H	-6.46	47.85	74	26.15
2377.84	36.95	Ave.	323	1.4	H	-6.46	30.49	54	23.51
2483.50	66.13	PK	26	1.6	H	-4.74	61.39	74	12.61
2483.50	41.37	Ave.	26	1.6	H	-4.74	36.63	54	17.37
2487.91	62.69	PK	209	1.6	H	-4.74	57.95	74	16.05
2487.91	36.97	Ave.	209	1.6	H	-4.74	32.23	54	21.77
4960.00	60.31	PK	147	1.5	H	3.19	63.50	74	10.50
4960.00	41.39	Ave.	147	1.5	H	3.19	44.58	54	9.42
7440.00	57.31	PK	285	1.9	H	8.17	65.48	74	8.52
7440.00	37.16	Ave.	285	1.9	H	8.17	45.33	54	8.67
9920.00	56.15	PK	11	1.9	V	13.21	69.36	74	4.64
9920.00	34.16	Ave.	11	1.9	V	13.21	47.37	54	6.63

OFDM OPTION1 Mode:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2401.2 MHz)									
167.98	40.31	QP	339	1.6	V	-8.4	31.91	43.5	11.59
2401.20	70.97	PK	314	1.6	H	32.61	103.58	/	/
2401.20	62.96	Ave.	314	1.6	H	32.61	95.57	/	/
2401.20	70.03	PK	297	2.4	V	32.61	102.64	/	/
2401.20	61.36	Ave.	297	2.4	V	32.61	93.97	/	/
2381.03	55.31	PK	224	1.3	H	-6.46	48.85	74	25.15
2381.03	37.95	Ave.	224	1.3	H	-6.46	31.49	54	22.51
2389.19	59.31	PK	310	2.3	V	-6.46	52.85	74	21.15
2389.19	41.36	Ave.	310	2.3	V	-6.46	34.90	54	19.10
2486.16	59.01	PK	10	1.4	H	-4.74	54.27	74	19.73
2486.16	39.69	Ave.	10	1.4	H	-4.74	34.95	54	19.05
4802.40	55.31	PK	274	2.0	H	3.79	59.10	74	14.90
4802.40	36.97	Ave.	274	2.0	H	3.79	40.76	54	13.24
7203.60	55.07	PK	307	1.6	H	9.79	64.86	74	9.14
7203.60	36.01	Ave.	307	1.6	H	9.79	45.80	54	8.20
9604.80	53.16	PK	301	2.1	H	11.85	65.01	74	8.99
9604.80	32.19	Ave.	301	2.1	H	11.85	44.04	54	9.96
Middle Channel (2438.4 MHz)									
167.98	40.75	QP	255	1.8	V	-8.4	32.35	43.5	11.15
2438.40	70.19	PK	10	1.1	H	32.61	102.80	/	/
2438.40	62.93	Ave.	10	1.1	H	32.61	95.54	/	/
2438.40	70.37	PK	246	2.1	V	32.61	102.98	/	/
2438.40	61.24	Ave.	246	2.1	V	32.61	93.85	/	/
2383.13	55.33	PK	52	2.5	H	-6.46	48.87	74	25.13
2383.13	37.97	Ave.	52	2.5	H	-6.46	31.51	54	22.49
2388.98	58.31	PK	124	2.3	V	-6.46	51.85	74	22.15
2388.98	40.36	Ave.	124	2.3	V	-6.46	33.90	54	20.10
2485.76	59.16	PK	235	1.3	H	-4.74	54.42	74	19.58
2485.76	36.16	Ave.	235	1.3	H	-4.74	31.42	54	22.58
4876.80	53.93	PK	220	1.1	V	3.56	57.49	74	16.51
4876.80	34.31	Ave.	220	1.1	V	3.56	37.87	54	16.13
7315.20	52.09	PK	217	2.5	V	10.11	62.20	74	11.80
7315.20	35.06	Ave.	217	2.5	V	10.11	45.17	54	8.83
9753.60	51.19	PK	193	2.3	H	13.21	64.40	74	9.60
9753.60	33.19	Ave.	193	2.3	H	13.21	46.40	54	7.60

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
High Channel (2476.8 MHz)									
167.98	40.98	QP	107	2.4	V	-8.4	32.58	43.5	10.92
2476.80	72.39	PK	17	1.1	H	34.21	106.60	/	/
2476.80	64.96	Ave.	17	1.1	H	34.21	99.17	/	/
2476.80	72.01	PK	254	1.3	V	34.21	106.22	/	/
2476.80	63.99	Ave.	254	1.3	V	34.21	98.20	/	/
2385.13	56.33	PK	178	1.0	V	-6.46	49.87	74	24.13
2385.13	39.16	Ave.	178	1.0	V	-6.46	32.70	54	21.30
2483.96	59.31	PK	25	1.3	H	-4.74	54.57	74	19.43
2483.96	43.16	Ave.	25	1.3	H	-4.74	38.42	54	15.58
2489.31	58.13	PK	205	1.8	H	-4.74	53.39	74	20.61
2489.31	36.31	Ave.	205	1.8	H	-4.74	31.57	54	22.43
4953.60	53.19	PK	317	1.0	H	3.19	56.38	74	17.62
4953.60	35.16	Ave.	317	1.0	H	3.19	38.35	54	15.65
7430.40	53.09	PK	123	1.7	H	8.17	61.26	74	12.74
7430.40	36.17	Ave.	123	1.7	H	8.17	44.34	54	9.66
9907.20	50.97	PK	130	1.5	V	13.21	64.18	74	9.82
9907.20	33.15	Ave.	130	1.5	V	13.21	46.36	54	7.64

OFDM OPTION2 Mode:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2400.8 MHz)									
167.98	40.51	QP	329	1.8	V	-8.4	32.11	43.5	11.39
2400.80	70.11	PK	96	1.1	H	32.61	102.72	/	/
2400.80	62.62	Ave.	96	1.1	H	32.61	95.23	/	/
2400.80	69.16	PK	58	1.7	V	32.61	101.77	/	/
2400.80	62.04	Ave.	58	1.7	V	32.61	94.65	/	/
2381.06	58.31	PK	6	1.1	H	-6.46	51.85	74	22.15
2381.06	41.31	Ave.	6	1.1	H	-6.46	34.85	54	19.15
2389.17	59.63	PK	205	1.8	H	-6.46	53.17	74	20.83
2389.17	44.31	Ave.	205	1.8	H	-6.46	37.85	54	16.15
2486.15	56.36	PK	198	1.4	V	-4.74	51.62	74	22.38
2486.15	36.19	Ave.	198	1.4	V	-4.74	31.45	54	22.55
4801.60	55.31	PK	313	2.5	V	3.79	59.10	74	14.90
4801.60	37.16	Ave.	313	2.5	V	3.79	40.95	54	13.05
7202.40	54.06	PK	288	1.1	H	9.79	63.85	74	10.15
7202.40	36.55	Ave.	288	1.1	H	9.79	46.34	54	7.66
9603.20	50.86	PK	100	2.4	H	11.85	62.71	74	11.29
9603.20	35.16	Ave.	100	2.4	H	11.85	47.01	54	6.99
Middle Channel (2438.4 MHz)									
167.98	42.17	QP	309	2.0	V	-8.4	33.77	43.5	9.73
2438.40	72.63	PK	229	1.9	H	32.61	105.24	/	/
2438.40	64.19	Ave.	229	1.9	H	32.61	96.80	/	/
2438.40	71.39	PK	44	1.8	V	32.61	104.00	/	/
2438.40	63.01	Ave.	44	1.8	V	32.61	95.62	/	/
2382.06	59.11	PK	46	2.2	H	-6.46	52.65	74	21.35
2382.06	42.16	Ave.	46	2.2	H	-6.46	35.70	54	18.30
2389.63	60.63	PK	68	2.4	V	-6.46	54.17	74	19.83
2389.63	45.39	Ave.	68	2.4	V	-6.46	38.93	54	15.07
2489.31	58.31	PK	87	1.2	H	-4.74	53.57	74	20.43
2489.31	37.17	Ave.	87	1.2	H	-4.74	32.43	54	21.57
4876.80	56.32	PK	199	1.9	H	3.56	59.88	74	14.12
4876.80	38.16	Ave.	199	1.9	H	3.56	41.72	54	12.28
7315.20	55.39	PK	108	1.3	V	10.11	65.50	74	8.50
7315.20	36.73	Ave.	108	1.3	V	10.11	46.84	54	7.16
9753.60	51.66	PK	114	2.4	H	13.21	64.87	74	9.13
9753.60	33.96	Ave.	114	2.4	H	13.21	47.17	54	6.83

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
High Channel (2477.6 MHz)									
167.98	39.96	QP	80	1.6	V	-8.4	31.56	43.5	11.94
2477.60	70.13	PK	37	1.1	H	34.21	104.34	/	/
2477.60	60.03	Ave.	37	1.1	H	34.21	94.24	/	/
2477.60	69.68	PK	67	1.7	V	34.21	103.89	/	/
2477.60	59.99	Ave.	67	1.7	V	34.21	94.20	/	/
2368.83	52.09	PK	195	2.2	V	-6.46	45.63	74	28.37
2368.83	38.57	Ave.	195	2.2	V	-6.46	32.11	54	21.89
2487.96	53.38	PK	195	1.0	H	-4.74	48.64	74	25.36
2487.96	40.05	Ave.	195	1.0	H	-4.74	35.31	54	18.69
2488.16	53.76	PK	347	1.8	H	-4.74	49.02	74	24.98
2488.16	39.96	Ave.	347	1.8	H	-4.74	35.22	54	18.78
4955.20	58.31	PK	321	1.5	V	3.19	61.50	74	12.50
4955.20	39.59	Ave.	321	1.5	V	3.19	42.78	54	11.22
7432.80	57.31	PK	7	1.2	H	8.17	65.48	74	8.52
7432.80	35.16	Ave.	7	1.2	H	8.17	43.33	54	10.67
9910.40	56.16	PK	196	2.3	V	13.21	69.37	74	4.63
9910.40	34.13	Ave.	196	2.3	V	13.21	47.34	54	6.66

Note:
The fundamental test was without the Amplifier.
Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
Corrected Amplitude = Corrected Factor + Reading
Margin = Limit - Corrected. Amplitude

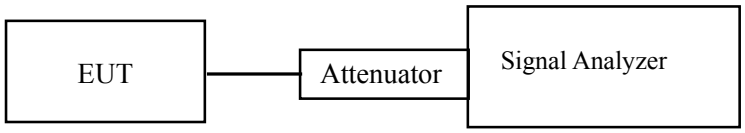
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH

Applicable Standard

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.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2015-12-11	2016-12-11
Ducommun technologies	RF Cable	RG-214	3	2015-06-15	2016-06-15
WEINSCHEL	10dB Attenuator	5324	AU0709	2015-06-18	2016-06-18

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	23~25 ℃
Relative Humidity:	45~50 %
ATM Pressure:	100.1~101.0 kPa

The testing was performed by Hill He on 2016-01-13 and 2016-01-19.

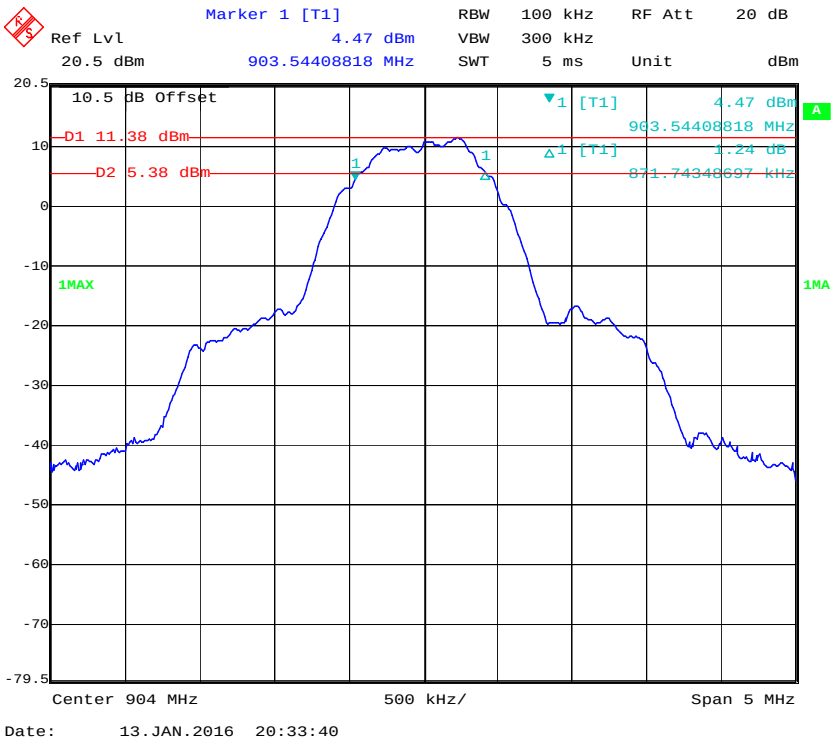
Test Result: Pass.

Please refer to the following table and plots.

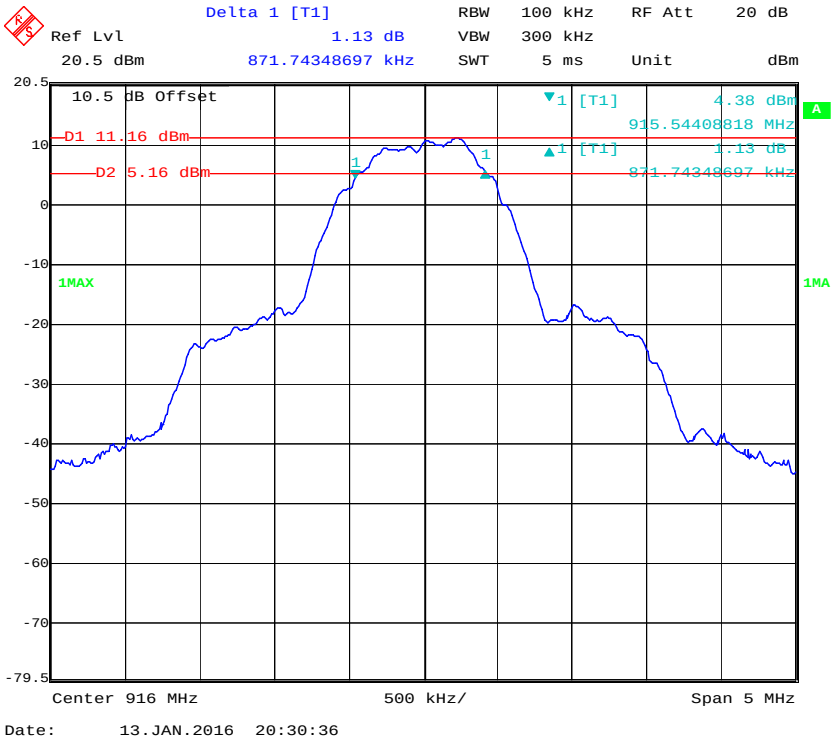
EUT operation mode: Transmitting (900MHz)

Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (kHz)
O-QPSK mode			
Low	904	0.872	≥500
Middle	916	0.872	≥500
High	926	0.872	≥500
OFDM Option1 mode			
Low	903.2	1.115	≥500
Middle	915.2	1.102	≥500
High	926	1.102	≥500

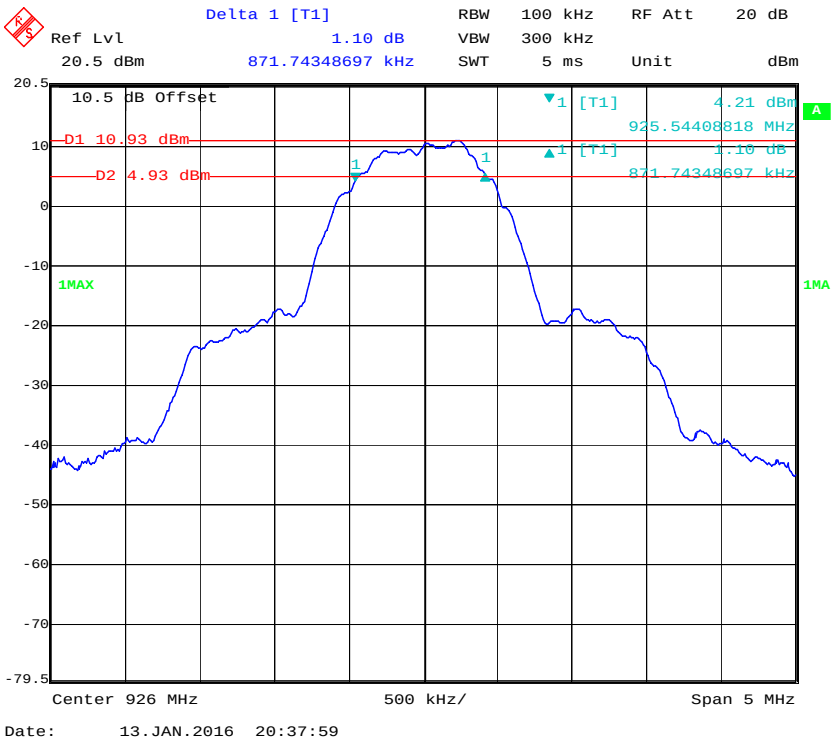
O-QPSK Low Channel



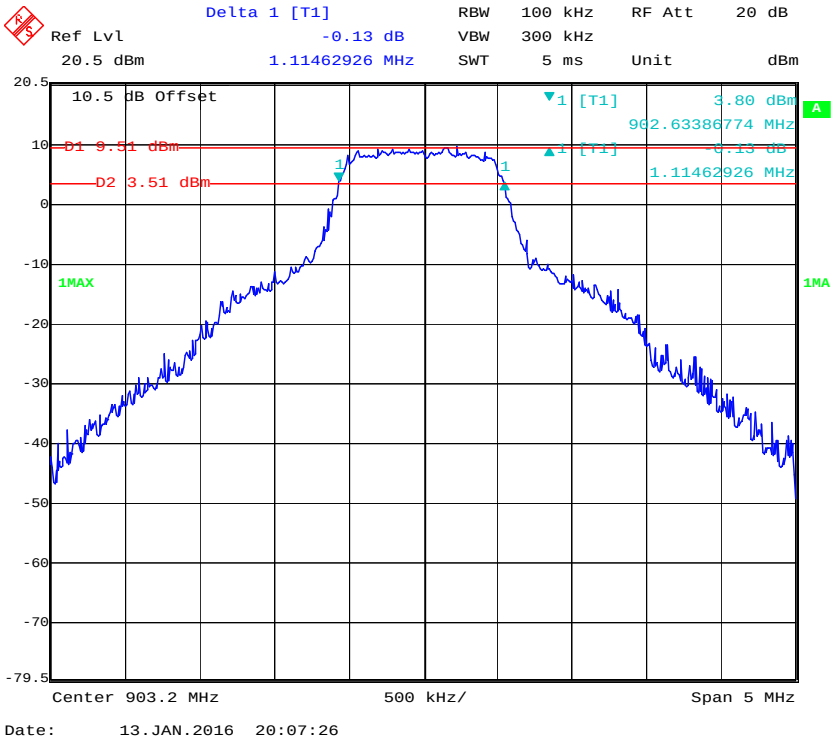
O-QPSK Middle Channel



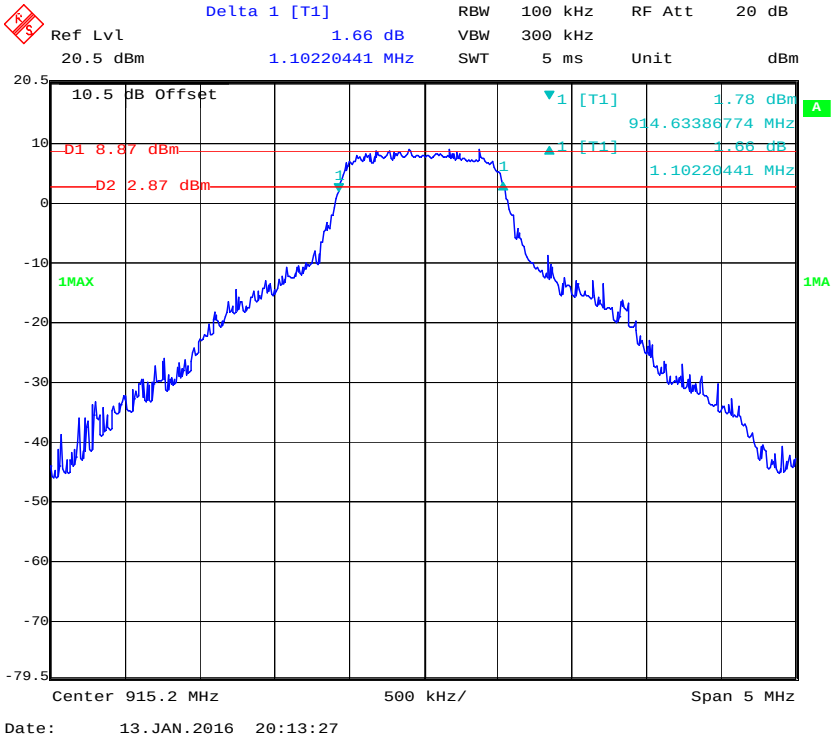
O-QPSK High Channel



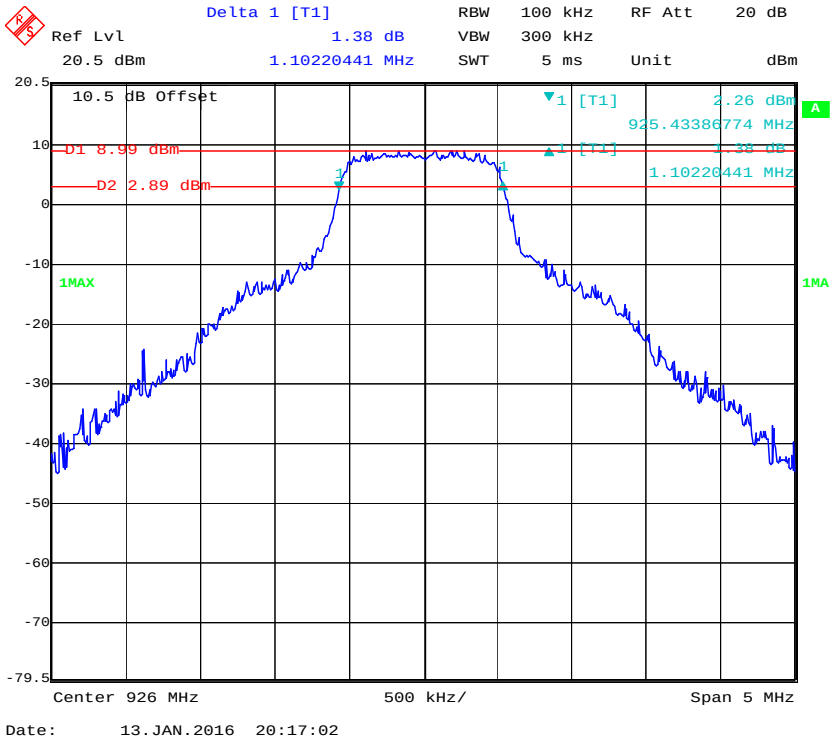
OFDM Option1 Low Channel



OFDM Option1 Middle Channel



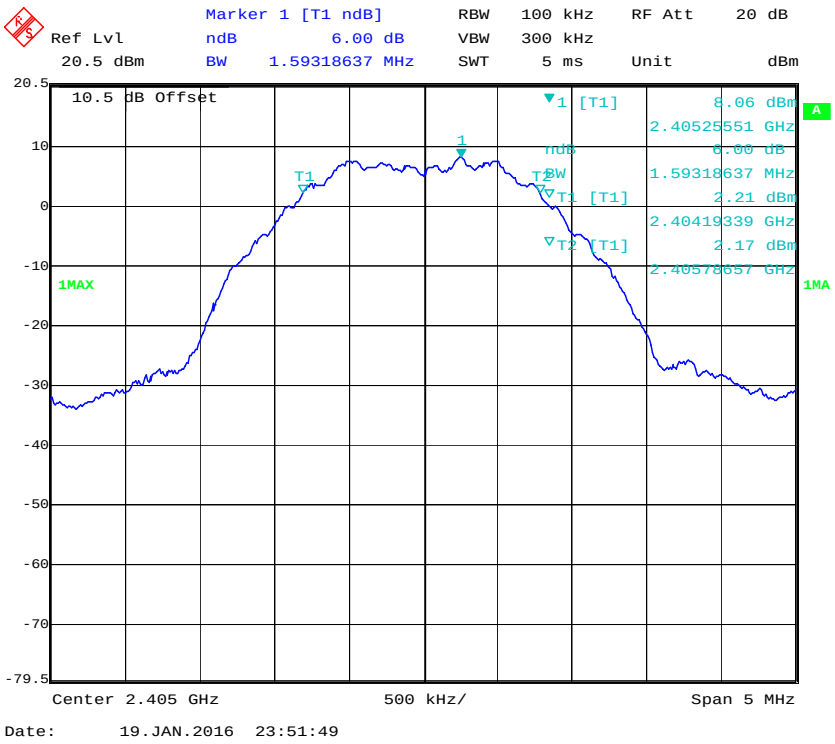
OFDM Option1 High Channel



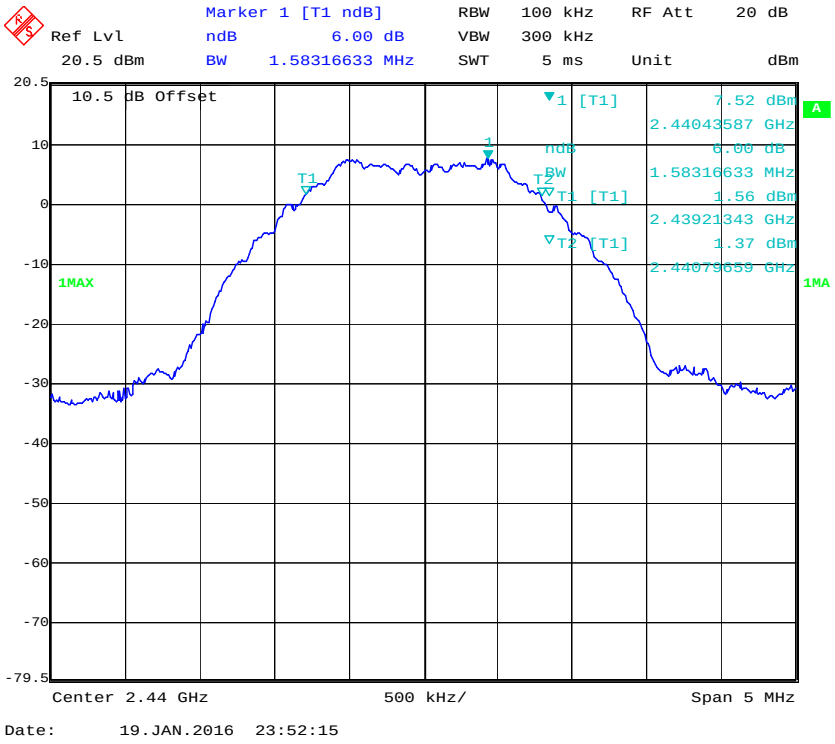
EUT operation mode: Transmitting (2.4GHz)

Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (kHz)
O-QPSK mode			
Low	2405	1.593	≥500
Middle	2440	1.583	≥500
High	2480	1.583	≥500
OFDM Option1 mode			
Low	2401.2	1.102	≥500
Middle	2438.4	1.092	≥500
High	2476.8	1.092	≥500
OFDM Option2 mode			
Low	2400.8	0.601	≥500
Middle	2438.4	0.613	≥500
High	2477.6	0.595	≥500

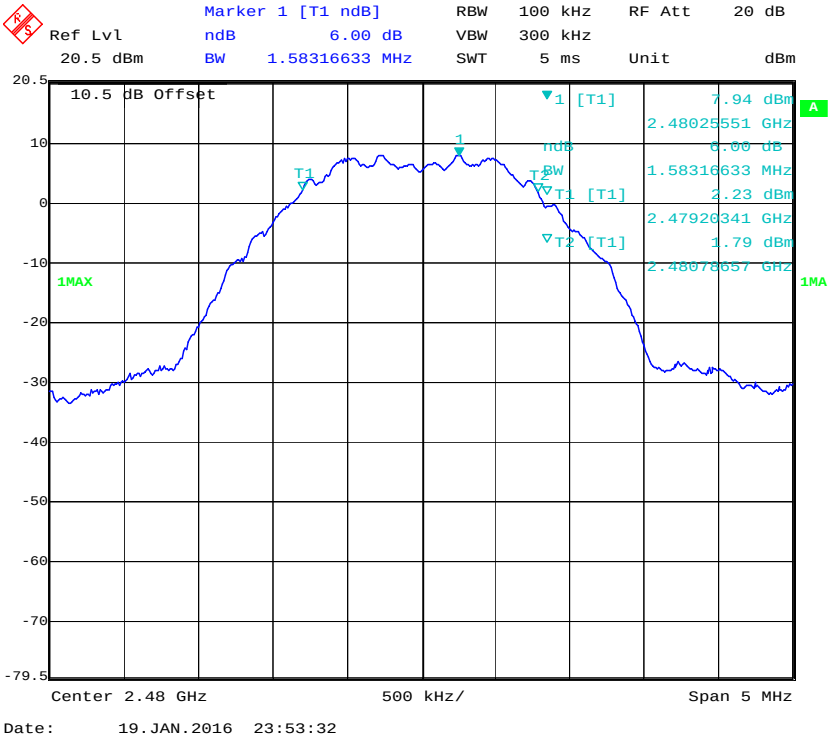
O-QPSK Low Channel



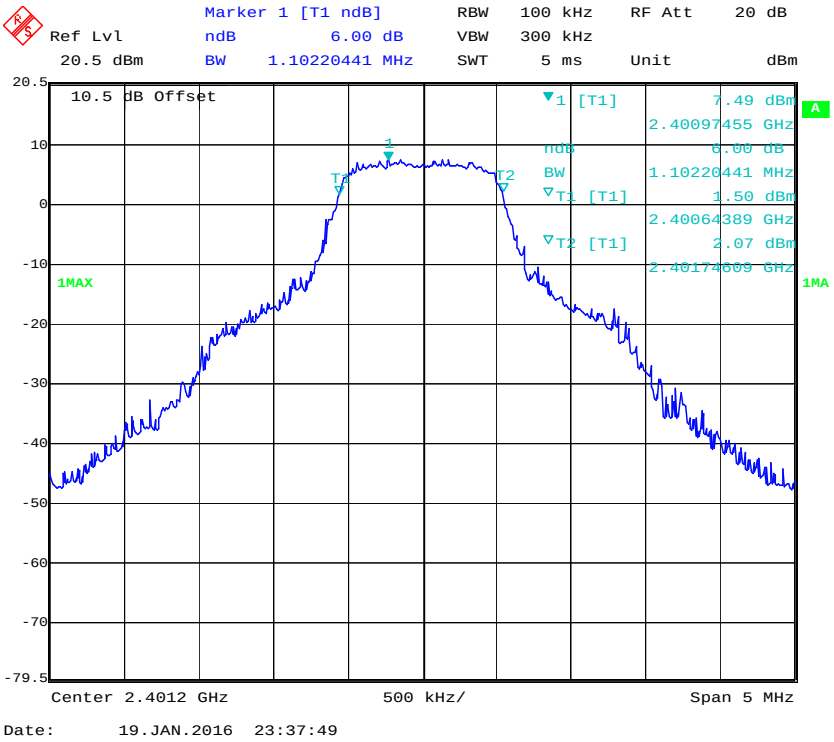
O-QPSK Middle Channel



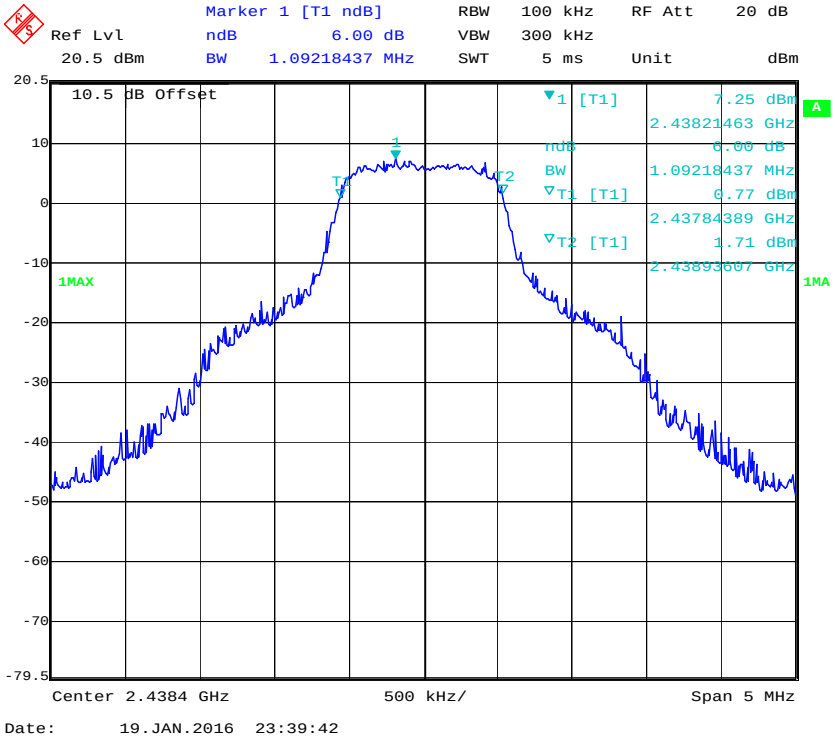
O-QPSK High Channel



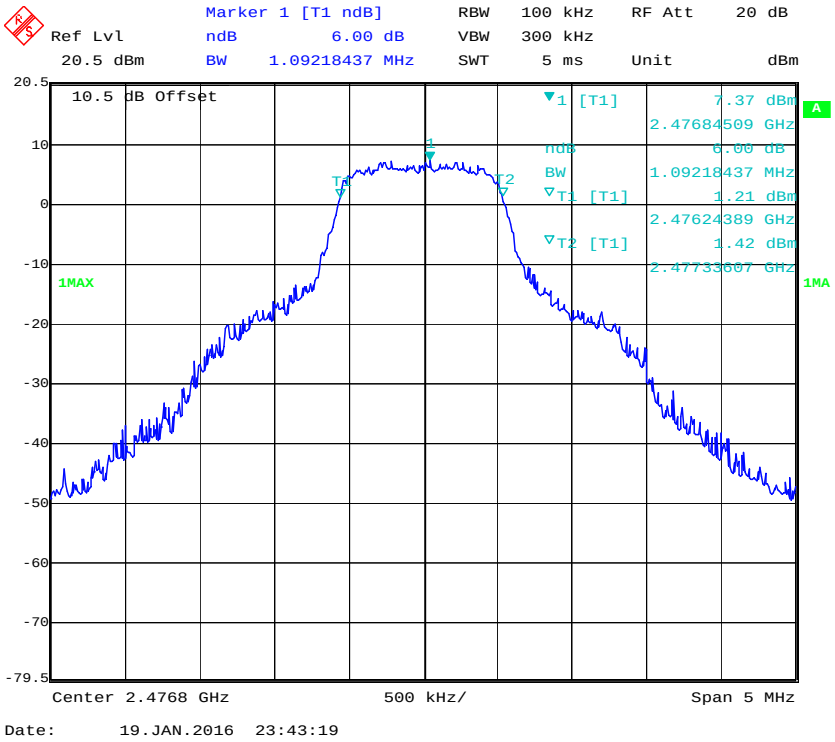
OFDM Option1 Low Channel



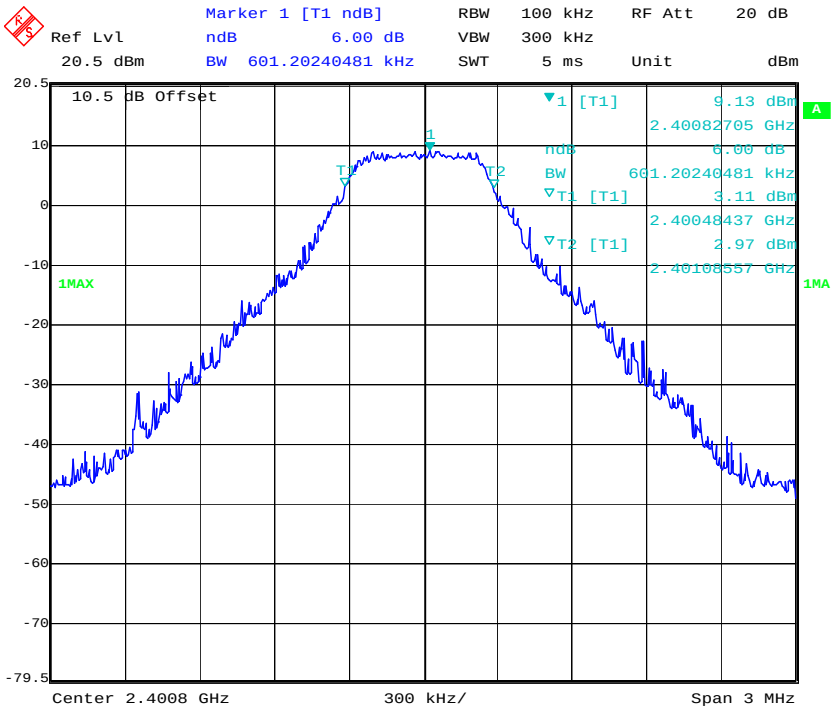
OFDM Option1 Middle Channel



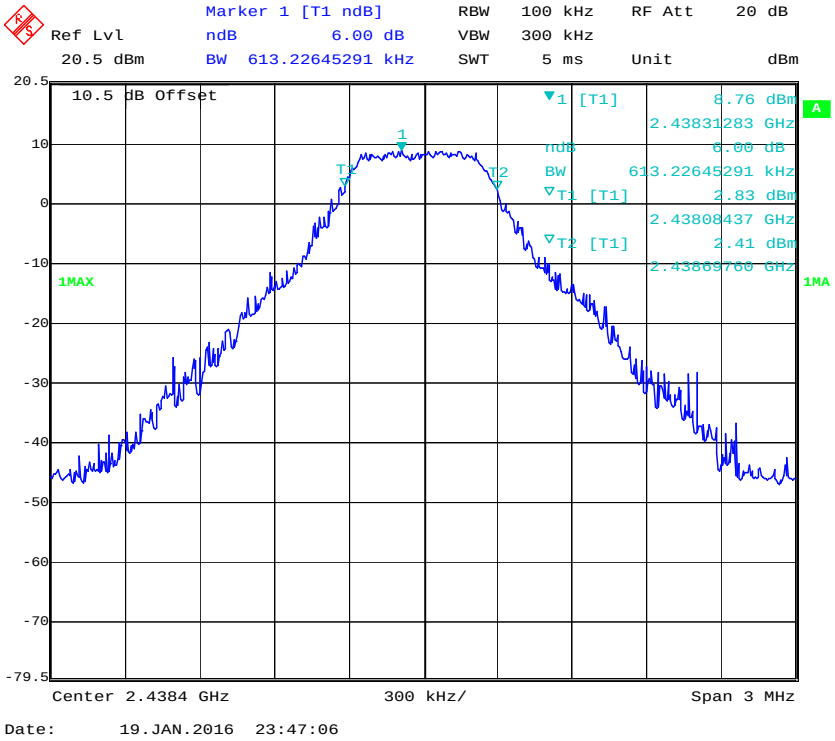
OFDM Option1 High Channel



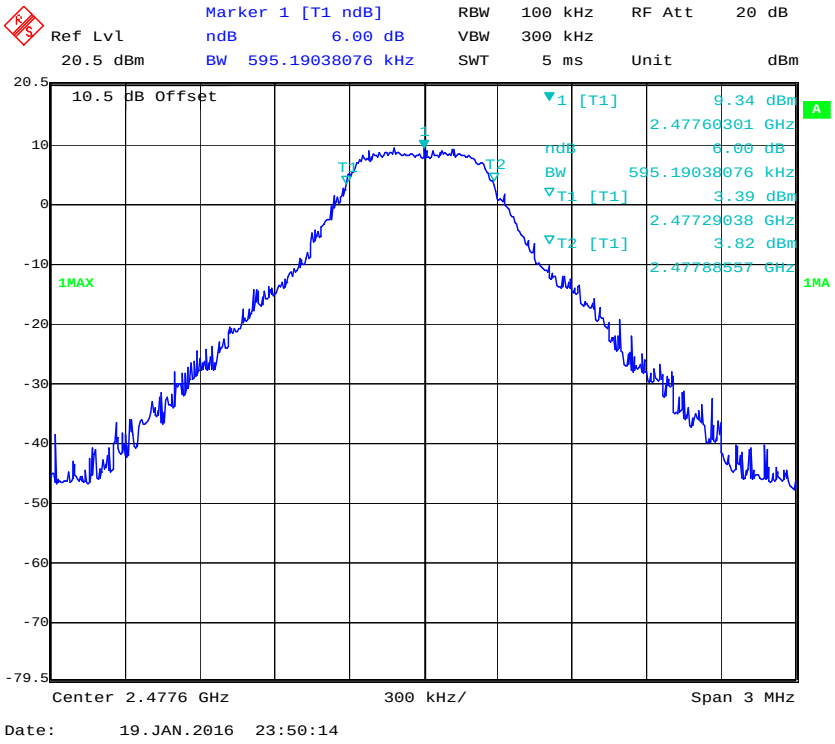
OFDM Option2 Low Channel



OFDM Option2 Middle Channel



OFDM Option2 High Channel



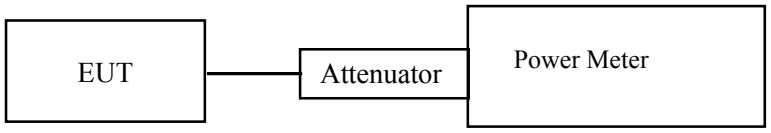
FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER

Applicable Standard

According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

Test Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to one test equipment.
3. Add a correction factor to the display.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Power Meter	N1912A	MY5000448	2015-11-03	2016-11-03
HP	Power Sensor	N1921A	MY54210016	2015-11-03	2016-11-03
Ducommun technologies	RF Cable	RG-214	3	2015-06-15	2016-06-15
WEINSCHEL	10dB Attenuator	5324	AU0709	2015-06-18	2016-06-18

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Hill He on 2016-01-21.

Maximum peak conducted output power:

EUT operation mode: Transmitting (900MHz)

Mode	Channel	Frequency (MHz)	Reading (dBm)	Limit (dBm)	Result
O-QPSK	Low	904	12.74	30	PASS
	Middle	916	12.47	30	PASS
	High	926	12.24	30	PASS
OFDM Option1	Low	903.2	13.38	30	PASS
	Middle	915.2	13.23	30	PASS
	High	926	12.97	30	PASS

EUT operation mode: Transmitting (2.4GHz)

Mode	Channel	Frequency (MHz)	Reading (dBm)	Limit (dBm)	Result
O-QPSK	Low	2405	11.50	30	PASS
	Middle	2440	11.45	30	PASS
	High	2480	11.35	30	PASS
OFDM Option1	Low	2401.2	11.68	30	PASS
	Middle	2438.4	11.75	30	PASS
	High	2476.8	11.56	30	PASS
OFDM Option2	Low	2400.8	11.69	30	PASS
	Middle	2438.4	11.97	30	PASS
	High	2477.6	11.76	30	PASS

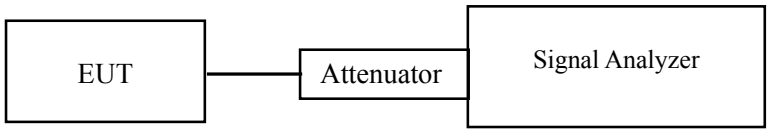
FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE

Applicable Standard

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)).

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2015-12-11	2016-12-11
Ducommun technologies	RF Cable	RG-214	3	2015-06-15	2016-06-15
WEINSCHEL	10dB Attenuator	5324	AU0709	2015-06-18	2016-06-18

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	23~25 ℃
Relative Humidity:	45~50 %
ATM Pressure:	100.1~101.0 kPa

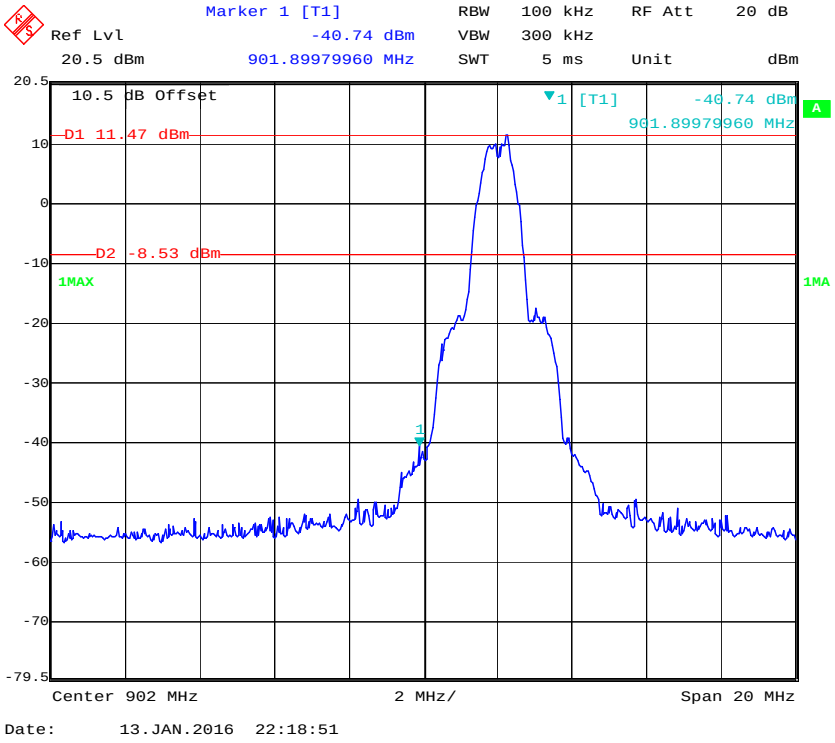
The testing was performed by Hill He on 2016-01-13 to 2016-01-20.

Test Result: *Compliance*

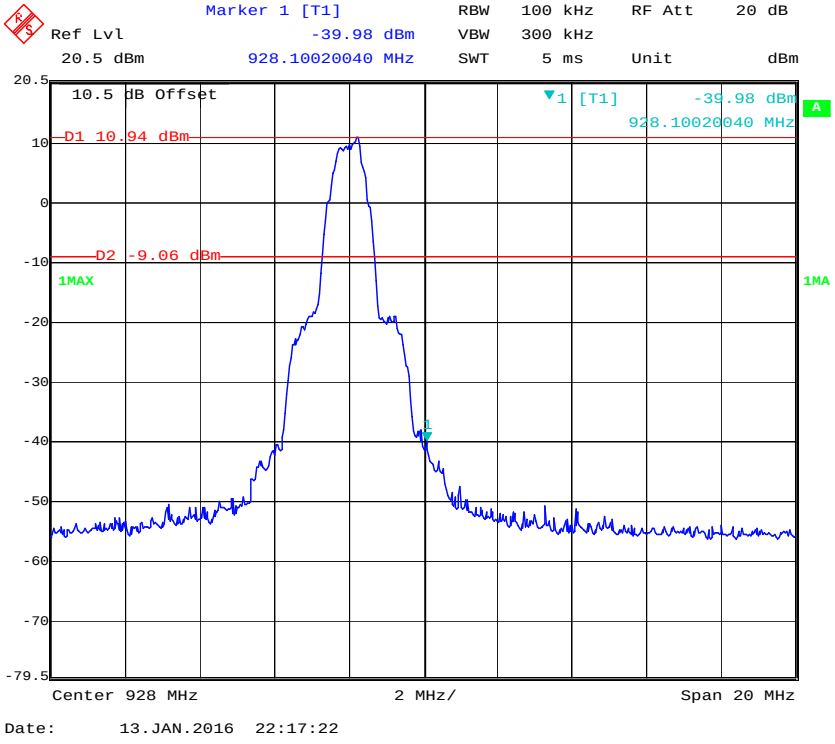
Please refer to the following plots.

EUT operation mode: Transmitting (900MHz)

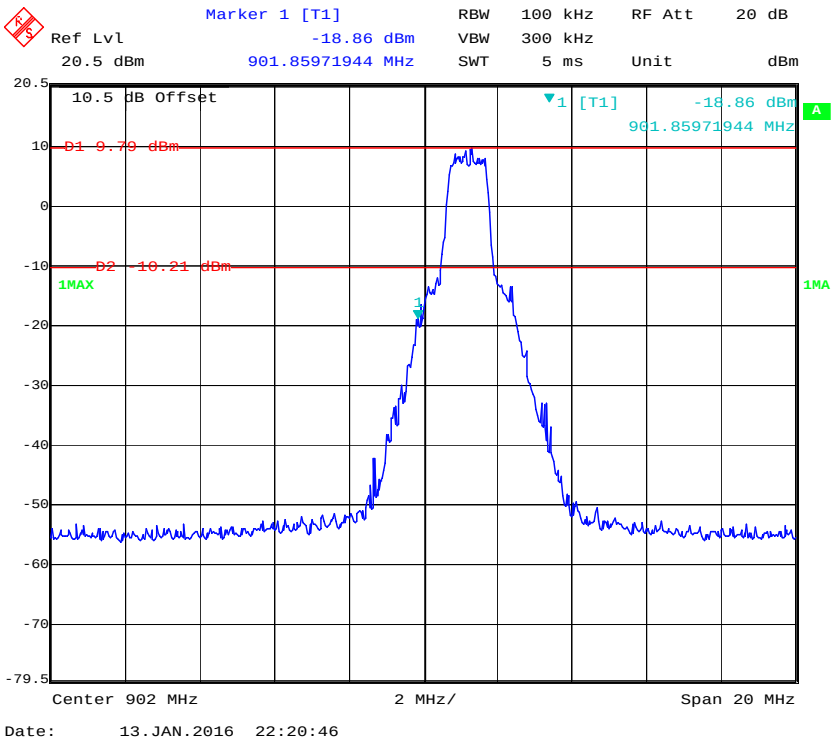
O-QPSK: Band Edge, Left Side



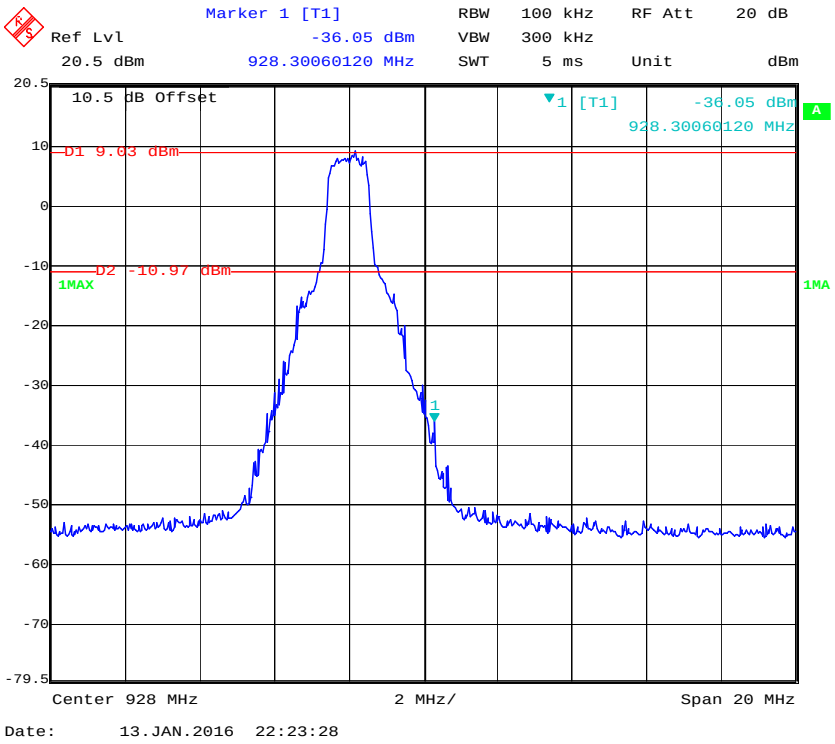
O-QPSK: Band Edge, Right Side



OFDM Option1: Band Edge, Left Side

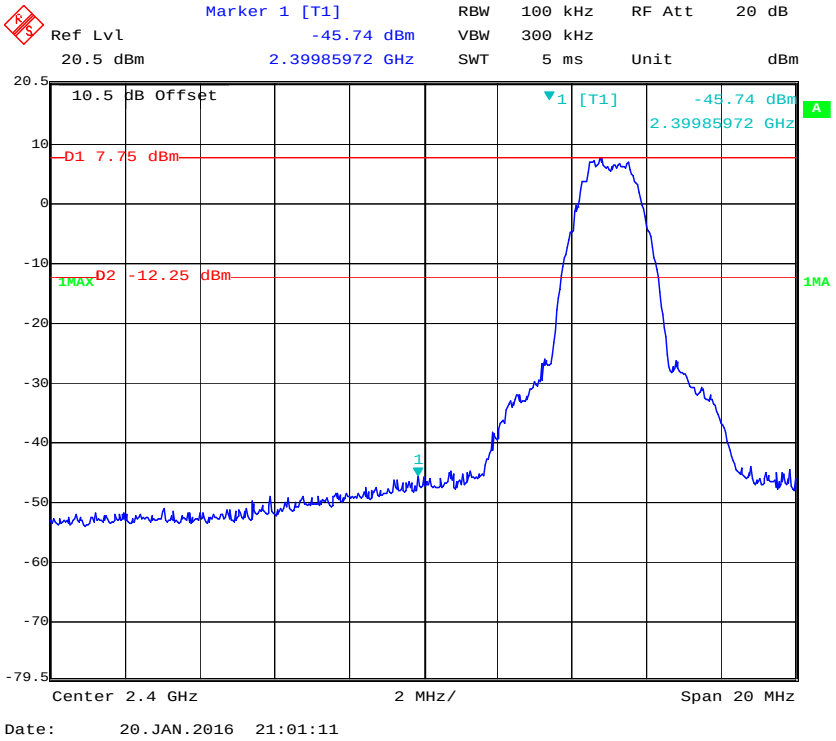


OFDM Option1: Band Edge, Right Side

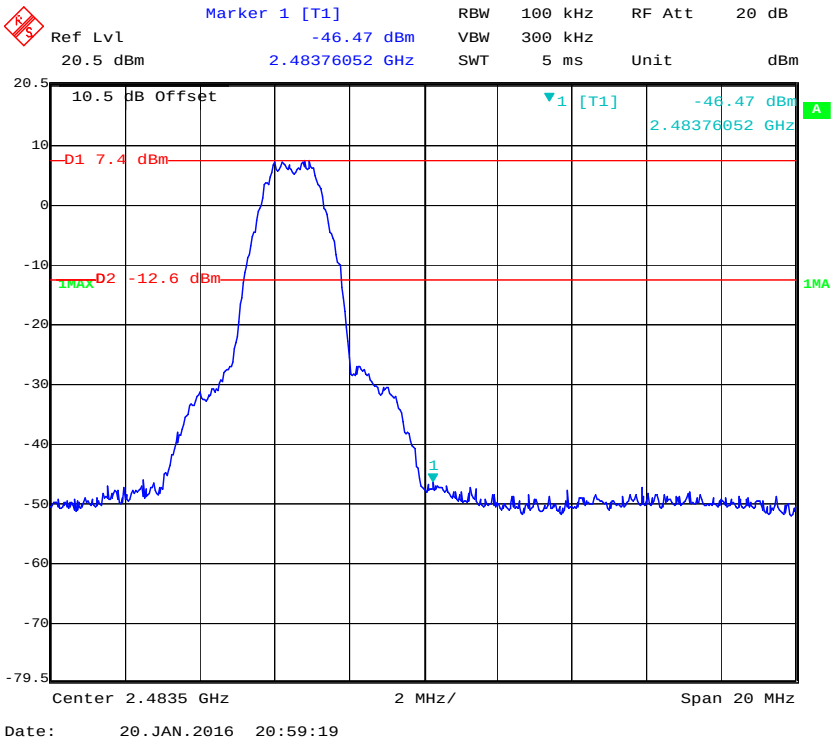


EUT operation mode: Transmitting (2.4GHz)

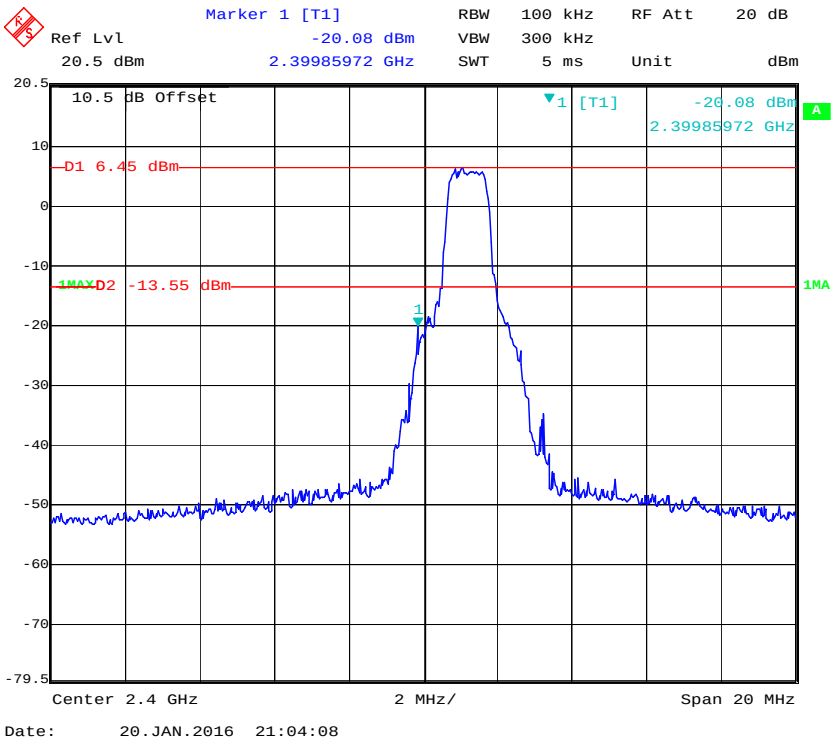
O-QPSK: Band Edge, Left Side



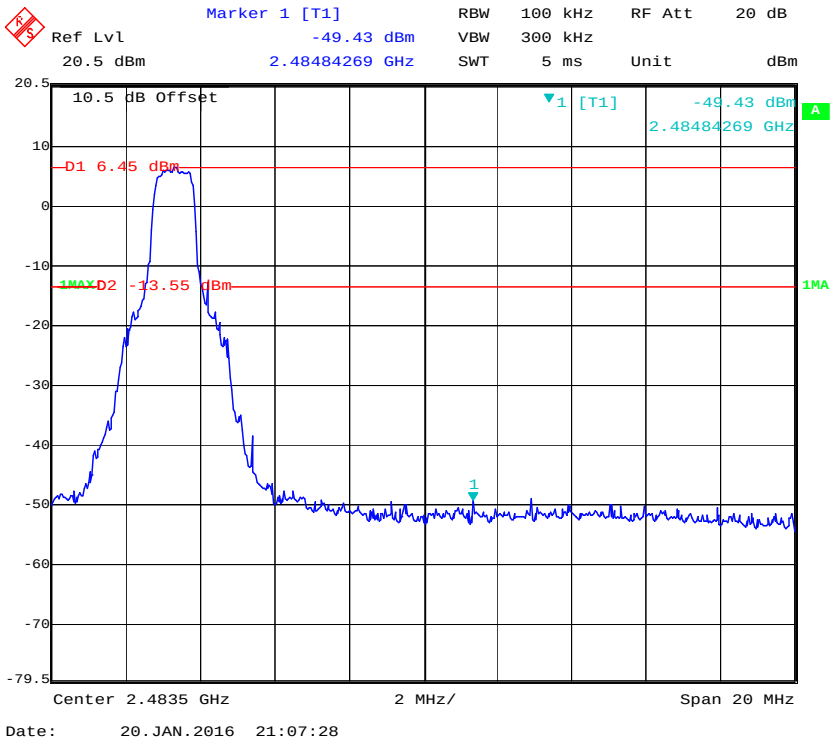
O-QPSK: Band Edge, Right Side



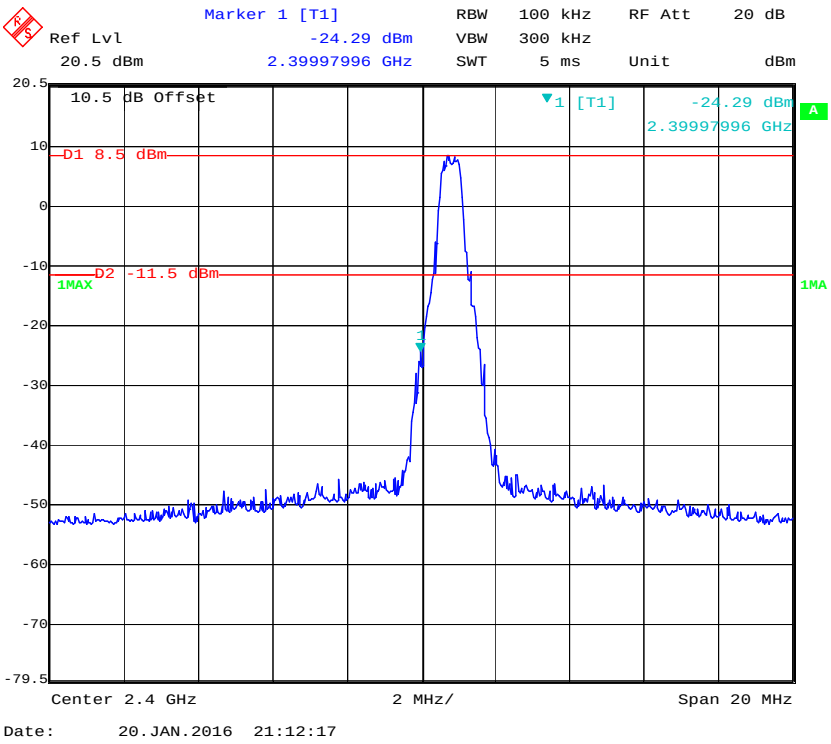
OFDM Option1: Band Edge, Left Side



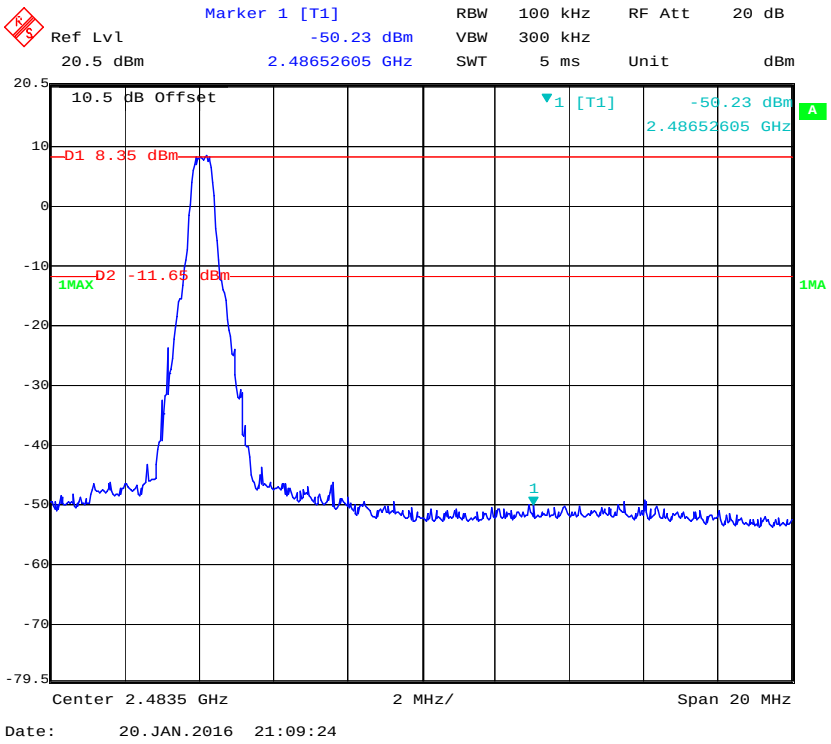
OFDM Option1: Band Edge, Right Side



OFDM Option2: Band Edge, Left Side



OFDM Option2: Band Edge, Right Side



FCC §15.247(e) - POWER SPECTRAL DENSITY

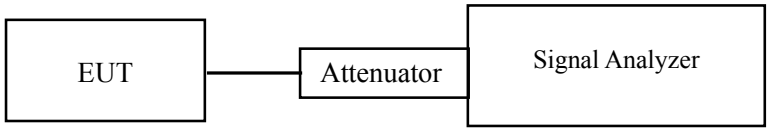
Applicable Standard

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

Test Procedure

According to KDB558074 D01 DTS Meas Guidance v03r04 sub-clause 10.2

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW to: 3kHz≤ RBW≤100 kHz.
3. Set the VBW ≥ 3×RBW.
4. Set the span to 1.5 times the DTS bandwidth.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2015-12-11	2016-12-11
Ducommun technologies	RF Cable	RG-214	3	2015-06-15	2016-06-15
WEINSCHEL	10dB Attenuator	5324	AU0709	2015-06-18	2016-06-18

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

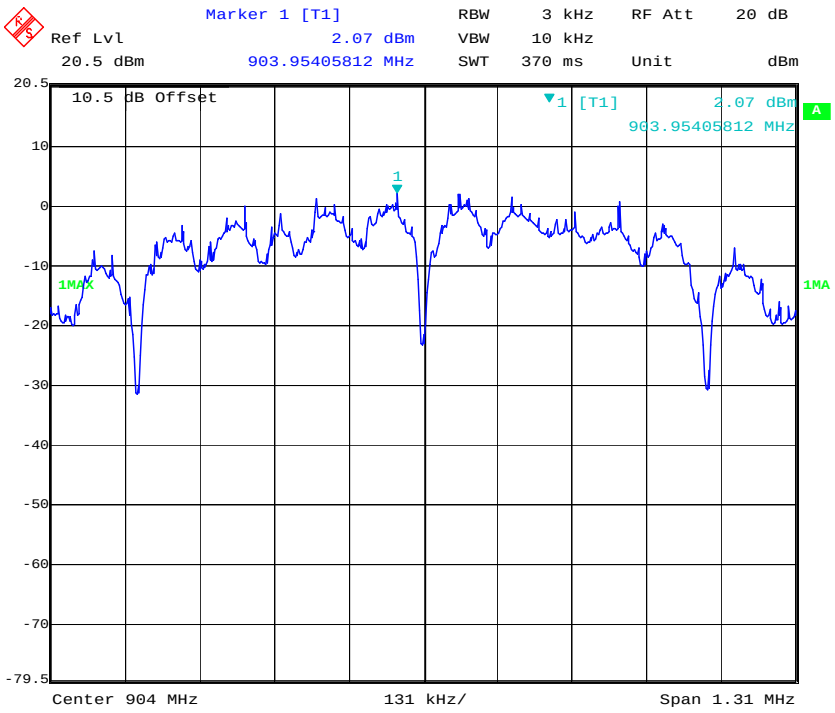
The testing was performed by Hill He on 2016-01-20.

Test Result: Pass

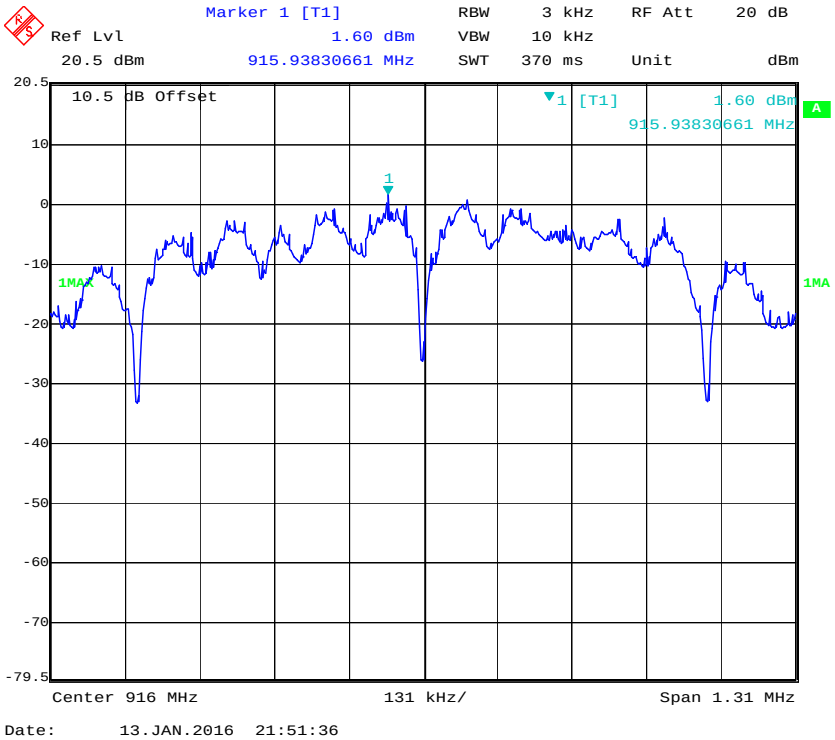
EUT operation mode: Transmitting (900MHz)

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
O-QPSK mode			
Low	903.2	2.07	≤8
Middle	915.2	1.60	≤8
High	926	1.69	≤8
OFDM Option1 mode			
Low	904	-8.21	≤8
Middle	916	-7.16	≤8
High	926	-7.41	≤8

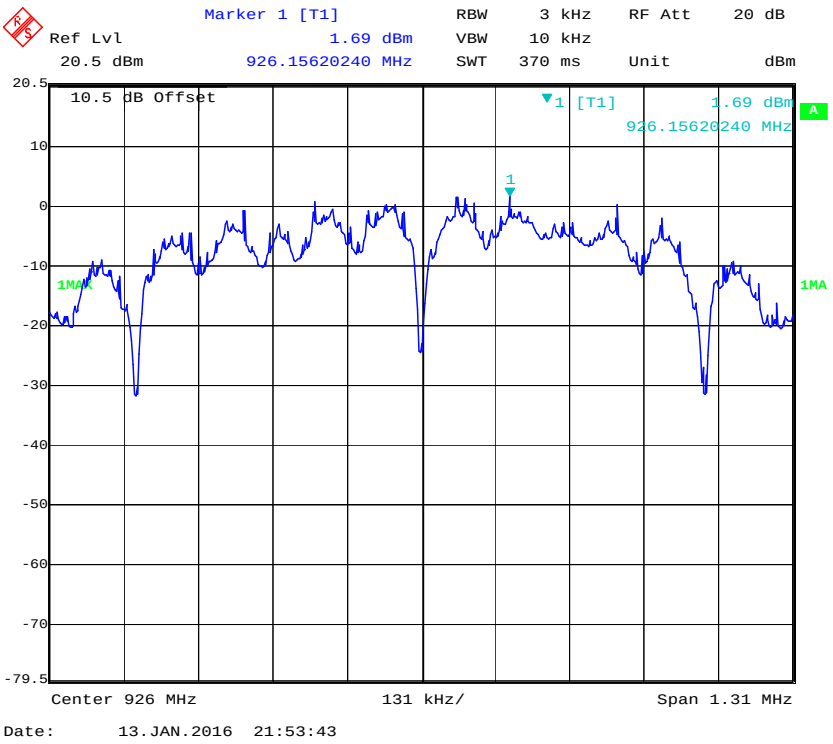
Power Spectral Density, O-QPSK Low Channel



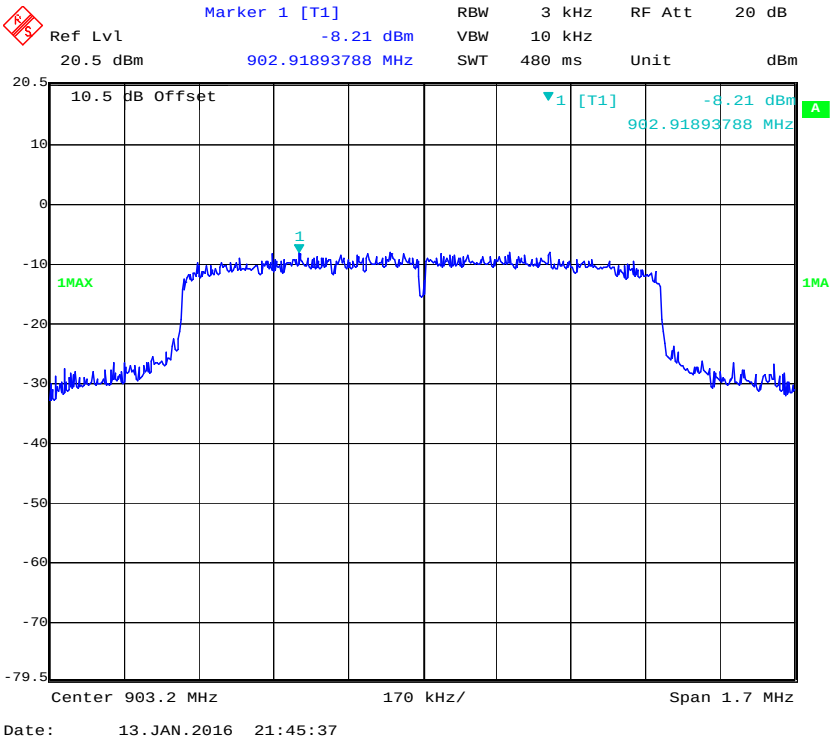
Power Spectral Density, O-QPSK Middle Channel



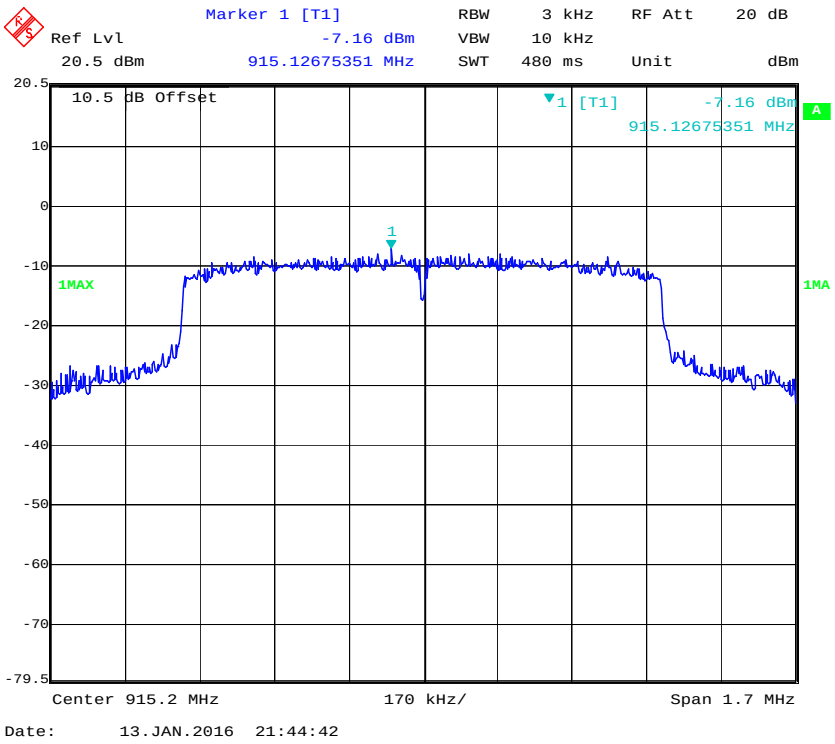
Power Spectral Density, O-QPSK High Channel



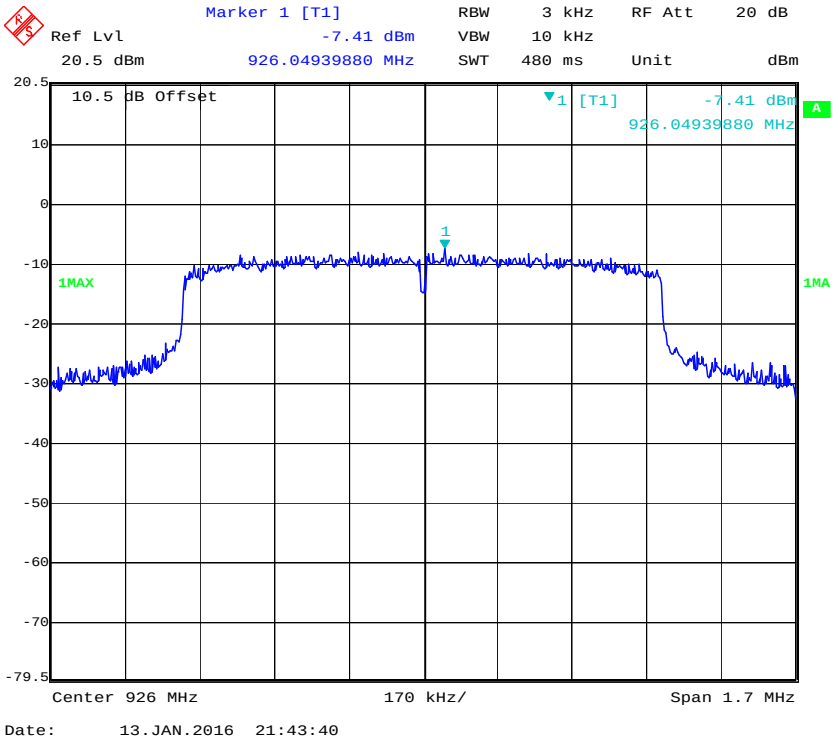
Power Spectral Density, OFDM Option1 Low Channel



Power Spectral Density, OFDM Option1 Middle Channel



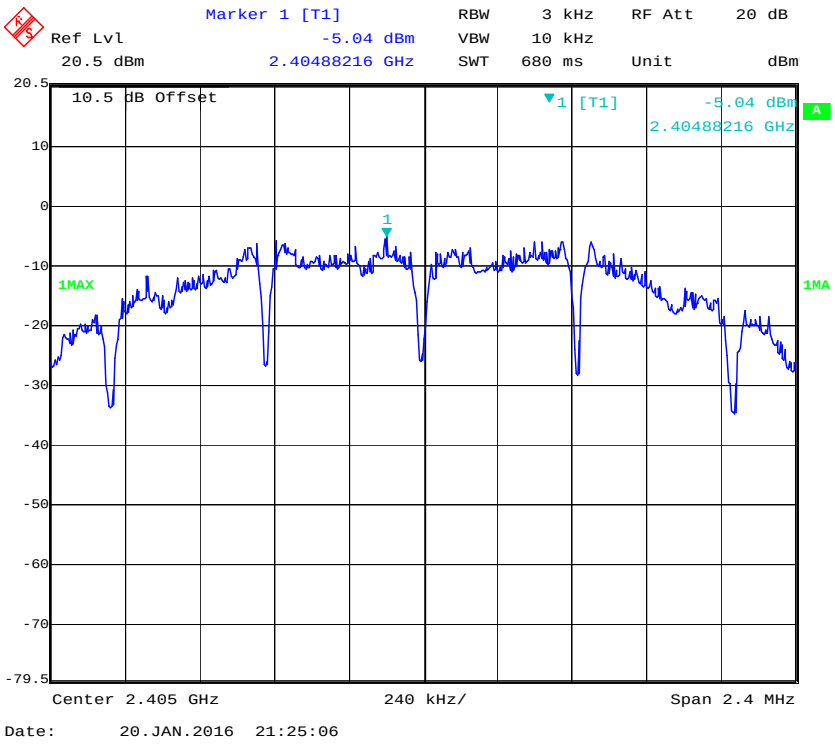
Power Spectral Density, OFDM Option1 High Channel



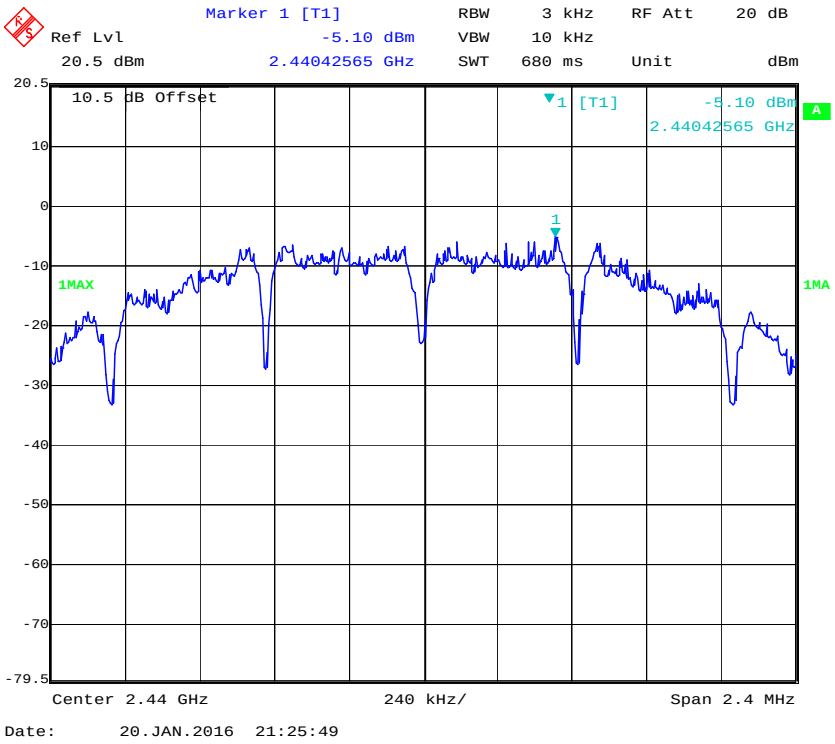
EUT operation mode: Transmitting (2.4GHz)

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
O-QPSK mode			
Low	2405	-5.04	≤8
Middle	2440	-5.10	≤8
High	2480	-5.43	≤8
OFDM Option1 mode			
Low	2401.2	-9.96	≤8
Middle	2438.4	-10.32	≤8
High	2476.8	-10.87	≤8
OFDM Option2 mode			
Low	2400.8	-7.33	≤8
Middle	2438.4	-7.72	≤8
High	2477.6	-7.79	≤8

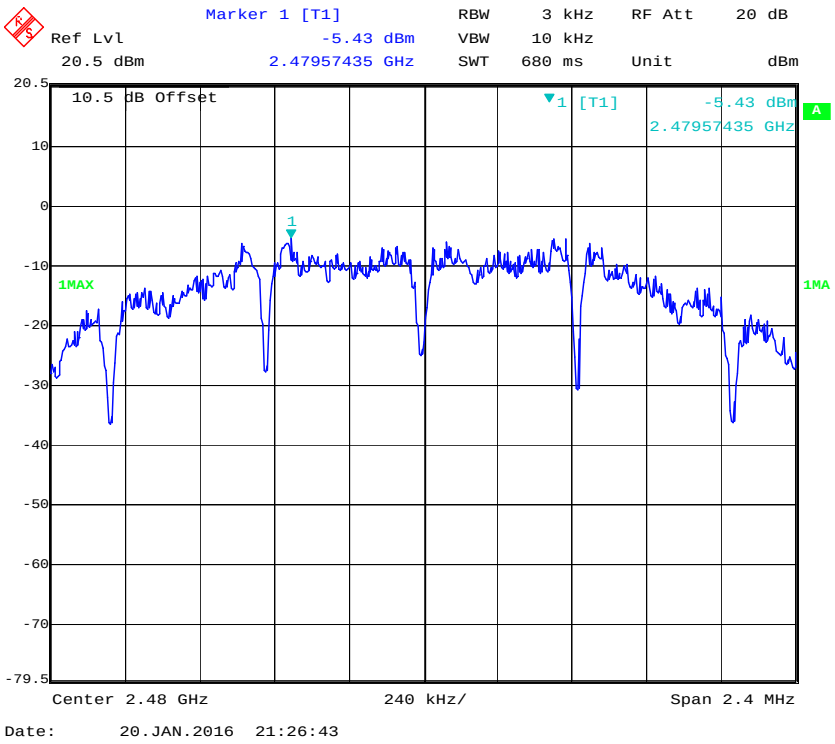
Power Spectral Density, O-QPSK Low Channel



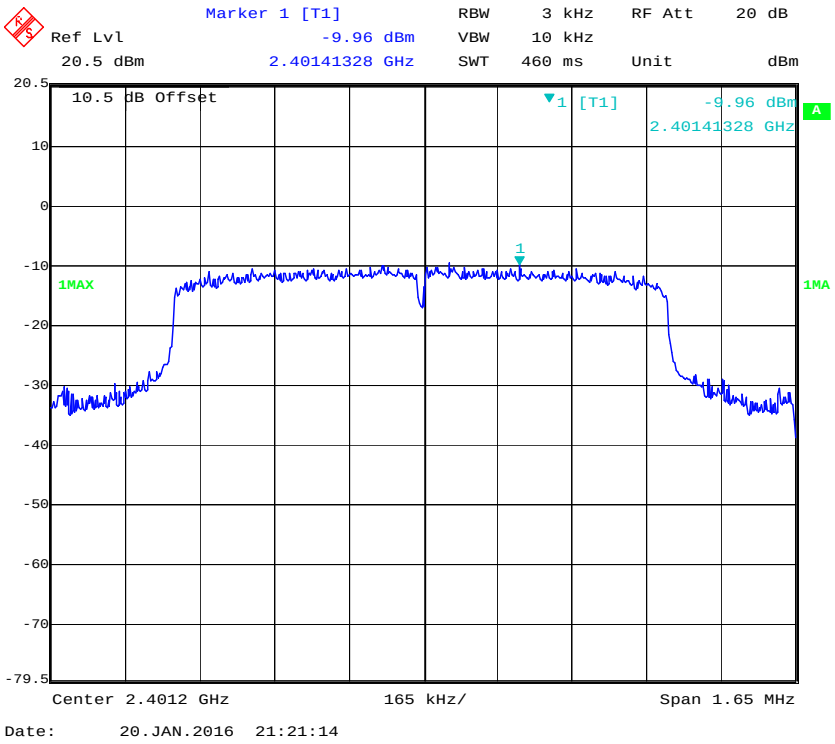
Power Spectral Density, O-QPSK Middle Channel



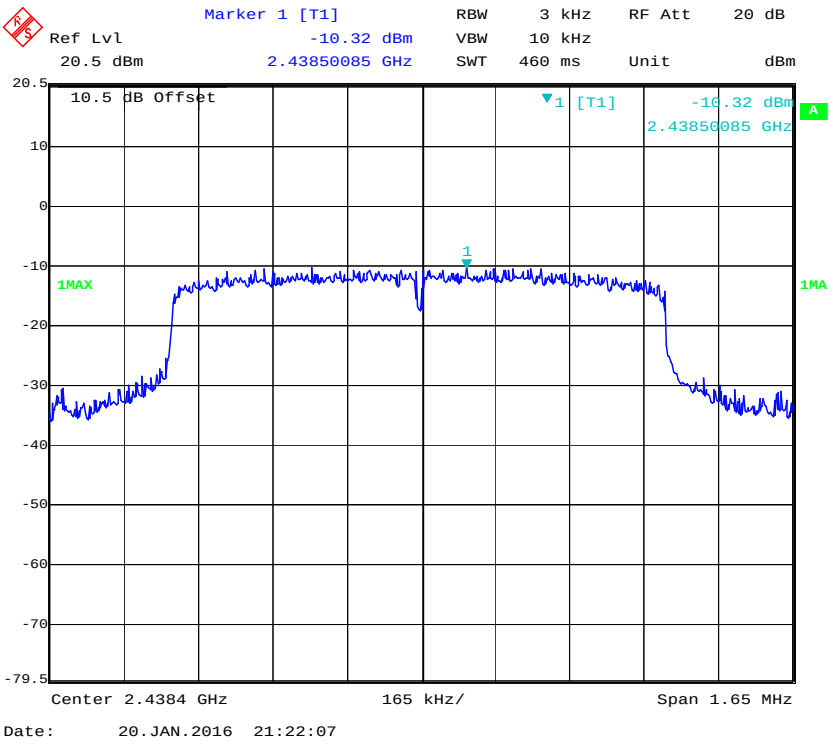
Power Spectral Density, O-QPSK High Channel



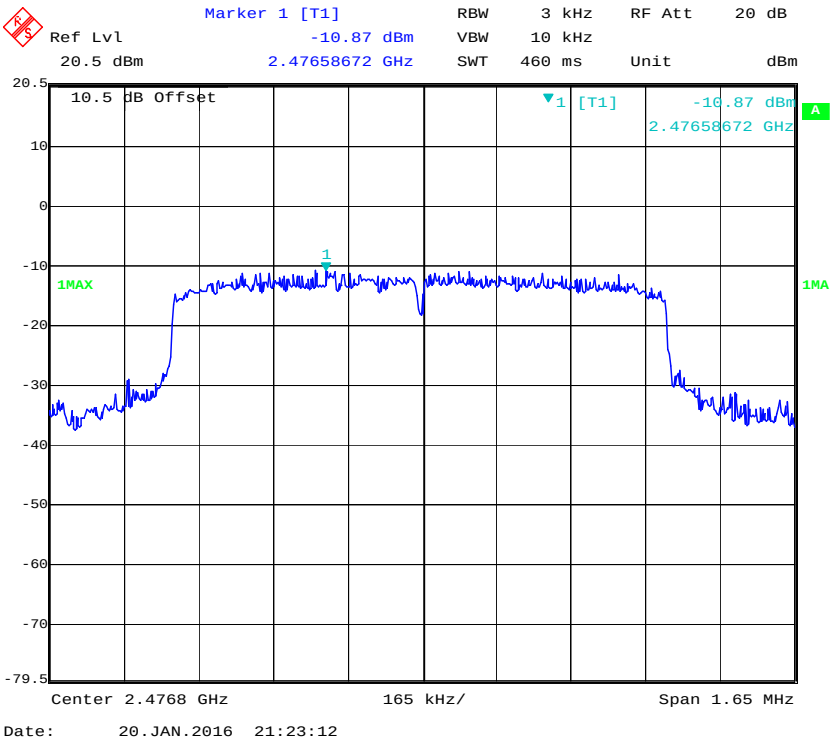
Power Spectral Density, OFDM Option1 Low Channel



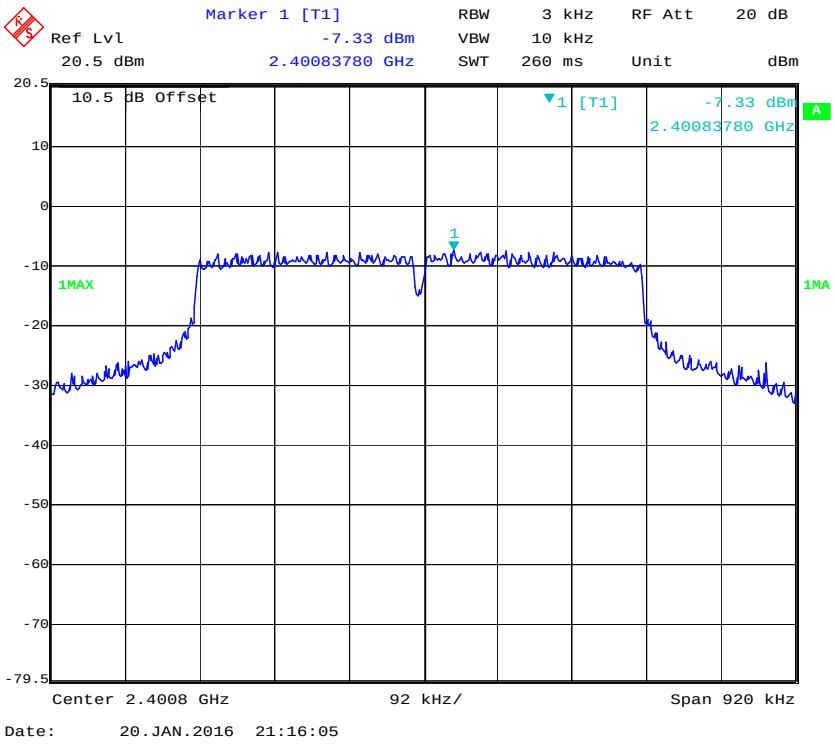
Power Spectral Density, OFDM Option1 Middle Channel



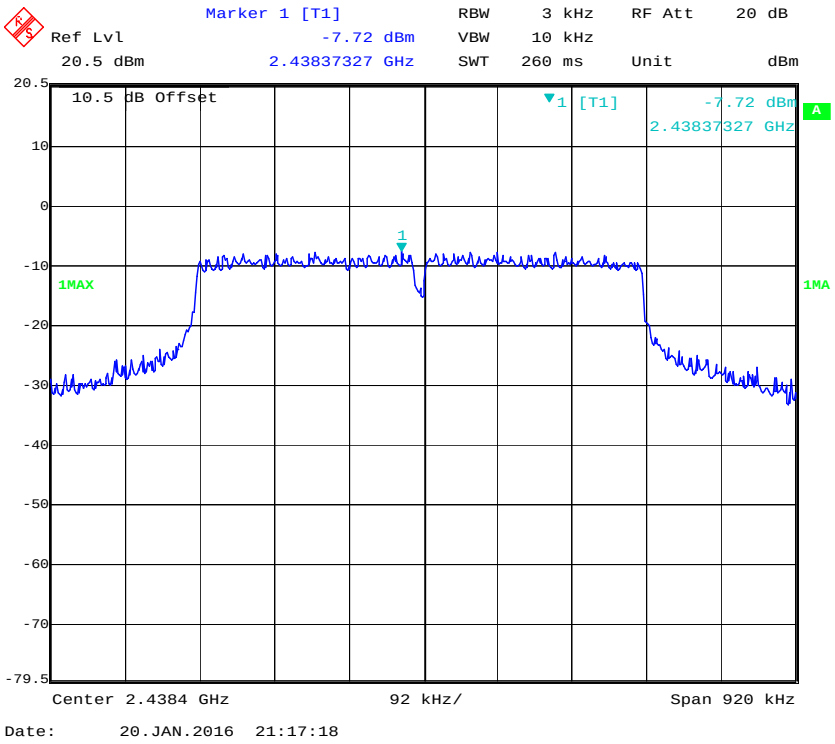
Power Spectral Density, OFDM Option1 High Channel



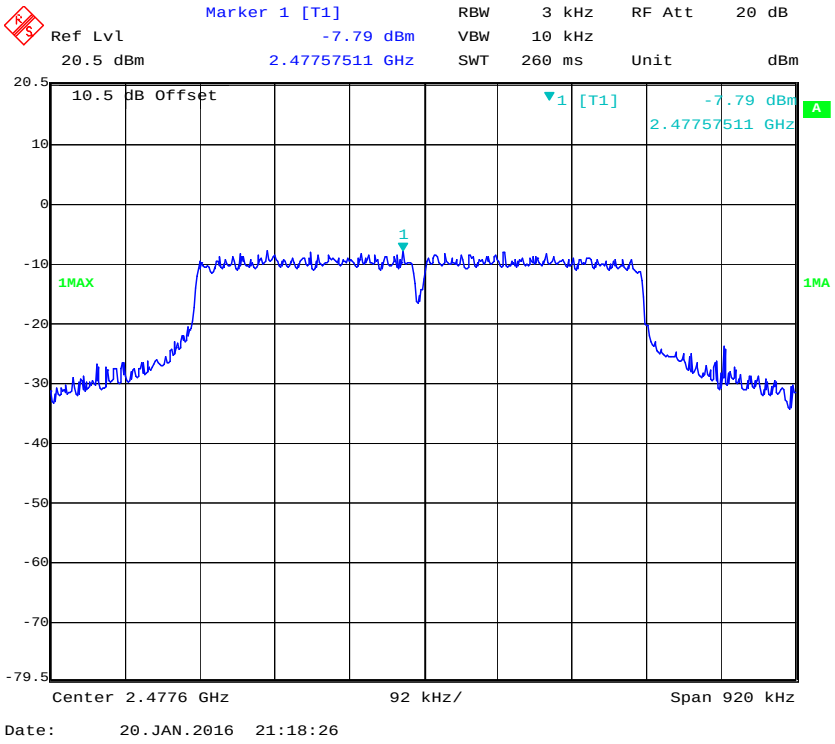
Power Spectral Density, OFDM Option2 Low Channel



Power Spectral Density, OFDM Option2 Middle Channel



Power Spectral Density, OFDM Option2 High Channel



******* END OF REPORT *******