FCC Part 15.247

TEST REPORT

For

Draytek Corporation

No. 26, Fu shing Rd., Hukou County, Hsinchu Industrial Park Hsinchu, 303, Taiwan

FCC ID: VGY2862

Report Type:	**Product Type:**
Original Report	VDSL2 & ADSL2 + Dual-WAN Security Router

Report Producer:	Kaylee Chiang
Report Number:	RTWA170214001-00A
Report Date:	2017-09-25
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REVISION HISTORY

Revision	Issue Date	Description
1.0	2017.09.25	Original

TABLE OF CONTENTS

1 General Information

1.1 Product Description for Equipment Under Test (EUT)

Applicant:	Draytek Corporation No. 26, Fu shing Rd., Hukou County, Hsinchu Industrial Park Hsinchu, 303, Taiwan
Manufacturer:	Draytek Corporation No. 26, Fu shing Rd., Hukou County, Hsinchu Industrial Park Hsinchu, 303, Taiwan
Product:	VDSL2 & ADSL2 + Dual-WAN Security Router
Model:	Vigor2862BLgVac
Series Model:	*Please refer to DECLARATION OF SIMILARITY*
Trade Name:	DrayTek
Frequency Range:	IEEE 802.11b/g / IEEE 802.11n HT20 MHz Mode: 2412 ~ 2462 MHz / IEEE 802.11n HT40 MHz Mode: 2422 ~ 2452 MHz
Transmit Power:	IEEE 802.11b Mode: 24.25 dBm (0.266W) IEEE 802.11g Mode: 29.63 dBm (0.918W) IEEE 802.11n HT20 MHz Mode: 29.88 dBm (0.972W) IEEE 802.11n HT40 MHz Mode: 29.77 dBm (0.948W)
Modulation Technique:	IEEE 802.11b: DSSS IEEE 802.11g: OFDM IEEE 802.11n HT20 MHz Mode: OFDM IEEE 802.11n HT40 MHz Mode: OFDM
Transmit Data Rate:	IEEE 802.11b Mode: 11, 5.5, 2, 1 Mbps IEEE 802.11g Mode: 54, 48, 36, 24, 18, 12, 11 , 9, 6Mbps IEEE 802.11n HT 20 MHz Channel mode: 6.5, 7.2, 13, 14.4, 14.44, 19.5, 21.7, 26, 28.89, 28.9, 39, 43.3, 43.33 52, 57.78, 57.8, 58.5, 65.0, 72.2, 78, 86.67, 104, 115.56, 117, 130, 144.44 Mbps IEEE 802.11n HT 40 MHz Channel mode: 13.5, 15,27, 30, 40.5, 45, 54, 60, 81, 90, 108, 120, 121.5, 135, 150, 162, 180, 216, 240, 243, 270, 300 Mbps
Number of Channels:	IEEE 802.11b/g / IEEE 802.11n HT20 MHz Mode: 11 Channels IEEE 802.11n HT40 MHz Mode: 7 Channels
Antenna Specification:	Diploe Antenna/Gain: 2.18 dBi
Voltage Range:	I/P: 100-240Vac, 50-60Hz O/P: 12Vdc
Date of Test:	Feb 22, 2017 ~ Sep 25, 2017

**All measurement and test data in this report was gathered from production sample serial number: 17021401 (Assigned by BACL, Taiwan) The EUT supplied by the applicant was received on 2017-02-14.*

Adaptor 1 Information:
Model: WA-36A12FU
I/P: 100-240Vac, 50-60Hz, 0.9A Max
O/P: 12Vdc, 3A

Adaptor 2 Information:
Model: 2ABN036F US
I/P: 100-240Vac, 50-60Hz, 1.0A
O/P: 12Vdc, 3A

Adaptor 3 Information:
Model: 2ABB018F US
I/P: 100-240Vac, 50-60Hz, 0.6A
O/P: 12Vdc, 1.5A

Adaptor 4 Information:
Model: 2ABL030F US
I/P: 100-240Vac, 50-60Hz, 1.0A
O/P: 12Vdc, 2.5A

1.2 Objective

This report is prepared on behalf of *Draytek Corporation* in accordance with Part 2, Subpart J, Part 15, Subparts A and C of the Federal Communication Commission's rules.

The objective is to determine compliance with FCC Part 15.247 rules for Output Power, Antenna Requirements, 6 dB Bandwidth, power spectral density, 100 kHz Bandwidth of Band Edges Measurement, Conducted and Radiated Spurious Emissions.

1.3 Related Submittal(s)/Grant(s)

FCC Part 15.407 UNII submission with FCC ID: VGY2862

1.4 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

KDB 662911 D01 Multiple Transmitter Output v02r01

KDB 558074 D01 DTS Meas Guidance v04

1.5 Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Taiwan) to collect test data is located on
☒70, Lane 169, Sec. 2, Datong Road, Xizhi Dist., New Taipei City 22183, Taiwan, R.O.C.
☐68-3, Lane 169, Sec. 2, Datong Road, Xizhi Dist., New Taipei City 22183, Taiwan, R.O.C.

Bay Area Compliance Laboratories Corp. (Taiwan) Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 3180) and the FCC designation No. TW3180 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.10.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 974454. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

2 System Test Configuration

2.1 Description of Test Configuration

For WIFI mode, there are totally 11 channels.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437		

For 802.11 b/g/n20 Modes were testd with channel 1, 6 and 11.
For 802.11n40 Mode were testd with channel 3, 6 and 9.

SISO mode and MIMO mode have the same power level setting and base on output power testing, MIMO mode power than SISO mode large, MIMO mode was selected for full testing.

The device supports MIMO (CDD) at all modes.

2.2 Equipment Modifications

No modification was made to the EUT

2.3 Test Mode

Mode 1: Full System (Vigor2862BLgVac, Adapter WA-36A12FU) tested all measure item.

Mode 2: Full System (Vigor2862BLgFVac, Adapter WA-36A12FU) tested Radiated Emission below 1GHz. The mode difference is fiber function.

Mode 3: Full System (Vigor2862BLgVac, Adapter 2ABN036F US) tested Radiated Emission below 1GHz and AC Line Conducted Emissions.

Mode 4: Full System (Vigor2862BLgVac, Adapter 2ABB018F US) tested Radiated Emission below 1GHz and AC Line Conducted Emissions.

Mode 5: Full System (Vigor2862BLgVac, Adapter 2ABL030F US) tested Radiated Emission below 1GHz and AC Line Conducted Emissions.

2.4 EUT Exercise Software

Used "MP-Tool RTL819 x3.0" software.

Engineering Mode		Chain 0		
Test Frequency		Low	Mid	High
Power Level Setting	B Mode MIMO(CDD)	20	21	19
	G Mode MIMO(CDD)	31	28	29
	N20 Mode MIMO(CDD)	31	28	28
	N40 Mode MIMO(CDD)	32	31	30
Engineering Mode		Chain 1		
Test Frequency		Low	Mid	High
Power Level Setting	B Mode MIMO(CDD)	23	25	22
	G Mode MIMO(CDD)	31	28	29
	N20 Mode MIMO(CDD)	31	28	28
	N40 Mode MIMO(CDD)	32	31	30

The EUT was configured for testing in an engineering mode which was provided by the manufacturer.
The worst-case data rates are determined to be as follows for each mode based upon investigations by measuring the average power and PSD across all data rates bandwidths, and modulations.

802.11b: 1Mbps
802.11g: 6Mbps
802.11n ht20 MIMO: MCS0
802.11n ht40 MIMO: MCS0

2.5 Support Equipment List and Details

Description	Manufacturer	Model Number	S/N
Telephone	ASITO	AS-10301	3CN061J03758
Telephone	TECO	N/A	XYFXC601
USB dongle	Kingston	N/A	N/A
USB dongle	Kingston	N/A	N/A
NB	Dell	E6410	10912240367
PSTN	Draytek	N/A	N/A

2.6 External Cable List and Details

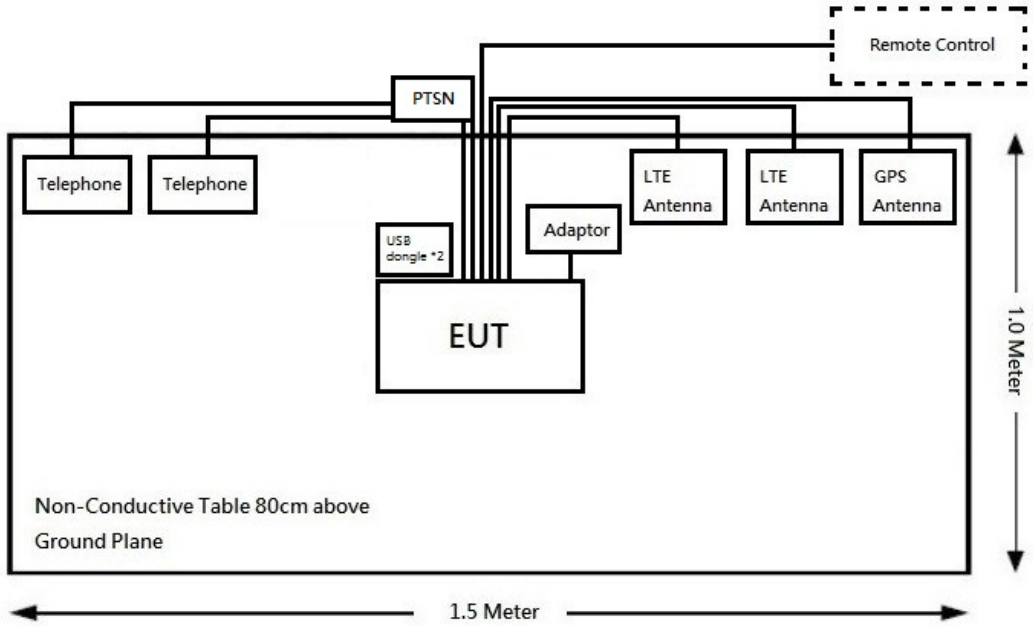
Cable Description	Length (m)	From	To
RJ11 Cable * 2	2M	Telephone	EUT
LTE Extension cord	1M	LTE Antenna	EUT
LTE Extension cord	1M	LTE Antenna	EUT
GPS Extension cord	1M	GPS Antenna	EUT
RJ45 Cable * 4	10M	Remote Control	EUT

2.7 Block Diagram of Test Setup

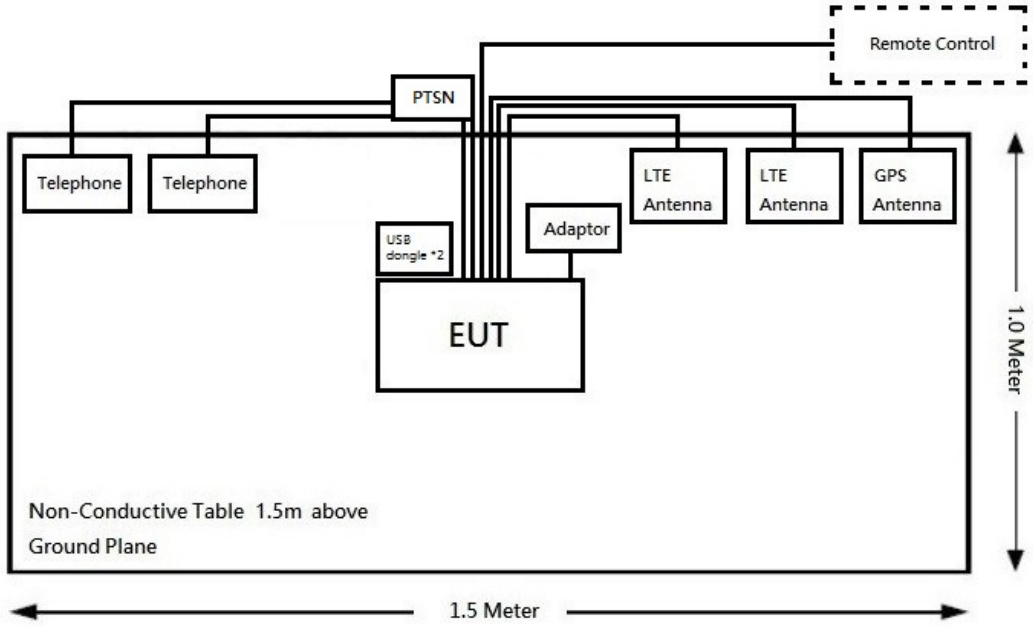
See test photographs attached in Exhibit A for the actual connections between EUT and support equipment.

Radiation:

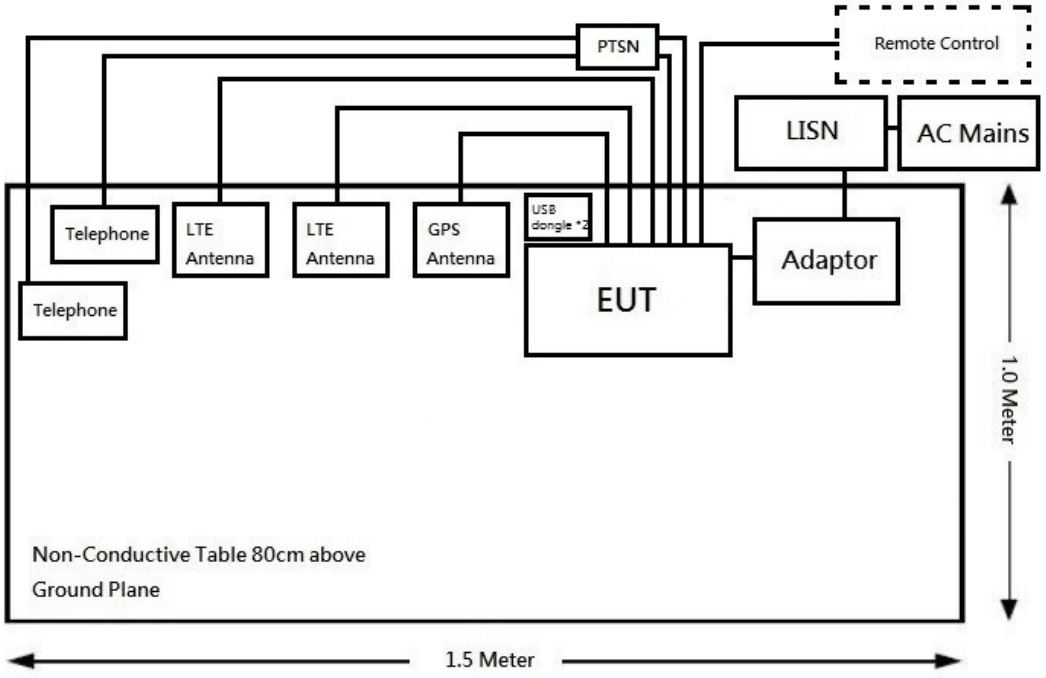
Below 1GHz:



Above 1GHz:



Conduction:


PTSN
Remote Control
LISN
AC Mains
Telephone
LTE Antenna
LTE Antenna
GPS Antenna
USB dongle *3
Adaptor
EUT
Telephone
1.0 Meter
Non-Conductive Table 80cm above Ground Plane
1.5 Meter

2.8 Duty Cycle

According to KDB 789033 D02 General UNII Test Procedures New Rules v01r04 section B:

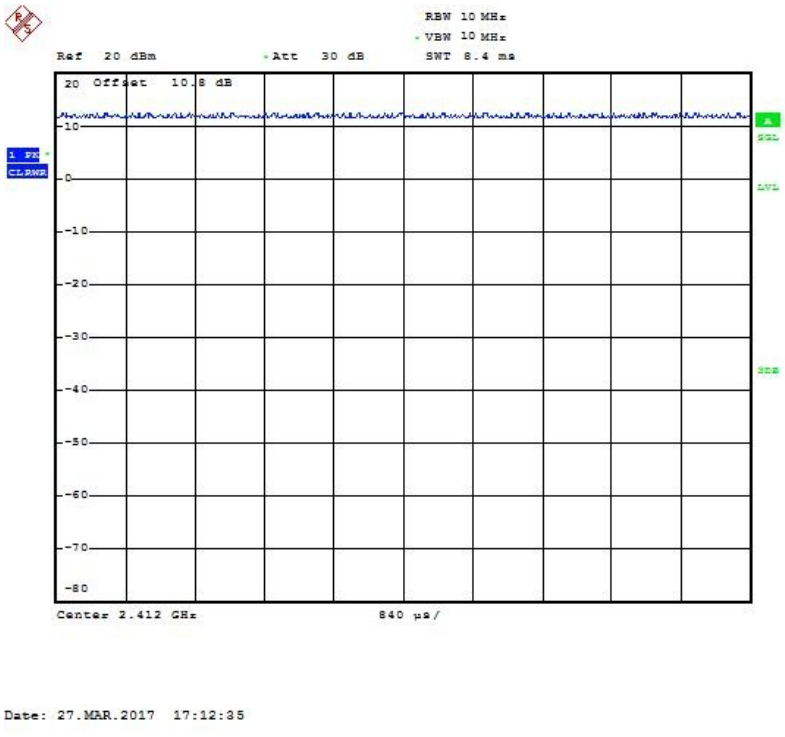
All measurements are to be performed with the EUT transmitting at 100% duty cycle at its maximum power control level; however, if 100% duty cycle cannot be achieved, measurements of duty cycle, x, and maximumpower transmission duration, T, are required for each tested mode of operation.

Radio Mode	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
802.11b	8.4	8.4	100	0
802.11g	5	5	100	0
802.11n20	5	5	100	0
802.11n40	5	5	100	0

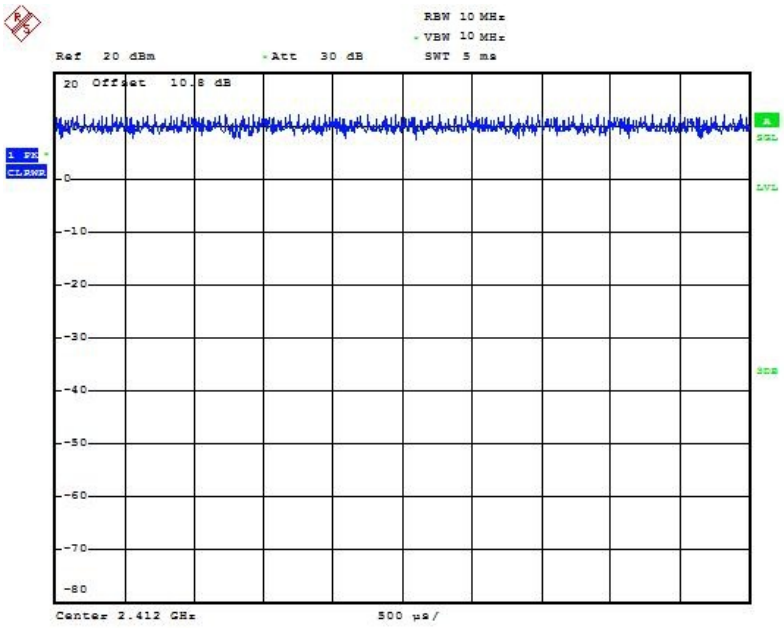
Note: Duty Cycle Correction Factor = 10*log(1/duty cycle)

Please refer to the following plots.

B Mode

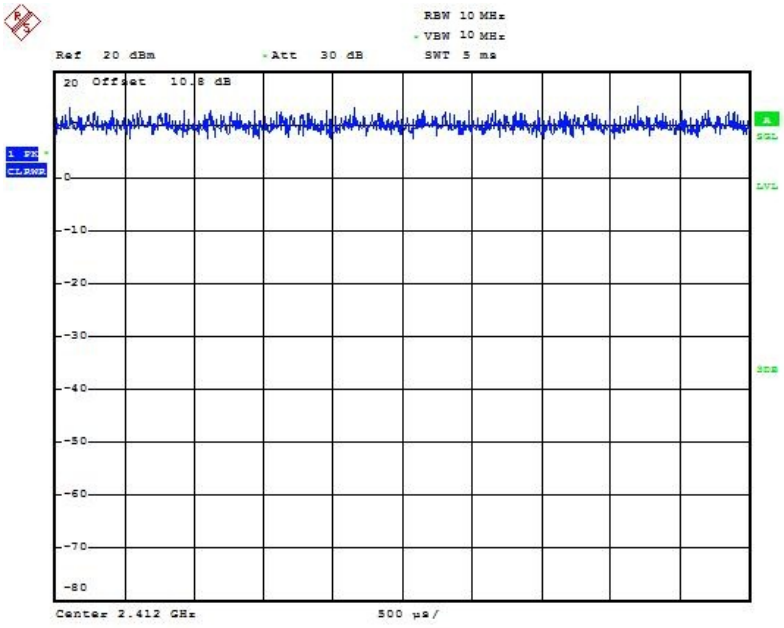


G Mode



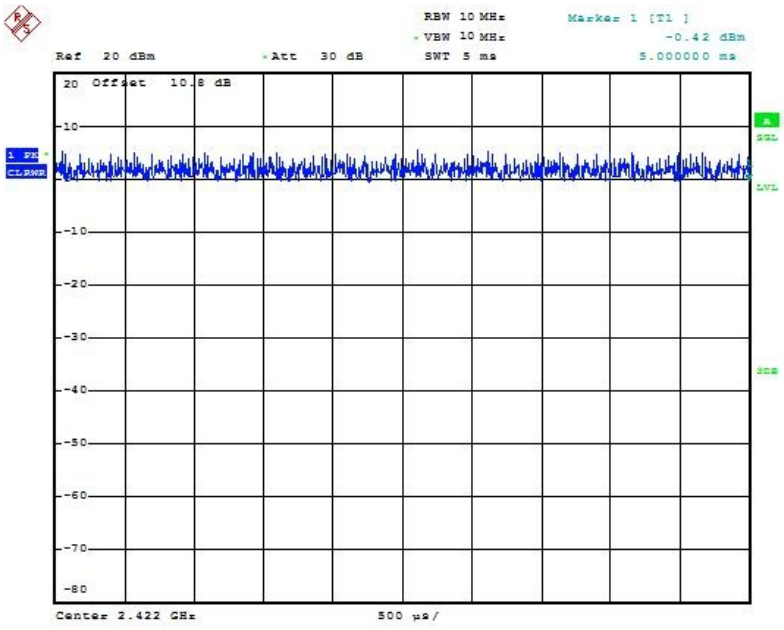
Date: 27.MAR.2017 17:13:34

N20 Mode



Date: 27.MAR.2017 17:14:00

N40 Mode


RBW 10 MHz
VBW 10 MHz
SWT 5 ms
Marker 1 [T1]
-0.42 dBm
5.000000 ms
Ref 20 dBm
Att 30 dB
Offset 10.8 dB
Center 2.422 GHz
500 µs/
Date: 27.MAR.2017 17:11:21

3 Summary of Test Results

FCC Rules	Description of Test	Result
§15.247(i), §1.1310 ,§ 2.1091	Maximum Permissible Exposure (MPE)	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 Peak Output Power	Compliance
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance
§15.247(e)	Power Spectral Density	Compliance

4 FCC § 15.247(i), §1.1310, § 2.1091 - Maximum Permissible Exposure (MPE)

4.1 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	*($180/f^2$)	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);

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

4.2 RF Exposure Evaluation Result

MPE evaluation for single transmission:

Mode	Frequency Range (MHz)	Antenna Gain		Target Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
2.4G WIFI	2412-2462	2.18	1.65	23.5	223.87	20	0.07	1.0
5G WIFI B1	5180-5240	4.45	1.65	21.0	125.89	20	0.07	1.0
5G WIFI B4	5745-5825	4.45	2.79	24.0	251.19	20	0.14	1.0
WCDMA B V	826.4-846.6	2.13	1.63	23.5	223.87	20	0.07	0.551
WCDMA B II	1852.4-1907.6	3.42	2.20	23.5	223.87	20	0.10	1.0
LTE B II	1850.7-1909.3	3.42	2.20	24.0	251.19	20	0.11	1.0
LTE B IV	1710.7-1754.3	3.68	2.33	24.0	251.19	20	0.17	1.0
LTE B XII	699.7-715.3	0.35	1.08	24.0	251.19	20	0.05	0.466

MPE evaluation for simultaneous transmission:

2.4G WIFI, 5G WIFI and 3G&4G can transmit at the same time, MPE evaluation is as below formula:

PD1/Limit1+PD2/Limit2+……＜1, PD (Power Density)

MPE evaluation=
MPE of 2.4G WIFI/1 + MPE of 5G WIFI/1+ MPE of 3G&4G/0.564
= 0.07/1+0.14/1+ 0.07/0.551=0.34＜1.0

Result: MPE evaluation of single and simultaneous transmission meet the requirement of standard.

5 FCC §15.203 – Antenna Requirements

5.1 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.

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 does not exceed 6 dBi.

5.2 Antenna List and Details

No.	Manufacturer	Model	Antenna Type	Antenna Gain	Connector Type	Result
Ant 1	WALSIN TECHNOLOGY CORP.	RFDPA131300S BLB805(GP)	Dipole Antenna	2.18 dBi	RP-SMA Plug Male	Compliance
Ant 2	WALSIN TECHNOLOGY CORP.	RFDPA131300S BLB805(GP)	Dipole Antenna	2.18 dBi	RP-SMA Plug Male	Compliance

The EUT have 2 external antenna for 2.4GHz Band, the antennas permanently attached to the unit.

6 FCC §15.207 - AC Line Conducted Emissions

6.1 Applicable Standard

According to FCC §15.207 Conducted limits:

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

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56 Note 1	56 to 46 Note 2
0.5-5	56	46
5-30	60	50

Note 1: Decreases with the logarithm of the frequency.
Note 2: A linear average detector is required

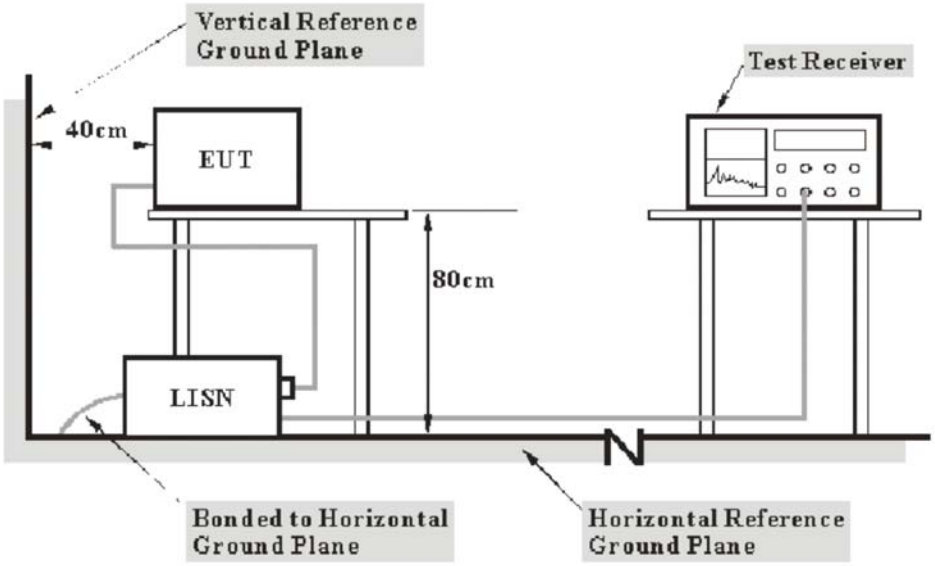
6.2 Measurement Uncertainty

Input quantities to be considered for conducted disturbance measurements maybe receiver reading, attenuation of the connection between LISN/ISN and receiver, LISN/ISN voltage division factor, LISN/ISN 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. (Taiwan) 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	4.64 dB (k=2, 95% level of confidence)

6.3 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.

6.4 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	Receiver RBW
150 kHz - 30 MHz	9 kHz

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

6.6 Corrected Factor & Margin Calculation

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

Factor = LISN VDF + Cable Loss + Transient Limiter Attenuation

The "Over Limit" column of the following data tables indicates the degree of compliance with the applicable limit. For example, an over limit of -7 dB means the emission is 7 dB below the limit. The equation for Over Limit calculation is as follows:

Over Limit = Level – Limit Line

6.7 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Date	Calibration Due Date
LISN	Rohde & Schwarz	ENV216	101248	2017/07/20	2018/07/19
LISN	EMCO	3816/2	00075848	2017/08/02	2018/08/01
EMI Test Receiver	Rohde & Schwarz	ESR7	101419	2016/11/03	2017/11/02
Pulse Limiter	Rohde & Schwarz	ESH3Z2	TXZEM025	2017/08/11	2018/08/10
RF Cable	EMEC	EM-CB5D	001	2017/07/24	2018/07/23
Software	AUDIX	E3	V9.150826k	N.C.R	N.C.R

**** Statement of Traceability:*** BACL Corp. attests that all calibrations have been performed according to TAF requirements, traceable to the ETC.

6.8 Test Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	58 %
ATM Pressure:	1020 hPa

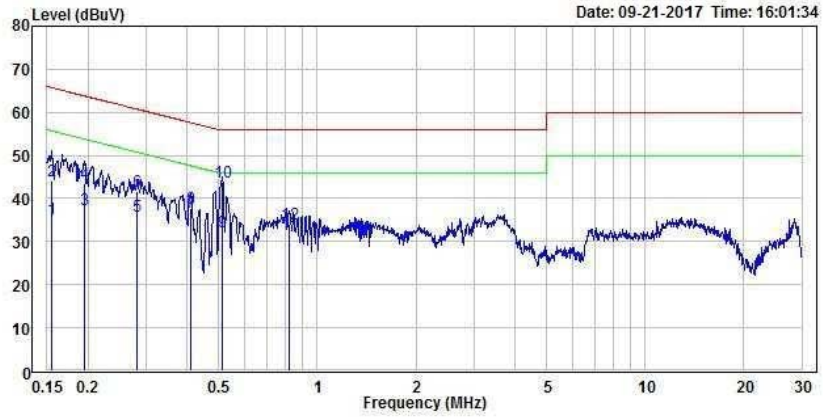
The testing was performed by David Hsu on 2017-09-21.

6.9 Test Results

Mode: Charge + Transmitting Mode

Please refer to the following plots and tables.

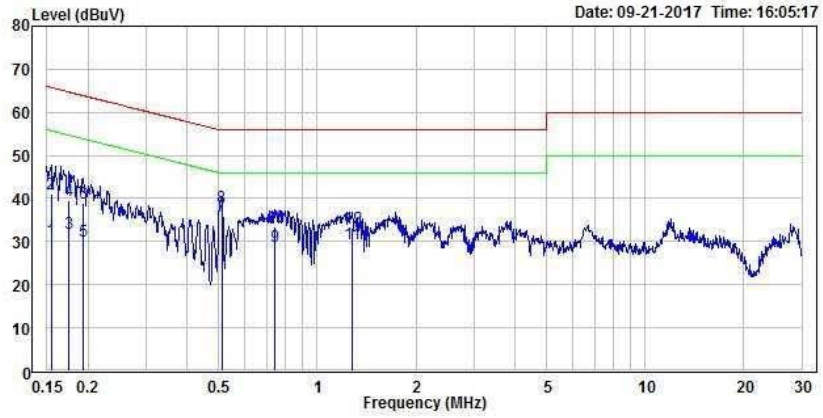
Main: AC 120V/60 Hz, Line (Mode 1)



Condition: Line
EUT :
Mode :
Note : 120V/60Hz,

	Freq	Level	Limit Line	Over Limit	Factor	Read Level	Remark	Pol/Phase
	MHz	dBuV	dBuV	dB	dB	dBuV		
1	0.155	35.19	55.70	-20.51	19.56	15.63	Average	Line
2	0.155	44.05	65.70	-21.65	19.56	24.49	QP	Line
3	0.194	37.46	53.84	-16.38	19.58	17.88	Average	Line
4	0.194	43.58	63.84	-20.26	19.58	24.00	QP	Line
5	0.282	35.90	50.76	-14.86	19.56	16.34	Average	Line
6	0.282	41.65	60.76	-19.11	19.56	22.09	QP	Line
7	0.412	36.84	47.61	-10.77	19.54	17.30	Average	Line
8	0.412	37.68	57.61	-19.93	19.54	18.14	QP	Line
9	0.515	32.39	46.00	-13.61	19.55	12.84	Average	Line
10	0.515	43.74	56.00	-12.26	19.55	24.19	QP	Line
11	0.819	31.69	46.00	-14.31	19.58	12.11	Average	Line
12	0.819	34.05	56.00	-21.95	19.58	14.47	QP	Line

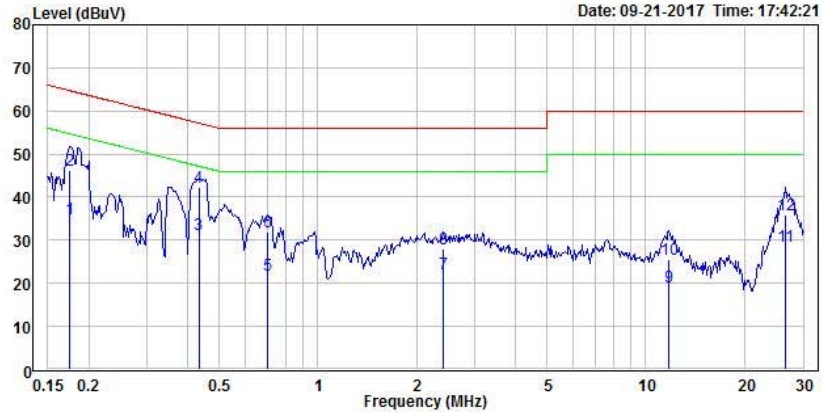
Main: AC 120V/60 Hz, Neutral



Condition: Neutral
EUT :
Mode :
Note : 120V/60Hz,

	Freq	Level	Limit Line	Over Limit	Factor	Read Level	Remark	Pol/Phase
	MHz	dBuV	dBuV	dB	dB	dBuV		
1	0.154	30.50	55.77	-25.27	19.56	10.94	Average	Neutral
2	0.154	41.15	65.77	-24.62	19.56	21.59	QP	Neutral
3	0.175	32.04	54.71	-22.67	19.54	12.50	Average	Neutral
4	0.175	39.69	64.71	-25.02	19.54	20.15	QP	Neutral
5	0.194	30.14	53.88	-23.74	19.52	10.62	Average	Neutral
6	0.194	38.98	63.88	-24.90	19.52	19.46	QP	Neutral
7	0.511	35.89	46.00	-10.11	19.55	16.34	Average	Neutral
8	0.511	38.06	56.00	-17.94	19.55	18.51	QP	Neutral
9	0.741	28.98	46.00	-17.02	19.57	9.41	Average	Neutral
10	0.741	33.59	56.00	-22.41	19.57	14.02	QP	Neutral
11	1.275	29.42	46.00	-16.58	19.60	9.82	Average	Neutral
12	1.275	33.00	56.00	-23.00	19.60	13.40	QP	Neutral

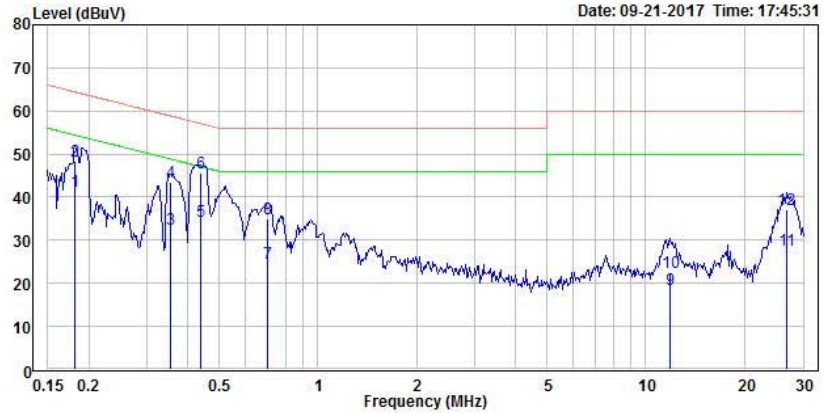
Main: AC 120V/60 Hz, Line (Mode 3)



Condition: Line
EUT :
Mode :
Note : 120V/60Hz,

	Freq	Level	Limit Line	Over Limit	Factor	Read Level	Remark	Pol/Phase
	MHz	dBuV	dBuV	dB	dB	dBuV		
1	0.175	35.00	54.74	-19.74	19.50	15.50	Average	Line
2	0.175	46.33	64.74	-18.41	19.50	26.83	QP	Line
3	0.433	31.28	47.20	-15.92	19.51	11.77	Average	Line
4	0.433	42.14	57.20	-15.06	19.51	22.63	QP	Line
5	0.704	22.01	46.00	-23.99	19.52	2.49	Average	Line
6	0.704	31.81	56.00	-24.19	19.52	12.29	QP	Line
7	2.419	22.27	46.00	-23.73	19.59	2.68	Average	Line
8	2.419	28.02	56.00	-27.98	19.59	8.43	QP	Line
9	11.811	19.01	50.00	-30.99	19.77	-0.76	Average	Line
10	11.811	25.43	60.00	-34.57	19.77	5.66	QP	Line
11	26.409	28.72	50.00	-21.28	19.87	8.85	Average	Line
12	26.409	35.75	60.00	-24.25	19.87	15.88	QP	Line

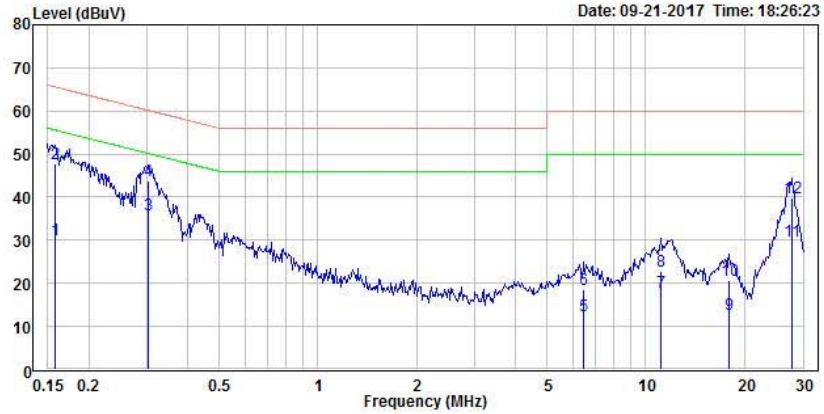
Main: AC 120V/60 Hz, Neutral



Condition: Neutral
EUT :
Mode :
Note : 120V/60Hz,

	Freq	Level	Limit Line	Over Limit	Factor	Read Level	Remark	Pol/Phase
	MHz	dBuV	dBuV	dB	dB	dBuV		
1	0.182	41.31	54.41	-13.10	19.63	21.68	Average	Neutral
2	0.182	48.23	64.41	-16.18	19.63	28.60	QP	Neutral
3	0.355	32.66	48.85	-16.19	19.64	13.02	Average	Neutral
4	0.355	43.45	58.85	-15.40	19.64	23.81	QP	Neutral
5	0.440	34.51	47.07	-12.56	19.64	14.87	Average	Neutral
6	0.440	45.76	57.07	-11.31	19.64	26.12	QP	Neutral
7	0.704	24.68	46.00	-21.32	19.66	5.02	Average	Neutral
8	0.704	34.96	56.00	-21.04	19.66	15.30	QP	Neutral
9	11.905	18.45	50.00	-31.55	19.93	-1.48	Average	Neutral
10	11.905	22.45	60.00	-37.55	19.93	2.52	QP	Neutral
11	26.621	27.59	50.00	-22.41	20.11	7.48	Average	Neutral
12	26.621	37.20	60.00	-22.80	20.11	17.09	QP	Neutral

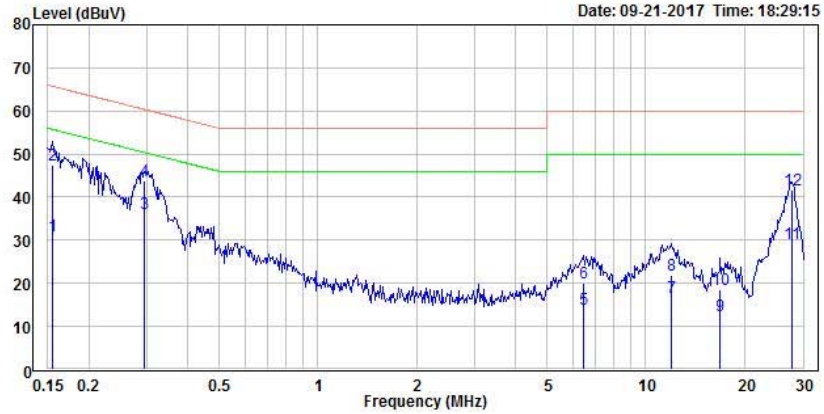
Main: AC 120V/60 Hz, Line (Mode 4)



Condition: Line
EUT :
Mode :
Note : 120V/60Hz,

	Freq	Level	Limit Line	Over Limit	Factor	Read Level	Remark	Pol/Phase
	MHz	dBuV	dBuV	dB	dB	dBuV		
1	0.157	30.19	55.60	-25.41	19.50	10.69	Average	Line
2	0.157	47.87	65.60	-17.73	19.50	28.37	QP	Line
3	0.305	35.86	50.11	-14.25	19.50	16.36	Average	Line
4	0.305	43.86	60.11	-16.25	19.50	24.36	QP	Line
5	6.498	12.48	50.00	-37.52	19.70	-7.22	Average	Line
6	6.498	18.52	60.00	-41.48	19.70	-1.18	QP	Line
7	11.170	18.03	50.00	-31.97	19.77	-1.74	Average	Line
8	11.170	22.94	60.00	-37.06	19.77	3.17	QP	Line
9	17.873	12.79	50.00	-37.21	19.82	-7.03	Average	Line
10	17.873	20.74	60.00	-39.26	19.82	0.92	QP	Line
11	27.703	29.66	50.00	-20.34	19.88	9.78	Average	Line
12	27.703	39.74	60.00	-20.26	19.88	19.86	QP	Line

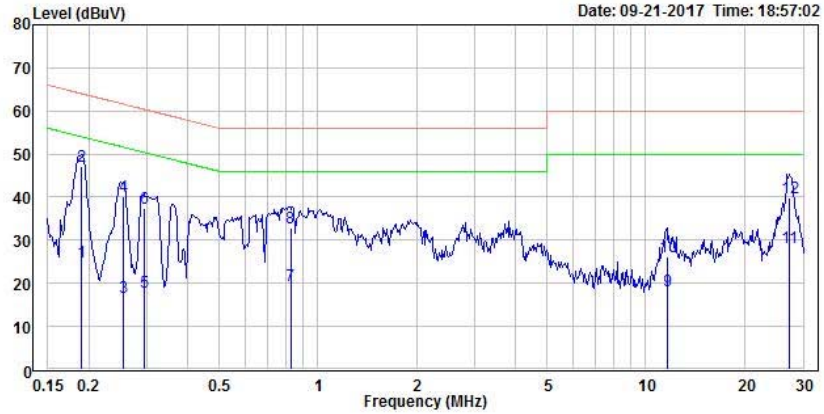
Main: AC 120V/60 Hz, Neutral



Condition: Neutral
EUT :
Mode :
Note : 120V/60Hz,

	Freq	Level	Limit Line	Over Limit	Factor	Read Level	Remark	Pol/Phase
	MHz	dBuV	dBuV	dB	dB	dBuV		
1	0.155	31.17	55.74	-24.57	19.63	11.54	Average	Neutral
2	0.155	47.58	65.74	-18.16	19.63	27.95	QP	Neutral
3	0.295	36.13	50.38	-14.25	19.63	16.50	Average	Neutral
4	0.295	43.67	60.38	-16.71	19.63	24.04	QP	Neutral
5	6.498	13.84	50.00	-36.16	19.85	-6.01	Average	Neutral
6	6.498	20.17	60.00	-39.83	19.85	0.32	QP	Neutral
7	12.000	16.71	50.00	-33.29	19.93	-3.22	Average	Neutral
8	12.000	21.88	60.00	-38.12	19.93	1.95	QP	Neutral
9	16.770	12.57	50.00	-37.43	20.00	-7.43	Average	Neutral
10	16.770	18.52	60.00	-41.48	20.00	-1.48	QP	Neutral
11	27.703	29.13	50.00	-20.87	20.13	9.00	Average	Neutral
12	27.703	41.59	60.00	-18.41	20.13	21.46	QP	Neutral

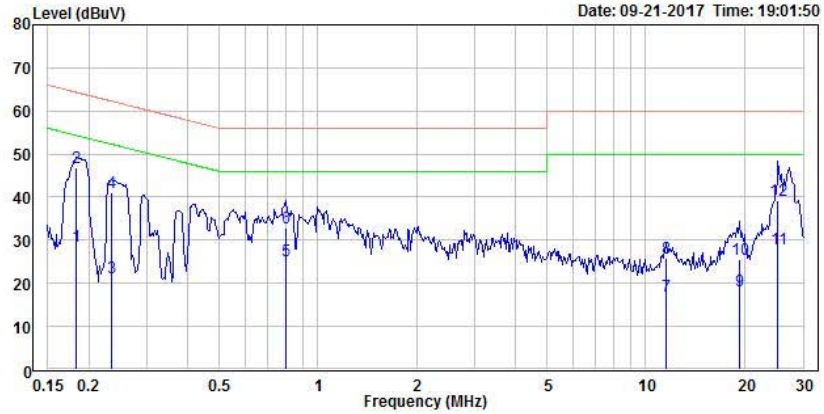
Main: AC 120V/60 Hz, Line (Mode 5)



Condition: Line
EUT :
Mode :
Note : 120V/60Hz,

	Freq	Level	Limit Line	Over Limit	Factor	Read Level	Remark	Pol/Phase
	MHz	dBuV	dBuV	dB	dB	dBuV		
1	0.191	24.97	54.01	-29.04	19.50	5.47	Average	Line
2	0.191	47.14	64.01	-16.87	19.50	27.64	QP	Line
3	0.254	16.86	51.63	-34.77	19.50	-2.64	Average	Line
4	0.254	40.18	61.63	-21.45	19.50	20.68	QP	Line
5	0.295	17.86	50.38	-32.52	19.50	-1.64	Average	Line
6	0.295	37.52	60.38	-22.86	19.50	18.02	QP	Line
7	0.825	19.47	46.00	-26.53	19.52	-0.05	Average	Line
8	0.825	32.98	56.00	-23.02	19.52	13.46	QP	Line
9	11.624	18.26	50.00	-31.74	19.77	-1.51	Average	Line
10	11.624	26.25	60.00	-33.75	19.77	6.48	QP	Line
11	27.265	28.21	50.00	-21.79	19.88	8.33	Average	Line
12	27.265	39.90	60.00	-20.10	19.88	20.02	QP	Line

Main: AC 120V/60 Hz, Neutral



Condition: Neutral
EUT :
Mode :
Note : 120V/60Hz,

	Freq	Level	Limit Line	Over Limit	Factor	Read Level	Remark	Pol/Phase
	MHz	dBuV	dBuV	dB	dB	dBuV		
1	0.183	28.50	54.35	-25.85	19.63	8.87	Average	Neutral
2	0.183	46.78	64.35	-17.57	19.63	27.15	QP	Neutral
3	0.234	21.22	52.29	-31.07	19.63	1.59	Average	Neutral
4	0.234	41.06	62.29	-21.23	19.63	21.43	QP	Neutral
5	0.799	25.13	46.00	-20.87	19.66	5.47	Average	Neutral
6	0.799	32.76	56.00	-23.24	19.66	13.10	QP	Neutral
7	11.532	17.10	50.00	-32.90	19.93	-2.83	Average	Neutral
8	11.532	25.84	60.00	-34.16	19.93	5.91	QP	Neutral
9	19.202	18.30	50.00	-31.70	20.04	-1.74	Average	Neutral
10	19.202	25.46	60.00	-34.54	20.04	5.42	QP	Neutral
11	25.177	27.99	50.00	-22.01	20.09	7.90	Average	Neutral
12	25.177	39.30	60.00	-20.70	20.09	19.21	QP	Neutral

7 FCC §15.209, §15.205, §15.247(d) – Spurious Emissions

7.1 Applicable Standard

As per FCC §15.35(d): Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz.

As Per FCC §15.205(a) and RSS-Gen except as show in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 – 0.110 0.495 – 0.505 2.1735 – 2.1905 4.125 – 4.128 4.17725 – 4.17775 4.20725 – 4.20775 6.215 – 6.218 6.26775 – 6.26825 6.31175 – 6.31225 8.291 – 8.294 8.362 – 8.366 8.37625 – 8.38675 8.41425 – 8.41475 12.29 – 12.293 12.51975 – 12.52025 12.57675 – 12.57725 13.36 – 13.41	16.42 – 16.423 16.69475 – 16.69525 25.5 – 25.67 37.5 – 38.25 73 – 74.6 74.8 – 75.2 108 – 121.94 123 – 138 149.9 – 150.05 156.52475 – 156.52525 156.7 – 156.9 162.0125 –167.17 167.72 – 173.2 240 – 285 322 – 335.4 399.9 – 410 608 – 614	960 – 1240 1300 – 1427 1435 – 1626.5 1645.5 – 1646.5 1660 – 1710 1718.8 – 1722.2 2200 – 2300 2310 – 2390 2483.5 – 2500 2690 – 2900 3260 – 3267 3.332 – 3.339 3 3458 – 3 358 3.600 – 4.400	4. 5 – 5. 15 5. 35 – 5. 46 7.25 – 7.75 8.025 – 8.5 9.0 – 9.2 9.3 – 9.5 10.6 – 12.7 13.25 – 13.4 14.47 – 14.5 15.35 – 16.2 17.7 – 21.4 22.01 – 23.12 23.6 – 24.0 31.2 – 31.8 36.43 – 36.5 Above 38.6

As per FCC §15.209(a): Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (micro volts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

As per FCC §15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c).

7.2 Measurement Uncertainty

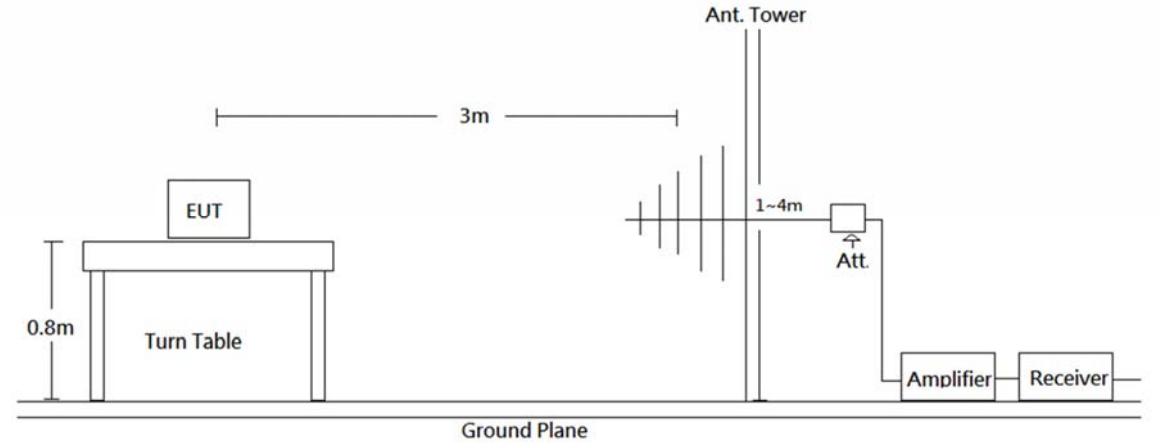
All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency 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. (Taiwan) is shown in below table. And the uncertainty will not be taken into consideration for the test data recorded in the report.

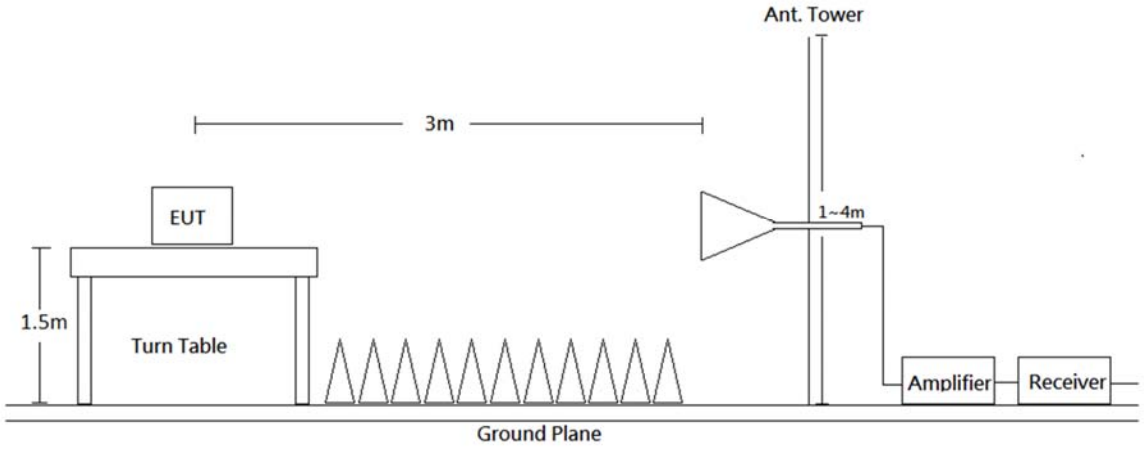
Frequency	Measurement uncertainty
30 MHz~200 MHz	3.76 dB (k=2, 95% level of confidence)
200 MHz~1 GHz	4.12 dB (k=2, 95% level of confidence)
1 GHz~6 GHz	4.84 dB (k=2, 95% level of confidence)
6 GHz~18 GHz	5.16 dB (k=2, 95% level of confidence)
18 GHz~26 GHz	4.84 dB (k=2, 95% level of confidence)
26 GHz~40 GHz	4.30 dB (k=2, 95% level of confidence)

7.3 EUT Setup

Blow 1 GHz:



Above 1 GHz:



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

7.4 EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 26.5 GHz. During the radiated emission test, the EMI test receiver was set with the following configurations measurement method 6.3 in ANSI C63.10.

Frequency Range	RBW	VBW	Detector	Duty cycle
30-1000 MHz	120 kHz	/	QP	
Above 1 GHz	1 MHz	3 MHz	PK	
	1 MHz	10 Hz	Ave	>98%
	1 MHz	1/T	Ave	<98%

7.5 Test Procedure

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

All data was recorded in the Quasi-peak detector mode from 30 MHz to 1 GHz and PK and average detector modes for frequencies above 1 GHz.

7.6 Corrected Factor & Margin Calculation

The Correct Factor 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:

Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain + Attenuator

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 = Result –Limit

7.7 Test Results Summary

According to the data in the following table, the EUT complied with the FCC §15.209 Limit. Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies with the limit if

$$Lm + U(Lm) \leq Llim + Ucispr$$

In BACL, U(Lm) is less than Ucispr, if Lm is less than Llim, it implies that the EUT complies with the limit.

7.8 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due Date
966A Room					
Broadband Antenna	Sunol Sciences	JB6	A050115	2016/11/16	2017/11/15
Amplifier	Sonoma	310N	130602	2016/7/15	2017/7/14
EMI Test Receiver	Rohde & Schwarz	ESR7	101419	2016/11/3	2017/11/2
Mircoflex Cable	UTIFLEX	UFB311A-Q-1440-300300	220490-006	2016/11/2	2017/11/1
Mircoflex Cable	UTIFLEX	UFB197C-1-2362-70U-70U	225757-001	2016/7/15	2017/7/14
Mircoflex Cable	UTIFLEX	UFA210A-1-3149-300300	MFR64639 226389-001	2016/12/1	2017/11/30
Turn Table	Champro	TT-2000	060772-T	N.C.R	N.C.R
Antenna Tower	Champro	AM-BS-4500-B	060772-A	N.C.R	N.C.R
Controller	Champro	EM1000	060772	N.C.R	N.C.R
Software	Farad	EZ_EMC	BACL-03A1	N.C.R	N.C.R
Broadband Antenna	Sunol Sciences	JB6	A050115	2016/11/16	2017/11/15
Horn Antenna	EMCO	3115	9311-4158	2016/5/10	2017/5/9
Horn Antenna	ETS-Lindgren	3116	00062638	2016/9/5	2017/9/4
Preamplifier	EMEC	EM01G18G	060657	2016/12/13	2017/12/12
Preamplifier	EMEC	EM18G40G	060656	2016/12/13	2017/12/12
Spectrum Analyzer	Rohde & Schwarz	FSV40	101203	2016/07/13	2016/07/12
Mircoflex Cable	ROSNAL	K1K50-UP0264-K1K50-80CM	160309-2	2017/1/18	2018/1/17
Mircoflex Cable	ROSNAL	K1K50-UP0264-K1K50-450CM	160309-1	2017/3/24	2018/3/23
Conducted Room					
Cable	WOKEN	SFL402	S02-160323-07	2017/2/22	2018/2/21
Spectrum Analyzer	Rohde & Schwarz	FSU26	200268	2016/5/7	2017/5/6
Attenuator	MINI-CIRCUITS	BW-S10W5+	N/A	2017/3/16	2018/3/15

**** Statement of Traceability:*** BACL Corp. attests that all calibrations have been performed according to TAF requirements, traceable to the ETC.

7.9 Test Environmental Conditions

Temperature:	24 ° C
Relative Humidity:	57 %
ATM Pressure:	1020 hPa

The testing was performed by David Hsu on 2017-03-27 ~2017-04-06.

7.10 Test Results

Below 1 GHz

Test Mode: *Transmitting Mode.*

Mode 1

Horizontal

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
171.62	33.90	-12.44	21.46	43.50	-22.04	100	134	QP
347.19	34.51	-8.84	25.67	46.00	-20.33	100	24	QP
492.69	35.66	-5.84	29.82	46.00	-16.18	100	145	QP
683.78	38.04	-3.00	35.04	46.00	-10.96	100	154	QP
828.31	36.09	-0.01	36.08	46.00	-9.92	100	263	QP
999.99	27.34	3.93	31.27	54.00	-22.73	100	4	QP

Vertical

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
52.31	40.41	-16.51	23.90	40.00	-16.10	100	177	QP
217.21	29.91	-12.82	17.09	46.00	-28.91	100	301	QP
347.19	30.31	-8.84	21.47	46.00	-24.53	100	321	QP
519.85	27.18	-5.43	21.75	46.00	-24.25	100	308	QP
578.05	28.47	-4.42	24.05	46.00	-21.95	100	1	QP
695.42	26.74	-2.88	23.86	46.00	-22.14	100	253	QP

Mode 2

Horizontal

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
195.87	29.73	-11.56	18.17	43.50	-25.33	100	302	QP
284.14	30.51	-10.00	20.51	46.00	-25.49	100	327	QP
349.13	40.30	-8.79	31.51	46.00	-14.49	100	327	QP
516.94	32.07	-5.47	26.60	46.00	-19.40	100	5	QP
587.75	31.79	-4.23	27.56	46.00	-18.44	100	326	QP
761.38	29.51	-1.52	27.99	46.00	-18.01	100	10	QP

Vertical

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
52.31	41.81	-16.51	25.30	40.00	-14.70	100	177	QP
191.99	36.15	-12.35	23.80	43.50	-19.70	100	123	QP
311.30	30.47	-9.59	20.88	46.00	-25.12	100	298	QP
488.81	30.44	-5.90	24.54	46.00	-21.46	100	330	QP
625.58	27.27	-3.65	23.62	46.00	-22.38	100	46	QP
746.83	28.37	-1.86	26.51	46.00	-19.49	100	123	QP

Mode 3

Horizontal

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
204.60	48.01	-11.76	36.25	43.50	-7.25	100	98	QP
276.38	48.51	-10.16	38.35	46.00	-7.65	100	216	QP
359.80	47.87	-8.57	39.30	46.00	-6.70	100	354	QP
467.47	44.07	-6.25	37.82	46.00	-8.18	100	151	QP
792.42	39.72	-0.76	38.96	46.00	-7.04	100	93	QP
935.98	34.73	2.30	37.03	46.00	-8.97	100	22	QP

Vertical

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
228.85	48.47	-12.37	36.10	46.00	-9.90	100	2	QP
395.69	45.40	-7.82	37.58	46.00	-8.42	100	0	QP
540.22	41.43	-5.14	36.29	46.00	-9.71	100	218	QP
647.89	42.07	-3.38	38.69	46.00	-7.31	100	311	QP
864.20	33.61	0.69	34.30	46.00	-11.70	100	1	QP
972.84	32.12	3.24	35.36	54.00	-18.64	100	318	QP

Mode 4

Horizontal

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
319.06	45.91	-9.44	36.47	46.00	-9.53	100	50	QP
467.47	44.09	-6.25	37.84	46.00	-8.16	100	158	QP
540.22	40.09	-5.14	34.95	46.00	-11.05	100	62	QP
792.42	39.74	-0.76	38.98	46.00	-7.02	100	89	QP
852.56	37.43	0.47	37.90	46.00	-8.10	100	86	QP
935.98	33.76	2.30	36.06	46.00	-9.94	100	10	QP

Vertical

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
468.44	39.88	-6.22	33.66	46.00	-12.34	100	261	QP
576.11	39.87	-4.46	35.41	46.00	-10.59	100	185	QP
647.89	42.33	-3.38	38.95	46.00	-7.05	100	317	QP
683.78	39.25	-3.00	36.25	46.00	-9.75	100	51	QP
852.56	32.17	0.47	32.64	46.00	-13.36	100	224	QP
935.98	34.10	2.30	36.40	46.00	-9.60	100	322	QP

Mode 5

Horizontal

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
130.88	36.33	-10.54	25.79	43.50	-17.71	100	1	QP
319.06	45.94	-9.44	36.50	46.00	-9.50	100	36	QP
467.47	43.25	-6.25	37.00	46.00	-9.00	100	151	QP
792.42	39.69	-0.76	38.93	46.00	-7.07	100	97	QP
864.20	39.22	0.69	39.91	46.00	-6.09	100	22	QP
935.98	33.87	2.30	36.17	46.00	-9.83	100	17	QP

Vertical

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
228.85	48.82	-12.37	36.45	46.00	-9.55	100	360	QP
359.80	43.38	-8.57	34.81	46.00	-11.19	100	53	QP
395.69	44.85	-7.82	37.03	46.00	-8.97	100	4	QP
647.89	41.81	-3.38	38.43	46.00	-7.57	100	318	QP
683.78	39.61	-3.00	36.61	46.00	-9.39	100	65	QP
935.98	33.33	2.30	35.63	46.00	-10.37	100	330	QP

Above 1 GHz

Test Mode: *Transmitting Mode.*

Mode 1

Horizontal

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
B Mode, Low Channel								
2390.00	29.75	32.82	62.57	74.00	-11.43	122	85	peak
2390.00	18.96	32.82	51.78	54.00	-2.22	122	85	AVG
2412.00	88.72	32.88	121.60	N/A	N/A	122	85	peak
2412.00	85.45	32.88	118.33	N/A	N/A	122	85	AVG
4824.00	55.07	1.05	56.12	74.00	-17.88	135	53	peak
4824.00	52.52	1.05	53.57	54.00	-0.43	135	53	AVG
B Mode, Middle Channel								
2390.00	30.86	32.82	63.68	74.00	-10.32	114	255	peak
2390.00	16.53	32.82	49.35	54.00	-4.65	114	255	AVG
2437.00	91.61	32.94	124.55	N/A	N/A	120	66	peak
2437.00	88.38	32.94	121.32	N/A	N/A	120	66	AVG
2483.50	28.00	33.05	61.05	74.00	-12.95	116	95	peak
2483.50	14.76	33.05	47.81	54.00	-6.19	116	95	AVG
4874.00	54.32	1.23	55.55	74.00	-18.45	138	125	peak
4874.00	51.94	1.23	53.17	54.00	-0.83	138	125	AVG
B Mode, High Channel								
2462.00	91.04	33.01	124.05	N/A	N/A	129	281	peak
2462.00	87.66	33.01	120.67	N/A	N/A	129	281	AVG
2483.50	28.75	33.05	61.80	74.00	-12.20	129	281	peak
2483.50	15.02	33.05	48.07	54.00	-5.93	129	281	AVG
4924.00	53.81	1.40	55.21	74.00	-18.79	131	129	peak
4924.00	51.64	1.40	53.04	54.00	-0.96	131	129	AVG

Note: Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

Vertical

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
B Mode, Low Channel								
2390.00	27.12	32.82	59.94	74.00	-14.06	175	164	peak
2390.00	15.59	32.82	48.41	54.00	-5.59	175	164	AVG
2412.00	78.72	32.88	111.60	N/A	N/A	175	164	peak
2412.00	75.82	32.88	108.70	N/A	N/A	175	164	AVG
4824.00	52.34	1.05	53.39	74.00	-20.61	156	87	peak
4824.00	51.68	1.05	52.73	54.00	-1.27	156	87	AVG
7236.00	47.13	6.69	53.82	74.00	-20.18	147	8	peak
7236.00	44.04	6.69	50.73	54.00	-3.27	147	8	AVG
B Mode, Middle Channel								
2390.00	27.23	32.82	60.05	74.00	-13.95	168	173	peak
2390.00	14.73	32.82	47.55	54.00	-6.45	168	173	AVG
2437.00	82.90	32.94	115.84	N/A	N/A	168	173	peak
2437.00	79.78	32.94	112.72	N/A	N/A	168	173	AVG
2483.50	27.60	33.05	60.65	74.00	-13.35	168	173	peak
2483.50	14.48	33.05	47.53	54.00	-6.47	168	173	AVG
4874.00	53.18	1.23	54.41	74.00	-19.59	144	60	peak
4874.00	49.62	1.23	50.85	54.00	-3.15	144	60	AVG
7311.00	47.62	6.97	54.59	74.00	-19.41	135	120	peak
7311.00	41.88	6.97	48.85	54.00	-5.15	135	120	AVG
B Mode, High Channel								
2462.00	80.60	33.01	113.61	N/A	N/A	172	190	peak
2462.00	77.95	33.01	110.96	N/A	N/A	172	190	AVG
2483.50	27.46	33.05	60.51	74.00	-13.49	172	190	peak
2483.50	14.76	33.05	47.81	54.00	-6.19	172	190	AVG
4924.00	53.31	1.40	54.71	74.00	-19.29	157	25	peak
4924.00	51.30	1.40	52.70	54.00	-1.30	157	25	AVG
7386.00	45.37	7.28	52.65	74.00	-21.35	142	128	peak
7386.00	40.77	7.28	48.05	54.00	-5.95	142	128	AVG

Note: Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

Horizontal

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
G Mode, Low Channel								
2390.00	36.69	32.82	69.51	74.00	-4.49	131	294	peak
2390.00	19.64	32.82	52.46	54.00	-1.54	131	294	AVG
2412.00	86.42	32.88	119.30	N/A	N/A	131	294	peak
2412.00	77.60	32.88	110.48	N/A	N/A	131	294	AVG
4824.00	56.73	1.05	57.78	74.00	-16.22	136	34	peak
4824.00	45.32	1.05	46.37	54.00	-7.63	136	34	AVG
7236.00	55.10	6.69	61.79	74.00	-12.21	132	161	peak
7236.00	42.70	6.69	49.39	54.00	-4.61	132	161	AVG
G Mode, Middle Channel								
2390.00	28.13	32.82	60.95	74.00	-13.05	146	271	peak
2390.00	17.54	32.82	50.36	54.00	-3.64	146	271	AVG
2437.00	90.58	32.94	123.52	N/A	N/A	146	271	peak
2437.00	82.41	32.94	115.35	N/A	N/A	146	271	AVG
2483.50	27.29	33.05	60.34	74.00	-13.66	146	271	peak
2483.50	17.37	33.05	50.42	54.00	-3.58	146	271	AVG
4874.00	52.74	1.23	53.97	74.00	-20.03	128	132	peak
4874.00	40.84	1.23	42.07	54.00	-11.93	128	132	AVG
7311.00	51.32	6.98	58.30	74.00	-15.70	139	1	peak
7311.00	41.71	6.98	48.69	54.00	-5.31	139	1	AVG
G Mode, High Channel								
2462.00	86.51	33.01	119.52	N/A	N/A	134	82	peak
2462.00	77.78	33.01	110.79	N/A	N/A	134	82	AVG
2483.50	34.38	33.05	67.43	74.00	-6.57	134	82	peak
2483.50	18.29	33.05	51.34	54.00	-2.66	134	82	AVG
4924.00	52.05	1.40	53.45	74.00	-20.55	130	53	peak
4924.00	41.49	1.40	42.89	54.00	-11.11	130	53	AVG

Note: Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

Vertical

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
G Mode, Low Channel								
2390.00	30.77	32.82	63.59	74.00	-10.41	191	156	peak
2390.00	17.02	32.82	49.84	54.00	-4.16	191	156	AVG
2412.00	77.81	32.88	110.69	N/A	N/A	191	156	peak
2412.00	69.23	32.88	102.11	N/A	N/A	191	156	AVG
4824.00	60.29	1.05	61.34	74.00	-12.66	163	299	peak
4824.00	48.42	1.05	49.47	54.00	-4.53	163	299	AVG
7236.00	62.54	6.69	69.23	74.00	-4.77	149	8	peak
7236.00	46.31	6.69	53.00	54.00	-1.00	149	8	AVG
G Mode, Middle Channel								
2390.00	27.16	32.82	59.98	74.00	-14.02	182	197	peak
2390.00	14.65	32.82	47.47	54.00	-6.53	182	197	AVG
2437.00	82.53	32.94	115.47	N/A	N/A	182	197	peak
2437.00	73.75	32.94	106.69	N/A	N/A	182	197	AVG
2483.50	27.72	33.05	60.77	74.00	-13.23	182	197	peak
2483.50	14.81	33.05	47.86	54.00	-6.14	182	197	AVG
4874.00	55.83	1.23	57.06	74.00	-16.94	165	18	peak
4874.00	42.37	1.23	43.60	54.00	-10.40	165	18	AVG
7311.00	57.89	6.98	64.87	74.00	-9.13	134	15	peak
7311.00	43.87	6.98	50.85	54.00	-3.15	134	15	AVG
G Mode, High Channel								
2462.00	76.77	33.01	109.78	N/A	N/A	186	197	peak
2462.00	68.15	33.01	101.16	N/A	N/A	186	197	AVG
2483.50	28.65	33.05	61.70	74.00	-12.30	186	197	peak
2483.50	15.51	33.05	48.56	54.00	-5.44	186	197	AVG
4924.00	57.31	1.40	58.71	74.00	-15.29	144	22	peak
4924.00	44.33	1.40	45.73	54.00	-8.27	144	22	AVG
7386.00	57.54	7.28	64.82	74.00	-9.18	143	8	peak
7386.00	42.39	7.28	49.67	54.00	-4.33	143	8	AVG

Note: Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

Horizontal

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
N20 Mode, Low Channel								
2390.00	35.53	32.82	68.35	74.00	-5.65	137	87	peak
2390.00	18.35	32.82	51.17	54.00	-2.83	137	87	AVG
2412.00	86.05	32.88	118.93	N/A	N/A	137	87	peak
2412.00	75.05	32.88	107.93	N/A	N/A	137	87	AVG
4824.00	55.50	1.05	56.55	74.00	-17.45	122	271	peak
4824.00	40.95	1.05	42.00	54.00	-12.00	122	271	AVG
7236.00	50.97	6.69	57.66	74.00	-16.34	139	153	peak
7236.00	38.73	6.69	45.42	54.00	-8.58	139	153	AVG
N20 Mode, Middle Channel								
2390.00	35.49	32.82	68.31	74.00	-5.69	132	271	peak
2390.00	19.86	32.82	52.68	54.00	-1.32	132	271	AVG
2437.00	92.41	32.94	125.35	N/A	N/A	132	271	peak
2437.00	81.33	32.94	114.27	N/A	N/A	132	271	AVG
2483.50	29.74	33.05	62.79	74.00	-11.21	128	80	peak
2483.50	15.31	33.05	48.36	54.00	-5.64	128	80	AVG
4874.00	48.84	1.23	50.07	74.00	-23.93	134	131	peak
4874.00	38.41	1.23	39.64	54.00	-14.36	134	131	AVG
7311.00	49.72	6.98	56.70	74.00	-17.30	144	330	peak
7311.00	37.01	6.98	43.99	54.00	-10.01	144	330	AVG
N20 Mode, High Channel								
2462.00	84.72	33.01	117.73	N/A	N/A	133	87	peak
2462.00	75.15	33.01	108.16	N/A	N/A	133	87	AVG
2483.50	31.62	33.05	64.67	74.00	-9.33	133	87	peak
2483.50	19.86	33.05	52.91	54.00	-1.09	133	87	AVG
4924.00	50.02	1.40	51.42	74.00	-22.58	137	131	peak
4924.00	39.41	1.40	40.81	54.00	-13.19	137	131	AVG

Note: Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

Vertical

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
N20 Mode, Low Channel								
2390.00	28.84	32.82	61.66	74.00	-12.34	188	156	peak
2390.00	15.83	32.82	48.65	54.00	-5.35	188	156	AVG
2412.00	76.75	32.88	109.63	N/A	N/A	188	156	peak
2412.00	66.26	32.88	99.14	N/A	N/A	188	156	AVG
4824.00	59.39	1.05	60.44	74.00	-13.56	174	92	peak
4824.00	44.48	1.05	45.53	54.00	-8.47	174	92	AVG
7236.00	58.36	6.69	65.05	74.00	-8.95	157	125	peak
7236.00	45.99	6.69	52.68	54.00	-1.32	157	125	AVG
N20 Mode, Middle Channel								
2390.00	27.63	32.82	60.45	74.00	-13.55	182	198	peak
2390.00	14.93	32.82	47.75	54.00	-6.25	182	198	AVG
2437.00	83.30	32.94	116.24	N/A	N/A	182	198	peak
2437.00	73.07	32.94	106.01	N/A	N/A	182	198	AVG
2483.50	27.32	33.05	60.37	74.00	-13.63	182	198	peak
2483.50	14.95	33.05	48.00	54.00	-6.00	182	198	AVG
4874.00	55.73	1.23	56.96	74.00	-17.04	163	28	peak
4874.00	38.46	1.23	39.69	54.00	-14.31	163	28	AVG
7311.00	56.67	6.98	63.65	74.00	-10.35	155	125	peak
7311.00	43.14	6.98	50.12	54.00	-3.88	155	125	AVG
N20 Mode, High Channel								
2462.00	76.18	33.01	109.19	N/A	N/A	186	173	peak
2462.00	64.97	33.01	97.98	N/A	N/A	186	173	AVG
2483.50	28.27	33.05	61.32	74.00	-12.68	186	173	peak
2483.50	14.93	33.05	47.98	54.00	-6.02	186	173	AVG
4924.00	53.12	1.40	54.52	74.00	-19.48	161	21	peak
4924.00	42.27	1.40	43.67	54.00	-10.33	161	21	AVG
7386.00	52.54	7.28	59.82	74.00	-14.18	158	127	peak
7386.00	40.69	7.28	47.97	54.00	-6.03	158	127	AVG

Note: Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

Horizontal

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
N40 Mode, Low Channel								
2390.00	31.74	32.82	64.56	74.00	-9.44	118	267	peak
2390.00	19.79	32.82	52.61	54.00	-1.39	118	267	AVG
2422.00	81.81	32.91	114.72	N/A	N/A	118	267	peak
2422.00	71.20	32.91	104.11	N/A	N/A	118	267	AVG
4844.00	48.22	1.12	49.34	74.00	-24.66	126	30	peak
4844.00	33.11	1.12	34.23	54.00	-19.77	126	30	AVG
N40 Mode, Middle Channel								
2390.00	30.18	32.82	63.00	74.00	-11.00	115	283	peak
2390.00	16.94	32.82	49.76	54.00	-4.24	115	283	AVG
2437.00	85.25	32.94	118.19	N/A	N/A	115	283	peak
2437.00	73.61	32.94	106.55	N/A	N/A	115	283	AVG
2483.50	34.72	33.05	67.77	74.00	-6.23	123	90	peak
2483.50	18.43	33.05	51.48	54.00	-2.52	123	90	AVG
4893.00	49.25	1.29	50.54	74.00	-23.46	120	133	peak
4893.00	34.60	1.29	35.89	54.00	-18.11	120	133	AVG
N40 Mode, High Channel								
2452.00	79.94	32.98	112.92	N/A	N/A	112	286	peak
2452.00	69.32	32.98	102.30	N/A	N/A	112	286	AVG
2483.50	29.94	33.05	62.99	74.00	-11.01	112	286	peak
2483.50	18.36	33.05	51.41	54.00	-2.59	112	286	AVG
4904.00	49.19	1.33	50.52	74.00	-23.48	126	134	peak
4904.00	36.46	1.33	37.79	54.00	-16.21	126	134	AVG

Note: Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

Vertical

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
N40 Mode, Low Channel								
2390.00	27.71	32.82	60.53	74.00	-13.47	167	180	peak
2390.00	16.00	32.82	48.82	54.00	-5.18	167	180	AVG
2422.00	73.05	32.91	105.96	N/A	N/A	167	180	peak
2422.00	62.54	32.91	95.45	N/A	N/A	167	180	AVG
4844.00	51.72	1.12	52.84	74.00	-21.16	156	94	peak
4844.00	36.32	1.12	37.44	54.00	-16.56	156	94	AVG
7266.00	52.29	6.80	59.09	74.00	-14.91	132	119	peak
7266.00	40.03	6.80	46.83	54.00	-7.17	132	119	AVG
N40 Mode, Middle Channel								
2390.00	27.52	32.82	60.34	74.00	-13.66	177	193	peak
2390.00	14.60	32.82	47.42	54.00	-6.58	177	193	AVG
2437.00	75.60	32.94	108.54	N/A	N/A	177	193	peak
2437.00	65.37	32.94	98.31	N/A	N/A	177	193	AVG
2483.50	27.21	33.05	60.26	74.00	-13.74	177	193	peak
2483.50	15.24	33.05	48.29	54.00	-5.71	177	193	AVG
4874.00	49.36	1.23	50.59	74.00	-23.41	171	28	peak
4874.00	38.34	1.23	39.57	54.00	-14.43	171	28	AVG
7311.00	52.07	6.98	59.05	74.00	-14.95	143	123	peak
7311.00	41.88	6.98	48.86	54.00	-5.14	143	123	AVG
N40 Mode, High Channel								
2452.00	70.15	32.98	103.13	N/A	N/A	174	193	peak
2452.00	60.41	32.98	93.39	N/A	N/A	174	193	AVG
2483.50	27.88	33.05	60.93	74.00	-13.07	174	193	peak
2483.50	14.74	33.05	47.79	54.00	-6.21	174	193	AVG
4904.00	47.94	1.33	49.27	74.00	-24.73	139	28	peak
4904.00	37.12	1.33	38.45	54.00	-15.55	139	28	AVG

Note: Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

Test Mode: simultaneous transmissions (WCDMA & LTE+2.4G WIFI+5G WIFI)

Mode 1

Horizontal

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
69.77	36.05	-16.88	19.17	40.00	-20.83	100	138	QP
214.30	45.77	-12.88	32.89	43.50	-10.61	100	296	QP
260.86	34.46	-11.25	23.21	46.00	-22.79	100	167	QP
550.89	35.20	-4.97	30.23	46.00	-15.77	100	43	QP
745.86	34.97	-1.89	33.08	46.00	-12.92	100	146	QP
892.33	27.15	1.25	28.40	46.00	-17.60	100	303	QP
3760.00	36.36	-0.60	35.76	74.00	-38.24	100	331	peak
3760.00	35.10	-0.60	34.50	54.00	-19.5	100	331	AVG
4824.00	34.26	1.05	35.31	74.00	-38.69	100	134	peak
4824.00	32.51	1.05	33.56	54.00	-20.44	100	134	AVG
11570.00	45.17	13.21	58.38	74.00	-15.62	100	147	peak
11570.00	35.25	13.21	48.46	54.00	-5.54	100	147	AVG

Vertical

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
65.89	41.95	-17.15	24.80	40.00	-15.20	100	257	QP
129.91	34.26	-10.51	23.75	43.50	-19.75	100	119	QP
238.55	34.88	-12.04	22.84	46.00	-23.16	100	78	QP
450.01	33.84	-6.54	27.30	46.00	-18.70	100	247	QP
810.85	23.94	-0.36	23.58	46.00	-22.42	100	212	QP
885.54	23.76	1.11	24.87	46.00	-21.13	100	169	QP
3760.00	34.84	-0.6	34.24	74.00	-39.76	100	145	peak
3760.00	33.94	-0.6	33.34	54.00	-20.66	100	145	AVG
4824.00	33.19	1.05	34.24	74.00	-39.76	100	74	peak
4824.00	25.45	1.05	26.50	54.00	-27.5	100	74	AVG
11570.00	28.35	13.21	40.56	74.00	-33.44	100	69	peak
11570.00	21.84	13.21	35.05	54.00	-18.95	100	69	AVG

Note: Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

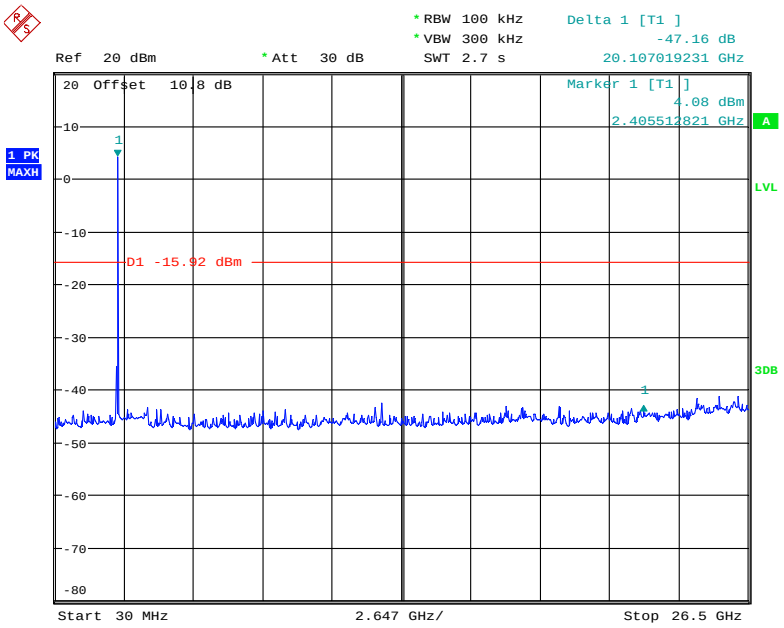
Spurious emissions more than 20 dB below the limit were not reported.

Conducted Spurious Emissions:

Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)			Limit (dBc)	RESULT
		Chain 0	Chain 1	Total Delta		
B Mode						
Low	2412	47.16	49.75	45.25	≥ 20	PASS
Mid	2437	51.62	48.33	46.66	≥ 20	PASS
High	2462	51.31	49.85	47.51	≥ 20	PASS
G Mode						
Low	2412	47.94	49.75	45.74	≥ 20	PASS
Mid	2437	45.82	49.64	44.31	≥ 20	PASS
High	2462	47.56	47.99	44.76	≥ 20	PASS
N20 Mode						
Low	2412	47.53	49.57	45.42	≥ 20	PASS
Mid	2437	48.13	49.11	45.58	≥ 20	PASS
High	2462	47.46	48.85	45.09	≥ 20	PASS
N40 Mode						
Low	2422	44.83	47.03	42.78	≥ 20	PASS
Mid	2437	43.35	47.00	41.79	≥ 20	PASS
High	2452	44.35	44.77	41.54	≥ 20	PASS

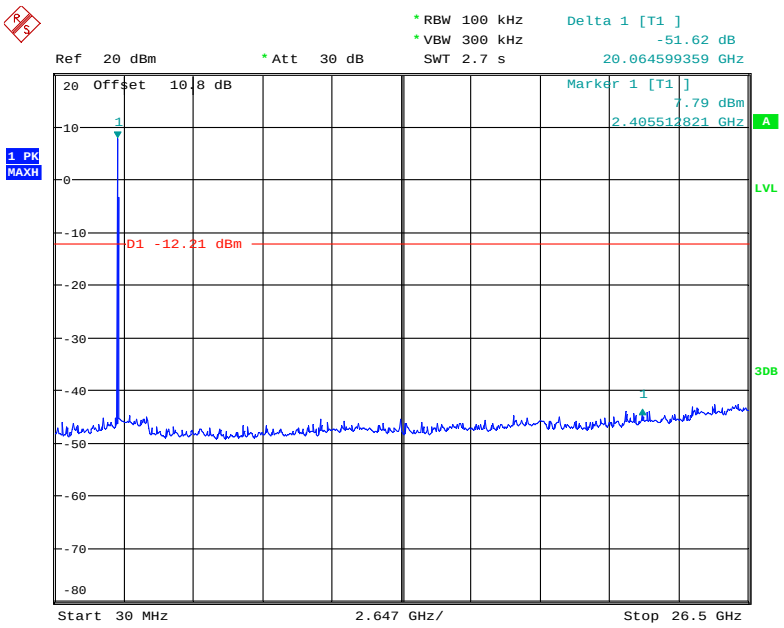
Total Delta: According to FCC KDB 662911 D01 Multiple Transmitter Output v02r01

B Mode Low Channel (Chain 0)



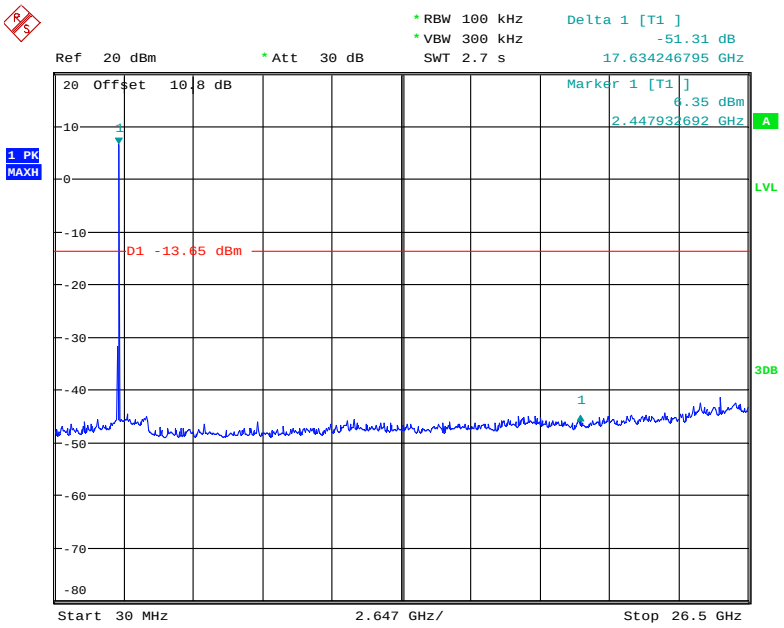
Date: 5.APR.2017 16:06:41

B Mode Middle Channel (Chain 0)



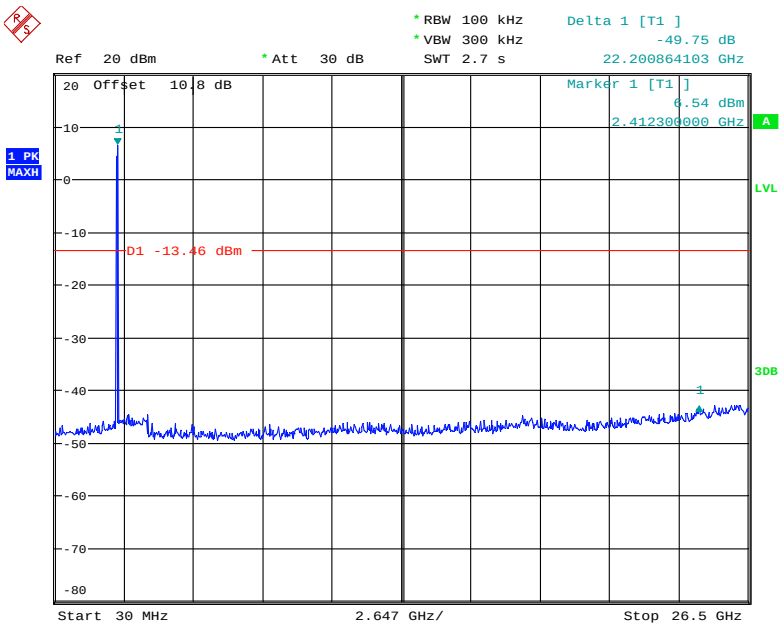
Date: 5.APR.2017 16:35:07

B Mode High Channel (Chain 0)



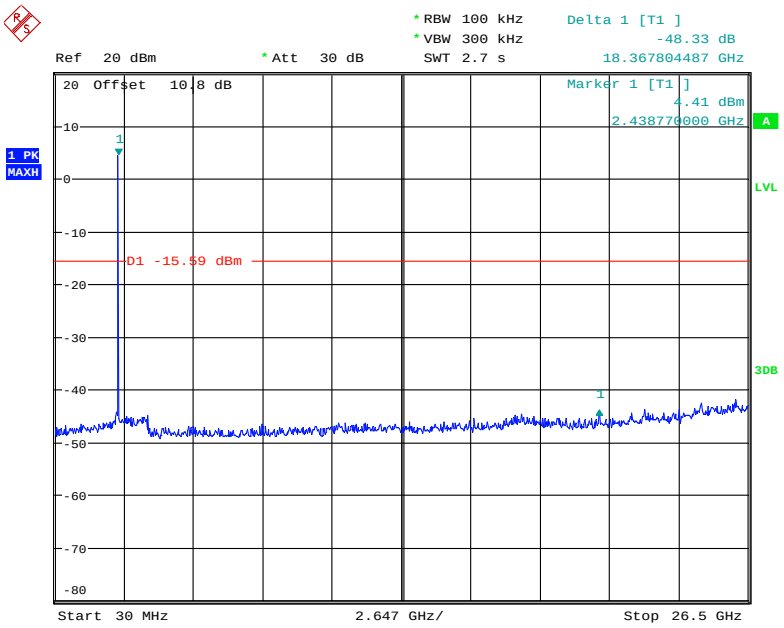
Date: 5.APR.2017 16:37:52

B Mode Low Channel (Chain 1)



Date: 27.MAR.2017 15:03:39

B Mode Middle Channel (Chain 1)



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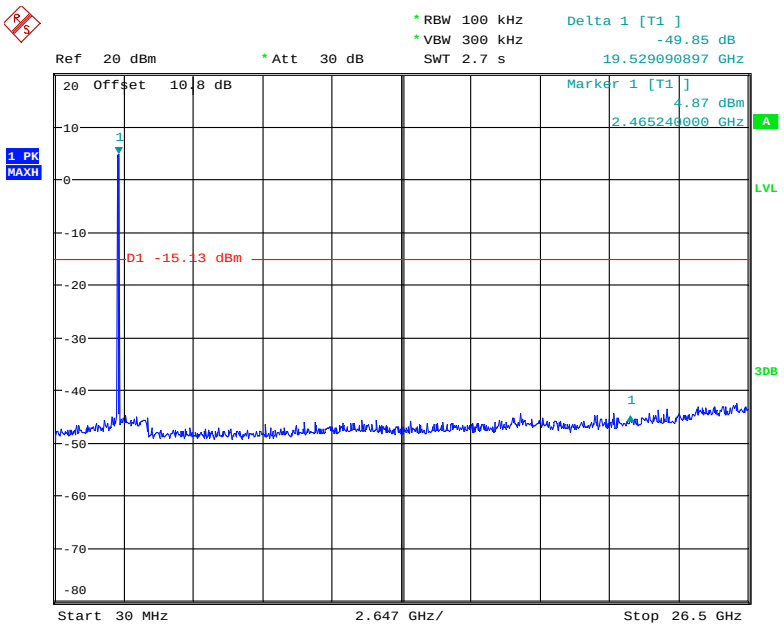
B Mode High Channel (Chain 1)



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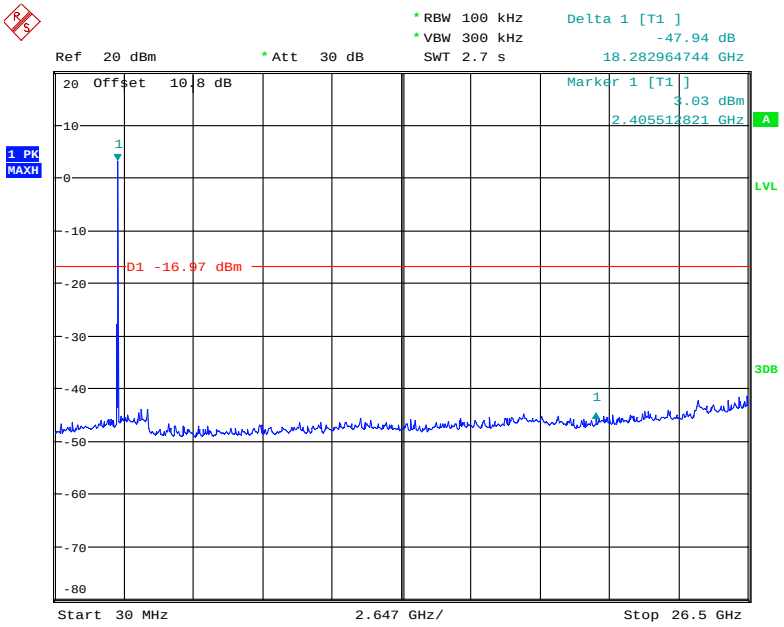
G Mode Low Channel (Chain 0)



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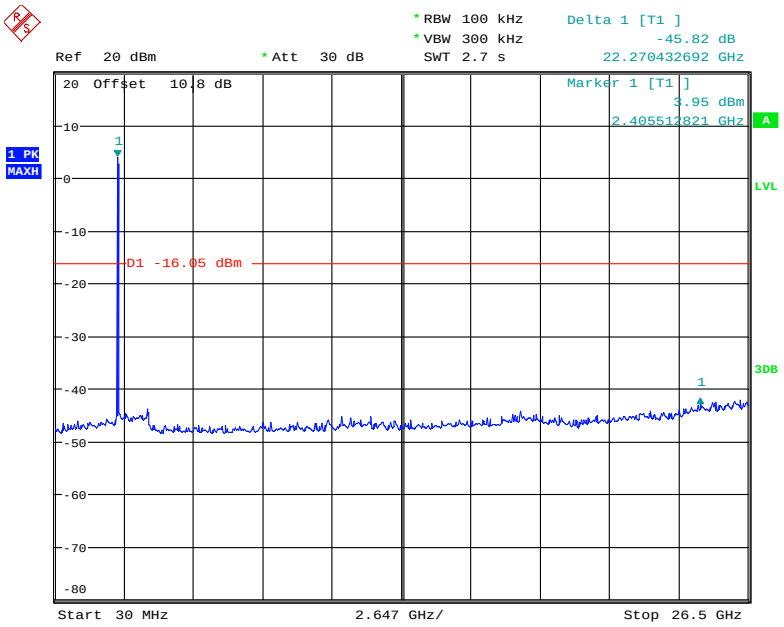
G Mode Middle Channel (Chain 0)



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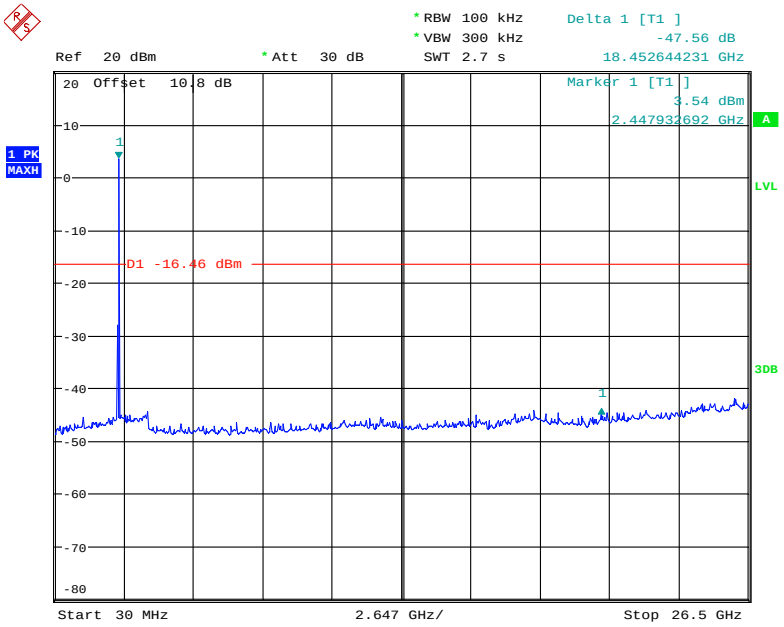
G Mode High Channel (Chain 0)



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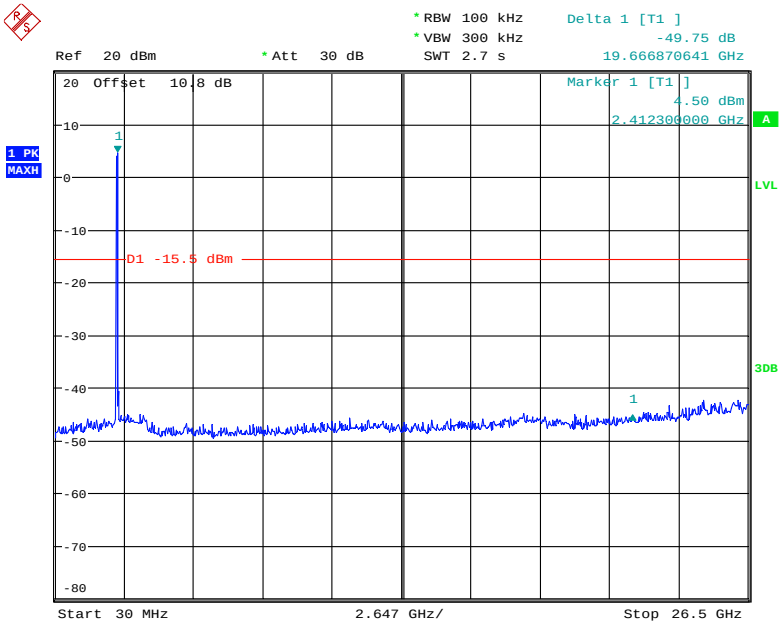
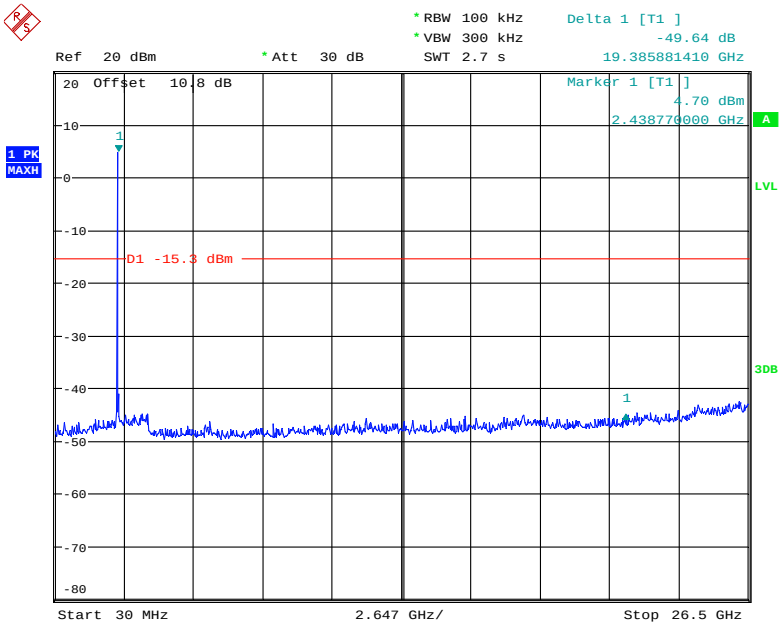
G Mode Low Channel (Chain 1)



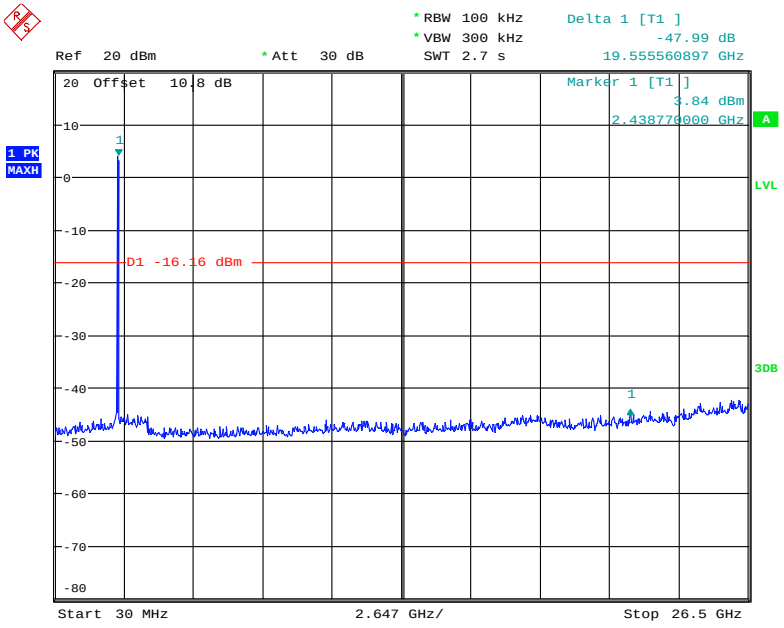
Date: 27.MAR.2017 15:26:48

G Mode Middle Channel (Chain 1)



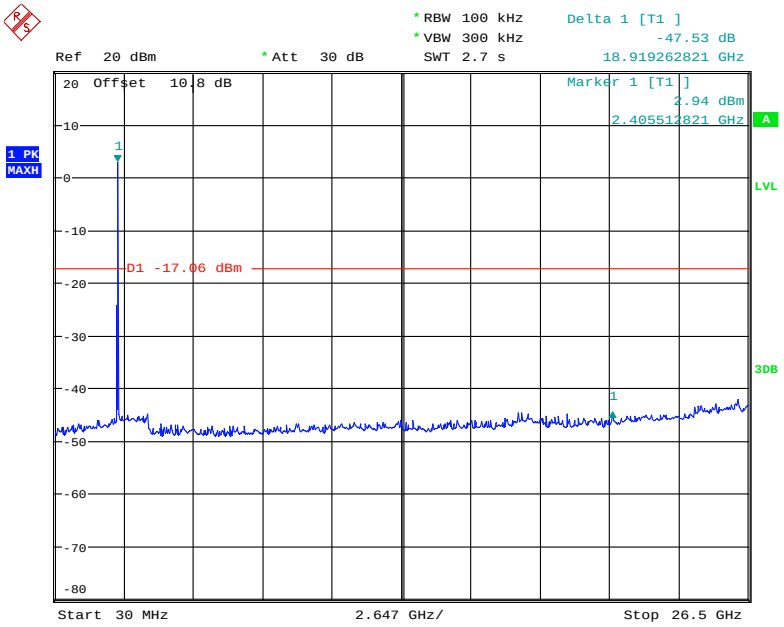
Date: 27.MAR.2017 15:28:52

G Mode High Channel (Chain 1)



Date: 27.MAR.2017 15:30:32

N20 Mode Low Channel (Chain 0)



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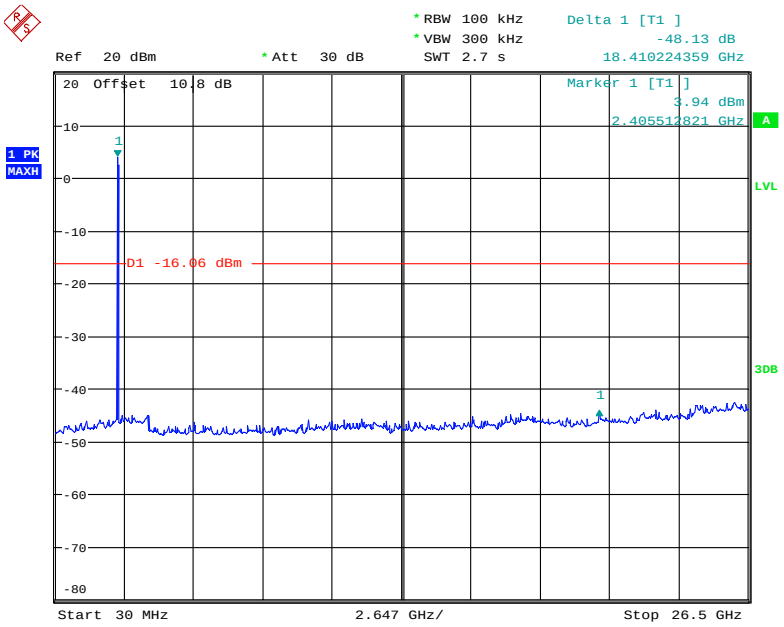
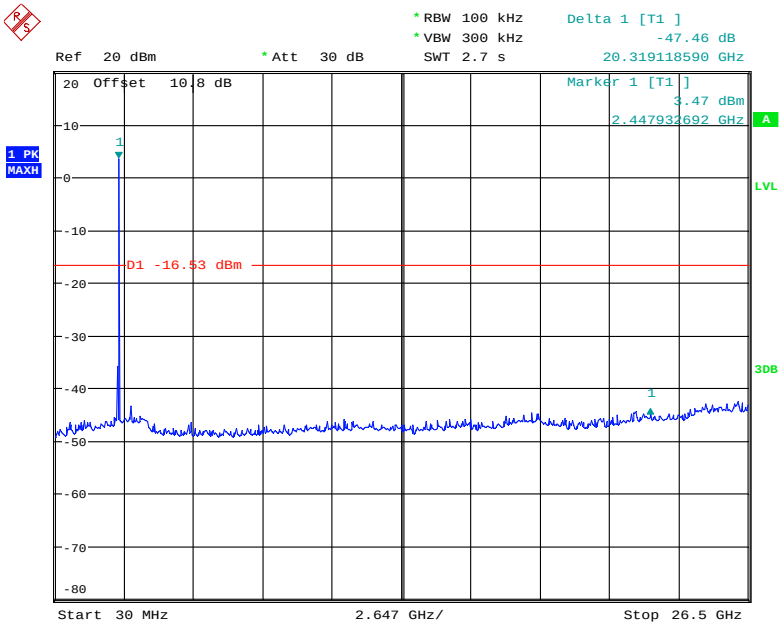
N20 Mode Middle Channel (Chain 0)



Date: 5.APR.2017 17:10:34

N20 Mode High Channel (Chain 0)



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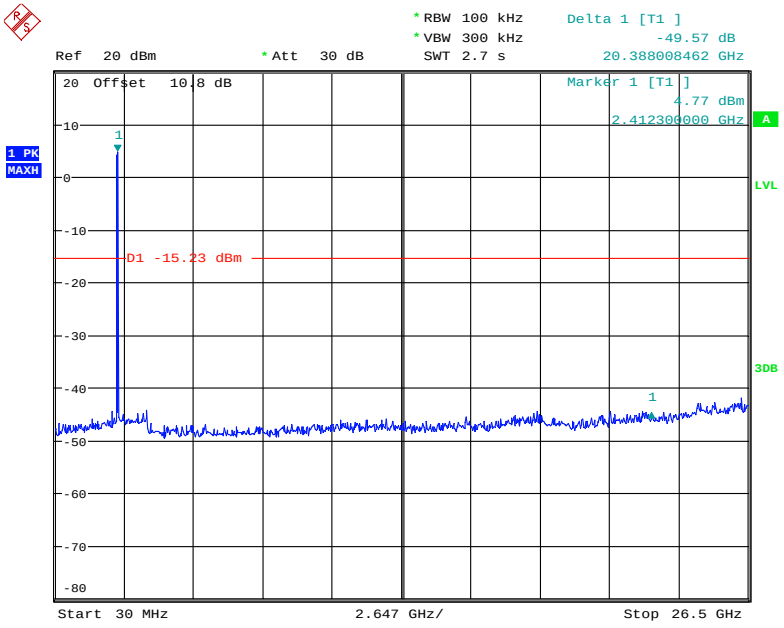
N20 Mode Low Channel (Chain 1)



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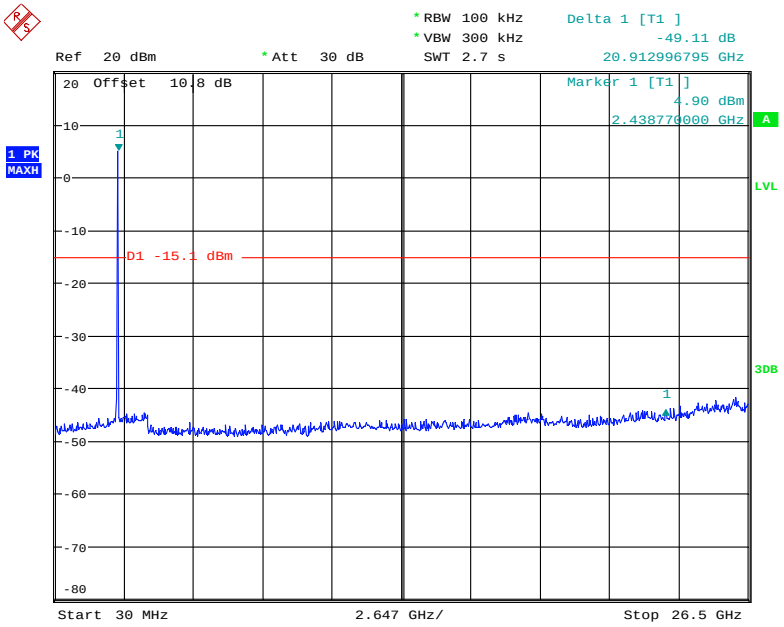
N20 Mode Middle Channel (Chain 1)



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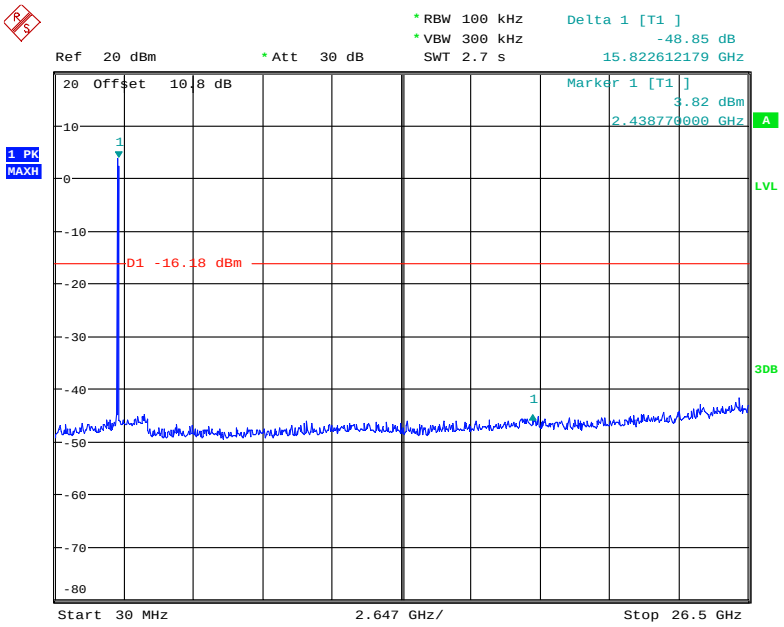
N20 Mode High Channel (Chain 1)



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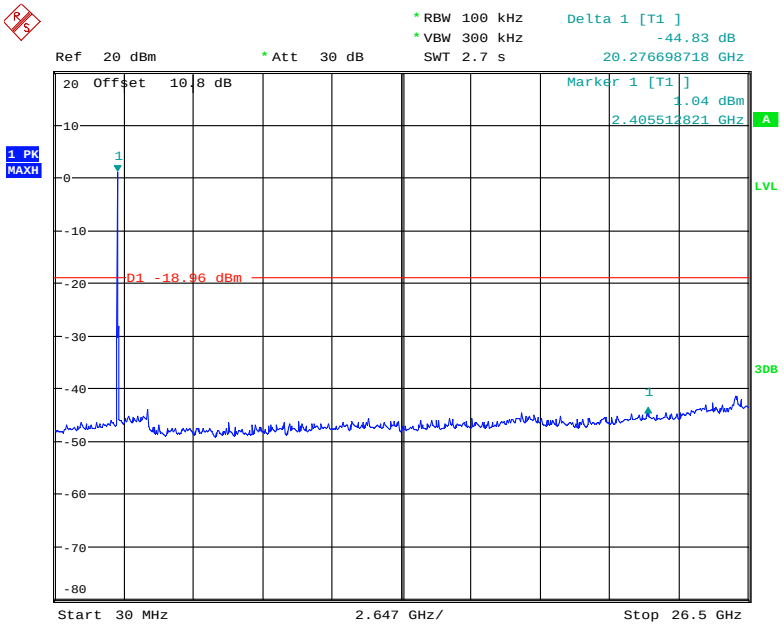
N40 Mode Low Channel (Chain 0)



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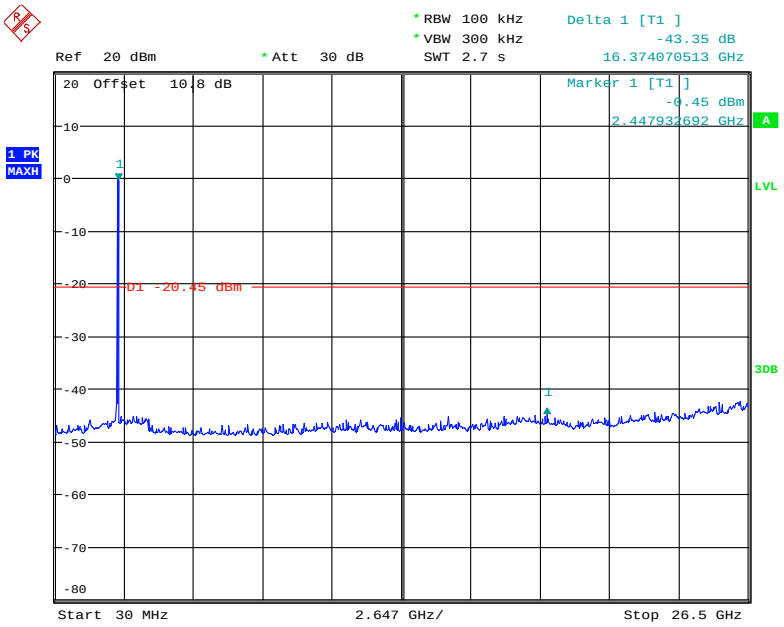
N40 Mode Middle Channel (Chain 0)



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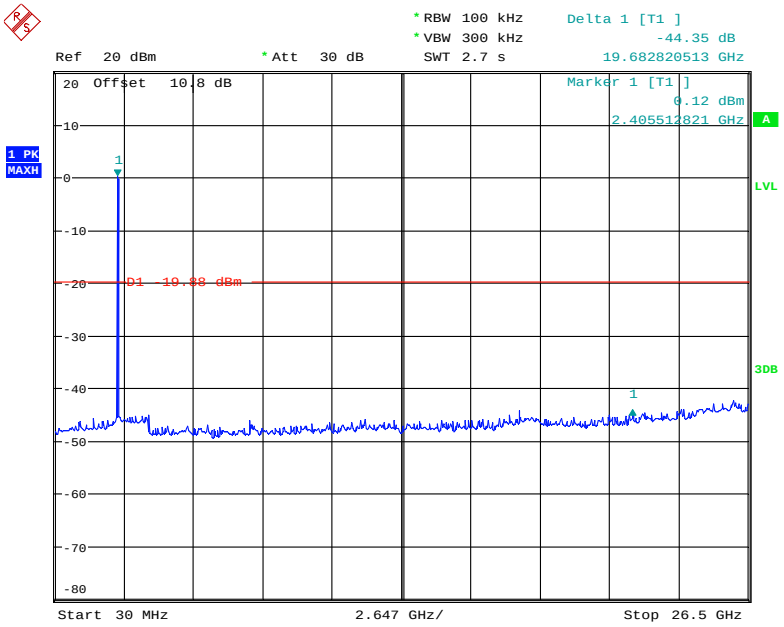
N40 Mode High Channel (Chain 0)



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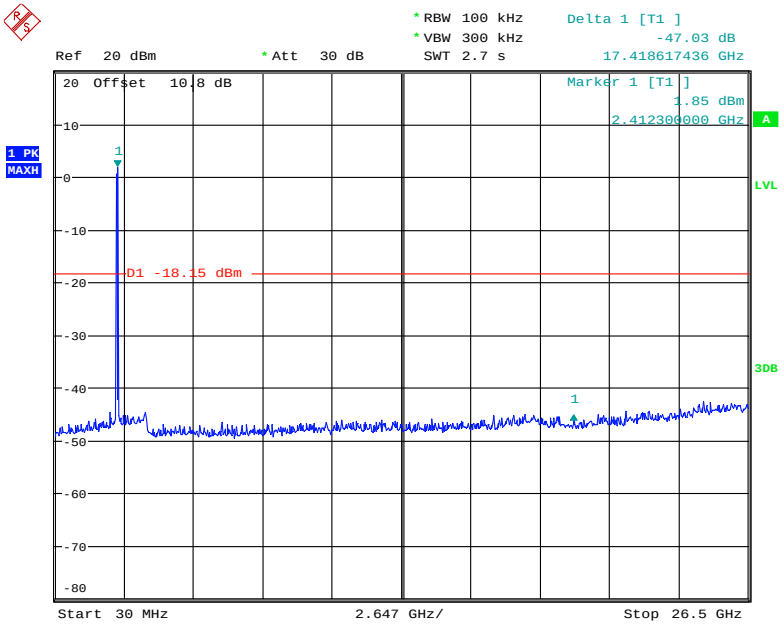
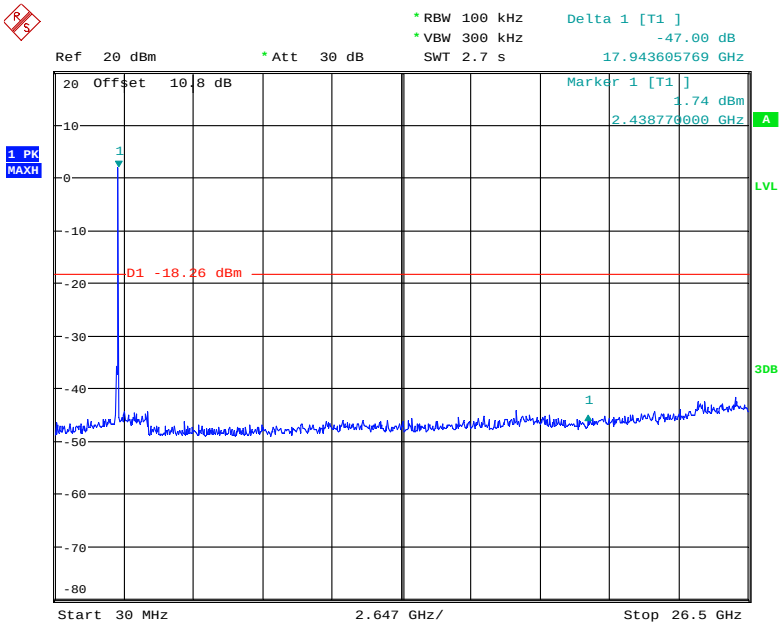
N40 Mode Low Channel (Chain 1)



Date: 27.MAR.2017 16:41:13

N40 Mode Middle Channel (Chain 1)



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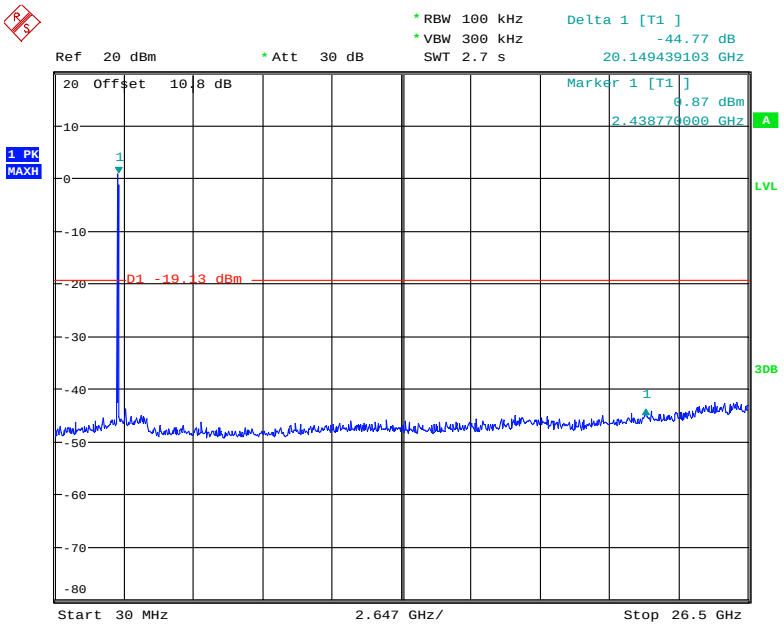
N40 Mode High Channel (Chain 1)



Date: 27.MAR.2017 16:47:30

8 FCC §15.247(a)(2) – 6 dB Emission Bandwidth

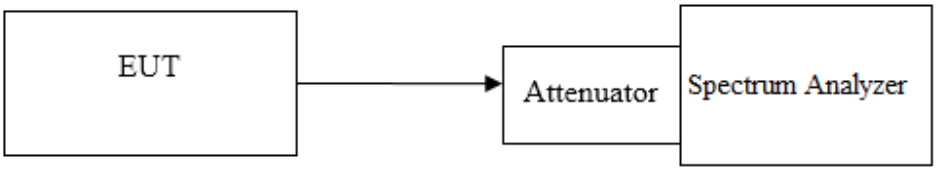
8.1 Applicable Standard

According to FCC §15.247(a) (2).

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

8.2 Test Procedure

According to ANSI C63.10-2013



6 dB Emission Bandwidth

The steps for the first option are as follows:

a) Set RBW = 100 kHz.

b) Set the VBW ≥ [3 × RBW].

c) Detector = peak.

d) Trace mode = max hold.

e) Sweep = auto couple.

f) Allow the trace to stabilize.

g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

8.3 Test Equipment List and Details

Descriptions	Manufacturers	Models	Serial Numbers	Calibration Date	Calibration Due Date
Cable	WOKEN	SFL402	S02-160323-07	2017/2/22	2018/2/21
Spectrum Analyzer	Rohde & Schwarz	FSU26	200268	2016/5/7	2017/5/6
Attenuator	MINI-CIRCUITS	BW-S10W5+	N/A	2017/3/14	2018/3/13

**** Statement of Traceability:*** BACL Corp. attests that all calibrations have been performed according to TAF requirements, traceable to the ETC.

8.4 Test Environmental Conditions

Temperature:	26° C
Relative Humidity:	58 %
ATM Pressure:	1010 hPa

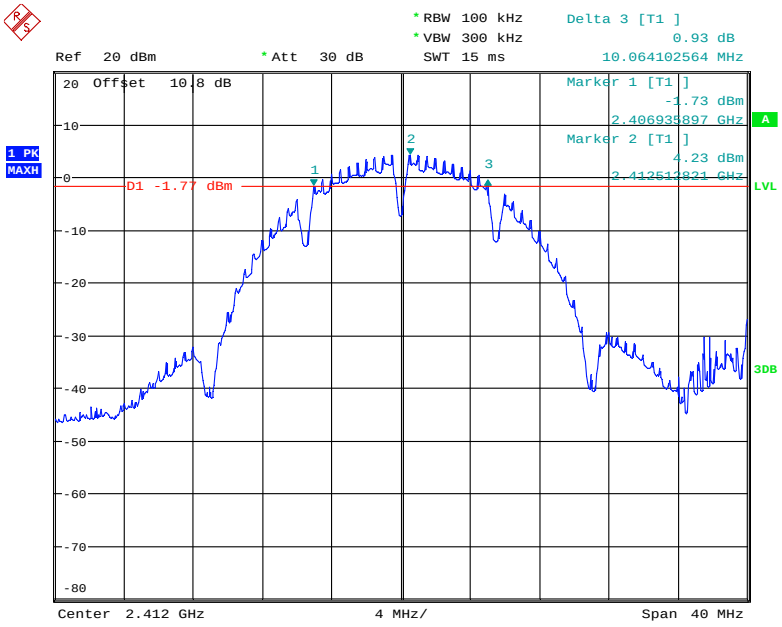
The testing was performed by David Hsu on 2017-03-02 ~ 2017-04-06.

8.5 Test Results

Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)		Limit (kHz)	Result
		Chain 0	Chain 1		
B Mode					
Low	2412	10.06	10.06	>500	PASS
Mid	2437	10.12	10.06	>500	PASS
High	2462	10.12	10.12	>500	PASS
G Mode					
Low	2412	16.60	16.60	>500	PASS
Mid	2437	16.47	16.60	>500	PASS
High	2462	16.53	16.60	>500	PASS
N20 Mode					
Low	2412	17.82	17.82	>500	PASS
Mid	2437	17.82	17.82	>500	PASS
High	2462	17.82	17.82	>500	PASS
N40 Mode					
Low	2422	36.53	36.53	>500	PASS
Mid	2437	36.41	36.53	>500	PASS
High	2452	36.53	36.53	>500	PASS

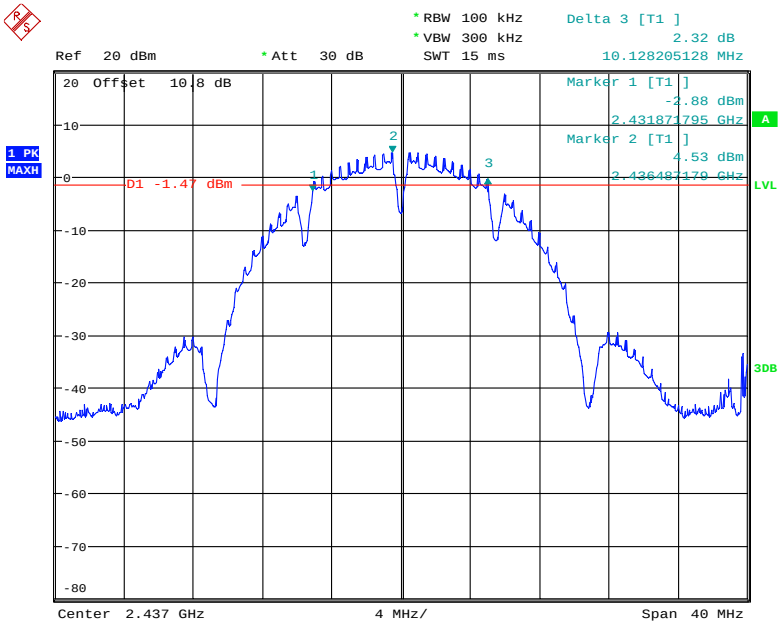
6 dB Emission Bandwidth

B Mode Low Channel (Chain 0)



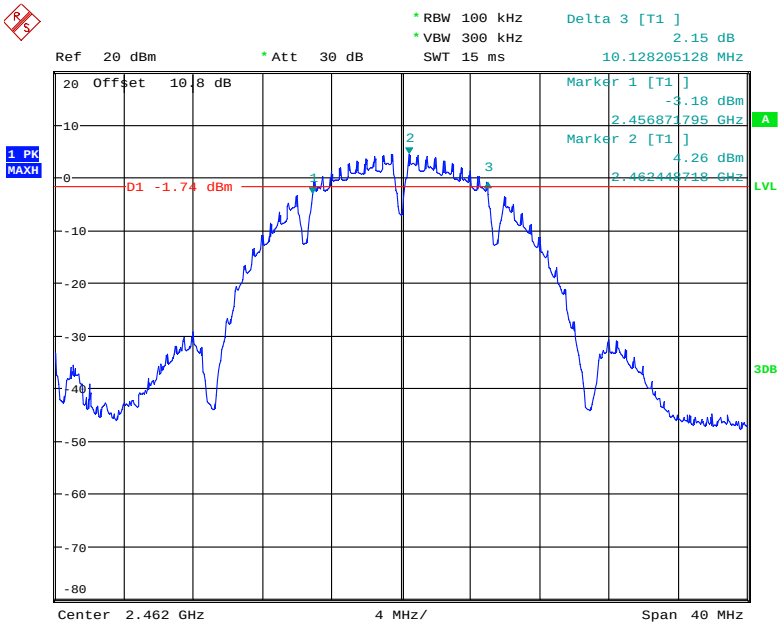
Date: 2.MAR.2017 10:52:56

B Mode Middle Channel (Chain 0)



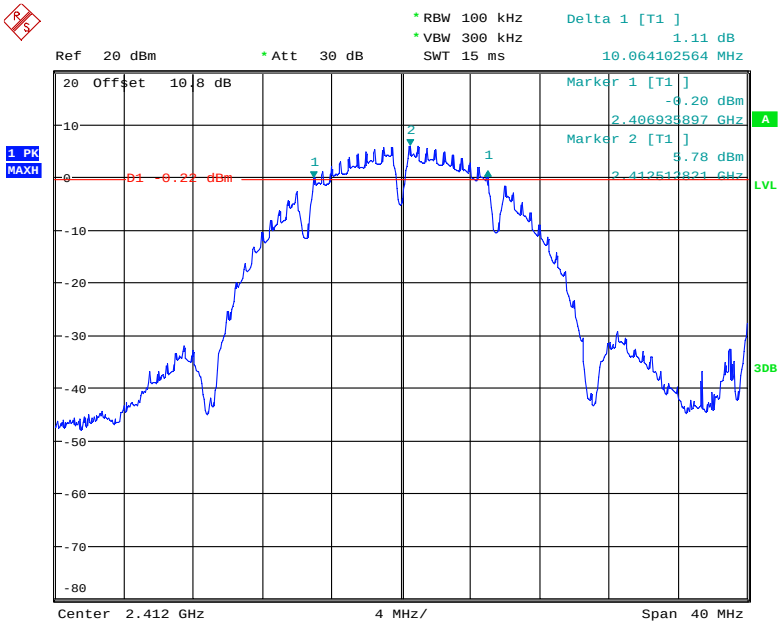
Date: 2.MAR.2017 10:54:58

B Mode High Channel (Chain 0)



Date: 2.MAR.2017 10:56:09

B Mode Low Channel (Chain 1)



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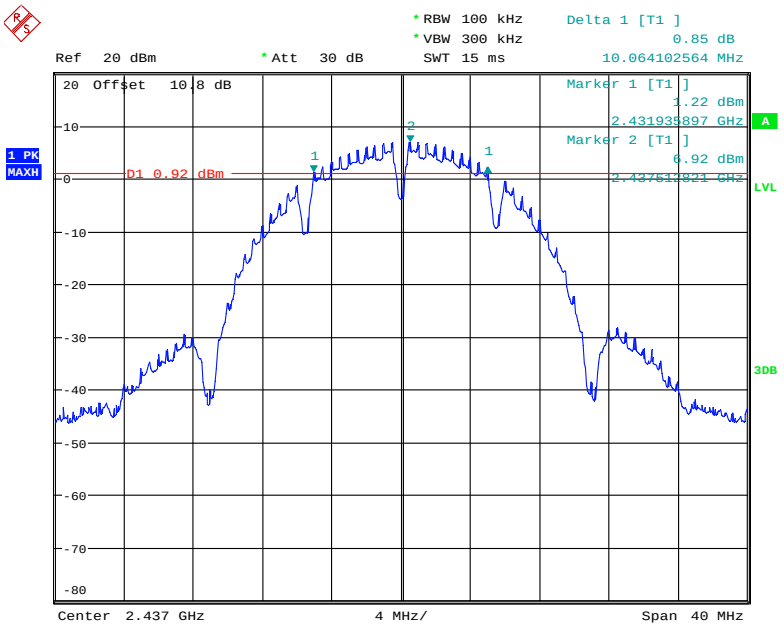
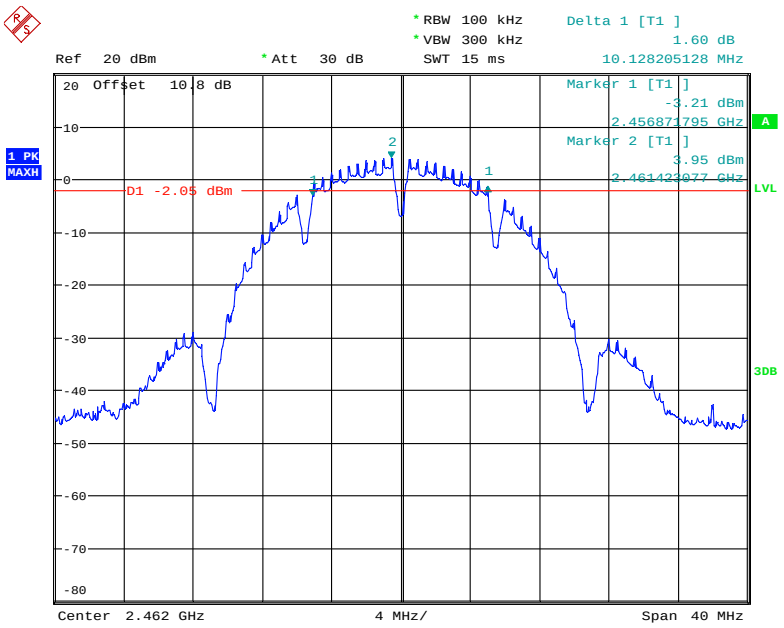
B Mode Middle Channel (Chain 1)



Date: 2.MAR.2017 11:27:18

B Mode High Channel (Chain 1)



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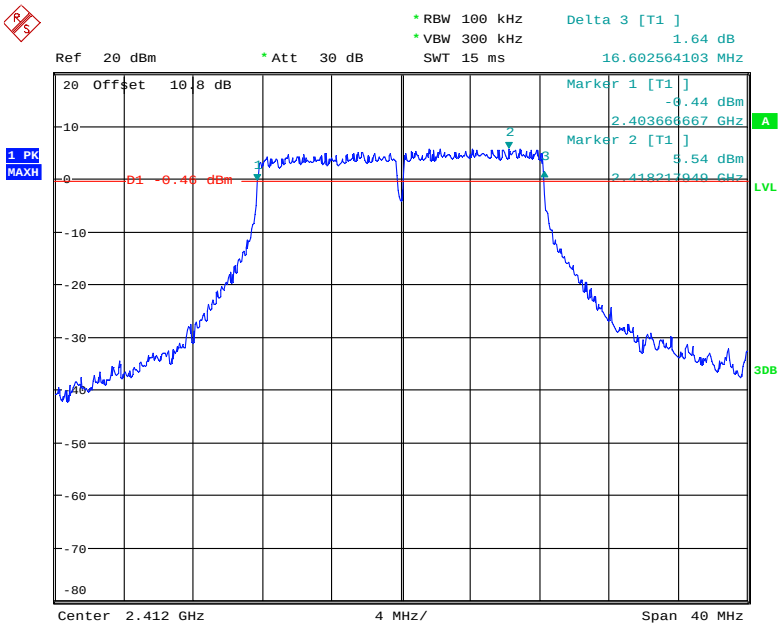
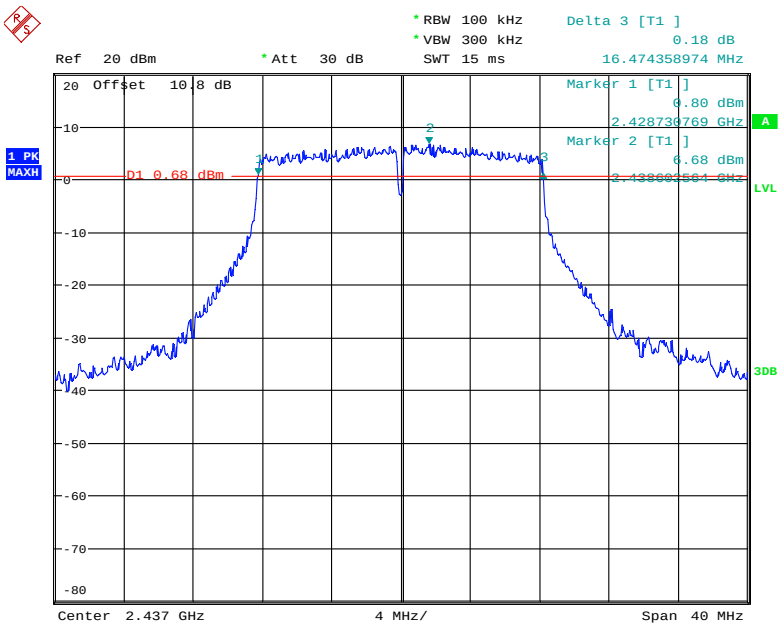
G Mode Low Channel (Chain 0)



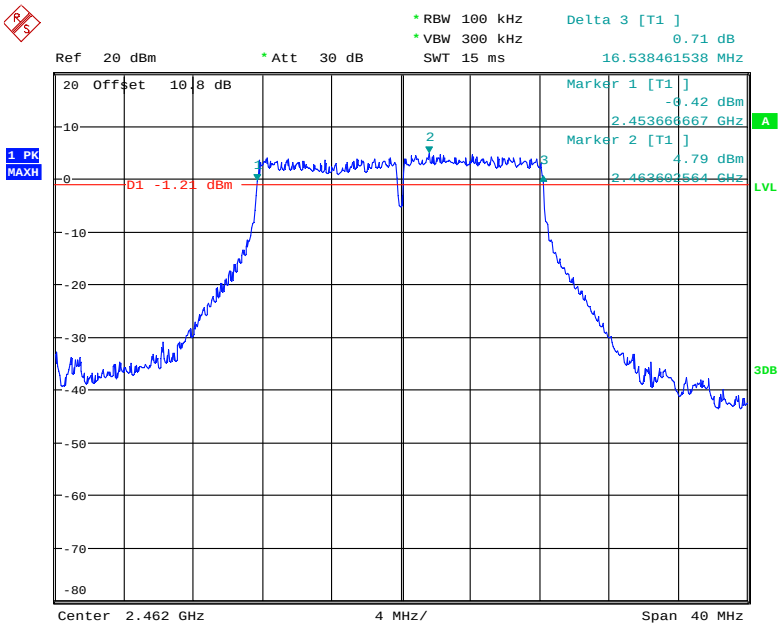
Date: 2.MAR.2017 11:01:58

G Mode Middle Channel (Chain 0)



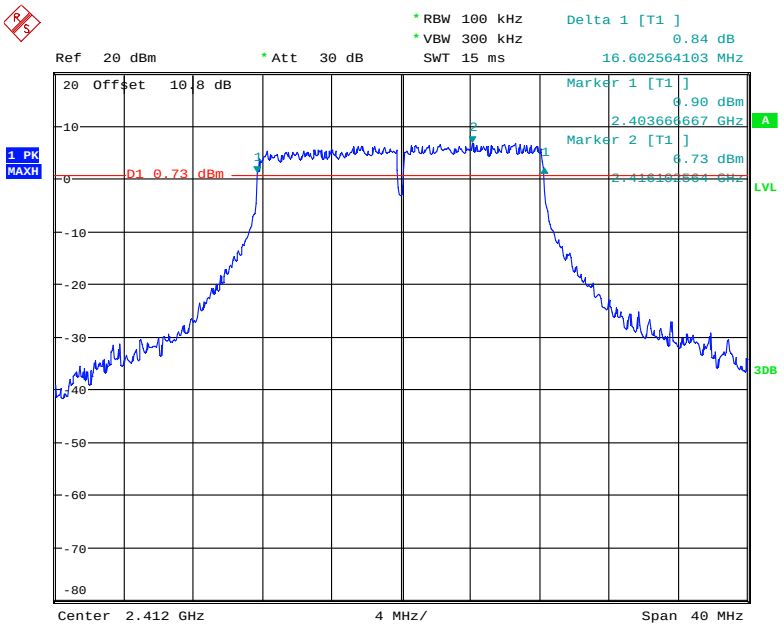
Date: 2.MAR.2017 11:00:02

G Mode High Channel (Chain 0)



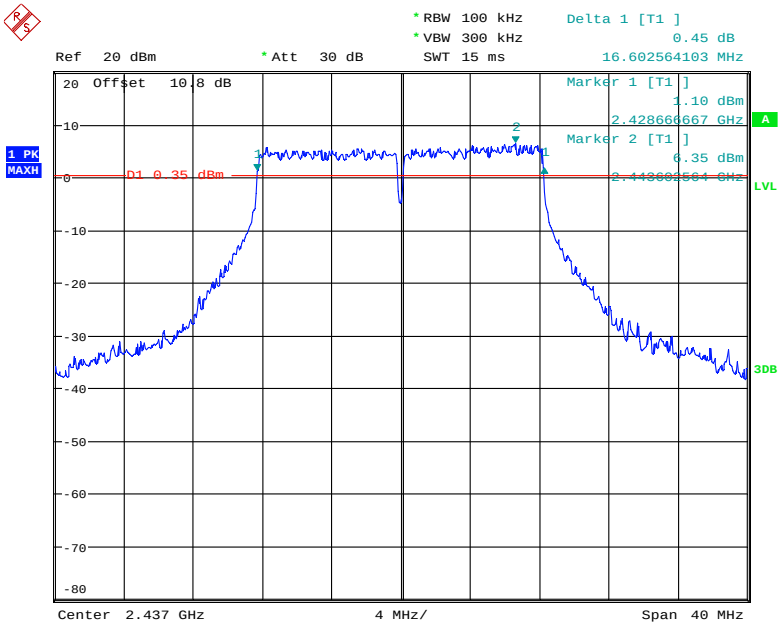
Date: 2.MAR.2017 10:58:27

G Mode Low Channel (Chain 1)



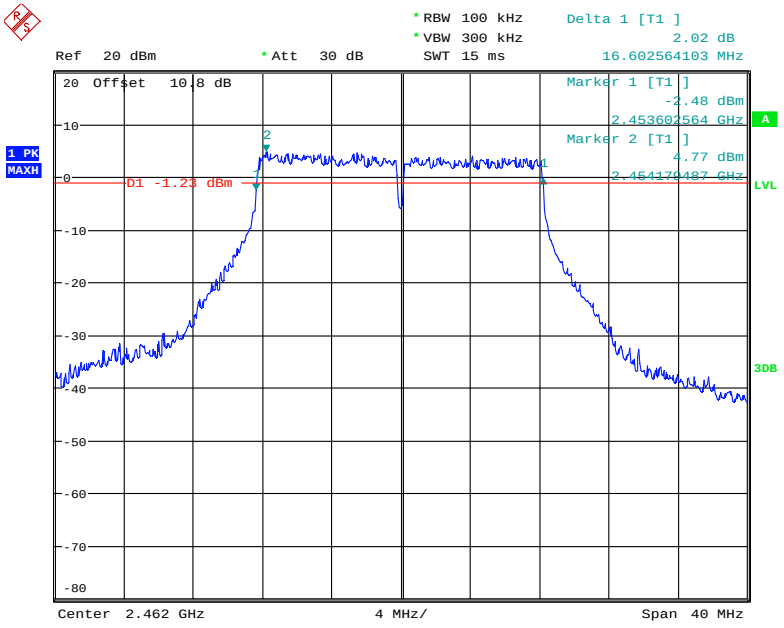
Date: 2.MAR.2017 11:32:32

G Mode Middle Channel (Chain 1)



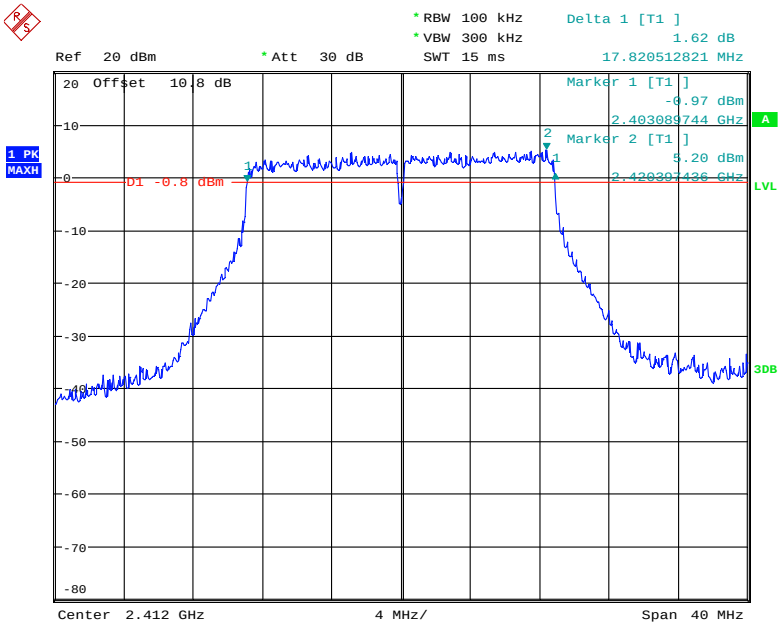
Date: 2.MAR.2017 11:31:03

G Mode High Channel (Chain 1)



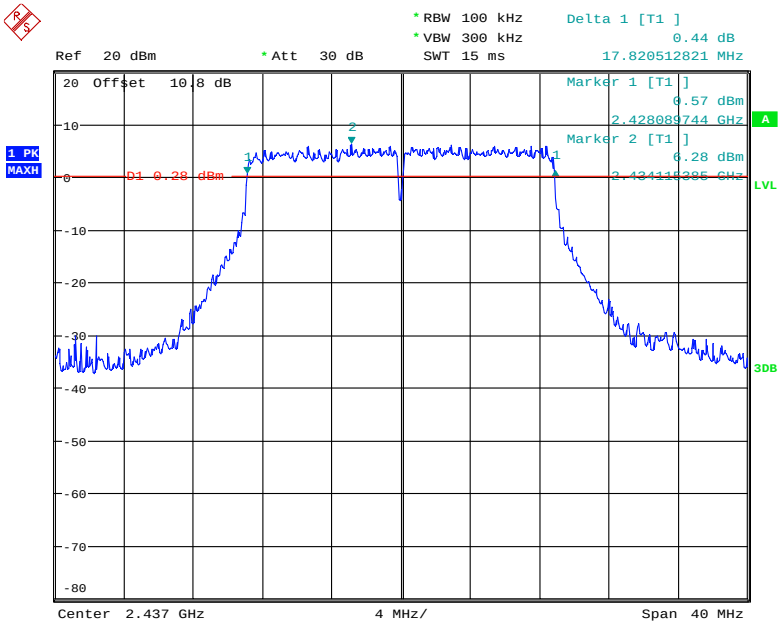
Date: 2.MAR.2017 11:29:31

N20 Mode Low Channel (Chain 0)



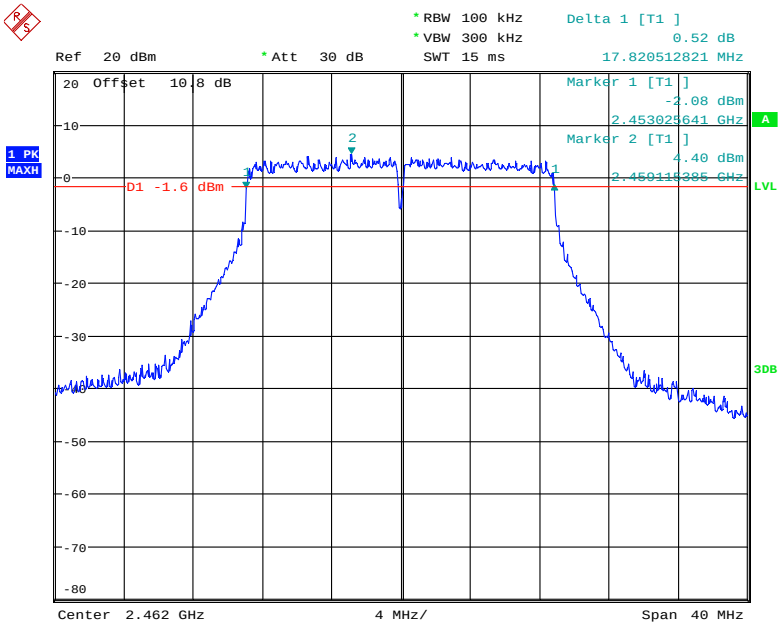
Date: 2.MAR.2017 11:05:21

N20 Mode Middle Channel (Chain 0)



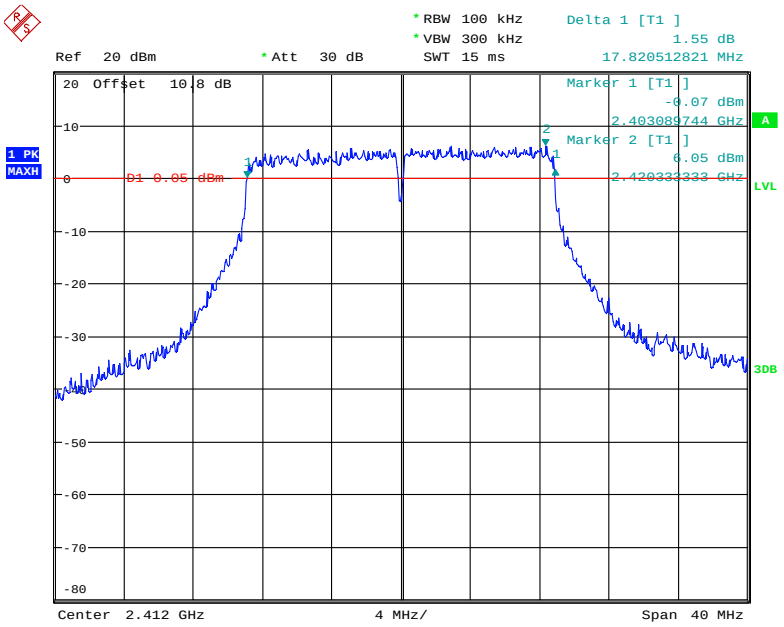
Date: 2.MAR.2017 11:07:26

N20 Mode High Channel (Chain 0)



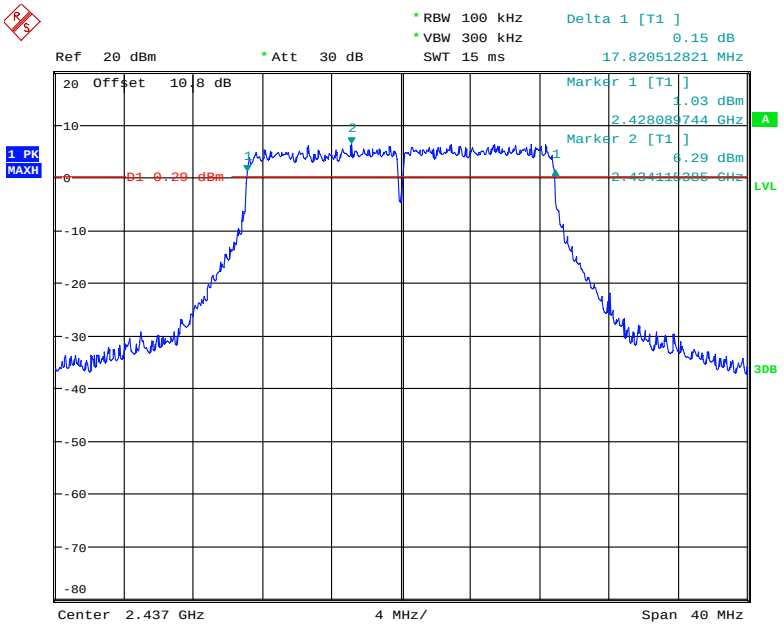
Date: 2.MAR.2017 11:08:47

N20 Mode Low Channel (Chain 1)



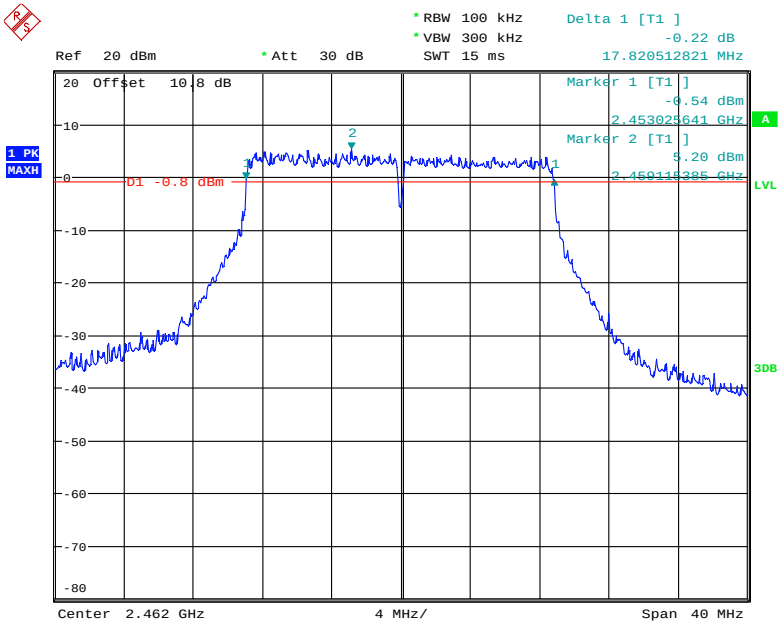
Date: 2.MAR.2017 11:33:29

N20 Mode Middle Channel (Chain 1)



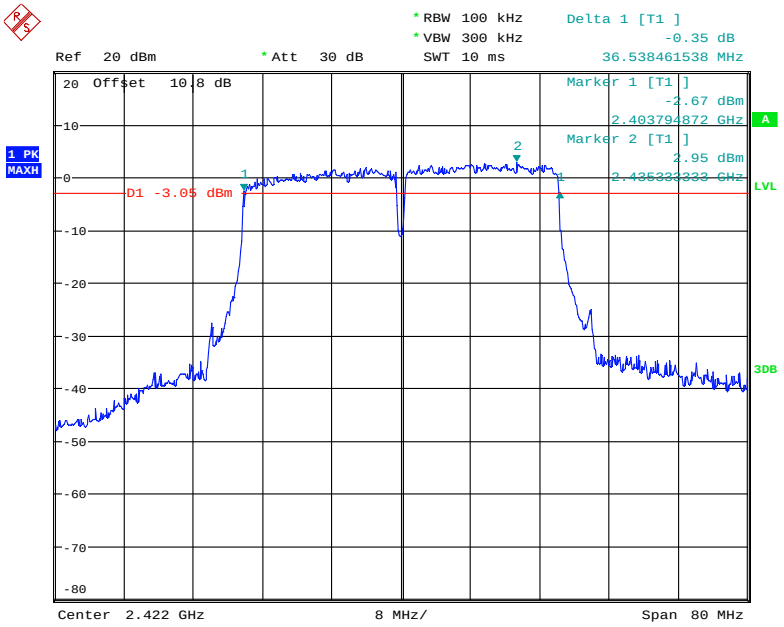
Date: 2.MAR.2017 11:34:56

N20 Mode High Channel (Chain 1)



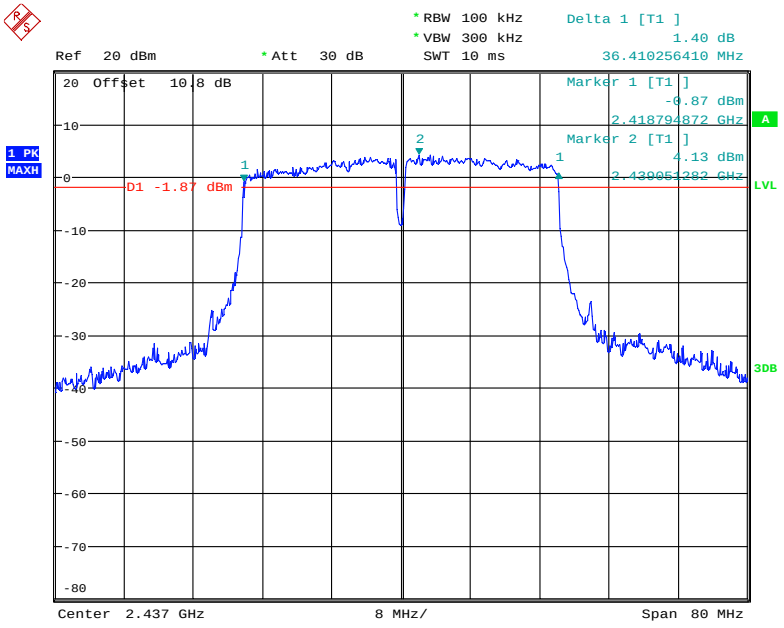
Date: 2.MAR.2017 11:36:44

N40 Mode Low Channel (Chain 0)



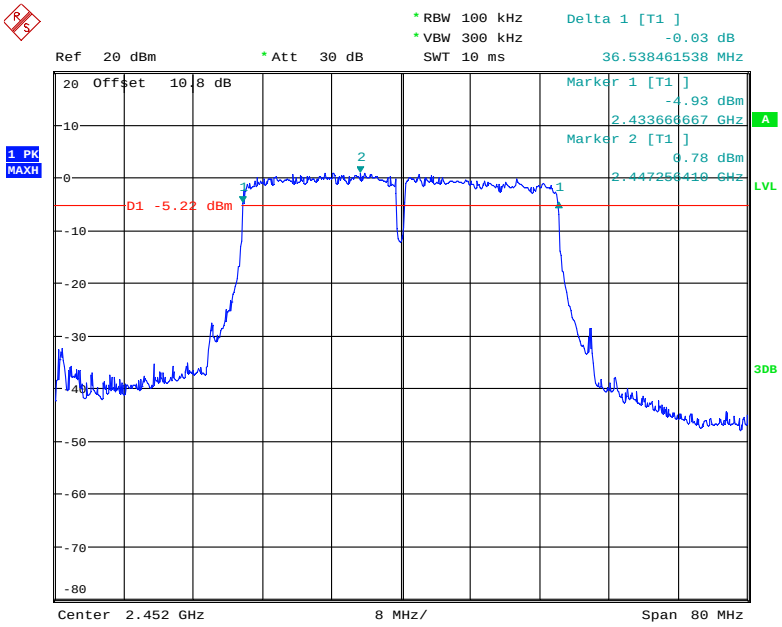
Date: 2.MAR.2017 11:13:36

N40 Mode Middle Channel (Chain 0)



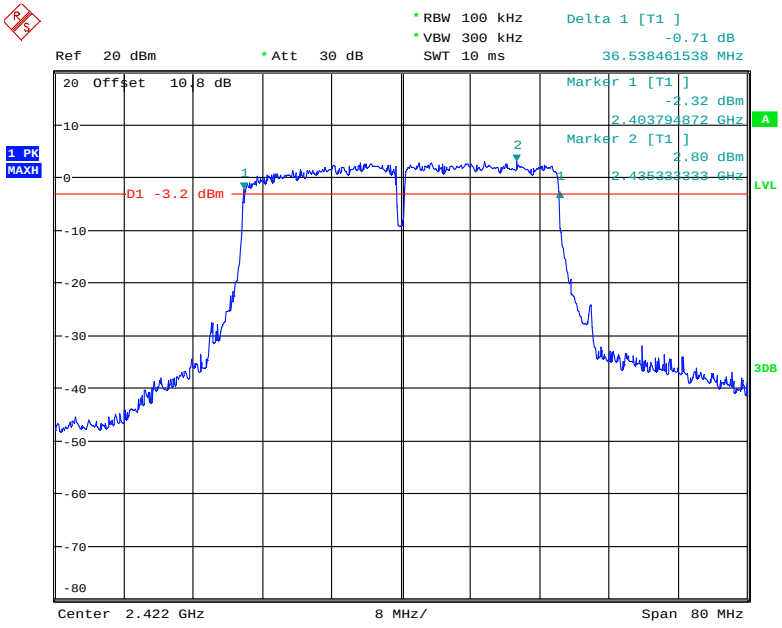
Date: 2.MAR.2017 14:12:27

N40 Mode High Channel (Chain 0)



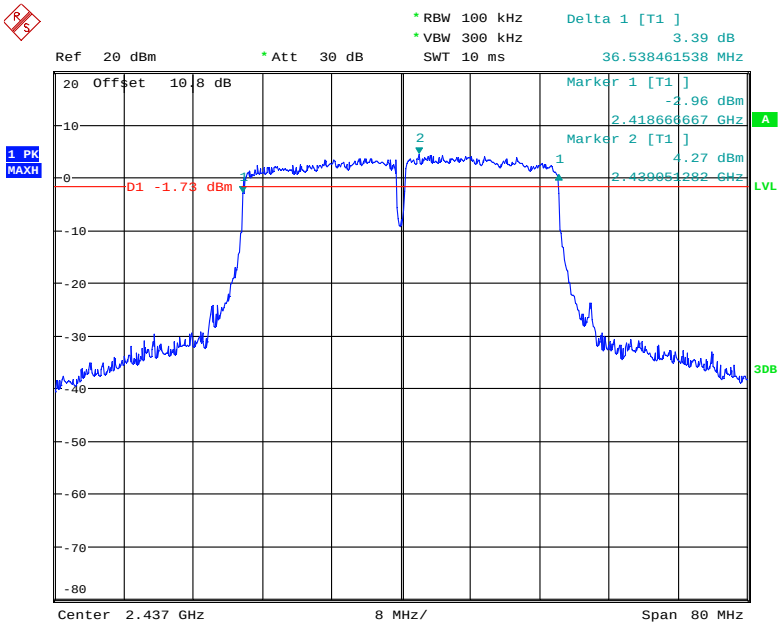
Date: 6.APR.2017 15:31:30

N40 Mode Low Channel (Chain 1)



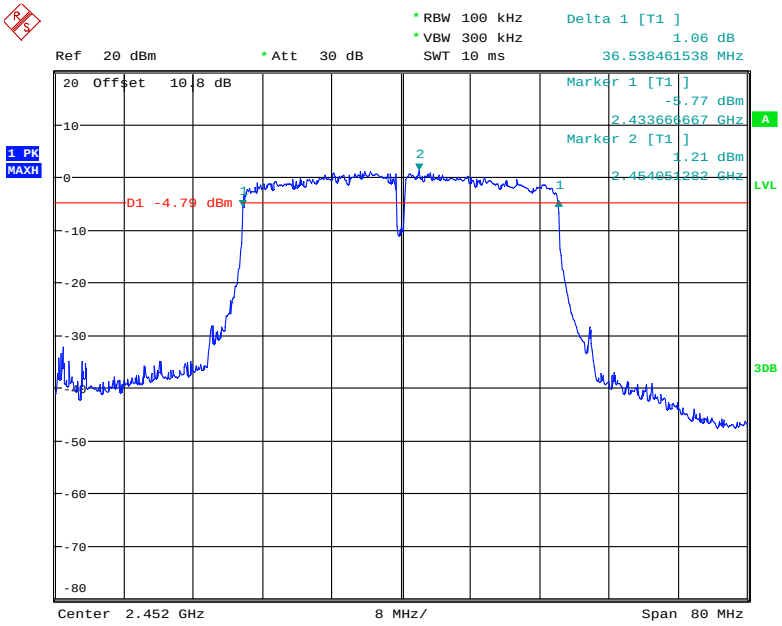
Date: 2.MAR.2017 11:19:52

N40 Mode Middle Channel (Chain 1)



Date: 2.MAR.2017 11:21:48

N40 Mode High Channel (Chain 1)



Date: 6.APR.2017 15:28:48

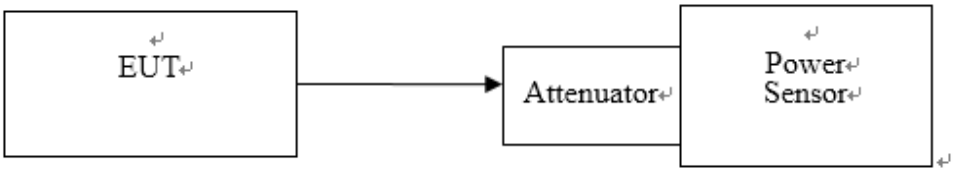
9 FCC §15.247(b) (3) – Maximum Output Power

9.1 Applicable Standard

According to FCC §15.247(b) (3).
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.

9.2 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 measuring equipment.



9.3 Test Equipment List and Details

Descriptions	Manufacturers	Models	Serial Numbers	Calibration Date	Calibration Due Date
Cable	WOKEN	SFL402	S02-160323-07	2017/2/22	2018/2/21
Power Sensor	KEYSIGHT	U2021XA	MY54080018	2017/3/21	2018/3/20
Attenuator	MINI-CIRCUITS	BW-S10W5+	N/A	2017/3/14	2018/3/13

**** Statement of Traceability:*** BACL Corp. attests that all calibrations have been performed according to TAF requirements, traceable to the ETC.

9.4 Test Environmental Conditions

Temperature:	26° C
Relative Humidity:	58 %
ATM Pressure:	1010 hPa

The testing was performed by David Hsu on 2017-03-23.

9.5 Test Results

SISO mode and MIMO mode have the same power level setting, so every port measure power is same.

MIMO (CDD) Mode:

Channel	Frequency (MHz)	Conducted Peak Output Power				Limit (W)	RESULT
		Chain 0(dBm)	Chain 1(dBm)	Total (dBm)	Total (W)		
B Mode							
Low	2412	18.95	19.34	22.16	0.164	1	PASS
Mid	2437	21.61	20.83	24.25	0.266	1	PASS
High	2462	20.08	19.16	22.65	0.184	1	PASS
G Mode							
Low	2412	26.07	26.80	29.46	0.883	1	PASS
Mid	2437	26.05	26.78	29.44	0.879	1	PASS
High	2462	26.47	26.76	29.63	0.918	1	PASS
N20 Mode							
Low	2412	26.20	27.16	29.72	0.937	1	PASS
Mid	2437	26.96	26.78	29.88	0.972	1	PASS
High	2462	26.10	26.60	29.37	0.865	1	PASS
N40 Mode							
Low	2422	26.64	26.75	29.71	0.935	1	PASS
Mid	2437	26.84	26.67	29.77	0.948	1	PASS
High	2452	25.54	26.27	28.93	0.781	1	PASS
Channel	**Frequency (MHz)**	**Conducted Average Output Power**				**Limit (W)**	**RESULT**
		Chain 0(dBm)	**Chain 1(dBm)**	**Total (dBm)**	**Total (W)**		
B Mode							
Low	2412	15.40	16.35	18.91	0.078	1	PASS
Mid	2437	18.73	17.66	21.24	0.133	1	PASS
High	2462	17.22	16.23	19.76	0.095	1	PASS
G Mode							
Low	2412	19.85	20.88	23.41	0.219	1	PASS
Mid	2437	19.98	19.99	23.00	0.200	1	PASS
High	2462	20.18	19.98	23.09	0.204	1	PASS
N20 Mode							
Low	2412	19.71	20.77	23.28	0.213	1	PASS
Mid	2437	20.40	20.40	23.41	0.219	1	PASS
High	2462	19.48	20.55	23.06	0.202	1	PASS
N40 Mode							
Low	2422	20.29	20.44	23.38	0.218	1	PASS
Mid	2437	20.47	20.15	23.32	0.215	1	PASS
High	2452	19.13	19.91	22.55	0.180	1	PASS

According to FCC KDB 662911 D01 Multiple Transmitter Output v02r01

For power measurements on IEEE 802.11 devices, Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4.

The device have two antenna, so array gain is 0 dB.

10 FCC §15.247(d) – 100 kHz Bandwidth of Frequency Band Edge

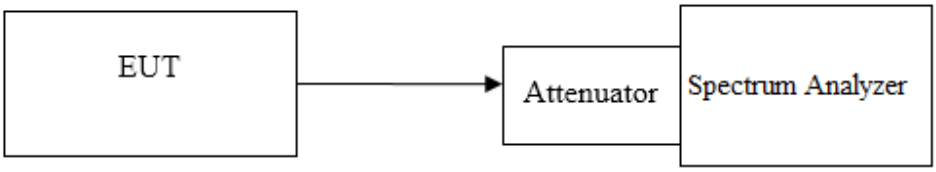
10.1 Applicable Standard

According to FCC §15.247(d).

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

10.2 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.



10.3 Test Equipment List and Details

Descriptions	Manufacturers	Models	Serial Numbers	Calibration Date	Calibration Due Date
Cable	WOKEN	SFL402	S02-160323-07	2017/2/22	2018/2/21
Spectrum Analyzer	Rohde & Schwarz	FSU26	200268	2016/5/7	2017/5/6
Attenuator	MINI-CIRCUITS	BW-S10W5+	N/A	2017/3/16	2018/3/15

**** Statement of Traceability:*** BACL Corp. attests that all calibrations have been performed according to TAF requirements, traceable to the ETC.

10.4 Test Environmental Conditions

Temperature:	25° C
Relative Humidity:	56 %
ATM Pressure:	1010 hPa

The testing was performed by David Hsu on 2017-03-27 ~ 2017-04-04.

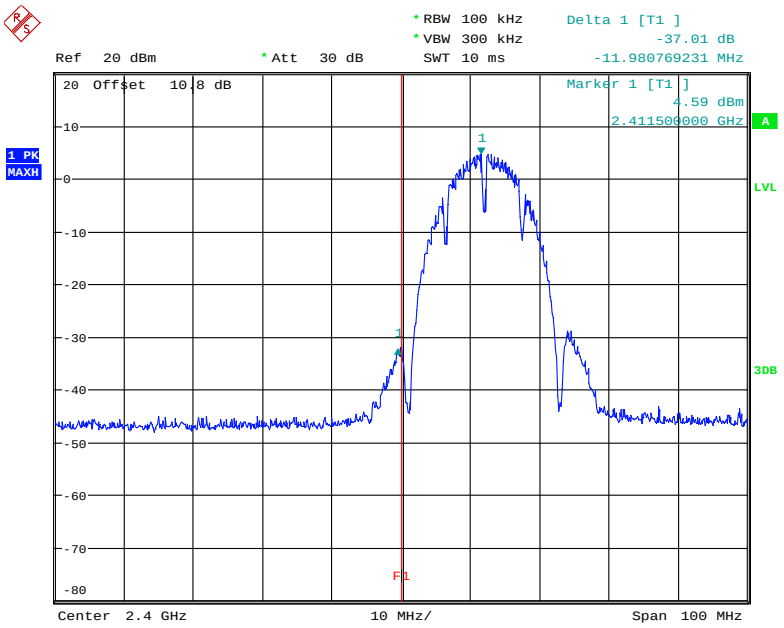
10.5 Test Results

Please refer to the following plots

Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)			Limit (dBc)	RESULT
		Chain 0	Chain 1	Total Delta		
B Mode						
Low	2412	37.01	38.22	34.56	≥ 20	PASS
High	2462	51.46	50.21	47.78	≥ 20	PASS
G Mode						
Low	2412	35.55	36.44	32.96	≥ 20	PASS
High	2462	49.42	49.50	46.45	≥ 20	PASS
N20 Mode						
Low	2412	36.80	34.00	32.17	≥ 20	PASS
High	2462	47.85	49.32	45.51	≥ 20	PASS
N40 Mode						
Low	2422	37.40	31.53	30.53	≥ 20	PASS
High	2452	44.31	45.84	42.00	≥ 20	PASS

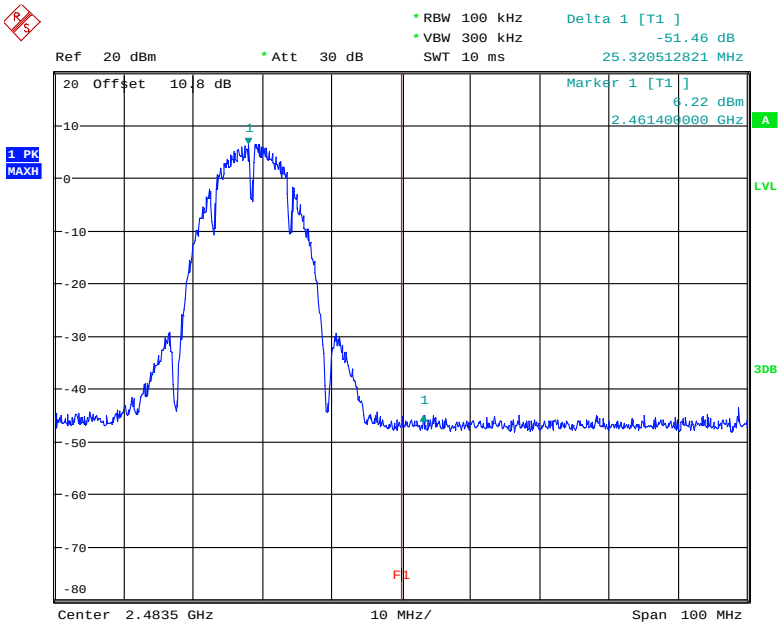
Total Delta: According to FCC KDB 662911 D01 Multiple Transmitter Output v02r01

Band Edge, Left Side (B mode / CH Low Chain 0)



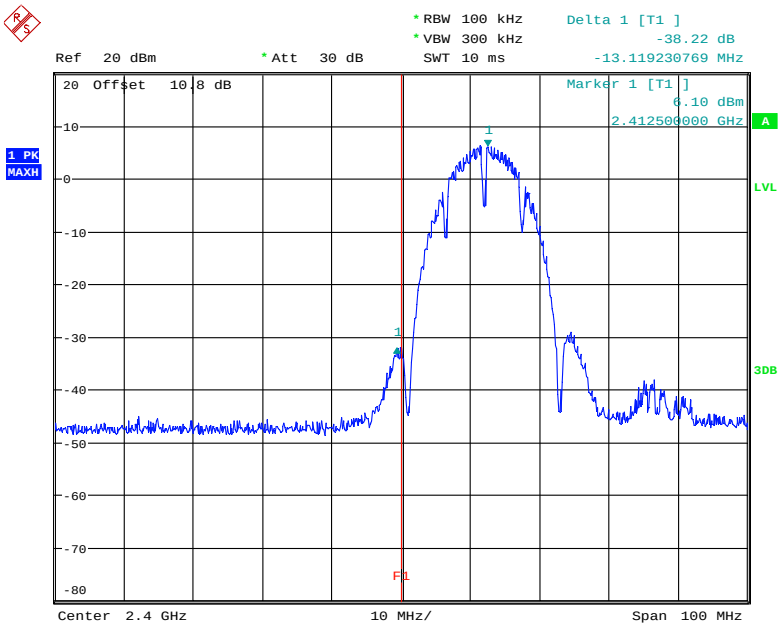
Date: 4.APR.2017 17:03:23

Band Edge, Right Side (B mode / CH High Chain 0)



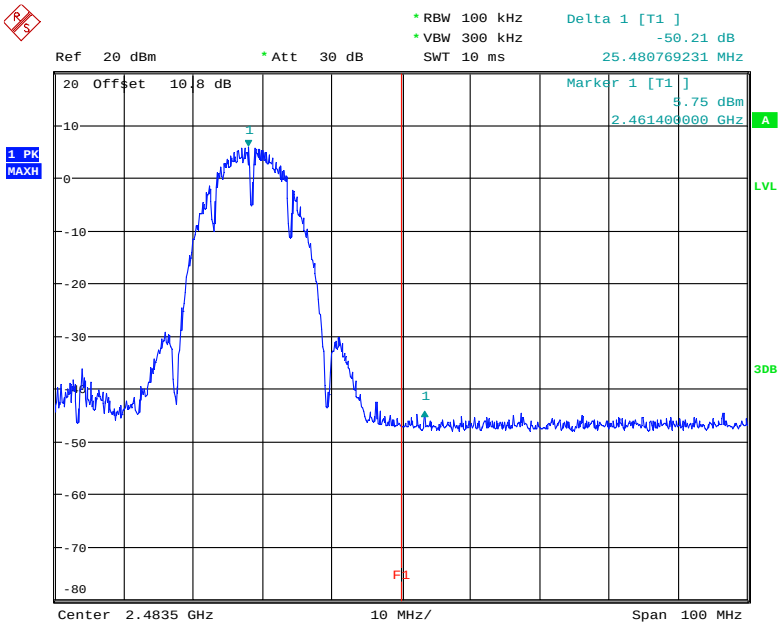
Date: 4.APR.2017 17:07:23

Band Edge, Left Side (B mode / CH Low Chain 1)



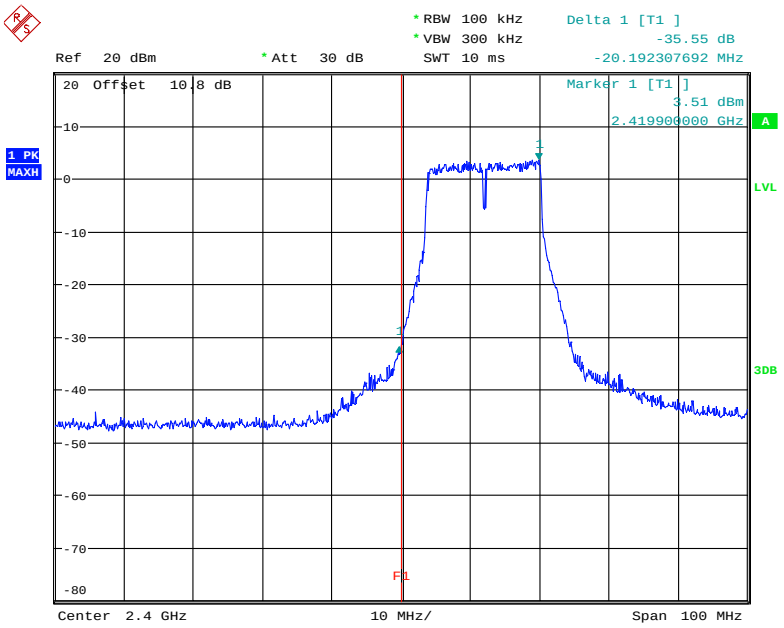
Date: 27.MAR.2017 17:21:59

Band Edge, Right Side (B mode / CH High Chain 1)



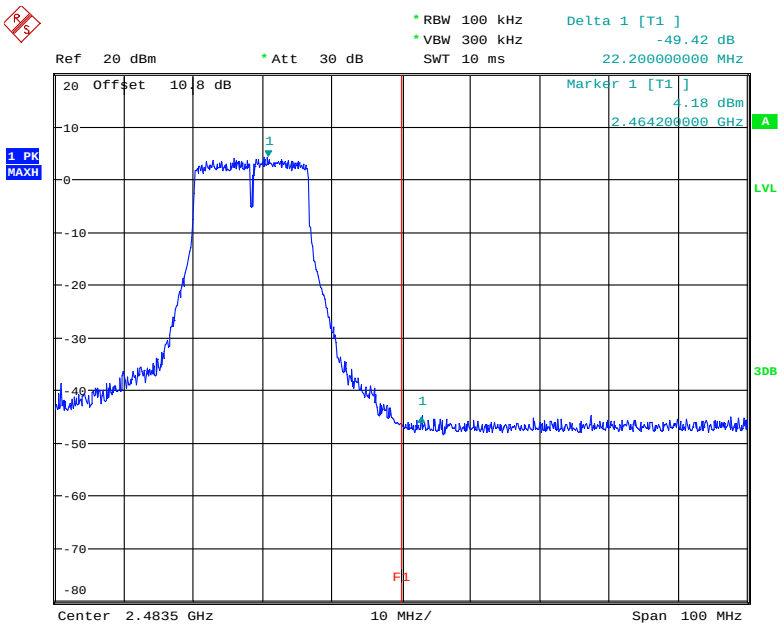
Date: 27.MAR.2017 17:42:16

Band Edge, Left Side (G mode / CH Low Chain 0)



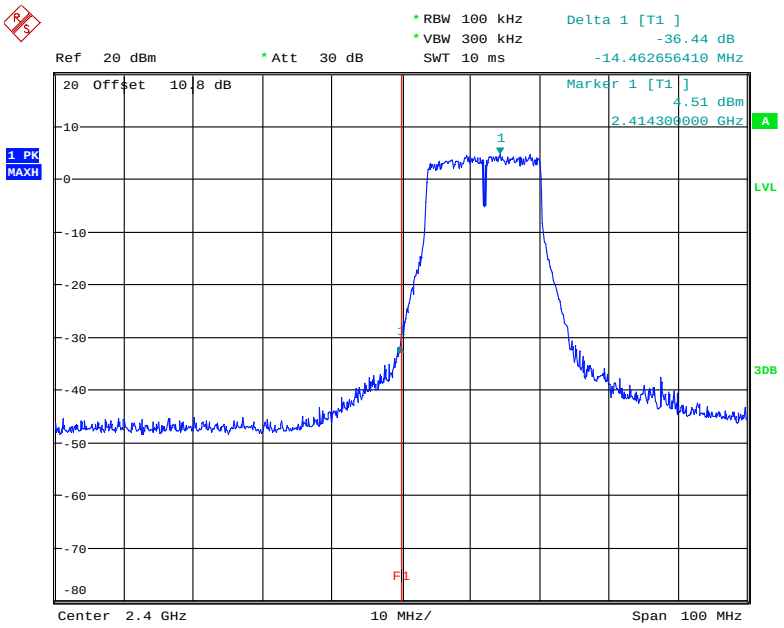
Date: 4.APR.2017 17:15:02

Band Edge, Right Side (G mode / CH High Chain 0)



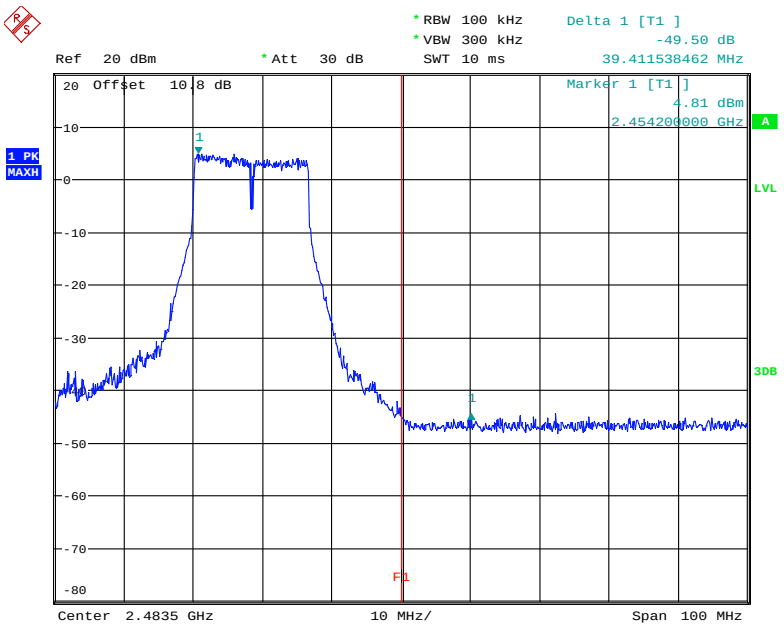
Date: 4.APR.2017 17:09:42

Band Edge, Left Side (G mode / CH Low Chain 1)



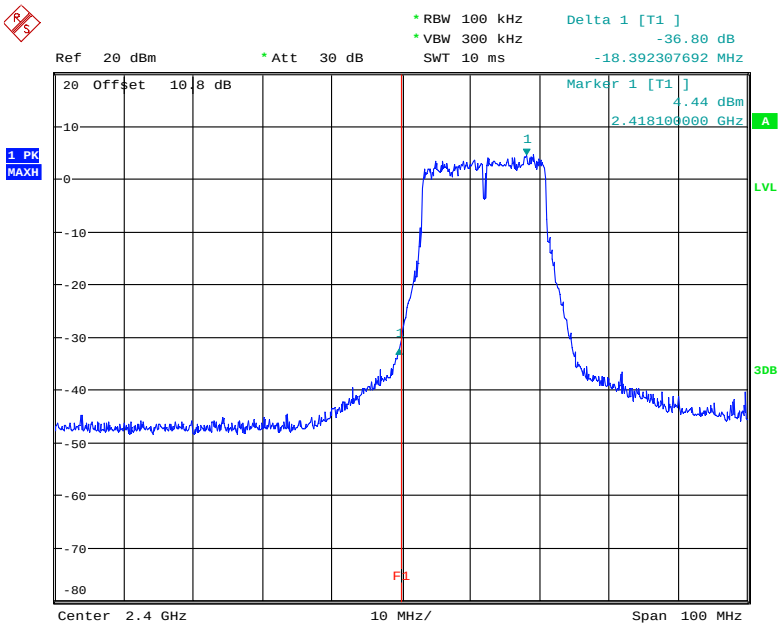
Date: 27.MAR.2017 17:47:03

Band Edge, Right Side (G mode / CH High Chain 1)



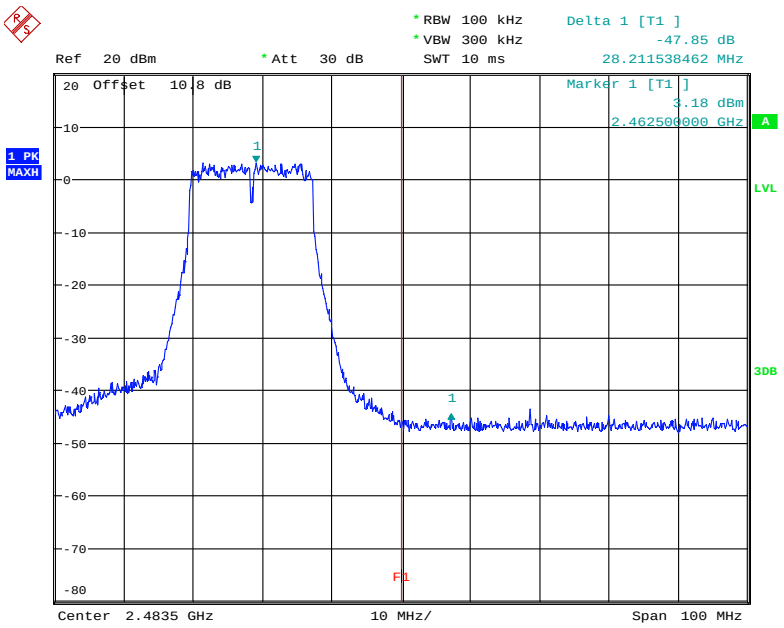
Date: 27.MAR.2017 17:40:03

Band Edge, Left Side (N20 mode / CH Low Chain 0)



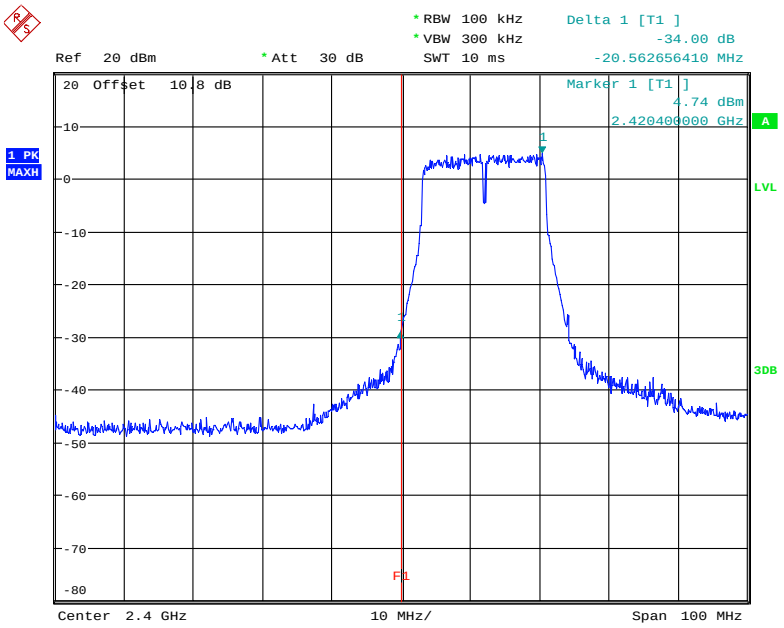
Date: 4.APR.2017 17:16:51

Band Edge, Right Side (N20 mode / CH High Chain 0)



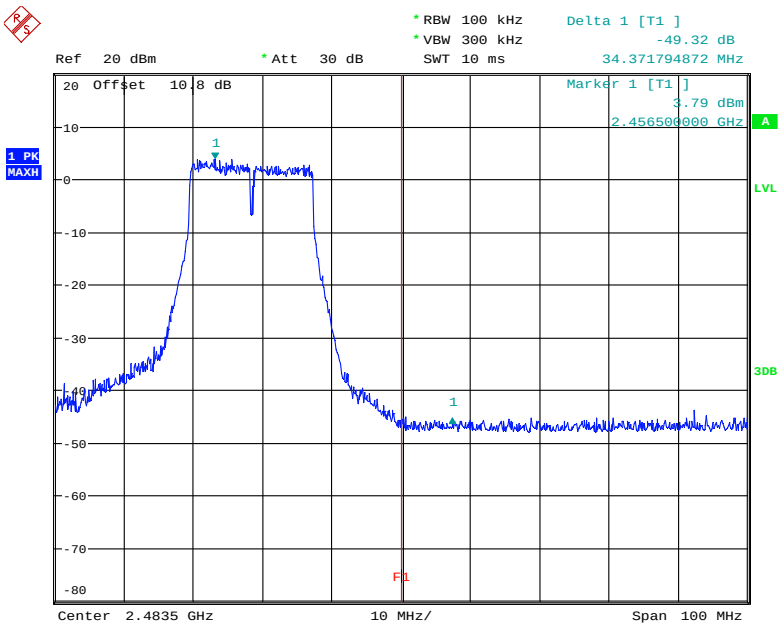
Date: 4.APR.2017 17:19:19

Band Edge, Left Side (N20 mode / CH Low Chain 1)



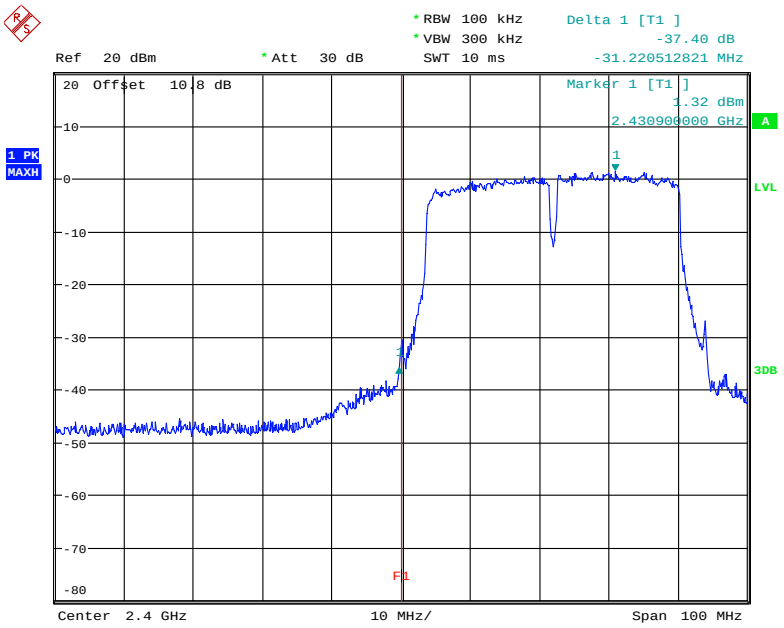
Date: 27.MAR.2017 17:48:46

Band Edge, Right Side (N20 mode / CH High Chain 1)



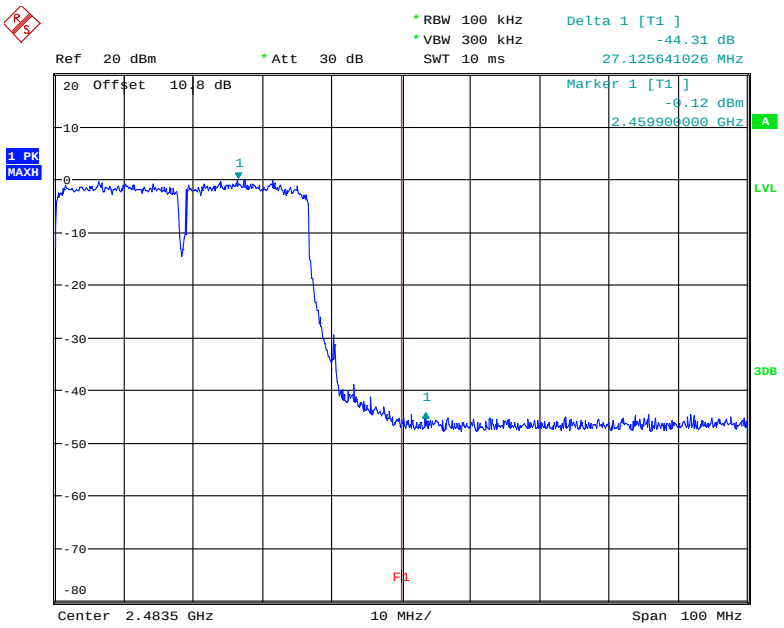
Date: 27.MAR.2017 17:51:08

Band Edge, Left Side (N40 mode / CH Low Chain 0)



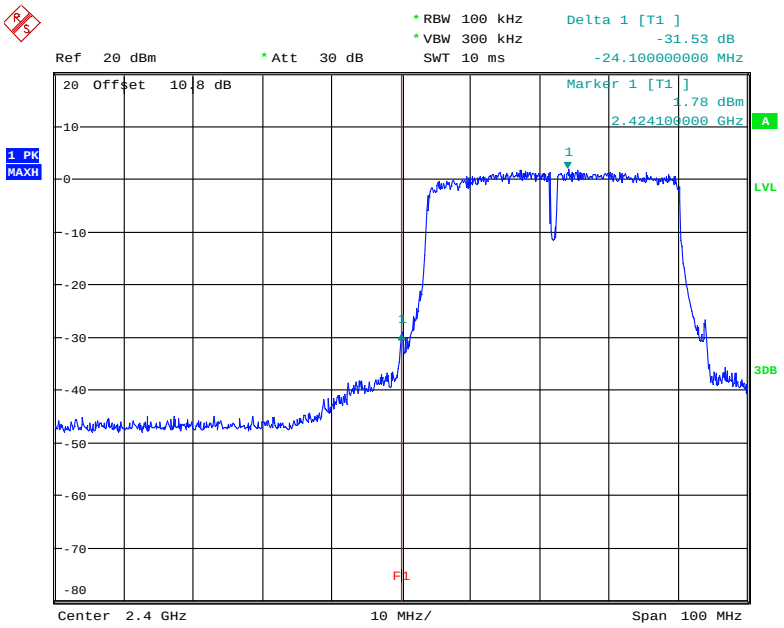
Date: 4.APR.2017 17:27:22

Band Edge, Right Side (N40 mode / CH High Chain 0)



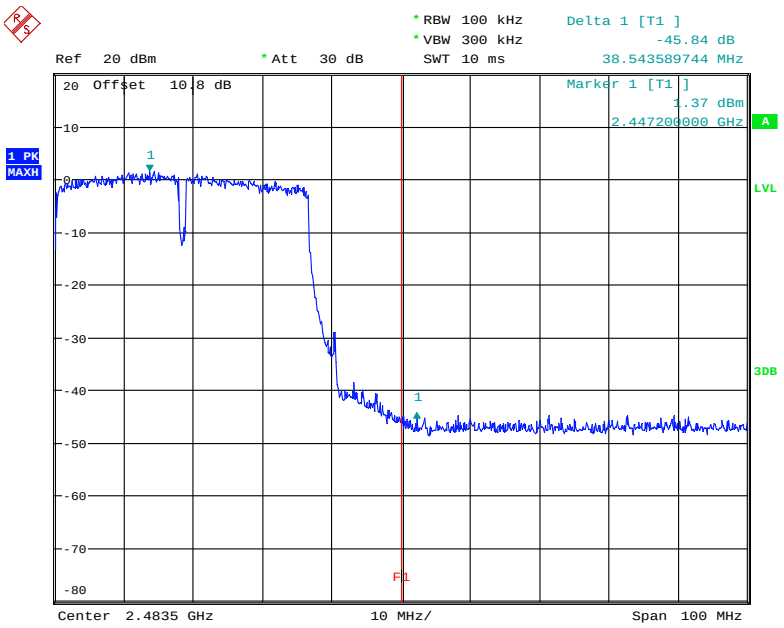
Date: 4.APR.2017 17:23:06

Band Edge, Left Side (N40 mode / CH Low Chain 1)



Date: 27.MAR.2017 17:56:38

Band Edge, Right Side (N40 mode / CH High Chain 1)



Date: 27.MAR.2017 17:52:53

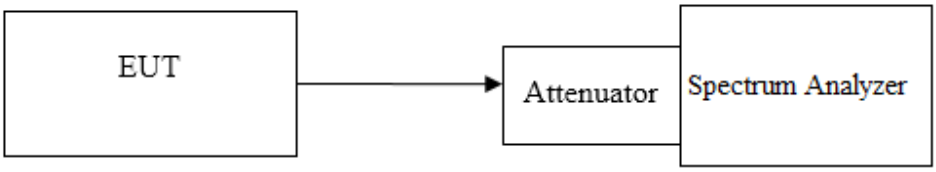
11 FCC §15.247(e) – Power Spectral Density

11.1 Applicable Standard

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

11.2 Test Procedure

According to ANSI C63.10-2013
a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to 3 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ≥ [3 × RBW].
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.
j) If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat



11.3 Test Equipment List and Details

Descriptions	Manufacturers	Models	Serial Numbers	Calibration Date	Calibration Due Date
Cable	WOKEN	SFL402	S02-160323-07	2017/2/22	2018/2/21
Spectrum Analyzer	Rohde & Schwarz	FSU26	200268	2016/5/7	2017/5/6
Attenuator	MINI-CIRCUITS	BW-S10W5+	N/A	2017/3/16	2018/3/15

**** Statement of Traceability:*** BACL Corp. attests that all calibrations have been performed according to TAF requirements, traceable to the ETC.

11.4 Test Environmental Conditions

Temperature:	24° C
Relative Humidity:	58 %
ATM Pressure:	101.0 kPa

The testing was performed by David Hsu on 2017-03-28 ~ 2017-04-04.

11.5 Test Results

MIMO (CDD):

Channel	Frequency (MHz)	Power Spectral Density			Limit (dBm/3kHz)	RESULT
		Chain 0 (dBm/3kHz)	Chain 1 (dBm/3kHz)	Total (dBm/3kHz)		
B Mode						
Low	2412	-15.50	-12.96	-11.04	8	PASS
Mid	2437	-15.28	-11.98	-10.31	8	PASS
High	2462	-13.67	-12.63	-10.11	8	PASS
G Mode						
Low	2412	-9.53	-9.14	-6.32	8	PASS
Mid	2437	-10.46	-9.59	-6.99	8	PASS
High	2462	-10.52	-9.35	-6.89	8	PASS
N20 Mode						
Low	2412	-9.53	-9.10	-6.30	8	PASS
Mid	2437	-10.10	-9.23	-6.63	8	PASS
High	2462	-10.62	-8.90	-6.67	8	PASS
N40 Mode						
Low	2422	-12.54	-10.68	-8.50	8	PASS
Mid	2437	-13.25	-11.31	-9.16	8	PASS
High	2452	-13.46	-11.13	-9.13	8	PASS

The device is a master device. the 2 antenna maximum antenna gain are 2.18dBi, and employed Cyclic Delay Diversity (CDD) for 802.11 MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for Power spectral density (PSD) measurements on the devices:

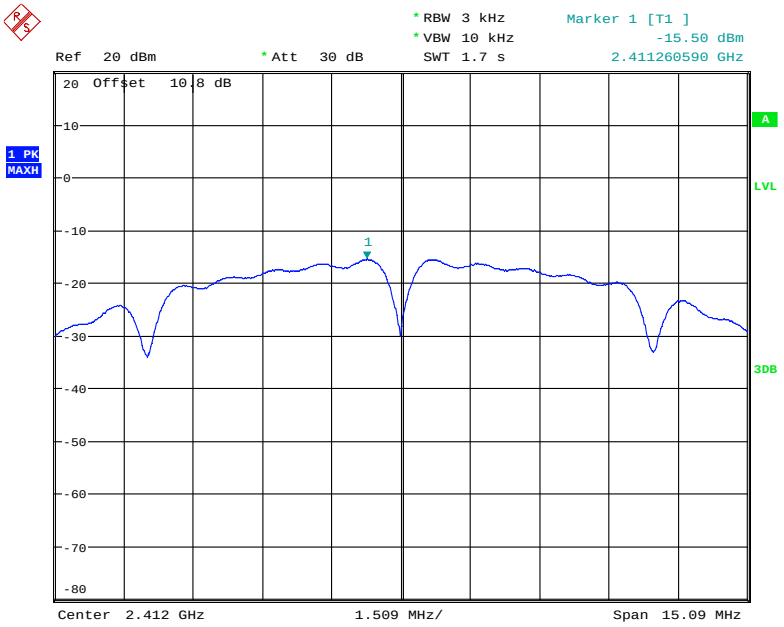
Array Gain = 10 log(NANT/NSS) dB.

So:

Directional gain = GANT + Array Gain = 2.18+10*log(2) =5.18 dBi

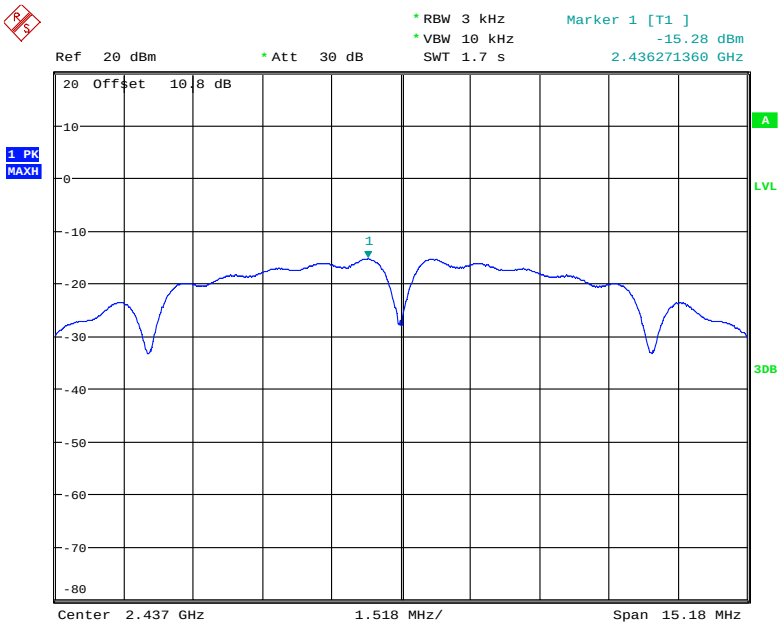
The Power density Limits was reduce 0 dB

B Mode PPSD, Low Channel (Chain 0)



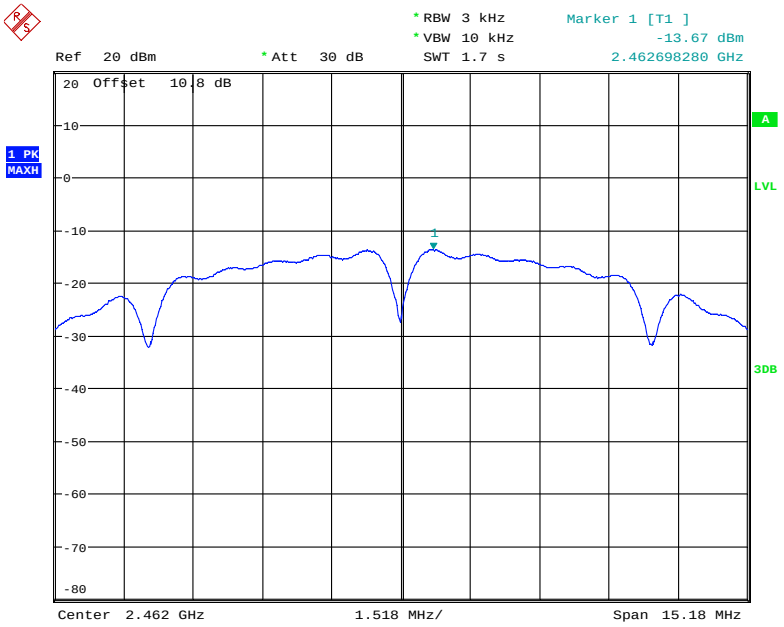
Date: 4.APR.2017 17:32:47

B Mode PPSD, Middle Channel (Chain 0)



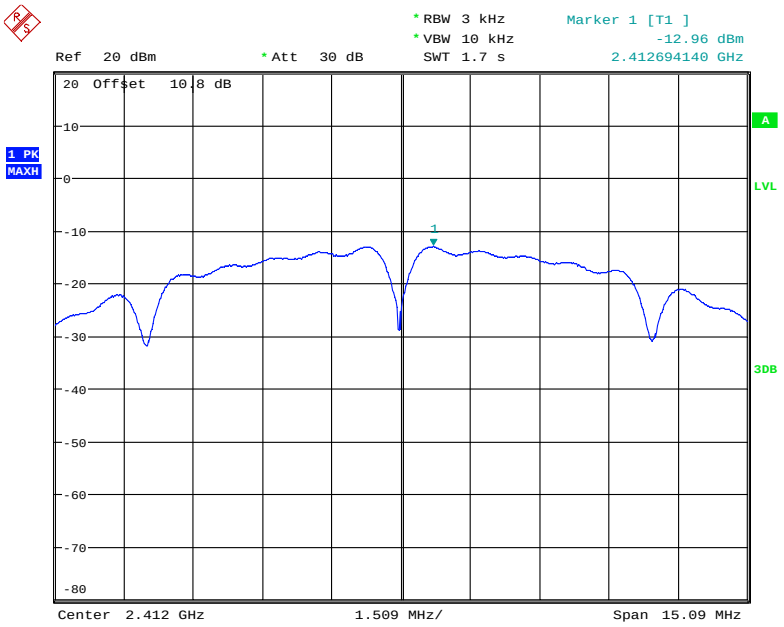
Date: 4.APR.2017 17:34:55

B Mode PPSD, High Channel (Chain 0)



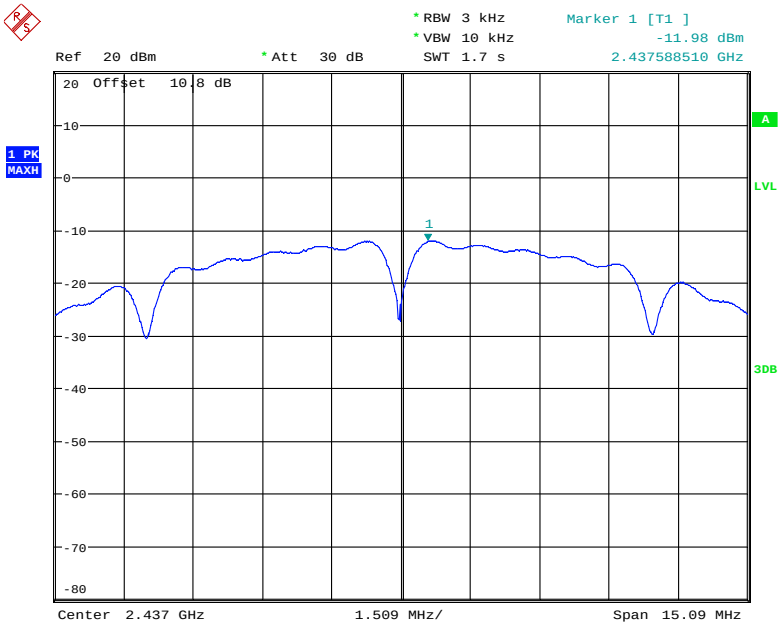
Date: 4.APR.2017 17:36:21

B Mode PPSD, Low Channel (Chain 1)



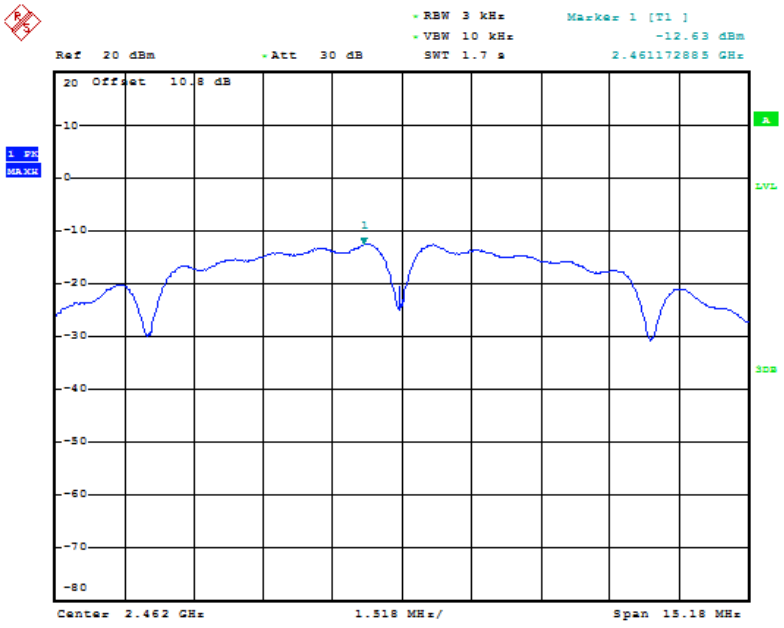
Date: 28.MAR.2017 12:14:14

B Mode PPSD, Middle Channel (Chain 1)



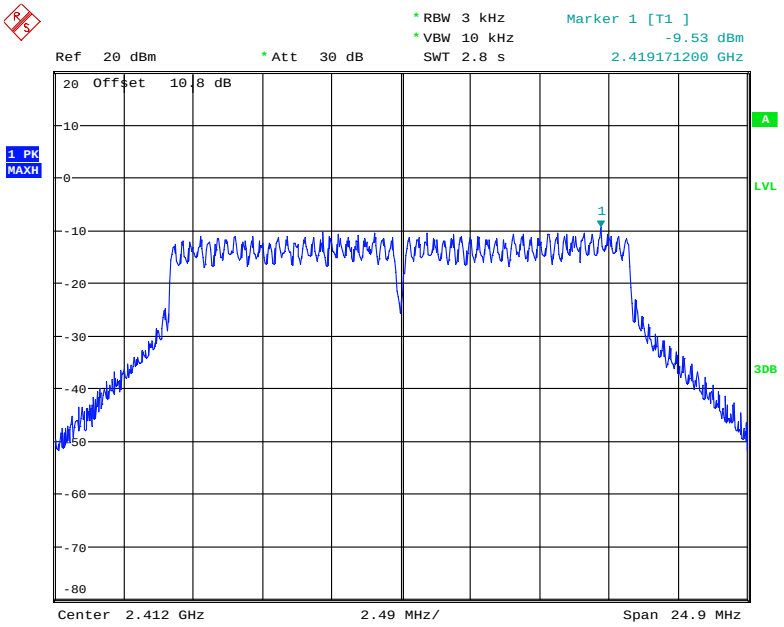
Date: 28.MAR.2017 12:20:06

B Mode PPSD, High Channel (Chain 1)



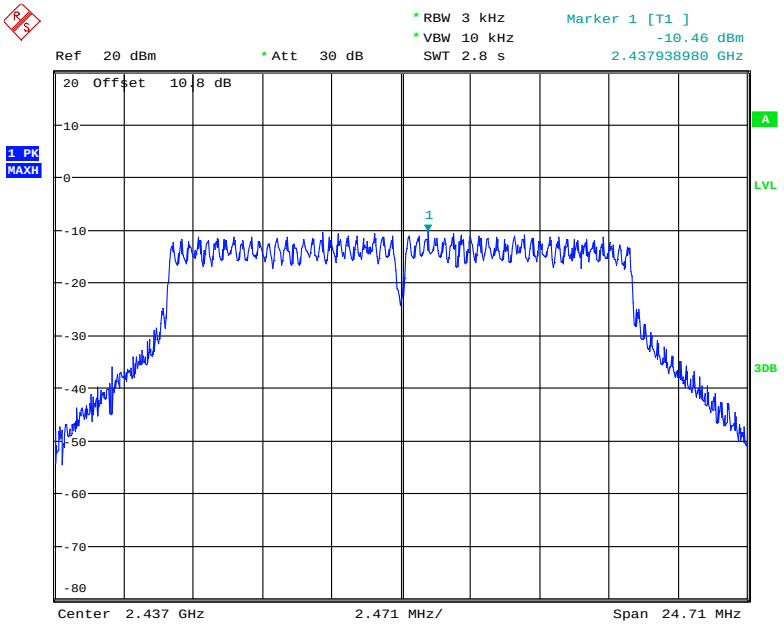
Date: 28.MAR.2017 16:39:25

G Mode PPSD, Low Channel (Chain 0)



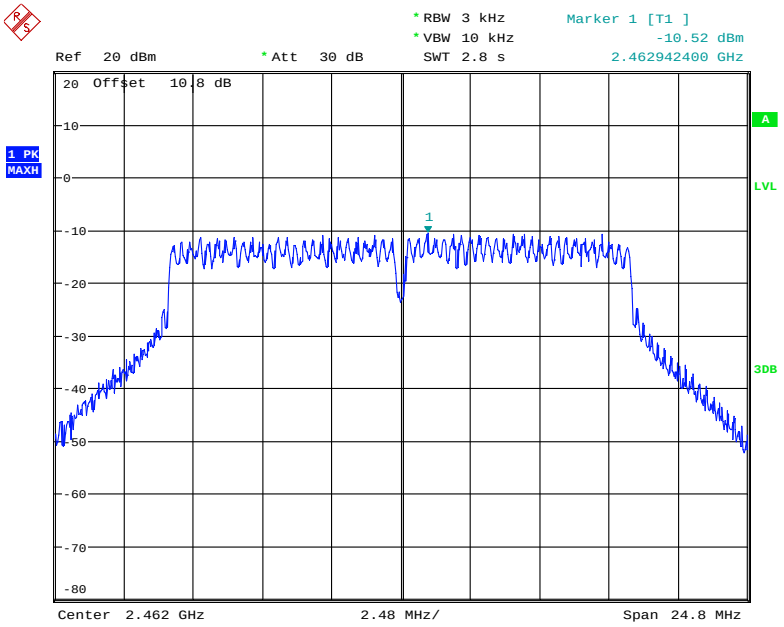
Date: 4.APR.2017 17:42:23

G Mode PPSD, Middle Channel (Chain 0)



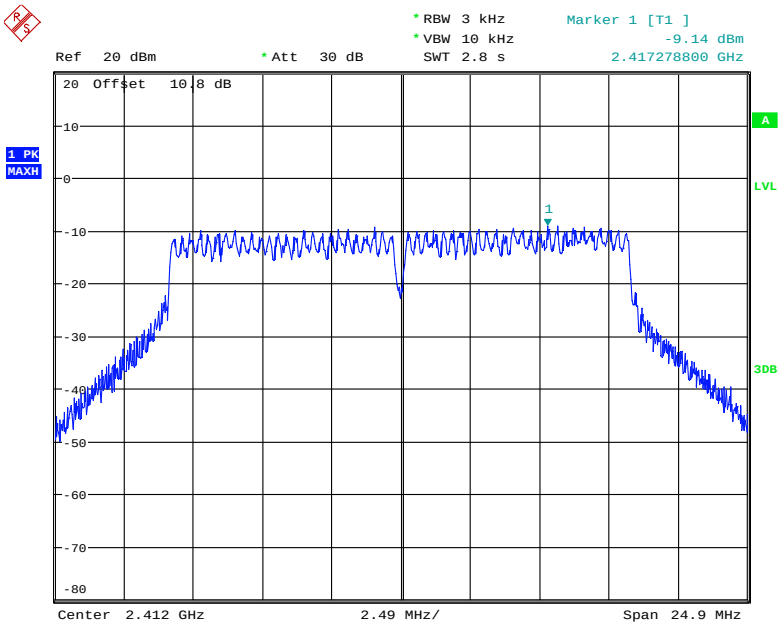
Date: 4.APR.2017 17:43:50

G Mode PPSD, High Channel (Chain 0)



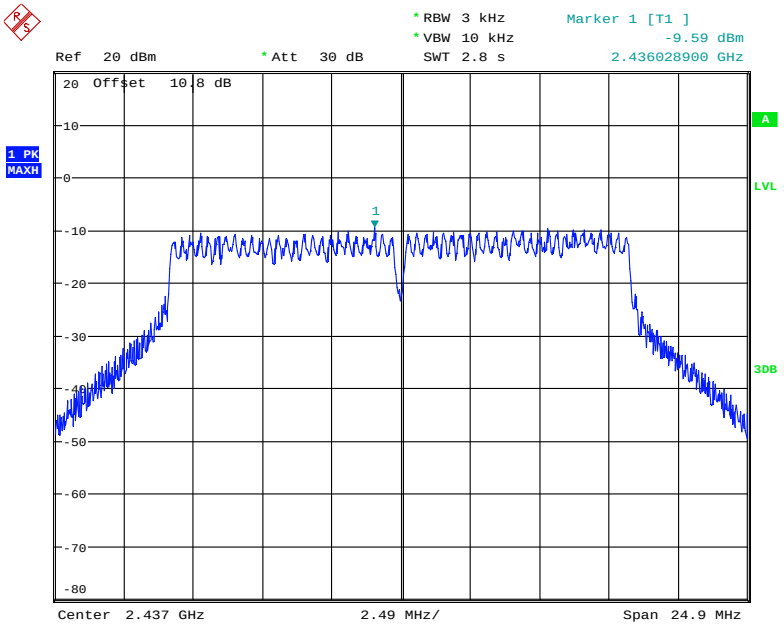
Date: 4.APR.2017 17:38:34

G Mode PPSD, Low Channel (Chain 1)



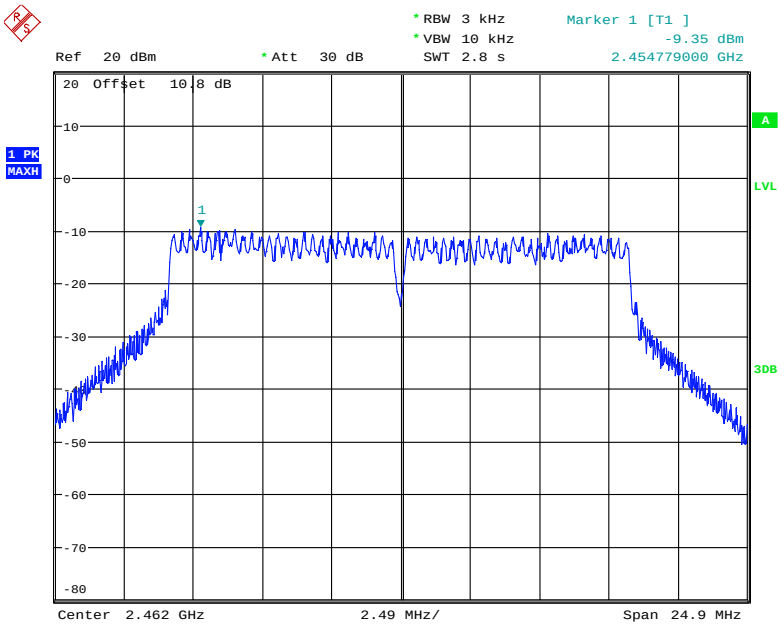
Date: 28.MAR.2017 12:25:41

G Mode PPSD, Middle Channel (Chain 1)



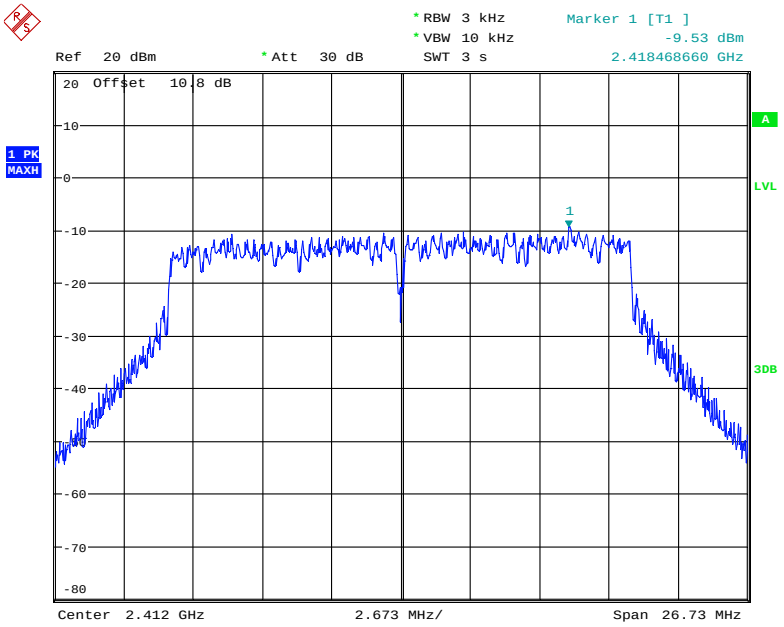
Date: 28.MAR.2017 12:24:32

G Mode PPSD, High Channel (Chain 1)



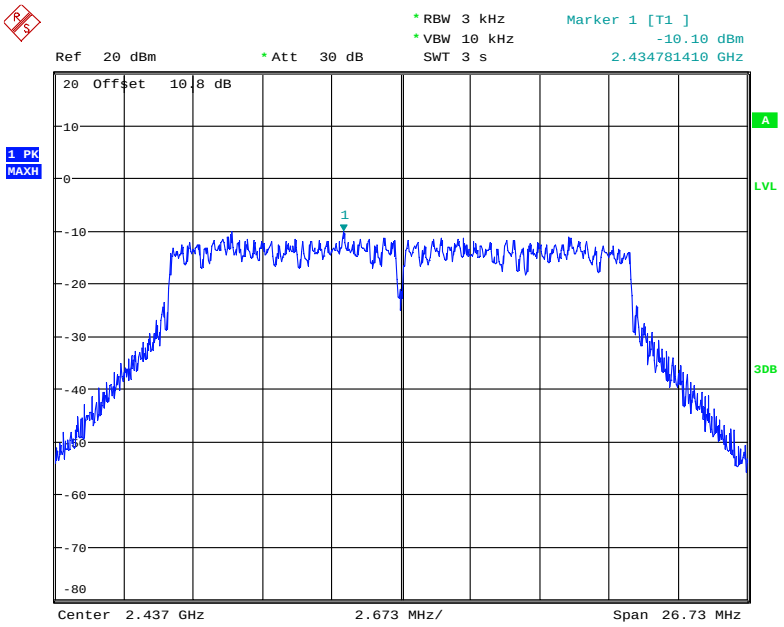
Date: 28.MAR.2017 12:23:17

N20 Mode PPSD, Low Channel (Chain 0)



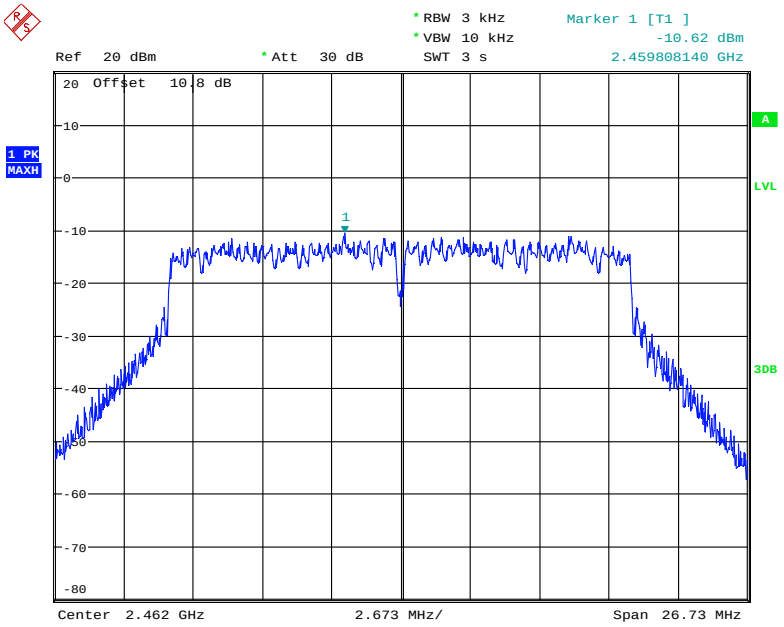
Date: 4.APR.2017 17:47:13

N20 Mode PPSD, Middle Channel (Chain 0)



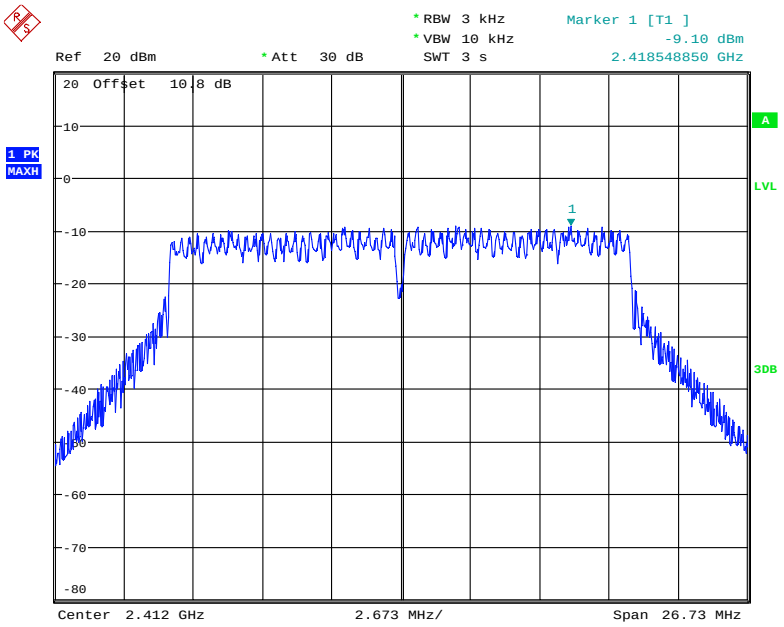
Date: 4.APR.2017 17:48:34

N20 Mode PPSD, High Channel (Chain 0)



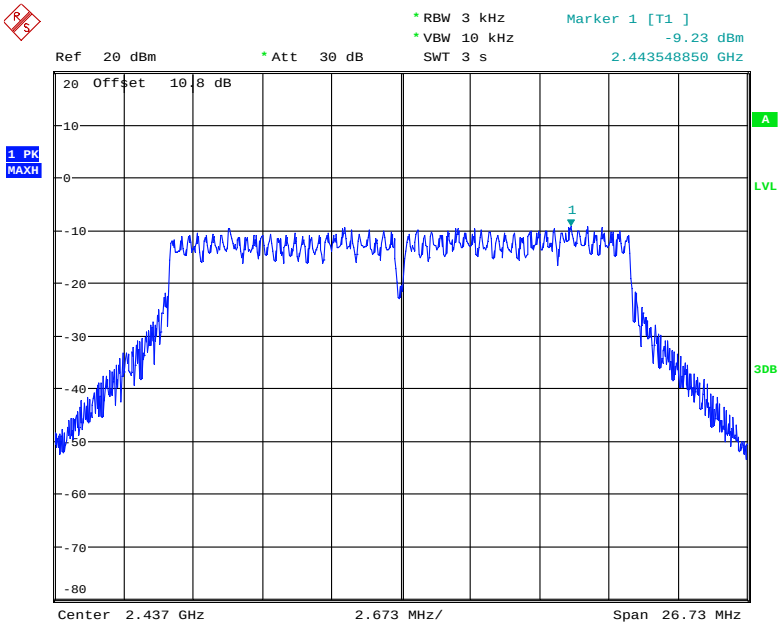
Date: 4.APR.2017 17:50:10

N20 Mode PPSD, Low Channel (Chain 1)



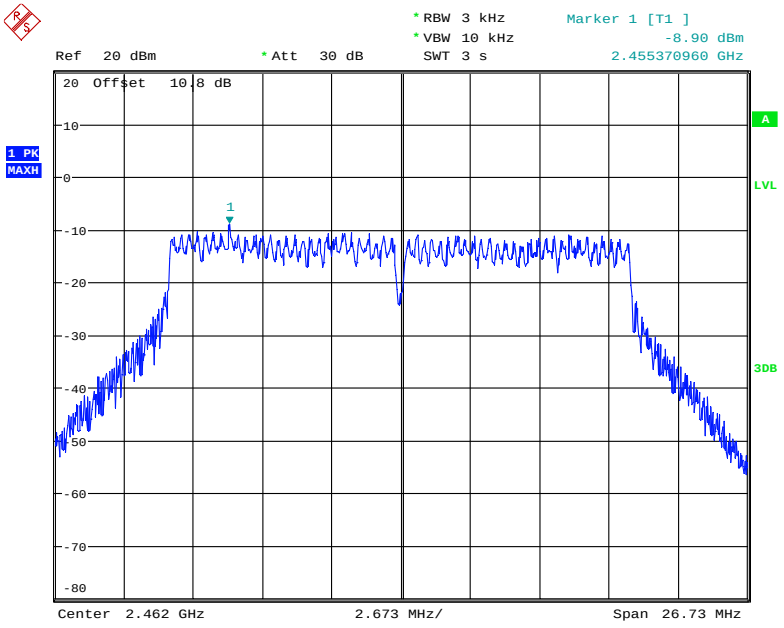
Date: 28.MAR.2017 12:27:05

N20 Mode PPSD, Middle Channel (Chain 1)



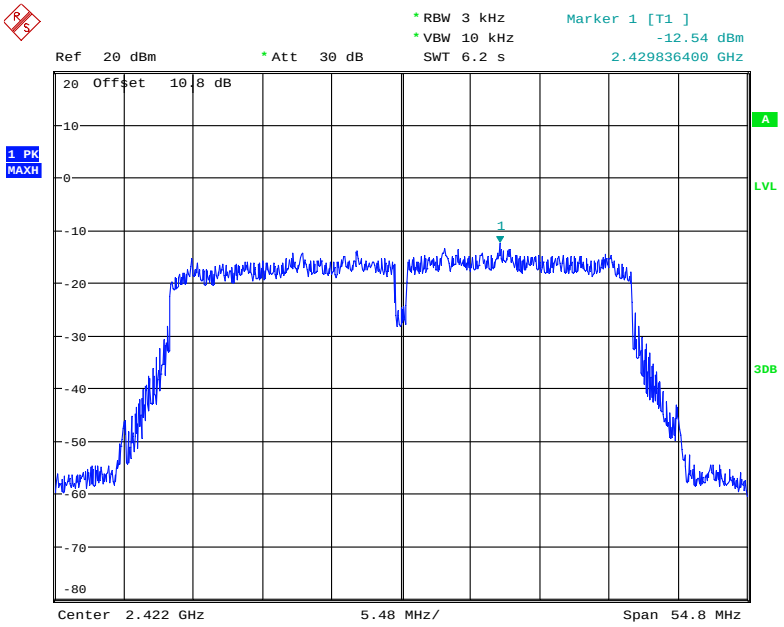
Date: 28.MAR.2017 12:28:41

N20 Mode PPSD, High Channel (Chain 1)



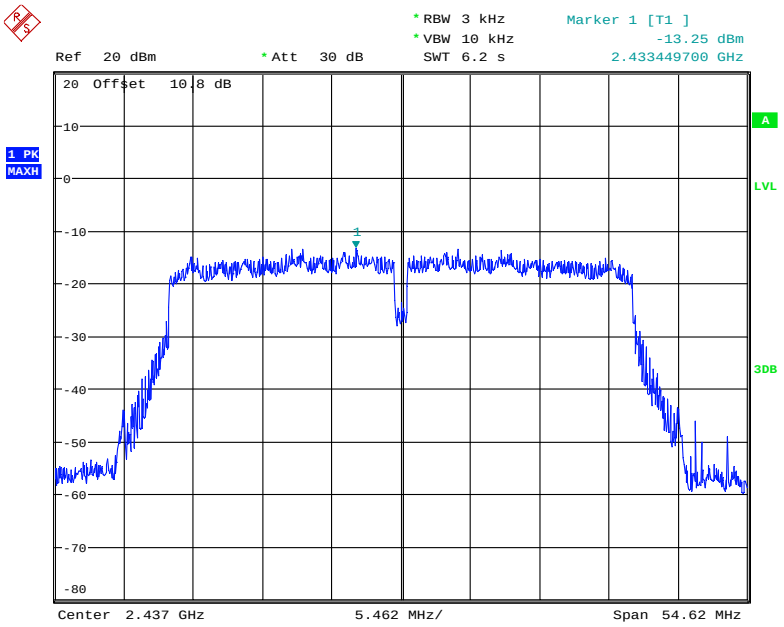
Date: 28.MAR.2017 12:29:48

N40 Mode PPSD, Low Channel (Chain 0)



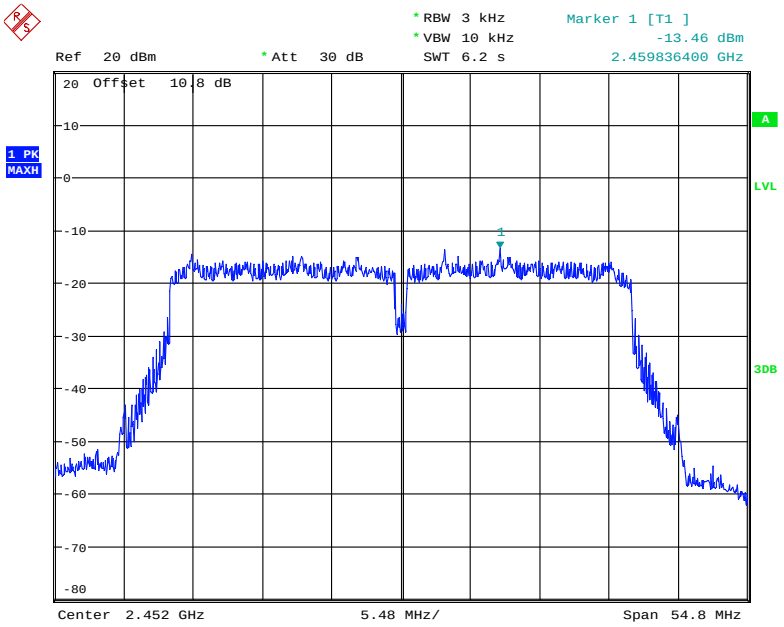
Date: 4.APR.2017 17:54:11

N40 Mode PPSD, Middle Channel (Chain 0)



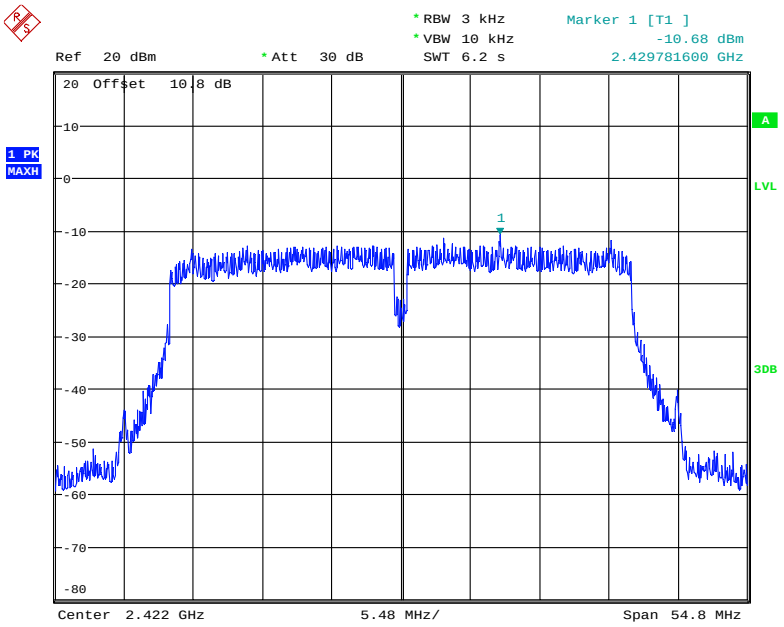
Date: 4.APR.2017 17:56:21

N40 Mode PPSD, High Channel (Chain 0)



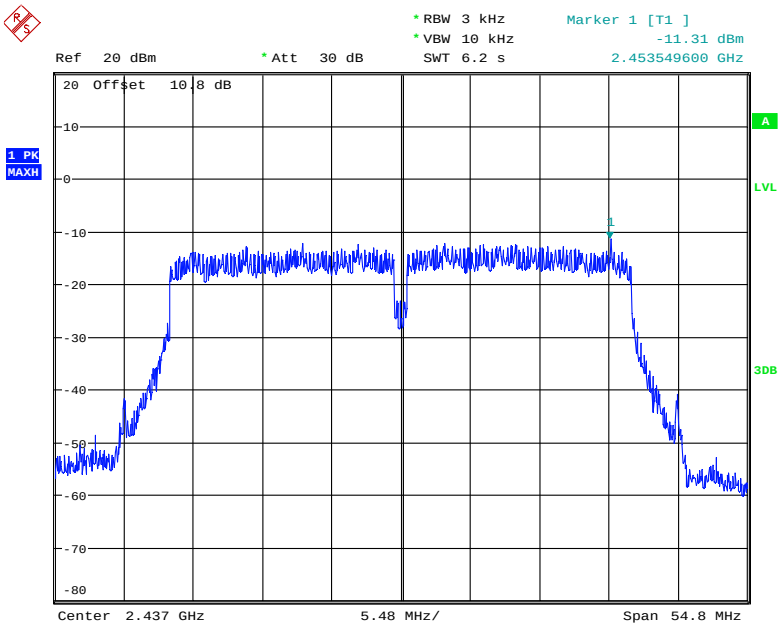
Date: 4.APR.2017 18:00:55

N40 Mode PPSD, Low Channel (Chain 1)



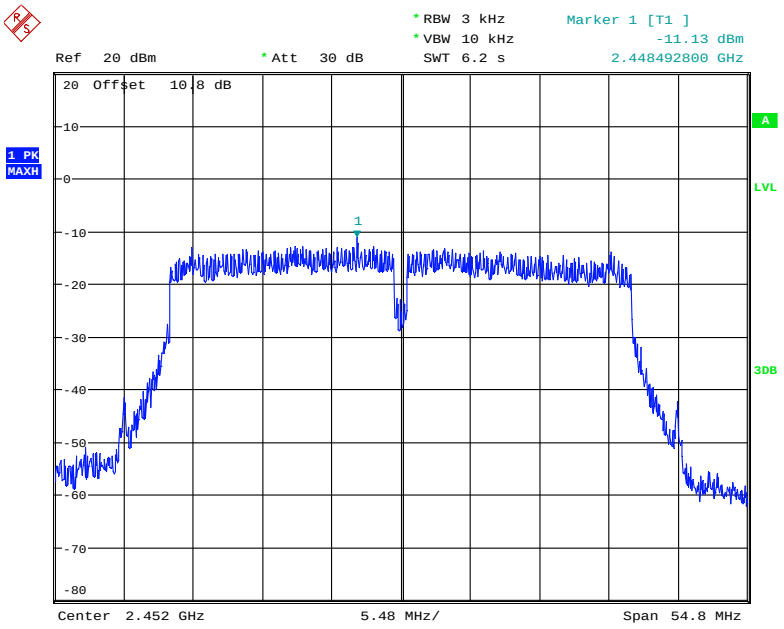
Date: 28.MAR.2017 12:32:03

N40 Mode PPSD, Middle Channel (Chain 1)



Date: 28.MAR.2017 12:33:22

N40 Mode PPSD, High Channel (Chain 1)



Date: 28.MAR.2017 12:34:48

12 DECLARATION OF SIMILARITY

Draytek Corporation
No. 26, Fu Shing Rd., Hukou County, Hsinchu
Industrial Park, Hsinchu 303 Taiwan

DECLARATION OF SIMILARITY

May 12, 2017

FEDERAL COMMUNICATIONS COMMISSIONS
Authorization and Evaluation Division
7435 Oakland Mills Road
Columbia, MD 21046

Dear Sir or Madam:

We Draytek Corporation hereby declare that product: VDSL2 & ADSL2+ Dual-WAN Security Router,

model(s): Vigor2862BLgVac、Series Model:Vigor2862Lac, Vigor2862LVac, Vigor2862LFac, Vigor2862LFVac,Vigor2862Lgac, Vigor2862LgVac, Vigor2862LgFac, Vigor2862LgFVac, Vigor2862BLgVac, Vigor2862BLgFVac, Vigor2926Lac, Vigor2926LVac, Vigor2926LFac, Vigor2926LFVac, Vigor2926Lgac, Vigor2926LgVac, Vigor2926LgFac, Vigor2926LgFVac, Vigor2860Lac, Vigor2860LVac, Vigor2860LFac, Vigor2860LFVac, Vigor2860Lgac, Vigor2860LgVac, Vigor2860LgFac, Vigor2860LgFVac, Vigor2860BLgVac, Vigor2860BLgFVac, Vigor2925Lac, Vigor2925LVac, Vigor2925LFac, Vigor2925LFVac, Vigor2925Lgac, Vigor2925LgVac, Vigor2925LgFac, Vigor2925LgFVac, Vigor2862ac, Vigor2862Vac, Vigor2862Fac, Vigor2862FVac, Vigor2926ac, Vigor2926Vac, Vigor2926Fac, Vigor2926FVac, Vigor2860ac, Vigor2860Vac, Vigor2860Fac, Vigor2860FVac, Vigor2925ac, Vigor2925Vac, Vigor2925Fa, Vigor2925FVac are electrically identical with the same electromagnetic emissions and electromagnetic compatibility characteristics as model: Vigor2862BLgFVac tested by BACL, the results of which are featured in BACL project: RTWA170214001.

A description of the differences between the tested model and those that are declared similar are as follows:

2862 ,2860 ,2832,has dsl function

2926 ,2925 didn't has dsl function

2862 ,2860 ,2832 for different marketing

2926 ,2925 for different marketing

ac 2.4G Wi-fi function and 5G Wi-fi function

F Fiber function

V VoIP function L LTE function

B Bonding VDSL function

g GPS function

Please contact me should there be need for any additional clarification or information. Best

Regards,

Abbott Yu/ HW manager

No. 26, Fu Shing Rd., Hukou County, Hsinchu Industrial Park, Hsinchu 303 Taiwan

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