FCC Part 15.247

TEST REPORT

For

TAIJET BOINTEC CORPORATION LIMITED

4F, #114, Zhouzi St., Neihu-Taipei 11493, Taiwan

FCC ID: 2AMAFCSW808KAS

Report Type: Original Report	**Product Type:** 802.11 b/g/n, 1T1R, USB SMT Module
Report Producer:	Kaylee Chiang
Report Number:	RTWA161003001-00A
Report Date:	2017-03-16
Reviewed By:	Jerry Chang
	Bay Area Compliance Laboratories Corp.(Taiwan) 70, Lane 169, Sec. 2, Datong Road, Xizhi Dist., New Taipei City 22183, Taiwan, R.O.C. Tel: +886 (2) 2647 6898 Fax: +886 (2) 2647 6895 www.bacl.com.tw

REVISION HISTORY

Revision	Issue Date	Description
1.0	2017.03.16	Original

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1 General Information

1.1 Product Description for Equipment Under Test (EUT)

Applicant:	TAIJET BOINTEC CORPORATION LIMITED 4F, #114, Zhouzi St., Neihu-Taipei 11493, Taiwan
Manufacturer:	TAIJET BOINTEC CORPORATION LIMITED 4F, #114, Zhouzi St., Neihu-Taipei 11493, Taiwan
Product:	802.11 b/g/n, 1T1R, USB SMT Module
Model:	CSW808K
Trade Name:	Bointec
Frequency Range:	IEEE 802.11b/g/n HT20 Mode: 2412 ~ 2462 MHz IEEE 802.11n HT40 Mode: 2422 ~ 2452 MHz
Transmit Power:	IEEE 802.11b Mode: 14.25dBm (0.027W) IEEE 802.11g Mode: 26.53dBm (0.450W) IEEE 802.11n HT20 Mode: 25.36dBm (0.344W) IEEE 802.11n HT40 Mode: 27.62dBm (0.578W)
Modulation Technique:	IEEE 802.11b: DSSS IEEE 802.11g: OFDM IEEE 802.11n HT20 Mode: OFDM IEEE 802.11n HT40 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 mode: 6.5 - 72.2Mbps IEEE 802.11n HT 40 MHz mode: 13.5 - 150 Mbps
Number of Channels:	IEEE 802.11b/g / IEEE 802.11n HT20 Mode: 11 Channels IEEE 802.11n HT40 Mode: 7 Channels
Antenna Specification:	PCB Antenna/Gain: -2.12 dBi
Voltage Range:	3.3Vdc
Date of Test:	Sep 09, 2016 ~ Mar 16, 2017

**All measurement and test data in this report was gathered from production sample serial number: 161003001 (Assigned by BACL, Taiwan) The EUT supplied by the applicant was received on 2016-10-03.*

1.2 Objective

This report is prepared on behalf of *TAIJET BOINTEC CORPORATION LIMITED* 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 15.203, 15.205, 15.209, 15.207 and 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)

N/A.

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 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 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

2.2 Equipment Modifications

No modification was made to the EUT

2.3 EUT Exercise Software

Used "CSW808K-LabTool V1.8" software.

WIFI

Test Software Version		Engineering Mode		
Test Frequency		Low	Mid	High
Power Level Setting	B Mode	8	8	8
	G Mode	16	16	16
	N20 Mode	16	16	16
	N40 Mode	19	19	19

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: MCS0
802.11n ht40: MCS0

2.4 Support Equipment List and Details

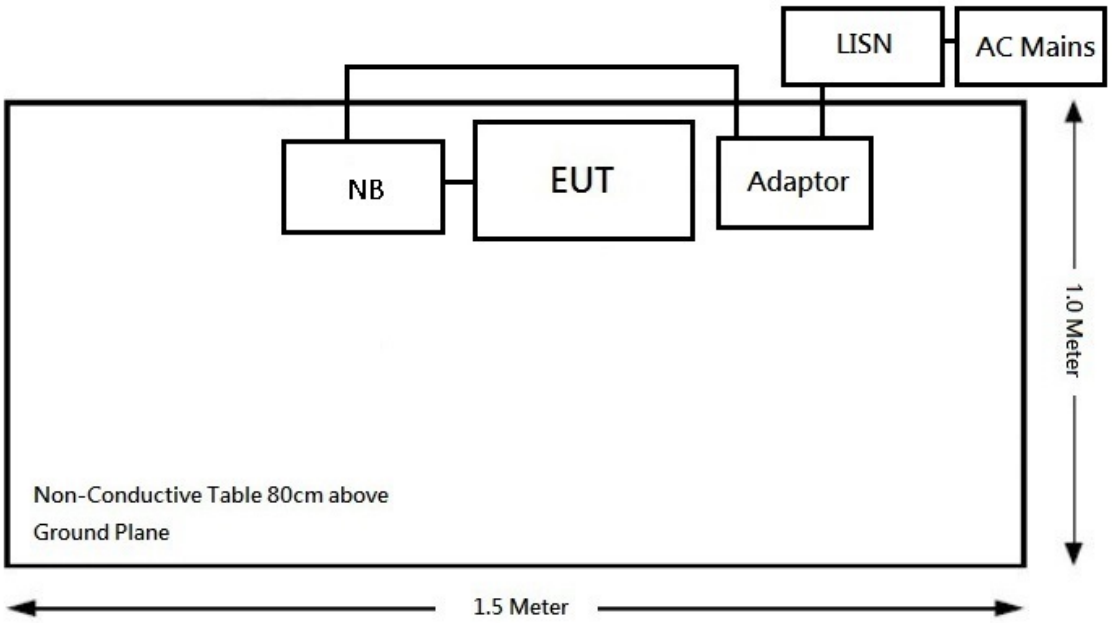
Description	Manufacturer	Model Number	BSMI	FCC ID / DOC	S/N
NB	DELL	E6410	N/A	PD98260NGU	10912240367

2.5 External Cable List and Details

Cable Description	Length (m)	From	To
Mini USB Cable	1.5	NB	EUT

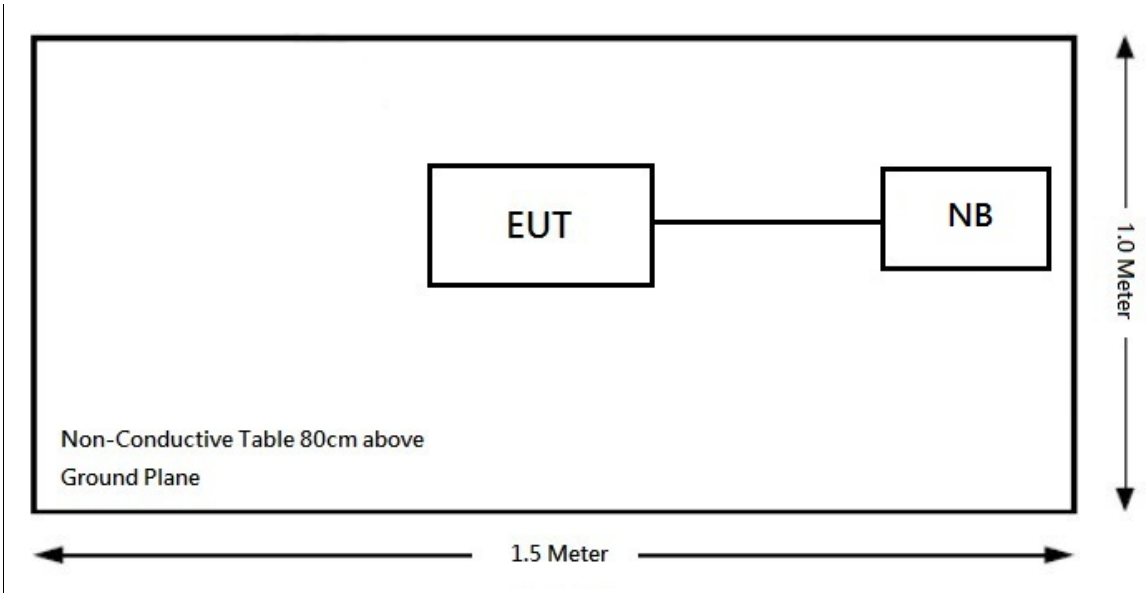
2.6 Block Diagram of Test Setup

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

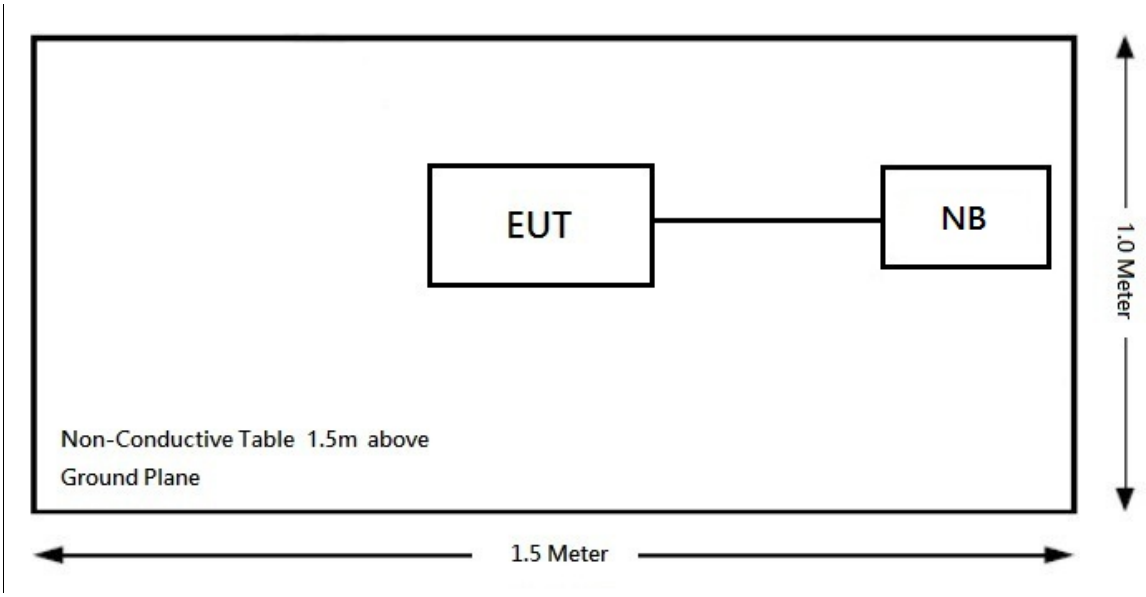


Radiation

Below 1GHz:



Above 1GHz:


EUT
NB
1.0 Meter
Non-Conductive Table 1.5m above
Ground Plane
1.5 Meter

2.7 Duty Cycle

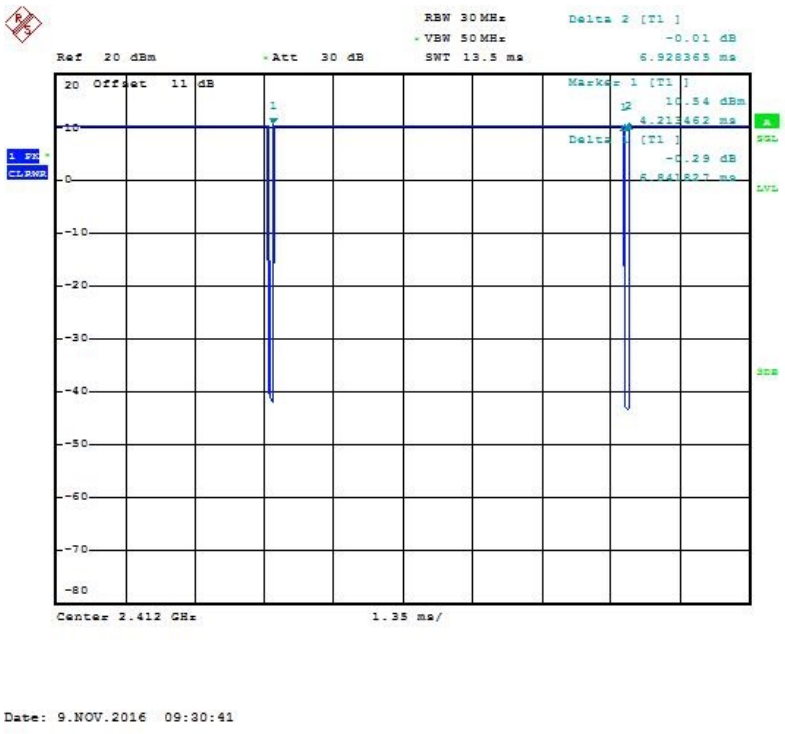
According to KDB 558074 D01 DTS Meas Guidance v04 section 6.0:
All measurements are to be performed with the EUT transmitting at 100% duty cycle at its maximum power control level; however, if 100% duty cycle cannot be achieved, measurements of duty cycle, x, and maximumpower transmission duration, T, are required for each tested mode of operation.

Radio Mode	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
B Mode	6.84	6.92	99	0.04
G Mode	1.46	1.64	88	0.56
N20 Mode	1.36	1.55	87	0.60
N40 Mode	0.63	0.88	72	1.43

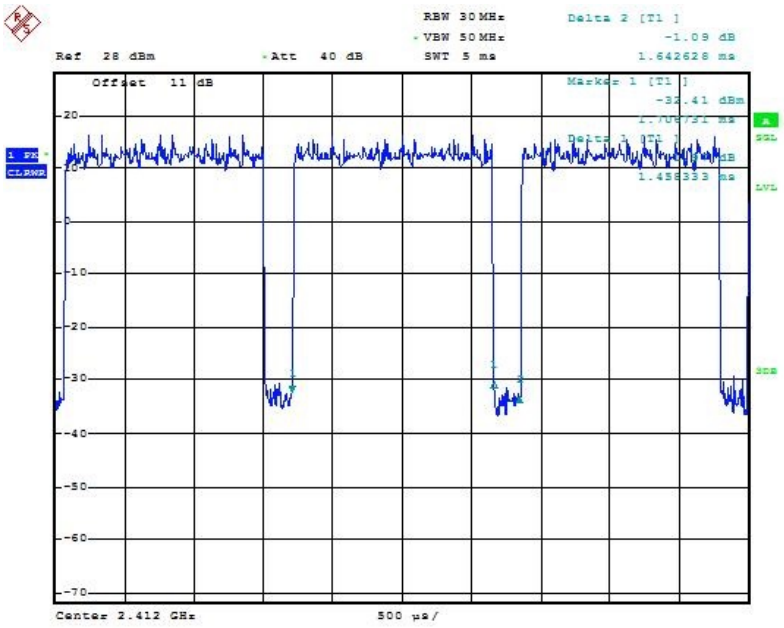
Note: Duty Cycle Correction Factor = 10*log(1/duty cycle)

Please refer to the following plots.

B Mode



G Mode



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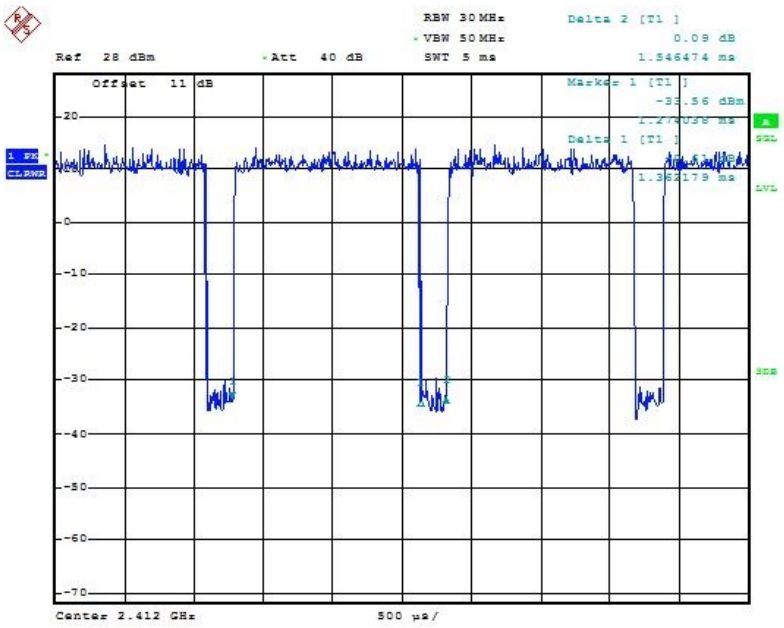
N20 Mode



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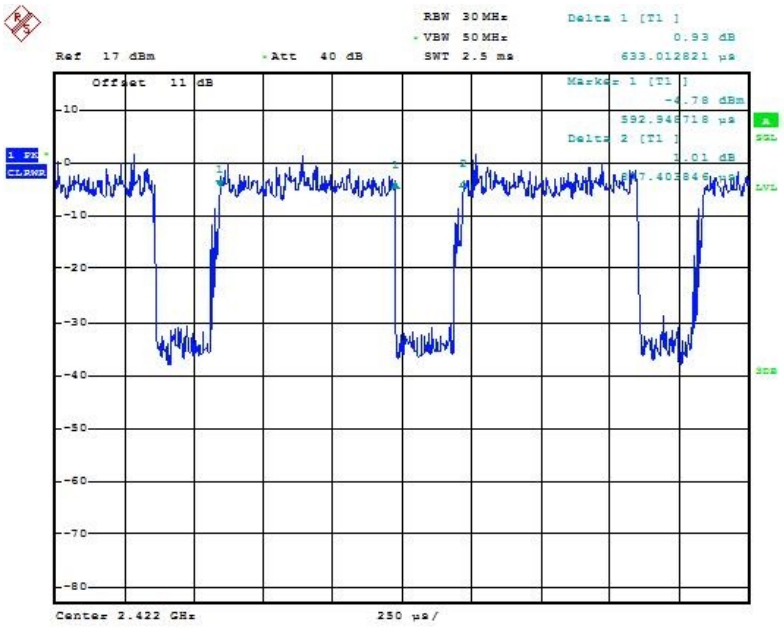
N40 Mode



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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);

4.2 RF Exposure Evaluation Result

MPE evaluation:

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)			
WIFI	2412-2462	-2.12	0.614	21.00	125.9	20	0.01537	1

Result: MPE evaluation meet 20 cm 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

Manufacturer	Antenna Type	Antenna Gain	Result
TAIJET BOINTEC CORPORATION LIMITED	PCB Antenna	-2.12	Compliance

The EUT has an internal antenna arrangement, which was permanently attached, fulfill the requirement of this section.

6 FCC §15.207 - AC Line Conducted Emissions

6.1 Applicable Standard

FCC §15.207

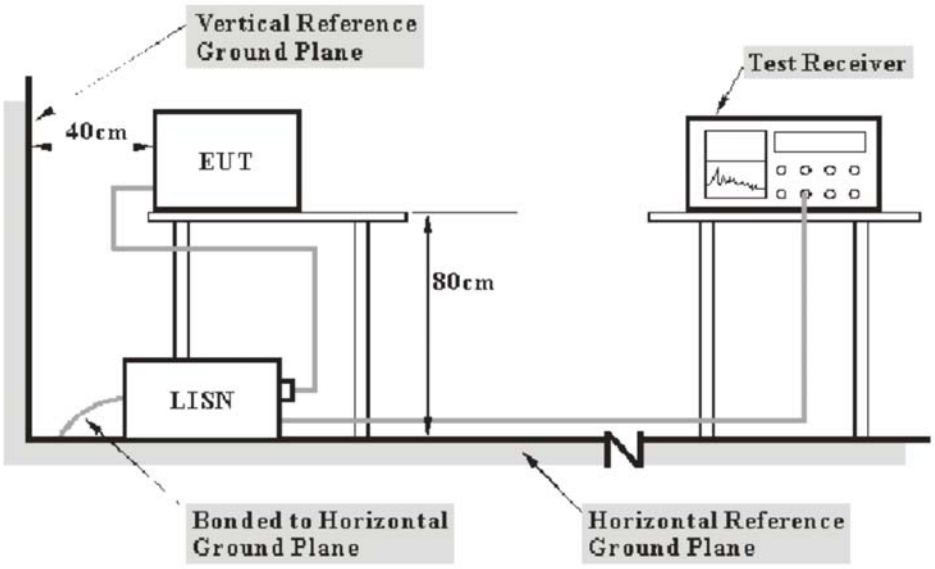
6.2 Measurement Uncertainty

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	2016/7/27	2017/7/26
LISN	EMCO	3816/2	75848	2016/8/4	2017/8/3
EMI Test Receiver	Rohde & Schwarz	ESCI	100540	2016/7/22	2017/7/21
Pulse Limiter	Rohde & Schwarz	ESH3Z2	TXZEM025	2016/8/19	2017/8/18
RF Cable	EMEC	EM-CB5D	001	2016/7/27	2017/7/26
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

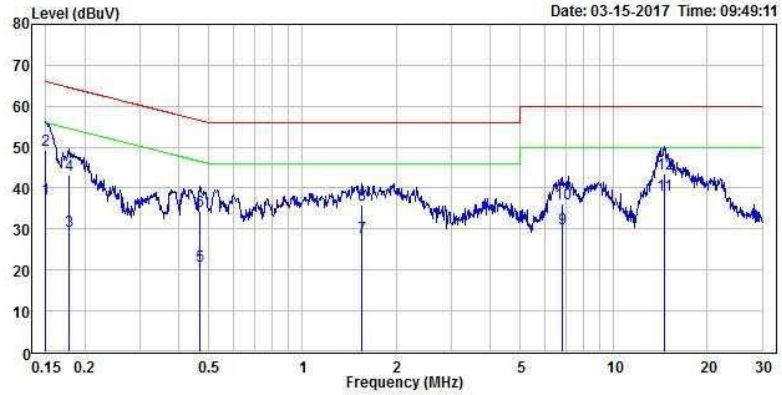
The testing was performed by David Hsu on 2017-03-15.

6.9 Test Results

Please refer to the following plots and tables.

Test mode: Transmitting

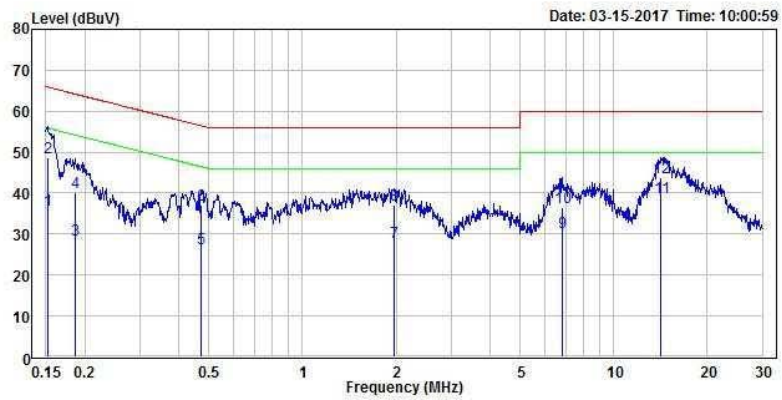
Main: AC 120V/60 Hz, Line



Condition: Line
EUT :
Mode :
Note :

	Freq	Level	Limit Line	Over Limit	Factor	Read Level	Remark	Pol/Phase
	MHz	dBuV	dBuV	dB	dB	dBuV		
1	0.150	37.32	56.00	-18.68	19.56	17.76	Average	Line
2	0.150	49.24	66.00	-16.76	19.56	29.68	QP	Line
3	0.177	29.61	54.61	-25.00	19.57	10.04	Average	Line
4	0.177	43.17	64.61	-21.44	19.57	23.60	QP	Line
5	0.466	20.98	46.58	-25.60	19.55	1.43	Average	Line
6	0.466	34.27	56.58	-22.31	19.55	14.72	QP	Line
7	1.557	27.86	46.00	-18.14	19.65	8.21	Average	Line
8	1.557	35.86	56.00	-20.14	19.65	16.21	QP	Line
9	6.848	30.11	50.00	-19.89	19.74	10.37	Average	Line
10	6.848	36.24	60.00	-23.76	19.74	16.50	QP	Line
11	14.505	38.35	50.00	-11.65	19.81	18.54	Average	Line
12	14.505	43.52	60.00	-16.48	19.81	23.71	QP	Line

Main: AC 120V/60 Hz, Neutral



Condition: Neutral
EUT :
Mode :
Note :

	MHz	dBuV	Limit Line dBuV	Over Limit dB	Factor dB	Read Level dBuV	Remark	Pol/Phase
1	0.152	35.91	55.90	-19.99	19.56	16.35	Average	Neutral
2	0.152	48.67	65.90	-17.23	19.56	29.11	QP	Neutral
3	0.186	28.64	54.21	-25.57	19.53	9.11	Average	Neutral
4	0.186	40.26	64.21	-23.95	19.53	20.73	QP	Neutral
5	0.474	26.42	46.45	-20.03	19.55	6.87	Average	Neutral
6	0.474	36.98	56.45	-19.47	19.55	17.43	QP	Neutral
7	1.978	27.86	46.00	-18.14	19.65	8.21	Average	Neutral
8	1.978	37.03	56.00	-18.97	19.65	17.38	QP	Neutral
9	6.820	30.53	50.00	-19.47	19.78	10.75	Average	Neutral
10	6.820	36.44	60.00	-23.56	19.78	16.66	QP	Neutral
11	14.219	38.93	50.00	-11.07	19.92	19.01	Average	Neutral
12	14.219	43.67	60.00	-16.33	19.92	23.75	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) 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

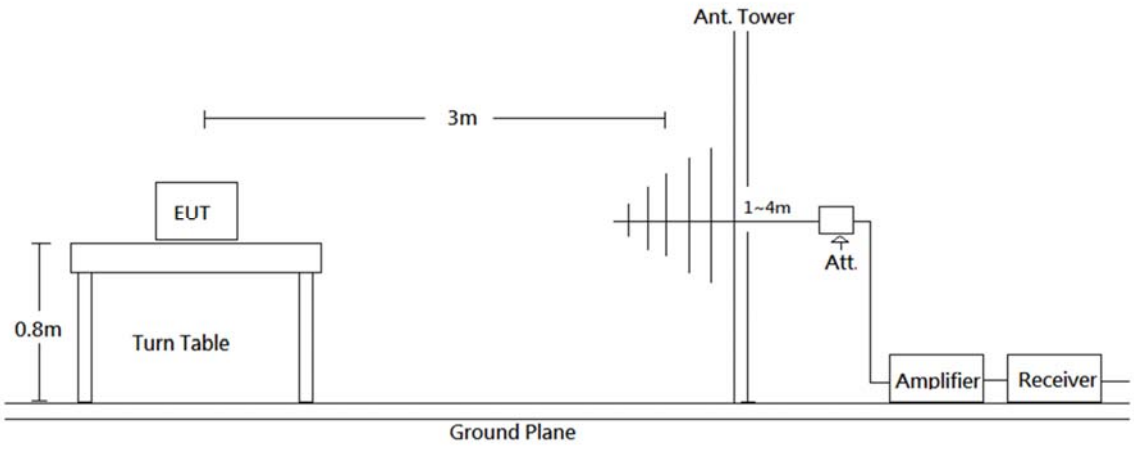
All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency 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.

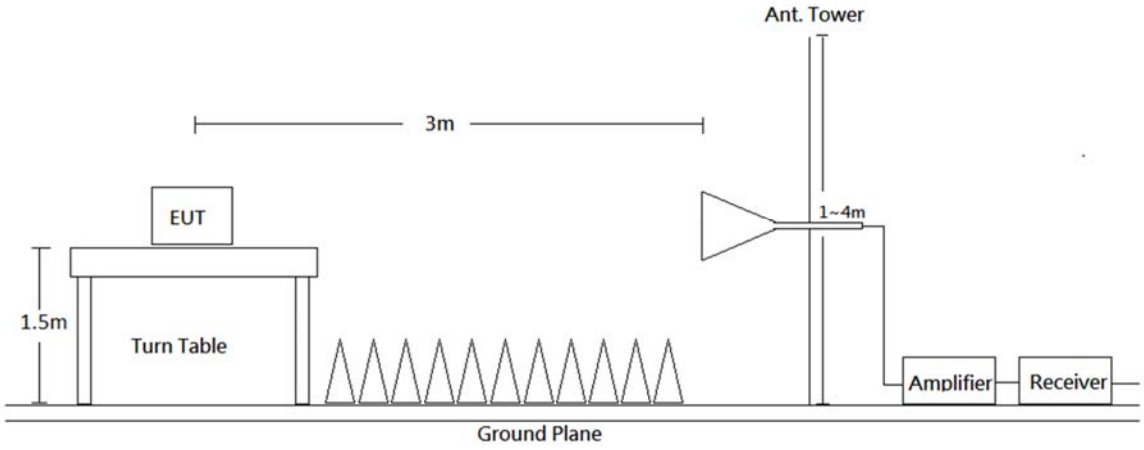
Frequency	Measurement uncertainty
30 MHz~200 MHz	3.76 dB (k=2, 95% level of confidence)
200 MHz~1 GHz	4.12 dB (k=2, 95% level of confidence)
1 GHz~6 GHz	4.84 dB (k=2, 95% level of confidence)
6 GHz~18 GHz	5.16 dB (k=2, 95% level of confidence)
18 GHz~26 GHz	4.84 dB (k=2, 95% level of confidence)
26 GHz~40 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 for below 1GHz and spectrum analyzer for above 1GHz was set with the following configurations measurement method 6.3 in ANSI C63.10.

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

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

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	2016/07/15	2017/07/14
EMI Test Receiver	Rohde & Schwarz	ESR7	101419	2016/11/03	2017/11/02
Mircoflex Cable	UTIFLEX	UFB311A-Q-1440-300300	220490-006	2016/11/02	2017/11/01
Mircoflex Cable	UTIFLEX	UFB197C-1-2362-70U-70U	225757-001	2016/07/15	2017/07/14
Mircoflex Cable	UTIFLEX	UFA210A-1-3149-300300	MFR64639 226389-001	2016/11/29	2017/11/28
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
Horn Antenna	EMCO	3115	9311-4158	2016/05/10	2017/05/09
Horn Antenna	ETS-Lindgren	3116	00062638	2016/09/05	2017/09/04
Preamplifier	EMEC	EM01G18G	060657	2016/12/13	2017/12/12
Preamplifier	EMEC	EM18G40G	060656	2016/12/13	2017/12/12
Spectrum Analyzer	Rohde & Schwarz	FSEK30	825084/006	2016/12/15	2017/12/14
Mircoflex Cable	ROSNAL	K1K50-UP0264-K1K50-80CM	160309-2	2016/03/24	2017/03/23
Mircoflex Cable	ROSNAL	K1K50-UP0264-K1K50-450CM	160309-1	2016/03/24	2017/03/23
Conducted Room					
Cable	WOKEN	SFL402	S02-160323-07	2016/11/22	2017/11/21
Spectrum Analyzer	Rohde & Schwarz	FSU26	200268	2016/05/07	2017/05/06
Attenuator	MINI-CIRCUITS	BW-S10W5+	N/A	2016/03/09	2017/03/08

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 radiation testing was performed by David Hsu on 2017-03-13.

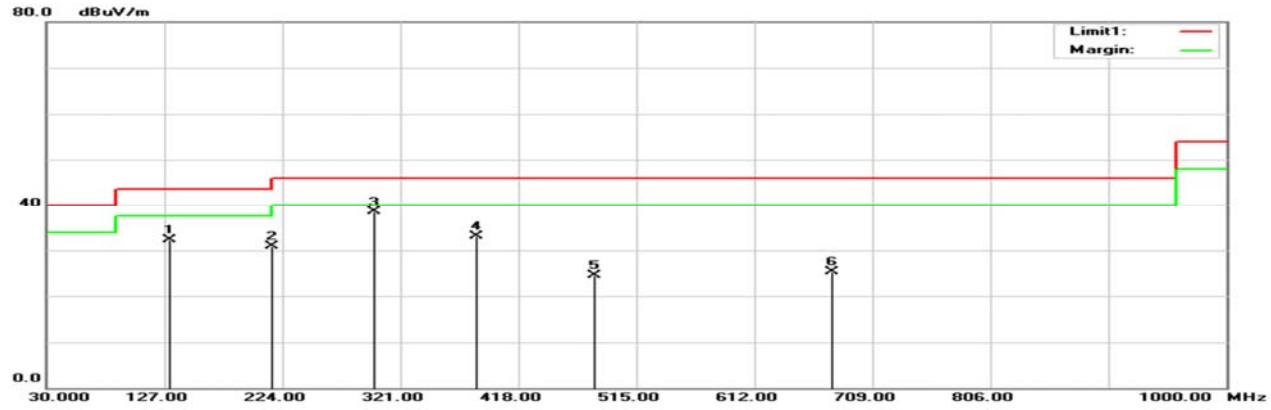
The conducted testing was performed by David Hsu on 2016-12-05.

7.10 Test Results

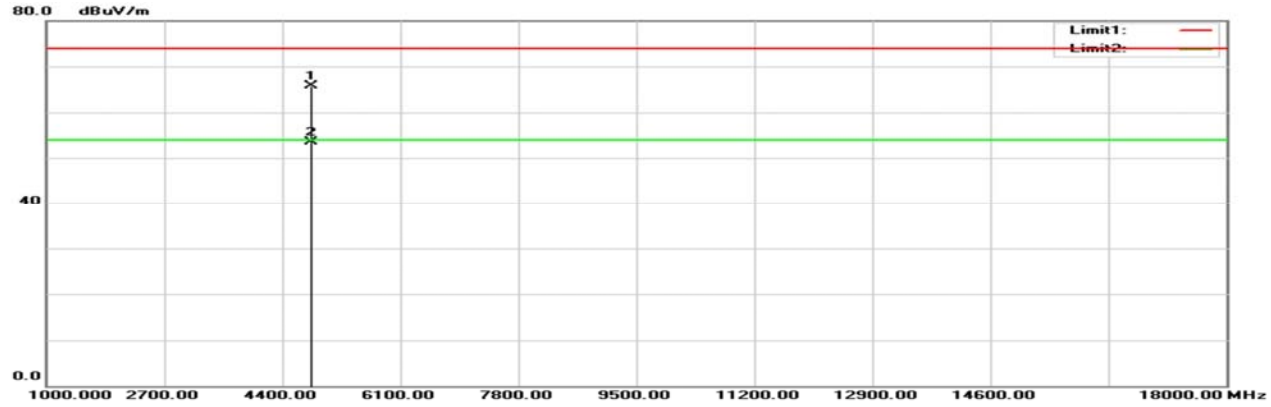
Test Mode: Transmitting

Horizontal (*worst case is G mode Low channel*)

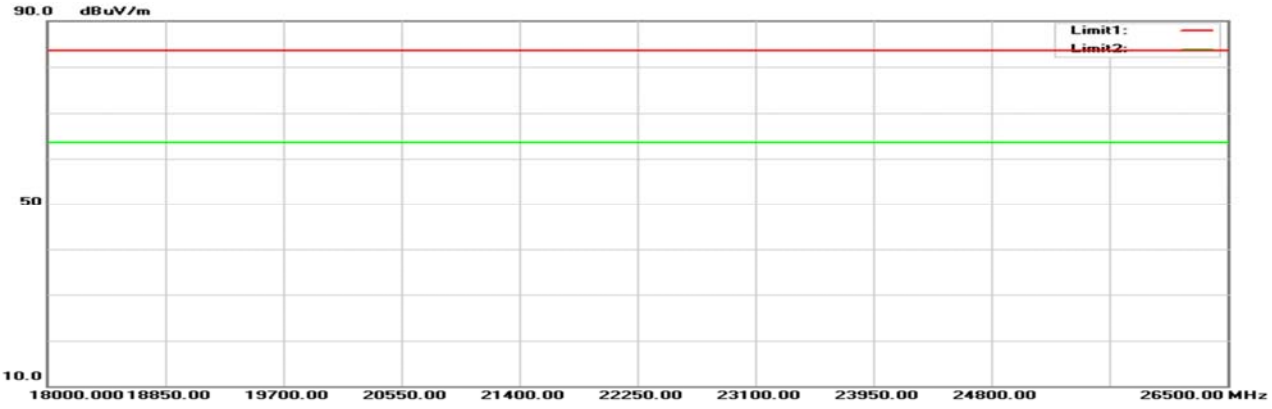
30MHz-1GHz:



1GHz-18GHz:

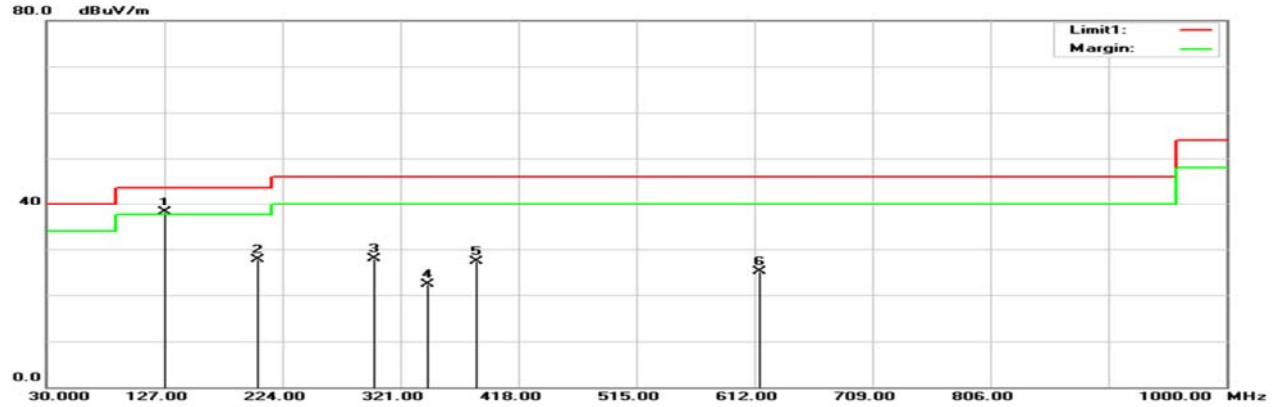


18GHz-26.5GHz:

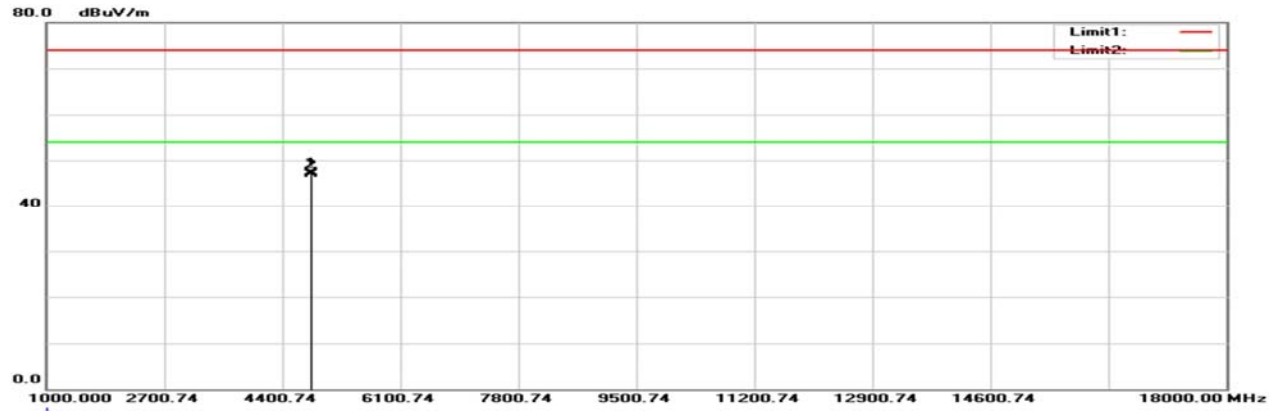


Vertical (*worst case is B mode Low channel*)

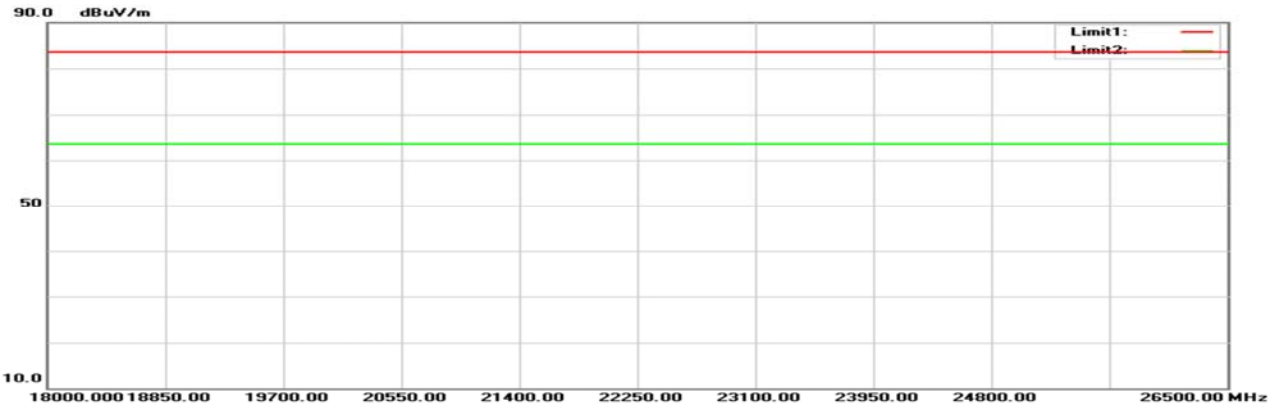
30MHz-1GHz:



1GHz-18GHz:



18GHz-26.5GHz:



Horizontal

Frequency (MHz)	Reading (dB μV)	Correct Factor(dB/m)	Result (dB μV/m)	Limit (dB μV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
B Mode, Low Channel								
94.99	51.20	-15.96	35.24	43.50	-8.26	100	150	QP
203.63	51.42	-11.65	39.77	43.50	-3.73	100	107	QP
287.05	45.91	-10.21	35.70	46.00	-10.30	100	342	QP
398.60	35.56	-7.99	27.57	46.00	-18.43	100	33	QP
531.49	29.64	-5.55	24.09	46.00	-21.91	100	246	QP
693.48	29.03	-3.20	25.83	46.00	-20.17	100	242	QP
2390.00	43.41	-4.89	38.52	74.00	-35.48	100	307	peak
2390.00	28.73	-4.89	23.84	54.00	-30.16	100	307	AVG
2412.00	114.76	-4.84	109.92	N/A	N/A	100	307	peak
2412.00	110.58	-4.84	105.74	N/A	N/A	100	307	AVG
4824.00	52.43	1.05	53.48	74.00	-20.52	100	304	peak
4824.00	51.67	1.05	52.72	54.00	-1.28	100	304	AVG
B Mode, Middle Channel								
107.60	45.83	-12.84	32.99	43.50	-10.51	100	183	QP
191.99	38.93	-12.37	26.56	43.50	-16.94	100	54	QP
303.54	42.83	-9.95	32.88	46.00	-13.12	100	138	QP
385.99	38.52	-8.25	30.27	46.00	-15.73	100	0	QP
521.79	28.07	-5.68	22.39	46.00	-23.61	100	239	QP
690.57	28.34	-3.22	25.12	46.00	-20.88	100	139	QP
2437.00	112.33	-4.78	107.55	N/A	N/A	100	308	peak
2437.00	109.32	-4.78	104.54	N/A	N/A	100	308	AVG
4874.00	52.25	1.23	53.48	74.00	-20.52	100	302	peak
4874.00	50.41	1.23	51.64	54.00	-2.36	100	302	AVG
B Mode, High Channel								
95.96	48.32	-15.71	32.61	43.50	-10.89	100	150	QP
203.63	43.35	-11.65	31.70	43.50	-11.80	100	107	QP
275.41	41.27	-10.47	30.80	46.00	-15.20	100	120	QP
359.80	40.05	-8.78	31.27	46.00	-14.73	100	351	QP
450.98	29.95	-6.72	23.23	46.00	-22.77	100	183	QP
688.63	28.63	-3.25	25.38	46.00	-20.62	100	242	QP
2462.00	114.11	-4.72	109.39	N/A	N/A	100	303	peak
2462.00	109.81	-4.72	105.09	N/A	N/A	100	303	AVG
2483.50	42.67	-4.69	37.98	74.00	-36.02	100	303	peak
2483.50	30.35	-4.69	25.66	54.00	-28.34	100	303	AVG
4924.00	52.95	1.40	54.35	74.00	-19.65	100	301	peak
4924.00	51.89	1.40	53.29	54.00	-0.71	100	301	AVG

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 (dB μV)	Correct Factor(dB/m)	Result (dB μV/m)	Limit (dB μV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
B Mode, Low Channel								
127.00	48.79	-10.78	38.01	43.50	-5.49	100	61	QP
203.63	39.30	-11.65	27.65	43.50	-15.85	100	135	QP
299.66	37.95	-10.02	27.93	46.00	-18.07	100	205	QP
343.31	31.45	-9.12	22.33	46.00	-23.67	100	34	QP
383.08	35.69	-8.31	27.38	46.00	-18.62	100	154	QP
615.88	29.25	-4.12	25.13	46.00	-20.87	100	84	QP
2390.00	43.41	-4.89	38.52	74.00	-35.48	100	336	peak
2390.00	27.92	-4.89	23.03	54.00	-30.97	100	336	AVG
2412.00	103.36	-4.84	98.52	N/A	N/A	100	336	peak
2412.00	99.46	-4.84	94.62	N/A	N/A	100	336	AVG
4824.00	46.20	1.05	47.25	74.00	-26.75	100	331	peak
4824.00	45.95	1.05	47.00	54.00	-7.00	100	331	AVG
B Mode, Middle Channel								
128.94	43.40	-10.72	32.68	43.50	-10.82	100	61	QP
202.66	36.43	-11.40	25.03	43.50	-18.47	100	198	QP
339.43	31.76	-9.20	22.56	46.00	-23.44	100	44	QP
509.18	29.69	-5.83	23.86	46.00	-22.14	100	97	QP
667.29	28.74	-3.51	25.23	46.00	-20.77	100	183	QP
837.04	27.57	-0.31	27.26	46.00	-18.74	100	30	QP
2437.00	101.63	-4.78	96.85	N/A	N/A	100	102	peak
2437.00	99.21	-4.78	94.43	N/A	N/A	100	102	AVG
4874.00	46.28	1.23	47.51	74.00	-26.49	100	340	peak
4874.00	44.49	1.23	45.72	54.00	-8.28	100	340	AVG
B Mode, High Channel								
129.91	43.69	-10.69	33.00	43.50	-10.50	100	71	QP
251.16	36.92	-12.24	24.68	46.00	-21.32	100	64	QP
338.46	32.25	-9.22	23.03	46.00	-22.97	100	258	QP
383.08	32.97	-8.31	24.66	46.00	-21.34	100	154	QP
549.92	29.32	-5.33	23.99	46.00	-22.01	100	68	QP
751.68	28.43	-2.15	26.28	46.00	-19.72	100	253	QP
2462.00	102.92	-4.72	98.20	N/A	N/A	100	16	peak
2462.00	97.86	-4.72	93.14	N/A	N/A	100	16	AVG
2483.50	40.81	-4.69	36.12	74.00	-37.88	100	16	peak
2483.50	27.03	-4.69	22.34	54.00	-31.66	100	16	AVG
4924.00	48.06	1.40	49.46	74.00	-24.54	100	331	peak
4924.00	44.44	1.40	45.84	54.00	-8.16	100	331	AVG

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 (dB μV)	Correct Factor(dB/m)	Result (dB μV/m)	Limit (dB μV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
G Mode, Low Channel								
131.85	43.07	-10.75	32.32	43.50	-11.18	100	355	QP
215.27	44.04	-13.09	30.95	43.50	-12.55	100	285	QP
299.66	48.45	-10.02	38.43	46.00	-7.57	100	124	QP
383.08	41.45	-8.31	33.14	46.00	-12.86	100	281	QP
480.08	30.69	-6.26	24.43	46.00	-21.57	100	248	QP
676.02	28.64	-3.40	25.24	46.00	-20.76	100	128	QP
2390.00	66.36	-4.89	61.47	74.00	-12.53	100	303	peak
2390.00	52.10	-4.89	47.21	54.00	-6.79	100	303	AVG
2412.00	124.61	-4.84	119.77	N/A	N/A	100	303	peak
2412.00	115.47	-4.84	110.63	N/A	N/A	100	303	AVG
4824.00	64.65	1.05	65.70	74.00	-8.30	100	303	peak
4824.00	52.41	1.05	53.46	54.00	-0.54	100	303	AVG
G Mode, Middle Channel								
107.60	44.92	-12.84	32.08	43.50	-11.42	100	183	QP
203.63	39.75	-11.65	28.10	43.50	-15.40	100	107	QP
303.54	42.69	-9.95	32.74	46.00	-13.26	100	138	QP
385.99	39.73	-8.25	31.48	46.00	-14.52	100	0	QP
468.44	28.43	-6.44	21.99	46.00	-24.01	100	238	QP
735.19	28.74	-2.46	26.28	46.00	-19.72	100	30	QP
2437.00	126.52	-4.78	121.74	N/A	N/A	100	359	peak
2437.00	117.80	-4.78	113.02	N/A	N/A	100	359	AVG
4874.00	63.80	1.23	65.03	74.00	-8.97	100	261	peak
4874.00	51.35	1.23	52.58	54.00	-1.42	100	261	AVG
G Mode, High Channel								
94.99	49.24	-15.96	33.28	43.50	-10.22	100	150	QP
143.49	40.73	-11.18	29.55	43.50	-13.95	100	7	QP
231.76	41.96	-12.61	29.35	46.00	-16.65	100	34	QP
299.66	46.09	-10.02	36.07	46.00	-9.93	100	124	QP
322.94	41.81	-9.55	32.26	46.00	-13.74	100	157	QP
385.99	38.75	-8.25	30.50	46.00	-15.50	100	0	QP
2462.00	126.50	-4.72	121.78	N/A	N/A	100	358	peak
2462.00	117.52	-4.72	112.80	N/A	N/A	100	358	AVG
2483.50	76.17	-4.69	71.48	74.00	-2.52	100	358	peak
2483.50	52.98	-4.69	48.29	54.00	-5.71	100	358	AVG
4924.00	62.87	1.40	64.27	74.00	-9.73	100	29	peak
4924.00	50.60	1.40	52.00	54.00	-2.00	100	29	AVG

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 (dB μV)	Correct Factor(dB/m)	Result (dB μV/m)	Limit (dB μV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
G Mode, Low Channel								
129.91	43.69	-10.69	33.00	43.50	-10.50	100	71	QP
251.16	36.92	-12.24	24.68	46.00	-21.32	100	64	QP
338.46	32.25	-9.22	23.03	46.00	-22.97	100	258	QP
383.08	32.97	-8.31	24.66	46.00	-21.34	100	154	QP
549.92	29.32	-5.33	23.99	46.00	-22.01	100	68	QP
751.68	28.43	-2.15	26.28	46.00	-19.72	100	253	QP
2390.00	61.26	-4.89	56.37	74.00	-17.63	100	324	peak
2390.00	48.64	-4.89	43.75	54.00	-10.25	100	324	AVG
2412.00	113.09	-4.84	108.25	N/A	N/A	100	324	peak
2412.00	102.63	-4.84	97.79	N/A	N/A	100	324	AVG
4824.00	54.42	1.05	55.47	74.00	-18.53	100	307	peak
4824.00	43.96	1.05	45.01	54.00	-8.99	100	307	AVG
G Mode, Middle Channel								
127.00	44.03	-10.78	33.25	43.50	-10.25	100	61	QP
215.27	37.28	-13.09	24.19	43.50	-19.31	100	140	QP
298.69	33.31	-10.04	23.27	46.00	-22.73	100	160	QP
383.08	34.08	-8.31	25.77	46.00	-20.23	100	154	QP
511.12	30.49	-5.80	24.69	46.00	-21.31	100	187	QP
682.81	30.33	-3.31	27.02	46.00	-18.98	100	356	QP
2437.00	116.78	-4.78	112.00	N/A	N/A	100	89	peak
2437.00	107.67	-4.78	102.89	N/A	N/A	100	89	AVG
4874.00	53.68	1.23	54.91	74.00	-19.09	100	352	peak
4874.00	41.40	1.23	42.63	54.00	-11.37	100	352	AVG
G Mode, High Channel								
107.60	44.75	-12.84	31.91	43.50	-11.59	100	97	QP
127.00	42.36	-10.78	31.58	43.50	-11.92	100	61	QP
144.46	40.65	-11.21	29.44	43.50	-14.06	100	2	QP
151.25	37.39	-11.42	25.97	43.50	-17.53	100	1	QP
215.27	37.98	-13.09	24.89	43.50	-18.61	100	140	QP
383.08	34.80	-8.31	26.49	46.00	-19.51	100	154	QP
2462.00	115.86	-4.72	111.14	N/A	N/A	100	57	peak
2462.00	106.01	-4.72	101.29	N/A	N/A	100	57	AVG
2483.50	65.25	-4.69	60.56	74.00	-13.44	100	57	peak
2483.50	49.77	-4.69	45.08	54.00	-8.92	100	57	AVG
4924.00	54.64	1.40	56.04	74.00	-17.96	100	29	peak
4924.00	42.40	1.40	43.80	54.00	-10.20	100	29	AVG

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 (dB μV)	Correct Factor(dB/m)	Result (dB μV/m)	Limit (dB μV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
N20 Mode, Low Channel								
30.97	40.37	-4.33	36.04	40.00	-3.96	100	39	QP
107.60	45.45	-12.84	32.61	43.50	-10.89	100	183	QP
143.49	41.69	-11.18	30.51	43.50	-12.99	100	7	QP
299.66	48.65	-10.02	38.63	46.00	-7.37	100	124	QP
332.64	44.10	-9.35	34.75	46.00	-11.25	100	354	QP
383.08	40.78	-8.31	32.47	46.00	-13.53	100	281	QP
2390.00	68.45	-4.89	63.56	74.00	-10.44	100	321	peak
2390.00	51.84	-4.89	46.95	54.00	-7.05	100	321	AVG
2412.00	123.57	-4.84	118.73	N/A	N/A	100	356	peak
2412.00	114.33	-4.84	109.49	N/A	N/A	100	356	AVG
4824.00	60.82	1.05	61.87	74.00	-12.13	100	343	peak
4824.00	50.20	1.05	51.25	54.00	-2.75	100	343	AVG
N20 Mode, Middle Channel								
94.99	53.40	-15.96	37.44	43.50	-6.06	100	107	QP
107.60	46.39	-12.84	33.55	43.50	-9.95	100	118	QP
203.63	52.03	-11.65	40.38	43.50	-3.12	100	52	QP
299.66	46.21	-10.02	36.19	46.00	-9.81	100	37	QP
323.91	45.81	-9.53	36.28	46.00	-9.72	100	154	QP
491.72	36.87	-6.07	30.80	46.00	-15.20	100	241	QP
2437.00	123.71	-4.78	118.93	N/A	N/A	100	356	peak
2437.00	115.01	-4.78	110.23	N/A	N/A	100	356	AVG
4874.00	58.92	1.23	60.15	74.00	-13.85	100	352	peak
4874.00	49.46	1.23	50.69	54.00	-3.31	100	352	AVG
N20 Mode, High Channel								
30.00	40.22	-3.62	36.60	40.00	-3.40	100	48	QP
131.85	42.74	-10.75	31.99	43.50	-11.51	100	355	QP
155.13	37.44	-11.44	26.00	43.50	-17.50	100	67	QP
203.63	43.77	-11.65	32.12	43.50	-11.38	100	107	QP
298.69	49.95	-10.04	39.91	46.00	-6.09	100	145	QP
383.08	40.75	-8.31	32.44	46.00	-13.56	100	281	QP
2462.00	124.84	-4.72	120.12	N/A	N/A	100	357	peak
2462.00	115.42	-4.72	110.70	N/A	N/A	100	357	AVG
2483.50	72.55	-4.69	67.86	74.00	-6.14	100	357	peak
2483.50	50.38	-4.69	45.69	54.00	-8.31	100	357	AVG
4924.00	62.21	1.40	63.61	74.00	-10.39	100	349	peak
4924.00	50.60	1.40	52.00	54.00	-2.00	100	349	AVG

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 (dB μV)	Correct Factor(dB/m)	Result (dB μV/m)	Limit (dB μV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
N20 Mode, Low Channel								
129.91	42.24	-10.69	31.55	43.50	-11.95	100	71	QP
203.63	35.81	-11.65	24.16	43.50	-19.34	100	135	QP
256.01	33.48	-11.84	21.64	46.00	-24.36	100	91	QP
328.76	33.28	-9.42	23.86	46.00	-22.14	100	99	QP
395.69	32.49	-8.05	24.44	46.00	-21.56	100	113	QP
578.05	29.28	-4.76	24.52	46.00	-21.48	100	97	QP
2390.00	61.53	-4.89	56.64	74.00	-17.36	100	85	peak
2390.00	49.11	-4.89	44.22	54.00	-9.78	100	85	AVG
2412.00	112.24	-4.84	107.40	N/A	N/A	100	85	peak
2412.00	104.12	-4.84	99.28	N/A	N/A	100	85	AVG
4824.00	51.86	1.05	52.91	74.00	-21.09	100	348	peak
4824.00	42.27	1.05	43.32	54.00	-10.68	100	348	AVG
N20 Mode, Middle Channel								
94.99	48.80	-15.96	32.84	43.50	-10.66	100	145	QP
130.88	42.14	-10.73	31.41	43.50	-12.09	100	61	QP
211.39	34.97	-13.19	21.78	43.50	-21.72	100	132	QP
253.10	35.39	-12.07	23.32	46.00	-22.68	100	54	QP
299.66	33.82	-10.02	23.80	46.00	-22.20	100	205	QP
616.85	28.31	-4.11	24.20	46.00	-21.80	100	34	QP
2437.00	113.72	-4.78	108.94	N/A	N/A	100	90	peak
2437.00	105.06	-4.78	100.28	N/A	N/A	100	90	AVG
4874.00	52.02	1.23	53.25	74.00	-20.75	100	28	peak
4874.00	42.40	1.23	43.63	54.00	-10.37	100	28	AVG
N20 Mode, High Channel								
124.09	43.22	-10.88	32.34	43.50	-11.16	100	229	QP
203.63	36.64	-11.65	24.99	43.50	-18.51	100	135	QP
215.27	38.26	-13.09	25.17	43.50	-18.33	100	140	QP
253.10	34.38	-12.07	22.31	46.00	-23.69	100	54	QP
328.76	33.09	-9.42	23.67	46.00	-22.33	100	99	QP
364.65	32.36	-8.70	23.66	46.00	-22.34	100	344	QP
2462.00	114.24	-4.72	109.52	N/A	N/A	100	60	peak
2462.00	105.08	-4.72	100.36	N/A	N/A	100	60	AVG
2483.50	61.12	-4.69	56.43	74.00	-17.57	100	60	peak
2483.50	49.12	-4.69	44.43	54.00	-9.57	100	60	AVG
4924.00	55.78	1.40	57.18	74.00	-16.82	100	20	peak
4924.00	46.37	1.40	47.77	54.00	-6.23	100	20	AVG

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 (dB μV)	Correct Factor(dB/m)	Result (dB μV/m)	Limit (dB μV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
N40 Mode, Low Channel								
94.99	51.20	-15.96	35.24	43.50	-8.26	100	150	QP
203.63	51.42	-11.65	39.77	43.50	-3.73	100	107	QP
287.05	45.91	-10.21	35.70	46.00	-10.30	100	342	QP
398.60	35.56	-7.99	27.57	46.00	-18.43	100	33	QP
531.49	29.64	-5.55	24.09	46.00	-21.91	100	246	QP
693.48	29.03	-3.20	25.83	46.00	-20.17	100	242	QP
2390.00	73.56	-4.89	68.67	74.00	-5.33	100	359	peak
2390.00	58.31	-4.89	53.42	54.00	-0.58	100	359	AVG
2422.00	123.37	-4.81	118.56	N/A	N/A	100	359	peak
2422.00	114.48	-4.81	109.67	N/A	N/A	100	359	AVG
4844.00	59.22	1.12	60.34	74.00	-13.66	100	26	peak
4844.00	49.88	1.12	51.00	54.00	-3.00	100	26	AVG
N40 Mode, Middle Channel								
107.60	44.51	-12.84	31.67	43.50	-11.83	100	118	QP
130.88	42.56	-10.73	31.83	43.50	-11.67	100	359	QP
203.63	44.14	-11.65	32.49	43.50	-11.01	100	52	QP
311.30	46.20	-9.79	36.41	46.00	-9.59	100	108	QP
332.64	44.21	-9.35	34.86	46.00	-11.14	100	349	QP
395.69	39.88	-8.05	31.83	46.00	-14.17	100	105	QP
2390.00	68.03	-4.89	63.14	74.00	-10.86	100	356	peak
2390.00	53.57	-4.89	48.68	54.00	-5.32	100	356	AVG
2437.00	123.77	-4.78	118.99	N/A	N/A	100	356	peak
2437.00	114.90	-4.78	110.12	N/A	N/A	100	356	AVG
2483.50	66.93	-4.69	62.24	74.00	-11.76	100	356	peak
2483.50	51.42	-4.69	46.73	54.00	-7.27	100	356	AVG
4874.00	59.54	1.23	60.77	74.00	-13.23	100	356	peak
4874.00	50.54	1.23	51.77	54.00	-2.23	100	356	AVG
N40 Mode, High Channel								
94.99	49.01	-15.96	33.05	43.50	-10.45	100	107	QP
107.60	45.34	-12.84	32.50	43.50	-11.00	100	118	QP
131.85	43.12	-10.75	32.37	43.50	-11.13	100	359	QP
287.05	44.20	-10.21	33.99	46.00	-12.01	100	115	QP
332.64	44.00	-9.35	34.65	46.00	-11.35	100	349	QP
385.99	38.88	-8.25	30.63	46.00	-15.37	100	359	QP
2452.00	124.01	-4.75	119.26	N/A	N/A	100	355	peak
2452.00	115.19	-4.75	110.44	N/A	N/A	100	355	AVG
2483.50	71.58	-4.69	66.89	74.00	-7.11	100	355	peak
2483.50	54.81	-4.69	50.12	54.00	-3.88	100	355	AVG
4904.00	62.53	1.33	63.86	74.00	-10.14	100	30	peak
4904.00	49.08	1.33	50.41	54.00	-3.59	100	30	AVG

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 (dB μV)	Correct Factor(dB/m)	Result (dB μV/m)	Limit (dB μV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
N40 Mode, Low Channel								
127.97	43.36	-10.76	32.60	43.50	-10.90	100	89	QP
215.27	38.96	-13.09	25.87	43.50	-17.63	100	140	QP
253.10	37.35	-12.07	25.28	46.00	-20.72	100	54	QP
299.66	33.92	-10.02	23.90	46.00	-22.10	100	205	QP
383.08	34.53	-8.31	26.22	46.00	-19.78	100	154	QP
681.84	29.45	-3.32	26.13	46.00	-19.87	100	126	QP
2390.00	65.15	-4.89	60.26	74.00	-13.74	100	63	peak
2390.00	52.05	-4.89	47.16	54.00	-6.84	100	63	AVG
2422.00	113.21	-4.81	108.40	N/A	N/A	100	89	peak
2422.00	104.21	-4.81	99.40	N/A	N/A	100	89	AVG
4844.00	52.10	1.12	53.22	74.00	-20.78	100	29	peak
4844.00	43.26	1.12	44.38	54.00	-9.62	100	29	AVG
N40 Mode, Middle Channel								
128.94	43.17	-10.72	32.45	43.50	-11.05	100	61	QP
255.04	34.72	-11.92	22.80	46.00	-23.20	100	72	QP
383.08	35.36	-8.31	27.05	46.00	-18.95	100	154	QP
521.79	30.30	-5.68	24.62	46.00	-21.38	100	176	QP
709.00	28.55	-2.94	25.61	46.00	-20.39	100	207	QP
866.14	27.44	0.31	27.75	46.00	-18.25	100	70	QP
2437.00	114.27	-4.78	109.49	N/A	N/A	100	90	peak
2437.00	105.02	-4.78	100.24	N/A	N/A	100	90	AVG
4874.00	52.31	1.23	53.54	74.00	-20.46	100	347	peak
4874.00	43.06	1.23	44.29	54.00	-9.71	100	347	AVG
N40 Mode, High Channel								
121.18	46.32	-10.97	35.35	43.50	-8.15	100	95	QP
147.37	42.13	-11.31	30.82	43.50	-12.68	100	48	QP
215.27	38.49	-13.09	25.40	43.50	-18.10	100	140	QP
255.04	39.66	-11.92	27.74	46.00	-18.26	100	72	QP
347.19	32.95	-9.05	23.90	46.00	-22.10	100	22	QP
384.05	34.05	-8.29	25.76	46.00	-20.24	100	154	QP
2452.00	114.19	-4.75	109.44	N/A	N/A	100	86	peak
2452.00	104.97	-4.75	100.22	N/A	N/A	100	86	AVG
2483.50	64.67	-4.69	59.98	74.00	-14.02	100	86	peak
2483.50	50.44	-4.69	45.75	54.00	-8.25	100	86	AVG
4904.00	53.01	1.33	54.34	74.00	-19.66	100	358	peak
4904.00	42.44	1.33	43.77	54.00	-10.23	100	358	AVG

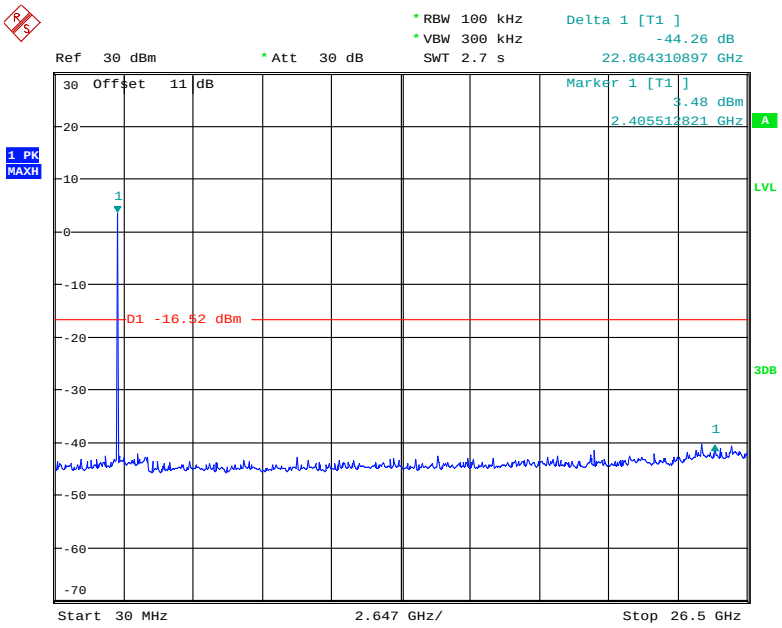
Result = Reading + Correct Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain
Spurious emissions more than 20 dB below the limit were not reported

Conducted Spurious Emissions:

WIFI

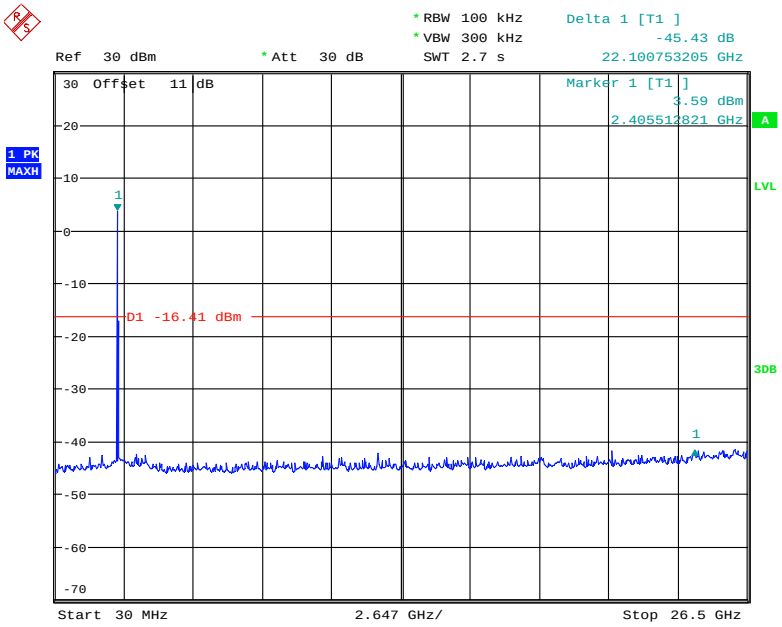
Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
B Mode				
Low	2412	44.26	≥ 20	PASS
Mid	2437	45.43	≥ 20	PASS
High	2462	46.11	≥ 20	PASS
G Mode				
Low	2412	40.68	≥ 20	PASS
Mid	2437	40.90	≥ 20	PASS
High	2462	41.17	≥ 20	PASS
N20 Mode				
Low	2412	42.41	≥ 20	PASS
Mid	2437	42.94	≥ 20	PASS
High	2462	41.51	≥ 20	PASS
N40 Mode				
Low	2422	38.80	≥ 20	PASS
Mid	2437	38.23	≥ 20	PASS
High	2452	38.48	≥ 20	PASS

B Mode Low Channel



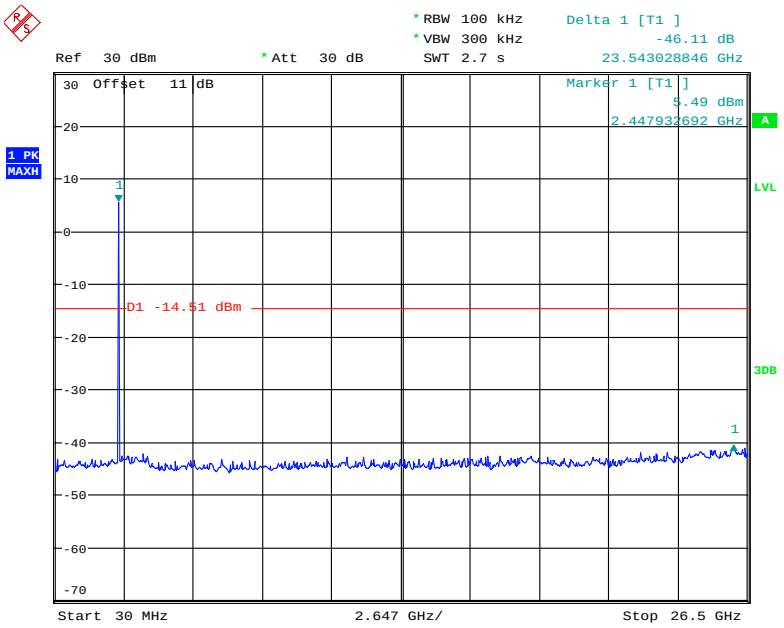
Date: 5.DEC.2016 09:42:24

B Mode Middle Channel



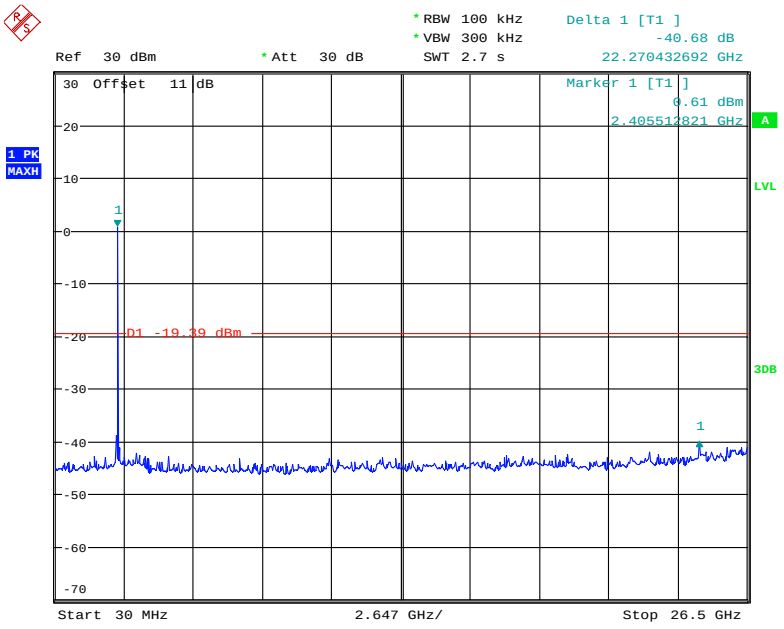
Date: 5.DEC.2016 09:40:30

B Mode High Channel



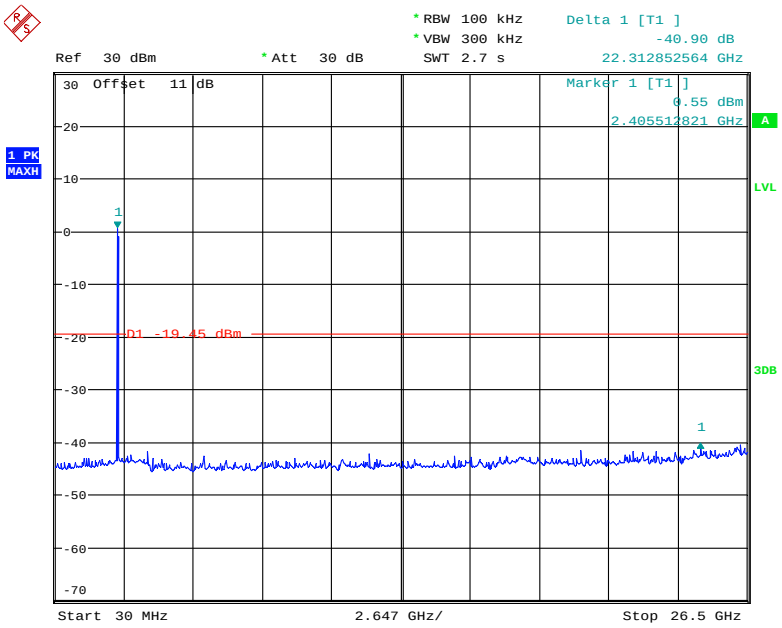
Date: 5.DEC.2016 09:45:35

G Mode Low Channel



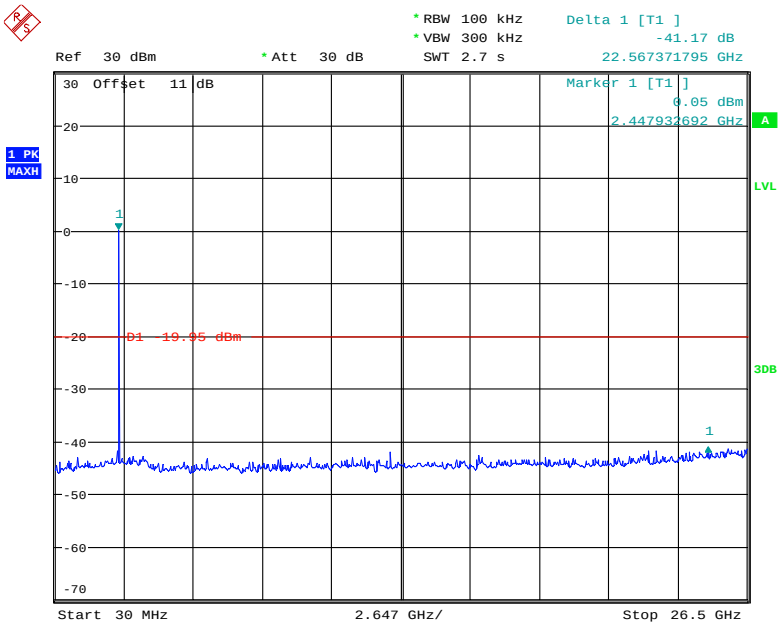
Date: 5.DEC.2016 09:53:55

G Mode Middle Channel



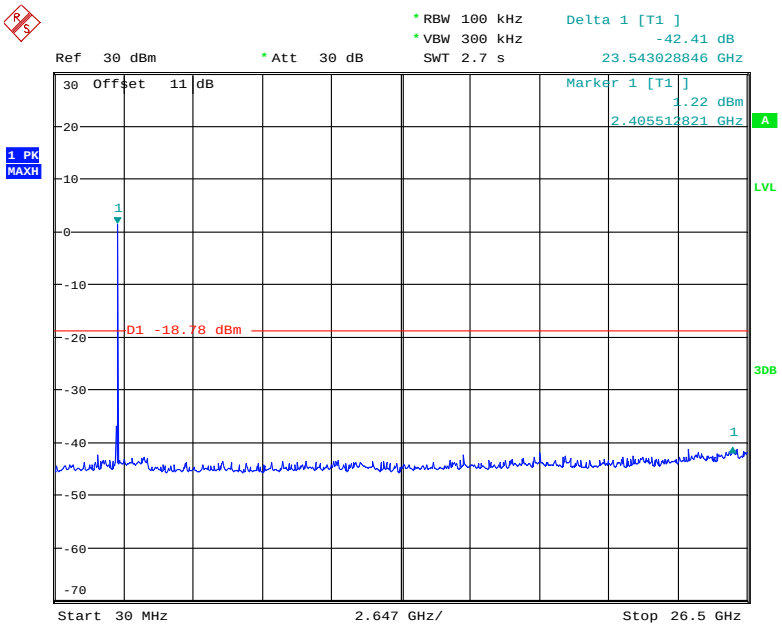
Date: 5.DEC.2016 09:51:42

G Mode High Channel



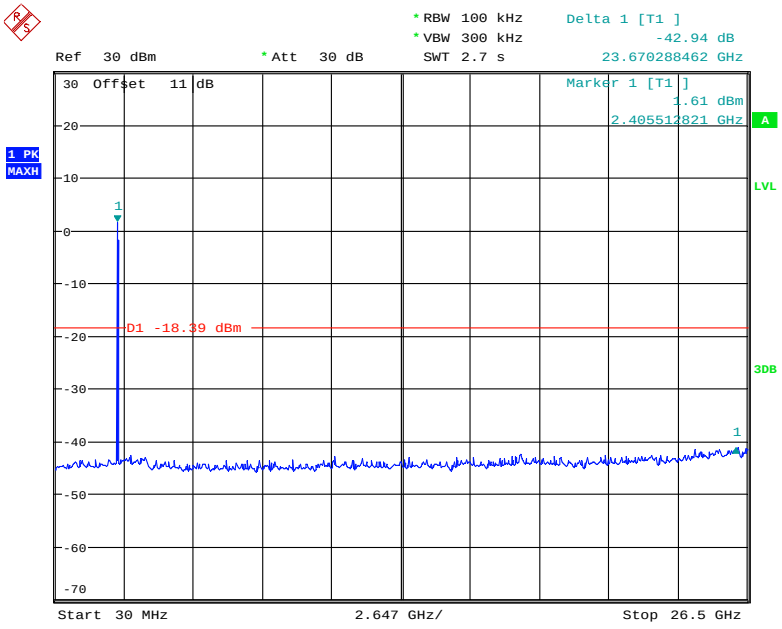
Date: 5.DEC.2016 09:55:29

N20 Mode Low Channel



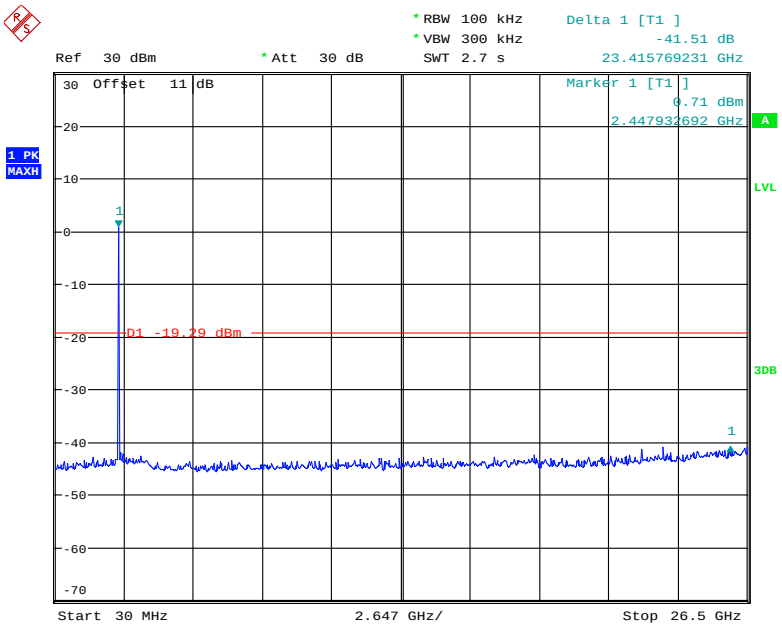
Date: 5.DEC.2016 10:26:51

N20 Mode Middle Channel



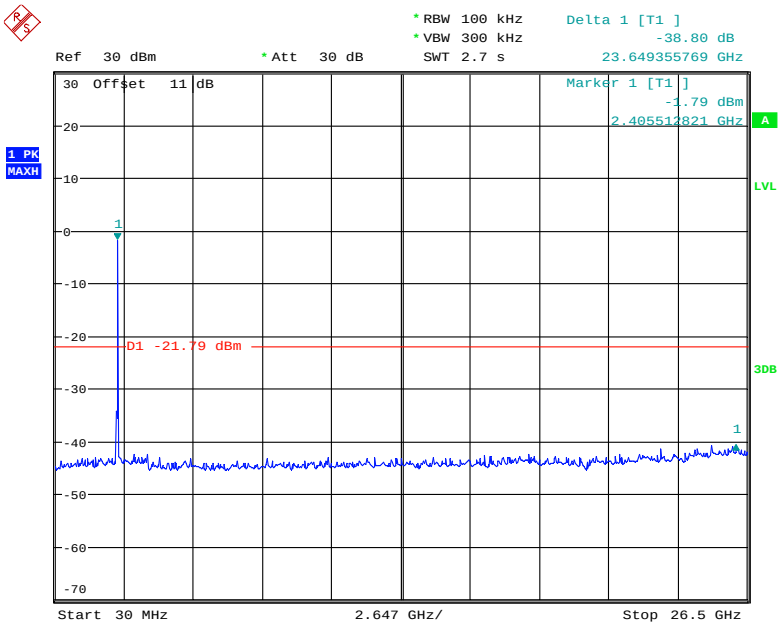
Date: 5.DEC.2016 10:25:31

N20 Mode High Channel



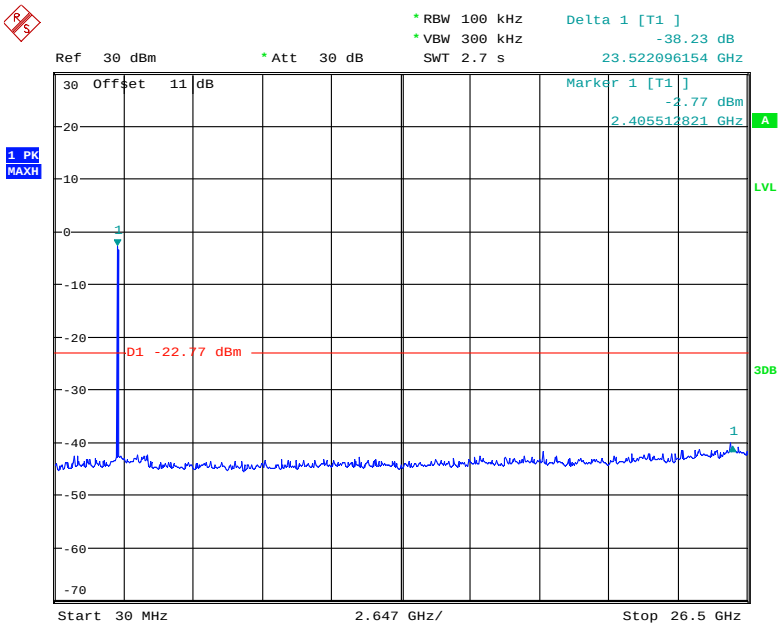
Date: 5.DEC.2016 10:29:57

N40 Mode Low Channel



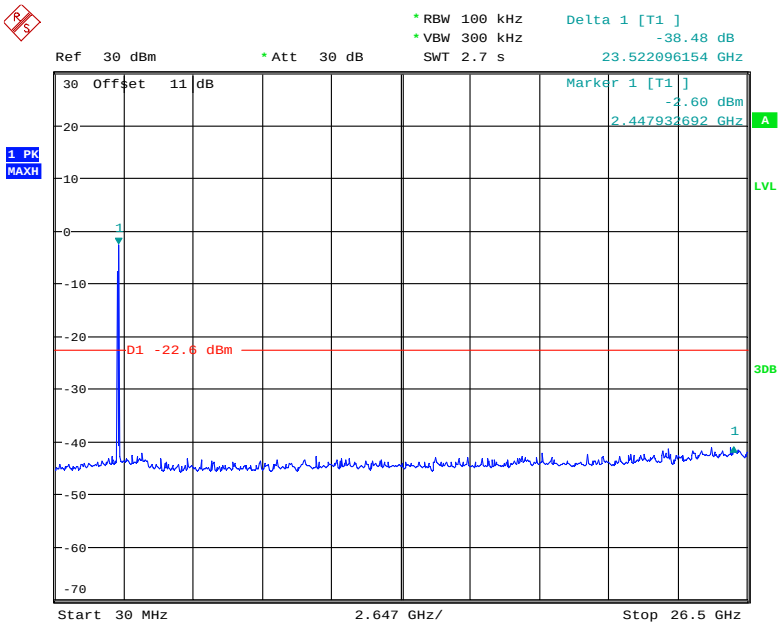
Date: 5.DEC.2016 10:33:48

N40 Mode Middle Channel



Date: 5.DEC.2016 10:38:04

N40 Mode High Channel



Date: 5.DEC.2016 10:40:07

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	2016/11/22	2017/11/21
Spectrum Analyzer	Rohde & Schwarz	FSU26	200268	2016/05/07	2017/05/06
Attenuator	MINI-CIRCUITS	BW-S10W5+	N/A	2017/03/09	2018/03/08

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:	56 %
ATM Pressure:	1010 hPa

The testing was performed by David Hsu on 2017-03-13.

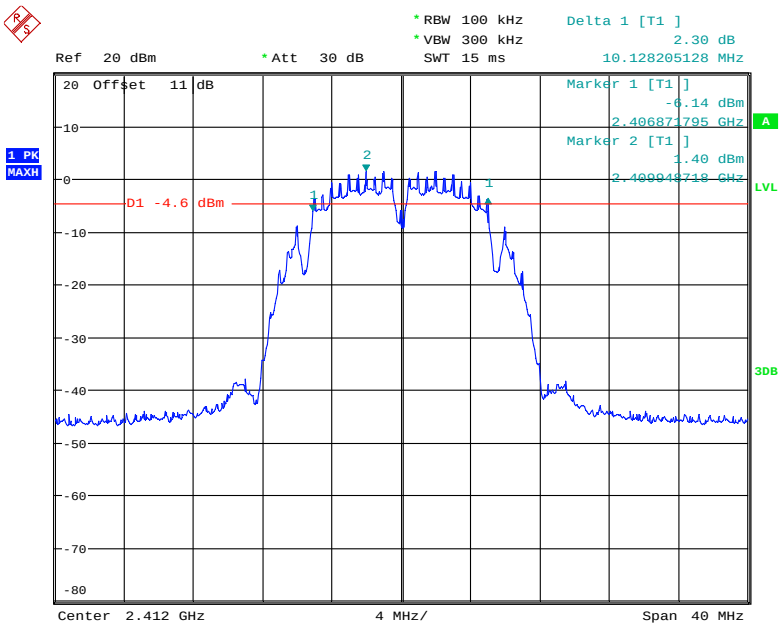
8.5 Test Results

Channel	Frequency (MHz)	6 dBc Bandwidth (MHz)	Limit (MHz)	Result
B Mode				
Low	2412	10.13	≥ 0.5	PASS
Mid	2437	10.13	≥ 0.5	PASS
High	2462	10.06	≥ 0.5	PASS
G Mode				
Low	2412	16.47	≥ 0.5	PASS
Mid	2437	16.41	≥ 0.5	PASS
High	2462	16.41	≥ 0.5	PASS
N20 Mode				
Low	2412	17.37	≥ 0.5	PASS
Mid	2437	17.56	≥ 0.5	PASS
High	2462	17.56	≥ 0.5	PASS
N40 Mode				
Low	2422	36.28	≥ 0.5	PASS
Mid	2437	36.41	≥ 0.5	PASS
High	2452	36.41	≥ 0.5	PASS

Please refer to the following plots

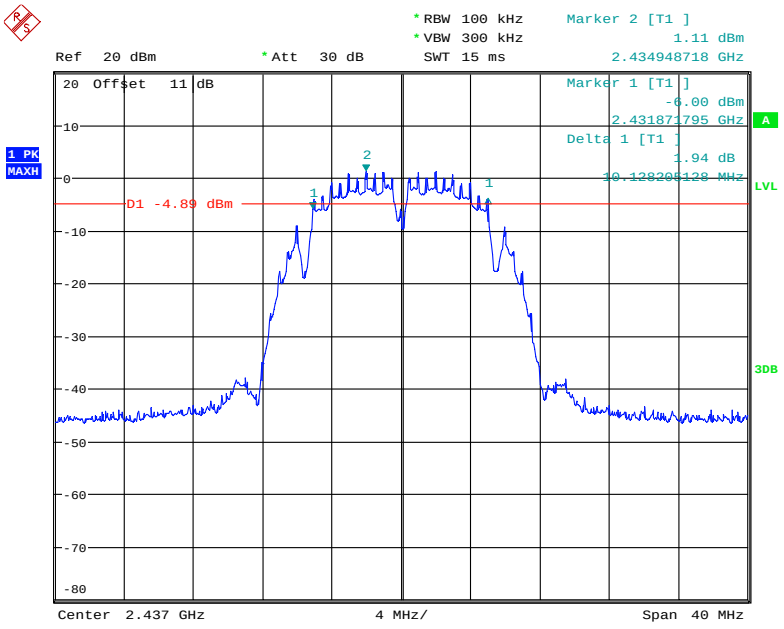
6 dB Emission Bandwidth

B Mode Low Channel



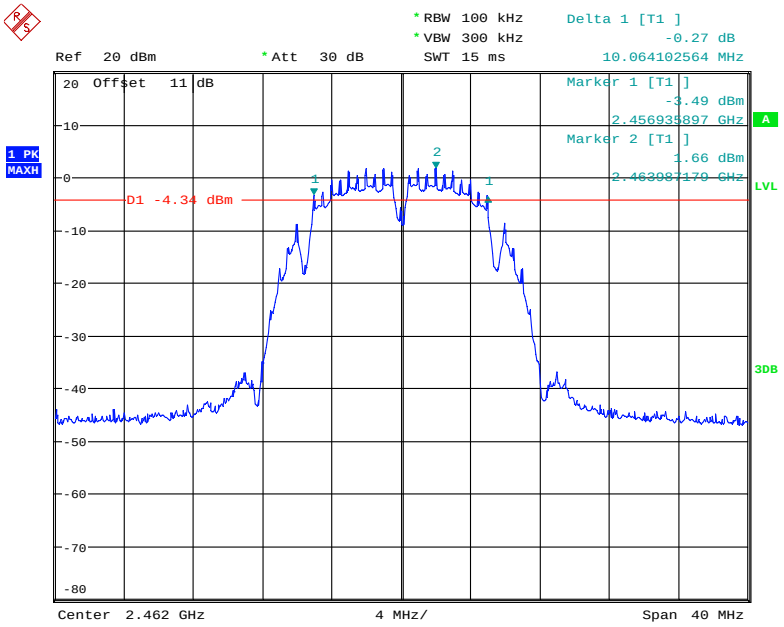
Date: 13.MAR.2017 17:38:17

B Mode Middle Channel



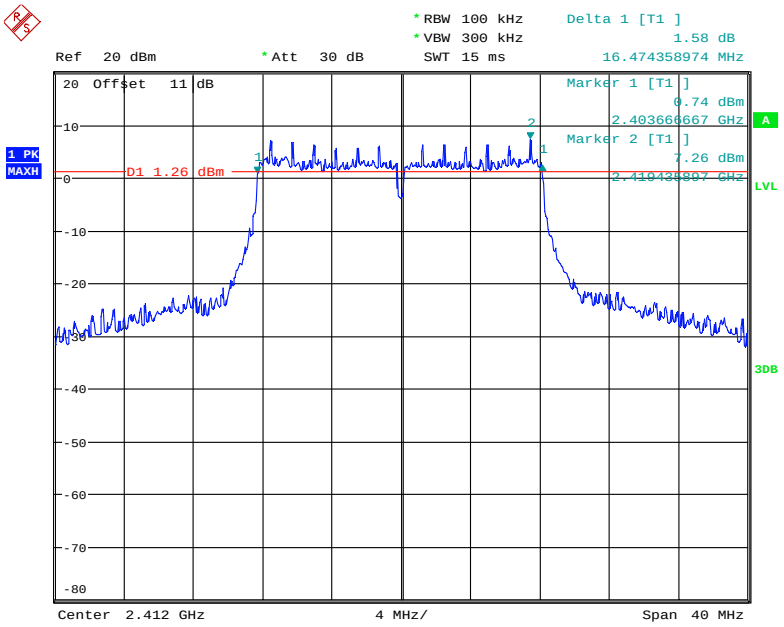
Date: 13.MAR.2017 17:42:47

B Mode High Channel



Date: 13.MAR.2017 17:45:56

G Mode Low Channel



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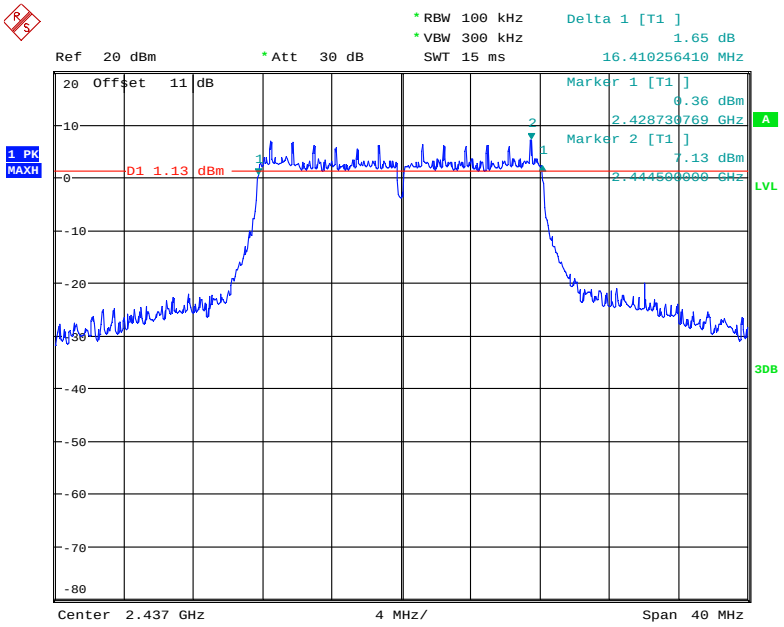
G Mode Middle Channel



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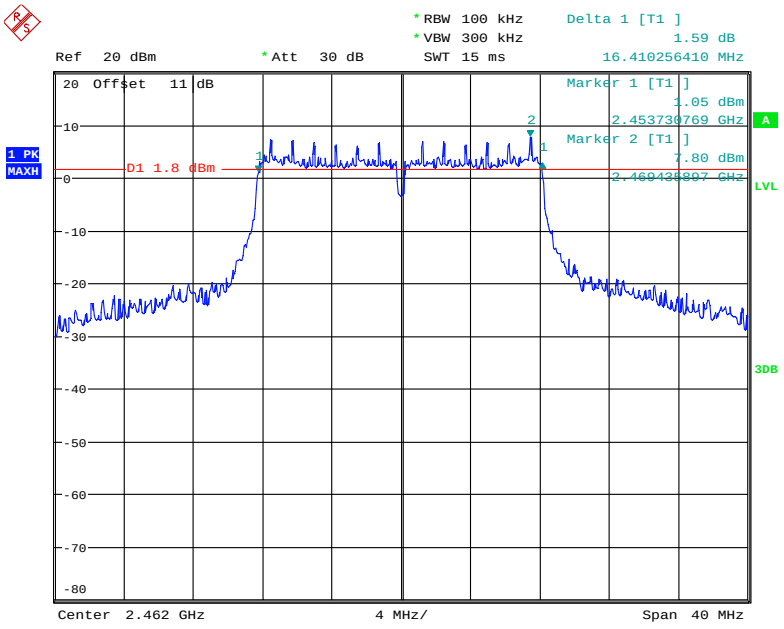
G Mode High Channel



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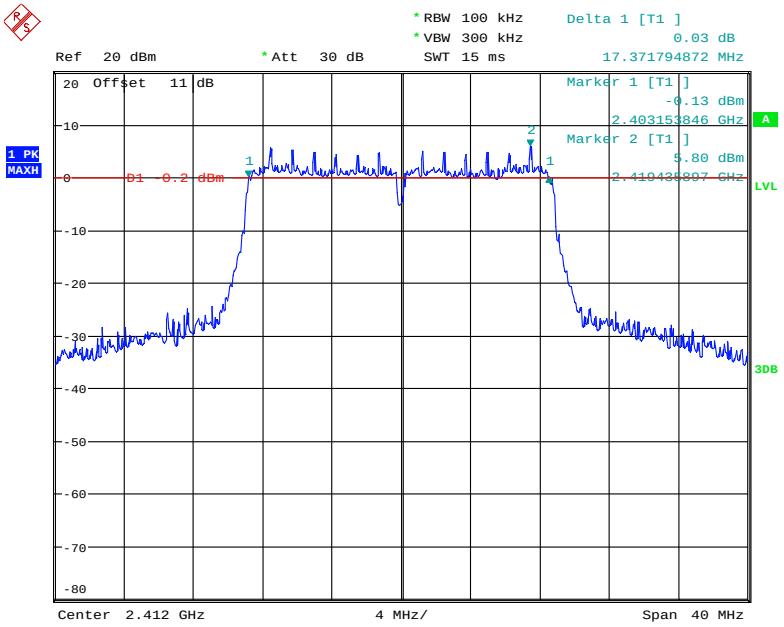
N20 Mode Low Channel



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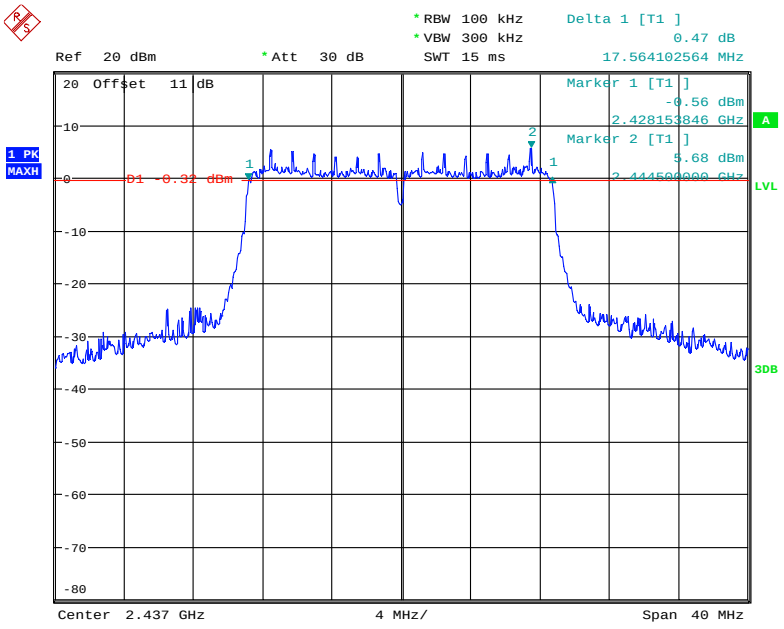
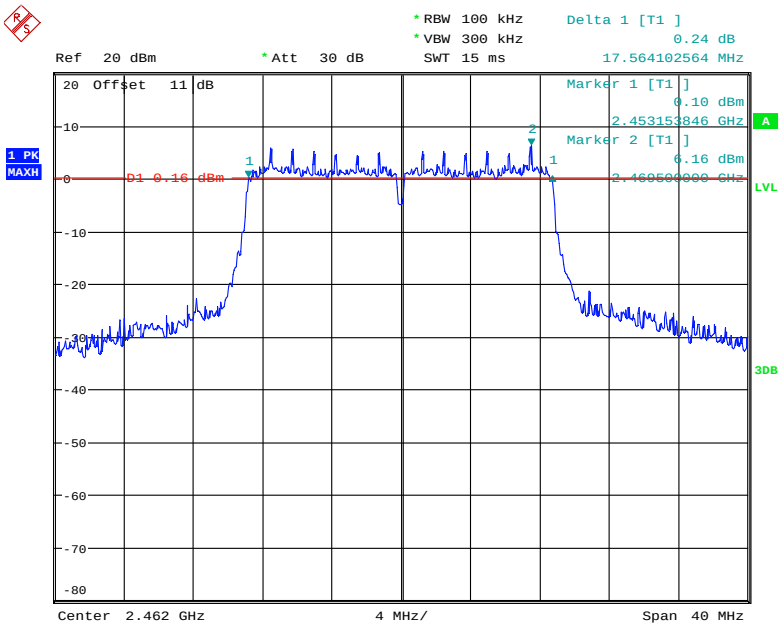
N20 Mode Middle Channel



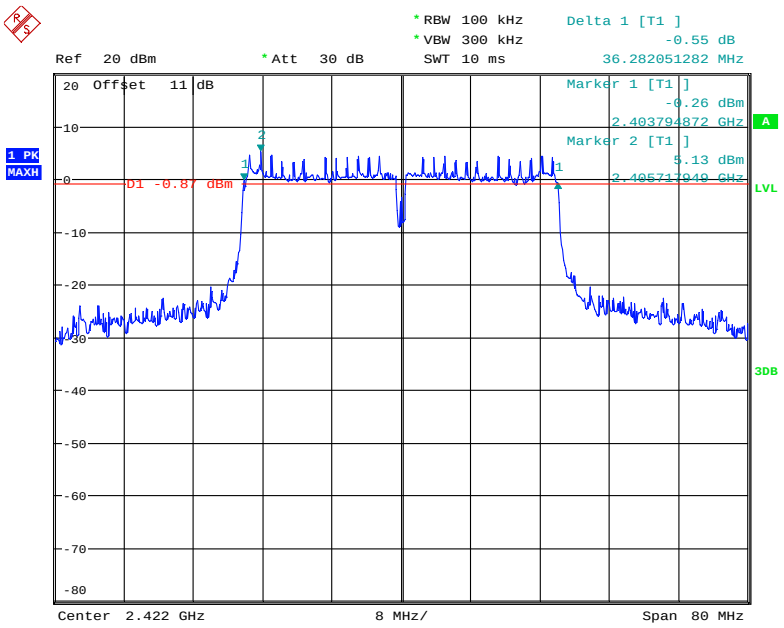
Date: 13.MAR.2017 18:00:47

N20 Mode High Channel



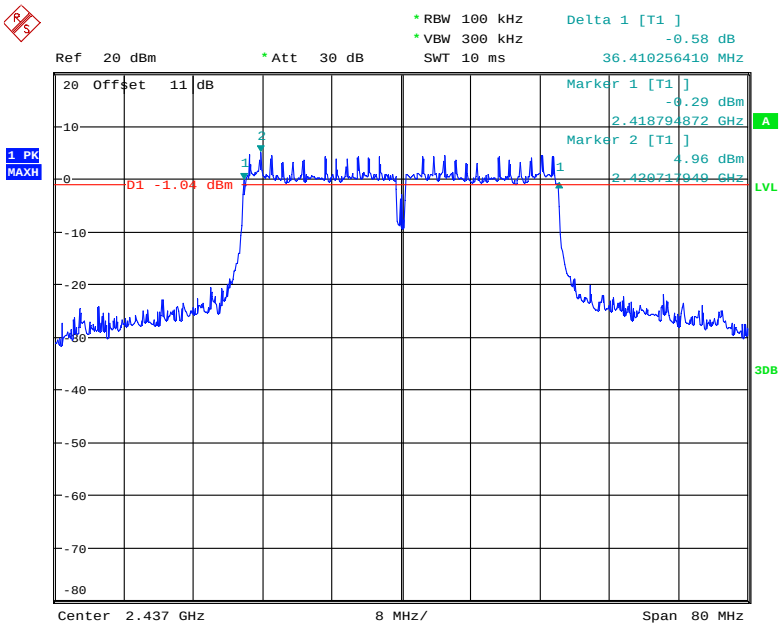
Date: 13.MAR.2017 18:02:51

N40 Mode Low Channel



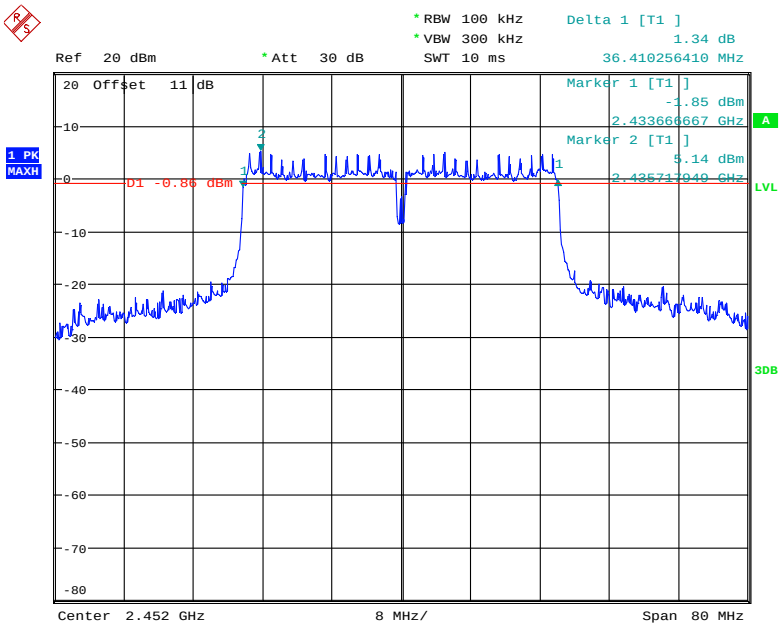
Date: 13.MAR.2017 18:06:29

N40 Mode Middle Channel



Date: 13.MAR.2017 18:09:36

N40 Mode High Channel



Date: 13.MAR.2017 18:14:38

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

9.1 Applicable Standard

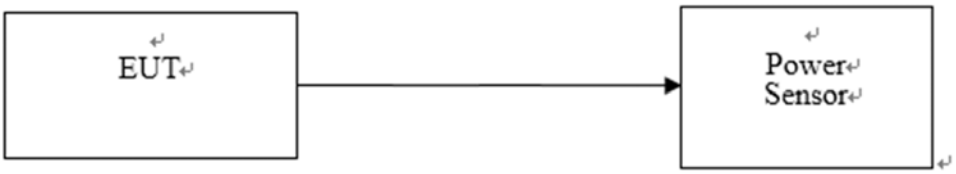
According to FCC §15.247(b) (3).

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
Power Sensor	KEYSIGHT	U2021XA	MY54080018	2016/03/21	2017/03/20
Cable	WOKEN	SFL402	S02-160323-07	2016/11/22	2017/11/21

**** 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 2017-03-13.

9.5 Test Results

Peak power

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
B Mode					
Low	2412	13.99	0.025	1	PASS
Mid	2437	13.81	0.024	1	PASS
High	2462	14.25	0.027	1	PASS
G Mode					
Low	2412	26.34	0.431	1	PASS
Mid	2437	26.17	0.414	1	PASS
High	2462	26.53	0.450	1	PASS
N20 Mode					
Low	2412	25.07	0.321	1	PASS
Mid	2437	24.88	0.308	1	PASS
High	2462	25.36	0.344	1	PASS
N40 Mode					
Low	2422	27.49	0.561	1	PASS
Mid	2437	27.24	0.530	1	PASS
High	2452	27.62	0.578	1	PASS

Average power

Channel	Frequency (MHz)	Measurement value (dBm)	Duty Factor (dB)	Output Power (dBm)	Output Power (W)	Limit (W)
B Mode						
Low	2412	11.04	0.04	11.08	0.013	1
Mid	2437	10.83	0.04	10.87	0.012	1
High	2462	11.33	0.04	11.37	0.014	1
G Mode						
Low	2412	19.84	0.56	20.40	0.110	1
Mid	2437	19.67	0.56	20.23	0.105	1
High	2462	20.07	0.56	20.63	0.116	1
N20 Mode						
Low	2412	18.54	0.60	19.14	0.082	1
Mid	2437	18.31	0.60	18.91	0.078	1
High	2462	18.73	0.60	19.33	0.086	1
N40 Mode						
Low	2422	20.54	1.43	21.97	0.157	1
Mid	2437	20.39	1.43	21.82	0.152	1
High	2452	20.77	1.43	22.20	0.166	1

Note: Output Power=Measurement value+ Duty Factor

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
Spectrum Analyzer	Rohde & Schwarz	FSU26	200268	2016/05/07	2017/05/06
Cable	WOKEN	SFL402	S02-160323-07	2016/11/22	2017/11/21
Attenuator	MINI-CIRCUITS	BW-S10W5+	N/A	2016/03/09	2017/03/08

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

10.4 Test Environmental Conditions

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

The testing was performed by David Hsu on 2016-12-03.

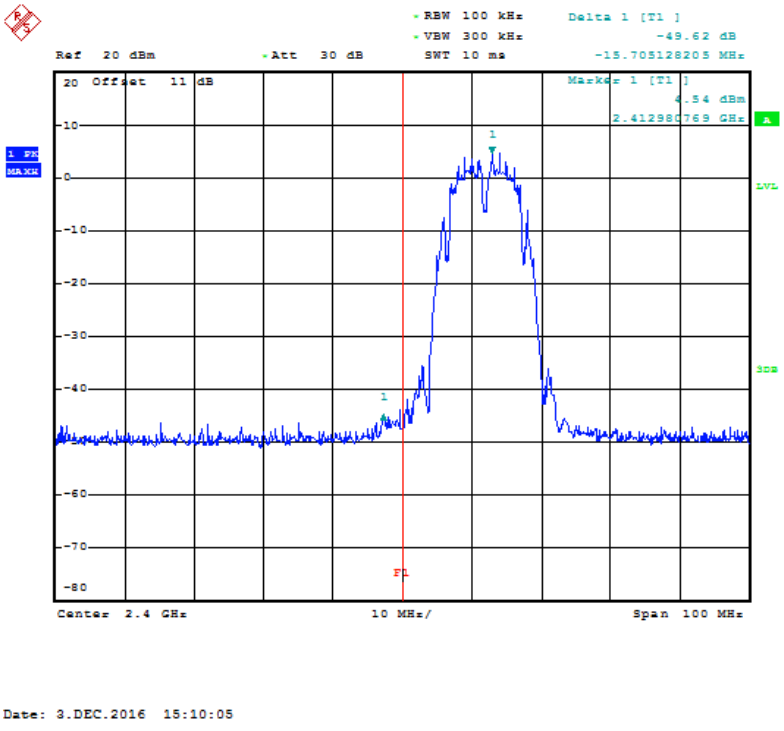
10.5 Test Results

WIFI

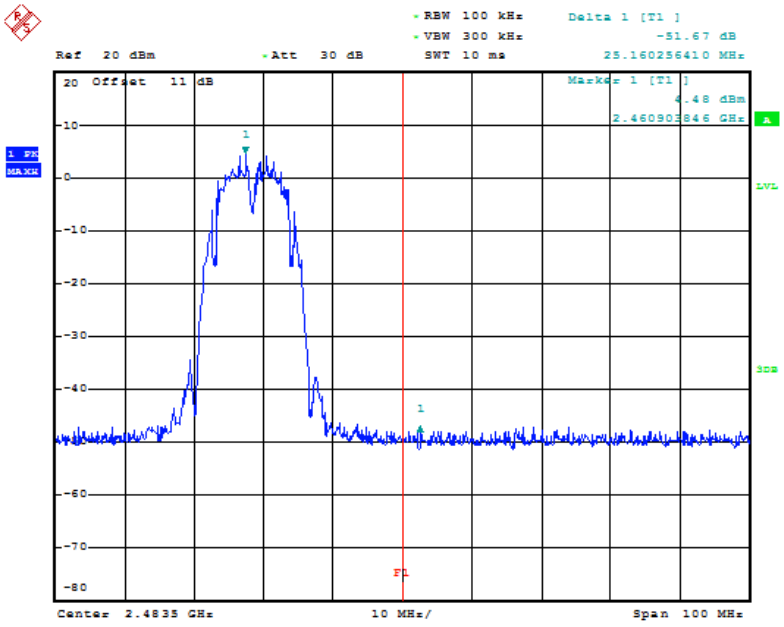
Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
B Mode				
Low	2412	49.62	≥ 20	PASS
High	2462	51.67	≥ 20	PASS
G Mode				
Low	2412	38.75	≥ 20	PASS
High	2462	46.41	≥ 20	PASS
N20 Mode				
Low	2412	39.24	≥ 20	PASS
High	2462	45.25	≥ 20	PASS
N40 Mode				
Low	2422	35.75	≥ 20	PASS
High	2452	41.69	≥ 20	PASS

Please refer to the following plots

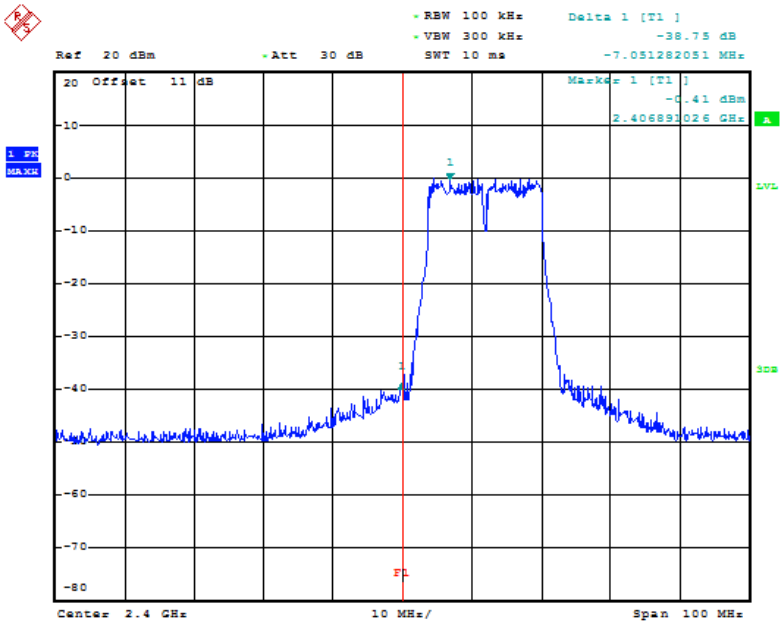
Band Edge, Left Side (B mode / CH Low)



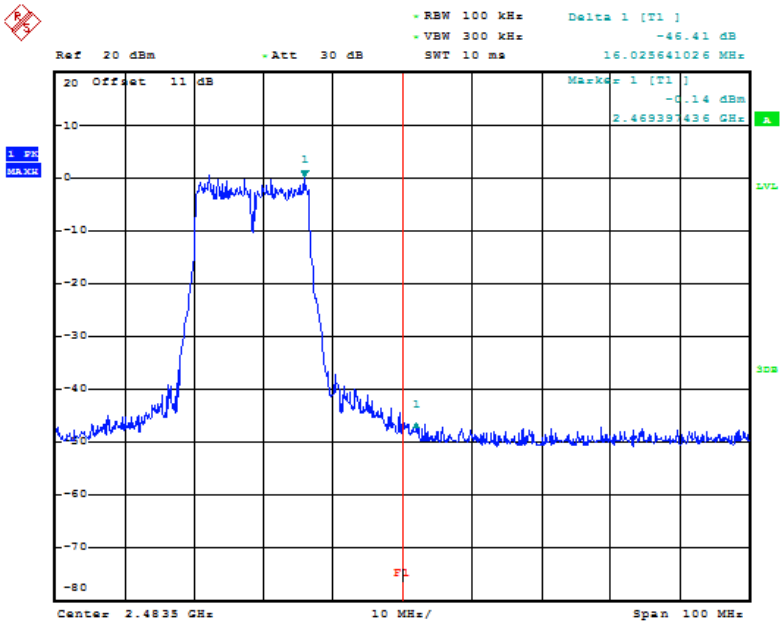
Band Edge, Right Side (B mode / CH High)



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



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



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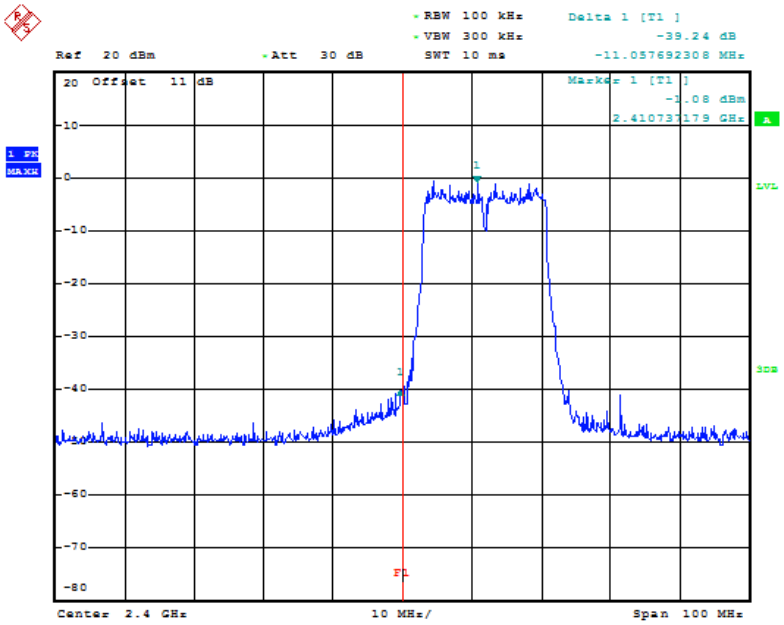
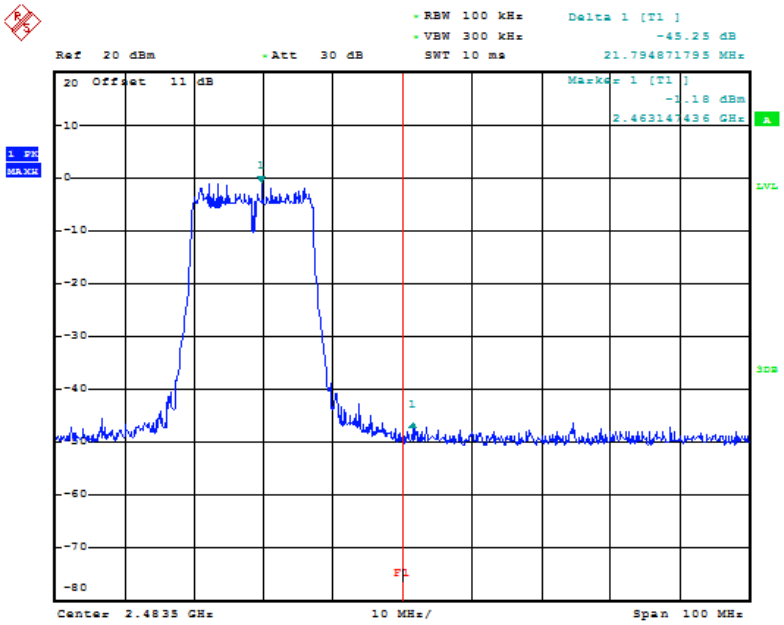
Band Edge, Left Side (N20 mode / CH Low)



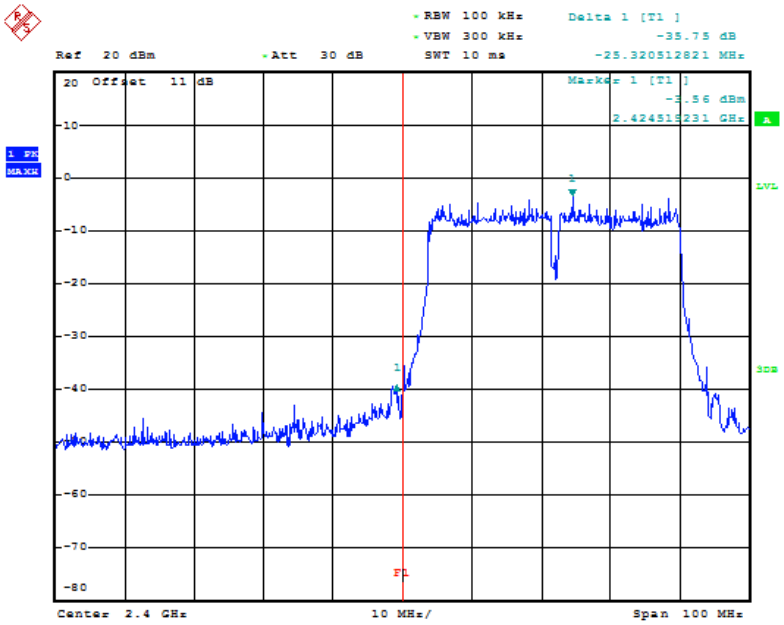
Date: 3.DEC.2016 15:13:34

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



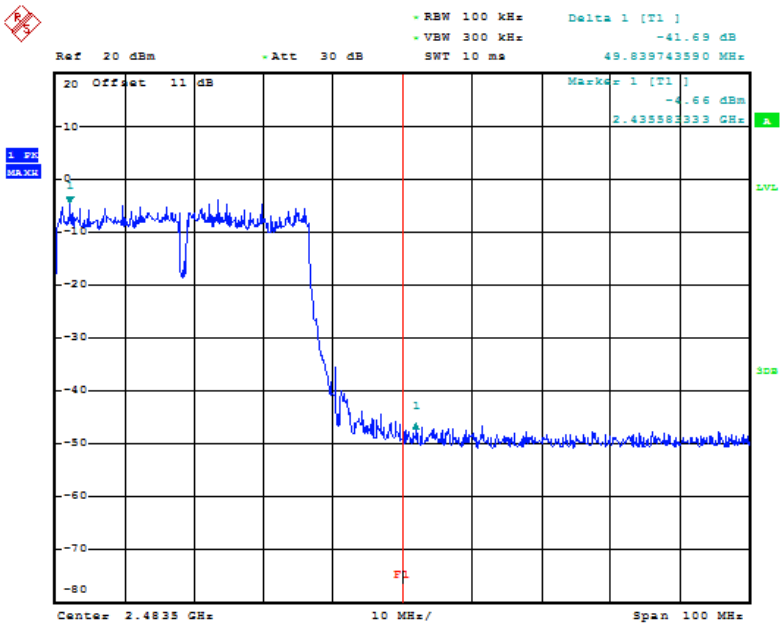
Date: 3.DEC.2016 14:42:02

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



Date: 3.DEC.2016 15:14:34

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



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
Spectrum Analyzer	Rohde & Schwarz	FSU26	200268	2017/05/08	2018/05/07
Cable	WOKEN	SFL402	S02-160323-07	2016/11/22	2017/11/21
Attenuator	MINI-CIRCUITS	BW-S10W5+	N/A	2017/03/09	2018/03/08

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 2017-03-15.

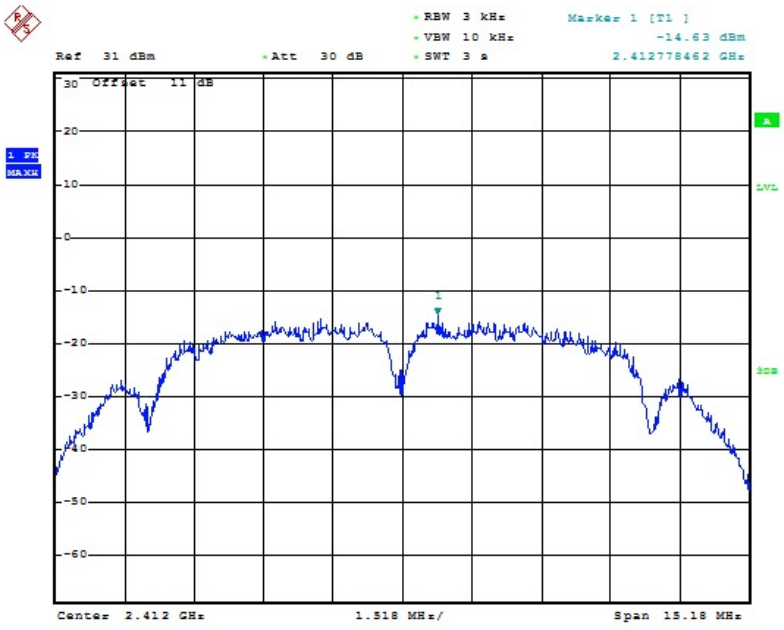
11.5 Test Results

WIFI

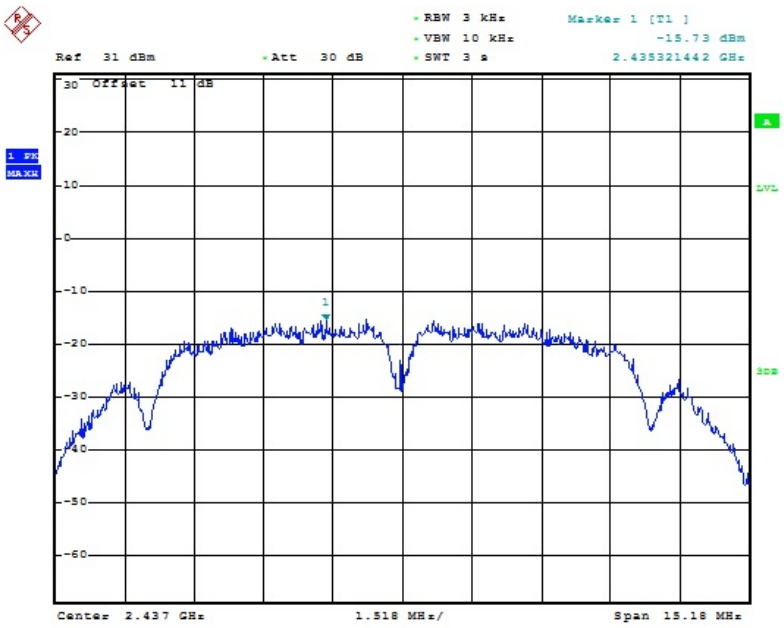
Channel	Frequency (MHz)	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	RESULT
B Mode				
Low	2412	-14.63	8	PASS
Mid	2437	-15.73	8	PASS
High	2462	-15.12	8	PASS
G Mode				
Low	2412	-9.53	8	PASS
Mid	2437	-10.75	8	PASS
High	2462	-9.18	8	PASS
N20 Mode				
Low	2412	-10.45	8	PASS
Mid	2437	-10.02	8	PASS
High	2462	-9.97	8	PASS
N40 Mode				
Low	2422	-9.87	8	PASS
Mid	2437	-11.75	8	PASS
High	2452	-10.68	8	PASS

Please refer to the following plots

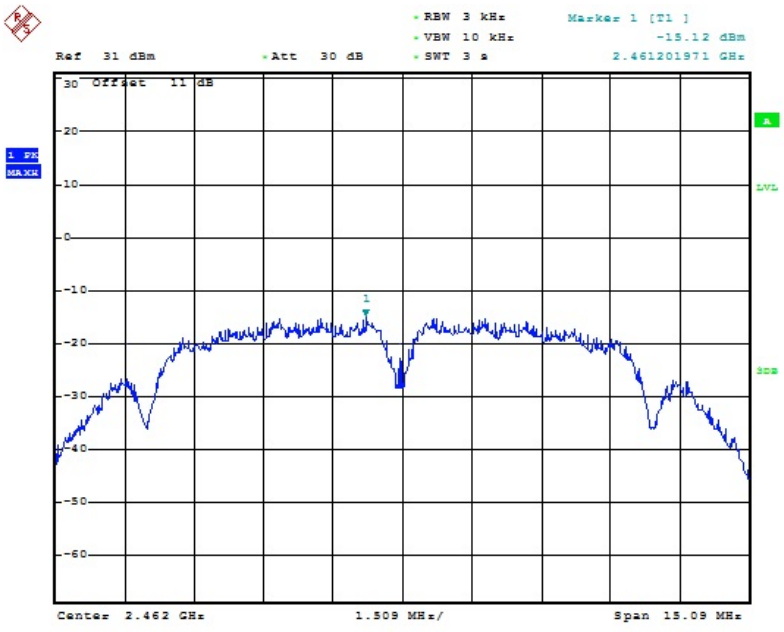
B Mode PPSD Low Channel



B Mode PPSD Middle Channel

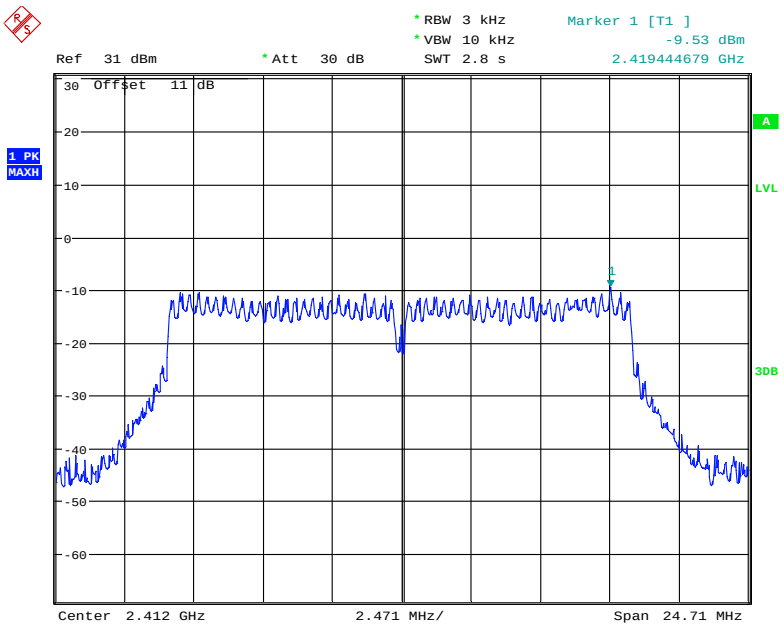


B Mode PPSD High Channel



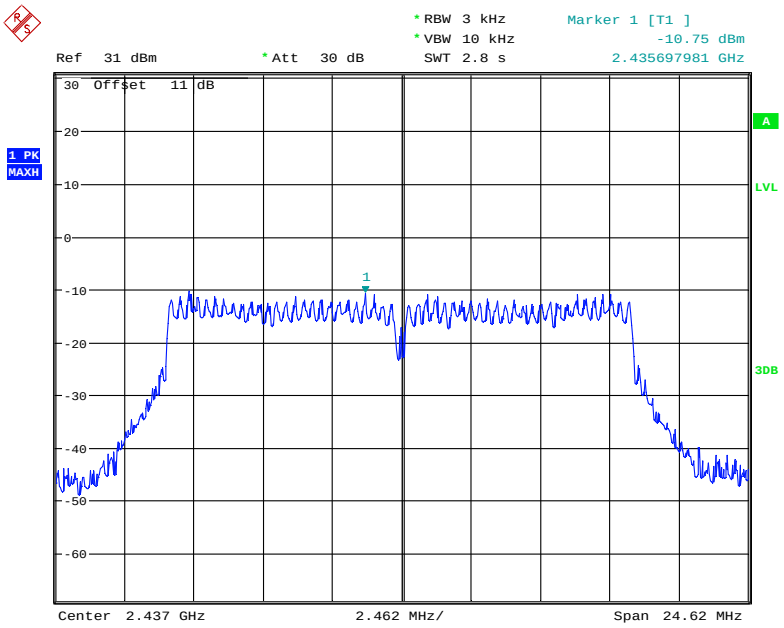
Date: 15.MAR.2017 14:21:31

G Mode PPSD Low Channel



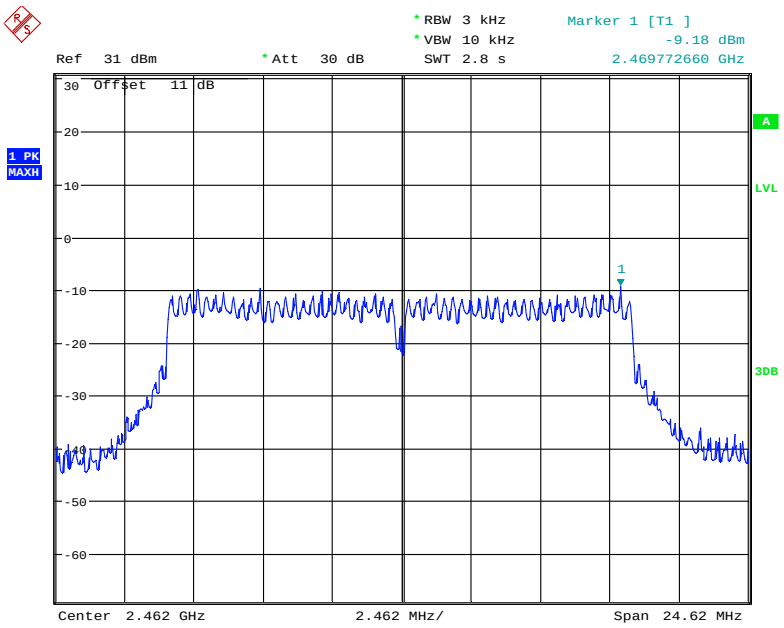
Date: 15.MAR.2017 14:38:30

G Mode PPSD Middle Channel



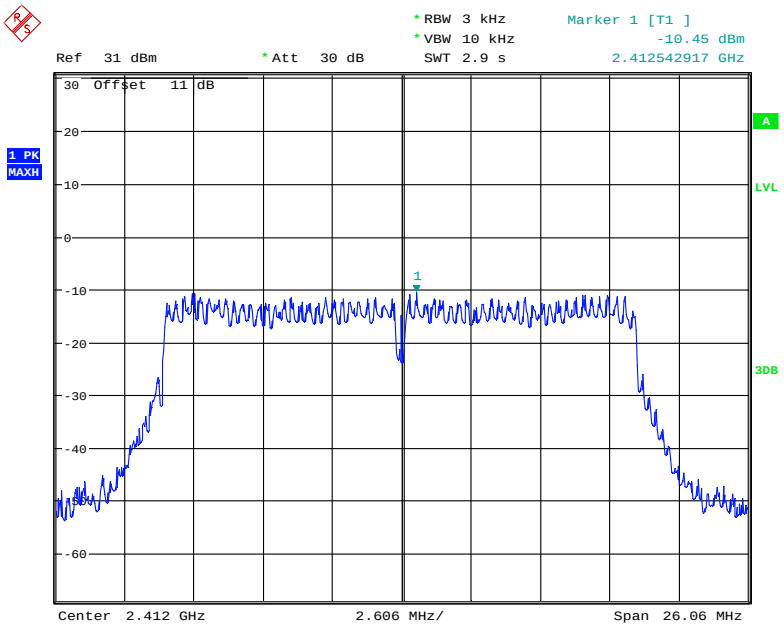
Date: 15.MAR.2017 14:40:17

G Mode PPSD High Channel



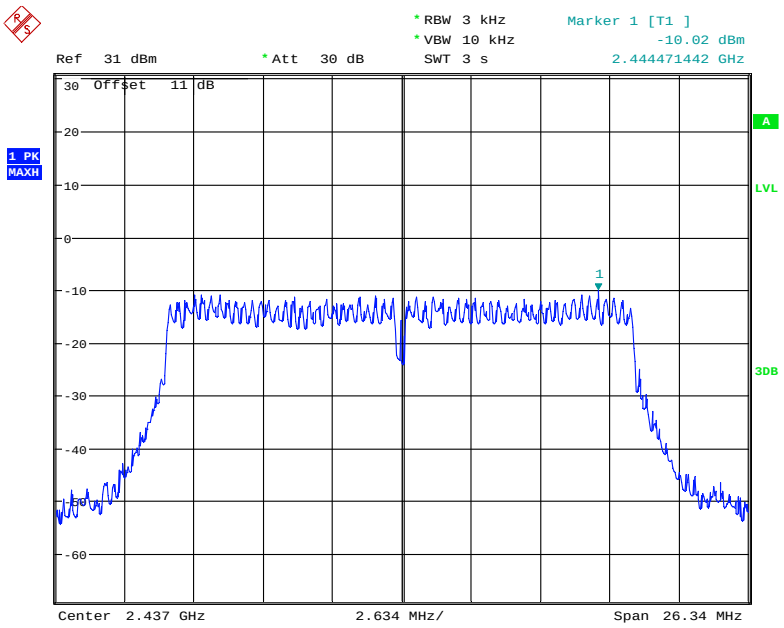
Date: 15.MAR.2017 14:41:36

N20 Mode PPSD Low Channel



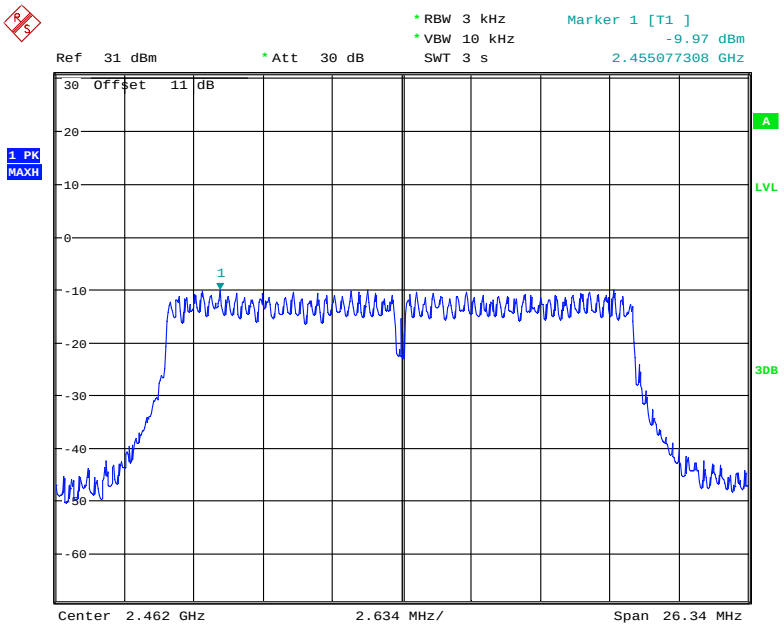
Date: 15.MAR.2017 14:43:57

N20 Mode PPSD Middle Channel



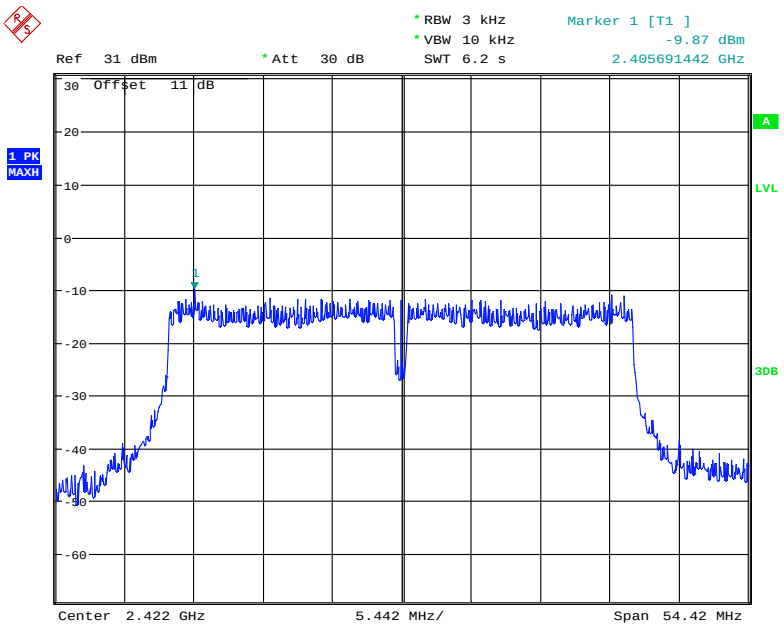
Date: 15.MAR.2017 14:46:28

N20 Mode PPSD High Channel



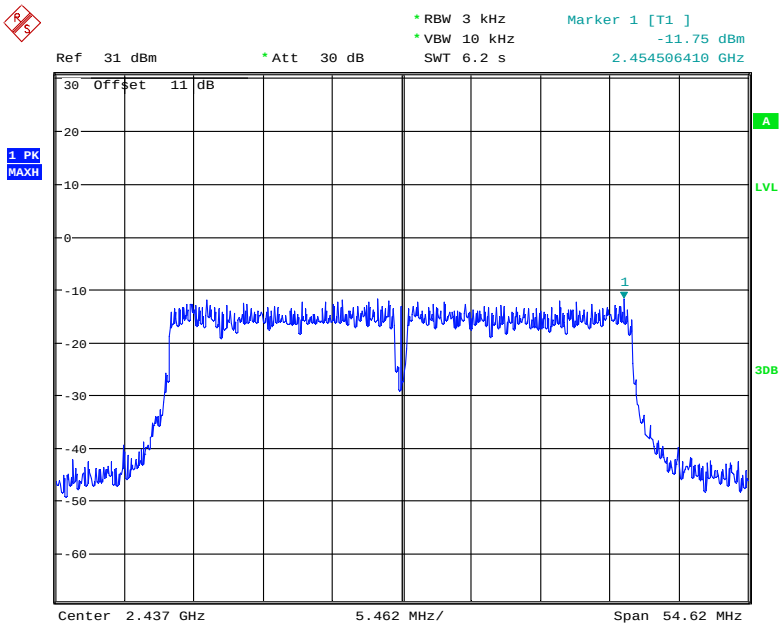
Date: 15.MAR.2017 14:48:47

N40 Mode PPSD Low Channel



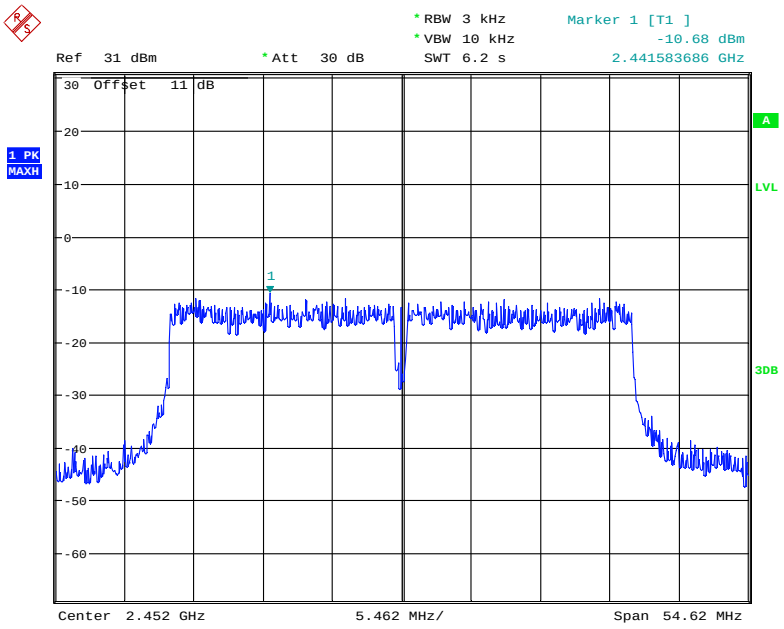
Date: 15.MAR.2017 14:32:45

N40 Mode PPSD Middle Channel



Date: 15.MAR.2017 14:35:11

N40 Mode PPSD High Channel



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