FCC PART 90

TEST REPORT

For

Communication Networks LLC

3 Corporate Drive, DANBURY, Connecticut, United States

FCC ID: 2ANZ6NW10

Report Type:	Product Type:
Original Report	Wireless AP

Test Engineer:	Chris Wang
Report Number:	RKS170721003-00B
Report Date:	2017-12-20
Reviewed By:	Oscar Ye RF Leader
Prepared By:	Bay Area Compliance Laboratories Corp. (Kunshan) No.248 Chenghu Road, Kunshan, Jiangsu province, China Tel: +86-0512-86175000 Fax: +86-0512-88934268 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	Communication Networks LLC
Tested Model	NW10
Seties Model	NW10IN, NW10/M
Product Type	Wireless AP
Dimension	45 mm(L)×15 mm(W)×35 mm(H)
Power Supply	DC48-56V from adapter

Adapter Information:
Model: PSE801G
Input: AC100-240 V 50/60Hz
Output:DC48-56V

** Note: The difference between tested model and series model was explained in the declaration letter.*

**All measurement and test data in this report was gathered from production sample serial number: 20170721001. (Assigned by BACL, Kunshan). The EUT was received on 2017-07-21.*

Objective

This test report is prepared on behalf of Communication Networks LLC in accordance with Part 2, and Part 90 of the Federal Communication Commissions rules.

Related Submittal(s)/Grant(s)

FCC Part 15B JBP and Part 15.407 NII submission with FCC ID: 2ANZ6NW10.

Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of federal Regulations Title 47 Part 2, Part90 as well as the following individual parts:

Part 90 – Private Land Mobile Radio Service

Applicable Standards: KDB 971168 D01, ANSI C63.26-2016.

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

Measurement Uncertainty

Item		Uncertainty
RF conducted test with spectrum		0.9dB
RF Output Power with Power meter		0.5dB
Radiated emission	30MHz~1GHz	5.91dB
	1GHz~6GHz	4.68dB
	6 GHz ~18 GHz	4.92dB
	18 GHz~40 GHz	5.21dB
Occupied Bandwidth		0.5kHz
Temperature		1.0℃
Humidity		6%

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road,Kunshan,Jiangsu province,China.

Bay Area Compliance Laboratories Corp. (Kunshan) Lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4323.01) and the FCC designation No. CN1185 under the FCC KDB 974614 D01. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The EUT was configured for testing in an engineering mode which was provided by the manufacturer.

In **4940~4990 MHz** band, test channel list is as below, EUT was tested with channel 3, 6 and 9.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
3	4950	7	4970
4	4955	8	4975
5	4960	9	4980
6	4965		

EUT Exercise Software

RF test tool: Telnet.

Mode	Data rate	Power level
20M	6 Mbps	0

Special Accessories

No special accessory was used.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

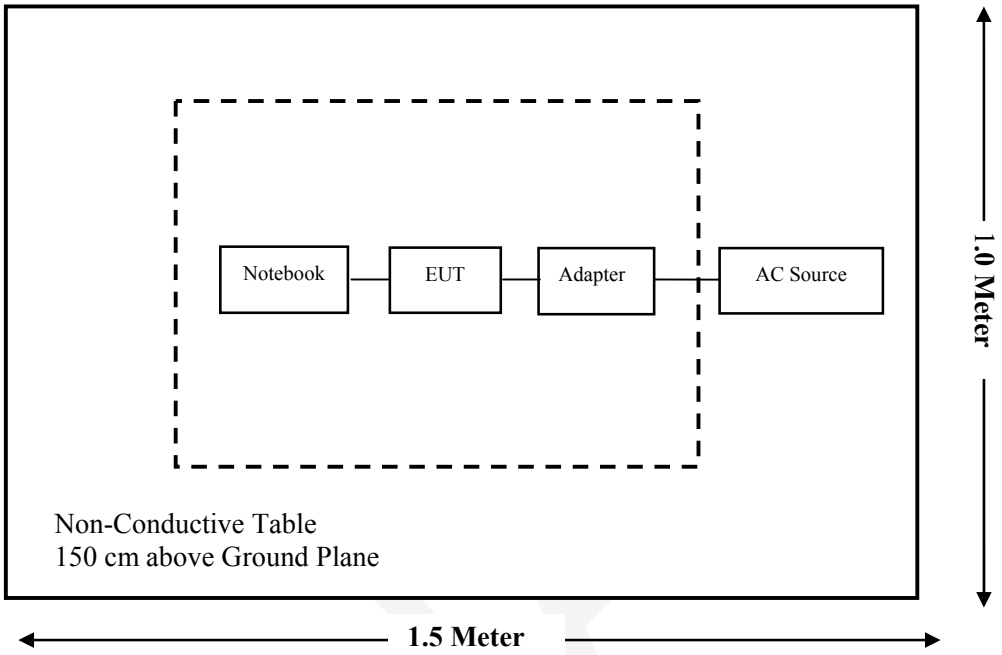
Manufacturer	Description	Model	Serial Number
DELL	Notebook	GX620	D65874152

External I/O Cable

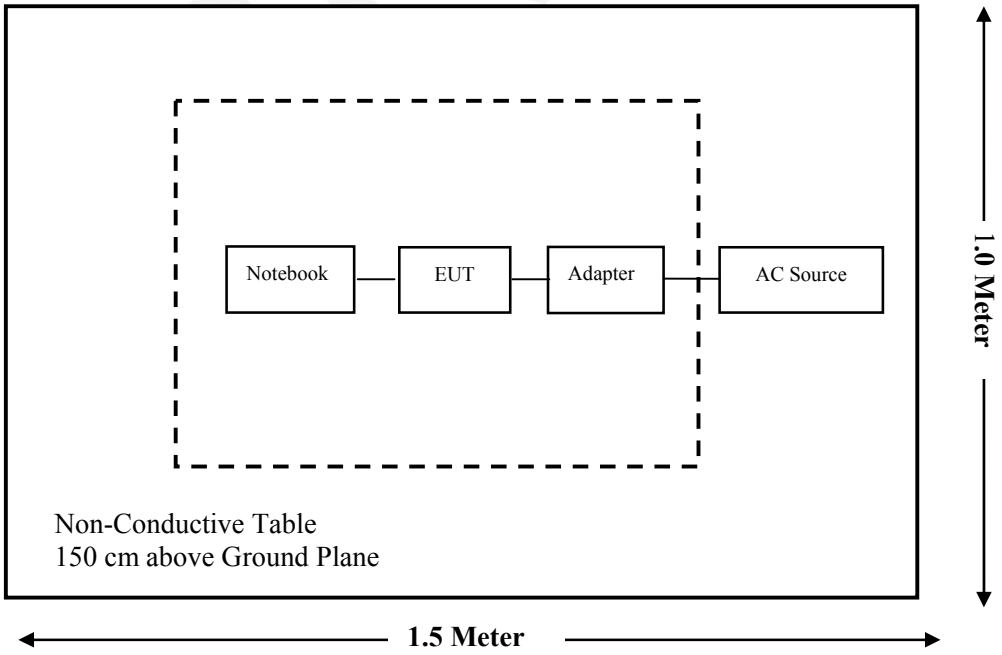
Cable Description	Shielding Type	Length (m)	From Port	To
RJ45 Cable	Un-shielding	1.0	Notebook	EUT

Block Diagram of Test Setup

For Radiated Emissions(Below 1GHz):



For Radiated Emissions(Above 1GHz):



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§1.1307(b), §2.1091	Maximum Permissible Exposure (MPE)	Compliance
§2.1046, § 2.1046, 90.205(p), 90.1215(a)(1)	Power Output	Compliance
§2.1049, 90Y	Occupied Bandwidth	Compliance
§ 90.1215(a)(2)	Power Spectral Density	Compliance
§ 90.1215(e)	Peak Excursion	Compliance
§2.1051, § 90.210(m)	Conducted Spurious Emission at the Antenna Terminals	Compliance
§2.1053, § 90.210(m)	Radiated Spurious Emissions	Compliance
§ 2.1055, § 90.213	Frequency Stability	Compliance*

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test（Chamber 1#）					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2016-12-25	2017-12-24
Sunol Sciences	Broadband Antenna	JB3	A040914-2	2016-01-09	2019-01-08
Sunol Sciences	Broadband Antenna	JB3	A040914-1	2016-01-09	2019-01-08
HP	Signal Generator	8341B	DE23437	2017-08-29	2018-08-28
Sonoma Instrunent	Pre-amplifier	310N	171205	2017-08-15	2018-08-14
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-8	008	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-9	009	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-10	010	2017-08-15	2018-08-14
Radiated Emission Test（Chamber 2#）					
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2016-12-25	2017-12-24
Rohde & Schwarz	Signal Analyzer	FSV40	101116	2017-07-22	2018-07-21
ETS-LINDGREN	Horn Antenna	3115	6229	2016-01-11	2019-01-10
ETS-LINDGREN	Horn Antenna	3115	9311-4159	2016-01-11	2019-01-10
ETS-LINDGREN	Horn Antenna	3116	00084159	2016-10-18	2019-10-17
ETS-LINDGREN	Horn Antenna	3116	2516	2016-10-18	2019-10-17
HP	Signal Generator	8341B	DE23437	2017-08-29	2018-08-28
Narda	Pre-amplifier	AFS42-00101800	2001270	2016-12-22	2017-12-21
Heatsink Required	Amplifier	QLW-18405536-J0	15964001009	2016-12-22	2017-12-21
SINOSCITE	Band Reject Filter	BSF	/	2017-08-05	2018-08-04
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-6	006	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-11	011	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-12	012	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-13	013	2017-08-15	2018-08-14
RF Conducted Test					
Rohde & Schwarz	Signal Analyzer	FSV40	101116	2017-07-22	2018-07-21
Agilent	Power Meter	N1912A	MY5000492	2017-05-16	2018-05-15
Agilent	Power Sensor	N1921A	MY54210024	2017-05-16	2018-05-15
BACL	Temperature & Humidity Chamber	BTH-150	30023	2017-07-20	2018-07-19
EAST	Regulated DC Power Supply	MCH-303D-II	14070562	2017-07-20	2018-07-19
Communication Networks	RF Cable	/	/	/	/

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

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

Applicable Standard

According to §2.1091and §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

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);

Calculated Data:

Mode	Frequency Range (MHz)	Antenna Gain		Tune up Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
802.11a	5150-5250	19	79.43	10	10.00	100	0.0063	1.0
	5725-5850	19	79.43	14	25.12	100	0.0159	1.0
802.11n ht20	5150-5250	19	79.43	13	19.95	100	0.0126	1.0
	5725-5850	19	79.43	17	50.12	100	0.0317	1.0
802.11n ht40	5150-5250	19	79.43	13	19.95	100	0.0126	1.0
	5725-5850	19	79.43	17	50.12	100	0.0317	1.0
20MHz	4950-4980	19	79.43	20	100.00	100	0.0632	1.0

Note:

The tune up powers are declared by the Manufacturer.

Result: The device meet.FCC MPE at 100cm distance.

FCC § 2.1049 - OCCUPIED BANDWIDTH

Applicable Standard

FCC Part 2.1049

Test Procedure

The following procedure shall be used for measuring (99 %) power bandwidth

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (i.e., two to five times the OBW).
b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.
c) Set the reference level of the instrument as required to keep the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least 10log (OBW / RBW) below the reference level.
d) NOTE—Steps a) through c) may require iteration to adjust within the specified tolerances.
e) Set the detection mode to peak, and the trace mode to max hold..
f) Use the 99 % power bandwidth function of the spectrum analyzer (if available) and report the measured bandwidth.
g) If the instrument does not have a 99 % power bandwidth function, the trace data points are to be recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99 % power bandwidth is the difference between these two frequencies.
h) The OBW shall be reported by providing plot(s) of the measuring instrument display. The frequency and amplitude axes and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

Test Data

Environmental Conditions

Temperature:	22.3 ℃
Relative Humidity:	51%
ATM Pressure:	101.2 kPa

The testing was performed by Chris Wang on 2017-11-20.

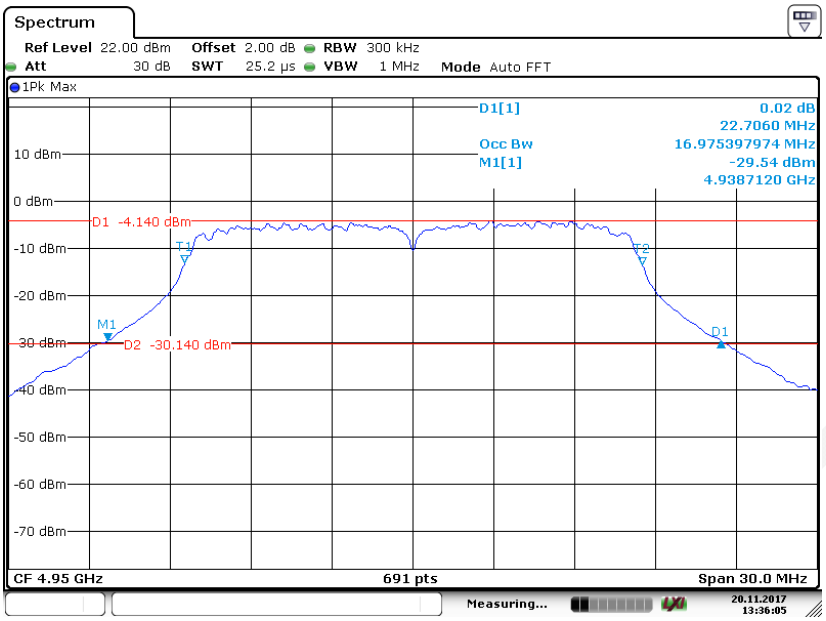
EUT Operation Mode: Transmitting

Test Result: Compliance.

Declared Channel Bandwidth (MHz)	Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	
			Chain0	Chain1
20	Low	4950	16.98	16.98
	Middle	4965	16.98	16.98
	High	4980	16.89	17.06

Chain 0

Low Channel



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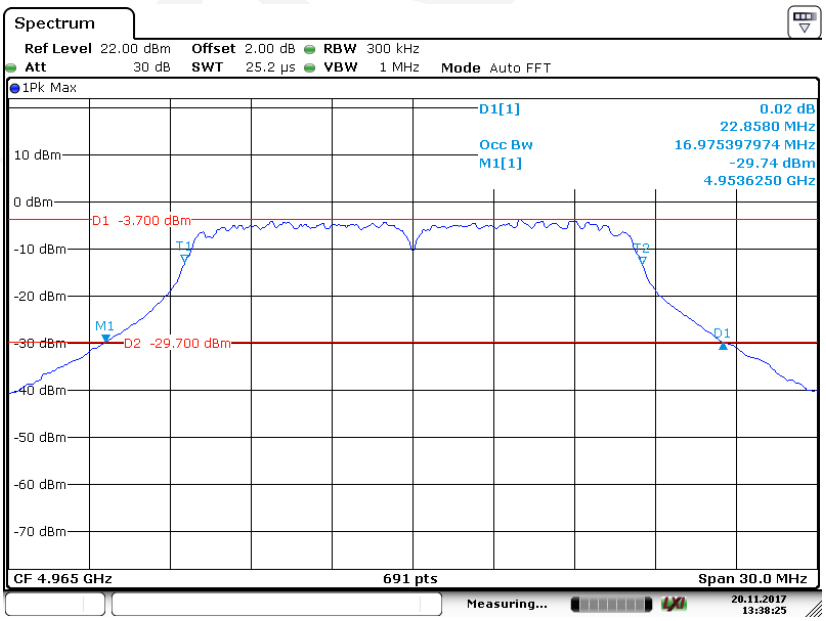
Middle Channel



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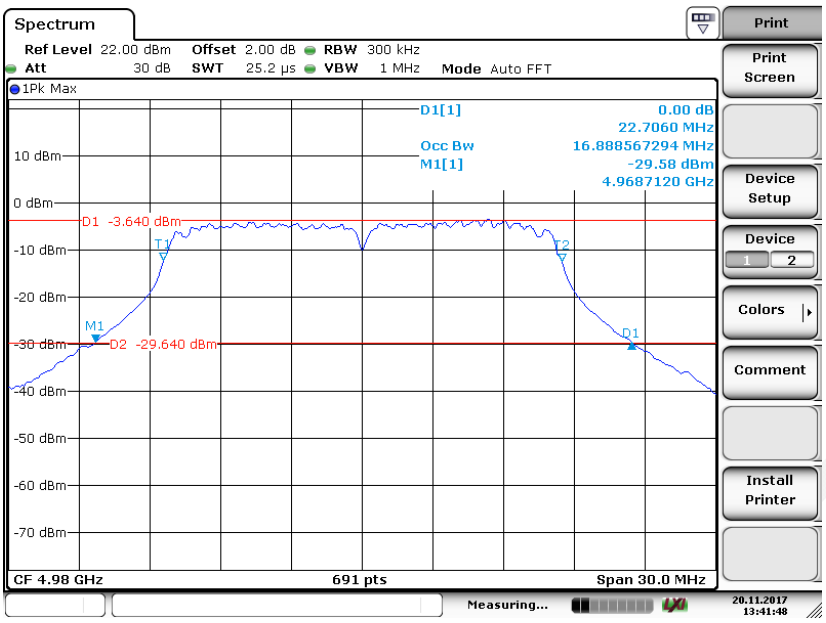

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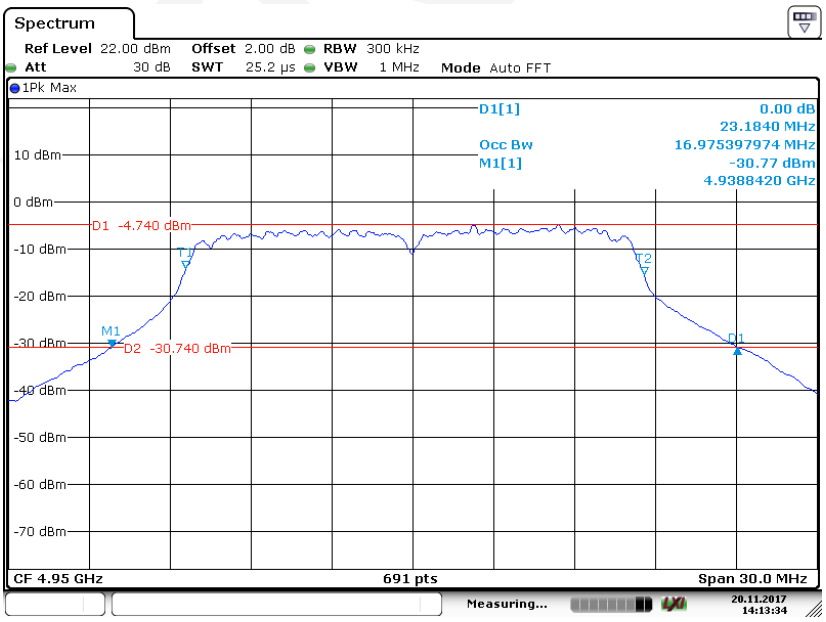
Chain 1

Low Channel



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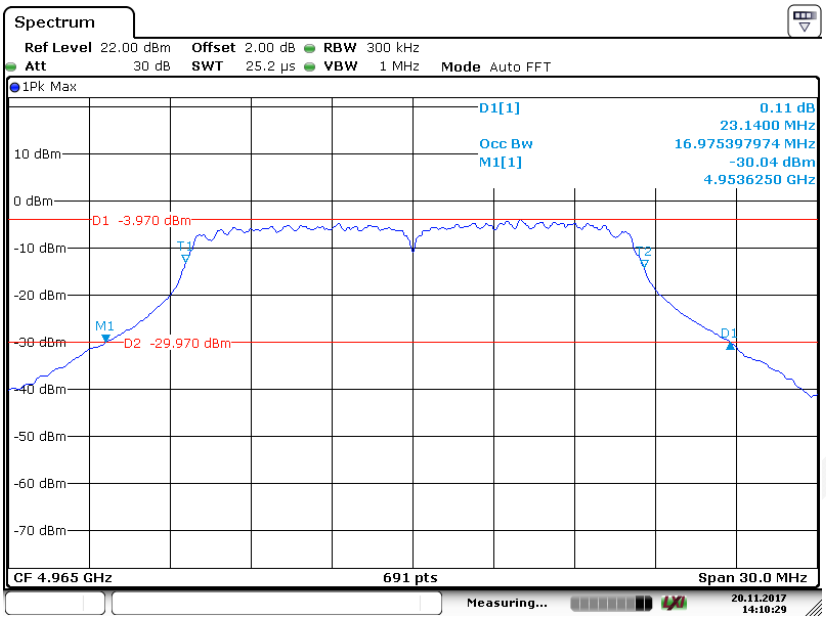

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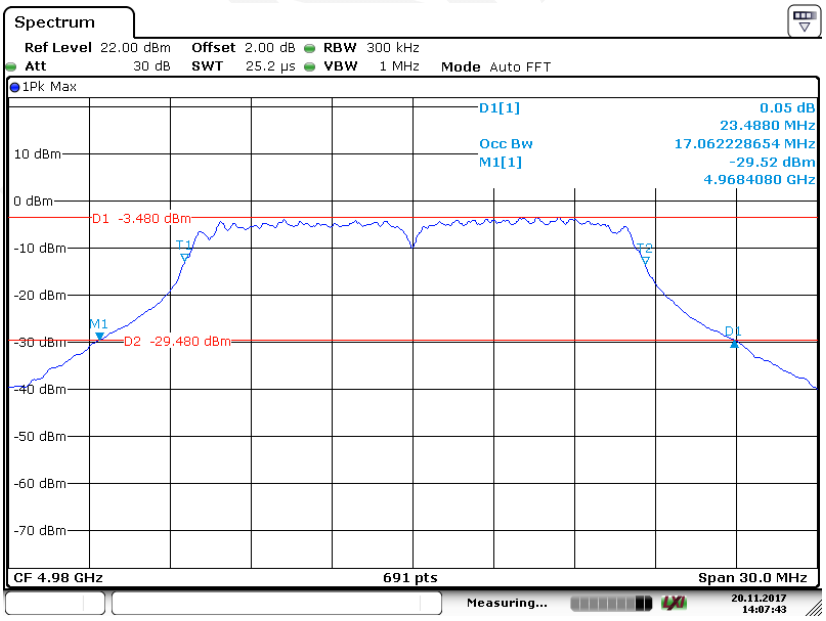
High Channel



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FCC § 2.1046, § 2.1046, § 90.205(p), § 90.1215(a)(1) - POWER OUTPUT

Applicable Standard

FCC Part 2.1046, 90.205(p), & 90.1215(a)(1)
(1) The maximum conducted output power should not exceed 33 dBm
(2)High power devices are also limited to a peak power spectral density of 21 dBm per one MHz. High power devices using channel bandwidths other than those listed above are permitted; however, they are limited to peak power spectral density of 21 dBm/MHz. If transmitting antennas of directional gain greater than 9 dBi are used, both the maximum conducted output power and the peak power spectral density should be reduced by the amount in decibels that the directional gain of the antenna exceeds 9 dBi.

Test Procedure

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

Test Data

Environmental Conditions

Temperature:	22.3 ℃
Relative Humidity:	51%
ATM Pressure:	101.2 kPa

The testing was performed by Chris Wang on 2017-11-21.

EUT Operation Mode: Transmitting

Test Result: Compliance.

Decleared Channel Bandwidth (MHz)	Channel	Frequency (MHz)	Maximum Conducted Output Power (dBm)			Limit (dBm)
			Chain0	Chain1	Total	
20	Low	4950	15.38	15.96	18.69	23
	Middle	4965	15.61	16.37	19.02	23
	High	4980	15.80	16.45	19.15	23

Note:

1: The total output power=10Log10(10^(Chain 0/10)+10^(Chain 1/10))
2: The antenna gain is 19dBi, So the limit should be 33dBm-(19dBi-9dBi)=23dBm

FCC § 2.1046 , § 90.205(p), § 90.1215(a)(2) - POWER SPECTRAL DENSITY

Applicable Standard

FCC Part 2.1046, 90.205(p), & 90.1215(a)(2)

Test Procedure

Procedure for use when EUT can be configured to transmit continuously or when sweep triggering/signal gating can be properly implemented

The EUT is considered to transmit continuously if it can be configured to transmit at a burst duty cycle of greater than or equal to 98% throughout the duration of the measurement. If this condition can be achieved, then the following procedure can be used to measure the average PSD.

This procedure can also be used when the EUT cannot be configured to transmit continuously, provided that the measurement instrument can be configured to trigger a sweep at the beginning of each full-power transmission burst, and the sweep time is less than or equal to the minimum transmission time during each burst (i.e., no burst off-time is to be included in the measurement).

a) Set the analyzer center frequency to the OBW center frequency.
b) Set the span to 1.5 times the OBW bandwidth.
c) Set the RBW to the specified reference bandwidth (often 1 MHz).
d) Set the VBW ≥ 3 × RBW.
e) Set the number of points in sweep ≥ span / RBW.
Note: This requirement is applicable only to final measurement. It can be violated for preliminary (pre-scan) measurements when necessary for wide span measurements.
f) Detector = peak.
g) Sweep time = auto couple.
h) Trace mode = max hold.
i) Allow trace to fully stabilize.
j) Use the peak marker function to determine the maximum amplitude level within the specified reference bandwidth (PSD)

Test Data

Environmental Conditions

Temperature:	22.3 ℃
Relative Humidity:	51%
ATM Pressure:	101.2 kPa

The testing was performed by Chris Wang on 2017-11-20.

EUT Operation Mode: Transmitting

Test Result: Compliance.

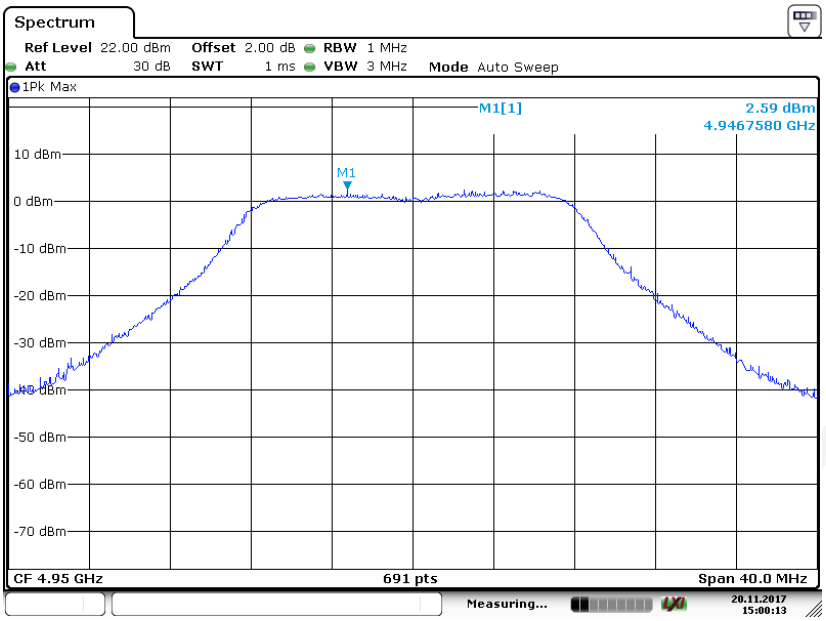
Decleared Channel Bandwidth (MHz)	Channel	Frequency (MHz)	PSD (dBm/MHz)			Limit (dBm/MHz)
			Chain0	Chain1	Total	
20	Low	4950	2.59	2.30	5.46	11
	Middle	4965	2.39	3.57	6.03	11
	High	4980	2.95	3.72	6.36	11

Note:

1: The total PSD=10Log10(10^(Chain 0/10)+10^(Chain 1/10))
2: The antenna gain is 19dBi, So the limit should be 21dBm-(19dBi-9dBi)=11dBm

Chain 0

Low Channel



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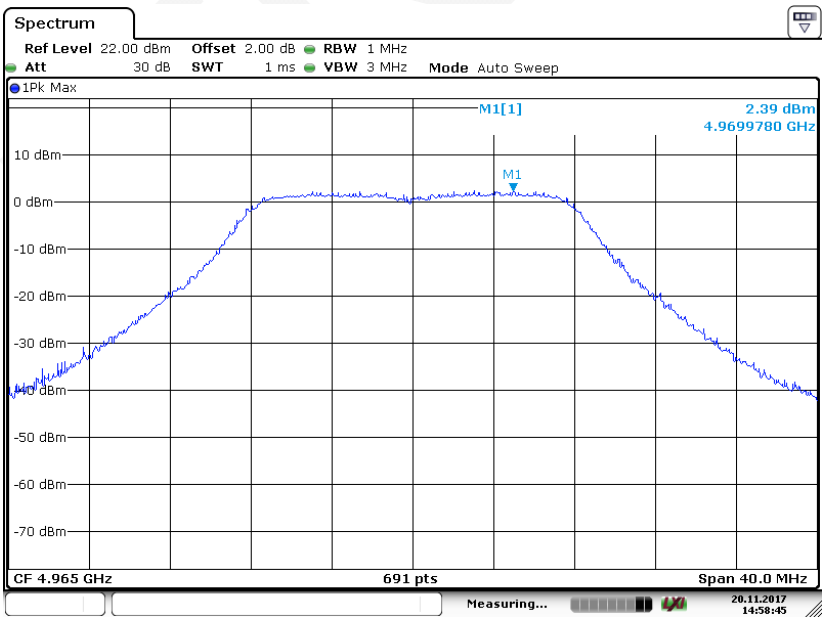
Middle Channel



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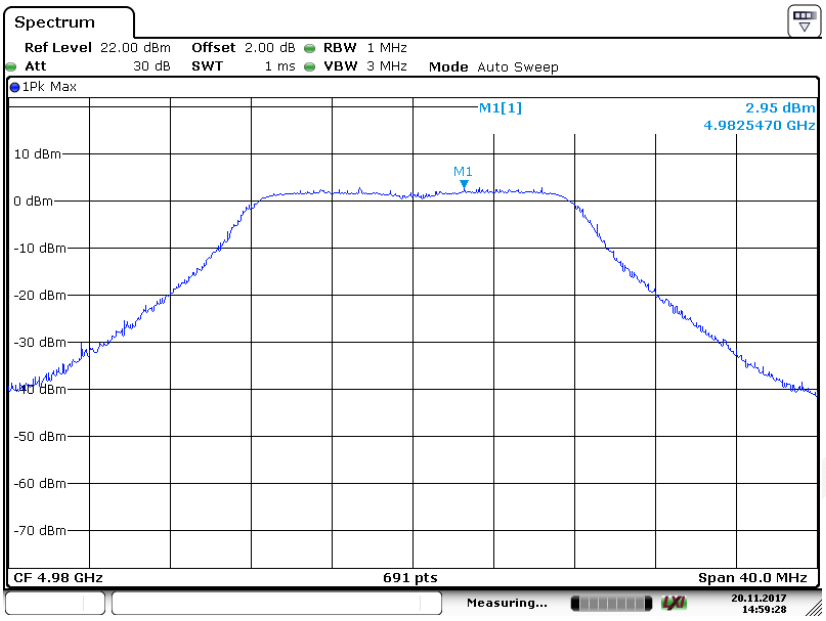
High Channel



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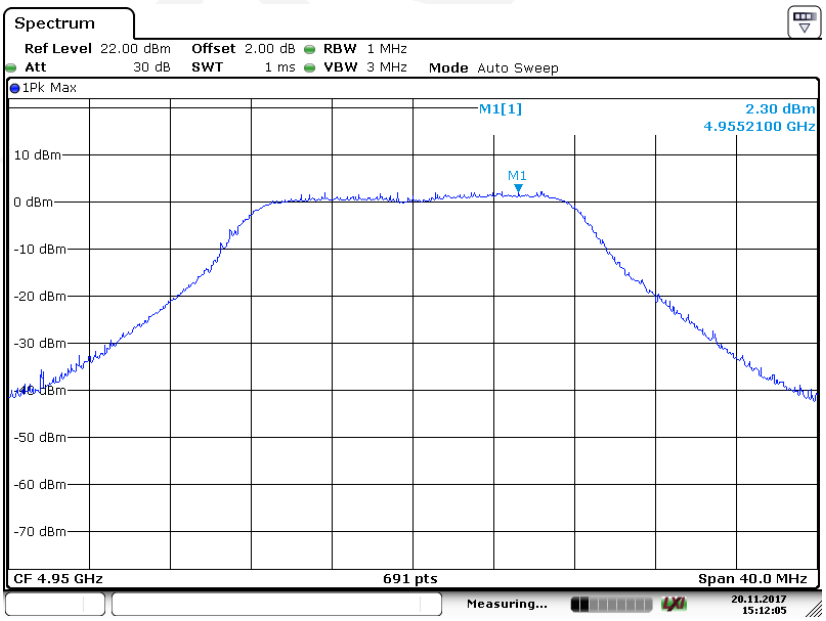
Chain 1

Low Channel



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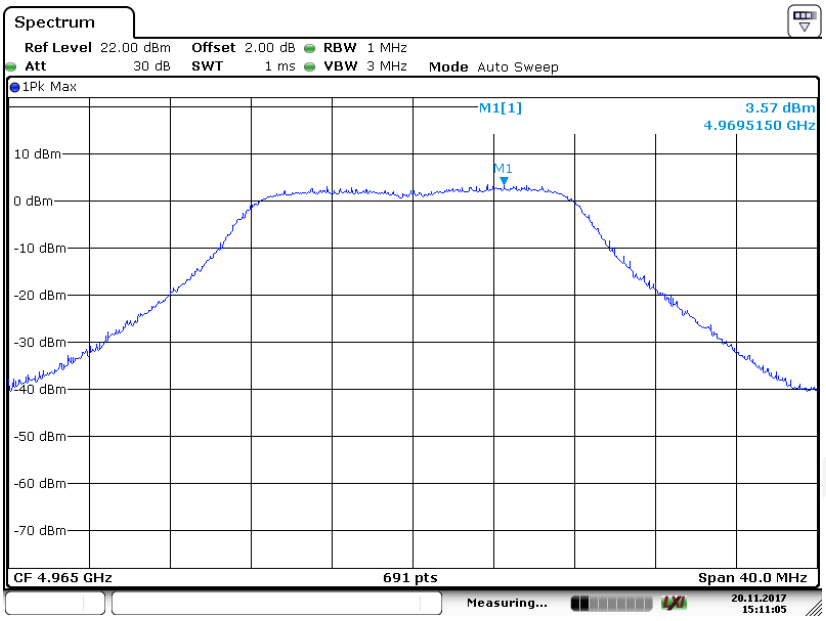

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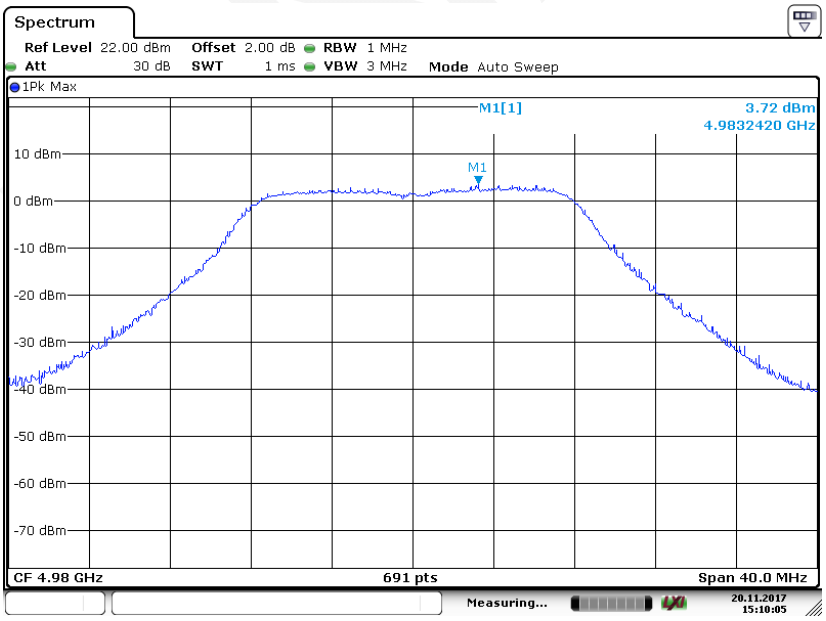

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FCC § 90.1215(e) - PEAK EXCURSION

Applicable Standard

FCC Part 90.1215(e)

Test Procedure

The inherent randomness of the power peaks in a noise-like digital signal makes it difficult to quantify the peak power using traditional measurement techniques for determining the peak power of an analog signal. The peak power of a digitally-modulated signal is predictable only on a statistical basis. Thus, for these types of signals, a statistical measurement of the peak power is necessary.

The power complementary cumulative distribution function (CCDF) curves provide a means for characterizing the power peaks of a digitally modulated signal on a statistical basis. A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth. The following guidelines are offered for performing a CCDF measurement.

a) Refer to instrument's analyzer instruction manual for details on how to use the power statistics/CCDF function;
b) Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
c) Set the number of counts to a value that stabilizes the measured CCDF curve;
d) Set the measurement interval as follows:
1) for continuous transmissions, set to 1 ms,
2) for burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time that is less than or equal to the burst duration.
e) Record the maximum PAPR level associated with a probability of 0.1%.

Test Data

Environmental Conditions

Temperature:	22.3 ℃
Relative Humidity:	51%
ATM Pressure:	101.2 kPa

The testing was performed by Chris Wang on 2017-09-02.

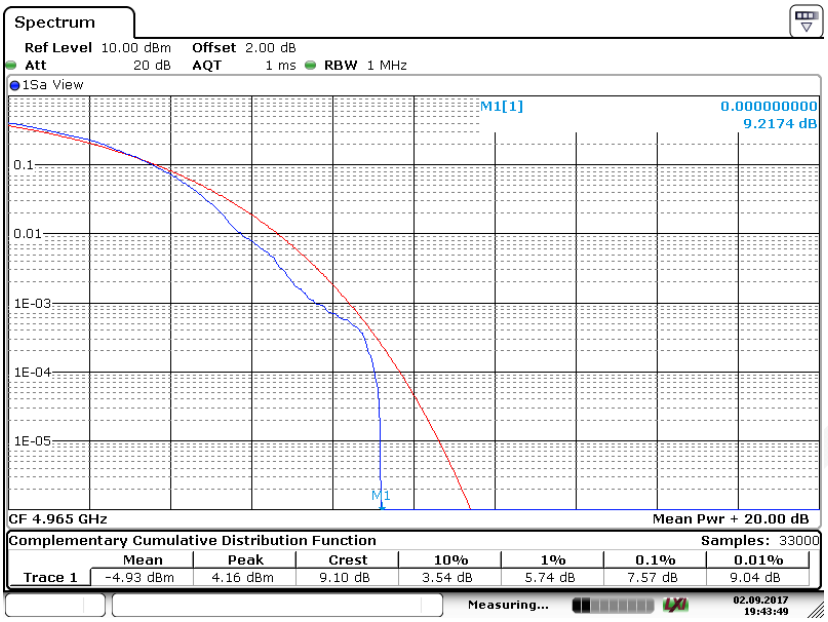
EUT Operation Mode: Transmitting

Test Result: Compliance.

Chain	Channel Bandwidth (MHz)	Frequency (MHz)	Resolution Bandwidth (MHz)	AQT (ms)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Chain 0	20	4965	1	1	7.57	13	5.43
Chain 1	20	4965	1	1	8.12	13	4.88

Chain 0

Middle Channel



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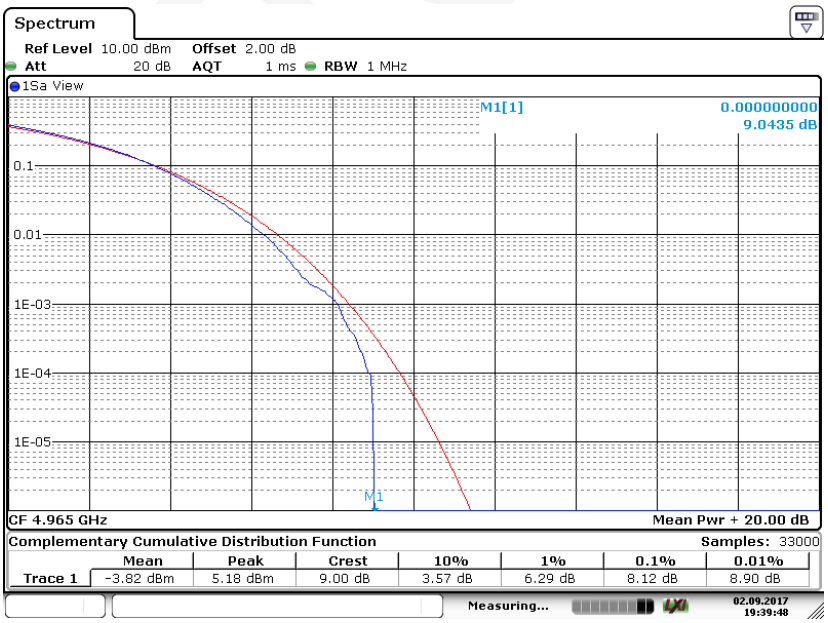
Chain 1

Middle Channel



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FCC § 2.1051, § 90.210 (m) - CONDUCTED EMISSION MASK

Applicable Standard

FCC Part 2.1051, 90.210 (m)
High power transmitters (greater that 20 dBm) operating in the 4940-4990 MHz frequency band, the power spectral density of the emissions must be attenuated below the output power of the transmitter as follows:
(1) On any frequency removed from the assigned frequency between 0-45% of the authorized bandwidth (BW): 0 dB.
(2) On any frequency removed from the assigned frequency between 45-50% of the authorized bandwidth: 568 log (% of (BW)/45) dB.
(3) On any frequency removed from the assigned frequency between 50-55% of the authorized bandwidth: 26 + 145 log (% of BW/50) dB.
(4) On any frequency removed from the assigned frequency between 55-100% of the authorized bandwidth: 32 + 31 log (% of (BW)/55) dB.
(5) On any frequency removed from the assigned frequency between 100-150% of the authorized bandwidth: 40 + 57 log (% of (BW)/100) dB.
(6) On any frequency removed from the assigned frequency between above 150% of the authorized bandwidth: 50 dB or 55 + 10 log (P) dB, whichever is the lesser attenuation.

Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The zero dB reference is measured relative to the highest average power of the fundamental emission, Emission levels are also based on the use of measurement instrumentation employing a resolution bandwidth of at least one percent of the occupied bandwidth.

Test Data

Environmental Conditions

Temperature:	22.3 ℃
Relative Humidity:	51 %
ATM Pressure:	101.1 kPa

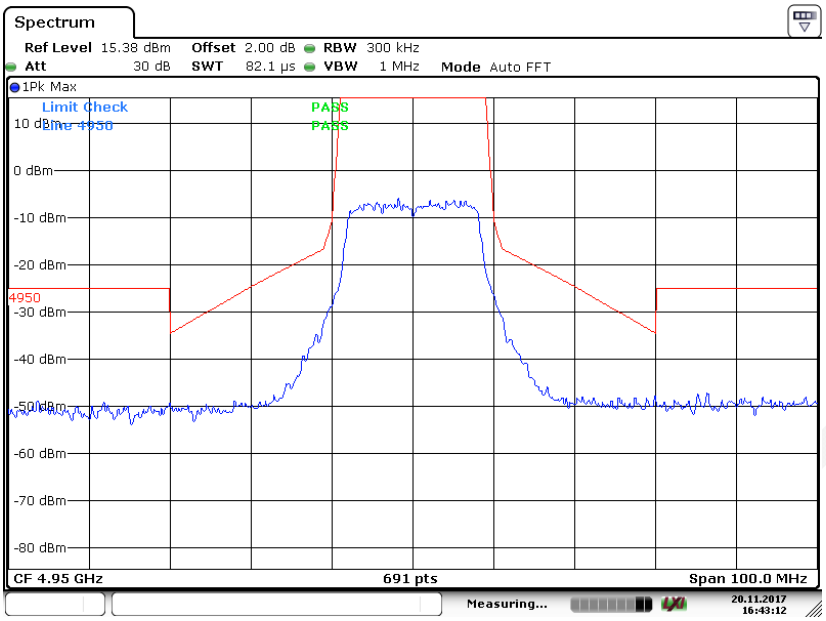
The testing was performed by Chris Wang on 2017-11-20.

EUT Operation Mode: Transmitting

Test Result: Compliance.

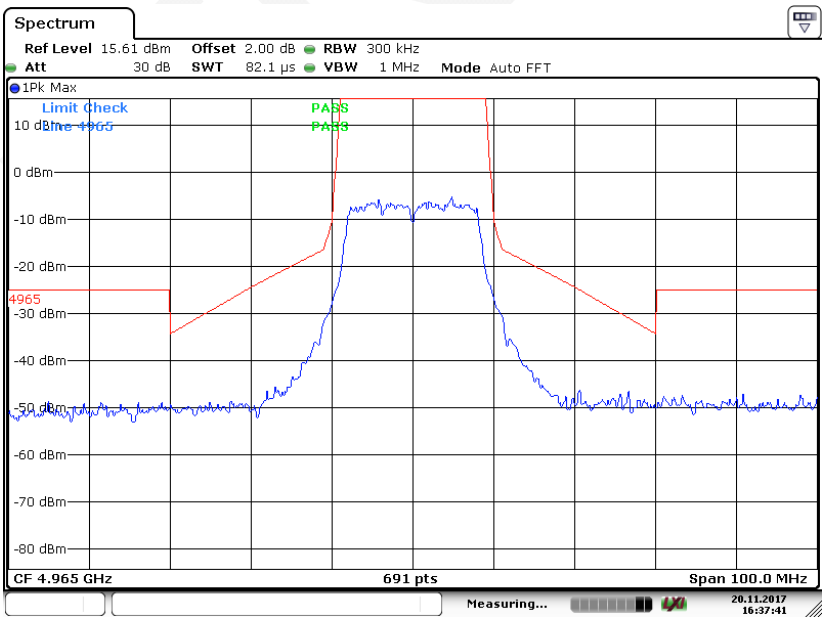
Chain 0

Low Channel



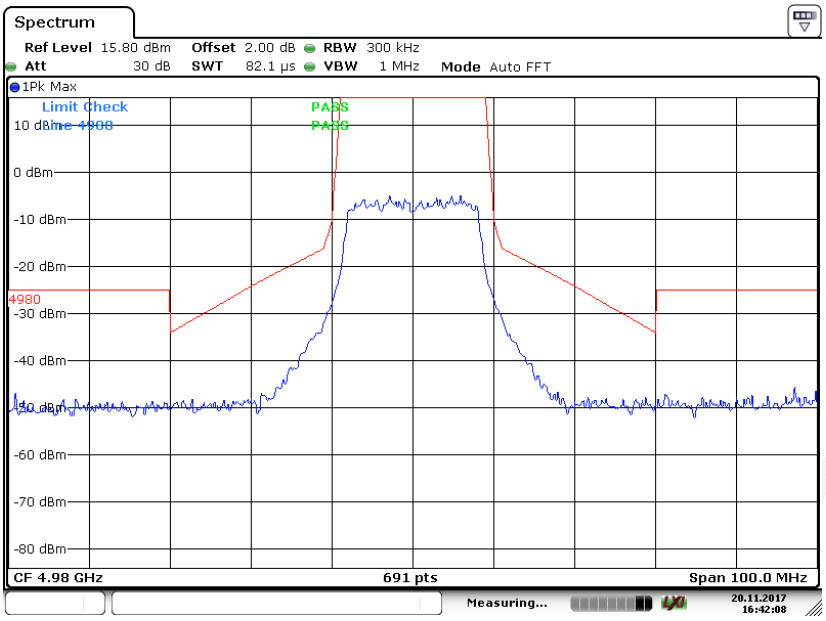
Date: 20.NOV.2017 16:43:12

Middle Channel



Date: 20.NOV.2017 16:37:40

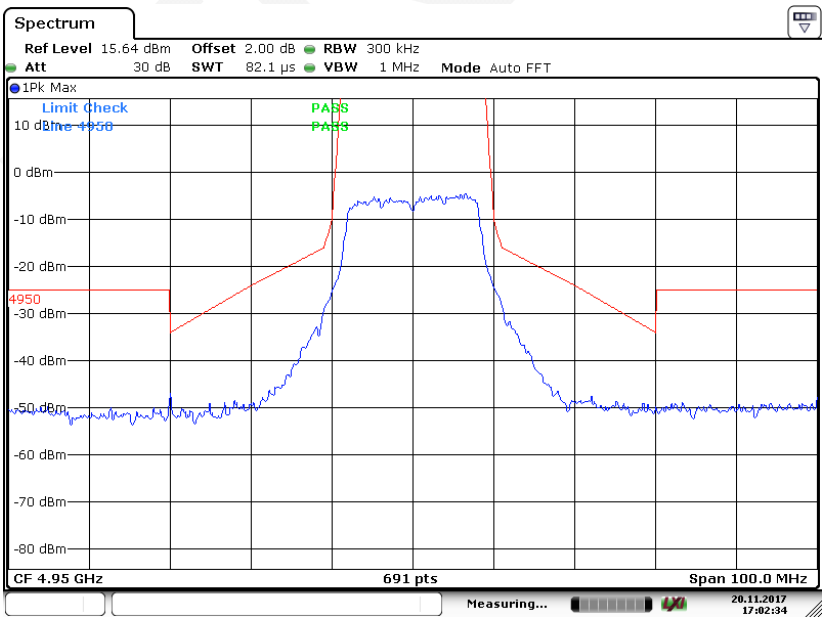
High Channel



Date: 20.NOV.2017 16:42:08

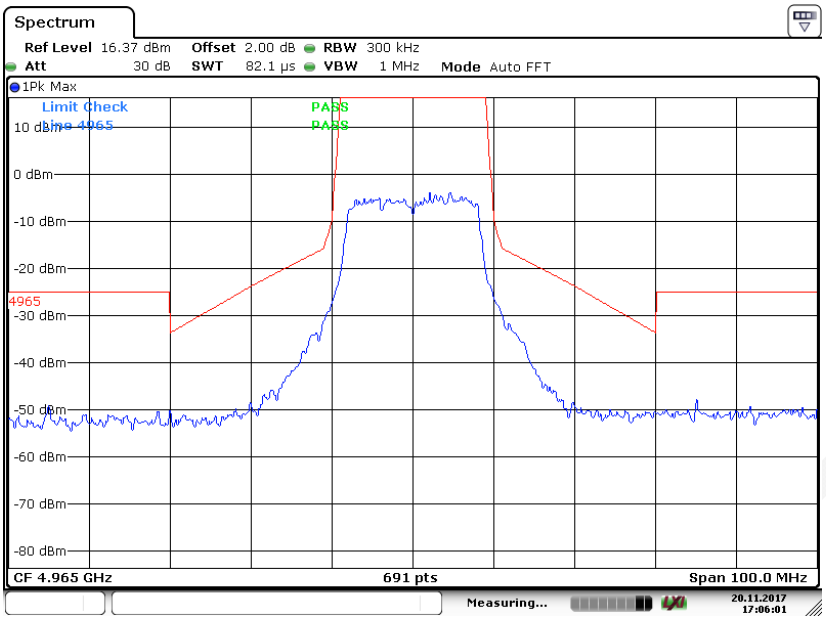
Chain 1

Low Channel



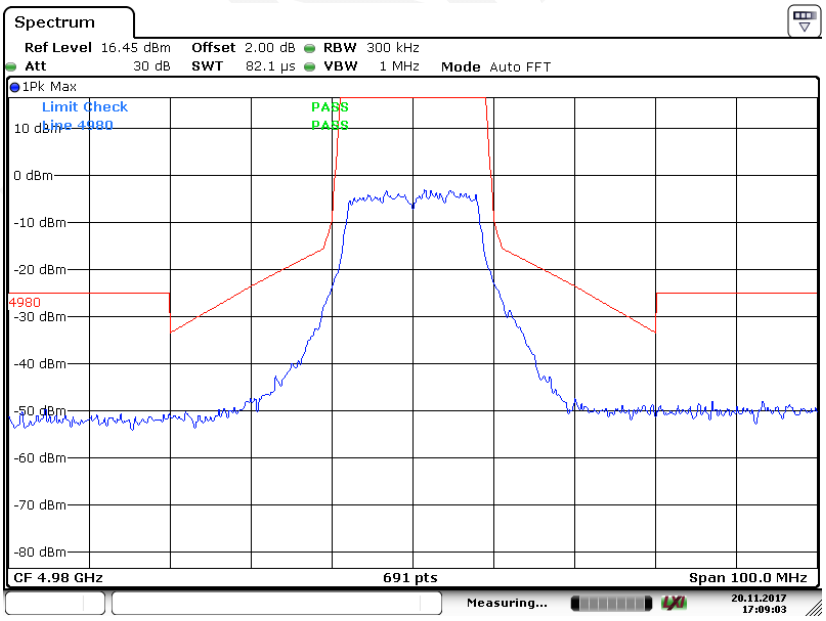
Date: 20.NOV.2017 17:02:34

Middle Channel



Date: 20.NOV.2017 17:06:01

High Channel



Date: 20.NOV.2017 17:09:03

FCC § 2.1051, § 90.210 (m)(6)(7) - CONDUCTED SPURIOUS EMISSIONS

Applicable Standard

FCC Part 2.1051, 90.210 (m)(6)(7)

Test Procedure

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100kHz for below 1GHz, and 1MHz for above 1GHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.

Test Data

Environmental Conditions

Temperature:	22.3 ℃
Relative Humidity:	51%
ATM Pressure:	101.2 kPa

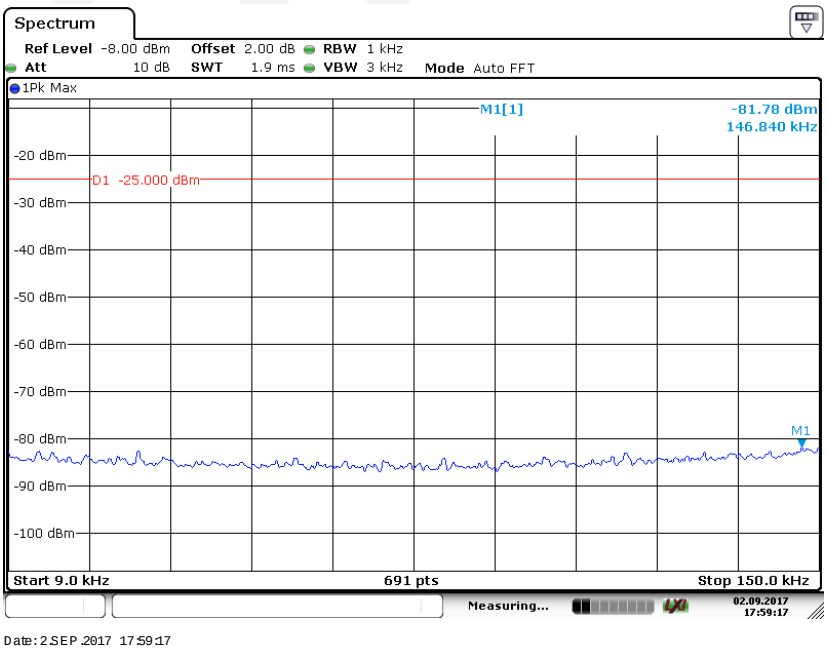
The testing was performed by Chris Wang on 2017-09-02.

EUT Operation Mode: Transmitting

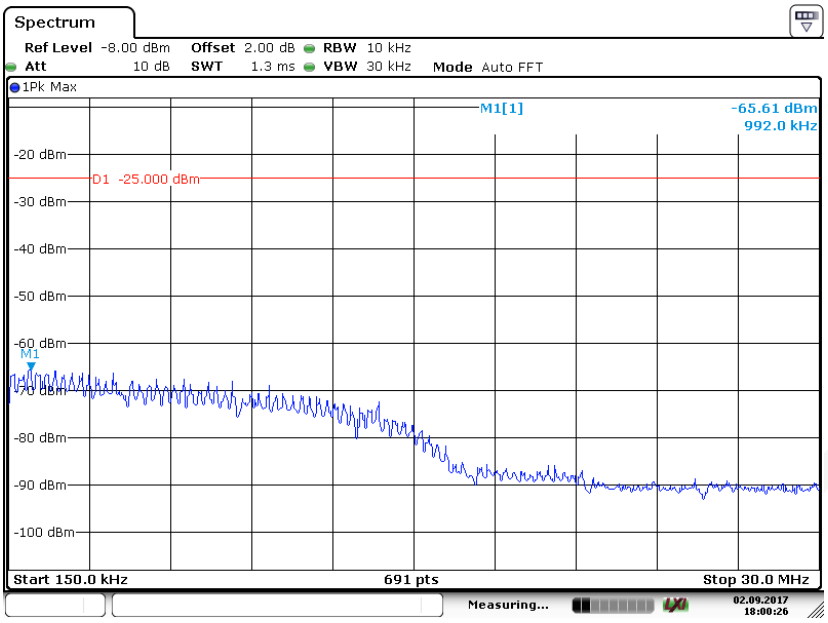
Test Result: Compliance.

Chain 0

Low Channel (9kHz~150kHz)

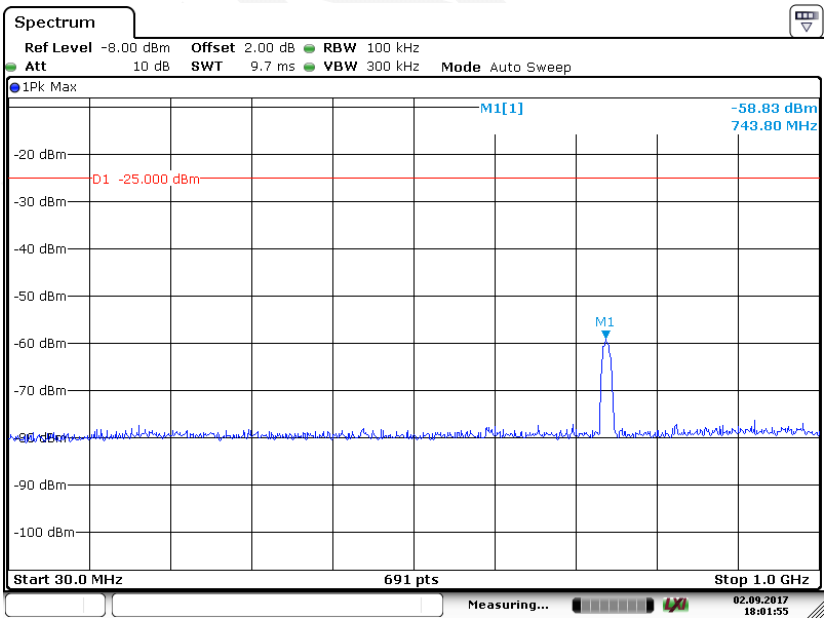


Low Channel (150kHz~30MHz)



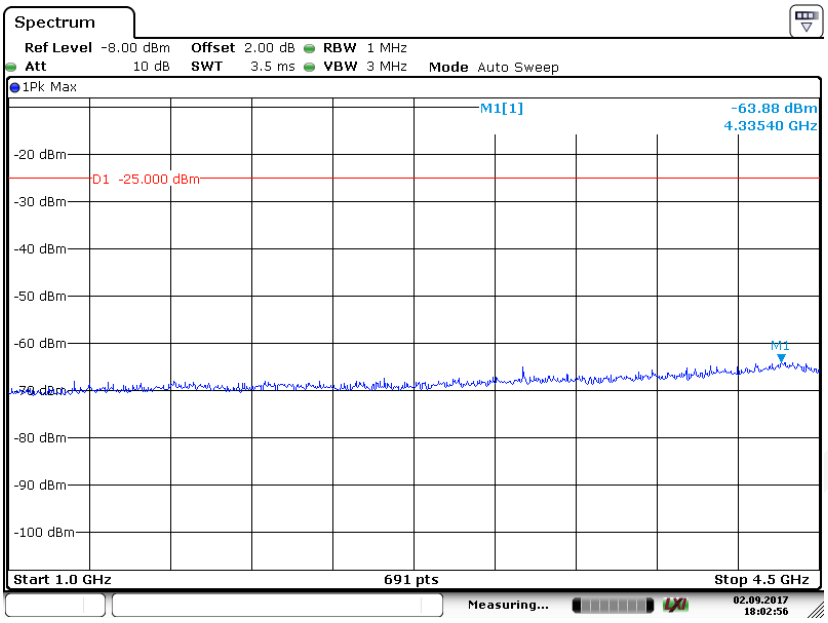
Date: 2.SEP.2017 18:00:26

Low Channel (30MHz~1GHz)



Date: 2.SEP.2017 18:01:55

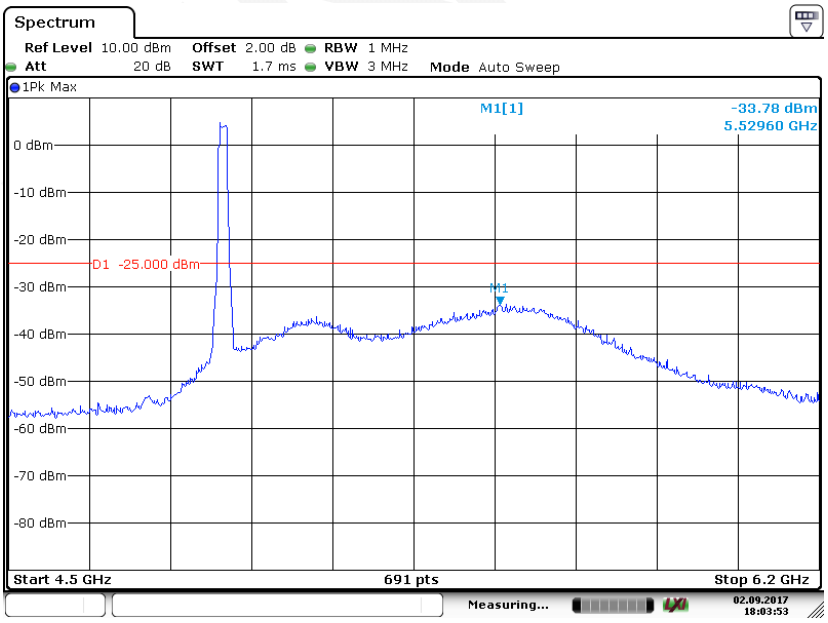
Low Channel (1GHz~4.5GHz)



Date: 2.SEP.2017 18:02:56

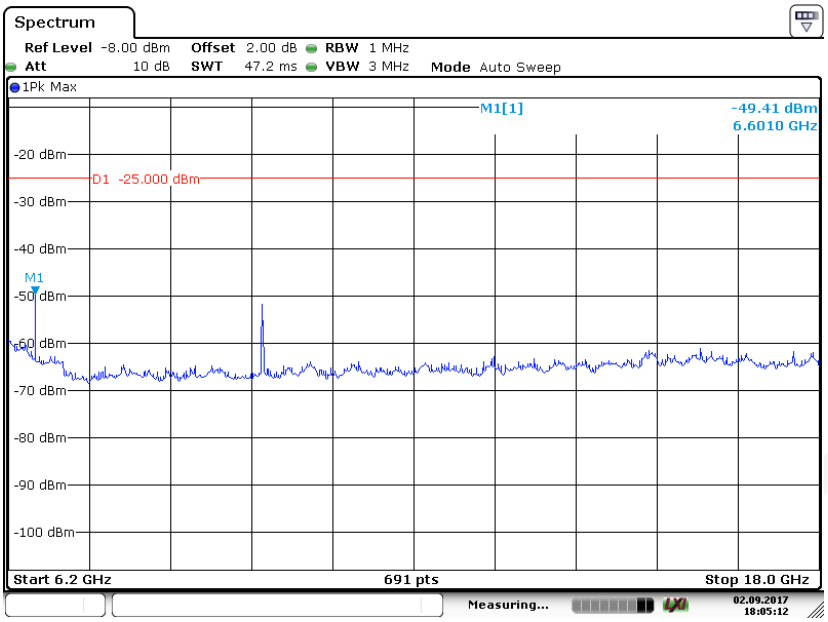
Low Channel (4.5GHz~6.2GHz)

Fundamental test



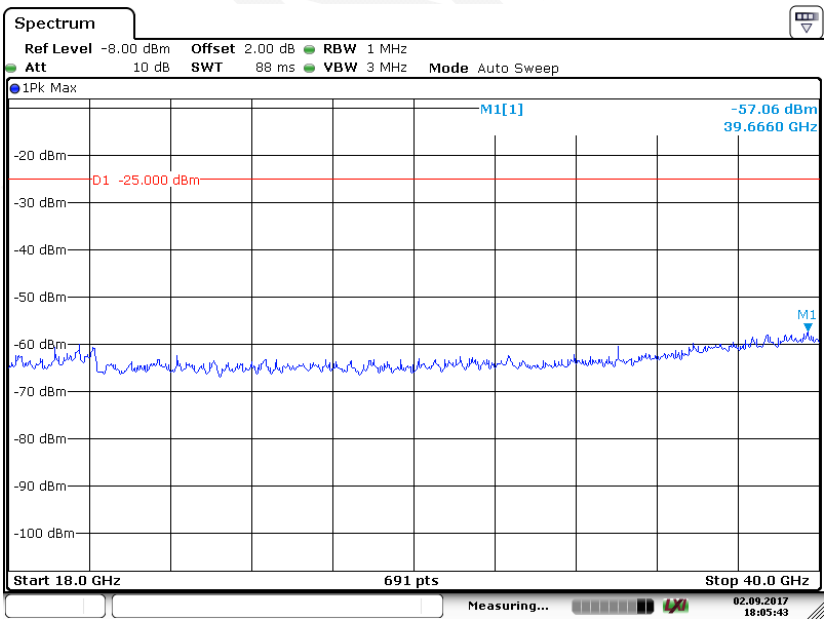
Date: 2.SEP.2017 18:03:54

Low Channel (6.2GHz~18GHz)



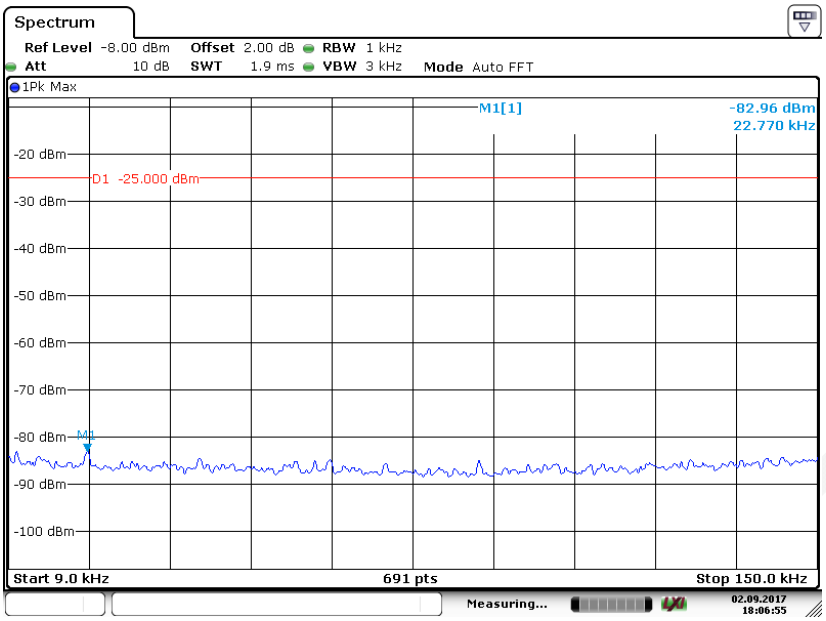
Date: 2.SEP.2017 18:05:13

Low Channel (18GHz~40GHz)



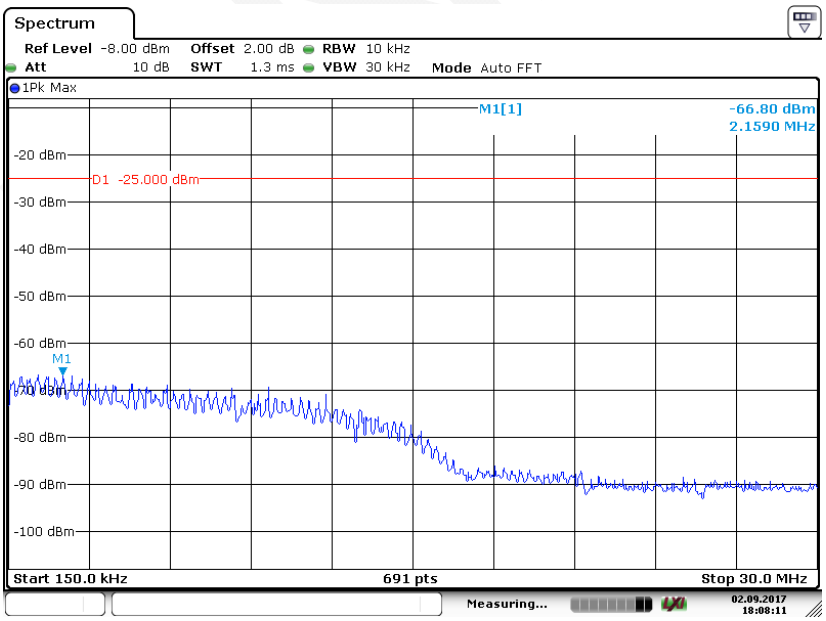
Date: 2.SEP.2017 18:05:43

Middle Channel (9kHz~150kHz)



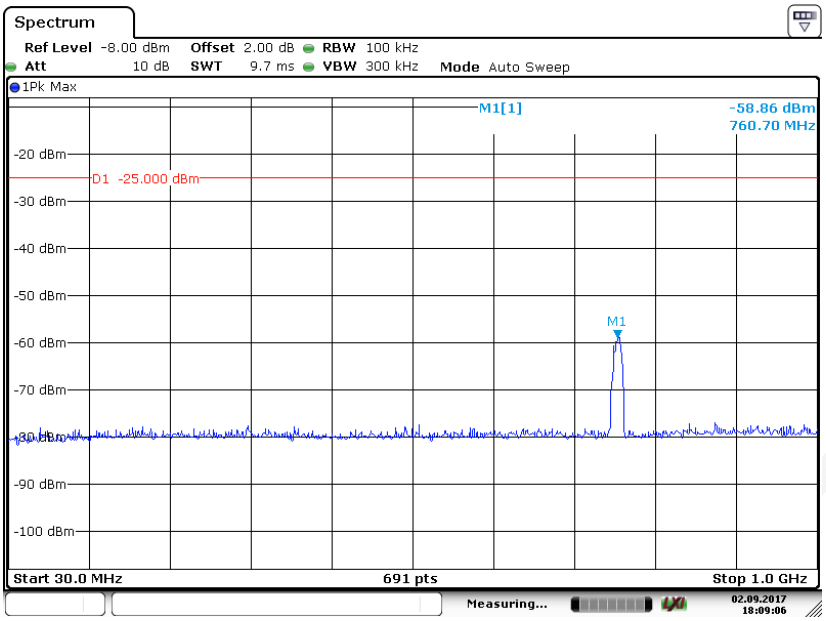
Date: 2.SEP.2017 18:06:55

Middle Channel (150kHz~30MHz)



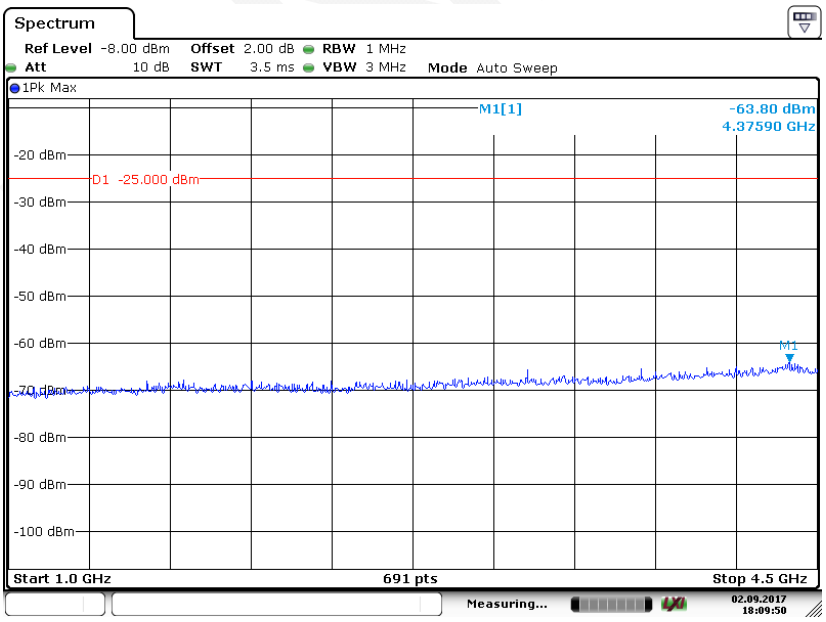
Date: 2.SEP.2017 18:08:11

Middle Channel (30MHz~1GHz)



Date: 2.SEP.2017 18:09:06

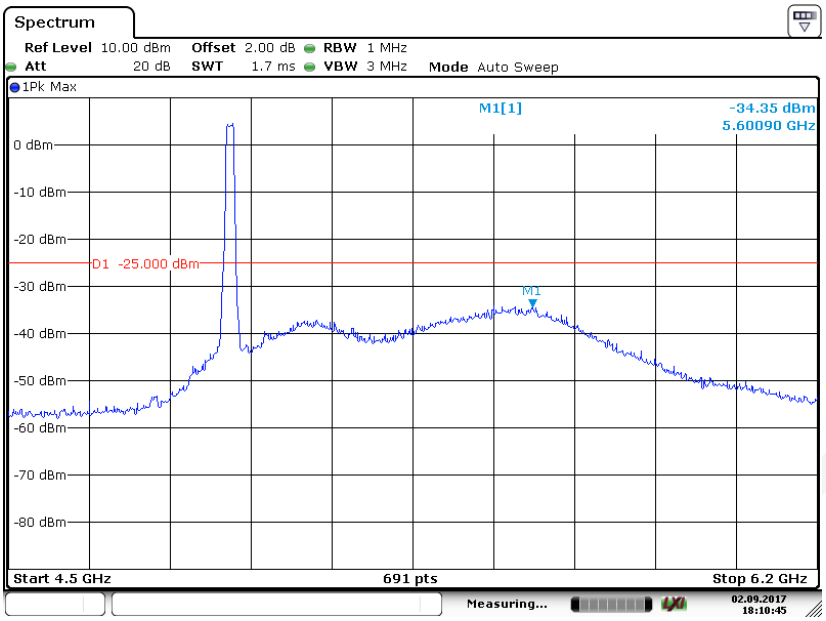
Middle Channel (1GHz~4.5GHz)



Date: 2.SEP.2017 18:09:50

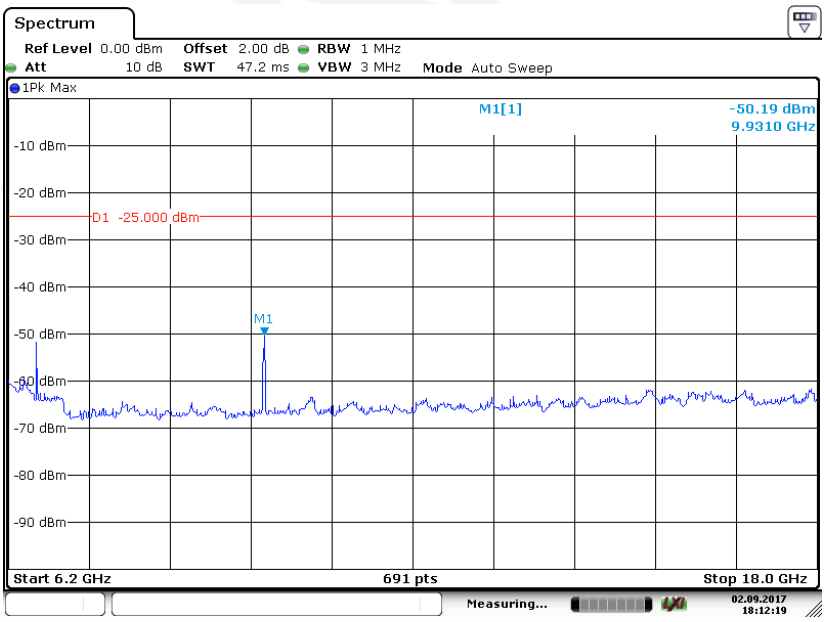
Middle Channel (4.5GHz~6.2GHz)

Fundamental test



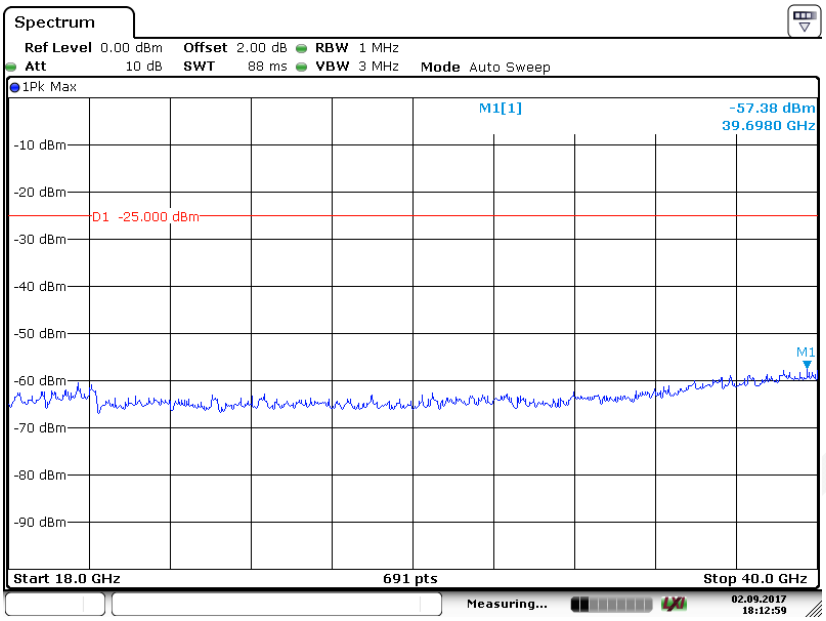
Date: 2.SEP.2017 18:10:45

Middle Channel (6.2GHz~18GHz)



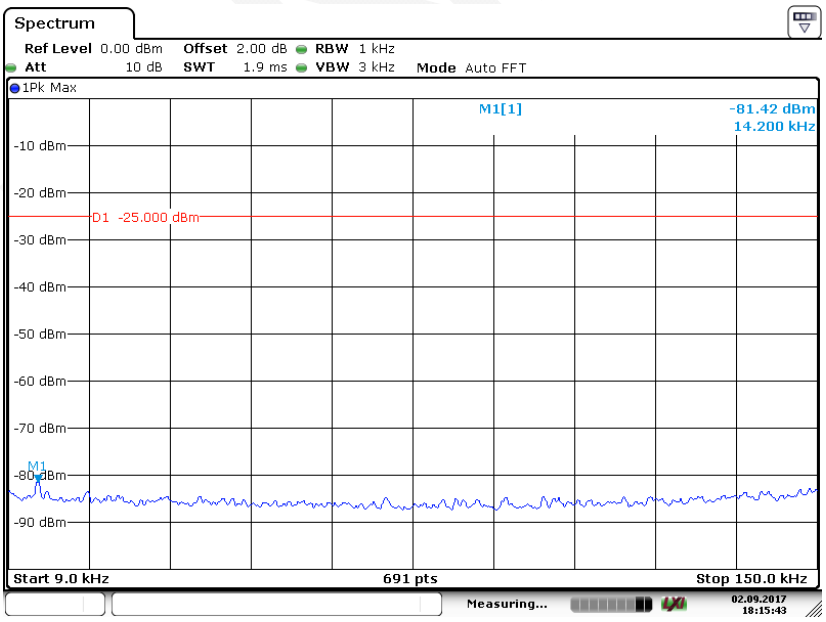
Date: 2.SEP.2017 18:12:20

Middle Channel (18GHz~40GHz)



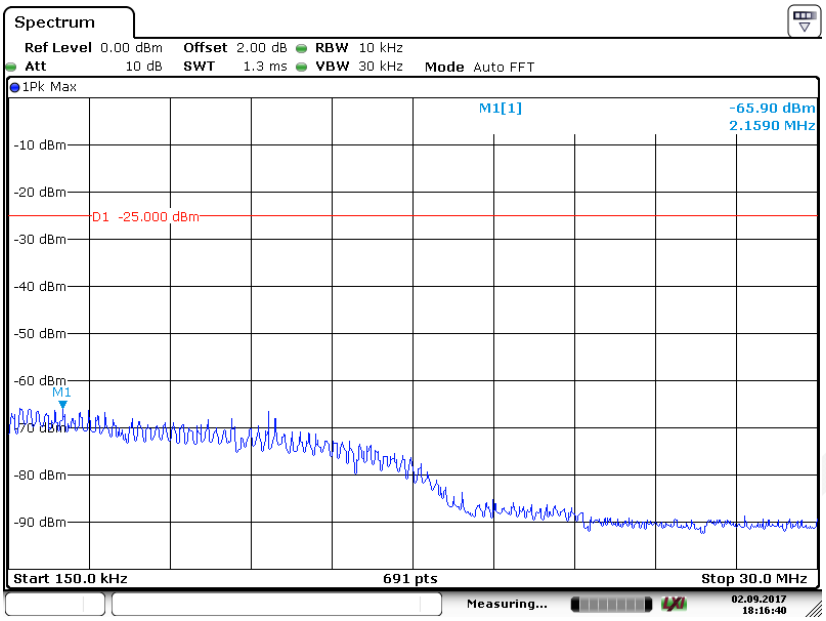
Date: 2.SEP.2017 18:12:59

High Channel (9kHz~150kHz)



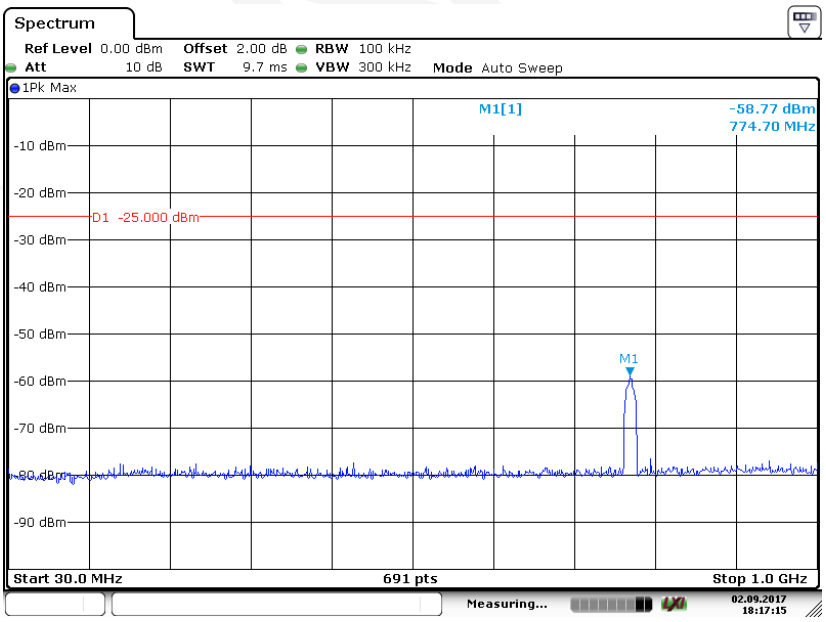
Date: 2.SEP.2017 18:15:44

High Channel (150kHz~30MHz)



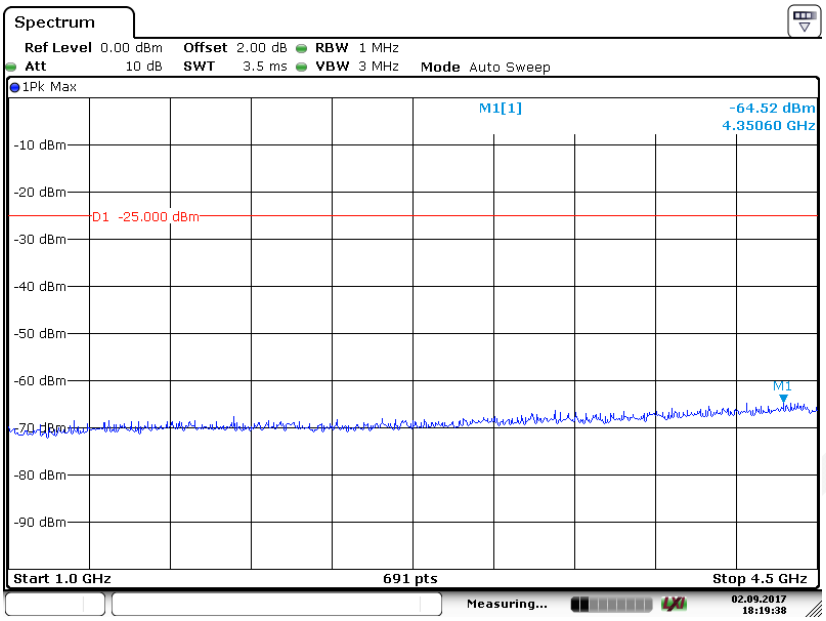
Date: 2.SEP.2017 18:16:40

High Channel (30MHz~1GHz)



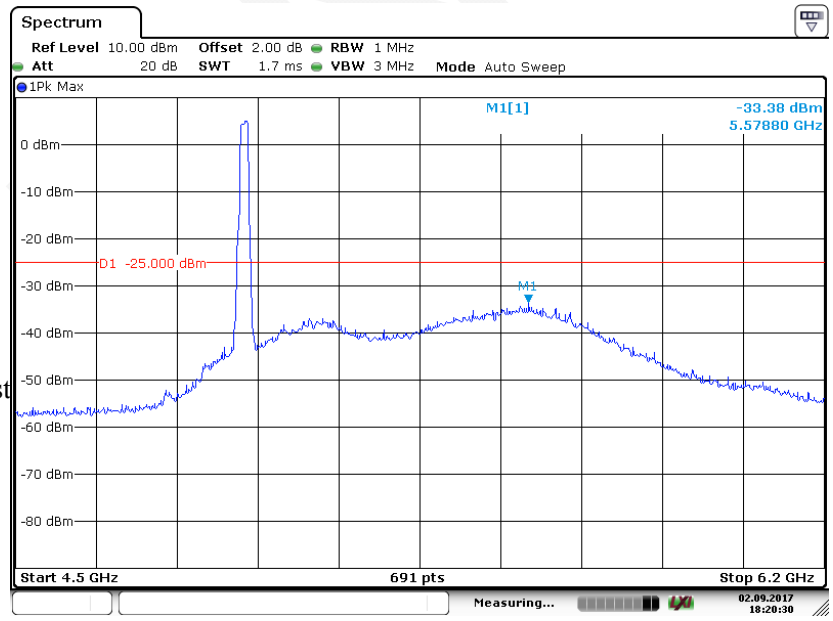
Date: 2.SEP.2017 18:17:16

High Channel (1GHz~4.5GHz)



Date: 2.SEP.2017 18:19:39

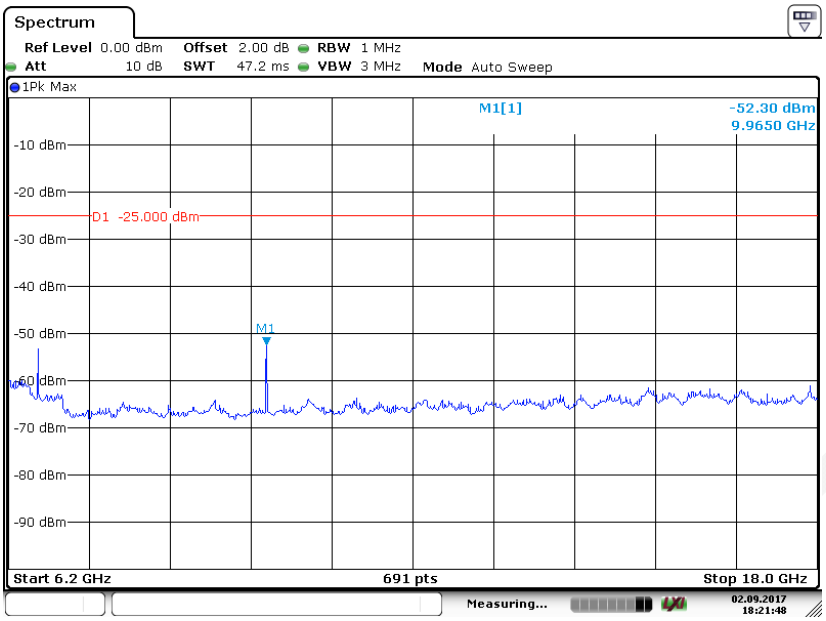
High Channel (4.5GHz~6.2GHz)



Fundamental test

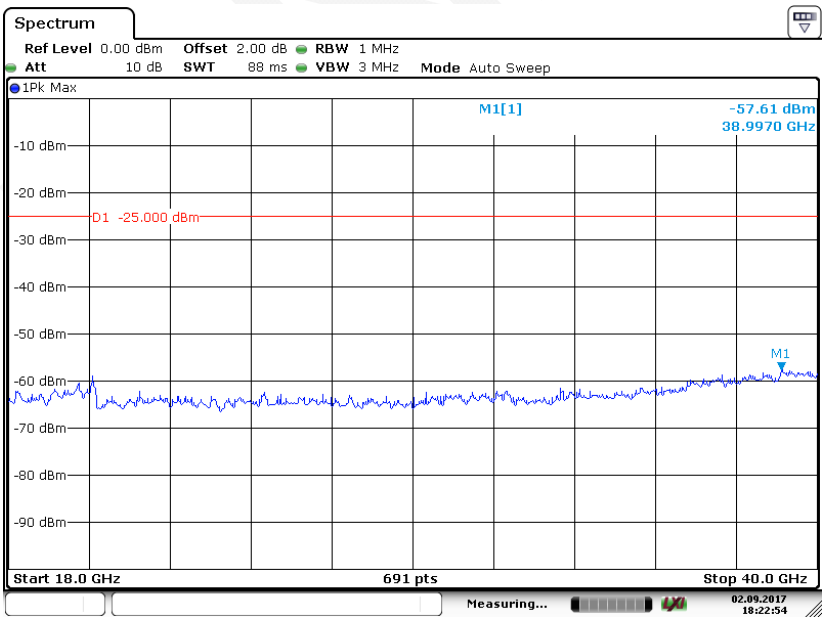
Date: 2.SEP.2017 18:20:30

High Channel (6.2GHz~18GHz)



Date: 2.SEP.2017 18:21:49

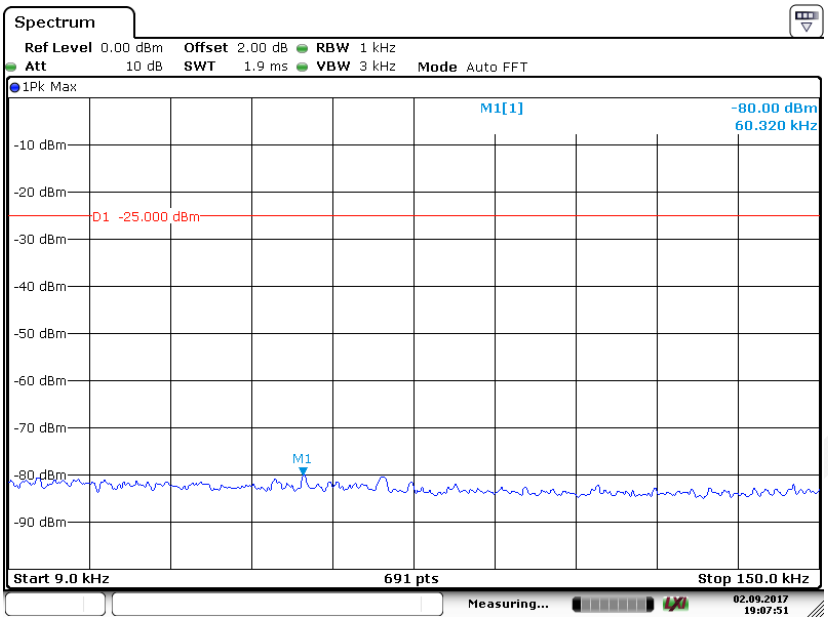
High Channel (18GHz~40GHz)



Date: 2.SEP.2017 18:22:54

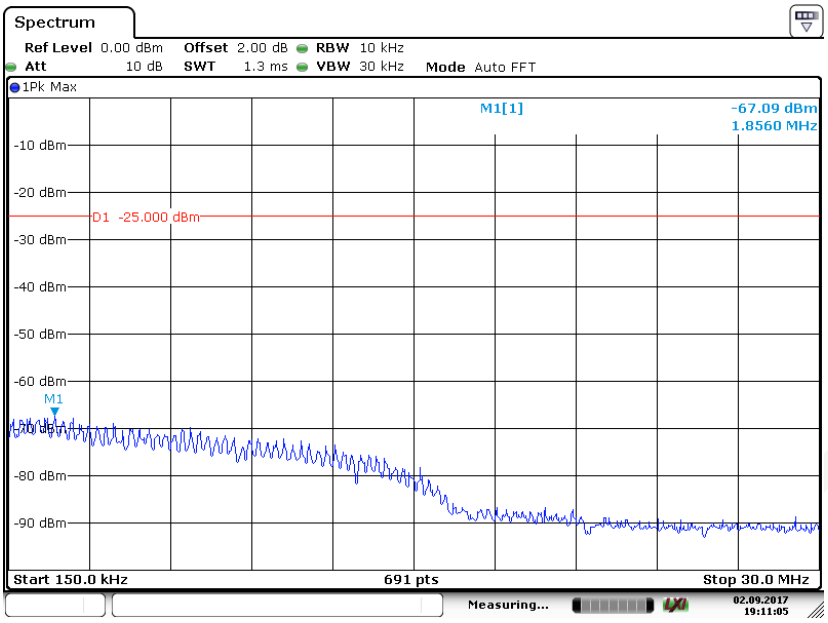
Chain 1

Low Channel (9kHz~150kHz)



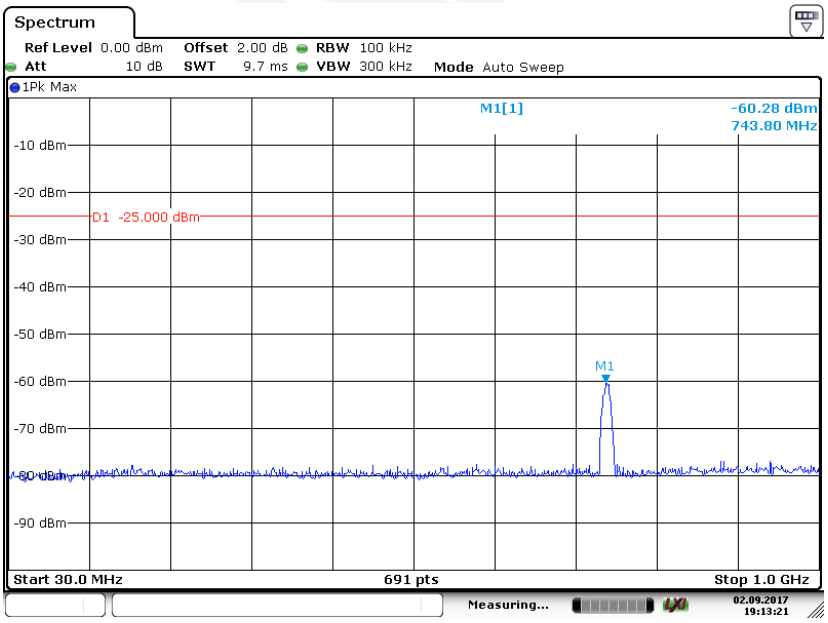
Date: 2.SEP.2017 19:07:52

Low Channel (150kHz~30MHz)



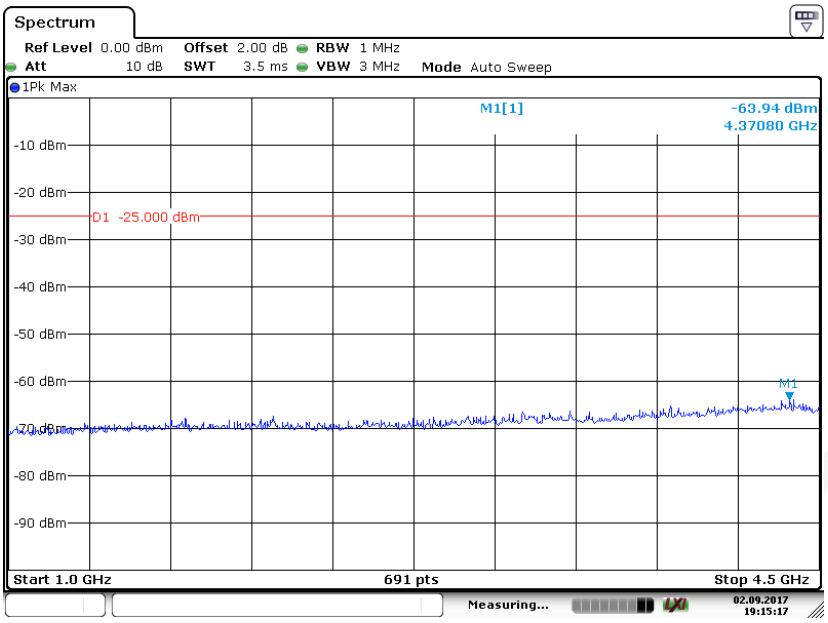
Date: 2.SEP.2017 19:11:05

Low Channel (30MHz~1GHz)



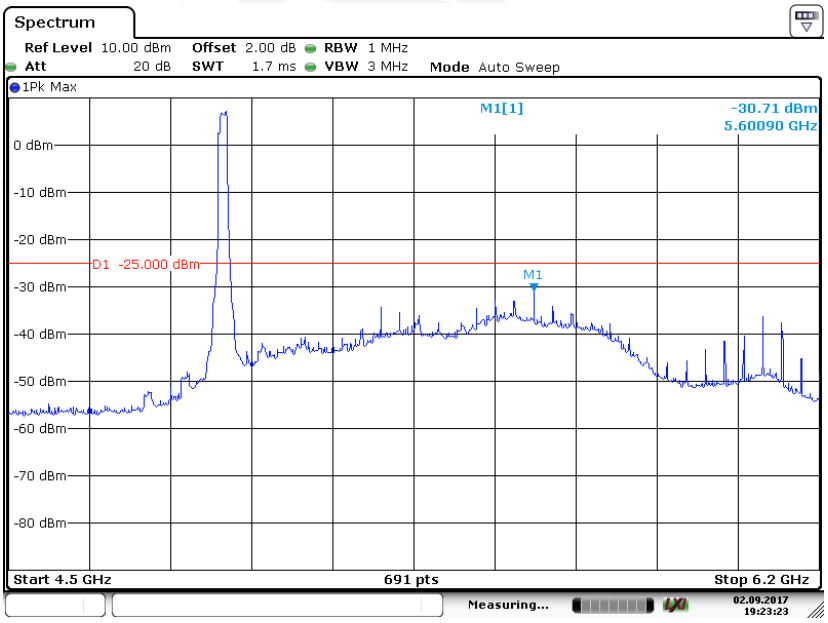
Date: 2.SEP.2017 19:13:21

Low Channel (1GHz~4.5GHz)



Date: 2.SEP.2017 19:15:17

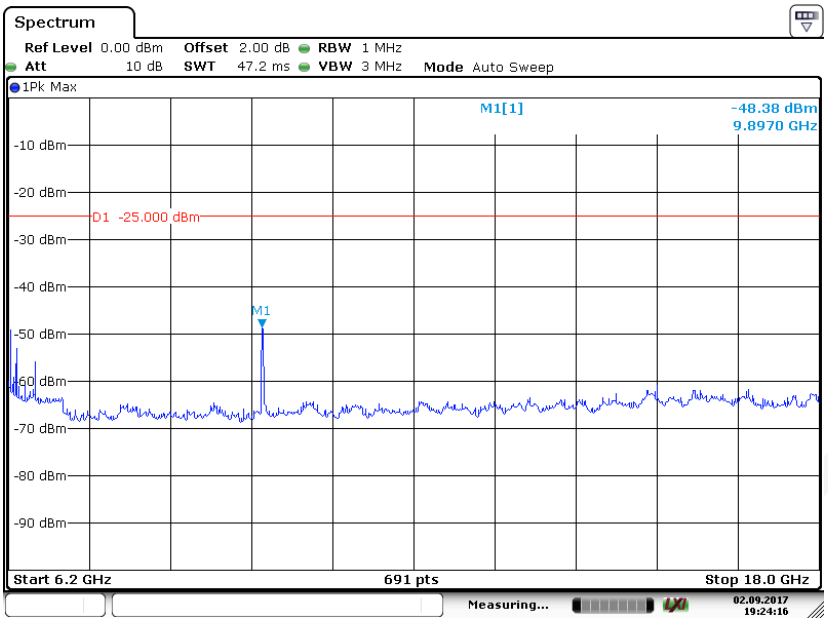
Low Channel (4.5GHz~6.2GHz)



Date: 2.SEP.2017 19:23:24

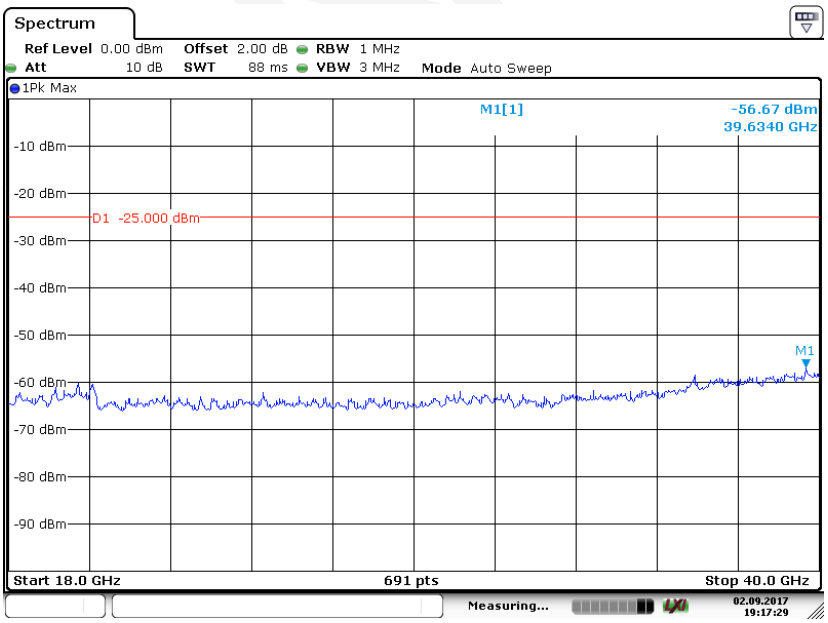
Fundamental test

Low Channel (6.2GHz~18GHz)



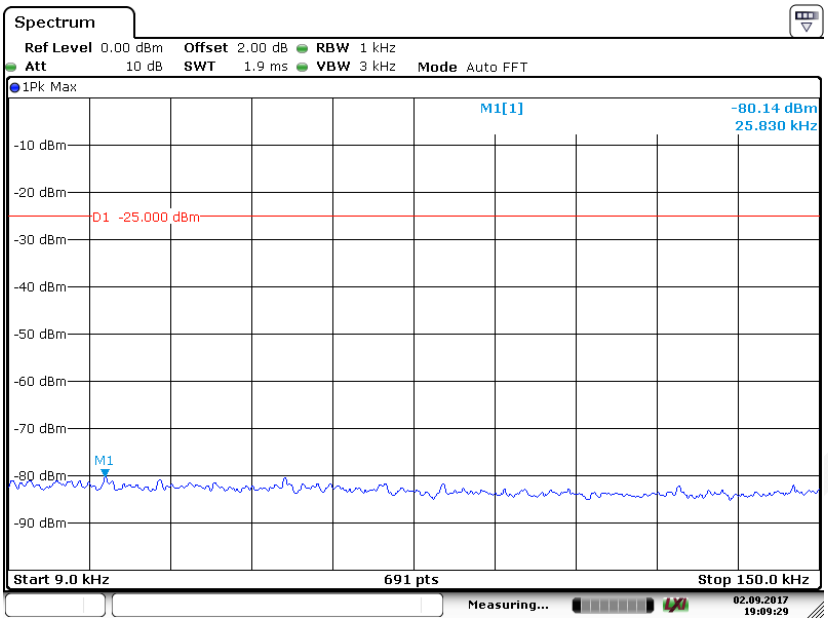
Date: 2.SEP.2017 19:24:16

Low Channel (18GHz~40GHz)



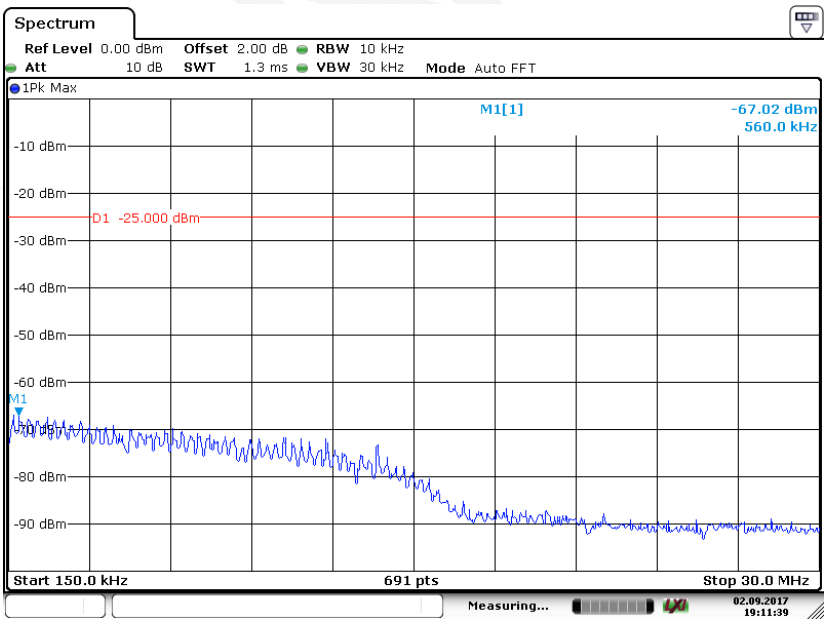
Date: 2.SEP.2017 19:17:29

Middle Channel (9kHz~150kHz)



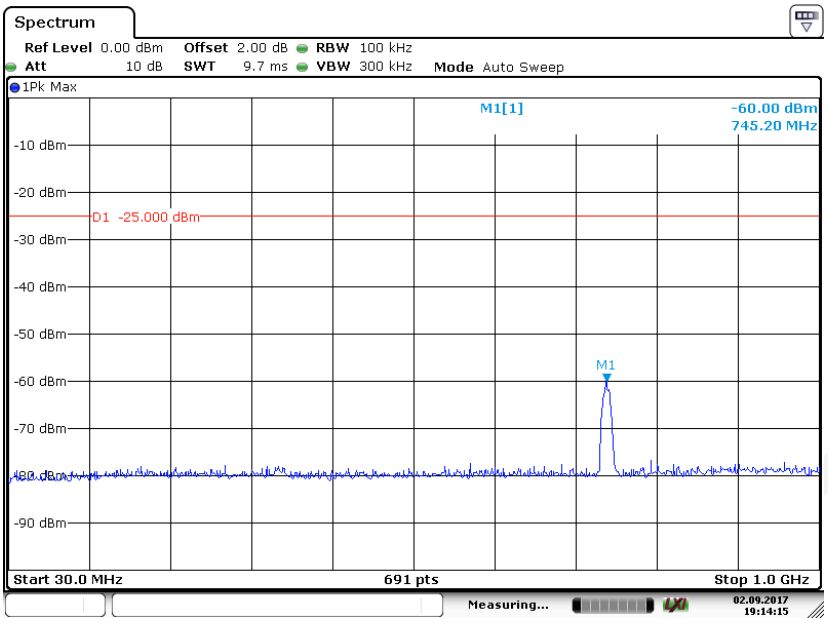
Date: 2.SEP.2017 19:09:29

Middle Channel (150kHz~30MHz)



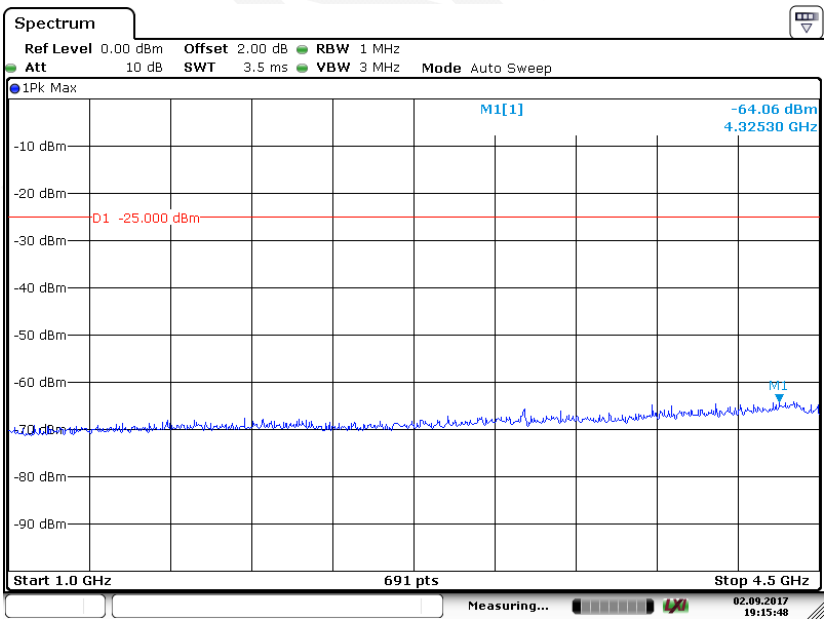
Date: 2.SEP.2017 19:11:38

Middle Channel (30MHz~1GHz)



Date: 2.SEP.2017 19:14:15

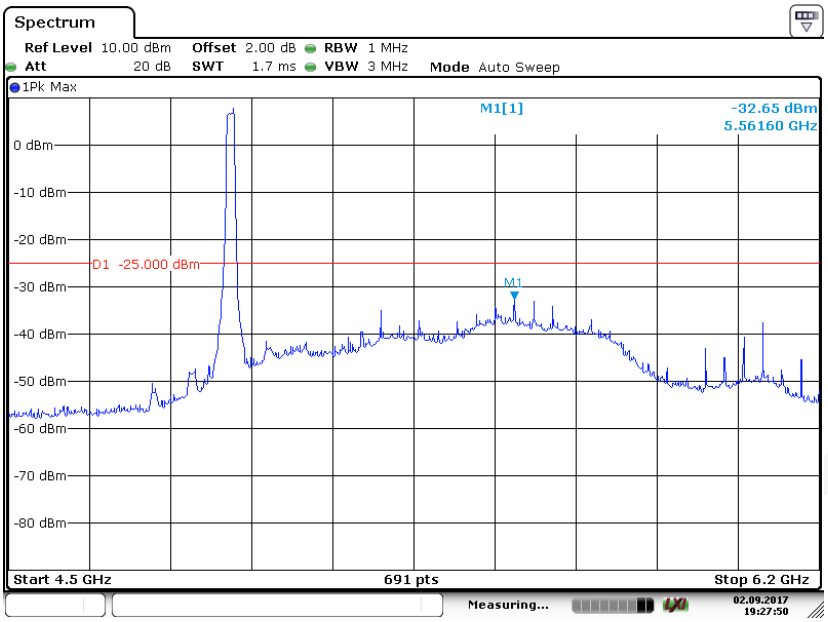
Middle Channel (1GHz~4.5GHz)



Date: 2.SEP.2017 19:15:48

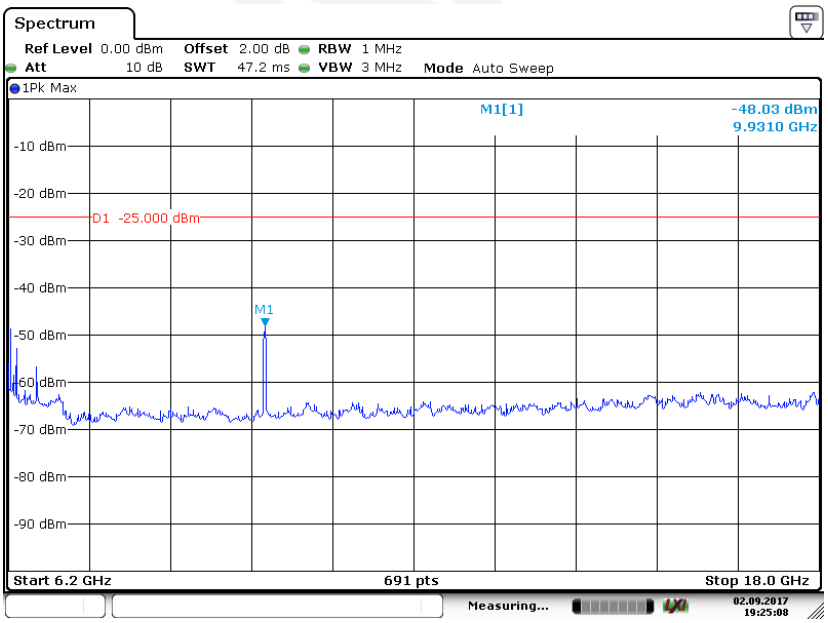
Middle Channel (4.5GHz~6.2GHz)

Fundamental test



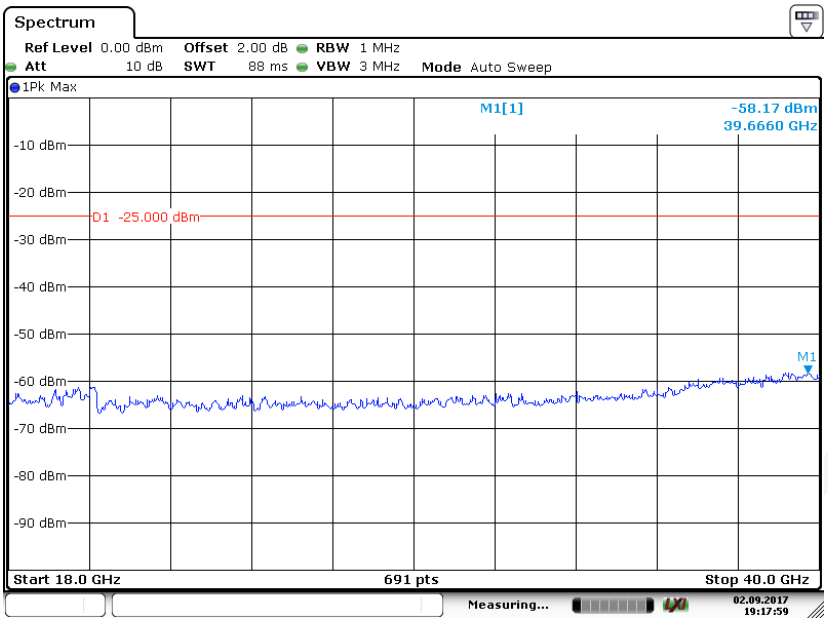
Date: 2.SEP.2017 19:27:50

Middle Channel (6.2GHz~18GHz)



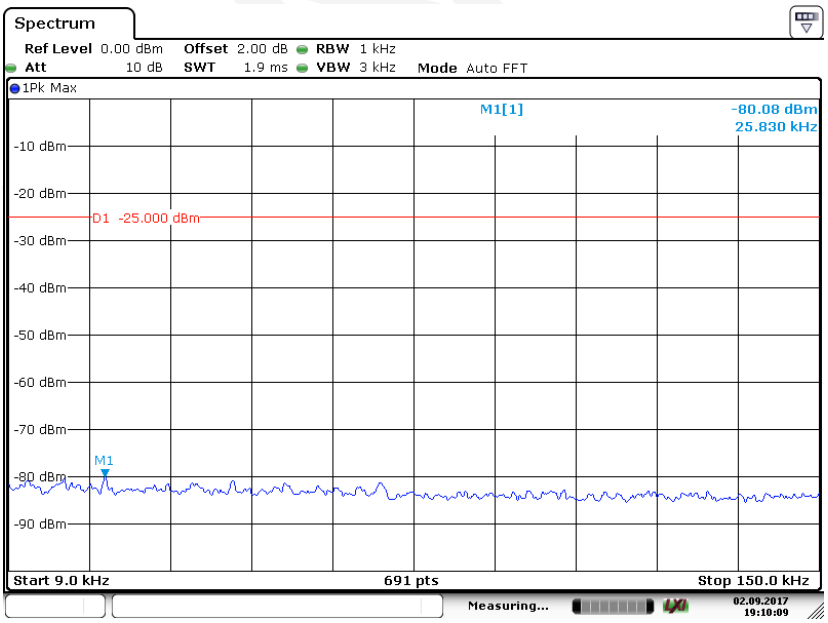
Date: 2.SEP.2017 19:25:08

Middle Channel (18GHz~40GHz)



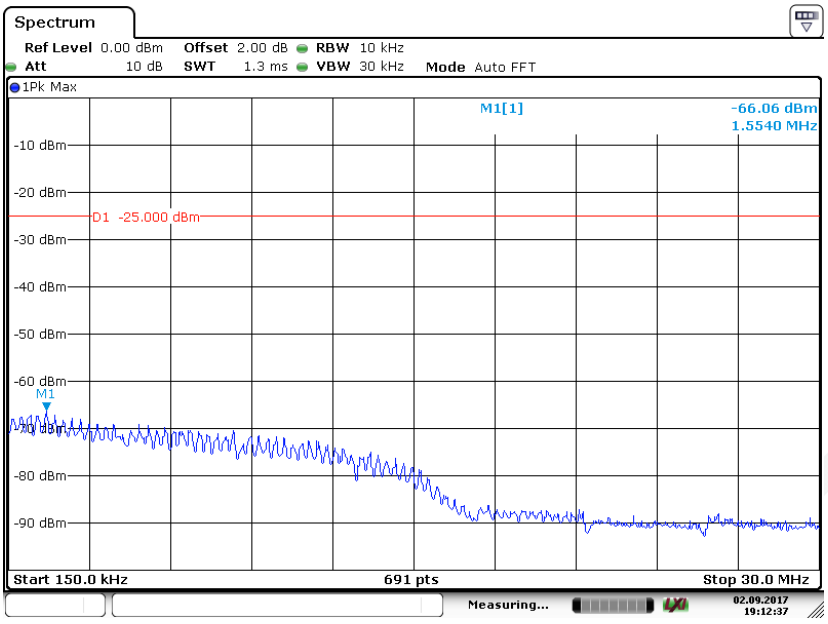
Date: 2.SEP.2017 19:17:59

High Channel (9kHz~150kHz)



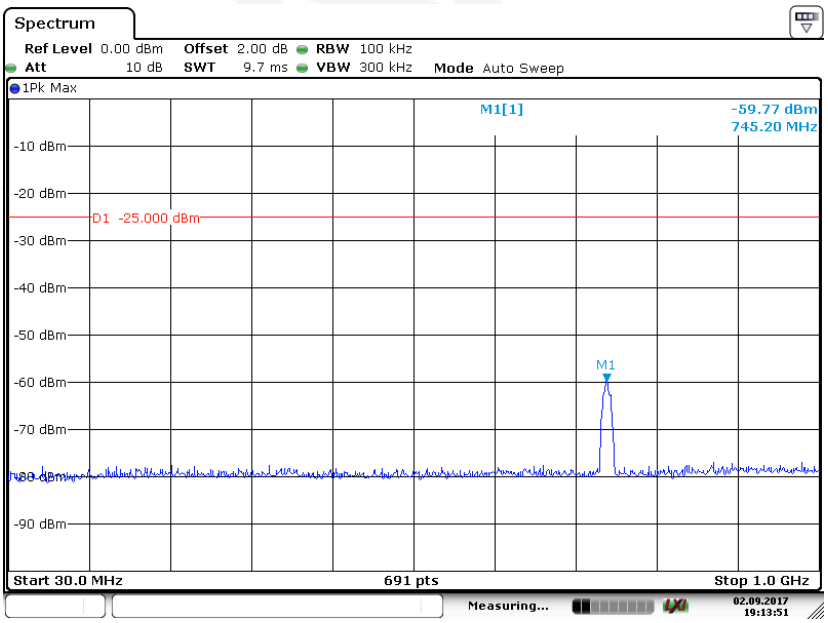
Date: 2.SEP.2017 19:10:09

High Channel (150kHz~30MHz)



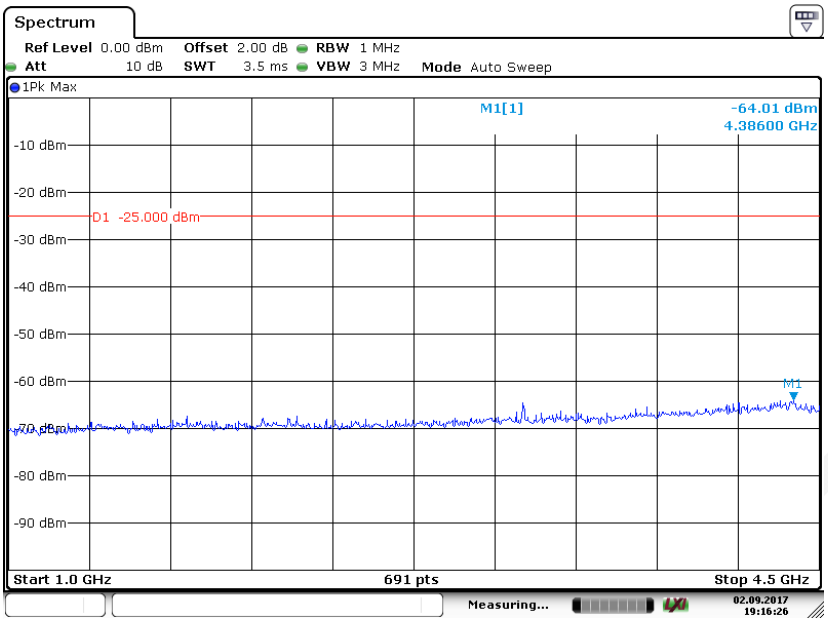
Date: 2.SEP.2017 19:12:38

High Channel (30MHz~1GHz)



Date: 2.SEP.2017 19:13:52

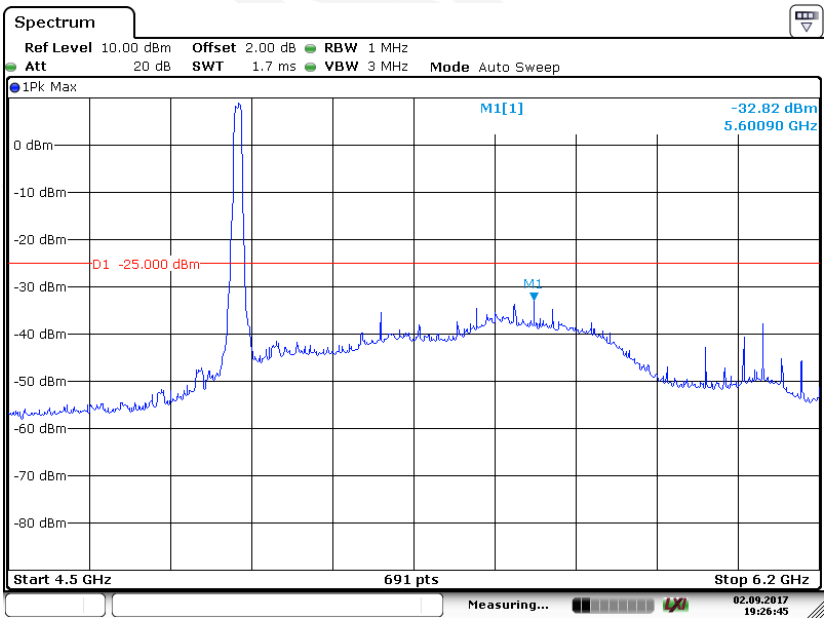
High Channel (1GHz~4.5GHz)



Date: 2.SEP.2017 19:16:26

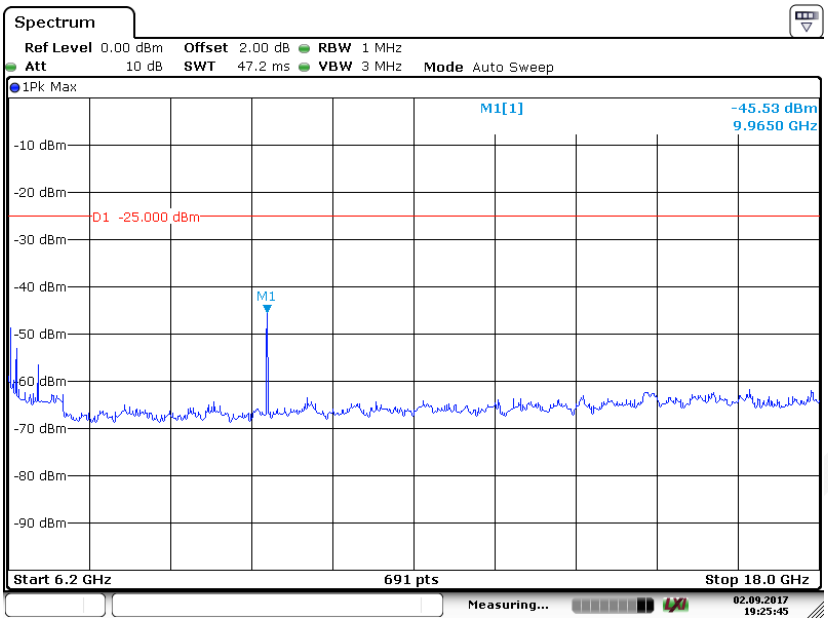
High Channel (4.5GHz~6.2GHz)

Fundamental test



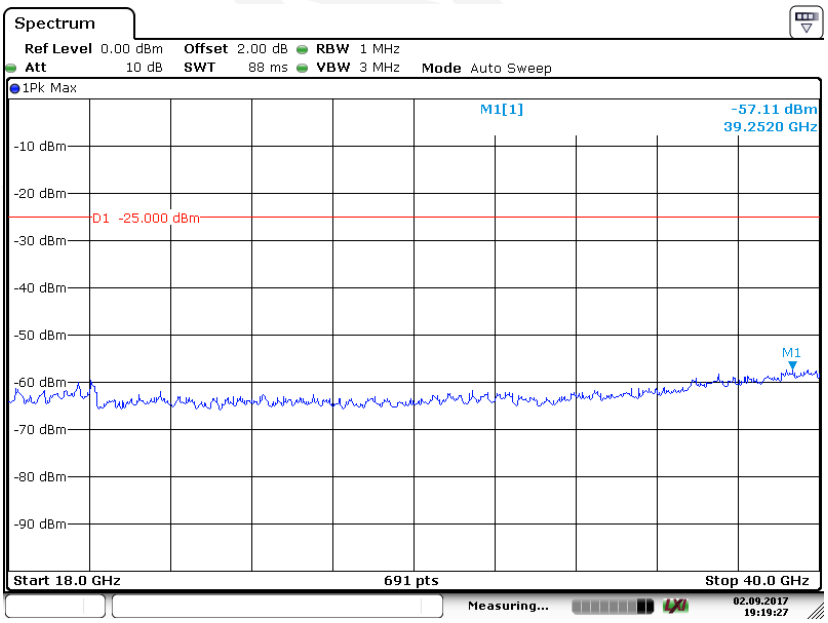
Date: 2.SEP.2017 19:26:45

High Channel (6.2GHz~18GHz)



Date: 2.SEP.2017 19:25:45

High Channel (18GHz~40GHz)



Date: 2.SEP.2017 19:19:27

FCC § 2.1053, § 90.210 (m)(6)(7) - RADIATED SPURIOUS EMISSIONS

Applicable Standard

FCC Part 2.1053, 90.210 (m)(6)(7)

Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load, which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT .The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to teeth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB =10 1g (TXpwr in Watts/0.001)-the absolute level

Spurious attenuation limit in 50 dB or 55 + 10 log (P) dB, whichever is the lesser attenuation.

Test Data

Environmental Conditions

Temperature:	22.3 ℃
Relative Humidity:	51 %
ATM Pressure:	101.1 kPa

The testing was performed by Chris Wang on 2017-09-05.

EUT operation mode: Transmitting

Test Result: Compliance.

30MHz - 40GHz:

NW10

*Pre-scan with X,Y and Z axes of orientation, the worst case **Y-axis of orientation** was recorded*

Frequency (MHz)	Receiver Reading (dBµV)	Turn Table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)			
Channel 4950MHz										
745.20	44.99	6	105	H	-56.14	0.62	-1.52	-58.28	-25	33.28
745.20	43.36	282	224	V	-53.91	0.62	-1.52	-56.05	-25	31.05
9900.00	34.44	102	106	H	-57.66	1.95	11.62	-47.99	-25	22.99
9900.00	34.27	7	118	V	-57.99	1.95	11.62	-48.32	-25	23.32
14850.00	15.42	337	105	H	-69.83	2.62	13.33	-59.12	-25	34.12
14850.00	15.99	58	134	V	-70.13	2.62	13.33	-59.42	-25	34.42
Channel 4965MHz										
745.20	45.62	331	134	H	-55.51	0.62	-1.52	-57.65	-25	32.65
745.20	43.65	128	184	V	-53.62	0.62	-1.52	-55.76	-25	30.76
9930.00	33.18	62	147	H	-58.87	1.95	11.64	-49.18	-25	24.18
9930.00	32.85	113	243	V	-59.36	1.95	11.64	-49.67	-25	24.67
14895.00	16.81	359	100	H	-68.39	2.63	13.34	-57.68	-25	32.68
14895.00	16.51	83	241	V	-69.56	2.63	13.34	-58.85	-25	33.85
Channel 4980MHz										
745.20	45.79	262	152	H	-55.34	0.62	-1.52	-57.48	-25	32.48
745.20	43.44	153	121	V	-53.83	0.62	-1.52	-55.97	-25	30.97
9960.00	34.98	12	182	H	-57.02	1.95	11.67	-47.30	-25	22.30
9960.00	34.18	299	158	V	-57.98	1.95	11.67	-48.26	-25	23.26
14940.00	16.49	98	143	H	-68.66	2.64	13.35	-57.95	-25	32.95
14940.00	14.92	102	109	V	-71.11	2.64	13.35	-60.40	-25	35.40

NW10IN

*Pre-scan with X,Y and Z axes of orientation, the worst case **Y-axis of orientation** was recorded*

Frequency (MHz)	Receiver Reading (dBμV)	Turn Table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)			
Channel 4950MHz										
745.20	44.61	95	217	H	-56.52	0.62	-1.52	-58.66	-25	33.66
745.20	42.08	185	185	V	-55.19	0.62	-1.52	-57.33	-25	32.33
9900.00	34.26	68	179	H	-57.84	1.95	11.62	-48.17	-25	23.17
9900.00	33.57	106	210	V	-58.69	1.95	11.62	-49.02	-25	24.02
14850.00	15.50	264	216	H	-69.75	2.62	13.33	-59.04	-25	34.04
14850.00	16.03	329	125	V	-70.09	2.62	13.33	-59.38	-25	34.38
Channel 4965MHz										
745.20	44.88	74	153	H	-56.25	0.62	-1.52	-58.39	-25	33.39
745.20	42.24	17	155	V	-55.03	0.62	-1.52	-57.17	-25	32.17
9930.00	34.05	99	177	H	-58.00	1.95	11.64	-48.31	-25	23.31
9930.00	33.15	309	238	V	-59.06	1.95	11.64	-49.37	-25	24.37
14895.00	15.53	219	183	H	-69.67	2.63	13.34	-58.96	-25	33.96
14895.00	15.48	112	125	V	-70.59	2.63	13.34	-59.88	-25	34.88
Channel 4980MHz										
745.20	44.50	76	153	H	-56.63	0.62	-1.52	-58.77	-25	33.77
745.20	42.72	10	157	V	-54.55	0.62	-1.52	-56.69	-25	31.69
9960.00	33.84	109	104	H	-58.16	1.95	11.67	-48.44	-25	23.44
9960.00	33.60	33	106	V	-58.56	1.95	11.67	-48.84	-25	23.84
14940.00	15.01	5	140	H	-70.14	2.64	13.35	-59.43	-25	34.43
14940.00	15.16	193	218	V	-70.87	2.64	13.35	-60.16	-25	35.16

NW10/M

*Pre-scan with X,Y and Z axes of orientation, the worst case **Y-axis of orientation** was recorded*

Frequency (MHz)	Receiver Reading (dBμV)	Turn Table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)			
Channel 4950MHz										
745.20	42.94	88	137	H	-58.19	0.62	-1.52	-60.33	-25	35.33
745.20	40.62	215	142	V	-56.65	0.62	-1.52	-58.79	-25	33.79
9900.00	32.75	173	237	H	-59.35	1.95	11.62	-49.68	-25	24.68
9900.00	31.75	319	147	V	-60.51	1.95	11.62	-50.84	-25	25.84
14850.00	14.31	188	241	H	-70.94	2.62	13.33	-60.23	-25	35.23
14850.00	14.09	191	157	V	-72.03	2.62	13.33	-61.32	-25	36.32
Channel 4965MHz										
745.20	43.02	276	123	H	-58.11	0.62	-1.52	-60.25	-25	35.25
745.20	40.67	123	133	V	-56.6	0.62	-1.52	-58.74	-25	33.74
9930.00	32.15	103	165	H	-59.9	1.95	11.64	-50.21	-25	25.21
9930.00	31.54	5	136	V	-60.67	1.95	11.64	-50.98	-25	25.98
14895.00	14.11	260	235	H	-71.09	2.63	13.34	-60.38	-25	35.38
14895.00	14.18	47	200	V	-71.89	2.63	13.34	-61.18	-25	36.18
Channel 4980MHz										
745.20	43.38	102	206	H	-57.75	0.62	-1.52	-59.89	-25	34.89
745.20	40.95	160	248	V	-56.32	0.62	-1.52	-58.46	-25	33.46
9960.00	32.26	50	122	H	-59.74	1.95	11.67	-50.02	-25	25.02
9960.00	31.71	208	211	V	-60.45	1.95	11.67	-50.73	-25	25.73
14940.00	13.97	167	101	H	-71.18	2.64	13.35	-60.47	-25	35.47
14940.00	13.86	245	103	V	-72.17	2.64	13.35	-61.46	-25	36.46

FCC § 2.1055 - FREQUENCY STABILITY

Applicable Standard

FCC Part 2.1055

According to FCC §2.1055, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an DC power supply and the RF output was connected to a frequency counter via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the counter.

Test Data

Environmental Conditions

Temperature:	22.3 ℃
Relative Humidity:	51 %
ATM Pressure:	101.1 kPa

The testing was performed by Chris Wang on 2017-09-05.

EUT Operation Mode: Transmitting (Test was performed at Chain 0)

Test Result: Compliance.

Temperature (℃)	Voltage (V_{DC})	f_L at Low Test Channel (MHz)	F_H at High Test Channel (MHz)	Limit
-40	52	4941.5122	4988.4452	f_L and f_H Within 4940~4990MHz range
-30		4941.5116	4988.4463	
-20		4941.5124	4988.4457	
-10		4941.5116	4988.4461	
0		4941.5112	4988.4462	
10		4941.5128	4988.4459	
20		4941.5120	4988.4460	
30		4941.5124	4988.4459	
40		4941.5126	4988.4462	
50		4941.5122	4988.4465	
60		4941.5113	4988.4456	
70		4941.5115	4988.4459	
75		4941.5126	4988.4461	
25	48	4941.5128	4988.4459	
25	56	4941.5124	4988.4458	

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