

FCC PART 90

TEST REPORT

For

Shanghai Huace Navigation Technology LTD.

Building C,599 Gaojing Road, Qingpu District Shanghai

FCC ID: SY4-A01005

Report Type: Original Report	Product Type: GNSS Receiver
Test Engineer: <u>Ada Yu</u> <i>Ada Yu</i>	
Report Number: <u>RKS160808011-00C</u>	
Report Date: <u>2016-12-15</u>	
Reviewed By: <u>RF Engineer</u> <i>Oscar Ye</i>	
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	

Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

TABLE OF CONTENTS

GENERAL INFORMATION.....	3
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	3
OBJECTIVE	3
RELATED SUBMITTAL(S)/GRANT(S).....	3
TEST METHODOLOGY	3
MEASUREMENT UNCERTAINTY	4
TEST FACILITY	4
SYSTEM TEST CONFIGURATION.....	5
DESCRIPTION OF TEST CONFIGURATION	5
EUT EXERCISE SOFTWARE	5
SPECIAL ACCESSORIES.....	5
EQUIPMENT MODIFICATIONS	5
SUPPORT EQUIPMENT LIST AND DETAILS	5
BLOCK DIAGRAM OF TEST SETUP	6
SUMMARY OF TEST RESULTS	7
TEST EQUIPMENT LIST	8
FCC §1.1307& §2.1091 –MAXIMUM PERMISSIBLE EXPOSURE (MPE)	9
APPLICABLE STANDARD	9
FCC §2.1046 & §90.205 - RF OUTPUT POWER.....	11
APPLICABLE STANDARD	11
TEST PROCEDURE	11
TEST DATA	11
FCC §2.1047 & §90.207 - MODULATION CHARACTERISTIC.....	12
FCC §2.1049 &§90.209 & §90.210 – OCCUPIED BANDWIDTH & EMISSION MASK	13
APPLICABLE STANDARD	13
TEST PROCEDURE	14
TEST DATA	14
FCC §2.1051 & §90.210 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS	20
APPLICABLE STANDARD	20
TEST PROCEDURE	20
TEST DATA	20
FCC §2.1053 & §90.210 - RADIATED SPURIOUS EMISSIONS	24
APPLICABLE STANDARD	24
TEST PROCEDURE	24
TEST DATA	24
FCC §2.1055 &§90.213 - FREQUENCY STABILITY.....	26
APPLICABLE STANDARD	26
TEST PROCEDURE	26
TEST DATA	26

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The Shanghai Huace Navigation Technology LTD.'s product, model number: M6 (FCC ID: SY4-A01005) or the "EUT" in this report is a GNSS Receiver, which was measured approximately: 124mm (W) x 140mm (H), rated input voltage: DC 7.4V rechargeable battery.

Note: The product's series model number: M6X(X=0-9,A-Z). The difference between them was explained in the attached declaration letter.

**All measurement and test data in this report was gathered from production sample serial number: 20160801027.*

(Assigned by BACL, Kunshan). The EUT supplied by the applicant was received on 2016-08-01.

Objective

This test report is prepared on behalf of Shanghai Huace Navigation Technology LTD in accordance with Part 2, and Part 90 of the Federal Communication Commissions rules.

Related Submittal(s)/Grant(s)

FCC Part 22H/24E/27 PCB, FCC Part15.247 DTS, Part15.247 DSS & Part 15B JBP submissions with FCC ID: SY4-A01005.

Test Methodology

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

Part 90 – Private Land Mobile Radio Service

Applicable Standards: TIA 603-D and ANSI C63.4-2014.

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	4.88dB
Occupied Bandwidth		0.5kHz
Temperature		1.0°C
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.

Test site at Bay Area Compliance Laboratories Corp. (Kunshan) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 06, 2014. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 815570. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in a test mode which has been done in the factory.

For UHF (Digital) mode, 5593 channels are provided to test:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	403.0500	2798	438.0125
2	403.0625
...
...
2796	437.9875	5592	472.9375
2797	438.0000	5593	472.9500

EUT was tested with Channel 1, 2797 and 5593.

EUT Exercise Software

No exercise software was used

Special Accessories

No special accessory was used.

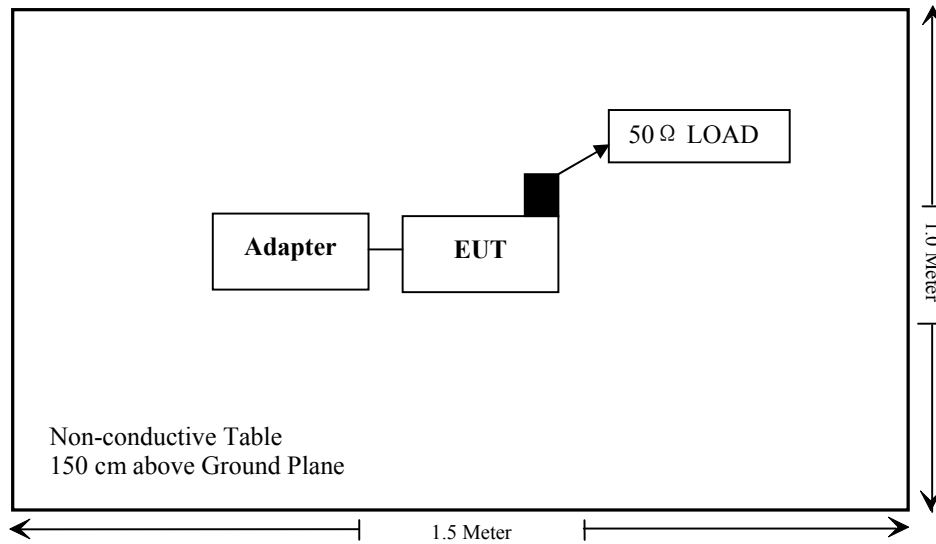
Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
/	/	/	/

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§1.1307(b), §2.1091	Maximum Permissible Exposure (MPE)	Compliance
§2.1046; §90.205	RF Output Power	Compliance
§2.1047; §90.207	Modulation Characteristic	Not Applicable
§2.1049; §90.209; §90.210	Occupied Bandwidth & Emission Mask	Compliance
§2.1051; §90.210	Spurious Emission at Antenna Terminal	Compliance
§2.1053; §90.210	Spurious Radiated Emissions	Compliance
§2.1055; §90.213	Frequency Stability	Compliance
§90.203(j)(5)	Data Rate	Compliance*

Compliance*: the data rate is declared by the manufacturer, please refer to the declaration letter.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2016-11-25	2017-11-24
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2016-11-25	2017-11-24
Sunol Sciences	Broadband Antenna	JB3	A040914-1	2016-01-09	2019-01-08
Sunol Sciences	Broadband Antenna	JB3	A090314-2	2016-01-09	2019-01-08
ETS-LINDGREN	Horn Antenna	3115	9311-4159	2016-01-11	2019-01-10
ETS-LINDGREN	Horn Antenna	3115	6229	2016-01-11	2017-01-10
Sonoma Instrunent	Amplifier	330	171377	2016-12-12	2017-12-11
Narda	Pre-amplifier	AFS42-00101800	2001270	2016-12-12	2017-12-11
R&S	Auto test Software	EMC32	V 09.10.0	/	/
Haojintech	Coaxial Cable	Cable-1	001	2016-12-12	2017-12-11
Haojintech	Coaxial Cable	Cable-2	002	2016-12-12	2017-12-11
Haojintech	Coaxial Cable	Cable-3	003	2016-12-12	2017-12-11
MICRO-COAX	Coaxial Cable	Cable-4	004	2016-12-12	2017-12-11
MICRO-COAX	Coaxial Cable	Cable-5	005	2016-12-12	2017-12-11
RF Conducted test					
Rohde & Schwarz	Signal Analyzer	FSIQ26	836131/009	2016-09-21	2017-09-20
BACL	Temperature & Humidity Chamber	BTH-150	30023	2016-09-10	2017-09-09
Narda	Attenuator	769-6	3165	2016-09-23	2017-09-22
Huace	RF Cable	/	/	2016-08-01	2017-07-31

* **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 §1.1307& §2.1091 –MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart § 2.1051 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/cm²)	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/cm²);

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	Antenna Gain		Output Power		Evaluation Distance	Power Density	MPE Limit
	(MHz)	(dBi)	(numeric)	(dBm)	(mW)	(cm)	(mW/cm ²)	(mW/cm ²)
802.11b	2412-2462	0.0	1.00	16.00	39.81	20	0.0079	1.00
802.11g	2412-2462	0.0	1.00	15.00	31.62	20	0.0063	1.00
802.11n HT20	2412-2462	0.0	1.00	15.00	31.62	20	0.0063	1.00
BT	2402-2480	0.0	1.00	10.00	10.00	20	0.0020	1.00
EGPRS 850	824.2-848.8	0.0	1.00	21.00	125.89	20	0.0251	0.55
EGPRS 1900	1850.2-1909.8	0.0	1.00	21.00	125.89	20	0.0251	1.00
GPRS 850	824.2-848.8	0.0	1.00	27.00	501.19	20	0.0998	0.55
GPRS 1900	1850.2-1909.8	0.0	1.00	24.00	251.19	20	0.0500	1.00
WCDMA (Band II)	1852.4-1907.6	0.0	1.00	24.00	251.19	20	0.0500	1.00
WCDMA (Band IV)	1712.4-1752.6	0.0	1.00	24.00	251.19	20	0.0500	1.00
WCDMA (Band V)	826.4-846.6	0.0	1.00	24.00	251.19	20	0.0500	0.55
UHF	403.05-472.95	0.0	1.00	30.50	1122.02	20	0.2233	0.27

Number of Time slot	1	2	3	4
Duty Cycle	1:8.3	1:4.15	1:2.77	1:2.08
Time based Ave. power compared to slotted Ave. power	-9 dB	-6 dB	-4.26 dB	-3 dB

Note: (1) The target output power:

802.11b: 15.5 ± 0.5 dBm,

802.11g: 14.5 ± 0.5 dBm,

802.11n(HT20): 14.5 ± 0.5 dBm

BT: 8.5 ± 1.5 dBm

EGPRS 850: 1 slot 27 ± 2 dBm, 2slot 25 ± 2 dBm max average power 21dBm

EGPRS 1900: 1 slot 26 ± 2 dBm, 2slot 25 ± 2 dBm max average power 21dBm

GPRS 850: 1 slot 32 ± 2 dBm, 2slot 31 ± 2 dBm max average power 27dBm

GPRS 1900: 1 slot 29 ± 2 dBm, 2slot 28 ± 2 dBm max average power 24dBm

WCDMA (Band II): 22 ± 2 dBm

WCDMA (Band IV): 22 ± 2 dBm

WCDMA (Band V): 22 ± 2 dBm

UHF: Low power 21.5 ± 0.5 dBm, High power 30 ± 0.5 dBm

which declared by the Manufacturer.

(2) The EUT has the BT, 2.4GHz WIFI, UHF, GSM and WCDMA functions, they can transmitting simultaneously. According to KDB 447498 D01 General RF Exposure Guidance v06 and test data, the 2.4G Wi-Fi(802.11b), GSM/WCDMA(GPRS 850), UHF (Digital) model is the worst case, their sum of MPE ratio is 0.9347, which is less than 1.0, so the collocation exposure exclusion applies.

Result: The device meet FCC MPE at 20 cm distance.

FCC §2.1046 & §90.205 - RF OUTPUT POWER

Applicable Standard

FCC §2.1046 and §90.205

Test Procedure

Conducted RF Output Power:

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

Spectrum Analyzer Setting:

R B/W	V B/W
100 kHz	300 kHz

Test Data

Environmental Conditions

Temperature:	22.4 °C
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Ada Yu on 2016-10-13.

EUT Operation Mode: Transmitting

Test Result: Compliance. Please refer to following table.

Mode	Frequency Spacing (kHz)	Frequency (MHz)	Power level	Output (dBm)	Output Power(W)
Digital	12.5	403.05	High	30.39	1.09
			Low	21.37	0.14
		438.00	High	30.13	1.03
			Low	21.54	0.14
		472.95	High	30.29	1.07
			Low	21.69	0.15

Note: The high rated power is 1.0W.
The low rated power is 0.125W.

FCC §2.1047 & §90.207 - MODULATION CHARACTERISTIC

According to FCC § 2.1047(d), Part 90.207, there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

FCC §2.1049 & §90.209 & §90.210 – OCCUPIED BANDWIDTH & EMISSION MASK

Applicable Standard

FCC §2.1049, §90.209 and §90.210

Applicable Emission Masks		
Frequency band (MHz)	Mask for equipment with audio low pass filter	Mask for equipment without audio low pass filter
Below 25	A or B	A or C
25-50	B	C
72-76	B	C
150-174	B, D, or E	C, D or E
150 paging only	B	C
220-222	F	F
421-512	B, D, or E	C, D, or E
450 paging only	B	G
806-809/851-854	B	H
809-824/854-869	B	G
896-901/935-940	I	J
902-928	K	K
929-930	B	G
4940-4990 MHz	L or M	L or M
5850-5925		
All other bands	B	C

Emission Mask D—12.5 kHz channel bandwidth equipment. For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

- (1) On any frequency from the center of the authorized bandwidth f_0 to 5.625 kHz removed from f_0 : Zero dB.
- (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least $7.27(f_d - 2.88 \text{ kHz})$ dB.
- (3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz: At least $50 + 10 \log(P)$ dB or 70 dB, whichever is the lesser attenuation.

(4) The reference level for showing compliance with the emission mask shall be established using a resolution bandwidth sufficiently wide (usually two or three times the channel bandwidth) to capture the true peak emission of the equipment under test. In order to show compliance with the emission mask up to and including 50 kHz removed from the edge of the authorized bandwidth, adjust the resolution bandwidth to 100 Hz with the measuring instrument in a peak hold mode. A sufficient number of sweeps must be measured to insure that the emission profile is developed. If video filtering is used, its bandwidth must not be less than the instrument resolution bandwidth. For emissions beyond 50 kHz from the edge of the authorized bandwidth, see paragraph (o) of this section. If it can be shown that use of the above instrumentation settings do not accurately represent the true interference potential of the equipment under test, an alternate procedure may be used provided prior Commission approval is obtained.

Emission Mask E—6.25 kHz or less channel bandwidth equipment. For transmitters designed to operate with a 6.25 kHz or less bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

- (1) On any frequency from the center of the authorized bandwidth f_0 to 3.0 kHz removed from f_0 : Zero dB.
- (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 3.0 kHz but no more than 4.6 kHz: At least $30 + 16.67(f_d - 3 \text{ kHz})$ or $55 + 10 \log(P)$ or 65 dB, whichever is the lesser attenuation.
- (3) On any frequency removed from the center of the authorized bandwidth by more than 4.6 kHz: At least $55 + 10 \log(P)$ or 65 dB, whichever is the lesser attenuation.
- (4) The reference level for showing compliance with the emission mask shall be established using a resolution bandwidth sufficiently wide (usually two or three times the channel bandwidth) to capture the true peak emission of the equipment under test. In order to show compliance with the emission mask up to and including 50 kHz removed from the edge of the authorized bandwidth, adjust the resolution bandwidth to 100 Hz with the measuring instrument in a peak hold mode. A sufficient number of sweeps must be measured to insure that the emission profile is developed. If video filtering is used, its bandwidth must not be less than the instrument resolution bandwidth. For emissions beyond 50 kHz from the edge of the authorized bandwidth, see paragraph (o) of this section. If it can be shown that use of the above instrumentation settings do not accurately represent the true interference potential of the equipment under test, an alternate procedure may be used provided prior Commission approval is obtained.

Test Procedure

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

The resolution bandwidth of the spectrum analyzer was set at 100 Hz and the spectrum was recorded in the frequency band ± 50 kHz from the carrier frequency.

Test Data

Environmental Conditions

Temperature:	22.5 °C
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Ada Yu on 2016-10-13.

EUT Operation Mode: Transmitting

Modulation	Channel Separation (kHz)	Frequency (MHz)	Power Level	99% Occupied Bandwidth (kHz)	26 dB Emissions Bandwidth (kHz)
Digital	12.5	403.05	High	7.81	9.84
			Low	7.81	9.77
		438.00	High	7.81	9.84
			Low	7.74	9.84
		472.95	High	7.89	9.84
			Low	8.32	9.84

Note: Emission bandwidth was based on calculation method instead of measurement.

Emission Designator per CFR 47 §2.201& §2.202&, Bn = 2M + 2D

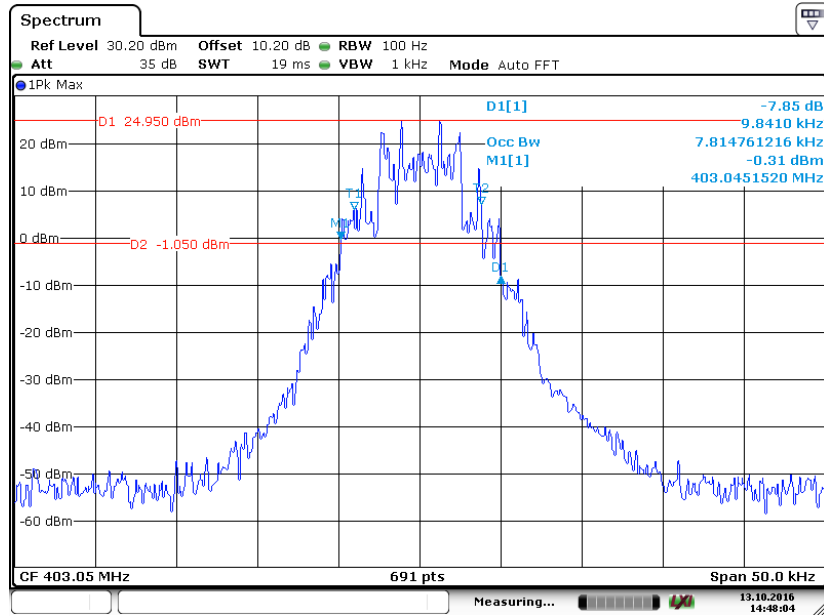
For Digital Mode (Channel Spacing: 12.5 kHz)

Emission Designator 8K32F1D.

The 99% energy rule (title 47CFR 2.1049) was used for digital mode. It basically states that 99% of the modulation energy falls within X kHz, in this case, 8.32 kHz. The emission mask was obtained from 47CFR 90.210(d).

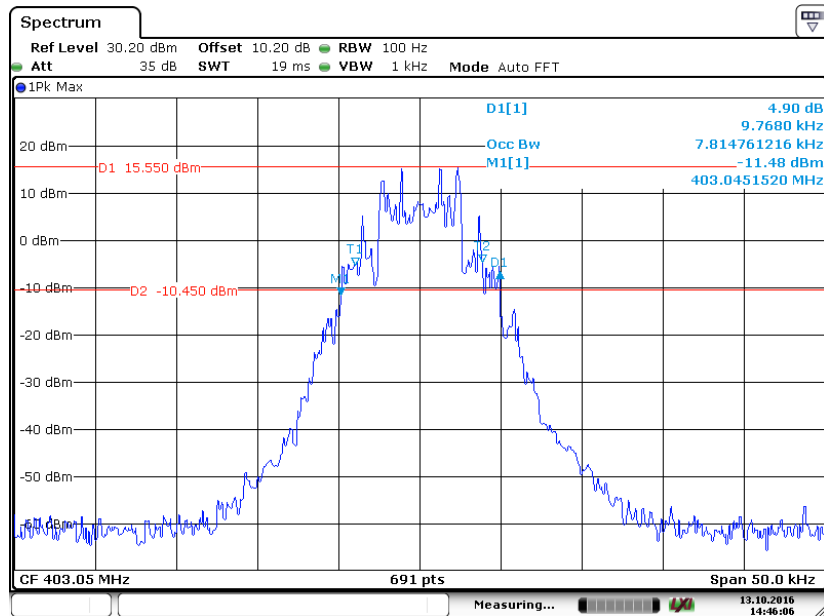
99% Occupied & 26 dB Bandwidth

Low Channel High Power



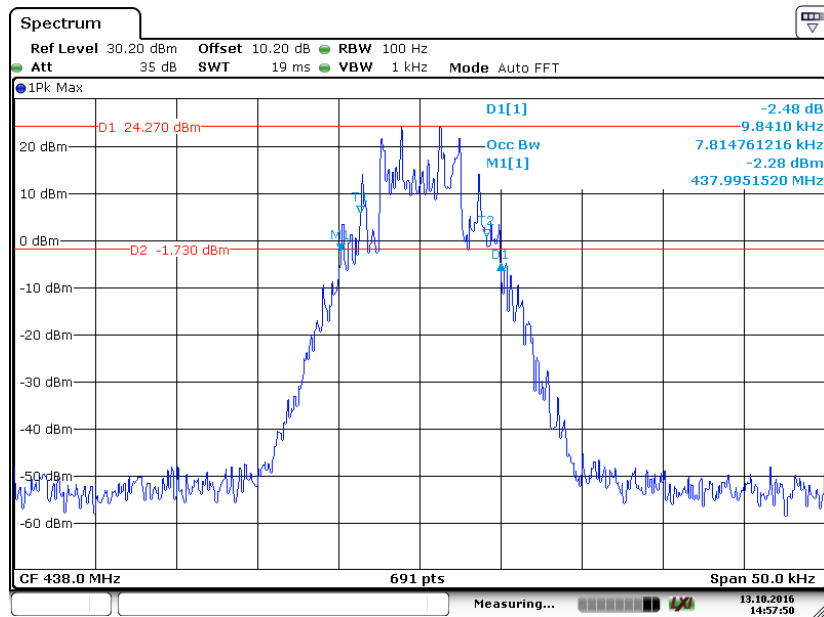
Date: 13 OCT 2016 14:48:04

Low Channel Low Power



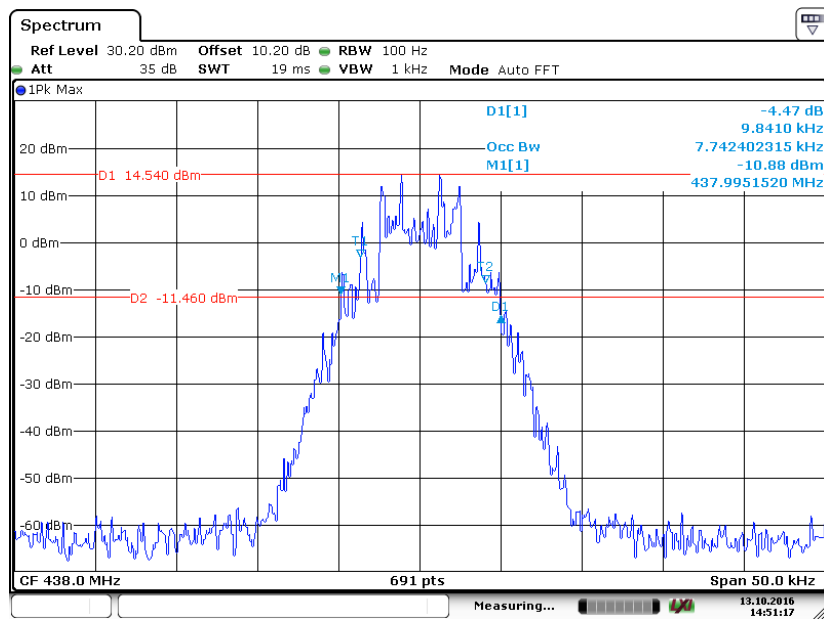
Date: 13 OCT 2016 14:46:07

Middle Channel High Power



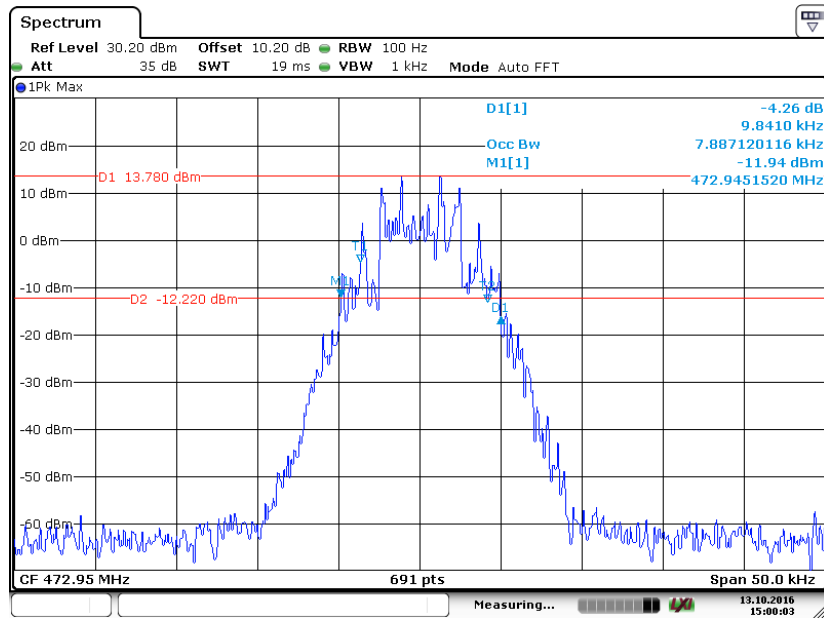
Date: 13 OCT 2016 14:57:51

Middle Channel Low Power



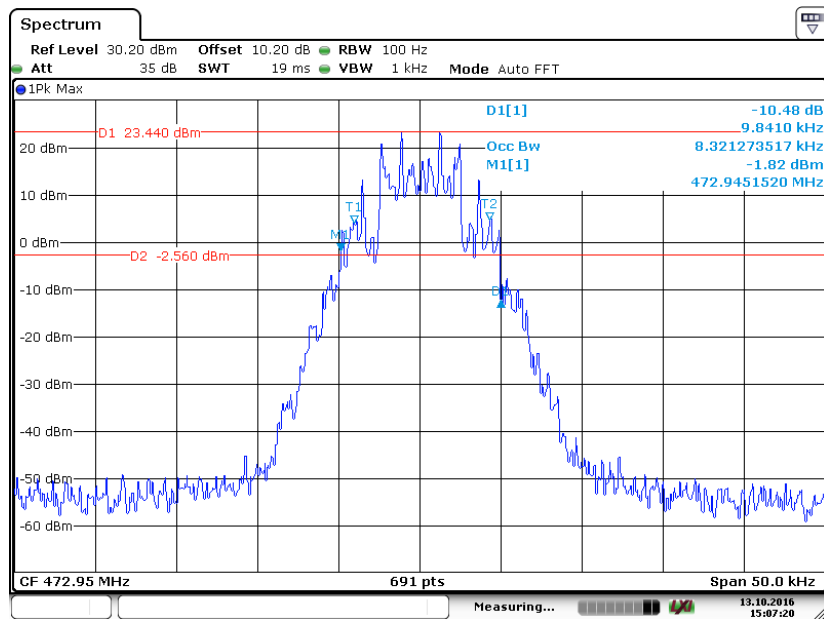
Date: 13 OCT 2016 14:51:17

High Channel High Power



Date: 13 OCT 2016 15:00:03

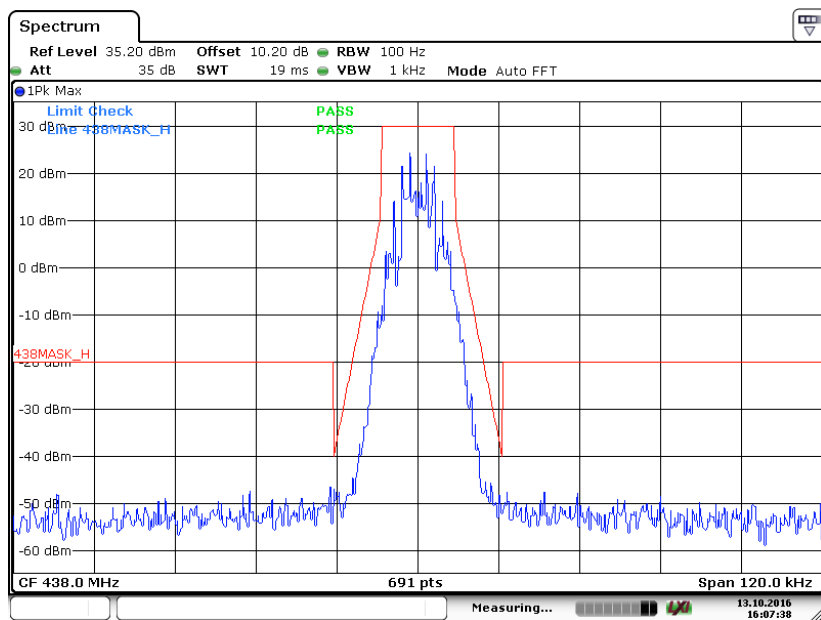
High Channel Low Power



Date: 13 OCT 2016 15:07:20

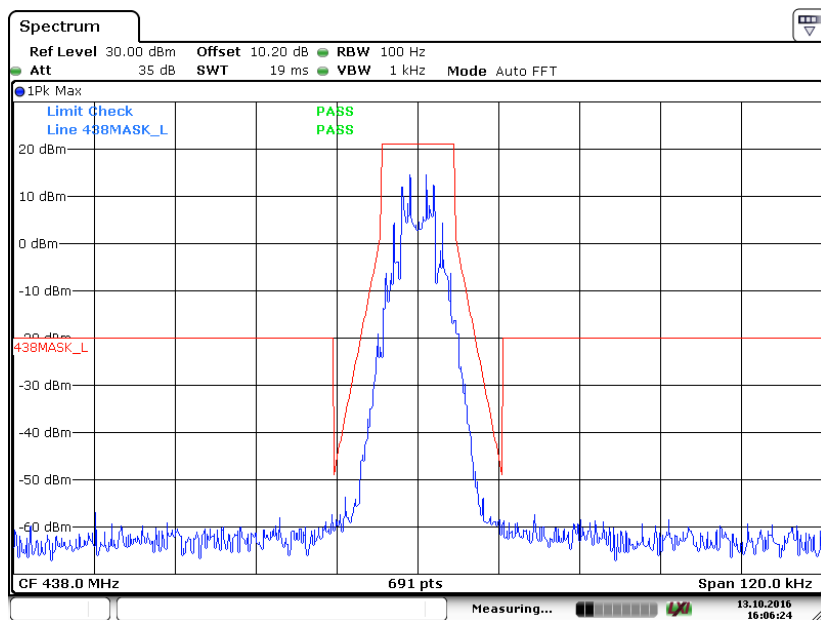
Emission Mask

Middle Channel High Power



Date: 13 OCT 2016 16:07:38

Middle Channel Low Power



Date: 13 OCT 2016 16:06:24

FCC §2.1051 & §90.210 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Applicable Standard

Emission Mask D—12.5 kHz channel bandwidth equipment. For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

- 1) For any frequency removed from the center of the authorized bandwidth f_0 to 5.625 kHz removed from f_0 , 0 dB.
- 2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5.626 kHz but no more than 12.5 kHz, at least 7.27 ($f_d - 2.88$ kHz) dB.
- 3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz: At least $50 + 10 \log (P)$ dB or 70 dB, whichever is the lesser attenuation.

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:	25 °C
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

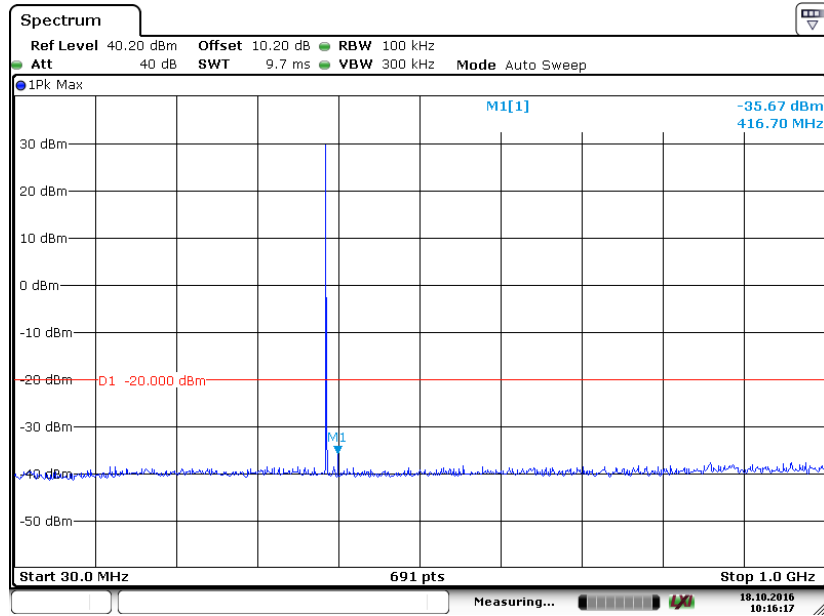
The testing was performed by Ada Yu on 2016-10-18.

EUT Operation Mode: Transmitting

Test result: Compliance, please refer to the following plots.

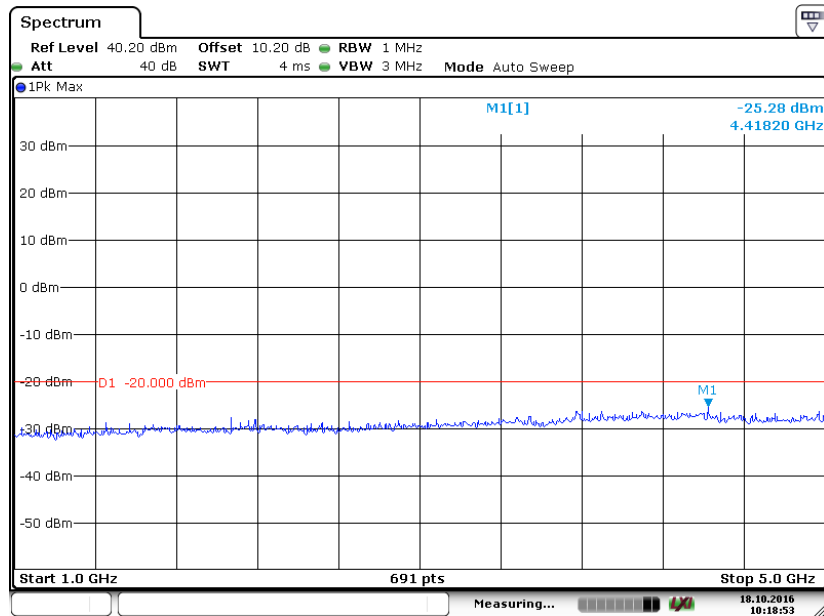
Digital Modulation:

Low Channel 30MHz - 1GHz



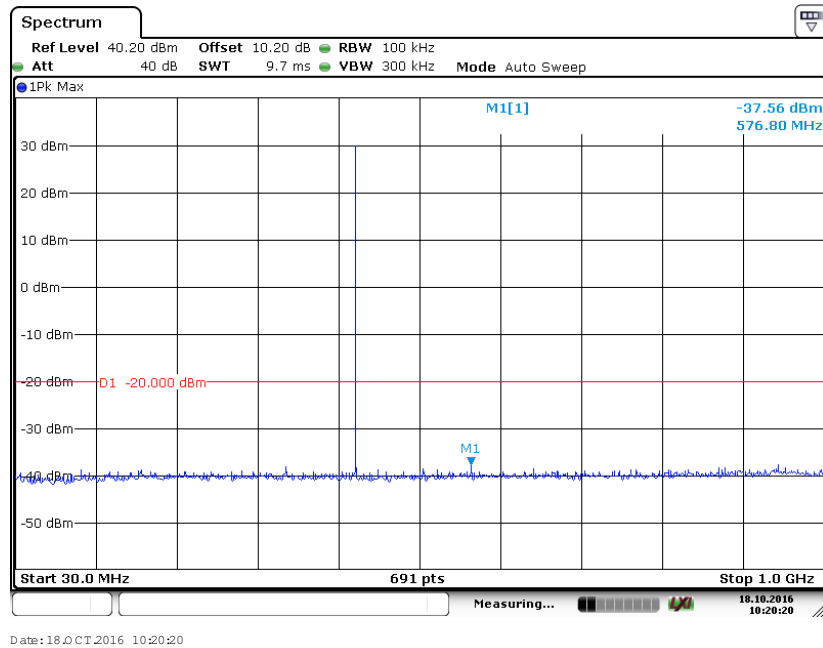
Date: 18 OCT 2016 10:16:17

Low Channel 1GHz - 5GHz

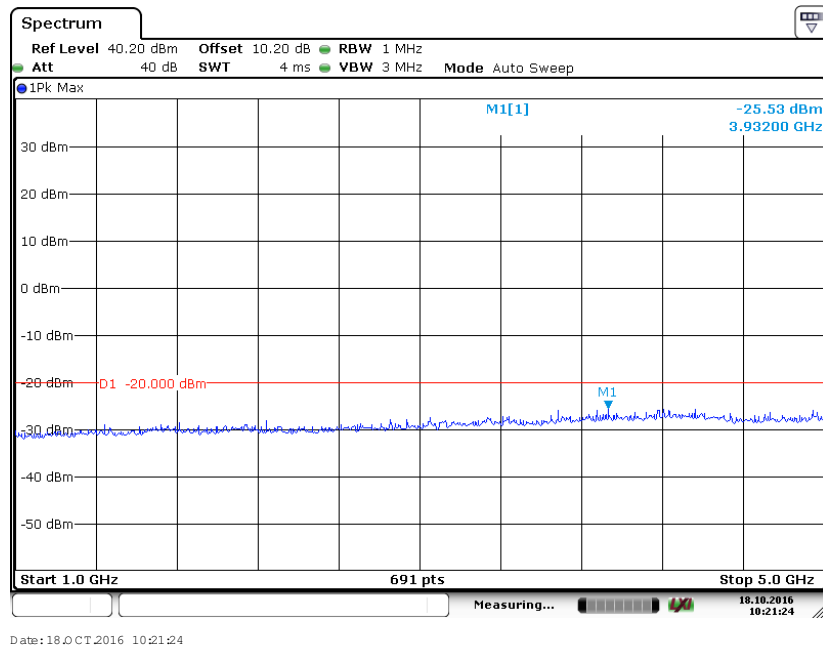


Date: 18 OCT 2016 10:18:54

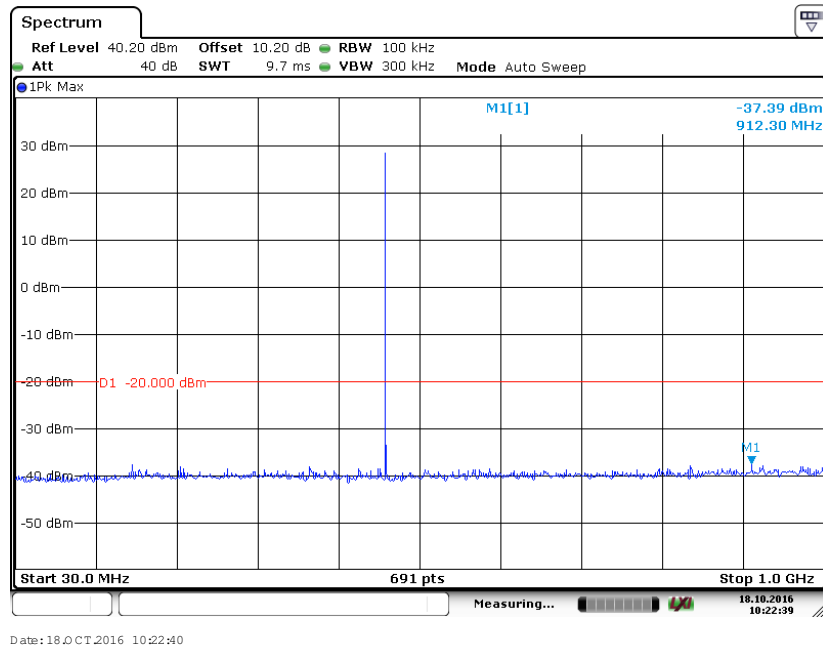
Middle Channel 30MHz - 1GHz



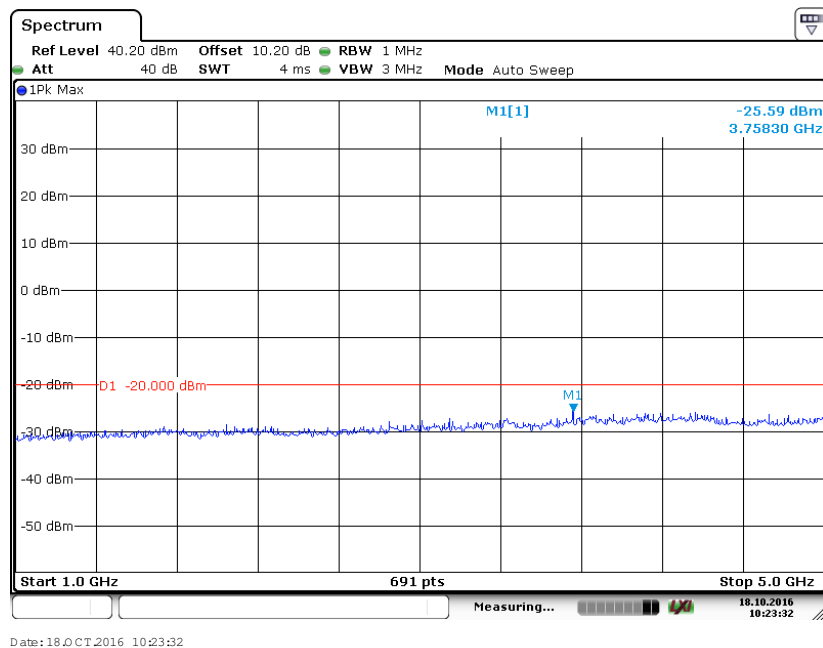
Middle Channel 1GHz - 5GHz



Hihg Channel 30MHz - 1GHz



Hihg Channel 1GHz - 5GHz



FCC §2.1053 & §90.210 - RADIATED SPURIOUS EMISSIONS

Applicable Standard

FCC §2.1053 and §90.210

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 lg (TXpwr in Watts/0.001)-the absolute level

Spurious attenuation limit in dB = 50 + 10 Log₁₀ (power out in Watts) for EUT with a 12.5 kHz channel bandwidth.

Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Ada Yu on 2016-12-13.

EUT Operation Mode: Transmitting

Test result: Compliance, please refer to the following table.

30MHz - 5GHz:

Frequency (MHz)	Receiver Reading (dBμV)	Turn Table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)	SG Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)			
Channel 403.05MHz										
320.63	51.43	244	1.9	H	-61.79	0.20	4.01	-57.98	-20	37.98
320.63	47.41	133	2.2	V	-62.67	0.20	4.01	-58.86	-20	38.86
806.10	40.30	140	2.2	H	-62.85	0.26	4.77	-58.34	-20	38.34
806.10	38.84	254	1.5	V	-63.35	0.26	4.77	-58.84	-20	38.84
1209.15	50.43	41	1.2	H	-61.23	0.31	7.39	-54.15	-20	34.15
1209.15	51.03	313	2.4	V	-62.4	0.31	7.39	-55.32	-20	35.32
Channel 438.00MHz										
320.63	50.55	118	1.7	H	-61.95	0.20	4.01	-58.14	-20	38.14
320.63	46.63	309	2	V	-64.55	0.20	4.01	-60.74	-20	40.74
876.00	40.57	7	1.2	H	-62.58	0.27	4.98	-57.87	-20	37.87
876.00	39.50	260	2.3	V	-62.69	0.27	4.98	-57.98	-20	37.98
1314.00	49.92	101	1.4	H	-61.74	0.32	7.68	-54.38	-20	34.38
1314.00	51.89	216	2.2	V	-61.54	0.32	7.68	-54.18	-20	34.18
Channel 472.95MHz										
320.55	51.22	108	1.2	H	-62.00	0.20	4.01	-58.19	-20	38.19
320.55	47.38	231	1.9	V	-62.70	0.20	4.01	-58.89	-20	38.89
945.90	40.62	20	2.2	H	-62.53	0.26	4.77	-58.02	-20	38.02
945.90	38.56	37	1.9	V	-63.63	0.26	4.77	-59.12	-20	39.12
1418.85	50.31	358	1.9	H	-61.35	0.34	7.95	-53.74	-20	33.74
1418.85	51.79	197	1.0	V	-61.64	0.34	7.95	-54.03	-20	34.03

Note:

Absolute Level = SG Level - Cable loss + Antenna Gain

Margin = Limit- Absolute Level

FCC §2.1055 & §90.213 - FREQUENCY STABILITY

Applicable Standard

FCC §2.1055 and §90.213

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external 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:	25 °C
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Ada Yu on 2016-10-13.

EUT Operation Mode: Transmitting

Test result: Compliance, please refer to the following table.

Digital Modulation

Reference Frequency: 438.00 MHz, Limit: ± 2.5 ppm, 12.5 kHz			
Test Environment		Frequency Measure with Time Elapsed	
Temperature (°C)	Power Supplied (V _{DC})	Measured Frequency (MHz)	Frequency Error (ppm)
Frequency Stability versus Input Temperature			
50	7.4	438.0003	0.68
40	7.4	437.9998	-0.46
30	7.4	438.0004	0.91
20	7.4	437.9997	-0.68
10	7.4	437.9999	-0.23
0	7.4	437.9996	-0.91
-10	7.4	438.0002	0.46
-20	7.4	437.9997	-0.68
-30	7.4	438.0001	0.23
Frequency Stability versus Input Voltage			
20	6.3	438.0004	0.91

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