FCC PART 15.249

TEST REPORT

For

HHC Changzhou Corp.

No. 61 Xinggang Road, Zhonglou District, Changzhou, Jiangsu, China, 213023

FCC ID: 2AEQWCH13HHC009

Report Type:	**Product Type:**
Original Report	remote control

Test Engineer:	Ada Yu
Report Number:	RSHA170824005-00A
Report Date:	2017-09-04
Reviewed By:	Oscar Ye RF Leader
Test Laboratory:	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**
JUSTIFICATION 5
EUT EXERCISE SOFTWARE 5
BLOCK DIAGRAM OF TEST SETUP 5
SUMMARY OF TEST RESULTS **6**
TEST EQUIPMENT LIST **7**
FCC§15.203 - ANTENNA REQUIREMENT **8**
APPLICABLE STANDARD 8
ANTENNA CONNECTOR CONSTRUCTION 8
FCC§15.205, §15.209&§15.249- RADIATED EMISSIONS& OUT OF BAND EMISSION **9**
APPLICABLE STANDARD 9
EUT SETUP 9
TEST EQUIPMENT SETUP 10
TEST PROCEDURE 10
CORRECTED AMPLITUDE & MARGIN CALCULATION 11
TEST RESULTS SUMMARY 11
TEST DATA 11
FCC §15.215(C) – 20 DB BANDWIDTH TESTING **14**
APPLICABLE STANDARD 14
TEST PROCEDURE 14
TEST DATA 14

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	HHC Changzhou Corp.
Tested Model	CH13
Product Type	remote control
Dimension	170 mm(L)×65 mm(W)×28 mm(H)
Power Supply	DC 1.5V*3 by batteries

All measurement and test data in this report was gathered from production sample serial number: 20170824005. (Assigned by BACL, Kunshan). The EUT was received on 2017-08-24.

Objective

This type approval report is prepared on behalf of HHC Changzhou Corp. in accordance with Part 2-Subpart J, and Part 15-Subparts A and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.209 and 15.249 rules.

Related Submittal(s)/Grant(s)

N/A

Test Methodology

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

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

Measurement Uncertainty

Item		Uncertainty
AC Power Lines Conducted Emissions		3.19 dB
RF conducted test with spectrum		0.9dB
RF Output Power with Power meter		0.5dB
Radiated emission	30MHz~1GHz	6.11dB
	1GHz~6GHz	4.45dB
	6GHz~18GHz	5.23dB
	18GHz~40GHz	4.88dB
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.

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

Justification

Channel list for GFSK modulation:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2403	40	2442
2	2404	41	2443
…	…	…	…
38	2440	77	2479
39	2441	78	2480

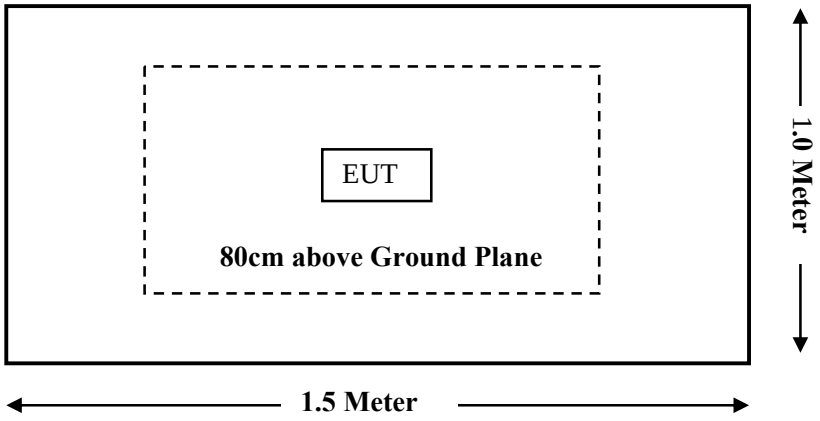
EUT was tested with channel 1, 39 and 78.

EUT Exercise Software

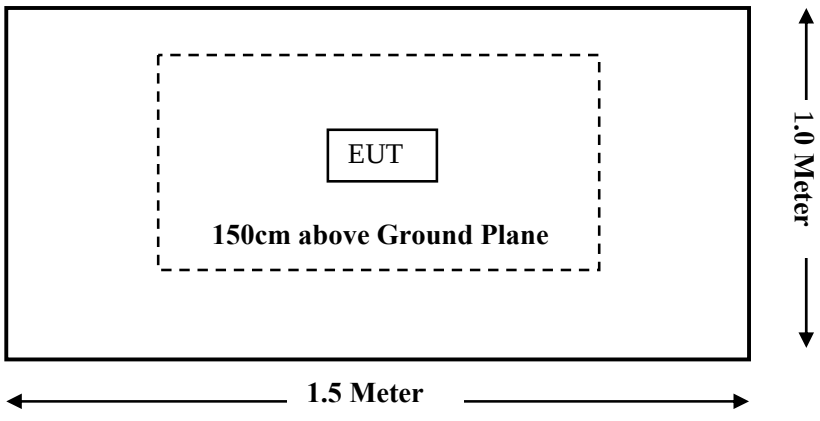
No software was used during the test.

Block Diagram of Test Setup

For Radiated Emissions(Below 1GHz):



For Radiated Emissions(Above 1GHz):



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.207(a)	Conduction Emissions	Not Applicable
15.205, §15.209, §15.249	Radiated Emissions& Out of Band Emission	Compliance
§15.215 (c)	20 dB Bandwidth	Compliance

Note: The EUT is battery operated equipment.

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	2016-11-25	2017-11-24
Sunol Sciences	Broadband Antenna	JB3	A090314-2	2016-01-09	2019-01-08
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	2016-11-25	2017-11-24
ETS-LINDGREN	Horn Antenna	3115	6229	2016-01-11	2019-01-10
ETS-LINDGREN	Horn Antenna	3116	00084159	2016-10-18	2019-10-17
Narda	Pre-amplifier	AFS42-00101800	2001270	2016-12-12	2017-12-11
Heatsink Required	Amplifier	QLW-18405536-J0	15964001009	2016-12-12	2017-12-11
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	FSIQ26	836131/009	2016-09-21	2017-09-20
HHC	RF Cable	/	/	2017-08-24	2018-08-23

*** 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§15.203 - ANTENNA REQUIREMENT

Applicable Standard

For intentional device, 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.

Antenna Connector Construction

The EUT has a PCB antenna arrangement and antenna gain is 2dBi, which was permanently attached ,fulfill the requirement of this section, please refer to the EUT photos.

Result: Compliant.

FCC§15.205, §15.209&§15.249- RADIATED EMISSIONS& OUT OF BAND EMISSION

Applicable Standard

As per FCC§15.249 (a), except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

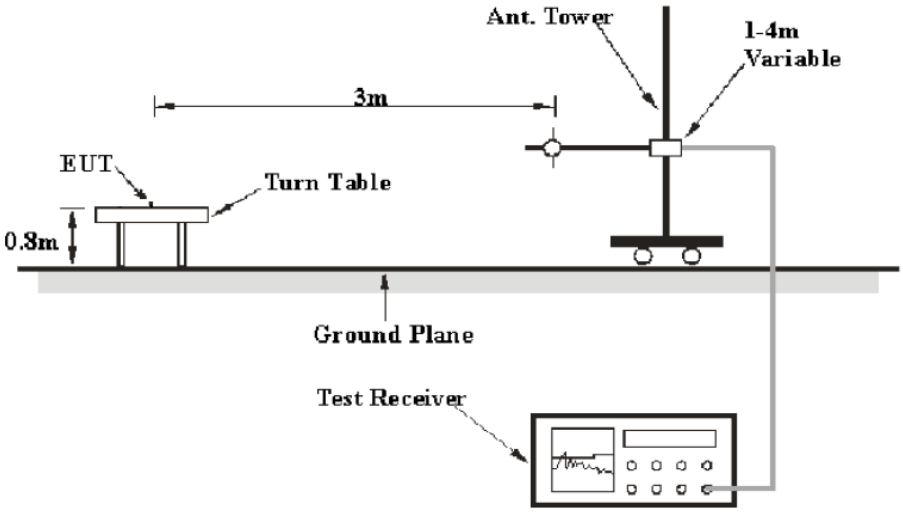
Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

As per FCC§15.249 (c), Field strength limits are specified at a distance of 3 meters.

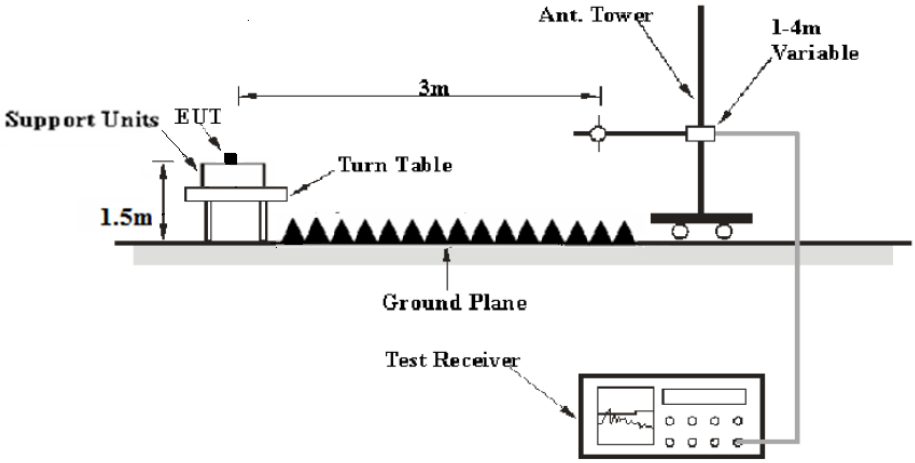
(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

EUT Setup

Below 1 GHz:



Above 1 GHz:



The radiated emission and out of band 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 15.209/15.205 and FCC 15.249 limits.
The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

Test Equipment Setup

The system was investigated from 30 MHz to 25 GHz.

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

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP

Frequency Range	RBW	Video B/W	Detector
1GHz – 25GHz	1MHz	3 MHz	PK
	1MHz	10 Hz	Ave.

Test Procedure

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

All data was recorded in the Quasi-peak detection mode from 30MHz to 1GHz, Peak and average detection mode above 1 GHz.

Corrected Amplitude & Margin Calculation

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

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

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

Margin = Limit –Corrected Amplitude

Test Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15.209 &15.205 & 15.249.

Test Data

Environmental Conditions

Temperature:	24.6°C
Relative Humidity:	52%
ATM Pressure:	101.2 kPa

The testing was performed by Ada Yu on 2017-09-03.

Test Mode: Transmitting (Scan with X-Axis, Y-Axis and Z-Axis position, the worst case X-Axis was recorded)

30MHz-25GHz:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.249/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2403.00MHz)									
225.17	42.15	QP	115	149	H	-11.87	30.28	46	15.72
2403.00	97.93	PK	319	101	V	-4.93	93.00	114	21.00
2403.00	86.05	Ave	170	108	V	-4.93	81.12	94	12.88
2403.00	97.16	PK	341	110	H	-4.93	92.23	114	21.77
2403.00	75.02	Ave	165	130	H	-4.93	70.09	94	23.91
2390.00	53.82	PK	99	141	V	-4.96	48.86	74	25.14
2390.00	39.18	Ave	262	135	V	-4.96	34.22	54	19.78
2400.00	68.79	PK	161	147	V	-4.94	63.85	74	10.15
2400.00	40.06	Ave	237	108	V	-4.94	35.12	54	18.88
1225.89	45.19	PK	357	125	V	-10.05	35.14	74	38.86
1225.89	31.26	Ave	230	150	V	-10.05	21.21	54	32.79
4806.00	44.16	PK	115	120	V	2.48	46.64	74	27.36
4806.00	30.12	Ave	45	145	V	2.48	32.60	54	21.40
7209.00	41.08	PK	7	116	V	9.79	50.87	74	23.13
7209.00	28.15	Ave	53	116	V	9.79	37.94	54	16.06

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.249/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Middle Channel (2441.00MHz)									
225.17	42.10	QP	130	122	H	-11.87	30.23	46	15.77
2441.00	98.85	PK	108	108	V	-4.82	94.03	114	19.97
2441.00	87.01	Ave	35	143	V	-4.82	82.19	94	11.81
2441.00	98.11	PK	63	104	H	-4.82	93.29	114	20.71
2441.00	75.99	Ave	340	146	H	-4.82	71.17	94	22.83
1220.96	46.10	PK	157	140	V	-10.09	36.01	74	37.99
1220.96	32.20	Ave	25	139	V	-10.09	22.11	54	31.89
3569.14	47.09	PK	345	105	H	-0.68	46.41	74	27.59
3569.14	33.12	Ave	186	127	H	-0.68	32.44	54	21.56
4882.00	45.15	PK	38	130	V	2.65	47.80	74	26.20
4882.00	31.02	Ave	310	144	V	2.65	33.67	54	20.33
6316.63	47.07	PK	131	100	H	7.33	54.40	74	19.60
6316.63	33.11	Ave	239	127	H	7.33	40.44	54	13.56
7323.00	41.99	PK	200	121	V	9.96	51.95	74	22.05
7323.00	29.13	Ave	303	144	V	9.96	39.09	54	14.91

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.249/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
High Channel (2480.00MHz)									
225.17	42.12	QP	0	146	H	-11.87	30.25	46	15.75
2480.00	99.42	PK	168	102	V	-4.72	94.70	114	19.30
2480.00	87.52	Ave	153	118	V	-4.72	82.80	94	11.20
2480.00	98.63	PK	117	129	H	-4.72	93.91	114	20.09
2480.00	76.56	Ave	122	114	H	-4.72	71.84	94	22.16
2483.50	69.36	PK	14	130	V	-4.71	64.65	74	9.35
2483.50	40.63	Ave	358	117	V	-4.71	35.92	54	18.08
1240.48	47.67	PK	241	127	V	-9.94	37.73	74	36.27
1240.48	33.71	Ave	215	110	V	-9.94	23.77	54	30.23
4960.00	45.70	PK	151	147	V	2.82	48.52	74	25.48
4960.00	31.54	Ave	307	133	V	2.82	34.36	54	19.64
6671.34	47.57	PK	88	107	H	8.68	56.25	74	17.75
6671.34	33.62	Ave	62	135	H	8.68	42.30	54	11.70
7440.00	42.58	PK	359	104	V	10.14	52.72	74	21.28
7440.00	29.72	Ave	151	136	V	10.14	39.86	54	14.14

Note:
Corrected Amplitude = Corrected Factor + Reading
Corrected Factor = Antenna factor (Rx) + cable loss – amplifier factor
Margin = Limit - Corr. Amplitude

FCC §15.215(c) – 20 dB BANDWIDTH TESTING

Applicable Standard

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

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 on the test table without connection to measurement instrument. Turn on the EUT. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Test Data

Environmental Conditions

Temperature:	24.2°C
Relative Humidity:	51 %
ATM Pressure:	101.2kPa

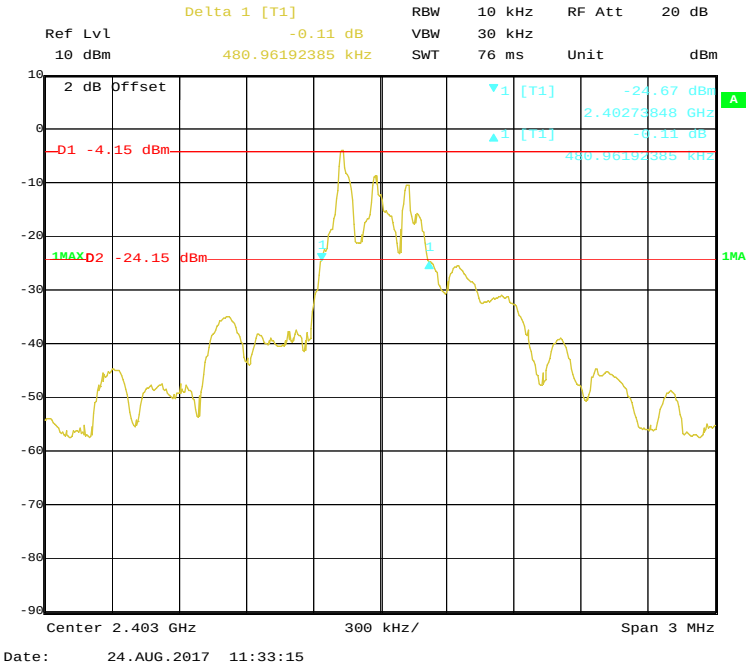
The testing was performed by Ada Yu on 2017-08-24.

Test Result: Compliant.

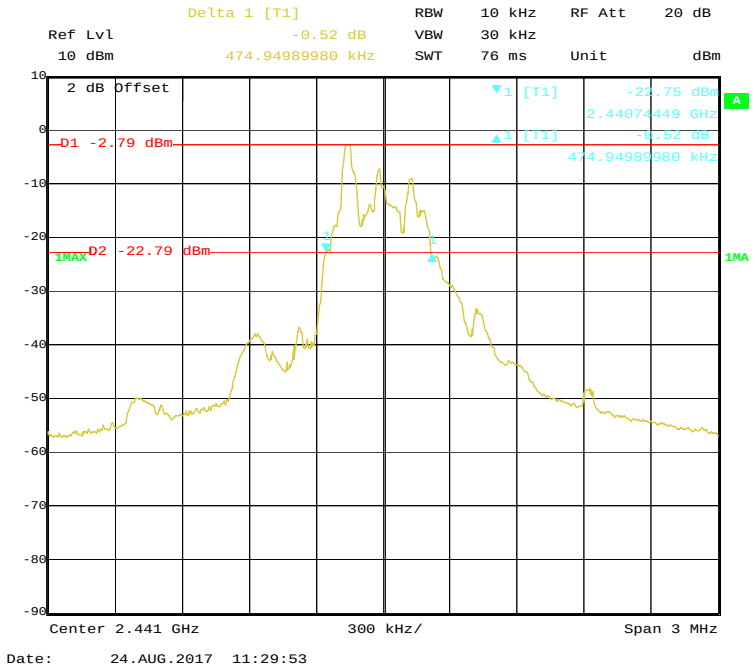
Test Mode: Transmitting

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
Low	2403.00	0.481
Middle	2441.00	0.475
High	2480.00	0.481

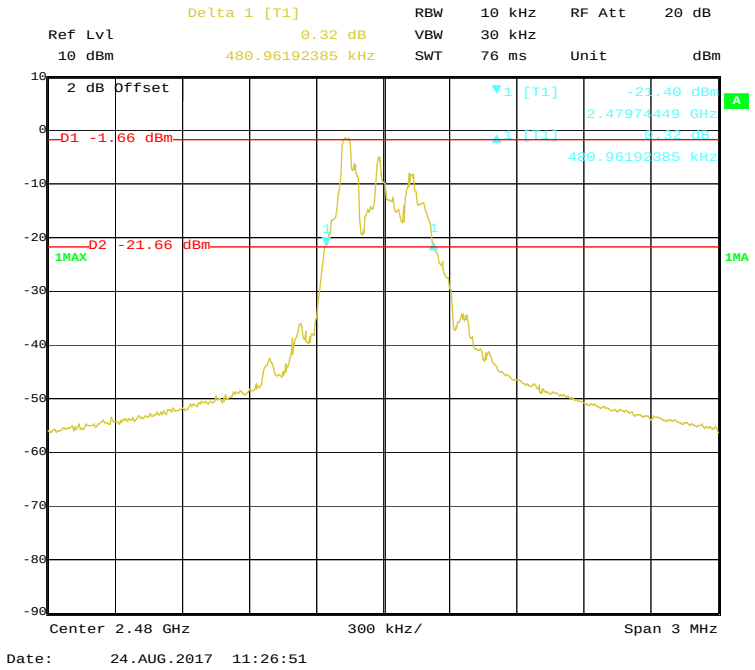
Low Channel



Middle Channel



High Channel



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