



# FCC PART 15.249

## TEST REPORT

For

### Skyrocket Toys LLC

12910 Culver Blvd, Suite F, Los Angeles, CA 90066, U.S.A

**FCC ID: O5301942RX24G**

<b>Report Type:</b> Original Report	<b>Product Name:</b> DASH Nano Drone
<b>Report Number:</b>	RDG180409012-00B
<b>Report Date:</b>	2018-04-26
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\* This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk “\*” .

## 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.....3

    TEST FACILITY.....4

**SYSTEM TEST CONFIGURATION.....5**

    JUSTIFICATION.....5

    EUT EXERCISE SOFTWARE.....5

    EQUIPMENT MODIFICATIONS.....5

    SUPPORT EQUIPMENT LIST AND DETAILS.....5

    SUPPORT CABLE LIST AND DETAILS.....5

    BLOCK DIAGRAM OF TEST SETUP.....6

**SUMMARY OF TEST RESULTS.....7**

**FCC§15.203 - ANTENNA REQUIREMENT.....8**

    APPLICABLE STANDARD.....8

    ANTENNA CONNECTOR CONSTRUCTION.....8

**FCC §15.207 (A)– AC LINE CONDUCTED EMISSIONS.....9**

    APPLICABLE STANDARD.....9

    EUT SETUP.....9

    EMI TEST RECEIVER SETUP.....9

    TEST PROCEDURE.....10

    CORRECTED AMPLITUDE & MARGIN CALCULATION.....10

    TEST EQUIPMENT LIST AND DETAILS.....10

    TEST DATA.....11

**FCC§15.205, §15.209&§15.249- RADIATED EMISSIONS.....13**

    APPLICABLE STANDARD.....13

    EUT SETUP.....13

    TEST EQUIPMENT SETUP.....14

    TEST PROCEDURE.....14

    CORRECTED AMPLITUDE & MARGIN CALCULATION.....14

    TEST EQUIPMENT LIST AND DETAILS.....15

    TEST DATA.....15

**FCC §15.215(C) – 20 DB BANDWIDTH TESTING.....21**

    APPLICABLE STANDARD.....21

    TEST PROCEDURE.....21

    TEST EQUIPMENT LIST AND DETAILS.....21

    TEST DATA.....21

## GENERAL INFORMATION

### Product Description for Equipment under Test (EUT)

<b>EUT Name:</b>	DASH Nano Drone
<b>EUT Model:</b>	01942
<b>FCC ID:</b>	O5301942RX24G
<b>Rated Input Voltage:</b>	DC 3.7V from battery
<b>External Dimension:</b>	Length (49 mm)*Width (49 mm)*High (21 mm)
<b>Serial Number:</b>	180409012
<b>EUT Received Date:</b>	2018.04.17

### Objective

This type approval report is prepared on behalf of *Skyrocket Toys LLC* 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 Rules Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.249 rules.

### Related Submittal(s)/Grant(s)

Submitted with the part of a system with FCC ID: O5301942TX24G.

### 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 emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Dongguan).

### Measurement Uncertainty

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
Unwanted Emissions, radiated	30M~200MHz: 4.58 dB for Horizontal, 4.59 dB for Vertical 200M~1GHz: 4.83 dB for Horizontal, 5.85 dB for Vertical 1G~6GHz: 4.45 dB, 6G~26.5GHz: 5.23 dB
Temperature	±1°C
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%
AC Power Lines Conducted Emission	3.12 dB (150 kHz to 30 MHz)

### **Test Facility**

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 897218, the FCC Designation No. : CN1220.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062D.

## SYSTEM TEST CONFIGURATION

### Justification

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

The device employs 65 channels as below list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2408	34	2440
2	2410	35	2441
~	~	~	~
~	~	64	2471
32	2439	65	2472
33	2440		

EUT was tested with Channel 1, 33, and 65

### EUT Exercise Software

No software was used in test, the device was configured to engineer mode by manufacturer, test channel switched by keys.

### Equipment Modifications

No modifications were made to the EUT.

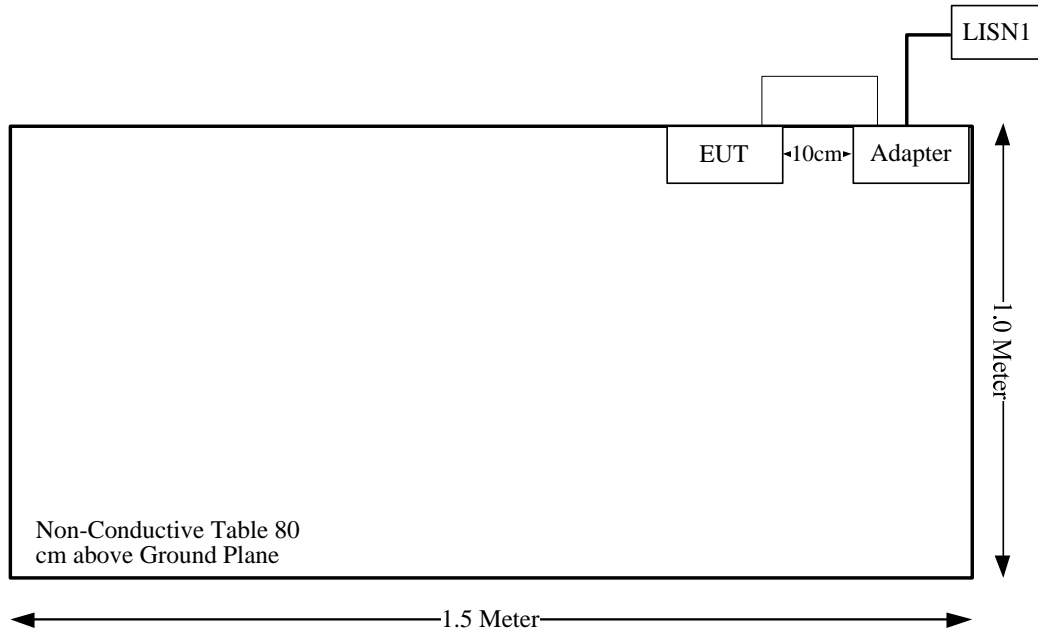
### Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
POSH	Adapter	TPA-46050150UU	N/A

### Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From	To
Power Cable	No	No	0.57	USB of Adapter	EUT

### Block Diagram of Test Setup



**SUMMARY OF TEST RESULTS**

<b>FCC Rules</b>	<b>Description of Test</b>	<b>Result</b>
§15.203	Antenna Requirement	Compliance
§15.207(a)	Conduction Emissions	Compliance
15.205, §15.209, §15.249	Radiated Emissions	Compliance
§15.215 (c)	20 dB Bandwidth	Compliance

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## **FCC§15.203 - ANTENNA REQUIREMENT**

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### **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 one monopole antenna arrangement, and the antenna gain is 0 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

**Result:** Compliant.

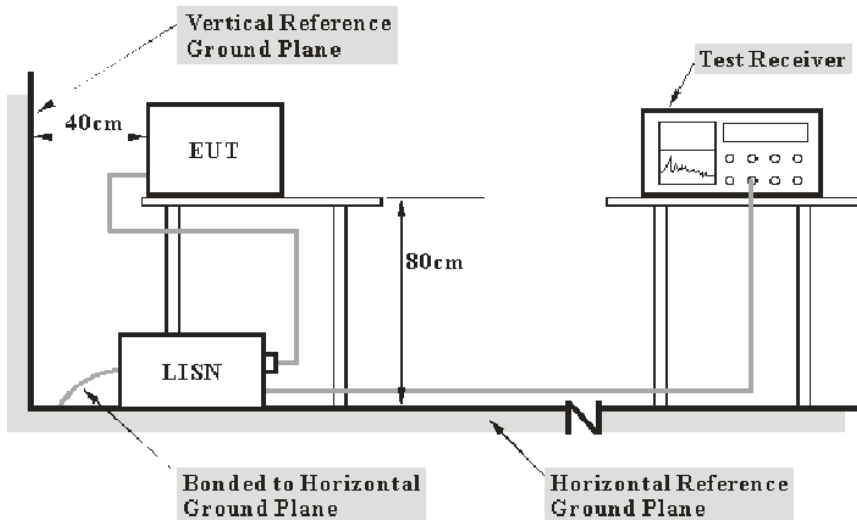


**FCC §15.207 (a)– AC LINE CONDUCTED EMISSIONS**

**Applicable Standard**

FCC§15.207(a)

**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.

The spacing between the peripherals was 10 cm.

The adapter was connected to the main LISN with a 120 V/60 Hz AC power source.

**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	IF B/W
150 kHz – 30 MHz	9 kHz

## Test Procedure

During the conducted emission test, the adapter was connected to the first 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.

## Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$$V_C = V_R + A_C + VDF$$

$$C_f = A_C + VDF$$

Herein,

$V_C$  (cord. Reading): corrected voltage amplitude

$V_R$ : reading voltage amplitude

$A_C$ : attenuation caused by cable loss

VDF: voltage division factor of AMN

$C_f$ : Correction Factor

The “**Margin**” column of the following data tables indicates the degree of compliance within 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:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

## Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCS 30	830245/006	2017-12-11	2018-12-11
N/A	Coaxial Cable	C-NJNJ-50	C-0200-01	2017-09-05	2018-09-05
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A
R&S	Two-line V-network	ENV 216	101614	2017-12-08	2018-12-08

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

**Test Data**

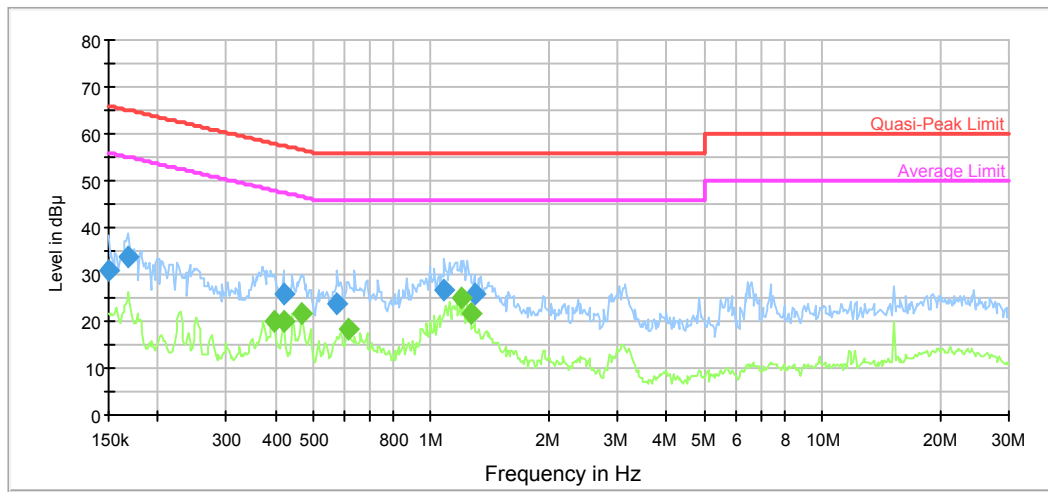
**Environmental Conditions**

<b>Temperature:</b>	25.2 °C
<b>Relative Humidity:</b>	52 %
<b>ATM Pressure:</b>	101.2 kPa

The testing was performed by Alex You on 2018-04-17.

**Test Mode:** Transmitting

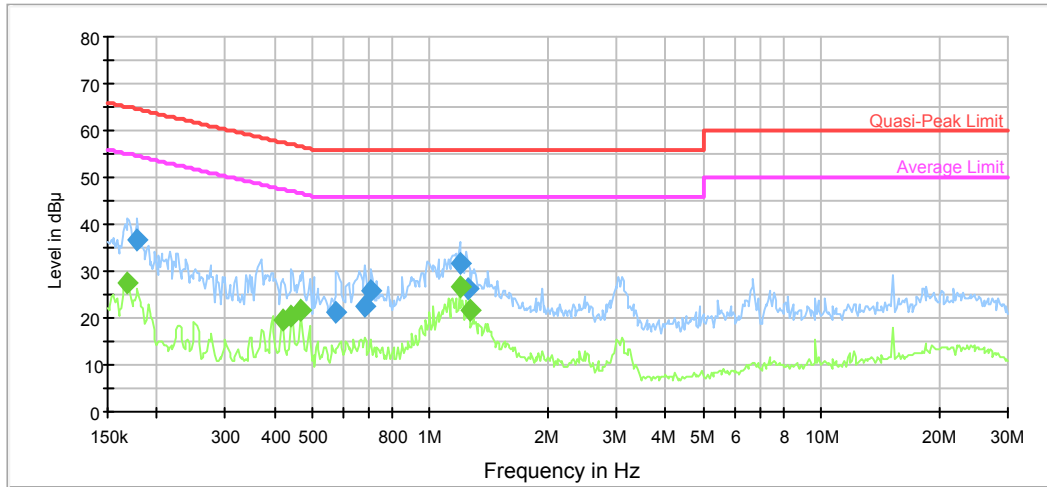
**AC120V, 60 Hz, Line:**



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	30.8	9.000	L1	11.2	35.2	66.0	Compliance
0.169044	33.6	9.000	L1	10.9	31.4	65.0	Compliance
0.419276	25.7	9.000	L1	10.0	31.8	57.5	Compliance
0.576662	23.6	9.000	L1	9.8	32.4	56.0	Compliance
1.082190	26.5	9.000	L1	9.8	29.5	56.0	Compliance
1.289541	26.0	9.000	L1	9.8	30.0	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.396530	19.8	9.000	L1	10.0	28.1	47.9	Compliance
0.419276	20.2	9.000	L1	10.0	27.3	47.5	Compliance
0.468757	21.6	9.000	L1	9.9	24.9	46.5	Compliance
0.614619	18.4	9.000	L1	9.8	27.6	46.0	Compliance
1.190776	24.8	9.000	L1	9.8	21.2	46.0	Compliance
1.259081	21.5	9.000	L1	9.8	24.5	46.0	Compliance

**AC120V, 60 Hz, Neutral:**



Frequency (MHz)	QuasiPeak (dB $\mu$ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)	Comment
0.178741	36.8	9.000	N	10.8	27.7	64.5	Compliance
0.576662	21.2	9.000	N	9.8	34.8	56.0	Compliance
0.681699	22.6	9.000	N	9.8	33.4	56.0	Compliance
0.709407	26.0	9.000	N	9.8	30.0	56.0	Compliance
1.190776	31.8	9.000	N	9.8	24.2	56.0	Compliance
1.249088	26.4	9.000	N	9.8	29.6	56.0	Compliance

Frequency (MHz)	Average (dB $\mu$ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)	Comment
0.169044	27.3	9.000	N	10.9	27.7	55.0	Compliance
0.419276	19.8	9.000	N	10.0	27.7	47.5	Compliance
0.443327	20.3	9.000	N	9.9	26.7	47.0	Compliance
0.468757	21.6	9.000	N	9.9	24.9	46.5	Compliance
1.190776	26.8	9.000	N	9.8	19.2	46.0	Compliance
1.259081	21.5	9.000	N	9.8	24.5	46.0	Compliance

## FCC§15.205, §15.209&§15.249- RADIATED EMISSIONS

### 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:

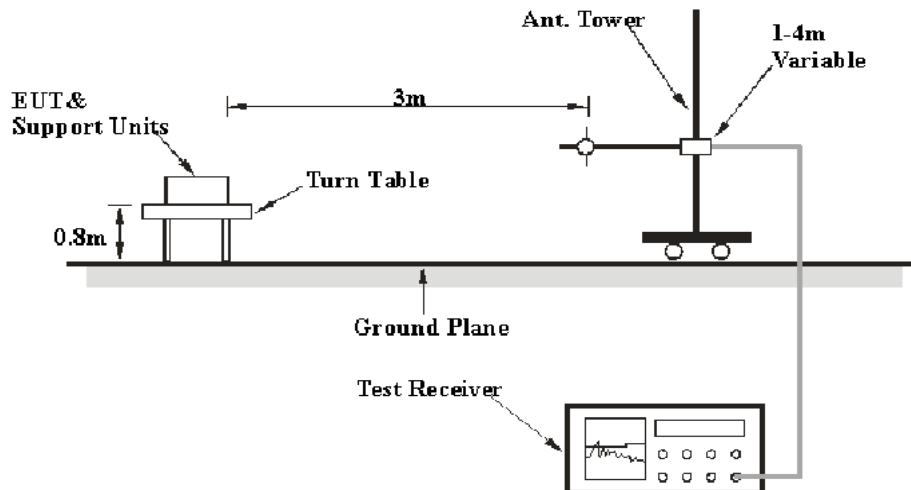
Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

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

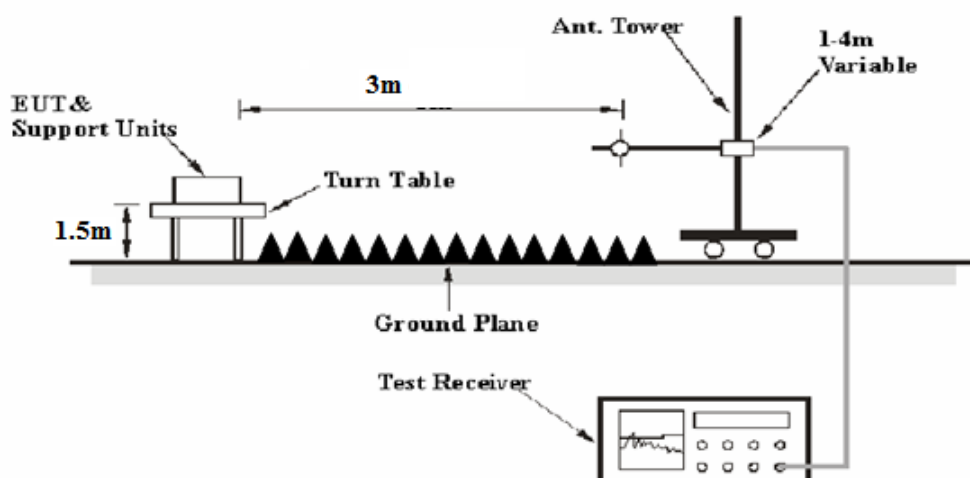
(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

### EUT Setup

Below 1 GHz:



Above 1 GHz:



The radiated emission tests were performed in the 3 meters distance, 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.

### 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
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	AV

### 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 30 MHz to 1GHz, peak 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:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

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:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2017-12-11	2018-12-11
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2018-11-10
HP	Amplifier	8447D	2727A05902	2017-09-05	2018-09-05
ETS-Lindgren	Horn Antenna	3115	000 527 35	2016-01-05	2019-01-04
MITEQ	Amplifier	AFS42-00101800-25-S-42	2001271	2017-09-05	2018-09-05
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-01 1304	2016-11-18	2019-11-18
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2017-06-27	2018-06-27
E-Microwave	Band-stop Filters	OBSF-2400-2483.5-S	OE01601525	2017-06-16	2018-06-16
Micro-tronics	High Pass Filter	HPM50111	S/N-G217	2017-06-16	2018-06-16
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-02	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-02	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-2200-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-2.4J2.4J-50	C-0700-02	2017-06-27	2018-06-27
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A

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

### Test Data

#### Environmental Conditions

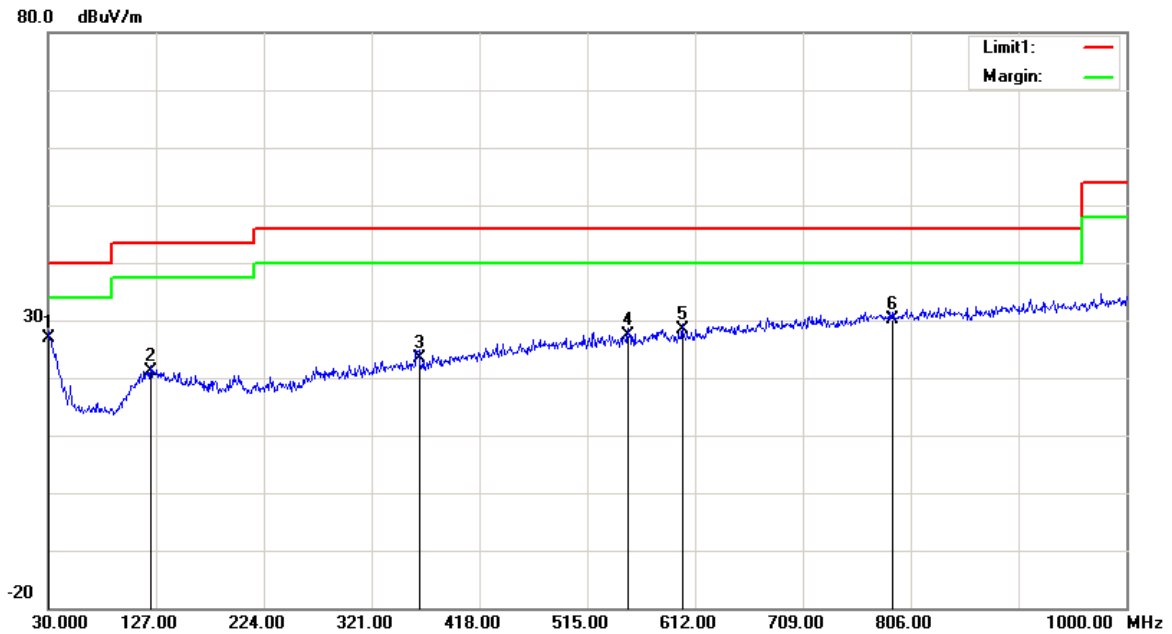
<b>Temperature:</b>	24.6 °C
<b>Relative Humidity:</b>	49 %
<b>ATM Pressure:</b>	100.8 kPa

*The testing was performed by Sunny Cen and Blake Yang on 2018-04-20.*

Test Mode: Transmitting

1) 30MHz-1GHz(Worst Case at Middle Channel)

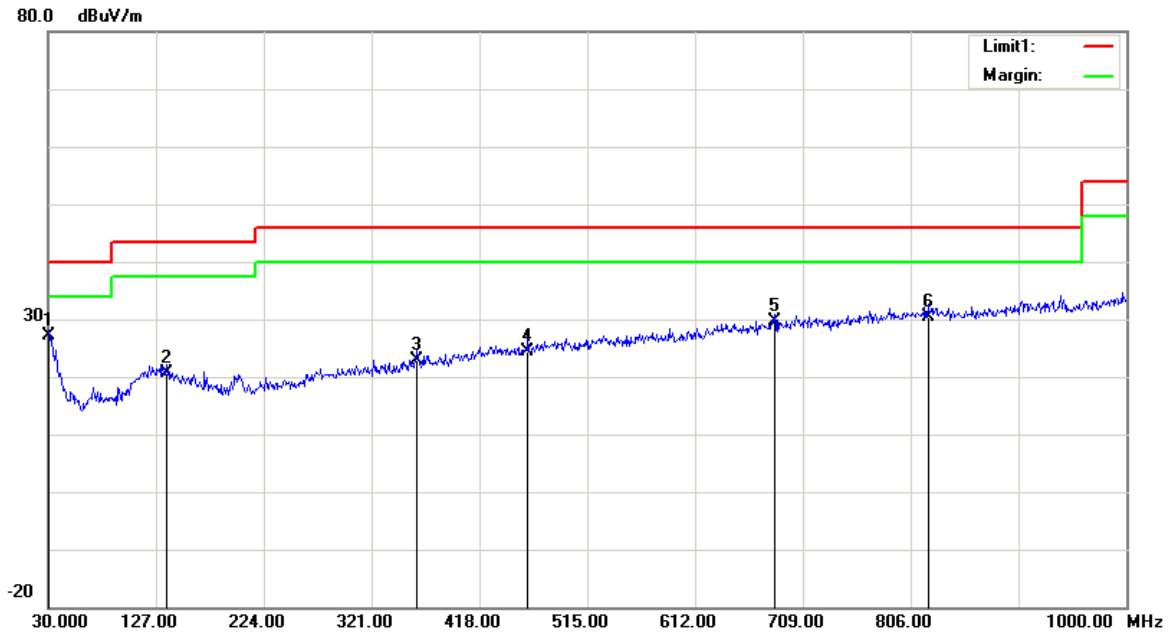
Horizontal:



Frequency (MHz)	Receiver Reading (dBuV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
30.0000	25.26	QP	1.54	26.80	40.00	13.20
122.1500	25.92	QP	-4.82	21.10	43.50	22.40
363.6800	26.19	QP	-2.79	23.40	46.00	22.60
551.8600	27.28	QP	0.22	27.50	46.00	18.50
600.3600	27.43	QP	0.87	28.30	46.00	17.70
789.5100	25.57	QP	4.53	30.10	46.00	15.90



**Vertical:**



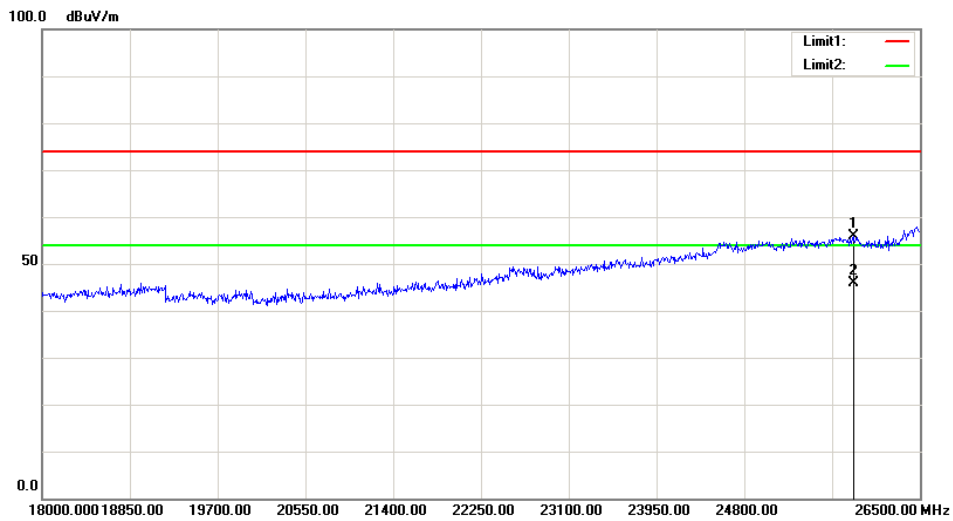
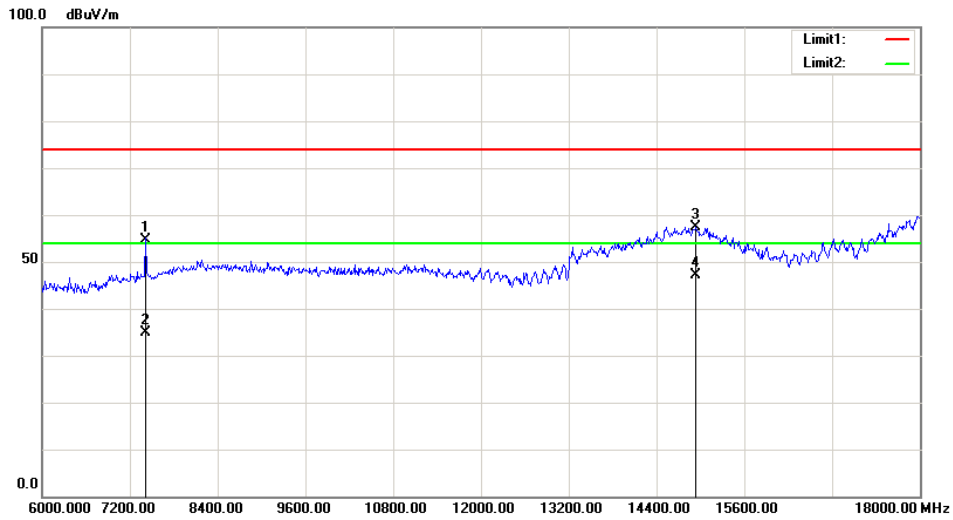
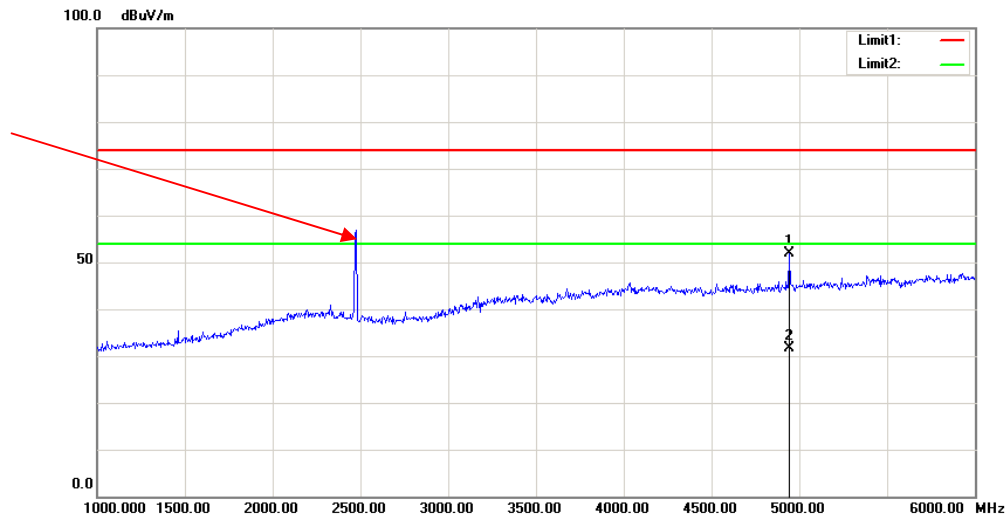
Frequency (MHz)	Receiver Reading (dBuV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
30.9700	26.29	QP	0.81	27.10	40.00	12.90
136.7000	25.99	QP	-5.39	20.60	43.50	22.90
361.7400	25.62	QP	-2.82	22.80	46.00	23.20
461.6500	25.30	QP	-0.80	24.50	46.00	21.50
683.7800	26.89	QP	2.71	29.60	46.00	16.40
821.5200	25.32	QP	5.18	30.50	46.00	15.50

## 2) 1GHz-25GHz:

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
	Reading (dB $\mu$ V)	Detector	Polar (H/V)	Factor (dB/m)					
Low Channel: 2408 MHz									
2408.00	52.14	PK	H	28.12	1.80	0.00	82.06	113.98	31.92
2408.00	26.42	AV	H	28.12	1.80	0.00	56.34	93.98	37.64
2408.00	54.26	PK	V	28.12	1.80	0.00	84.18	113.98	29.80
2408.00	28.52	AV	V	28.12	1.80	0.00	58.44	93.98	35.54
2400.00	27.85	PK	V	28.10	1.80	0.00	57.75	74.00	16.25
2400.00	15.81	AV	V	28.10	1.80	0.00	45.71	54.00	8.29
4816.00	53.74	PK	V	32.93	3.18	37.20	52.65	74.00	21.35
4816.00	33.72	AV	V	32.93	3.18	37.20	32.63	54.00	21.37
7224.00	54.15	PK	V	35.78	4.79	37.25	57.47	74.00	16.53
7224.00	34.57	AV	V	35.78	4.79	37.25	37.89	54.00	16.11
Middle Channel: 2440 MHz									
2440.00	53.42	PK	H	28.18	1.82	0.00	83.42	113.98	30.56
2440.00	27.42	AV	H	28.18	1.82	0.00	57.42	93.98	36.56
2440.00	54.75	PK	V	28.18	1.82	0.00	84.75	113.98	29.23
2440.00	28.64	AV	V	28.18	1.82	0.00	58.64	93.98	35.34
4880.00	55.33	PK	V	33.06	3.27	37.21	54.45	74.00	19.55
4880.00	35.45	AV	V	33.06	3.27	37.21	34.57	54.00	19.43
7320.00	53.74	PK	V	36.03	4.62	37.37	57.02	74.00	16.98
7320.00	33.45	AV	V	36.03	4.62	37.37	36.73	54.00	17.27
High Channel: 2472 MHz									
2472.00	53.73	PK	H	28.24	1.84	0.00	83.81	113.98	30.17
2472.00	27.45	AV	H	28.24	1.84	0.00	57.53	93.98	36.45
2472.00	55.61	PK	V	28.24	1.84	0.00	85.69	113.98	28.29
2472.00	29.43	AV	V	28.24	1.84	0.00	59.51	93.98	34.47
2483.50	24.27	PK	V	28.27	1.84	0.00	54.38	74.00	19.62
2483.50	15.96	AV	V	28.27	1.84	0.00	46.07	54.00	7.93
4944.00	52.72	PK	V	33.19	3.25	37.24	51.92	74.00	22.08
4944.00	32.44	AV	V	33.19	3.25	37.24	31.64	54.00	22.36
7416.00	51.37	PK	V	36.28	4.46	37.49	54.62	74.00	19.38
7416.00	31.67	AV	V	36.28	4.46	37.49	34.92	54.00	19.08

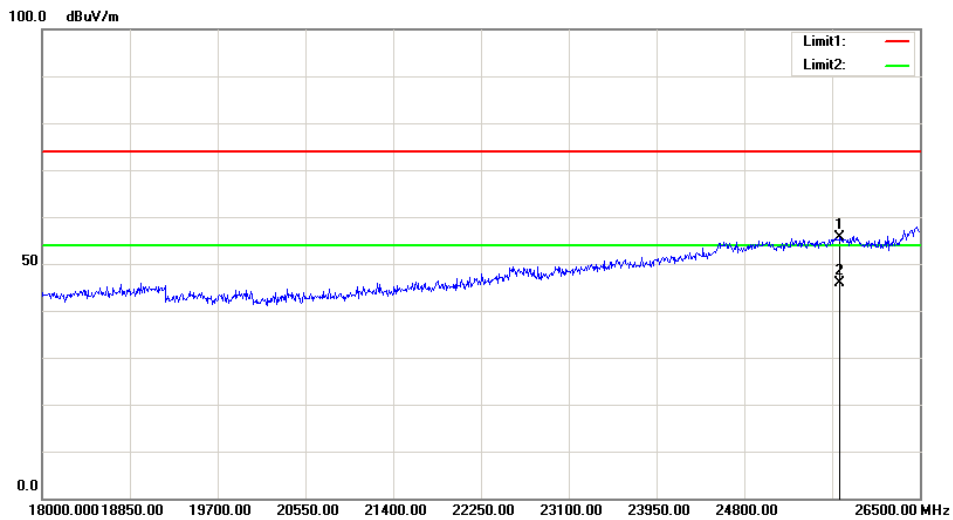
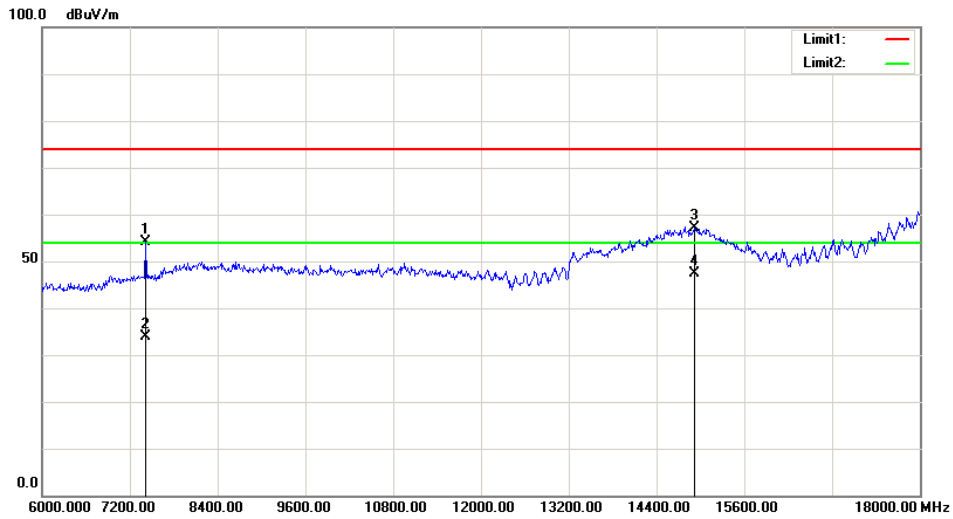
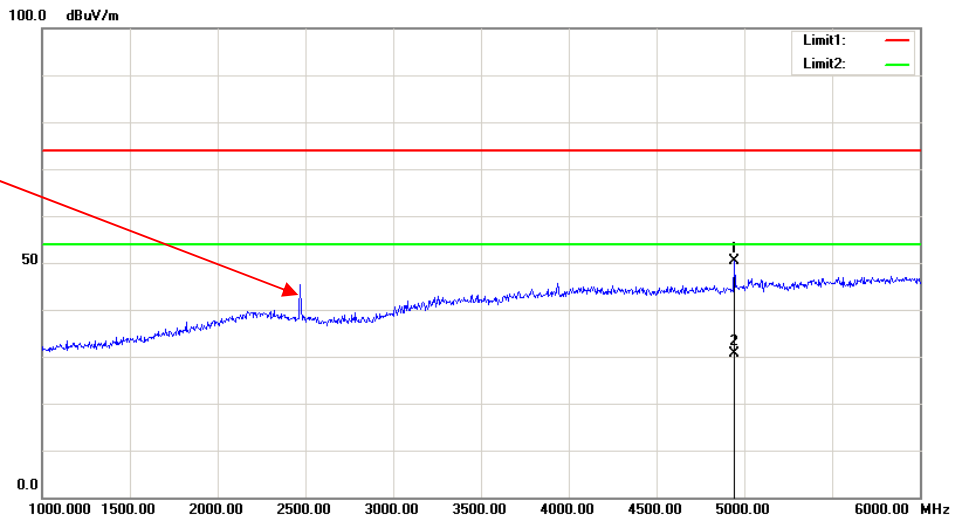
### Test plots at Low Channel Horizontal

Fundamental  
Test with Band  
Rejection Filter



Vertical

Fundamental Test with Band Rejection Filter



## 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. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
3. Repeat above procedures until all frequencies measured were complete.

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU 26	200256	2018-01-04	2019-01-04
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each Time	/

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

### Test Data

#### Environmental Conditions

Temperature:	25.6 °C
Relative Humidity:	50 %
ATM Pressure:	100.8 kPa

*The testing was performed by Andy Huang on 2018-04-20.*

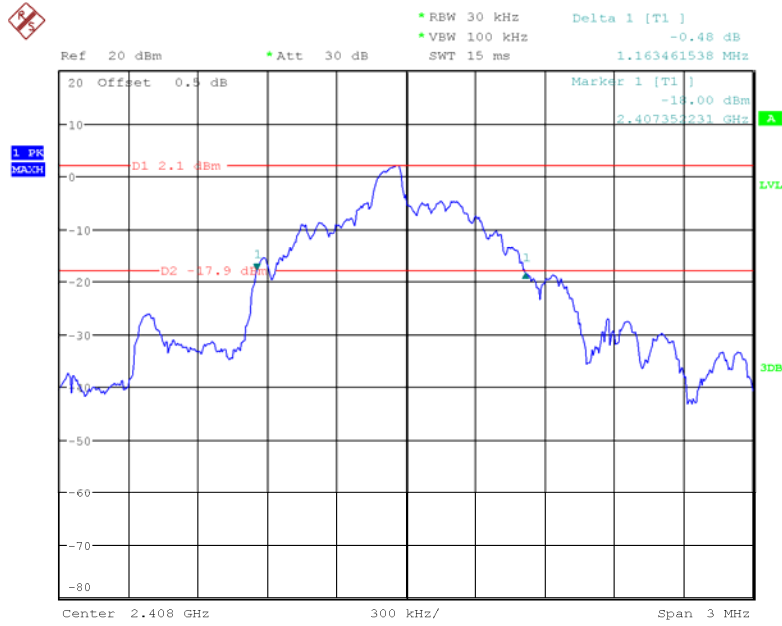
**Test Result:** Compliant.

Please refer to following tables and plots

Test Mode: Transmitting

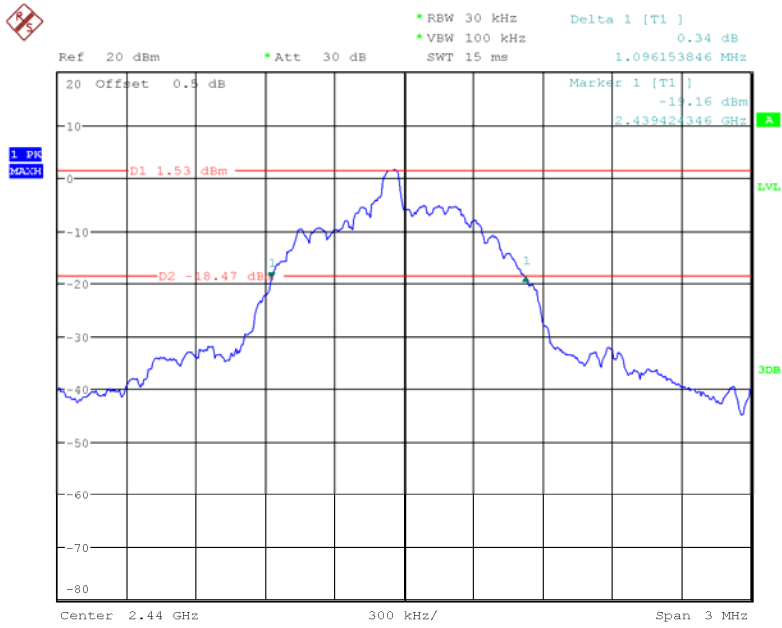
Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
Low	2408	1.163
Middle	2440	1.096
High	2472	1.106

Low Channel



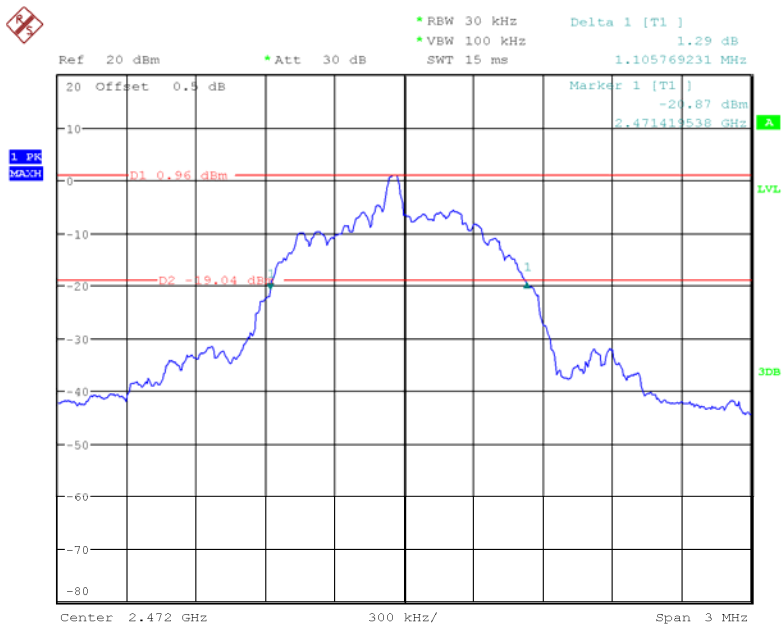
Date: 20.APR.2018 21:55:26

### Middle Channel



Date: 20.APR.2018 22:00:20

### High Channel



Date: 20.APR.2018 22:07:03

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