FCC PART 15.249

TEST REPORT

For

Zeeva International Limited

Suite 1007B,10th Floor, Exchange Tower, 33 Wang Chiu Road, Kowloon Bay, Hong Kong

FCC ID: 2ADM5-TL-0021

Report Type:	Product Type:
Original Report	Drone

Report Number:	RSZ170714833-00
Report Date:	2017-08-11
Reviewed By:	Rocky Kang RF Engineer
Prepared By:	Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Zeeva International Limited's* product, model number: *TL-0021 (FCC ID: 2ADM5-TL-0021, UPC Number: 400029063947)* in this report is a *Drone,* which was measured approximately: 16 cm (L) * 11 cm (W) *6 cm (H), rated with input voltage: DC 3 * 1.5 V AA battery.

** All measurement and test data in this report was gathered from production sample serial number: 20170714 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2017-07-14.*

Objective

This type approval report is prepared on behalf of *Zeeva International Limited* 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)

No related submittal(s).

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 Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Parameter	uncertainty
Occupied Channel Bandwidth	±5%
RF Output Power with Power meter	±0.5dB
RF conducted test with spectrum	±1.5dB
AC Power Lines Conducted Emissions	±1.95dB
All emissions, radiated	±4.88dB
Temperature	±3℃
Humidity	±6%
Supply voltages	±0.4%

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China.

Bay Area Compliance Laboratories Corp. (Shenzhen) has been accredited to ISO/IEC 17025 by CNAS(Lab code: L2408). And accredited to ISO/IEC 17025 by NVLAP(Lab code: 200707-0), the FCC Designation No. CN5001 under the KDB 974614 D01.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Bay Area Compliance Laboratories Corp. (Shenzhen) was registered with ISED Canada under ISED Canada Registration Number 3062B.

SYSTEM TEST CONFIGURATION

Justification

The system was configured for testing by software.

41 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2420	21	2441
1	2421	22	2442
2	2422	23	2443
3	2423	24	2444
4	2424	25	2445
5	2425	26	2446
6	2426	27	2447
7	2427	28	2448
8	2428	29	2449
9	2429	30	2450
10	2430	31	2451
11	2431	32	2452
12	2432	33	2453
13	2433	34	2454
14	2434	35	2455
15	2435	36	2456
16	2436	37	2457
17	2437	38	2458
18	2438	39	2459
19	2439	40	2460
20	2440		

EUT was tested with Channel 0, 20 and 40.

EUT Exercise Software

No software was used.

Equipment Modifications

No modifications were made to the unit tested.

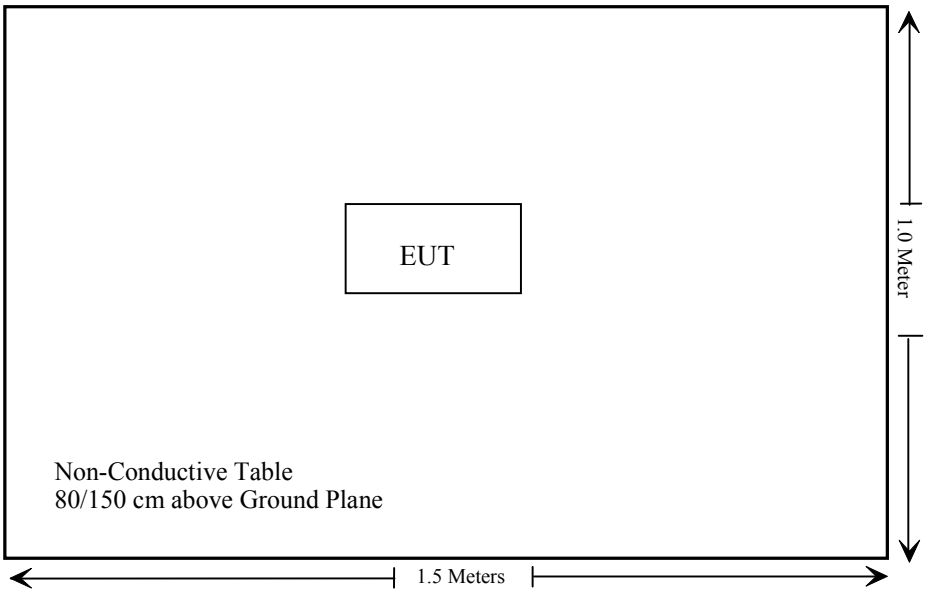
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
N/A	N/A	N/A	N/A

Support Cable Descriptions

Cable Description	Length (m)	From/Port	To
N/A	N/A	N/A	N/A

Block Diagram of Test Setup



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(d)	Radiated Emissions& Outside of Band Emission	Compliance
§15.215 (c)	20 dB Bandwidth	Compliance

Not Applicable: The EUT was powered by battery only.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
Sunol Sciences	Horn Antenna	DRH-118	A052604	2014-12-29	2017-12-28
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2017-04-24	2018-04-24
Sunol Sciences	Bi-log Antenna	JB1	A040904-2	2014-12-17	2017-12-16
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2017-02-14	2018-02-14
HP	Amplifier	HP8447E	1937A01046	2017-05-21	2017-11-19
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2016-12-07	2017-12-07
Ducommun technologies	RF Cable	UFA210A-1-4724-30050U	MFR64369 223410-001	2017-05-21	2017-11-19
Ducommun technologies	RF Cable	104PEA	218124002	2017-05-21	2017-11-19
Ducommun technologies	RF Cable	RG-214	1	2017-05-21	2017-11-19
Ducommun technologies	RF Cable	RG-214	2	2017-05-22	2017-11-22
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-04	2014-12-29	2017-12-28
Ducommun Technologies	Pre-amplifier	ALN-22093530-01	991373-01	2017-08-03	2018-08-03

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) 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

According to FCC § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Antenna Connector Construction

The EUT has one monopole antenna which was permanently attached and the antenna gain is-0.68 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliance.

FCC§15.205, §15.209 & §15.249(d) - 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.

As per FCC§15.249 (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.

Test Equipment Setup

The spectrum analyzer or receiver is set as:

Below 1000MHz:

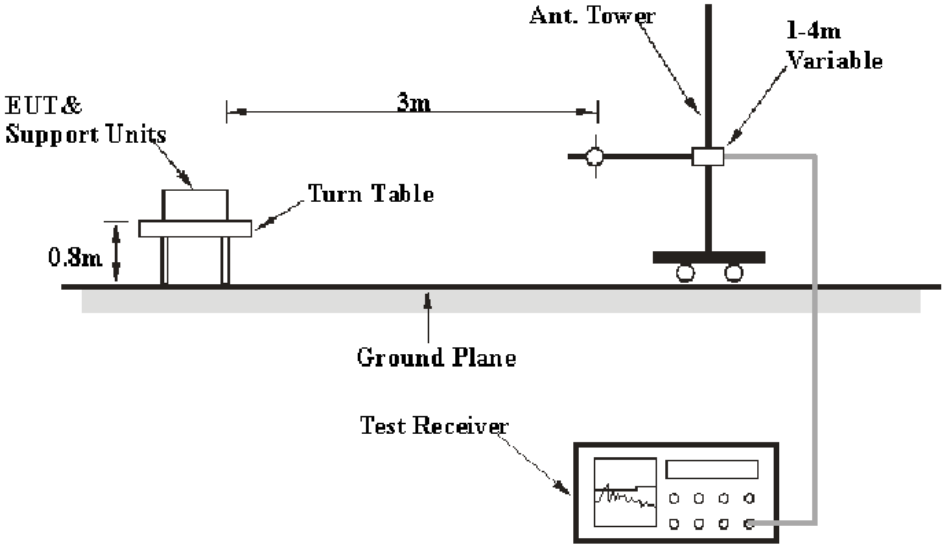
RBW = 100 kHz / VBW = 300 kHz / Sweep = Auto

Above 1000MHz:

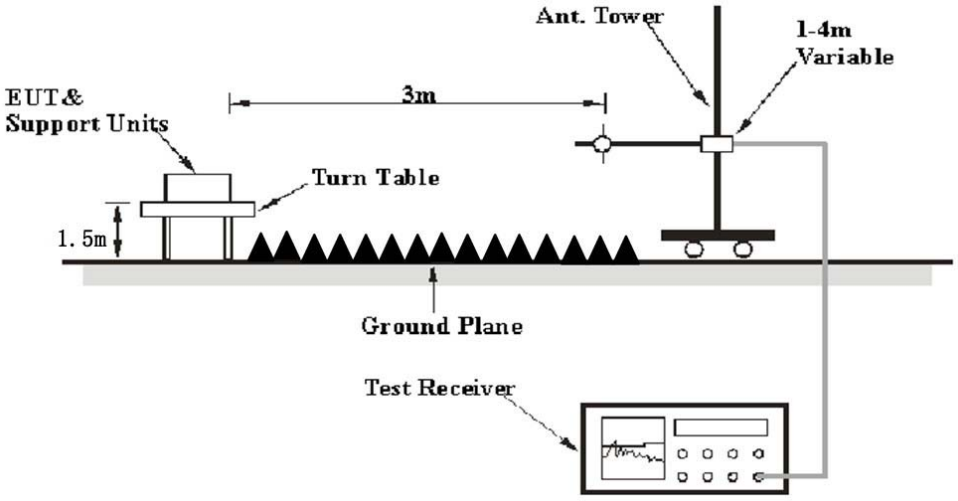
Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto
Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

EUT Setup

Below 1G:



Above 1GHz:



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.

Test Procedure

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

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 mete, and the EUT is placed on a turntable, which is 0.8 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

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 15.205, 15.209 & §15.249

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL, $U_{(Lm)}$ is less than U_{cispr}, if L_m is less than L_{lim}, it implies that the EUT complies with the limit.

Test Data

Environmental Conditions

Temperature:	22 ℃
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

The testing was performed by Tracy Hu on 2017-08-08.

Test Mode: Transmitting

30 MHz to 25 GHz:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.249&15.209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2420 MHz)									
169.36	34.43	QP	111	1.5	H	-6.7	27.73	43.5	15.77
2420.00	76.64	PK	99	1.7	H	-0.88	75.76	114	38.24
2420.00	59.95	Ave.	99	1.7	H	-0.88	59.07	94	34.93
2420.00	70.84	PK	193	1.7	V	-0.88	69.96	114	44.04
2420.00	53.10	Ave.	193	1.7	V	-0.88	52.22	94	41.78
2387.92	61.93	PK	347	1.6	H	-0.88	61.05	74	12.95
2387.92	48.58	Ave.	347	1.6	H	-0.88	47.70	54	6.30
2385.64	62.22	PK	140	1.4	H	-0.88	61.34	74	12.66
2385.64	48.56	Ave.	140	1.4	H	-0.88	47.68	54	6.32
4840.00	54.64	PK	28	2.5	H	5.84	60.48	74	13.52
4840.00	40.12	Ave.	28	2.5	H	5.84	45.96	54	8.04
Middle Channel (2440 MHz)									
169.36	34.28	QP	278	1.5	H	-6.7	27.58	43.5	15.92
2440.00	77.84	PK	344	1.1	H	-0.88	76.96	114	37.04
2440.00	60.59	Ave.	344	1.1	H	-0.88	59.71	94	34.29
2440.00	71.44	PK	322	2.1	V	-0.88	70.56	114	43.44
2440.00	53.90	Ave.	322	2.1	V	-0.88	53.02	94	40.98
2345.21	62.18	PK	271	1.2	H	-0.74	61.44	74	12.56
2345.21	48.33	Ave.	271	1.2	H	-0.74	47.59	54	6.41
2485.63	62.64	PK	282	1.1	H	-0.62	62.02	74	11.98
2485.63	48.04	Ave.	282	1.1	H	-0.62	47.42	54	6.58
4880.00	53.58	PK	295	2.2	H	6.21	59.79	74	14.21
4880.00	38.26	Ave.	295	2.2	H	6.21	44.47	54	9.53

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.249&15.209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
High Channel (2460 MHz)									
169.36	33.95	QP	114	2.4	H	-6.7	27.25	43.5	16.25
2460.00	77.79	PK	200	2.2	H	-0.62	77.17	114	36.83
2460.00	60.05	Ave.	200	2.2	H	-0.62	59.43	94	34.57
2460.00	71.26	PK	334	2.1	V	-0.62	70.64	114	43.36
2460.00	53.80	Ave.	334	2.1	V	-0.62	53.18	94	40.82
2324.10	62.18	PK	327	1.1	H	-0.74	61.44	74	12.56
2324.10	48.33	Ave.	327	1.1	H	-0.74	47.59	54	6.41
2483.84	63.2	PK	267	2.2	H	-0.62	62.58	74	11.42
2483.84	48.02	Ave.	267	2.2	H	-0.62	47.40	54	6.60
4920.00	52.98	PK	174	1.7	V	6.21	59.19	74	14.81
4920.00	42.51	Ave.	174	1.7	H	6.21	48.72	54	5.28

Note:
Corrected Amplitude = Corrected Factor + Reading
Corrected Factor=Antenna factor（RX）+cable loss – amplifier factor
Margin = Limit- Corr. Amplitude
The emission more than20dB below the limit was not required to be recorded.

FCC§15.215(c) - 20dB EMISSION BANDWIDTH

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 without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. 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 indicated 20dB bandwidth.

4. Repeat above procedures until all frequencies measured were complete.

Test Data

Environmental Conditions

Temperature:	22 ℃
Relative Humidity:	51 %
ATM Pressure:	101.0 kPa

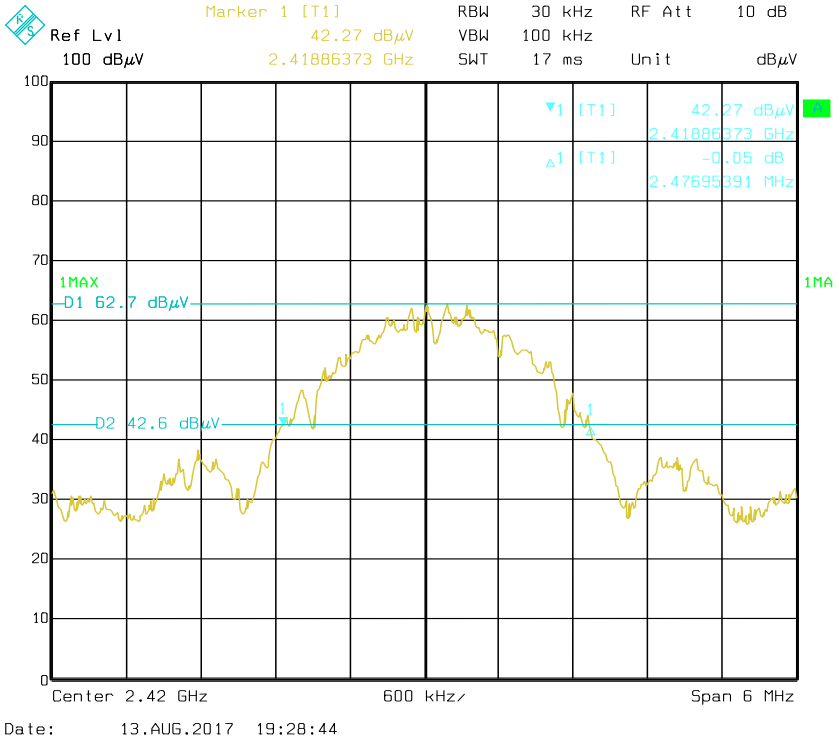
The testing was performed by Tracy Hu on 2017-08-13.

Test Mode: Transmitting

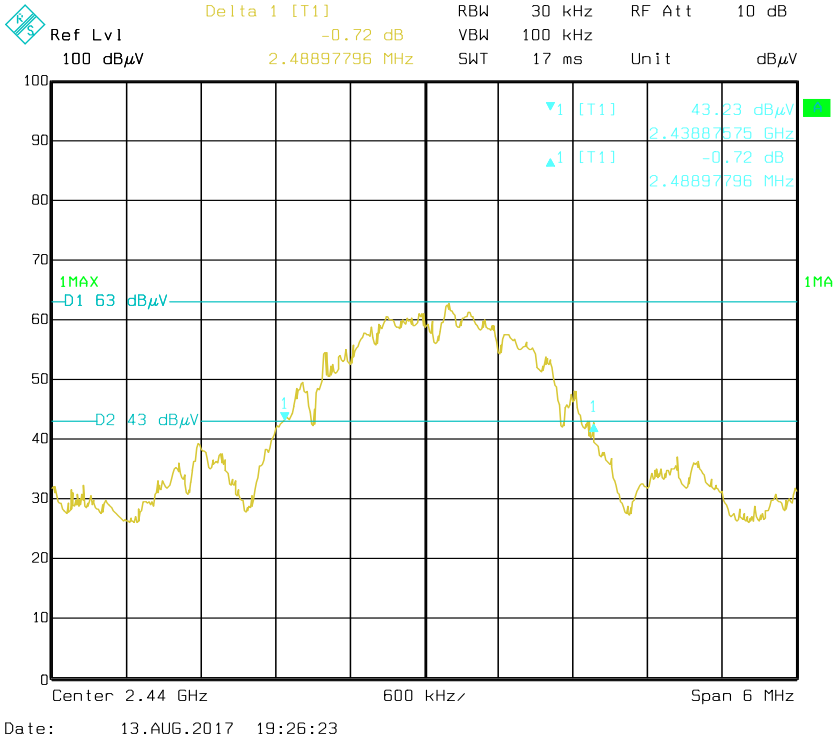
Please refer to the following table and plots.

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
Low	2420	2.477
Middle	2440	2.489
High	2460	2.525

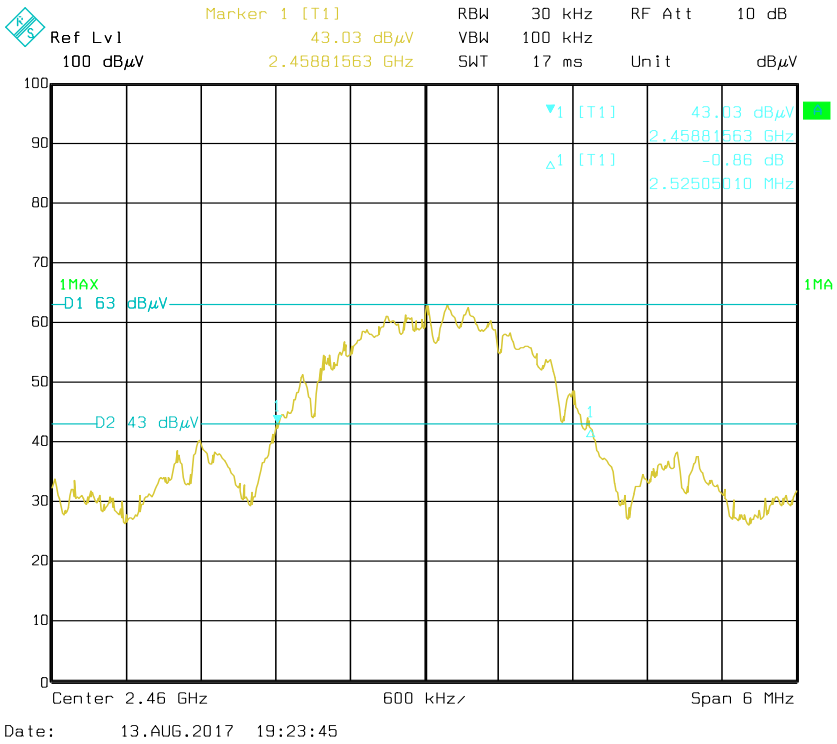
Low Channel



Middle Channel



High Channel



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