FCC PART 15.249

TEST REPORT

For

Hobbico Inc

2904 Research Road, Champaign, Illinos United States

FCC ID: IYFMR101

Report Type:	Product Type:
Original Report	XL370 FPV Drone RTF
Test Engineer:	Robin Zheng
Report Number:	RDG160329004-00B
Report Date:	2016-04-13
Reviewed By:	Jerry Zhang EMC Manager
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 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. (Dongguan).

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Hobbico Inc*'s product, model number: *DIDE05GG (FCC ID: IYFMR101)* (the "EUT") in this report was a *XL370 FPV Drone RTF,* which was measured approximately: 18.5 cm (L) x 12 cm (W) x 7.8 cm (H), rated input voltage: DC6.0V from battery.

Note: The series product, product name: XL370 UAV Drone RTF, XL370 FPV Drone RTF, model DIDE05GG, DIDE05BB, DIDE05RR, DIDE05NN, DIDE06BB, DIDE06RR, DIDE06NN, DIDE06GG are electrically identical, the difference between them are the model name and appearance color, we selected DIDE05GG for fully testing, the details was explained in the attached declaration letter.

All measurement and test data in this report was gathered from production sample serial number: 160329004 (Assigned byBACL, Dongguan). The EUT was received on 2016-04-05.

Objective

This type approval report is prepared on behalf of *Hobbico Inc.* in accordance with Part 2-Subpart J, and Part 15-Subparts A, B 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)/grant(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 emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Dongguan).

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 Industrial Zone, Tangxia, Dongguan, Guangdong, China

Test site at Bay Area Compliance Laboratories Corp. (Dongguan) 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 February 06, 2015.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 273710. 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

The system was configured for testing in Engineering Mode, which was provided by the manufacturer.

The Engineering mode was switched channel by keys.

The device employed 7 operation Channels, as below table:

Channel Number	Frequency (MHz)
1	2403
2	2413
3	2430
4	2440
5	2462
6	2472
7	2478

And channel 1, 4, 7 was chose for testing.

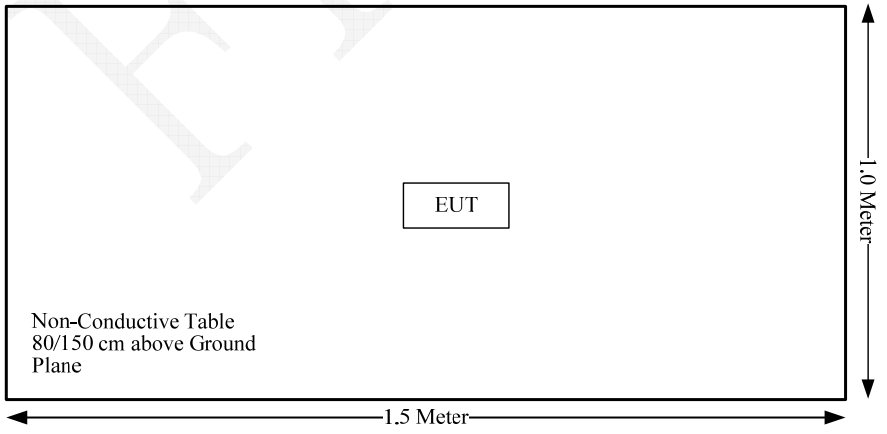
EUT Exercise Software

No software was used during testing.

Equipment Modifications

No modifications were made to the EUT.

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	Radiated Emissions	Compliance
§15.215 (c)	20 dB Bandwidth	Compliance

Not Applicable*: the device was powered by battery.

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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 an internal antenna, the antenna gain is 4dBi, fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliant.

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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.

Measurement Uncertainty

Compliance or non- compliance with a disturbance limit shall be determined in the following manner：

If U_{lab} is less than or equal to U_{cispr} of Table 1, then:
- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non - compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

If U_{lab} is greater than U_{cispr} of Table 1, then:
- compliance is deemed to occur if no measured disturbance level, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit;
- non - compliance is deemed to occur if any measured disturbance level, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit.

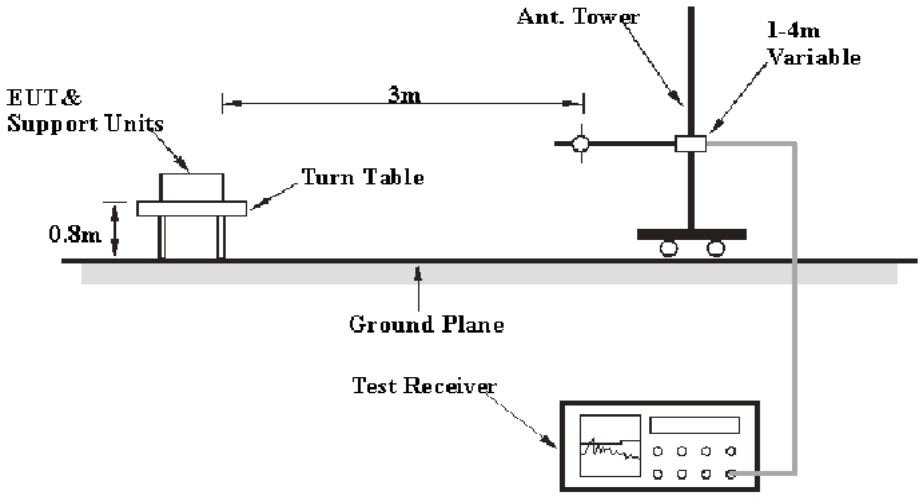
Based on CISPR 16-4-2: 2011, measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Dongguan) is: 30M~200MHz: 4.58 dB for Horizontal, 4.59 dB for Vertical; 200M~1GHz: 4.83 dB for Horizontal, 5.85 dB for Vertical; 1G~6GHz: 4.45 dB, 6G~18GHz: 5.23 dB

Table 1 – Values of U_{cispr}

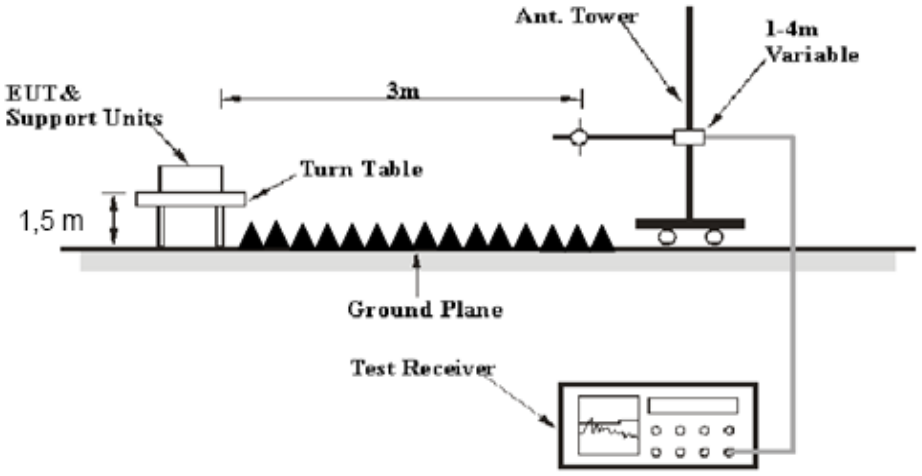
Measurement	U_{cispr}
Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	5.5 dB

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.

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	/	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 30 MHz 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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2015-08-03	2016-08-02
Sunol Sciences	Antenna	JB3	A060611-3	2014-11-06	2017-11-05
HP	Amplifier	8447E	2434A02181	2015-09-01	2016-09-01
Agilent	Spectrum Analyzer	E4440A	SG43360054	2015-11-23	2016-11-22
ETS-Lindgren	Horn Antenna	3115	9808-5557	2015-09-06	2018-09-06
Mini-Circuit	Amplifier	ZVA-213-S+	054201245	2016-02-19	2017-02-19
R&S	Spectrum Analyzer	FSP 38	100478	2015-11-23	2016-11-22
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-01 1304	2014-06-16	2017-06-15
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2015-09-06	2016-09-06
N/A	Coaxial Cable	14m	N/A	2015-05-06	2016-05-06
N/A	Coaxial Cable	8m	N/A	2015-05-06	2016-05-06

*** 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 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:	27.4 °C
Relative Humidity:	58 %
ATM Pressure:	100.8 kPa

The testing was performed by Robin Zheng on 2016-04-06.

Test Mode: Transmitting

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Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB(1/m))					
frequency: 2403 MHz									
2403	58.67	PK	H	25.65	3.66	0.00	87.98	114.00	26.02
2403	45.13	AV	H	25.65	3.66	0.00	74.44	94.00	19.56
2403	53.41	PK	V	25.65	3.66	0.00	82.72	114.00	31.28
2403	40.05	AV	V	25.65	3.66	0.00	69.36	94.00	24.64
2400	38.05	PK	H	25.64	3.65	0.00	67.34	74.00	6.66
2400	13.74	AV	H	25.64	3.65	0.00	43.03	54.00	10.97
4806	32.08	PK	H	30.60	5.06	27.41	40.33	74.00	33.67
4806	18.65	AV	H	30.60	5.06	27.41	26.90	54.00	27.10
7209	32.18	PK	H	34.10	6.62	25.91	46.99	74.00	27.01
7209	18.41	AV	H	34.10	6.62	25.91	33.22	54.00	20.78
9612	29.36	PK	H	35.97	8.53	27.54	46.32	74.00	27.68
9612	16.18	AV	H	35.97	8.53	27.54	33.14	54.00	20.86
3131	32.56	PK	H	27.62	6.93	27.43	39.68	74.00	34.32
3131	20.22	AV	H	27.62	6.93	27.43	27.34	54.00	26.66
530.6	28.6	QP	H	18.41	2.79	22.10	27.70	46.00	18.30
frequency: 2440 MHz									
2440	59.35	PK	H	25.74	3.76	0.00	88.85	114.00	25.15
2440	45.85	AV	H	25.74	3.76	0.00	75.35	94.00	18.65
2440	54.12	PK	V	25.74	3.76	0.00	83.62	114.00	30.38
2440	40.61	AV	V	25.74	3.76	0.00	70.11	94.00	23.89
4880	32.17	PK	H	30.79	5.18	27.42	40.72	74.00	33.28
4880	18.72	AV	H	30.79	5.18	27.42	27.27	54.00	26.73
7320	32.05	PK	H	34.37	6.75	25.88	47.29	74.00	26.71
7320	18.39	AV	H	34.37	6.75	25.88	33.63	54.00	20.37
9760	29.33	PK	H	36.32	8.62	27.21	47.06	74.00	26.94
9760	16.12	AV	H	36.32	8.62	27.21	33.85	54.00	20.15
3131	32.57	PK	H	27.62	6.93	27.43	39.69	74.00	34.31
3131	20.33	AV	H	27.62	6.93	27.43	27.45	54.00	26.55
3610	32.22	PK	H	29.04	4.61	27.28	38.59	74.00	35.41
3610	19.86	AV	H	29.04	4.61	27.28	26.23	54.00	27.77
530.6	28.8	QP	H	18.41	2.79	22.10	27.90	46.00	18.10
frequency: 2478 MHz									
2478	59.1	PK	H	25.84	3.69	0.00	88.63	114.00	25.37
2478	45.73	AV	H	25.84	3.69	0.00	75.26	94.00	18.74
2478	54.19	PK	V	25.84	3.69	0.00	83.72	114.00	30.28
2478	40.66	AV	V	25.84	3.69	0.00	70.19	94.00	23.81
2483.5	35.7	PK	H	25.86	3.67	0.00	65.23	74.00	8.77
2483.5	13.91	AV	H	25.86	3.67	0.00	43.44	54.00	10.56
4956	31.88	PK	H	30.99	5.35	27.43	40.79	74.00	33.21
4956	18.68	AV	H	30.99	5.35	27.43	27.59	54.00	26.41
7434	31.89	PK	H	34.64	6.88	25.95	47.46	74.00	26.54
7434	18.35	AV	H	34.64	6.88	25.95	33.92	54.00	20.08
9912	29.22	PK	H	36.69	8.70	26.69	47.92	74.00	26.08
9912	16.03	AV	H	36.69	8.70	26.69	34.73	54.00	19.27
3235	32.44	PK	H	27.95	6.24	27.34	39.29	74.00	34.71
3235	20.03	AV	H	27.95	6.24	27.34	26.88	54.00	27.12
530.6	28.1	QP	H	18.41	2.79	22.10	27.20	46.00	18.80

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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSEM	831259/019	2015-07-28	2016-07-27
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2015-05-06	2016-05-06
N/A	Coaxial Cable	0.1m	N/A	2015-05-06	2016-05-06

*** 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:	26.1 °C
Relative Humidity:	61 %
ATM Pressure:	100.3 kPa

The testing was performed by Robin Zheng on 2016-04-12.

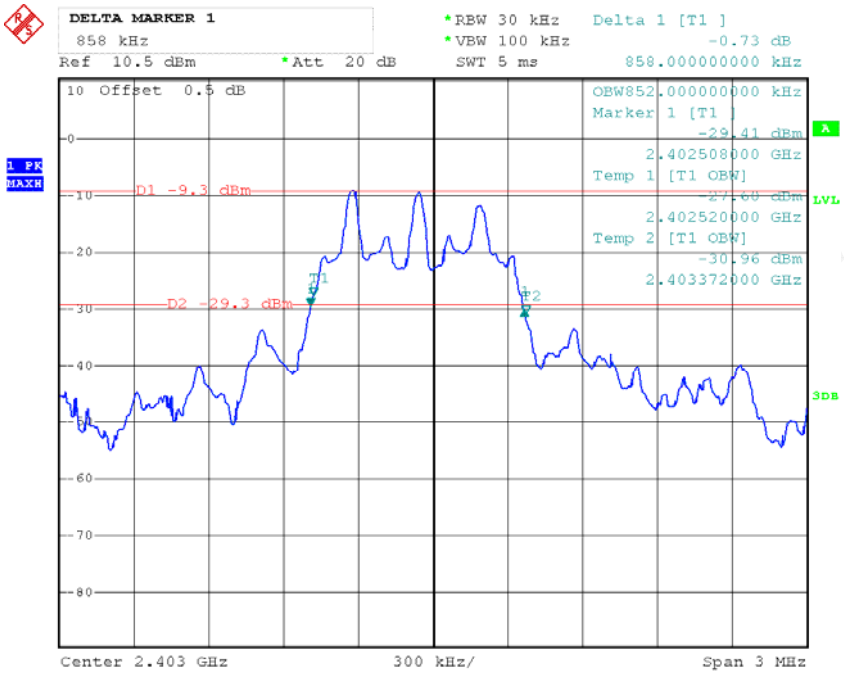
Test Result: Compliant.

Please refer to following tables and plots

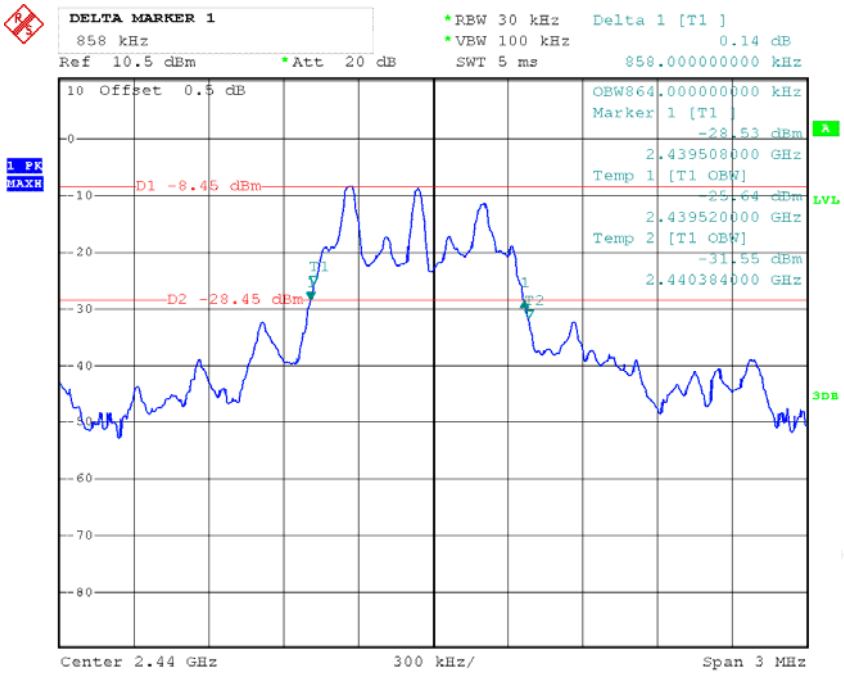
Test Mode: Transmitting

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
Low	2403	0.858
Middle	2440	0.858
High	2478	1.002

Low Channel



Middle Channel



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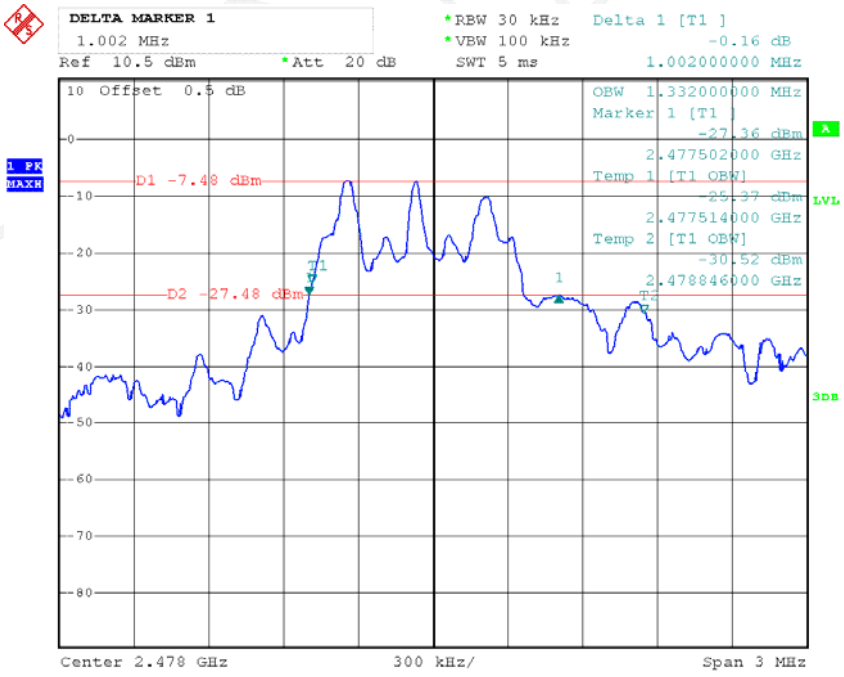
High Channel



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