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CERTIFICATION TEST REPORT

Manufacturer:	**Sports Sensors, Inc.** **7260 Edington Drive** **Cincinnati, Ohio 45249-1063 USA**
Applicant:	**Same as Above**
Product Name:	Swing Speed Radar RDL; Swing Speed Radar with Tempo Timer RDL
Product Description:	Multi-Sports Doppler Speed Measuring Device with Bluetooth Data Link
Operating Voltage/Freq. of EUT During Testing:	Battery-Operated
Model(s):	**RDL-SSR364*** **Denotes actual model tested as worst-case representative of product family that includes Swing Speed Radar RDL model RDL-SSR364 and Swing Speed Radar with Tempo Timer RDL model RDL-SSRTT364.*
FCC ID:	**NVE364BT**
Testing Commenced:	2023-11-21
Testing Ended:	2024-01-24
Summary of Test Results:	**In Compliance***
	The EUT complies with the EMC requirements when manufactured identically as the unit tested in this report, including any required modifications and/or manufacturer's statement. Any changes to the design or build of this unit subsequent to this testing may deem it non-compliant.

**Test report reflects limited testing to confirm power reduction on BLE radio for SAR requirements.*

Rules:
- **FCC Part 15 Subpart C, Section 15.247**
- **FCC Part 15.31(e)**
- **ANSI C63.10:2013**

Evaluation Conducted by:

Julius Chiller, Senior Wireless Project Engineer

Report Reviewed by:

Ken Littell, Vice President of Operations

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1 ADMINISTRATIVE INFORMATION

1.1 Measurement Location:

F2 Labs in Middlefield, Ohio. Site description and attenuation data are on file with the FCC's Sampling and Measurement Branch at the FCC Laboratory in Columbia, MD**.**

1.2 Measurement Procedure:

All measurements were performed according to ANSI C63.10 and recommended FCC procedure of measurement under Section 15.247 and in KDB558074. A list of the measurement equipment can be found in Section 6.

1.3 Uncertainty Budget:

The uncertainty in EMC measurements arises from several factors which affect the results, some associated with environmental conditions in the measurement room, the test equipment being used, and the measurement techniques adopted.

The measurement uncertainty budgets detailed below are calculated from the test and calibration data and are expressed with a 95% confidence factor using a coverage factor of k=2. The Uncertainty for a laboratory is referred to as *U*lab. For Radiated and Conducted Emissions, the Expanded Uncertainty is compared to the *U*cispr values to determine if a specific margin is required to deem compliance.

*U*lab

Measurement Range	Combined Uncertainty	Expanded Uncertainty
Radiated Emissions <1 GHz @ 3m	2.54dB	5.07dB
Radiated Emissions <1 GHz @ 10m	2.55dB	5.09dB
Radiated Emissions 1 GHz to 2.7 GHz	1.81dB	3.62dB
Radiated Emissions 2.7 GHz to 18 GHz	1.55dB	3.10dB
AC Power Line Conducted Emissions, 150kHz to 30 MHz	1.38dB	2.76dB
AC Power Line Conducted Emissions, 9kHz to 150kHz	1.66dB	3.32dB

*U*cispr

Measurement Range	Expanded Uncertainty
Radiated Emissions <1 GHz @ 3m	5.2dB
Radiated Emissions <1 GHz @ 10m	5.2dB
Radiated Emissions 1 GHz to 2.7 GHz	Under Consideration
Radiated Emissions 2.7 GHz to 18 GHz	Under Consideration
AC Power Line Conducted Emissions, 150kHz to 30 MHz	3.6dB
AC Power Line Conducted Emissions, 9kHz to 150kHz	4.0dB

If *U*lab is less than or equal to *U*cispr, then:
- compliance is deemed to occur if no measured disturbance exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance exceeds the disturbance limit.

If *U*lab is greater than *U*cispr in table 1, then:
- compliance is deemed to occur if no measured disturbance, increased by (*U*lab – *U*cispr), exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance, increased by (*U*lab – *U*cispr), exceeds the disturbance limit.

Note: Only measurements listed in the tables above that relate to tests included in this Test Report are applicable.

1.4 Document History:

Document Number	Description	Issue Date	Approved By
F2P31012-01E	First Issue	2024-02-09	K. Littell

2 SUMMARY OF TEST RESULTS

Test Name	Standard(s)	Results
Radiated Spurious Emissions	CFR 47 Part 15.247(d) / Part 15.209 / KDB558074	Complies
Conducted Output Power	CFR 47 Part 15.247(b)(2) / KDB558074	Complies

Note: Product was battery-operated. Requirements of 15.31 were met by using new batteries.

Modifications Made to the Equipment
Client reduced power on BLE radio to meet SAR requirements.

3 TABLE OF MEASURED RESULTS

Test	Low Channel 2402 MHz	Mid Channel 2426 MHz	High Channel 2480 MHz
Average Field Strength of Fundamental	83.6dBµV/m, 15.1mV/m	81.7dBµV/m, 12.1mV/m	79.5dBµV/m, 9.4mV/m
Average Limit for Fundamental	50 millivolts/meter (93.97 dBµV/m)	50 millivolts/meter (93.97 dBµV/m)	50 millivolts/meter (93.97 dBµV/m)
Conducted Output Power*	0.0137mW, -18.63dBm	0.0123mW, -19.1dBm	0.0142mW, -18.46dBm
Conducted Output Power Limit	1 Watt, (30dBm)	1 Watt, (30dBm)	1 Watt, (30dBm)

**Includes 1.2dB cable loss.*

4 ENGINEERING STATEMENT

This report has been prepared on behalf of Sports Sensors, Inc. to provide documentation for the testing described herein. This equipment has been tested and found to comply with Part 15.247 of the FCC Rules using ANSI C63.10 and KDB558074 standards. The test results found in this test report relate only to the items tested.

5 EUT INFORMATION AND DATA

5.1 Equipment Under Test:

Product: Swing Speed Radar with Tempo Timer RDL
Model: RDL-SSR364*
**Denotes actual model tested as worst-case representative of product family that includes Swing Speed Radar RDL model RDL-SSR364 and Swing Speed Radar with Tempo Timer RDL model RDL-SSRTT364.*
Serial No.: 7CBB36
BT Firmware: v0.14
BT Hardware: v0.10
SSR Firmware: 66781901
SSR Hardware: V1.0
FCC ID: NVE364BT

5.2 Trade Name:

Sports Sensors, Inc.

5.3 Power Supply:

Battery-Operated

5.4 Applicable Rules:

CFR 47, Part 15.247, subpart C

5.5 Equipment Category:

Radio Transmitter-DXT

5.6 Antenna:

Integral Antenna

5.7 Accessories:
N/A

5.8 Test Item Condition:
The equipment to be tested was received in good condition.

5.9 Testing Algorithm:
EUT was tested for Bluetooth field strength on low, mid and high channels in the BLE 2.4 GHz band.

6 LIST OF MEASUREMENT INSTRUMENTATION

Equipment Type	Asset Number	Manufacturer	Model	Serial Number	Calibration Due Date
Shielded Chamber	CL166-E	Albatross Projects	B83117-DF435-T261	US140023	2024-11-15
Temp/Hum. Recorder	CL232	Extech	445814	01	2025-05-19
Receiver	CL151	Rohde & Schwarz	ESU40	100319	2024-04-10
Low Loss Cable Set	CL315	Fairview Microwave	FMC0202914-240	None Spec.	2024-04-14
Horn Antenna	CL098	Emco	3115	9809-5580	2024-01-19
Pre-Amplifier	CL153	Keysight Tech.	83006A	MY39500791	2023-12-16

7 RADIATED SPURIOUS EMISSIONS

The EUT antenna port was fitted with its 0dBi gain Integral Antenna. Radiated emissions were measured in a Semi-Anechoic Chamber. All emissions generated that fall in the restricted bands per FCC Part 15.205 were examined.

7.1 Requirements:

All emissions that fall in the restricted bands defined in FCC Part 15.205 shall not exceed the maximum field strength listed in FCC Part 15.209(a).

Scans were performed from 9kHz to 10 GHz at the low, mid, and high channels and the mid channel was determined to be the worst-case. The tables of measured results follow in data presented and include measurements from all channels.

7.1 Radiated Spurious Emissions Test Data

Test Date(s):	2023-11-21	**Test Engineer(s):**	J. Chiller
Standards:	CFR 47 Part 15.249(a)	**Air Temperature:**	22.2ºC
		Relative Humidity:	37%

Notes: Plots are peak, max hold prescan data included only to determine what frequencies to investigate and measure. The EUT was initially placed in a semi-anechoic chamber and rotated in all three orthogonal positions to maximize the emissions. Characterization measurements were then performed to determine at which frequencies significant emissions occurred. These graphs are shown below.

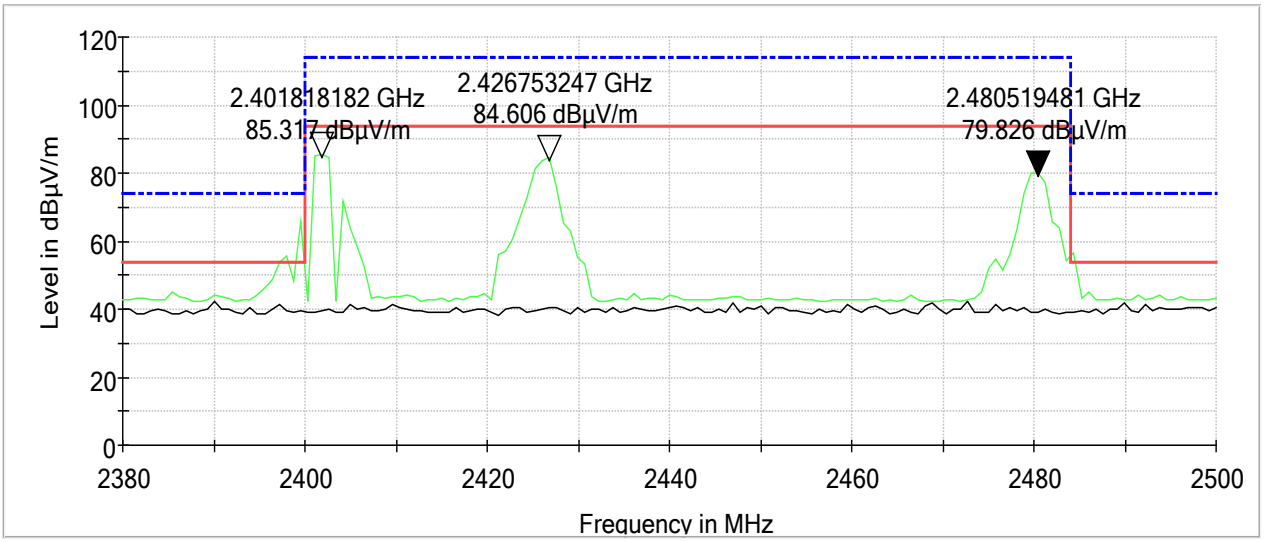
The equipment was fully exercised with all cabling attached to the EUT and was positioned on the Semi-Anechoic Chamber for maximum emissions. While the equipment was energized, the receiving antenna was scanned from 1.0 meter to 4.0 meters in both vertical and horizontal polarities while the turntable was adjusted 360 degrees to determine the maximum field strength. The tables of measured results can be found below.

Some of the frequencies did not change with the EUT on or off. At those frequencies, the test distance was shortened to 1 meter and still no emissions from the EUT were visible or over the ambient or limit.

In the following plots, the black line indicates ambient noise and the red line indicates the measurement with the EUT on. Emissions to be found by the EUT were measured and listed in tables. The plots are for reference only and the limit lines are not actual limit lines but merely a guide.

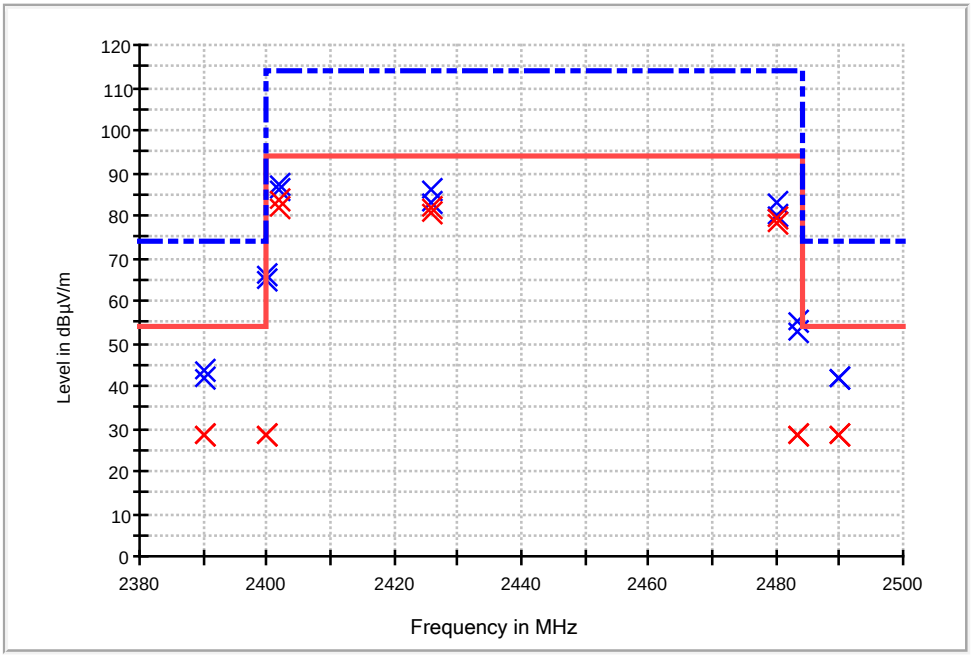
The 20 MHz 802.11n bandwidth was found to be the worst-case emissions.

Band Edges: Vertical



Band Edge and Field Strength of the Fundamentals

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBµV/m)
2390.000000	43.7	28.4	1000.0	1000.000	150.0	V	245.0	6.9	25.6	54.0
2390.000000	41.6	28.3	1000.0	1000.000	150.0	H	202.0	6.9	25.7	54.0
2400.000000	64.7	28.2	1000.0	1000.000	150.0	H	202.0	6.9	25.8	54.0
2400.000000	65.8	28.3	1000.0	1000.000	150.0	V	245.0	6.9	25.7	54.0
2402.000000	87.5	83.6	1000.0	1000.000	150.0	V	245.0	6.9	10.4	94.0
2402.000000	86.0	82.1	1000.0	1000.000	150.0	H	202.0	6.9	11.9	94.0
2426.000000	83.1	80.9	1000.0	1000.000	150.0	H	202.0	6.9	13.1	94.0
2426.000000	86.0	81.7	1000.0	1000.000	150.0	V	207.0	6.9	12.3	94.0
2480.000000	83.0	79.5	1000.0	1000.000	150.0	V	210.0	6.9	14.5	94.0
2480.000000	80.2	78.2	1000.0	1000.000	150.0	H	202.0	6.9	15.8	94.0
2483.500000	55.0	28.4	1000.0	1000.000	150.0	V	210.0	6.9	25.6	54.0
2483.500000	52.9	28.3	1000.0	1000.000	150.0	H	202.0	6.9	25.7	54.0
2490.000000	41.6	28.7	1000.0	1000.000	150.0	H	202.0	7.0	25.3	54.0
2490.000000	42.0	28.8	1000.0	1000.000	150.0	V	210.0	7.0	25.2	54.0



8 CONDUCTED OUTPUT POWER

The EUT antenna port was fitted with an SMA connector and directly connected to the input of the receiver. The peak power output was measured.

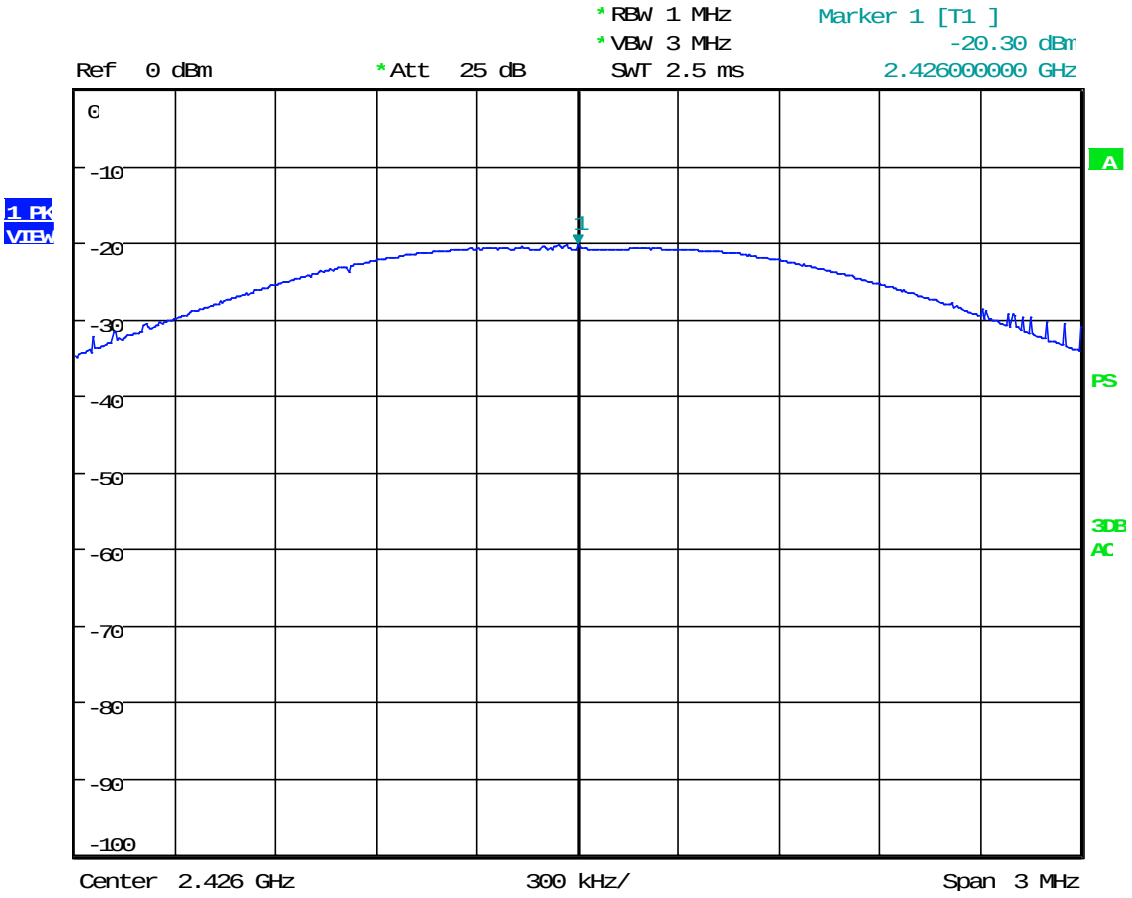
8.1 Requirements:

The peak power output shall be 1 watt (30 dBm) or less when using an antenna with a gain of less than 6dBi. For antennas having a gain of more than 6dBi, the limit is reduced by 1dB for every dB the antenna gain is over 6dBi.

8.2 Conducted Output Power Test Data

Test Date:	2024-01-24	**Test Engineer:**	J. Chiller
Standards:	CFR 47 Part 15.247(b)(3); KDB558074	**Air Temperature:**	22.4ºC
		Relative Humidity:	35%

Mid Channel



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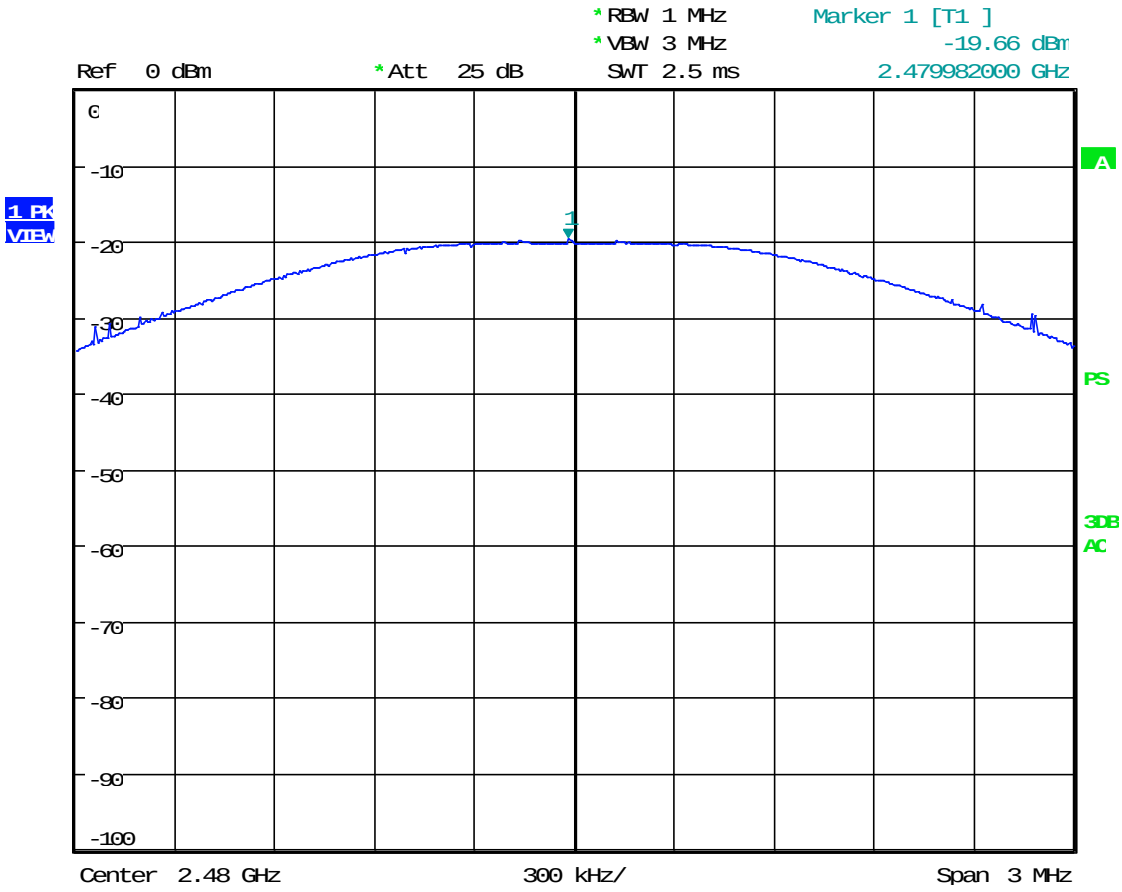
High Channel



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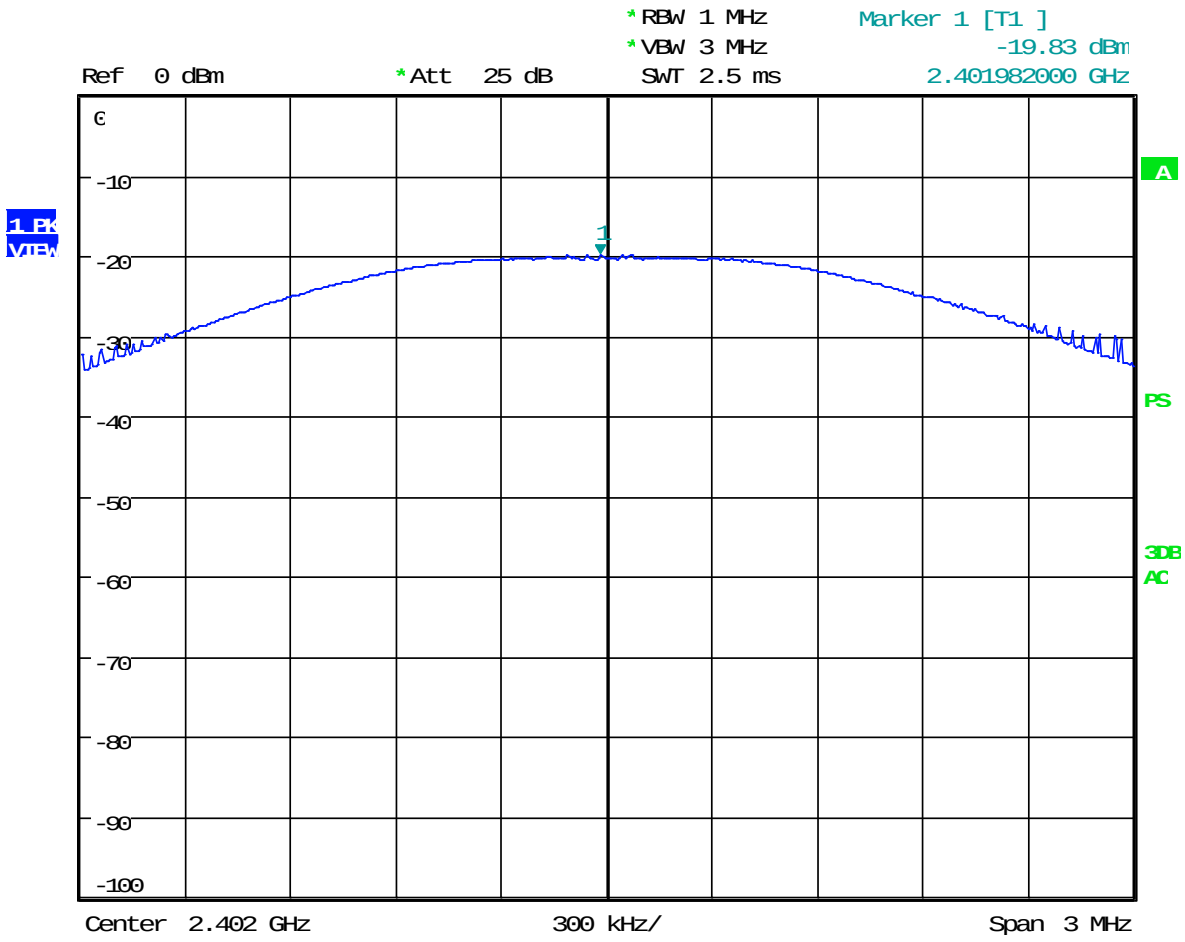
Low Channel



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9 PHOTOGRAPHS - TEST SETUPS

Radiated Spurious Emissions

Conducted Output Power