Test Report

INTENTIONAL RADIATOR TESTS ACCORDING TO FCC PART 15 C and INDUSTRY CANADA REQUIREMENTS

Equipment Under Test:	Dosimeter with BT LE
Type/ Model:	MBD-1
Manufacturer:	Mirion Technologies (RADOS) Oy Mustionkatu 2 FI-20101 Turku FINLAND
Customer:	Mirion Technologies (RADOS) Oy Mustionkatu 2 FI-20101 Turku FINLAND
FCC Rule Part: IC Rule Part:	15.249: 2015 RSS-247:2015

Date: 11 March 2016

Issued by:

Rauno Repo
EMC/RF Specialist

11 March 2016

Janne Nyman
Compliance Specialist

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Equipment Under Test (EUT)

Dosimeter	
Type/ Model:	MBD-1
Serial Number:	2257
FCC ID:	2AHI8-MBD-PD-1

The EUT is a dosimeter to be used around a wrist or chest. The EUT uses 2.4 GHz Low Energy Bluetooth transmission.

Classification of the device

Fixed device	☐
Mobile Device (Human body distance > 20cm)	☐
Portable Device (Human body distance < 20cm)	☒

Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing

Ratings and declarations

Operating Frequency Range (OFR):	2402 - 2480 MHz
Channels:	40 channels
Channel separation:	2 MHz
Modulation:	GFSK
Integrated antenna gain:	1.2 dBi

Power Supply

The EUT is an internal battery (3 V) powered device.

Disclaimer

SUMMARY OF TESTING

Test Specification	Description of Test	Result
§15.249, a / RSS-247 5.4	Maximum Peak Radiated Output Power	PASS
RSS-GEN 6.6	99 % Occupied Bandwidth	PASS
§15.249, a /RSS-247 5.5	Unintentional Radiated Emissions	PASS

EUT Test Conditions during Testing

The EUT was configured into the wanted channel and was in continuous transmit mode during all the tests.

During the radiated measurements above 1 GHz the EUT was on 150 cm high Styrofoam table. New battery was installed before the measurements.

Before the tests the EUT was set in X, Y, Z positions to specify the position having the highest radiated emission levels. The highest levels were received when the EUT was in a position display pointing upwards.

Following channels were used during the tests:

Channel	Frequency/ MHz
Low (CH 0)	2402
Mid (CH 12)	2426
High (CH 39)	2480

Test Facility

☐	Testing Location / address: FCC registration number: **90598**	SGS Fimko Ltd Särkiniementie 3 FI-00210, HELSINKI FINLAND
☒	Testing Location / address: FCC registration number: **178986** Industry Canada registration number: **8708A-2**	SGS Fimko Ltd Karakaarenkuja 4 FI-02610, ESPOO FINLAND

Maximum Peak Radiated Output Power

Standard:	ANSI C63.10	(2013)
Tested by:	RRE	
Date:	8 March 2016	
Temperature:	22 ± 3 °C	
Humidity:	30 - 60 % RH	
Measurement uncertainty	± 4.5 dB	Level of confidence 95 % (k = 2)

FCC Rule: 15.249

Results:

Channel	Radiated Power/Peak [dBµV/m]	Peak Limit [dBµV/m]	Margin [dB]	Result
Low	78.9	114.0	35.1	PASS
Mid	79.7	114.0	34.3	PASS
High	78.6	114.0	35.4	PASS

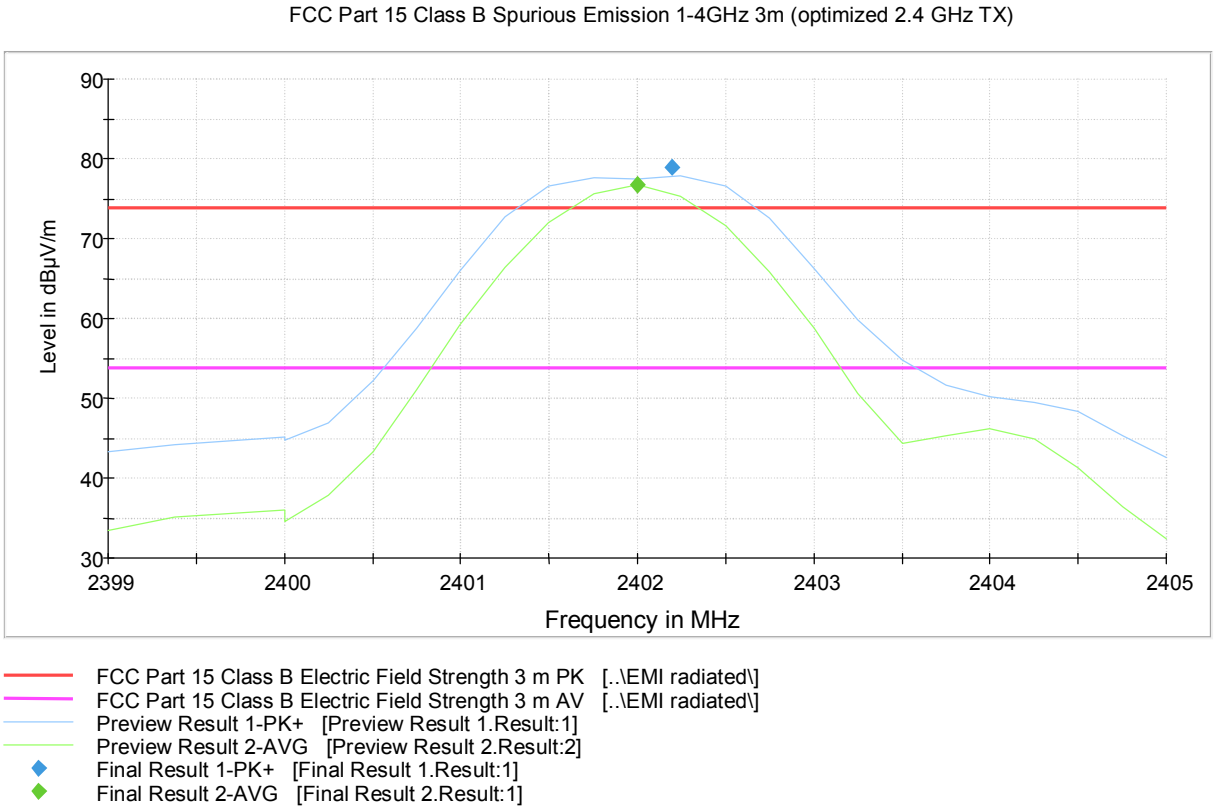

Figure 1. Low channel.

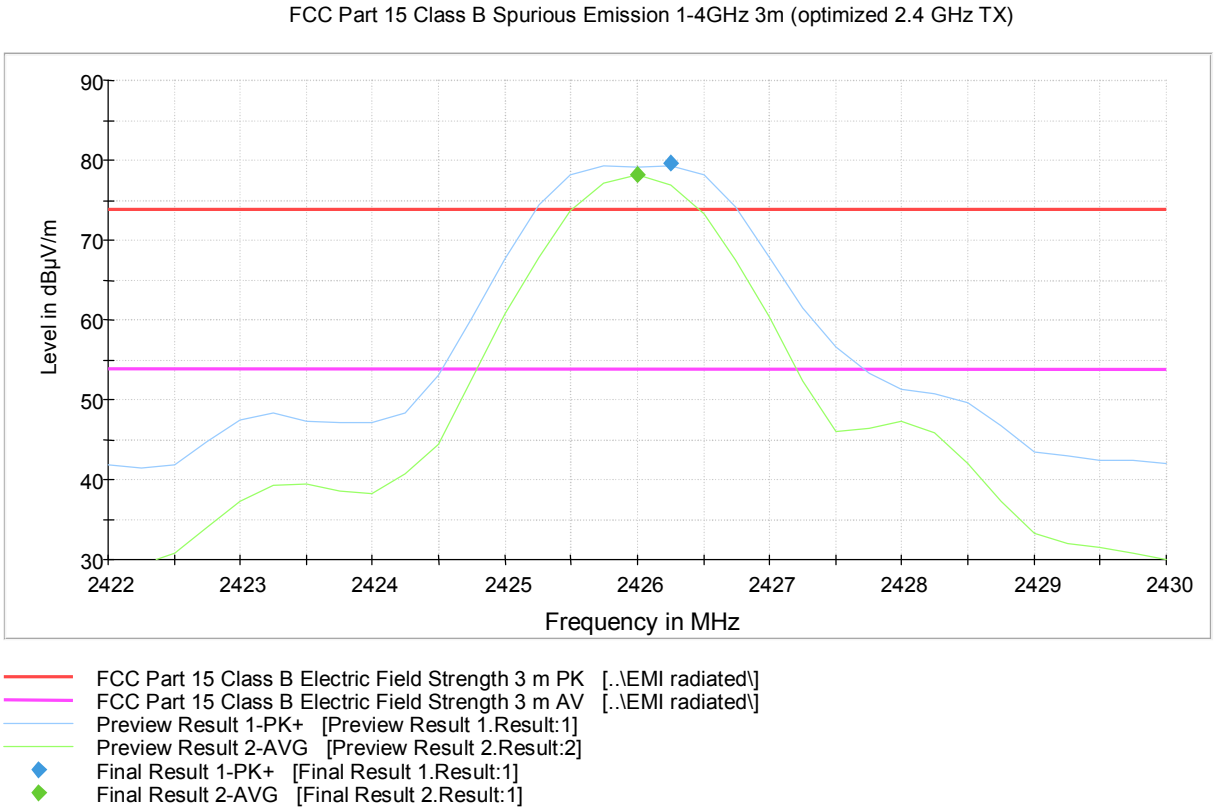

Figure 2. Mid channel.

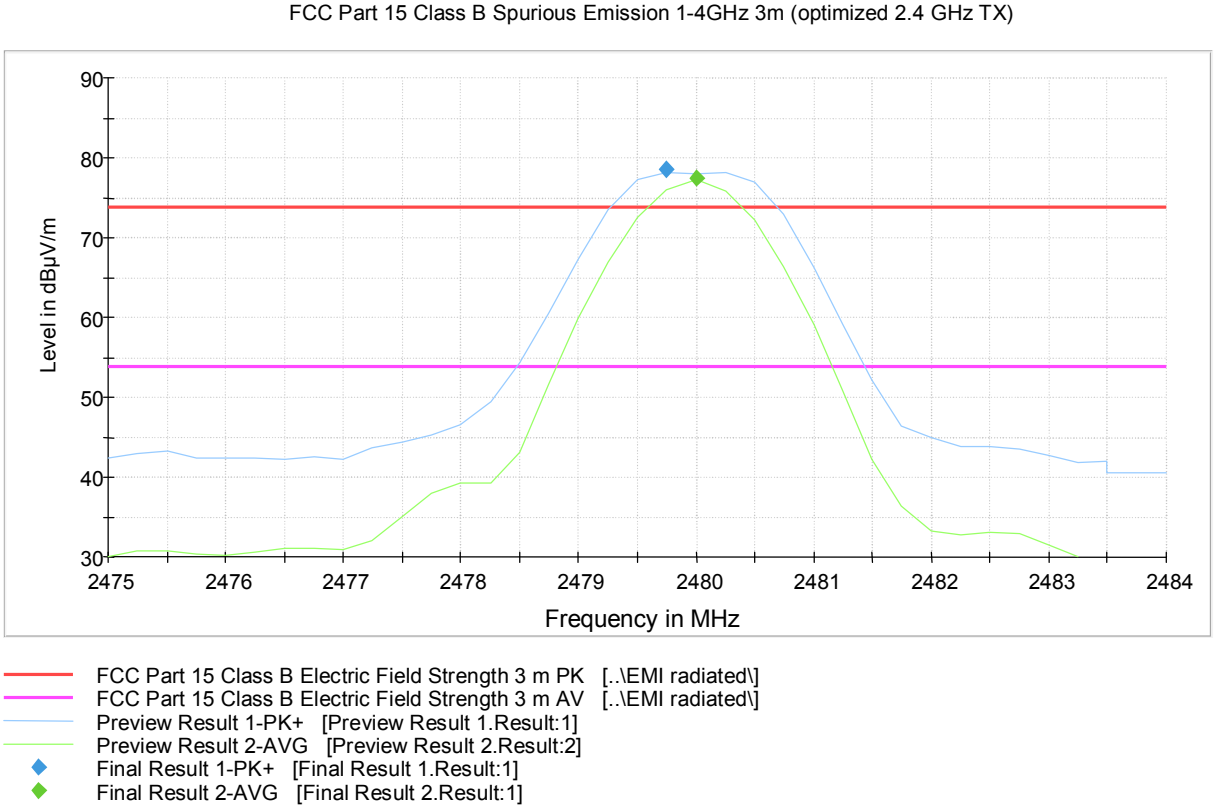

Figure 3. High channel.

Transmitter Radiated Emissions 30 MHz to 26.5 GHz

Standard:	ANSI C63.10	(2013)
Tested by:	RRE, PKA	
Date:	8 March 2016	
Temperature:	22 ± 3 °C	
Humidity:	30 - 60 % RH	
Measurement uncertainty	± 4.51 dB	Level of confidence 95 % (k = 2)

FCC Rule: 15.249

The correction factor in the final result table contains the sum of the transducers (antenna + amplifier + cables). The result value is the measured value corrected with the correction factor.

Test results

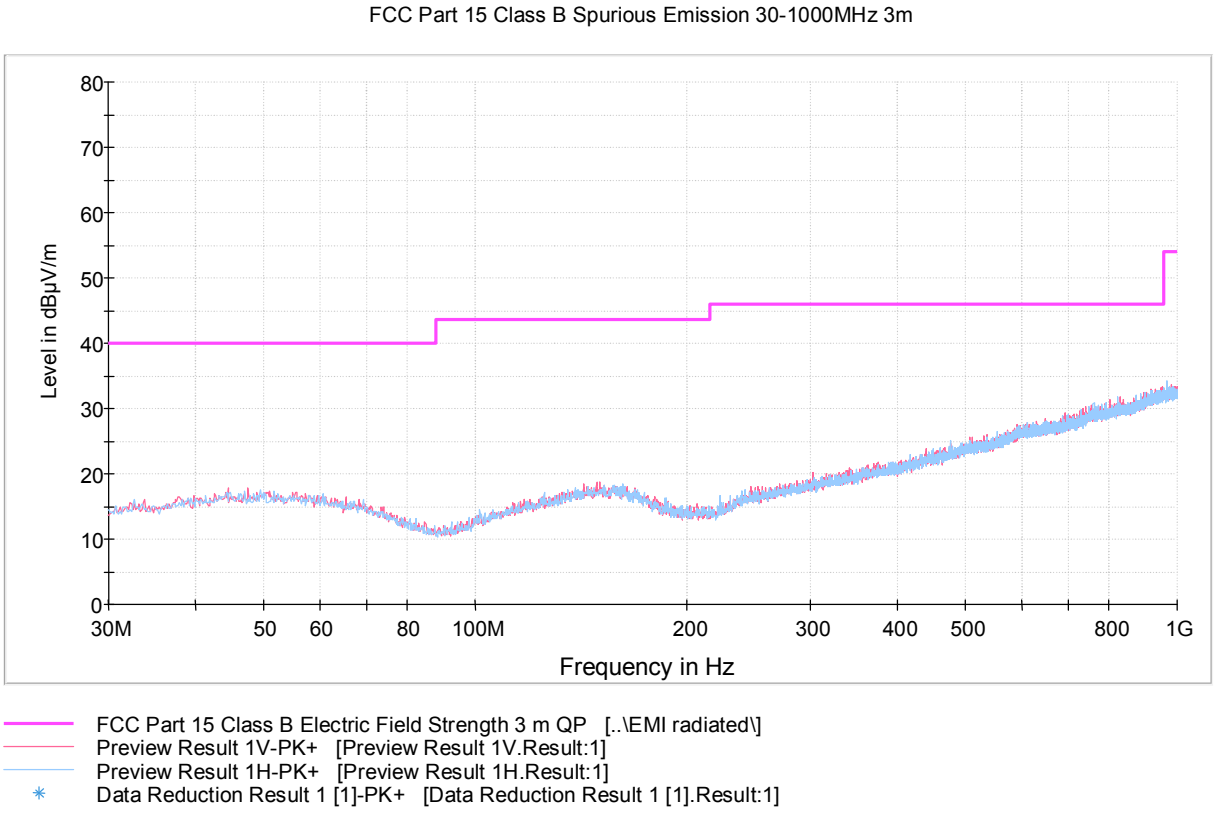

Figure 4. Measured curve with peak detector (Low channel).

Final measurements were not performed because no peaks were detected above the noise floor.

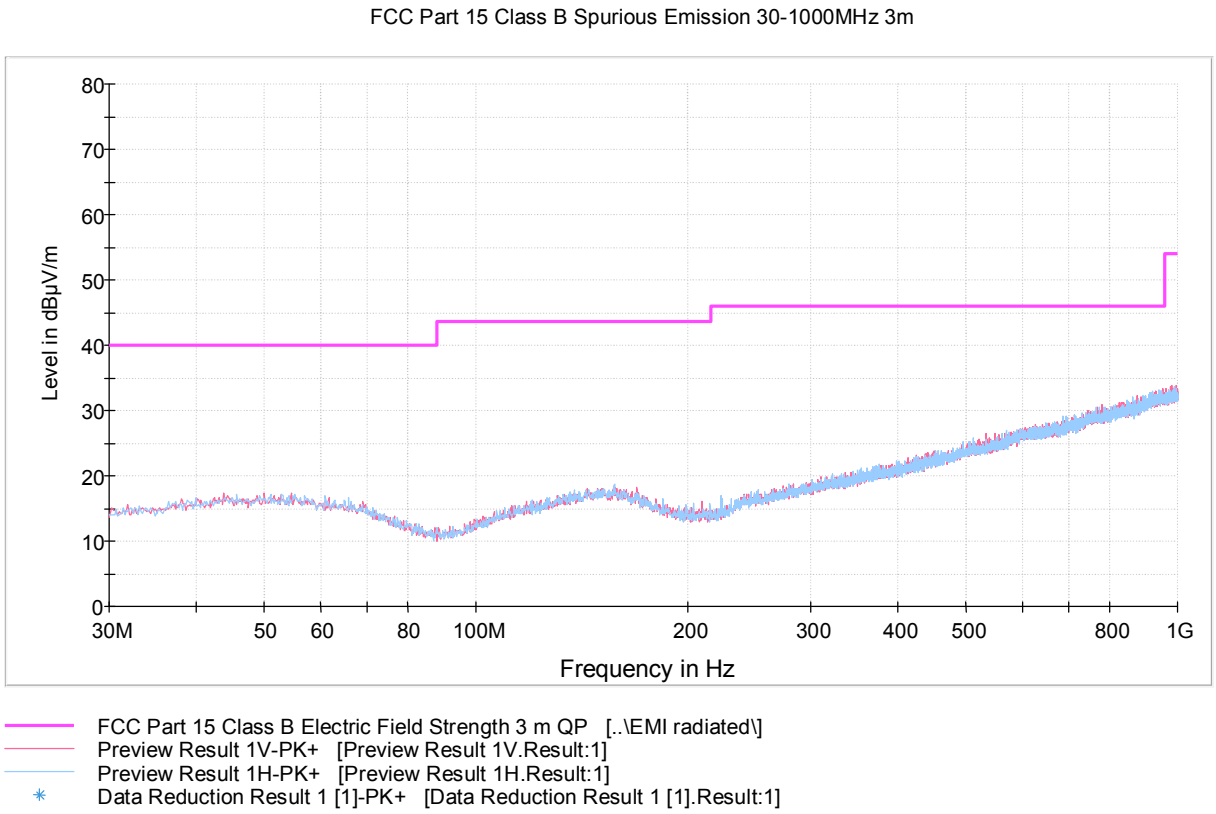

Figure 5. Measured curve with peak detector (Mid channel).

Final measurements were not performed because no peaks were detected above the noise floor.

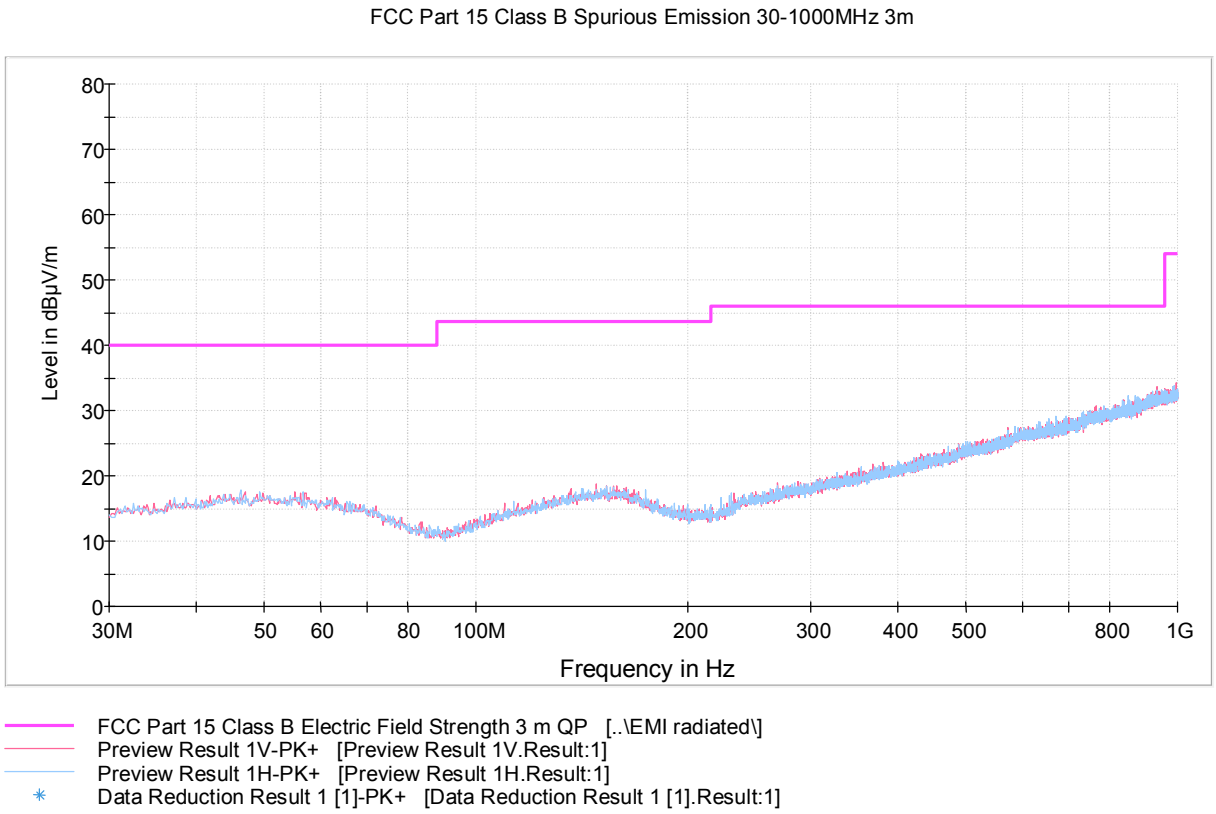

Figure 6. Measured curve with peak detector (High channel).

Final measurements were not performed because no peaks were detected above the noise floor.

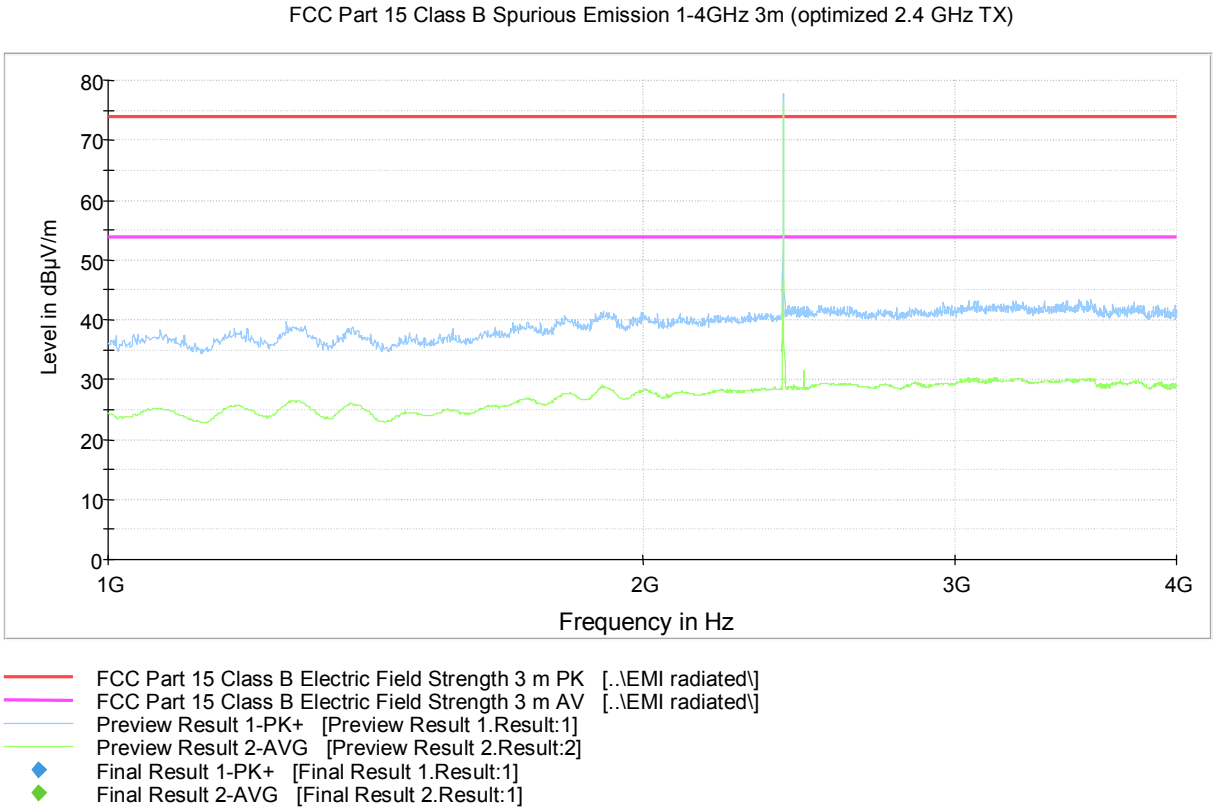

Figure 7. Measured curve with peak and average detectors (Low channel).

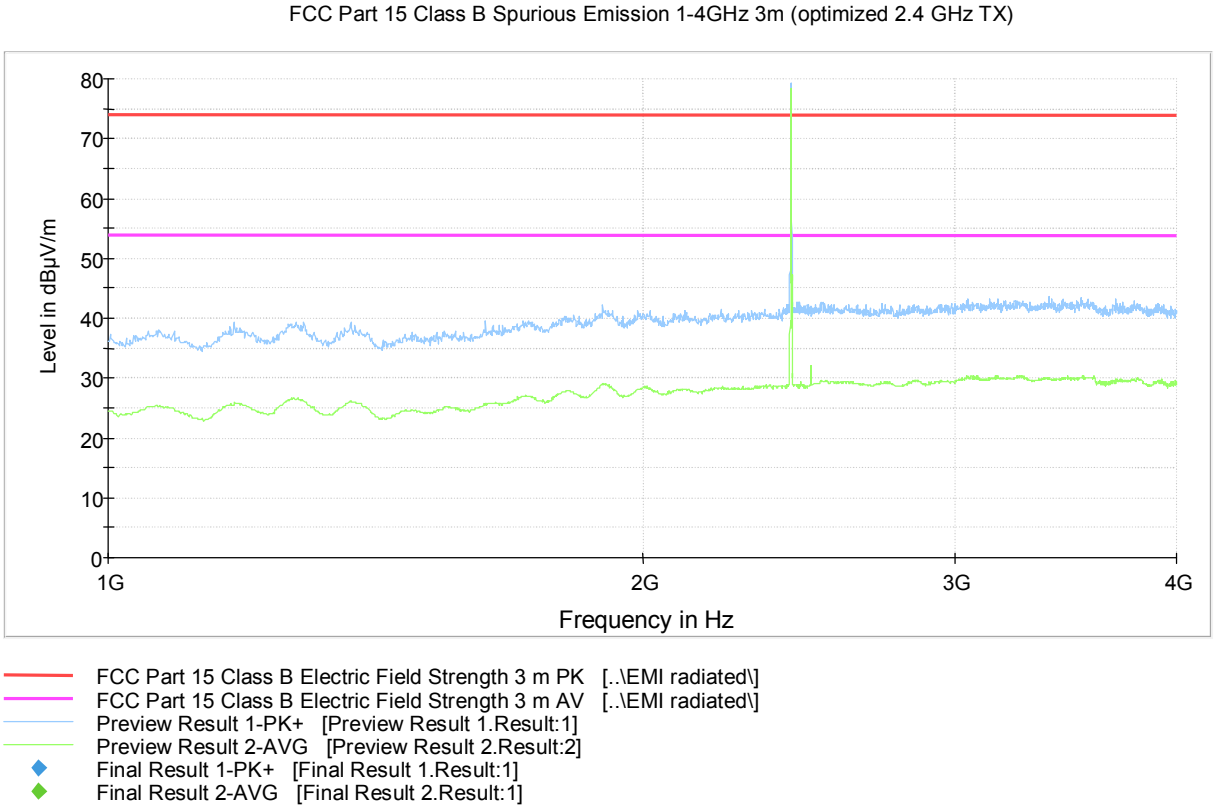

Figure 8. Measured curve with peak and average detectors (Mid channel).

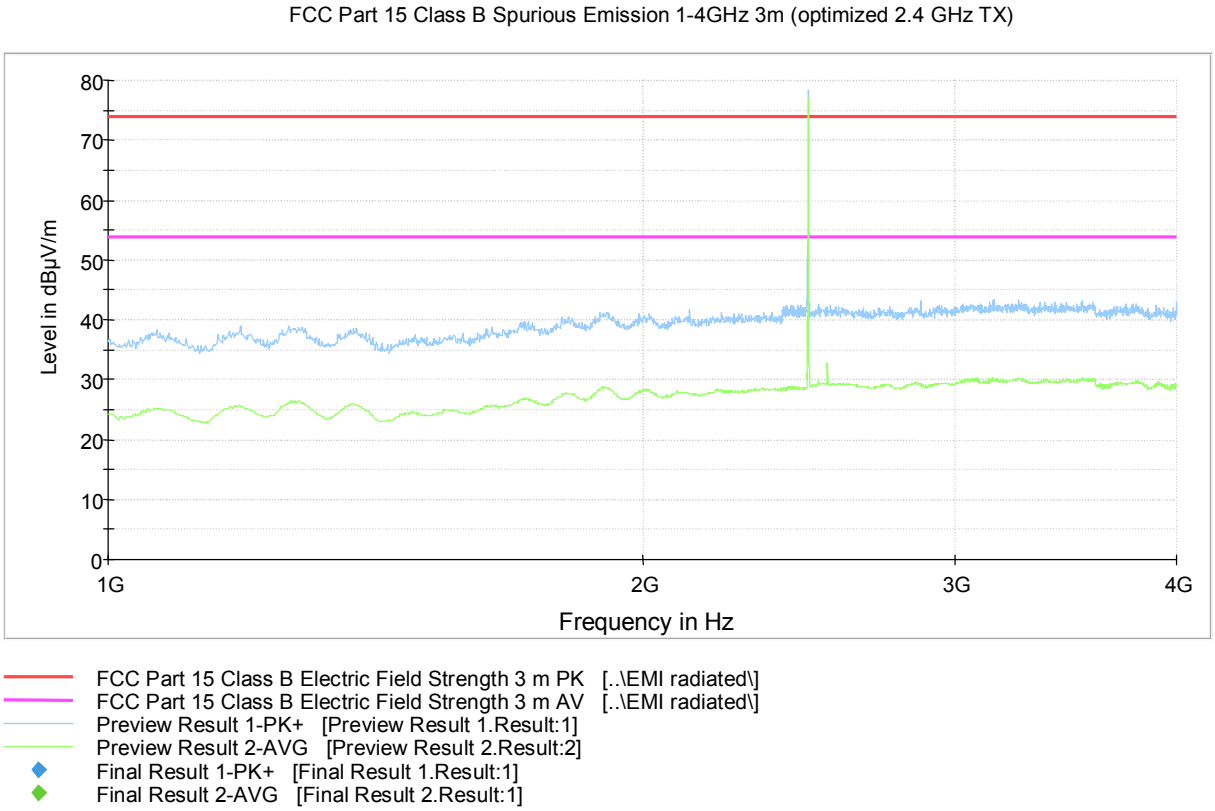

Figure 9. Measured curve with peak and average detectors (High channel).

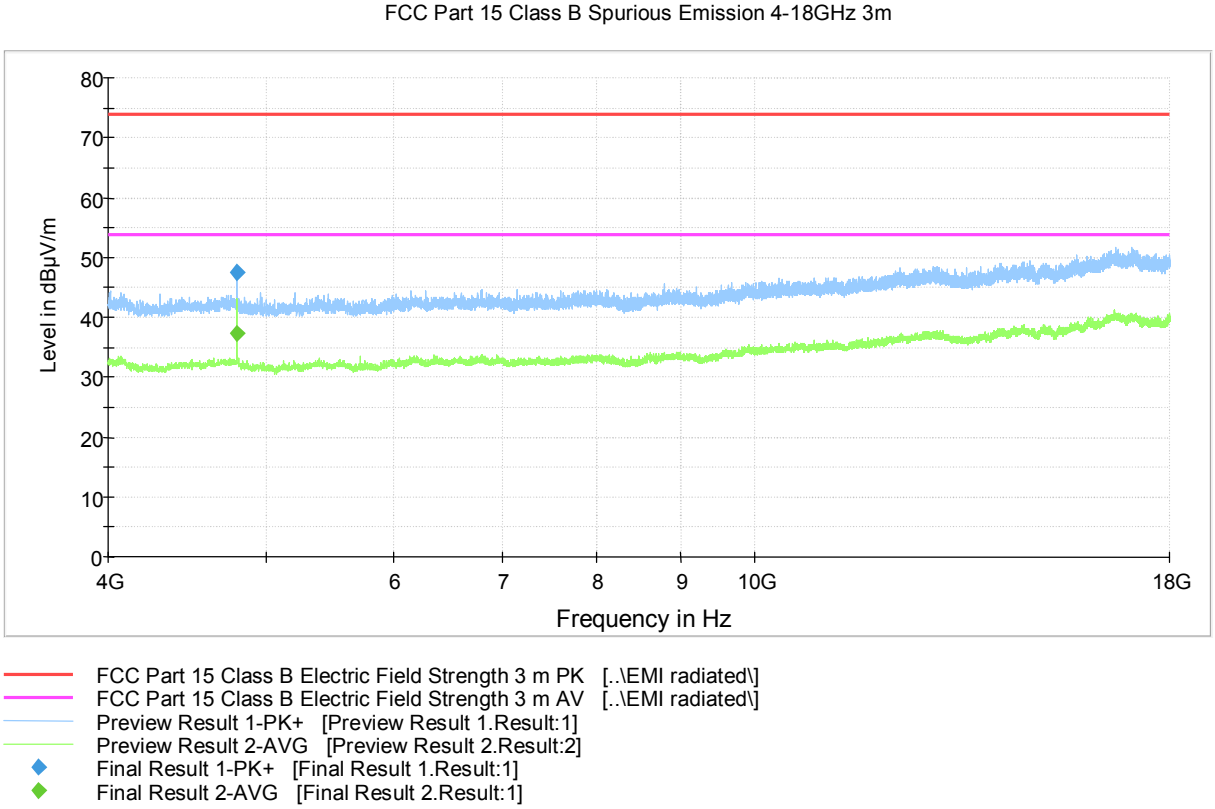

Figure 10. Measured curve with peak and average detectors (Low channel).

Table 1. Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
4805.900000	47.5	1000.0	1000.000	196.0	H	314.0	10.3	26.4	73.9	-

Table 2. Final Average results.

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
4805.900000	37.4	1000.0	1000.000	194.0	H	308.0	10.3	16.5	53.9	-

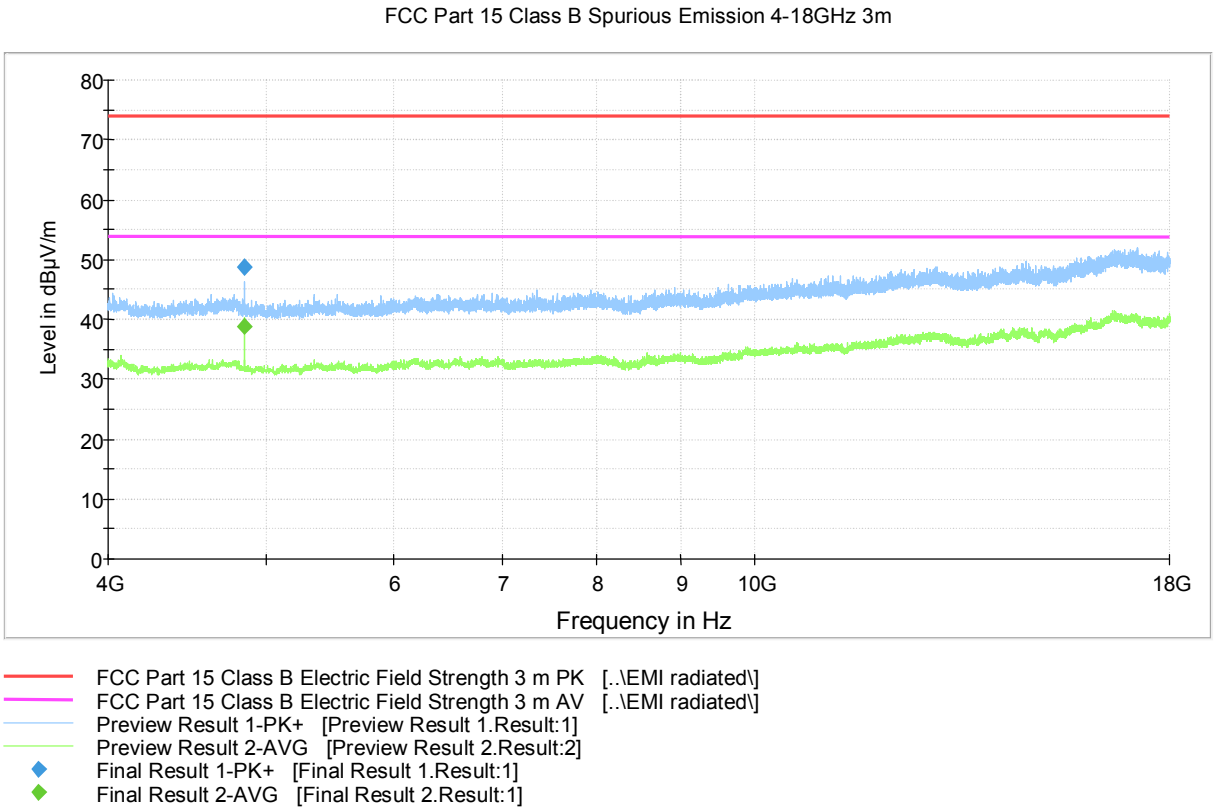

Figure 11. Measured curve with peak and average detectors (Mid channel).

Table 3. Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
4854.100000	48.8	1000.0	1000.000	100.0	H	315.0	10.2	25.1	73.9	-

Table 4. Final Average results.

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
4854.000000	38.7	1000.0	1000.000	204.0	H	167.0	10.2	15.2	53.9	-

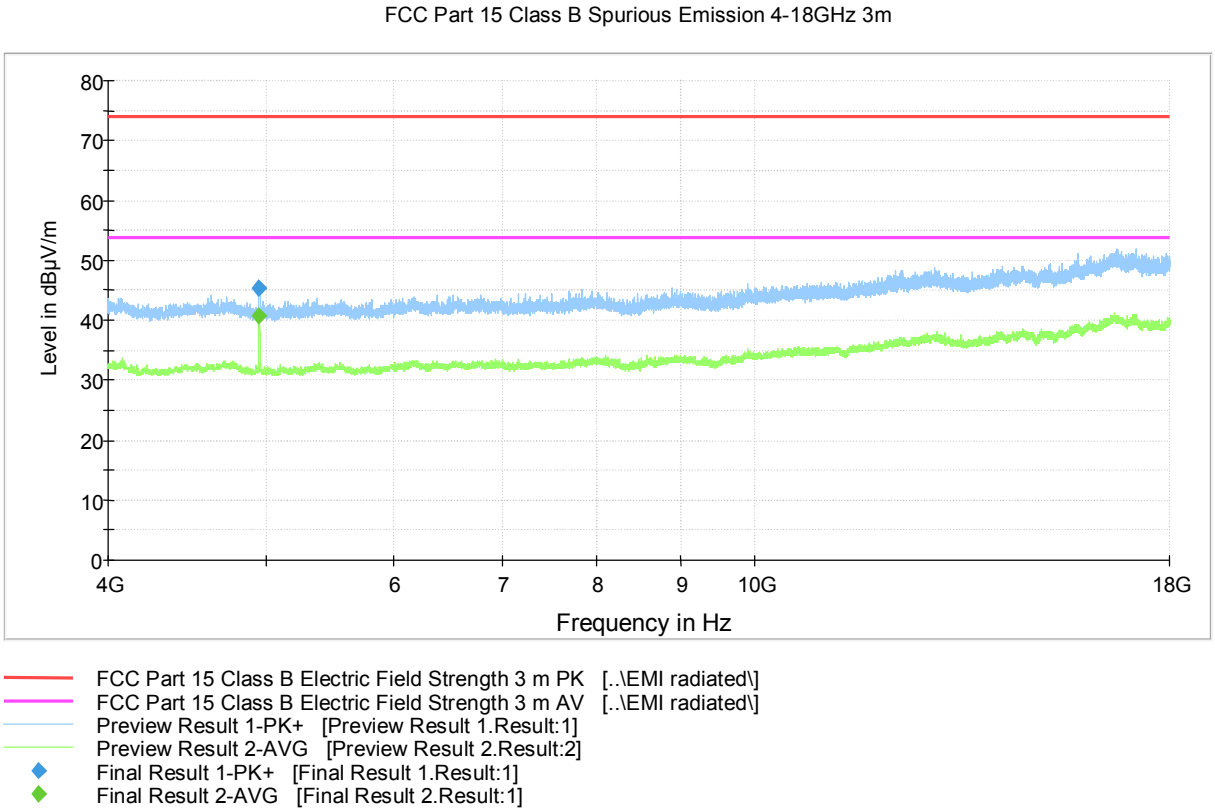

Figure 12. Measured curve with peak and average detectors (High channel).

Table 5. Final Max Peak results.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
4958.000000	45.3	1000.0	1000.000	259.0	V	227.0	10.2	28.6	73.9	-

Table 6. Final Average results.

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
4958.000000	42.0	1000.0	1000.000	204.0	H	298.0	10.2	23.5	53.9	-

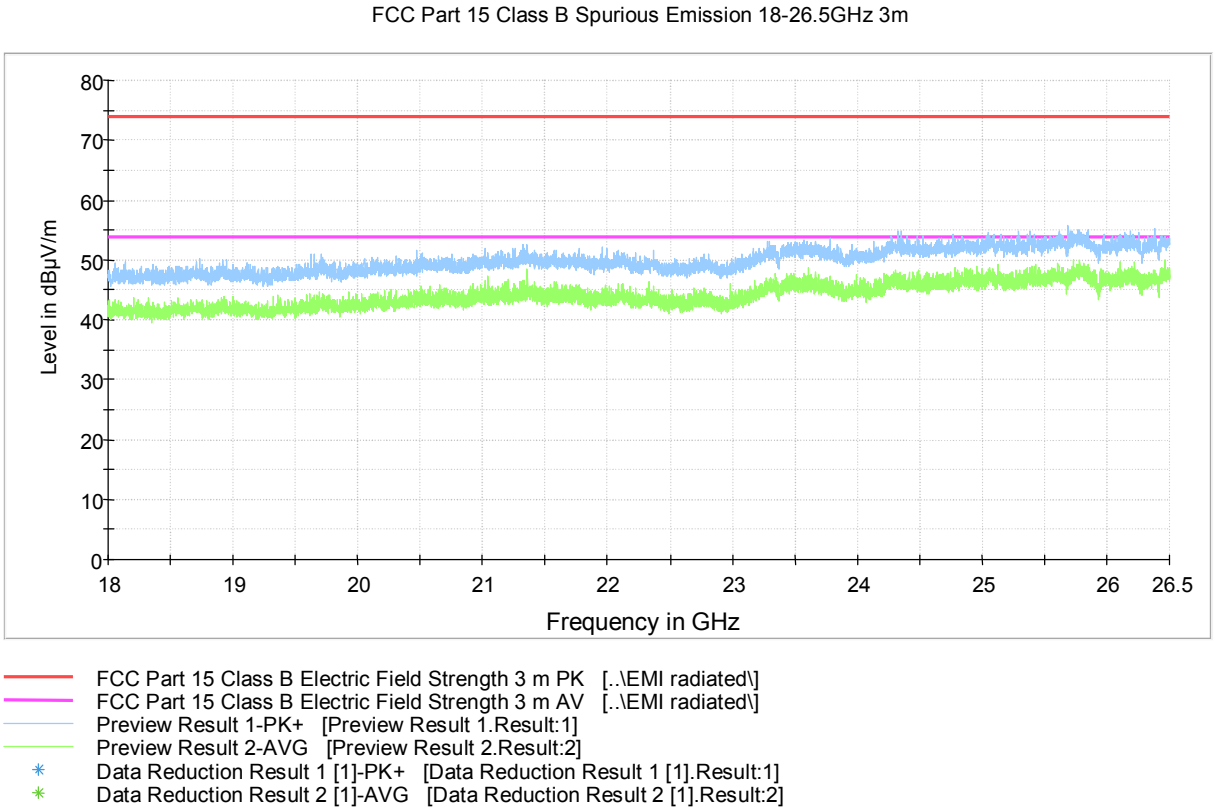

Figure 13. Measured curve with peak and average detectors (Low channel).

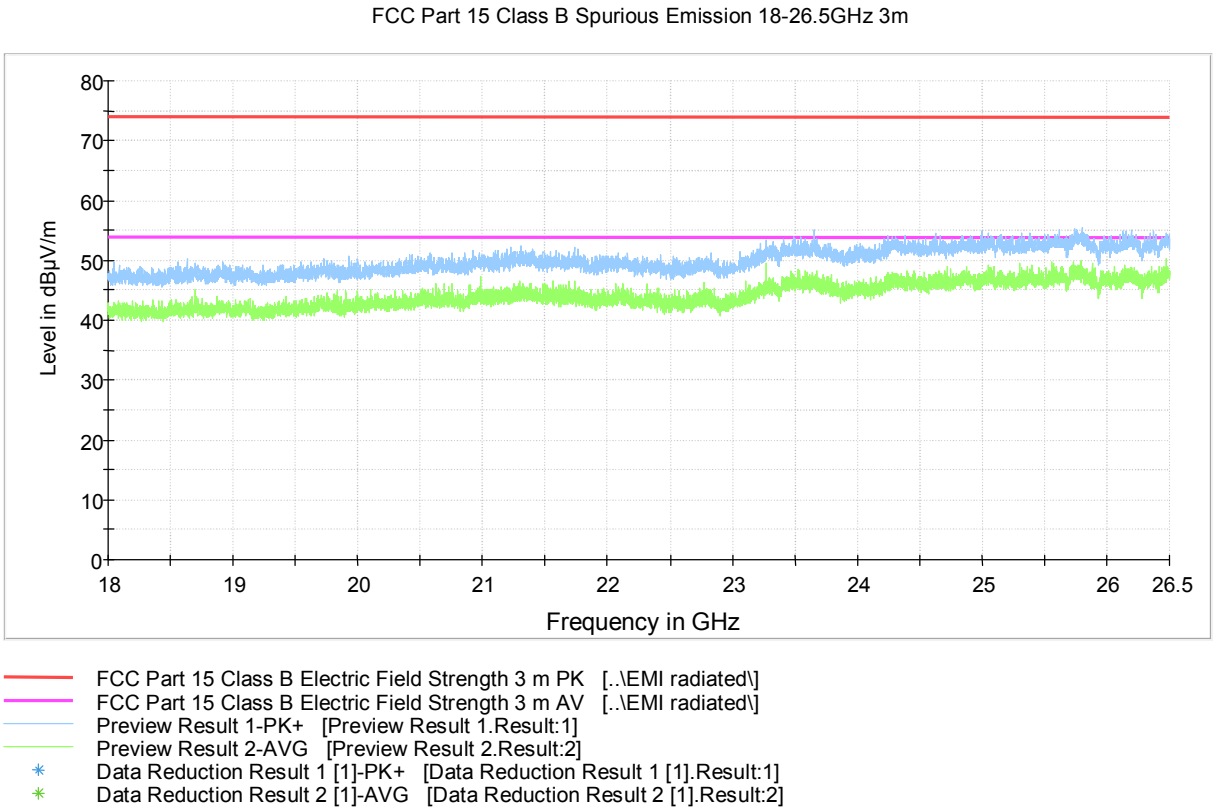

Figure 14. Measured curve with peak and average detectors (Mid channel).

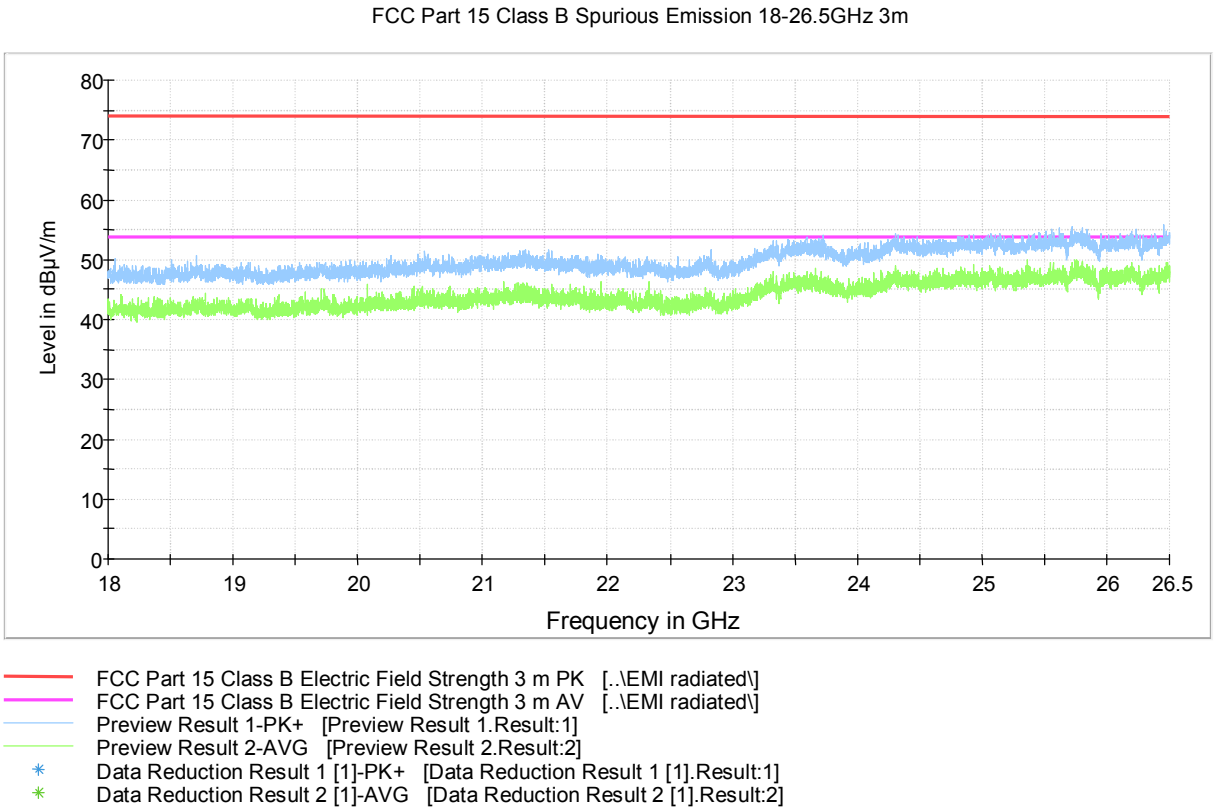

Figure 15. Measured curve with peak and average detectors (High channel).

Radiated Band Edge Measurement results

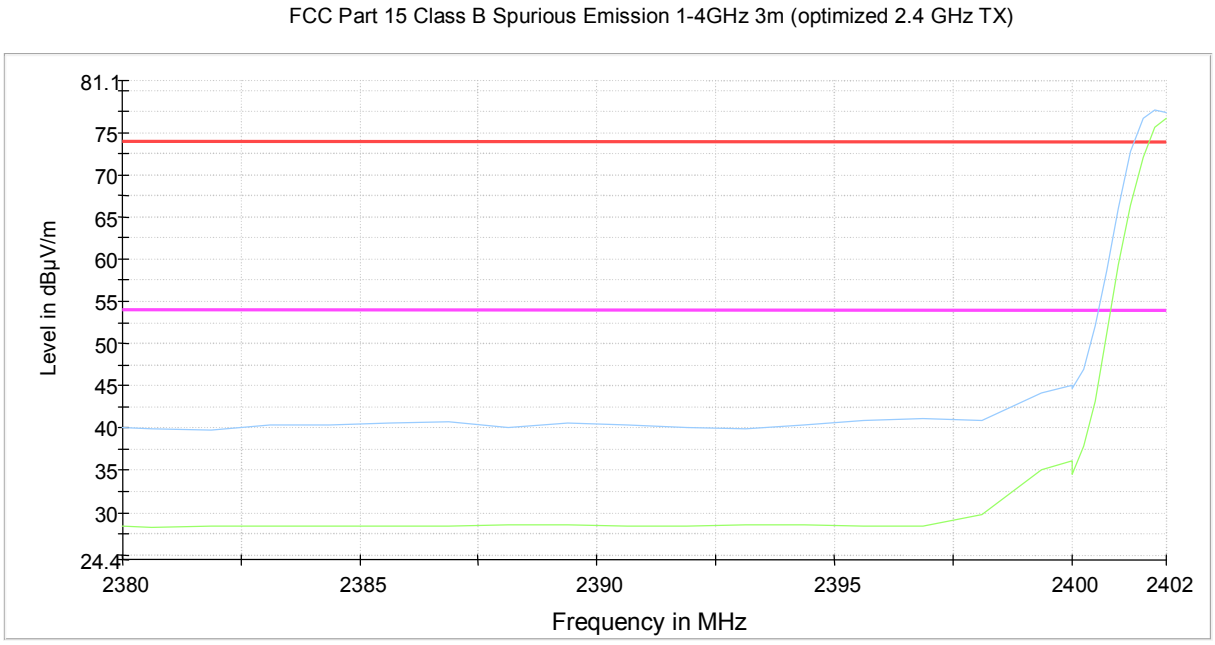

Figure 16. Low channel band edge.

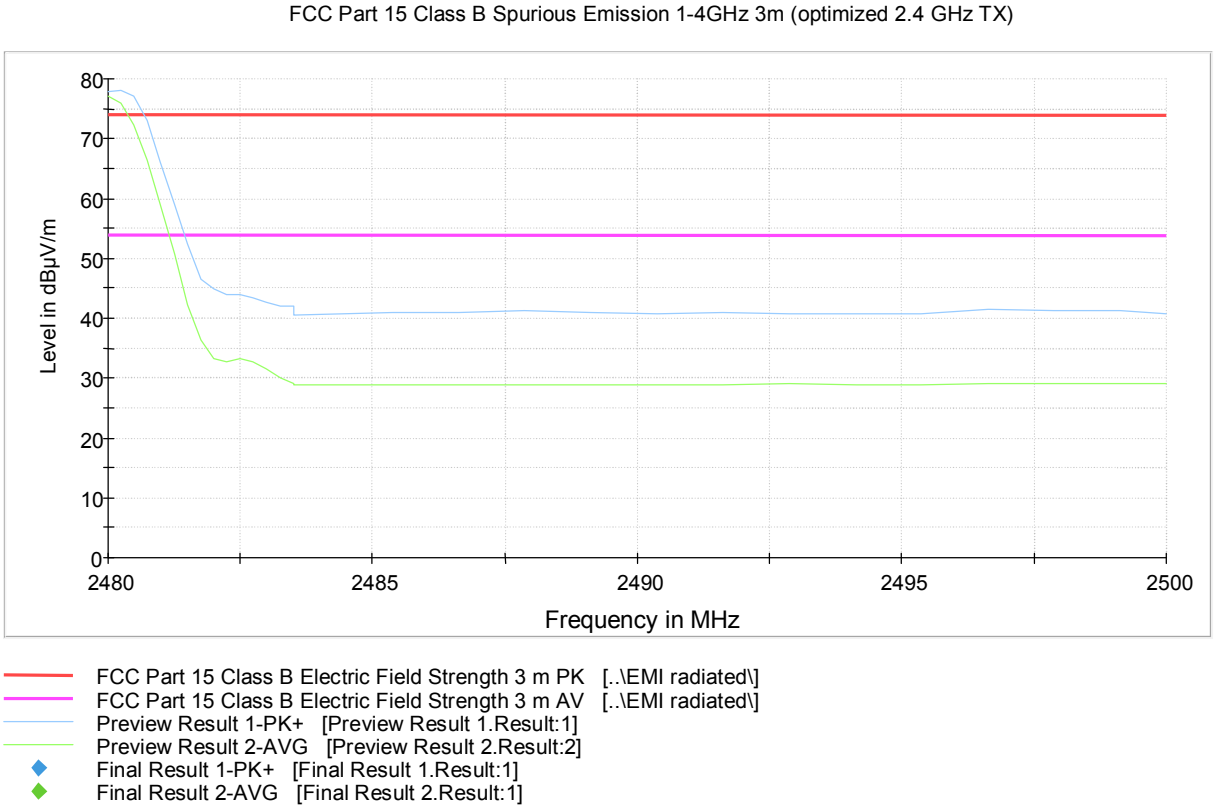

Figure 17. High channel band edge.

99% Occupied Bandwidth

Standard:	RSS-GEN	(2014)
Tested by:	RRE	
Date:	8 March 2016	
Temperature:	22 ± 3 °C	
Humidity:	30 - 60 % RH	

RSS-GEN 6.6

Table 7. 99 % OBW test results.

Channel	Limit	99 % BW [MHz]	Result
Low	-	1.145833333	PASS
Mid	-	1.153846154	PASS
High	-	1.137820513	PASS

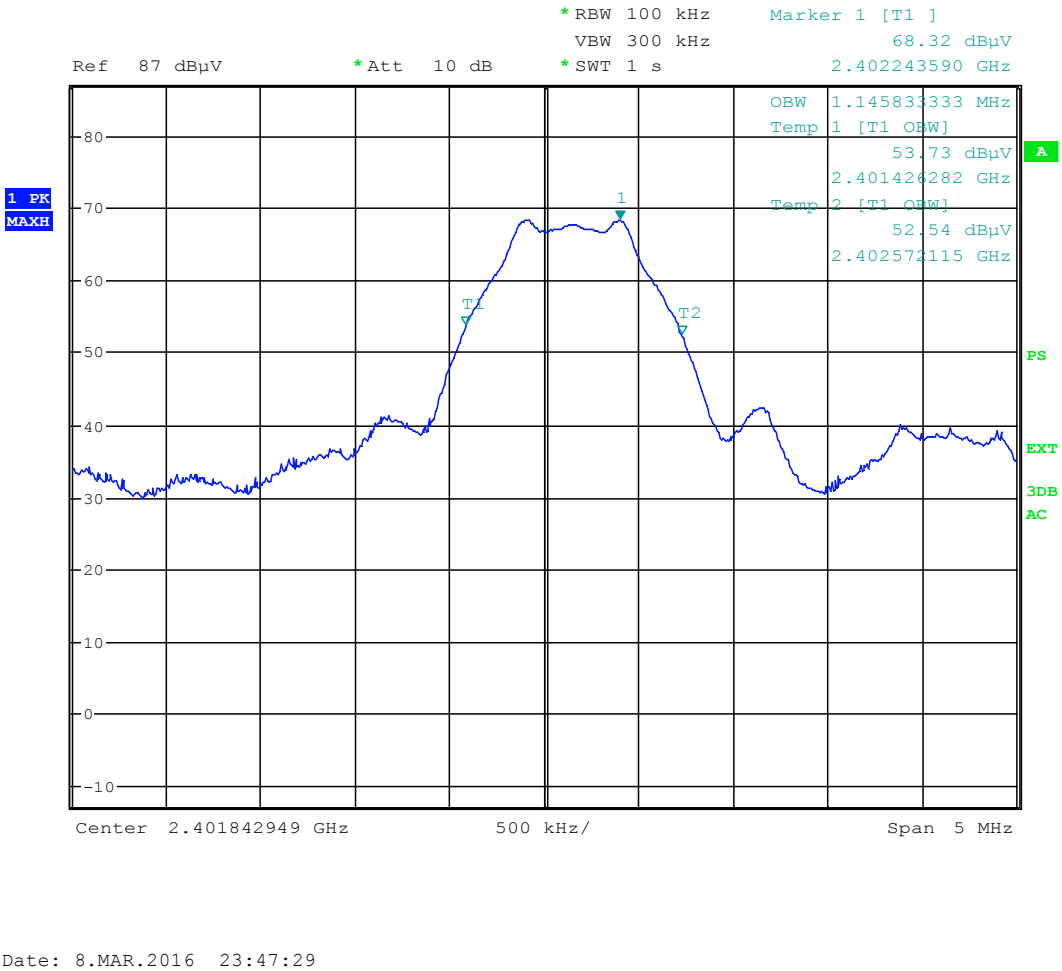

Figure 18. 99 % OBW. Low channel.

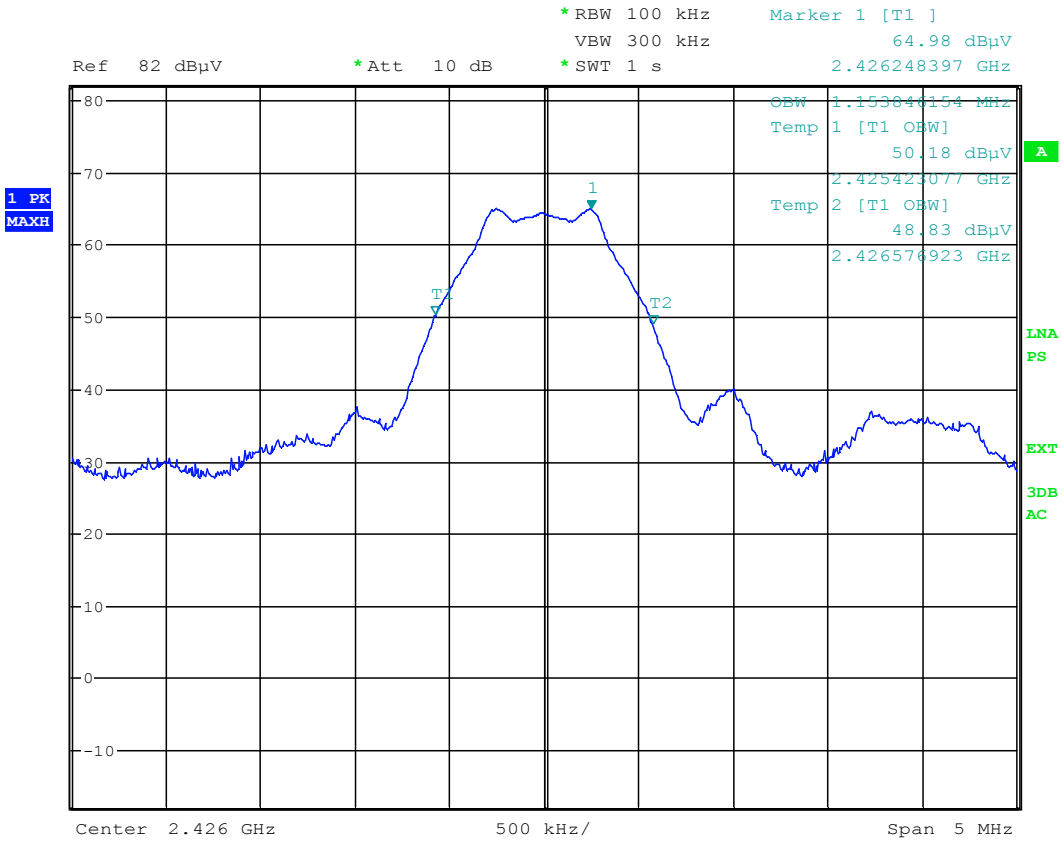

Figure 19. 99 % OBW. Mid channel.

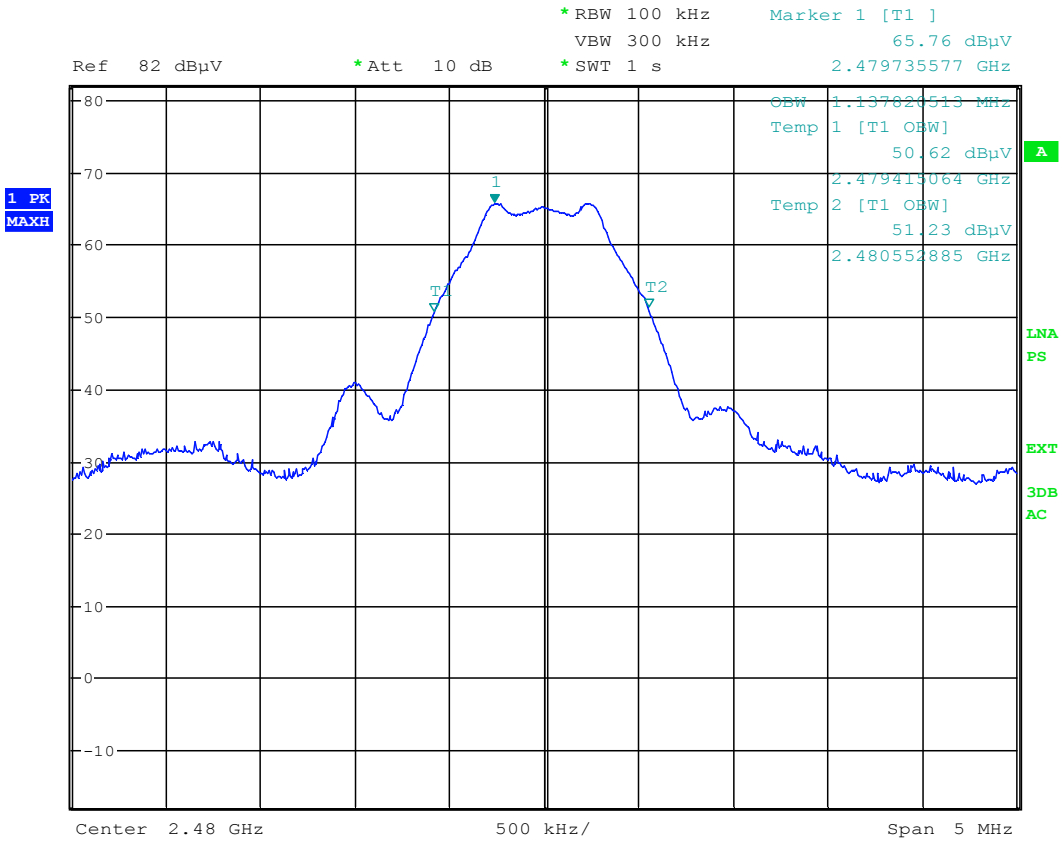

Figure 20. 99 % OBW. High channel.

LIST OF TEST EQUIPMENT

Equipment	Manufacturer	Type	Serial no	Inv.no	Cal. due (yyyy-mm-dd)
TEST RECEIVER	ROHDE & SCHWARZ	ESU 26	100185	8453	2016-07-01
TEST SOFTWARE	ROHDE & SCHWARZ	EMC-32	-	-	-
ANTENNA (30-1000 MHz)	SCHWARZBECK	VULB 9168	8168-503	8911	2016-05-04
ANTENNA MAST	DEISEL	MA240	240/455	5017	-
TURNTABLE	DEISEL	DS430	-	5015	-
CONTROLLER	COMTEST	HD100	100/457	5018	-
ANTENNA (1-18 GHz)	EMCO	3117	00086191	9569	2017-03-03
ANTENNA (18-26.5 GHz)	EMCO	3160- 09	030232-022	7294	-
PREAMPLIFIER (0.5-26GHz)	HP	83017A	3950M00102	5226	2017-02-03
HIGH PASS FILTER	WAINWRIGHT	WHKX4.0/18G-10SS	10	-	2017-01-17