Test Report

Electromagnetic Compatibility (EMC)

FINAS
Finnish Accreditation Service
T004 (EN ISO/IEC 17025)

Equipment Under Test:	USB powered controller for drones
Marketing name:	Intel® Drone Link DVT FabA
Type:	IWBS1
Manufacturer:	Intel Behringstraße 10 82152 Planegg GERMANY
Customer:	Intel Corporation 2200 Mission College Blvd Santa Clara, CA 95054 USA

Tests have been performed according to the following standards

FCC CFR 47 Part 15 (October 2017)	Subpart B	Class B
ICES-003 Issue 6	Class B	

Date: 30 October 2017
Issued by:
Pekka Kälviäinen
Testing Engineer

Date: 30 October 2017
Checked by:
Rauno Repo
Testing Engineer

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PRODUCT DESCRIPTION

Equipment Under Test (EUT)

EUT:	USB powered controller for drones
Type:	IWBS1
Serial no:	W1DVT1KY7380023
SW:	Main FW: F407_test_171009 Radio card FWs: v3.8 testing editions Bluetooth FW: 9.1.10.0
FCC ID:	CC2500: 2AJ2A-RCM24G Bluetooth: SQGBT900
IC:	CC2500: 1000B-RCM24G Bluetooth: 3147A-BT900

Max. internal frequency 168 MHz.

Type Of The EUT

The EUT will be tested as a tabletop unit.

Ratings and declarations

Remote controller radios:	
Operating Frequency Range (OFR):	2402.5 – 2471.5 MHz
Channels:	70
Channel separation:	1 MHz
Effective conducted power:	19.93 dBm
Transmission technique:	ADFSS
Modulation:	MSK
Antenna gain:	2.0 dBi

Bluetooth:	
Operating Frequency Range (OFR):	2402 – 2480 MHz
Channels:	80
Channel separation:	1 MHz
Effective conducted power:	8 dBm
Transmission technique:	FHSS
Modulation:	GFSK
Antenna gain:	0.5 dBi

Power Supply

Operating voltage range:	5.0 VDC (UBS connection), USB cable 1.0 m lenght

Mechanical Size of the EUT

Height: 2 cm Width: 11 cm Length: 11 cm

Cable Lengths and Types

Cable:	**Length:**	**Type:**
USB cable	1.0 m	Shielded

Peripherals

Computer: type HP EliteBook 8540w, s/n CND1177MFQ,
supplied by the customer.

Disclaimer

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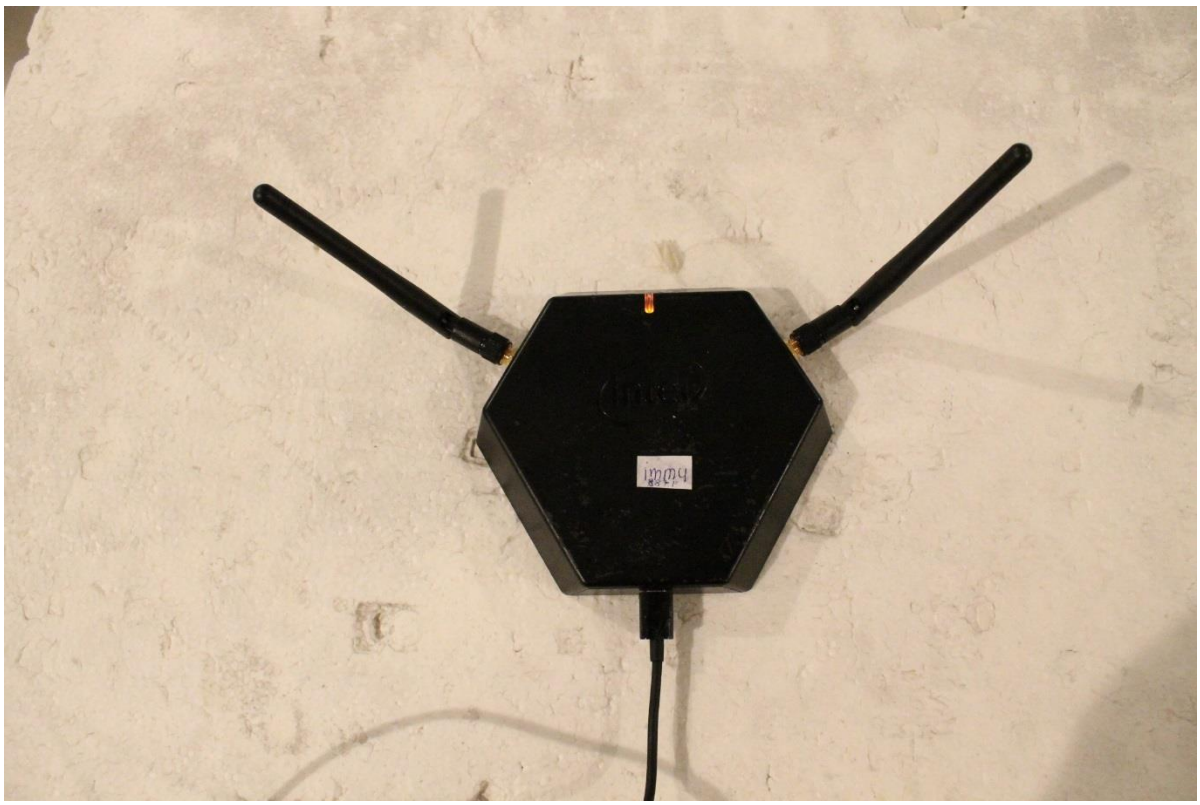
TEST CONDITIONS

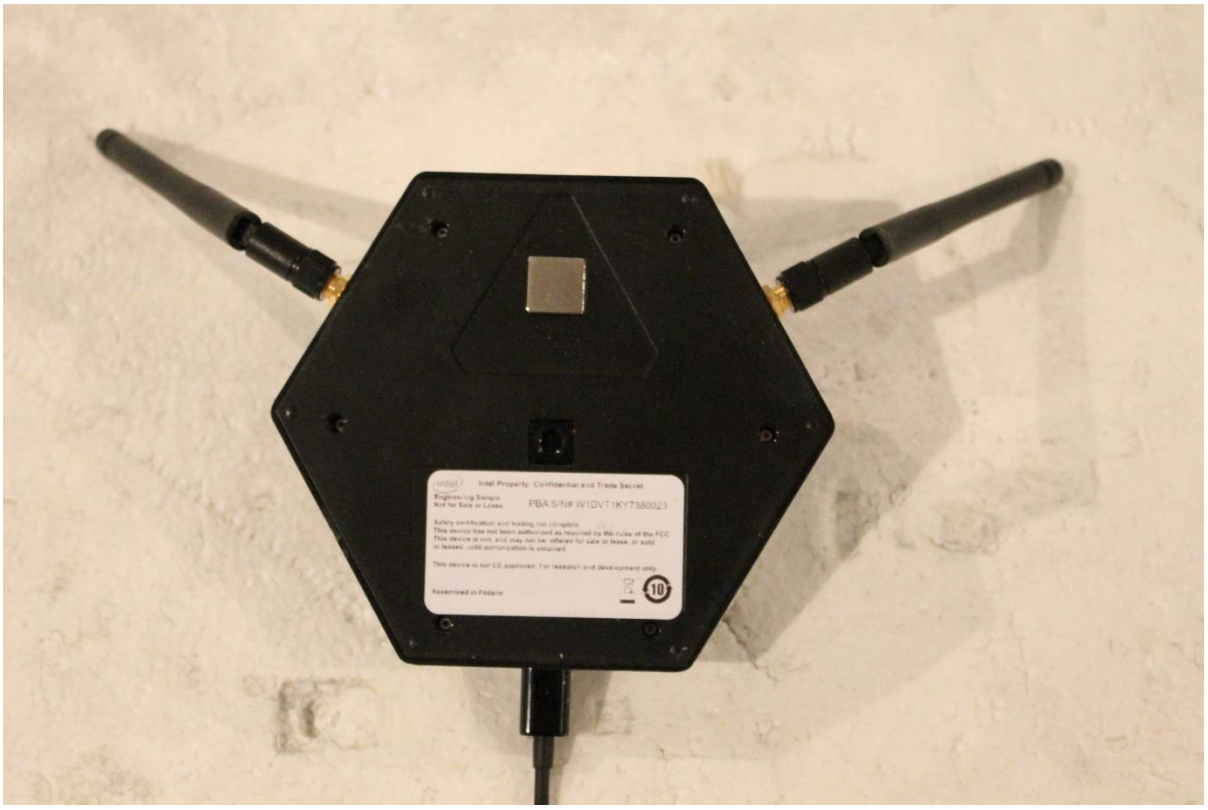
EUT Test Conditions During EMC-Testing

The USB port of the EUT was connected to the computer. The transmitters of the EUT were in stand-by mode all the tests.

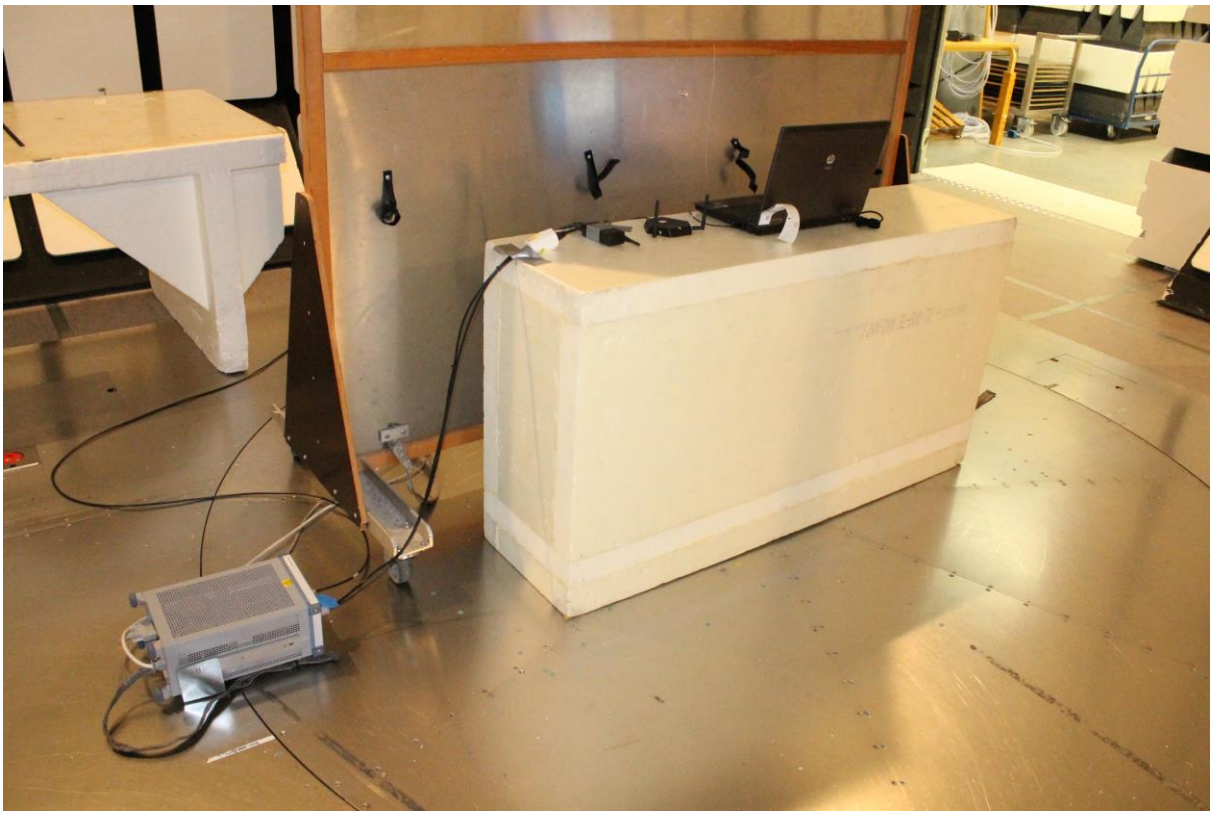
Photographs of the EUT



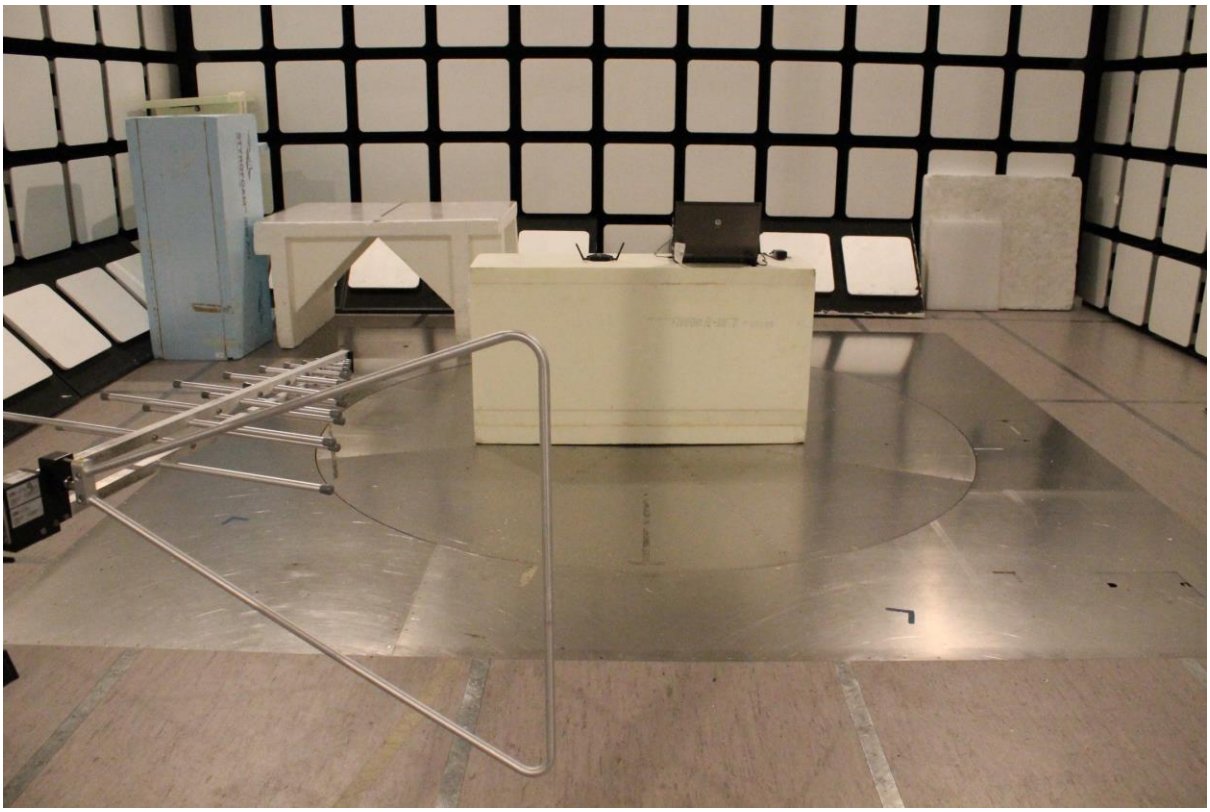
Picture 1 EUT.



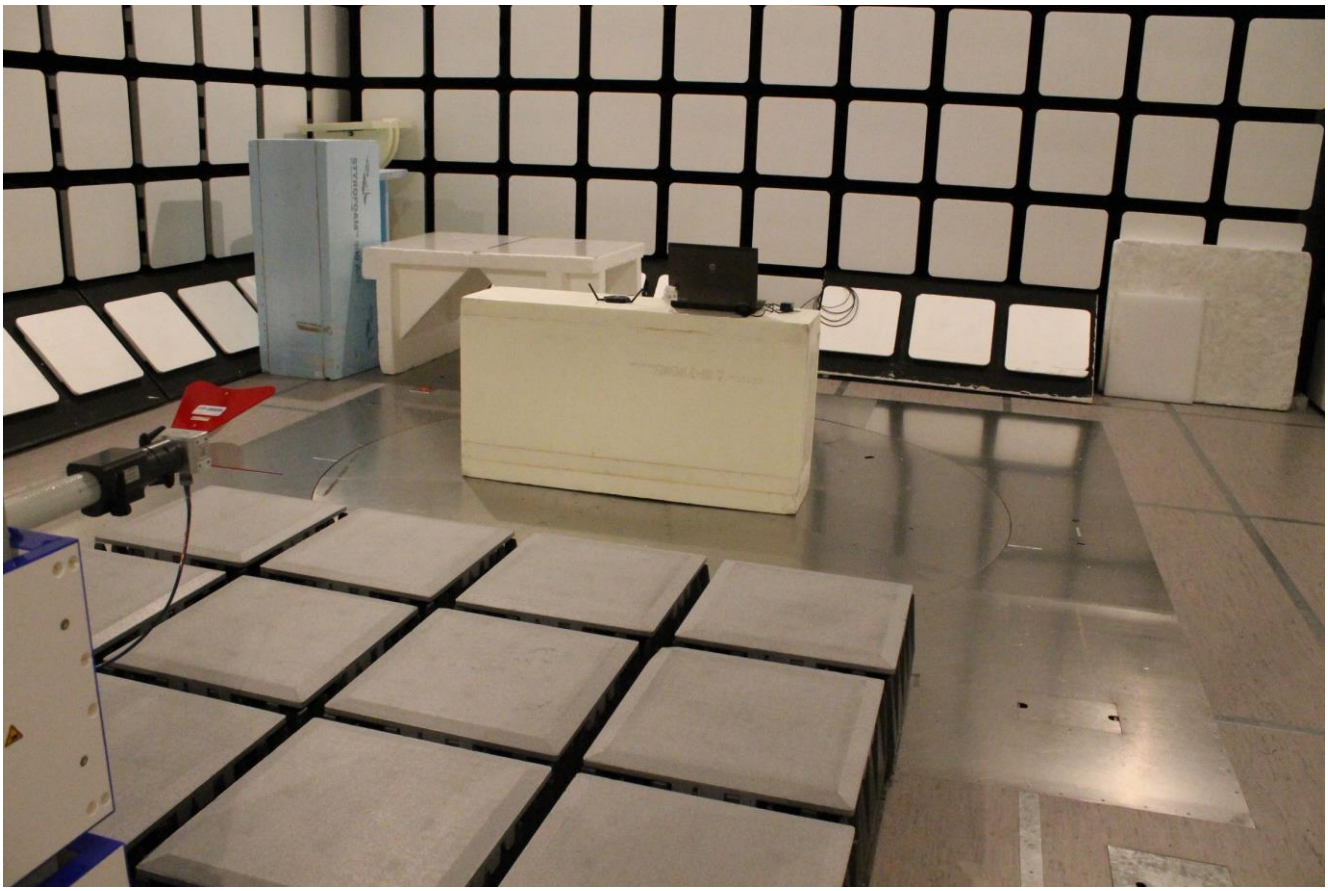
Picture 2 EUT back.



Picture 3. The EUT and test set-up for conducted emission test.



Picture 4. The EUT and the test set-up for radiated emission test 30MHz-1GHz.



Picture 5. The EUT and the test set-up for radiated emission test 1-2GHz.

SUMMARY OF TESTING

Test Specification	Description of Test	Result
§15.107	Conducted Emissions	PASS
§15.109	Radiated Emissions	PASS

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

Conducted Emissions In The Frequency Range 150 kHz - 30 MHz.

Standard:	ANSI C63.4	(2014)
Tested by:	MIH	
Date:	23 October 2017	
Temperature:	23 °C	
Humidity:	19 %	
Barometric pressure	1019 hPa	
Measurement uncertainty:	± 2.9 dB	Level of confidence 95 % (k = 2)

Test Plan

Conducted disturbance voltage was measured with an artificial main network from 150 kHz to 30 MHz with 80 Hz steps and a resolution bandwidth of 9 kHz. Measurements were carried out with peak and average detectors from the phase(s) and neutral lines of the power supply cable.

The EUT was working as described in the section “EUT Test Conditions”.

The input voltage of the computer was 115V 60Hz during the test.

Test results

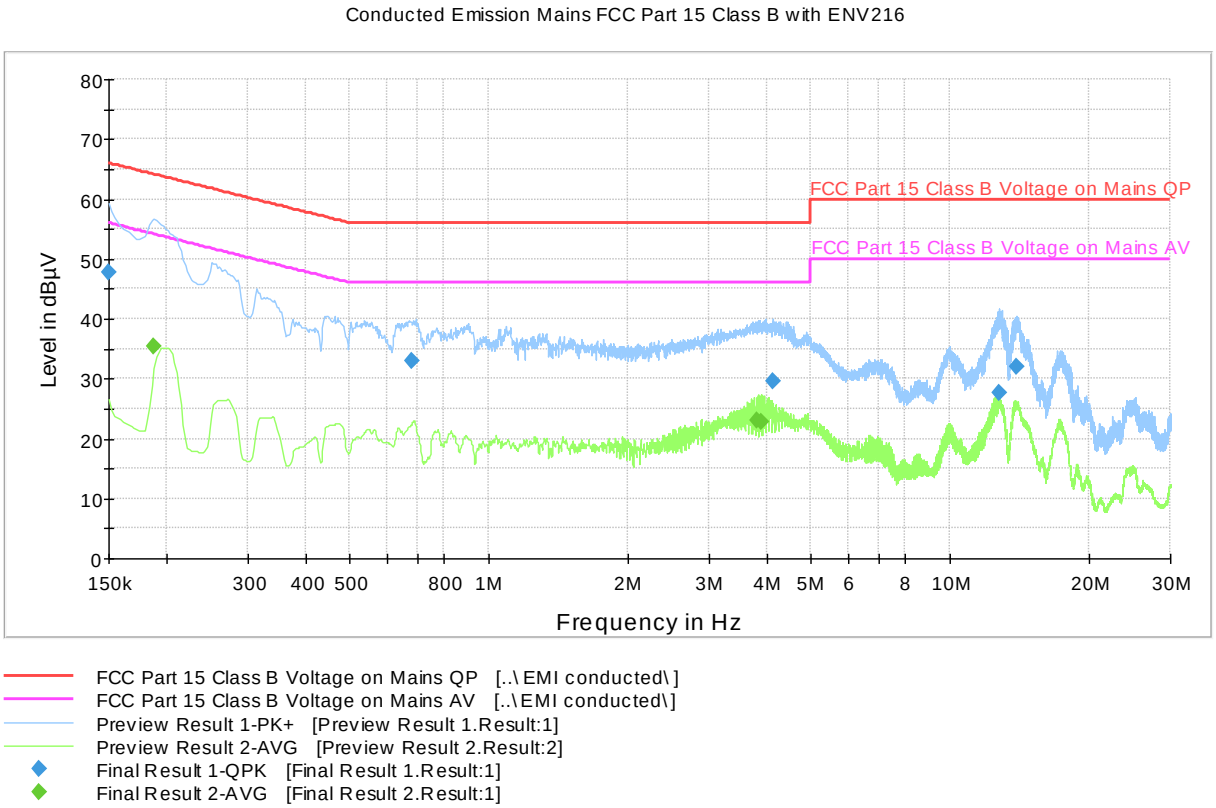


Figure 1. The measured curves with peak- and average-detectors, measured from AC mains.

Final measurements from the worst frequencies

Table 1. Quasi-peak Results.

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	47.8	1000.0	9.000	On	L1	9.9	18.2	66.0
0.680000	33.0	1000.0	9.000	On	N	10.3	23.0	56.0
4.137750	29.7	1000.0	9.000	On	N	10.4	26.3	56.0
12.762000	27.5	1000.0	9.000	On	L1	10.4	32.5	60.0
13.935000	32.1	1000.0	9.000	On	N	10.6	27.9	60.0

Table 2. Average Results.

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Band-width (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.188250	35.5	1000.0	9.000	On	N	10.1	18.6	54.1
3.811750	23.0	1000.0	9.000	On	N	10.4	23.0	46.0
3.884000	22.7	1000.0	9.000	On	N	10.4	23.3	46.0

Correction factor (dB) in the final result tables contains the sum of the transducers.
Final values are the measured values corrected with the correction factor.

Radiated Emissions In The Frequency Range 30 MHz - 1000 MHz.

Standard:	ANSI C63.4 (2014)	
Tested by:	MIH	
Date:	23 October 2017	
Temperature:	23 °C	
Humidity:	19 %	
Barometric pressure	1019 hPa	
Measurement uncertainty:	± 4.9 dB (30 to 200 MHz) ± 4.1 dB (0.2 to 1 GHz)	Level of confidence 95 % (k = 2).

Radiated electric field strength was measured from 30 MHz to 1 GHz in a semi-anechoic chamber. Measurements were done with a resolution bandwidth of 120 kHz. The preview measurements were done with a peak detector and the final measurements with a quasi peak detector.

The measuring distance between EUT and the receiving antenna was 3 meters.

The AC-supply to the turntable was fed through the filter.

The EUT was placed on a table and 0.8 m above the reflecting ground plane.

Radiated measurement settings

Preliminary testing:

Turntable movement:	20 ° step
Turntable position:	10 ° to 350°
Antenna movement:	1.5 m step
Antenna height:	1.0 m to 4.0 m
Antenna polarization:	Vertical and horizontal

Final testing:

Turntable movement:	Continuous
Turntable position:	± 15 °
Antenna movement:	Continuous
Antenna height:	± 0.75 m
Antenna polarization:	Vertical and horizontal

Test results

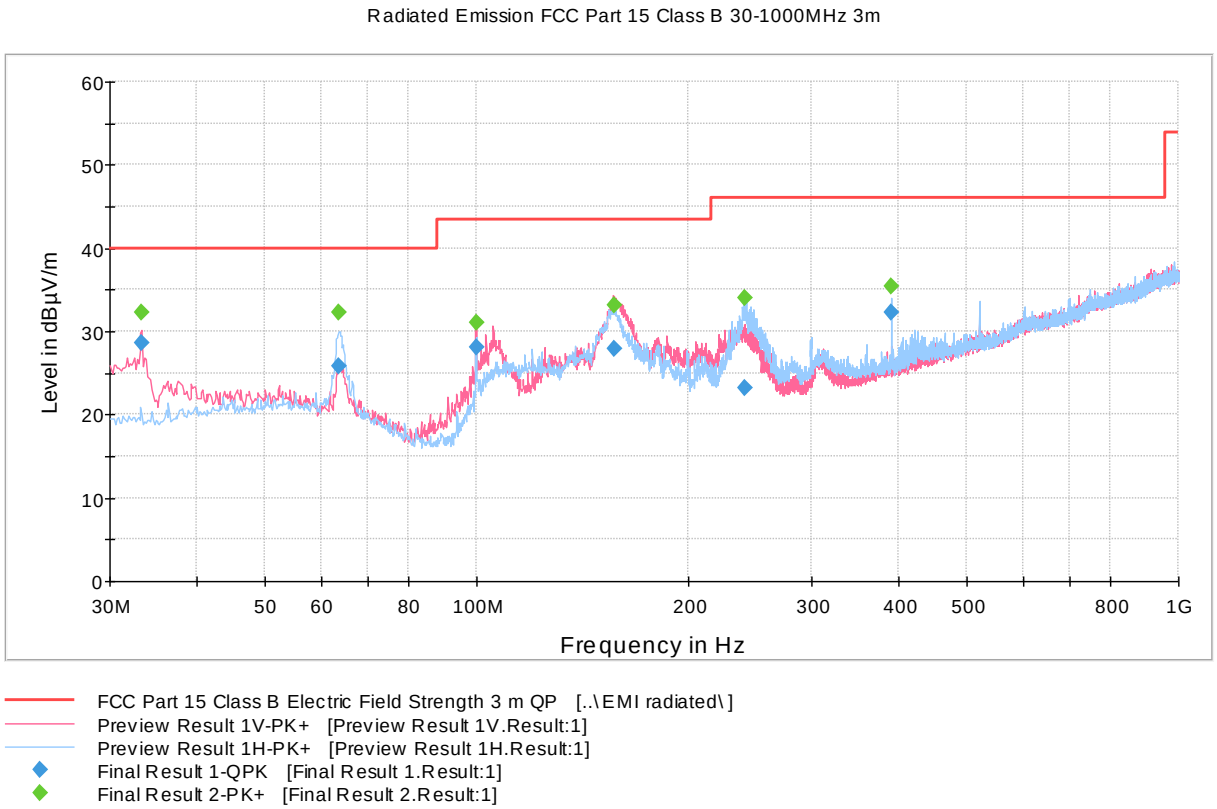


Figure 2. The measured curves with the peak-detector and both measuring antenna polarization.

Table 3. Final quasi-peak measurements from the worst frequencies.

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
33.295000	28.6	1000.0	120.000	100.0	V	3.0	17.1	11.4	40.0
63.695000	25.9	1000.0	120.000	400.0	H	3.0	17.2	14.1	40.0
99.895000	28.1	1000.0	120.000	120.0	V	3.0	13.8	15.4	43.5
157.075000	28.0	1000.0	120.000	100.0	V	3.0	18.4	15.5	43.5
241.495000	23.1	1000.0	120.000	100.0	H	3.0	17.0	22.9	46.0
389.975000	32.3	1000.0	120.000	100.0	H	3.0	21.3	13.7	46.0

Correction factor (dB) in the final result tables contains the sum of the transducers (cables + antenna factor). Final values are the measured values corrected with the correction factor.

Radiated Emissions In The Frequency Range 1-2 GHz

Standard:	ANSI C63.4	(2014)
Tested by:	MIH	
Date:	23 October 2017	
Temperature:	23 °C	
Humidity:	19 %	
Barometric pressure:	1019 hPa	
Measurement uncertainty:	± 4.3 dB (1-2 GHz)	Level of confidence 95 % (k = 2).

Test plan

Radiated electric field strength was measured in a semi-anechoic chamber. The preview measurements were done with a peak detector and the final measurements with peak- and average detectors. The EUT was placed on a table 0.8 meters above the ground plane. The AC-supply to the turntable was fed through the filter.

The measuring distance between EUT and the receiving antenna was 3 meters.

The highest internal source frequency of the EUT is 168 MHz.

The EUT was working as described in the section “EUT Test Conditions During Testing”.

Radiated measurement settings

Preliminary testing (1 to 2 GHz):

Turntable movement:	15 ° step
Turntable position:	0 ° to 345°
Antenna movement:	1 m step
Antenna height:	1.0 m to 4.00 m
Antenna polarization:	Vertical and horizontal

Final testing (1 to 2 GHz):

Turntable movement:	Continuous
Turntable position:	± 15 °
Antenna movement:	Continuous
Antenna height:	± 0.5 m
Antenna polarization:	Vertical and horizontal

Test results

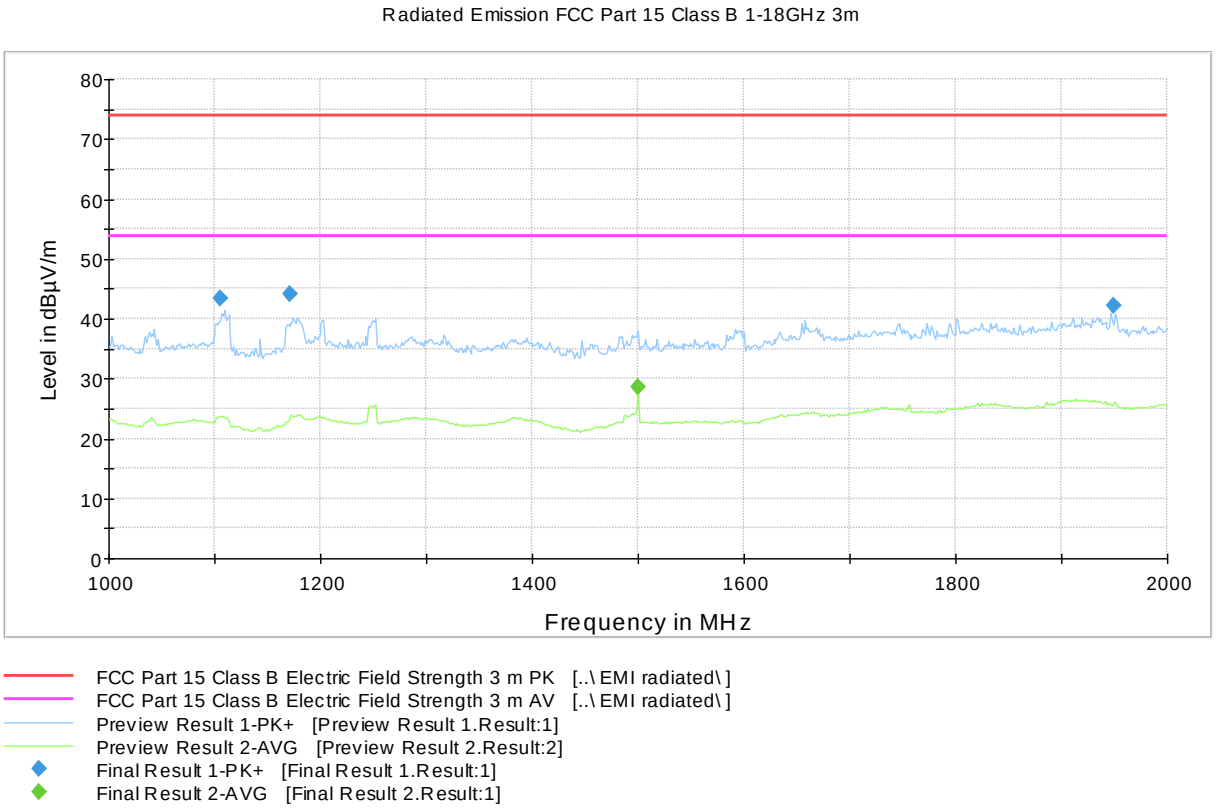


Figure 3. The measured curves with the peak-detector and both measuring antenna polarization.

Table 4. Final quasi-peak measurements from the worst frequencies.

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1104.975000	43.5	1000.0	1000.000	285.0	V	217.0	-0.8	30.4	73.9
1170.575000	44.1	1000.0	1000.000	106.0	V	240.0	-0.5	29.8	73.9
1948.875000	42.1	1000.0	1000.000	289.0	V	194.0	3.2	31.8	73.9

Table 5. Final quasi-peak measurements from the worst frequencies.

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1500.025000	28.6	1000.0	1000.000	100.0	V	107.0	-0.1	25.3	53.9

Correction factor (dB) in the final result tables contains the sum of the transducers (cables + antenna factor). Final values are the measured values corrected with the correction factor.

List of test equipment

Conducted Emissions

Equipment	Manufacturer	Type	Inv number	Prev Calib	Next Calib
TEST SOFTWARE	ROHDE & SCHWARZ	EMC-32	-	-	-
LISN	ROHDE & SCHWARZ	ENV216	inv:9611	2017-02-23	2018-02-23
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESU 26	inv:8453	2017-07-10	2018-07-10

Radiated Emissions

Equipment	Manufacturer	Type	Inv or serial	Prev Calib	Next Calib
ANTENNA	EMCO	3117	inv:7293	2016-03-16	2018-03-06
ANTENNA	SCHWARZBECK	VULB 9168	inv:8911	2016-25-10	2018-25-10
PREAMPLIFIER	CIAO	CA118-3123	inv. 10278	2016-11-28	2017-11-28
TURNTABLE	MATURO	DS430 UPGRADED	inv:10182	-	-
MAST & TURNTABLE CONTROLLER	MATURO	NCD	inv:10183	-	-
ANTENNA MAST	MATURO	TAM 4.0E	inv:10181	-	-
TEST SOFTWARE	ROHDE & SCHWARZ	EMC-32	-	-	-
ATTENUATOR	PASTERNACK	PE 7004-4	inv:10126	2016-12-30	2017-12-30