

Report on the FCC and IC Testing of the
dormakaba EAD GmbH
Time and Attendance Terminal with
RFID and BLE reader module.
Model: Terminal 97 00 with
RMs Legic SM-6300 (BLE)
In accordance with FCC 47 CFR Part 15C and
ISED RSS-GEN

Prepared for: dormakaba EAD GmbH
Albertstr. 3
78056 Villingen-Schwenningen - Germany



Product Service

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FCC ID: NVI-LEGBLE
IC: 11038A-LEGBLE

COMMERCIAL-IN-CONFIDENCE

Date: 2020-06-05
Document Number: TR-69547-72895-06 | Issue: 02

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Project Management	Martin Steindl	2020-06-05	 SIGN-ID 366229
Authorised Signatory	Alex Fink	2020-06-05	 SIGN-ID 366238

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service document control rules.

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR Part 15C and ISED RSS-GEN. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Martin Steindl	2020-06-05	 SIGN-ID 366233

Laboratory Accreditation
DAkkS Reg. No. D-PL-11321-11-02
DAkkS Reg. No. D-PL-11321-11-03

Laboratory recognition
Registration No. BNetzA-CAB-16/21-15
3050A-2

ISED test site registration

EXECUTIVE SUMMARY

A sample of this product was tested and found to be compliant with FCC 47 CFR Part 15C:2019, and ISED RSS-GEN Issue 05 (03-2019).

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Annex A Test setup photos 2 pages

1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	2019-11-29
2	Updated Reference to RSS-Gen to Issue 5 Corrected typo in cal. Data for No. 19533 and 19383 from "last cal." to "cal. due".	2020-06-05

Table 1

1.2 Introduction

Applicant	dormakaba EAD GmbH
Manufacturer	dormakaba EAD GmbH
Model Number(s)	Terminal 97 00 with RMs Legic SM-6300 (BLE)
Serial Number(s)	04047503
Hardware Version(s)	Version K6 (HW) and RMs Legic SM-6300 BLE
Software Version(s)	Android V5.02 with HR30 (SW)
Number of Samples Tested	1 in 2 variants
Test Specification/Issue/Date	FCC 47 CFR Part 15C, ISED RSS-GEN:2016 Issue 04 (11-2014)
Test Plan/Issue/Date	---
Order Number	200323
Date	2019-10-14
Date of Receipt of EUT	2019-10-14
Start of Test	2019-10-15
Finish of Test	2019-10-15
Name of Engineer(s)	Martin Steindl
Related Document(s)	ANSI C63.10 (2013)

1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 15C and ISED RSS-GEN is shown below.

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Configuration and Mode: Module RMs Legic Advant SM-6300 and Wireless LAN Module AIRETOS AR 9462 Transmitting at 2442 MHz				
2.1.6.1	15.209, 6.13	Field Strength of any Emission	Pass	ANSI C63.10 (2013)
Configuration and Mode: Module RMs Legic Advant SM-6300 and Wireless LAN Module AIRETOS AR 9462 Transmitting at 5500 MHz				
2.1.6.2	15.209, 6.13	Field Strength of any Emission	Pass	ANSI C63.10 (2013)
Configuration and Mode: Module RMs Legic Advant SM-6300 and 3G/GSM-Module UC20G Transmitting at 837 MHz				
2.1.6.3	15.209, 6.13	Field Strength of any Emission	Pass	ANSI C63.10 (2013)
Configuration and Mode: Module RMs Legic Advant SM-6300 and 3G/GSM-Module UC20G Transmitting at 1880 MHz				
2.1.6.4	15.209, 6.13	Field Strength of any Emission	Pass	ANSI C63.10 (2013)

Table 2



1.4 Product Information

1.4.1 Technical Description

The Terminal 97 00 is a Time and Attendance Terminal. The Terminal 97 00 can be equipped with two radio modules. One module slot can be equipped with either the "RMs Legic Advant SM-4200" RFID module, the "RMs Legic SM-6300 (BLE)" RFID module or the "RMs iClass SE/Prox" RFID module. The second slot can be equipped with either the 3G/GSM-module "UC20G" or the WLAN-module "AIRETOS AEH-AR9462". This test report covers configurations with the "RMs Legic SM-6300 (BLE)"-module, only. PCB type Penta-Band WWAN antenna ANTX200P001BWPEN3 (Yageo) is used with 3G/GSM-module. PCB type antenna is internally connected to 3G/GSM-module and not detachable. PCB type Dual Band antenna ANTX200P001B24553 (Yageo) is used with WLAN-module. PCB type antenna is internally connected to WLAN-module and not detachable.

1.4.2 Identification of radio modules

Module Type Designation	FCC ID	IC
RMs Legic Advant SM-4200 (MRD)	NVI-LEGMRD	11038A-LEGMRD
RMs Legic SM-6300 (BLE)	NVI-LEGBLE	11038A-LEGBLE
RMs iCLASS SE/Prox (HID)	NVI-SE3200	11038A-SE3200
UC20G (Quectel)	XMR201510UC20	10224A-201510UC20
AIRETOS AEH-AR9462 (VoxMicro)	2AE3B-AEH-AR9462	20662-AEHAR9462

1.5 EUT Modification Record

The table below details modifications made to the EUT during the test programme. The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification fitted By	Date Modification fitted
0	As supplied by the customer	Not Applicable	Not Applicable

Table 3

1.6 Test Location

TÜV SÜD Product Service conducted the following tests at our Straubing Test Laboratory.

Test Name	Name of Engineer(s)
Configuration and Mode: Module RMs Logic Advant SM-4200 and 3G/GSM-Module UC20G Transmitting at 837 MHz	
Field Strength of any Emission	Martin Steindl
Configuration and Mode: Module RMs Logic Advant SM-4200 and 3G/GSM-Module UC20G Transmitting at 1880 MHz	
Field Strength of any Emission	Martin Steindl
Configuration and Mode: Module RMs iClass SE/Prox and 3G/GSM-Module UC20G Transmitting at 837 MHz	
Field Strength of any Emission	Martin Steindl
Configuration and Mode: Module RMs iClass SE/Prox and 3G/GSM-Module UC20G Transmitting at 1880 MHz	
Field Strength of any Emission	Martin Steindl

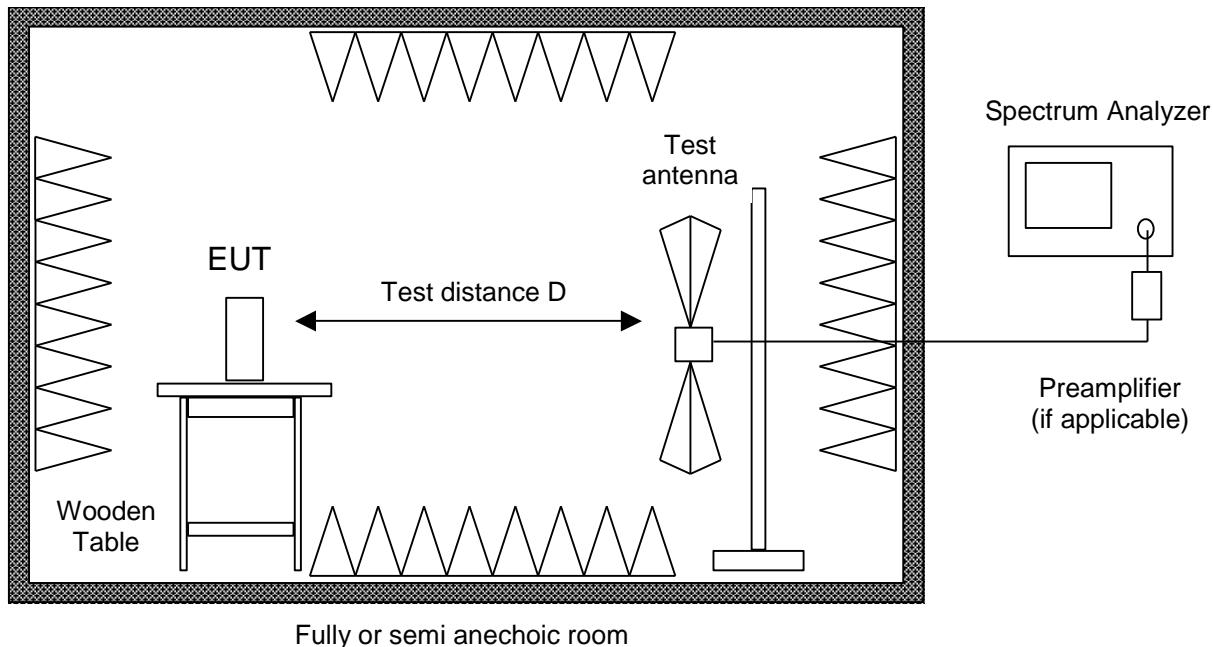
Table 4

Office Address:

Äußere Frühlingstraße 45
94315 Straubing
Germany

2 Test Setups

2.1.1.1 Radiated Emission in Fully or Semi Anechoic Room



Radiated emission in fully or semi anechoic room is measured in the frequency range from 30 MHz to the maximum frequency as specified in CFR 47 Part 15 section 15.33.

Measurements are made in both the horizontal and vertical planes of polarization using a spectrum analyzer with the detector function set to peak and resolution as well as video bandwidth set to 100 kHz (below 1 GHz) or 1 MHz (above 1 GHz).

Testing up to 1 GHz is performed with a linear polarized logarithmic periodic antenna combined with a 4:1 broadband dipole ("Trilog broadband antenna"). For testing above 1 GHz horn antennas are used.

All tests below 8.2 GHz are performed at a test distance D of 3 meters. For higher frequencies the test distance may be reduced (e.g. to 1 meter) due to the sensitivity of the measuring instrument(s) and the test results are calculated according to CFR 47 Part 15 section 15.31(f)(1) using an extrapolation factor of 20 dB/decade. If required, preamplifiers are used for the whole frequency range. Special care is taken to avoid overload, using appropriate attenuators and filters, if necessary.

If the radiated emission limits are expressed in terms of the average value of the emission there also is a peak limit corresponding to 20 dB above the maximum permitted average limit. Additionally, if pulsed operation is employed, the average field strength is determined by averaging over one complete pulse train, including blanking intervals, as specified in CFR 47 Part 15 section 15.35(c). If the pulse train exceeds 0.1 second that 0.1 second interval during which the value of the emission is at its maximum is selected for calculation. The pulse train correction is added to the peak value of the emission to get the average value.

Hand-held or body-worn devices are rotated through three orthogonal axes to determine which attitude and configuration produces the highest emission relative to the limit and therefore shall be used for final testing.

During testing the EUT is rotated all around to find the maximum levels of emissions. Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.

For final testing below 1 GHz a semi anechoic room complying with the NSA requirements of ANSI C63.4 for alternative test sites is used. If prescans are recorded in fully anechoic room they are indicated appropriately.



According to section 13 of KDB558074 the requirement for radiated emissions on the band edges was performed with a reduced bandwidth of 100 kHz instead of 1 MHz.

Radiated emission in the frequency range 9 kHz to 30 MHz is measured using an active loop antenna. First the whole spectrum of emission caused by the equipment is recorded at a distance of 3 meters in a fully or semi anechoic room with the detector of the spectrum analyzer or EMI receiver set to peak. This configuration is also used for recording the spectrum of intentional radiators.

Hand-held or body-worn devices are rotated through three orthogonal axes to determine which attitude and configuration produces the highest emission relative to the limit and therefore shall be used for final testing.

EUT is rotated all around to find the maximum levels of emissions. Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.

If worst case emission of the EUT cannot be recorded with EUT in standard position and loop antenna in vertical polarization the EUT (or the radiating part of the EUT) is rotated by 90 degrees instead of changing the loop antenna to horizontal polarization. This procedure is selected to minimize the influence of the environment (e.g. effects caused by the floor especially with longer distances).

Final measurement is performed at a test distance D of 30 meters using an open field test site. In case the regulation requires testing at other distances, the result is extrapolated by either making measurements at an additional distance D of 10 meters to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). In cases of very low emissions measurements are performed at shorter distances and results are extrapolated to the required distance. The provisions of CFR 47 Part 15 sections 15.31(d) and (f)(2) apply. According to CFR 47 Part 15 section 15.209(d) final measurement is performed with detector function set to quasi-peak except for the frequency bands 9 to 90 kHz and 110 to 490 kHz where, for non-pulsed operation, average detector is employed.

If the radiated emission limits are expressed in terms of the average value of the emission there also is a peak limit corresponding to 20 dB above the maximum permitted average limit. Additionally, if pulsed operation is employed, the average field strength is determined by averaging over one complete pulse train, including blanking intervals, as specified in CFR 47 Part 15 section 15.35(c). If the pulse train exceeds 0.1 second that 0.1 second interval during which the value of the emission is at its maximum is selected for calculation. The pulse train correction is added to the peak value of the emission to get the average value.

3 Test Details

3.1 Field Strength of any Emission

3.1.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.209
ISED RSS-GEN, Clauses 6.13 and 8.9

3.1.2 Equipment Under Test and Modification State

Terminal 97 00 , S/N: 111697100009 - Modification State 0

3.1.3 Date of Test

2019-11-13

3.1.4 Test Method

This test was performed in accordance with ANSI C63.10, clause 6.3, 6.4 and 6.5. and ISED RSS-Gen clause 6.13.

Measurements were made at a distance of 3 m and at a distance of 1 m over 8 GHz, respectively. The limit lines shown on the plots for frequencies below 30 MHz were extrapolated from either 300 m or 30 m to the measurement distance of 3 m. The limit lines shown on the plots for frequencies above 8 GHz were extrapolated from 3 m to 1 m: Extrapolations were taken in accordance with ANSI C63.10 Clause 6.4.4.2.

For any emissions detected within 20 dB of the limit, a final measurement was made and recorded in the table below. The detector used for these measurements was a quasi-peak detector except for emissions within the bands 9 kHz to 90 kHz and 110 kHz to 490 kHz where a CISPR average detector was used.

Radiated tests in the frequency range 9 kHz to 30 MHz were performed in two orientations of the loop antenna.

Carrier emissions were not evaluated to limit. Please refer to original test report of 3G-module.

Tests were performed with test software Rohde & Schwarz EMC 32, Version V10.20.01 and V10.40.00.

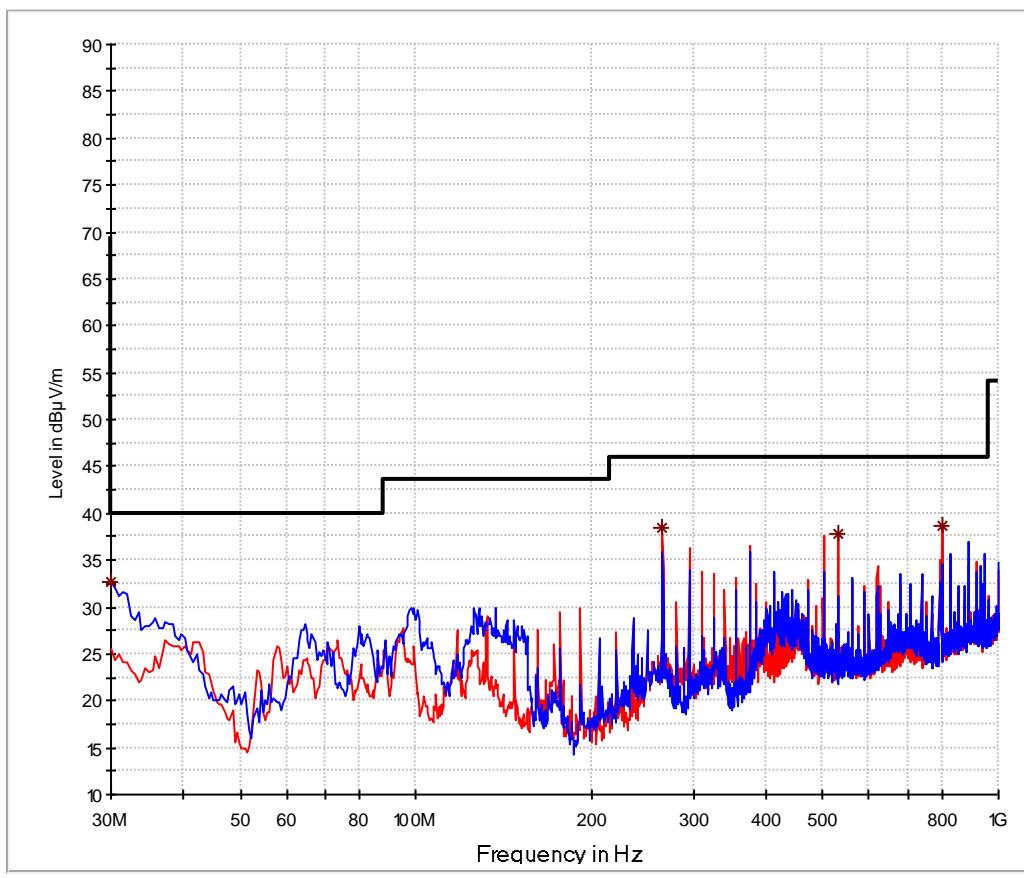
For details see chapter 2 of this test report

3.1.5 Environmental Conditions

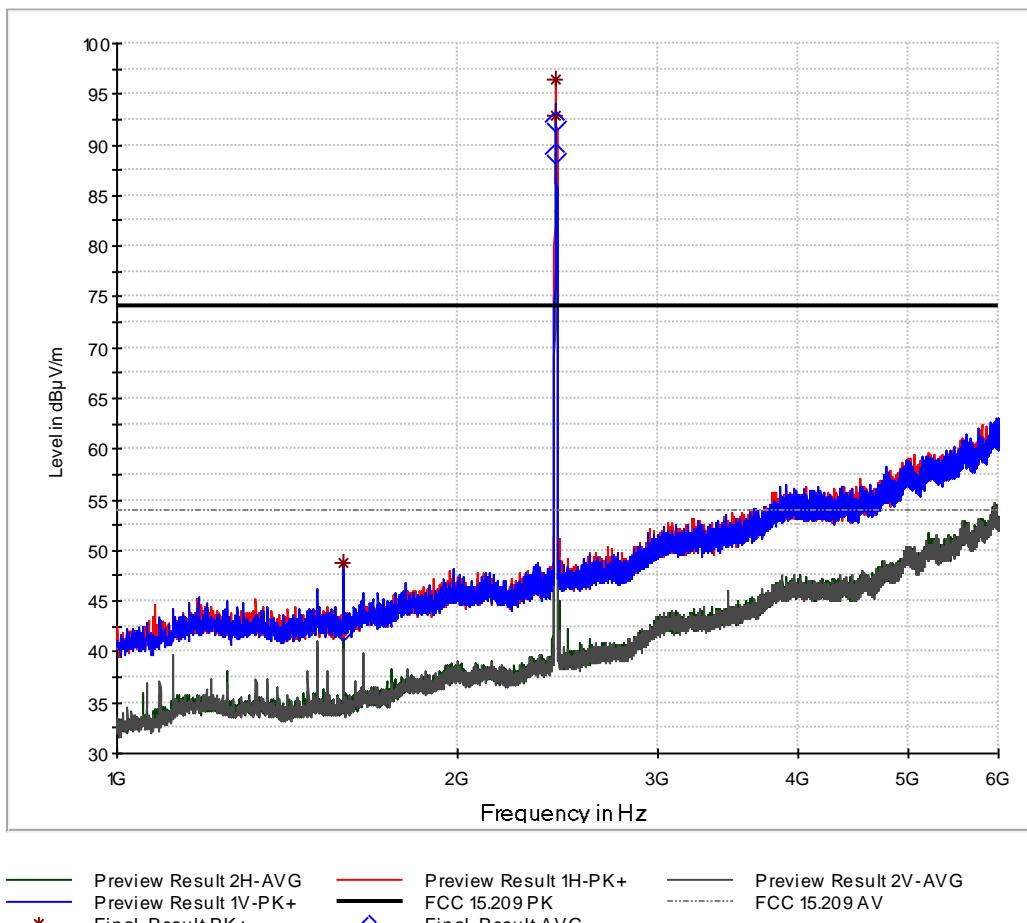
Ambient Temperature	21.0 °C
Relative Humidity	32.0 %

3.1.6 Test Results

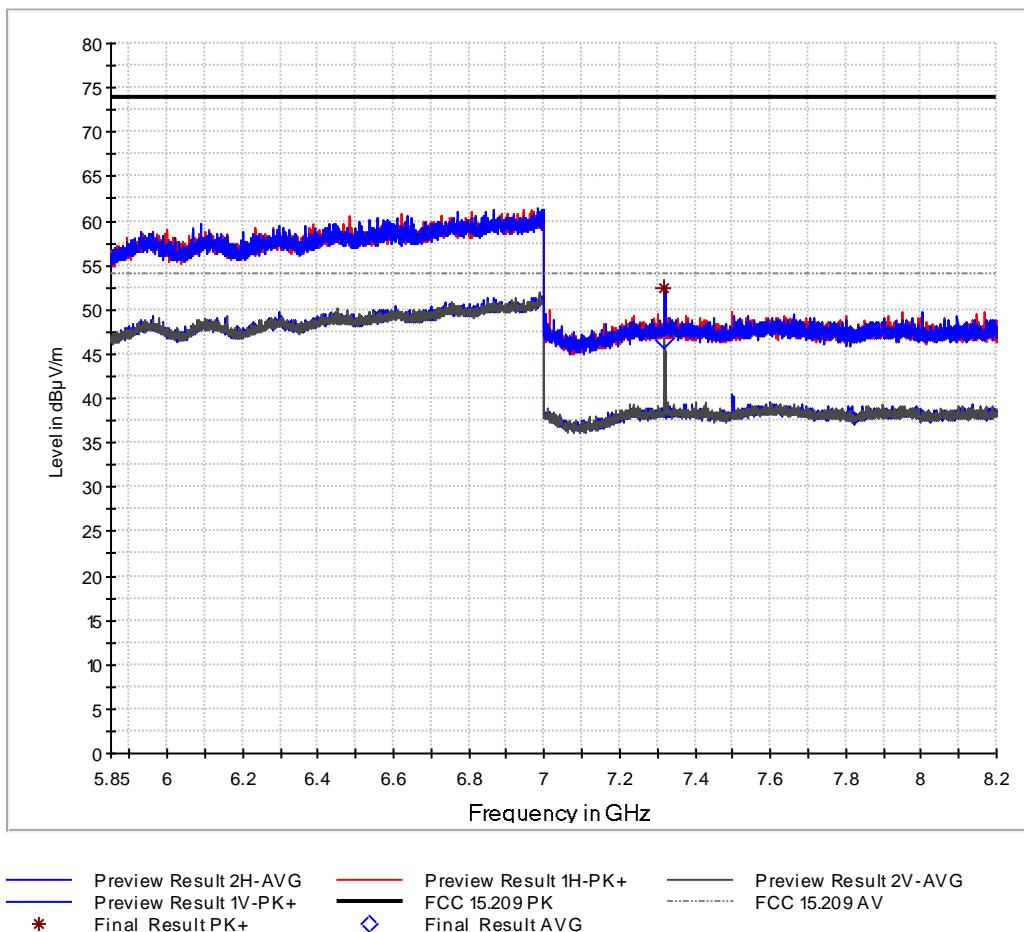
3.1.6.1 Module RMs Logic Advant SM-6300 and Wireless LAN Module AIRETOS AR 9462 Transmitting at 2442 MHz



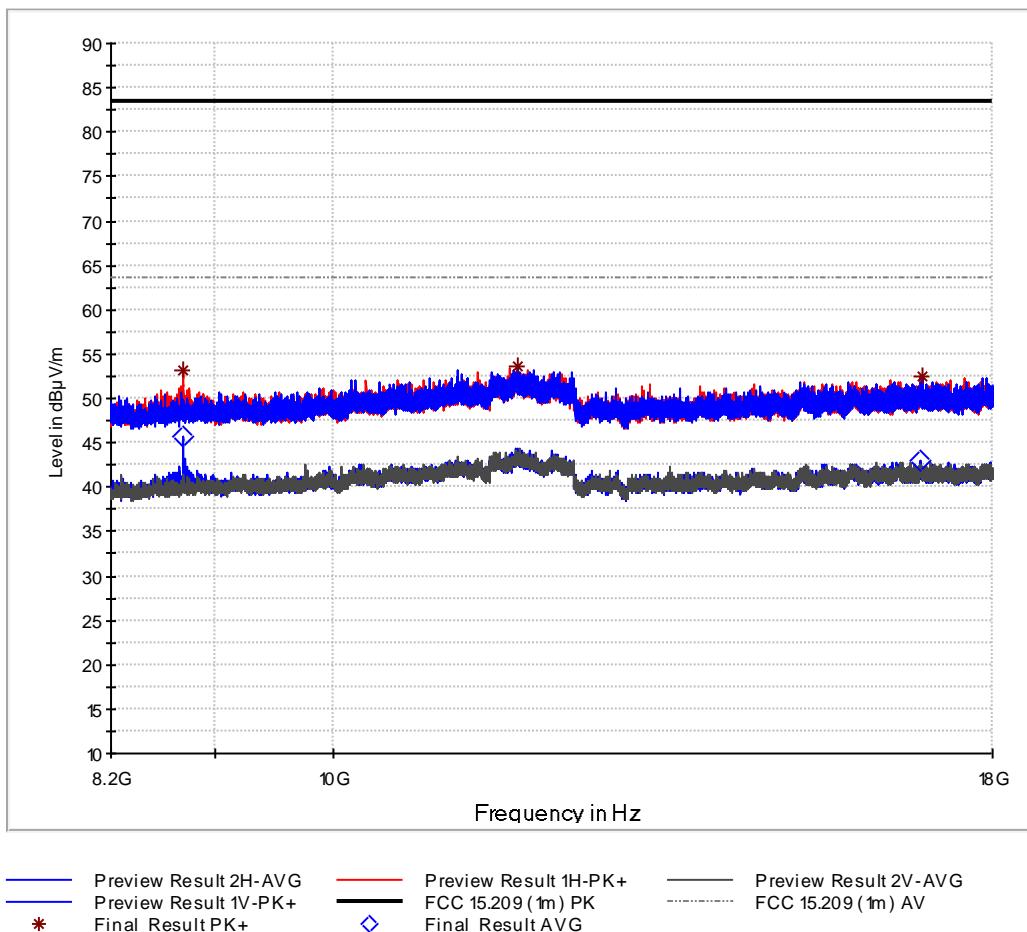
Frequency MHz	MaxPeak dB μ V/m	Limit dB μ V/m	Margin dB	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB/m
30.000000	32.74	69.50	36.76	100.000	155.0	V	355.0	20
265.225000	38.42	46.00	7.58	100.000	155.0	H	97.0	12
531.005000	37.79	46.00	8.21	100.000	155.0	H	120.0	17
800.665000	38.67	46.00	7.33	100.000	155.0	H	12.0	21



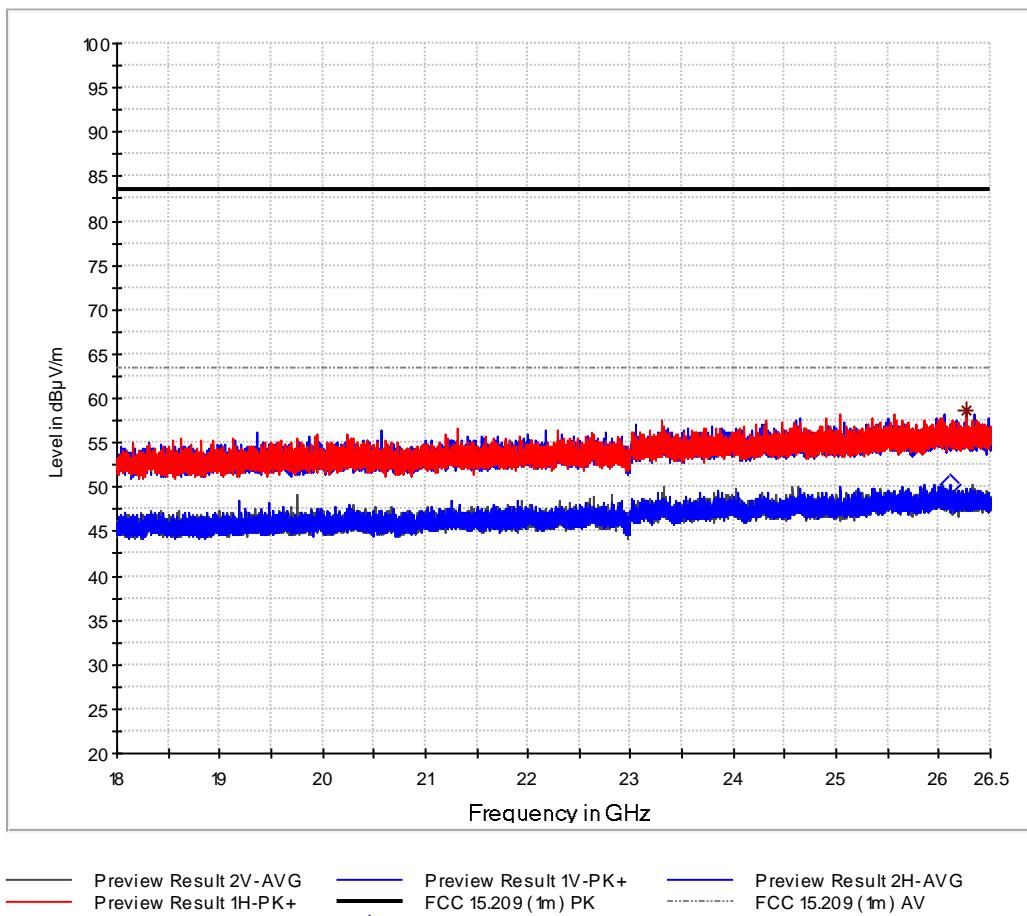
Frequency MHz	MaxPeak dB μ V/m	Average dB μ V/m	Limit dB μ V/m	Margin dB	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
1583.500000		42.04	54.00	11.96	1000.000	150.0	H	263.0	28.5
1583.500000	48.70		74.00	25.30	1000.000	150.0	V	231.0	28.5
2439.500000		92.38	54.00	-38.38	1000.000	150.0	H	127.0	31.8
2440.000000	96.46		74.00	-22.46	1000.000	150.0	H	35.0	31.8
2443.000000		89.17	54.00	-35.17	1000.000	150.0	H	55.0	31.7
2443.500000	92.85		74.00	-18.85	1000.000	150.0	H	55.0	31.7



Frequency MHz	MaxPeak dBµV/m	Average dBµV/m	Limit dBµV/m	Margin dB	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB/m
7319.729167		46.71	54.00	7.29	1000.000	150.0	V	32.0	37
7319.729167	52.49		74.00	21.51	1000.000	150.0	V	32.0	37



Frequency MHz	MaxPeak dB μ V/m	Average dB μ V/m	Limit dB μ V/m	Margin dB	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
8748.625000	53.24		83.50	30.26	1000.000	150.0	H	282.0	37.8
8749.675000		45.65	63.50	17.85	1000.000	150.0	H	285.0	37.8
11778.925000	53.71		83.50	29.79	1000.000	150.0	V	16.0	40.1
16886.300000		43.09	63.50	20.41	1000.000	150.0	H	197.0	37.2
16896.100000	52.45		83.50	31.05	1000.000	150.0	V	70.0	37.2



Legend:

- Preview Result 2V-AVG
- Preview Result 1H-PK+
- Preview Result 2H-AVG
- FCC 15.209 (1m) PK
- FCC 15.209 (1m) AV
- * Final_Result PK+
- Final_Result AVG

Frequency MHz	MaxPeak dB μ V/m	Average dB μ V/m	Limit dB μ V/m	Margin dB	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
26119.093750		50.37	63.50	13.13	1000.000	150.0	H	116.0	40.5
26266.781250	58.56		83.50	24.94	1000.000	150.0	H	85.0	40.5

Sample calculation of final values:

Final Value (dB μ V/m) = Reading Value (dB μ V) + Cable Correction Factor (dB)
+ Antenna Correction Factor (dB/m)
+ Pulse Train Correction (dB)



FCC 47 CFR Part 15, Limit Clause 15.209

Frequency (MHz)	Field Strength (μ V/m)	Measurement Distance (m)
0.009 to 0.490	2400/F (kHz)	300
0.490 to 1.705	24000/F (kHz)	30
1705 to 30	30	30
30 to 88	100**	3
88 to 216	150**	3
216 to 960	200**	3
Above 960	500	3

Table 5 - FCC Limit

NOTE: The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission.

ISED RSS-210, Limit Clause 4.4

Under no circumstance shall the level of any unwanted emissions exceed the level of the fundamental emissions.

ISED RSS-Gen, Limit Clause 8.9

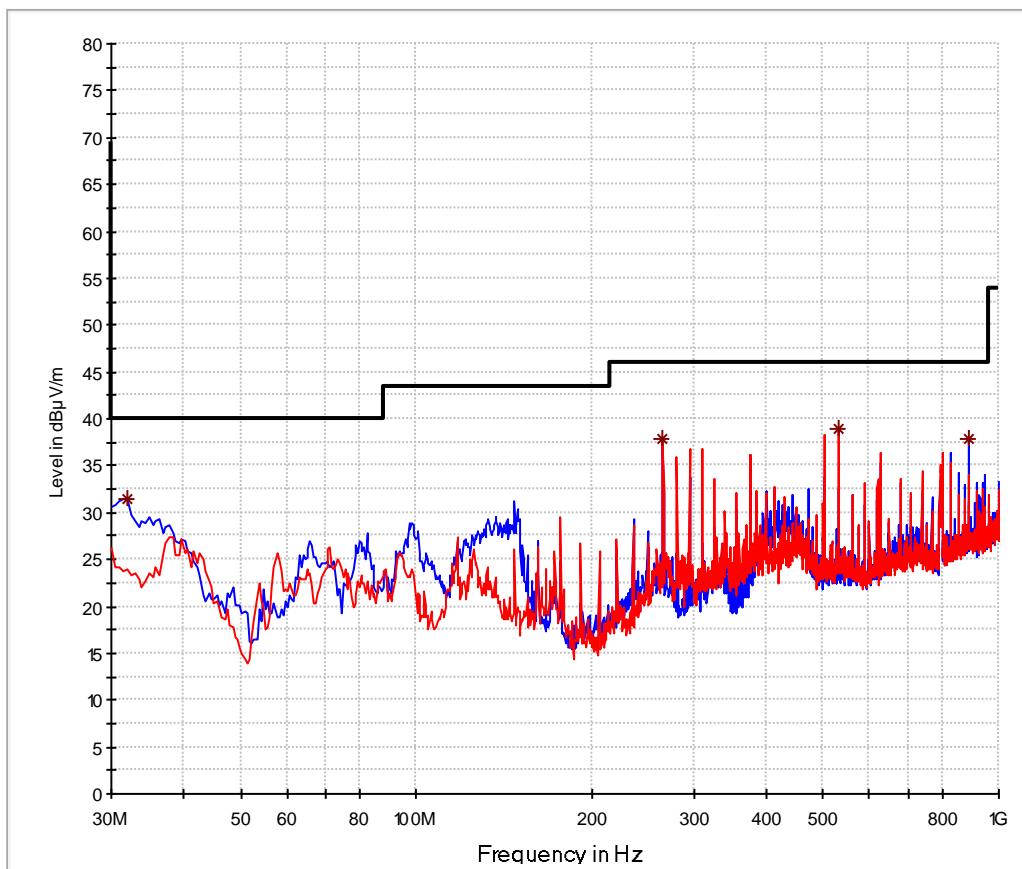
Frequency (MHz)	Field Strength (μ V/m)	Measurement Distance (m)
0.009 to 0.490	2400/F (kHz)	300
0.490 to 1.705	24000/F (kHz)	30
1705 to 30	30	30

Table 6 - IC Limit, Below 30 MHz

Frequency (MHz)	Field Strength (μ V/m at 3 metres)
30 to 88	100
88 to 216	150
216 to 960	200
Above 960	500

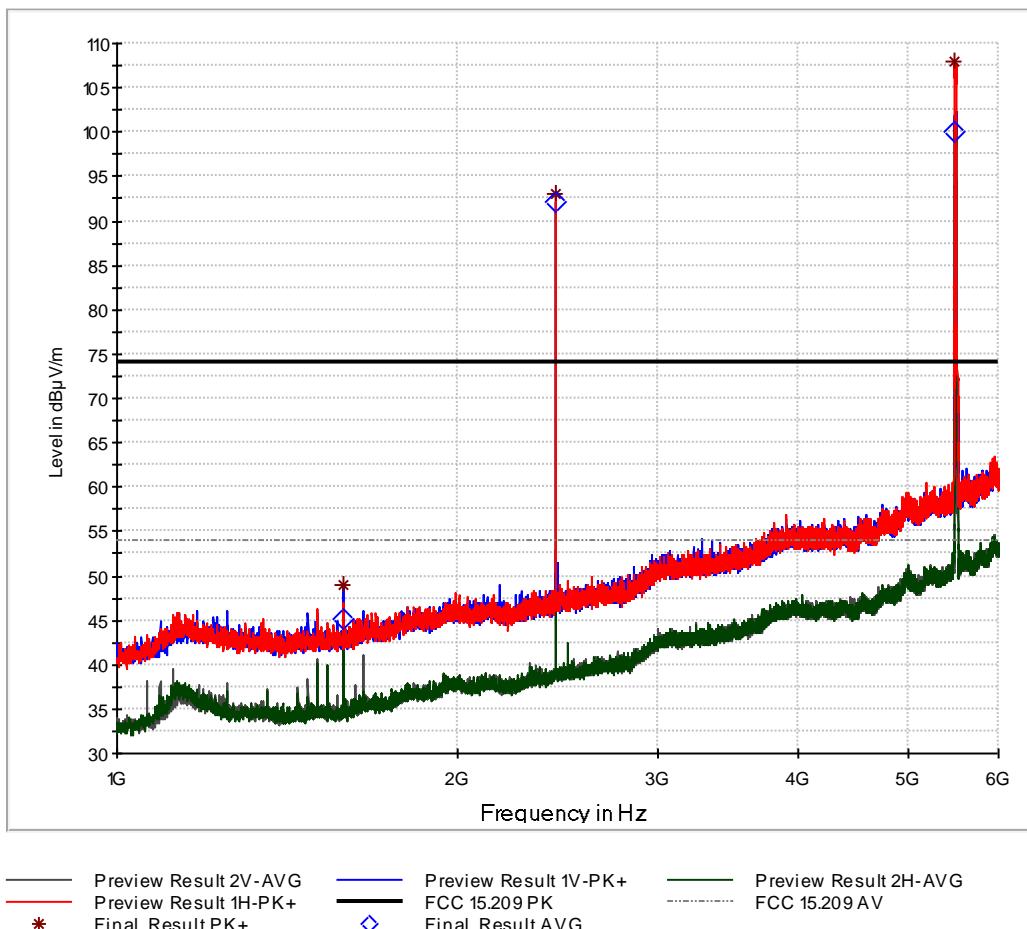
Table 7 - IC Limit, Above 30 MHz

3.1.6.2 Module RMs Legic Advant SM-6300 and Wireless LAN Module AIRETOS AR 9462 Transmitting at 5500 MHz

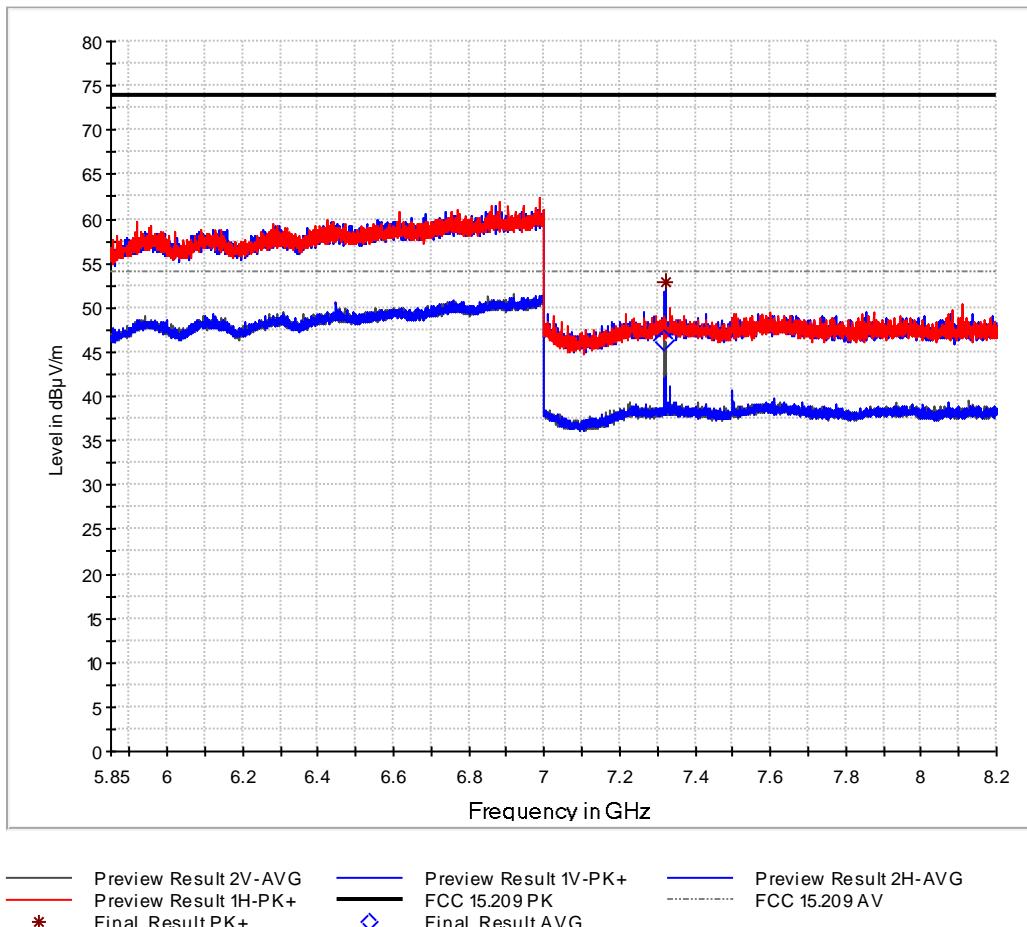


— Preview Result 1V-PK+ — Preview Result 1H-PK+ — FCC 15.209 * Final_Result P

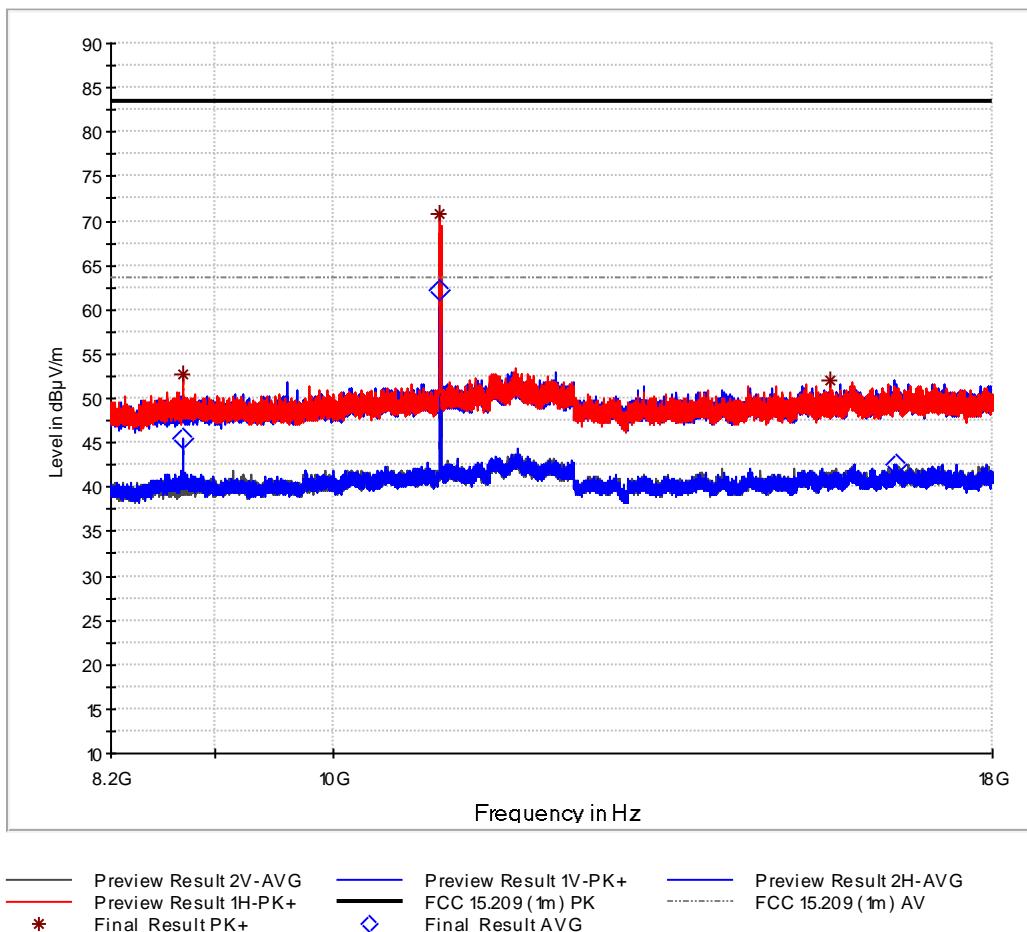
Frequency MHz	MaxPeak dB μ V/m	Limit dB μ V/m	Margin dB	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
31.940000	31.55	40.00	8.45	100.000	155.0	V	328.0	19.1
265.225000	37.82	46.00	8.18	100.000	155.0	H	112.0	11.5
531.005000	38.98	46.00	7.02	100.000	155.0	H	127.0	17.1
885.055000	37.85	46.00	8.15	100.000	155.0	V	54.0	21.8



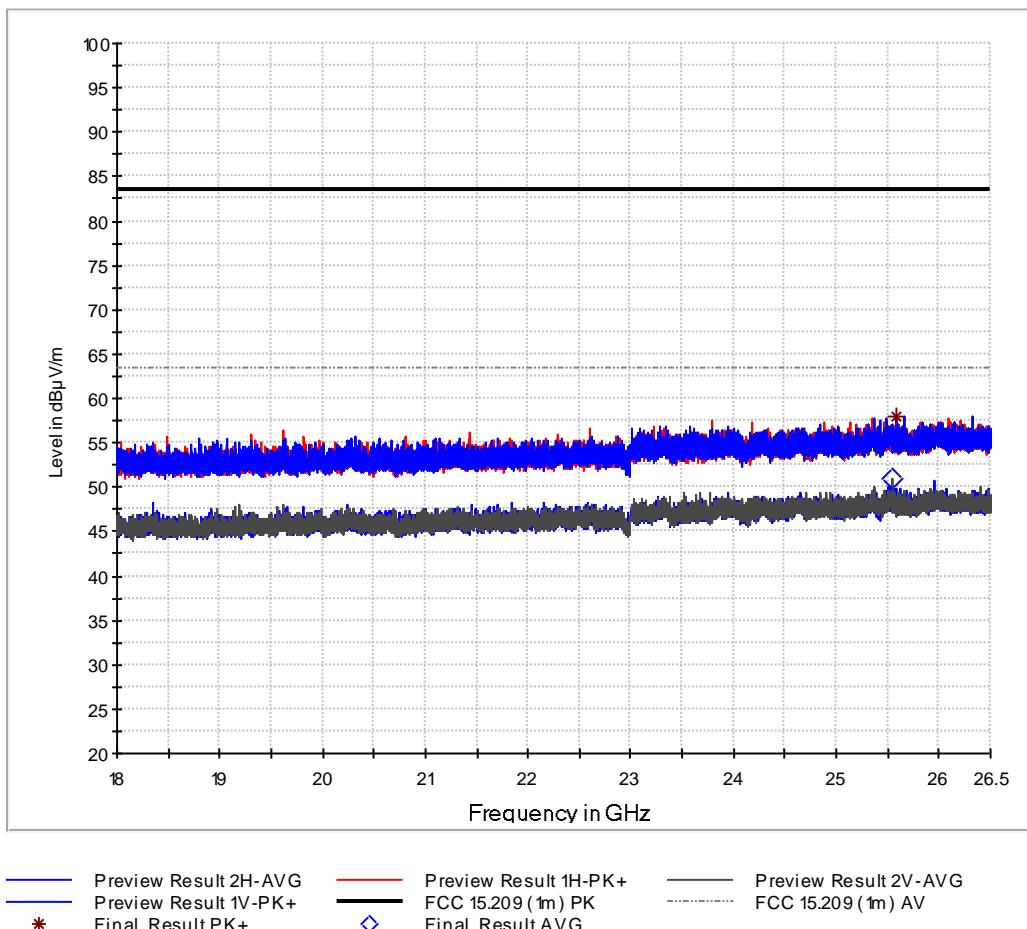
Frequency MHz	MaxPeak dB μ V/m	Average dB μ V/m	Limit dB μ V/m	Margin dB	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB/m
1584.000000		45.16	54.00	8.84	1000.000	150.0	V	283.0	29
1584.000000	48.99		74.00	25.01	1000.000	150.0	V	283.0	29
2439.500000	93.04		74.00	-19.04	1000.000	150.0	H	129.0	32
2440.000000		92.21	54.00	-38.21	1000.000	150.0	H	129.0	32
5493.500000	108.00		74.00	-34.00	1000.000	150.0	H	124.0	40
5495.500000		100.10	54.00	-46.10	1000.000	150.0	H	120.0	40



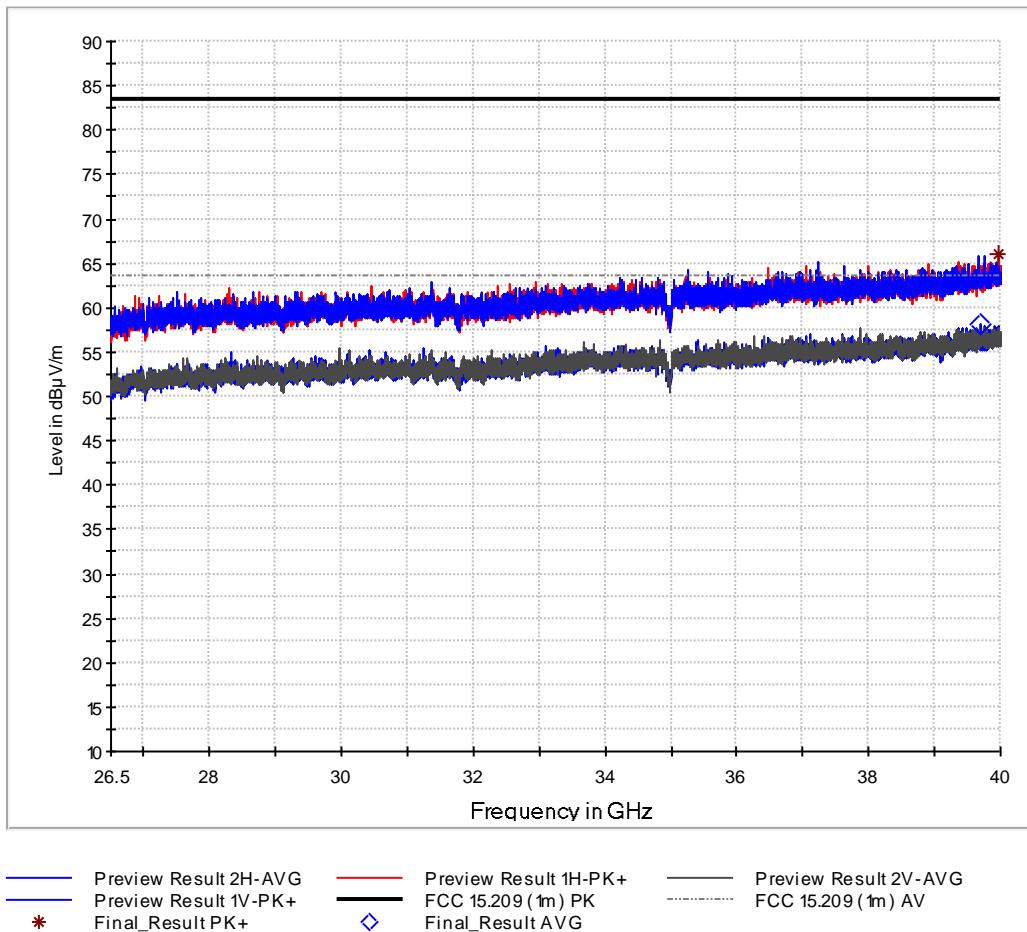
Frequency MHz	MaxPeak dB μ V/m	Average dB μ V/m	Limit dB μ V/m	Margin dB	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
7319.729167		46.32	54.00	7.68	1000.000	150.0	V	33.0	36.7
7320.708333	52.96		74.00	21.04	1000.000	150.0	V	87.0	36.7



Frequency MHz	MaxPeak dB μ V/m	Average dB μ V/m	Limit dB μ V/m	Margin dB	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
8749.150000		45.41	63.50	18.09	1000.000	150.0	H	22.0	37.8
8749.675000	52.68		83.50	30.82	1000.000	150.0	H	42.0	37.8
10999.825000		62.12	63.50	1.38	1000.000	150.0	H	308.0	38.9
11000.875000	70.72		83.50	12.78	1000.000	150.0	H	2.0	38.9
15574.500000	52.14		83.50	31.36	1000.000	150.0	H	86.0	37.2
16526.500000		42.60	63.50	20.90	1000.000	150.0	H	123.0	37.2



Frequency MHz	MaxPeak dB μ V/m	Average dB μ V/m	Limit dB μ V/m	Margin dB	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
25538.437500		50.98	63.50	12.52	1000.000	150.0	V	288.0	40.5
25588.375000	58.02		83.50	25.49	1000.000	150.0	V	93.0	40.5



Frequency MHz	MaxPeak dB μ V/m	Average dB μ V/m	Limit dB μ V/m	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB/m
39697.600000		58.02	63.50	5.48	5.0	1000.000	150.0	H	293.0	44
39981.100000	66.08		83.50	17.42	5.0	1000.000	150.0	H	62.0	44

Sample calculation of final values:

$$\text{Final Value (dB}\mu\text{V/m)} = \text{Reading Value (dB}\mu\text{V)} + \text{Cable Correction Factor (dB)} \\ + \text{Antenna Correction Factor (dB/m)} \\ + \text{Pulse Train Correction (dB)}$$



FCC 47 CFR Part 15, Limit Clause 15.209

Frequency (MHz)	Field Strength (μ V/m)	Measurement Distance (m)
0.009 to 0.490	2400/F (kHz)	300
0.490 to 1.705	24000/F (kHz)	30
1705 to 30	30	30
30 to 88	100**	3
88 to 216	150**	3
216 to 960	200**	3
Above 960	500	3

Table 8 - FCC Limit

NOTE: The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission.

ISED RSS-210, Limit Clause 4.4

Under no circumstance shall the level of any unwanted emissions exceed the level of the fundamental emissions.

ISED RSS-Gen, Limit Clause 8.9

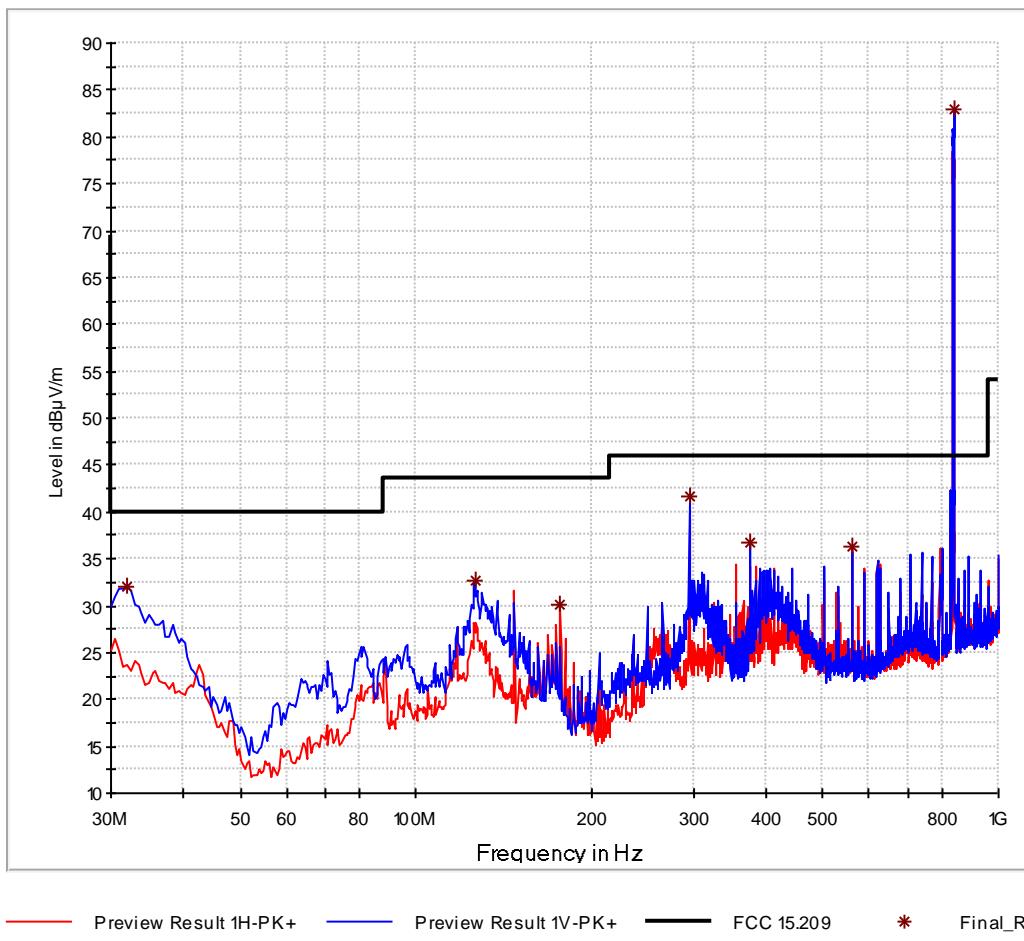
Frequency (MHz)	Field Strength (μ V/m)	Measurement Distance (m)
0.009 to 0.490	2400/F (kHz)	300
0.490 to 1.705	24000/F (kHz)	30
1705 to 30	30	30

Table 9 - IC Limit, Below 30 MHz

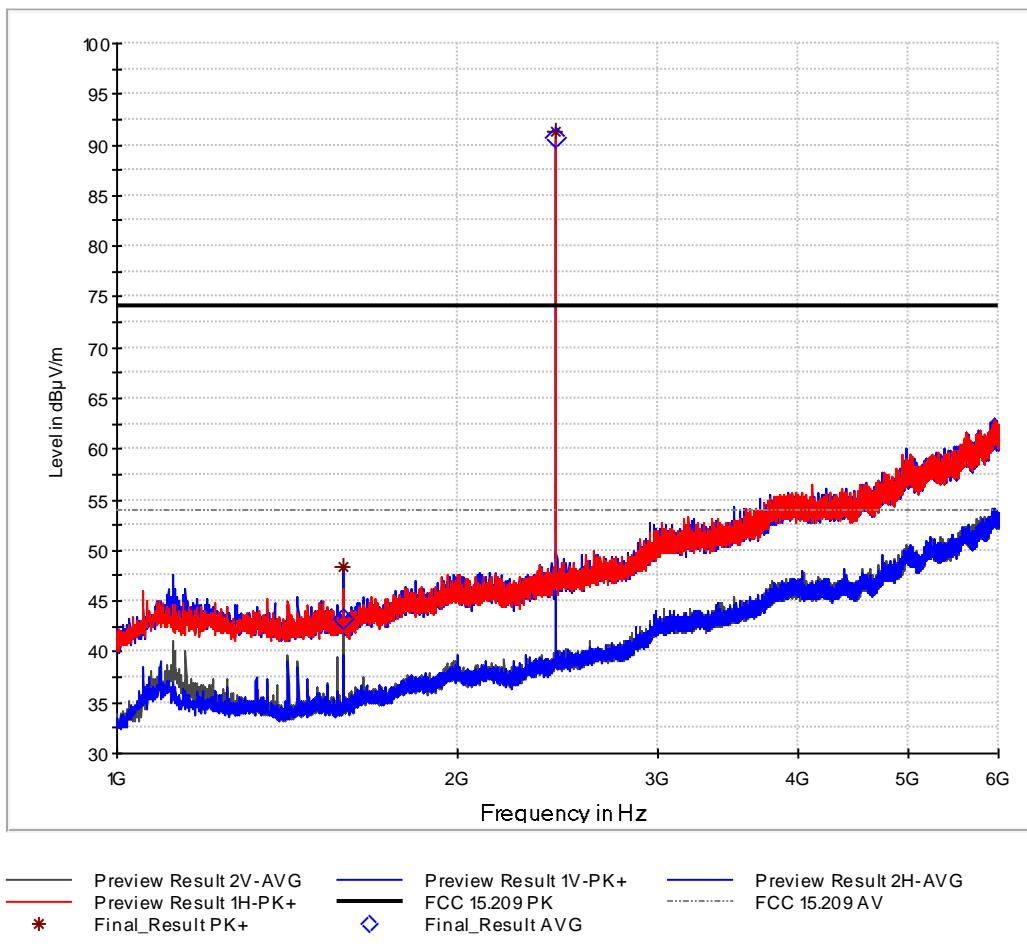
Frequency (MHz)	Field Strength (μ V/m at 3 metres)
30 to 88	100
88 to 216	150
216 to 960	200
Above 960	500

Table 10 - IC Limit, Above 30 MHz

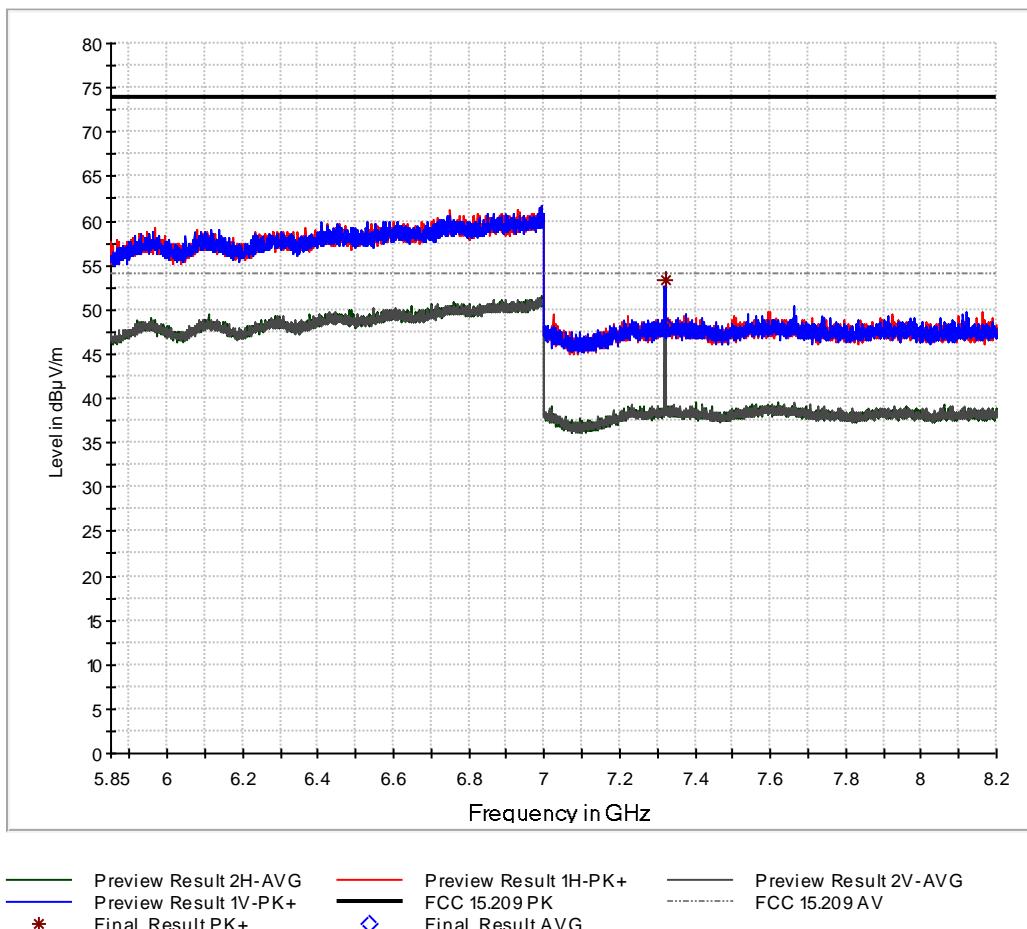
3.1.6.3 Module RMs Logic Advant SM-6300 and 3G/GSM-Module UC20G Transmitting at 837 MHz



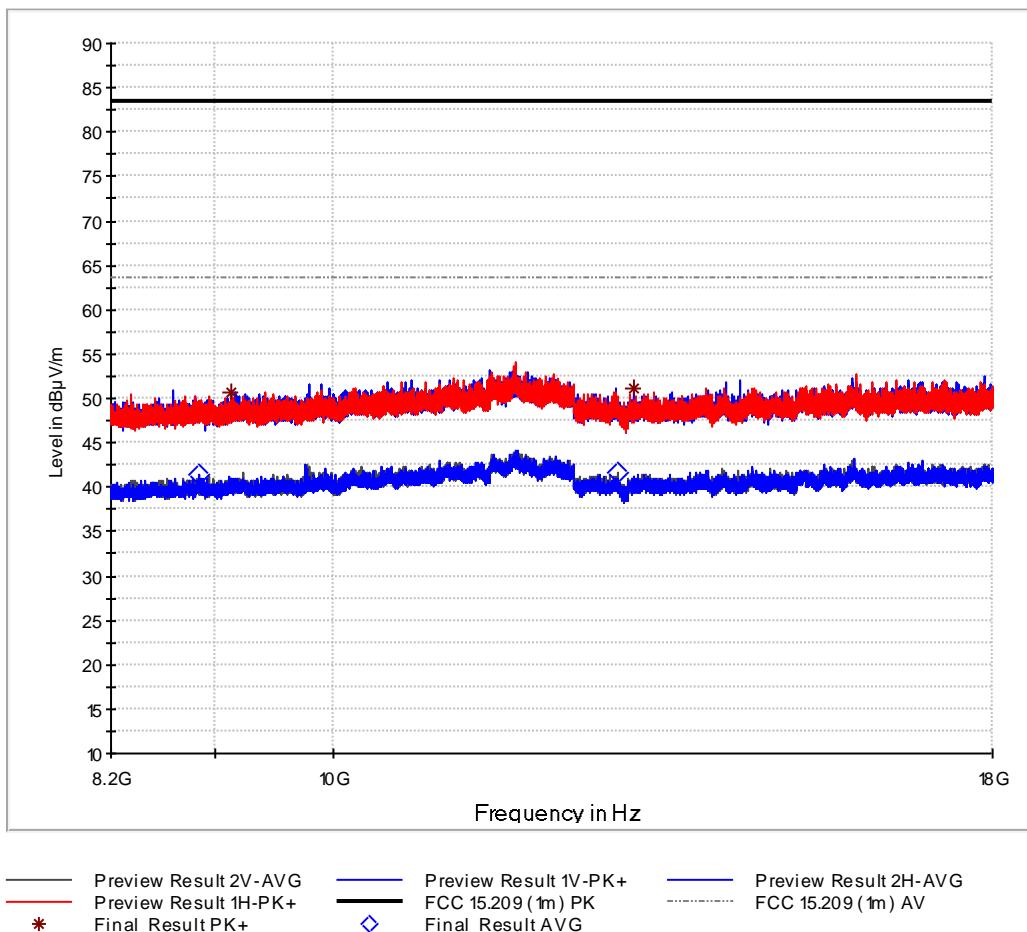
Frequency MHz	MaxPeak dB μ V/m	Limit dB μ V/m	Margin dB	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB/m
31.940000	32.09	40.00	7.91	100.000	155.0	V	164.0	19
126.515000	32.67	43.50	10.83	100.000	155.0	V	0.0	12
176.955000	30.17	43.50	13.33	100.000	155.0	H	139.0	11
294.810000	41.64	46.00	4.36	100.000	155.0	V	9.0	12
374.835000	36.68	46.00	9.32	100.000	155.0	V	43.0	14
560.590000	36.22	46.00	9.78	100.000	155.0	H	82.0	18
837.525000	82.96	46.00	-36.96	100.000	155.0	V	8.0	21



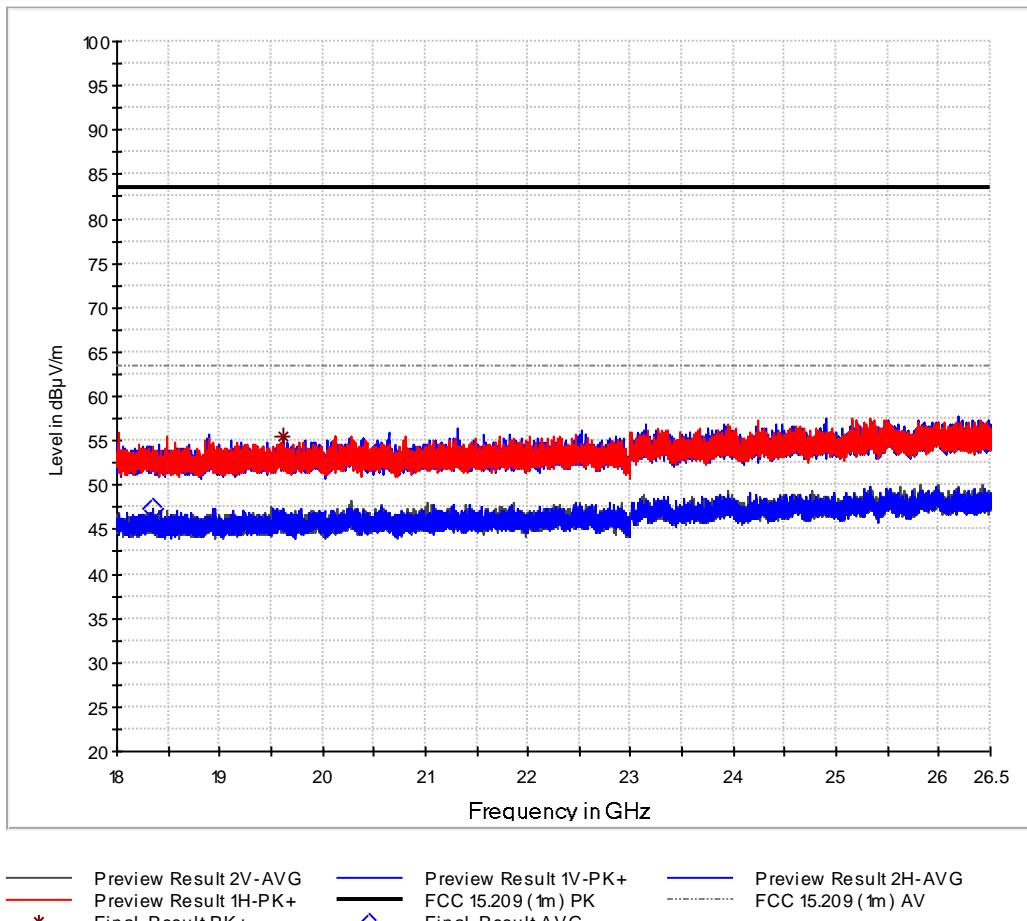
Frequency MHz	MaxPeak dB μ V/m	Average dB μ V/m	Limit dB μ V/m	Margin dB	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
1584.000000		43.27	54.00	10.73	1000.000	150.0	V	285.0	28.5
1584.000000	48.30		74.00	25.70	1000.000	150.0	V	285.0	28.5
2439.500000	91.23		74.00	-17.23	1000.000	150.0	H	134.0	31.8
2440.000000		90.72	54.00	-36.72	1000.000	150.0	H	134.0	31.8



Frequency MHz	MaxPeak dB μ V/m	Average dB μ V/m	Limit dB μ V/m	Margin dB	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB/m
7320.708333		48.00	54.00	6.00	1000.000	150.0	V	76.0	37
7320.708333	53.40		74.00	20.60	1000.000	150.0	V	76.0	37



Frequency MHz	MaxPeak dB μ V/m	Average dB μ V/m	Limit dB μ V/m	Margin dB	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
8874.625000		41.34	63.50	22.16	1000.000	150.0	H	38.0	37.9
9130.825000	50.76		83.50	32.74	1000.000	150.0	V	103.0	37.9
12883.000000		41.62	63.50	21.88	1000.000	150.0	V	304.0	37.1
13081.800000	51.22		83.50	32.28	1000.000	150.0	V	275.0	37.1



Frequency MHz	MaxPeak dB μ V/m	Average dB μ V/m	Limit dB μ V/m	Margin dB	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
18349.031250		47.27	63.50	16.23	1000.000	150.0	H	191.0	40.2
19616.593750	55.53		83.50	27.97	1000.000	150.0	V	289.0	40.3

Sample calculation of final values:

$$\text{Final Value (dB}\mu\text{V/m)} = \text{Reading Value (dB}\mu\text{V)} + \text{Cable Correction Factor (dB)} \\ + \text{Antenna Correction Factor (dB/m)} \\ + \text{Pulse Train Correction (dB)}$$



FCC 47 CFR Part 15, Limit Clause 15.209

Frequency (MHz)	Field Strength (μ V/m)	Measurement Distance (m)
0.009 to 0.490	2400/F (kHz)	300
0.490 to 1.705	24000/F (kHz)	30
1705 to 30	30	30
30 to 88	100**	3
88 to 216	150**	3
216 to 960	200**	3
Above 960	500	3

Table 11 - FCC Limit

NOTE: The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission.

ISED RSS-210, Limit Clause 4.4

Under no circumstance shall the level of any unwanted emissions exceed the level of the fundamental emissions.

ISED RSS-Gen, Limit Clause 8.9

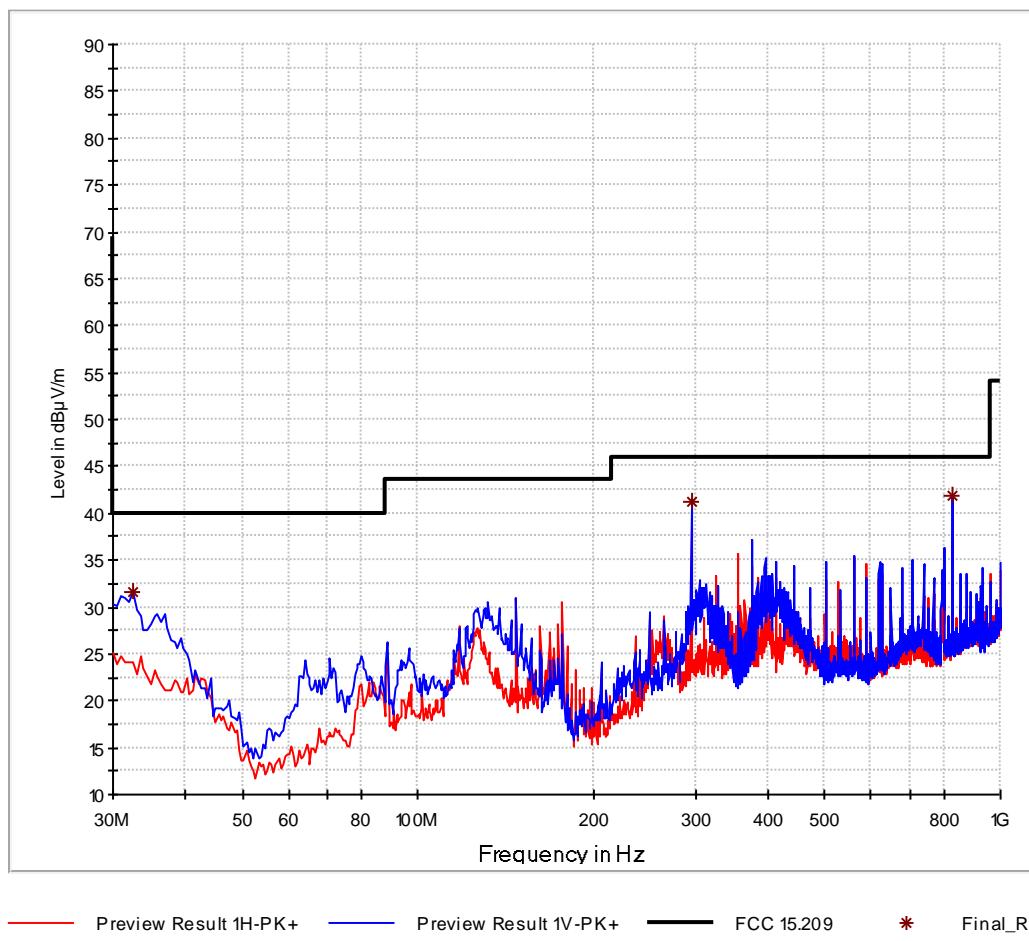
Frequency (MHz)	Field Strength (μ V/m)	Measurement Distance (m)
0.009 to 0.490	2400/F (kHz)	300
0.490 to 1.705	24000/F (kHz)	30
1705 to 30	30	30

Table 12 - IC Limit, Below 30 MHz

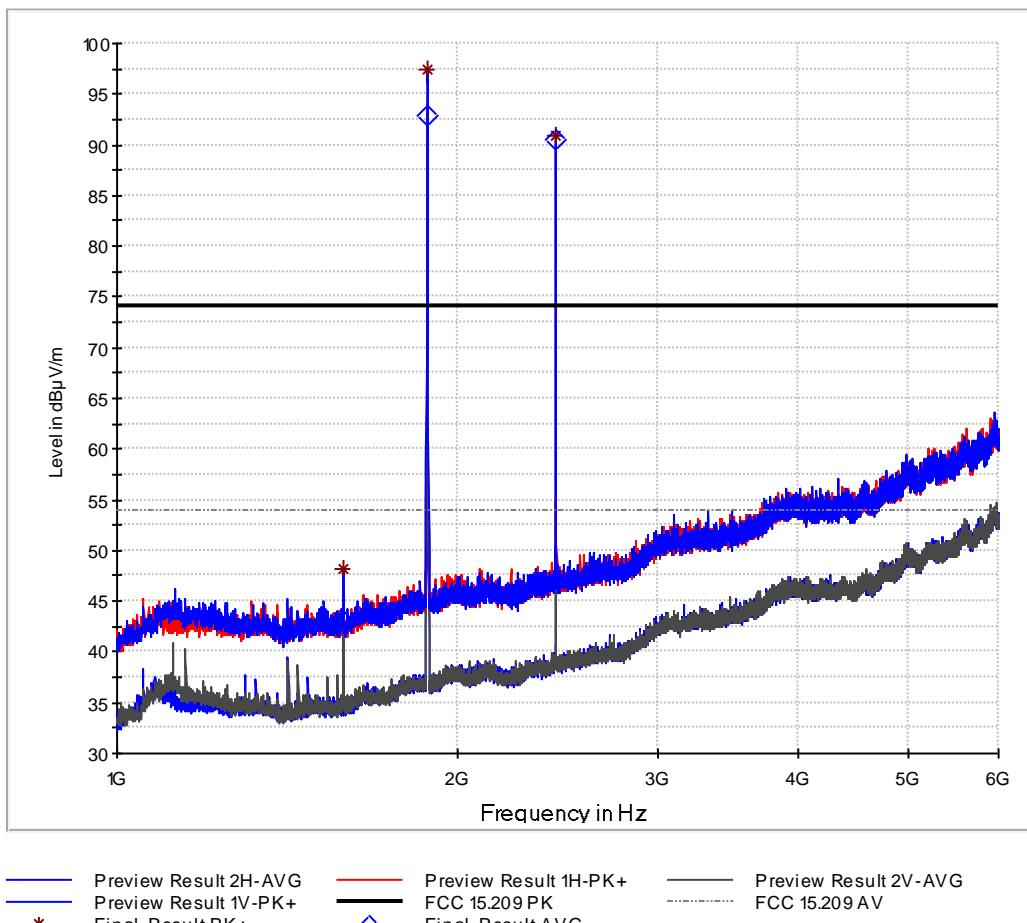
Frequency (MHz)	Field Strength (μ V/m at 3 metres)
30 to 88	100
88 to 216	150
216 to 960	200
Above 960	500

Table 13 - IC Limit, Above 30 MHz

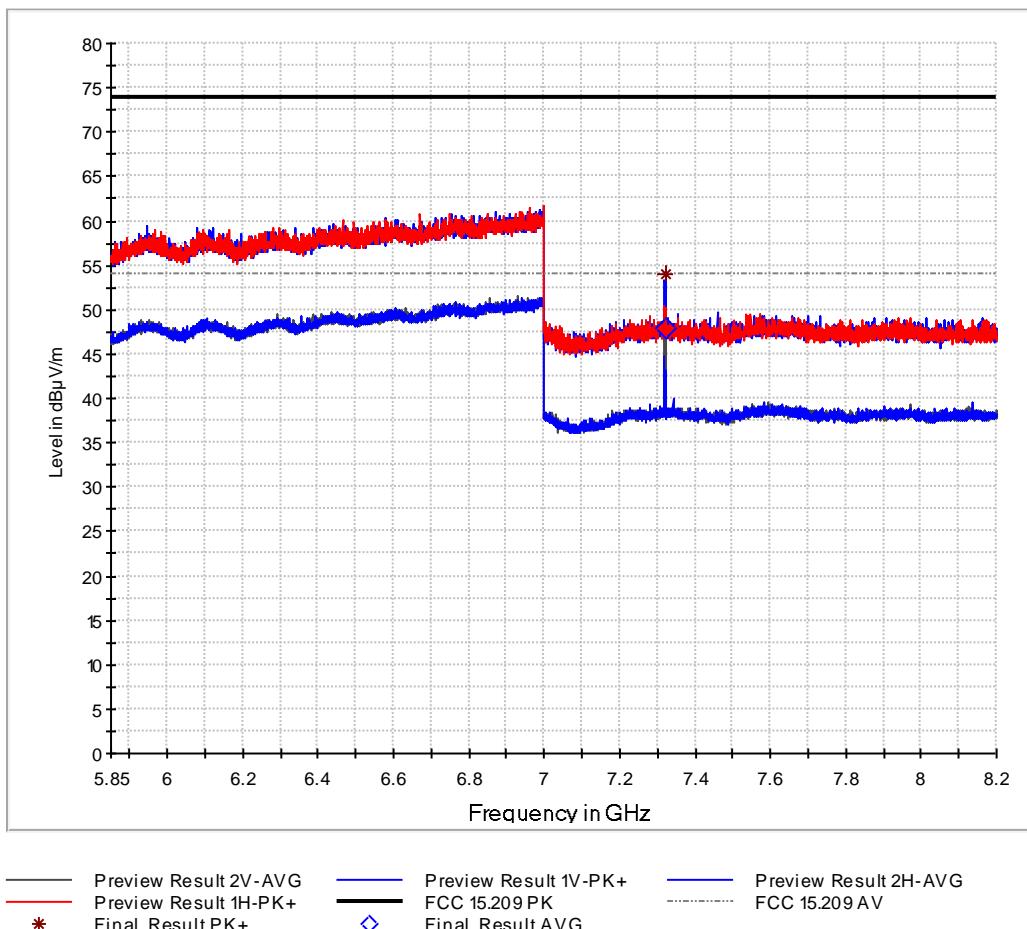
3.1.6.4 Module RMs Legic Advant SM-6300 and 3G/GSM-Module UC20G Transmitting at 1880 MHz



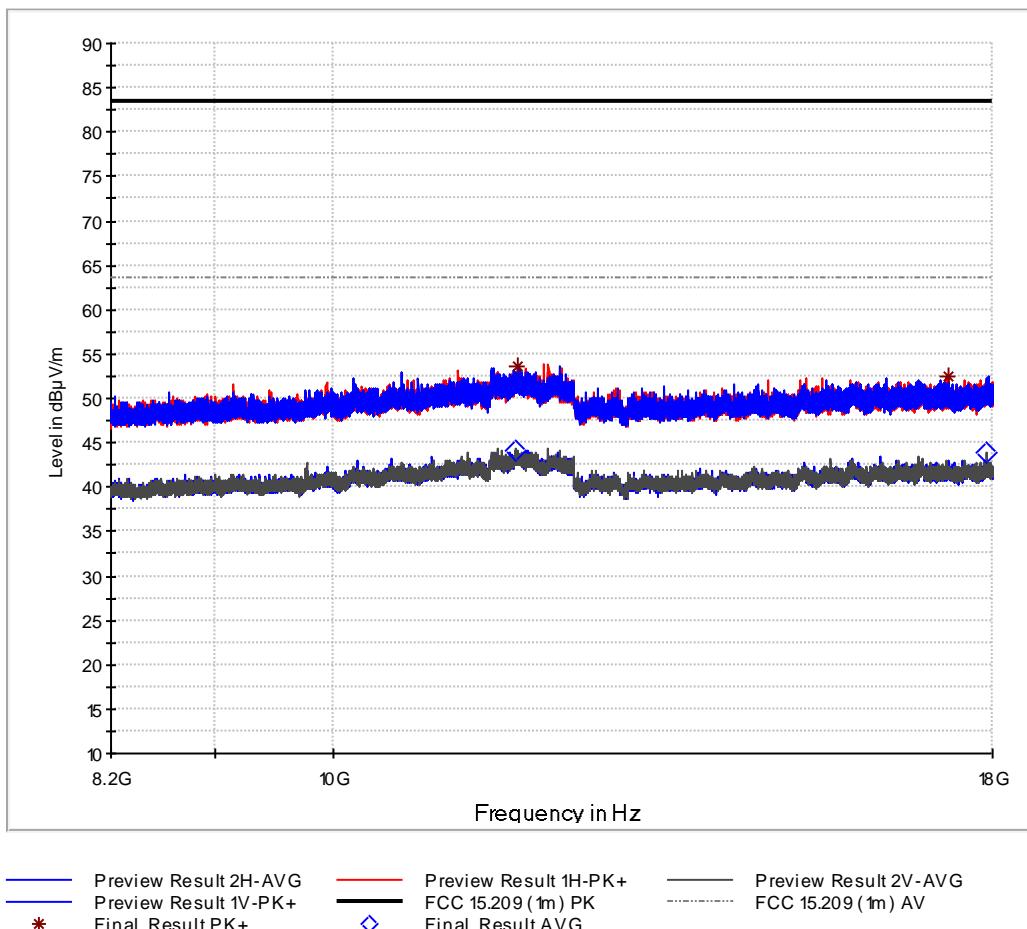
Frequency MHz	MaxPeak dB μ V/m	Limit dB μ V/m	Margin dB	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB/m
32.425000	31.67	40.00	8.33	100.000	155.0	V	319.0	19
294.810000	41.15	46.00	4.85	100.000	155.0	V	29.0	12
826.370000	41.95	46.00	4.05	100.000	155.0	V	57.0	21



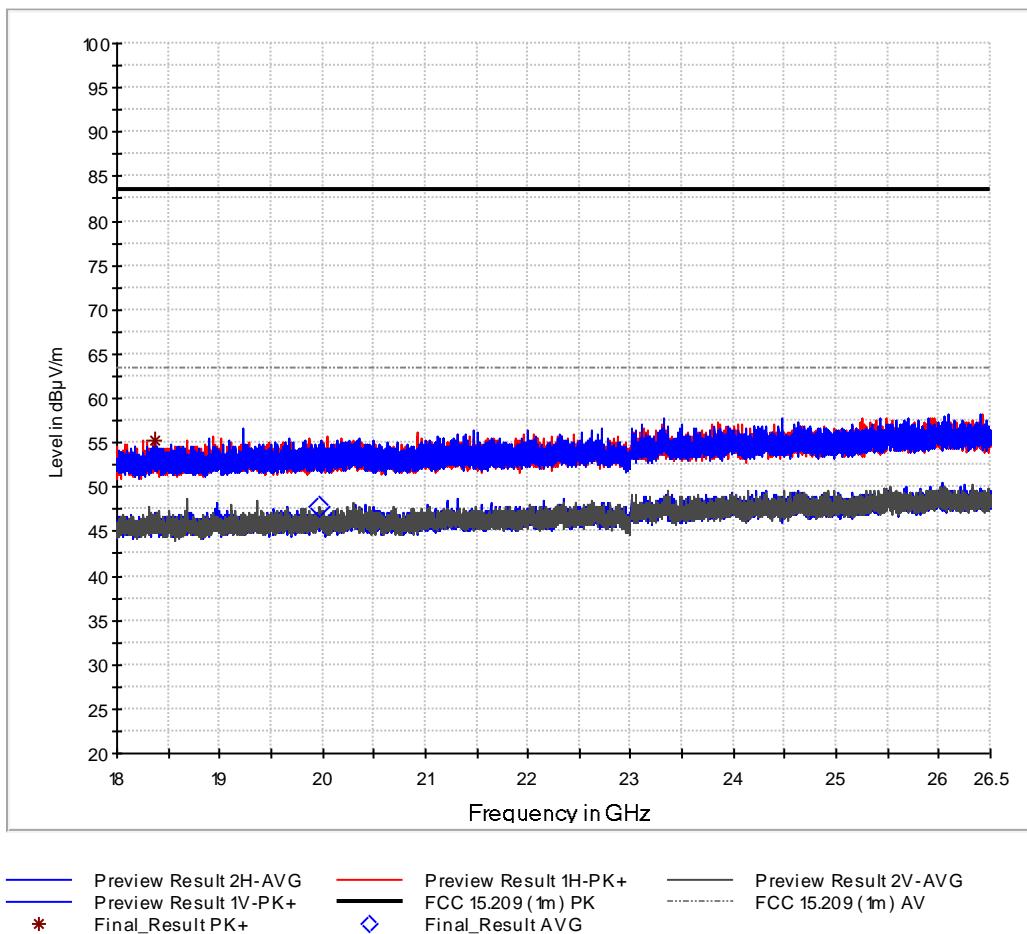
Frequency MHz	MaxPeak dB μ V/m	Average dB μ V/m	Limit dB μ V/m	Margin dB	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
1584.000000		42.99	54.00	11.01	1000.000	150.0	V	277.0	28.5
1584.000000	48.11		74.00	25.89	1000.000	150.0	V	277.0	28.5
1880.500000		92.87	54.00	-38.87	1000.000	150.0	V	133.0	30.2
1881.000000	97.38		74.00	-23.38	1000.000	150.0	V	132.0	30.2
2439.500000	90.94		74.00	-16.94	1000.000	150.0	H	133.0	31.8
2440.000000		90.59	54.00	-36.59	1000.000	150.0	H	129.0	31.8



Frequency MHz	MaxPeak dB μ V/m	Average dB μ V/m	Limit dB μ V/m	Margin dB	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
7320.708333		47.95	54.00	6.05	1000.000	150.0	V	76.0	36.7
7320.708333	54.00		74.00	20.00	1000.000	150.0	V	76.0	36.7



Frequency MHz	MaxPeak dB μ V/m	Average dB μ V/m	Limit dB μ V/m	Margin dB	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB/m
11774.200000		44.12	63.50	19.38	1000.000	150.0	V	3.0	40
11780.500000	53.57		83.50	29.93	1000.000	150.0	V	137.0	40
17295.800000	52.54		83.50	30.96	1000.000	150.0	H	346.0	37
17916.000000		43.99	63.50	19.51	1000.000	150.0	V	122.0	37



Frequency MHz	MaxPeak dB μ V/m	Average dB μ V/m	Limit dB μ V/m	Margin dB	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB/m
18370.281250	55.25		83.50	28.25	1000.000	150.0	V	29.0	40
19961.375000		47.78	63.50	15.72	1000.000	150.0	V	72.0	40

Sample calculation of final values:

$$\text{Final Value (dB}\mu\text{V/m)} = \text{Reading Value (dB}\mu\text{V)} + \text{Cable Correction Factor (dB)} \\ + \text{Antenna Correction Factor (dB/m)} \\ + \text{Pulse Train Correction (dB)}$$



FCC 47 CFR Part 15, Limit Clause 15.209

Frequency (MHz)	Field Strength (μ V/m)	Measurement Distance (m)
0.009 to 0.490	2400/F (kHz)	300
0.490 to 1.705	24000/F (kHz)	30
1705 to 30	30	30
30 to 88	100**	3
88 to 216	150**	3
216 to 960	200**	3
Above 960	500	3

Table 14 - FCC Limit

NOTE: The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission.

ISED RSS-210, Limit Clause 4.4

Under no circumstance shall the level of any unwanted emissions exceed the level of the fundamental emissions.

ISED RSS-Gen, Limit Clause 8.9

Frequency (MHz)	Field Strength (μ V/m)	Measurement Distance (m)
0.009 to 0.490	2400/F (kHz)	300
0.490 to 1.705	24000/F (kHz)	30
1705 to 30	30	30

Table 15 - IC Limit, Below 30 MHz

Frequency (MHz)	Field Strength (μ V/m at 3 metres)
30 to 88	100
88 to 216	150
216 to 960	200
Above 960	500

Table 16 - IC Limit, Above 30 MHz

3.1.7 Test Location and Test Equipment Used

This test was carried out in Semi anechoic room - cabin no. 2.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
FSP30	Rohde & Schwarz	100063	19533	24	2020-08
FSV40	Rohde & Schwarz	101448	20219	12	2020-01
HL562E	Rohde & Schwarz	100992	38401	36	2021-05
3115	EMCO Elektronik	9408-4553	19383	36	2020-03
3160-09	EMCO	9403-1025	19125	O/P Mon	
3160-10	EMCO	399185	19442	O/P Mon	

Table 17

TU - Traceability Unscheduled

O/P Mon – Output Monitored using calibrated equipment

N/A - Not Applicable



Product Service

4 Photographs

Please refer to Annex A

5 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

Radio Testing			
Test Name	kp	Expanded Uncertainty	Note
Occupied Bandwidth	2.0	$\pm 1.14 \%$	2
RF-Frequency error	1.96	$\pm 1 \cdot 10^{-7}$	7
RF-Power, conducted carrier	2	$\pm 0.079 \text{ dB}$	2
RF-Power uncertainty for given BER	1.96	$+0.94 \text{ dB} / -1.05$	7
RF power, conducted, spurious emissions	1.96	$+1.4 \text{ dB} / -1.6 \text{ dB}$	7
RF power, radiated			
25 MHz – 4 GHz	1.96	$+3.6 \text{ dB} / -5.2 \text{ dB}$	8
1 GHz – 18 GHz	1.96	$+3.8 \text{ dB} / -5.6 \text{ dB}$	8
18 GHz – 26.5 GHz	1.96	$+3.4 \text{ dB} / -4.5 \text{ dB}$	8
40 GHz – 170 GHz	1.96	$+4.2 \text{ dB} / -7.1 \text{ dB}$	8
Spectral Power Density, conducted	2.0	$\pm 0.53 \text{ dB}$	2
Maximum frequency deviation			
300 Hz – 6 kHz	2	$\pm 2.89 \%$	2
6 kHz – 25 kHz	2	$\pm 0.2 \text{ dB}$	2
Maximum frequency deviation for FM	2	$\pm 2.89 \%$	2
Adjacent channel power 25 MHz – 1 GHz	2	$\pm 2.31 \%$	2
Temperature	2	$\pm 0.39 \text{ K}$	4
(Relative) Humidity	2	$\pm 2.28 \%$	2
DC- and low frequency AC voltage			
DC voltage	2	$\pm 0.01 \%$	2
AC voltage up to 1 kHz	2	$\pm 1.2 \%$	2
Time	2	$\pm 0.6 \%$	2

Table 18

Radio Interference Emission Testing			
Test Name	kp	Expanded Uncertainty	Note
Conducted Voltage Emission			
9 kHz to 150 kHz (50Ω/50µH AMN)	2	± 3.8 dB	1
150 kHz to 30 MHz (50Ω/50µH AMN)	2	± 3.4 dB	1
100 kHz to 200 MHz (50Ω/5µH AMN)	2	± 3.6 dB	1
Discontinuous Conducted Emission			
9 kHz to 150 kHz (50Ω/50µH AMN)	2	± 3.8 dB	1
150 kHz to 30 MHz (50Ω/50µH AMN)	2	± 3.4 dB	1
Conducted Current Emission			
9 kHz to 200 MHz	2	± 3.5 dB	1
Magnetic Field strength			
9 kHz to 30 MHz (with loop antenna)	2	± 3.9 dB	1
9 kHz to 30 MHz (large-loop antenna 2 m)	2	± 3.5 dB	1
Radiated Emission			
Test distance 1 m (ALSE)			
9 kHz to 150 kHz	2	± 4.6 dB	1
150 kHz to 30 MHz	2	± 4.1 dB	1
30 MHz to 200 MHz	2	± 5.2 dB	1
200 MHz to 2 GHz	2	± 4.4 dB	1
2 GHz to 3 GHz	2	± 4.6 dB	1
Test distance 3 m			
30 MHz to 300 MHz	2	± 4.9 dB	1
300 MHz to 1 GHz	2	± 5.0 dB	1
1 GHz to 6 GHz	2	± 4.6 dB	1
Test distance 10 m			
30 MHz to 300 MHz	2	± 4.9 dB	1
300 MHz to 1 GHz	2	± 4.9 dB	1
Radio Interference Power			
30 MHz to 300 MHz	2	± 3.5 dB	1
Harmonic Current Emissions			4
Voltage Changes, Voltage Fluctuations and Flicker			4

Table 19

Immunity Testing			
Test Name	kp	Expanded Uncertainty	Note
Electrostatic Discharges			4
Radiated RF-Field			
Pre-calibrated field level	2	+32.2 / -24.3 %	5
Dynamic feedback field level	2.05	+21.2 / -17.5 %	3
Electrical Fast Transients (EFT) / Bursts			4
Surges			4
Conducted Disturbances, induced by RF-Fields			
via CDN	2	+15.1 / -13.1 %	6
via EM clamp	2	+42.6 / -29.9 %	6
via current clamp	2	+43.9 / -30.5 %	6
Power Frequency Magnetic Field	2	+20.7 / -17.1 %	2
Pulse Magnetic Field			4
Voltage Dips, Short Interruptions and Voltage Variations			4
Oscillatory Waves			4
Conducted Low Frequency Disturbances			
Voltage setting	2	± 0.9 %	2
Frequency setting	2	± 0.1 %	2
Electrical Transient Transmission in Road Vehicles			4

Table 20

Note 1:

The expanded uncertainty reported according to CISPR 16-4-2:2003-11 is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%

Note 2:

The expanded uncertainty reported according to UKAS Lab 34 (Edition 1, 2002-08) is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%

Note 3:

The expanded uncertainty reported according to UKAS Lab 34 (Edition 1, 2002-08) is based on a standard uncertainty multiplied by a coverage factor of kp = 2.05, providing a level of confidence of p = 95.45%

Note 4:

It has been demonstrated that the used test equipment meets the specified requirements in the standard with at least a 95% confidence.

Note 5:

The expanded uncertainty reported according to IEC 61000-4-3 is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%

Note 6:

The expanded uncertainty reported according to IEC 61000-4-6 is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%

Note 7:

The expanded uncertainty reported according ETSI TR 100 028 V1.4.1 (all parts) to is based on a standard uncertainty multiplied by a coverage factor of kp = 1.96, providing a level of confidence of p = 95.45%



Product Service

Note 8:

The expanded uncertainty reported according to ETSI TR 102 273 V1.2.1 (all parts) is based on a standard uncertainty multiplied by a coverage factor of $k_p = 1.96$, providing a level of confidence of $p = 95.45\%$