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1. MANUFACTURER AND EUT IDENTIFICATION¹	
Manufacturer	CAEN RFID s.r.l.
Address	Via Vetraia, 11 55049 Viareggio (LU) Italy
Test Family Name	R4301 ION (UHF)
Date of reception	2016 March 04
Sampling	Laboratory sample for certification
Test Item Description	RFID Device
Nominal Input Voltage	24 Vdc
FCC ID	UVECAENRFID022

¹A detailed documentation is preserved in the internal fascicle.

2. REFERENCE STANDARDS

Tests and measurements are performed accordingly to the reference standards given in the table below:

<i>TEST</i>	<i>STANDARD</i>
Emissions: Radiated – Section 15.109	FCC Rules ad Regulations, Title 47 Part 15 – Sub part C ANSI C63.4 2014 – American National Standard for Methods of Measuring of Radio-Noise Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz – 40 GHz
Emissions: Conducted – Section 15.107	FCC Rules ad Regulations, Title 47 Part 15 – Sub part C ANSI C63.4 2014 – American National Standard for Methods of Measuring of Radio-Noise Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz – 40 GHz

3. TEST GENERALITY, RESULT, CONDITION, MEASUREMENT UNCERTAINTY**Sub-part 2.1033(b)****Test And Measurement Data**

All tests and measurement data shown were performed in accordance with FCC Rules and Regulations, Volume II; Part 2 and the following individual Parts: 15.109; Unintentional Radiators

Standard Test Conditions and Engineering Practices

Except as noted herein, the following conditions and procedures were observed during the testing: In accordance with ANSI C63.4-2009, and unless otherwise indicated in the specific measurement results, the ambient temperature of the actual EUT was maintained within the range of 10° to 40°C (50° to 104 °F) unless the particular equipment requirements specify testing over a different temperature range. Also, unless otherwise indicated, the humidity levels were in the range of 10% to 90% relative humidity.

Prior to testing, the EUT was tuned up in accordance with the manufacturer's alignment procedures.

All external gain controls were maintained at the position of maximum and/or optimum gain throughout the testing.

Measurement results, unless otherwise noted, are worst-case measurements.

Summary of Test Results

<i>TEST</i>	<i>RESULT</i>
<i>Emissions: conducted Section 15.107</i>	<i>Pass</i>
<i>Emissions: radiated Section 15.109</i>	<i>Pass</i>

Measurement uncertainty

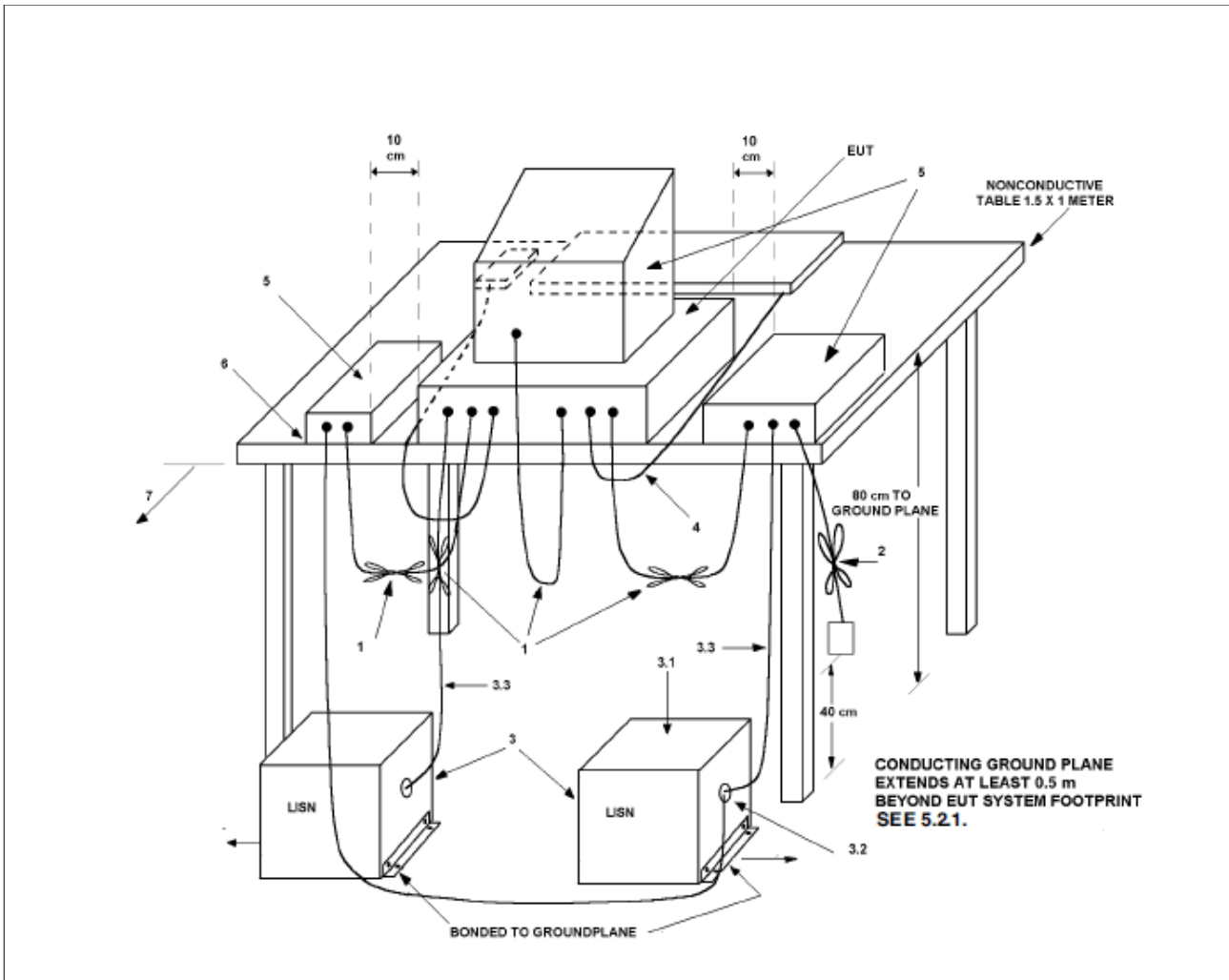
<i>TEST</i>	<i>EXPANDED UNCERTAINTY</i>
Conducted Emission – 50Ω/50μH (150 kHz - 30 MHz)	± 3.5 dB
Radiated Emission – (Semianechoic Room) (30 MHz - 18 GHz)	± 4.7 dB

Climatic Conditions

<i>PARAMETER</i>	<i>VALUE</i>
Temperature	(293 ± 3) K
Relative humidity	(50 ± 5) %

Extensions

The results refer only to the sampled EUT and under the specified conditions.



Conducted and Radiated EUT Test Set-up example (ANSI C63.4 2014)

Test Mode: the EUT was used with a personal computer and it was tested with standard SW CAEN RFID Easy Controller by USB.

4. RADIATED EMISSIONS

In the following table you can find the limits established by the reference standard:

FREQUENCY RANGE (MHz)	<i>Field Strength</i> <i>QUASI-PEAK LIMITS</i> [dB (μ V/m)]
30 ÷ 88	40
88 ÷ 216	43,5
216 ÷ 960	46
Above 960	54

Test Equipment

EQUIPMENT	MANUFACTURER	MODEL	CAL. DUE
EMI Receiver	HP	HP8546A	01/2017
EMI Receiver Filter Section	HP	HP85460A	01/2017
Anechoic Chamber	Comtest	CSA01	01/2017
Bilog Antenna	Schaffner	CBL6112B	01/2017
Horn Antenna	EMCO	3115	01/2017
Controller	Deisel	HD100	01/2017
Turn Table	Deisel	MA240	01/2017
LISN	GSD	NTW06	01/2017

Test procedure: RE22R02Notes

Azimuth position EUT-Antenna corresponding to 0° identifies the rotating table orientation (TT) in which the instrument to be tested shows the front part turned towards the antenna. Positive grades individuate clockwise rotations of TT when this one is observed from the top. For negative degrees, TT rotation is anticlockwise.

Antenna height respect to the mass plane is conventionally individuated with: MA=XXX where XXX indicates the height (always positive for $e > 100$) expressed in cm.

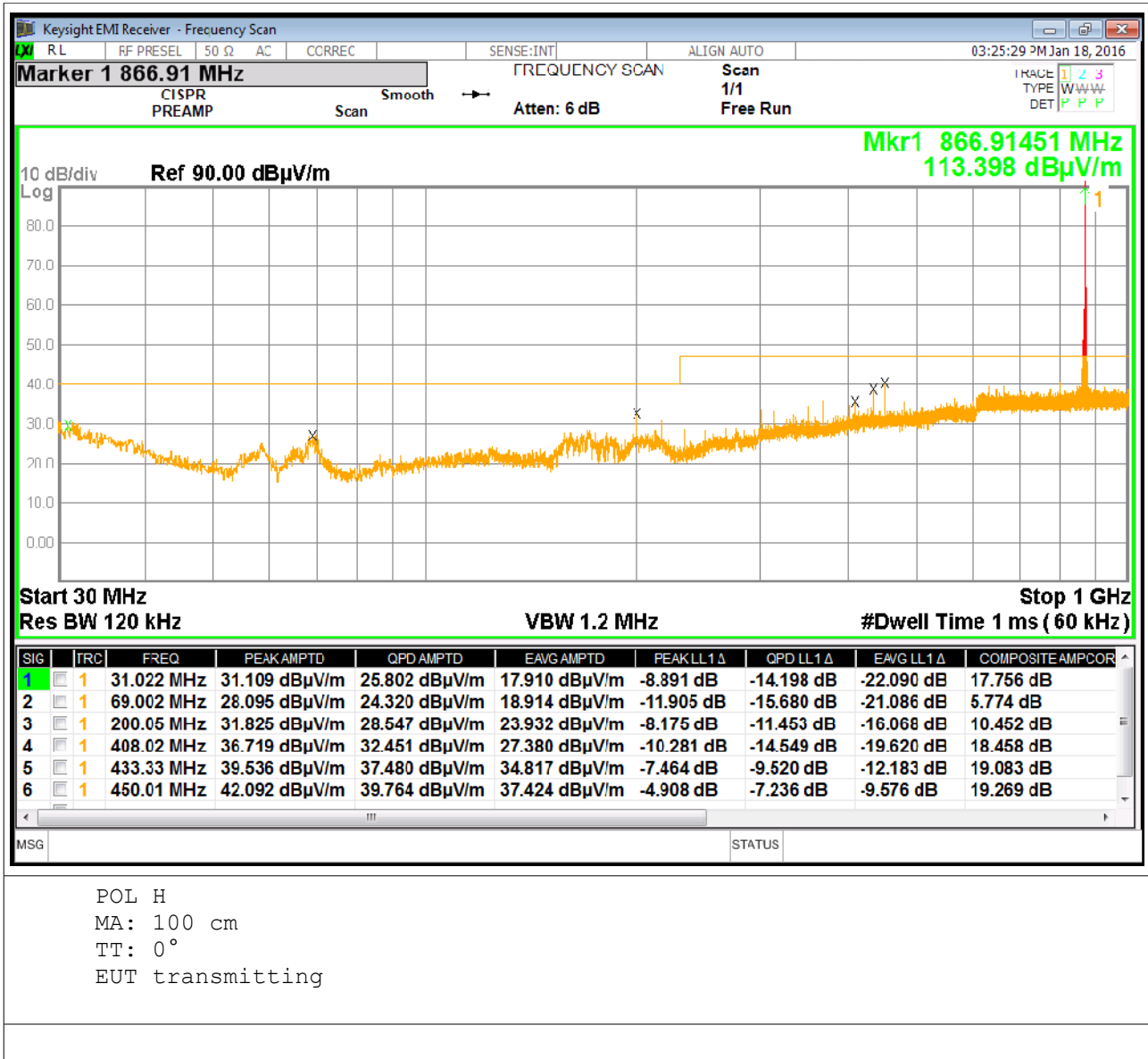
Antenna horizontal polarisation is indicated by POL=H.

Antenna vertical polarisation is indicated by POL=V.

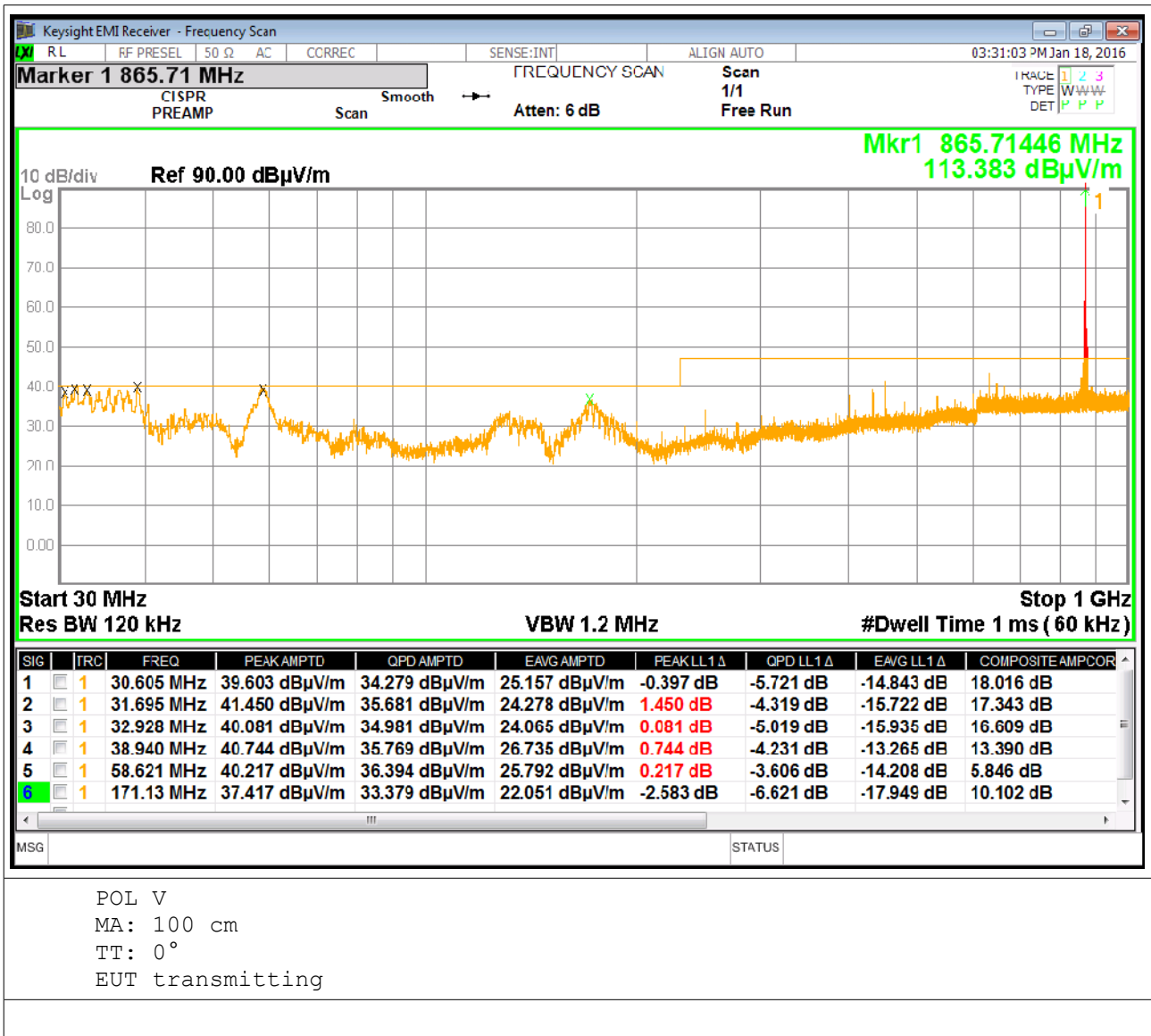
EUT was tested in the three ortogonal planes.

Results and conclusions

In all the operative conditions, equipment complied with the standard limits. Graphics in following figures show the most significant registrations of the performed measurements.



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5. POWERLINE CONDUCTED EMISSIONS

Equipment shall meet the limits below when using a CISPR16 quasi-peak and average detector receivers.

FCC, 15.107

<i>FREQUENCY RANGE</i> (MHz)	<i>QUASI-PEAK LIMIT</i> [dB (μV)]	<i>AVERAGE LIMIT</i> [dB (μV)]
0.15 ÷ 0.50	66 ÷ 56 ^(*)	56 ÷ 46 ^(*)
0.50 ÷ 5	56	46
5 ÷ 30	60	50

^(*) Limit decreasing linearly with logarithm of frequency

Test Equipment

EQUIPMENT	MANUFACTURER	MODEL	CAL. DUE
EMI Receiver	HP	HP8546A	
EMI Receiver Filter Section	HP	HP85460A	
Screened Room	GSD	CSC01	
Transient Limiter	HP	11947A	01/2017
LISN	GSD	GSDA01	01/2017

Test procedure: CE22R01

The EUT power cable was connected to a LISN and the monitored output of the LISN was connected to a spectrum analyzer by a transient limiter. The conducted emissions from 150 kHz to 30 MHz were monitored and compared to the specification limits

Test method

Test method was in accordance with the reference standard.

EUT modes of operations were tested in order to achieve the maximum level of emission.

Results

Equipment complied with the test specification limits.

Graphics in following figures show some registrations of the frequency spectrum of the conducted emissions.

Job Number FCC-16574B
 Test Name Power line Conducted Emissions
 FCC 15.207
 EUT Name R4301 ION (UHF)

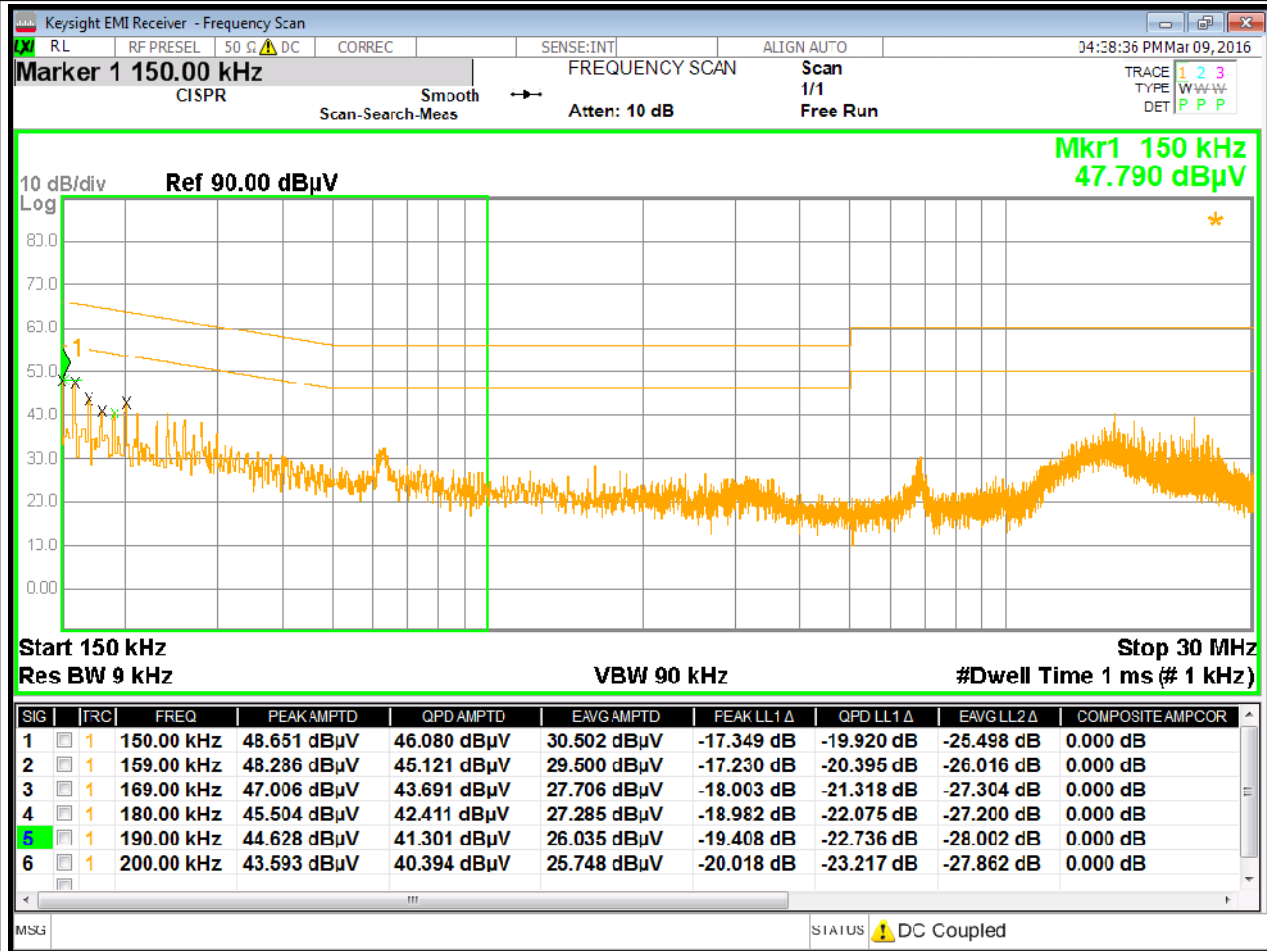


Fig. 5.1

Phase 1 of EUT
 EUT mode: Standby
 Auxiliary apparatus: Laptop whit power supply linked

B Band (0.15 – 30 MHz)

Job Number FCC-16574B
 Test Name Power line Conducted Emissions
 FCC 15.207
 EUT Name R4301 ION (UHF)

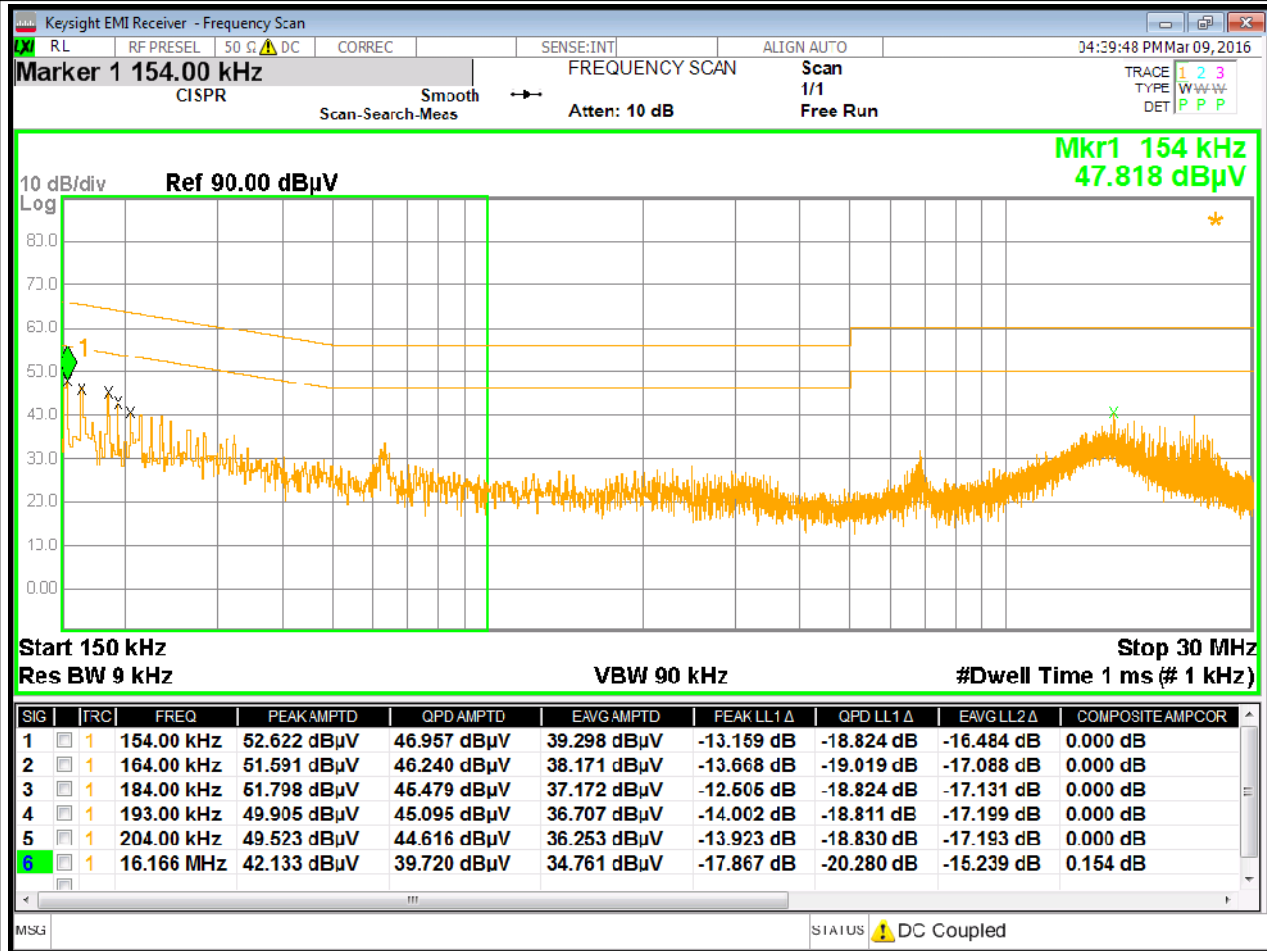


Fig. 5.2

Phase 2 of EUT
 EUT mode: Standby
 Auxiliary apparatus: Laptop whit power supply linked

B Band (0.15 – 30 MHz)

Job Number FCC-16574B
 Test Name Power line Conducted Emissions
 FCC 15.207
 EUT Name R4301 ION (UHF)

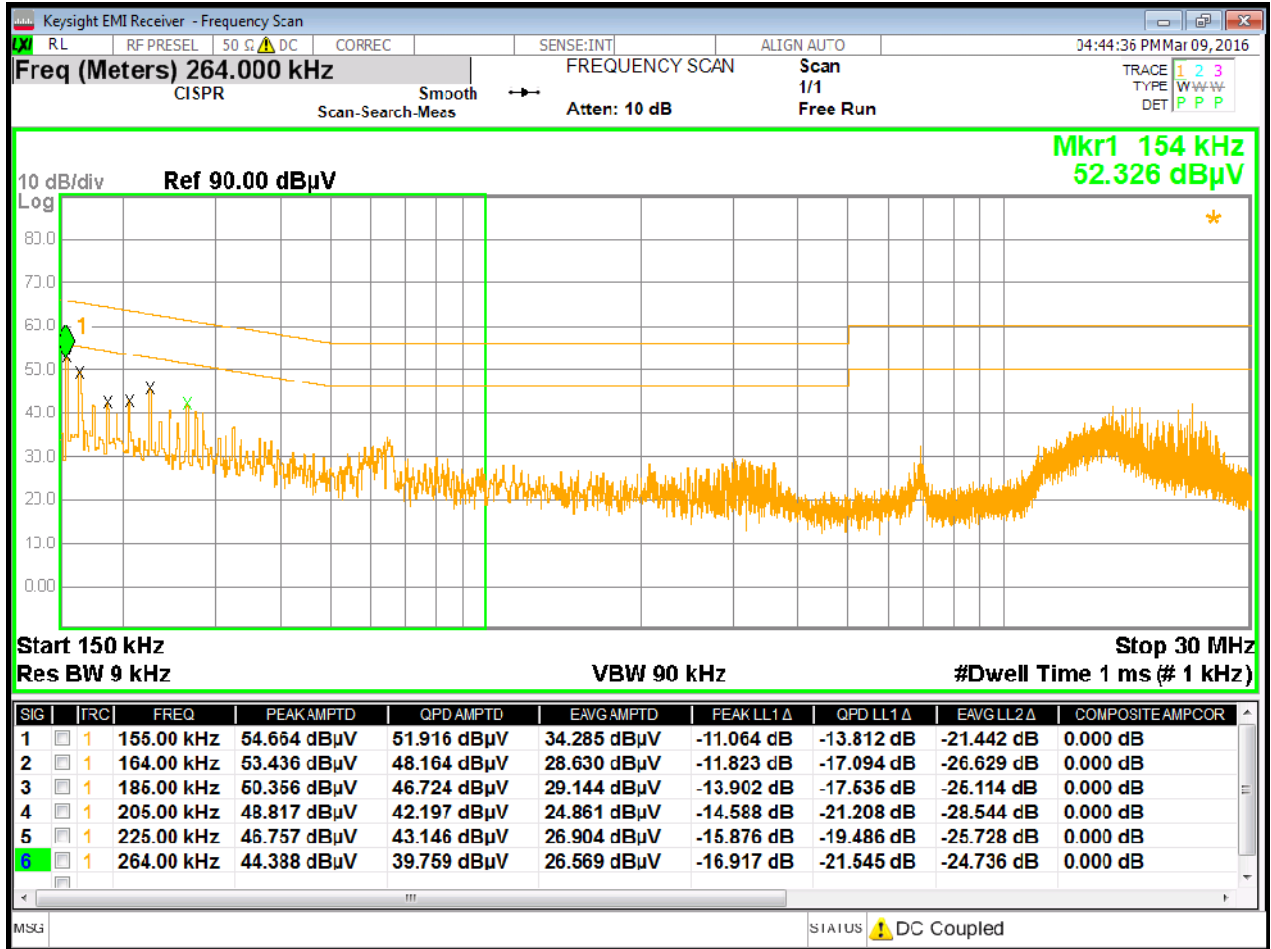


Fig. 5.3

Phase 1 of EUT
 EUT mode: Modulation type 1
 Auxiliary apparatus: Laptop whit power supply linked

B Band (0.15 – 30 MHz)

Job Number FCC-16574B
 Test Name Power line Conducted Emissions
 FCC 15.207
 EUT Name R4301 ION (UHF)

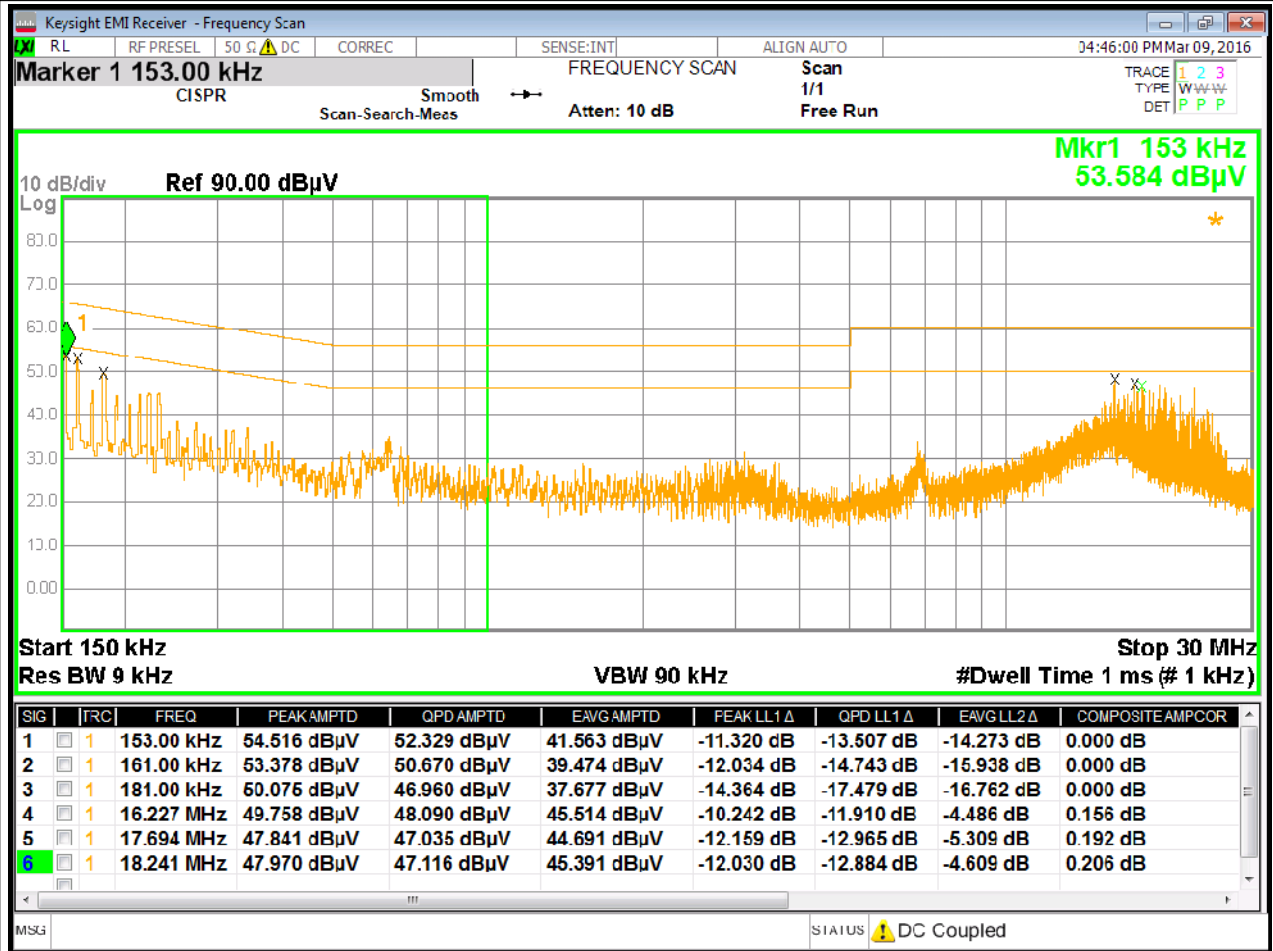


Fig. 5.4

Phase 2 of EUT
 EUT mode: Modulation type 1
 Auxiliary apparatus: Laptop whit power supply linked

B Band (0.15 – 30 MHz)

Job Number FCC-16574B
 Test Name Power line Conducted Emissions
 FCC 15.207
 EUT Name R4301 ION (UHF)

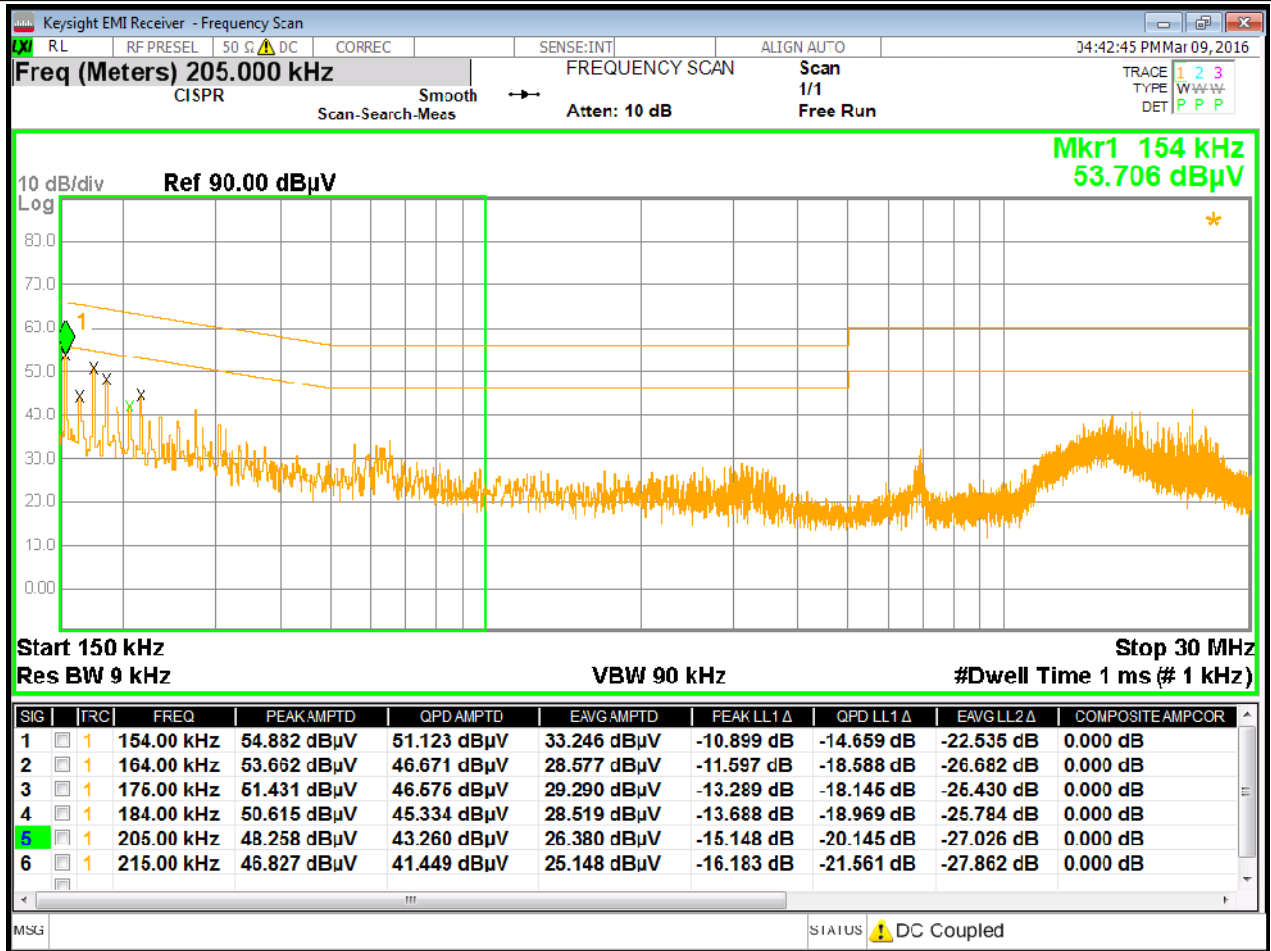


Fig. 5.5

Phase 1 of EUT
 EUT mode: Modulation type 2
 Auxiliary apparatus: Laptop whit power supply linked

B Band (0.15 – 30 MHz)

Job Number FCC-16574B
 Test Name Power line Conducted Emissions
 FCC 15.207
 EUT Name R4301 ION (UHF)

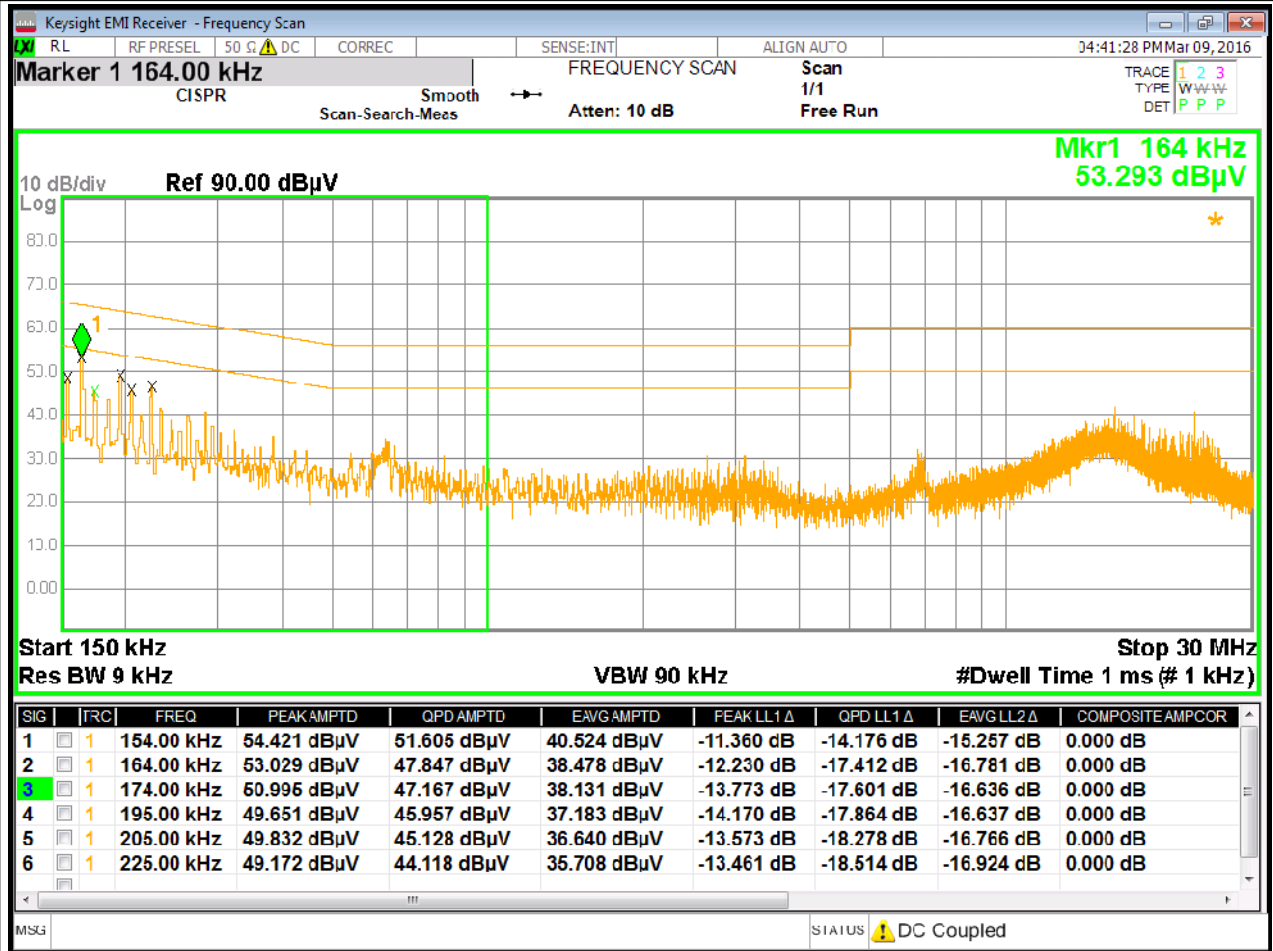


Fig. 5.6

Phase 2 of EUT
 EUT mode: Modulation type 2
 Auxiliary apparatus: Laptop whit power supply linked

B Band (0.15 – 30 MHz)

Job Number FCC-16574B
 Test Name Power line Conducted Emissions
 FCC 15.207
 EUT Name R4301 ION (UHF)

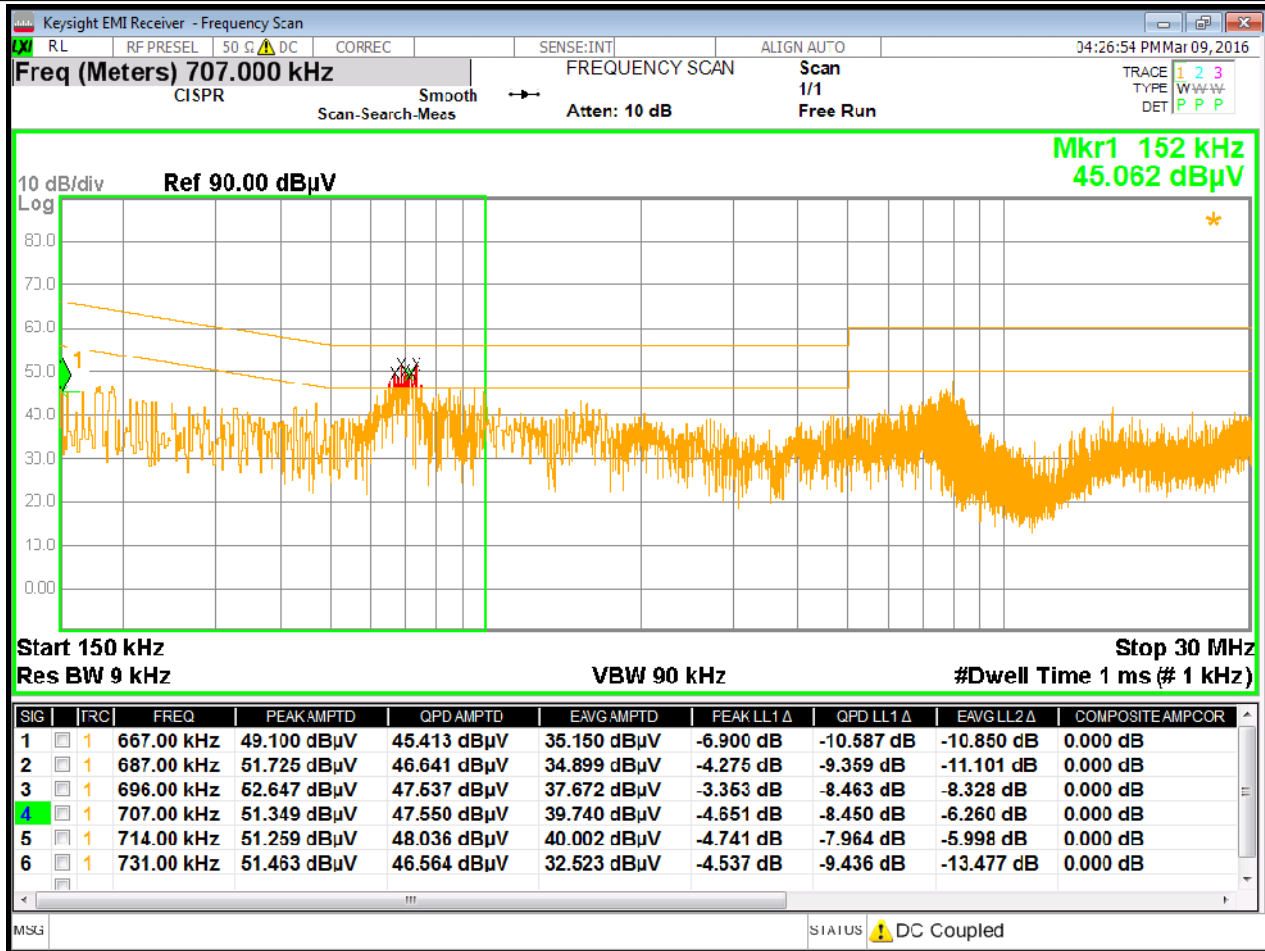


Fig. 5.7

Phase 1 of auxiliary apparatus (worst case)
 EUT mode: Standby
 Auxiliary apparatus: Laptop whit power supply linked

B Band (0.15 – 30 MHz)

Job Number FCC-16574B
 Test Name Power line Conducted Emissions
 FCC 15.207
 EUT Name R4301 ION (UHF)

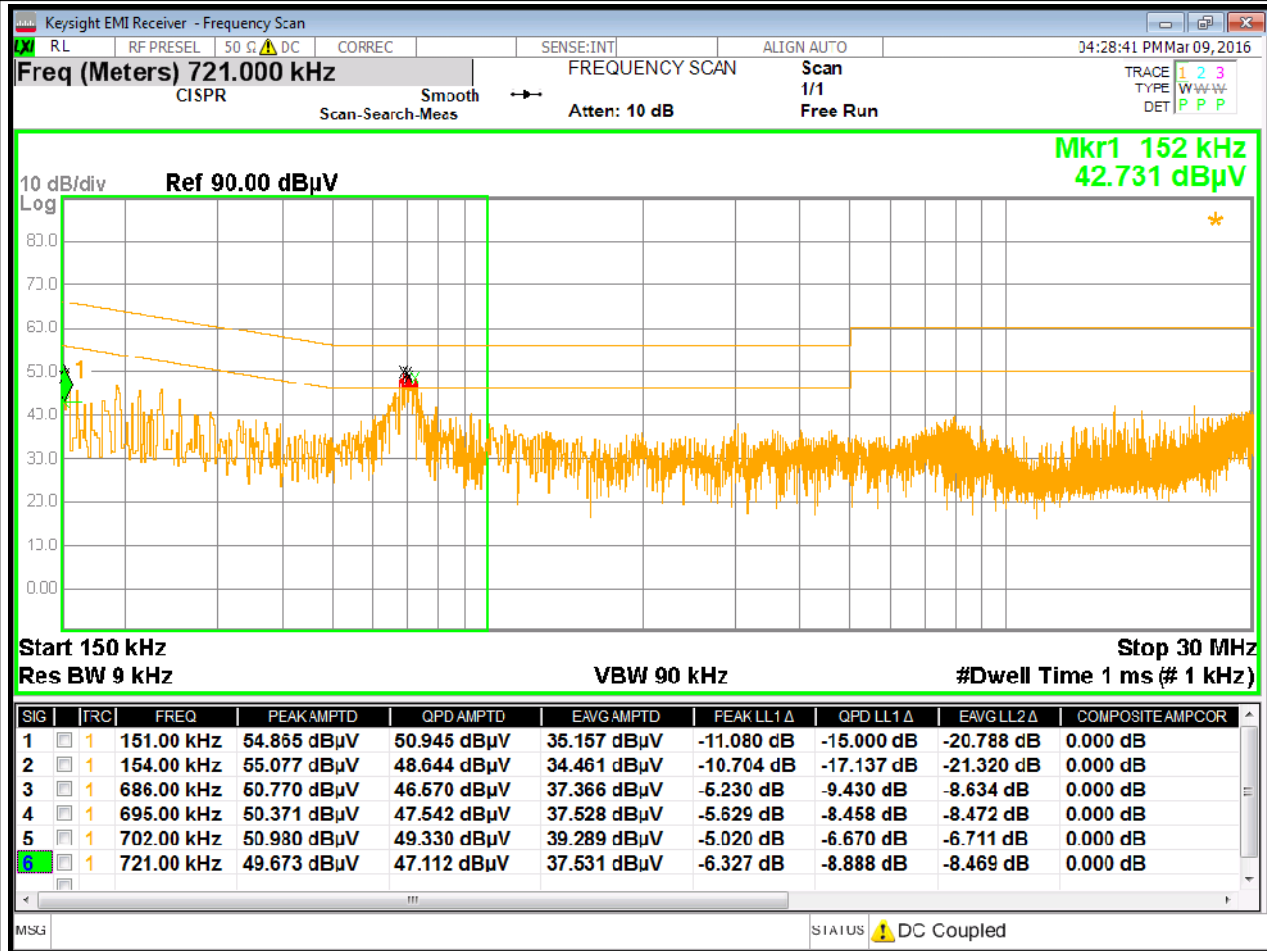


Fig. 5.8

Phase 2 of auxiliary apparatus (worst case)
 EUT mode: Standby
 Auxiliary apparatus: Laptop whit power supply linked

B Band (0.15 – 30 MHz)

Job Number FCC-16574B
 Test Name Power line Conducted Emissions
 FCC 15.207
 EUT Name R4301 ION (UHF)

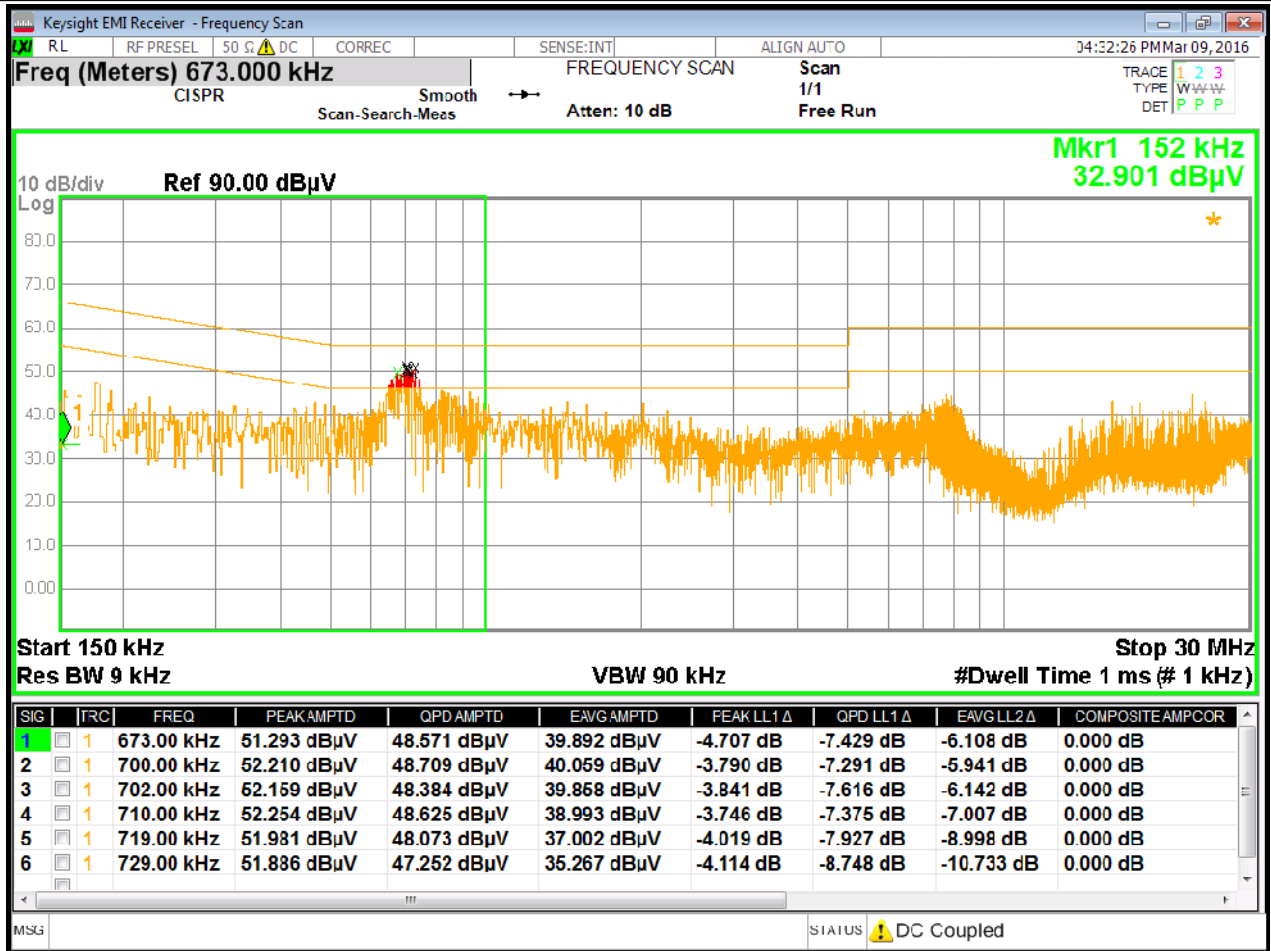


Fig. 5.9

Phase 1 of auxiliary apparatus (worst case)
 EUT mode: Modulation type 1
 Auxiliary apparatus: Laptop whit power supply linked

B Band (0.15 – 30 MHz)

Job Number FCC-16574B
 Test Name Power line Conducted Emissions
 FCC 15.207
 EUT Name R4301 ION (UHF)

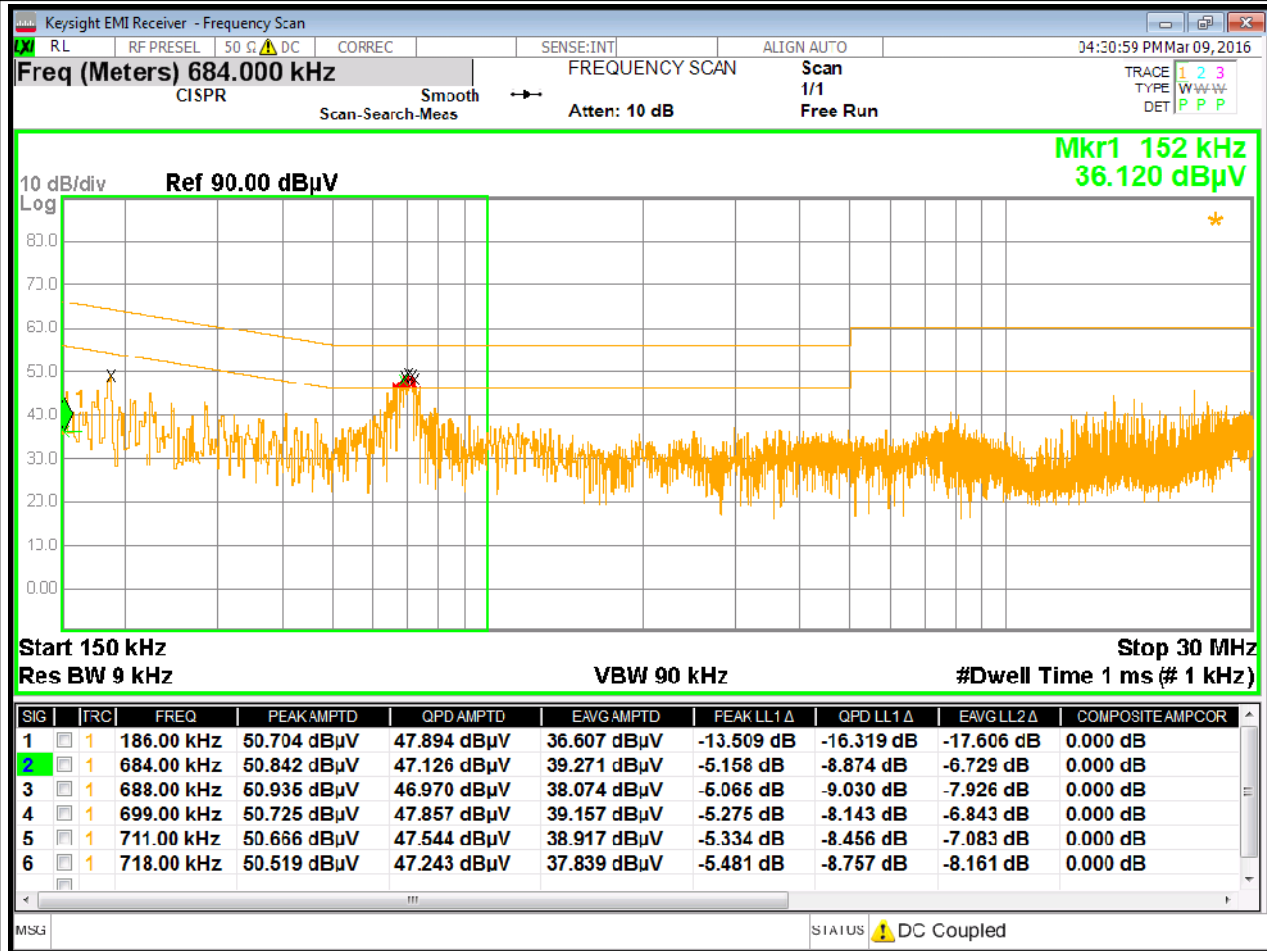


Fig. 5.10

Phase 2 of auxiliary apparatus (worst case)
 EUT mode: Modulation type 1
 Auxiliary apparatus: Laptop whit power supply linked

B Band (0.15 – 30 MHz)

Job Number FCC-16574B
 Test Name Power line Conducted Emissions
 FCC 15.207
 EUT Name R4301 ION (UHF)

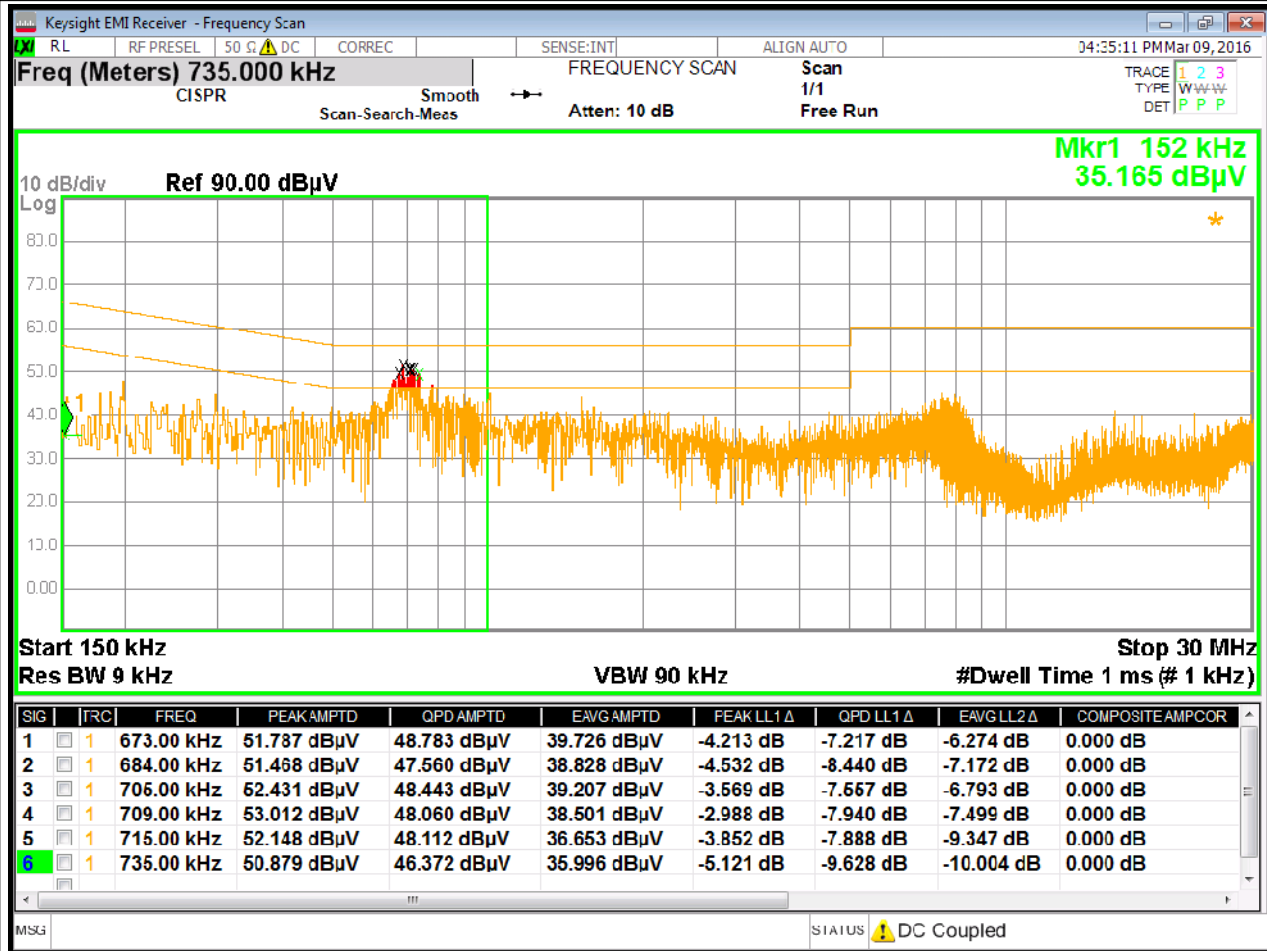


Fig. 5.11

Phase 1 of auxiliary apparatus (worst case)
 EUT mode: Modulation type 2
 Auxiliary apparatus: Laptop whit power supply linked

B Band (0.15 – 30 MHz)

Job Number FCC-16574B
 Test Name Power line Conducted Emissions
 FCC 15.207
 EUT Name R4301 ION (UHF)

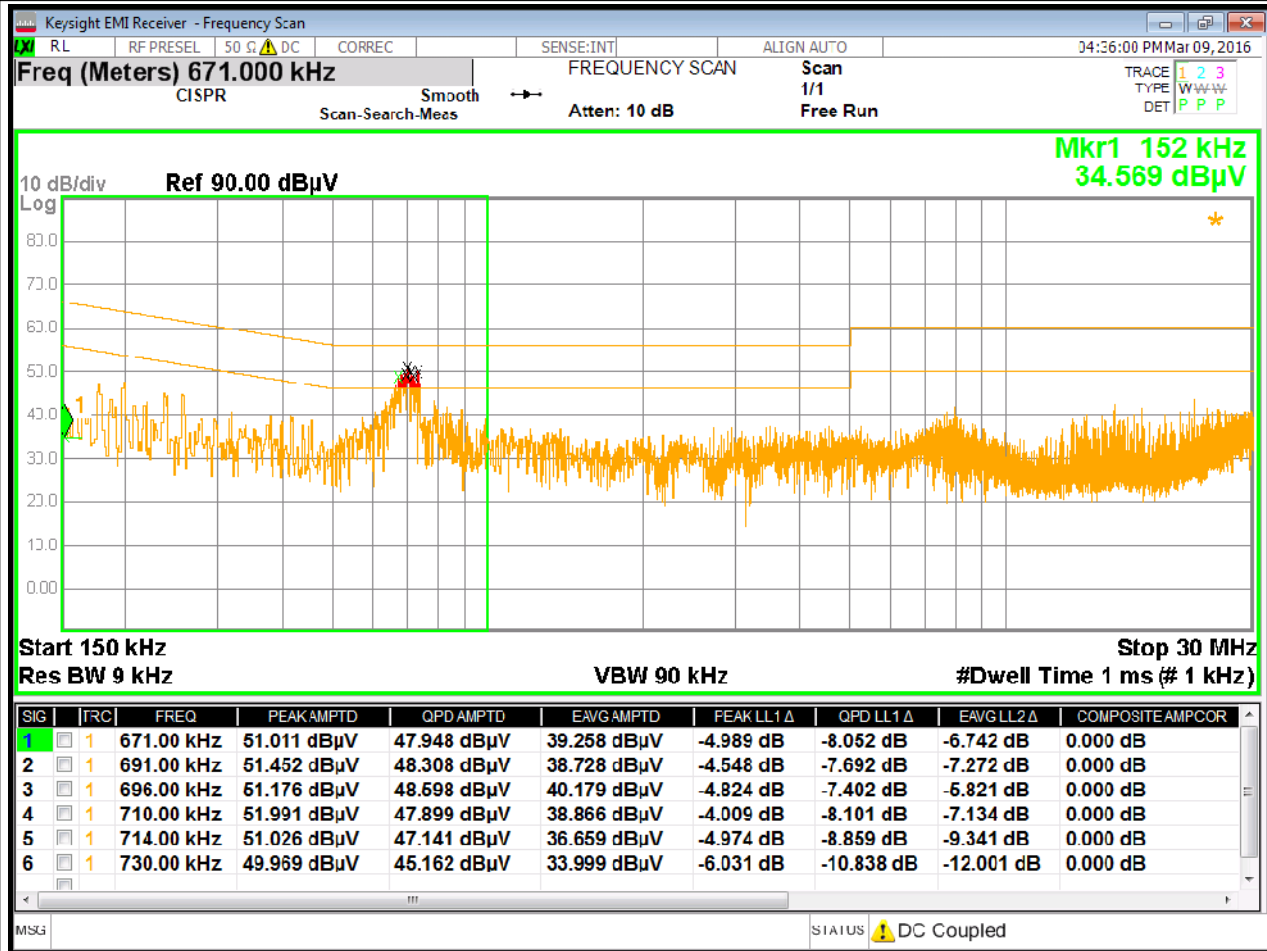


Fig. 5.12

Phase 2 of auxiliary apparatus (worst case)
 EUT mode: Modulation type 2
 Auxiliary apparatus: Laptop whit power supply linked

B Band (0.15 – 30 MHz)

6. PHOTO

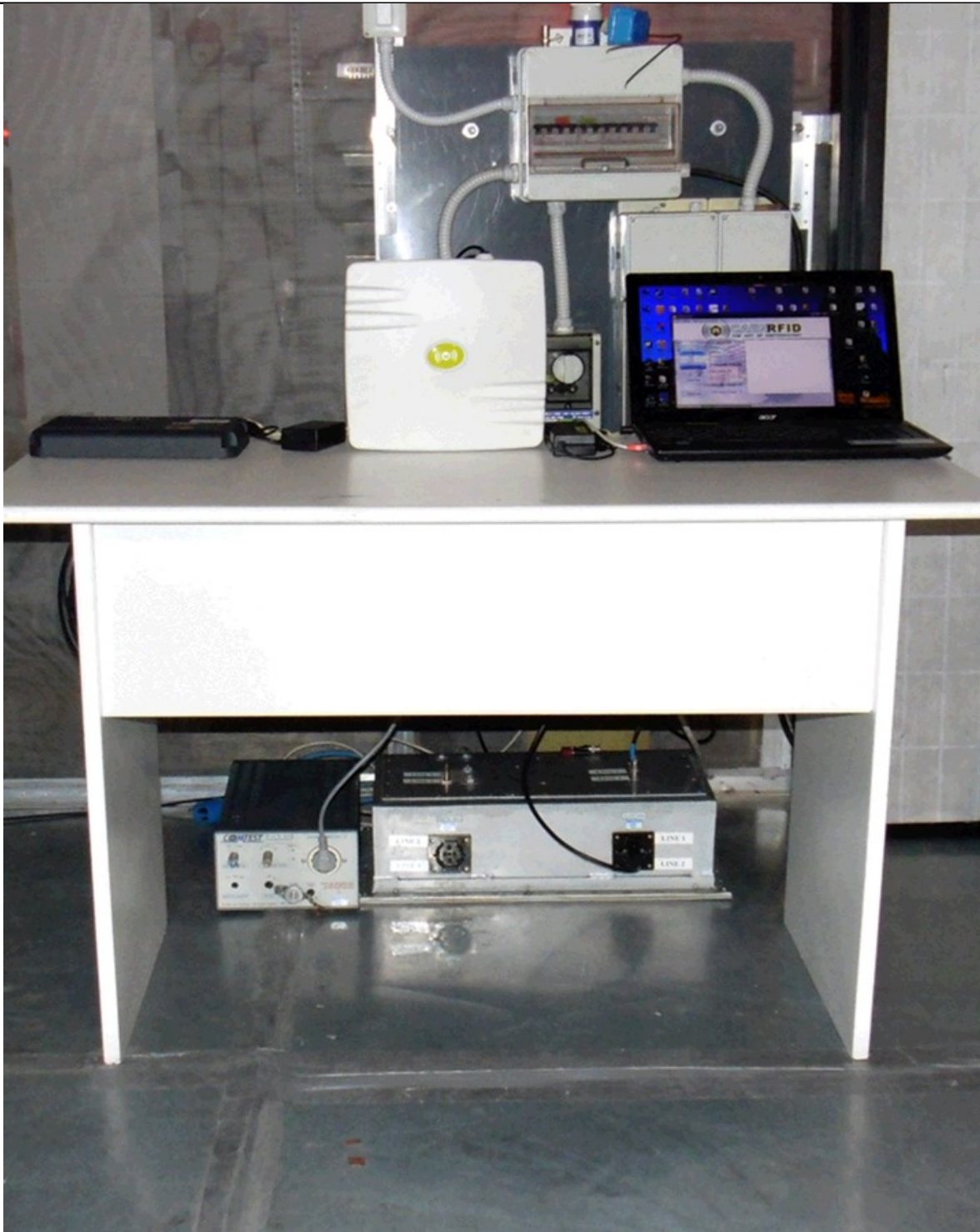


Fig. 6.1

Conducted Emissions Test Set-up

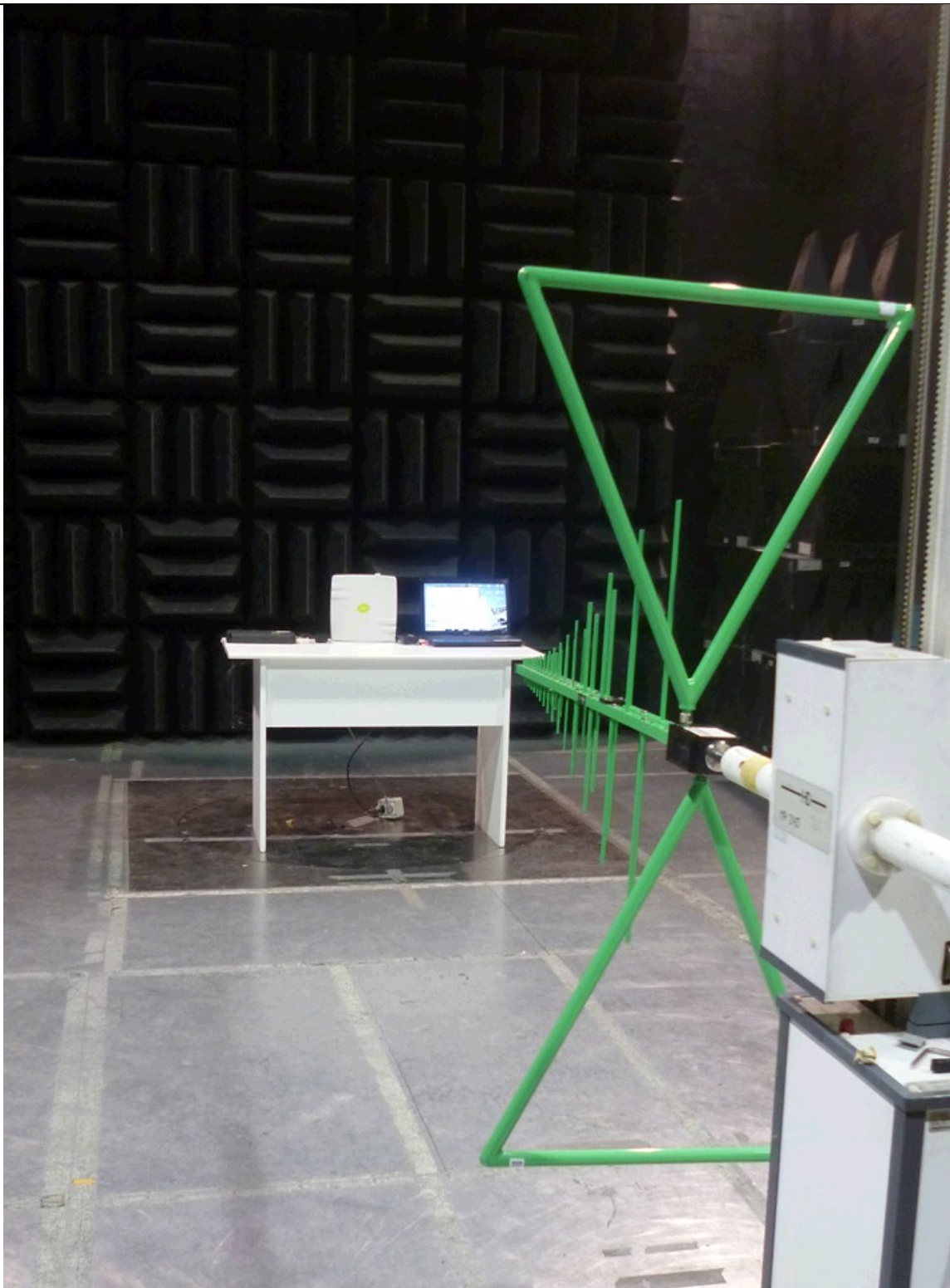


Fig. 6.2

Radiated Emissions Test Set-up