



CE MARKING

ELECTROMAGNETIC COMPATIBILITY
ELECTRICAL SAFETY
LASER SPECTROSCOPY
ENVIRONMENTAL PHYSICS

G.S.D. S.r.l.
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Certificate N. 39 00 1850509

G.S.D. Srl PISA - Italy	Test Report n. FCC-16795	Rev. 00
Manufacturer	TERTIUM Technology S.r.l.	
Address	Via G. B. Picotti, 8 56124 Pisa Italy	
Test Family Name	NFC SCANNER	
Testing Laboratory Name	G.S.D. S.r.l.	
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SENIOR EMC TEST MANAGER

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Report Revision History

Revision details

<i>Date</i>	<i>Page No.(s)</i>	<i>Details</i>
2016 December 30	21	Rev. 00 Initial issue
2017 March 17	26	Rev. 01 Second issue

1. MANUFACTURER AND EUT IDENTIFICATION¹

Manufacturer	TERTIUM Technology S.r.l..
Address	Via G. B. Picotti, 8 56124 Pisa Italy
Test Family Name	NFC SCANNER
Date of reception	2016 November 03
Sampling	Laboratory sample for certification
Test Item Description	RFID Device
Nominal Input Voltage	3,7 Vdc Li-ion Batteries rechargeable batteries via micro USB
EUT Dimensions	7.80 cm x 4.35 cm
FCC ID	Y6D-NFCLE-RW050

¹A detailed documentation is preserved in the internal fascicle.

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*Fig. 1.1
Equipment Photo*



*Fig. 1.2
Equipment Photo*

2. REFERENCE STANDARDS

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

TEST	STANDARD
Emissions: Conducted and Radiated – Section 15.207 and 15.209	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 ANSI C63.10 2013 – American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
Operation within the band 13.110-14.010 MHz: Section 15.225	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 ANSI C63.10 2013 – American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

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3. RESULT, CONDITION, MEASUREMENT UNCERTAINTY

Summary of Test Results

TEST	RESULT
<i>Emissions: conducted</i> <i>Section 15.207</i>	<i>Pass</i>
<i>Emissions: radiated</i> <i>Section 15.209</i>	<i>Pass</i>
<i>Operation within the band 13.110-14.010 MHz</i>	<i>Pass</i>

Measurement uncertainty

TEST	EXPANDED UNCERTAINTY
Conducted Emission – 50Ω/50µH AMN (150 kHz - 30 MHz)	± 3.5 dB
Radiated Emission – (Semianechoic Room) (30 MHz - 18 GHz)	± 4.7 dB
Frequency Error	± 2.5 x 10 ⁻⁷

Climatic Conditions

PARAMETER	VALUE
Temperature	(293 ± 3) K
Relative humidity	(50 ± 5) %

Extensions

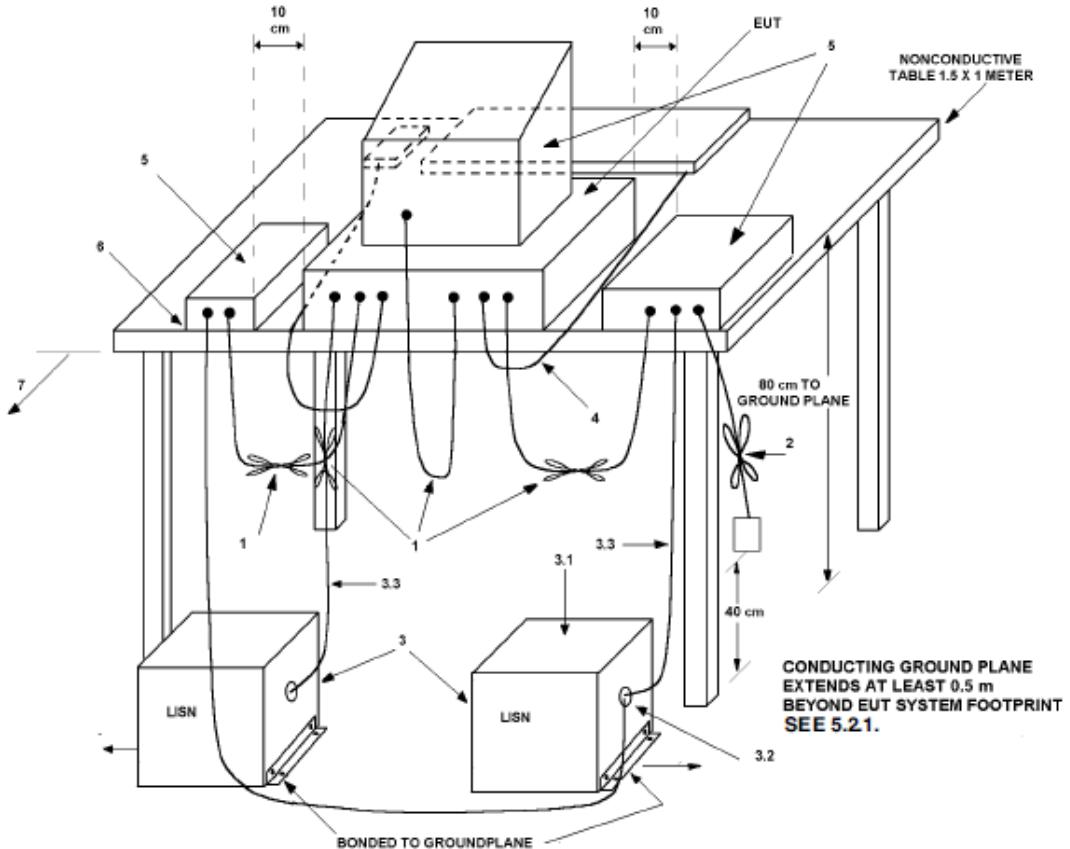
The results refer only to the sampled EUT and under the specified conditions.

Test Software:

TT_RFID_Configurator

Test Conditions:

For 15.107 and 15.109 tests equipment was connected to a PC with data exchange but not for 15.207 and 15.209 tests.



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

4. RADIATED EMISSIONS §15.209

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

FREQUENCY RANGE (MHz)	Field Strength QUASI-PEAK LIMITS [dB (μ V/m)]
0.009 to 0.490	128.5 to 93.8
0.490 to 1.705	73.8 to 63.0
1.705 to 30	69.5
30 ÷ 88	40
88 ÷ 216	43,5
216 ÷ 960	46
Above 960	54

Extrapolation below 30 MHz is calculated at 40 dB/decade

Test Equipment

EQUIPMENT	MANUFACTURER	MODEL	CAL. DUE
EMI Receiver	Agilent	N9038A	01/2017
Anechoic Chamber	Comtest	CSA01	01/2017
Loop Antenna	ETS	6115	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: RE22R02

Tests performed with equipment stand-alone and connected to a Personal Computer.

Notes

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 orthogonal planes.

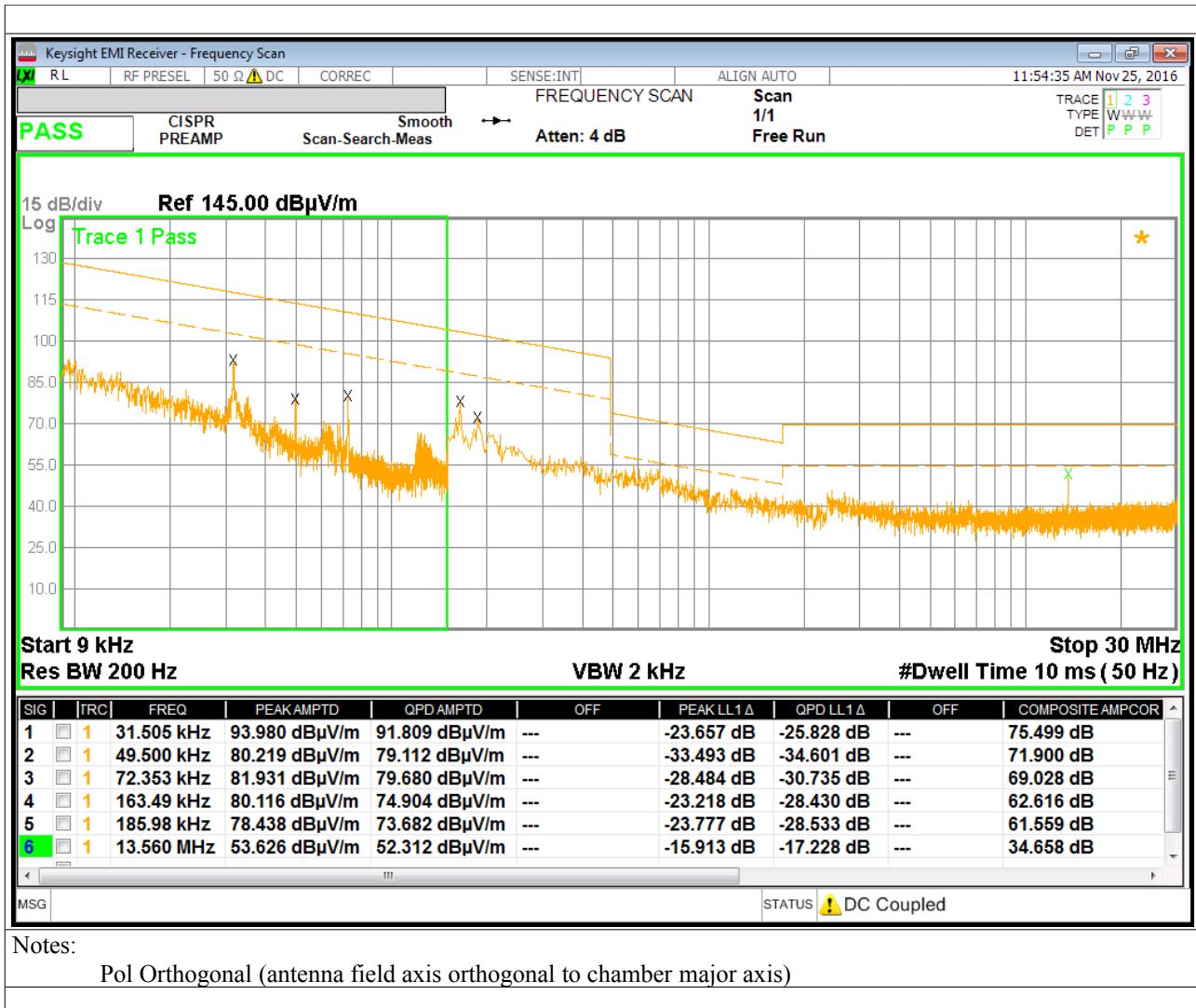
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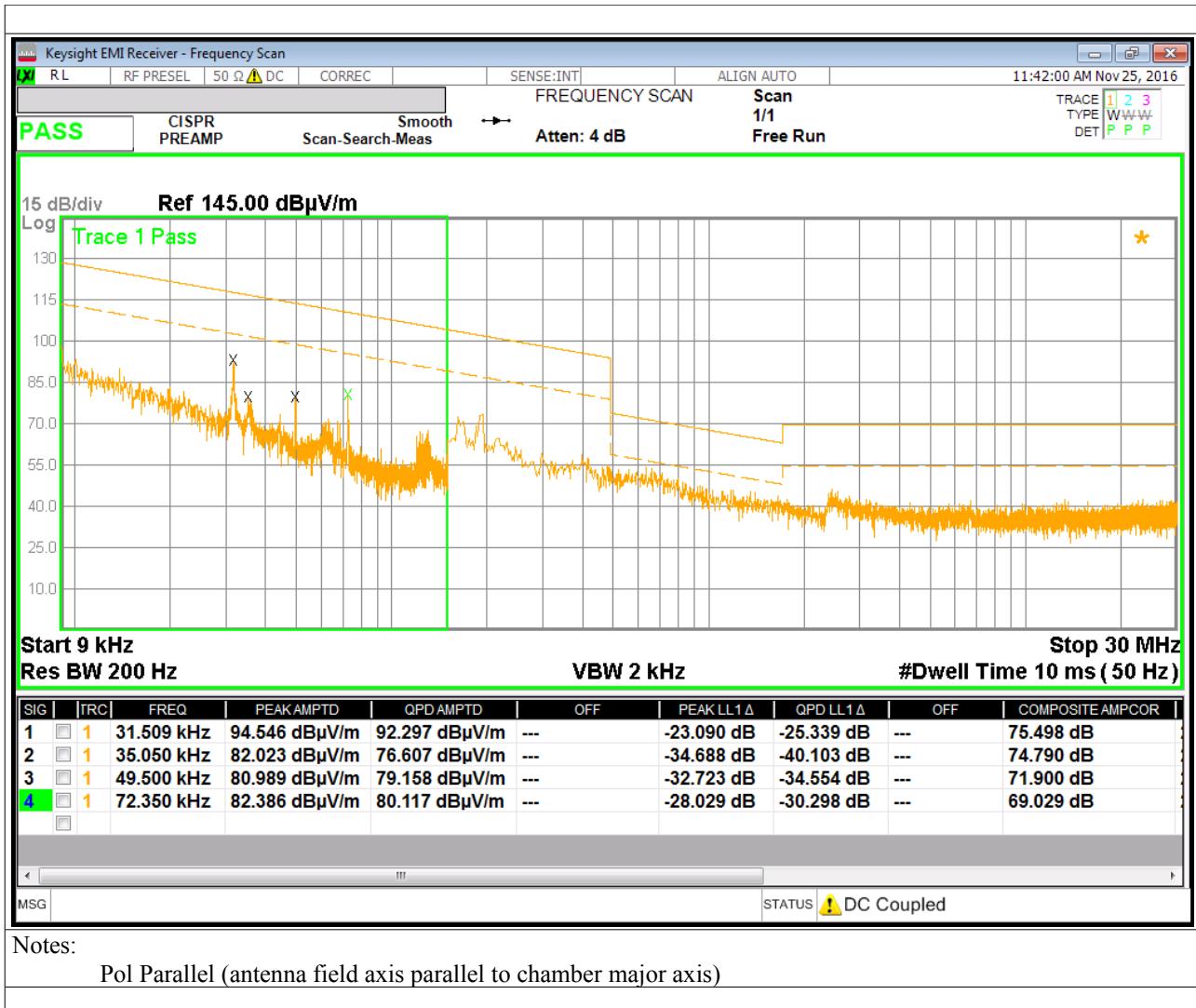
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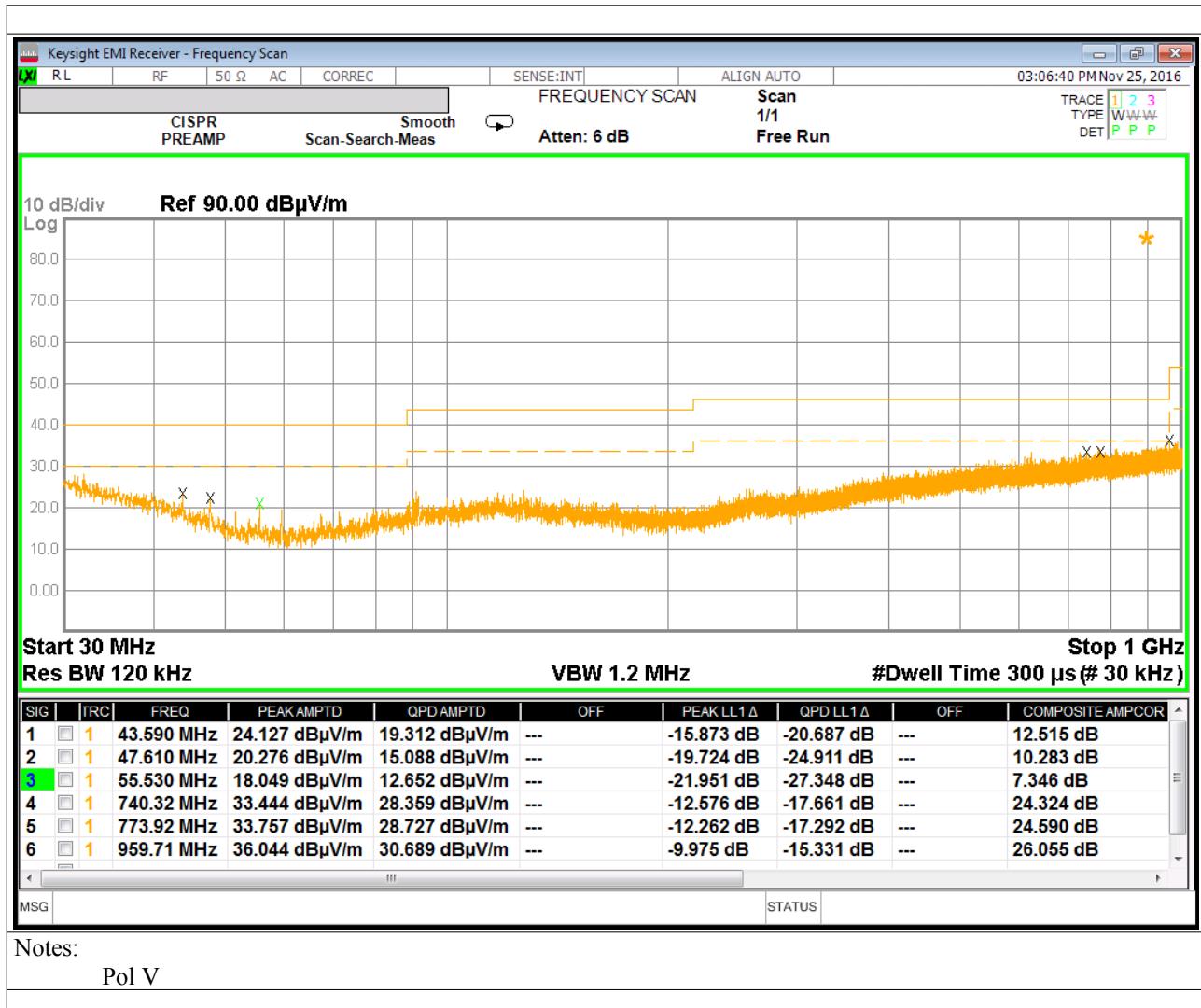
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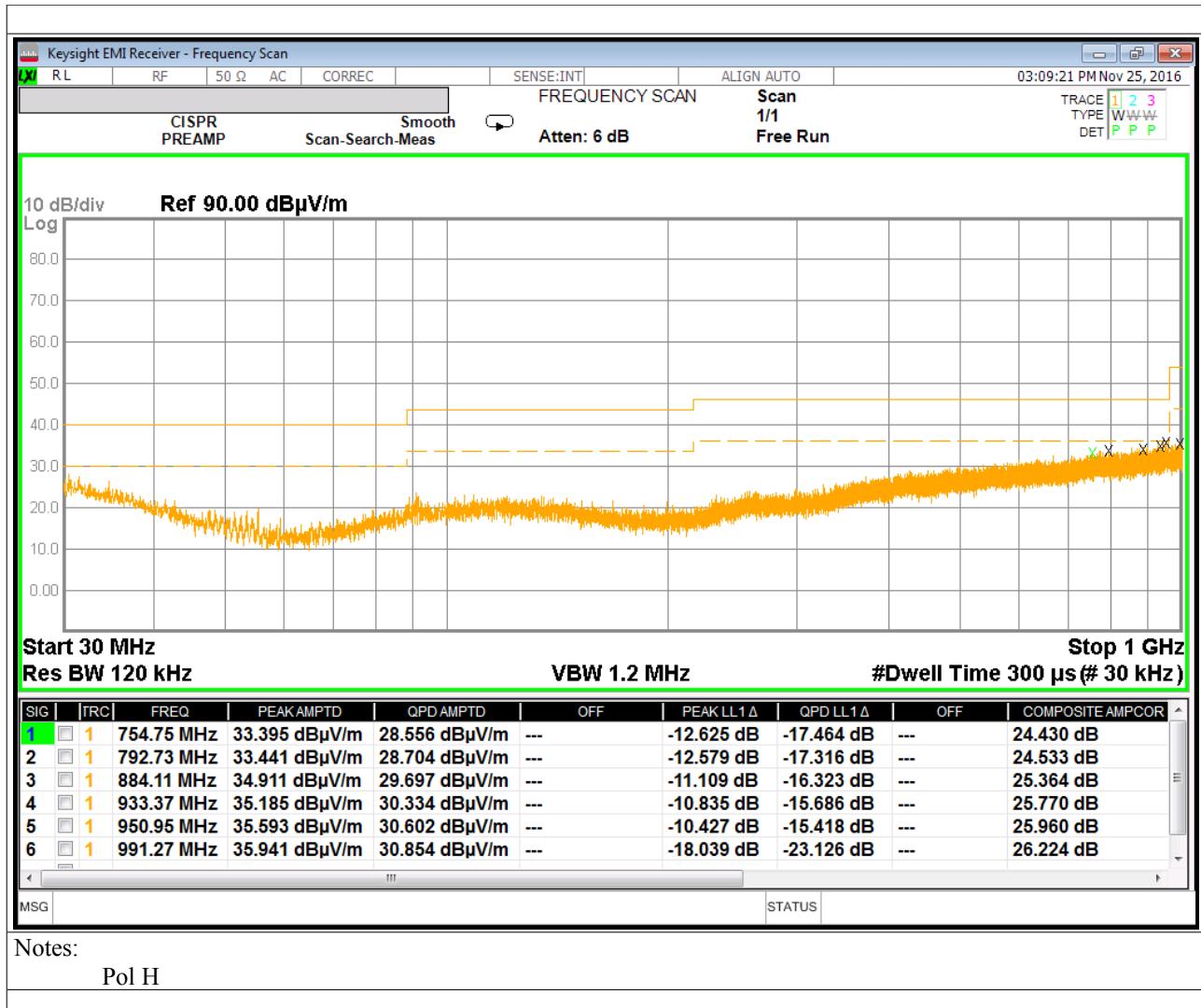
Results and conclusions

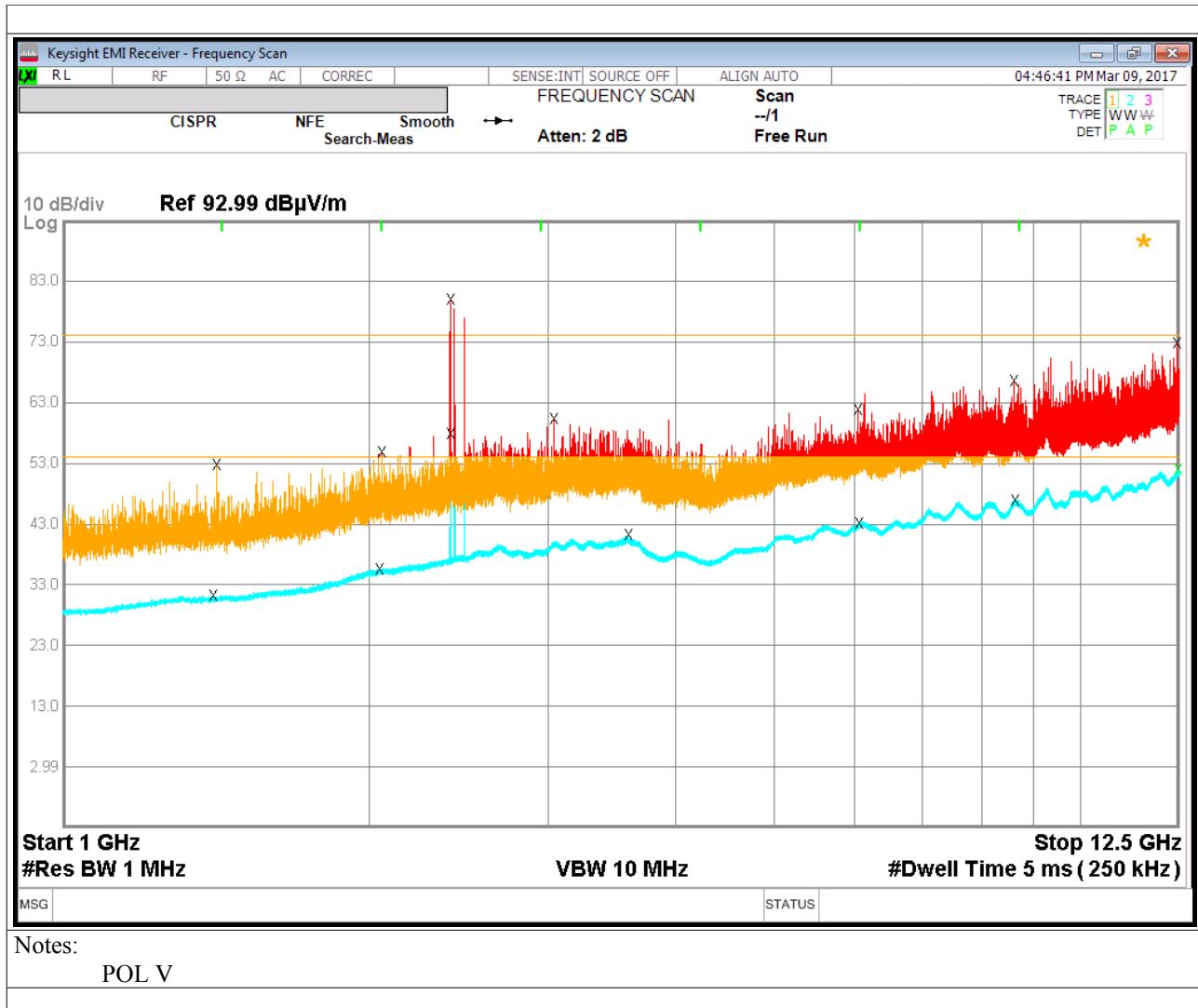
In all the operative conditions, equipment complied with the standard limits. Graphics in following figures show the most significant registrations of the performed measurements.

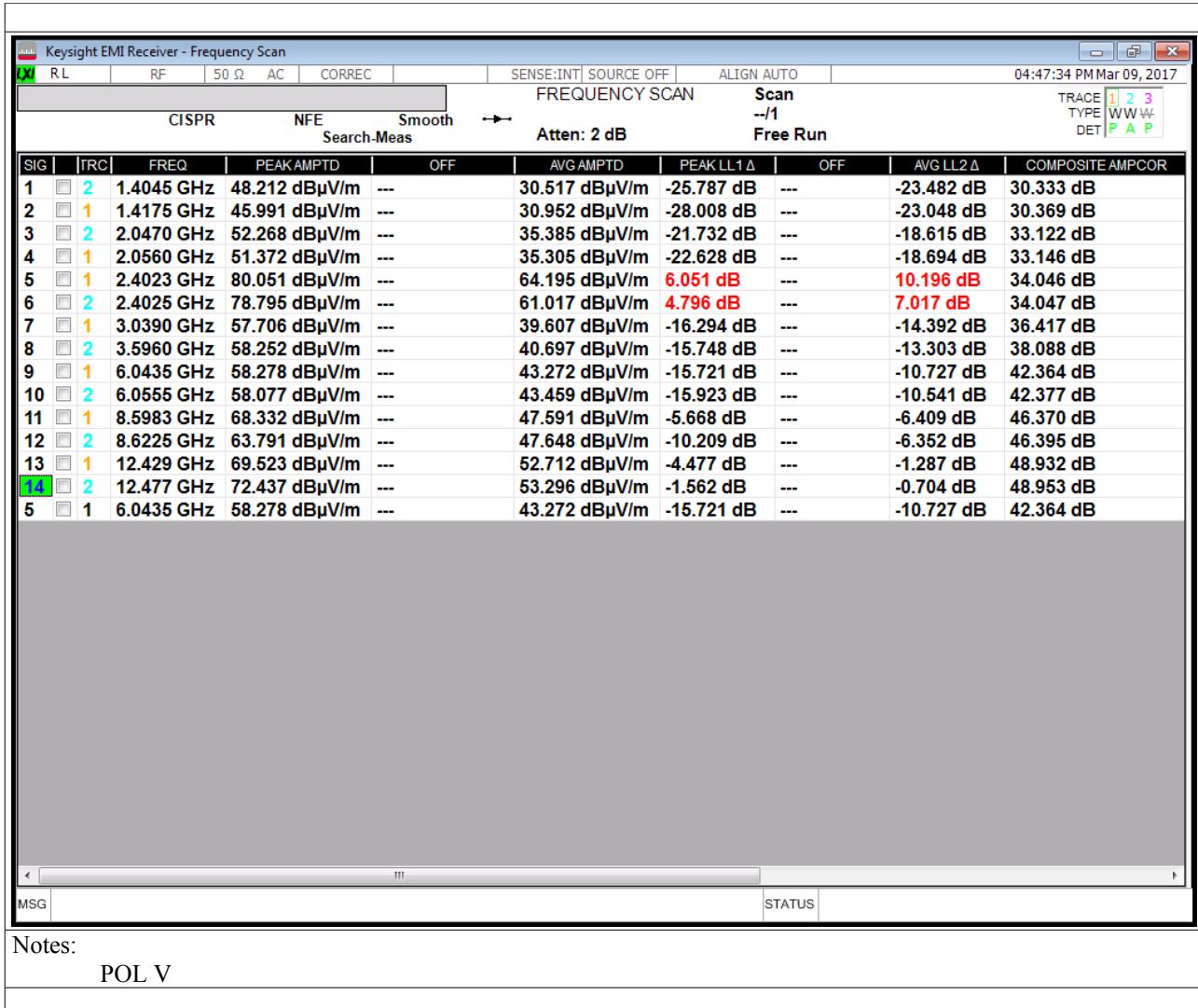


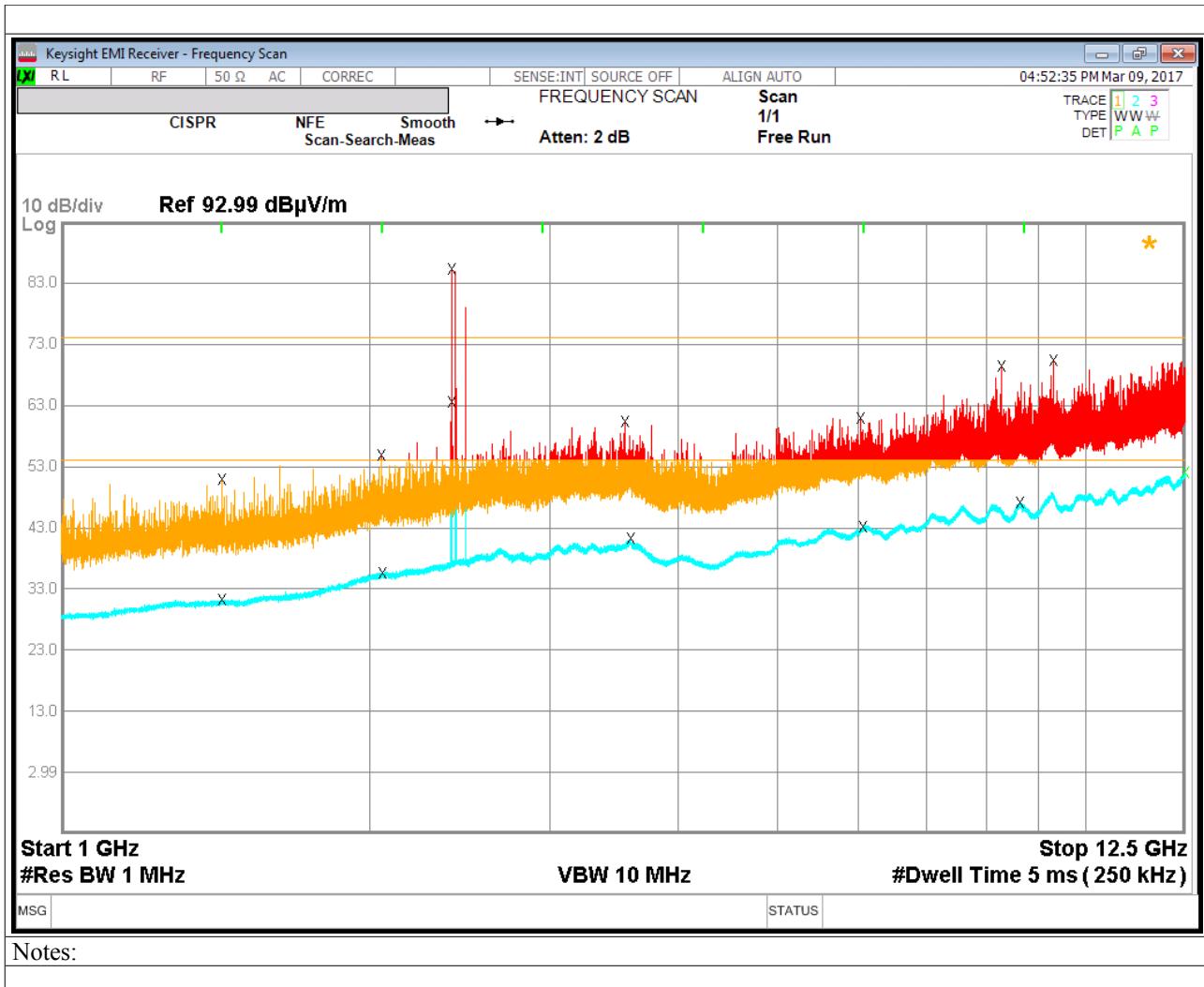


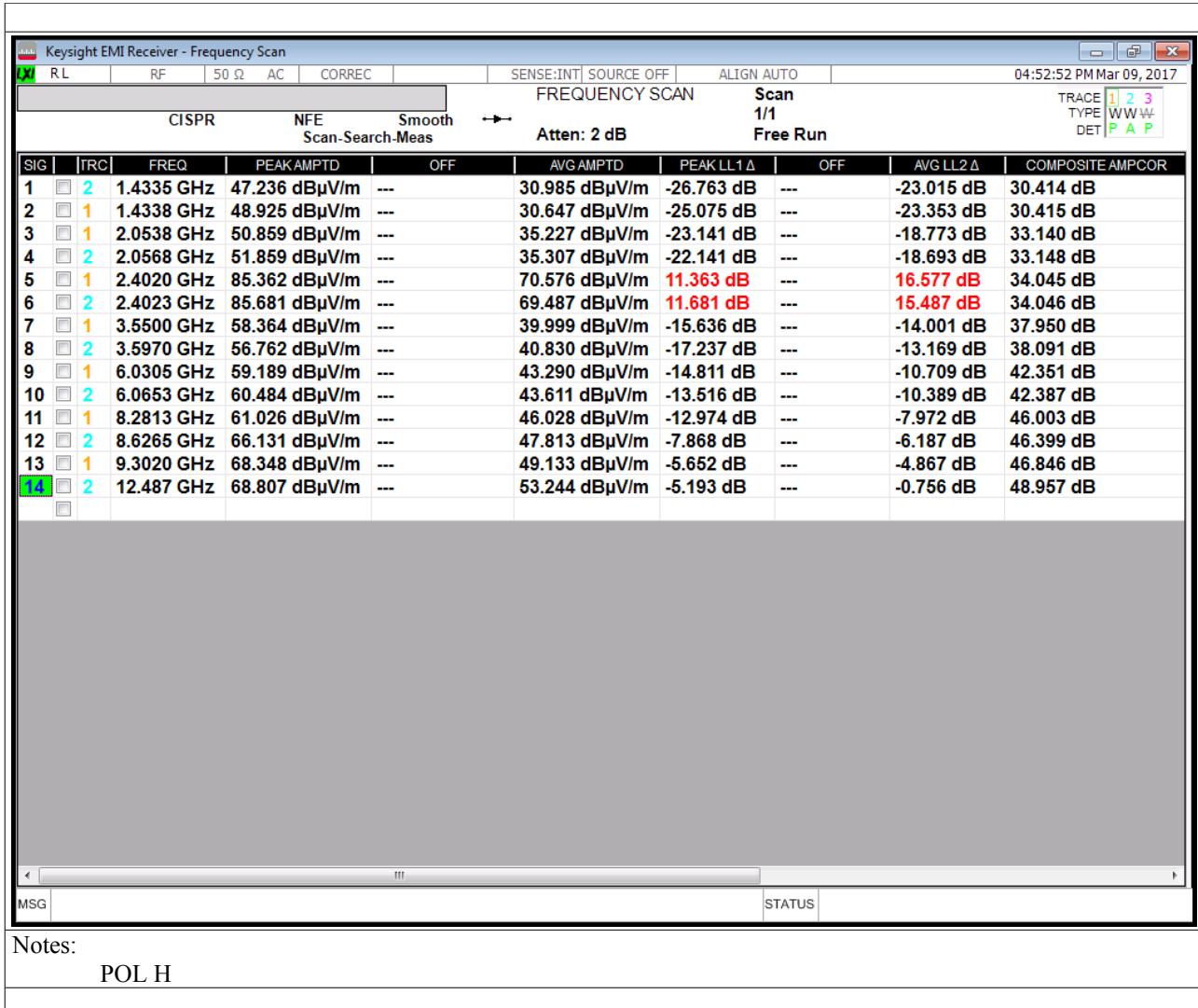












5. OPERATION WITHIN THE BAND 13.100-14.010 MHz.

(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

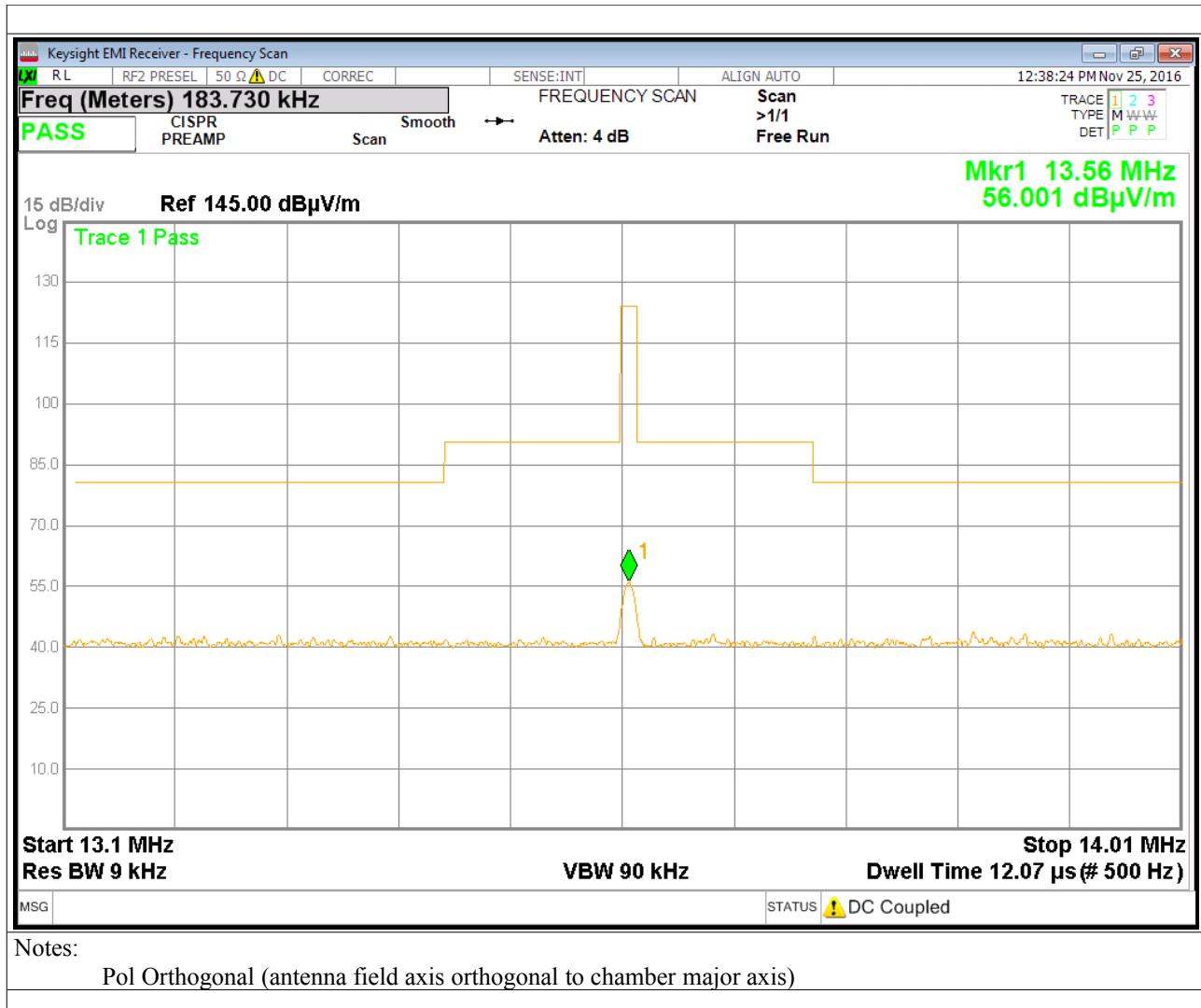
(e) The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

Test Equipment

EQUIPMENT	MANUFACTURER	MODEL	CAL. DUE
EMI Receiver	Agilent	N9038A	01/2017
Anechoic Chamber	Comtest	CSA01	01/2017
Loop Antenna	ETS	6115	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
Climatic Chamber	Weiss	201614	01/2017
Coaxial Cable	Suhner	110/01	01/2017
Attenuators	Aeroflex	48-30-43	01/2017

Test procedure: CE22R01

Note: Preliminary measurement to an OATs was performed: same results as in GSD CSA01 Anechoic Chamber.





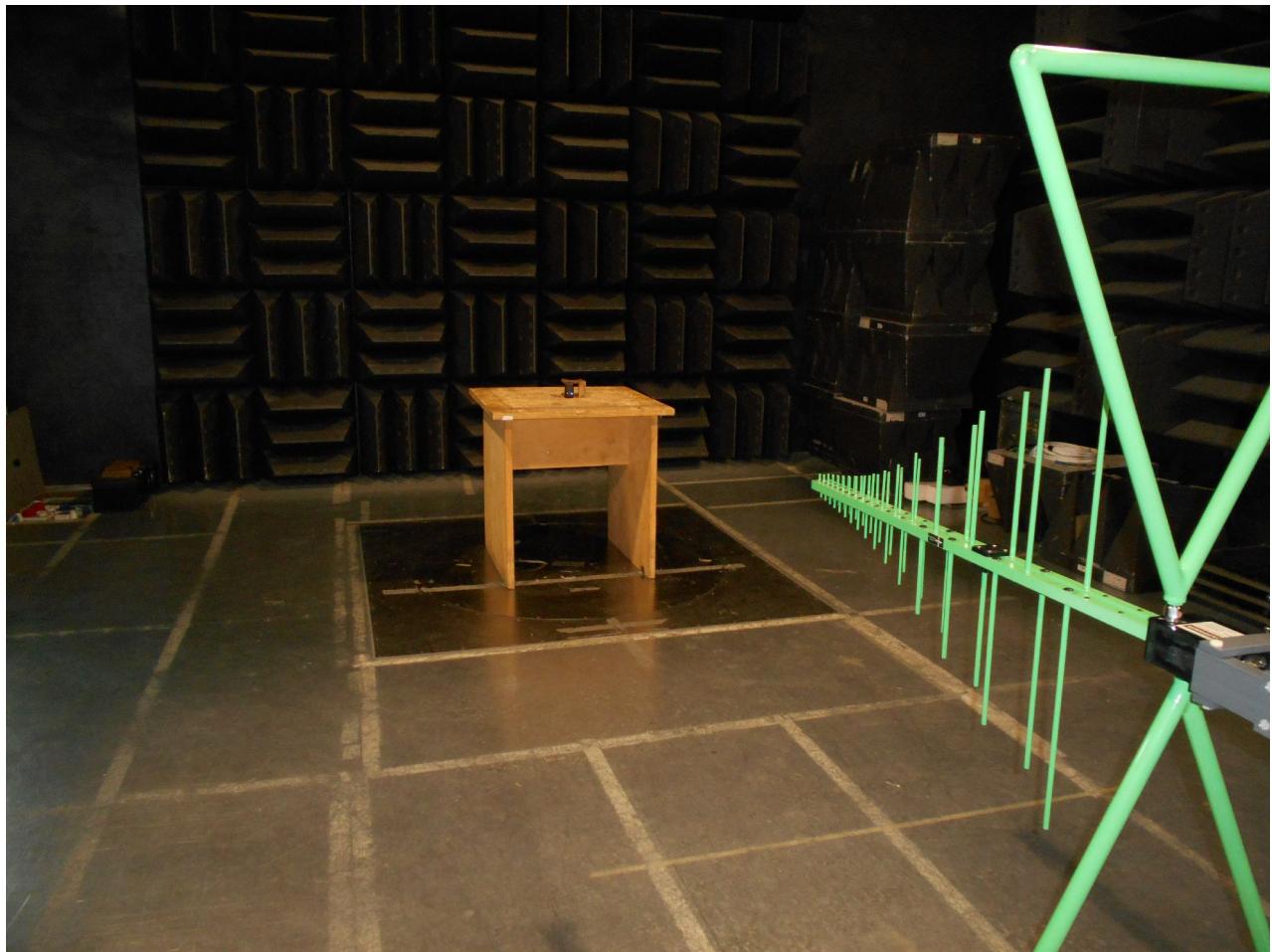
FREQUENCY ERROR OR FREQUENCY DRIFT OF 13.56 MHz CARRIER

T (°C)	V (VOLT)	F NORMAL (MHz)	F EXTREME (MHz)	ERROR (PPM)	LIMIT (PPM)	REMARKS	PASS (YES/No)
20.0	3.7	13.560015					
-20.0	3.7	13.560015	13.559935	-6	100		YES
-10.0	3.7	13.560015	13.559975	-3	100		YES
0.0	3.7	13.560015	13.560050	3	100		YES
10.0	3.7	13.560015	13.560030	1	100		YES
30.0	3.7	13.560015	13.560030	1	100		YES
40.0	3.7	13.560015	13.560015	0	100		YES
50.0	3.7	13.560015	13.560010	0	100		YES

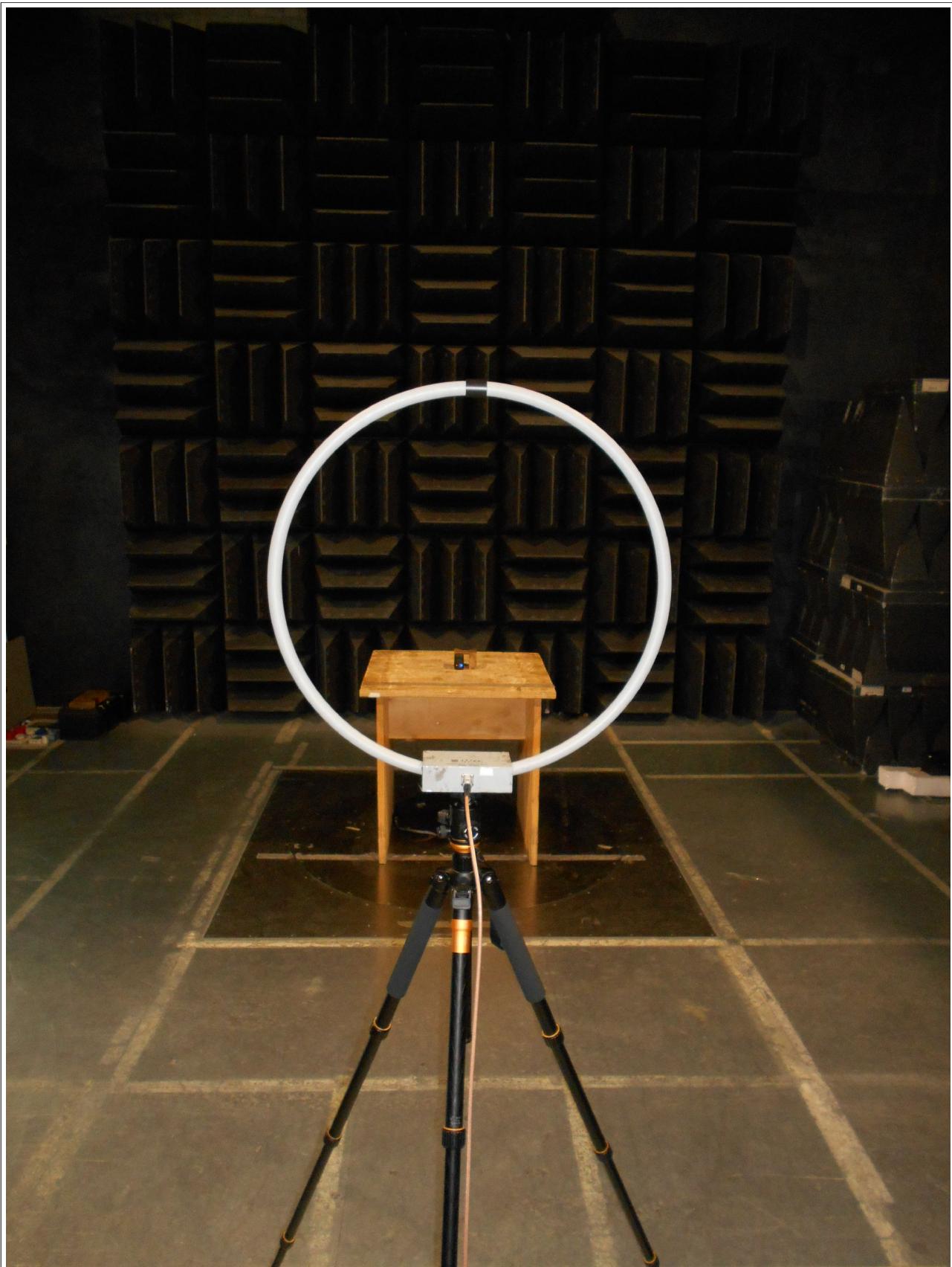
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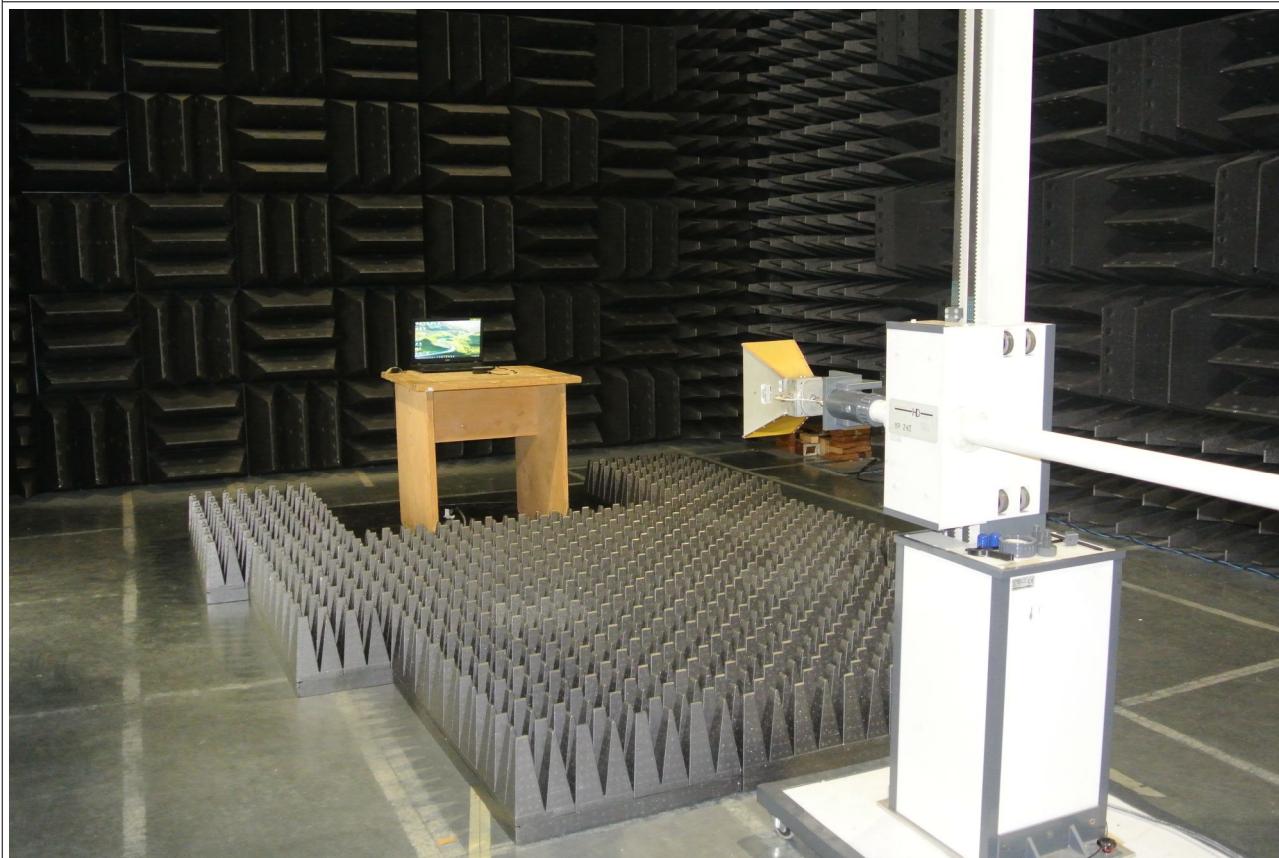
6. PHOTO



*Fig. 6.1
Radiated Emissions*



*Fig. 6.2
Radiated Emissions*



*Fig. 6.3
Radiated Emissions*



*Fig. 6.4
Frequency Error Test Set-up*