

 CE MARKING <i>ELECTROMAGNETIC COMPATIBILITY</i> <i>ELECTRICAL SAFETY</i> <i>LASER SPECTROSCOPY</i> <i>ENVIRONMENTAL PHYSICS</i>		G.S.D. S.r.l. Certified in accordance with UNI EN ISO 9001:2008 by TÜV Rheinland Italia S.r.l. 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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		FCC Listed: Registration Number: 424037			
Location and Date of Issue		Pisa, 2016 December 30			
<div style="text-align: center;"> G.S.D. s.r.l. Via Marmiceto, 8 56121 OSPEDALETTO - PISA Tel. 050.984254 - Fax 050.984262 P. IVA 01343950505 </div> <div style="display: flex; justify-content: space-between; margin-top: 20px;"> <div style="width: 45%;"> SENIOR EMC TEST MANAGER <i>Dr. Gian Luca Genovesi</i>  </div> <div style="width: 45%;"> QUALITY MANAGER <i>Dr. David Pelliccia</i>  </div> </div>					
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Report Revision History		
<i>Revision details</i>		
<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.



*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:

<i>TEST</i>	<i>STANDARD</i>
Emissions: Conducted and Radiated – Section 15.207 and 15.209	<p>FCC Rules and Regulations, Title 47 Part 15 – Sub part C</p> <p>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</p> <p>ANSI C63.10 2013 – American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices</p>
Operation within the band 13.110-14.010 MHz: Section 15.225	<p>FCC Rules and Regulations, Title 47 Part 15 – Sub part C</p> <p>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</p> <p>ANSI C63.10 2013 – American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices</p>

3. RESULT, CONDITION, MEASUREMENT UNCERTAINTYSummary of Test Results

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

Measurement uncertainty

<i>TEST</i>	<i>EXPANDED UNCERTAINTY</i>
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

<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.

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.

4. RADIATED EMISSIONS §15.209

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

FREQUENCY RANGE (MHz)	<i>Field Strenght</i> QUASI-PEAK LIMITS [dB (μV/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 conncted 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.

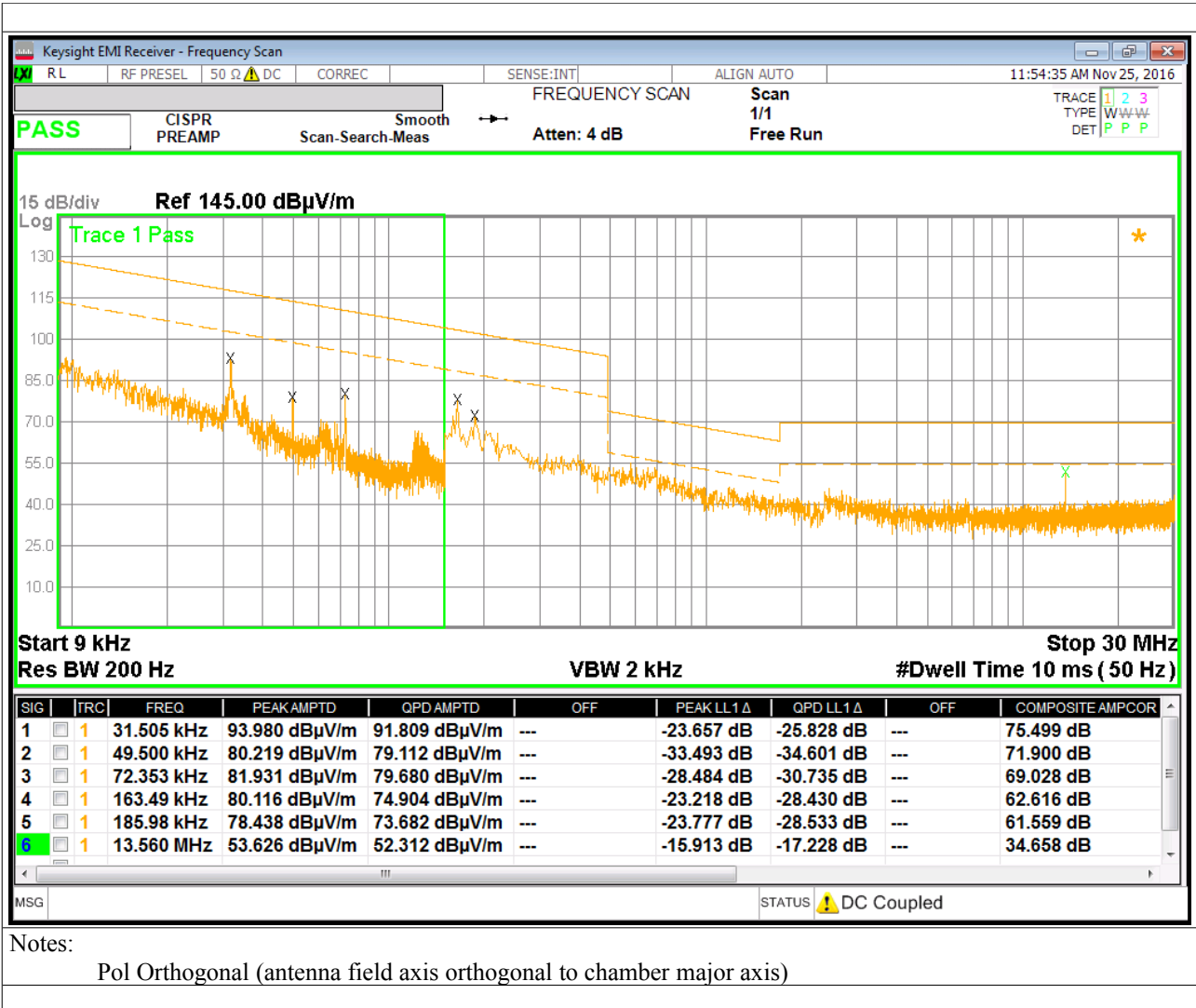
EUT was tested in the three ortogonal planes.

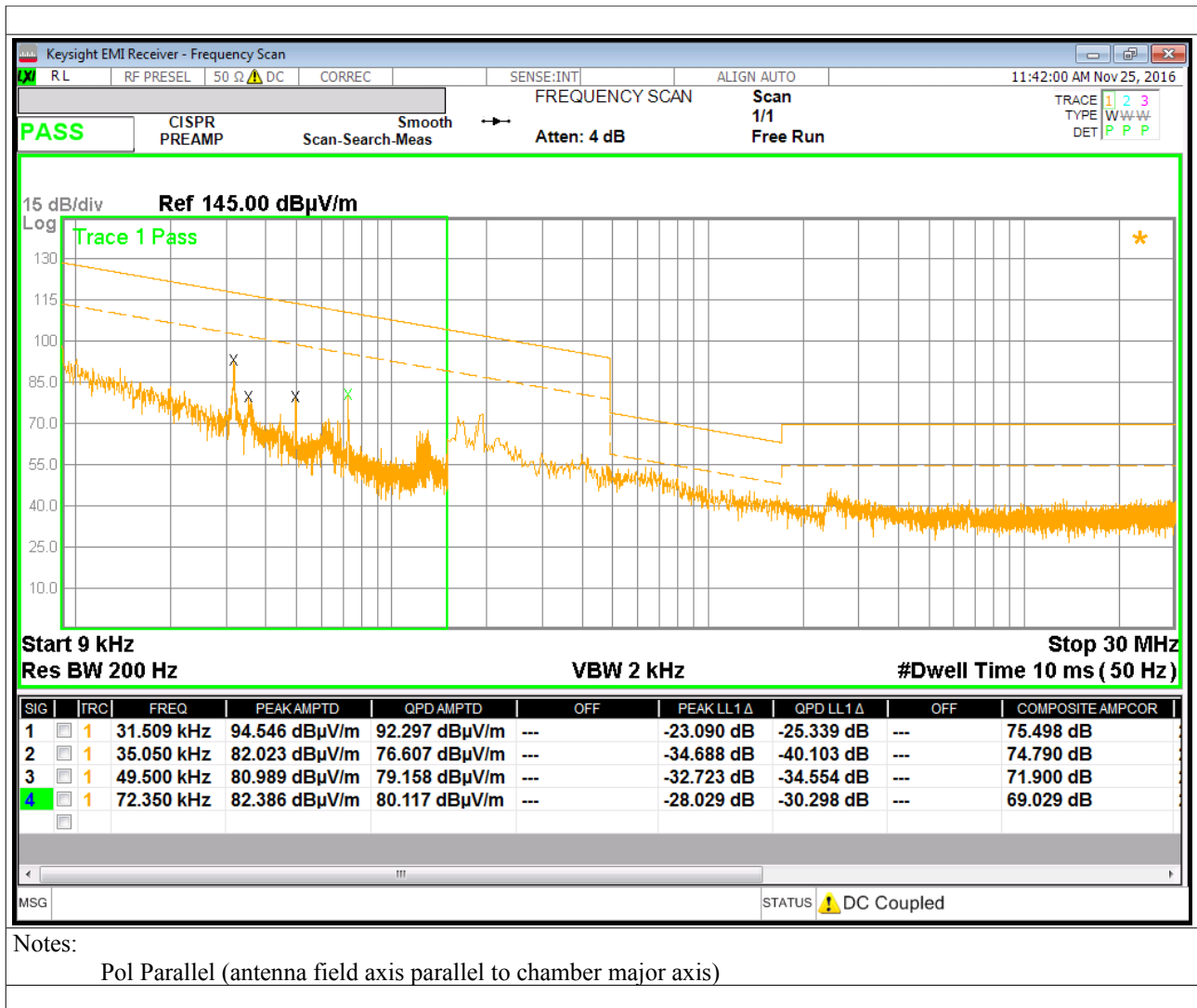
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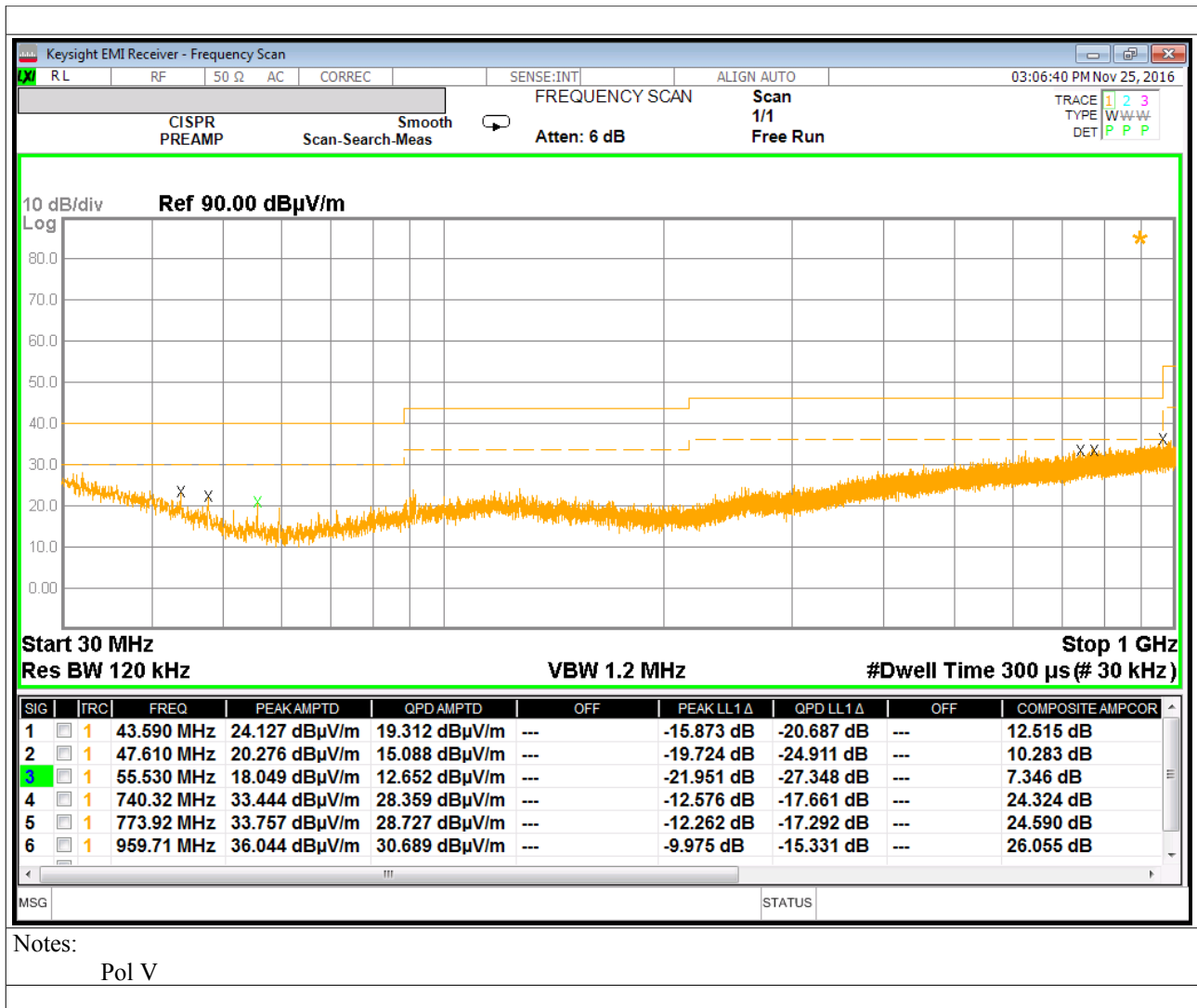
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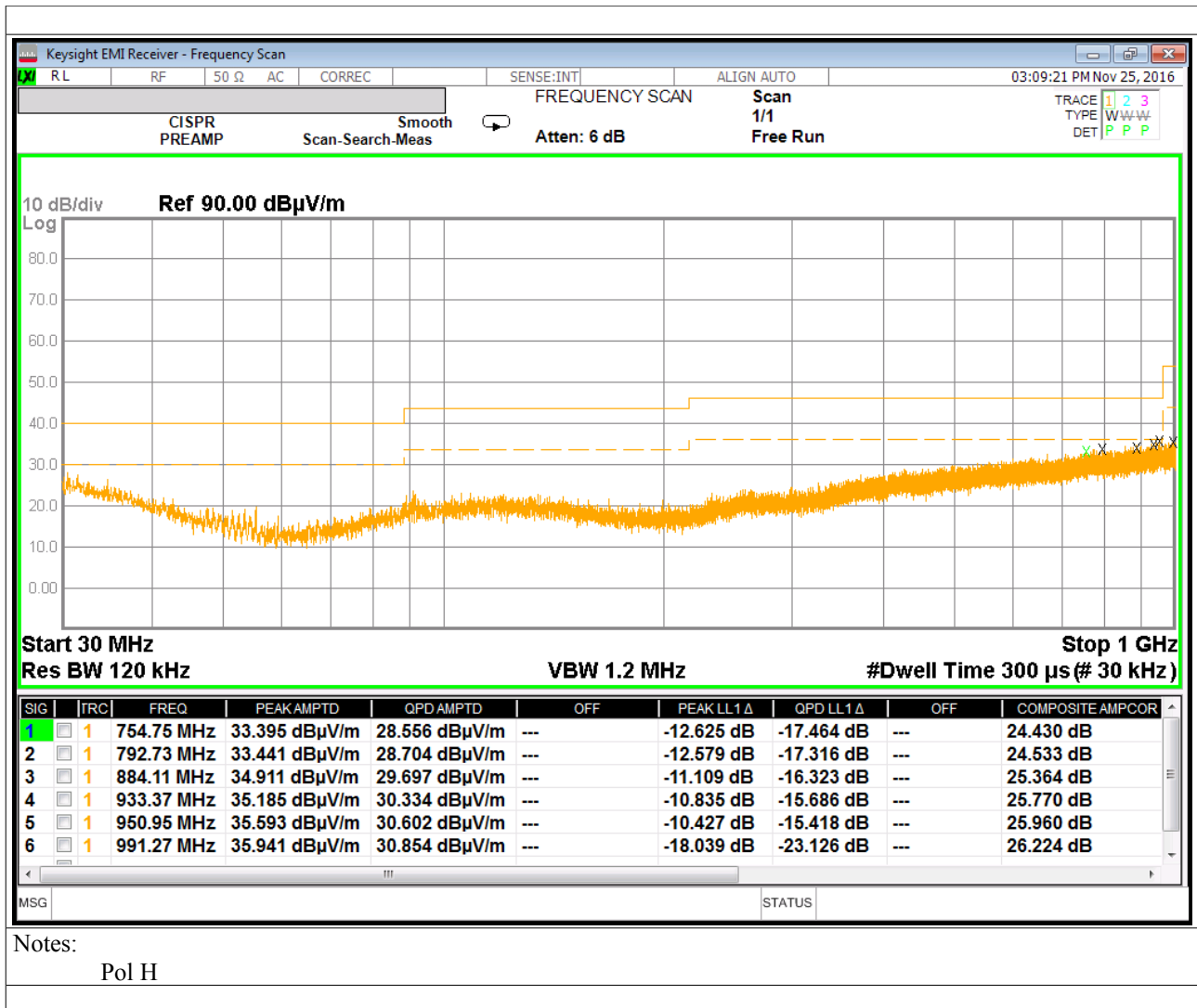
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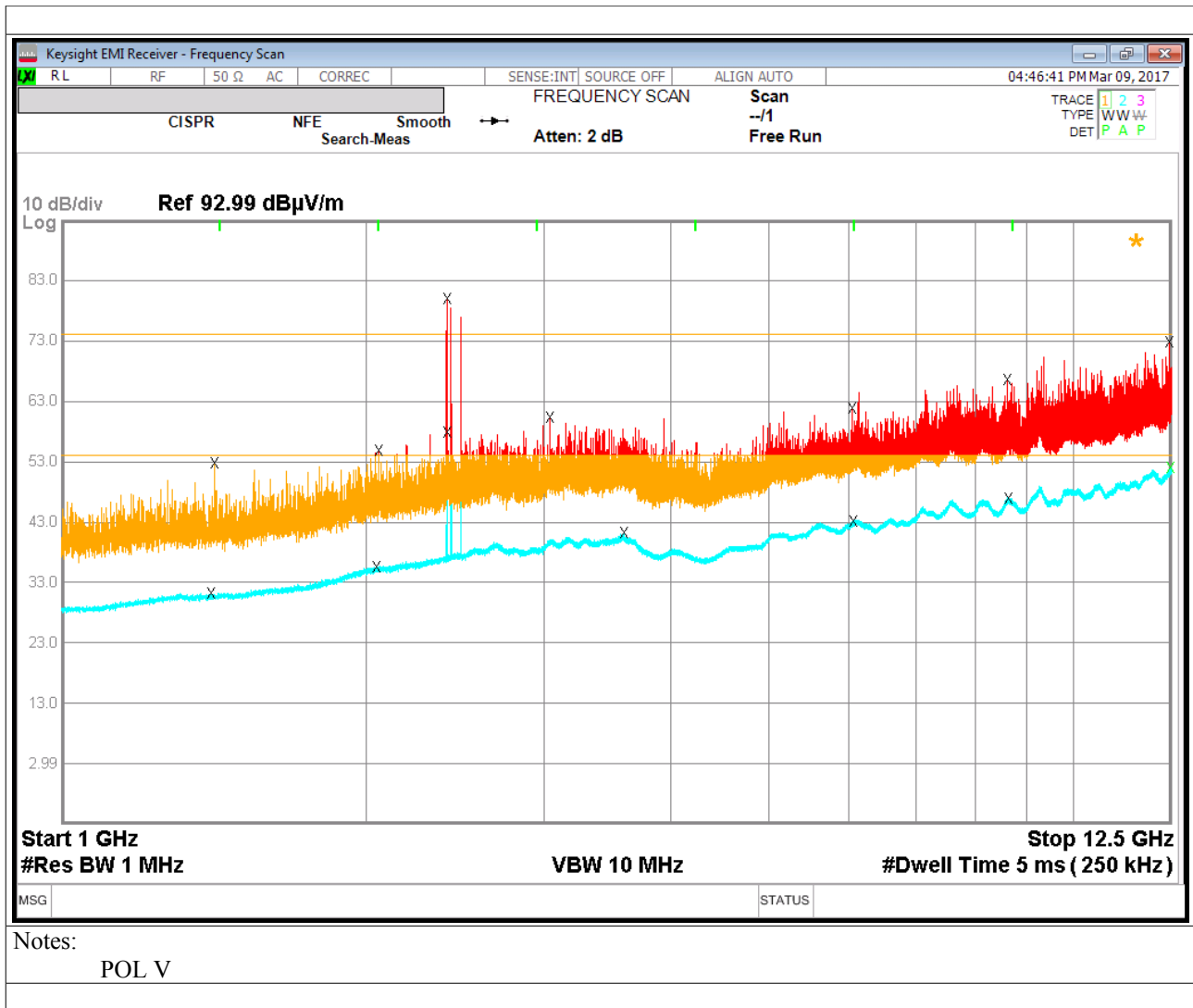
Results and conclusions
In all the operative conditions, equipment complied with the standard limits. Graphics in following figures show the most significant registrations of the performed measurements.







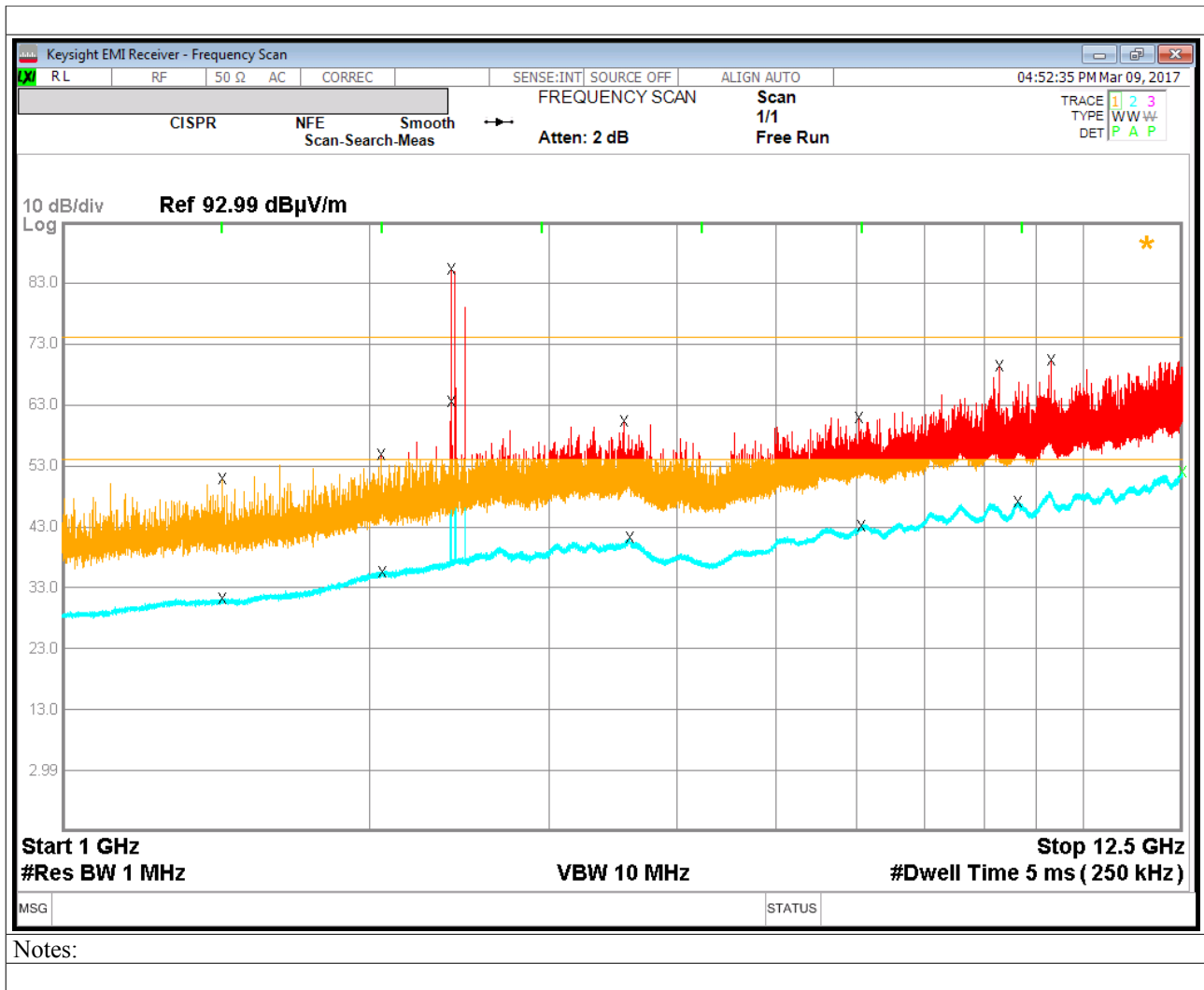




Keysight EMI Receiver - Frequency Scan											04:47:34 PM Mar 09, 2017	
RL		RF	50 Ω	AC	CORREC	SENSE:INT SOURCE OFF		ALIGN AUTO				
CISPR NFE Smooth						FREQUENCY SCAN		Scan		TRACE 1 2 3		
Search-Meas						Atten: 2 dB		Free Run		TYPE WW		
										DET P A P		
SIG	TRC	FREQ	PEAKAMPTD	OFF	AVGAMPTD	PEAK LL1 Δ	OFF	AVG LL2 Δ	COMPOSITE AMPCOR			
1	2	1.4045 GHz	48.212 dBμV/m	---	30.517 dBμV/m	-25.787 dB	---	-23.482 dB	30.333 dB			
2	1	1.4175 GHz	45.991 dBμV/m	---	30.952 dBμV/m	-28.008 dB	---	-23.048 dB	30.369 dB			
3	2	2.0470 GHz	52.268 dBμV/m	---	35.385 dBμV/m	-21.732 dB	---	-18.615 dB	33.122 dB			
4	1	2.0560 GHz	51.372 dBμV/m	---	35.305 dBμV/m	-22.628 dB	---	-18.694 dB	33.146 dB			
5	1	2.4023 GHz	80.051 dBμV/m	---	64.195 dBμV/m	6.051 dB	---	10.196 dB	34.046 dB			
6	2	2.4025 GHz	78.795 dBμV/m	---	61.017 dBμV/m	4.796 dB	---	7.017 dB	34.047 dB			
7	1	3.0390 GHz	57.706 dBμV/m	---	39.607 dBμV/m	-16.294 dB	---	-14.392 dB	36.417 dB			
8	2	3.5960 GHz	58.252 dBμV/m	---	40.697 dBμV/m	-15.748 dB	---	-13.303 dB	38.088 dB			
9	1	6.0435 GHz	58.278 dBμV/m	---	43.272 dBμV/m	-15.721 dB	---	-10.727 dB	42.364 dB			
10	2	6.0555 GHz	58.077 dBμV/m	---	43.459 dBμV/m	-15.923 dB	---	-10.541 dB	42.377 dB			
11	1	8.5983 GHz	68.332 dBμV/m	---	47.591 dBμV/m	-5.668 dB	---	-6.409 dB	46.370 dB			
12	2	8.6225 GHz	63.791 dBμV/m	---	47.648 dBμV/m	-10.209 dB	---	-6.352 dB	46.395 dB			
13	1	12.429 GHz	69.523 dBμV/m	---	52.712 dBμV/m	-4.477 dB	---	-1.287 dB	48.932 dB			
14	2	12.477 GHz	72.437 dBμV/m	---	53.296 dBμV/m	-1.562 dB	---	-0.704 dB	48.953 dB			
5	1	6.0435 GHz	58.278 dBμV/m	---	43.272 dBμV/m	-15.721 dB	---	-10.727 dB	42.364 dB			
MSG											STATUS	

Notes:

POL V



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.

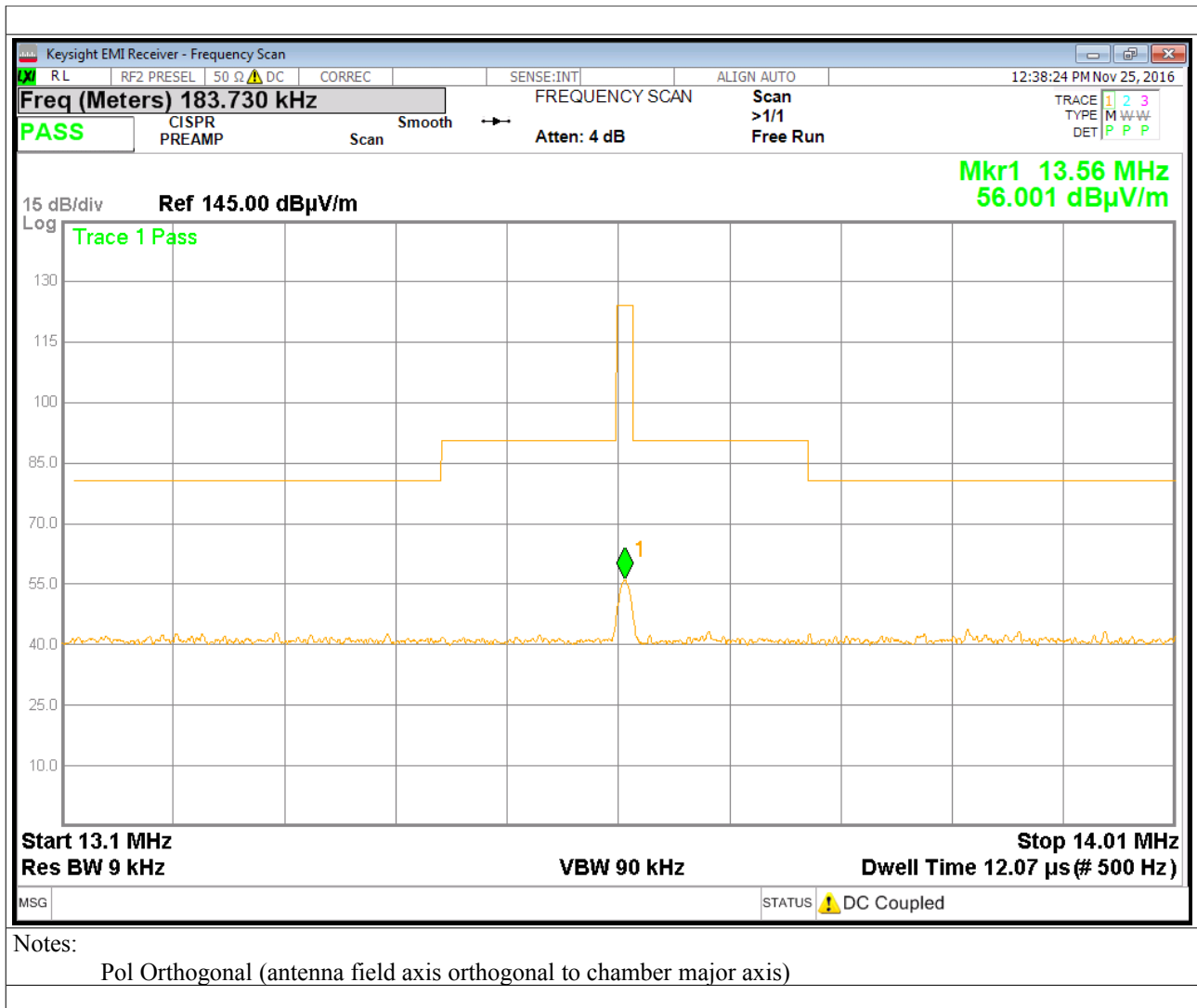
(e) The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency over a temperature variation of -20 degrees to $+50$ degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage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

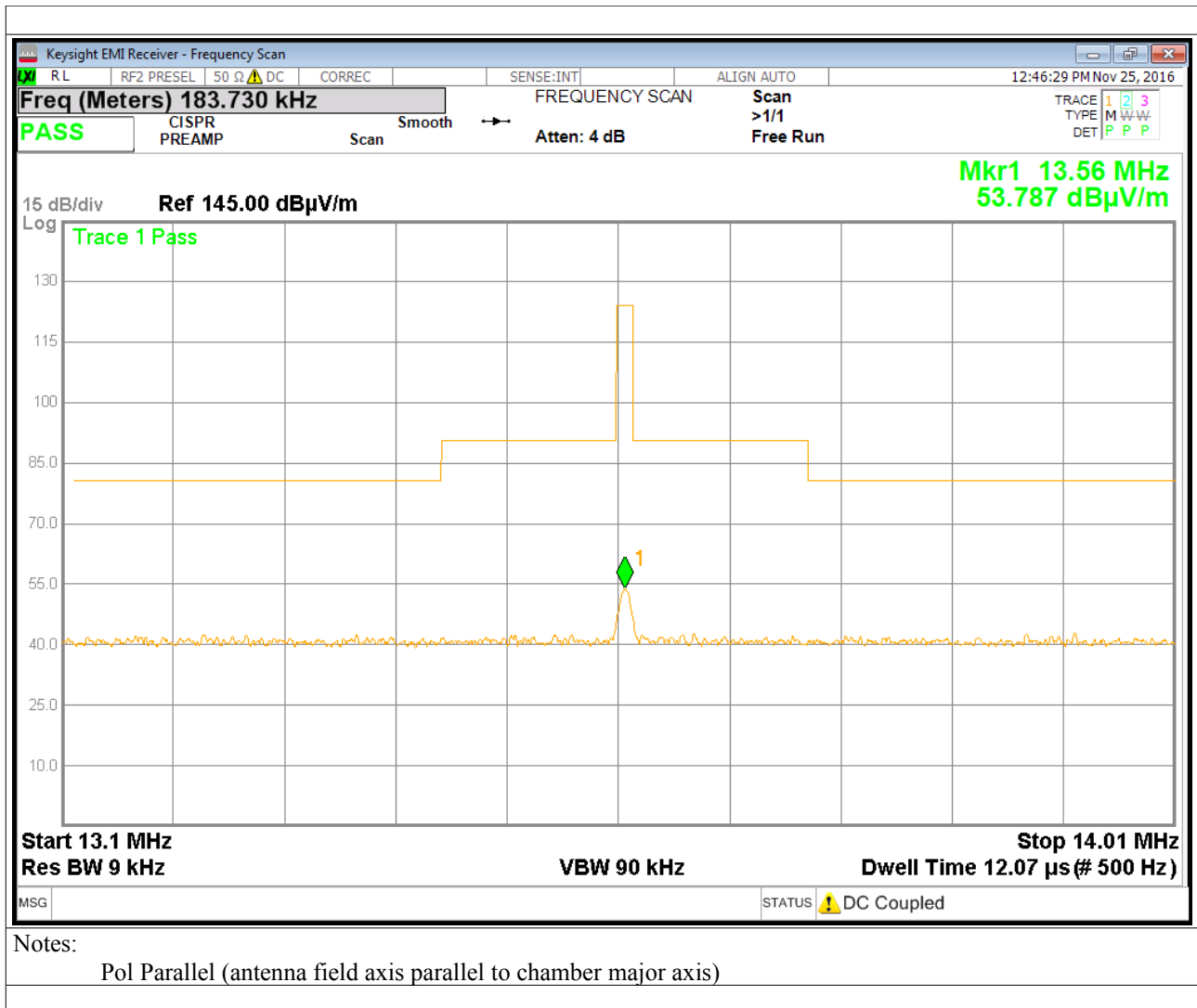
Test Equipment

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

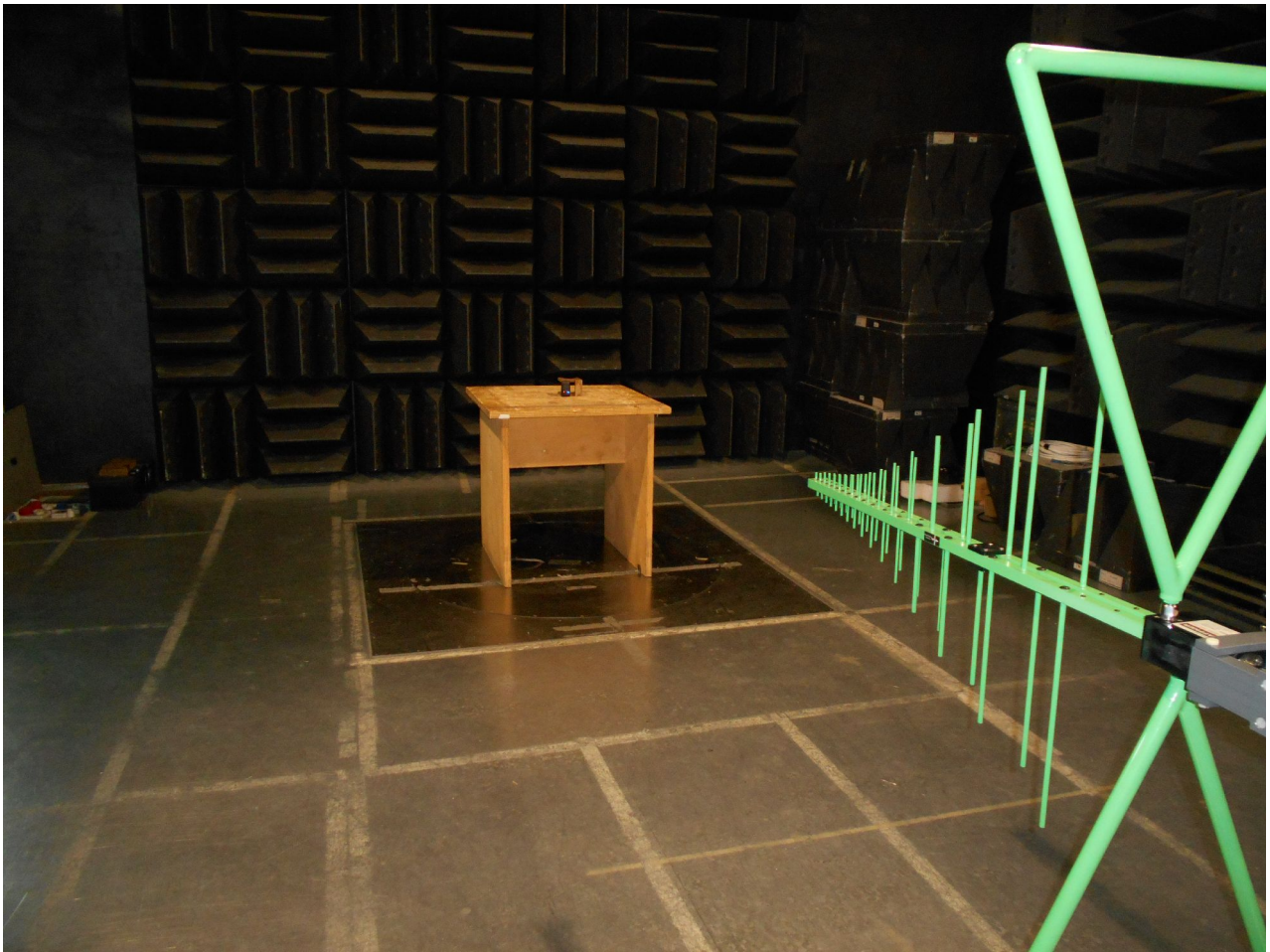
Note: Preliminary measurement to an OATs was performed: same results as in GSD CSA01 Anechoic Chamber.



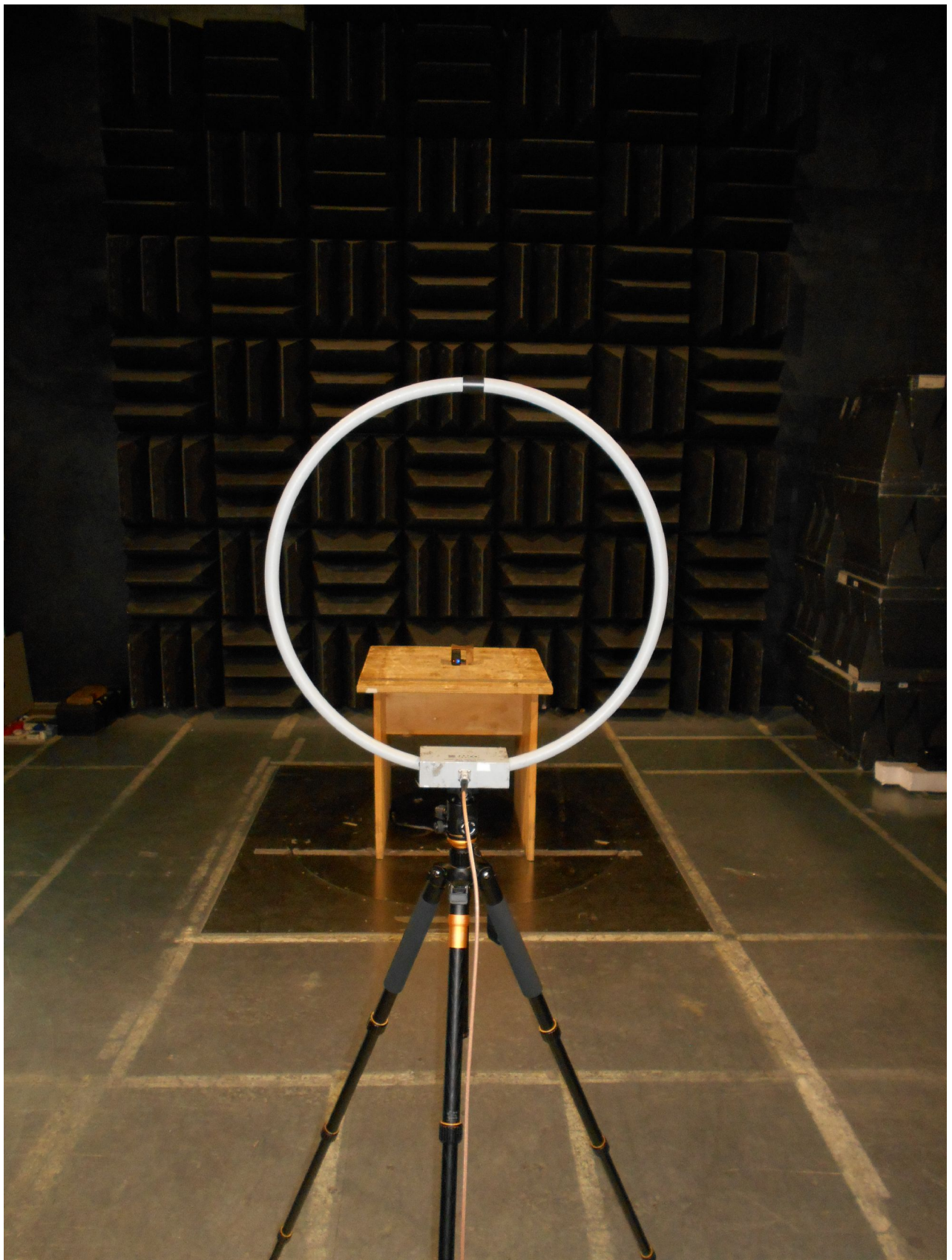


FREQUENCY ERROR OR FREQUENCY DRIFT OF 13.56 MHz CARRIER							
T (°C)	V (VOLT)	F NORMAL (MHz)	F EXTREME (MHz)	ERROR (PPM)	LIMIT (PPM)	REMARKS	PASS (YES/NO)
20.0	3.7	13.560015					
-20.0	3.7	13.560015	13.559935	-6	100		YES
-10.0	3.7	13.560015	13.559975	-3	100		YES
0.0	3.7	13.560015	13.560050	3	100		YES
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

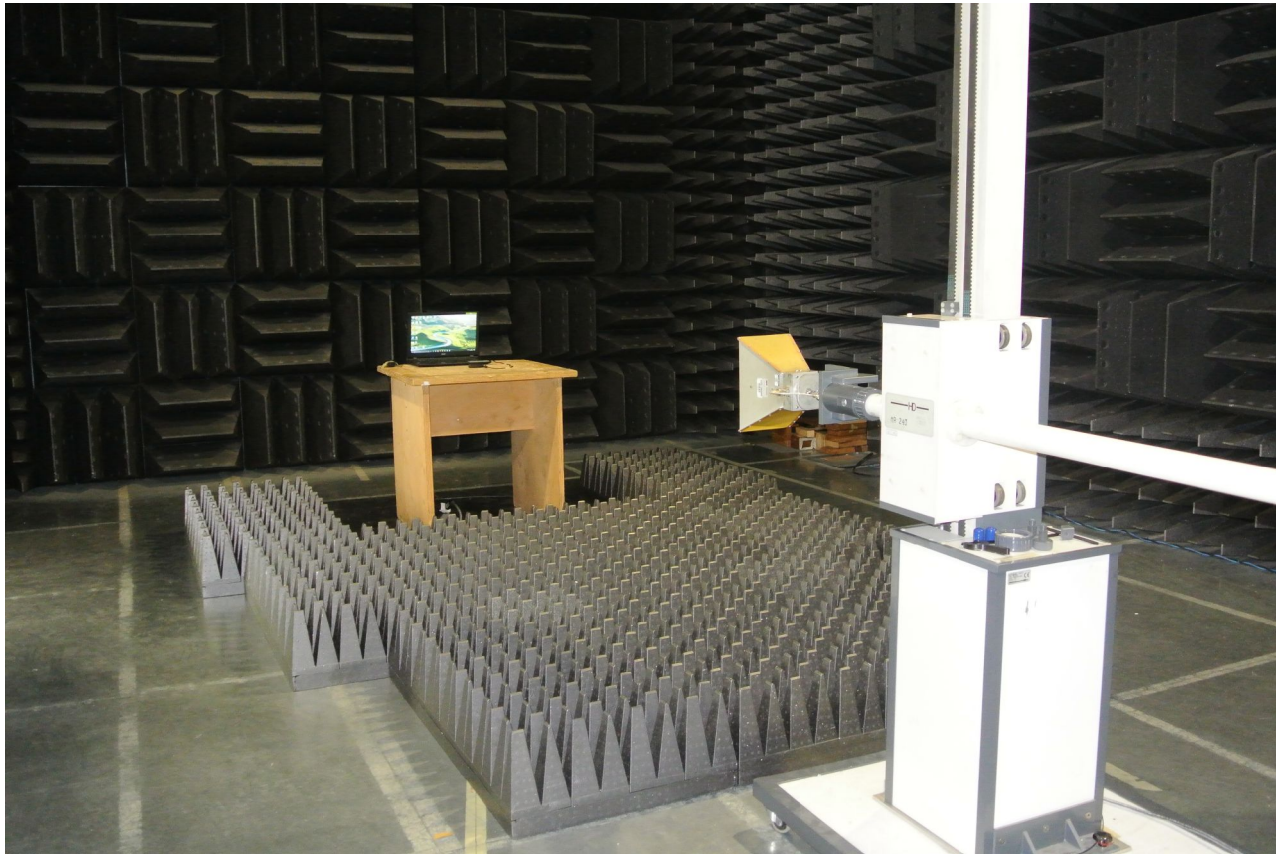
6. PHOTO



*Fig. 6.1
Radiated Emissions*



*Fig. 6.2
Radiated Emissions*



*Fig. 6.3
Radiated Emissions*



*Fig. 6.4
Frequency Error Test Set-up*