Compliance Department - EMC Test Report

Report reference: BE2018130

Laboratory:

IDNEO Technologies, S.A.U.
Polígon Industrial Can Mitjans s/n.
08232 Viladecavalls - Barcelona (Spain)
Telephone: +34 937 008 549
FAX: +34 937 332 718
www.idneo.com

Requested by:

Lazer Lamps
Unit 1&2, Harlow Mill Business Centre,
Riverway, Harlow,
CM20 2FD, UK

Represented by:

Eduard Grigoras
Telephone: +44 (0) 1992 677374

Project

Equipment Under Test (EUT): WL45 G2 & WL80 G2 Lamp

Authorized signatories:

Edited by:	Revised and approved by:
Pedro José Moreno 2018.11.21 14:22:20 +01'00'	David Ortiz 2018.11.21 15:22:18 +01'00'
Pedro Moreno	David Ortiz
Compliance Engineer	Compliance Manager

Dates and Testing site

Sample	Sample WL45 G2	Sample WL80 G2
EUT reception	04/06/2018	02/08/2018
Initial test date:	06/06/2018	03/10/2018
Final test date:	08/06/2018	10/10/2018
Testing site:	Compliance department – IDNEO Technologies	

Sample References:

Sample #1:	P/N: Utility – WL45 G2
Sample #2:	P/N: Utility – WL80 G2

Revision history:

Document Reference	Date	Description
V01.00-ENG	2018-06-18	Document delivery
V01.01-ENG	2018-11-14	Change name for sample 1, new name WL45 G2. Added test results for WL80 G2 Lamp.
V01.02-ENG	2018-11-21	Added comment in Figure 1.

INDEX

1 Introduction 4
2 Summary Results 4
3 Referenced documents 4
4 General conditions 4
5 System description and validation requirements 5
5.1 Equipment Under Test (EUT) 5
5.1.1 Pin-out 6
5.2 Operational modes 6
5.3 Matrix of samples under test 6
6 Test Results 7
6.1 EMC Test 7
6.1.1 Acceptance Criteria of Radiated/Conducted Emission 7
6.1.2 Scanning receiver Parameters of Radiated/Conducted Emission 8
6.1.3 Conducted Emissions – Voltage method 9
6.1.4 Radiated Emissions – ALSE method 16
7 Equipments 39
8 Glossary 40

1 Introduction

This document collects EMC tests results for the project WL45 G2 & WL80 G2 Lamp.

2 Summary Results

Test	Results	
	WL45 G2	WL80 G2
Conducted Emissions – Voltage method	PASS	PASS
Radiated Emissions – ALSE method	PASS	PASS

Table 1. Summary results.

3 Referenced documents

Document Reference	Version	Document
CISPR 25	Ed 3 (2008)	Vehicles, boats and internal combustion engines – Radio disturbance characteristics – Limits and methods of measurement for the protection of on-board receivers.

Table 2. Referenced documents.

4 General conditions

Unless otherwise specifications, tests have been done at following conditions:

Supply voltage:	27 ± 0.5 V_{DC}
Temperature	23 ºC ± 5 ºC.

Table 3. General conditions.

5 System description and validation requirements

5.1 Equipment Under Test (EUT)

Figure 1. Sample under test WL45 G2 Lamp (Lens picture is not according to the production level).

Figure 2. Sample under test WL80 G2 Lamp.

5.1.1 Pin-out

Pin	Signal description
1	VCC
2	GND

Table 4. Pin-out information.

5.2 Operational modes

The WL45 G2 and WL80 G2 lamps powered by two batteries of 14VDC and power supply (with 27VDC) in parallel.

5.3 Matrix of samples under test

Test Description	Samples	
	WL45 G2	WL80 G2
Conducted Emissions – Voltage method	1	1
Radiated Emissions – ALSE method	1	1

Table 5. Matrix of samples under test.

6 Test Results

6.1 EMC Test

6.1.1 Acceptance Criteria of Radiated/Conducted Emission

In all cases the EUT shall conform with the average limit.

The EUT shall also conform with either peak of quasi-peak limits as follows.

- For frequencies where both peak and quasi-peak limits are defined, the EUT shall conform with either the peak or the quasi-peak limits.
- For frequencies where only peak limits are defined, the EUT shall conform with the peak limit.

The general procedure applicable for all frequency bands is described in Figure 3.

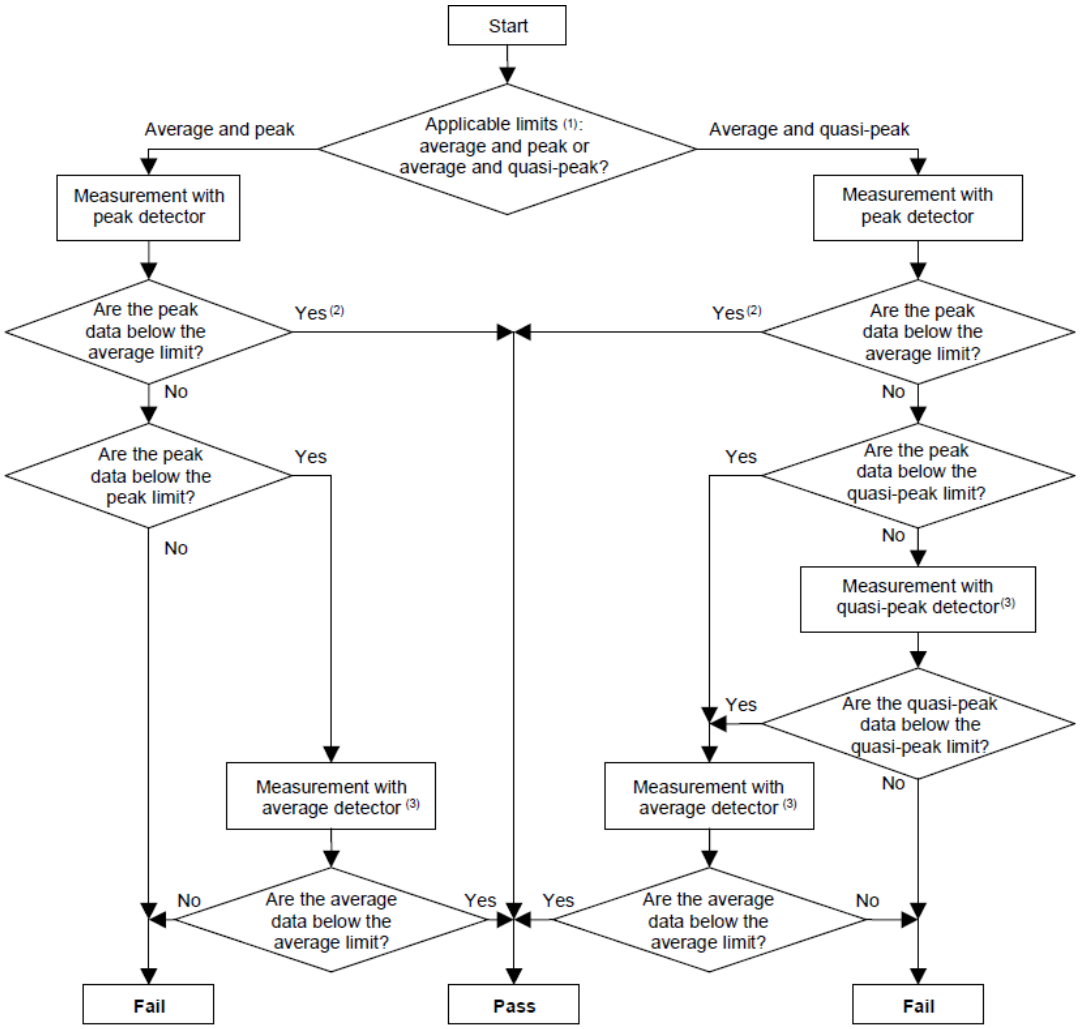


Figure 3. Acceptance Criteria Flow Chart – Radiated and Conducted Emissions.

6.1.2 Scanning receiver Parameters of Radiated/Conducted Emission

The dwell time of the scanning receiver shall be adjusted for the CISPR frequency band and detection mode used. The minimum dwell time, maximum step size and recommended bandwidth (BW) are listed in Table 6.

The bandwidth of the scanning receiver shall be chosen such that the noise floor is at least 6 dB lower than the applicable limits.

Service / Frequency range MHz		Peak detection			Quasi-peak detection			Average detection		
		BW at -6 dB	Step size	Dwell time	BW at -6 dB	Step size	Dwell time	BW at -6 dB	Step size	Dwell time
AM broadcast and mobile services	0,15 - 30	9 kHz	5 kHz	50 ms	9 kHz	5 kHz	1 s	9 kHz	5 kHz	50 ms
FM broadcast	76 - 108	120 kHz	50 kHz	5 ms	120 kHz	50 kHz	1 s	120 kHz	50 kHz	5 ms
Mobile services	30 to 1 000									
TV Band I	41 – 88									
TV Band III	174 – 230									
TV Band IV/V	470 – 890									
DAB	171 - 245									
DTTV	470 - 770	120 kHz	50 kHz	5 ms	Does not apply	Does not apply	Does not apply	120 kHz	50 kHz	5 ms
Mobile service	1 000 - 2 500	120 kHz	50 kHz	5 ms	Does not apply	Does not apply	Does not apply	120 kHz	50 kHz	5 ms
GPS L1 civil	1 567 – 1 583	Does not apply	Does not apply	Does not apply	Does not apply	Does not apply	Does not apply	9 kHz	5 kHz	5 ms
NOTE For emissions generated by brush commutator motors without an electronic control unit, the maximum step size may be increased up to 5 times the bandwidth.										

Table 6. Scanning receiver parameters.

6.1.3 Conducted Emissions – Voltage method

6.1.3.1 Test purpose

This test is intended to evaluate radio frequency radiated disturbance emissions by the EUT and its wiring.

6.1.3.2 Reference Limits

Class 3 is applied.

Service / Band	Frequency MHz	Levels in dB(µV)									
		Class 1		Class 2		Class 3		Class 4		Class 5	
		Peak	Quasi-peak	Peak	Quasi-peak	Peak	Quasi-peak	Peak	Quasi-peak	Peak	Quasi-peak
BROADCAST											
LW	0,15 - 0,30	110	97	100	87	90	77	80	67	70	57
MW	0,53 - 1,8	86	73	78	65	70	57	62	49	54	41
SW	5,9 - 6,2	77	64	71	58	65	52	59	46	53	40
FM	76 - 108	62	49	56	43	50	37	44	31	38	25
TV Band I	41 - 88	58	-	52	-	46	-	40	-	34	-
MOBILE SERVICES											
CB	26 - 28	68	55	62	49	56	43	50	37	44	31
VHF	30 - 54	68	55	62	49	56	43	50	37	44	31
VHF	68 - 87	62	49	56	43	50	37	44	31	38	25

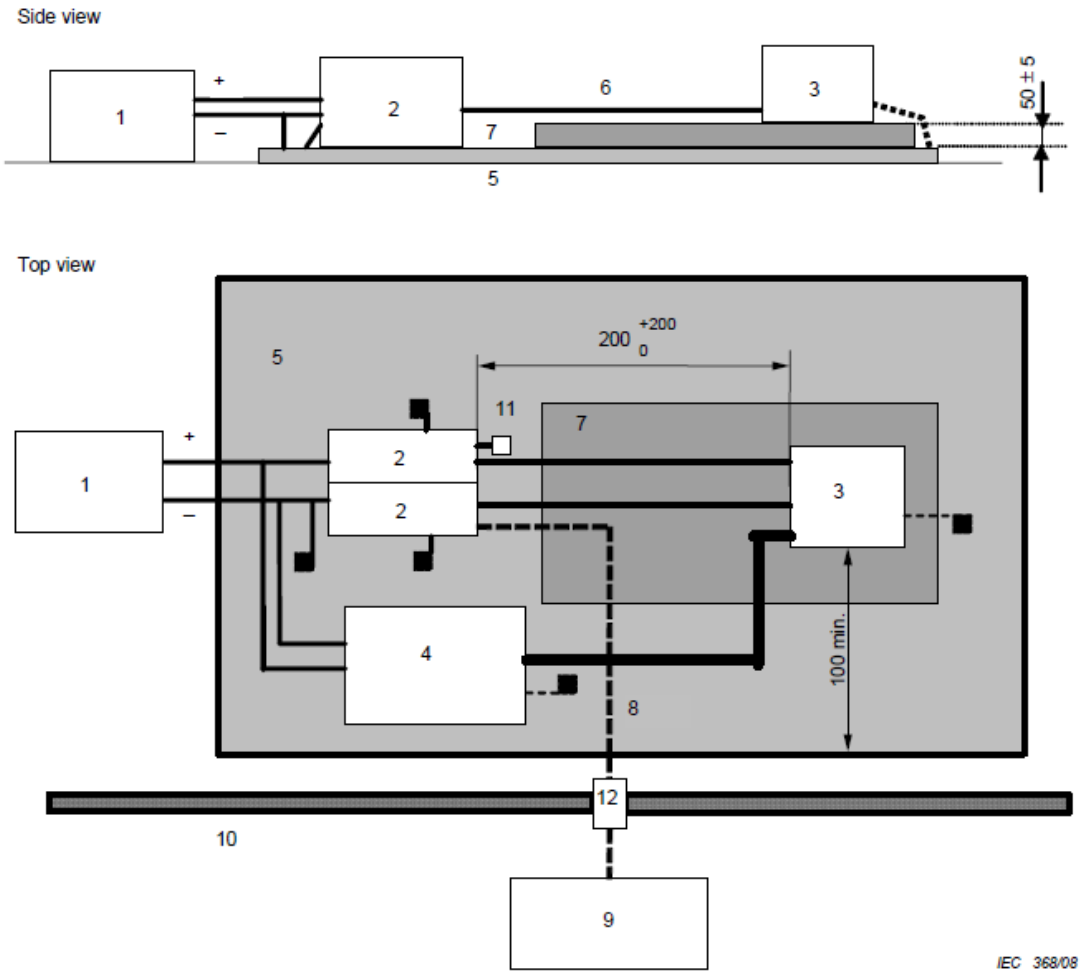
Table 7. CE Test. Quasi-Peak and Peak limits for conducted disturbances.

Service / Band	Frequency MHz	Levels in dB(µV)				
		Class 1	Class 2	Class 3	Class 4	Class 5
		AVG	AVG	AVG	AVG	AVG
BROADCAST						
LW	0,15 - 0,30	90	80	70	60	50
MW	0,53 - 1,8	66	58	50	42	34
SW	5,9 - 6,2	57	51	45	39	33
FM	76 - 108	42	36	30	24	18
TV Band I	41 - 88	48	42	36	30	24
MOBILE SERVICES						
CB	26 - 28	48	42	36	30	24
VHF	30 - 54	48	42	36	30	24
VHF	68 - 87	42	36	30	24	18

Table 8. CE Test. Average limits for conducted disturbances.

6.1.3.3 Test Setup

Dimensions in millimetres – not to scale



Key

1 Power supply (may be placed on the ground plane)
2 Artificial network
3 EUT (housing grounded if required in test plan)
4 Load simulator (metallic casing grounded if required in test plan)
5 Ground plane
6 Power supply lines
7 Low relative permittivity support ($\varepsilon_r \leq 1,4$)
8 High-quality coaxial cable e.g. double-shielded (50 Ω)
9 Measuring instrument
10 Shielded enclosure
11 50 Ω load
12 Bulkhead connector

NOTE The EUT housing ground lead, when required in the test plan, should not be longer than 150 mm.

Figure 4. CE Test. Schematic Test Setup.

Figure 5. CE Test. Test Setup applied for WL45 G2 lamp.

Figure 6. CE Test. Test Setup applied for WL80 G2 lamp.

6.1.3.4 Test information

Sample	WL45 G2	WL80G2
Test Site	SAR 1	SAR 1
Temperature	23 ºC	20 ºC
Humidity	42%	50%
Date of test	06/06/2018	03/10/2018
Test Engineer	P. Moreno	
Harness length	200 cm	

Table 9. CE Test. Test information.

6.1.3.5 Test Results

Sample	Line	Frequency Range [MHz]	Type of measurement	Result
#1 (WL45 G2)	GND	0.15 – 108	PK	PASS
			QPK	PASS
			AVG	PASS
	VCC	0.15 – 108	PK	PASS
			QPK	PASS
			AVG	PASS
#2 (WL80 G2)	GND	0.15 – 108	PK	PASS
			QPK	PASS
			AVG	PASS
	VCC	0.15 – 108	PK	PASS
			QPK	PASS
			AVG	PASS

Table 10. CE Test. Test Results.

6.1.3.5.1 Ambient noise measurements

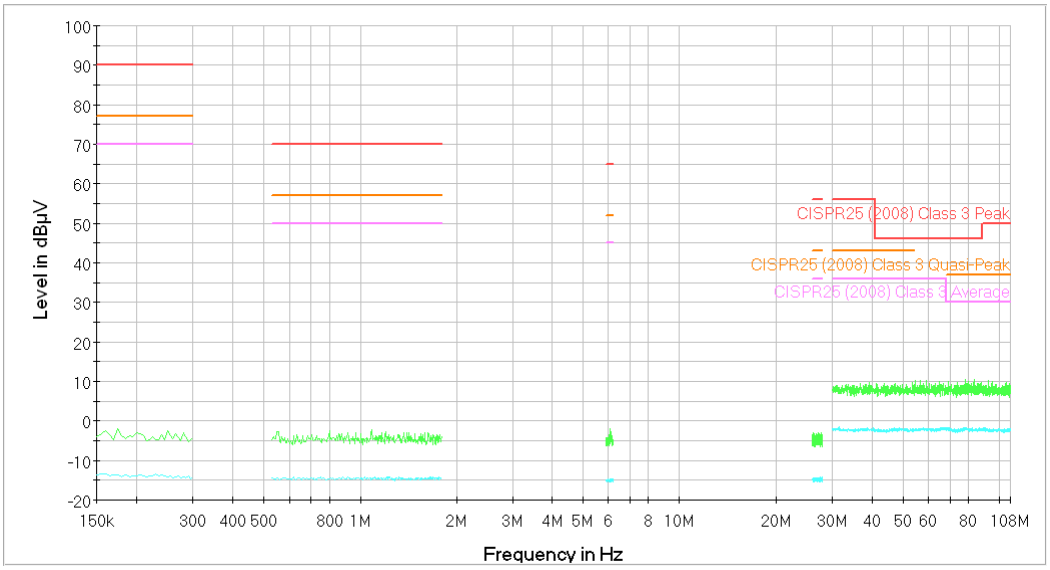


Figure 7. Ambient measurement. GND Line. From 150kHz to 108MHz. Peak and Average measurement.

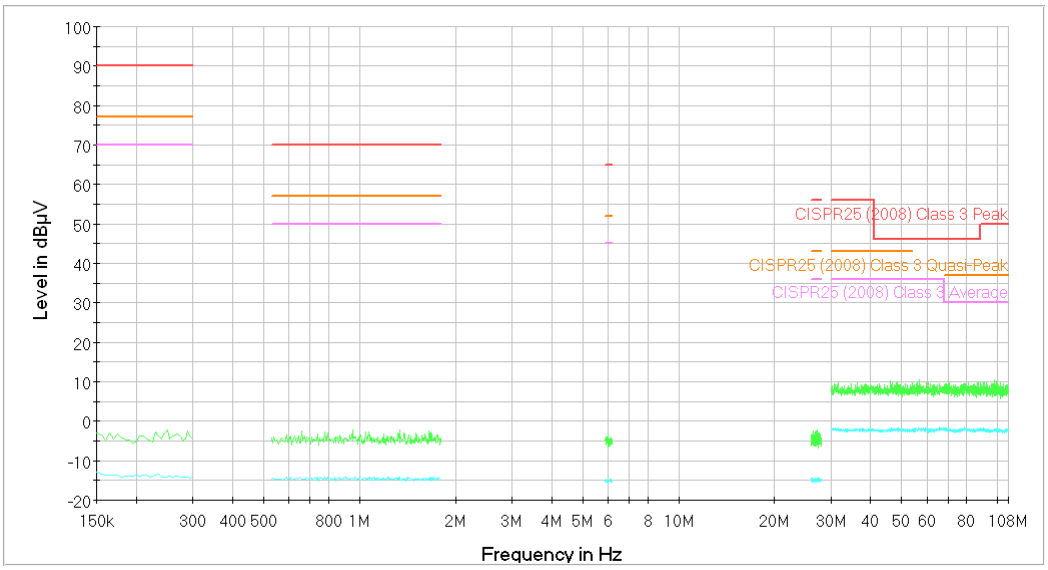


Figure 8. Ambient measurement. VCC Line. From 150kHz to 108MHz. Peak and Average measurement.

6.1.3.5.2Tests Graphs. Sample #1 (WL45 G2).

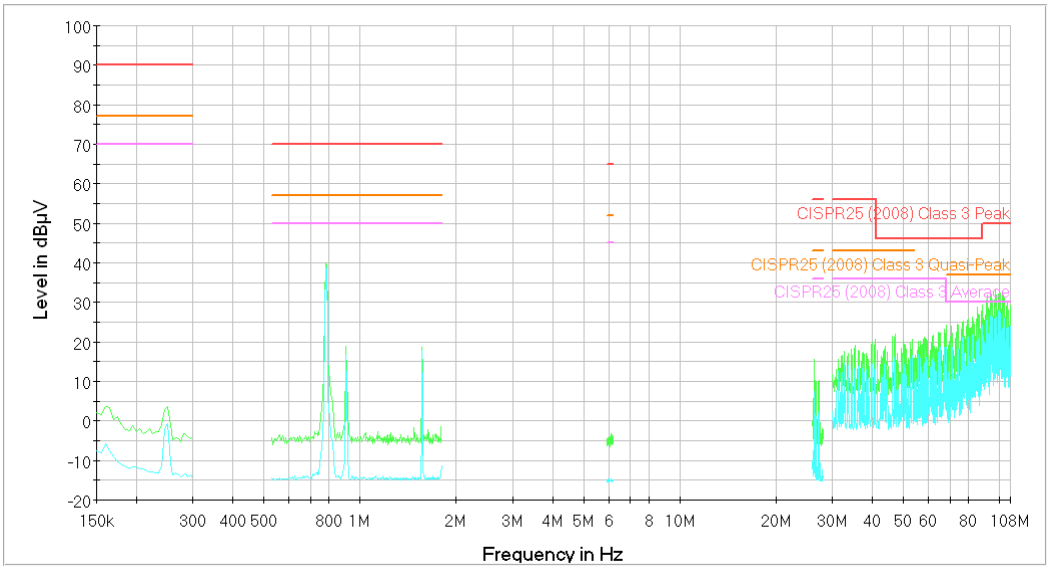


Figure 9. Test measurement. Sample 1. GND Line. From 150kHz to 108MHz. Peak and Average measurements.

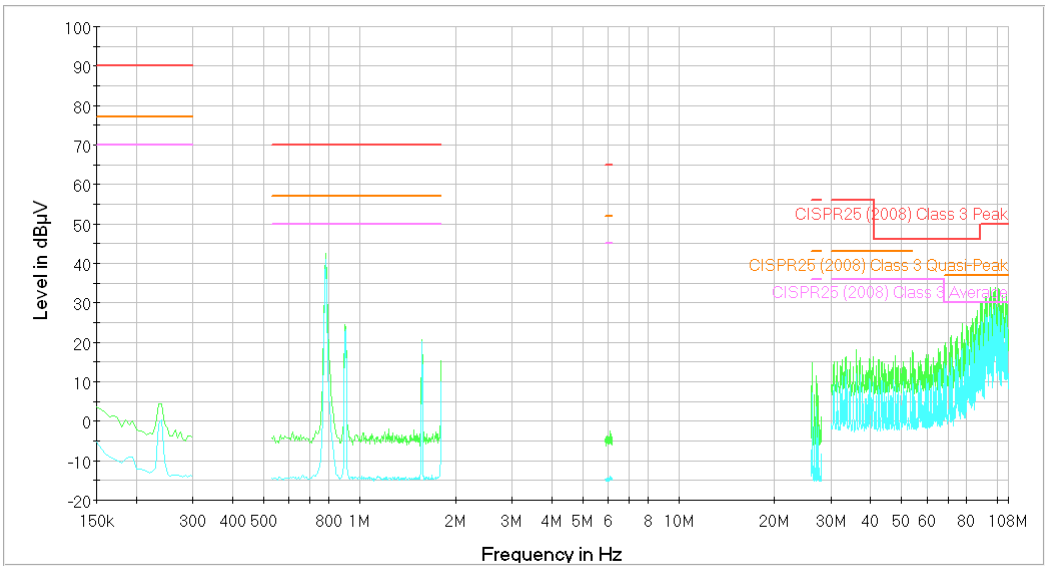


Figure 10. Test measurement. Sample 1. VCC Line. From 150kHz to 108MHz. Peak and Average measurements.

6.1.3.5.3Tests Graphs. Sample #2 (WL80 G2).

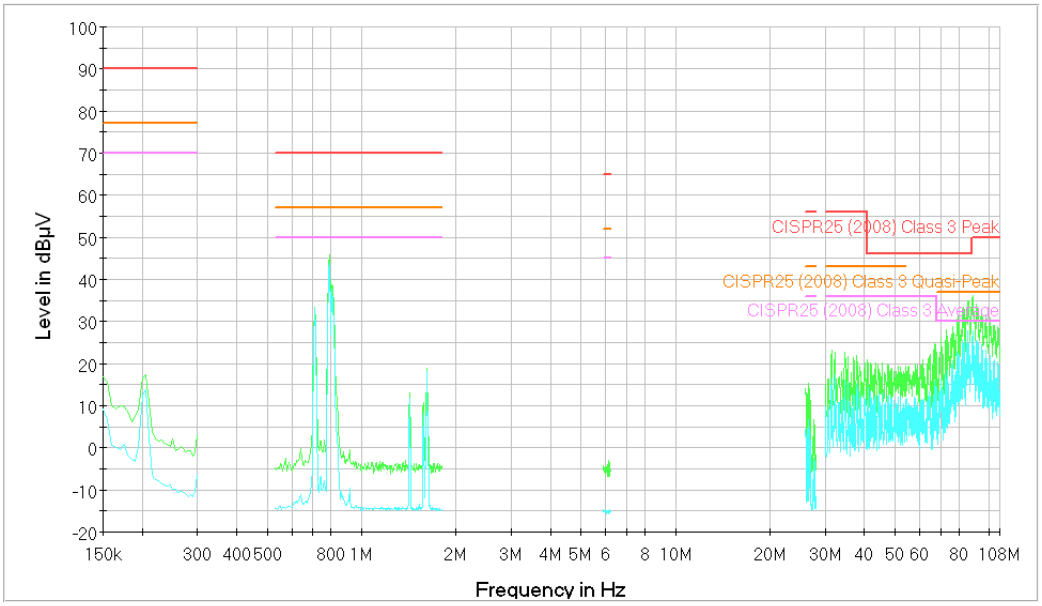


Figure 11. Test measurement. Sample 2. GND Line. From 150kHz to 108MHz. Peak and Average measurements.

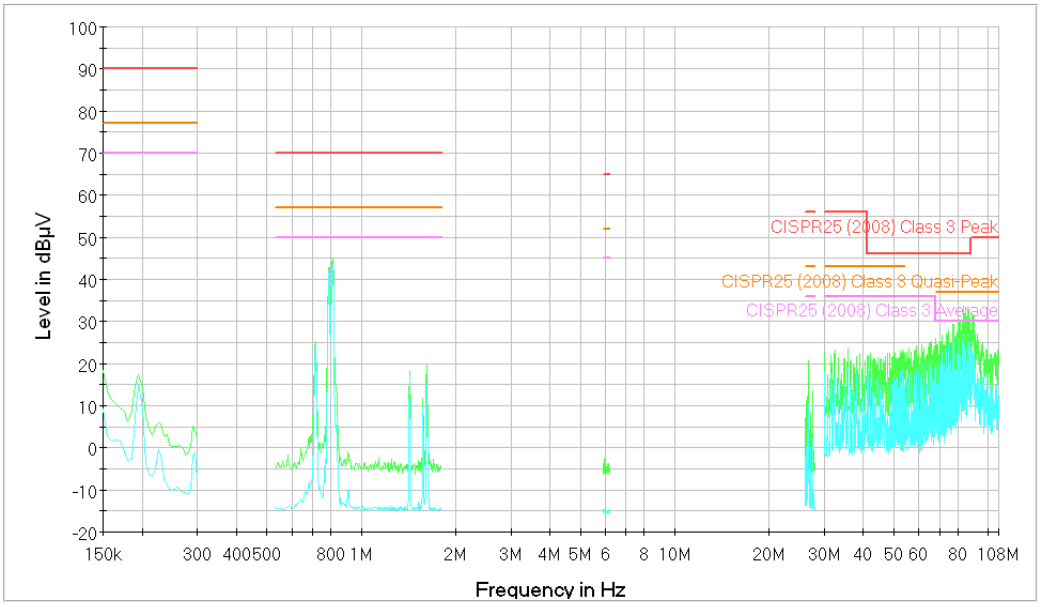


Figure 12. Test measurement. Sample 2. VCC Line. From 150kHz to 108MHz. Peak and Average measurements.

6.1.4 Radiated Emissions – ALSE method

6.1.4.1 Test purpose

This test is intended to evaluate the radio frequency disturbances transmitted by radiation by the DUT and its wiring.

6.1.4.2 Reference Limits

Shall satisfy the next table, Class 3:

Service / Band	Frequency MHz	Levels in dB(µV/m)									
		Class 1		Class 2		Class 3		Class 4		Class 5	
		Peak	Quasi-peak	Peak	Quasi-peak	Peak	Quasi-peak	Peak	Quasi-peak	Peak	Quasi-peak
BROADCAST											
LW	0,15 - 0,30	86	73	76	63	66	53	56	43	46	33
MW	0,53 - 1,8	72	59	64	51	56	43	48	35	40	27
SW	5,9 - 6,2	64	51	58	45	52	39	46	33	40	27
FM	76 - 108	62	49	56	43	50	37	44	31	38	25
TV Band I	41 - 88	52	-	46	-	40	-	34	-	28	-
TV Band III	174 - 230	56	-	50	-	44	-	38	-	32	-
DAB III	171 - 245	50	-	44	-	38	-	32	-	26	-
TV Band IV/	468 - 944	65	-	59	-	53	-	47	-	41	-
DTTV	470 - 770	69	-	63	-	57	-	51	-	45	-
DAB L band	1447 - 1494	52	-	46	-	40	-	34	-	28	-
SDARS	2320 - 2345	58	-	52	-	46	-	40	-	34	-
MOBILE SERVICES											
CB	26 - 28	64	51	58	45	52	39	46	33	40	27
VHF	30 - 54	64	51	58	45	52	39	46	33	40	27
VHF	68 - 87	59	46	53	40	47	34	41	28	35	22
VHF	142 -175	59	46	53	40	47	34	41	28	35	22
Analogue UHF	380 - 512	62	49	56	43	50	37	44	31	38	25
RKE	300 - 330	56	-	50	-	44	-	38	-	32	-
RKE	420 - 450	56	-	50	-	44	-	38	-	32	-
Analogue UHF	820 - 960	68	55	62	49	56	43	50	37	44	31
GSM 800	860 - 895	68	-	62	-	56	-	50	-	44	-
EGSM/GSM 900	925 - 960	68	-	62	-	56	-	50	-	44	-
GPS L1 civil	1567 - 1583	-	-	-	-	-	-	-	-	-	-
GSM 1800 (PCN)	1803 - 1882	68	-	62	-	56	-	50	-	44	-
GSM 1900	1850 - 1990	68	-	62	-	56	-	50	-	44	-
3G / IMT 2000	1900 - 1992	68	-	62	-	56	-	50	-	44	-
3G / IMT 2000	2010 - 2025	68	-	62	-	56	-	50	-	44	-
3G / IMT 2000	2108 - 2172	68	-	62	-	56	-	50	-	44	-
Bluetooth/802.11	2400 - 2500	68	-	62	-	56	-	50	-	44	-

NOTE 1 All values listed in this table are valid for the bandwidths in Tables 1 and 2. If measurements have to be performed with different bandwidths than those specified in Tables 1 and 2 because of noise floor requirements, then applicable limits should be defined in the test plan.

NOTE 2 Where multiple bands use the same limits the user shall select the appropriate bands over which to test. When the test plan includes bands that overlap the test plan shall define the applicable limit.

Table 11. RE Test. Quasi-Peak and Peak limits

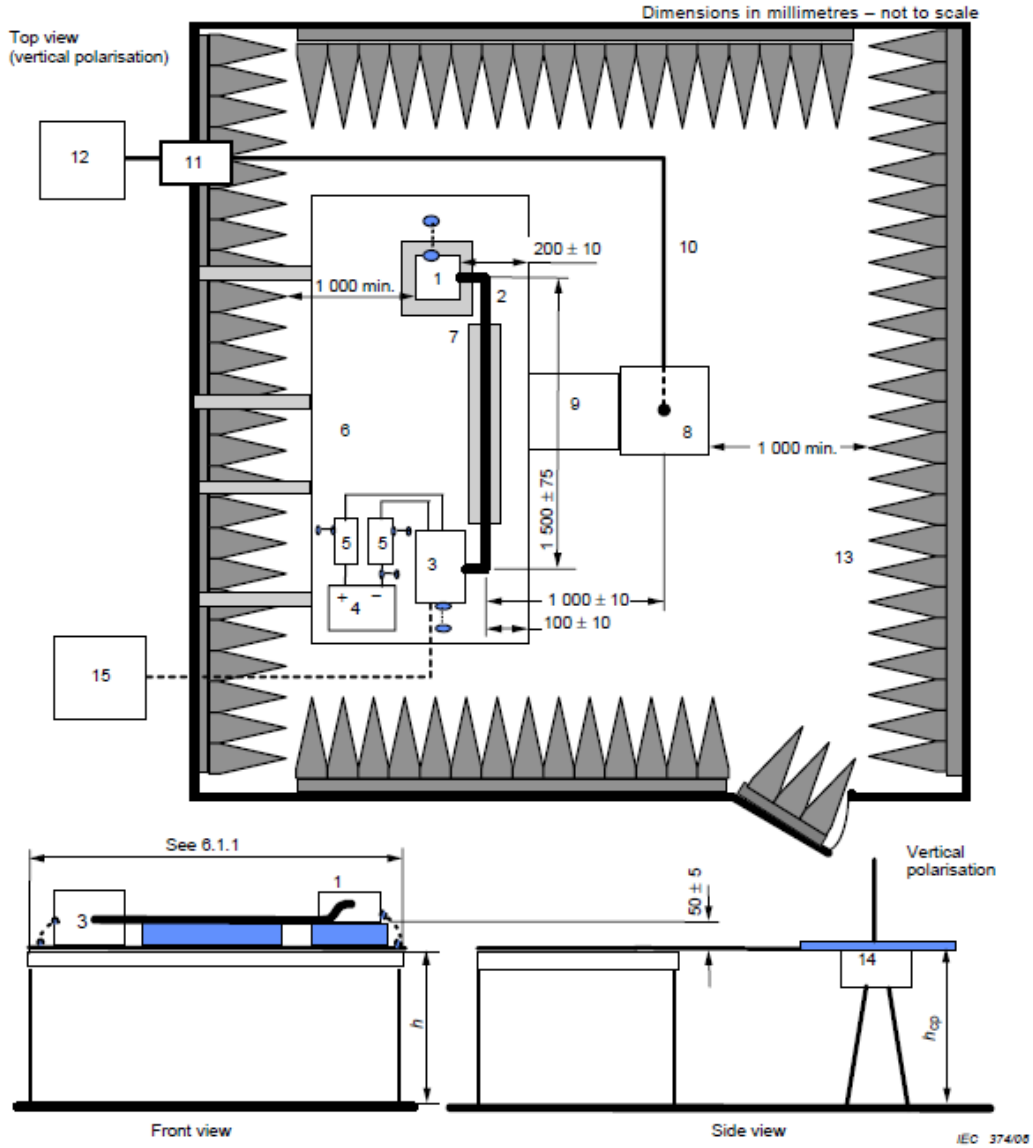
Service / Band	Frequency MHz	Levels in dB(µV/m)				
		Class 1	Class 2	Class 3	Class 4	Class 5
		AVG	AVG	AVG	AVG	AVG
BROADCAST						
LW	0,15 - 0,30	66	56	46	36	26
MW	0,53 - 1,8	52	44	36	28	20
SW	5,9 - 6,2	44	38	32	26	20
FM	76 - 108	42	36	30	24	18
TV Band I	41 - 88	42	36	30	24	18
TV Band III	174 - 230	46	40	34	28	22
DAB III	171 - 245	40	34	28	22	16
TV Band IV/V	468 - 944	55	49	43	37	31
DTTV	470 - 770	59	53	47	41	35
DAB L band	1447 - 1494	42	36	30	24	18
SDARS	2320 - 2345	48	42	36	30	24
MOBILE SERVICES						
CB	26 - 28	44	38	32	26	20
VHF	30 - 54	44	38	32	26	20
VHF	68 - 87	39	33	27	21	15
VHF	142 -175	39	33	27	21	15
Analogue UHF	380 - 512	42	36	30	24	18
RKE	300 - 330	42	36	30	24	18
RKE	420 - 450	42	36	30	24	18
Analogue UHF	820 - 960	48	42	36	30	24
GSM 800	860 - 895	48	42	36	30	24
EGSM/GSM 900	925 - 960	48	42	36	30	24
GPS L1 civil	1567 - 1583	34	28	22	16	10
GSM 1800 (PCN)	1803 - 1882	48	42	36	30	24
GSM 1900	1850 - 1990	48	42	36	30	24
3G / IMT 2000	1900 - 1992	48	42	36	30	24
3G / IMT 2000	2010 - 2025	48	42	36	30	24
3G / IMT 2000	2108 - 2172	48	42	36	30	24
Bluetooth/802.11	2400 - 2500	48	42	36	30	24

NOTE 1 All values listed in this table are valid for the bandwidths in Tables 1 and 2. If measurements have to be performed with different bandwidths than those specified in Tables 1 and 2 because of noise floor requirements, then applicable limits should be defined in the test plan.

NOTE 2 Where multiple bands use the same limits the user shall select the appropriate bands over which to test. When the test plan includes bands that overlap the test plan shall define the applicable limit.

Table 12. RE Test. Average limits

6.1.4.3 Test Setup



Key

1 EUT (grounded locally if required in test plan)
2 Test harness
3 Load simulator (placement and ground connection according to 6.4.2.5)
4 Power supply (location optional)
5 Artificial network (AN)
6 Ground plane (bonded to shielded enclosure)
7 Low relative permittivity support ($\varepsilon_r \leq 1{,}4$)
8 Rod antenna with counterpoise (dimensions: 600 mm by 600 mm typical)

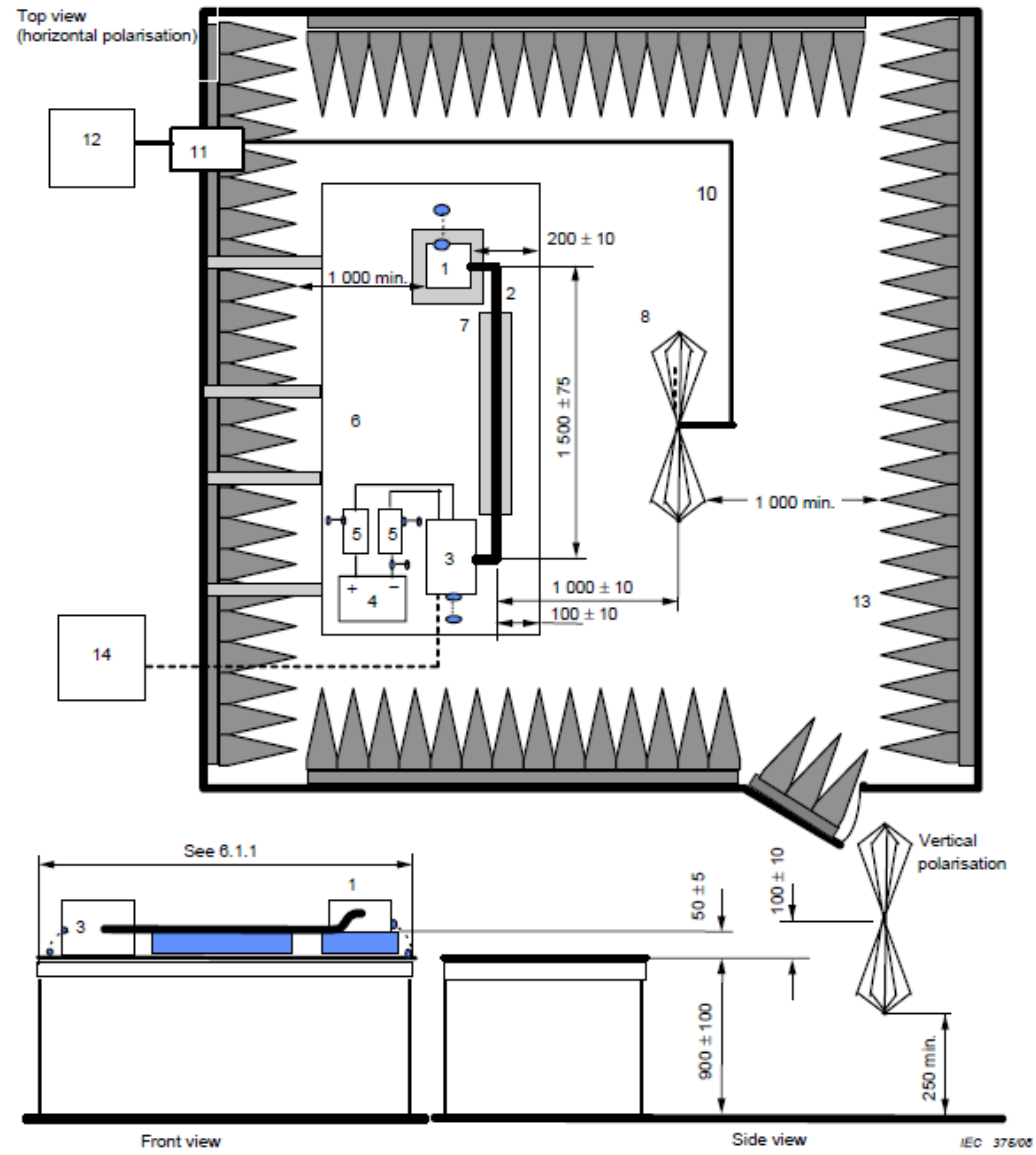
h = (900 ± 100) mm

$h_{cp} = h + (+10 / -20)$ mm

9 Grounding connection (full width bond between counterpoise and ground plane)
10 High-quality coaxial cable e.g. double-shielded (50 Ω)
11 Bulkhead connector
12 Measuring instrument
13 RF absorber material
14 Antenna matching unit (the preferred location is below the counterpoise; if above the counterpoise then the base of the antenna rod shall be at the height of the ground plane)
15 Stimulation and monitoring system

Figure 13. RE Test. Schematic Test Setup 100kHz to 30MHz.

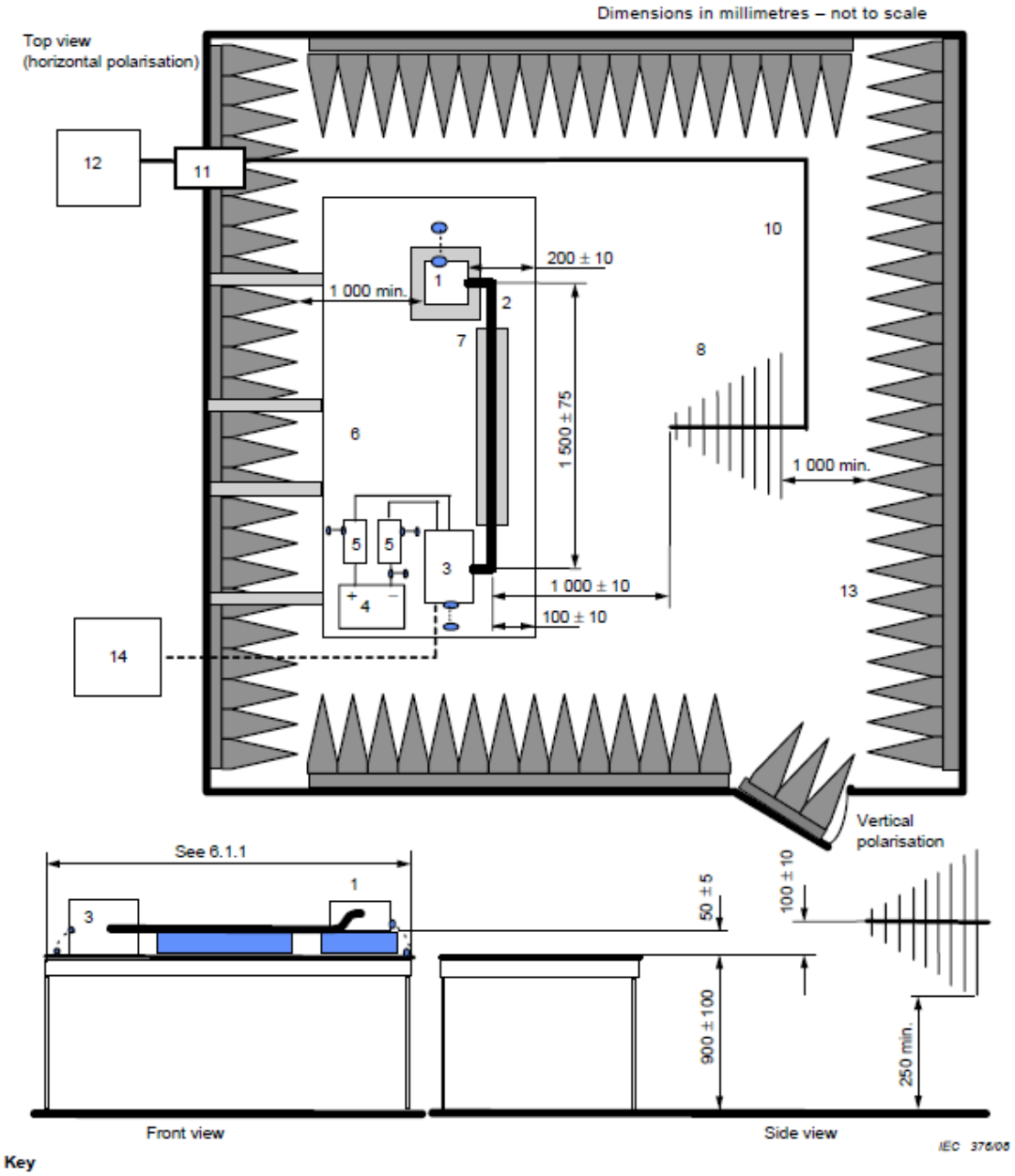
Dimensions in millimetres – not to scale



Key

1 EUT (grounded locally if required in test plan)
2 Test harness
3 Load simulator (placement and ground connection according to 6.4.2.5)
4 Power supply (location optional)
5 Artificial network (AN)
6 Ground plane (bonded to shielded enclosure)
7 Low relative permittivity support ($\varepsilon_r \leq 1{,}4$)
8 Biconical antenna
10 High-quality coaxial cable e.g. double-shielded (50 Ω)
11 Bulkhead connector
12 Measuring instrument
13 RF absorber material
14 Stimulation and monitoring system

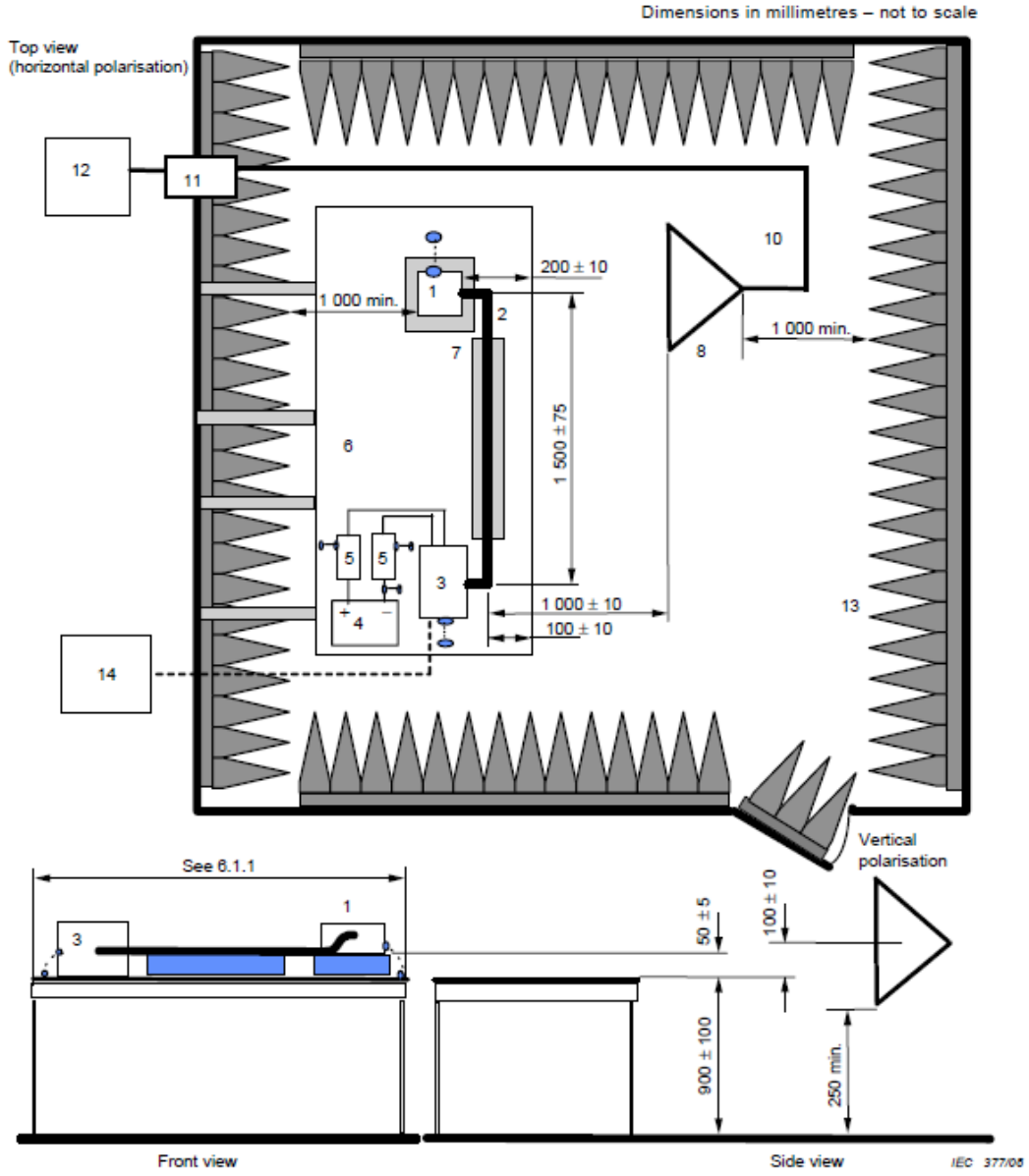
Figure 14. RE Test. Schematic Test Setup 30MHz to 200MHz.



Key

1 EUT (grounded locally if required in test plan)
2 Test harness
3 Load simulator (placement and ground connection according to 6.4.2.5)
4 Power supply (location optional)
5 Artificial network (AN)
6 Ground plane (bonded to shielded enclosure)
7 Low relative permittivity support ($\varepsilon_r \leq 1{,}4$)
8 Log-periodic antenna
10 High-quality coaxial cable e.g. double-shielded (50 Ω)
11 Bulkhead connector
12 Measuring instrument
13 RF absorber material
14 Stimulation and monitoring system

Figure 15. RE Test. Schematic Test Setup 200MHz to 1000MHz.



Key

1 EUT (grounded locally if required in test plan)
2 Test harness
3 Load simulator (placement and ground connection according to 6.4.2.5)
4 Power supply (location optional)
5 Artificial network (AN)
6 Ground plane (bonded to shielded enclosure)
7 Low relative permittivity support ($\varepsilon_r \leq 1{,}4$)
8 Horn antenna
10 High-quality coaxial cable e.g. double-shielded (50 Ω)
11 Bulkhead connector
12 Measuring instrument
13 RF absorber material
14 Stimulation and monitoring system

Figure 16. RE Test. Schematic Test Setup 1000MHz to 2500MHz.

Figure 17. RE Test. Test Setup from 100kHz to 30MHz. WL45 G2

Figure 18. . RE Test. Test Setup from 30MHz to 200MHz. WL45 G2

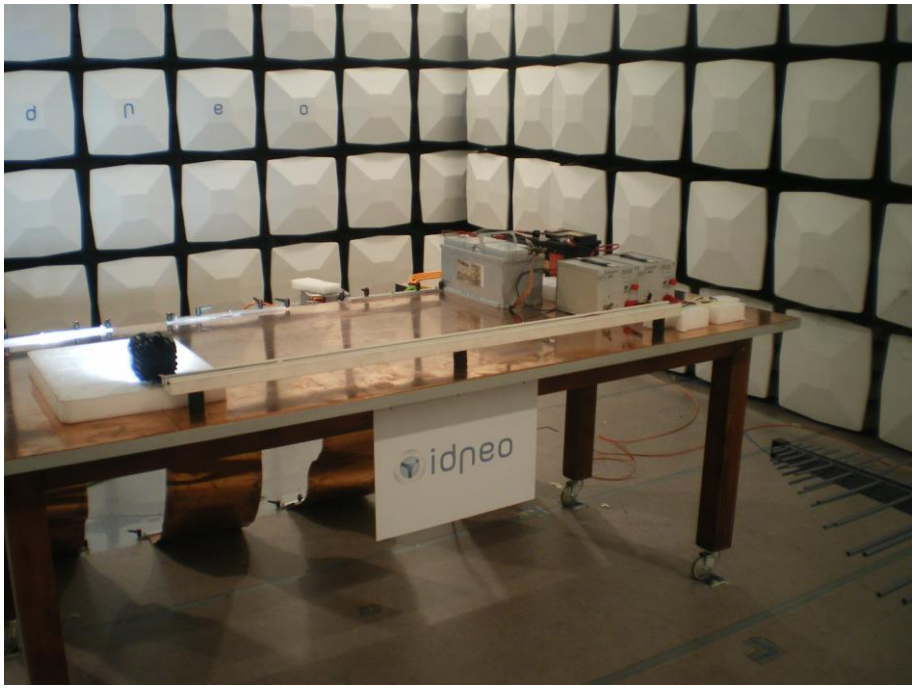


Figure 19. . RE Test. Test Setup from 200MHz to 1000MHz. WL45 G2

Figure 20. . RE Test. Test Setup from 1000MHz to 2500MHz. WL45 G2

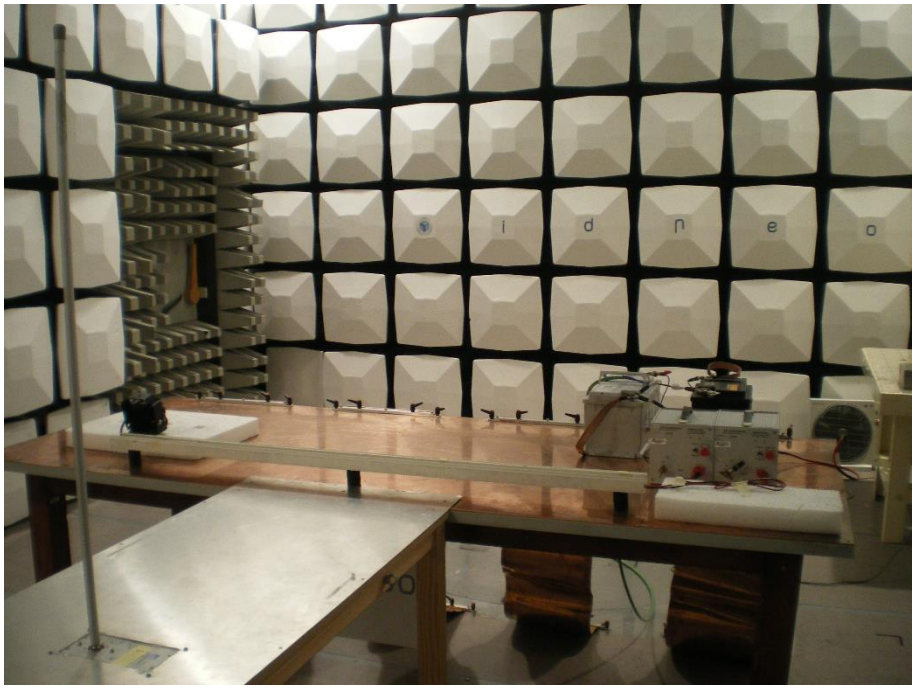


Figure 21. RE Test. Test Setup from 100kHz to 30MHz. WL80 G2

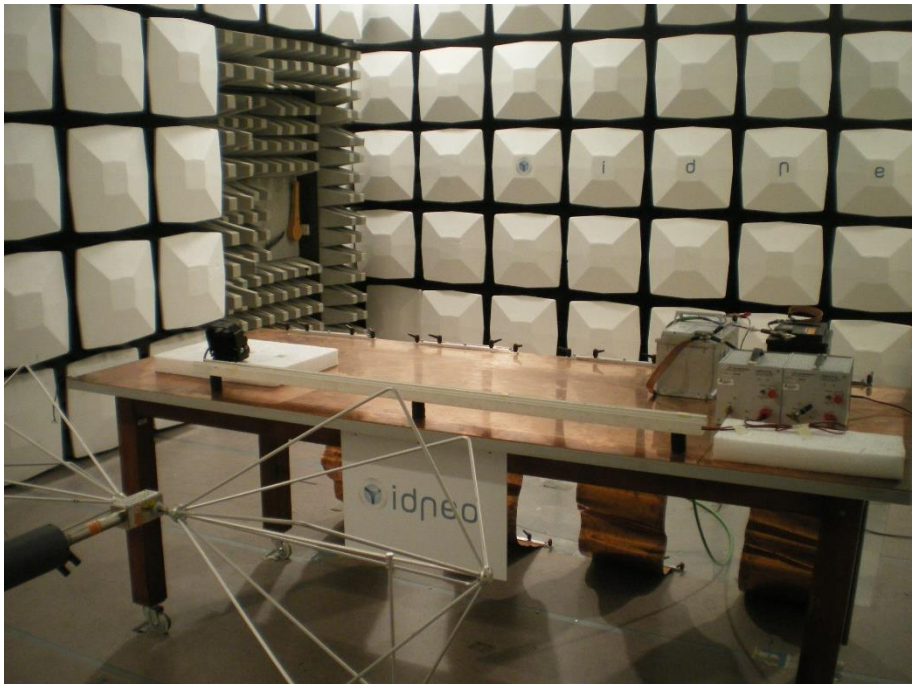


Figure 22. . RE Test. Test Setup from 30MHz to 200MHz. WL80 G2

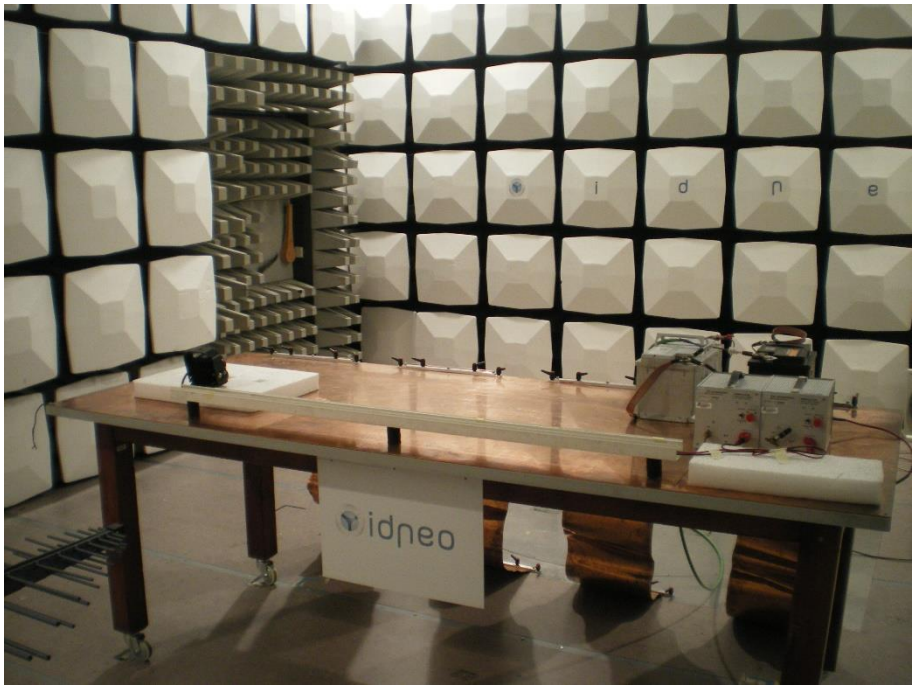


Figure 23. . RE Test. Test Setup from 200MHz to 1000MHz. WL80 G2

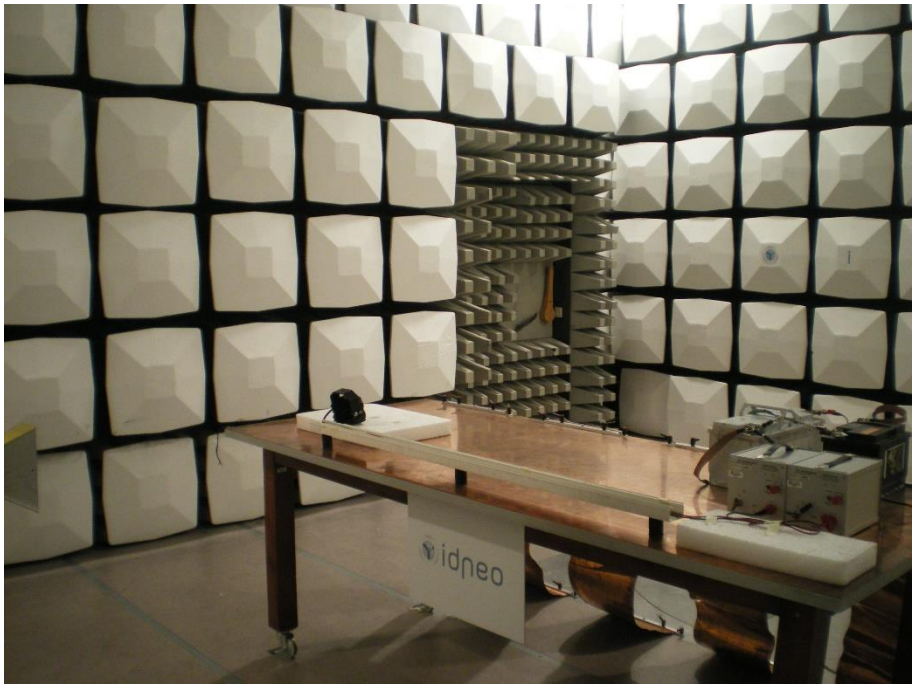


Figure 24. . RE Test. Test Setup from 1000MHz to 2500MHz. WL80 G2

6.1.4.4 Test information

Sample	WL45 G2	WL80 G2
Test Site	SAR 1	SAR 1
Temperature	23 ºC	21 ºC
Humidity	42%	49%
Date of test	08/06/2018	10/10/2018
Test Engineer	P. Moreno	
Harness length	2000 cm	

Table 13. CE Test. Test information.

6.1.4.5 Test Results

Sample	Antenna	Frequency Range [MHz]	Polarization	Type of measurement	Result
#1 (WL45 G2)	Monopole	0.15 – 30	-	PK	PASS
				QPK	PASS
				AVG	PASS
	Biconical	30 – 200	H	PK	PASS
				QPK	PASS
				AVG	PASS
			V	PK	PASS
				QPK	PASS
				AVG	PASS
	Logo periodical	200 – 1000	H	PK	PASS
				QPK	PASS
				AVG	PASS
			V	PK	PASS
				QPK	PASS
				AVG	PASS
	Horn	1447 – 2500	H	PK	PASS
				AVG	PASS
			V	PK	PASS
				AVG	PASS

Table 14. RE Test. Test Results. Sample #1.

Sample	Antenna	Frequency Range [MHz]	Polarization	Type of measurement	Result
#2 (WL80 G2)	Monopole	0.15 – 30	-	PK	PASS
				QPK	PASS
				AVG	PASS
	Biconical	30 – 200	H	PK	PASS
				QPK	PASS
				AVG	PASS
			V	PK	PASS
				QPK	PASS
				AVG	PASS
	Logo periodical	200 – 1000	H	PK	PASS
				QPK	PASS
				AVG	PASS
			V	PK	PASS
				QPK	PASS
				AVG	PASS
	Horn	1447 – 2500	H	PK	PASS
				AVG	PASS
			V	PK	PASS
				AVG	PASS

Table 15. RE Test. Test Results. Sample #2.

6.1.4.5.1Ambient noise measurements

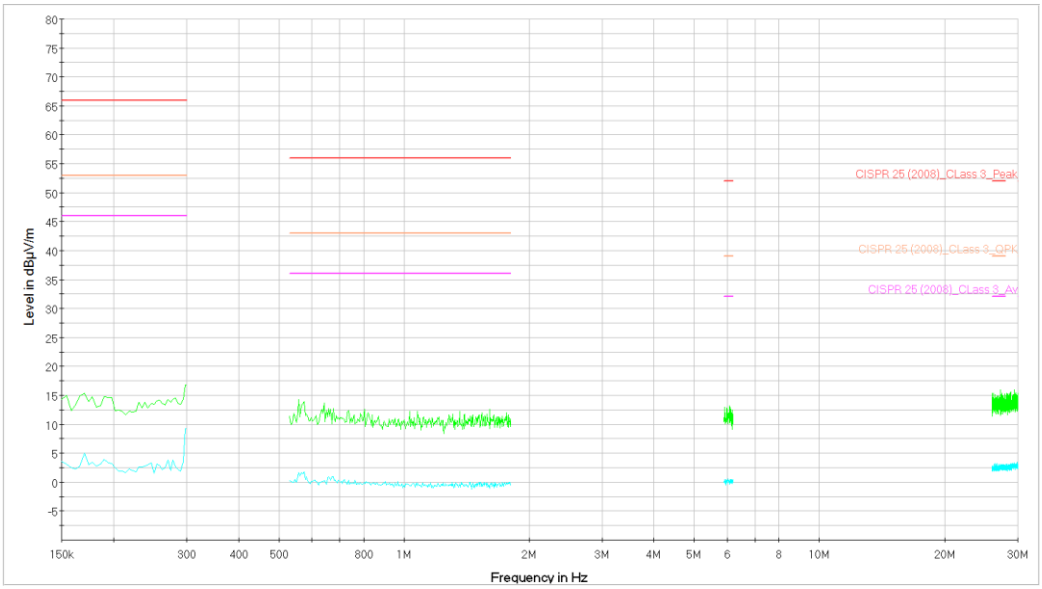


Figure 25. Ambient measurement. From 150kHz to 30MHz. Peak and Average measurement.

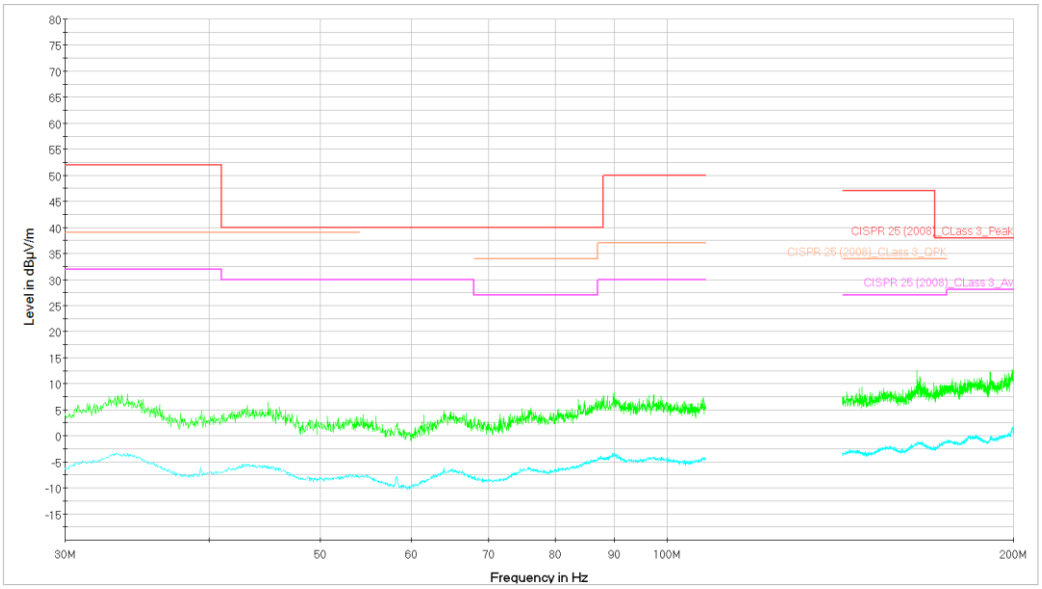


Figure 26. Ambient measurement. From 30 to 200MHz. Horizontal Polarization. Peak and Average measurement.

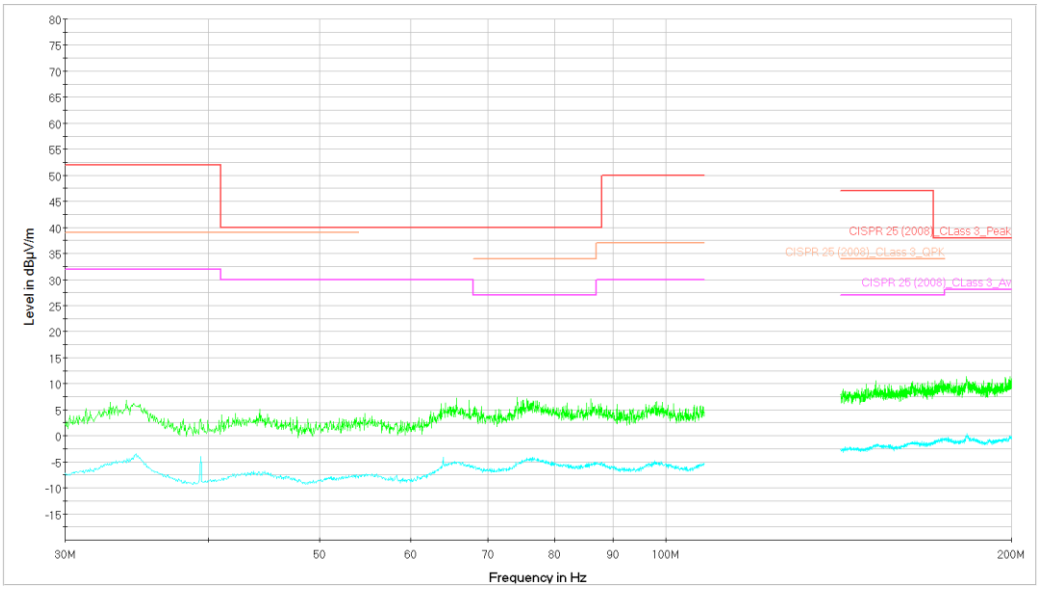


Figure 27. Ambient measurement. From 30 to 200MHz. Vertical Polarization. Peak and Average measurement.

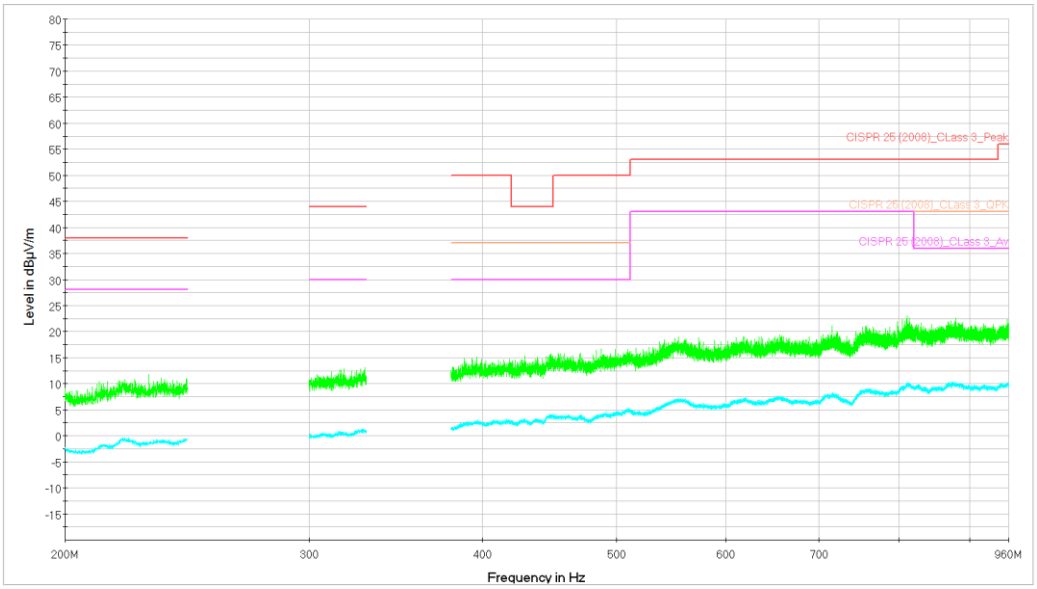


Figure 28. Ambient measurement. From 200 to 1000MHz. Horizontal Polarization. Peak and Average measurement.

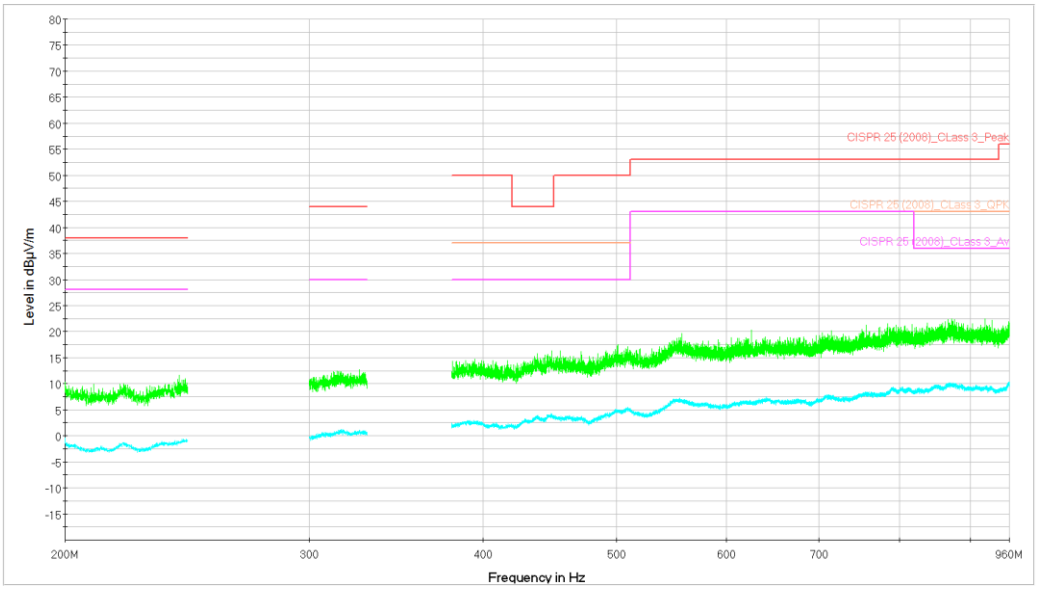


Figure 29. Ambient measurement. From 200 to 1000MHz. Vertical Polarization. Peak and Average measurement.

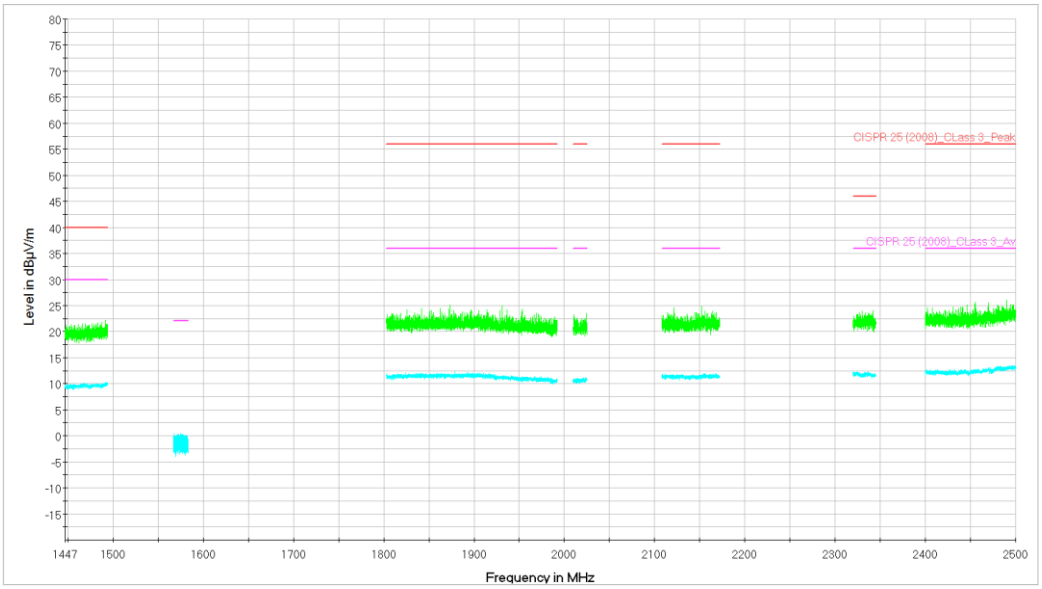


Figure 30. Ambient measurement. From 1000 to 2500MHz. Horizontal Polarization. Peak and Average measurement.

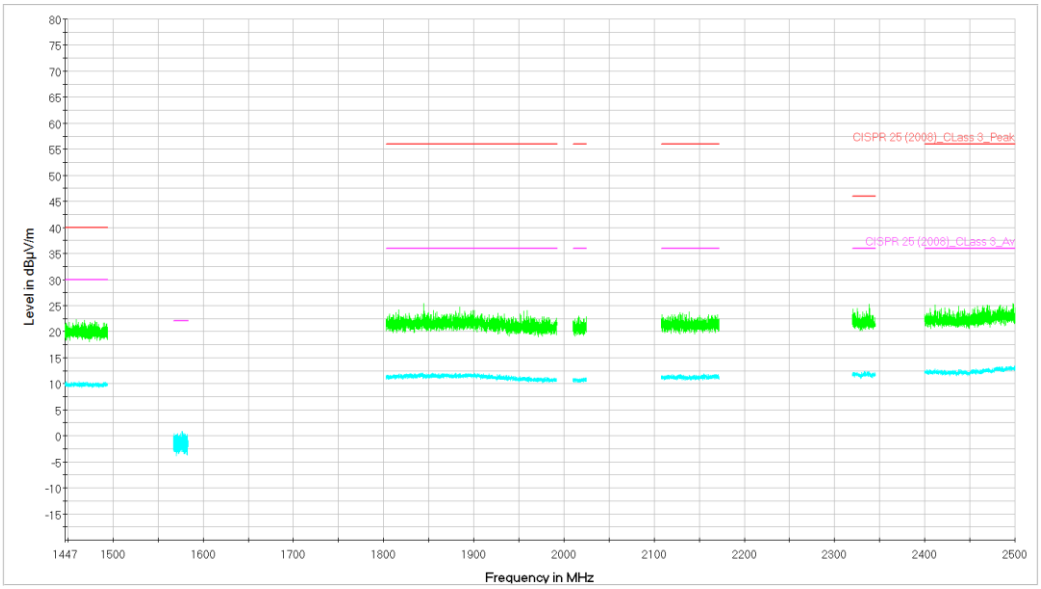


Figure 31. Ambient measurement. From 1000 to 2500MHz. Vertical Polarization. Peak and Average measurement.

6.1.4.5.2Tests Graphs. Sample #1 (WL45 G2).

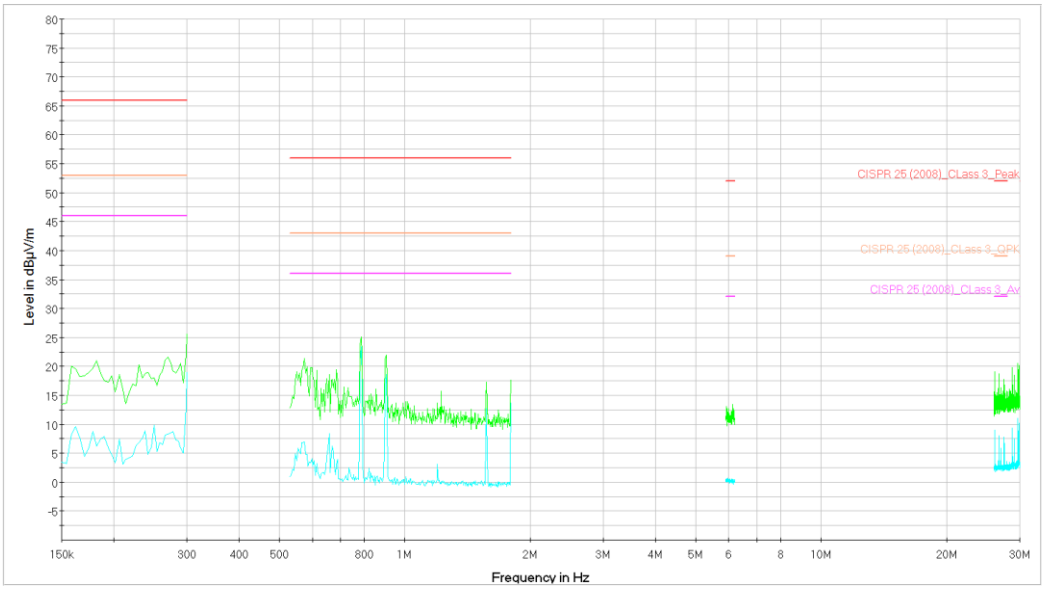


Figure 32. Sample 1. From 100kHz to 30MHz. Peak and Average measurements.

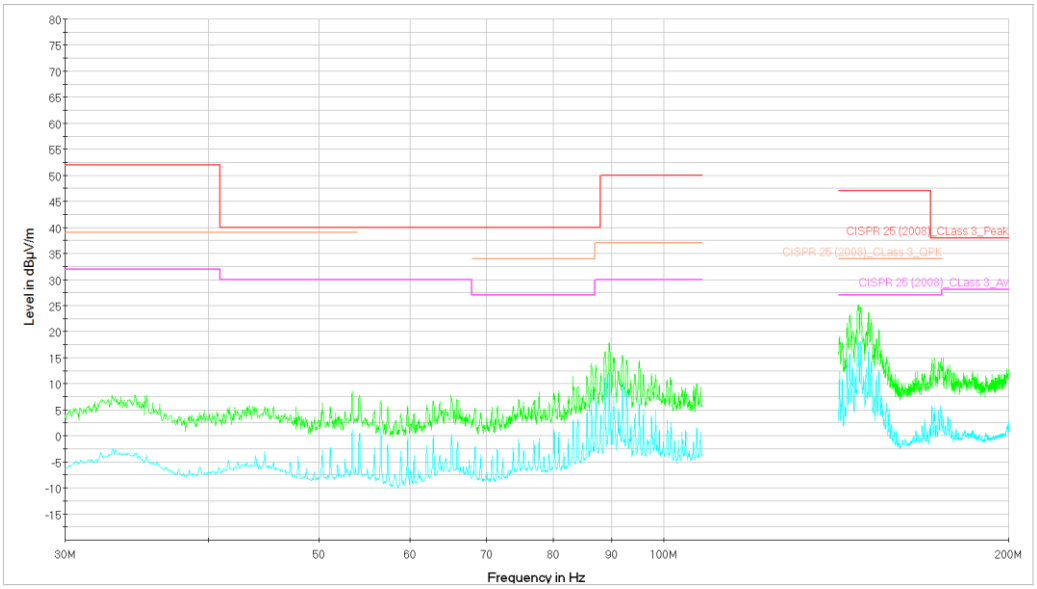


Figure 33. Sample 1. From 30 to 200MHz. Horizontal Polarization. Peak and Average measurement.

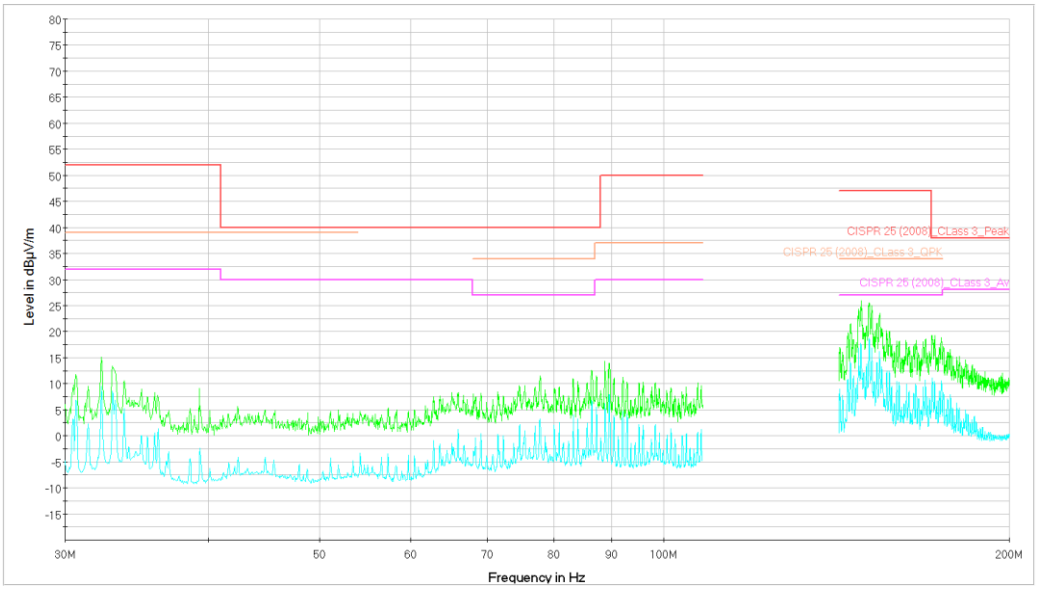


Figure 34. Sample 1. From 30 to 200MHz. Vertical Polarization. Peak and Average measurement.

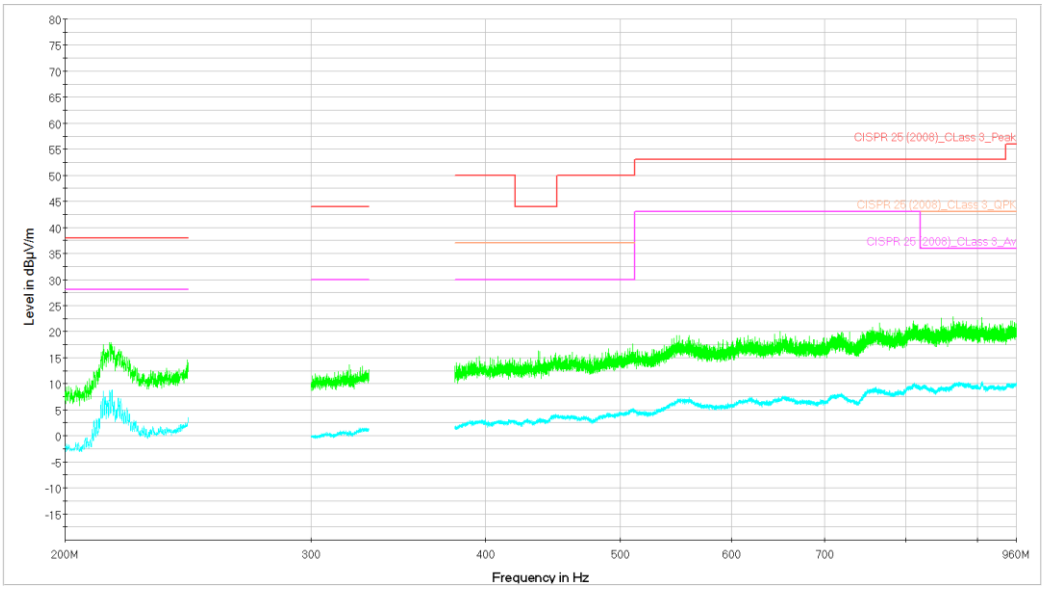


Figure 35. Sample 1. From 200 to 1000MHz. Horizontal Polarization. Peak and Average measurement.

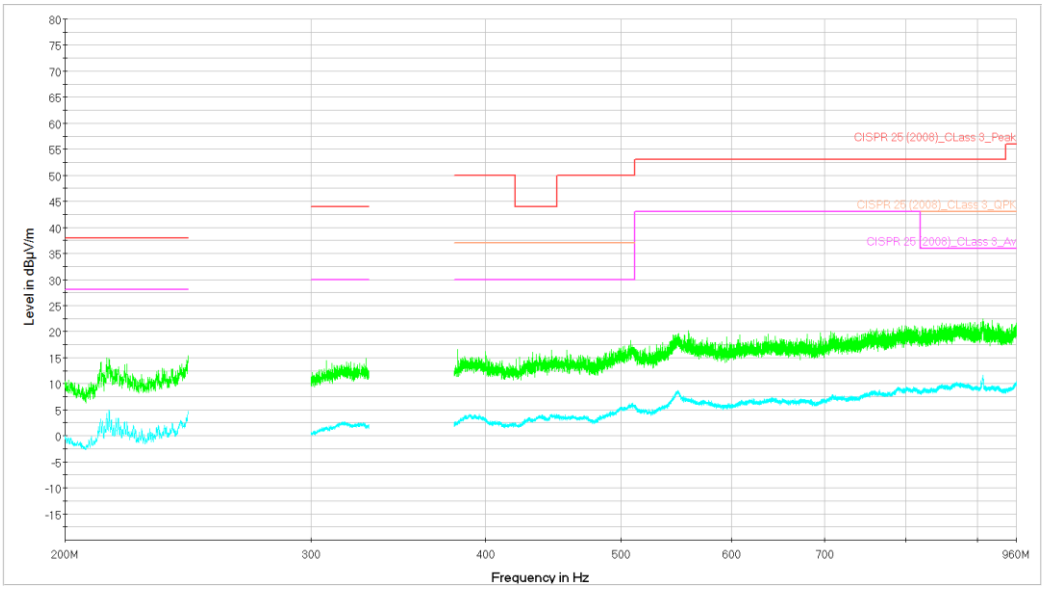


Figure 36. Sample 1. From 200 to 1000MHz. Vertical Polarization. Peak and Average measurement.

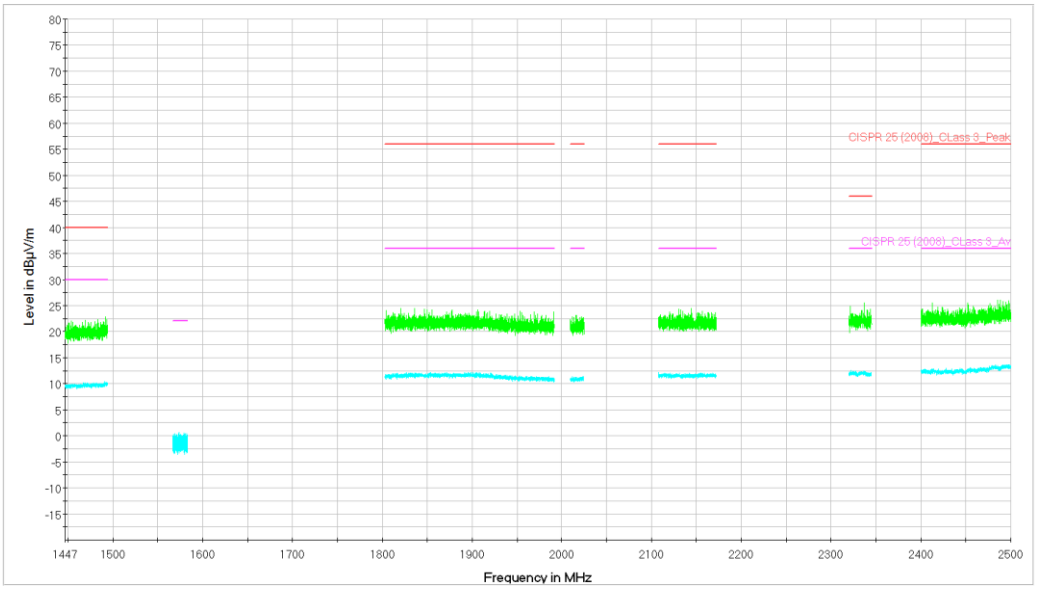


Figure 37. Sample 1. From 1000 to 2500MHz. Horizontal Polarization. Peak and Average measurement.

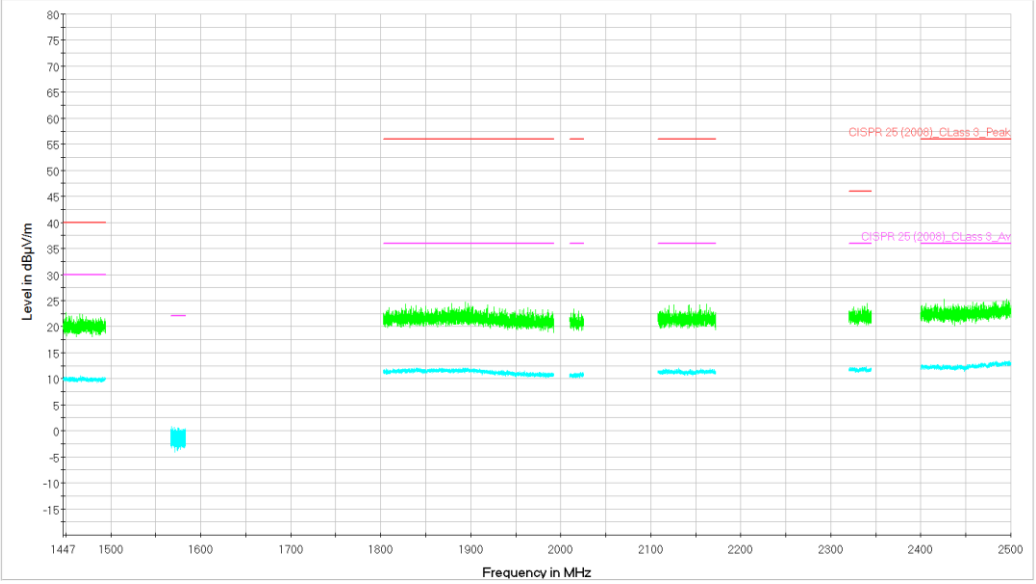


Figure 38. Sample 1. From 1000 to 2500MHz. Vertical Polarization. Peak and Average measurement.

6.1.4.5.3Tests Graphs. Sample #2 (WL80 G2).

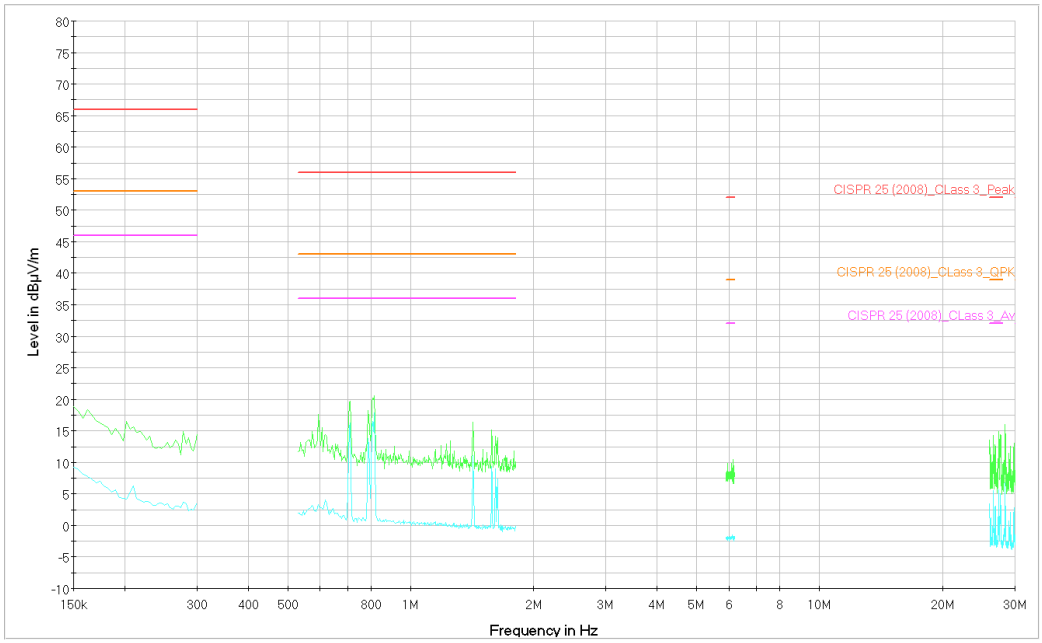


Figure 39. Sample 2. From 100kHz to 30MHz. Peak and Average measurements.

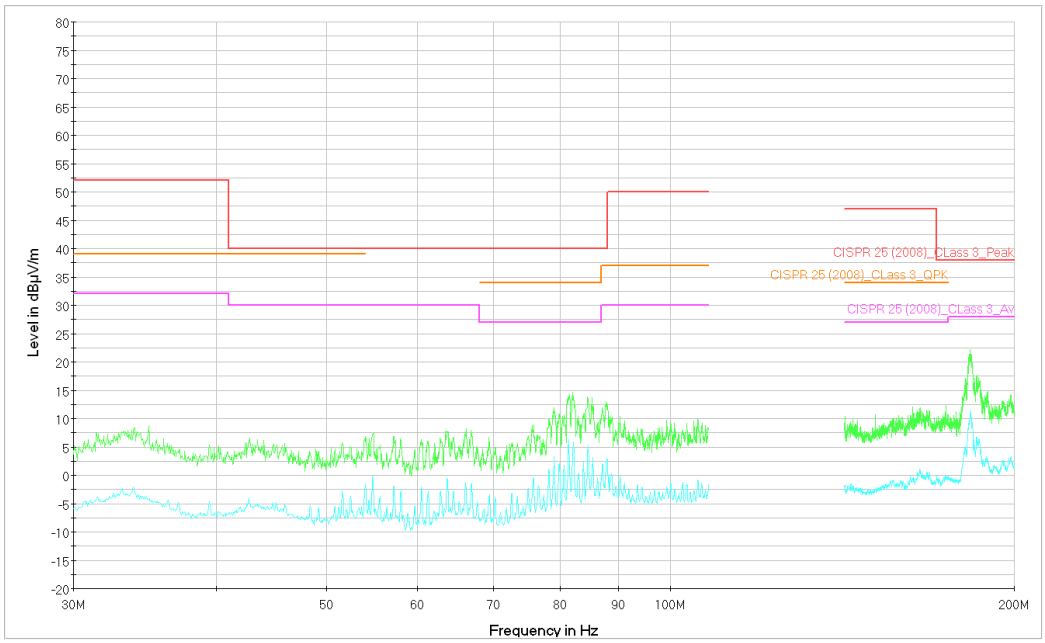


Figure 40. Sample 2. From 30 to 200MHz. Horizontal Polarization. Peak and Average measurement.

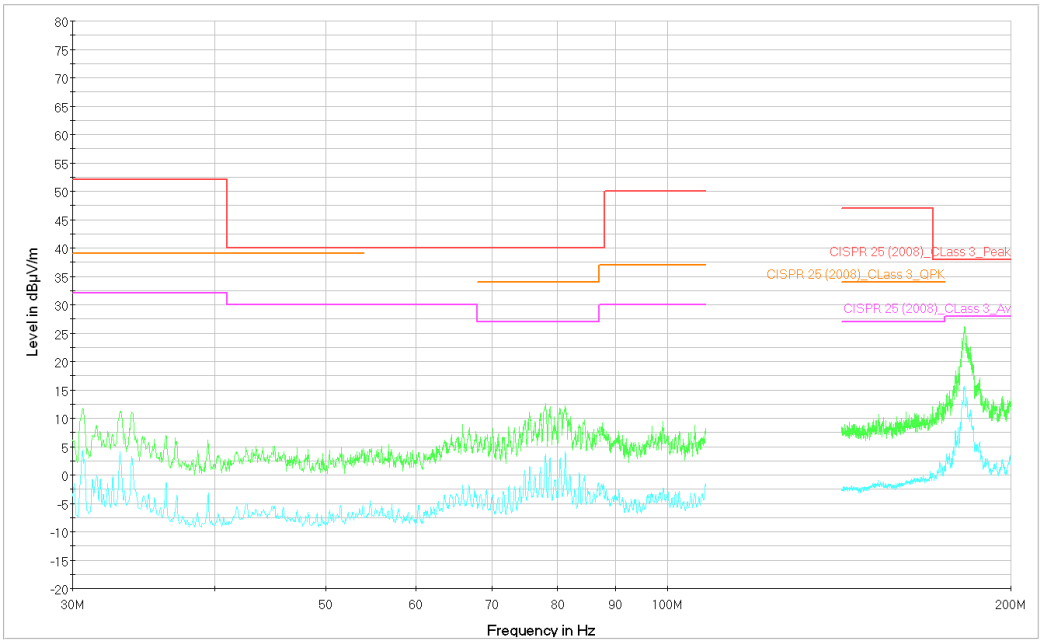


Figure 41. Sample 2. From 30 to 200MHz. Vertical Polarization. Peak and Average measurement.

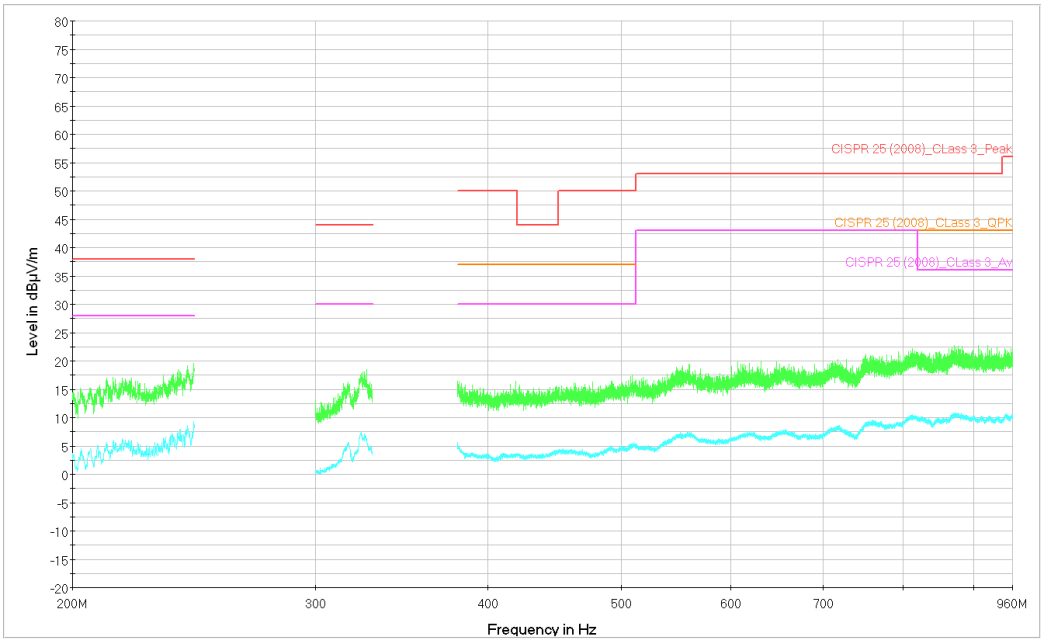


Figure 42. Sample 2. From 200 to 1000MHz. Horizontal Polarization. Peak and Average measurement.

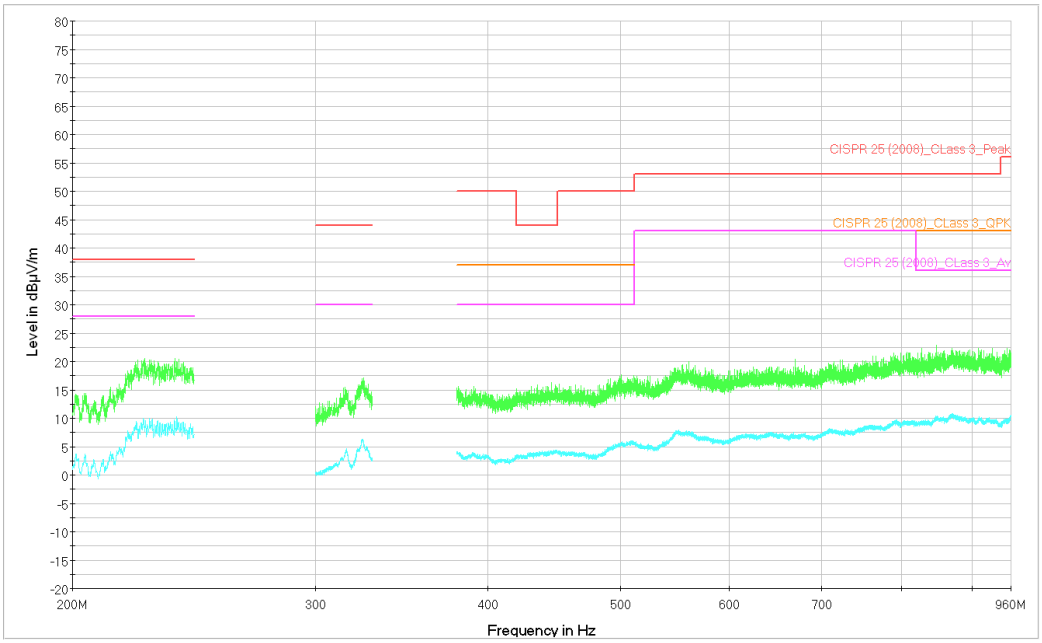


Figure 43. Sample 2. From 200 to 1000MHz. Vertical Polarization. Peak and Average measurement.

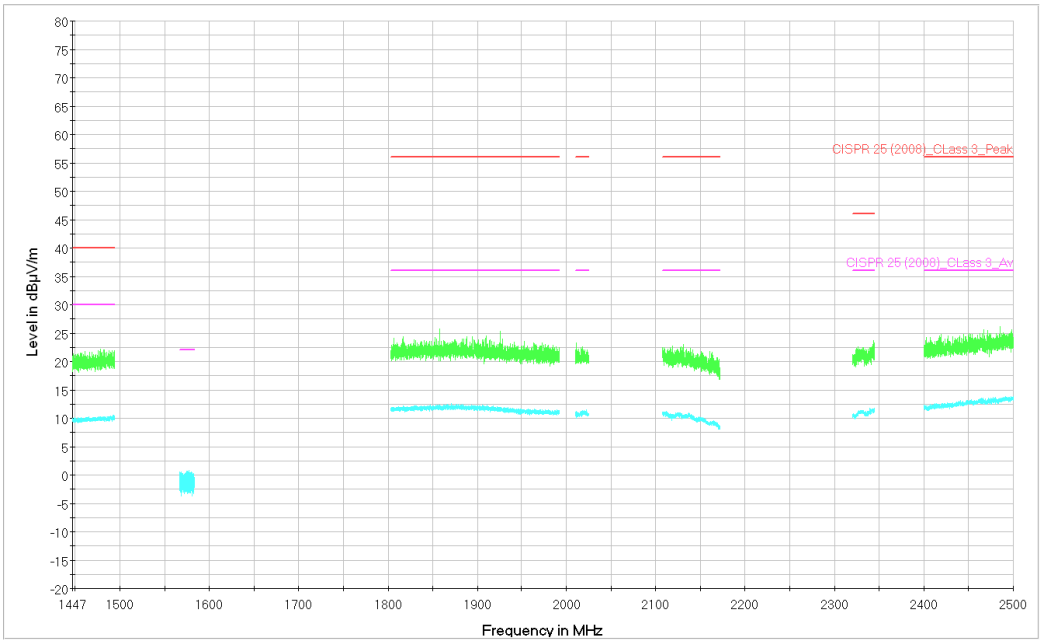


Figure 44. Sample 2. From 1000 to 2500MHz. Horizontal Polarization. Peak and Average measurement.

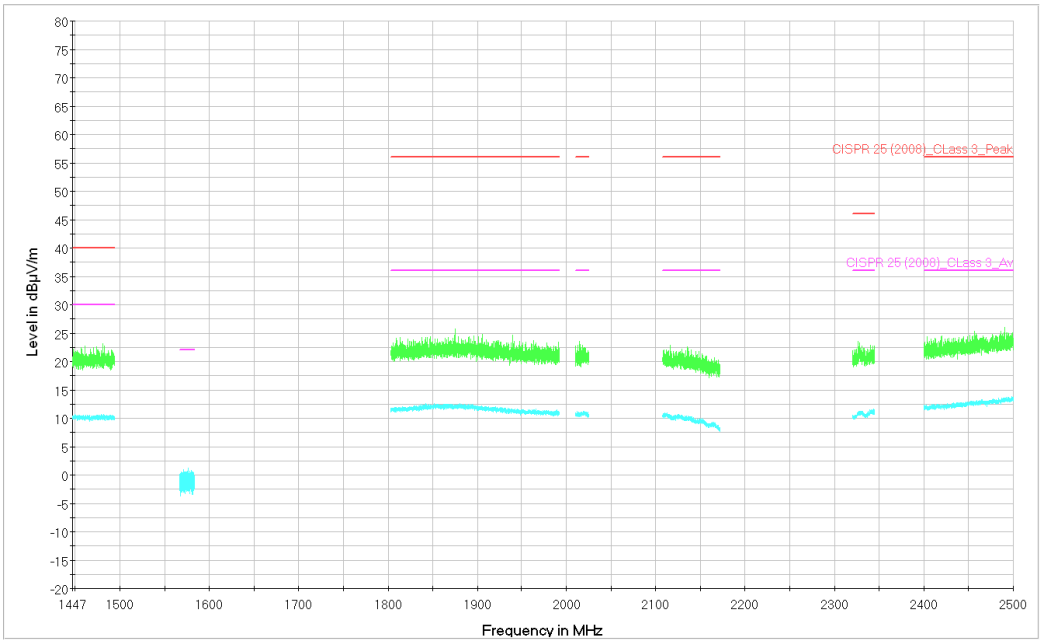


Figure 45. Sample 2. From 1000 to 2500MHz. Vertical Polarization. Peak and Average measurement.

7 Equipments

MANUFACTER	MODEL	MODEL	MODEL
ANTENNA	SCHWARZBECK	STPLP9128ES	S/N: 129
ANTENNA	SCHWARZBECK	BBA9106 + VHBB9124	S/N: 9124-395
ANTENNA	ROHDE & SCHWARZ	HL 223	S/N: 100258
PRE AMPLIFIER	BONN	BLMA 0118-1A	S/N: 066332
POWER SUPPLY	TDK LAMBDA	GEN 30 -80	S/N: 422A251-001
POWER SUPPLY	TDK LAMBDA	GEN 30 -50	S/N: 526A264-005
POWER SUPPLY	TDK LAMBDA	GEN 30 -50	S/N: 526A264-005
LISN	SCHWARZBECK	NNBM 8124-200	S/N: 8124200-047
LISN	SCHWARZBECK	NNBM 8124-200	S/N: 8124200-048
TRANSCEIVER	MESSTECHNIK	optoCAN-HS	S/N: 14-003715 S/N: 14-003716
RECEIVER	ROHDE & SCHWARZ	ESCI 3	S/N: 100182
RECEIVER	ROHDE & SCHWARZ	ESU 26	S/N: 100203

8 Glossary

DUT	Device Under Test
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
LISN	Line Impedance Stability Network
ISO	International Standard Organization
CISPR	Comité International Spécial des Perturbations Radioélectriques
JASO	Japanese Automotive Standards Organization
DV	Design Validation
PV	Product Validation
VCC	Battery
GND	Ground
HW	Hardware
SW	Software
ESD	Electrostatic Discharges
RF	Radio Frequency
BNC	Bayonet Neill-Concelman (RF connector)
CAN	Controller-Area Network (vehicle bus standard)
LIN	Local Interconnect Network (vehicle bus standard)
USB	Universal Serial Bus (connection and communication)