

# CUS400M

# EMISSIONS DATA

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Test results are reference data based on our standard measurement condition.

### 1. Summary of Emissions Test Result

**MODEL : CUS400M-12/FX5; CUS400M-24/FX5**

Item	Standard	Test Class	Result	Page	Notes & Conditions
Input Current Harmonics	IEC61000-3-2	A	PASS	4	
Voltage Flicker	IEC61000-3-3	$d_{max} < 4\%$	PASS	5	
Conducted Emissions	CISPR 11 / 32	B	PASS	6	Class II units require ferrite sleeve on cables to PASS Class B emissions, otherwise Class A.
	FCC 47-15-B	B	PASS	6	
Radiated Emissions	CISPR 11 / 32	B	PASS	12	
	FCC 47-15-B	B	PASS	18	

## 2. Input Current Harmonics (IEC61000-3-2)

MODEL : C U S 4 0 0 M - 1 2

### (1) Equipment Used

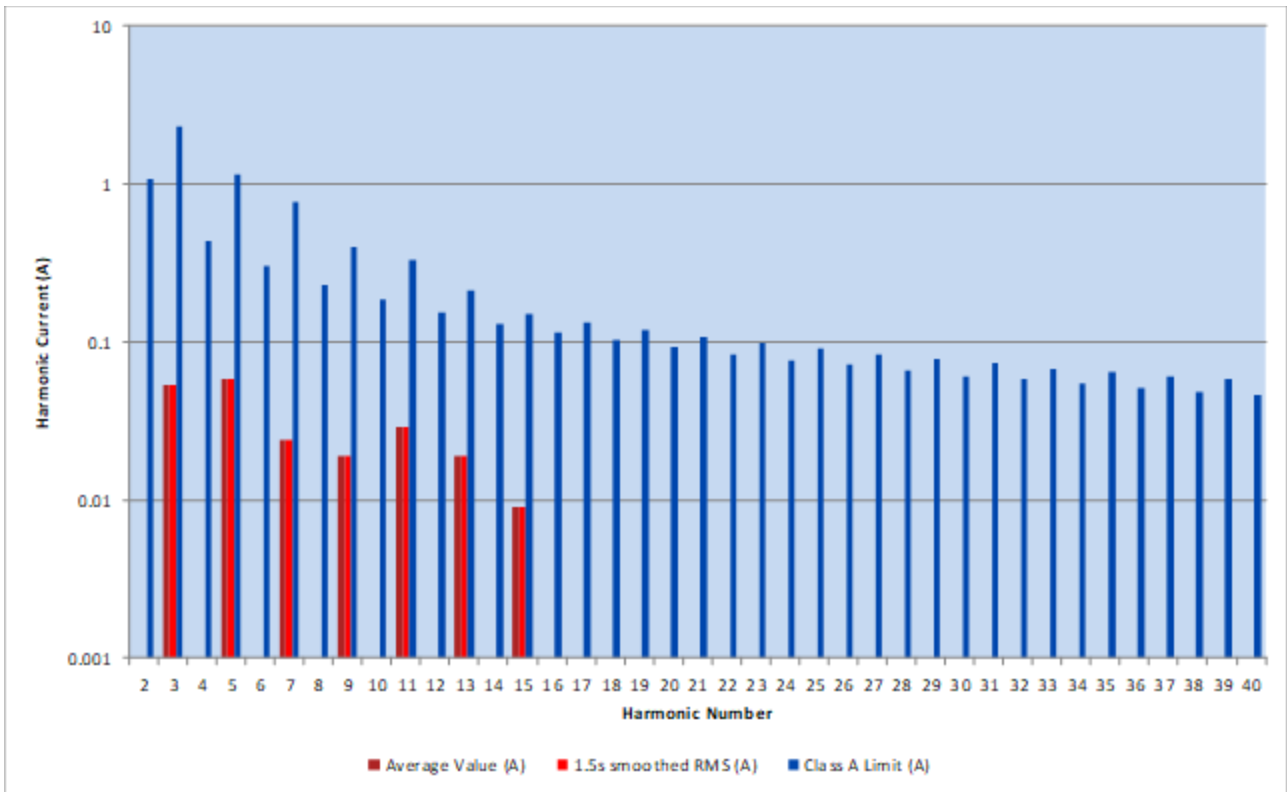
AC Power Source :Chroma 61500  
 Power Analyser :Vitrek PA900

### (2) Test Conditions

Input Voltage :230VAC                      Mains Frequency :50Hz  
 Output Voltage :Rated                      Output Current :33.3A  
 Test Observation Period :1.5 seconds                      Ambient Temperature :21°C

### (3) Test Result

230Vac



Test	Class	[Unit]
EN61000-3-2	A	CUS400M-12

### 3. Voltage Flicker (IEC61000-3-3)

**MODEL : C U S 4 0 0 M - 2 4**

**(1) Equipment Used**

AC Power Source :Chroma 61500  
 Oscilloscope : LeCroy Oscilloscope

**(2) Test Conditions**

Input Voltage : 230VAC Mains Frequency :50Hz  
 Output Voltage :Rated Output Current :16.7A  
 Test :d<sub>max</sub> Ambient Temperature :21°C

**(3) Test Result**

Number	Voltage (V)	Number	Voltage (V)	Number	Voltage (V)	Number	Voltage (V)
1	6.4	7	6.2	13	4.6	19	6.0
2	6.9	8	7.3	14	5.5	20	8.7
3	5.4	9	6.0	15	6.2	21	8.2
4	4.7	10	7.5	16	6.6	22	5.8
5	5.0	11	8.1	17	8.4	23	9.9
6	8.1	12	7.8	18	8.8	24	7.4

Note: The highest and lowest are highlighted, and excluded from the calculation

Average voltage change d<sub>max</sub> = 6.9Volts, or 3.0%.

Test	Test	[Unit]
EN61000-3-3	d <sub>max</sub> < 4%	CUS400M-24

### 4. Conducted Emissions (CISPR11)

MODEL : CUS400M-12/FX5

#### (1) Equipment Used

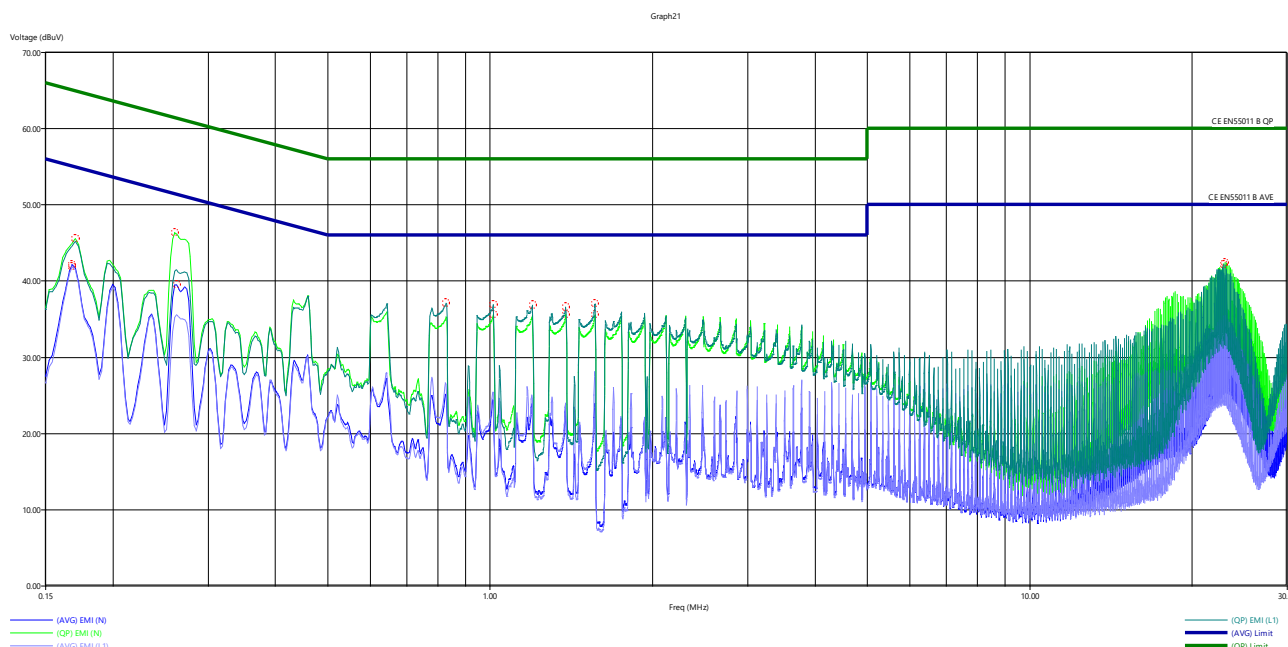
Receiver :Rohde & Schwarz ESR 3  
 2 Line V-Network :Rohde & Schwarz ESH3-Z5  
 Pulse Limiter :Rohde & Schwarz ESH3-Z2

#### (2) Test Conditions

Input Voltage : 230VAC Mains Frequency :50Hz  
 Output Voltage :Rated Output Load :100%, 50% and 0%  
 Class :B Ambient Temperature :21°C

#### (3) Test Results

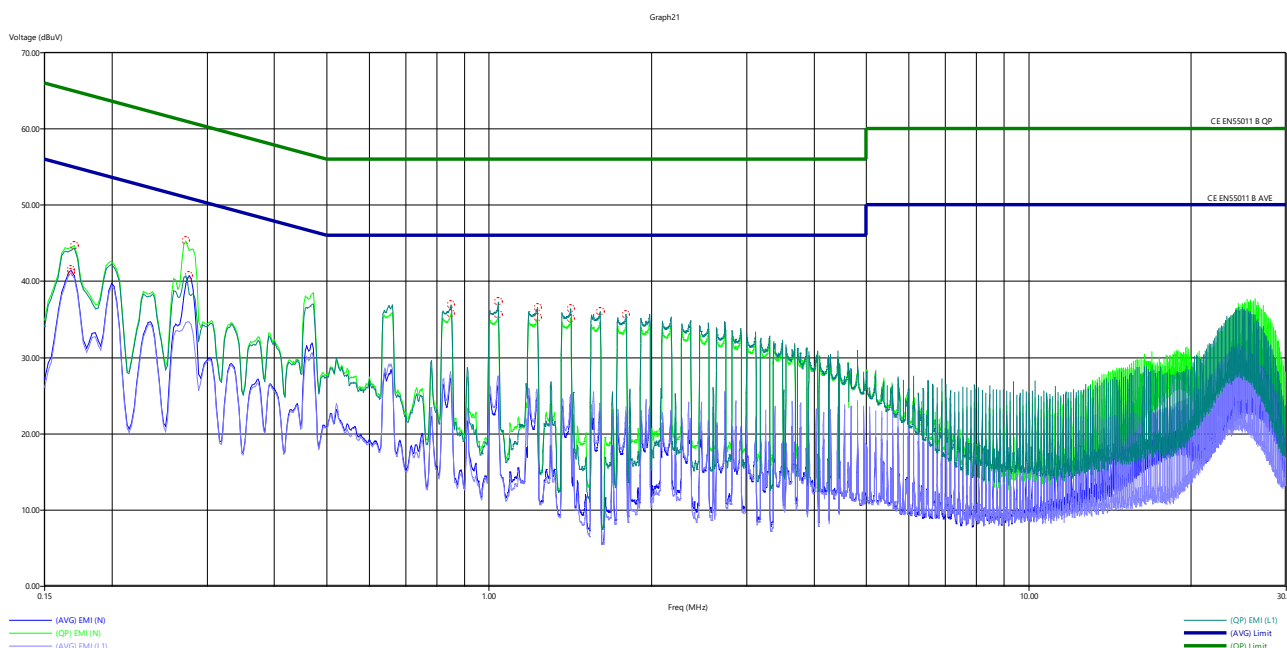
##### 100% Load



Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Quasi-Peak (dBµV)	Limit (dBµV)	Margin (dB)
0.17	42.22	55.06	12.84	44.95	65.06	20.11
0.17	41.73	54.95	13.22	45.53	64.95	19.42
0.26	39.50	51.42	11.92	46.38	61.42	15.04
0.26	39.54	51.35	<b>11.81</b>	46.19	61.35	15.16
0.83	26.41	46.00	19.59	37.13	56.00	18.87
1.01	25.31	46.00	20.69	36.93	56.00	19.07
1.20	24.45	46.00	21.55	36.83	56.00	19.17
1.38	23.28	46.00	22.72	36.60	56.00	19.40
1.57	26.63	46.00	19.37	37.03	56.00	18.97
22.91	35.11	50.00	14.89	42.17	60.00	17.83
23.04	33.92	50.00	16.08	42.45	60.00	17.55

Note: The emission with the least margin is highlighted.

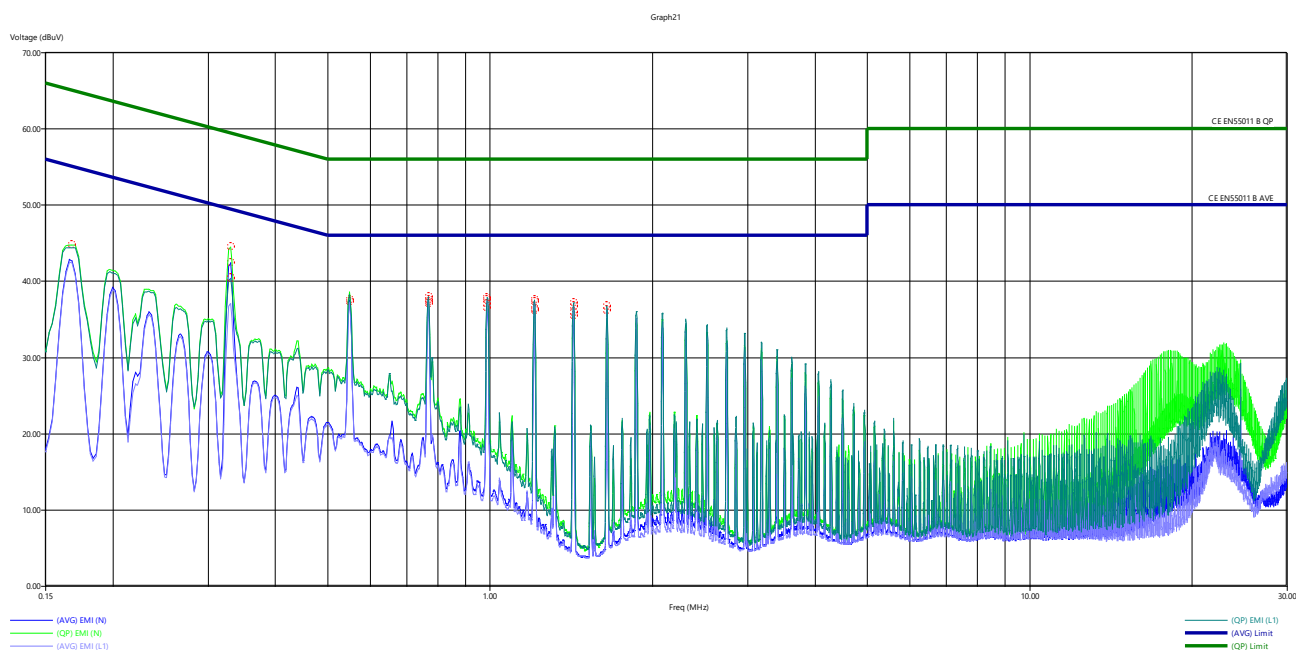
50% Load



Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Quasi-Peak (dBµV)	Limit (dBµV)	Margin (dB)
0.17	41.49	55.06	13.57	44.45	65.06	20.61
0.17	40.68	54.95	14.27	44.66	64.95	20.29
0.27	39.68	51.00	11.32	45.32	61.00	15.68
0.28	40.77	50.87	<b>10.10</b>	44.03	60.87	16.84
0.85	27.43	46.00	18.57	36.91	56.00	19.09
1.04	27.56	46.00	18.44	37.26	56.00	18.74
1.23	25.09	46.00	20.91	36.55	56.00	19.45
1.42	24.40	46.00	21.60	36.34	56.00	19.66
1.61	23.12	46.00	22.88	36.05	56.00	19.95
1.79	22.76	46.00	23.24	35.68	56.00	20.32

Note: The emission with the least margin is highlighted.

0% Load



Frequency (MHz)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Quasi-Peak (dBμV)	Limit (dBμV)	Margin (dB)
0.17	42.74	55.06	12.32	44.75	65.06	20.31
0.33	42.40	49.45	<b>7.05</b>	44.46	59.45	14.99
0.55	37.50	46.00	8.50	38.61	56.00	17.39
0.77	37.64	46.00	8.36	38.00	56.00	18.00
0.99	37.57	46.00	8.43	37.94	56.00	18.06
1.21	37.30	46.00	8.70	37.58	56.00	18.42
1.43	36.72	46.00	9.28	37.17	56.00	18.83
1.65	36.18	46.00	9.82	36.74	56.00	19.26

Note: The emission with the least margin is highlighted.



**MODEL: CUS400M-24/FX5**

**(1) Equipment Used**

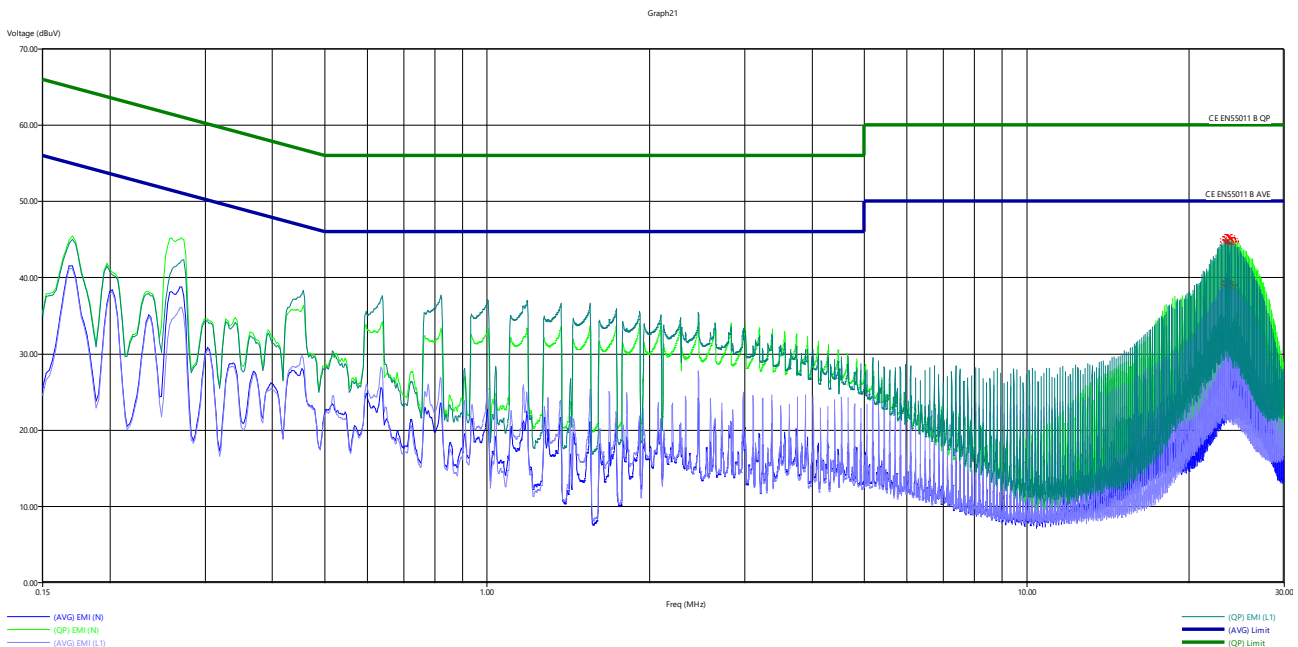
Receiver	:Rohde & Schwarz ESR 3
2 Line V-Network	:Rohde & Schwarz ESH3-Z5
Pulse Limiter	:Rohde & Schwarz ESH3-Z2

**(2) Test Conditions**

Input Voltage	: 230VAC	Mains Frequency	:50Hz
Output Voltage	:Rated	Output Load	:100%, 50% and 0%
Class	:B	Ambient Temperature	:21°C

**(3) Test Results**

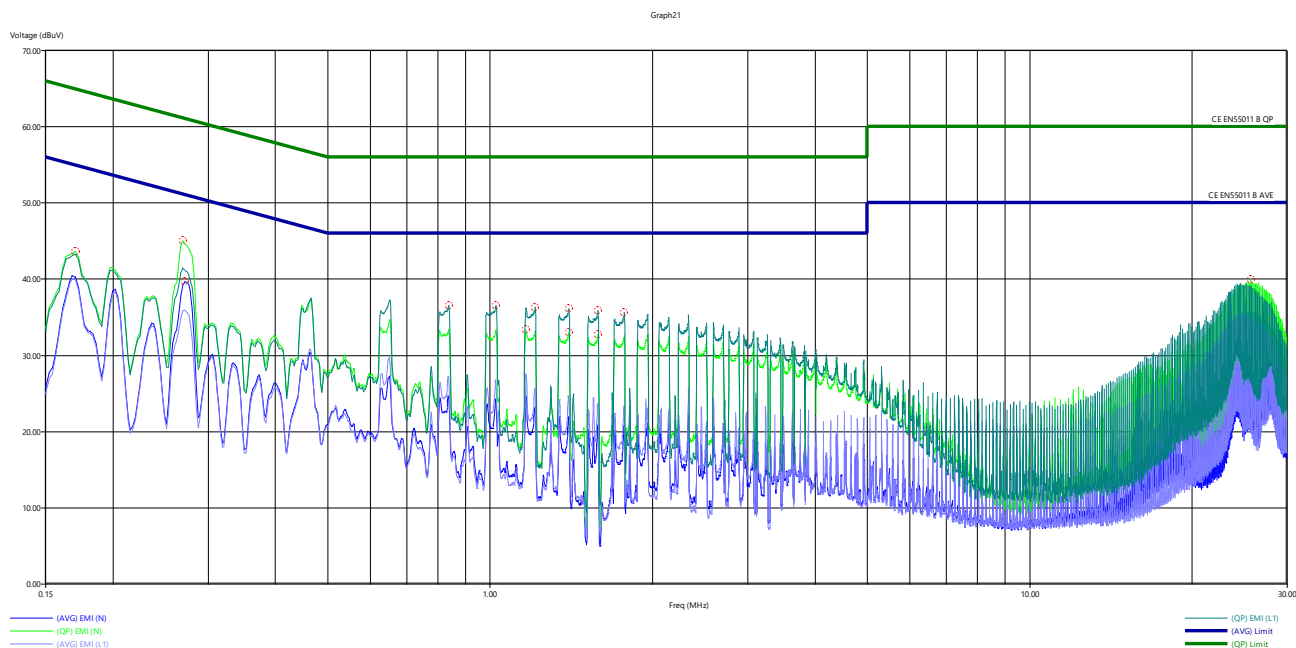
**100% Load**



Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Quasi-Peak (dBµV)	Limit (dBµV)	Margin (dB)
23.20	37.67	50.00	12.33	44.85	60.00	15.15
23.20	38.95	50.00	11.05	44.17	60.00	15.83
23.33	38.70	50.00	11.30	45.14	60.00	14.86
23.33	39.30	50.00	10.70	44.11	60.00	15.89
23.46	37.68	50.00	12.32	45.12	60.00	14.88
23.46	39.20	50.00	10.80	44.87	60.00	15.13
23.46	39.33	50.00	<b>10.67</b>	43.84	60.00	16.16
23.59	38.30	50.00	11.70	45.01	60.00	14.99
23.59	39.25	50.00	10.75	44.36	60.00	15.64
23.59	39.10	50.00	10.90	43.85	60.00	16.15
23.71	36.75	50.00	13.25	44.83	60.00	15.17

Note: The emission with the least margin is highlighted.

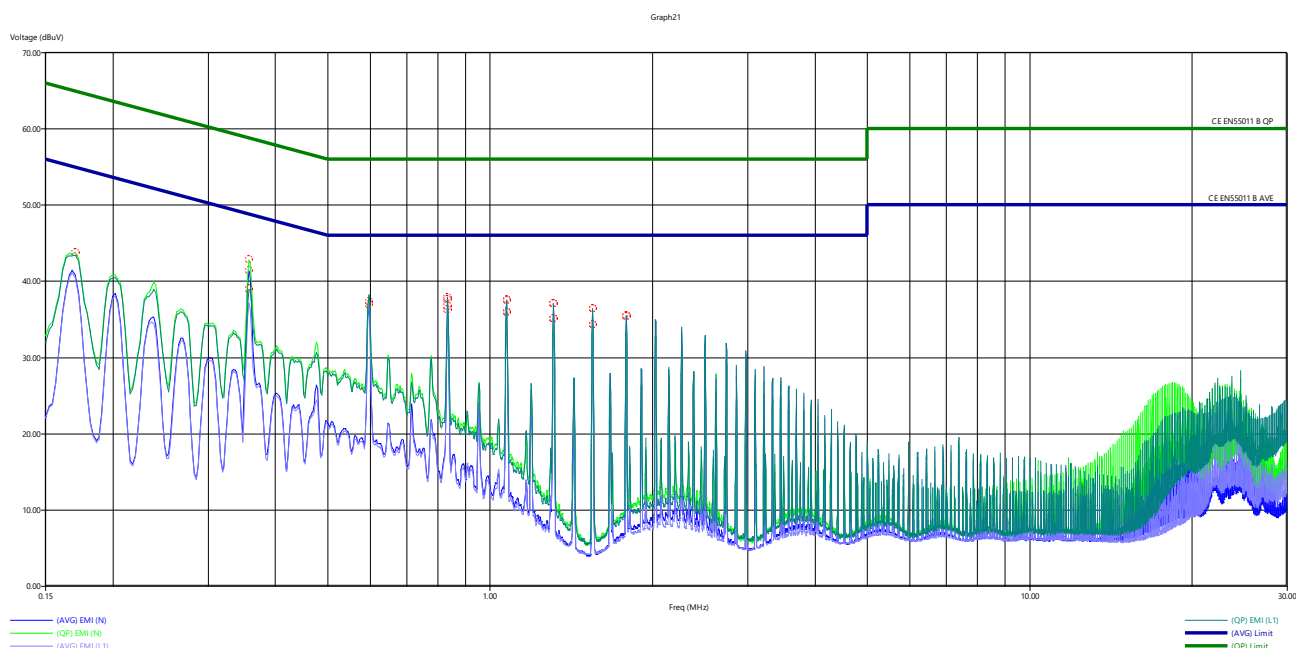
50% Load



Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Quasi-Peak (dBµV)	Limit (dBµV)	Margin (dB)
0.17	40.29	54.95	14.66	43.58	64.95	21.37
0.27	39.22	51.14	11.92	45.04	61.14	16.10
0.27	39.65	51.07	<b>11.42</b>	44.71	61.07	16.36
0.84	26.89	46.00	19.11	36.53	56.00	19.47
1.03	26.18	46.00	19.82	36.57	56.00	19.43
1.16	25.96	46.00	20.04	35.96	56.00	20.04
1.21	24.98	46.00	21.02	36.33	56.00	19.67
1.40	23.90	46.00	22.10	36.13	56.00	19.87
1.59	22.74	46.00	23.26	35.88	56.00	20.12
1.77	22.36	46.00	23.64	35.54	56.00	20.46
25.65	35.48	50.00	14.52	39.95	60.00	20.05

Note: The emission with the least margin is highlighted.

0% Load



Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Quasi-Peak (dBµV)	Limit (dBµV)	Margin (dB)
0.17	40.73	54.95	14.22	43.75	64.95	21.20
0.36	41.37	48.80	7.43	42.78	58.80	16.02
0.60	37.24	46.00	8.76	38.22	56.00	17.78
0.83	37.63	46.00	8.37	37.89	56.00	18.11
1.07	37.47	46.00	8.53	37.57	56.00	18.43
1.31	37.06	46.00	8.94	36.99	56.00	19.01
1.55	36.42	46.00	9.58	36.36	56.00	19.64
1.79	35.45	46.00	10.55	35.43	56.00	20.57

Note: The emission with the least margin is highlighted.

Note: Limits of CISPR11, EN55011, CISPR32, EN55032, FCC and VCCI Class B are identical.

## 5. Radiated Emissions (CISPR11)

MODEL : CUS400M-12/FX5

### (1) Equipment Used

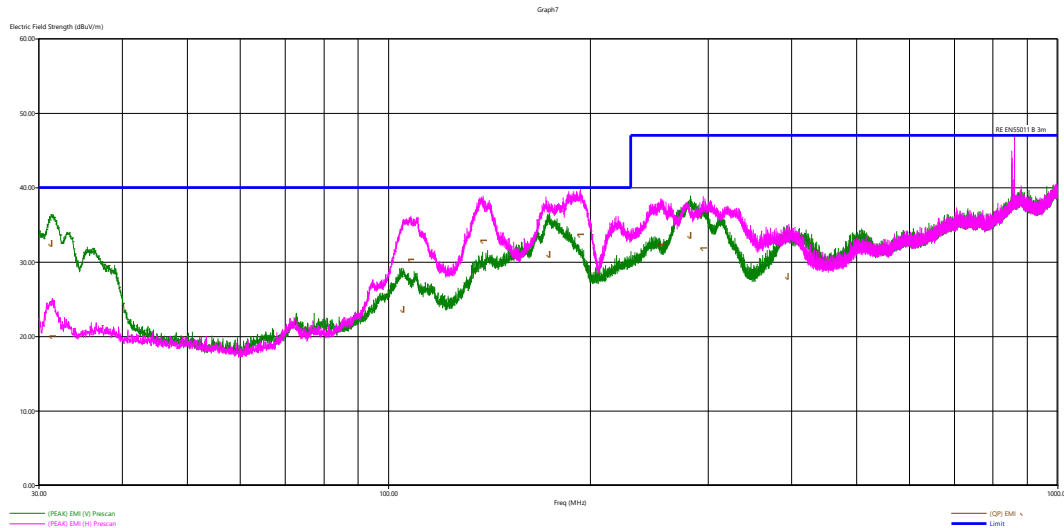
Receiver	:Rohde & Schwarz ESR 3
Antenna	:Schwarzbeck Mess VULB 9166
Controller	:Mature Control Unit MCU
Antenna Mast	:Mature Antenna Mast AM 4.0
Turntable	:Mature Turntable TT 2.0 SI
Semi-Anechoic Chamber	:TRS 3m Semi-Anechoic Chamber

### (2) Test Conditions

Input Voltage	: 230VAC	Mains Frequency	:50Hz
Output Voltage	:Rated	Output Load	:100%, 50% and 0%
Class	:B	Ambient Temperature	:21°C

### (3) Test Results

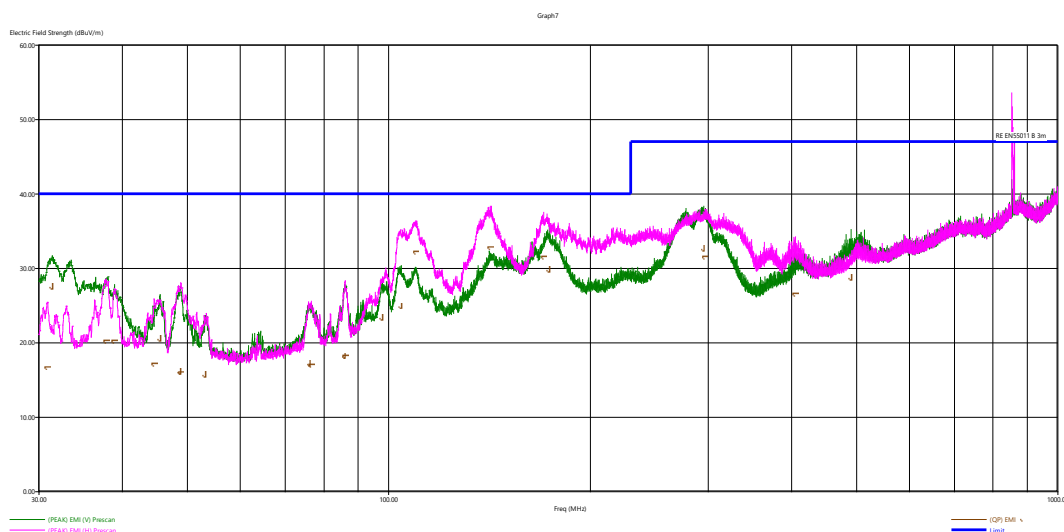
#### 100% Load



Frequency (MHz)	Polarisation	EUT Angle (Degrees)	Tower Height (cm)	Quasi-Peak (dBµV/m)	Limit (dBµV/m)	Margin (dB)
31.38	H	209.9	249	20.00	40.00	20.00
107.82	H	9.5	299	30.20	40.00	9.80
138.30	H	223.6	200	32.87	40.00	7.13
193.23	H	194.5	101	33.68	40.00	<b>6.32</b>
254.91	H	171.0	101	32.29	47.00	14.71
295.08	H	12.5	101	31.75	47.00	15.25
31.26	V	113.5	121	32.40	40.00	7.60
105.06	V	77.0	249	23.59	40.00	16.41
173.82	V	113.5	121	30.98	40.00	9.02
282.51	V	19.6	200	33.51	47.00	13.49
394.83	V	311.8	151	28.00	47.00	19.00

Note: The emission with the least margin is highlighted.

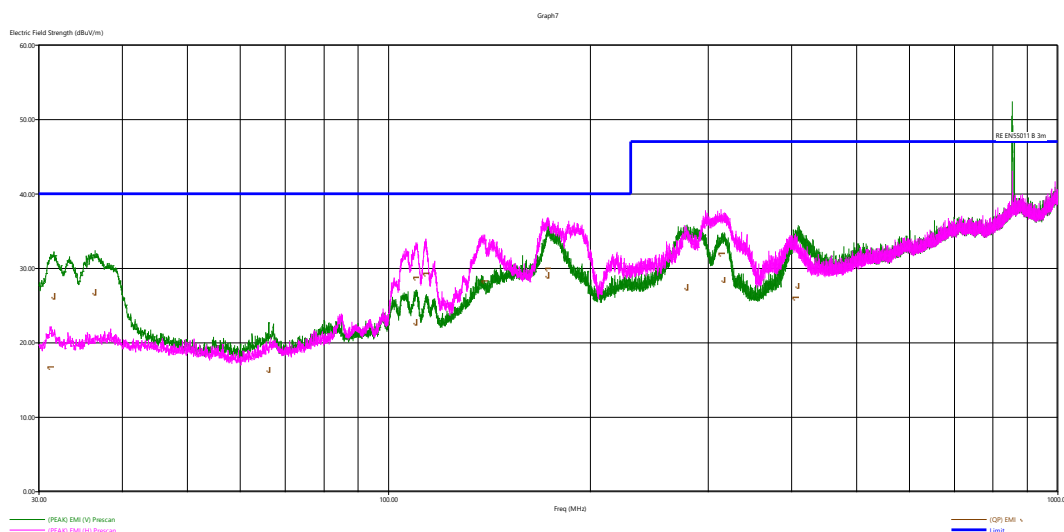
50% Load



Frequency (MHz)	Polarisation	EUT Angle (Degrees)	Tower Height (cm)	Quasi-Peak (dBµV/m)	Limit (dBµV/m)	Margin (dB)
31.38	V	85.5	121	27.45	40.00	12.55
45.51	V	132.9	121	20.54	40.00	19.46
97.83	V	103.6	151	23.27	40.00	16.73
104.37	V	81.5	200	24.81	40.00	15.19
173.73	V	133.5	121	29.75	40.00	10.25
295.83	V	103.5	151	32.60	47.00	14.40
490.95	V	81.0	151	28.64	47.00	18.36
37.80	H	186.9	349	20.20	40.00	19.80
38.94	H	11.5	399	20.23	40.00	19.77
109.71	H	25.6	249	32.18	40.00	7.82
141.84	H	214.9	200	32.78	40.00	<b>7.22</b>
170.40	H	235.9	249	31.52	40.00	8.48
297.03	H	52.5	101	31.49	47.00	15.51
405.66	H	313.0	101	26.58	47.00	20.42

Note: The emission with the least margin is highlighted.

0% Load



Frequency (MHz)	Polarisation	EUT Angle (Degrees)	Tower Height (cm)	Quasi-Peak (dBµV/m)	Limit (dBµV/m)	Margin (dB)
31.17	H	191.8	299	16.61	40.00	23.39
109.80	H	219.5	299	28.66	40.00	11.34
113.49	H	218.0	299	29.25	40.00	10.75
138.87	H	12.5	200	28.18	40.00	11.82
172.56	H	214.4	249	29.88	40.00	<b>10.12</b>
313.74	H	342.9	101	31.97	47.00	15.03
405.57	H	342.0	101	26.00	47.00	21.00
31.59	V	64.5	121	26.10	40.00	13.90
36.39	V	52.5	151	26.64	40.00	13.36
66.18	V	231.0	121	16.28	40.00	23.72
109.86	V	87.5	200	22.62	40.00	17.38
173.19	V	136.5	121	28.95	40.00	11.05
278.97	V	328.4	200	27.32	47.00	19.68
317.19	V	298.1	151	28.37	47.00	18.63

Note: The emission with the least margin is highlighted.

**MODEL : CUS400M-24/FX5**

**(4) Equipment Used**

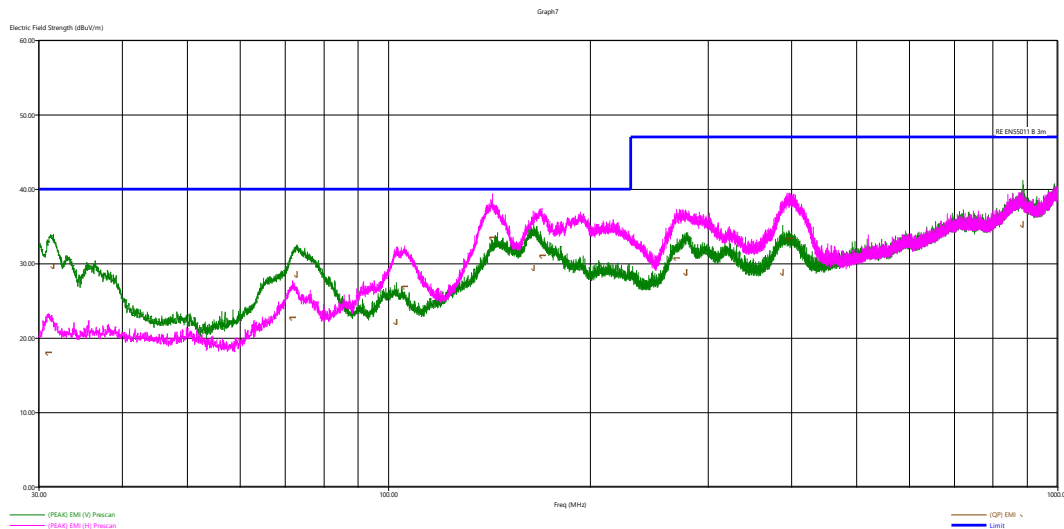
Receiver	:Rohde & Schwarz ESR 3
Antenna	:Schwarzbeck Mess VULB 9166
Controller	:Matur Control Unit MCU
Antenna Mast	:Matur Antenna Mast AM 4.0
Turntable	:Matur Turntable TT 2.0 SI
Semi-Anechoic Chamber	:TRS 3m Semi-Anechoic Chamber

**(5) Test Conditions**

Input Voltage	: 230VAC	Mains Frequency	:50Hz
Output Voltage	:Rated	Output Load	:100%, 50% and 0%
Class	:B	Ambient Temperature	:21°C

**(6) Test Results**

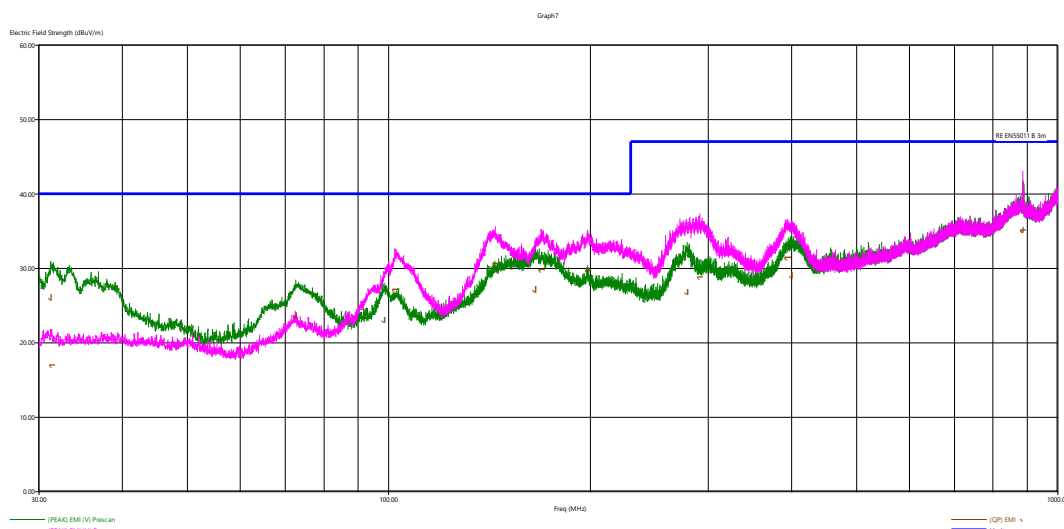
**100% Load**



Frequency (MHz)	Polarisation	EUT Angle (Degrees)	Tower Height (cm)	Quasi-Peak (dBµV/m)	Limit (dBµV/m)	Margin (dB)
30.99	H	217.9	249	18.01	40.00	21.99
71.82	H	12.6	299	22.66	40.00	17.34
105.69	H	23.5	299	26.86	40.00	13.14
142.86	H	214.5	200	33.44	40.00	<b>6.56</b>
169.53	H	241.9	249	31.05	40.00	8.95
269.04	H	170.5	151	30.67	47.00	16.33
396.57	H	351.0	101	33.30	47.00	13.70
31.50	V	80.6	121	29.65	40.00	10.35
72.84	V	40.6	151	28.54	40.00	11.46
102.69	V	88.9	249	22.06	40.00	17.94
164.61	V	304.5	151	29.30	40.00	10.70
278.58	V	335.5	200	28.75	47.00	18.25
387.75	V	34.1	121	28.73	47.00	18.27
886.08	V	108.5	121	35.21	47.00	11.79

Note: The emission with the least margin is highlighted.

50% Load

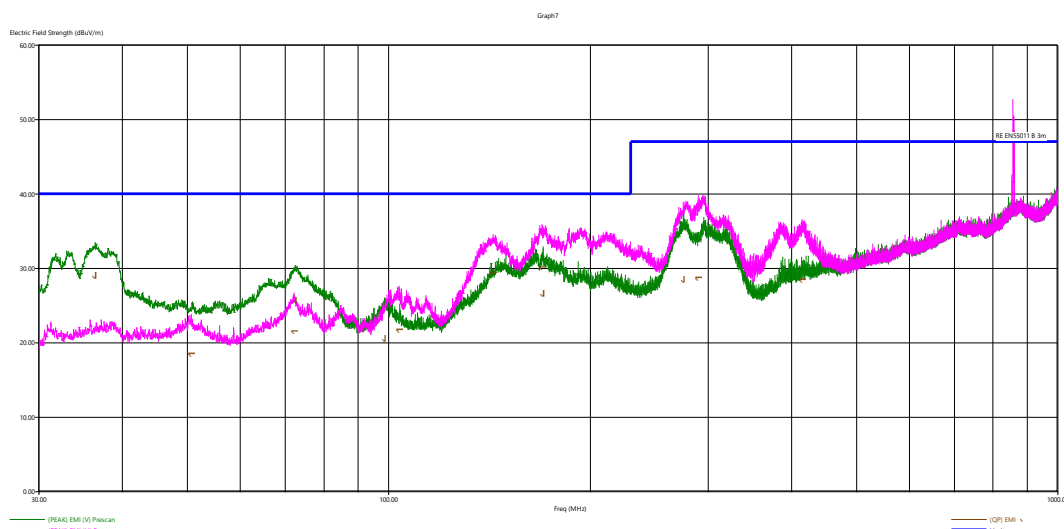


Frequency (MHz)	Polarisation	EUT Angle (Degrees)	Tower Height (cm)	Quasi-Peak (dBµV/m)	Limit (dBµV/m)	Margin (dB)
31.32	H	117.9	249	16.92	40.00	23.08
102.15	H	21.5	249	27.10	40.00	12.90
144.24	H	199.5	200	30.49	40.00	<b>9.51</b>
168.93	H	257.5	249	29.77	40.00	10.23
198.39	H	207.5	151	29.61	40.00	10.39
291.84	H	12.5	101	28.74	47.00	18.26
394.17	H	333.9	101	31.35	47.00	15.65
886.05	H	281.5	349	35.04	47.00	11.96
31.23	V	12.5	121	25.97	40.00	14.03
72.63	V	26.5	121	23.56	40.00	16.44
98.46	V	210.9	121	22.95	40.00	17.05
165.72	V	293.4	249	27.05	40.00	12.95
279.36	V	319.4	151	26.69	47.00	20.31
400.05	V	280.1	121	28.99	47.00	18.01

Note: The emission with the least margin is highlighted.



0% Load



Frequency (MHz)	Polarisation	EUT Angle (Degrees)	Tower Height (cm)	Quasi-Peak (dBµV/m)	Limit (dBµV/m)	Margin (dB)
50.64	H	148.9	399	18.42	40.00	21.58
72.18	H	14.5	249	21.46	40.00	18.54
103.68	H	49.4	249	21.73	40.00	18.27
143.28	H	12.5	200	29.30	40.00	10.70
169.59	H	236.5	249	30.08	40.00	<b>9.92</b>
289.86	H	53.1	101	28.68	47.00	18.32
414.69	H	330.9	101	28.46	47.00	18.54
36.42	V	34.5	121	28.92	40.00	11.08
72.63	V	35.9	121	25.70	40.00	14.30
98.52	V	202.8	121	20.50	40.00	19.50
169.98	V	293.5	151	26.60	40.00	13.40
275.82	V	57.6	121	28.41	47.00	18.59

Note: The emission with the least margin is highlighted.

## 6. Radiated Emissions (FCC Title 47 – 15 B)

MODEL : CUS400M-12/FX5

### (1) Equipment Used

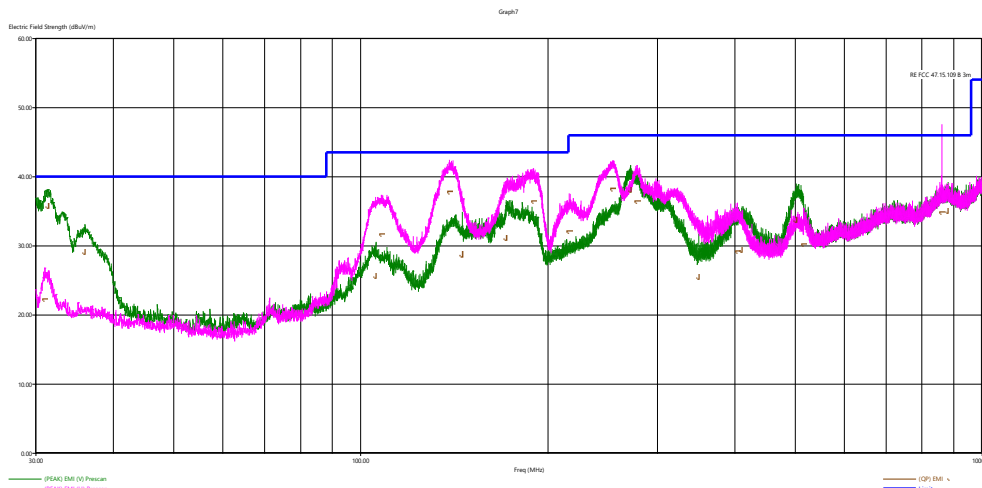
Receiver	:Rohde & Schwarz ESR 3
Antenna	:Schwarzbeck Mess VULB 9166
Controller	:Mature Control Unit MCU
Antenna Mast	:Mature Antenna Mast AM 4.0
Turntable	:Mature Turntable TT 2.0 SI
Semi-Anechoic Chamber	:TRS 3m Semi-Anechoic Chamber

### (2) Test Conditions

Input Voltage	: 120VAC	Mains Frequency	:50Hz
Output Voltage	:Rated	Output Load	:100%
Class	:B	Ambient Temperature	:21°C

### (3) Test Results

#### 100% Load



Frequency (MHz)	Polarisation	EUT Angle (Degrees)	Tower Height (cm)	Quasi-Peak (dBµV/m)	Limit (dBµV/m)	Margin (dB)
31.41	V	72.5	121	35.68	40.00	4.32
36.00	V	109.9	151	29.04	40.00	10.96
145.62	V	73.2	121	28.65	43.50	14.85
171.39	V	159.4	121	31.05	43.50	12.45
271.53	V	96.5	121	37.95	46.00	8.05
502.65	V	235.0	121	33.69	46.00	12.31
880.83	V	122.1	349	34.94	46.00	11.06
108.18	H	197.4	200	31.55	43.50	11.95
138.81	H	217.4	249	37.77	43.50	5.73
189.63	H	201.0	101	36.37	43.50	7.13
216.42	H	216.9	151	32.00	46.00	14.00
254.25	H	172.5	101	38.22	46.00	7.78
278.52	H	228.5	101	36.44	46.00	9.56
861.39	H	171.5	200	34.75	46.00	11.25

Note: The emission with the least margin is highlighted.

**MODEL : CUS400M-24/FX5**

**(4) Equipment Used**

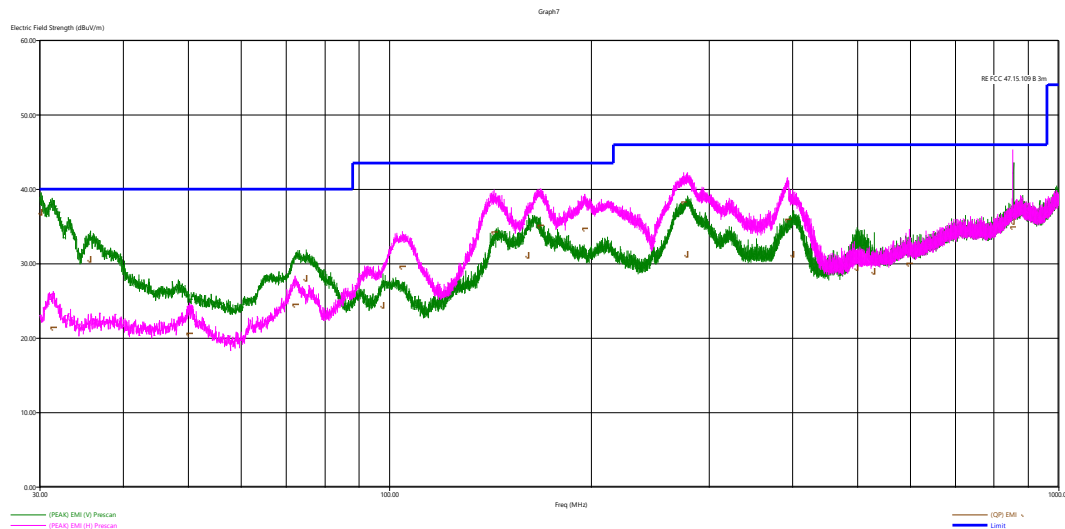
Receiver	:Rohde & Schwarz ESR 3
Antenna	:Schwarzbeck Mess VULB 9166
Controller	:Mature Control Unit MCU
Antenna Mast	:Mature Antenna Mast AM 4.0
Turntable	:Mature Turntable TT 2.0 SI
Semi-Anechoic Chamber	:TRS 3m Semi-Anechoic Chamber

**(5) Test Conditions**

Input Voltage	: 120VAC	Mains Frequency	:50Hz
Output Voltage	:Rated	Output Load	:100%
Class	:B	Ambient Temperature	:21°C

**(6) Test Results**

**100% Load**



Frequency (MHz)	Polarisation	EUT Angle (Degrees)	Tower Height (cm)	Quasi-Peak (dBµV/m)	Limit (dBµV/m)	Margin (dB)
104.46	H	11.4	249	29.58	43.50	13.92
143.25	H	11.5	200	34.19	43.50	9.31
167.88	H	208.9	249	35.06	43.50	8.44
195.75	H	201.5	151	34.61	43.50	8.89
275.10	H	180.5	101	38.23	46.00	7.77
393.33	H	1.9	101	35.81	46.00	10.19
853.17	H	314.5	151	34.85	46.00	11.15
30.09	V	19.6	121	36.82	40.00	<b>3.18</b>
35.70	V	20.9	121	30.50	40.00	9.50
75.00	V	31.8	121	27.94	40.00	12.06
161.28	V	349.5	200	31.03	43.50	12.47
278.61	V	236.5	121	31.18	46.00	14.82
400.83	V	266.9	121	31.16	46.00	14.84
855.66	V	11.5	399	35.50	46.00	10.50

Note: The emission with the least margin is highlighted.