

1 Cover Page

FCC Test Report (DoC)

Application No.: HKEM1605000556IT
Applicant: Zhejiang Dahua Vision Technology Co., Ltd.
Product Information:
Product Name: Ethernet Switch
Model: DH-PFS5924-24X, PFS5924-24X, DH-PFS6428-24T, PFS6428-24T, DH-PFS5424-24T, PFS5424-24T
 (Refer to 4.10)
Serial No.: --
Requirement: CFR 47 FCC PART 15 SUBPART B, 2015
Date of Receipt: 2016-04-13
Date of Test: 2016-04-19 to 2016-05-04
Date of Issue: 2016-06-13

Test Result:	PASS*
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* In the configuration tested, the EUT complied with the standards specified above

Authorized Signature:




CHEN Jian-feng, Jeffrey

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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

2 Test Summary

Test	Test Requirement	Test Method	Class / Severity	Result
Conducted Emission (150KHz to 30MHz)	FCC PART 15, SUBPART B: 2015	ANSI C63.4: 2014	Class B	PASS
Radiated Emission (30MHz to 1GHz)	FCC PART 15, SUBPART B: 2015	ANSI C63.4: 2014	Class B	PASS
Radiated Emission above 1 GHz	FCC PART 15, SUBPART B: 2015	ANSI C63.4: 2014	Class B	PASS

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4 General Information

4.1 Client Information

Applicant: Zhejiang Dahua Vision Technology Co., Ltd.
Address of Applicant: The 1st Floor, Building F, No.1199 Binan Road, Changhe Street, Binjiang District, Hangzhou, Zhejiang, P.R.China

4.2 General Description of EUT

EUT Name: Ethernet Switch
Model: PFS5424-24T
Serial No.: --
EUT Description: DH-PFS5424-24T is a type of managed switch with layer 2+, which adopts 350G back panel design structure and realizes many functions such as route, port mirroring, port isolation, ARP binding, spanning tree, VLAN, ACL, DHCP snooping, multicast, link aggregation and etc. It is the best choice in small and medium-sized enterprises.

4.3 Details of EUT

Power Supply: AC100-240V 50/60Hz
Power Cord: N/A
Operating frequency: 416MHz (the Highest working frequency)

4.4 Description of Support Units

Supporting equipment:

Description	Manufacturer	Model No.	Serial No.	Data Cable	Power Cable
Personal Computer	DELL	OPTIPLEX 755	E191 (reference no.)	N/A	1.5m
Monitor	DELL	SP2208WFPt	DT09068168FB	VGA	1.5m
Printer	Hewett Packard	C3990A	JPZT098822	LPT	1.5m
Universal Programmer	Qian LongSheng	QL-2006	201105116086	COM/USB ¹⁾	1.5m (DC)
Keyboard	Lenovo	KB1021	0000319	USB ²⁾	N/A
Mouse	Lenovo	MO28UOL	4401282 081	USB ³⁾	N/A-
Ethernet router	Net Screen	NS-5GT-103	006402200400 2202	LAN	1.8m (DC)
Network camera	Hikvision	DS-2CD2012-1	411841394	LAN	0.5m
Note: For the cable detail please refer to below table.					

Cables:

#	Type	Length, m	Shield	Metallic hood	Ferrite
1	VGA	1.8	Yes	No	Yes
2	LPT	1.8	Yes	No	No
3	COM	1.5	Yes	No	No
4	USB ¹⁾	1.5	Yes	No	No
5	USB ²⁾	1.8	Yes	No	No
6	USB ³⁾	1.8	Yes	No	No

Software:

Description	Manufacturer	Software name	Version no.
EMC test software	Microsoft	command prompt	6.1.7601

4.5 Standards Applicable for Testing

CFR 47, FCC Part 15, 2015
ANSI C63.4: 2014

4.6 Test Location

All tests were performed at:

SGS IECC Ltd. (wholly owned by SGS Group)

Units 303-305, 3/F., 31 Lok Yip Road, On Lok Tsuen, Fanling, N.T., Hong Kong

Tel: +852 2305 2570 Fax: +852 2756 4480.

4.7 Test Laboratory

The test laboratory is recognized by FCC as accredited laboratory:

- **FCC – CAB Registration No.: 446297**

Measurement facility located at Fanling (Hong Kong), accredited as a Conformity Assessment Body (CAB) and was designated by FCC to perform compliance testing on equipment subject to Declaration Of Conformity (DOC) and Certification under Part 15 and 18 of the Commission's Rules.

4.8 Deviation from Standards

None.

4.9 Abnormalities from Standard Conditions

None.

4.10 Declaration of Family Grouping

Model No.: DH-PFS5924-24X, PFS5924-24X, DH-PFS6428-24T, PFS6428-24T, DH-PFS5424-24T, PFS5424-24T

Only the Model No. PFS5424-24T since the electrical circuit design, layout, components used and internal wiring were identical for all above models. Only different on model number, trade name and appearance deviation.

4.11 Abbreviations

N/A: Not Applicable

EUT: Equipment Under Test

5 Equipments Used during Test

Conducted Emission				
Equipment	Manufacturer	Model / Serial No.	Cal. Date	Cal. Due Date
Test Receiver	Rohde & Schwarz	ESCS 30 /100388	2015-09-29	2016-09-28
Impulse Limiter	Rohde & Schwarz	ESH-3-Z2 / 375881052	2015-02-02	2017-02-01
Artificial Mains Network (LISN)	Schwarzbeck	NSLK 8127 / 8127309	2015-09-29	2016-09-28

Radiated Emission				
Equipment	Manufacturer	Model / Serial No.	Cal. Date	Cal. Due Date
3m Semi-Anechoic Chamber (pre-test)	--	--	--	--
3m / 10m Open Area Test Site	--	--	2015-03-11	2018-03-10
Test Receiver 9kHz-30MHz	Rohde & Schwarz	ESCS 30 /100388	2015-09-29	2016-09-28
Test Receiver 20MHz-1000MHz	Rohde & Schwarz	ESVS30/828525/006	2015-09-29	2016-09-28
Spectrum Analyzer 9kHz - 30GHz	Rohde & Schwarz	FSP30/101474	2015-06-12	2016-06-11
Loop Antenna 9kHz-30MHz	Rohde & Schwarz	HFH2-Z2	2016-01-23	2019-01-22
Antenna, 30MHz – 1000MHz	Schaffner	CBL6111C / 2791	2014-10-19	2016-10-18
Horn Antenna 1 - 18GHz	Schwarzbeck	BBHA9120D/9120D-1070	2016-01-23	2018-01-22
Preamplifier 1 - 18GHz	Schwarzbeck	BBV9718/9718-223	2016-01-23	2017-01-22
Coaxial Cable	--	E167	2015-06-12	2016-06-11
Antenna Mast System	Schwarzbeck	AM9104 / -	--	--
Turntable with Controller	Drehtisch	DT312 / -	--	--

6 Test Results

6.1 Conducted Emissions Mains Terminals, 150kHz to 30MHz

Test Requirement: FCC Part15 B
 Test Method: ANSI C63.4: 2014
 Test Voltage & frequency: 120V AC, 60Hz
 Test Date: 2016-05-04
 Frequency Range: 150kHz to 30MHz
 Class / Severity: Class B
 Detector: Peak for pre-scan (9kHz Resolution Bandwidth)
 Quasi-Peak and Average if maximised peak within 20dB of Quasi-Peak limit

Limit:

Frequency range MHz	Class B Limits dB (μV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Note: 1) The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz. 2) The lower limit is applicable at the transition frequency.		

6.1.1 EUT Operation

Operating Environment:

Temperature: 25°C

Humidity: 47%

Atmospheric Pressure: 1020mbar

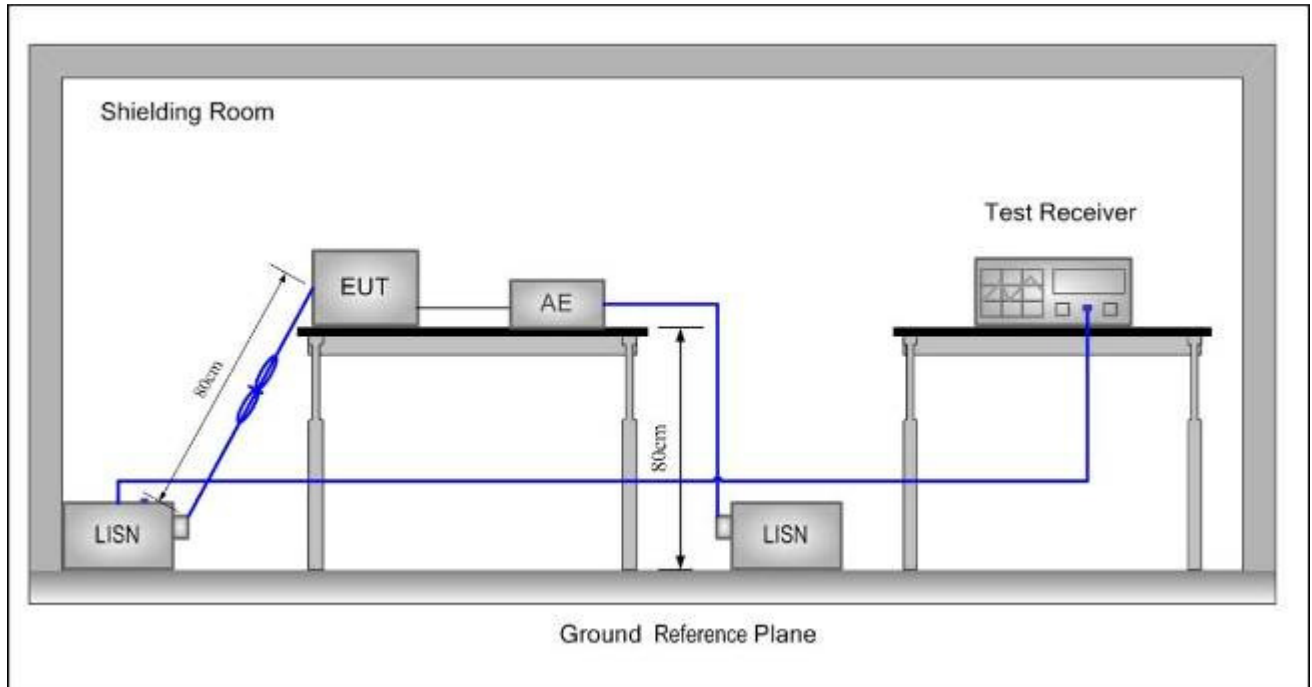
EUT Operation: Pre-test with Peak detector with the following modes:

1: Running mode (Connect EUT to laptop keep EUT data running continual.)

Final test with Quasi-Peak and Average detector with the following mode(s):

1: Running mode (Connect EUT to laptop keep EUT data running continual.)

6.1.2 Test Setup and Procedure



1. The mains terminal conducted emission test was conducted in a shielded room.
2. The EUT was connected via the host computer to AC power source through a LISN (Line Impedance Stabilization Network) which provides a $50\Omega/50\mu\text{H} + 5\Omega$ linear impedance. For Load terminal voltage measurement, a voltage probe was used on the load terminals. Measurement at control terminals were carried out by means of an impedance stabilization network (ISN). The ISN was bounded to ground.
3. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.
4. The EUT kept a distance of at least 0.8m from any other earthed conducting surface. The Artificial Mains Network was situated at a distance of 0.8m from the EUT. The mains lead of EUT excess 0.8m was folded back and forth parallel to the lead so as to form a horizontal bundle with a length between 0.3m and 0.4m.

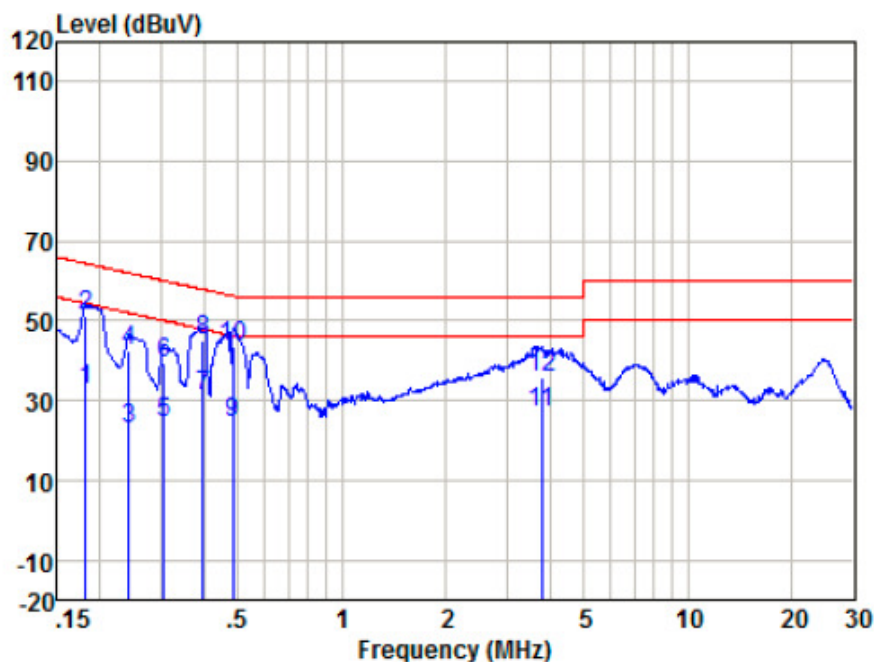
6.1.3 Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.

Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

The following Quasi-Peak and Average measurements were as below:

Live line :



Quasi-peak and Average measurement:

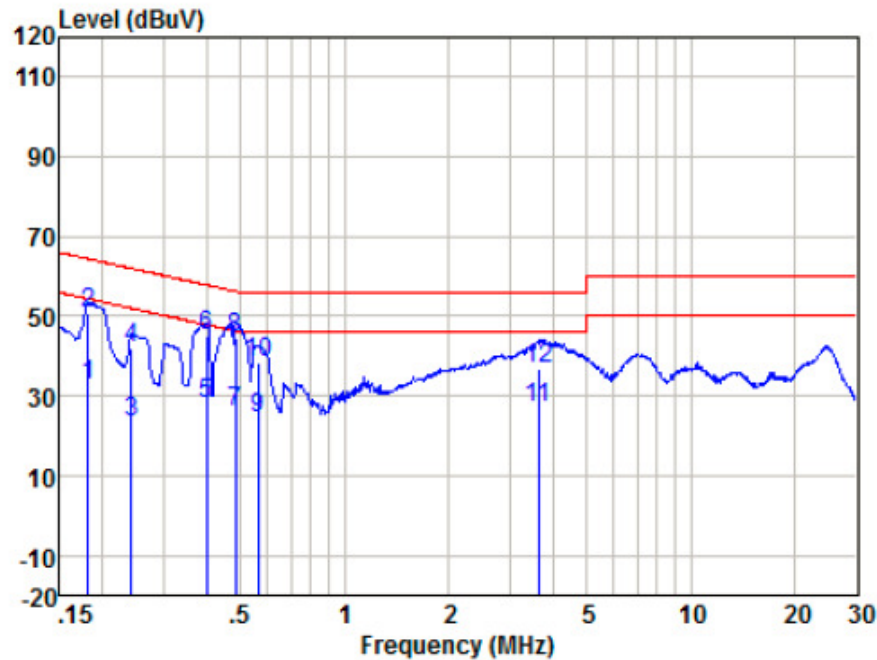
	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.182	32.63	0.11	0.10	32.84	54.42	-21.58	Average
2	0.182	51.12	0.11	0.10	51.33	64.42	-13.09	QP
3	0.242	22.62	0.06	0.10	22.78	52.04	-29.26	Average
4	0.242	42.35	0.06	0.10	42.51	62.04	-19.53	QP
5	0.305	24.16	0.02	0.10	24.28	50.10	-25.82	Average
6	0.305	39.07	0.02	0.10	39.19	60.10	-20.91	QP
7	0.396	31.26	0.03	0.10	31.39	47.95	-16.56	Average
8	0.396	44.94	0.03	0.10	45.07	57.95	-12.88	QP
9	0.484	24.26	0.08	0.10	24.44	46.27	-21.83	Average
10	0.484	43.55	0.08	0.10	43.73	56.27	-12.54	QP
11	3.779	26.81	0.27	0.10	27.18	46.00	-18.82	Average
12	3.779	35.59	0.27	0.10	35.96	56.00	-20.04	QP

Level = Read Level + LISN Factor + Cable Loss.

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Neutral line :



Quasi-peak and Average measurement:

	Read Freq	LISN Level	Cable Factor	Cable Loss	Limit Level	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dB	
1	0.182	32.61	0.11	0.10	32.82	54.42 -21.60	Average
2	0.182	50.82	0.11	0.10	51.03	64.42 -13.39	QP
3	0.242	23.46	0.06	0.10	23.62	52.04 -28.42	Average
4	0.242	41.84	0.06	0.10	42.00	62.04 -20.04	QP
5	0.400	27.70	0.01	0.10	27.81	47.86 -20.05	Average
6	0.400	44.85	0.01	0.10	44.96	57.86 -12.90	QP
7	0.484	26.00	0.03	0.10	26.13	46.27 -20.14	Average
8	0.484	44.43	0.03	0.10	44.56	56.27 -11.71	QP
9	0.561	24.50	0.05	0.10	24.65	46.00 -21.35	Average
10	0.561	38.24	0.05	0.10	38.39	56.00 -17.61	QP
11	3.623	26.80	0.19	0.10	27.09	46.00 -18.91	Average
12	3.623	36.46	0.19	0.10	36.75	56.00 -19.25	QP

Level = Read Level + LISN Factor + Cable Loss.

6.2 Radiated Emissions, 30MHz to 1GHz

Test Requirement: FCC Part15 B
 Test Method: ANSI C63.4: 2014
 Test Voltage & frequency: 120V AC, 60Hz
 Test Date: 2016-04-19
 Frequency Range: 30MHz to 1GHz
 Measurement Distance: 3m
 Detector: Peak for pre-scan (120kHz resolution bandwidth)
 Quasi-Peak if maximised peak within 20dB of limit
 Class: Class B

Frequency range MHz	Quasi-peak limits dB (µV/m)
30 to 88	40
88 to 216	43.5
216 to 960	46
Above 960	54
Note: At transitional frequencies the lower limit applies.	

6.2.1 EUT Operation

Operating Environment:

Temperature: 25°C

Humidity: 47%

Atmospheric Pressure: 1020mbar

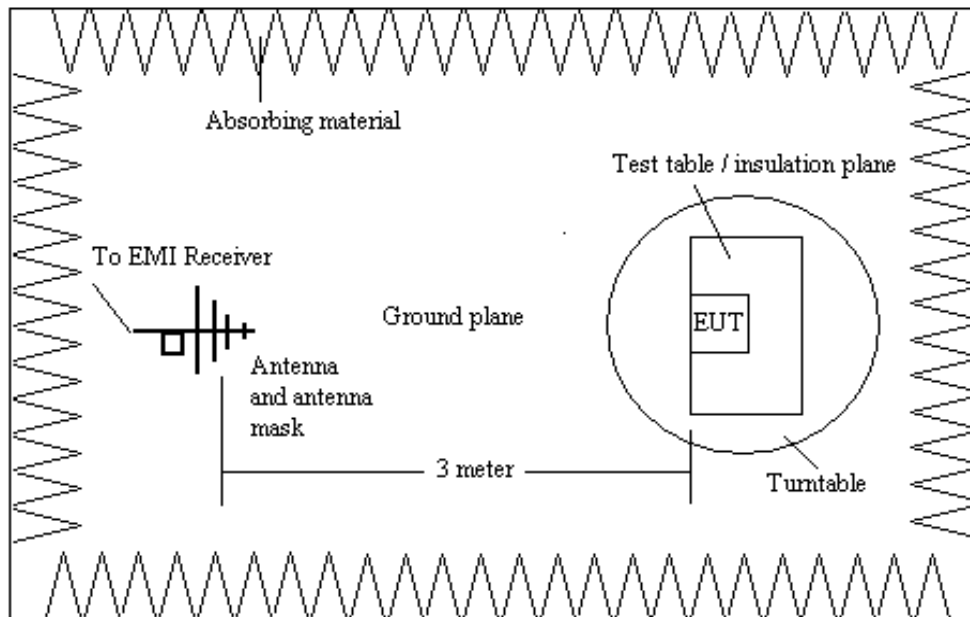
EUT Operation: Pre-test with Peak detector with the following modes:

1: Running mode (Connect EUT to laptop keep EUT data running continual.)

Final test with Quasi-Peak and Average detector with the following mode(s):

1: Running mode (Connect EUT to laptop keep EUT data running continual.)

6.2.2 Test Setup and Procedure



1. The pre-test of the radiated emissions test was conducted in a semi-anechoic chamber and the final measurement was conducted in the open area test site.
2. Bilog antenna was used for the frequency range from 30MHz to 1GHz
3. The EUT was connected to the host PC which was connected to AC power source through a mains power outlet which was bonded to the ground reference plane; The mains cables shall drape to the ground reference plane. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.
4. Before final measurements of radiated emissions, a pre-scan was performed in the spectrum mode with the peak detector to find out the maximum emissions spectrum plots of the EUT with located frequencies.
5. The actual frequencies of maximum emission were confirmed in the final radiated emissions measurement. At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the maximum disturbance. Measurements were performed for both horizontal and vertical antenna polarization.

6.2.3 Measurement Data

An initial pre-scan was performed in the 3m chamber using the spectrum analyser in peak detection mode. The EUT was measured by Bilog antenna with 2 orthogonal polarities and frequencies of peak emissions from the EUT were detected within 20dB of the class B limit line. Final measurement was conducted in the open area test site with data as follows:

Frequency (MHz)	Antenna Polarization	Trans. (dB/m)	Receiver QP Reading (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)
31.18	V	12.62	20.76	33.38	40.00	-6.62
37.28	V	13.08	17.97	31.05	40.00	-8.95
81.13	V	8.99	25.23	34.22	40.00	-5.78
81.20	H	8.98	16.59	25.57	40.00	-14.43
93.66	V	8.95	27.38	36.33	43.50	-7.17
196.61	H	10.90	19.13	30.03	43.50	-13.47
249.77	H	12.08	22.70	34.78	46.00	-11.22
250.65	V	12.11	24.88	36.99	46.00	-9.01
477.52	V	16.60	20.49	37.09	46.00	-8.91
477.74	H	16.61	22.35	38.96	46.00	-7.04
689.99	H	20.30	11.47	31.77	46.00	-14.23
749.88	H	21.96	9.36	31.32	46.00	-14.68
Note: 1) All readings are Quasi-Peak values. 2) Transducer = Antenna Factor + Cable Loss. 3) Final Test Level = Receiver Reading + Transducer.						

6.3 Radiated Emissions, above 1GHz

Test Requirement: FCC Part15 B
 Test Method: ANSI C63.4: 2014
 Test Voltage & frequency: 120V AC, 60Hz
 Test Date: 2016-04-19
 Frequency Range: 1GHz to 6GHz
 Measurement Distance: 3m
 Detector: Peak for pre-scan (1MHz resolution bandwidth)
 Peak and Average if maximised peak within 20dB of limit
 Class: Class B

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement Range (MHz)
Below 1.705	30
1.705 to 108	1000
108 to 500	2000
500 to 1000	5000
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower
Average limits dB(μV/m)	Peak limits dB(μV/m)
54	74

6.3.1 EUT Operation

Operating Environment:

Temperature: 25°C

Humidity: 47%

Atmospheric Pressure: 1020mbar

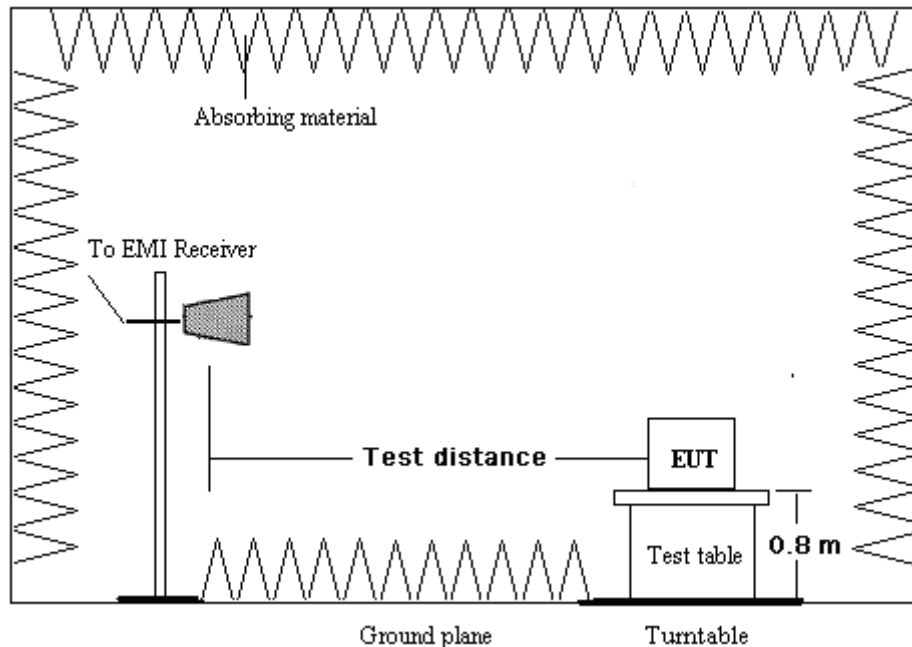
EUT Operation: Pre-test with Peak detector with the following modes:

1: Running mode (Connect EUT to laptop keep EUT data running continual.)

Final test with Quasi-Peak and Average detector with the following mode(s):

1: Running mode (Connect EUT to laptop keep EUT data running continual.)

6.3.2 Test Setup and Procedure



1. The pre-test of the radiated emissions test was conducted in a semi-anechoic chamber and the final measurement was conducted in the open area test site.
2. Horn antenna was used for the frequency range from 1GHz to 18GHz
3. The EUT was connected to the host PC which was connected to AC power source through a mains power outlet which was bonded to the ground reference plane; The mains cables shall drape to the ground reference plane. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.
4. Before final measurements of radiated emissions, a pre-scan was performed in the spectrum mode with the peak detector to find out the maximum emissions spectrum plots of the EUT with located frequencies.
5. The actual frequencies of maximum emission were confirmed in the final radiated emissions measurement. At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters, and keeping point the antenna in cones of radiation from EUT area both in azimuth and elevation in order to determine the maximum disturbance. Measurements were performed for both horizontal and vertical antenna polarization.

6.3.3 Measurement Data

An initial pre-scan was performed in the 3m chamber using the spectrum analyser in peak detection mode. The EUT was measured by Horn antenna with 2 orthogonal polarities and frequencies of peak emissions from the EUT were detected within 20dB of the class B limit line. Final measurement was conducted in the open area test site with data as follows:

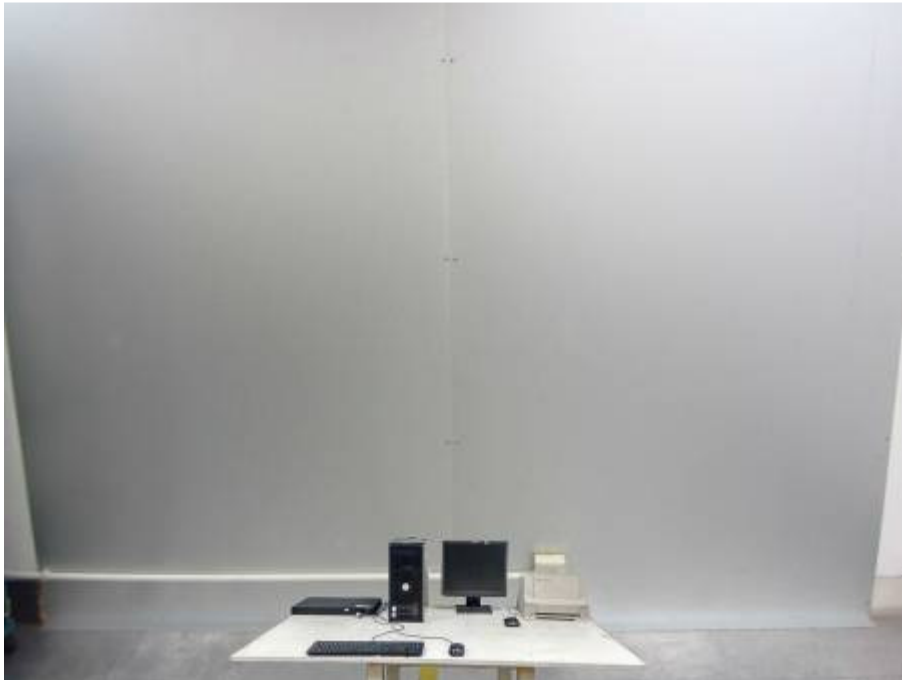
Frequency (GHz)	Antenna Polarization	Trans. (dB/m)	Receiver Reading (dBμV)	Emission Level (dBμV/m)	Detector	Limit (dBμV/m)	Over Limit (dB)
1038.34	V	-13.46	32	18.54	Average	54	-35.46
1038.34	V	-13.46	47.06	33.6	Peak	74	-40.4
1097.65	H	-13.23	32	18.77	Average	54	-35.23
1097.65	H	-13.23	49.17	35.94	Peak	74	-38.06
1139.74	H	-13.06	34.99	21.93	Average	54	-32.07
1139.74	H	-13.06	51.5	38.44	Peak	74	-35.56
1177.1	V	-12.94	34	21.06	Average	54	-32.94
1177.1	V	-12.94	50.26	37.32	Peak	74	-36.68
1260.03	V	-12.64	32	19.36	Average	54	-34.64
1260.03	V	-12.64	48.65	36.01	Peak	74	-37.99
1260.03	H	-12.62	33.01	20.39	Average	54	-33.61
1260.03	H	-12.62	47.92	35.3	Peak	74	-38.7
1358.51	H	-12.24	33	20.76	Average	54	-33.24
1358.51	H	-12.24	48.65	36.41	Peak	74	-37.59
1415.67	V	-12.06	30	17.94	Average	54	-36.06
1415.67	V	-12.06	47.49	35.43	Peak	74	-38.57
1499.21	V	-11.75	31	19.25	Average	54	-34.75
1499.21	V	-11.75	49.43	37.68	Peak	74	-36.32
1509.99	H	-11.65	31	19.35	Average	54	-34.65
1509.99	H	-11.65	46.2	34.55	Peak	74	-39.45
1702.59	V	-10.65	31.01	20.36	Average	54	-33.64
1702.59	V	-10.65	49.39	38.74	Peak	74	-35.26
1793.4	H	-10.13	29	18.87	Average	54	-35.13
1793.4	H	-10.13	48.02	37.89	Peak	74	-36.11

Note:

- 1) All readings are Quasi-Peak values.
- 2) Transducer = Antenna Factor + Cable Loss - Pre-amp.
- 3) Final Test Level = Receiver Reading + Transducer .

7 Photographs

7.1 Conducted Emission Test Setup



7.2 Radiated Emission Test Setup



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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

7.3 EUT Constructional Details



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