

FCC Test Report

Report No.: RF140707C54I-4

FCC ID: M82-UTX-3115

Test Model: UTX-3115

Series Model: UTX-3115XXXXXXXXXXXXXXXXXX, UTX3115XXXXXXXXXXXXXXXXXX ("X" can be 0-9 or A-Z or blank or any alphanumeric character), HPE Edgeline EL10

Received Date: Jun. 18, 2014

Test Date: Mar. 22, 2016 (For radiated emission above 1GHz test)

Aug. 30 ~ Oct. 03, 2016 (For radiated emission below 1GHz and power line conducted emission Tests)

Issued Date: Oct. 03, 2016

Applicant: ADVANTECH CO., LTD

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

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Test Location: No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)



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Release Control Record

Issue No.	Description	Date Issued
RF140707C54I-4	Original release	Oct. 03, 2016

1 Certificate of Conformity

Product: COMPUTER

Brand: Advantech, Hewlett Packard Enterprise

Test Model: UTX-3115

Series Model: UTX-3115XXXXXXXXXXXXXXXXXX, UTX3115XXXXXXXXXXXXXXXXXX ("X" can be 0-9 or A-Z or blank or any alphanumeric character), HPE Edgeline EL10

Sample Status: Engineering sample

Applicant: ADVANTECH CO., LTD

Test Date: Mar. 22, 2016 (For radiated emission above 1GHz test)
Aug. 30 ~ Oct. 03, 2016 (For radiated emission below 1GHz and power line conducted emission Tests)

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.247)
ANSI C63.10:2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : Celine Chou , **Date:** Oct. 03, 2016
Celine Chou / Specialist

Approved by : Ken Liu , **Date:** Oct. 03, 2016
Ken Liu / Senior Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	Pass	Meet the requirement of limit. Minimum passing margin is -14.40dB at 0.15000MHz.
15.247(a)(1)(iii)	Number of Hopping Frequency Used	NA	Refer to Note below.
15.247(a)(1)(iii)	Dwell Time on Each Channel	NA	Refer to Note below.
15.247(a)(1)	1. Hopping Channel Separation 2. Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System	NA	Refer to Note below.
15.247(b)	Maximum Peak Output Power	NA	Refer to Note below.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -3.1dB at 30.00MHz.
15.247(d)	Antenna Port Emission	NA	Refer to Note below.
15.203	Antenna Requirement	Pass	Antenna connector is SMA (M) not a standard connector.

Note: Test items for conducted and radiated emission test were performed for this report. Other testing data please refer to module (Brand: Intel, Model: 7260HMW, FCC ID: PD97260H) Report.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports0	150kHz ~ 30MHz	2.44 dB
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	3.63 dB
	200MHz ~ 1000MHz	3.64 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	COMPUTER
Brand	Advantech, Hewlett Packard Enterprise
Test Model	UTX-3115
Series Model	UTX-3115XXXXXXXXXXXXXXXXXX, UTX3115XXXXXXXXXXXXXXXXXX ("X" can be 0-9 or A-Z or blank or any alphanumeric character), HPE Edgeline EL10
Model Difference	Refer to Note
Status of EUT	Engineering sample
Power Supply Rating	12Vdc from Adapter
Modulation Type	GFSK, $\pi/4$ -DQPSK, 8DPSK
Modulation Technology	FHSS
Transfer Rate	1/2/3Mbps
Operating Frequency	2402 ~ 2480MHz
Number of Channel	79
Antenna Type	Dipole antenna with 2.98dBi gain
Antenna Connector	SMA (M)
Accessory Device	Refer to note
Data Cable Supplied	NA

Note:

1. This report is prepared for FCC class II permissive change
2. This report is issued as a supplementary report to the original BV ADT report no.: RF140707C54D-4. The differences compared with original report are adding components, only radiated emission and power line conducted emission had been tested for this addendum.
3. All models are listed as below.

Brand	Model	Difference
Advantech	UTX-3115XXXXXXXXXXXXXXXXXX ("X" can be 0-9 or A-Z or blank or any alphanumeric character)	For marketing purpose.
	UTX3115XXXXXXXXXXXXXXXXXX ("X" can be 0-9 or A-Z or blank or any alphanumeric character)	
Hewlett Packard Enterprise	HPE Edgeline EL10	

* Model UTX-3115 was chosen for final test.

4. The EUT uses the following components. (New components are marked in boldface.)

Part	Specification	Vendor	Model
Main board	-	Advantech	AIMB-115
Memory	DDR3L 4GB	Apacer	PC3-1066 CL9
SSD	32GB	Plextor	PX-32G5Le-72
	64GB	Plextor	PX-64G5Le-72
	64GB	Liteon	PZ8-CC064
	64GB	Advantech	SQF-S25M4-64G-S9E
	64GB	Transcend	96FD25-S064-TR7
CPU	1.4GHz	Intel	ATOM E3826
3G Module	-	Telit	HE910
Wi-Fi Module	-	Intel	7260HMW
Adapter 1	I/P: 100-240Vac, 50-60Hz, 1.5A O/P: 12Vdc, 3A DC: 1.5m cable with one core attached on adapter AC: 1.8m shielded cable without core	FSP	FSP036-RAB
Adapter 2	I/P: 100-240Vac, 50-60Hz, 1.2A O/P: 12Vdc, 3A DC: 1.45m cable with one core attached on adapter AC: 1.8m shielded cable without core	FSP	FSP036-RBBN2

3.2 Description of Test Modes

79 channels are provided to this EUT:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461		

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO			DESCRIPTION
	RE $\geq$ 1G	RE<1G	PLC	
A	√	√	√	Powered by adapter 1 + Plextor SSD (32GB)
B	-	√	√	Powered by adapter 2 + Liteon SSD (64GB)

Where **RE $\geq$ 1G**: Radiated Emission above 1GHz & Bandedge Measurement
RE<1G: Radiated Emission below 1GHz
PLC: Power Line Conducted Emission
APCM: Antenna Port Conducted Measurement

Note: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.

Radiated Emission Test (Above 1GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE
A	0 to 78	0, 39, 78	FHSS	GFSK	DH5
A	0 to 78	0, 39, 78	FHSS	8DPSK	DH5

Radiated Emission Test (Below 1GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE
A, B	0 to 78	0	FHSS	GFSK	DH5

Power Line Conducted Emission Test:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE
A, B	0 to 78	0	FHSS	GFSK	DH5

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE $\geq$ 1G	22deg. C, 66%RH	120Vac, 60Hz	Tank Wu
RE $<$ 1G	20deg. C, 69%RH 25deg. C, 69%RH	120Vac, 60Hz	Bond Tseng
PLC	25deg. C, 75%RH 20deg. C, 69%RH	120Vac, 60Hz	Chris Lin Bayu Wu

3.3 Description of Support Units

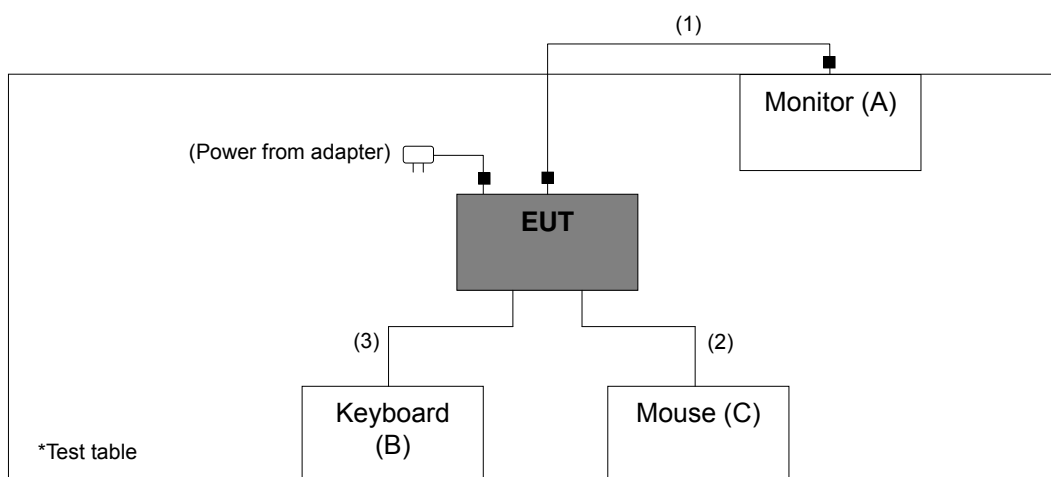
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Monitor	Samsung	173v	N/A	FCC DoC Approved	-
B.	Mouse	DELL	MS-111T	CN-0KW2YH-71616-2 8H-0L30	N/A	-
C.	Keyboard	WINTEK	WM700	20110700000	N/A	-

Note: All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	D-Sub	1	1.8	Y	2	-
2.	USB	1	1.8	Y	0	-
3.	USB	1	1.8	Y	0	-

3.3.1 Configuration of System under Test



3.4 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C (15.247)

FCC Public Notice DA 00-705

ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

Note: The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC).
The test report has been issued separately.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

Note:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCS30	100289	Dec. 23, 2015	Dec. 22, 2016
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100269	Apr. 19, 2015	Apr. 18, 2016
			Apr. 19, 2016	Apr. 18, 2017
BILOG Antenna SCHWARZBECK	VULB9168	9168-148	Jan. 18, 2016	Jan. 17, 2017
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-1169	Jan. 08, 2016	Jan. 07, 2017
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Jan. 18, 2016	Jan. 17, 2017
Loop Antenna	EM-6879	269	Aug. 11, 2015	Aug. 10, 2016
			Aug. 11, 2016	Aug. 10, 2017
Preamplifier Agilent	8449B	3008A01911	Aug. 09, 2015	Aug. 08, 2016
			Aug. 09, 2016	Aug. 08, 2017
Preamplifier Agilent	8447D	2944A10638	Aug. 09, 2015	Aug. 08, 2016
			Aug. 09, 2016	Aug. 08, 2017
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-02(309222 +248780)	Aug. 09, 2015	Aug. 08, 2016
			Aug. 09, 2016	Aug. 08, 2017
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-03(274092)	Aug. 09, 2015	Aug. 08, 2016
			Aug. 09, 2016	Aug. 08, 2017
RF signal cable Woken	8D-FB	Cable-CH9-01	Aug. 09, 2015	Aug. 08, 2016
			Aug. 09, 2016	Aug. 08, 2017
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower & Turn BV ADT	AT100	AT93021705	NA	NA
Turn Table BV ADT	TT100	TT93021705	NA	NA
Turn Table Controller BV ADT	SC100	SC93021705	NA	NA

- Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 9.
3. The horn antenna and preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Site Registration No. is 215374.
5. The IC Site Registration No. is IC 7450F-9.

4.1.3 Test Procedures

For Radiated emission below 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Both X and Y axes of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

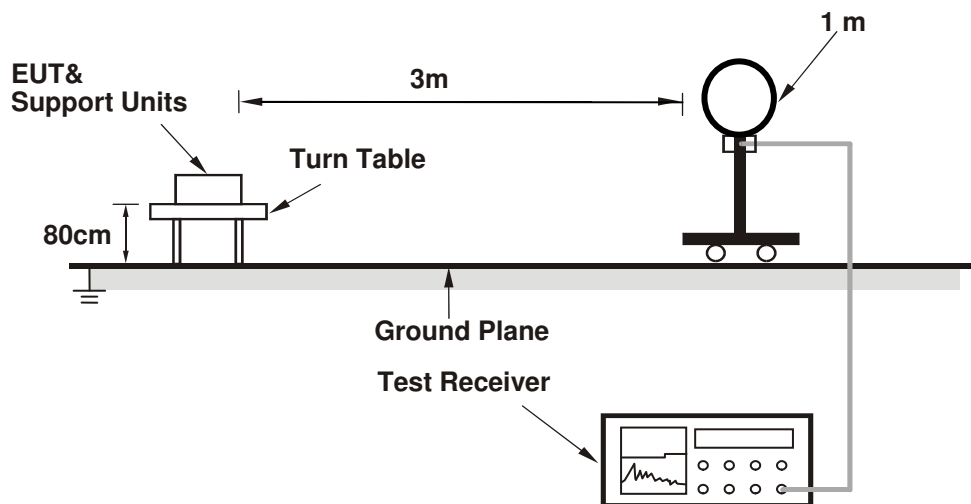
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle < 98%) or 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

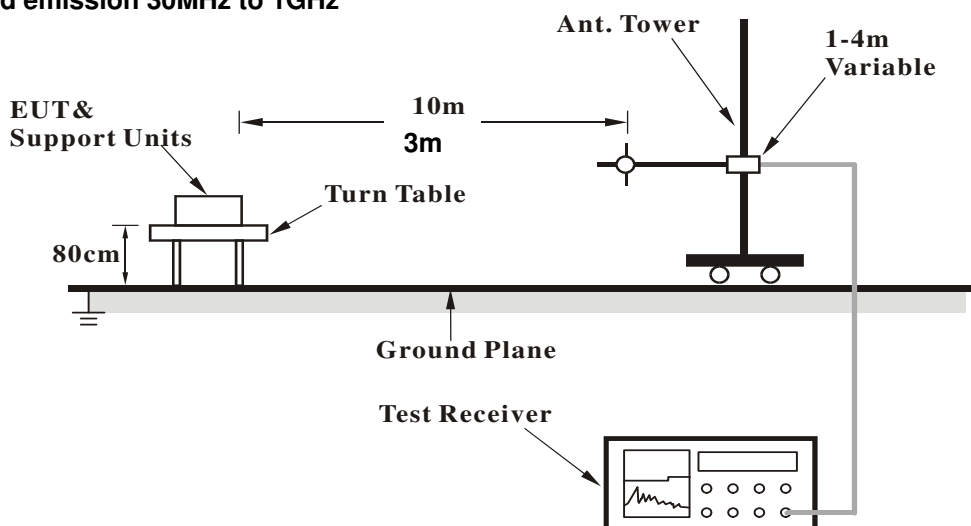
No deviation.

4.1.5 Test Set Up

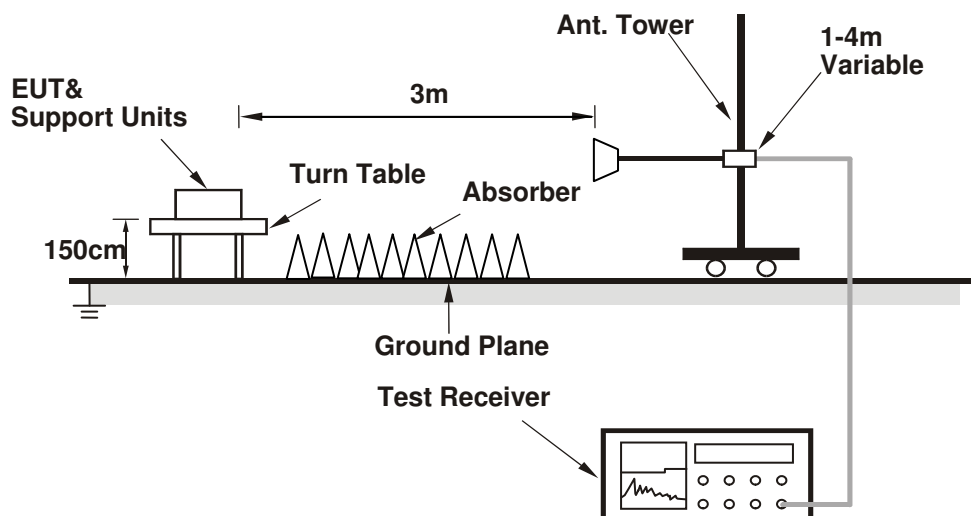
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.6 EUT Operating Conditions

- Placed the EUT on the testing table.
- The EUT ran a test program (provided by manufacturer) to enable itself under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1GHz Data:

GFSK

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	53.2 PK	74.0	-20.8	1.15 H	312	55.60	-2.40
2	2390.00	40.2 AV	54.0	-13.8	1.15 H	312	42.60	-2.40
3	#2400.00	51.8 PK	74.0	-22.2	1.16 H	128	54.00	-2.20
4	#2400.00	21.7 AV	54.0	-32.3	1.16 H	128	23.90	-2.20
5	*2402.00	96.8 PK			1.16 H	128	64.70	32.10
6	*2402.00	66.7 AV			1.16 H	128	34.60	32.10
7	4804.00	47.8 PK	74.0	-26.2	1.26 H	39	41.30	6.50
8	4804.00	17.7 AV	54.0	-36.3	1.26 H	39	11.20	6.50
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	55.6 PK	74.0	-18.4	1.25 V	97	58.00	-2.40
2	2390.00	40.2 AV	54.0	-13.8	1.25 V	97	42.60	-2.40
3	#2400.00	59.8 PK	74.0	-14.2	1.42 V	298	62.00	-2.20
4	#2400.00	29.7 AV	54.0	-24.3	1.42 V	298	31.90	-2.20
5	*2402.00	104.8 PK			1.42 V	298	72.70	32.10
6	*2402.00	74.7 AV			1.42 V	298	42.60	32.10
7	4804.00	47.0 PK	74.0	-27.0	1.06 V	228	40.50	6.50
8	4804.00	16.9 AV	54.0	-37.1	1.06 V	228	10.40	6.50

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 39	DETECTOR	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz	FUNCTION	Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	97.1 PK			1.28 H	153	64.90	32.20
2	*2441.00	67.0 AV			1.28 H	153	34.80	32.20
3	4882.00	47.5 PK	74.0	-26.5	1.62 H	35	40.90	6.60
4	4882.00	17.4 AV	54.0	-36.6	1.62 H	35	10.80	6.60
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	107.1 PK			1.35 V	282	74.90	32.20
2	*2441.00	77.0 AV			1.35 V	282	44.80	32.20
3	4882.00	49.5 PK	74.0	-24.5	1.39 V	64	42.90	6.60
4	4882.00	19.4 AV	54.0	-34.6	1.39 V	64	12.80	6.60

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 78	DETECTOR	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz	FUNCTION	Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	96.8 PK			1.16 H	222	64.40	32.40
2	*2480.00	66.7 AV			1.16 H	222	34.30	32.40
3	2483.50	51.8 PK	74.0	-22.2	1.16 H	222	53.80	-2.00
4	2483.50	21.7 AV	54.0	-32.3	1.16 H	222	23.70	-2.00
5	4960.00	45.5 PK	74.0	-28.5	1.36 H	98	38.70	6.80
6	4960.00	15.4 AV	54.0	-38.6	1.36 H	98	8.60	6.80
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	106.2 PK			1.29 V	187	73.80	32.40
2	*2480.00	76.1 AV			1.29 V	187	43.70	32.40
3	2483.50	61.2 PK	74.0	-12.8	1.29 V	187	63.20	-2.00
4	2483.50	31.1 AV	54.0	-22.9	1.29 V	187	33.10	-2.00
5	4960.00	48.1 PK	74.0	-25.9	1.39 V	68	41.30	6.80
6	4960.00	18.0 AV	54.0	-36.0	1.39 V	68	11.20	6.80

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

8DPSK

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	49.9 PK	74.0	-24.1	1.24 H	150	52.30	-2.40
2	2390.00	38.1 AV	54.0	-15.9	1.24 H	150	40.50	-2.40
3	*2402.00	89.7 PK			1.29 H	144	57.60	32.10
4	*2402.00	59.6 AV			1.29 H	144	27.50	32.10
5	2483.50	44.7 PK	74.0	-29.3	1.29 H	144	46.70	-2.00
6	2483.50	14.6 AV	54.0	-39.4	1.29 H	144	16.60	-2.00
7	4804.00	46.8 PK	74.0	-27.2	1.55 H	206	40.30	6.50
8	4804.00	16.7 AV	54.0	-37.3	1.55 H	206	10.20	6.50
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	53.2 PK	74.0	-20.8	1.28 V	260	55.60	-2.40
2	2390.00	40.2 AV	54.0	-13.8	1.28 V	260	42.60	-2.40
3	#2400.00	52.0 PK	74.0	-22.0	1.25 V	156	54.20	-2.20
4	#2400.00	21.9 AV	54.0	-32.1	1.25 V	156	24.10	-2.20
5	*2402.00	97.0 PK			1.25 V	156	64.90	32.10
6	*2402.00	66.9 AV			1.25 V	156	34.80	32.10
7	4804.00	49.4 PK	74.0	-24.6	1.29 V	64	42.90	6.50
8	4804.00	19.2 AV	54.0	-34.8	1.29 V	64	12.70	6.50

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 39	DETECTOR	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz	FUNCTION	Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	90.7 PK			1.30 H	320	58.50	32.20
2	*2441.00	60.6 AV			1.30 H	320	28.40	32.20
3	4882.00	46.8 PK	74.0	-27.2	1.22 H	56	40.20	6.60
4	4882.00	16.7 AV	54.0	-37.3	1.22 H	56	10.10	6.60
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	100.1 PK			1.40 V	290	67.90	32.20
2	*2441.00	70.0 AV			1.40 V	290	37.80	32.20
3	4882.00	48.9 PK	74.0	-25.1	1.36 V	98	42.30	6.60
4	4882.00	18.8 AV	54.0	-35.2	1.36 V	98	12.20	6.60

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 78	DETECTOR	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz	FUNCTION	Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	91.2 PK			1.30 H	320	58.80	32.40
2	*2480.00	61.1 AV			1.30 H	320	28.70	32.40
3	2483.50	46.2 PK	74.0	-27.8	1.28 H	318	48.20	-2.00
4	2483.50	16.1 AV	54.0	-37.9	1.28 H	318	18.10	-2.00
5	4960.00	47.3 PK	74.0	-26.7	1.26 H	39	40.50	6.80
6	4960.00	17.2 AV	54.0	-36.8	1.26 H	39	10.40	6.80
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	99.3 PK			1.40 V	300	66.90	32.40
2	*2480.00	69.2 AV			1.40 V	300	36.80	32.40
3	2483.50	54.3 PK	74.0	-19.7	1.38 V	295	56.30	-2.00
4	2483.50	24.2 AV	54.0	-29.8	1.38 V	295	26.20	-2.00
5	4960.00	49.0 PK	74.0	-25.0	1.30 V	56	42.20	6.80
6	4960.00	18.9 AV	54.0	-35.1	1.30 V	56	12.10	6.80

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

Below 1GHz worst-case data:

GFSK

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		
TEST MODE	A		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	30.00	31.2 QP	40.0	-8.8	1.49 H	234	46.8	-15.6
2	82.38	30.8 QP	40.0	-9.2	1.99 H	239	49.2	-18.4
3	111.48	25.5 QP	43.5	-18.0	1.24 H	110	42.3	-16.8
4	132.82	26.1 QP	43.5	-17.4	1.99 H	233	40.7	-14.6
5	441.28	32.0 QP	46.0	-14.0	1.24 H	42	39.8	-7.8
6	901.06	41.6 QP	46.0	-4.4	1.00 H	211	38.6	3.0
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	30.00	36.9 QP	40.0	-3.1	1.49 V	10	52.5	-15.6
2	109.54	31.0 QP	43.5	-12.5	1.00 V	301	48.1	-17.1
3	206.54	28.3 QP	43.5	-15.2	1.00 V	112	44.3	-16.0
4	253.10	25.4 QP	46.0	-20.6	1.24 V	132	38.6	-13.2
5	433.52	33.1 QP	46.0	-12.9	1.99 V	31	41.0	-7.9
6	903.00	40.8 QP	46.0	-5.2	1.49 V	4	37.8	3.0

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		
TEST MODE	B		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	30.00	28.6 QP	40.0	-11.4	1.01 H	15	44.2	-15.6
2	78.50	23.6 QP	40.0	-16.4	1.50 H	272	41.2	-17.6
3	158.04	24.0 QP	43.5	-19.5	2.00 H	88	37.3	-13.3
4	249.22	25.7 QP	46.0	-20.3	1.25 H	156	39.1	-13.4
5	499.48	29.0 QP	46.0	-17.0	1.01 H	225	35.5	-6.5
6	835.10	42.1 QP	46.0	-3.9	1.01 H	6	40.7	1.4
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	33.88	35.1 QP	40.0	-4.9	1.25 V	107	50.5	-15.4
2	76.56	29.7 QP	40.0	-10.3	1.00 V	312	47.0	-17.3
3	158.04	20.6 QP	43.5	-22.9	1.00 V	301	33.9	-13.3
4	256.98	27.1 QP	46.0	-18.9	2.00 V	309	40.2	-13.1
5	499.48	29.7 QP	46.0	-16.3	1.50 V	160	36.2	-6.5
6	835.10	41.0 QP	46.0	-5.0	1.00 V	7	39.6	1.4

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Nov. 16, 2015	Nov. 15, 2016
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond1-01	Dec. 26, 2015	Dec. 25, 2016
LISN/AMN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Feb. 26, 2016	Feb. 25, 2017
LISN/AMN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100220	Nov. 13, 2015	Nov. 12, 2016
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in HwaYa Shielded Room 1.

3. The VCCI Site Registration No. is C-2040.

4.2.3 Test Procedures

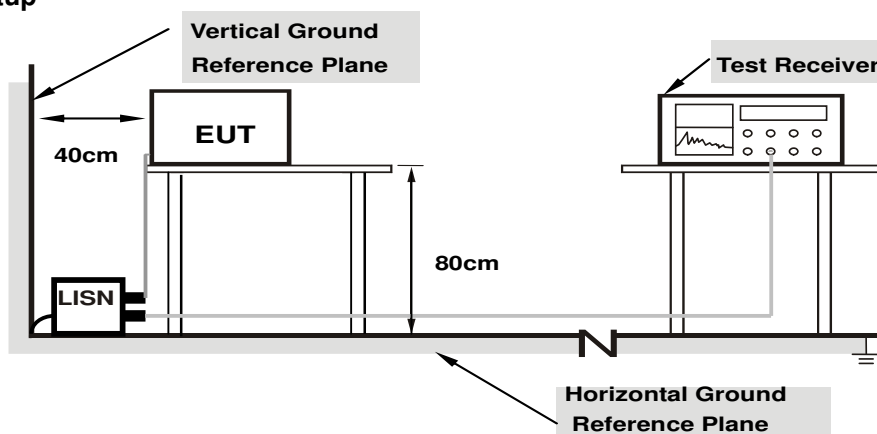
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.

For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.2.6 EUT Operating Conditions

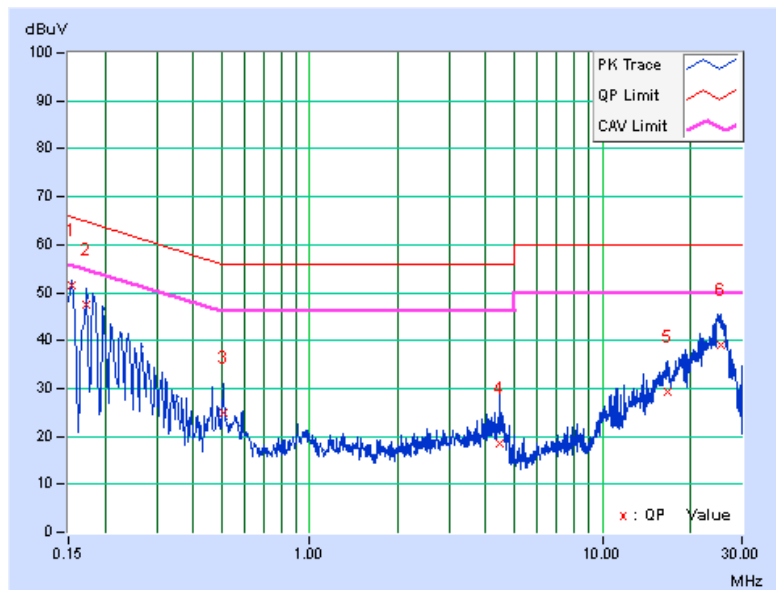
Same as 4.1.6.

Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	A		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
	[MHz]		[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	10.03	41.36	24.06	51.39	34.09	65.79	55.79	-14.40	-21.70
2	0.17346	10.03	37.59	21.45	47.62	31.48	64.79	54.79	-17.17	-23.31
3	0.50581	10.14	14.61	6.47	24.75	16.61	56.00	46.00	-31.25	-29.39
4	4.47560	10.46	8.00	-0.80	18.46	9.66	56.00	46.00	-37.54	-36.34
5	16.67366	11.23	18.20	10.12	29.43	21.35	60.00	50.00	-30.57	-28.65
6	25.35777	11.85	27.20	18.09	39.05	29.94	60.00	50.00	-20.95	-20.06

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

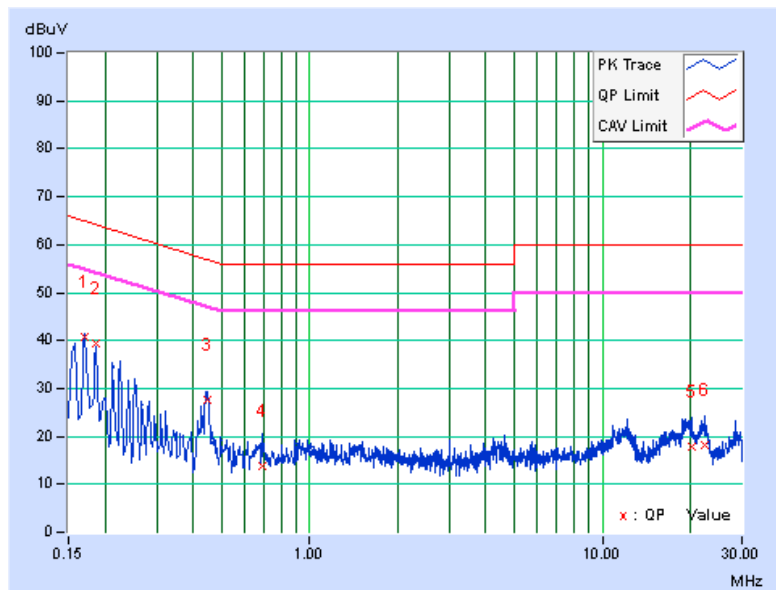


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16955	10.02	30.65	15.52	40.67	25.54	64.98	54.98	-24.31	-29.44
2	0.18519	10.03	29.26	15.15	39.29	25.18	64.25	54.25	-24.96	-29.07
3	0.44716	10.13	17.62	10.36	27.75	20.49	56.93	46.93	-29.18	-26.44
4	0.68958	10.16	3.77	-1.14	13.93	9.02	56.00	46.00	-42.07	-36.98
5	20.29823	11.38	6.36	0.63	17.74	12.01	60.00	50.00	-42.26	-37.99
6	22.33925	11.51	6.62	1.68	18.13	13.19	60.00	50.00	-41.87	-36.81

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

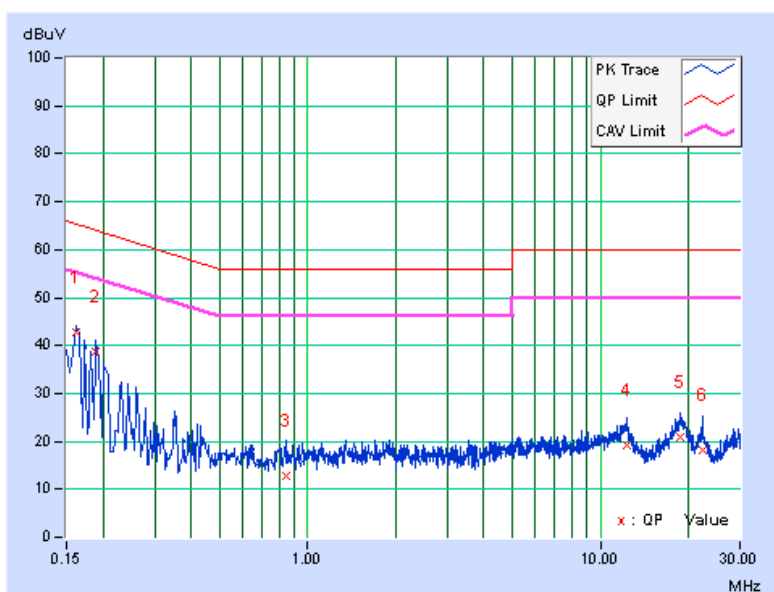


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16181	10.03	32.79	15.57	42.82	25.60	65.37	55.37	-22.55	-29.77
2	0.18910	10.04	28.78	12.92	38.82	22.96	64.08	54.08	-25.26	-31.12
3	0.84598	10.19	2.48	-1.52	12.67	8.67	56.00	46.00	-43.33	-37.33
4	12.32183	10.94	8.33	1.47	19.27	12.41	60.00	50.00	-40.73	-37.59
5	18.73032	11.39	9.54	3.92	20.93	15.31	60.00	50.00	-39.07	-34.69
6	22.33925	11.64	6.50	1.05	18.14	12.69	60.00	50.00	-41.86	-37.31

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.



5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

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