

FCC Test Report

Report No.: RF170717D15

FCC ID: NRIHS1X0900

Test Model: LMD-509, LMD-109

Series Model: LM(T)-(U)(V)(W)(X)(Y)(Z)
(where (T)(X)(Y)(Z) may be A-Z; (U)(V)(W) may be 0-9 or blank)

Received Date: Jul. 17, 2017

Test Date: Dec. 12 ~ 13, 2017 & Feb. 14, 2018

Issued Date: Feb. 27, 2018

Applicant: IR-TEC International Ltd.

Address: 6 Rong An Road, Luzhu Taoyuan 33852, TAIWAN

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

Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C.)

**FCC Registration /
Designation Number:** 198487 / TW2021



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Release Control Record

Issue No.	Description	Date Issued
RF170717D15	Original release.	Feb. 27, 2018

1 Certificate of Conformity

Product: TRANS-HFD

Brand: IR-TEC

Test Model: LMD-509, LMD-109

Series Model: LM(T)-(U)(V)(W)(X)(Y)(Z)

(where (T)(X)(Y)(Z) may be A-Z; (U)(V)(W) may be 0-9 or blank)

Sample Status: Engineering sample

Applicant: IR-TEC International Ltd.

Test Date: Dec. 12 ~ 13, 2017 & Feb. 14, 2018

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.245)
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 RF characteristics under the conditions specified in this report.

Prepared by : Annie Chang , **Date:** Feb. 27, 2018
Annie Chang / Senior Specialist

Approved by : Rex Lai , **Date:** Feb. 27, 2018
Rex Lai / Associate Technical Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (SECTION 15.245)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -25.45dB at 0.18906MHz.
15.209 15.245 (b)	Radiated Emission Test Band Edge Measurement Limit: 50dB less than the peak value of fundamental frequency or meet radiated emission limit in section 15.209	PASS	Meet the requirement of limit. Minimum passing margin is -6.13dB at 17400.00MHz.

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 ports	150kHz ~ 30MHz	2.77 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1000MHz	5.54 dB
Radiated Emissions above 1 GHz	1-6GHz	4.77 dB
	6-18GHz	5.48 dB

2.2 Modification Record

There were no modifications required for compliance.

2. The rating of EUT is as follows:

Power Supply	AC 120/240/277V, 50/60Hz		
Maximum load	120VAC	240VAC	277VAC
	800/*500W(VA)	5A	1200/*750W(VA)
	800/*500W(VA)	5A	1200/*750W(VA)
	540/*500VA	5A	1200/*750VA

3. The following representative models are selected for the test, which RF circuit are identical to each other except for the following difference only:

Representative Model	Differentiation			
	Dimming/ Non-dimming	Outer appearance	PCB Board Construction	Electronic components
LMD-509	Dimming	Circle	Vertical Overlap	AC6-03(Power board) HS1-02(Sensor board)
LMD-109	Dimming	Oblong	Horizontal Parallel	AC6-03(Power board) HS1-02(Sensor board)
LMS-109	Non-dimming	Oblong (Same as LMD-109)	Horizontal Parallel (Same as LMD-109)	AC6-03(Power board) HS1-01(Sensor board, not originally built-in #1-[U4,R27,C30,R28,C31,R29,R30,R31,R32] used in DIM-Output small signal gain amplifier circuit & #2-[R33,R13,C12,C32] used in feedback of modulation of DIM-Output signal. Above-mentioned 2 parts' circuit and components all belong to function of luminaire dimming control, not a part of RF circuit.

Model: LMD-109 & LMS-109 were pretested and the **Model: LMD-109** was the worst case for final test.

4. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 Description of Test Modes

1 channel is provided to this EUT:

Channel	Frequency
1	5800MHz

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO			DESCRIPTION
	RE \geq 1G	RE<1G	PLC	
A	√	√	√	Model: LMD-509
B	√	√	√	Model: LMD-109

Where **RE \geq 1G**: Radiated Emission above 1GHz & Bandedge Measurement

RE<1G: Radiated Emission below 1GHz

PLC: Power Line Conducted Emission

NOTE: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Y-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
A & B	1	1

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
A & B	1	1

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
A & B	1	1

Test Condition:

Applicable To	EUT Configure Mode	Environmental Conditions	Input Power	Tested By
RE\geq1G	A	16deg. C, 81%RH	120Vac, 60Hz	James Wei
	B	21deg. C, 80%RH	120Vac, 60Hz	James Wei
RE<1G	A	16deg. C, 81%RH	120Vac, 60Hz	James Wei
	B	28deg. C, 67%RH	120Vac, 60Hz	James Wei
PLC	A & B	22deg. C, 76%RH	120Vac, 60Hz	Ian Chang

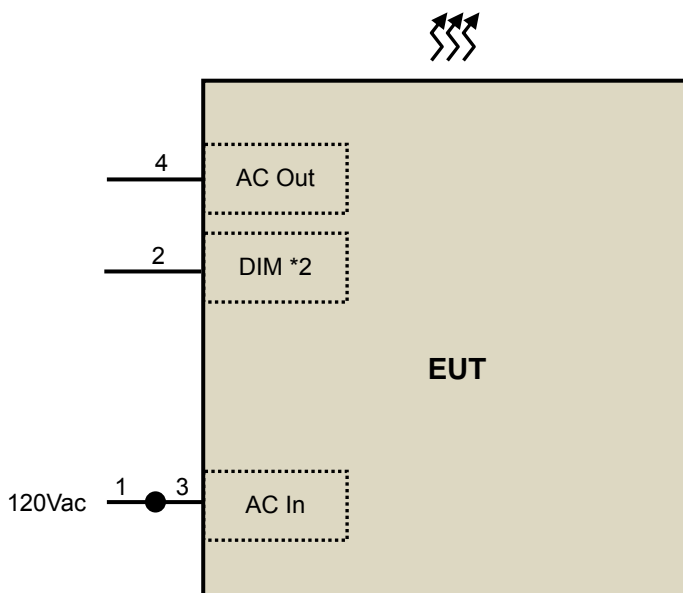
3.3 Description of Support Units

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	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	AC cable	1	1	N	0	Provided by Lab
2.	DIM cable	2	0.4	N	0	Supplied by client
3.	AC cable	2	0.4	N	0	Supplied by client
4.	AC cable	1	0.4	N	0	Supplied by client

Note: The core(s) is(are) originally attached to the cable(s).

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 (15.245)

ANSI C63.10-2013

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following

Fundamental Frequency (MHz)	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
902 ~ 928	500	16
2435 ~ 2465	500	1.6
5785 ~ 5815	500	1.6
10500 ~ 10550	2500	25.0
24075 ~ 24175	2500	25.0

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits as below table, whichever is the lesser attenuation

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.	CALIBRATED DATE	CALIBRATED UNTIL
HP Preamplifier	8447D	2432A03504	Feb. 21, 2017	Feb. 20, 2018
HP Preamplifier	8449B	3008A01201	Feb. 22, 2017	Feb. 21, 2018
MITEQ Preamplifier	AMF-6F-260400-33-8P	892164	Feb. 21, 2017	Feb. 20, 2018
Agilent TEST RECEIVER	N9038A	MY51210129	Feb. 8, 2017	Feb. 7, 2018
			Feb. 6, 2018	Feb. 5, 2019
Schwarzbeck Antenna	VULB 9168	139	Nov. 29, 2017	Nov. 28, 2018
Schwarzbeck Antenna	VHBA 9123	480	May 19, 2017	May 18, 2019
Schwarzbeck Horn Antenna	BBHA-9170	212	Dec. 1, 2017	Nov. 30, 2018
Schwarzbeck Horn Antenna	BBHA 9120-D1	D130	Dec. 1, 2017	Nov. 30, 2018
ADT. Turn Table	TT100	0306	NA	NA
ADT. Tower	AT100	0306	NA	NA
Software	Radiated_V7.6.15.9.5	NA	NA	NA
SUHNER RF cable With 4dB PAD	SF104	CABLE-CH6	Aug. 14, 2017	Aug. 13, 2018
SUHNER RF cable With 3dB PAD	SF102	Cable-CH8-3.6m	Aug. 14, 2017	Aug. 13, 2018
KEYSIGHT MIMO Powermeasurement Test set	U2021XA	U2021XA-001	May 31, 2017	May 30, 2018
KEYSIGHT Spectrum Analyzer	N9030A	MY54490260	Jul. 26, 2017	Jul. 25, 2018
Loop Antenna EMCI	LPA600	270	Aug. 11, 2017	Aug. 10, 2019
EMCO Horn Antenna	3115	00028257	Nov. 30, 2017	Nov. 29, 2018
Highpass filter Wainwright Instruments	WHK 3.1/18G-10SS	SN 8	NA	NA
ROHDE & SCHWARZ Spectrum Analyzer	FSV40	101042	Sep. 29, 2017	Sep. 28, 2018
Anritsu Power Sensor	MA2411B	0738404	Apr. 24, 2017	Apr. 23, 2018
Anritsu Power Meter	ML2495A	0842014	Apr. 24, 2017	Apr. 23, 2018

- NOTE:**
1. The calibration interval of the above test instruments is 12/24 months. And the calibrations are traceable to NML/ROC and NIST/USA.
 2. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
 3. The test was performed in Chamber No. 6.
 4. The Industry Canada Reference No. IC 7450E-6.

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: 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 below 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:

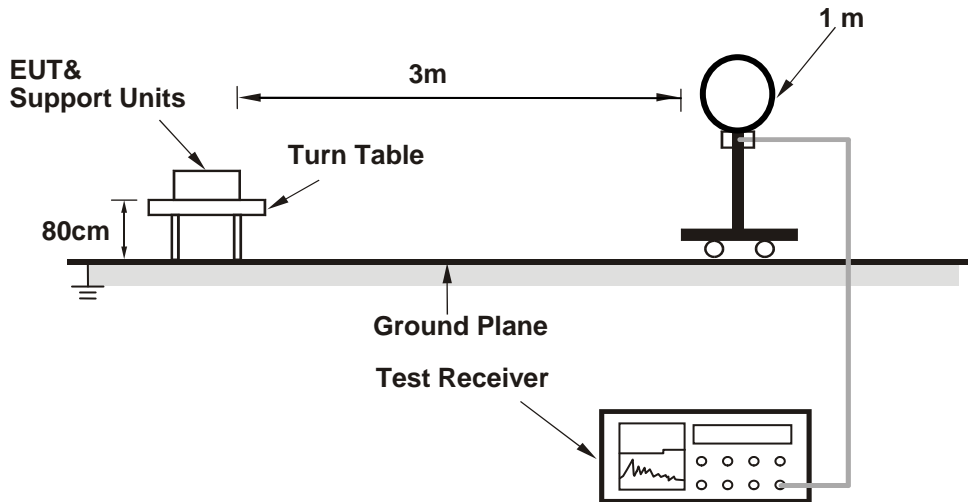
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average (Duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor ($10 \log(1/\text{duty cycle})$).
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

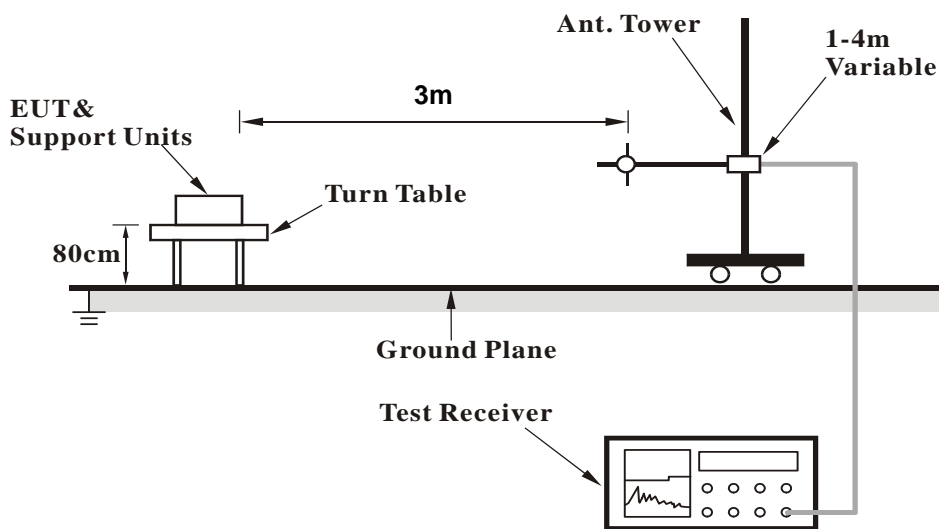
No deviation.

4.1.5 Test Set Up

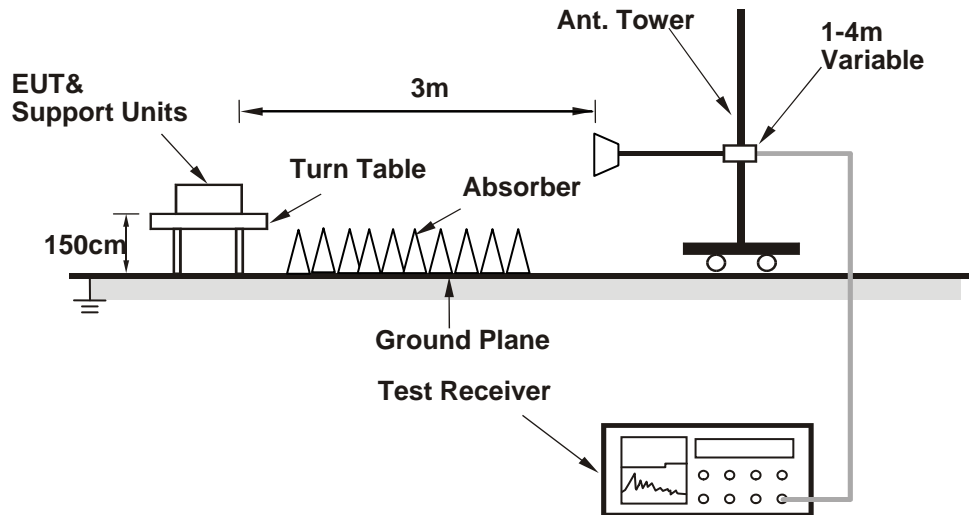
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



<Frequency Range above 1GHz>



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

4.1.6 EUT Operating Conditions

Set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

ABOVE 1GHz DATA

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)
TEST MODE	Mode A		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

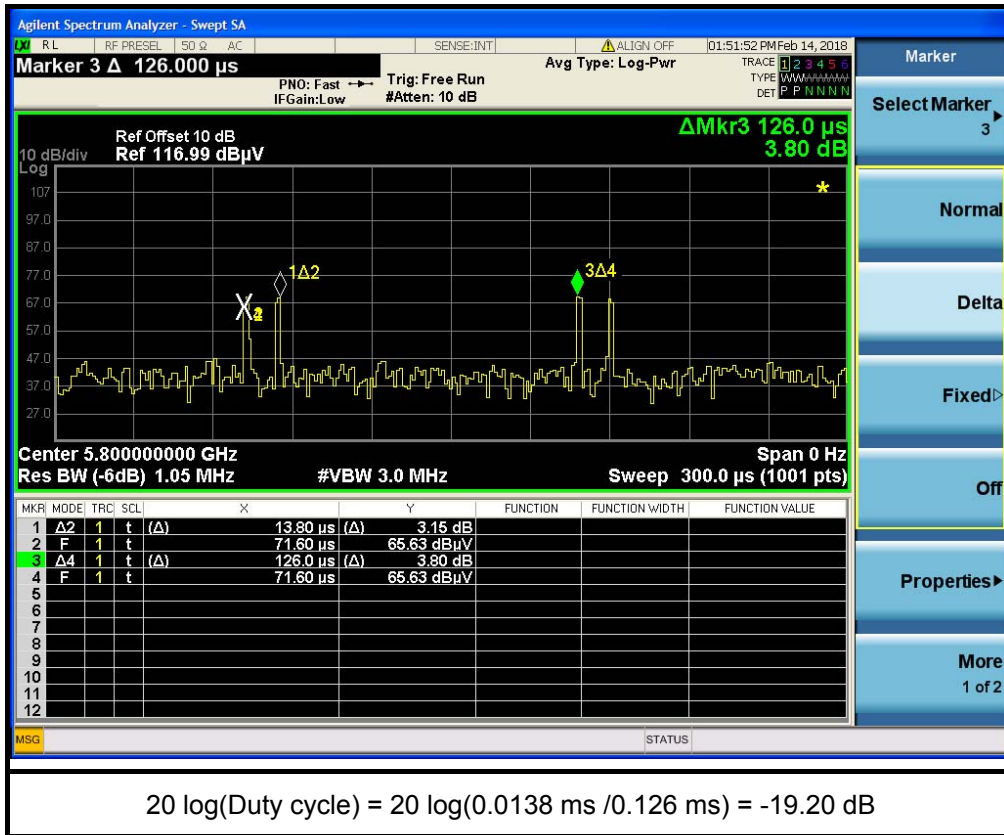
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5785.00	57.19 PK	74.00	-16.81	1.00 H	40	50.84	6.35
2	5785.00	43.45 AV	54.00	-10.55	1.00 H	40	37.10	6.35
3	*5800.00	82.88 PK	134.00	-51.12	1.00 H	40	76.47	6.41
4	*5800.00	63.68 AV	114.00	-50.32	1.00 H	40	57.27	6.41
5	5815.00	56.92 PK	74.00	-17.08	1.00 H	40	50.45	6.47
6	5815.00	43.48 AV	54.00	-10.52	1.00 H	40	37.01	6.47
7	11600.00	57.09 PK	74.00	-16.91	2.55 H	105	40.21	16.88
8	11600.00	37.89 AV	54.00	-16.11	2.55 H	105	21.01	16.88
9	17400.00	63.12 PK	74.00	-10.88	3.35 H	102	39.27	23.85
10	17400.00	43.92 AV	54.00	-10.08	3.35 H	102	20.07	23.85

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	5785.00	57.65 PK	74.00	-16.35	2.11 V	26	51.30	6.35
2	5785.00	43.48 AV	54.00	-10.52	2.11 V	26	37.13	6.35
3	*5800.00	89.32 PK	134.00	-44.68	2.11 V	26	82.91	6.41
4	*5800.00	70.12 AV	114.00	-43.88	2.11 V	26	63.71	6.41
5	5815.00	57.04 PK	74.00	-16.96	2.11 V	26	50.57	6.47
6	5815.00	43.45 AV	54.00	-10.55	2.11 V	26	36.98	6.47
7	11600.00	63.70 PK	74.00	-10.30	2.71 V	224	46.82	16.88
8	11600.00	44.50 AV	54.00	-9.50	2.71 V	224	27.62	16.88
9	17400.00	67.07 PK	74.00	-6.93	1.05 V	221	43.22	23.85
10	17400.00	47.87 AV	54.00	-6.13	1.05 V	221	24.02	23.85

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- " * ": Fundamental frequency.
- The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty factor is calculated from following formula:
 $20 \log(\text{Duty cycle}) = 20 \log(0.0138 \text{ ms} / 0.126 \text{ ms}) = -19.20 \text{ dB}$
 Please see page 16 for plotted duty.



CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)
TEST MODE	Mode B		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

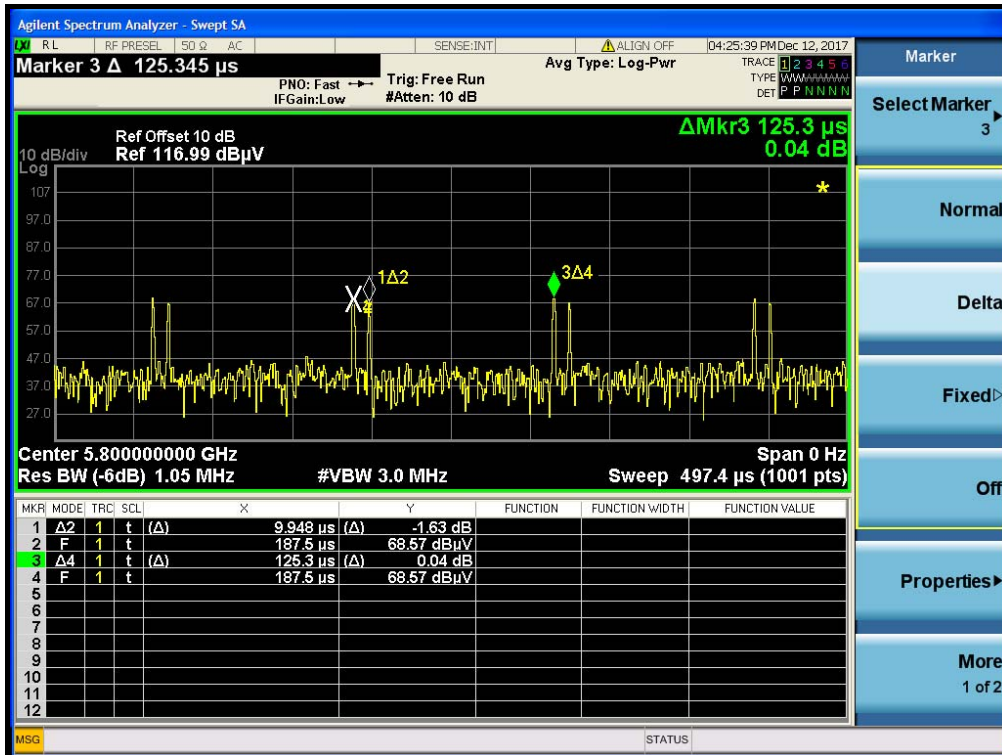
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5785.00	59.99 PK	74.00	-14.01	3.38 H	358	53.27	6.72
2	5785.00	37.99 AV	54.00	-16.01	3.38 H	358	31.27	6.72
3	*5800.00	85.23 PK	134.00	-48.77	3.38 H	358	78.49	6.74
4	*5800.00	63.23 AV	114.00	-50.77	3.38 H	358	56.49	6.74
5	5815.00	60.12 PK	74.00	-13.88	3.38 H	358	53.36	6.76
6	5815.00	38.12 AV	54.00	-15.88	3.38 H	358	31.36	6.76
7	11600.00	57.39 PK	74.00	-16.61	1.20 H	188	40.66	16.73
8	11600.00	35.39 AV	54.00	-18.61	1.20 H	188	18.66	16.73
9	17400.00	62.63 PK	74.00	-11.37	2.12 H	13	39.13	23.50
10	17400.00	40.63 AV	54.00	-13.37	2.12 H	13	17.13	23.50

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	5785.00	59.84 PK	74.00	-14.16	3.82 V	120	51.27	8.57
2	5785.00	37.84 AV	54.00	-16.16	3.82 V	120	29.27	8.57
3	*5800.00	83.04 PK	134.00	-50.96	3.82 V	120	74.47	8.57
4	*5800.00	61.04 AV	114.00	-52.96	3.82 V	120	52.47	8.57
5	5815.00	59.64 PK	74.00	-14.36	3.82 V	120	51.06	8.58
6	5815.00	37.64 AV	54.00	-16.36	3.82 V	120	29.06	8.58
7	11600.00	63.23 PK	74.00	-10.77	1.00 V	313	47.33	15.90
8	11600.00	41.23 AV	54.00	-12.77	1.00 V	313	25.33	15.90
9	17400.00	67.14 PK	74.00	-6.86	2.20 V	57	43.72	23.42
10	17400.00	45.14 AV	54.00	-8.86	2.20 V	57	21.72	23.42

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- " * ": Fundamental frequency.
- The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty factor is calculated from following formula:
 $20 \log(\text{Duty cycle}) = 20 \log(0.009948 \text{ ms} / 0.1253 \text{ ms}) = -22.00 \text{ dB}$
Please see page 18 for plotted duty.



$$20 \log(\text{Duty cycle}) = 20 \log(0.009948 \text{ ms} / 0.1253 \text{ ms}) = -22.00 \text{ dB}$$

BELOW 1GHz WORST-CASE DATA

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		
TEST MODE	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	37.47	23.39 QP	40.00	-16.61	2.01 H	269	33.16	-9.77
2	149.41	21.17 QP	43.50	-22.33	2.24 H	269	29.98	-8.81
3	347.29	22.24 QP	46.00	-23.76	3.35 H	148	28.55	-6.31
4	602.11	28.04 QP	46.00	-17.96	3.85 H	203	28.36	-0.32
5	742.51	34.72 QP	46.00	-11.28	2.10 H	115	32.78	1.94
6	908.09	34.00 QP	46.00	-12.00	1.14 H	139	28.73	5.27

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	51.49	30.93 QP	40.00	-9.07	2.03 V	320	39.76	-8.83
2	214.93	16.30 QP	43.50	-27.20	1.66 V	126	27.61	-11.31
3	351.51	21.54 QP	46.00	-24.46	2.25 V	186	27.81	-6.27
4	594.98	27.82 QP	46.00	-18.18	2.87 V	101	28.25	-0.43
5	729.90	36.85 QP	46.00	-9.15	1.81 V	208	34.79	2.06
6	903.05	33.18 QP	46.00	-12.82	1.03 V	118	28.11	5.07

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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		
TEST MODE	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	127.39	29.08 QP	43.50	-14.42	2.28 H	269	40.18	-11.10
2	228.07	28.30 QP	46.00	-17.70	1.52 H	242	39.70	-11.40
3	444.00	26.26 QP	46.00	-19.74	1.05 H	284	30.28	-4.02
4	611.66	28.32 QP	46.00	-17.68	2.65 H	218	28.73	-0.41
5	825.30	31.07 QP	46.00	-14.93	3.31 H	5	27.40	3.67
6	966.39	32.45 QP	54.00	-21.55	1.87 H	264	26.41	6.04

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	32.57	28.60 QP	40.00	-11.40	1.66 V	22	39.35	-10.75
2	114.54	26.71 QP	43.50	-16.79	2.01 V	231	38.93	-12.22
3	130.35	26.33 QP	43.50	-17.17	2.21 V	92	37.17	-10.84
4	229.19	23.82 QP	46.00	-22.18	1.85 V	153	35.18	-11.36
5	521.74	25.27 QP	46.00	-20.73	1.47 V	63	27.72	-2.45
6	909.30	32.07 QP	46.00	-13.93	2.81 V	0	27.10	4.97

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) – Pre-Amplifier 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
ROHDE & SCHWARZ TEST RECEIVER	ESCS 30	100292	Dec. 8, 2017	Dec. 7, 2018
ROHDE & SCHWARZ Artificial Mains Network (For EUT)	ENV216	101195	May 2, 2017	May 1, 2018
LISN With Adapter (for EUT)	AD10	C03Ada-002	May 2, 2017	May 1, 2018
EMCO L.I.S.N. (For peripherals)	3825/2	9504-2359	Jul. 25, 2017	Jul. 24, 2018
SCHWARZBECK Artificial Mains Network (For EUT)	NNLK8129	8129229	May 9, 2017	May 8, 2018
Software	Cond_V7.3.7.4	NA	NA	NA
RF cable (JYEBAO) With 10dB PAD	5D-FB	Cable-C03.01	Sep. 19, 2017	Sep. 18, 2018
LYNICS Terminator (For EMCO LISN)	0900510	E1-01-300	Jan. 19, 2018	Jan. 18, 2019
LYNICS Terminator (For EMCO LISN)	0900510	E1-01-301	Jan. 19, 2018	Jan. 18, 2019
ROHDE & SCHWARZ Artificial Mains Network (For TV EUT)	ESH3-Z5	100220	Nov. 14, 2017	Nov. 13, 2018
LISN With Adapter (for TV EUT)	100220	N/A	Nov. 14, 2017	Nov. 13, 2018

Notes: 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 Shielded Room No. 3.

3. Tested Date: Feb. 14, 2018

4.2.3 Test Procedures

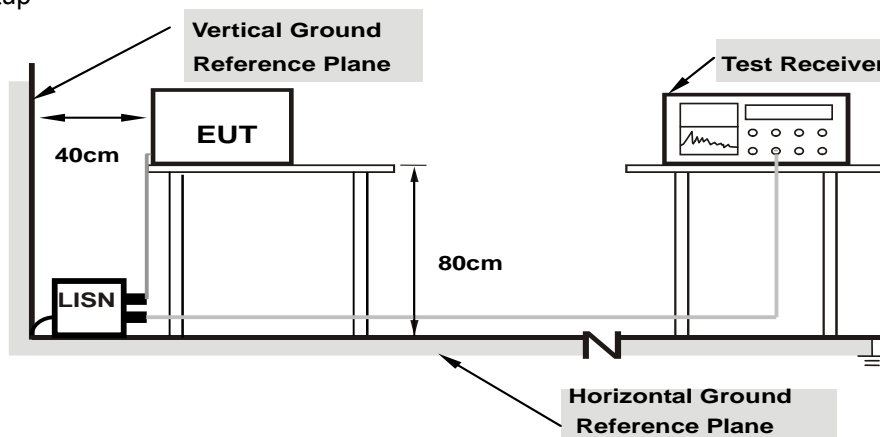
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance 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.

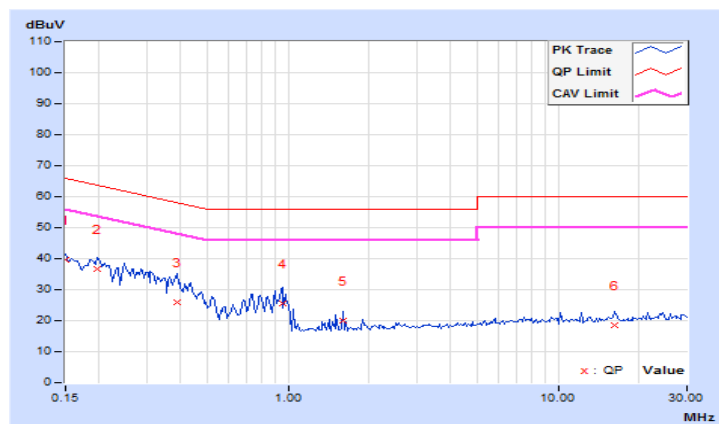
4.2.7 Test Results

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

No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	
1	0.15000	9.57	29.89	10.90	39.46	20.47	66.00	56.00	-26.54	-35.53
2	0.19687	9.58	27.13	8.17	36.71	17.75	63.74	53.74	-27.03	-35.99
3	0.38828	9.58	16.22	3.17	25.80	12.75	58.10	48.10	-32.30	-35.35
4	0.95078	9.61	16.00	2.66	25.61	12.27	56.00	46.00	-30.39	-33.73
5	1.58984	9.64	10.30	0.32	19.94	9.96	56.00	46.00	-36.06	-36.04
6	16.22266	9.87	8.81	4.37	18.68	14.24	60.00	50.00	-41.32	-35.76

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

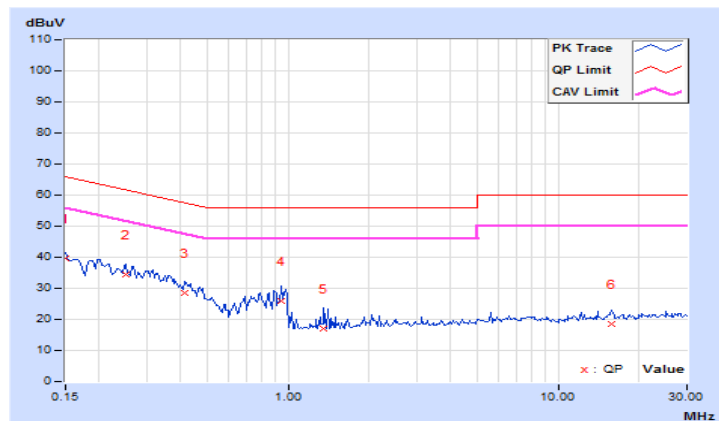


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	Mode A		

No	Freq. [MHz]	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
	1	0.15000	9.73	29.81	10.66	39.54	20.39	66.00	56.00	-26.46
2	0.25156	9.74	24.72	5.78	34.46	15.52	61.71	51.71	-27.25	-36.19
3	0.41563	9.74	18.89	0.46	28.63	10.20	57.54	47.54	-28.91	-37.34
4	0.94688	9.78	16.30	1.89	26.08	11.67	56.00	46.00	-29.92	-34.33
5	1.35938	9.80	7.09	4.52	16.89	14.32	56.00	46.00	-39.11	-31.68
6	15.75000	10.07	8.43	4.00	18.50	14.07	60.00	50.00	-41.50	-35.93

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

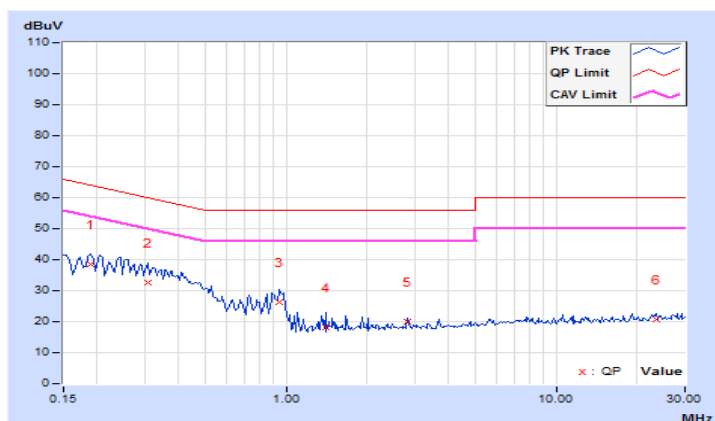


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	Mode B		

No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor (dB)	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	
1	0.18906	9.58	29.05	10.26	38.63	19.84	64.08	54.08	-25.45	-34.24
2	0.31016	9.58	22.91	3.05	32.49	12.63	59.97	49.97	-27.48	-37.34
3	0.94688	9.61	16.57	2.03	26.18	11.64	56.00	46.00	-29.82	-34.36
4	1.39844	9.63	8.69	5.10	18.32	14.73	56.00	46.00	-37.68	-31.27
5	2.80469	9.68	10.50	7.37	20.18	17.05	56.00	46.00	-35.82	-28.95
6	23.46094	9.91	10.96	0.62	20.87	10.53	60.00	50.00	-39.13	-39.47

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

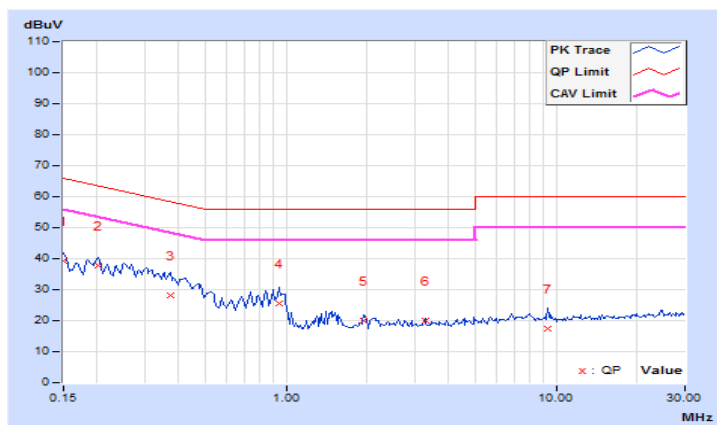


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	Mode B		

No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor (dB)	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	
1	0.15000	9.73	29.63	10.94	39.36	20.67	66.00	56.00	-26.64	-35.33
2	0.20078	9.74	27.97	9.37	37.71	19.11	63.58	53.58	-25.87	-34.47
3	0.37266	9.74	18.46	0.90	28.20	10.64	58.44	48.44	-30.24	-37.80
4	0.94297	9.78	15.70	2.34	25.48	12.12	56.00	46.00	-30.52	-33.88
5	1.94531	9.83	10.18	0.01	20.01	9.84	56.00	46.00	-35.99	-36.16
6	3.28125	9.87	10.28	1.88	20.15	11.75	56.00	46.00	-35.85	-34.25
7	9.26172	9.99	7.42	3.97	17.41	13.96	60.00	50.00	-42.59	-36.04

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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