FCC Test Report

Report No.:	RF160105C16
FCC ID:	E2K-DWRFID1601
Test Model:	DWRFID1601
Received Date:	Jan. 06, 2016
Test Date:	Jan. 12 ~ Jan. 28, 2016
Issued Date:	Feb. 24, 2016
Applicant:	Dell Inc.
Address:	One Dell Way, Round Rock, Texas 78682, USA
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.
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
RF160105C16	Original release	Feb. 24, 2016

1 Certificate of Conformity

Product:	RFID13.56MHz Wireless Module
Brand:	DELL
Test Model:	DWRFID1601
Sample Status:	Engineering sample
Applicant:	Dell Inc.
Test Date:	Jan. 12 ~ Jan. 28, 2016
Standards:	47 CFR FCC Part 15, Subpart C (Section 15.225) 47 CFR FCC Part 15, Subpart C (Section 15.215) 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:** Feb. 24, 2016

Celine Chou / Specialist

Approved by : Ken Liu , **Date:** Feb. 24, 2016

Ken Liu / Senior Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.225, 15.215)			
FCC Clause	Test Item	Result	Remarks
15.207	Conducted emission test	Pass	Meet the requirement of limit. Minimum passing margin is -9.34dB at 3.24219MHz
15.225 (a)	The field strength of any emissions within the band 13.553-13.567 MHz	Pass	Meet the requirement of limit. Minimum passing margin is -73.80dB at 13.56MHz.
15.225 (b)	The field strength of any emissions within the bands 13.410-13.553 MHz and 13.567-13.710 MHz	Pass	Meet the requirement of limit.
15.225 (c)	The field strength of any emissions within the bands 13.110-13.410 MHz and 13.710-14.010 MHz	Pass	Meet the requirement of limit.
15.225 (d)	The field strength of any emissions appearing outside of the 13.110-14.010 MHz band	Pass	Meet the requirement of limit. Minimum passing margin is -3.8dB at 70.93MHz.
15.225 (e)	The frequency tolerance	Pass	Meet the requirement of limit.
15.215 (c)	20dB Bandwidth	Pass	Meet the requirement of limit.

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	Expended Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.44 dB
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	3.86 dB
	200MHz ~1000MHz	3.87 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	RFID13.56MHz Wireless Module
Brand	DELL
Test Model	DWRFID1601
Sample Status	Engineering Sample
Power Supply Rating	3.6Vdc for High Supply Reader Mode 2.8Vdc for Low Supply Reader Mode
Modulation Type	ASK
Operating Frequency	13.56MHz
Antenna Type	Loop antenna
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. The transmitter module is authorized for using in the following specific End-products.

Product name	Brand	Model	Description
Notebook computer	DELL	P45G	All models are electrically identical, different model names are for marketing purpose.
		P45G002	
Notebook computer	DELL	P18T	All models are electrically identical, different model names are for marketing purpose.
		P18T002	
Notebook computer	DELL	P46G	All models are electrically identical, different model names are for marketing purpose.
		P46G002	

3.2 Description of Test Modes

1 channel is provided to this EUT

Channel	FREQ. (MHz)
1	13.56

3.2.1 Test Mode Applicability and Tested Channel Deta

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE	PLC	FS	EB	
A	√	√	√	√	End-product: P45G
B	√	√	√	√	End-product: P18T
C	√	√	√	√	End-product: P46G

Where **RE:** Radiated Emission **PLC:** Power Line Conducted Emission
FS: Frequency Stability **EB:** 20dB Bandwidth 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:

☒ 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 CONFIGUURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
A, B, C	1	1	ASK

Frequency Stability:

☒ 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 CONFIGUURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
A, B, C	1	1	ASK

20dB Bandwidth:

☒ 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 CONFIGUURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
A, B, C	1	1	ASK

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
RE	18deg. C, 70%RH	120Vac, 60Hz	Nick Hsu
PLC	16deg. C, 70%RH	120Vac, 60Hz	Nick Hsu
FS	25deg. C, 66%RH	120Vac, 60Hz	Match Tsui
BW	25deg. C, 66%RH	120Vac, 60Hz	Match Tsui

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.

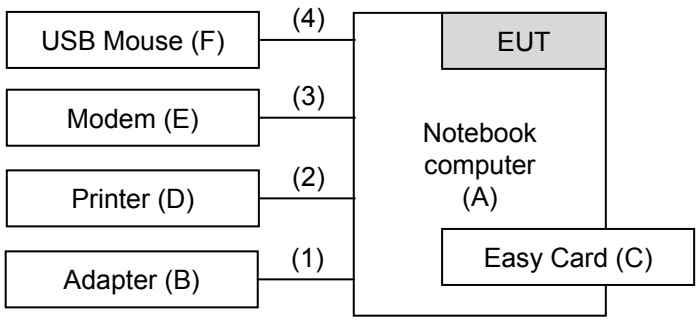
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook computer	DELL	P45G	NA	FCC DoC Approved	For test mode A only
	Notebook computer	DELL	P18T	NA	FCC DoC Approved	For test mode B only
	Notebook computer	DELL	P46G	NA	FCC DoC Approved	For test mode C only
B.	Adapter	DELL	HA65NM130	NA	NA	-
C.	Easy Card	NA	NA	NA	NA	-
D.	Printer	EPSON	T22	MEEZ070220	FCC DoC Approved	-
E.	Modem	ACEEX	1414V/3	0401008245	IFAXDM1414	-
F.	USB Mouse	DELL	MS111-P	CN-011D3V-71581-1C J-092S	FCC DoC Approved	-

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item A acted as a communication partner to transfer data.

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	Power Cable	1	1.8	N	0	Attached on adapter
2.	USB Cable	1	1.5	Y	0	-
3.	RS-232 Cable	1	1.8	N	0	-
4.	USB Cable	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 (15.225)

FCC Part 15, Subpart C (15.215)

ANSI C63.10-2013

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

Note: The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It 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 Measurement

4.1.1 Limits of Radiated Emission Measurement

The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.

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	ESIB7	100187	Apr. 10, 2015	Apr. 09, 2016
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	Sep. 02, 2015	Sep. 01, 2016
BILOG Antenna SCHWARZBECK	VULB9168	9168-151	Jan. 07, 2016	Jan. 06, 2017
HORN Antenna SCHWARZBECK	9120D	209	Jan. 20, 2016	Jan. 19, 2017
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Jan. 18, 2016	Jan. 17, 2017
Loop Antenna R&S	HFH2-Z2	100070	Mar. 24, 2014	Mar. 23, 2016
Preamplifier Agilent	8447D	2944A10738	Oct.18, 2015	Oct. 17, 2016
Preamplifier Agilent	8449B	3008A01964	Aug. 22, 2015	Aug. 21, 2016
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH3-03 (214378)	Aug. 22, 2015	Aug. 21, 2016
RF signal cable HUBER+SUHNER	SUCOFLEX 106	Cable-CH3-03 (309224+12738)	Aug. 22, 2015	Aug. 21, 2016
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021702	NA	NA
Turn Table BV ADT	TT100	TT93021702	NA	NA
Turn Table Controller BV ADT	SC100	SC93021702	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 calibration interval of the loop antenna is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 3.
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 988962.
5. The IC Site Registration No. is IC 7450F-3.

4.1.3 Test Procedures

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters semi-anechoic chamber. 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. Height of receiving 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 Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

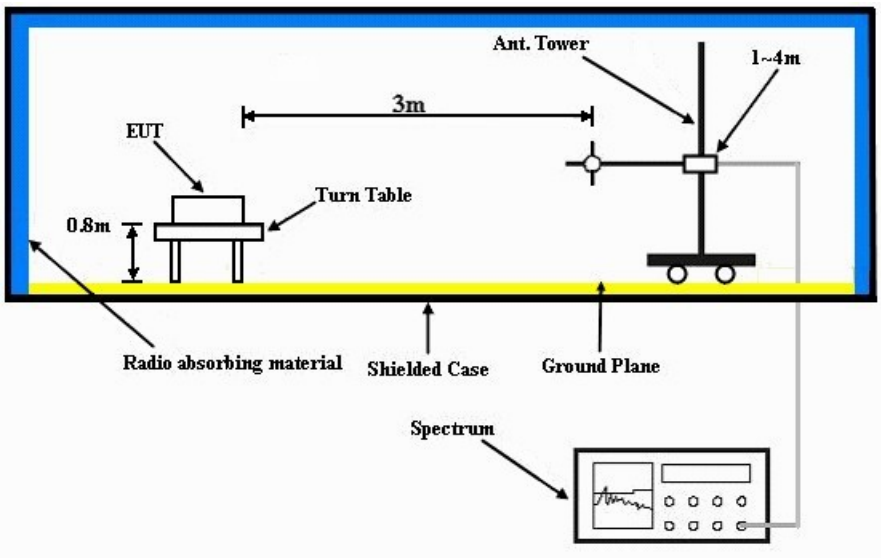
Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz(Duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.
5. These test were performed other than open test site, adequate comparison measurements were confirmed against 30m open test site. Therefore sufficient were made to demonstrate that the alternative site produces reaults that corrlate with the ones of tests made in an open field based on KDB937606.

4.1.4 Deviation from Test Standard

No deviation.

4.1.5 Test Set Up



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

4.1.6 EUT Operating Conditions

a. Installed the EUT into notebook.
b. Set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

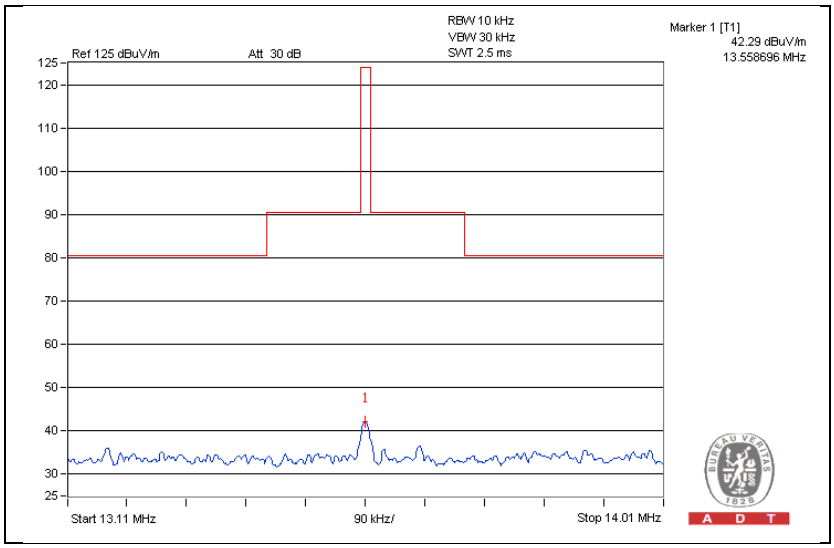
EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	13.553 ~ 13.567MHz
Input Power	120Vac, 60Hz (System)	Detector Function	Quasi-Peak
Environmental Conditions	18deg. C, 70%RH	Tested By	Nick Hsu
Test Mode	A		

Antenna Polarity & Test Distance: Loop Antenna Open At 3m								
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	13.56	42.29	124.00	-81.71	1	287	22.09	20.20

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.
5. Above limits have been translated by the formula

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)
Example:

13.56MHz = 15848uV/m 30m
= 84dBuV/m 30m
= $84+20\log(30/3)^2$ 3m
= 124dBuV/m



EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	13.553 ~ 13.567MHz
Input Power	120Vac, 60Hz (System)	Detector Function	Quasi-Peak
Environmental Conditions	18deg. C, 70%RH	Tested By	Nick Hsu
Test Mode	A		

Antenna Polarity & Test Distance: Loop Antenna Close At 3m								
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	13.56	39.88	124.00	-84.12	1	295	19.68	20.20

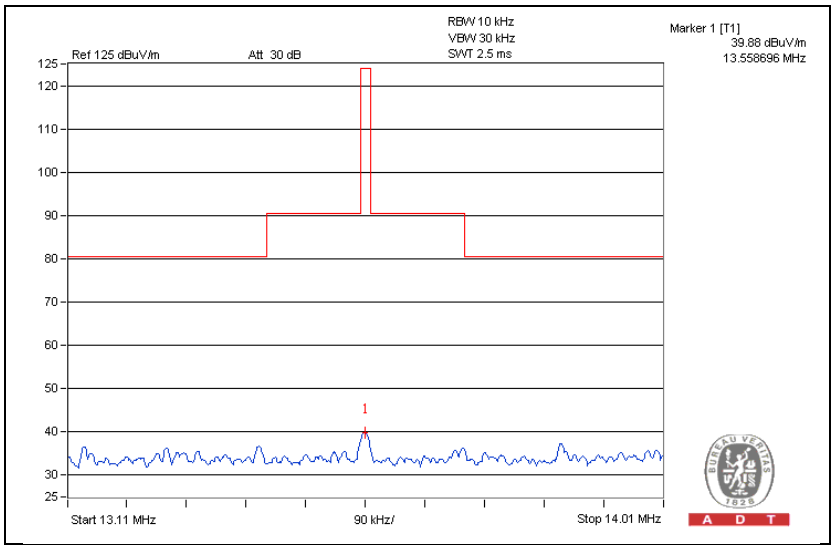
Remarks:

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.
5. Above limits have been translated by the formula

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

Example:

13.56MHz = 15848uV/m 30m
= 84dBuV/m 30m
= $84+20\log(30/3)^2$ 3m
= 124dBuV/m



EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	13.553 ~ 13.567MHz
Input Power	120Vac, 60Hz (System)	Detector Function	Quasi-Peak
Environmental Conditions	18deg. C, 70%RH	Tested By	Nick Hsu
Test Mode	B		

Antenna Polarity & Test Distance: Loop Antenna Open At 3m								
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	13.56	44.98	124.00	-79.02	1	5	24.78	20.20

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.
5. Above limits have been translated by the formula

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

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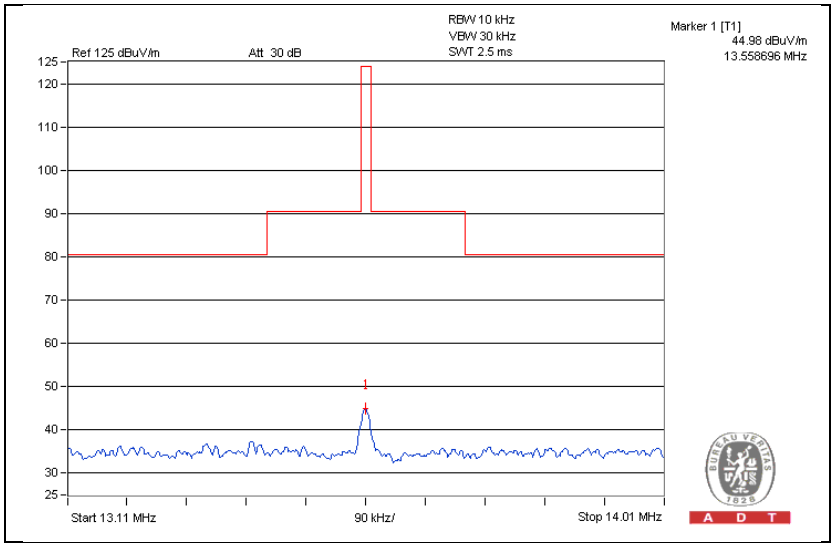
= 84dBuV/m 30m
= $84+20\log(30/3)^2$ 3m
= 124dBuV/m



EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	13.553 ~ 13.567MHz
Input Power	120Vac, 60Hz (System)	Detector Function	Quasi-Peak
Environmental Conditions	18deg. C, 70%RH	Tested By	Nick Hsu
Test Mode	B		

Antenna Polarity & Test Distance: Loop Antenna Close At 3m								
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	13.56	42.20	124.00	-81.80	1	60	22.00	20.20

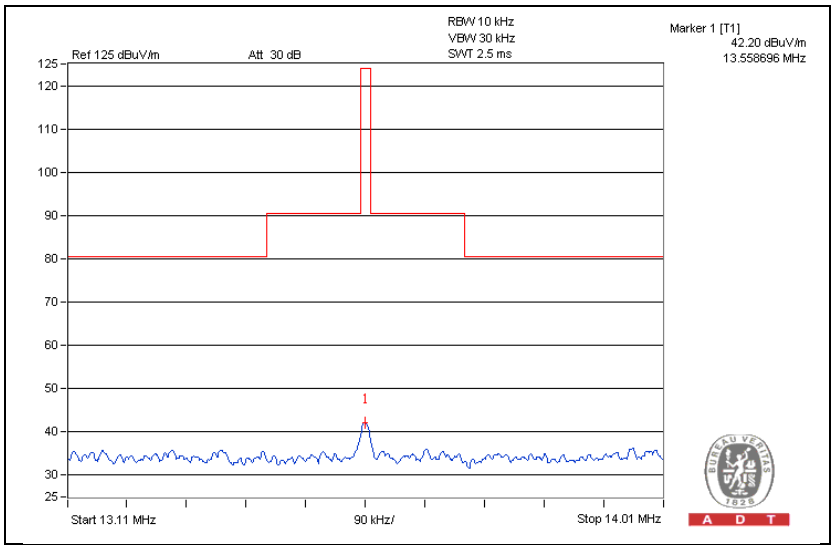
Remarks:

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.
5. Above limits have been translated by the formula

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

Example:

13.56MHz = 15848uV/m 30m
= 84dBuV/m 30m
= $84+20\log(30/3)^2$ 3m
= 124dBuV/m



EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	13.553 ~ 13.567MHz
Input Power	120Vac, 60Hz (System)	Detector Function	Quasi-Peak
Environmental Conditions	18deg. C, 70%RH	Tested By	Nick Hsu
Test Mode	C		

Antenna Polarity & Test Distance: Loop Antenna Open At 3m								
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	**13.56**	**50.20**	**124.00**	**-73.80**	**1**	**286**	**30.00**	**20.20**

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.
5. Above limits have been translated by the formula

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)
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= 84dBuV/m 30m
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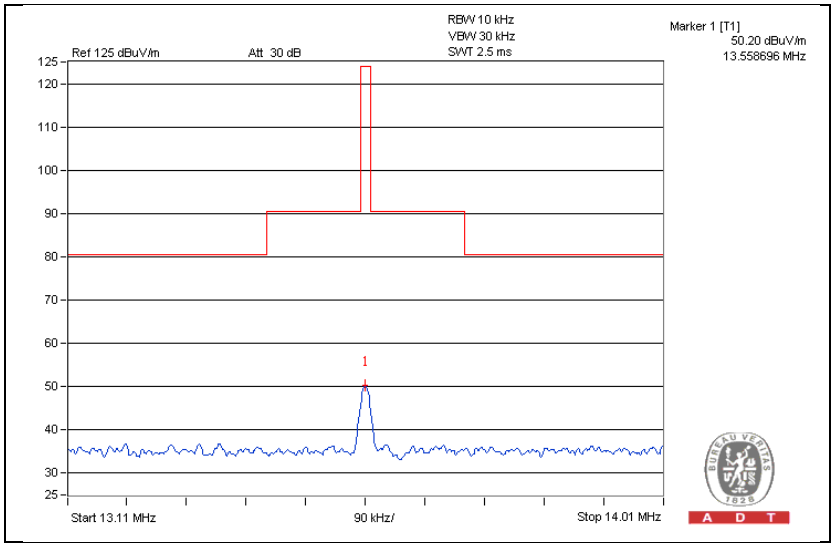
= 124dBuV/m



EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	13.553 ~ 13.567MHz
Input Power	120Vac, 60Hz (System)	Detector Function	Quasi-Peak
Environmental Conditions	18deg. C, 70%RH	Tested By	Nick Hsu
Test Mode	C		

Antenna Polarity & Test Distance: Loop Antenna Close At 3m								
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	13.56	44.28	124.00	-79.72	1	13	24.08	20.20

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)
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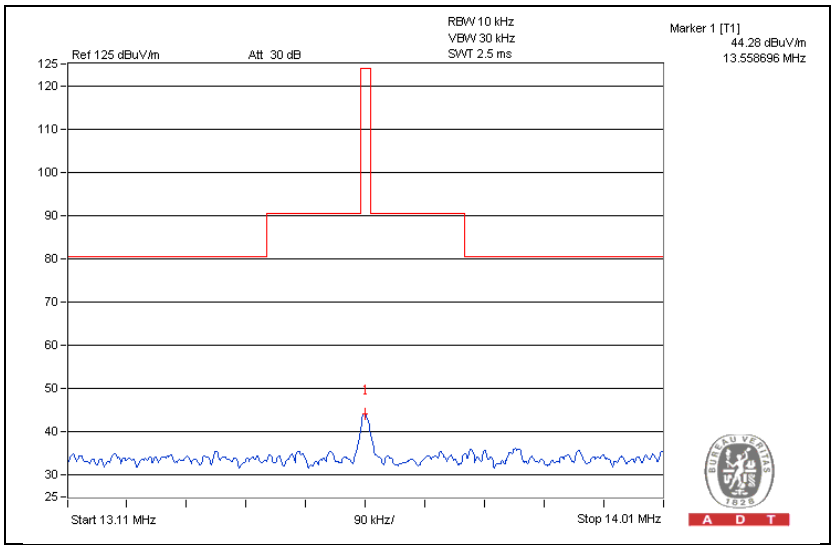
= 124dBuV/m

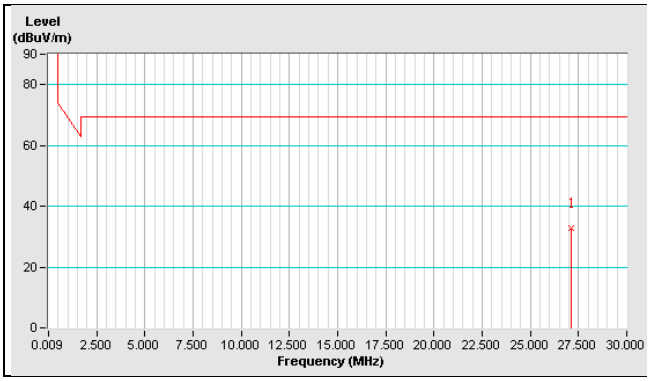


EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	Below 30MHz
Input Power	120Vac, 60Hz (System)	Detector Function	Quasi-Peak
Environmental Conditions	18deg. C, 70%RH	Tested By	Nick Hsu
Test Mode	A		

Antenna Polarity & Test Distance: Loop Antenna Open At 3m								
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	27.12	32.70	69.50	-36.80	1	244	12.30	20.40

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

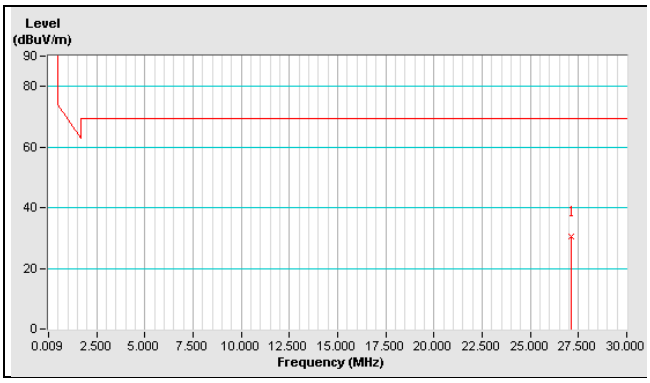


EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	Below 30MHz
Input Power	120Vac, 60Hz (System)	Detector Function	Quasi-Peak
Environmental Conditions	18deg. C, 70%RH	Tested By	Nick Hsu
Test Mode	A		

Antenna Polarity & Test Distance: Loop Antenna Close At 3m								
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	27.12	30.50	69.50	-39.00	1	224	10.10	20.40

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

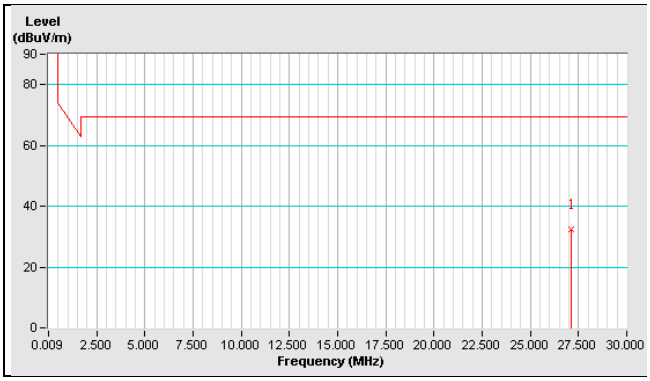


EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	Below 30MHz
Input Power	120Vac, 60Hz (System)	Detector Function	Quasi-Peak
Environmental Conditions	18deg. C, 70%RH	Tested By	Nick Hsu
Test Mode	B		

Antenna Polarity & Test Distance: Loop Antenna Open At 3m								
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	27.12	32.50	69.50	-37.00	1	196	12.10	20.40

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

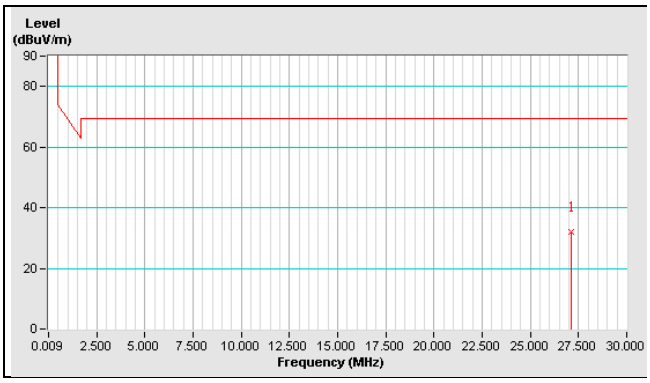


EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	Below 30MHz
Input Power	120Vac, 60Hz (System)	Detector Function	Quasi-Peak
Environmental Conditions	18deg. C, 70%RH	Tested By	Nick Hsu
Test Mode	B		

Antenna Polarity & Test Distance: Loop Antenna Close At 3m								
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	27.12	32.00	69.50	-37.50	1	208	11.60	20.40

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

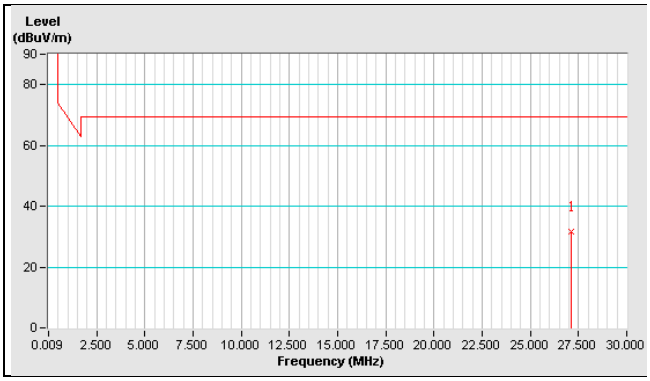


EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	Below 30MHz
Input Power	120Vac, 60Hz (System)	Detector Function	Quasi-Peak
Environmental Conditions	18deg. C, 70%RH	Tested By	Nick Hsu
Test Mode	C		

Antenna Polarity & Test Distance: Loop Antenna Open At 3m								
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	27.12	31.50	69.50	-38.00	1	222	11.10	20.40

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

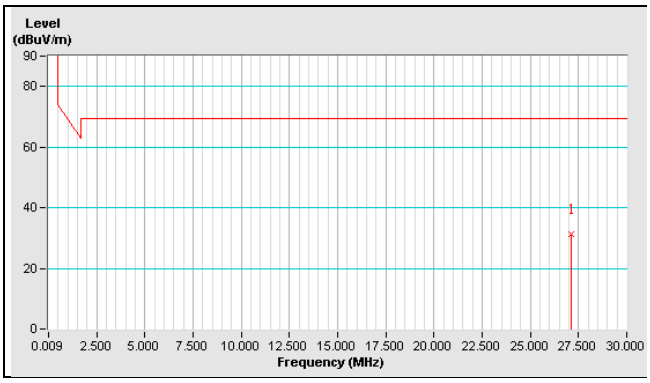


EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	Below 30MHz
Input Power	120Vac, 60Hz (System)	Detector Function	Quasi-Peak
Environmental Conditions	18deg. C, 70%RH	Tested By	Nick Hsu
Test Mode	C		

Antenna Polarity & Test Distance: Loop Antenna Close At 3m								
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	27.12	31.10	69.50	-38.40	1	165	10.70	20.40

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



EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	Below 1000MHz
Input Power	120Vac, 60Hz (System)	Detector Function	Quasi-Peak
Environmental Conditions	18deg. C, 70%RH	Tested By	Nick Hsu
Test Mode	A		

Antenna Polarity & Test Distance: Horizontal At 3m								
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	32.34	20.6 QP	40.0	-19.4	1.50 H	142	36.80	-16.20
2	57.62	32.2 QP	40.0	-7.8	2.00 H	63	46.80	-14.60
3	92.32	24.7 QP	43.5	-18.8	2.00 H	185	44.40	-19.70
4	119.84	19.5 QP	43.5	-24.0	1.50 H	243	35.90	-16.40
5	141.32	22.2 QP	43.5	-21.3	2.00 H	228	36.70	-14.50
6	168.54	23.7 QP	43.5	-19.8	1.50 H	138	37.80	-14.10
Antenna Polarity & Test Distance: Vertical At 3m								
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	33.99	33.3 QP	40.0	-6.7	1.50 V	184	48.90	-15.60
2	57.32	27.2 QP	40.0	-12.8	1.50 V	68	41.80	-14.60
3	91.17	25.6 QP	43.5	-17.9	1.00 V	142	45.30	-19.70
4	111.96	25.8 QP	43.5	-17.7	1.00 V	24	42.90	-17.10
5	135.49	21.6 QP	43.5	-21.9	1.50 V	264	36.70	-15.10
6	168.64	21.2 QP	43.5	-22.3	1.00 V	117	35.30	-14.10

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

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	Below 1000MHz
Input Power	120Vac, 60Hz (System)	Detector Function	Quasi-Peak
Environmental Conditions	18deg. C, 70%RH	Tested By	Nick Hsu
Test Mode	B		

Antenna Polarity & Test Distance: Horizontal At 3m								
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	57.32	32.0 QP	40.0	-8.0	1.82 H	64	46.60	-14.60
2	90.17	25.9 QP	43.5	-17.6	2.00 H	241	45.60	-19.70
3	119.64	26.4 QP	43.5	-17.1	1.50 H	134	42.80	-16.40
4	177.27	32.2 QP	43.5	-11.3	2.00 H	84	47.00	-14.80
5	216.35	37.0 QP	46.0	-9.0	1.00 H	237	53.00	-16.00
6	236.69	30.1 QP	46.0	-15.9	1.50 H	90	45.10	-15.00
Antenna Polarity & Test Distance: Vertical At 3m								
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	35.93	30.6 QP	40.0	-9.4	1.05 V	213	46.30	-15.70
2	**70.93**	**36.2 QP**	**40.0**	**-3.8**	**1.00 V**	**234**	**52.90**	**-16.70**
3	119.64	29.5 QP	43.5	-14.0	1.00 V	82	45.90	-16.40
4	166.30	32.2 QP	43.5	-11.3	1.52 V	342	46.20	-14.00
5	210.92	33.3 QP	43.5	-10.2	1.49 V	31	49.60	-16.30
6	269.35	33.0 QP	46.0	-13.0	2.03 V	2	46.20	-13.20

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

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	Below 1000MHz
Input Power	120Vac, 60Hz (System)	Detector Function	Quasi-Peak
Environmental Conditions	18deg. C, 70%RH	Tested By	Nick Hsu
Test Mode	C		

Antenna Polarity & Test Distance: Horizontal At 3m								
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	39.92	26.5 QP	40.0	-13.5	2.00 H	43	41.80	-15.30
2	57.32	32.0 QP	40.0	-8.0	2.00 H	82	46.60	-14.60
3	92.02	26.0 QP	43.5	-17.5	2.00 H	224	45.70	-19.70
4	119.84	23.9 QP	43.5	-19.6	1.50 H	142	40.30	-16.40
5	141.72	25.7 QP	43.5	-17.8	1.00 H	253	40.10	-14.40
6	175.92	25.9 QP	43.5	-17.6	1.50 H	84	40.60	-14.70
Antenna Polarity & Test Distance: Vertical At 3m								
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	41.87	31.7 QP	40.0	-8.3	1.00 V	300	46.80	-15.10
2	58.12	27.5 QP	40.0	-12.5	1.00 V	205	42.20	-14.70
3	92.82	25.9 QP	43.5	-17.6	1.00 V	164	45.60	-19.70
4	111.76	26.2 QP	43.5	-17.3	1.50 V	18	43.30	-17.10
5	141.22	20.1 QP	43.5	-23.4	1.00 V	234	34.60	-14.50
6	183.90	23.9 QP	43.5	-19.6	1.00 V	133	39.50	-15.60

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)
   – 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
Test Receiver ROHDE & SCHWARZ	ESCS 30	100288	Apr. 27, 2015	Apr. 26, 2016
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond2-01	Dec. 26, 2015	Dec. 25, 2016
LISN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Jan. 11, 2016	Jan. 10, 2017
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Jul. 21, 2015	Jul. 20, 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 2.
3. The VCCI Site Registration No. is C-2047.

4.2.3 Test Procedures

a. 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.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

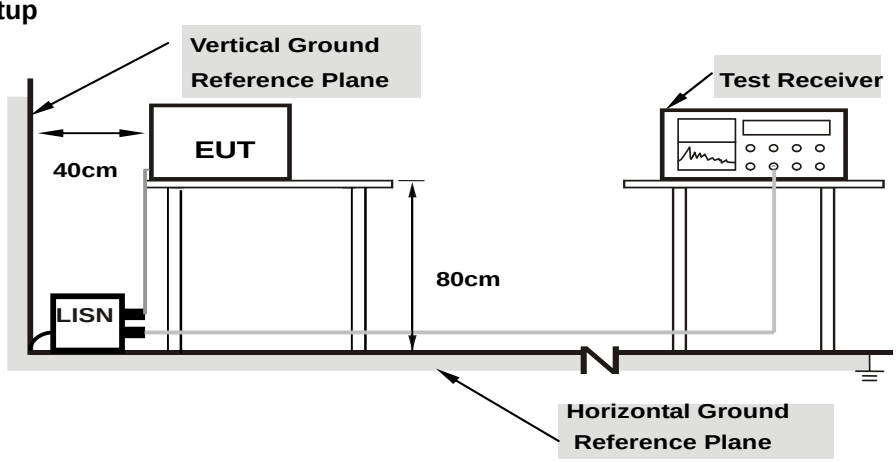
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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.

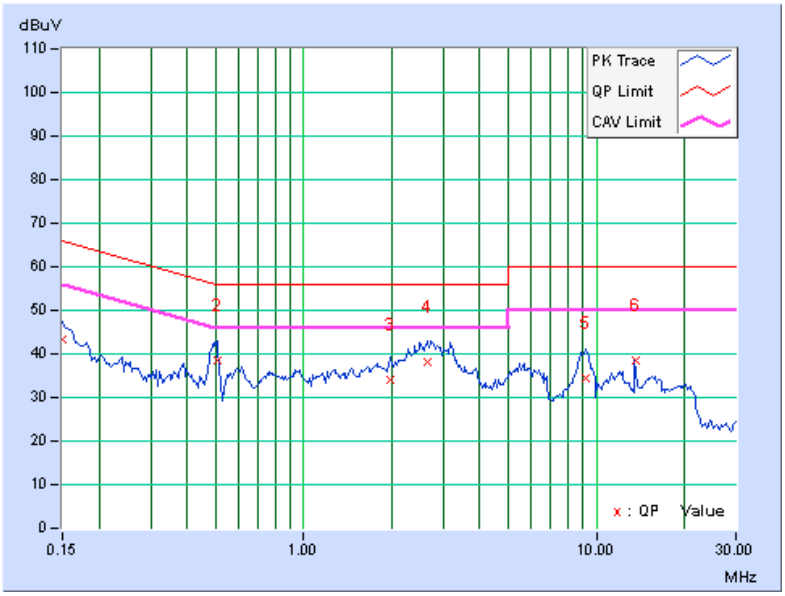
4.2.7 Test Results

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

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.18	33.13	20.90	43.31	31.08	66.00	56.00	-22.69	-24.92
2	0.50547	10.25	28.44	23.91	38.69	34.16	56.00	46.00	-17.31	-11.84
3	1.97266	10.38	23.74	19.73	34.12	30.11	56.00	46.00	-21.88	-15.89
4	2.64063	10.39	27.75	23.69	38.14	34.08	56.00	46.00	-17.86	-11.92
5	9.24219	10.51	23.75	18.39	34.26	28.90	60.00	50.00	-25.74	-21.10
6	13.56000	10.57	28.10	26.56	38.67	37.13	60.00	50.00	-21.33	-12.87

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.

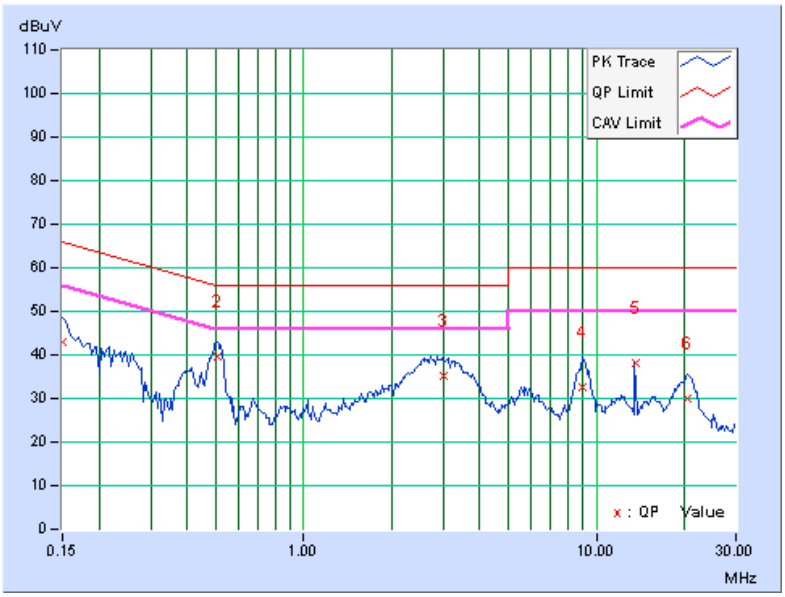


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	A		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.19	32.72	18.26	42.91	28.45	66.00	56.00	-23.09	-27.55
2	0.50853	10.30	29.22	24.81	39.52	35.11	56.00	46.00	-16.48	-10.89
3	2.99219	10.48	24.75	21.14	35.23	31.62	56.00	46.00	-20.77	-14.38
4	8.98828	10.60	22.07	16.77	32.67	27.37	60.00	50.00	-27.33	-22.63
5	13.56000	10.69	27.61	26.82	38.30	37.51	60.00	50.00	-21.70	-12.49
6	20.52344	10.88	19.02	15.02	29.90	25.90	60.00	50.00	-30.10	-24.10

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.

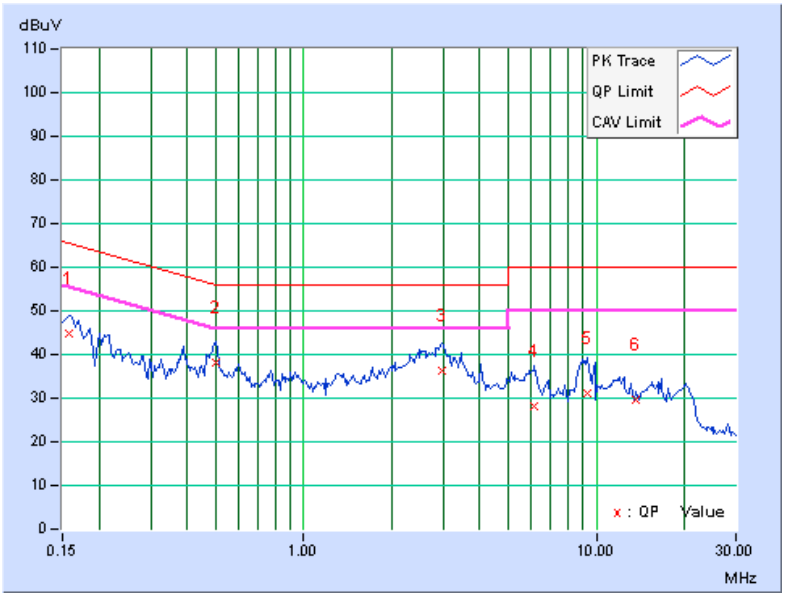


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	10.18	34.58	20.91	44.76	31.09	65.58	55.58	-20.81	-24.48
2	0.50156	10.25	27.88	23.08	38.13	33.33	56.00	46.00	-17.87	-12.67
3	2.97656	10.39	25.74	20.71	36.13	31.10	56.00	46.00	-19.87	-14.90
4	6.16406	10.45	17.71	12.41	28.16	22.86	60.00	50.00	-31.84	-27.14
5	9.37500	10.52	20.74	15.11	31.26	25.63	60.00	50.00	-28.74	-24.37
6	13.56000	10.57	19.12	15.85	29.69	26.42	60.00	50.00	-30.31	-23.58

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.

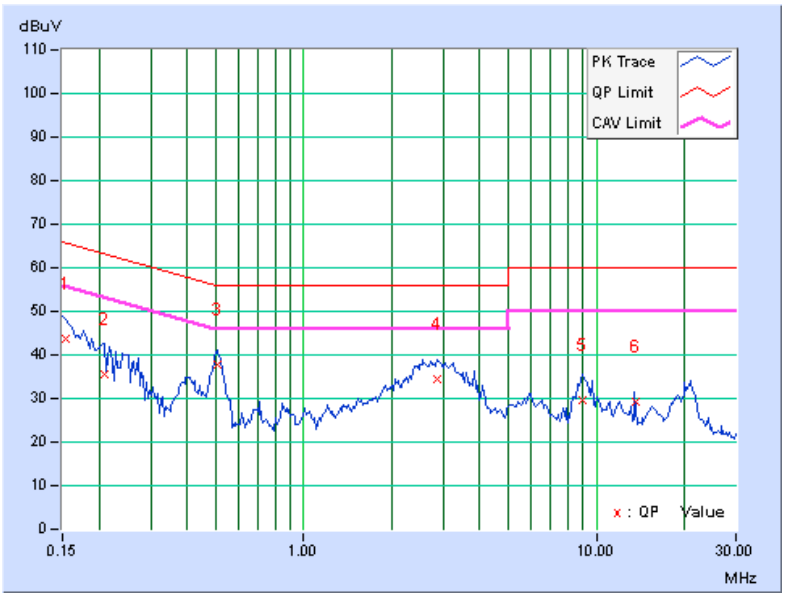


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	10.19	33.55	19.30	43.74	29.49	65.79	55.79	-22.05	-26.30
2	0.20859	10.20	25.46	15.51	35.66	25.71	63.26	53.26	-27.60	-27.55
3	0.50547	10.30	27.52	23.08	37.82	33.38	56.00	46.00	-18.18	-12.62
4	2.87109	10.47	24.12	19.70	34.59	30.17	56.00	46.00	-21.41	-15.83
5	8.96094	10.60	19.19	12.88	29.79	23.48	60.00	50.00	-30.21	-26.52
6	13.56000	10.69	18.67	17.19	29.36	27.88	60.00	50.00	-30.64	-22.12

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.

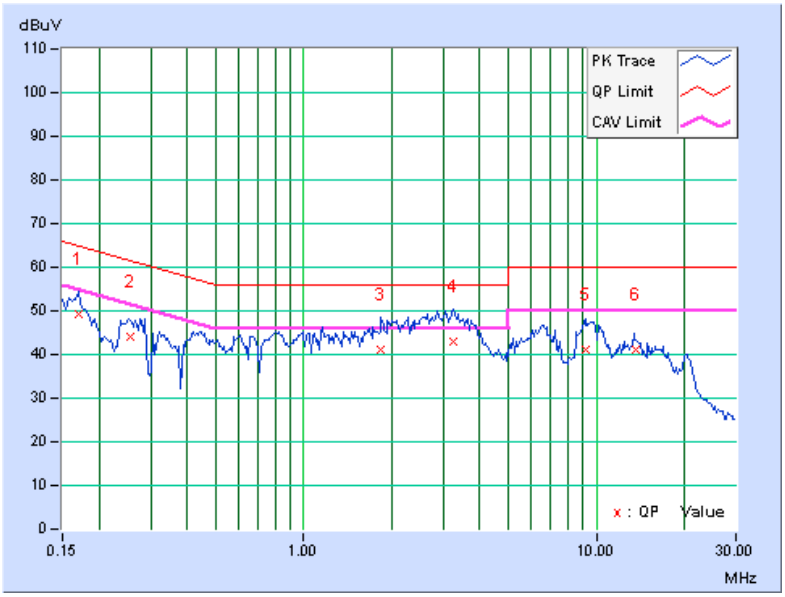


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	C		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16953	10.19	39.19	29.16	49.38	39.35	64.98	54.98	-15.60	-15.63
2	0.25547	10.22	34.02	25.69	44.24	35.91	61.58	51.58	-17.34	-15.67
3	1.83594	10.37	30.69	22.79	41.06	33.16	56.00	46.00	-14.94	-12.84
4	**3.24219**	**10.40**	**32.48**	**26.26**	**42.88**	**36.66**	**56.00**	**46.00**	**-13.12**	**-9.34**
5	9.25000	10.51	30.74	25.70	41.25	36.21	60.00	50.00	-18.75	-13.79
6	13.56000	10.57	30.62	25.43	41.19	36.00	60.00	50.00	-18.81	-14.00

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.

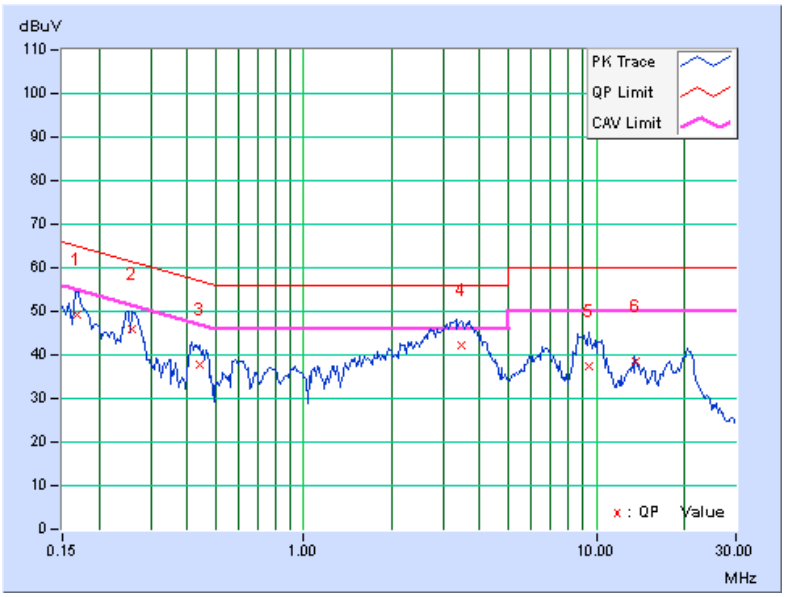


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	C		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16817	10.19	38.90	26.49	49.09	36.68	65.05	55.05	-15.96	-18.37
2	0.25956	10.23	35.61	28.49	45.84	38.72	61.45	51.45	-15.61	-12.73
3	0.43906	10.30	27.50	17.43	37.80	27.73	57.08	47.08	-19.28	-19.35
4	3.46094	10.51	31.83	24.64	42.34	35.15	56.00	46.00	-13.66	-10.85
5	9.42969	10.60	26.85	21.40	37.45	32.00	60.00	50.00	-22.55	-18.00
6	13.56000	10.69	27.80	26.17	38.49	36.86	60.00	50.00	-21.51	-13.14

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.

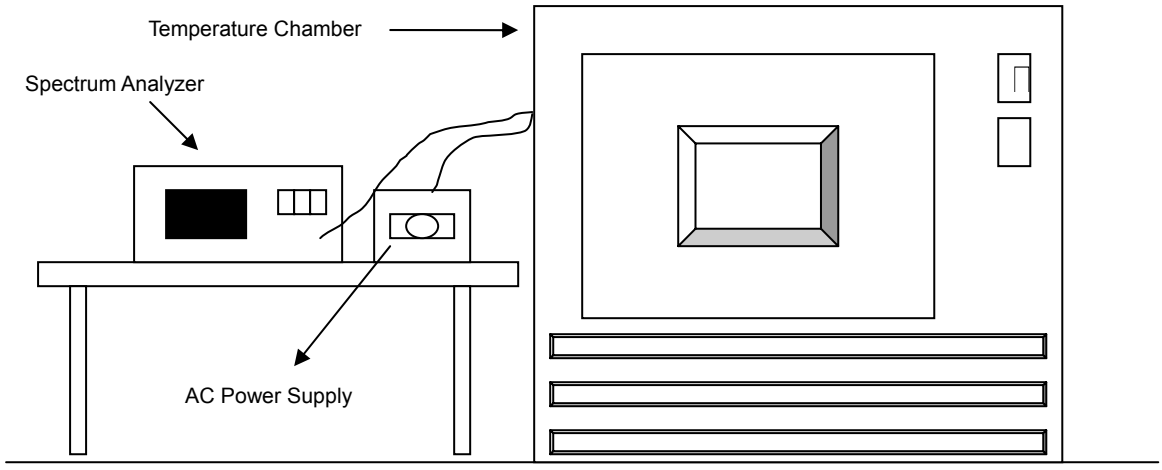


4.3 Frequency Stability

4.3.1 Limits of Frequency Stability Measurement

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of –20 degrees to 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

a. The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.

b. Turned the EUT on and coupled its output to a spectrum analyzer.

c. Turned the EUT off and set the chamber to the highest temperature specified.

d. Allowed sufficient time (approximately 30 min) for the temperature of the chamber to stabilize then turned the EUT on and measured the operating frequency after 2, 5, and 10 minutes.

e. Repeated step 2 and 3 with the temperature chamber set to the lowest temperature.

f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

4.3.5 Deviation fromTest Standard

No deviation.

4.3.6 EUT Operating Conditions

Same as Item 4.1.6.

4.3.7 Test Result

Test Mode A

Frequency Stability Versus Temp.									
TEMP. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift
		(MHz)	%	(MHz)	%	(MHz)	%	(MHz)	%
50	120	13.55995	-0.00037	13.559945	-0.00041	13.559936	-0.00047	13.559945	-0.00041
40	120	13.560061	0.00045	13.560073	0.00054	13.560063	0.00046	13.560075	0.00055
30	120	13.560011	0.00008	13.560022	0.00016	13.560013	0.00010	13.560028	0.00021
20	120	13.560026	0.00019	13.560034	0.00025	13.560022	0.00016	13.560018	0.00013
10	120	13.559926	-0.00055	13.559931	-0.00051	13.559951	-0.00036	13.559941	-0.00044
0	120	13.560007	0.00005	13.560003	0.00002	13.560024	0.00018	13.560007	0.00005
-10	120	13.560004	0.00003	13.559997	-0.00002	13.560005	0.00004	13.559991	-0.00007
-20	120	13.560039	0.00029	13.560032	0.00024	13.560057	0.00042	13.560046	0.00034

Frequency Stability Versus Voltage									
TEMP. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift
		(MHz)	%	(MHz)	%	(MHz)	%	(MHz)	%
20	138	13.560048	0.00035	13.560041	0.00030	13.560006	0.00004	13.560043	0.00032
	120	13.560026	0.00019	13.560034	0.00025	13.560022	0.00016	13.560018	0.00013
	102	13.560051	0.00038	13.560041	0.00030	13.56006	0.00044	13.560044	0.00032

Test Mode B

Frequency Stability Versus Temp.									
TEMP. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift
		(MHz)	%	(MHz)	%	(MHz)	%	(MHz)	%
50	120	13.560008	0.00006	13.560005	0.00004	13.560008	0.00006	13.560005	0.00004
40	120	13.560035	0.00026	13.560014	0.00010	13.560033	0.00024	13.560025	0.00018
30	120	13.560033	0.00024	13.560034	0.00025	13.560047	0.00035	13.560047	0.00035
20	120	13.55993	-0.00052	13.559937	-0.00046	13.559939	-0.00045	13.559934	-0.00049
10	120	13.55995	-0.00037	13.559945	-0.00041	13.559951	-0.00036	13.559951	-0.00036
0	120	13.559964	-0.00027	13.559976	-0.00018	13.559971	-0.00021	13.559963	-0.00027
-10	120	13.559994	-0.00004	13.559986	-0.00010	13.559983	-0.00013	13.559982	-0.00013
-20	120	13.56005	0.00037	13.560038	0.00028	13.560055	0.00041	13.560054	0.00040

Frequency Stability Versus Voltage									
TEMP. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift
		(MHz)	%	(MHz)	%	(MHz)	%	(MHz)	%
20	138	13.559926	-0.00055	13.559937	-0.00046	13.559938	-0.00046	13.559937	-0.00046
	120	13.55993	-0.00052	13.559937	-0.00046	13.559939	-0.00045	13.559934	-0.00049
	102	13.559927	-0.00054	13.559936	-0.00047	13.559935	-0.00048	13.559933	-0.00049

Test Mode C

Frequemcy Stability Versus Temp.									
TEMP. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift
		(MHz)	%	(MHz)	%	(MHz)	%	(MHz)	%
50	120	13.559935	-0.00048	13.559945	-0.00041	13.559955	-0.00033	13.559963	-0.00027
40	120	13.560056	0.00041	13.560055	0.00041	13.56006	0.00044	13.560062	0.00046
30	120	13.559995	-0.00004	13.559988	-0.00009	13.560001	0.00001	13.559983	-0.00013
20	120	13.560009	0.00007	13.560015	0.00011	13.560011	0.00008	13.560009	0.00007
10	120	13.560017	0.00013	13.560021	0.00015	13.560028	0.00021	13.560013	0.00010
0	120	13.559984	-0.00012	13.559966	-0.00025	13.559985	-0.00011	13.559985	-0.00011
-10	120	13.559989	-0.00008	13.559988	-0.00009	13.559974	-0.00019	13.559983	-0.00013
-20	120	13.560006	0.00004	13.560004	0.00003	13.560018	0.00013	13.560008	0.00006

Frequemcy Stability Versus Voltage									
TEMP. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift
		(MHz)	%	(MHz)	%	(MHz)	%	(MHz)	%
20	138	13.56001	0.00007	13.560014	0.00010	13.560011	0.00008	13.56001	0.00007
	120	13.560009	0.00007	13.560015	0.00011	13.560011	0.00008	13.560009	0.00007
	102	13.56001	0.00007	13.560013	0.00010	13.560009	0.00007	13.560009	0.00007

4.4 20dB bandwidth

4.4.1 Limits of 20dB Bandwidth Measurement

The 20dB bandwidth shall be specified in operating frequency band.

4.4.2 Test Setup

Same as Item 4.1.5.

4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedures

The bandwidth of the fundamental frequency was measured by spectrum analyzer with 1kHz RBW and 3kHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

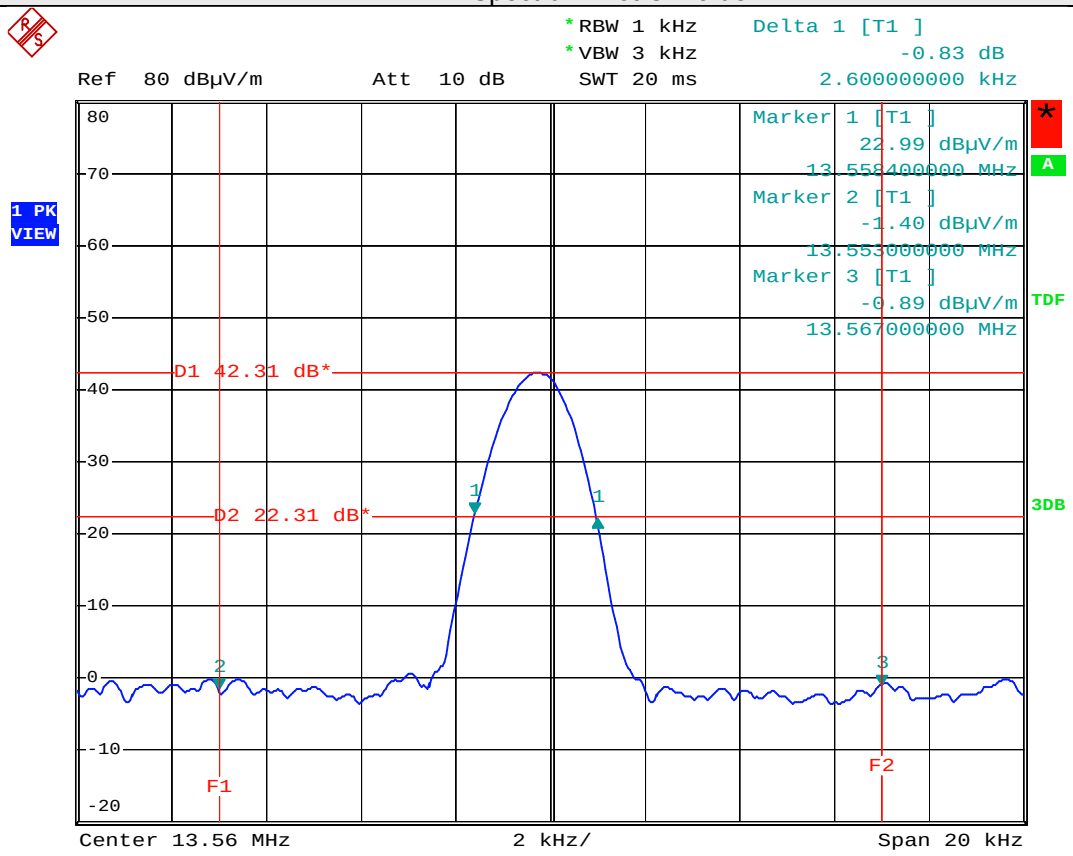
Same as Item 4.1.6.

4.4.7 Test Results

Test Mode A

20dBc point (Low)	20dBc point (High)	Operating frequency band (MHz)	Pass / Fail
13.55840	13.56100	13.553~13.567	Pass

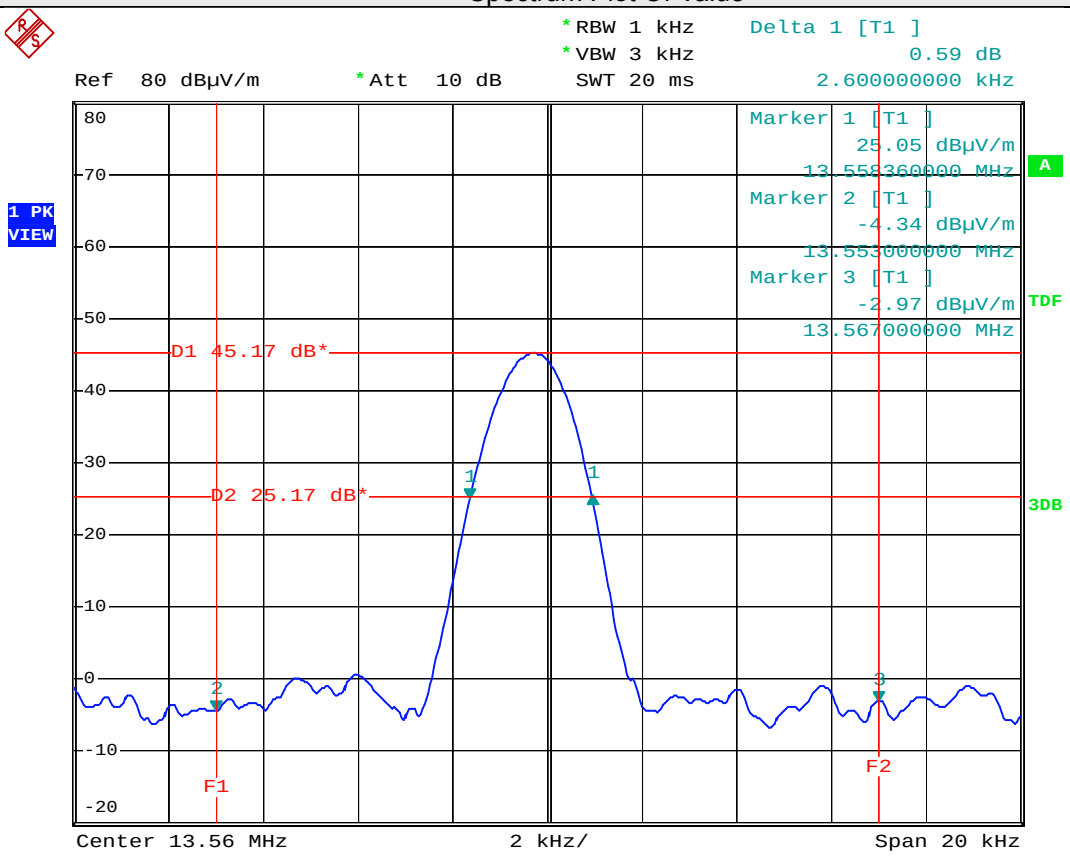
Spectrum Plot Of Value



Test Mode B

20dBc point (Low)	20dBc point (High)	Operating frequency band (MHz)	Pass / Fail
13.55836	13.56096	13.553~13.567	Pass

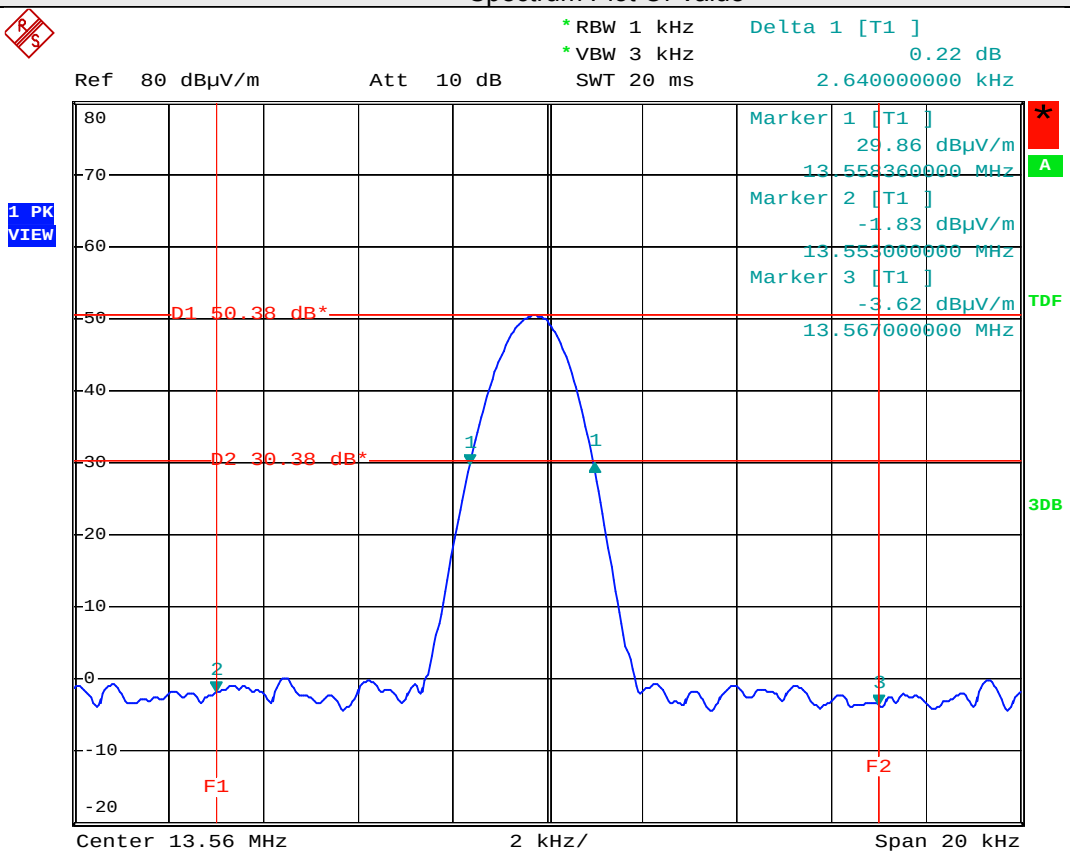
Spectrum Plot Of Value



Test Mode C

20dBc point (Low)	20dBc point (High)	Operating frequency band (MHz)	Pass / Fail
13.55836	13.56100	13.553~13.567	Pass

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

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