

## FCC Test Report

**Report No.:** RF150612C01-3

**FCC ID:** VQK-F02H

**Test Model:** F-02H

**Received Date:** Jun. 12, 2015

**Test Date:** Aug. 10 ~ Aug. 20, 2015

**Issued Date:** Sep. 04, 2015

**Applicant:** FUJITSU LIMITED

**Address:** 1-1, Kamikodanaka 4-chome, Nakahara-ku, Kawasaki 211-8588, Japan

**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.

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



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## Table of Contents

<b>Release Control Record</b> .....	<b>4</b>
<b>1 Certificate of Conformity</b> .....	<b>5</b>
<b>2 Summary of Test Results</b> .....	<b>6</b>
2.1 Measurement Uncertainty.....	6
2.2 Modification Record.....	6
<b>3 General Information</b> .....	<b>7</b>
3.1 General Description of EUT.....	7
3.2 Description of Test Modes.....	8
3.2.1 Test Mode Applicability and Tested Channel Detail.....	9
3.3 Description of Support Units.....	11
3.3.1 Configuration of System under Test.....	11
3.4 General Description of Applied Standards.....	11
<b>4 Test Types and Results</b> .....	<b>12</b>
4.1 Radiated Emission and Bandedge Measurement.....	12
4.1.1 Limits of Radiated Emission and Bandedge Measurement.....	12
4.1.2 Test Instruments.....	13
4.1.3 Test Procedures.....	14
4.1.4 Deviation from Test Standard.....	14
4.1.5 Test Set Up.....	15
4.1.6 EUT Operating Conditions.....	15
4.1.7 Test Results.....	16
4.2 Conducted Emission Measurement.....	20
4.2.1 Limits of Conducted Emission Measurement.....	20
4.2.2 Test Instruments.....	20
4.2.3 Test Procedures.....	21
4.2.4 Deviation from Test Standard.....	21
4.2.5 Test Setup.....	21
4.2.6 EUT Operating Conditions.....	21
4.2.7 Test Results.....	22
4.3 6dB Bandwidth Measurement.....	24
4.3.1 Limits of 6dB Bandwidth Measurement.....	24
4.3.2 Test Setup.....	24
4.3.3 Test Instruments.....	24
4.3.4 Test Procedure.....	24
4.3.5 Deviation from Test Standard.....	24
4.3.6 EUT Operating Conditions.....	24
4.3.7 Test Result.....	25
4.4 Conducted Output Power Measurement.....	26
4.4.1 Limits of Conducted Output Power Measurement.....	26
4.4.2 Test Setup.....	26
4.4.3 Test Instruments.....	26
4.4.4 Test Procedures.....	26
4.4.5 Deviation from Test Standard.....	26
4.4.6 EUT Operating Conditions.....	26
4.4.7 Test Results.....	26
4.5 Power Spectral Density Measurement.....	27
4.5.1 Limits of Power Spectral Density Measurement.....	27
4.5.2 Test Setup.....	27
4.5.3 Test Instruments.....	27
4.5.4 Test Procedure.....	27
4.5.5 Deviation from Test Standard.....	27
4.5.6 EUT Operating Condition.....	27
4.5.7 Test Results.....	28



4.6	Conducted Out of Band Emission Measurement.....	29
4.6.1	Limits of Conducted Out of Band Emission Measurement .....	29
4.6.2	Test Setup.....	29
4.6.3	Test Instruments .....	29
4.6.4	Test Procedure .....	29
4.6.5	Deviation from Test Standard .....	30
4.6.6	EUT Operating Condition .....	30
4.6.7	Test Results .....	30
<b>5</b>	<b>Pictures of Test Arrangements.....</b>	<b>32</b>
	<b>Appendix – Information on the Testing Laboratories .....</b>	<b>33</b>



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### Release Control Record

Issue No.	Description	Date Issued
RF150612C01-3	Original release	Sep. 04, 2015

## 1 Certificate of Conformity

**Product:** Smart Phone  
**Brand:** FUJITSU  
**Test Model:** F-02H  
**Sample Status:** Engineering sample  
**Applicant:** FUJITSU LIMITED  
**Test Date:** Aug. 10 ~ Aug. 20, 2015  
**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:** Sep. 04, 2015  
Celine Chou / Specialist

**Approved by :** Ken Liu , **Date:** Sep. 04, 2015  
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 -13.30dB at 0.43272MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -7.8dB at 72.87MHz.
15.247(d)	Antenna Port Emission	Pass	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	Pass	Meet the requirement of limit.
15.247(b)	Conducted power	Pass	Meet the requirement of limit.
15.247(e)	Power Spectral Density	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	Antenna connector is Murata not a standard connector.

### 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) ( $\pm$ )
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
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	Smart Phone
Brand	FUJITSU
Test Model	F-02H
Status of EUT	Engineering sample
Power Supply Rating	3.8Vdc (Battery) 5Vdc (Adapter or cradle)
Modulation Type	GFSK
Transfer Rate	1Mbps
Operating Frequency	2402 ~ 2480MHz
Number of Channel	40
Channel Spacing	2MHz
Output Power	1.130mW
Antenna Type	λ/4 Monopole antenna with -4.3dBi gain
Antenna Connector	Murata
Accessory Device	Refer to Note as below
Data Cable Supplied	NA

Note:

1. The EUT contains the following accessories.

Product	Brand	Model	Description
Battery	NTT docomo	N/A	3.8Vdc, 3390mAh, 12.8Wh (Built-in battery)
Cradle	NTT docomo	F52	Input: 5.0Vdc, 1.5A Output: 5.0Vdc, 1.5A

2. The following adapter is support unit only.

Product	Brand	Model	Description
Adapter	NTT docomo	AC Adapter 04	Input: 100-240Vac, 50-60Hz, 0.22A Output: 5.0Vdc, 1.8A Power line: 1.05m cable with two cores attached on adapter

3. SW version is R021.1e

4. HW version is v2.1.0.

5. IMEI Code: 351914070005043 and 35914070005050.

6. 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

40 channels are provided to this EUT:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480



### 3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE≥1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where **RE≥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 **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	MODULATION TYPE	DATA RATE (Mbps)
-	0 to 39	0, 19, 39	GFSK	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	MODULATION TYPE	DATA RATE (Mbps)
-	0 to 39	0	GFSK	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	MODULATION TYPE	DATA RATE (Mbps)
-	0 to 39	0	GFSK	1

**Antenna Port Conducted Measurement:**

- This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- 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	DATA RATE (Mbps)
-	0 to 39	0, 19, 39	GFSK	1

**Test Condition:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
RE≥1G	22deg. C, 70%RH	120Vac, 60Hz	Jones Chang
RE<1G	22deg. C, 70%RH	120Vac, 60Hz	Jones Chang
PLC	20deg. C, 70%RH	120Vac, 60Hz	Jones Chang
APCM	24deg. C, 64%RH	120Vac, 60Hz	Match Tsui

### 3.3 Description of Support Units

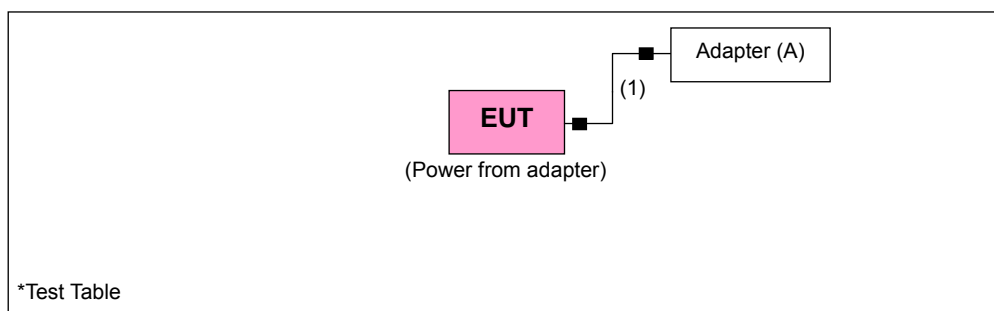
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Adapter	NTT docomo	AC Adapter 04	NA	NA	Provided by the client

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	Power cable	1	1.05	Y	2	Provided by the client Attached on adapter

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 (15.247)**  
**558074 D01 DTS Meas Guidance v03r03**

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 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	ESIB7	100187	Apr. 10, 2015	Apr. 09, 2016
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	Aug. 29, 2014	Aug. 28, 2015
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Feb. 05, 2015	Feb. 04, 2016
HORN Antenna SCHWARZBECK	9120D	209	Feb. 09, 2015	Feb. 08, 2016
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Feb. 09, 2015	Feb. 08, 2016
Preamplifier Agilent	8447D	2944A10738	Oct. 18, 2014	Oct. 17, 2015
Preamplifier Agilent	8449B	3008A01964	Aug. 22, 2014	Aug. 21, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	214378/4	Aug. 22, 2014	Aug. 21, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 106	12738/6 +309224/4	Aug. 22, 2014	Aug. 21, 2015
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
High Speed Peak Power Meter	ML2495A	0824011	Jul. 09, 2015	Jul. 08, 2016
Power Sensor	MA2411B	0738171	Jul. 09, 2015	Jul. 08, 2016

- 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 3.
  3. The horn antenna and HP 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 (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:**

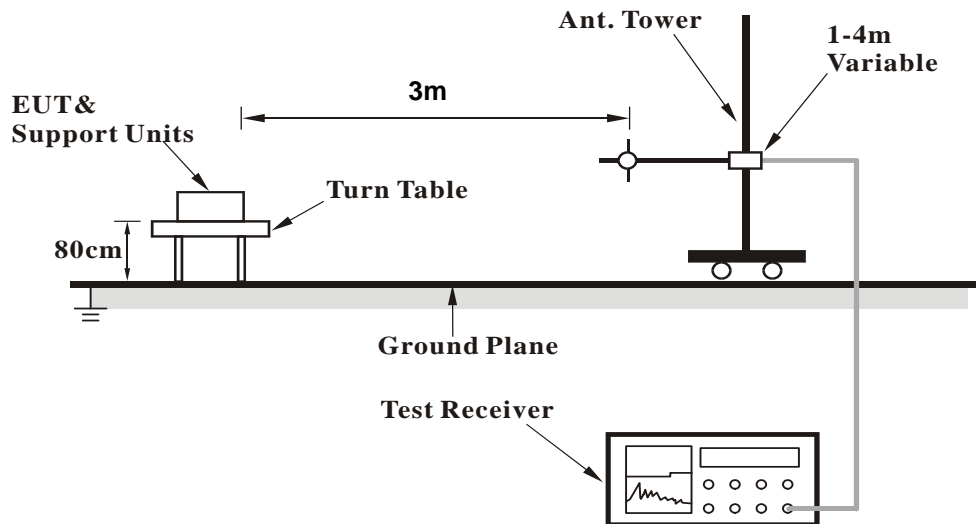
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
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

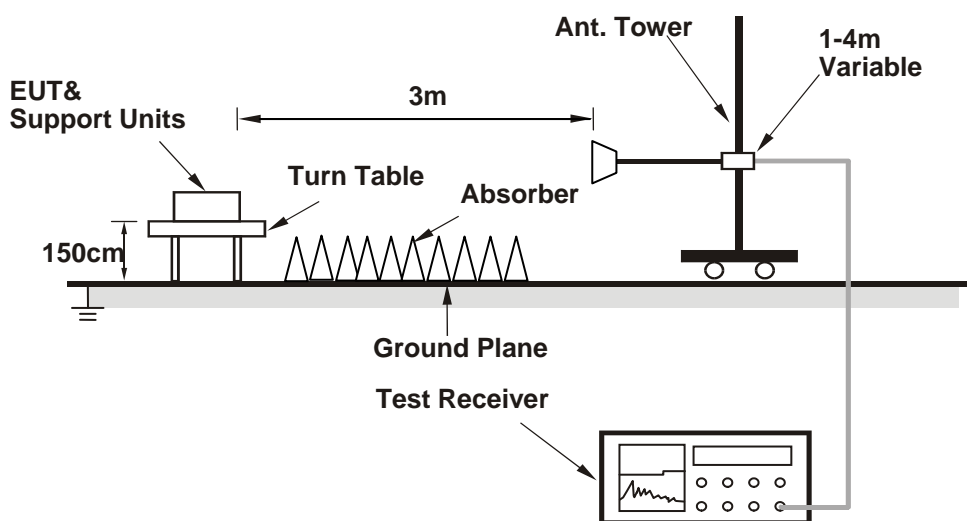
No deviation.

#### 4.1.5 Test Set Up

<Frequency Range below 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 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	55.9 PK	74.0	-18.1	1.75 H	298	23.40	32.50
2	2390.00	45.5 AV	54.0	-8.5	1.75 H	298	13.00	32.50
3	*2402.00	91.5 PK			1.75 H	298	58.90	32.60
4	*2402.00	88.3 AV			1.75 H	298	55.70	32.60
5	4804.00	48.1 PK	74.0	-25.9	1.40 H	225	42.20	5.90
6	4804.00	34.9 AV	54.0	-19.1	1.40 H	225	29.00	5.90

##### 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	54.6 PK	74.0	-19.4	1.88 V	281	22.10	32.50
2	2390.00	44.4 AV	54.0	-9.6	1.88 V	281	11.90	32.50
3	*2402.00	91.6 PK			1.88 V	281	59.00	32.60
4	*2402.00	87.7 AV			1.88 V	281	55.10	32.60
5	4804.00	47.8 PK	74.0	-26.2	1.60 V	180	41.90	5.90
6	4804.00	34.7 AV	54.0	-19.3	1.60 V	180	28.80	5.90

##### 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 19	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	*2440.00	90.3 PK			1.65 H	298	57.60	32.70
2	*2440.00	86.8 AV			1.65 H	298	54.10	32.70
3	4880.00	48.4 PK	74.0	-25.6	1.36 H	198	42.50	5.90
4	4880.00	35.2 AV	54.0	-18.8	1.36 H	198	29.30	5.90

**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	*2440.00	87.5 PK			1.85 V	284	54.80	32.70
2	*2440.00	83.6 AV			1.85 V	284	50.90	32.70
3	4880.00	47.9 PK	74.0	-26.1	1.66 V	301	42.00	5.90
4	4880.00	34.9 AV	54.0	-19.1	1.66 V	301	29.00	5.90

**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 39	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	*2480.00	91.1 PK			1.63 H	300	58.40	32.70
2	*2480.00	86.9 AV			1.63 H	300	54.20	32.70
3	2483.50	54.7 PK	74.0	-19.3	1.63 H	300	22.00	32.70
4	2483.50	44.4 AV	54.0	-9.6	1.63 H	300	11.70	32.70
5	4960.00	47.8 PK	74.0	-26.2	1.33 H	192	41.70	6.10
6	4960.00	34.8 AV	54.0	-19.2	1.33 H	192	28.70	6.10
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	87.3 PK			1.83 V	261	54.60	32.70
2	*2480.00	83.4 AV			1.83 V	261	50.70	32.70
3	2483.50	53.9 PK	74.0	-20.1	1.83 V	161	21.20	32.70
4	2483.50	43.7 AV	54.0	-10.3	1.83 V	161	11.00	32.70
5	4960.00	47.6 PK	74.0	-26.4	1.53 V	222	41.50	6.10
6	4960.00	34.5 AV	54.0	-19.5	1.53 V	222	28.40	6.10

**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)
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

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

## ANTENNA POLARITY &amp; 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	57.12	30.6 QP	40.0	-9.4	2.00 H	255	45.40	-14.80
2	70.73	20.5 QP	40.0	-19.5	2.00 H	215	36.80	-16.30
3	86.28	20.0 QP	40.0	-20.0	2.00 H	196	39.70	-19.70
4	136.84	19.1 QP	43.5	-24.4	2.00 H	243	34.10	-15.00
5	294.32	16.6 QP	46.0	-29.4	1.00 H	279	29.20	-12.60
6	325.43	20.0 QP	46.0	-26.0	1.00 H	274	31.70	-11.70

## ANTENNA POLARITY &amp; 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	31.84	28.6 QP	40.0	-11.4	1.00 V	229	44.70	-16.10
2	57.12	29.0 QP	40.0	-11.0	1.49 V	8	43.80	-14.80
<b>3</b>	<b>72.67</b>	<b>32.2 QP</b>	<b>40.0</b>	<b>-7.8</b>	<b>1.49 V</b>	<b>171</b>	<b>49.40</b>	<b>-17.20</b>
4	111.56	17.0 QP	43.5	-26.5	1.49 V	8	34.30	-17.30
5	138.78	16.0 QP	43.5	-27.5	1.00 V	258	30.70	-14.70
6	325.43	19.0 QP	46.0	-27.0	1.49 V	168	30.70	-11.70

## 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	ESCS30	100288	Apr. 27, 2015	Apr. 26, 2016
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond2-01	Dec. 26, 2014	Dec. 25, 2015
LISN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Dec. 30, 2014	Dec. 29, 2015
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

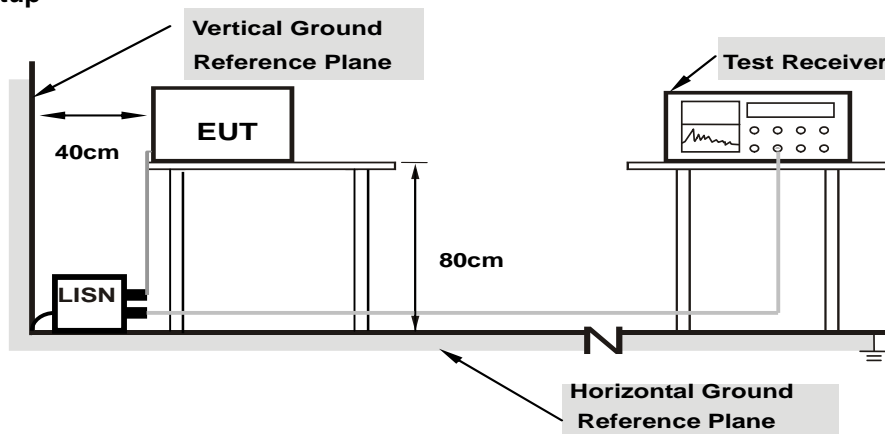
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

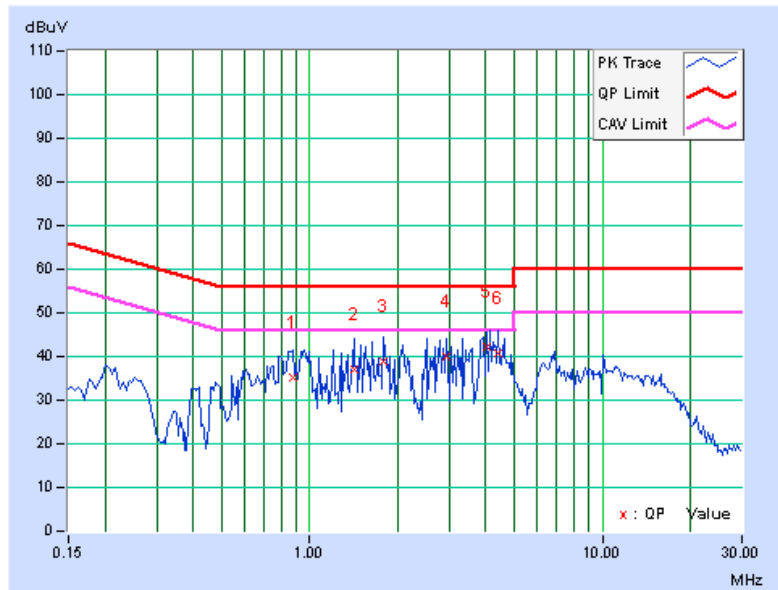
### 4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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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	0.88047	0.28	34.88	20.44	35.16	20.72	56.00
2	1.41797	0.33	36.81	27.60	37.14	27.93	56.00	46.00	-18.86	-18.07
3	1.79688	0.35	38.63	29.08	38.98	29.43	56.00	46.00	-17.02	-16.57
4	2.94531	0.39	39.45	27.77	39.84	28.16	56.00	46.00	-16.16	-17.84
5	4.04297	0.43	41.87	28.38	42.30	28.81	56.00	46.00	-13.70	-17.19
6	4.42188	0.43	40.48	29.22	40.91	29.65	56.00	46.00	-15.09	-16.35

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.

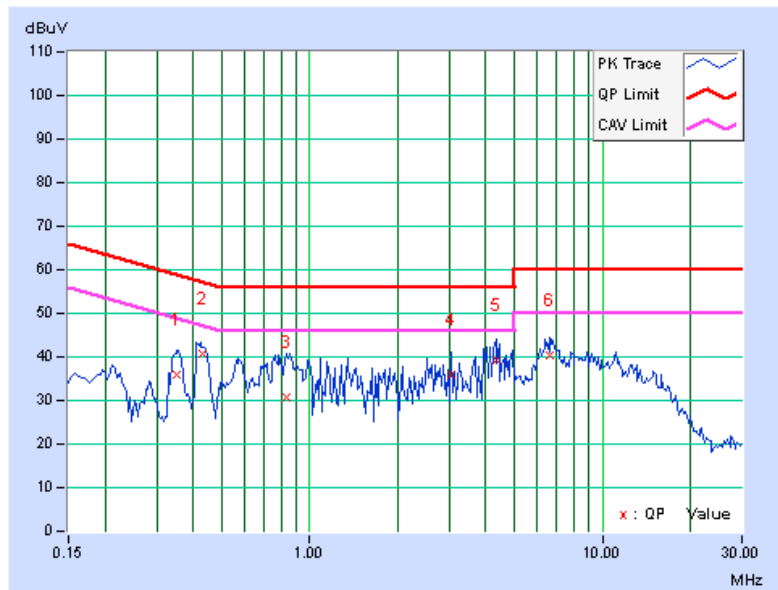


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
			1	0.35313	0.24	35.83	22.93	36.07	23.17	58.89
<b>2</b>	<b>0.43272</b>	<b>0.25</b>	<b>40.64</b>	<b>33.65</b>	<b>40.89</b>	<b>33.90</b>	<b>57.20</b>	<b>47.20</b>	<b>-16.31</b>	<b>-13.30</b>
3	0.83750	0.29	30.62	23.09	30.91	23.38	56.00	46.00	-25.09	-22.62
4	3.05078	0.43	35.65	26.41	36.08	26.84	56.00	46.00	-19.92	-19.16
5	4.33594	0.47	38.69	26.86	39.16	27.33	56.00	46.00	-16.84	-18.67
6	6.61719	0.51	39.80	34.82	40.31	35.33	60.00	50.00	-19.69	-14.67

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.

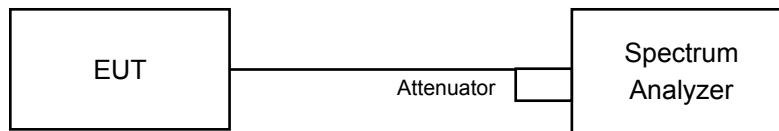


### 4.3 6dB Bandwidth Measurement

#### 4.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

#### 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

- Set resolution bandwidth (RBW) = 100kHz
- Set the video bandwidth (VBW)  $\geq 3 \times$  RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

#### 4.3.5 Deviation from Test Standard

No deviation.

#### 4.3.6 EUT Operating Conditions

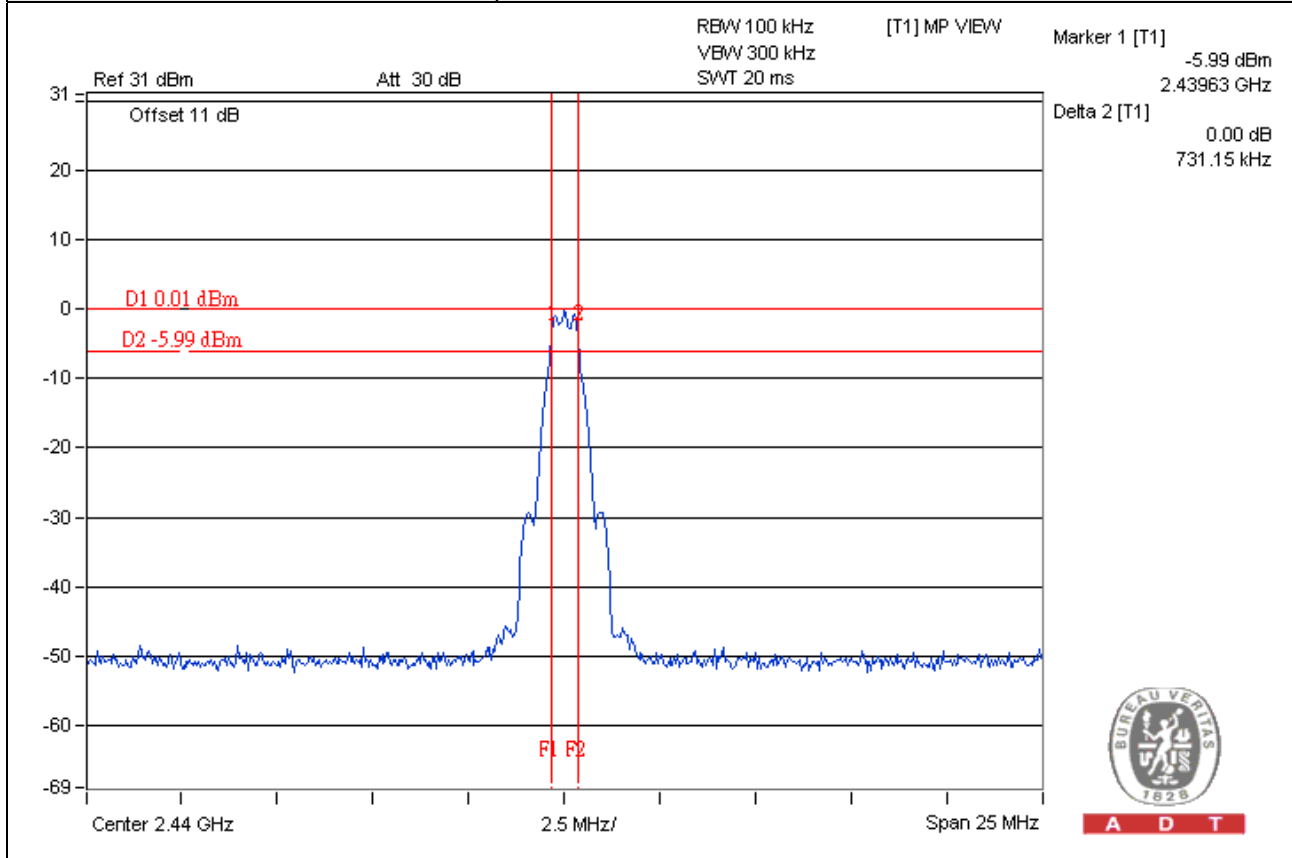
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.



### 4.3.7 Test Result

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
0	2402	0.714	0.5	Pass
19	2440	0.731	0.5	Pass
39	2480	0.726	0.5	Pass

Spectrum Plot of Worst Value

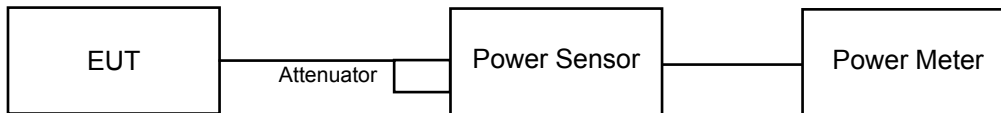


#### 4.4 Conducted Output Power Measurement

##### 4.4.1 Limits of Conducted Output Power Measurement

For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

##### 4.4.2 Test Setup



##### 4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

##### 4.4.4 Test Procedures

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

##### 4.4.5 Deviation from Test Standard

No deviation.

##### 4.4.6 EUT Operating Conditions

Same as Item 4.3.6.

##### 4.4.7 Test Results

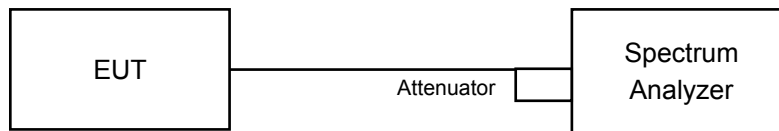
Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
0	2402	1.089	0.37	30	Pass
19	2440	1.102	0.42	30	Pass
39	2480	<b>1.130</b>	0.53	30	Pass

## 4.5 Power Spectral Density Measurement

### 4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm.

### 4.5.2 Test Setup



### 4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 4.5.4 Test Procedure

- a. Set analyzer center frequency to DTS channel center frequency.
- b. Set the span to 1.5 times the DTS bandwidth.
- c. Set the RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
- d. Set the VBW  $\geq 3 \times \text{RBW}$ .
- e. Detector = peak.
- f. Sweep time = auto couple.
- g. Trace mode = max hold.
- h. Allow trace to fully stabilize.
- i. Use the peak marker function to determine the maximum amplitude level within the RBW.

### 4.5.5 Deviation from Test Standard

No deviation.

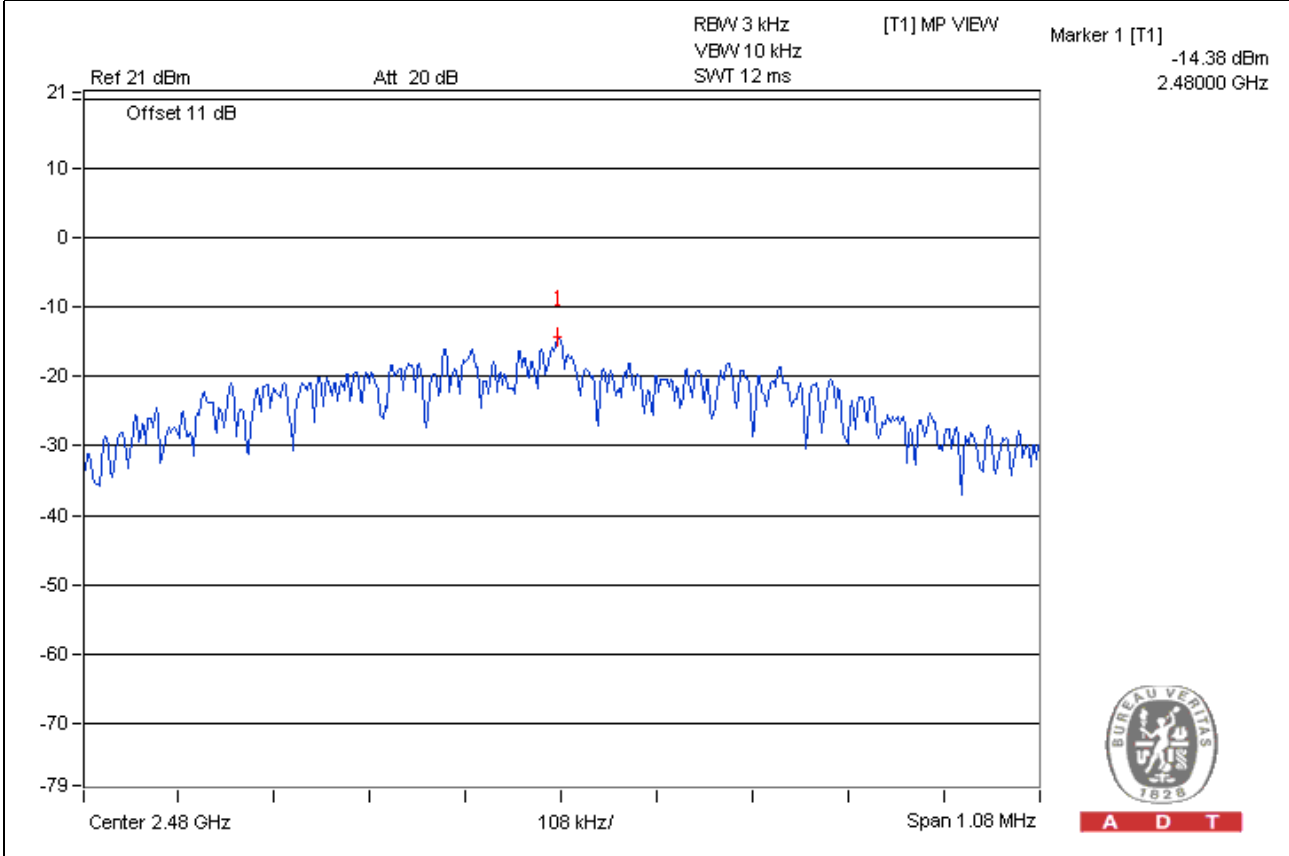
### 4.5.6 EUT Operating Condition

Same as Item 4.3.6

### 4.5.7 Test Results

Channel	Freq. (MHz)	PSD (dBm)	Limit (dBm)	Pass /Fail
0	2402	-14.85	8	Pass
19	2440	-14.55	8	Pass
39	2480	-14.38	8	Pass

Spectrum Plot of Worst Value

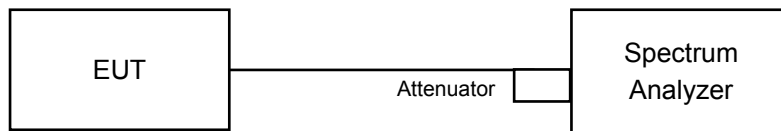


## 4.6 Conducted Out of Band Emission Measurement

### 4.6.1 Limits of Conducted Out of Band Emission Measurement

Below 20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

### 4.6.2 Test Setup



### 4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 4.6.4 Test Procedure

#### MEASUREMENT PROCEDURE REF

- Set the RBW = 100 kHz.
- Set the VBW  $\geq$  300 kHz.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

#### MEASUREMENT PROCEDURE OOB

- Set RBW = 100 kHz.
- Set VBW  $\geq$  300 kHz.
- Detector = peak.
- Sweep = auto couple.
- Trace Mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level.

#### **4.6.5 Deviation from Test Standard**

No deviation.

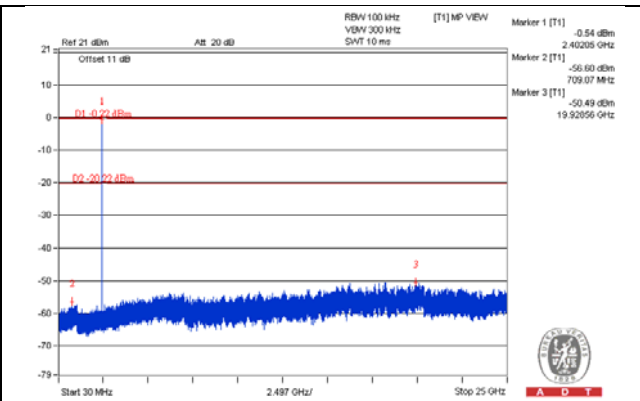
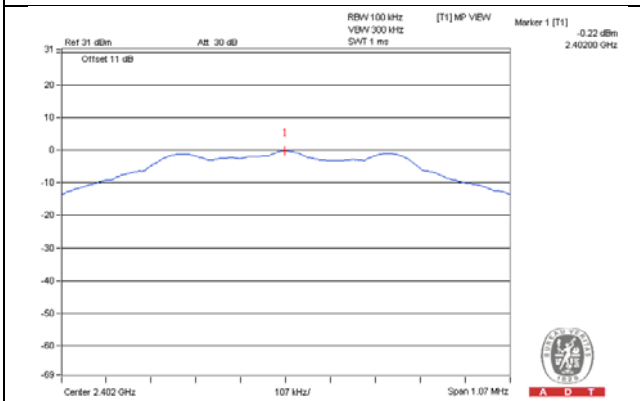
#### **4.6.6 EUT Operating Condition**

Same as Item 4.3.6

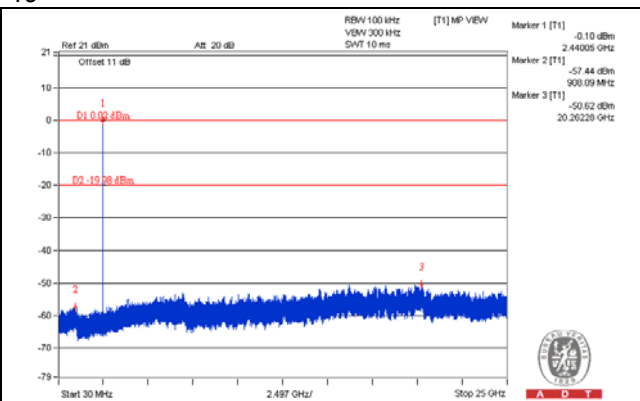
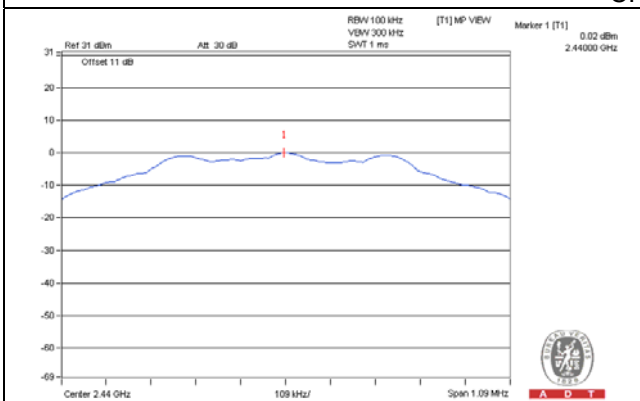
#### **4.6.7 Test Results**

The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

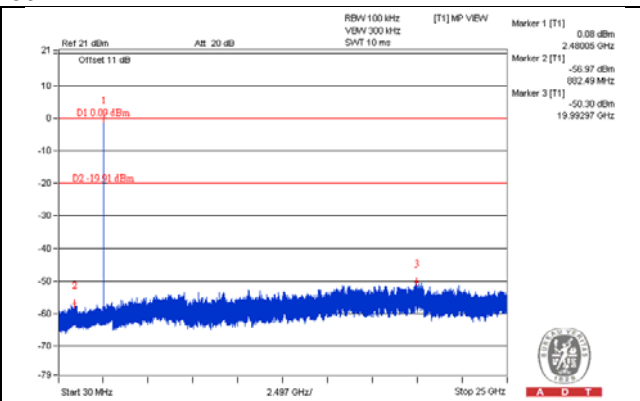
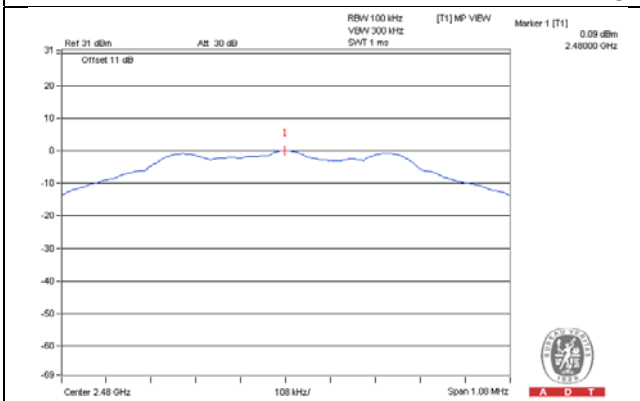
### CH 0



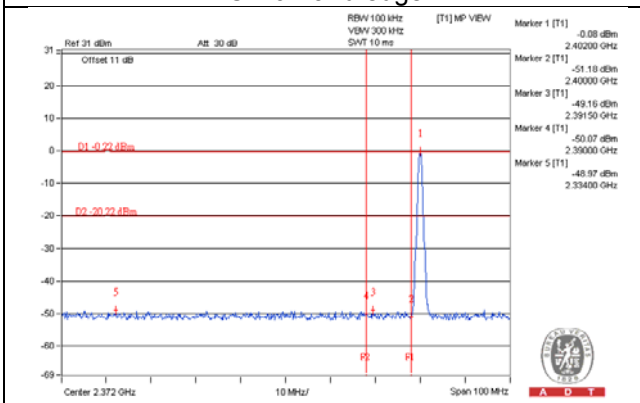
### CH 19



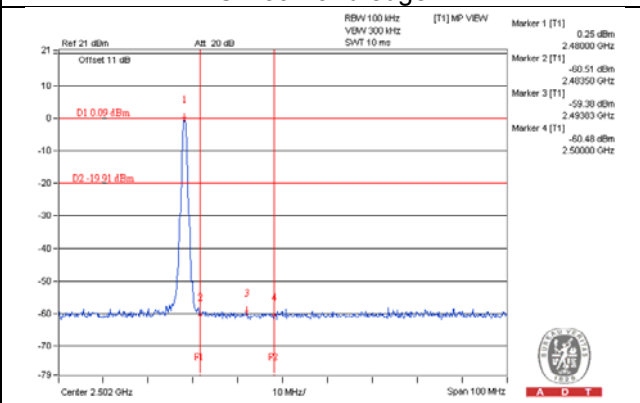
### CH 39



### CH 0 Band edge



### CH 39 Band edge



## 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:

### **Linko EMC/RF Lab**

Tel: 886-2-26052180

Fax: 886-2-26051924

### **Hsin Chu EMC/RF/Telecom Lab**

Tel: 886-3-5935343

Fax: 886-3-5935342

### **Hwa Ya EMC/RF/Safety Lab**

Tel: 886-3-3183232

Fax: 886-3-3270892

**Email:** [service.adt@tw.bureauveritas.com](mailto:service.adt@tw.bureauveritas.com)

**Web Site:** [www.bureauveritas-adt.com](http://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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