FCC TEST REPORT (15.247)

REPORT NO.:	RF990714C11
MODEL NO.:	HB557 (refer to 3.1 for more detail)
FCC ID:	T5U-HB557
RECEIVED:	Jul. 22, 2010
TESTED:	Jul. 30 ~ Aug. 26, 2010
ISSUED:	Aug. 27, 2010

APPLICANT:	Quanta Microsystems, Inc.
ADDRESS:	188 Wenhwa 2nd Rd.,Kueishan Hsiang Taoyuan Shien 333,Taiwan ,R.O.C.

ISSUED BY:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
LAB ADDRESS:	No. 47, 14th Ling, Chia Pau Tsuen, Lin Kou Hsiang, Taipei Hsien 244, Taiwan, R.O.C.
TEST LOCATION:	No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

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1. CERTIFICATION

PRODUCT: Wireless HDMI Receiver (refer to item 3.1 for more detail)

MODEL: HB557 (refer to item 3.1 for more detail)

BRAND: QMI (refer to item 3.1 for more detail)

APPLICANT: Quanta Microsystems, Inc.

TEST SAMPLE: ENGINEERING SAMPLE

TESTED: Jul. 30 ~ Aug. 26, 2010

STANDARDS: **FCC Part 15, Subpart C (Section 15.247)**
ANSI C63.4-2003

The above equipment (Model: HB557) 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 : Andrea Hsia , **DATE:** Aug. 27, 2010
Andrea Hsia / Specialist

TECHNICAL ACCEPTANCE : Long Chen , **DATE:** Aug. 27, 2010
Responsible for RF Long Chen / Senior Engineer

APPROVED BY : Gary Chang , **DATE:** Aug. 27, 2010
Gary Chang / Assistant Manager

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247)			
STANDARD SECTION	**TEST TYPE AND LIMIT**	**RESULT**	**REMARK**
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -15.60dB at 0.357MHz.
15.247(a)(2)	Spectrum Bandwidth of a Direct Sequence Spread Spectrum System Limit: min. 500kHz	PASS	Meet the requirement of limit.
15.247(b)	Maximum Output Power Limit: max. 30dBm	PASS	Meet the requirement of limit.
15.247(d)	Radiated Emissions Limit: Table 15.209	PASS	Meet the requirement of limit. Minimum passing margin is -3.1dB at 29.90MHz.
15.247(e)	Power Spectral Density Limit: max. 8dBm	PASS	Meet the requirement of limit.
15.247(d)	Band Edge Measurement Limit: 20dB less than the peak value of fundamental frequency	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	No antenna connector is used.

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	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	2.93 dB
	200MHz ~1000MHz	2.95 dB
	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

EUT	Wireless HDMI Receiver (refer to note as below)
MODEL NO.	HB557 (refer to note as below)
FCC ID	T5U-HB557
POWER SUPPLY	5Vdc
MODULATION TYPE	OOK
MODULATION TECHNOLOGY	OFDM
TRANSFER RATE	60 Kbps
OPERATING FREQUENCY	5755 ~ 5795MHz
NUMBER OF CHANNEL	2
OUTPUT POWER	190.5mW
ANTENNA TYPE	Printed antenna with 3.6dBi gain
ANTENNA CONNECTOR	NA
I/O PORTS	HDMI, USB, DC-IN
DATA CABLE	HDMI cable 1m, HDMI cable 0.5m, USB splitter cable 0.4m, USB cable 0.5m
ACCESSORY DEVICES	Adapter

NOTE:

1. All models are electrically identical, different model name, product name & brand name are for marketing purpose

BRAND	PRODUCT NAME	MODELNAME
QMI	Wireless HDMI Receiver	HB557
HP	TV Adaptor	HSTNN-QR02

2. The EUT is a Wireless HDMI Receiver. The test data are separated into following test reports.

	TEST STANDARD	REFERENCE REPORT
802.11n (40MHz) (5755~5795MHz)	FCC Part 15, Subpart C (Section 15.247)	RF990714C11
802.11n (40MHz) (5190~5230MHz)	FCC Part 15, Subpart E (Section 15.407)	RF990714C11-1
802.11a (5835MHz)	FCC Part 15, Subpart C (Section 15.249)	RF990714C11-2

3. The EUT provides one completed transmitter and five receivers.

MODULATION MODE	TX FUNCTION
802.11n (40MHz)	1TX

4. The EUT was powered by the following adapter:

BRAND:	HON KWANG
MODEL:	HK-R110-A05
INPUT:	100-240Vac, 50/60Hz, 0.5A
OUTPUT:	5Vdc, 2A
POWER LINE:	1.8m non-shielded cable without core

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

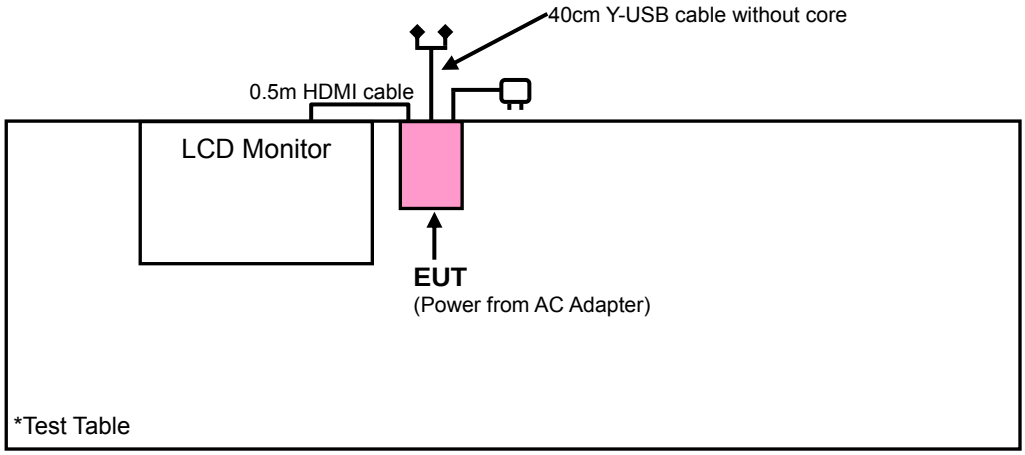
3.2 DESCRIPTION OF TEST MODES

FOR 5745 ~ 5825MHz:

2 channels are provided for 802.11n (40MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
151	5755MHz	159	5795MHz

3.2.1 CONFIGURATION OF SYSTEM UNDER TEST



3.2.2 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 **RE<1G:** Radiated Emission below 1GHz
PLC: Power Line Conducted Emission **APCM:** Antenna Port Conducted Measurement

RADIATED EMISSION TEST (ABOVE 1GHz):

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)	AXIS
802.11n (40MHz)	151 to 159	151, 159	OFDM	OOK	63	Z

RADIATED EMISSION TEST (BELOW 1GHz):

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)	AXIS
802.11n (40MHz)	151 to 159	159	OFDM	OOK	63	Z

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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11n (40MHz)	151 to 159	159	OFDM	OOK	63

BANDEDGE MEASUREMENT:

☒ 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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11n (40MHz)	151 to 159	151, 159	OFDM	OOK	63

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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11n (40MHz)	151 to 159	151, 159	OFDM	OOK	63

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
RE≥1G	25deg. C, 65%RH, 1013 hPa	120Vac, 60Hz	Sun Lin Mark Liao
RE<1G	25deg. C, 65%RH, 1020 hPa	120Vac, 60Hz	Brad Wu
PLC	28deg. C, 68%RH, 1015 hPa	120Vac, 60Hz	Sun Lin
APCM	25deg. C, 65%RH, 1006 hPa	120Vac, 60Hz	Brad Wu

3.3 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)
ANSI C63.4-2003

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.

3.4 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.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	LCD MONITOR	DELL	2408FPb	CN-0G293H-74261 -874-237S-A00	FCC DoC Approved

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	0.5m HDMI cable without core

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

4. TEST TYPES AND RESULTS (FOR 5.0GHz BAND)

4.1 RADIATED EMISSION MEASUREMENT

4.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

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. As shown in 15.35(b), 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.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESIB7	100188	Dec. 21, 2009	Dec. 20, 2010
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	Jul. 09, 2010	Jul. 08, 2011
BILOG Antenna SCHWARZBECK	VULB9168	9168-156	Apr. 30, 2010	Apr. 29, 2011
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-408	Jan. 05, 2010	Jan. 04, 2011
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170242	Dec. 25, 2009	Dec. 24, 2010
Preamplifier Agilent	8449B	3008A01910	Sep. 11, 2009	Sep. 10, 2010
Preamplifier Agilent	8447D	2944A10638	Dec. 21, 2009	Dec. 20, 2010
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	218190/4 231241/4	May 14, 2010	May 13, 2011
RF signal cable Worken	8D-FB	Cable-HYCH9-01	Oct. 24, 2009	Oct. 23, 2010
Software	ADT_Radiated_ V7.6.15.9.2	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower &Turn Table Controller EMCO	2090	NA	NA	NA
26GHz ~ 40GHz Amplifier	EM26400	07026401	Aug. 27, 2009	Aug. 26, 2010

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

2. The test was performed in HwaYa Chamber 9.

3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.

4. The FCC Site Registration No. is 460141.

5. The IC Site Registration No. is IC 7450F-4.

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. The antenna is a broadband antenna, and its height 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.

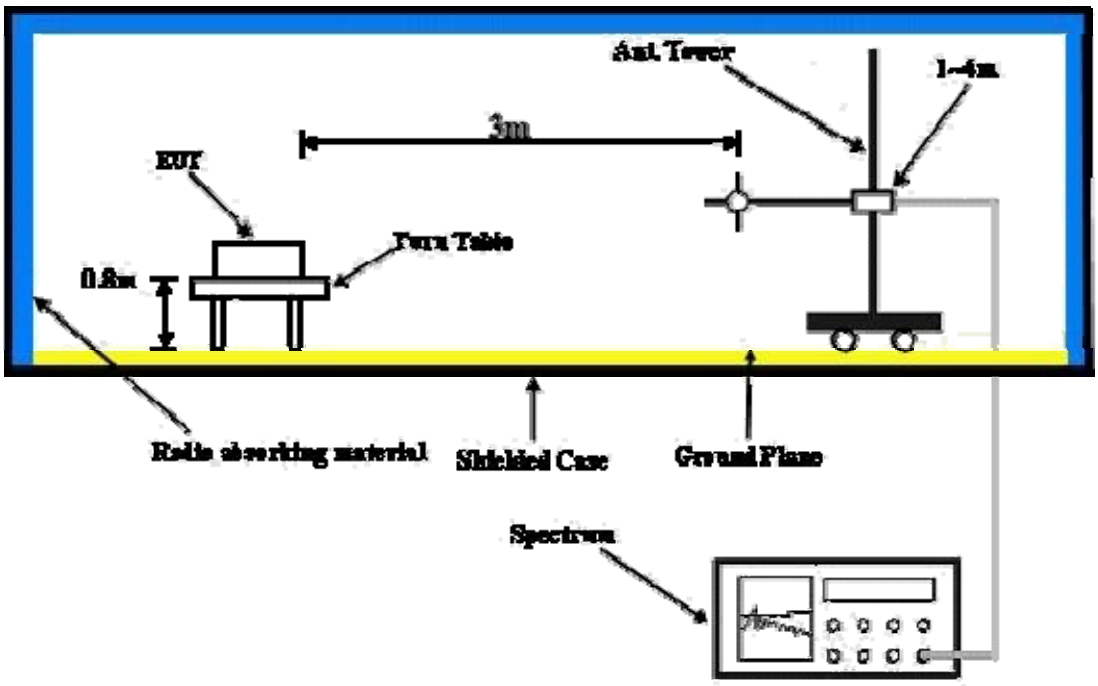
NOTE:

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 10Hz for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 DEVIATION FROM TEST STANDARD

No deviation.

4.1.5 TEST SETUP



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

4.1.6 EUT OPERATING CONDITIONS

a. Placed the EUT on the testing table & connected with LCD monitor via HDMI cable.
b. Test laptop pc connected with EUT via console cable and ran a test program to control EUT to transmit at specific frequency and power level continuously.
c. When EUT worked at test mode, test laptop pc disconnected with EUT and removed from the test table.

4.1.7 TEST RESULTS

802.11n (40MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 151	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH 1015 hPa	TESTED BY	Sun Lin

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	#5725.00	72.8 PK	83.4	-10.6	1.18 H	137	32.80	40.00
2	#5725.00	53.7 AV	72.2	-18.5	1.18 H	137	13.70	40.00
3	*5755.00	103.4 PK			1.18 H	137	63.40	40.00
4	*5755.00	92.2 AV			1.18 H	137	52.20	40.00
5	11510.00	59.5 PK	74.0	-14.5	1.05 H	41	8.80	50.70
6	11510.00	50.8 AV	54.0	-3.2	1.05 H	41	0.10	50.70
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	#5725.00	70.3 PK	82.3	-12.0	1.22 V	235	30.30	40.00
2	#5725.00	49.7 AV	71.2	-21.5	1.22 V	235	9.70	40.00
3	*5755.00	102.3 PK			1.22 V	232	62.30	40.00
4	*5755.00	91.2 AV			1.22 V	232	51.20	40.00
5	11510.00	60.3 PK	74.0	-13.7	1.35 V	30	9.60	50.70
6	11510.00	50.7 AV	54.0	-3.3	1.35 V	30	0.00	50.70

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.
5. " * ": Fundamental frequency.
6. The limit value is defined as per 15.247.
7. "#":The radiated frequency is out the restricted band.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 159	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH 1015 hPa	TESTED BY	Mark Liao

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	*5795.00	103.8 PK			1.03 H	210	63.80	40.00
2	*5795.00	92.6 AV			1.03 H	210	52.60	40.00
3	#5850.00	55.7 PK	83.8	-28.1	1.28 H	224	15.60	40.10
4	#5850.00	40.2 AV	72.6	-32.4	1.28 H	224	0.10	40.10
5	11590.00	59.8 PK	74.0	-14.2	1.12 H	128	9.30	50.50
6	11590.00	48.8 AV	54.0	-5.2	1.12 H	128	-1.70	50.50
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	*5795.00	102.0 PK			1.09 V	6	62.00	40.00
2	*5795.00	90.8 AV			1.09 V	6	50.80	40.00
3	#5850.00	53.9 PK	82.0	-28.1	1.22 V	281	13.80	40.10
4	#5850.00	37.7 AV	70.8	-33.1	1.22 V	281	-2.40	40.10
5	11590.00	58.4 PK	74.0	-15.6	1.20 V	121	7.90	50.50
6	11590.00	46.9 AV	54.0	-7.1	1.20 V	121	-3.60	50.50

REMARKS: 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).

2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).

3. The other emission levels were very low against the limit.

4. Margin value = Emission level – Limit value.

5. " * ": Fundamental frequency.

6. The limit value is defined as per 15.247.

7. "#":The radiated frequency is out the restricted band.

BELOW 1GHz WORST-CASE DATA：802.11n (40MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 159	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH 1020 hPa	TESTED BY	Brad Wu

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	131.00	36.1 QP	43.5	-7.4	1.50 H	169	23.90	12.20
2	249.60	35.9 QP	46.0	-10.1	1.00 H	325	23.00	12.90
3	465.42	32.9 QP	46.0	-13.1	2.00 H	334	14.70	18.20
4	533.47	31.5 QP	46.0	-14.5	2.00 H	337	11.20	20.30
5	731.79	34.7 QP	46.0	-11.3	1.00 H	10	11.10	23.60
6	865.94	33.1 QP	46.0	-12.9	1.00 H	55	7.30	25.80
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	**29.90**	**36.9 QP**	**40.0**	**-3.1**	**1.00 V**	**25**	**24.60**	**12.30**
2	64.90	35.6 QP	40.0	-4.4	1.00 V	358	23.10	12.50
3	127.11	37.2 QP	43.5	-6.3	1.00 V	292	25.10	12.10
4	465.42	36.7 QP	46.0	-9.3	1.50 V	340	18.50	18.20
5	663.74	34.2 QP	46.0	-11.8	1.50 V	292	11.70	22.50
6	930.11	38.0 QP	46.0	-8.0	1.50 V	175	11.60	26.40

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).
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 OF EMISSION (MHz)	CONDUCTED LIMIT (dBμV)	
	Quasi-peak	Average
0.15 ~ 0.5	66 to 56	56 to 46
0.5 ~ 5	56	46
5 ~ 30	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.

3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.2.2 T EST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCS30	100288	Sep. 24, 2009	Sep. 23, 2010
RF signal cable Woken	5D-FB	Cable-HYCO2-01	Dec. 31, 2009	Dec. 30, 2010
LISN ROHDE & SCHWARZ	ESH2-Z5	100100	Dec. 25, 2009	Dec. 24, 2010
LISN ROHDE & SCHWARZ	ESH3-Z5	100311	Jul. 08, 2010	Jul. 07, 2011
Software ADT	ADT_Cond_ V7.3.7	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.

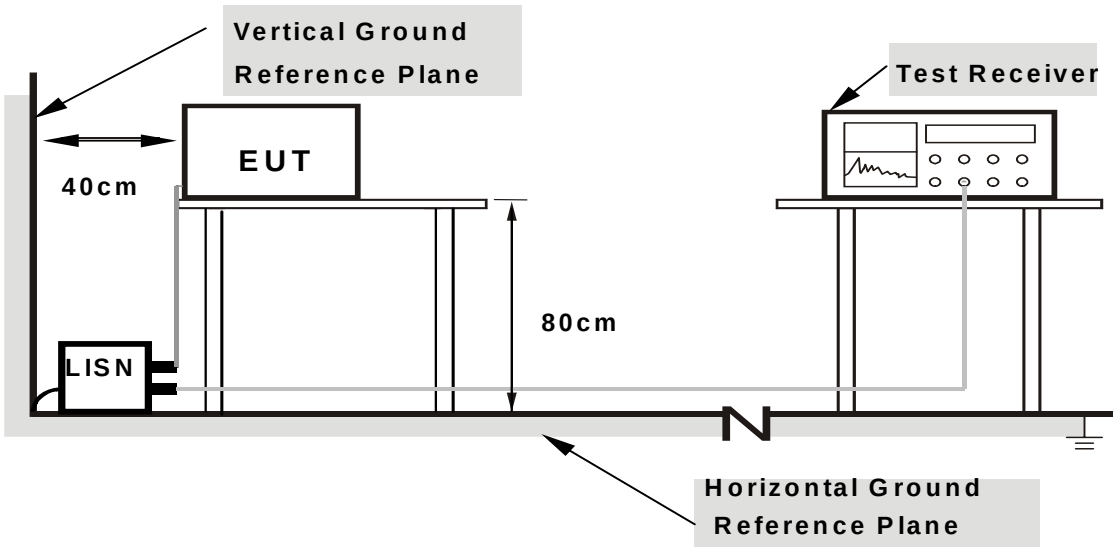
b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

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

4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

4.2.5 TEST SETUP



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

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

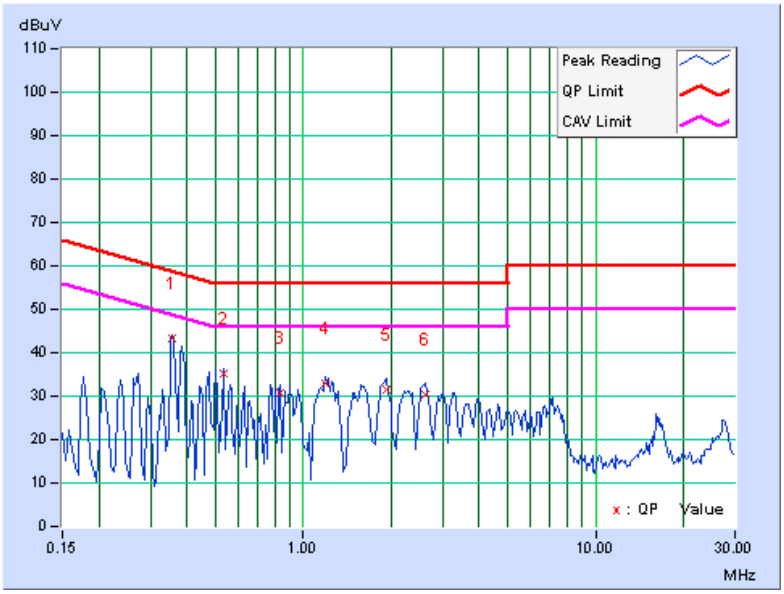
4.2.7 TEST RESULTS

CONDUCTED WORST-CASE DATA： 802.11n (40MHz)

PHASE	Line 1	6dB BANDWIDTH	9kHz

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	**0.357**	**0.18**	**43.02**	**-**	**43.20**	**-**	**58.80**	**48.80**	**-15.60**	**-**
2	0.533	0.19	34.82	-	35.01	-	56.00	46.00	-20.99	-
3	0.838	0.22	30.42	-	30.64	-	56.00	46.00	-25.36	-
4	1.191	0.25	32.62	-	32.87	-	56.00	46.00	-23.13	-
5	1.930	0.30	31.27	-	31.57	-	56.00	46.00	-24.43	-
6	2.621	0.32	30.15	-	30.47	-	56.00	46.00	-25.53	-

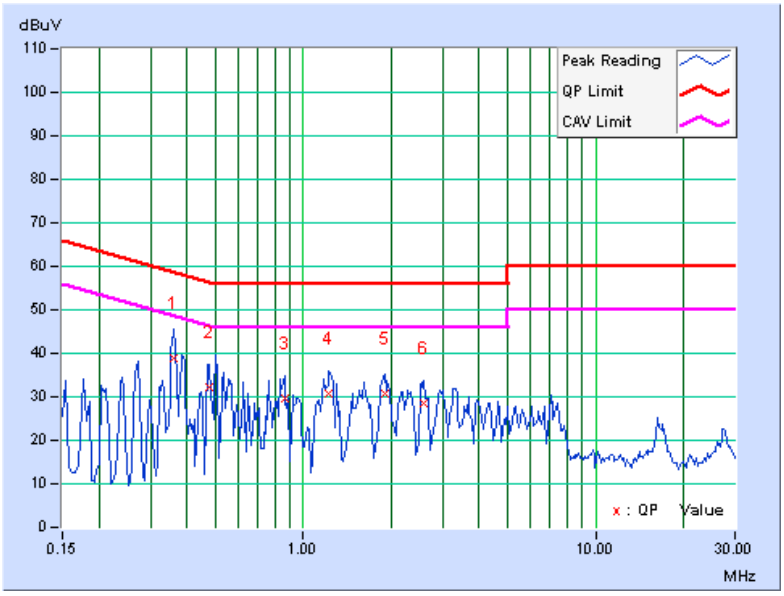
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.



PHASE	Line 2	6dB BANDWIDTH	9kHz

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.361	0.15	38.71	-	38.86	-	58.71	48.71	-19.84	-
2	0.478	0.17	31.94	-	32.11	-	56.37	46.37	-24.26	-
3	0.861	0.21	29.38	-	29.59	-	56.00	46.00	-26.41	-
4	1.219	0.24	30.38	-	30.62	-	56.00	46.00	-25.38	-
5	1.902	0.29	30.31	-	30.60	-	56.00	46.00	-25.40	-
6	2.594	0.32	28.23	-	28.55	-	56.00	46.00	-27.45	-

REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. 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 0.5MHz.

4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100039	Jan. 11, 2010	Jan. 10, 2011

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

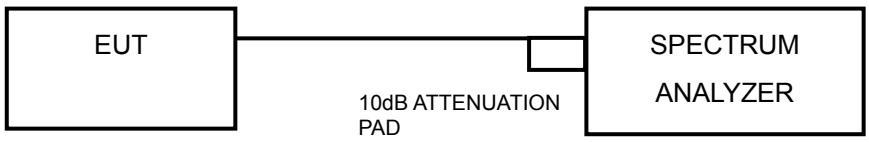
4.3.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100kHz RBW and 300kHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 TEST SETUP



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 RESULTS

802.11n (40MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
151	5755	37.53	0.5	PASS
159	5795	37.77	0.5	PASS

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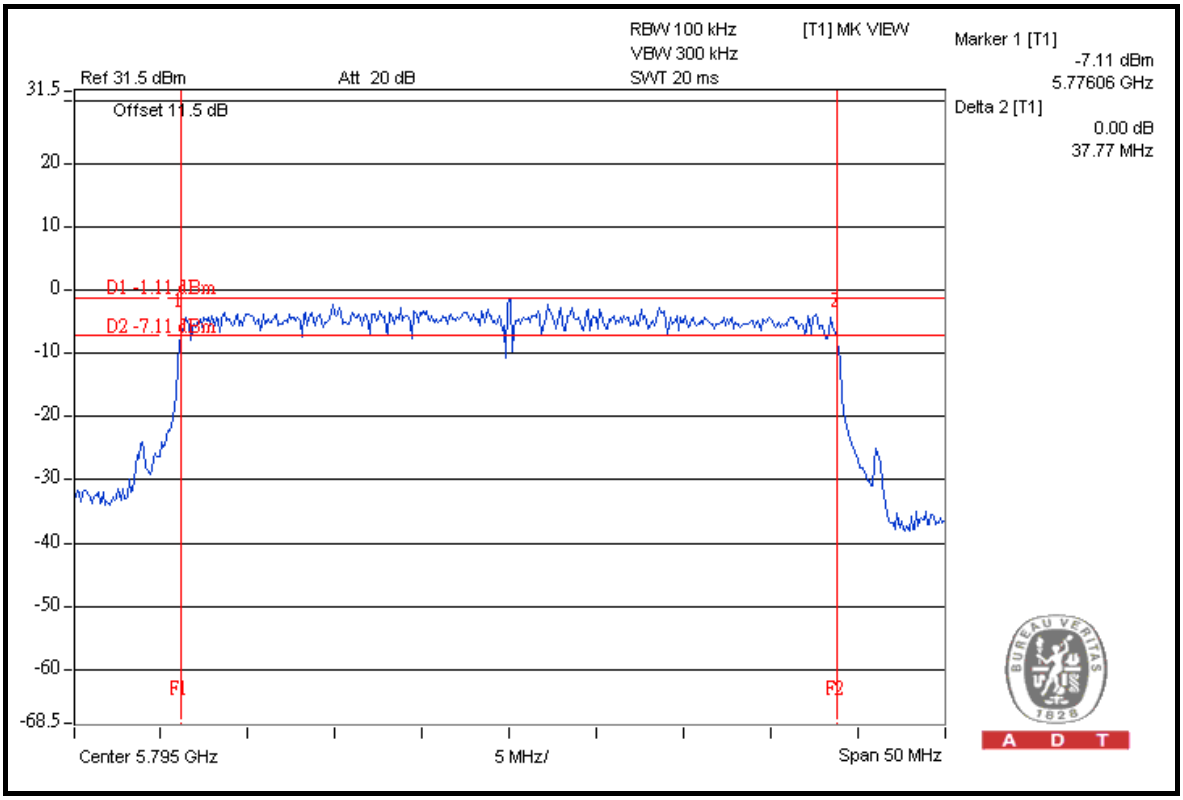


4.4 MAXIMUM OUTPUT POWER

4.4.1 LIMITS OF MAXIMUM OUTPUT POWER MEASUREMENT

The Maximum Output Power Measurement is 30dBm.

4.4.2 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
High Speed Peak Power Meter	ML2495A	0842014	Apr. 21, 2010	Apr. 20, 2011
Power Sensor	MA2411B	0738404	Apr. 21, 2010	Apr. 20, 2011

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. Measurement Bandwidth of ML2495A is 65MHz greater than 6dB bandwidth of emission.

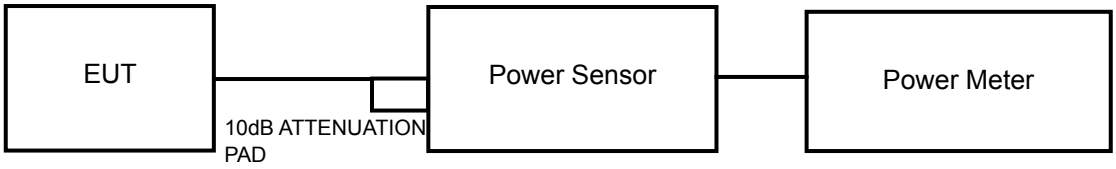
4.4.3 TEST PROCEDURE

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

4.4.4 DEVIATION FROM TEST STANDARD

No deviation.

4.4.5 TEST SETUP



4.4.6 EUT OPERATING CONDITIONS

Same as Item 5.3.6

4.4.7 TEST RESULTS

802.11n (40MHz)

CHAN.	CHANNEL FREQUENCY (MHz)	POWER OUTPUT (mW)	POWER OUTPUT (dBm)	POWER LIMIT (dBm)	PASS/FAIL
151	5755	177.8	22.5	30	PASS
159	5795	190.5	22.8	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 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
R&S SPECTRUM ANALYZER	FSP40	100039	Jan. 11, 2010	Jan. 10, 2011

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

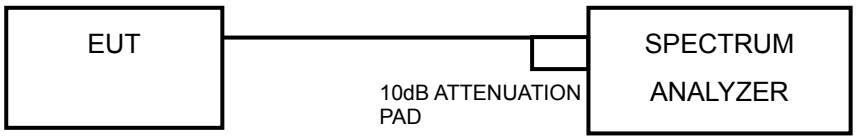
4.5.3 TEST PROCEDURE

1. Follow DTS measurement (PSD Option 2), the transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer. Locate and zoom in on emission peak(s) within the pass band.
2. Set RBW = 3 kHz /VBW > 9 kHz and sweep time to Automatic.
3. Detector use peak mode and a video trigger with the trigger level set to enable triggering only on full power pulses.
4. Trace average 100 traces in power averaging mode. The power spectral density was measured and recorded.

4.5.4 DEVIATION FROM TEST STANDARD

No deviation.

4.5.5 TEST SETUP



4.5.6 EUT OPERATING CONDITION

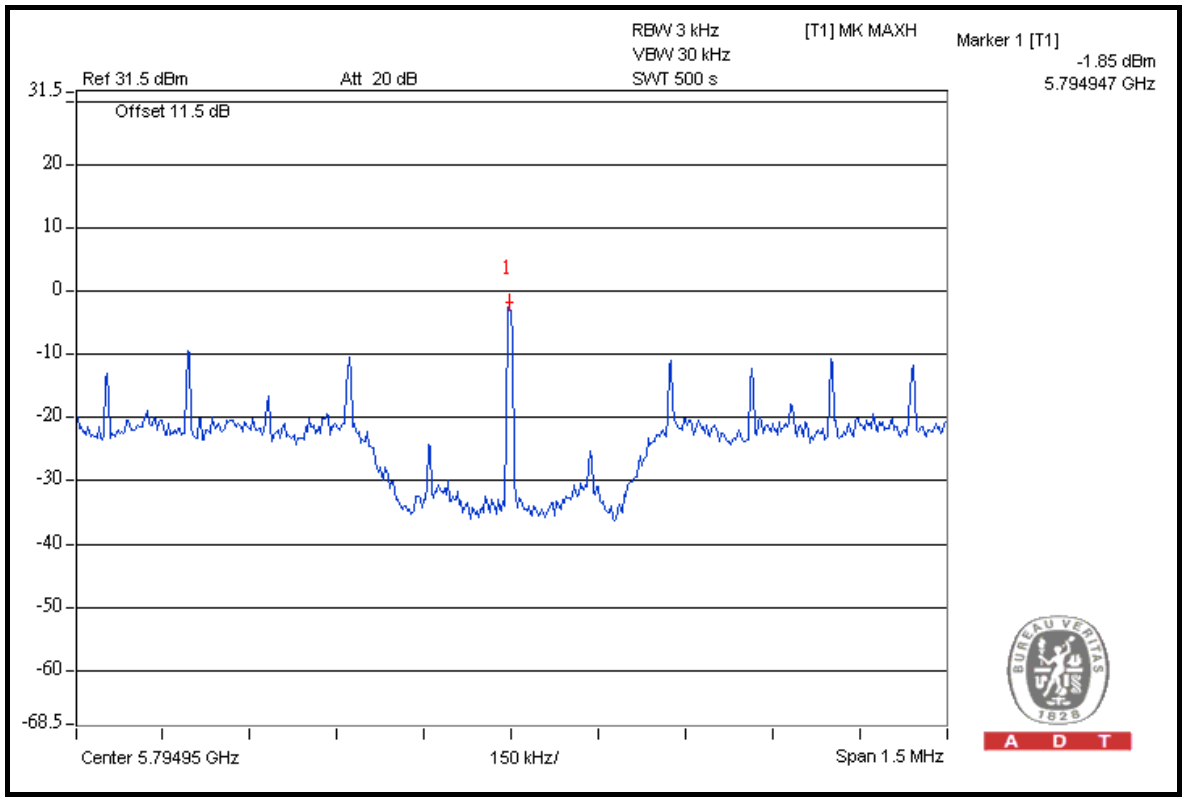
Same as Item 5.3.6.

4.5.7 TEST RESULTS

802.11n (40MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3 kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
151	5755	-1.95	8	PASS
159	5795	-1.85	8	PASS

CH 159



4.6 BAND EDGES MEASUREMENT

4.6.1 LIMITS OF BAND EDGES MEASUREMENT

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

4.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
R&S SPECTRUM ANALYZER	FSP40	100039	Jan. 11, 2010	Jan. 10, 2011

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

4.6.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set both RBW and VBW of spectrum analyzer to 100kHz and 300kHz with suitable frequency span including 100MHz bandwidth from band edge. The band edges was measured and recorded.

The spectrum plots (Peak RBW = 100kHz, VBW = 300kHz; Average RBW = 1MHz, VBW = 10Hz) are attached on the following pages.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

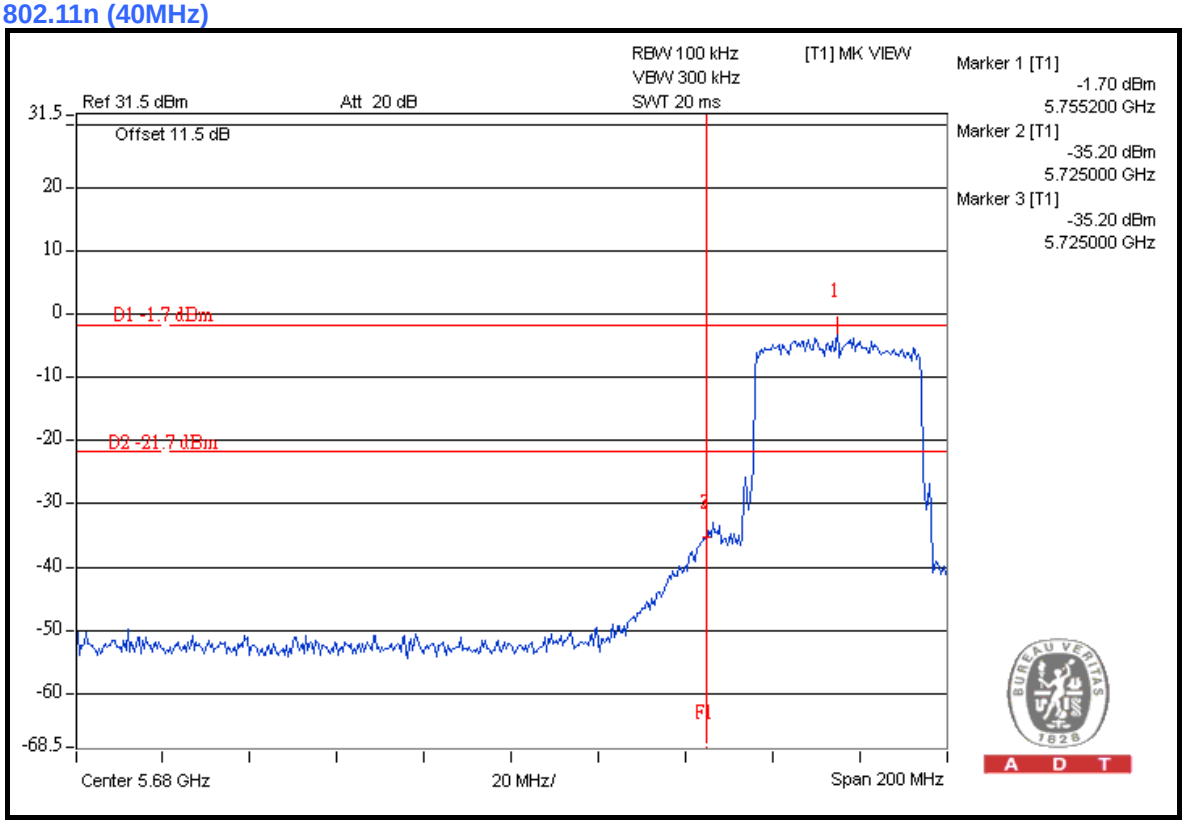
4.6.5 EUT OPERATING CONDITION

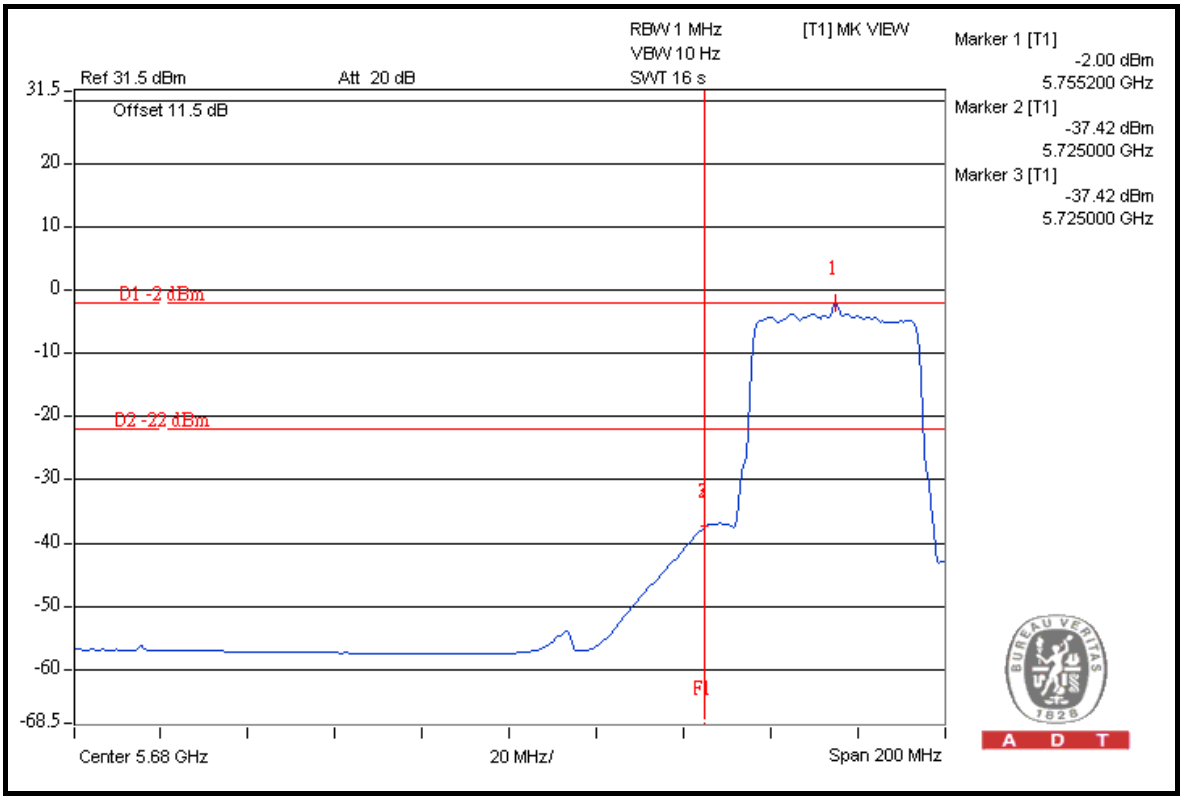
Same as Item 4.3.6

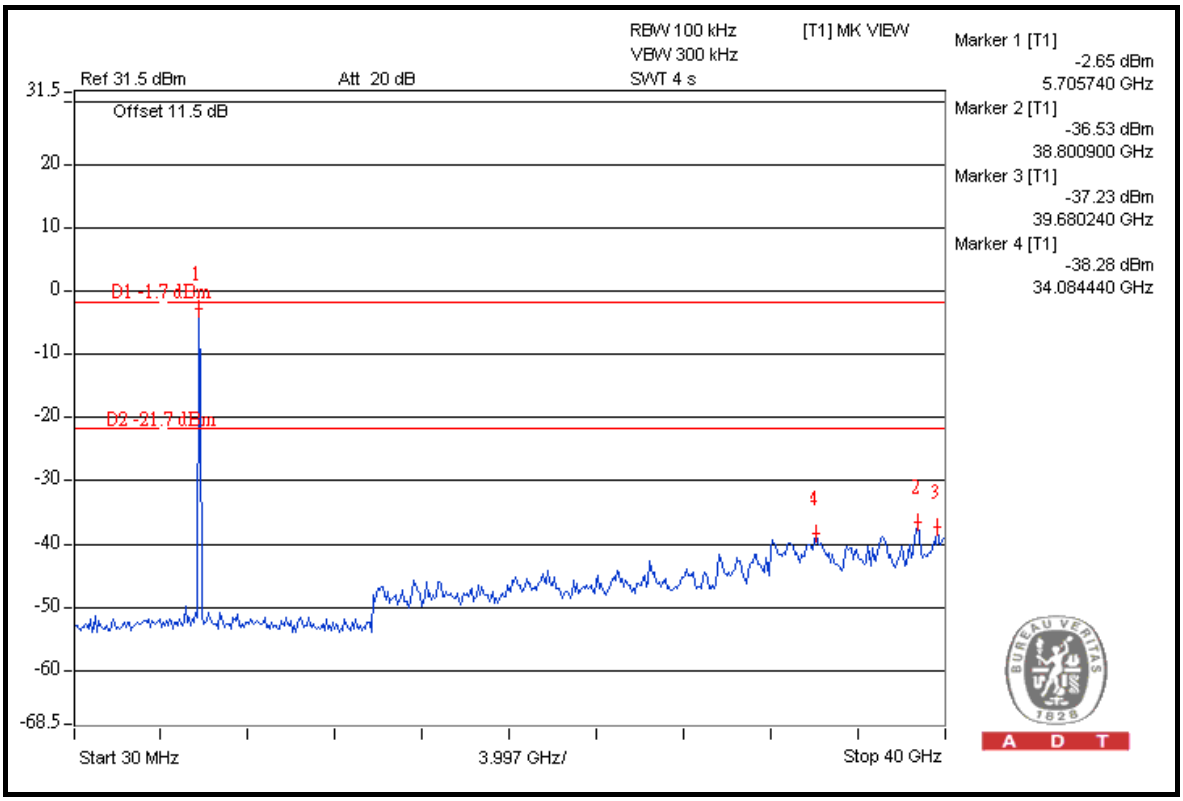
4.6.6 TEST RESULTS

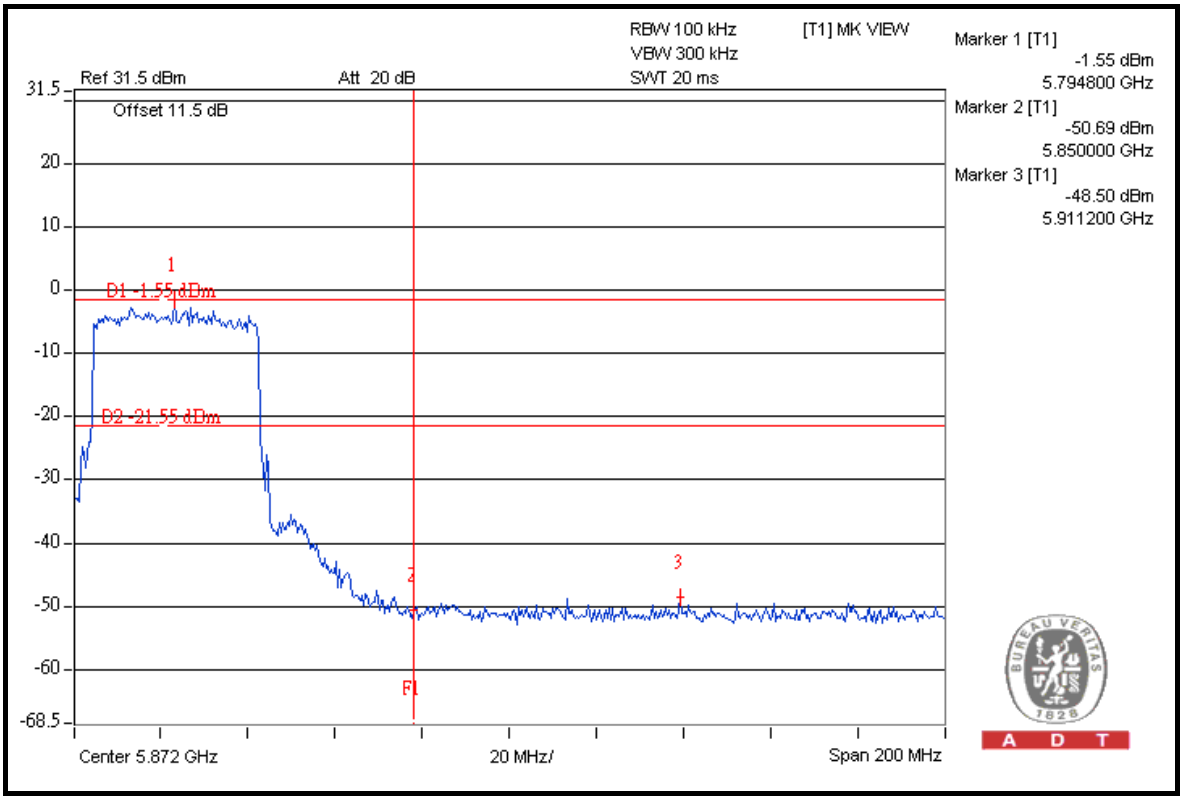
The spectrum plots are attached on the following pages. D1 line indicates the highest level, D2 line indicates the 20dB offset below D1. It shows compliance with the requirement in part 15.247(d).

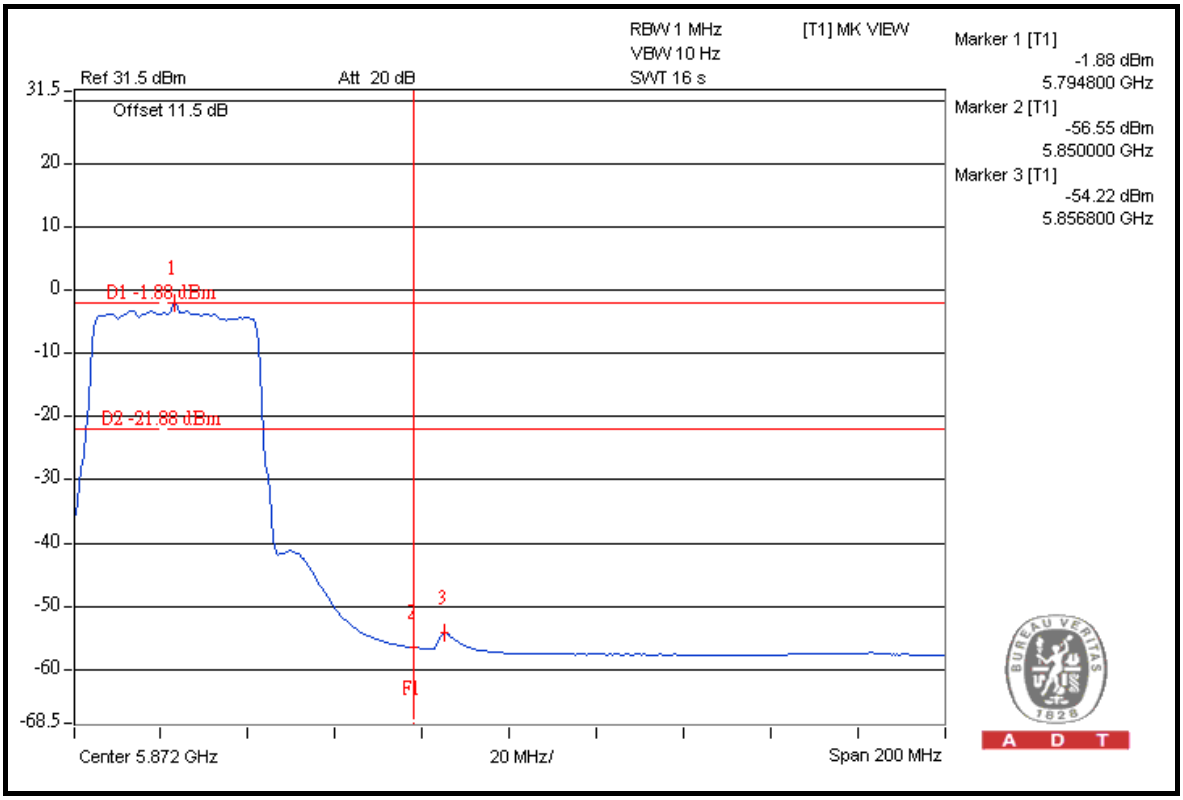
802.11n (40MHz)

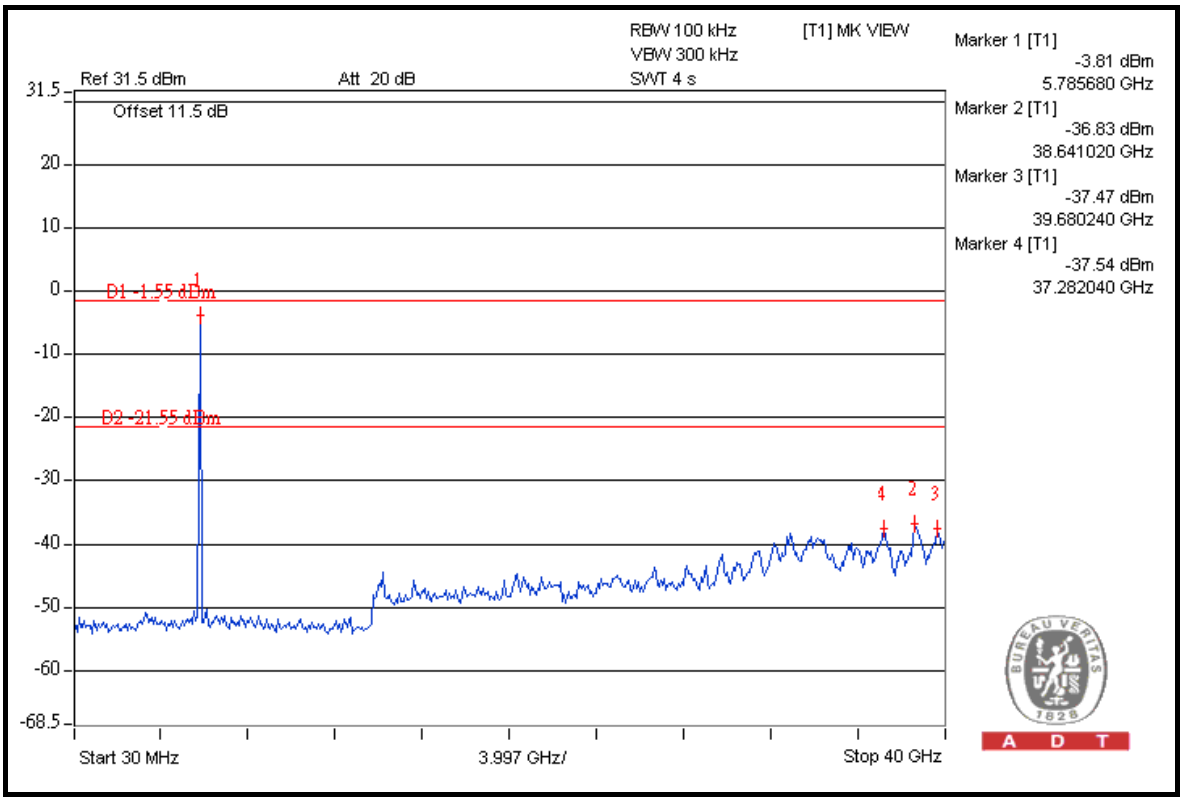





RBW 100 kHz
VBW 300 kHz
SWT 4 s
[T1] MK VIEW
Ref 31.5 dBm
Att 20 dB
Offset 11.5 dB
D1 -1.7 dBm
D2 -21.7 dBm
Marker 1 [T1]
-2.65 dBm
5.705740 GHz
Marker 2 [T1]
-36.53 dBm
38.800900 GHz
Marker 3 [T1]
-37.23 dBm
39.680240 GHz
Marker 4 [T1]
-38.28 dBm
34.084440 GHz
31.5
20
10
0
-10
-20
-30
-40
-50
-60
-68.5
Start 30 MHz
3.997 GHz/
Stop 40 GHz


RBW 100 kHz
VBW 300 kHz
SWT 20 ms
[T1] MK VIEW
Ref 31.5 dBm
Att 20 dB
Offset 11.5 dB
D1 -1.55 dBm
D2 -21.55 dBm
Marker 1 [T1]
-1.55 dBm
5.794800 GHz
Marker 2 [T1]
-50.69 dBm
5.850000 GHz
Marker 3 [T1]
-48.50 dBm
5.911200 GHz
31.5
20
10
0
-10
-20
-30
-40
-50
-60
-68.5
Center 5.872 GHz
20 MHz/
Span 200 MHz


RBW 1 MHz
VBW 10 Hz
SWT 16 s
[T1] MK VIEW
Ref 31.5 dBm
Att 20 dB
Offset 11.5 dB
31.5
20
10
0
-10
-20
-30
-40
-50
-60
-68.5
D1 -1.88 dBm
D2 -21.88 dBm
Center 5.872 GHz
20 MHz/
Span 200 MHz
Marker 1 [T1]
-1.88 dBm
5.794800 GHz
Marker 2 [T1]
-56.55 dBm
5.850000 GHz
Marker 3 [T1]
-54.22 dBm
5.856800 GHz


RBW 100 kHz
VBW 300 kHz
SWT 4 s
[T1] MK VIEW
Ref 31.5 dBm
Att 20 dB
Offset 11.5 dB
31.5
20
10
0
-10
-20
-30
-40
-50
-60
-68.5
D1 -1.55 dBm
D2 -21.55 dBm
Start 30 MHz
3.997 GHz/
Stop 40 GHz
Marker 1 [T1]
-3.81 dBm
5.785680 GHz
Marker 2 [T1]
-36.83 dBm
38.641020 GHz
Marker 3 [T1]
-37.47 dBm
39.680240 GHz
Marker 4 [T1]
-37.54 dBm
37.282040 GHz

5. PHOTOGRAPHS OF THE TEST CONFIGURATION

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

6. 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:

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: www.adt.com.tw/index.5/phtml. 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 Lab:
Tel: 886-3-5935343
Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety/TPCI Lab:
Tel: 886-3-3183232
Fax: 886-3-3185050

Web Site: www.adt.com.tw

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

7. APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.

---END---