



FCC TEST REPORT

REPORT NO.: RF130801C01A-1
MODEL NO.: HB-2000
FCC ID: OGSHB2000
RECEIVED: Aug. 01, 2013
TESTED: Aug. 30 ~ Sep. 05, 2013
ISSUED: Sep. 09, 2013

APPLICANT: Applied Wireless identifications Group Inc.

ADDRESS: 18300 Sutter Blvd, Morgan Hill, CA95037 USA

ISSUED BY: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

LAB ADDRESS: No. 47, 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 Tsuen, Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF130801C01A-1	Original release	Sep. 09, 2013

1. CERTIFICATION

PRODUCT: UHF RFID Handheld Reader/Writer
MODEL NO.: HB-2000
BRAND: AWID
APPLICANT: Applied Wireless identifications Group Inc.
TESTED: Aug. 30 ~ Sep. 05, 2013
TEST SAMPLE: ENGINEERING SAMPLE
STANDARDS: **FCC Part 15, Subpart C (Section 15.247)**
ANSI C63.10-2009

The above equipment (model: HB-2000) 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. 09, 2013
Celine Chou / Specialist

APPROVED BY : Ken Liu , DATE : Sep. 09, 2013
Ken Liu / Senior 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 -22.31dB at 0.16953MHz.
15.247(a)(1)(i)	Number of Hopping Frequency Used Spec.: At least 50 channels	PASS	Meet the requirement of limit.
15.247(a)(1)(i)	Dwell Time on Each Channel Spec.: Max. 0.4 second within 20 second	PASS	Meet the requirement of limit.
15.247(a)(1)(i)	1. Hopping Channel Separation Spec.: Min. 25 kHz or 20 dB bandwidth, whichever is greater 2. Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System	PASS	Meet the requirement of limit.
15.247(b)(2)	Maximum Peak Output Power Spec.: max. 30dBm	PASS	Meet the requirement of limit.
15.247(d)	Transmitter Radiated Emissions Spec.: Table 15.209	PASS	Meet the requirement of limit. Minimum passing margin is -2.2dB at 142.44MHz.
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is MMCX 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	UNCERTAINTY
Conducted emissions	150kHz~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 $k = 2$.



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3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

EUT	UHF RFID Handheld Reader/Writer
MODEL NO.	HB-2000
POWER SUPPLY	12Vdc (Adapter) 7.4Vdc (Battery)
MODULATION TYPE	ASK
TRANSFER RATE	40Kbps
OPERATING FREQUENCY	902.60 ~ 927.40MHz
NUMBER OF CHANNEL	125
OUTPUT POWER	496.592mW
ANTENNA TYPE	Circular Polarized Antenna with 1.14dBi gain
ANTENNA CONNECTOR	MMCX
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ACCESSORY DEVICES	Adapter, Battery

NOTE:

1. The EUT uses following adapter and battery.

ADAPTER	
BRAND	GME SWITCHING POWER ADAPTER
MODEL	GFP241-1220BX-1
INPUT POWER	100-240Vac, 50-60Hz, 0.55A
OUTPUT POWER	12Vdc, 2A
POEWR LINE	DC: 1.8m cable with one core attached on adapter

BATTERY	
BRAND	CBINC
MODEL	SAM-BP1310
POWER RATING	7.4Vdc, 1300mAh, 9.6Wh

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



3.2 DESCRIPTION OF TEST MODES

125 channels are provided to this EUT:

CH.	FREQ. (MHz)	CH.	FREQ. (MHz)	CH.	FREQ. (MHz)	CH.	FREQ. (MHz)	CH.	FREQ. (MHz)
0	902.60	25	907.60	50	912.60	75	917.60	100	922.60
1	902.80	26	907.80	51	912.80	76	917.80	101	922.80
2	903.00	27	908.00	52	913.00	77	918.00	102	923.00
3	903.20	28	908.20	53	913.20	78	918.20	103	923.20
4	903.40	29	908.40	54	913.40	79	918.40	104	923.40
5	903.60	30	908.60	55	913.60	80	918.60	105	923.60
6	903.80	31	908.80	56	913.80	81	918.80	106	923.80
7	904.00	32	909.00	57	914.00	82	919.00	107	924.00
8	904.20	33	909.20	58	914.20	83	919.20	108	924.20
9	904.40	34	909.40	59	914.40	84	919.40	109	924.40
10	904.60	35	909.60	60	914.60	85	919.60	110	924.60
11	904.80	36	909.80	61	914.80	86	919.80	111	924.80
12	905.00	37	910.00	62	915.00	87	920.00	112	925.00
13	905.20	38	910.20	63	915.20	88	920.20	113	925.20
14	905.40	39	910.40	64	915.40	89	920.40	114	925.40
15	905.60	40	910.60	65	915.60	90	920.60	115	925.60
16	905.80	41	910.80	66	915.80	91	920.80	116	925.80
17	906.00	42	911.00	67	916.00	92	921.00	117	926.00
18	906.20	43	911.20	68	916.20	93	921.20	118	926.20
19	906.40	44	911.40	69	916.40	94	921.40	119	926.40
20	906.60	45	911.60	70	916.60	95	921.60	120	926.60
21	906.80	46	911.80	71	916.80	96	921.80	121	926.80
22	907.00	47	912.00	72	917.00	97	922.00	122	927.00
23	907.20	48	912.20	73	917.20	98	922.20	123	927.20
24	907.40	49	912.40	74	917.40	99	922.40	124	927.40



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 **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
-	0 to 124	0, 62, 124	ASK

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
-	0 to 124	0, 62, 124	ASK

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
-	0 to 124	0	ASK



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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.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
-	0 to 124	0, 124	ASK

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 CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
-	0 to 124	0, 62, 124	ASK

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	25deg. C, 65%RH	120Vac, 60Hz	Ted Chang
RE<1G	25deg. C, 65%RH 23deg. C, 64%RH	120Vac, 60Hz	Ted Chang Brad Tung
PLC	25deg. C, 65%RH	120Vac, 60Hz	Ted Chang
APCM	23deg. C, 64%RH	120Vac, 60Hz	Nick Chen

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.

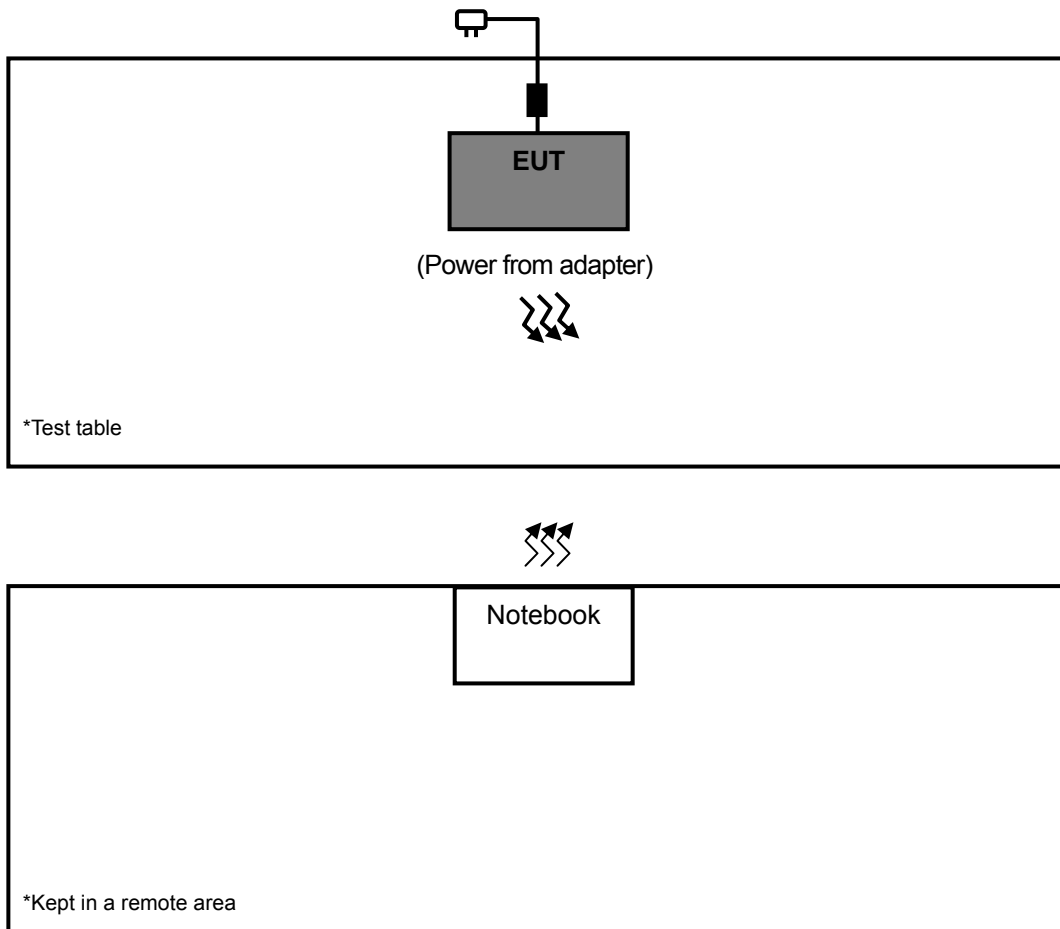
NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK	SONY	SVS151A12P	27554847 7001150	FCC Doc Approved

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA

NOTE:

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

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)

ANSI C63.10-2009

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

4. TEST TYPES AND RESULTS

4.1 RADIATED EMISSION AND BANDEDGE MEASUREMENT

4.1.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT

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. 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	ESCS30	100289	Nov. 16, 2012	Nov. 15, 2013
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100269	Jan. 28, 2013	Jan. 27, 2014
BILOG Antenna SCHWARZBECK	VULB9168	9168-156	Mar. 22, 2013	Mar. 21, 2014
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-209	Sep. 03, 2012	Sep. 02, 2013
			Sep. 04, 2013	Sep. 03, 2014
HORN Antenna SCHWARZBECK	BBHA 9170	148	Jul. 15, 2013	Jul. 14, 2014
Preamplifier Agilent	8449B	3008A01911	Oct. 25, 2012	Oct. 24, 2013
Preamplifier Agilent	8447D	2944A10638	Oct. 25, 2012	Oct. 24, 2013
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309222/4 248780/4 274392/4	Aug. 22, 2013	Aug. 21, 2014
RF signal cable Worken	8D-FB	Cable-HYCH9-0 1	Aug. 11, 2013	Aug. 10, 2014
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower & Turn Table Controller EMCO	2090	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 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 215374.
 5. The IC Site Registration No. is IC 7450F-9.

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:

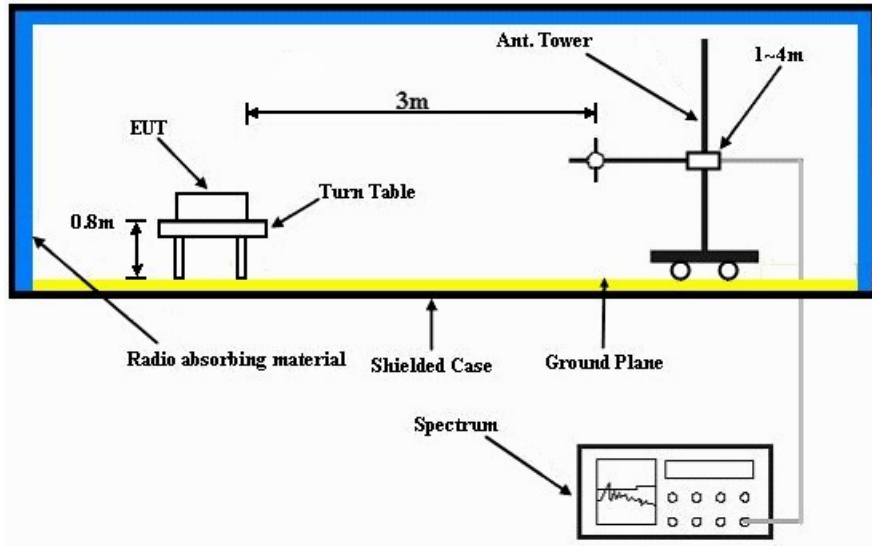
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution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

4.1.4 DEVIATION FROM TEST STANDARD

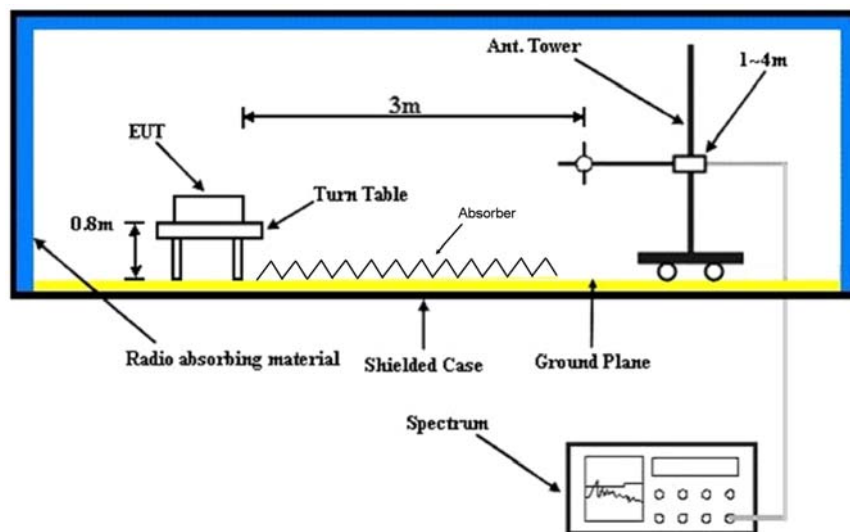
No deviation.

4.1.5 TEST SETUP

Frequency range 30MHz~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

- a. Placed the EUT on a testing table.
- b. Set the EUT under transmission condition continuously at specific channel frequency.



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4.1.7 TEST RESULTS

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Ted Chang

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	#902.00	65.0 QP	97.6	-32.6	1.44 H	200	38.10	26.90
2	#902.00	54.2 AV	96.7	-42.5	1.44 H	200	27.30	26.90
3	*902.60	117.6 QP			1.44 H	201	90.70	26.90
4	*902.60	116.7 AV			1.44 H	201	89.80	26.90
5	#928.00	65.3 QP	97.6	-31.3	1.44 H	203	37.80	27.50
6	#928.00	54.3 AV	96.7	-42.4	1.44 H	203	26.80	27.50

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	#902.00	67.9 QP	102.7	-34.8	1.06 V	45	41.00	26.90
2	#902.00	55.4 AV	101.7	-46.3	1.06 V	45	28.50	26.90
3	*902.60	122.7 QP			1.06 V	48	95.80	26.90
4	*902.60	121.7 AV			1.06 V	48	94.80	26.90
5	#928.00	66.2 QP	102.7	-36.5	1.05 V	42	38.70	27.50
6	#928.00	54.2 AV	101.7	-47.5	1.05 V	42	26.70	27.50

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) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ * “: Fundamental frequency.
6. “#”:The radiated frequency is out the restricted band.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 62	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Ted Chang

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	#902.00	65.4 QP	104.8	-39.4	1.41 H	125	38.50	26.90
2	#902.00	53.8 AV	103.9	-50.1	1.41 H	125	26.90	26.90
3	*915.00	124.8 QP			1.43 H	143	97.50	27.30
4	*915.00	123.9 AV			1.43 H	143	96.60	27.30
5	#928.00	65.1 QP	104.8	-39.7	1.43 H	214	37.60	27.50
6	#928.00	54.4 AV	103.9	-49.5	1.43 H	214	26.90	27.50
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	#902.00	64.5 QP	107.2	-42.7	1.03 V	321	37.60	26.90
2	#902.00	53.8 AV	106.3	-52.5	1.03 V	321	26.90	26.90
3	*915.00	127.2 QP			1.00 V	304	99.90	27.30
4	*915.00	126.3 AV			1.00 V	304	99.00	27.30
5	#928.00	65.5 QP	107.2	-41.7	1.02 V	147	38.00	27.50
6	#928.00	54.2 AV	106.3	-52.1	1.02 V	147	26.70	27.50

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) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ * “: Fundamental frequency.
6. “#”:The radiated frequency is out the restricted band.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 124	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Ted Chang

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	#902.00	64.9 QP	102.9	-38.0	1.42 H	0	38.00	26.90
2	#902.00	53.8 AV	102.2	-48.4	1.42 H	0	26.90	26.90
3	*927.40	122.9 QP			1.42 H	0	95.50	27.40
4	*927.40	122.2 AV			1.42 H	0	94.80	27.40
5	#928.00	67.9 QP	102.9	-35.0	1.42 H	102	40.40	27.50
6	#928.00	56.5 AV	102.2	-45.7	1.42 H	102	29.00	27.50

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	#902.00	65.5 QP	106.0	-40.5	1.03 V	241	38.60	26.90
2	#902.00	55.4 AV	105.0	-49.6	1.03 V	241	28.50	26.90
3	*927.40	126.0 QP			1.00 V	309	98.60	27.40
4	*927.40	125.0 AV			1.00 V	309	97.60	27.40
5	#928.00	69.1 QP	106.0	-36.9	1.00 V	305	41.60	27.50
6	#928.00	56.8 AV	105.0	-48.2	1.00 V	305	29.30	27.50

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) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ * “: Fundamental frequency.
6. “#”:The radiated frequency is out the restricted band.



ABOVE 1GHz DATA

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Ted Chang

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	2707.80	44.1 PK	74.0	-29.9	1.18 H	224	46.40	-2.30
2	2707.80	33.5 AV	54.0	-20.5	1.18 H	224	35.80	-2.30
3	3610.40	45.1 PK	74.0	-28.9	1.00 H	45	44.20	0.90
4	3610.40	32.1 AV	54.0	-21.9	1.00 H	45	31.20	0.90
5	4513.00	50.4 PK	74.0	-23.6	1.00 H	182	47.80	2.60
6	4513.00	42.1 AV	54.0	-11.9	1.00 H	182	39.50	2.60
7	5415.60	52.6 PK	74.0	-21.4	1.58 H	20	47.90	4.70
8	5415.60	45.0 AV	54.0	-9.0	1.58 H	20	40.30	4.70
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	2707.80	43.9 PK	74.0	-30.1	1.04 V	104	46.20	-2.30
2	2707.80	33.9 AV	54.0	-20.1	1.04 V	104	36.20	-2.30
3	3610.40	45.6 PK	74.0	-28.4	1.06 V	215	44.70	0.90
4	3610.40	33.1 AV	54.0	-20.9	1.06 V	215	32.20	0.90
5	4513.00	51.6 PK	74.0	-22.4	1.27 V	67	49.00	2.60
6	4513.00	44.6 AV	54.0	-9.4	1.27 V	67	42.00	2.60
7	5415.60	53.5 PK	74.0	-20.5	1.13 V	100	48.80	4.70
8	5415.60	47.1 AV	54.0	-6.9	1.13 V	100	42.40	4.70

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



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 62	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Ted Chang

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	#1830.00	45.7 PK	104.8	-59.1	1.83 H	75	50.90	-5.20
2	#1830.00	40.4 AV	103.9	-63.5	1.83 H	75	45.60	-5.20
3	2745.00	44.3 PK	74.0	-29.7	1.00 H	169	46.50	-2.20
4	2745.00	33.9 AV	54.0	-20.1	1.00 H	169	36.10	-2.20
5	3660.00	46.6 PK	74.0	-27.4	1.00 H	124	45.60	1.00
6	3660.00	33.5 AV	54.0	-20.5	1.00 H	124	32.50	1.00
7	4575.00	49.0 PK	74.0	-25.0	1.00 H	71	46.20	2.80
8	4575.00	36.7 AV	54.0	-17.3	1.00 H	71	33.90	2.80

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	#1830.00	53.4 PK	107.2	-53.8	1.00 V	170	58.60	-5.20
2	#1830.00	47.9 AV	106.3	-58.4	1.00 V	170	53.10	-5.20
3	2745.00	45.1 PK	74.0	-28.9	1.00 V	170	47.30	-2.20
4	2745.00	36.9 AV	54.0	-17.1	1.00 V	170	39.10	-2.20
5	3660.00	45.7 PK	74.0	-28.3	1.00 V	190	44.70	1.00
6	3660.00	34.9 AV	54.0	-19.1	1.00 V	190	33.90	1.00
7	4575.00	52.3 PK	74.0	-21.7	1.00 V	245	49.50	2.80
8	4575.00	38.0 AV	54.0	-16.0	1.00 V	245	35.20	2.80

REMARKS:

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



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 124	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Ted Chang

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	#1854.80	57.3 PK	102.9	-45.6	1.45 H	326	62.40	-5.10
2	#1854.80	55.4 AV	102.2	-46.8	1.45 H	326	60.50	-5.10
3	2782.20	46.1 PK	74.0	-27.9	1.65 H	155	48.10	-2.00
4	2782.20	41.4 AV	54.0	-12.6	1.65 H	155	43.40	-2.00
5	3709.60	46.2 PK	74.0	-27.8	1.03 H	223	45.00	1.20
6	3709.60	34.3 AV	54.0	-19.7	1.03 H	223	33.10	1.20
7	4637.00	48.0 PK	74.0	-26.0	1.06 H	184	44.90	3.10
8	4637.00	35.7 AV	54.0	-18.3	1.06 H	184	32.60	3.10

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	#1854.80	57.4 PK	106.0	-48.6	1.00 V	36	62.50	-5.10
2	#1854.80	53.2 AV	105.0	-51.8	1.00 V	36	58.30	-5.10
3	2782.20	45.5 PK	74.0	-28.5	1.00 V	351	47.50	-2.00
4	2782.20	38.3 AV	54.0	-15.7	1.00 V	351	40.30	-2.00
5	3709.60	46.7 PK	74.0	-27.3	1.00 V	140	45.50	1.20
6	3709.60	34.1 AV	54.0	-19.9	1.00 V	140	32.90	1.20
7	4637.00	50.2 PK	74.0	-23.8	1.02 V	206	47.10	3.10
8	4637.00	39.1 AV	54.0	-14.9	1.02 V	206	36.00	3.10

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



A D T

BELOW 1GHz WORST-CASE DATA

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	23deg. C, 64%RH	TESTED BY	Brad Tung

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	117.22	35.4 QP	43.5	-8.1	2.00 H	118	51.80	-16.40
2	161.85	33.5 QP	43.5	-10.0	1.00 H	273	47.10	-13.60
3	222.00	34.3 QP	46.0	-11.7	1.00 H	140	50.50	-16.20
4	239.46	32.5 QP	46.0	-13.5	1.25 H	274	47.30	-14.80
5	287.97	30.9 QP	46.0	-15.1	1.50 H	306	43.50	-12.60
6	629.48	31.8 QP	46.0	-14.2	1.00 H	179	37.40	-5.60

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	43.48	35.8 QP	40.0	-4.2	1.25 V	243	50.30	-14.50
2	117.22	33.6 QP	43.5	-9.9	1.00 V	105	50.00	-16.40
3	142.44	37.8 QP	43.5	-5.7	1.50 V	206	52.00	-14.20
4	161.85	40.2 QP	43.5	-3.3	1.00 V	260	53.80	-13.60
5	231.70	28.8 QP	46.0	-17.2	2.00 V	225	44.40	-15.60
6	701.28	33.5 QP	46.0	-12.5	1.00 V	71	38.20	-4.70

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



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 62	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	23deg. C, 64%RH	TESTED BY	Brad Tung

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	45.42	30.9 QP	40.0	-9.1	1.50 H	19	45.00	-14.10
2	117.22	37.4 QP	43.5	-6.1	1.25 H	144	53.80	-16.40
3	161.85	33.0 QP	43.5	-10.5	1.50 H	293	46.60	-13.60
4	222.00	35.4 QP	46.0	-10.6	1.50 H	144	51.60	-16.20
5	350.07	33.6 QP	46.0	-12.4	1.00 H	144	45.00	-11.40
6	697.40	39.6 QP	46.0	-6.4	2.00 H	295	44.40	-4.80

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	30.21	34.4 QP	40.0	-5.6	2.00 V	68	50.10	-15.70
2	45.42	34.3 QP	40.0	-5.7	1.00 V	244	48.40	-14.10
3	117.22	33.6 QP	43.5	-9.9	1.25 V	96	50.00	-16.40
4	142.44	41.3 QP	43.5	-2.2	1.00 V	193	55.50	-14.20
5	161.85	35.7 QP	43.5	-7.8	1.25 V	189	49.30	-13.60
6	701.28	35.3 QP	46.0	-10.7	1.50 V	223	40.00	-4.70

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



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 124	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	23deg. C, 64%RH	TESTED BY	Brad Tung

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	45.86	29.9 QP	40.0	-10.1	1.25 H	35	43.90	-14.00
2	118.36	36.4 QP	43.5	-7.1	1.00 H	255	52.70	-16.30
3	165.01	32.0 QP	43.5	-11.5	1.50 H	11	46.30	-14.30
4	225.96	35.5 QP	46.0	-10.5	1.50 H	21	51.90	-16.40
5	350.00	33.2 QP	46.0	-12.8	1.00 H	99	44.60	-11.40
6	725.60	39.1 QP	46.0	-6.9	1.00 H	2	43.30	-4.20

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	34.00	29.3 QP	40.0	-10.7	1.50 V	129	45.30	-16.00
2	152.00	32.9 QP	43.5	-10.6	1.50 V	241	46.60	-13.70
3	215.09	36.1 QP	43.5	-7.4	1.00 V	331	52.50	-16.40
4	286.96	35.5 QP	46.0	-10.5	2.00 V	60	48.10	-12.60
5	377.18	33.2 QP	46.0	-12.8	1.00 V	130	44.00	-10.80
6	763.06	38.2 QP	46.0	-7.8	1.25 V	74	41.30	-3.10

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

4.2 CONDUCTED EMISSION MEASUREMENT

4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB μ V)	
	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 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCS30	100289	Nov. 16, 2012	Nov. 15, 2013
RF signal cable Woken	5D-FB	Cable-HYC01-01	Dec. 28, 2012	Dec. 27, 2013
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Feb. 04, 2013	Feb. 03, 2014
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Jul. 08, 2013	Jul. 07, 2014
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in HwaYa Shielded Room 1.
 3. The VCCI Site Registration No. is C-2040.

4.2.3 TEST PROCEDURES

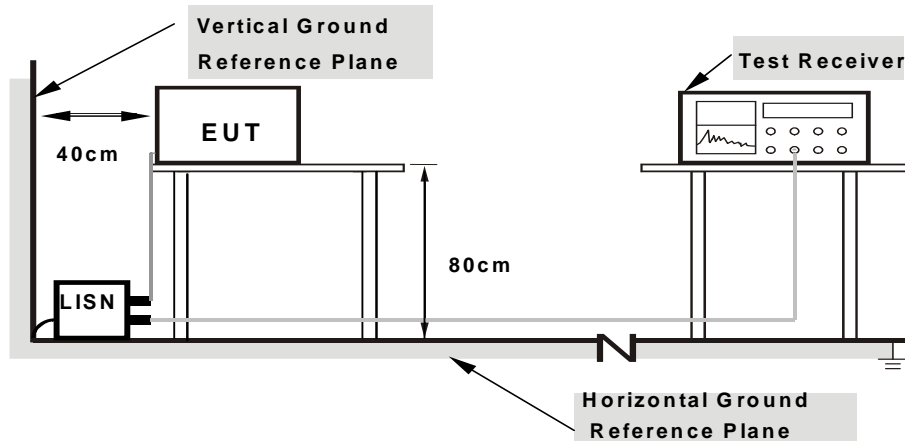
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

NOTE: All modes of operation were investigated and the worst-case emissions are reported.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

4.2.5 TEST SETUP



- Note:**
- Support units were connected to second LISN.
 - 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

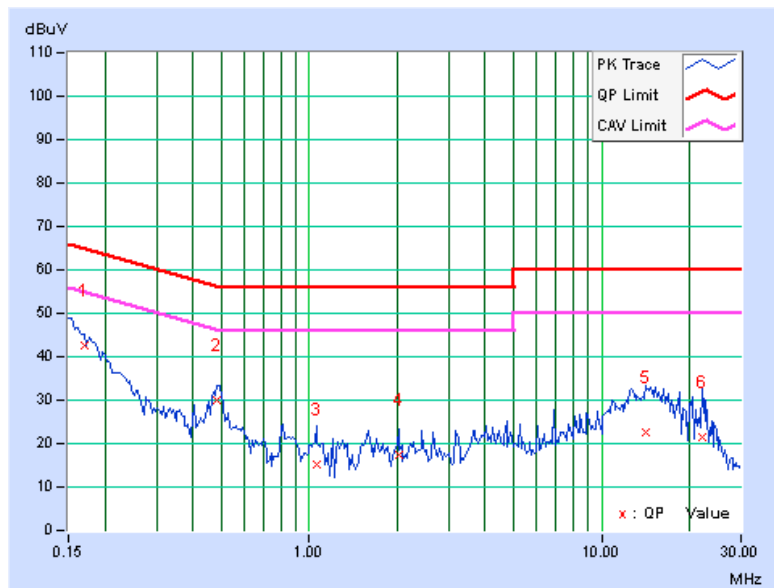
CONDUCTED WORST-CASE DATA :

PHASE	Line 1	6dB BANDWIDTH	9kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16953	0.16	42.52	19.49	42.68	19.65	64.98	54.98	-22.31	-35.34
2	0.48203	0.23	29.88	19.43	30.11	19.66	56.30	46.30	-26.19	-26.64
3	1.05469	0.25	15.09	5.84	15.34	6.09	56.00	46.00	-40.66	-39.91
4	2.01953	0.29	17.05	11.46	17.34	11.75	56.00	46.00	-38.66	-34.25
5	14.26563	0.93	21.74	12.80	22.67	13.73	60.00	50.00	-37.33	-36.27
6	22.21074	1.34	20.05	19.13	21.39	20.47	60.00	50.00	-38.61	-29.53

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

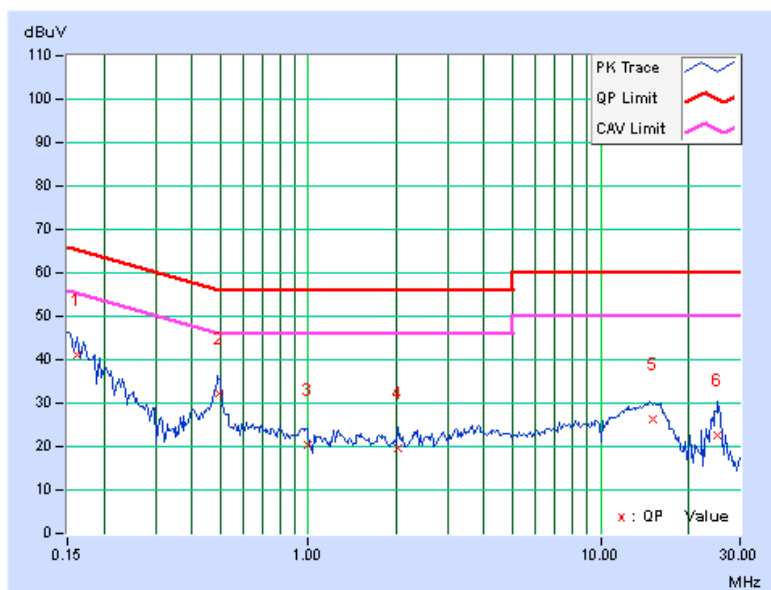


PHASE	Line 2	6dB BANDWIDTH	9kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	0.17	40.92	19.88	41.09	20.05	65.38	55.38	-24.29	-35.33
2	0.49766	0.24	32.08	21.98	32.32	22.22	56.04	46.04	-23.72	-23.82
3	0.99375	0.25	20.08	9.92	20.33	10.17	56.00	46.00	-35.67	-35.83
4	2.01953	0.28	19.44	12.92	19.72	13.20	56.00	46.00	-36.28	-32.80
5	15.08594	0.76	25.47	16.67	26.23	17.43	60.00	50.00	-33.77	-32.57
6	25.01953	1.11	21.66	14.80	22.77	15.91	60.00	50.00	-37.23	-34.09

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

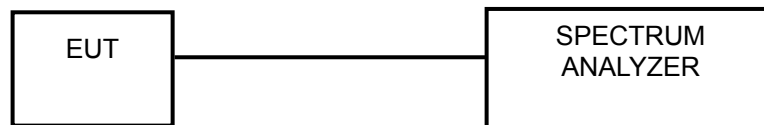


4.3 NUMBER OF HOPPING FREQUENCY USED

4.3.1 LIMIT OF HOPPING FREQUENCY USED

At least 50 channels frequencies, and should be equally spaced.

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 PROCEDURES

- a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- c. Set the SA on MaxHold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
- d. Set the SA on View mode and then plot the result on SA screen.
- e. Repeat above procedures until all frequencies measured were complete.

4.3.5 DEVIATION FROM TEST STANDARD

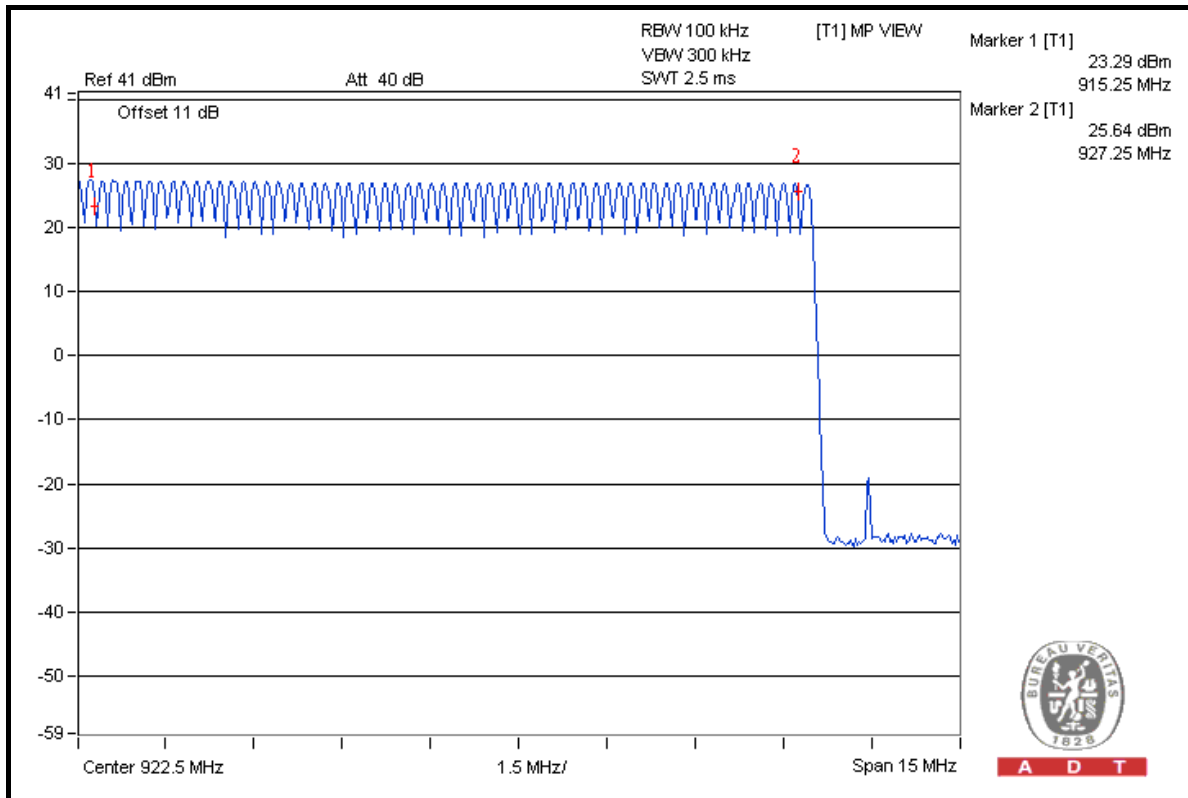
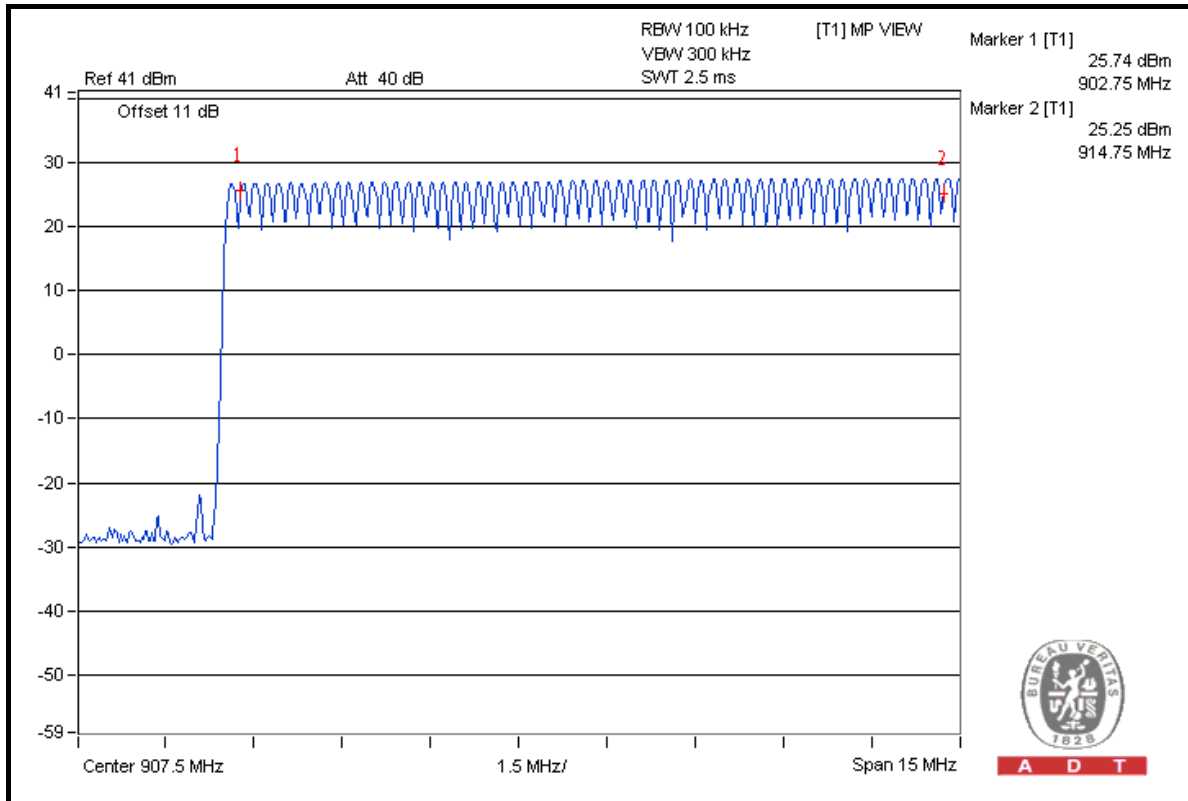
No deviation.

4.3.6 TEST RESULTS

There are 50 hopping frequencies in the hopping mode. Please refer to next page for the test result. On the plots, it shows that the hopping frequencies are equally spaced.



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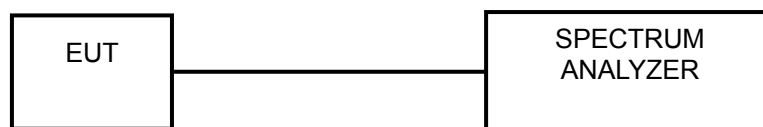


4.4 DWELL TIME ON EACH CHANNEL

4.4.1 LIMIT OF DWELL TIME USED

The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period.

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. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- c. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
- d. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
- e. Repeat above procedures until all different time-slot modes have been completed.

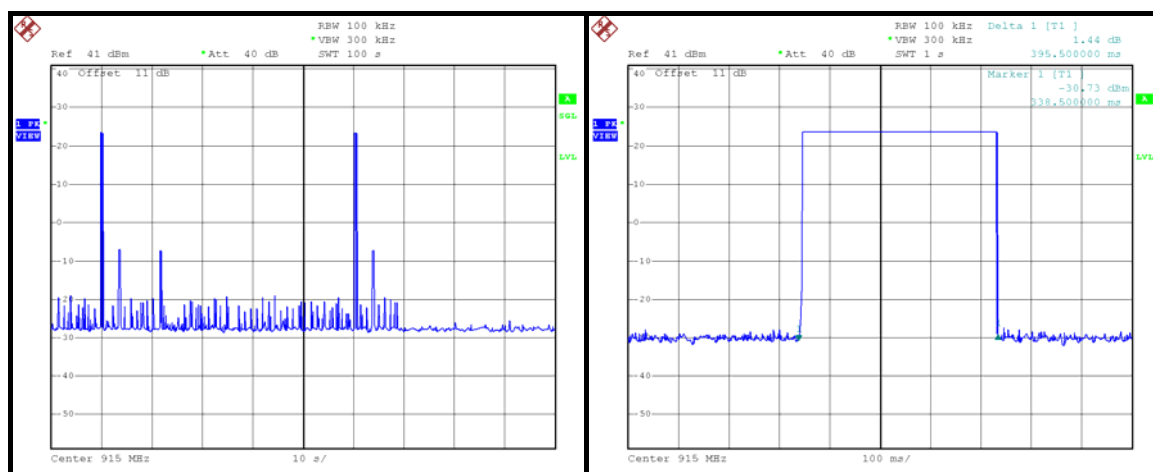
4.4.5 DEVIATION FROM TEST STANDARD

No deviation.

4.4.6 TEST RESULTS

Length of transmission time (ms)	TX Burst of 20s period	Result	Limit
395.5	1	395.5ms / 20s	400ms / 20s

NOTE: Test plots of the transmitting time slot are shown on following.

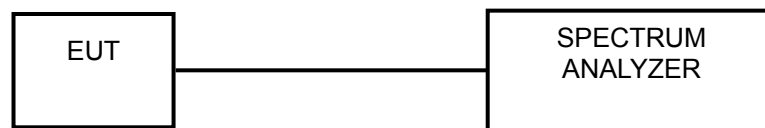


4.5 CHANNEL BANDWIDTH

4.5.1 LIMITS OF CHANNEL BANDWIDTH

The 20 dB bandwidth of the hopping channel shall be less than 250 kHz.

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. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- c. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
- d. Repeat above procedures until all frequencies measured were complete.

4.5.5 DEVIATION FROM TEST STANDARD

No deviation.

4.5.6 EUT OPERATING CONDITION

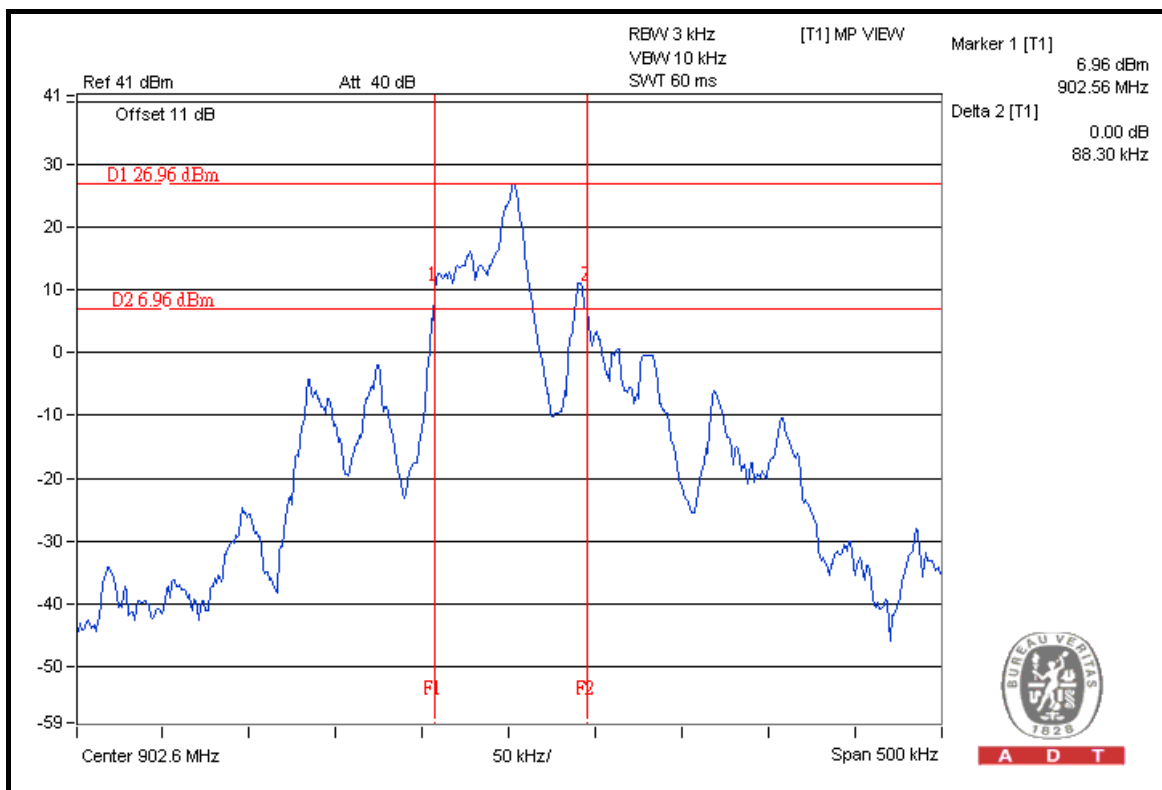
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.



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4.5.7 TEST RESULTS

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (kHz)	LIMIT (kHz)
0	902.6	88.30	250
62	915.0	87.10	250
124	927.4	86.50	250

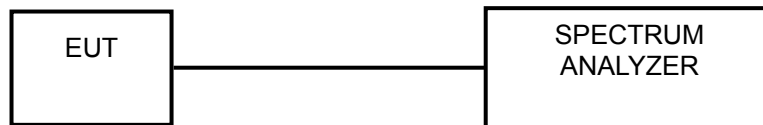


4.6 HOPPING CHANNEL SEPARATION

4.6.1 LIMIT OF HOPPING CHANNEL SEPARATION

At least 25kHz or 20dB hopping channel bandwidth (whichever is greater).

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 PROCEDURES

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
3. By using the MaxHold function record the separation of two adjacent channels.
4. Measure the frequency difference of these two adjacent channels by SA MARK function. And then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

4.6.5 DEVIATION FROM TEST STANDARD

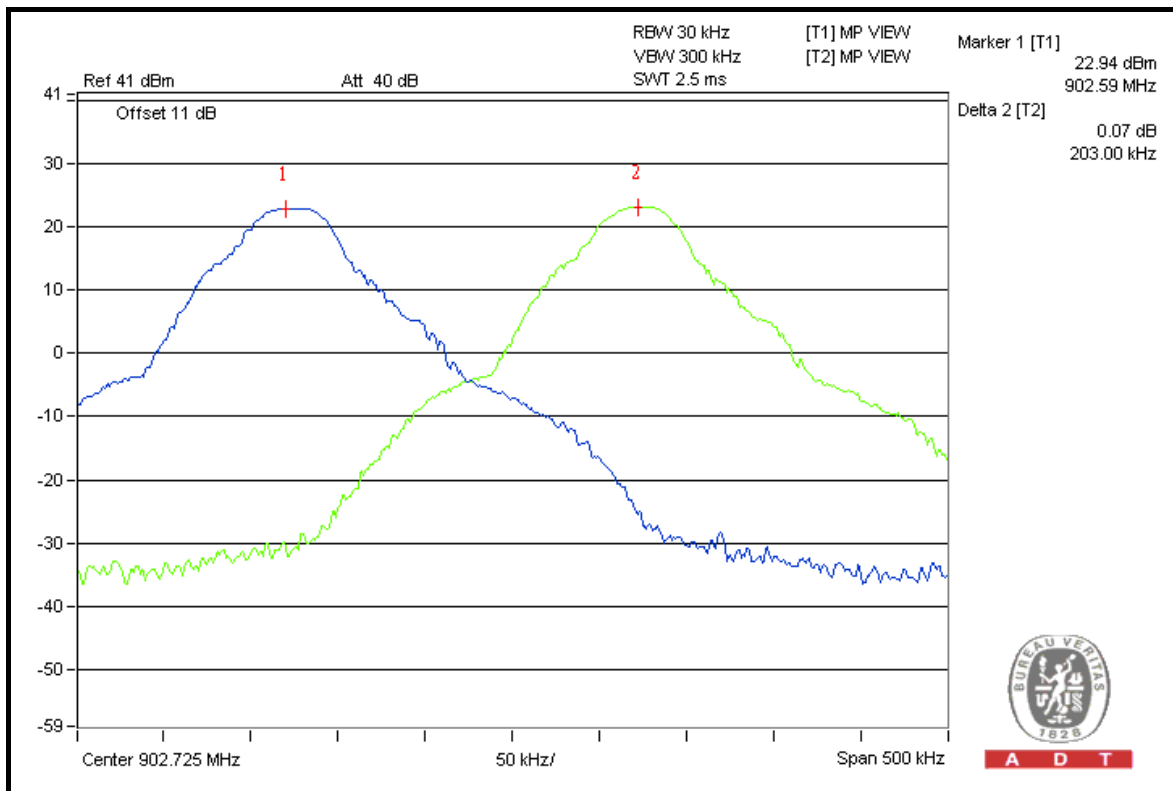
No deviation.



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4.6.6 TEST RESULTS

CHANNEL	FREQUENCY (MHz)	ADJACENT CHANNEL SEPARATION (kHz)	MINIMUM LIMIT (kHz)	PASS / FAIL
0	902.6	203.0	88.30	PASS
62	915.0	201.0	88.30	PASS
124	927.4	203.0	88.30	PASS

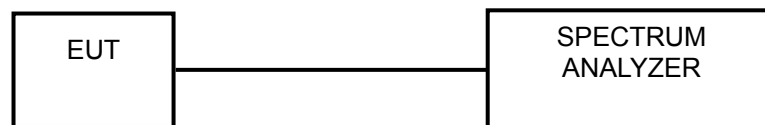


4.7 MAXIMUM OUTPUT POWER

4.7.1 LIMITS OF MAXIMUM OUTPUT POWER MEASUREMENT

The Maximum Output Power Measurement is 30dBm.

4.7.2 TEST SETUP



4.7.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.7.4 TEST PROCEDURES

- a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- c. The center frequency of the spectrum analyzer is set to the fundamental frequency and using 3MHz RBW and 10 MHz VBW.
- d. Measure the captured power within the band and recording the plot.
- e. Repeat above procedures until all frequencies required were complete.

4.7.5 DEVIATION FROM TEST STANDARD

No deviation

4.7.6 EUT OPERATING CONDITION

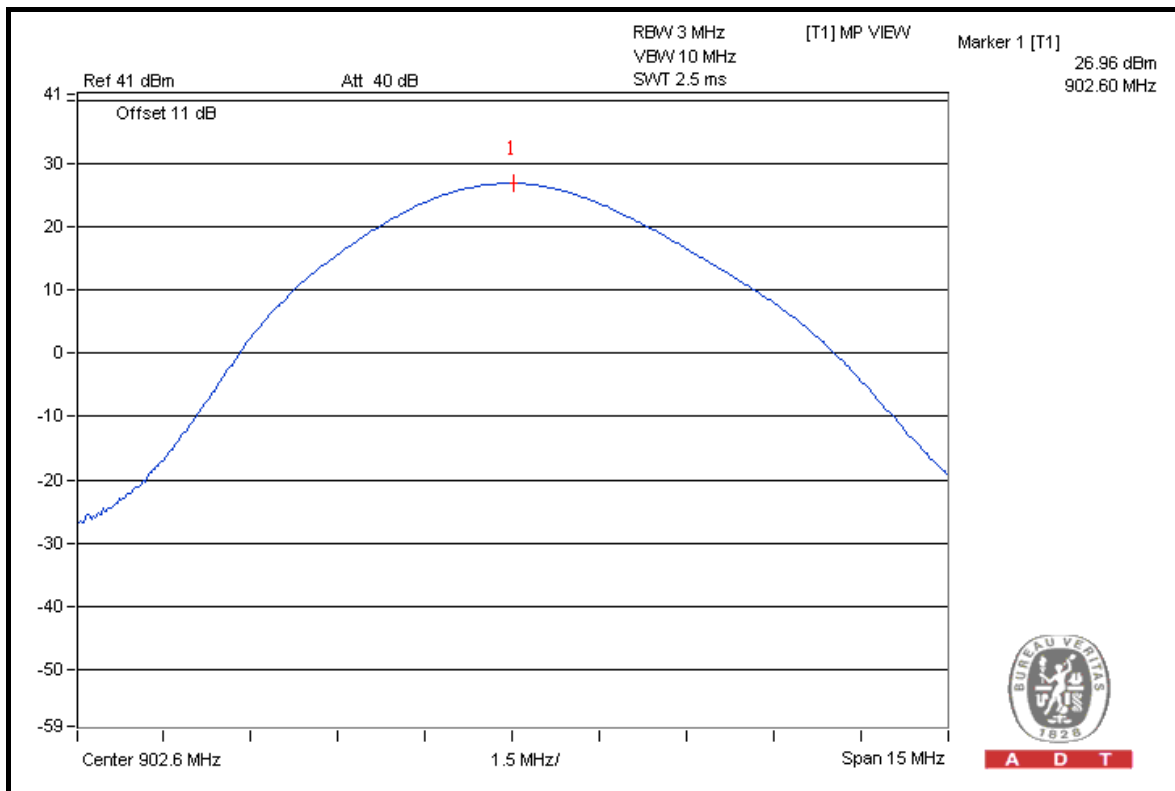
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.



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4.7.7 TEST RESULTS

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	POWER LIMIT (dBm)	PASS/FAIL
0	902.6	496.592	26.96	30	PASS
62	915.0	496.592	26.96	30	PASS
124	927.4	496.592	26.96	30	PASS



4.8 CONDUCTED OUT OF BAND EMISSION MEASUREMENT

4.8.1 LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT

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

4.8.2 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.8.3 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 300 kHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

4.8.4 DEVIATION FROM TEST STANDARD

No deviation.

4.8.5 EUT OPERATING CONDITION

The software provided by client enabled the EUT to transmit and receive data at lowest and highest channel frequencies individually.

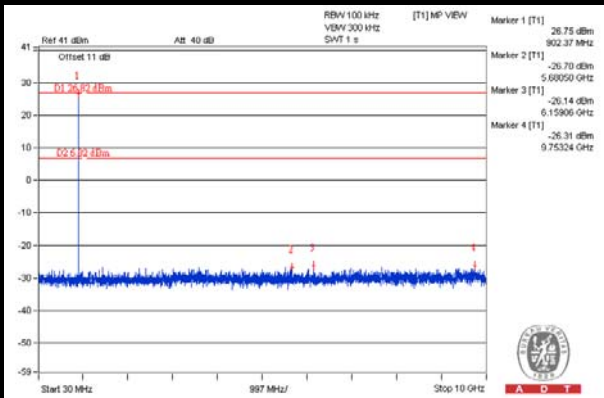
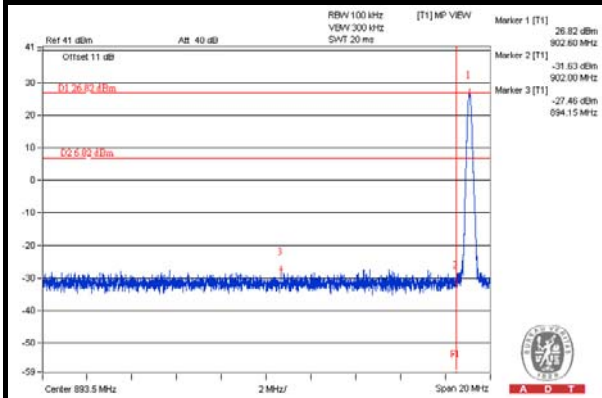
4.8.6 TEST RESULTS

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

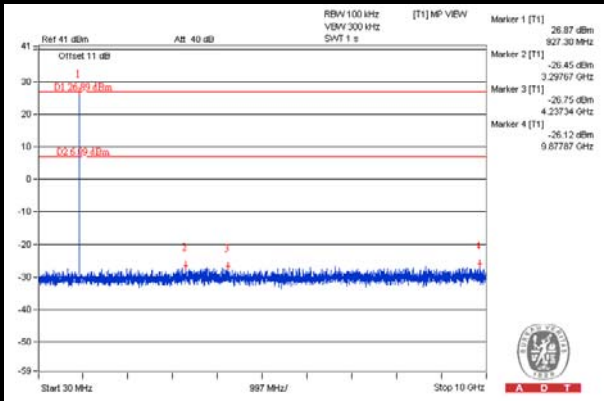
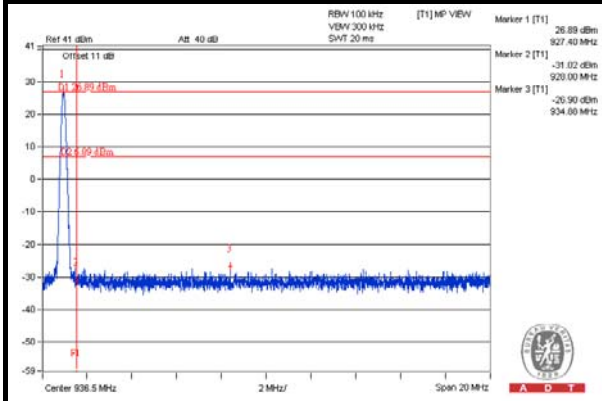


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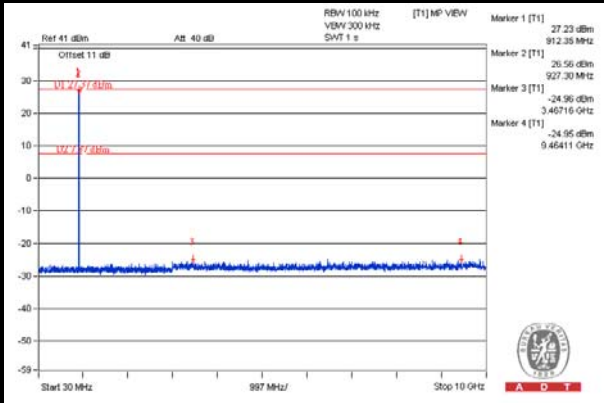
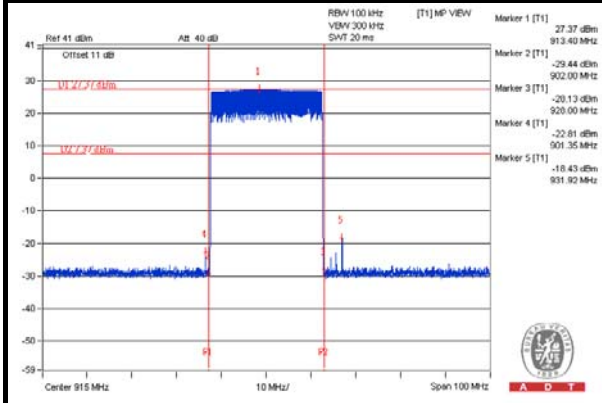
Hopping disabled_Low Channel



Hopping disabled_High Channel



Hopping enabled





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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.

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 Telecom Lab:

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

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



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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---