FCC TEST REPORT

(RFID)

REPORT NO.:	RF981028L05
MODEL NO.:	FS901-AB0A
RECEIVED:	Oct. 28, 2009
TESTED:	Jan. 22 ~ Feb. 03, 2010
ISSUED:	Feb. 03, 2010

APPLICANT:	Free2move Scientific S/B
ADDRESS:	22nd Floor Menara Haw Par Jalan Sultan Ismail 50250 Kuala Lumpur

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:	Gemia
BRAND:	Free2move
MODEL:	FS901-AB0A
APPLICANT:	Free2move Scientific S/B
TESTED:	Jan. 22 ~ Feb. 03, 2010
TEST SAMPLE:	ENGINEERING SAMPLE
STANDARDS:	**FCC Part 15, Subpart C (Section 15.247),** ANSI C63.4-2003

The above equipment (Model: FS901-AB0A) 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	: Polly Chien Polly Chien / Specialist	**, DATE :**	Feb. 03, 2010
TECHNICAL ACCEPTANCE Responsible for RF	: Long Chen Long Chen / Senior Engineer	**, DATE :**	Feb. 03, 2010
APPROVED BY	: Gary Chang Gary Chang / Assistant Manager	**, DATE :**	Feb. 03, 2010

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 –16.47dB at 0.150MHz.
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 –2.0dB at 928.0MHz
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 Emission	150kHz ~ 30MHz	2.44 dB
Radiated emissions	150MHz ~ 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	Gemia
MODEL NO.	FS901-AB0A
FCC ID	XZEFS901AB0A
POWER SUPPLY	5.0Vdc (Host equipment) 3.7Vdc (Rechargeable battery)
MODULATION TYPE	ASK (ISO18000-6c) (EPC C1G2)
TRANSFER RATE	80kbps
OPERATING FREQUENCY	902.3 ~ 927.7MHz
NUMBER OF CHANNEL	128
CHANNEL SPACING	200kHz
OUTPUT POWER	252.9mW
ANTENNA TYPE	In built antenna with 2dBi gain
ANTENNA CONNECTOR	MMCX
DATA CABLE	0.2m non-shielded USB cable without core
I/O PORTS	Refer to user's manual
ACCESSORY DEVICES	NA

NOTE:

1. The EUT is a Gemia with RFID and Bluetooth functions. The functions of EUT listed as below:

	REFERENCE REPORT
RFID	RF981028L05
BLUETOOTH	RF981028L05-1

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.

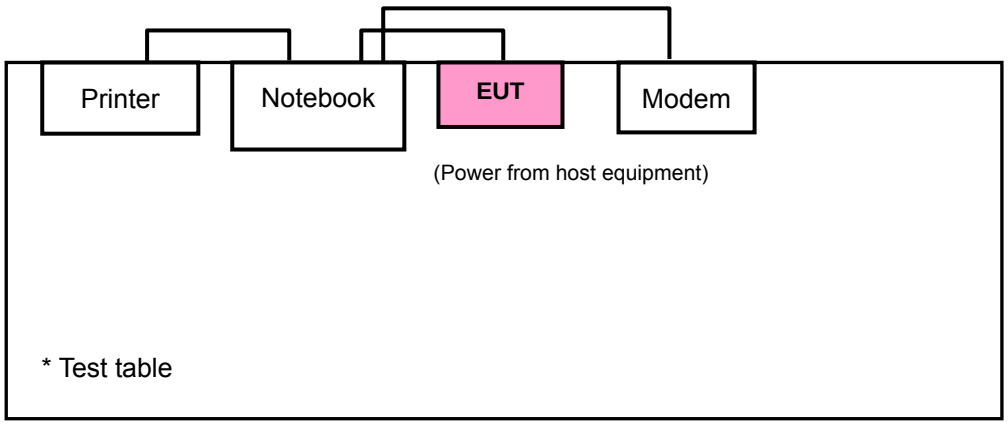
3.2 DESCRIPTION OF TEST MODES

128 channels are provided to this EUT:

CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)
1	902.3	21	906.3	41	910.3	61	914.3
2	902.5	22	906.5	42	910.5	62	914.5
3	902.7	23	906.7	43	910.7	63	914.7
4	902.9	24	906.9	44	910.9	64	914.9
5	903.1	25	907.1	45	911.1	65	915.1
6	903.3	26	907.3	46	911.3	66	915.3
7	903.5	27	907.5	47	911.5	67	915.5
8	903.7	28	907.7	48	911.7	68	915.7
9	903.9	29	907.9	49	911.9	69	915.9
10	904.1	30	908.1	50	912.1	70	916.1
11	904.3	31	908.3	51	912.3	71	916.3
12	904.5	32	908.5	52	912.5	72	916.5
13	904.7	33	908.7	53	912.7	73	916.7
14	904.9	34	908.9	54	912.9	74	916.9
15	905.1	35	909.1	55	913.1	75	917.1
16	905.3	36	909.3	56	913.3	76	917.3
17	905.5	37	909.5	57	913.5	77	917.5
18	905.7	38	909.7	58	913.7	78	917.7
19	905.9	39	909.9	59	913.9	79	917.9
20	906.1	40	910.1	60	914.1	80	918.1

CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)
81	918.3	101	922.3	121	926.3
82	918.5	102	922.5	122	926.5
83	918.7	103	922.7	123	926.7
84	918.9	104	922.9	124	926.9
85	919.1	105	923.1	125	927.1
86	919.3	106	923.3	126	927.3
87	919.5	107	923.5	127	927.5
88	919.7	108	923.7	128	927.7
89	919.9	109	923.9		
90	920.1	110	924.1		
91	920.3	111	924.3		
92	920.5	112	924.5		
93	920.7	113	924.7		
94	920.9	114	924.9		
95	921.1	115	925.1		
96	921.3	116	925.3		
97	921.5	117	925.5		
98	921.7	118	925.7		
99	921.9	119	925.9		
100	922.1	120	926.1		

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 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, XYZ axis, antenna ports (if EUT with antenna diversity architecture) and packet type.

☒ 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)	AXIS
-	1 to 128	1, 65, 128	ASK	80kbits/s	Y

RADIATED EMISSION TEST (BELOW 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, XYZ axis, antenna ports (if EUT with antenna diversity architecture) and packet type.

☒ 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)	AXIS
-	1 to 128	1	ASK	80kbits/s	Y

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)
-	1 to 128	1	ASK	80kbits/s

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, antenna ports (if EUT with antenna diversity architecture), and packet types.

☒ 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)
-	1 to 128	1, 65, 128	ASK	80kbits/s

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	25deg. C, 65%RH, 1011 hPa	5Vdc	Mark Liao
RE<1G	25deg. C, 65%RH, 1011 hPa	5Vdc	Mark Liao
PLC	25deg. C, 65%RH, 1012 hPa	5Vdc	Mark Liao
APCM	25deg. C, 65%RH, 1018 hPa	5Vdc	Dean Wang

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	NOTEBOOK	DELL	D820	21498926752	FCC DoC Approved
2	PRINTER	HP	1300	CNBJC66727	FCC DoC Approved
3	MODEM	ACEEX	1414V/3	0401008260	IFAXDM1414

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	1.8m braid shielded wire, USB connector, w/o core.
3	1.2m braid shielded wire, DB25 & DB9 connector, w/o core.

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

4. TEST TYPES AND RESULTS

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	100212	May 25, 2009	May 24, 2010
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Jul. 07, 2009	Jul. 06, 2010
BILOG Antenna SCHWARZBECK	VULB9168	9168-156	Apr. 30, 2009	Apr. 29, 2010
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-563	Aug. 10, 2009	Aug. 09, 2010
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170242	Jan. 06, 2009	Jan. 05, 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 13, 2009	May 12, 2010
RF signal cable Worken	8D-FB	Cable-HYCH9-01	Aug. 17, 2009	Aug. 16, 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

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 meter 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.

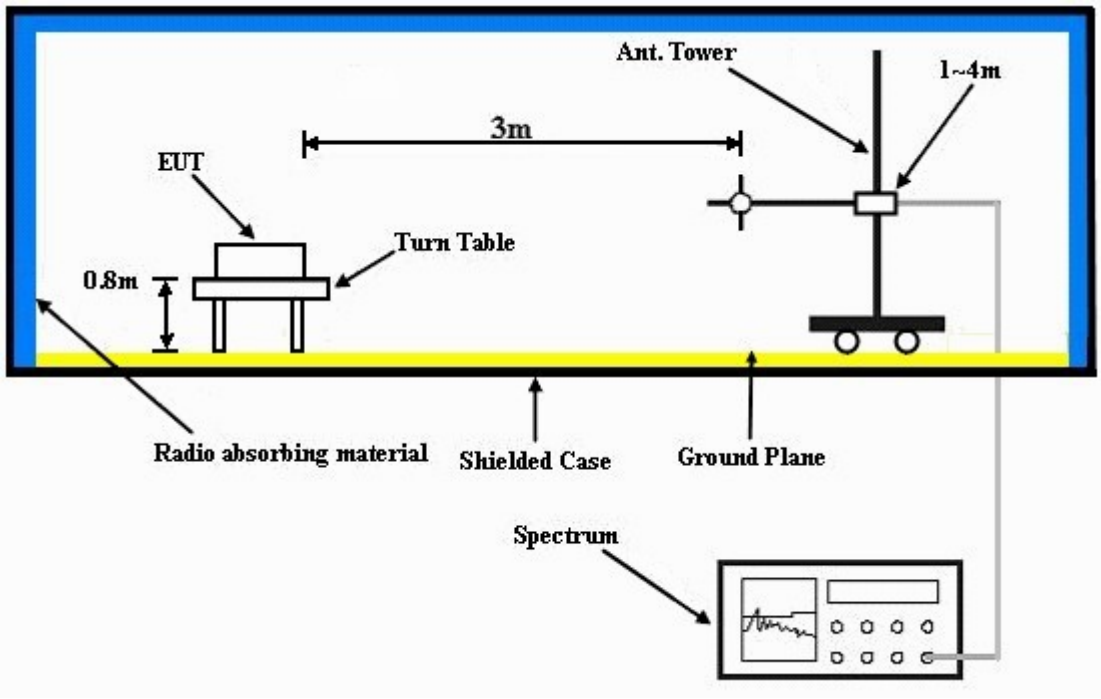
NOTE:

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 1 MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. 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 a testing table.
b. Set the EUT under transmission condition continuously at specific channel frequency.
c. The necessary accessories enable the system in full functions.

4.1.7 TEST RESULTS

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	Below 1GHz
INPUT POWER	5Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH 1011 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	#900.0	73.7 PK	99.6	-25.9	1.44 H	98	47.5	26.2
2	#900.0	58.1 AV	80.8	-22.7	1.44 H	98	31.9	26.2
3	#902.0	97.2 PK	99.6	-2.4	1.44 H	98	71.0	26.2
4	#902.0	78.4 AV	80.8	-2.4	1.44 H	98	52.2	26.2
5	*902.3	119.6 PK			1.44 H	98	93.4	26.2
6	*902.3	100.8 AV			1.44 H	98	74.6	26.2
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	#900.0	71.1 PK	98.3	-27.2	1.16 V	121	44.9	26.2
2	#900.0	55.8 AV	79.5	-23.7	1.16 V	121	29.6	26.2
3	#902.0	95.9 PK	98.3	-2.4	1.16 V	121	69.7	26.2
4	#902.0	77.1 AV	79.5	-2.4	1.16 V	121	50.9	26.2
5	*902.3	118.3 PK			1.16 V	121	92.1	26.2
6	*902.3	99.5 AV			1.16 V	121	73.3	26.2

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 radiated frequency is out the restricted band.
7. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:

   20 log (Duty cycle) = 20 log (5.74*2 ms / 100 ms) = -18.8 dB

   Please see page 25 for plotted duty.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 65	FREQUENCY RANGE	Below 1GHz
INPUT POWER	5Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH 1011 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	*915.1	120.4 PK			1.51 H	82	94.1	26.3
2	*915.1	101.6 AV			1.51 H	82	75.3	26.3
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	*915.1	120.5 PK			1.12 V	79	94.2	26.3
2	*915.1	101.7 AV			1.12 V	79	75.4	26.3

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 average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:

   20 log (Duty cycle) = 20 log (5.74*2 ms / 100 ms) = -18.8 dB

   Please see page 25 for plotted duty.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 128	FREQUENCY RANGE	Below 1GHz
INPUT POWER	5Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH 1011 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	*927.7	118.4 PK			1.43 H	85	92.0	26.4
2	*927.7	99.6 AV			1.43 H	85	73.2	26.4
3	**#928.0**	**96.4 PK**	**98.4**	**-2.0**	**1.43 H**	**85**	**70.0**	**26.4**
4	**#928.0**	**77.6 AV**	**79.6**	**-2.0**	**1.43 H**	**85**	**51.2**	**26.4**
5	#930.0	73.0 PK	98.4	-25.4	1.43 H	85	46.6	26.4
6	#930.0	57.2 AV	79.6	-22.4	1.43 H	85	30.8	26.4
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	*927.7	118.3 PK			1.12 V	79	91.9	26.4
2	*927.7	99.5 AV			1.12 V	79	73.1	26.4
3	**#928.0**	**96.3 PK**	**98.3**	**-2.0**	**1.12 V**	**79**	**69.9**	**26.4**
4	**#928.0**	**77.5 AV**	**79.5**	**-2.0**	**1.12 V**	**79**	**51.1**	**26.4**
5	#930.0	71.7 PK	98.3	-26.6	1.12 V	79	45.3	26.4
6	#930.0	55.3 AV	79.5	-24.2	1.12 V	79	28.9	26.4

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 radiated frequency is out the restricted band.

7. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:

20 log (Duty cycle) = 20 log (5.74*2 ms / 100 ms) = -18.8 dB

Please see page 25 for plotted duty.

RADIATED ABOVE 1GHz DATA:

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	5Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH 1011 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	#1804.6	68.5 PK	99.6	-31.1	1.00 H	84	38.3	30.2
2	#1804.6	49.7 AV	80.8	-31.1	1.00 H	84	19.5	30.2
3	2706.9	56.9 PK	74.0	-17.1	1.20 H	100	23.5	33.4
4	2706.9	38.1 AV	54.0	-15.9	1.20 H	100	4.7	33.4
5	3609.2	55.5 PK	74.0	-18.5	1.20 H	160	20.2	35.3
6	3609.2	36.7 AV	54.0	-17.3	1.20 H	160	1.4	35.3
7	4511.5	62.6 PK	74.0	-11.4	1.09 H	41	24.9	37.7
8	4511.5	43.8 AV	54.0	-10.2	1.09 H	41	6.1	37.7
9	5413.8	58.1 PK	74.0	-15.9	1.09 H	94	18.7	39.4
10	5413.8	39.3 AV	54.0	-14.7	1.09 H	94	-0.1	39.4
11	#6316.1	52.6 PK	99.6	-47.0	1.37 H	144	10.9	41.7
12	#6316.1	33.8 AV	80.8	-47.0	1.37 H	144	-7.9	41.7

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. "#":The radiated frequency is out the restricted band.
6. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:

   20 log (Duty cycle) = 20 log (5.74*2 ms / 100 ms) = -18.8 dB

   Please see page 25 for plotted duty.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	5Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH 1011 hPa	TESTED BY	Mark Liao

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	#1804.6	75.0 PK	98.3	-23.3	1.25 V	288	44.8	30.2
2	#1804.6	56.2 AV	79.5	-23.3	1.25 V	288	26.0	30.2
3	2706.9	56.6 PK	74.0	-17.4	1.03 V	111	23.2	33.4
4	2706.9	37.8 AV	54.0	-16.2	1.03 V	111	4.4	33.4
5	3609.2	56.8 PK	74.0	-17.2	1.20 V	112	21.5	35.3
6	3609.2	38.0 AV	54.0	-16.0	1.20 V	112	2.7	35.3
7	4511.5	56.6 PK	74.0	-17.4	1.00 V	215	18.9	37.7
8	4511.5	37.8 AV	54.0	-16.2	1.00 V	215	0.1	37.7
9	5413.8	57.2 PK	74.0	-16.8	1.00 V	224	17.8	39.4
10	5413.8	38.4 AV	54.0	-15.6	1.00 V	224	-1.0	39.4
11	#6316.1	53.7 PK	98.3	-44.6	1.33 V	304	12.0	41.7
12	#6316.1	34.9 AV	79.5	-44.6	1.33 V	304	-6.8	41.7

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. "#":The radiated frequency is out the restricted band.
6. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:

   20 log (Duty cycle) = 20 log (5.74*2 ms / 100 ms) = -18.8 dB

   Please see page 25 for plotted duty.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 65	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	5Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH 1011 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	#1830.2	66.3 PK	100.4	-34.1	1.46 H	104	36.0	30.3
2	#1830.2	47.50 AV	81.6	-34.1	1.46 H	104	17.2	30.3
3	2745.3	54.8 PK	74.0	-19.2	1.10 H	111	21.3	33.5
4	2745.3	36.0 AV	54.0	-18.0	1.10 H	111	2.5	33.5
5	3660.4	54.2 PK	74.0	-19.8	1.06 H	202	18.7	35.5
6	3660.4	35.4 AV	54.0	-18.6	1.06 H	202	-0.1	35.5
7	4575.5	60.7 PK	74.0	-13.3	1.06 H	40	22.9	37.8
8	4575.5	41.9 AV	54.0	-12.1	1.06 H	40	4.1	37.8
9	#5490.6	55.3 PK	100.4	-45.1	1.06 H	93	15.8	39.5
10	#5490.6	36.5 AV	81.6	-45.1	1.06 H	93	-3.0	39.5
11	#6405.7	53.4 PK	100.4	-47.0	1.35 H	148	11.4	42.0
12	#6405.7	34.6 AV	81.6	-47.0	1.35 H	148	-7.4	42.0

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. "#":The radiated frequency is out the restricted band.
6. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:

   20 log (Duty cycle) = 20 log (5.74*2 ms / 100 ms) = -18.8 dB

   Please see page 25 for plotted duty.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 64	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	5Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH 1011 hPa	TESTED BY	Mark Liao

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	#1830.2	70.4 PK	100.5	-30.1	1.00 V	89	40.1	30.3
2	#1830.2	51.6 AV	81.7	-30.1	1.00 V	89	21.3	30.3
3	2745.3	59.8 PK	74.0	-14.2	1.00 V	106	26.3	33.5
4	2745.3	41.0 AV	54.0	-13.0	1.00 V	106	7.5	33.5
5	3660.4	54.7 PK	74.0	-19.3	1.16 V	113	19.2	35.5
6	3660.4	35.9 AV	54.0	-18.1	1.16 V	113	0.4	35.5
7	4575.5	55.0 PK	74.0	-19.0	1.46 V	254	17.2	37.8
8	4575.5	36.2 AV	54.0	-17.8	1.46 V	254	-1.6	37.8
9	#5490.6	52.5 PK	100.5	-48.0	1.42 V	113	13.0	39.5
10	#5490.6	33.7 AV	81.7	-48.0	1.42 V	113	-5.8	39.5
11	#6405.7	53.1 PK	100.5	-47.4	1.53 V	113	11.1	42.0
12	#6405.7	34.3 AV	81.7	-47.4	1.53 V	113	-7.7	42.0

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. "#":The radiated frequency is out the restricted band.
6. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:

   20 log (Duty cycle) = 20 log (5.74*2 ms / 100 ms) = -18.8 dB

   Please see page 25 for plotted duty.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 128	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	5Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH 1011 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	#1855.4	64.0 PK	98.4	-34.4	1.00 H	122	33.6	30.4
2	#1855.4	45.2 AV	79.6	-34.4	1.00 H	122	14.8	30.4
3	2783.1	61.5 PK	74.0	-12.5	1.19 H	90	27.8	33.7
4	2783.1	42.7 AV	54.0	-11.3	1.19 H	90	9.0	33.7
5	3710.8	55.7 PK	74.0	-18.3	1.19 H	221	20.1	35.6
6	3710.8	36.9 AV	54.0	-17.1	1.19 H	221	1.3	35.6
7	4638.5	57.1 PK	74.0	-16.9	1.45 H	161	19.1	38.0
8	4638.5	38.3 AV	54.0	-15.7	1.45 H	161	0.3	38.0
9	#5566.2	55.2 PK	98.4	-43.2	1.37 H	96	15.6	39.6
10	#5566.2	36.4 AV	79.6	-43.2	1.37 H	96	-3.2	39.6
11	#6493.9	54.6 PK	98.4	-43.8	1.44 H	108	12.3	42.3
12	#6493.9	35.8 AV	79.6	-43.8	1.44 H	108	-6.5	42.3

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. "#":The radiated frequency is out the restricted band.
6. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:

   20 log (Duty cycle) = 20 log (5.74*2 ms / 100 ms) = -18.8 dB

   Please see page 25 for plotted duty.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 128	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	5Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH 1011 hPa	TESTED BY	Mark Liao

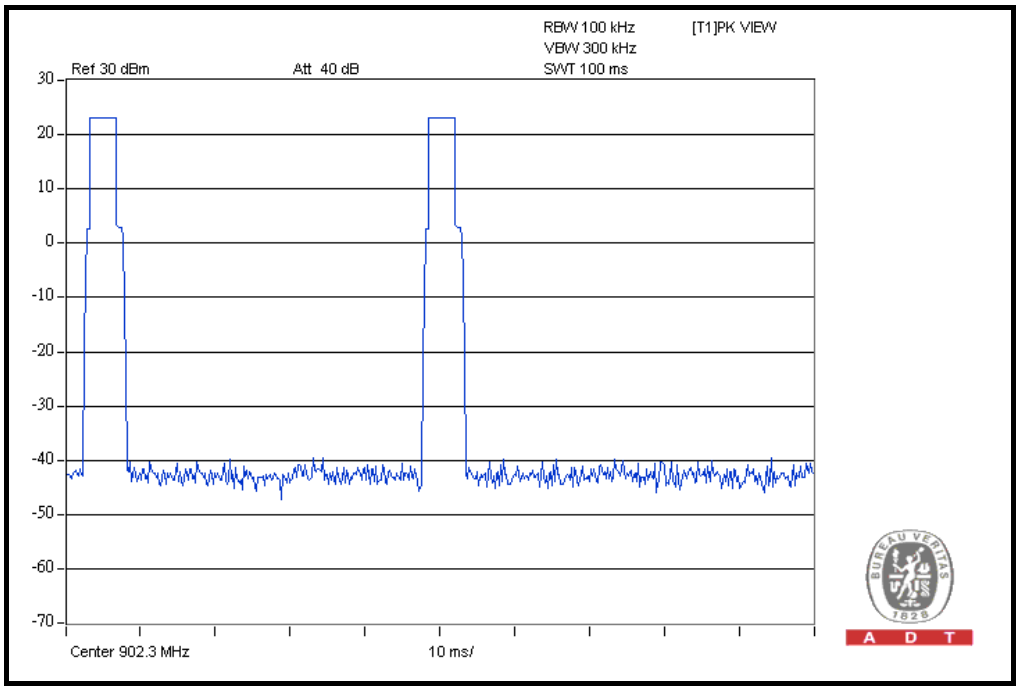
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#1855.4	69.7 PK	98.3	-28.6	1.19 V	105	39.3	30.4
2	#1855.4	50.9 AV	79.5	-28.6	1.19 V	105	20.5	30.4
3	2783.1	60.0 PK	74.0	-14.0	1.28 V	290	26.3	33.7
4	2783.1	41.2 AV	54.0	-12.8	1.28 V	290	7.5	33.7
5	3710.8	55.5 PK	74.0	-18.5	1.16 V	115	19.9	35.6
6	3710.8	36.7 AV	54.0	-17.3	1.16 V	115	1.1	35.6
7	4638.5	56.1 PK	74.0	-17.9	1.19 V	100	18.1	38.0
8	4638.5	37.3 AV	54.0	-16.7	1.19 V	100	-0.7	38.0
9	#5566.2	50.6 PK	98.3	-47.7	1.30 V	85	11.0	39.6
10	#5566.2	31.8 AV	79.5	-47.7	1.30 V	85	-7.8	39.6
11	#6493.9	53.4 PK	98.3	-44.9	1.32 V	142	11.1	42.3
12	#6493.9	34.6 AV	79.5	-44.9	1.32 V	142	-7.7	42.3

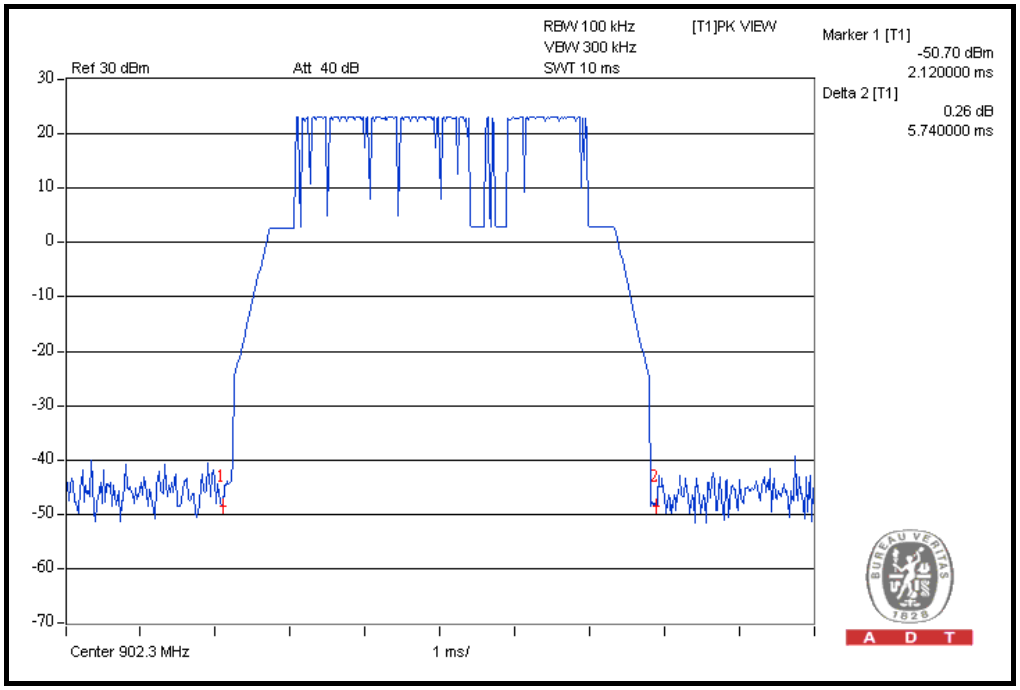
REMARKS: 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).

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. "#":The radiated frequency is out the restricted band.
6. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:

   20 log (Duty cycle) = 20 log (5.74*2 ms / 100 ms) = -18.8 dB

   Please see page 25 for plotted duty.


RBW 100 kHz
VBW 300 kHz
SWT 100 ms
[T1]PK VIEW
Ref 30 dBm
Att 40 dB
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
Center 902.3 MHz
10 ms/


RBW 100 kHz
VBW 300 kHz
SWT 10 ms
[T1]PK VIEW
Marker 1 [T1]
-50.70 dBm
2.120000 ms
Delta 2 [T1]
0.26 dB
5.740000 ms
Ref 30 dBm
Att 40 dB
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
Center 902.3 MHz
1 ms/

BELOW 1GHz WORST-CASE DATA

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	5Vdc	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH 1011 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	132.95	40.4 QP	43.5	-3.1	2.25 H	61	28.10	12.30
2	228.22	32.6 QP	46.0	-13.4	1.25 H	61	20.70	11.90
3	399.31	40.8 QP	46.0	-5.2	2.25 H	97	24.70	16.10
4	597.63	33.6 QP	46.0	-12.4	1.50 H	169	11.70	21.90
5	733.73	34.4 QP	46.0	-11.6	2.25 H	58	10.80	23.60
6	836.78	36.9 QP	46.0	-9.1	2.25 H	115	11.30	25.60
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	41.57	30.8 QP	40.0	-9.2	1.25 V	289	18.30	12.50
2	127.11	36.7 QP	43.5	-6.8	1.50 V	358	24.60	12.10
3	399.31	34.6 QP	46.0	-11.4	1.25 V	4	18.50	16.10
4	667.63	34.1 QP	46.0	-11.9	1.50 V	94	11.60	22.50
5	733.73	33.9 QP	46.0	-12.1	1.25 V	55	10.30	23.60
6	879.55	35.1 QP	46.0	-10.9	1.00 V	70	9.10	26.00

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 0.50 MHz.
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	100291	Dec. 16, 2009	Dec. 15, 2010
RF signal cable Woken	5D-FB	Cable-HYC01-01	Nov. 12, 2009	Nov. 11, 2010
LISN ROHDE & SCHWARZ	ESH3-Z5	100312	Jun. 18, 2009	Jun. 17, 2010
LISN ROHDE & SCHWARZ	ESH3-Z5	835239/001	Feb. 24, 2009	Feb. 23, 2010
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 1.
3. The VCCI Site Registration No. is C-2040.

4.2.3 TEST PROCEDURES

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

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

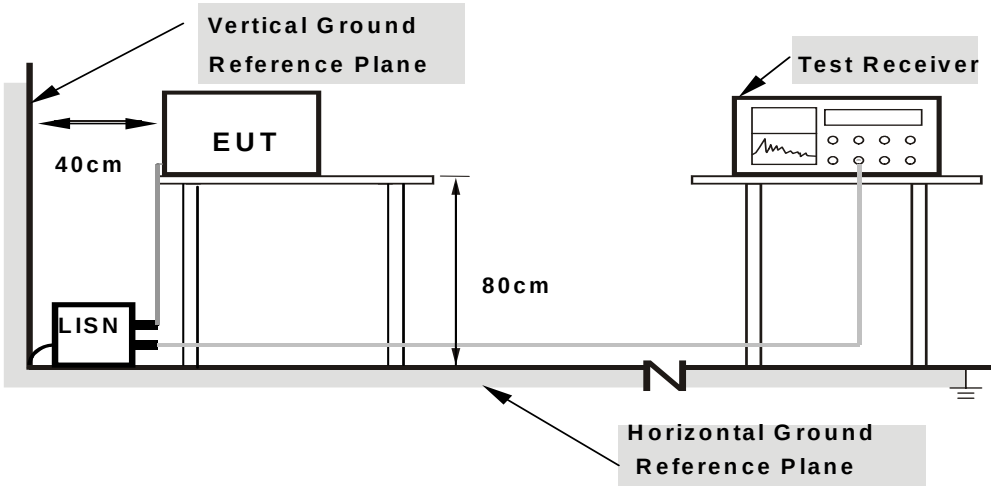
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: 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: 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.

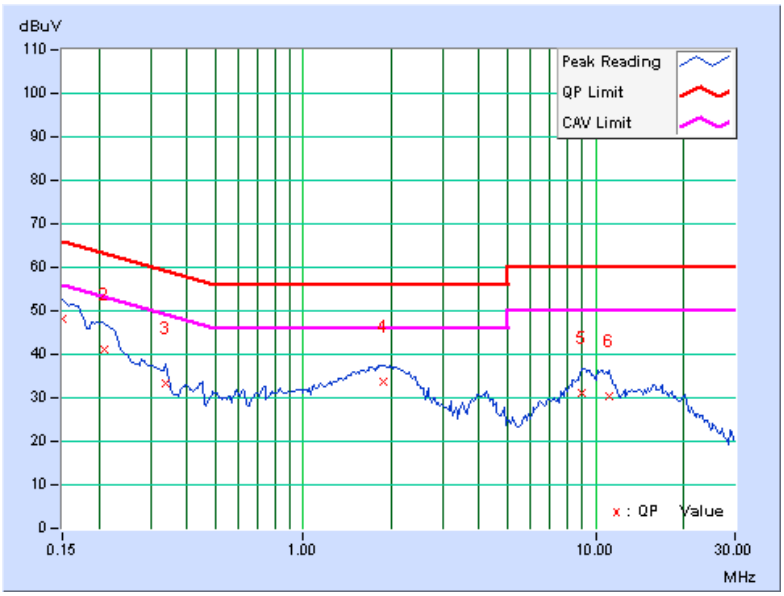
4.2.7 TEST RESULTS

CONDUCTED WORST-CASE DATA

PHASE	Line 1	6dB BANDWIDTH	9kHz

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.13	47.94	-	48.07	-	66.00	56.00	-17.93	-
2	0.209	0.13	40.85	-	40.98	-	63.26	53.26	-22.28	-
3	0.338	0.14	33.15	-	33.29	-	59.26	49.26	-25.98	-
4	1.879	0.22	33.65	-	33.87	-	56.00	46.00	-22.13	-
5	9.012	0.61	30.54	-	31.15	-	60.00	50.00	-28.85	-
6	11.137	0.72	29.71	-	30.43	-	60.00	50.00	-29.57	-

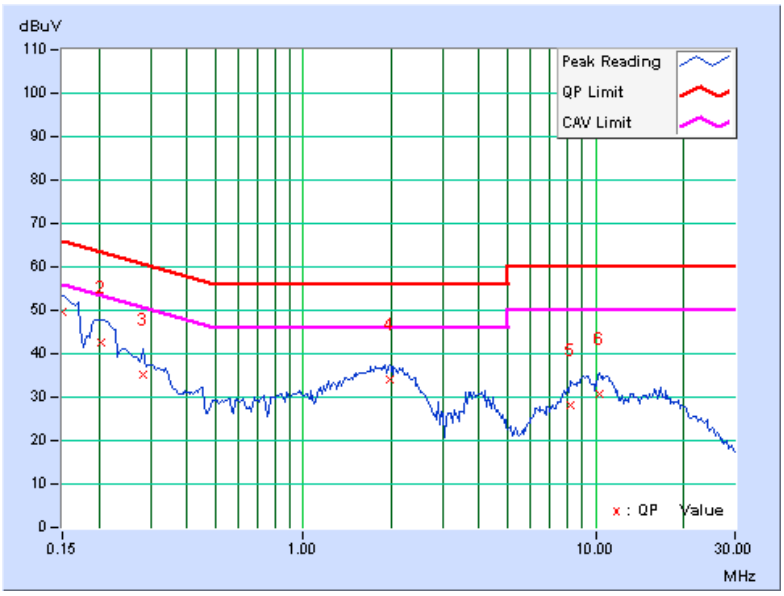
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



PHASE	Line 2	6dB BANDWIDTH	9kHz

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	**0.150**	**0.14**	**49.39**	**-**	**49.53**	**-**	**66.00**	**56.00**	**-16.47**	**-**
2	0.205	0.15	42.38	-	42.53	-	63.42	53.42	-20.89	-
3	0.283	0.15	35.22	-	35.37	-	60.73	50.73	-25.36	-
4	1.977	0.25	33.84	-	34.09	-	56.00	46.00	-21.91	-
5	8.223	0.58	27.43	-	28.01	-	60.00	50.00	-31.99	-
6	10.371	0.67	29.99	-	30.66	-	60.00	50.00	-29.34	-

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 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 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
R&S SPECTRUM ANALYZER	FSP40	100041	May 13, 2009	May 12, 2010

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 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.

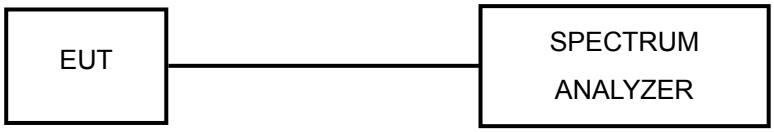
d. Set the SA on View mode and then plot the result on SA screen.

e. Repeat above procedures until all frequencies measured were complete.

4.3.4 DEVIATION FROM TEST STANDARD

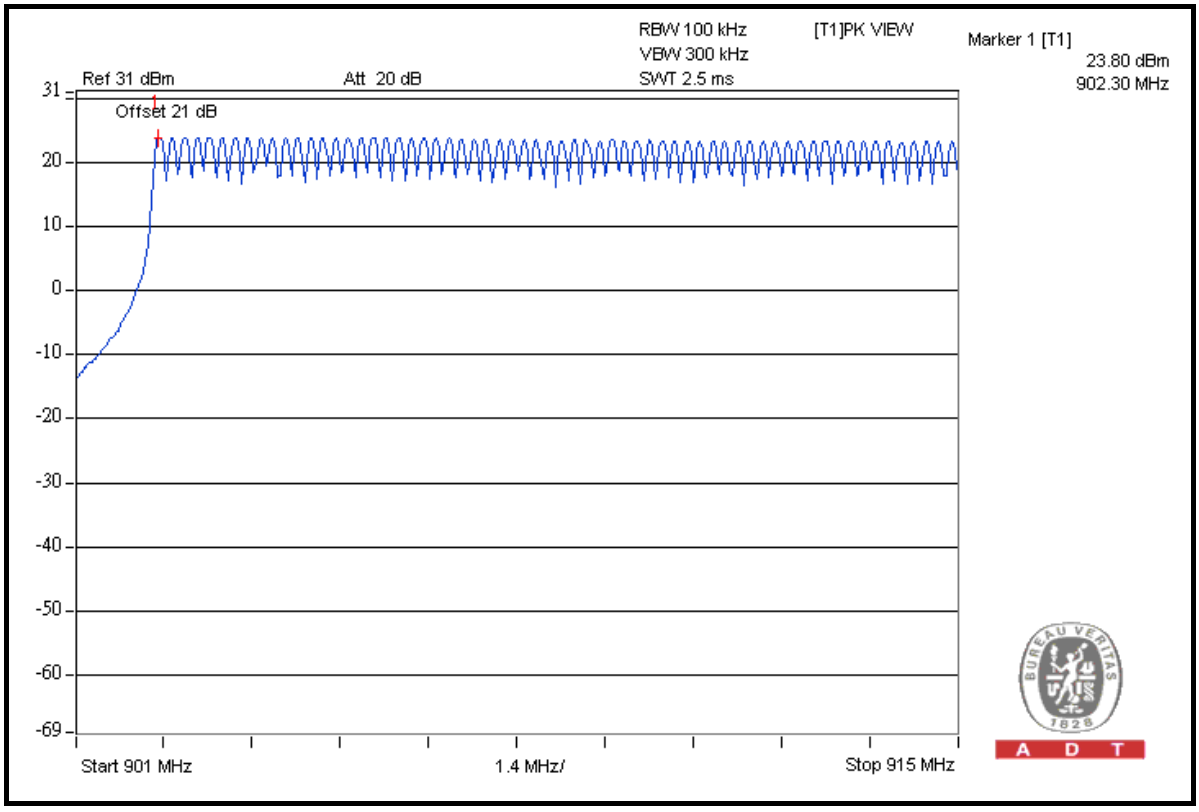
No deviation.

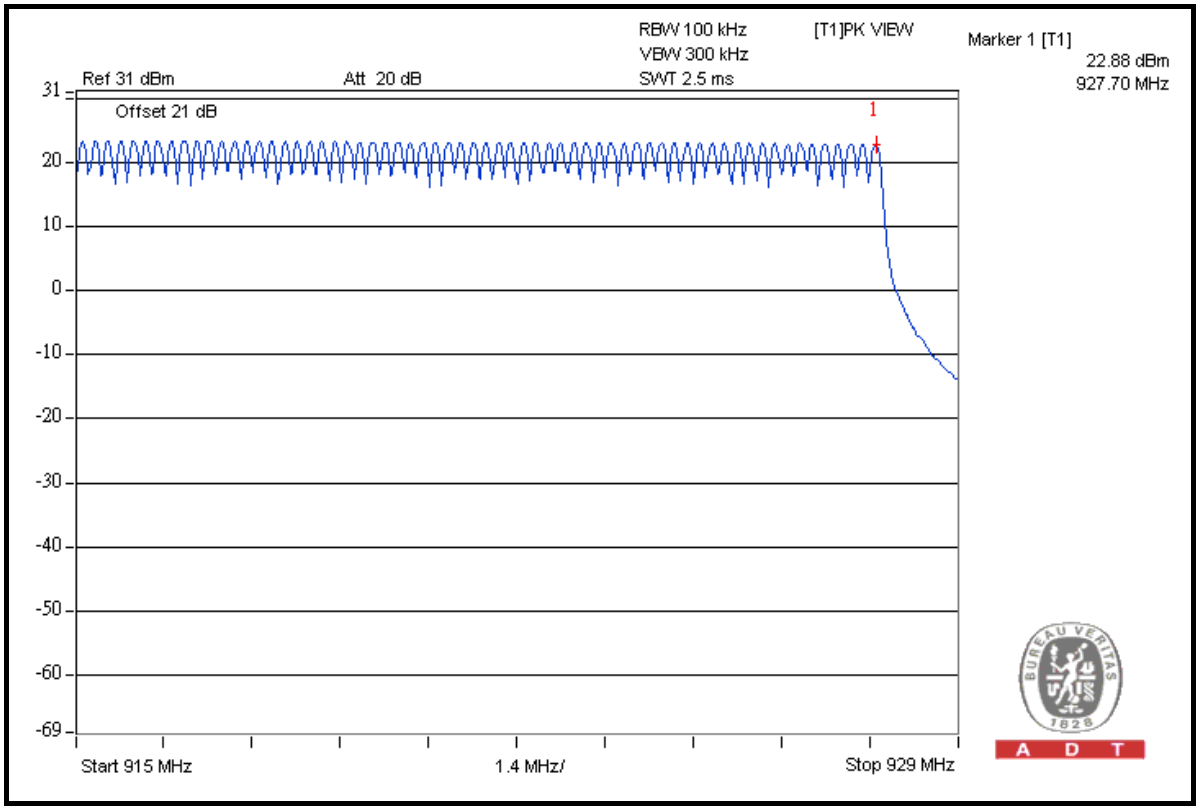
4.3.5 TEST SETUP

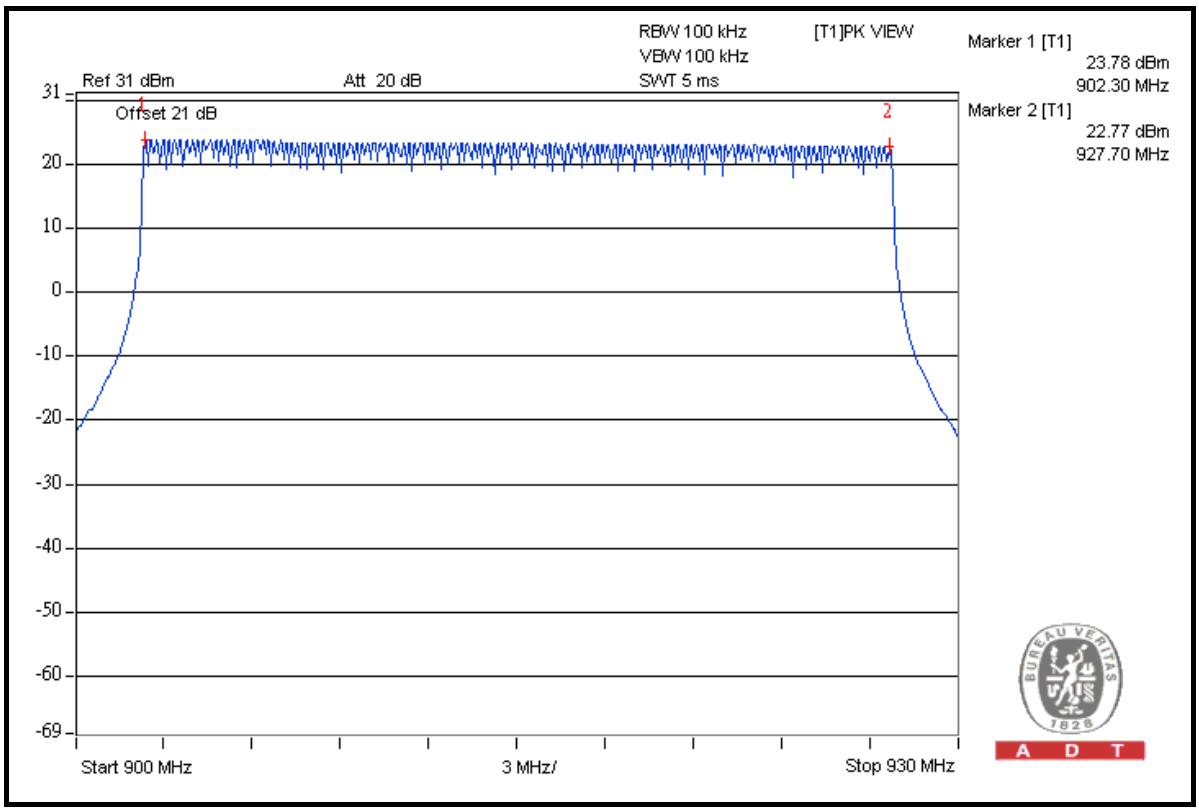


4.3.6 TEST RESULTS

There are 128 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.


RBW 100 kHz
VBW 300 kHz
SWT 2.5 ms
[T1]PK VIEW
Marker 1 [T1]
23.80 dBm
902.30 MHz
Ref 31 dBm
Att 20 dB
Offset 21 dB
31
20
10
0
-10
-20
-30
-40
-50
-60
-69
Start 901 MHz
1.4 MHz/
Stop 915 MHz


RBW 100 kHz
VBW 300 kHz
SWT 2.5 ms
[T1]PK VIEW
Marker 1 [T1]
22.88 dBm
927.70 MHz
Ref 31 dBm
Att 20 dB
Offset 21 dB
1
31
20
10
0
-10
-20
-30
-40
-50
-60
-69
Start 915 MHz
1.4 MHz/
Stop 929 MHz


RBW 100 kHz
VBW 100 kHz
SWT 5 ms
[T1]PK VIEW
Marker 1 [T1]
23.78 dBm
902.30 MHz
Marker 2 [T1]
22.77 dBm
927.70 MHz
Ref 31 dBm
Att 20 dB
Offset 21 dB
31
20
10
0
-10
-20
-30
-40
-50
-60
-69
Start 900 MHz
3 MHz/
Stop 930 MHz

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 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
R&S SPECTRUM ANALYZER	FSP40	100041	May 13, 2009	May 12, 2010

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

4.4.3 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.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation.

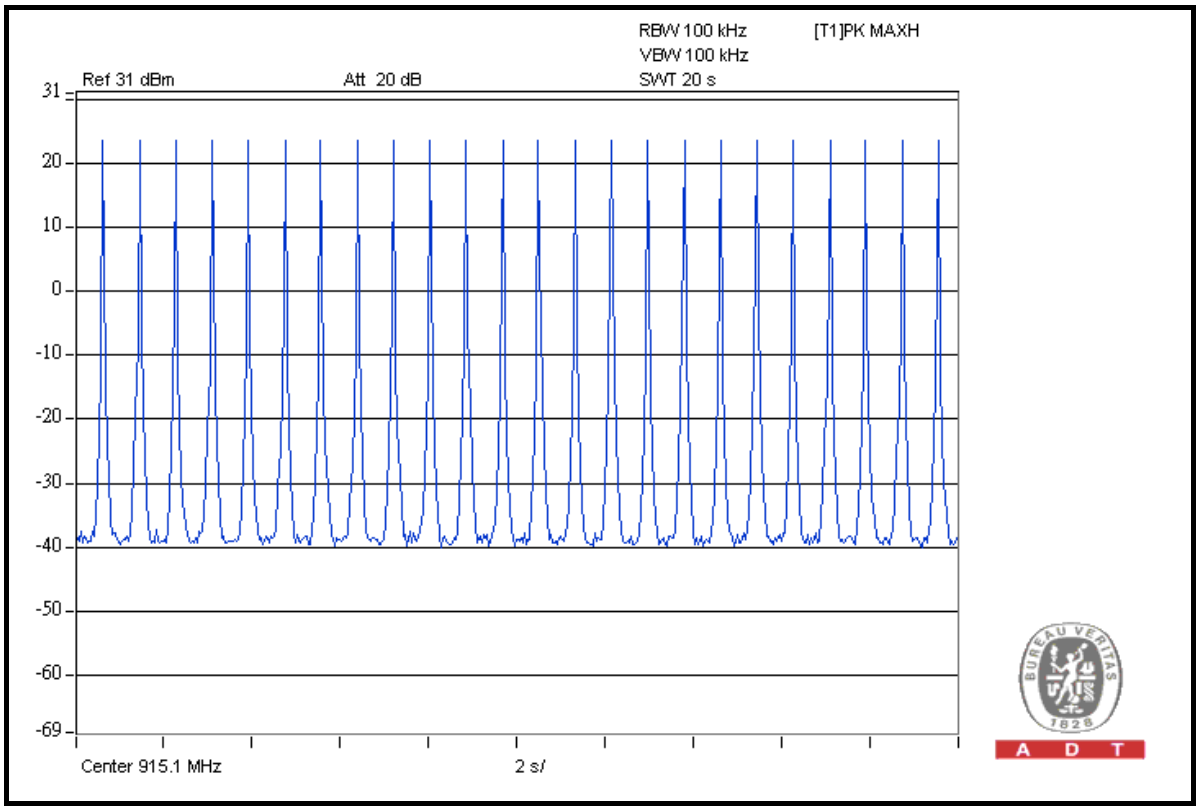
4.4.5 TEST SETUP

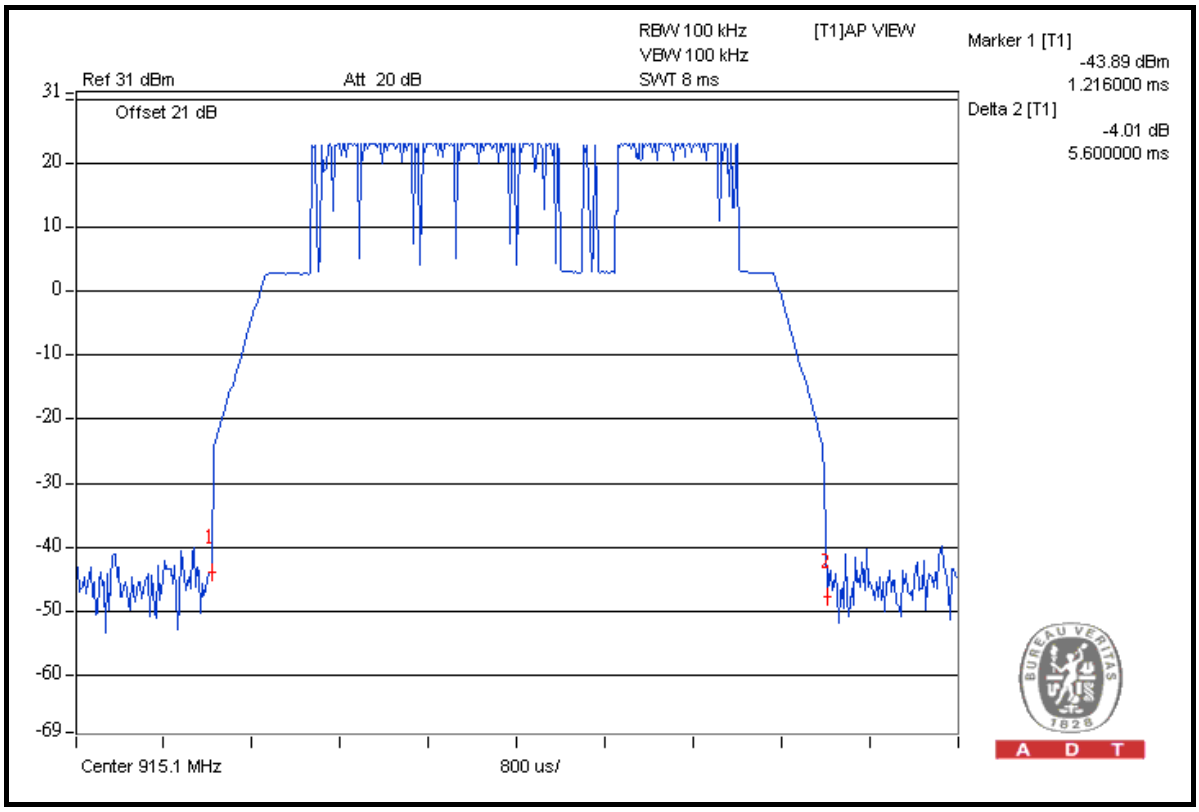
Same as 4.3.5.

4.4.6 TEST RESULTS

Length of transmission time (ms)	TX Burst of 20s period	Result	Limit
5.6	24	134.4ms / 20s	400ms / 20s

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


RBW 100 kHz
VBW 100 kHz
SWT 20 s
[T1]PK MAXH
Ref 31 dBm
Att 20 dB
31
20
10
0
-10
-20
-30
-40
-50
-60
-69
Center 915.1 MHz
2 s/


RBW 100 kHz
VBW 100 kHz
SWT 8 ms
[T1]AP VIEW
Marker 1 [T1]
-43.89 dBm
1.216000 ms
Delta 2 [T1]
-4.01 dB
5.600000 ms
Ref 31 dBm
Att 20 dB
Offset 21 dB
31
20
10
0
-10
-20
-30
-40
-50
-60
-69
Center 915.1 MHz
800 us/

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 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
R&S SPECTRUM ANALYZER	FSP40	100041	May 13, 2009	May 12, 2010

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

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.

4.5.4 DEVIATION FROM TEST STANDARD

No deviation.

4.5.5 TEST SETUP

Same as 4.3.5.

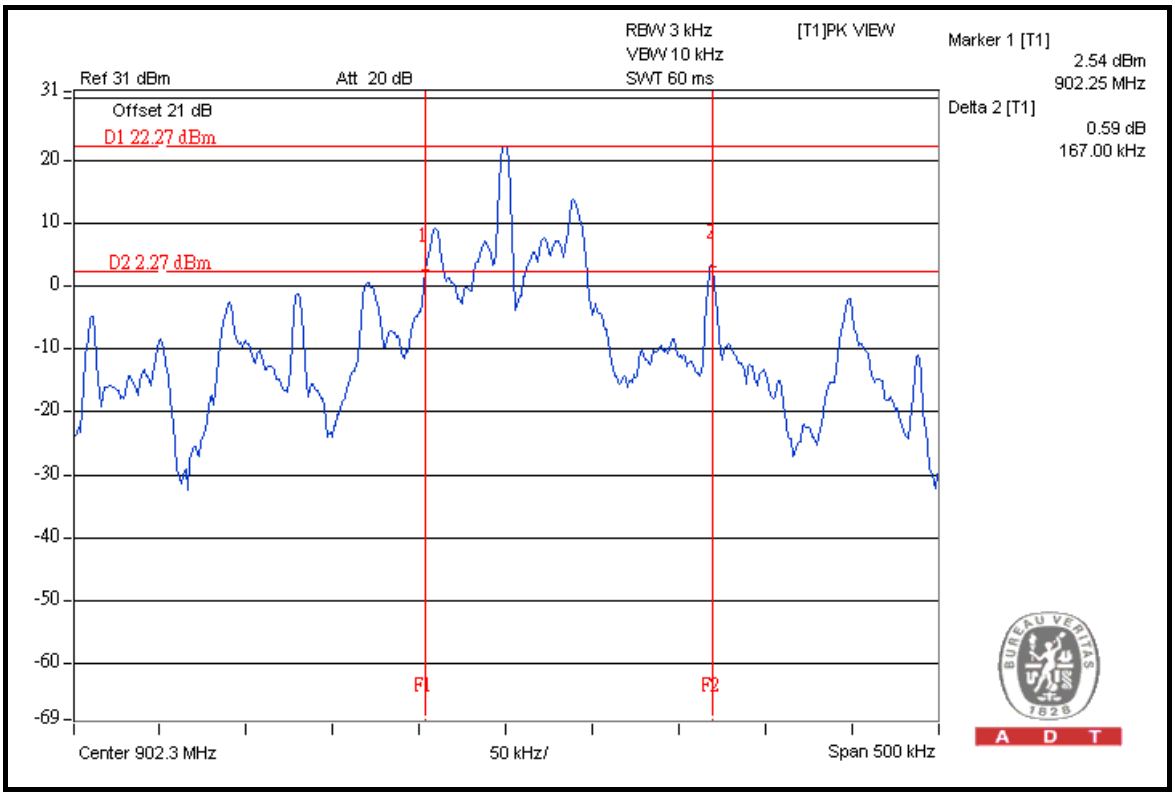
4.5.6 EUT OPERATING CONDITION

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

4.5.7 TEST RESULTS

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (kHz)	LIMIT (kHz)
1	902.3	167	250
65	915.1	167	250
128	927.7	167	250

CH 1



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 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
R&S SPECTRUM ANALYZER	FSP40	100041	May 13, 2009	May 12, 2010

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 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.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation.

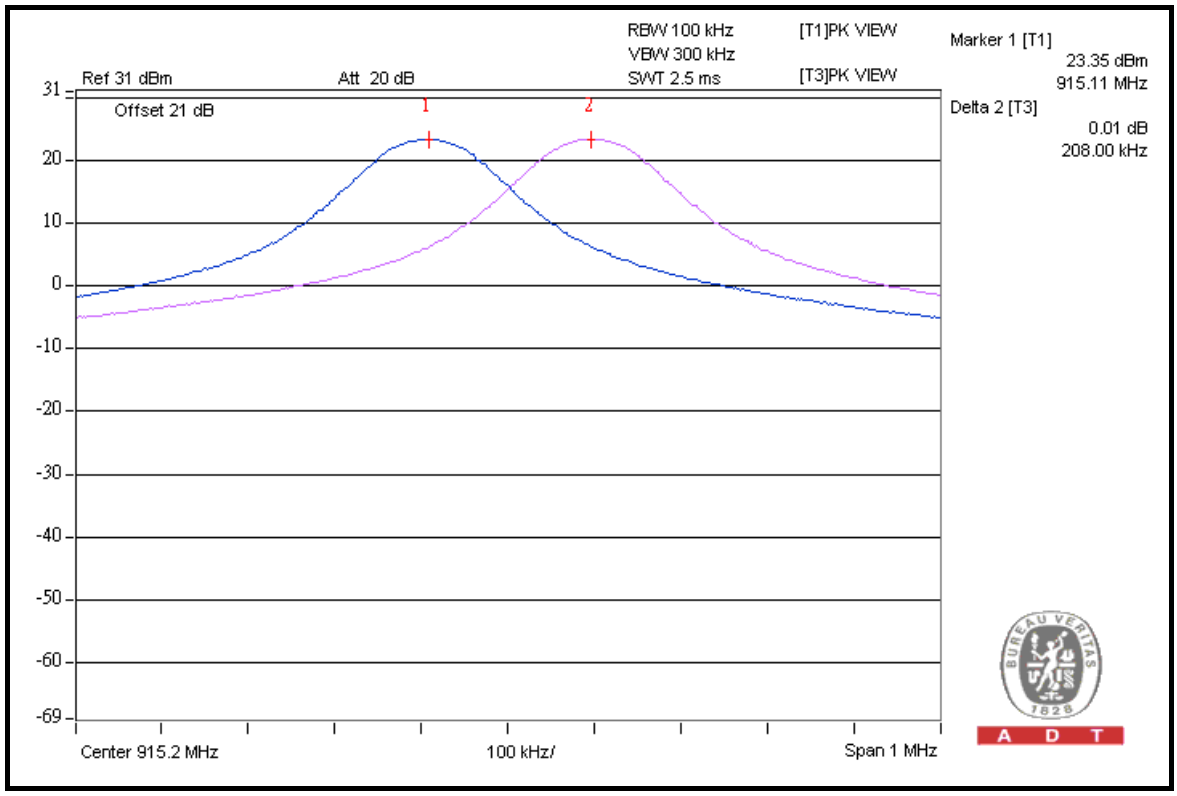
4.6.5 TEST SETUP

Same as 4.3.5

4.6.6 TEST RESULTS

CHANNEL	FREQUENCY (MHz)	ADJACENT CHANNEL SEPARATION (kHz)	MINIMUM LIMIT (kHz)	PASS / FAIL
1	902.3	204	167	PASS
65	915.1	208	167	PASS
128	927.7	206	167	PASS

CH 65



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 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
R&S SPECTRUM ANALYZER	FSP40	100041	May 13, 2009	May 12, 2010

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

4.7.3 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 1MHz RBW and 3 MHz VBW.

d. Measure the captured power within the band and recording the plot.

e. Repeat above procedures until all frequencies required were complete.

4.7.4 DEVIATION FROM TEST STANDARD

No deviation

4.7.5 TEST SETUP

Same as 4.3.5.

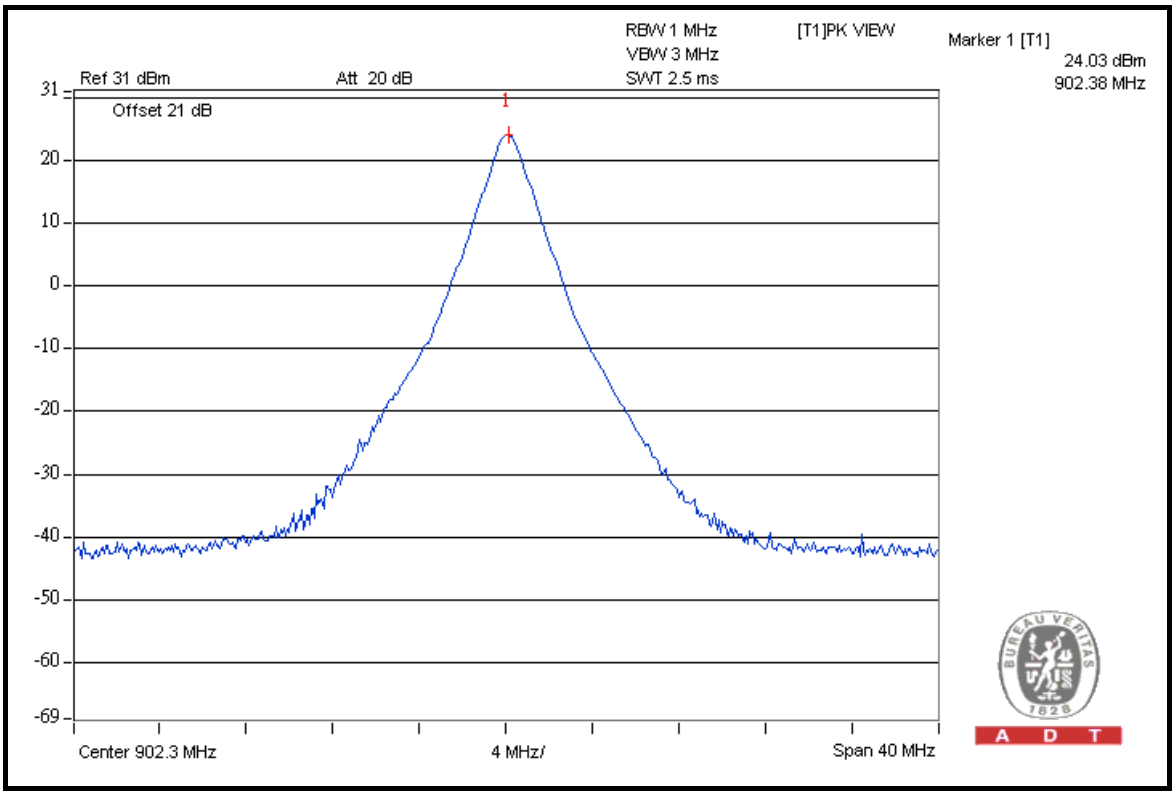
4.7.6 EUT OPERATING CONDITION

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

4.7.7 TEST RESULTS

CHANNEL	CHANNEL FREQUENCY (MHz)	POWER OUTPUT (mW)	POWER OUTPUT (dBm)	POWER LIMIT (dBm)	PASS/FAIL
1	902.3	252.9	24.0	30	PASS
65	915.1	218.3	23.4	30	PASS
128	927.7	197.2	23.0	30	PASS

CH 1



4.8 BAND EDGES MEASUREMENT

4.8.1 LIMITS OF BAND EDGES MEASUREMENT

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

4.8.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
R&S SPECTRUM ANALYZER	FSP40	100041	May 13, 2009	May 12, 2010

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

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 100 / 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 in part 15.247(d).

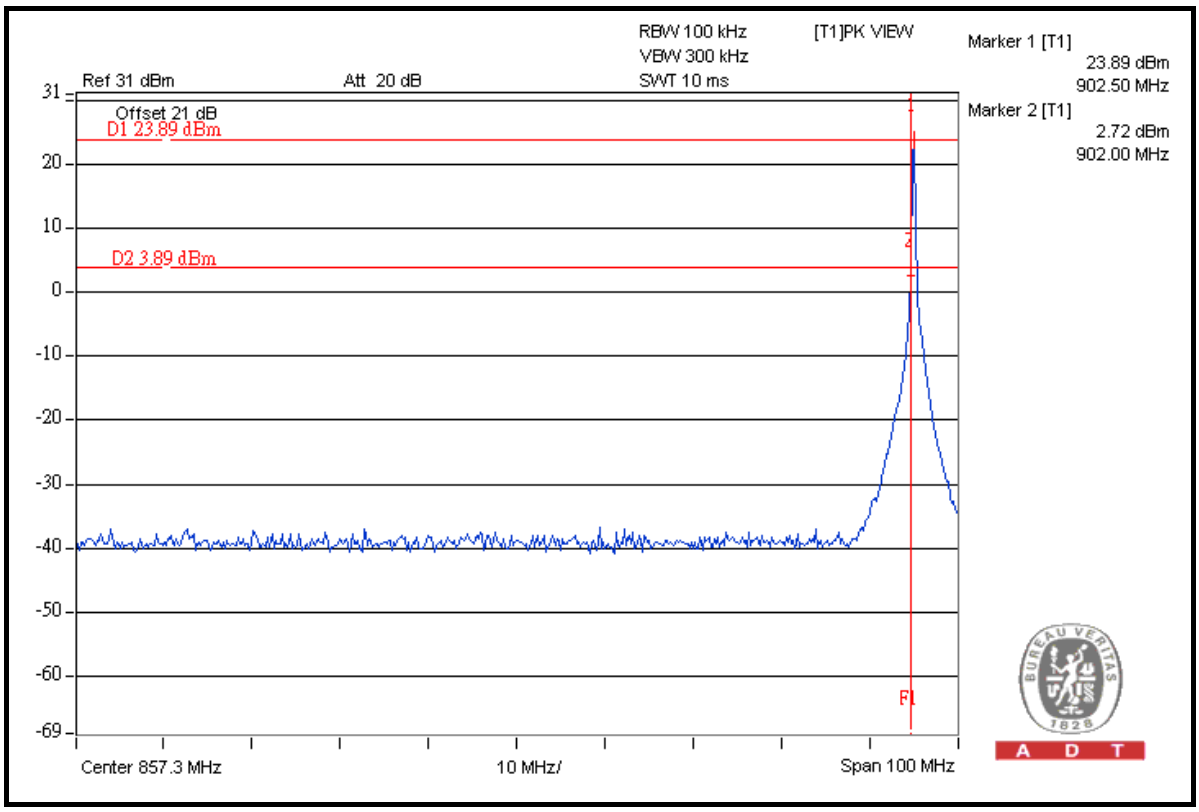
FREQUENCY (MHz)	FUNDAMENTAL EMISSION (dBuV/m)	DELTA (dB)	MAXIMUM FIELD STRENGTH OUT OF BAND (dBuV/m)	LIMIT (dBuV/m)
902 (PK)	119.6	21.17	98.43	99.6
902 (AV)	-	-	79.63	80.8

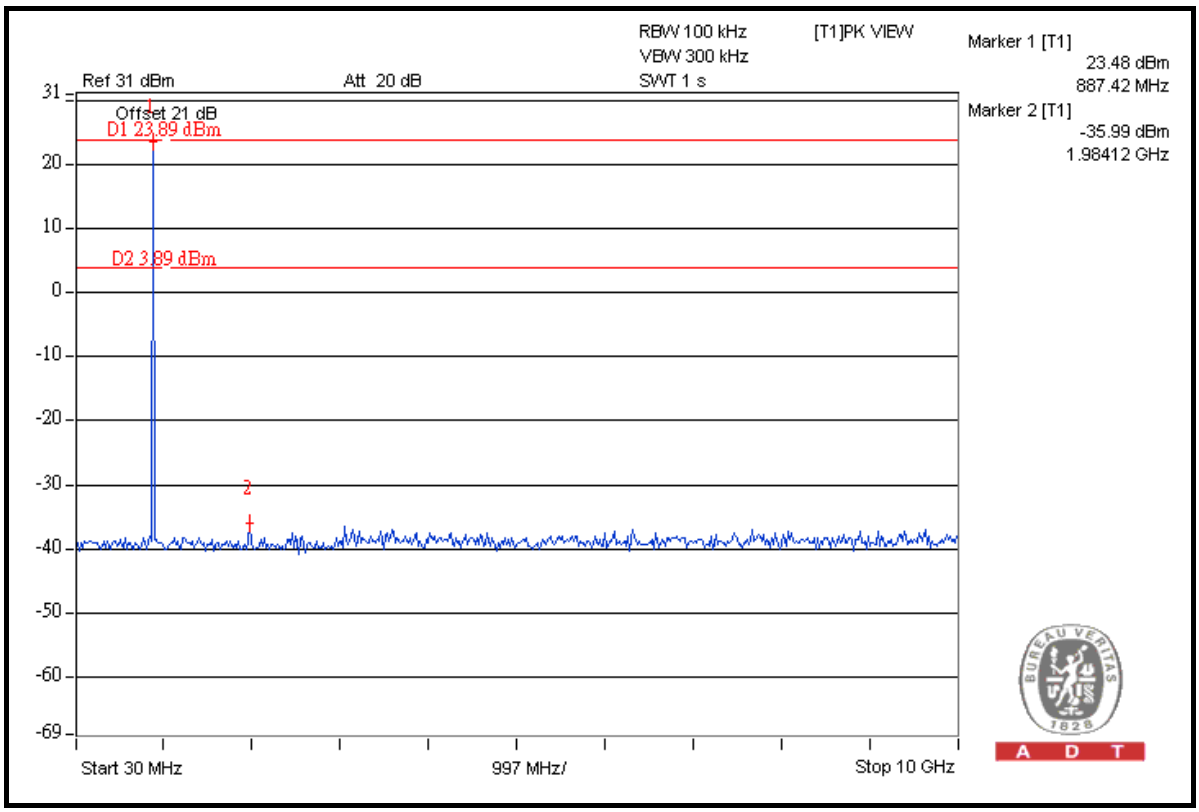
FREQUENCY (MHz)	FUNDAMENTAL EMISSION (dBuV/m)	DELTA (dB)	MAXIMUM FIELD STRENGTH OUT OF BAND (dBuV/m)	LIMIT (dBuV/m)
928 (PK)	118.4	25.38	93.02	98.4
928 (AV)	-	-	74.22	79.6

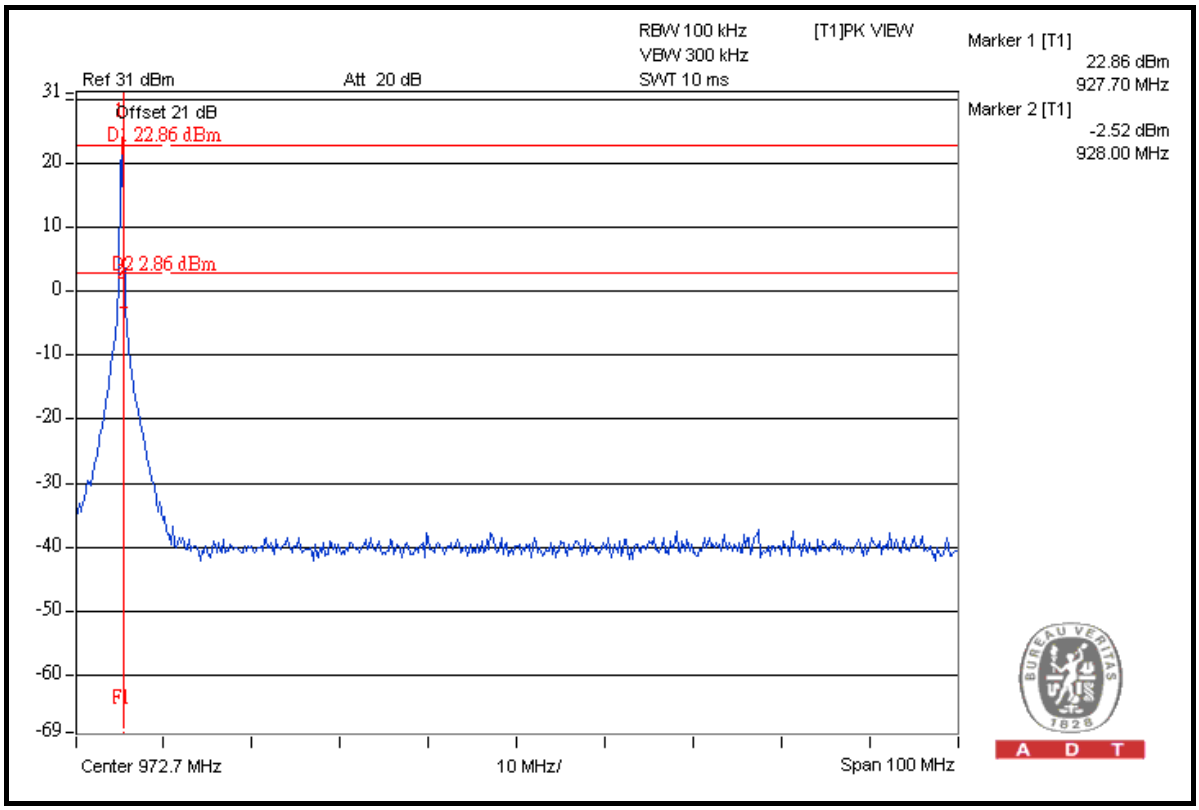
NOTE:

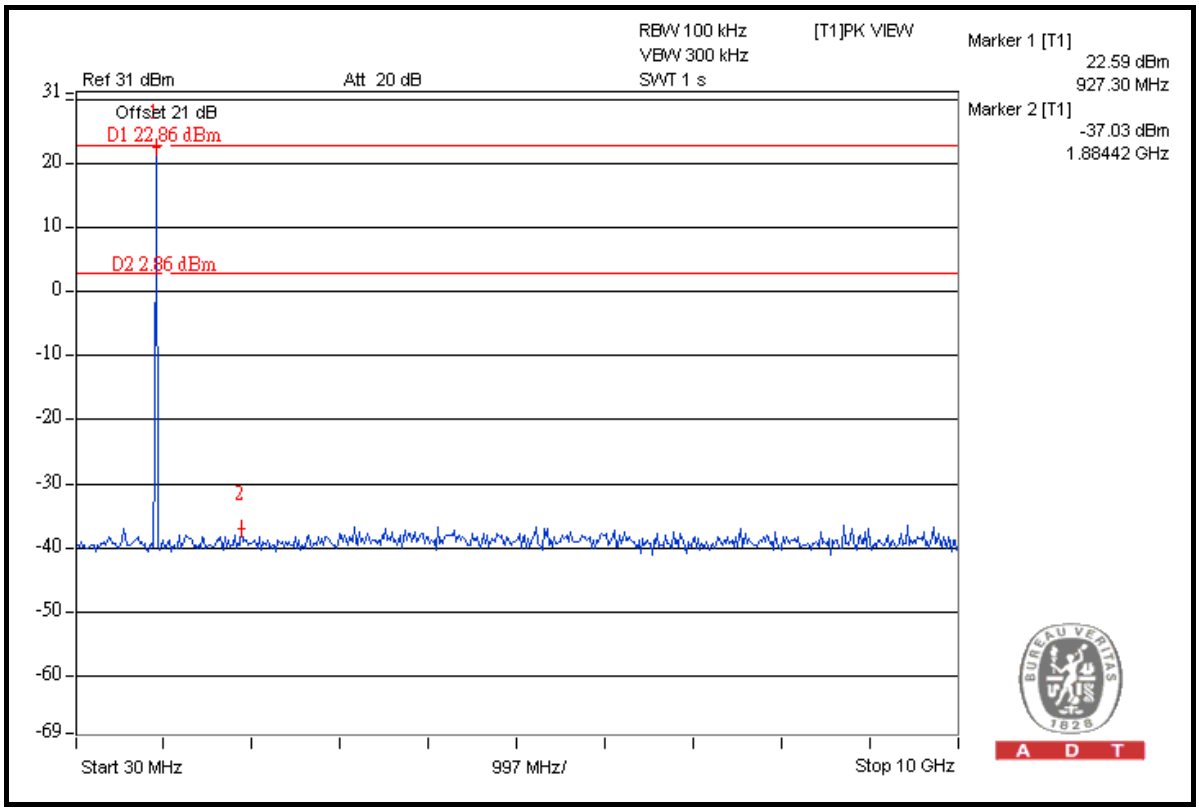
1. Delta = Amplitude between the peak of the fundamental and the peak of the band edge emission. Please check following 2 pages.
2. Maximum field strength out of band (PK value) = Fundamental emission (PK value) – Delta.
3. Average value =Peak value + 20 Log (duty cycle) = Peak value – 18.8dB.
4. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:

   20 log (Duty cycle) = 20 log (5.74*2 ms / 100 ms) = -18.8 dB


RBW 100 kHz
VBW 300 kHz
SWT 10 ms
[T1]PK VIEW
Marker 1 [T1]
23.89 dBm
902.50 MHz
Marker 2 [T1]
2.72 dBm
902.00 MHz
Ref 31 dBm
Att 20 dB
Offset 21 dB
D1 23.89 dBm
D2 3.89 dBm
31
20
10
0
-10
-20
-30
-40
-50
-60
-69
Center 857.3 MHz
10 MHz/
Span 100 MHz


RBW 100 kHz
VBW 300 kHz
SWT 1 s
[T1]PK VIEW
Marker 1 [T1]
23.48 dBm
887.42 MHz
Marker 2 [T1]
-35.99 dBm
1.98412 GHz
Ref 31 dBm
Att 20 dB
Offset 21 dB
D1 23.89 dBm
D2 3.89 dBm
31
20
10
0
-10
-20
-30
-40
-50
-60
-69
Start 30 MHz
997 MHz/
Stop 10 GHz


RBW 100 kHz
VBW 300 kHz
SWT 10 ms
[T1]PK VIEW
Marker 1 [T1]
22.86 dBm
927.70 MHz
Marker 2 [T1]
-2.52 dBm
928.00 MHz
Ref 31 dBm
Att 20 dB
Offset 21 dB
D1 22.86 dBm
D2 2.86 dBm
31
20
10
0
-10
-20
-30
-40
-50
-60
-69
Center 972.7 MHz
10 MHz/
Span 100 MHz


RBW 100 kHz
VBW 300 kHz
SWT 1 s
[T1]PK VIEW
Marker 1 [T1]
22.59 dBm
927.30 MHz
Marker 2 [T1]
-37.03 dBm
1.88442 GHz
Ref 31 dBm
Att 20 dB
Offset 21 dB
D1 22.86 dBm
D2 2.86 dBm
31
20
10
0
-10
-20
-30
-40
-50
-60
-69
Start 30 MHz
997 MHz/
Stop 10 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 Telecom 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 ---