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FCC TEST REPORT

REPORT NO.: RF990810E03

MODEL NO.: A-R0002

FCC ID: JNZAR0002

RECEIVED: Aug. 10, 2010

TESTED: Aug. 12 to 18, 2010

ISSUED: Aug. 20, 2010

APPLICANT: LOGITECH FAR EAST LTD.

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ISSUED BY: Bureau Veritas Consumer Products Services (H.K.)
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1 CERTIFICATION

PRODUCT : Logitech Wireless Headset F540
BRAND NAME : Logitech
MODEL NO. : A-R0002
TESTED: Aug. 12 to 18, 2010
APPLICANT : LOGITECH FAR EAST LTD.
TEST ITEM: R&D SAMPLE
STANDARDS : 47 CFR Part 15, Subpart C (Section 15.247)
ANSI C63.4-2003

The above equipment (Model: A-R0002) 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 : Sunny Wen, **DATE:** Aug. 20, 2010
(Sunny Wen, Specialist)

TECHNICAL ACCEPTANCE : Hank Chung, **DATE:** Aug. 20, 2010
(Hank Chung, Deputy Manager)

APPROVED BY : May Chen, **DATE:** Aug. 20, 2010
(May Chen, Deputy 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 -9.28dB at 0.935MHz
15.247(a)(2)	Spectrum Bandwidth of a Direct Sequence Spread Spectrum System Limit: min. 500kHz	PASS	Meet the requirement of limit.
15.247(b)	Maximum Peak Output Power Limit: max. 30dBm	PASS	Meet the requirement of limit.
15.247(d)	Radiated Emissions Limit: Table 15.209	PASS	Meet the requirement of limit. Minimum passing margin is -1.8dB at 649.66MHz
15.247(e)	Power Spectral Density Limit: max. 8dBm	PASS	Meet the requirement of limit.
15.247(d)	Conducted Out-Band Emission Measurement Limit: 20dB less than the peak value of fundamental frequency	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	No antenna connector is used.

2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

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

Measurement	Value
Conducted emissions	2.45 dB
Radiated emissions (30MHz-1GHz)	3.30 dB
Radiated emissions (1GHz -18GHz)	2.19 dB
Radiated emissions (18GHz -40GHz)	2.55 dB

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Logitech Wireless Headset F540
MODEL NO.	A-R0002
FCC ID	JNZAR0002
POWER SUPPLY	DC 6V from host equipment or DC 3.7V battery
MODULATION TYPE	$\pi/4$ -DQPSK
CARRIER FREQUENCY OF EACH CHANNEL	2405MHz ~ 2477MHz
NUMBER OF CHANNEL	37
MAXIMUM OUTPUT POWER	0.9mW
ANTENNA TYPE	Wire monopole, $\frac{1}{4}$ wave (Antenna Gain : 7.7dBi)
DATA CABLE	XBox 360 voice cable (Shielded, 1.2m) Mini-USB PS3 voice cable (Shielded, 1.8m)
I/O PORTS	USB port x 1 voice audio port x 1
ASSOCIATED DEVICES	Battery

NOTE:

- The EUT must be supplied with a battery as following table:

Brand	Li-ion
Model No.	L-LY11
Rating	3.7V, 600mAh

- The EUT was pre-tested under the following modes:

Test Mode	Description
Mode A	Y-Z Plane - Host system mode
Mode B	X-Y Plane - Host system mode
Mode C	X-Z Plane - Host system mode
Mode D	Y-Z Plane - Battery mode
Mode E	X-Y Plane - Battery mode
Mode F	X-Z Plane - Battery mode

The worse radiated emission was found in **Mode B**. Therefore only the test data of the modes were recorded in this report.

- 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

Thirty-seven channels are provided to this EUT.

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	2405	10	2425	20	2445	30	2465
1	2407	11	2427	21	2447	31	2467
2	2409	12	2429	22	2449	32	2469
3	2411	13	2431	23	2451	33	2471
4	2413	14	2433	24	2453	34	2473
5	2415	15	2435	25	2455	35	2475
6	2417	16	2437	26	2457	36	2477
7	2419	17	2439	27	2459		
8	2421	18	2441	28	2461		
9	2423	19	2443	29	2463		

3.3 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT configure mode	Applicable to				Description
	PLC	RE<1G	RE≥1G	APCM	
-	√	√	√	√	-

Where PLC: Power Line Conducted Emission

RE<1G: Radiated Emission below 1GHz

RE≥1G: Radiated Emission above 1GHz

APCM: Antenna Port Conducted Measurement

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.

Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
0 to 36	18	$\pi/4$ -DQPSK	1

Radiated Emission Test (Below 1 GHz):

- ☒ 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.

Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
0 to 36	18	$\pi/4$ -DQPSK	1

Radiated Emission Test (Above 1 GHz):

- ☒ 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.

Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
0 to 36	0, 18, 36	$\pi/4$ -DQPSK	1

CONDUCTED OUT-BAND EMISSION 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.

Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
0 to 36	0, 36	$\pi/4$ -DQPSK	1

Antenna Port Conducted 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.

Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
0 to 36	0, 18, 36	$\pi/4$ -DQPSK	1

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (system)	TESTED BY
RE³1G	26deg. C, 61%RH, 1014 hPa	120Vac, 60Hz	Frank Liu
RE<1G	25deg. C, 73%RH, 1014 hPa	120Vac, 60Hz	Frank Liu
PLC	25deg. C, 50%RH, 1014 hPa	120Vac, 60Hz	Eric Lee
APCM	25deg. C, 60%RH, 1014 hPa	120Vac, 60Hz	Rex Huang



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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:

47 CFR Part 15, Subpart C. (15.247)

ANSI C63.4 : 2003

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

NOTE: The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

3.5 DESCRIPTION OF SUPPORT UNITS

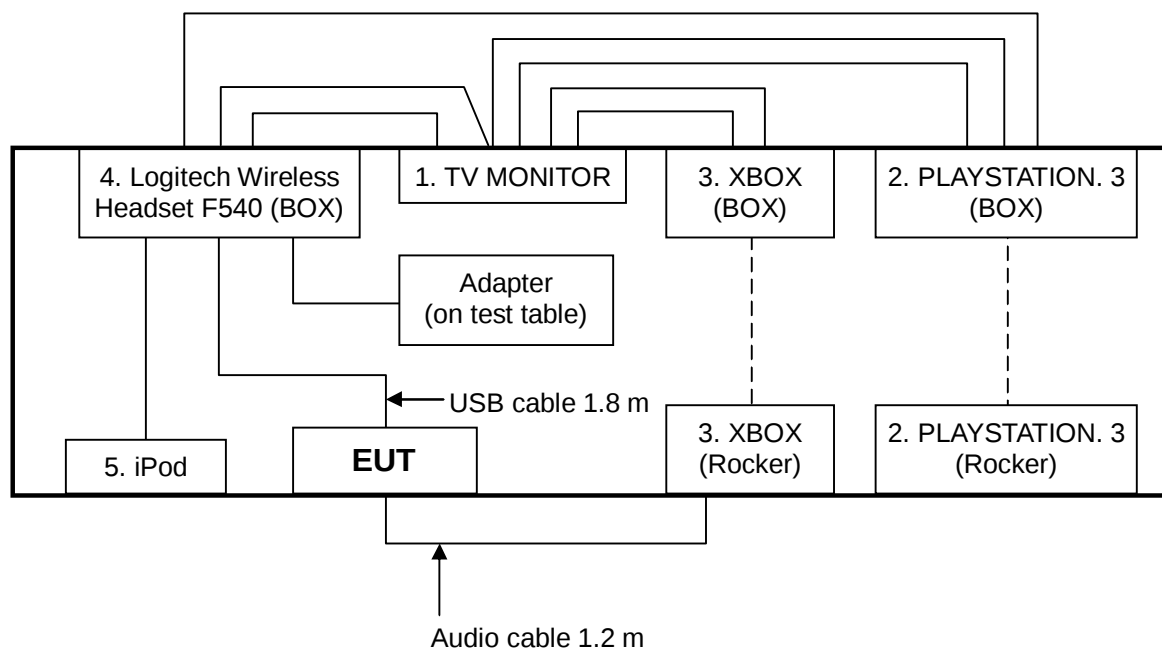
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Product	Brand	Model No.	Serial No.	FCC ID
1	TV MONITOR	Panasonic	TH-L26K10W	9540684	NA
2	PLAYSTATION. 3	SONY	CECHB07	27430232-9740084	FCC DoC
3	XBOX	Microsoft	XBOX 360	NA	FCC DoC
4	Logitech Wireless Headset F540 (BOX)	Logitech	A-E0001	NA	NA
5	iPod	APPLE	A1199	YM712NGUVQ5	FCC DoC

No.	Signal cable description
1	NA
2	1.8 m Video cable.
3	1.8 m Video cable. / 1.8 m & 1.2 m Audio cable.
4	1.9 m Audio cable. / 1.2 m USB cable.
5	1.0 m shielded cable, terminated with USB connector, w/o core.

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

3.6 CONFIGURATION OF SYSTEM UNDER TEST



4 TEST TYPES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

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

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver	ESCS 30	100375	Mar. 09, 2010	Mar. 08, 2011
Line-Impedance Stabilization Network (for EUT)	NSLK 8127	8127-522	Sep. 23, 2009	Sep. 22, 2010
Line-Impedance Stabilization Network (for Peripheral)	ESH3-Z5	848773/004	Oct. 26, 2009	Oct. 25, 2010
RF Cable (JYEBAO)	5DFB	COBCAB-001	Nov. 24, 2009	Nov. 23, 2010
50 ohms Terminator	50	3	Oct. 28, 2009	Oct. 27, 2010
Software	BV ADT_Cond_V7.3.7	NA	NA	NA

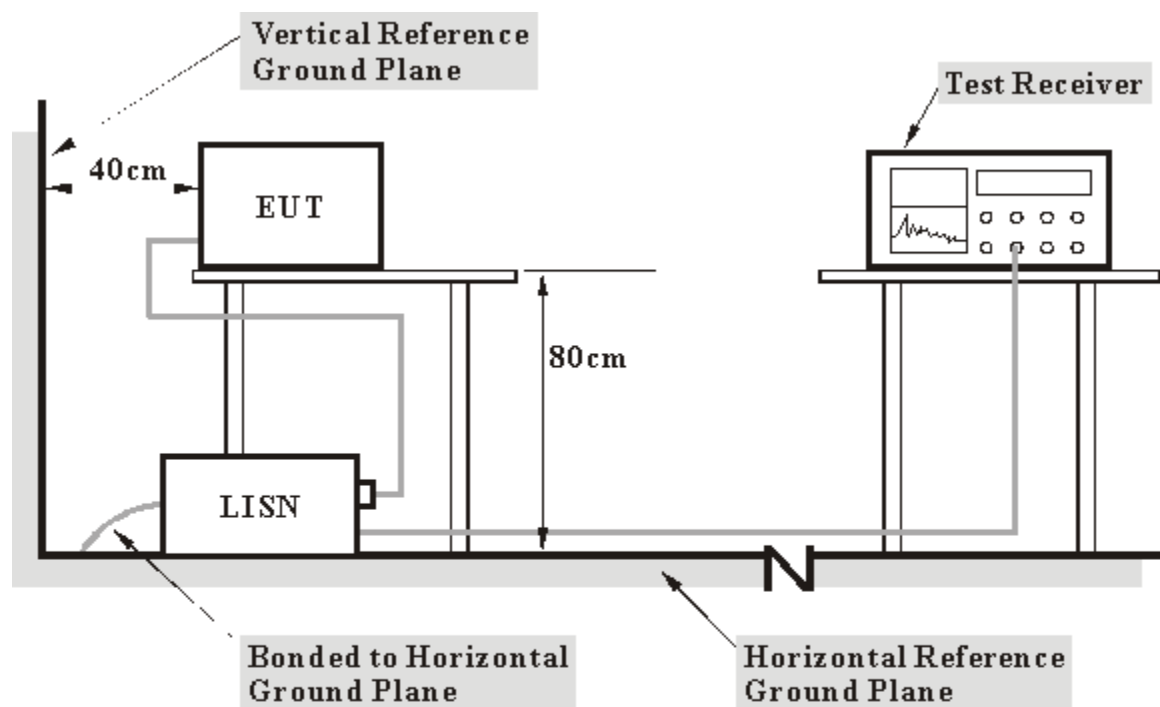
Note:

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 Shielded Room No. C.
- 3 The VCCI Con C Registration No. is C-3611.

4.1.3 TEST PROCEDURES

- The EUT/HOST was placed 0.4 meters from the conducting wall of the shielded room with EUT/HOST 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/HOST were checked for maximum conducted interference.
- The frequency range from 150 kHz to 30 MHz was searched. Emission levels over 10dB under the prescribed limits could not be reported

4.1.4 TEST SETUP



- Note:**
- Support units were connected to second LISN.
 - Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.1.5 DEVIATION FROM TEST STANDARD

No deviation

4.1.6 EUT OPERATING CONDITIONS

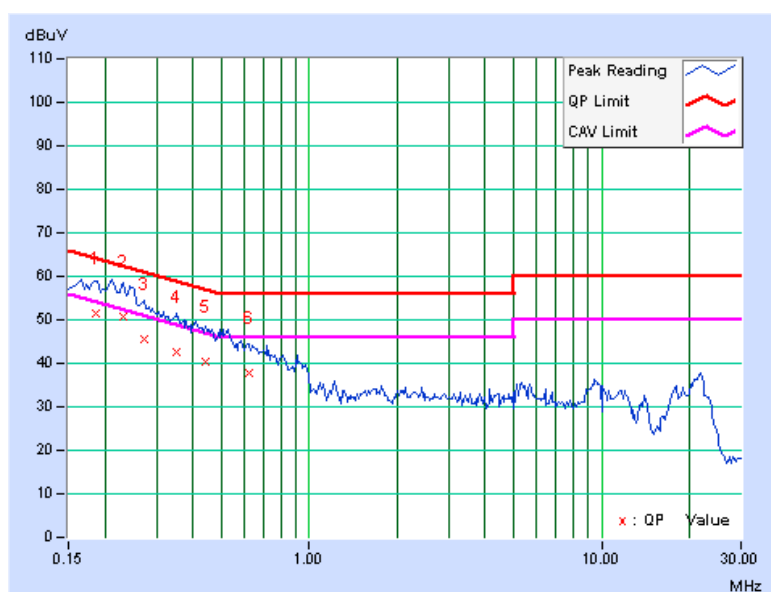
1. Turn on the power of EUT.
2. Set the EUT under transmission / receiver condition continuously at specific channel frequency.

4.1.7 TEST RESULTS(MODE 1)

PHASE	Line (L)	6dB BANDWIDTH	9 kHz
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No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.185	0.05	51.52	-	51.57	-	64.25	54.25	-12.68	-
2	0.232	0.05	50.64	-	50.69	-	62.38	52.38	-11.69	-
3	0.271	0.05	45.42	-	45.47	-	61.08	51.08	-15.61	-
4	0.353	0.06	42.59	-	42.65	-	58.89	48.89	-16.24	-
5	0.439	0.06	40.27	-	40.33	-	57.08	47.08	-16.75	-
6	0.619	0.07	37.62	-	37.69	-	56.00	46.00	-18.31	-

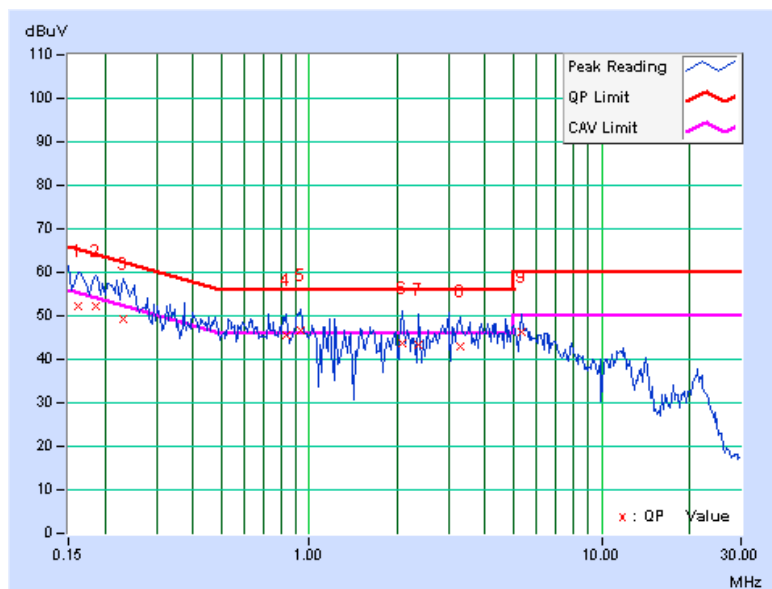
- REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



PHASE	Neutral (N)	6dB BANDWIDTH	9 kHz
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No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor [dB]	[dB (uV)]	AV.	[dB (uV)]	AV.	[dB (uV)]	AV.	[dB]	AV.
1	0.162	0.06	52.17	-	52.23	-	65.38	55.38	-13.14	-
2	0.185	0.06	52.13	-	52.19	-	64.25	54.25	-12.06	-
3	0.232	0.06	49.35	-	49.41	-	62.38	52.38	-12.97	-
4	0.834	0.09	45.51	-	45.60	-	56.00	46.00	-10.40	-
5	0.935	0.10	46.62	34.12	46.72	34.22	56.00	46.00	-9.28	-11.78
6	2.086	0.14	43.46	-	43.60	-	56.00	46.00	-12.40	-
7	2.375	0.15	43.32	-	43.47	-	56.00	46.00	-12.53	-
8	3.277	0.18	42.78	-	42.96	-	56.00	46.00	-13.04	-
9	5.340	0.24	46.21	-	46.45	-	60.00	50.00	-13.55	-

- 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.



4.2 RADIATED EMISSION MEASUREMENT

4.2.1 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.



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4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Agilent Spectrum Analyzer	E4446A	MY48250253	Aug. 03, 2010	Aug. 02, 2011
Agilent Pre-Selector	N9039A	MY46520311	July 14, 2010	July 13, 2011
Agilent Signal Generator	N5181A	MY49060517	July 14, 2010	July 13, 2011
Mini-Circuits Pre-Amplifier	ZFL-1000VH2B	AMP-ZFL-03	Nov. 18, 2009	Nov. 17, 2010
Agilent Pre-Amplifier	8449B	3008A02578	July 05, 2010	July 04, 2011
Miteq Pre-Amplifier	AFS33-1800265 0-30-8P-44	881786	NA	NA
SCHWARZBECK Trilog Broadband Antenna	VULB 9168	9168-360	Sep. 30, 2009	Sep. 29, 2010
AISI Horn_Antenna	AIH.8018	0000320091110	Nov. 16, 2009	Nov. 15, 2010
SCHWARZBECK Horn_Antenna	BBHA 9170	9170-424	Sep. 30, 2009	Sep. 29, 2010
RF CABLE	NA	RF104-201 RF104-203 RF104-204	Dec. 24, 2009	Dec. 23, 2010
RF Cable	NA	CHGCAB_001	NA	NA
Software	ADT_Radiated_ V8.7.05	NA	NA	NA
CT Antenna Tower & Turn Table	NA	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 horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.

3. The test was performed in 966 Chamber No. G.

4. The FCC Site Registration No. is 966073.

5. The VCCI Site Registration No. is G-137.

6. The CANADA Site Registration No. is IC 7450H-2.

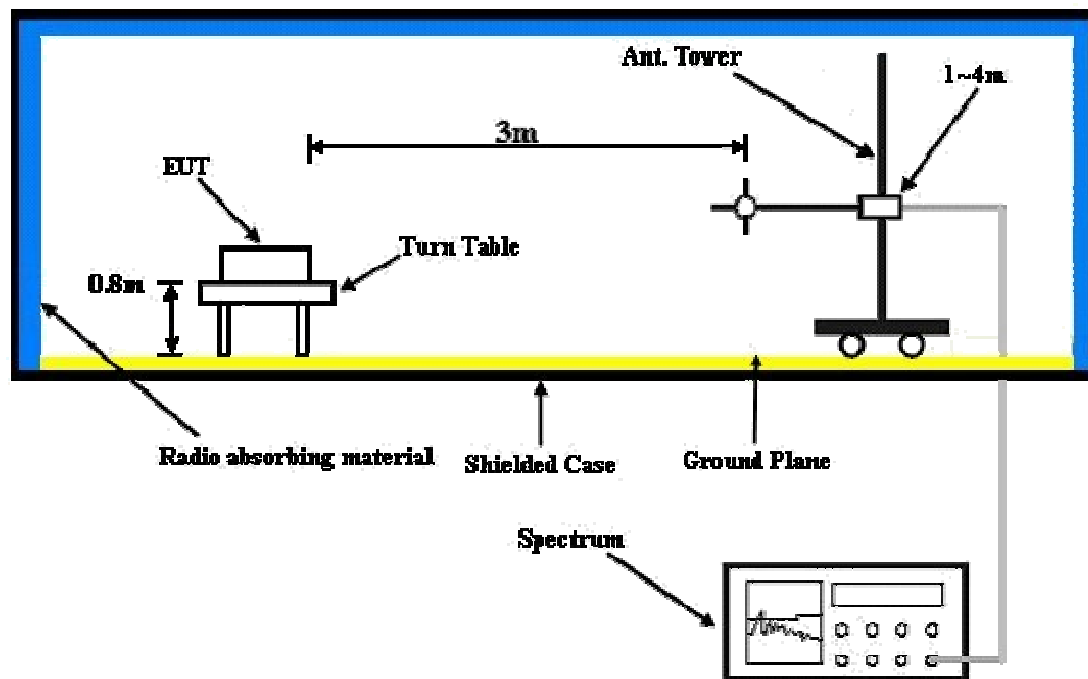
4.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters chamber room. 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 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin 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 Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1GHz.

4.2.4 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.2.5 DEVIATION FROM TEST STANDARD

No deviation

4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6

4.2.7 TEST RESULTS

BELOW 1GHz WORST-CASE DATA

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 18	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 73%RH 1014 hPa	TESTED BY	Frank Liu

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	150.24	32.2 QP	43.5	-11.3	1.25 H	24	18.40	13.80
2	338.73	40.4 QP	46.0	-5.6	1.00 H	0	24.37	16.04
3	476.21	40.1 QP	46.0	-5.9	2.00 H	299	20.97	19.14
4	508.10	37.8 QP	46.0	-8.2	1.75 H	48	17.95	19.89
5	639.97	43.5 QP	46.0	-2.5	1.00 H	222	21.13	22.41
6	649.66	44.2 QP	46.0	-1.8	2.50 H	239	21.71	22.52
7	799.94	38.4 QP	46.0	-7.6	1.25 H	47	13.92	24.48
8	898.76	35.2 QP	46.0	-10.8	1.00 H	145	9.02	26.22
9	960.50	32.2 QP	54.0	-21.8	1.00 H	197	5.47	26.73
10	999.60	38.6 QP	54.0	-15.4	1.25 H	48	11.54	27.08
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	33.24	36.0 QP	40.0	-4.0	1.25 V	48	22.99	12.99
2	53.24	37.8 QP	40.0	-2.2	1.75 V	294	24.14	13.70
3	76.58	36.3 QP	40.0	-3.7	1.50 V	93	26.17	10.13
4	315.24	41.0 QP	46.0	-5.0	1.75 V	345	25.48	15.53
5	338.92	40.0 QP	46.0	-6.0	1.00 V	88	23.96	16.04
6	475.21	43.5 QP	46.0	-2.5	1.25 V	98	24.43	19.11
7	507.99	38.6 QP	46.0	-7.4	2.25 V	198	18.76	19.88
8	640.10	43.6 QP	46.0	-2.4	1.50 V	297	21.22	22.42
9	800.20	40.0 QP	46.0	-6.0	2.00 V	198	15.52	24.48
10	959.98	40.0 QP	46.0	-6.0	1.25 V	8	13.28	26.72

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.



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ABOVE 1GHz DATA

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 0	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	26deg. C, 61%RH 1014 hPa	TESTED BY	Frank Liu

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	2389.27	57.3 PK	74.0	-16.7	1.35 H	265	26.10	31.20
2	2389.27	47.4 AV	54.0	-6.6	1.35 H	265	16.20	31.20
3	*2405.00	104.4 PK			1.35 H	265	73.10	31.30
4	*2405.00	92.4 AV			1.35 H	265	61.10	31.30
5	4810.00	50.9 PK	74.0	-23.1	1.68 H	268	11.50	39.40
6	4810.00	35.3 AV	54.0	-18.7	1.68 H	268	-4.10	39.40
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	54.5 PK	74.0	-19.5	1.46 V	276	23.30	31.20
2	2390.00	41.9 AV	54.0	-12.1	1.46 V	276	10.70	31.20
3	*2405.00	93.5 PK			1.46 V	276	62.20	31.30
4	*2405.00	81.8 AV			1.46 V	276	50.50	31.30
5	4810.00	47.2 PK	74.0	-26.8	1.64 V	332	7.80	39.40
6	4810.00	34.2 AV	54.0	-19.8	1.64 V	332	-5.20	39.40

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * ”: Fundamental frequency.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 18	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	26deg. C, 61%RH 1014 hPa	TESTED BY	Frank Liu

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	*2441.00	103.6 PK			1.27 H	257	72.30	31.30
2	*2441.00	91.7 AV			1.27 H	257	60.40	31.30
3	4882.00	52.3 PK	74.0	-21.7	1.52 H	243	12.70	39.60
4	4882.00	36.1 AV	54.0	-17.9	1.52 H	243	-3.50	39.60
5	7323.00	54.4 PK	74.0	-19.6	1.27 H	126	10.30	44.10
6	7323.00	41.4 AV	54.0	-12.6	1.27 H	126	-2.70	44.10
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	*2441.00	93.4 PK			1.42 V	281	62.10	31.30
2	*2441.00	81.5 AV			1.42 V	281	50.20	31.30
3	4882.00	48.2 PK	74.0	-25.8	1.62 V	35	8.60	39.60
4	4882.00	34.3 AV	54.0	-19.7	1.62 V	35	-5.30	39.60
5	7323.00	54.1 PK	74.0	-19.9	1.27 V	309	10.00	44.10
6	7323.00	41.7 AV	54.0	-12.3	1.27 V	309	-2.40	44.10

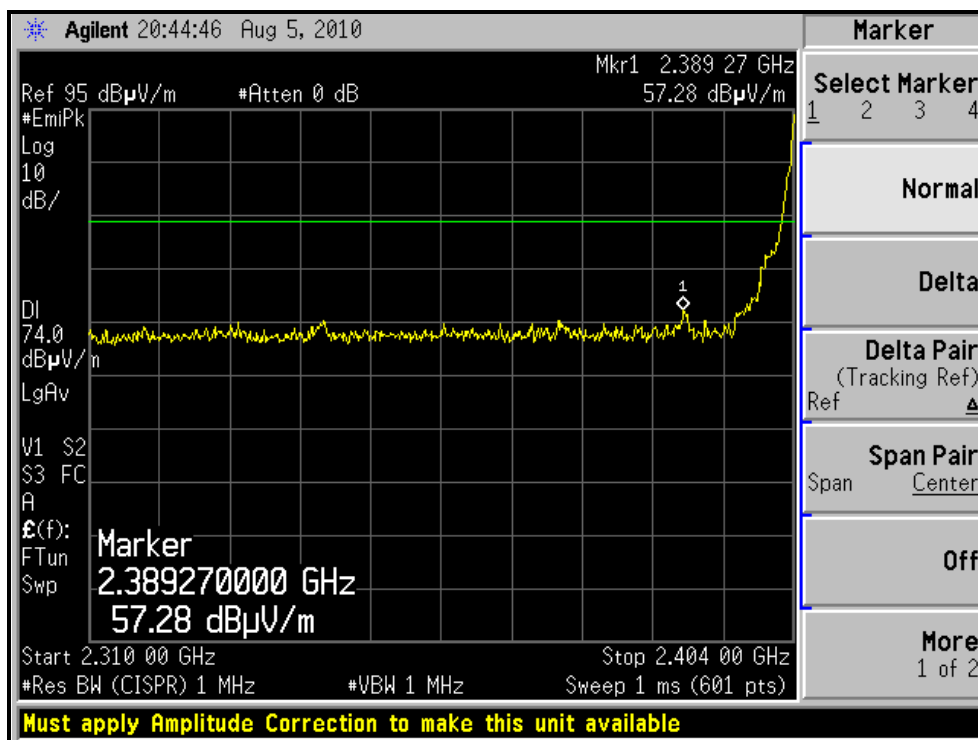
REMARKS: 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * ”: Fundamental frequency.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 36	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	26deg. C, 61%RH 1014 hPa	TESTED BY	Frank Liu

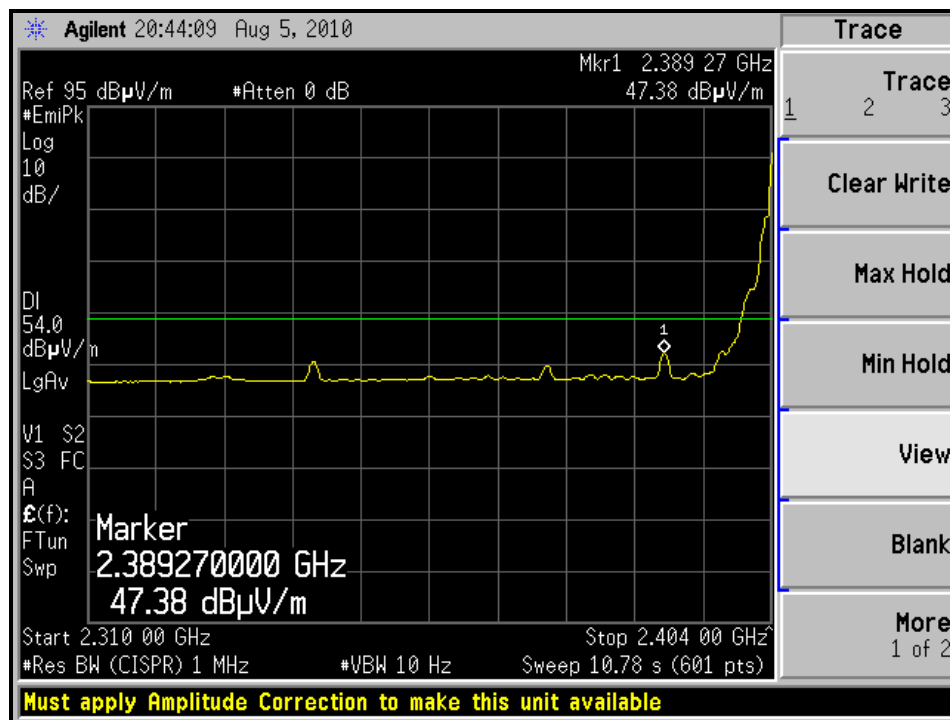
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2477.00	103.1 PK			1.33 H	275	71.70	31.40
2	*2477.00	91.3 AV			1.33 H	275	59.90	31.40
3	2483.50	55.6 PK	74.0	-18.4	1.33 H	275	24.10	31.50
4	2483.50	44.3 AV	54.0	-9.7	1.33 H	275	12.80	31.50
5	4954.00	54.3 PK	74.0	-19.7	1.63 H	280	14.40	39.90
6	4954.00	37.8 AV	54.0	-16.2	1.63 H	280	-2.10	39.90
7	7431.00	54.7 PK	74.0	-19.3	1.32 H	120	10.50	44.20
8	7431.00	41.8 AV	54.0	-12.2	1.32 H	120	-2.40	44.20
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	*2477.00	93.2 PK			1.45 V	283	61.80	31.40
2	*2477.00	81.8 AV			1.45 V	283	50.40	31.40
3	2483.50	54.4 PK	74.0	-19.6	1.43 V	272	22.90	31.50
4	2483.50	42.7 AV	54.0	-11.3	1.43 V	272	11.20	31.50
5	4954.00	49.4 PK	74.0	-24.6	1.05 V	333	9.50	39.90
6	4954.00	35.4 AV	54.0	-18.6	1.05 V	333	-4.50	39.90
7	7431.00	54.4 PK	74.0	-19.6	1.39 V	301	10.20	44.20
8	7431.00	41.8 AV	54.0	-12.2	1.39 V	301	-2.40	44.20

REMARKS: 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ * ”: Fundamental frequency.

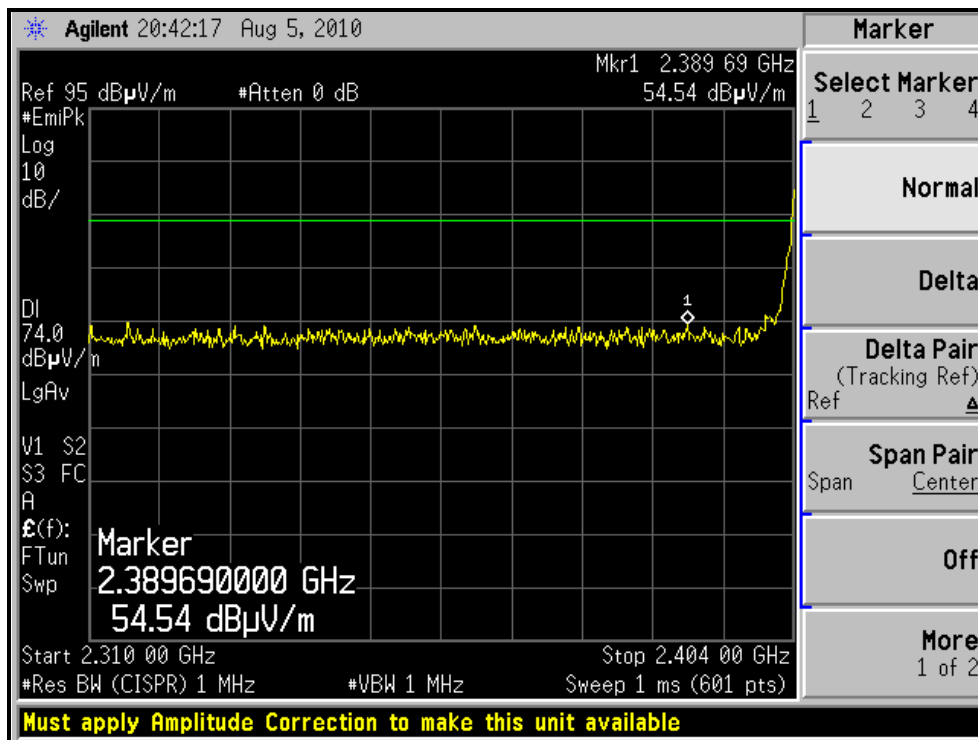
RESTRICTED BANDEDGE (CH0, HORIZONTAL)



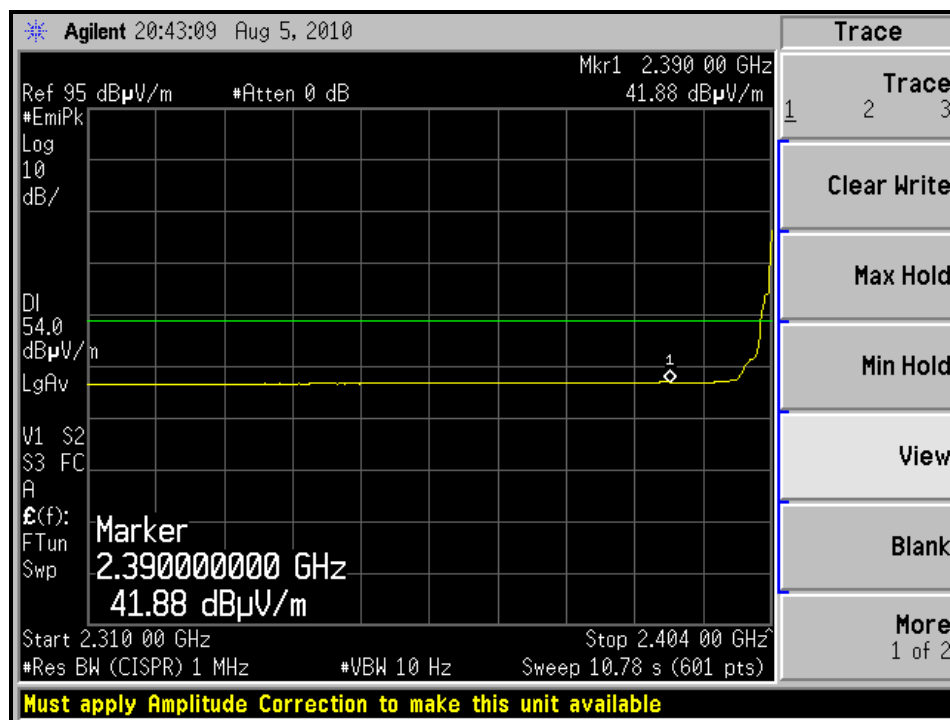
RESTRICTED BANDEDGE (CH0, HORIZONTAL)



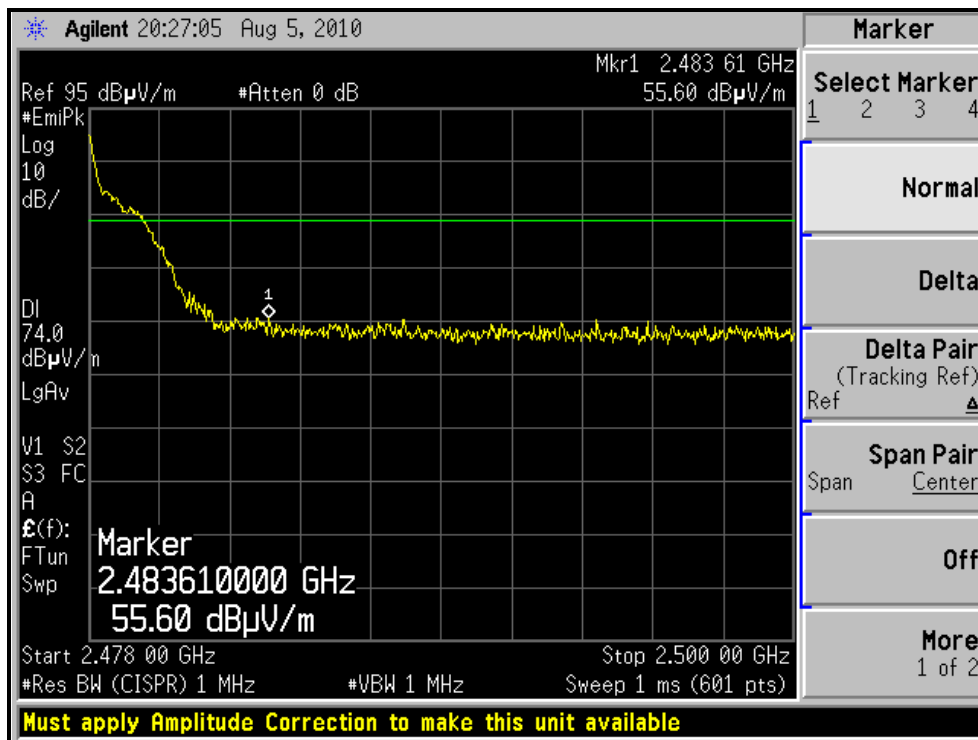
RESTRICTED BANDEDGE (CH0, VERTICAL)



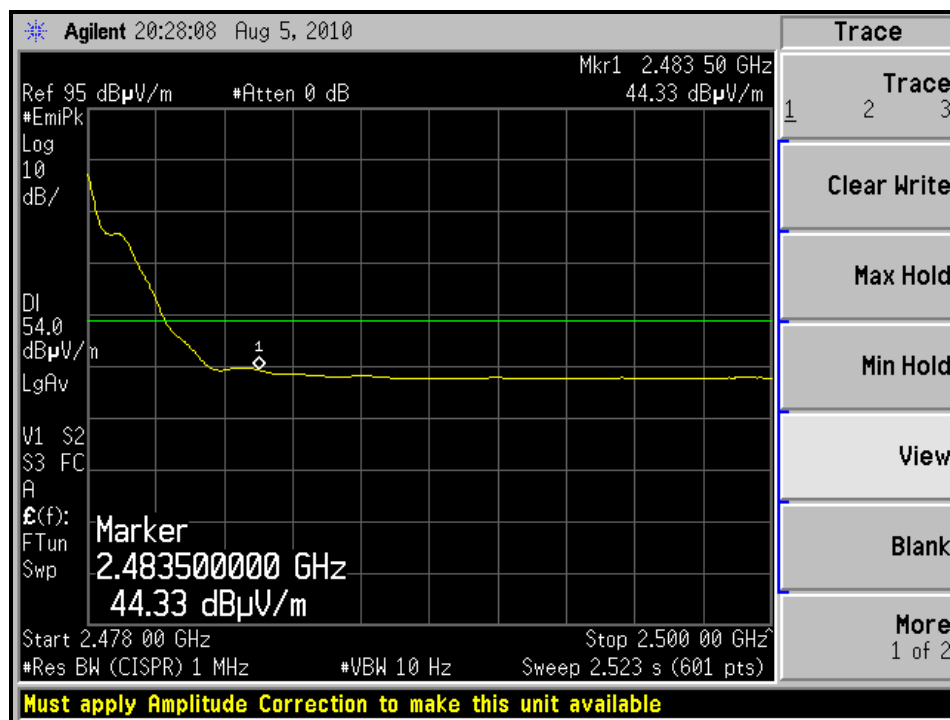
RESTRICTED BANDEDGE (CH0, VERTICAL)



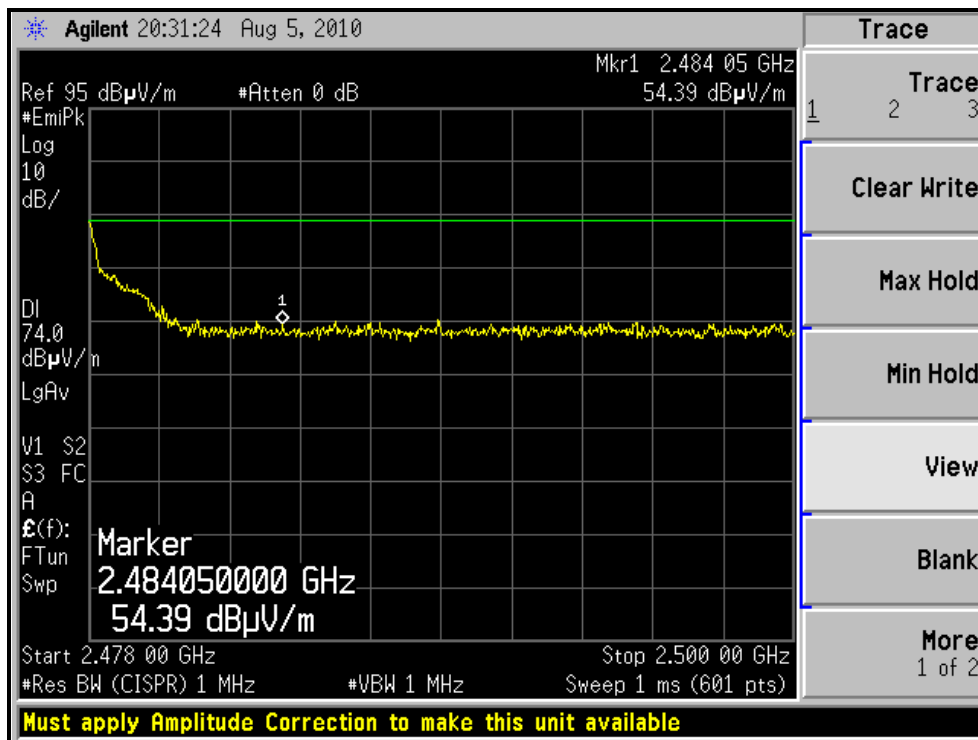
RESTRICTED BANDEDGE (CH36, HORIZONTAL)



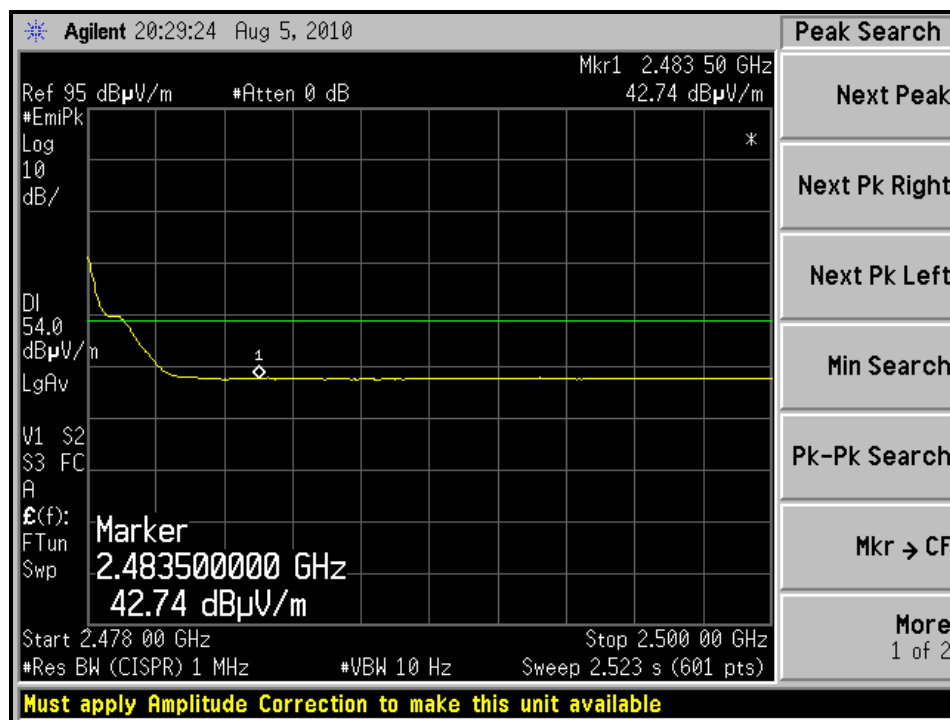
RESTRICTED BANDEDGE (CH36, HORIZONTAL)



RESTRICTED BANDEDGE (CH36, VERTICAL)



RESTRICTED BANDEDGE (CH36, VERTICAL)



4.3 6dB BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer	E4446A	MY48250254	July 14, 2010	July 13, 2011

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

4.3.3 TEST PROCEDURE

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

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 TEST SETUP



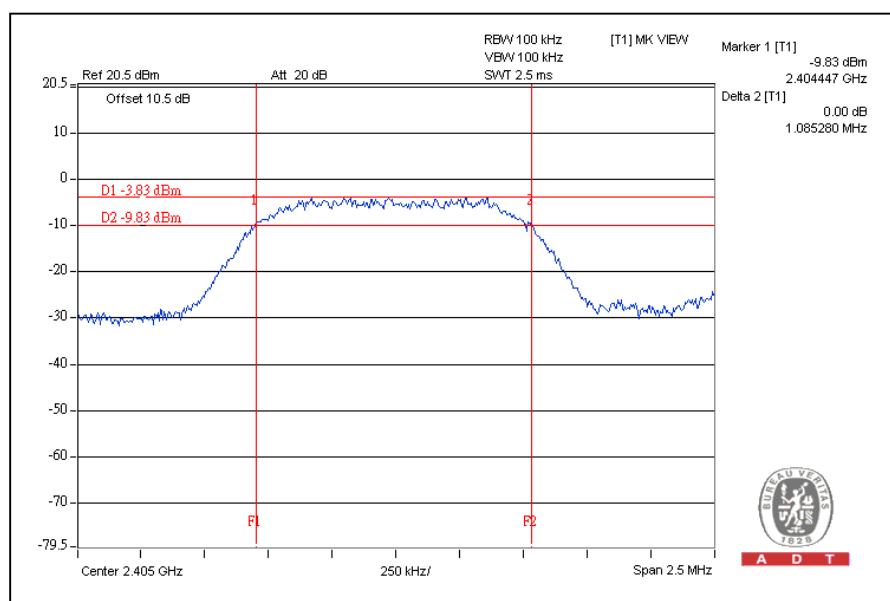
4.3.6 EUT OPERATING CONDITIONS

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

4.3.7 TEST RESULTS

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
0	2405	1.08	0.5	PASS
18	2441	1.06	0.5	PASS
36	2477	1.04	0.5	PASS

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4.4 MAXIMUM PEAK OUTPUT POWER

4.4.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 30dBm.

4.4.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Anritsu Power Meter	ML2495A	0824006	May 04, 2010	May 03, 2011
Pulse Power Sensor	MA2411B	0738172	May 04, 2010	May 03, 2011

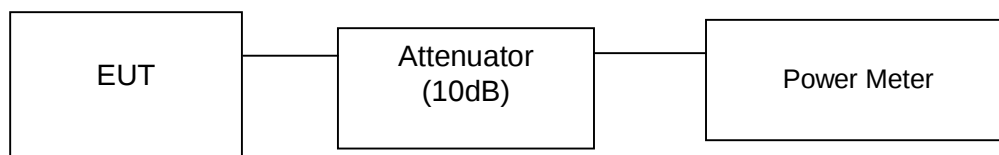
NOTE:

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

4.4.3 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. Set a reference level on the measuring instrument equal to the highest peak value.
3. The center frequency of the spectrum analyzer is set to the fundamental frequency and using 3 MHz RBW and 10 MHz VBW.
4. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
5. Repeat above procedures until all frequencies measured were complete.

4.4.4 TEST SETUP



4.4.5 DEVIATION FROM TEST STANDARD

No deviation

4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.2.6

4.4.7 TEST RESULTS

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
0	2405	0.9	-0.5	28.3	PASS
18	2441	0.9	-0.3	28.3	PASS
36	2477	0.9	-0.4	28.3	PASS

4.5 POWER SPECTRAL DENSITY MEASUREMENT

4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

4.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer	E4446A	MY48250254	July 14, 2010	July 13, 2011

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

4.5.3 TEST PROCEDURE

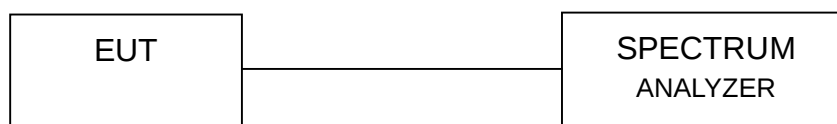
The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3 kHz RBW and 30 kHz VBW, set sweep time = span/3 kHz. The power spectral density was measured and recorded.

The sweep time is allowed to be longer than span/3 kHz for a full response of the mixer in the spectrum analyzer.

4.5.4 DEVIATION FROM TEST STANDARD

No deviation

4.5.5 TEST SETUP



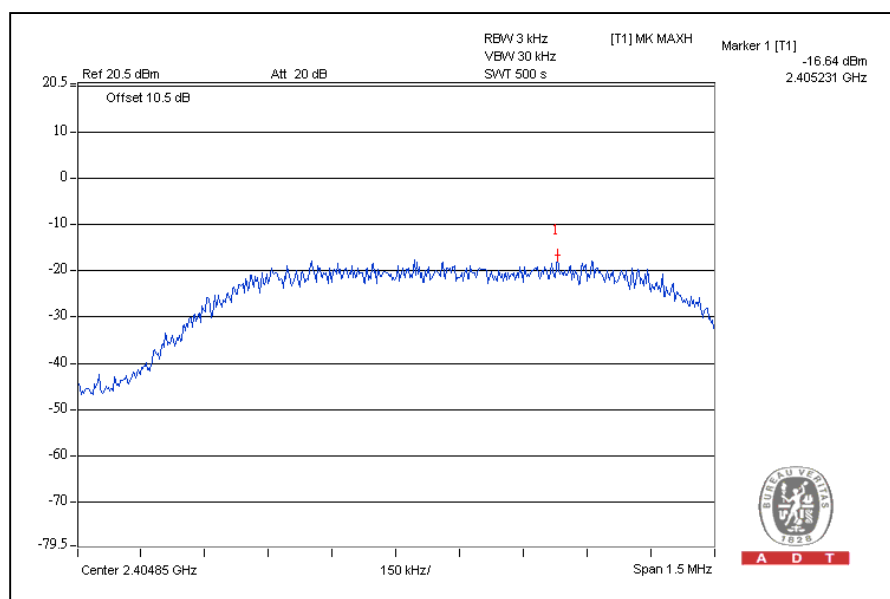
4.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6

4.5.7 TEST RESULTS

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS / FAIL
0	2405	-16.6	8	PASS
18	2441	-17.5	8	PASS
36	2477	-17.0	8	PASS

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4.6 CONDUCTED OUT-BAND EMISSION MEASUREMENT

4.6.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT

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

4.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer	E4446A	MY48250254	July 14, 2010	July 13, 2011

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

4.6.3 TEST PROCEDURE

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

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

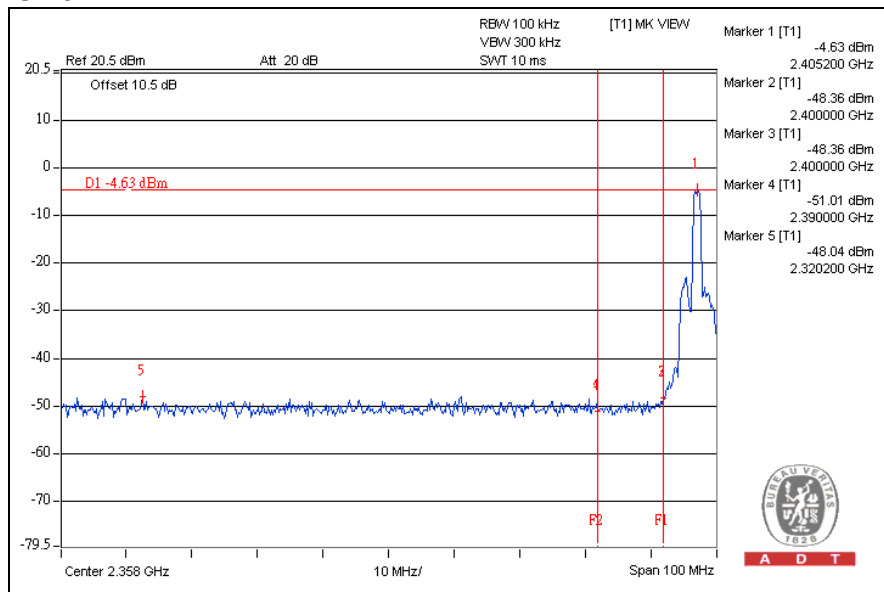
4.6.5 EUT OPERATING CONDITION

Same as Item 4.3.6

4.6.6 TEST RESULTS

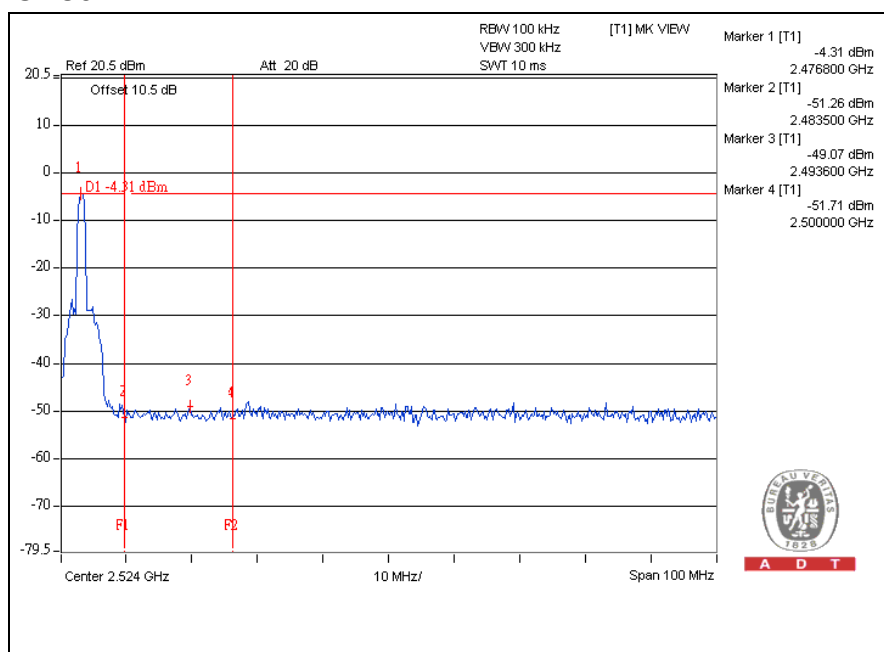
The spectrum plots are attached on the following pages. D2 line indicates the highest level, D1 line indicates the 20dB offset below D2. It shows compliance with the requirement in part 15.247(d).

CH0



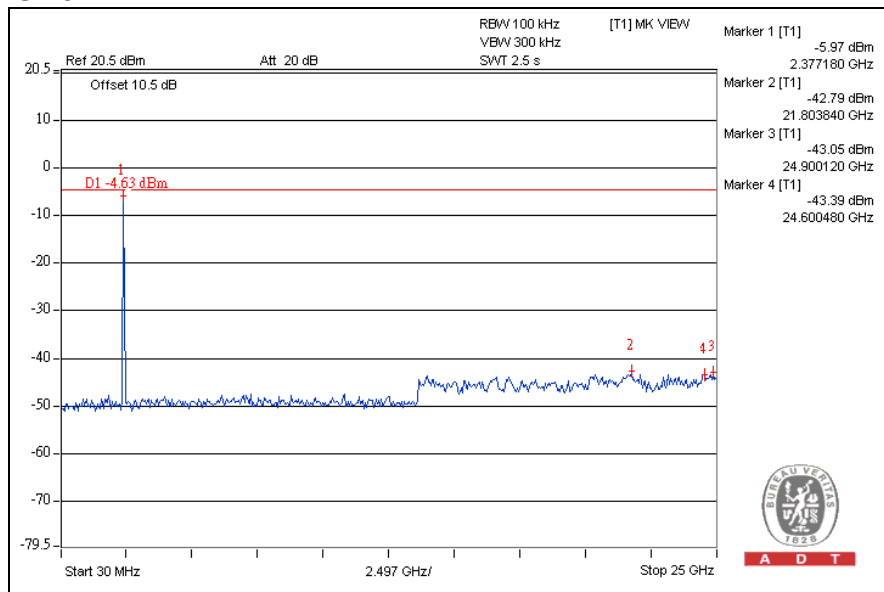
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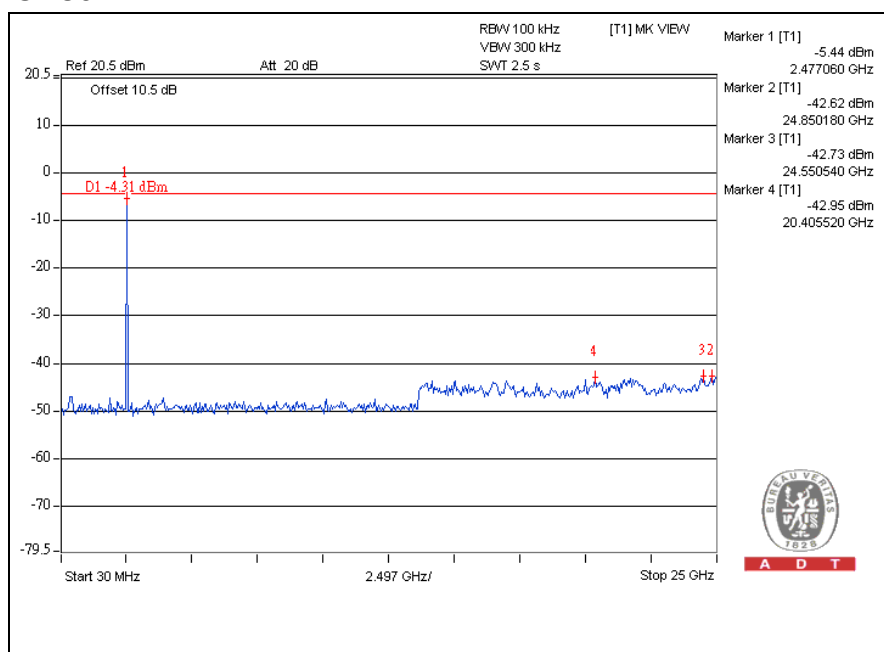
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CH36



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5 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: 886-2-26052943

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.



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6 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.

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