



# FCC TEST REPORT

**REPORT NO.:** RF110411E03

**MODEL NO.:** DIR-300 TX, DIR-500 TX, MIR-500 TX

**FCC ID :** BY4-DIR300

**RECEIVED:** Apr. 11, 2011

**TESTED:** Apr. 25 to May 02, 2011

**ISSUED:** May 09, 2011

**APPLICANT :** Trans Electric Co., Ltd.

**ADDRESS :** 771, Sec.2 Chungsan Rd, Huatang, Changhua,  
Taiwan.

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

**LAB ADDRESS:** No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen,  
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## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF110411E03	Original release	May 09, 2011



# 1 CERTIFICATION

**PRODUCT:** Digital Remote Control Extender  
**BRAND NAME:** PX  
**MODEL NO:** DIR-300 TX, DIR-500 TX, MIR-500 TX  
**TEST SAMPLE:** ENGINEERING SAMPLE  
**APPLICANT:** Trans Electric Co., Ltd.  
**TESTED:** Apr. 25 to May 02, 2011  
**STANDARDS:** **FCC Part 15, Subpart C (Section 15.231)**  
ANSI C63.4-2003  
ANSI C63.10-2009

The above equipment (model: DIR-300 TX, DIR-500 TX) have 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** : Carol Liao , **DATE:** May 09, 2011  
(Carol Liao, Specialist )

**APPROVED BY** : May Chen , **DATE:** May 09, 2011  
( 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 15.231)			
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -3.71dB at 0.451MHz
15.209 15.231(b)	Radiated Emission Test	PASS	Meet the requirement of limit. Minimum passing margin is -2.1dB at 433.92MHz.
15.231(c)	Emission Bandwidth Measurement	PASS	Meet the requirement of limit.
15.231(a)	De-activation	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	No antenna connector is used.

### 2.1 MEASUREMENT UNCERTAINTY

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

Measurement	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

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

<b>PRODUCT</b>	Digital Remote Control Extender
<b>MODEL NO.</b>	DIR-300 TX, DIR-500 TX, MIR-500 TX
<b>FCC ID</b>	BY4-DIR300
<b>POWER SUPPLY</b>	DC 12V from power adapter
<b>MODULATION TYPE</b>	FSK
<b>CARRIER FREQUENCY</b>	433.92MHz
<b>NUMBER OF CHANNEL</b>	1
<b>ANTENNA TYPE</b>	Quater Lamda antenna with 0dBi gain
<b>ANTENNA CONNECTOR</b>	NA
<b>DATA CABLE</b>	NA
<b>I/O PORTS</b>	NA
<b>ACCESSORY DEVICES</b>	Adapter x 1

**NOTE:**

- The EUT has three model names which are identical to each other in all aspects except for the following table:

Brand	Model No.	Description
PX	DIR-300 TX	only appearance different
	DIR-500 TX	
	MIR-500 TX	1. Same as DIR-500 TX 2. Only for different marketing

For conducted test, model: DIR-500 TX was selected as representative model for the test; and for radiated test, model: DIR-300 TX was selected as representative model for the test and their data were recorded in this report.

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

<b>Brand:</b>	TEN PAO
<b>Model No.:</b>	S005IU1200025
<b>Input power :</b>	AC120V~, 50Hz, 150mA
<b>Output power :</b>	DC 12V, 250mA DC output cable (Unshielded, 1.9m)

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



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### 3.2 DESCRIPTION OF TEST MODES

One channel was provided to this EUT.

CHANNEL	FREQUENCY
1	433.92MHz

### 3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO					DESCRIPTION
	RE <sup>≥</sup> 1G	RE < 1G	PLC	EB	DT	
-	√	√	√	√	√	-

Where **RE <sup>≥</sup> 1G**: Radiated Emission above 1GHz      **RE < 1G**: Radiated Emission below 1GHz  
**PLC**: Power Line Conducted Emission      **EB**: 20dB Bandwidth measurement  
**DT**: Deactivation Time 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
1	1	FSK

#### **RADIATED EMISSION TEST (ABOVE 1 GHz):**

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

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
1	1	FSK

#### **RADIATED EMISSION TEST (BELOW 1 GHz):**

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

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
1	1	FSK



**EMISSION BANDWIDTH MEASUREMENT:**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations.
- Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
1	1	FSK

**DEACTIVATION TIME MEASUREMENT:**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations.
- Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
1	1	FSK

**TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE <sup>≥</sup> 1G	17deg. C, 73%RH, 1021 hPa	120Vac, 60Hz	Frank Liu
RE<1G	16deg. C, 67%RH, 1021 hPa	120Vac, 60Hz	Frank Liu
EB	17deg. C, 73%RH, 1021 hPa	120Vac, 60Hz	Frank Liu
PLC	25deg. C, 70%RH, 1021 hPa	120Vac, 60Hz	Timmy Hu
DT	17deg. C, 73%RH, 1021 hPa	120Vac, 60Hz	Frank Liu

### 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 (15.231)**  
**ANSI C63.4-2003**  
**ANSI C63.10-2009**

All test items 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.



### 3.4 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.

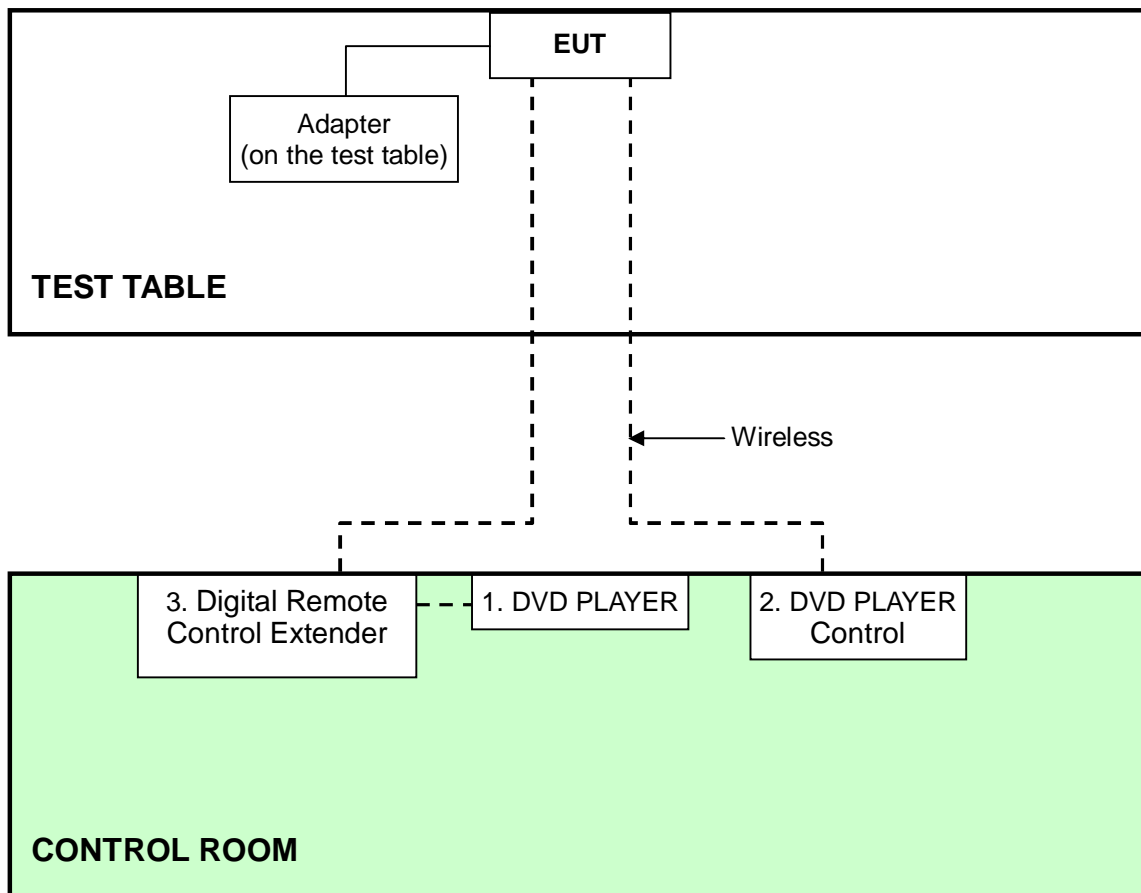
NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	DVD PLAYER	Pioneer	DV-600AV-S	GIKD005479LS	FCC DoC
2	DVD PLAYER Control	Pioneer	NA	NA	NA
3	Digital Remote Control Extender	PX	DIR-500 RX	NA	NA
4	Remote Control	NA	NA	NA	NA

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

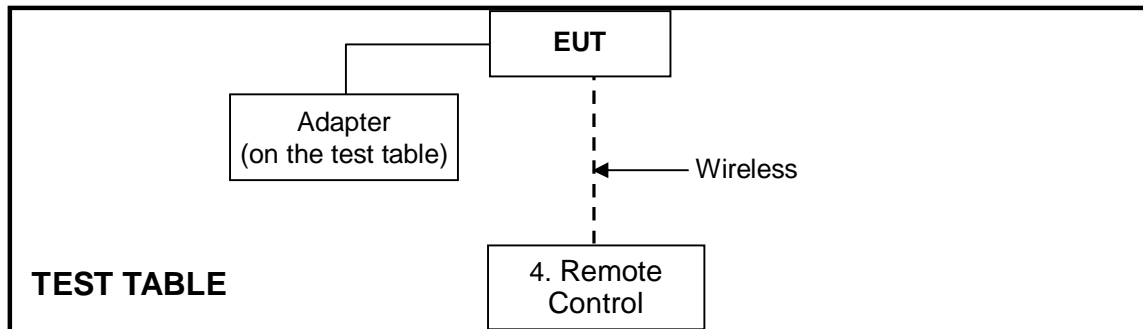
**NOTE:** 1. All power cords of the above support units are non shielded (1.8m).

### 3.5 CONFIGURATION OF SYSTEM UNDER TEST

For conducted test:



**For radiated test:**



## 4 TEST PROCEDURE AND RESULT

### 4.1 CONDUCTED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB $\mu$ 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 0.50 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.

#### 4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESCS 30	100287	Mar. 02, 2011	Mar. 01, 2012
Line-Impedance Stabilization Network (for EUT)	NSLK 8127	8127-523	Sep. 17, 2010	Sep. 16, 2011
Line-Impedance Stabilization Network (for Peripheral)	ENV-216	100072	June 11, 2010	June 10, 2011
RF Cable (JYEBAO)	5DFB	CONCAB-003	Aug. 06, 2010	Aug. 05, 2011
50 ohms Terminator	50	3	Nov. 03, 2010	Nov. 02, 2011
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. A.
3. The VCCI Con A Registration No. is C-817.

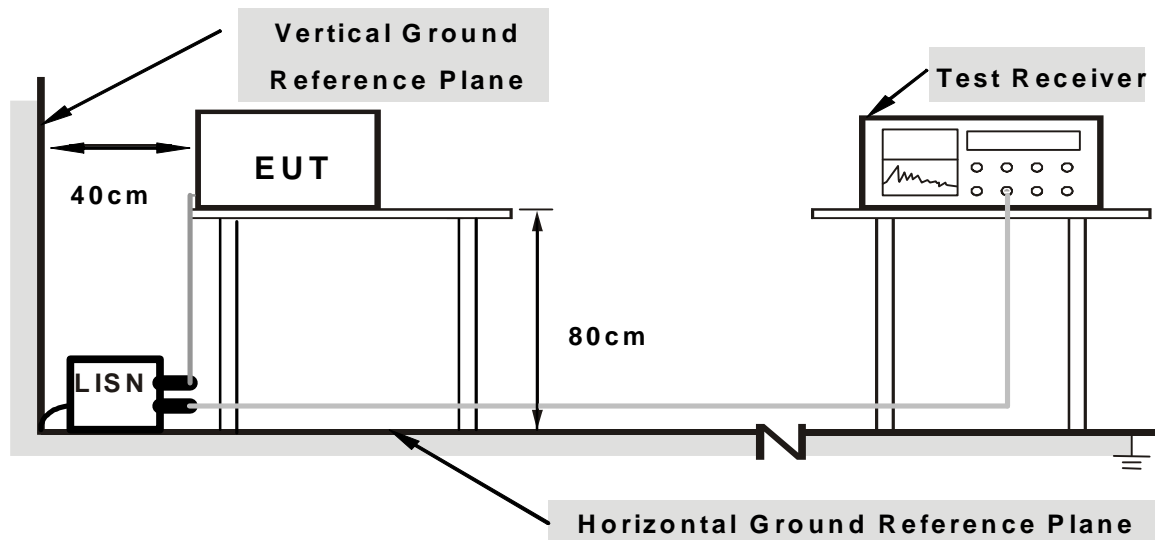
#### 4.1.3 TEST PROCEDURES

- 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) were not recorded.

#### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.1.5 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 related item – Photographs of the Test Configuration.

#### 4.1.6 EUT OPERATING CONDITIONS

1. Place the EUT on testing table.
2. The support unit 2 (DVD PLAYER Control) links with EUT under transmission condition continuously via wireless.
3. EUT links with support unit 3 (Digital Remote Control Extender) via wireless.
4. The support unit 3 (Digital Remote Control Extender) links with support unit 1 (DVD PLAYER) and to enable support unit 1 (DVD PLAYER) power on via wireless.

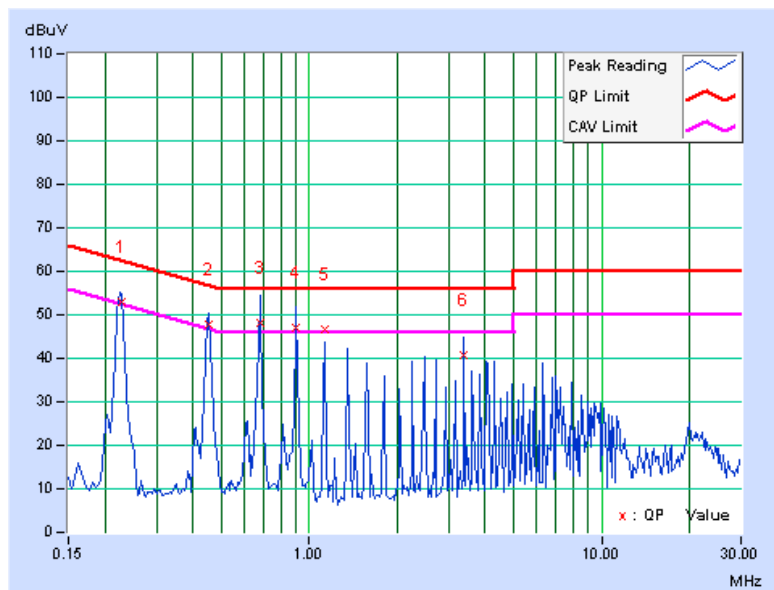


#### 4.1.7 TEST RESULTS

<b>PHASE</b>	Line (L)	<b>6dB BANDWIDTH</b>	9 kHz
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No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor (dB)	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.228	0.36	52.72	47.56	53.08	47.92	62.52	52.52	-9.44	-4.60
2	<b>0.451</b>	<b>0.36</b>	<b>47.25</b>	<b>42.79</b>	<b>47.61</b>	<b>43.15</b>	<b>56.86</b>	<b>46.86</b>	<b>-9.25</b>	<b>-3.71</b>
3	0.677	0.38	47.94	31.57	48.32	31.95	56.00	46.00	-7.68	-14.05
4	0.904	0.40	46.70	42.04	47.10	42.44	56.00	46.00	-8.90	-3.56
5	1.130	0.42	46.09	41.15	46.51	41.57	56.00	46.00	-9.49	-4.43
6	3.394	0.49	40.11	-	40.60	-	56.00	46.00	-15.40	-

- 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.



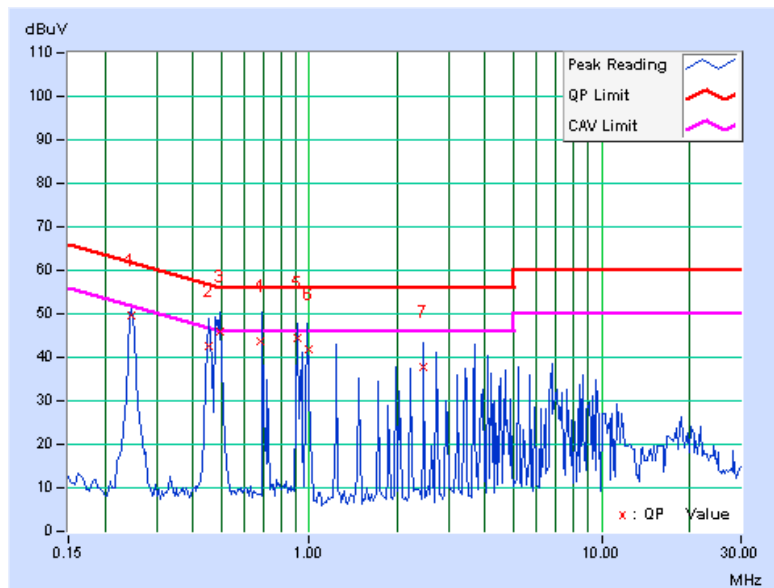


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<b>PHASE</b>	Neutral (N)	<b>6dB BANDWIDTH</b>	9 kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.248	0.10	49.67	-	49.77	-	61.84	51.84	-12.06	-
2	0.451	0.11	42.41	-	42.52	-	56.86	46.86	-14.34	-
3	0.494	0.12	45.99	39.03	46.11	39.15	56.10	46.10	-10.00	-6.96
4	0.684	0.13	43.59	-	43.72	-	56.00	46.00	-12.28	-
5	0.908	0.15	44.46	-	44.61	-	56.00	46.00	-11.39	-
6	0.990	0.16	41.60	-	41.76	-	56.00	46.00	-14.24	-
7	2.469	0.21	37.45	-	37.66	-	56.00	46.00	-18.34	-

- 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.



## 4.1 RADIATED EMISSION MEASUREMENT

### 4.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT

According to 15.231(b) the field strength of emissions from intentional radiators operated under these frequencies bands shall not exceed the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental		Field Strength of Spurious	
	uV/meter	dBuV/meter	uV/meter	dBuV/meter
40.66 ~ 40.70	2250	67.04	225	48.04
70 ~ 130	1250	61.94	125	41.94
130 ~ 174	1250 ~ 3750	61.94 ~ 71.48	125 ~ 375	41.94 ~ 51.48
174 ~ 260	3750	71.48	75	37.50
260 ~ 470	3750 ~ 12500	71.48 ~ 81.94	375 ~ 1250	51.48 ~ 61.94
Above 470	12500	81.94	1250	61.94

**NOTE:**

- Where F is the frequency in MHz, the formula for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, uV/m at 3 meters =  $56.81818(F)-6136.3636$ ; for the band 260-470 MHz, uV/m at 3 meters =  $41.6667(F)-7083.3333$ . The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.
- The above field strength limits are specified at a distance of 3meters. The tighter limits apply at the band edges.

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	$2400/F(\text{kHz})$	300
0.490 ~ 1.705	$24000/F(\text{kHz})$	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

**NOTE:**

- The lower limit shall apply at the transition frequencies.
- Emission level (dBuV/m) =  $20 \log$  Emission level (uV/m).
- 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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#### 4.1.2 TEST INSTRUMENT

Test date: Apr. 27 to 28, 2011

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Agilent Spectrum Analyzer	E4446A	MY48250254	July 14, 2010	July 13, 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. 16, 2010	Nov. 15, 2011
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	Apr. 29, 2010	Apr. 28, 2011
AISI Horn_Antenna	AIH.8018	0000320091110	Nov. 12, 2010	Nov. 11, 2011
SCHWARZBECK Horn_Antenna	BBHA 9170	9170-424	Oct. 08, 2010	Oct. 07, 2011
RF CABLE	NA	RF104-201 RF104-203 RF104-204	Dec. 27, 2010	Dec. 26, 2011
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.

#### 4.1.3 TEST PROCEDURE

- 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 height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

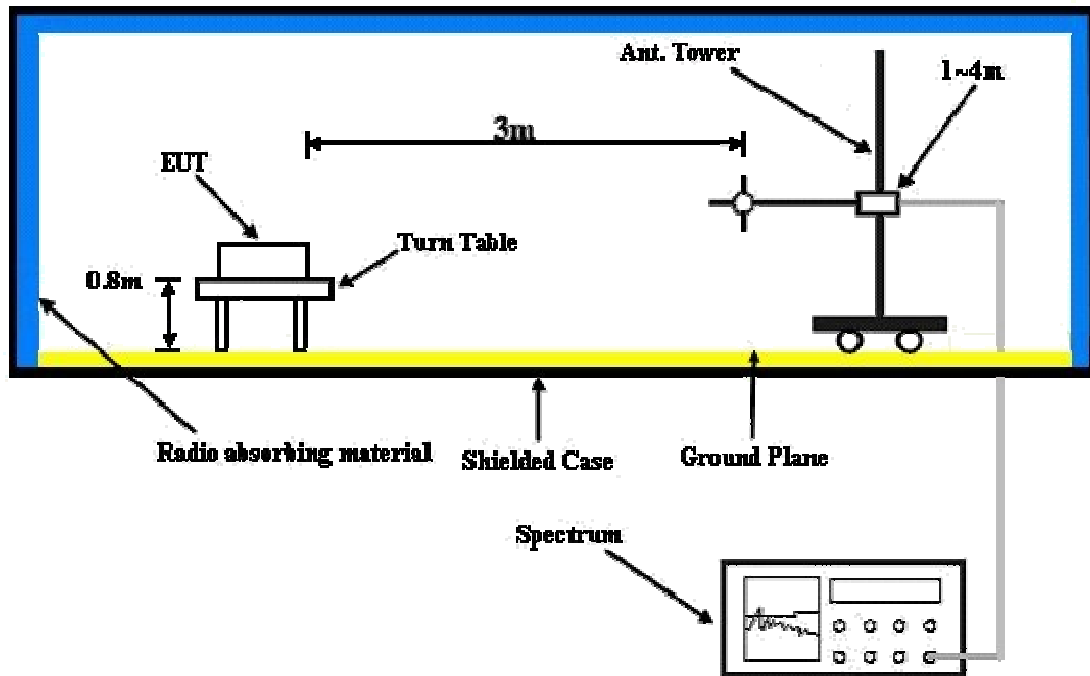
**NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for 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. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz for Average detection (AV) at frequency above 1GHz.

#### 4.1.4 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 CONDITION

Set the transmitter part of EUT under transmission condition continuously at specific channel frequency.



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## 4.1.7 TEST RESULTS

## ABOVE 1GHz DATA

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 5GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	17deg. C, 73%RH 1021hPa	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	1301.76	49.4 PK	80.8	-31.4	1.00 H	120	21.92	27.48
2	1301.76	45.0 AV	60.6	-15.6	1.00 H	120	17.52	27.48
3	1735.68	48.0 PK	80.8	-32.8	1.00 H	211	18.80	29.20
4	1735.68	35.0 AV	60.6	-25.6	1.00 H	211	5.80	29.20
5	2169.60	52.8 PK	80.8	-28.0	1.00 H	87	21.75	31.05
6	2169.60	48.1 AV	60.6	-12.5	1.00 H	87	17.05	31.05
7	2603.52	56.3 PK	80.8	-24.5	1.00 H	213	23.88	32.42
8	2603.52	46.2 AV	60.6	-14.4	1.00 H	213	13.78	32.42
9	3038.41	58.6 PK	80.8	-22.2	1.00 H	293	25.05	33.55
10	3038.41	55.7 AV	60.6	-4.9	1.00 H	293	22.15	33.55
11	3471.36	60.4 PK	80.8	-20.4	1.00 H	277	25.93	34.47
12	3471.36	50.3 AV	60.6	-10.3	1.00 H	277	15.83	34.47
13	3905.28	55.4 PK	80.8	-25.4	1.00 H	247	19.42	35.98
14	3905.28	49.3 AV	60.6	-11.3	1.00 H	247	13.32	35.98
15	4339.20	60.4 PK	80.8	-20.4	1.00 H	214	22.75	37.65
16	4339.20	49.3 AV	60.6	-11.3	1.00 H	214	11.65	37.65

- 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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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 5GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	17deg. C, 73%RH 1021hPa	TESTED BY	Frank Liu

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	1301.76	47.0 PK	80.8	-33.8	1.57 V	342	19.52	27.48
2	1301.76	41.7 AV	60.6	-18.9	1.57 V	342	14.22	27.48
3	1735.68	48.0 PK	80.8	-32.8	1.00 V	26	18.80	29.20
4	1735.68	35.5 AV	60.6	-25.1	1.00 V	26	6.30	29.20
5	2169.60	49.9 PK	80.8	-30.9	1.22 V	341	18.85	31.05
6	2169.60	41.1 AV	60.6	-19.5	1.22 V	341	10.05	31.05
7	2603.52	50.3 PK	80.8	-30.5	1.22 V	243	17.88	32.42
8	2603.52	41.9 AV	60.6	-18.7	1.22 V	243	9.48	32.42
9	3037.44	54.1 PK	80.8	-26.7	1.18 V	141	20.55	33.55
10	3037.44	51.3 AV	60.6	-9.3	1.18 V	141	17.75	33.55
11	3471.38	52.1 PK	80.8	-28.7	1.00 V	132	17.63	34.47
12	3471.38	44.0 AV	60.6	-16.6	1.00 V	132	9.52	34.47
13	3905.28	53.1 PK	80.8	-27.7	1.12 V	324	17.12	35.98
14	3905.28	45.6 AV	60.6	-15.0	1.12 V	324	9.62	35.98
15	4339.20	56.4 PK	80.8	-24.4	1.37 V	213	18.75	37.65
16	4339.20	45.3 AV	60.6	-15.3	1.37 V	213	7.65	37.65

- 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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BELOW 1GHz DATA

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	17deg. C, 69%RH 1021hPa	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	*433.92	84.6 PK	100.8	-16.2	1.00 H	20	100.47	-15.87
2	*433.92	73.2 AV	80.8	-7.6	1.00 H	20	89.07	-15.87
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	*433.92	89.3 PK	100.8	-11.5	1.00 V	234	104.17	-14.87
2	*433.92	78.7 AV	80.8	-2.1	1.00 V	234	93.57	-14.87

- 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 1	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	16deg. C, 67%RH 1021hPa	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	60.08	27.3 QP	40.0	-12.7	1.00 H	194	13.70	13.57
2	156.00	37.4 QP	43.5	-6.1	1.50 H	82	23.01	14.43
3	259.98	35.3 QP	46.0	-10.7	1.00 H	73	21.48	13.85
4	312.08	34.4 QP	46.0	-11.6	1.00 H	277	18.67	15.72
5	538.03	34.7 QP	46.0	-11.3	1.50 H	29	13.76	20.96
6	868.20	43.0 QP	46.0	-3.0	2.00 H	59	16.79	26.25

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	43.97	30.7 QP	40.0	-9.3	1.00 V	343	16.42	14.32
2	130.07	32.5 QP	43.5	-11.0	1.00 V	360	19.16	13.34
3	260.10	35.5 QP	46.0	-10.5	1.50 V	0	21.66	13.85
4	312.08	31.8 QP	46.0	-14.2	1.50 V	78	16.07	15.72
5	486.05	31.9 QP	46.0	-14.1	1.00 V	304	12.13	19.76
6	538.03	38.6 QP	46.0	-7.4	1.00 V	70	17.61	20.96
7	868.20	40.1 QP	46.0	-5.9	1.00 V	81	13.82	26.25

- 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 20dB OCCUPIED BANDWIDTH MEASUREMENT

### 4.2.1 LIMITS OF EMISSION BANDWIDTH MEASUREMENT

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for device operating above 70 MHz and below 900 MHz.

FUNDAMENTAL FREQUENCY (MHz)	LIMIT OF EMISSION BANDWIDTH (kHz)
433.92	1084.80

### 4.2.2 TEST INSTRUMENT

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
R&S SPECTRUM ANALYZER	FSP40	100037	Sep. 08, 2010	Sep. 07, 2011

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

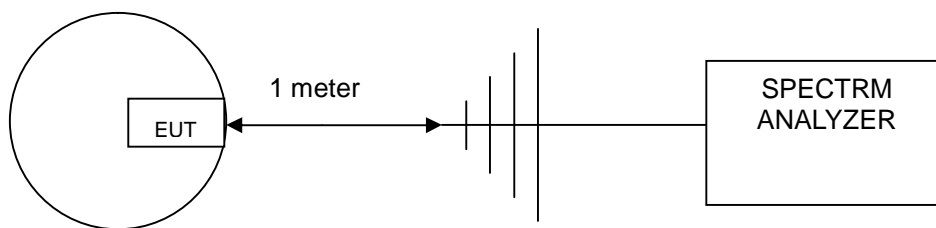
### 4.2.3 TEST PROCEDURE

- a. The EUT was placed on the turn table.
- b. The signal was coupled to the spectrum analyzer through an antenna.
- c. Set the resolution bandwidth to 10 kHz and video bandwidth to 30 kHz then select Peak function to scan the channel frequency.
- d. The emission bandwidth was measured and recorded.

#### 4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.2.5 TEST SETUP



#### 4.2.6 TEST RESULTS

FREQUENCY (MHz)	20dB BANDWIDTH (kHz)	MAXIMUM LIMIT (kHz)	PASS/FAIL
433.92	404.0	1084.80	PASS

The plot of test result is attached as below.



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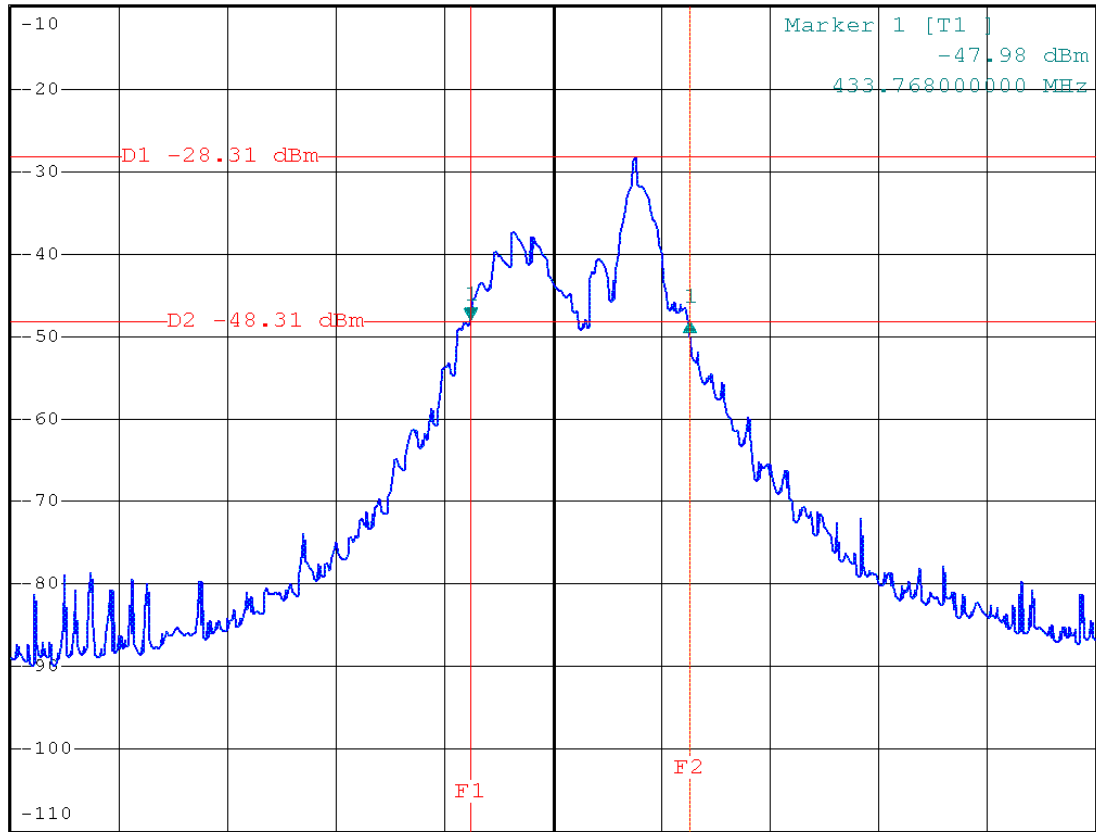


\*RBW 10 kHz Delta 1 [T1 ]  
\*VBW 30 kHz -0.14 dB  
SWT 20 ms 404.000000000 kHz

Ref -10 dBm

\*Att 0 dB

1 PK  
VIEW



Center 433.92 MHz

200 kHz/

Span 2 MHz

Date: 2.MAY.2011 12:52:55

### 4.3 DEACTIVATION TIME

#### 4.3.1 LIMITS OF DEACTIVATION TIME MEASUREMENT

15.231 (a)(1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

15.231 (a)(2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

#### 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.

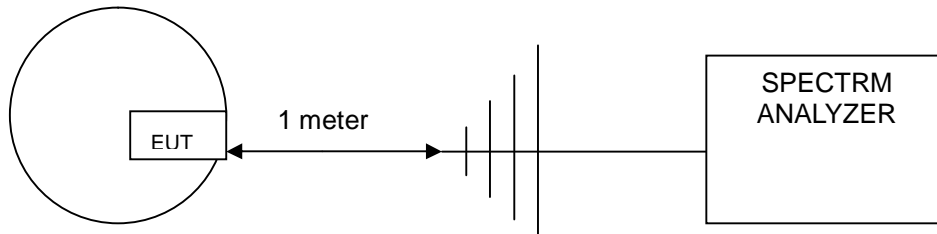
#### 4.3.3 TEST PROCEDURES

- a. The EUT was placed on the turning table.
- b. The signal was coupled to the spectrum analyzer through an antenna.
- c. Set the resolution bandwidth to 100kHz and video bandwidth to 100kHz. The spectrum analyzer was turned to the centre frequency of the transmitter's and the analyzer's marker function was used to determine the duration of transmission.
- d. The transmission duration was measured and recorded.

#### 4.3.4 DEVIATION FROM TEST STANDARD

No deviation.

### 4.3.5 TEST SETUP



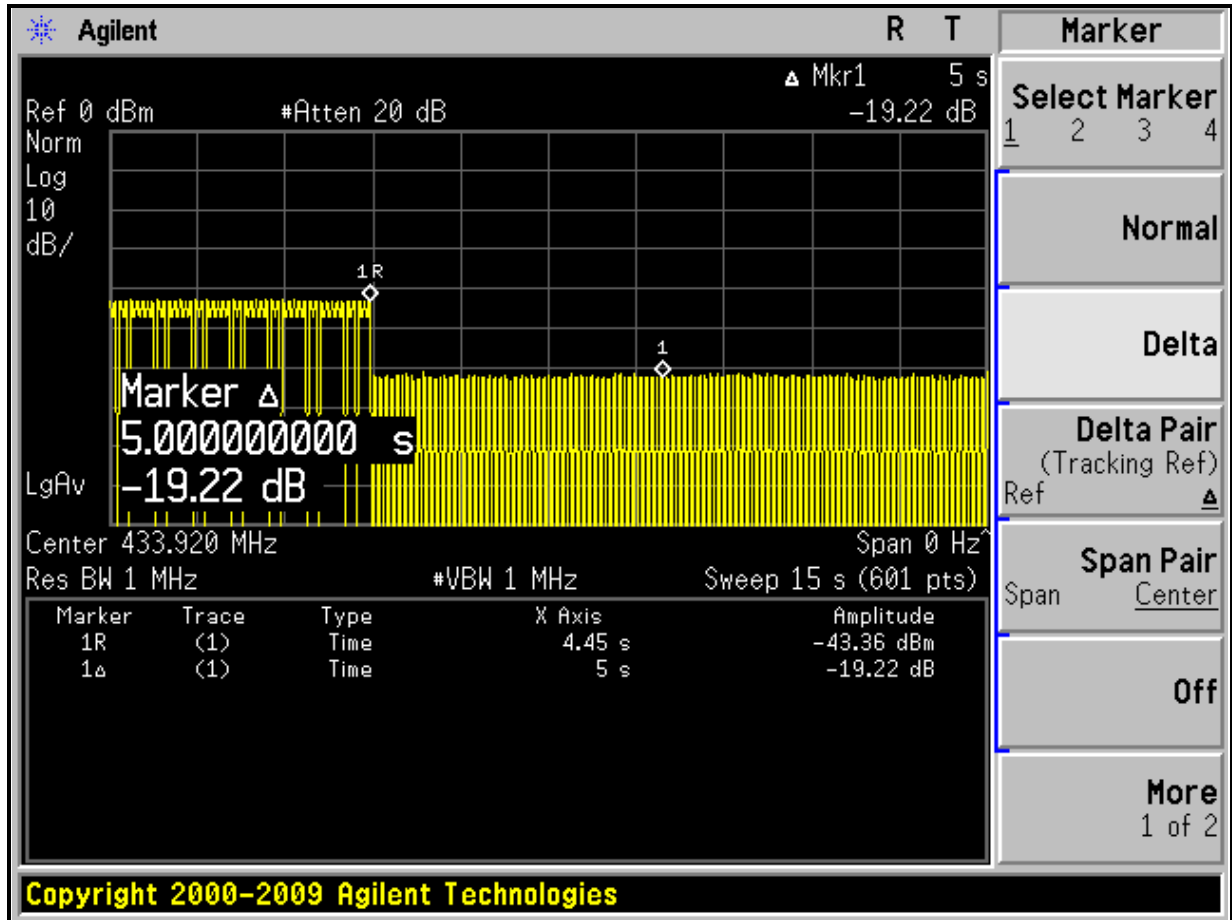
### 4.3.6 TEST RESULTS

PUSH BUTTON	FREQUENCY (MHz)	MAXIMUM LIMIT (sec)	PASS/FAIL
1	433.92	5	PASS

The plots of test results are attached as below.



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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.

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](http://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](http://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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## **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 ---**