

# **FCC TEST REPORT**

REPORT NO.: RF961225L01
MODEL NO.: 101239-0001
RECEIVED: Dec. 25, 2007
TESTED: Dec. 27, 2007
ISSUED: Dec. 31, 2007

**APPLICANT:** Southwire Company - Flatwire Technologies Division

ADDRESS: One Southwire Drive, Carrollton, Georgia 30119

**ISSUED BY:** Advance Data Technology Corporation

LAB ADDRESS: No. 47, 14<sup>th</sup> Ling, Chia Pau Tsuen, Lin Kou Hsiang

244, Taipei Hsien, Taiwan, R.O.C.

**TEST LOCATION:** No. 19. Hwa Ya 2<sup>nd</sup> Rd., Wen Hwa Tsuen, Kwei

Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

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No.: 2177-01



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#### CERTIFICATION

PRODUCT: WIRELESS WALL MOUNT REMOTE CONTROL

TRANSMITTER

MODEL: 101239-0001

**BRAND:** Southwire

**APPLICANT:** Southwire Company - Flatwire Technologies Division

**TESTED:** Dec. 27, 2007

**TEST SAMPLE: ENGINEERING SAMPLE** 

STANDARDS: FCC Part 15, Subpart C (Section 15.231)

ANSI C63.4-2003

The above equipment (model: 101239-0001) has been tested by Advance Data Technology Corporation, 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

**TECHNICAL** 

ACCEPTANCE

Responsible for RF

Gary Chang / Assistant Manager, DATE: Dec. 31, 2007 **APPROVED BY** 



# 2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

	APPLIED STANDARD: FCC Part 15, Subpart C; RSS-210 Issue 6					
Standard Section	Test Type and Limit	Result	REMARK			
15.207	AC Power Conducted Emission	NA	NA			
15.209 15.231(b)	Radiated Emission Test		Meet the requirement of limit. Minimum passing margin is –3.50dB 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			

#### 2.1 MEASUREMENT UNCERTAINTY

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

Measurement	Frequency	Uncertainty
Conducted emissions	9kHz~30MHz	2.55 dB
	30MHz ~ 200MHz	2.93 dB
Radiated emissions	200MHz ~1000MHz	2.95 dB
Tradiated emissions	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

PRODUCT	WIRELESS WALL MOUNT REMOTE CONTROL TRANSMITTER
MODEL NO.	101239-0001
FCC ID	VXN101239-0001
POWER SUPPLY	3Vdc from battery
MODULATION TYPE	ASK
CARRIER FREQUENCY	433.92MHz
NUMBER OF CHANNEL	1
ANTENNA TYPE	wire antenna with 0dBi gain
DATA CABLE	NA
I/O PORTS	NA
ACCESSORY DEVICES	Battery

**NOTE:** 1. The EUT is only transmitter part.

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

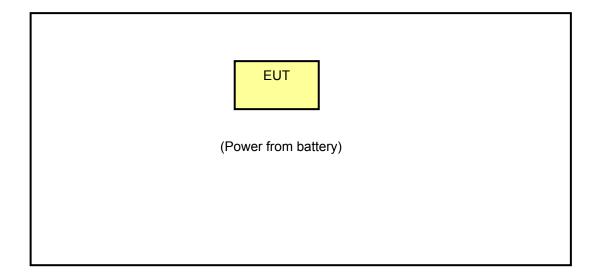


# 3.2 DESCRIPTION OF TEST MODES

One channel was provided to this EUT.

Channel	Frequency
1	433.92MHz

# 3.2.1 CONFIGURATION OF SYSTEM UNDER TEST





#### 3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

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

Where **RE ≥ 1G**: Radiated Emission above 1GHz

RE < 1G: Radiated Emission below 1GHz

**PLC:** Power Line Conducted Emission

EB: 20dB Bandwidth measurement

DT: Deactivation Time measurement

NOTE: No need to concern of Conducted Emission due to the EUT is powered by battery.

#### **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	TESTED	MODULATION	AXIS
CHANNEL	CHANNEL	TYPE	
1	1	ASK	Z

#### **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	TESTED	MODULATION	AXIS
CHANNEL	CHANNEL	TYPE	
1	1	ASK	Z

#### **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	TESTED	MODULATION
CHANNEL	CHANNEL	TYPE
1	1	ASK



#### **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	TESTED	MODULATION
CHANNEL	CHANNEL	TYPE
1	1	ASK

#### 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

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

#### 3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit.



### 4 TEST PROCEDURE AND RESULT

#### 4.1 CONDUCTED EMISSION MEASUREMENT

NA

#### 4.2 RADIATED EMISSION MEASUREMENT

#### 4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

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

Fundamental	Field Strength	of Fundamental	Field Strengt	h of Spurious
Frequency (MHz)	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:

- 1. 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.
- 2. 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(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.



#### 4.2.2 TEST INSTRUMENT

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Jul. 27, 2008
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100269	Aug. 05, 2008
BILOG Antenna SCHWARZBECK	VULB9168	9168-153	Jan. 04, 2008
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-563	Jul. 30, 2008
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170242	Jan. 16, 2008
Preamplifier Agilent	8449B	3008A01910	Sep. 19, 2008
Preamplifier Agilent	8447D	2944A10638	Dec. 19, 2008
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	274039/223650	Nov. 07, 2008
RF signal cable Worken	8D-FB	Cable-HYCH9-01	Aug. 09, 2008
Software	ADT_Radiated_V7.6	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA
Turn Table EMCO	2087-2.03	NA	NA
Antenna Tower &Turn Table Controller EMCO	2090	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 IC Site Registration No. is IC3789B-9.



#### 4.2.3 TEST PROCEDURE

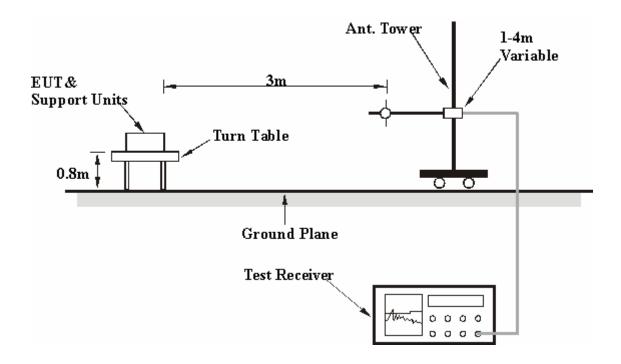
- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on 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 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 the quasi-peak method or average method as specified and then reported in Data sheet peak mode and QP mode.

#### 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 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.



# 4.2.4 TEST SETUP



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

# 4. EUT OPERATING CONDITION

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



#### 4.2.5 TEST RESULTS

#### **Above 1GHz Worst-Case Data**

EUT TEST CONDITION		MEASUREMENT DETAIL		
FREQUENCY RANGE	1 ~ 10GHz		Peak (PK) Average (AV)	
INPUT POWER	3Vdc		24deg. C, 64%RH, 1000.4hPa	
TESTED BY	Brad Wu			

	ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M							
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1301.70	47.86 PK	74.00	-26.14	1.01 H	31	18.86	28.99
2	1301.70	34.69 AV	54.00	-19.31	1.01 H	31	5.69	28.99
3	1735.60	46.18 PK	74.00	-27.82	1.00 H	324	17.26	28.92
4	1735.60	33.01 AV	54.00	-20.99	1.00 H	324	4.09	28.92
5	2169.60	58.20 PK	74.00	-15.80	1.79 H	8	26.12	32.09
6	2169.60	45.03 AV	54.00	-8.97	1.79 H	8	12.95	32.09
7	2603.50	51.96 PK	74.00	-22.04	1.15 H	5	19.31	32.65
8	2603.50	38.79 AV	54.00	-15.21	1.15 H	5	6.14	32.65

	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	1301.70	53.19 PK	74.00	-20.81	1.33 V	210	24.20	28.99	
2	1301.70	40.02 AV	54.00	-13.98	1.33 V	210	11.03	28.99	
3	1735.60	57.97 PK	74.00	-16.03	1.30 V	13	29.05	28.92	
4	1735.60	44.80 AV	54.00	-9.20	1.30 V	13	15.88	28.92	
5	2169.60	58.47 PK	74.00	-15.53	1.00 V	157	26.39	32.09	
6	2169.60	45.30 AV	54.00	-8.70	1.00 V	157	13.22	32.09	
7	2603.50	47.21 PK	74.00	-26.79	1.31 V	24	14.56	32.65	
8	2603.50	34.04 AV	54.00	-19.96	1.31 V	24	1.39	32.65	

#### 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.
- 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:

20log (Duty cycle) = 
$$20log \frac{90 \times 0.244ms}{100 \text{ ms}}$$
 = -13.17dB

Please see page 17 for plotted duty.



#### **Below 1GHz Worst-Case Data**

EUT TEST CONDITION		MEASUREMENT DETAIL		
FREQUENCY RANGE	Below 1000MHz	DETECTOR FUNCTION	Quasi-Peak / Peak / Average	
INPUT POWER	3Vdc	ENVIRONMENTAL CONDITIONS	24deg. C, 64%RH, 1000.4hPa	
TESTED BY	Brad Wu			

	ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)	
1	160.24	9.51 QP	43.50	-33.99	2.00 H	70	-3.94	13.44	
2	391.56	10.56 QP	46.00	-35.44	1.50 H	103	-4.96	15.51	
3	*433.92	90.47 PK	100.80	-10.33	2.00 H	8	73.73	16.73	
4	*433.92	77.30 AV	80.80	-3.50	2.00 H	8	60.56	16.73	
5	562.63	16.03 QP	46.00	-29.97	2.00 H	298	-4.19	20.22	
6	710.36	17.33 QP	46.00	-28.67	2.00 H	322	-4.92	22.24	
7	846.43	20.23 QP	46.00	-25.77	2.00 H	340	-4.58	24.81	
8	867.84	54.17 PK	80.80	-26.63	1.00 H	189	29.16	25.01	
9	867.84	41.00 AV	60.80	-19.80	1.00 H	189	15.99	25.01	
10	930.02	20.73 QP	46.00	-25.27	2.00 H	259	-4.84	25.56	

#### **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:

20log (Duty cycle) = 
$$20log \frac{90 \times 0.244ms}{100ms}$$
 = -13.17dB

Please see page 17 for plotted duty.



EUT TEST CONDITION		MEASUREMENT DETAIL		
FREQUENCY RANGE	Below 1000MHz	DETECTOR FUNCTION	Quasi-Peak / Peak / Average	
INPUT POWER	3Vdc	ENVIRONMENTAL CONDITIONS	24deg. C, 64%RH, 1000.4hPa	
TESTED BY	Brad Wu			

	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	85.55 PK	100.80	-15.25	1.15 V	102	68.81	16.73	
2	*433.92	72.38 AV	80.80	-8.42	1.15 V	102	55.64	16.73	
3	582.06	14.49 QP	46.00	-31.51	1.00 V	97	-6.19	20.68	
4	644.27	16.20 QP	46.00	-29.80	1.00 V	4	-5.29	21.50	
5	735.63	16.71 QP	46.00	-29.29	1.50 V	166	-6.13	22.85	
6	803.67	19.07 QP	46.00	-26.93	1.00 V	130	-5.33	24.40	
7	867.64	61.39 PK	80.80	-19.41	1.15 V	256	36.38	25.01	
8	867.64	48.22 AV	60.80	-12.58	1.15 V	256	23.21	25.01	
9	930.02	20.31 QP	46.00	-25.69	1.00 V	247	-5.25	25.56	
10	970.84	22.37 QP	54.00	-31.63	1.50 V	199	-3.44	25.80	

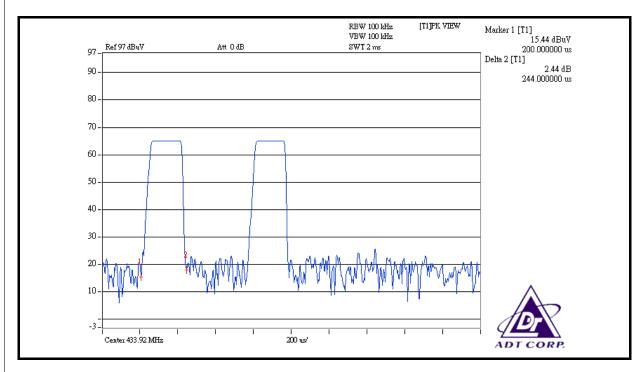
#### **REMARKS**:

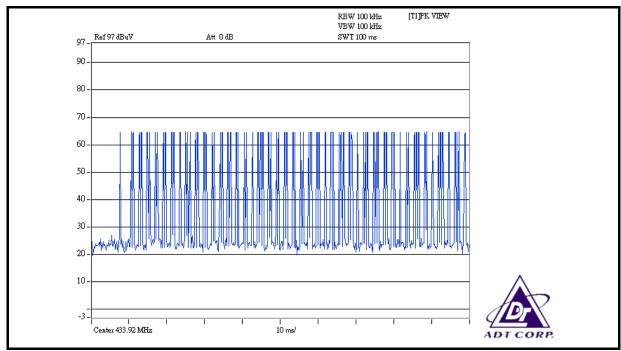
- 1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
- 2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
- 3. The other emission levels were very low against the limit.
- 4. Margin value = Emission level Limit value.
- 5. "\*" = Fundamental frequency
- 6. The average value of fundamental frequency is: Average = Peak value + 20log (Duty cycle) Where the duty factor is calculated from following formula:

20log (Duty cycle) = 
$$20log \frac{90 \times 0.244ms}{100ms}$$
 - -13.17dB

Please see page 17 for plotted duty.







20log (Duty cycle) = 
$$20log \frac{90 \times 0.244 \text{ ms}}{100\text{ms}}$$
 = -13.17dB



#### 4.3 20dB OCCUPIED BANDWIDTH MEASUREMENT

#### 4.3.1 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	

#### 4.3.2 TEST INSTRUMENT

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSP40	100040	Jun. 28, 2008

**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

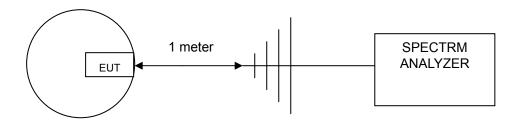
- a. The EUT was placed on the turn table.
- b. The signal was coupled to the spectrum analyzer through an antenna.
- c. Set the resolution bandwidth to 10 kHz and video bandwidth to 30 kHz then select Peak function to scan the channel frequency.
- d. The emission bandwidth was measured and recorded.



# 4.3.4 DEVIATION FROM TEST STANDARD

No deviation.

# 4.3.5 TEST SETUP

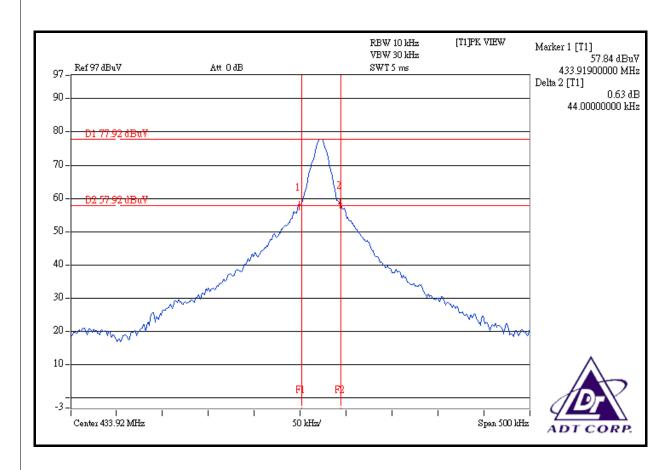


# 4.3.6 TEST RESULTS

Frequency (MHz)	20dB Bandwidth (kHz)	Maximum Limit (kHz)	PASS/FAIL
433.92	44.00	1084.80	PASS

The plot of test result is attached as below.







#### 4.4 DEACTIVATION TIME

#### 4.4.1 LIMITS OF DEACTIVATION TIME MEASUREMENT

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

#### 4.4.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSP40	100040	Jun. 28, 2008

**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

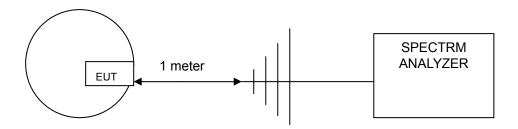
- a. The EUT was placed on the turning table.
- b. The signal was coupled to the spectrum analyzer through an antenna.
- c. Set the resolution bandwidth to 100kHz and video bandwidth to 100kHz. The spectrum analyser was turned to the centre frequency of the transmitter's and the analyser's marker function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

#### 4.4.4 DEVIATION FROM TEST STANDARD

No deviation



# 4.4.5 TEST SETUP

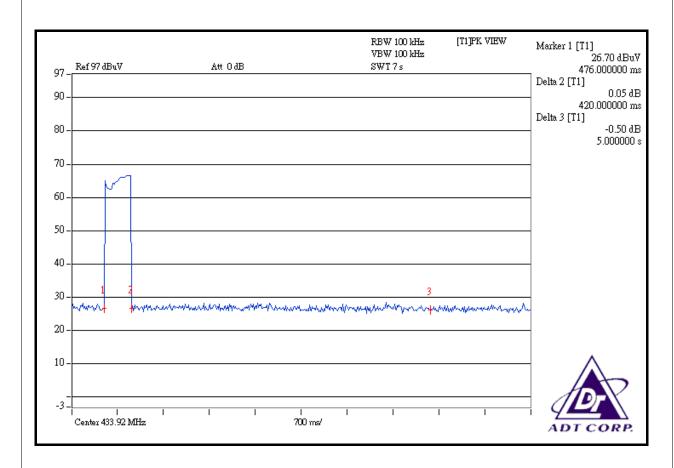


# 4.4.6 TEST RESULTS

Push button	Frequency (MHz)	Maximum limit (sec)	PASS/FAIL
1	433.92	5	PASS

The plots of test results are attached as below.







# **5 PHOTOGRAPHS OF THE TEST CONFIGURATION** Please refer to the attached file (Test Setup Photo).



# **6 INFORMATION ON THE TESTING LABORATORIES**

We, ADT Corp., were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

USA FCC, UL, A2LA
Germany TUV Rheinland

Japan VCCI Norway NEMKO

Canada INDUSTRY CANADA, CSA

R.O.C. TAF, BSMI, NCC

Netherlands Telefication

Singapore GOST-ASIA(MOU)

Russia CERTIS(MOU)

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: <a href="www.adt.com.tw/index.5/phtml">www.adt.com.tw/index.5/phtml</a>. If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab: Hsin Chu EMC/RF Lab:

Tel: 886-2-26052180 Tel: 886-3-5935343 Fax: 886-2-26051924 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.



# **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.