



FCC ID TEST REPORT

Application No.: STUGZEMO120614555RF
Applicant: CASON ELECTRONICS CO.,LTD.
Address NO.13 EAST ROAD ALONG RIVER, NANTOU, ZHONGSHAN,
GUANGDONG, CHINA

Equipment Under Test (EUT):

EUT Name: Temperature Transmitter
Trade Mark: TX-AC2012
Model No.: N/A
Serial No.: Not supplied by client
FCC ID: QL5AC2012TX13
Standards: FCC Part 15 Subpart C, Paragraph 15.231
Date of Receipt: Jul.01, 2012
Date of Test: Jul.01, 2012~ Jul.20, 2012

Test Result :	PASS*
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Tested By: David Li / Engineer.

David . Li

Reviewed By: Jimmy Yao / EMC Manager

Jimmy Yao



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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15, Subpart C (15.231)			
Standard Section	Test Item	Judgment	Remark
FCC Part 15, Paragraph 15.203	Antenna Requirement	Pass	Compliant
FCC Part 15, Paragraph 15.207	Conducted Emission	N/A	Compliant
FCC Part 15, Paragraph 15.209	General Requirement	Pass	Meets Class B Limit
FCC Part 15, Paragraph 15.231 (b)	Radiated Emission Test	Pass	Compliant
FCC Part 15, Paragraph 15.231 (c)	20dB Bandwidth Testing	Pass	Compliant
FCC Part 15, Paragraph 15.231 (a) (1)	Deactivate Testing	Pass	Compliant

We hereby certify that:

The above equipment was tested by Guangdong Electronic & Electrical Products Inspection and Supervision Institute (CGEL). The data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in **ANSI C 63.4:2003**. The sample tested as described in this report is in compliance with the FCC Rules Part 15.

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1.1 TEST FACILITY

Guangdong Electronic & Electrical Products Inspection and Supervision Institute (CGEL)
45 South Street Shayongnan village Sanyuanli Guangzhou

FCC Registration No.: 597719.
Industry Canada (IC) Assigned No.: 6664A.

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	Conducted Emission Test	$\pm 1.38\text{dB}$
2	Radiated Emission Test	$\pm 3.17\text{dB}$
3	RF power,conducted	$\pm 0.16\text{dB}$
4	Spurious emissions,conducted	$\pm 0.21\text{dB}$
5	All emissions,radiated(<1G)	$\pm 4.68\text{dB}$
6	All emissions,radiated(>1G)	$\pm 4.89\text{dB}$

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2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Temperature Transmitter
Trade Name	N/A
Model Name	TX-AC2012
OEM Brand/Model Name	N/A
Model Difference	N/A
Applicant:	CASON ELECTRONICS CO.,LTD.
Address	NO.13 EAST ROAD ALONG RIVER, NANTOU, ZHONGSHAN, GUANGDONG, CHINA
Manufacture	CASON ELECTRONICS CO.,LTD.
Address	NO.13 EAST ROAD ALONG RIVER, NANTOU, ZHONGSHAN, GUANGDONG, CHINA
Operation Frequency	433.92MHz
Antenna Designation	A permanent fixed antenna, designed as an indispensable part of the EUT.
Power Source	DC 3.0V (1.5Vx2pcs, size "AA" batteries operation)
Connecting I/O Port(s)	Please refer to the User's Manual
Products Covered	N/A
EUT Modification(s)	N/A

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.



2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

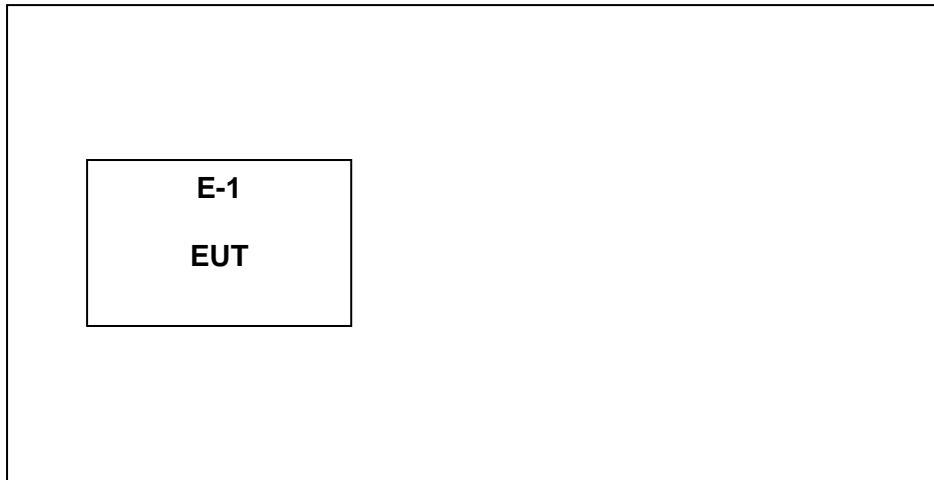
Pretest Mode	Description
Mode 1	TX

For Conducted Emission	
Final Test Mode	Description
-	“N/A” denotes test is not applicable in this Test Report

For Radiated Emission	
Final Test Mode	Description
Mode 1	TX



2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED





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2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

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.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	Temperature Transmitter	N/A	TX-AC2012	N/A	EUT

Item	Shielded Type	Ferrite Core	Length	Note

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

**2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS****Radiation Test equipment**

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	Agilent	E4407B	160400005	Jul. 06. 2013
2	Test Receiver	R&S	ESPI	101318	Jul. 06. 2013
3	Bilog Antenna	TESEQ	CBL6111D	31216	Jul. 06. 2013
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	Jul. 06. 2013
5	Spectrum Analyzer	ADVANTEST	R3132	150900201	Jul. 06. 2013
6	Horn Antenna	EM	EM-AH-10180	2011071402	Jul. 06. 2013
7	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	Jul. 06. 2013
8	Amplifier	EM	EM-30180	060538	Jul. 06. 2013
9	Loop Antenna	ARA	PLA-1030/B	1029	Jul. 06. 2013
10	Power Meter	R&S	NRVS	100696	Jul. 06. 2013

Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Test Receiver	R&S	ESCI	101160	Jul. 06. 2013
2	LISN	R&S	ENV216	101313	Jul. 06. 2013
3	LISN	EMCO	3816/2	00042990	Jul. 06. 2013
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	Jul. 06. 2013
5	Passive Voltage Probe	R&S	ESH2-Z3	100196	Jul. 06. 2013
6	Absorbing clamp	R&S	MOS-21	100423	Jul. 06. 2013



3. TEST RESULT

3.1 ANTENNA REQUIREMENT

3.1.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

3.1.2 EUT ANTENNA

The EUT antenna is a permanent fixed antenna, designed as an indispensable part of the EUT.integral Antenna. It complies with the standard requirement.

**3.2 CONDUCTED EMISSION MEASUREMENT****3.2.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)**

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)		Standard
	Quasi-peak	Average	Quasi-peak	Average	
0.15 -0.5			66 - 56 *	56 - 46 *	CISPR
0.50 -5.0			56.00	46.00	CISPR
5.0 -30.0			60.00	50.00	CISPR

0.15 -0.5			66 - 56 *	56 - 46 *	LP002.
0.50 -5.0			56.00	46.00	LP002.
5.0 -30.0			60.00	50.00	LP002.

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

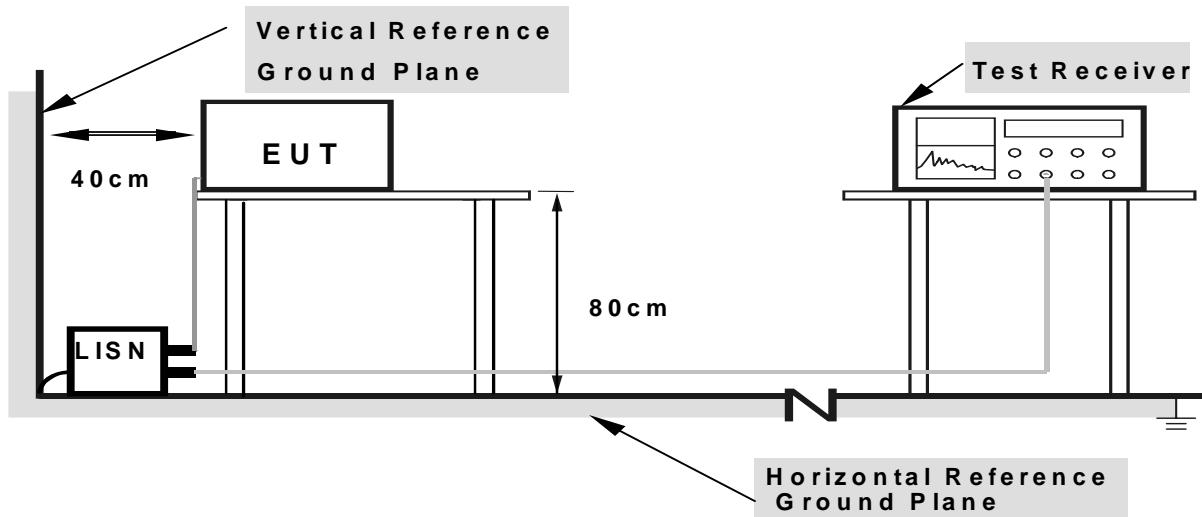
3.2.2 TEST PROCEDURE

- a. The EUT was placed 0.4 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.2.3 DEVIATION FROM TEST STANDARD

No deviation

3.2.4 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 cm from other units and other metal planes

3.2.5 TEST RESULT

N/A

Owing to DC operation of EUT, this test item is not performed.

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3.3 RADIATED EMISSION MEASUREMENT

3.3.1 Radiated Emission Limits (FCC 15.209)

Frequencies (MHz)	Field Strength (micorvolts/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 tighter limit applies at the band edges.
- (2) Emission level (dBuV/m)=20log Emission level (uV/m).

RADIATED EMISSION LIMITS (FCC 15.231)

Fundamental Frequency (MHz)	Field Strength of Fundamental		Field Strength of Spurious Emission	
	uV/m	dBuV/m	uV/m	dBuV/m
40.66-40.70	2250	67.04	225	47.04
70-130	1250	61.94	125	41.94
130-174	1250-3370	61.94-70.55	125-375	41.94-51.48
174-260	3750	71.48	375	51.48
260-470	3750-12500	71.48-81.94	375-1250	51.48-61.94
Above 470	12500	81.94	1250	61.94

Note:

- (1) RF Field Strength (dBuV) = 20 log RF Voltage (uV)
- (2) Linear interpolations for frequency ranges 130-174MHz and 260-470MHz

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1MHz / 1MHz for Peak

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Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.3.2 TEST PROCEDURE

- a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3m meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m.
- d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

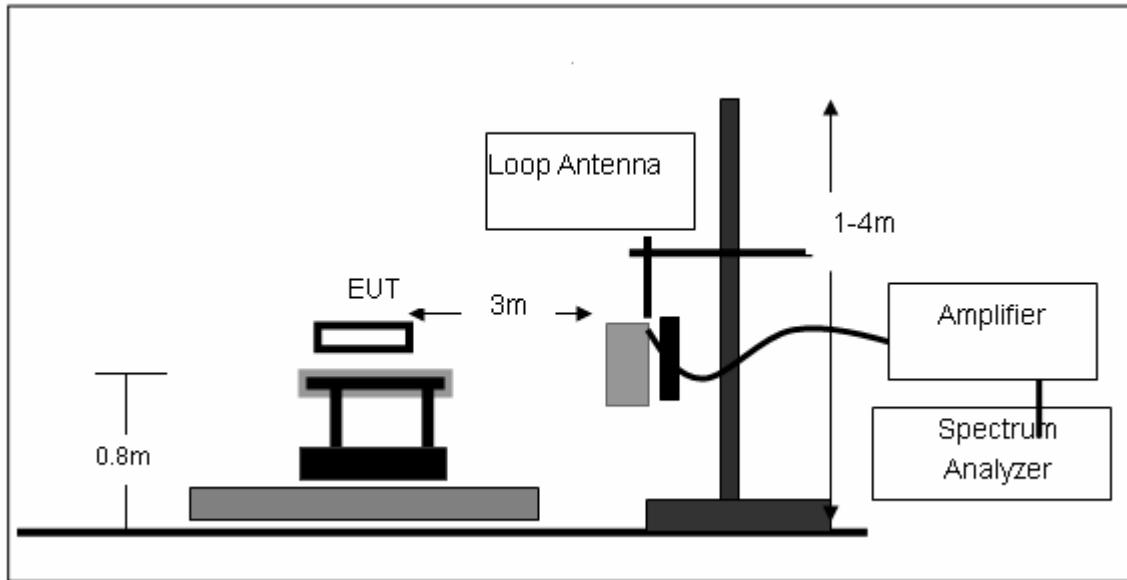
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

3.3.3 DEVIATION FROM TEST STANDARD

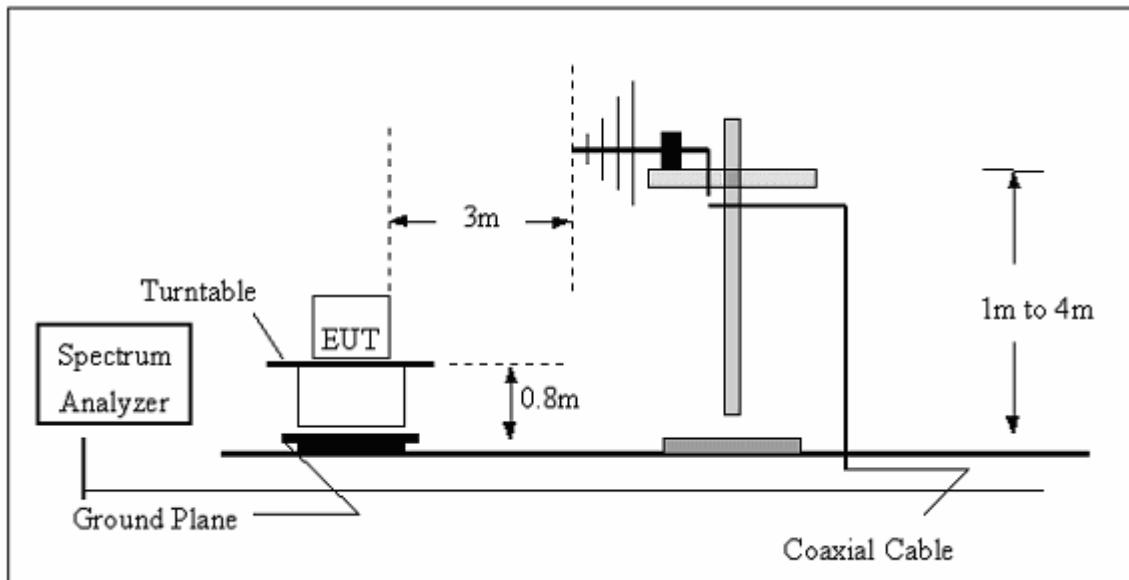
No deviation

3.3.4 TEST SETUP

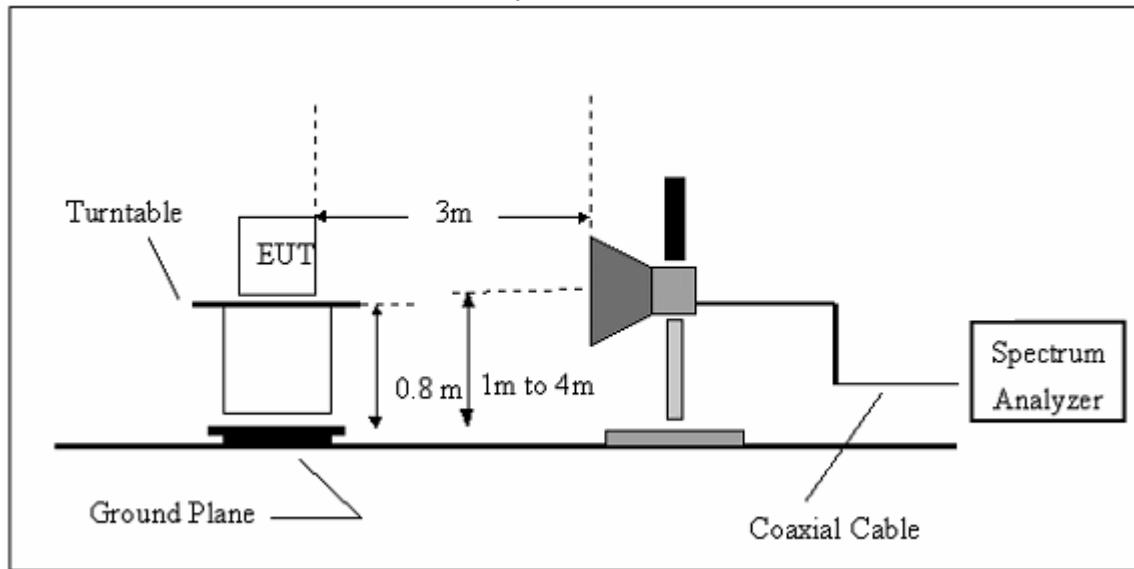
(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz



**3.3.5 TEST RESULTS (BLOW 30MHz)**

EUT :	Temperature Transmitter	Model Name. :	TX-AC2012
Temperature :	25°C	Relative HuMaylong Mobility Tabletity :	50%
Pressure :	1010 hPa	Test Voltage :	DC 3.0V
Test Mode :	TX	Polarization :	--

Freq. (MHz)	Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	State
--	--	--	--	P/F
--	--	--	--	PASS
--	--	--	--	PASS

NOTE:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = $20 \log (\text{specific distance}/\text{test distance})$ (dB);
Limit line = specific limits(dBuV) + distance extrapolation factor.



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3.3.6 TEST RESULTS (BETWEEN 30-5000MHZ)

EUT :	Temperature Transmitter	Model Name :	TX-AC2012
Temperature:	25 °C	Relative Humidity :	50%
Pressure :	1010 hPa	Test Date :	2012-07-11
Test Mode :	TX	Polarization :	Horizontal
Test Power :	DC 3.0V		

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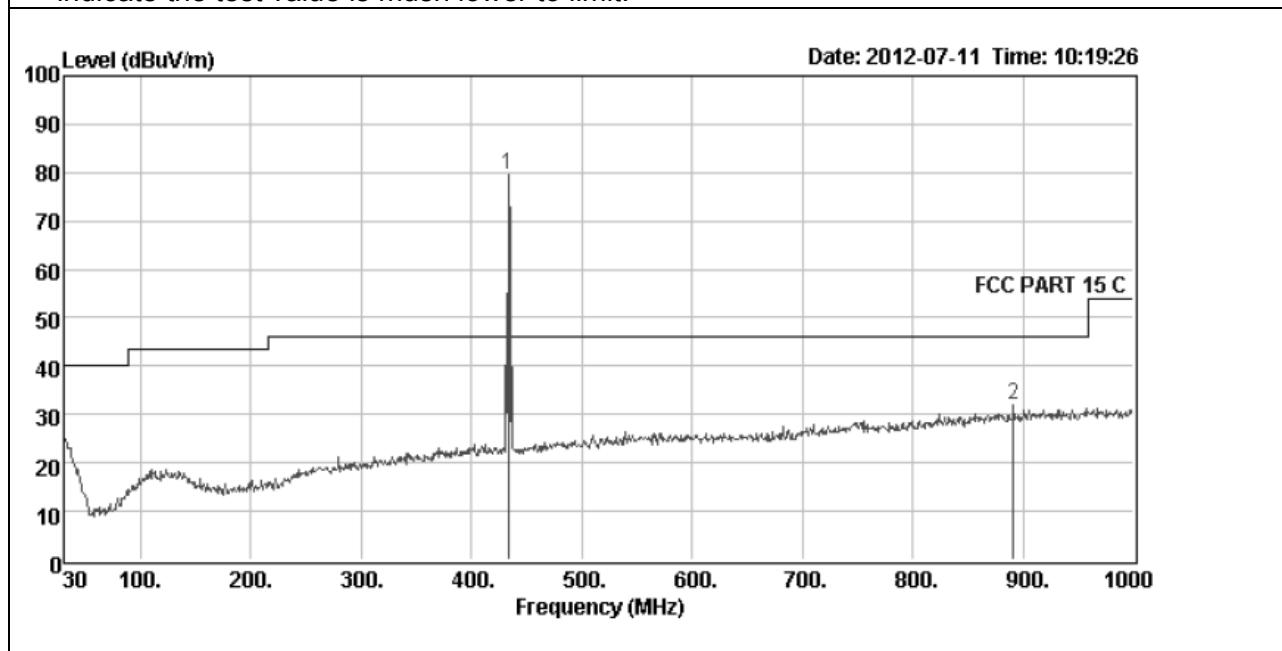
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Frequency	Antenna Pol.	Field Strength	Field Strength	Limit(PK)	Limit(QP)	Limit(AV)	State
MHz	H/V	dBuV/m (PK)	dBuV/m (AV)	dBuV/m	dBuV/m	dBuV/m	
433.920	H	89.24	70.26	100.82	--	80.82	PASS
891.360	H	35.12	16.14	80.82	--	60.82	PASS
1301.500	H	45.17	26.19	74.00	--	54.00	PASS
1736.020	H	--	--	80.82	--	60.82	PASS
3037.480	H	--	--	80.82	--	60.82	PASS
4339.000	H	--	--	74.00	--	54.00	PASS

Remark:

“-”indicate the test value is much lower to limit.



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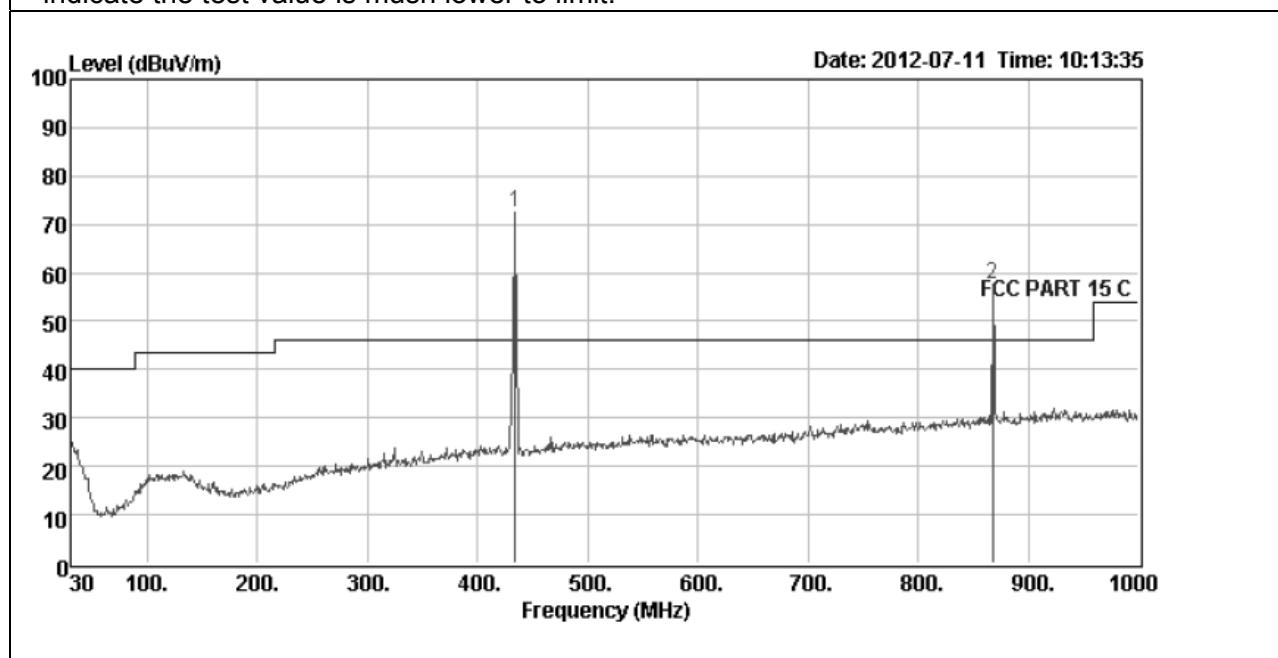
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EUT :	Temperature Transmitter	Model Name :	TX-AC2012
Temperature :	25 °C	Relative Humidity :	50%
Pressure :	1010 hPa	Test Date :	2012-07-11
Test Mode :	TX	Polarization :	Vertical
Test Power :	DC 3.0V		

Frequency	Antenna Pol.	Field Strength	Field Strength	Limit(PK)	Limit(QP)	Limit(AV)	State
MHz	H/V	dBuV/m (PK)	dBuV/m (AV)	dBuV/m	dBuV/m	dBuV/m	
433.920	V	82.28	68.30	100.82	--	80.82	PASS
867.860	V	60.66	41.68	80.82	--	60.82	PASS
1301.780	V	48.02	29.04	74.00	--	54.00	PASS
1735.670	V	--	--	80.82	--	60.82	PASS
3037.500	V	--	--	80.82	--	60.82	PASS
4339.000	V	--	--	74.00	--	54.00	PASS

Remark:

"--"indicate the test value is much lower to limit.



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4. 20DB BANDWIDTH TEST

4.1 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting : RBW= 100KHz, VBW \geq RBW, Sweep time = Auto.

4.2 REQUIREMENT

Per 15.231(c), The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20dB down from the modulated carrier.

4.3 TEST SETUP



4.4 TEST RESULTS

EUT :	Temperature Transmitter	Model Name :	TX-AC2012
Temperature :	26 °C	Relative Humidity :	55%
Pressure :	1020 hPa	Test Power :	DC 3.0V
Test Mode :	TX		

Frequency (MHz)	20dB Bandwidth Emission (kHz)	Limit (MHz)	Result
433.92	320.64	1.08	PASS

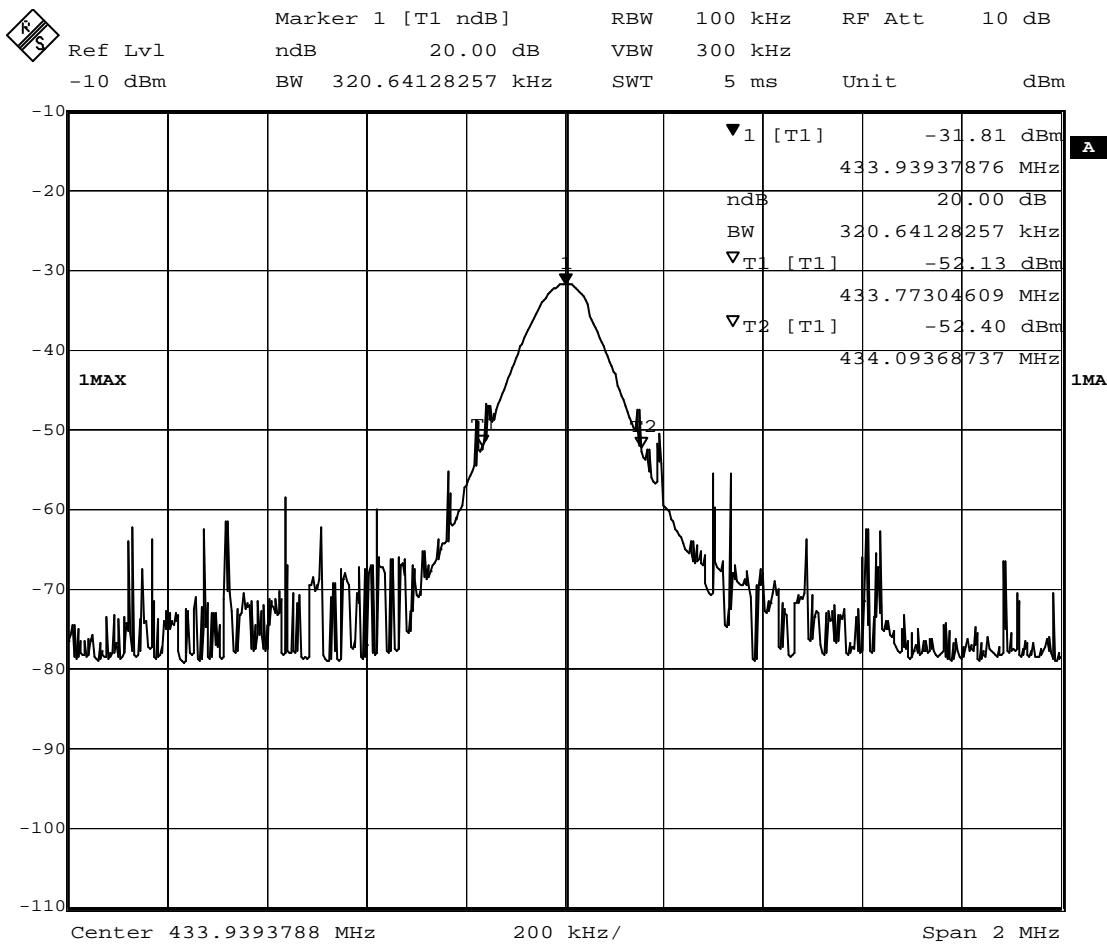
Note:

Limit=Frequency x 0.25% = 433.92 x 0.25% = 1.08MHz



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5. DEACTIVATE TEST

5.1 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- b. Spectrum Setting : RBW= 100KHz, VBW \geq RBW, Center Frequency = 433.92MHz.

5.2 REQUIREMENT

Per 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.

5.3 TEST SETUP



5.4 TEST RESULTS

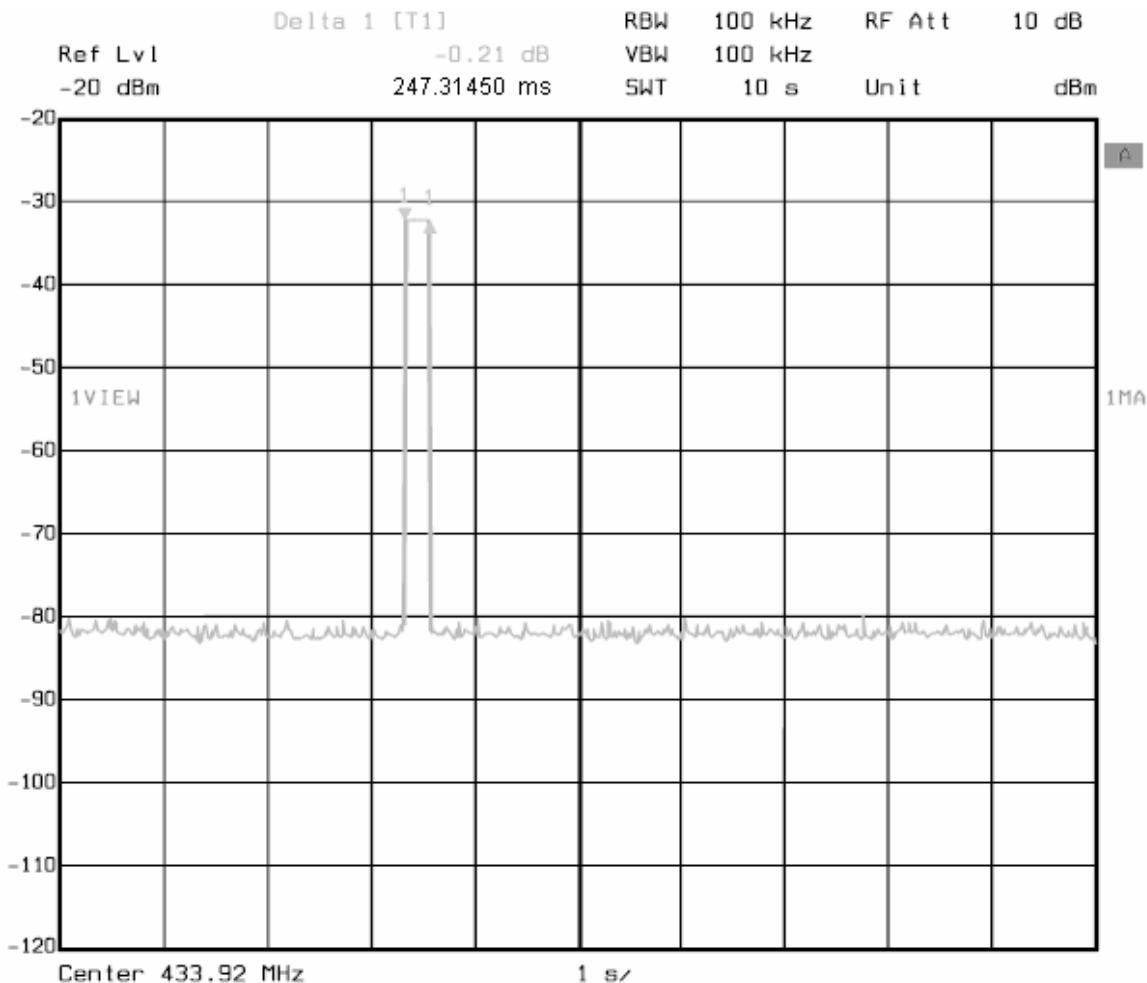
EUT :	Temperature Transmitter	Model Name :	TX-AC2012
Temperature :	26 °C	Relative Humidity :	55%
Pressure :	1020 hPa	Test Power :	DC 3.0V
Test Mode :	TX		

The Duration Of Each Transmission (ms)	Limit (s)	Result
247.3	5	PASS



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