APPLICATION CERTIFICATION
On Behalf of
La Crosse Technology

Temperature transmitter
Model No.: TX43U

FCC ID: OMO-M-13

Prepared for	:	La Crosse Technology
Address	:	2809 Losey Blvd. So. La Crosse WI 54601, USA
Prepared by	:	ACCURATE TECHNOLOGY CO. LTD
Address	:	F1, Bldg. A, Changyuan New Material Port, Keyuan Rd. Science & Industry Park, Nanshan, Shenzhen, Guangdong P.R. China
		Tel: (0755) 26503290
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Report Number	:	ATE20110647
Date of Test	:	April 20, 2011
Date of Report	:	April 28, 2011

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Description Page

Test Report Certification

Applicant	:	La Crosse Technology
Manufacturer	:	La Crosse Technology
EUT Description	:	Temperature transmitter
		(A) Model No.: TX43U
		(B) Serial No.: N/A
		(C) Power Supply: DC 3V ("AA" batteries 2×)

Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.231
ANSI 63.4: 2003

The device described above is tested by ACCURATE TECHNOLOGY CO. LTD to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C Section 15.231 limits. The measurement results are contained in this test report and ACCURATE TECHNOLOGY CO. LTD is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

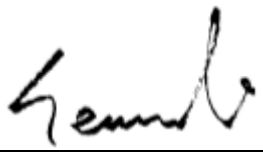
This report applies to above tested sample only. This report shall not be reproduced in part without written approval of ACCURATE TECHNOLOGY CO. LTD.

Date of Test : April 20, 2011

Prepared by :

(Kitty Chen, Engineer)

Approved & Authorized Signer :



(Sean Liu, Manager)

1. GENERAL INFORMATION

1.1.Description of Device (EUT)

EUT	:	Temperature transmitter
Model Number	:	TX43U
Operation Frequency	:	433.92MHz
Power Supply	:	DC 3V (“AA” batteries 2×)
Applicant	:	La Crosse Technology
Address	:	2809 Losey Blvd. So. La Crosse WI 54601, USA
Manufacturer	:	La Crosse Technology
Address	:	2809 Losey Blvd. So. La Crosse WI 54601, USA
Date of sample received	:	April 18, 2011
Date of Test	:	April 20, 2011

1.2.Description of Test Facility

EMC Lab	:	Accredited by TUV Rheinland Shenzhen Listed by FCC The Registration Number is 752051 Listed by Industry Canada The Registration Number is 5077A-2 Accredited by China National Accreditation Committee for Laboratories The Certificate Registration Number is L3193
Name of Firm	:	ACCURATE TECHNOLOGY CO. LTD
Site Location	:	F1, Bldg. A, Changyuan New Material Port, Keyuan Rd. Science & Industry Park, Nanshan, Shenzhen, Guangdong P.R. China

1.3.Measurement Uncertainty

Conducted Emission Expanded Uncertainty	=	2.23dB, k=2
Radiated emission expanded uncertainty (9kHz-30MHz)	=	3.08dB, k=2
Radiated emission expanded uncertainty (30MHz-1000MHz)	=	4.42dB, k=2
Radiated emission expanded uncertainty (Above 1GHz)	=	4.06dB, k=2

2. MEASURING DEVICE AND TEST EQUIPMENT

Table 1: List of Test and Measurement Equipment

Kind of equipment	Manufacturer	Type	S/N	Calibrated until
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	Jan. 15, 2012
EMI Test Receiver	Rohde&Schwarz	ESPI3	101526/003	Jan. 15, 2012
Spectrum Analyzer	Agilent	E7405A	MY45115511	Jan. 15, 2012
Pre-Amplifier	Rohde&Schwarz	CBLU1183540-01	3791	Jan. 15, 2012
Loop Antenna	Schwarzbeck	FMZB1516	1516131	Jan. 15, 2012
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan. 15, 2012
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan. 15, 2012
Horn Antenna	Schwarzbeck	BBHA9170	9170-359	Jan. 15, 2012
LISN	Rohde&Schwarz	ESH3-Z5	100305	Jan. 15, 2012
LISN	Schwarzbeck	NSLK8126	8126431	Jan. 15, 2012

3. SUMMARY OF TEST RESULTS

FCC Rules	**Description of Test**	**Result**
Section 15.207	Conducted Emission	N/A
Section 15.231(e)	Radiated Emission	Compliant
Section 15.231(c)	20dB Bandwidth	Compliant
Section 15.231(e)	Duration time and silent period measurement	Compliant

Remark: “N/A” means “Not applicable”.

4. THE FIELD STRENGTH OF RADIATION EMISSION

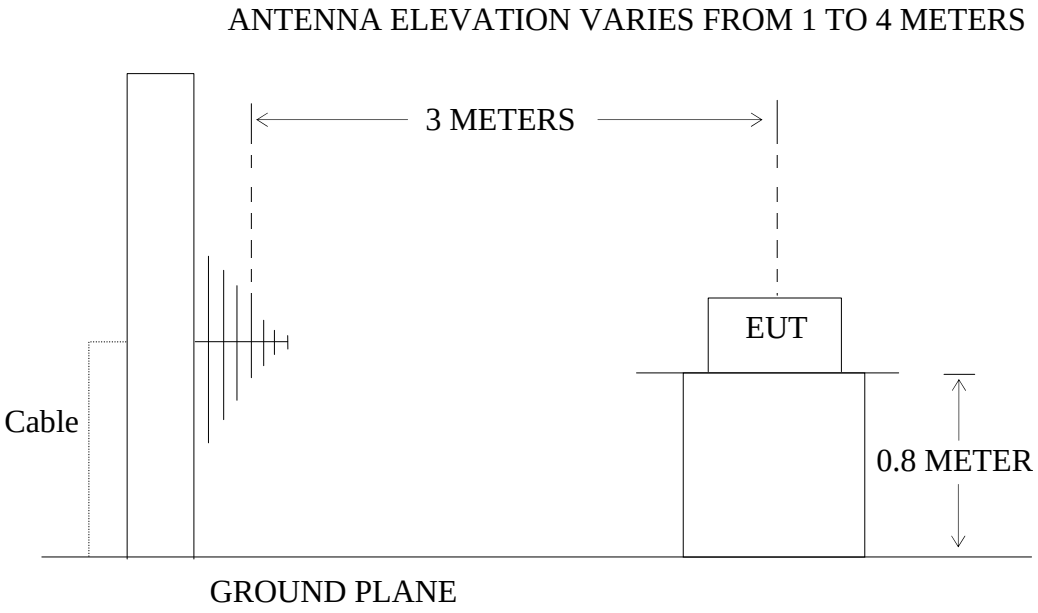
4.1.Block Diagram of Test Setup

4.1.1.Block diagram of connection between the EUT and simulators

EUT

(EUT: Temperature transmitter)

4.1.2.Semi-anechoic Chamber Test Setup Diagram



(EUT: Temperature transmitter)

4.2.The Field Strength of Radiation Emission Measurement Limits

4.2.1.Radiation Emission Measurement Limits According to Section 15.231(e)

Frequency Range of Fundamental [MHz]	Field Strength of Fundamental Emission [Average] [μV/m]	Field Strength of Spurious Emission [Average] [μV/m]
40.66-40.70	1000	100
70-130	500	50
130-174	500 - 1500	50-150
174-260	1500	150
260-470	1500-5000	150-500
Above 470	5000	500

Where F is the frequency in MHz, The formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174MHz, μV/m at 3 meters=22.72727(F)-2454.545; For the band 260-470MHz, μV/m at 3 meters=16.6667(F)-2833.3333. The maximum permissible unwanted emission level is 20dB below the maximum permitted fundamental level.

4.2.2.Restricted Band Radiation Emission Measurement Limits According to FCC part 15 Section 15.205 and Section15.209.

4.3.Configuration of EUT on Measurement

The following equipment are installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

4.3.1. Temperature transmitter (EUT)

Model Number **:** TX43U
Serial Number **:** N/A
Manufacturer **:** La Crosse Technology

4.4.Operating Condition of EUT

4.4.1.Setup the EUT and simulator as shown as Section 4.1.

4.4.2.Turn on the power of all equipment.

4.4.3.Let the EUT work in measuring mode (TX) measure it.

4.5. Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bi-log antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the EUT location must be manipulated according to ANSI 63.4 on radiated emission measurement.

The bandwidth of test receiver is set at 120kHz in 30-1000MHz, and 1MHz in 1000-5000MHz.

The frequency range from 30MHz to 5000MHz is checked.

4.6. The Field Strength of Radiation Emission Measurement Results

PASS.

The frequency range 30MHz to 5000MHz is investigated.

Date of Test:	April 20, 2011	Temperature:	25°C
EUT:	Temperature transmitter	Humidity:	50%
Model No.:	TX43U	Power Supply:	DC 3V
Test Mode:	TX	Test Engineer:	PEI

Frequency (MHz)	Reading (dBμV/m)	Factor Corr.	Average Factor	Result(dBμV/m)		Limit(dBμV/m)		Margin(dB)		Polarization
	PEAK	(dB)	(dB)	AV	PEAK	AV	PEAK	AV	PEAK	
433.9379	**53.74**	**22.95**	**-13.31**	**63.38**	**76.69**	**72.8**	**92.8**	**-9.42**	**-16.11**	Horizontal
867.8758	20.83	28.64	-13.31	36.16	49.47	52.8	72.8	-16.64	-23.33	
*1301.814	65.87	-12.20	-13.31	40.36	53.67	54.0	74.0	-13.64	-20.33	
1735.752	58.36	-10.39	-13.31	34.66	47.97	52.8	72.8	-18.14	-24.83	
2169.689	56.58	-8.38	-13.31	34.89	48.20	52.8	72.8	-17.91	-24.60	
2603.627	51.37	-6.72	-13.31	31.34	44.65	52.8	72.8	-21.46	-28.15	
433.9375	**55.36**	**22.95**	**-13.31**	**65.00**	**78.31**	**72.8**	**92.8**	**-7.80**	**-14.49**	Vertical
867.8750	22.39	28.64	-13.31	37.72	51.03	52.8	72.8	-15.08	-21.77	
*1301.813	67.97	-12.20	-13.31	42.46	55.77	54.0	74.0	-11.54	-18.23	
1735.750	53.47	-10.39	-13.31	39.77	53.08	52.8	72.8	-13.03	-19.72	
2169.688	57.24	-8.38	-13.31	35.55	48.86	52.8	72.8	-17.25	-23.94	
2603.625	51.13	-6.72	-13.31	31.10	44.41	52.8	72.8	-21.70	-28.39	

Note:

1. The lab use average detector to perform average measurement. The report shows average factor and average results were calculated by using average factor calculation method.
2. Emissions attenuated more than 20 dB below the permissible value are not reported.
3. *: Denotes restricted band of operation.

   Measurements were made using a peak detector. Average results were calculated by using average factor calculation method. Any emission falling within the restricted bands of FCC Part 15 Section 15.205 were compliance with the emission limit of FCC Part 15 Section 15.209.
4. The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

   Result = Reading + Corrected Factor

   Where Corrected Factor = Antenna Factor + Cable Loss + High Pass Filter Loss – Amplifier Gain
5. FCC Limit for Average Measurement = 16.6667(433.9)-2833.3333 = 4383.35μV/m= 72.8dBμV/m

6. Pulse Desensitization Correction Factor

   Pulse Width (PW) = 25.9ms

   1/PW = 1/25.9ms = 0.0386 kHz

   RBW (10 kHz) > 1/PW (0.0386 kHz)

   Therefore PDCF is not needed.

7. The report shows average factor and average results were calculated by using average factor calculation method.

5. 20DB OCCUPIED BANDWIDTH

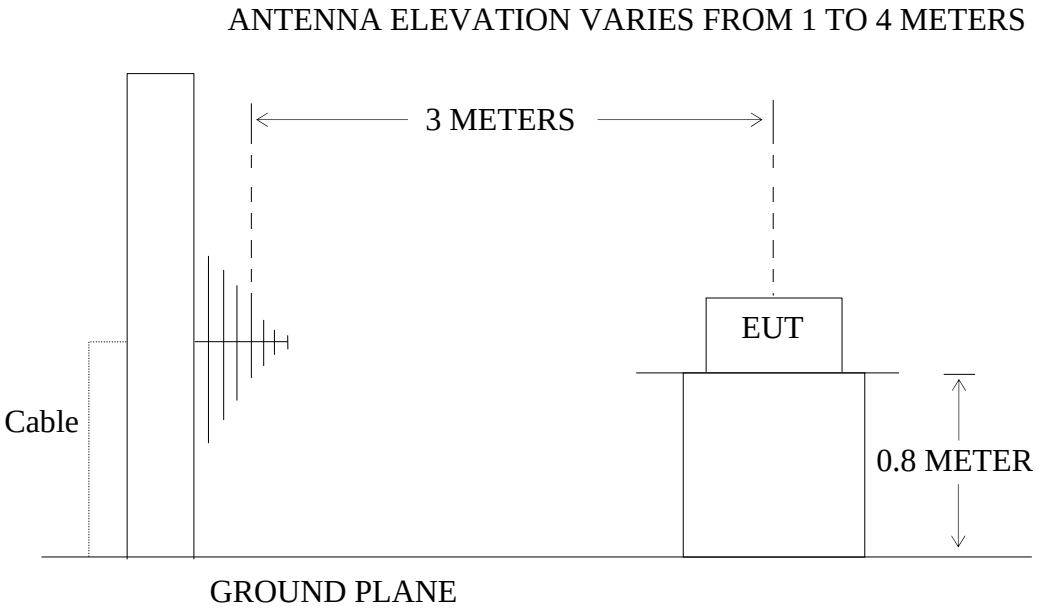
5.1.Block Diagram of Test Setup

5.1.1.Block diagram of connection between the EUT and simulators

EUT

(EUT: Temperature transmitter)

5.1.2.Semi-anechoic Chamber Test Setup Diagram



(EUT: Temperature transmitter)

5.2.The Bandwidth of Emission Limit According To FCC Part 15 Section

15.231(c)

The bandwidth of emission shall be no wider than 0.25% of the center frequency. Therefore, the bandwidth of the emission limit is 433.9MHz×0.25% = 1084.75kHz.
Bandwidth is determined at the two points 20 dB down from the top of modulated carrier.

5.3.EUT Configuration on Measurement

The following equipment are installed on the bandwidth of emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

5.3.1. Temperature transmitter (EUT)

Model Number	**:**	TX43U
Serial Number	**:**	N/A
Manufacturer	**:**	La Crosse Technology

5.4.Operating Condition of EUT

5.4.1.Setup the EUT and simulator as shown as Section 5.1.

5.4.2.Turn on the power of all equipment.

5.4.3.Let the EUT work in measuring mode (TX) measure it.

5.5.Test Procedure

5.5.1.Set SPA Center Frequency = Fundamental frequency, RBW = 10kHz, VBW = 30kHz, Span = 500kHz.

5.5.2.Set SPA Max hold. Mark peak, -20dB

5.6. Measurement Result

The EUT does meet the FCC requirement.

-20dB bandwidth = 10.4 kHz < 1084.75 kHz.

The spectral diagrams in appendix I.

6. DURATION TIME AND SILENT PERIOD MEASUREMENT

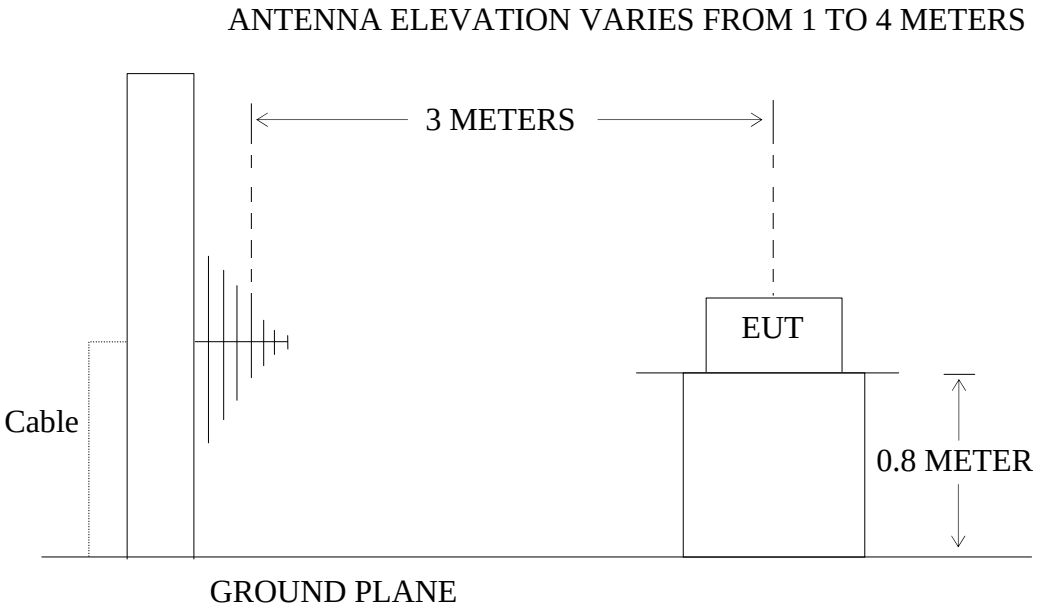
6.1.Block Diagram of Test Setup

6.1.1.Block diagram of connection between the EUT and simulators

EUT

(EUT: Temperature transmitter)

6.1.2.Semi-anechoic Chamber Test Setup Diagram



(EUT: Temperature transmitter)

6.2.Duration Time and silent period measurement according to FCC Part 15

Section 15.231(e)

Section 15.231(e) In addition, devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

6.3.EUT Configuration on Measurement

The following equipment are installed on duration time and silent period measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

6.3.1.Temperature transmitter (EUT)

Model Number	**:**	TX43U
Serial Number	**:**	N/A
Manufacturer	**:**	La Crosse Technology

6.4.Operating Condition of EUT

6.4.1.Setup the EUT and simulator as shown as Section 6.1.

6.4.2.Turn on the power of all equipment.

6.4.3.Let the EUT work in measuring mode (TX) measure it.

6.5.Test Procedure

6.5.1.Set SPA Center Frequency = Fundamental frequency, RBW = 10kHz,

VBW =30kHz, Span = 0Hz.

6.5.2.Set EUT as normal operation.

6.5.3.Set SPA View. Delta Mark time.

6.6. Measurement Result

The EUT does meet the FCC requirement.

Duration time = 0.956 s <1 s

Silent period = 55.84 seconds > 30 times the duration of the transmission > 10 seconds

The spectral diagrams in appendix I.

7. AVERAGE FACTOR MEASUREMENT

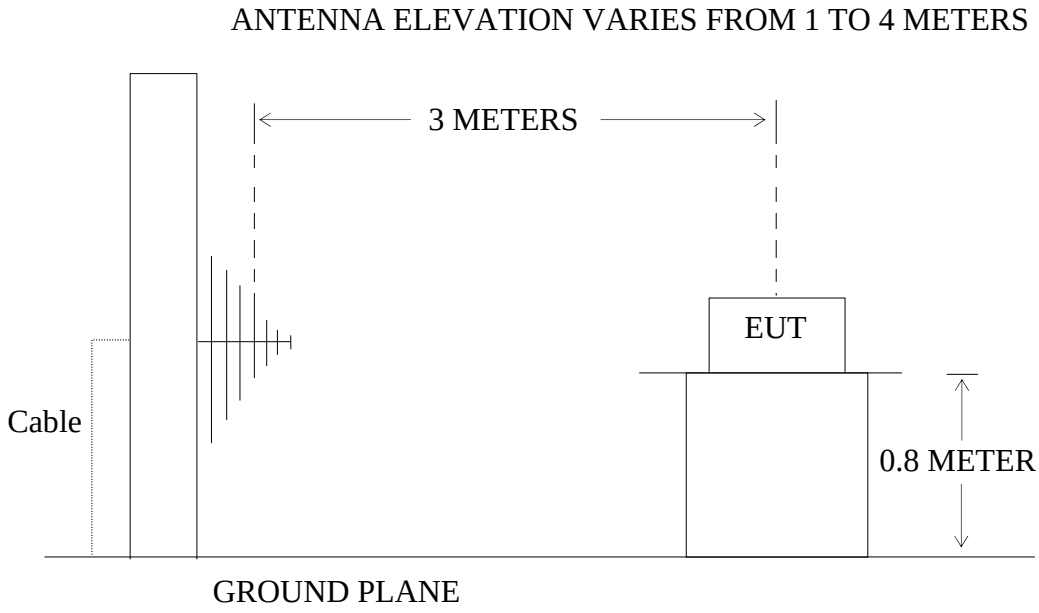
7.1.Block Diagram of Test Setup

7.1.1.Block diagram of connection between the EUT and simulators

EUT

(EUT: Temperature transmitter)

7.1.2.Semi-anechoic Chamber Test Setup Diagram



(EUT: Temperature transmitter)

7.2. Average factor Measurement according to ANSI 63.4: 2003

ANSI 63.4: 2003 Section 13.1.4.2 Devices transmitting pulsed emissions and subject to a limit requiring an average detector function for radiated emissions shall initially be measured with an instrument that uses a peak detector. A radiated emission measured with a peak detector may then be corrected to a true average using the appropriate factor for emission duty cycle. This correction factor relates the measured peak level to the average limit and is derived by averaging absolute field strength over one complete pulse train that is 0.1 s, or less, in length. If the pulse train is longer than 0.1 s, the average shall be determined from the average absolute field strength during the 0.1 s interval in which the field strength is at a maximum. Instructions on calculating the duty cycle of a transmitter with pulsed emissions are provided in ANSI 63.4 H.4, step j.

Average factor in dB = 20 log (duty cycle)

7.3.EUT Configuration on Measurement

The following equipment are installed on average factor Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

7.3.1. Temperature transmitter (EUT)

Model Number	**:**	TX43U
Serial Number	**:**	N/A
Manufacturer	**:**	La Crosse Technology

7.4.Operating Condition of EUT

7.4.1.Setup the EUT and simulator as shown as Section 7.1.

7.4.2.Turn on the power of all equipment.

7.4.3.Let the EUT work in measuring mode (TX) measure it.

7.5.Test Procedure

7.5.1.The time period over which the duty cycle is measured is 100 milliseconds, or the repetition cycle, whichever is a shorter time frame. The worst case (highest percentage on) duty cycle is used for the calculation.

7.5.2.Set SPA Center Frequency = Fundamental frequency, RBW = 10kHz,

VBW =30kHz, Span = 0Hz.

7.5.3.Set EUT as normal operation.

7.5.4.Set SPA View. Delta Mark time.

7.6. Measurement Result

The duty cycle is simply the on time divided by the period:

The duration of one cycle = 120ms
Effective period of the cycle = 37×0.7 ms= 25.9ms

DC = 25.9ms/120ms = 0.216

Therefore, the average factor is found by 20log0.216 = -13.31dB

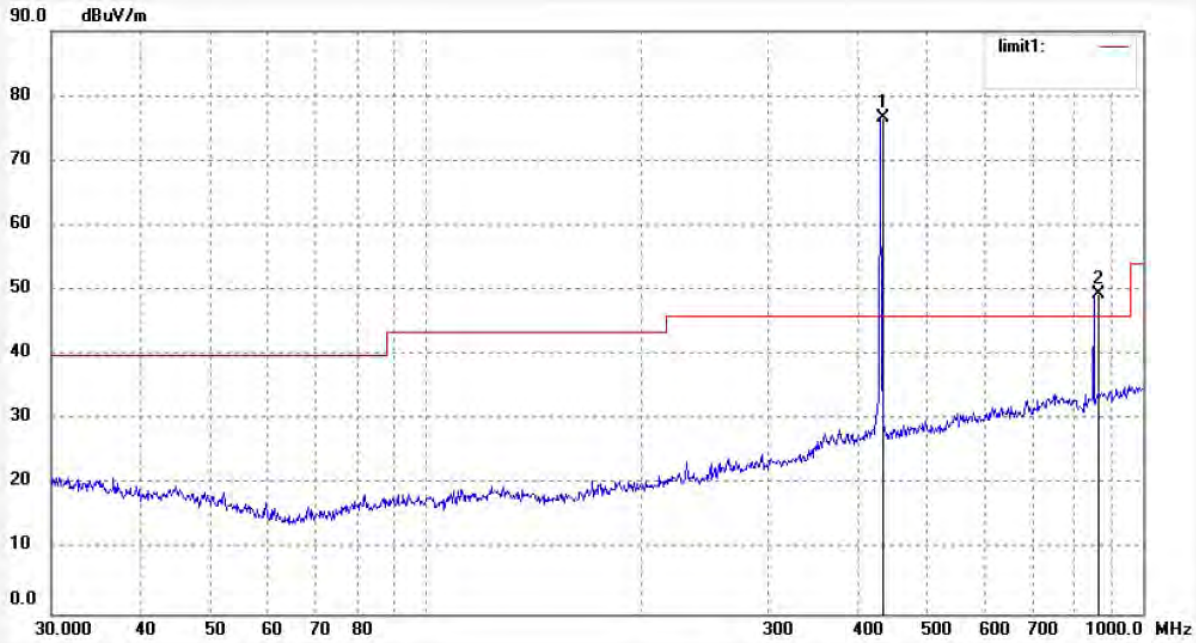
The spectral diagrams in appendix I.

APPENDIX I
(Test Curves)

ACCURATE TECHNOLOGY CO., LTD.
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China
Site: 966 chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: pei #3497	Polarization: Horizontal
Standard: FCC Class B 3M Radiated	Power Source: DC 3V
Test item: Radiation Test	Date: 2011/04/20
Temp.(C)/Hum.(%) 25 C / 51 %	Time: 12:49:36
EUT: Temperature transmitter	Engineer Signature: PEI
Mode: TX	Distance: 3m
Model: TX43U	
Manufacturer: La Crosse Technology	

Note: Report No.:ATE20110647



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	433.9379	53.74	22.95	76.69	92.80	-16.11	peak			
2	867.8758	20.83	28.64	49.47	72.80	-23.33	peak			

ACCURATE TECHNOLOGY CO., LTD.
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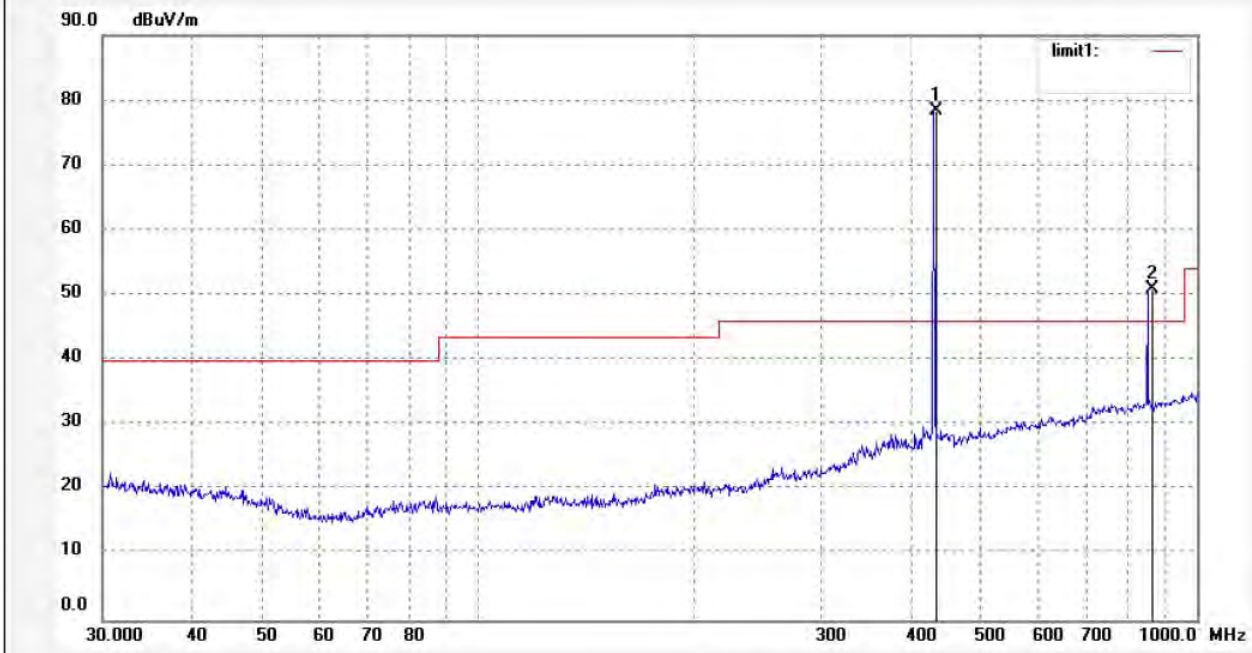
Job No.: pei #3498	Polarization: Vertical
Standard: FCC Class B 3M Radiated	Power Source: DC 3V
Test item: Radiation Test	Date: 2011/04/20
Temp.(C)/Hum.(%) 25 C / 51 %	Time: 13:02:45
EUT: Temperature transmitter	Engineer Signature: PEI
Mode: TX	Distance: 3m
Model: TX43U	
Manufacturer: La Crosse Technology	

Note: Report No.:ATE20110647



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	433.9375	55.36	22.95	78.31	92.80	-14.49	peak			
2	867.8750	22.39	28.64	51.03	72.80	-21.77	peak			

ACCURATE TECHNOLOGY CO., LTD.
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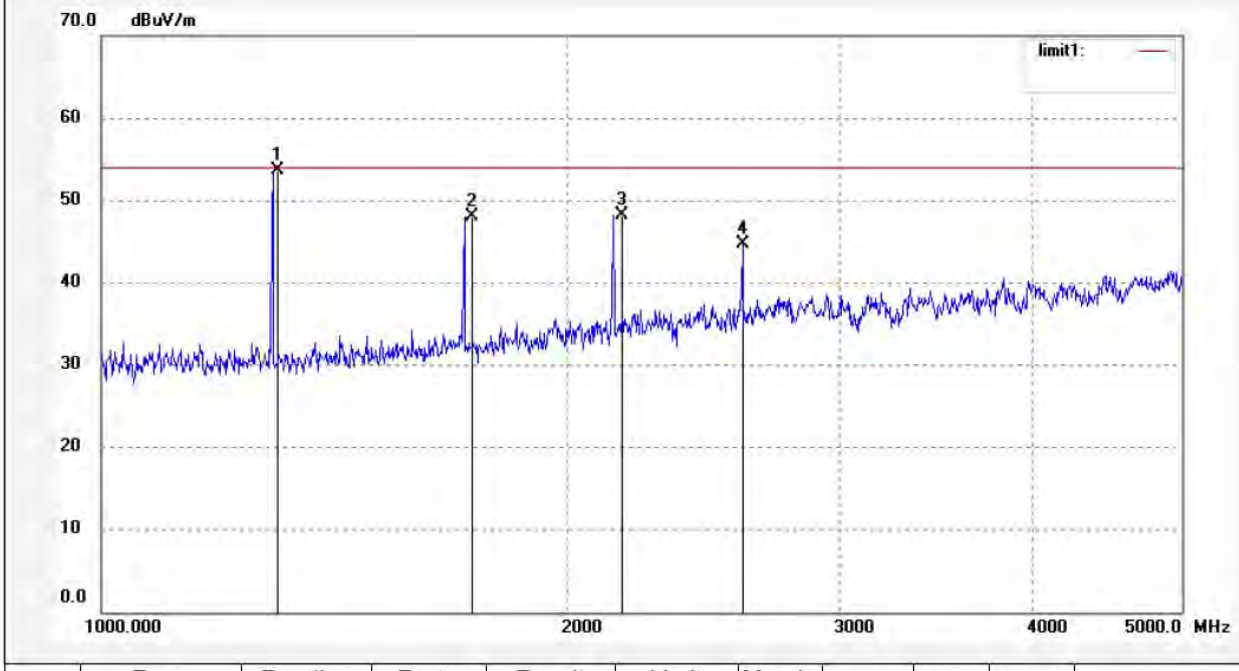
Site: 966 chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: pei #3500	Polarization: Horizontal
Standard: FCC Class B 3M Radiated	Power Source: DC 3V
Test item: Radiation Test	Date: 2011/04/20
Temp.(C)/Hum.(%) 25 C / 51 %	Time: 13:25:25
EUT: Temperature transmitter	Engineer Signature: PEI
Mode: TX	Distance: 3m
Model: TX43U	
Manufacturer: La Crosse Technology	

Note: Report No.:ATE20110647



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	1301.814	65.87	-12.20	53.67	74.00	-20.33	peak			
2	1735.752	58.36	-10.39	47.97	72.80	-24.83	peak			
3	2169.689	56.58	-8.38	48.20	72.80	-24.60	peak			
4	2603.627	51.37	-6.72	44.65	72.80	-28.15	peak			

ACCURATE TECHNOLOGY CO., LTD.
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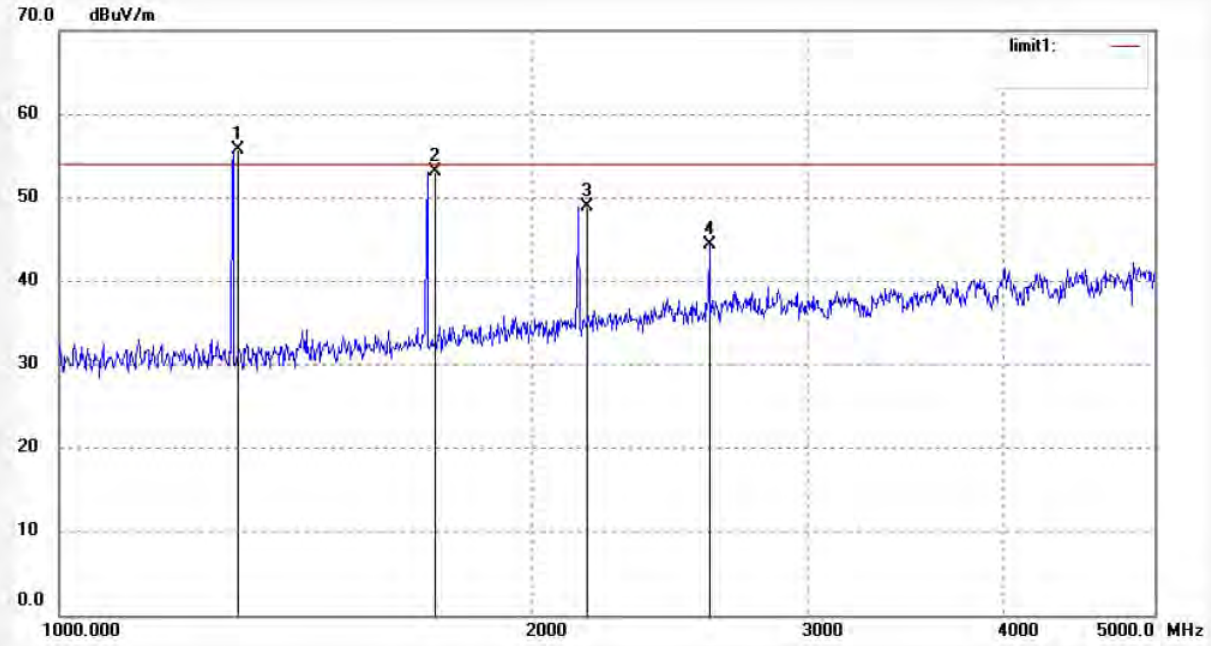
Site: 966 chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

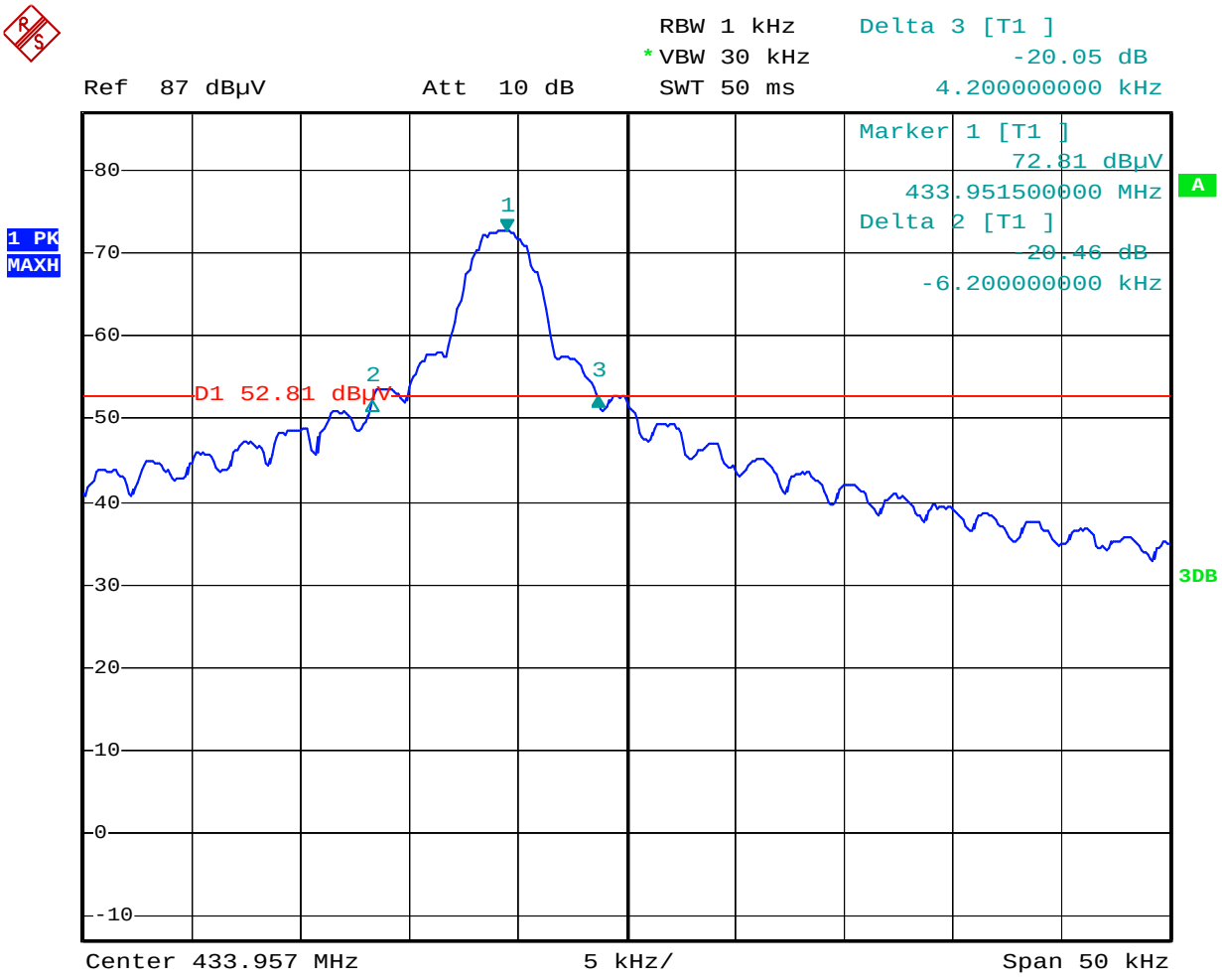
Job No.: pei #3499
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 51 %
EUT: Temperature transmitter
Mode: TX
Model: TX43U
Manufacturer: La Crosse Technology

Polarization: Vertical
Power Source: DC 3V
Date: 2011/04/20
Time: 13:14:09
Engineer Signature: PEI
Distance: 3m

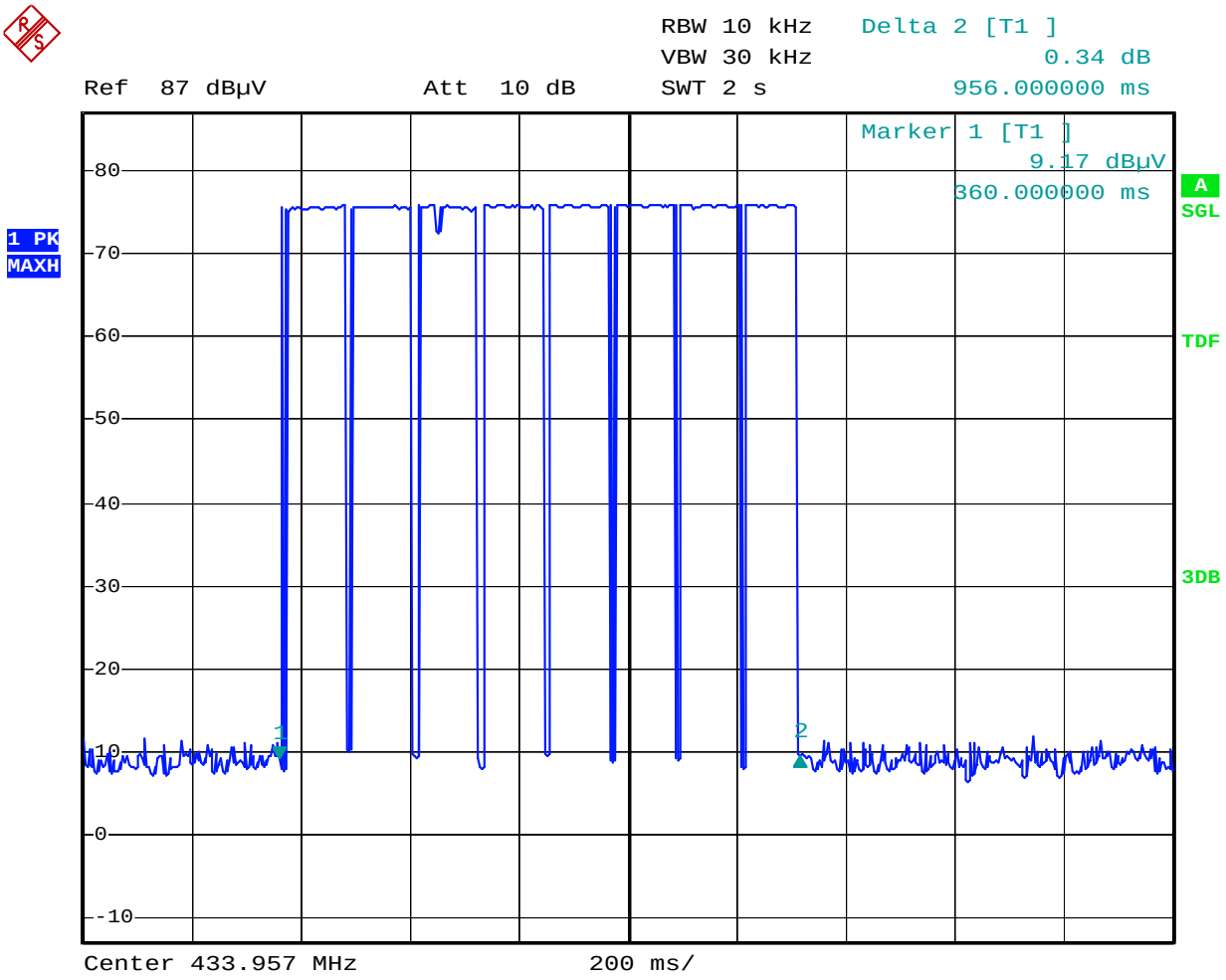
Note: Report No.:ATE20110647



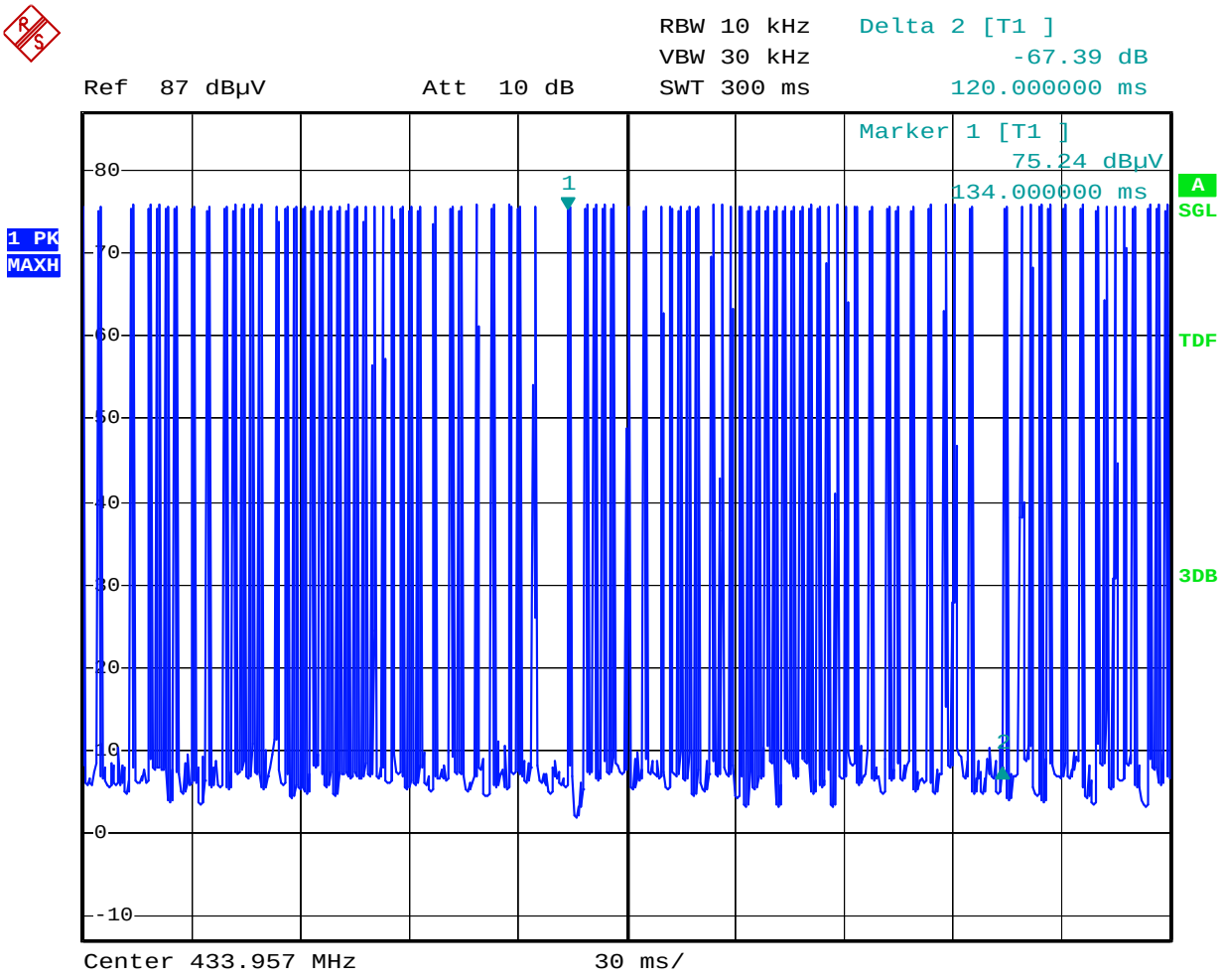
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	1301.813	67.97	-12.20	55.77	74.00	-18.23	peak			
2	1735.750	63.47	-10.39	53.08	72.80	-19.72	peak			
3	2169.688	57.24	-8.38	48.86	72.80	-23.94	peak			
4	2603.625	51.13	-6.72	44.41	72.80	-28.39	peak			



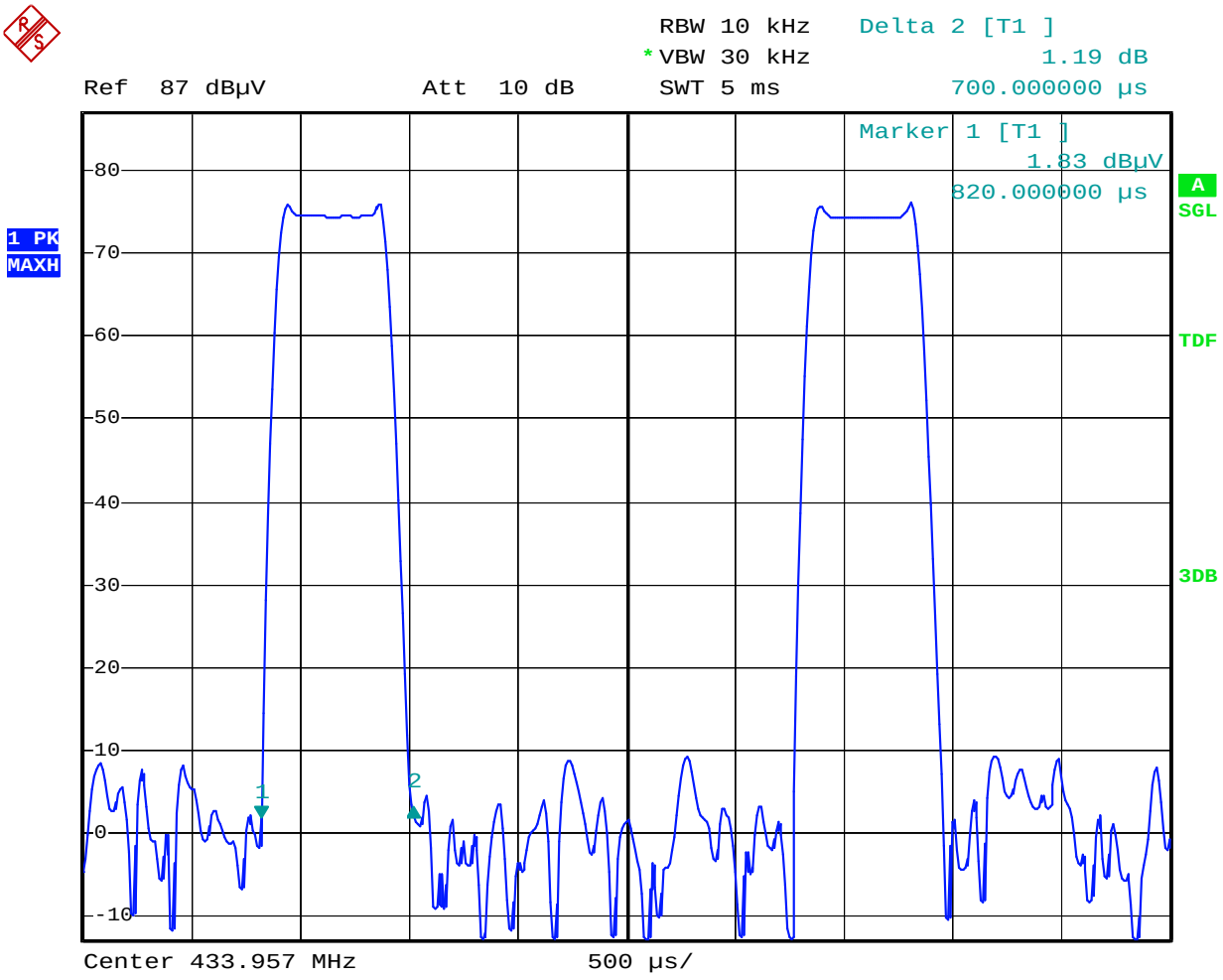
-20dB bandwidth is 10.4 kHz.



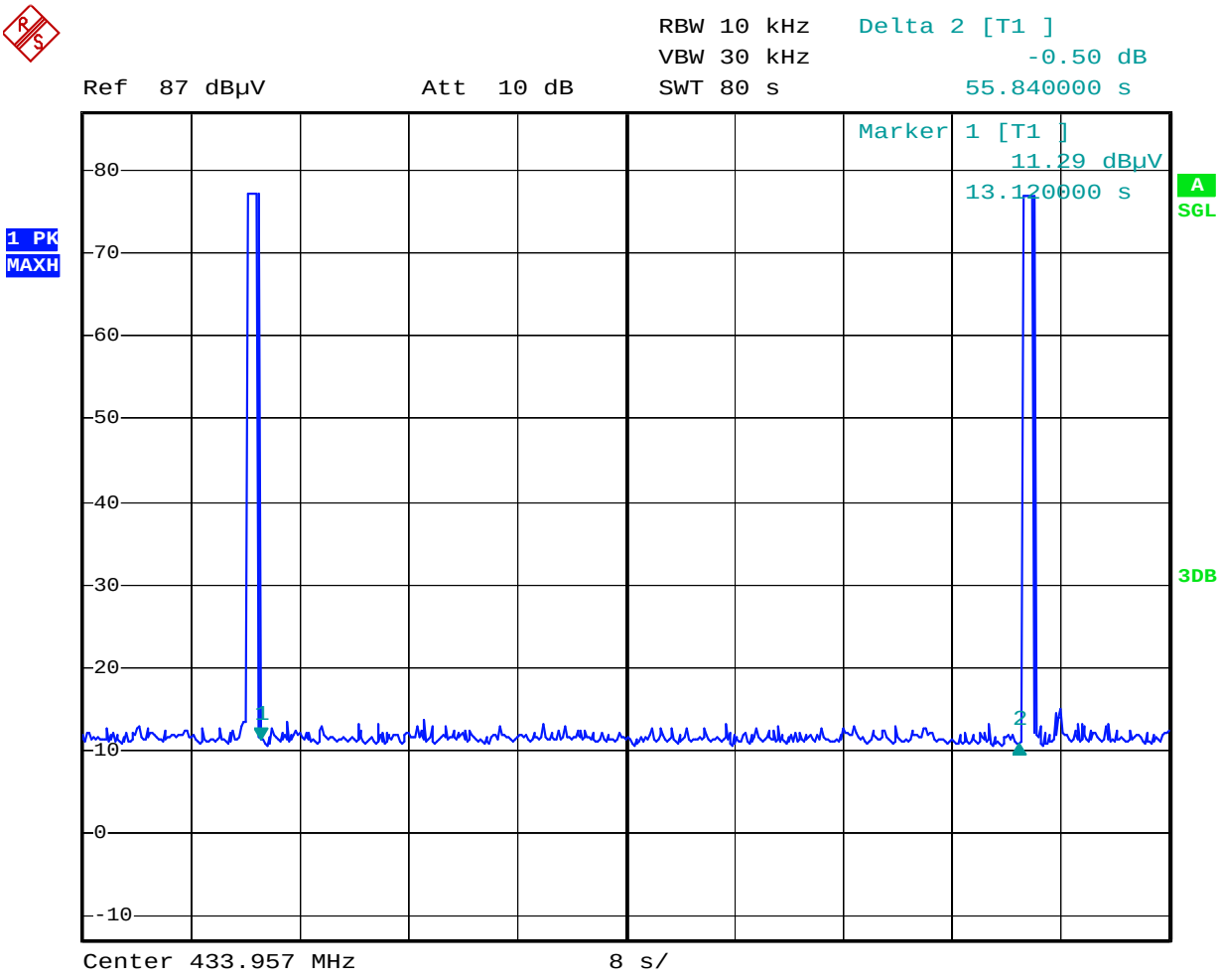
The graph shows the duration time is 956 ms.



The duration of one cycle is 120 ms; it shows 37 ‘on’ signals.



The graph shows the duration of ‘on’ signal. From marker 1 to marker 2, duration is 0.7 ms.



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The graphs show the silent period of ‘off’ signal, silent period is 55.84 s.