

APPLICATION CERTIFICATION

On Behalf of
Acumen Technologies Ltd.

Acumen FDC 502 Tx ONLY
Model No.: 00-002121-00

FCC ID: EPK502

Prepared for : Acumen Technologies Ltd.
Address : Guang Zhou, She Jiang Town, Mei County, Guang
Province, Mei Zhou City, China

Prepared by : ACCURATE TECHNOLOGY CO., LTD
Address : F1, Bldg. A, Changyuan New Material Port, Keyuan Rd.
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Report Number : ATE20102187
Date of Test : October 22-23, 2010
Date of Report : October 28, 2010

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APPENDIX I (TEST CURVES) (10 pages)

Test Report Certification

Applicant : Acumen Technologies Ltd.
Manufacturer : Acumen Technologies Ltd.
EUT Description : Acumen FDC 502 Tx ONLY
(A) MODEL NO.: 00-002121-00
(B) SERIAL NO.: N/A
(C) POWER SUPPLY: 4.5V DC ("AAA" batteries 3×)

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. 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 : October 22-23, 2010

Prepared by :



(Engineer)

Approved & Authorized Signer :



(Manager)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	:	Acumen FDC 502 Tx ONLY
Model Number	:	00-002121-00
Power Supply	:	4.5V DC (“AAA” batteries 3×)
Operation Frequency	:	350MHz
Applicant	:	Acumen Technologies Ltd.
Address	:	Guang Zhou, She Jiang Town, Mei County, Guang Province, Mei Zhou City, China
Manufacturer	:	Acumen Technologies Ltd.
Address	:	Guang Zhou, She Jiang Town, Mei County, Guang Province, Mei Zhou City, China
Date of sample received	:	October 14, 2010
Date of Test	:	October 22-23, 2010

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 = 3.08dB, k=2
(9kHz-30MHz)

Radiated emission expanded uncertainty = 4.42dB, k=2
(30MHz-1000MHz)

Radiated emission expanded uncertainty = 4.06dB, k=2
(Above 1GHz)

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. 9, 2011
EMI Test Receiver	Rohde&Schwarz	ESPI3	101526/003	Jan. 9, 2011
Spectrum Analyzer	Agilent	E7405A	MY45115511	Jan. 9, 2011
Pre-Amplifier	Rohde&Schwarz	CBLU118354 0-01	3791	Jan. 9, 2011
Loop Antenna	Schwarzbeck	FMZB1516	1516131	Jan. 9, 2011
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan. 9, 2011
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan. 9, 2011
Horn Antenna	Schwarzbeck	BBHA9170	9170-359	Jan. 9, 2011
LISN	Rohde&Schwarz	ESH3-Z5	100305	Jan. 9, 2011
LISN	Schwarzbeck	NSLK8126	8126431	Jan. 9, 2011

3. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
Section 15.207	Conducted Emission	N/A
Section 15.231(b)	Radiated Emission	Compliant
Section 15.231(c)	20dB Bandwidth	Compliant
Section 15.231(a)(1)	Release Time Measurement	Compliant

The product is a manually operated Remote Control transmitter.
Section 15.231 (a) (2), (3), (4) and (5) are not applicable.

4. THE FIELD STRENGTH OF RADIATION EMISSION

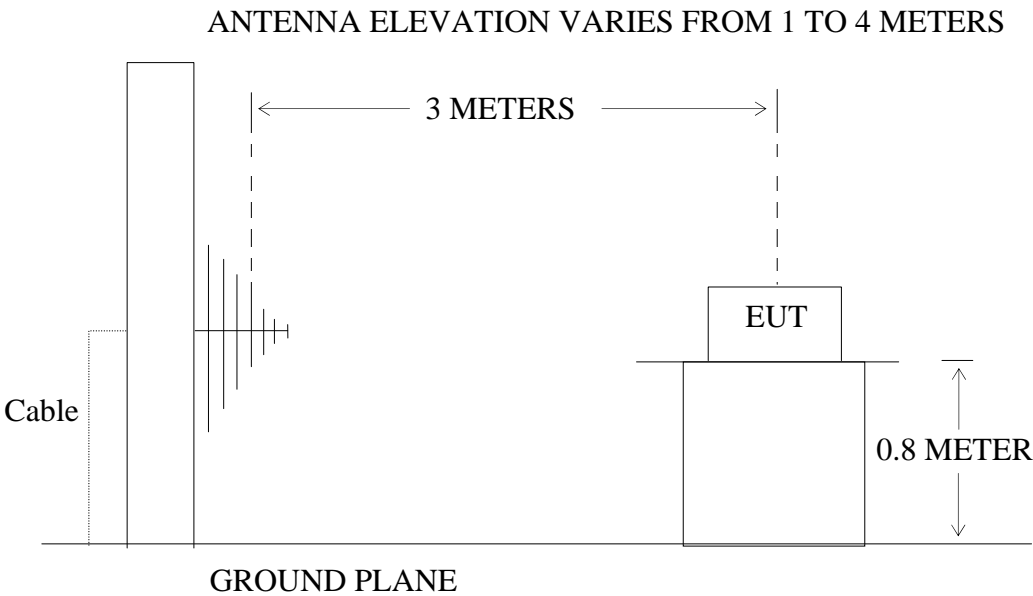
4.1. Block Diagram of Test Setup

4.1.1. Block diagram of connection between the EUT and simulators



(EUT: Acumen FDC 502 Tx ONLY)

4.1.2. Semi-Anechoic Chamber Test Setup Diagram



(EUT: Acumen FDC 502 Tx ONLY)

4.2.The Field Strength of Radiation Emission Measurement Limits

4.2.1.Radiation Emission Measurement Limits According to FCC Part 15 Section 15.231(b)

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	2250	225
70-130	1250	125
130-174	1250-3750	125-375
174-260	3750	375
260-470	3750-12500	375-1250
Above 470	12500	1250

Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, $\mu\text{V/m}$ at 3 meters = $56.81818(F) - 6136.3636$; for the band 260-470 MHz, $\mu\text{V/m}$ at 3 meters = $41.6667(F) - 7083.3333$. The maximum permitted unwanted emission level is 20 dB 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 is 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. Acumen FDC 502 Tx ONLY (EUT)

Model Number : 00-002121-00
 Serial Number : N/A
 Manufacturer : Acumen Technologies Ltd.

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 TX mode 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 EUT was tested in 3 orthogonal planes.

The bandwidth of test receiver is set at 120kHz in 30-1000MHz, and 1MHz in 1000-4000MHz.

The frequency range from 30MHz to 4000MHz is checked.

4.6. The Field Strength of Radiation Emission Measurement Results

PASS.

The frequency range 30MHz to 4000MHz is investigated.

Date of Test:	October 22, 2010	Temperature:	25°C
EUT:	Acumen FDC 502 Tx ONLY	Humidity:	50%
Model No.:	00-002121-00	Power Supply:	4.5V DC (“AAA” batteries 3×)
Test Mode:	TX	Test Engineer:	Joe

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	
349.9200	65.56	20.77	-11.63	74.70	86.33	77.5	97.5	-2.80	-11.17	Horizontal
699.8420	26.51	26.50	-11.63	41.38	53.01	57.5	77.5	-16.12	-24.49	
*1049.780	74.08	-10.70	-11.63	51.75	63.38	54.0	74.0	-2.25	-10.62	
*1399.682	69.37	-9.80	-11.63	47.94	59.57	54.0	74.0	-6.06	-14.43	
1749.606	60.00	-8.45	-11.63	39.92	51.55	57.5	77.5	-17.58	-25.95	
349.9200	61.78	20.77	-11.63	70.92	82.55	77.5	97.5	-6.58	-14.95	Vertical
699.8420	21.51	26.50	-11.63	36.38	48.01	57.5	77.5	-21.12	-29.49	
*1049.780	72.50	-10.70	-11.63	50.17	61.80	54.0	74.0	-3.83	-12.20	
*1399.682	66.44	-9.80	-11.63	45.01	56.64	54.0	74.0	-8.99	-17.36	
1749.606	53.27	-8.45	-11.63	33.19	44.82	57.5	77.5	-24.31	-32.68	

Note:

1. Emissions attenuated more than 20 dB below the permissible value are not reported.
2. *: Denotes restricted band of operation.

Measurements were made using a peak detector and average detector. 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.

3. 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:

$$\text{Result} = \text{Reading} + \text{Corrected Factor}$$

$$\text{Where Corrected Factor} = \text{Antenna Factor} + \text{Cable Loss} + \text{High Pass Filter Loss} - \text{Amplifier Gain}$$

4. FCC Limit for Average Measurement = $41.6667(350) - 7083.3333 = 7500.0117\mu\text{V/m} = 77.5\text{dB}\mu\text{V/m}$
5. The spectral diagrams in appendix I display the measurement of peak values.
6. 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.

5. 20DB OCCUPIED BANDWIDTH

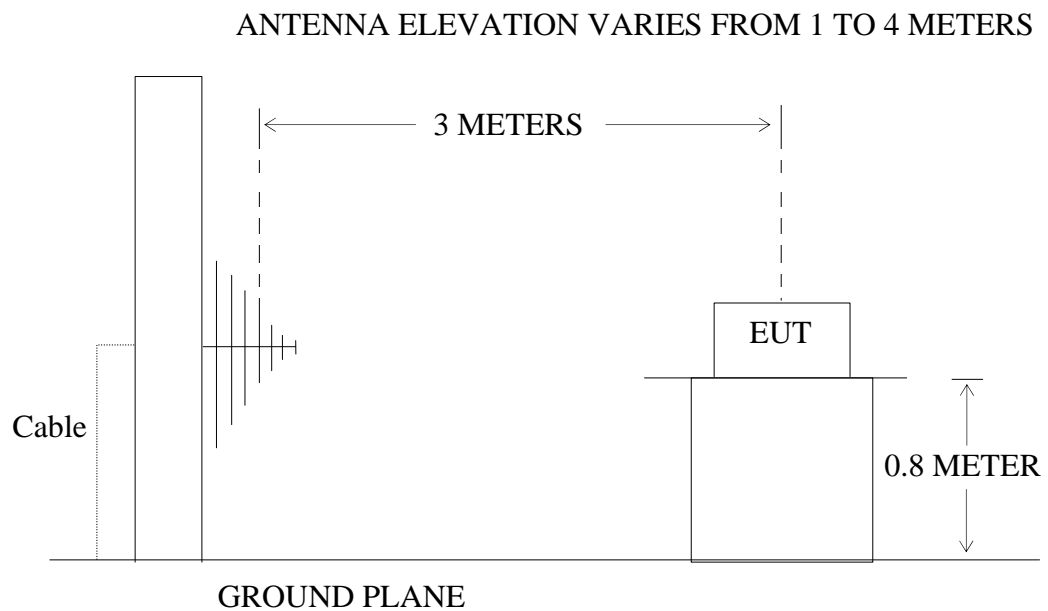
5.1. Block Diagram of Test Setup

5.1.1. Block diagram of connection between the EUT and simulators



(EUT: Acumen FDC 502 Tx ONLY)

5.1.2. Semi-Anechoic Chamber Test Setup Diagram



(EUT: Acumen FDC 502 Tx ONLY)

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 $350\text{MHz} \times 0.25\% = 875.0\text{kHz}$. 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.Acumen FDC 502 Tx ONLY (EUT)

Model Number : 00-002121-00
Serial Number : N/A
Manufacturer : Acumen Technologies Ltd.

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 TX mode measure it.

5.5.Test Procedure

5.5.1.Set SPA Center Frequency = Fundamental frequency, RBW = 10kHz, VBW = 30kHz, Span = 1MHz.

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

5.6.Measurement Result

The EUT does meet the FCC requirement.

-20dB bandwidth = 52kHz < 875.0kHz.

The spectral diagrams in appendix I.

6. RELEASE TIME MEASUREMENT

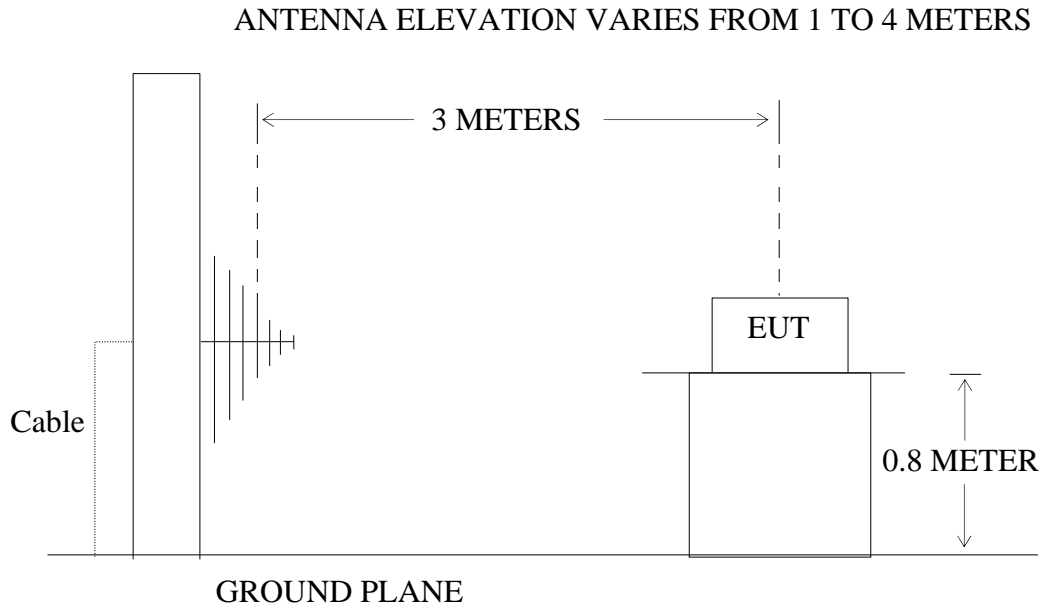
6.1. Block Diagram of Test Setup

6.1.1. Block diagram of connection between the EUT and simulators



(EUT: Acumen FDC 502 Tx ONLY)

6.1.2. Semi-Anechoic Chamber Test Setup Diagram



(EUT: Acumen FDC 502 Tx ONLY)

6.2. Release Time Measurement According To FCC Part 15 Section 15.231(a)

Section 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.

6.3.EUT Configuration on Measurement

The following equipment are installed on Release Time 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. Acumen FDC 502 Tx ONLY (EUT)

Model Number : 00-002121-00
Serial Number : N/A
Manufacturer : Acumen Technologies Ltd.

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 TX mode measure it.

6.5.Test Procedure

6.5.1.Set SPA Center Frequency = Fundamental frequency, RBW = 100kHz, VBW = 300kHz, Span = 0Hz. Sweep time = 5 seconds.

6.5.2.Set EUT as normal operation and press Transmitter button.

6.5.3.Set SPA View. Delta Mark time.

6.6. Measurement Result

The release time less than 5 seconds.

Release Time= 1.5 s

The spectral diagrams in appendix I.

7. AVERAGE FACTOR MEASUREMENT

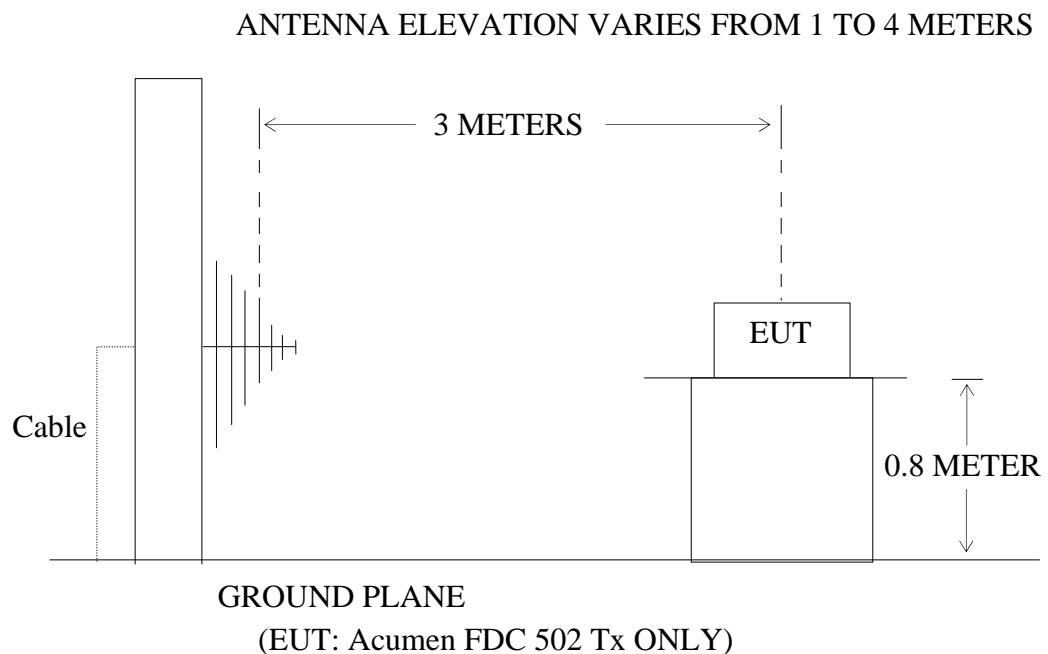
7.1. Block Diagram of Test Setup

7.1.1. Block diagram of connection between the EUT and simulators



(EUT: Acumen FDC 502 Tx ONLY)

7.1.2. Semi-Anechoic Chamber Test Setup Diagram



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 = $20 \log (\text{duty cycle})$

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. Acumen FDC 502 Tx ONLY (EUT)

Model Number : 00-002121-00
Serial Number : N/A
Manufacturer : Acumen Technologies Ltd.

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 TX mode 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 = 100kHz, VBW = 300kHz, 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 = 32.272ms

Effective period of the cycle = $(10 \times 0.5292) + (3 \times 1.05)$ ms = 8.442ms

DC = $8.442\text{ms} / 32.272\text{ms} = 0.262$

Therefore, the average factor is found by $20\log 0.262 = -11.63\text{dB}$

The spectral diagrams in appendix I.

APPENDIX I (Test Curves)



ACCURATE TECHNOLOGY CO., LTD.

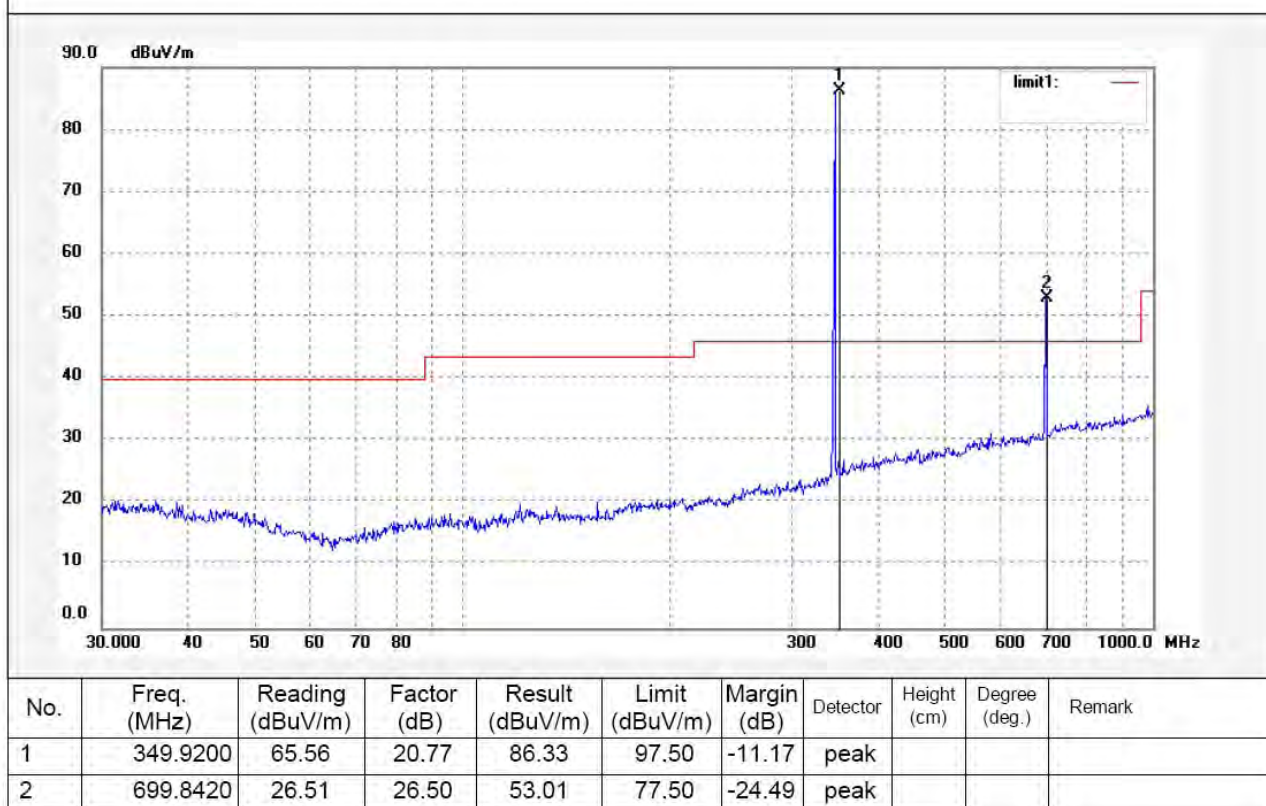
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 966 chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: joe #1004
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 50 %
EUT: Acumen FDC 502 Tx ONLY
Mode: TX
Model: 11-112121-00
Manufacturer: Acumen Technologies Ltd.

Polarization: Horizontal
Power Source: DC 4.5V
Date: 2010/10/22
Time: 9:24:45
Engineer Signature: Joe
Distance: 3m

Note: Sample No.:102466 Report No.:ATE20102187





ACCURATE TECHNOLOGY CO., LTD.

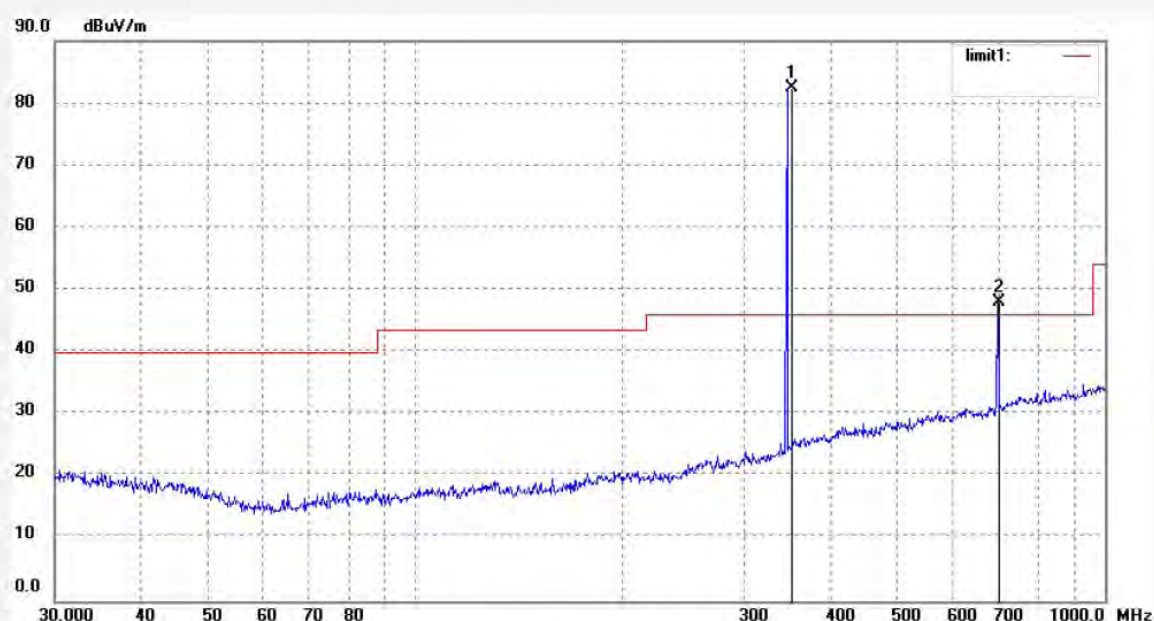
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 966 chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: joe #1003
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 50 %
EUT: Acumen FDC 502 Tx ONLY
Mode: TX
Model: 11-112121-00
Manufacturer: Acumen Technologies Ltd.

Polarization: Vertical
Power Source: DC 4.5V
Date: 2010/10/22
Time: 9:20:38
Engineer Signature: Joe
Distance: 3m

Note: Sample No.:102466 Report No.:ATE20102187



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	349.9200	61.78	20.77	82.55	97.50	-14.95	peak			
2	699.8420	21.51	26.50	48.01	77.50	-29.49	peak			


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.: joe #1006

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 50 %

EUT: Acumen FDC 502 Tx ONLY

Mode: TX

Model: 11-112121-00

Manufacturer: Acumen Technologies Ltd.

Polarization: Horizontal

Power Source: DC 4.5V

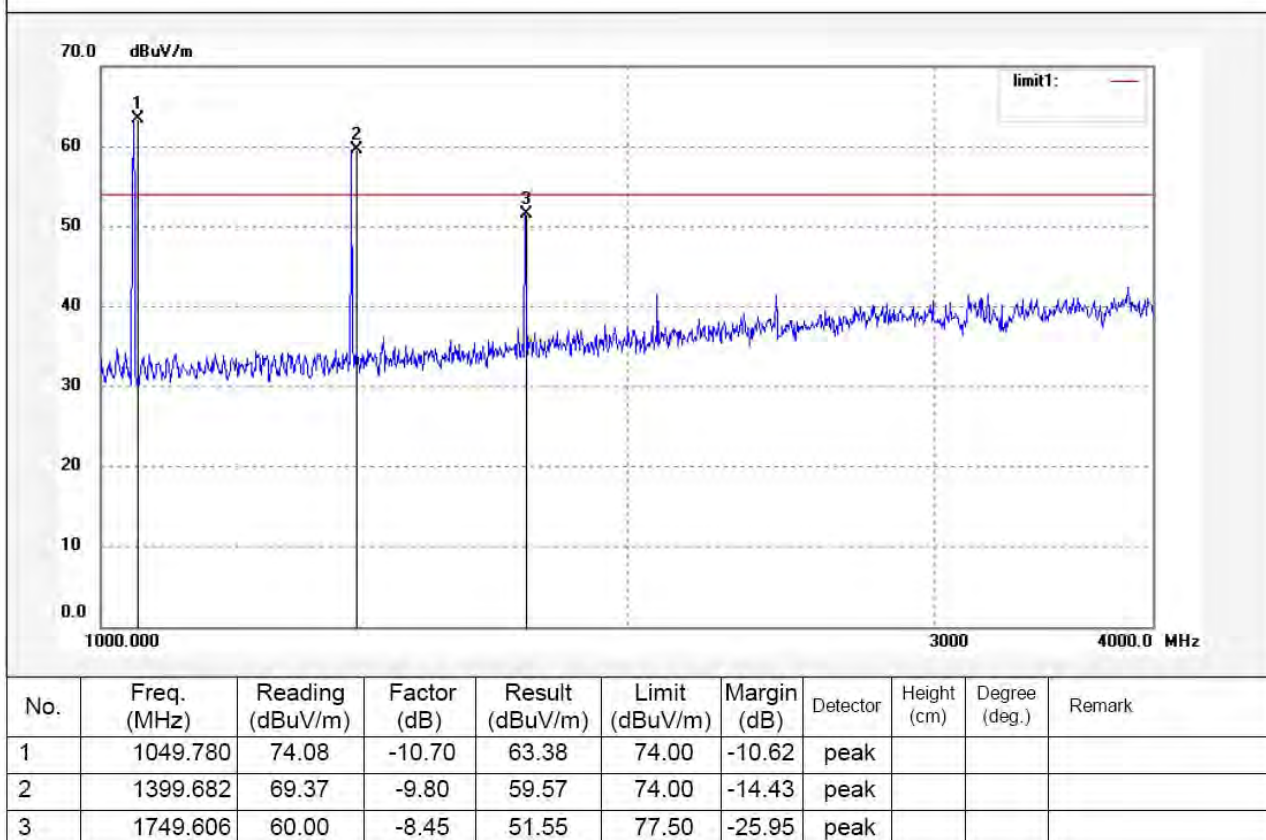
Date: 2010/10/22

Time: 9:43:32

Engineer Signature: Joe

Distance: 3m

Note: Sample No.:102466 Report No.:ATE20102187




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.: joe #1005

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 50 %

EUT: Acumen FDC 502 Tx ONLY

Mode: TX

Model: 11-112121-00

Manufacturer: Acumen Technologies Ltd.

Polarization: Vertical

Power Source: DC 4.5V

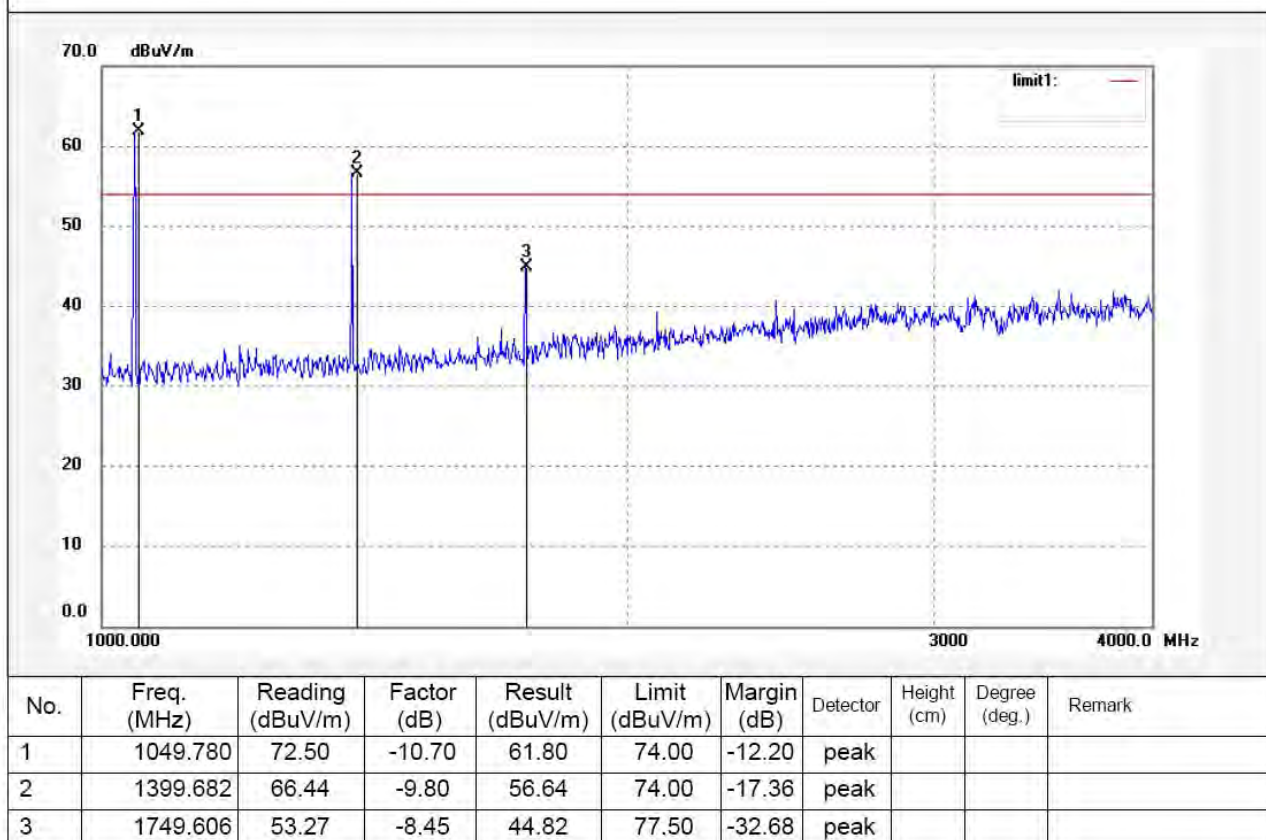
Date: 2010/10/22

Time: 9:39:10

Engineer Signature: Joe

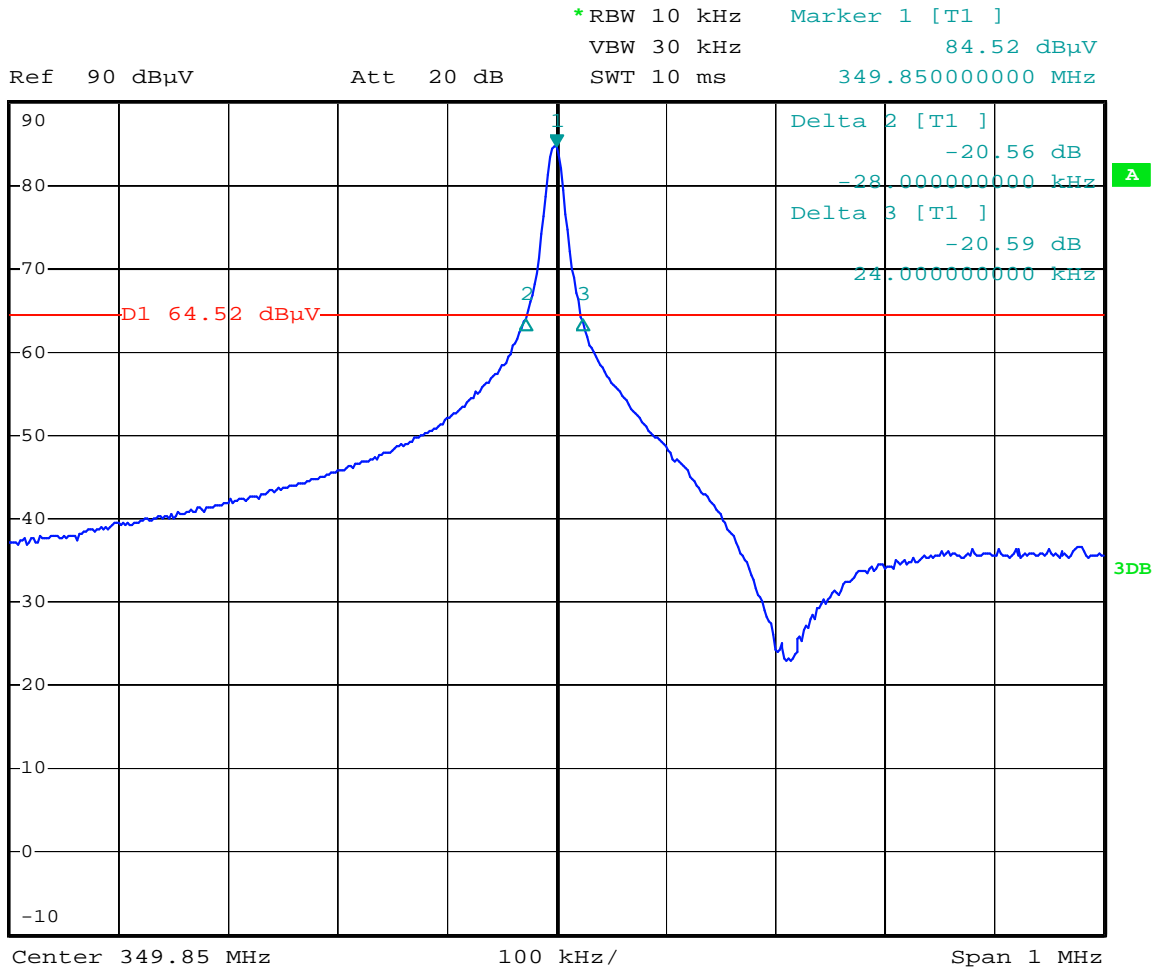
Distance: 3m

Note: Sample No.:102466 Report No.:ATE20102187

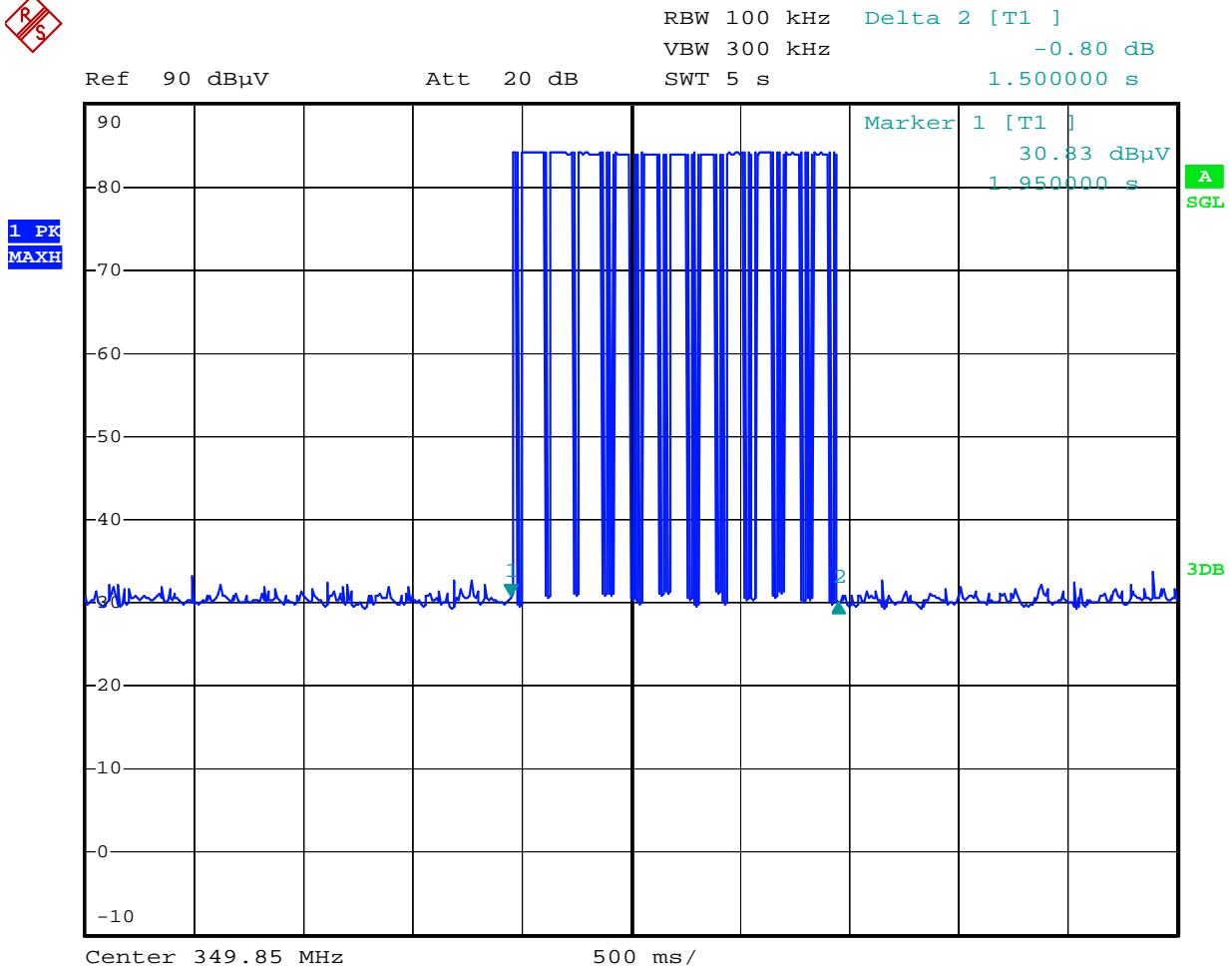




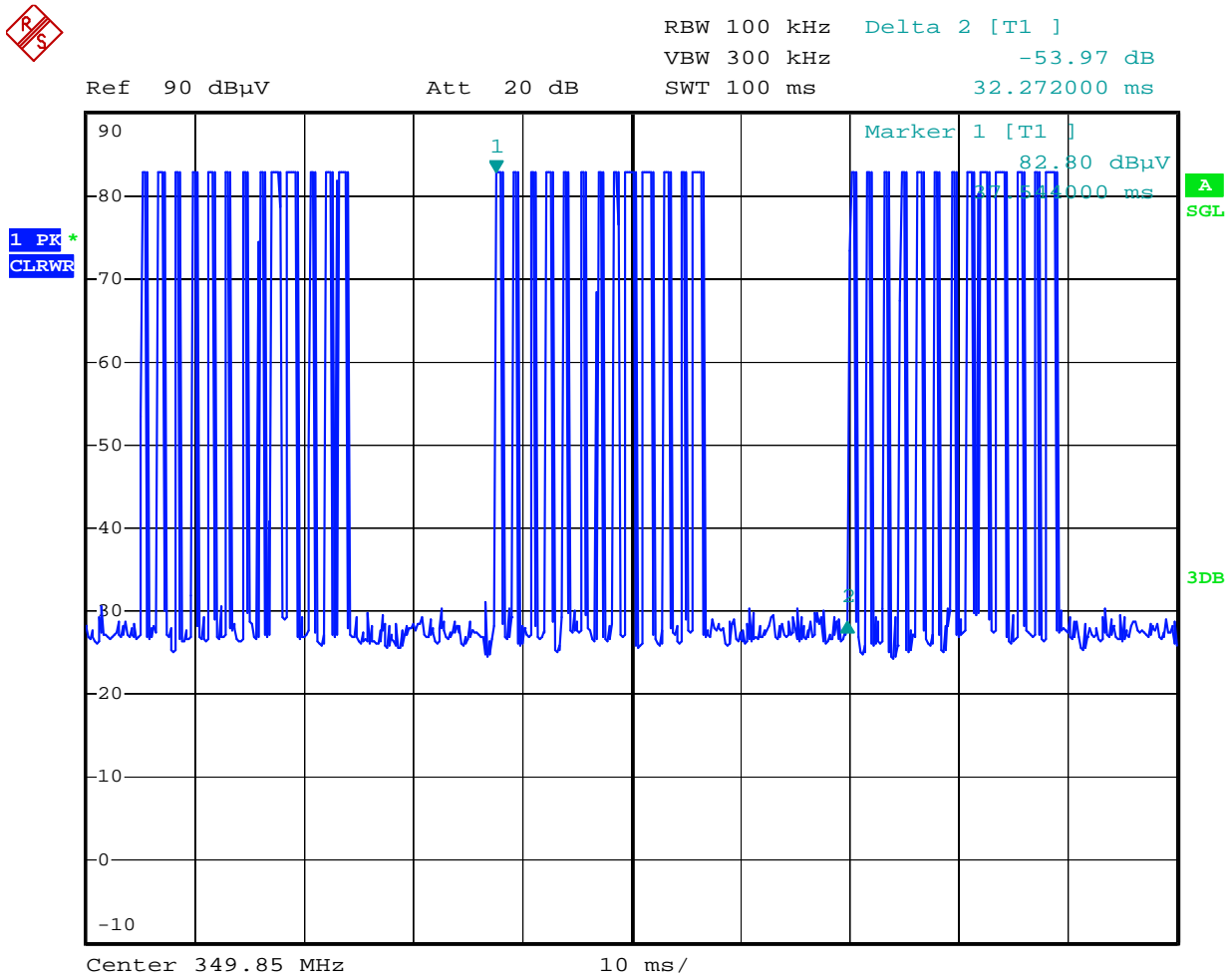
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Date: 23.OCT.2010 16:27:11

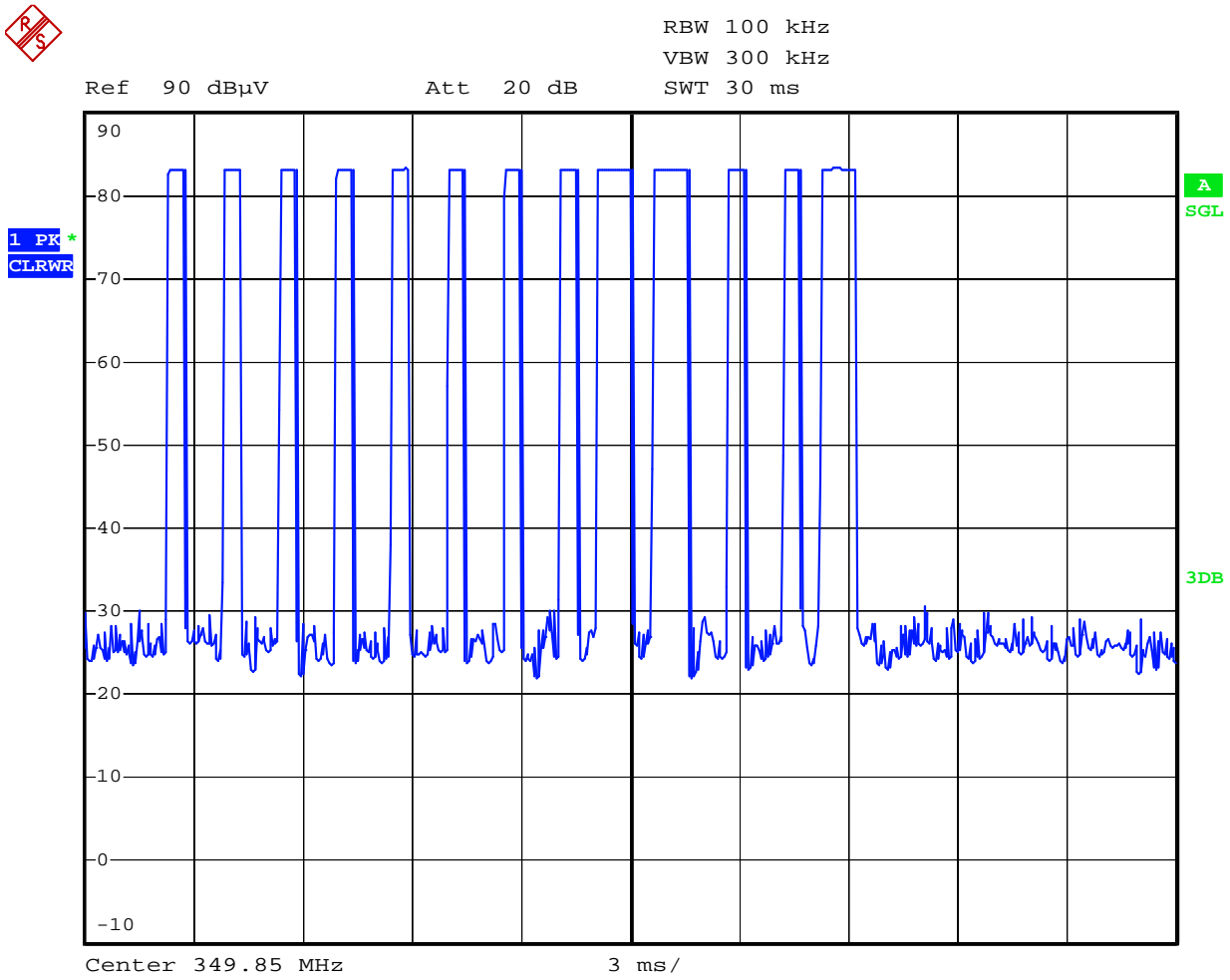


Date: 23.OCT.2010 16:32:19



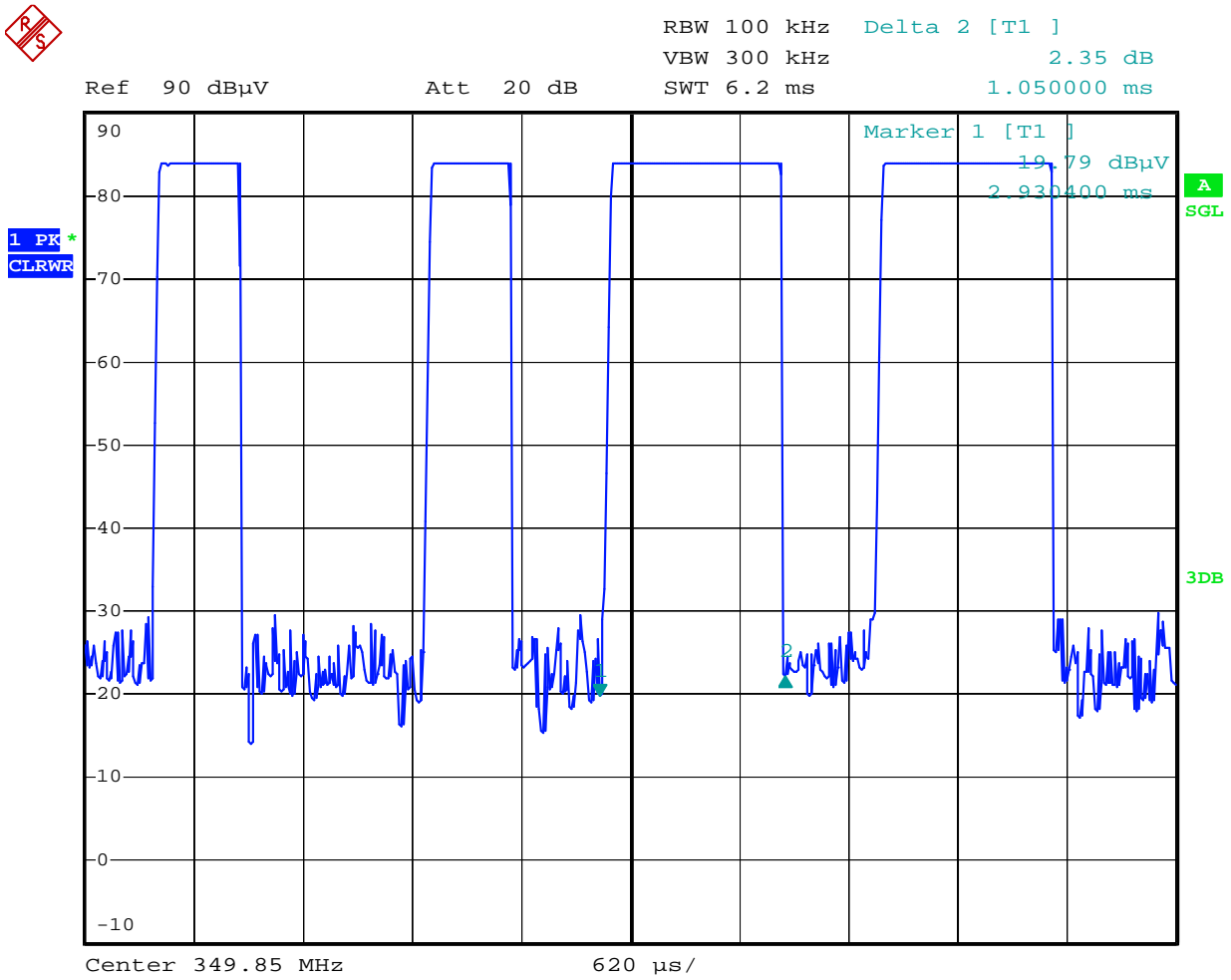
Date: 23.OCT.2010 16:39:48

The graph shows the pattern of coding during the signal transmission.
The duration of one cycle = 32.272ms.



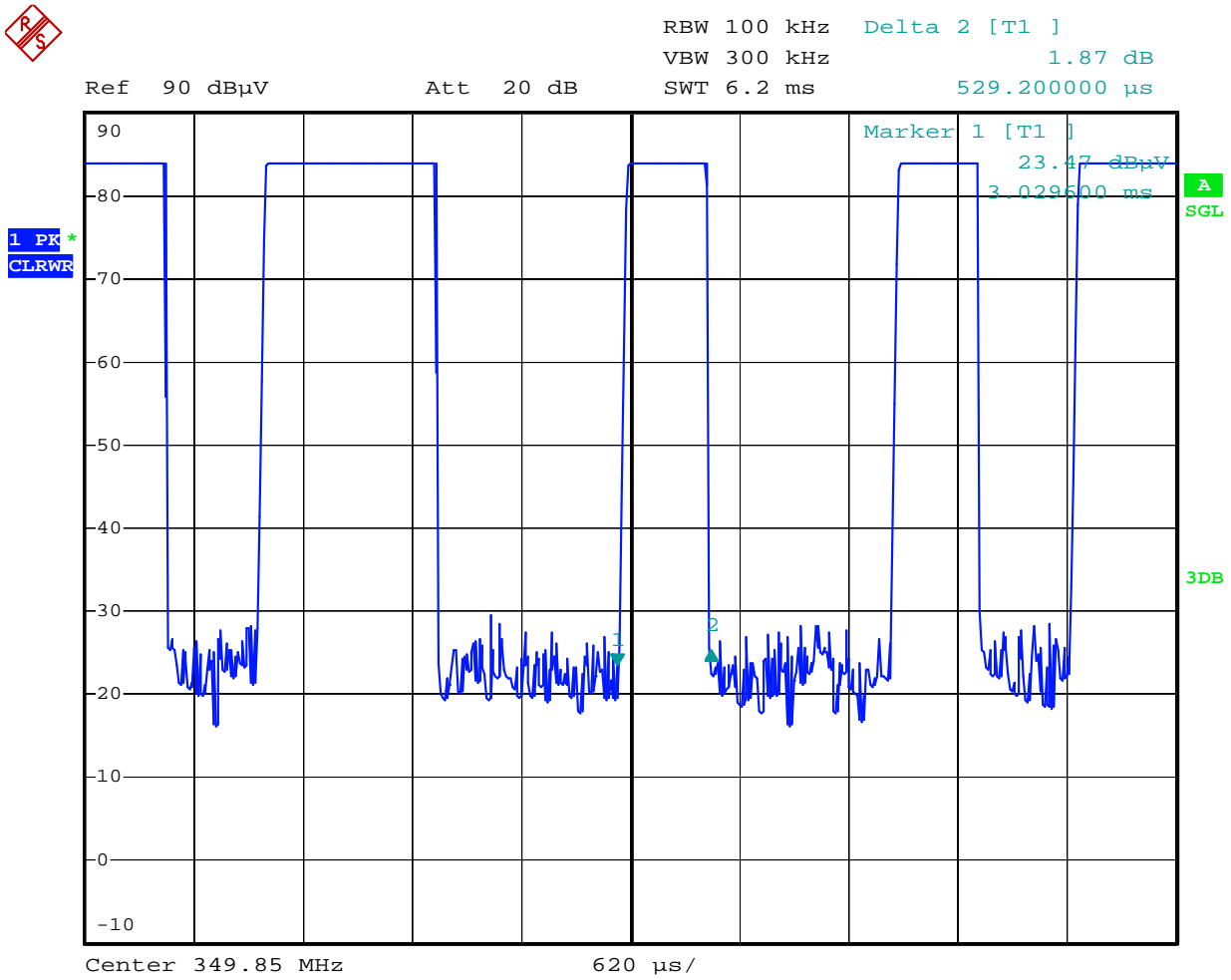
Date: 23.OCT.2010 16:41:41

The graph shows the pattern of coding during the signal transmission.
It sums of 3 long 'on' signals and 10 short 'on' signals.



Date: 23.OCT.2010 16:45:51

The graph shows the duration of long 'on' signal. From marker 1 to marker 2, duration is 1.05ms.



Date: 23.OCT.2010 16:44:25

The graph shows the duration of short 'on' signal. From marker 1 to marker 2, duration is 0.5292ms.