# APPLICATION CERTIFICATION On Behalf of South East Asia Resources Ltd.

EON 03/04 Model No.: FTX-S3, FTX-S4

FCC ID: EPKEON0304 IC ID: 2887A-EON0304

Prepared for : South East Asia Resources Ltd.

Address : 1902-03, Kwong Sang Center, 151-153 Hoi Bun Road

Kwun Tong, Hong Kong

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 Fax: (0755) 26503396

Report Number : ATE20072541
Date of Test : October 29, 2007
Date of Report : October 31, 2007

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# **Test Report Certification**

Applicant : South East Asia Resources Ltd.

Manufacturer : Acumen Electronic (Shen Zhen) Ltd.

EUT Description : EON 03/04

(A) MODEL NO.: FTX-S3, FTX-S4

(B) SERIAL NO.: N/A

(C) POWER SUPPLY: 4.5V DC ("AAA" battery Type×3)

#### Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.231: 2006 & ANSI C 63.4: 2003 RSS-210 Issue 7 June 2007

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, RSS-210 Issue 7 June 2007 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:	October 29, 2007	
Prepared by :	sley wang	
	(Engineer)	
Reviewer:	Seal -	
	(Quality Manager)	
Approved & Authorized Signer:	Martinh	
	(Manager)	

#### 1. GENERAL INFORMATION

1.1.Description of Device (EUT)

**EUT : EON** 03/04

Model Number : FTX-S3, FTX-S4

(Note: Model FTX-S3 is identical to model FTX-S4, except appearance are

difference. Therefore only model FTX-S4 is tested.)

Power Supply : 4.5V DC ("AAA" battery Type  $\times 3$ )

Applicant : South East Asia Resources Ltd.

Address : 1902-03, Kwong Sang Center, 151-153 Hoi Bun Road

Kwun Tong, Hong Kong

Manufacturer : Acumen Electronic (Shen Zhen) Ltd.

Address : No.8, Sanxiang, Queshan Industrial Eastate, Da Lang

Street, Longhua Town, Baoan, Shenzhen, China

Date of sample received: October 26, 2007 Date of Test: October 29, 2007

1.2.Description of Test Facility

EMC Lab : Accredited by CNAS, September 20, 2007

The Certificate Registration Number is CNAS L3193

Listed by FCC, March 20, 2007 The Registration Number is 253065

Listed by Industry Canada, May 3, 2007 The Registration Number is IC 5077A-1

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 = 4.12dB, k=2

# 2. MEASURING DEVICE AND TEST EQUIPMENT

**Table 1: List of Test and Measurement Equipment** 

Kind of equipment	Manufacturer	Туре	S/N	Calibrated until
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	03.31.2008
EMI Test Receiver	Rohde&Schwarz	ESI26	838786/013	01.02.2008
Bilog Antenna	Schwarzbeck	VULB9163	9163-194	03.31.2008
Bilog Antenna	Chase	CBL6112B	2591	03.31.2008
Horn Antenna	Rohde&Schwarz	HF906	100013	01.02.2008
Spectrum Analyzer	Anritsu	MS2651B	6200238856	03.31.2008
Pre-Amplifier	Agilent	8447D	2944A10619	03.31.2008

# 3. THE FIELD STRENGTH OF RADIATED EMISSION

# 3.1.Block Diagram of Test Setup

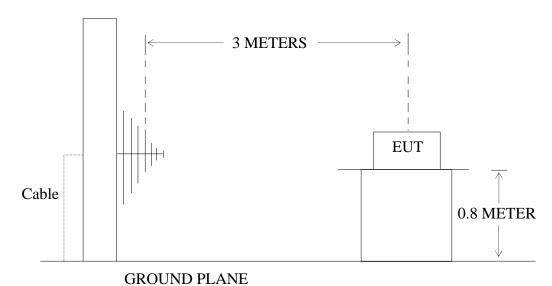
3.1.1.Block diagram of connection between the EUT and simulators

EUT

(EUT: EON 03/04)

# 3.1.2. Anechoic Chamber Test Setup Diagram

# ANTENNA ELEVATION VARIES FROM 1 TO 4 METERS



(EUT: EON 03/04)

# 3.2. The Field Strength of Radiated Emission Measurement Limits

3.2.1 Transmitter Radiation Emission Measurement Limits According to FCC Part 15 Section 15.231(b) & RSS-210 Table 4

Frequency Range of Fundamental [MHz]	Field Strength of Fundamental Emission [Average] [µV/m]	Field Strength of Spurious Emission [Average] [\mu V/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		

		4.5.00
Above 470	12500	1250
ADOVE 470	12.300	12.30

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,  $\mu$ V/m at 3 meters=56.81818(F)-6136.3636; For the band 260-470MHz,  $\mu$ V/m at 3 meters=41.6667(F)-7083.3333. The maximum permissible unwanted emission level is 20dB below the maximum permitted fundamental level. The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average(or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in Section 15.209, whichever limit permits a higher field strength.

# 3.2.2 Receiver Radiation Emission Measurement Limits According to FCC Part 15 Section 15.209 & RSS-210 Table 2

Frequency [MHz]	Field Strength [μV/m]	Measurement Distance [meters]		
30-88	100	3		
88-216	150	3		
216-960	200	3		
Above 960	500	3		

3.2.3 Restricted Band Radiation Emission Measurement Limits According to FCC part 15 Section 15.205 and Section15.209; RSS-210 table1.

## 3.3. 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.

#### 3.3.1. EON 03/04 (EUT)

Model Number : FTX-S4 Serial Number : N/A

Manufacturer : Acumen Electronic (Shen Zhen) Ltd.

# 3.4. Operating Condition of EUT

- 3.4.1. Setup the EUT and simulator as shown as Section 3.1.
- 3.4.2. Turn on the power of all equipment.
- 3.4.3. Let the EUT work in measuring modes (TX) measure it.
- 3.4.4. Let the EUT work in measuring modes (RX) measure it.

#### 3.5.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 (R&S ESI26) is set at 120KHz in 30-1000MHz, and 1MHz in 1000-4000MHz.

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

# 3.6. The Field Strength of Radiation Emission Measurement Results **PASS.**

The frequency range 30MHz to 4000MHz is investigated.

Date of Test: October 29, 2007 Temperature: 25°C

EUT: EON 03/04 Humidity: 58%

4.5V DC ("AAA" battery

Model No.: FTX-S4 Power Supply:  $\underline{\text{Type} \times 3}$ 

Test Mode: TX Test Engineer: Andy

#### **Fundamental Emission**

Frequency	Reading	Factor	Average	Result(dBµV/m)		Limit(dBµV/m)		Margin(dBµV/m)		Polarization
(MHz)	$(dB\mu V/m)$	Corr.	Factor							
	PEAK	(dB)	(dB)	AV	PEAK	AV	PEAK	AV	PEAK	
349.952	70.5	-17.7	-8.8	44.0	52.8	77.5	97.5	33.5	44.7	Horizontal
349.952	63.6	-17.7	-8.8	37.1	45.9	77.5	97.5	40.4	51.6	Vertical

**Spurious Emission** 

Frequency	Reading	Factor	Average	Result(dBµV/m)		Limit(dBµV/m)		Margin(dBµV/m)		Polarization
(MHz)	(dBµV/m)	Corr.	Factor							
	PEAK	(dB)	(dB)	AV	PEAK	AV	PEAK	AV	PEAK	
699.894	49.7	-13.6	-8.8	27.3	36.1	57.5	77.5	30.2	41.4	Horizontal
699.894	45.9	-13.6	-8.8	23.5	32.3	57.5	77.5	34.0	45.2	Vertical

#### Note:

1. 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

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

#### **Below 1GHz:**

Frequency	Reading	Factor	Result(dBµV/m)	Limit(dBµV/m)	Margin(dBµV/m)	Polarization
(MHz)	(dBµV/m)	Corr.				
	QP	(dB)	QP	QP	QP	
615.110	32.1	-14.0	18.1	46.0	27.9	Horizontal
966.954	32.0	-11.5	20.5	54.0	33.5	Vertical

#### Above 1GHz

Frequency	Reading		Factor	Result(d	esult(dBµV/m)		Limit(dBµV/m)		(dBμV/	Polarization
(MHz)	$(dB\mu V/m)$		Corr.					m)		
	AV	PEAK	(dB)	AV	PEAK	AV	PEAK	AV	PEAK	
3909.819	18.2	32.9	0.8	19.0	33.7	54.0	74.0	35.0	40.3	Horizontal
3909.819	18.5	33.0	0.8	19.3	33.8	54.0	74.0	34.7	40.2	Vertical

#### Note:

1. 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

2. The spectral diagrams in appendix I display the measurement of peak values.

# 4. 20DB OCCUPIED BANDWIDTH

# 4.1.Block Diagram of Test Setup

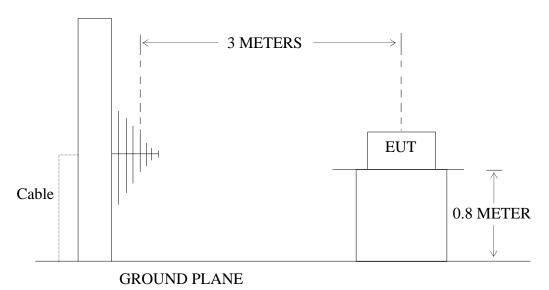
4.1.1.Block diagram of connection between the EUT and simulators

EUT

(EUT: EON 03/04)

#### 4.1.2. Anechoic Chamber Test Setup Diagram

# ANTENNA ELEVATION VARIES FROM 1 TO 4 METERS



(EUT: EON 03/04)

# 4.2. 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  $350\text{MHz} \times 0.25\% = 875\text{KHz}$ . Bandwidth is determined at the two points 20 dB down from the top of modulated carrier.

# 4.3.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.

#### 4.3.1.EON 03/04 (EUT)

Model Number : FTX-S4 Serial Number : N/A

Manufacturer : Acumen Electronic (Shen Zhen) 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 measuring mode (TX) measure it.

#### 4.5.Test Procedure

- 4.5.1. Set SPA Center Frequency = Fundamental frequency, RBW = 3kHz, VBW = 10kHz, Span = 300kHz.
- 4.5.2. Set SPA Max hold. Mark peak, -20dB

# 4.6. Measurement Result

# The EUT does meet the FCC requirement.

-20dB bandwidth = 9.6KHz < 875KHz.

The spectral diagrams in appendix I.

# 5. 99% OCCUPIED BANDWIDTH

# 5.1.Block Diagram of Test Setup

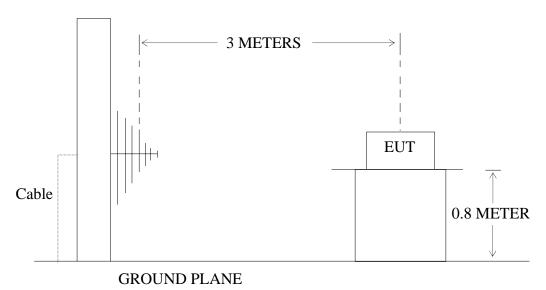
5.1.1.Block diagram of connection between the EUT and simulators

EUT

(EUT: EON 03/04)

#### 5.1.2. Anechoic Chamber Test Setup Diagram

# ANTENNA ELEVATION VARIES FROM 1 TO 4 METERS



(EUT: EON 03/04)

# 5.2. The Bandwidth of Emission Limit According To RSS-210 A1.1.3

The 99% bandwidth shall be no wider than 0.25% of the center frequency for device operating between 70-900MHz. Therefore, the bandwidth of the emission limit is  $350\text{MHz} \times 0.25\% = 875\text{KHz}$ .

# 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.EON 03/04 (EUT)

Model Number : FTX-S4 Serial Number : N/A

Manufacturer : Acumen Electronic (Shen Zhen) Ltd.

# 5.4. Operating Condition of EUT

- 5.4.1. Setup the EUT and simulator as shown as Section 4.1.
- 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 = 3kHz, VBW = 10kHz, Span = 300kHz.
- 5.5.2.Set SPA Max hold. Mark peak.
- 5.5.3.Set SPA "Meas" function, Select "Occupied Bandwidth" function, Select "99% Power Bandwidth". The frequency of the upper and lower markers indicating the edges of the transmitters "99% Power" emission bandwidth shall be recorded to automate by SPA.

# 5.6. Measurement Result

# The EUT does meet the RSS-210 requirement.

99% Power bandwidth = 8.4KHz < 875KHz.

The spectral diagrams in appendix I.

# 6. RELEASE TIME MEASUREMENT

# 6.1.Block Diagram of Test Setup

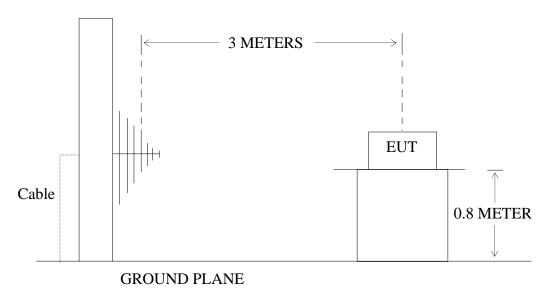
6.1.1.Block diagram of connection between the EUT and simulators

EUT

(EUT: EON 03/04)

6.1.2. Anechoic Chamber Test Setup Diagram

#### ANTENNA ELEVATION VARIES FROM 1 TO 4 METERS



(EUT: EON 03/04)

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

#### RSS-210 A1.1.1

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.

A1.1.1 (1) A manually operated transmitter shall employ a push-to-operate switch and be under manual control at all transmission times. When released, the transmitter shall cease transmission.(holdover time of up to 5 seconds if permitted) (2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

# 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.EON 03/04 (EUT)

Model Number : FTX-S4 Serial Number : N/A

Manufacturer : Acumen Electronic (Shen Zhen) Ltd.

# 6.4. Operating Condition of EUT

- 6.4.1. Setup the EUT and simulator as shown as Section 5.1.
- 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 = 100kHz, VBW = 300kHz, Span = 0Hz. Sweep time = 10seconds.
- 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= 1.53 seconds

The spectral diagrams in appendix I.

#### 7. AVERAGE FACTOR MEASUREMENT

# 7.1.Block Diagram of Test Setup

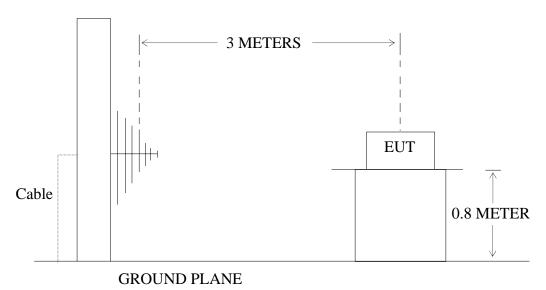
7.1.1.Block diagram of connection between the EUT and simulators

EUT

(EUT: EON 03/04)

7.1.2. Anechoic Chamber Test Setup Diagram

#### ANTENNA ELEVATION VARIES FROM 1 TO 4 METERS



(EUT: EON 03/04)

# 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. EON 03/04 (EUT)

Model Number : FTX-S4 Serial Number : N/A

Manufacturer : Acumen Electronic (Shen Zhen) Ltd.

# 7.4. Operating Condition of EUT

- 7.4.1. Setup the EUT and simulator as shown as Section 5.1.
- 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 = 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 = 32.6ms Effective period of the cycle =  $(9 \times 1.07) + (4 \times 0.54)$  ms= 11.79ms

DC = 11.79 ms/32.6 ms = 0.3616

# Therefore, the average factor is found by $20\log 0.3616 = -8.8dB$

The spectral diagrams in appendix I.

# APPENDIX I (Test Curves)

#### FCC Part 15

EUT: EON 03/04 M/N:FTX-S4

Manufacturer: Acumen Electronic

Operating Condition: TX

Test Site: ATC EMC Lab.SAC

Operator: Andy

Test Specification: Horizontal Comment: DC 4.5V

Level [dBµV/m] 60 50 40 30 20 10 50M 70M 100M 500M 700M 1G 30M 200M 300M Frequency [Hz] MES FTX-S4 L Hor LIM FCC ClassB F QP FCC ClassB, field strength

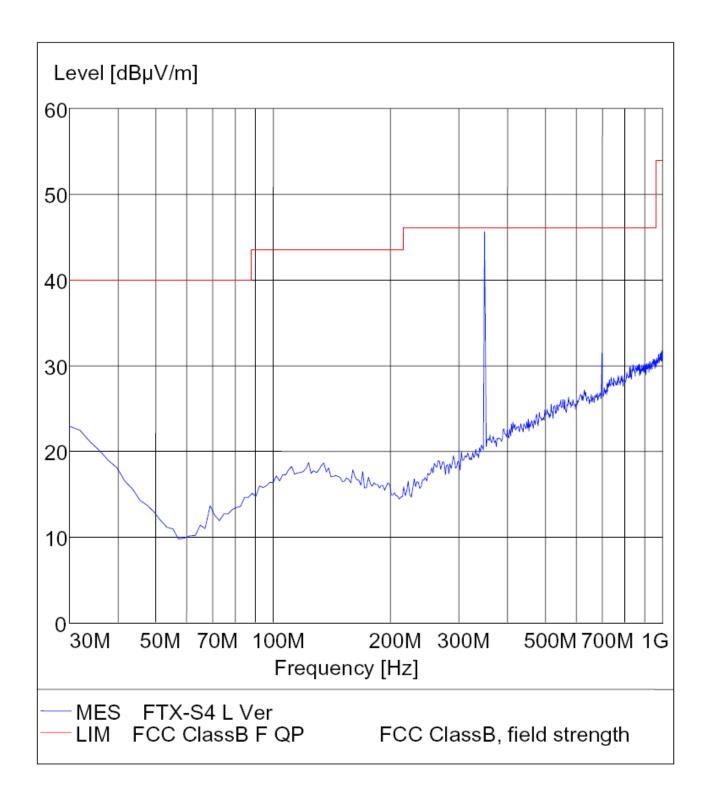
#### FCC Part 15

EUT: EON 03/04 M/N:FTX-S4

Manufacturer: Acumen Electronic

Operating Condition: TX
Test Site: ATC EMC Lab.SAC
Operator: Andy

Operator: Andy
Test Specification: Vertical
Comment: DC 4.5V



#### FCC Part 15

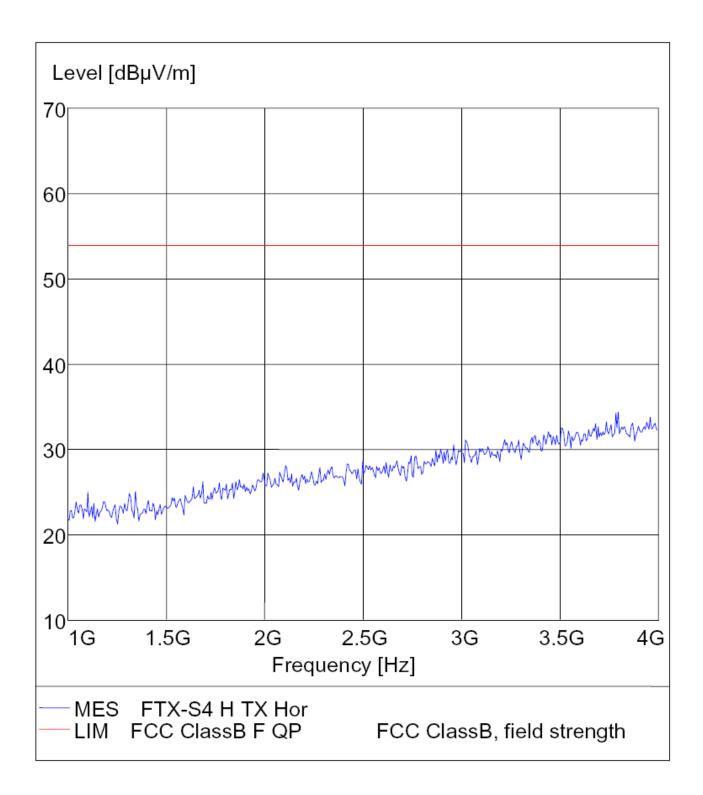
EUT: EON 03/04 M/N:FTX-S4

Manufacturer: Acumen Electronic

Operating Condition: TX

Test Site: ATC EMC Lab.SAC

Operator: Andy
Test Specification: Horizontal
Comment: DC 4.5V



#### FCC Part 15

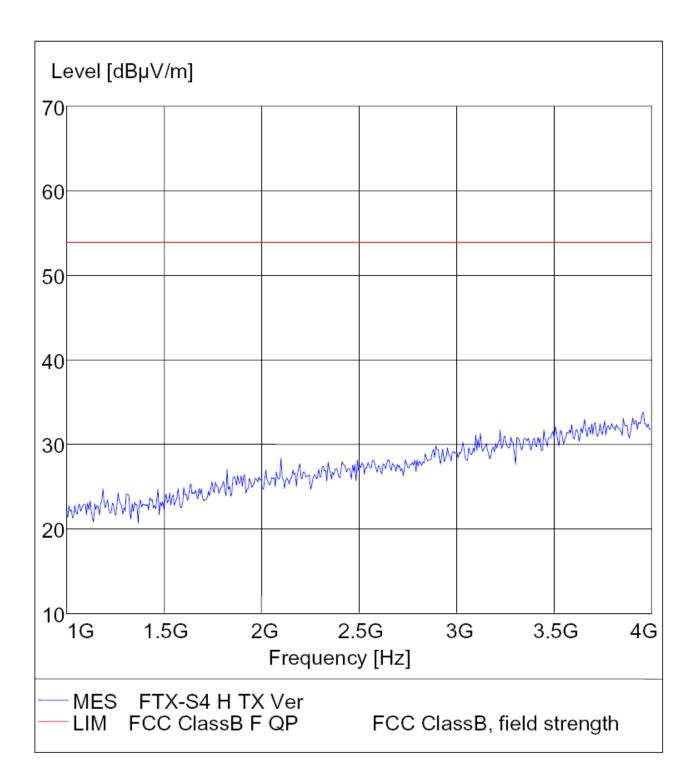
EUT: EON 03/04 M/N:FTX-S4

Manufacturer: Acumen Electronic

Operating Condition: TX

Test Site: ATC EMC Lab.SAC

Operator: Andy
Test Specification: Vertical
Comment: DC 4.5V



#### FCC Part 15

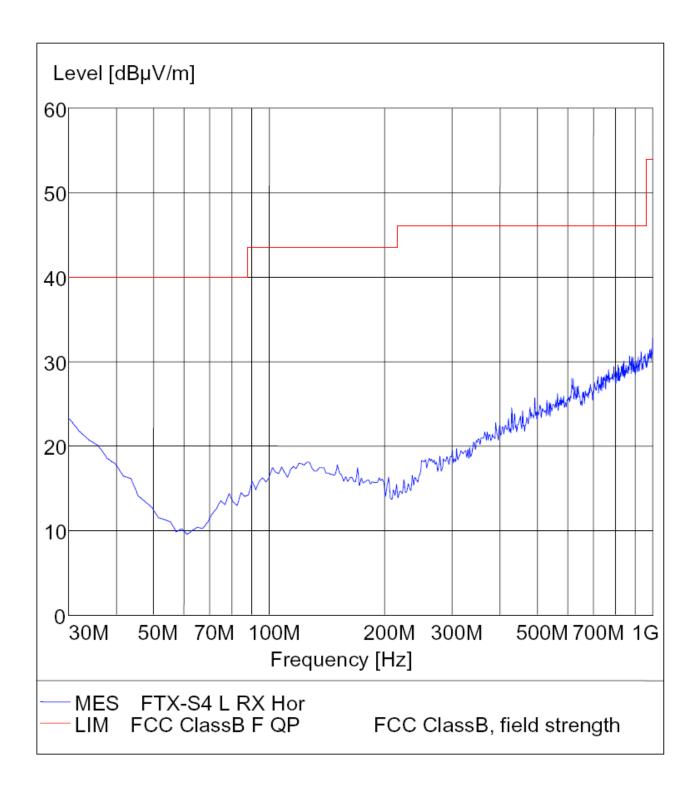
EUT: EON 03/04 M/N:FTX-S4

Manufacturer: Acumen Electronic Operating Condition: RX

Operating Condition: RX

Test Site: ATC EMC Lab.SAC Operator: Andy

Test Specification: Horizontal Comment: DC 4.5V



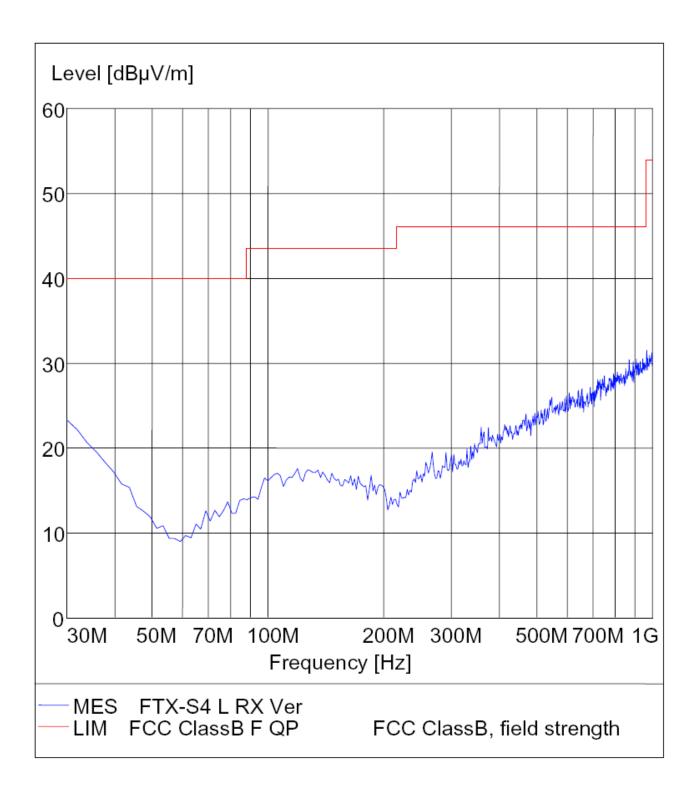
#### FCC Part 15

EUT: EON 03/04 M/N:FTX-S4

Manufacturer: Acumen Electronic

Operating Condition: RX

Test Site: ATC EMC Lab.SAC Operator: Andy Test Specification: Vertical Comment: DC 4.5V



#### FCC Part 15

EUT: EON 03/04 M/N:FTX-S4

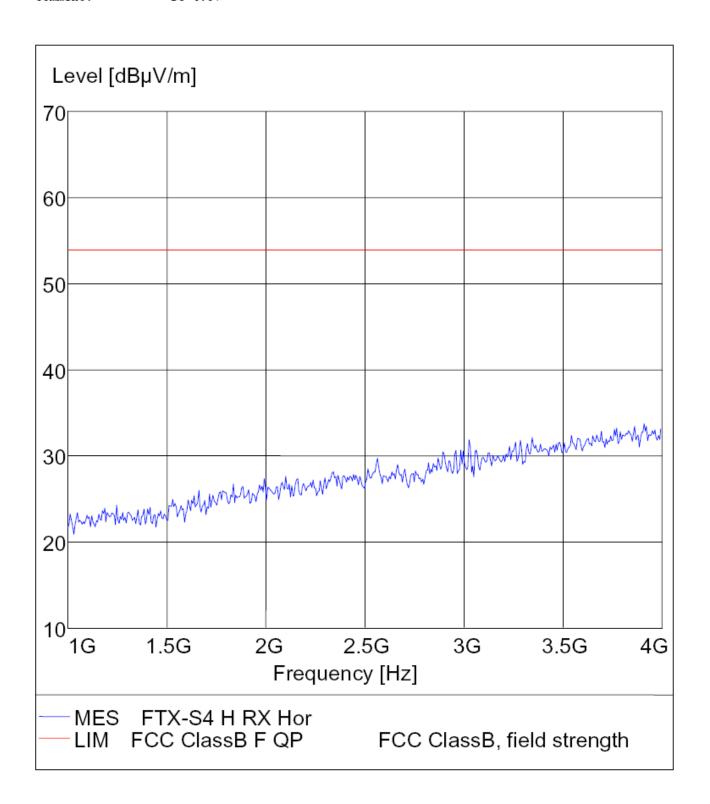
Manufacturer: Acumen Electronic

Operating Condition: RX

Test Site: ATC EMC Lab.SAC

Operator: Andy

Test Specification: Horizontal Comment: DC 4.5V



#### FCC Part 15

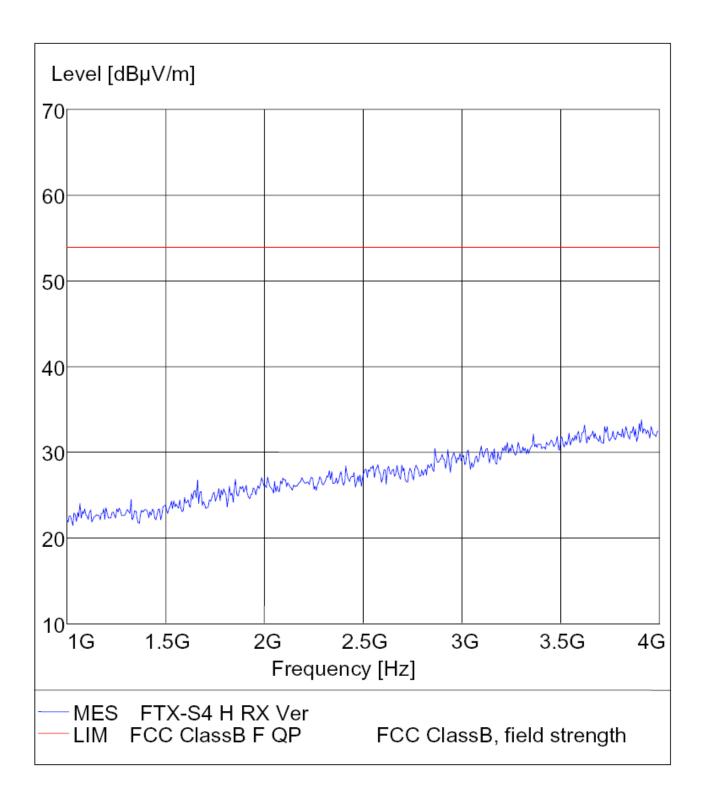
EUT: EON 03/04 M/N:FTX-S4

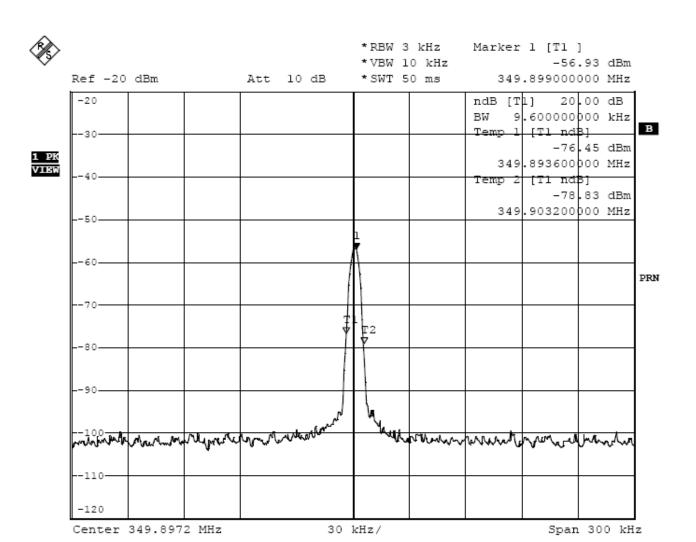
Manufacturer: Acumen Electronic

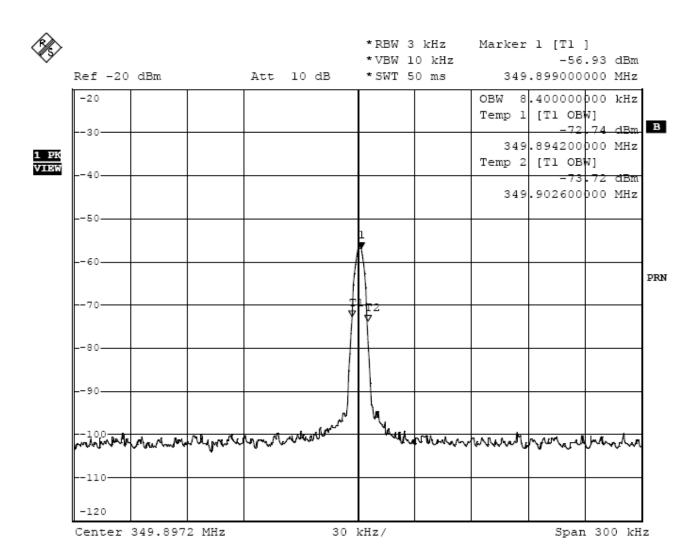
Operating Condition: RX

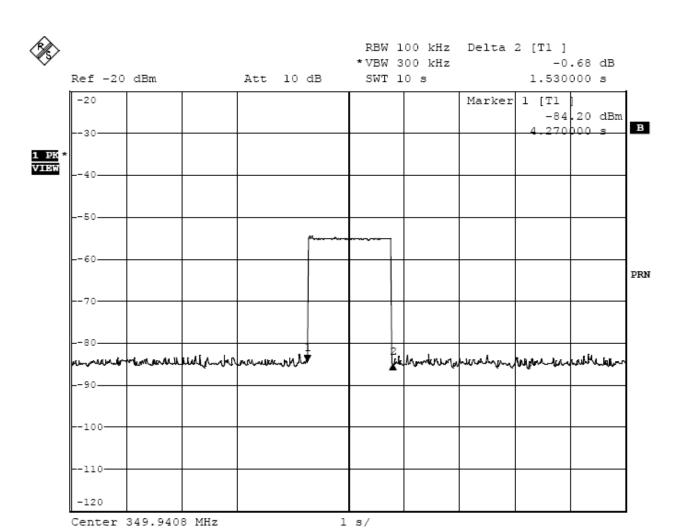
Test Site: ATC EMC Lab.SAC

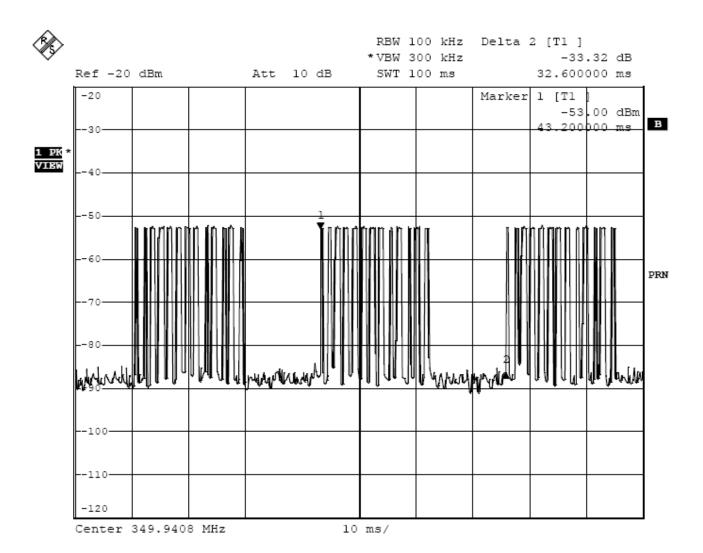
Operator: Andy
Test Specification: Vertical
Comment: DC 4.5V



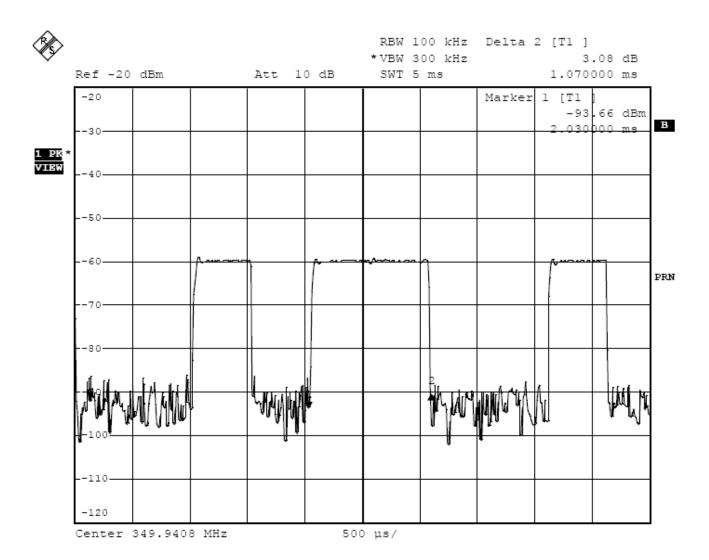




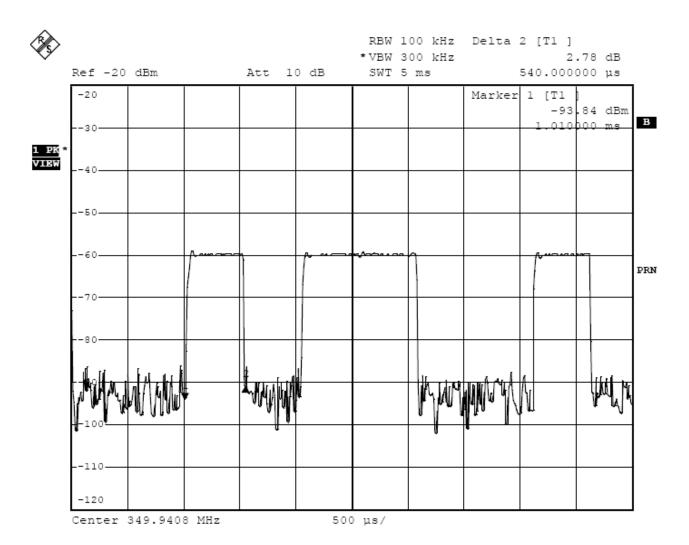




The graph shows the pattern of coding during the signal transmission. The time interval of one coding period starts from marker 1 to marker 2, Hence the total time of one period is 32.6ms. It sums of 9 long 'on' signals and 4 short 'on' signals.



The graph show the duration of long 'on' signal. From marker 1 to marker 2, duration is 1.07ms.



The graph show the duration of short 'on' signal. From marker 1 to marker 2, duration is 0.54ms.