

# EMC TEST REPORT

**Report No. : EME-050611****Model No. : 10K1-pedo****Issued Date : Dec. 23, 2005**

**Applicant : Johnson Health Tech. Co., Ltd.**  
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Project Engineer



Kevin Chen

Reviewed By



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**Summary of Tests****Pedo Meter -Model: 10K1-pedo  
FCC ID: TN710K1PEDO**

Test	Reference	Results
Conducted Emission of AC Power	15.207	Complies
Radiated Emission test	15.231(e), 15.209	Complies
Measured bandwidth	15.231(c)	Complies

## 1. General information

### 1.1 Identification of the EUT

Manufacturer	: Johnson Health Tech. Co., Ltd.
Product	: Pedo Meter
Model No.	: 10K1-pedo
FCC ID.	: TN710K1PEDO
Frequency Range	: 315MHz
Channel Number	: Single
Frequency of each channel	: 315MHz
Type of Modulation	: ASK
Power Supply	: 3Vdc
Power Cord	: N/A
Sample Received	: Jun. 13, 2005
Test Date(s)	: Jul. 12, 2005 ~ Oct. 13, 2005

### 1.2 Additional information about the EUT

User has taken an important step in developing and sustaining an exercise program. User's Horizon Fitness Pedometer is a motivating tool that can be used while walking or running to help monitor user's progress and achieve user's personal fitness goals.

For more detail features, please refer to User's manual as file name "Installation guide.pdf"

### **1.3 Antenna description**

The EUT uses a permanently connected antenna.

Antenna Gain : 1dBi max

Antenna Type : PCB Printed antenna

Connector Type : N/A

## **2. Test specifications**

### **2.1 Test standard**

The EUT was performed according to the procedures in FCC Part 15 Subpart C Section 15.231(e).

### **2.2 Operation mode**

After verifying three setup of transmitter, the worst case was occurred at setup 1.

The final test was executed under this condition and recorded in this report.

The EUT was operated in continuously transmitting status during all of the tests.

Once the button releasing, the transmission will be stopped within 1 second.

**2.3 Test equipment**

Equipment	Brand	Frequency range	Model No.	Intertek ID No.	Next Cal. Date
EMI Test Receiver	Rohde & Schwarz	9kHz~2.75GHz	ESCS 30	EC303	04/13/2006
EMI Test Receiver	Rohde & Schwarz	20Hz~26.5GHz	ESMI	EC317	07/14/2006
Spectrum Analyzer	Rohde & Schwarz	9kHz~30GHz	FSP 30	EC353	07/13/2006
Spectrum Analyzer	Rohde & Schwarz	20Hz~40GHz	FSEK 30	EC365	10/18/2005
Horn Antenna	EMCO	1GHz~18GHz	3115	EC338	08/16/2006
Horn Antenna	SCHWARZBECK	14GHz~40GHz	BBHA 9170	EC351	07/08/2006
Bilog Antenna	SCHWARZBECK	25MHz~1.7GHz	VULB 9160	EC368	05/20/2006
Pre-Amplifier	MITEQ	100MHz~26.5GHz	919981	EC373	4/13/2006
Pre-Amplifier	MITEQ	26GHz~40GHz	828825	EC374	1/28/2006
Controller	HDGmbH	N/A	HD 100	EP317-1	N/A
Antenna Tower	HDGmbH	N/A	MA 240	EP317-2	N/A
Turn Table	HDGmbH	N/A	DS 420S	EP317-3	N/A
LISN	Rohde & Schwarz	9KHz~30MHz	ESH3-Z5	EC344	01/14/2006

Note: The above equipments are within the valid calibration period.

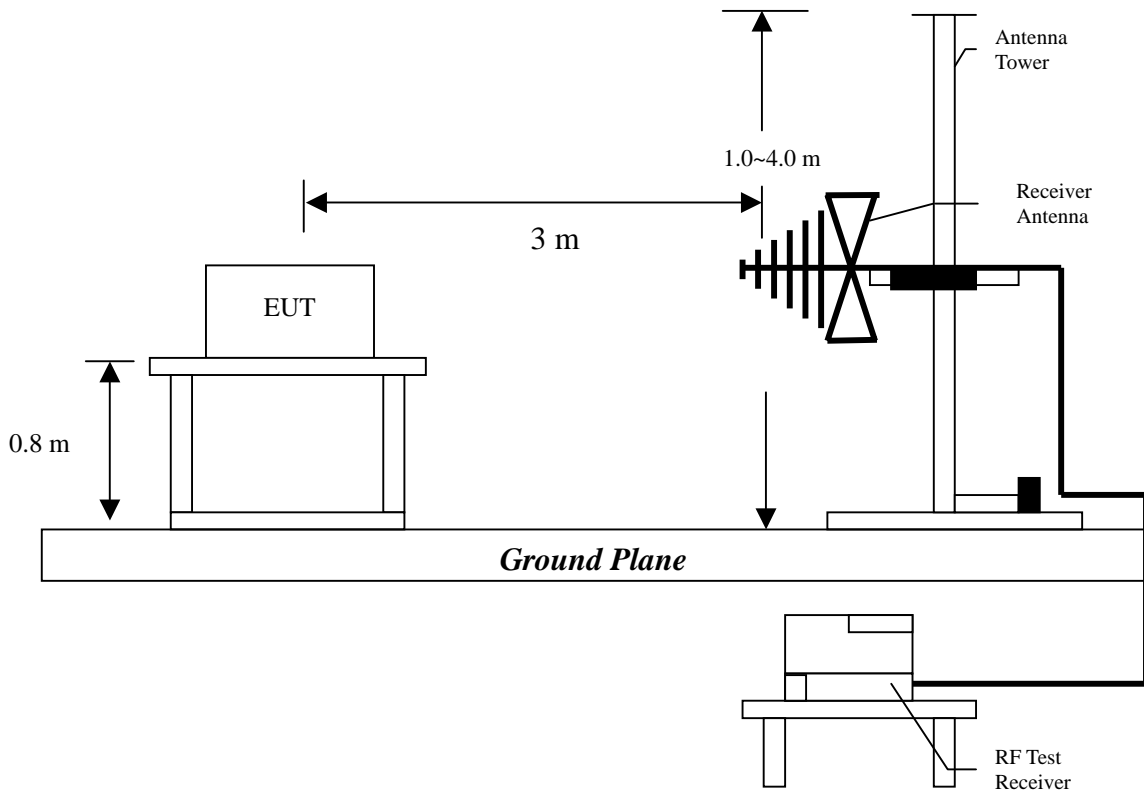
### 3. Radiated emission test FCC 15.231 (e)

#### 3.1 Operating environment

Temperature: 25  
Relative Humidity: 60 %  
Atmospheric Pressure 1023 hPa

#### 3.2 Test setup & procedure

The Diagram below shows the test setup, which is utilized to make these measurements.



Radiated emission measurements were performed from 30MHz to 25GHz. Spectrum Analyzer Resolution Bandwidth is 100kHz or greater for frequencies 30MHz to 1GHz, 1MHz – for frequencies above 1GHz.

The EUT for testing is arranged on a wooden turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.



The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance.

The signal is maximized through rotation and placement in the three orthogonal axes.



**Setup 1**



**Setup 2**



**Setup 3**

After verifying three axes, we found the maximum electromagnetic field was occurred at setup 1 configuration. The final test data was executed under this configuration.

The EUT configuration please refer to the “Spurious set-up photo.pdf”.

**3.3 Radiated emission limit**

**3.3.1 Fundamental and harmonics emission limits**

Frequency (MHz)	Field Strength of Fundamental		Field Strength of Harmonics	
	(uV/m@3m)	(dBuV/m@3m)	(uV/m@3m)	(dBuV/m@3m)
315	2416.68	67.7	241.67	47.7

### 3.3.2 General radiated emission limit

The spurious Emission shall test through the 10th harmonic. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

Frequency MHz	15.209 Limits (dB $\mu$ V/m@3m)
30-88	40
88-216	43.5
216-960	46
Above 960	54

Remark:

1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

Uncertainty was calculated in accordance with NAMAS NIS 81. Expanded uncertainty (k=2) of radiated emission measurement is  $\pm 3.078$  dB.

### 3.4 Calculation of RF Duty and Average Factor

Devices operated under 15.231(e) 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:

**Transmission duration: 15.33 sec**

**Transmission time: 331ms < 1sec**

**Silent time: 15sec > 9.93sec (331ms × 30 = 9.93 sec) or 10sec which is greater**

The specification for output field strengths in accordance with the FCC rules specify measurements with an average detector. During testing, a spectrum analyzer incorporating a peak detector was used. Therefore, a reduction factor can be applied to the resultant peak signal level and compared to the limit for measurement instrumentation incorporating an average detector.

The time period over which the duty cycle is measured in 100 ms or the repetition cycle, whichever is a shorter time frame. The duty cycle is measured by placing the spectrum analyzer in zero span mode at 100 resolution bandwidth.

**Averaging factor in dB = 20log (duty cycle)**

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

**The duration of one cycle = 15.33 sec**

**Duty Cycle =**

**$(7.2\text{ms} \times 4 + 700\text{us} \times 9 + 1.4\text{ms} \times 3 + 4.8\text{ms} \times 1 + 3\text{ms} \times 1) / 100\text{ms} = 0.471$**

**Therefore, the averaging factor is found by  $20 \log_{10} 0.471 = -6.54 \text{ dB}$**

Please see the plot below.

Fig. 1 Transmission Duration

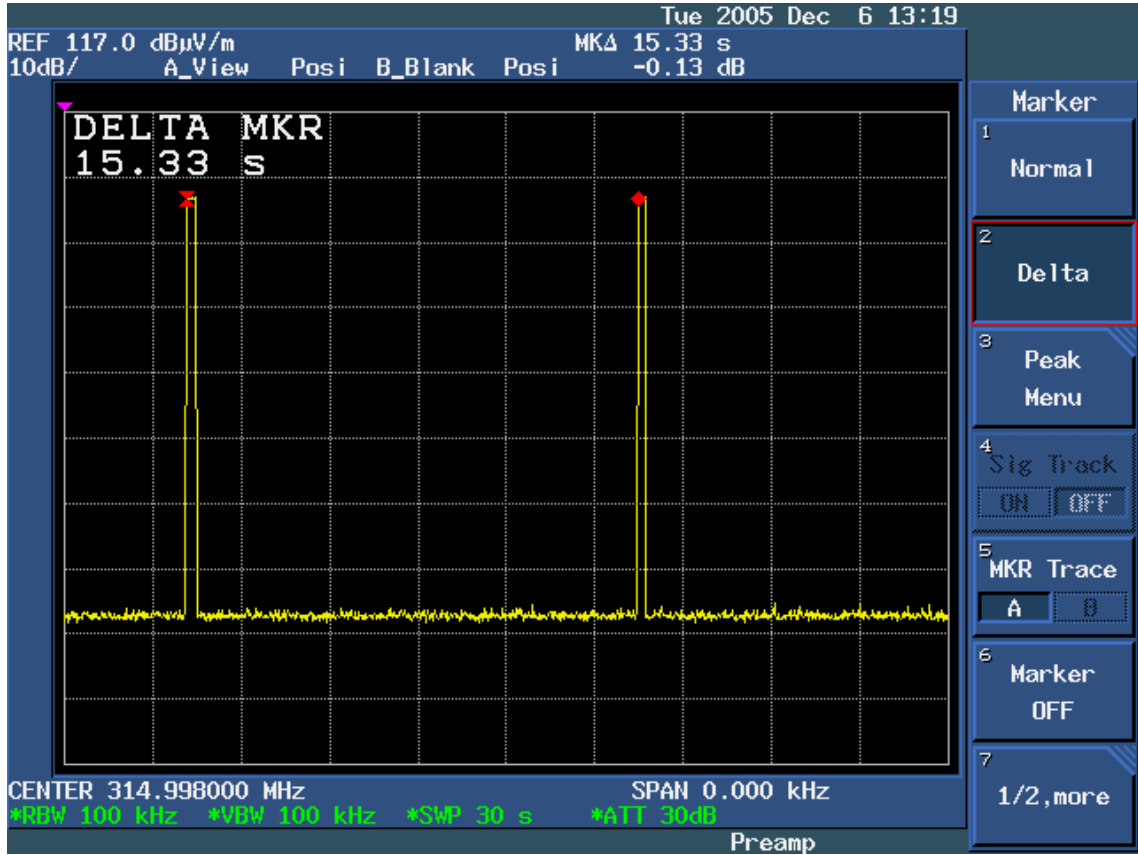


Fig. 2 Tx Burst (1)

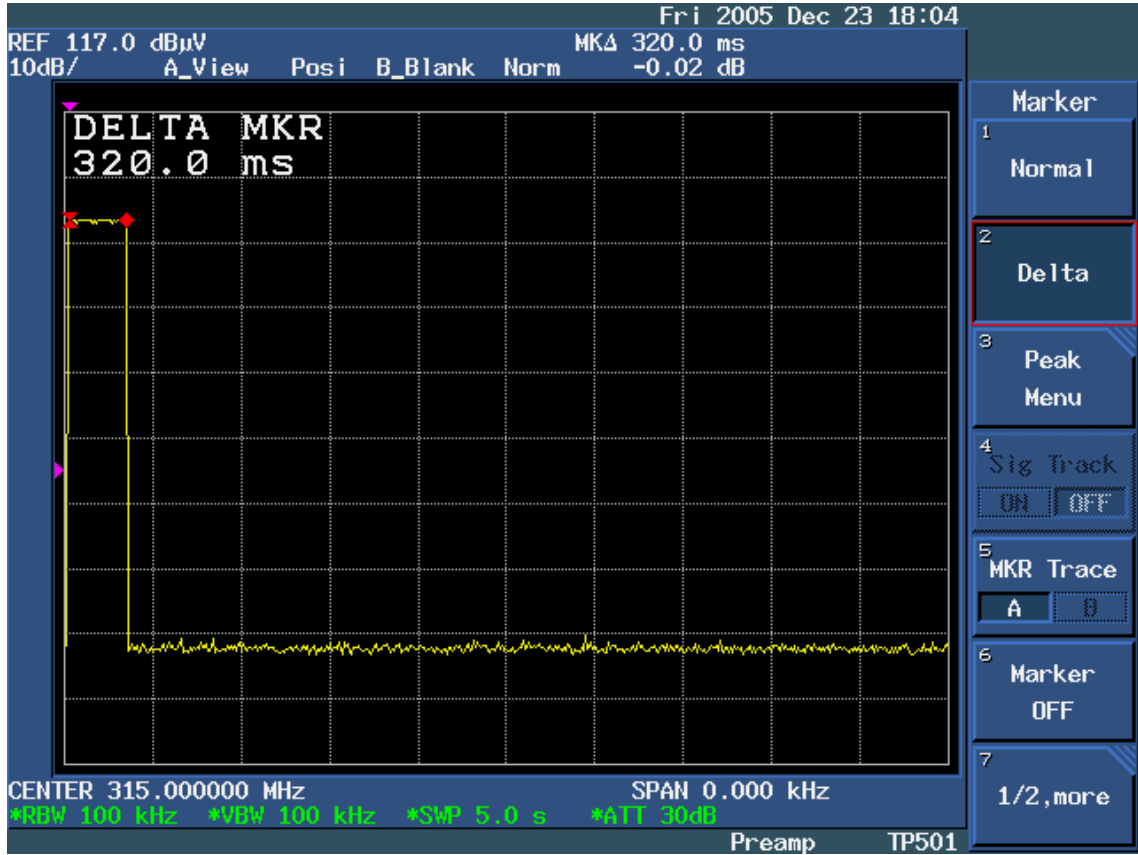


Fig. 3 Tx Burst (2)

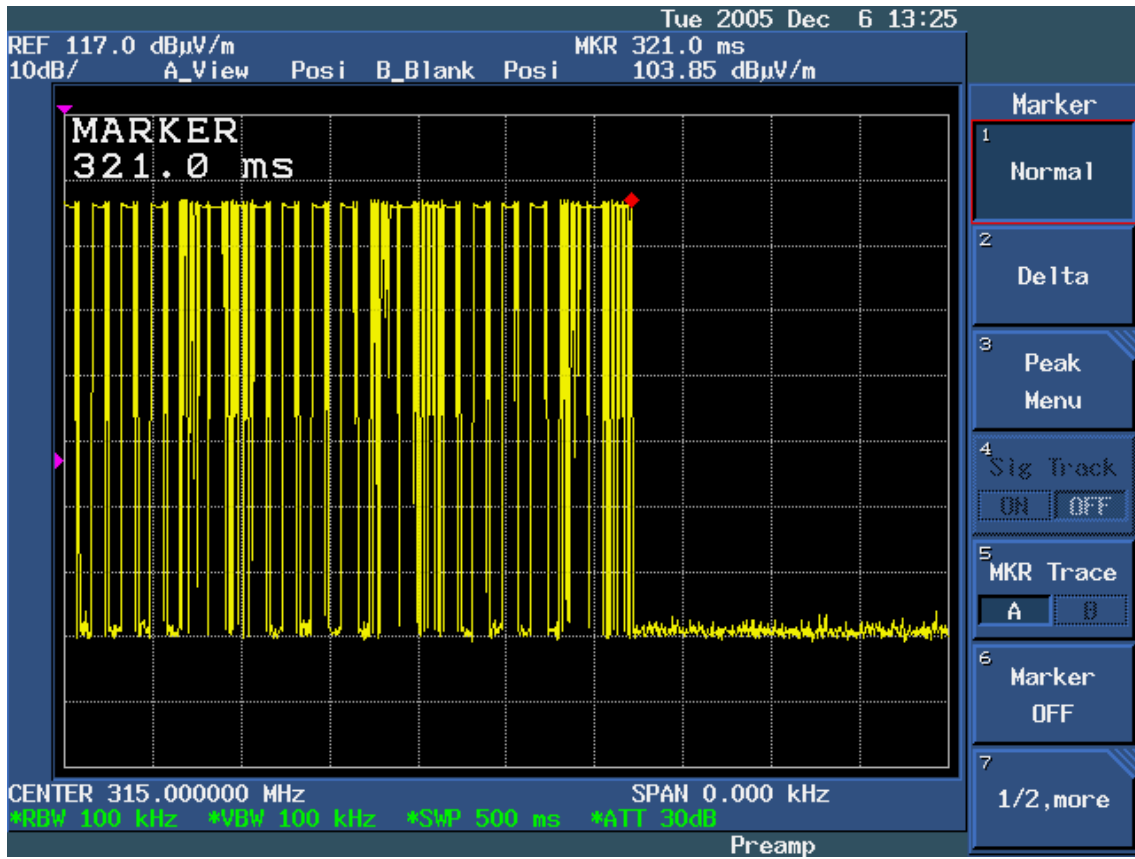


Fig. 4 Duty Cycle (1)

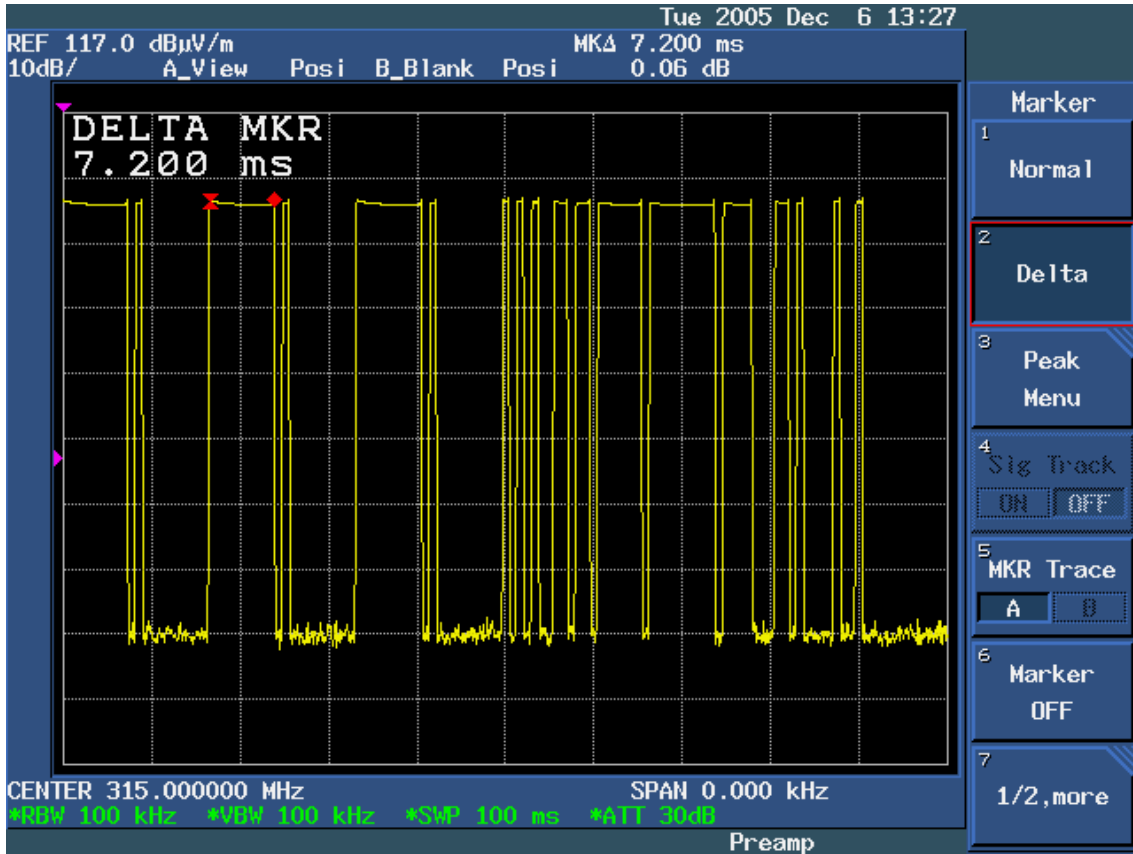


Fig. 5 Duty Cycle (2)

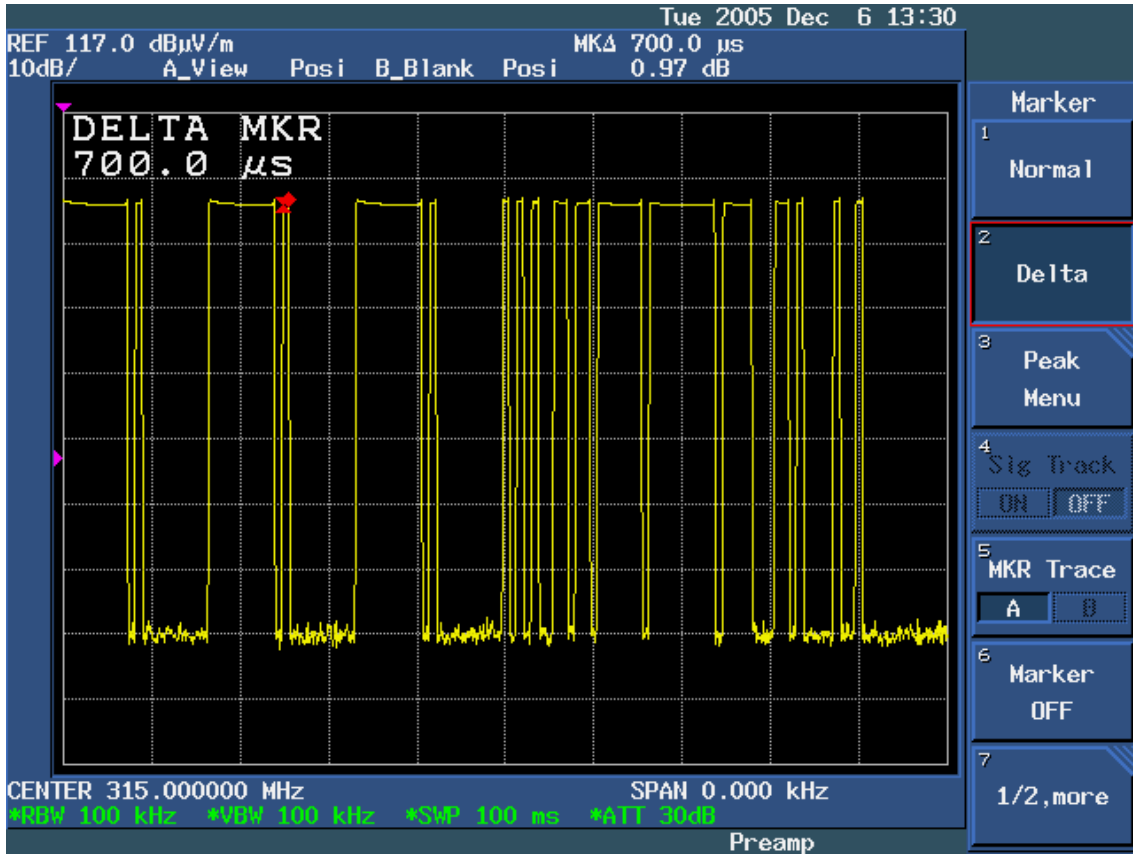




Fig. 6 Duty Cycle (3)

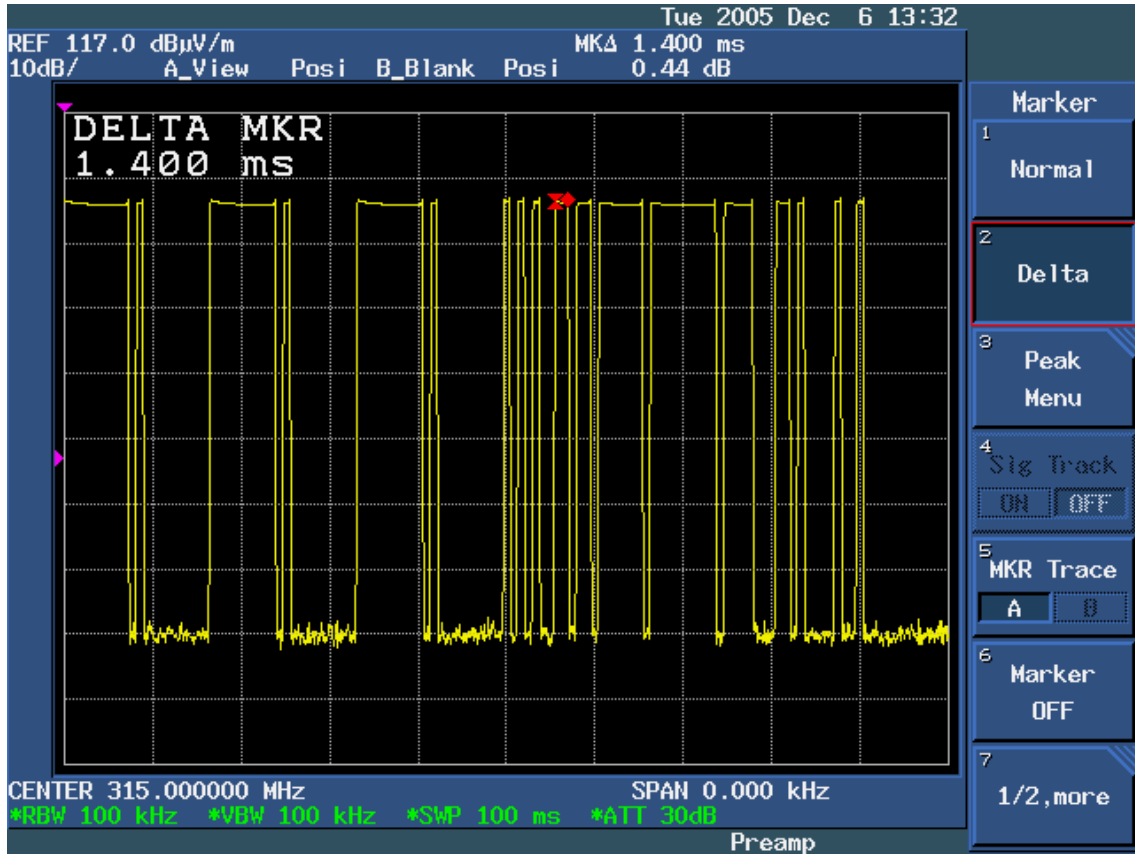


Fig. 7 Duty Cycle (4)

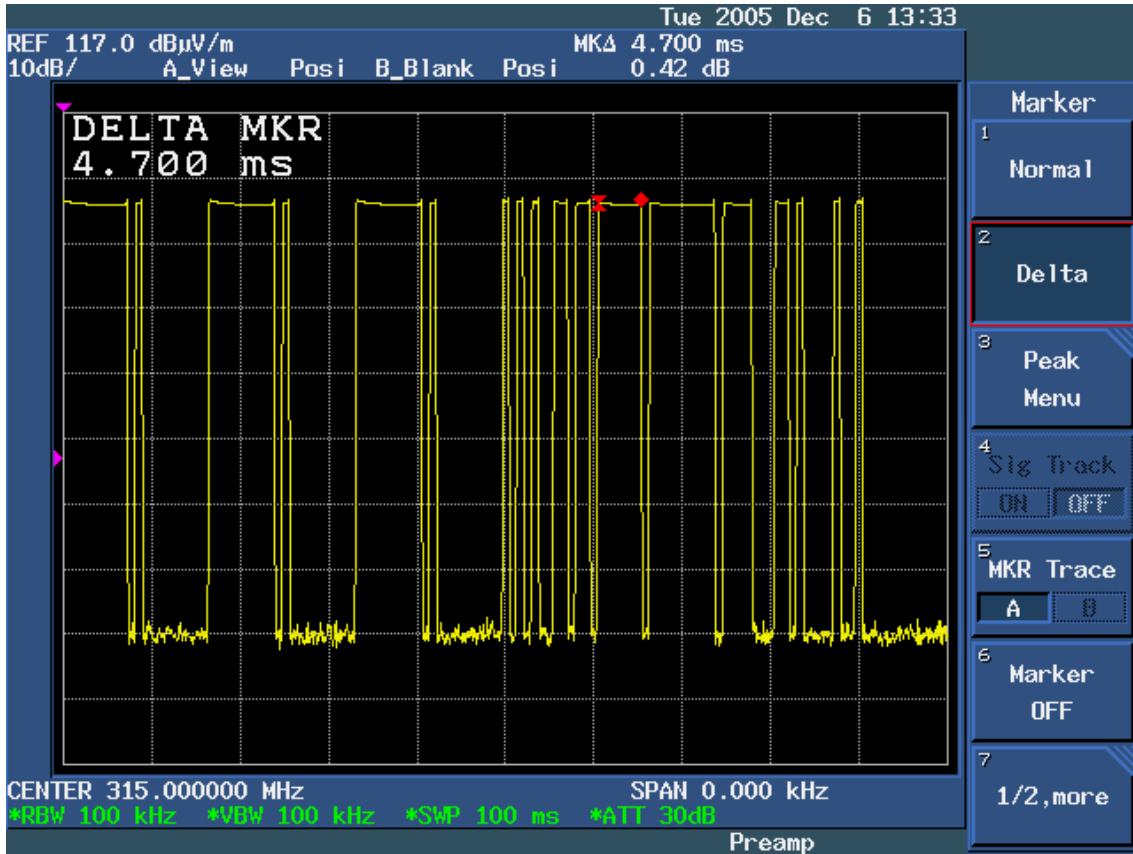
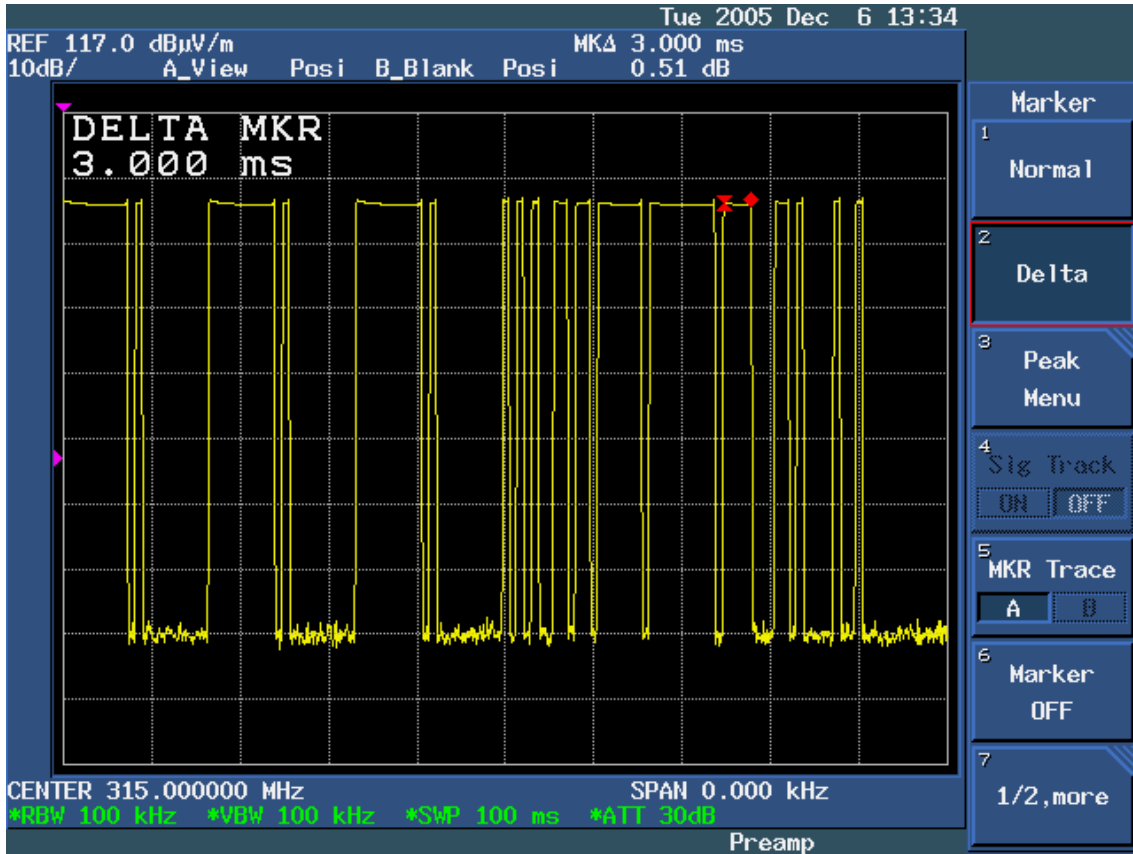


Fig. 8 Duty Cycle (5)



### 3.5 Radiated emission test data FCC 15.231(e)

The radiated emissions at

Frequency(MHz)	Margin
630	-3.38

are less than uncertainty. This is within the stated measurement uncertainty, this may affect compliance determined in other test arrangements.

#### 3.5.1 Measurement results

EUT : 10K1-pedo

Worst Case : Tx at 315MHz with setup 1

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Average Factor (dB)	Reading (dBuV/m)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
*315	PK	V	14.39		34.29	48.68	87.7	-39.02	136	41
*315	AV	V	14.39	-6.54	34.29	42.14	67.7	-25.56	136	41
630	PK	V	21.19		27.36	48.55	67.7	-19.15	123	174
630	AV	V	21.19	-6.54	27.36	42.01	47.7	-5.69	123	174
945	PK	V	25.21		18.98	44.19	67.7	-23.51	141	111
945	AV	V	25.21	-6.54	18.98	37.65	47.7	-10.05	141	111
1260	PK	V	-	-	-	-	-	-	-	-
1575	PK	V	-	-	-	-	-	-	-	-
1890	PK	V	-	-	-	-	-	-	-	-
2205	PK	V	-	-	-	-	-	-	-	-
2520	PK	V	-	-	-	-	-	-	-	-
2835	PK	V	-	-	-	-	-	-	-	-
3150	PK	V	-	-	-	-	-	-	-	-

Remark:

1. “\*”: Fundamental Frequency
2. Corrected Level = Correction Factor + Reading + Average Factor
3. Correction Factor = Antenna Factor + Cable Loss
4. The frequency measured ranges from 1GHz to 4GHz. The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

For PK:

1GHz-4GHz: 50dBuV

EUT : 10K1-pedo  
 Worst Case : Tx at 315MHz with setup 1

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Average Factor (dB)	Reading (dBuV/m)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
*315	PK	H	14.67		48.54	63.21	87.7	-24.49	128	4
*315	AV	H	14.67	-6.54	48.54	56.67	67.7	-11.03	128	4
630	PK	H	21.25		32.69	53.94	67.7	-13.76	161	259
630	AV	H	21.25	-6.54	32.69	47.4	47.7	-0.3	161	259
945	PK	H	25.42		23.71	49.13	67.7	-18.57	100	0
945	AV	H	25.42	-6.54	23.71	42.59	47.7	-5.11	100	0
1260	PK	H	-	-	-	-	-	-	-	-
1575	PK	H	-	-	-	-	-	-	-	-
1890	PK	H	-	-	-	-	-	-	-	-
2205	PK	H	-	-	-	-	-	-	-	-
2520	PK	H	-	-	-	-	-	-	-	-
2835	PK	H	-	-	-	-	-	-	-	-
3150	PK	H	-	-	-	-	-	-	-	-

**Remark:**

1. “\*”: Fundamental Frequency
2. Corrected Level = Correction Factor + Reading + Average Factor
3. Correction Factor = Antenna Factor + Cable Loss
4. The frequency measured ranges from 1GHz to 4GHz. The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

For PK:

1GHz-4GHz: 50dBuV

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.

Test Result:

Transmission Time:

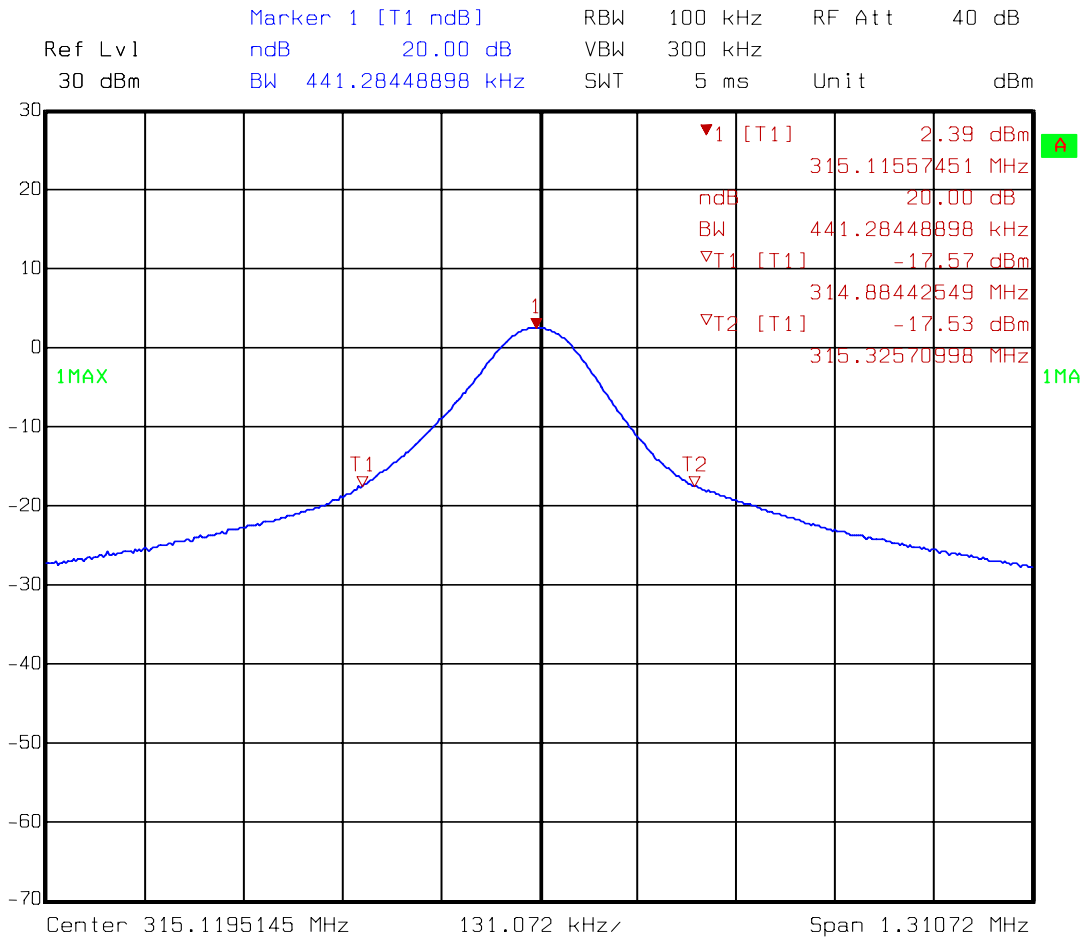
### 3.6 Measured bandwidth FCC 15.231(C)

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

$$B.W(20dBc) \text{ Limit} = 0.25\% \times f(\text{MHz}) = 0.25\% \times 315\text{MHz} = 0.7875\text{MHz}$$

From the plot, the bandwidth is observed to be 315MHz, at 20dBc where the bandwidth limit is 0.7875MHz.

Please see the plot below.



Comment A: 20dB Bandwidth  
Date: 11.OCT.2005 20:58:32