EMC
TEST REPORT

Report No. : **TS10080061-EME**
Model No. : **5300-01, 5100-01, 5200-01**
Issued Date : **Jan. 07, 2011**

Applicant:	**ENGINEERING FITNESS INTERNATIONAL CORPORATION DBA TOTAL GYM** **7755 ARJONS DRIVE, SAN DIEGO, CA 92126**
Test Method/ Standard:	**FCC Part 15C 15.231 and according to the procedures in ANSI C63.4.2003**
Test By:	**Intertek Testing Services Taiwan Ltd.** **No. 11, Ko-Tze-Nan Chia-Tung Li, Shiang-Shan District, Hsinchu, Taiwan**

The test report was prepared by: Sign on File
Julie Wang / Senior Assistant

These measurements were taken by: Sign on File
Terry Hsu/ Engineer

The test report was reviewed by: Jimmy Yang

Name Jimmy Yang
Title Engineer

Table of Contents

Summary of Tests

Test	Reference	Results
Radiated Emission test	15.231(b), 15.209	Pass
Measured bandwidth	15.231(c)	Pass

1. General information

1.1 Identification of the EUT

Manufacturer	: TUNG KENG ENTERPRISE CO., LTD
Product	: Total Gym
Model No.	: 5300-01
FCC ID.	: UHJPOWERTOWER
Frequency Range	: 433.92 MHz
Channel Number	: Single channel
Frequency of each channel	: 433.92 MHz
Type of Modulation	: ASK
Power Supply	: DC 12V from battery
Power Cord	: N/A
Sample Received	: Aug. 06, 2010
Test Date(s)	: Oct. 15, 2010 ~ Dec. 29, 2010

1.2 Additional information about the EUT

The EUT is a Total Gym, and was defined as information technology equipment.

The customer confirmed the models listed below were identical to model 5300-01 (EUT). Different brands served as marketing strategy.

Trade Name	Model Number
Total Gym PowerTower	5300-01
Total Gym Sport	5100-01
Total Gym GTS	5200-01

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

2. Test specifications

2.1 Test standard

The EUT was performed according to the requirement in FCC Part 15C 15.231 and according to the procedures in ANSI C63.4.2003

2.2 Operation mode

The EUT was supplied with DC 12V from battery and it was running in operating mode.

The EUT was transmitted continuously during the test.

2.3 Test equipment

Equipment	Brand	Frequency range	Model No.	Last Cal.	Cal. interval
EMI Test Receiver	Rohde & Schwarz	9kHz~2.75GHz	ESCS 30	2010/9/3	1 year
Spectrum Analyzer	Rohde & Schwarz	9kHz~30GHz	FSP 30	2010/8/16	1 year
Spectrum Analyzer	Rohde & Schwarz	20Hz~40GHz	FSEK 30	2010/1/18	1 year
Horn Antenna	SCHWARZBECK	1GHz~18GHz	BBHA9120D	2010/8/31	2 years
Bilog Antenna	SCHWARZBECK	25MHz~1.7GHz	VULB 9168	2009/9/22	2 years
Turn Table	HDGmbH	N/A	DS 420S	N/A	N/A
Antenna Tower	HDGmbH	N/A	MA 240	N/A	N/A
Pre-Amplifier	MITER	100MHz~26.5GHz	AFS42-00102650	2009/10/27	2 years
LISN	Rohde & Schwarz	9KHz~30MHz	ESH3-Z5	2009/3/13	2 years
Power Meter	Anritsu	N/A	2495A	2010/10/20	1 year
Power Senor	Anritsu	N/A	2411B	2010/10/20	1 year

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

3. Radiated emission test FCC 15.231 (b)

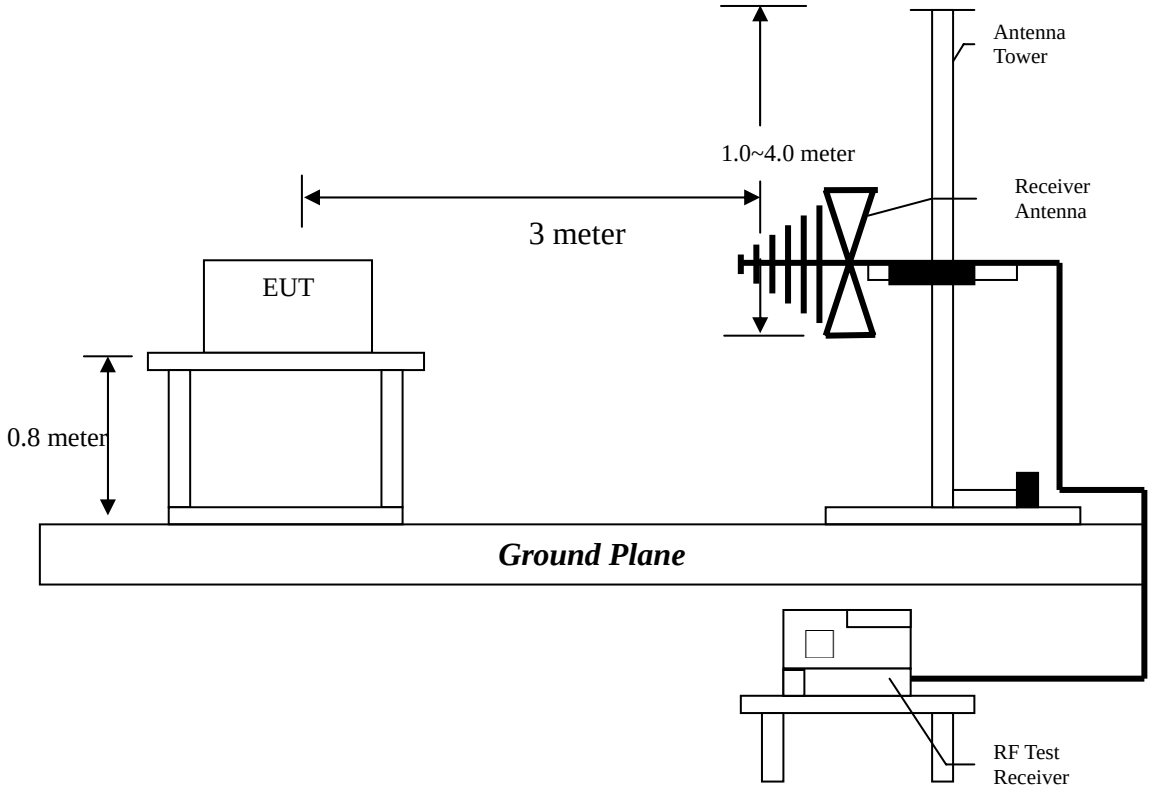
3.1 Operating environment

Temperature:	24	℃
Relative Humidity:	55	%
Atmospheric Pressure	1008	hPa

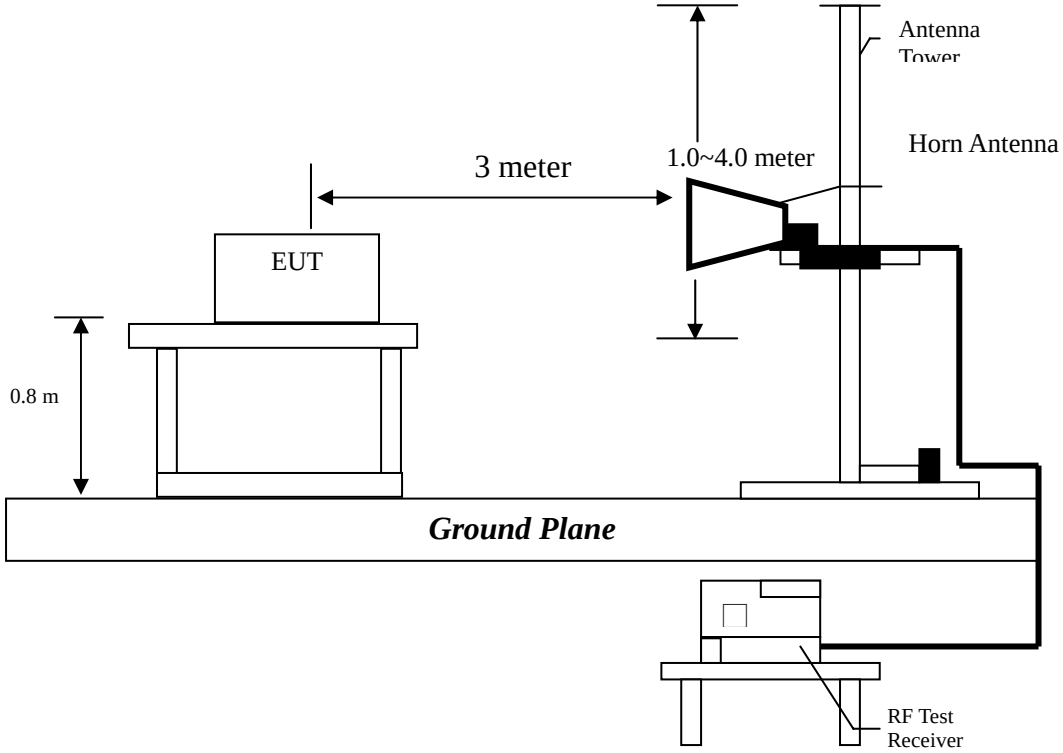
3.2 Test setup & procedure

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

The frequency spectrum from 30 MHz to 1000 MHz was investigated.



The frequency spectrum from over 1 GHz was investigated.



The signal is maximized through rotation and placement in the three orthogonal axes. Radiated emission measurements were performed from 30 MHz to 25 GHz. Spectrum Analyzer Resolution Bandwidth is 100 kHz or greater for frequencies 30 MHz to 1 GHz, 1 MHz – for frequencies above 1 GHz.
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 X

Setup Y

Setup Z

After verifying three axes, we found the maximum electromagnetic field was ccurred at setup Y configuration. The final tset data was executed under this onfiguration.

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@3 m)	(dBuV/m@3 m)	(uV/m@3 m)	(dBuV/m@3 m)
433.92	10958	80.8	1096.5	60.8

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 μ V/m@3 m)
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

Expanded uncertainty (k=2) of radiated emission measurement is ±5.10 dB.

3.4 Calculation of Average Factor

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 = 18.9 ms

The number of short pulses in each period (13) multiplied by the duration of each short pulses (0.270ms) =3.51 ms

The number of long pulses in each period (6) multiplied by the duration of each long pulses (0.534ms) = 3.204ms

Effective period of the cycle = 3.51+3.204=6.714ms

Duty Cycle = 6.714 ms / 18.9 ms = 0.3552

Therefore, the duty cycle correction factor will be 20 $\log_{10}$ 0.3552= -8.99 dB

3.5 Transmitting Time

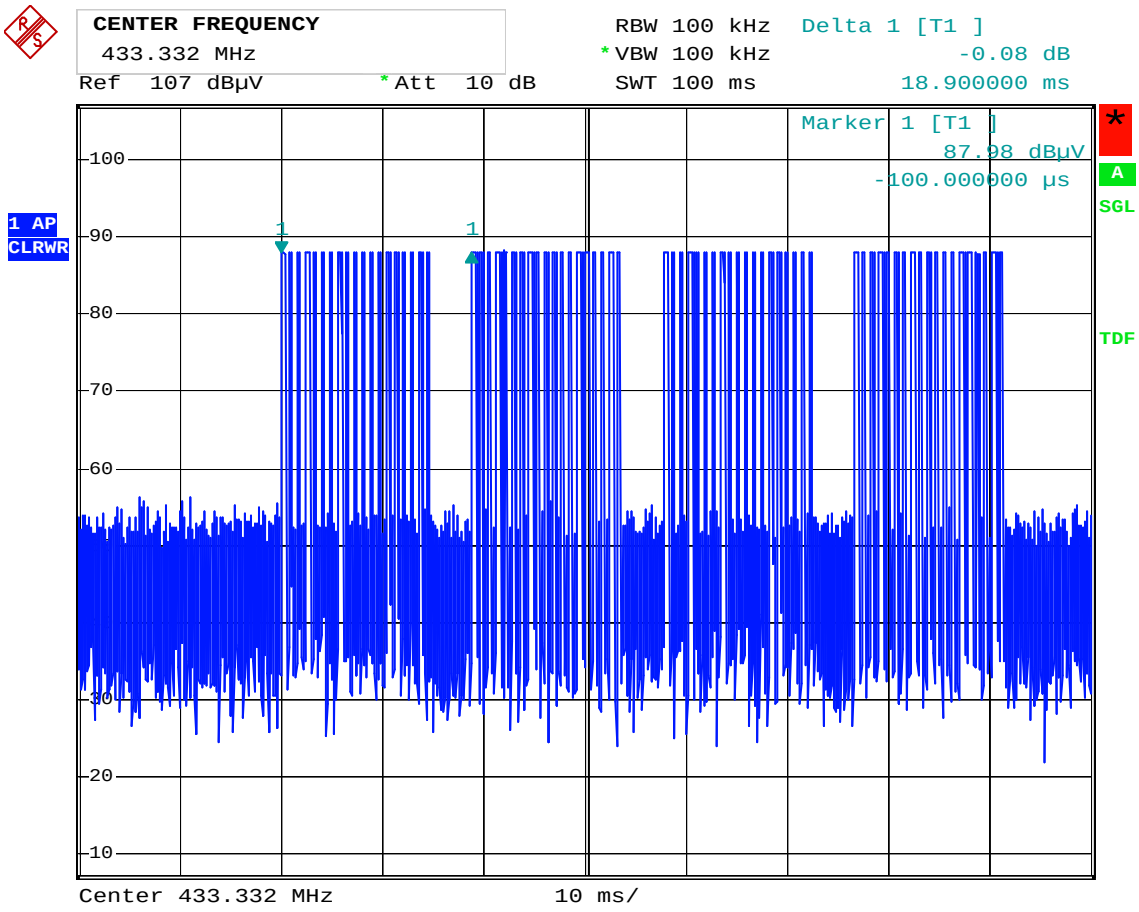
The total duration of transmissions does not exceed more than two seconds per hour for each transmitter.

6.714 ms × 240 =1611.36 ms (1.61136 s)

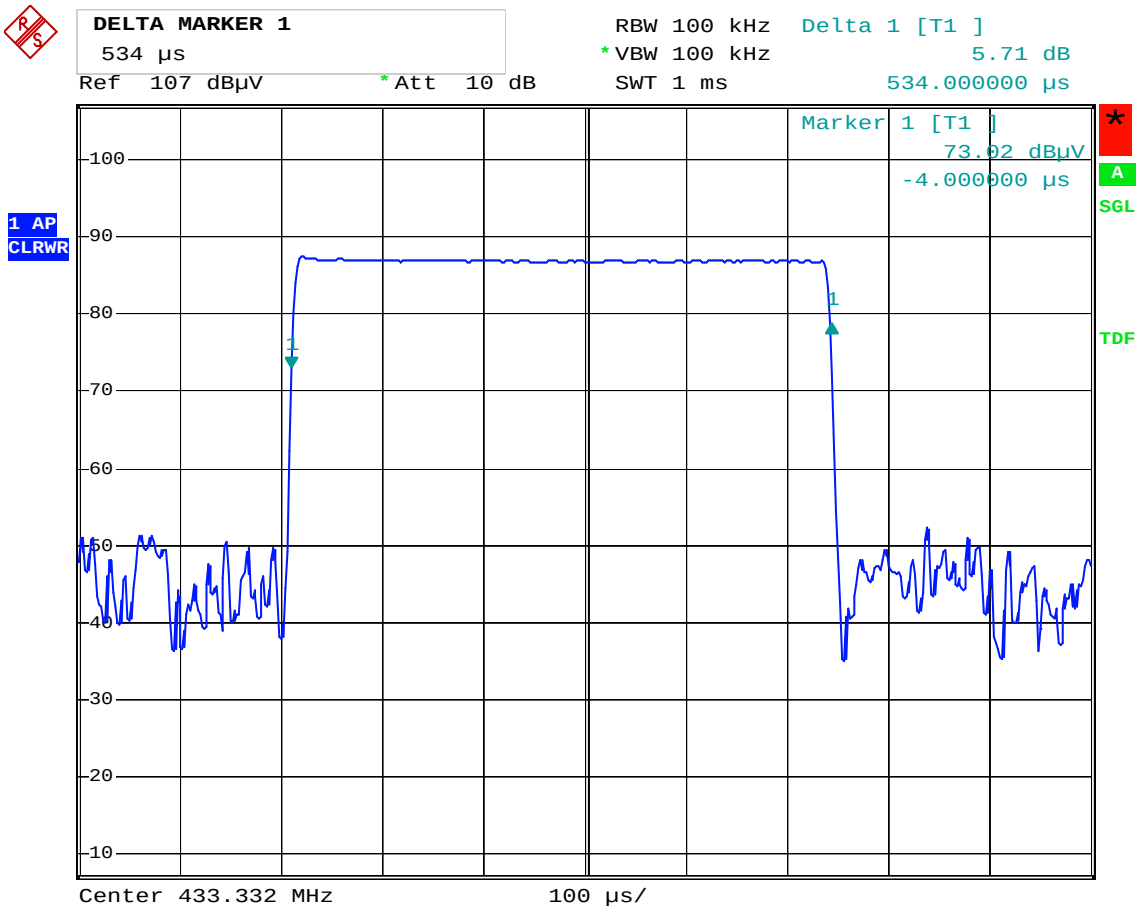
Note: 240 means that the device was transmitted once for each 15 seconds.
So there are 240 times of transmitting during one hour.

Please see the plot below.

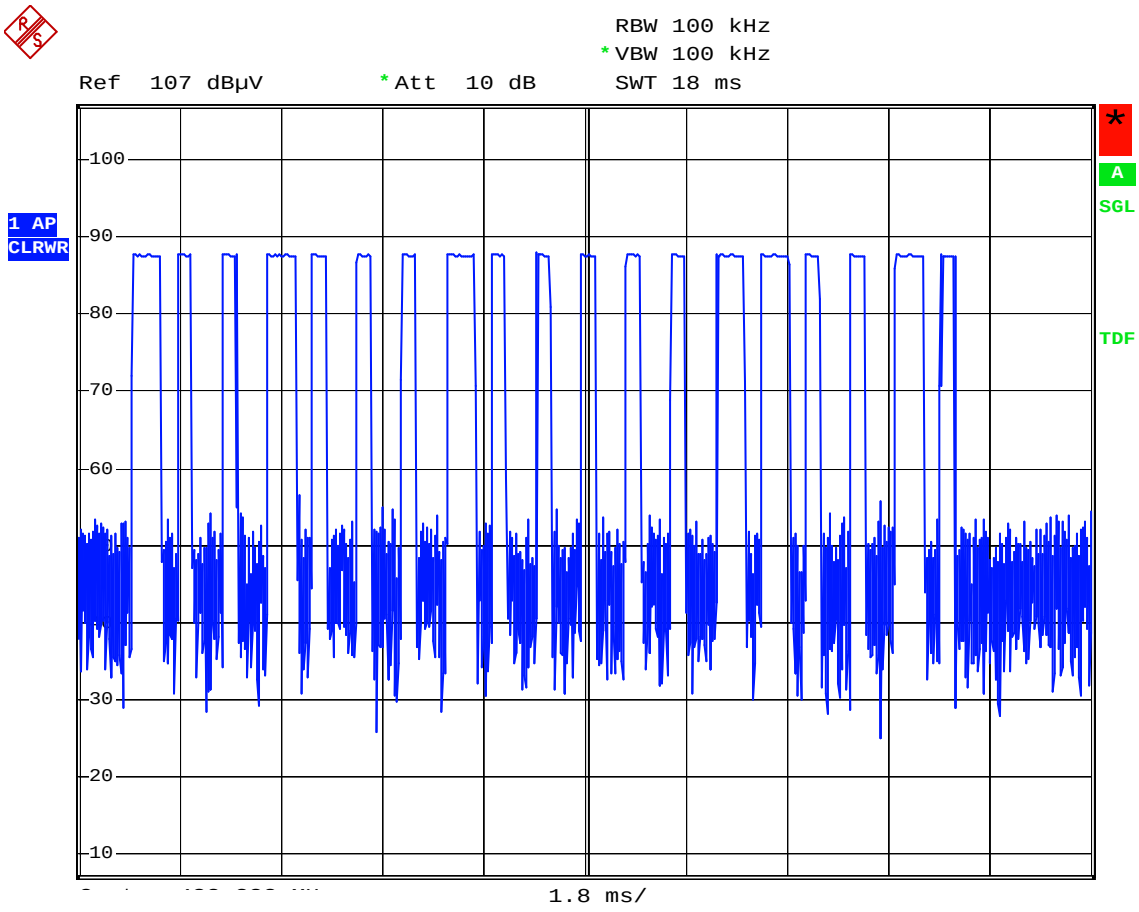
1 cycle


CENTER FREQUENCY
433.332 MHz
RBW 100 kHz
*VBW 100 kHz
SWT 100 ms
Delta 1 [T1]
-0.08 dB
18.900000 ms
Ref 107 dBµV
*Att 10 dB
Marker 1 [T1]
87.98 dBµV
-100.000000 µs
1 AP
CLRWR
SGL
TDF
100
90
80
70
60
30
20
10
Center 433.332 MHz
10 ms/

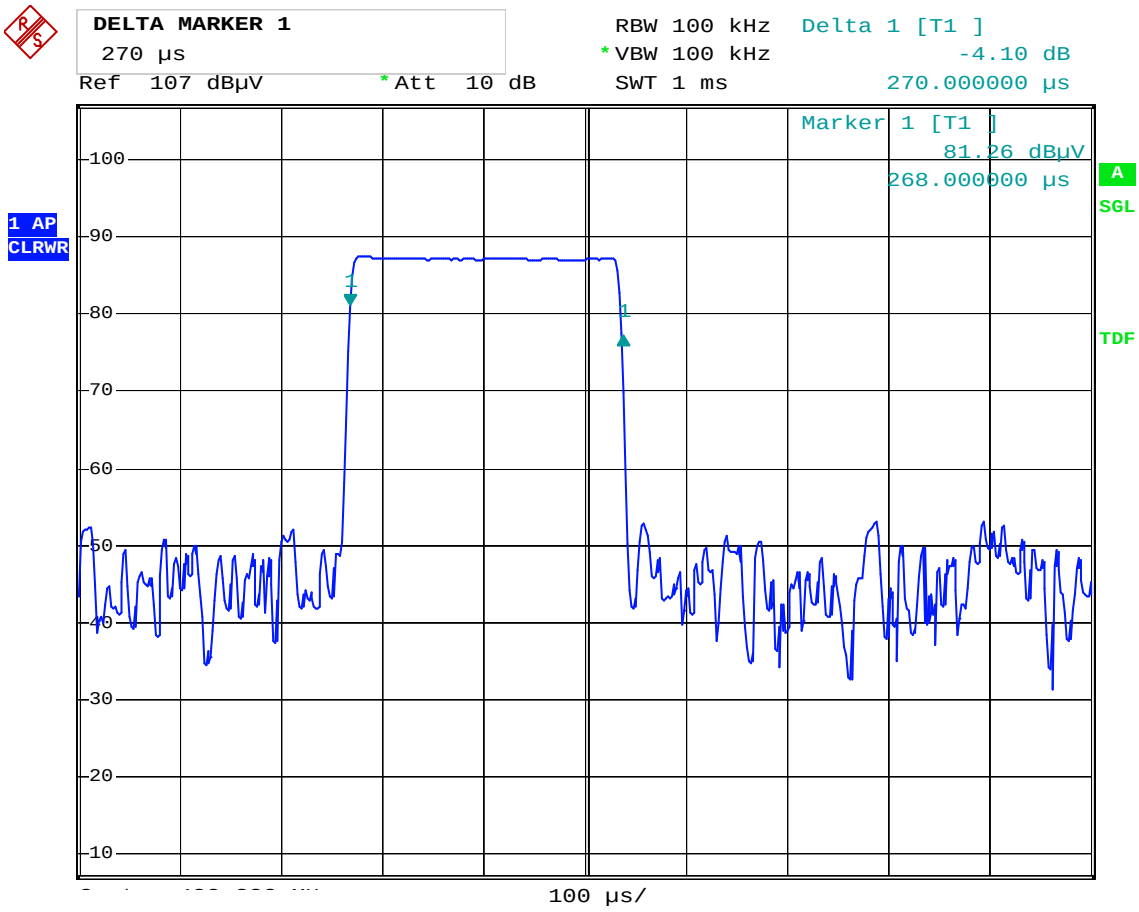
Long pulse


DELTA MARKER 1
534 µs
RBW 100 kHz
*VBW 100 kHz
SWT 1 ms
Delta 1 [T1]
5.71 dB
534.000000 µs
Ref 107 dBµV
*Att 10 dB
Marker 1 [T1]
73.02 dBµV
-4.000000 µs
1 AP
CLRWR
SGL
TDF
100
90
80
70
60
50
40
30
20
10
Center 433.332 MHz
100 µs/

On time

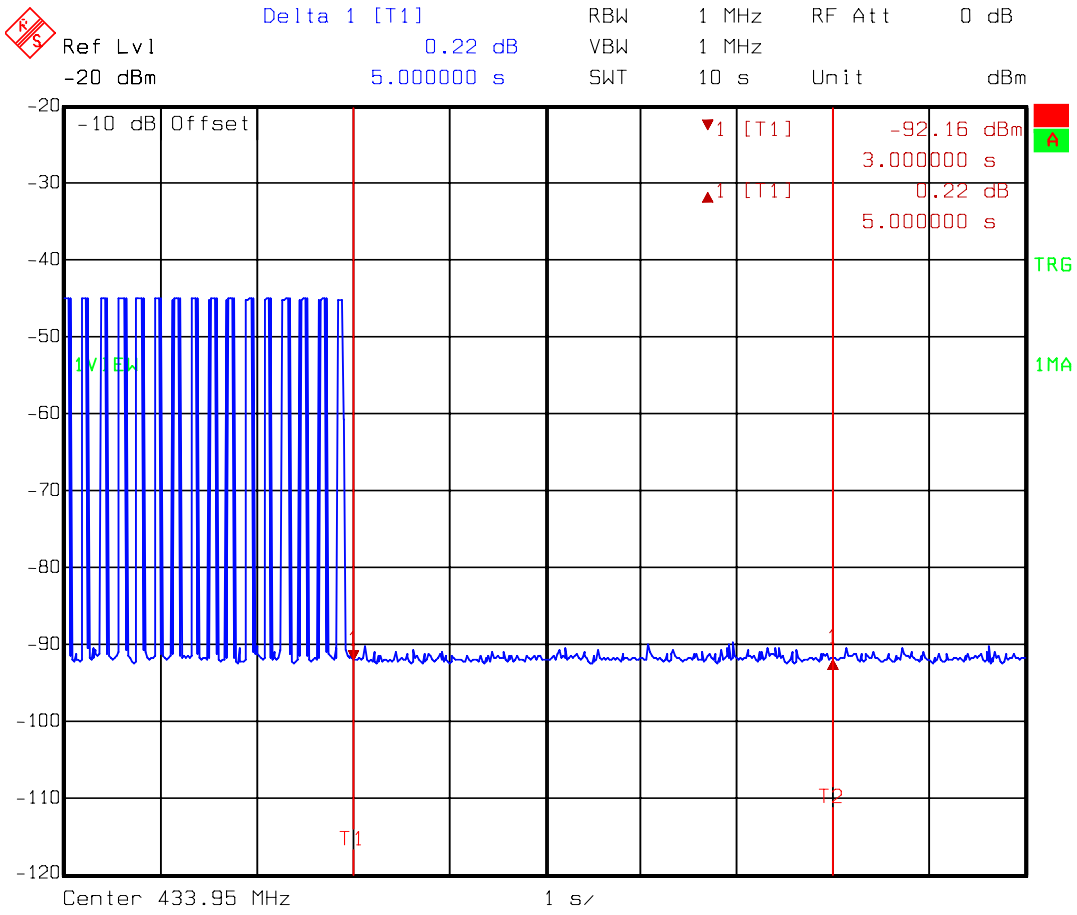

RBW 100 kHz
*VBW 100 kHz
Ref 107 dBµV
*Att 10 dB
SWT 18 ms
1 AP
CLRWR
*
A
SGL
TDF
100
90
80
70
60
30
20
10
1.8 ms/

short pulse



Date: 28.DEC.2010 11:16:52

Release time



3.6 Radiated emission test data FCC 15.231

3.6.1 Measurement results: frequencies equal to or less than 1 GHz

EUT : 5300-01
Worst Case : Tx at 433.92 MHz with setup Y

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Average Factor (dB)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
433.92	PK	V	19.40	64.59	0.00	83.99	100.800	-16.81
433.92	AV	V	19.40	64.59	-8.99	75.00	80.800	-5.80
867.84	PK	V	26.46	25.52	0.00	51.98	80.800	-28.82
867.84	AV	V	26.46	25.52	-8.99	42.99	60.800	-17.81
433.92	PK	H	19.40	69.91	0.00	89.31	100.800	-11.49
433.92	AV	H	19.40	69.91	-8.99	80.32	80.800	-0.48
867.84	PK	H	26.46	35.00	0.00	61.46	80.800	-19.34
867.84	AV	H	26.46	35.00	-8.99	52.47	60.800	-8.33

Remark:
1. Corrected Level = Reading + Correction Factor＋Average Factor
2. Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

3.6.2 Measurement results: frequencies above 1GHz

EUT : 5300-01
Worst Case : Tx at 433.92 MHz with setup Y

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Average Factor (dB)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
1302.00	PK	V	29.45	24.21	0.00	53.66	74.000	-20.34
1302.00	AV	V	29.45	24.21	-8.99	44.67	54.000	-9.33
1302.00	PK	H	29.39	24.41	0.00	53.80	74.000	-20.20
1302.00	AV	H	29.39	24.41	-8.99	44.81	54.000	-9.19

Remark:
1. Corrected Level = Reading + Correction Factor + Average Factor
2. Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

4. 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(20 dBc) Limit = 0.25 % × f(MHz) = 0.25% × 433.92 MHz = 1.08 MHz

From the plot, the bandwidth is observed to be 344.00 kHz, at 20 dBc where the bandwidth limit is 1.08 MHz.

Please see the plot below.