TEST REPORT

Report Number: 3162283MPK-001
Project Number: 3162283
October 30, 2008

Testing performed on the
Universal System Controller
Model Number: T1-B
FCC ID: MMURTI1100
IC: 3166-RTI1100
to
FCC Part 15.231
RSS 210

For
Remote Technologies, Inc

ACCREDITED

A2LA Certificate Number: 1755-

Test Performed by:	**Test Authorized by:**
Intertek Testing Services	Remote Technologies, Inc
1365 Adams Court	5775 12th Avenue East, Suite180
Menlo Park, CA 94025	Shakopee, MN 55379

Prepared by: _____ Date: October 30, 2008
Suresh Kondapalli

Reviewed by: _____ Date: October 30, 2008
Ollie Moyrong

TABLE OF CONTENTS

1.0 Summary of Tests

MODEL: T1-B
FCC ID: MMURTI1100

TEST	FCC REFERENCE	IC REFERENCE	RESULTS
Radiated Emission	15.231(b)	RSS-210 A1.1.2	Complies
Out of Band Radiated Emission	15.231(b)	RSS-210 A1.1.2	Complies
AC Conducted Emission	15.207	ICES-003	Complies*
20 dB Bandwidth	15.231(c)	RSS-210 A1.1.3	Complies
Transmitter Deactivation Time	15.231(a)	RSS-210 A1.1.1(a)	Complies
Frequency Tolerance	15.231(d)	-	Not Applicable
Antenna Requirement	15.203	-	Complies**

*EUT is Battery Powered. Associated Wall charger Model KSAA0600100W1US unit complies.
** EUT has internal antenna permanently attached.

Suresh Kondapalli, Test Engineer: Date: October 30, 2008

Ollie Moyrong EMC Manager Date: October 30, 2008

2.0 General Description

2.1 Product Description

Overview of the EUT

Applicant	Remote Technologies, Inc 5775 12th Avenue East, Suite180 Shakopee, MN 55379 USA
Trade Name & Model No.	T1-B
FCC Identifier	MMURTI1100
Industry Canada Identifier	3166-RTI1100
Use of product	Universal Remote control
Transmitter activation	Manual and automatically deactivates within 5seconds of being released
Frequency Range (MHz)	433.925MHz
Antenna Requirement	The EUT uses a permanently connected internal antenna.
Manufacturer name & address	Remote Technologies, Inc 5775 12th Avenue East, Suite180 Shakopee, MN 55379 USA

A Production version of the EUT was received on October 10, 2008 in good operating condition.

2.2 Related Submittal(s) Grants

This report is for use with an application for certification of a low power transmitter. One transmitter is included in the application.

2.3 Test Methodology

Both AC mains line-conducted and radiated emissions measurements were performed according to the procedures in ANSI C63.4 (2003). Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the **"Data Sheet"** of this Application. All other measurements were made in accordance with the procedures in part 2 of CFR 47.

2.4 Test Facility

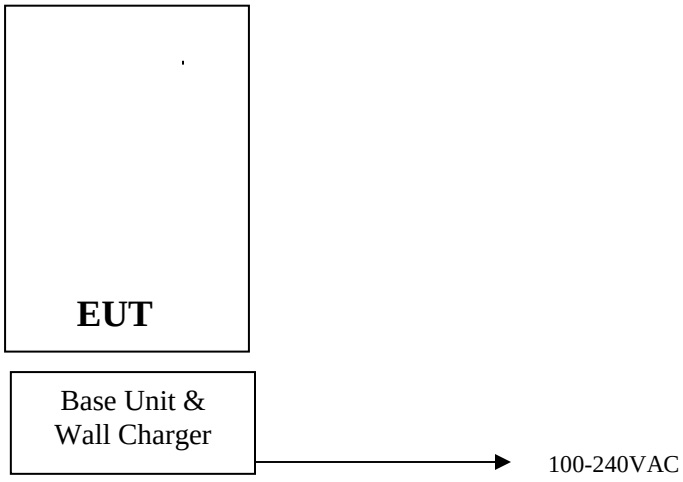
The open area test site and conducted measurement facility used to collect the radiated data is site 10meter Semi anechoic Chamber, Menlo Park CA. This test facility and site measurement data have been fully placed on file with the FCC and A2LA accredited.

3.0 System Test Configuration

3.1 Support Equipment and description

EUT is stand alone device. No support was used for testing.

3.2 Block Diagram of Test Setup



Wall charger Model: KSAA0600100W1US

S = Shielded **U** = Unshielded	**F** = With Ferrite **M** = Length in Meters

3.3 Justification

For emission testing , the test procedures, as described in American National Standards Institute C63.4-2003, were employed. The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it).

If the EUT attaches to peripherals, they are connected and operational (as typical as possible). The EUT is wired to transmit full power.

Each test was performed with the new battery.

3.4 Software Exercise Program

No special software program was required to exercise the EUT.

3.5 Mode of Operation During Test

EUT is manually operated by pressing buttons.

3.6 Modifications Required for Compliance

No modifications were installed by Intertek Testing Services during compliance testing in order to bring the product into compliance (Please note that this does not include changes made specifically by Remote Technologies, Inc before testing)

3.7 Additions, deviations and exclusions from standards

No additions, deviations or exclusions from the standard were made.

4.0 Measurement Results

4.1 Radiated Emission
FCC Rule 15.231(b) and RSS-210 A1.1.2

The limit specified in section 15.231(b) was used.

Procedure

For radiated emission measurements, the EUT is attached to a cardboard box (if necessary) and placed on the wooden turntable. The signal is maximized through rotation and placement in the three orthogonal axes.

During the test the EUT is rotated and the antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters.

Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance. All readings are extrapolated back to the equivalent three-meter reading using inverse scaling with distance.

Radiated emission measurements were performed from 30 MHz to 5000 MHz.
Analyzer resolution is:
100 kHz or greater for frequencies 1000 MHz and below,
1 MHz for frequencies above 1000 MHz.

Analyzer video bandwidth is equal or grater than resolution bandwidth – for peak measurements, and 10 Hz – for average measurements.

The Peak and Average values of the Field Strength of the fundamental frequency and harmonics were measured.

All other spurious emissions were verified by using “delta-marker” method. Antenna was setup at approximately 0.1 m from the EUT. The graphs of the spectrum analyzer were printed and the “delta” between readings at fundamental frequency and worst-case spurious emission frequency was noted. The field strength of spurious emissions was calculated by subtracting the “delta” from the field strength at fundamental.

Data is included of the worst-case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation is as follows:
FS = RA + AF + CF - AG
Where FS = Field Strength in dB (μV/m)
RA = Receiver Amplitude (including preamplifier) in dB (μV)
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB(1/m)
AG = Amplifier Gain in dB

4.1.1 Test Results

The data below list the significant emission frequencies, the limit and the margin of compliance.

Field Strength of Fundamental: 433.925MHz

Frequency MHz	SA Reading dBuv	Amp Gain dB	Ant Factor dB/m	Cable loss dB	Duty Cycle dB	Fd Strength dBuV/m	Limit dBuV/m	Margin dB	
433.9	72.5	0.0	16.7	1.5	0.0	90.7	100.8	-10.1	Peak
433.9	72.5	0.0	16.7	1.5	11.3*	79.4	80.8	-1.4	Avg

*Duty Cycle Calculated as 11.3dB. See section 4.5 for details.

Field Strength of Harmonics Date of Test: October14, 2008

Frequency MHz	SA Reading dBuv	Amp Gain dB	Ant Factor dB/m	Cable loss dB	Duty Cycle dB	Field Strength dBuV/m	Limit dBuV/m	Margin dB	
867.9	49.1	25.0	22.0	2.1	0.0	48.2	80.8	-32.6	Peak
867.9	49.1	25.0	22.0	2.1	11.3	36.9	60.8	-23.9	Avg
1301.0	53.2	34.1	26.0	2.7	0.0	47.8	80.8	-33.0	Peak
1301.0	53.2	34.1	26.0	2.7	11.3	36.5	60.8	-24.3	Avg
1735.0	50.9	34.1	26.7	3.1	0.0	46.6	80.8	-34.2	Peak
1735.0	50.9	34.1	26.7	3.1	11.3	35.6	60.8	-25.2	Avg
2160.0	49.7	34.2	29.1	3.1	0.0	47.7	80.8	-33.1	Peak
2160.0	49.7	34.2	29.1	3.1	11.3	36.4	60.8	-24.4	Avg
2603.0	42.2	34.3	30.7	4.9	0.0	43.5	80.8	-37.3	Peak
2603.0	42.2	34.3	30.7	4.9	11.3	32.2	60.8	-28.6	Avg
3037.0	42.5	34.4	31.5	6.1	0.0	45.7	80.8	-35.1	Peak
3037.0	42.5	34.4	31.5	6.1	11.3	34.4	60.8	-26.4	Avg
3471.0	48.8	34.0	32.8	6.6	0.0	54.2	80.8	-26.6	Peak
3471.0	48.8	34.0	32.8	6.6	11.3	42.9	60.8	-17.9	Avg
3905.0	34.7	33.9	34.2	6.8	0.0	41.8	80.8	-39.0	Peak
3905.0	34.7	33.9	34.2	6.8	11.3	30.5	60.8	-30.3	Avg

Note: For Harmonics and Spurious emissions test only worst case results are reported.
All other Harmonics not reported are at least 20dB below the limit.

4.1.1 Test Results

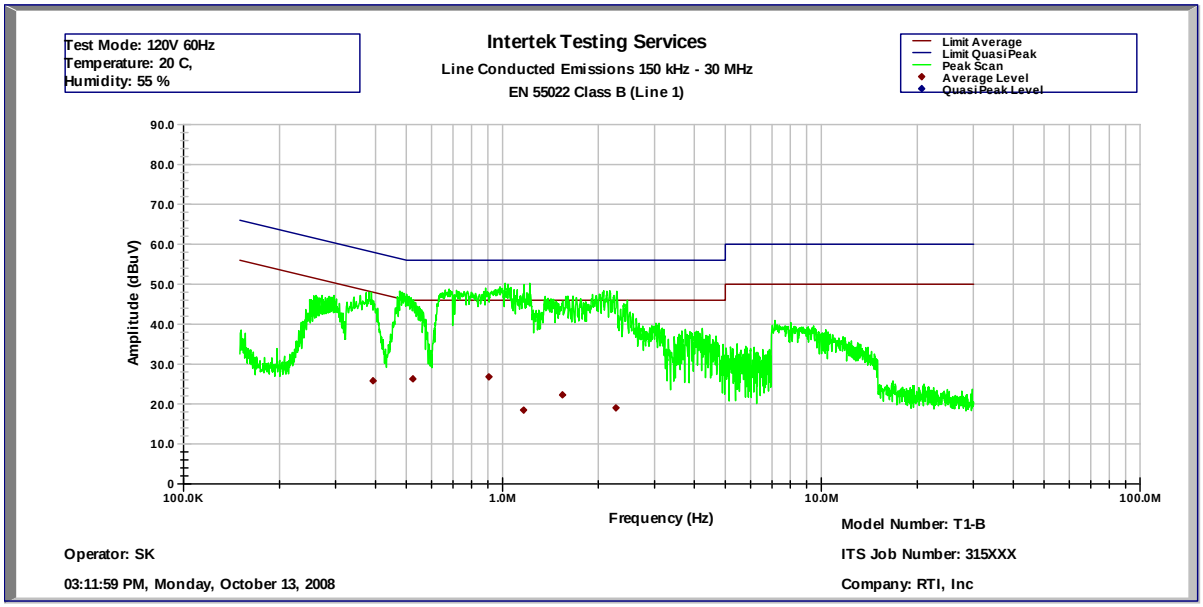
FCC Rule 15.209/RSS-210
Field Strength of Spurious Emissions

Date of Test: October14, 2008

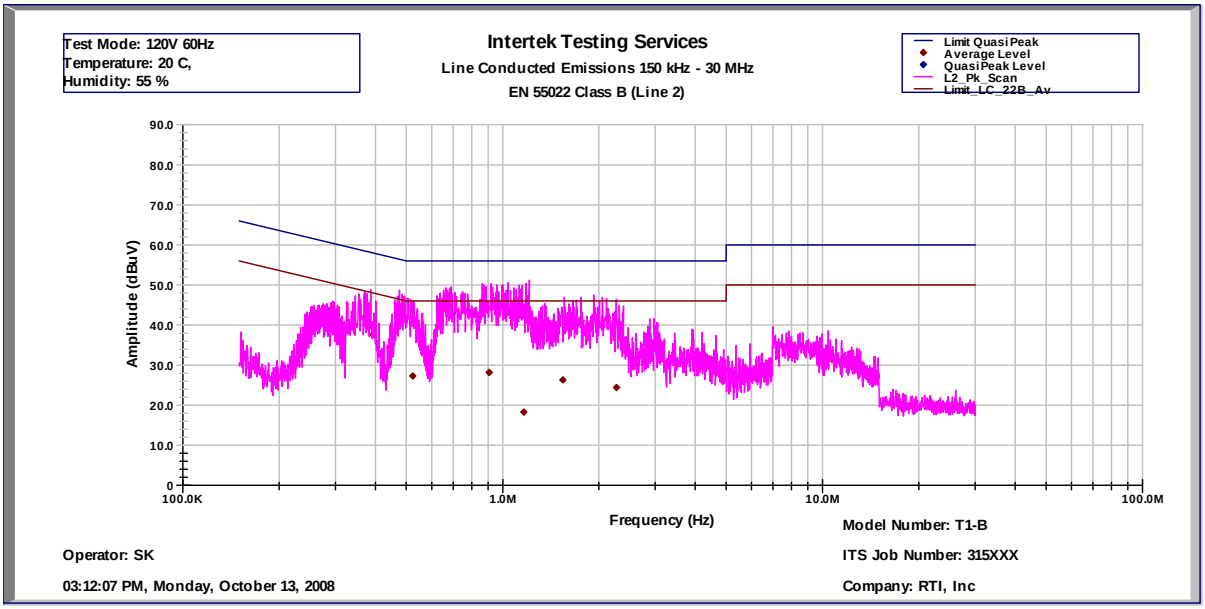
Frequency	Peak FS	Limit@10m	RA	CF	AG	AF	Margin
(MHz)	dB(uV)	dB(uV/m)	dB(uV)	dB	dB	dB(1/m)	dB
30.0	8.0	30	26.3	0.6	32.0	13.2	-22.0
62.3	6.5	30	32.1	0.8	32.0	5.6	-23.5
574.0	20.3	37	31.5	2.5	32.4	18.7	-16.7
800.3	23.8	37	31.6	3.0	32.4	21.5	-13.2

Note: Spurious emissions test, Test was performed 30MHz to 5GHz, vertical and Horizontal polarizations of Antenna, only worst case results are reported.
All other spurious emissions not reported are at least 20dB below the limit.

4.2 AC Line Conducted Emission
FCC Rule 15.207



Intertek Testing Services						
Line Conducted Emissions 150 kHz - 30 MHz						
EN 55022 Class B (Line 1)						
Operator: SK			Model Number: T1-B			
			ITS Job Number: 3162283			
03:11:59 PM, Monday, October 13, 2008			Company: RTI, Inc			
Frequency	Av Level	Av Limit	Av Margin			
MHz	(dBuV)	(dBuV)	(dBuV)			
0.393	25.8	49.1	-23.3			
0.524	26.3	46.0	-19.7			
0.907	26.8	46.0	-19.2			
1.17	18.5	46.0	-27.5			
1.54	22.3	46.0	-23.7			
2.27	19.0	46.0	-27.0			
Test Mode: 120V 60Hz						
Temperature: 20 C,						
Humidity: 55 %						



Intertek Testing Services						
Line Conducted Emissions 150 kHz - 30 MHz						
EN 55022 Class B (Line 2)						
Operator: SK			Model Number: T1-B			
			ITS Job Number: 3162283			
03:11:59 PM, Monday, October 13, 2008			Company: RTI, Inc			
Frequency	Av Level	Av Limit	Av Margin			
MHz	(dBuV)	(dBuV)	(dBuV)			
0.393	37.6	49.1	-11.5			
0.524	27.3	46.0	-18.7			
0.907	28.2	46.0	-17.8			
1.17	18.3	46.0	-27.7			
Test Mode: 120V 60Hz						
Temperature: 20 C,						
Humidity: 55 %						

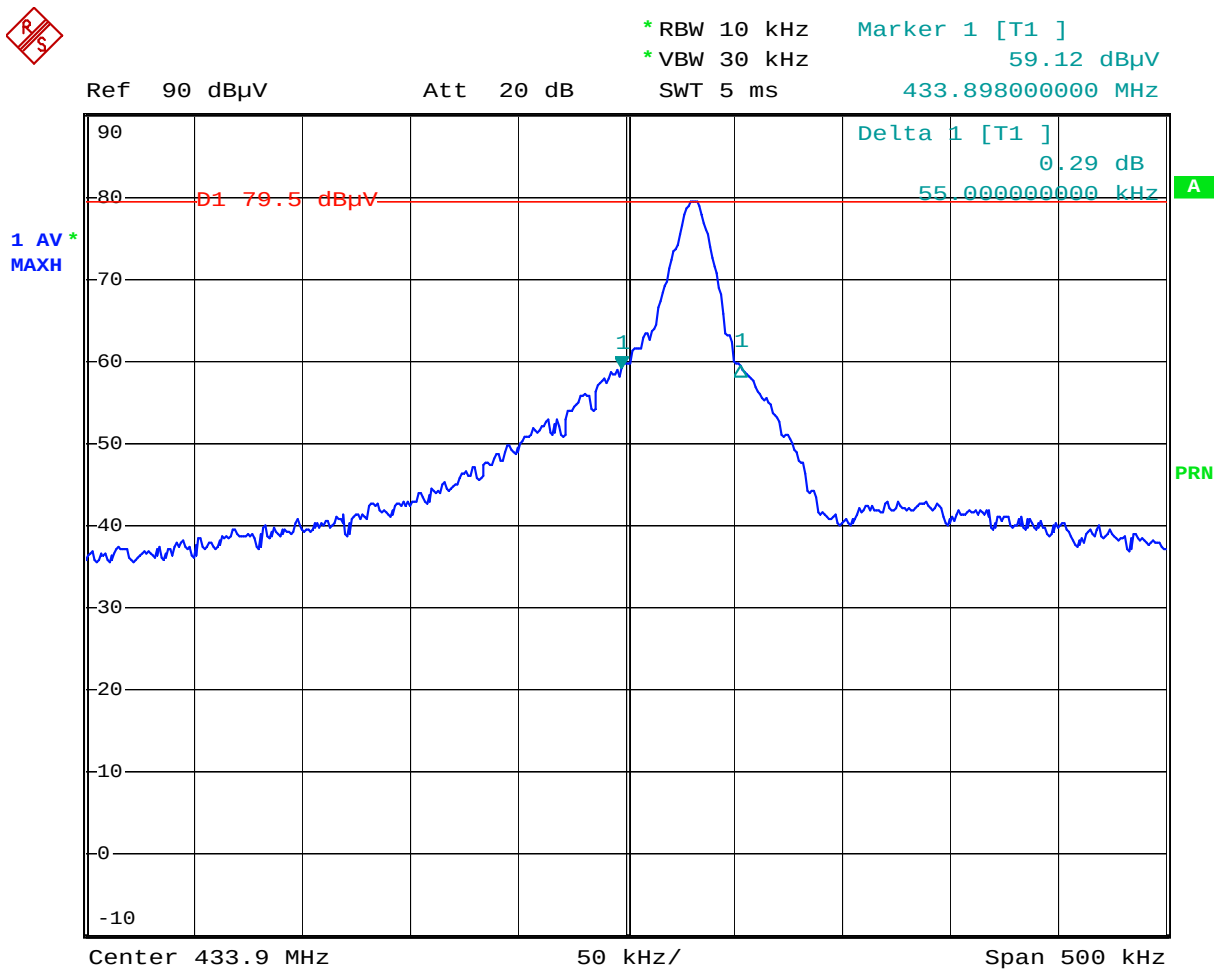
4.3 Occupied Bandwidth

The 15.231(c) emission bandwidth requirement: **0.25%** of fundamental frequency

The worst-case (widest) emission bandwidth at 20 dBc is 55kHz, which is 0.012% of the fundamental frequency.

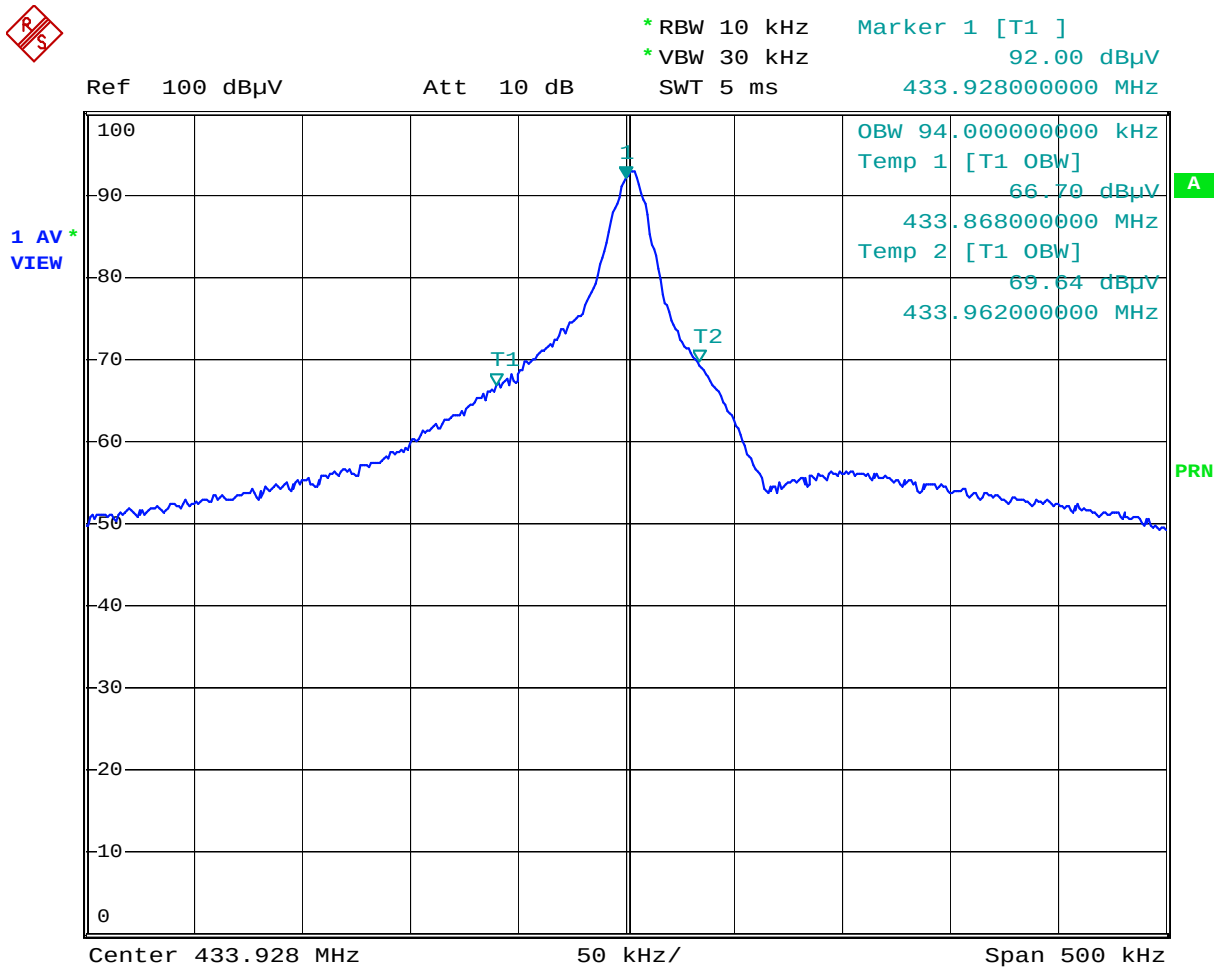
The following plots show the emission bandwidth of the transmitter:

FCC 20dB BW



Date of the test October 18, 2008

Industry Canada Occupied Bandwidth measured at 99%: 94KHz



Date of the test October 18, 2008

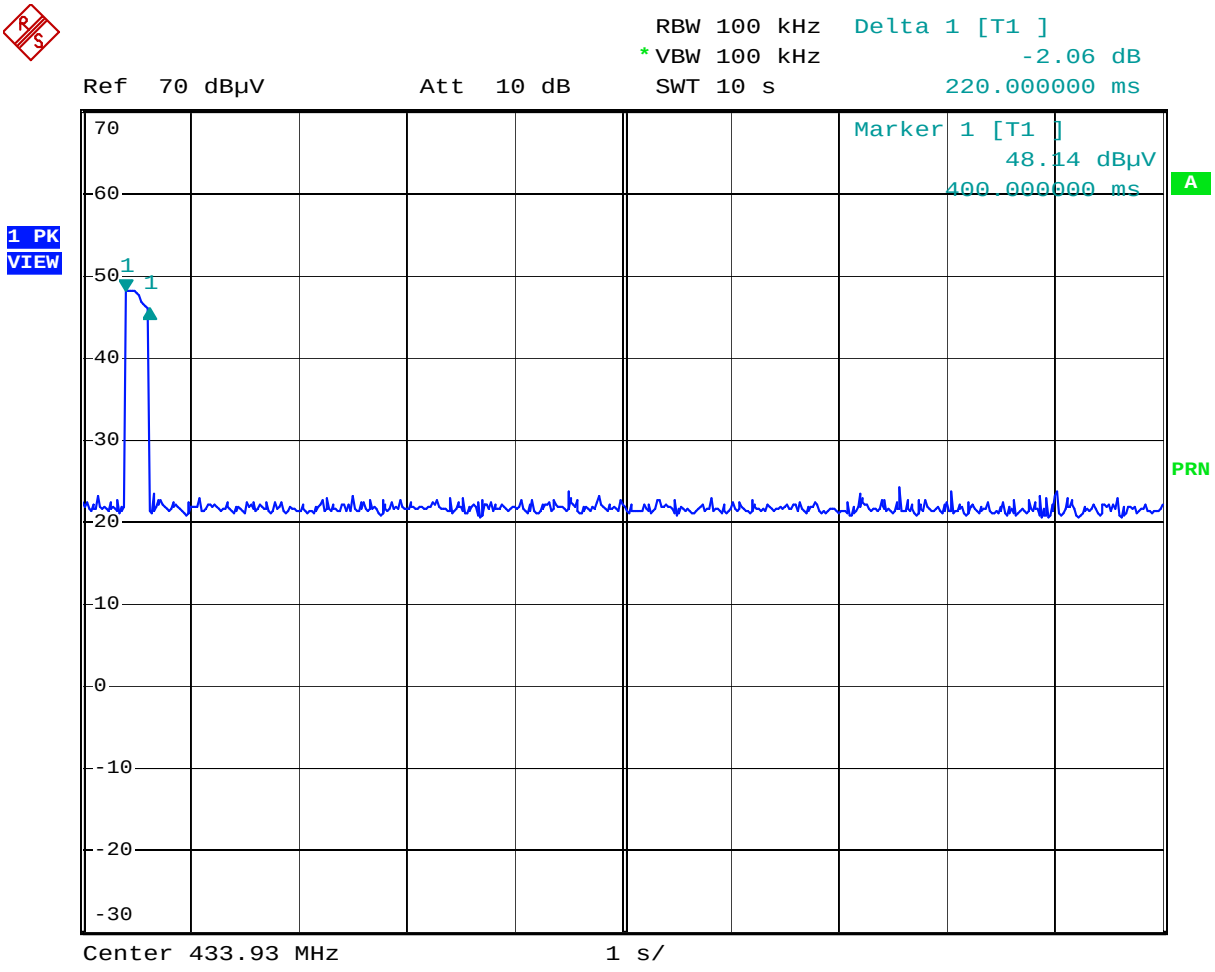
4.4 Transmitter De activation Time

FCC Rule 15.231(a) and RSS-210 A1.1.1
Maximum allowed deactivation time: 5 Seconds

Manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

Test Results: Pass

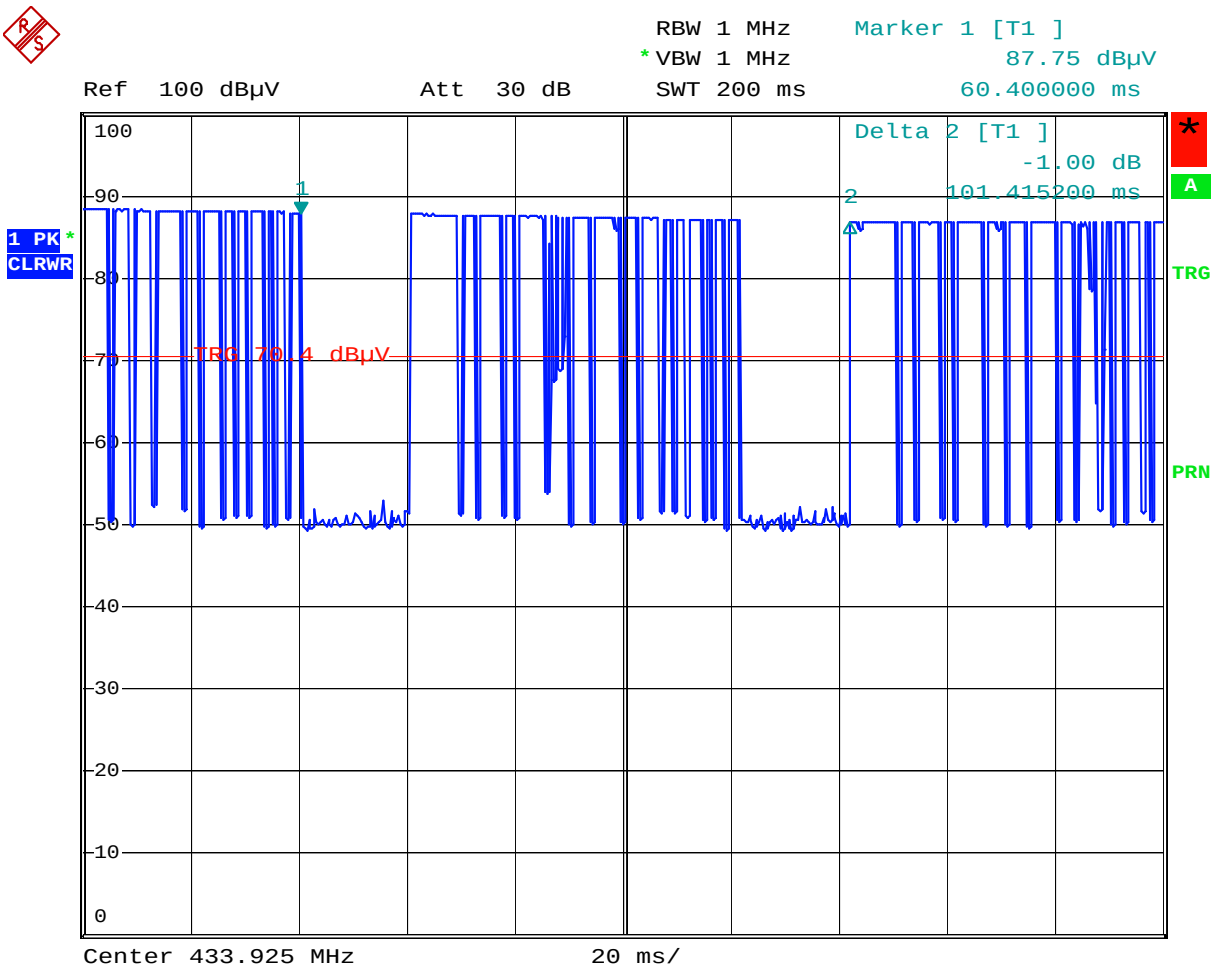
T1-B Remote controller transmits continuously while activation button is pressed. Transmission ceases 180ms after single operation of activation button.



Date of the test October 28, 2008

4.5 Duty cycle graphs

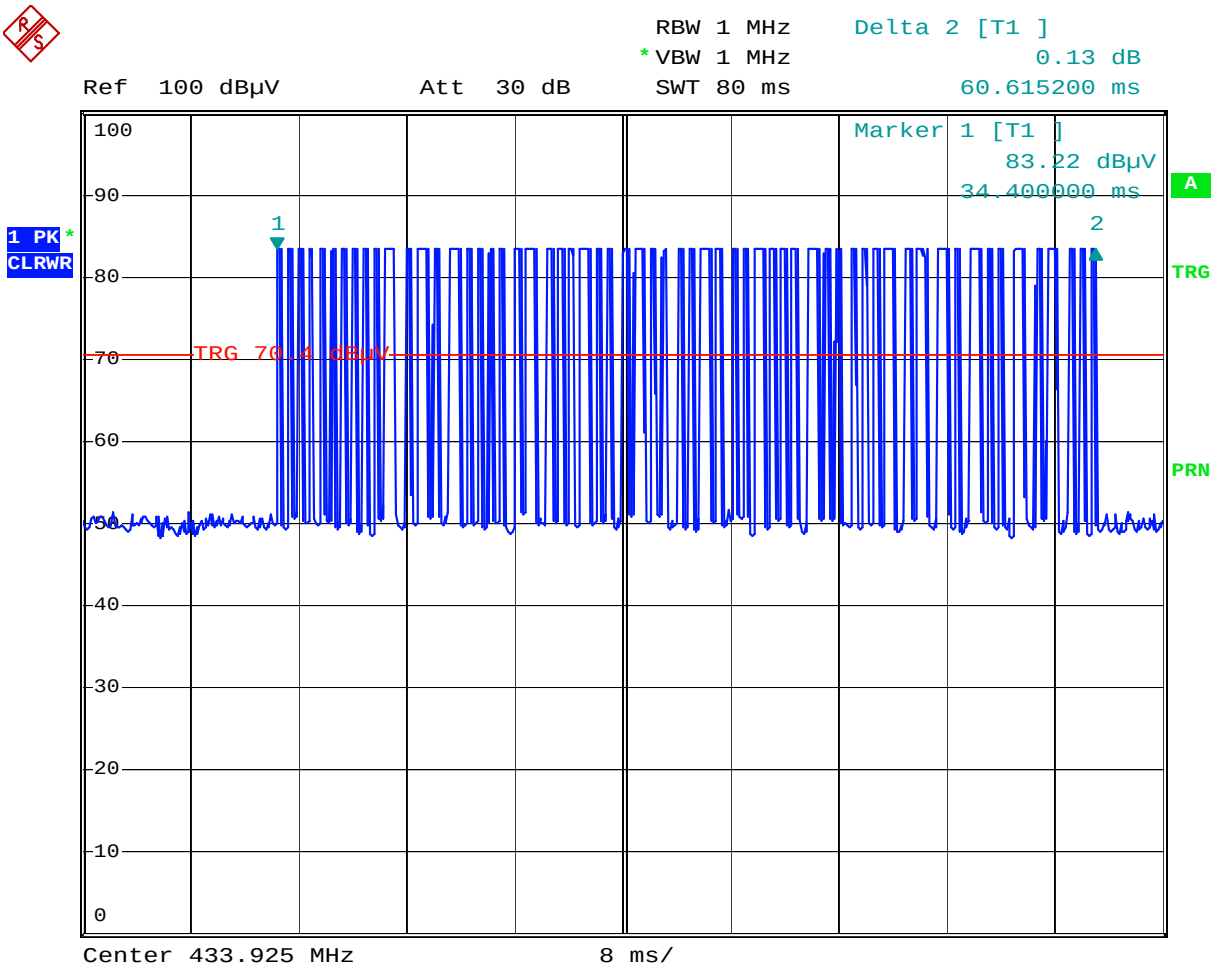
Graph 1:



Date of the test October 28, 2008

Total Time: 101.4ms
Burst “ON” Time: 60.6 ms

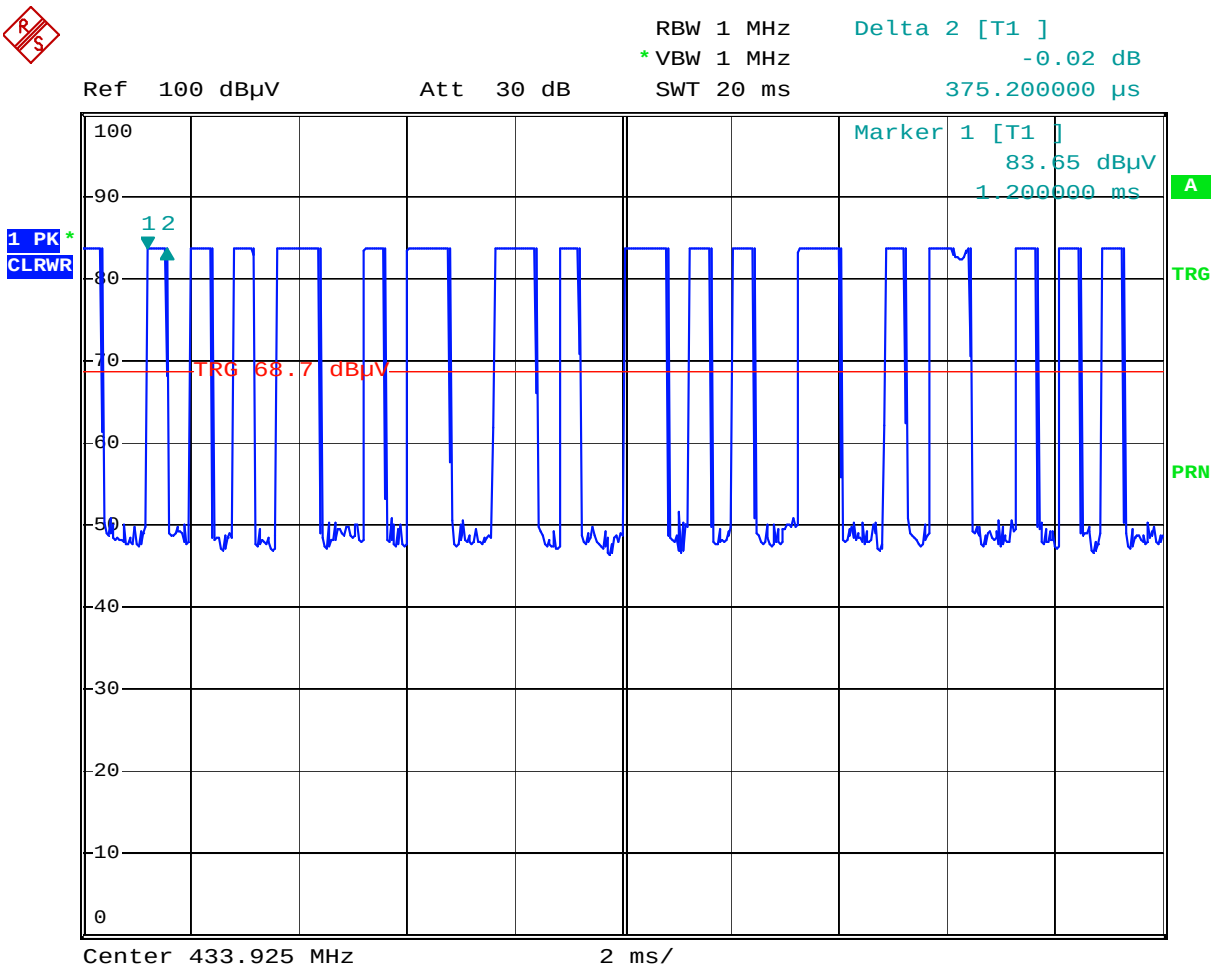
Graph 2:



Date of the test October 28, 2008

Duration of the Burst: 60.6ms

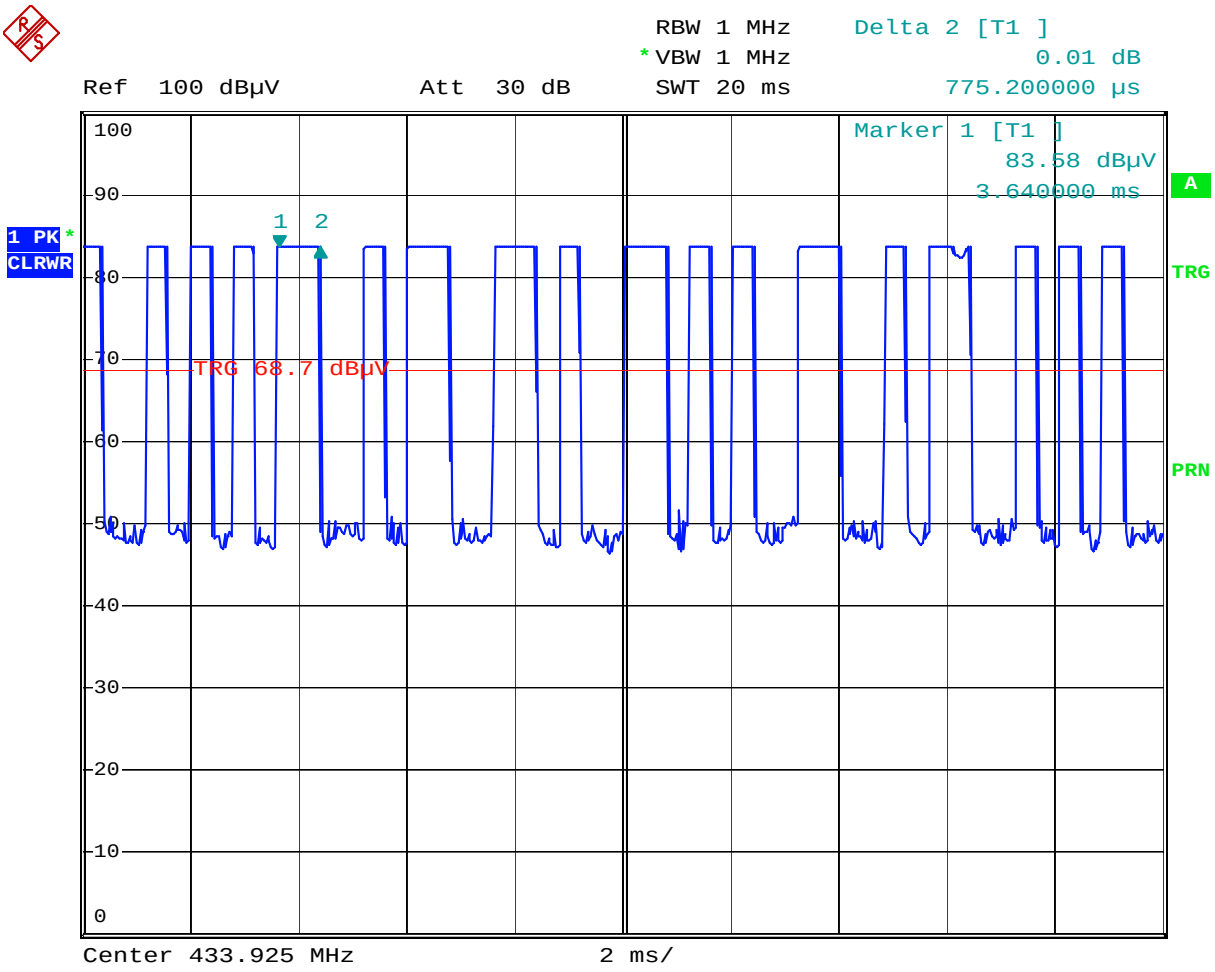
Graph 3:



Date of the test October 28, 2008

Duration of Short Pulse: 375.2 micro seconds

Graph 4:



Date of the test October 28, 2008

Duration of wide Pulse: 775.2micro Seconds

ON time: 42(Short Pulses) X 375.2 us+ 15(Wide pulses)X 775.2 us = 27.386ms (From Graph2)

Duty Cycle calculation: 20Log(27.38/101.4) = 11.37dB

5.0 List of test equipment

Equipment	Manufacturer	Model/Type	Serial #	Cal Int	Cal Due
RF Filter Section	Hewlett Packard	85460A	3448A00267	12	10/03/09
EMI Receiver	Hewlett Packard	8546A	3710A00373	12	10/03/09
BI-Log Antenna	ARA	LPB-2512A	9509-1160	12	6/11/09
Pre-Amplifier	HP	8447D	2944a09519	12	6/20/09
LISN	FCC	FCC-LISN-50-50-M-H	2011	12	9/19/09
Horn Antenna	EMCO	3115	8812-3049	12	7/29/09
Pre-Amplifier	Miteq	AMF-4D-001180-24-10P	799159	12	7/13/09

6.0 Document History

Revision/ Job Number	Writer Initials	Date	Change
1.0 / 3162283	SK	October 30, 2008	Original document