

TEST REPORT

Report Number: 3107561LEX-001

Project Number: 3107561

Evaluation of the T2-C Universal System Controller

Model Number: T2-C

FCC ID: MMURTI0600

ICID: 3166-RTI0600

**Tested to the Criteria in:
FCC Part 15 Subpart C, RSS-210, and ICES-003**

For

Remote Technologies Inc.

Test Performed by:

Intertek
731 Enterprise Drive
Lexington, KY 40510

Test Authorized by:

Remote Technologies Inc.
7651 Anagram Drive
Eden Prairie, MN 55344

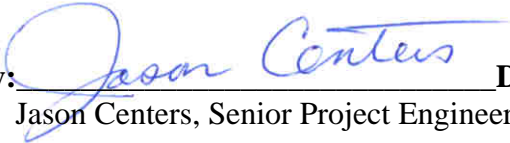
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TABLE OF CONTENTS

1	EXECUTIVE SUMMARY.....	3
2	JOB DESCRIPTION.....	4
2.1	CLIENT INFORMATION	4
2.2	EQUIPMENT UNDER TEST (EUT).....	4
2.3	SYSTEM SUPPORT EQUIPMENT	4
2.4	CABLES ASSOCIATED WITH EUT	4
2.5	TEST CONFIGURATION.....	5
2.6	MODIFICATIONS REQUIRED FOR COMPLIANCE	5
2.7	RELATED SUBMITTAL(S) GRANTS.....	5
2.8	BLOCK DIAGRAM	5
3	TEST FACILITY.....	6
3.1	TEST EQUIPMENT.....	7
4	TRANSMITTING TIME	8
4.1	TEST PROCEDURE	8
4.2	TEST RESULTS	8
5	FIELD STRENGTH OF FUNDAMENTAL AND SPURIOUS RADIATION	9
5.1	TEST PROCEDURE	9
5.2	TEST RESULTS	10
6	BANDWIDTH OF EMISSIONS	11
6.1	TEST PROCEDURE	11
6.2	TEST RESULTS	11
7	POWER LINE CONDUCTED EMISSIONS.....	12
7.1	TEST PROCEDURE	12
7.2	TEST RESULTS	12
8	RADIATED EMISSIONS	13
8.1	TEST PROCEDURE	13
8.2	TEST RESULTS	14

Evaluation For: Remote Technologies Inc.
Model No: T2-C

FCC ID: MMURTI0600

1 EXECUTIVE SUMMARY

Testing performed for: Remote Technologies Inc.

Equipment Under Test: T2-C

The T2-C manufactured by Remote Technologies Inc. was tested to and found to be compliant with the tests listed in the following table.

Test Description	FCC Rule	IC Rule	Results	Page
Transmitting Time	FCC Part 15.231(a)(1)	RSS210 Section 6.1.1(a)(1)	Passed	8
Field Strength of Fundamental and Spurious Radiation	FCC Part 15.231(b)	RSS210 Section 6.1.1(b)	Passed	9
Bandwidth of Emissions	FCC Part 15.231(c)	RSS210 Section 6.1.1(c)	Passed	11
Power Line Conducted Emissions	FCC Part 15.107	ICES-003 Section 5.3	Passed	12
Radiated Emissions	FCC Part 15.109	ICES-003 Section 5.5	Passed	13

EUT receive date: 11/6/2006

EUT receive condition: The EUT was received in good condition with no apparent damage.

Test start date: 11/6/2006

Test completion date: 11/14/2006

The test results in this report pertain only to the item tested.

2 JOB DESCRIPTION

2.1 Client information

The T2-C Universal System Controller has been tested at the request of

Company: Remote Technologies Inc.
7651 Anagram Drive
Eden Prairie, MN 55344

Name of contact: Paul Weichelt
Telephone: (952) 253-3113
Fax: (952) 253-3131

2.2 Equipment Under Test (EUT)

The T2-C Universal System Controller is a remote control operating at 433.9MHz. The intended use of the T2-C Universal System Controller is to generate and transmit an RF and Infrared signal to control home entertainment systems. The T2-C Universal System Controller gets its power from a 3.7V (nominal) rechargeable battery.

2.3 System Support Equipment

The T2-C Universal System Controller was tested in a stand alone configuration without any support equipment connected to it.

2.4 Cables associated with EUT

Table 2-1 contains the details of the cables associated with the EUT.

Table 2-1: Interconnecting cables between modules of EUT

Cables					
Description	Length	Shielding	Ferrites	Connection	
				From	To
DC Output Cable ¹	4 ft	None	None	AC/DC Power Pack	T2-C Charging Base
AC Power Cable ¹	5 ft	None	None	120VAC Power Source	AC/DC Power Pack

¹ Used only when the T2-C was in “charging” mode.

2.5 Test Configuration

The T2-C Universal System Controller was configured to either transmit continuously (for transmitter tests) or be in standby mode (for non-transmitter tests). It was tested in a stand alone configuration without any support equipment being connected to it. The IR transmitter was on during all testing.

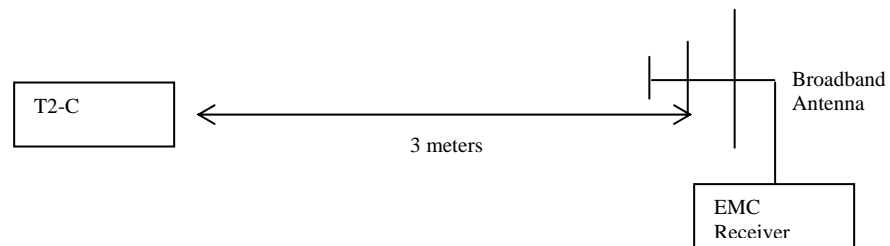
2.6 Modifications required for compliance

No modifications were implemented by Intertek.

2.7 Related Submittal(s) Grants

None

2.8 Block Diagram



3 TEST FACILITY

The INTERTEK-Lexington is located at 731 Enterprise Drive, Lexington Kentucky, 40510. The radiated emission test site is a 10-meter semi-anechoic chamber. The chamber meets the characteristics of CISPR 16-1: 1993 and ANSI C63.4: 1992. For measurements, a remotely controlled flush-mount metal-top turntable is used to rotate the EUT a full 360 degrees. A remote controlled non-conductive antenna mast is used to scan the antenna height from one to four meters.

For radiated immunity testing, removable ferrite tiles are positioned between the transmitting antenna and the area occupied by the equipment under test. The remaining tests typically are performed outside the chamber on the conducting ground reference plane.



The Industry Canada filing number for this site is 2055. The FCC registration number is 485103. The VCCI registration numbers are R-2056, C-2214, and T-195.

3.1 Test Equipment

The following test equipment was used for the evaluation.

Description	Manufacturer	Model Number	Serial Number	Calibration due date
Test Receiver	Rohde & Schwarz	ESI26	1088.7490.26	8/16/2007
Bilog Antenna	ETS	3142C	00051864	11/30/2006
LISN	Fischer Custom Communication	FCC-LISN-50-50-2M	1026	5/9/2007

4 TRANSMITTING TIME

FCC §15.231(a)(1); RSS210 Section 6.1.1(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.

4.1 Test Procedure

The T2-C Universal System Controller transmitted continuously while the activation button was pressed. The transmitted signal was observed on a spectrum analyzer and then the activation button was released. The signal on the spectrum analyzer was observed to see if the transmission stopped within 5 seconds of the activation button being released.

4.2 Test Results

The transmission stopped within 1 second of the release of the activation button.

5 FIELD STRENGTH OF FUNDAMENTAL AND SPURIOUS RADIATION

FCC §15.231(b); RSS210 Section 6.1.1(b)

Emissions from a transmitter with a fundamental frequency of 433.9MHz shall not exceed 80.8dBuV/m for the fundamental and 60.8dBuV/m for the spurious emissions.

5.1 Test Procedure

The emission measurements were performed according to the procedures in ANSI C63.4-2001. All field strength radiated emission measurements were performed in a semi-anechoic chamber and for each scan the procedure for maximizing emissions in Appendices D and E were followed. All field strength measurements were performed at an antenna to EUT distance of 3 meters. A frequency range starting from 30MHz and extending to 10GHz was investigated during the test with the receiving antenna polarized vertically and horizontally.

5.2 Test Results

The maximized peak readings are shown below in Figure 5-1 and Figure 5-2. Readings below 1GHz were taken with a bandwidth of 100kHz. Readings above 1GHz were taken with a bandwidth of 1GHz. A peak detector was used for all measurements.

Figure 5-1: Field Strength of the Fundamental

Polarity	Frequency	Cable and Preamp	Ant. Fact.	Peak Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)
V	433.83 MHz	3.148	16.38	78.69	80.8	-2.11
H	433.93 MHz	3.15	16.382	64.826	80.8	-15.974

Figure 5-2: Field Strength of Spurious Radiation

Polarity	Frequency	Cable and Preamp	Ant. Fact.	Peak Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)
H	1.299 GHz	-37.145	25.292	37.706	60.8	-23.094
V	1.7366 GHz	-36.337	26.647	36.586	60.8	-24.214
V	3.4637 GHz	-33.629	31.3	39.123	60.8	-21.677
H	3.4637 GHz	-33.629	31.391	51.374	60.8	-9.426
V	433.13 MHz	3.13	16.366	51.833	60.8	-8.967
V	433.63 MHz	3.143	16.376	47.074	60.8	-13.726
V	435.03 MHz	3.178	16.404	48.508	60.8	-12.292
V	435.23 MHz	3.176	16.408	46.302	60.8	-14.498
V	796.47 MHz	4.309	21.872	45.858	60.8	-14.942
V	867.77 MHz	4.488	22.543	51.241	60.8	-9.559
H	867.77 MHz	4.488	22.543	54.587	60.8	-6.213
V	9.29 GHz	-23.771	37.8	39.194	60.8	-21.606
H	9.97 GHz	-24.131	38.27	39.382	60.8	-21.418

6 BANDWIDTH OF EMISSIONS

FCC §15.231(c); RSS210 Section 6.1.1(c)

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

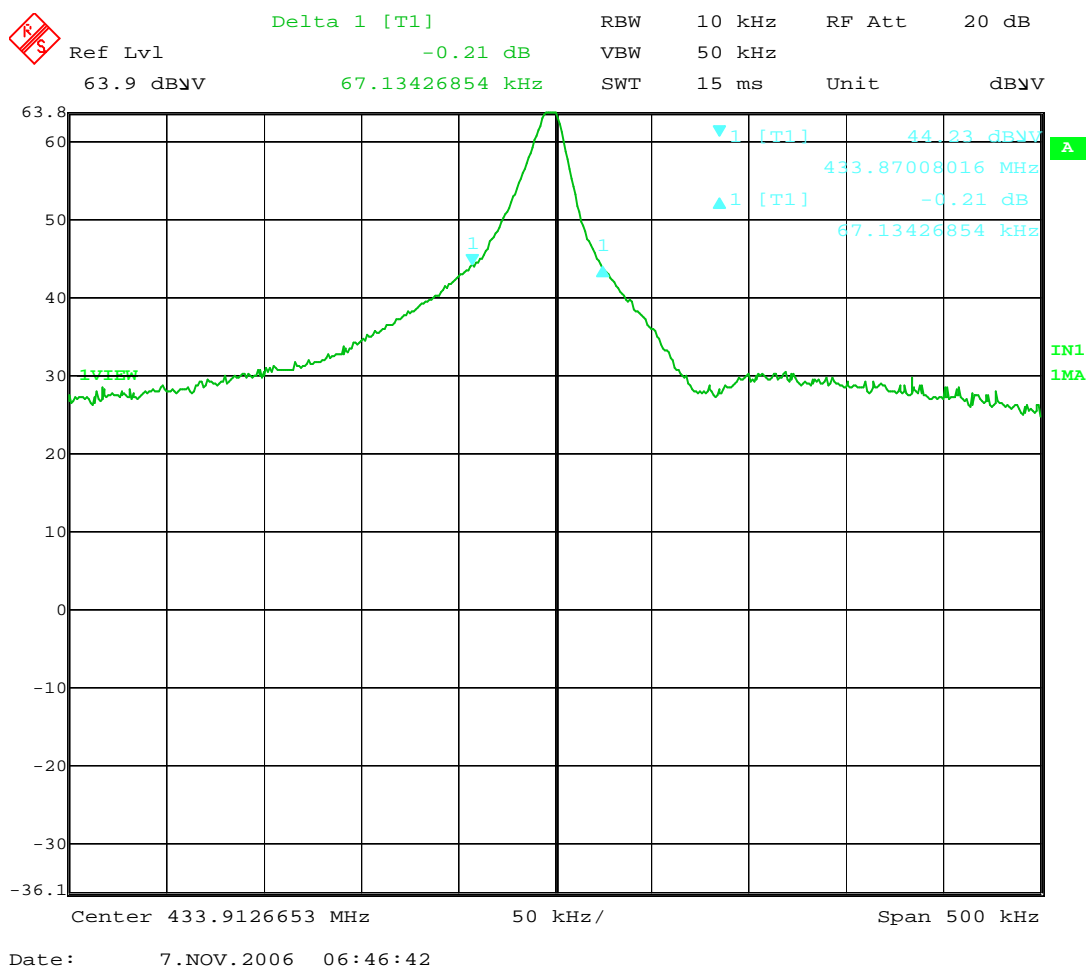
6.1 Test Procedure

The emission bandwidth was measured at the 20dB points using a marker delta method.

6.2 Test Results

The emission bandwidth was measured to be 67.13kHz which is much less than the maximum allowed bandwidth of $433.87\text{MHz} \times 0.25\% = 1084.67\text{kHz}$.

Figure 6-1: Emission Bandwidth



7 POWER LINE CONDUCTED EMISSIONS

FCC §15.107 Class B; ICES-003 Section 5.3

7.1 Test Procedure

Conducted voltage emission measurements were performed as follows:

The T2-C Universal System Controller was placed in its charging base and connected to the power source using a Line Impedance Stabilization Network (LISN) in line with the AC power cord. A spectrum analyzer was connected to the RF port of the LISN installed on the line under test. The T2-C Universal System Controller was powered and was charging during the test.

The insertion loss of the measurement cable, the LISN insertion loss, and the output of the spectrum analyzer were added together to give a corrected reading in dBuV. The corrected reading was compared to the limit above to determine compliance. A quasi-peak and/or average detector was used for measurements close to or exceeding the limit with a peak detector.

7.2 Test Results

The T2-C Universal System Controller was **compliant** with the class B conducted voltage emissions requirements for FCC Part 15.107. No conducted voltage emissions on the AC power interface exceeded the quasi-peak or average limits while the T2-C was charging.

Conducted Voltage Emissions Graphical Data (L1 & L2)

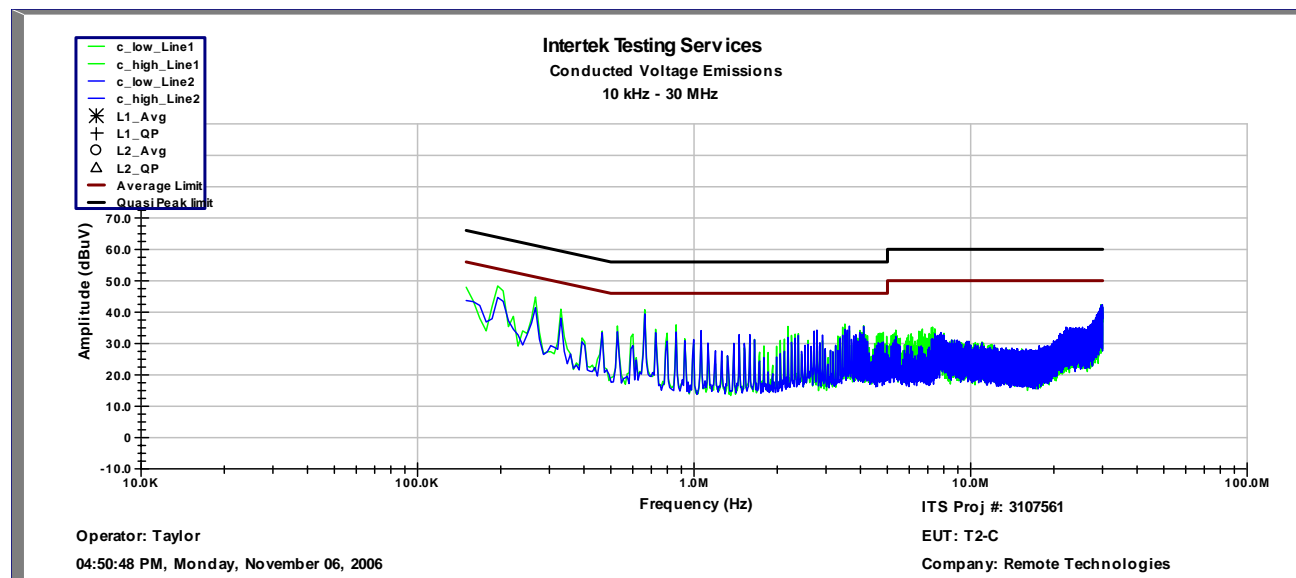


Exhibit 1

8 RADIATED EMISSIONS

FCC §15.109 Class B; ICES-003 Section 5.5

The radiated emission limits for a class B device are shown in Table 8-1 below.

Table 8-1 Radiated Emission Limit for FCC §15.109

Radiated Emission Limits at 3 meters	
Frequency (MHz)	Quasi-Peak limits, dB (μV/m)
30 to 88	40.0
88 to 216	43.5
216 to 960	46.0
960 and up	54.0

8.1 Test Procedure

The EUT was placed on a non-conductive 80 cm high turntable. Measurements were made over the frequency range of 30 MHz to five times the highest frequency operating within the device. The measuring receiver met the requirements of Section One of CISPR 16 and the measuring antenna was correlated to a balanced dipole. From 30 to 1000 MHz, a quasi-peak detector was used for measurement. Above 1000 MHz, average measurements were performed.

Measurements of the radiated field were made with the antenna located at a distance of 3 meters from the EUT and in vertical and horizontal polarities. The EUT was rotated from 0 to 360 degrees and the antenna adjusted between 1m and 4m in height above the ground plane for maximum meter reading at each test frequency.

8.2 Test Results

The T2-C Universal System Controller met the radiated disturbance requirements of FCC §15.109. The maximized quasi peak data and graphical results can be found in the following two exhibits.

Figure 8-1 FCC §15.109 Maximized Quasi Peak and Average Emissions

Frequency (MHz)	Polarity (H/V)	Cab. (dB)	Ant. (dB)	Corr. Reading. (dBuV/m)	Limit (dBuV/m)	Delta (dB)	Azimuth (deg)	Tower (m)	Results
157.3 MHz	V	1.89	9.44	31.18	43.5	-12.32	102	1	Compliant
463.4 MHz	V	3.28	17.24	39.66	46	-6.34	157	1	Compliant

Figure 8-2 FCC §15.109 Graphical Data

