EMC
TEST REPORT

Report No. : EME-020184
Model No. : C-C01
Issued Date : May 15, 2002

Applicant : Young Town Enterprises Co., Ltd.
26, Lane 242, Sec. 3, Chung Cheng Rd., Jen Te Hsiang, Tainan, Taiwan, R.O.C.

Test By : Intertek Testing Services Taiwan Ltd.
No. 11, Ko-Tze-Nan Chia-Tung Li, Shiang-Shan District, Hsinchu, Taiwan, R.O.C.

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Summary of Tests

Transmitter -Model: C-C01
FCC ID: QDRTRAN-CC01-CC02

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

1. General information

1.1 Identification of the EUT

Applicant	: Youn town Enterprises Co., Ltd.
Product	: Transmitter
Model No.	: C-C01
FCC ID.	: QDRTRAN-CC01-CC02
Frequency Range	: 433.92MHz
Channel Number	: 1 channels
Frequency of Each Channel	: 433.92MHz
Type of Modulation	: LC
Power Supply	: 12Vdc alkaline battery
Power Cord	: N/A
Sample Received	: Mar. 1, 2002
Test Date(s)	: April 22, 2002 to April 29, 2002

A DoC report has been generated for the client.

1.2 Additional information about the EUT

The EUT has integrated the radio receiver into the motor, with a hand held remote transmitter to identify the lower / upper limit positions and the motor operation.

The model C-C02 is series model to C-C01, according to they have the identical hardware aspect, and both of the two models were tested and recorded in this report.

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

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	: 0dBi max
Antenna Type	: Loop

2. Test specifications

2.1 Test standard

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

2.2 Operation mode

EUT (C-C01 and C-C02) was used a new 12Vdc alkaline battery. Press any key of the EUT.
The EUT transmitted continuously during all the tests, NOT at normal operation for users.

2.3 Test equipment

Equipment	Brand	Frequency range	Model No.	Series No.	Cal.Date
EMI Receiver	Rohde & Schwarz	9kHz~2.75GHz	ESCS 30	825788/014	May 29, 2001
Pulse Limiter	Rohde & Schwarz	9kHz~30MHz	ESH3-Z2	848.766/052	N/A
Spectrum Analyzer	Rohde & Schwarz	9kHz~30GHz	FSP 30	100137	July 9, 2001
Horn Antenna	EMCO	1GHz~18GHz	3115	9906-5822	Sep. 10, 2001
Horn Antenna	SCHWARZBECK	14GHz~40GHz	BBHA 9170	159	June 21, 2001
Bilog Antenna	SCHWARZBECK	25MHz~1.7GHz	VULB 9160	3111	June 21, 2001
Turn Table	HDGmbH	N/A	DS 420S	420/669/01	N/A
Antenna Tower	HDGmbH	N/A	MA 240	240/573	N/A
Microwave Amplifier	Agilent	2GHz~26.5GHz	8348A	3111A00567	Dec. 20, 2002

Note:
1. The calibration interval of the above instruments is 12 months.

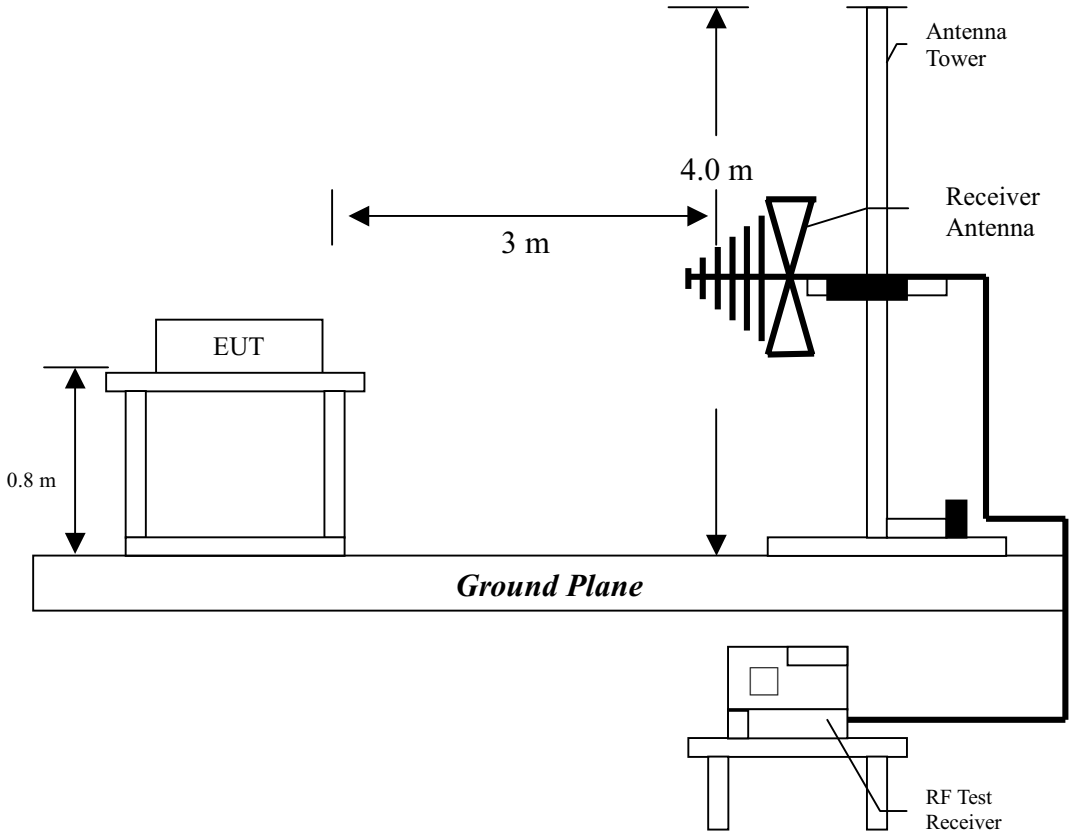
3. Radiated emission test FCC 15.231 (b)

3.1 Operating environment

Temperature:	22	℃
Relative Humidity:	59	%

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.

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)
433.92	10997	80.83	1100.27	60.83

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@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 ±3.078 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 kHz resolution bandwidth.

Averaging factor in dB = 20log (duty cycle)

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

Model No.: C-C01
The duration of one cycle = 74.7 ms
Effective period of the cycle = 51.12 ms

DC = 51.12 ms / 74.7 ms = 0.68

Therefore, the averaging factor is fond by 20 $\log_{10}$ 0.68 = -3.29 dB

Model No.: C-C01
The duration of one cycle = 75.5 ms
Effective period of the cycle = 52.4 ms

DC = 52.4 ms / 75.5 ms = 0.69

Therefore, the averaging factor is fond by 20 $\log_{10}$ 0.69 = -3.17 dB

Please see the Average Factor plot as file name “Average Factor plot.pdf”.

3.5 Radiated emission test data FCC 15.231

3.5.1 Fundamental & Harmonics Radiated Emission Data

EUT : C-C01
Test Condition : Transmitter Mode

Freq. (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Average Factor (dB)	Reading Level (dBuV)	Corrected Reading (dBuV/m)	Limit At 3m (dBuV/m)	Margin (dB)
433	PK	V	17.7	-3.29	45.9	60.31	80.83	-20.52
433	PK	H	17.7	-3.29	58.2	72.61	80.83	-8.22
115.9	PK	V	12.5	-3.29	11.6	20.81	43.5	-22.69
867	PK	V	24.3	-3.29	14.2	35.21	60.83	-25.62
1301.76	PK	V	29.5	-3.29	-	-	54	-
867	PK	H	24.3	-3.29	24.2	45.21	60.83	-15.62
1301.76	PK	H	27.1	-3.29	-	-	54	-

Remark:
1.Corrected Level = Reading Level + Correction Factor + Average Factor
2.Correction Factor = Antenna Factor + Cable Loss
3. “-“ means the emission is below the noise floor.

EUT : C-C02
Test Condition : Transmitter Mode

Freq. (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Average Factor (dB)	Reading Level (dBuV)	Corrected Reading (dBuV/m)	Limit At 3m (dBuV/m)	Margin (dB)
433	PK	V	17.7	-3.17	50.4	64.93	80.83	-15.9
433	PK	H	17.7	-3.17	62.9	77.43	80.83	-3.4
53.2	PK	V	13	-3.17	16.1	25.93	43.5	-17.57
867	PK	V	24.3	-3.17	15.9	37.03	60.83	-23.8
1301.76	PK	V	29.3	-3.17	18.5	44.63	54	-9.37
1735.68	PK	V	35.2	-3.17	-	-	60.83	-
867	PK	H	24.3	-3.17	28.3	49.43	60.83	-11.4
1301.76	PK	H	27.1	-3.17	22.8	46.73	54	-7.27
1735.68	PK	H	35.2	-3.17	-	-	60.83	-

Remark:
1.Corrected Level = Reading Level + Correction Factor + Average Factor
2.Correction Factor = Antenna Factor + Cable Loss
3. “-“ means the emission is below the noise floor.

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(20dBc) Limit = 0.25% × f(MHz) = 0.25% × 433.92MHz = 1.0848MHz

Model No.: C-C01

From the plot, the bandwidth is observed to be 512kHz, at 20dBc where the bandwidth limit is 1.0848MHz..

Model No.: C-C02

From the plot, the bandwidth is observed to be 544kHz, at 20dBc where the bandwidth limit is 1.0848MHz..

See 20dB Bandwidth plot as file name “20dB Bandwidth plot.pdf”