FCC PART 15 C

MEASUREMENT AND TEST REPORT

For

Shanghai Steel Tower Alarm Equipment Co.,Ltd.

Zone#3 Waigang International Automobile Fitting Ind.Zone, Jiading District, Shanghai, China

FCC ID: TFVST-Q318

July 08, 2005

This Report Concerns:	**Equipment Type:**
☒ Original Report	CAR ALARM SYSTEM

Test Engineer:	Tony Wu
Report Number:	**SE05F-087E**
Test Date:	June 25~July 06, 2005
Reviewed By:	
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1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	**SHANGHAI STEEL TOWER ALARM EQUIPMENT CO.,LTD.**
Address of applicant:	Zone#3 Waigang International Automobile Fitting Ind. Zone, Jiading District, Shanghai, China Tel: 86-21-69575989 Fax: 86-21-69575989
Manufacturer:	**SHANGHAI STEEL TOWER ALARM EQUIPMENT CO.,LTD.**
Address of manufacturer:	Zone#3 Waigang International Automobile Fitting Ind. Zone, Jiading District, Shanghai, China Tel: 86-21-69575989 Fax: 86-21-69575989

General Description of E.U.T

The **SHANGHAI STEEL TOWER ALARM EQUIPMENT CO.,LTD.**'s product, model number: **ST-Q318** or the "EUT" as referred to in this report is a **transmitter of CAR ALARM SYSTEM**. The EUT is measured approximately 6.0cm L x 3.1cm W x 1.4cm H.

The technical data has been listed following:

Items	Description
EUT Description:	Tx of CAR ALARM SYSTEM
Trade Name:	N/A
Model No.:	ST-Q318
Rated Voltage	DC 12V for Receiver and DC 12V for Transmitter
Frequency range	433.7741MHz
Number of channels	1
Channel Separation	None
Product Class:	Low Power Communication Device Transmitter

** The test data gathered are from the production sample provided by the manufacturer.*

1.2 Test Standards

The following Declaration of Conformity report of EUT is prepared in accordance with

FCC Rules and Regulations Part 15 Subpart C Section 15.231

The objective of the manufacturer is to demonstrate compliance with the described above standards.

1.3 Test Summary

For the EUT described above. The standards used were FCC Part 15 Subpart C Section 15.231 for Emissions

Tests Carried Out Under FCC Part 15 Subpart C

Standard	Test Items	Status	Application
Part 15 Subpart C Section 15.231	Disturbance Voltage at The Mains Terminals	x	N/A, without AC power supply
	Radiation Emission	√	
	20dB Bandwidth	√	
	Duty Cycle	√	

√ Indicates that the test is applicable
× Indicates that the test is not applicable

1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2001, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the Operating Instructions.

The maximum emission levels emanating from the device are compared to the Part 15 Subpart C Section 15.231 limits for radiation emissions and the measurement results contained in this test report show that EUT is to be technically compliant with FCC requirements.

All measurement required was performed at laboratory of Shenzhen Huatongwei International Inspection Co., Ltd at Keji Nan No.12 Road, Hi-tech Park, Shenzhen, China

1.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC – Registration No.: 662850

Shenzhen Huatongwei International Inspection Co., Ltd, EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 662850, November 17, 2003.

1.6 Test Equipment List and Details

Table 1: Test Equipment for Emission Test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal	Calibration Period
EMI Test Receiver	ROHDE & SCHWARZ	ESCS30	100038	2004/11	1 year
EMI Test Receiver	ROHDE & SCHWARZ	ESPI	100106	2005/03	1 year
Artificial Mains	ROHDE & SCHWARZ	ESH2-Z5	100028	2004/11	1 year
Pulse Limiter	ROHDE & SCHWARZ	ESHSZ2	100044	2004/11	1 year
Ultra-Broadband Antenna	ROHDE & SCHWARZ	HL562	100015	2004/11	1 year
LOOP ANTENNA	ROHDE & SCHWARZ	HFH2-Z2	100020	2004/11	1 year
HORN ANTENNA	ROHDE & SCHWARZ	HF906	100039	2004/11	1 year
EMI Test Receiver	ROHDE & SCHWARZ	ESI 26	100009	2004/11	1 year
RF Test Panel	ROHDE & SCHWARZ	TS / RSP	335015/ 0017	N/A	N/A
Turntable	ETS	2088	2149	N/A	N/A
Antenna Mast	ETS	2075	2346	N/A	N/A

2 - SYSTEM TEST CONFIGURATION

2.1 Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

2.2 EUT Exercise Software

The EUT exercising program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The software offered by manufacture, can let the EUT being normal operation.

2.3 Special Accessories

There are no special accessories necessary for compliance of this product supplied by **SHANGHAI STEEL TOWER ALARM EQUIPMENT CO.,LTD** and its respective support equipment manufacturers.

2.4 Equipment Modifications

The EUT tested was not modified by S&E.

2.5 Basic Test Setup Block Diagram

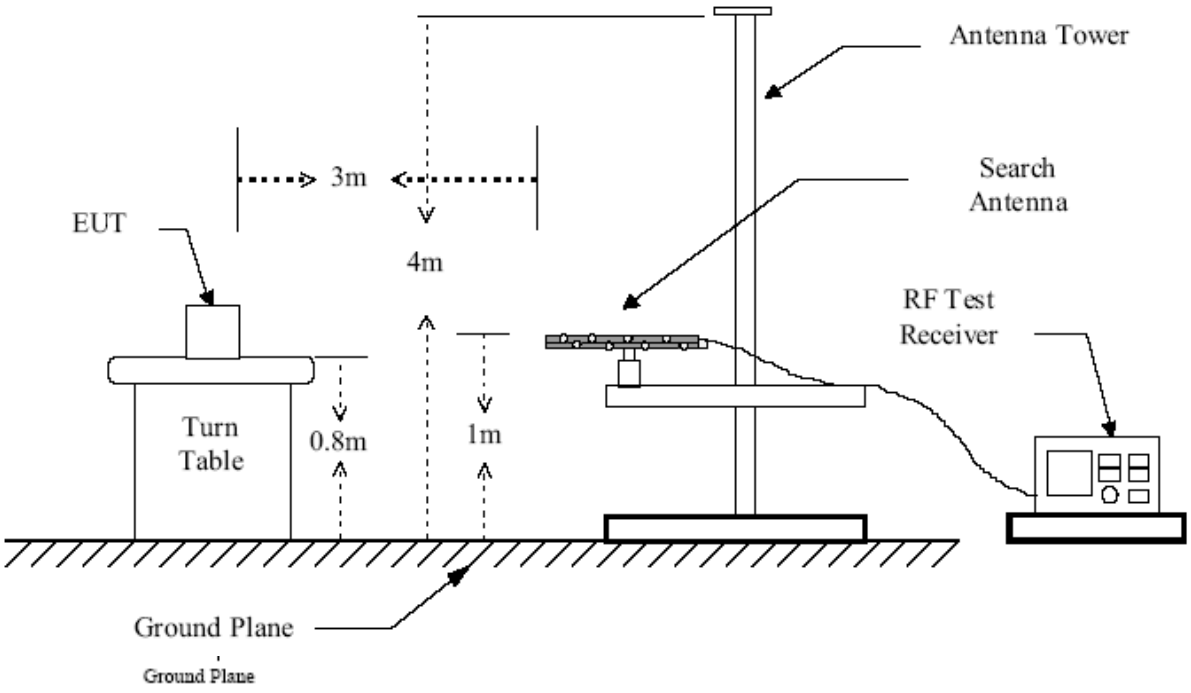


Figure 1 : Frequencies measured below 1 GHz configuration

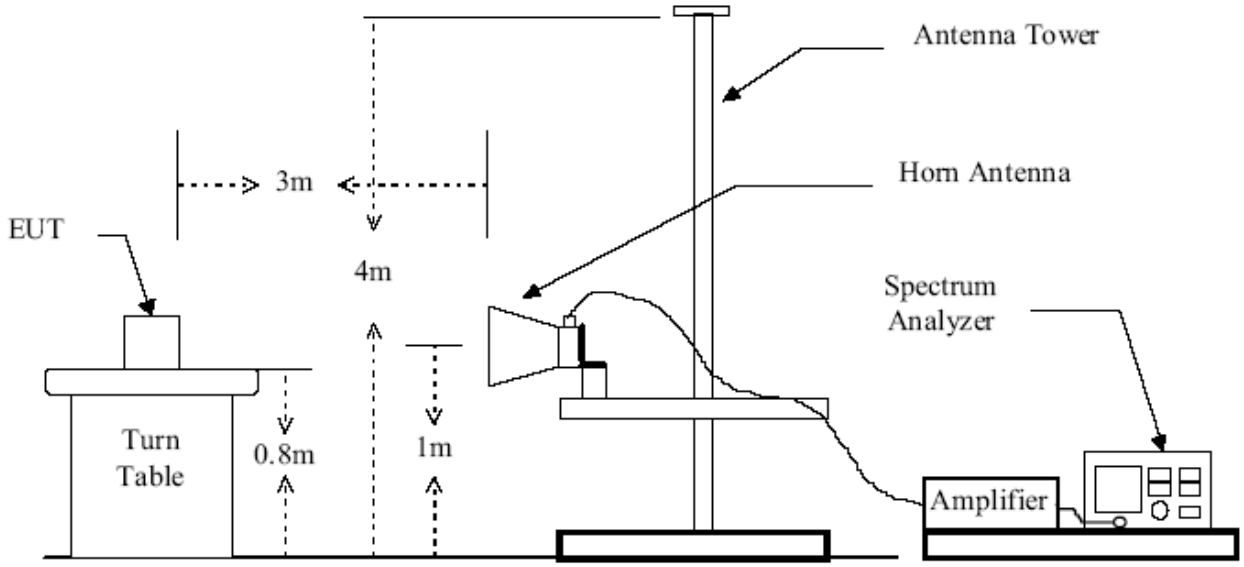


Figure 2 : Frequencies measured above 1 GHz configuration

3 – DISTURBANCE VOLTAGE AT THE MAINS TERMINALS

3.1 Measurement Uncertainty

All test results complied with Section 15.207 requirements. Measurement Uncertainty is 2.4 dB.

3.2 Applicable Standard

Section 15.207: For a Low-power Radio-frequency Device is designed to be connected to the AC power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed below limits table.

Frequency Range (MHz)	Limits (dBuV)	
	Quasi-Peak	Average
0.150～0.500	66～56	56～46
0.500～5.000	56	46
5.000～30.00	60	50

3.3 Test Description

The EUT is excused from investigation of Disturbance Voltage at The Mains Terminals, for it is powered by a DC 12V bettary. According to the Section 15.207(d),measurement to demonstrate compliance with the limits of Disturbance Voltage at The Mains Terminals are not required to the devices which only employed bettary power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines.

4- RADIATED DISTURBANCES

4.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is ±4.0 dB.

4.2 Limit of Radiated Disturbances

According to 15.231(b), the field strength of emissions from Intentional Radiators operated under this section shall not exceed the following:

Fundamental Frequency	Field Strength of Fundamental		Field Strength of Spurious	
(MHz)	(dBuV/m)	(uV/m)	(dBuV/m)	(uV/m)
40.66 - 40.70	67.04	2,250	47.04	225
70 - 130	61.94	1,250	41.94	125
130 - 174	* 61.94 - 71.48	* 1,250 -3,750	* 41.94 - 51.48	* 125 - 375
174 - 260	71.48	3,750	51.48	375
260 - 470	* 71.48 - 81.94	* 3,750 - 12,500	* 51.48 - 61.94	* 375 - 1,250
above 470	81.94	12,500	61.94	1,250

4.3 EUT Setup

The radiated emission tests were performed in the in the 3-meter anechoic chamber, using the setup accordance with the ANSI C63.4-2001. The specification used was the FCC Part 15 Subpart B limits.

The EUT was placed on the center of the test table. In the frequency range below 1 GHz, Ultra-Broadband Antenna horn-antenna is used. In the frequency range above 1 GHz horn-antenna is used. Test setup refer to **Section 2.5 Basic Test Setup Block Diagram** of this report.

Maximum emission emitted from EUT was determined by manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation and the levels in the final result of the test were recorded with the EUT running in the operating mode that maximum emission was emitted.

4.4 Test Receiver Setup

According to FCC Part 15 rule, the frequency was investigated from 30 to 5000 MHz.During the radiated emission test, the test receiver was set with the following configurations:

Test Receiver Setting for frequency range below 1000MHz:

Detector……..Peak & Quasi-Peak
IF Band Width……..100KHz
Frequency Range……30MHz to 1000MHz
Turntable Rotated……0 to 360 degrees

Test Receiver Setting for frequency range above 1000MHz:

Detector……..Peak
IF Band Width……..1MHz
Frequency Range……1000MHz to 5000MHz
Turntable Rotated……0 to 360 degrees

Antenna Position:

Height……1m to 4m
Polarity……...Horizontal and Vertical

4.5 Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

1). Configure the EUT according to ANSI C63.4.

2). The EUT was placed on the top of the turntable 0.8 meter above ground.

3). The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.

4). Power on the EUT and all the supporting units.

5). The turntable was rotated by 360 degrees to determine the position of the highest radiation.

6). The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emission field strength of both horizontal and vertical polarization.

7). For each suspected emission, the antenna tower was scanned (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.

8). Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode. Then all data was recorded in the peak detection mode. Quasi-peak readings performed only when an emission was found to be marginal (within -10 dBμV of specification limits), and are distinguished with a "**QP**" in the data plots.

4.6 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dBμV means the emission is 7dBμV below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. –Limit

4.7 Radiated Emissions Test Result

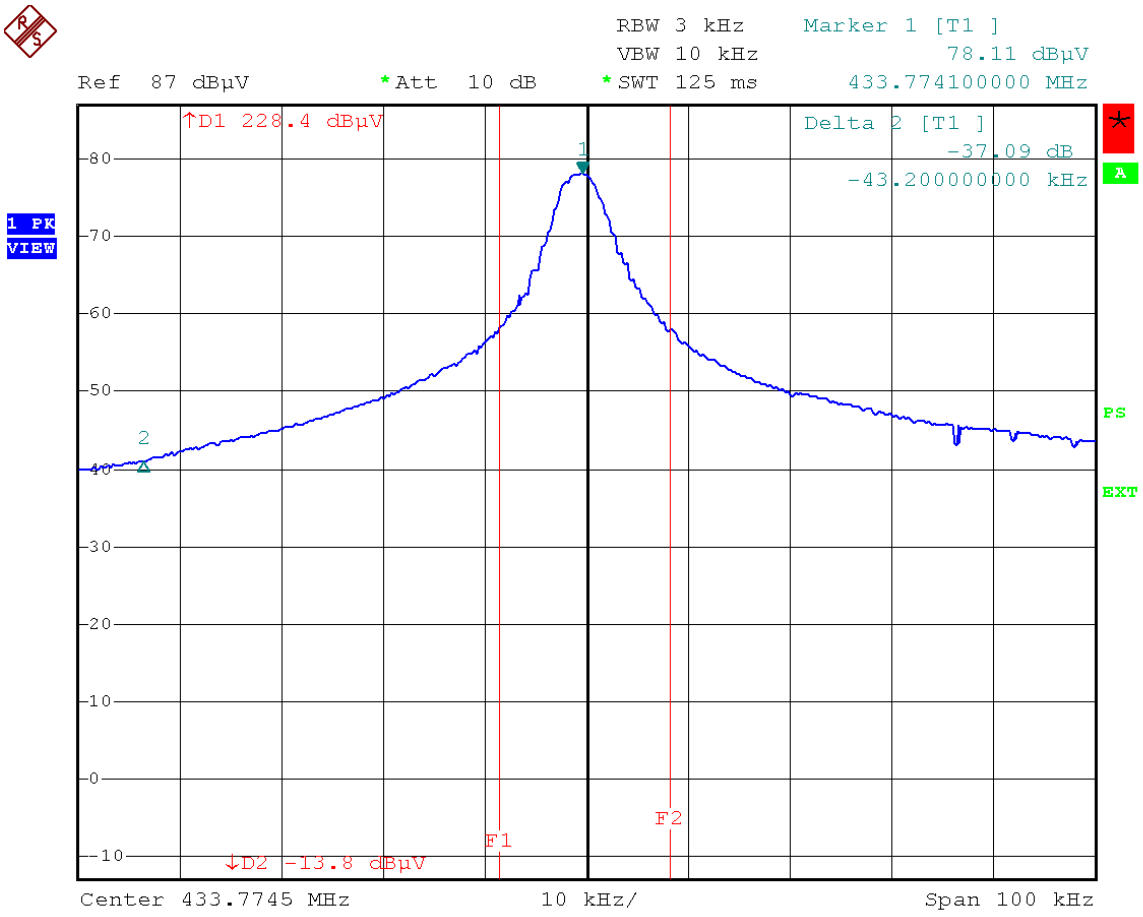
Temperature (℃)	22~23
Humidity (%RH)	50~54
Barometric Pressure (mbar)	950~1000
EUT	Tx of CAR ALARM SYSTEM
M/N	ST-Q318
Operating Mode	Keep Tx operating in continuous transmitting mode

Test plots see following pages

433.7741 MHz Tx in operation							
Maximum Frequency (MHz)	Emission Position and Level					Limit	Margin
	Polarity	m	Deg°	Transd	dBμV/m	dBμV/m	dBμV/m
433.7741	V	1.00	119.0	20.4	66.91	80.1	13.2
867.5484	V	1.20	89.0	21.5	43.56	61.94	18.4
1301.3225	V	1.00	72.0	23.2	36.38	61.94	25.5
1735.0967	V	1.00	155.0	23.6	34.67	61.94	27.2
2168.8707	V	1.00	54.0	24.1	33.33	61.94	28.6
2602.6449	V	---	---	---	---	61.94	---
3036.4190	V	---	---	---	---	61.94	---
3470.1931	V	---	---	---	---	61.94	---
---	---	---	---	---	---	---	---
Maximum Frequency (MHz)	Emission Position and Level					Limit	Margin
	Polarity	m	Deg°	Transd	dBμV/m	dBμV/m	dBμV/m
433.7741	H	1.20	7.0	20.4	77.5	80.1	2.6
867.5483	H	1.20	35.0	21.5	48.72	61.94	13.2
1301.3224	H	1.00	60.0	25.6	40.60	61.94	21.3
1735.0967	H	1.00	176.0	23.2	37.75	61.94	24.2
2168.8709	H	1.00	345.0	23.5	34.57	61.94	27.4
2602.6451	H	1.00	2.0	24.1	33.42	61.94	28.52
3036.4190	H	---	---	---	---	61.94	---
3470.1932	H	---	---	---	---	61.94	---
---	---	---	---	---	---	---	---

Remark:

--- Means that The emission level of the rest measuring harmonic up to 5GHz are so low below applicable limit in operation mode, so the result were not recorded.



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5- 20dB BANDWIDTH

5.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is ±4.0 dB.

5.2 Limit of 20dB Bandwidth

In accordance with Part15.231(c), the fundamental frequency bandwidth was kept within 0.25% of the center frequency for devices operating>70MHz and <900MHz.

Fundamental Frequency (MHz)	Limit of 20dB Bandwidth (kHz)
433.7741	433.7741x0.0025=1084.4

5.3 EUT Setup

The radiated emission tests were performed in the in the 3-meter anechoic chamber, using the setup accordance with the ANSI C63.4-2001.

The EUT was placed on the center of the nonmetal table which is 0.8 meter above a grounded turntable. The turntable can rotate 360 degrees to determine the azimuth of the maximum emission level.

Maximum emission emitted from EUT was determined by manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation and the levels in the final result of the test were recorded with the EUT running in the operating mode that maximum emission was emitted.

5.4 Test Procedure

1) Turn on the transmitter, and set it to transmit the pulse train continuously.

2) Set Test Receiver into spectrum analyzer mode, Tune the spectrum analyzer to the transmitter carrier frequency, and set the spectrum analyzer resolution bandwidth(RBW) to 100kHz and video bandwidth(VBW) to 100kHz, then select Peak function to scan the channel frequency.

3) The 20dB bandwidth was measured and recorded.

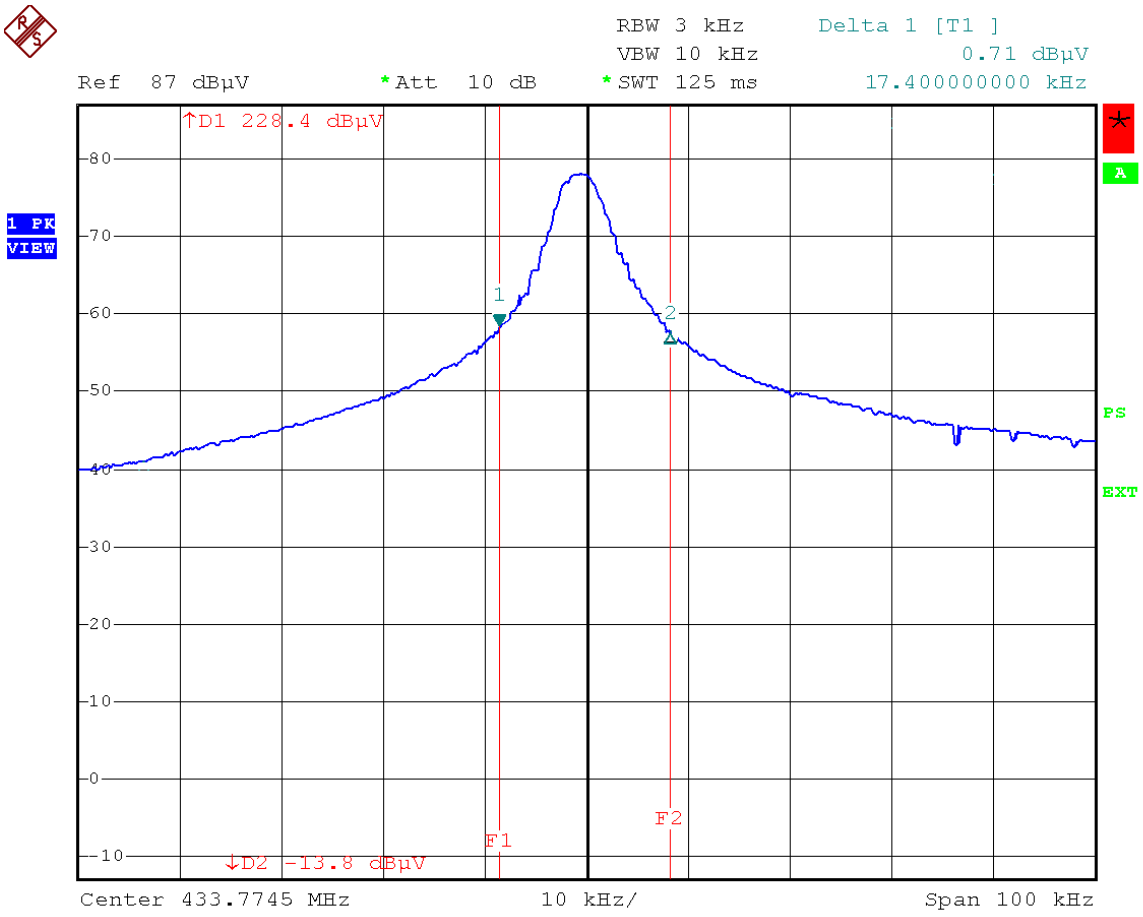
Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

5.5 Emissions within Band Edges Test Result

Temperature (℃)	22~23
Humidity (%RH)	50~54
Barometric Pressure (mbar)	950~1000
EUT	Tx of CAR ALARM SYSTEM
M/N	ST-Q318
Operating Mode	Keep Tx operating in continuous transmitting mode

Test plots see following pages

Fundamental Frequency (MHz)	20dB Bandwidth (kHz)	Maximum Limit (kHz)	Pass/Fail
433.7741	17.4	1084.4	Pass



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6- Duty Cycle

6.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is ±4.0 dB.

6.2 EUT Setup

The radiated emission tests were performed in the in the 3-meter anechoic chamber, using the setup accordance with the ANSI C63.4-2001.

The EUT was placed on the center of the nonmetal table which is 0.8 meter above a grounded turntable. The turntable can rotate 360 degrees to determine the azimuth of the maximum emission level.

6.3 Test Procedure

1) The EUT was placed on a turntable which is 0.8m above ground plane.

2) Set EUT operating in continuous transmitting mode

3) Set Test Receiver into spectrum analyzer mode, Tune the spectrum analyzer to the transmitter carrier frequency, and set the spectrum analyzer resolution bandwidth(RBW) to 1000kHz and video bandwidth(VBW) to 1000kHz, Span was set to 0Hz.

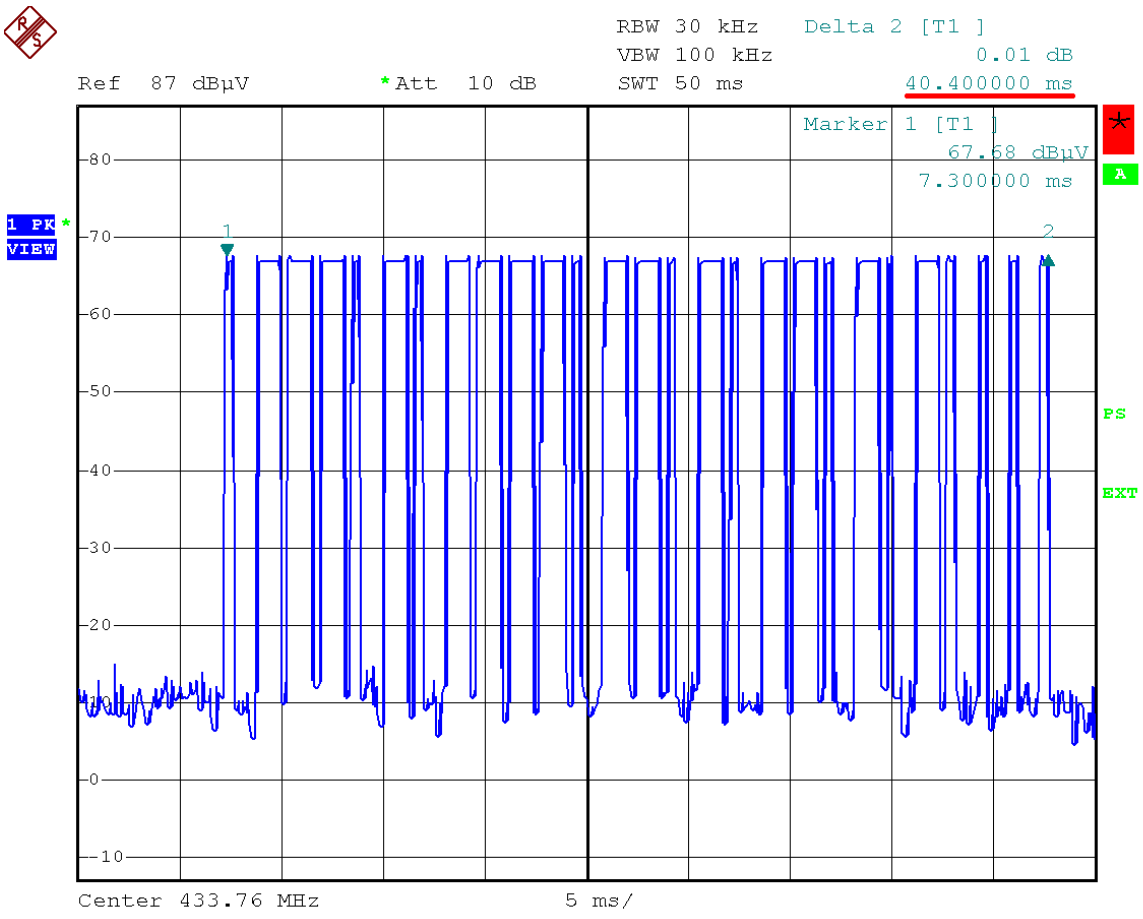
4) The Duty Cycle was measured and recorded.

6.4 Measurement Result

Temperature (℃)	22~23
Humidity (%RH)	50~54
Barometric Pressure (mbar)	950~1000
EUT	Tx of CAR ALARM SYSTEM
M/N	ST-Q318
Operating Mode	Keep Tx operating in continuous transmitting mode

Test plots see following pages

Total Pulse Time of Transmitter During 0.1 seconds Pulse Train Time = 1.2 msec×15 + 0.4msec×12
= 22.8msec



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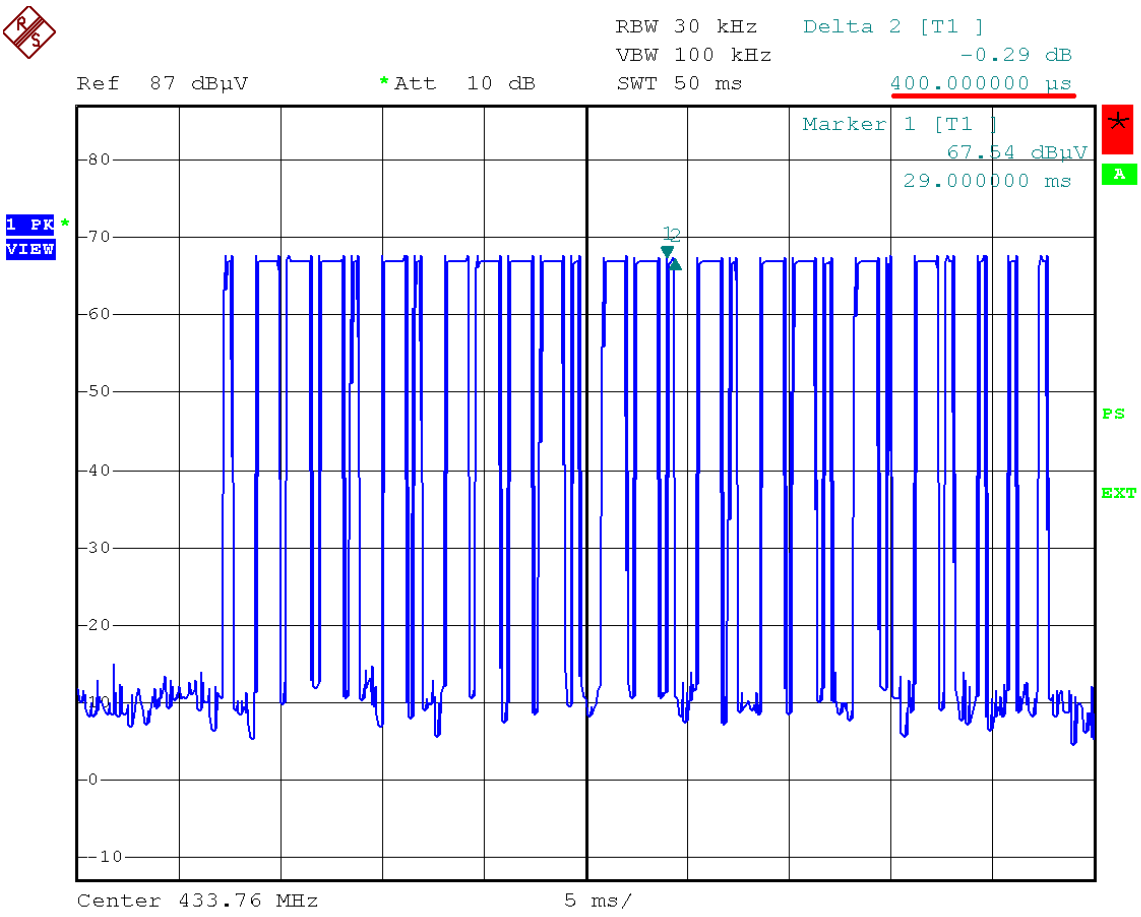

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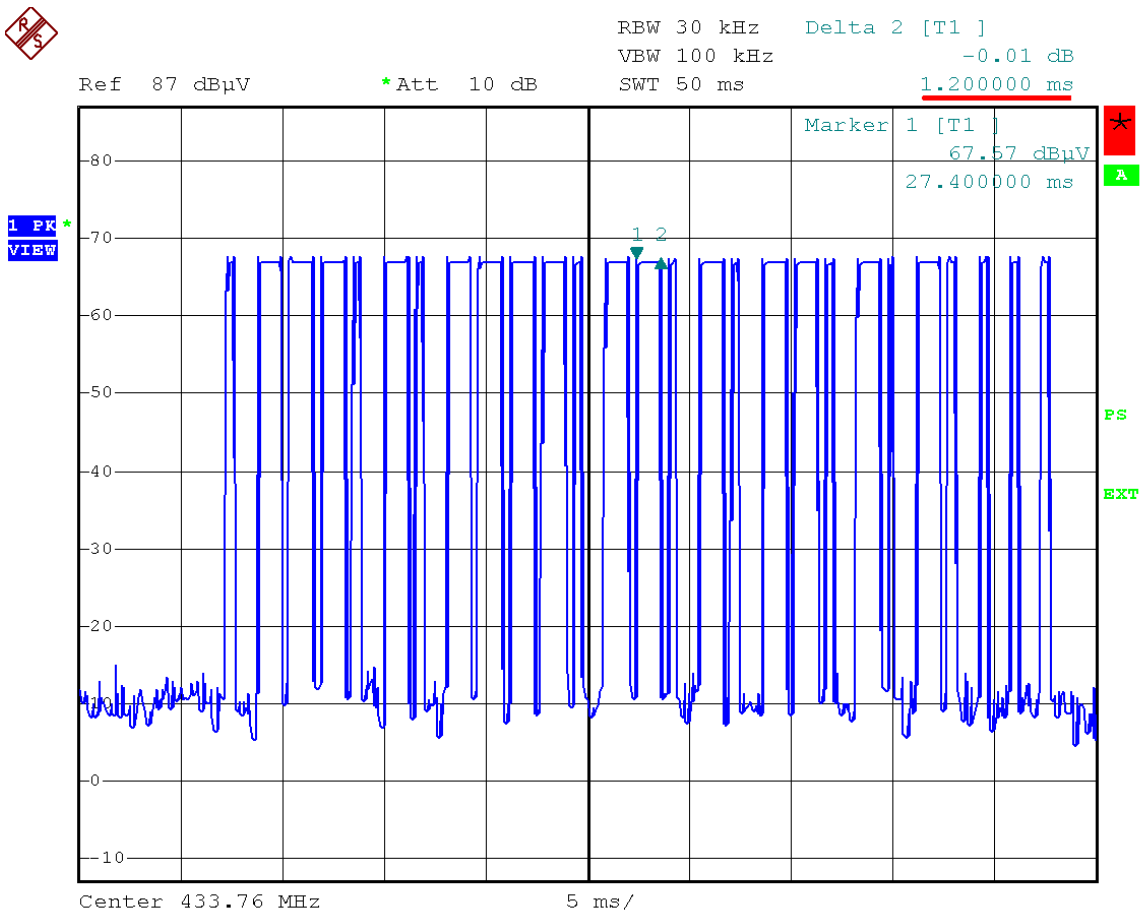

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