FCC PART 15.231

MEASUREMENT AND TEST REPORT

FOR

Shenzhen Viracle Electronics Co., Limited

5/F, Bldg.14, Lianchuang Tech-Park, Buji, Shenzhen, China.

FCC ID: ZQLVIRACLEVC8

Report Concerns: Original Report	**Equipment Type:** One Way Car Alarm With PKE Function
Model:	VC8
Report No.:	STR11068247I
Test Date:	2011-06-26 to 2011-07-08
Issue Date:	2011-07-12
Tested By:	Galy He / Engineer
Reviewed By:	Lahm Peng / EMC Manager
Approved & Authorized By:	Jandy so/PSQ Manager

Prepared By:

SEM.Test Compliance Service Co., Ltd
3/F, Jinbao Commerce Building, Xin'an Fanshen Road,
Bao'an District, Shenzhen, P.R.C.（518101）
Tel.: +86-755-33663308 Fax.: +86-755-33663309 Website: www.semtest.com.cn

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: Shenzhen Viracle Electronics Co., Limited
Address of applicant: 5/F, Bldg.14, Lianchuang Tech-Park, Buji, Shenzhen, China.

Manufacturer: Shenzhen Viracle Electronics Co., Limited
Address of manufacturer: 5/F, Bldg.14, Lianchuang Tech-Park, Buji, Shenzhen, China.

General Description of E.U.T

Items	Description
EUT Description:	One Way Car Alarm With PKE Function
Trade Name:	Viracle
Model No.:	VC8
Adding Model:	VC-360, VC-370, VC-380
Rated Voltage:	DC 3.0 V Battery
Frequency Range:	433.92MHz
Channel Spacing:	1
Antenna Type:	Integral Antenna
For more information refer to the circuit diagram form and the user's manual.	

The test data is gathered from a production sample, provided by the manufacturer, The other model listed in the report has different appearance only of VC8 without circuit and electronic construction changed, declared by the manufacturer.

1.2 Test Standards

The following report is prepared on behalf of the Shenzhen Viracle Electronics Co., Limited in accordance with FCC Part 15, Subpart C, and section 15.231, 15.203, 15.205 and 15.209 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15, Subpart C, and section 15.231, 15.203, 15.205 and 15.209 of the Federal Communication Commissions rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission/immunity, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, 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 emission level. The test modes were adapted accordingly in reference to the Operating Instructions. The EUT was set to keep transmitting during the test.

1.4 Test Facility

- **FCC – Registration No.: 994117**
  SEM.Test Compliance Services 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 and the Registration is 994117.

- **Industry Canada (IC) Registration No.: 7673A**
  The 3m Semi-anechoic chamber of SEM.Test Compliance Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 7673A.

- **CNAS Registration No.: L4062**
  Shenzhen SEM.Test Electronics Service Co., Ltd. is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L4062. All measurement facilities used to collect the measurement data are located at 3/F, Jinbao Commerce Building, Xin'an Fanshen Road, Bao'an District, Shenzhen, P.R.C (518101)

1.5 EUT Exercise Software

The EUT exercise program used during the testing was designed to exercise the system components. The test software, provided by the customer, is started while the whole system is running.

1.6 Accessories Equipment List and Details

Description	Manufacturer	Model	Serial Number
/	/	/	/
/	/	/	/

1.7 EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
/	/	/	/
/	/	/	/

2. SUMMARY OF TEST RESULTS

Description of Test	Result
§15.203 Antenna Requirement	Compliant
§15.205 Restricted Band	Compliant
§15.207 Conducted Emission	N/A
§15.209 General Requirement	Compliant
§15.231 (a) Deactivation Testing	Compliant
§15.231 (c) 20dB Band Width Testing	Compliant
§15.231 (b) Radiated Emission	Compliant

3. §15.203 ANTENNA REQUIREMENT

3.1 Standard Applicable

According to FCC 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

3.2 Test Result

This product has a permanent antenna, fulfill the requirement of this section.

4. §15.205, §15.209, §15.231 (b) RADIATED EMISSION

4.1 Measurement Uncertainty

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is ±5.10 dB.

4.2 Standard Applicable

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

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	\1\ 1,250 to 3,750	\1\ 125 to 375
174-260	3,750	375
260-470	\1\ 3,750 to 12,500	\1\ 375 to 1,250
Above 470	12,500	1,250

\1\ Linear interpolations.

The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in §15.209, whichever limit permits a higher field strength.

compliance with the provisions of §15.205 shall be demonstrated using the measurement instrumentation specified in that section.

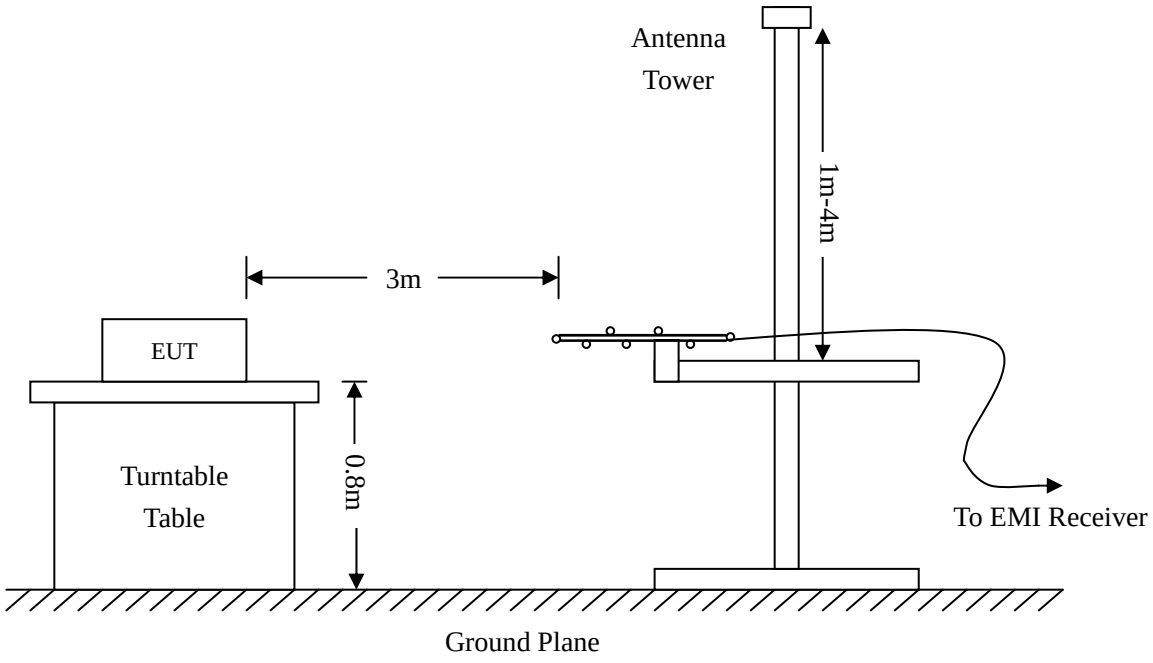
4.3 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2010-12-20	2011-12-19
EMI Test Receiver	R&S	ESVB	825471/005	2010-12-20	2011-12-19
Positioning Controller	C&C	CC-C-1F	N/A	2010-12-20	2011-12-19
RF Switch	EM	EMSW18	SW060023	2010-12-20	2011-12-19
Pre-amplifier	Agilent	8447F	3113A06717	2010-12-20	2011-12-19
Pre-amplifier	Compliance Direction	PAP-0118	24002	2010-12-20	2011-12-19
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2011-01-09	2012-01-08
Horn Antenna	ETS	3117	00086197	2011-01-09	2012-01-08

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

4.4 Test Procedure

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15.205 15.231(b) and FCC Part 15.209 Limit.



4.5 Corrected Amplitude & Margin Calculation

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

Corr. Ampl. = Indicated Reading +Ant.Loss +Cab. Loss – Ampl.Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dBμV means the emission is 6dBμV below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – FCC Part 15.231 Limit

4.6 Environmental Conditions

Temperature:	21° C
Relative Humidity:	50%
ATM Pressure:	1011 mbar

4.7 Summary of Test Results/Plots

According to the data below, the FCC Part 15.205, 15.209 and 15.231 standards, and had the worst margin of:

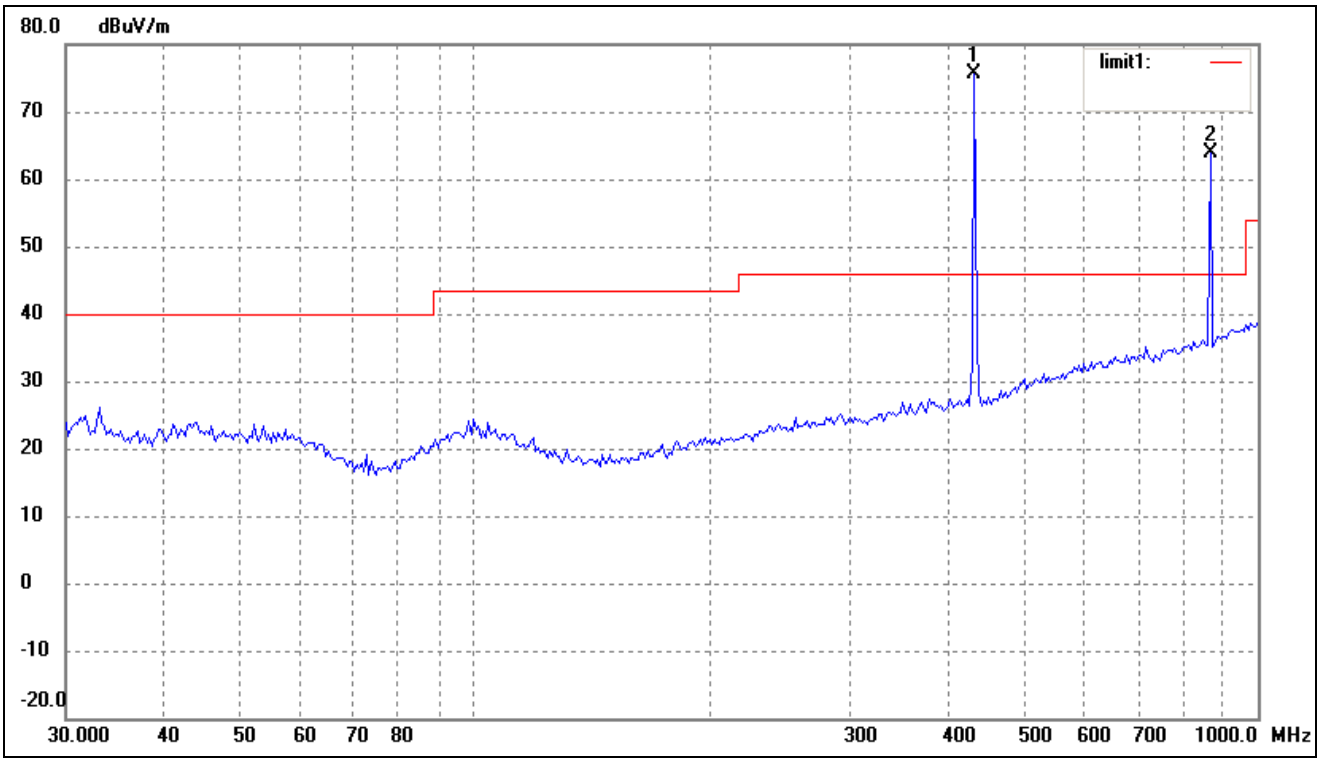
-4.48 dBμV at **1303.20MHz** in the **Horizontal, Ave Detector** polarization, **Transmitting** Model, **30 MHz to 5 GHz, 3Meters**

Note: *this EUT was tested in 3 orthogonal positions and the worst case position data was reported.*

Plot of Radiation Emissions Test

Test Model: Transmitting

Horizontal:

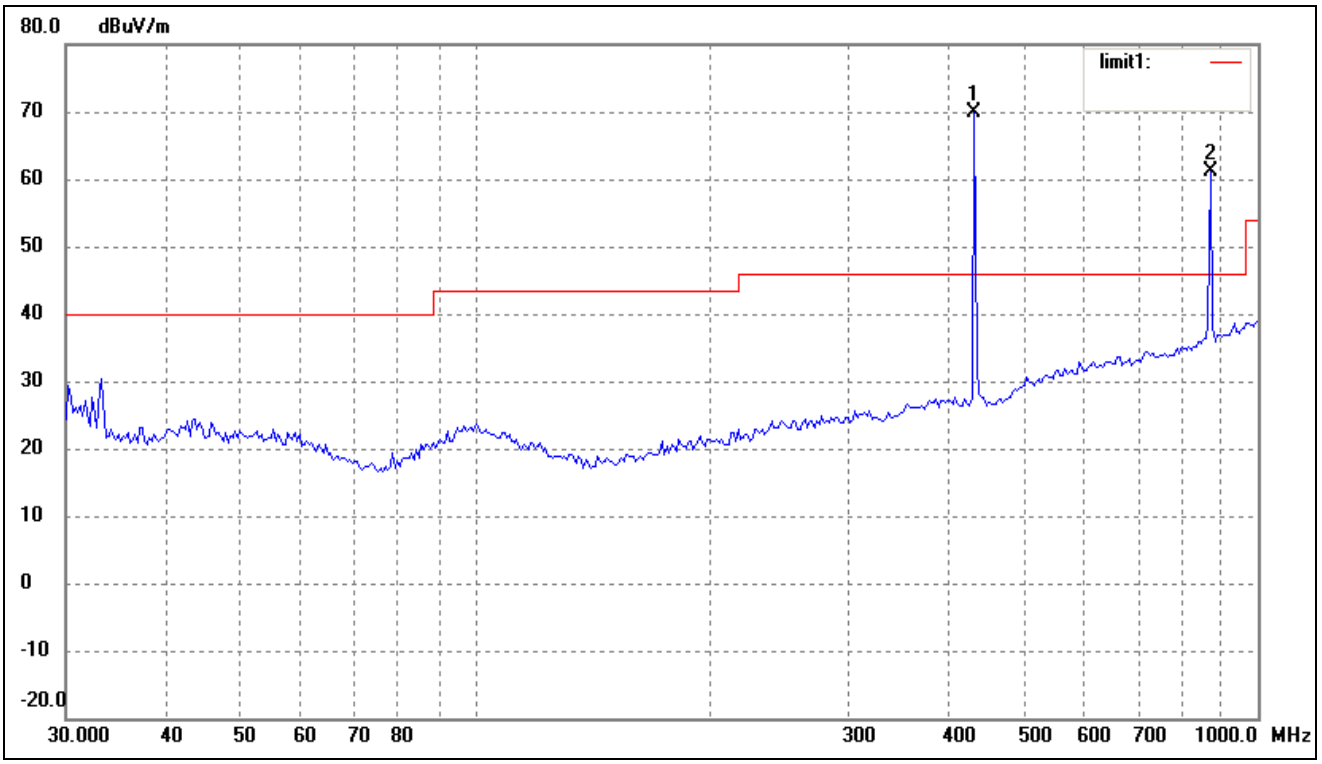


No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor (dB)	Dutycycle Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	433.9200	63.82	11.93	N/A	75.75	100.81	-25.06	360	200	peak
2	869.1302	43.65	20.32	N/A	63.97	80.83	-16.86	360	200	peak
	433.9200	/	/	-9.58	66.17	80.81	-14.64	80	200	Ave
	869.1302	/	/	-9.58	54.39	60.83	-6.44	85	200	Ave

Above 1GHz

No.	Frequency MHz	Reading dBuV/m	Corr. Factor (dB)	Dutycycle Factor (dB)	Result dBuV/m	Limit dBuV/m	Margin dB	Deg. (°)	Height (cm)	Remark
1	1303.20	32.15	26.95	N/A	59.10	74.00	-14.90	360	100	Peak
2	1738.70	29.52	27.77	N/A	57.29	74.00	-16.71	360	100	Peak
	1303.20	/	/	-9.58	49.52	54.00	-4.48	120	100	Ave
	1738.70	/	/	-9.58	47.71	54.00	-6.29	175	100	Ave

Vertical:



No.	Frequency	Reading	Corr.	Dutycycle	Result	Limit	Margin	Deg.	Height	Remark
	MHz	dBuV/m	Factor(dB)	Factor (dB)	dBuV/m	dBuV/m	(dB)	(°)	(cm)	
3	433.9200	57.89	11.93	N/A	69.82	100.81	-30.99	360	100	peak
4	869.1302	40.75	20.32	N/A	61.07	80.83	-19.76	360	100	peak
	433.9200	/	/	-9.58	60.24	80.81	-20.57	85	100	Ave
	869.1301	/	/	-9.58	51.49	60.83	-9.34	80	100	Ave

Above 1GHz

No.	Frequency	Reading	Corr.	Dutycycle	Result	Limit	Margin	Deg.	Height	Remark
	MHz	dBuV/m	Factor (dB)	Factor (dB)	dBuV/m	dBuV/m	dB	(°)	(cm)	
1	1303.20	31.59	26.95	N/A	58.54	74.00	-15.46	360	100	Peak
2	1738.70	28.24	27.77	N/A	56.01	74.00	-17.99	360	100	Peak
	1303.20	/	/	-9.58	48.96	54.00	-5.04	78	100	Ave
	1738.70	/	/	-9.58	46.43	54.00	-7.57	92	100	Ave

Note: The EUT was tested in all three orthogonal planes and frequency rang 30MHz to the tenth harmonics. Emissions attenuated closely to the noise base are not reported.

The fundamental frequency is 433.92MHz, so the fundamental and spurious emissions radiated limit base on the the operating frequency 433.92MHz.

5. §15.231(c) 20dB BANDWIDTH TESTING

5.1 Standard Applicable

According to FCC 15.231(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. Bandwidth is determined at the points 20 dB down from the modulated carrier.

5.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	Agilent	E4402B	US41192821	2010-12-20	2011-12-19
Attenuator	ATTEN	ATS100-4-20	/	2010-12-20	2011-12-19

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

5.3 Test Procedure

With the EUT's antenna attached, the EUT's 20dB Bandwidth power was received by the test antenna, which was connected to the spectrum analyzer with the START, and STOP frequencies set to the EUT's operation band.

5.4 Environmental Conditions

Temperature:	21° C
Relative Humidity:	52%
ATM Pressure:	1011 mbar

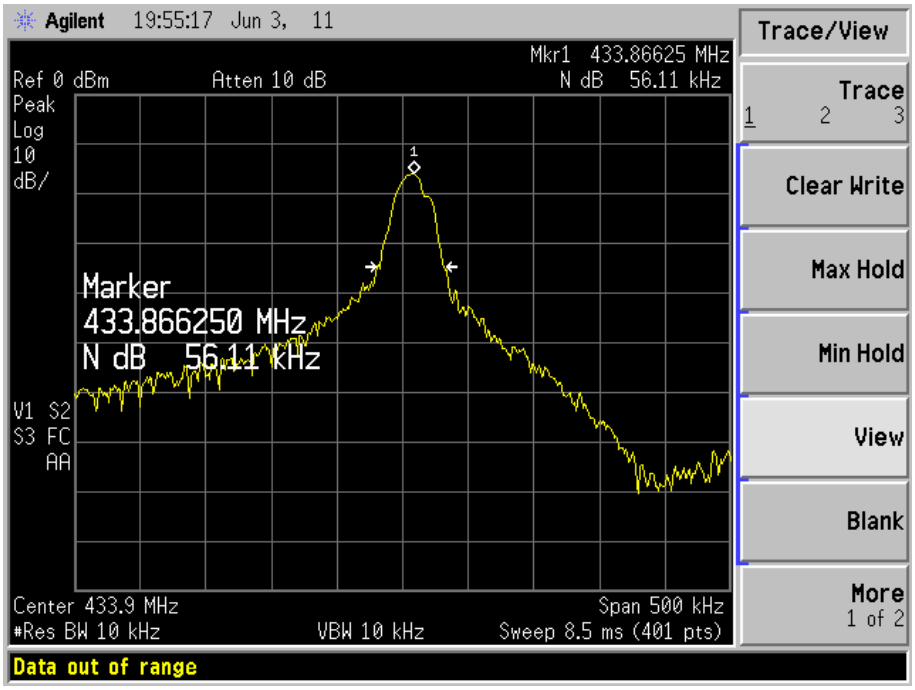
5.5 Summary of Test Results/Plots

Frequency MHz	20dB Bandwidth KHz	Limit kHz
433.92	56.11	1084.8

Limit=Fundamental Frequency×0.25%=433.92×0.25%=1084.8kHz

Test Result Pass

Refer to the attached plots.



6. §15.231(a) DEACTIVATION TESTING

6.1 Standard Applicable

According to FCC 15.231 (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.

6.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	Agilent	E4402B	US41192821	2010-12-20	2011-12-19
Attenuator	ATTEN	ATS100-4-20	/	2010-12-20	2011-12-19

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

6.3 Test Procedure

With the EUT's antenna attached, the EUT's output signal was received by the test antenna, which was connected to the spectrum analyzer. Set the center frequency to 433.92MHz, than set the spectrum analyzer to Zero Span for the release time reading. During the testing, the switch was released then the EUT automatically deactivated.

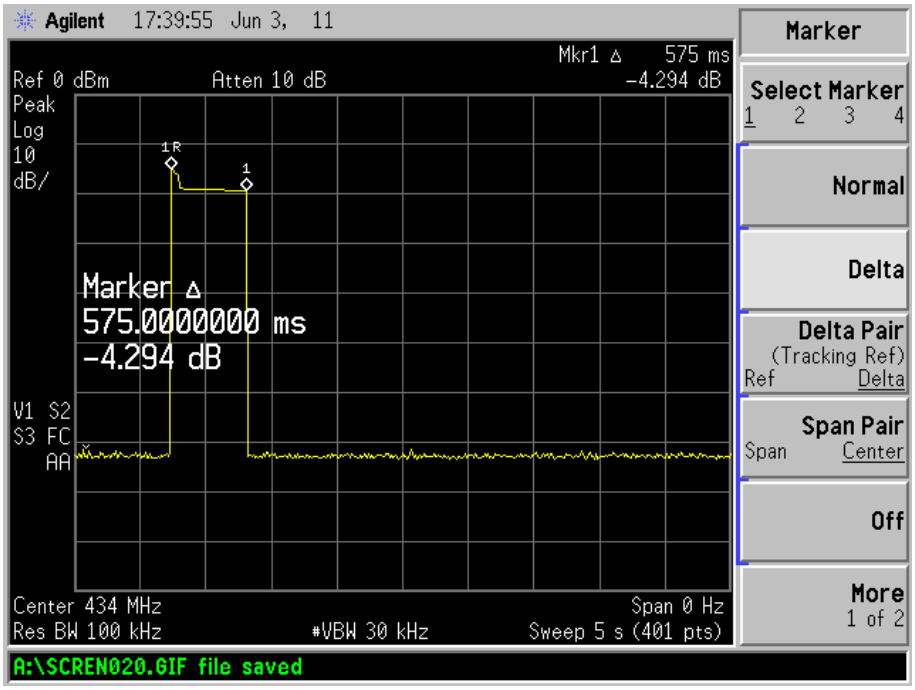
6.4 Environmental Conditions

Temperature:	20° C
Relative Humidity:	52%
ATM Pressure:	1011 mbar

6.5 Summary of Test Results/Plots

Refer to the attached plots.

The transmission time <5s



Result: Pass

7. §15.231(b) Duty Cycle

7.1 Standard Applicable

According to FCC 15.231 (b)(2) and 15.35 (c), For pulse operation transmitter, the averaging pulsed emissions are calculated by peak value of measured emission plus duty cycle factor.

7.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	Agilent	E4402B	US41192821	2010-12-20	2011-12-19
Attenuator	ATTEN	ATS100-4-20	/	2010-12-20	2011-12-19

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

7.3 Test Procedure

With the EUT's antenna attached, the EUT's output signal was received by the test antenna, which was connected to the spectrum analyzer. Set the center frequency to 433.92MHz, than set the spectrum analyzer to Zero Span for the release time reading. During the testing, the switch was released then the EUT automatically deactivated.

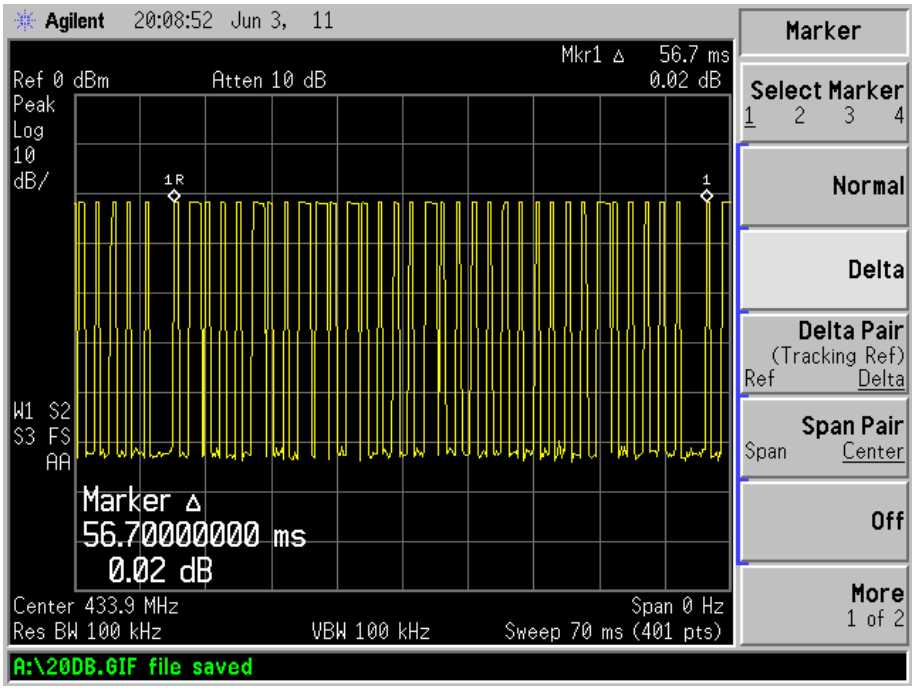
7.4 Environmental Conditions

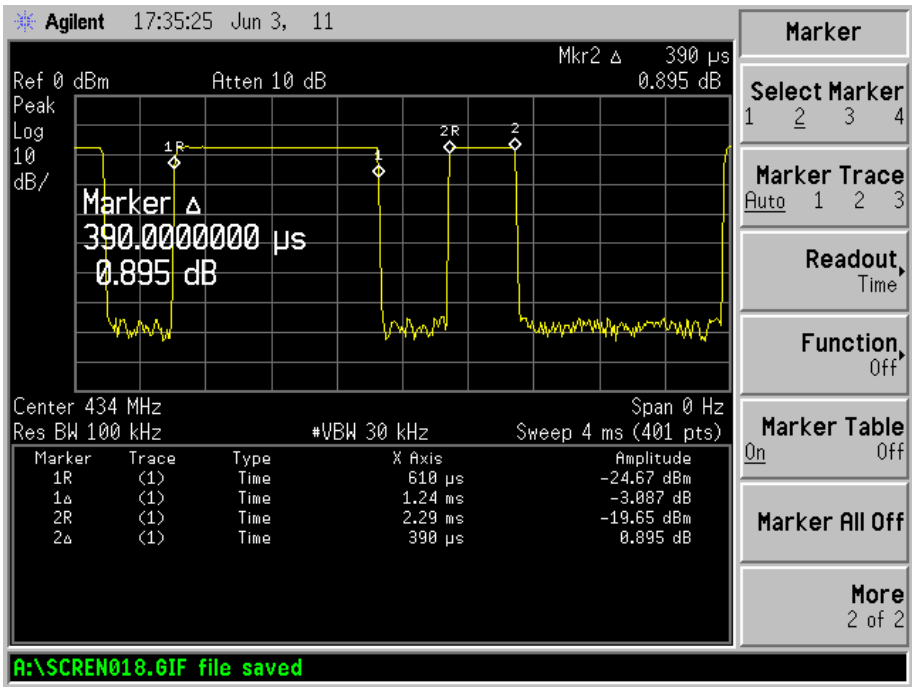
Temperature:	20° C
Relative Humidity:	52%
ATM Pressure:	1011 mbar

7.5 Summary of Test Results/Plots

Tp = 56.7 ms
Ton = Ton1 * Number + Ton2 * Number = 1.24*7+0.39*26=18.82ms
Duty Cycle = Ton / Tp * 100% = 33.19%
Factor = 20*Log (Ton/Tp) = -9.58dB

Refer to the attached plots.





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