



**FCC PART 15C
TEST REPORT
No. 2014EEB00058-SRD**

For

LOCCA lost&found services GmbH

GPS tracker

Model Name: T100

Marketing Name: Locca Mini

With

Hardware Version: V3.1

Software Version: V2.0

FCC ID: 2ABNZ-LOCCAMINI

IC Number: 11840A-LOCCAMINI

Issued Date: Aug 22nd, 2014

Test Laboratory:

FCC 2.948 Listed: No.310359

IC O.A.T.S listed: No.6629C-1

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of TMC Beijing.

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1. Test Laboratory

1.1. Testing Location

Company Name: TMC Shenzhen, Telecommunication Metrology Center of MIIT
Address: No.12 Building, Shangsha Innovation and Technology Park, Futian District, Shenzhen, P. R. China
Postal Code: 518048
Telephone: +86(0)755-33322000
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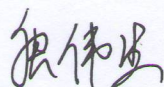
1.2. Testing Environment

Normal Temperature: 15°C-30°C
Extreme Temperature: -20°C/+55°C
Relative Humidity: 30%-60%

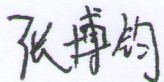
1.3. Project data

Project Leader: Zhang Bojun
Test Engineer: Tang Weisheng
Testing Start Date: Jan 6th, 2014
Testing End Date: Aug 15th, 2014

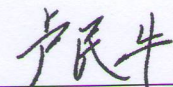
1.4. Signature



Tang Weisheng
(Prepared this test report)



Zhang Bojun
(Reviewed this test report)



Lu Minniu
Director of the laboratory
(Approved this test report)

2. Client Information

2.1. Applicant Information

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2.2. Manufacturer Information

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andar a , macau
Country: China
City: macau
E-mail: Michael.sun@emporiatelecom.com
Telephone: (86) 755 2391 0500
Fax: (86) 755 2351 0530

3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description	GPS tracker
Type	T100
Marketing Name	Locca Mini
Frequency	868.3MHz
Modulation bandwidth	100kHz
Assigned Frequency Band	868.25MHz~868.35MHz
Channel Number	1
Extreme Temperature	-20/+55°C
Normal Voltage	3.7 V
Extreme Low Voltage	3.5 V
Extreme High Voltage	4.2 V
FCC ID	2ABNZ-LOCCAMINI
IC Number	11840A-LOCCAMINI

Note: Photographs of EUT are shown in ANNEX A of this test report.

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version
EUT1	/	V3.1	V2.0

*EUT ID: is used to identify the test sample in the lab internally.

3.3. Internal Identification of AE used during the test

AE ID*	Description	Type	SN
AE1	Li-ion Battery	AK-T100	/
AE2	Charger	TPA-655055UU	/

*AE ID: is used to identify the test accessory in the lab internally.

4. Reference Documents

4.1. Documents supplied by applicant

EUT feature information is supplied by the applicant or manufacturer, which is the basis of testing.

4.2. Reference Documents for testing

The following documents listed in this section are referred for testing.

Reference	Title	Version
FCC Part15	FCC CFR 47, Part 15, Subpart C: 15.205 Restricted bands of operation; 15.209 Radiated emission limits, general requirements; 15.231 Periodic operation in the band 40.66–40.70MHz and above 70 MHz.	Oct,2012 Edition
ANSI C63.4	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2009
IC RSS-210	RSS-210 Spectrum Management and Telecommunications Radio Standards Specification - Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment	Issue 8 Dec,2010
IC RSS-Gen	General Requirements and Information for the Certification of Radio Apparatus	Issue 3 Dec,2010

5. Laboratory Environment

Half-anechoic chamber (11.20 meters×6.10 meters×5.60 meters) did not exceed following limits:

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 2M Ω
Ground system resistance	< 0.5 Ω
Normalized Site Attenuation (NSA)	< ±3.5dB, with 3m of Measuring distance, 30MHz – 1000MHz
Uniformity of field strength	Between 0 and 6 dB, from 80MHz to 3000 MHz

Fully-anechoic chamber (11.20 meters×6.10 meters×6.60 meters) did not exceed following limits:

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 2M Ω
Ground system resistance	< 0.5 Ω
VSWR	Between 0 and 6 dB, from 30MHz to 18 000 MHz

Conduction Lab did not exceed following limits:

Temperature	Min.=15 °C, Max.=30 °C
Relative humidity	Min.=30 %, Max.= 60 %
Shielding effectiveness	> 80 dB
Electrical insulation	> 2M Ω
Ground system resistance	< 0.5 Ω

6. Summary of Test Results

6.1. Summary of Test Results

No	Test cases	Sub-clause of Part15C	Sub-clause of IC	Verdict
0	Antenna Requirement	15.203	/	P
1	Occupied 20dB Bandwidth	15.231(c)	/	P
2	Release Time Measurement	15.231(e)	/	P
3	Radiated Spurious Emission	15.231(e),15.205,15.209	RSS-GEN Issue3 7.2.5	P
4	Occupied Bandwidth	/	RSS-210 Issue8 A1.1.3	P

6.2. Statements

TMC has evaluated the test cases requested by the applicant/manufacture as listed in section 6.1 of this report, for the EUT specified in section 3, according to the standards or reference documents listed in section 4.2

6.3. Terms used in the result table

Terms used in Verdict column

P	Pass
NA	Not Available
F	Fail

Abbreviations

AC	Alternating Current
BW	Band Width
ISM	Industrial, Scientific and Medical
RF	Radio Frequency

7. Test Equipments Utilized

Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Due date	Calibration Period
1	Vector Signal Analyzer	FSV40	100903	Rohde & Schwarz	2015-04-22	1 year

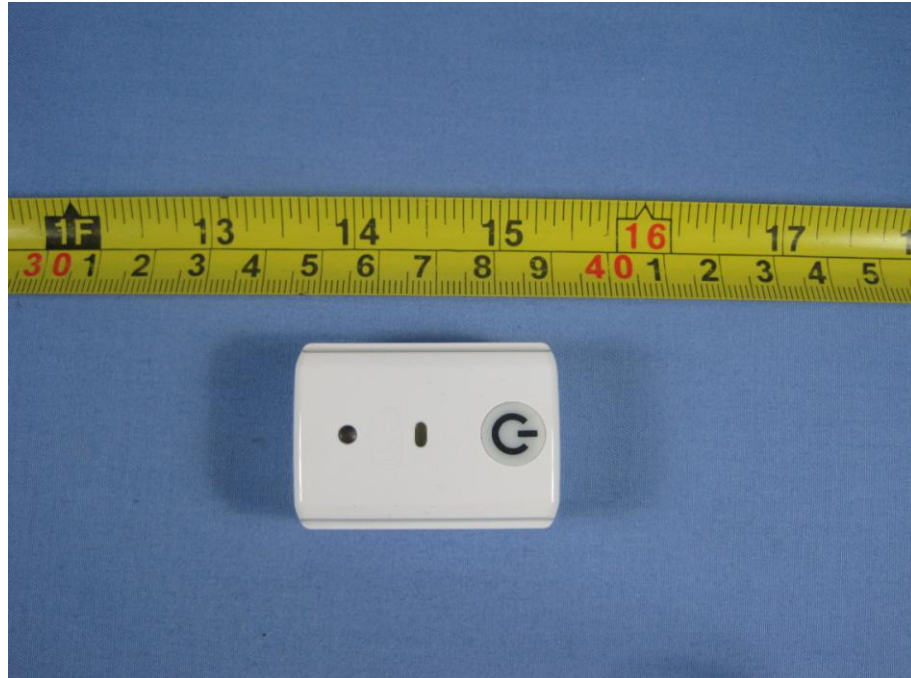
Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Due date	Calibration Period
1	Chamber	FACT5-2.0	4166	ETS-Lindgren	2016-05-29	3 years
2	Test Receiver	ESCI	100701	Rohde & Schwarz	2015-07-30	1 year
3	Spectrum Analyzer	FSP40	100378	Rohde & Schwarz	2014-12-20	1 year
4	BiLog Antenna	VULB9163	9163-329	Schwarzbeck	2017-01-20	3 years
5	Dual-Ridge Waveguide Horn Antenna	3117	00066577	ETS-Lindgren	2016-04-01	3 years

Anechoic chamber

Fully anechoic chamber by ETS-Lindgren.

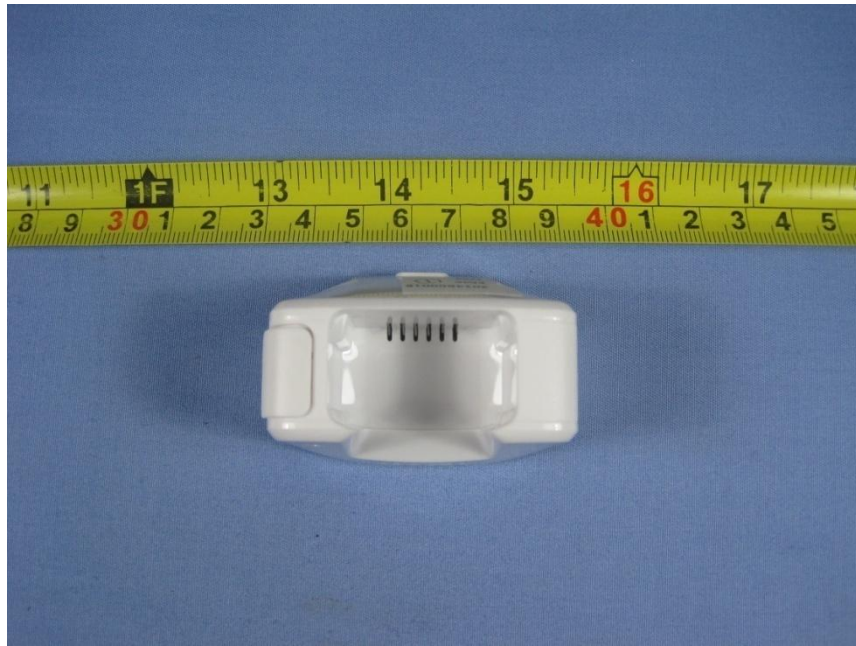
ANNEX A: EUT photograph



Pic A-1 GPS tracker



Pic A-2 GPS tracker



Pic A-3 Docker



Pic A-4 Charger

ANNEX B: MEASUREMENT RESULTS

B.0 Antenna requirement

Measurement Limit:

Standard	Requirement
FCC CRF Part 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. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, § 15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

**Conclusion: The Directional gains of antenna used for transmitting is -1.0 dBi.
The RF transmitter uses an integrate antenna without connector.**

B.1 Occupied 20dB Bandwidth

Measurement Limit:

Standard	Limit (kHz)
FCC 47 CFR Part 15.231 (c)	No wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz.

Measurement Result:

Frequency(MHz)	Occupied 20dB Bandwidth(kHz)	Limit(kHz)	Test Result	conclusion
868.3	115.80	2170.75	Fig.1	P

See ANNEX C for test graphs.

Conclusion: PASS

B.2 Release Time Measurement

Standard

FCC 47 CFR Part 15.231(e)

Measurement Limit:

In addition, devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmission shall not be at least 30 times the duration of the transmission but in no case less than 10seconds.

Calculation:

Period time=12.17s, Duration time=0.11s,

Silent time=12.17s-0.11s=12.06s>10s, Silent time=12.17s-0.11s=12.06s>30*0.11s=3.3s

Measurement Result:

Frequency (MHz)	One period(s)	Pulse width(ms)	Test Result
868.3	12.17	110.87	Fig.2
			Fig.3

See ANNEX C for test graphs.

Conclusion: PASS

B.3 Average Factor Measurement

Standard

ANSI C63.4-2009 Section 13.4.2

Measurement Limit:

Devices transmitting pulsed emissions and subject to a limit requiring an average detector function for radiated emissions shall initially be measured with an instrument that uses a peak detector. A radiated emission measured with a peak detector may then be corrected to a true average using the appropriate factor for emission duty cycle. This correction factor relates the measured peak level to the average limit and is derived by averaging absolute field strength over one complete pulse train that is 0.1s, or less, in length. If the pulse train is longer than 0.1s, the average shall be determined from the average absolute field strength during the 0.1s interval in which the field strength is at a maximum.

Calculation:

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

Effective period of the cycle= $(0.87 \times 36) + (2.68 \times 3) + (18.55 \times 1)$ ms = 57.91ms

DC=57.91ms/100ms=57.91%

The average factor is found by $20\log 0.5791 = -4.75$ dB

Measurement Result:

Frequency (MHz)	One period (s)	Long Pulse width(ms)	Long Pulse num	Medium Pulse width(ms)	Medium Pulse num	Short Pulse width(ms)	Short Pulse num	Test Result
868.3	12.17	18.55	1	2.68	3	0.87	36	Fig.4
								Fig.5
								Fig.6
								Fig.7

See ANNEX C for test graphs.

Conclusion: PASS

B.4 Radiated Spurious Emission

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.231(b), 15.205, 15.209, 15.23(e) RSS-GEN Issue3 7.2.5	20dB below peak output power

In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a) and 15.231(e), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)) and 15.231(e).

Limit in restricted band:

Frequency of emission (MHz)	Field strength(μ V/m)	Measurement distance(meters)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Condition

The EUT was placed on a non-conductive table. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

Frequency of emission (MHz)	RBW/VBW	Sweep Time(s)
30-1000	120kHz/300kHz	5
1000-4000	1MHz/1MHz	15
4000-18000	1MHz/1MHz	40
18000-26500	1MHz/1MHz	20

Note: According to the performance evaluation, the radiated emission margin of EUT is over 20dB in the band from 9kHz to 30MHz. Therefore, the measurement starts from 30MHz to tenth harmonic.

The measurement results include the horizontal polarization and vertical polarization measurements.

Measurement Results:

Frequency(MHz)	Frequency Range	Value (dB μ V/m)	Limit (dB μ V/m)	Test Results	Conclusion
868.3	30 MHz ~1 GHz (QP Detect)	73.4	74.0	Fig.8	P
	1 GHz ~ 10 GHz (PK&AV Detect)	/	/	Fig.9	P

Fig.8 display the measurement of QP values.

Average value=peak value +Average factor(Duty cycle)

Tx Radiated Spurious Emission (1-10GHz)

Frequency (MHz)	MaxPeak (dBμV/m)	Polarization	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1740.2500	43.7	V	-1.5	29.3	74.0
2604.2500	43.9	V	0.1	30.1	74.0
3472.7500	46.9	V	2.0	27.1	74.0
4341.2500	49.0	H	4.7	25.0	74.0
6078.2500	46.6	H	7.1	27.4	74.0
9968.5000	51.9	V	10.4	22.1	74.0

Tx Radiated Spurious Emission (1-10GHz)

Frequency (MHz)	Average (dBμV/m)	Polarization	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1740.2500	37.9	V	-1.5	16.1	54.0
2604.2500	38.7	V	0.1	15.3	54.0
3472.7500	42.4	V	2.0	11.6	54.0
4341.2500	46.5	H	4.7	7.5	54.0
6078.2500	40.1	H	7.1	13.9	54.0
9968.5000	41.2	V	10.4	12.8	54.0

See ANNEX C for test graphs.

Conclusion: Pass

B.5 Occupied Bandwidth

Measurement Limit:

Standard	Limit
RSS-210 Issue8 A1.1.3	The 99% bandwidth shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz.

Measurement Result:

Frequency(MHz)	Test Value(kHz)	Limit(kHz)	Test Result	conclusion
868.3	101.30	2170.75	Fig.10	P

See ANNEX C for test graphs.

Conclusion: PASS

ANNEX C: TEST FIGURE LIST

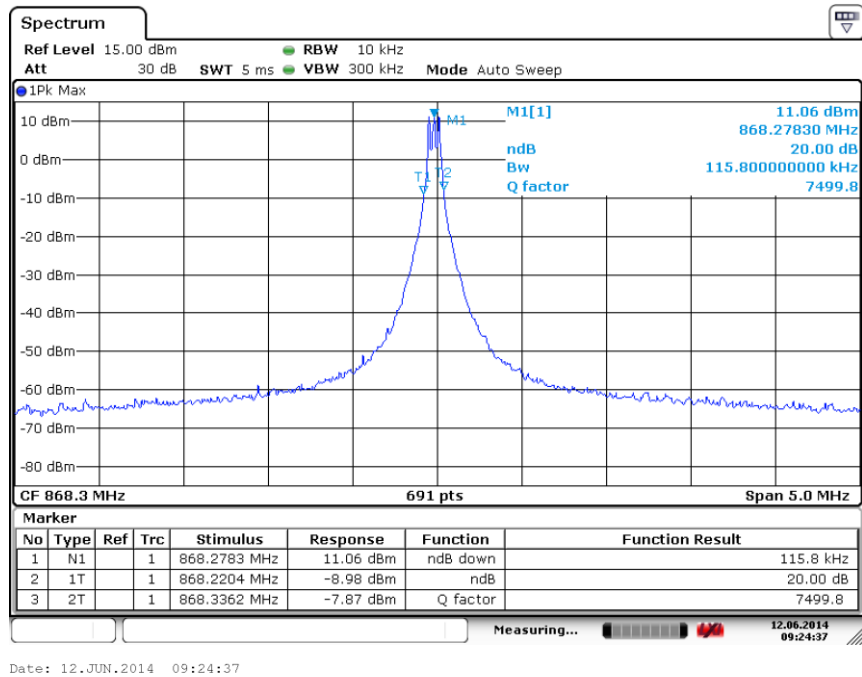


Fig. 1 Occupied 20dB Bandwidth

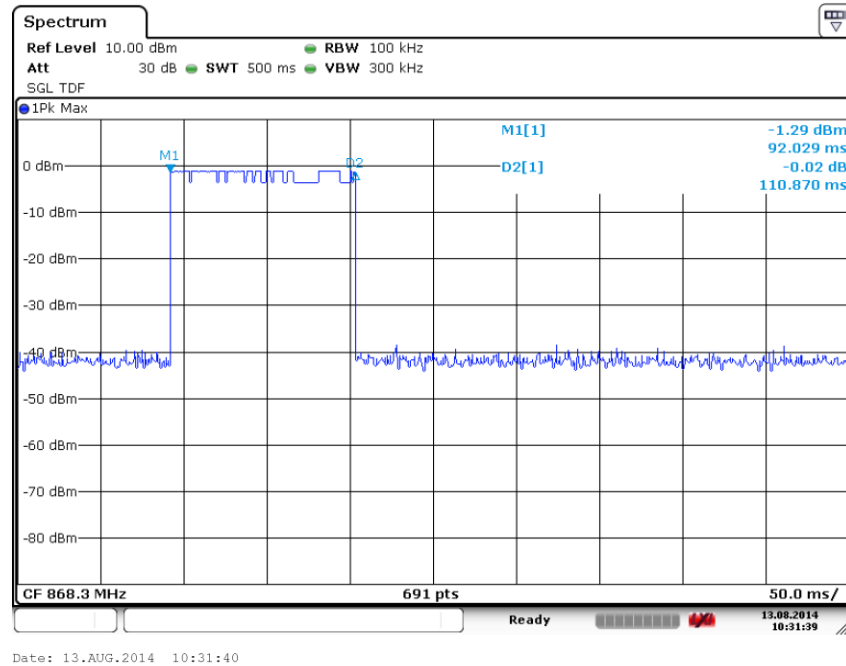


Fig. 2 Release Time

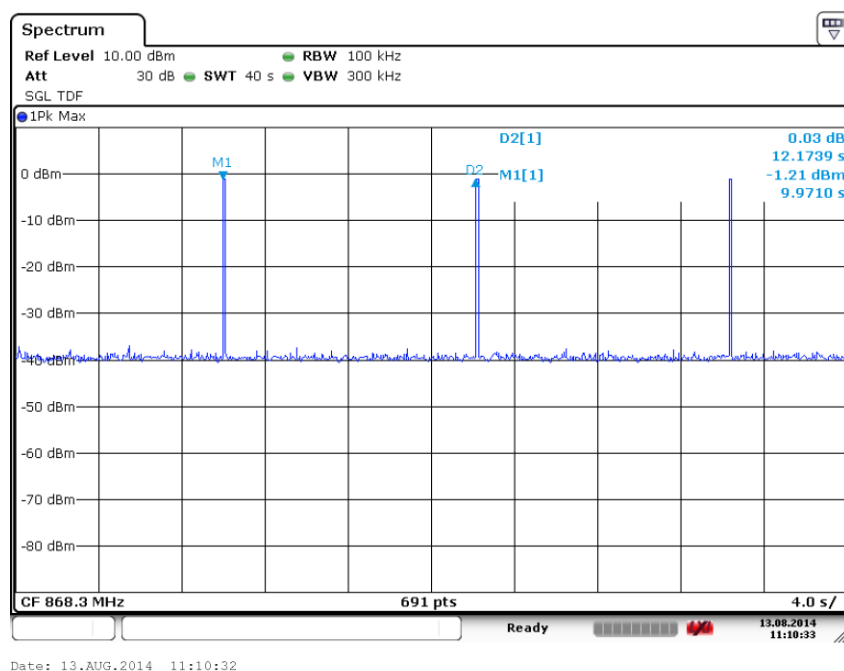


Fig. 3 Release Time

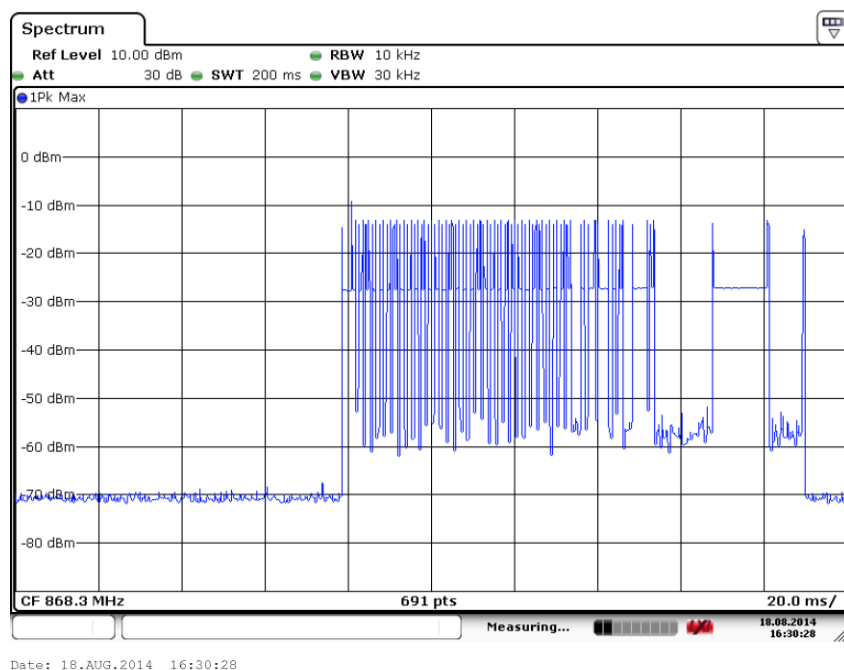


Fig. 4 Average Factor (one complete transmission)

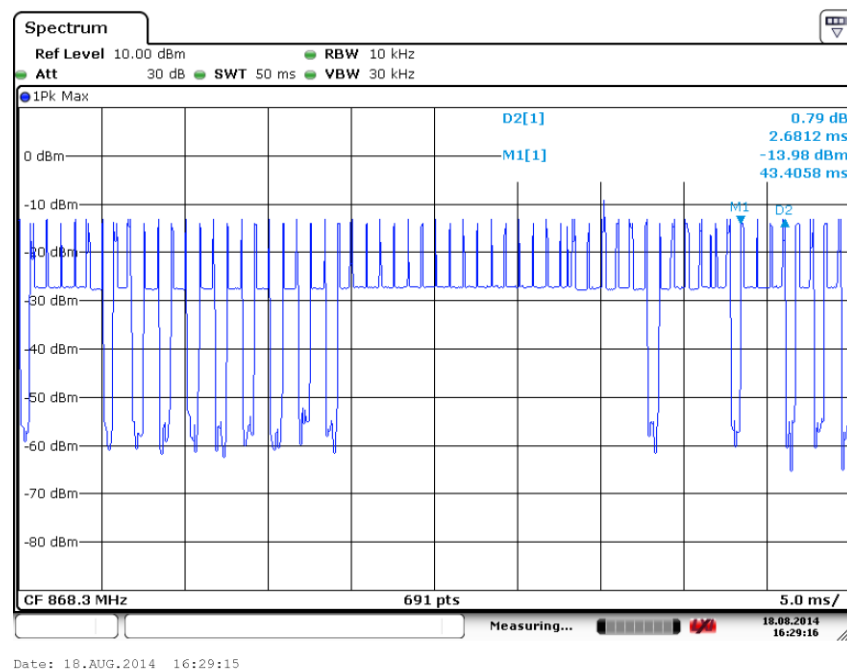


Fig. 5 Average Factor (medium length pulse)

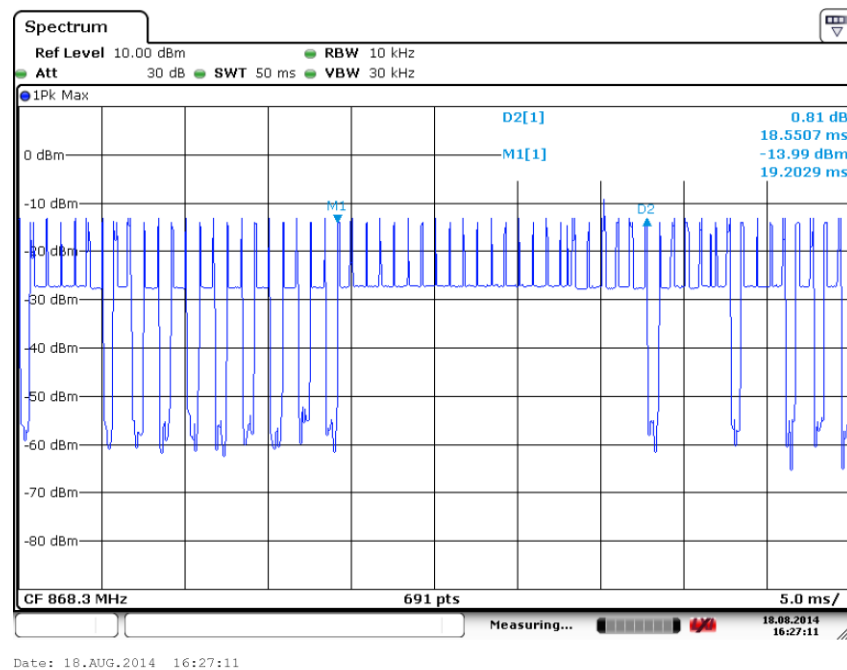


Fig. 6 Average Factor (long pulse)

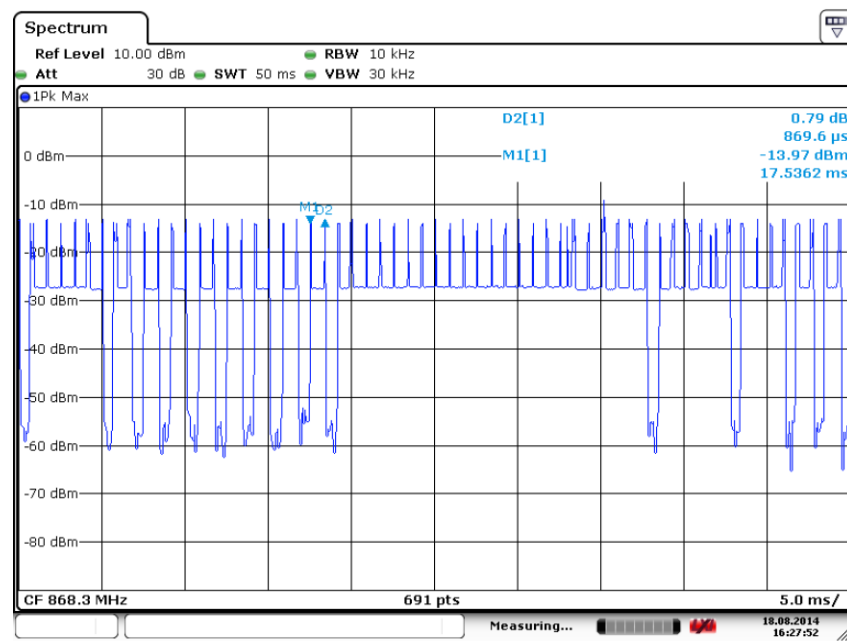


Fig. 7 Average Factor (short pulse)

RE 30M-1G SWEEP

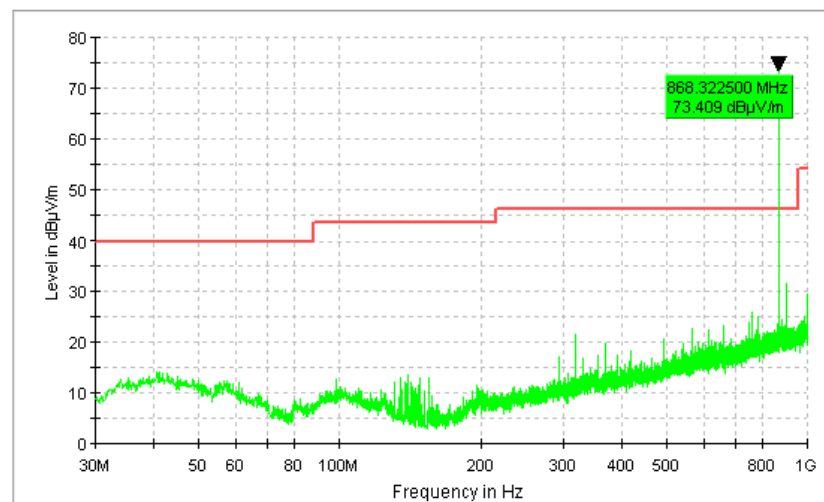


Fig. 8 Tx Radiated Spurious Emission (30MHz-1GHz)

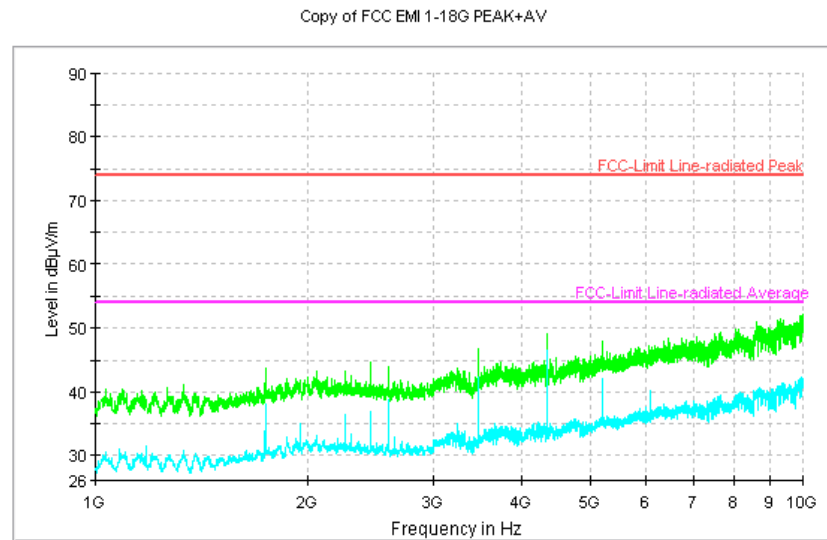


Fig. 9 Tx Radiated Spurious Emission (1GHz-10GHz)

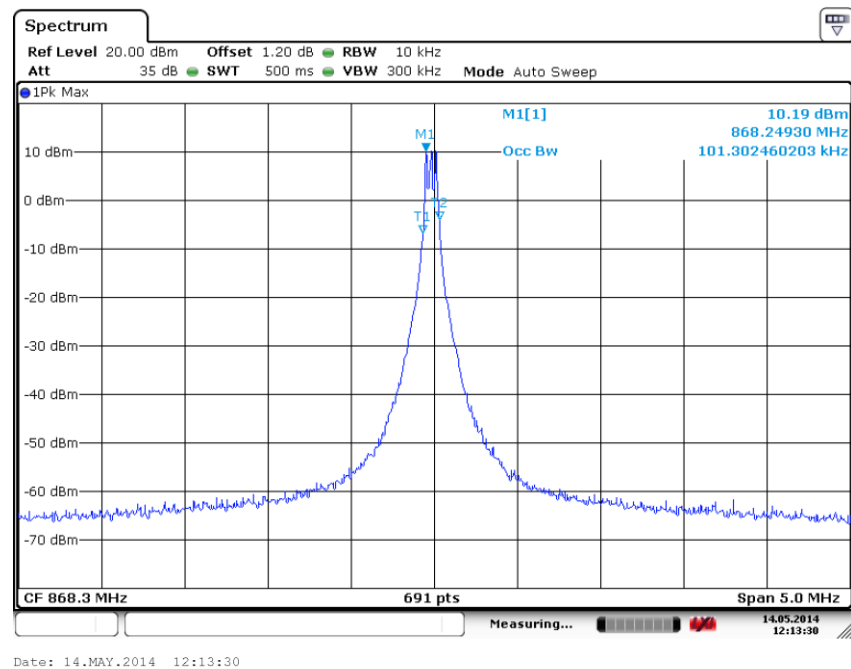


Fig. 10 Occupied Bandwidth

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