FCC PART 15.231

EMI MEASUREMENT AND TEST REPORT

For

Beijing Timesbright Electronic Technology Co., Ltd.

4F, Building A, Innovation Center, No.1 information road, Shangdi, Haidian District, Beijing, China

FCC ID: S9YTBCETIMS

June 23, 2005

This Report Concerns:	**Equipment Type:**
☒ Original Report	TPMS（Tire Pressure Monitoring System）

Test Engineer:	William Chen
Report No.:	RBJ05042851
Test Date:	June 8-10, 2005
Reviewed By:	Chris Zeng
Prepared By:	Bay Area Compliance Lab Corp. (ShenZhen) 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone, ShenZhen, Guangdong 518038, P.R.China Tel: +86-755-33320018 Fax: +86-755-33320008

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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *Beijing Timesbright Electronic Technology Co., Ltd.* 's product, model *1B* or the "EUT" as referred to in this report is a TPMS（Tire Pressure Monitoring System） which measures approximately 7.6cm L x 3.0cm W x 1.7cm H, rated input voltage: DC 9 V battery.

** The test data gathered are from an engineering sample, serial number: TBCEABA00352, provided by the manufacturer.*

Objective

This document is a test report based on the Electromagnetic Interference (EMI) tests performed on the EUT.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203,15.205,15.209 and 15.231 rules.

Related Submittal(s)/Grant(s)

No Related Submittals

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. All data measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

The Test site used by Bay Area Compliance Lab Corp. (ShenZhen) to collect test data is located in the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone, ShenZhen, Guangdong 518038, P.R.China.

Test site at Bay Area Compliance Lab Corp. (ShenZhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 04, 2004. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Lab Corp. (ShenZhen) is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200707-0). The current scope of accreditations can be found at http://ts.nist.gov/ts/htdocs/210/214/scopes/2007070.htm.

SYSTEM TEST CONFIGURATION

Justification

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

EUT Exercise Software

N/A.

Special Accessories

N/A.

Equipment Modifications

Bay Area Compliance Lab Corp. (ShenZhen) has not done any modification on the EUT.

Configuration of Test Setup

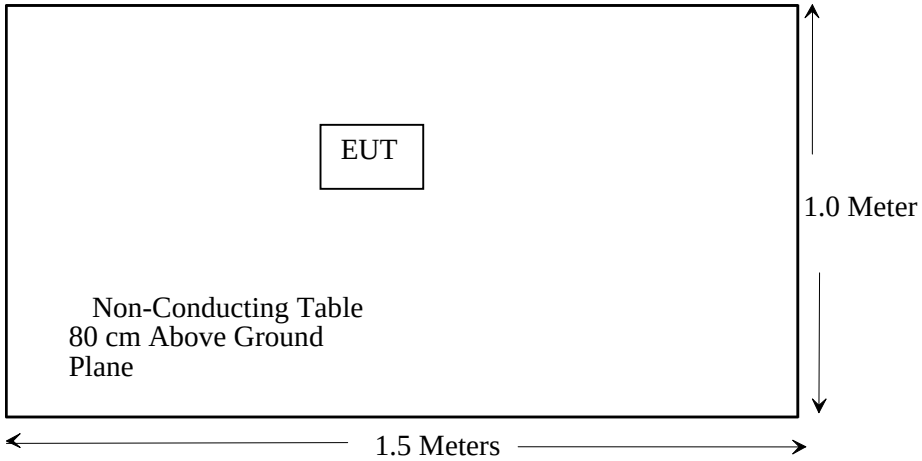
Lie View

Side view

stand view

Note: We test lie orientation, side orientation and stand orientation, the lie orientation is the worst mode, so we select the lie orientation to test.

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§ 15.231 (b) (e)	Radiated Emission	Compliant
§ 15.231 (c)	20dB Band Width Testing	Compliant
§ 15.231 (e)	Deactivation Testing	Compliant
§ 15.205	Restricted Band	Compliant
§ 15.209	Radiated emission limits; General Requirements	Compliant
§ 15.203	Antenna Requirement	Compliant

§15.203 - ANTENNA REQUIREMENT

Standard Applicable

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.

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

Test Result: Pass

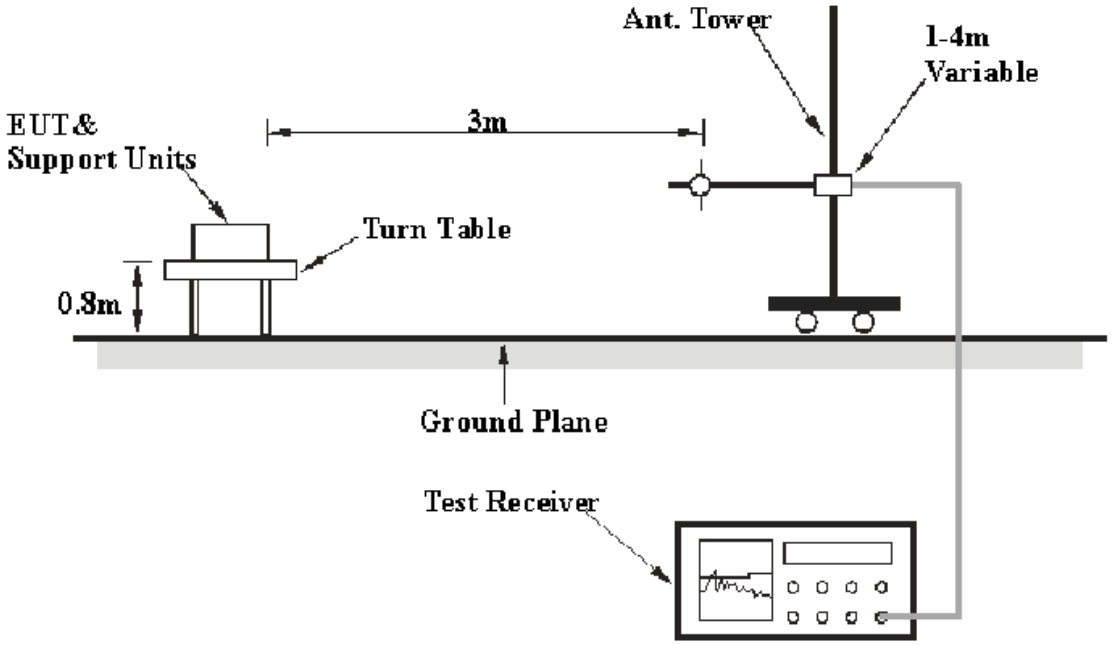
§15.205, §15.209, §15.231 (b)(e)- RADIATED EMISSION

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.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at Bay Area Compliance Lab Corp. (ShenZhen) is ±4.0 dB.

EUT Setup



The radiated emission tests were performed in the 3 meters chamber A test site, using the setup accordance with the ANSI C63.4 - 2003. The specification used was the FCC 15.231 and FCC 15.209.

EMI Test Receiver Setup

The system was investigated from 30 MHz to 5 GHz.

During the radiated emission test, the EMI test receiver was set with the following configurations:

Frequency Range	***RBW***	***VBW***
30 – 1000 MHz	100 kHz	100 kHz
1000 MHz –5 GHz	1 MHz	1 MHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2004-11-10	2005-11-9
HP	Amplifier	HP8449B	3008A00277	2004-9-1	2005-8-31
Sunol Sciences	Horn Antenna	DRH-118	A052604	2004-6-2	2005-6-2
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2004-9-15	2005-9-15
HP	Amplifier	HP8447D	2944A09795	2004-9-1	2005-8-31
Sunol Sciences	Bilog Antenna	JB1	A040904-1	2005-4-28	2006-4-28

*** Statement of Traceability:** Bay Area Compliance Lab Corp. (ShenZhen) attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

Test Procedure

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

All data was recorded in the Peak and Average detection mode.

Standard Applicable

According to §15.231(e), 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	1,000……..……...……	100
70-130…..……...……	500……...……...…	50
130-174……..……	500 to 1,500..……...……	50 to150
174-260……..……	1,500	150
260-470……..……...……	1,500 to 5,000..……...……	150 to 500
Above 470	5,000……..……...……	500

Linear interpolations for frequency ranges 130 - 174 MHz and 260 - 470 MHz.

The above field strength limits are specified at a distance of 3 meters. The tighter limits apply at the band edges.

Intentional radiators operating under the provisions of this section shall demonstrate compliance with the limits on the field strength of emissions, as shown in the above table, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector. The specific method of measurement employed shall be specified in the application for equipment authorization. If average emission measurements are employed, the provisions in § 15.35 for averaging pulsed emissions and for limiting peak emissions apply. Further, compliance with the provisions of § 15.205 shall be demonstrated using the measurement instrumentation specified in that section.

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 § 15.209, whichever limit permits a higher field strength.

Corrected Amplitude & Margin Calculation

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

Corr. Ampl. = Meter Reading + Antenna Loss + Cable Loss - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of –5.8dB means the emission is 5.8dB below the maximum limit for Class C. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – Limit

Test Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15.231, with the worst margin reading of:

-7.80 dB at **433.92 MHz** in the **Vertical** polarization.

Test Data

Environmental Conditions

Temperature:	25 ° C
Relative Humidity:	50%
ATM Pressure:	1032mbar

The testing was performed by William Chen on 2005-6-8.

Test Mode: Transmitting

Frequency	Meter Reading	Direction	Height	Polar	Antenna Loss	Cable loss	Amplifer Gain	Corr. Ampl.	FCC Part 15.231		
MHz	dBuV/m	Degree	Meter	H / V	dB/m	dB	dB	dBuV/m	Limit dBuV/m	Margin dB	Remark
433.92	75.50	0	1.0	V	16.8	2.20	28.3	66.20	72.8	-6.60	Fundamental(AV)
433.92	75.00	0	1.0	H	16.8	2.20	28.3	65.70	72.8	-7.10	Fundamental(AV)
867.80	47.30	90	1.0	V	22.2	3.40	28.1	44.80	52.8	-8.00	Harmonic(PK)
75.63	50.51	90	1.2	V	8.6	0.84	28.7	31.25	40.0	-8.75	Spurious Emission(PK)
867.80	46.00	90	1.0	H	22.2	3.40	28.1	43.50	52.8	-9.30	Harmonic(PK)
73.61	49.46	90	1.0	H	8.6	0.82	28.7	30.18	40.0	-9.82	Spurious Emission(PK)
38.25	40.62	90	1.0	V	17.7	0.59	28.8	30.11	40.0	-9.89	Spurious Emission(PK)
44.15	43.75	120	1.0	V	14.3	0.55	28.8	29.80	40.0	-10.20	Spurious Emission(PK)
33.14	33.79	90	1.0	V	24.1	0.56	28.8	29.65	40.0	-10.35	Spurious Emission(PK)
77.65	48.91	180	1.0	V	8.6	0.84	28.7	29.65	40.0	-10.35	Spurious Emission(PK)
35.15	39.16	90	1.0	H	17.7	0.59	28.8	28.65	40.0	-11.35	Spurious Emission(PK)
98.65	50.92	180	1.2	H	8.2	0.93	28.6	31.45	43.5	-12.05	Spurious Emission(PK)
116.35	45.52	180	1.2	H	13.3	1.10	28.5	31.42	43.5	-12.08	Spurious Emission(PK)
38.41	38.00	120	1.0	H	17.7	0.59	28.8	27.49	40.0	-12.51	Spurious Emission(PK)
43.67	40.54	120	1.2	H	14.3	0.55	28.8	26.59	40.0	-13.41	Spurious Emission(PK)
106.31	45.25	180	1.0	V	11.0	1.00	28.5	28.75	43.5	-14.75	Spurious Emission(PK)
433.92	77.70	0	1.0	V	16.8	2.20	28.3	68.40	92.8	-24.40	Fundamental(PK)
433.92	76.91	0	1.0	H	16.8	2.20	28.3	67.61	92.8	-25.19	Fundamental(PK)

Note: The EUT was tested in all three orthogonal planes.

§15.231(c) 20dB BANDWIDTH TESTING

Requirement

Per 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.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2004-9-15	2005-9-15
HP	Amplifier	HP8447D	2944A09795	2004-9-1	2005-8-31
Sunol Sciences	Bilog Antenna	JB1	A040904-1	2005-4-28	2006-4-28

*** Statement of Traceability:** Bay Area Compliance Lab Corp. (ShenZhen) attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

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.

Test Data

Environmental Conditions

Temperature:	25 ° C
Relative Humidity:	50%
ATM Pressure:	1032mbar

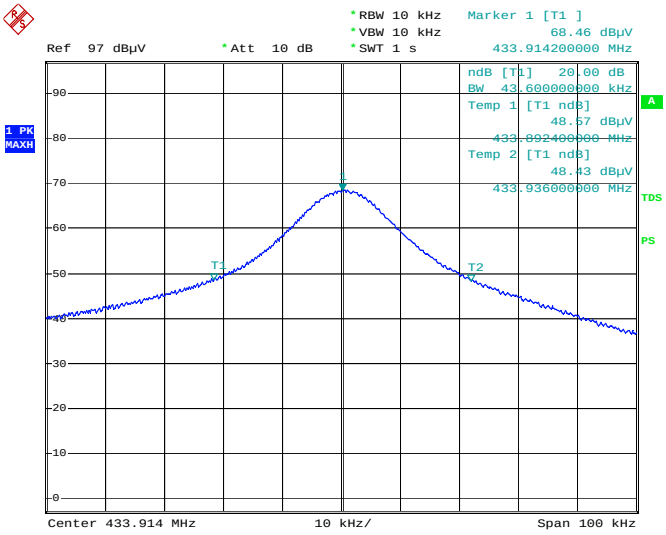
The testing was performed by William Chen on 2005-6-10.

Test Mode: Transmitting

Test Result: Pass

Frequency (Fundamental)	20 dB Bandwidth	Limit (433.92MHz * 0.25%)	Margin	Result
433.92 MHz	43.6 KHz	1.0848 MHz	43.6 KHz ＜1.0848 MHz	PASS

Refer to the attached plots.



Timesbright TSMP 1B(T) bandwidth

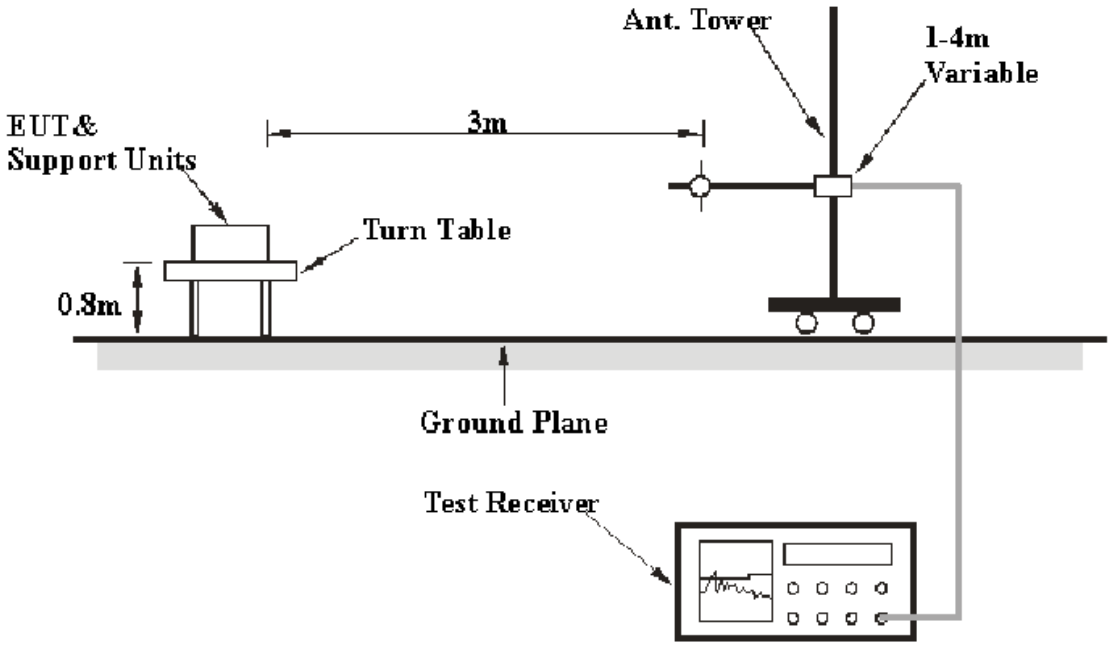
Date: 10.JUN.2005 18:54:46

§15.231(e)-DEACTIVATION TESTING

Requirement

Per 15.231(e), 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 transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

EUT Setup



The deactivation test was performed in the 3 meters chamber A test site, using the setup accordance with the ANSI C63.4 - 2003. The specification used was the FCC 15.231(e) limits.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2004-9-15	2005-9-15
HP	Amplifier	HP8447D	2944A09795	2004-9-1	2005-8-31
Sunol Sciences	Bilog Antenna	JB1	A040904-1	2005-4-28	2006-4-28

*** Statement of Traceability:** Bay Area Compliance Lab Corp. (ShenZhen) attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

Test Procedure

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

Test Data

Environmental Conditions

Temperature:	25 ° C
Relative Humidity:	50%
ATM Pressure:	1032mbar

The testing was performed by William Chen on 2005-6-10.

Test Mode: Transmitting

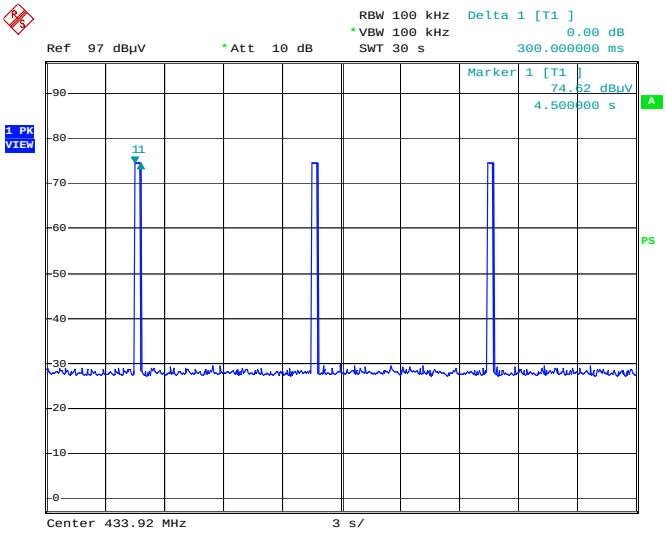
Transmission time:

Frequency (Fundamental)	Transmission (Turn on)	Limit	Margin	Result
433.92 MHz	300 ms	1 s	- 700 ms	PASS

Silent Time:

Frequency (Fundamental)	Transmission (Turn off)	Limit 1 >Turn on*30 times	Margin	Limit 2 >10s	Result
433.92 MHz	178.2 s	300ms*30=9 s	169.2 s	178.2 s	PASS

The result has been complied with the 15.231(e).



Timsbright TMPS-1B

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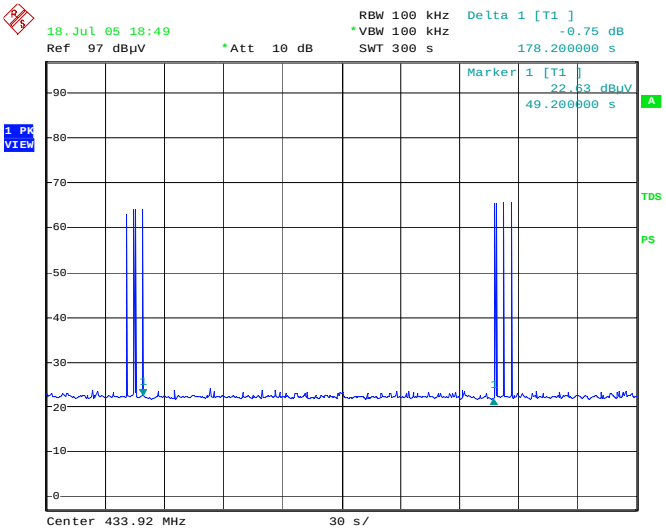

Timesbright TEMP-1B (Transmitter time)

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