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FCC CERTIFICATION RADIO Measurement Technical Report

according to standard:
FCC Part 15

Equipment under test:
SAMOS3 - 433 MHZ REMOTE CONTROL

FCC ID:
RKXSAMOS3

Company:
PARROT

DISTRIBUTION: Mr LEGEAY

Company: PARROT

Number of pages: 24 including 4 annexes

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This document is the result of testing a specimen or a sample of the product submitted. It does not imply an assessment of the conformity of the whole manufactured products of the tested sample.

PRODUCT: SAMOS3 - 433 MHZ REMOTE CONTROL

Reference / model: SAMOS3

Serial number: not communicated

MANUFACTURER: PARROT

COMPANY SUBMITTING THE PRODUCT:

Company: PARROT

Address: 174, quai de Jemmapes
75010 PARIS
FRANCE

Responsible: Mr LEGEAY

DATE(S) OF TEST: 31 May 2007
2 June 2007

TESTING LOCATION: EMITECH ATLANTIQUE laboratory at ANGERS (49) FRANCE
EMITECH ATLANTIQUE open area test site in LA POUEZE (49)
FRANCE

Registration Number by FCC: 101696/FRN: 0006 6490 08

TESTED BY: M. DUMESNIL

TUTOR: Y. JUDEAUX

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1. INTRODUCTION

This document presents the result of RADIO test carried out on the following equipment: SAMOS3 - 433 MHZ REMOTE CONTROL, in accordance with normative reference.

2. PRODUCT DESCRIPTION

ITU Emission code: F1D

Class: B (residential environment)

Intermittent control signals with no continuous transmission, the transmitter operates only when a key is depressed.

Utilization: Remote control which permit user to pilot its Bluetooth handsfree car kit wireless

Antenna type: incorporated antenna

Operating frequency: 433.92 MHz

No of channels: 1

Channel spacing: not concerned

Frequency generation: SAW Resonator Crystal Synthetiser

Modulation: Amplitude (pulsed modulated device) Digital Frequency
 Phase

Power source: lithium battery CR2032 (3 V)

Power level, frequency range and channels characteristics are not user adjustable.
The details pictures of the product and the circuit boards are joined with this file.

3. NORMATIVE REFERENCE

The standards and testing methods related throughout this report are those listed below.
They are applied on the whole test report even though the extensions (version, date and amendment) are not repeated.

FCC Part 15 (2006) Code of Federal Regulations
Title 47 - Telecommunication
Chapter 1 - Federal Communications Commission
Part 15 - Radio frequency devices
Subpart C - Intentional Radiators

4. TEST METHODOLOGY

ANSI C63.4 (2003) Methods of Measurement of Radio-Noise Emissions from Low-voltage Electrical and Electronics Equipment in the range of 9 kHz to 40 GHz.

Radio performance tests procedures given in part 15:

- Paragraph 33: frequency range of radiated measurements
- Paragraph 35: measurement detector functions and bandwidths
- Paragraph 203: antenna requirement
- Paragraph 205: restricted bands of operation
- Paragraph 209: radiated emission limits; general requirements (Subpart C intentional Radiators)
- Paragraph 231: periodic operation in the band 40.66 – 40.70 MHz and above 70 MHz (Subpart C intentional Radiators)

5. ADD ATTACHMENTS FILES

JOINED DOCUMENTATIONS

- “Synoptic “***
- “Block diagram “***
- “External photos and Product labeling “***
- “Assembly of components “***
- “Internal photos “***
- “Layout pcb “***
- “Bil of materials “***
- “Schematics “***
- “Product description “***
- “User guide “***

6. TESTS AND CONCLUSIONS

Test procedure	Description of test	Criteria respected ?				Comment
		Yes	No	NAP	NAs	
FCC Part 15.203	ANTENNA REQUIREMENT	X				Note 1
FCC Part 15.205	RESTRICTED BANDS OF OPERATION	X				
FCC Part 15.209	RADIATED EMISSION LIMITS	X				
FCC Part 15.231	PERIODIC OPERATION IN THE BAND 40.66 – 40.70 MHz AND ABOVE 70 MHz					
	(a)	X				Note 2
	(b)	X				Notes 3 and 5
	(c)	X				Note 4

NAP: Not Applicable

NAs: Not Asked

Note 1: internal antenna without connector (see photo in annex 1).

Note 2: the equipment is manually operated and employ a switch that deactivates automatically the transmitter and ceases transmission within 5 seconds after activation.
The transmitter does not perform periodic transmissions.
The transmitter is not activated automatically.

Note 3: field strength limit of fundamental ($F = 433.92 \text{ MHz}$)
 $41.6667 (F) - 7083.3333 = 10996.68 \mu\text{V/m}$ at 3 m = 80.82 dB $\mu\text{V/m}$ at 3 m.
The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.

Note 4: the bandwidth of the emission at 20 dB is 906 kHz (see annex 3), less than 0.25 % of the centre frequency (433.904 MHz).

Note 5: pulsed modulated device.

* A duty cycle correction factor has been applied to measures, we use the formulas:

$$* \text{ON TIME} = (N1 \cdot L1 + N2 \cdot L2 + \dots + Nn-1 \cdot Ln-1 + Nn \cdot Ln) \times 2$$

(where N1 is number of type 1 pulse, L1 is length of type 1 pulse and 2 is the number of data sequence emitted) and * DUTY CYCLE = ON TIME / 100 ms or T (whichever is less, where T is the period of the pulse train).

We have found (see annex 4)

$N1 = 188 \mu\text{s}$	$N4 = 616 \mu\text{s}$	$N7 = 594 \mu\text{s}$	$L1 = 23$	$L5 = 2$
$N2 = 7.056 \text{ ms}$	$N5 = 396 \mu\text{s}$	$N8 = 418 \mu\text{s}$	$L2 = 1$	$L6 = 1$
$N3 = 176 \mu\text{s}$	$N6 = 1.628 \text{ ms}$		$L3 = 6$	$L7 = 1$
			$L4 = 1$	$L8 = 1$

$$T = 55.944 \text{ ms}$$

So DUTY CYCLE = 58.93 % which gives a correction factor of -2.3 dB.

Conclusion:

The sample of SAMOS3 - 433 MHZ REMOTE CONTROL submitted to the tests complies with the regulations of the standard FCC Part 15 in accordance with the limits or criteria defined in this report.

7. RADIATED EMISSION LIMITS; GENERAL REQUIREMENTS (TRANSMITTER)**Standard:** FCC Part 15**Test procedure:** paragraph 205 / 209**Test equipment:**

TYPE	BRAND	EMITECH NUMBER
Antenna RGA-60	Electrometrics	1204
Log periodic antenna	Rohde & Schwarz HL 223	1999
Spectrum analyzer FSP40	Rohde & Schwarz FSP40	4088
Open area test site	EMITECH	1274
Preamplifier 1 to 18 GHz	DBS Microwave DB97-1852	2648
High pass filter	Micro-tronics HPM11630	1673
Multimeter 77-2	Fluke	0812
Biconical antenna	Hewlett Packard 11966C	0728

Test set up:

The system is tested in an open area test site (OATS).

The test unit is placed on a rotating table, 0.8 m from a ground plane. Zero degree azimuth corresponds to the front of the equipment under test.

Frequency range: from 30 MHz to harmonic 10 ($F_{\text{carrier}} \leq 1 \text{ GHz}$)**Detection mode:** Peak ($F < 1 \text{ GHz}$)
Peak ($F > 1 \text{ GHz}$)**Bandwidth:** 100 kHz ($F < 1 \text{ GHz}$)
1 MHz ($F > 1 \text{ GHz}$)**Distance of antenna:** 3 meters**Antenna height:** 1 to 4 meters**Antenna polarization:** vertical and horizontal (only the highest level is recorded)**Equipment under test operating condition:**

The equipment is blocked in transmission mode modulated.

Results:

Ambient temperature (°C): 20.5
 Relative humidity (%): 62

Power source: we used for power source the internal battery of the equipment and we noted:

Voltage at the beginning of test (V): 3.309 | 3.292
 Voltage at the end of test (V): 2.882 | 2.851
 Percentage of the voltage drop during the test (%): 12.90 | 13.39

The polarity column refers to the antenna polarity at which the maximum emissions level is measured.

Channel Emission

FREQUENCIES (MHz)	Detector	E.U.T. orientation	Antenna height (cm)	Polarization of antenna H: Horizontal V: Vertical	Azimuth (degrees)	Correction factor (dB)	Field strength (dBμV/m) with factor correction	Limits (dBμV/m)
433.906 ⁽¹⁾	P	Z	132	V	92	2.3	79.1	80.82
867.811	P	Z	124	V	259	2.3	56.6	60.82
1301.71	P	Z	100	V	0	2.3	53.6	53.97*
1735.62	P	Z	106	V	147	2.3	48.4	60.82
2169.52	P	Z	115	V	214	2.3	49.2	60.82
2603.43	P	Z	100	V	0	2.3	51.7	60.82
3037.33	P	Z	140	V	216	2.3	47	60.82
3471.24	P	Z	178	H	41	2.3	51	60.82
3905.15	P	Z	146	H	20	2.3	52.4	53.97*

⁽¹⁾ fundamental.

E.U.T.: Equipment Under Test

* restricted band of operation § 15.205.

E.U.T. orientation A: average
 X: to put flat Q: quasi peak
 Y: on the edge P: Peak
 Z: up right

Note: 10996.68 μV/m at 3 m = 80.82 dBμV/m at 3 m; 1099.66 μV/m at 3 m = 60.82 dBμV/m at 3 m; 500 μV/m at 3 m = 53.97 dBμV/m at 3 m.

The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.

All readings were taken using a peak detector function and the duty cycle correction factor in order to determinate the average value of the emission (see §15.35; pulsed modulated devices)

□□□ End of report, 4 annexes to be forwarded □□□

ANNEX 1: PHOTOS OF THE EQUIPMENT UNDER TEST

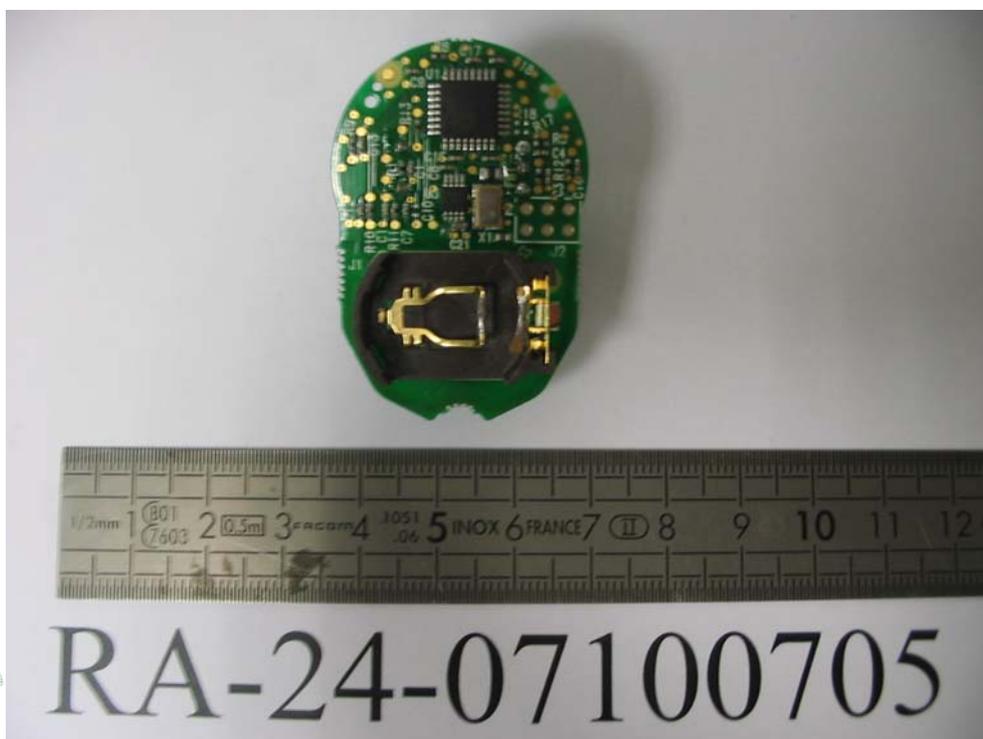
GENERAL VIEW



Printed circuit board: face 1



Printed circuit board: face 2



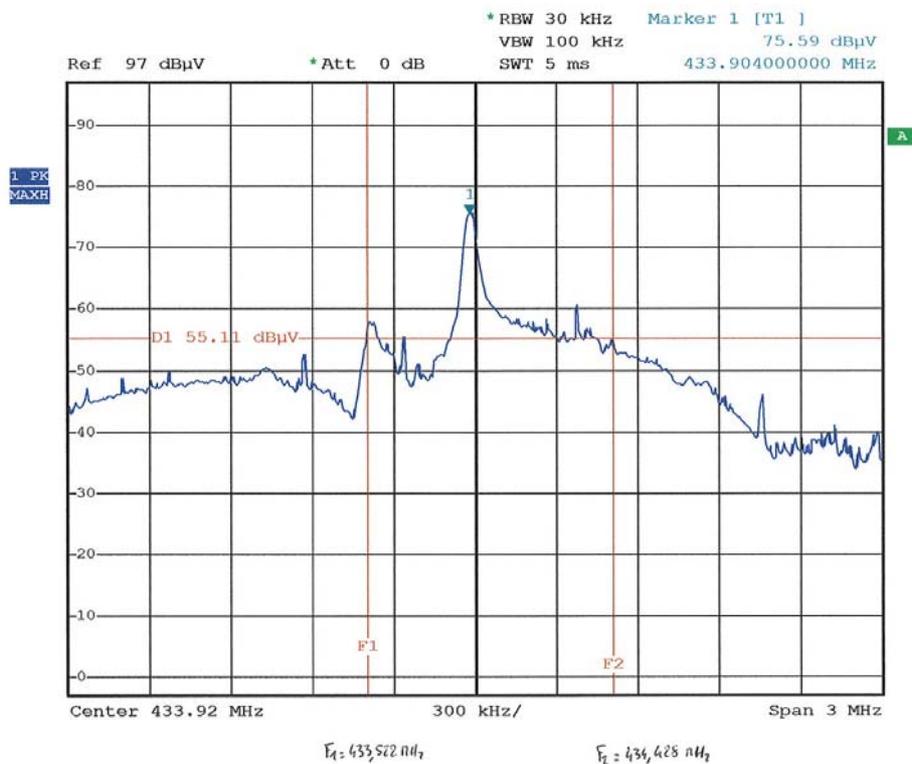
ANNEX 2: TEST SET UP AND OPEN AREA TEST SITE



OPEN AREA TEST SITE

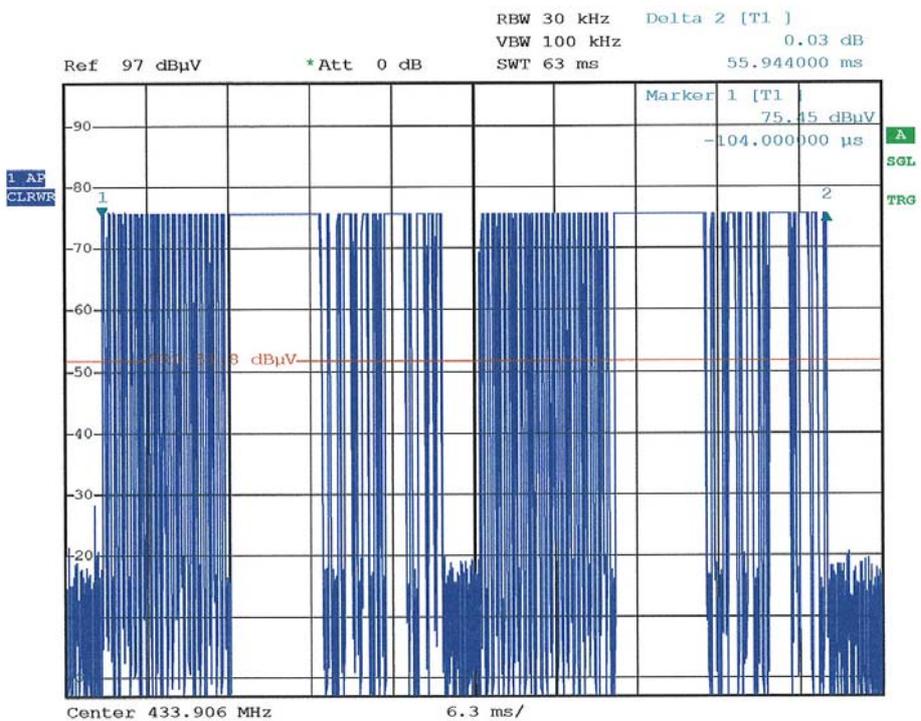


ANNEX 3: EMISSION BANDWIDTH

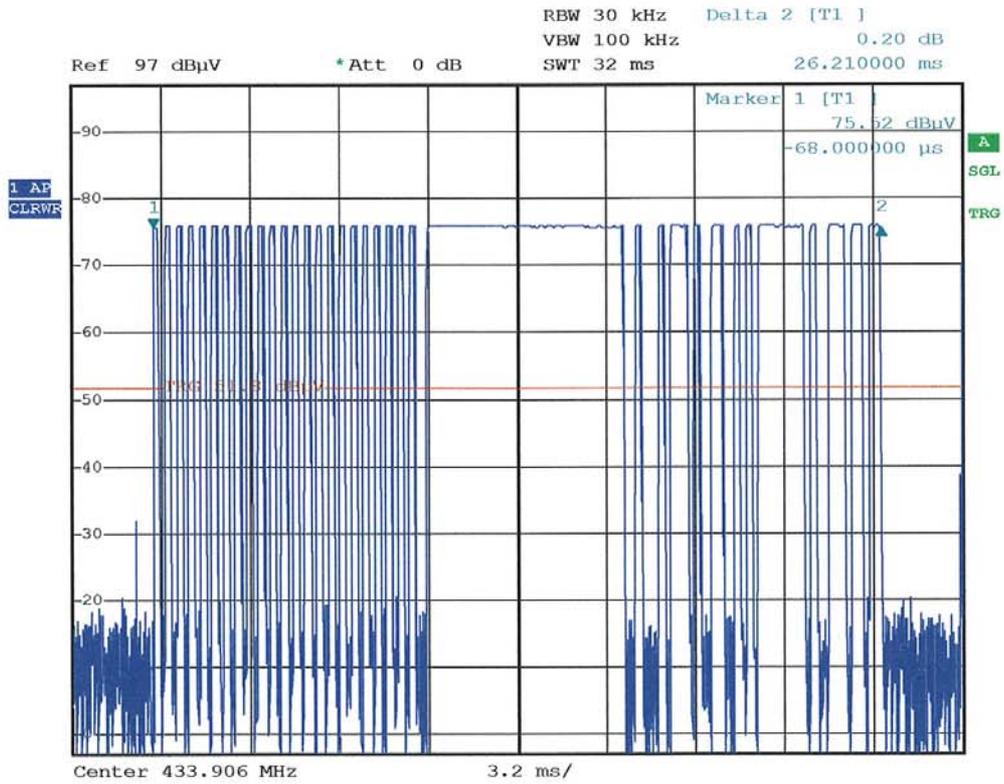


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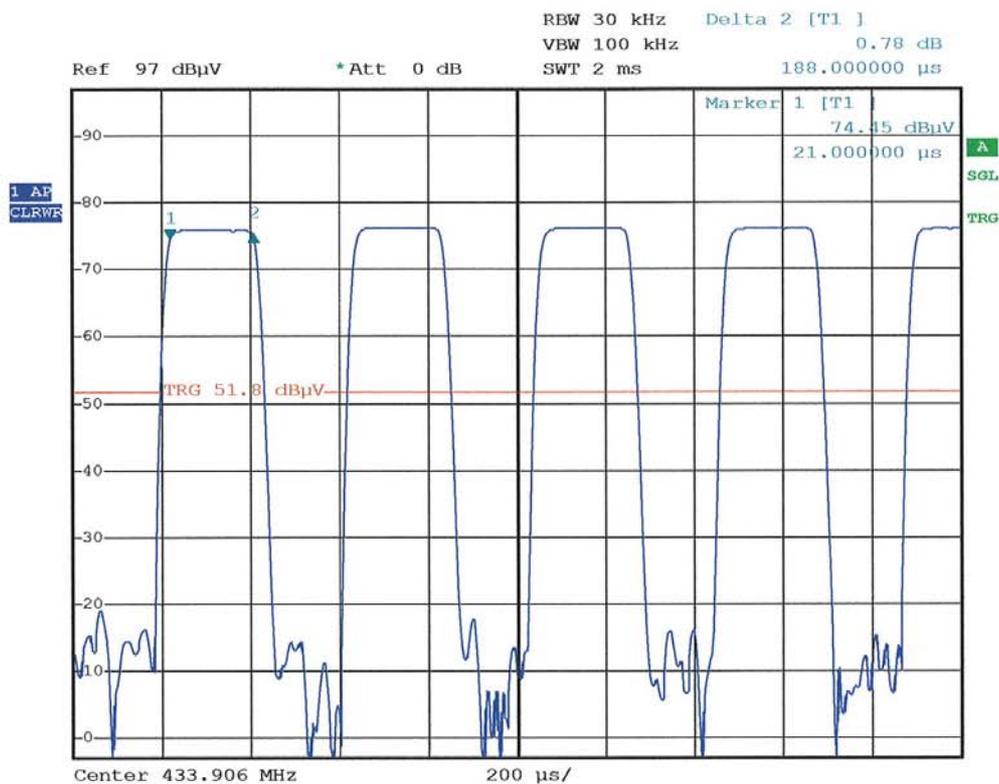
ANNEX 4: DUTY CYCLE DETERMINATION



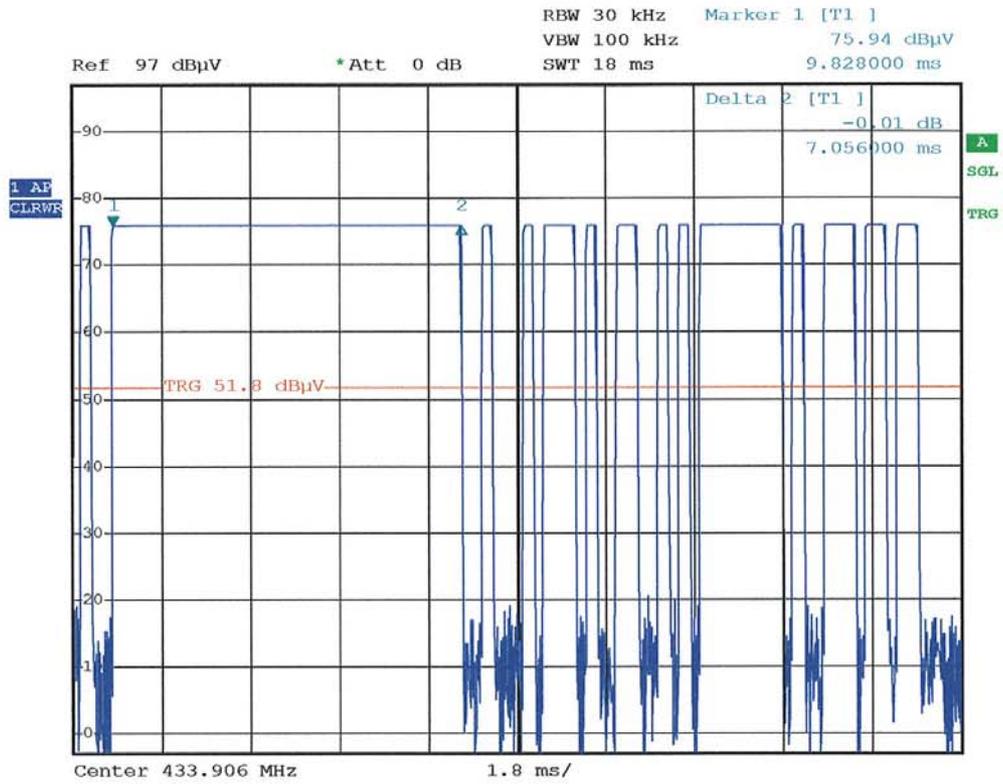
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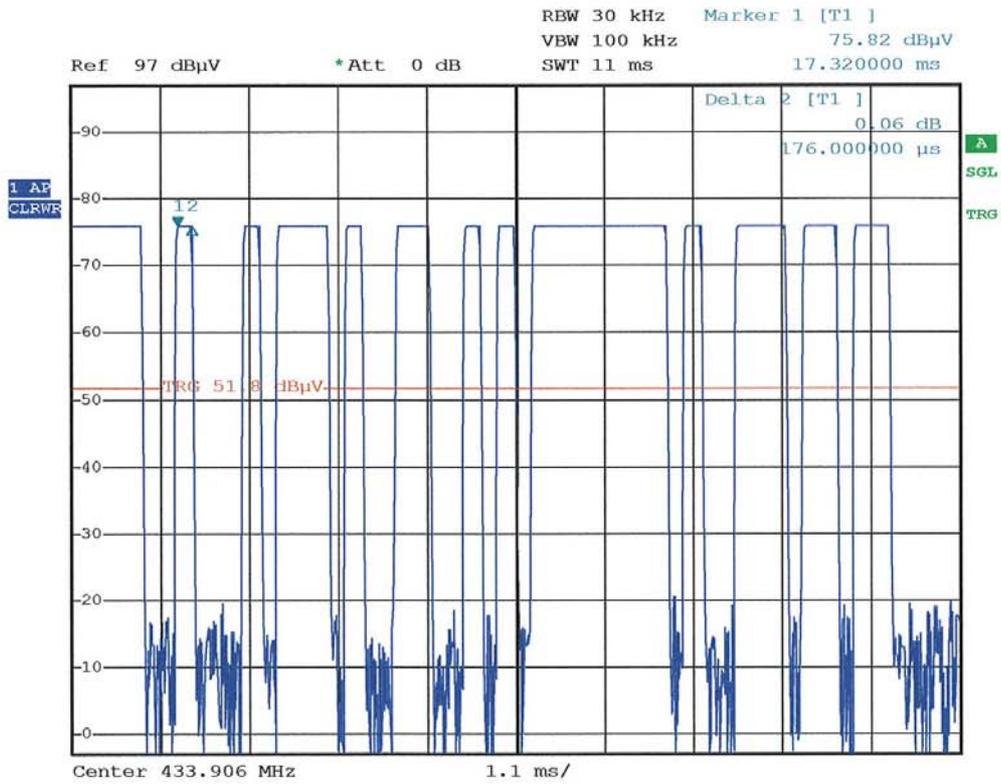
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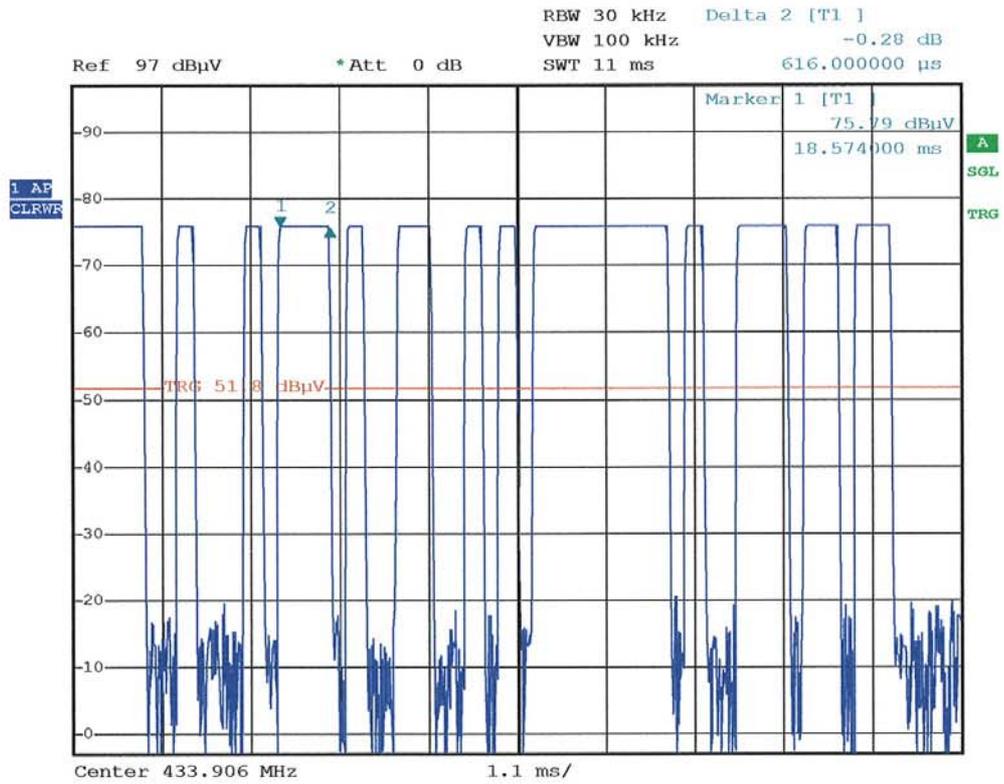
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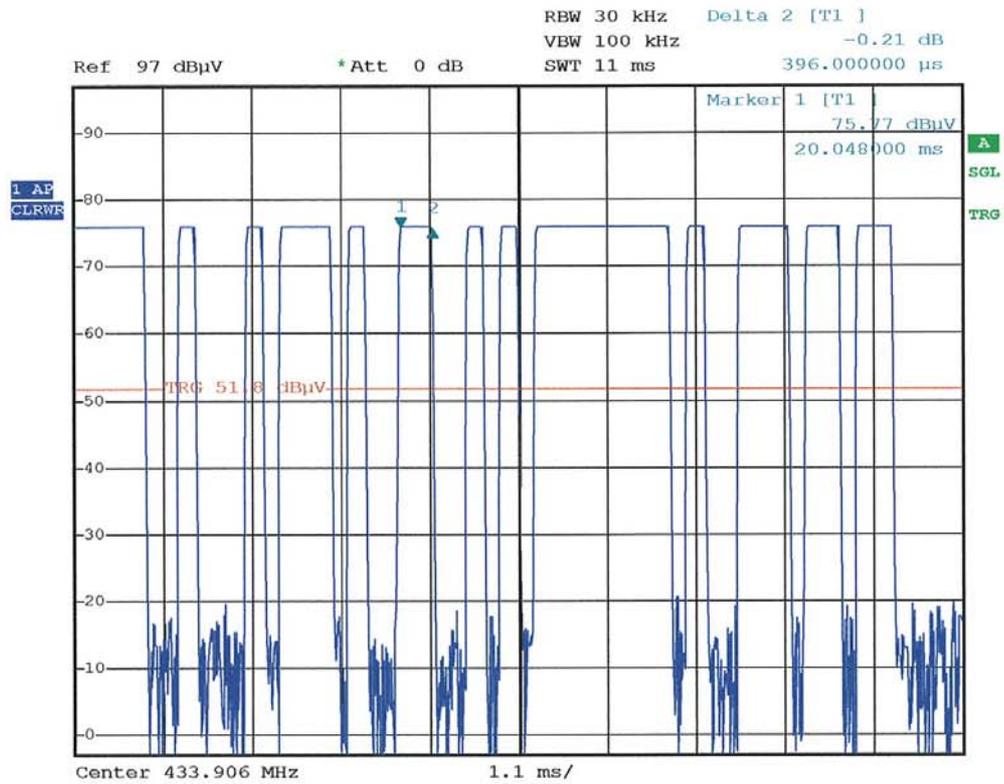
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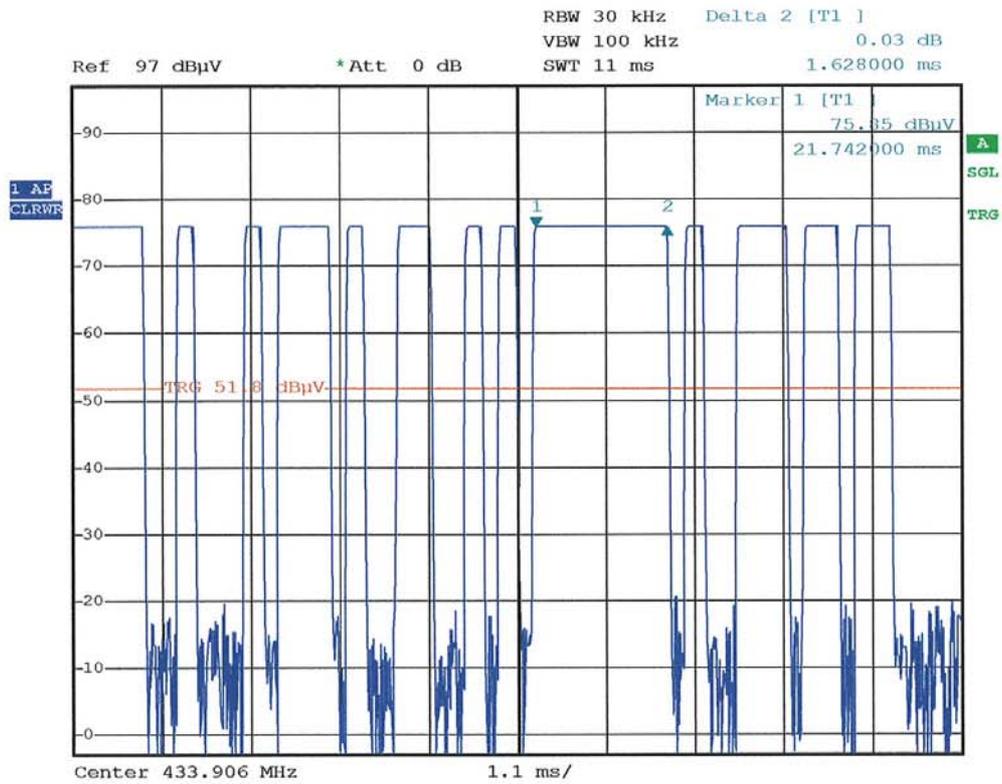
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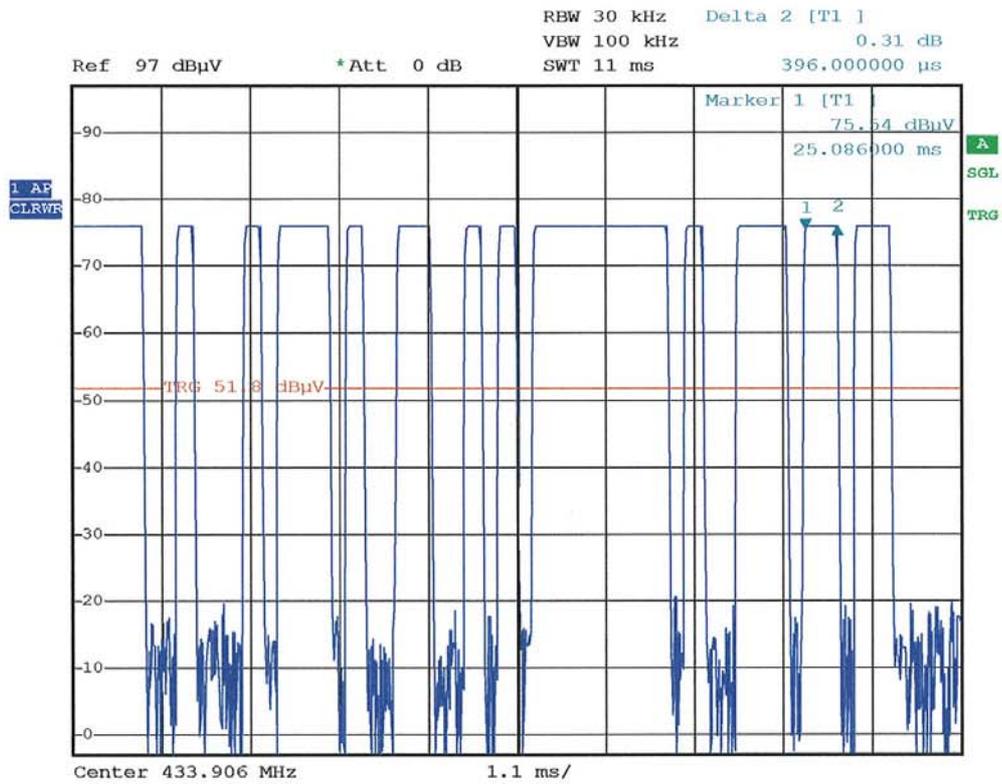
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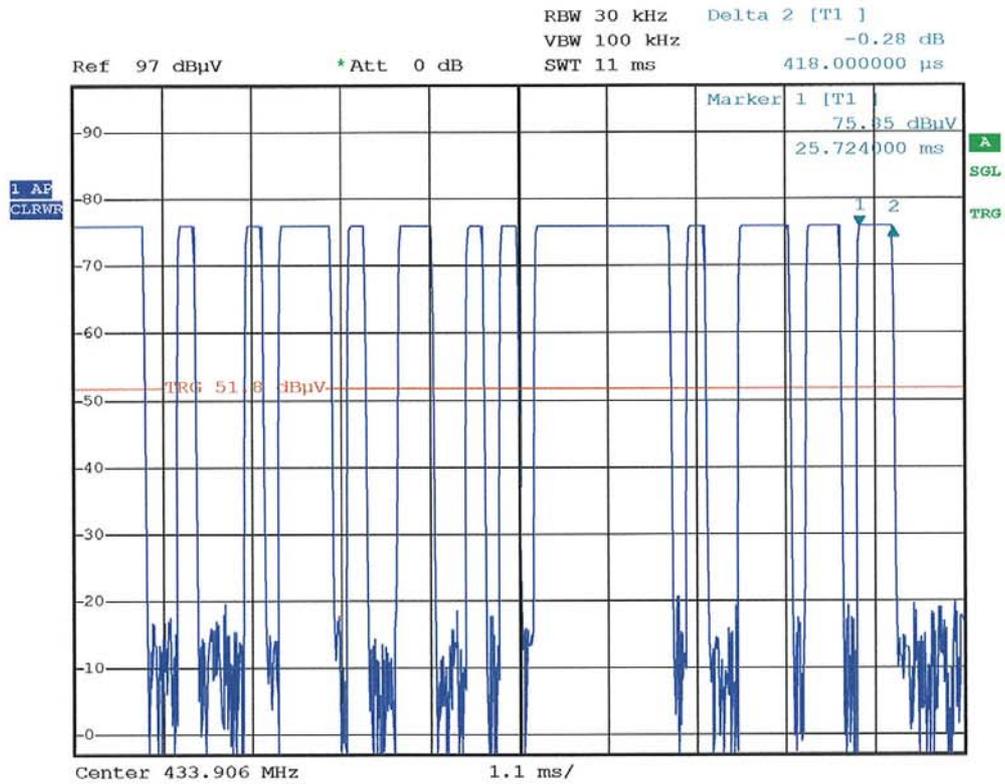
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