

RA-24-08101924-1 /A Ed. 0

**FCC CERTIFICATION
RADIO Measurement
Technical Report**

**standard to apply:
FCC Part 15.249**

**Equipment under test:
916 MHZ DUAL MAXI DISPLAY
T215**

**FCC ID :
RX9-T215-916**

**Company:
TACKTICK**

DISTRIBUTION: Mr HODGSON

Company: TACKTICK

Number of pages: 18 including 3 annexes

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Duplication of this test report is only permitted for an integral photographic facsimile. It includes the number of pages referenced here above.

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: 916 MHZ DUAL MAXI DISPLAY

Reference / model: T215

Serial number: not communicated

MANUFACTURER: not communicated

COMPANY SUBMITTING THE PRODUCT:

Company: TACKTICK

Address: 27 rue Anita Conti
Parc d'activités Laroiseau
56000 VANNES
FRANCE

Responsible: Mr HODGSON

DATES OF TEST: 16 June 2008

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: L. BERTHAUD

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1. INTRODUCTION

This document presents the result of RADIO test carried out on the following equipment: 916 MHZ DUAL MAXI DISPLAY-T215 in accordance with normative reference.

2. PRODUCT DESCRIPTION

Class: B (residential environment)

Utilization: wireless display for sailing

Antenna type: incorporated antenna

Operating frequency range: 916.1 MHz

Number of channels: 1

Channel spacing: not concerned

Frequency generation: ☐ SAW Resonator ☐ Crystal ☒ Synthetiser

Modulation: ☐ Amplitude ☐ Digital ☒ Frequency ☐ Phase

Power source: 3 V lithium batteries (CR2032)

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 (2007) Code of Federal Regulations
Title 47 - Telecommunication
Chapter 1 - Federal Communications Commission
Part 15 - Radio frequency devices
Subpart C - Intentional Radiators

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.

4. TEST METHODOLOGY

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
- Paragraph 249: operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz and 24.0-24.25 GHz

5. ADD ATTACHMENTS FILES

- “Synoptic “***
- “Block diagram “***
- “External photos and Product labelling “***
- “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 15.207	CONDUCTED LIMITS			X		
FCC Part 15.209	RADIATED EMISSION LIMITS; general requirements	X				Note 2
FCC Part 15.249	OPERATION WITHIN THE BANDS 902-928 MHZ, 2400-2483.5 MHZ, 5725-5875 MHZ AND 24.0-24.25 GHZ					
	(a) field strength fundamental and harmonics	X				
	(b) fixed point-to-point operation			X		
	(c) field strength distance	X				
	(d) radiated emissions outside specified frequency bands	X				
	(e) peak measurements	X				
	(f) requirement note of section 15.37 (d)			X		

NAP: Not Applicable

NAs: Not Asked

Note 1: internal PCB antenna (see photos in annex 1)

Note 2: see FCC part 15.249 (d).

Conclusion:

The sample of 916 MHZ DUAL MAXI DISPLAY-T215 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. FIELD STRENGTH OF FUNDAMENTAL

Standard: FCC Part 15

Test procedure: paragraph 15.249

Test equipment:

TYPE	BRAND	EMITECH NUMBER
Spectrum analyzer FSP40	Rohde & Schwarz	4088
Test receiver ESVS10	Rohde & Schwarz	1219
Log periodic antenna HL 223	Rohde & Schwarz	1999
Open area test site	Emitech	1274
Multimeter 77-2	Fluke	812

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 azimuths correspond to the front of the equipment under test.

Detection mode: Quasi-Peak

Resolution bandwidth: 120 KHz

Distance of antenna: 3 meters

Antenna height: 1 to 4 meters

Antenna polarization: vertical and horizontal

Equipment under test operating condition:

The equipment is blocked in continuous transmission mode, modulated by internal data signal.

Results:

Ambient temperature (°C): 19.5
Relative humidity (%): 60

We used for power source the internal batteries of the equipment and we noted:

Voltage at the beginning of the test (V): 3.08
Voltage at the end of the test (V): 2.98

Sample n° 1

Electro-magnetic field (dBμV/m)	Limit (dBμV/m)	Margin (dB)
92.3	93.98	1.68

Polarization of test antenna: vertical (height: 111 cm)
Position of equipment: use position (azimuth: 0 degrees)

Test conclusion:

RESPECTED STANDARD

8. RADIATED EMISSION OF TRANSMITTER

Standard: FCC Part 15

Test procedure: paragraph 15.205
paragraph 15.209
paragraph 15.249

Test equipment:

TYPE	BRAND	EMITECH NUMBER
Test receiver ESH3	Rohde & Schwarz	1058
Test receiver ESVS 10	Rohde & Schwarz	1219
Spectrum analyzer FSP 40	Rohde & Schwarz	4088
Loop antenna	EMCO	1406
Biconical antenna HP 11966C	Hewlett Packard	728
Log periodic antenna HL 223	Rohde & Schwarz	1999
Open site	Emitech	1274
Antenna RGA-60	Electrometrics	1204
Multimeter 77-2	fluke	812

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 azimuths correspond to the front of the equipment under test.

Frequency range: from 9 kHz to harmonic 10 ($F_{\text{carrier}} \leq 10 \text{ GHz}$)

Bandwidth: 120 kHz ($F < 1 \text{ GHz}$) or 100 kHz, following 15.205 or 15.249
1 MHz ($F > 1 \text{ GHz}$) or 100 kHz, following 15.205 or 15.249

Distance of antenna: between 30 m and 3 m according the frequencies and the limits.

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 continuous transmission mode, modulated by internal data signal.

Results:

Ambient temperature (°C): 19.5

Relative humidity (%): 60

We use for power source the internal batteries of the equipment and we noted:

Voltage at the beginning of test (V): 3.08

Voltage at the end of test (V): 2.98

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

Channel

FREQUENCIES (MHz)	Detector	Antenna height (cm)	Azimuth (degree)	resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dBμV/m)	Limits (dBμV/m)	Margin (dB)
1832.19	Avg	173	177	1000	H	37.3	53.98	16.68
1832.19	Peak	173	177	1000	H	56.5	73.98	17.48
2748.28	Avg	189	197	1000	H	46.37	53.98	7.61
2748.28	Peak	189	197	1000	H	65.57	73.98	8.41
3664.32	Avg	121	174	1000	V	21.8	53.98	32.18
3664.32	Peak	121	174	1000	V	40	73.98	33.98

Any spurious which has more than 20 dB of margin compared to the limit is not necessarily reported.

Test conclusion:

RESPECTED STANDARD

9. BAND EDGE COMPLIANCE

Standard: FCC part 15.247

Test procedure: Public Notice DA 00-705, Delta Marker method.

Test equipment used:

TYPE	MANUFACTURER	EMITECH NUMBER
Spectrum analyzer FSP 40	Rohde & Schwarz	4088
Antenna RGA-60	Electrometrics	1204

Test set up:

The measure is realized in near field. The recorded field strength is correlated with the 3 m measurements.

Test operating condition of the equipment:

The equipment is blocked in continuous transmission mode, modulated by internal data signal.

Results:

Lower Band Edge: from 608 MHz to 614 MHz (curve n°1)

Upper Band Edge: from 960 MHz to 1240 MHz (curve n°2)

Sample n° 1:

Fundamental Frequency (MHz)	Field Strength Level of fundamental (dBμV/m)	Peak Or Average	Frequency of maximum Band-edges Emission (MHz)	Delta Marker (dB)*	Calculated Max Out of Band Emission Level (dBμV/m)**	Limit (dBμV/m)	Margin (dB)
916.1	92.3	Peak	611.52	-59.86	32.44 (1)	66.02	33.58
916.1	92.3	Peak	1102.44	-58.32	33.98 (1)	73.98	40

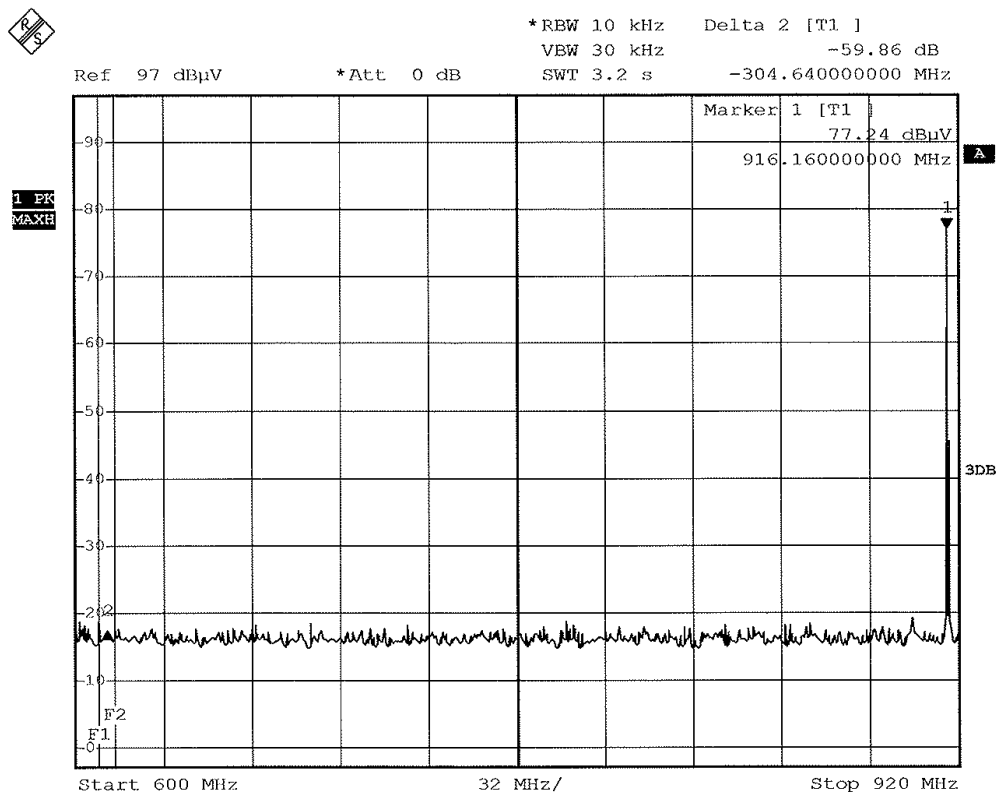
* According to step 2 of Marker-Delta Method DA 00-705

** According to step 3 of Marker-Delta Method:

Calculated Emission Level = Field Strength Level – Delta Marker Level

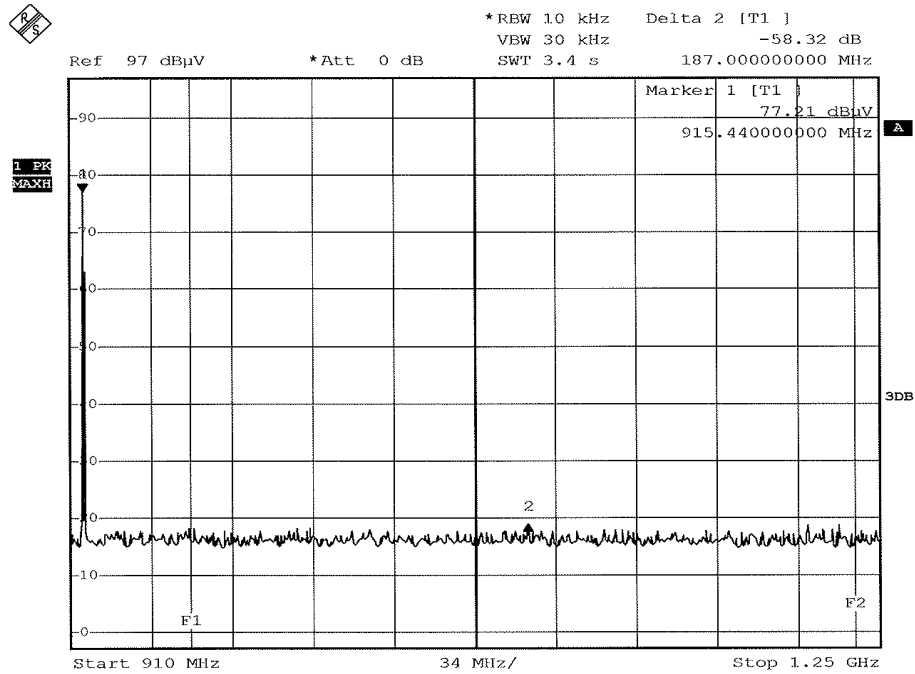
(1) The peak level recorded is below the average limit.

CURVE N°1.



Date: 18.JUN.2008 10:24:06

CURVE N°2.

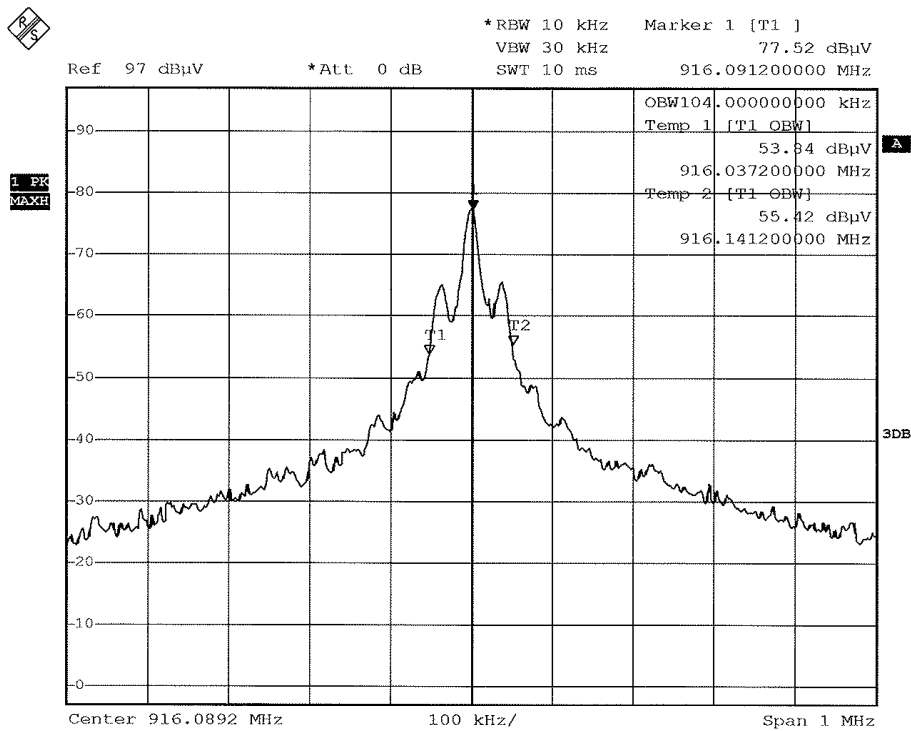


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Test conclusion: RESPECTED RECOMMENDATION

□□□ End of report, 3 annexes to be forwarded □□□

ANNEX 1: OCCUPIED BANDWIDTH



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ANNEX 2: PHOTOS OF THE EQUIPMENT UNDER TEST

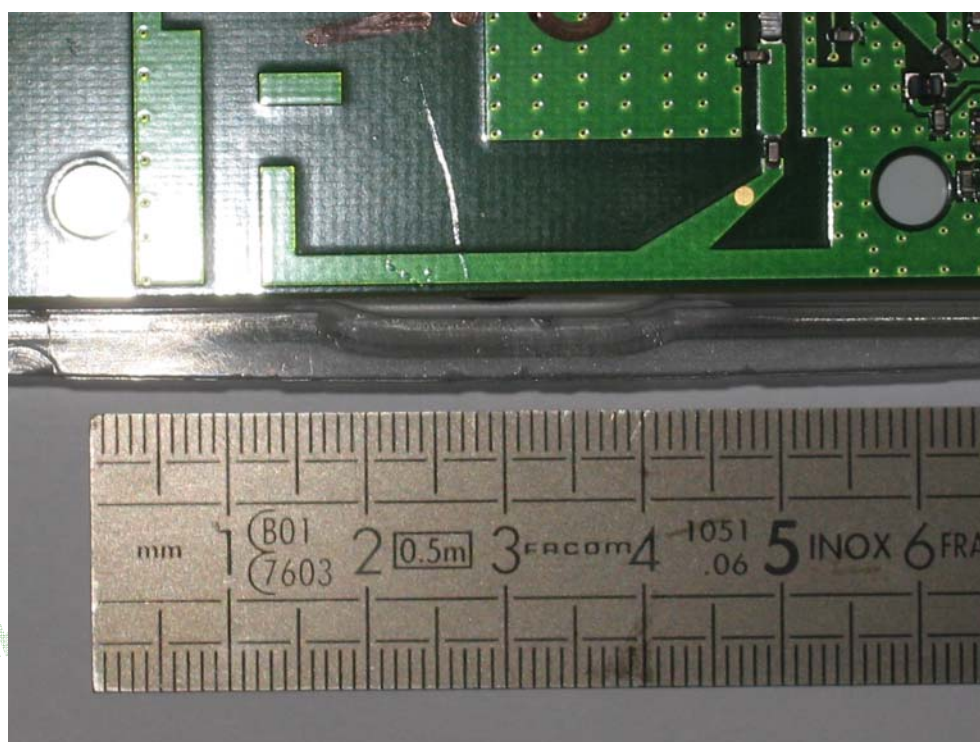
GENERAL VIEW



Printed circuit board



Antenna



ANNEX 3: TEST SET UP

OPEN AREA TEST SITE SET UP



