

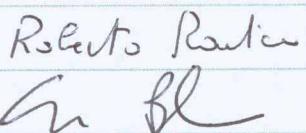
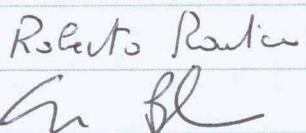
TEST REPORT

No. ARSM00048/2

performed in accordance with

FCC Rules: Code of Federal Regulations (CFR) no. 47
Part 15 Subpart C Section 15.249

PRODUCT	THRUSTER POCKET TRANSMITTER
MODEL(s) TESTED	PW94
FCC ID	O2W-TXP
TRADE MARK(s)	QUICK
APPLICANT	QUICK S.p.A. – Via Piangipane, 120/A – 48124 PIANGIPANE (RA) - ITALY

Tested by	Roberto Radice	
Approved by	Giorgio Belussi [Laboratory head]	

Revision Sheet

Release No.	Date	Revision Description
Rev. 0	2012-08-06	First edition



IMQ S.p.A. con socio unico
Via Quintiliano, 43
20138 MILANO - I

1. GENERAL DATA

SAMPLE		
Samples received on	2012-06-29	(item sent and sampling by applicant)
IMQ reference samples	BEM	64749
Samples tested No.	1	
Object under analysis recognition	Not carried out Except where stated, characteristics of products were taken from client description and were not verified by the laboratory	
TEST LOCATION		
Testing dates	2012-07-03 ÷ 2012-08-03	
Testing laboratory.	IMQ S.p.A. - Via Quintiliano, 43 – I-20138 Milano	
ENVIRONMENTAL CONDITIONING		
Parameter	Measured	
Ambient Temperature	25 ÷ 35 °C	
Relative Humidity	50 ÷ 60 %	
Atmospheric Pressure	900 ÷ 1000 mbar	

2. REFERENCE DOCUMENT

DOCUMENT		DATE	TITLE
<input checked="" type="checkbox"/>	47 CFR Part 15	2008	Radio Frequency Device
<input checked="" type="checkbox"/>	ANSI C63.4	2009	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
<input checked="" type="checkbox"/>	ANSI C63.10	2009	American National Standard for Testing Unlicensed Wireless Devices

3. UNIT UNDER TEST (EUT) DETAILS**GENERAL DATA**

MODEL (basic)	Description
PW94	Thruster Pocket transmitter with n°4 keys
VARIANTS (derived)	Description
PT94	Thruster Pocket transmitter with n°4 keys
P904	Pocket transmitter with n°4 keys
P902	Pocket transmitter with n°2 keys

FCC ID	O2W-TXP
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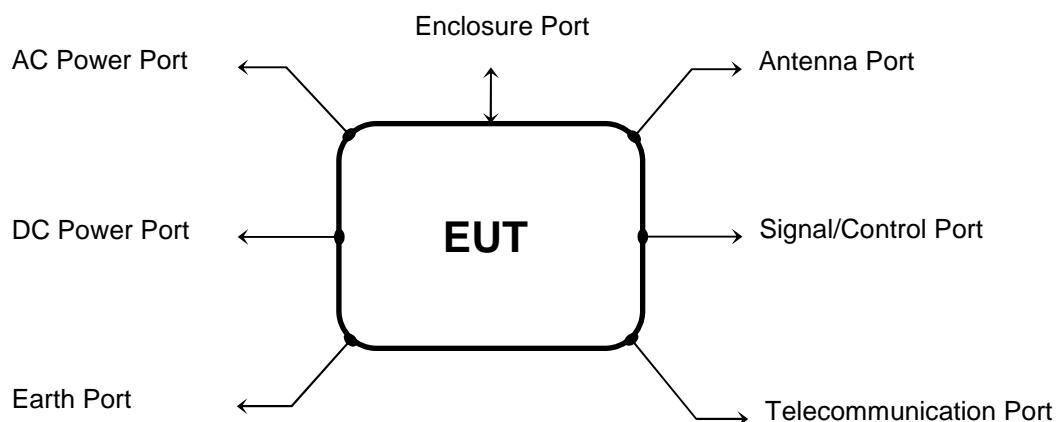
Manufacturer	QUICK S.p.A. – Via Piangipane, 120/A – 48124 PIANGIPANE (RA) - ITALY
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Type of equipment	THRUSTER POCKET TRANSMITTER
Operating frequency:	913,70 MHz
Maximum RF radiated power:	89,0 dB _P V/m
Modulation:	FSK
Channel Spacing:	/
Antenna:	Integral (on PCB)
RX sensitivity:	/
Main SW identification	/
Main HW Board identification	
Peripherals included (for system application)	/
Interfaces :	/
Integrated interfaces :	/
AC adapter:	/
Data cable	/
Telecom cable	/
Power supply type :	Internal CR2450 3V Lithium battery
AC power input cable :	/

DC power input cable : /

4. TEST CONFIGURATION OF UNIT UNDER TEST

EUT PORTS



Port	Description	Max length
Enclosure	Plastic surface, closed by 4 metallic screws	60mm.
AC power	Port not present	/
DC power	Internal CR2450 3V Lithium battery	/
Earth	Port not present	/
Telecommunication	Port not present	/
Signal	Port not present	/
Control	Port not present	/
Antenna	Integral (on PCB)	/



STATE OF THE EUT DURING TESTS

Ref.	Mode	Description
#1	Operating	Continuous transmission

SUPPORT EQUIPMENT

Defined as equipment needed for correct operation or loading of the EUT, but not considered as tested:

Equipment	Manufacturer	Model
None		

ELECTROMAGNETICALLY RELEVANT COMPONENTS

Component	No.	Manufacturer	Model
/			

RFI SUPPRESSION DEVICES

Component	No.	Manufacturer	Model
/			

EMI PROTECTION DEVICES

Component	No.	Manufacturer	Model
/			

EUT TECHNICAL DOCUMENTATION

Document	Reference
TX PW94-PT94 - Manual of installation and use	Rev 000a
TX P902-904 - Manual of installation and use	Rev 000a



5. METHODS OF MEASUREMENT

All compliance measurements have been carried out using the procedures described in the standard ANSI C63.4-2009, ANSI C63.10-2009 and Section 15.31 of CFR47 Part 15 – Subpart A (General).

Additional test requirements have been adopted according to the reference Section indicated in the § 6 of this test report.

FREQUENCY RANGE INVESTIGATED

Radiated emission tests: from 0,15 MHz to tenth harmonic of fundamental.

6. SUMMARY OF TEST RESULTS

POSSIBLE TEST CASE VERDICTS:	
Test object does meet the requirement	PASS
Test object does not meet the requirement	FAIL
Test case does not apply to the test object	N.A.
Test not performed	N.P.

CFR47 Part 15	TITLE	RESULT
§ 15.203	Antenna Requirements	PASS
§ 15.35 (c)	Pulse train measurement for pulsed operation	Measured
§ 15.207 (a)	Conducted Emission	N.A.1
§ 15.205 (a) (b)	Restricted band of operation	
§ 15.209	Radiated Emissions	PASS
§ 15.249 (a) (d)	Operation within band 902–928MHz	
§ 2.202 (a)	Occupied bandwidth	Measured
§ 15.215 (c)	Bandwidth of emission (20dB Bandwidth)	PASS
§ 1.1307 (b)(1)	RF exposure evaluation	PASS

Note 1	Port not present, battery operating device
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7. TEST RESULTS

7.1 ANTENNA REQUIREMENTS

TEST REQUIREMENT

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 Sections 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 Section 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.

Antenna specifications

N°of authorized antenna types	1
Antenna type	Integral antenna on PCB
Maximum total gain	< 6dB
External power amplifiers	Not present

TEST RESULT

The EUT meets the requirements of section 15.203 and 15.204

7.2 PULSE TRAIN MEASUREMENT FOR PULSED OPERATION

TEST REQUIREMENT

According to CFR 47 Part 15, section 15.35(c).

Guide ANSI C63.4

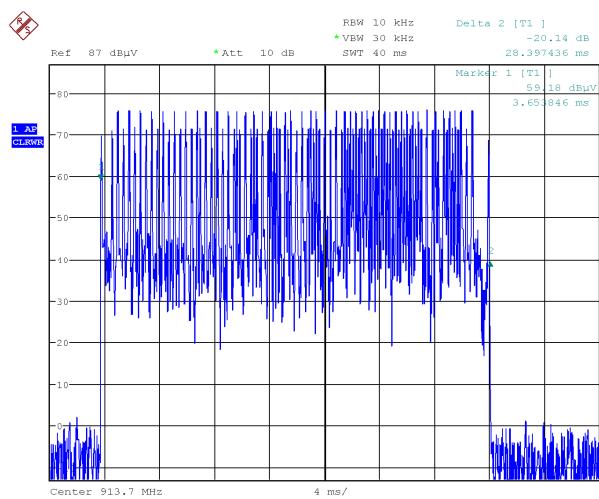
Devices transmitting pulsed emissions and subject to a limit requiring an average detector function for radiated emissions shall initially be measured with an instrument that uses a peak detector.

A radiated emission measured with a peak detector may then be corrected to a true average using the appropriate factor for emission duty cycle.

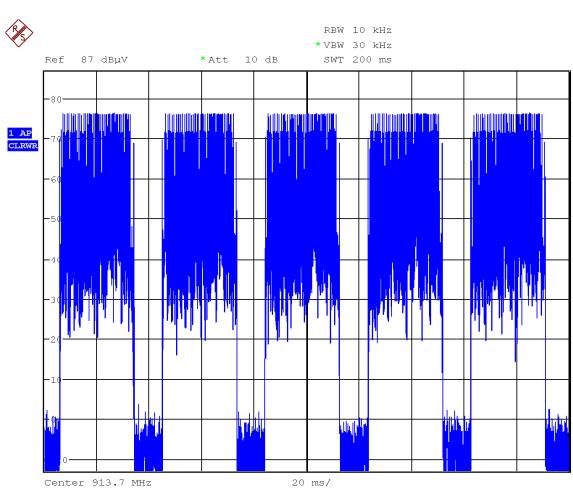
This correction factor relates the measured peak level to the average limit and is derived by averaging absolute field strength over one complete pulse train that is 0.1 s, or less, in length. If the pulse train is longer than 0.1 s, the average shall be determined from the average absolute field strength during the 0.1 s interval in which the field strength is at a maximum.

MEASUREMENTS RESULTS

Single pulse



Total pulse train



TEST RESULT

T single pulse: 28,39ms

$T_{on} = 28,39 \times 5 = 141,95 \text{ ms}$

Total period: 200 ms

Pulse train correction: $20 \times \log (T_{on}/\text{Total period}) = -2.97 \text{ dB}$.

REMARKS

None



7.3 RADIATED DISTURBANCES

TEST REQUIREMENT	
Test setup	ANSI C63.4
Test facility	Semi-anechoic chamber
Test distance	3 meters
Frequency range	9 kHz to tenth harmonic of fundamental
IF bandwidth (below 30 MHz)	9 kHz
IF bandwidth (below 1,000 MHz)	120 kHz
IF bandwidth (above 1,000 MHz)	1 MHz
Deviation to test procedure	None
Limits	Sections 15.205, 15.209, 15.249
EUT operating condition	#1
Remark	(*) In accordance with part 15.31 (f) (2), where the measurement distance was specified to be 30 or 300 meters, a correction factor was applied in order to permit measurement to be performed at a separation distance. The applied formula for limits at 3 meter is: Extrapolation (dB) = 40log (300meter / 3meter) = +80db Extrapolation (dB) = 40log (30meter / 3meter) = +40db
TEST RESULT	
The EUT meets the requirements of sections 15.205, 15.209 and 15.249.	

LIMIT FOR FUNDAMENTAL		
Frequency (MHz)	Quasi-Peak (dBμV/m)	Quasi-Peak Limit (μV/m)
913,70	94	50.000

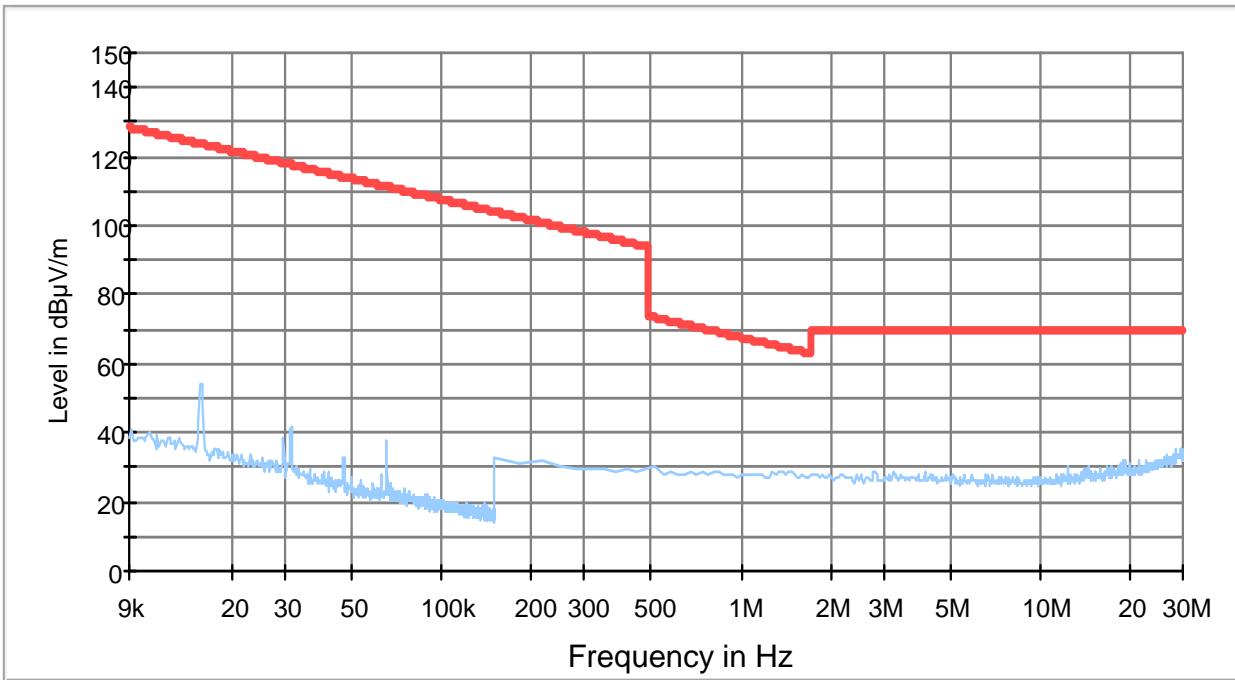
LIMITS FOR SPURIOUS		
Band of operations	Peak (dBμV/m)	Average Limit (dBμV/m)
Restricted bands (par. 15.205)	74	54
Other bands	According to 15.209 or fundamental –20dB (which is greater)	According to 15.209 or fundamental –20dB (which is greater)

TEST PROCEDURE

- 1) The EUT was placed on turntable which is 0.8 m above the ground plane
- 2) The turntable shall rotate from 0° to 360° degrees to determine the position of maximum emission level.
- 3) The EUT is positioned 3 m away from the receiving antenna which varied from 1 to 4 m to find the highest emission.
- 4) The measurements were made with the detector set to PEAK and AVERAGE amplitude within a bandwidth of 100 kHz below 1000 MHz and 1 MHz above 1000 MHz.
- 5) The receiving antenna was positioned in both horizontal and vertical polarization.
- 6) The measurements with Quasi-Peak detector, below 1000 MHz are performed only for frequencies for which the Peak values are \geq (Q.P. limit – 6 dB).

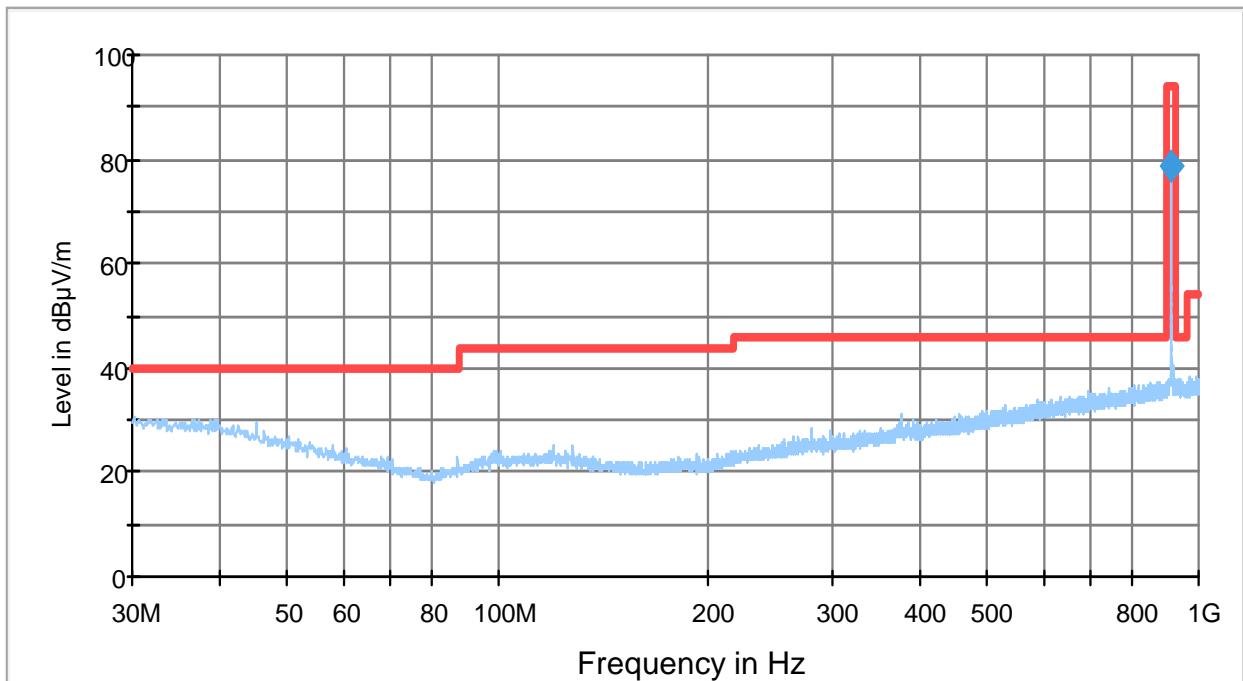
MEASUREMENTS RESULTS

Range: 9kHz ÷ 30MHz

EMI 9k-30MHz LOOP HFH2-Z2 ESMI - Res in dB μ V/m

Range: 30 + 1000 MHz Horizontal polarization

EMI 30-1000MHz ARA ESCI_H

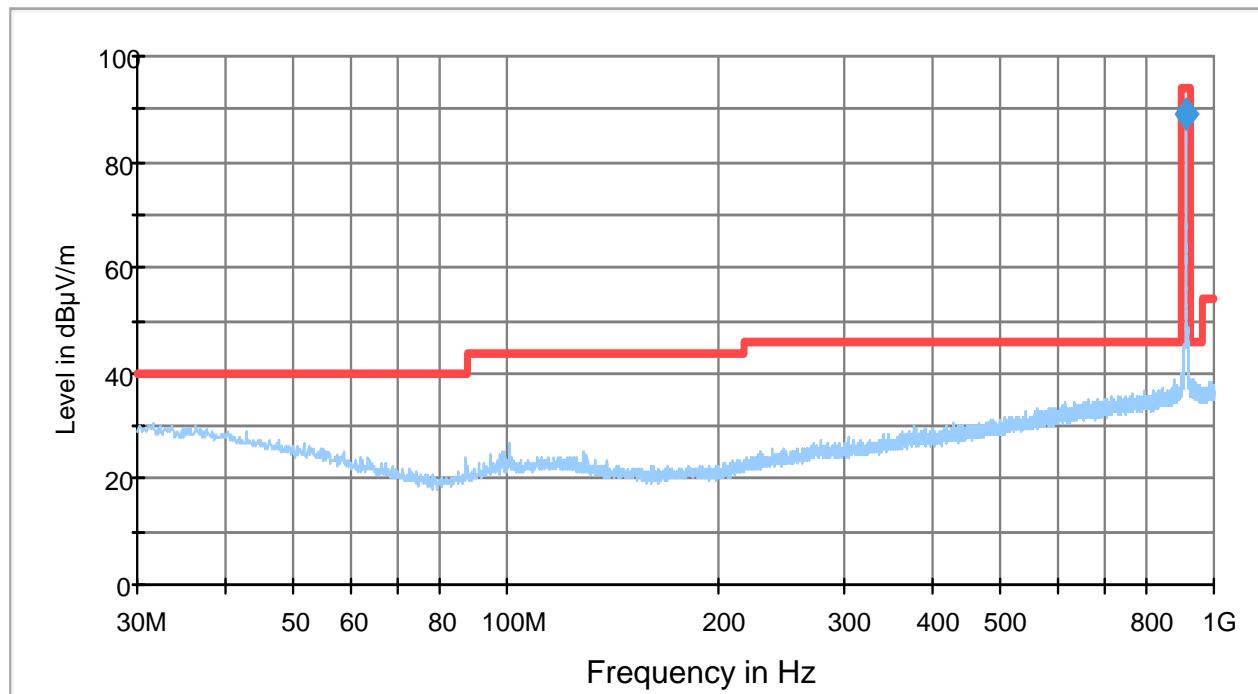


Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
913.670000	78.6	1000.0	120.000	99.9	H	-18.0	24.5	15.40	94.00

Max fundamental frequency value in horizontal polarization: 78,6 dBμV/m

Range: 30 + 1000 MHz Vertical polarization

EMI 30-1000MHz ARA ESCI_V



Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)
913.670000	89.0	1000.0	120.000	176.0	V	-68.0	24.5	5.00	94.00

Max fundamental frequency value in vertical polarization: 89,0 dB μ V/m

Range: 1000 + 10000 MHz**PEAK RESULT (RBW=1MHz; VBW=1MHz) – VERTICAL POLARIZATION**

Frequency (MHz)	Reading value (dB μ V)	Antenna Factor (dB3/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Correcting reading (dB μ V/m)	Average Limit (μ V/m)	Average Limit (dB μ V/m)	Margin (dB)
1827,33	57,26	25,30	3,53	-37,44	48,65	500	54,00	>5
2741,30	54,00	27,50	4,00	-37,47	48,03	500	54,00	>5
3654,88	44,20	28,70	4,91	-37,20	40,61	500	54,00	>13
4567,20	< 40	30,90	5,92	-36,75	< 40	500	54,00	>14
5482,24	< 40	31,90	6,40	-36,70	< 40	500	54,00	>14
6395,95	< 40	34,40	6,94	-36,95	< 40	500	54,00	>14
7309,60	< 40	36,50	7,40	-37,00	< 40	500	54,00	>14
8223,37	< 40	37,10	8,20	-37,20	< 40	500	54,00	>14
9137,00	< 40	37,10	8,80	-37,60	< 40	500	54,00	>14

NOTE: The peak levels measured are under Average Limit (54 dB μ V/m), so the Average spurious levels are not been measured.

The measures above are the worst case on 3 axes X Y and Z

PEAK RESULT (RBW=1MHz; VBW=1MHz) – HORIZONTAL POLARIZATION

Frequency (MHz)	Reading value (dB μ V)	Antenna Factor (dB3/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Correcting reading (dB μ V/m)	Average Limit (μ V/m)	Average Limit (dB μ V/m)	Margin (dB)
1827,33	57,24	25,30	3,53	-37,44	48,63	500	54,00	>5
2741,30	55,95	27,50	4,00	-37,47	49,98	500	54,00	>4
3654,88	44,71	28,70	4,91	-37,20	41,12	500	54,00	>12
4567,20	< 40	30,90	5,92	-36,75	< 40	500	54,00	>14
5482,24	< 40	31,90	6,40	-36,70	< 40	500	54,00	>14
6395,95	< 40	34,40	6,94	-36,95	< 40	500	54,00	>14
7309,60	< 40	36,50	7,40	-37,00	< 40	500	54,00	>14
8223,37	< 40	37,10	8,20	-37,20	< 40	500	54,00	>14
9137,00	< 40	37,10	8,80	-37,60	< 40	500	54,00	>14

NOTE: The peak levels measured are under Average Limit (54 dB μ V/m), so the Average spurious levels are not been measured.

The measures above are the worst case on 3 axes X Y and Z

7.4 OCCUPIED BANDWIDTH

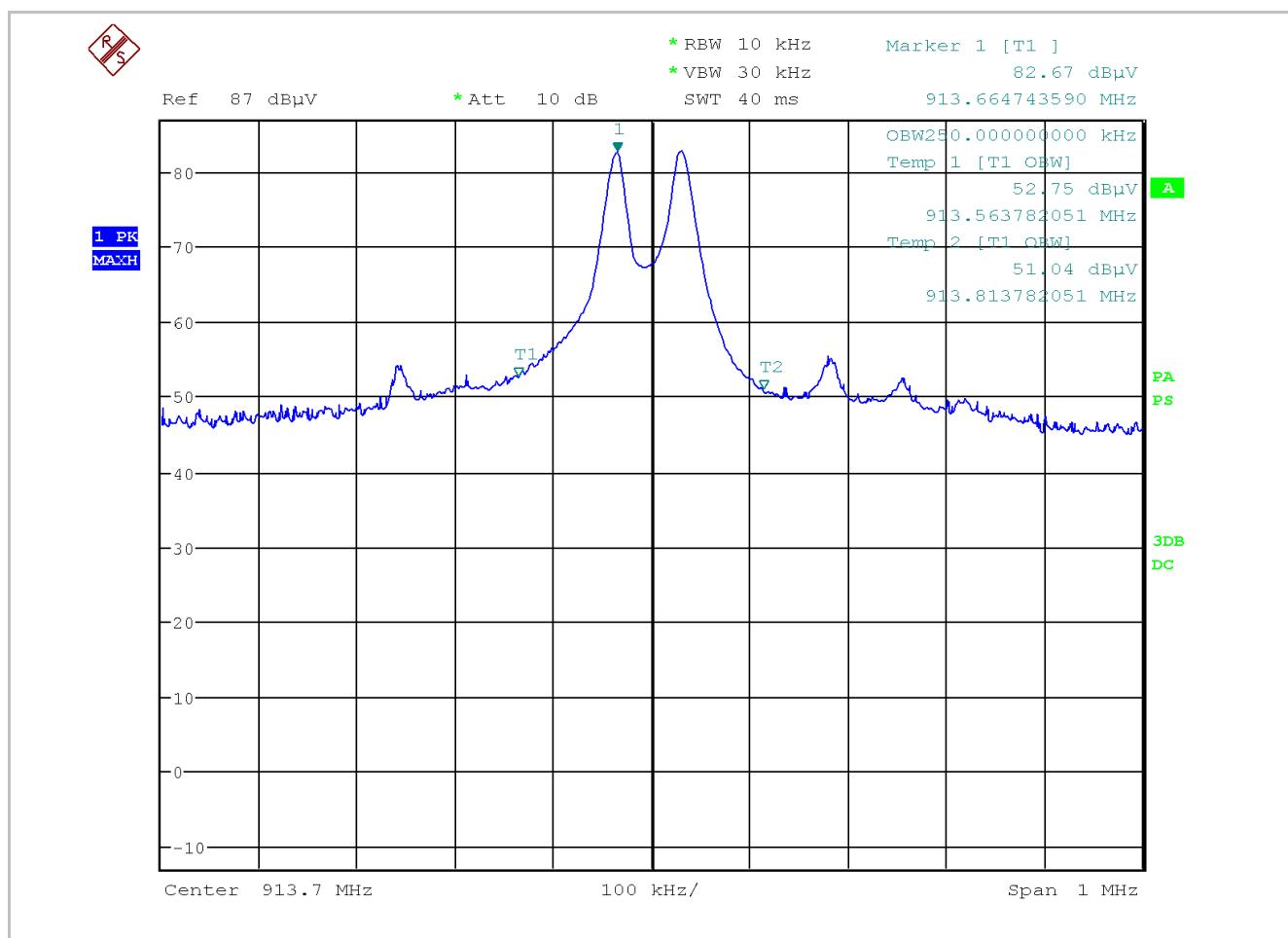
TEST REQUIREMENT

The frequency bandwidth according to CFR 47 Part 2, section 2.202(a) is measured as the 99% of emission bandwidth.

The frequency bandwidth such that, below its lower and above its upper frequency limits, the mean power radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

Guide ANSI C63.4

In order to measure the modulated signal properly, a resolution bandwidth that is small compared with the bandwidth required by the procuring or regulatory agency shall be used on the measuring instrument. However, the resolution bandwidth of the measuring instrument shall be set to a value within 1% to 5% of the signal bandwidth requirements.



TEST RESULT

Occupied bandwidth (99%)	250 kHz @ 913,70MHz
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7.5 BANDWIDTH OF EMISSIONS

TEST REQUIREMENT

Spectrum analyzer settings

Span	1 MHz
Resolution bandwidth (RBW)	10 kHz
Video bandwidth (VBW)	30 kHz
Sweep time (SWT)	Auto
Detector function	Peak
Trace	Max hold
Attenuator	/
Deviation to test procedure	None
EUT operating condition	#1
Remark	None

LIMITS

20 dB below peak output power

TEST RESULT

The EUT meets the requirements of sections 2.1049

TEST PROCEDURE

The EUT is set to transmit with modulation in continuous mode

ANSI C63-4 Specification

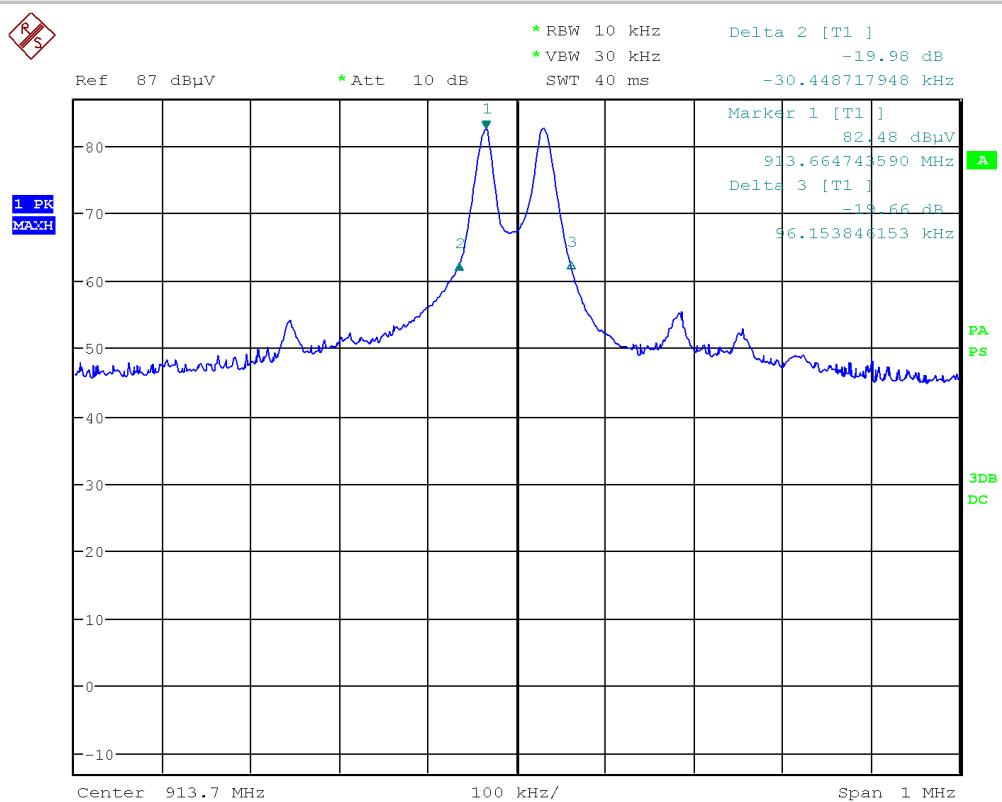
13.1.7 Occupied bandwidth measurements

In order to measure the modulated signal properly, a resolution bandwidth that is small compared with the bandwidth required by the procuring or regulatory agency shall be used on the measuring instrument. However, the resolution bandwidth of the measuring instrument shall be set to a value greater than 5% of the bandwidth requirements. When no bandwidth requirements are specified, the minimum resolution bandwidth of the measuring instrument is given in the following table:

Fundamental frequency	Minimum resolution bandwidth
9 kHz to 30 MHz	1 kHz
30 to 1000 MHz	10 kHz
1000 MHz to 40 GHz	100 kHz

MEASUREMENTS RESULTS

Channel (No.)	Frequency (MHz)	Channel Bandwidth (kHz)	Plot (No.)
01	913,70	126,59	1

Plot 1



7.6 RF EXPOSURE EVALUATION

TEST REQUIREMENT

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines § 1.1307(b)(1).

EUT classification (fixed, mobile or portable devices)	Portable
Deviation to test procedure	None
EUT operating condition	#1
Remark	None

Limit for maximum permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Average Time (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3÷3.0	614	1.63	(100)*	6
3.0÷30	1842/f	4.89/f	(900/f ²)*	6
30÷300	61.4	0.163	1.0	6
300÷1500	--	--	f/300	6
1500÷100,000	--	--	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3÷3.0	614	1.63	(100)*	30
3.0÷30	824/f	2.19/f	(180/f ²)*	30
30÷300	27.5	0.073	0.2	30
300÷1500	--	--	f/1500	30
1500÷100,000	--	--	1.0	30

F = Frequency in MHz

*Plane-wave equivalent power density

The distance from the device's transmitting antenna where the exposure level reaches the maximum permitted limit is calculated using the general equation:

$$S = P \cdot G / 4\pi R^2$$

Where:

S = Power Density (mW/cm²)

P = Conducted power (mW)

G = Linear power gain relative to isotropic radiator (numeric gain)

R = Distance (cm)

RF Exposure evaluation

Low threshold limit			
Exposure category	Frequency range fMHz	Limit	Limit value (mW/cm ²)
General population	913,70	$f_{MHz} / 1500$	0.609

Both conducted and radiated (EIRP) output power values must be compared to the threshold limit.

MEASUREMENTS RESULTS

T_{on} (ms)	Total Period (ms)	Time average factor (dB)	Source-based time averaged output (dBm)	Source-based time averaged output (mW)
141,95	200	-1.48	-7.71	0.169

The time average factor is calculated as follows:

$$10 * \log (T_{on} / \text{Total Period}) \text{ dB}$$

T_{on} and *Total Period* are expressed in ms; measured values are:

$$T_{on} = 141,95 \text{ ms}$$

$$\text{Total Period} = 200 \text{ ms}$$

The resulting time average factor used is -1.48 dB.

The highest output power (radiated) is -6.23 dBm (89.00 dB μ V/m). Therefore the averaged output power is calculated as follows:

$$-6.23 -1.48 = -7.71 \text{ dBm (0.169 mW)}$$

TEST RESULT

This value is less than the low threshold limit corresponding to the general population exposure category and therefore no SAR test is required.

8. MEASUREMENTS AND TESTS UNCERTAINTY

The measurement uncertainties stated were calculated in accordance with the IMQ procedure No. IO-DT-U01 and requirement of NIST Technical Note 1297 and NIS 81: 1994 "The Treatment of Uncertainty in EMC Measurements"

Methods	Expanded Uncertainty	Unit	confidence level	Coverage factor	Degree of freedom
Radiated emission (30 ÷ 1000 MHz)	4.77	dB	95 %	2	9
Radiated emission (above 1000 MHz)	3.53	dB	95 %	2	9

9. LIST OF MEASURING EQUIPMENT AND CALIBRATION INFORMATION

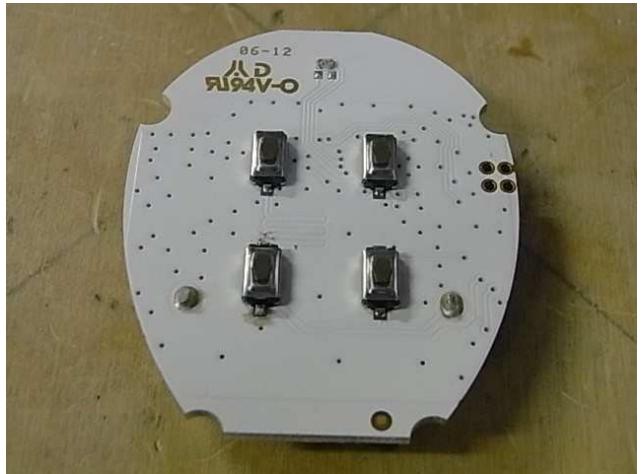
IMQ Serial Number	Instrument	Manufacturer	Type	Last Cal.	Cal. Period.	Calibration Company
P01709	Shielded semi-anechoic chamber	SIDT	/	07-12	12	IMQ
P02486	Turntable controller unit	FRANKONIA	FCTAM01	-	-	-
P02488	Mast antenna	FRANKONIA	FAM4	-	-	-
S02350	EMI Receiver	ROHDE & SCHWARZ	ESMI-RF	05-11	12	INRIM
S04355	EMI Receiver	ROHDE & SCHWARZ	ESCI 3	11-11	12	INRIM
S02508	Loop antenna	ROHDE & SCHWARZ	HFH2-Z2	01-12	36	OKD
S02385	Log antenna	ARA	LPB-2513	07-11	36	NPL
S03463	Horn Antenna	SCHWARZBECK	BBHA 9120D	09-11	36	NPL
S03629	Spectrum Analyzer	Rohde & Schwarz	FSP40	09-11	12	I.N.RI.M.
S03542	Preamplifier	Hewlett Packard	HP 8449B	02-11	24	IMQ
S04159	Multimeter	Fluke	45	02-12	12	IMQ
W-00199/E	Software	ROHDE & SCHWARZ	EMC32 Ver. 6.30			
H-00165	PC		/			

Note: The IMQ instruments are tested and calibrated according to UNI EN 45001, the IMQ procedure IP-037 "Calibration test equipment and measurement" and according to plans set on IMQ operating instruction IO-FT-034 "Criteria for the calibration of test equipment and measurement" which are an integral part of the Quality Manual of IMQ.

10. PHOTOGRAPHIC DOCUMENTATION



INTERNAL VIEW



SET-UP

Test set-up radiated emission test



END OF REPORT