

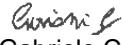


<b>Report Reference ID:</b>	152185-1TRFWL
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<b>Test specification:</b>	Title 47-Telecommunication Chapter I - Federal Communications Commission Subchapter A - General Part 15 - Radio Frequency Devices Subpart C - Intentional Radiators  <b>§15.231 Periodic operation in the band 40.66–40.70 MHz and above 70 MHz</b>
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<b>Applicant:</b>	META System S.p.A. Via Majakovskij 10/b/c/d/e Reggio Emilia, I-42124; Italy
<b>Apparatus:</b>	433 MHz Remote control transmitter
<b>FCC ID:</b>	<b>P3O98400</b>
<b>Model:</b>	TXBMW MR

<b>Testing laboratory:</b>	Nemko Spa Via del Carroccio, 4 I 20046 Biassono (Italy)  Telephone: +039 039 2201201  Facsimile: +39 039 220 1221
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	<b>Name and title</b>	<b>Date</b>
<b>Tested by:</b>	 Daniele Guarnone, Wireless/EMC Specialist	2010-09-10
<b>Reviewed by:</b>	 Gabriele Curioni, Wireless/EMC Specialist	2010-09-10

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## Table of contents

<b>Section 1: Report summary .....</b>	<b>3</b>
1.1 Test specification.....	3
1.2 Statement of compliance .....	3
1.3 Exclusions .....	3
1.4 Registration number .....	3
1.5 Test report revision history .....	3
1.6 Limits of responsibility .....	3
<b>Section 2: Summary of test results .....</b>	<b>4</b>
2.1 FCC Part 15 Subpart C – Intentional Radiators, test results .....	4
<b>Section 3: Equipment under test (EUT) and application details .....</b>	<b>5</b>
3.1 Applicant details .....	5
3.2 Modular equipment.....	5
3.3 Product details.....	5
3.4 Application purpose .....	5
3.5 Composite/related equipment.....	5
3.6 Sample information.....	6
3.7 EUT technical specifications.....	6
3.8 Operation of the EUT during testing .....	6
3.9 EUT setup diagram.....	6
<b>Section 4: Engineering considerations .....</b>	<b>7</b>
4.1 Modifications incorporated in the EUT.....	7
4.2 Deviations from laboratory tests procedures .....	7
4.3 Technical judgment .....	7
<b>Section 5: Test conditions .....</b>	<b>8</b>
5.1 Power source and ambient temperatures.....	8
<b>Section 6: Measurement uncertainty .....</b>	<b>9</b>
<b>Section 7: Test equipment .....</b>	<b>10</b>
7.1 Test equipment list .....	10
<b>Section 8: Testing data .....</b>	<b>11</b>
8.1 Clause 15.31(e) Variation of power source .....	11
8.2 Clause 15.31(m) Number of operating frequencies.....	12
8.3 Clause 15.203 Antenna requirement.....	13
8.4 Clause 15.207(a) Conducted limits .....	14
8.5 Clause 15.231(a) Conditions for intentional radiators to comply with periodic operation .....	16
8.6 Clause 15.231(b) Field strength of emissions .....	19
8.7 Clause 15.231(c) Emission bandwidth .....	26
8.8 Clause 15.231(d) Requirements for devices operating within 40.66–40.70 MHz band.....	27
8.9 Clause 15.231(e) Field strength of emissions for periodic radiators .....	28
<b>Section 9: Block diagrams of test set-ups .....</b>	<b>30</b>
<b>Section 10: EUT photos .....</b>	<b>31</b>

 <b>Nemko</b> Nemko Spa Via del Carroccio, 4 – I 20046 Biassono (Italy)	<b>Section 1: Report summary</b>	<b>Product:</b> TXBMW/MR
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## Section 1: Report summary

### 1.1 Test specification

<b>Specifications</b>	<b>FCC Part 15 Subpart C, 15.231</b> Periodic operation in the band 40.66–40.70 MHz and above 70 MHz
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### 1.2 Statement of compliance

<b>Compliance</b>	In the configuration tested the EUT was found compliant Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> This report contains an assessment of apparatus against specifications based upon tests carried out on samples submitted at Nemko Canada Inc. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15; Subpart C. Radiated tests were conducted in accordance with ANSI C63.4-2003.
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### 1.3 Exclusions

<b>Exclusions</b>	None
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### 1.4 Registration number

<b>Test site FCC ID number</b>	Test Firm Registration Number FCC: 481407
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### 1.5 Test report revision history

<b>Revision #</b>	Details of changes made to test report
TRF	Original report issued
R1TRF	XXX

### 1.6 Limits of responsibility

The date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025.

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**Section 2: Summary of test results****Product: TXBMW/MR**

## Section 2: Summary of test results

### 2.1 FCC Part 15 Subpart C – Intentional Radiators, test results

#### General requirements for FCC Part 15

Part	Test description	Verdict
§15.31(e)	Variation of power source	Pass
§15.31(m)	Number of operating frequencies	Pass
§15.203	Antenna requirement	Pass
§15.207(a)	Conducted limits	N/A

#### Specific requirements for FCC Part 15 Subpart C, 15.231

Part	Test description	Verdict
§15.231(a)	Conditions for intentional radiators to comply with periodic operation	Pass
§15.231(b)	Field strength of emissions	Pass
§15.231(c)	Emission bandwidth	Pass
§15.231(d)	Requirements for devices operating within 40.66–40.70 MHz band	N/A
§15.231(e)	Conditions for intentional radiators to comply with periodic operation	N/A

Notes: None

**Section 3: Equipment under test (EUT) details      Product: TXBMW MR****Section 3: Equipment under test (EUT) and application details****3.1 Applicant details**

<b>Applicant complete business name</b>	Name:	META System S.p.A Via Majakovskij 10/b/c/d/e I-421124, Reggio Emilia, Italy
	Federal Registration Number (FRN):	0006537807
	Grantee code	P3O
<b>Mailing address</b>	Address: City: Province/State: Post code: Country:	<a href="mailto:info@metasystem.it">info@metasystem.it</a> Reggio Emilia Reggio Emilia -- Italy

**3.2 Modular equipment**

<b>a) Single modular approval</b>	Single modular approval Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
<b>b) Limited single modular approval</b>	Limited single modular approval Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	

**3.3 Product details**

<b>FCC ID</b>	Grantee code:	<b>P3O</b>
	Product code:	<b>98400</b>
<b>Equipment class</b>	DSC – Part 15 Remote Control/Security Device Transmitter	
<b>Description of product as it is marketed</b>	Remote Control Transmitter	
	Model name/number:	<b>TXBMW MR</b>
	Serial number:	--

**3.4 Application purpose**

<b>Type of application</b>	<input checked="" type="checkbox"/> Original certification <input type="checkbox"/> Change in identification of presently authorized equipment Original FCC ID: _____ Grant date: _____ <input type="checkbox"/> Class II permissive change or modification of presently authorized equipment
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**3.5 Composite/related equipment**

<b>a) Composite equipment</b>	The EUT is a composite device subject to an additional equipment authorization Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
<b>b) Related equipment</b>	The EUT is part of a system that operates with, or is marketed with, another device that requires an equipment authorization Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
<b>c) Related FCC ID</b>	If either of the above is "yes": <input type="checkbox"/> has been granted under the FCC ID(s) listed below: <input type="checkbox"/> is in the process of being filled under the FCC ID(s) listed below: <input type="checkbox"/> is pending with the FCC ID(s) listed below: <input type="checkbox"/> has a mix of pending and granted statuses under the FCC ID(s) listed below: i FCC ID: ii FCC ID:

**3.6 Sample information**

<b>Receipt date:</b>	2010-06-11
<b>Nemko sample ID number:</b>	152185

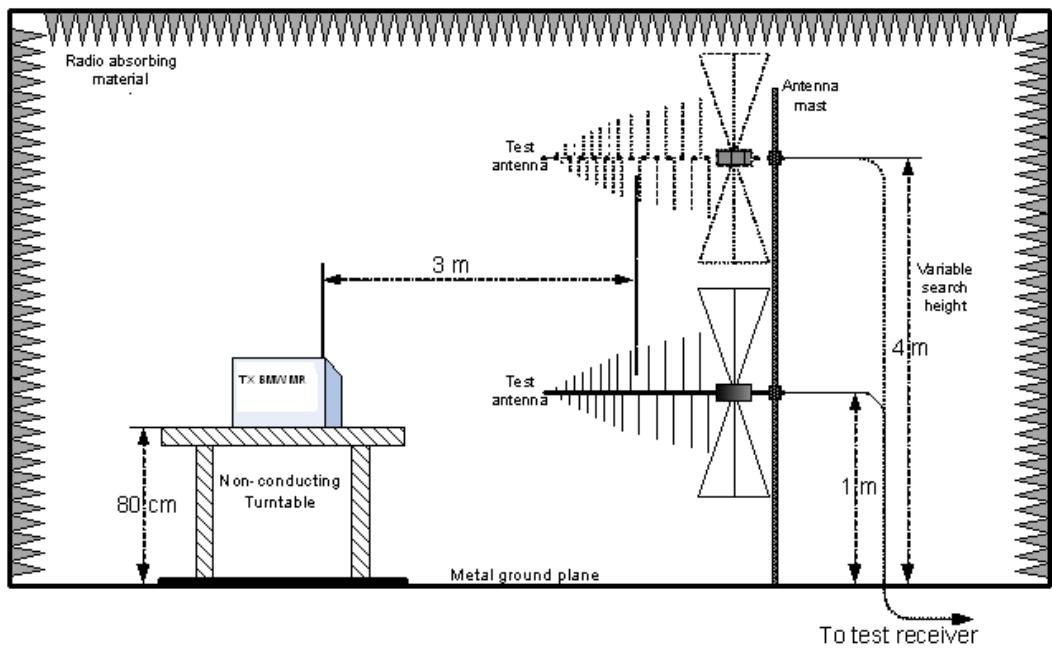
**3.7 EUT technical specifications**

<b>Operating band:</b>	433.5 – 434.5 MHz
<b>Operating frequency:</b>	433.92 MHz
<b>Modulation type:</b>	On off Key, 4096 bit/s, 4096Hz
<b>Occupied bandwidth:</b>	35.6 kHz
<b>Channel spacing:</b>	only one channel device
<b>Emission designator:</b>	35K6P1D
<b>Antenna type:</b>	Integral
<b>Power source:</b>	3 VDC lithium battery

**3.8 Operation of the EUT during testing**

<b>Details:</b>	Constant transmitting at maximum power
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**3.9 EUT setup diagram**





## Section 4: Engineering considerations

### 4.1 Modifications incorporated in the EUT

Modifications	Modifications performed to the EUT during this assessment
None <input checked="" type="checkbox"/>	Yes <input type="checkbox"/> , performed by Client <input type="checkbox"/> or Nemko <input type="checkbox"/> Details:

### 4.2 Deviations from laboratory tests procedures

Deviations	Deviations from laboratory test procedures
None <input checked="" type="checkbox"/>	Yes <input type="checkbox"/> - details are listed below:

### 4.3 Technical judgment

Judgment	None

## Section 5: Test conditions

### 5.1 Power source and ambient temperatures

<b>Normal temperature, humidity and air pressure test conditions</b>	Temperature: 15–30 °C Relative humidity: 20–75 % Air pressure: 86–106 kPa  When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.
<b>Power supply range:</b>	The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages $\pm 5\%$ , for which the equipment was designed.



## Section 6: Measurement uncertainty

Product: TXBMW/MR

### Section 6: Measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report according to CISPR 16-4-2 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements" and is documented in the Nemko Spa Technical Procedure WML1002. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device

**Section 7: Test equipment****Product: TXBMW/MR**

## Section 7: Test equipment

### 7.1 Test equipment list

Equipment	Manufacturer	Model No.	Asset/Serial No.	Next cal.
Emi Test Receiver 20 Hz ÷ 5 GHz	R&S	ESBI	828038/003	08/2011
Spectrum Analyzer 9 KHz ÷ 40 GHz	R&S	FSEK	848255/005	09/2011
Trilog Broad Band Antenna 25 MHz÷2 GHz	Schwarzbeck	VULB 9168	VULB 9168-242	08/2013
Semi-anechoic chamber	Nemko	10m semi-anechoic chamber	530	08/2013
Shielded room	Siemens	10m control room	1947	08/2013
Broadband preamplifier	Schwarzbeck	BBV 9718	9718-137	05/2011
Bilog antenna 1 ÷18 GHz	Schwarzbeck	STLP 9148-123	123	09/2011
Climatic Chamber	Votsch	VC7150	59566038380010	03/2012

Note: N/A = Not applicable, NCR = No cal required, COU = Cal on use



<b>Section 8: Testing data</b>	<b>Product:</b> TXBMW/MR	
<b>Test name:</b> Clause 15.31(e) Variation of power source		
<b>Test date:</b> 2010-07-05	<b>Test engineer:</b> Daniele Guarnone	<b>Verdict:</b> Pass
<b>Specification:</b> FCC Part 15 Subpart A		

## Section 8: Testing data

### 8.1 Clause 15.31(e) Variation of power source

#### § 15.31 Measurement standards.

- (e) For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85 % and 115 % of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.

#### Special notes

None

#### Test data

New battery was used during the tests

 <b>Nemko</b> Nemko Spa Via del Carroccio, 4 I 20046 Biassono (Italy)	<b>Section 8: Testing data</b>		<b>Product:</b> TXBMW/MR
	<b>Test name:</b> Clause 15.31(m) Number of operating frequencies		
	<b>Test date:</b> 2010-07-05	<b>Test engineer:</b> Daniele Guarnone	<b>Verdict:</b> Pass
	Specification: FCC Part 15 Subpart A		

## 8.2 Clause 15.31(m) Number of operating frequencies

### § 15.31 Measurement standards.

- (m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and, if required, reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:

Frequency range over which device operates	Number of frequencies	Location in the range of operation
1 MHz and less	1	Middle
1 to 10 MHz	2	1 near top and 1 near bottom
More than 10 MHz	3	1 near top, 1 near middle and 1 near bottom

### Special notes

None

### Test data

The EUT is one channel equipment, 433.92 MHz

Low frequency / channel	NA
Mid frequency / channel	NA
High frequency / channel	NA

 <b>Nemko</b> Nemko Spa Via del Carroccio, 4 I 20046 Biassono (Italy)	<b>Section 8: Testing data</b>	Product: TXBMW MR
	<b>Test name:</b> Clause 15.203 Antenna requirement	
	<b>Test date:</b> 2010-07-05	<b>Test engineer:</b> Daniele Guarnone
	<b>Verdict:</b> Pass	
<b>Specification:</b> FCC Part 15 Subpart C		

## 8.3 Clause 15.203 Antenna requirement

### § 15.203 Antenna 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 §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.

### Special notes

None

### Test data

- (The EUT has a non-standard antenna jack or electrical connector.)

Detailed photo of RF connector:



The antenna is integral.

<b>Nemko</b>	<b>Section 8: Testing data</b>	<b>Product: Errore. L'origine riferimento non è stata trovata.</b>
Nemko Spa Via del Carroccio, 4 I 20046 Biassono (Italy)	<b>Test name:</b> Clause 15.207(a) Conducted limits	
<b>Test date:</b> XXXX	<b>Test engineer:</b> XXXX	
<b>Verdict:</b> NA	<b>Supply input:</b> XXXX	
<b>Temperature:</b> XXX °C	<b>Air pressure:</b> XXXX mbar	<b>Relative humidity:</b> XXX %
<b>Specification:</b> FCC Part 15 Subpart C		

## 8.4 Clause 15.207(a) Conducted limits

### § 15.207 Conducted limits.

- (a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (MHz)	Conducted limit (dB $\mu$ V)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

\*-Decreases with the logarithm of the frequency.

### Special notes

None

### Test data

NA

The spectral scan has been corrected with transducer factors (i.e. cable loss, LISN factors, and attenuators) for determination of compliance.

A preview measurement was generated with the receiver in continuous scan mode. Emissions detected within 6 dB or above limit were re-measured with the appropriate detector against the correlating limit and recorded as the final measurement.

#### Receiver/Spectrum analyzer settings:

0.15 MHz to 30 MHz

#### Preview measurements

Receiver: 9 kHz RBW, Peak and Average detector, max hold  
Measurement time 100 ms

#### Final measurement

Receiver: 9 kHz RBW, Quasi-peak and Average detector



Nemko

Nemko Spa Via del  
Carroccio, 4  
I 20046 Biassono (Italy)

Section 8: Testing data	Product: Errore. L'origine riferimento non è stata trovata.	
Test name: Clause 15.207(a) Conducted limits		
Test date: XXXX	Test engineer: XXXX	
Verdict: NA	Supply input: XXXX	
Temperature: XXX °C	Air pressure: XXXX mbar	Relative humidity: XXX %
Specification: FCC Part 15 Subpart C		

## Test data, continued

## Tabular results

## Notes

Correction factor includes cable loss, LISN, and attenuator.

Result measurement is a summation of the raw measurement value and the correction factor.



<b>Section 8: Testing data</b>	<b>Product: TXBMW/MR</b>	
<b>Test name:</b> Clause 15.231(a) Conditions for intentional radiators to comply with periodic operation		
<b>Test date:</b> 2010-07-07	<b>Test engineer:</b> Daniele Guarnone	
<b>Verdict:</b> Pass	<b>Supply input</b> 3 Vdc lithium battery	
<b>Temperature:</b> 25 °C	<b>Air pressure:</b> 1005 mbar	<b>Relative humidity:</b> 65%
<b>Specification:</b> FCC Part 15 Subpart C		

## 8.5 Clause 15.231(a) Conditions for intentional radiators to comply with periodic operation

### § 15.231 Periodic operation in the band 40.66–40.70 MHz and above 70 MHz.

- (a) The provisions of this section are restricted to periodic operation within the band 40.66–40.70 MHz and above 70 MHz. Except as shown in paragraph (e) of this section, the intentional radiator is restricted to the transmission of a control signal such as those used with alarm systems, door openers, remote switches, etc. Continuous transmissions, voice, video and the radio control of toys are not permitted. Data is permitted to be sent with a control signal. The following conditions shall be met to comply with the provisions for this periodic operation:
- (1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.
  - (2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.
  - (3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.
  - (4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition
  - (5) Transmission of set-up information for security systems may exceed the transmission duration limits in paragraphs (a)(1) and (a)(2) of this section, provided such transmissions are under the control of a professional installer and do not exceed ten seconds after a manually operated switch is released or a transmitter is activated automatically. Such set-up information may include data.

#### Special notes

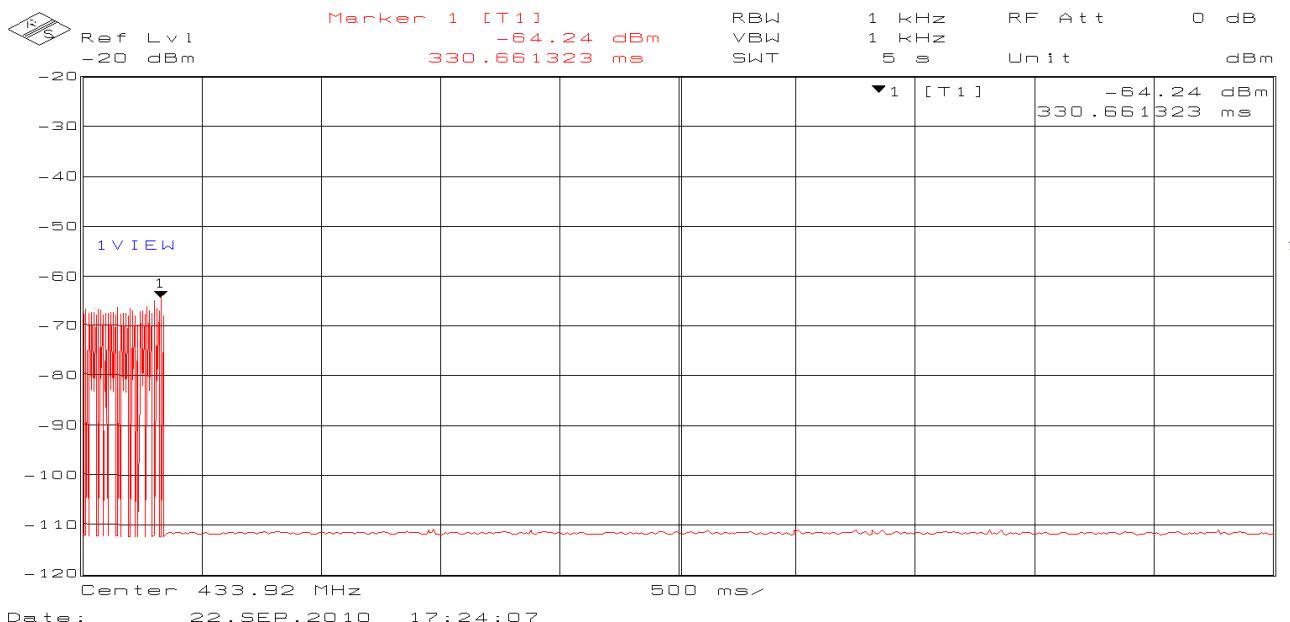
None



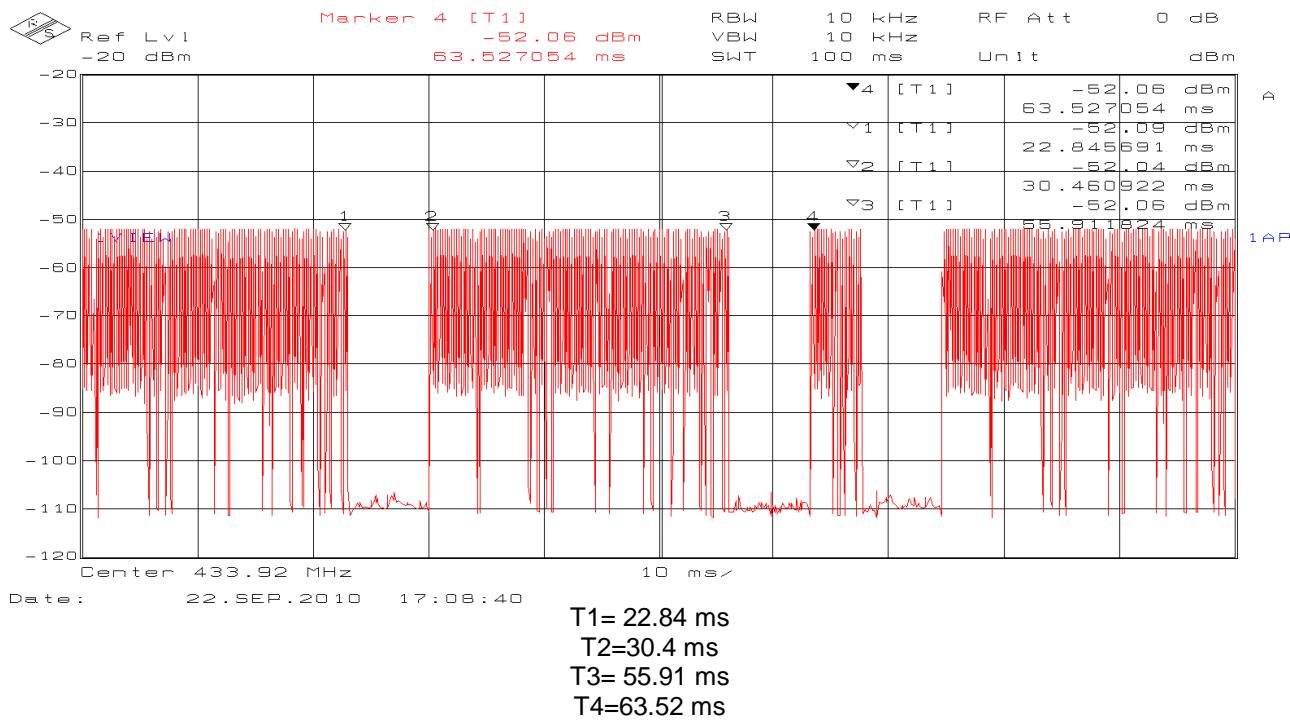
<b>Section 8: Testing data</b>		<b>Product: TXBMW/MR</b>
<b>Test name:</b> Clause 15.231(a) Conditions for intentional radiators to comply with periodic operation		
<b>Test date:</b> 2010-07-07	<b>Test engineer:</b> Daniele Guarnone	
<b>Verdict:</b> Pass	<b>Supply input3 Vdc lithium battery</b>	
<b>Temperature:</b> 25 °C	<b>Air pressure:</b> 1005 mbar	<b>Relative humidity:</b> 65%
<b>Specification:</b> FCC Part 15 Subpart C		

## Test data

### (1) The EUT is manually triggered.



### Signal transmitted

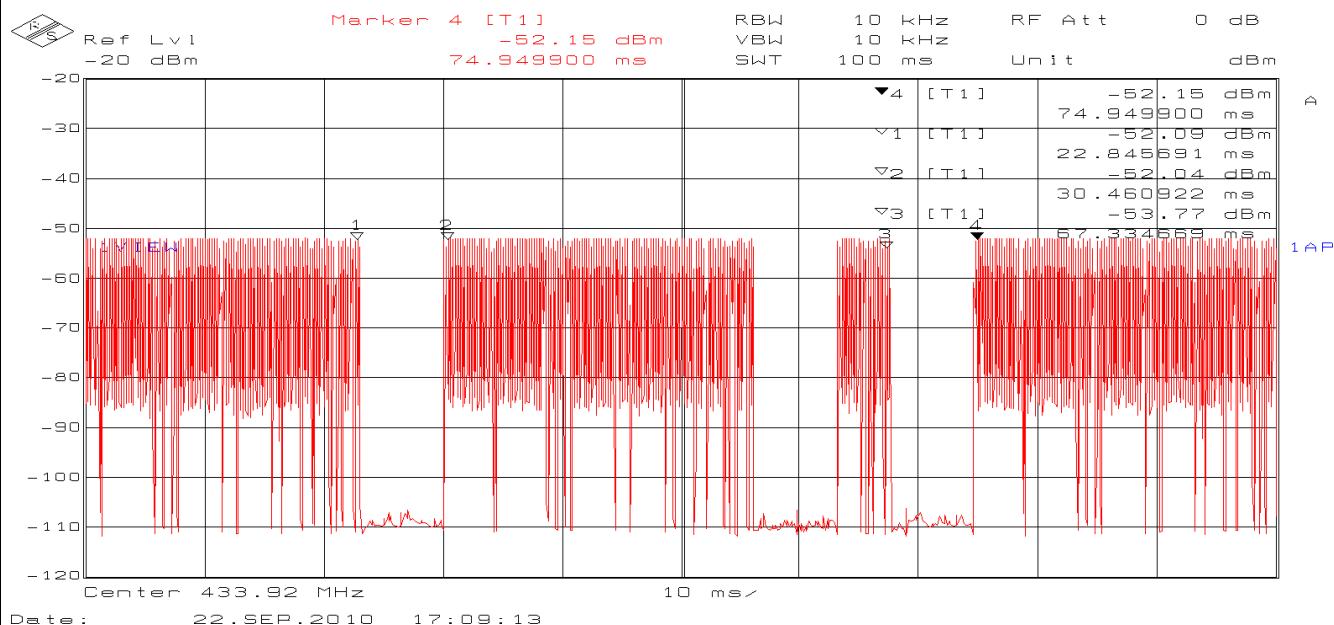




<b>Section 8: Testing data</b>		<b>Product: TXBMW/MR</b>
<b>Test name:</b> Clause 15.231(a) Conditions for intentional radiators to comply with periodic operation		
<b>Test date:</b> 2010-07-07	<b>Test engineer:</b> Daniele Guarnone	
<b>Verdict:</b> Pass	<b>Supply input:</b> 3 Vdc lithium battery	
<b>Temperature:</b> 25 °C	<b>Air pressure:</b> 1005 mbar	<b>Relative humidity:</b> 65%
<b>Specification:</b> FCC Part 15 Subpart C		

## Test data, continue

Signal transmitted, continue..



T1= 22.84 ms  
T2=30.4 ms  
T3= 67.33 ms  
T4=74.94 ms

Toff = 22.8 ms  
Ton= 77.22 ms  
Ttotal=100ms



<b>Section 8: Testing data</b>		<b>Product:</b> TXBMW/MR
<b>Test name:</b> Clause 15.231(b) Field strength of emissions		
<b>Test date:</b> 2010-07-06	<b>Test engineer:</b> Daniele Guarnone	
<b>Verdict:</b> Pass	<b>Supply input:</b> 3 Vdc lithium battery	
<b>Temperature:</b> 25 °C	<b>Air pressure:</b> 1005 mbar	<b>Relative humidity:</b> 65 %
<b>Specification:</b> FCC Part 15 Subpart C		

## 8.6 Clause 15.231(b) Field strength of emissions

### § 15.231 Periodic operation in the band 40.66–40.70 MHz and above 70 MHz.

- (b) In addition to the provisions of §15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field strength of fundamental (µV/m)	Field strength of fundamental (dBµV/m)	Field strength of spurious emissions (µV/m)	Field strength of spurious emissions (dBµV/m)
40.66–40.70	2,250	67	225	47
70–130	1,250	61.9	125	41.9
130–174	1,250 to 3,750*	61.9 to 71.5*	125 to 375*	41.9 to 51.5*
174–260	3,750	71.5	375	51.5
260–470	3,750 to 12,500*	71.5 to 81.9*	375 to 1,250*	51.5 to 61.9*
Above 470	12,500	81.9	1,250	61.9

\* Linear interpolations

- (1) The above field strength limits are specified at a distance of 3 meters. The tighter limits apply at the band edges.
- (2) 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.
- (3) 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 this table or to the general limits shown in §15.209, whichever limit permits a higher field strength.



<b>Section 8: Testing data</b>		<b>Product:</b> TXBMW/MR
<b>Test name:</b> Clause 15.231(b) Field strength of emissions		
<b>Test date:</b> 2010-07-06	<b>Test engineer:</b> Daniele Guarnone	
<b>Verdict:</b> Pass	<b>Supply input:</b> 3 Vdc lithium battery	
<b>Temperature:</b> 25 °C	<b>Air pressure:</b> 1005 mbar	<b>Relative humidity:</b> 65 %
<b>Specification:</b> FCC Part 15 Subpart C		

## Special notes

### §15.209 – Radiated emission limits

Frequency (MHz)	Field strength		Measurement distance (m)
	( $\mu$ V/m)	(dB $\mu$ V/m)	
0.009–0.490	2400/F	67.6–20log(F)	300
0.490–1.705	24000/F	87.6–20log(F)	30
1.705–30.0	30	29.5	30
30–88	100	40.0	3
88–216	150	43.5	3
216–960	200	46.0	3
above 960	500	54.0	3

#### Notes:

- F = fundamental frequency in kHz
- In the emission table above, the tighter limit applies at the band edges.
- For frequencies above 1 GHz the limit on peak RF emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test.

### §15.205 – Restricted bands of operation

MHz	MHz	MHz	GHz
0.090–0.110	16.42–16.423	399.9–410	4.5–5.15
0.495–0.505	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225	123–138	2200–2300	14.47–14.5
8.291–8.294	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675	156.7–156.9	2690–2900	22.01–23.12
8.41425–8.41475	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025	240–285	3345.8–3358	36.43–36.5
12.57675–12.57725	322–335.4	3600–4400	Above 38.6
13.36–13.41			

- The spectrum was searched from 30 MHz to the 10<sup>th</sup> harmonic.
- The EUT was measured on three orthogonal axis.
- All measurements were performed at a distance of 3 m.
- All measurements were performed:
  - below 30 MHz: using a quasi-peak detector with 9 kHz/30 kHz RBW/VBW,
  - within 30–1000 MHz range: using a quasi-peak detector with 120 kHz/300 kHz RBW/VBW,
  - within 30–1000 MHz range: using a peak detector with 100 kHz/300 kHz RBW/VBW,
  - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
    - and using peak detector with 1 MHz/10 Hz RBW/VBW for average results
    - or using average detector with 1 MHz/3 MHz RBW/VBW for average results



<b>Section 8: Testing data</b>	<b>Product: TXBMW/MR</b>	
<b>Test name:</b> Clause 15.231(b) Field strength of emissions		
<b>Test date:</b> 2010-07-06	<b>Test engineer:</b> Daniele Guarnone	
<b>Verdict:</b> Pass	<b>Supply input:</b> 3 Vdc lithium battery	
<b>Temperature:</b> 25 °C	<b>Air pressure:</b> 1005 mbar	<b>Relative humidity:</b> 65 %
<b>Specification:</b> FCC Part 15 Subpart C		

## Test data

### Duty cycle/average factor calculations

§15.35(c) When the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds.

### Duty cycle/average factor calculations: NA

$$\text{Duty cycle / average factor} = 20 \times \log_{10} \left( \frac{T_{x_{100ms}}}{100ms} \right)$$



<b>Section 8: Testing data</b>		<b>Product:</b> TXBMW MR
<b>Test name:</b> Clause 15.231(b) Field strength of emissions		
<b>Test date:</b> 2010-07-06	<b>Test engineer:</b> Daniele Guarnone	
<b>Verdict:</b> Pass	<b>Supply input:</b> 3 Vdc lithium battery	
<b>Temperature:</b> 25 °C	<b>Air pressure:</b> 1005 mbar	<b>Relative humidity:</b> 65 %
<b>Specification:</b> FCC Part 15 Subpart C		

### Test data, continued

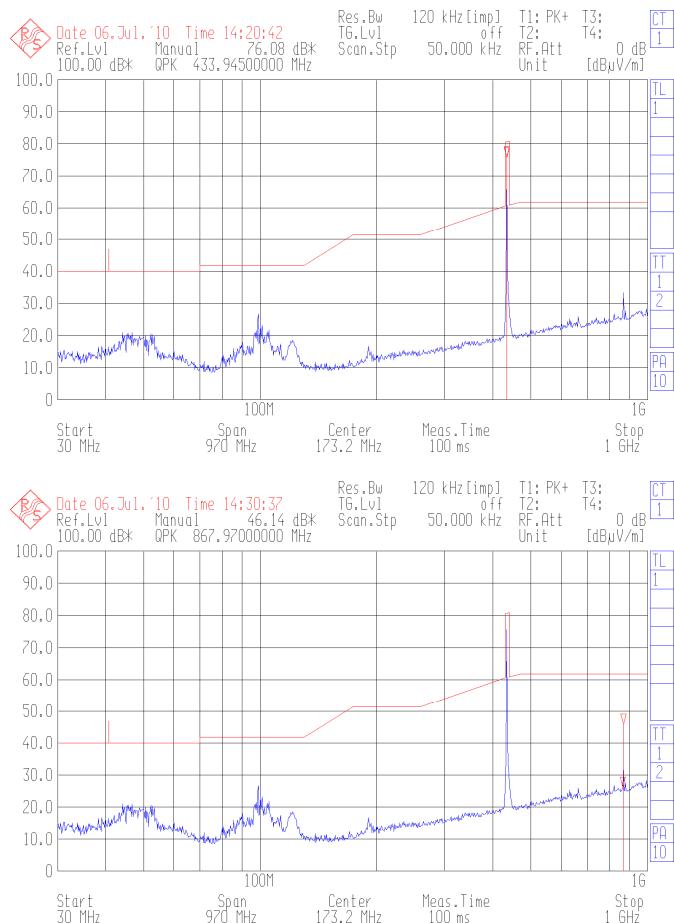
Test facility	Measuring distance (m)	Antenna height variation (m)	Turn table position (°)
10m Semi anechoic chamber	3	1-4	0-360

### Results

Refer to spectral plots and tables of this section.

### Spectral plots

#### Horizontal polarization



Frequency (MHz)	Qp level (dB $\mu$ V/m)	QP Limit (dB $\mu$ V/m)	Remarks
433.945	76.1	80.8	
867.970	46.1	60.8	

### Receiver/Spectrum analyzer settings:

30 MHz to 1 GHz

Preview measurements	Final measurement
Receiver: 120 kHz RBW, Peak detector, max hold	Receiver: 120 kHz RBW, Quasi-peak detector
1 GHz to 40 GHz	
Preview measurements	Final measurement
Spectrum analyzer: 1 MHz RBW, Peak detector, max hold	Receiver: 1 MHz RBW, Average and Peak detector
Measurement time 100ms	



<b>Section 8: Testing data</b>		<b>Product:</b> TXBMW MR
<b>Test name:</b> Clause 15.231(b) Field strength of emissions		
<b>Test date:</b> 2010-07-06	<b>Test engineer:</b> Daniele Guarnone	
<b>Verdict:</b> Pass	<b>Supply input:</b> 3 Vdc lithium battery	
<b>Temperature:</b> 25 °C	<b>Air pressure:</b> 1005 mbar	<b>Relative humidity:</b> 65 %
<b>Specification:</b> FCC Part 15 Subpart C		

### Test data, continued

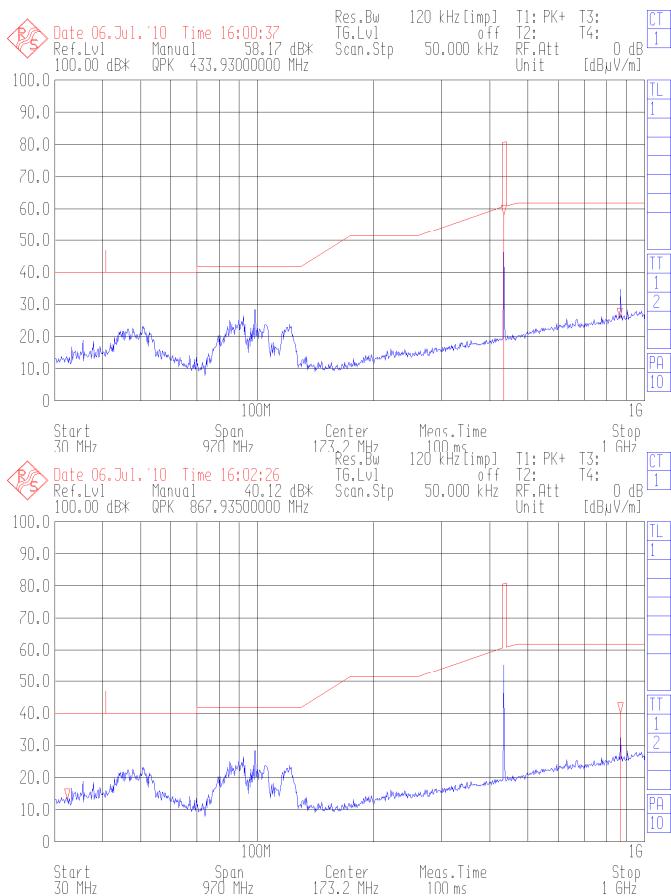
Test facility	Measuring distance (m)	Antenna height variation (m)	Turn table position (°)
10m Semi anechoic chamber	3	1-4	0-360

### Results

Refer to spectral plots and tables of this section.

#### Spectral plots

##### Vertical polarization



Frequency (MHz)	Qp level (dBµV/m)	QP Limit (dBµV/m)	Remarks
433.945	58.2	80.8	
867.970	40	60.8	

#### Receiver/Spectrum analyzer settings:

30 MHz to 1 GHz

<b>Preview measurements</b>	<b>Final measurement</b>
Receiver: 120 kHz RBW, Peak detector, max hold	Receiver: 120 kHz RBW, Quasi-peak detector
1 GHz to 40 GHz	
<b>Preview measurements</b>	<b>Final measurement</b>
Spectrum analyzer: 1 MHz RBW, Peak detector, max hold	Receiver: 1 MHz RBW, Average and Peak detector
Measurement time 100ms	



<b>Section 8: Testing data</b>		<b>Product:</b> TXBMW/MR
<b>Test name:</b> Clause 15.231(b) Field strength of emissions		
<b>Test date:</b> 2010-07-06	<b>Test engineer:</b> Daniele Guarnone	
<b>Verdict:</b> Pass	<b>Supply input:</b> 3 Vdc lithium battery	
<b>Temperature:</b> 25 °C	<b>Air pressure:</b> 1005 mbar	<b>Relative humidity:</b> 65 %
<b>Specification:</b> FCC Part 15 Subpart C		

### Test data, continued

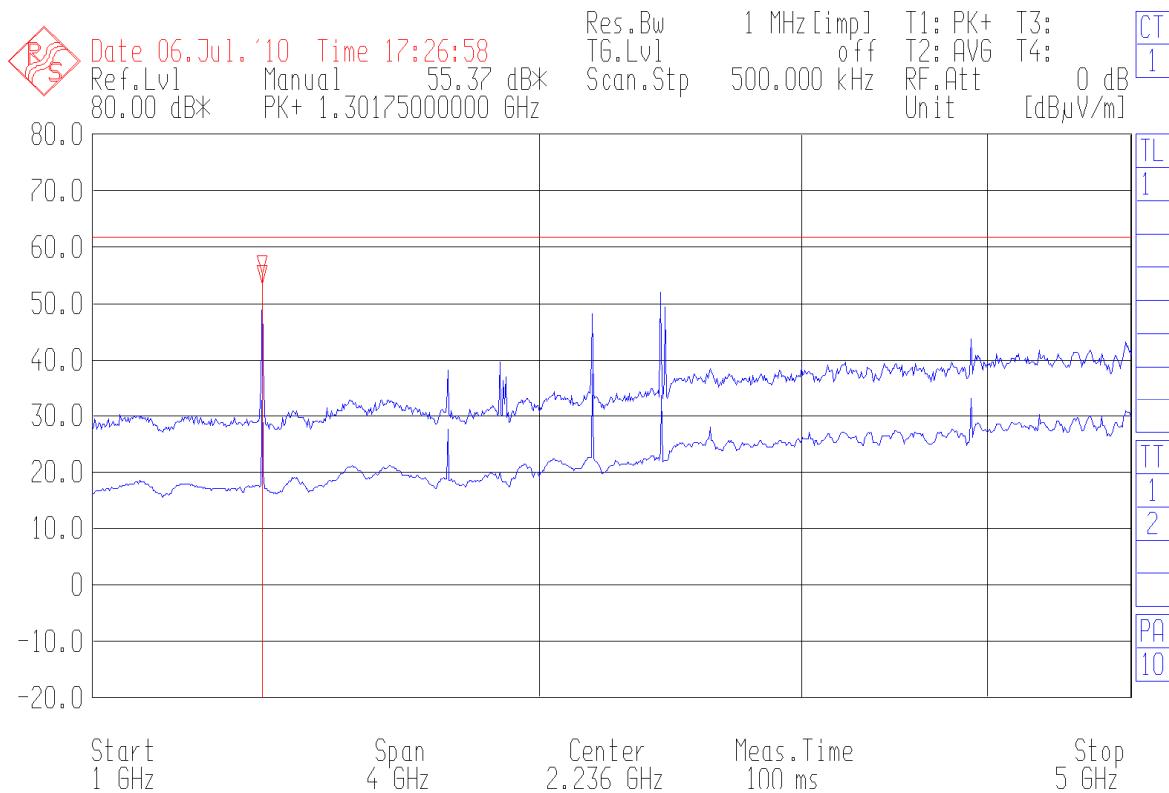
Test facility	Measuring distance (m)	Antenna height variation (m)	Turn table position (°)
10m Semi anechoic chamber	3	1-4	0-360

### Results

Refer to spectral plots and tables of this section.

#### Spectral plots

Horizontal polarization



Frequency (MHz)	Peak level (dBuV/m)	Peak Limit (dBuV/m)	Average level (dBuV/m)	Average limit (dBuV/m)	Remarks
1301.750	55.4	60.8	40	60.8	
1732.57	40.3	60.8	29.4	60.8	
1877.92	41.9	60.8	--	60.8	
2177.099	55.7	60.8	39.7	60.8	
2408.52	54.7	60.8	35.8	60.8	
3898.50	46.1	60.8	35.2	60.8	



<b>Section 8: Testing data</b>		<b>Product:</b> TXBMW MR
<b>Test name:</b> Clause 15.231(b) Field strength of emissions		
<b>Test date:</b> 2010-07-06	<b>Test engineer:</b> Daniele Guarnone	
<b>Verdict:</b> Pass	<b>Supply input:</b> 3 Vdc lithium battery	
<b>Temperature:</b> 25 °C	<b>Air pressure:</b> 1005 mbar	<b>Relative humidity:</b> 65 %
<b>Specification:</b> FCC Part 15 Subpart C		

### Test data, continued

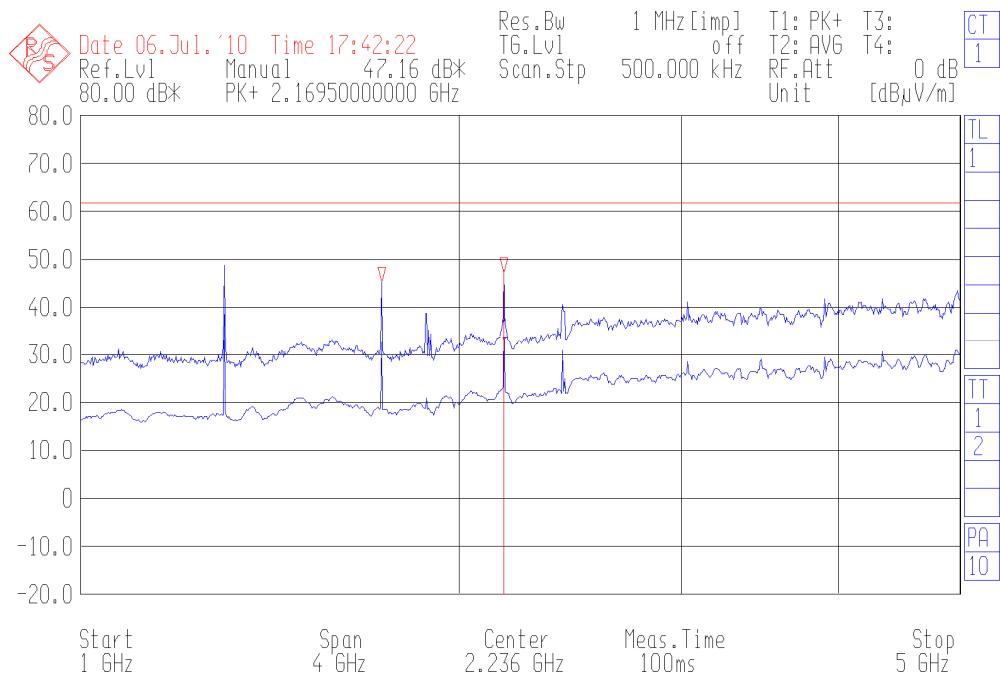
Test facility	Measuring distance (m)	Antenna height variation (m)	Turn table position (°)
10m Semi anechoic chamber	3	1-4	0-360

### Results

Refer to spectral plots and tables of this section.

### Spectral plots

Vertical polarization



Frequency (MHz)	Peak level (dBuV/m)	Peak Limit (dBuV/m)	Average level (dBuV/m)	Average limit (dBuV/m)	Remarks
1301.750	49.2	60.8	38.9	60.8	
1732.57	45.7	60.8	33	60.8	
2169.50	47.2	60.8	29.4	60.8	
2421.49	39.5	60.8	31.2	60.8	

### Receiver/Spectrum analyzer settings:

30 MHz to 1 GHz

#### Preview measurements

Receiver: 120 kHz RBW, Peak detector, max hold

#### Final measurement

Receiver: 120 kHz RBW, Quasi-peak detector

1 GHz to 40 GHz

#### Preview measurements

Spectrum analyzer: 1 MHz RBW, Peak detector, max hold

#### Final measurement

Receiver: 1 MHz RBW, Average and Peak detector

Measurement time 100ms



Section 8: Testing data		Product: TXBMW/MR
Test name: Clause 15.231(c) Emission bandwidth		
Test date: 2010-07-09		Test engineer: Daniele Guarnone
Verdict: Pass		Supply input: XXXX
Temperature: 25 °C	Air pressure: 1005 mbar	Relative humidity: 65 %
Specification: FCC Part 15 Subpart C		

## 8.7 Clause 15.231(c) Emission bandwidth

### § 15.231 Periodic operation in the band 40.66–40.70 MHz and above 70 MHz.

- (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. For devices operating above 900 MHz, the emission shall be no wider than 0.5 % of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

#### Special notes

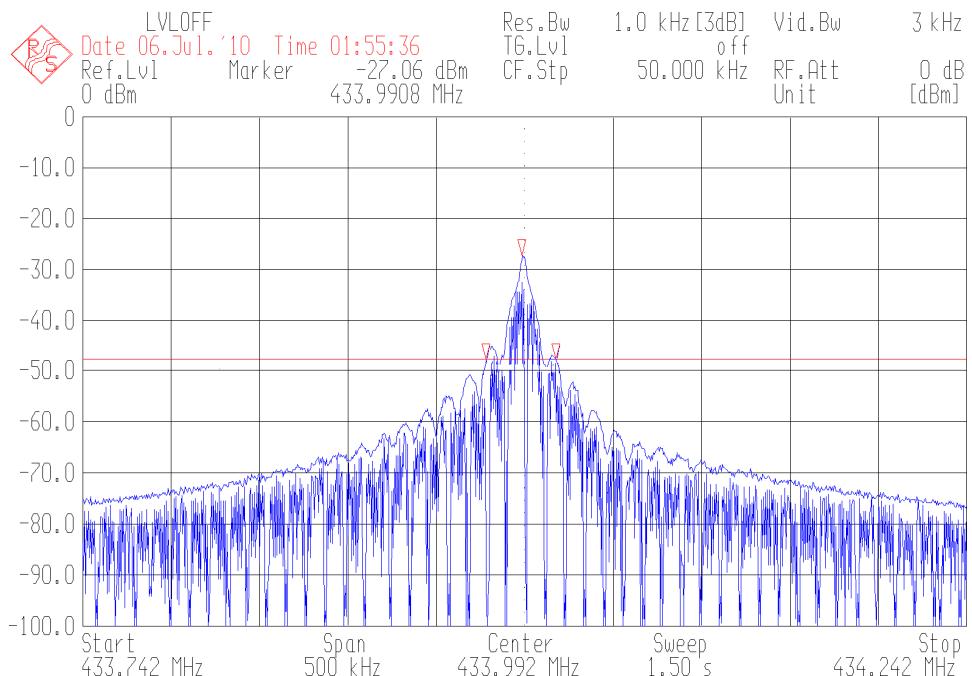
The test was performed using peak detector of the spectrum analyzer with RBW no narrower than 1 % of the emission bandwidth.

#### Test data

##### Limits

0.25 % of 433.9908 MHz is 1084.977 kHz

##### Measured results



20 dB bandwidth (kHz)	Limit (kHz)	Margin (kHz)
434008.6 – 433973.0 = 35.6	1084.8	1049.37



<b>Section 8:</b> Testing data	<b>Product:</b> TXBMW/MR
<b>Test name:</b> Clause 15.231(d) Requirements for devices operating within 40.66–40.70 MHz band	
<b>Test date:</b> 2010-07-09	<b>Test engineer:</b> Daniele Guarnone
<b>Verdict:</b> NA	<b>Supply input:</b> 3 Vdc lithium battery
<b>Temperature:</b> 25 °C	<b>Air pressure:</b> 1005 mbar
<b>Specification:</b> FCC Part 15 Subpart C	

## 8.8 Clause 15.231(d) Requirements for devices operating within 40.66–40.70 MHz band

### § 15.231 Periodic operation in the band 40.66–40.70 MHz and above 70 MHz.

- (d) For devices operating within the frequency band 40.66–40.70 MHz, the bandwidth of the emission shall be confined within the band edges and the frequency tolerance of the carrier shall be  $\pm 0.01\%$ . This frequency tolerance shall be maintained for a temperature variation of –20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85 % to 115 % of the rated supply voltage at a temperature of 20 degrees C. For battery-operated equipment, the equipment tests shall be performed using a new battery.

#### Special notes

None

#### Test data

NA.



<b>Section 8: Testing data</b>		<b>Product: Errore. L'origine riferimento non è stata trovata.</b>
<b>Test name:</b> Clause 15.231(e) Field strength of emissions for periodic radiators		
<b>Test date:</b> XXXX	<b>Test engineer:</b> XXXX	
<b>Verdict:</b> NA	<b>Supply input:</b> XXXX	
<b>Temperature:</b> XXX °C	<b>Air pressure:</b> XXXX mbar	<b>Relative humidity:</b> XXX %
<b>Specification:</b> FCC Part 15 Subpart C		

## 8.9 Clause 15.231(e) Field strength of emissions for periodic radiators

### § 15.231 Periodic operation in the band 40.66–40.70 MHz and above 70 MHz.

(e) Intentional radiators may operate at a periodic rate exceeding that specified in paragraph (a) of this section and may be employed for any type of operation, including operation prohibited in paragraph (a) of this section, provided the intentional radiator complies with the provisions of paragraphs (b) through (d) of this section, except the field strength table in paragraph (b) of this section is replaced by the following:

Fundamental frequency (MHz)	Field strength of fundamental (µV/m)	Field strength of fundamental (dBµV/m)	Field strength of spurious emissions (µV/m)	Field strength of spurious emissions (dBµV/m)
40.66–40.70	1,000	60	100	40
70–130	500	53.9	50	33.9
130–174	500 to 1,500*	53.9 to 63.5*	50 to 150*	33.9 to 43.5*
174–260	1,500	63.5	150	43.5
260–470	1,500 to 5,000*	63.5 to 73.9*	150 to 500*	43.5 to 53.9*
Above 470	5,000	73.9	500	53.9

– \* Linear interpolations.

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

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 transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

### Special Notes

None



<b>Section 8: Testing data</b>	<b>Product: Errore. L'origine riferimento non è stata trovata.</b>	
<b>Test name:</b> Clause 15.231(e) Field strength of emissions for periodic radiators		
<b>Test date:</b> XXXX	<b>Test engineer:</b> XXXX	
<b>Verdict:</b> NA	<b>Supply input:</b> XXXX	
<b>Temperature:</b> XXX °C	<b>Air pressure:</b> XXXX mbar	<b>Relative humidity:</b> XXX %
<b>Specification:</b> FCC Part 15 Subpart C		

## Test data

### Duty cycle/average factor calculations

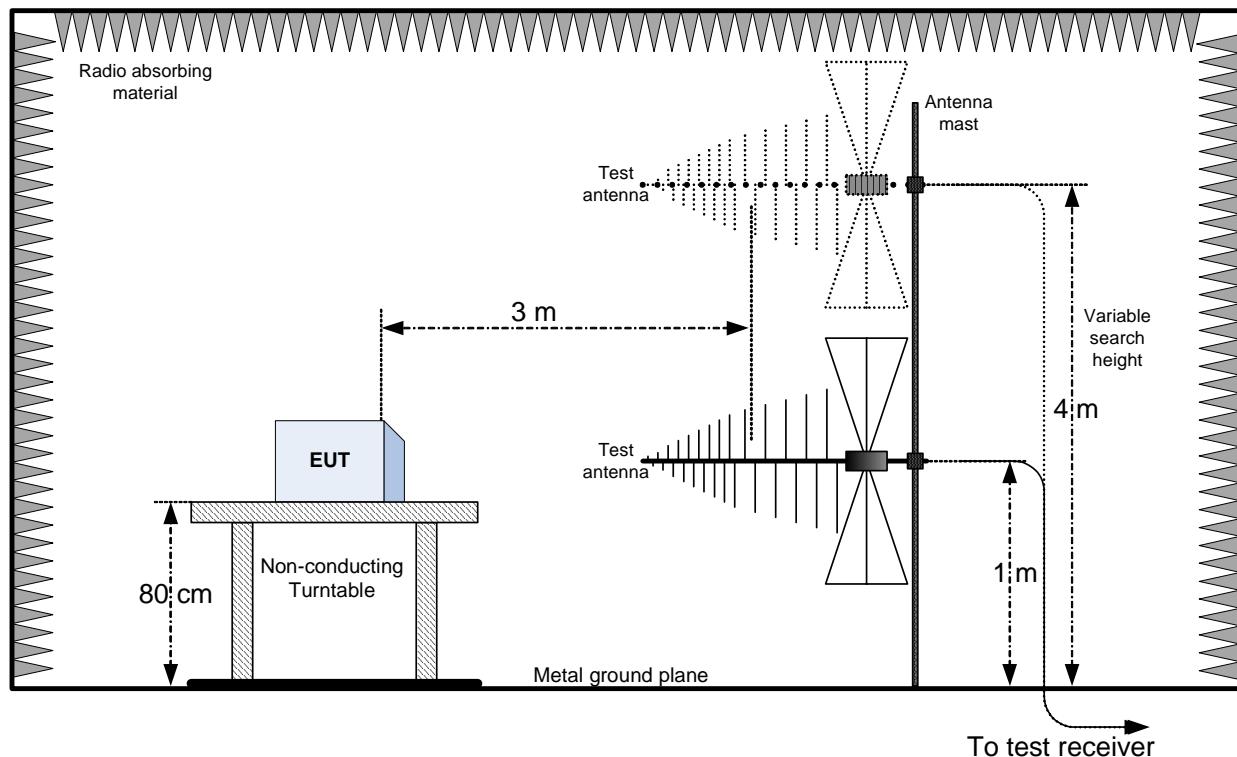
§15.35(c) When the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds.

### Duty cycle/average factor calculations: NA

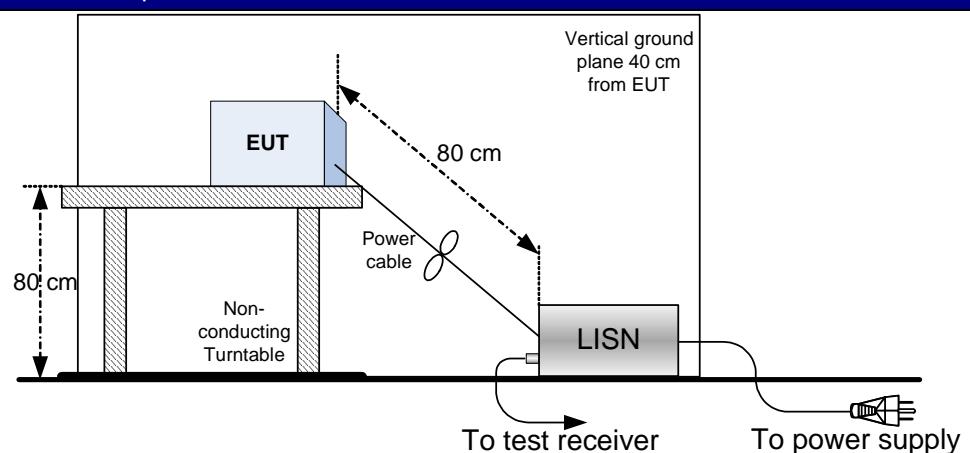
$$\text{Duty cycle / average factor} = 20 \times \log_{10} \left( \frac{T_{x_{100ms}}}{100ms} \right)$$

## Section 9: Block diagrams of test set-ups

### Radiated emissions set-up



### Conducted emissions set-up



**Section 10: EUT photos****EUT**



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I 20046 Biassono (Italy)

**Section 10: EUT photos**

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**EUT**



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I 20046 Biassono (Italy)

**Section 10: EUT photos**

**Product: TXBMW/MR**

**EUT**

