

# Test report

**250618-1TRFWL**

Date of issue: February 19, 2014

Applicant:

**Barrett Communications Pty**

Product:

**2050 Transceiver**

Model:

**2050**

FCC ID:

**OW4-BARRETT2050HF**

Specifications:

- ◆ **FCC 47 CFR Part 90**  
Private Land Mobile Radio Services

Test location

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Nemko Canada Inc.  
303 River Road  
Ottawa, ON, K1V 1H2  
Canada  
Test site FCC ID: 176392 and IC ID: 2040A-4 (3 m semi anechoic chamber)

**Telephone** +1 613 737 9680  
**Facsimile** +1 613 737 9691  
**Toll free** +1 800 563 6336  
**Website** www.nemko.com

**Tested by** Kevin Rose, Wireless/EMC Specialist

**Signature**



February 19, 2014

**Date**

Limits of responsibility

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Note that the results contained in this report relate only to the items tested and were obtained in the period between 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. All results contain in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

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## Section 1 Report summary

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### 1.1 Applicant

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Barrett Communications Pty  
 10 Port Kembla Drive,  
 Bibra Lake, Perth,  
 Western Australia, 6163

### 1.2 Manufacturer

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Barrett Communications Pty  
 10 Port Kembla Drive,  
 Bibra Lake, Perth,  
 Western Australia, 6163

### 1.3 Test specifications

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Standard	Description
FCC 47 CFR Part 2 Subpart J	Equipment Authorization Procedures
FCC 47 CFR Part 90	Private Land Mobile Radio Services

### 1.4 Statement of compliance

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In the configuration tested, the EUT was found compliant.

Testing was completed against all relevant requirements of the test standard. Results obtained indicate that the product under test complies in full with the requirements tested. The test results relate only to the items tested.

See "Summary of test results" for full details.

### 1.5 Exclusions

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None

### 1.6 Test report revision history

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Revision #	Details of changes made to test report
TRF	Original report issued

## Section 2 Summary of test results

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### 2.1 FCC Part 90, test results

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Clause	Test Method	Test description	Verdict
90.205	2.1046	Output power	Pass
90.207		Type of emissions	Not tested
90.209	2.1049	Occupied bandwidth	Not tested
90.210	2.1051	Spurious Emissions at the antenna terminal	Pass
90.210	2.1053	Field strength of spurious radiation	Pass
90.213	2.1055	Frequency stability	Not tested
2.1047	2.1047	Modulation Characteristics	Not tested

Notes: The testing was performed for an Audit test limited testing was completed

## Section 3 Equipment under test (EUT) details

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### 3.1 Sample information

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**Receipt date** January 6, 2014  
**Nemko sample ID number** 2

### 3.2 EUT information

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**Product name** Barrett 2050 HF Transceiver  
**Model** 2050  
**Serial Number** 205029571

### 3.3 Technical information

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**Operating band** Below 25 MHz and 25–50 MHz  
**Operating frequency** 2–29.9MHz  
**Modulation type** Upper Single Sideband Suppressed Carrier,  
**Rated Power:** 110 W PEP  
**Power requirements** 13.8 V<sub>DC</sub>

### 3.4 Product description and theory of operation

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Barrett 2050 HF Transceiver is a Single Side Band (SSB).

### 3.5 EUT exercise details

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Barrett 2050 HF Transceiver was programmed with low, mid, and high test software.

### 3.6 EUT setup diagram

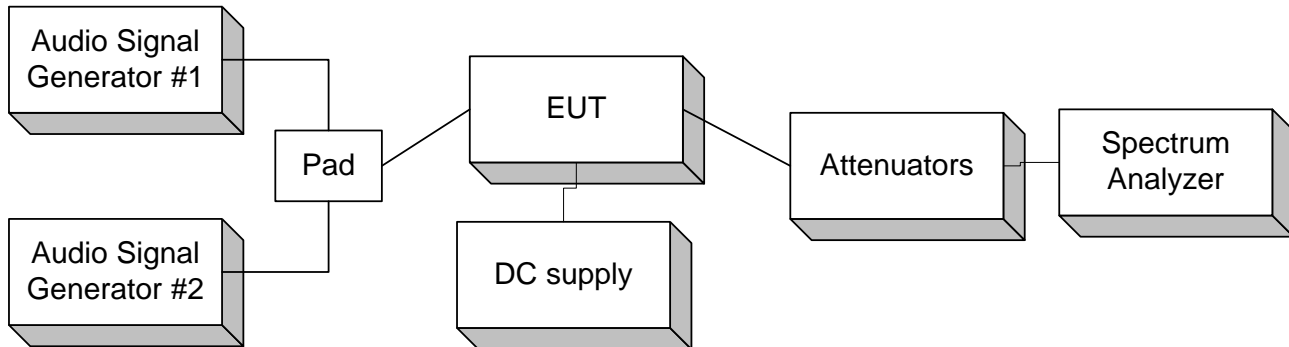


Diagram 3.6-1: Setup diagram

### 3.7 Support equipment

Description	Brand name	Model/Part number	Serial number	Rev.
Audio Generator	HP	33120A	FA001082	-
Audio Generator	HP	209A	FA000101	-
Power supply	Barrett	2022	202207554	-

## Section 4 Engineering considerations

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### 4.1 Modifications incorporated in the EUT

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There were no modifications performed to the EUT during this assessment.

### 4.2 Technical judgment

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Limited testing was performed for audit testing

### 4.3 Deviations from laboratory tests procedures

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No deviations were made from laboratory procedures.



## Section 5 Test conditions

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### 5.1 Atmospheric conditions

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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.

### 5.2 Power supply range

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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

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### 6.1 Uncertainty of measurement

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Nemko Canada Inc. has calculated measurement uncertainty and is documented in EMC/MUC/001 "Uncertainty in EMC measurements." Measurement uncertainty was calculated using the methods described in CISPR 16-4 Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC measurements; as well as described in UKAS LAB34: The expression of Uncertainty in EMC Testing. Measurement uncertainty calculations assume a coverage factor of  $K=2$  with 95% certainty.

## Section 7 Test equipment

### 7.1 Test equipment list

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
3 m EMI test chamber	TDK	SAC-3	FA002047	1 year	Mar. 09/14
Flush mount turntable	Sunol	FM2022	FA002082	—	NCR
Controller	Sunol	SC104V	FA002060	—	NCR
Antenna mast	Sunol	TLT2	FA002061	—	NCR
Active loop antenna (0.01–30 MHz)	EMCO	6502	FA001686	1 year	Sept. 27/14
Bilog antenna	Sunol	JB3	FA002108	1 year	Feb. 21/14
50 $\Omega$ coax cable	Huber + Suhner	NONE	FA002392	1 year	July. 17/14
50 $\Omega$ coax cable	C.C.A.	None	FA002555	1 year	Oct. 07/14
Receiver/spectrum analyzer	Rohde & Schwarz	ESU 26	FA002043	1 year	Oct. 24/14
Spectrum analyzer	Rohde & Schwarz	FSP	FA001920	1 year	June 25/14

Note: NCR - no calibration required

## Section 8 Testing data

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### 8.1 RF Power Output

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#### 8.1.1 Definitions and limits

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**FCC:**

Applicants for licenses must request and use no more power than the actual power necessary for satisfactory operation. Except where otherwise specifically provided for, the maximum power that will be authorized for new stations authorized after August 16, 1995 is as follows in FCC Part 90.205(a) through (r).

#### 8.1.2 Test summary

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<b>Test date</b>	January 6, 2014	<b>Test engineer</b>	Kevin Rose	<b>Verdict</b>	Pass
<b>Temperature</b>	23 °C	<b>Air pressure</b>	1003 mbar	<b>Relative humidity</b>	38 %
<b>Test date</b>	February 19, 2014	<b>Test engineer</b>	Kevin Rose	<b>Verdict</b>	Pass
<b>Temperature</b>	22 °C	<b>Air pressure</b>	1001 mbar	<b>Relative humidity</b>	33 %

#### 8.1.3 Observations/special notes

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The EUT was set up as tabletop configuration.

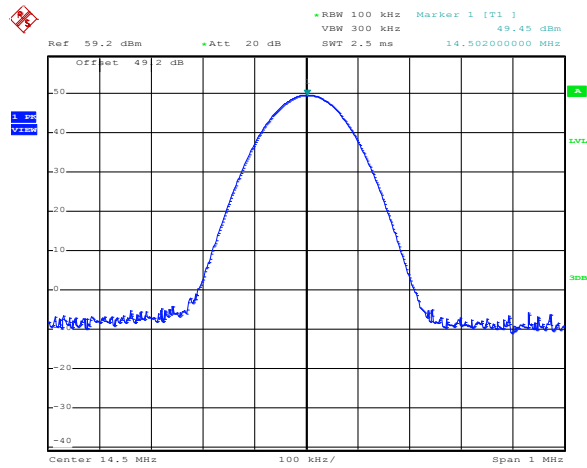
The spectral scan has been corrected with transducer factors (i.e. cable loss, and attenuators) for determination of compliance.

**Receiver/spectrum analyzer settings** 100 kHz RBW and 300 kHz VBW

8.1.4 Test data

Table 8.1-1: Output power limits

Frequency, MHz	Modulation type	Maximum PEP, dBm	Maximum PEP, W	Maximum PEP Rated, W
2.0	J3E	50.39	109.4	110
2.5	J3E	50.14	103.3	110
14.5	J3E	49.45	88.1	110
29.9	J3E	49.32	85.5	110



Date: 6.JAN.2014 19:44:51

Figure 8.1-1: Example of the peak output power



## 8.2 Emission Mask and Occupied Bandwidth

### 8.2.1 Definitions and limits

#### 90.210 Emission masks.

Except as indicated elsewhere in this part, transmitters used in the radio services governed by this part must comply with the emission masks outlined in this section. Unless otherwise stated, per paragraphs (d)(4), (e)(4), and (m) of this section, measurements of emission power can be expressed in either peak or average values provided that emission powers are expressed with the same parameters used to specify the unmodulated transmitter carrier power. For transmitters that do not produce a full power unmodulated carrier, reference to the unmodulated transmitter carrier power refers to the total power contained in the channel bandwidth. Unless indicated elsewhere in this part, the table in this section specifies the emission masks for equipment operating in the frequency bands governed under this part.

**Table 8.2-1:** Emissions mask specifications

Frequency band (MHz)	Mask for equipment with Audio low pass filter	Mask for equipment without audio low pass filter
Below 25	A or B	A or C
25–50	B	C

#### § 2.1049 Measurements required: Occupied bandwidth.

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions as applicable:

- (a) Radiotelegraph transmitters for manual operation when keyed at 16 dots per second.
- (b) Other keyed transmitters—when keyed at the maximum machine speed.
- (c) Radiotelephone transmitters equipped with a device to limit modulation or peak envelope power shall be modulated as follows. For single sideband and independent sideband transmitters, the input level of the modulating signal shall be 10 dB greater than that necessary to produce rated peak envelope power.
  - (1) Other than single sideband or independent sideband transmitters—when modulated by a 2500 Hz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation. The input level shall be established at the frequency of maximum response of the audio modulating circuit.
  - (2) Single sideband transmitters in A3A or A3J emission modes—when modulated by two tones at frequencies of 400 Hz and 1800 Hz (for 3.0 kHz authorized bandwidth), or 500 Hz and 2100 Hz (for 3.5 kHz authorized bandwidth), or 500 Hz and 2400 Hz (for 4.0 kHz authorized bandwidth), applied simultaneously. The input levels of the tones shall be so adjusted that the two principal frequency components of the radio frequency signal produced are equal in magnitude.
  - (3) Single sideband transmitters in the A3H emission mode—when modulated by one tone at a frequency of 1500 Hz (for 3.0 kHz authorized bandwidth), or 1700 Hz (for 3.5 kHz authorized bandwidth), or 1900 Hz (for 4.0 kHz authorized bandwidth), the level of which is adjusted to produce a radio frequency signal component equal in magnitude to the magnitude of the carrier in this mode.
  - (4) As an alternative to paragraphs (c) (2) and (3) of this section, other tones besides those specified may be used as modulating frequencies, upon a sufficient showing of need. However, any tones so chosen must not be harmonically related, the third and fifth order intermodulation products which occur must fall within the –25 dB step of the emission bandwidth limitation curve, the seventh and ninth order products must fall within the –35 dB step of the referenced curve and the eleventh and all higher order products must fall beyond the –35 dB step of the referenced curve.
  - (5) Independent sideband transmitters having two channels—when modulated by 1700 Hz tones applied simultaneously to both channels. The input levels of the tones shall be so adjusted that the two principal frequency components of the radio frequency signal produced are equal in magnitude.
- (d) Radiotelephone transmitters without a device to limit modulation or peak envelope power shall be modulated as follows. For single sideband and independent sideband transmitters, the input level of the modulating signal should be that necessary to produce rated peak envelope power.

### 8.2.1 Definitions and limits, continued

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(1) Other than single sideband or independent sideband transmitters—when modulated by a 2500 Hz tone of sufficient level to produce at least 85 percent modulation. If 85 percent modulation is unattainable, the highest percentage modulation shall be used.

(2) Single sideband transmitters in A3A or A3J emission modes—when modulated by two tones at frequencies of 400 Hz and 1800 Hz (for 3.0 kHz authorized bandwidth), or 500 Hz and 2100 Hz (for 3.5 kHz authorized bandwidth), or 500 Hz and 2400 Hz (for 4.0 kHz authorized bandwidth), applied simultaneously. The input levels of the tones shall be so adjusted that the two principal frequency components of the radio frequency signal produced are equal in magnitude.

(3) Single sideband transmitters in the A3H emission mode—when modulated by one tone at a frequency of 1500 Hz (for 3.0 kHz authorized bandwidth), or 1700 Hz (for 3.5 kHz authorized bandwidth), or 1900 Hz (for 4.0 kHz authorized bandwidth), the level of which is adjusted to produce a radio frequency signal component equal in magnitude to the magnitude of the carrier in this mode.

(4) As an alternative to paragraphs (d) (2) and (3) of this section, other tones besides those specified may be used as modulating frequencies, upon a sufficient showing of need. However any tones so chosen must not be harmonically related, the third and fifth order intermodulation products which occur must fall within the -25 dB step of the emission bandwidth limitation curve, the seventh and ninth order products must fall within the -35 dB step of the referenced curve and the eleventh and all higher order products must fall beyond the -35 dB step of the referenced curve.

(5) Independent sideband transmitters having two channels—when modulated by 1700 Hz tones applied simultaneously to both channels. The input levels of the tones shall be so adjusted that the two principal frequency components of the radio frequency signal produced are equal in magnitude.

Clause 6.3 **Unwanted Emissions:** The unwanted emissions comprise of out-of band emissions in the vicinity of the passband, spurious emissions and harmonics.

#### 6.3.1 Unwanted Emissions of J3E, R3E and H3E

Adjust the transmitter to the manufacturer's rated output power before performing the other test below.

Connect the equipment as in 6.2.1 (Peak Envelope Power Test) for J3E and R3E emission categories, and as in 6.2.2 for the H3E category.

Adjust the levels of audio tone generators ( $V_{i1} = V_{i2}$ ) to a level 10 dB higher than that is necessary to produce rated  $P_{pk}$ .

**Minimum Standard:** The power of unwanted emissions shall be attenuated below the transmitter peak envelope power in accordance with the following schedule:

- i. on any frequency removed from the assigned frequency by more than 50% (i.e.: outside the band  $f_c - 0.1$  kHz to  $f_c + 2.9$  kHz\*) and up to and including 150% of the authorized bandwidth: at least 25 dB, measured with a resolution bandwidth of 300 Hz. (\* **Note:** the spectrum analyzer centre frequency corresponds to  $f_c - 0.25$  kHz and  $f_c + 3.05$  kHz at the edges of the band).
- ii. on any frequency removed from the assigned frequency by more than 150% and up to and including 250% of the authorized bandwidth: at least 35 dB, measured with a resolution bandwidth of 300 Hz.
- iii. in any 30 kHz band removed from the assigned frequency by more than 250% of the authorized bandwidth: at least  $43 + 10 \cdot \log(P_{pk})$  or 70 dB. The search for unwanted emissions shall be from the lowest frequency internally generated or used in the device (local oscillator, intermediate or carrier frequency) or 100 kHz below its lowest assignable frequency, whichever is the lowest frequency, to the 5th harmonic of the highest frequency generated or used without exceeding 23 GHz.

**Note:** The assigned frequency =  $f_c + 1.4$  kHz

#### 6.3.2 Unwanted Emissions of A3E

Adjust the equipment to the manufacturer's rated output power before performing the test below.

Connect the equipment as in 6.2.3 (Mean Output Power Test).

Adjust the level of the audio tone generator until the two RF sideband powers are each 12 dB below the carrier level, i.e. the modulation index is 50%.

Increase the voltage of the audio tone generator by 16 dB.

**Minimum Standard:** The power of emissions shall be attenuated below the transmitter mean power ( $P_{mean}$ ) in accordance with the following schedule:

- i. on any frequency removed from the carrier frequency by more than 50% and up to and including 150% of the authorized bandwidth: at least 25 dB, measured with a resolution bandwidth of 300 Hz;
- ii. on any frequency removed from the carrier frequency by more than 150% and up to and including 250% of the authorized bandwidth: at least 35 dB, measured with a resolution bandwidth of 300 Hz;
- iii. in any 30 kHz band removed from the carrier frequency by more than 250% of the authorized bandwidth: at least  $43 + 10 \cdot \log(P_{mean})$  or 70 dB. The search for unwanted emissions shall be from the lowest frequency internally generated or used in the device (local oscillator, intermediate or carrier frequency) or 100 kHz below its lowest assignable frequency, whichever is the lowest frequency, to the 5th harmonic of the highest frequency generated or used without exceeding 23 GHz.

**Note:** The assigned frequency =  $f_c$

8.2.2 Test summary

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<b>Test date</b>	January 6, 2014	<b>Test engineer</b>	Kevin Rose	<b>Verdict</b>	Pass
<b>Temperature</b>	23 °C	<b>Air pressure</b>	1003 mbar	<b>Relative humidity</b>	38 %
<b>Test date</b>	February 19, 2014	<b>Test engineer</b>	Kevin Rose	<b>Verdict</b>	Pass
<b>Temperature</b>	22 °C	<b>Air pressure</b>	1001 mbar	<b>Relative humidity</b>	33 %

8.2.3 Observations/special notes and procedures

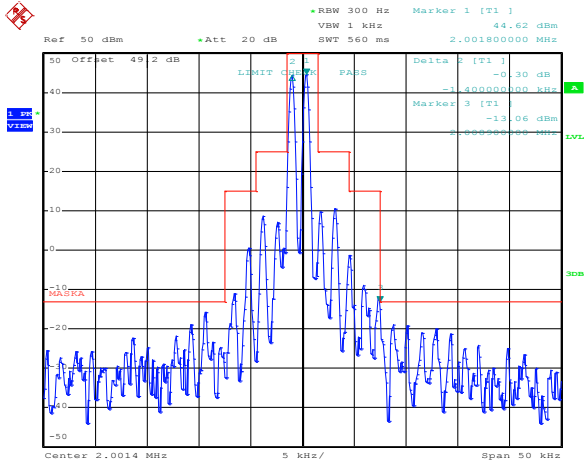
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Emission Mask A. For transmitters utilizing J3E emission, the carrier must be at least 40 dB below the peak envelope power and the power of emissions must be reduced below the output power (P in watts) of the transmitter as follows:

- (1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 150 percent of the authorized bandwidth: At least 25 dB.
- (2) On any frequency removed from the assigned frequency by more than 150 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB.
- (3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least  $43 + 10 \log P$  dB.

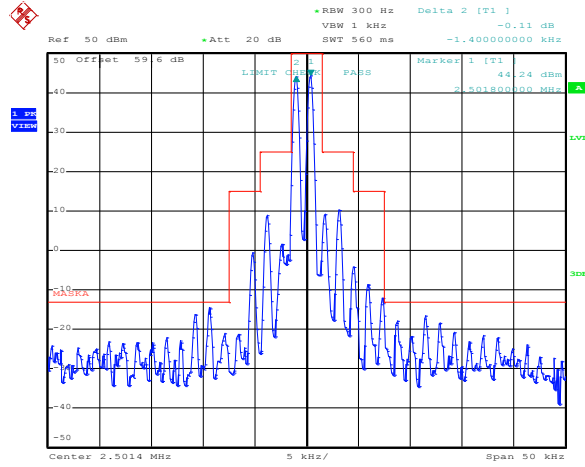


8.2.4 Test data



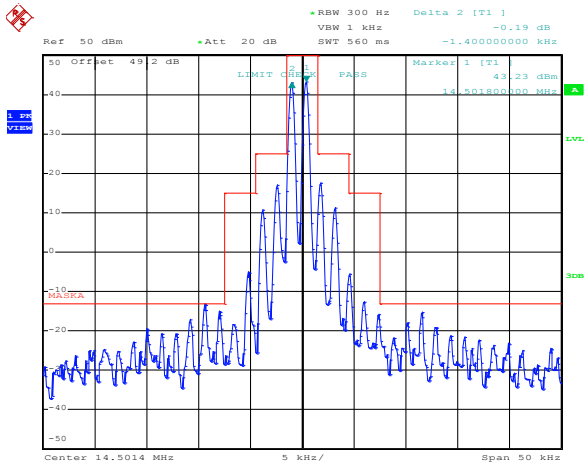
Date: 6.JAN.2014 19:41:18

Figure 8.2-1: Mask A for J3E, Low 2.0 MHz channel



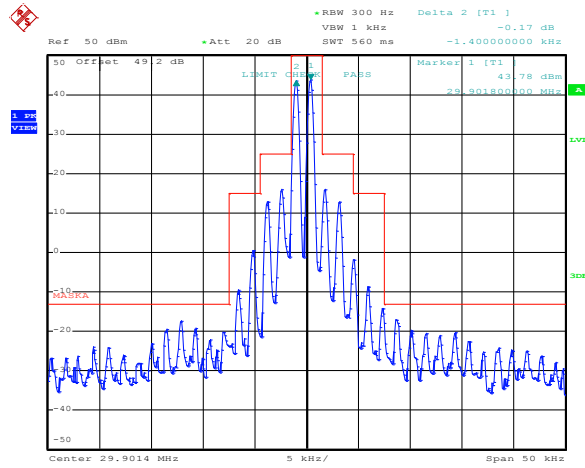
Date: 19.FEB.2014 18:11:01

Figure 8.2-2: Mask A for J3E, Low 2.5 MHz channel



Date: 6.JAN.2014 19:38:34

Figure 8.2-3: Mask A for J3E, Mid channel



Date: 6.JAN.2014 19:36:07

Figure 8.2-4: Mask A for J3E, High channel

### 8.3 Spurious Emissions at Antenna Terminals

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#### 8.3.1 Definitions and limits

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**FCC 2.1051** Measurements required: Spurious emissions at antenna terminals.

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in § 2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

#### 8.3.2 Test summary

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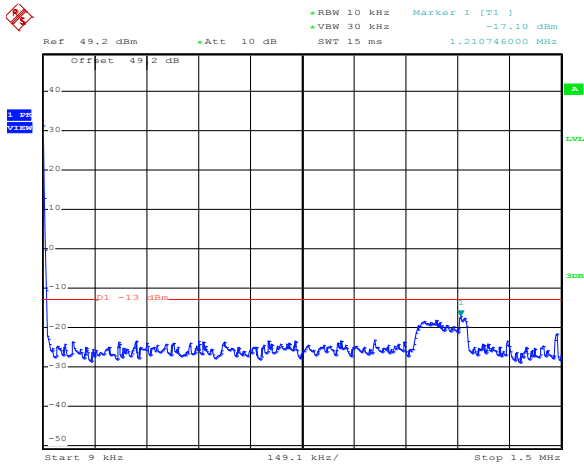
<b>Test date</b>	January 6, 2014	<b>Test engineer</b>	Kevin Rose	<b>Verdict</b>	Pass
<b>Temperature</b>	23 °C	<b>Air pressure</b>	1003 mbar	<b>Relative humidity</b>	38 %
<b>Test date</b>	February 19, 2014	<b>Test engineer</b>	Kevin Rose	<b>Verdict</b>	Pass
<b>Temperature</b>	22 °C	<b>Air pressure</b>	1001 mbar	<b>Relative humidity</b>	33 %

#### 8.3.3 Observations/special notes and procedures

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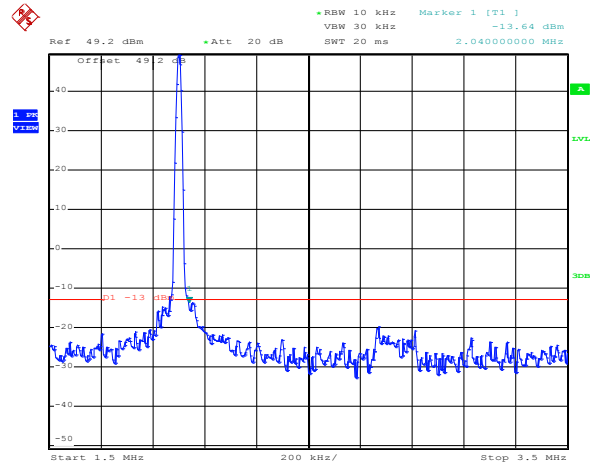
None

8.3.4 Test data



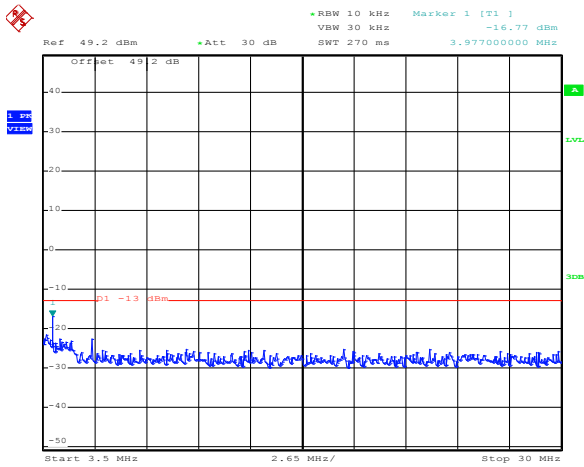
Date: 9.JAN.2014 10:38:15

Figure 8.3-1:Antenna Spurious– Low 2.0 MHz channel



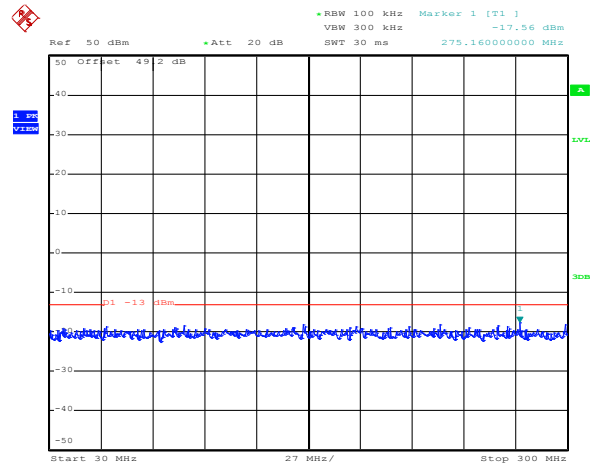
Date: 9.JAN.2014 10:41:40

Figure 8.3-2: Antenna Spurious– Low 2.0 MHz channel



Date: 6.JAN.2014 19:56:39

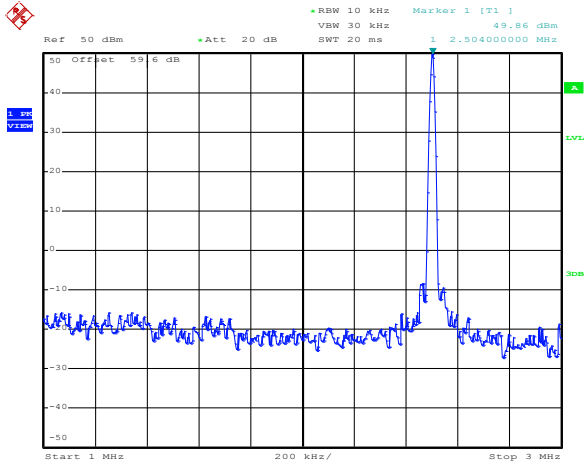
Figure 8.3-3:Antenna Spurious– Low 2.0 MHz channel



Date: 6.JAN.2014 19:57:32

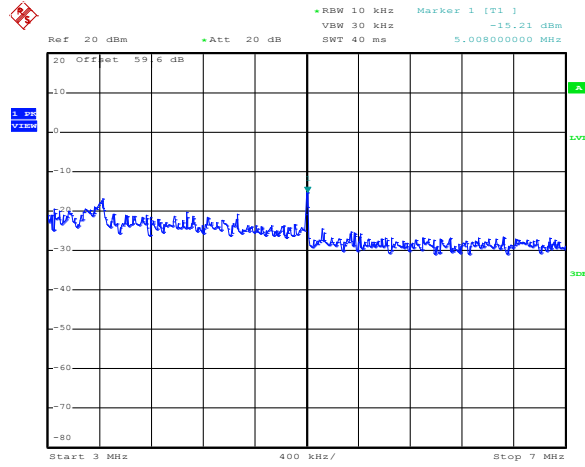
Figure 8.3-4: Antenna Spurious– Low 2.0 MHz channel

8.3.4 Test data continued



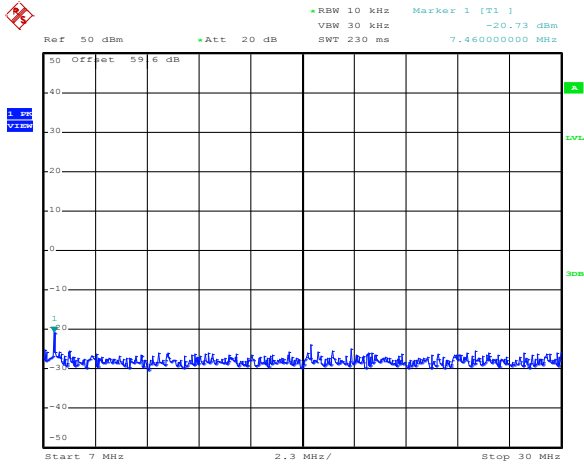
Date: 19.FEB.2014 18:06:08

Figure 8.3-5:Antenna Spurious– Low 2.5 MHz channel



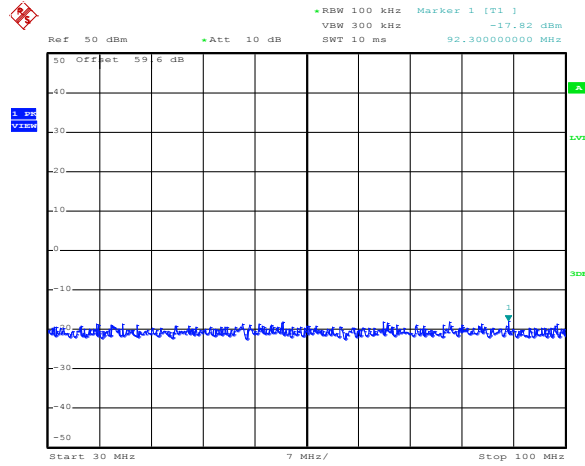
Date: 19.FEB.2014 18:05:16

Figure 8.3-6: Antenna Spurious– Low 2.5 MHz channel



Date: 19.FEB.2014 18:07:11

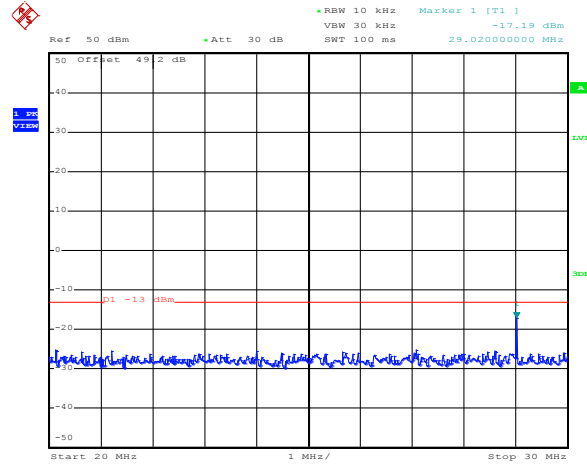
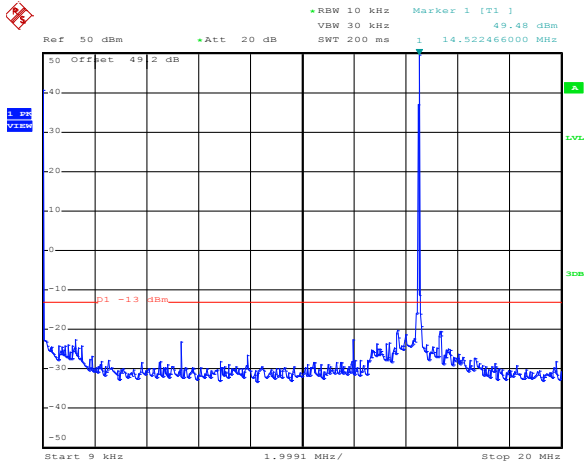
Figure 8.3-7:Antenna Spurious– Low 2.5 MHz channel



Date: 19.FEB.2014 18:08:05

Figure 8.3-8: Antenna Spurious– Low 2.5 MHz channel

8.3.4 Test data continued

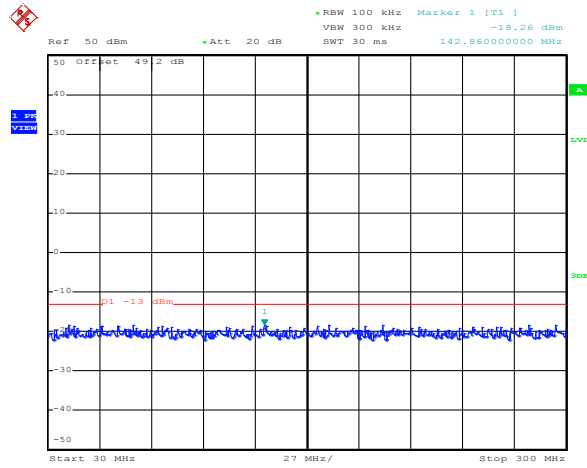


Date: 6.JAN.2014 19:59:18

Date: 6.JAN.2014 20:00:06

Figure 8.3-9:Antenna Spurious– Mid channel

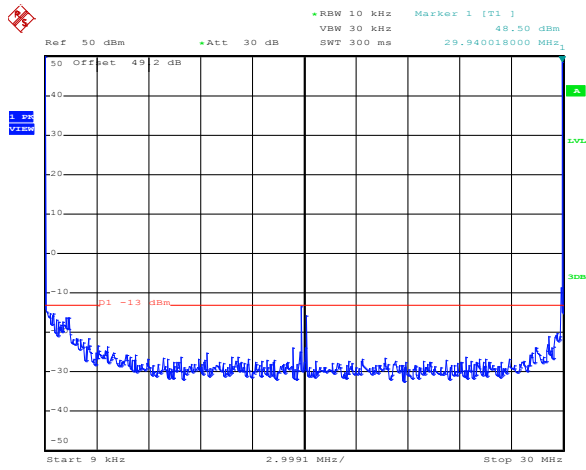
Figure 8.3-10: Antenna Spurious– Mid channel



Date: 6.JAN.2014 20:00:52

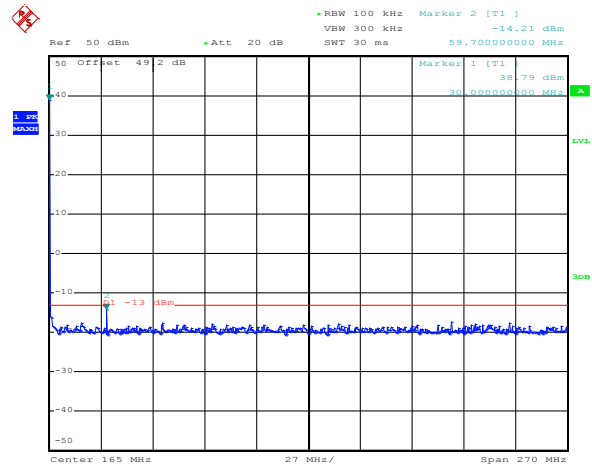
Figure 8.3-11:Antenna Spurious– Mid channel

8.3.4 Test data continued



Date: 6.JAN.2014 20:03:53

Figure 8.3-12:Antenna Spurious– High channel



Date: 6.JAN.2014 20:06:06

Figure 8.3-13: Antenna Spurious– High channel

## 8.4 Field strength of spurious radiation

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### 8.4.1 Definitions and limits

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**FCC:**

Measurements required: Field strength of spurious radiation.

(a) Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of § 2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required, with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from half-wave dipole antennas.

(b) The measurements specified in paragraph (a) of this section shall be made for the following equipment:

- (1) Those in which the spurious emissions are required to be 60 dB or more below the mean power of the transmitter.
- (2) All equipment operating on frequencies higher than 25 MHz.
- (3) All equipment where the antenna is an integral part of, and attached directly to the transmitter.
- (4) Other types of equipment as required, when deemed necessary by the Commission.

### 8.4.2 Definitions and limits, continued

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### 8.4.3 Test summary

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<b>Test date</b>	January 6, 2014	<b>Test engineer</b>	Kevin Rose	<b>Verdict</b>	Pass
<b>Temperature</b>	23 °C	<b>Air pressure</b>	1003 mbar	<b>Relative humidity</b>	38 %

### 8.4.4 Observations/special notes and procedures

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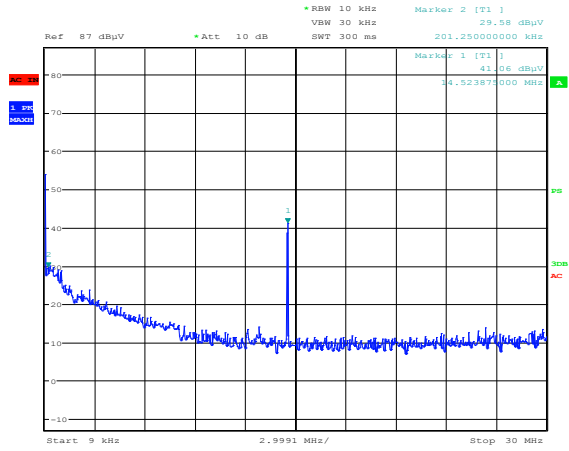
EUT was scanned from 9 kHz to 300 MHz.

10 kHz RBW and 30 kHz VBW was used during 9 kHz to 30 MHz scan.

100 kHz RBW and 300 kHz VBW was used during 30 MHz to 300 MHz scan.

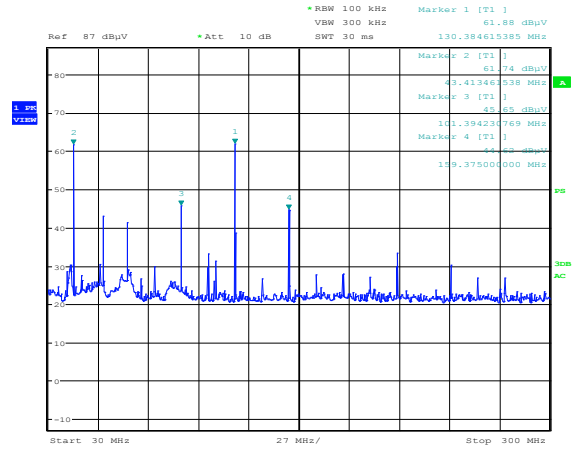
Low channel had no emission within 20 dB of the limit.

8.4.5 Test data



Date: 6.JAN.2014 23:46:38

Figure 8.4-1: Radiated spurious emissions on mid channel



Date: 6.JAN.2014 23:37:48

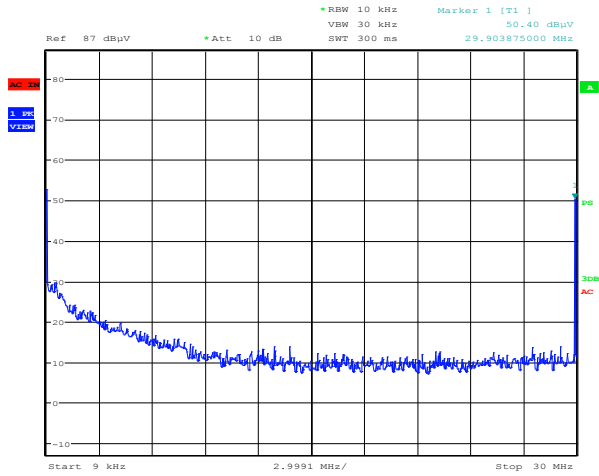
Figure 8.4-2: Radiated spurious emissions on mid channel

Table 8.4-1: ERP of spurious emissions mid channel

Frequency (MHz)	Received signal (dBμV)	Substitution factor (dB)	ERP (dBm)	ERP limit (dBm)	Margin (dB)
130.4	61.9	83.9	-22.0	-13	9.0
43.4	61.7	91.1	-29.4	-13	16.4
101.4	45.6	88.2	-42.6	-13	29.6
159.4	44.6	81.5	-36.9	-13	23.9

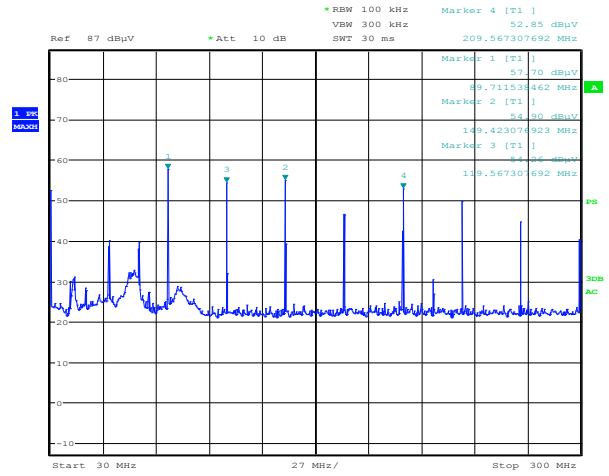


8.4.4 Test data, continued



Date: 6.JAN.2014 23:45:46

Figure 8.4-3: Radiated spurious emissions on high channel



Date: 6.JAN.2014 23:39:12

Figure 8.4-4: Radiated spurious emissions on high channel

Table 8.4-2: ERP of spurious emissions high channel

Frequency (MHz)	Received signal (dBμV)	Substitution factor (dB)	ERP (dBm)	ERP limit (dBm)	Margin (dB)
89.7	57.7	90.7	-33.0	-13	20.0
149.4	54.9	81.4	-26.5	-13	13.5
119.6	54.3	83.8	-29.5	-13	16.5
209.5	52.8	76.2	-23.4	-13	10.4

## Section 9 Block diagrams of test set-ups

### 9.1 Radiated emissions set-up

