



EXHIBIT 2A

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Test Report for FCC Equipment Authorization

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Publication History

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Decision Ratifier

The release of this document has been reviewed and approved for distribution and use by the following:

Ratifier's Name	Signature	Date
Tom Danshin	Tom Danshin	

Revision History

Stream/Issue	Revision Date	Reason for Change	Author
00/0.1	7/7/2004	Draft release of Test Report	Tuan Tran
00/0.2	7/15/2004	Approved of Test Report	Tuan Tran

Change bars will not be used in this document.

Acronyms and Abbreviations

BPF	Bandpass Filter
BTS	Base Station Transceiver Subsystem
BW	Bandwidth
cBTS	Compact Base Station Transceiver Subsystem
CDMA	Code Division Multiple Access
CEM	Channel Enhancement Module
CM	Control Module
CR	Cost Reduced
DE	Digital Encloser
DOM	Data Only Module
DPM	Duplexer Preselector Module
GPSTM	Global Position System Timing Module
LO	Local Oscillator
MFRM	Multi-Carrier Flexible Radio Module
PA	Power Amplifier
PSK	Phase Shift Keying
QAM	Quadrature Amplitude Modulation
QPSK	Quadrature Phase Shift Keying
RBW	Resolution BandWidth
RM	Radio Module
RMS	Root Mean Square
RF	Radio Frequency
SA	Spectrum Analyzer
TBD	To Be Determined
VSA	Vector Signal Analyzer

1 Introduction

This test report supports FCC filing for the cBTS 800 MHz Radio Module. This test report will be used as a filing for FCC part 22. This filing includes single, two and three carrier modes for the 800MHz cellular band. The following test results include; RF Power Output, Occupied Bandwidth, Spurious Emissions at Antenna Terminals, and Transmitter Test (CDMA Mode Transmitter). Frequency over voltage and temperature test results are included. Emissions testing was conducted at -48VDC at room temperature. The IS95 and IS856 modulation schemes will be included in this report.

This test report is submitted in accordance with the FCC Rules and Regulations, Part 2, Subpart J, Sections 2.1046 through 2.1057 for equipment authorization of Nortel Networks' cBTS 800 MHz Radio Module (800 MHz RM).

The cBTS 800 MHz Radio Module is intended for use in the Domestic Public Cellular Radio Telecommunications Service and is designed in accordance with the following standards:

- *CFR 47, Part 22, Subpart H, Cellular Radiotelephone Service [1]*
- *CFR 47, Part 2, Subpart J, Equipment Authorization Procedures - Equipment Authorization[2]*
- *IC RSS-129, Issue 2, 800 MHz Dual-Mode CDMA Cellular Telephones [3]*
- *TIA/EIA-97-D, Recommended Minimum Performance Standards for Base Stations Supporting Dual Mode Spread Spectrum Systems [4]*

1.1 Required Tests

Table 1 summarizes the required tests for the cBTS 800 MHz Radio Module.

Table 1 : Required Tests

FCC Measurement Specification	FCC Limit Specification	Description	Test to be Performed ?
2.1046	22.913	RF Power Output	Yes
2.1049	22.917	Occupied Bandwidth	Yes
2.1051, 2.1057	22.917	Spurious Emissions at Antenna Terminals	Yes
2.1053, 2.1057	22.917	Field Strength of Spurious Emissions	Yes ^a
2.1055		Frequency Stability	Yes

a. Field strength of spurious emissions testing will be performed by Sanmina-SCI Canada, Calgary.

2 Engineering Declaration

The CDMA 800MHz Compact Radio Module has been tested in accordance with the requirements contained in the Federal Communications Commission Rules and Regulations Part 2 and 22.

To the best of my knowledge, these tests were performed in accordance with good engineering practices using measurement procedures consistent with industry or commission standards or previous Commission correspondence or guidance and demonstrate that this equipment complies with the appropriate standards. All tests were conducted on a representative sample of the equipment for which equipment authorization is sought.

Tested by:
Tuan Tran
Systems Test Prime
Nortel Networks
Calgary Canada


Signature

July 15, 2004
Date

Reviewed by:
Thomas Wong
CDMA/TDMA Regulatory
Emissions Prime
Nortel Networks
Calgary Canada


Signature

July 15, 2004
Date

Approved by:
Tom Danshin
BTS System Manager
Nortel Networks
Calgary Canada


Signature

July 15, 2004
Date

3 Equipment Authorization Application Requirements

3.1 Standard Test Conditions and Test Equipment

The cBTS 800 MHz Radio Module will be tested under the following standard test conditions unless otherwise noted:

- Ambient Temperature: 20 to 35 degrees C
- Ambient Humidity: 20 to 40%
- DC Supply Voltage: -48 Vdc and +24 Vdc (nominal)
- Input modulation IS-95, IS-856

3.2 EUT Identification List

Table 2 shows the identification of the components required for testing.

Table 2 : EUT Identification List

Equipment Description	Model / Part Number	Release Number	Serial Number
800 MHz Compact Radio Module	NTRZ71AA	P5	NNTM536G2CDL
800 DPM	NTRZ79AA	P4	ALLG74000JBQ

3.3 Test Equipment List

Table 3 shows the identification of the test equipment required.

Table 3 : Test Equipment List

Description	Manufacturer	Model	Serial Number	Cal. Due Date
9kHz to 40 GHz Spectrum Analyzer	Rohde&Schwarz	FSEK-30	DE25178	19 May 2005
RF Power Meter	Agilent	E4419B	US38260822	6 DEC 2005
RF Power Sensor Head	Agilent	E9300A	US39210633	09 DEC 2004
30dB Attenuator (>100W)	Weinschel	40-30-43	KL694	n/a
RF Cable 1 24"	Nortel	A0734233	n/a	n/a
RF Cable 2 8m Heliac	Nortel	A0803065	n/a	n/a

4 Transmitter Tests

4.1 RF Power Output

4.1.1 RF Power Output Requirements

FCC Part 2.1046 Measurements required: RF power output

§(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in §2.1033(c)(8). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

(c) For measurements conducted pursuant to paragraphs (a) and (b) of this section, all calculations and methods used by the applicant for determining carrier power or peak envelope power, as appropriate, on the basis of measured power in the radio frequency load attached to the transmitter output terminals shall be shown. Under the test conditions specified, no components of the emission spectrum shall exceed the limits specified in the applicable rule parts as necessary for meeting occupied bandwidth or emission limitations.

4.1.2 Test Method

Setup the DE via the BTS controller to enable the cBTS 800 MHz Radio Module to transmit at the rated power for each of the carrier configurations one, two and three carrier in the Baseband modulation formats IS-95 and IS-856. Measurements will be made on channels at the bottom and top of the operator bands with the Compact RM operating with -48Vdc. The RF output power will be measured using the power meter.

4.1.3 Test Setup

The set-up required for the cBTS 800 MHz Radio Module RF output power test is illustrated in Figure 1. RF output power measurements will be referenced to the antenna port of the DPM

4.1.4 IS-95

The conducted spurious emissions of the cBTS 800 MHz Radio Module, with IS-95 waveforms were tested at maximum power. Transmitters operating with IS95 are tested at +47.3 dBm.

4.1.5 IS-856 DOM

The conducted spurious emissions of the cBTS 800 MHz Radio Module, with IS-856 waveforms were tested at maximum power. Transmitters operating with IS-856 are tested at +47.3 dBm.

4.1.6 Noise Floor

Table 4 lists the noise floor of the measurement system with no signal present.

Table 4 : Spectrum Analyzer Noise Floor

Start (MHz)	Stop (MHz)	Peak (dBm)	RBW kHz
0.01	400	-42.19	100
400	1000	-39.73	100
1000	2000	-37.82	100
2000	3000	-37.04	100
3000	4000	-36.06	100
4000	5000	-36.13	100
5000	6000	-33.52	100
6000	7000	-29.81	100
7000	8000	-31.88	100
8000	9000	-32.18	100
9000	10000	-32.77	100

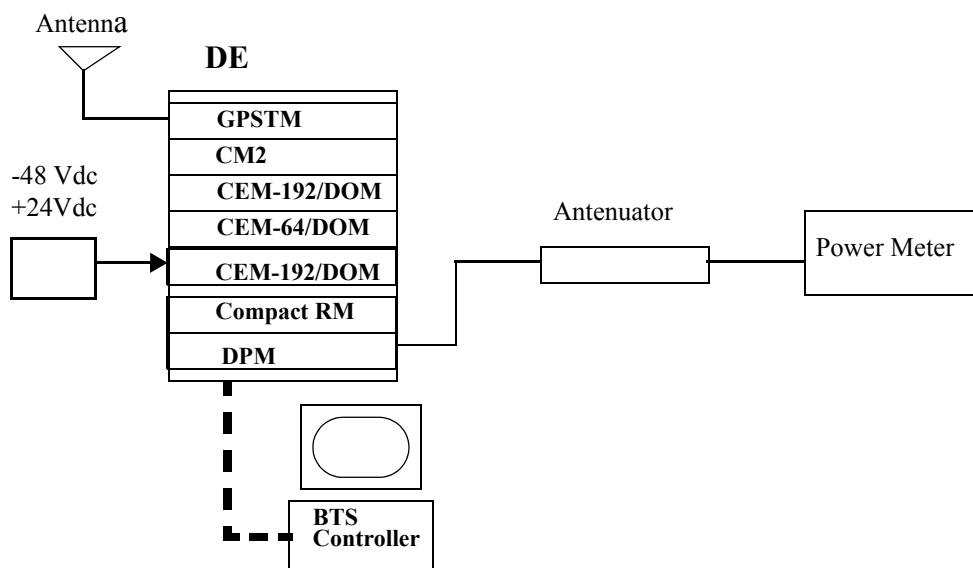


Figure 1 : Test Setup for RF Power Output Measurement

4.1.7 RF Output Power Test Results

Table 5 : RF Output Power cBTS 800 MHz Radio Module 1-Carrier IS95

Channel Number (Band)	Frequency (MHz)	Measured RF Output Power (dBm)	Typical Maximum Rated Power (dBm)
1015 (A'')	869.76	47.3	47.3
308 (A)	879.24	47.3	47.3
358 (B)	880.74	47.36	47.3
642 (B)	889.26	47.37	47.3
692 (A')	890.76	47.37	47.3
742 (B')	892.26	47.30	47.3
775 (B')	893.25	47.19	47.3

Table 6 : RF Output Power cBTS 800 MHz Radio Module 2-Carrier IS95

Channel Number (Band)	Frequency (MHz)	Measured RF Output Power (dBm)	Typical Maximum Rated Power (dBm)
358, 399 (B)	880.74, 881.97	47.32	47.3
601, 642 (B)	888.03, 889.26	47.20	47.3

Table 7 : RF Output Power of cBTS 800 MHz Radio Module 3-Carrier IS95

Channel Number (Band)	Frequencies (MHz)	Measured RF Output Power (dBm)	Typical Maximum Rated Power (dBm)
1015, 33, 74 (A'', A)	869.76, 870.99, 872.22	47.18	47.3
226, 267, 308 (A)	876.78, 878.01, 879.24	47.20	47.3
358, 399, 440 (B)	880.74, 881.97, 883.20	47.23	47.3
560, 601, 642 (B)	886.8, 888.03, 889.26	47.15	47.3

Table 8: RF Output Power of cBTS 800MHz Radio Module IS-856 Modulation

Carriers	Channel Number	Frequency(MHz)	Measured O/P (dBm)	Typical Maximum Rated Power (dBm)
1-IS856-16QAM	358	880.74	47.27	47.3
1-IS856-16QAM	642	889.26	47.12	47.3
3-IS856-16QAM	358, 399, 440	880.74, 881.97, 883.2	47.39	47.3
3-IS856-16QAM	560, 601, 642	886.8, 888.03, 889.26	47.24	47.3
2-IS856-16QAM, 1-IS95	358, 399, 440	880.74, 881.97, 883.2	47.16	47.3
2-IS856-16QAM, 1-IS95	560, 601, 642	886.8, 888.03, 889.26	47.17	47.3
3-IS856-8PSK	358, 399, 440	880.74, 881.97, 883.2	47.37	47.3
3-IS856-8PKS	560, 601, 642	886.8, 888.03, 889.26	47.30	47.3
3-IS856-QPSK	358, 399, 440	880.74, 881.97, 883.2	47.25	47.3
3-IS856-QPSK	560, 601, 642	886.8, 888.03, 889.26	47.25	47.3

4.2 Certification Requirements

4.2.1 Application for certification

FCC Part 2.1033 Application for certification.

(c) Applications for equipment other than that operating under parts 15 and 18 of the rules shall be accompanied by a technical report containing the following information:

(8) The dc voltages applied to and dc currents into the several elements of the final radio frequency amplifying device for normal operation over the power range.

4.2.2 Test Method

This information required for this section is available from [6]:

Title: Compact Metrocell Radio Module Beta Test Plan

Dataset Name: TPRZ71AA

Document Status: Approved

Stream: 00 Issue: 03.1

Issue Date: January 7, 2004

Author: Ken Minderhoud

4.2.3 Test Setup

See above document

4.2.4 Test Results

The final amplifying dc voltage is 27.0 VDC. The final dc current is:

Table 9 : Average Current Values Pout = 48 dBm @ the output of PA

Average Current [A] Values @ Pout = 48 dBm				
	25°C			
	Q4	Q5	Q6	Q7
Mean	3.66	4.01	3.8	3.73

4.3 Occupied Bandwidth

4.3.1 Occupied Bandwidth Requirements

FCC Part 2.1049

The OBW, 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:

(g) Transmitter in which the modulating baseband comprises not more than three independent channels - when modulated by the full complement of signals for which the transmitter is rated. The level of modulation for each channel should be set to that prescribed in rule parts applicable to the services for which the transmitter is intended. If specific modulation levels are not set forth in the rules, the tests should provide the manufacturer's maximum rated condition.

(h) Transmitters employing digital modulation techniques - when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated. The signal shall be applied through any filter networks, pseudo-random generators or other devices required in normal service. Additionally, the occupied bandwidth shall be shown for operation with any devices used for modifying the spectrum when such devices are optional at discretion of the user.

4.3.2 Test Method

Setup the DE via the BTS controller to enable the cBTS 800 MHz Radio Module to transmit at maximum rated power for each of the carrier configurations one, two and three carrier in the Baseband modulation formats IS-95 and IS-856. Measurements will be made on channels at the bottom and top of each of the operator bands. The Occupied bandwidth is measured using the 99% Channel Power feature of the SA.

4.3.3 Test Setup

The set-up required for the cBTS 800 MHz Radio Module Occupied bandwidth test is illustrated in Figure 2.

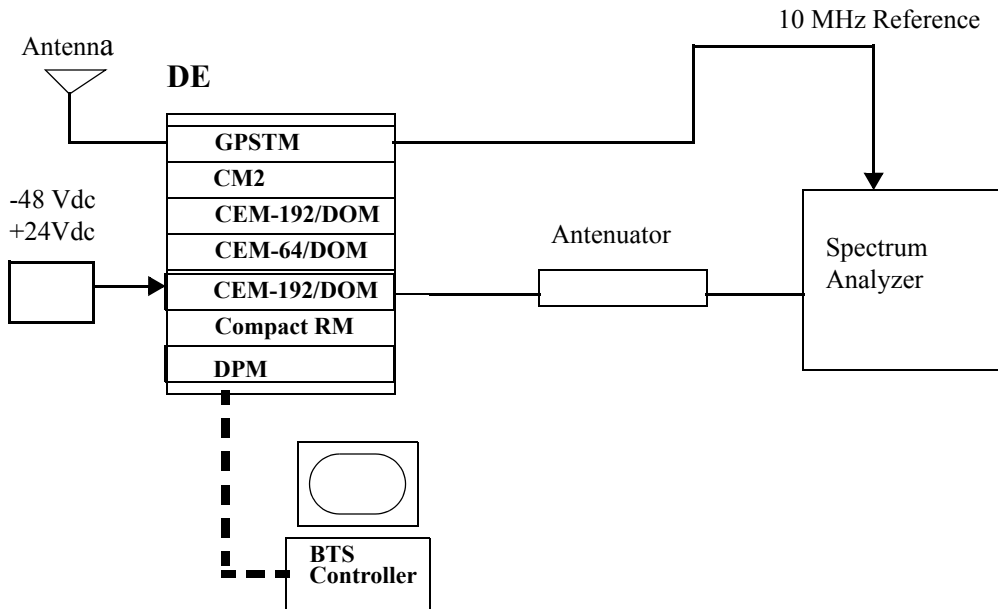


Figure 2 : Test Setup for Occupied Bandwidth Measurement

4.3.4 Test Result

Table 10 : Measured Occupied Bandwidth cBTS 800 MHz Radio Module 1-Carrier IS95

Channel Number (Band)	Frequency (MHz)	Measured Occupied Bandwidth (MHz) (1-Carrier)
1015 (A'')	869.76	1.2665
308 (A)	879.24	1.2665
358 (B)	880.74	1.2705
642 (B)	889.26	1.2665
692 (A')	890.76	1.2665
742 (B')	892.26	1.2705
775 (B')	893.25	1.2665

Table 11 : Measured Occupied Bandwidth cBTS 800 MHz Radio Module 2-Carrier IS95

Channel Number (Band)	Frequency (MHz)	Measured Occupied Bandwidth (MHz)
358, 399 (B)	880.74, 881.97	2.4609
601, 642 (B)	888.03, 889.26	2.4609

Table 12 : Measured Occupied Bandwidth of cBTS 800 MHz Radio Module 3-Carrier IS95

Channel Number (Band)	Frequencies (MHz)	Measured Occupied Bandwidth (MHz)
1015, 33, 74 (A', A)	869.76, 870.99, 872.22	3.6713
226, 267, 308 (A)	876.78, 878.01, 879.24	3.6713
358, 399, 440 (B)	880.74, 881.97, 883.20	3.6713
560, 601, 642 (B)	886.8, 888.03, 889.26	3.6713

Table 13: Measured Occupied Bandwidth of cBTS 800 MHz Radio Module IS856 Modulation

Carrier	Channel Number	Frequencies (MHz)	Measured Occupied Bandwidth (MHz)
1-IS856-16QAM	358	880.74	1.2625
1-IS856-16QAM	642	889.26	1.2665
3-IS856-16QAM	358, 399, 440	880.74, 881.97, 883.2	3.6713
3-IS856-16QAM	560, 601, 642	886.8, 888.03, 889.26	3.6713
2-IS856-16QAM, 1-IS95	358, 399, 440	880.74, 881.97, 883.2	3.6713
2-IS856-16QAM, 1-IS95	560, 601, 642	886.8, 888.03, 889.26	3.6713
3-IS856-8PSK	358, 399, 440	880.74, 881.97, 883.2	3.6713
3-IS856-8PSK	560, 601, 642	886.8, 888.03, 889.26	3.6713
3-IS856-QPSK	358, 399, 440	880.74, 881.97, 883.2	3.6713
3-IS856-QPSK	560, 601, 642	886.8, 888.03, 889.26	3.6713

4.4 Spurious Emissions at Antenna Terminals

4.4.1 Spurious Emissions Requirements

FCC Part 2.1051

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.

FCC Part 2.1057 - Frequency Spectrum to be investigated

The spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency or to the highest frequency practicable in the present state of the art of measuring techniques, whichever is lower. Particular attention should be paid to harmonics and subharmonics of the carrier frequency. Radiation at the frequencies of multiplier stages should be checked. The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be reported.

FCC Part 22.917 Limit

Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

Alternative out of band emission limit. Licensees in this service may establish an alternative out of band emission limit to be used at specified band edge(s) in specified geographical areas, in lieu of that set forth in this section, pursuant to a private contractual arrangement of all affected licensees and applicants. In this event, each party to such contract shall maintain a copy of the contract in their station files and disclose it to prospective assignees or transferees and, upon request, to the FCC.

Interference caused by out of band emissions. If any emission from a transmitter operating in this service results in interference to users of another radio service, the FCC may require a greater attenuation of that emission than specified in this section

4.4.2 Test Method

Configure the BTS via the BTS controller to enable the cBTS 800 MHz Radio Module to transmit at maximum rated power for each of the carrier configurations one, two and three carrier in the Baseband modulation formats IS-95. Measurements will be made on channels at the bottom and top of the operator bands. The following spectrum analyzer settings are to be used for the measurement of the antenna port (DPM) spurious emissions:

4.4.2.1 Adjacent 1MHz to indicated cellular band (Upper and Lower)

Table 14: Adjacent 1MHZ Spectrum Analyze Settings

Setting	1 Carrier	2 Carrier	3 Carrier
Resolution Bandwidth ^a :	12.5 kHz	25 kHz	37.5 kHz
Video Bandwidth (3x RBW) ^b	(3x RBW)	(3x RBW)	(3x RBW)
Video Average	10 Averages	10 Averages	10 Averages
Span	Set accordingly	Set accordingly	Set accordingly
Detector	RMS	RMS	RMS
Attenuation ^c	30 dB	30 dB	30 dB
Ref. Level	35 dBm	35 dBm	35 dBm
Ref. Level Offset	31-34.5 dB	31-34.5 dB	31-34.5 dB

- If the spectrum analyze cannot be set to the specified RBW the next highest RBW should be used and all measurements corrected to the specified RBW
- If the spectrum analyze cannot be set to the specified Video Bandwidth the next highest Video Bandwidth should be used.
- The lowest value of attenuator should be used to improve measurement accuracy, without overdriving the Spectrum Analyzer.

All spectrum analyzer settings were coupled as per the manufacturers recommendations to improve measurement time, without compromising data.

4.4.2.2 All other Spurious Emissions up to 10 GHz

Table 15 : All other Emission Spectrum Analyze Settings

Setting	1 Carrier	2 Carrier	3 Carrier
Resolution Bandwidth	100 kHz	100 kHz	100 kHz
Video Bandwidth (3x RBW)	300 kHz	300 kHz	300 kHz
Video Average	10 Averages	10 Averages	10 Averages
Span	Set accordingly	Set accordingly	Set accordingly
Detector	RMS	RMS	RMS
Attenuation ^a	30 dB	30 dB	30 dB
Ref. Level	35 dBm	35 dBm	35 dBm
Ref. Level Offset	31-34.5 dB	31-34.5 dB	31-34.5 dB

a. The lowest value of attenuator should be used to improve measurement accuracy, without overdriving the Spectrum Analyzer.

The emissions will be investigated up to 10 GHz (the 10th harmonic of the fundamental emission) for all carrier configurations (1, 2, 3) as per FCC Part 22.

4.4.3 Test Requirements

Table 16 : Spurious Emissions Requirements

Frequency Offset	1 Carrier	2 Carrier	3 Carrier
+/- 740 kHz	< -13 dBm/12.5KHz	< -13 dBm/25 KHz	< -13 dBm/37.5 KHz

4.4.4 Test Setup

The set-up required for the cBTS 800 MHz Radio Module Antenna Port (DPM) Spurious Emission test is illustrated in Figure 3.

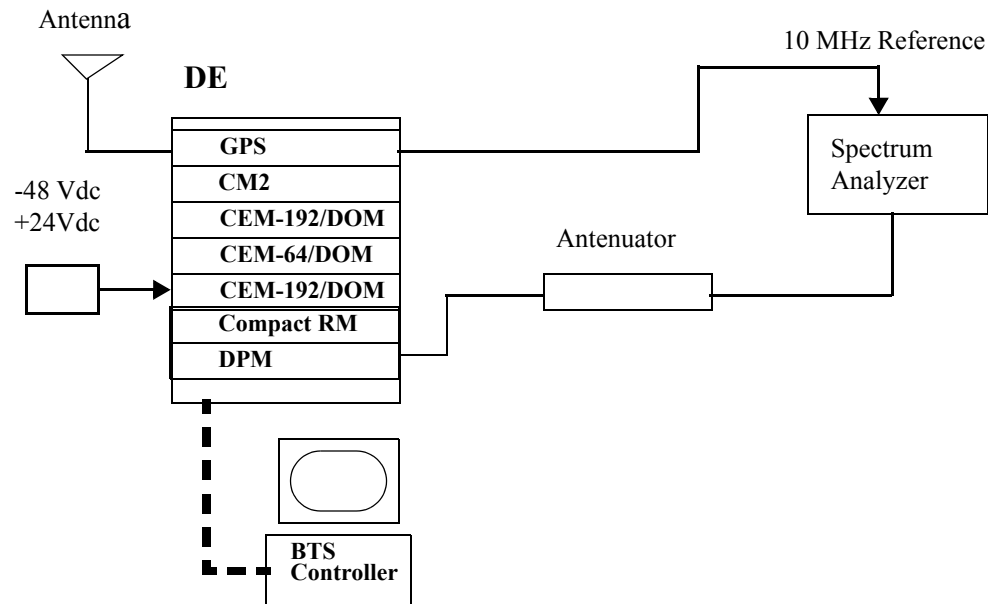


Figure 3 : Test Setup for Spurious Emissions Measurement

4.4.5 Test Results IS-95 and IS-856 *

Table 17 : Spurious Emissions at the cBTS 800 MHz Radio Module Ant. Port one Carrier band A and A'' IS95^a

Frequency (MHz)	Spurious Emissions Level (dBm)	Margin to FCC Limit of -13 dBm (dB)
	1Carrier IS-95	1Carrier
869 MHz (Lower edge of band A'') Ch 1015 (RBW=12.5 kHz)	-27.27	14.27
880 MHz (Upper edge of band A) Ch 308 (RBW=12.5 kHz)	-28.24	15.24
0-1000 (RBW=100KHz)	-30.94	17.94
1000-2000 (RBW=100KHz)	-29.74	16.74
2000-3000 (RBW=100KHz)	-36.83	23.83
3000-4000 (RBW=100KHz)	-36.01	23.01
4000-5000 (RBW=100KHz)	-36.16	23.16
5000-6000 (RBW=100KHz)	-33.58	20.58
6000-7000 (RBW=100KHz)	-29.84	16.84
7000-8000 (RBW=100KHz)	-31.83	18.83
8000-9000 (RBW=100KHz)	-32.10	19.10
9000-10000 (RBW=100KHz)	-32.60	19.60

a. See Appendix A. Single Carrier IS-95 Spurious Emission

*. Samples of the plots are shown in Appendix A to H

Table 18 : Spurious Emissions at the cBTS 800 MHz Radio Module Ant. Port Three
Carrier band A and A'' IS-95*

Frequency (MHz)	Spurious Emissions Level (dBm)	Margin to FCC Limit of -13 dBm (dB)
	3Carrier IS-95	3Carrier
869 MHz (Lower edge of band A'') Ch 1015, 33, 74 (RBW=37.5 kHz)	-29.64	16.64
880 MHz (Upper edge of band A) Ch 226, 267, 308 (RBW=37.5 kHz)	-31.38	18.38
0-1000 (RBW=100KHz)	-24.98	11.98
1000-2000 (RBW=100KHz)	-33.27	20.27
2000-3000 (RBW=100KHz)	-37.81	24.81
3000-4000 (RBW=100KHz)	-36.99	23.99
4000-5000 (RBW=100KHz)	-37.22	24.22
5000-6000 (RBW=100KHz)	-34.39	21.39
6000-7000 (RBW=100KHz)	-30.55	17.55
7000-8000 (RBW=100KHz)	-32.70	19.70
8000-9000 (RBW=100KHz)	-33.05	20.05
9000-10000 (RBW=100KHz)	-33.91	20.91

*. See Appendix C - Three Carriers IS-95 Spurious Emission

**Table 19 : Spurious Emissions at the cBTS 800 MHz Radio Module Ant. Port One Carrier
band B IS-95**

Frequency (MHz)	Spurious Emissions Level (dBm)	Margin to FCC Limit of -13 dBm (dB)
	1Carrier IS-95	1Carrier
880 MHz (Lower edge of band B) Ch 358 (RBW=12.5kHz)	-25.14	12.14
890 MHz (Upper edge of band B) Ch 642 (RBW=12.5kHz)	-26.13	13.13
0-1000 (RBW=100KHz)	-27.48	14.48
1000-2000 (RBW=100KHz)	-31.76	18.76
2000-3000 (RBW=100KHz)	-37.59	24.59
3000-4000 (RBW=100KHz)	-36.58	23.58
4000-5000 (RBW=100KHz)	-36.48	23.48
5000-6000 (RBW=100KHz)	-34.13	21.13
6000-7000 (RBW=100KHz)	-30.29	17.29
7000-8000 (RBW=100KHz)	-32.72	19.72
8000-9000 (RBW=100KHz)	-32.72	19.72
9000-10000 (RBW=100KHz)	-33.37	20.37

Table 20 : Spurious Emissions at the cBTS 800 MHz Radio Module Ant. Port Two Carrier band B IS-95*

Frequency (MHz)	Spurious Emissions Level (dBm)	Margin to FCC Limit of -13 dBm (dB)
	2Carrier IS-95	2Carrier
880 MHz (Lower edge of band B) Ch 358, 399 (RBW=25.0 kHz)	-25.14	12.14
890 MHz (Upper edge of band B) Ch 601, 642 (RBW=25.0 kHz)	-26.13	13.13
0-1000 (RBW=100KHz)	-27.48	14.48
1000-2000 (RBW=100KHz)	-31.76	18.76
2000-3000 (RBW=100KHz)	-37.59	24.59
3000-4000 (RBW=100KHz)	-36.58	23.58
4000-5000 (RBW=100KHz)	-36.48	23.48
5000-6000 (RBW=100KHz)	-34.13	21.13
6000-7000 (RBW=100KHz)	-30.29	17.29
7000-8000 (RBW=100KHz)	-32.72	19.72
8000-9000 (RBW=100KHz)	-32.72	19.72
9000-10000 (RBW=100KHz)	-33.37	20.37

*. See Appendix B - Two Carriers IS-95 Spurious Emission

**Table 21 : Spurious Emissions at the cBTS 800 MHz Radio Module Ant. Port Three
Carrier band B IS-95**

Frequency (MHz)	Spurious Emissions Level (dBm)	Margin to FCC Limit of -13 dBm (dB)
	3Carrier IS-95	3Carrier
880 MHz (Lower edge of band B) Ch 358, 399, 440 (RBW=37.5 kHz)	-27.54	14.54
890 MHz (Upper edge of band B) Ch 560, 601, 642 (RBW=37.5 kHz)	-28.73	15.73
0-1000 (RBW=100KHz)	-26.95	13.95
1000-2000 (RBW=100KHz)	-34.09	21.09
2000-3000 (RBW=100KHz)	-38.01	25.01
3000-4000 (RBW=100KHz)	-37.15	24.15
4000-5000 (RBW=100KHz)	-37.46	24.46
5000-6000 (RBW=100KHz)	-34.61	21.61
6000-7000 (RBW=100KHz)	-30.73	17.73
7000-8000 (RBW=100KHz)	-32.96	19.93
8000-9000 (RBW=100KHz)	-33.11	20.11
9000-10000 (RBW=100KHz)	-33.85	20.85

Table 22 : Spurious Emissions at the cBTS 800 MHz Radio Module Ant. Port One Carrier band A' IS-95

Frequency (MHz)	Spurious Emissions Level (dBm)	Margin to FCC Limit of -13 dBm (dB)
	1 Carrier IS-95	1 Carrier
890 Mhz (Lower edge of band A') Ch 692(RBW=12.5 kHz)	-29.19	16.19
891.5 MHz (upper edge of band A') Ch 692 (RBW=12.5kHz)	-25.47	12.47
0-1000 (RBW=100KHz)	-32.23	19.23
1000-2000 (RBW=100KHz)	-31.38	18.38
2000-3000 (RBW=100KHz)	-37.03	24.03
3000-4000 (RBW=100KHz)	-36.19	23.19
4000-5000 (RBW=100KHz)	-36.34	23.34
5000-6000 (RBW=100KHz)	-35.58	22.58
6000-7000 (RBW=100KHz)	-29.89	16.89
7000-8000 (RBW=100KHz)	-32.20	19.20
8000-9000 (RBW=100KHz)	-32.45	19.45
9000-10000 (RBW=100KHz)	-33.01	20.01

Table 23 : Spurious Emissions at the cBTS 800 MHz Radio Module Ant. Port One Carrier band B' IS95

Frequency (MHz)	Spurious Emissions Level (dBm)	Margin to FCC Limit of -13 dBm (dB)
	1 Carrier IS-95	1 Carrier
891.5 MHz (lower edge of band B') Ch 742 (RBW=12.5kHz)	-28.05	15.05
894 MHz (upper edge of band B') Ch 775 (RBW=12.5kHz)	-27.05	14.05
0-1000 (RBW=100KHz)	-30.95	17.95
1000-2000 (RBW=100KHz)	-31.60	18.60
2000-3000 (RBW=100KHz)	-37.08	24.08
3000-4000 (RBW=100KHz)	-36.56	23.56
4000-5000 (RBW=100KHz)	-36.32	23.32
5000-6000 (RBW=100KHz)	-33.83	20.83
6000-7000 (RBW=100KHz)	-29.96	16.96
7000-8000 (RBW=100KHz)	-32.17	19.17
8000-9000 (RBW=100KHz)	-32.53	19.53
9000-10000 (RBW=100KHz)	-33.04	20.04

Table 24: Spurious Emissions at the cBTS 800 MHz Radio Module Ant. Port One Carrier band B IS856 ^a

Frequency (MHz)	Spurious Emissions Level (dBm)	Margin to FCC Limit of -13 dBm (dB)
	1 Carrier IS 856 16QAM	1 Carrier
880 MHz (Lower edge of band B) Ch 358 (RBW=12.5kHz)	-26.48	13.48
890 MHz (Upper edge of band B) Ch 642 (RBW=12.5kHz)	-27.36	14.36
0-1000 (RBW=100KHz)	-32.05	19.05
1000-2000 (RBW=100KHz)	-31.52	18.52
2000-3000 (RBW=100KHz)	-36.94	23.94
3000-4000 (RBW=100KHz)	-36.01	23.01
4000-5000 (RBW=100KHz)	-36.26	23.26
5000-6000 (RBW=100KHz)	-33.53	20.53
6000-7000 (RBW=100KHz)	-29.63	16.63
7000-8000 (RBW=100KHz)	-32.12	19.12
8000-9000 (RBW=100KHz)	-32.36	19.36
9000-10000 (RBW=100KHz)	-32.86	18.86

a. See Appendix D - One Carrier IS-856 16QAM Spurious Emission

Table 25: Spurious Emissions at the cBTS 800 MHz Radio Module Ant. Port Three Carrier band B IS856 16QAM^a

Frequency (MHz)	Spurious Emissions Level (dBm)	Margin to FCC Limit of -13 dBm (dB)
	3-Carriers IS856 16QAM	3 Carriers
880 MHz (Lower edge of band B) Ch 358, 399, 440 (RBW=37.5 kHz)	-26.97	13.97
890 MHz (Upper edge of band B) Ch 560, 601, 642 (RBW=37.5 kHz)	-29.16	16.16
0-1000 (RBW=100KHz)	-26.97	13.97
1000-2000 (RBW=100KHz)	-34.17	21.17
2000-3000 (RBW=100KHz)	-37.58	24.58
3000-4000 (RBW=100KHz)	-36.77	23.77
4000-5000 (RBW=100KHz)	-36.86	23.86
5000-6000 (RBW=100KHz)	-34.60	21.60
6000-7000 (RBW=100KHz)	-30.49	17.49
7000-8000 (RBW=100KHz)	-32.74	29.74
8000-9000 (RBW=100KHz)	-33.03	20.03
9000-10000 (RBW=100KHz)	-33.62	20.62

a. See Appendix E - Three Carriers IS-856 16QAM Spurious Emission

Table 26: Spurious Emissions at the cBTS 800 MHz Radio Module Ant. Port Band B Two Carrier IS856 (16QAM) One Carrier IS95 ^a

Frequency (MHz)	Spurious Emissions Level (dBm)	Margin to FCC Limit of -13 dBm (dB)
	3 Carriers 2-IS856 16QAM ,1-IS95	3 Carriers
880 MHz (Lower edge of band B) Ch 358, 399, 440 (RBW=37.5 kHz)	-28.47	15.47
890 MHz (Upper edge of band B) Ch 560, 601, 642 (RBW=37.5 kHz)	-29.79	16.79
0-1000 (RBW=100KHz)	-26.66	13.66
1000-2000 (RBW=100KHz)	-34.68	21.68
2000-3000 (RBW=100KHz)	-37.73	24.73
3000-4000 (RBW=100KHz)	-36.79	23.79
4000-5000 (RBW=100KHz)	-37.09	24.09
5000-6000 (RBW=100KHz)	-34.49	21.49
6000-7000 (RBW=100KHz)	-30.55	17.55
7000-8000 (RBW=100KHz)	-32.70	19.70
8000-9000 (RBW=100KHz)	-33.05	20.05
9000-10000 (RBW=100KHz)	-33.68	20.68

a. See Appendix F - Two Carriers IS856 16QAM, One Carrier IS95 Spurious Emission

Table 27: Spurious Emissions at the cBTS 800 MHz Radio Module Ant. Port Three Carrier band B IS856 [8PSK] ^a

Frequency (MHz)	Spurious Emissions Level (dBm)	Margin to FCC Limit of -13 dBm (dB)
	3 Carriers IS856 8PSK	3 Carriers
880 MHz (Lower edge of band B) Ch 358, 399, 440 (RBW=37.5 kHz)	-27.09	14.09
890 MHz (Upper edge of band B) Ch 560, 601, 642 (RBW=37.5 kHz)	-29.89	16.89
0-1000 (RBW=100KHz)	-26.73	13.73
1000-2000 (RBW=100KHz)	-34.46	21.46
2000-3000 (RBW=100KHz)	-37.64	24.64
3000-4000 (RBW=100KHz)	-37.06	24.06
4000-5000 (RBW=100KHz)	-36.86	23.86
5000-6000 (RBW=100KHz)	-34.63	21.63
6000-7000 (RBW=100KHz)	-30.64	17.64
7000-8000 (RBW=100KHz)	-32.78	19.78
8000-9000 (RBW=100KHz)	-32.94	19.84
9000-10000 (RBW=100KHz)	-33.75	20.75

a. See Appendix G - Three Carriers IS856 8PSK Spurious Emission

Table 28: Spurious Emissions at the cBTS 800 MHz Radio Module Ant. Port Three Carrier band B IS856 [QPSK] ^a

Frequency (MHz)	Spurious Emissions Level (dBm)	Margin to FCC Limit of -13 dBm (dB)
	3 Carriers IS856 QPSK	3 Carriers
880 MHz (Lower edge of band B) Ch 358, 399, 440 (RBW=37.5 kHz)	-27.06	14.06
890 MHz (Upper edge of band B) Ch 560, 601, 642 (RBW=37.5 kHz)	-29.13	16.13
0-1000 (RBW=100KHz)	-26.18	13.18
1000-2000 (RBW=100KHz)	-34.14	21.14
2000-3000 (RBW=100KHz)	-37.73	24.73
3000-4000 (RBW=100KHz)	-36.80	23.80
4000-5000 (RBW=100KHz)	-37.04	24.04
5000-6000 (RBW=100KHz)	-34.80	21.80
6000-7000 (RBW=100KHz)	-30.49	17.49
7000-8000 (RBW=100KHz)	-32.78	19.78
8000-9000 (RBW=100KHz)	-32.91	19.91
9000-10000 (RBW=100KHz)	-33.53	20.53

a. See Appendix H - Three Carriers IS856 QPSK Spurious Emission

4.5 Transmitter Tests (CDMA Mode)

Unwanted Emissions

Unwanted emissions are emissions on a frequency or frequencies outside the necessary bandwidth which result from the modulation process, from spurious emissions and harmonics.

IC RSS-129

(1) Suppression inside cellular band: For all base station transmit frequencies allocated to the same operator system, the total spurious emissions in any 30 kHz band shall be attenuated below the mean output power level in accordance with the following schedule:

(a) for all offset frequencies greater than 750 kHz from the CDMA centre frequency, at least 45 dB. 800 MHz Dual-Mode CDMA Cellular Telephones RSS-129.

(b) for all offset frequencies greater than 1.98 MHz from the CDMA centre frequency, at least 60 dB.

(c) for all offset frequencies not allocated to the same operator system, at least 60 dB or -13 dBm, whichever is less stringent.

(2) In any 30 kHz outside the cellular band, the attenuation shall be at least $43+10 \log_{10}$ (mean output power in watts) or 70, dB, whichever is the less stringent.

4.5.1 Test Method

Configure the BTS via the BTS controller to enable the Compact RM to transmit at maximum rated power for each of the carrier configurations one, two and three carrier in the Baseband modulation formats IS-95. Measurements will be made on channels at the bottom and top of the duplexer band. The following spectrum analyzer settings are to be used for the measurement of the antenna port (DPM) spurious emissions:

4.5.1.1 Adjacent 1MHz to indicated cellular band (Upper and Lower)

Table 29: Adjacent 750 KHz and 1.98 MHz Spectrum Analyze Settings

Setting	1 Carrier	2 Carrier	3 Carrier
Resolution Bandwidth ^a :	30 kHz	30 kHz	30 kHz
Video Bandwidth (3x RBW)	100 kHz	100 kHz	100 kHz
Video Average	10 Averages	10 Averages	10 Averages
Span	Set accordingly	Set accordingly	Set accordingly
Detector	RMS	RMS	RMS
Attenuation	30 dB	30 dB	30 dB
Ref. Level	35 dBm	35 dBm	35 dBm
Ref. Level Offset	31-34.5 dB	31-34.5 dB	31-34.5 dB

- a. If the spectrum analyzer can not be set to the specified RBW the next highest RBW should be used and all measurements corrected to the specified RBW

All spectrum analyzer settings were coupled as per the manufacturers recommendations to improve measurement time, without compromising data.

4.5.2 Test Setup

The set-up required for the Compact RM Antenna Port (DPM) Spurious Emission test is illustrated in Figure 4.

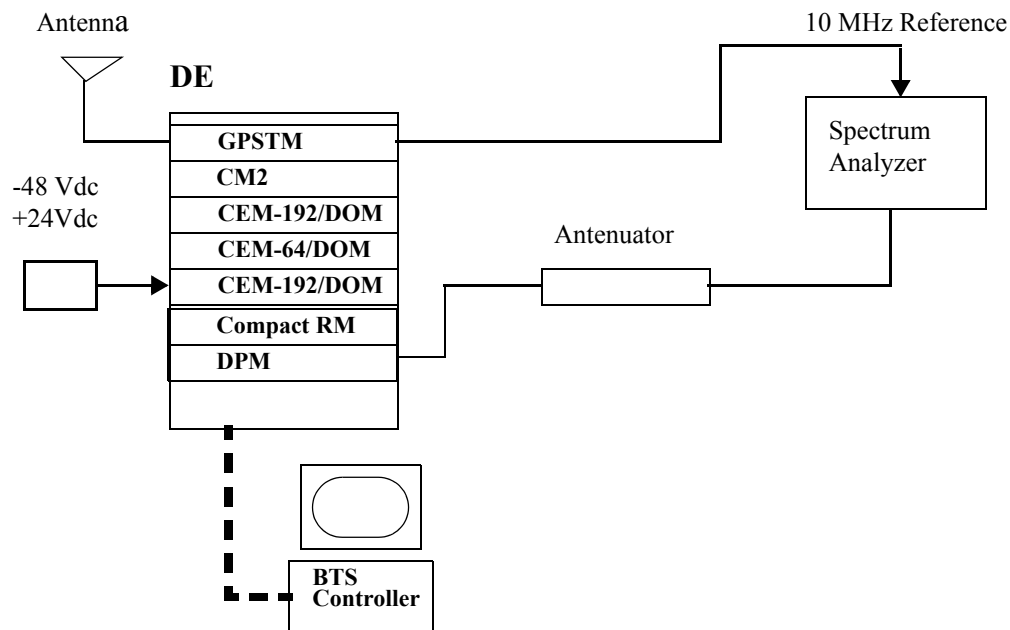


Figure 4 : Test Setup for Spurious Emissions Measurement

4.5.3 Test Results

Table 30 : Industry Canada Suppression inside cellular band cBTS 800 MHz Radio Module Antenna Port IS95, 1 Carrier band A”*

Frequency (MHz)	Spurious Emissions Level (dBm)	Limit for 45 dBc/ 30KHz (dBm)	Margin to IC Limit of 45 dBc/ 30KHz (dB)
	1Carrier IS-95	1Carrier	1 Carrier
Ch1015 750KHz offset at lower side	-17.55	2.3	19.85
Ch1015 750KHz offset at upper side	-19.59	2.3	21.89
		Limit for 60 dBc/ 30KHz (dBm)	Margin to IC Limit of 60 dBc/ 30KHz (dB)
Ch1015 1.98MHz offset at lower side	-42.37	-12.7	29.67
Ch1015 1.89MHz offset at upper side	-42.36	-12.7	29.66

*. See Appendix A - Single Carrier IS95 Spurious Emission

Table 31 : Industry Canada Suppression inside cellular band cBTS 800 MHz Radio Module Antenna Port IS95, 3 Carrier band A'' and A ^a

Frequency (MHz)	Spurious Emissions Level (dBm)	Limit for 45 dBc/ 30KHz (dBm)	Margin to IC Limit of 45 dBc/ 30KHz (dB)
	3Carrier IS-95	3Carrier	3Carrier
Ch1015, 33, 74 750KHz offset at lower side	-23.46	2.3	25.76
Ch1015, 33, 74 750KHz offset at upper side	-24.77	2.3	27.07
		Limit for 60 dBc/ 30KHz (dBm)	Margin to IC Limit of 60 dBc/ 30KHz (dB)
Ch1015, 33, 74 1.98MHz offset at lower side	-36.42	-12.7	23.72
Ch1015, 33, 74 1.98MHz offset at upper side	-34.92	-12.7	22.22

a. See Appendix C - Three Carriers IS95 Spurious Emission

**Table 32: Industry Canada Suppression inside cellular band cBTS 800 MHz Radio Module
Antenna Port IS95, 1 Carrier band B'**

Frequency (MHz)	Spurious Emissions Level (dBm)	Limit for 45 dBc/ 30KHz (dBm)	Margin to IC Limit of 45 dBc/ 30KHz (dB)
	1 Carrier IS-95	1 Carrier	1 Carrier
Ch 742 750KHz offset at lower side	-18.24	2.3	20.54
Ch 742 750KHz offset at upper side	-19.92	2.3	22.22
		Limit for 60 dBc/ 30KHz (dBm)	Margin to IC Limit of 60 dBc/ 30KHz (dB)
Ch 742 1.98MHz offset at lower side	-42.06	-12.7	29.36
Ch 742 1.98MHz offset at upper side	-43.00	-12.7	30.3

**Table 33: Industry Canada Suppression inside cellular band cBTS 800 MHz Radio Module
 Antenna Port IS856-16QAM, 1 Carrier band B ^a**

Frequency (MHz)	Spurious Emissions Level (dBm)	Limit for 45 dBc/30KHz (dBm)	Margin to IC Limit of 45 dBc/ 30KHz (dB)
	1Carrier IS856-16QAM	1Carrier	1Carrier
Ch 358 750KHz offset at lower side	-17.73	2.3	20.03
Ch 358 750KHz offset at upper side	-19.36	2.3	21.66
		Limit for 60 dBc/30KHz (dBm)	Margin to IC Limit of 60 dBc/ 30KHz (dB)
Ch 358 1.98MHz offset at lower side	-42.35	-12.7	29.65
Ch 358 1.98MHz offset at upper side	-43.02	-12.7	30.32

a. See Appendix D - One Carrier IS-856 16QAM Spurious Emission

**Table 34: Industry Canada Suppression inside cellular band cBTS 800 MHz Radio Module
Antenna Port IS856-16QAM, 3 Carriers band B^a**

Frequency (MHz)	Spurious Emissions Level (dBm)	Limit for 45 dBc/30KHz (dBm)	Margin to IC Limit of 45 dBc/ 30KHz (dB)
	3Carrier IS856-16QAM	3Carrier	3Carrier
Ch 358, 399, 440 750KHz offset at lower side	-22.91	2.3	25.21
Ch 358, 399, 440 750KHz offset at upper side	-24.52	2.3	26.82
		Limit for 60 dBc/30KHz (dBm)	Margin to IC Limit of 60 dBc/ 30KHz (dB)
Ch 358, 399, 440 1.98MHz offset at lower side	-34.92	-12.7	22.22
Ch 358, 399, 440 1.98MHz offset at upper side	-35.85	-12.7	23.15

a. See Appendix E - Three Carriers IS-856 16QAM Spurious Emission

Frequency Stability

4.5.4 Frequency Stability Requirements

FCC Part 2.1055

(a) The frequency stability shall be measured with variation of ambient temperature as follows:

(1) From -30 to +50 centigrade for all equipment except that specified in subparagraphs (2) and (3) of this paragraph.

(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10 centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.

(d) The frequency stability shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.

(3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

(e) When deemed necessary, the Commission may require tests of frequency stability under conditions in addition to those specifically set out in paragraphs (a), (b), (c) and (d) of this section. (For example, measurements showing the effect of proximity to large metal objects, or of various types of antennas, may be required for portable equipment.)

FCC Part 22.355 Frequency Tolerance

The carrier frequency of each transmitter in the 821-896 MHz Frequency range, must be maintained within 1.5ppm tolerance, according to table C-1 of this section (22.355)

4.5.5 Test Procedure

The test equipment was configured as shown in figure 5.

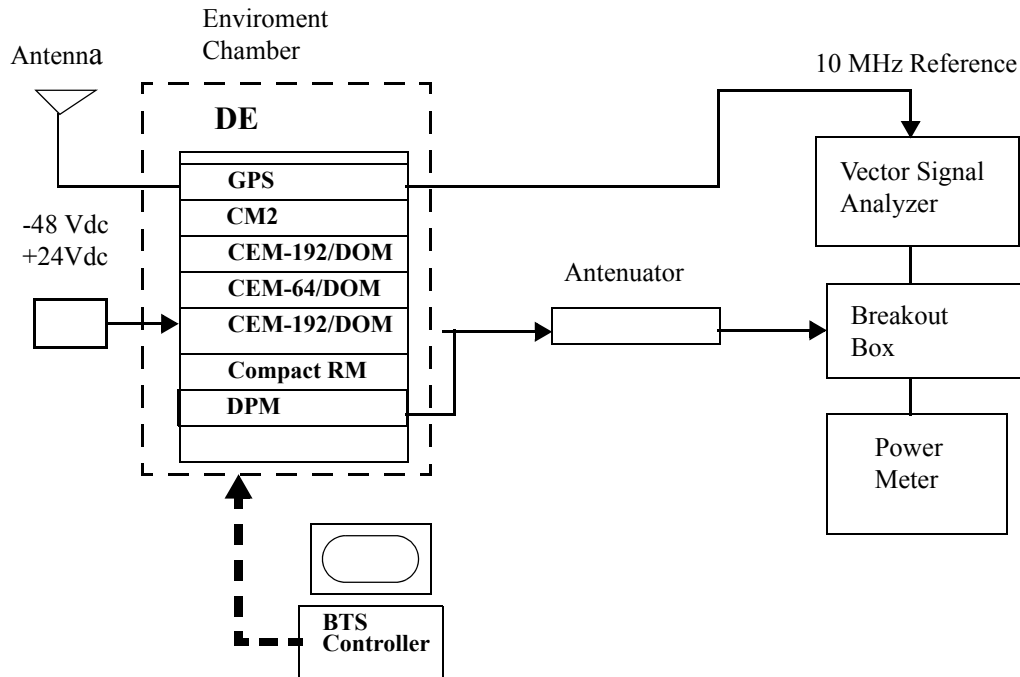


Figure 5 : Test configuration for Frequency Stability

4.5.6 Frequency Results

The frequency measured in this section is 881.97 MHz. Operating temperature for the cBTS 800 MHz Radio Module is from -5°C to +50°C. See Reference [7]

Table 35 : Test results for Frequency Stability versus Power supply Voltage

Voltage (Vdc)	Maximum Carrier Frequency Deviation (PPM)	Maximum Carrier Frequency Deviation (Hz)
40	0.005593	4.93
48 nominal	0.005959	5.26
56	0.006482	5.72
20	0.005335	4.71
24 nominal	0.007491	6.61
28	0.006781	5.98

Table 36 : Test results for Frequency Stability versus Temperature at -48V operation

Temperature (°C)	Maximum Carrier Frequency Deviation (PPM)	Maximum Carrier Frequency Deviation (Hz)
-5	0.005246	4.63
0	0.006923	6.11
10	0.005920	5.22
20	0.007764	6.85
30	0.004776	4.21
40	0.006290	5.55
50	0.006641	5.86

Table 37 : Test results for Frequency Stability versus Temperature at 24V operation

Temperature (°C)	Maximum Carrier Frequency Deviation (PPM)	Maximum Carrier Frequency Deviation (Hz)
-5	0.004364	3.85
0	0.007256	6.40
10	0.007321	6.46
20	0.007878	6.95
30	0.006267	5.53
40	0.006294	5.55
50	0.009294	8.20