Certification Test Report

CFR 47 FCC Part 22, Subpart H
CFR 47 FCC Part 2, Subpart J
Industry Canada RSS 129

Star Solutions iCell 1xRTT Indoor Compact BTS 800MHz

FCC ID # S52-1-07-00-00-1
IC ID # 8076A-10700001

Project Code CG-1243

Report CG-1243-RA-1-2
Revision: 2

(This report supersedes CG-1243-RA-1-1)

April 22, 2010

Prepared for:	Star Solutions
Author:	Daryl Therens Senior Test Specialist
Approved by:	Nick Kobrosly Director of Canadian Operations

Report Summary

Test Facility:	**National Technical Systems, Canada** Product Integrity Laboratory 5151-47th Street, NE Calgary Alberta T3J 3R2
Accreditation Numbers:	0214.22 Electrical 0214.23 Mechanical Accredited by A2LA The American Association for Laboratory Accreditation CLIENTS SERVED: All interested parties FIELDS OF TESTING: Electrical/Electronic, Mechanical/Physical ACCREDITATION DATE: May 14, 2009 VALID TO: December 31, 2011
Applicant:	Star Solutions 120 – 4600 Jacombs Road Richmond, BC, Canada V6V 3B1
Customer Representative:	Name: Azadeh Farzin Phone #: (604) 276-0055, x244 Email Address: azadeh.farzin@starsolutions.com

EUT Description[1]

EUT Description / Model	Manufacturer	Revision	Serial Number
iCell 1xRTT Indoor Compact BTS, Macro, 1F, Sector 1 Main, 800MHz, Fullband (3U Unit) 24246626GS	Star Solutions	A3	17MUY4CKEI1H
iCell Indoor Compact BTS, Macro, 1F, Sector 2/3, 800MHz FullBand (2, 2U Units) 24245903GS	Star Solutions	A3	17NMY4CKEI1L 17NMY4CKEI1K

[1] See section 2.1 for more detail.

Test Summary

Appendix	Test/Requirement Description	Deviations* from:			Pass / Fail	Applicable FCC Rule Parts	Applicable Industry Canada Rule Parts
		Base Standard	Test Basis	NTS Procedure			
A	RF Power Output	No	No	No	PASS	FCC 2.1046, 22.913,	RSS-129[2], 9.1, 9.2.3
B	Occupied Bandwidth (26dB emission bandwidth)	No	No	No	PASS	FCC 2.1049, 22.917,	N/A
B	Occupied Bandwidth (99% emission bandwidth)	No	No	No	PASS	N/A	RSS-Gen[3], 4.6.1
C	Conducted Spurious Emissions - Band Edge	No	No	No	PASS	FCC 2.1051, 22.917,	RSS-129, 8.1.2
C	Unwanted Emissions (offset frequencies > ± 750 kHz and > ± 1.98 MHz)	No	No	No	PASS	N/A	RSS-129, 8.1.2
C	Conducted Spurious Emissions	No	No	No	PASS	FCC 2.1051, 22.917,	RSS-129, 8.1.2
C	Receiver Spurious Emissions	No	No	No	PASS	N/A	RSS-129, 10
D	TX Frequency Stability	No	No	No	PASS	FCC 2.1055, 22.355,	RSS-129, 9.2.1
E	Field Strength of Spurious Emissions	No	No	No	PASS	FCC 2.1053, 22.917,	RSS-Gen, RSS-129, 10

Test Result: The product presented for testing complied with test requirements as shown above.

Prepared By: Daryl Therens 2010.04.22 14:15:44 -06'00'

Daryl Therens
Senior Test Specialist

Reviewed By: Digitally signed by Deniz Demirci
Date: 2010.04.22 14:27:06 -06'00'

Deniz Demirci
Senior Wireless / EMC Technologist

Approved By: Alex Mathews 2010.04.22 14:26:08 -06'00'

Alex Mathews
Quality Management Representative

[2] RSS-129, Issue 2, September 25, 1999
[3] RSS-Gen, Issue 2, June, 2007

Table of Contents

Register of Revisions

Revision	Date	Description of Revisions
1	April 21, 2010	Initial release to client for review
2	April 22, 2010	Updated after client review

1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this document is to describe the tests applied by NTS Canada to demonstrate compliance of the iCell 1xRTT Indoor Compact BTS, 800MHz, Fullband from Star Solutions to FCC Part 22 Subpart H, FCC Part 2 Subpart J, and equivalent sections of Industry Canada's RSS-129, RSS-Gen.

The configuration tested is the worst case and covers off all product configurations.

2.0 EUT DESCRIPTION

2.1 CONFIGURATION

	Name / Model	Revision	Serial Number
EUT	iCell 1xRTT Indoor Compact BTS, Macro, 1F, Sector 1 Main, 800MHz, Fullband (3U Unit) 24246626GS[4]	A3	17MUY4CKEI1H
	iCell Indoor Compact BTS, Macro, 1F, Sector 2/3, 800MHz FullBand (2, 2U Units) 24245903GS	A3	17NMY4CKEI1L 17NMY4CKEI1K
Classification	Base-station		
Modulation	1xRTT		
Frequency Range	See section 2.4		
Size	13.33 cm High x 48.26 cm Wide x 60.96 cm Deep		
Weight	25kg		
General Functional Description	The Compact BTS is a part of Star Solutions end-to-end all IP-based wireless communication solution providing the mobility and media in a packet-based environment. The Main 3U-high Assembly contains all the components required for 1 sector operation. The main unit also supports the addition of 2 more sector units. Each sector unit comes in a 2U-high rack mounted chassis. The transmitter section of the Main 3U assembly and the 2U assembly is identical.		

2.2 EUT POWER

Voltage	110 – 240 VAC, 50 / 60 Hz
Number of Feeds	1, 3-wire AC power cable (line, neutral, ground), #14 AWG
Power Consumption	450 watts for the Main 3U Assembly

[4] All conducted testing in this report was performed on the 3U unit. The transmitter section of the Main 3U assembly and the 2U assembly is identical. The configuration tested is the worst case and covers off all product configurations.

2.3 EUT CABLING

Item	Routing		Description	Length
	From	To		
1	EUT	Attenuator/ Load	Sucoflex RF Cable for Main Ant. Port (1xRTT)	3m
2	EUT	GPS Splitter	LMR400 RF Cable for GPS Port	8m
3	EUT	Earth Ground	#2 AWG Ground Cable	10m

2.4 FREQUENCIES

The following table lists the lowest and highest supported channels of the Compact BTS.

ACS Type (duplexer)	Lowest Supported Channel	Highest Supported Channel
Fullband	1015	775

The following table lists the channels tested that meet the FCC Part 22.917 -13dBm limit at the applicable band / block edges.

ACS Type	Tested Channel Number (Block)	Frequency (MHz)	Applicable Band / Block Edge and Frequency (MHz)
Fullband	1015 (A")	869.76	Lower Band A" edge (869 MHz)
	308 (A)	879.24	Upper Block A edge (880 MHz)
	358 (B)	880.74	Lower Block B edge (880 MHz)
	642 (B)	889.26	Upper Block B edge (890 MHz)
	691 (A')	890.73	Lower Block A' edge (890 MHz)
	692 (A')	890.76	Upper Block A' edge (891.5 MHz)
	741 (B')	892.23	Lower Block B' edge (891.5 MHz)
	775 (B')	893.25	Upper Band B' edge (894 MHz)

3.0 TEST ENVIRONMENT

3.1 NORMAL TEST CONDITIONS

Temperature:	20 – 23 °C
Relative Humidity:	28 – 35 %
Atmospheric pressure:	883 – 890 mbar
Nominal test voltage:	120 VAC, 60 Hz

APPENDICES

APPENDIX A: POWER OUTPUT

A.1. Base Standard & Test Basis

Base Standard	FCC Part 22.913; IC RSS-129, 9.1, 9.2.3
Test Basis	FCC 2.1046
Test Method	TIA/EIA 603

A.2. Specifications

FCC Part 2.1046

(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.

A.3. FCC Limit

FCC Part 22.913

The effective radiated power (ERP) of transmitters in the Cellular Radiotelephone Service must not exceed the limits in this section.

(a) Maximum ERP. In general, the effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts. However, for those systems operating in areas more than 72 km (45 miles) from international borders that:

2) Extend coverage on a secondary basis into cellular unserved areas, as those areas are defined in 22.949, the ERP of base transmitters and cellular repeaters of such systems must not exceed 1000 Watts. The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

A.4. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

A.5. Test Method

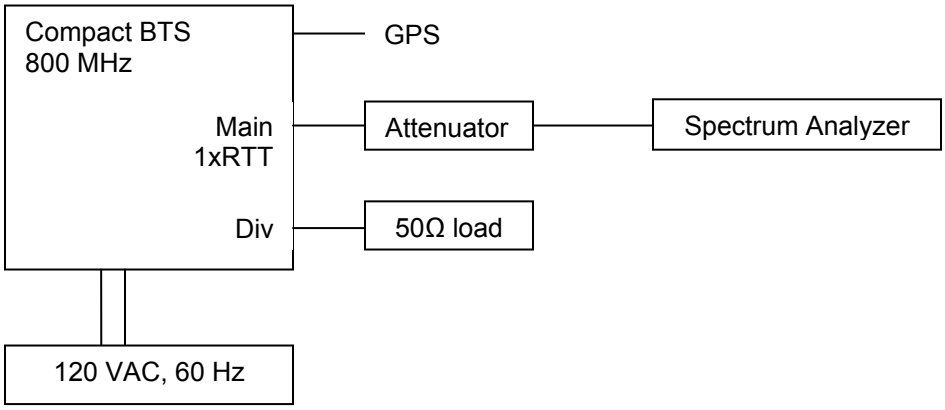
The EUT was setup via a PC and Star Solutions software to transmit at maximum power in 1xRTT mode, at the low, middle, and high ends of the frequency bands supported. The RF output power was measured using the spectrum analyzer with a maximum peak detector.

The Compact BTS utilizes a fullband duplexer.

A.6. Test Setup

The set-up used for the RF output power test is illustrated below. RF output power measurements were referenced to the Sector 1 main antenna port. The diversity antenna port was terminated into a 50Ω load.

Figure 1: Power Output Setup



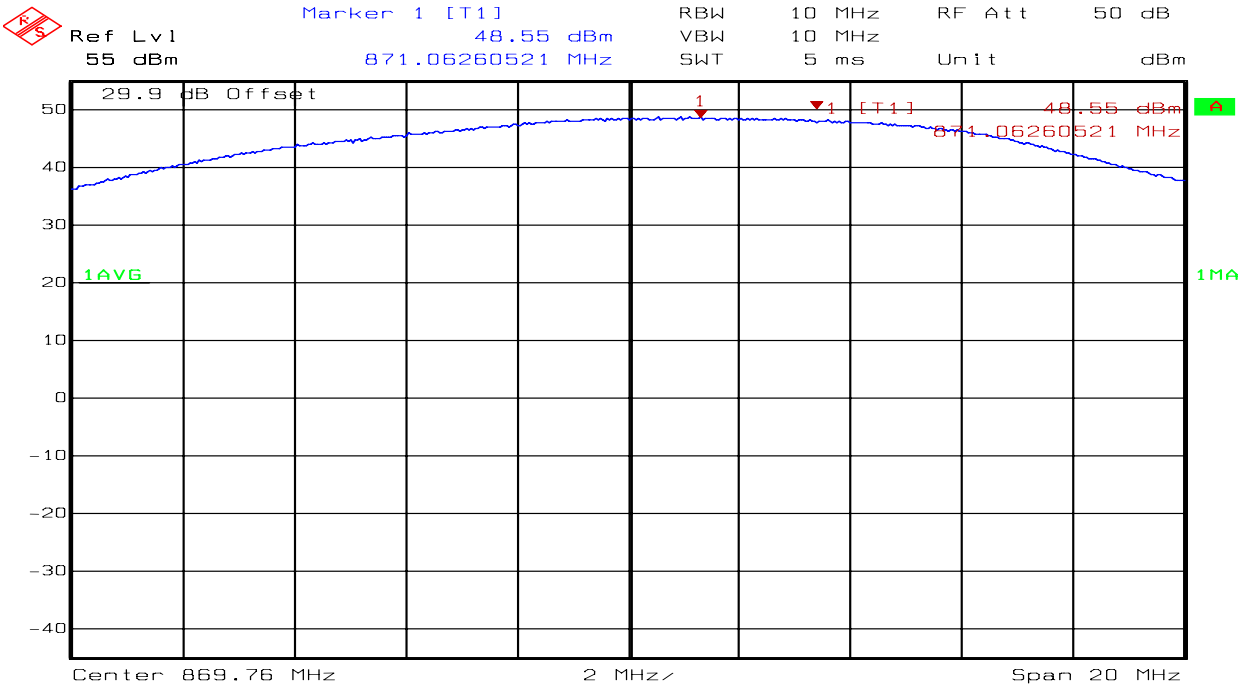
A.7. Test Results

Table 1: 1xRTT RF Power Output

ACS Type	Channel Number (Block)	Modulation	Frequency (MHz)	Measured Peak RF Output Power (dBm)
Fullband	1015 (A")	1xRTT	869.76	48.55
	500 (B)	1xRTT	885	48.41
	775 (B')	1xRTT	893.25	47.91

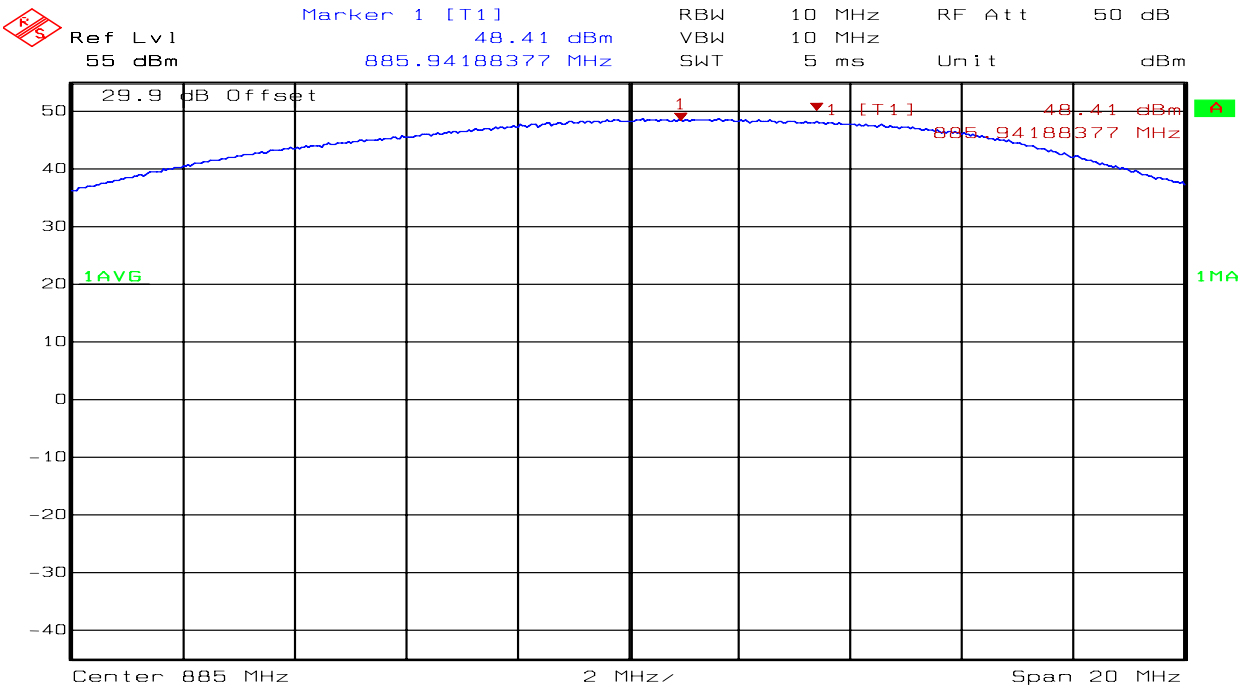
Note: All final reported values are corrected values.

Figure 2: 1xRTT RF Power, Channel 1015



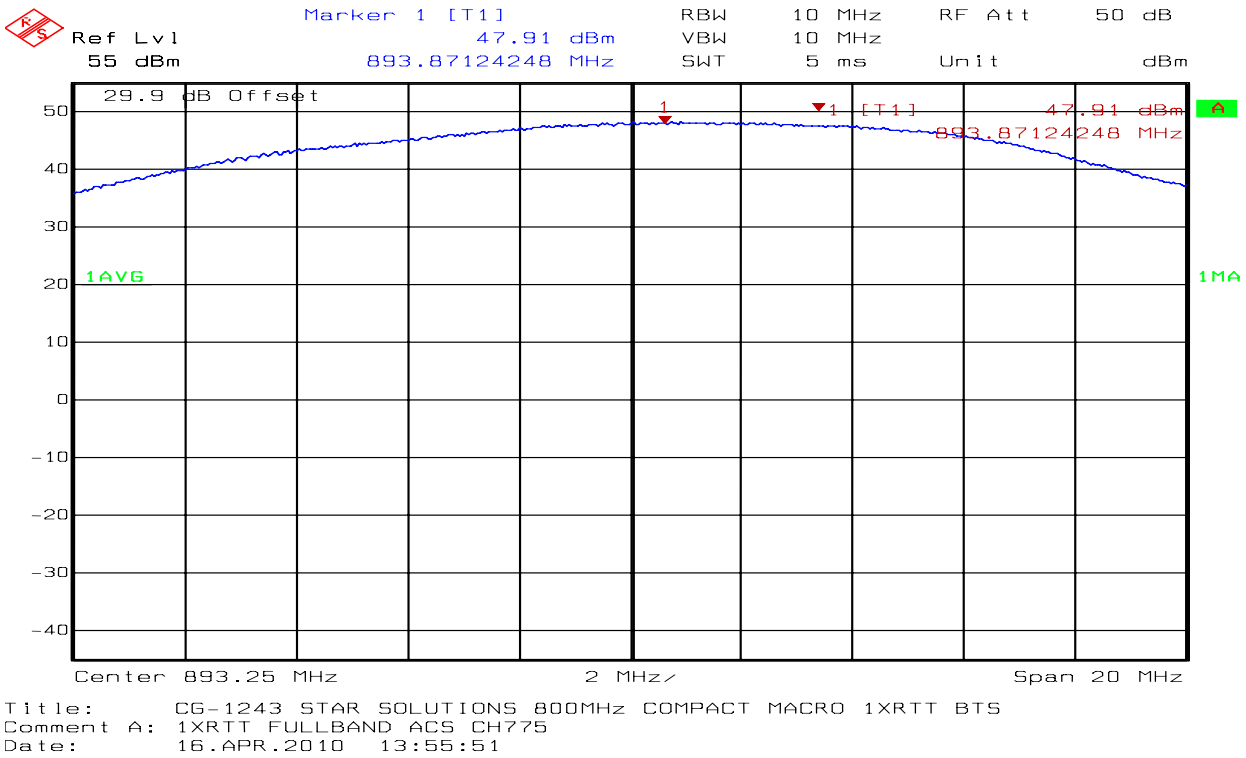
Title: CG-1243 STAR SOLUTIONS 800MHz COMPACT MACRO 1XRTT BTS
Comment A: 1XRTT FULLBAND ACS CH1015
Date: 16.APR.2010 12:45:09

Figure 3: 1xRTT RF Power, Channel 500



Title: CG-1243 STAR SOLUTIONS 800MHz COMPACT MACRO 1XRTT BTS
Comment A: 1XRTT FULLBAND ACS CH500
Date: 16.APR.2010 13:14:08

Figure 4: 1xRTT RF Power, Channel 775



A.8. Tested By

This testing was conducted in accordance with the ISO 17025:2005 scope of accreditation, table 1; Quality Manual.

Name: Daryl Therens
Senior Test Specialist

A.9. Test Dates

Test Start: April 16, 2010
Test Complete: April 16, 2010

APPENDIX B: OCCUPIED BANDWIDTH

B.1. Base Standard & Test Basis

Base Standard	FCC Part 22.917; IC RSS-Gen, 4.6.1
Test Basis	FCC PART 2.1049; IC RSS-Gen, 4.6.1
Test Method	FCC PART 2.1049 / 22.917; IC RSS-Gen, 4.6.1

B.2. Specifications

FCC Part 2.1049

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:

(g) Transmitters 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 the discretion of the user.

B.3. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

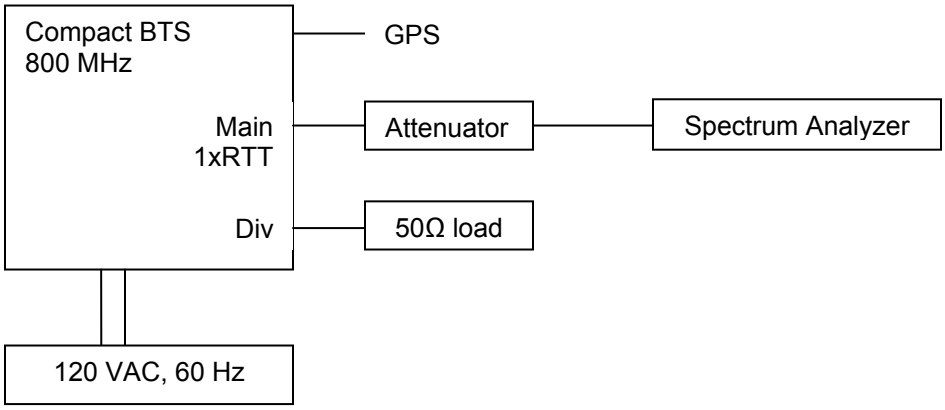
B.4. Test Method

The EUT was setup via a PC and Star Solutions software to transmit at maximum power in 1xRTT mode. Industry Canada occupied bandwidth was measured using the 99% channel power feature of the spectrum analyzer. A maximum peak detector was used for all measurements. Occupied bandwidth measurements were performed on Sector 1 main antenna port for 1xRTT measurements. The diversity antenna port was terminated into a 50Ω load.

B.5. Test Setup

The test setup for Occupied BW is as illustrated below.

Figure 5: Occupied BW Setup



B.6. Test Results

To reduce the number of Figures, only a typical maximum plot for the IC and FCC methods are shown.

Table 2: IC 1xRTT Occupied BW

ACS Type	Channel Number (Block)	Modulation	Frequency (MHz)	IC 99% Occupied BW (MHz)
Fullband	1015 (A")	1xRTT	869.76	1.28
	500 (B)	1xRTT	885	1.29
	775 (B')	1xRTT	893.25	1.29

Table 3: FCC 1xRTT Occupied BW

ACS Type	Channel Number (Block)	Modulation	Frequency (MHz)	FCC 26dB Occupied BW (MHz)
Fullband	1015 (A")	1xRTT	869.76	1.29
	500 (B)	1xRTT	885	1.29
	775 (B')	1xRTT	893.25	1.29

Figure 6: 1xRTT IC 99% Occupied BW, Channel 500

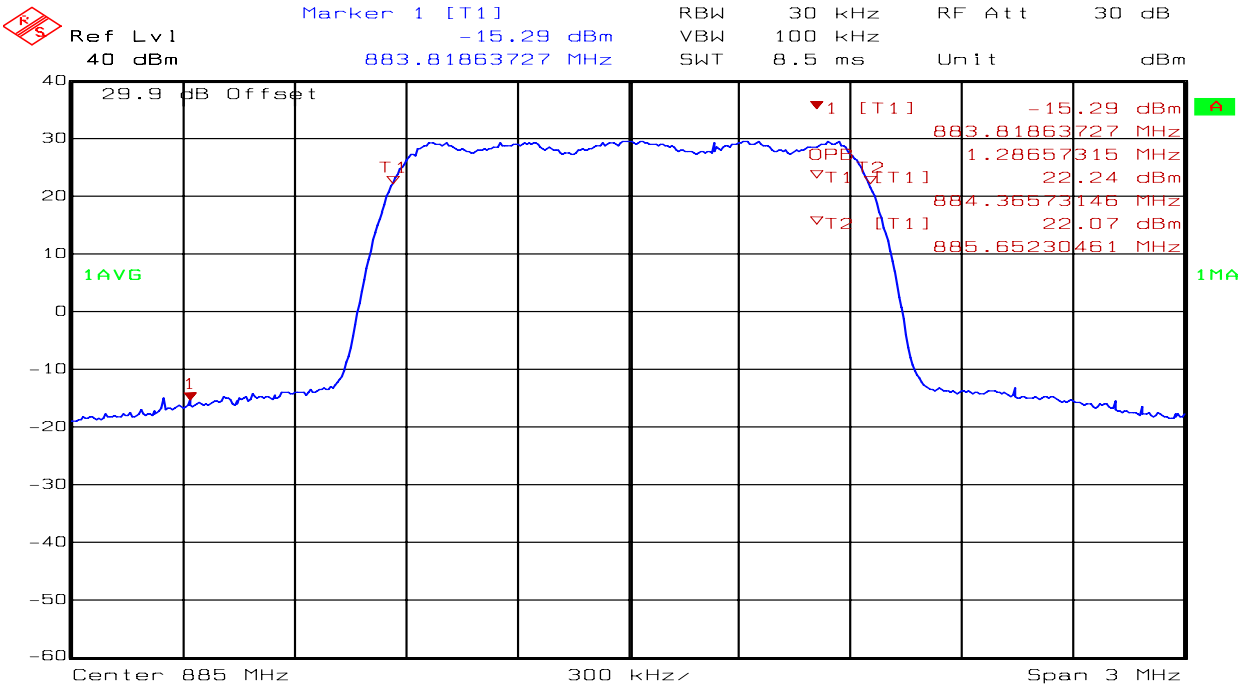
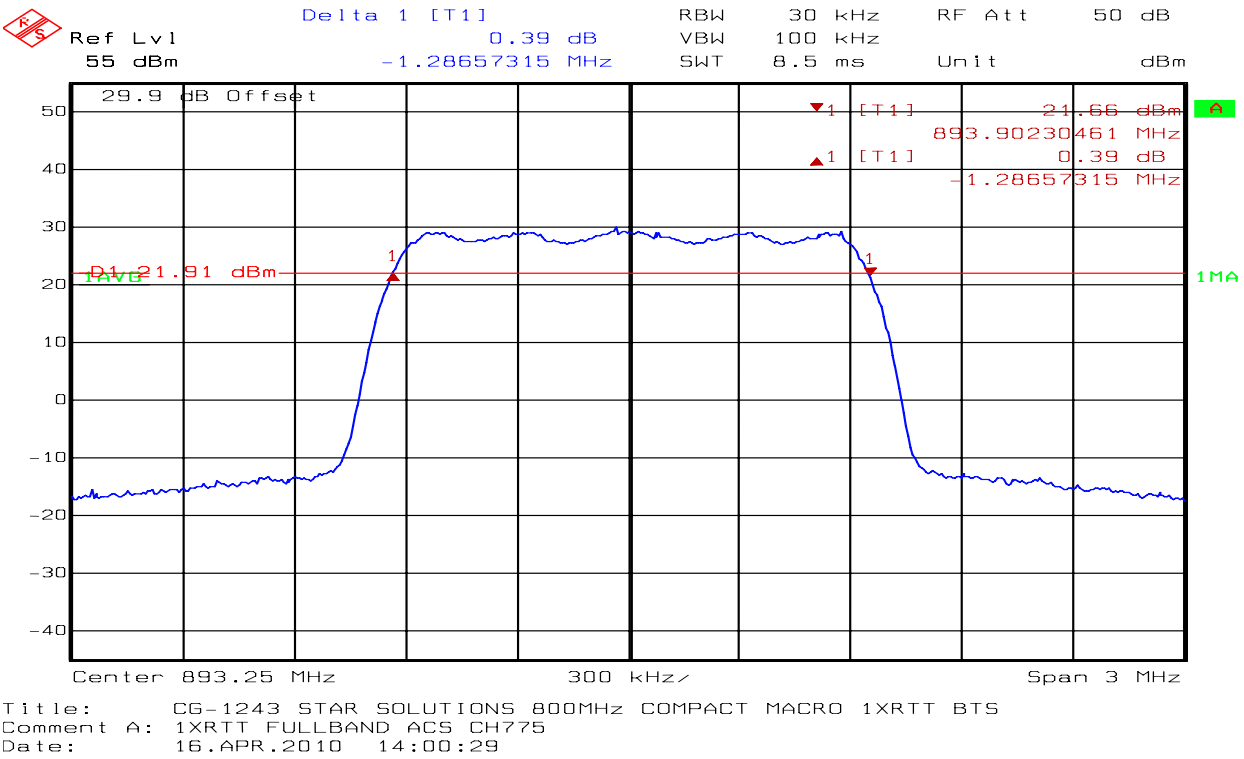


Figure 7: 1xRTT FCC 26dB Occupied BW, Channel 775



B.7. Tested By

This testing was conducted in accordance with the ISO 17025:2005 scope of accreditation, table 1; Quality Manual.

Name: Daryl Therens
Senior Test Specialist

B.8. Test Dates

Test Start: April 16, 2010
Test Complete: April 16, 2010

APPENDIX C: CONDUCTED SPURIOUS EMISSIONS

C.1. Base Standard & Test Basis

Base Standard	FCC Part 2.1051, 22.917; IC RSS-129, 8.1.2, 10
Test Basis	FCC 2.1051; IC RSS-129, 8.1.2, 10
Test Method	FCC 2.1051; IC RSS-129, 8.1.2, 10

C.2. Specifications

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

(a) In all of the measurements set forth in 2.1051 and 2.1053, the spectrum shall be investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to at least the frequency shown below:

(1) If the equipment operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

(2) If the equipment operates at or above 10 GHz and below 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 100 GHz, whichever is lower.

(3) If the equipment operates at or above 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 200 GHz, whichever is lower.

(b) Particular attention should be paid to harmonics and subharmonics of the carrier frequency as well as to those frequencies removed from the carrier by multiples of the oscillator frequency. Radiation at the frequencies of multiplier stages should also be checked.

(c) The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be reported.

(d) Unless otherwise specified, measurements above 40 GHz shall be performed using a minimum resolution bandwidth of 1 MHz.

FCC Part 22.917 Limit

The rules in this section govern the spectral characteristics of emissions in the Cellular Radiotelephone Service.

(a) 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.

(b) 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.

IC RSS-129, 8.1.2

(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.

(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 Log10 (mean output power in watts) or 70, dB, whichever is the less stringent.

IC RSS-129, 10

(a) No spurious output signals appearing at the antenna terminals shall exceed 2 nanowatts per any 4 kHz spurious frequency in the band 30-1000 MHz or 5 nanowatts above 1 GHz.

C.3. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

C.4. Test Procedure

The EUT was setup via a PC and Star Solutions software to transmit at maximum power in 1xRTT mode. Measurements were made in 1xRTT at all Band / Block Edges of the frequency band supported. Spurious emission measurements were performed on Sector 1 main antenna port for 1xRTT measurements. The diversity antenna port was terminated into a 50Ω load.

The following spectrum analyzer settings were used for the measurement of the antenna port spurious emissions:

15 kHz adjacent to frequency band / block

Channel Power Function

Channel Bandwidth: 15 kHz

Resolution Bandwidth: 1 kHz

Video Bandwidth: 3 kHz

Trace Average: 10 Averages

Detector: Maximum Peak

Span: 30 kHz

Attenuation: 30 dB

Ref. Level: 40 dBm

Ref. Level Offset: Set according to cable/attenuator loss

1 MHz adjacent to frequency band / block

Resolution Bandwidth: 20 kHz

Video Bandwidth: 100 kHz

Trace Average: 100 Averages

Detector: Maximum Peak

Span: 5 MHz

Attenuation: 30 dB

Ref. Level: 40 dBm

Ref. Level Offset: Set according to cable/attenuator loss

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

All other Spurious Emissions up to 10 GHz

Resolution Bandwidth: 1 MHz

Video Bandwidth: 3 MHz

Detector: Maximum Peak

Span: Auto-coupled

Attenuation: Auto-coupled

Ref. Level: Auto-coupled

Ref. Level Offset: Auto-coupled

Calibrated cables and attenuators were used (losses to 10GHz). The calibrated loss is the reference level offset on the spectrum analyzer.

Offset Frequencies > ± 750 kHz and > ± 1.98 MHz from CDMA Center Frequency

Resolution Bandwidth: 30 kHz

Video Bandwidth: 100 kHz

Trace Average: 100 Averages

Detector: Maximum Peak

Span: 5 MHz

Attenuation: 30 dB

Ref. Level: 40 dBm

Ref. Level Offset: Set according to cable/attenuator loss

Receiver Spurious Emissions 30-1000 MHz and 1-3 GHz

Resolution Bandwidth: 5 kHz

Video Bandwidth: 20 kHz

Detector: Maximum Peak

Span: Auto-coupled

Attenuation: Auto-coupled

Ref. Level: Auto-coupled

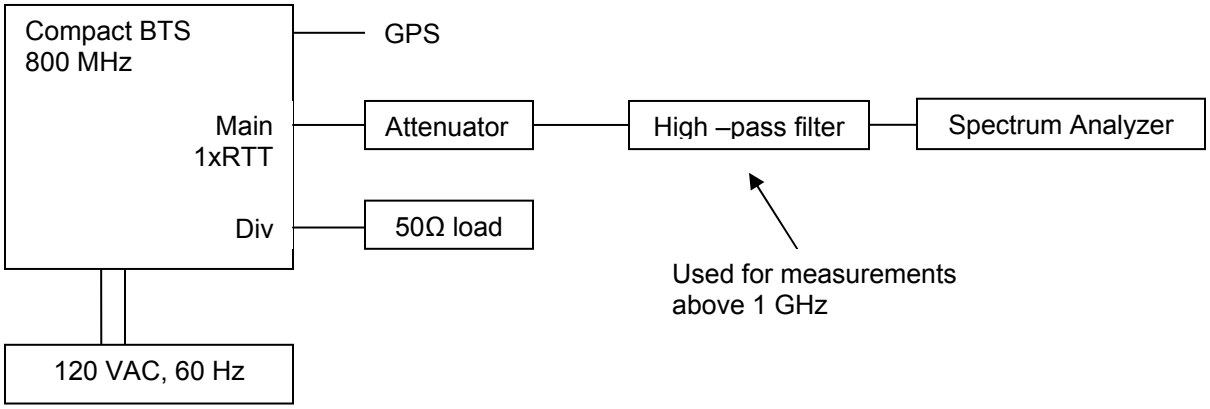
Ref. Level Offset: Auto-coupled

Calibrated cables were used (losses to 10GHz). The calibrated loss is the reference level offset on the spectrum analyzer.

C.5. Test Setup

The test setup for conducted spurious emissions is as shown in the figure below.

Figure 8: Conducted Spurious Emission Setup



C.6. Test Results

The documentation for the Compact BTS 800 MHz states the following lowest and highest RF channels are supported.

Table 4: ACS Supported Channels

ACS Type	Lowest Supported Channel	Highest Supported Channel
Fullband	1015	775

The frequency spectrum from 4 MHz to 10 GHz was scanned for emissions using the spectrum analyzer settings outlined in the test procedure.

The tables below shows the spurious emissions at the antenna port of the Compact BTS in 1xRTT mode.

To reduce the number of Figures not all plots are shown.

To reduce the number of Figures, only the worst case plots for 2nd and 3rd harmonics, and 4MHz to 1GHz are shown.

The Compact BTS complies with the limit of -13 dBm.

The Compact BTS complies with the 45 dBc and 60 dBc limits at offset frequencies greater than 750 kHz and 1.98 MHz from the CDMA center frequency.

The Compact BTS complies with the receiver spurious emissions limits of 2 and 5 nanowatts (-57 dBm and -53 dBm respectively).

Table 5: Unwanted Emissions, 750 kHz and 1.98 MHz Offset Frequencies, 1xRTT Mode

ACS Type	Channel Number (Block)	Modulation	Frequency (MHz)	Offset from CDMA Center Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin (dB)
Fullband	1015 (A")	1xRTT	869 .76	- 0.750	53.96	45	8.96
	1015 (A")	1xRTT	869 .76	- 1.98	71.32	60	11.32
	1015 (A")	1xRTT	869 .76	+ 0.750	48.03	45	3.03
	1015 (A")	1xRTT	869 .76	+ 1.98	68.56	60	8.56
	500 (B)	1xRTT	885	- 0.750	53.47	45	8.47
	500 (B)	1xRTT	885	- 1.98	70.42	60	10.42
	500 (B)	1xRTT	885	+ 0.750	48.43	45	3.43
	500 (B)	1xRTT	885	+ 1.98	69.86	60	9.86
	775 (B')	1xRTT	893.25	- 0.750	52.75	45	7.75
	775 (B')	1xRTT	893.25	- 1.98	68.87	60	8.87
	775 (B')	1xRTT	893.25	+ 0.750	48.3	45	3.3
	775 (B')	1xRTT	893.25	+ 1.98	68.97	60	8.97

Table 6: Conducted Spurious Emissions at Antenna Ports, 1xRTT Mode

ACS Type	Channel Number (Block)	Modulation	Comment	Emission Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)
Fullband	1015 (A")	1xRTT	A" Lower Band Edge	869 to 868.985	-16.5	-13	3.5
	775 (B')	1xRTT	B' Upper Band Edge	894 to 894.015	-16.95	-13	3.95
	1015 (A")	1xRTT	2nd harmonic	1739.47896	-28.61	-13	15.61
	1015 (A")	1xRTT	3rd harmonic	2605.21042	-22.47	-13	9.47
	500 (B)	1xRTT	2nd harmonic	1757.51503	-30.02	-13	17.02
	500 (B)	1xRTT	3rd harmonic	2641.28257	-23.93	-13	10.93
	775 (B')	1xRTT	2nd harmonic	1775.55110	-31.22	-13	18.22
	775 (B')	1xRTT	3rd harmonic	2677.35471	-27.28	-13	14.28
	500 (B)	1xRTT	Receiver spurious	30-1000	-74	-57	17
	500 (B)	1xRTT	Receiver spurious	1000-3000	-72	-53	19

Note: All final reported values are corrected values.

Figure 9: 1xRTT, Unwanted Emissions, 750kHz/1.98MHz Offset Frequencies, CH1015

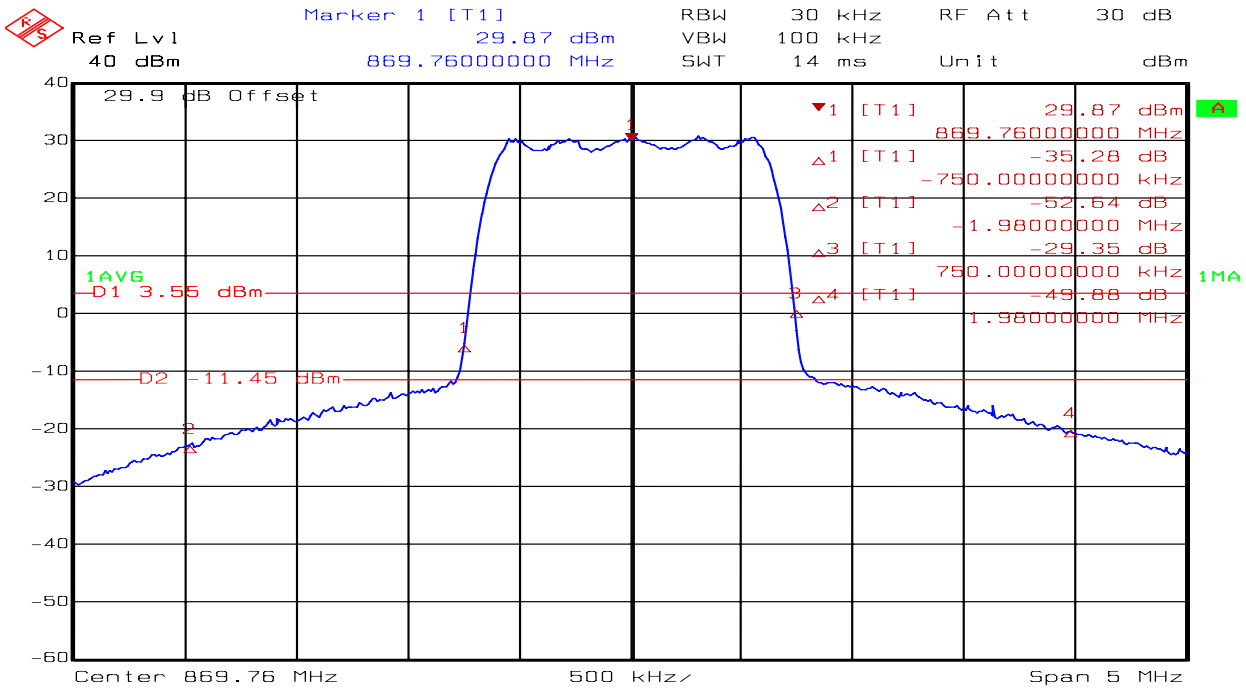


Figure 10: 1xRTT, Unwanted Emissions, 750kHz/1.98MHz Offset Frequencies, CH500

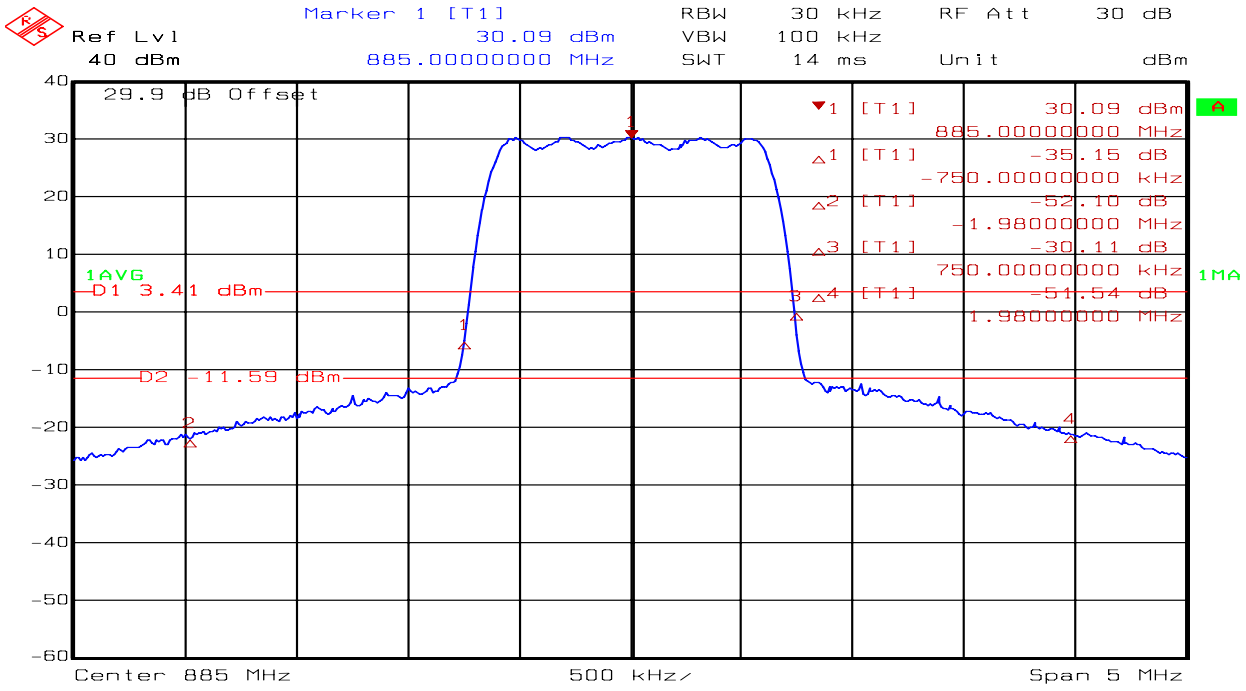
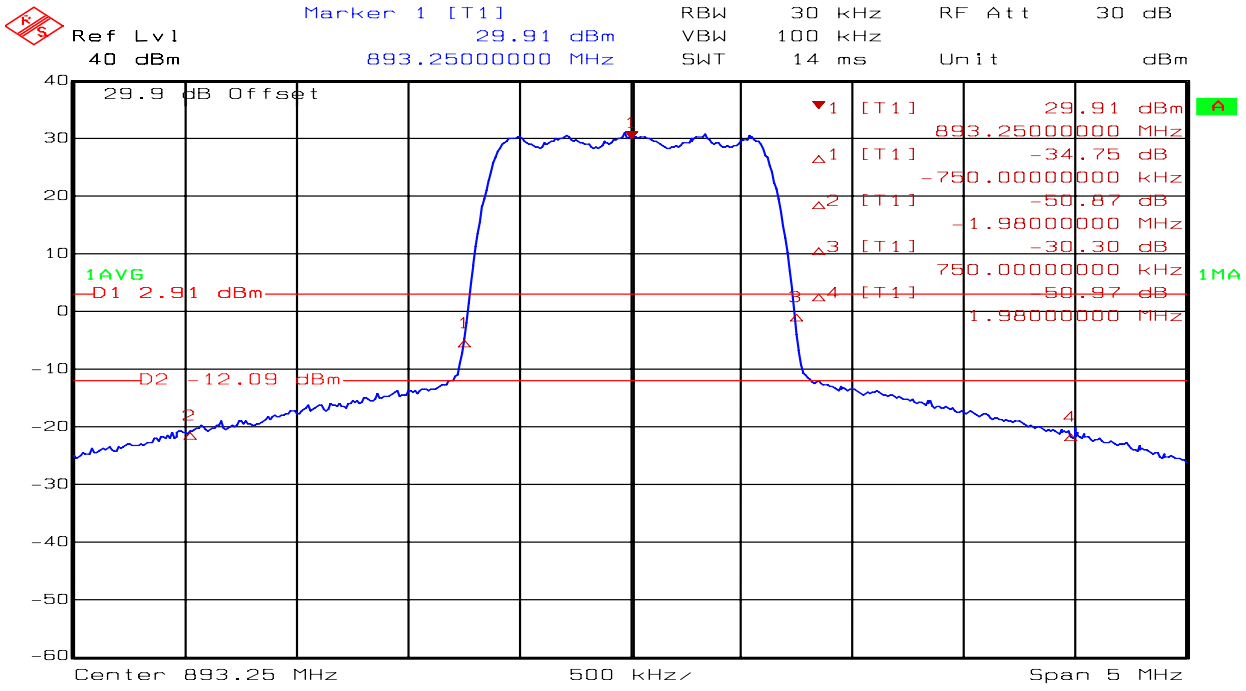
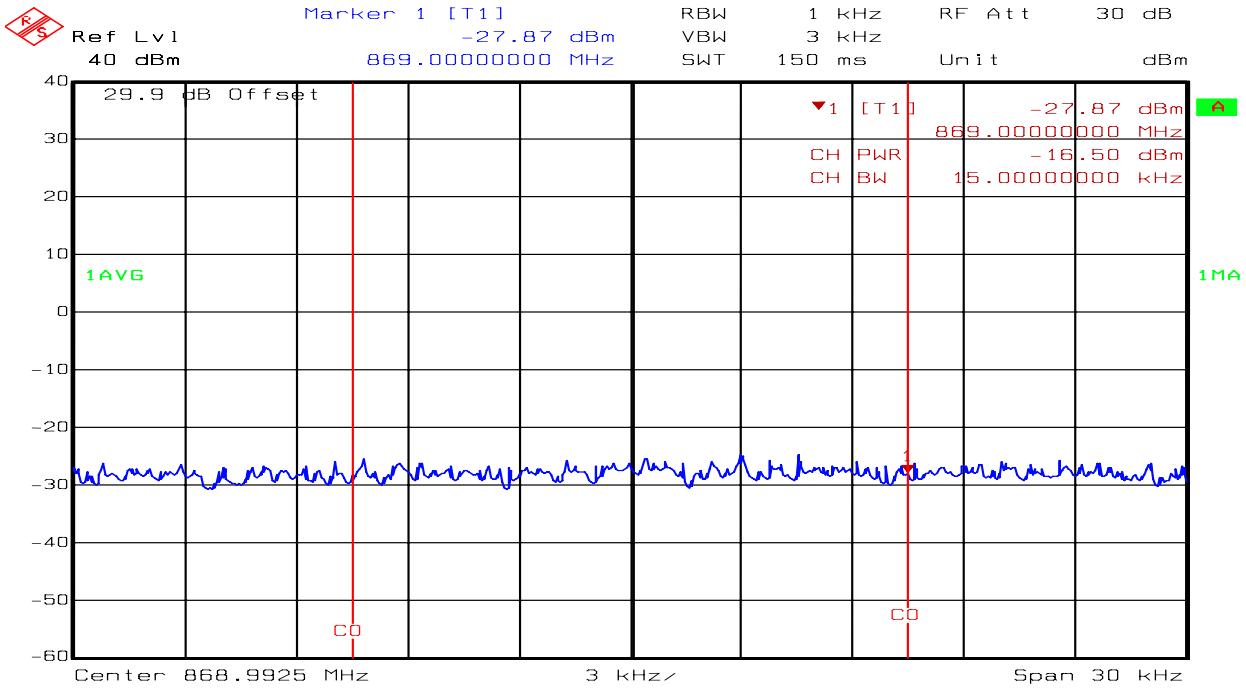


Figure 11: 1xRTT, Unwanted Emissions, 750kHz/1.98MHz Offset Frequencies, CH775



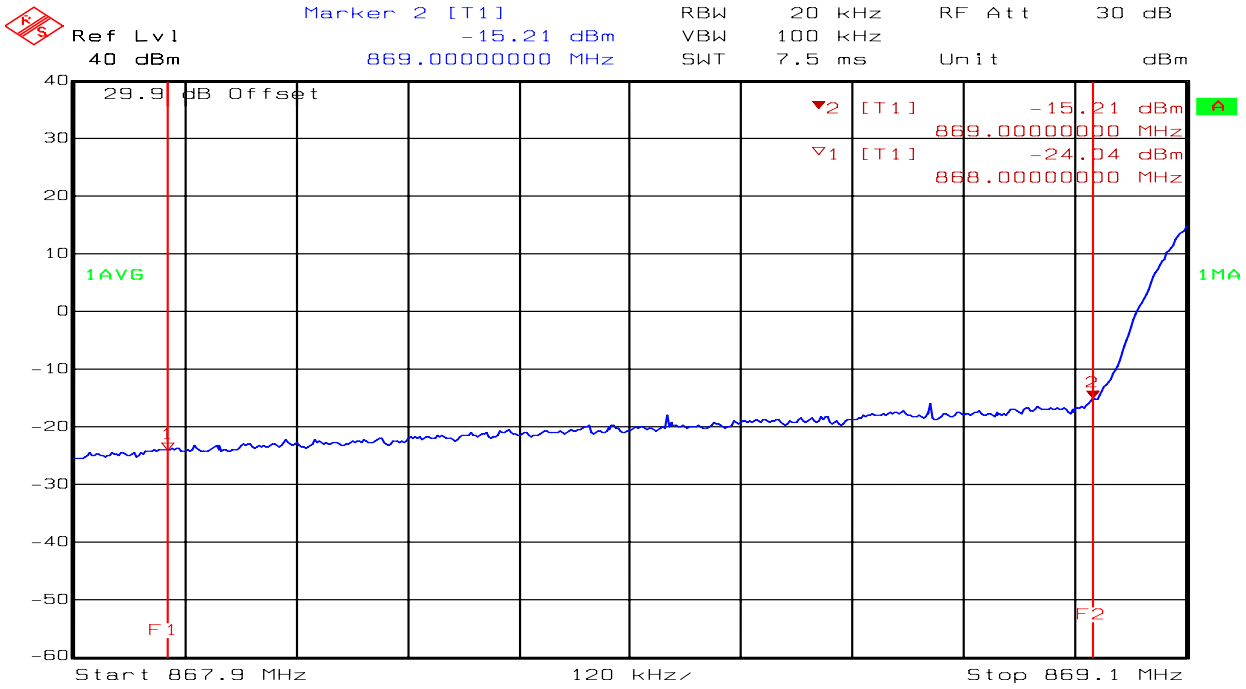
Title: CG-1243 STAR SOLUTIONS 800MHz COMPACT MACRO 1XRTT BTS
Comment A: 1XRTT FULLBAND ACS CH775
Date: 19.APR.2010 10:56:52

Figure 12: 1xRTT, A" Lower Band Edge, Fullband ACS, CH1015, Adjacent 15kHz



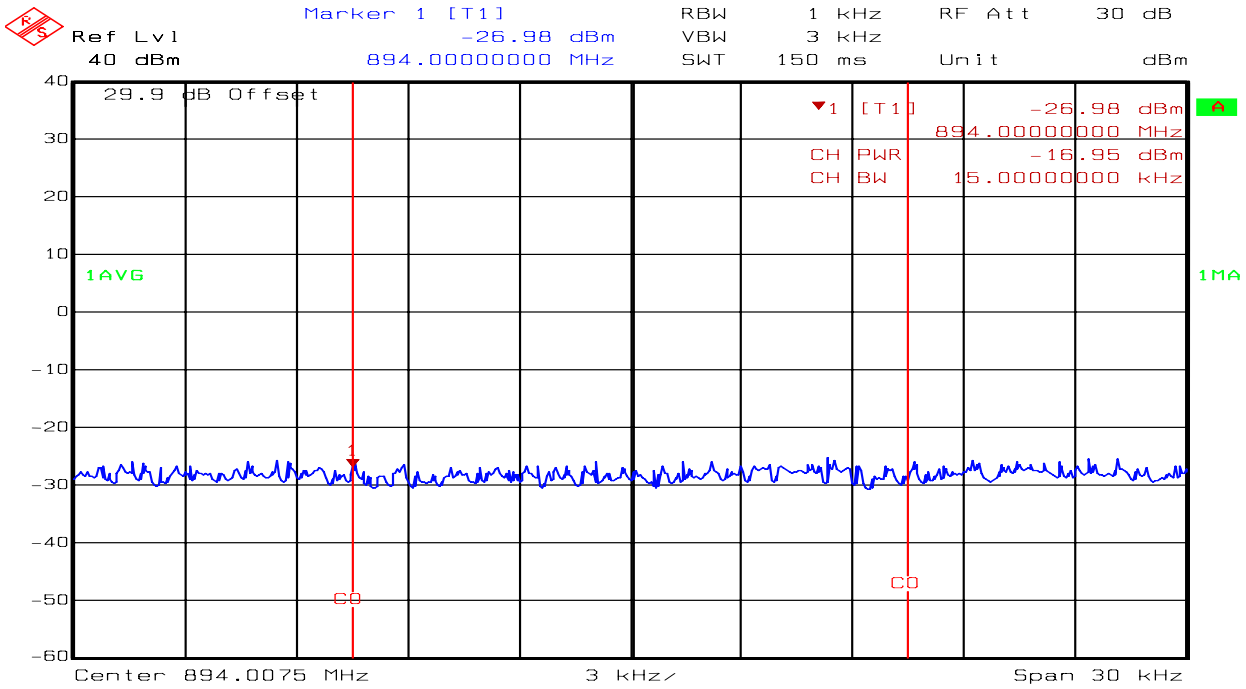
Title: CG-1243 STAR SOLUTIONS 800MHz COMPACT MACRO 1XRTT BTS
Comment A: 1XRTT FULLBAND ACS CH1015
Date: 19.APR.2010 8:01:58

Figure 13: 1xRTT, A" Lower Band Edge, Fullband ACS, CH1015, Adjacent 1MHz



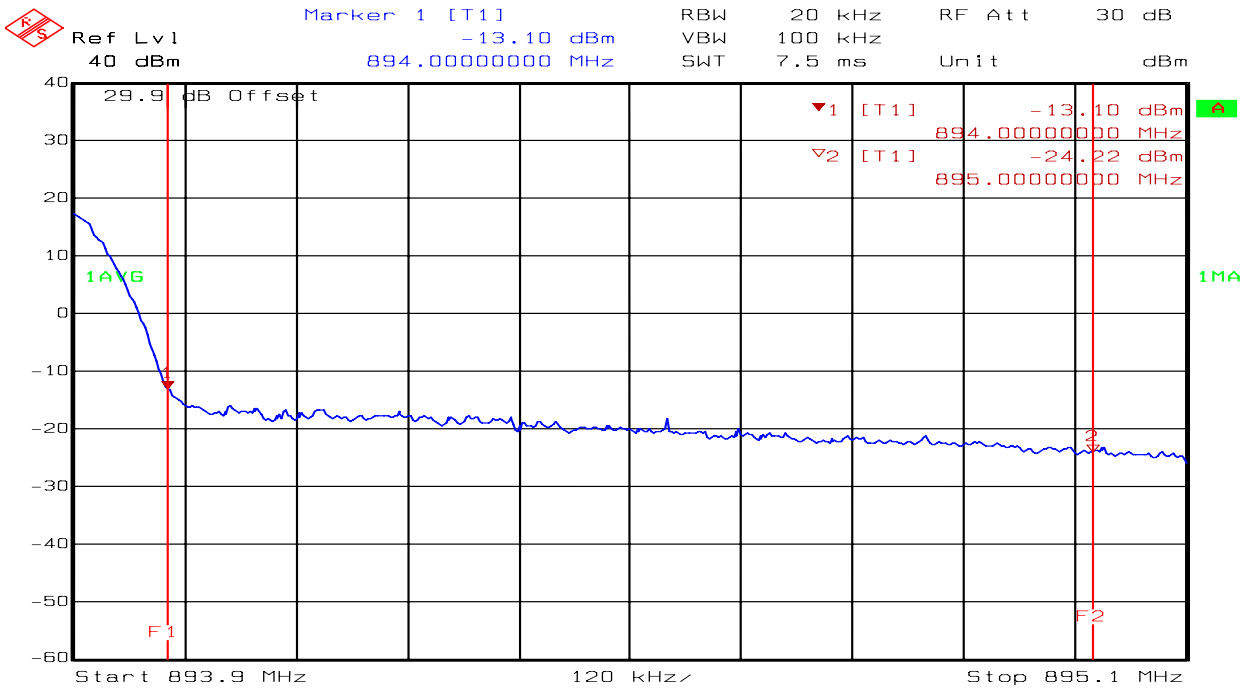
Title: CG-1243 STAR SOLUTIONS 800MHz COMPACT MACRO 1XRTT BTS
Comment A: 1XRTT FULLBAND ACS CH1015
Date: 20.APR.2010 7:32:23

Figure 14: 1xRTT, B' Upper Band Edge, Fullband ACS, CH775, Adjacent 15kHz



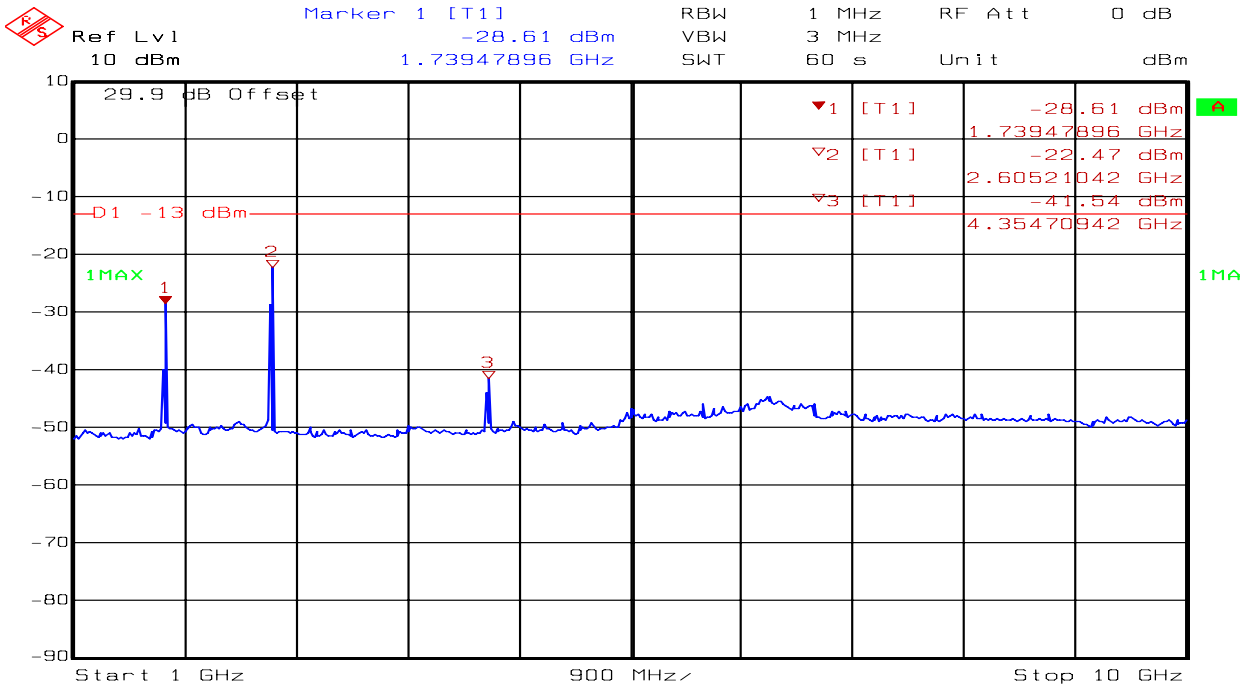
Title: CG-1243 STAR SOLUTIONS 800MHz COMPACT MACRO 1XRTT BTS
Comment A: 1XRTT FULLBAND ACS CH775
Date: 19.APR.2010 8:48:44

Figure 15: 1xRTT, B' Upper Band Edge, Fullband ACS, CH775, Adjacent 1MHz



Title: CG-1243 STAR SOLUTIONS 800MHz COMPACT MACRO 1XRTT BTS
Comment A: 1XRTT FULLBAND ACS CH775
Date: 20.APR.2010 7:22:30

Figure 16: 1xRTT, 1GHz – 10GHz, CH1015, 2nd and 3rd Harmonic



Title: CG-1243 STAR SOLUTIONS 800MHz COMPACT MACRO 1XRTT BTS
Comment A: 1XRTT FULLBAND ACS CH1015
Date: 19.APR.2010 11:51:51

Figure 17: 1xRTT, 4MHz – 1GHz, CH1015

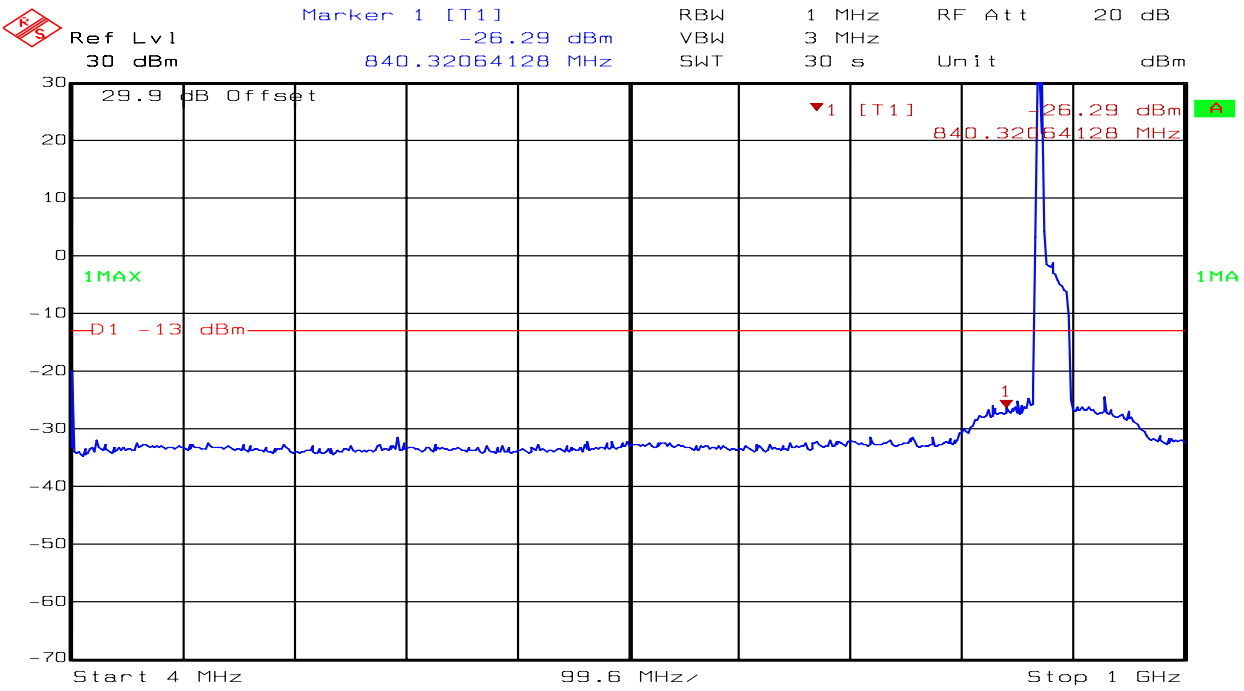


Figure 18: 1xRTT, Receiver Spurious Emissions, 30-1000MHz, CH500, MAIN Antenna Port

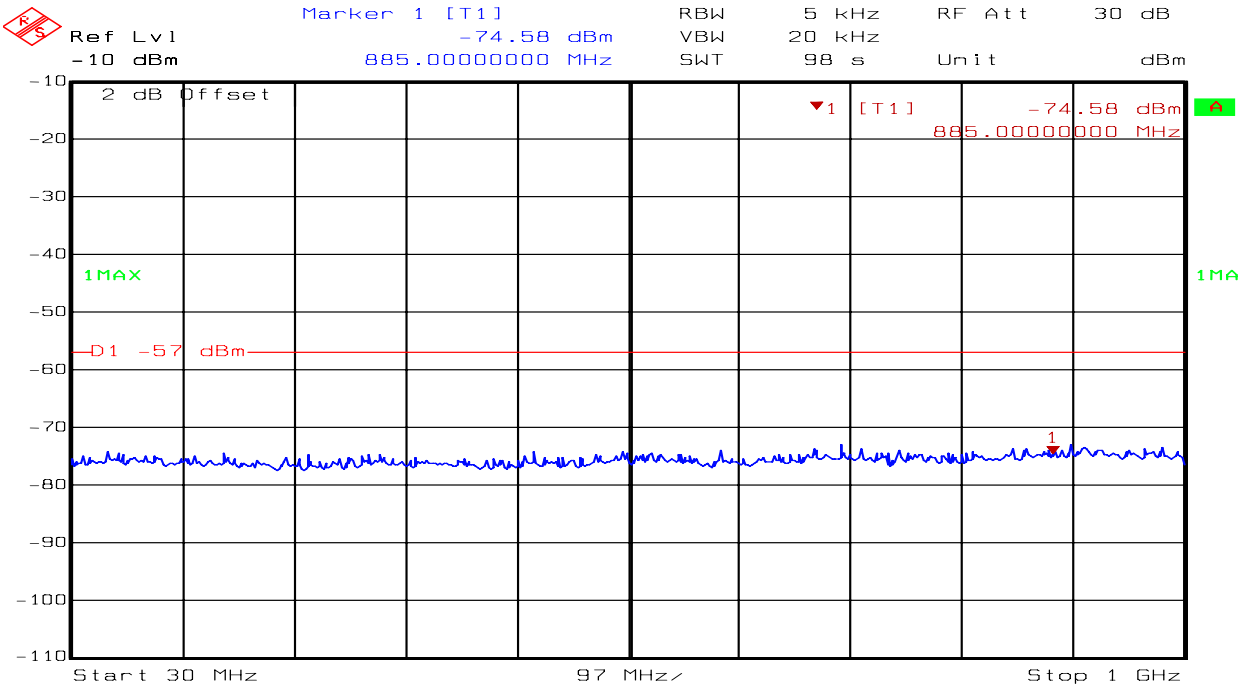


Figure 19: 1xRTT, Receiver Spurious Emissions, 30-1000MHz, CH500, DIVERSITY Antenna Port

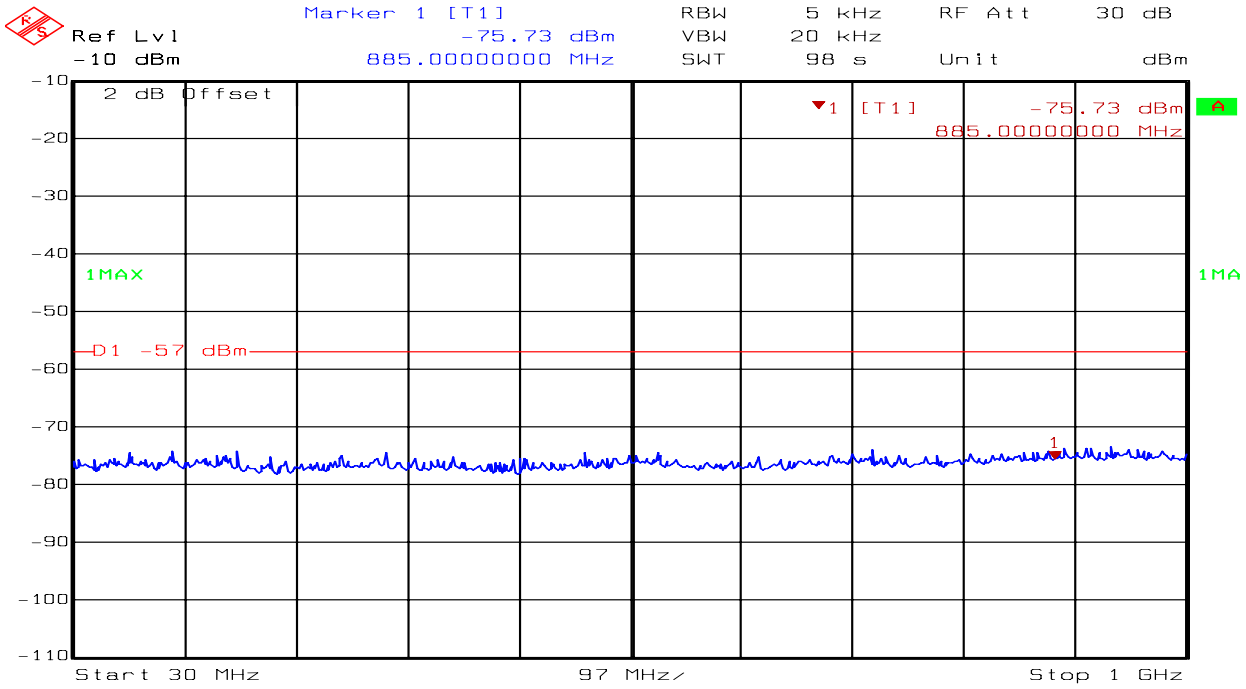


Figure 20: 1xRTT, Receiver Spurious Emissions, 1-3GHz, CH500, MAIN Antenna Port

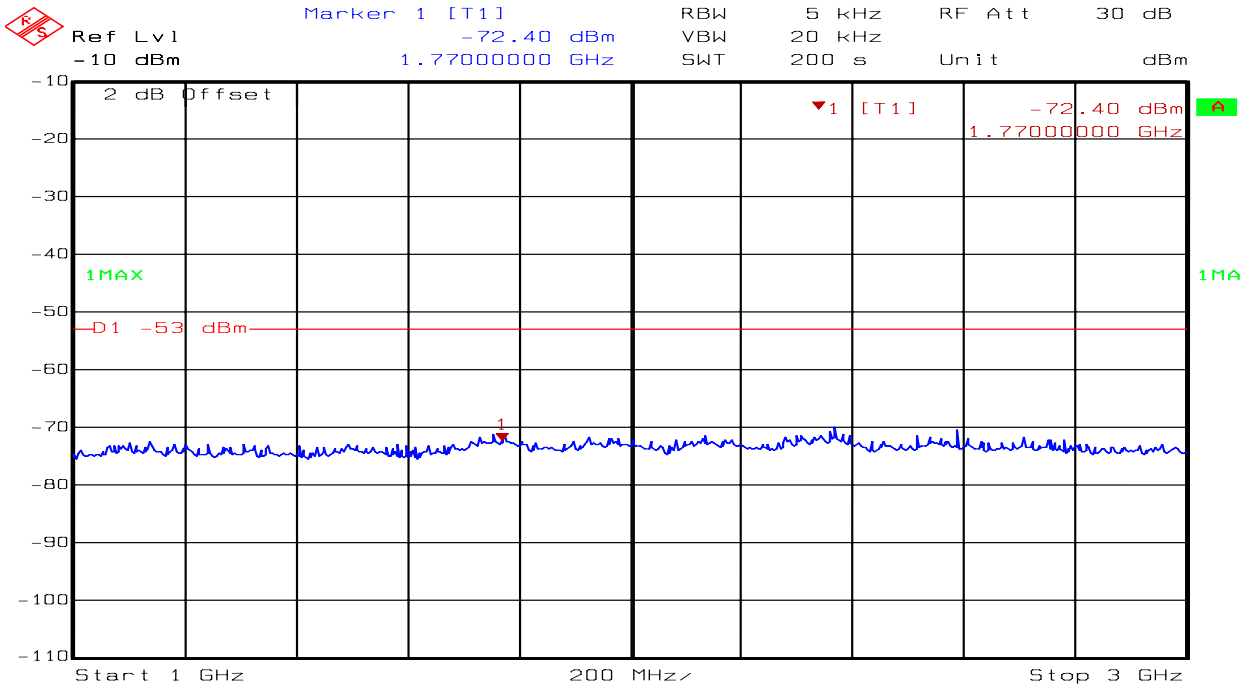
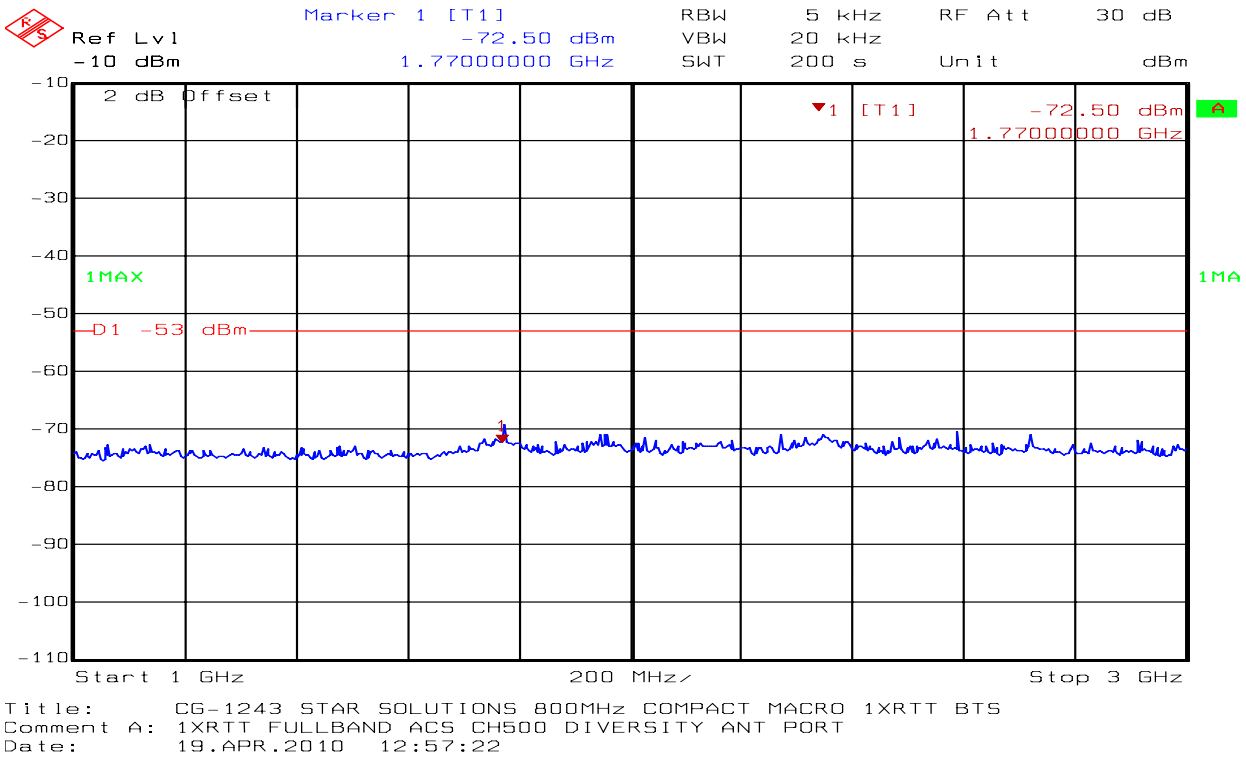


Figure 21: 1xRTT, Receiver Spurious Emissions, 1-3GHz, CH500, DIVERSITY Antenna Port



C.7. Tested By

This testing was conducted in accordance with the ISO 17025:2005 scope of accreditation, table 1; Quality Manual.

Name: Daryl Therens
Senior Test Specialist

C.8. Test Dates

Test Start: April 19, 2010
Test Complete: April 20, 2010

APPENDIX D: FREQUENCY STABILITY

D.1. Base Standard & Test Basis

Base Standard	FCC 22.355; IC RSS-129, 9.2.1
Test Basis	FCC Part 2.1055
Test Method	FCC Part 2.1055 / EIA/TIA 603

D.2. Specifications

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 Limit

Frequency Range (MHz)	Base, fixed (ppm)
25 to 50	20.0
50 to 450	5.0
450 to 512	2.5

Frequency Range (MHz)	Base, fixed (ppm)
821 to 896	1.5
928 to 929	5.0
929 to 960	1.5
2110 to 2220	10.0

D.3. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

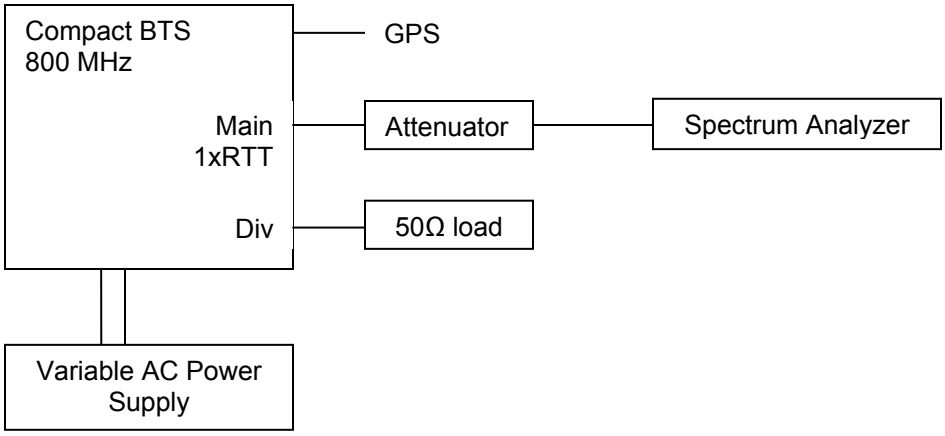
D.4. Test Method

The EUT was setup via a PC and Star Solutions software to transmit at maximum power in 1xRTT mode. Frequency stability measurements were performed on Sector 1 main antenna port for 1xRTT measurements. The diversity antenna port was terminated into a 50Ω load.

To verify the stability of the frequency determining components the 1xRTT carrier was set to transmit in CW mode. An external GPS reference was connected to the Compact BTS during test. Measurements were taken at startup and at 1 minute intervals for 10 minutes. Note that only the maximum frequency error reading is listed.

D.5. Test Set Up

Figure 22: Frequency Stability Setup



D.6. Test Results

Complies. In 1xRTT Mode, the maximum frequency error is +105 Hz. This is sufficient to ensure the fundamental stays within the assigned frequency block.

The RF carrier frequency also stayed within the specified reference frequency limit over the temperature and supply voltage ranges. The reference frequency is the frequency at 20°C and 120 VAC.

Table 7: 1xRTT Mode Frequency Stability Data

Channel / Frequency	Operating Conditions	Maximum Frequency Error (Hz)
CH 1015, 869.76 MHz	50°C and 120 VAC	+96
	40°C and 120 VAC	+98
	30°C and 120 VAC	+101
	20°C and 120 VAC	+102
	20°C and 138 VAC	+104
	20°C and 102 VAC	+105
	10°C and 120 VAC	+91
	0°C and 120 VAC	+97
	-10°C and 120 VAC	+102
	-15°C and 120 VAC	+97
	-20°C and 120 VAC	+93
	-22°C and 120 VAC	+99
	-24°C and 120 VAC	Transmitter would not key on
	-30°C and 120 VAC	Transmitter would not key on

D.7. Tested By

This testing was conducted in accordance with the ISO 17025:2005 scope of accreditation, table 1; Quality Manual.

Name: Daryl Therens
Senior Test Specialist

D.8. Test Dates

Test Start: April 20, 2010
Test Complete: April 21, 2010

APPENDIX E: FIELD STRENGTH OF SPURIOUS EMISSIONS; 30 TO 10,000 MHZ

E.1. Base Standard & Test Basis

Base Standard	CFR 47 - FCC Part 22 Subpart H, CFR 47 - FCC Part 2 Subpart J IC RSS-Gen, RSS-129, 10
Test Basis	EIA/TIA 603 C
Test Method	• NTS Emission Test Methods CAG EMC 02 • NTS Emission Verification Test Methods CAG EMC 01

E.2. Specifications

Frequency (MHz)	**CFR 47 FCC Part 22**	
	Theoretical Peak @ 3m[1] dBµV/m	**ERP[2] dBm**
1000 - 10000	84.3	-13

Note 1: Calculated using: Pd-(43 + 10 log(Pw)

where Pd is the EUT power in dBm and Pw is the EUT power in watts

Note 2: Calculated using: 120+20log(SQRT(49.2*Pw)/3)

where Pw is the EUT power in watts

E.3. Deviations

Deviation Number	**Time & Date**	**Descriptions**	**Deviation Reference**			**Approval**
			Base Standard	**Test Basis**	**NTS Procedure**	
None						

E.4. Special Considerations

None

E.5. Operating Mode During Test

The EUT was setup via a PC and Star Solutions software to transmit at maximum power in 1xRTT mode at a mid band RF channel (channel 500). Both the main and diversity antenna ports were terminated into 50Ω loads.

E.6. Transmit Test Results

Table 8: Compliance Scan Summary: 30 MHz to 1 GHz

There were no FCC Part 22 related emissions detected in this frequency range.

Table 9: Compliance Scan Summary: 1 GHz to 10 GHz

Frequency (MHz)	Polarization	Measured Level (dBµV/m)	Substitution Signal Generator Level (dBm)	Substitution Antenna Gain (dBd)	Tx Cable Loss (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1770.29	H-pol	42.20	-61.28	8.53	1.61	-54.36	-13.00	41.36
2655.41	H-pol	50.34	-55.53	9.60	1.88	-47.81	-13.00	34.81
2654.77	V-pol	50.62	-53.72	9.80	1.88	-45.80	-13.00	32.80
3540.42	V-pol	42.84	-61.99	9.90	1.92	-54.01	-13.00	41.01

Note: All final reported values are corrected values.

E.7. Observations

None.

E.8. Sample Calculation

3m Limit = 10m Limit – 20 * log (3/10)

Emission Level = Measured Level + Correction Factors

Margin = Limit – Emission Level

ERP Limit (dBm) = Pd-(43 + 10 log(Pw)

where Pd is the EUT power in dBm and Pw is the EUT power in watts

Theoretical ERP Limit (dBuV/m) 120+20log(SQRT(49.2*Pw)/3)

where Pw is the EUT power in watts

E.9. Tested By

This testing was conducted in accordance with the ISO 17025:2005 scope of accreditation table 1; Quality Manual.

Name: Lixin Wang
EMC Technologist

E.10. Test Dates

Test Start: April 14, 2010
Test Complete: April 14, 2010

TEST EQUIPMENT LIST

E.11. Test Equipment

Descriptions	Manufacturer	Type/Model	Serial #	Cal Due	Cal Date
Test Receiver	Rohde & Schwarz	ESMI Test Receiver	CG0433	4-May-10	4-May-09
		ESAI Test Receiver Display	CG0123	26-Feb-11	26-Feb-09
Bilog Antenna	Teseq	CBL 6112D	CG0314	23-Sept-10	28-Oct-08[5]
RF Cable	Sucoflex	Loaded cable	CG0398	NCR	NCR
Digital Barometer / Thermometer	Cole-Parmer	1870	CG0728	2-Sept-10	2-Sept-09
Mast Controller	EMCO	2090	CG0179	NCR	NCR
Multi-Device Controller TT1	EMCO	2090	CG0178	NCR	NCR
Horn Antenna (Rx) 1 GHz – 18GHz	EMCO	3115	CG0368	8-Sep-11	8-Sep-09
Horn Antenna (Rx) 1 GHz – 18GHz	EMCO	3115	CG0103	6-Mar-11	30-Sept-08[6]
High pass filter f>1000MHz	MicroTronics	HPM14576	CG0963	NCR	NCR
LNA 1 to18GHz	Miteq	JSD00121	CG0317	1-Dec-10	1-Dec-08
Spectrum Analyzer 9 kHz – 40GHz	Rohde & Schwarz	FSEK-20	CG0118	6-Aug-11	6-Aug-09
Spectrum Analyzer 30Hz – 40GHz	HP	8564E	CG0352	14-Oct-10	14-Oct-09
Attenuator	Weinschel	30dB 150W	CG0751	NCR	NCR
RF cable	Sucoflex	104	115762/4	NCR	NCR
RF cable	Sucoflex	104	115760/4	NCR	NCR
Multi-meter	Fluke	87	CG0384	6-Nov-10	6-Nov-09
Temperature Chamber	Staples and Stevens Co.	DSW	97817	NCR	NCR
Data Acquisition / Switch Unit	Fluke	Hydra	CG0217	23-Nov-10	23-Nov-09
Variable AC Power Supply	Elgar	DMACII	CG0236	NCR	NCR

[5] Equipment was hold “In Service Program” until 23-Sep-09.
[6] Equipment was hold “In Service Program” until 6-Mar-09.

END OF DOCUMENT