Product Integrity Laboratory

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Radio Test Report
Project Code CG-666
(Report CG-666-RA-1-2)

FCC Part 24/RSS 133 Report for

UTSTARCOM
iCell DOrA BTS 1900 MHz Module
FCC ID: S52-2-01-01-00-1
IC: 4021G-20101001
Revision: 2
(Replaces CG-666-RA-1-1)

December 12, 2007

Prepared for:	UTStarcom
Author:	Glen Moore EMC/Wireless Manager
Approved by:	Nick Kobrosly Director of Operations

Report Summary

Test Facility:	**National Technical Systems, Canada** Product Integrity Laboratory 5151-47th Street, N.E. Calgary Alberta T3J 3R2
Accreditation Numbers:	FCC 101386 IC 46405-3978 - File # IC3978-2 **Accredited by Standards Council of Canada** Accredited Laboratory No. 440(Conforms with requirements of CAN−P−4D (ISO/IEC 17025)) CLIENTS SERVED: All interested parties FIELDS OF TESTING: Electrical/Electronic, Mechanical/Physical ISSUED ON: 2005−06−02 VALID TO: 2009−03−20
Performed For:	UTStarcom Canada 4600 Jacombs Road Richmond, B.C. Canada V6V 3B1
Customer Representative:	Name: Peter Lee Phone: (604) 276-0055 Ext. 264 Fax: (604) 276-0501 Email Address: peter.lee@utstar.com
Responsible Manager:	Name: Joe Perella Phone: 604-303-2307 Fax: (604) 276-0501 Email Address: joe.perrella@utstar.com

Test Summary

Appendix	Test/Requirement Description	Deviations* from:			Status	Applicable Rule Parts
		Base Standard	Test Basis	NTS Procedure		
A	RF Power Output	No	No	No	PASS	FCC Part 24.232
B	Occupied Bandwidth	No	No	No	PASS	FCC Part 2.1049
C	TX Conducted Spurious Emissions	No	No	No	PASS	FCC Part 24.238
D	Radiated Emissions 30 MHz – 20 GHz	No	No	No	PASS	FCC Part 24.238
E	Frequency Stability	No	No	No	PASS	FCC Part 24.235
F	Test Equipment List	No	No	No	NA	NA

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

Test Log

APPENDIX	Test Case	Start	End	Tester
A	RF Power Output FCC Part 24.232	Nov 8, 2007	Nov 19, 2007	Glen Moore Wireless/EMC Manager
B	Occupied BW FCC Part 2.1049	Nov 8, 2007	Nov 19, 2007	Glen Moore Wireless/EMC Manager
C	TX Conducted Spurious Emissions FCC Part 24.238	Nov 8, 2007	Nov 19, 2007	Glen Moore Wireless/EMC Manager
D	Radiated Emissions 30 MHz – 20 GHz FCC Part 24.235	Nov 24, 2007	Nov 25, 2007	Glen Moore Wireless/EMC Manager
E	FCC Part 24.238 Frequency Stability	Oct 26, 2007	Oct 26, 2007	Spencer Watson Compliance Specialist

The test outlined may not be inclusive of all testing required by the Base Standards or fulfill the applicable regulatory requirements for this product in their entirety.

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

Prepared By: gmoore Digitally signed by gmoore DN: cn=gmoore, c=US, o=nts, email=glen.moore@ntscorp.com Date: 2007.12.13 11:26:54 -07'00'
Glen Moore,
EMC Manager

Reviewed By:
Deniz Demirci,
EMC Technologist

Approved By: Robyn Zuehlke 2007.12.13 15:07:34 -07'00'
Robyn Zuehlke
Quality Manager

Table of Contents

Register of Revisions

Revision	Date	Description of Revisions
0	November 26, 2007	Draft Release for customer review
1	December 11, 2007	Incorporated comments from customer review
2	December 12, 2007	Corrections from internal review

1.0 INTRODUCTION

1.1.1 PURPOSE

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 the iCell DOrA BTS 1900 MHz Module. The UTStarcom BTS is intended for use in the Domestic Public Cellular Radio Telecommunications Service and is designed in accordance with the following standards:

- CFR 47, Part 24 Subpart E Broadband Personal Communications Service [1]
- CFR 47, Part 2, Subpart J, Equipment Authorization Procedures - Equipment Authorization[2]

1.1.2 ABBREVIATIONS AND DEFINITIONS

The following are the abbreviations and definitions that may be relevant to this document.

Abbreviation	Explanation
A	Amps
AC	Alternating Current
AE	Ancillary Equipment
AF	Antenna Factor
ANSI	American National Standards Institute
AWG	American Wire Gauge
BTS	Base Transceiver Station
C	Celsius
CDMA	Code Division Multiple Access
CF	Correction Factor
CFR	Code of Federal Regulations
CH	Channel
CL	Cable Loss
cm	centimetre
CM	Control Module
dB	Decibel
dBm	Decibel relative to 1 milliwatt
dBµV	Decibel relative to 1 uV
DC	Direct Current
DM	Digital Module
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
EN	European Norms
EUT	Equipment UnderTest
FCC	Federal Communications Commission
GHz	Gigahertz
GPS	Global Positioning System
GR	Generic Requirements
Hpol	Horizontal Polarization
Hz	Hertz
IC	Industry Canada
kHz	kilohertz
LO	Local Oscillator

LNA	Low Noise Amplifier
m	Metre
MHz	Megahertz
ms	Milli Second
NTS	National Technical Systems
NA	Not Available
N/A	Not Applicable
PA	Power Amplifier
PI	Product Integrity
PK	Peak
PLL	Phase Lock Loop
P/N	Part Number
PS	Power Supply
PSU	Power Supply Unit
QP	Quasi-Peak
Qty	Quantity
RE	Radiated Emissions
RF	Radio Frequency
Rx	Receive
TT	Turn Table
Tx	Transmit
V	Volts
VDC	Volts Direct Current
Vpol	Vertical Polarization
W	Watt
Zt	Transfer Impedance

1.1.3 REFERENCES

US Code of Federal Regulations

- 47 CFR Part 24 — Federal Communications Commission, Part 24, Subpart E
- 47 CFR Part 2 — Federal Communications Comission, Part 2, Subpart J

American National Standards Institute

- ANSI C63.4-2003 — American National Standards for Methods of Measurements of Radio-Noise Emissions from Low Voltage Electrical and Electronic Equipments in the range of 9 kHz to 40 GHz, December 11, 2003
- TIA/EIA 603 C-2004 — Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

NTS Documentation

- NTS Radiated Emissions 30 MHz – 1 GHz Automated Test Method E001R7
- NTS Radiated Emissions 1 GHz – 40 GHz Manual Test Method E006R4

2.0 EUT

CONFIGURATION

Description of EUT

	Model Name	Part Number	Revision	Serial Number
EUT	iCell DOrA BTS module	2424285200	1	175XG9AH1D2M
Size (m)	NA			
Weight	Approx. 5.5 lbs			
Power	120 VAC			
Transmit band	1930 - 1990 MHz			
Receive band	1850 - 1910 MHz			
General Functional Description	General Functional Description: The iCell DOrA BTS module provides one CDMA2000 1xEVDO carrier support for one, two or three sector operation. The BTS module can operate as a standalone transceiver. It requires a single external Ethernet interface for communication with a RNC server and a connection to an external power supply.			

SET UP CONFIGURATION

EUT

Quantity	EUT Description	P/N	S/N	Rev
1	iCell DOrA BTS 1900 MHz Module	2424285200	175XG9AH1D2M	1

EUT POWER

Voltage	120 VAC
Number of Feeds	1
Gauge of cable	10
Current Draw	3 - 5 amps
Current Draw in final amplifier stage	0.5 A

CABLES

EUT Cable List

NA

EUT Operation

The BTS was controlled via manufacuters specialized sw to get the eut to transmit with different modulations, channels and power levels as required for each test.

APPENDICES

APPENDIX A: POWER OUTPUT

A.1. Base Standard & Test Basis

Base Standard	FCC Part 24.232
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 2.983(d)(5). 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 (Part 24.232)

The maximum RF power from a base station must not exceed 100 Watts.

A.4. Measurement Uncertainty

Expanded Uncertainty (K=2)
1.11/-1.22

A.5. Deviations

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

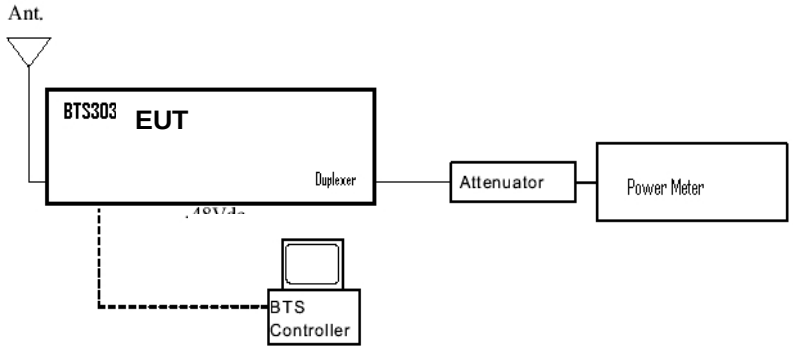
A.6. Test Method

The DE was setup via the BTS controller to enable to transmit at maximum power. The RF output power was measured using the power meter.

A.7. Test Setup

The set-up used for the RF output power test is illustrated below. RF output power measurements were referenced to the main antenna port of the duplexer.

Figure 1: Power Output test setup



A.8. Test Results

Complies. The maximum RF output power is 21.4 dBm on channel 750. This is 29.6 dB below the FCC Limit of 50 dBm.

Table 1: RF Power Output

Channel Number/ PCS Block	Modulation	Frequency (MHz)	Measured RF Output Power (dBm)	Typical Maximum Rated Power (dBm)	FCC Limit (dbm)
25/A	QPSK	1931.25	19.71	20.5	50
25/A	8PSK	1931.25	19.72	20.5	50
25/A	16QAM	1931.25	19.85	20.5	50
150/A	QPSK	1937.50	19.79	20.5	50
150/A	8PSK	1937.50	19.89	20.5	50
150/A	16QAM	1937.50	19.82	20.5	50
275/A	QPSK	1943.75	20.08	20.5	50
275/A	8PSK	1943.75	20.00	20.5	50
275/A	16QAM	1943.75	19.99	20.5	50
325/D	QPSK	1946.25	20.03	20.5	50
325/D	8PSK	1946.25	20.01	20.5	50
325/D	16QAM	1946.25	20.12	20.5	50
350/D	QPSK	1947.50	19.99	20.5	50
350/D	8PSK	1947.50	19.97	20.5	50
350/D	16QAM	1947.50	20.12	20.5	50
375/D	QPSK	1948.75	19.95	20.5	50
375/D	8PSK	1948.75	19.93	20.5	50
375/D	16QAM	1948.75	20.04	20.5	50
425/B	QPSK	1951.25	20.30	20.5	50
425/B	8PSK	1951.25	20.33	20.5	50
425/B	16QAM	1951.25	20.41	20.5	50
550/B	QPSK	1957.50	20.53	20.5	50
550/B	8PSK	1957.50	20.64	20.5	50
550/B	16QAM	1957.50	20.69	20.5	50
675/B	QPSK	1963.75	21.43	20.5	50
675/B	8PSK	1963.75	21.24	20.5	50
675/B	16QAM	1963.75	21.30	20.5	50
725/E	QPSK	1966.25	21.27	20.5	50
725/E	8PSK	1966.25	21.23	20.5	50

725/E	16QAM	1966.25	21.32	20.5	50
750/E	QPSK	1967.50	21.29	20.5	50
750/E	8PSK	1967.50	21.35	20.5	50
750/E	16QAM	1967.50	21.40	20.5	50
775/E	QPSK	1968.75	21.32	20.5	50
775/E	8PSK	1968.75	21.39	20.5	50
775/E	16QAM	1968.75	21.39	20.5	50
825/F	QPSK	1971.25	21.16	20.5	50
825/F	8PSK	1971.25	21.18	20.5	50
825/F	16QAM	1971.25	21.27	20.5	50
850/F	QPSK	1972.50	21.18	20.5	50
850/F	8PSK	1972.50	21.06	20.5	50
850/F	16QAM	1972.50	21.09	20.5	50
875/F	QPSK	1973.75	21.05	20.5	50
875/F	8PSK	1973.75	21.03	20.5	50
875/F	16QAM	1973.75	21.14	20.5	50
925/C	QPSK	1976.25	21.07	20.5	50
925/C	8PSK	1976.25	21.06	20.5	50
925/C	16QAM	1976.25	21.13	20.5	50
1050/C	QPSK	1982.50	20.67	20.5	50
1050/C	8PSK	1982.50	20.67	20.5	50
1050/C	16QAM	1982.50	20.69	20.5	50
1175/C	QPSK	1982.50	19.98	20.5	50
1175/C	8PSK	1982.50	20.33	20.5	50
1175/C	16QAM	1982.50	20.29	20.5	50

A.9. Tested By

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

Name: Glen Moore, Wireless/EMC Manager

APPENDIX B: OCCUPIED BANDWIDTH

B.1. Base Standard & Test Basis

Base Standard	FCC PART 2.1049
Test Basis	FCC PART 2.1049
Test Method	FCC PART 2.1049/24.238

B.2. Specifications

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.

B.3. Measurement Uncertainty

Expanded Uncertainty (K=2)
1.11/-1.22

B.4. Deviations

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

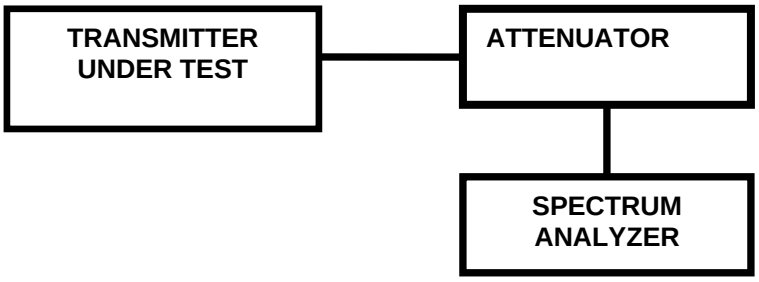
B.5. Test Method

The DE was setup via the BTS controller to enable the EUT to transmit at maximum power. The occupied bandwidth was measured using the 99% channel power feature of the spectrum analyzer.

B.6. Test Setup

The test setup for Occupied BW is as illustrated below

Figure 2: Occupied BW Setup



B.7. Test Results

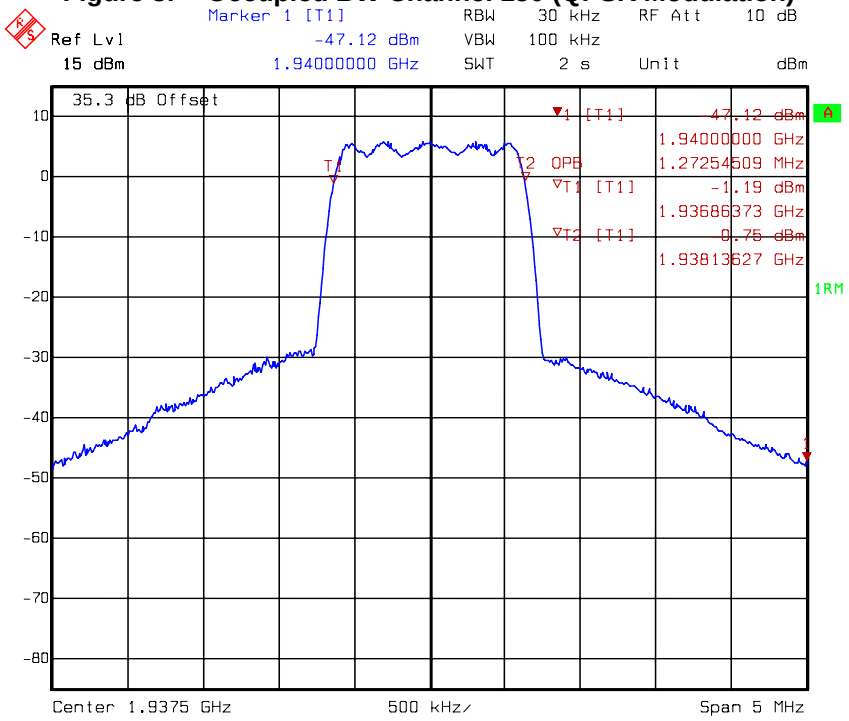
Table 2: Occupied BW

Channel Number /PCS Block	Modulation	Frequency (MHz)	Measured Occupied BW (MHz)
150/A	QPSK	1937.50	1.273
150/A	8PSK	1937.50	1.273
150/A	16 QAM	1937.50	1.273
350/D	QPSK	1947.50	1.273
350/D	8PSK	1947.50	1.273
350/D	16 QAM	1947.50	1.273
550/B	QPSK	1957.50	1.283
550/B	8PSK	1957.50	1.283
550/B	16 QAM	1957.50	1.273
750/E	QPSK	1967.50	1.273
750/E	8PSK	1967.50	1.273
750/E	16 QAM	1967.50	1.273
850/F	QPSK	1972.50	1.273
850/F	8PSK	1972.50	1.283
850/F	16 QAM	1972.50	1.283
1050/C	QPSK	1982.50	1.273
1050/C	8PSK	1982.50	1.273
1050/C	16 QAM	1982.50	1.273

B.8. Tested By

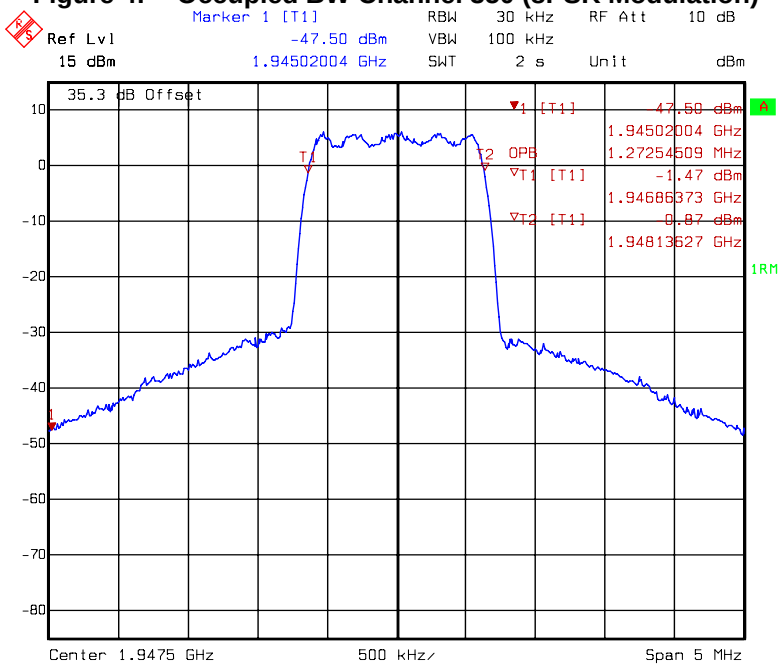
This testing was conducted in accordance with the ISO 17025 scope of accreditation, table 1; Quality Manual.
Name: Glen Moore, Wireless/EMC Manager

Figure 3: Occupied BW Channel 150 (QPSK Modulation)



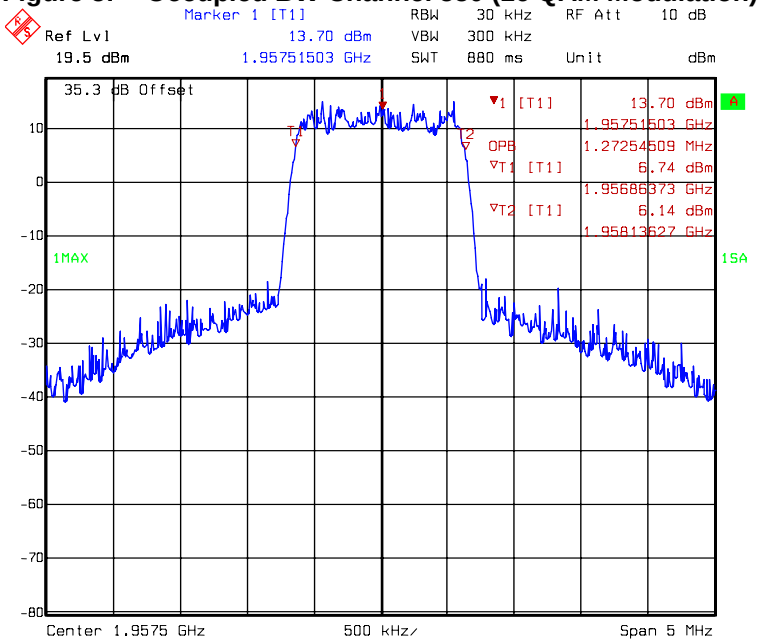
Title: CG666 UTStarcom PicoCell BTS
Comment A: A block OBW
channel 150 QPSK
Date: 19.NOV.2007 23:06:07

Figure 4: Occupied BW Channel 350 (8PSK Modulation)



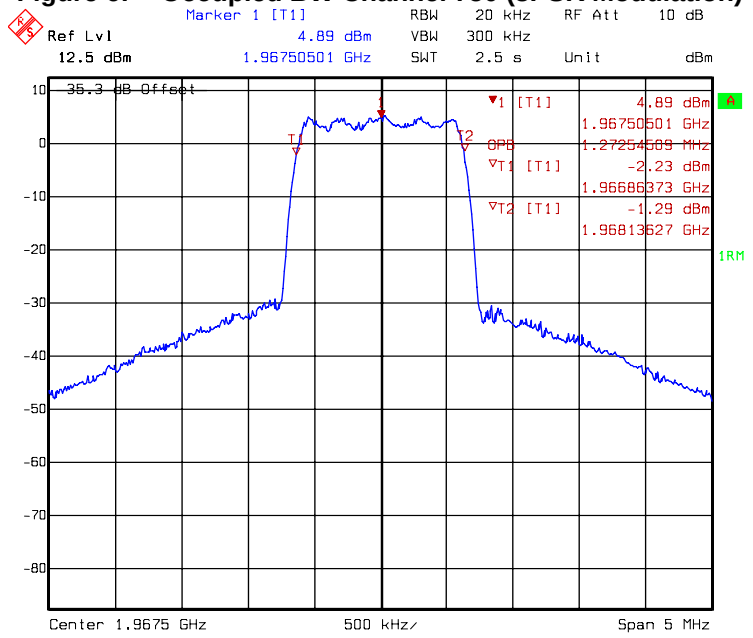
Title: CG666 UTStarcom PicoCell BTS
Comment A: D block OBW
channel 350 8PSK
Date: 19.NOV.2007 22:55:44

Figure 5: Occupied BW Channel 550 (16 QAM Modulation)



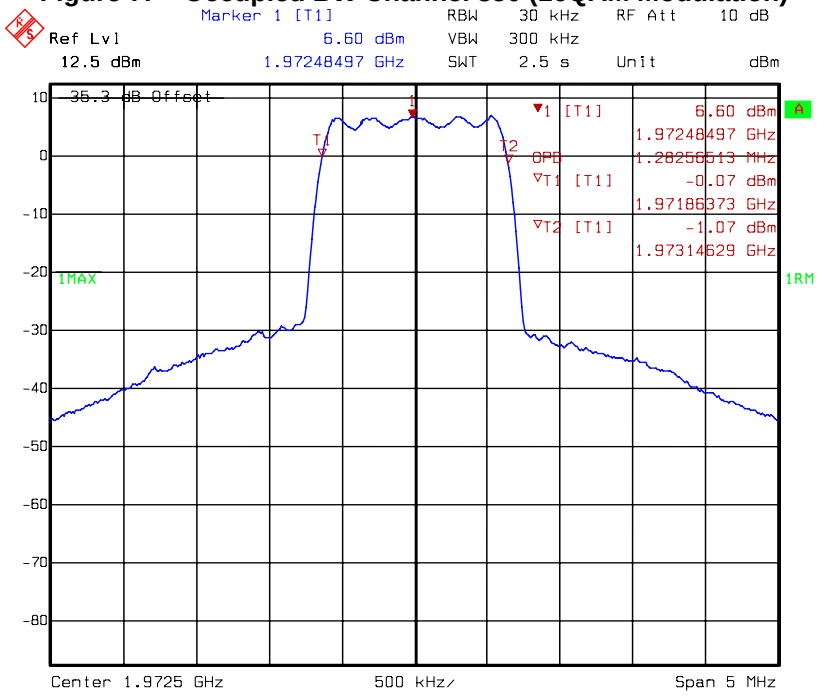
Title: CG-666 UTStarcom EVDO PicoCell BTS
Comment A: Occupied BW, Channel 550 Max power
16QAM modulation
Date: 8.NOV.2007 15:29:14

Figure 6: Occupied BW Channel 750 (8PSK Modulation)



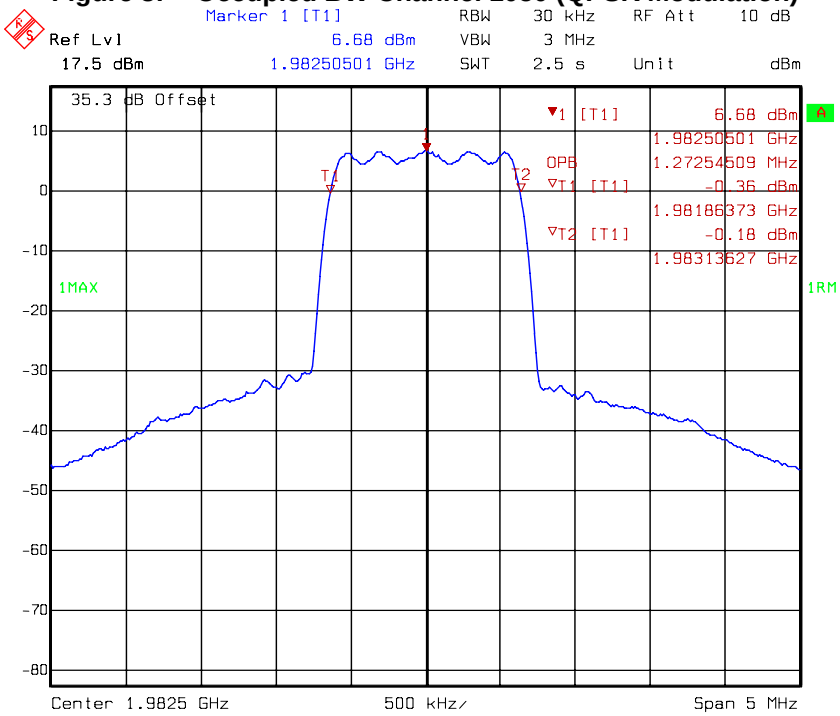
Title: CG-666 UTStarcomm Picocell BTS
Comment A: OBW Ch 750 block E
8PSK modulation
Date: 9.NOV.2007 18:16:24

Figure 7: Occupied BW Channel 850 (16QAM Modulation)



Title: CG-666 UTStarcomm Picocell BTS
Comment A: Occupied BW F block
Channel 850 16 QAM modulation
Date: 9.NOV.2007 16:29:49

Figure 8: Occupied BW Channel 1050 (QPSK Modulation)



Title: CG-666 UTStarcomm Picocell BTS
Comment A: Occupied B Channel 1050 QPSK modulation
Date: 9.NOV.2007 14:54:41

APPENDIX C: SPURIOUS EMISSIONS AT ANTENNA TERMINALS

C.1. Base Standard & Test Basis

Base Standard	FCC Part 24.238
Test Basis	FCC 2.1051
Test Method	FCC 2.1051

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 - 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 24.238 Limit

(a) On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmit power (P) by at least 43 + 10 log (P) dB.

(b) Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, 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. 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.

(c) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.

(d) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

C.3. Measurement Uncertainty

Expanded Uncertainty (K=2)
1.11/-1.22

C.4. Deviations

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

C.5. Test Procedure

The BTS was configured via the BTS controller to enable the to transmit at maximum power. Measurements were made on channels at the bottom and top of the licensed sub-bands. The following spectrum analyzer settings were used for the measurement of the antenna port spurious emissions:

Band/Block Edge Measurements

Method 1 – Integrated power measurement Adjacent 1MHz to indicated cellular band (Upper and Lower)

As per the plots enclosed, the channel power integrated measurement function on the spectrum analyzer was used to measure the adjacent 1 MHz bandedges of each PCS block. Measurements were done with each modulation type. Only band edge measurement plots have been provided to reduce file size.

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

Resolution Bandwidth: 30 KHz
Video Bandwidth: 100 KHz
Video Average/Detector: RMS
Span: Set accordingly
Attenuation: Variable
Ref. Level: variable
Ref. Level Offset: variable
Sweep time : Auto

All other Spurious Emissions up to 20 GHz

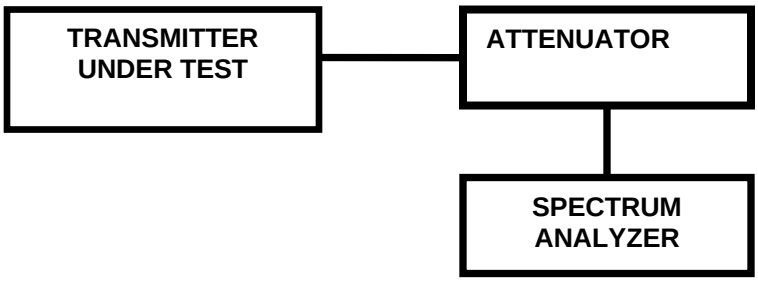
Resolution Bandwidth: 1 MHz
Video Bandwidth: 3 MHz
Detector: Peak to search emissions and average for final reading
Span: Set accordingly
Attenuation: 30 dB
Ref. Level: variable
Ref. Level Offset: variable

Calibrated the cables and attenuator losses from 50MHz to 20GHz using a network analyzer with 401 sample points. The calibrated loss is the reference level offset on the spectrum analyzer.

C.6. Test Setup

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

Figure 9: Conducted Spurious Emission setup



C.7. Test Results

The frequency spectrum from 50 MHz to 20 GHz was scanned for emissions using the spectrum analyzer settings outlined in the test method (Section 4.4.2). The EUT complies with the limit of -13 dBm, the block edge spurious emission was -21.68 dBm at the lower 1 MHz adjacent to the F block, this is 8.68 dB below the limit . The table below shows the spurious emissions at the antenna port of the EUT. The plots that follow show the spurious emissions . NOTE: The EUT was operating in transmit and receive mode, no receiver spurious emissions were detected.

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C.8. Tested By

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

Name: Glen Moore, Wireless EMC Manager

Table 3: Block Edge Spurious Emissions at the antenna port data summary

Frequency (MHz) and Measurement description	Modulaton Type	Spurious Emissions Level (dBm)	Margin to FCC Limit of -13 dBm
Lower Band edge Block A Channel 25 (adjacent 1 MHz integrated Power)	QPSK	-22.79	-9.79
	8PSK	-22.55	-9.55
	16QAM	-22.45	-9.45
Upper Band Edge Block C Channel 1175 (Adjacent 1 MHz integrated Power)	QPSK	- 24.92	-11.92
	8PSK	-24.73	-11.73
	16QAM	-24.47	-11.47
Block A Upper Block Edge Channel 275 (Adjacent 1 MHz integrated power)	QPSK	-23.88	-10.88
	8PSK	-23.72	-10.72
	16QAM	-23.71	-10.71
Block C Lower Block Edge Channel 925 (Adjacent 1 MHz integrated power)	QPSK	-22.81	-9.81
	8PSK	-22.58	-9.58
	16QAM	-22.02	-9.02
Block D Lower Block Edge Channel 325 (Adjacent 1 MHz integrated power)	QPSK	-23.54	-10.54
	8PSK	-23.70	-10.7
	16QAM	-23.53	-10.53
Block D Upper Block Edge Channel 375 (Adjacent 1 MHz integrated power)	QPSK	-23.48	-10.48
	8PSK	-24.25	-11.25
	16QAM	-23.97	-10.97
Block B Lower Block Edge Channel 425 (Adjacent 1 MHz integrated power)	QPSK	-23.23	-10.23
	8PSK	-23.16	-10.16
	16QAM	-23.14	-10.14
Block B Upper Block Edge Channel 675 (Adjacent 1 MHz integrated power)	QPSK	-23.03	-10.03
	8PSK	-22.92	-9.92
	16QAM	-22.66	-9.66
Block E Lower Block Edge Channel 725 (Adjacent 1 MHz integrated power)	QPSK	-22.17	-9.17
	8PSK	-22.85	-9.85
	16QAM	-21.85	-8.85
Block E Upper Block Edge Channel 775 (Adjacent 1 MHz integrated power)	QPSK	-22.58	-9.58
	8PSK	-22.85	-9.85
	16QAM	-22.87	-9.87

Block F Lower Block Edge Channel 825 (Adjacent 1 MHz integrated power)	QPSK	-22.35	-9.35
	8PSK	-22.15	-9.15
	16QAM	-21.68	-8.68
Block F Upper Block Edge Channel 875 (Adjacent 1 MHz integrated power)	QPSK	-23.74	-10.74
	8PSK	-23.62	-10.62
	16QAM	-23.11	-10.11

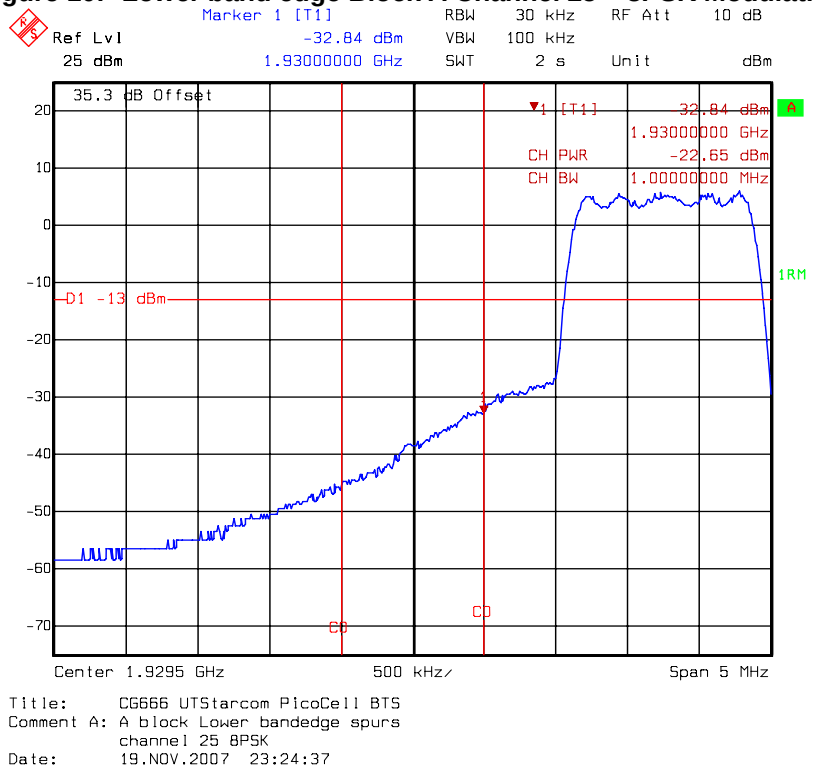
Notes: a Emission levels given in these ranges represents the worst case value over all the tested channels

Table 4: Spurious Emissions at the antenna port 30 MHz – 20 GHz data summary

PCS Block and Operating Channel	Modulaton Type	Spurious Emission Frequency (MHz)	Spurious Emissions Level (dBm)	Margin to FCC Limit of -13 dBm
Block A Channel 25	QPSK	3862.44	-25.06	12.06
	8PSK	3862.44	-25.2	12.2
	16QAM	3862.44	-24.92	11.92
Block B Channel 550	QPSK	3914.83	-28.94	15.94
	8PSK	3914.83	-29.96	16.96
	16QAM	3914.83	-30.24	17.24

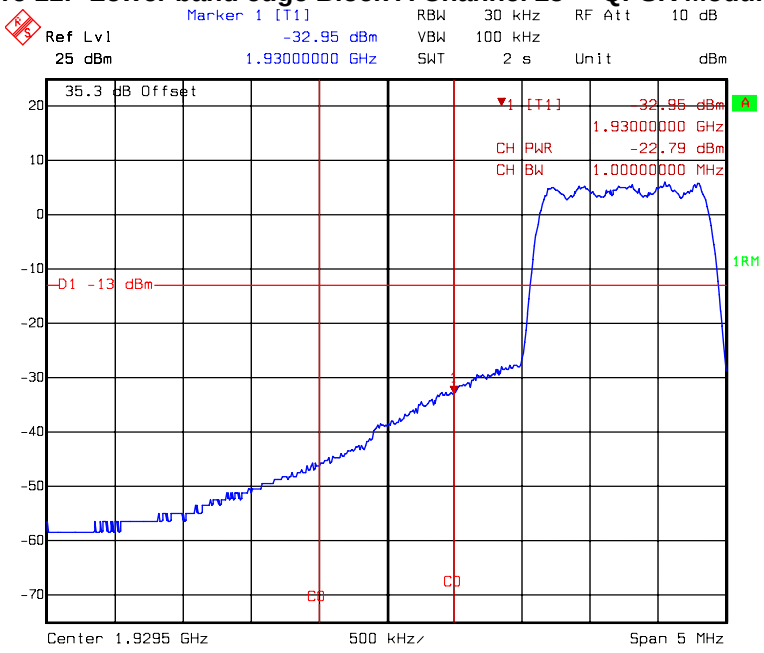
Note: The above represent the worst case spurious emissions as searched up to the 10 th harmonic of the highest fundamental frequency.

Figure 10: Lower band edge Block A Channel 25 – 8PSK Modulation



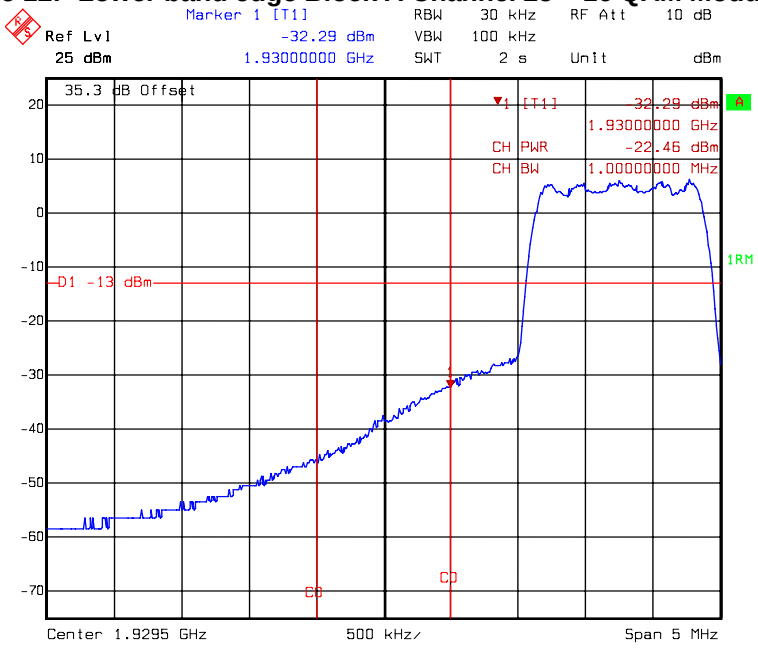
Title: CG666 UTStarcom PicoCell BTS
Comment A: A block Lower bandedge spurs channel 25 8PSK
Date: 19.NOV.2007 23:24:37

Figure 11: Lower band edge Block A Channel 25 – QPSK Modulation



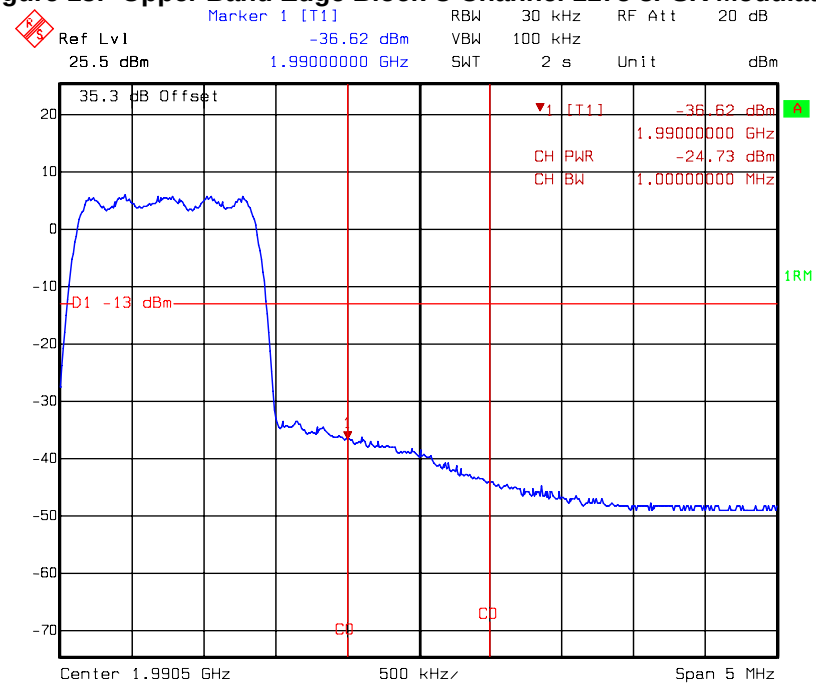
Title: CG666 UTStarcom PicoCell BTS
Comment A: A block Lower bandedge spurs channel 25 QPSK
Date: 19.NOV.2007 23:23:09

Figure 12: Lower band edge Block A Channel 25 – 16 QAM Modulation



Title: CG666 UTStarcom PicoCell BTS
Comment A: A block Lower bandedge spurs channel 25 16QAM
Date: 19.NOV.2007 23:25:47

Figure 13: Upper Band Edge Block C Channel 1175 8PSK Modulation



Title: CG-666 UTStarcomm Picocell BTS
Comment A: Bandedge Conducted Spurious Channel 1175 8PSK modulation
Date: 9.NOV.2007 13:44:23

Figure 14: Upper Band Edge Block C Channel 1175 QPSK Modulation

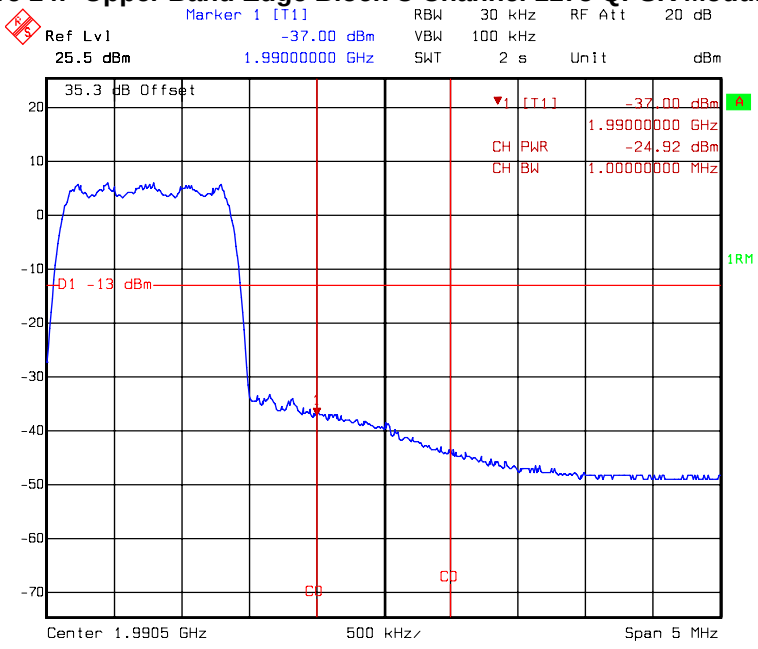


Figure 15: Upper Band Edge Block C Channel 1175 16 QAM Modulation

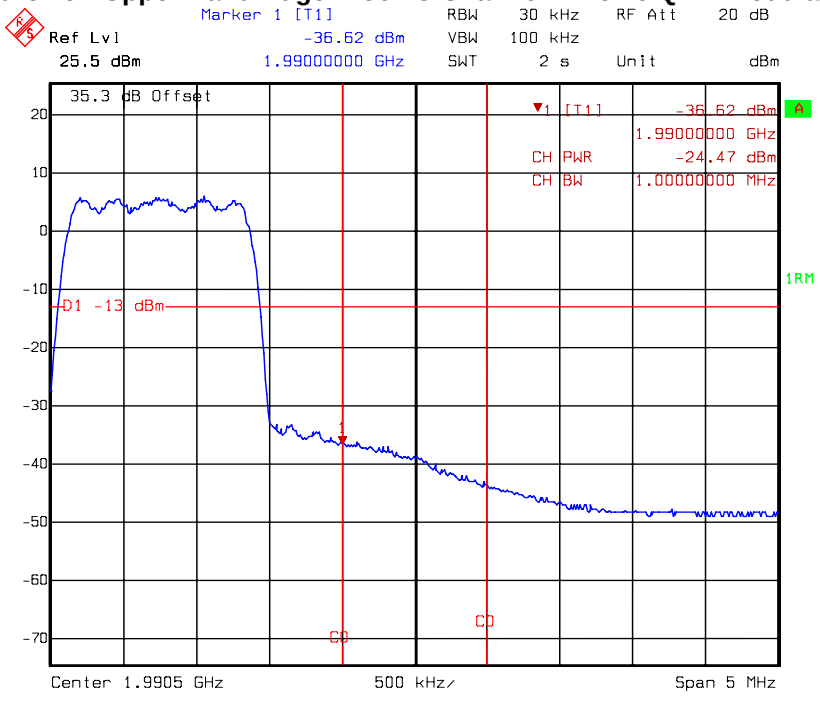


Figure 16: Spurious search with Peak Detector, Channel 25 QPSK Modulation

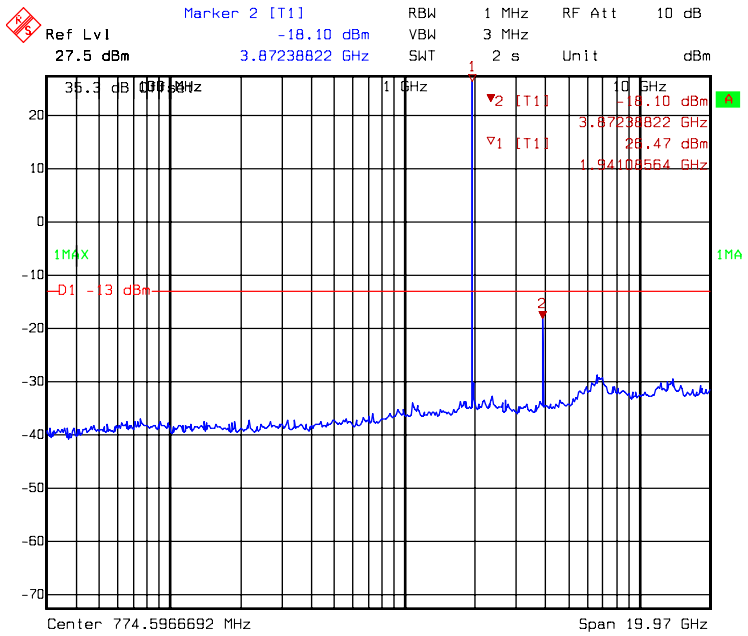


Figure 17: Spurious search with Peak Detector, Channel 150 16QAM Modulation

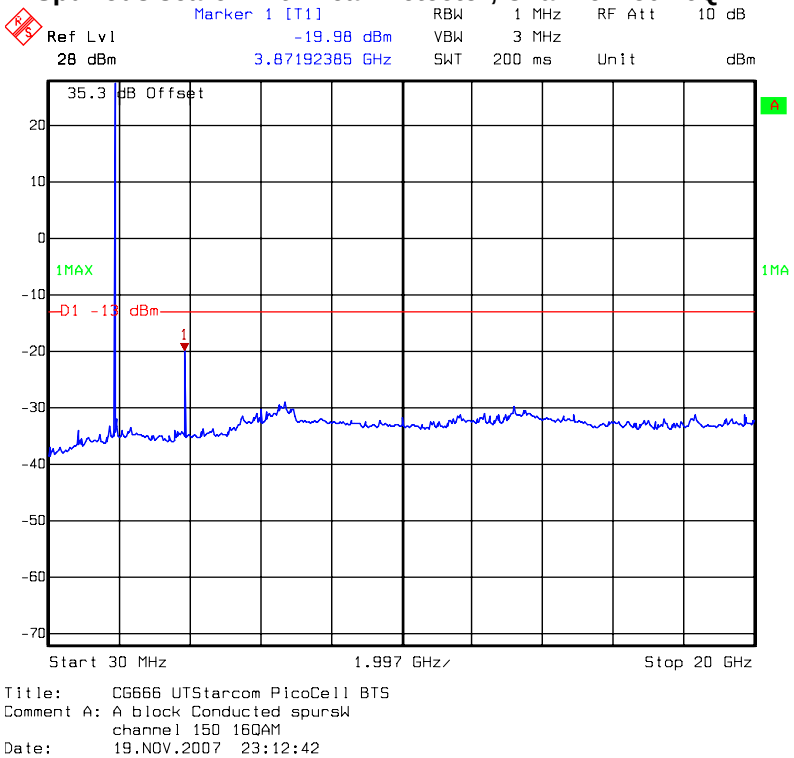
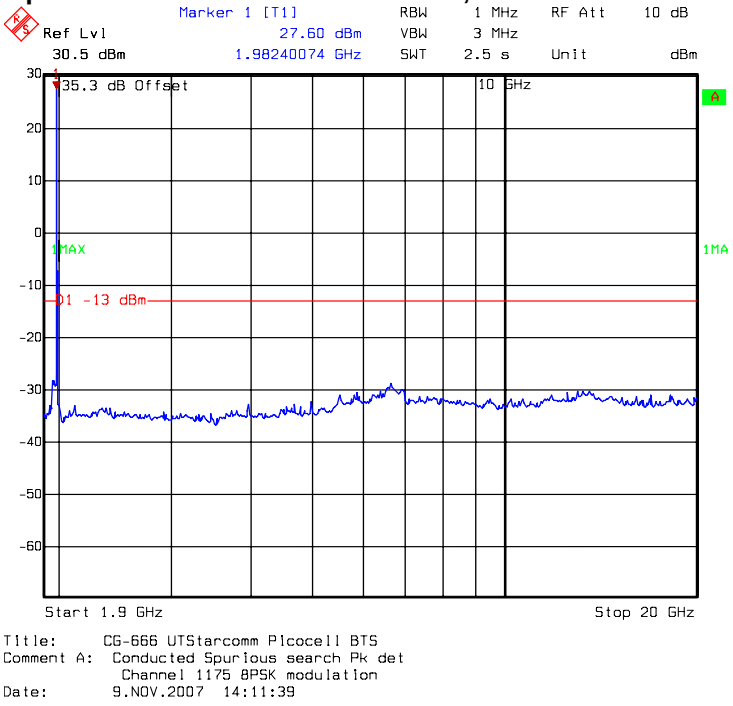


Figure 18: Spurious search with Peak Detector, Channel 1175 8PSK Modulation



APPENDIX D: RADIATED E-FIELD EMISSIONS – 30 MHZ – 20 GHZ

D.1. Base Standard & Test Basis

Base Standard	☒	CFR Title 47 – Telecommunications, Chapter I, Subchapter B, FCC Part 24 – Personal Communication Services
Test Basis	☒	EIA/TIA 603
Test Method	• NTS Radiated Emissions 30MHz – 1GHz Automated Test Method E001R7 • NTS Radiated Emissions 1GHz – 40 GHz Manual Test Method E006R4 • NTS Radiated Emissions Signal Substitution Method 30MHz - 20GHz. EMC Test Method 11.0, Revision 01	

D.2. Specifications

Frequency	☐	**47 CFR FCC Part 22**	
	☒	**47 CFR FCC Part 24**	
		Theoretical Peak @ 3m[1]	**ERP[2]**
MHz		**dBµV/m**	**dBm**
1000 - 20000		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

D.3. Measurement Uncertainty

Radiated Emissions (dB)	**Measurement Uncertainty**	**Expanded Uncertainty (K=2)**
30 MHz – 1 GHz	+2.32/-2.36	+4.65/-4.72
1 GHz – 20 GHz	+3.48/-3.51	+6.96/-7.02

D.4. Deviations

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

D.5. Special Considerations

None

D.6. Test Results

Compliance Scan Summary: 30 MHz – 1 GHz

No emissions within 20 dB of the limit were detected

The EUT is in compliance with FCC CFR47 Part 24 Radiated Emission requirements.

Compliance Scan Summary: 1 GHz – 20 GHz

The EUT is in compliance with FCC CFR47 Part 24 Radiated Emission requirements.

PCS Block and Operating Channel	Receive Ant Polariz (H/V)	Spurious Emission Frequency (MHz)	Corrected Field Strength Level (dBuV/M) @ 3 M	Spurious Emissions ERP Level (dBm) (substituion)	Margin to FCC Limit of -13 dBm
Block A Channel 25	H	3862.66	66.61	-30.73	17.73
	V	3862.58	63.71	-33.63	20.63
Block B Channel 550	H	3915.10	65.51	-31.83	18.83
	V	3915.05	61.64	-35.70	22.70
Block C Channel 1175	H	3977.61	58.37	-38.97	25.97
	V	3977.60	63.46	-33.88	20.88

D.7. Observations

None

D.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

D.9. Test Data & Photographs

The test data and photographs collected during this test appear following this page.

D.10. Tested By

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

Name:	Glen Moore	Spencer Watson
Function:	Wireless/EMC Manager	EMC Specialist

APPENDIX E: FREQUENCY STABILITY

E.1. Base Standard & Test Basis

Base Standard	FCC 24.235
Test Basis	FCC Part 2.1055
Test Method	FCC Part 2.1055/EIA/TIA 603

E.2. 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 temper ature 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 transmit ters) 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 equip
ment.)

2.1.1.1.1 24.235 Frequency stability.

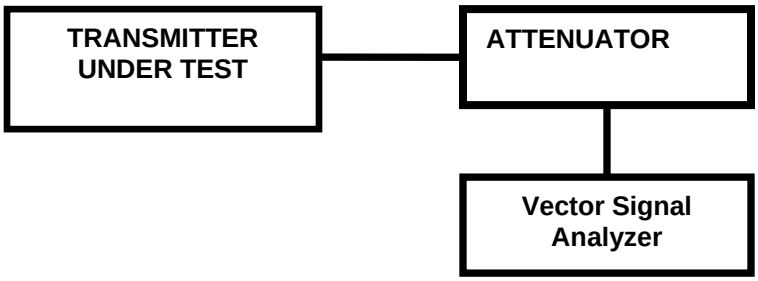
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

E.3. Deviations

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

E.4. Test Set Up

Figure 19: Frequency Stability setup



E.5. Test Results

Complinant. The worst case frequency drift is 36.85 Hz at -15 degrees celcius. Below this temperature the EUT would not operate.

Operating voltage	Degrees Celcius	Time	Frequency drift (Hz)
Nominal 120 VAC	-15	0	30.03
		1	36.85
		2	10.81
		3	34.85
		4	11.78
		5	14.77
		6	27.64
		7	21.45
		8	17.66
		9	30.19
		10	25.55
Nominal 120 VAC	-10	0	12.12
		1	22.09
		2	18.95
		3	24.2
		4	12.34
		5	8.18
		6	18.16
		7	17.26
		8	32.01
		9	14.85
		10	21.03
Nominal 120 VAC	0	0	14.72
		1	10.74
		2	18.88
		3	13.01
		4	-9.24
		5	8.48
		6	3.52
		7	-7.07
		8	7.22
		9	11.7
		10	4.7
Nominal 120 VAC	10	0	13.4
		1	8.54
		2	16.65
		3	8.84
		4	24.91
		5	13.78
		6	23.92
		7	8.88
		8	-6.9
		9	12.55
		10	7.6

		0	5.32
		1	13.2
		2	4.8
		3	4.3
		4	12.5
		5	14.0
		6	4.5
		7	7.33
		8	11.39
		9	4.90
Nominal 120 VAC	20	10	12.1
		0	6.34
		1	4.39
		2	13.2
		3	21.4
		4	18.0
		5	15.0
		6	5.12
		7	18.90
		8	12.22
		9	14.90
85% Nom	20	10	11.23
		0	12.45
		1	17.4
		2	12.12
		3	11.0
		4	4.9
		5	-3.2
		6	-7.0
		7	11
		8	17
		9	13.89
115% nom	20	10	11.1
		0	12.2
		1	35.3
		2	2
		3	6
		4	10.88
		5	-10.66
		6	-12.6
		7	2.69
		8	-12.9
		9	6.64
Nominal 120 VAC	30	10	16.17

		0	14.51
		1	1.21
		2	4.91
		3	21.86
		4	15.11
		5	18.4
		6	17.14
		7	5.04
		8	7.19
		9	4.1
Nominal 120 VAC	40	10	15.48
		0	16.87
		1	12.96
		2	-6.43
		3	5.4
		4	12.4
		5	-3
		6	12.22
		7	17.88
		8	11.60
		9	13.08
Nominal 120 VAC	50	10	15.48

E.6. Tested By

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

Name: Glen Moore, Wireless/EMC Manager

APPENDIX F: TEST EQUIPMENT LIST

F.1. Radiated Emissions 30 MHz – 1 GHz Measurement Equipment

Description	Manufacturer	Type/Model	Asset #	Cal Due	Cal Date
10m ANECHOIC CHAMBER					
Bilog Antenna	Teseq	CBL6112D	CG1177	10OCT08	10OCT07
RF Cable	Suhner Sucoflex	Ferrite bead loaded cable	CG0398	13APR08	13APR06
CONTROL ROOM					
Test Receiver	Rohde & Schwarz	ESMI	CG0433/ CG0434	27FEB08	27FEB07
Mast Controller	EMCO	2090	CG0179	N/A	N/A
Multi Device Controller TT1 (Turntable)	EMCO	2090	CG0178	N/A	N/A
- Cable 1	Suhner Sucoflex	NA	CG0690	13APR08	13APR06
- Amplifier	Hewlett Packard	8447F	CG0177	13APR08	13APR06

F.2. Radiated Emissions 1 GHz – 20 GHz Measurement Equipment

Description	Manufacturer	Type/Model	Asset #	Cal Due	Cal Date
10m ANECHOIC CHAMBER					
Horn Antenna (Rx) 1 GHz – 18 GHz	☒ EMCO	3115	CG0103	30AUG08	30AUG06
Standard Gain Horn (Rx) 18 GHz – 26.5 GHz	☒ EMCO	3160-09	CG0075	N/A	27NOV01
High pass filter f >1000 MHz	☒ MicroTronics	HPM14576	CG0963	10AUG08	10AUG06
LNA 1 GHz < f < 18 GHz	☒ Miteq	JSD00121	CG0317	10AUG08	10AUG06
LNA 18 GHz < f < 26.5 GHz	☒ Miteq	JSD00119	CG0482	19JAN08	19JAN07
Cable from LNA's to SA	Sucoflex 100	115757-4	CG0686	10AUG08	10AUG06
Spectrum Analyzer 9 kHz – 40 GHz	Rohde & Schwarz	FSEK-20	CG0118	19JUN08	19JUN07
LNA DC Power Supply	Xantrex	LXO 30-2	CG0493	NA	NA
HPIB Extender	HP	37204	CG0110	N/A	N/A
CONTROL ROOM					
PC with FSEK Manual ctrl S/W	N/A	N/A	N/A	N/A	N/A
HPIB Extender	HP	37204	CG0181	N/A	N/A
Mast Controller	EMCO	2090	CG0179	N/A	N/A
Multi Device Controller TT1	EMCO	2090	CG0178	N/A	N/A

F.3. Radio Measurement Equipment

Descriptions	Manufacturer	Type/Model	Serial #	Cal Due	Cal Date
EMI Receiver 9 kHz – 40 GHz	Rohde & Schwarz	ESI	CG0109	12NOV08	12NOV07
Power Meter	Agilent	E4418B	CG0119	21MAY08	21MAY07
Power Meter Sensor	Hewlett Packard	8481A	CG0264	21MAY08	21MAY07
Attenuator	Weinschel	30 dB	BM6254	30APR09	30APR07
RF cable	Sucoflex	104	263166	30APR09	30APR07
RF cable	Sucoflex	104	115760	30APR09	30APR07
Temperature Chamber	Thermotron	SM-8C	CG0836	NA	NA
Data Acquisition / Switch Unit	Hewlett Packard	34970A	CG0016	27NOV07	27NOV06
20 Channel Multiplexer	Agilent	34901A	CG0967	27NOV07	27NOV06
AC Power Source	ELGAR	SS66-3 AV3	CG0145	NA	NA
Spectrum Analyzer 9 kHz – 40 GHz	Rohde & Schwarz	FSEK-20	CG0118	19JUN08	19JUN07
Vector Signal Analzyer	Agilent	E4406A	CG0050	22OCT08	22OCT07

END OF DOCUMENT