Test Report A

Applicant: Ericsson (China)

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FCC: X3V1900MFRM3V2
IC: 287AJ-1900MFRM3V2

Test Report for

FCC/IC Equipment Authorization

CDMA Metrocell DC Indoor BTS with M3CR 1900MHz

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Revision History

Stream/Issue	Revision Date	Status	Changes	Author/Editor
00/00	04/27/2010	Draft	Initial test report	Stephen Tao
00/01	04/29/2010	Standard	Approved by manager	Stephen Tao

References

[1] FCC Part 24 Subpart E, “Personal Communication Services”

[2] FCC Part 2 Subpart J, “Frequency allocations and radio treaty matters; general rules and regulations”,

[3] TIA/EIA-97-D “Recommended Minimum Performance Standards for Base Stations Sup-porting Dual Mode Spread Spectrum Systems”.

[4] 2GHz Personal Communications Services, Industry Canada, RSS-133,Issue 5,Revision 1 February 2009

Acronyms and Abbreviations

ASIC	Application Specific Integrated Circuit
BBW	Breathing, Blossoming and Wilting
BPF	Bandpass Filter
BTS	Base Station Transceiver Subsystem
BW	Bandwidth
CDMA	Code Division Multiple Access
dBFS	dB relative to Full Scale
DDS	Direct Digital Synthesizer
DPM	Duplexer Preselector Module
EEPROM	Electrically Erasable and Programmable ROM
EC	Engineering Change
ERLCE	Excess Reverse Link Capacity Estimate
HSSPC	High-Speed Serial Protocol Controller
HW	Hardware
IF	Intermediate Frequency
IIC	Inter-Integrated Circuit Bus
IS	Interim Standard
LO	Local Oscillator
LPF	Low pass Filter
MCPA	Multi-Carrier Power Amplifier
MFRM	Multi-carrier Flexible Radio Module
NF	Noise Figure
OCNS	Orthogonal Channel Noise Source
OH	OverHead
PA	Power Amplifier
PC	Personal Computer
PPR	Peak Power Reduction
PSA	Product Specification Agreement
RBW	Resolution BandWidth
RF	Radio Frequency
Rx	Receive
SA	Spectrum Analyzer
SFRW	Single Carrier Flexible Radio Module
SW	Software
TBD	To Be Determined
TM	Triplexer Module
TPTL	Transmit Power Tracking Loop
TRM	Transmitter Receiver Module
Tx	Transmit
uP	Microprocessor
XCVR	Transceiver

Table of Contents

1.0 Introduction

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 Northern Telecom's (Nortel Networks) CDMA Metrocell DC Indoor BTS with 1900MHz M3 CR.

The M3 CR 1900MHz 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]*
- *2GHz Personal Communications Services, Industry Canada, RSS-133,Issue 5,Revision 1 February 2009*

1.1 Required Tests

Table 1 summarizes the measurement results for the CDMA M3 CR 1900MHz.

Table 1: Required Tests

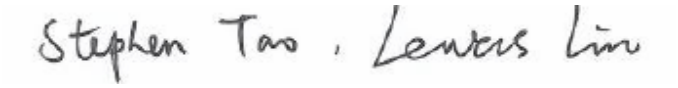
FCC Measurement Specification	FCC Limit Specification	IC Cross Reference	Description	Test to be Performed
2.1033	-	ASP-100	PA current specification	Yes
2.1046	24.232	RSS-133 section 4.1 & 6.4	RF Power Output	Yes
2.1049	-	RSS-Gen	Occupied Bandwidth	Yes
2.1051,2.1057	24.238	RSS-133 section 6.6 & RSS-Gen	Spurious Emissions at Antenna Terminals	Yes
2.1055	24.235	RSS-133 section 6.3	Frequency Stability	Yes

2.0 Engineering Declaration

The M3 CR 1900MHz has been tested in accordance with the requirements contained in the Federal Communications Commission Rules and Regulations Part 2 and 24.

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.

Test By:



Written By:

Approved By:

3.0 Equipment Authorization Application Requirements

3.1 Standard Test Conditions and Test Equipment

The M3 CR was tested under the following standard test conditions unless otherwise noted:

- Ambient Temperature: 20 to 25 degrees C
- Ambient Humidity: 20 to 40%
- DC Supply Voltage: -48 Vdc (nominal)

3.2 EUT Identification List

Table 2 shows the identification of the components tested in this report.

Table 2: EUT Identification List

Equipment Description	Model / Part Number	Serial Number
CEM192	NTRZ80BA 50	NNTM74X199NM
DOM-A	NTBW89SB A1	NNTMPX0002FM
DOM-A	NTBW89SB A1	NNTMPX0002FL
DOM-A	NTBW89SB A1	NNTMPX0002FG
GPSTM	NTGS50AA 14	NNTM74TM3JT0
CM-2	NTBW40BAE5 P1	NNTMDV01HFCK
CORE-2S	NTBW30DA 02	NNTM74X1WGW5
FAN	NTGZ85AAE5 A1	NNTM84G30002
M3 CR 1900MHz	NTGZ70BBE5 B7	NNTMEEK01018
AD TDPM	NTGZ81AB 03	ACET020011J3
BE TDPM	NTGZ81BB 01	ACET0200000V
CFG TDPM	NTGZ81DB 01	ACET020012TT
Digital Shelf	NTGS20BA 07	NNTM7860CSA7
Power Shelf	NTGS47AEE5 P1	NNTM74XL8656
Cooling System	NTGS18AC 03	NNTMCL0001B5

3.3 Test Equipment List

Table 3 shows the identification of the test equipment used in this report.

Table 3: Test Equipment List

Description	Manufacturer	Model	Serial Number	Cal. Due Date
PSA Series Spectrum Analyzer 3Hz-26.5GHz	Agilent	E4440A	MY48250517	2011-03-29
30dB Attenuator	Weinschel	53-30-33	NV821	Verified
RF Cable	SUCOFLEX	104PEA	28266, 28267 4PEA	Verified
Climatic Chamber	CEEC	CEEC-WSHR-15C	070016	2010-06-09

4.0 Transmitter Test and Measurement Results

4.1 PA DC Current Draw

4.1.1 PA DC Current Draw Requirements

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.

4.1.2 Test Method

The Metrocell BTS M3 CR 1900MHz was setup to blossom at maximum power. The RF output power was measured using the PSA. The softfail current registers were read with the BTS controller when the Metrocell BTS was fully blossomed.

4.1.3 Test Setup

The set-up used for the Metrocell BTS M3 CR 1900MHz PA DC current draw test is illustrated in Figure 1. RF output power measurements were referenced to the M3 CR PA output.

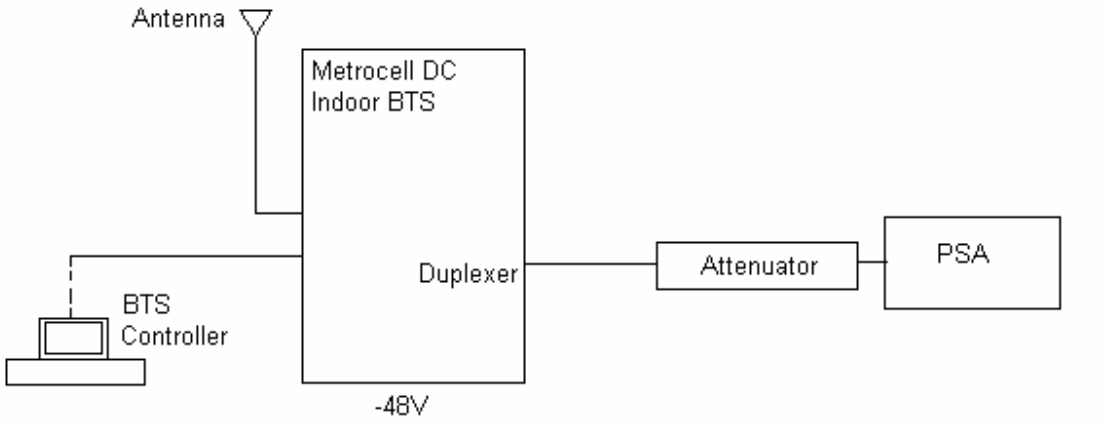


Figure 1: Test Setup for M3 CR PA DC current draw measurement

4.1.4 Test Results

The final DC current is shown in Table 4.

Table 4: Average Current Values @ Pout = 46.5dBm

PA Current Values (Ampere)		
PA1	PA2	PA3
5.807	5.791	5.977

4.2 RF Power Output

4.2.1 RF Power Output Requirements

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.

FCC Limit (Part 24.232)

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

4.2.2 Test Method

The DE was setup via the BTS controller to enable to transmit at maximum power. Measurements were made in one, two, and three carrier configurations. The RF output power was measured using the PSA.

4.2.3 Test Setup

The set-up used for the RF output power test is illustrated in Figure 2. RF output power measurements were referenced to the main antenna port of the duplexer.

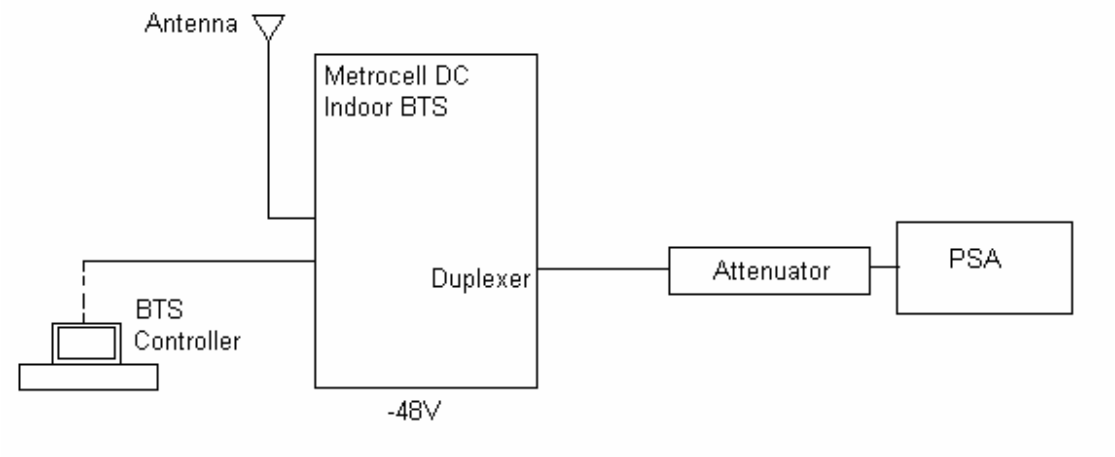


Figure 2: Test Setup for RF Power Output Measurement

4.2.4 Test Results

The Metrocell BTS M3 CR 1900MHz complies with the requirement. The maximum measured RF output power was 46.5 dBm.

Table 5: RF Output Power of Metrocell BTS M3 CR 1900MHz, 1 Carrier Mode IS95

Channel Number(Band)	Frequency(MHz)	Measured RF Output Power(dBm)	Typical Maximum Rated Power(dBm)
25(A)	1931.25	46.2	46.5
375(D)	1948.75	46.23	46.5
425(B)	1951.25	46.8	46.5
775(B)	1968.75	46.89	46.5
825(F)	1971.25	46.42	46.5
1275(G)	1993.75	46.43	46.5

Table 6: RF Output Power of Metrocell BTS M3 CR 1900MHz, 2 Carriers Mode IS95

Channel Number(Band)	Frequency(MHz)	Measured RF Output Power(dBm)	Typical Maximum Rated Power(dBm)
25, 50(A)	1931.25, 1932.5	46.3	46.5
350, 375(D)	1947.5, 1948.75	46.3	46.5
425, 450(B)	1951.25, 1952.5	46.88	46.5
750, 775(E)	1967.5, 1968.75	46.1	46.5
825, 850(F)	1971.25, 1972.5	46.52	46.5
1250, 1275(G)	1992.5, 1993.75	46.48	46.5

Table 7: RF Output Power of Metrocell BTS M3 CR 1900MHz, 3 Carriers Mode IS95

Channel Number(Band)	Frequency(MHz)	Measured RF Output Power(dBm)	Typical Maximum Rated Power(dBm)
25, 50, 75(A)	1931.25, 1932.5, 1933.75	46.41	46.5
325, 350, 375(D)	1946.25, 1947.5, 1948.75	46.65	46.5
425, 450, 475(B)	1951.25, 1952.5, 1953.75	46.42	46.5
725, 750, 775(E)	1966.25, 1967.5, 1968.75	46.24	46.5
825, 850, 875(F)	1971.25, 1972.5, 1973.75	46.76	46.5
1225, 1250, 1275(G)	1991.25, 1992.5, 1993.75	46.83	46.5

Table 8: RF Output Power of Metrocell BTS M3 CR 1900 MHz, 1 Carriers Mode IS856 QPSK

Channel Number(Band)	Frequency(MHz)	Measured RF Output Power(dBm)	Typical Maximum Rated Power(dBm)
25(A)	1931.25	45.41	46.5
375(D)	1948.75	45.35	46.5
425(B)	1951.25	45.17	46.5
775(B)	1968.75	45.3	46.5
825(F)	1971.25	45.43	46.5
1275(G)	1993.75	45.41	46.5

Table 9: RF Output Power of Metrocell BTS M3 CR 1900 MHz, 2 Carriers Mode IS856 8PSK

Channel Number(Band)	Frequency(MHz)	Measured RF Output Power(dBm)	Typical Maximum Rated Power(dBm)
25, 50(A)	1931.25, 1932.5	45.5	46.5
350, 375(D)	1947.5, 1948.75	45.55	46.5
425, 450(B)	1951.25, 1952.5	45.23	46.5
750, 775(E)	1967.5, 1968.75	45.65	46.5
825, 850(F)	1971.25, 1972.5	45.41	46.5
1250, 1275(G)	1992.5, 1993.75	45.3	46.5

Table 10: RF Output Power of Metrocell BTS M3 CR 1900 MHz, 3 Carriers Mode IS856 16QAM

Channel Number(Band)	Frequency(MHz)	Measured RF Output Power(dBm)	Typical Maximum Rated Power(dBm)
25, 50, 75(A)	1931.25, 1932.5, 1933.75	45.78	46.5
325, 350, 375(D)	1946.25, 1947.5, 1948.75	45.73	46.5
425, 450, 475(B)	1951.25, 1952.5, 1953.75	45.62	46.5
725, 750, 775(E)	1966.25, 1967.5, 1968.75	45.72	46.5
825, 850, 875(F)	1971.25, 1972.5, 1973.75	45.69	46.5
1225, 1250, 1275(G)	1991.25, 1992.5, 1993.75	45.71	46.5

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 Mothod

The DE was setup via the BTS controller to enable the M3 CR 1900MHz to transmit at maximum power. The occupied bandwidth was measured using the 99% channel power feature of the spectrum analyzer.

4.3.3 Test Setup

The set-up used for the Metrocell BTS M3 CR 1900MHz Occupied bandwidth test is illustrated in Figure 3.

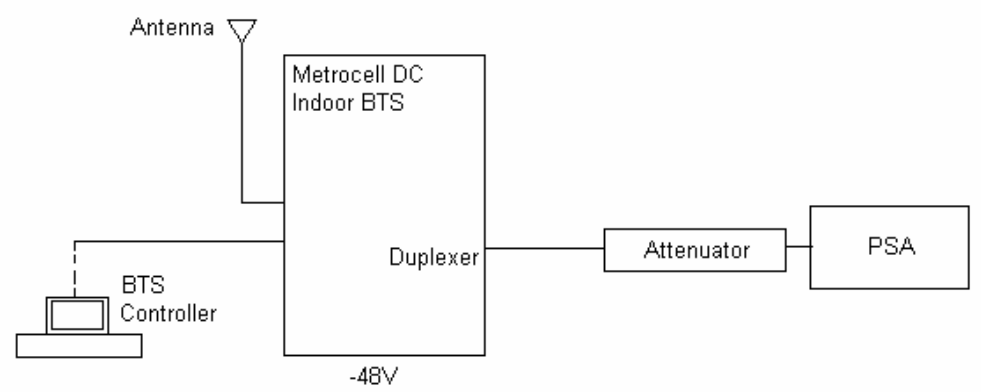


Figure 3: Test Setup for Occupied Bandwidth Measurement

4.3.4 Test Results

The Metrocell BTS M3 CR 1900 MHz complies with the requirement. The occupied bandwidth measured in one, two, and three carrier configurations for each licensed band. The plots that follow show the occupied bandwidth in one, two, and three carrier configurations. (Although plots were recorded for all channels tested, only one sample plot per carrier configuration is provided reduce the number of figures.).

Table 11: Occupied Bandwidth, Metrocell BTS M3 CR 1900 MHz, Single Carrier Mode IS95

Channel Number(Band)	Frequency(MHz)	Measured Occupied Bandwidth (MHz)
25(A)	1931.25	1.262
375(D)	1948.75	1.2672
425(B)	1951.25	1.2683
775(B)	1968.75	1.2677
825(F)	1971.25	1.2605
1275(G)	1993.75	1.2655

Table 12: Occupied Bandwidth, Metrocell BTS M3 CR 1900 MHz, 2 Carriers Mode IS95

Channel Number(Band)	Frequency(MHz)	Measured Occupied Bandwidth (MHz)
25, 50(A)	1931.25, 1932.5	2.4833
350, 375(D)	1947.5, 1948.75	2.4889
425, 450(B)	1951.25, 1952.5	2.5016
750, 775(E)	1967.5, 1968.75	2.4967
825, 850(F)	1971.25, 1972.5	2.4933
1250, 1275(G)	1992.5, 1993.75	2.4911

Table 13: Occupied Bandwidth, Metrocell BTS M3 CR 1900 MHz, 3 Carriers Mode IS95

Channel Number(Band)	Frequency(MHz)	Measured Occupied Bandwidth (MHz)
25, 50, 75(A)	1931.25, 1932.5, 1933.75	3.7269
325, 350, 375(D)	1946.25, 1947.5, 1948.75	3.7117
425, 450, 475(B)	1951.25, 1952.5, 1953.75	3.7243
725, 750, 775(E)	1966.25, 1967.5, 1968.75	3.7307
825, 850, 875(F)	1971.25, 1972.5, 1973.75	3.7369
1225, 1250, 1275(G)	1991.25, 1992.5, 1993.75	3.7195

Table 14: Occupied Bandwidth, Metrocell BTS M3 CR 1900 MHz, 1 Carriers Mode IS856 QPSK

Channel Number(Band)	Frequency(MHz)	Measured Occupied Bandwidth (MHz)
25(A)	1931.25	1.2627
375(D)	1948.75	1.2605
425(B)	1951.25	1.2584
775(B)	1968.75	1.2587
825(F)	1971.25	1.2631
1275(G)	1993.75	1.2583

Table 15: Occupied Bandwidth, Metrocell BTS M3 CR 1900 MHz, 2 Carriers Mode IS856 8PSK

Channel Number(Band)	Frequency(MHz)	Measured RF Output Power(dBm)
25, 50(A)	1931.25, 1932.5	2.4905
350, 375(D)	1947.5, 1948.75	2.4822
425, 450(B)	1951.25, 1952.5	2.4847
750, 775(E)	1967.5, 1968.75	2.4789
825, 850(F)	1971.25, 1972.5	2.4844
1250, 1275(G)	1992.5, 1993.75	2.4786

Table 16: Occupied Bandwidth, Metrocell BTS M3 CR 1900 MHz, 3 Carriers Mode IS856 16QAM

Channel Number(Band)	Frequency(MHz)	Measured Occupied Bandwidth (MHz)
25, 50, 75(A)	1931.25, 1932.5, 1933.75	3.7268
325, 350, 375(D)	1946.25, 1947.5, 1948.75	3.7184
425, 450, 475(B)	1951.25, 1952.5, 1953.75	3.713
725, 750, 775(E)	1966.25, 1967.5, 1968.75	3.7206
825, 850, 875(F)	1971.25, 1972.5, 1973.75	3.7163
1225, 1250, 1275(G)	1991.25, 1992.5, 1993.75	3.7332

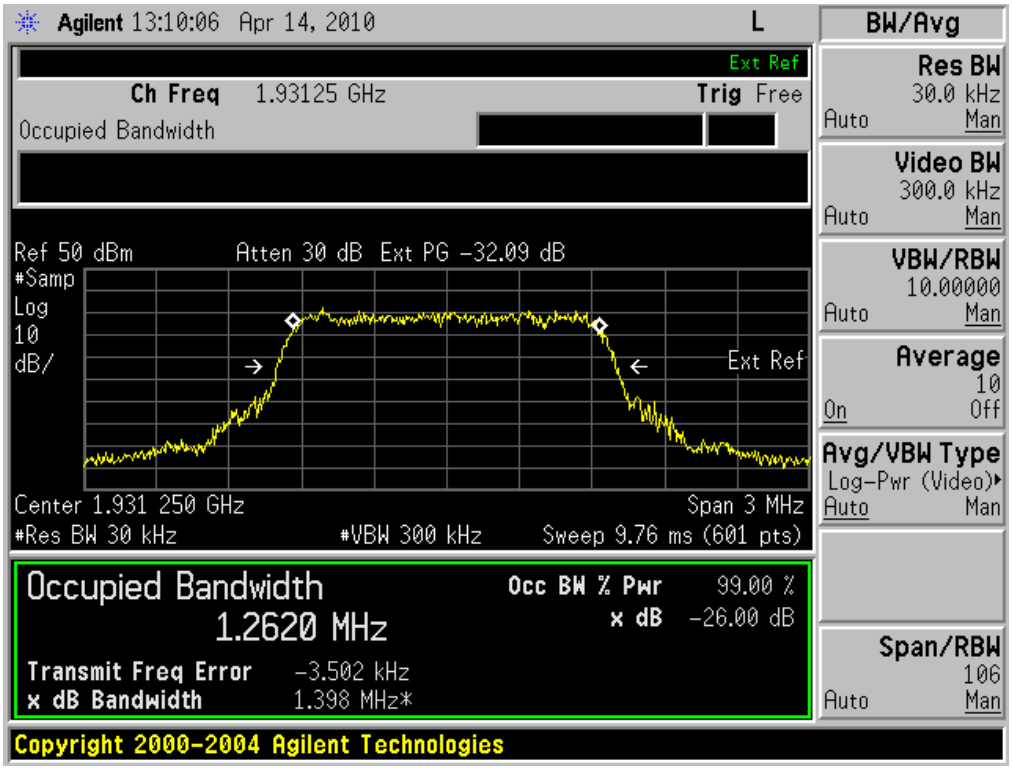


Figure 4: Occupied Bandwidth - Single Carrier Channel 25 (AD) IS95

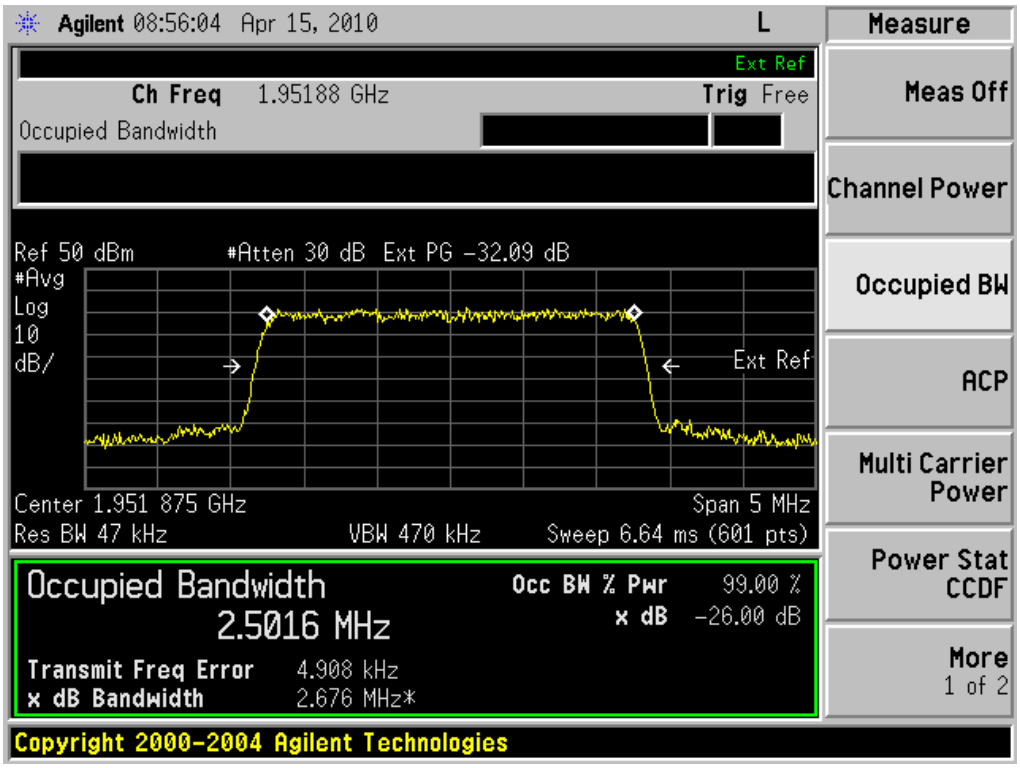


Figure 5: Occupied Bandwidth - 2 Carriers Channels 425, 450 (BE) IS95

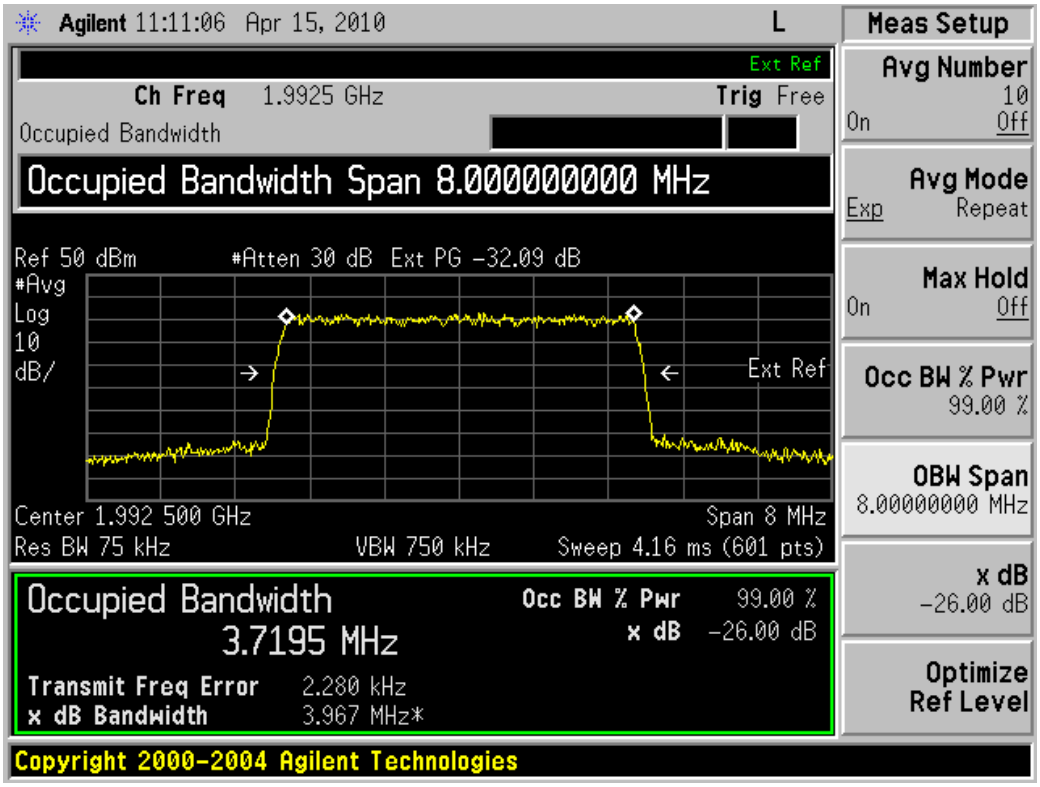


Figure 6: Occupied Bandwidth - 3 Carriers Channels 1225, 1250, 1275 (CFG) IS95

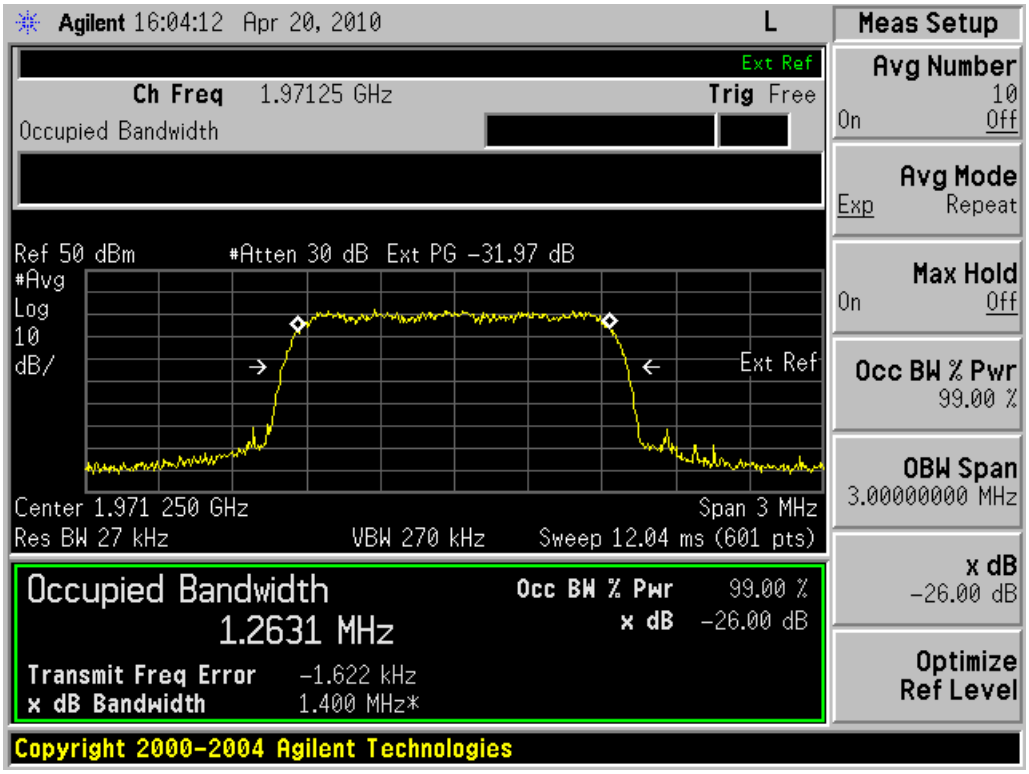


Figure 7: Occupied Bandwidth - Single Carrier Channel 825 (CFG) IS856 QPSK

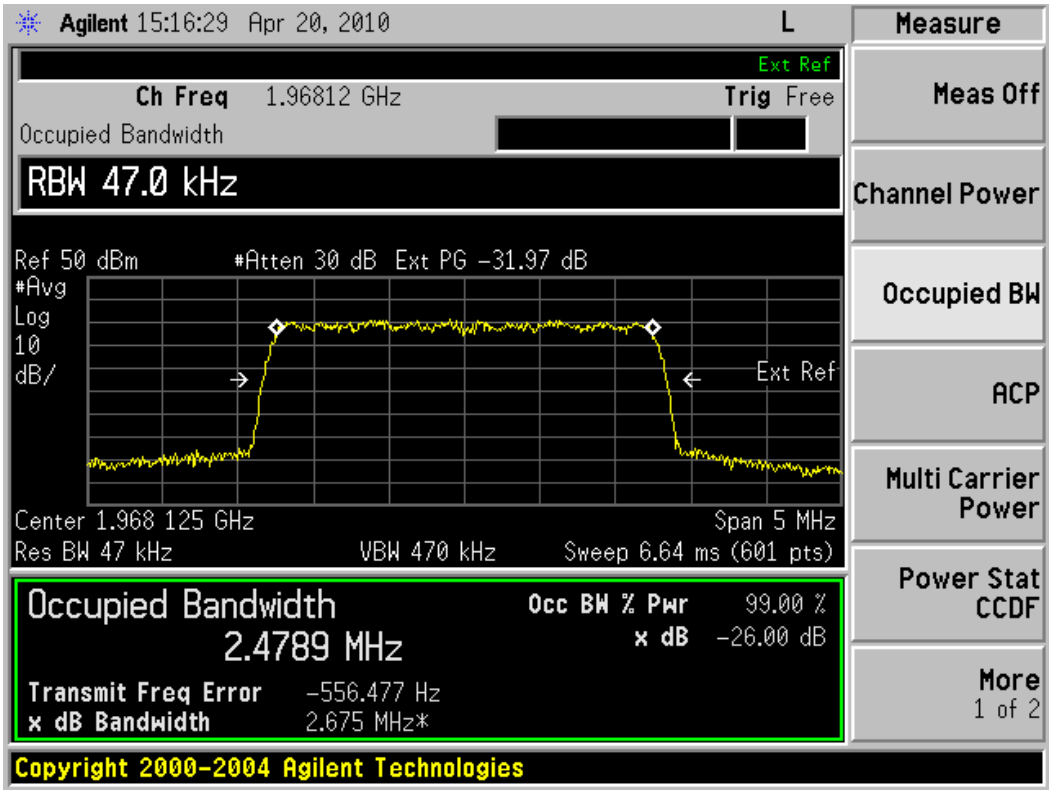


Figure 8: Occupied Bandwidth - 2 Carriers Channels 750, 775 (BE) IS856 8PSK

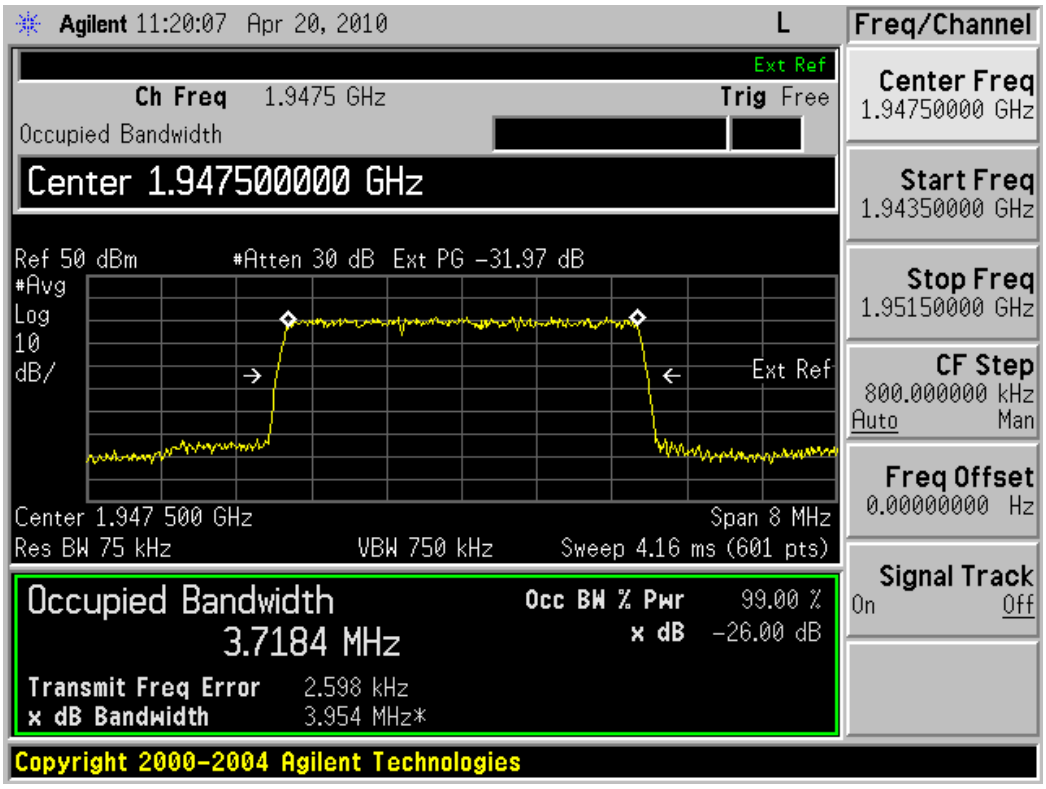


Figure 9: Occupied Bandwidth - 3 Carriers Channels 325, 350, 375 (AD) IS856 16QAM

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 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 a factor of at least 43+10*logP dB.*

(b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1MHz or greater. In the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of 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 emission 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.

4.4.2 Test Method

The BTS digital enclosure was configured via the BTS controller to enable the M3 CR to transmit at maximum power. Measurements were made on IS-97 and IS-856 channels at the bottom and top of the licensed sub-bands in one, two and three carrier configurations. The following spectrum analyzer settings were used for the measurement of the antenna port spurious emissions:

Adjacent Frequency (1900MHz—2G) bandwidth

Resolution Bandwidth:	30kHz (1 carrier), 30kHz (2 carriers), 30kHz (3 carriers)
Video Bandwidth:	100kHz (1 carrier), 100kHz (2 carriers), 100kHz (3 carriers)
Average:	10 Averages
Span:	set accordingly
Attenuation:	30 dB
Ref. Level:	variable
Ref. Level Offset:	variable

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

Other Frequency emissions up to 20GHz

Resolution Bandwidth:	1MHz (1 carrier), 1MHz (2 carriers), 1MHz (3 carriers)
Video Bandwidth:	3MHz (1 carrier), 3MHz (2 carriers), 3MHz (3 carriers)
Average:	10 Averages
Span:	set accordingly
Attenuation:	30 dB
Ref. Level:	variable
Ref. Level Offset:	variable

Calibrate the cables and attenuator losses using a network analyzer. The calibrated losses are the reference level offset on the spectrum analyzer.

4.4.3 Test Setup

Set-up used for the Metrocell BTS Antenna Port Spurious Emission test is illustrated in Figure 10.

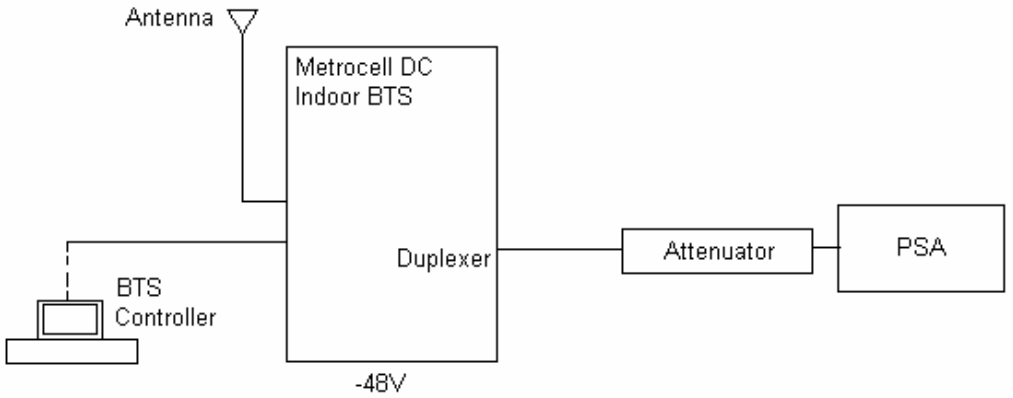


Figure 10: Test Setup for Spurious Emissions Measurement

4.4.4 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 Metrocell BTS complies with the limit of -13 dBm. Table 17 & 18 shows the spurious emissions at the antenna port of the Metrocell BTS M3 CR 1900MHz for 1, 2 and 3 carrier modes. The plots that follow show the spurious emissions in one, two, and three carrier configuration. (For each configuration, only some samples of one, two and three carriers are shown to reduce the number of figures). Please refer to Figures below.

Table 17: Spurious Emissions of AD Band at the Metrocell BTS Antenna Port IS95

Frequency(MHz)	Spurious Emissions Level(dBm)			Margin to FCC Limit of -13 dBm		
	1 Carrier	2 Carrier	3 Carrier	1 carrier	2 carrier	3 carrier
50MHz-1900MHz	-30.448	-30.327	-33.268	17.448	17.327	20.268
1900MHz-1929MHz	-35.761	-31.882	-35.352	22.761	18.882	22.352
1929MHz-1930MHz	-29.233	-27.215	-32.407	16.233	14.215	19.407
1950MHz-1951MHz	-31.422	-24.907	-28.649	18.422	11.907	15.649
1951MHz-2GHz	-39.832	-29.703	-32.005	26.832	16.703	19.005
2GHz-5GHz	-27.314	-28.158	-28.179	14.314	15.158	15.179
5GHz-10GHz	-26.043	-25.613	-25.805	13.043	12.613	12.805
10GHz-15GHz	-23.733	-23.23	-23.145	10.733	10.23	10.145
15GHz-20GHz	-24.138	-23.829	-24.399	11.138	10.829	11.399

Table 18: Spurious Emissions of BE Band at the Metrocell BTS Antenna Port IS95

Frequency(MHz)	Spurious Emissions Level(dBm)			Margin to FCC Limit of -13 dBm		
	1 Carrier	2 Carrier	3 Carrier	1 carrier	2 carrier	3 carrier
50MHz-1900MHz	-30.582	-30.95	-31.131	17.582	17.95	18.131
1900MHz-1949MHz	-38.014	-30.185	-33.315	25.014	17.185	20.315
1949MHz-1950MHz	-33.582	-25.847	-29.92	20.582	12.847	16.92
1970MHz-1971MHz	-34.034	-26.538	-31.895	21.034	13.538	18.895
1971MHz-2GHz	-38.251	-30.221	-34.179	25.251	17.221	21.179
2GHz-5GHz	-27.906	-27.844	-28.96	14.906	14.844	15.96
5GHz-10GHz	-25.866	-25.855	-27.667	12.866	12.855	14.667
10GHz-15GHz	-23.045	-23.39	-24.47	10.045	10.39	11.47
15GHz-20GHz	-23.698	-23.856	-24.915	10.698	10.856	11.915

Table 19: Spurious Emissions of CFG Band at the Metrocell BTS Antenna Port IS95

Frequency(MHz)	Spurious Emissions Level(dBm)			Margin to FCC Limit of -13 dBm		
	1 Carrier	2 Carrier	3 Carrier	1 carrier	2 carrier	3 carrier
50MHz-1900MHz	-31.945	-30.375	-31.062	18.945	17.375	18.062
1900MHz-1969MHz	-38.886	-30.071	-32.789	25.886	17.071	19.789
1969MHz-1970MHz	-32.755	-23.817	-27.658	19.755	10.817	14.658
1995MHz-1996MHz	-30.82	-22.73	-26.34	17.82	9.73	13.34
1996MHz-2GHz	-34.224	-30.69	-31.164	21.224	17.69	18.164
2GHz-5GHz	-27.033	-27.764	-27.002	14.033	14.764	14.002
5GHz-10GHz	-25.522	-25.543	-25.925	12.522	12.543	12.925
10GHz-15GHz	-23.394	-23.21	-23.111	10.394	10.21	10.111
15GHz-20GHz	-23.876	-23.816	-23.456	10.876	10.816	10.456

Table 20: Spurious Emissions of AD Band at the Metrocell BTS Antenna Port IS856 QPSK

Frequency(MHz)	Spurious Emissions Level(dBm)			Margin to FCC Limit of -13 dBm		
	1 Carrier	2 Carrier	3 Carrier	1 carrier	2 carrier	3 carrier
50MHz-1900MHz	-31.144	-31.221	-30.61	18.144	18.221	17.61
1900MHz-1929MHz	-36.822	-33.723	-32.163	23.822	20.723	19.163
1929MHz-1930MHz	-33.465	-28.387	-26.693	20.465	15.387	13.693
1950MHz-1951MHz	-35.122	-29.79	-28.986	22.122	16.79	15.986
1951MHz-2GHz	-40.143	-35.668	-29.84	27.143	22.668	16.84
2GHz-5GHz	-27.979	-27.603	-27.59	14.979	14.603	14.59
5GHz-10GHz	-25.583	-25.219	-25.44	12.583	12.219	12.44
10GHz-15GHz	-23.28	-23.096	-23.04	10.28	10.096	10.04
15GHz-20GHz	-23.501	-23.668	-23.584	10.501	10.668	10.584

Table 21: Spurious Emissions of BE Band at the Metrocell BTS Antenna Port IS856 8PSK

Frequency(MHz)	Spurious Emissions Level(dBm)			Margin to FCC Limit of -13 dBm		
	1 Carrier	2 Carrier	3 Carrier	1 carrier	2 carrier	3 carrier
50MHz-1900MHz	-30.98	-30.713	-30.489	17.98	17.713	17.489
1900MHz-1949MHz	-39.678	-34.388	-34.912	26.678	21.388	21.912
1949MHz-1950MHz	-31.003	-26.43	-27.825	18.003	13.43	14.825
1970MHz-1971MHz	-30.511	-29.396	-30.148	17.511	16.396	17.148
1971MHz-2GHz	-37.696	-36.636	-29.596	24.696	23.636	16.596
2GHz-5GHz	-27.731	-27.58	-27.657	14.731	14.58	14.657
5GHz-10GHz	-25.677	-25.471	-25.506	12.677	12.471	12.506
10GHz-15GHz	-23.151	-23.086	-23.135	10.151	10.086	10.135
15GHz-20GHz	-23.646	-23.574	-23.626	10.646	10.574	10.626

Table 22: Spurious Emissions of CFG Band at the Metrocell BTS Antenna Port IS856 16QAM

Frequency(MHz)	Spurious Emissions Level(dBm)			Margin to FCC Limit of -13 dBm		
	1 Carrier	2 Carrier	3 Carrier	1 carrier	2 carrier	3 carrier
50MHz-1900MHz	-30.133	-30.565	-30.601	17.133	17.565	17.601
1900MHz-1969MHz	-39.363	-35.328	-35.431	26.363	22.328	22.431
1969MHz-1970MHz	-35.589	-27.604	-29.755	22.589	14.604	16.755
1995MHz-1996MHz	-34.988	-35.183	-30.911	21.988	22.183	17.911
1996MHz-2GHz	-41.272	-39.729	-33.394	28.272	26.729	20.394
2GHz-5GHz	-27.825	-27.662	-27.473	14.825	14.662	14.473
5GHz-10GHz	-25.573	-25.676	-25.572	12.573	12.676	12.572
10GHz-15GHz	-23.051	-23.085	-23.14	10.051	10.085	10.14
15GHz-20GHz	-23.723	-23.529	-23.595	10.723	10.529	10.595

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

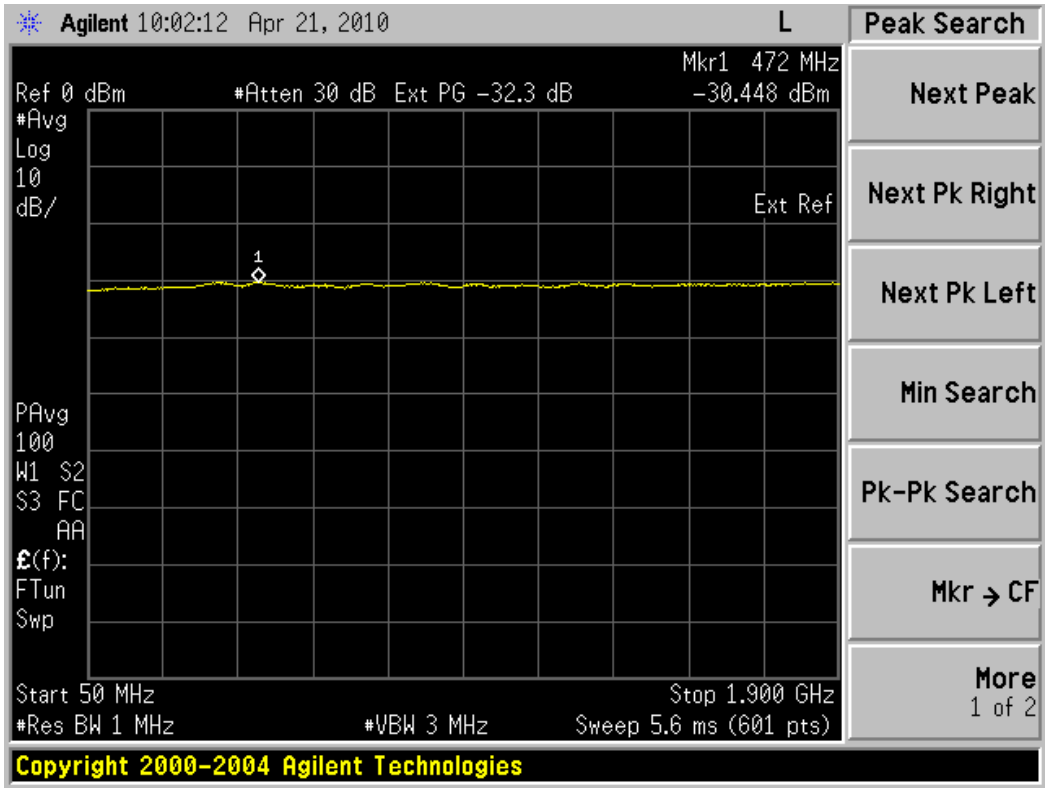


Figure 11: Conducted Spurious Emissions - 1 Carrier, Channel 25, 50MHz-1900MHz IS95

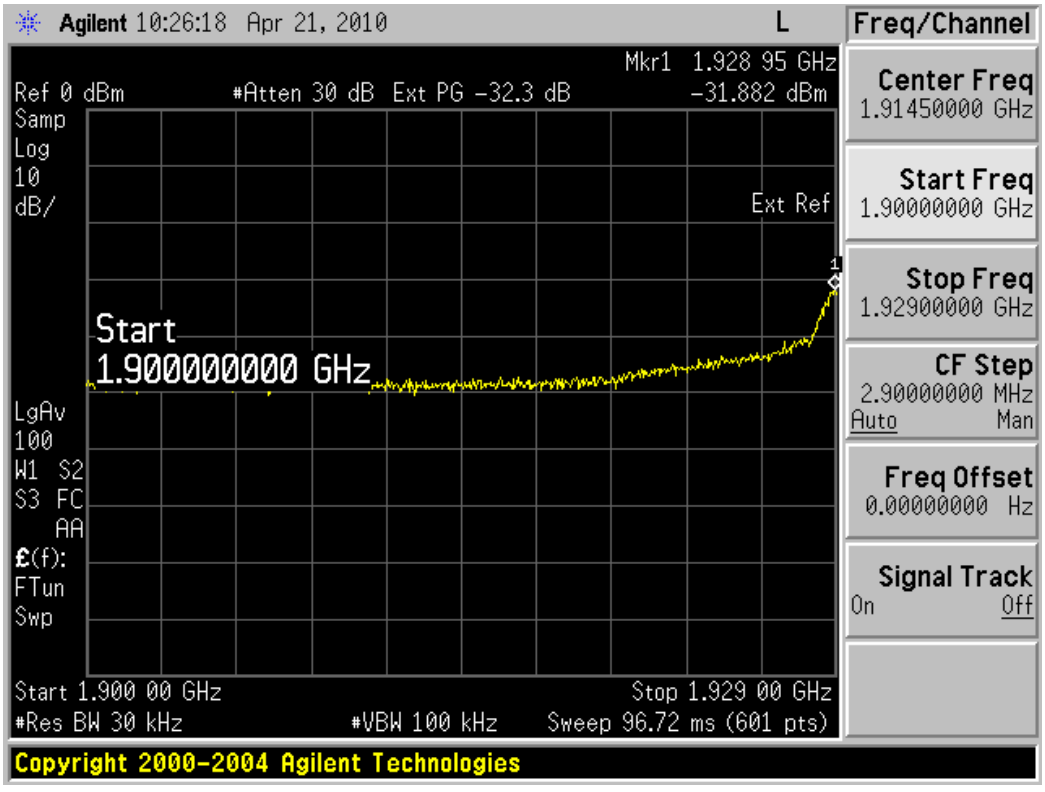


Figure 12: Conducted Spurious Emissions - 2 Carriers, Channel 25 50 1900MHz-1929MHz IS95

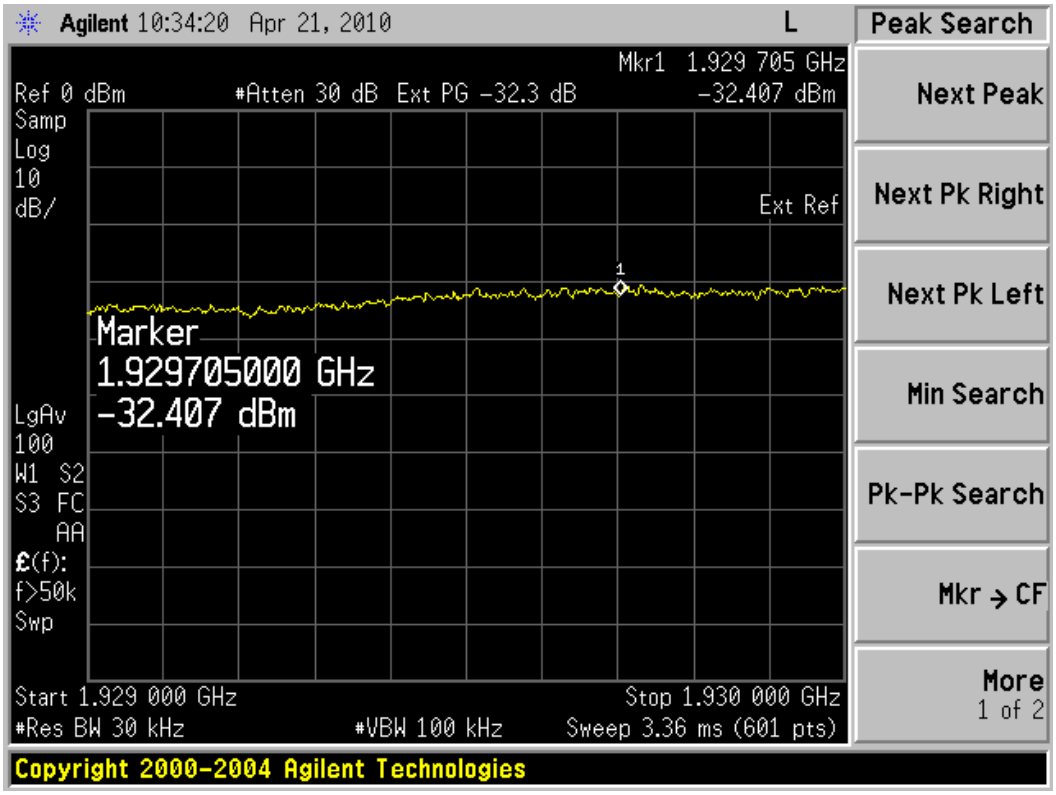


Figure 13: Conducted Spurious Emissions - 3 Carriers, Channel 25 50 75, 1920MHz-1930MHz IS95

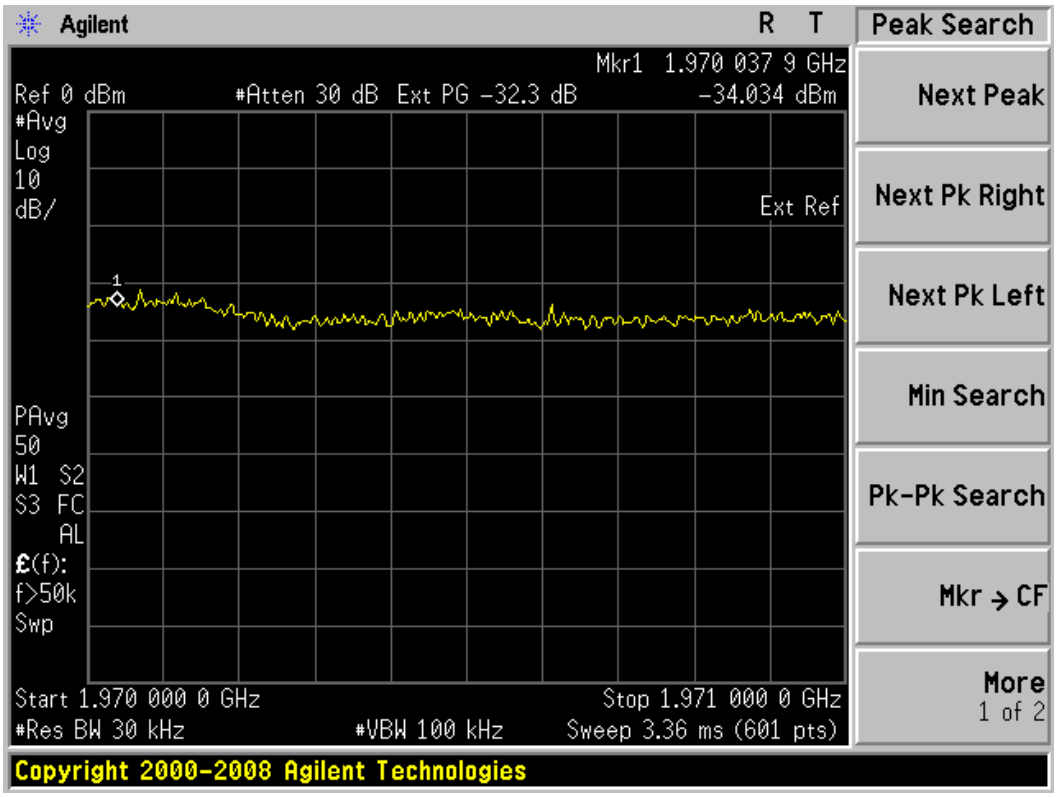


Figure 14: Conducted Spurious Emissions - 1 Carrier, Channel 775, 1970MHz-1971MHz IS95

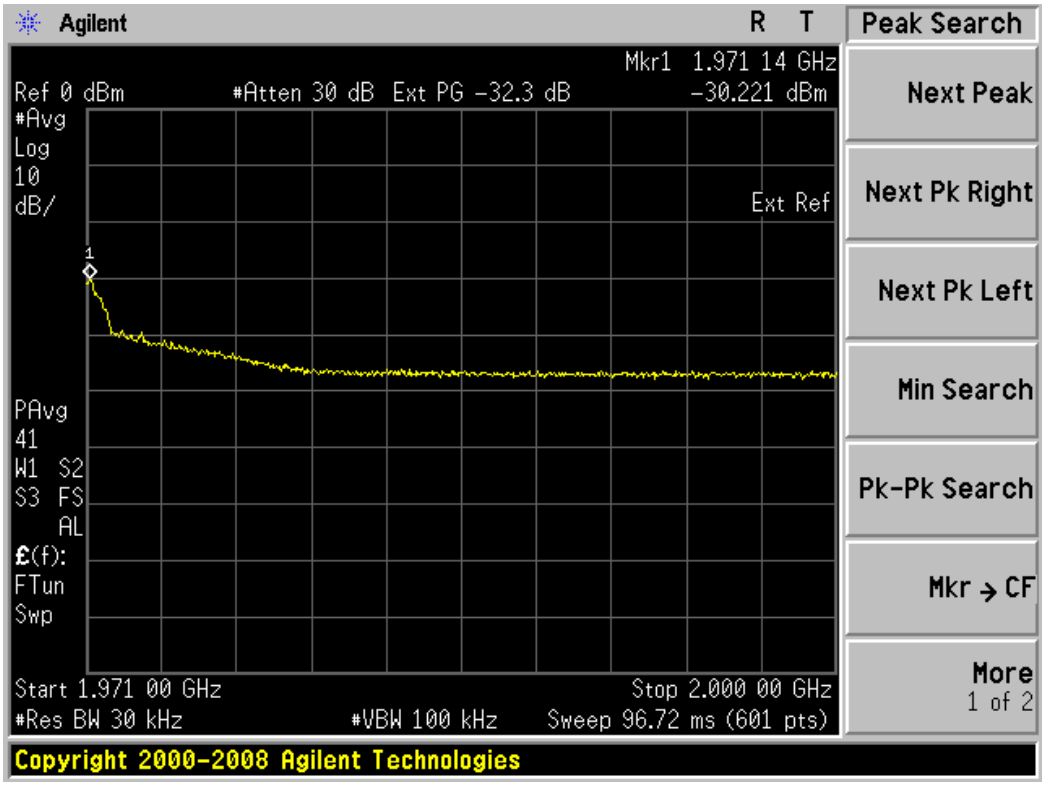


Figure 15: Conducted Spurious Emissions - 2 Carriers, Channel 750, 775, 1971GHz-2GHz IS95

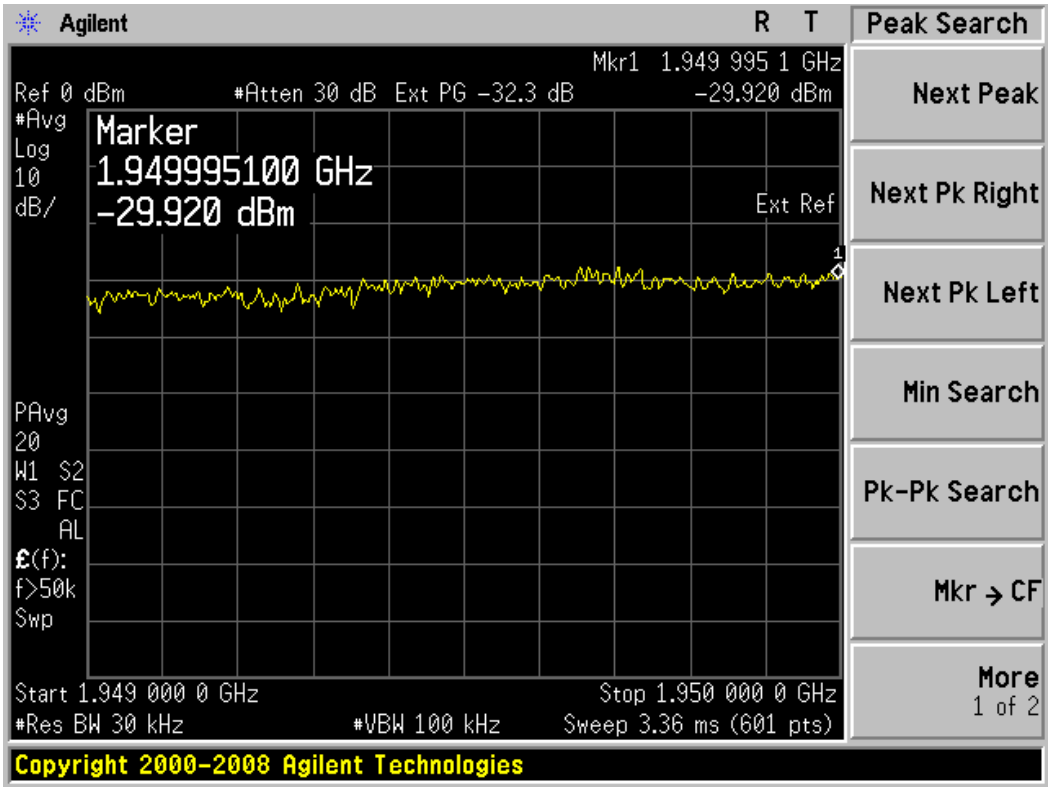


Figure 16: Conducted Spurious Emissions - 3 Carriers, Channel 425 450 475 1949MHz-1950MHz IS95

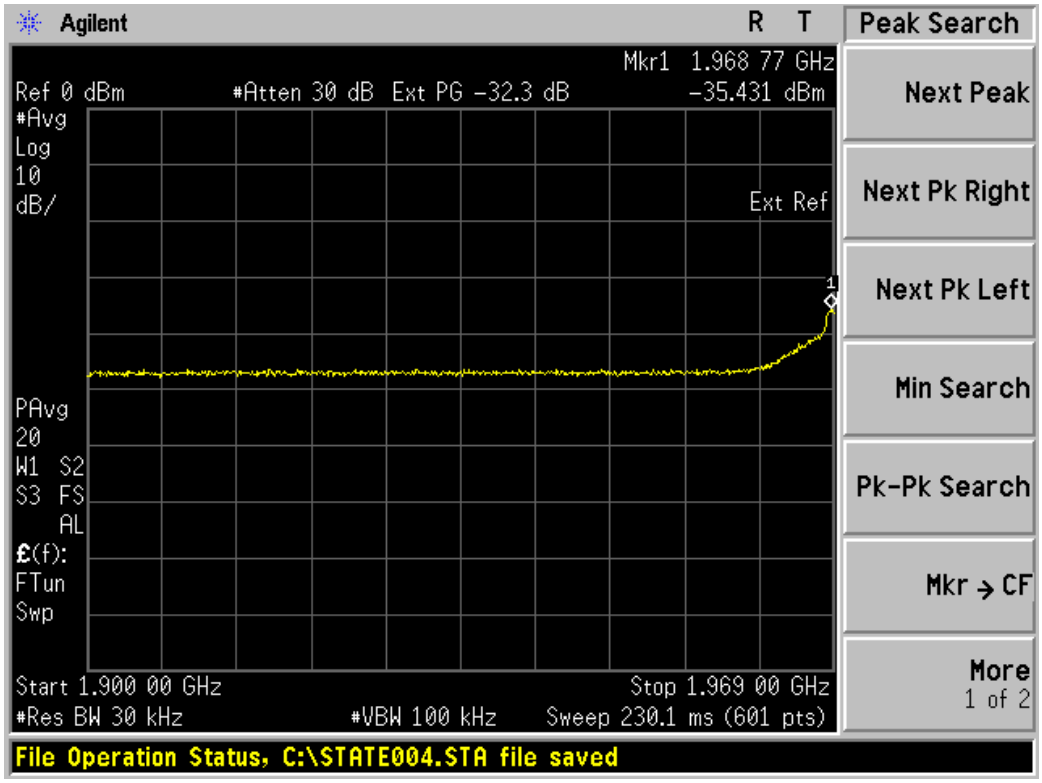


Figure 17: Conducted Spurious Emissions- 3 Carriers, Channel 425 450 475 1900MHz-1969MHz IS856

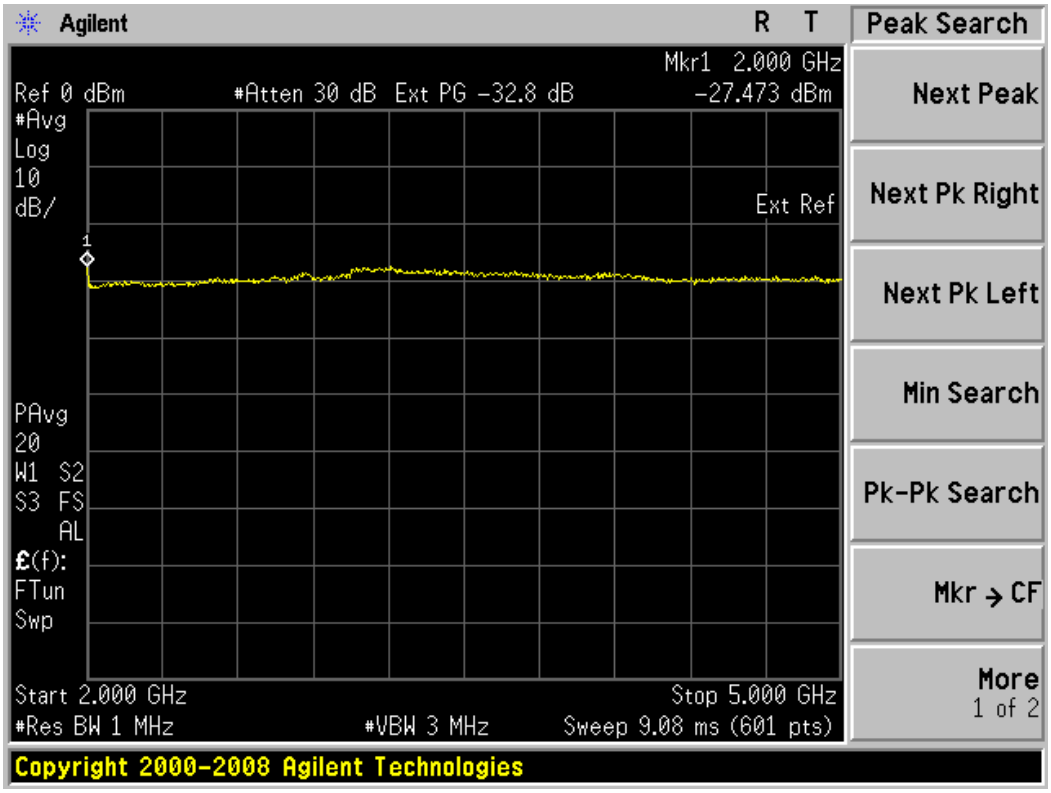


Figure 18: Conducted Spurious Emissions-3 Carriers, Channel 1225, 1250, 1275, 2GHz-5GHz IS856

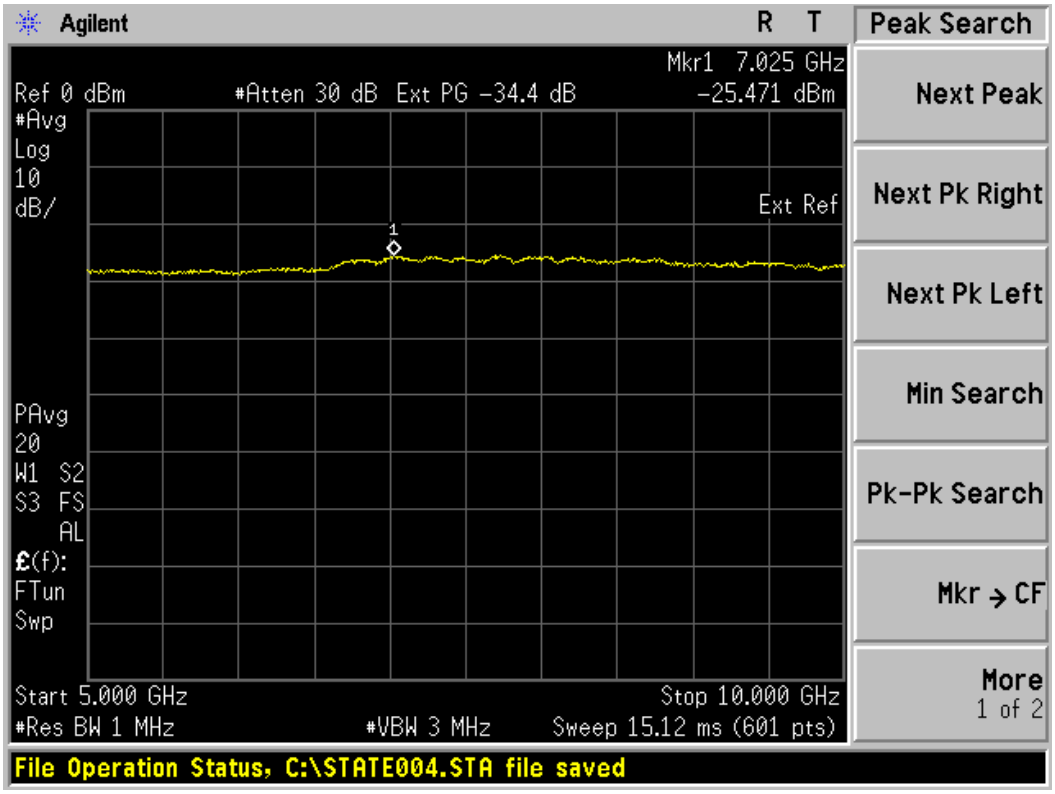


Figure 19: Conducted Spurious Emissions - 2 Carriers, Channel 750, 775, 5GHz-10GHz IS856

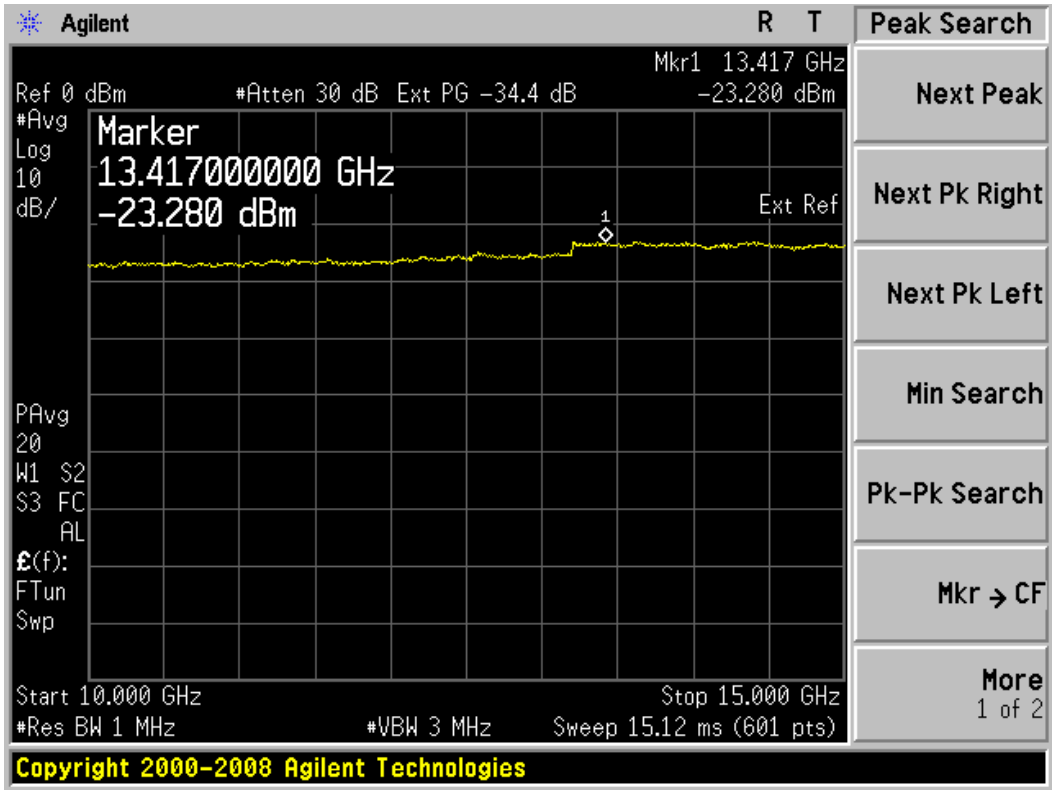


Figure 20: Conducted Spurious Emissions - 1 Carrier, Channel 375, 10GHz-15GHz IS856

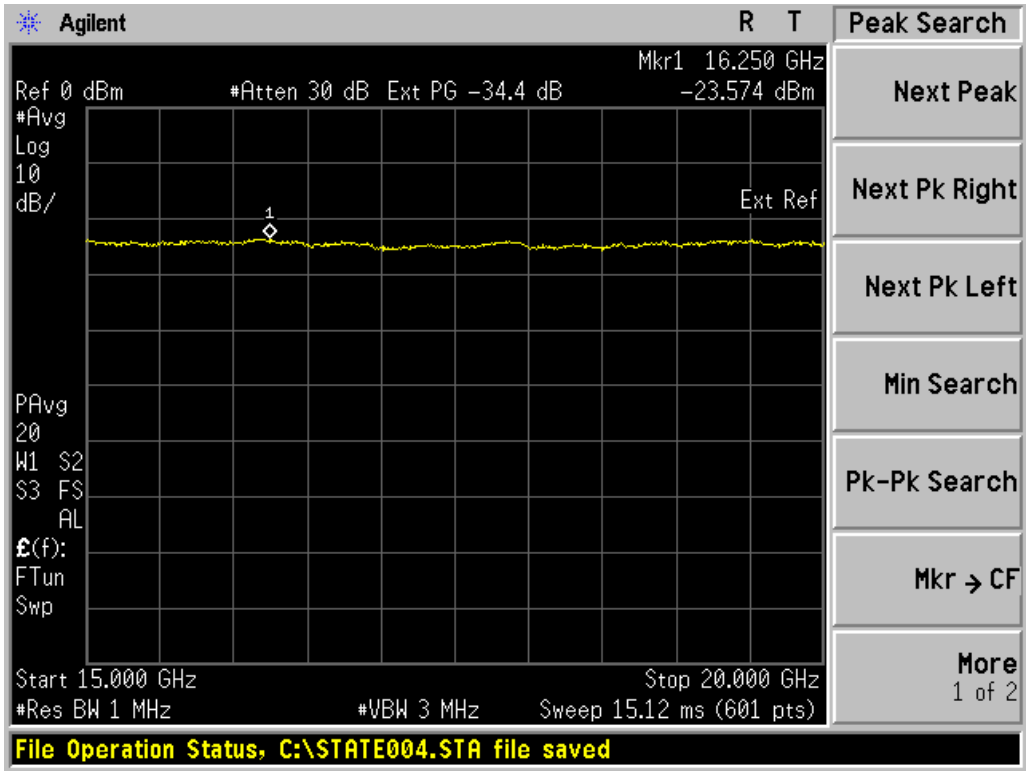


Figure 21: Conducted Spurious Emissions - 2 Carriers, Channel 1225, 1250 15GHz-20GMHz IS856

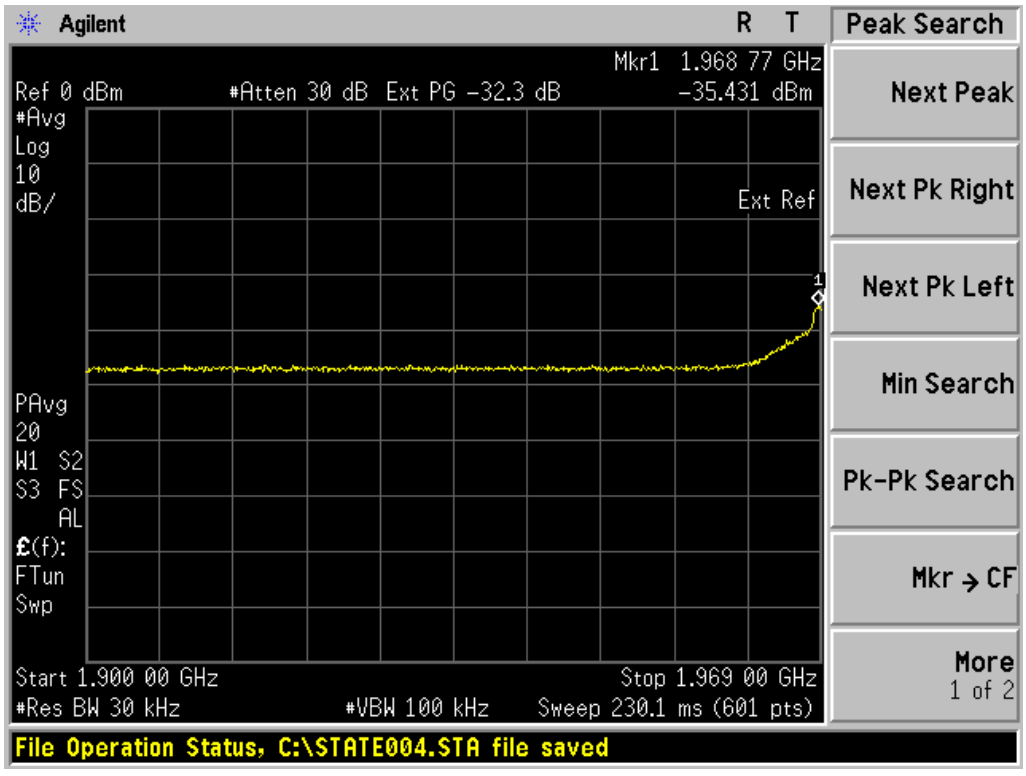


Figure 22: Conducted Spurious Emissions-3 Carriers, Channel 825 850 875, 1900MHz-1969MHz IS856

4.5 Frequency Stability

4.5.1 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 Limit

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

4.5.2 Test Procedure

The test equipment was configured as shown in figure 35.

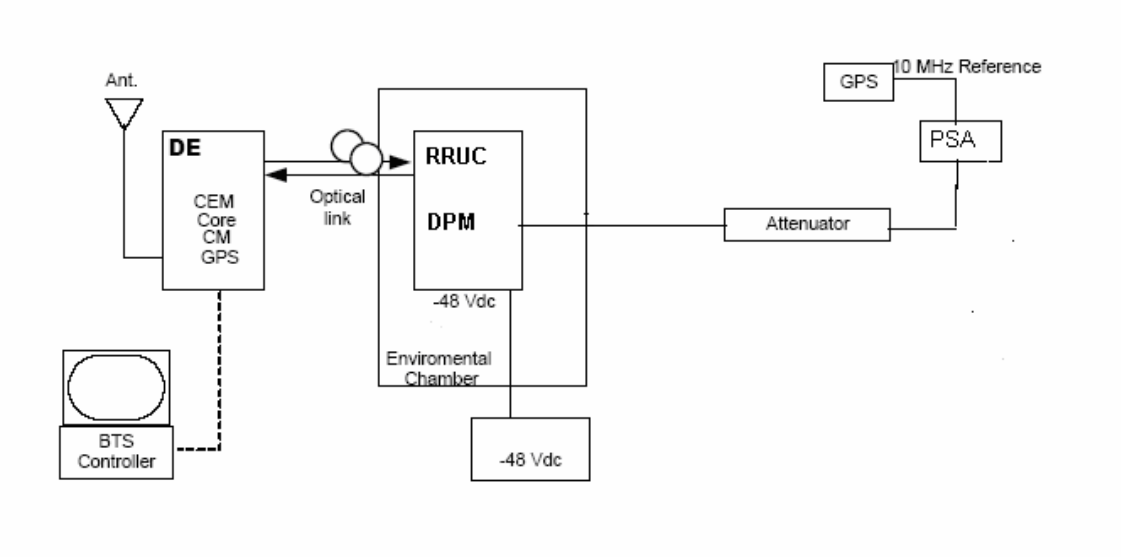


Figure 23: Test configuration for Frequency Stability

4.5.3 Frequency results

Operating temperature for the M3 CR 1900MHz is from -40°C to +50°C as specified NTTT0000_SDS System Design Specification.

Table 23: Test results for AD Band Frequency Stability versus Power supply Voltage at +25C

Frequency Stability versus Voltage at +25C Ch 300		
Voltage (VDC)	Max Carrier Frequency Deviation (Hz)	Max Carrier Frequency Deviation (PPM)
-48	5.08	0.00261

Table 24: Test results for BE Band Frequency Stability versus Power supply Voltage at +25C

Frequency Stability versus Voltage at +25C Ch 675		
Voltage (VDC)	Max Carrier Frequency Deviation (Hz)	Max Carrier Frequency Deviation (PPM)
-48	12.83	0.00653

Table 25: Test results for CFG Band Frequency Stability versus Power supply Voltage at +25C

Frequency Stability versus Voltage at +25C Ch 1175		
Voltage (VDC)	Max Carrier Frequency Deviation (Hz)	Max Carrier Frequency Deviation (PPM)
-48	11.54	0.00580

Table 26: Test results for AD Band Frequency Stability versus Temperature at -48V operation

Frequency Stability versus Temperature at -48V Ch 300		
Temperature (°C)	Max Carrier Frequency Deviation (Hz)	Max Carrier Frequency Deviation (PPM)
-40	-30.98	-0.01593
-30	5.75	0.00296
-20	8.33	0.00428
-10	-24.52	-0.01261
0	4.28	0.00220
10	-7.62	-0.00392
20	6.29	0.00323
30	-16.5	-0.00848
40	9.54	0.00490
50	-5.67	-0.00292

Table 27: Test results for BE Band Frequency Stability versus Temperature at -48V operation

Frequency Stability versus Temperature at -48V Ch675		
Temperature (°C)	Max Carrier Frequency Deviation (Hz)	Max Carrier Frequency Deviation (PPM)
-40	-38.36	-0.01953
-30	23.46	0.01195
-20	18.61	0.00948
-10	10.23	0.00521
0	15.07	0.00767
10	17.82	0.00907
20	12.83	0.00653
30	15.92	0.00811
40	-14.04	-0.00715
50	10.25	0.00522

Table 28: Test results for CFG Band Frequency Stability versus Temperature at -48V operation

Frequency Stability versus Temperature at -48V Ch1175		
Temperature (°C)	Max Carrier Frequency Deviation (Hz)	Max Carrier Frequency Deviation (PPM)
-40	7.67	0.00386
-30	26.93	0.01354
-20	18.61	0.00936
-10	15.58	0.00783
0	-12.01	-0.00604
10	17.37	0.00873
20	11.54	0.00580
30	-10.57	-0.00531
40	5.6	0.00282
50	5.49	0.00276

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