CFR 47 Part 2, 22, and 24 Test Report

Test Report Number: WR642.001

Terminal device: FCC ID: QMNRM-59 Model: 6155i Type: RM-59 HW: 3101 SW: MJ100b03.nep
(Detailed information is listed in section 4).

Originator:	Mark Severson
Function:	TCC - Dallas – EMC
Version/Status:	1.0 Approved
Location:	TCC Directories
Date:	September 2, 2005

Change History:

Version	*Date*	*Status*	*Handled By*	*Comments*
0.1	August 18, 2005	Draft	Mark Severson	
0.2	August 18, 2005	Review	Mark Severson	
1.0	Sept. 2, 2005	Approved	Nerina Walton	

Testing laboratory:
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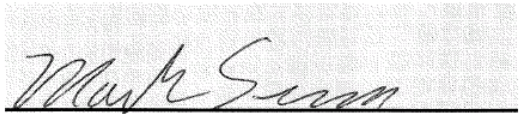
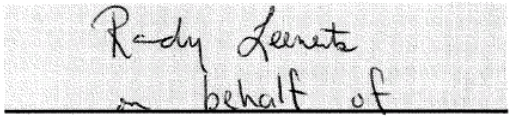
Date and signatures: **September 02, 2005**

For the contents:



Mark Severson
Technical Review



Nerina Walton
Manager Review

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1. GENERAL

1.1 Quality System

The quality system in place for TCC-Dallas conforms to ISO/IEC 17025 and has been audited to the standard by A2LA (American Association of Laboratory Accreditation). TCC - Dallas has also been audited using the ISO 9000 Quality System, as part of Nokia Mobile Phones, Inc., by ABS (American Bureau of Shipping) Quality Evaluations Inc.

TCC-Dallas is a recognized laboratory with the Federal Communications Commission in filing applications for Certification under Parts 15 and 18, Registration Number 100060, and Industry Canada, Registration Number IC 661.

1.2 List of General Information Required for Certification

This list is in accordance with FCC Rules and Regulations, CFR 47, Part 2, and to 22H, 24E, Confidentiality.

1.2.1 Sub-part 2.1033(c)(1)

Name and Address of Applicant:

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Manufacturer:

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1.2.2 Sub-part 2.1033(c)(2)

FCC ID: QMNRM-59

Model No: 6155i

1.2.3 Sub-part 2.1033(c)(3)

Instruction Manual(s): Refer to attached EXHIBITS

1.2.4 Sub-part 2.1033(c)(4)

Type of Emission: 40K0F8W / 40K0F1D / 1M25F9W

1.2.5 Sub-part 2.1033(c)(5)

Frequency Range, MHz: 824.04MHz – 848.97MHz

1851.25MHz – 1908.75MHz

1.2.6 Sub-part 2.1033(c)(6)

Power Rating, Watts: 0.349 W AMPS
0.207 W CDMA Cellular
0.349 W CDMA PCS

☐ Switchable ☒ Variable ☐ N/A

FCC Grant Note: BC- The output power is continuously variable from the value listed in this entry to 5%-10% of the value listed.

1.2.7 Sub-part 2.1033(c)(7)

Maximum Power Rating, Watts: 0.349 W

1.2.8 Sub-part 2.1033(c)(8)

Voltages & Currents in all elements in final R.F. Stage, including final transistor or solid-state device:
Collector Current, A = 0.94
Collector Voltage, Vdc = 3.7
Supply Voltage, Vdc = 3.7

1.2.9 Sub-part 2.1033(c)(9)

Tune-up Procedure: Refer to attached EXHIBITS

1.2.10 Sub-part 2.1033(c)(10)

Circuit Diagram/Circuit Description:
Including description of circuitry & devices provided for determining and stabilizing frequency, for suppression of spurious radiation, for limiting modulation and limiting power.
Refer to attached EXHIBITS

1.2.11 Sub-part 2.1033(c)(11)

Label Information: Refer to attached EXHIBITS

1.2.12 Sub-part 2.1033(c)(12)

Photographs: Refer to attached EXHIBITS

1.2.13 Sub-part 2.1033(c)(13)

Digital Modulation Description: N/A

1.2.14 Sub-part 2.1033(c)(14)

Test and Measurement Data: FOLLOWS

1.3 Objective

All tests and measurement data shown was performed to determine whether the selected handset was in compliance as specified in FCC: CFR47 Parts 2.947, 2.1033(c), 2.1041, 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, Part 22, and Part 24.

1.4 Test Summary

Test Results: *The test result relates only to those tested devices mentioned in Section 4 of this test report.*

Test Performed	Reference	Section of Report	Complies / Does not comply / Not Tested
RF Power Output (Conducted)	FCC Part 2.1046(a) / 22.913(a) / 24.232(b)(c)	6	Complies
RF Power Output (Radiated)	FCC Part 22.913(a) / 24.232(b)	7	Complies
Modulation Requirements: TX Audio Frequency Response	FCC Part 2.1047(a)	8	Complies
Modulation Requirements: Modulation Limiting	FCC Part 2.1047(b)	9	Complies
Modulation Requirements: Measurement of Maximum Deviation	FCC Part 2.1047(b), IC RSS 118 / 129	10	Complies
Occupied Bandwidth: Transmitter Conducted Measurements	FCC Part 2.1049(c)(1), 24.238(a)(b)	11	Not Tested
Spurious Emissions at Antenna Terminals	FCC Part 2.1051	12	Not Tested
Emissions in Receiver Critical Band	FCC Part 22.917(f)	13	Not Tested
Field Strength of Spurious Radiation	FCC Part 2.1053	14	Not Tested
Frequency Stability (Temperature Variation)	FCC Part 2.1055(a)(1)(b), 24.235	15	Not Tested
Frequency Stability (Voltage Variation)	FCC Part 2.1055(d)(1)(2), 24.235	16	Not Tested

2. STANDARDS BASIS

Testing has been carried out in accordance with:

REF.	Code of the standard	Name of the standard
1	ANSI C63.4	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz.
2	FCC: CFR 47 Part 2	Code of Federal Regulations (CFR) Title 47, Part 2 – Frequency Allocations and Radio Treaty Matters; General Rules and Regulations: Subpart J – Equipment Authorization Procedures
3	FCC: CFR 47 Part 22	Code of Federal Regulations (CFR) Title 47, Part 22 – Public Mobile Services: Subpart H – Cellular Radiotelephone Service
4	FCC: CFR 47 Part 24	Code of Federal Regulations (CFR) Title 47, Part 24 – Personal Communications Services: Subpart E – Broadband PCS
5	RSS-128	800 MHz Dual-Mode TDMA Cellular Telephones
6	RSS-132	800 MHz Cellular Telephones Employing New Technologies
7	RSS-133	2 GHz Personal Communications Services, Industry Canada
8	RSS-212	Test Facilities and Test Methods for Radio Equipment, Industry Canada (Provisional)
9	RSP-100	Radio Equipment Certification Procedure

Note: Unless otherwise stated, (by reference to a version number and a publication date), the latest version of the above documents applies.

Deviations:

Not Applicable.

3. LIST OF ABBREVIATIONS, ACRONYMS AND TERMS

3.1 Abbreviations

dB - decibel

dBc - decibels from carrier

dBm - decibels per milliwatt (absolute measurement)

GHz - gigahertz or 1000000000 hertz

kHz - kilohertz or 1000 hertz

MHz - megahertz or 1000000 hertz

3.2 Acronyms

AMPS - Advanced Mobile Phone System

BSS - Base Station Simulator

CDMA - Code Division Multiple Access

EDRP - Effective Dipole Radiated Power

EIRP - Effective Isotropic Radiated Power

EMC - Electromagnetic Compatibility

EMI - Electromagnetic Interference

ERP - Effective Radiated Power

EUT - Equipment under Test

GSM - Global System for Mobile communications

PCS - Personal Communications Services

RF - Radio Frequency

TDMA - Time Division Multiple Access

3.3 Terms

Base Station Simulator (BSS) - simulates all the necessary signals that a phone would experience while on a live network. There are many types of base station simulators catering for all current protocols, i.e., GSM, AMPS, TDMA, and CDMA.

Cellular - refers to a frequency in the 800MHz band.

PCS - refers to a frequency in the 1900MHz band.

4. EQUIPMENT-UNDER-TEST (EUT)

The results in this report relate only to the items listed below:

4.1 Description of Tested Device(s):

Test Performed	Mode of Operation	Date of Receipt	Condition of Sample	Item	Identifying Information
FCC Part 2.1046(a) / 22.913(a) / 24.232(b)(c) FCC Part 2.1047(a)(b)	Amps, CDMA 800/1900	August 03, 2005	Good	Phone	FCC ID: QMNRM-59 Type: RM-59 HW: 3101 SW: MJ100b03.nep ESN: 044/13202978
FCC Part 2.1046(a) / 22.913(a) / 24.232(b)(c) FCC Part 2.1047(a)(b)	Amps, CDMA 800/1900	August 03, 2005	Good	Battery	Type: BL-6C Other: 3.7 Vdc

4.2 Photograph of Tested Device(s):

5. TEST EQUIPMENT LIST

The listing below indicates the test equipment utilized for the test (s). Calibration interval on all items listed can be obtained from the Engineering Services Group within NMP, Product Creation - Dallas. Where relevant, measuring equipment is subjected to in-service checks between testing. TCC - Dallas shall notify clients promptly, in writing, of identification of defective measuring equipment that casts doubt on the validity of results given in this report.

Section of Report	NMP#	Test Equipment	Mfr. #	Model #	Calibration Due Date	Calibration Interval
6	N/A	6dB Attenuator	Weinshcel	Model 2	2/09/2006	12 months
6	02666	Base Station	R&S	CMU200	6/25/2006	12 months
6	02549	Power Meter	Agilent	E4418B	10/06/2005	12 months
6	02672	Power Sensor	Agilent	E9304A	10/06/2005	12 months
8, 9, 10	0087	Function Generator	Agilent	3324	3/03/2006	12 months
8, 9, 10	02601	Base Station	R&S	CMU200	8/26/2005	12 months
7	04064	Base Station	R&S	CMU200	7/21/2006	12 months
7	02663	EMI Receiver	Agilent	8546A / 85460A	6/03/06	12 months

6. RF POWER OUTPUT (CONDUCTED)

Specification: FCC Part 2.1046(a), 22.913(a), 24.232(b)(c)

6.1 Setup

Testing was performed with the EUT connected to a 6dB splitter and then to the RF Power Meter to measure the conducted RF power output. The base station simulator was connected to the other port of the splitter to establish a call.

6.2 Pass/Fail Criteria

Not Applicable

6.3 Detailed Test Results

Test Technician / Engineer	Jesse Torres
Date of Measurement	August 15, 2005
Temperature	22.0°C
Humidity	55.0%RH
Test Result	Was operated at max power and tested in accordance with FCC Part 2.1046(a), 22.913(a), 24.232(b)(c).

AMPS

Channel	Freq Max (MHz)	Max (mW)	Max (dBm)
991	824.04 MHz	407	25.1
384	836.52 MHz	324	25.1
799	848.97 MHz	331	25.1

CDMA 800

Channel	Freq Max (MHz)	Max (mW)	Max (dBm)
1013	824.70 MHz	331	25.0
384	836.52 MHz	295	25.0
777	848.31 MHz	295	25.0

CDMA 1900

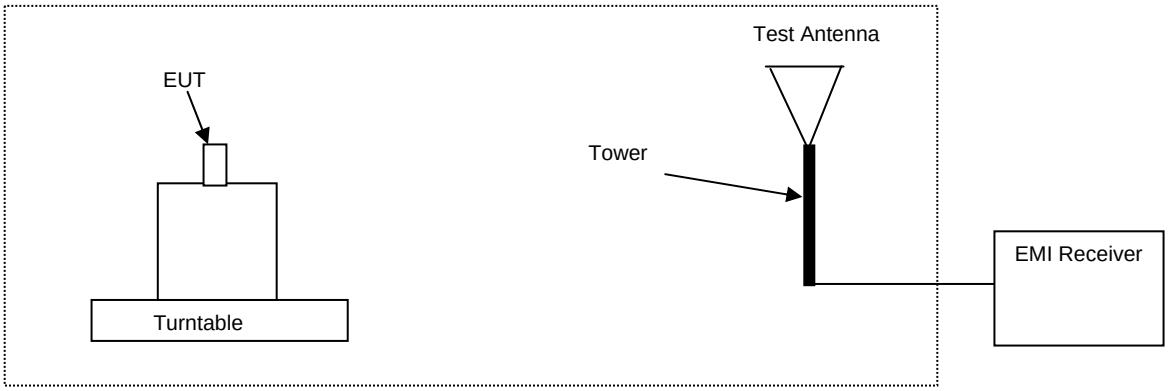
Channel	Freq Max (MHz)	Max (mW)	Max (dBm)
25	1851.25 MHz	191	22.9
600	1880.00 MHz	214	22.9
1175	1908.75 MHz	209	22.9

7. RF POWER OUTPUT (RADIATED)

Specification: FCC Part 22.913(a), 24.232(b)(c)

7.1 Setup

ERP values are calculated using the substitution method in accordance with TIA 603. The phone is set to transmit maximum power and the maximum measured level is recorded. A signal generator iss then used to drive a substitute transmit antenna until the equivalent level is measured. The power into the transmit antenna is then measured.



7.2 Pass/Fail Criteria

Band	FCC Limit (dBm)
Cellular	38.5 (EDRP)
PCS	33.0 (EIRP)

Test Technician / Engineer	Cindy Trinh
Date of Measurement	02 Sept-05
Temperature	23 to 26°C
Humidity	41 to 47 %RH
Test Result	Complies with FCC Part *22.913(a), 24.232(b)(c)*

7.3 Detailed Test Results

CDMA1900

Freq (MHz)	EIRP (dBm)	Ttbl Agl (deg)	Twr Ht (cm)	Pol
1851.25	23.00	19.00	149.00	H
1880.00	25.43	36.00	150.00	H
1908.75	24.94	43.00	149.00	H

CDMA800

Freq (MHz)	EDRP (dBm)	Ttbl Agl (deg)	Twr Ht (cm)	Pol
824.70	23.15	343.00	150.00	H
836.52	23.13	338.00	150.00	H
848.31	22.44	337.00	150.00	H

AMPS, Phone Vertical

Freq (MHz)	EDRP (dBm)	Ttbl Agl (deg)	Twr Ht (cm)	Pol
824.04	24.93	161.00	149.00	V
836.52	25.86	119.00	150.00	V
848.97	25.92	121.00	150.00	V

7.4 Measurement Uncertainty

The measurement uncertainty for this test is +/- 2.4dB for 800 to 2000 MHz.

8. TX AUDIO FREQUENCY RESPONSE

Specification: FCC Part 2.1047(a)

8.1 Setup

The audio signal generator was connected to the audio input circuit/microphone of the EUT.

The audio signal input was adjusted to obtain 20% modulation at 1kHz, and this point was taken as the 0dB reference level.

With input levels held constant and below limiting at all frequencies, the audio generator was varied from 100Hz to 50kHz.

The response in dB relative to 1kHz was then measured, using the HP 8901B modulation analyzer.

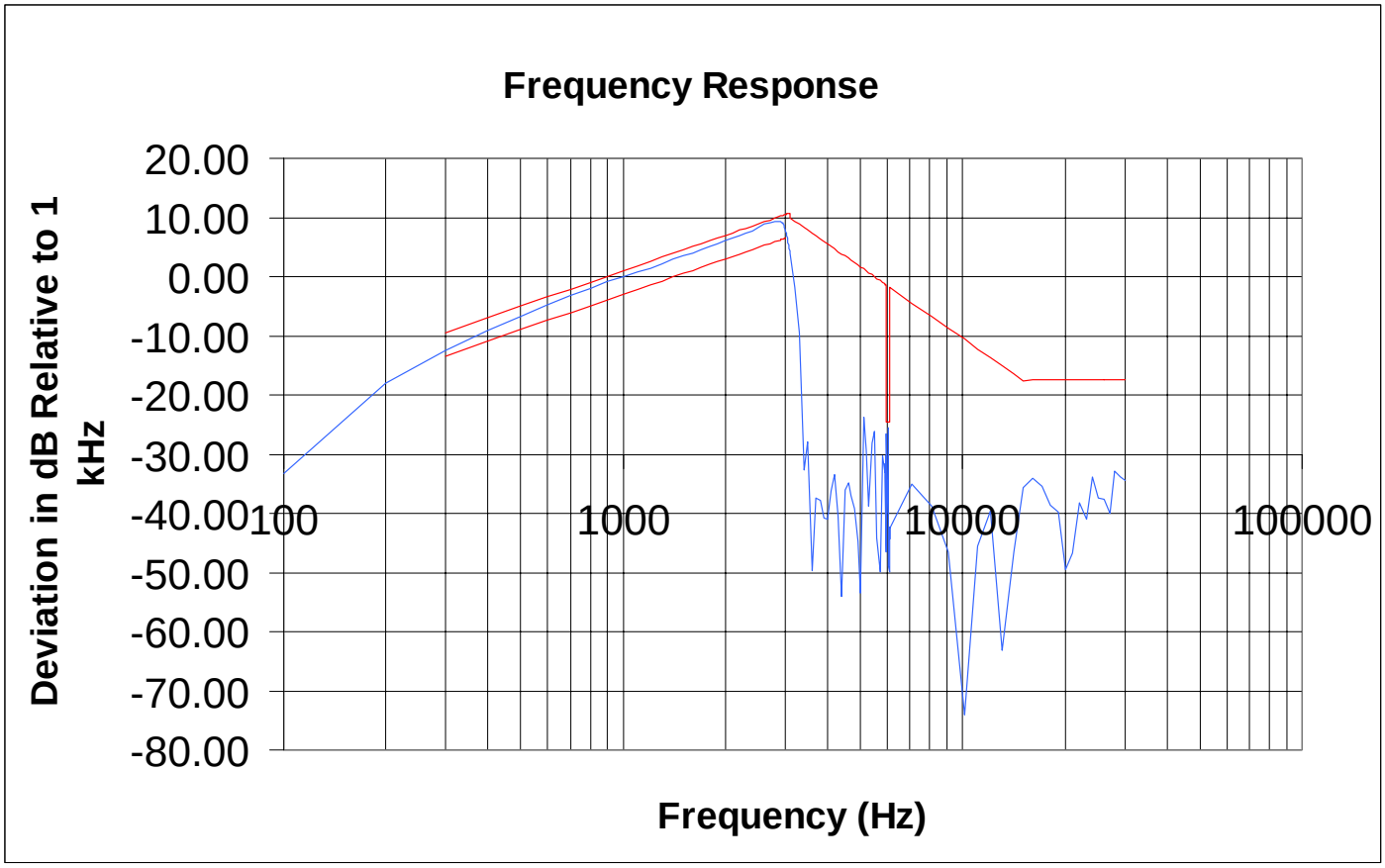
8.2 Pass/Fail Criteria

Emissions mask.

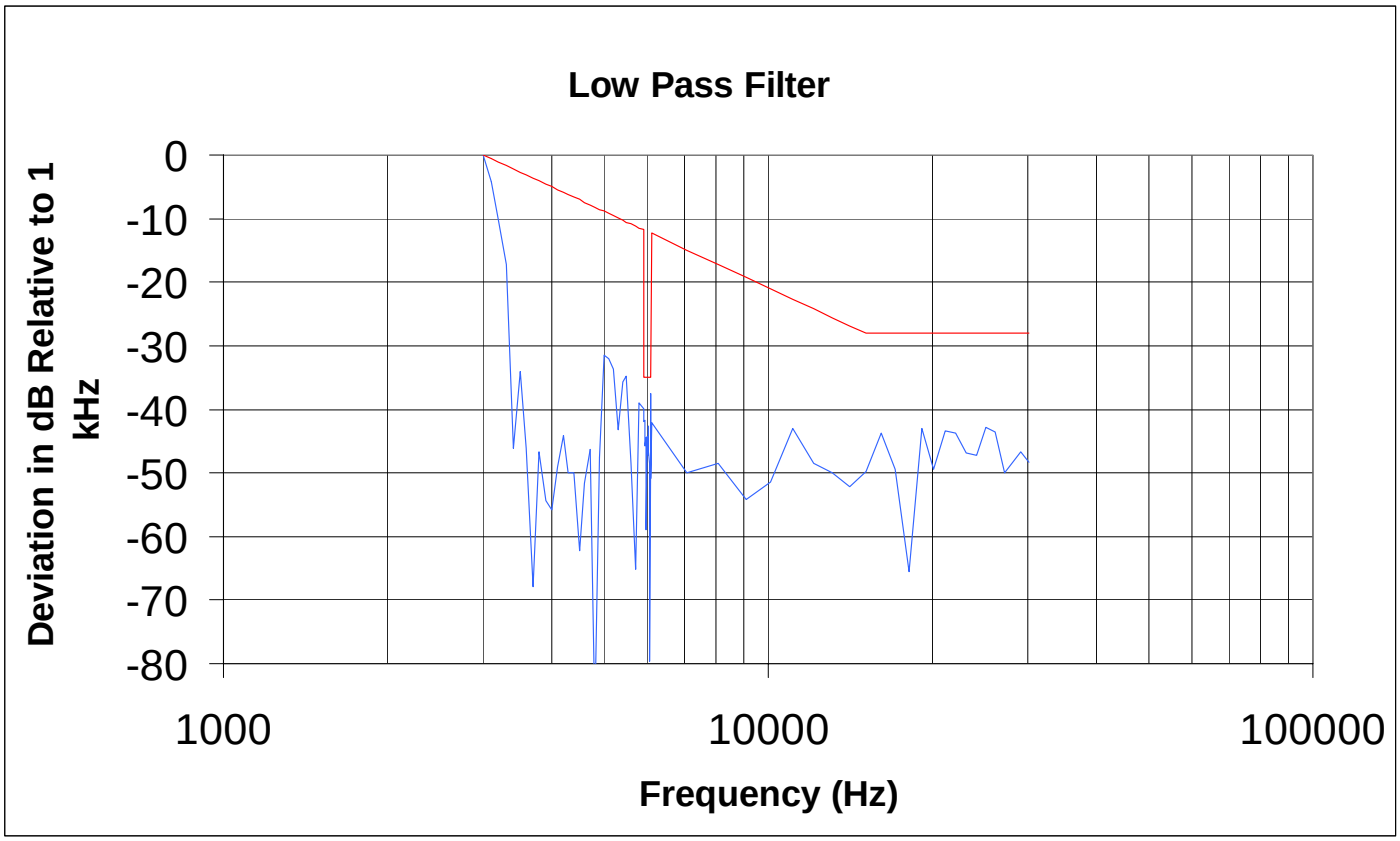
8.3 Detailed Test Results

Test Technician / Engineer	Jesse Torres
Date of Measurement	August 17, 2005
Temperature	22°C
Humidity	58%RH
Test Result	Was tested in accordance with FCC Part 2.1047(a)

Frequency Response



Low Pass Filter



9. MODULATION LIMITING

Specification: FCC Part 2.1047(b)

9.1 Setup

The audio signal generator was connected to the audio input circuit/microphone of the EUT.

The modulation response was measured for each of three tones (one of which was the frequency of maximum response), and the input voltage was varied and was observed on the HP 8901B modulation analyzer.

The audio input level was varied from 30% modulation (+/-3.6kHz deviation) to at least 20dB higher than the saturation point.

Measurements were performed for both negative and positive modulation and the respective results were recorded.

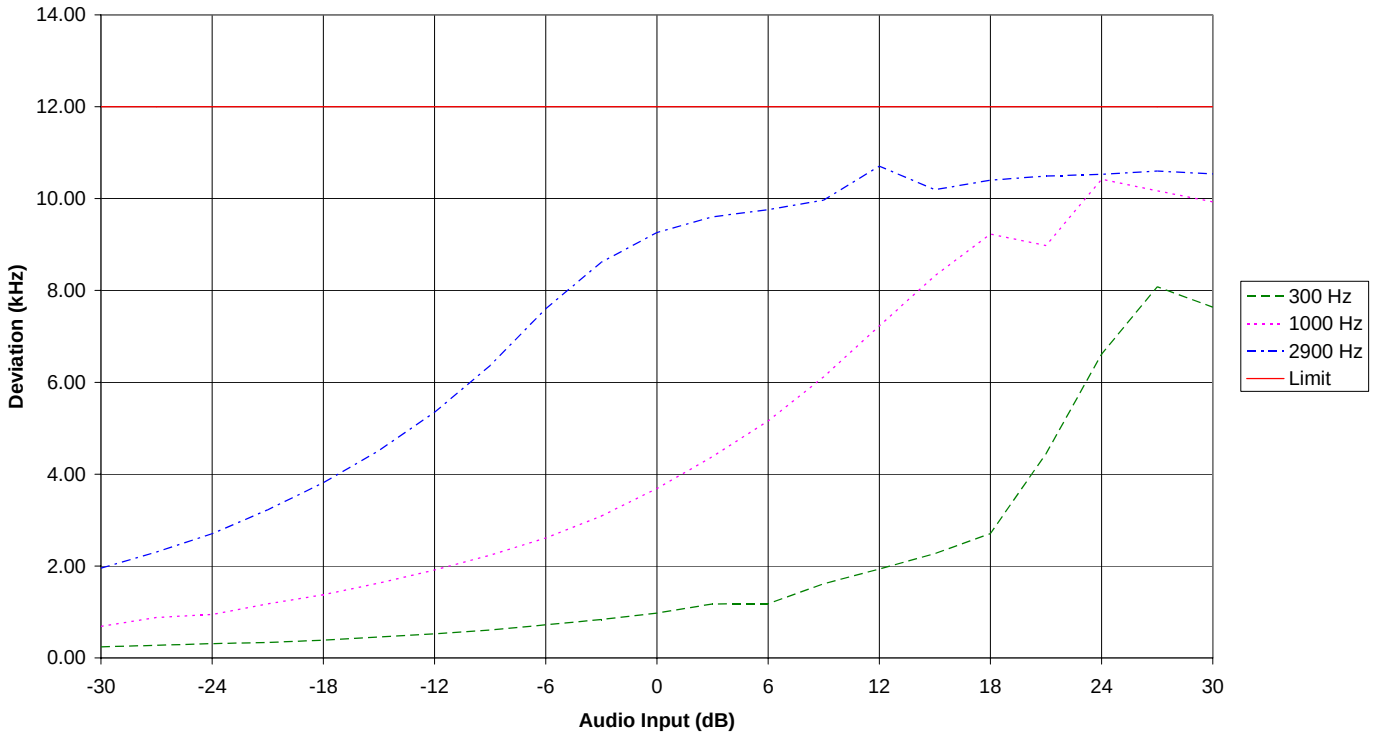
9.2 Pass/Fail Criteria

No pass/fail criteria

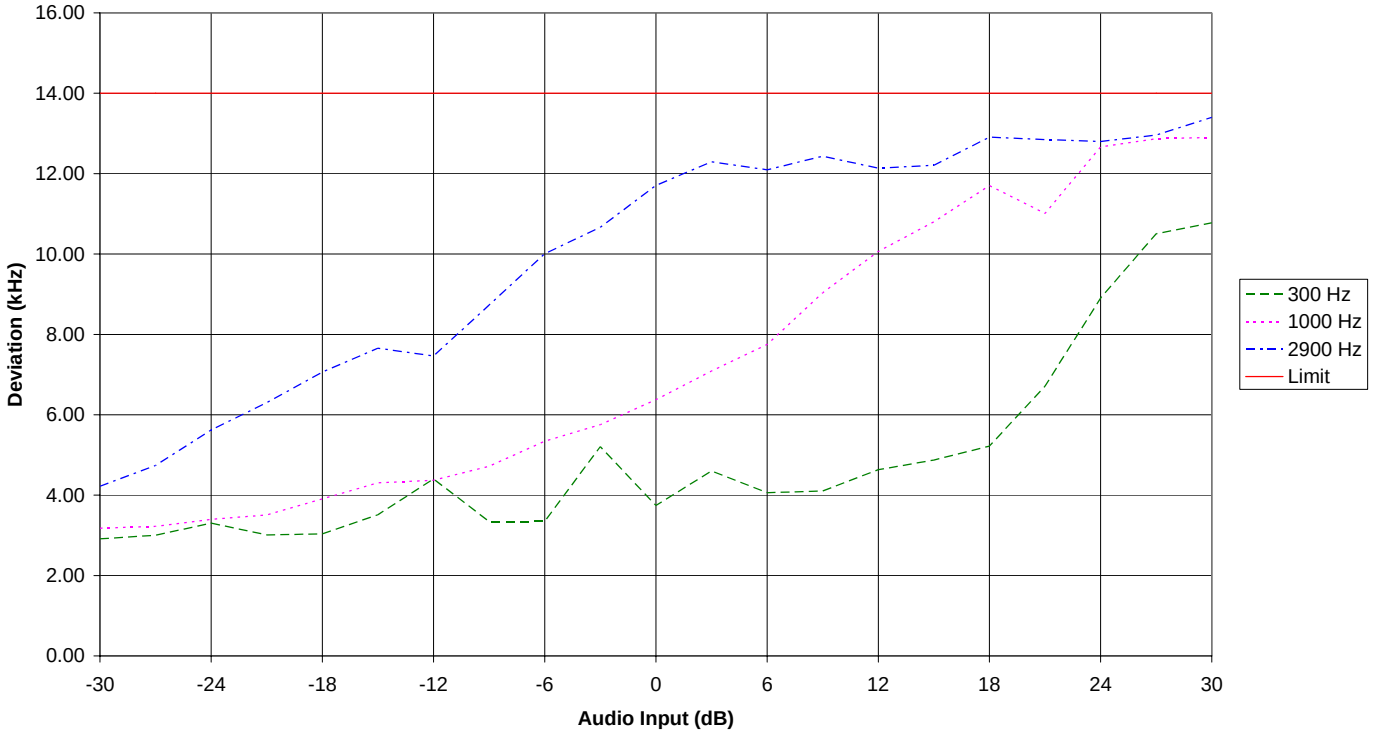
9.3 Detailed Test Results

Test Technician / Engineer	Jesse Torres
Date of Measurement	August 17, 2005
Temperature	22°C
Humidity	58%RH
Test Result	Was tested in accordance with FCC Part 2.1047(a)

Modulation Limiting - Voice Only, Positive Peaks



Modulation Limiting - Voice+SAT, Positive Peaks



10. MODULATION REQUIREMENTS (MEASUREMENT OF MAXIMUM DEVIATION)

Specification: RSS-118, RSS-129, FCC Part 2.1047(a)(b)

10.1 Setup

The function generator and/or internally generated signals modulated the EUT.

Maximum deviation measurements were recorded for the various configurations.

10.2 Pass/Fail Criteria

Modulation	Limit (kHz)
Voice	± 12 kHz
Wideband Data	±8 kHz
SAT	± 2 kHz
Voice + SAT	± 14 kHz

10.3 Detailed Test Results

Test Technician / Engineer	Jesse Torres
Date of Measurement	August 17, 2005
Temperature	22°C
Humidity	58%RH
Test Result	Complies

Modulation	Deviation (kHz)	Limit (kHz)
Voice	10.4	± 12 kHz
Wide Band Data	7.3	±8 kHz
SAT	1.8	± 2 kHz
Voice + SAT	11.1	± 14 kHz

11. OCCUPIED BANDWIDTH (TRANSMITTER CONDUCTED MEASUREMENTS)

Specification: FCC Part 2.1049(c)(1), 24.238(a)(b)

11.1 Setup

Testing was performed with the EUT connected to a 6dB attenuator, 6dB splitter, filter bank and then to the EMI receiver. The base station simulator was connected to the other port of the splitter to establish a call.

11.2 Pass/Fail Criteria

Occupied Bandwidth, Out of Band

Band	Frequency Range (MHz)	FCC Limits (dBm)
Cellular 800, Low Channel	< 824	-13
Cellular 800, High Channel	> 849	-13
PCS 1900, Low Channel	< 1850	-13
PCS 1900, High Channel	> 1910	-13

Occupied Bandwidth, In Band

No pass/fail, these plots are used to determine the emission designators.

11.3 Detailed Test Results

Not Tested

11.4 Measurement Uncertainty

The measurement uncertainty for this test is +/- 3.7dB for 100kHz - 1000MHz and +/- 5.3dB for 1 - 20GHz.

12. SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Specification: FCC Part 2.1051

12.1 Setup

Testing was performed with the EUT connected to a 6dB attenuator, 6dB splitter, filter bank and then to the EMI receiver. The base station simulator was connected to the other port of the splitter to establish a call. Filters were introduced to reduce or eliminate spurious emission, which could be generated internally in the EMI receiver.

12.2 Pass/Fail Criteria

Band	Frequency Range (MHz)	FCC Limits (dBm)
Cellular / PCS	30 – 20000 *	-13

* Frequency to be investigated up to the 10th harmonic of the highest clock or frequency used.

12.3 Detailed Test Results

Not Tested

12.4 Measurement Uncertainty

The measurement uncertainty for this test is +/- 3.7dB for 100kHz - 1000MHz and +/- 5.3dB for 1 - 20GHz.

13. EMISSIONS IN RECEIVER CRITICAL BAND

Specification: FCC Part 22.917(f)

13.1 Setup

Testing was performed with the EUT connected to a 6dB attenuator, 6dB splitter, filter bank and then to the EMI receiver. The base station simulator was connected to the other port of the splitter to establish a call. Filters were introduced to reduce or eliminate spurious emission, which could be generated internally in the EMI receiver.

13.2 Pass/Fail Criteria

Band	Frequency Range (MHz)	FCC Limits (dBm)
Cellular	869 - 894	-80

13.3 Detailed Test Results

Not Tested

13.4 Measurement Uncertainty

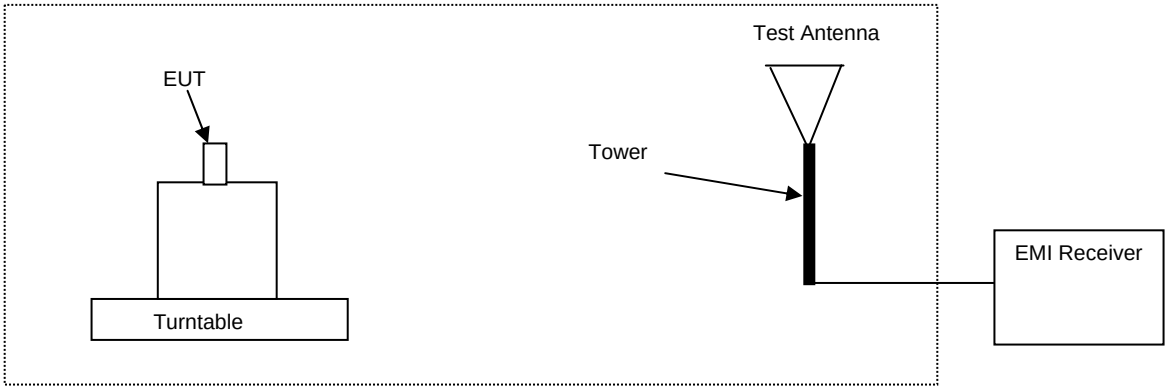
The measurement uncertainty for this test is +/- 3.7dB for 100kHz - 1000MHz.

14. FIELD STRENGTH OF SPURIOUS RADIATION

Specification: FCC Part 2.1053

14.1 Setup

Test equipment set-up.



14.2 Pass/Fail Criteria

Band	Frequency Range (MHz)	FCC Limit (dBm)
Cellular / PCS	30 – 20000*	-13

- Frequency to be investigated up to the 10th harmonic of the highest clock or frequency used.

Substitution method according to ANSI/TIA/EIA 603-1 was used for final measurements.

14.3 Detailed Test Results

Not Tested

14.4 Measurement Uncertainty

The measurement uncertainty for this test is +/- 5.2dB for 30-300MHz; +/- 5.2dB for 300-1000MHz, +/- 5.6dB for 1-6GHz and +/-6.8 for 6-18GHz.

15. FREQUENCY STABILITY (TEMPERATURE VARIATION)

Specification: FCC Part 2.1055(a)(1)(b), 24.235

15.1 Setup

The EUT was connected to the base station simulator to measure the RF power output.

15.2 Pass/Fail Criteria

Not Applicable

15.3 Detailed Test Results

Not Tested

16. FREQUENCY STABILITY (VOLTAGE VARIATION)

Specification: FCC Part 2.1055(d)(1)(2), 24.235

16.1 Setup

The EUT was connected to the base station simulator to measure the RF power output.

16.2 Pass/Fail Criteria

Not Applicable

16.3 Detailed Test Results

Not Tested