

Test & Certification Center (TCC) - Dallas

FCC ID: GMLNPW-1PA
Test Report #: 02-RF-0086
29 July 2002

Accredited Laboratory
Certificate Number: 1819-01

Ver 1.0

CFR 47 Part 2, 22, and 24 Test Report

Test Report Number: 02-RF-0086

Terminal device:

FCC ID: GMLNPW-1PA, Model 3361, SW: 2.17
(Detailed information is listed in section 4).

Originator: Ismail Mohamud
Function: TCC - Dallas – EMC
Version/Status: 1.0 Approved
Location: TCC Directories
Date: 29 July 2002

Change History:

Version	Date	Status	Handled By	Comments
0.1	01 July 2002	Draft	Ismail Mohamud	
0.2	17 July 2002	Proposed	Ismail Mohamud	
1.0	29 July 2002	Approved	Alan Ewing	

Testing laboratory:

Test & Certification Center (TCC) Dallas
Nokia Mobile Phones, Inc
6021 Connection Drive
Irving, Texas 75039
U.S.A.
Tel. 972-894-5000
Fax. 972-894-4988

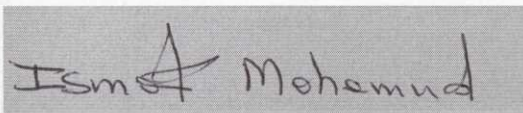
Client:

Nokia Mobile Phones, Inc.
Model 3361, FCC ID: GMLNPW-1PA
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Irving, Texas 75039
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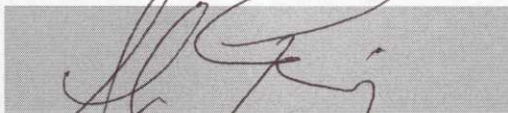
Date and signatures:

29 July 2002

For the contents:



Ismail Mohamud, EMC Engineer
Technical Review



Alan C. Ewing, General Manager
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). The appendix of this report contains the scope of accreditation for A2LA. 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: Nokia Mobile Phones
6021 Connection Drive
Irving, Texas 75039 USA

Manufacturer: Nokia Mexico, S.A. DE C.V.
Ave. Ind. Rio Bravo s/n, Parque Ind. del Nte.
Cd. Reynosa, Tam. CP, 88730

1.2.2 Sub-part 2.1033(c)(2)

FCC ID: GMLNPW-1PA

Model No: 3361

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: 40K0F1D, 40K0F8W, 30K0DXW

1.2.5 Sub-part 2.1033(c)(5)

Frequency Range, MHz: 824.04 to 848.97
1850.04 to 1909.92

1.2.6 Sub-part 2.1033(c)(6)

Power Rating, Watts: 0.263 ERDP AMPS
0.661 ERDP Cellular Band - TDMA
1.288 EIRP PCS - TDMA

☐ Switchable ☒ Variable ☐ N/A

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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: 1.3

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 = per manual
Collector Voltage, Vdc = per manual
Supply Voltage, Vdc = 3.6

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, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, Part 22, and Part 24.

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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
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 22.915(a)(b)(c)(d)(1)	10	Complies
Occupied Bandwidth: RF Emissions Masks	FCC Part 2.1049(c)(1), 24.238(a)(b)	11	Complies
Occupied Bandwidth: Transmitter Conducted Measurements	FCC Part 2.1049(c)(1), 24.238(a)(b)	12	Complies
Emissions in Receiver Critical Band	FCC Part 22.917(f)	13	Complies
Spurious Emissions at Antenna Terminals	FCC Part 2.1051	14	Complies
Field Strength of Spurious Radiation	FCC Part 2.1053	15	Complies
Frequency Stability (Temperature Variation)	FCC Part 2.1055(a)(1)(b), 24.235	16	Complies
Frequency Stability (Voltage Variation)	FCC Part 2.1055(d)(1)(2), 24.235	17	Complies

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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	ANSI/TIA/EIA 603-A	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3	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
4	FCC: CFR 47 Part 22	Code of Federal Regulations (CFR) Title 47, Part 22 – Public Mobile Services: Subpart H – Cellular Radiotelephone Service
5	FCC: CFR 47 Part 24	Code of Federal Regulations (CFR) Title 47, Part 24 – Personal Communications Services: Subpart E – Broadband PCS
6	RSS-128	800 MHz Dual-Mode TDMA Cellular Telephones, Industry Canada
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
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
EMC - Electromagnetic Compatibility
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.

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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
22.913(a), 24.232(b)(c), 2.1053, 2.1046(a), 22.913(a), 24.232(b)(c), 2.1047(a), 2.1047(b), 22.915(a)(b)(c)(d)(1), 2.1049(c)(1), 2.1051, 24.238(b), 22.917(f), 2.1055(a)(1)(b), 2.1055(d)(1)(2)	AMPS/TDMA 800/1900	11-June-02	Good	Phone	FCC ID: GMLNPW-1PA Model 3361
2.1046(a), 22.913(a), 24.232(b)(c), 2.1047(a), 2.1047(b), 22.915(a)(b)(c)(d)(1), 2.1049(c)(1), 2.1055(a)(1)(b), 2.1055(d)(1)(2)	AMPS/TDMA 800/1900	11-June-02	Good	Service Battery	Type: No Regulator Other: 4.0vdc
22.913(a), 24.232(b)(c), 2.1051, 2.1049(c)(1), 24.238(b), 22.917(f), 2.1053	AMPS/TDMA 800/1900	11-June-02	Good	Battery	Type: BMC-3 Other: 3.6v Ni-MH

4.2 Photograph of Tested Device(s):

Refer to attached EXHIBITS

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.

Test/ Section of Report	NMP#	Test Equipment	Mfr. #	Model #
6	02682	Power Meter	Agilent	E4419B
6	02674	Power Sensor	Agilent	E9304A
6	N/A	10dB Attenuator	Weinschel	Model 2
7, 15	00148	Power Meter	Boonton	4232A
7, 15	02404	Power Sensor	Boonton	51011(4B)
7, 15	02671	Signal Generator	Agilent	02671
7, 15	02872	Biconilog Antenna	EMCO	3142
7, 15	02846	Turntable and Tower Controller	Sunol	Turntable FM2022, Controller 2846
7, 15	00064	Horn Antenna	EMCO	3115
7, 15	02857	Horn Antenna	EMCO	3115
7, 11, 12, 13, 14, 15	00151/ 02830	Base Station Simulator	Acterna	4300/4305
7, 11, 12, 13, 14, 15	02663/ 02664	EMI Receiver	Agilent	8546A
14, 15	02679/ 02680	EMI Analyzer	Agilent	E7405A
8, 9, 10	00510	Modulation analyzer	Agilent	8901B
8, 9, 10, 16, 17	00280/ 00525/ 00303	Function generator (from base station simulator)	Agilent	8920B
10	00816	Oscilloscope	Tektronix	TDS 220
11, 12, 13, 14	3155	Power Splitter (must have 6 dB insertion loss)	Agilent	33120A
7, 11, 12, 13	N/A	6dB Attenuator	Weinschel	Model 2
13, 14	N/A	Notch Filter	Wainwright	WRCA 800/960-6SSK
14, 15	N/A	3GHz High Pass Filter	Trilithic Inc.	4HC2900/18000-1.1-KK
14	N/A	2GHz High Pass Filter	Trilithic Inc.	3HC1900/18000-1-KK
15	N/A	1GHz High Pass Filter	Wainwright.	WHK949-9SS
15	00001	RF preamplifier	Agilent	HP8449B

6. RF POWER OUTPUT (CONDUCTED)

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

6.1 Setup

The EUT was setup using PC Locals and antenna port was connected to RF Power Meter (using a 10dB attenuator) to measure the conducted RF power output. For TDMA (800/1900) protocols the duty cycle was set to 32.4%.

6.2 Pass/Fail Criteria

Not Applicable

6.3 Detailed Test Results

Test Technician / Engineer	Ismail Mohamud	
Date of Measurement	26 June 2002	
Temperature / Humidity	23°C	47-55%RH
Test Result	NPW-1PA with FCC ID: GMLNPW-1PA was operated at max power and tested in accordance with FCC Part 2.1046(a), 22.913(a), 24.232(b)(c).	

RF Conducted Power			
AMPS Mode	Channel	Max (mW)	Max (dBm)
824.04 MHz	991	354.8	25.5
836.52 MHz	384	331.1	25.2
848.97 MHz	799	331.1	25.2
TDMA Mode			
824.04 MHz	991	524.8	27.2
836.52 MHz	384	512.9	27.1
848.97 MHz	799	501.2	27.0
PCS Mode			
1850.04 MHz	2	512.9	27.1
1879.95 MHz	999	524.8	27.2
1909.92 MHz	1998	524.8	27.2

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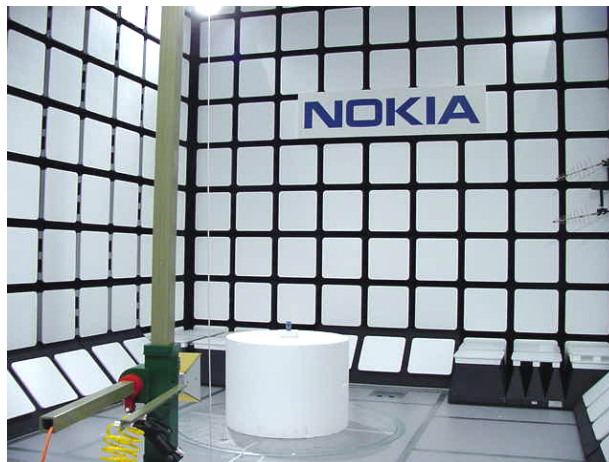
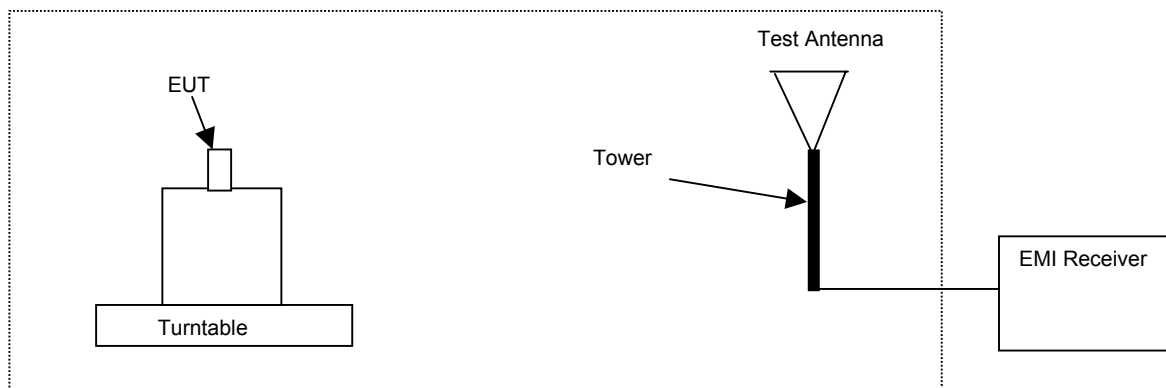
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7. RF POWER OUTPUT (RADIATED)

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

7.1 Setup

Testing was performed in accordance with document ANSI/TIA/EIA-603-A, section 2.2.17 Average Radiated Power Output.



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7.2 Pass/Fail Criteria

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

7.3 Detailed Test Results

Test Technician / Engineer	Mark Severson	
Date of Measurement	June 11-12, 2002	
Temperature / Humidity	24°C	49-45%RH
Test Result	NPW-1PA with FCC ID: GMLNPW-1PA complies with FCC Part 22.913(a) and FCC Part 24.232(b) when operated at max power.	

Cellular Band, AMPS Channel 991

Freq Max (MHz)	EDRP EMI (dBm)	Pol.
824.04	22.2	V

Cellular Band, AMPS Channel 384

Freq Max (MHz)	EDRP EMI (dBm)	Pol.
836.52	22.8	V

Cellular Band, AMPS Channel 799

Freq Max (MHz)	EDRP EMI (dBm)	Pol.
848.97	24.2	V

Cellular Band, TDMA Channel 991

Freq Max (MHz)	EDRP EMI (dBm)	Pol.
824.04	26.5	V

Cellular Band, TDMA Channel 384

Freq Max (MHz)	EDRP EMI (dBm)	Pol.
836.52	28.2	V

Cellular Band, TDMA Channel 799

Freq Max (MHz)	EDRP EMI (dBm)	Pol.
848.97	28.2	V

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PCS Band, TDMA1900 Channel 2

Freq Max (MHz)	EIRP EMI (dBm)	Pol.
1850.04	30.7	V

PCS Band, TDMA1900 Channel 999

Freq Max (MHz)	EIRP EMI (dBm)	Pol.
1879.95	31.1	V

PCS Band, TDMA1900 Channel 1998

Freq Max (MHz)	EIRP EMI (dBm)	Pol.
1909.92	30.6	V

7.4 Measurement Uncertainty

The measurement uncertainty for this test is +/- 3.4dB.

8. TX AUDIO FREQUENCY RESPONSE

Specification: FCC Part 2.1047(a)

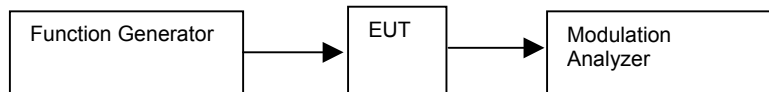
8.1 Setup

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.

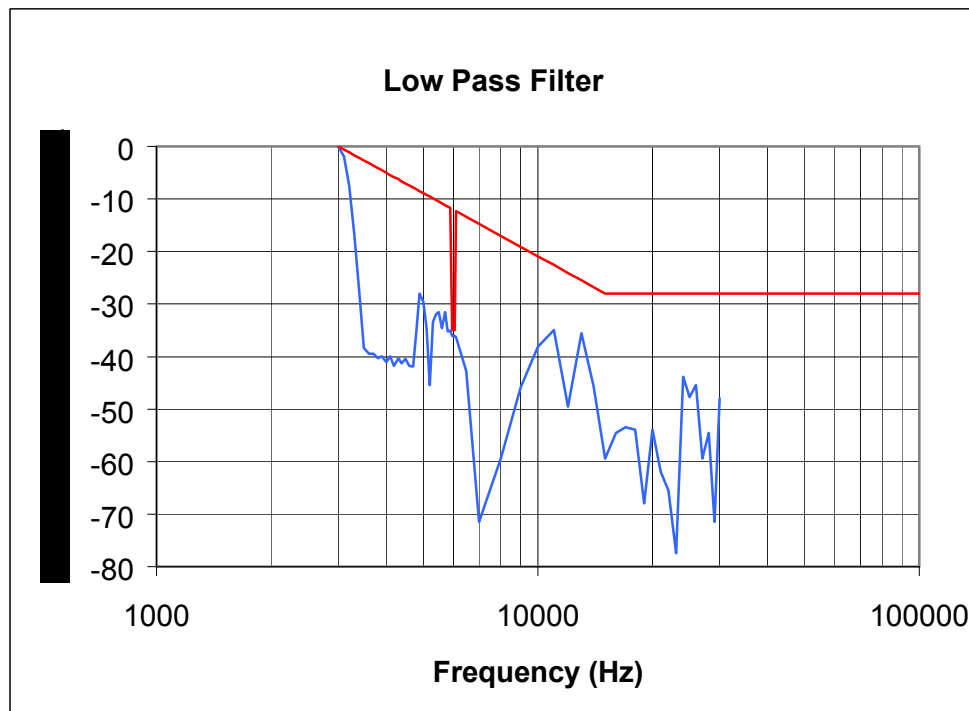
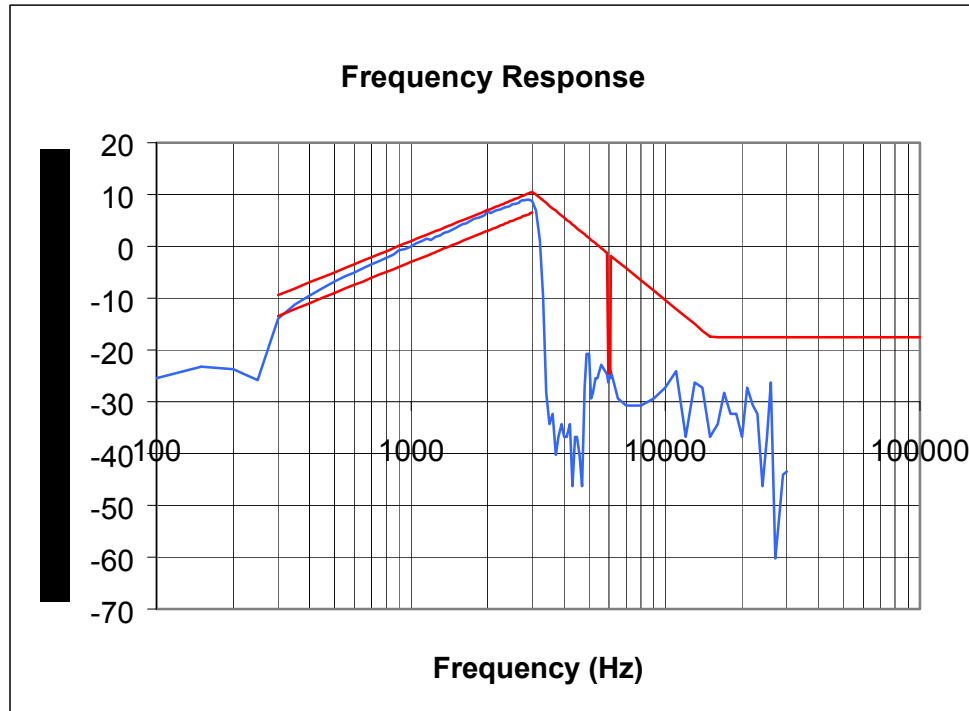


8.2 Pass/Fail Criteria

Emissions mask.

8.3 Detailed Test Results

Test Technician / Engineer	Anu Balijepalli	
Date of Measurement	3-5 July 2002	
Temperature / Humidity	23°C	48-55%RH
Test Result	NPW-1PA with FCC ID: GMLNPW-1PA complies with FCC Part 2.1047(a)	



9. MODULATION LIMITING

Specification: FCC Part 2.1047(b)

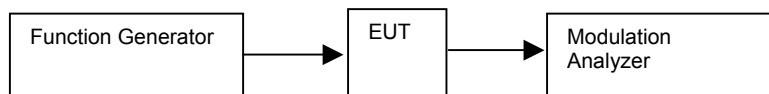
9.1 Setup

Testing was performed with the EUT connected to the audio input circuit/microphone of the EUT as for Frequency Response of the audio modulating circuit.

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.



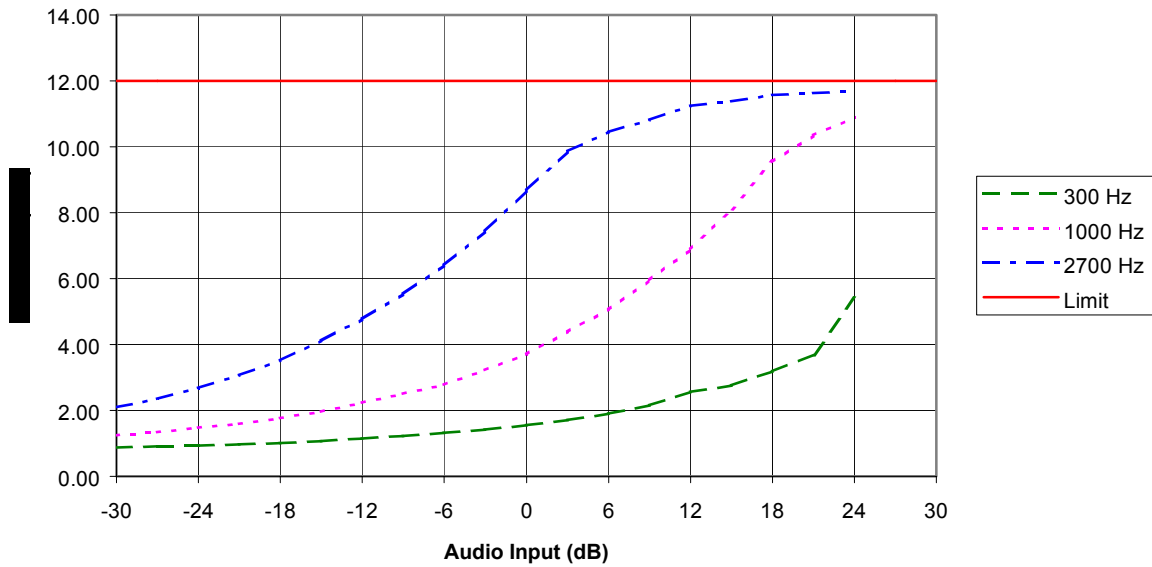
9.2 Pass/Fail Criteria

Less than +/-12kHz deviation.

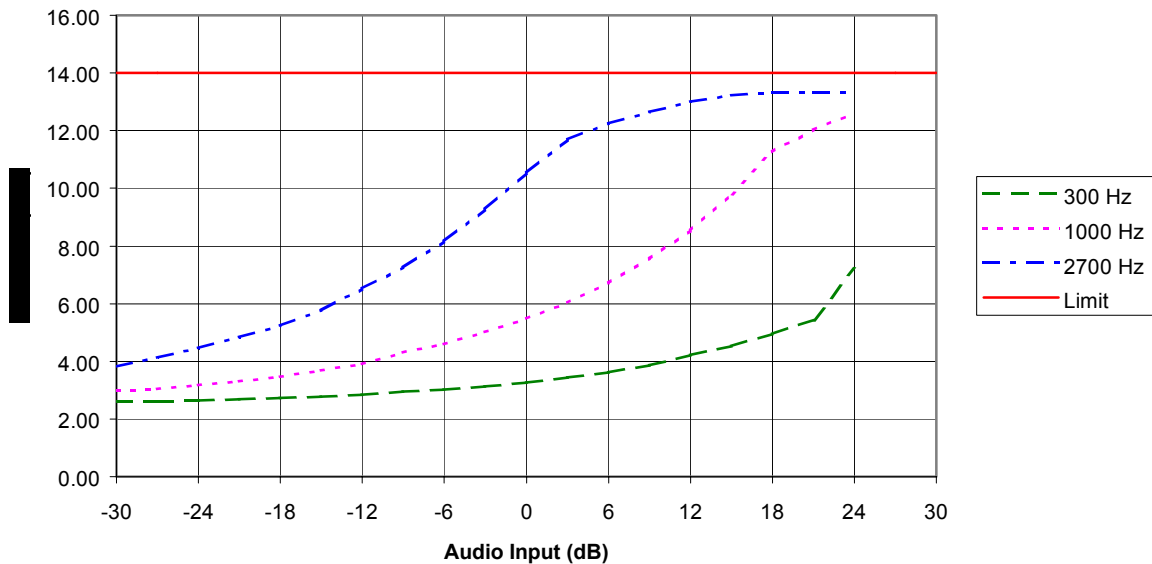
9.3 Detailed Test Results

Test Technician / Engineer	Anu Balijepalli	
Date of Measurement	11-12 July 2002	
Temperature / Humidity	23°C	45-58%RH
Test Result	NPW-1PA with FCC ID: GMLNPW-1PA complies with FCC Part 2.1047(b)	

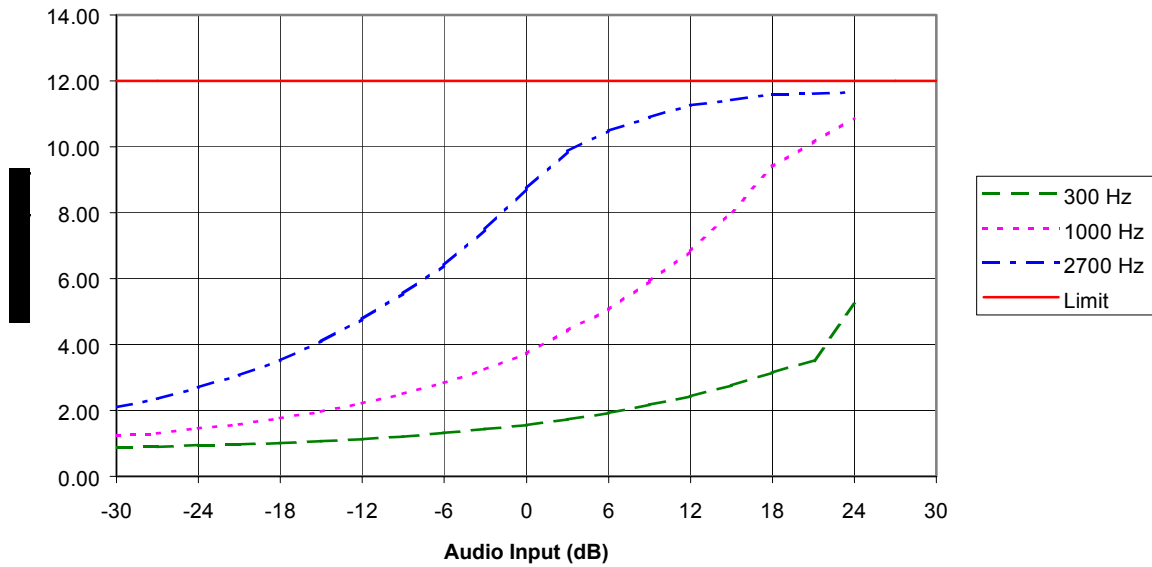
Modulation Limiting - Voice Only, Positive Peaks



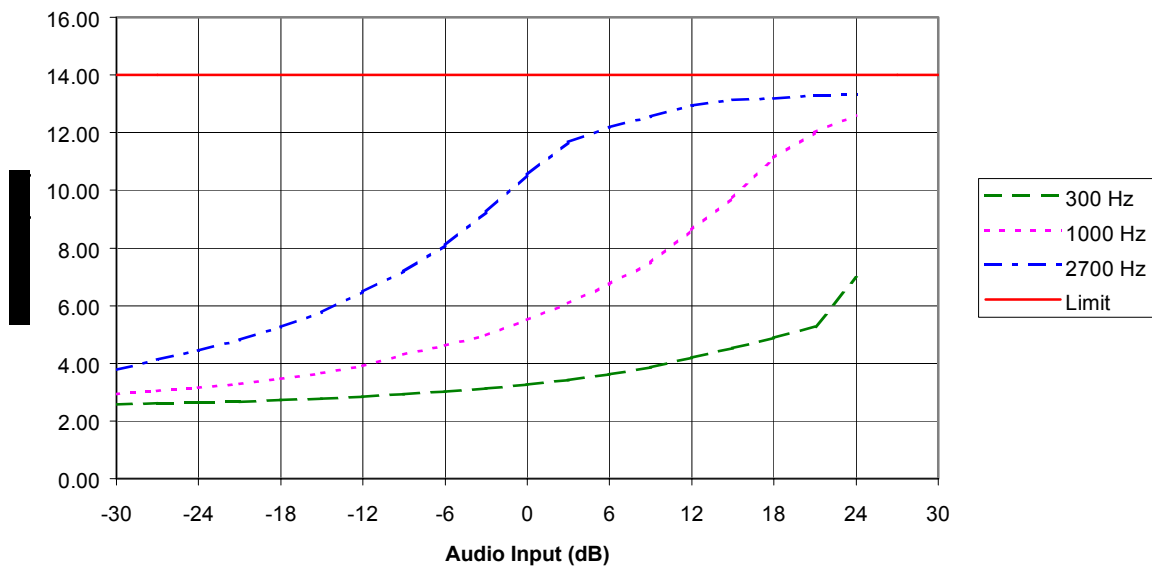
Modulation Limiting - Voice+SAT, Positive Peaks



Modulation Limiting - Voice Only, Negative Peaks



Modulation Limiting - Voice+SAT, Negative Peaks



10. MODULATION REQUIREMENTS (MEASUREMENT OF MAXIMUM DEVIATION)

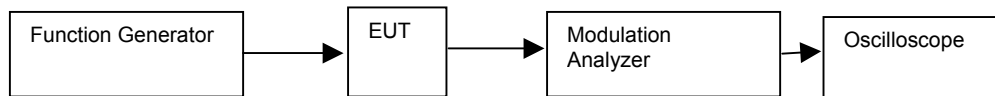
Specification: FCC Part 22.915(a)(b)(c)(d)(1)

10.1 Setup

The presentation of tones was obtained by attaching the oscilloscope to the modulation output of the modulation analyzer.

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	Low Limit (kHz)	High Limit (kHz)
Voice	10.8	13.2
Wideband Data	7.2	8.8
SAT	1.8	2.2
ST	7.2	8.8

10.3 Detailed Test Results

Test Technician / Engineer	Anu Balijepalli	
Date of Measurement	15 July 2002	
Temperature / Humidity	22-23°C	22-23°C
Test Result	NPW-1PA with FCC ID: GMLNPW-1PA complies with FCC Part 22.915(a)(b)(c)(d)(1)	

Modulation	Deviation (kHz)	Low Limit (kHz)	High Limit (kHz)
Voice	11.43	10.8	13.2
Wideband Data	8.01	7.2	8.8
SAT	2.002	1.8	2.2
ST	8.07	7.2	8.8
SAT + Voice	13.11	N/A	N/A
SAT + DTMF	11.81	N/A	N/A

11. OCCUPIED BANDWIDTH (EMISSIONS MASKS)

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

11.1 Setup

Testing was performed with the EUT connected to a 6dB splitter, 6dB attenuator, 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.

For EUTs supporting audio modulation, the audio signal generator was adjusted to the frequency of maximum response and with the output level set for +/-2.5kHz deviation (or 50% modulation). With level constant, the signal level was increased 16dB.

For EUTs supporting digital modulation, the digital modulation mode was operated to its maximum extent.



11.2 Pass/Fail Criteria

Modulation	Low Limit (kHz)	High Limit (kHz)
Voice	10.8	13.2
Wideband Data	7.2	8.8

11.3 Detailed Test Results

Test Technician / Engineer	Mark Severson	
Date of Measurement	June 21-25, 2002	
Temperature / Humidity	22°C	64-59%RH
Test Result	NPW-1PA with FCC ID: GMLNPW-1PA complies with FCC Part 2.1049(c)(1), 24.238(a)(b) when operated at max power.	

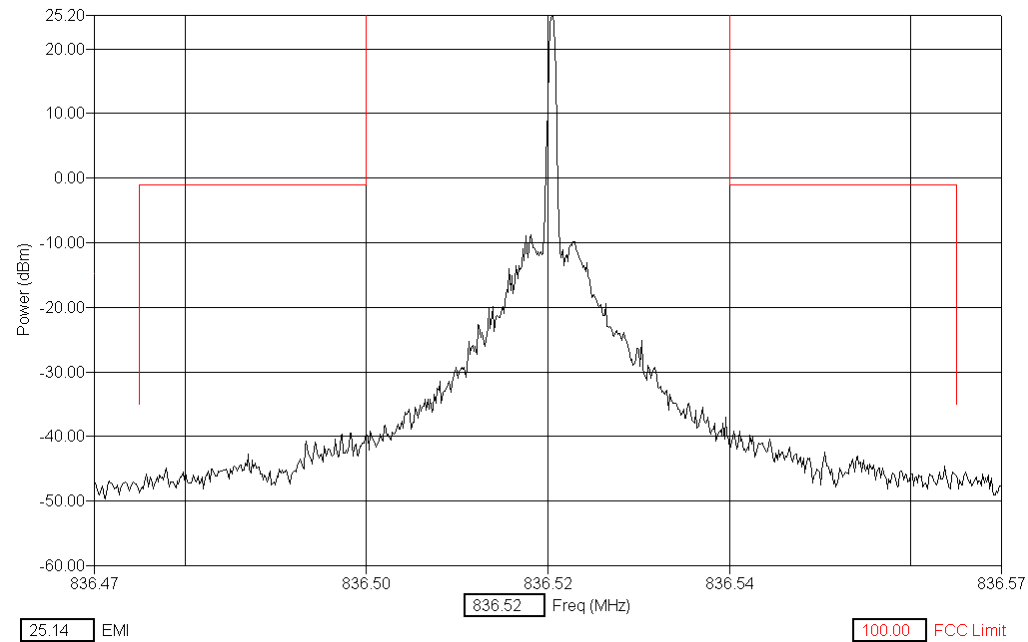
Test & Certification Center (TCC) - Dallas

FCC ID: GMLNPW-1PA
Test Report #: 02-RF-0086
29 July 2002

Ver 1.0

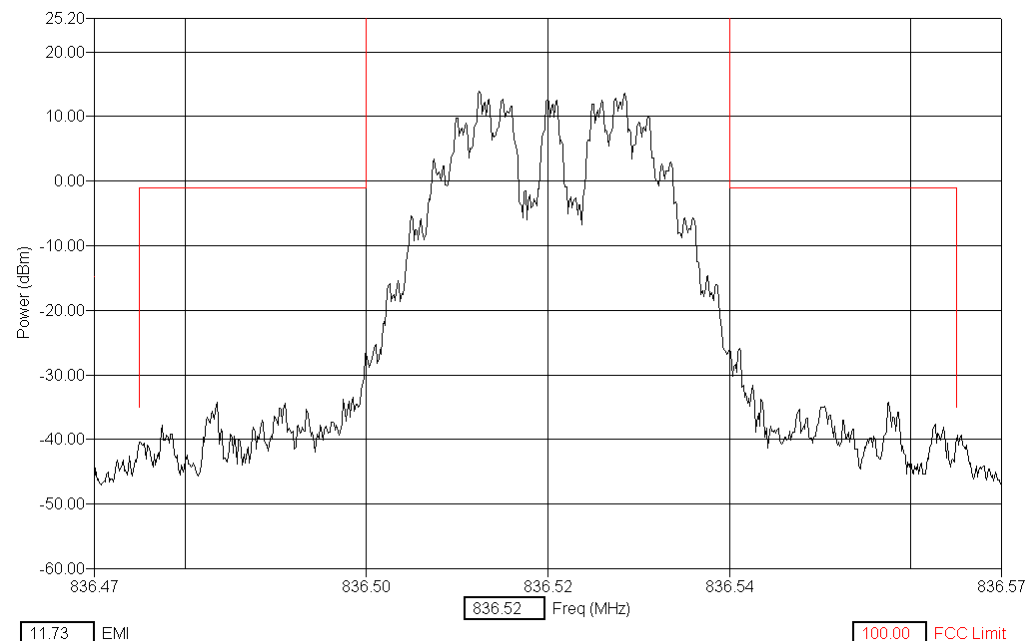
AMPS Max Power Measurements – No Modulation; Channel 384

100 kHz Span, 300 Hz RBW/VBW, 100ms Sweep Time, ref to power level



AMPS Max Power – Voice (2500 Hz Sine Wave); F3E/F3D mask, Channel 384

100 kHz Span, 300 Hz RBW/VBW, 100ms Sweep Time, ref to power level

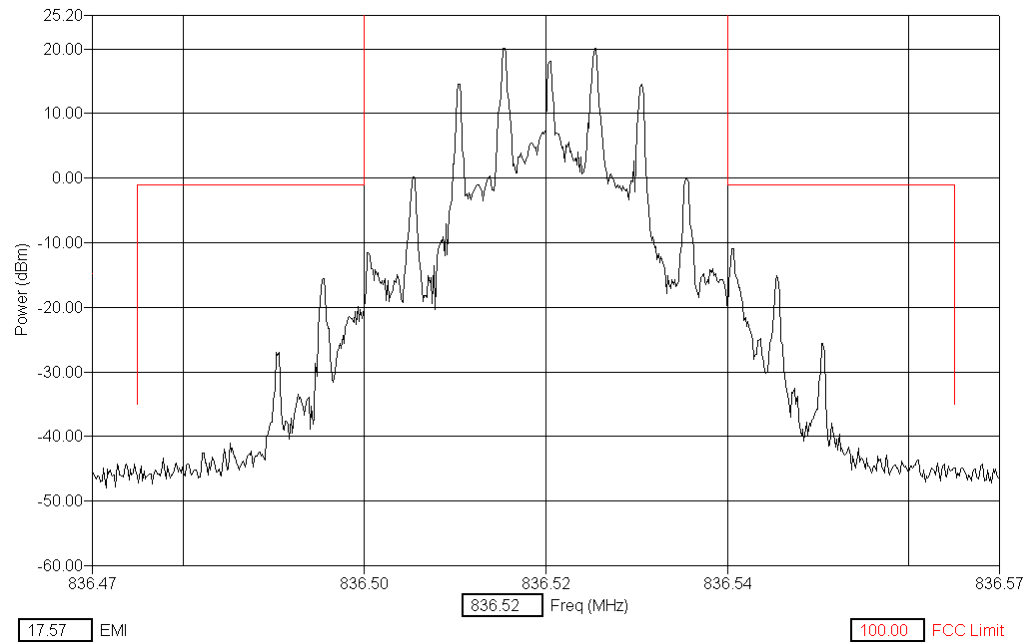


Test & Certification Center (TCC) - Dallas
 FCC ID: GMLNPW-1PA
 Test Report #: 02-RF-0086
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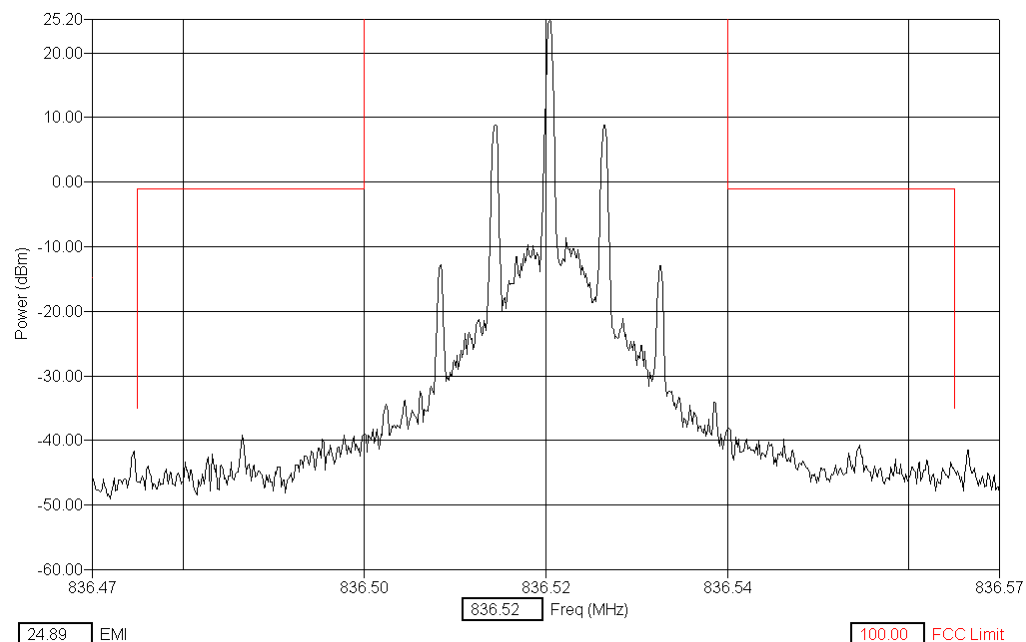
AMPS Max Power – Wideband Data; F3E/F3D mask, Channel 384

100 kHz Span, 300 Hz RBW/VBW, 100ms Sweep Time, ref to power level



AMPS Max Power – SAT; F3E/F3D mask, Channel 384

100 kHz Span, 300 Hz RBW/VBW, 100ms Sweep Time, ref to power level

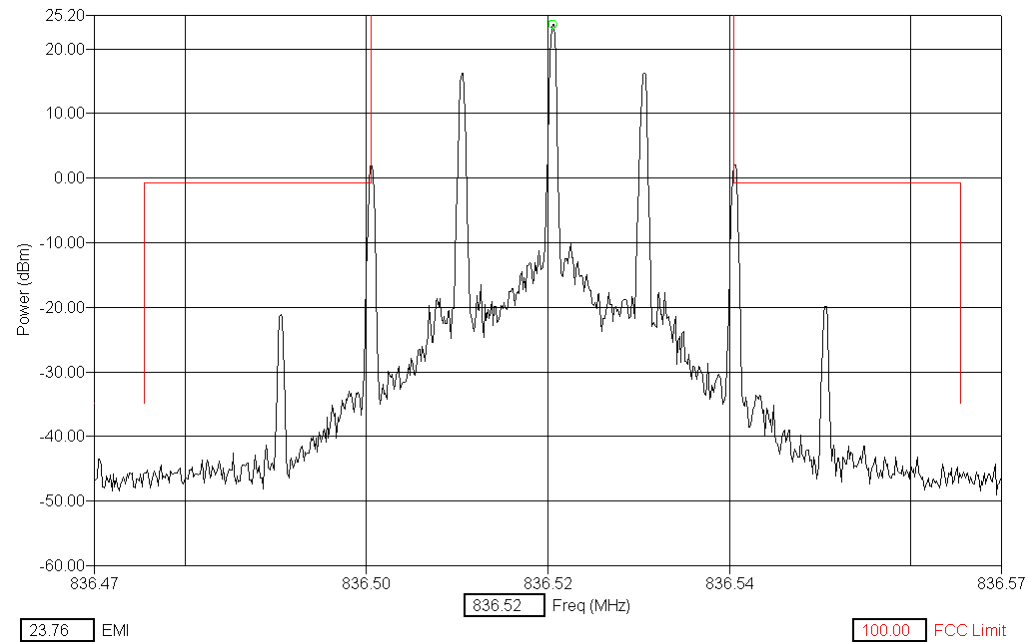


Test & Certification Center (TCC) - Dallas
 FCC ID: GMLNPW-1PA
 Test Report #: 02-RF-0086
 29 July 2002

Ver 1.0

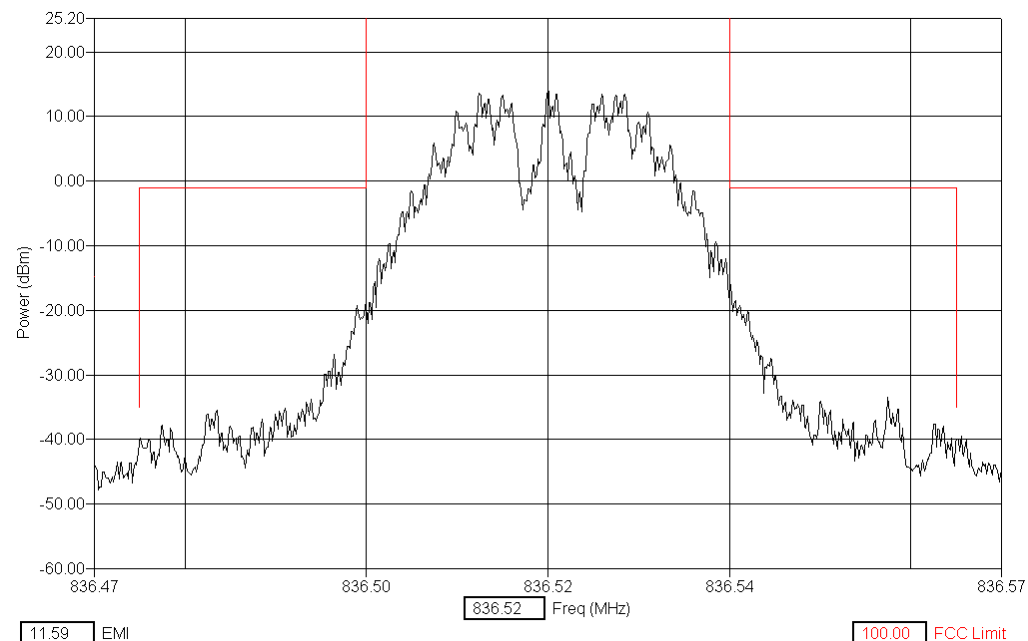
AMPS Max Power – ST; F3E/F3D mask, Channel 384

100 kHz Span, 300 Hz RBW/VBW, 100ms Sweep Time, ref to power level



AMPS Max Power – SAT + Voice; F3E/F3D mask, Channel 384

100 kHz Span, 300 Hz RBW/VBW, 100ms Sweep Time, ref to power level

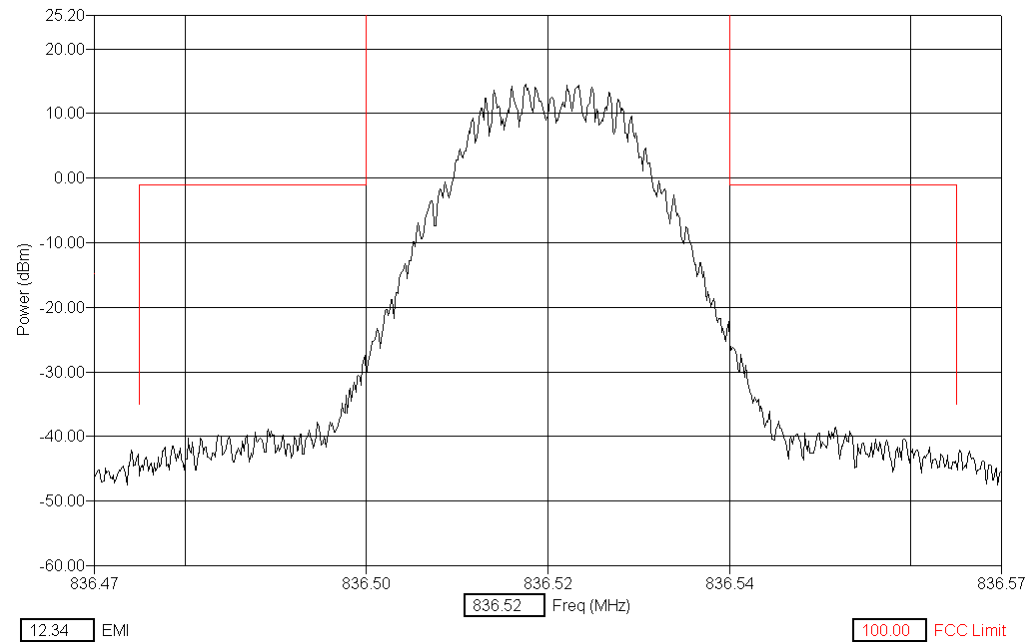


Test & Certification Center (TCC) - Dallas
 FCC ID: GMLNPW-1PA
 Test Report #: 02-RF-0086
 29 July 2002

Ver 1.0

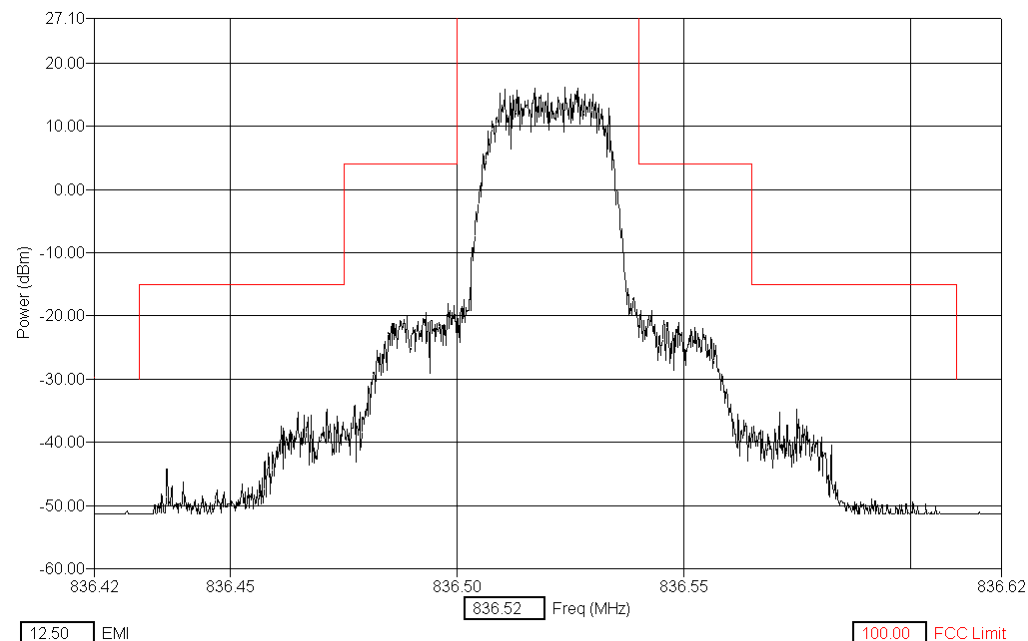
AMPS Max Power – SAT + DTMF; F3E/F3D mask, Channel 384

100 kHz Span, 300 Hz RBW/VBW, 100ms Sweep Time, ref to power level



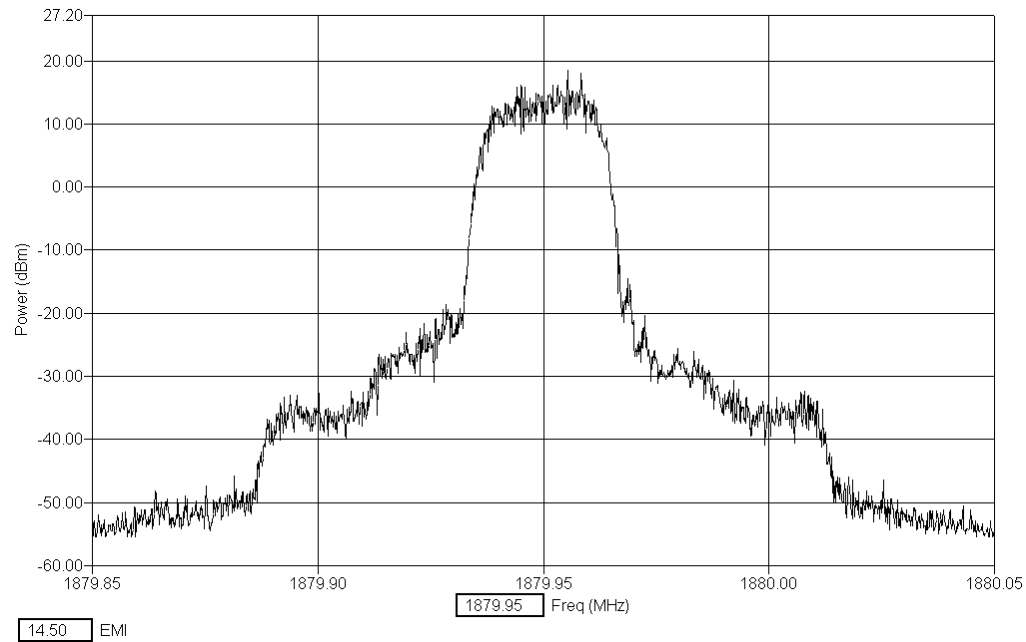
TDMA Cellular - Random Modulation; F1D, Channel 384

200 kHz Span, 300 Hz RBW/VBW, 100ms Sweep Time, ref to power level



TDMA PCS – Channel 999, 1879.95 MHz

200 kHz Span, 300 Hz RBW/VBW, 100ms Sweep Time, ref to power level



11.4 Measurement Uncertainty

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

12. OCCUPIED BANDWIDTH (TRANSMITTER CONDUCTED MEASUREMENTS)

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

12.1 Setup

Testing was performed with the EUT connected to a 6dB splitter, 6dB attenuator, 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.



12.2 Pass/Fail Criteria

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

12.3 Detailed Test Results

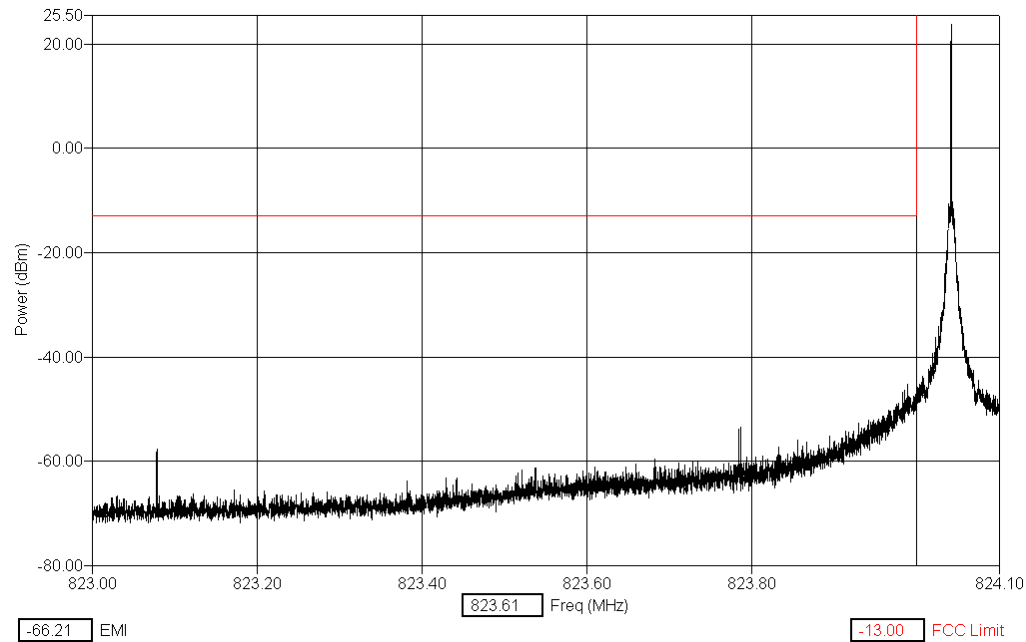
Test Technician / Engineer	Mark Severson	
Date of Measurement	June 21-25, 2002	
Temperature / Humidity	22°C	59-64%RH
Test Result	NPW-1PA with FCC ID: GMLNPW-1PA complies with FCC Part 2.1049(c)(1), 24.238(a)(b) when operated at max power.	

Test & Certification Center (TCC) - Dallas
 FCC ID: GMLNPW-1PA
 Test Report #: 02-RF-0086
 29 July 2002

Ver 1.0

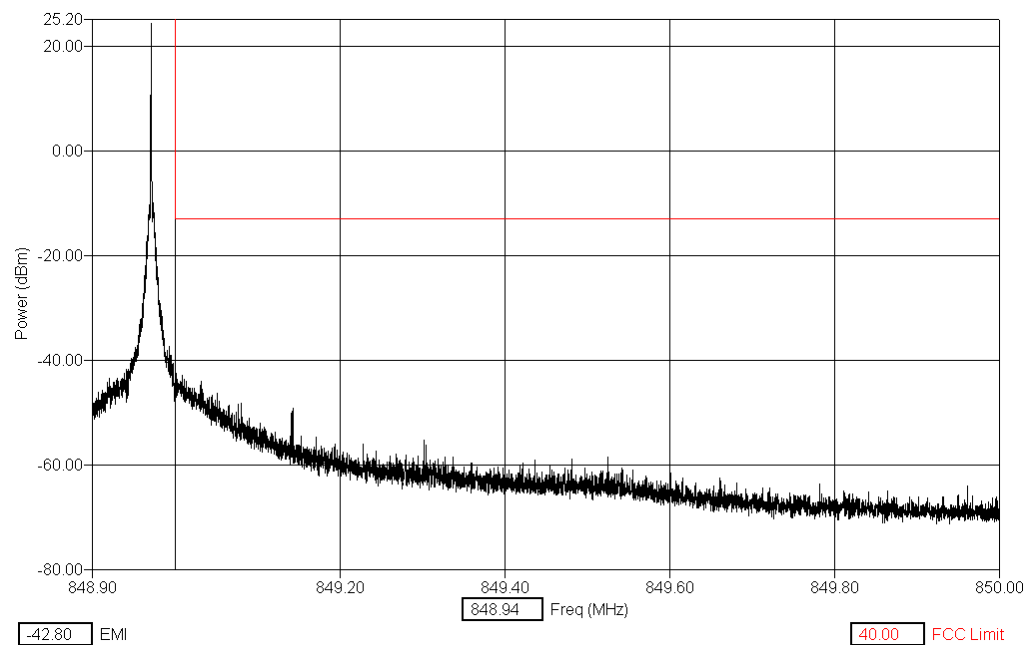
AMPS Max Power - Channel 991 (824.04 MHz) No Modulation

300 Hz RBW/VBW, 100ms Sweep Time, ref to power level



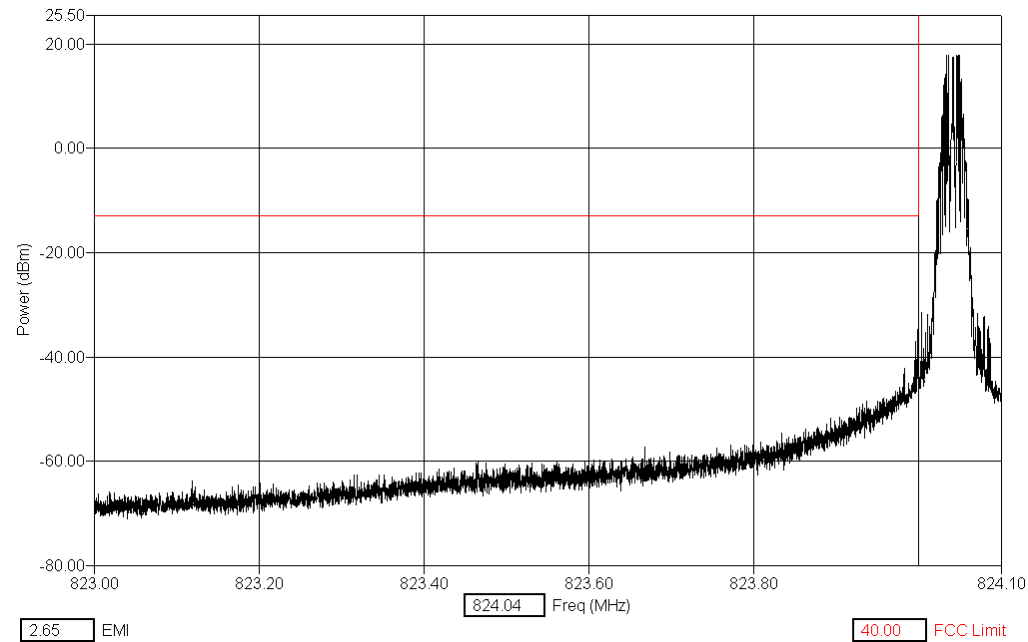
AMPS Max Power - Channel 799 (848.97 MHz) No Modulation

300 Hz RBW/VBW, 100ms Sweep Time, ref to power level



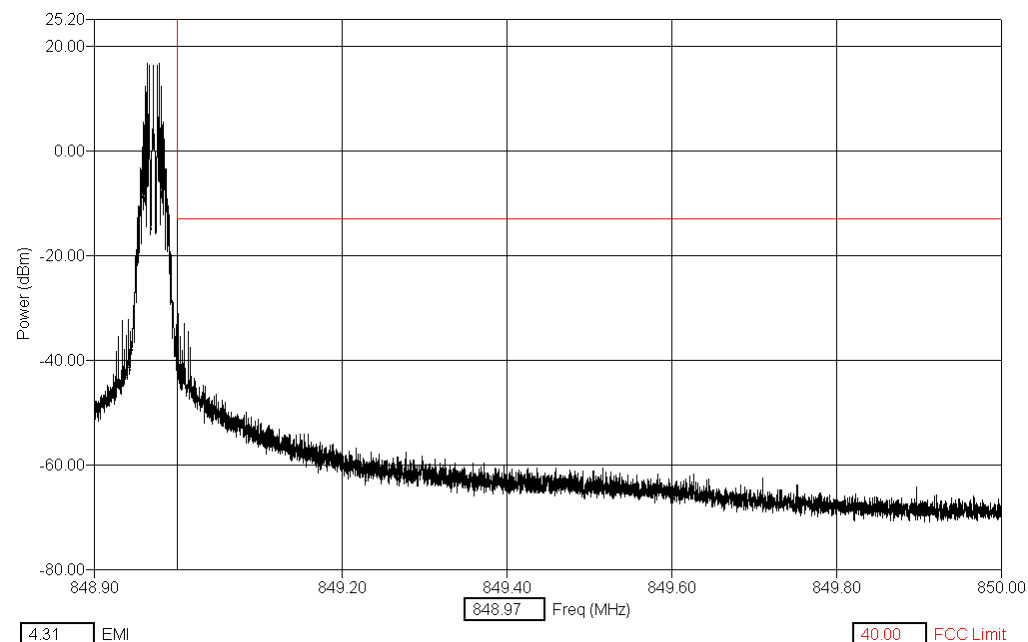
AMPS Max Power - Channel 991 (824.04 MHz) Voice + SAT Tone

300 Hz RBW/VBW, 100ms Sweep Time, ref to power level



AMPS Max Power - Channel 799 (848.97 MHz) Voice + SAT Tone

300 Hz RBW/VBW, 100ms Sweep Time, ref to power level

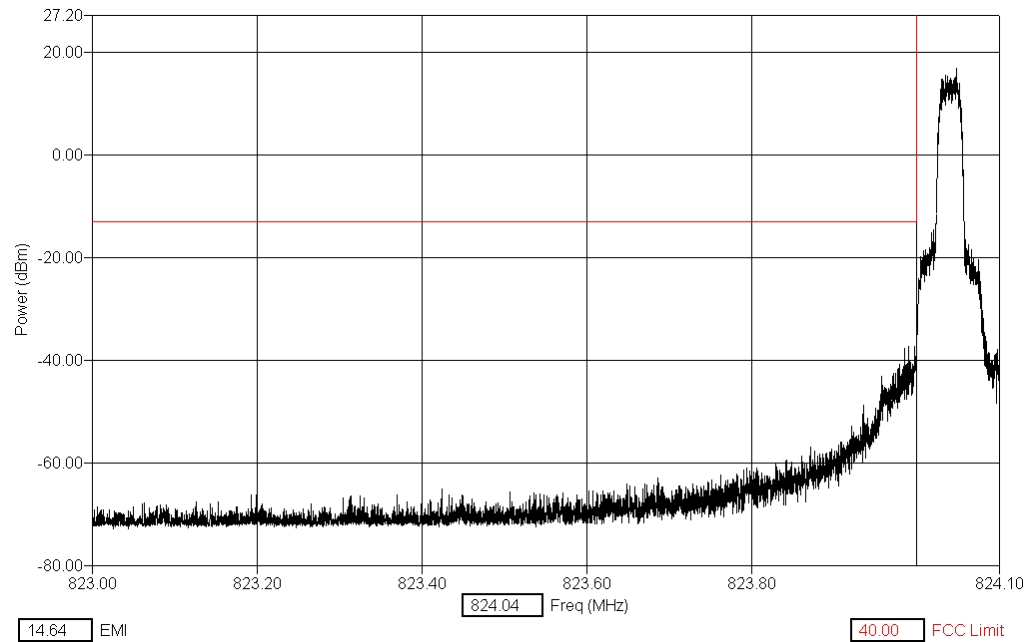


Test & Certification Center (TCC) - Dallas
 FCC ID: GMLNPW-1PA
 Test Report #: 02-RF-0086
 29 July 2002

Ver 1.0

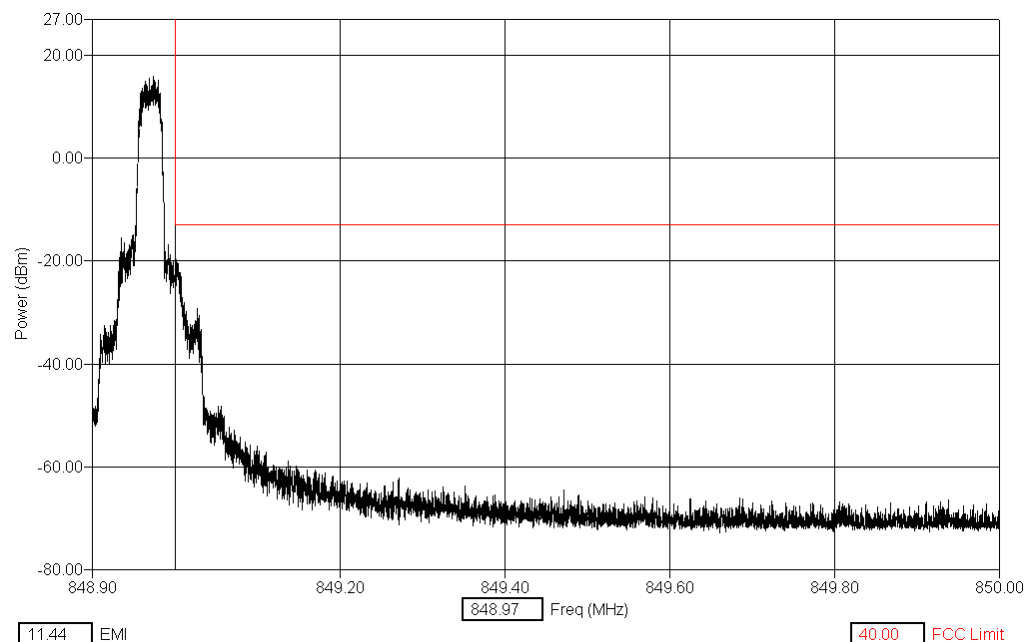
TDMA Cellular, Max Power - Channel 991 (824.04 MHz)

300 Hz RBW/VBW, 100ms Sweep Time, ref to power level



TDMA Cellular, Max Power - Channel 799 (848.97 MHz)

300 Hz RBW/VBW, 100ms Sweep Time, ref to power level

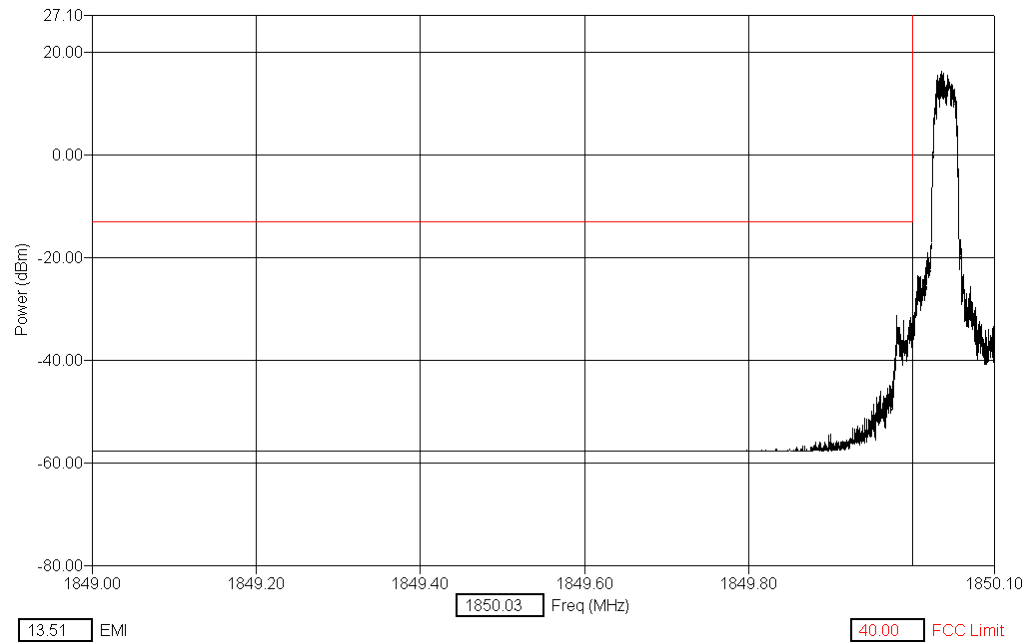


Test & Certification Center (TCC) - Dallas
 FCC ID: GMLNPW-1PA
 Test Report #: 02-RF-0086
 29 July 2002

Ver 1.0

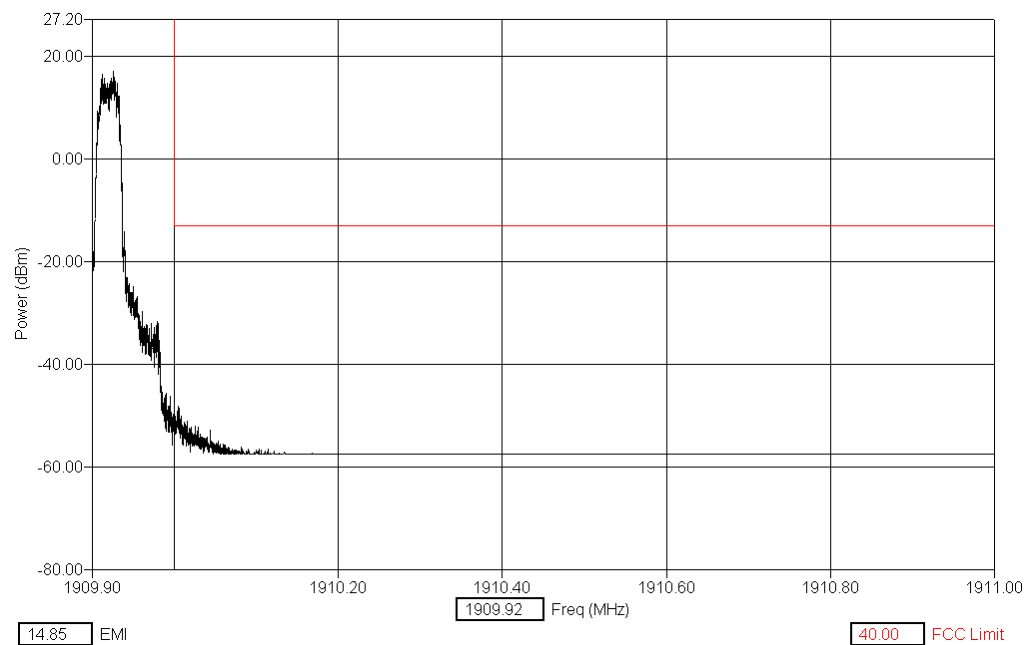
TDMA PCS, Max Power - Channel 2 (1850.04 MHz)

300 Hz RBW/VBW, 100ms Sweep Time, ref to power level



TDMA PCS, Max Power - Channel 1998 (1909.92 MHz)

300 Hz RBW/VBW, 100ms Sweep Time, ref to power level



Test & Certification Center (TCC) - Dallas

FCC ID: GMLNPW-1PA
Test Report #: 02-RF-0086
29 July 2002

Ver 1.0

12.4 Measurement Uncertainty

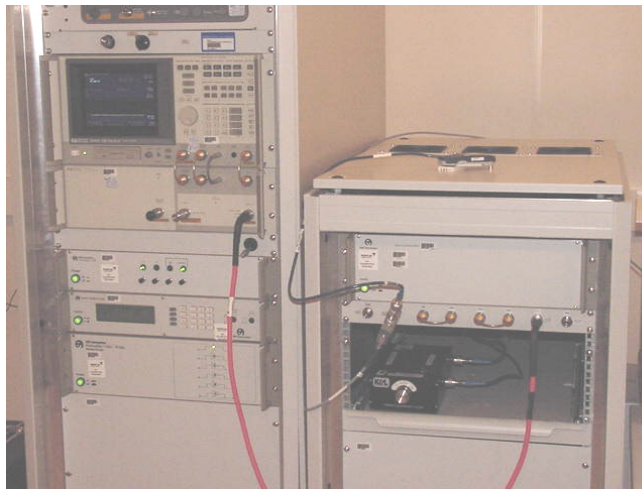
The measurement uncertainty for this test is +/- 3.7dB for 100kHz - 1000MHz and +/- 5.3dB for 1 - 20GHz.

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 splitter, 6dB attenuator, 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

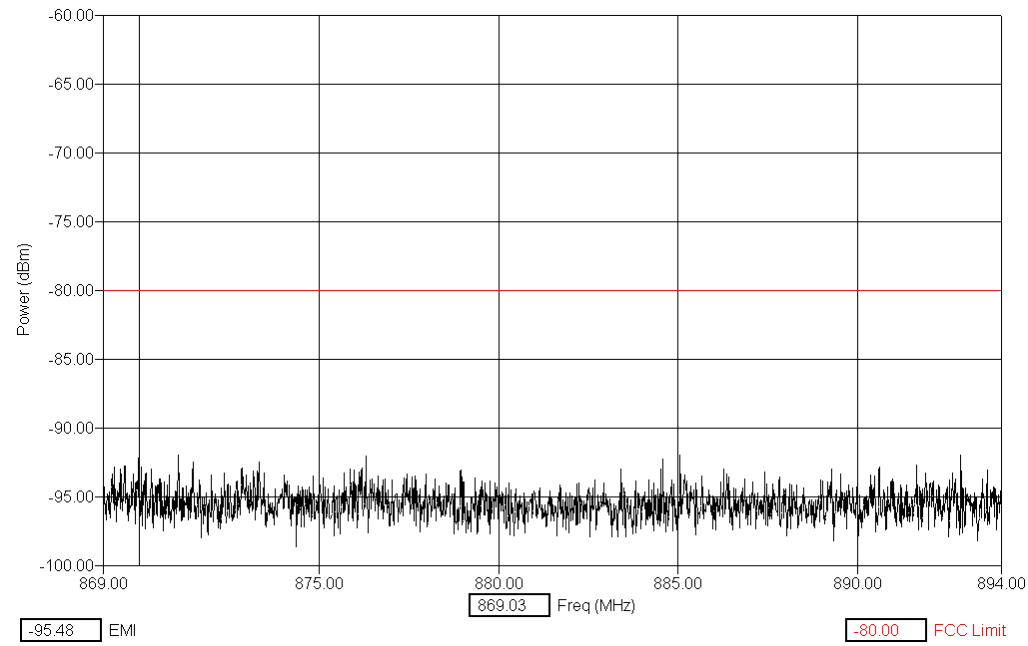
Test Technician / Engineer	Bob Alexander	
Date of Measurement	02 July 2002	
Temperature / Humidity	22°C	57%RH
Test Result	NPW-1PA with FCC ID: GMLNPW-1PA complies with FCC Part 22.917(f) when operated at max power.	

Test & Certification Center (TCC) - Dallas
 FCC ID: GMLNPW-1PA
 Test Report #: 02-RF-0086
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Ver 1.0

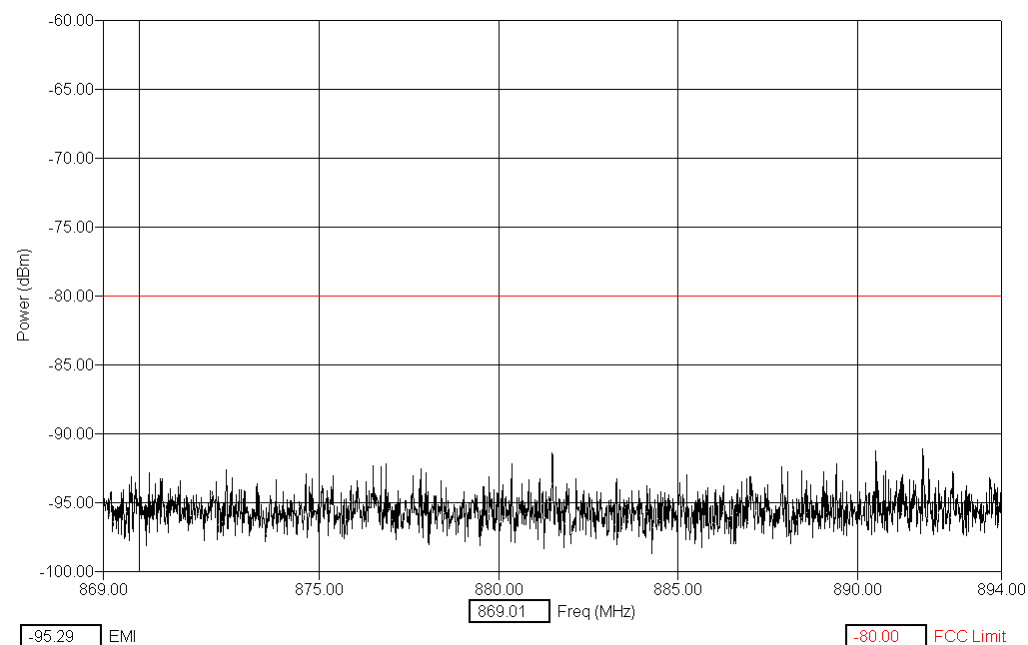
AMPS Max Power – Channel 991, 824.04MHz, Call Mode

30 kHz RBW/VBW, 100ms Sweep Time



AMPS Max Power - Channel 384, 836.52MHz, Call Mode

30 kHz RBW/VBW, 100ms Sweep Time

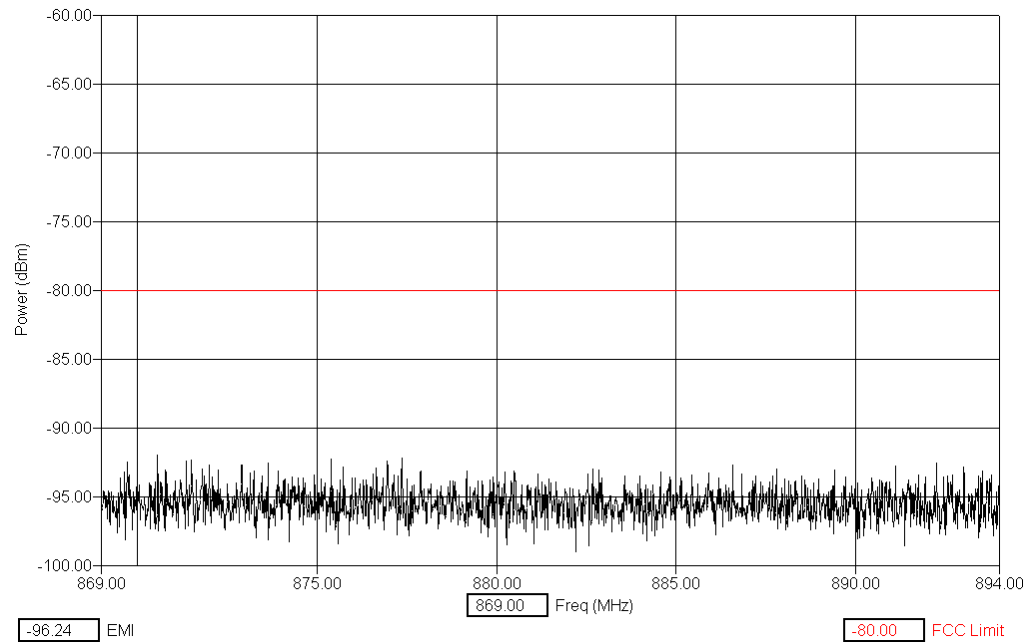


Test & Certification Center (TCC) - Dallas
 FCC ID: GMLNPW-1PA
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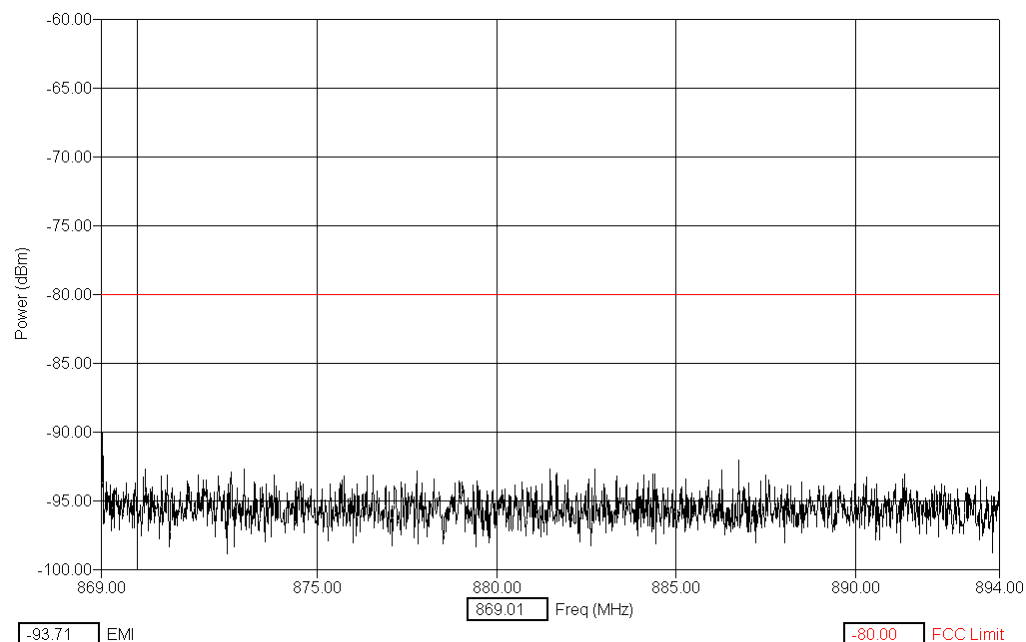
AMPS Max Power - Channel 799, 848.97MHz, Call Mode

30 kHz RBW/VBW, 100ms Sweep Time



TDMA Cellular, Max Power - Channel 991, 824.04MHz, Call Mode

30 kHz RBW/VBW, 100ms Sweep Time

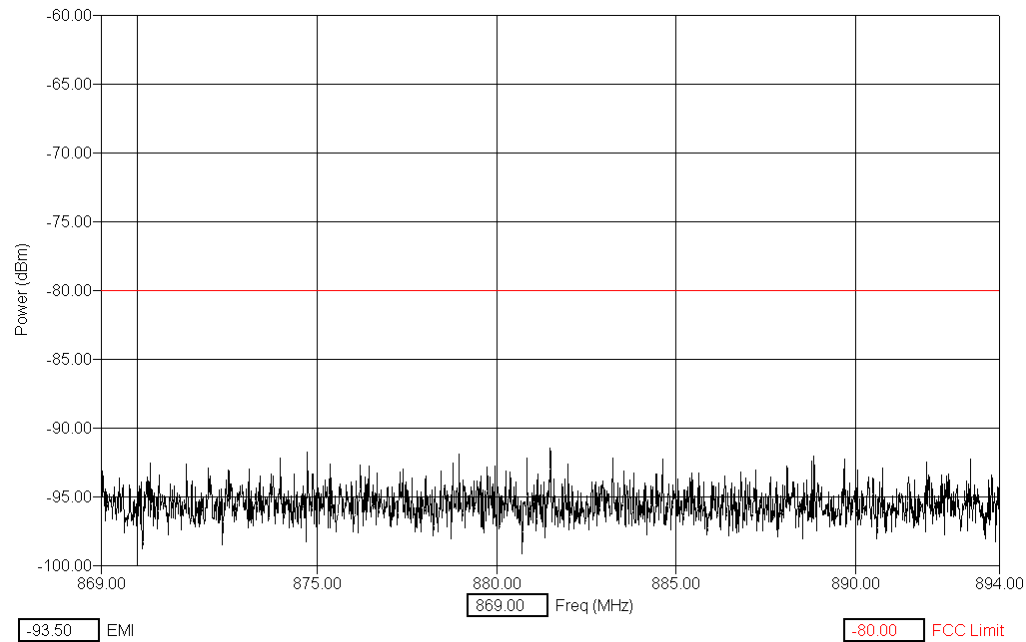


Test & Certification Center (TCC) - Dallas
 FCC ID: GMLNPW-1PA
 Test Report #: 02-RF-0086
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Ver 1.0

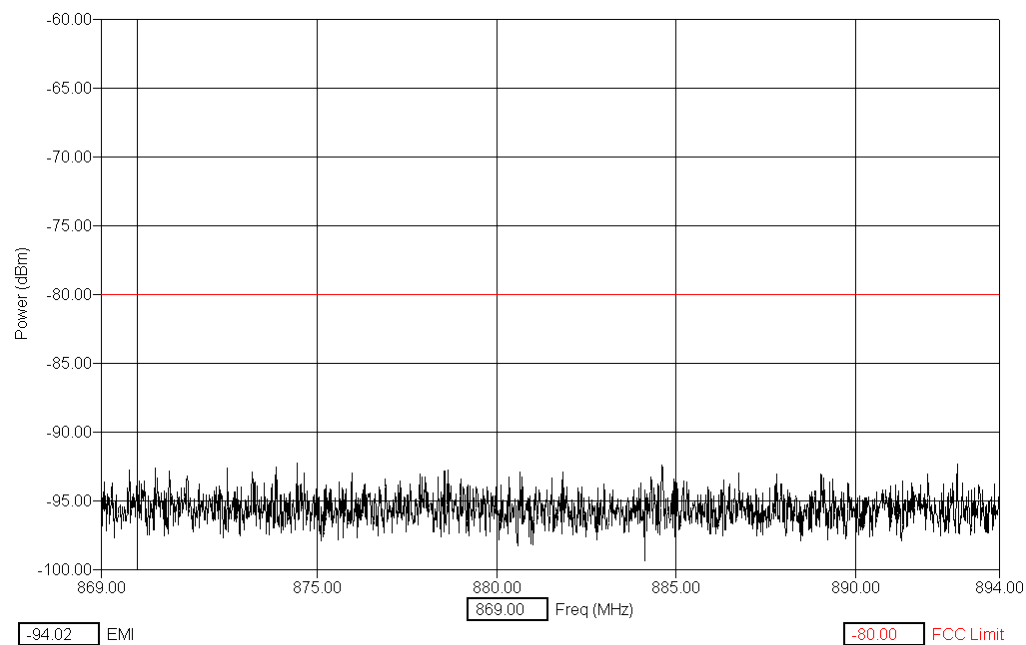
TDMA Cellular, Max Power - Channel 384, 836.52MHz, Call Mode

30 kHz RBW/VBW, 100ms Sweep Time



TDMA Cellular, Max Power - Channel 799, 848.97MHz, Call Mode

30 kHz RBW/VBW, 100ms Sweep Time



13.4 Measurement Uncertainty

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

14. SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Specification: FCC Part 2.1051

14.1 Setup

Testing was performed with the EUT connected to a 6dB splitter, 6dB attenuator, 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.



14.2 Pass/Fail Criteria

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

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

14.3 Detailed Test Results

Test Technician / Engineer	Bob Alexander	
Date of Measurement	22 June 2002	
Temperature / Humidity	22°C	59%RH
Test Result	NPW-1PA with FCC ID: GMLNPW-1PA complies with FCC Part 2.1051 when operated at max power.	

EMI (dBm) = trace (dBuV) + cable loss (dB) + filter loss (dB).

Test & Certification Center (TCC) - Dallas
 FCC ID: GMLNPW-1PA
 Test Report #: 02-RF-0086
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Ver 1.0

AMPS Max Power - Channel 991, 824.04 MHz, Call Mode

Freq (Max) (MHz)	(PK) Trace (dBm)	Cable (dB)	Filter (dB)	(PK) EMI (dBm)	FCC Limit (dBm)
1648.2	-31.8	0.8	2.2	-28.8	-13.00
2472.4	-45.0	1.0	3.0	-41.0	-13.00
3296.1	-48.1	1.2	3.3	-43.6	-13.00
4119.9	-49.9	1.6	3.4	-44.9	-13.00
4945.6	-48.9	1.8	3.5	-43.7	-13.00
5768.1	-46.6	2.0	3.7	-40.9	-13.00
6589.6	-48.2	2.0	4.0	-42.2	-13.00
7419.0	-44.1	2.1	4.2	-37.8	-13.00
8237.7	-45.3	2.2	4.4	-38.7	-13.00

AMPS Max Power - Channel 384, 836.52 MHz, Call Mode

Freq (Max) (MHz)	(PK) Trace (dBm)	Cable (dB)	Filter (dB)	(PK) EMI (dBm)	FCC Limit (dBm)
1673.0	-34.8	0.8	2.3	-31.7	-13.00
2510.0	-47.2	1.1	3.0	-43.1	-13.00
3344.6	-48.6	1.3	3.3	-44.1	-13.00
4183.8	-48.7	1.6	3.4	-43.7	-13.00
5019.6	-48.2	1.8	3.5	-42.9	-13.00
5852.9	-47.7	2.0	3.8	-41.9	-13.00
6691.5	-48.9	2.0	4.0	-42.9	-13.00
7527.3	-44.9	2.1	4.2	-38.6	-13.00
8365.1	-45.2	2.3	4.4	-38.5	-13.00

AMPS Max Power - Channel 799, 848.97 MHz, Call Mode

Freq (Max) (MHz)	(PK) Trace (dBm)	Cable (dB)	Filter (dB)	(PK) EMI (dBm)	FCC Limit (dBm)
1698.2	-35.7	0.8	2.2	-32.7	-13.00
2546.8	-44.3	1.0	3.0	-40.2	-13.00
3397.9	-47.3	1.4	3.3	-42.7	-13.00
4244.6	-48.9	1.6	3.4	-43.9	-13.00
5093.3	-48.9	1.8	3.5	-43.6	-13.00
5940.8	-49.6	2.0	3.8	-43.8	-13.00
6791.9	-45.1	2.0	4.0	-39.0	-13.00
7643.3	-44.8	2.1	4.2	-38.5	-13.00
8491.1	-44.7	2.4	4.4	-37.9	-13.00

Test & Certification Center (TCC) - Dallas
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TDMA Cellular Max Power - Channel 991, 824.04 MHz, Call Mode

Freq (Max) (MHz)	(PK) Trace (dBm)	Cable (dB)	Filter (dB)	(PK) EMI (dBm)	FCC Limit (dBm)
1648.0	-29.1	0.8	2.2	-26.1	-13.00
2472.5	-45.3	1.0	3.0	-41.3	-13.00
3297.9	-48.6	1.2	3.3	-44.1	-13.00
4121.8	-47.8	1.6	3.4	-42.9	-13.00
4944.3	-48.4	1.8	3.5	-43.2	-13.00
5768.8	-48.0	2.0	3.7	-42.3	-13.00
6592.2	-48.5	2.0	4.0	-42.5	-13.00
7413.9	-44.7	2.1	4.2	-38.4	-13.00
8238.5	-44.9	2.2	4.4	-38.3	-13.00

TDMA Cellular Max Power - Channel 384, 836.52 MHz, Call Mode

Freq (Max) (MHz)	(PK) Trace (dBm)	Cable (dB)	Filter (dB)	(PK) EMI (dBm)	FCC Limit (dBm)
1673.3	-31.1	0.8	2.3	-28.0	-13.00
2508.9	-46.9	1.1	3.0	-42.9	-13.00
3346.7	-47.2	1.3	3.3	-42.7	-13.00
4184.8	-48.7	1.6	3.4	-43.7	-13.00
5019.4	-48.3	1.8	3.5	-43.0	-13.00
5856.2	-49.3	2.0	3.8	-43.5	-13.00
6694.0	-47.7	2.0	4.0	-41.7	-13.00
7527.7	-45.3	2.1	4.2	-39.0	-13.00
8362.8	-46.2	2.3	4.4	-39.5	-13.00

TDMA Cellular Max Power - Channel 799, 848.97 MHz, Call Mode

Freq (Max) (MHz)	(PK) Trace (dBm)	Cable (dB)	Filter (dB)	(PK) EMI (dBm)	FCC Limit (dBm)
1697.9	-33.9	0.8	2.2	-30.9	-13.00
2547.0	-36.6	1.0	3.0	-32.5	-13.00
3393.0	-46.9	1.4	3.3	-42.2	-13.00
4243.6	-48.3	1.6	3.4	-43.3	-13.00
5094.8	-49.4	1.8	3.5	-44.1	-13.00
5940.3	-47.8	2.0	3.8	-42.1	-13.00
6794.3	-46.0	2.0	4.0	-39.9	-13.00
7642.3	-44.5	2.1	4.2	-38.2	-13.00
8488.8	-44.3	2.4	4.4	-37.5	-13.00

Test & Certification Center (TCC) - Dallas
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TDMA PCS Max Power - Channel 2, 1850.04 MHz, Call Mode

Freq (Max) (MHz)	(PK) Trace (dBm)	Cable (dB)	Filter (dB)	(PK) EMI (dBm)	FCC Limit (dBm)
3699.9	-46.4	1.5	3.3	-41.6	-13.00
5549.4	-47.1	1.9	3.7	-41.5	-13.00
7401.8	-44.7	2.1	4.2	-38.5	-13.00
9247.2	-45.0	2.8	4.6	-37.7	-13.00
11098.5	-43.4	3.2	5.2	-35.0	-13.00
12948.5	-44.9	3.3	5.9	-35.8	-13.00
14803.3	-42.3	3.3	6.4	-32.6	-13.00
16650.6	-43.3	3.4	7.4	-32.5	-13.00
18499.2	-44.7	4.0	8.3	-32.4	-13.00

TDMA PCS Max Power - Channel 999, 1879.95 MHz, Call Mode

Freq (Max) (MHz)	(PK) Trace (dBm)	Cable (dB)	Filter (dB)	(PK) EMI (dBm)	FCC Limit (dBm)
3759.5	-46.6	1.6	3.3	-41.7	-13.00
5642.3	-46.6	1.9	3.7	-40.9	-13.00
7519.0	-43.6	2.1	4.2	-37.4	-13.00
9402.8	-44.9	2.8	4.7	-37.5	-13.00
11278.7	-44.6	3.2	5.3	-36.1	-13.00
13157.5	-44.5	3.3	6.0	-35.3	-13.00
15044.0	-42.7	3.3	6.5	-32.9	-13.00
16919.7	-43.1	3.5	7.5	-32.2	-13.00
18799.2	-43.3	4.2	8.4	-30.7	-13.00

TDMA PCS Max Power - Channel 1998, 1909.92 MHz, Call Mode

Freq (Max) (MHz)	(PK) Trace (dBm)	Cable (dB)	Filter (dB)	(PK) EMI (dBm)	FCC Limit (dBm)
3819.4	-48.9	1.4	3.3	-44.2	-13.00
5729.6	-45.9	1.9	3.7	-40.3	-13.00
7639.8	-44.5	2.1	4.2	-38.2	-13.00
9550.6	-45.2	2.9	4.7	-37.6	-13.00
11462.4	-46.1	3.2	5.4	-37.5	-13.00
13371.2	-41.5	3.3	6.0	-32.2	-13.00
15280.7	-42.1	3.3	6.7	-32.2	-13.00
17188.8	-43.4	3.6	7.6	-32.2	-13.00
19096.6	-44.7	4.3	8.6	-31.9	-13.00

14.4 Measurement Uncertainty

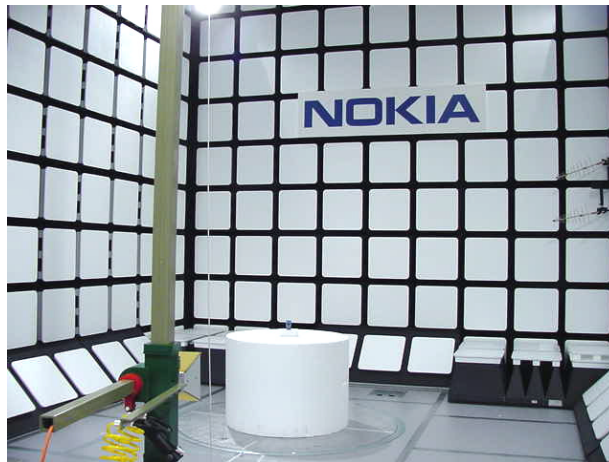
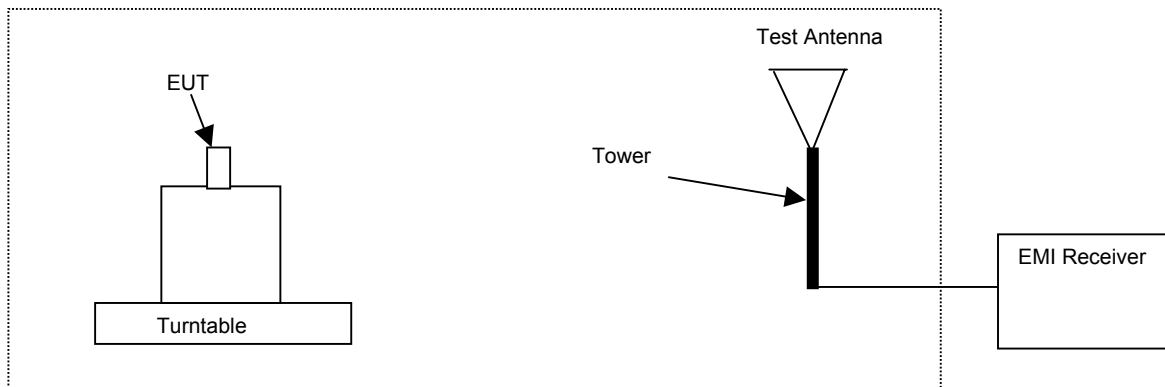
The measurement uncertainty for this test is +/- 3.7dB for 100kHz - 1000MHz and +/- 5.3dB for 1 - 20GHz.

15. FIELD STRENGTH OF SPURIOUS RADIATION

Specification: FCC Part 2.1053

15.1 Setup

Test equipment set-up.



15.2 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

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15.3 Detailed Test Results

Test Technician / Engineer	Bob Alexander	
Date of Measurement	12-27 June 2002	
Temperature / Humidity	24°C	38%RH
Test Result	NPW-1PA with FCC ID: GMLNPW-1PA complies with FCC Part 2.1053 when operated at max power.	

Amps Max Power - Channel 384

Tuned Freq (MHz)	Freq Max (MHz)	(PK) EMI (dBm)	dBc	FCC Limit (dBm)	Pol.
836.52	1673.5	-38.7	61.5	-13	H
836.52	1673.5	-38.6	61.4	-13	V
836.52	2509.0	-34.5	57.3	-13	H
836.52	2509.0	-34.4	57.2	-13	V
836.52	3346.0	-31.7	54.5	-13	H
836.52	3346.0	-31.2	54.0	-13	V
836.52	4181.5	-27.1	49.9	-13	H
836.52	4181.5	-28.0	50.8	-13	V
836.52	5018.5	-24.9	47.7	-13	H
836.52	5018.5	-23.9	46.7	-13	V
836.52	5855.5	-22.1	44.9	-13	H
836.52	5855.5	-23.1	45.9	-13	V
836.52	6692.0	-43.2	66.0	-13	H
836.52	6692.0	-42.9	65.7	-13	V
836.52	7528.0	-39.6	62.4	-13	H
836.52	7528.0	-41.4	64.2	-13	V
836.52	8365.5	-39.3	62.1	-13	H
836.52	8365.5	-38.9	61.7	-13	V

TDMA Cellular Band, Max Power - Channel 384

Tuned Freq (MHz)	Freq Max (MHz)	(PK) EMI (dBm)	dBc	FCC Limit (dBm)	Pol.
836.52	1673.5	-39.5	66.7	-13	H
836.52	1673.5	-38.4	66.6	-13	V
836.52	2509.0	-32.7	60.9	-13	H
836.52	2509.0	-32.4	60.6	-13	V
836.52	3346.0	-31.7	59.9	-13	H
836.52	3346.0	-31.6	59.8	-13	V
836.52	4183.0	-27.6	55.8	-13	H
836.52	4183.0	-27.9	56.1	-13	V
836.52	5018.5	-25.5	53.7	-13	H
836.52	5018.5	-24.6	52.8	-13	V
836.52	5855.5	-22.9	51.1	-13	H
836.52	5855.5	-22.2	50.4	-13	V
836.52	6692.0	-43.6	71.8	-13	H
836.52	6692.0	-43.8	72.0	-13	V
836.52	7528.5	-41.5	69.7	-13	H
836.52	7528.5	-41.1	69.3	-13	V
836.52	8365.5	-39.9	68.1	-13	H
836.52	8365.5	-39.4	67.6	-13	V

PCS Band, TDMA1900, Max Power - Channel 999

Tuned Freq (MHz)	Freq Max (MHz)	(PK) EMI (dBm)	dBc	FCC Limit (dBm)	Pol.
1879.95	3760.5	-26.1	57.2	-13	H
1879.95	3760.5	-26.5	57.6	-13	V
1879.95	5640.0	-19.5	50.6	-13	H
1879.95	5640.0	-20.6	51.7	-13	V
1879.95	7519.5	-36.5	67.6	-13	H
1879.95	7519.5	-36.2	67.3	-13	V
1879.95	9399.5	-34.0	65.1	-13	H
1879.95	9399.5	-33.6	64.7	-13	V
1879.95	11279.5	-31.3	62.4	-13	H
1879.95	11279.5	-32.2	63.3	-13	V
1879.95	13159.5	-27.4	58.5	-13	H
1879.95	13159.5	-27.6	58.7	-13	V
1879.95	15039.5	-25.5	56.6	-13	H
1879.95	15039.5	-24.6	55.7	-13	V
1879.95	16919.5	-24.9	56.0	-13	H
1879.95	16919.5	-23.8	54.9	-13	V

15.4 Measurement Uncertainty

The measurement uncertainty for this test is +/- 2.7dB.

16. FREQUENCY STABILITY (TEMPERATURE VARIATION)

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

Test Technician / Engineer	Anu Balijepalli		
Date of Measurement	25-26 June 2002		
Temperature / Humidity	21-23°C		53-65%RH
Test Result	NPW-1PA with FCC ID: GMLNPW-1PA was tested in accordance with 2.1055(a)(1)(b), 24.235		

AMPS MODE: Channel # 380 (836.4 MHz)

Temp. (°C)	Frequency (MHz)	Change (Hz)	Change (ppm*)
-30	836.400357	357	0.427
-20	836.400320	320	0.383
-10	836.400290	290	0.347
0	836.400248	248	0.297
10	836.400250	250	0.299
20	836.400251	251	0.300
30	836.400248	248	0.297
40	836.400312	312	0.373
50	836.400331	331	0.396

TDMA MODE: Channel # 380 (836.4 MHz)

Temp. (°C)	Frequency (MHz)	Change (Hz)	Change (ppm*)
-30	836.399995	-5	-0.006
-20	836.400002	2	0.002
-10	836.399997	-3	-0.004
0	836.399996	-4	-0.005
10	836.399996	-4	-0.005
20	836.399996	-4	-0.005
30	836.399995	-5	-0.006
40	836.399997	-3	-0.004
50	836.400005	5	0.006

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PCS-TDMA MODE:
Channel # 1000 (1879.98 MHz)

Temp. (°C)	Frequency (MHz)	Change (Hz)	Change (ppm*)
-30	1879.979991	-9	-0.005
-20	1879.979985	-15	-0.008
-10	1879.979994	-6	-0.003
0	1879.979981	-19	-0.010
10	1879.979979	-21	-0.011
20	1879.979980	-20	-0.011
30	1879.979988	-12	-0.006
40	1879.979989	-11	-0.006
50	1879.979985	-15	-0.008

* $(\text{ppm}/10^6) = (\text{Change in Hz}/\text{Frequency in MHz})$

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17. FREQUENCY STABILITY (VOLTAGE VARIATION)

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

17.1 Setup

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

17.2 Pass/Fail Criteria

Not Applicable

17.3 Detailed Test Results

Test Technician / Engineer	Anu Baliyepalli	
Date of Measurement	24 June 2002	
Temperature / Humidity	22-23°C	48-57%RH
Test Result	NPW-1PA with FCC ID: GMLNPW-1PA was tested in accordance with 2.1055(d)(1)(2), 24.235	

AMPS MODE:

Channel # 380 (836.4 MHz)

Battery End Point (Voltage) = 3.6

% of STV	Voltage	Frequency (MHz)	Change (Hz)	Change (ppm)
100	3.8	836.400244	244	0.292
115	4.4	836.400270	270	0.323
B.E.P.	3.6	836.400257	257	0.307

TDMA MODE:

Channel # 380 (836.4 MHz)

Battery End Point (Voltage) = 3.6

% of STV	Voltage	Frequency (MHz)	Change (Hz)	Change (ppm)
100	3.8	836.400003	3	0.004
115	4.4	836.400001	1	0.001
B.E.P.	3.6	836.400004	4	0.005

PCS-TDMA MODE:

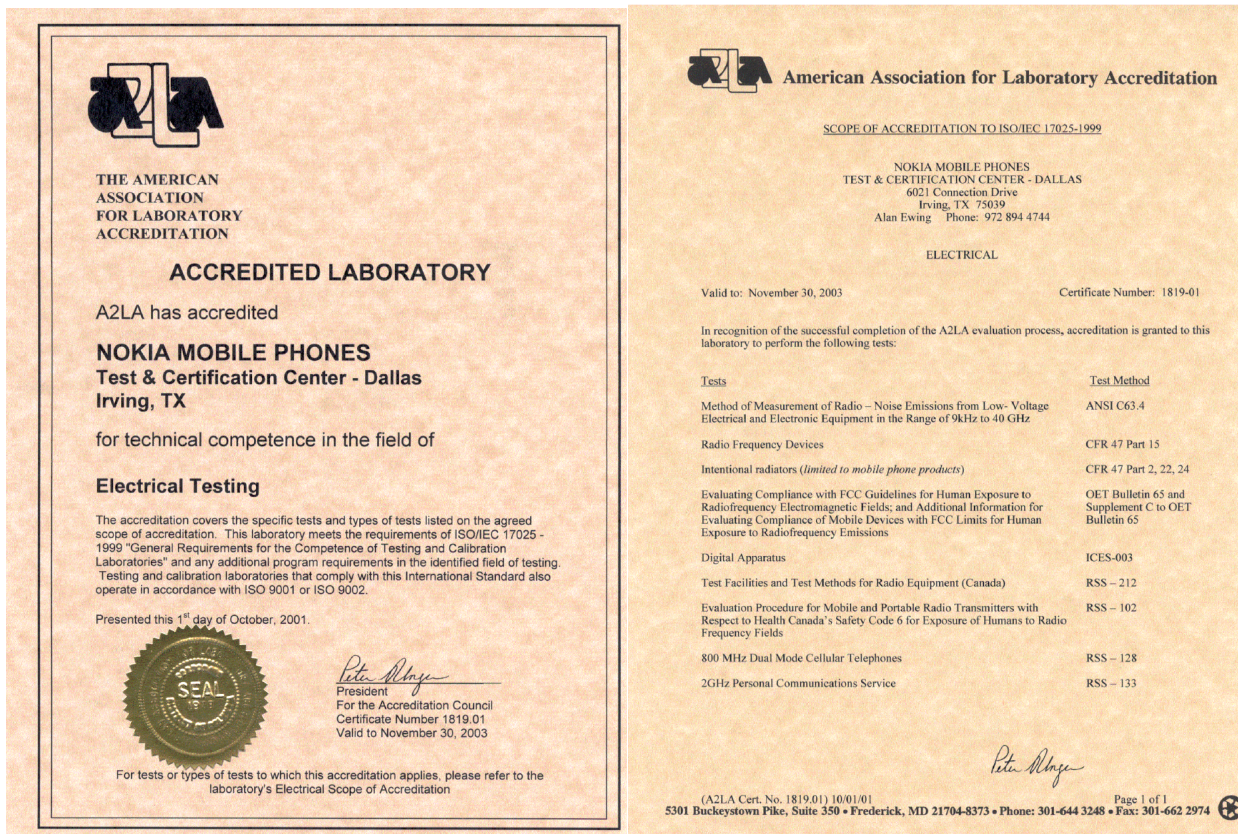
Channel # 1000 (1879.98 MHz)

Battery End Point (Voltage) = 3.6

% of STV	Voltage	Frequency (MHz)	Change (Hz)	Change (ppm)
100	3.8	1879.979991	-10	-0.005
115	4.4	1879.979990	-10	-0.005
B.E.P.	3.6	1879.979980	-20	-0.011

APPENDIX

TCC-Dallas is accredited by the American Association for Laboratory Accreditation (A2LA) as shown in the scope below:



"This laboratory is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this report have been determined to be in accordance with the laboratory's terms of accreditation unless stated otherwise in the report."

Should this report contain any data for tests for which we are not accredited, such data would not be covered by this laboratory's A2LA accreditation.