

Test & Certification Center (TCC) - Dallas

FCC ID: GMLRH-42

Test Report #: 02-RF-0262.001

13 August 2003

Accredited Laboratory
Certificate Number: 1819-01

Ver 1.0

CFR 47 Part 2 and 22 Test Report

Test Report Number: 02-RF-0262.001

Terminal device: FCC ID: GMLRH-42, Model 2220, HW: 1130f, 1132f, SW: 2.01
(Detailed information is listed in section 4).

Originator: Mark Severson
Function: TCC - Dallas - EMC
Version/Status: 1.0, Approved
Location: TCC Directories
Date: 13 August 2003

Change History:

Version	Date	Status	Handled By	Comments
0.1	24 July 03	Draft	Mark Severson	
0.2	11 Aug 03	Reviewed	M. Mobley	
1.0	13 Aug 03	Approved	A. Ewing	

Testing laboratory:

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Fax. 972-894-4988

Client:

Nokia Mobile Phones, Inc.
FCC ID: GMLRH-42, Model 2220
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Date and signatures:

13 Aug. 03

For the contents:



Nerina Walton, 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 Corporation, Elektroniikkatie 10, 90571 Oulu, FINLAND

Manufacturer: Nokia Finland, Joensuunkatu 7, 24100 Salo, FINLAND

1.2.2 Sub-part 2.1033(c)(2)

FCC ID: FCC ID: GMLRH-42

Model No: Model 2220

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

1.2.5 Sub-part 2.1033(c)(5)

Frequency Range, MHz: 824.04 to 848.97

1.2.6 Sub-part 2.1033(c)(6)

Power Rating, Watts: 0.302 EDRP AMPS
0.871 EDRP Cellular Band - TDMA

☐ 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.

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1.2.7 Sub-part 2.1033(c)(7)

Maximum Power Rating, Watts: 0.871

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

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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 and Part 22.

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 (Radiated)	FCC Part 22.913(a)	6	Complies
Occupied Bandwidth: Transmitter Conducted Measurements	FCC Part 2.1049(c)(1)	7	Complies
Spurious Emissions at Antenna Terminals	FCC Part 2.1051	8	Complies
Field Strength of Spurious Radiation	FCC Part 2.1053	9	Complies
Frequency Stability (Temperature Variation)	FCC Part 2.1055(a)(1)(b)	10	Complies
Frequency Stability (Voltage Variation)	FCC Part 2.1055(d)(1)(2)	10	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	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	ANSI/TIA/EIA 603-A	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
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

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

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), 2.1053 2.1051, 2.1049(c)(1), 2.1055(d)(1)(2), 2.1055(a)(1)(b)	AMPS/TDMA 800/1900	17-Dec-02	Good	Phone	Type: RH-42 Hw Id: 1130f ESN 7201969691 Code: 4794 Hw Id: 1132f ESN 7201969678 Code: 4818
2.1051, 2.1049(c)(1), 2.1055(d)(1)(2), 2.1055(a)(1)(b), 22.913(a), 2.1053	AMPS/TDMA 800/1900	17-Dec-02	Good	Battery	Type: BLC-2 Other: 3.6v Li-ion

4.2 Photograph of Tested Device(s):

Refer to attached EXHIBITS

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5. TEST EQUIPMENT LIST

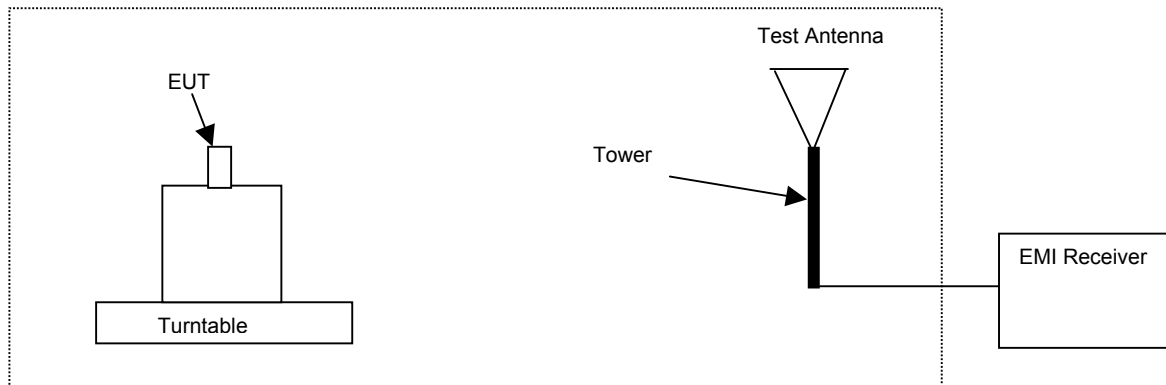
The listing below indicates the test equipment utilized for the test (s). Calibration interval on all items listed can be obtained from the Engineering Services Group within NMP, Product Creation - Dallas. Where relevant, measuring equipment is subjected to in-service checks between testing. TCC - Dallas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

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
283	Environmental Chamber with controller # 1189006	ENVIROTRONICS SH27 & 2030-22844	129010083	Verified with # 619	
619	THERMOMETER	FLUKE 51	4520028	Feb-03	Feb-04
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	Jul-02	Jul-03
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	Dec-01	Dec-03
1054	DUAL DIRECTIONAL COUPLER	NARDA 3020A	34366	Cal Not Req	N/A
1060	TUNABLE NOTCH FILTER	K&L 3TNF-500/1000-N/N	162	CBU	N/A
1304	HORN ANTENNA	ELECTRO METRICS RGA-60	6151	Jul-01	Jul-03
1310	Antenna horn	Electro Metrics RGA-60	6174	Jul-01	Jul-03
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	Feb-03	Feb-05
1467	10 db Attenuator DC 18 Ghz	MCL Inc. BW-S10W/2 10db-2WDC	NONE	CBU	N/A
1473	20db Attenuator DC 18 Ghz	Midwest Microwave 290-20db	NONE	CBU	N/A
1481	Microwave Highpass Filter	K & L 3DH1-2000/T8000-0/0	4	Cal B4 Use	N/A
1484	Cable 2.0-18.0 Ghz	Storm PR90-010-072	N/A	Jul-02	Jul-03
1485	Cable 2.0-18.0 Ghz	Storm PR90-010-216	N/A	Jul-02	Jul-03
1558	Multimeter	Fluke 79-II	67591192	Jan-03	Jan-04
1626	CABLE, 5 ft	MEGAPHASE 10311 1GVT4	N/A	CBU	N/A
1983	CABLE	KTL Site A OATS	N/A	Mar-03	Mar-04
Nokia ID NMP00130	Cellular Test System	Wavetek 3600D	9228038	Nov-02	Nov-03
Nokia ID NMP02549	Power Meter	Agilent E4418B	GB40206792	Sep-02	Sep-03
Nokia ID NMP02673	Power Sensor	Agilent E9304A	US39400260	Mar-03	Mar-04

6. RF POWER OUTPUT (RADIATED)

Specification: FCC Part 22.913(a)

6.1 Setup



6.2 Pass/Fail Criteria

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

6.3 Detailed Test Results

Test Technician / Engineer	Nemko Dallas Inc.	
Date of Measurement	July 21, 2003	
Temperature / Humidity	23°C	52%RH
Test Result	RH-42 Complies with FCC Part 22.913(a)	

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Cellular Band**AMPS, Channel 991**

Freq Max (MHz)	EDRP EMI (dBm)	Pol.
824.04	24.2	V

AMPS, Channel 384

Freq Max (MHz)	EDRP EMI (dBm)	Pol.
836.52	24.8	V

AMPS, Channel 384

Freq Max (MHz)	EDRP EMI (dBm)	Pol.
848.97	23.9	V

TDMA Cellular, Channel 991

Freq Max (MHz)	EDRP EMI (dBm)	Pol.
824.04	28.7	V

TDMA Cellular, Channel 384

Freq Max (MHz)	EDRP EMI (dBm)	Pol.
836.52	29.4	V

TDMA Cellular, Channel 384

Freq Max (MHz)	EDRP EMI (dBm)	Pol.
848.97	28.1	V

6.4 Measurement Uncertainty

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

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7. OCCUPIED BANDWIDTH (TRANSMITTER CONDUCTED MEASUREMENTS)

Specification: FCC Part 2.1049(c)(1)

7.1 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.

7.2 Pass/Fail Criteria

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

7.3 Detailed Test Results

Test Technician / Engineer	Nemko Dallas Inc.	
Date of Measurement	July 10, 2003	
Temperature / Humidity	22°C	52%RH
Test Result	RH-42 Complies with FCC Part 2.1049(c)(1)	

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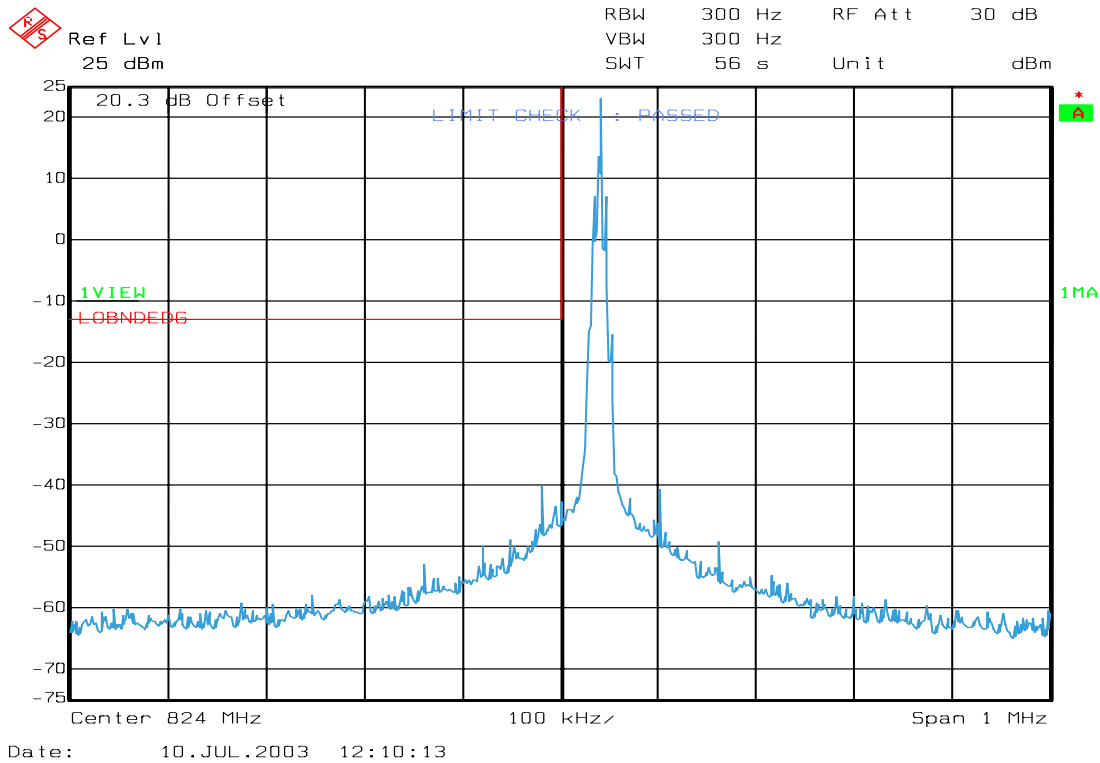
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Cellular Band, AMPS, Channel 991



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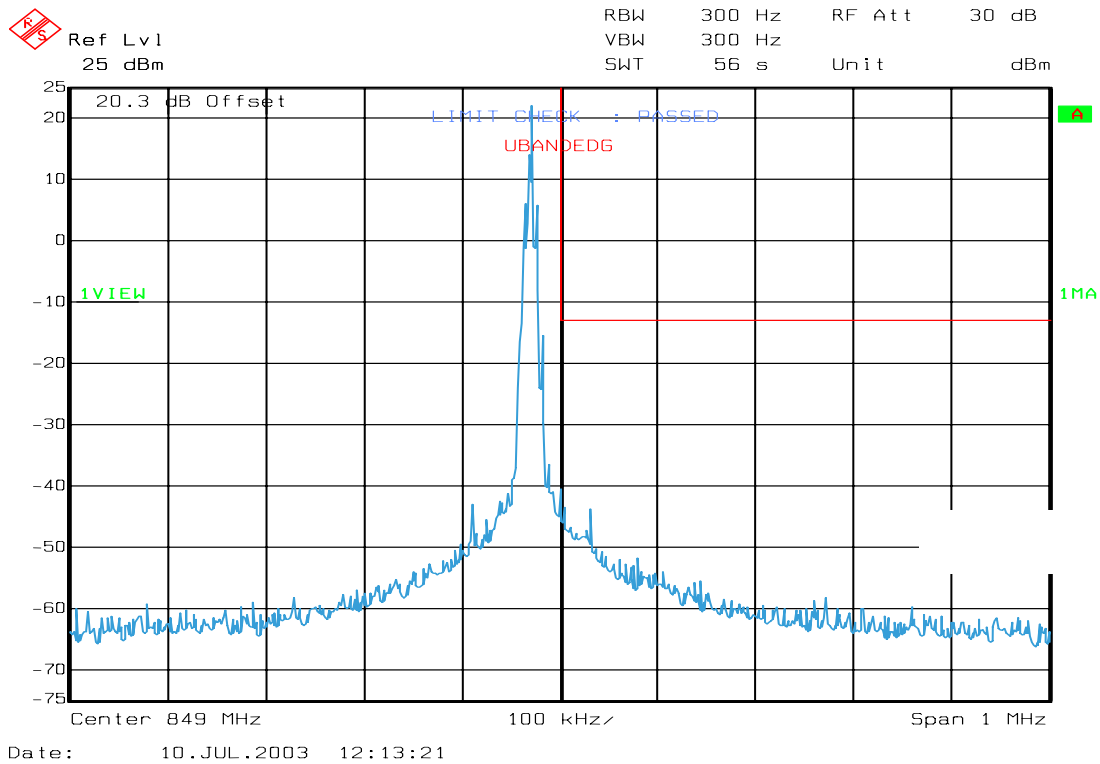
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Cellular Band, AMPS, Channel 799



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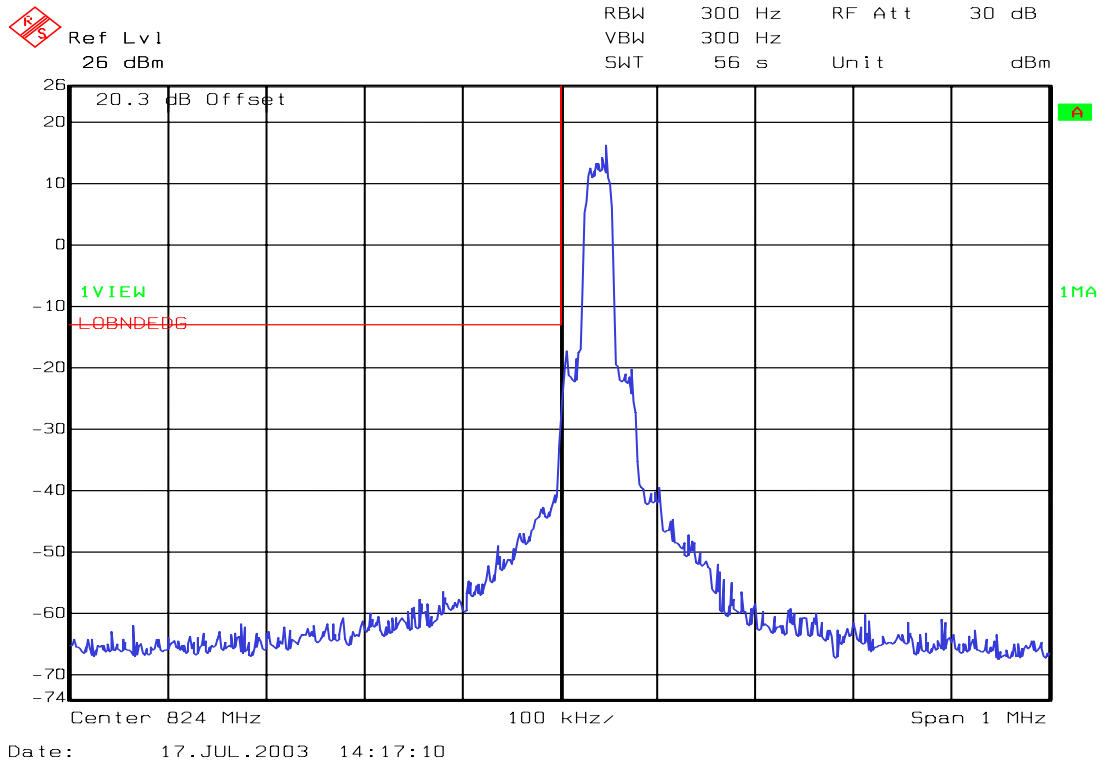
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Cellular Band, TDMA 800, Channel 991



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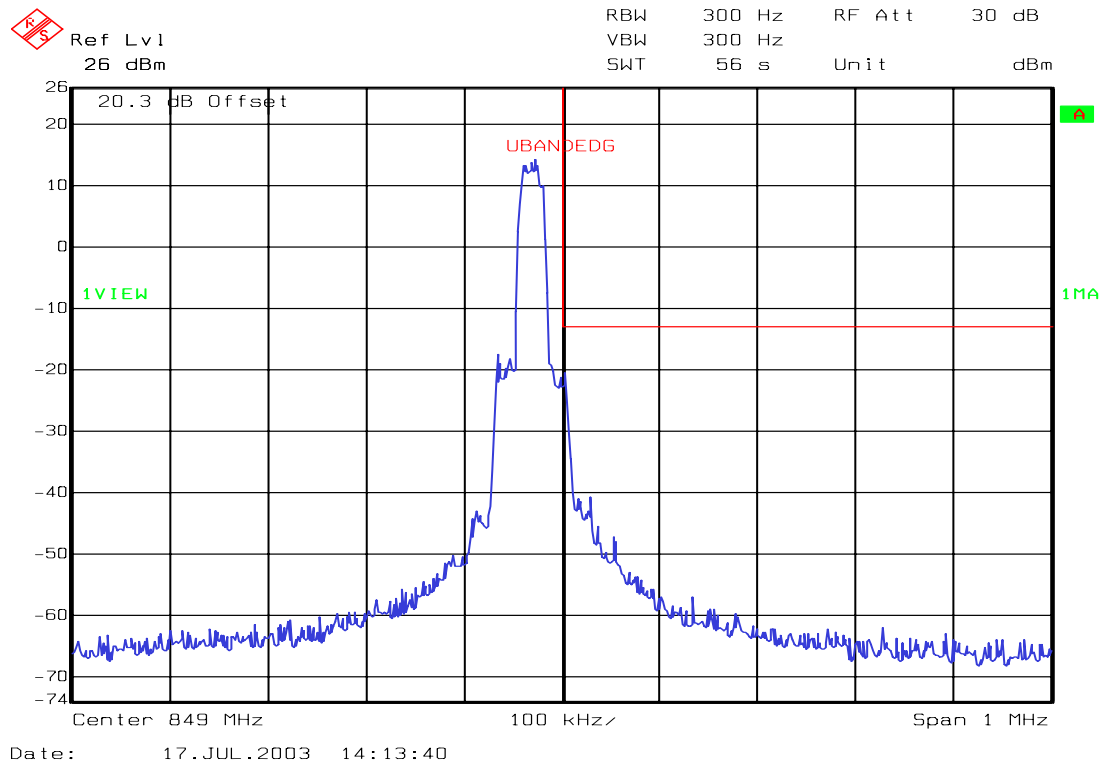
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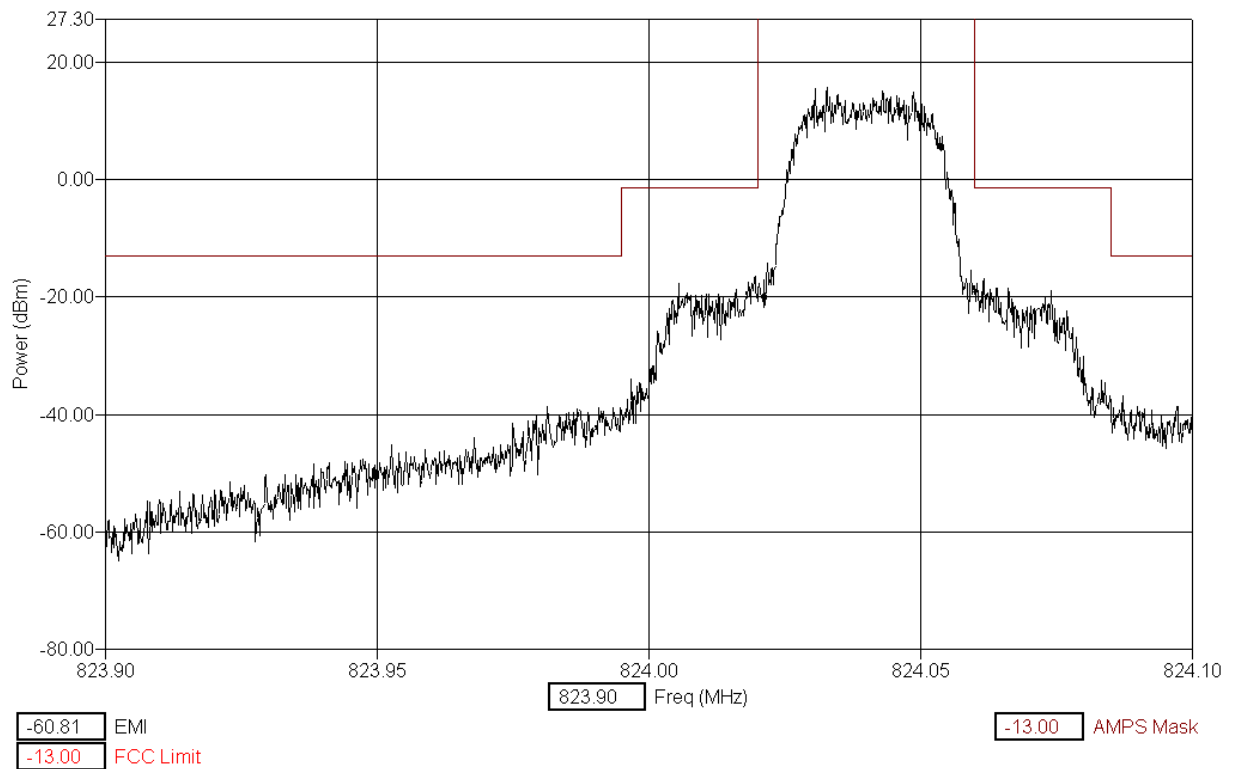
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Cellular Band, TDMA 800, Channel 799



7.4 Block Edge Requirements

TDMA800 Channel 991

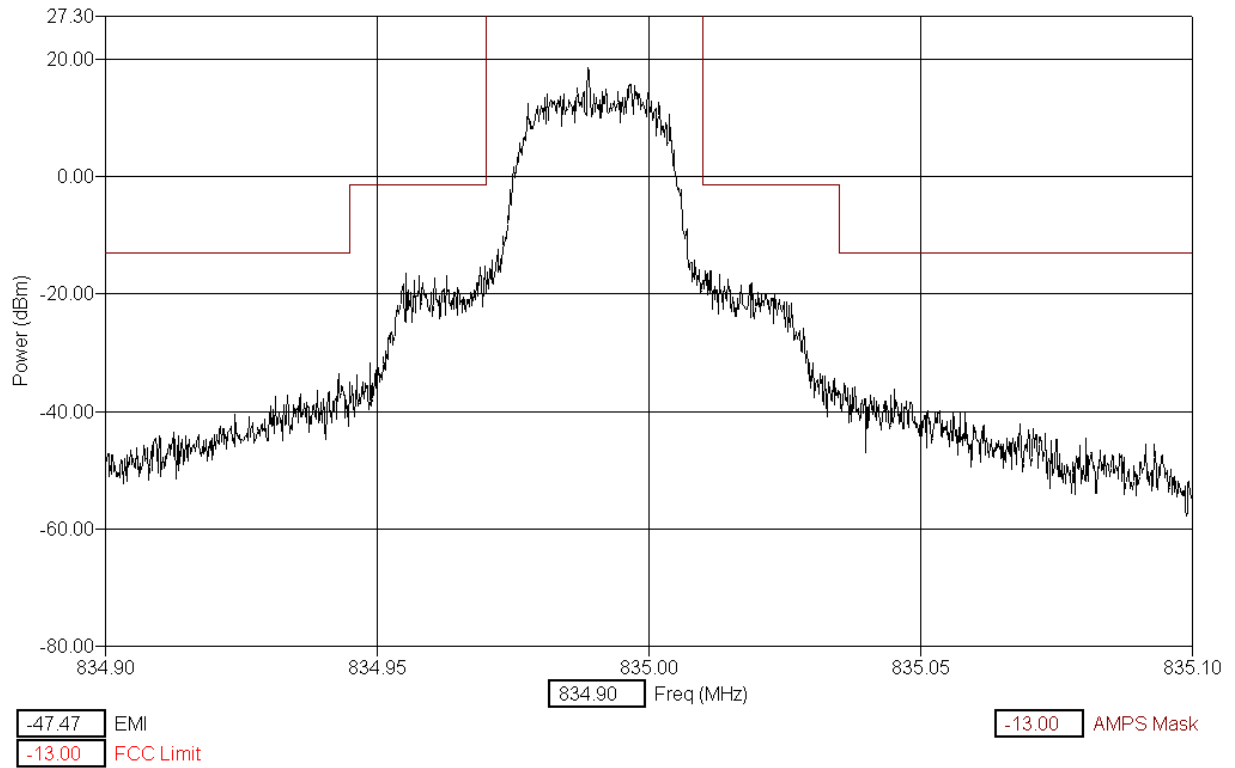


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TDMA800 Channel 333



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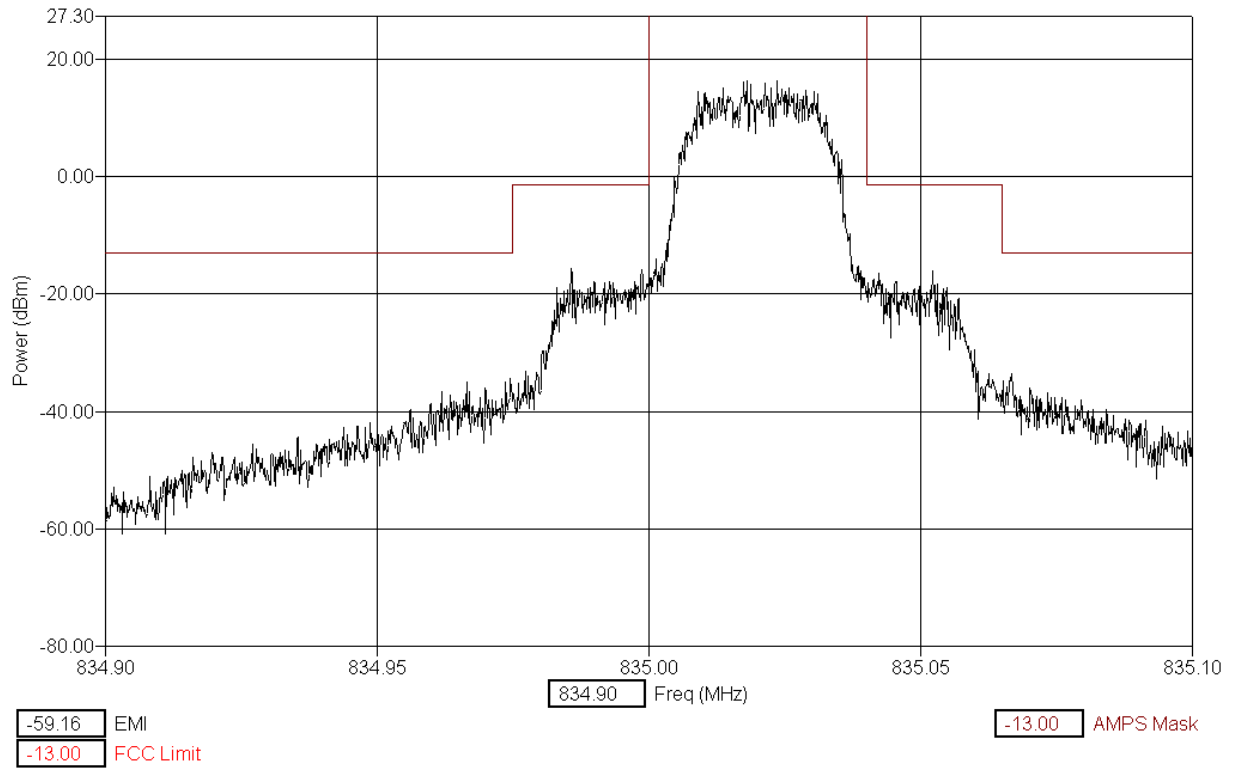
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TDMA800 Channel 334



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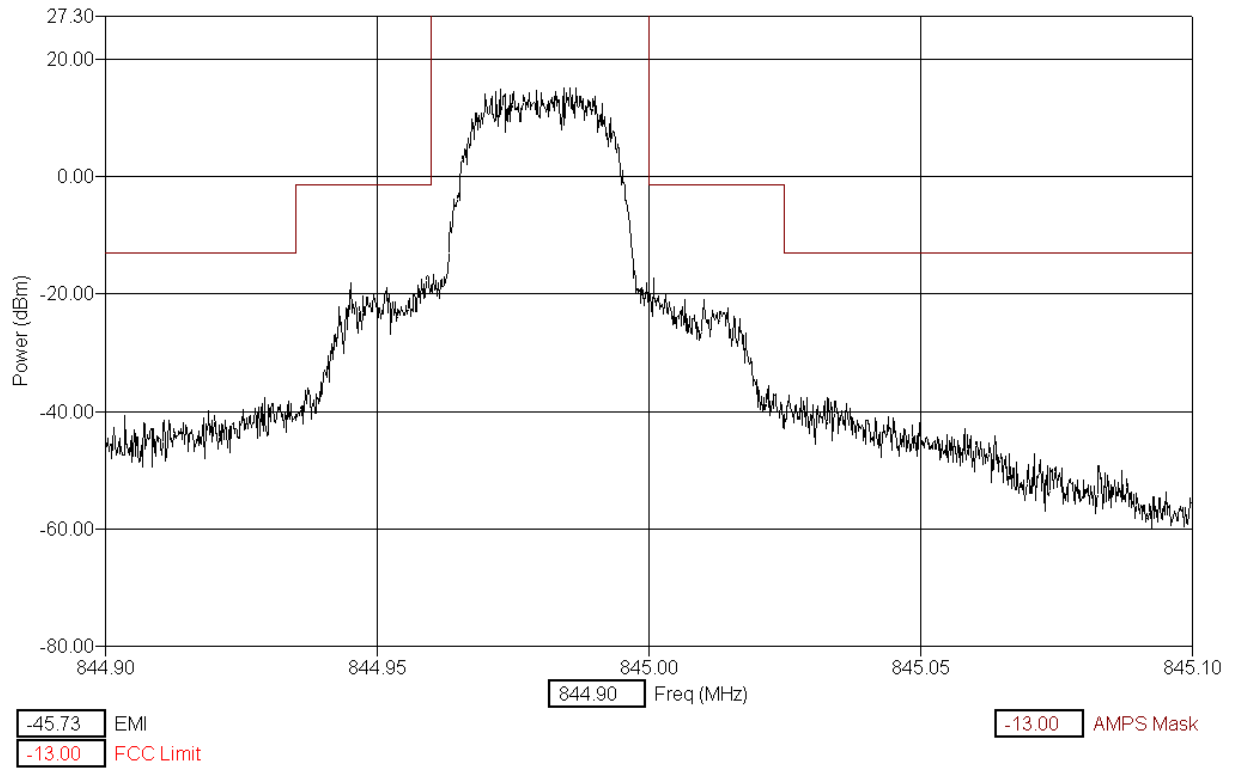
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TDMA800 Channel 666



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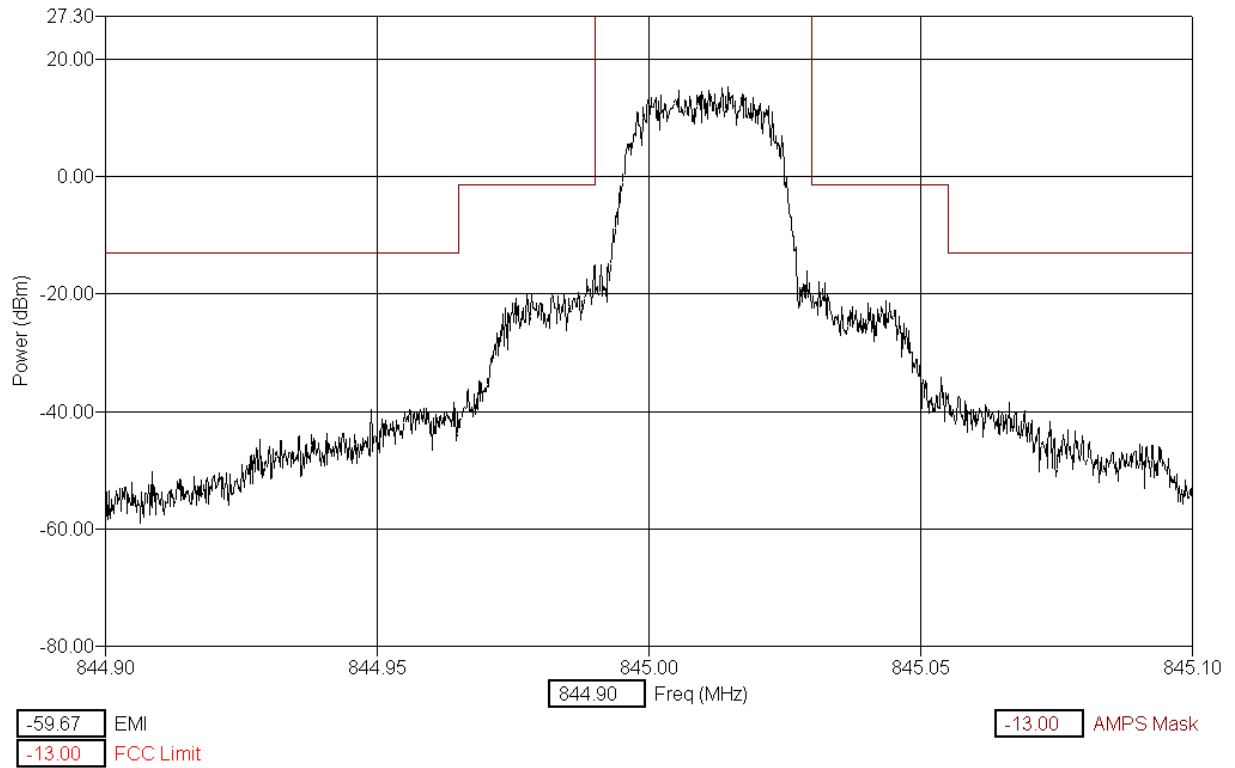
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TDMA800 Channel 667



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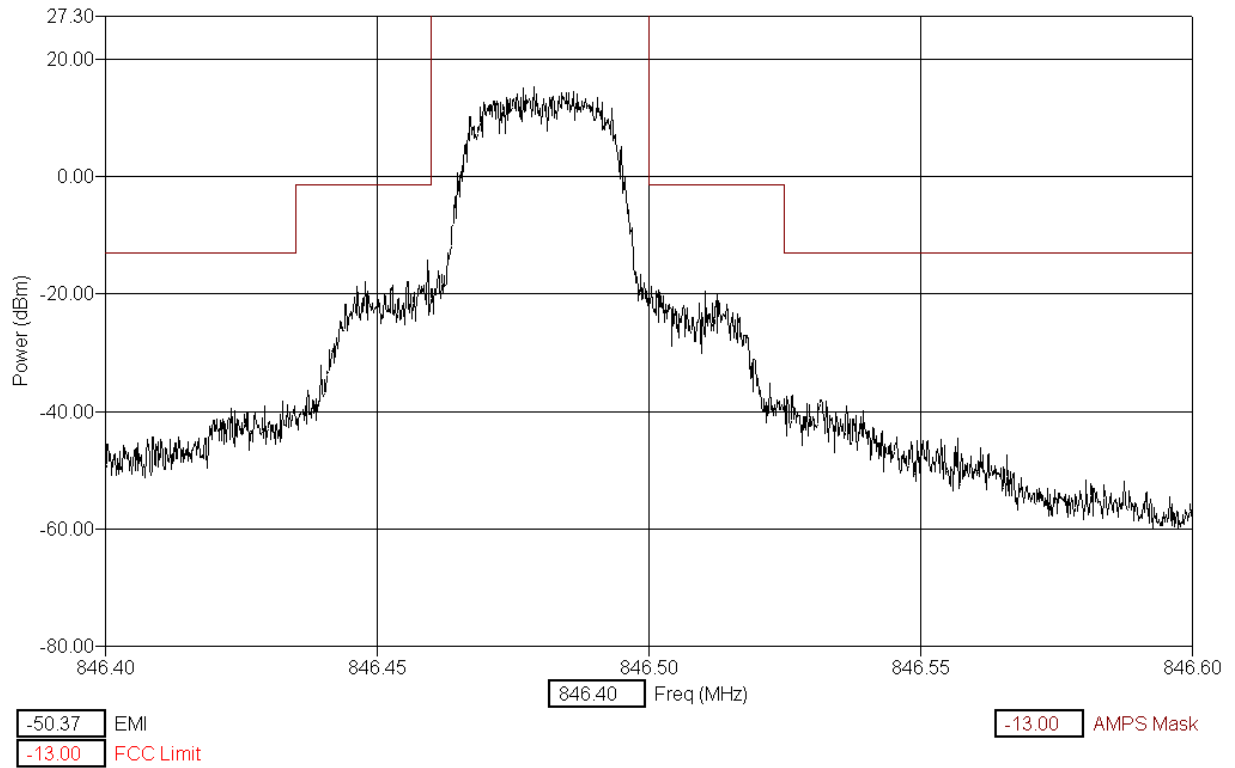
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TDMA800 Channel 716



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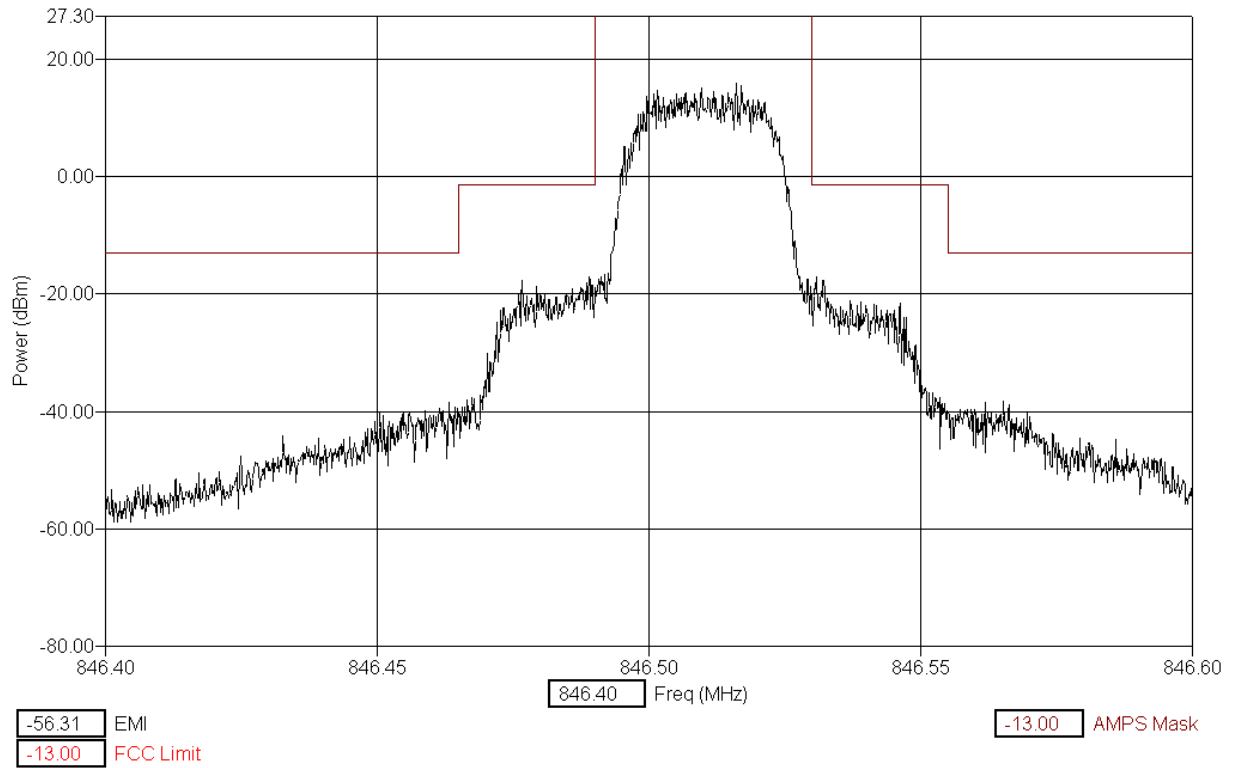
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TDMA800 Channel 717



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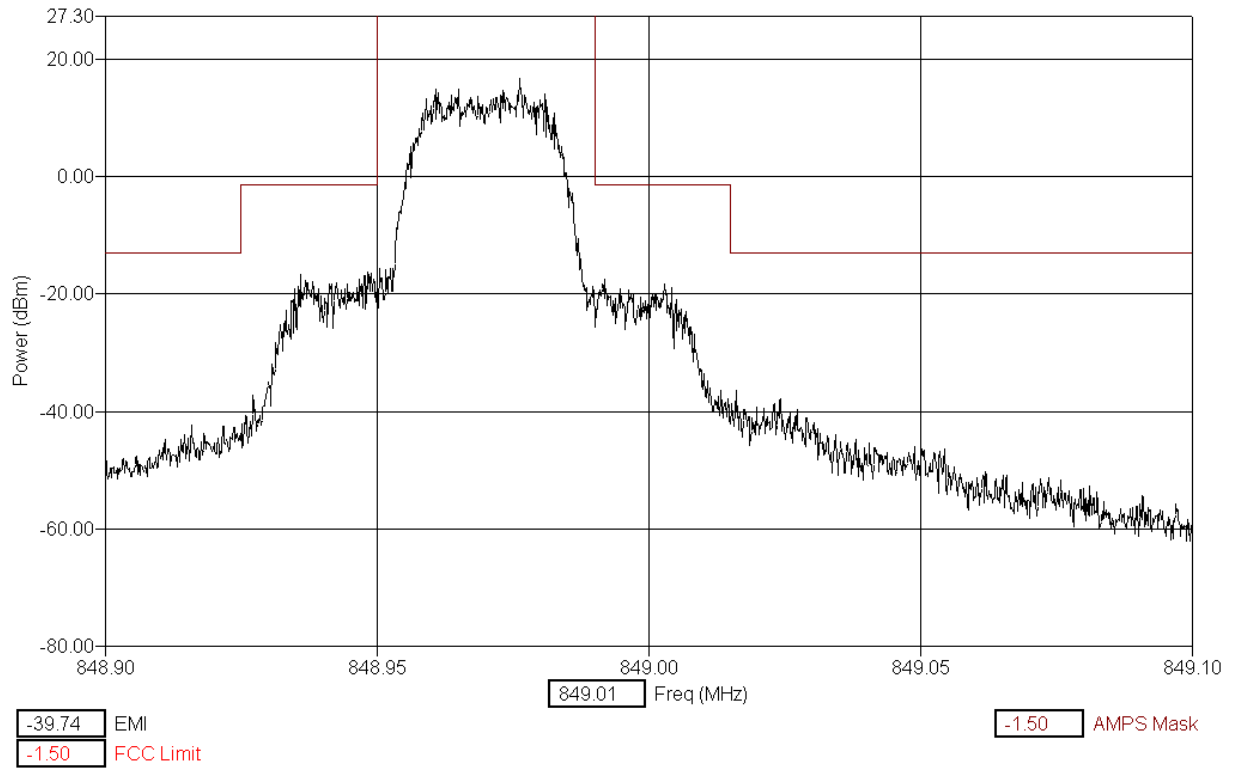
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TDMA800 Channel 799



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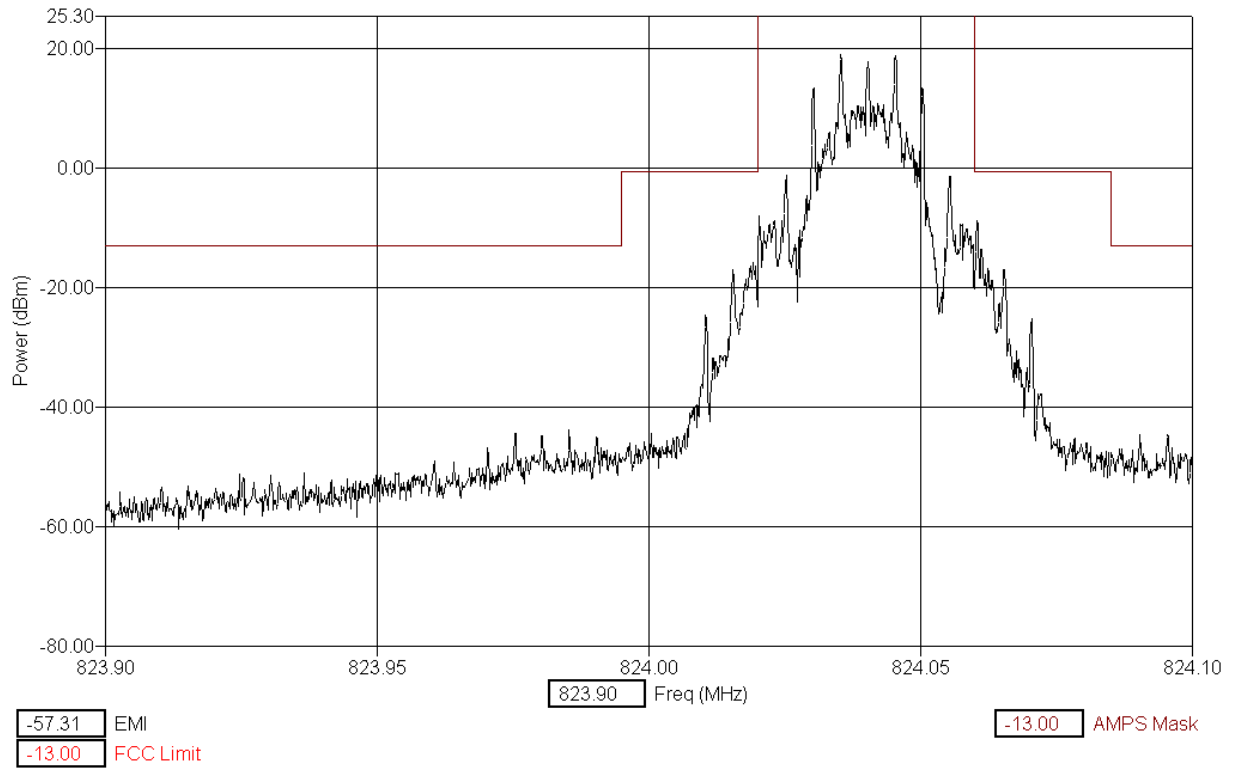
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AMPS (WB) Channel 991



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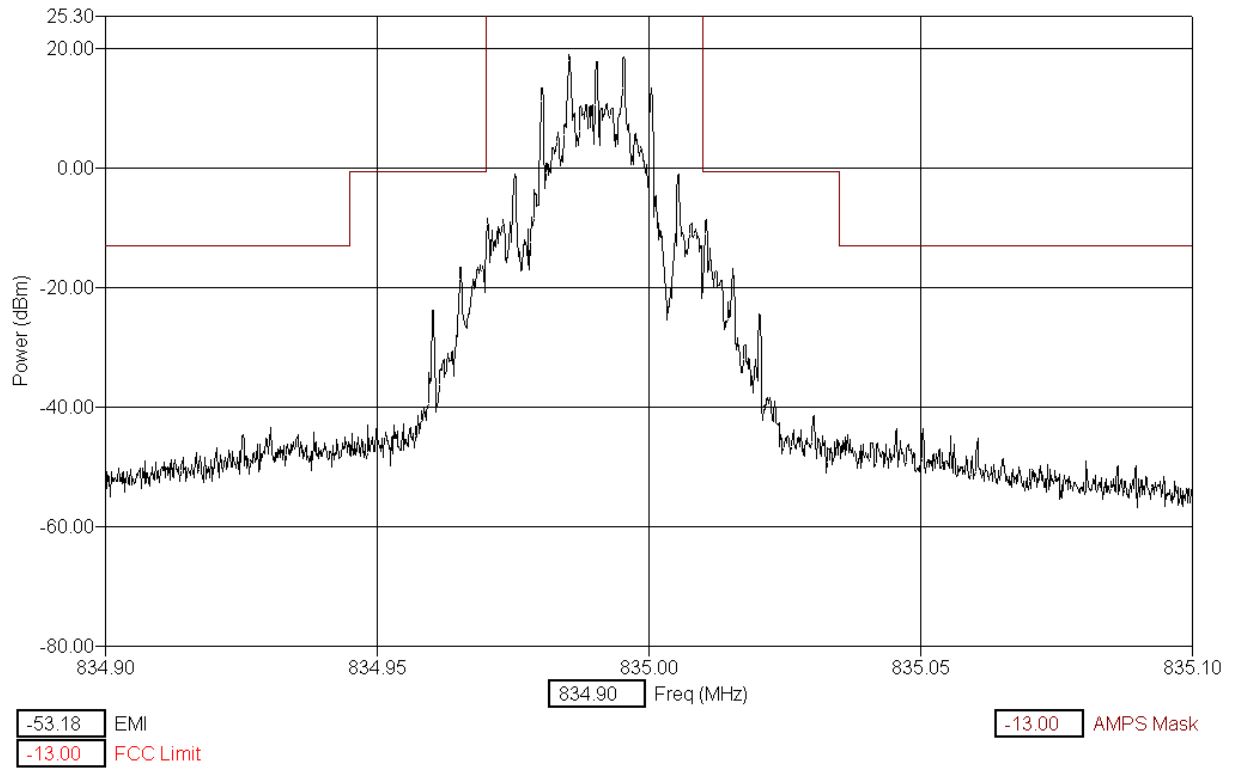
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AMPS (WB) Channel 333



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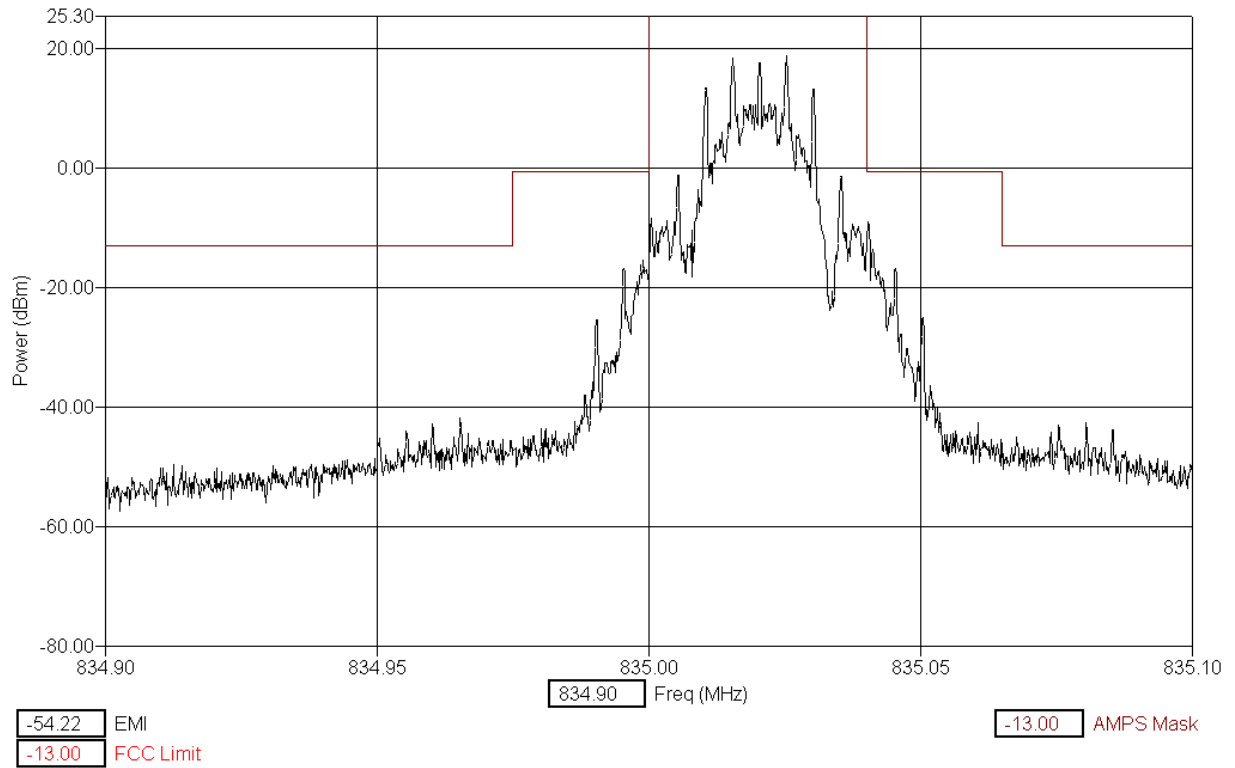
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AMPS (WB) Channel 334



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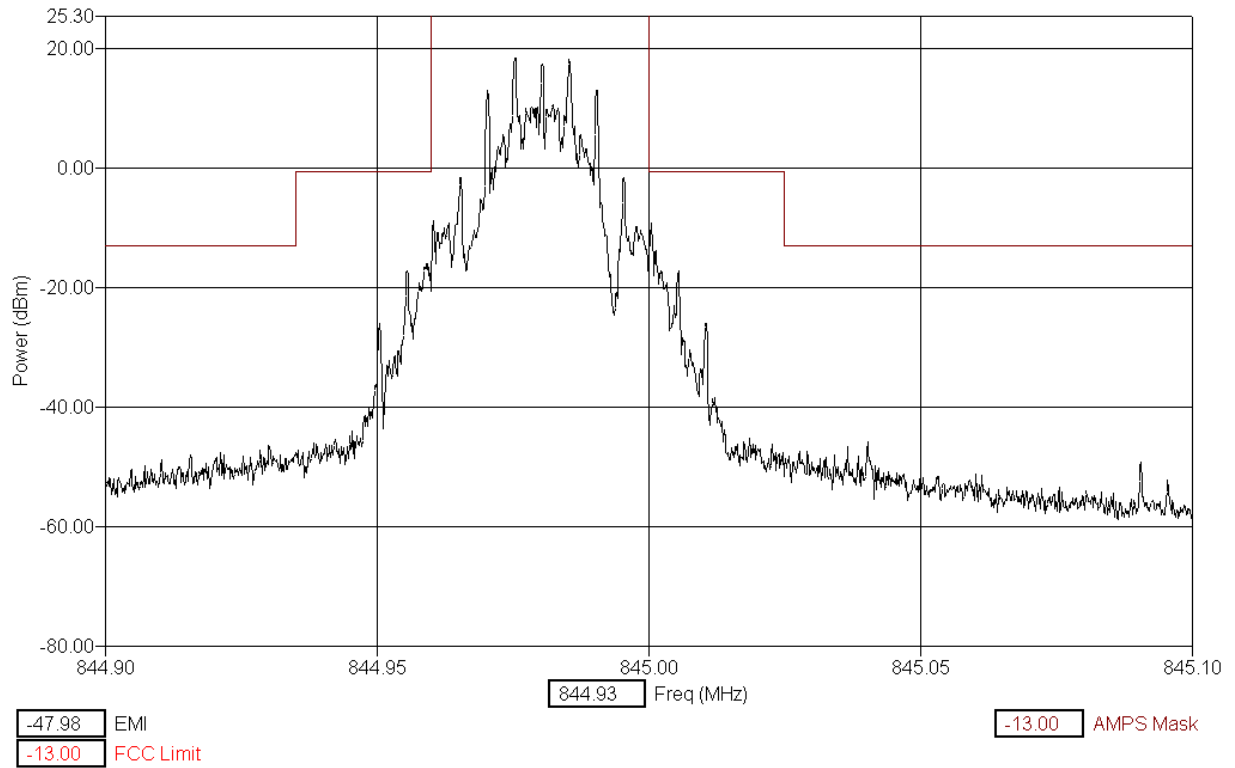
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AMPS (WB) Channel 666



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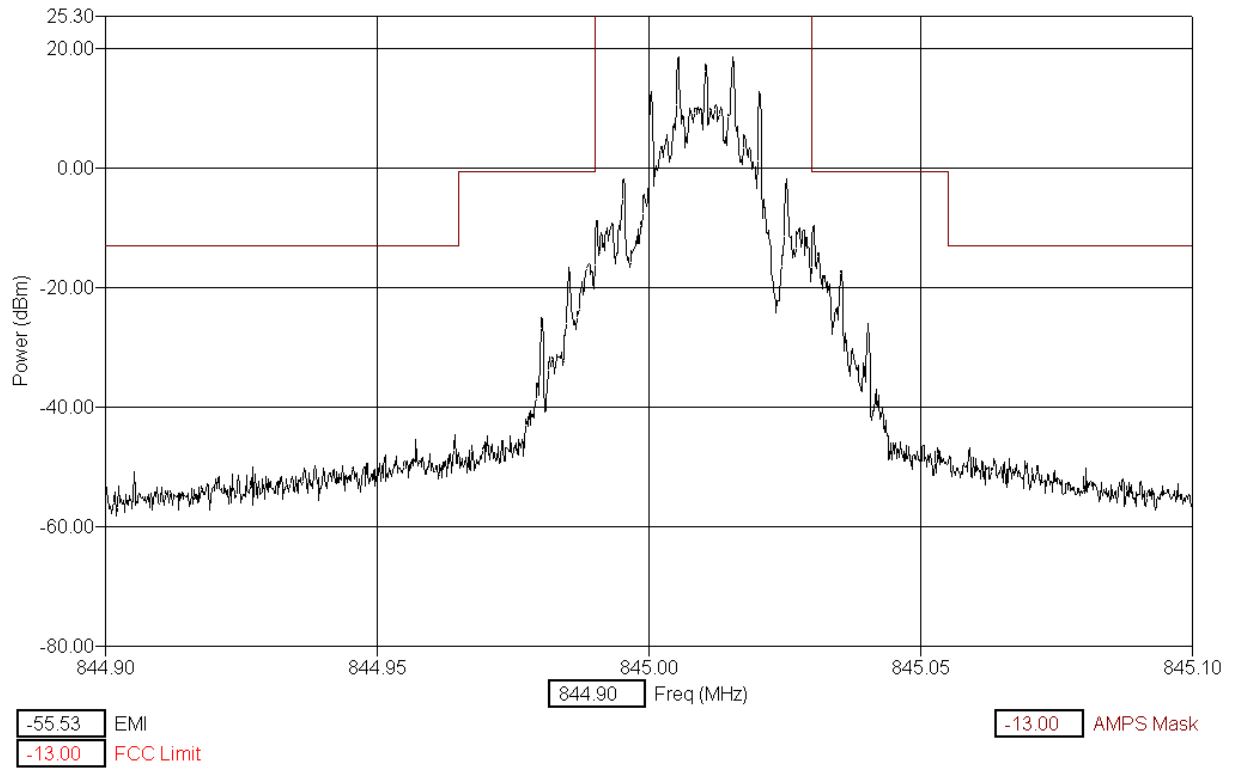
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AMPS (WB) Channel 667



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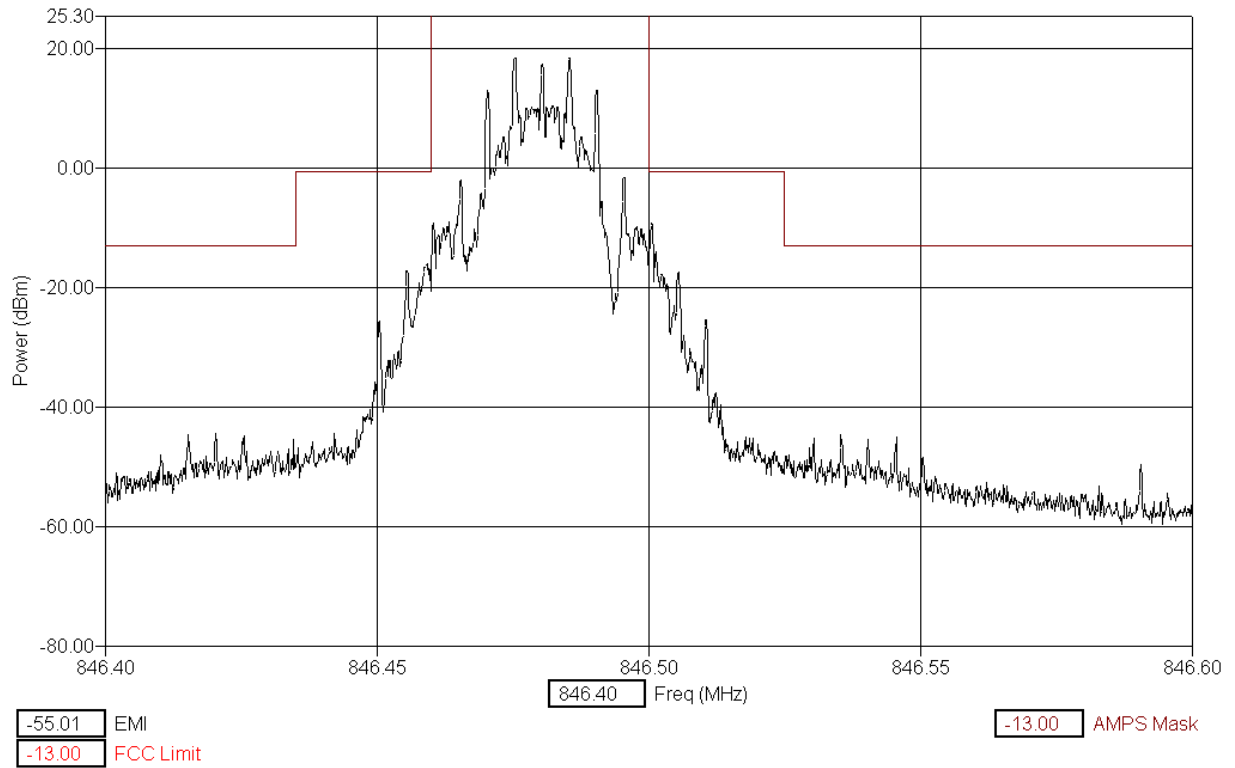
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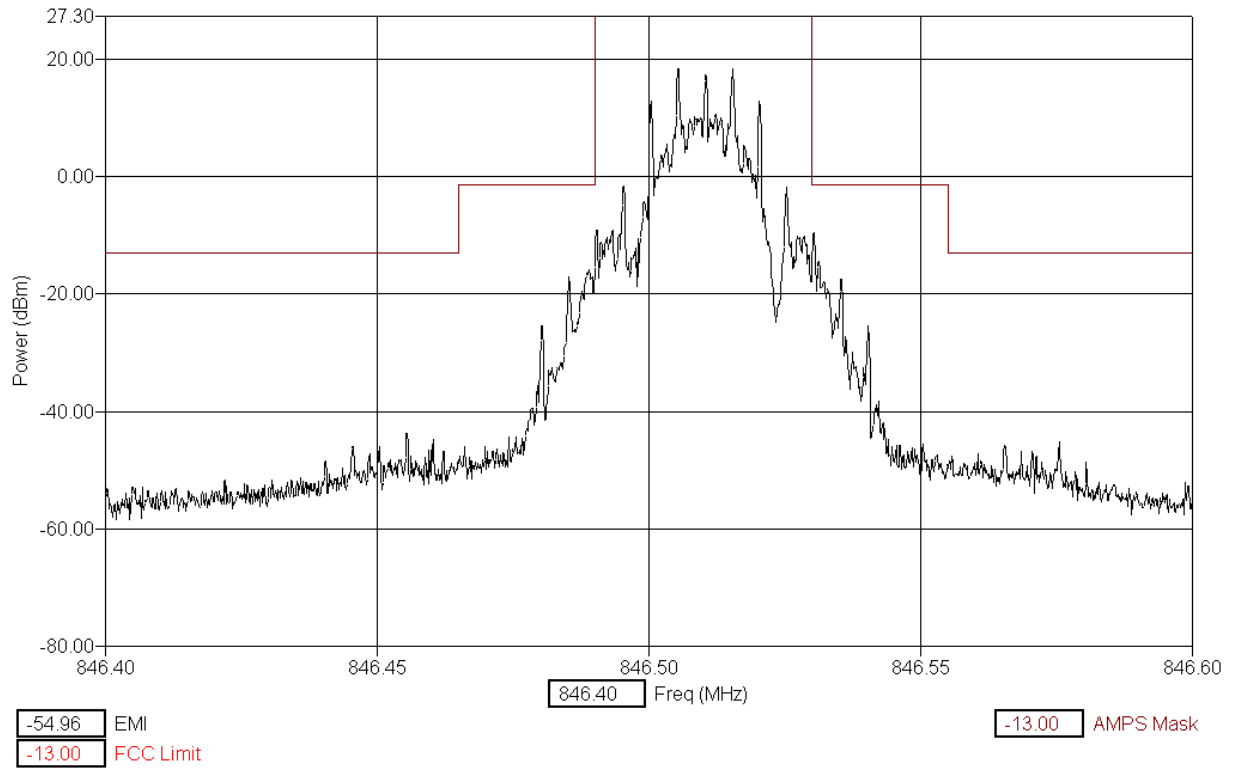
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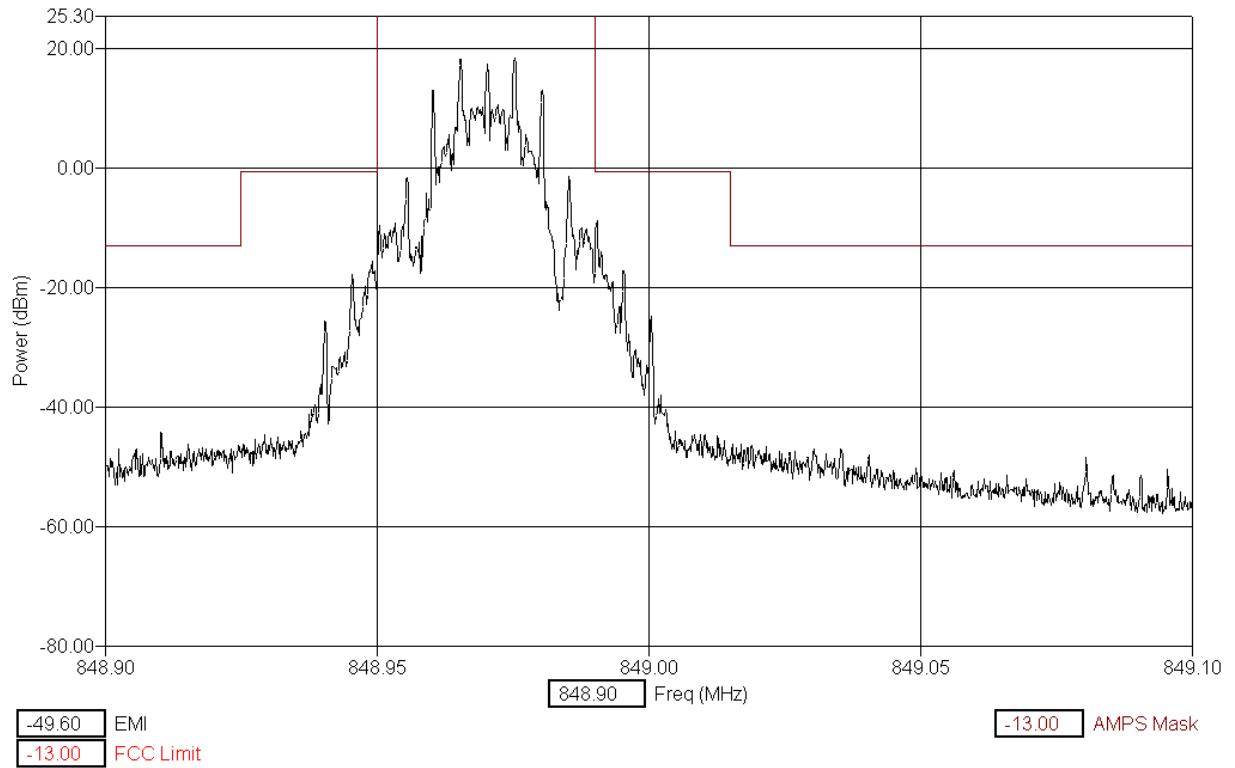
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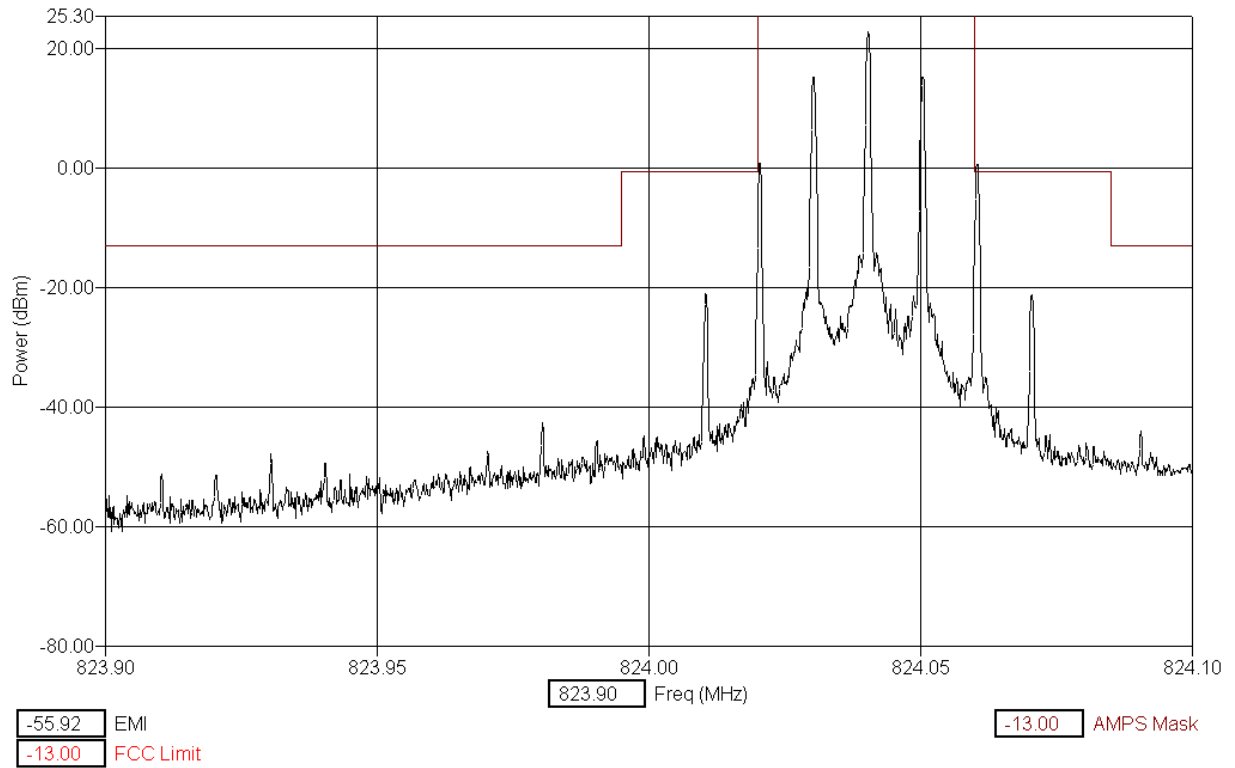
FCC ID: GMLRH-42

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Ver 1.0

AMPS (ST) Channel 991



Test & Certification Center (TCC) - Dallas

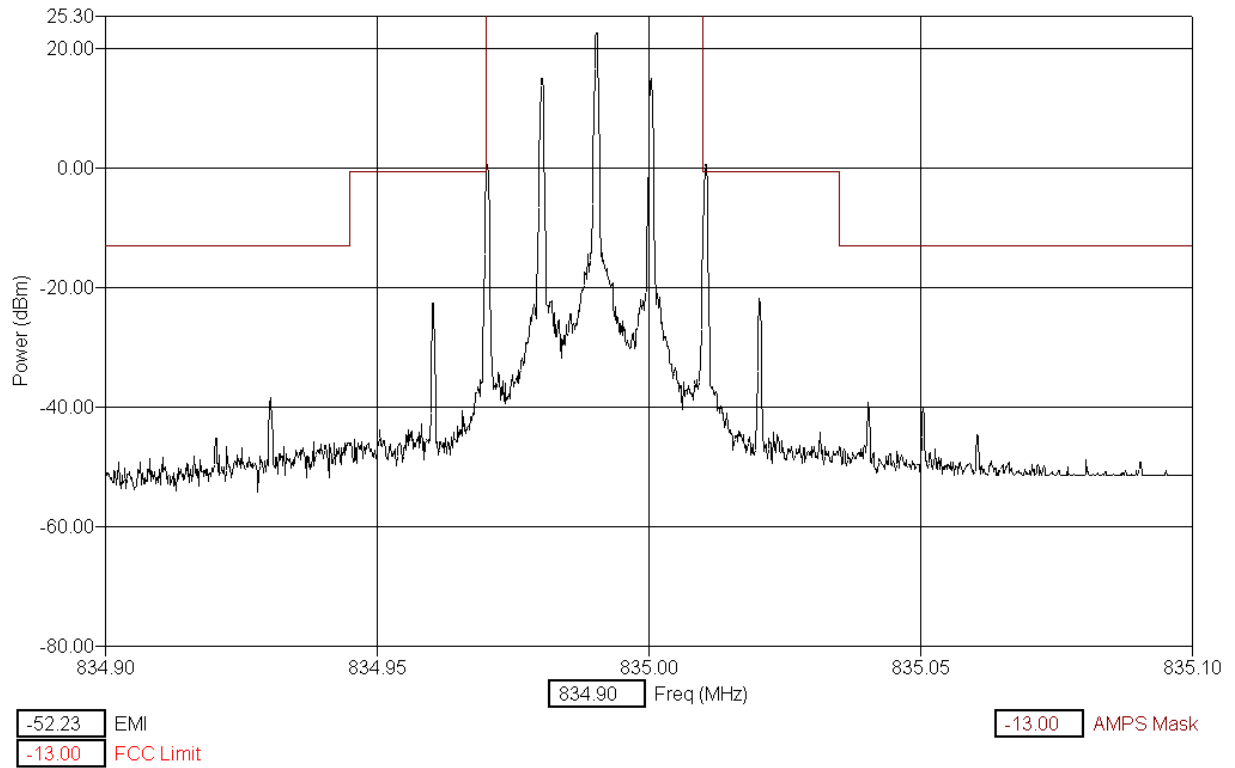
FCC ID: GMLRH-42

Test Report #: 02-RF-0262.001

August 13, 2003

Ver 1.0

AMPS (ST) Channel 333



Test & Certification Center (TCC) - Dallas

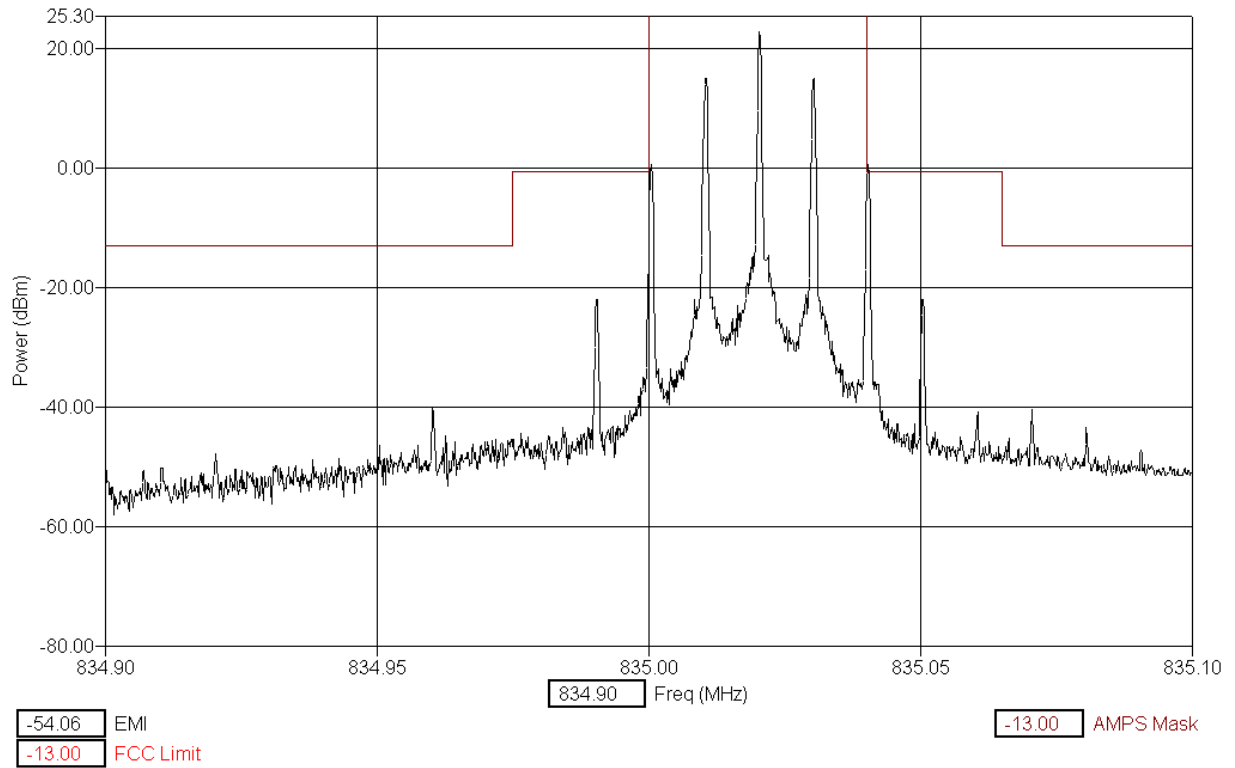
FCC ID: GMLRH-42

Test Report #: 02-RF-0262.001

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AMPS (ST) Channel 334



Test & Certification Center (TCC) - Dallas

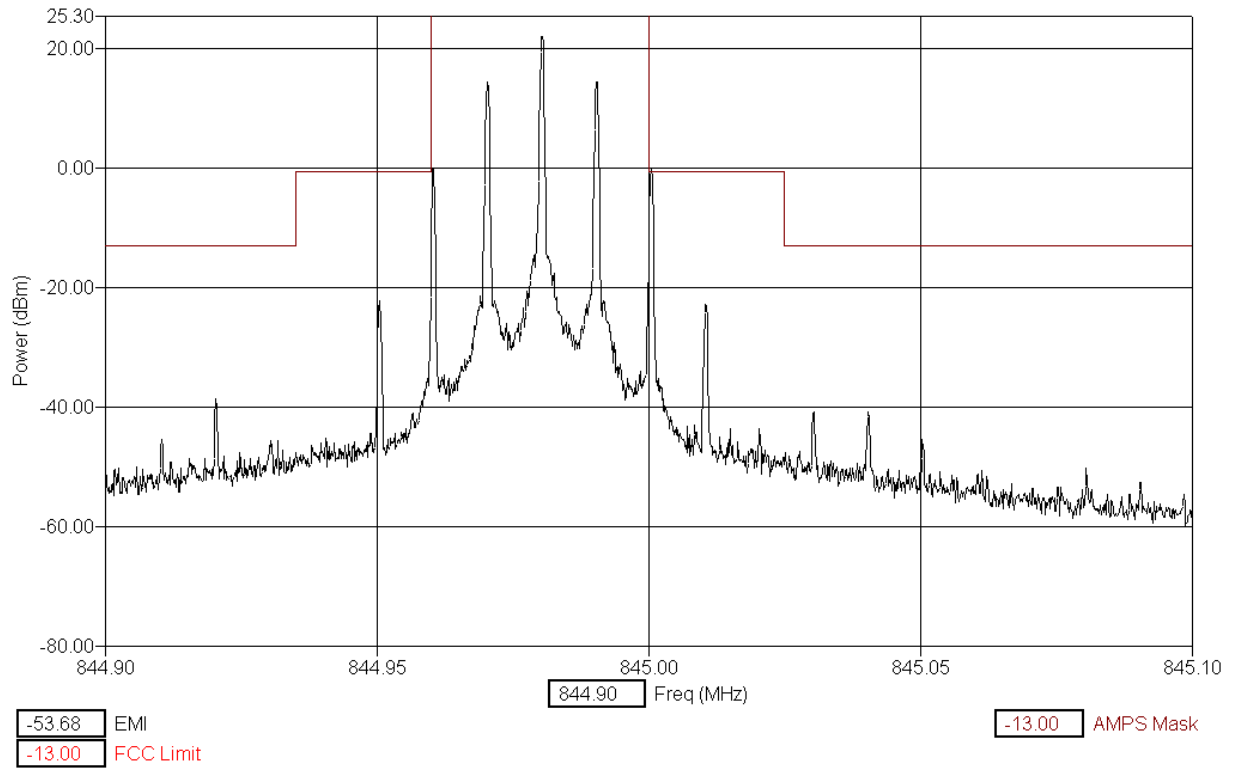
FCC ID: GMLRH-42

Test Report #: 02-RF-0262.001

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Ver 1.0

AMPS (ST) Channel 666



Test & Certification Center (TCC) - Dallas

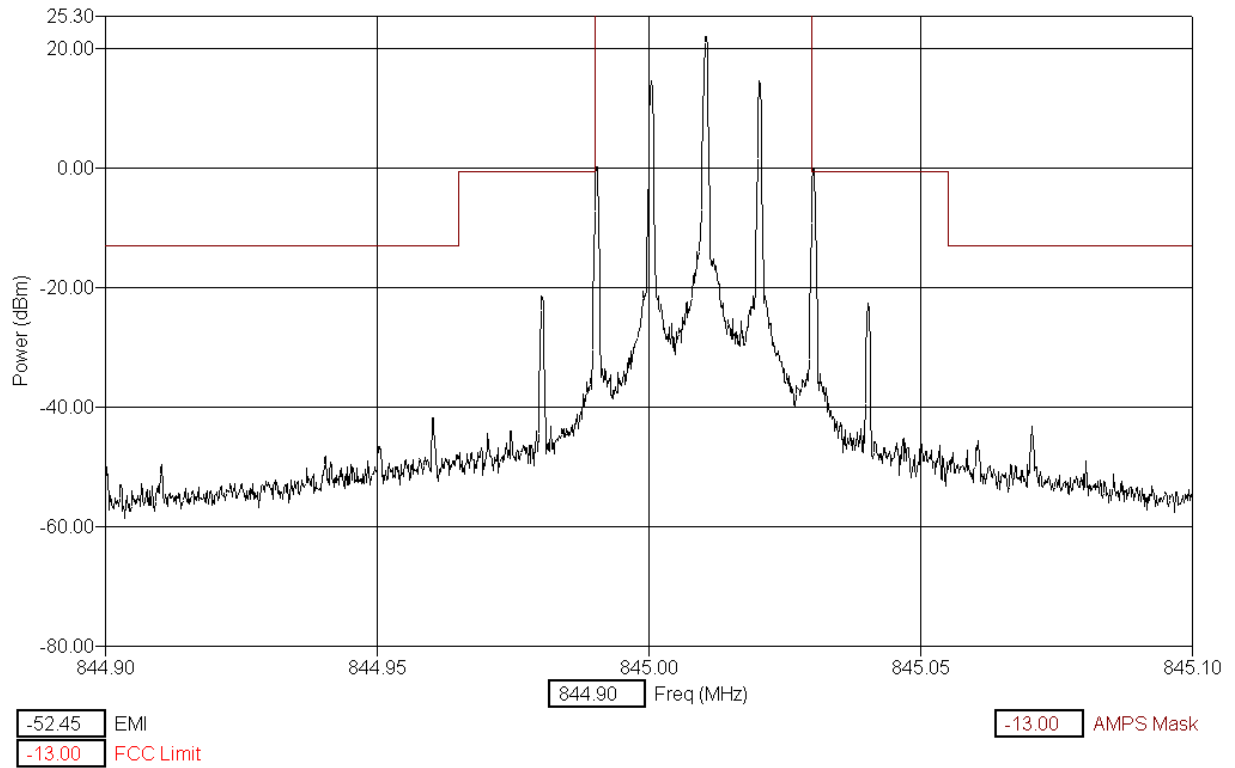
FCC ID: GMLRH-42

Test Report #: 02-RF-0262.001

August 13, 2003

Ver 1.0

AMPS (ST) Channel 667



Test & Certification Center (TCC) - Dallas

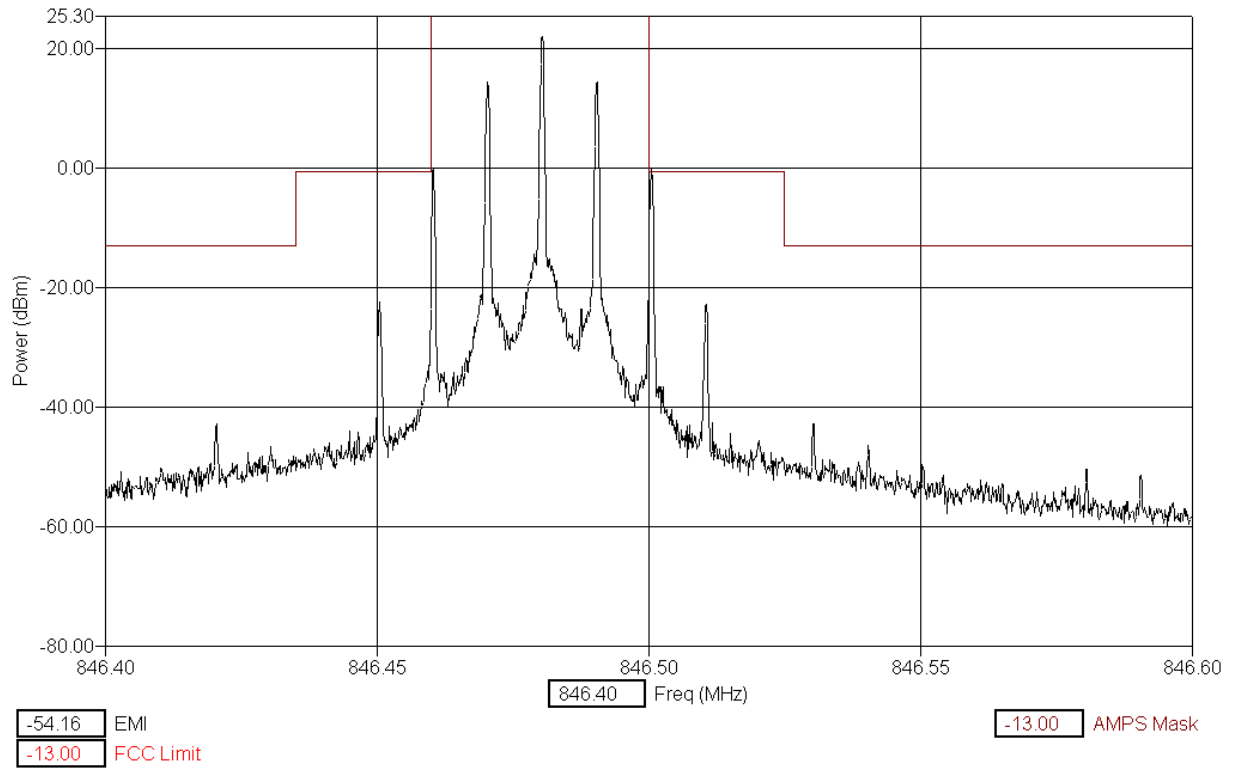
FCC ID: GMLRH-42

Test Report #: 02-RF-0262.001

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Ver 1.0

AMPS (ST) Channel 716



Test & Certification Center (TCC) - Dallas

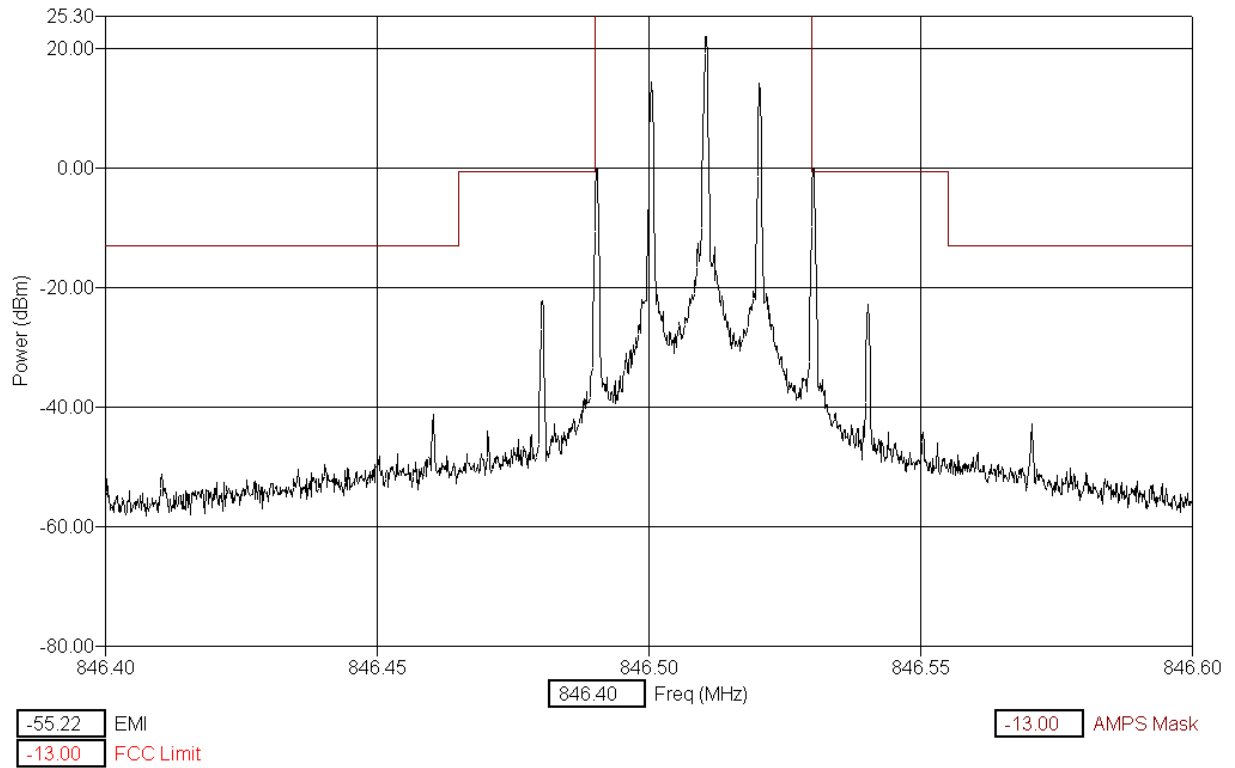
FCC ID: GMLRH-42

Test Report #: 02-RF-0262.001

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Ver 1.0

AMPS (ST) Channel 717



Test & Certification Center (TCC) - Dallas

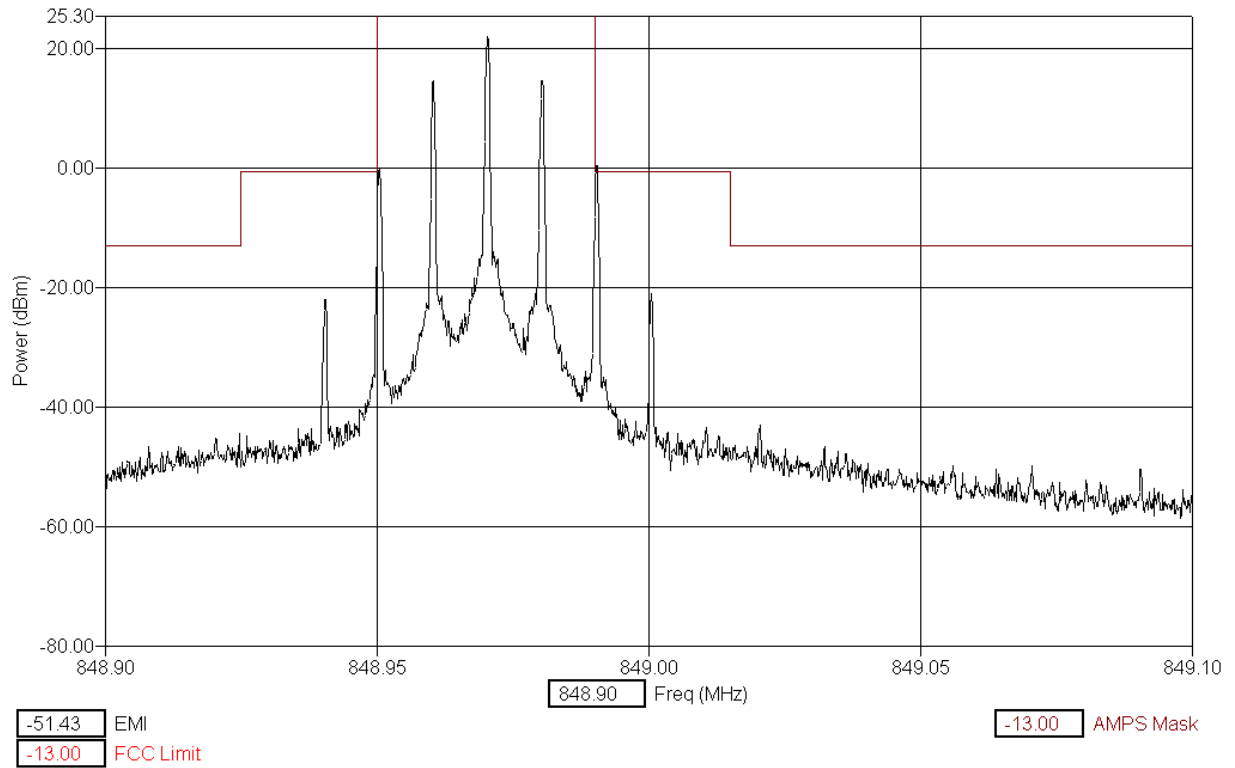
FCC ID: GMLRH-42

Test Report #: 02-RF-0262.001

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Ver 1.0

AMPS (ST) Channel 799



7.5 Measurement Uncertainty

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

8. SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Specification: FCC Part 2.1051

8.1 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.

8.2 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.

8.3 Detailed Test Results

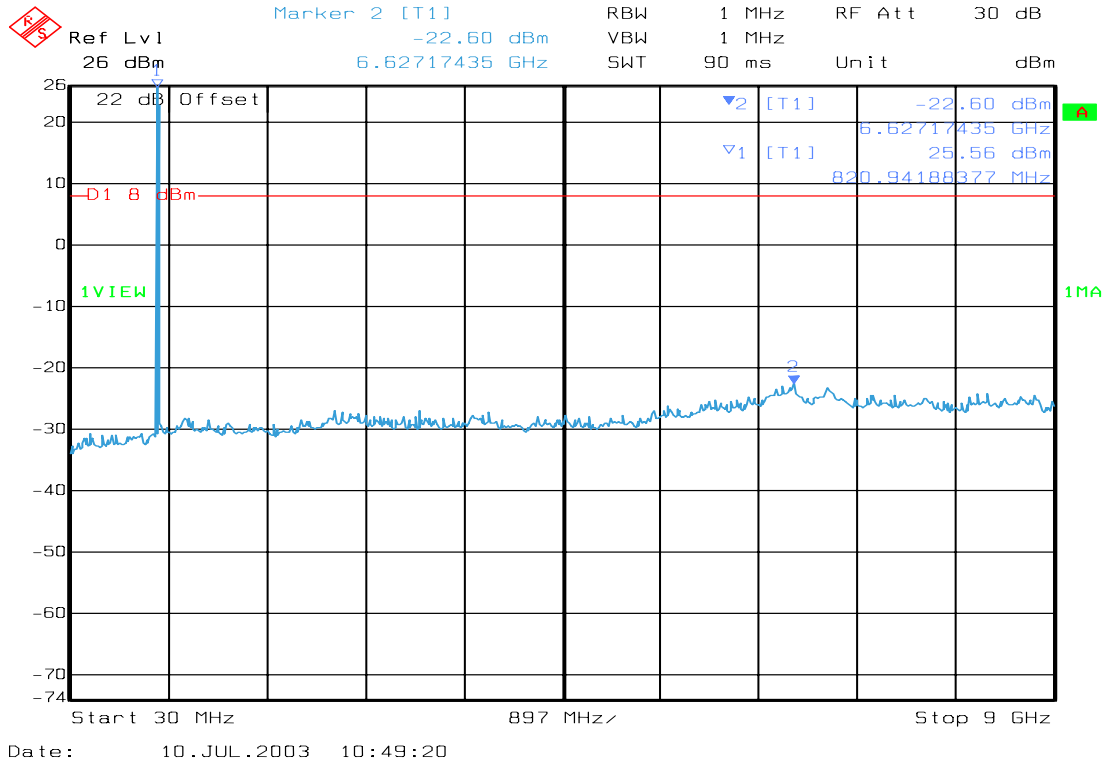
Test Technician / Engineer	Nemko Dallas Inc.	
Date of Measurement	July 10, 2003	
Temperature / Humidity	22°C	52%RH
Test Result	RH-42 Complies with FCC Part 2.1051	

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

Test & Certification Center (TCC) - Dallas
 FCC ID: GMLRH-42
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Cellular Band, AMPS, Channel 384



Test & Certification Center (TCC) - Dallas

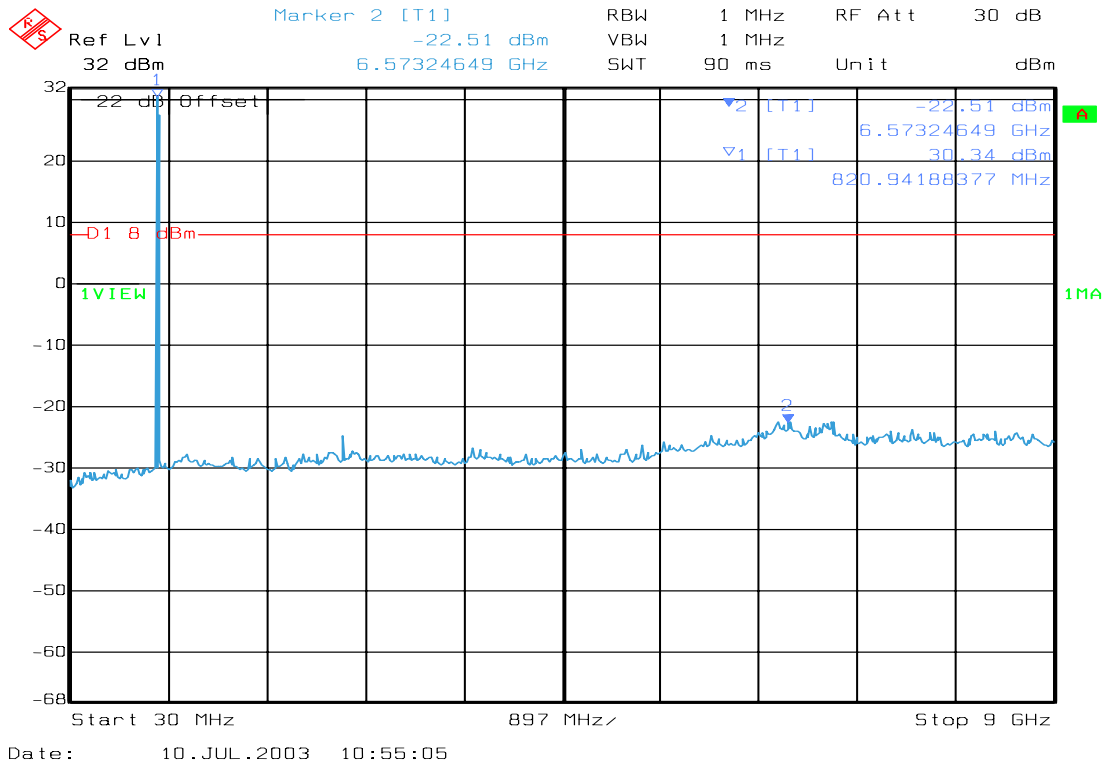
FCC ID: GMLRH-42

Test Report #: 02-RF-0262.001

August 13, 2003

Ver 1.0

Cellular Band, TDMA 800, Channel 384



8.4 Measurement Uncertainty

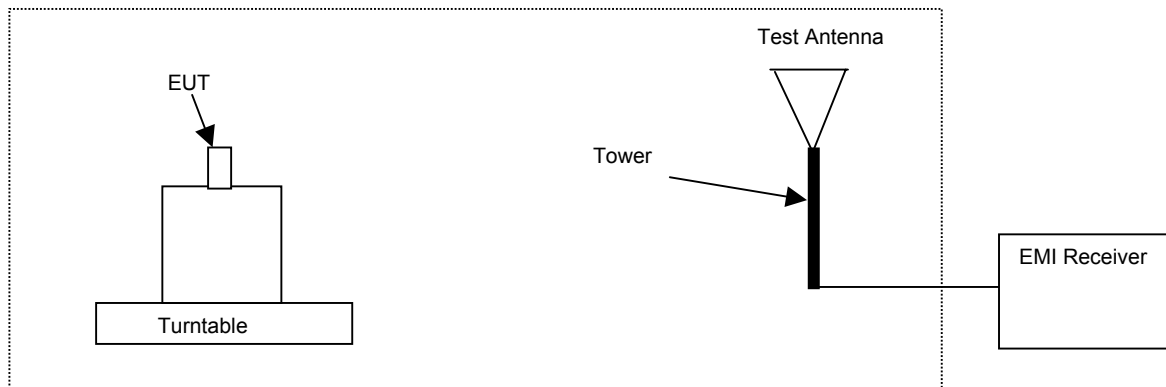
The measurement uncertainty for this test is +/- 3.7dB for 100kHz - 1000MHz and +/- 5.3dB for 1 - 20GHz.

9. FIELD STRENGTH OF SPURIOUS RADIATION

Specification: FCC Part 2.1053

9.1 Setup

Test equipment set-up.



9.2 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.

Test & Certification Center (TCC) - Dallas

FCC ID: GMLRH-42

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9.3 Detailed Test Results

Test Technician / Engineer	Nemko Dallas Inc	
Date of Measurement	July 11 & 18, 2003	
Temperature / Humidity	22°C	53-56%RH
Test Result	RH-42 Complies with FCC Part 2.1053	

Cellular Band, AMPS Channel 384

Frequency (MHz)	Meter Reading (dBm)	Substitution Level (dBm)	Pre-Amp Gain (dB)	Substitution Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarity	Comments
1673.04	-71.5	-40.5	0	7.3	-40.5	-13.0	-27.5000	V	Analog Ch 384
2509.56	-50.0	-47.5	33	8.0	-47.5	-13.0	-34.5000	V	
3346.08	-62.3	-55.1	32.6	8.0	-55.1	-13.0	-42.0667	V	
4068.3	-59.2	-47.0	33.1	8.2	-47.0	-13.0	-33.9667	V	
4182.6	-63.5	-51.4	33.2	8.2	-51.4	-13.0	-38.3667	V	
5019.12	-64.3	-56.2	33.2	8.2	-56.2	-13.0	-43.1667	V	
5855.64	-67.0	-59.0	31.8	9.3	-59.0	-13.0	-45.9667	V	
6692.16	-66.3	-56.6	31.6	9.4	-56.6	-13.0	-43.5667	V	
7528.68	-65.6	-56.3	32.5	9.2	-56.3	-13.0	-43.2667	V	
8365.2	-65.2	-55.7	33.3	9.1	-55.7	-13.0	-42.6667	V	
1673.04	-71.3	-38.3	0	7.3	-38.3	-13.0	-25.3000	H	
2509.56	-48.7	-46.2	33	8.0	-46.2	-13.0	-33.2000	H	
3346.08	-62.3	-58.6	32.6	8.0	-58.6	-13.0	-45.5667	H	
4068.3	-58.5	-56.8	33.1	8.2	-56.8	-13.0	-43.7667	H	
4182.6	-63.8	-62.2	33.2	8.2	-62.2	-13.0	-49.1667	H	
5019.12	-64.3	-59.2	33.2	8.2	-59.2	-13.0	-46.1667	H	
5855.64	-66.7	-60.7	31.8	9.3	-60.7	-13.0	-47.6667	H	
6692.16	-66.2	-58.6	31.6	9.4	-58.6	-13.0	-45.6333	H	
7528.68	-65.0	-56.0	32.5	9.2	-56.0	-13.0	-43.0000	H	
8365.2	-65.6	-56.4	33.3	9.1	-56.4	-13.0	-43.4000	H	

Notes: SEARCHED SPECTRUM TO THE 10TH HARMONIC OF CARRIER

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Frequency (MHz)	Meter Reading (dBm)	Substitution Level (dBm)	Pre-Amp Gain (dB)	Substitution Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarity	Comments
									TDMA Ch 384
1673.04	-69.3	-38.3	0	7.3	-38.3	-13.0	-25.3000	V	
2509.56	-45.7	-43.2	33	8.0	-43.2	-13.0	-30.2000	V	
3346.08	-61.8	-54.6	32.6	8.0	-54.6	-13.0	-41.5667	V	
4068.3	-58.5	-46.3	33.1	8.2	-46.3	-13.0	-33.2667	V	
4182.6	-60.3	-48.2	33.2	8.2	-48.2	-13.0	-35.1667	V	
5019.12	-63.2	-55.1	33.2	8.2	-55.1	-13.0	-42.0667	V	
5855.64	-66.0	-58.0	31.8	9.3	-58.0	-13.0	-44.9667	V	
6692.16	-64.7	-55.0	31.6	9.4	-55.0	-13.0	-41.9667	V	
7528.68	-66.3	-57.0	32.5	9.2	-57.0	-13.0	-43.9667	V	
8365.2	-64.0	-54.5	33.3	9.1	-54.5	-13.0	-41.4667	V	
1673.04	-70.5	-37.5	0	7.3	-37.5	-13.0	-24.5000	H	
2509.56	-43.5	-41.0	33	8.0	-41.0	-13.0	-28.0000	H	
3346.08	-58.8	-55.1	32.6	8.0	-55.1	-13.0	-42.0667	H	
4068.3	-59.3	-57.6	33.1	8.2	-57.6	-13.0	-44.5667	H	
4182.6	-59.8	-58.2	33.2	8.2	-58.2	-13.0	-45.1667	H	
5019.12	-64.8	-59.7	33.2	8.2	-59.7	-13.0	-46.6667	H	
5855.64	-66.3	-60.3	31.8	9.3	-60.3	-13.0	-47.2667	H	
6692.16	-65.3	-57.7	31.6	9.4	-57.7	-13.0	-44.7333	H	
7528.68	-66.3	-57.3	32.5	9.2	-57.3	-13.0	-44.3000	H	
8365.2	-64.5	-55.3	33.3	9.1	-55.3	-13.0	-42.3000	H	

Notes: SEARCHED SPECTRUM TO THE 10TH HARMONIC OF CARRIER

9.4 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.

10. FREQUENCY STABILITY (TEMPERATURE VARIATION / VOLTAGE VARIATION)

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

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

10.1 Setup

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

10.2 Pass/Fail Criteria

Not Applicable

10.3 Detailed Test Results

Test Technician / Engineer	Nemko Dallas Inc	
Date of Measurement	18 July 2003	
Temperature / Humidity	22°C	54%RH
Test Result	RH-42 at max power setting, was tested in accordance with 2.1055(a)(1)(b), 24.235	

AMPS, Call Mode, Channel 384, Frequency 836.52 MHz

Temperature (°C)	Voltage (Vdc)	Frequency (MHz)	Change (Hz)	Change (ppm)
50	4.0	836.520306	306	0.365
40	4.0	836.520349	349	0.417
30	4.0	836.520338	338	0.404
20	4.0	836.520369	369	0.441
10	4.0	836.520345	345	0.412
0	4.0	836.520357	357	0.426
-10	4.0	836.520360	360	0.430
-20	4.0	836.520359	359	0.429
-30	4.0	836.520331	331	0.395
20	4.6	836.520340	340	0.406
20	3.4*	836.520331	331	0.395

*Battery End Point

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TDMA 800, Call Mode, Channel 384, Frequency 836.52 MHz

Temperature (°C)	Voltage (Vdc)	Frequency (MHz)	Change (Hz)	Change (ppm)
50	4.0	836.520007	7	0.008
40	4.0	836.552008	8	0.010
30	4.0	836.519991	-9	0.011
20	4.0	836.519990	-10	0.012
10	4.0	836.519995	-5	0.006
0	4.0	836.520005	-5	0.006
-10	4.0	836.520006	6	0.007
-20	4.0	836.520005	5	0.006
-30	4.0	836.520008	8	0.009
20	4.6	836.519993	-7	0.008
20	3.3*	836.519991	-9	0.011

*Battery End Point

Test & Certification Center (TCC) - Dallas

FCC ID: GMLRH-41

Test Report #: 02-RF-0263.001

27 July 2003

Ver 1.0

APPENDIX

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




American Association for Laboratory Accreditation

SCOPE OF ACCREDITATION TO ISO/IEC 17025:1999

NOKIA MOBILE PHONES
 TEST & CERTIFICATION CENTER - DALLAS
 6021 Connection Drive
 Irving, TX 75039
 Alan Ewing Phone: 972 894 4744

ELECTRICAL

Valid to: November 30, 2003 Certificate Number: 1819-01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following Electromagnetic Compatibility (EMC), Specific Absorption Rate (SAR), and tests on wireless communications devices:

Tests	Test Method
Emissions	
Conducted and Radiated	CFR 47 Part 2, 15, 22, 24 CISPR 22; EN 55022 ICES-003; RSS-128, 132 and 133 3GPP TS 51.010-1 Section 12.2 ETSI EN 301 489-1; EN 301 489-7 (using ANSI C63.4 and RSS-212)
Specific Absorption Rate	IEEE 1528 EN 50360; EN 50361 CFR 47 Parts 2 and 24 OET Bulletin 65 and Supplement C RSS-102
Immunity	
Vehicular Immunity	ISO 7637-1; ETSI EN 301 489-1; EN 301 489-7
Electrostatic Discharge (ESD)	EN 61000-4-2; ETSI EN 301 489-1; EN 301 489-7
RF Radiated	EN 61000-4-3; ETSI EN 301 489-1; EN 301 489-7
Electrical Fast Transient/Burst	EN 61000-4-4; ETSI EN 301 489-1; EN 301 489-7
Surge	EN 61000-4-5; ETSI EN 301 489-1; EN 301 489-7
Conducted Voltage Dips, Short Interruptions and Voltage Variations	EN 61000-4-6; ETSI EN 301 489-1; EN 301 489-7



(A2LA Cert. No. 1819.01) Revised 09/18/02
 5301 Buckeystown Pike, Suite 350 • Frederick, MD 21704-8373 • Phone: 301-644 3248 • Fax: 301-662 2974

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(A2LA Cert. No. 1819.01) Revised 09/18/02

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“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.