

FCC PART 22 & 90 TYPE APPROVAL EMI MEASUREMENT AND TEST REPORT

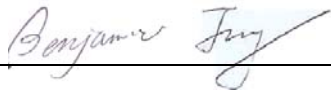
For

Cellular Specialties, Inc.

670 N. Commercial St.
Manchester NH 03101

FCC ID: NVRBA14X

2003-07-16

This Report Concerns: ☒ Original Report	Equipment Type: Amplifier
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Report No.: R0305291	
Test Date: 2003-07-09	
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1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

The *Cellular Specialties, Inc.* 's product, FCC ID: NVRBA14X or the "EUT" as referred to in this report is an Amplifier. The EUT measures approximately 6.2"L x 3.1"W x 1.1"H.

The EUT boosts the wireless network's performance by providing amplification of both transmit and receive signals. The unit receives the portable phone's signal through an inside antenna, amplifies it and then sends it to an outside antenna. This signal is referred to as the "Uplink". The amplifier also receives signals from the Cell Site base station through the outside antenna. This signal is amplified and re-radiated to the portable phone and is referred to as the "Downlink". It is necessary that sufficient signal be available at the outside antenna.

** The test data gathered are from typical production samples provided by the manufacturer.*

1.2 Objective

This type approval report is prepared on behalf of *Cellular Specialties, Inc.* in accordance with Part 2, Subpart J, Part 15, Subparts A and B, and Part 22 of the Federal Communication Commissions rules.

The objective of the manufacturer is to demonstrate compliance with FCC Part 2, Part 15, Part 22 and Part 90.

1.3 Related Submittal(s)/Grant(s)

No Related Submittals

1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-1992 and TIA/EIA 603A, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All radiated and conducted emissions measurement was performed by Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

1.5 Test Facility

The Open Area Test site used by BACL to collect radiated and conducted emission measurement data is located in the back parking lot of the building at 230 Commercial Street, Sunnyvale, California, USA.

Test site at BACL has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-1992.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The scope of the accreditation covers the FCC Method – 47 CFR Part – Digital Devices, CISPER 22: 1997: Electromagnetic Interference – Limits and Methods of Measurement of Information Technology Equipment test methods.

1.6 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Due Date
HP	Spectrum Analyzer	8568B	2517A01610	2003-10-30
HP	Spectrum Analyzer	8593A	29190A00242	2004-05-01
HP	Amplifier	8447E	1937A01054	2004-05-01
HP	Quasi-Peak Adapter	85650A	2521A00718	2004-05-01
Com-Power	Biconical Antenna	AB-100	14012	2004-05-01
Com-Power	LISN	LI-200	12005	2004-03-28
Com-Power	LISN	LI-200	12008	2004-03-28
Com-Power	Log Periodic Antenna	AL-100	16091	2004-05-01
Com-Power	Log Periodic Antenna	AB-900	15049	2004-05-01
Rohde & Schwarz	EMI Test Receiver	ESPI	1147 8007 07	2003-12-03
Agilent	Spectrum Analyzer (9KHz – 40GHz)	8564E	08303	2003-08-01
Agilent	Spectrum Analyzer (9KHz – 50GHz)	8565EC	06042	2004-05-03
HP	Amplifier (1-26.5GHz)	8449B	3147A00400	2004-03-14
A.H.System	Horn Antenna (700MHz-18GHz)	SAS-200/571	261	2003-05-31

* **Statement of Traceability:** Bay Area Compliance Laboratory Corp. declares that all equipment has been performed calibration using suitable standard traceable to National Institute of Standard and Technology (NIST).

1.7 Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
Rohde & Schwarz	Signal Generator	SMIQ03	1125.555.03	DoC

1.8 External I/O Cabling List and Details

Cable Description	Length (M)	Port/From	To
Shielded Cable	2.0	RF Port/Generator	RF Port/EUT

2 - SYSTEM TEST CONFIGURATION

2.1 Justification

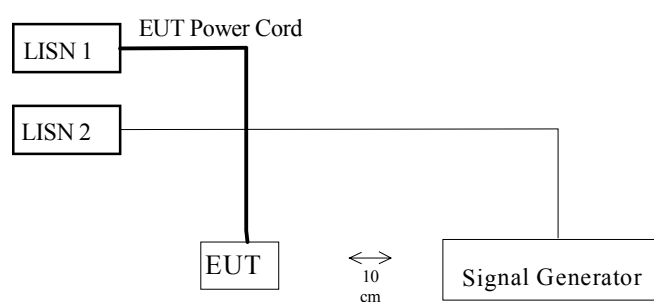
The EUT was configured for testing in a typical fashion (as normally used in a typical application).

The final qualification test was performed with the EUT operating at normal mode.

2.2 Schematics/Block Diagram

Please refer to Exhibit D.

2.3 Test Setup Block Diagram



2.4 Equipment Modifications

No modifications were necessary for the EUT to comply with the applicable standard and limit.

3 - SUMMARY OF TEST RESULTS

FCC RULE	DESCRIPTION OF TEST	Measured	Result
§2.1046 § 22.913(a) §90.205 (j)	Conducted Output Power	Section 4	Compliant
§ 2.1049 § 22.917(b) § 90.209	Emission Bandwidth	Section 5	Compliant
§2.1051 § 22.917(a) §90.210	Spurious emissions at antenna terminals	Section 6	Compliant
§2.1051	Two-Tone Test (Spurious emissions at antenna terminals)	Section 7	Compliant
§2.1053 § 22.917 (a) §90.210	Radiated Spurious Emission	Section 8	Compliant
§2.1049 §22.917(b)	Band Edge	Section 9	Compliant
§ 2.1055 (a) § 2.1055 (d)	Frequency stability vs. temperature Frequency stability vs. voltage	N/A	Compliant
§ 2.1047	Modulation Characteristics	N/A	Compliant
§2.1093	RF Exposure	Section 13	Compliant

4 – CONDUCTED OUTPUT POWER

4.1 Applicable Standard

According to FCC §2.1046 and §22.913 (a), the ERP of mobile transmitters must not exceed 7 Watts.

According to FCC §2.1046 and §90.205 (j), power depends upon station's antenna HAAT and required service area and may be from 1 to 500W.

4.2 Test Procedure

The antenna was removed and SMA connector was connected to the transmitter output. The transmitter output was connected to a calibrated coaxial attenuator (50 Ohm), the other end of which was connected to a spectrum analyzer. Transmitter output was read off the spectrum analyzer in dBm. The power output at the transmitter was determined by adding the value of the attenuator to the spectrum analyzer reading.

The test was performed at three frequencies (low, middle, and high channels) and on all power levels which can be setup on the transmitter.

4.3 Test equipment

Hewlett Packard HP8564E Spectrum Analyzer
Hewlett Packard HP 7470A Plotter
Rohde & Schwarz SMIQ03 Signal Generator
Rohde & Schwarz AMIQ I/Q Modulation Generator

4.4 Test Results

4.4.1 Test results for FCC Part 22, 824 – 849 MHz Uplink, 869 – 894 MHz Downlink

	Modulation	Channel	Frequency in MHz	RF Input Power in dBm	RF Output Power in dBm	RF Output Power in W	Limit
UPLINK	CDMA	Low	825	-30	21.2	0.132	7W
		Mid	835	-30	21.4	0.138	
		High	845	-30	21.1	0.129	
	GSM	Low	825	-30	21.3	0.135	
		Mid	835	-30	21.2	0.132	
		High	845	-30	21.4	0.138	
	TDMA	Low	825	-30	21.2	0.132	
		Mid	835	-30	21.1	0.129	
		High	845	-30	21.3	0.135	
DOWNLINK	CDMA	Low	870	-30	20.9	0.123	7W
		Mid	880	-30	21.1	0.129	
		High	890	-30	21.3	0.135	
	GSM	Low	870	-30	21.1	0.129	
		Mid	880	-30	21.4	0.138	
		High	890	-30	21.0	0.126	
	TDMA	Low	870	-30	21.2	0.132	
		Mid	880	-30	21.4	0.138	
		High	890	-30	21.1	0.129	

4.4.2 Test results for FCC Part 90, 806 – 824 MHz Uplink, 851 – 869 MHz Downlink

	Modulation	Channel	Frequency in MHz	RF Input Power in dBm	RF Output Power in dBm	RF Output Power in W	Limit
UPLINK	TDMA	Low	810	-30	21.2	0.132	500W
		Mid	815	-30	21.4	0.138	
		High	820	-30	21.1	0.129	
DOWNLINK	TDMA	Low	855	-30	21.2	0.129	
		Mid	860	-30	21.3	0.135	
		High	865	-30	21.2	0.132	

5 - EMISSION BANDWIDTH

5.1 Applicable Standards

According to FCC §2.1049 and §22.917 (b), the emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26dB below the transmitter power.

According to FCC §2.1049, §22.917 (b), and §90.209 emission masks depend upon frequency band and transmitter with or without audio low pass filter.

5.2 Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The resolution bandwidth of the spectrum analyzer was set at 30 KHz and the spectrum was recorded.

5.3 Test Equipment

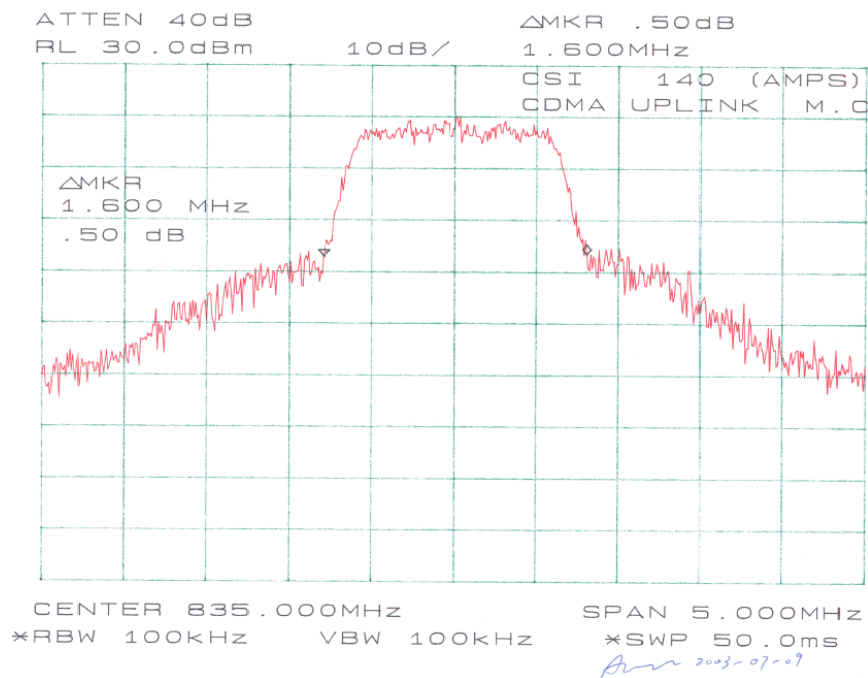
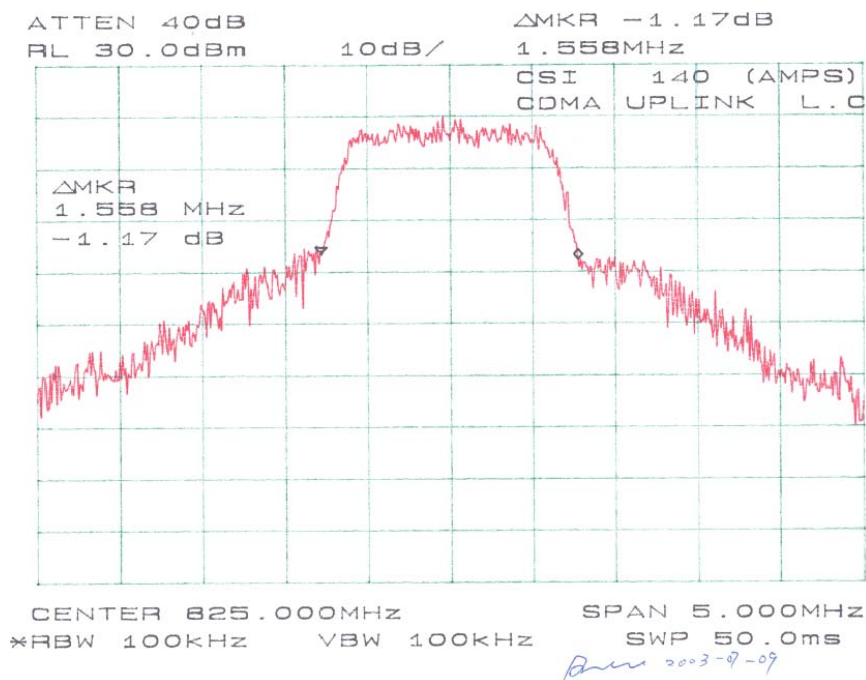
Hewlett Packard HP8566B Spectrum Analyzer
Hewlett Packard HP 7470A Plotter
Rohde & Schwarz SMIQ03B Signal Generator
Rohde & Schwarz AMIQ I/Q Modulation Generator

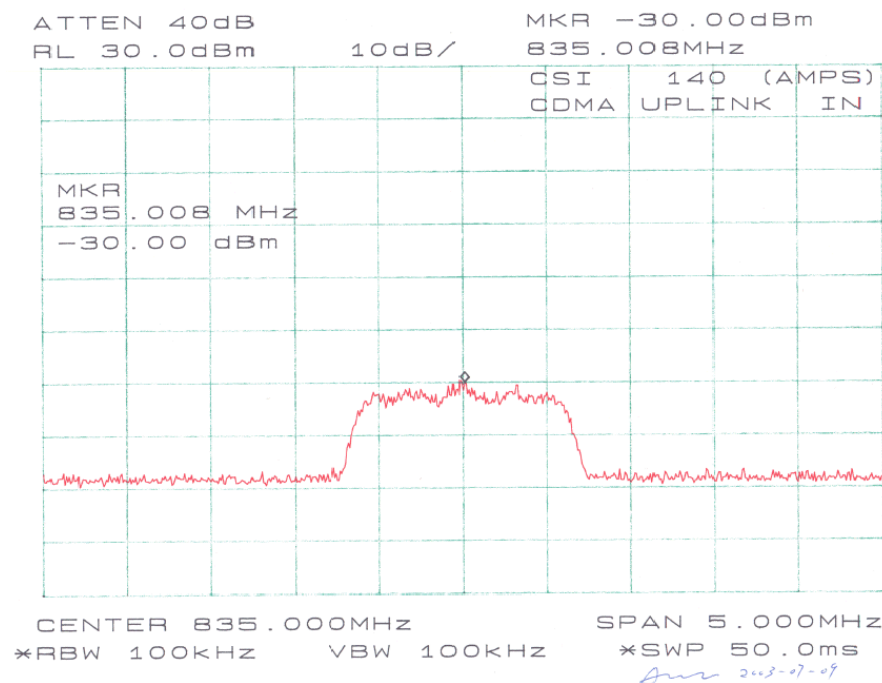
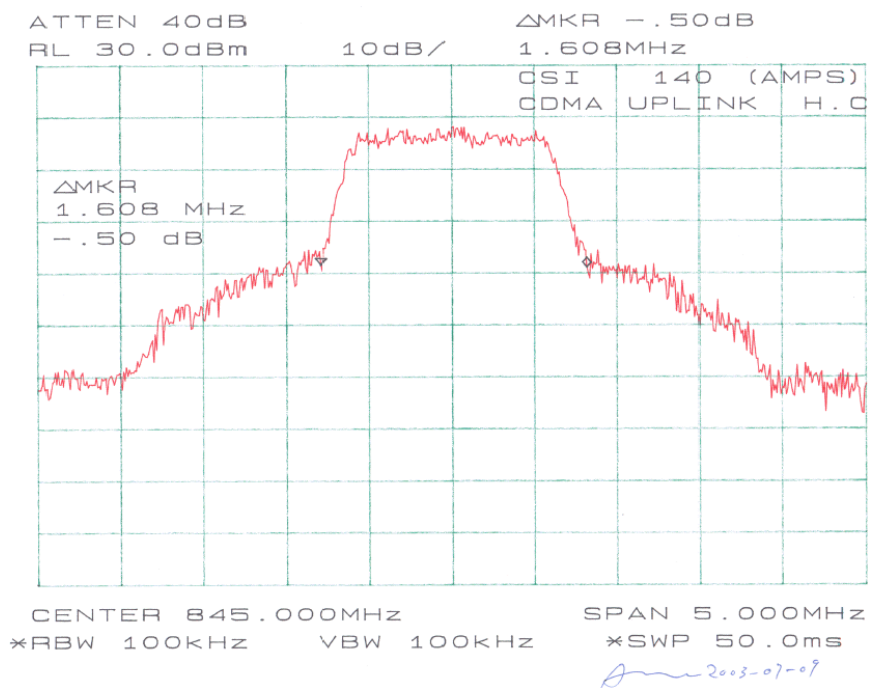
5.4 Plots of Occupied Bandwidth

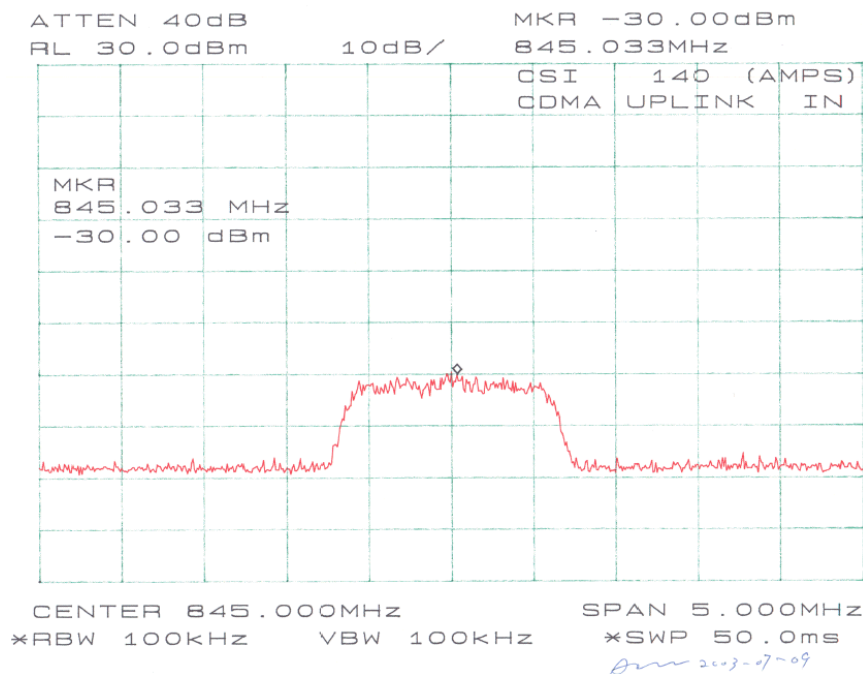
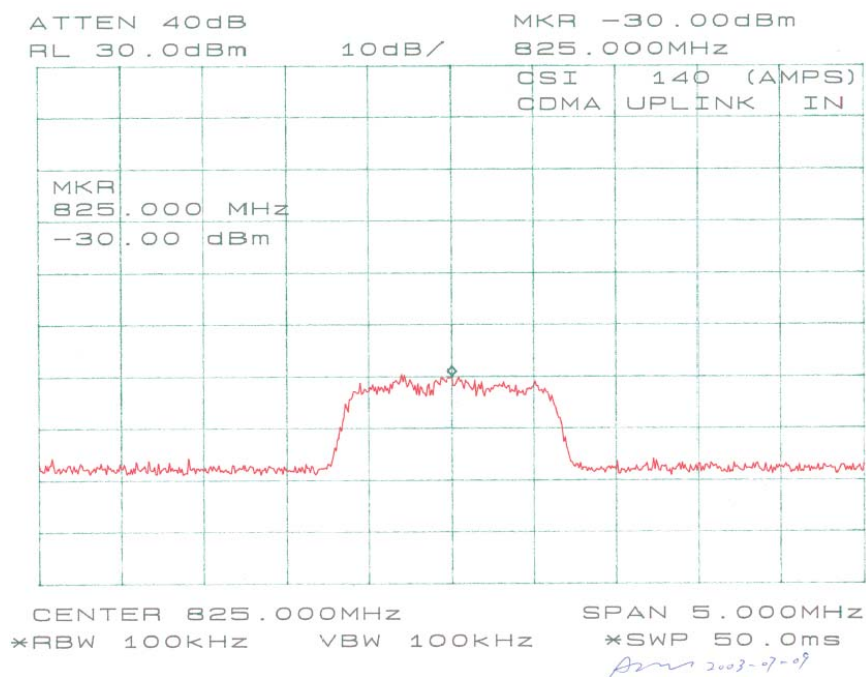
Please refer to tables and plots hereinafter.

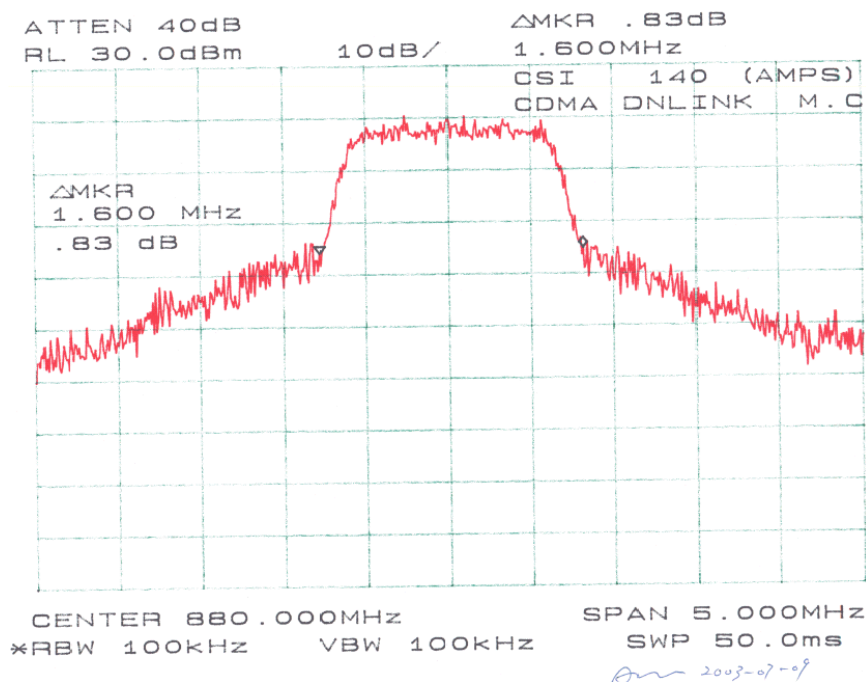
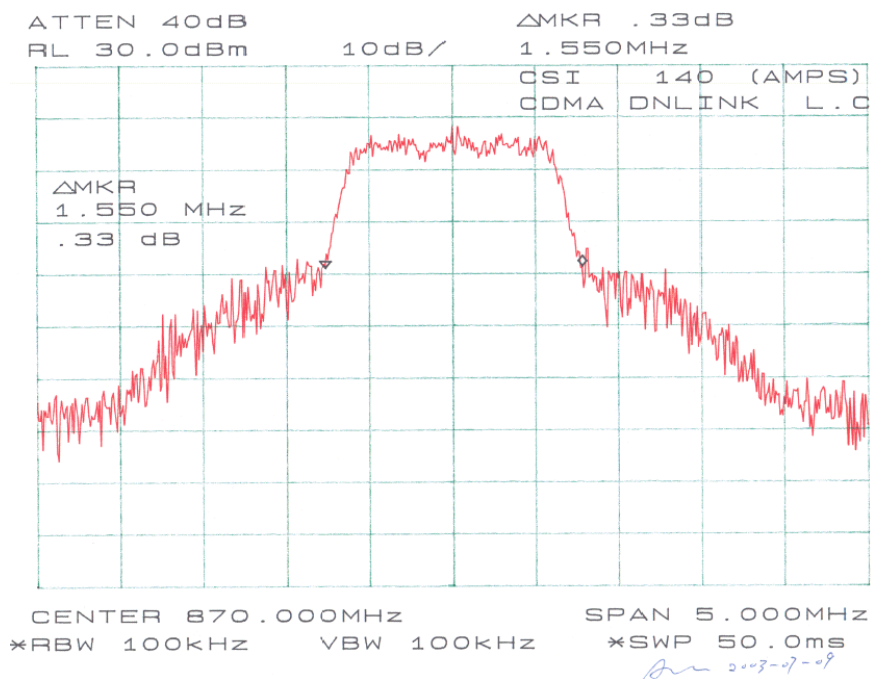
Test Data Summary

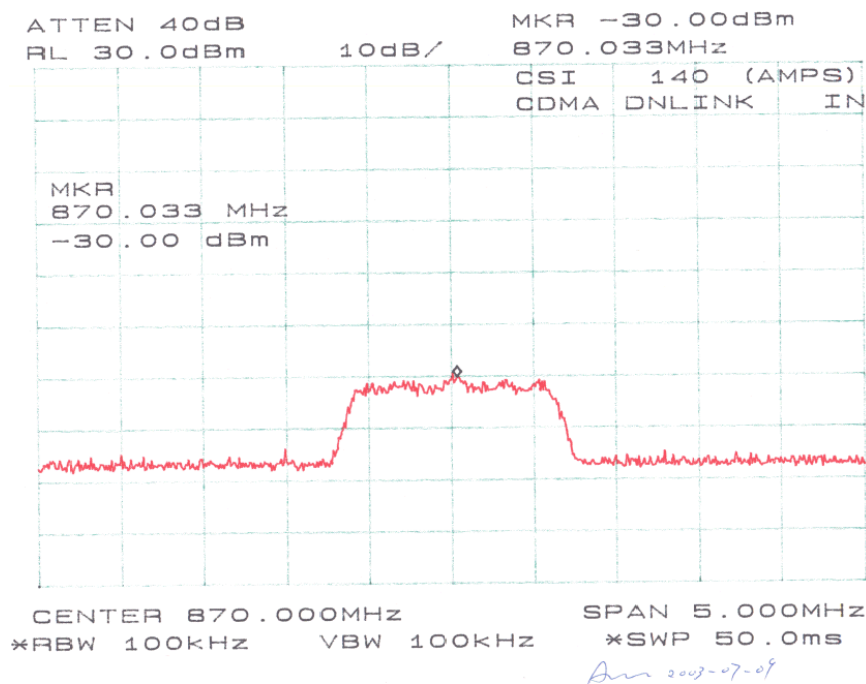
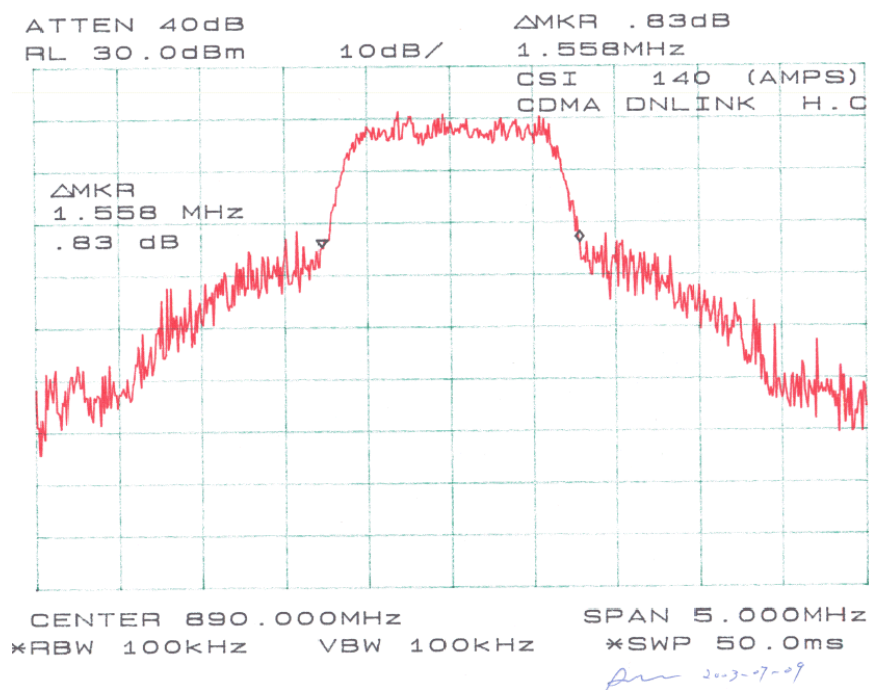
Modulation	Mode	Channel	Frequency in MHz	Emission Bandwidth in kHz
CDMA	Up-link	Low	825	1558
		Mid	835	1600
		High	845	1608
	Down-link	Low	870	1550
		Mid	880	1600
		High	890	1558
GSM	Up-link	Low	825	567
		Mid	835	567
		High	845	557
	Down-link	Low	870	553
		Mid	880	560
		High	890	553
TDMA	Up-link	Low	825	450
		Mid	835	450
		High	845	433
	Down-link	Low	870	442
		Mid	880	450
		High	890	450

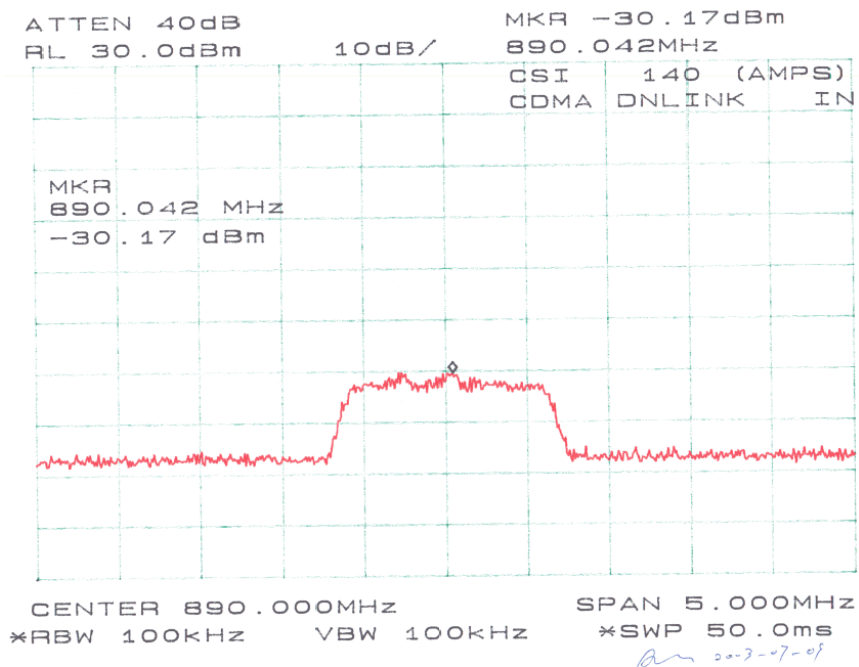
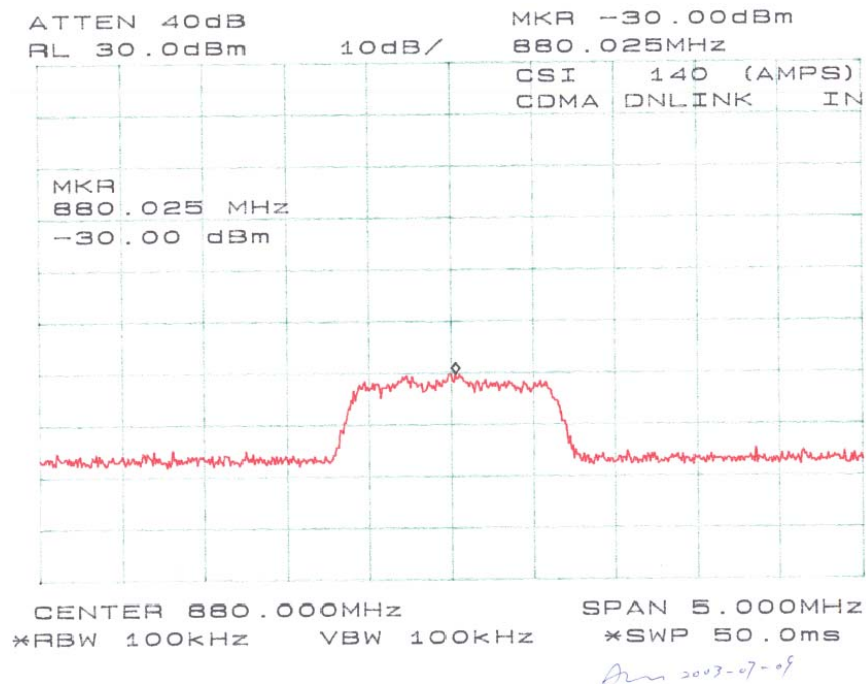


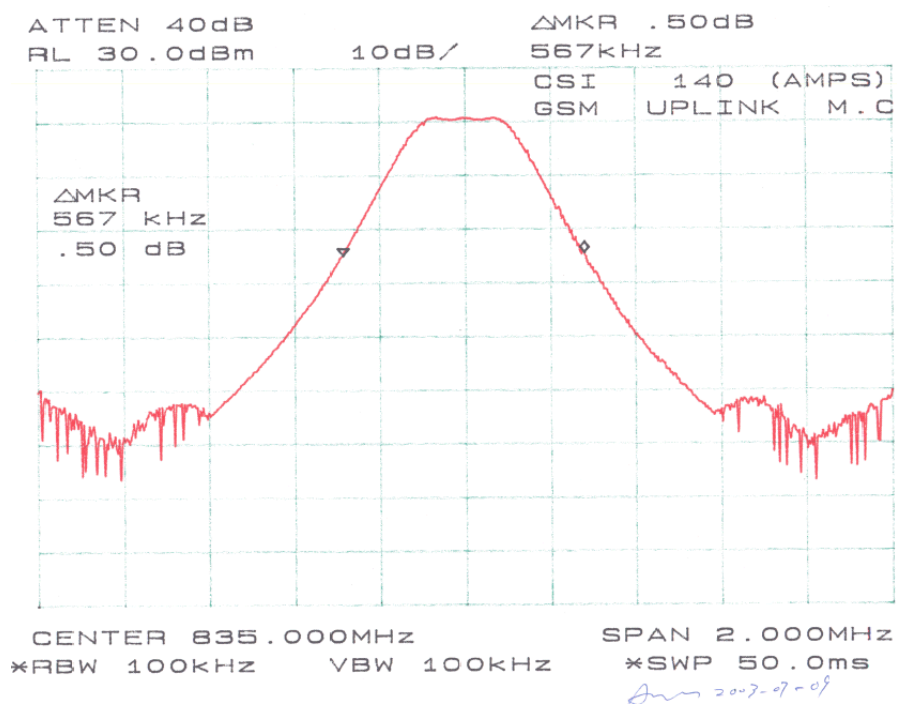
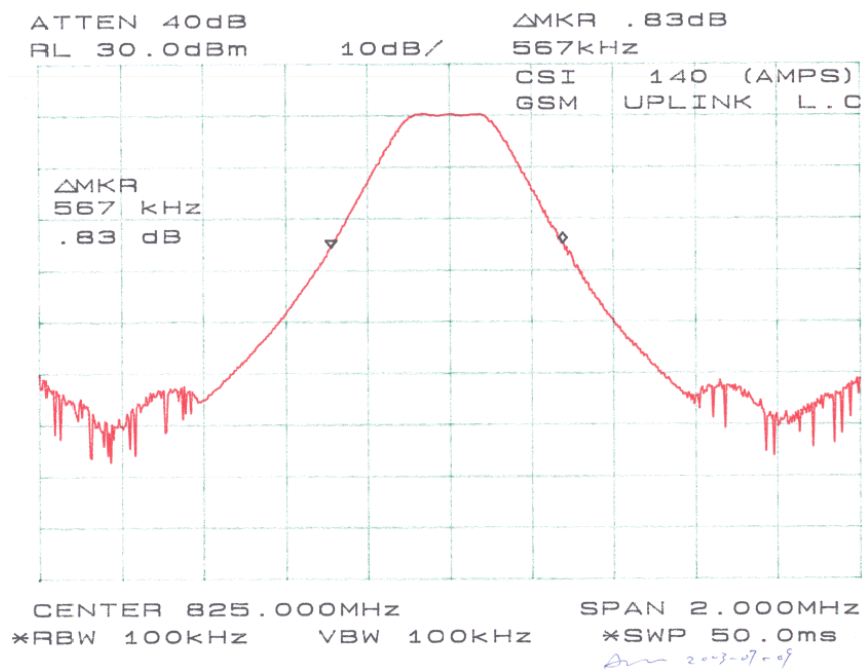


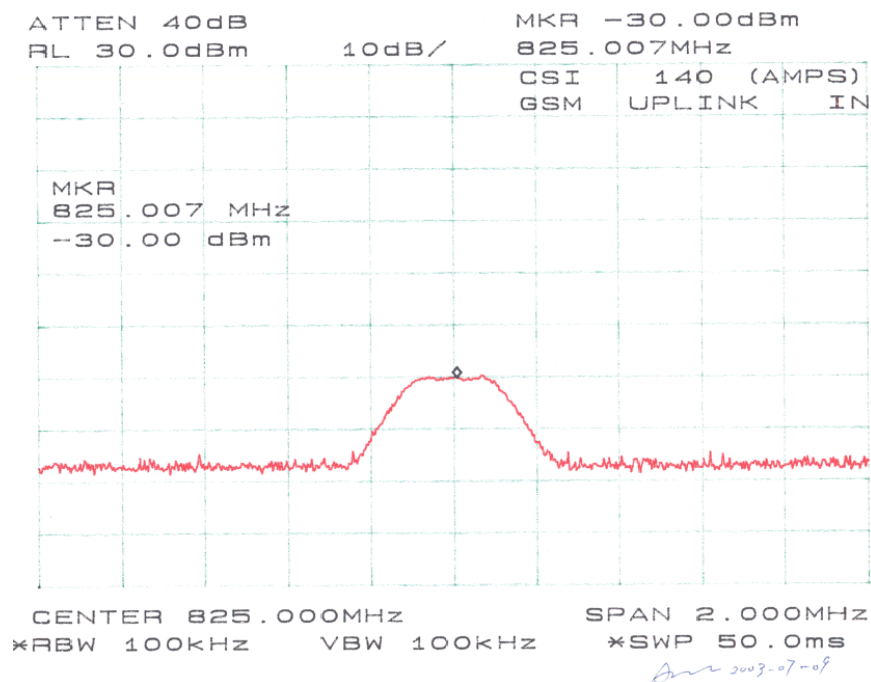
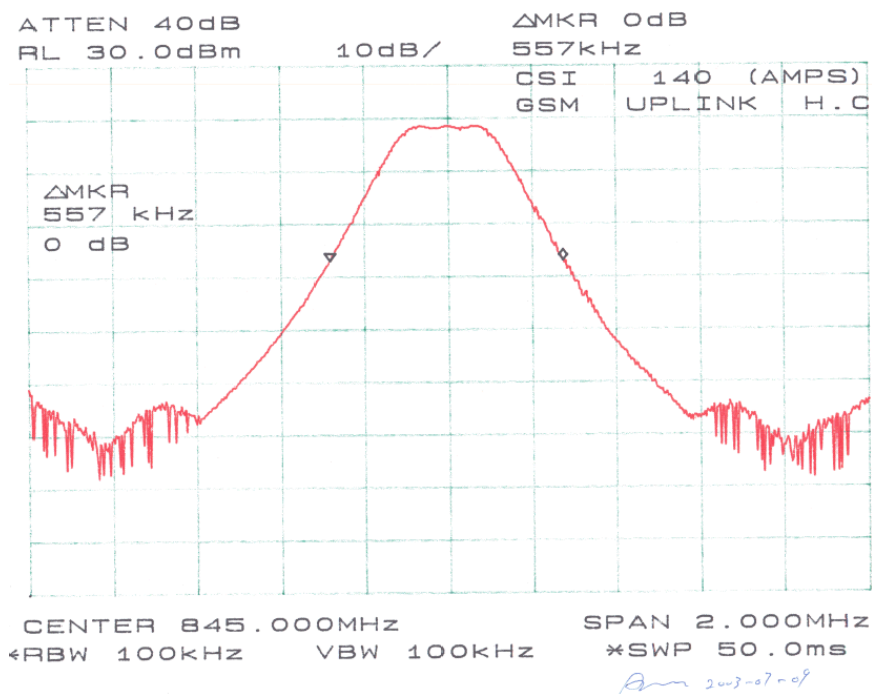


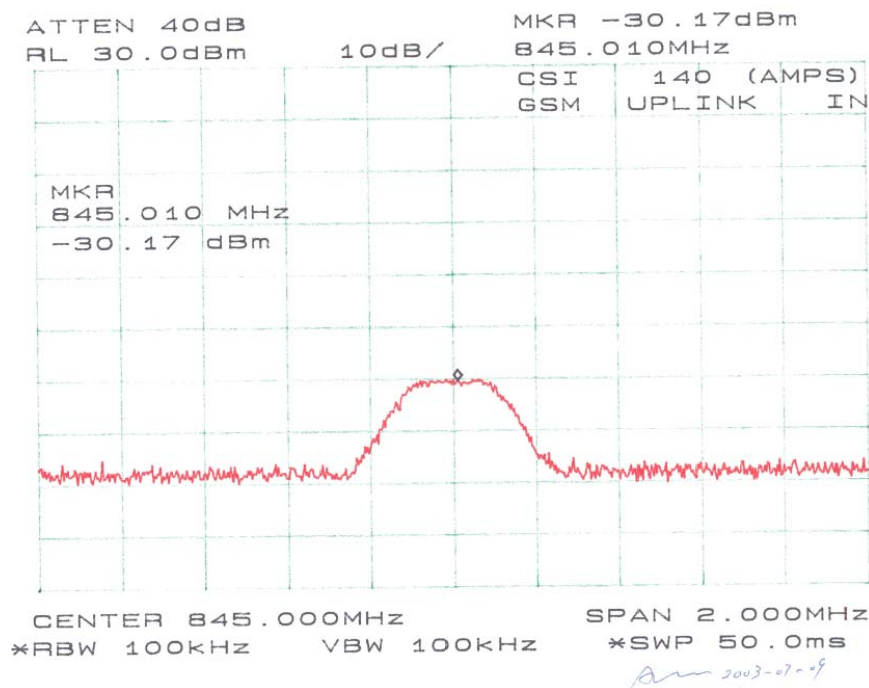
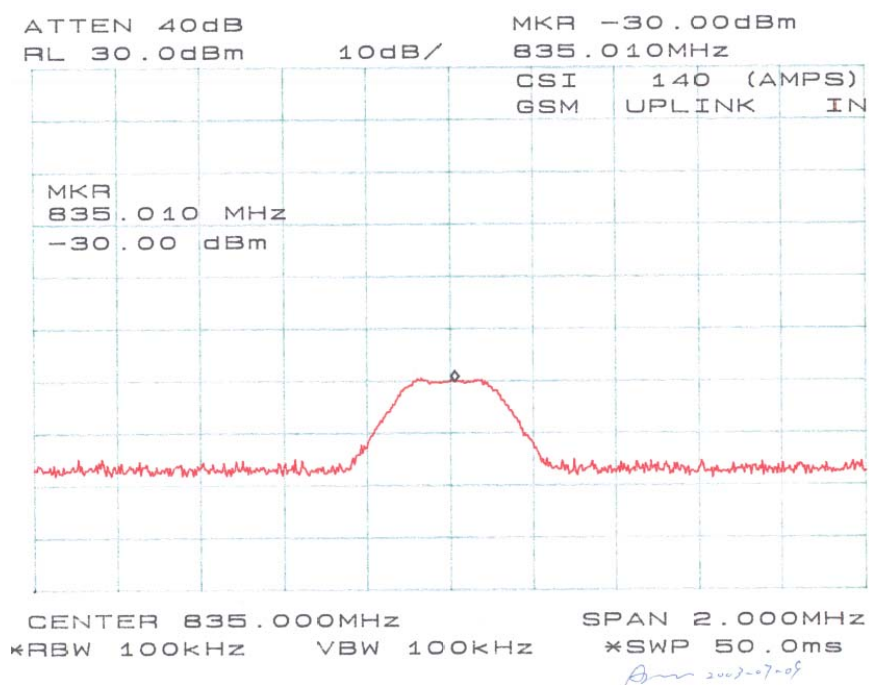


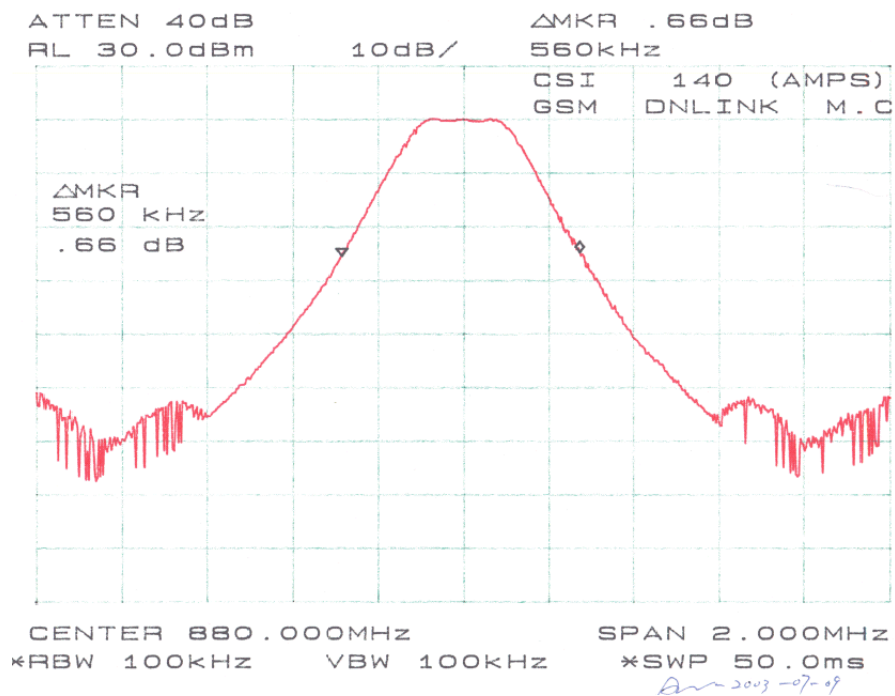
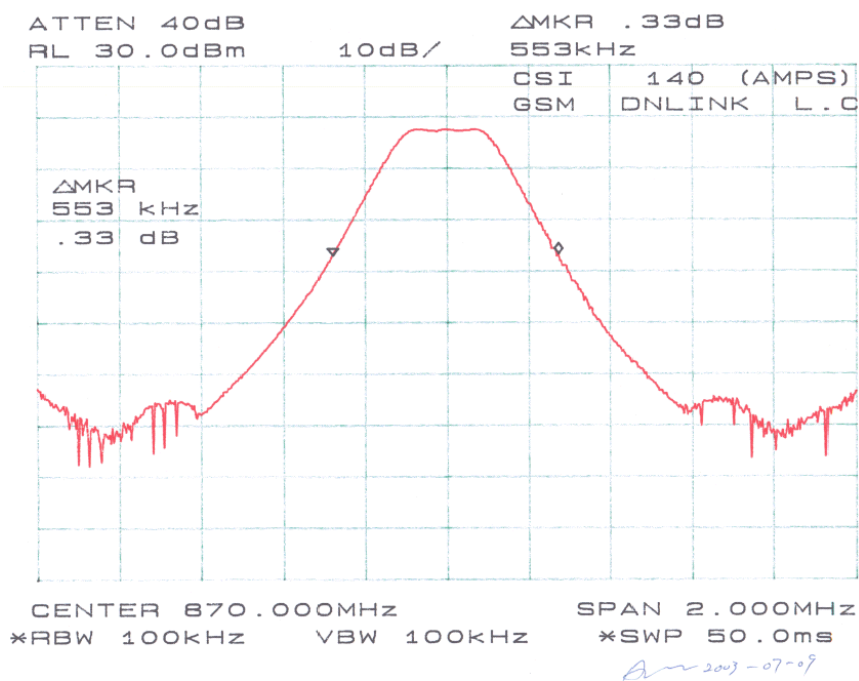


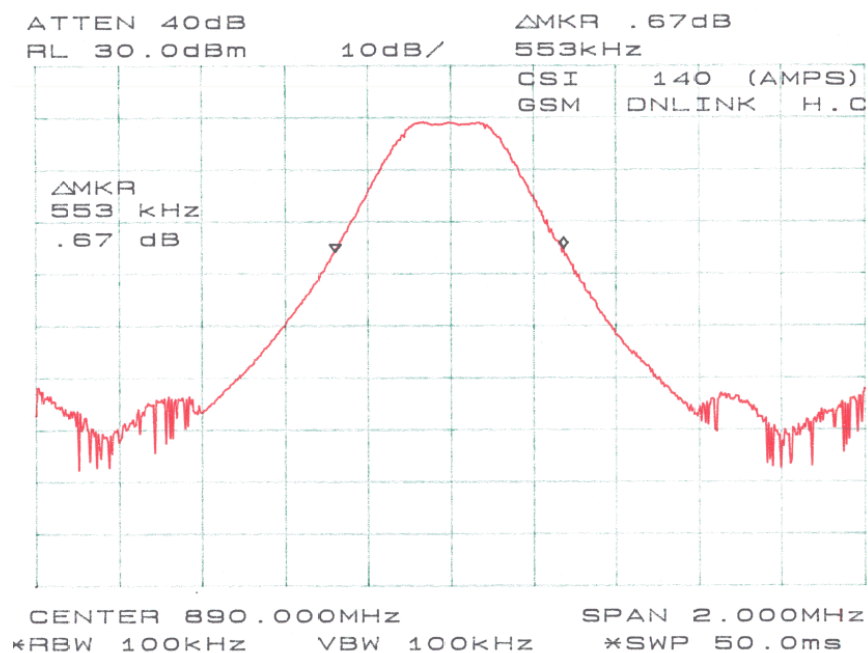




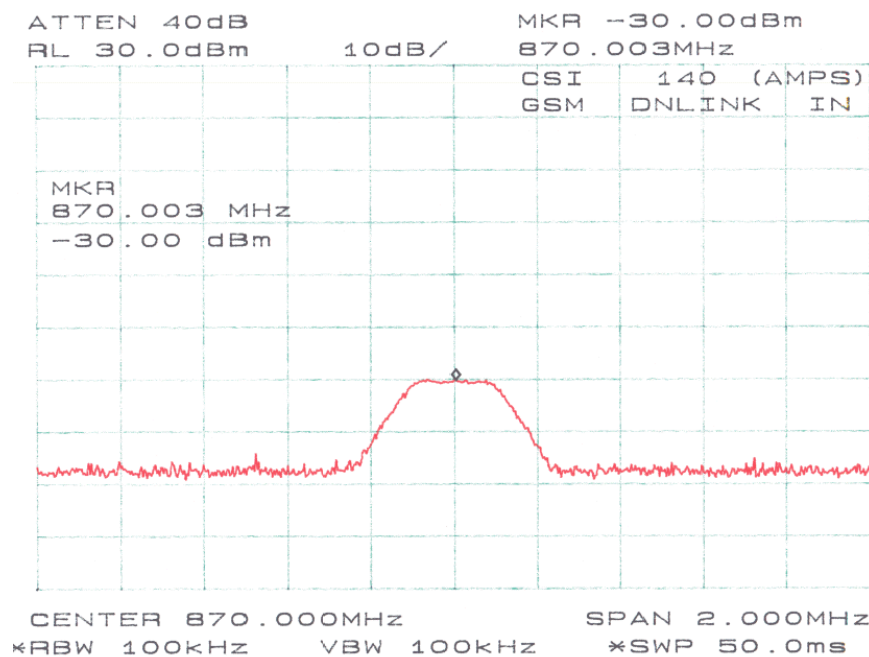








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