

FCC PART 24 TYPE APPROVAL EMI MEASUREMENT AND TEST REPORT

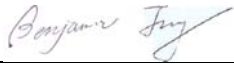
For

MPF Technologies, Inc.

5440 Trabuco Road
Irvine, CA 92620

FCC ID: RBBMPFP000B0F0

2003-09-19

This Report Concerns: ☒ Original Report	Equipment Type: PCS Repeater
Test Engineer: Benjamin Jing / 	
Report No.: R0307113	
Test Date: 2003-07-16	
Reviewed By: Ling Zhang / 	
Prepared By: Bay Area Compliance Laboratory Corporation 230 Commercial Street Sunnyvale, CA 94085 Tel: (408) 732-9162 Fax: (408) 732 9164	

Note: This test report is specially limited to the above client company and the product model only. It may not be duplicated without prior written consent of Bay Area Compliance Laboratory Corporation. This report **must not** be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

TABLE OF CONTENTS

1 - GENERAL INFORMATION.....	4
1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	4
1.2 OBJECTIVE	4
1.3 RELATED SUBMITTAL(S)/GRANT(S)	4
1.4 TEST METHODOLOGY	4
1.5 TEST FACILITY	4
1.6 TEST EQUIPMENT LIST	5
1.7 LOCAL SUPPORT EQUIPMENT LIST AND DETAILS.....	5
1.8 EXTERNAL I/O CABLING LIST AND DETAILS	5
1.9 POWER SUPPLY INFORMATION.....	6
2 - SYSTEM TEST CONFIGURATION.....	7
2.1 JUSTIFICATION	7
2.2 SCHEMATICS/BLOCK DIAGRAM	7
2.3 TEST SETUP BLOCK DIAGRAM.....	7
2.4 EQUIPMENT MODIFICATIONS	7
3 - SUMMARY OF TEST RESULTS.....	8
4 - RF POWER OUTPUT.....	9
4.1 APPLICABLE STANDARD	9
4.2 TEST PROCEDURE	9
4.3 TEST EQUIPMENT	9
4.4 TEST RESULTS	9
5 - EMISSION BANDWIDTH	11
5.1 APPLICABLE STANDARDS.....	11
5.2 TEST PROCEDURE	11
5.3 TEST EQUIPMENT	11
5.4 PLOTS OF OCCUPIED BANDWIDTH	11
6 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS	30
6.1 APPLICABLE STANDARDS.....	30
6.2 TEST PROCEDURE	30
6.3 TEST EQUIPMENT	30
6.4 TEST RESULTS	30
6.5 PLOTS OF OUT-OF-BAND EMISSIONS AT ANTENNA TERMINAL	30
7 - TWO-TONE TEST	37
7.1 APPLICABLE STANDARDS.....	37
7.2 TEST PROCEDURE	37
7.3 TEST EQUIPMENT	37
7.4 TEST RESULTS	37
7.5 PLOTS OF TWO-TONE TEST RESULT.....	37
8 - FIELD STRENGTH OF SPURIOUS RADIATION.....	44
8.1 TEST PROCEDURE	44
8.2 TEST PROCEDURE	44
8.3 TEST EQUIPMENT	44
8.4 TEST RESULT	44
9 - BAND EDGE TEST	47
9.1 APPLICABLE STANDARDS.....	47
9.2 TEST PROCEDURE	47
9.3 TEST EQUIPMENT	47
9.4 PLOTS OF OUT-OF-BAND-EDGE EMISSIONS AT ANTENNA TERMINAL.....	47
10 - MODULATION CHARACTERISTICS	60

11 - FREQUENCY STABILITY	61
11.1 APPLICABLE STANDARD	61
11.2 TEST PROCEDURE	61
11.3 TEST EQUIPMENT	61
11.4 TEST RESULTS.....	62
12 - CONDUCTED EMISSION	63
12.1 MEASUREMENT UNCERTAINTY	63
12.2 EUT SETUP.....	63
12.3 SPECTRUM ANALYZER SETUP	63
12.4 TEST PROCEDURE	63
12.5 SUMMARY OF TEST RESULTS.....	64
12.6 CONDUCTED EMISSIONS TEST DATA	64
12.7 PLOT OF CONDUCTED EMISSIONS TEST DATA	64

1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

The *MPF Technologies, Inc.* 's product, model: *USHR-1900* or the "EUT" as referred to in this report is a PCS Repeater. The EUT measures approximately 3.8"L x 3.1"W x 1.2"H.

The system was fed by ACE AC/DC adapter, M/N: DRS-051200.

** The test data was only good for test sample. It may have deviation for other product samples.*

1.2 Objective

This type approval report is prepared on behalf of *MPF Technologies, Inc.* in accordance with Part 2, Subpart J, Part 15, Subparts A and B, and Part 24 Subpart E, of the Federal Communication Commissions rules.

The objective of the manufacturer is to demonstrate compliance with FCC Part 2, Part 15 and Part 24.

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

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	2004-05-31

* **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	Generator	SMIQ03/AMIQ	N/A	DoC

1.8 External I/O Cabling List and Details

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

1.9 Power Supply Information

Manufacturer	Description	Model	Serial Number	FCC ID
AULT	AC Adapter	PW115KQ	N/A	DoC

2 - SYSTEM TEST CONFIGURATION

2.1 Justification

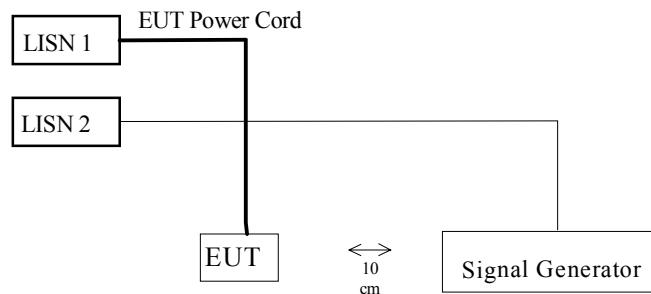
The EUT was configured for testing in a typical fashion (as normally used in a typical application).

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 made by BACL to ensure the EUT to comply with the applicable standard and limit.

3 - SUMMARY OF TEST RESULTS

FCC RULE	DESCRIPTION OF TEST	Reference	Result
§2.1046 § 24.232	RF power output	Section 4	Compliant
§ 2.1049 § 24.238	Emission Bandwidth	Section 5	Compliant
2.1051 § 24.238(a)	Spurious emissions at antenna terminals	Section 6	Compliant
2.1051 § 24.238 (a)	Two-Tone Test (Spurious emissions at antenna terminals)	Section 7	Compliant
2.1053 § 24.238 (a)	Radiated Emission	Section 8	Compliant
§ 2.1049	Band Edge	Section 9	Compliant
§ 2.1047	Modulation Characteristics	Section 10	Compliant
§ 2.1055 (a) § 2.1055 (d) § 24.235	Frequency stability vs. temperature Frequency stability vs. voltage	Section 11	Compliant
15.107	AC Line Conducted emission	Section 12	Compliant
§2.1093	RF Exposure	Section 13	Compliant

4 - RF POWER OUTPUT

4.1 Applicable Standard

According to FCC §2.1046 and §24.232 (a), in no case may the peak output power of a base station transmitter exceed 100 watt.

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

4.4 Test Results

Maximum Input Power vs Maximum Output Power

	Modulation	Channel	Frequency (MHz)	RF Input Power (dBm)	RF Output Power (dBm)	RF Output Power (W)
Uplink	CDMA	Low	1873	-35	15.34	0.0342
		Mid	1883	-35	15.48	0.0353
		High	1893	-35	15.39	0.0346
	GSM	Low	1873	-35	15.46	0.0352
		Mid	1883	-35	15.49	0.0354
		High	1893	-35	15.38	0.0345
	TDMA	Low	1873	-35	15.44	0.0350
		Mid	1883	-35	15.47	0.0352
		High	1893	-35	15.32	0.0340
Downlink	CDMA	Low	1953	-35	15.28	0.0337
		Mid	1963	-35	15.41	0.0348
		High	1973	-35	15.39	0.0346
	GSM	Low	1953	-35	15.37	0.0344
		Mid	1963	-35	15.35	0.0343
		High	1973	-35	15.42	0.0348
	TDMA	Low	1953	-35	15.31	0.0340
		Mid	1963	-35	15.46	0.0352
		High	1973	-35	15.48	0.0353

Note : Set the DIP switches to 10 dB attenuation for the 50 dB gain.

Maximum Gain vs Maximum Output Power

	Modulation	Channel	Frequency (MHz)	RF Input Power (dBm)	RF Output Power (dBm)	RF Output Power (W)
Uplink	CDMA	Low	1873	-45	15.06	0.0321
		Mid	1883	-45	15.18	0.033
		High	1893	-45	15.09	0.0323
	GSM	Low	1873	-45	15.11	0.0324
		Mid	1883	-45	15.13	0.0326
		High	1893	-45	15.08	0.0322
	TDMA	Low	1873	-45	15.05	0.032
		Mid	1883	-45	15.12	0.0325
		High	1893	-45	14.98	0.0315
Downlink	CDMA	Low	1953	-45	15.03	0.0138
		Mid	1963	-45	15.01	0.0317
		High	1973	-45	14.97	0.0314
	GSM	Low	1953	-45	15.04	0.0319
		Mid	1963	-45	15.08	0.0322
		High	1973	-45	14.99	0.0316
	TDMA	Low	1953	-45	15.12	0.0325
		Mid	1963	-45	15.05	0.032
		High	1973	-45	14.98	0.0315

Note : Set the DIP switches to 0 dB attenuation for the full 60 dB gain.

5 - EMISSION BANDWIDTH

5.1 Applicable Standards

According to FCC §2.1049 and §24.238 (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.

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

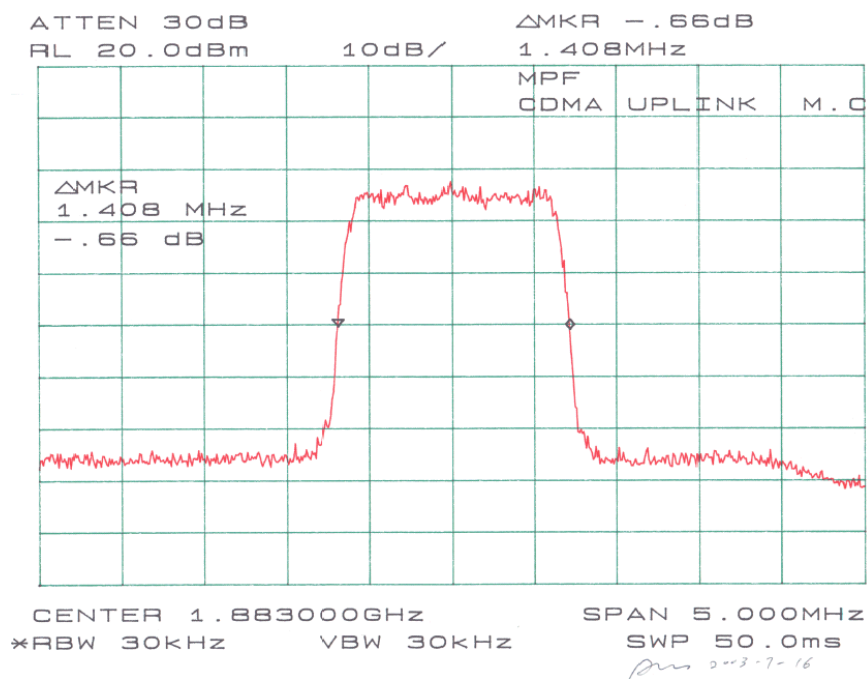
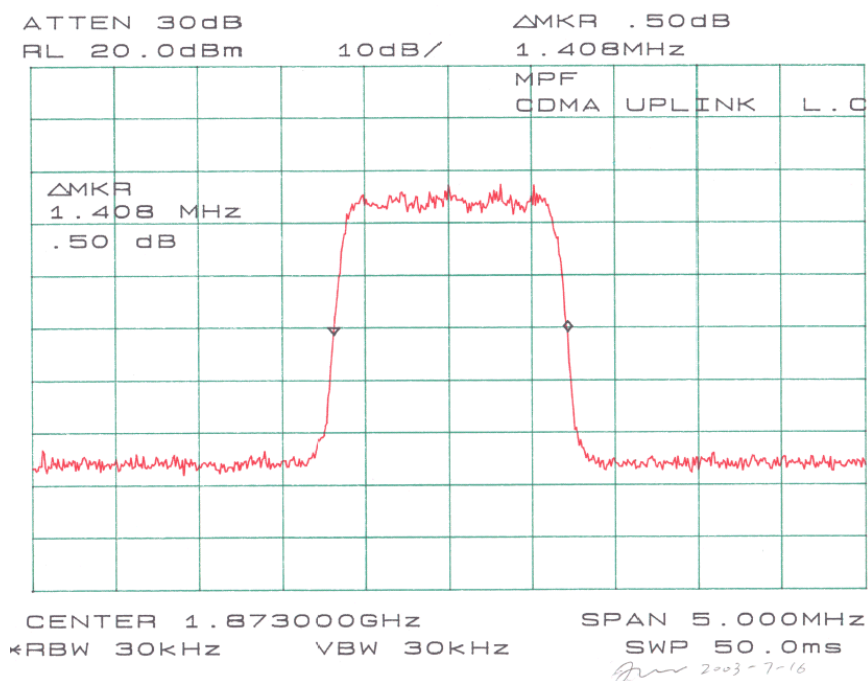
Hewlett Packard HP8566B Spectrum Analyzer
Hewlett Packard HP 7470A Plotter
Rohde & Schwarz SMIQ03B Signal Generator
Rohde & Schwarz AMIQ I/Q Modulation Generator

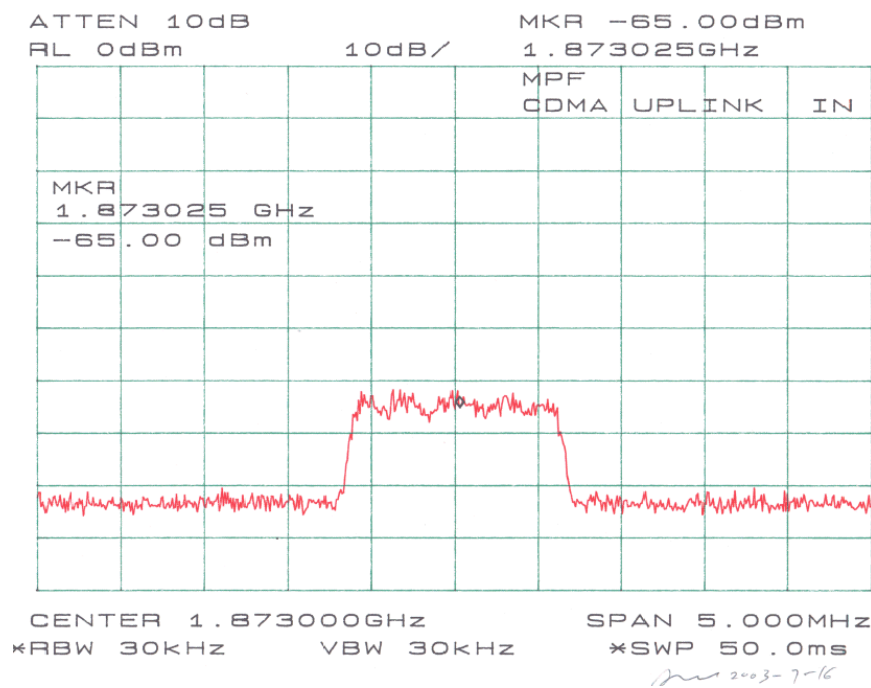
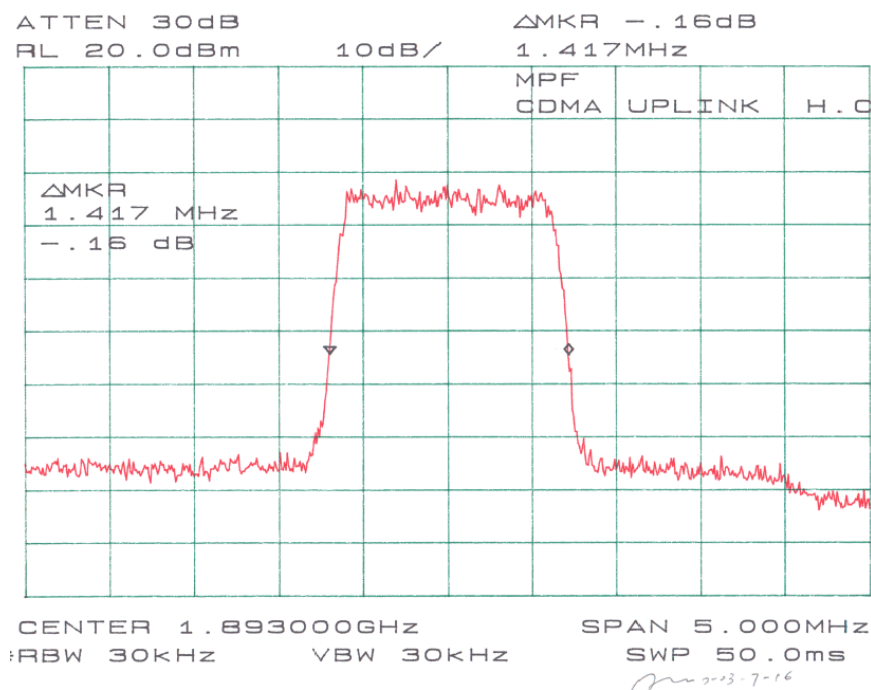
5.4 Plots of Occupied Bandwidth

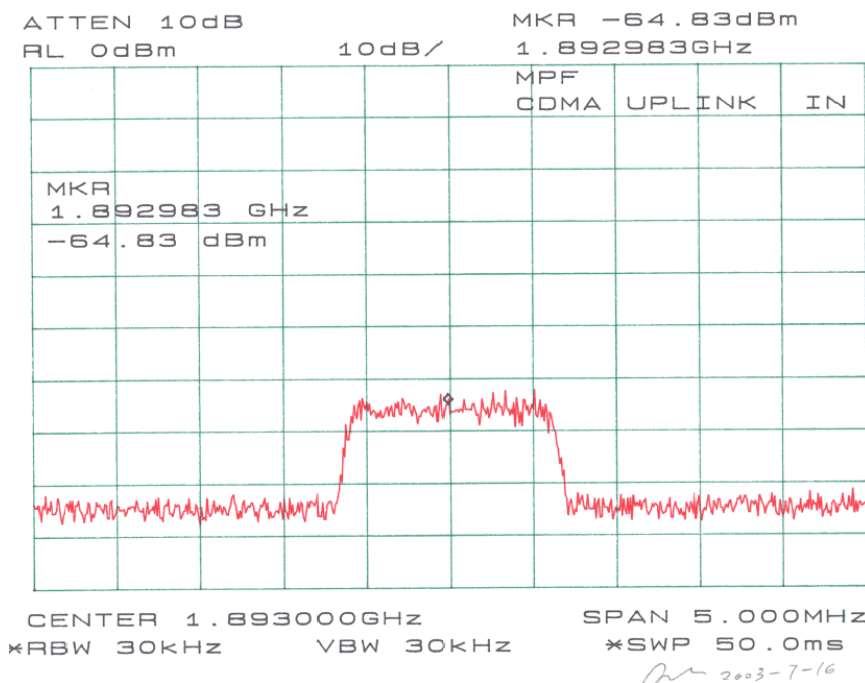
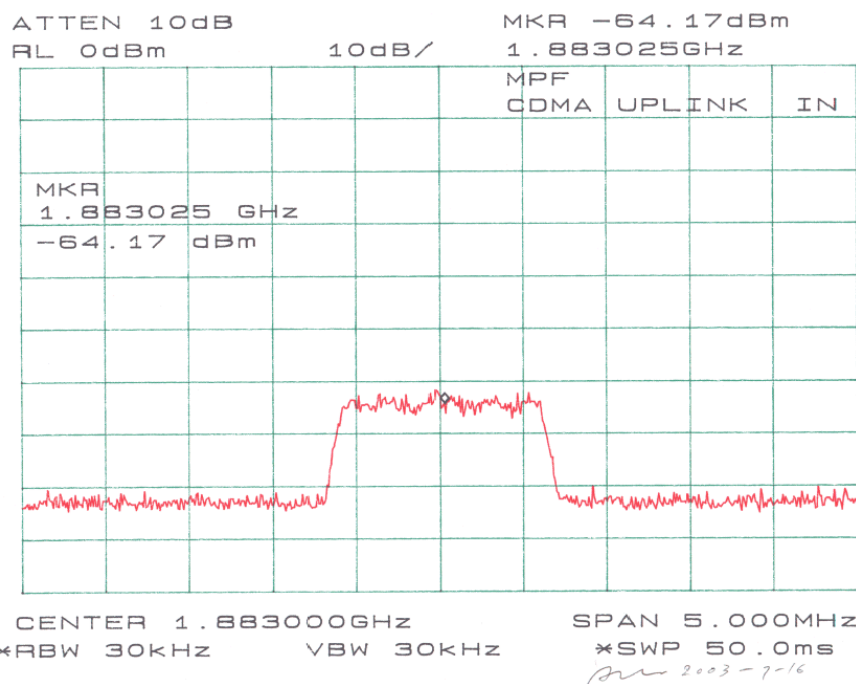
Please refer to plots hereinafter.

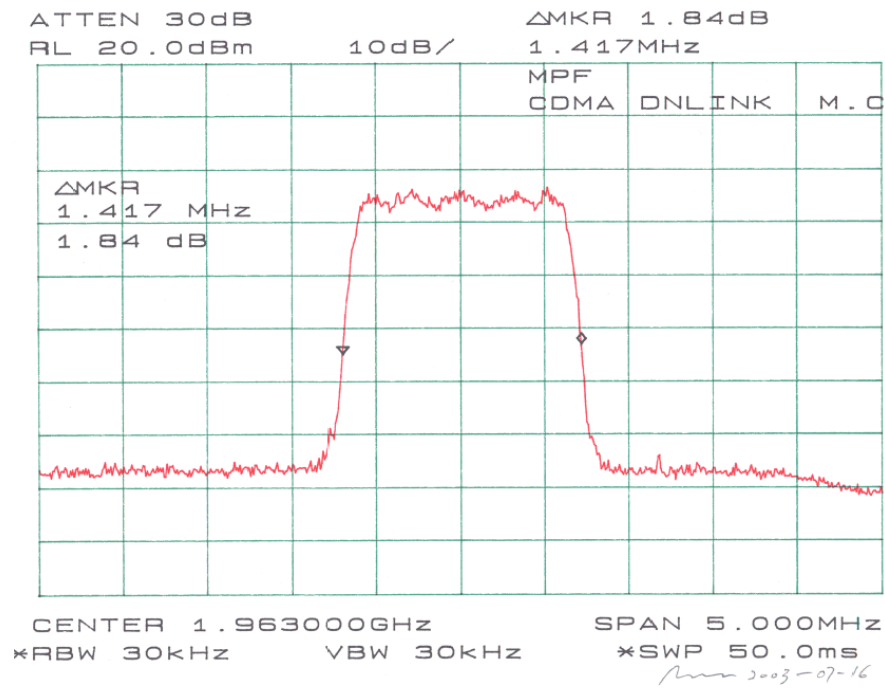
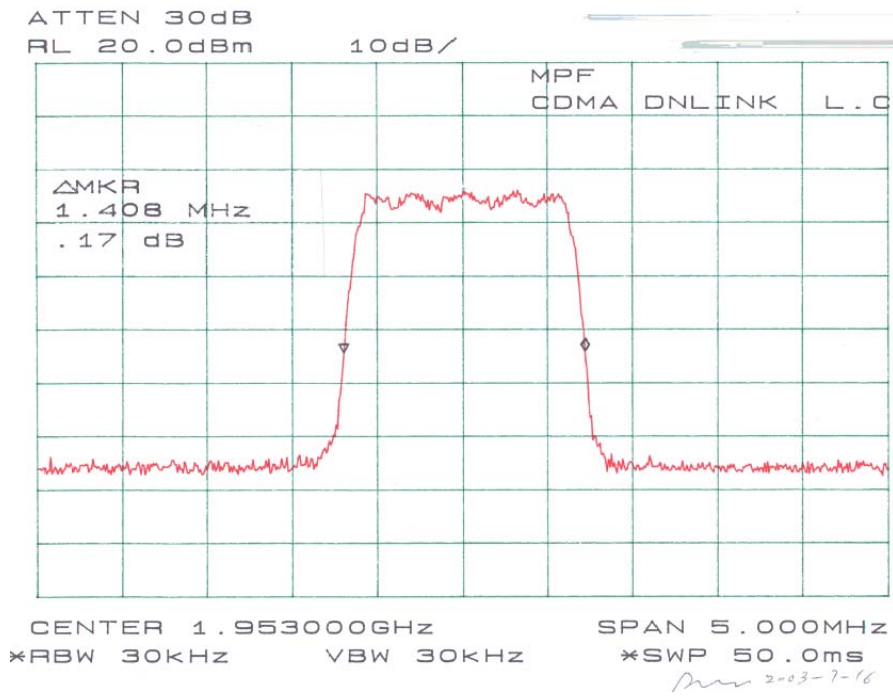
Test Data Summary

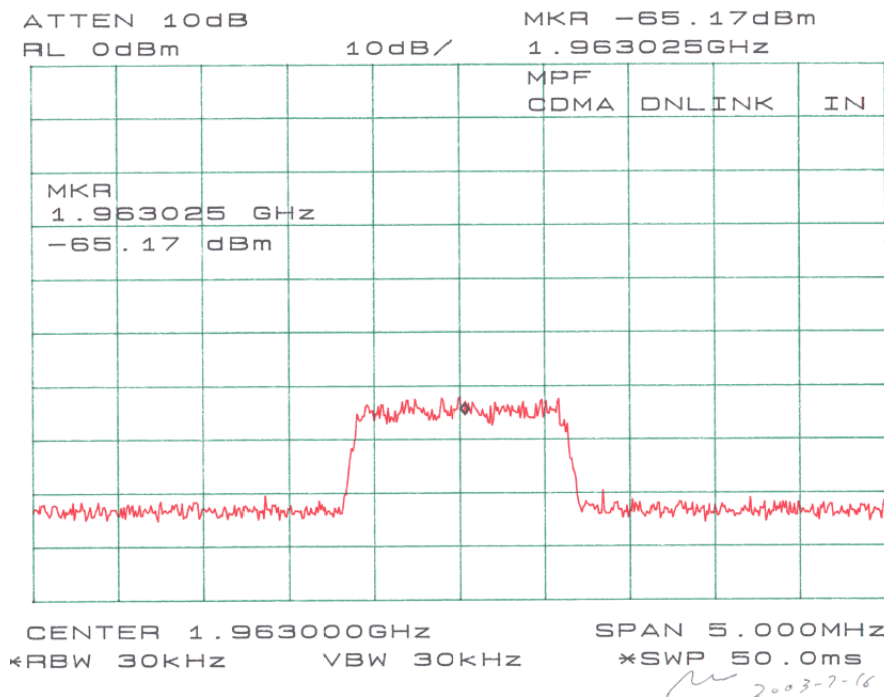
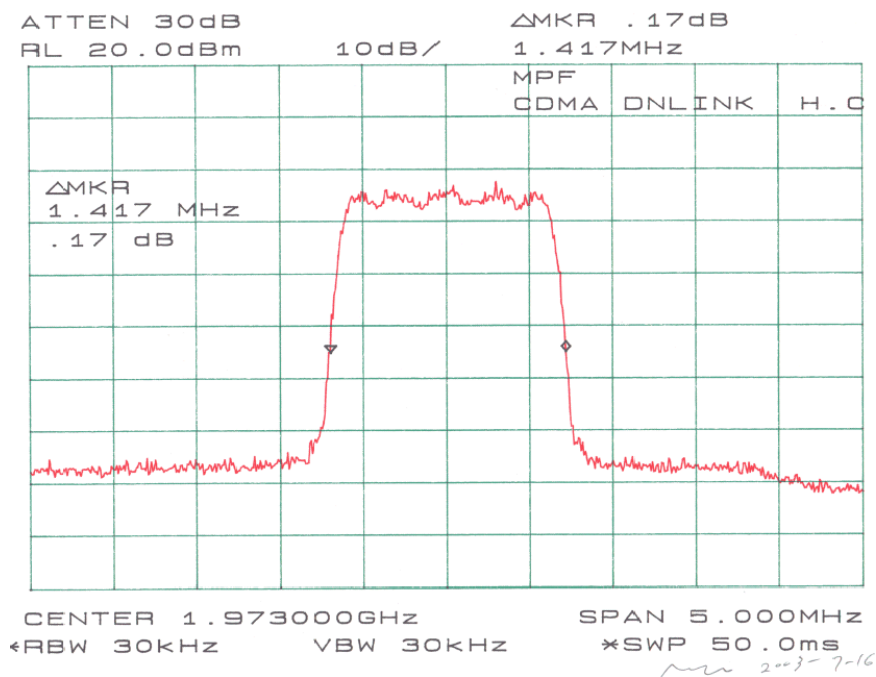
Modulation	Mode	Channel	Emission Bandwidth in kHz
CDMA	Up-link	Low	1408
		Mid	1408
		High	1417
	Down-link	Low	1408
		Mid	1417
		High	1417
GSM	Up-link	Low	357
		Mid	357
		High	357
	Down-link	Low	357
		Mid	357
		High	357
TDMA	Up-link	Low	143
		Mid	143
		High	143
	Down-link	Low	147
		Mid	143
		High	137

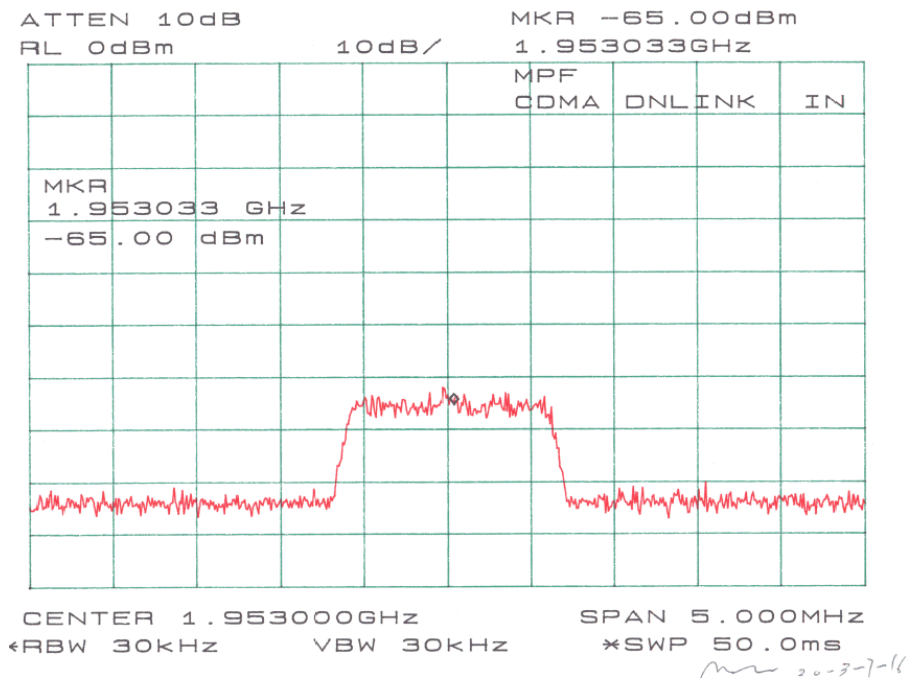
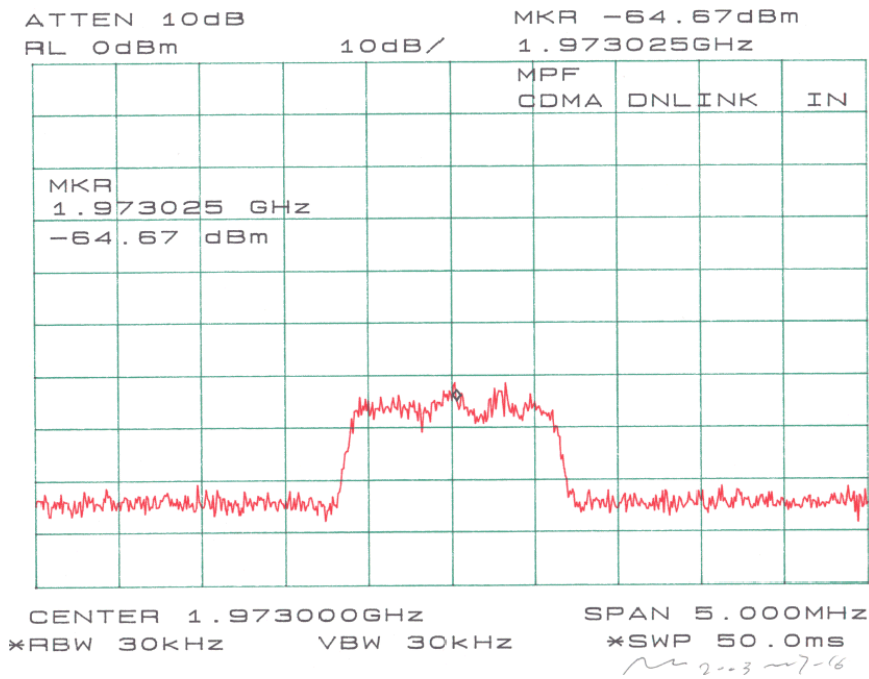


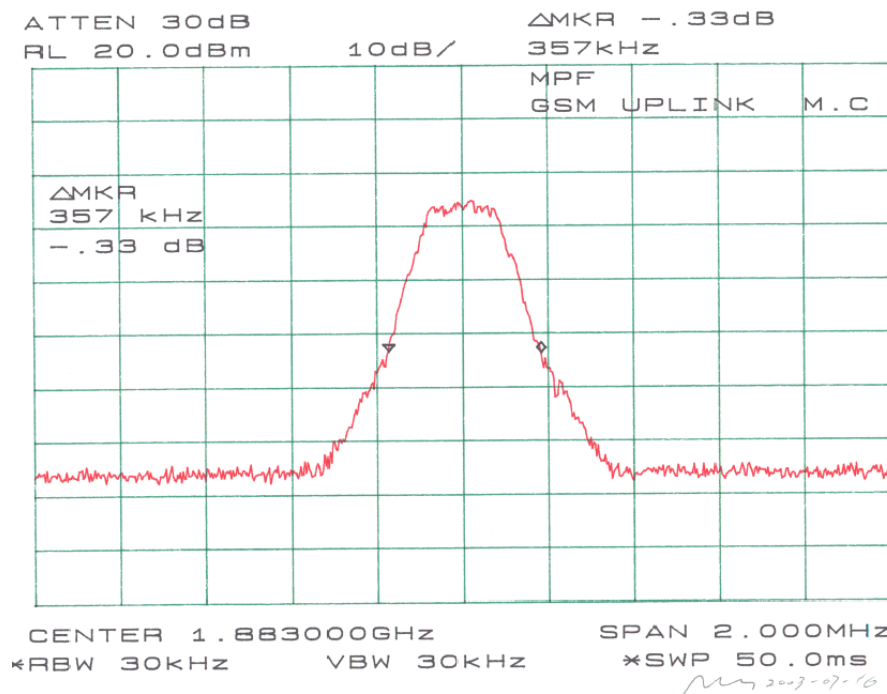
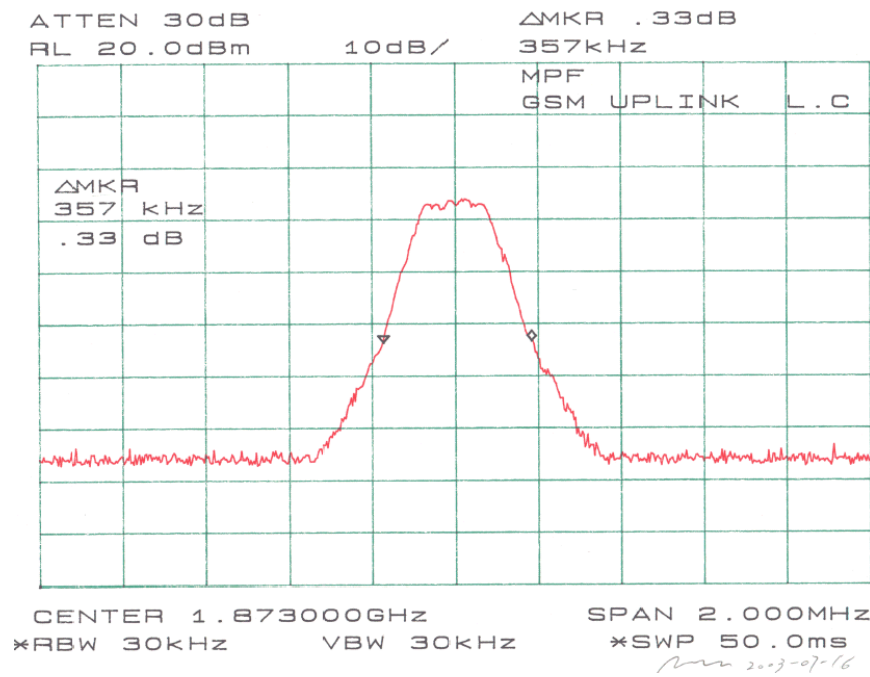


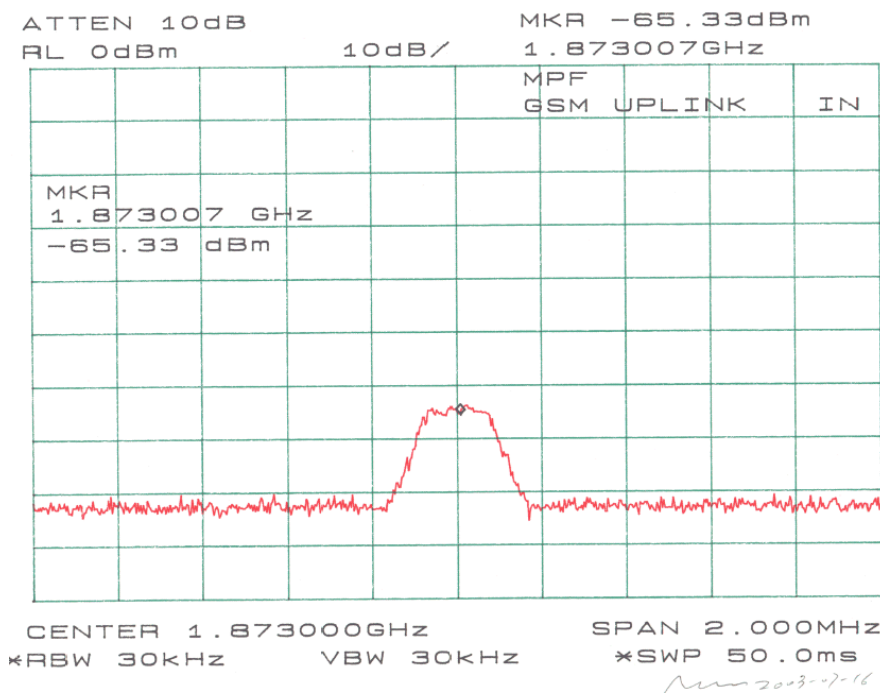
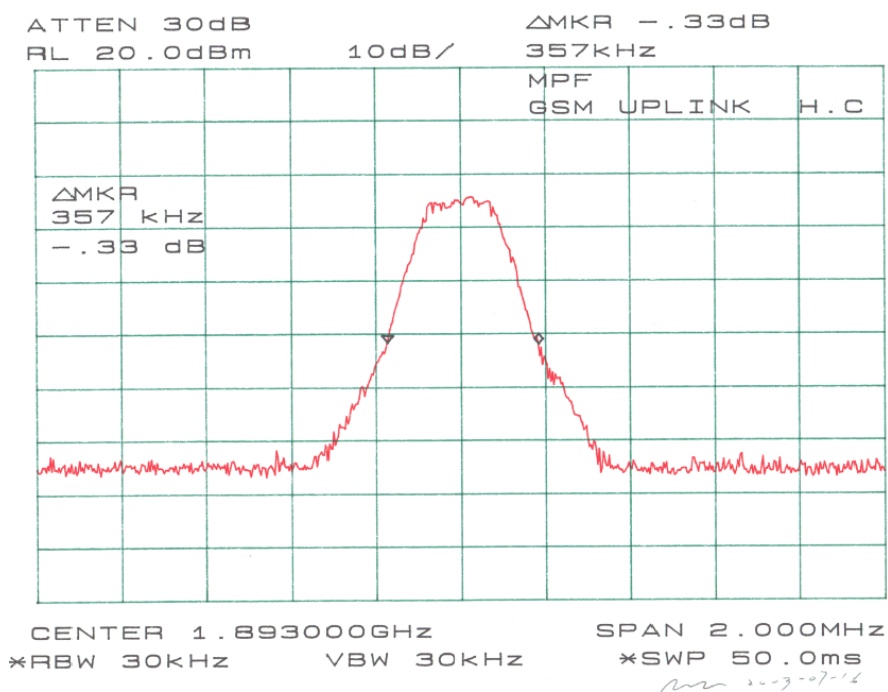


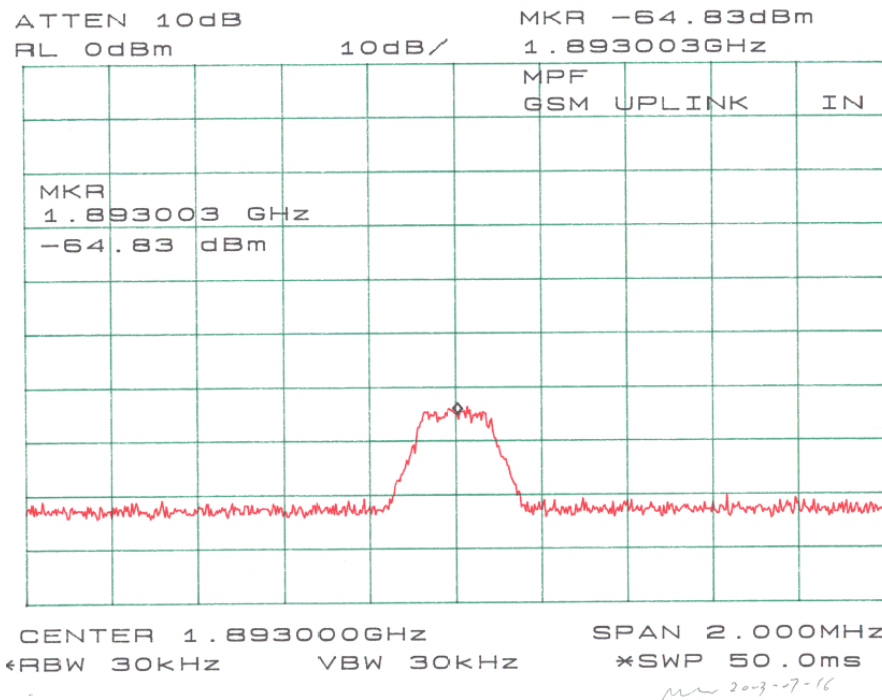
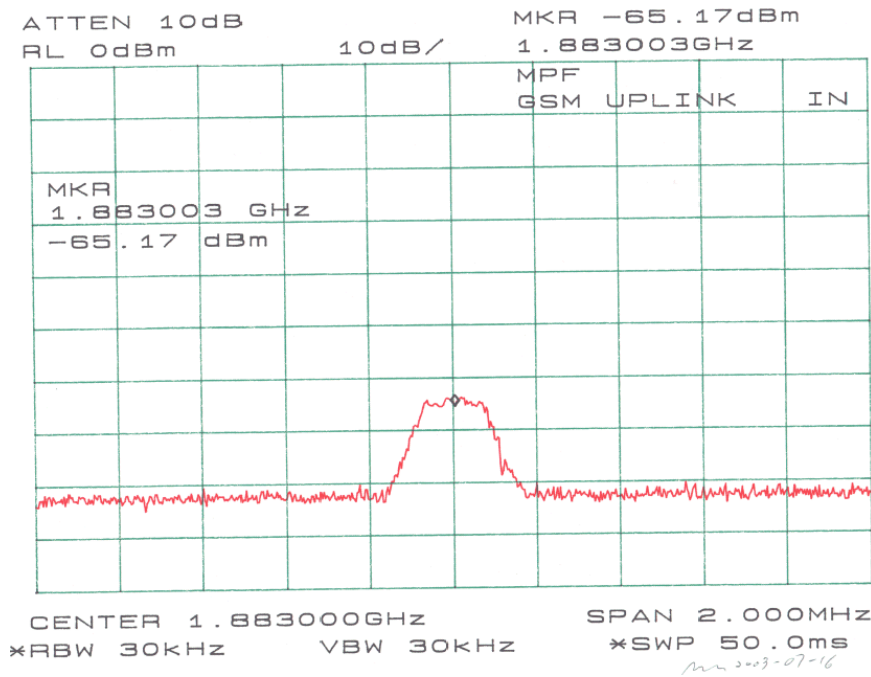


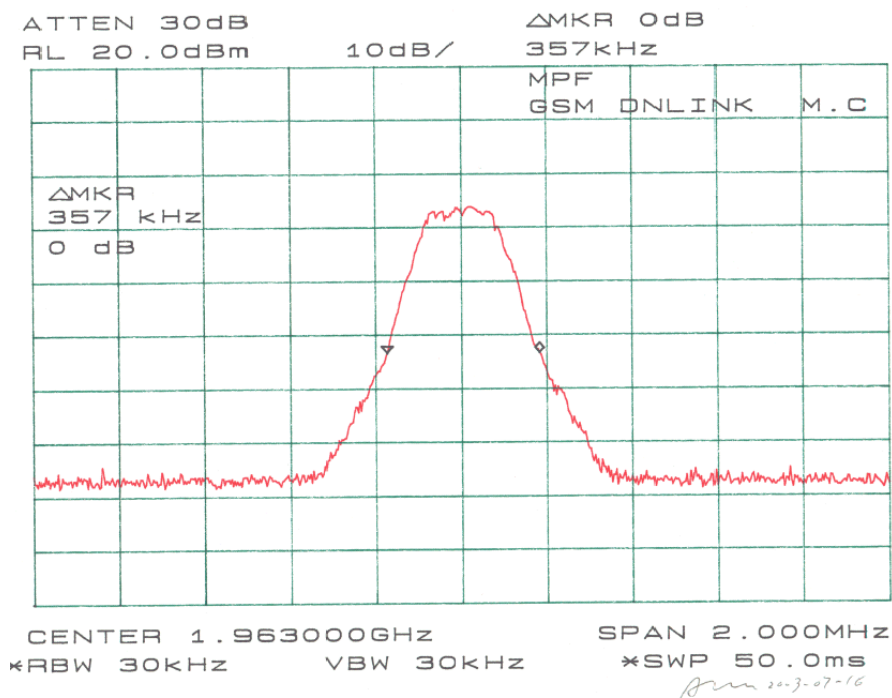
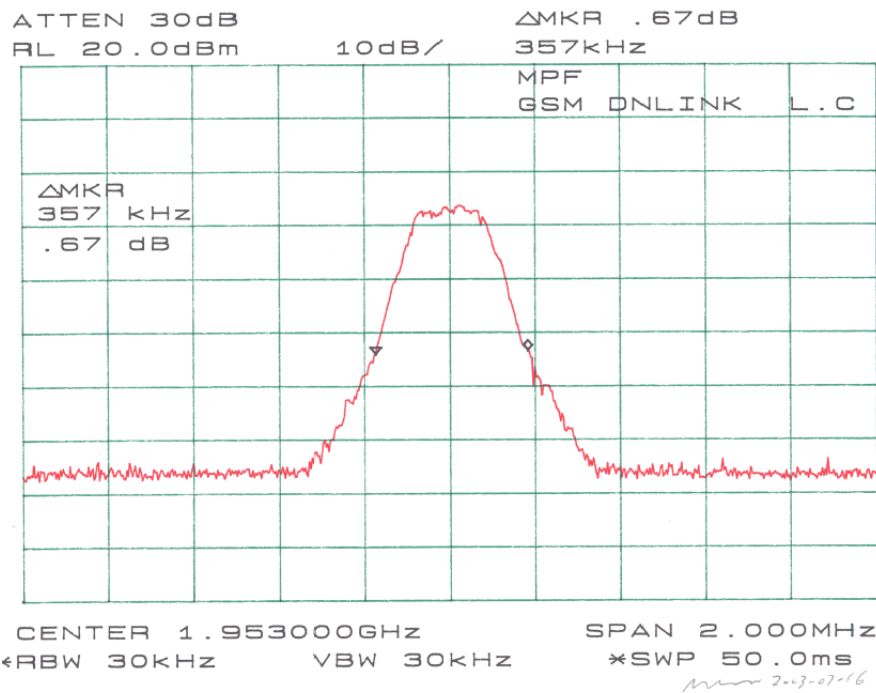


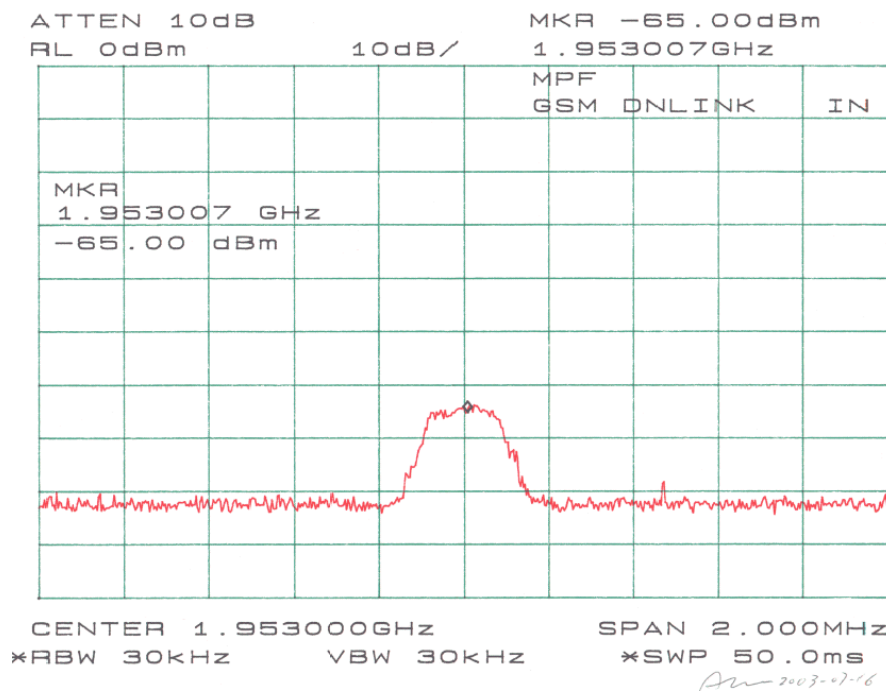
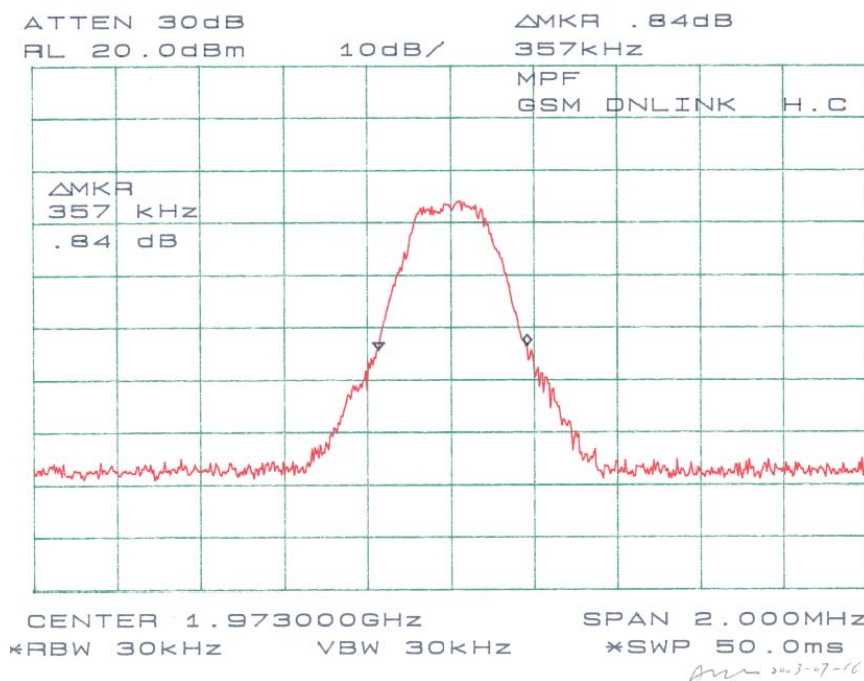


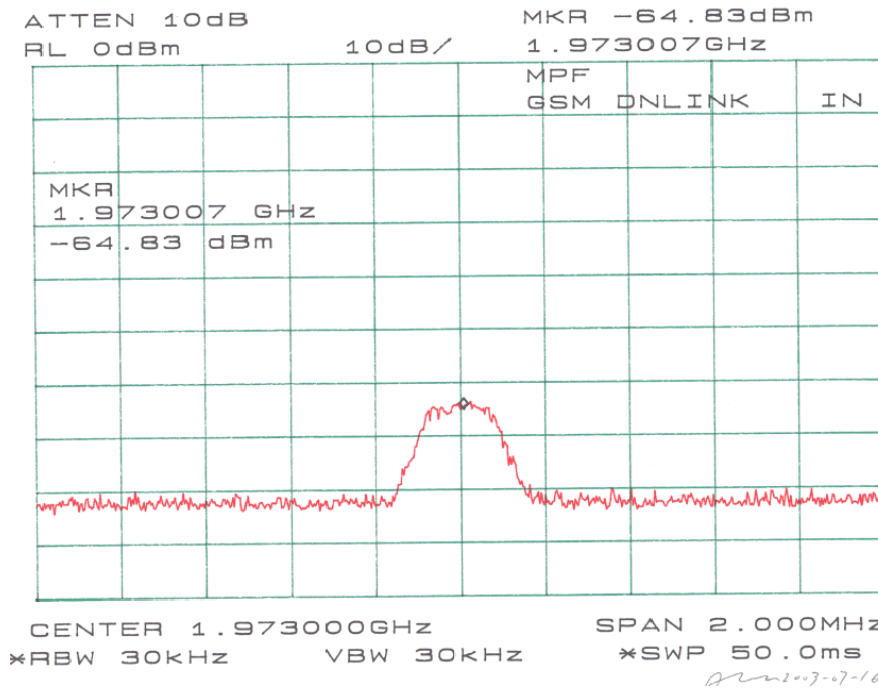
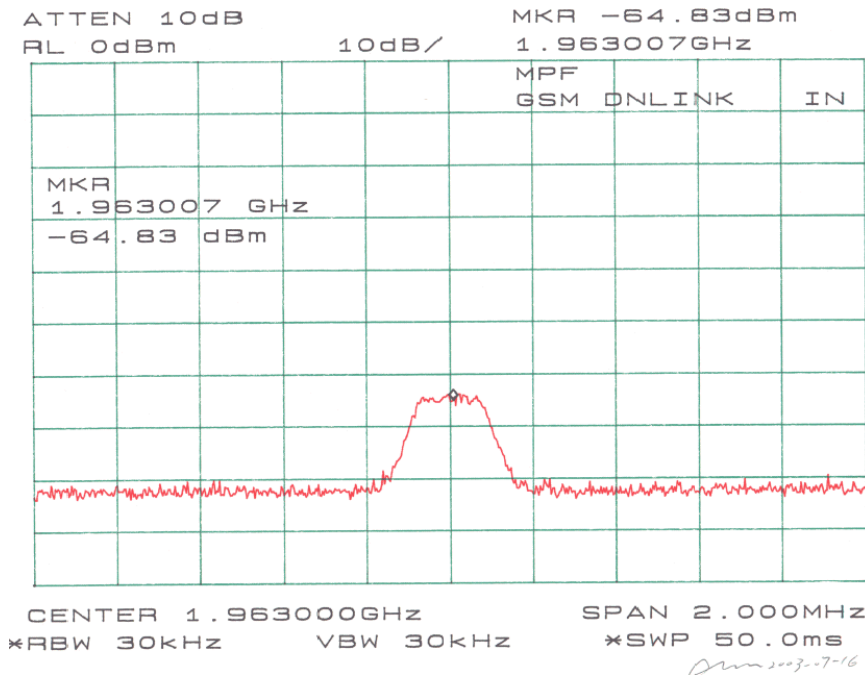


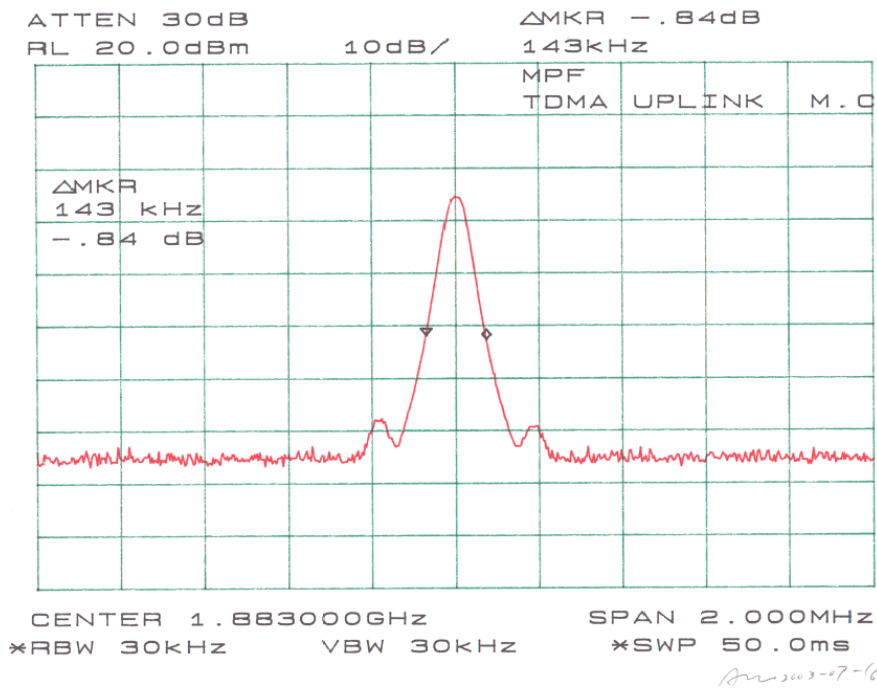
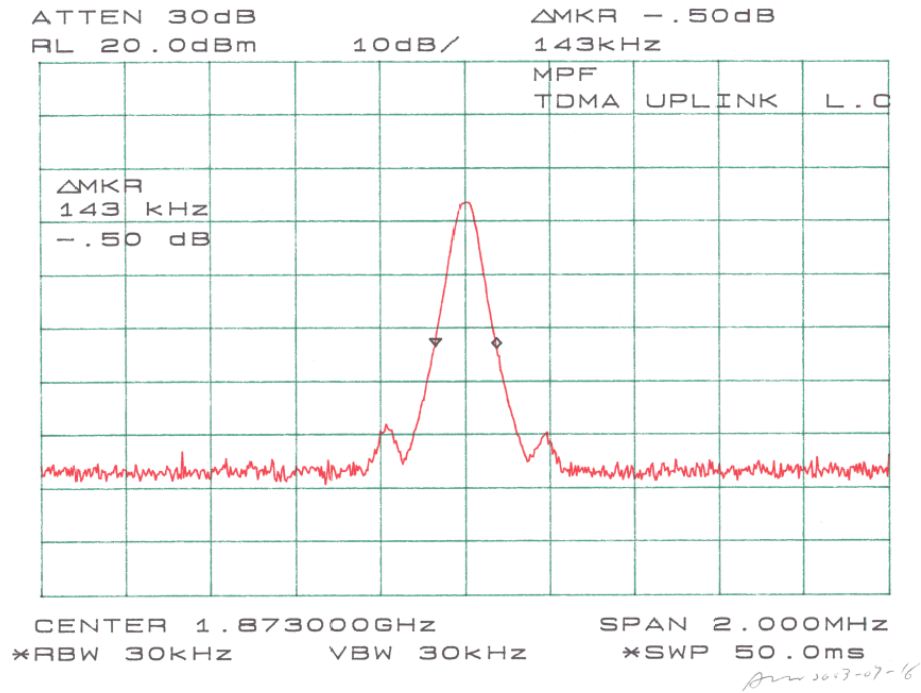


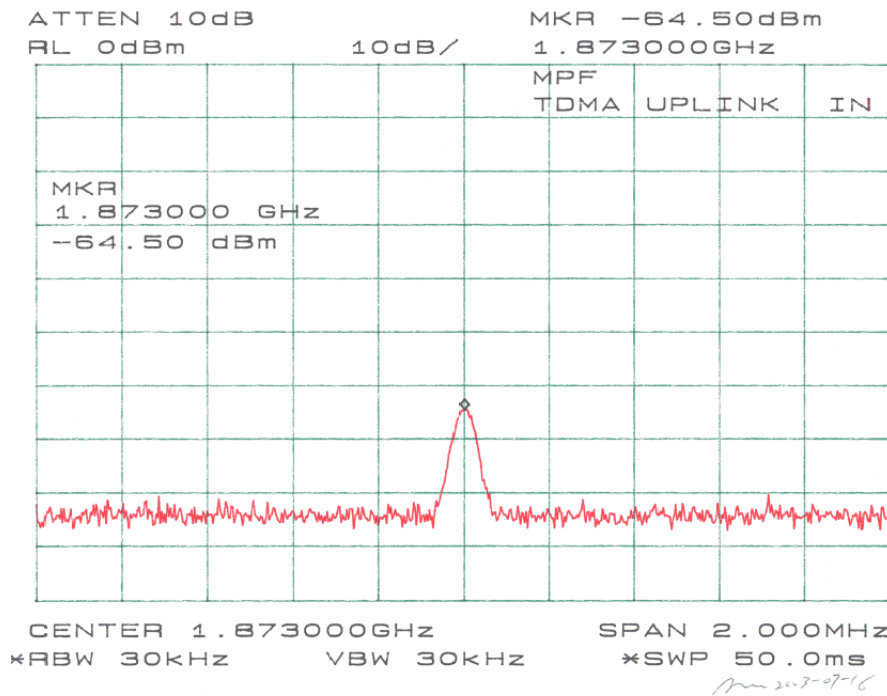
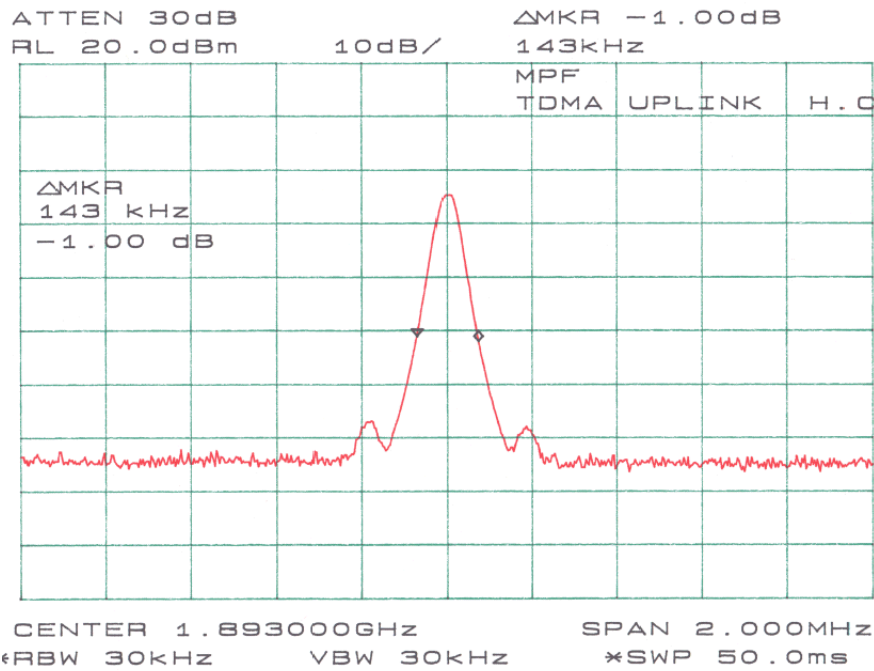


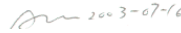


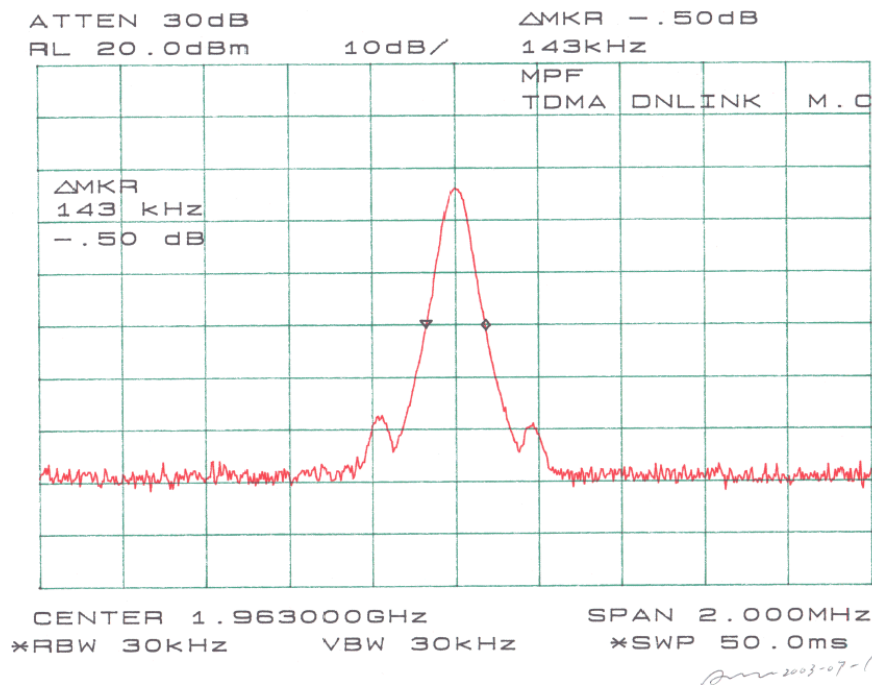
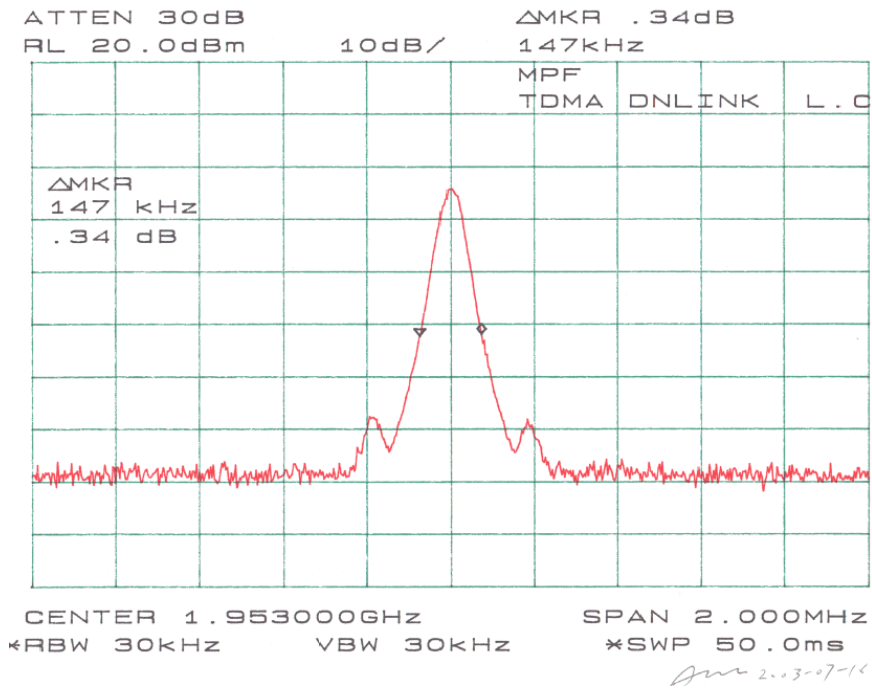


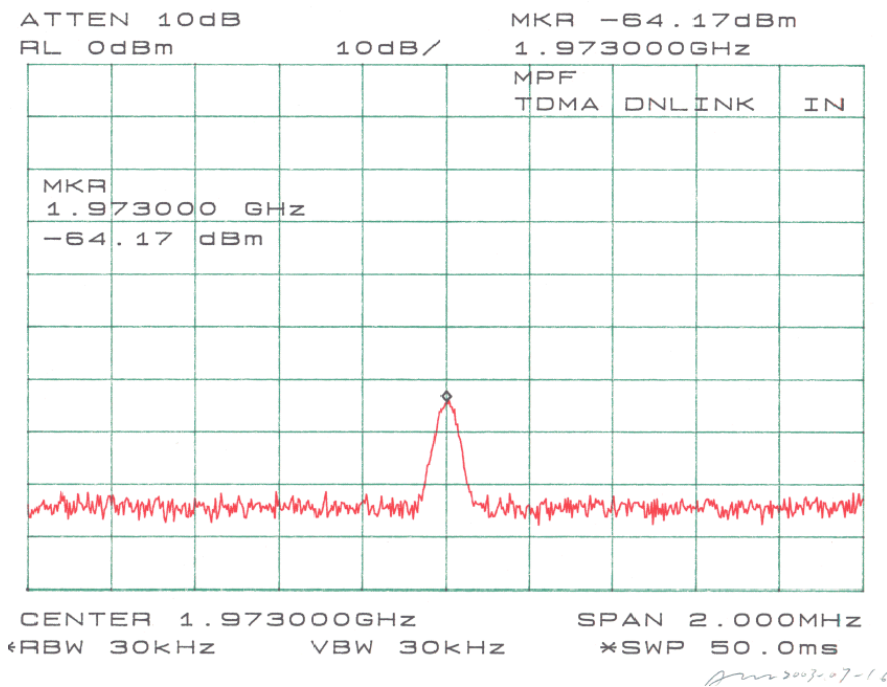
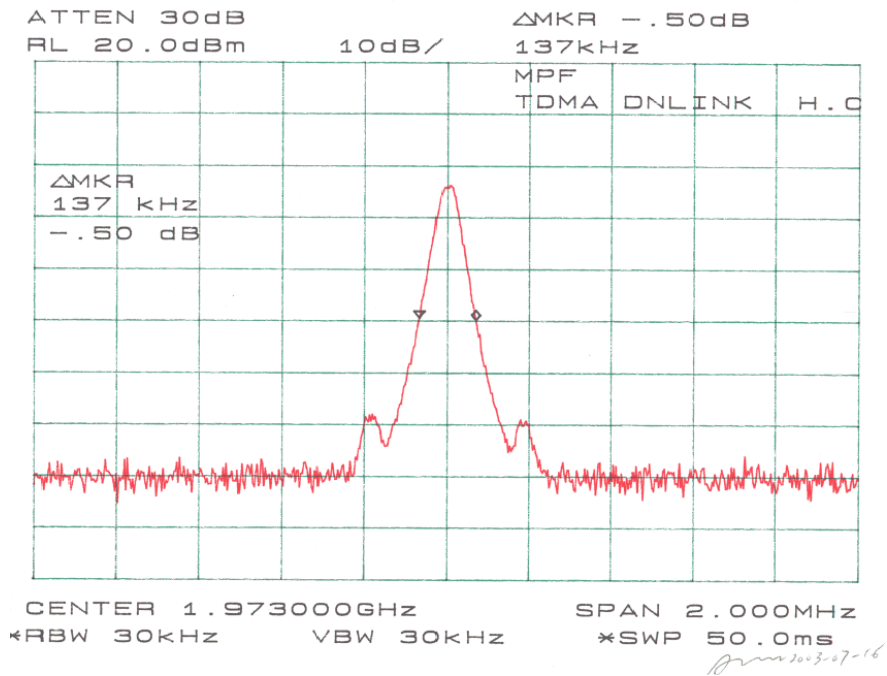


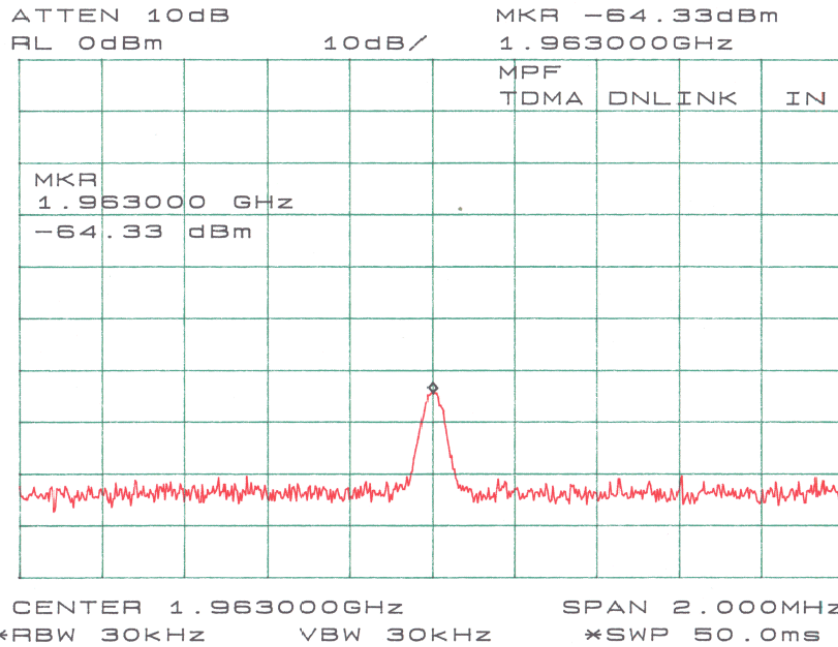
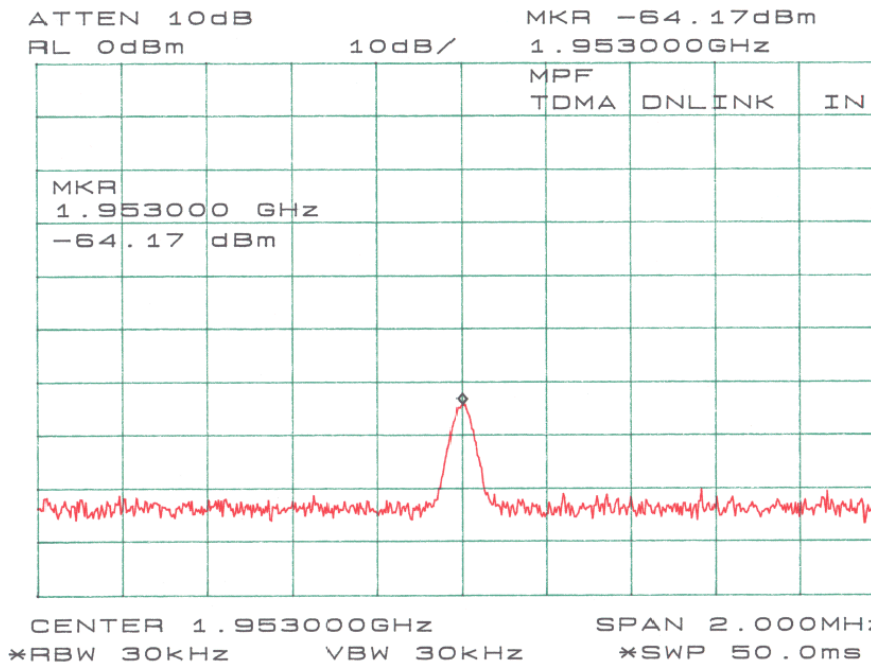










*Am 2003-07-16**Am 2003-07-16*