

## **9 – BAND EDGE TEST**

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### **9.1 Applicable Standards**

According to FCC §2.1049 and §24.238, when measuring the emission limits, carrier frequency shall be adjusted as close to the frequency block edges, both upper and lower.

### **9.2 Test Procedure**

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. Adjust the carrier frequency as close to the frequency block edges both upper and lower. Sufficient scans were taken to show any out of band-edge emission.

### **9.3 Test Equipment**

HP 8566B Spectrum Analyzer

HP 7470A Plotter

Hewlett Packard HP8566B Spectrum Analyzer

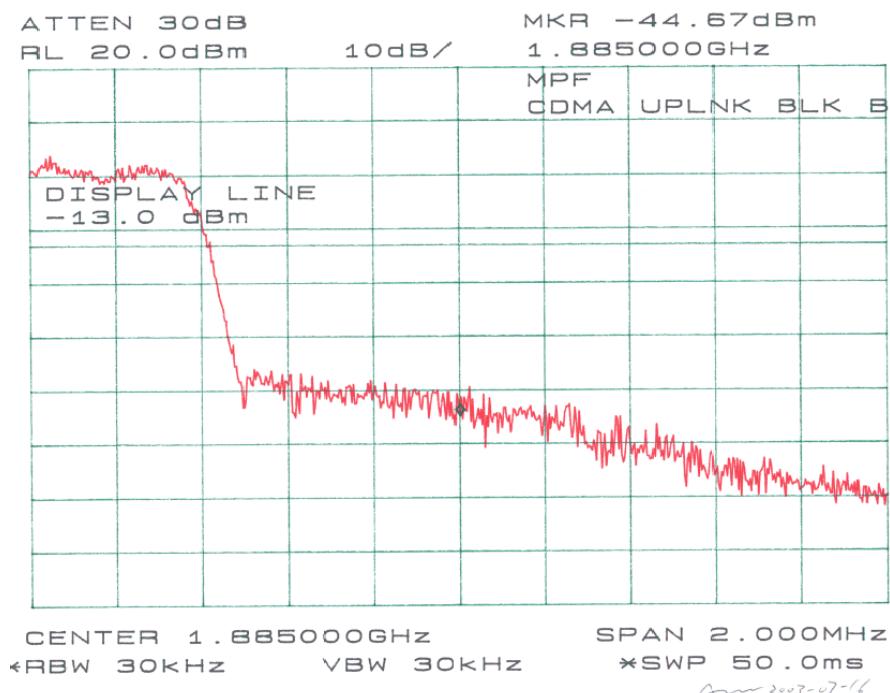
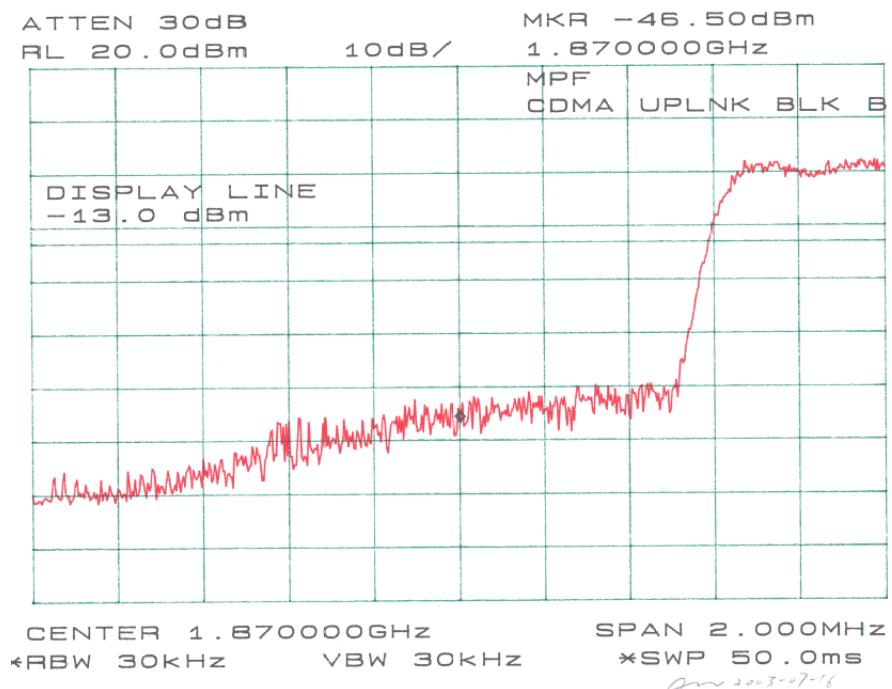
Hewlett Packard HP 7470A Plotter

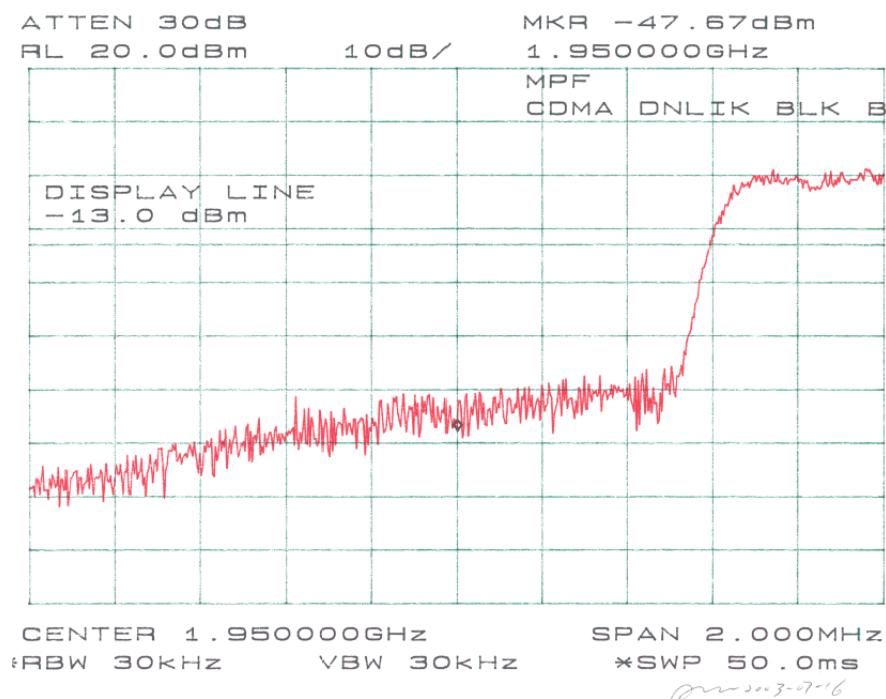
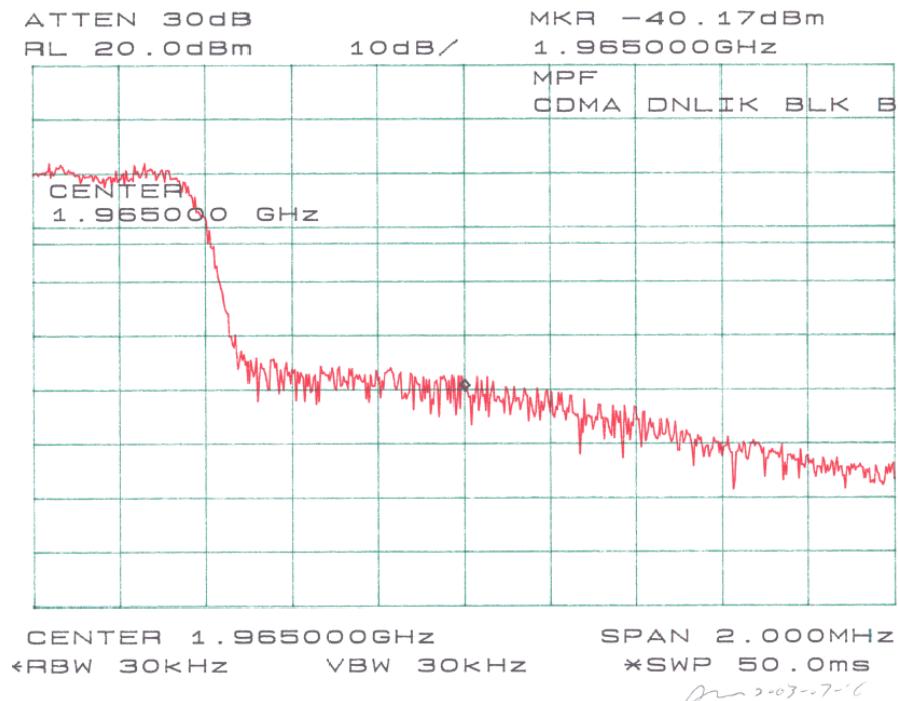
Rohde & Schwarz SMIQ03B Signal Generator

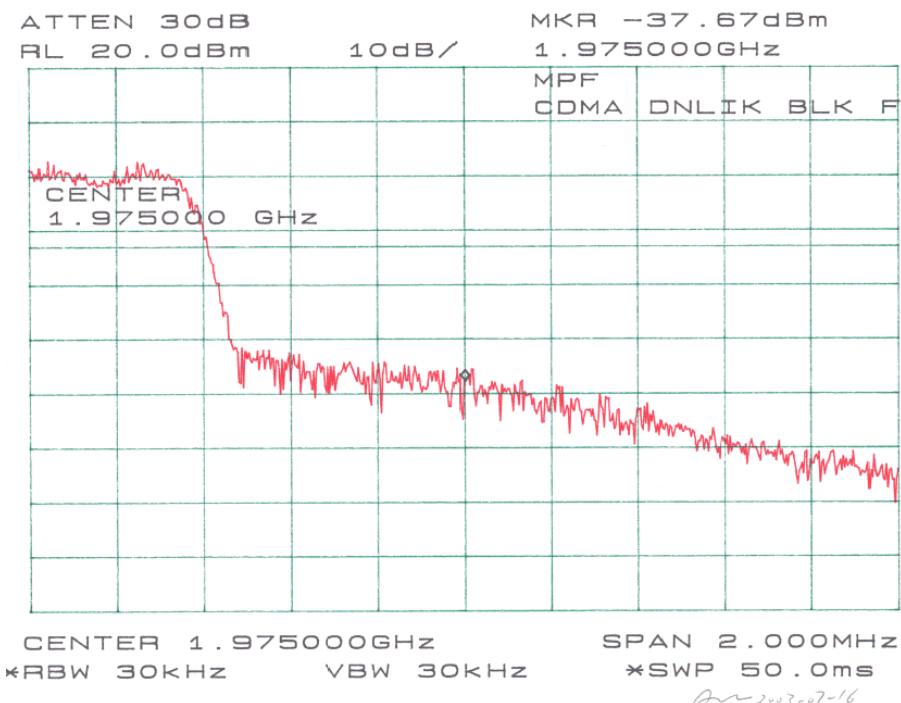
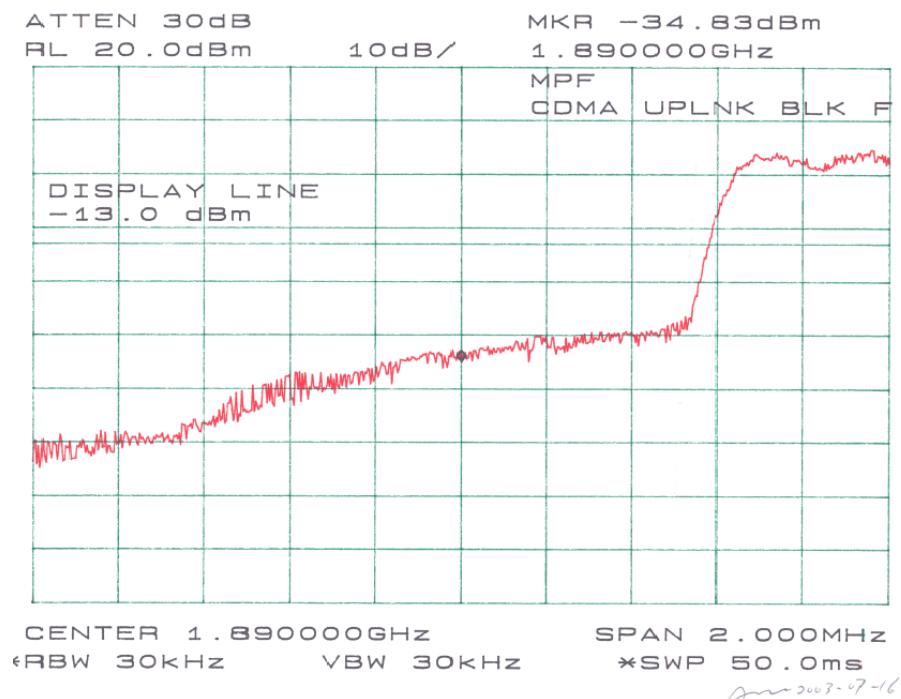
Rohde & Schwarz AMIQ I/Q Modulation Generator

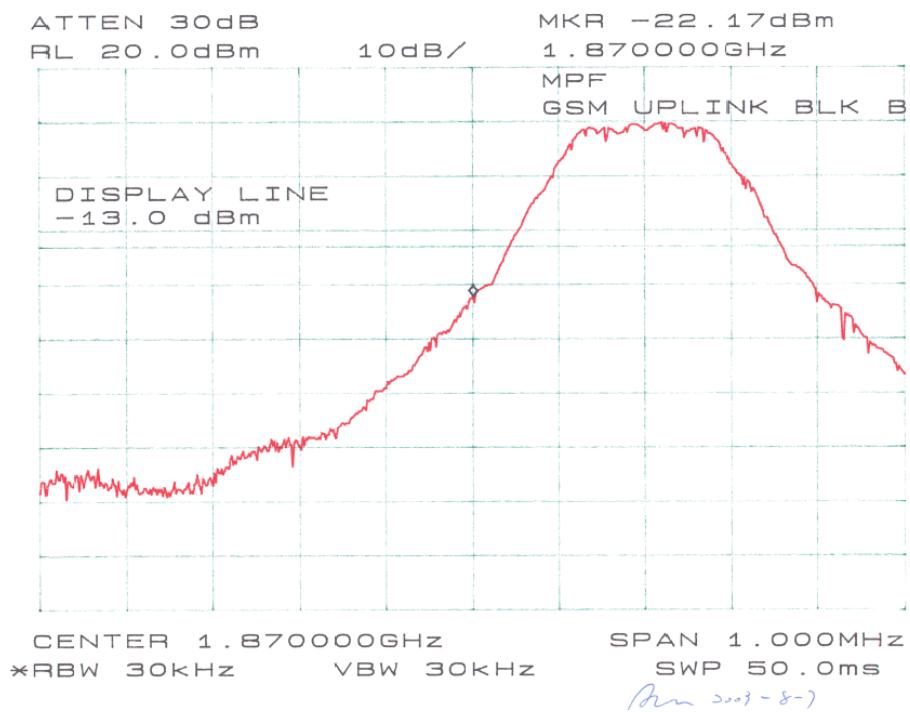
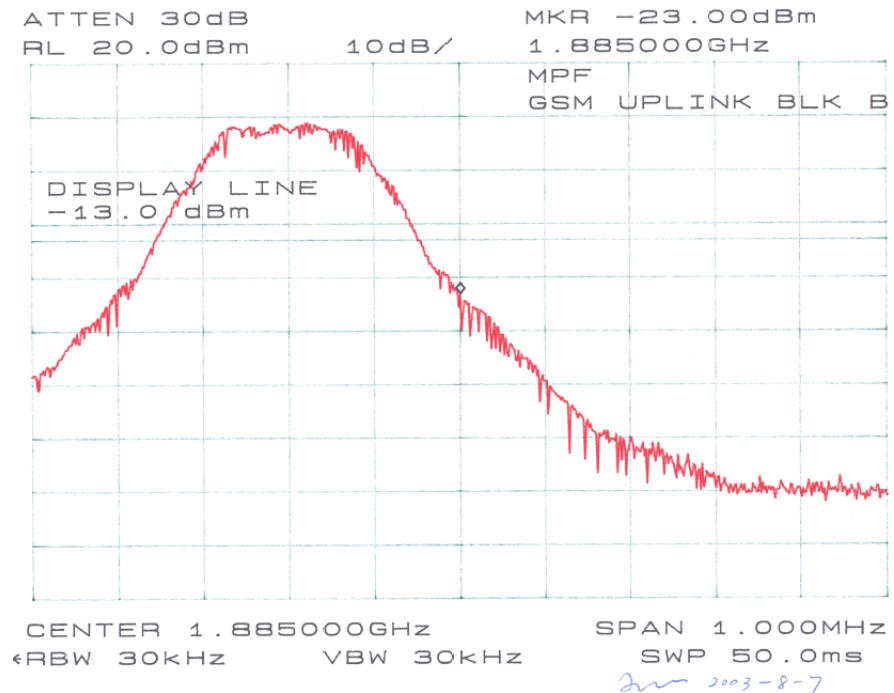
### **9.4 Plots of Out-of-Band-Edge Emissions at Antenna Terminal**

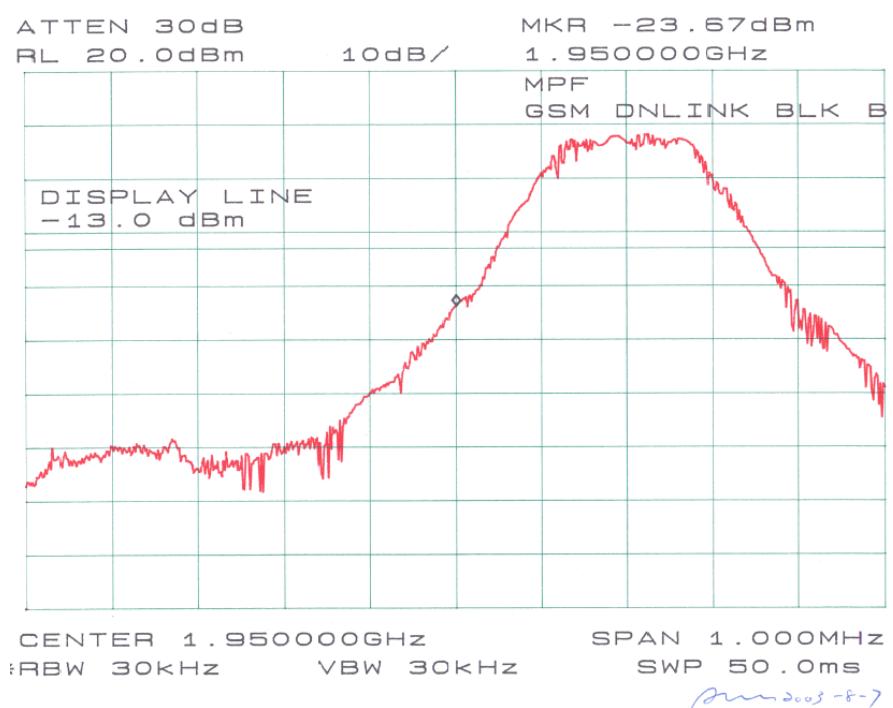
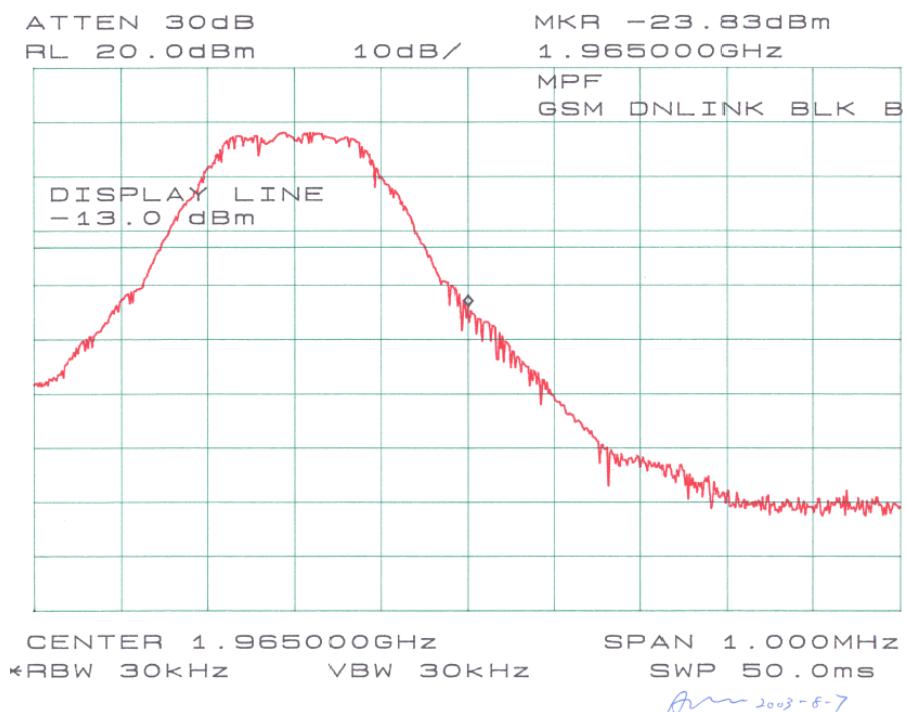
Please refer to plots hereinafter.

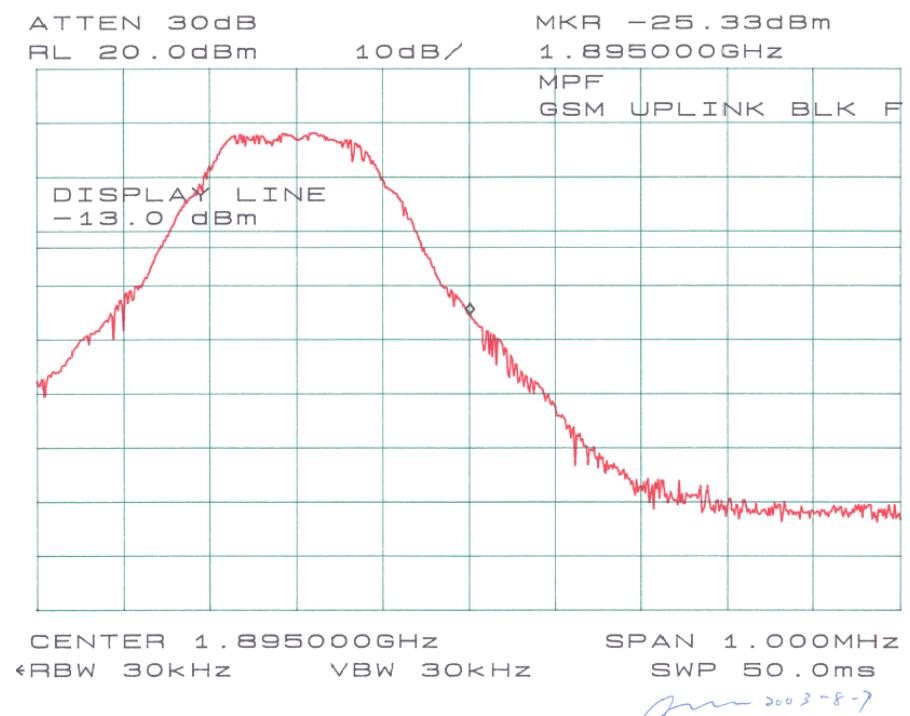
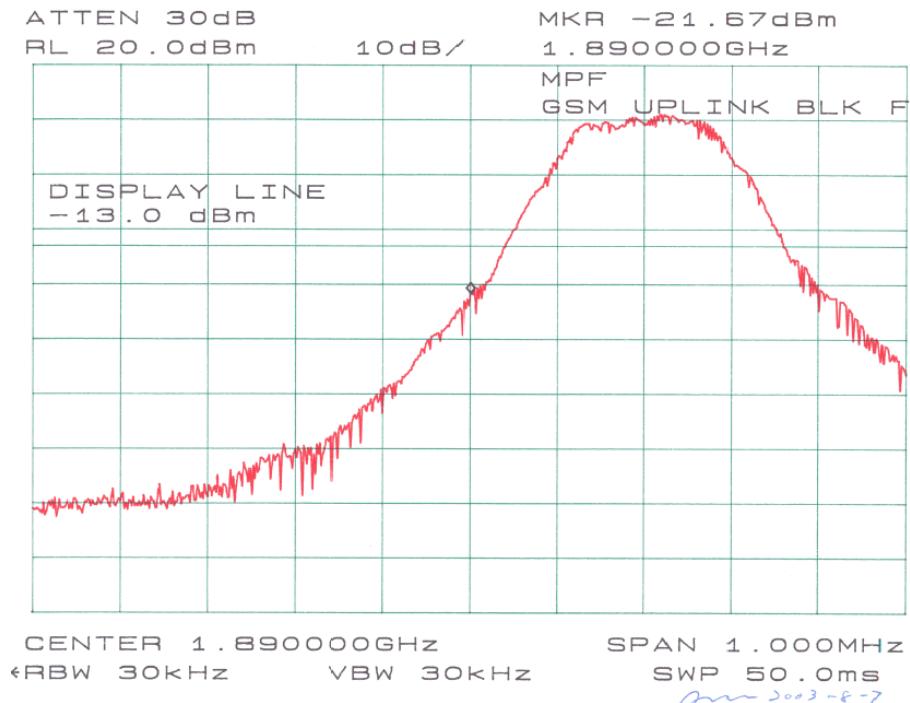


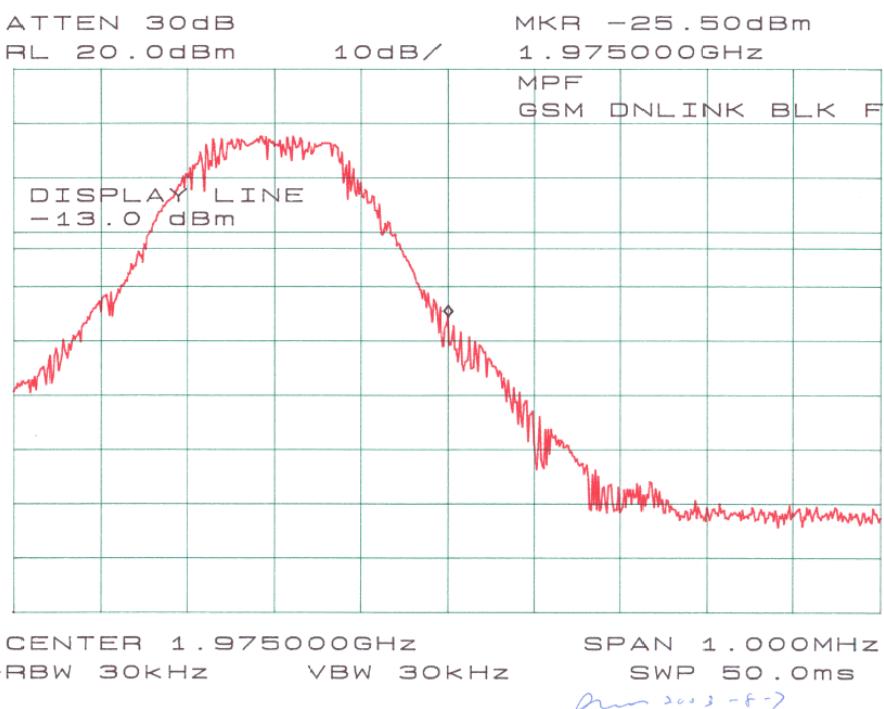
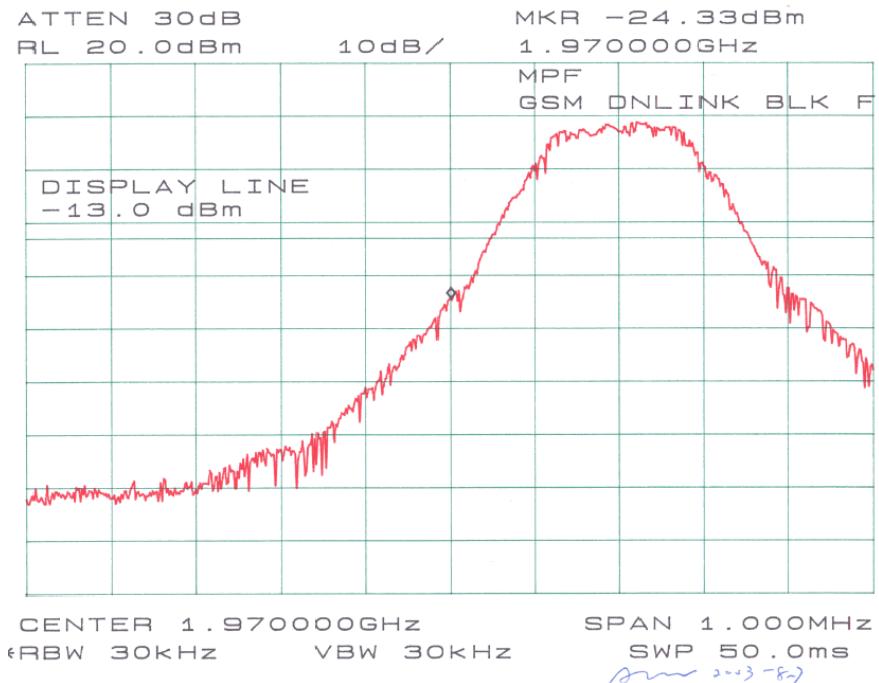


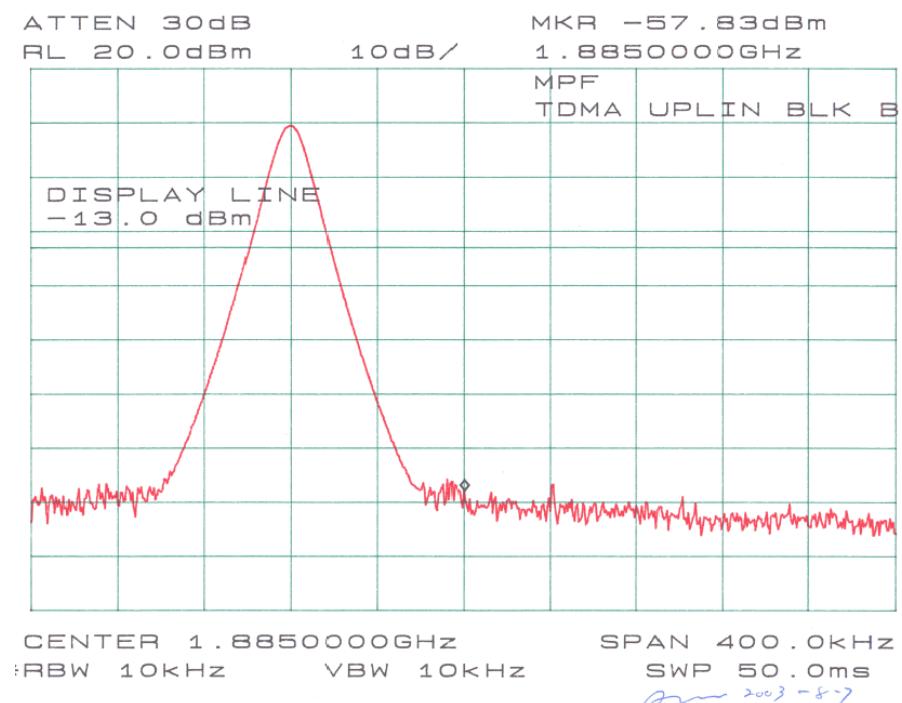
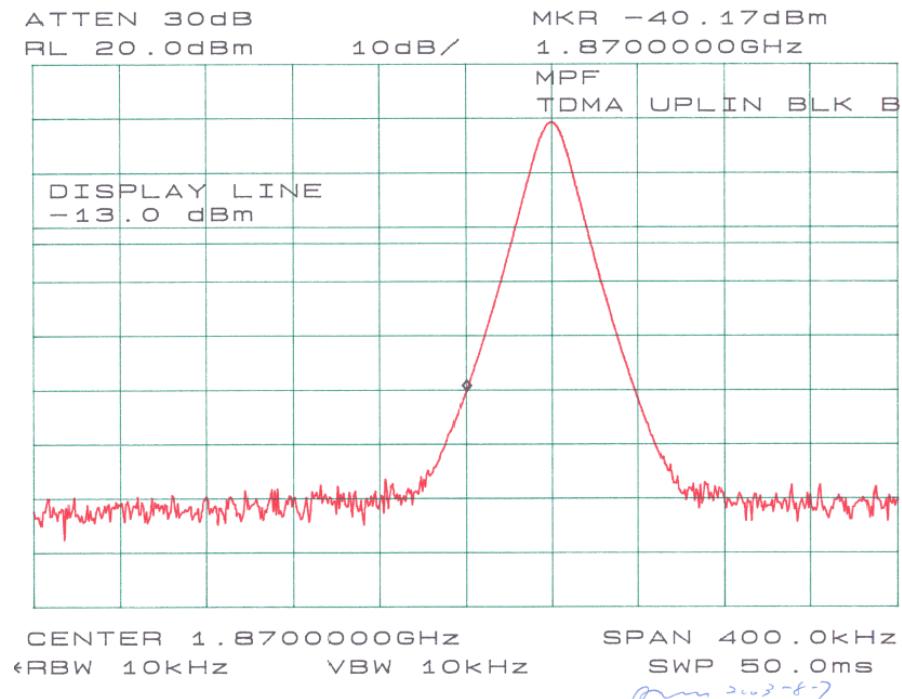


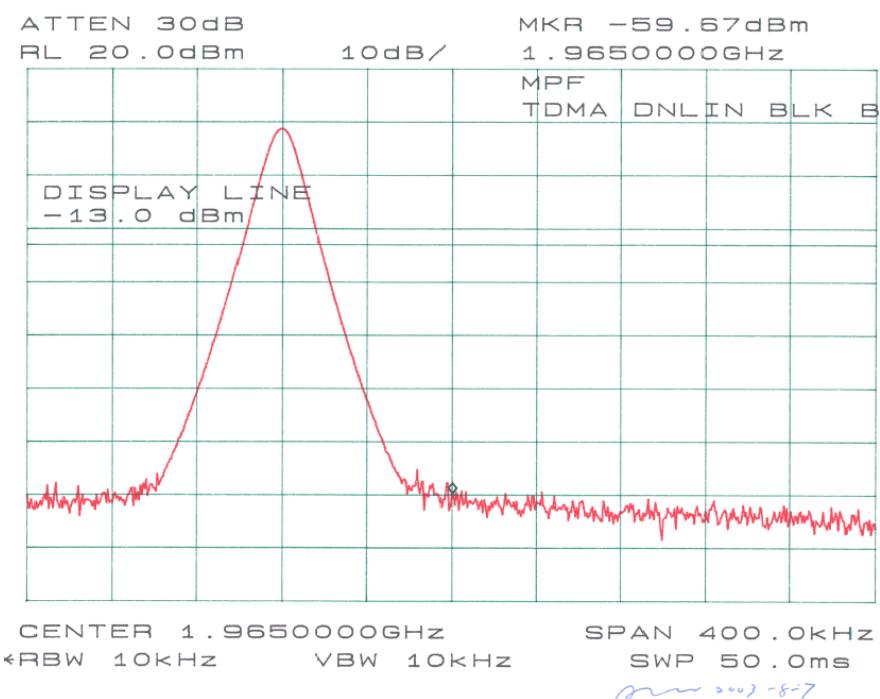
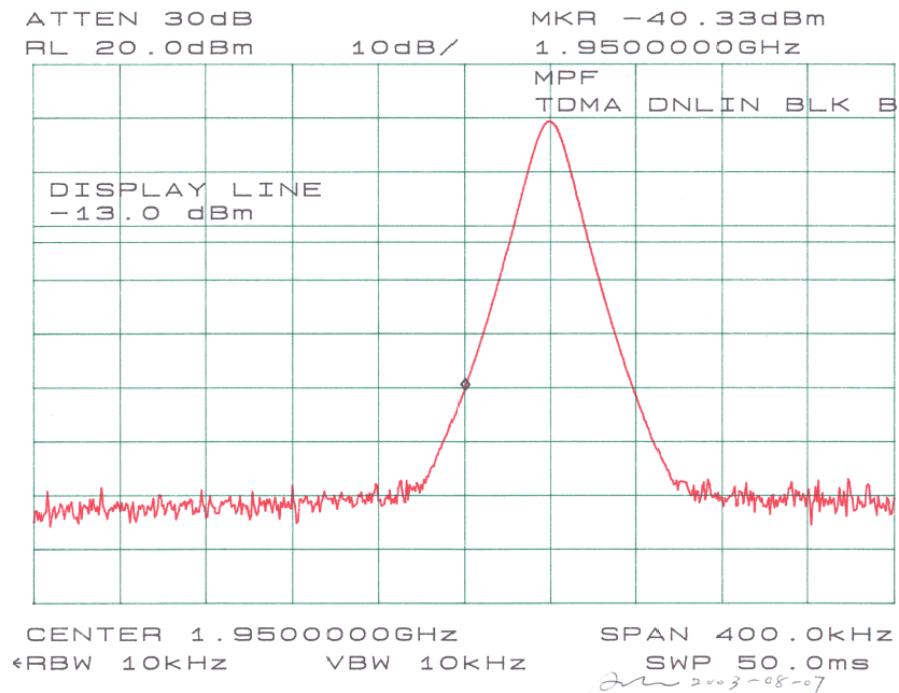


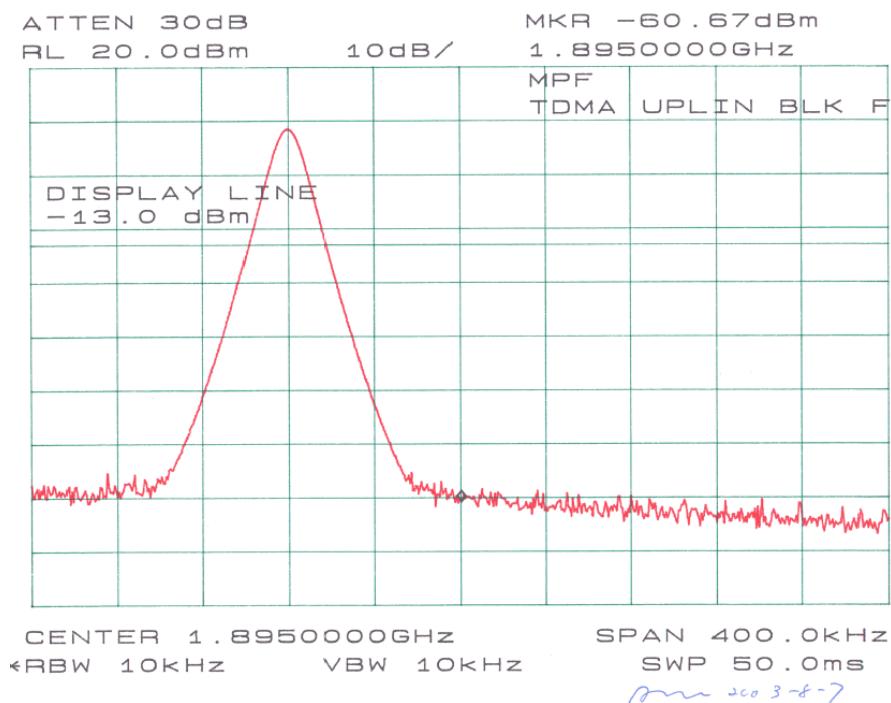
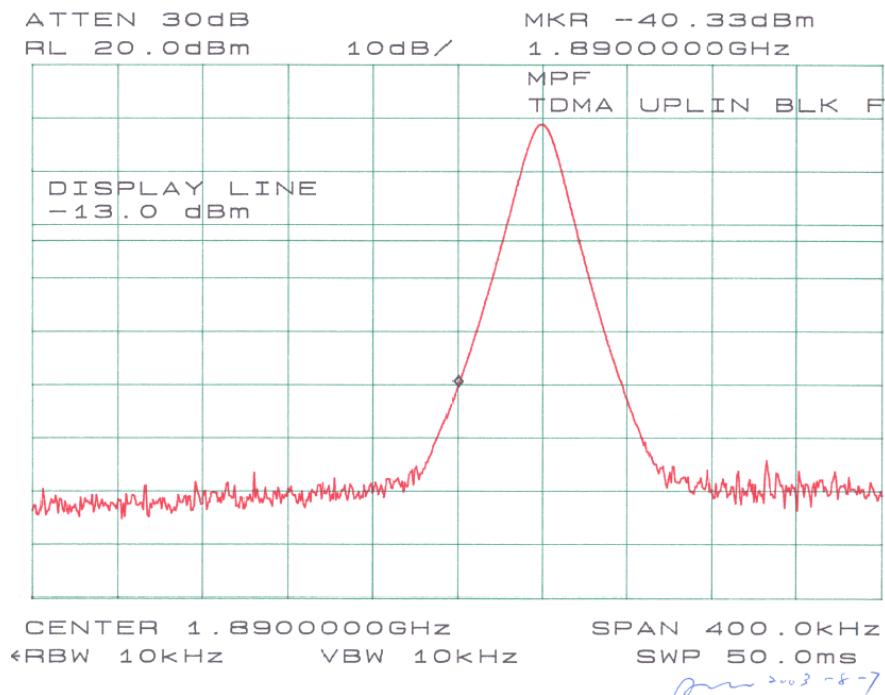


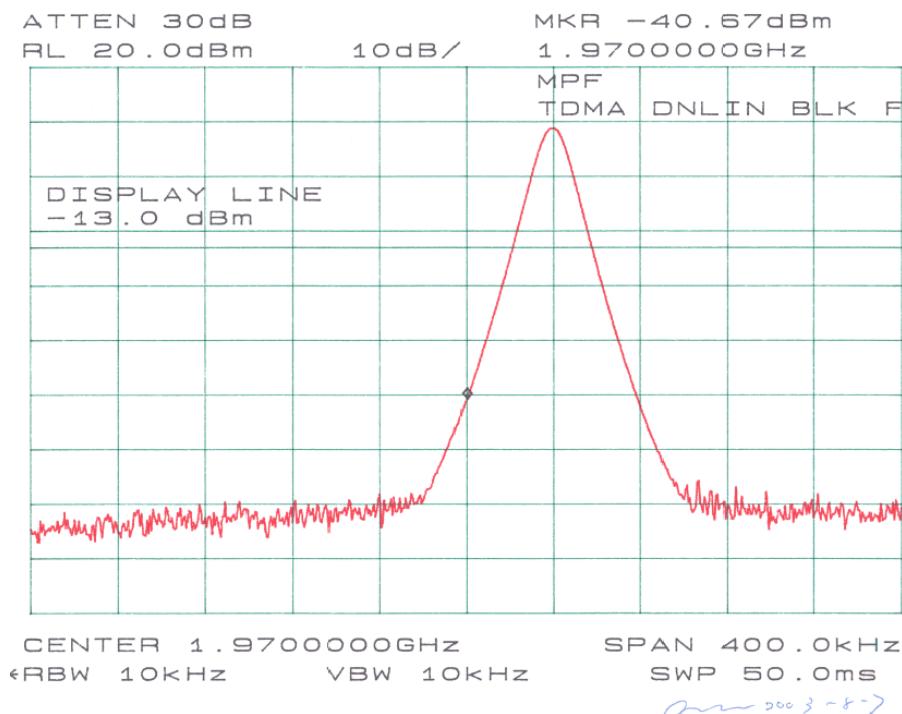
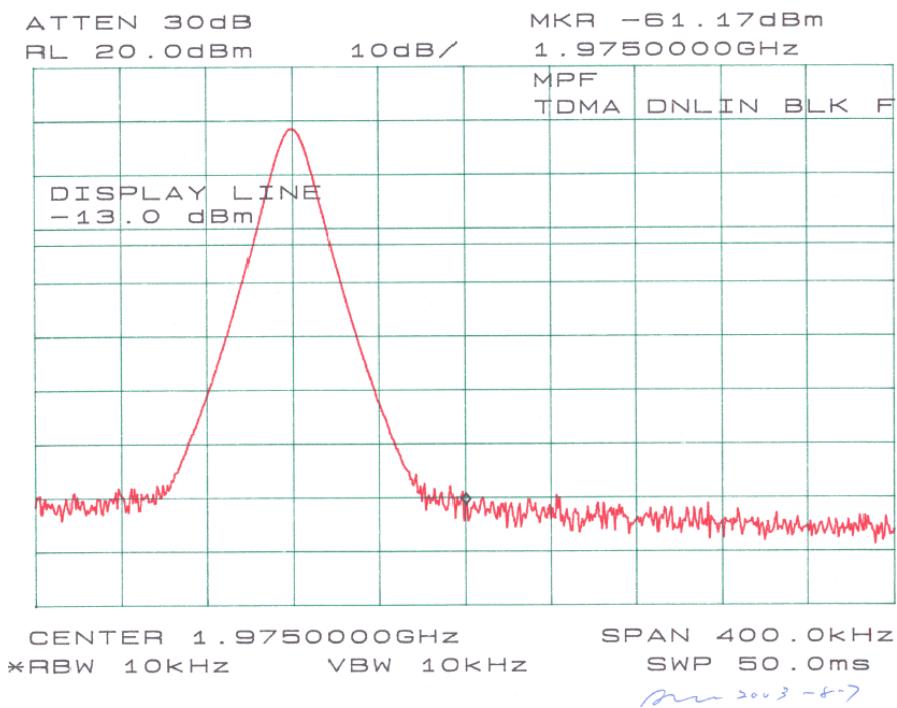


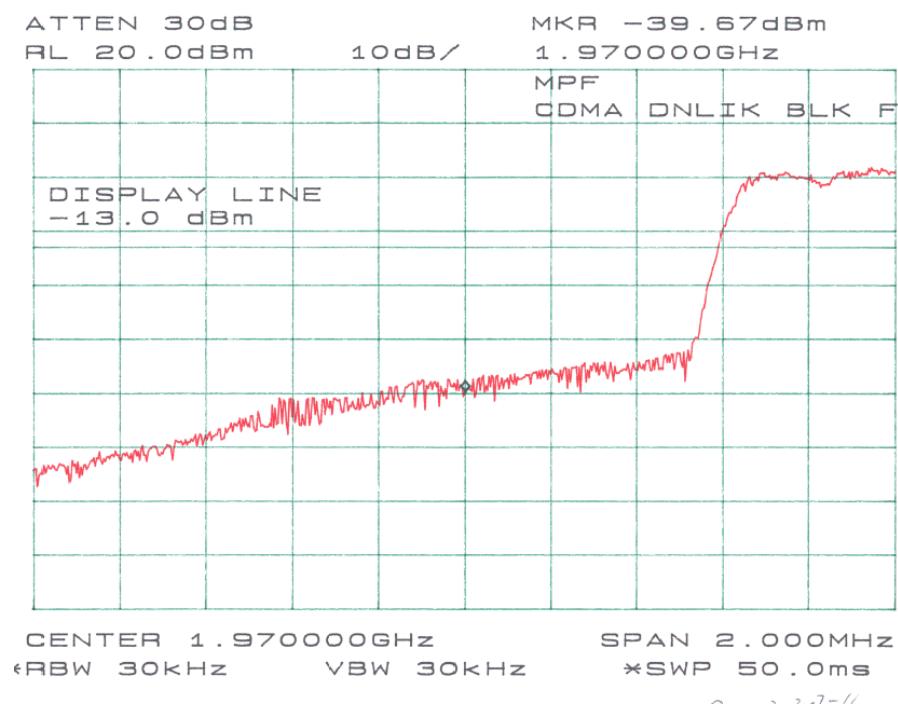
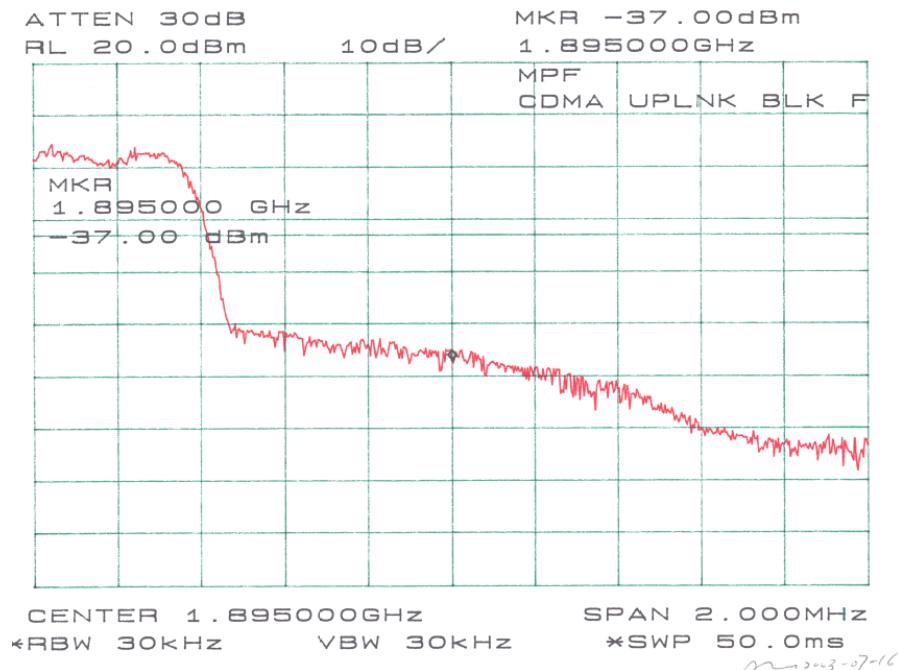












## **10 – Modulation Characteristics**

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This EUT only is an amplifier, it is not a transmitter. There is no modulating circuit in the EUT and no modulating characteristics measurement required.

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## 11 - FREQUENCY STABILITY

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### 11.1 Applicable Standard

Requirements: FCC § 2.1055 (a), § 2.1055 (d) and § 24.235

### 11.2 Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to a frequency counter via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the counter.

Frequency Stability vs. Voltage: An external variable DC power supply was connected to the battery terminals of the equipment under test. The voltage was set to 115% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the battery end point. The output frequency was recorded for each battery voltage.

### 11.3 Test Equipment

Temperature Chamber  $-50^{\circ}\text{C}$  to  $+100^{\circ}\text{C}$   
Hewlett Packard 5383A Frequency Counter  
Goldstar DC Power Supply, GR303

## 11.4 Test Results

### Frequency Stability Versus Temperature

Reference Frequency: 1883.00 MHz, Limit: 2.5 ppm			
Environment Temperature (°C)	Power Supplied (Vac)	Frequency Measure with Time Elapsed	
		MCF (MHz)	PPM Error
50	110	1882.9996	-0.2
40	110	1882.9996	-0.2
30	110	1882.9997	-0.16
20	110	1882.9997	-0.16
10	110	1882.9997	-0.16
0	110	1882.9997	-0.16
-10	110	1882.9998	-0.11
-20	110	1882.9998	-0.11
-30	110	1882.9998	-0.11

### Frequency Stability Versus Input Voltage

Power Supplied (Vac)	Reference Frequency: 1883.00 MHz, Limit: 2.5 ppm					
	Frequency Measure with Time Elapsed					
	2 Minutes		5 Minutes		10 Minutes	
Frequency	PPM	Frequency	PPM	Frequency	PPM	PPM
126.5	1882.9997	-0.16	1882.9997	-0.16	1882.9998	-0.11
110	1882.9997	-0.16	1882.9997	-0.16	1882.9997	-0.16
93.5	1882.9997	-0.16	1882.9997	-0.16	1882.9996	-0.2

Conclusion: The EUT complied with the applicable Frequency Stability Limits.

## 12 - CONDUCTED EMISSION

### 12.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at BACL is  $\pm 2.4$  dB.

### 12.2 EUT Setup

The measurement was performed at the test site, using the same setup per ANSI C63.4-1992 measurement procedure. The specification used was with FCC 15.207 limits.

### 12.3 Spectrum Analyzer Setup

The spectrum analyzer was set with the following configurations during the conduction test:

Start Frequency.....	150 kHz
Stop Frequency.....	30 MHz
Sweep Speed.....	Auto
IF Bandwidth.....	10 kHz
Video Bandwidth.....	10 kHz
Quasi-Peak Adapter Bandwidth .....	9 kHz
Quasi-Peak Adapter Mode.....	Normal

### 12.4 Test Procedure

During the conducted emission test, the power cord of the host system was connected to the auxiliary outlet of the first LISN.

Maximizing procedure was performed on the six (6) highest emissions of each modes tested to ensure EUT is compliant with all installation combination.

All data was recorded in the peak detection mode. Quasi-peak readings were only performed when an emission was found to be marginal (within specified limits of  $-4$  dB $\mu$ V). Quasi-peak readings are distinguished with a "Qp".

## 12.5 Summary of Test Results

According to the data in section 12.6, the EUT complied with the FCC Conducted margin for a Class B device and these test results is deemed satisfactory evidence of compliance with ICES-003 of the Canadian Interference-Causing Equipment Regulations, with the *worst* margin reading of:

-10.2 dB at 0.2 MHz in the Neutral mode.

## 12.6 Conducted Emissions Test Data

LINE CONDUCTED EMISSIONS				FCC CLASS B	
Frequency MHz	Amplitude dB $\mu$ V	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dB $\mu$ V	Margin dB
0.2	42.8	AVE	Neutral	53	-10.2
0.2	52.5	QP	Neutral	63	-10.5
0.2	35.8	AVE	Line	53	-17.2
0.2	44	QP	Line	63	-19
26.3	27.4	AVE	Neutral	50	-22.6
5.31	26.7	AVE	Line	50	-23.3
26.3	33.6	QP	Neutral	60	-26.4
5.31	32.5	QP	Line	60	-27.5
0.15	34.5	QP	Neutral	66	-31.5
0.15	28.4	QP	Line	66	-37.6
0.15	11.2	AVE	Neutral	56	-44.8
0.15	5.7	AVE	Line	56	-50.3

## 12.7 Plot of Conducted Emissions Test Data

Plot(s) of Conducted Emissions Test Data is presented as reference.

**Say Area Compliance Laboratory Corp**  
**CLASS B**

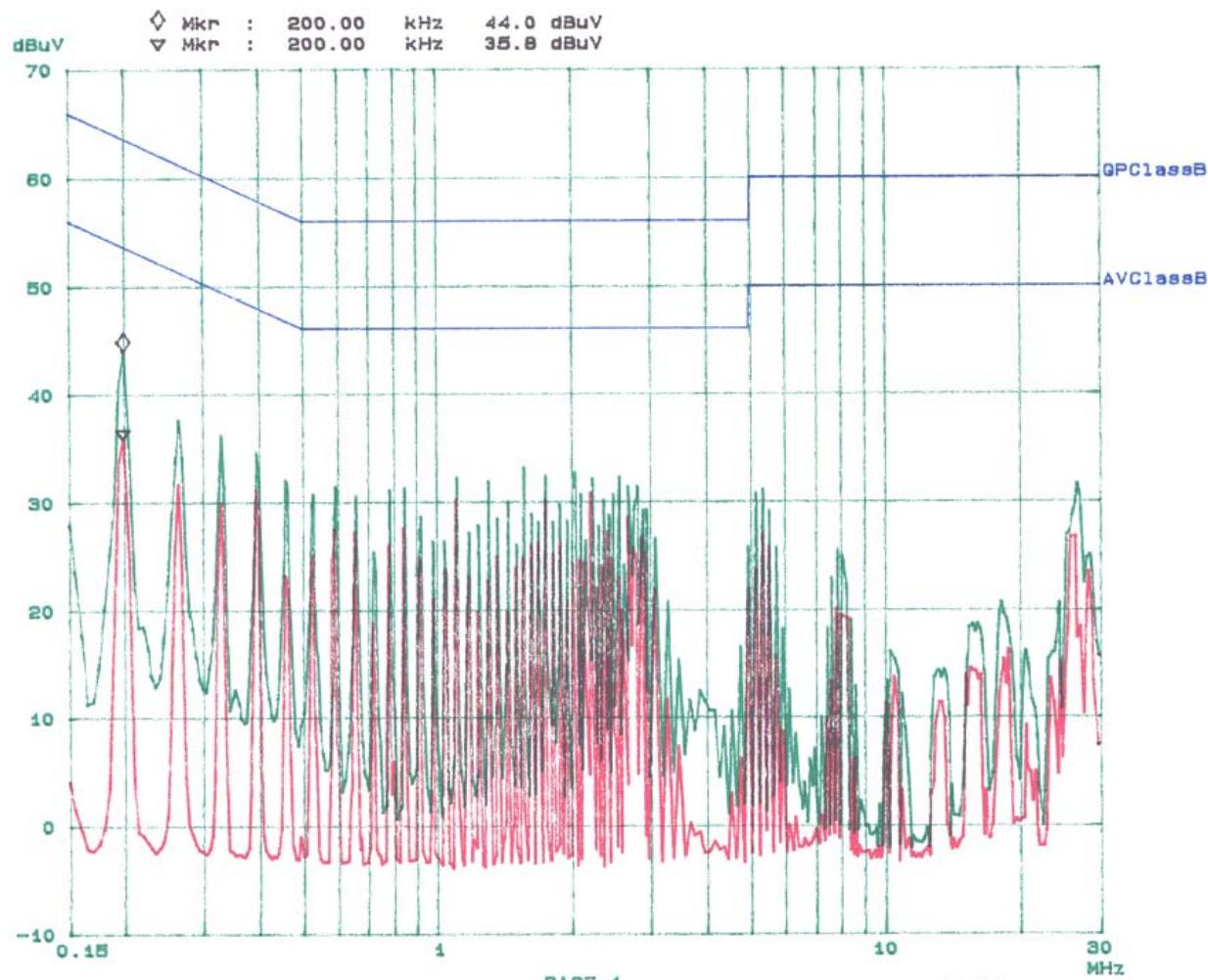
18. Jul 03 16:12

EUT: MPF Repeater  
 Manuf: MPF  
 Op Cond: Normal  
 Operator: Benjamin  
 Comment: L  
 File name:

## Scan Settings (3 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	H-Time	Atten	Preamp
150k	1M	5k	9k	QP+AV	20ms	10dBBLN	OFF
1M	3M	10k	9k	QP+AV	1ms	10dBBLN	OFF
3M	30M	100k	9k	QP+AV	1ms	10dBBLN	OFF

Final Measurement: x QP / + AV  
 Meas Time: 1 s  
 Subranges: 25  
 Acc Margin: 6dB



Bay Area Compliance Laboratory Corp  
CLASS B

18. Jul 03 15:50

EUT: MPF Repeater  
Manuf: MPF  
Op Cond: Normal  
Operator: Benjamin  
Comment: N  
File name:

## Scan Settings (3 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	1M	5k	9k	QP+AV	20ms	10dBLN	OFF
1M	3M	10k	9k	QP+AV	1ms	10dBLN	OFF
3M	30M	100k	9k	QP+AV	1ms	10dBLN	OFF

Final Measurement: x QP / + AV

Meas Time: 1 s  
Subranges: 28  
Acc Margin: 6dB

