On August 8-10, 2001, we tested the MCPA Power Amplifier, ITS project #3004587 to determine if it met the requirements for amplifiers of FCC Part 22 Subpart H.

The equipment under test is:
Multi-Carrier Power Amplifier Sub-system,
Product Number: KRB 101 1108.
Multi-Carrier Power Amplifier Module,
Product Number: 1/ KRB 101 1108.
4 Module Sub-rack.
Product Number: BFL 119 97/1

Installation and Operating Instructions:
The product is a Multi-Carrier Feed Forward Power Amplifier **(MCPA**) designed for cellular base station application. It is entirely solid-state and is powered by an external 27VDC power supply. The **MCPA** when installed in a Sub-rack becomes a Multi-Carrier Power Amplifier Sub-system. A complete technical description is provided in the Manuals, and Detailed Circuit Diagrams.

Emissions Types:
AMPS F8W (conventional AMPS)
AMPS F1D (wideband data conventional AMPS)
TDMA DXW
CDMA F9W

Frequency range: 869-894

Range of operating power:
The **Multi-Channel Power Amplifier (MCPA)** module has a fixed gain of **69.5** dB. The output power is dependent on the applied input power. Under normal operating conditions, the **MCPA** maximum average output power of **120 watts** is not exceeded. The **MCPA** dynamic range is 20 db.
The **Sub-system** which comprises of a **Sub-rack** and one to four MCPA's modules. The output power is dependent on the applied input power. Under normal operating conditions, the maximum average output power of **400** watts is not exceeded.

Maximum RF output power:
The maximum RF power rating of the **MCPA** module is 120 watts average standalone.
The maximum RF power rating of the **Sub-assembly** is 400 Watts average.

DC Voltage & Current. (At maximum RF Power)

MCPA Module	Voltage: 26 to 28 Volts.	
	Current: 55 Amps Typical	58 Amps Max.
Sub-assembly	Voltage: 26 to 28 Volts.	
	Current: 222 Amps Typical	234 Amps Max.

Tune –Up Procedure.
The unit is tuned to specification at the factory. There are no user adjustments or tune-up procedures associated with the amplifier. When the amplifier is properly installed in a radio base station (as shown in Fig 1: MCPA environment) the Cellular Radio Exchange (CRE) will supervise and control the output power per carrier. If a fault condition should arise in the amplifier, this is signalled to the CRE. In case of a major fault the amplifier is automatically shutdown.

Description of Frequency Determining/Stabilizing Circuits and Devices.
Description of Circuits Suppressing Spurious & Limiting Power.
The power amplifier does not affect the frequency characteristics of the signals that it amplifies. The unit is a solid –state linear power amplifier; no special or unusual circuitry is utilized to suppress spurious radiation, limit modulation or limit power.

The intended FCC ID is: QANKRB1011108

Manufacturer:
Ericsson Amplifier Technologies
49 Wireless Blvd.
Hauppauge, NY 11788-3935

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Following are the results of testing.

RF Power Output - Passed

The amplifier was operated in a typical fashion. The ouput of the EUT was connected through a 40 dB attenuator to an average power meter. Measurements of the EUT output power under various types of modulation were made. These measurements were used elsewhere in testing. It was found that the EUT maintained an approximately 100W output using any modulation scheme. Readings were made at the low, middle, and high frequencies in the passband. The low channel was 869 MHz, the middle channel was 881 MHz, and the high channel was 894 MHz.

Channel	TDMA	CDMA	AMPS (audio)	AMPS (audio & data)
Low	50.07 dBm	50.06 dBm	49.95 dBm	50.07 dBm
Mid	50.11 dBm	50.12 dBm	50.01 dBm	50.04 dBm
High	50.13 dBm	50.05 dBm	50.08 dBm	50.09 dBm

Test Equipment

Name	Brand	Model #:	Serial #:	Cal. Due Date:
Average Power Meter	Boonton	4232a	55601	12/20/01
Attenuator, 40 dB	Weinschel	45-40-43	LF899	Cal Verified

Occupied Bandwidth - Passed

The amplifier was operated in a typical fashion. The output was connected to a spectrum analyzer through a 40 dB attenuator, and measurements were made of the signal 99% bandwidth. The requirement is that the output from the amplifier does not have larger bandwidth than the input signal.

Modulation	CDMA		TDMA		AMPs (audio)		AMPS (audio and data)	
Channel	Input	Output	Input	Output	Input	Output	Input	Output
Low	1.26 MHz	1.26 MHz	28 kHz	28 kHz	16.5 kHz	16.5 kHz	44.5 kHz	44 kHz
Mid	1.27 MHz	1.27 MHz	28 kHz	28 kHz	16.5 kHz	16.5 kHz	44 kHz	43.5 kHz
High	1.265 MHz	1.265 MHz	28 kHz	28 kHz	16.5 kHz	16.5 kHz	44 kHz	44 kHz

Test Equipment:

Name	Brand	Model #:	Serial #:	Cal. Due Date:
High Frequency Cable	Sucoflex	104PEA	CBLSHF203	2/21/02
Signal Generator	HP	E4433B	US38440733	7/8/03
RF Filter	HP	85420E	3427A00177	1/22/02
EMI Receiver Set W/RF Filter	HP	85422E	3625A00188	1/22/02
Attenuator, 40 dB	Weinschel	45-40-43	LF899	Cal Verified

Field Strength of Spurious Radiated Emissions, Substitution Method - Passed

The amplifier was operated in a typical fashion. It was placed on a turntable in an open air test site. The output of the EUT was terminated in a 40.25 dB load. An antenna was placed at 3m distance and measurements were made of the worst-case radiated emission from the EUT. Emissions suspected to be within 20 dB of the limits were then duplicated with a signal generator and a transmit antenna. The readings were then adjusted for the difference between the transmit antenna gain and that of a tuned dipole antenna. This results in the Effective Isotropic Radiated Power of the EUT at that frequency, the value of which is then compared with the limits. The limits are designated in CFR Part 22.917.

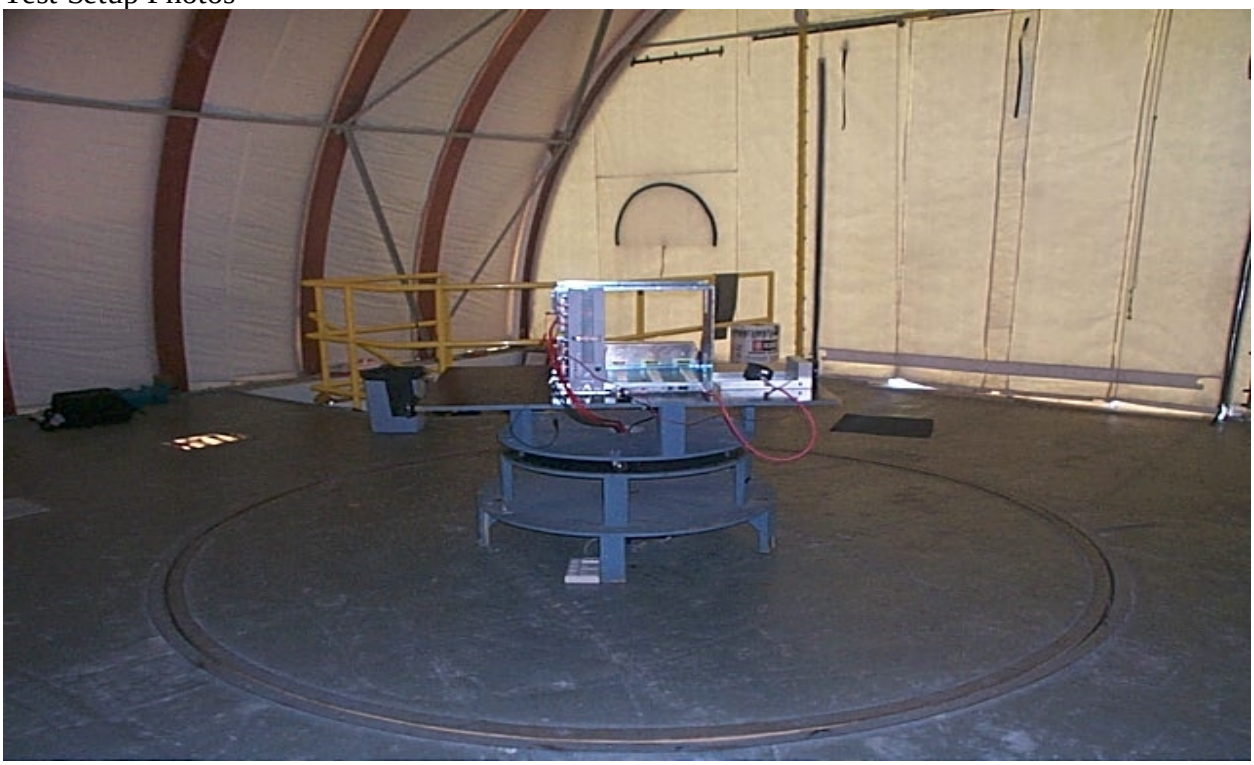
Note: It was determined that due to similarities between the results when measuring various modulation types, the TDMA and CW modulation types would be an adequate representative sample.

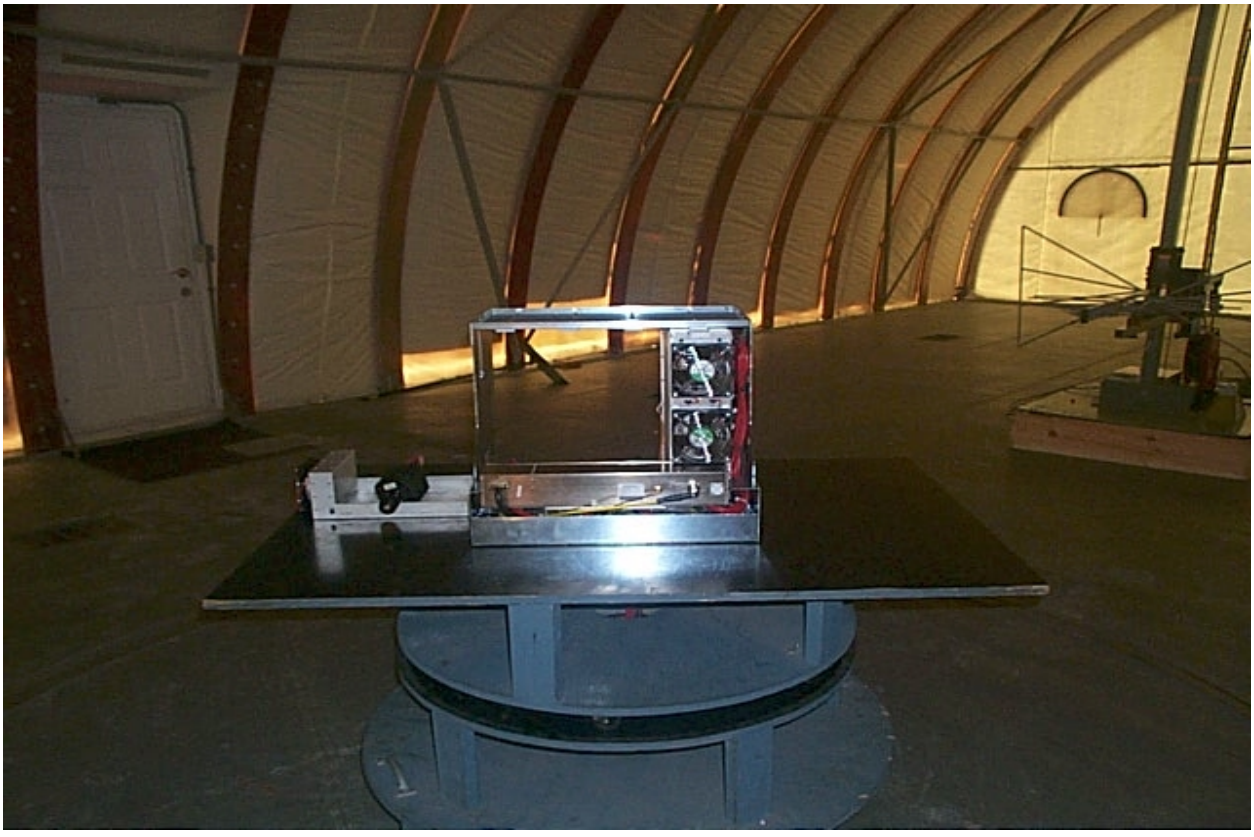
Test Equipment

Name	Brand	Model #:	Serial #:	Cal. Due Date:
High Frequency Cable	Sucoflex	104PEA	CBLSHF201	2/21/02
High Frequency Cable	Sucoflex	104PEA	CBLSHF203	2/21/02
Agilent Analyzer	Agilent	E7405A	US40240205	11/28/01
Antenna	EMCO	3142	9711-1224	11/17/01
Horn Antenna	EMCO	3115	9512-4632	10/09/02
Horn Antenna	EMCO	3115	9610-4980	11/01/01
Dipole Antenna	CDI	A100	00402	5/3/02
Signal Generator	HP	E4433B	US38440733	7/8/03

		Company:	Ericsson				Tested by:	Nicholas Abbondante			
		Model:	MCPA Power Amplifier				Location:	Site 3C			
		Project #:	3004587				Detector:	Agilent E7405A			
		Date:	08/09/01				Antenna:	LOG3, HORN3			
		Standard:	FCC22				PreAmp:	None			
		Class:	None	Group:	None		Cable(s):	SHF203			
		Notes:					Distance:	3	meters		
	Ant.			Antenna	Cable	Pre-amp	Distance				
	Pol.	Frequency	Reading	Factor	Loss	Factor	Factor	Net	Limit	Margin	
	(V/H)	MHz	dB(uV)	dB(1/m)	dB	dB	dB	dB(uV/m)	dB(uV/m)	dB	
	TDMA Modulation										
	V	56.530	23.2	7.8	0.6	0.0	10.5	21.2	39.1	-17.9	
	V	78.800	22.4	6.2	0.7	0.0	10.5	18.8	39.1	-20.3	
	H	144.000	27.9	8.0	0.8	0.0	10.5	26.3	43.5	-17.2	
	V	216.000	24.7	11.0	1.2	0.0	10.5	26.5	43.5	-17.0	
	V	280.000	17.7	12.9	1.2	0.0	10.5	21.3	46.4	-25.1	
	V	328.000	23.0	14.5	1.6	0.0	10.5	28.7	46.4	-17.7	
	V	344.000	24.6	15.3	1.6	0.0	10.5	31.0	46.4	-15.4	
	V	360.000	22.9	15.9	1.6	0.0	10.5	29.9	46.4	-16.5	
	V	424.000	15.4	16.6	1.6	0.0	10.5	23.2	46.4	-23.2	
	V	984.300	18.1	24.5	2.5	0.0	10.5	34.6	49.5	-14.9	
AVG	H	1762.000	44.0	28.7	3.5	0.0	0.0	76.2	RF sub	#VALUE!	*
AVG	V	1821.000	18.3	28.9	3.8	0.0	0.0	51.0	RF sub	#VALUE!	*
AVG	H	2643.000	28.0	31.1	4.4	0.0	0.0	63.5	RF sub	#VALUE!	*
AVG	H	3524.000	35.7	33.5	5.2	0.0	0.0	74.4	RF sub	#VALUE!	*
	CW, no modulation										
	V	56.530	18.2	7.8	0.6	0.0	10.5	16.2	39.1	-22.9	
	V	78.800	21.9	6.2	0.7	0.0	10.5	18.4	39.1	-20.7	
	H	144.000	31.4	8.0	0.8	0.0	10.5	29.8	43.5	-13.7	
	V	216.000	24.8	11.0	1.2	0.0	10.5	26.6	43.5	-16.9	
	H	280.000	20.5	12.9	1.2	0.0	10.5	24.2	46.4	-22.2	
	V	328.000	27.0	14.5	1.6	0.0	10.5	32.6	46.4	-13.8	
	H	344.000	26.4	15.3	1.6	0.0	10.5	32.8	46.4	-13.6	
	V	360.000	23.5	15.9	1.6	0.0	10.5	30.5	46.4	-15.9	
	V	424.000	18.4	16.6	1.6	0.0	10.5	26.1	46.4	-20.3	
	V	984.300	17.4	24.5	2.5	0.0	10.5	34.0	49.5	-15.5	
AVG	H	1762.000	46.8	28.7	3.5	0.0	0.0	79.0	RF sub	#VALUE!	*
AVG	V	1821.000	29.6	28.9	3.8	0.0	0.0	62.3	RF sub	#VALUE!	*
AVG	H	2643.000	28.4	31.1	4.4	0.0	0.0	63.9	RF sub	#VALUE!	*
AVG	H	3524.000	34.7	33.5	5.2	0.0	0.0	73.4	RF sub	#VALUE!	*
	TDMA Fundamental Frequency										
AVG	H	881.000	79.4	24.4	2.6	0.0	0.0	106.5	No Limit	#VALUE!	*
	CW, no modulation Fundamental Frequency										
AVG	H	881.000	81.1	24.4	2.6	0.0	0.0	108.2	No Limit	#VALUE!	*
	RF Substitution Method										
	DIP1 antenna MN A100 SN 00402, SHF201, LOG3, HORN3, AGL001, SHF203										
	Signal Generator: HP E4433B, Cal Due: 7/8/03, SN US38440733										
	Ant.			Antenna	Cable	Dipole	Distance				
	Pol.	Frequency	Reading	Factor	Loss	Factor	Factor	Net	Limit	Margin	
	(V/H)	MHz	dB(uV)	dB	dB	dB	dB	dB(m)	dB(m)	dB	
CW	V	881.000	115.0	0.0	0.4	0.0	0.0	8.4	No Limit	#VALUE!	*
CW	H	881.000	116.0	0.0	0.4	0.0	0.0	9.4	No Limit	#VALUE!	*
CW	V	1762.000	109.0	-28.8	0.5	-2.1	0.0	-24.2	-13.0	-11.2	
CW	H	1762.000	114.0	-28.8	0.5	-2.1	0.0	-19.2	-13.0	-6.2	
CW	V	1821.000	92.5	-28.8	0.5	-2.1	0.0	-40.7	-13.0	-27.7	
CW	H	1821.000	95.5	-28.8	0.5	-2.1	0.0	-37.7	-13.0	-24.7	
CW	V	2643.000	97.9	-29.8	0.6	-2.1	0.0	-36.2	-13.0	-23.2	
CW	H	2643.000	95.5	-29.8	0.6	-2.1	0.0	-38.6	-13.0	-25.6	
CW	V	3524.000	115.5	-32.6	1.1	-2.1	0.0	-20.9	-13.0	-7.9	
CW	H	3524.000	115.0	-32.6	1.1	-2.1	0.0	-21.4	-13.0	-8.4	
TDMA	V	881.000	118.9	0.0	0.4	0.0	0.0	12.3	No Limit	#VALUE!	*
TDMA	H	881.000	117.0	0.0	0.4	0.0	0.0	10.4	No Limit	#VALUE!	*
TDMA	V	1762.000	106.0	-29.8	0.5	-2.1	0.0	-28.2	-13.0	-15.2	
TDMA	H	1762.000	110.0	-29.8	0.5	-2.1	0.0	-24.2	-13.0	-11.2	
TDMA	V	2643.000	96.0	-29.8	0.6	-2.1	0.0	-38.1	-13.0	-25.1	
TDMA	H	2643.000	94.0	-29.8	0.6	-2.1	0.0	-40.1	-13.0	-27.1	
TDMA	V	3524.000	115.0	-32.6	1.1	-2.1	0.0	-21.4	-13.0	-8.4	
TDMA	H	3524.000	113.0	-32.6	1.1	-2.1	0.0	-23.4	-13.0	-10.4	

Test Setup Photos





Spurious Emissions at Antenna Terminals - Passed

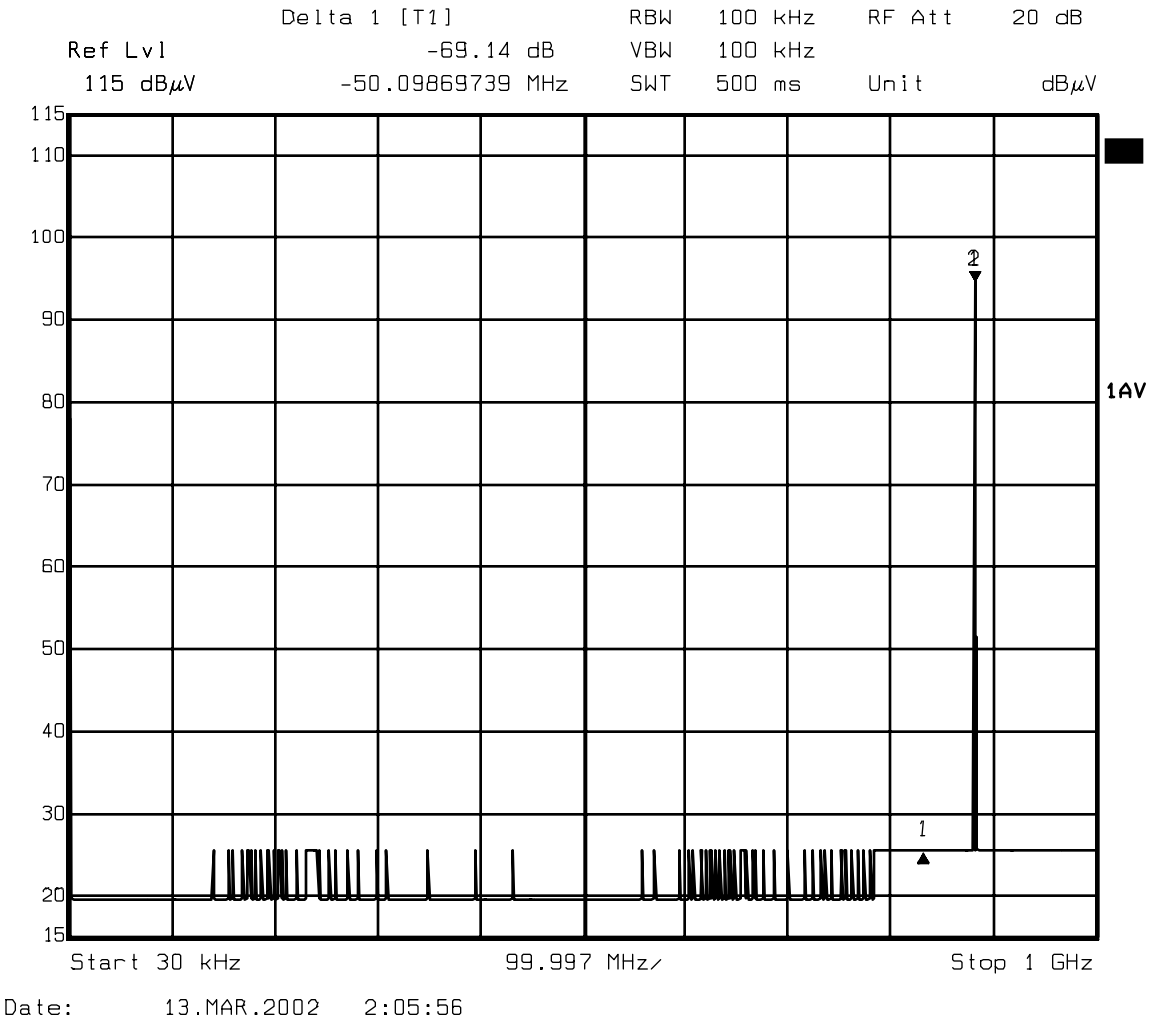
The amplifier was operated in a typical fashion. The output was set to 100Watts(50dBm=156.99dBuV) average power and was connected to a Spectrum Analyzer through a 40dB load Attenuator, an additional line pad of 10dB and cable loss of an additional 1db for a total of 51dB. A reference was established at the fundamental frequency (156.99dBuV-51dB=106 dBuV. From this reference all Spurious emissions were measured. After establishing the reference, the data was take by adjusting only the Frequency Span of the Spectrum Analyzer into over lapping bands thereby retaining the established reference for delta marker measurements. The Resolution and Video Bandwiths were set to 1 Mhz and maintained throughout the test plots.

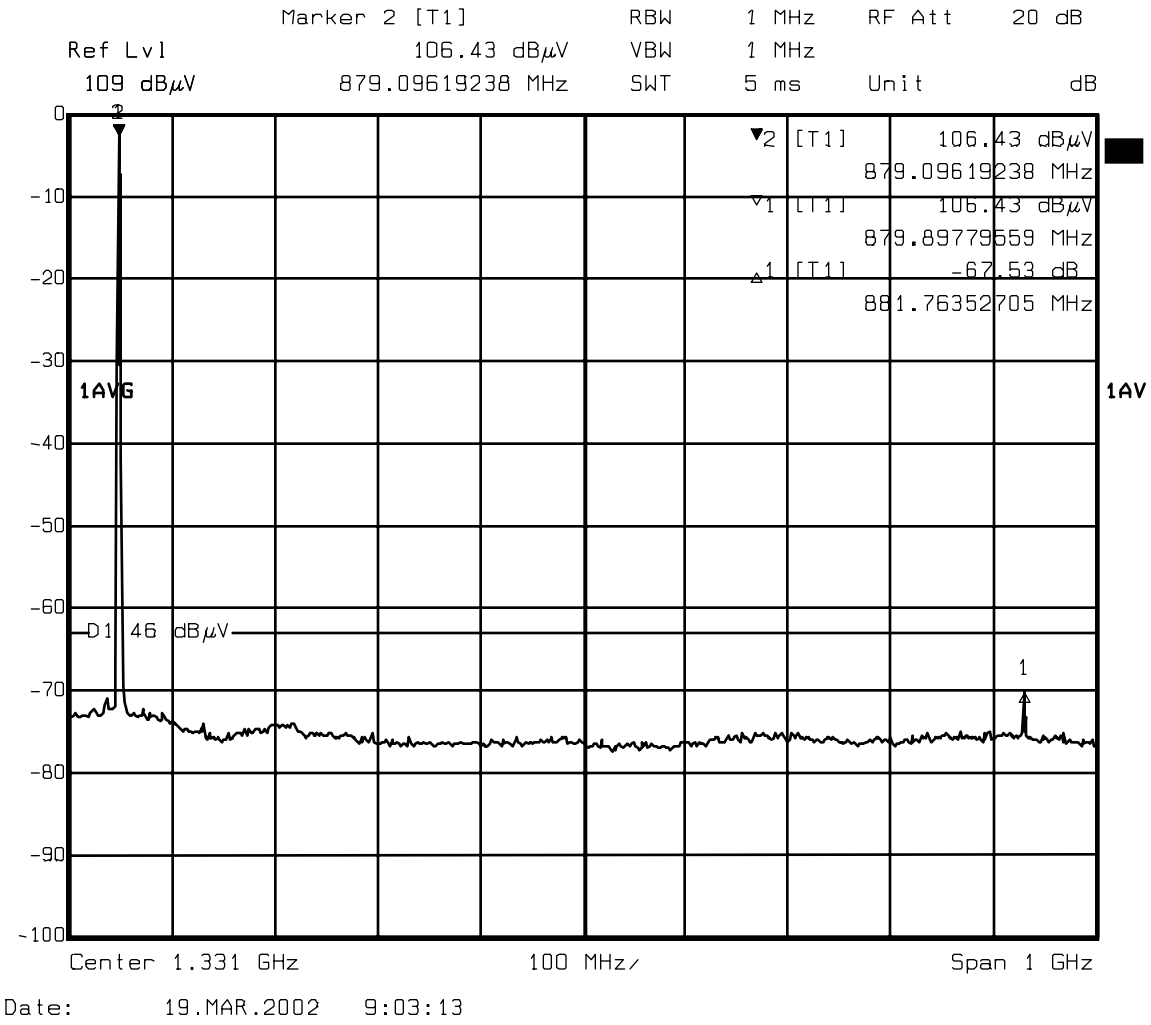
Data was taken for the AMPS(audio) and AMPS(audio and data) modulation types after determining that TDMA and CDMA modulations did not produce significantly different results. In accordance with CFR Part 22.917 the spurious limit was established as the lesser of :

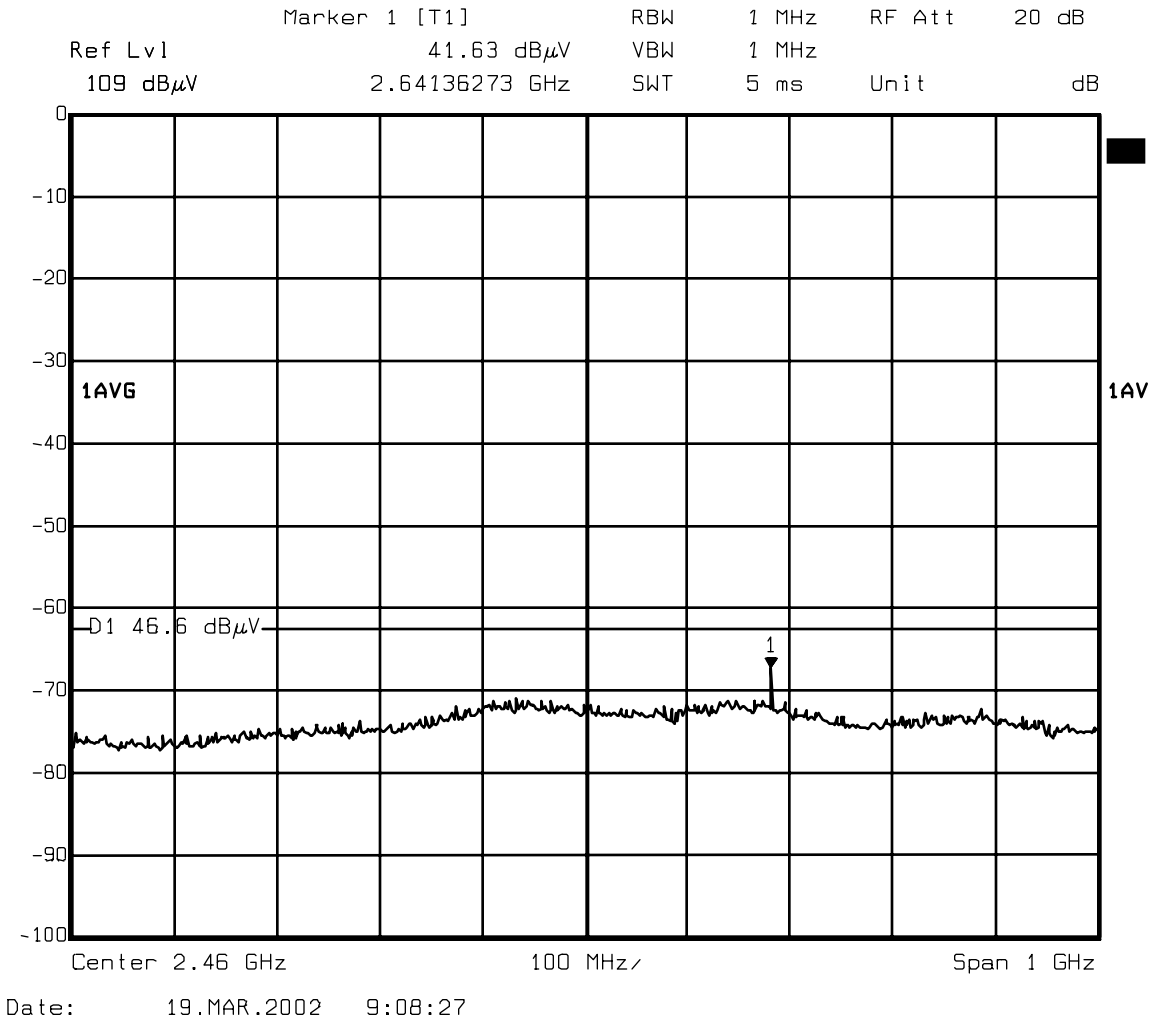
60 or 43+ (10Log Pout in WATTS)
43 +(10 Log 100W)
43+(10Log 2)
43+20 = 63

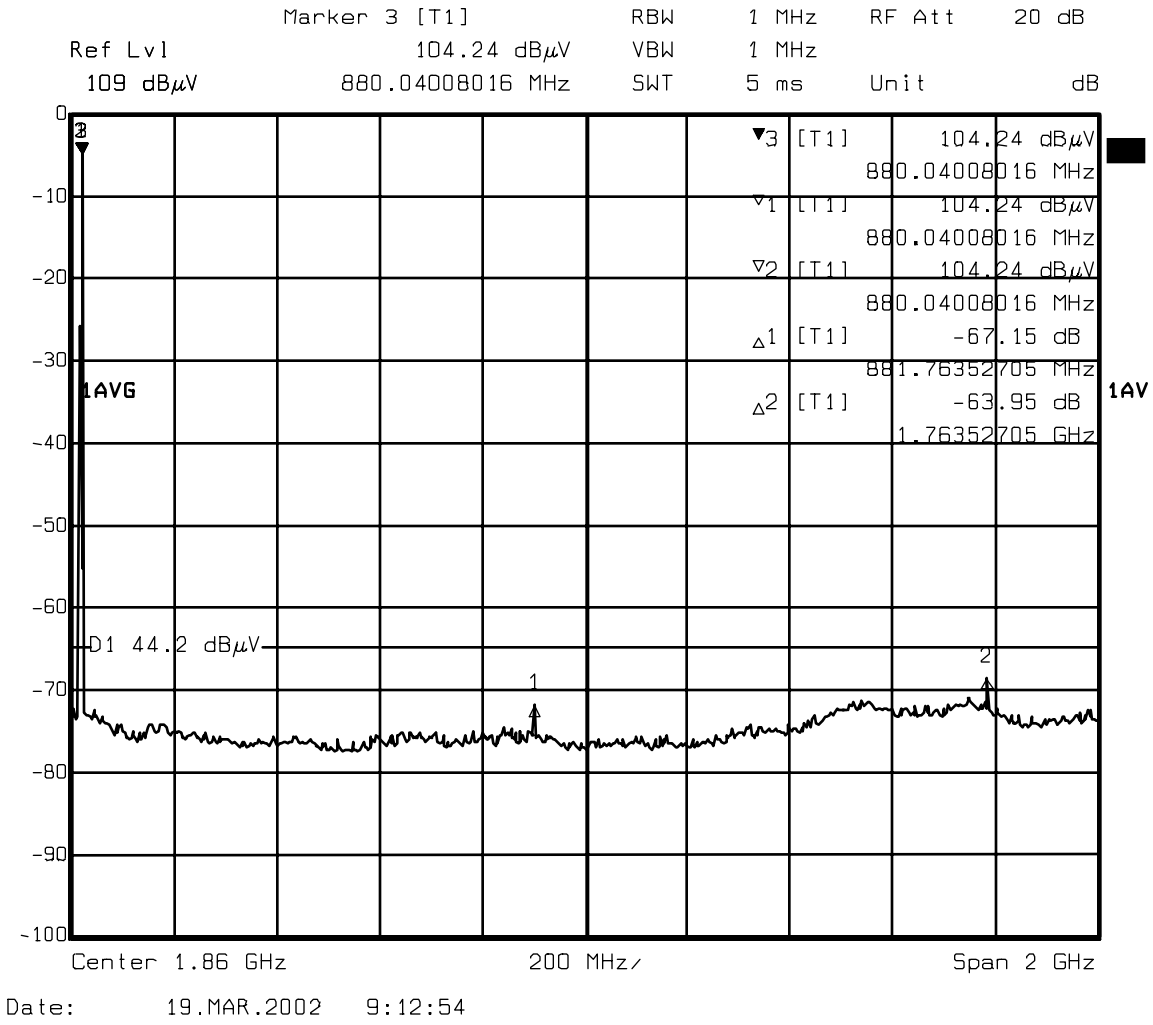
Therefore for the above output power the limit is 63dB below the fundamental.

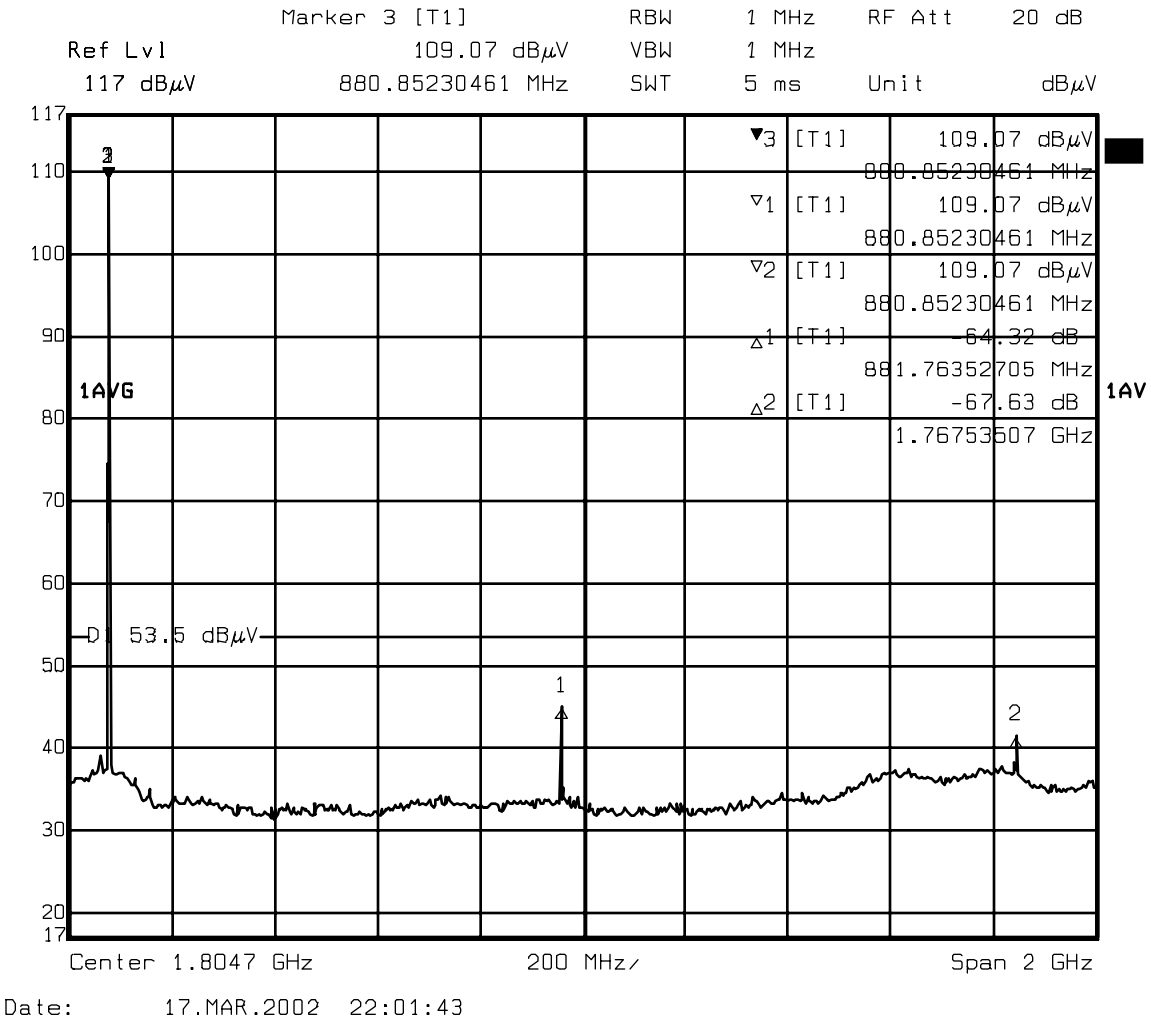
Modulation	Frequency	Limit=Ref-63dB	Measured Worst Case
AMPS(audio) AMPS(audio and data)	1760Mhz	106.4dBuV-63 =43.4dBuV	-67.53dB (38.87dBuV)
AMPS(audio) AMPS(audio and data)	2641Mhz	106.4dBuV-63 =43.4dBuV	-64.77dB (41.63dBuV)

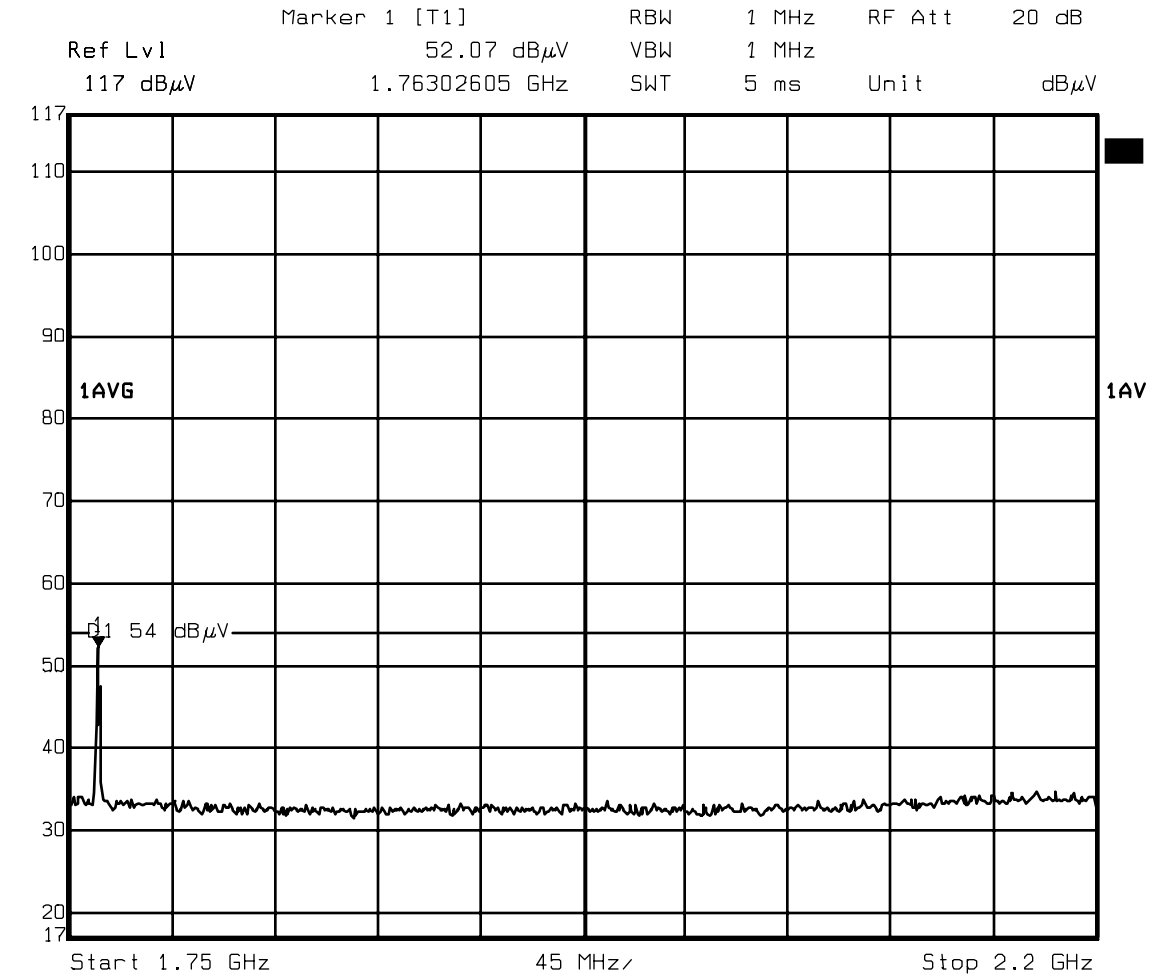

Delta 1 [T1]
RBW 100 kHz
RF Att 20 dB
Ref Lvl
-69.14 dB
VBW 100 kHz
115 dBµV
-50.09869739 MHz
SWT 500 ms
Unit dBµV
115
110
100
90
80
70
60
50
40
30
20
15
1AV
2
1
Start 30 kHz
99.997 MHz/
Stop 1 GHz
Date: 13.MAR.2002 2:05:56

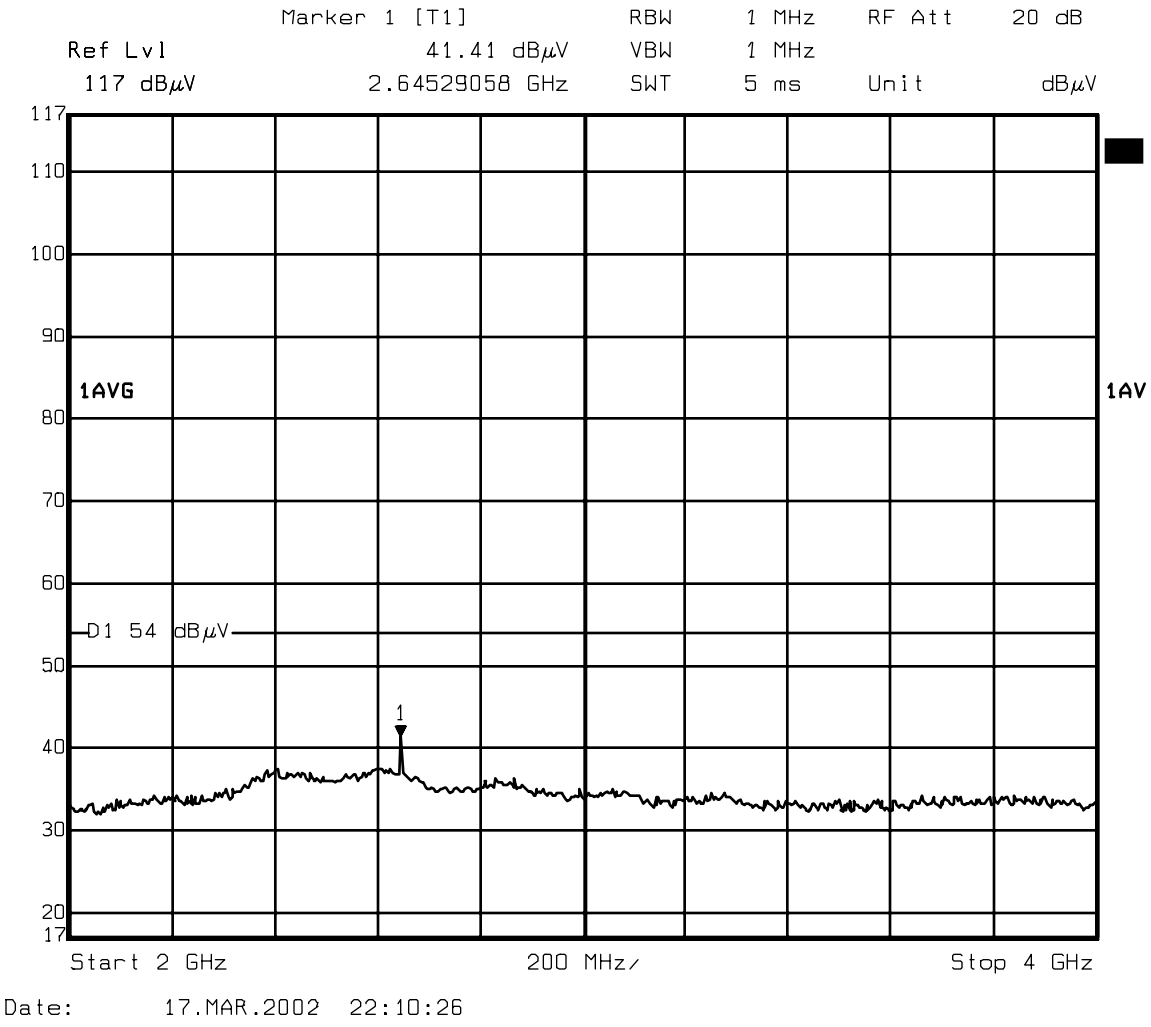

Marker 2 [T1]
RBW 1 MHz
RF Att 20 dB
Ref Lvl
106.43 dBµV
VBW 1 MHz
109 dBµV
879.09619238 MHz
SWT 5 ms
Unit dB
2 [T1] 106.43 dBµV
879.09619238 MHz
1 [T1] 106.43 dBµV
879.89779559 MHz
Δ1 [T1] -67.53 dB
881.76352705 MHz
1AVG
1AV
D1 46 dBµV
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center 1.331 GHz
100 MHz/
Span 1 GHz
Date: 19.MAR.2002 9:03:13

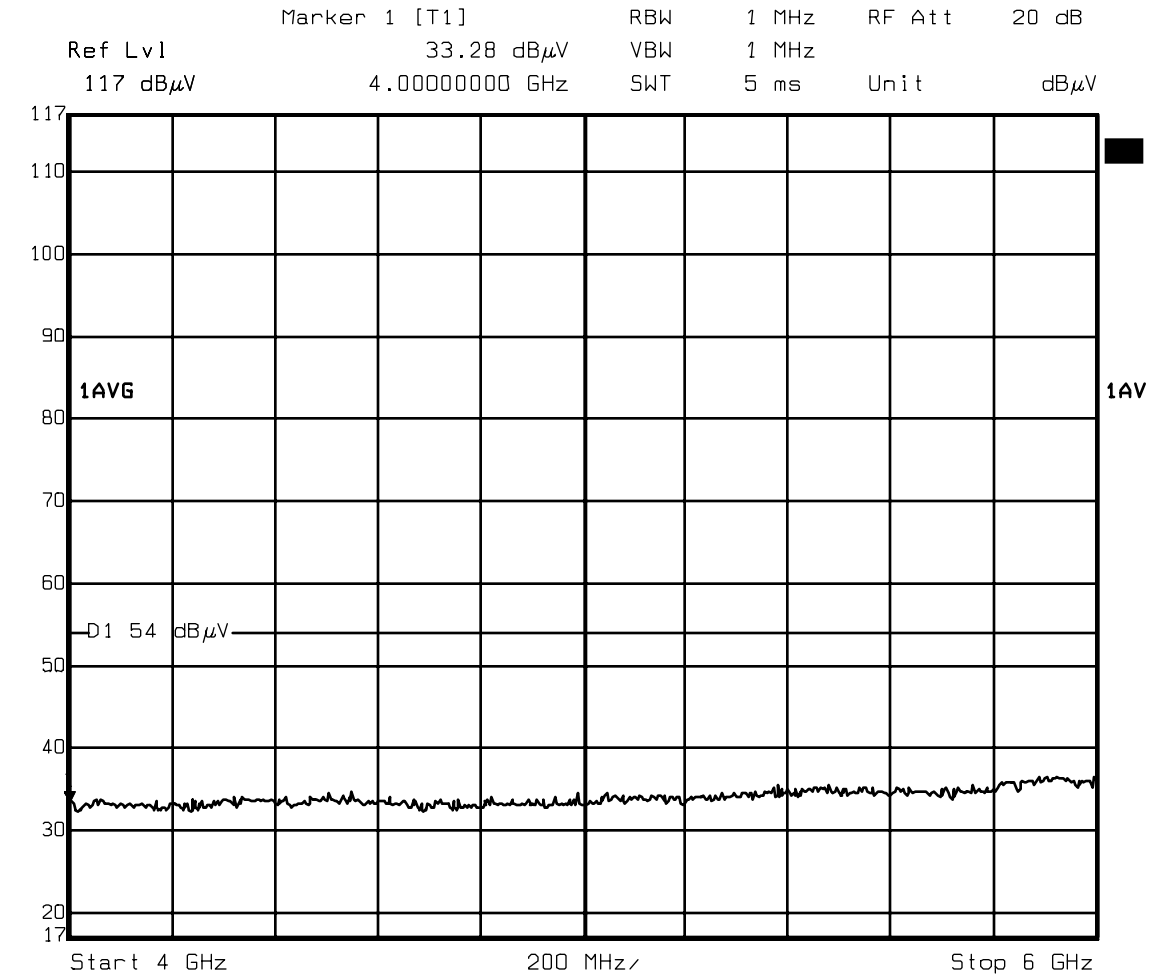

Marker 1 [T1]
RBW 1 MHz
RF Att 20 dB
Ref Lvl
41.63 dBµV
VBW 1 MHz
109 dBµV
2.64136273 GHz
SWT 5 ms
Unit dB
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
1AVG
1AV
D1 46.6 dBµV
1
Center 2.46 GHz
100 MHz/
Span 1 GHz
Date: 19.MAR.2002 9:08:27

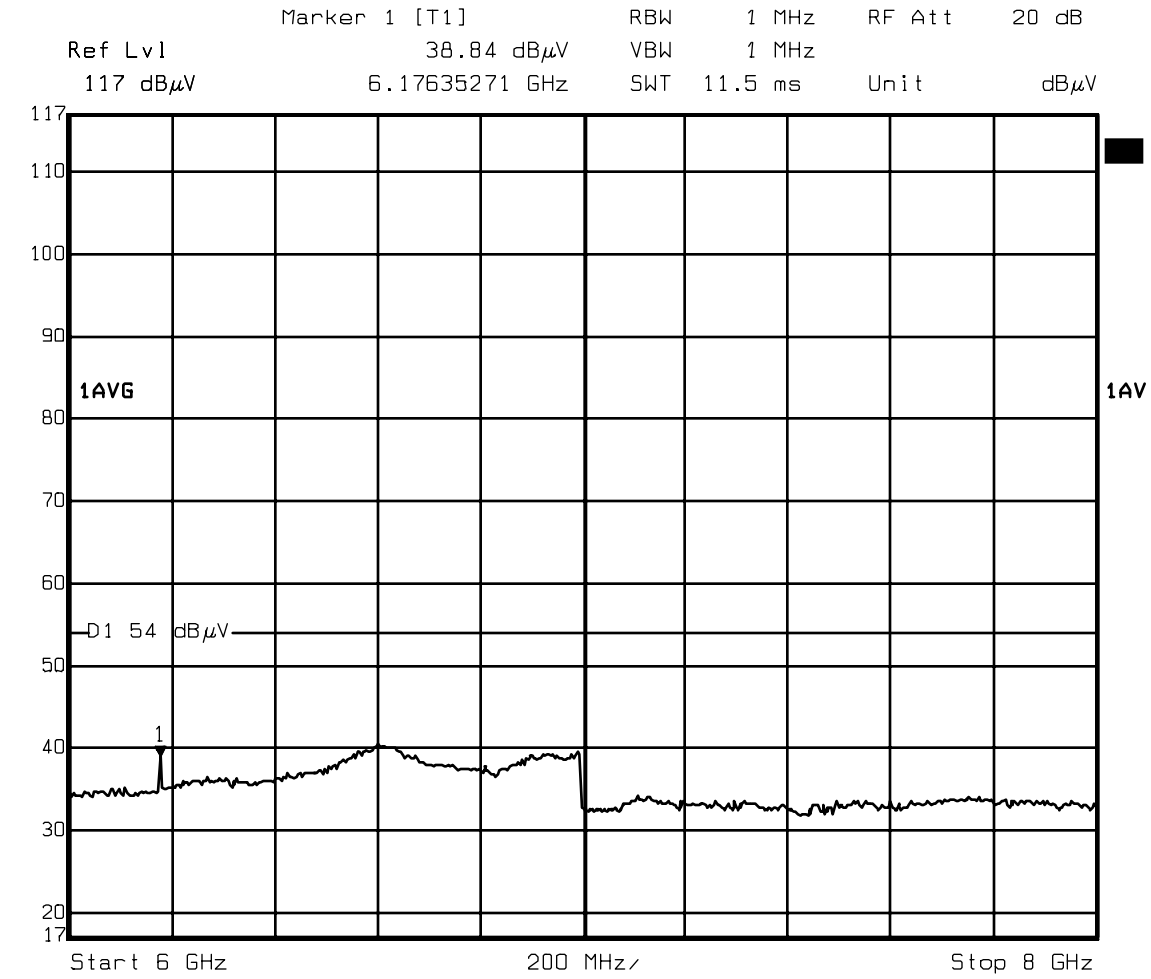

Marker 3 [T1]
RBW 1 MHz
RF Att 20 dB
Ref Lvl
104.24 dBµV
VBW 1 MHz
109 dBµV
880.04008016 MHz
SWT 5 ms
Unit dB
3 [T1] 104.24 dBµV
880.04008016 MHz
1 [T1] 104.24 dBµV
880.04008016 MHz
2 [T1] 104.24 dBµV
880.04008016 MHz
Δ1 [T1] -67.15 dB
881.76352705 MHz
Δ2 [T1] -63.95 dB
1.76352705 GHz
1AVG
1AV
D1 44.2 dBµV
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center 1.86 GHz
200 MHz/
Span 2 GHz
Date: 19.MAR.2002 9:12:54


Marker 3 [T1]
RBW 1 MHz
RF Att 20 dB
Ref Lvl
109.07 dBµV
VBW 1 MHz
117 dBµV
880.85230461 MHz
SWT 5 ms
Unit dBµV
▼3 [T1] 109.07 dBµV
880.85230461 MHz
▽1 [T1] 109.07 dBµV
880.85230461 MHz
▽2 [T1] 109.07 dBµV
880.85230461 MHz
Δ1 [T1] -64.32 dB
881.76352705 MHz
Δ2 [T1] -67.63 dB
1.76753507 GHz
1AVG
1AV
D1 53.5 dBµV
117
110
100
90
80
70
60
50
40
30
20
17
Center 1.8047 GHz
200 MHz/
Span 2 GHz
Date: 17.MAR.2002 22:01:43


Marker 1 [T1]
RBW 1 MHz
RF Att 20 dB
Ref Lvl
52.07 dBµV
VBW 1 MHz
117 dBµV
1.76302605 GHz
SWT 5 ms
Unit dBµV
117
110
100
90
1AVG
1AV
80
70
60
D1 54 dBµV
50
40
30
20
17
Start 1.75 GHz
45 MHz/
Stop 2.2 GHz
Date: 17.MAR.2002 22:09:05


Marker 1 [T1]
Ref Lvl
117 dBµV
41.41 dBµV
2.64529058 GHz
RBW 1 MHz
VBW 1 MHz
SWT 5 ms
RF Att 20 dB
Unit dBµV
117
110
100
90
80
70
60
50
40
30
20
17
1AVG
1AV
D1 54 dBµV
1
Start 2 GHz
200 MHz/
Stop 4 GHz
Date: 17.MAR.2002 22:10:26


Marker 1 [T1]
33.28 dBµV
4.00000000 GHz
RBW 1 MHz
VBW 1 MHz
SWT 5 ms
RF Att 20 dB
Unit dBµV
Ref Lvl
117 dBµV
117
110
100
90
80
70
60
50
40
30
20
17
1AVG
1AV
D1 54 dBµV
Start 4 GHz
200 MHz/
Stop 6 GHz
Date: 17.MAR.2002 22:11:13



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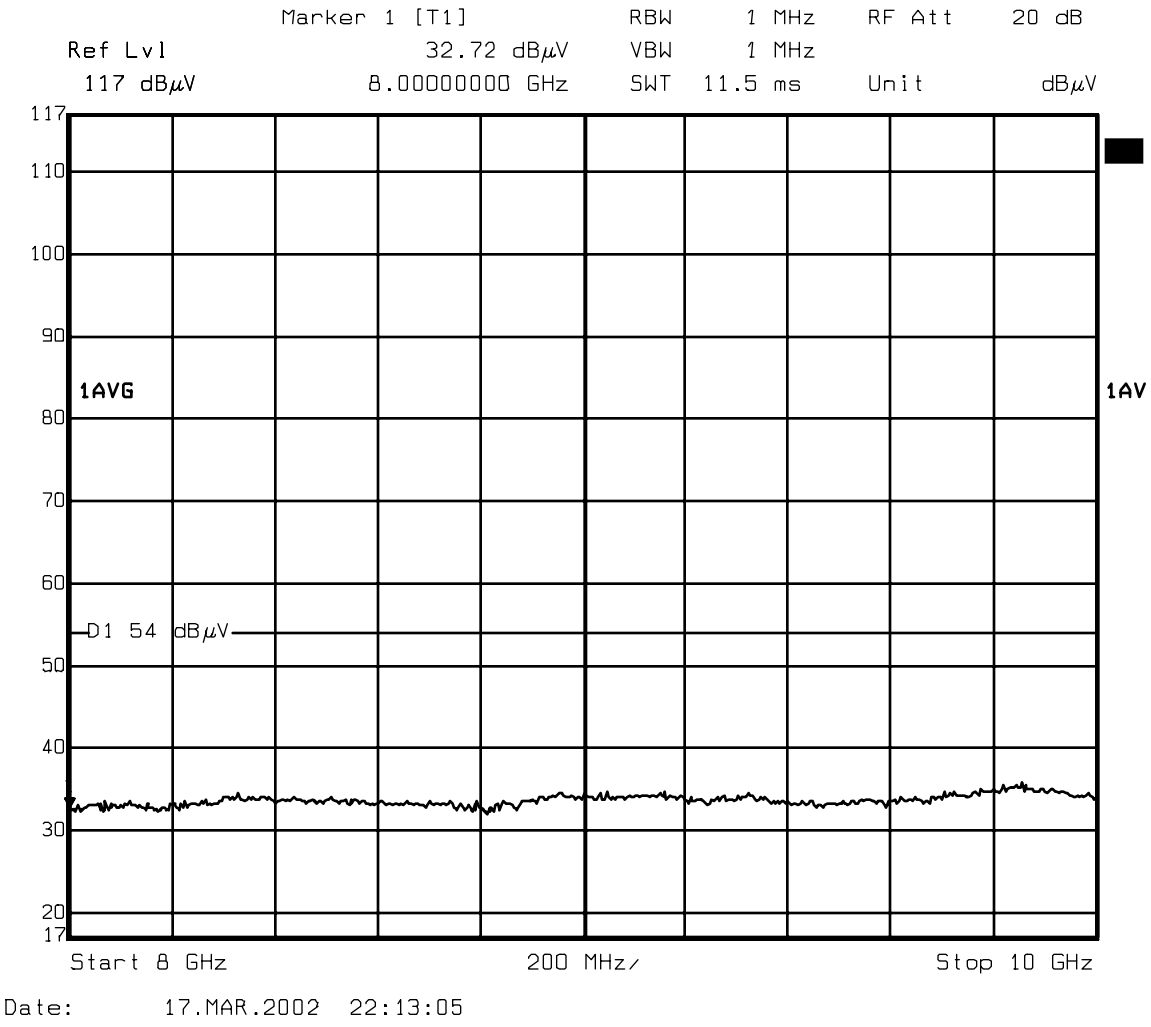
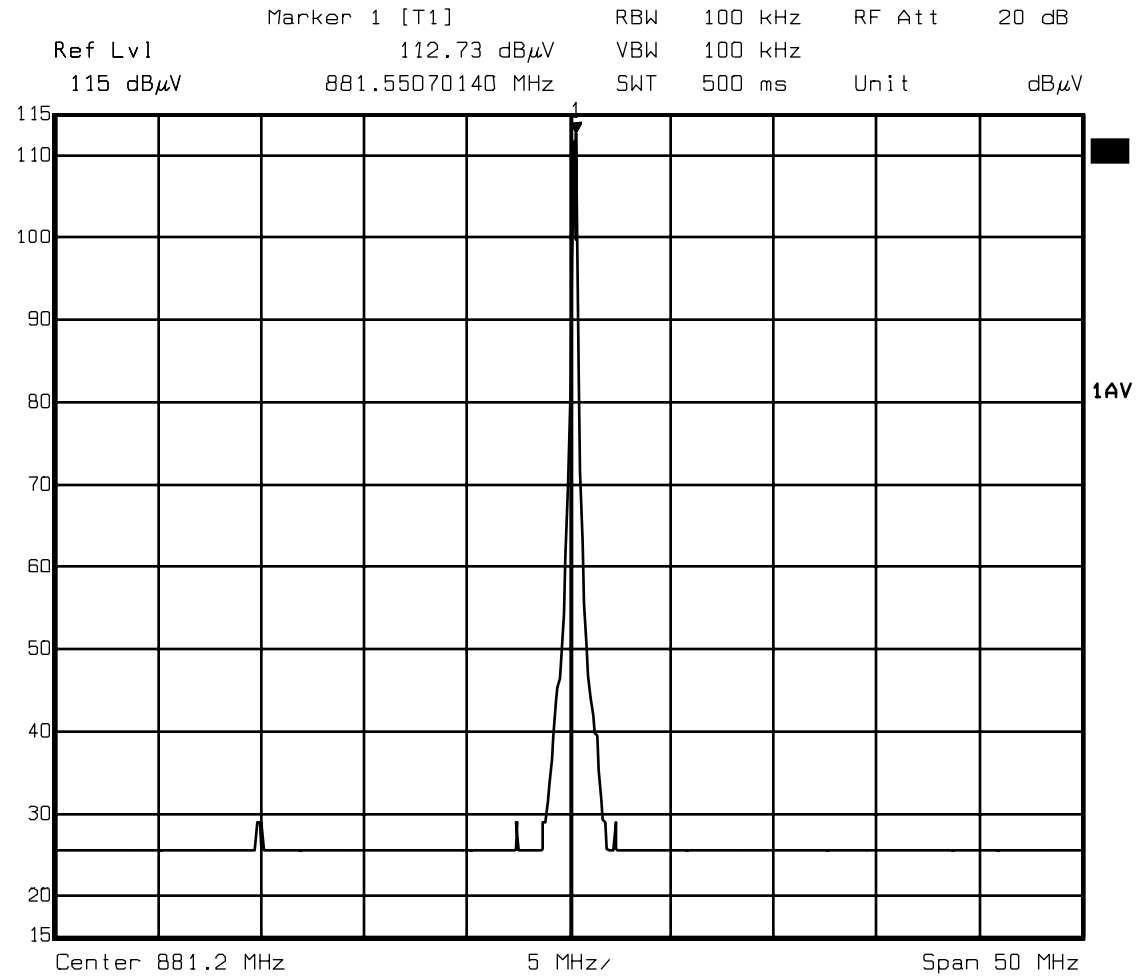
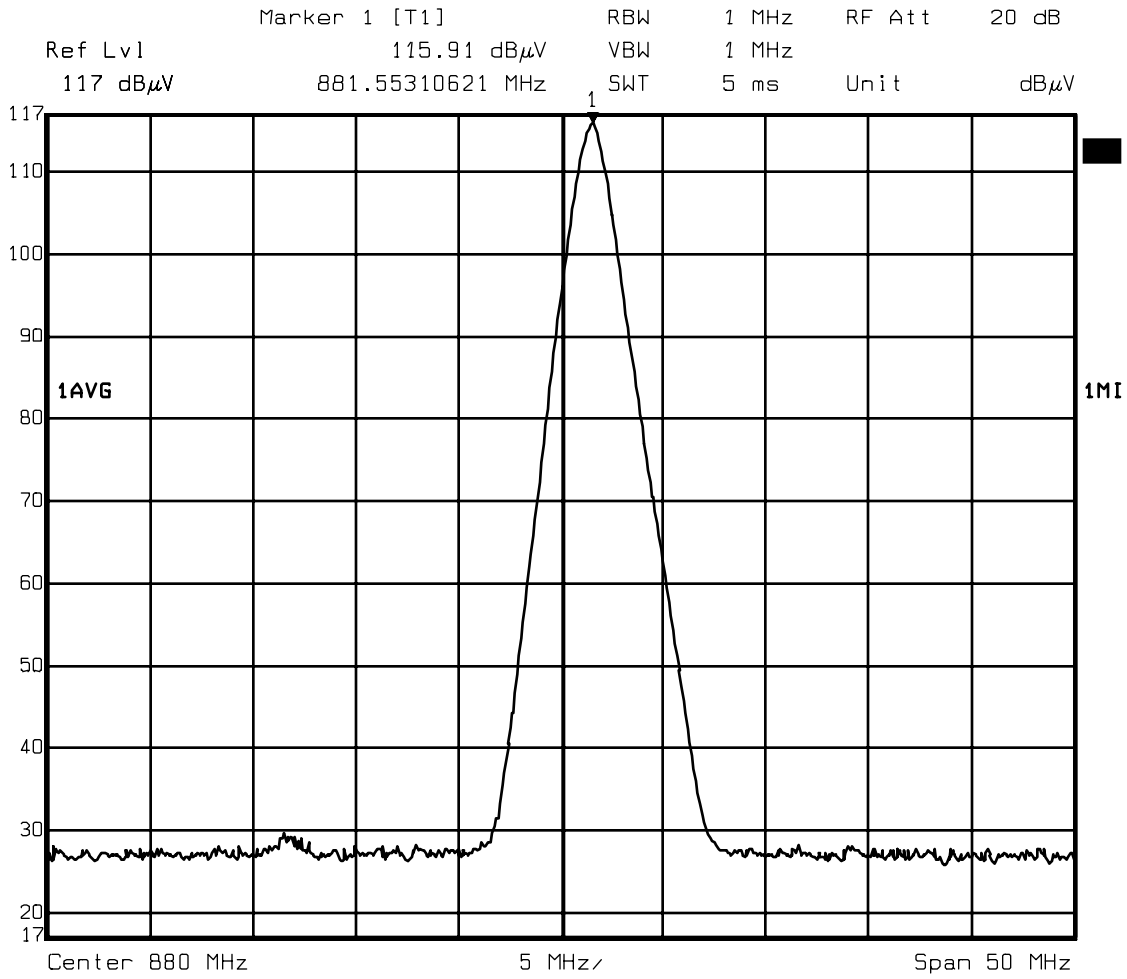
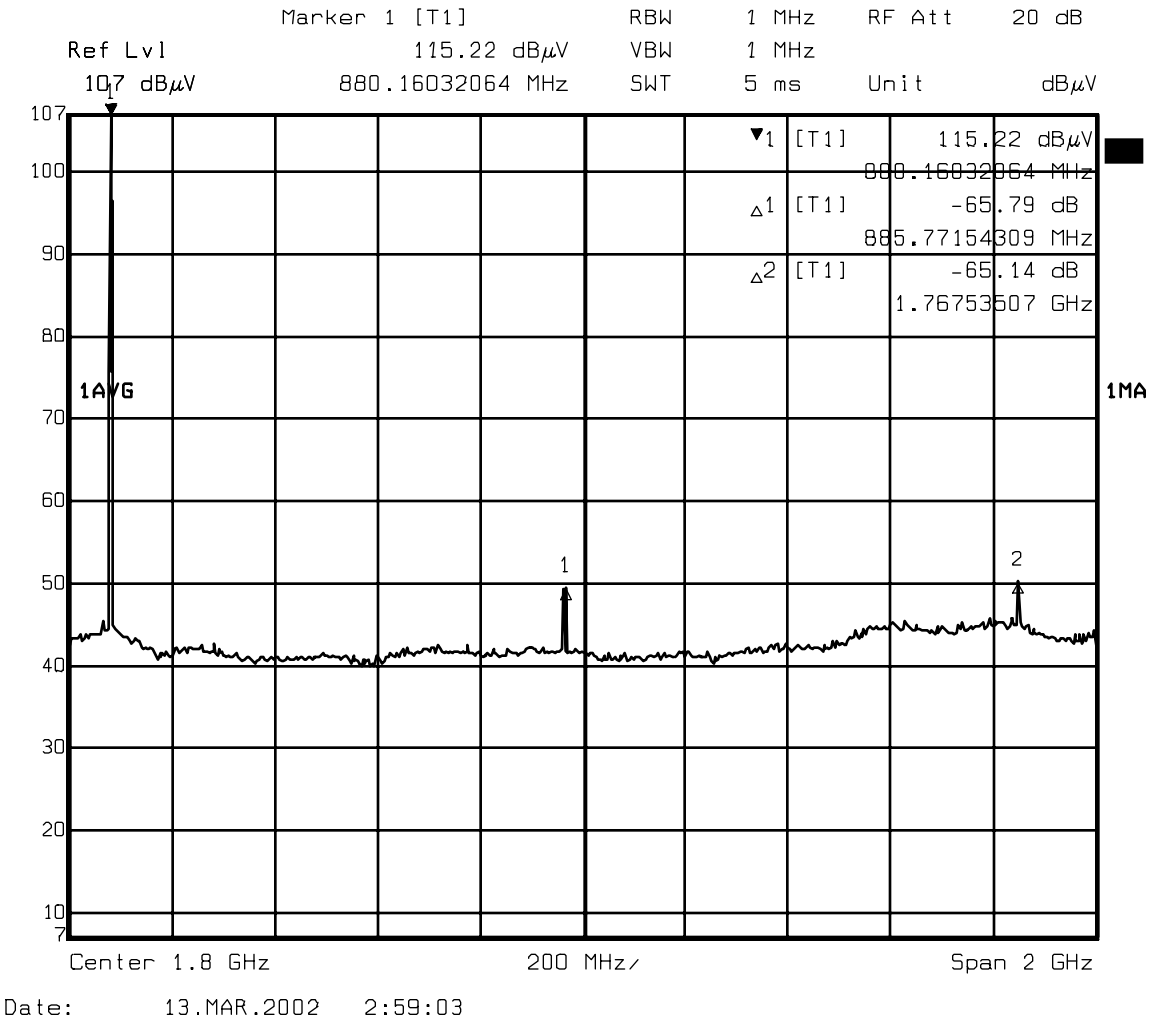

Marker 1 [T1]
32.72 dBµV
8.00000000 GHz
RBW 1 MHz
VBW 1 MHz
SWT 11.5 ms
RF Att 20 dB
Unit dBµV
Ref Lvl
117 dBµV
117
110
100
90
80
70
60
50
40
30
20
17
1AVG
1AV
D1 54 dBµV
Start 8 GHz
200 MHz/
Stop 10 GHz
Date: 17.MAR.2002 22:13:05

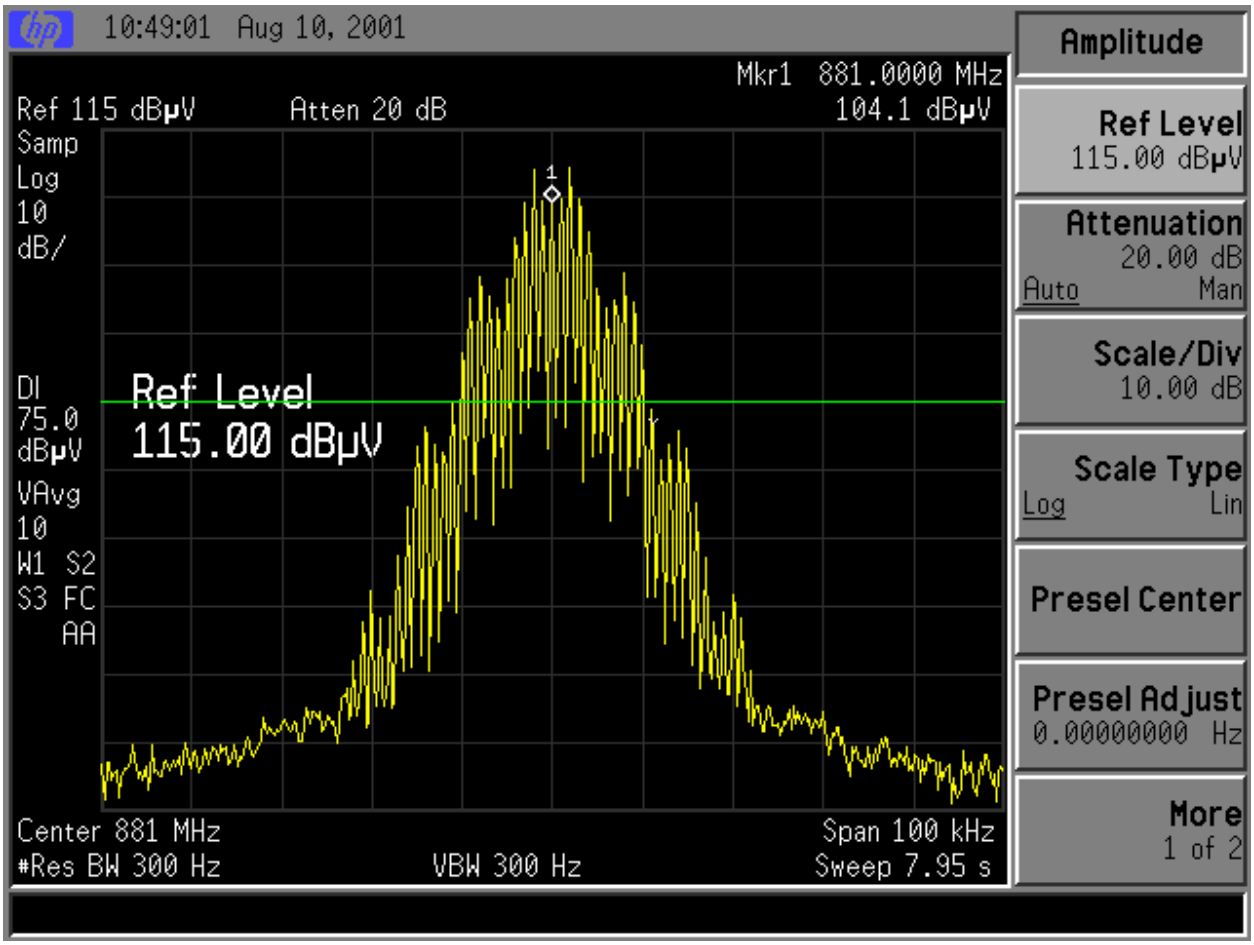

Marker 1 [T1]
112.73 dBµV
881.55070140 MHz
RBW 100 kHz
VBW 100 kHz
SWT 500 ms
RF Att 20 dB
Unit dBµV
Ref Lvl
115 dBµV
115
110
100
90
80
70
60
50
40
30
20
15
1AV
Center 881.2 MHz
5 MHz/
Span 50 MHz
Date: 13.MAR.2002 2:02:35

AMPS (Voice)

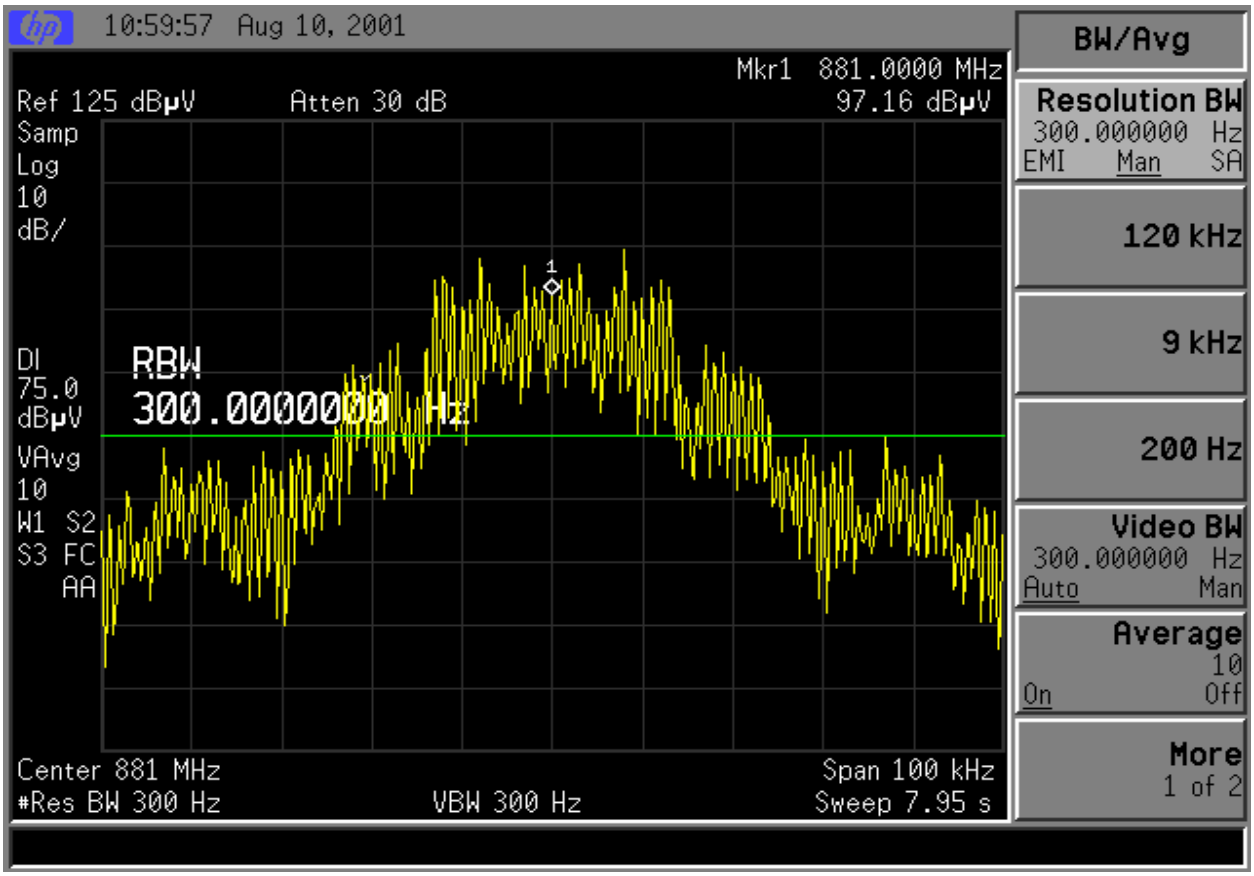


AMPS (Voice and Data)


Marker 1 [T1]
RBW 1 MHz
RF Att 20 dB
Ref Lvl
115.22 dBµV
VBW 1 MHz
107 dBµV
880.16032064 MHz
SWT 5 ms
Unit dBµV
1 [T1] 115.22 dBµV
880.16032064 MHz
Δ1 [T1] -65.79 dB
885.77154309 MHz
Δ2 [T1] -65.14 dB
1.76753507 GHz
1AVG
1MA
107
100
90
80
70
60
50
40
30
20
10
7
Center 1.8 GHz
200 MHz/
Span 2 GHz
Date: 13.MAR.2002 2:59:03


10:49:01 Aug 10, 2001
Mkr1 881.0000 MHz
104.1 dBµV
Ref 115 dBµV
Atten 20 dB
Samp
Log
10
dB/
Ref Level
115.00 dBµV
Dl
75.0
dBµV
VAvg
10
W1 S2
S3 FC
AA
Center 881 MHz
#Res BW 300 Hz
VBW 300 Hz
Span 100 kHz
Sweep 7.95 s
Amplitude
Ref Level
115.00 dBµV
Attenuation
20.00 dB
Auto Man
Scale/Div
10.00 dB
Scale Type
Log Lin
Presel Center
Presel Adjust
0.00000000 Hz
More
1 of 2

AMPS (Voice)



AMPS (voice & data)

Test Equipment:

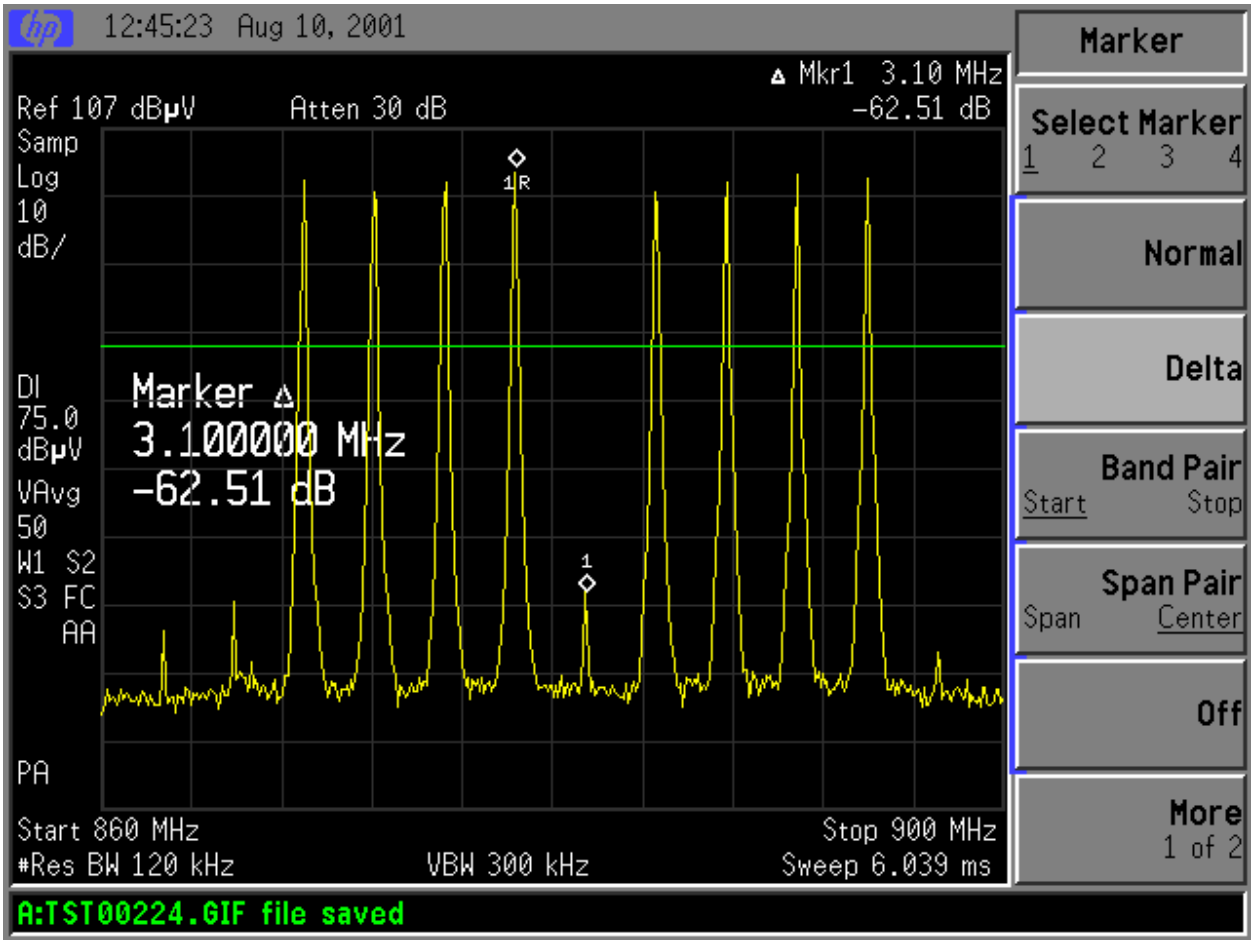
Name	Brand	Model #:	Serial #:	Cal. Due Date:
High Frequency Cable	Sucoflex	104PEA	CBLSHF203	2/21/02
Signal Generator	HP	E4433B	US38440733	7/8/03
Agilent Analyzer	Agilent	E7405A	US40240205	11/28/01
Attenuator, 40 dB	Weinschel	45-40-43	LF899	Cal Verified

Description	Mfr	Model #	Ser No	Cal Due Date
Attenuator 40 db	Weinschel	49-40-43	JY650	Cal Verified
High Freq Cable	Mega-phase	1074 1GTV	N/A	Cal Verified
Signal Generator	RDL	MTG-2000	118	31-July-02
Spectrum Analyzer	Rhode & Schwarz	FSEM	837105/041	31-July-02
RF Power Meter	HP	438A	2502A01333	19-Nov-02
Power Sensor	HP	8482A	US37292161	18-July-02
Directional Cplr	Narda	30600	01691	Cal Verified
Attenuator 10dB	Weinschel	47-10-34	AL3271	Cal Verified
Attenuator 20dB	Weinschel	1	BE9131	Cal Verified

All test equipment is traceable to the Nation Bureau Standards

Inter-modulation Distortion

The amplifier was operated in a typical fashion. 8 tones were input in an effort to produce spurious emissions due to inter-modulation distortion products. The output was connected to a spectrum analyzer through a 40 dB attenuator, and plots were made of the spectrum in the passband. It was determined that the TDMA and CDMA modulations did not produce significantly different results, therefore data was taken for the AMPs (audio) and AMPs (audio and data) modulation types. The requirement is that the spectrum output from the amplifier meet the emissions mask of CFR Part 22.917. No intermodulation products were observed that exceeded the 60 dB of attenuation from the fundamental that is required by 22.917.



Test Equipment:

Name	Brand	Model #:	Serial #:	Cal. Due Date:
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Signal Generator	HP	E4433B	US38440733	7/8/03
Agilent Analyzer	Agilent	E7405A	US40240205	11/28/01
Attenuator, 40 dB	Weinschel	45-40-43	LF899	Cal Verified