Exhibit 6

INDEX OF TEST RESULTS

Exhibit #	Description
6A	800 band/Part 22/AMPS: RF Power
6B	800 band/Part 22/AMPS: Modulation Characteristics
6C	800 band/Part 22/AMPS: Occupied bandwidth
6D	800 band/Part 22/AMPS: Spurious Emissions (conducted)
6E	800 band/Part 22/AMPS: Spurious Emissions (radiated)
6F	800 band/Part 22/AMPS: Frequency Stability
6G	800 band/Part 22/DAMPS: RF Power
6H	800 band/Part 22/DAMPS: Modulation Characteristics
6I	800 band/Part 22/DAMPS: Occupied bandwidth
6J	800 band/Part 22/DAMPS: Spurious Emissions (conducted)
6K	800 band/Part 22/DAMPS: Spurious Emissions (radiated)
6L	800 band/Part 22/DAMPS: Frequency Stability
6M	1900MHz/Part 24: RF Power
6N	1900MHz/Part 24: Modulation Characteristics
6O	1900MHz/Part 24: Occupied bandwidth
6P	1900MHz/Part 24: Spurious Emissions (conducted)
6Q	1900MHz/Part 24: Spurious Emissions (radiated)
6R	1900MHz/Part 24: Frequency Stability

EXHIBIT 6A1

800 MHz AMPS RF POWER OUTPUT

Para. 2.1033 (c,6,7), 2.1046 and 22.913 (a)

The RF power measured at the output terminals (antenna connector) is plotted against supply voltage variation and temperature variations at the highest levels.

Exhibit	Voltage (V)	Temperature	TX Freq	Power Level
6A2	4.8	Varied	Mid Band	0
6A3	Varied	+25 C	Mid Band	0

The measurements were made per IS-137A using a Hewlett Packard 8953DT North American Dual Mode Cellular Test System which includes the following equipment:

HP8958A Cellular Interface
HP6623A DC Power Supply
Thermotron SM-8C Temperature Chamber
HP437B RF Power Meter
HP8596E Spectrum Analyzer

EFFECTIVE RADIATED POWER

The following is a description of the substitution method used in accordance with IS-137A to obtain accurate ERP readings at the carrier fundamental frequency:

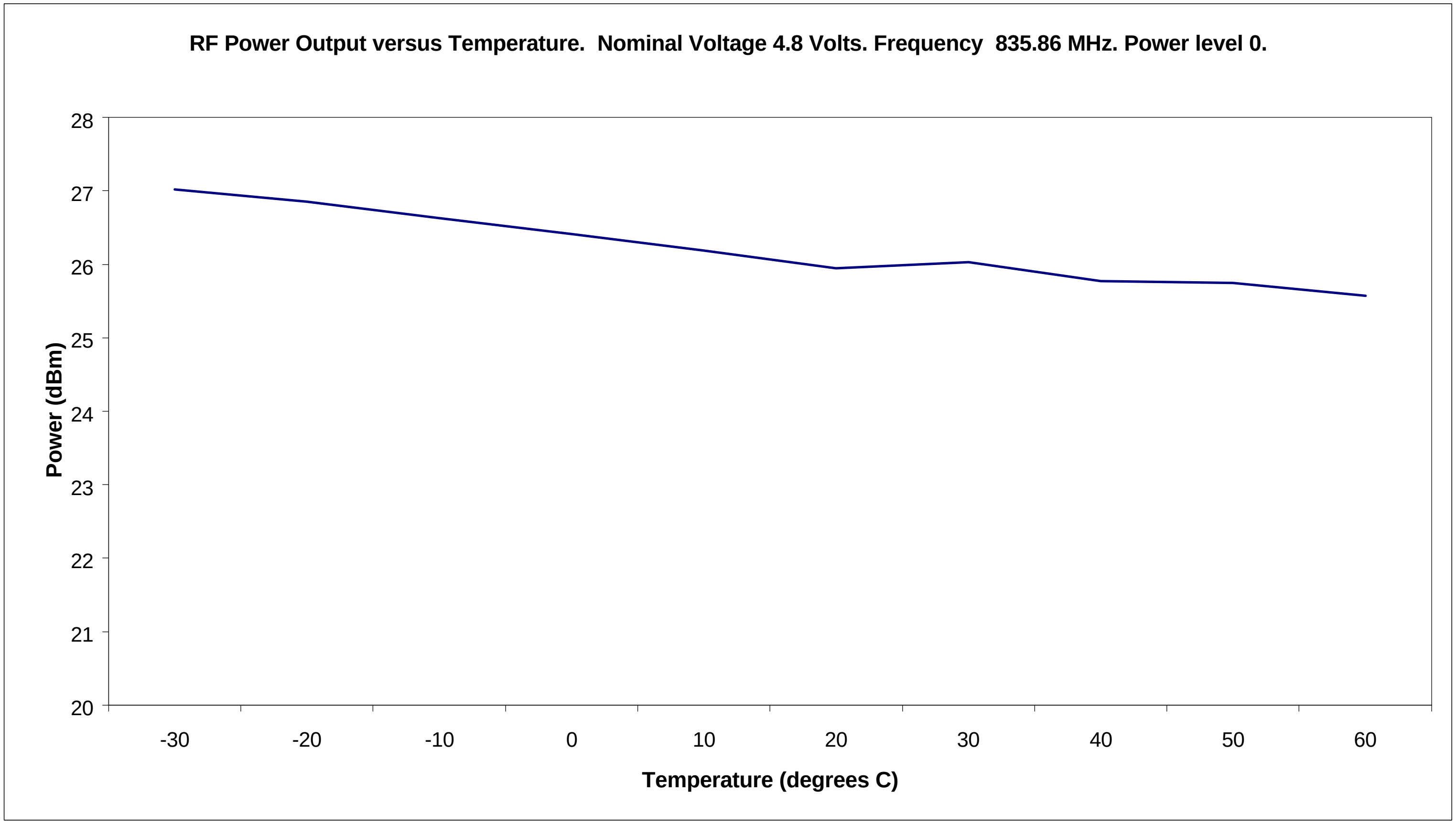
(1) EUT measurements are made at 3 m using calibrated antennas and equipment with known cable losses.
(2) A peak measurement is made by raising and lowering the antenna and rotating the EUT 360 degrees. Horizontal and vertical polarization data is recorded.
(3) A generator and dipole antenna are then substituted for the EUT. The dipole antenna is a half-wave dipole. If a dipole antenna cannot be used, then the designated antenna is referenced to a dipole antenna.
(4) Measurements are made through the dipole antenna at known power levels to determine the system calibration factors at a given frequency.
(5) At frequencies where no calibration data is taken, the value is interpolated between the closest data point above and below the transmit frequency. Calibration data is taken with a half-wave dipole antenna.

Table: Power comparison chart for all modes – SAR versus radiated power

Mode	f (MHz)	SAR (dBm)	* Radiated (dBm/mW)
AMPS	824	26.10	22.66 EDRP
	837	26.65	23.43 EDRP
	849	25.90	22.66 EDRP
D-AMPS	824	25.90	22.66 EDRP
	837	26.10	23.43 EDRP
	849	25.90	22.66 EDRP
D-AMPS	1850	25.50	25.99 EIRP
	1880	25.80	27.37 EIRP
	1910	26.00	24.57 EIRP

* Power used for declared power on Grant

Exhibit 6A2


RF Power Output versus Temperature. Nominal Voltage 4.8 Volts. Frequency 835.86 MHz. Power level 0.
Power (dBm)
28
27
26
25
24
23
22
21
20
-30
-20
-10
0
10
20
30
40
50
60
Temperature (degrees C)

APPLICANT:
ERICSSON INC

FCC ID NO:
AXATR-393-A2

Exhibit 6A3

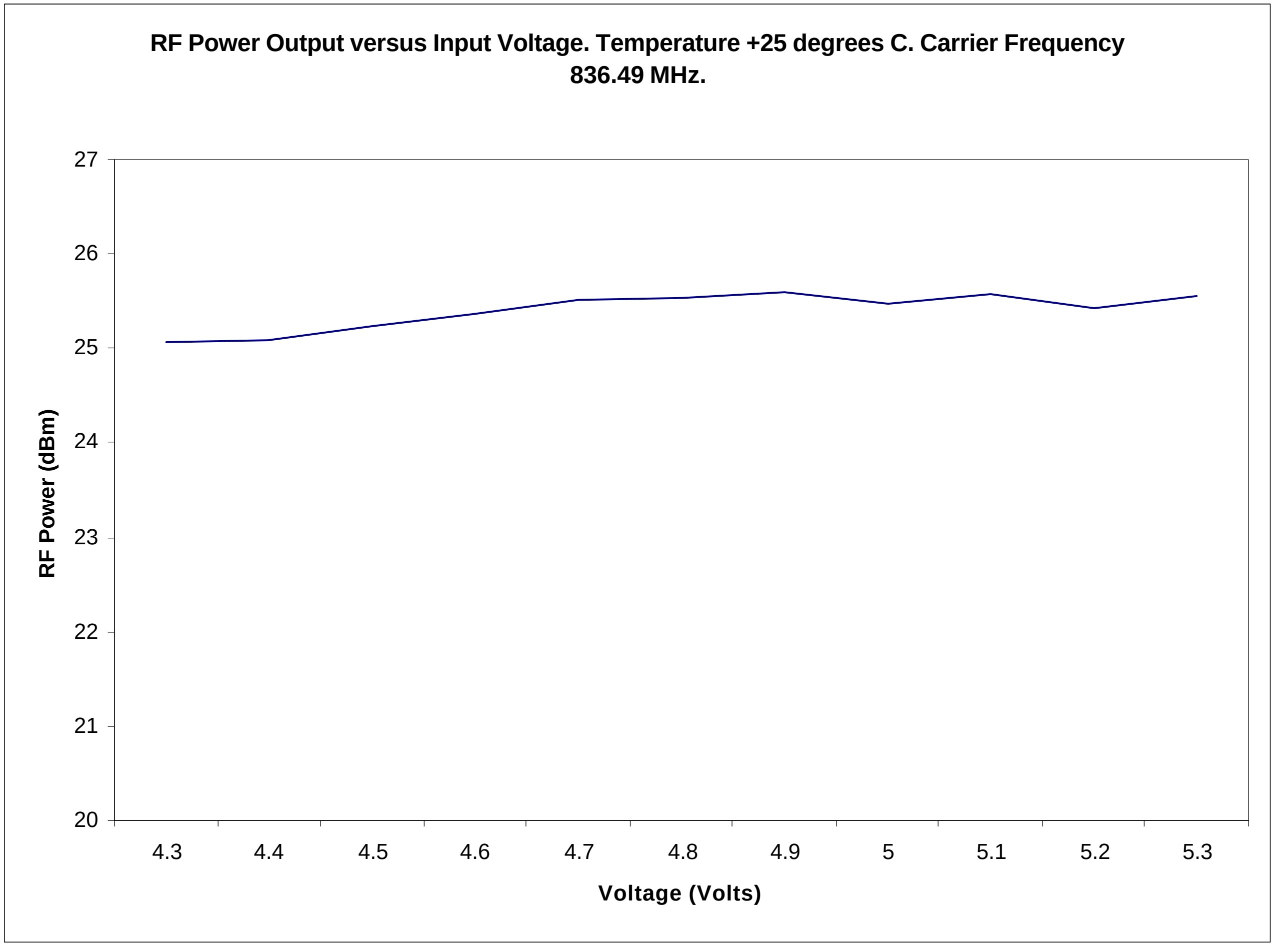


EXHIBIT 6B1

800 MHz AMPS MODULATION CHARACTERISTICS

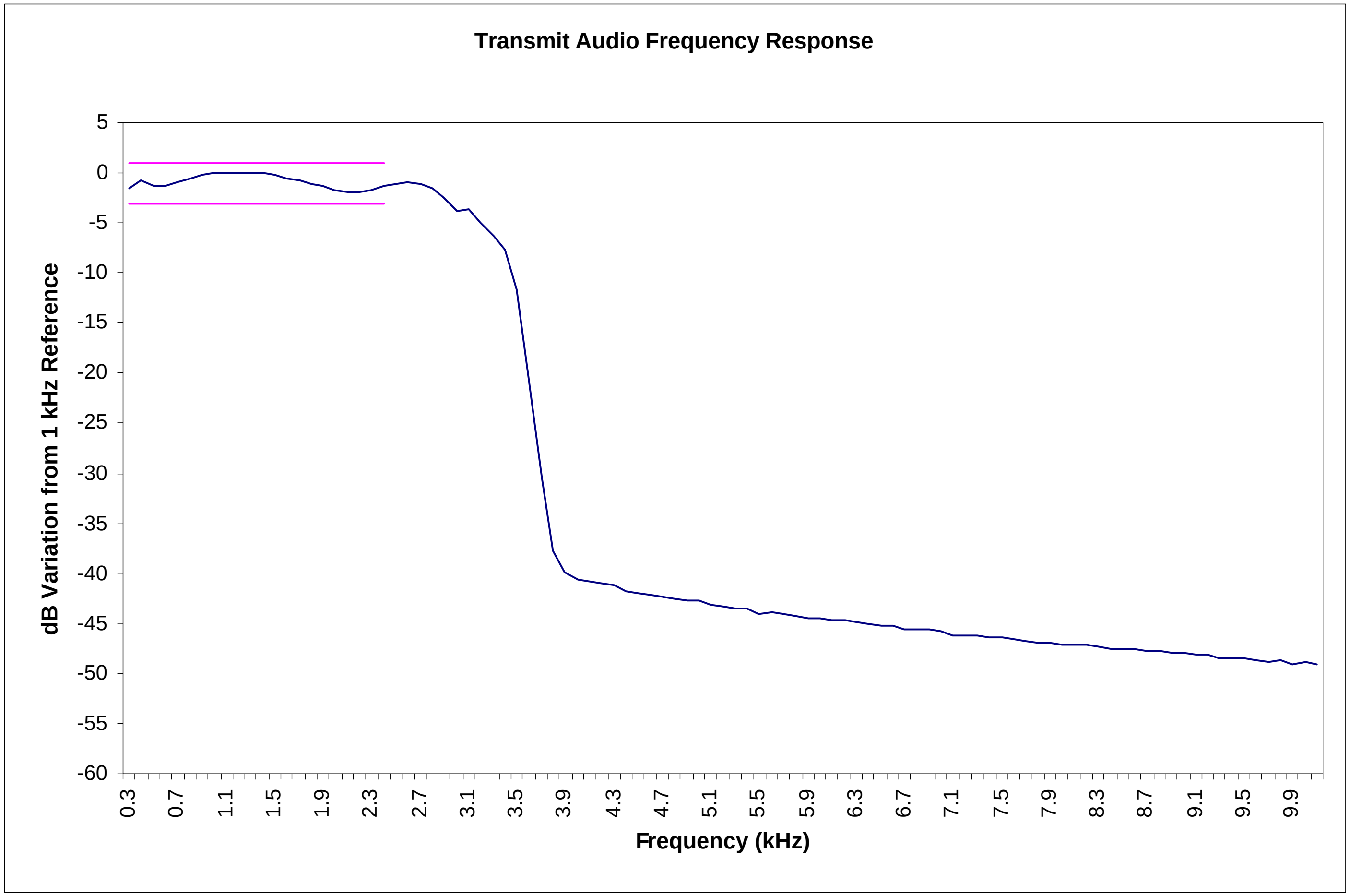
The frequency and amplitude response to audio inputs measured per IS-137A are shown on the following:

Exhibit #	Description	Clause
6B2	Transmit Audio Frequency Response	2.1047 (a,b)
6B3	Post Limiter Filter Attenuation	22.915 (d)
6B4	Modulation Limiting vs. Input Voltage	2.1047, 22.915 (b,1)

The measurements were made per IS-137A using a Hewlett Packard 8953DT North American Dual Mode Cellular Test System which includes the following equipment:

HP8958A Cellular Interface
HP 6623A DC Power Supply
HP 8596E Spectrum Analyzer
HP 437B RF Power Meter
HP 8901B Modulation Analyzer
HP 8903B Audio Analyzer
HP 35679 Signal Analyzer

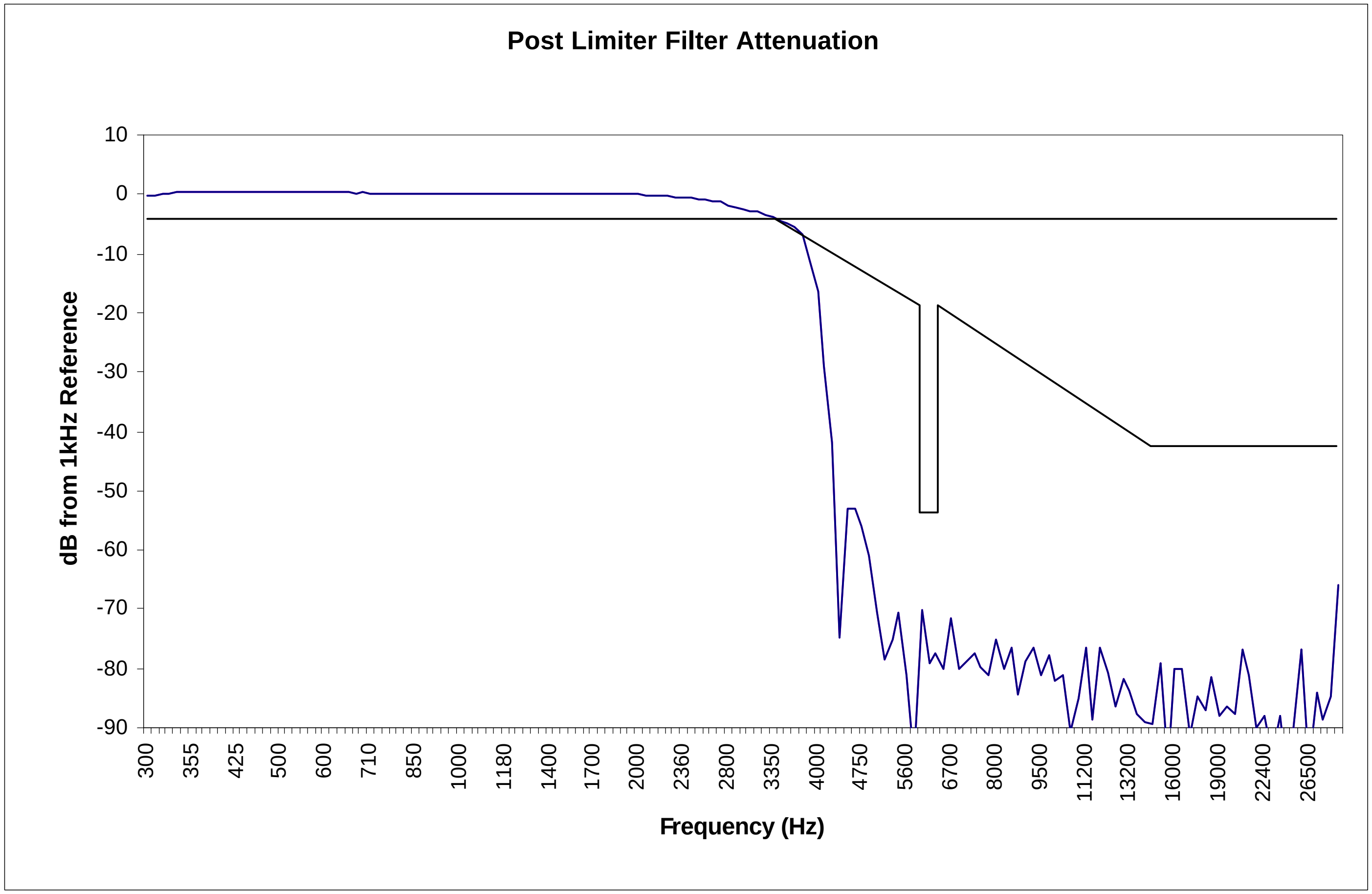
Exhibit 6B2


Transmit Audio Frequency Response
dB Variation from 1 kHz Reference
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
-55
-60
0.3
0.7
1.1
1.5
1.9
2.3
2.7
3.1
3.5
3.9
4.3
4.7
5.1
5.5
5.9
6.3
6.7
7.1
7.5
7.9
8.3
8.7
9.1
9.5
9.9
Frequency (kHz)

APPLICANT:
ERICSSON INC

FCC ID NO:
AXATR-393-A2

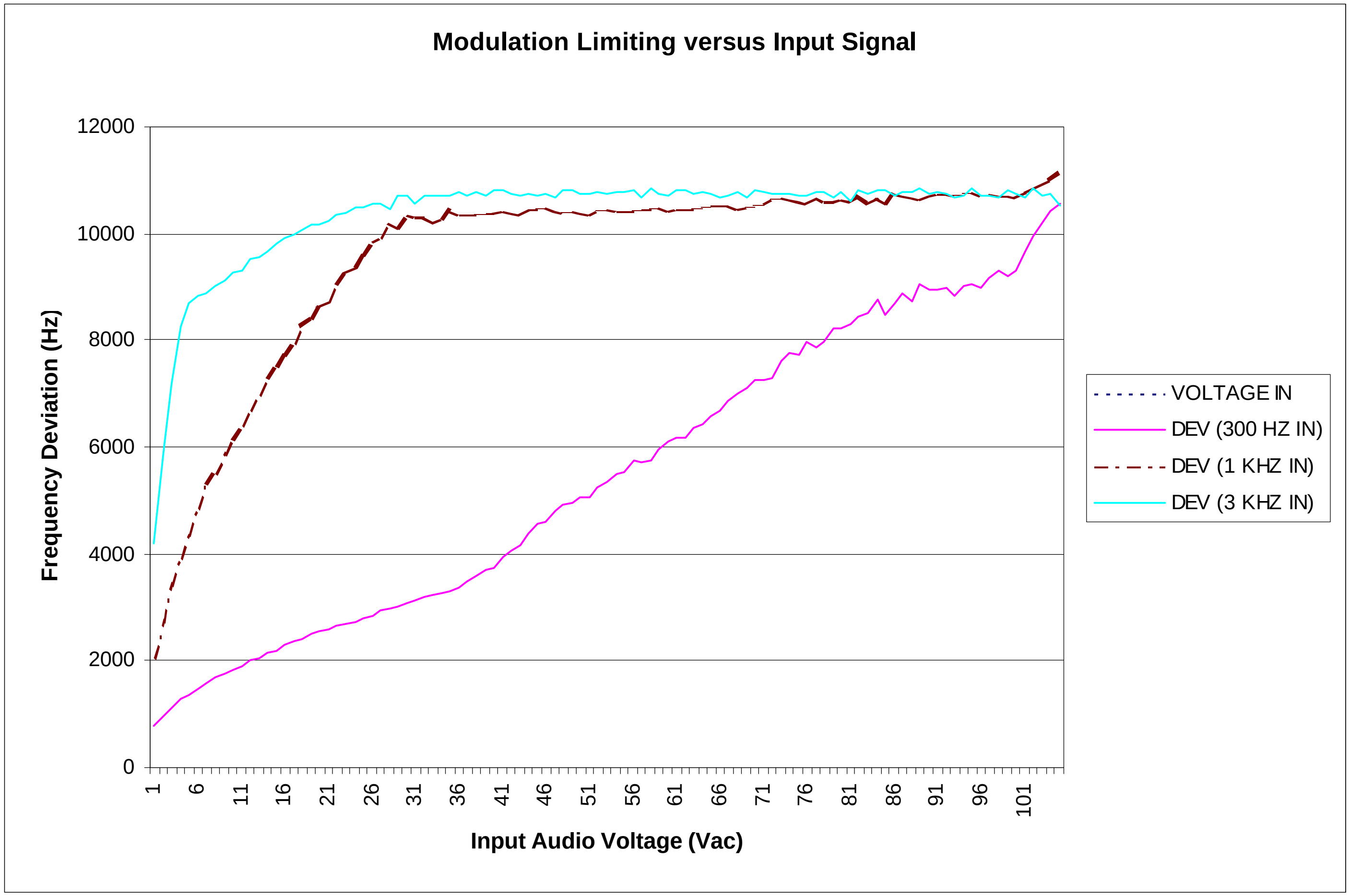
Exhibit 6B3



APPLICANT:
ERICSSON INC

FCC ID NO:
AXATR-393-A2

Exhibit 6B4



800 MHz AMPS OCCUPIED BANDWIDTH

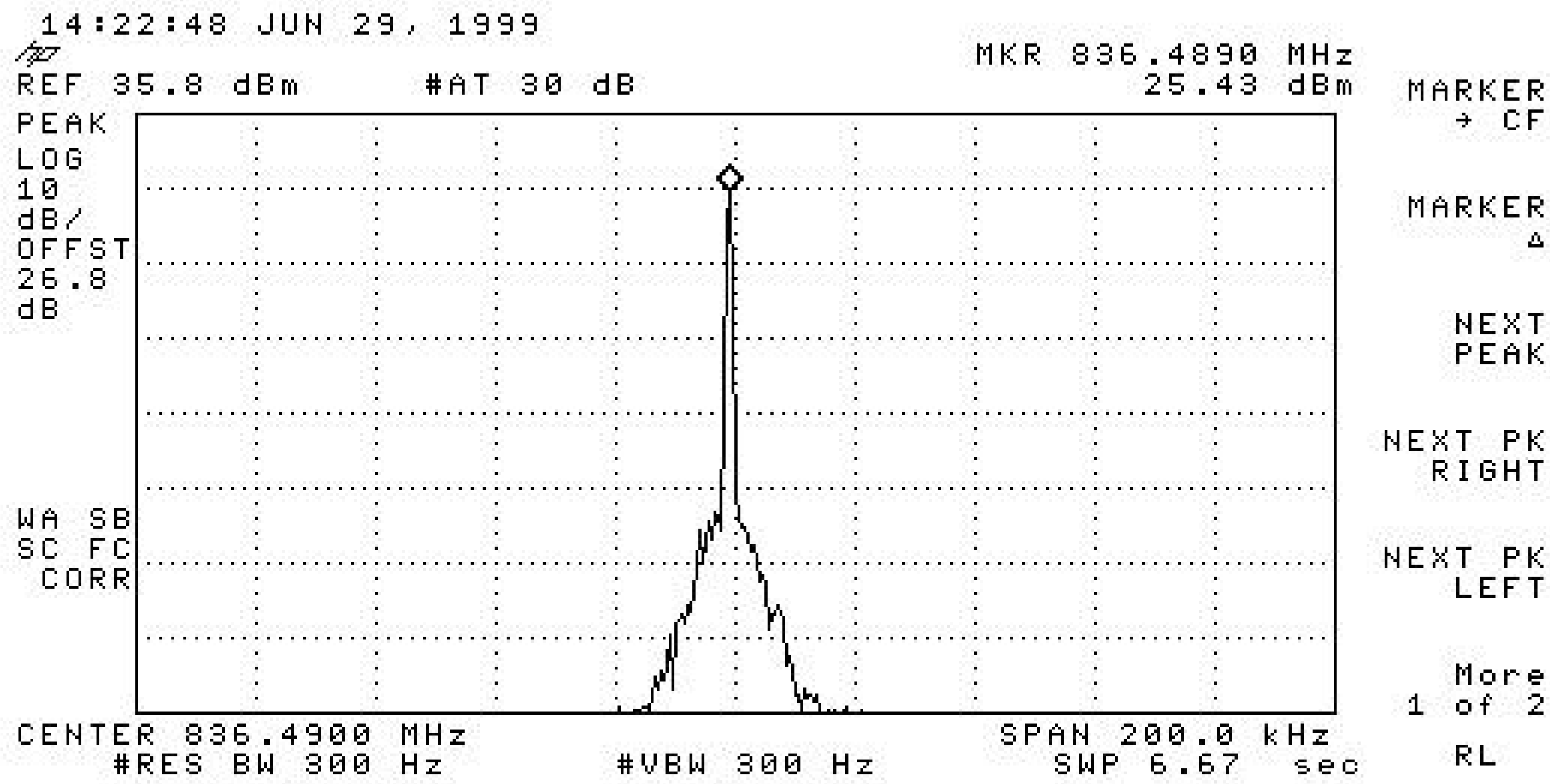
Part 22.917 (d)(1) the exhibits presented show the modulations that co-exist in a cellular system:

Exhibit #	Description	Power Level
6C2	Unmodulated Carrier	0
6C3	SAT and Voice	0
6C4	SAT and Signal Tone	0
6C5	SAT and DTMF #3	0
6C6	SAT and 10kb/s Wideband Data	0

These measurements wee made per IS-137A using a Hewlett Packard 8953DT North American Dual Mode Cellular Test System which includes the following equipment:

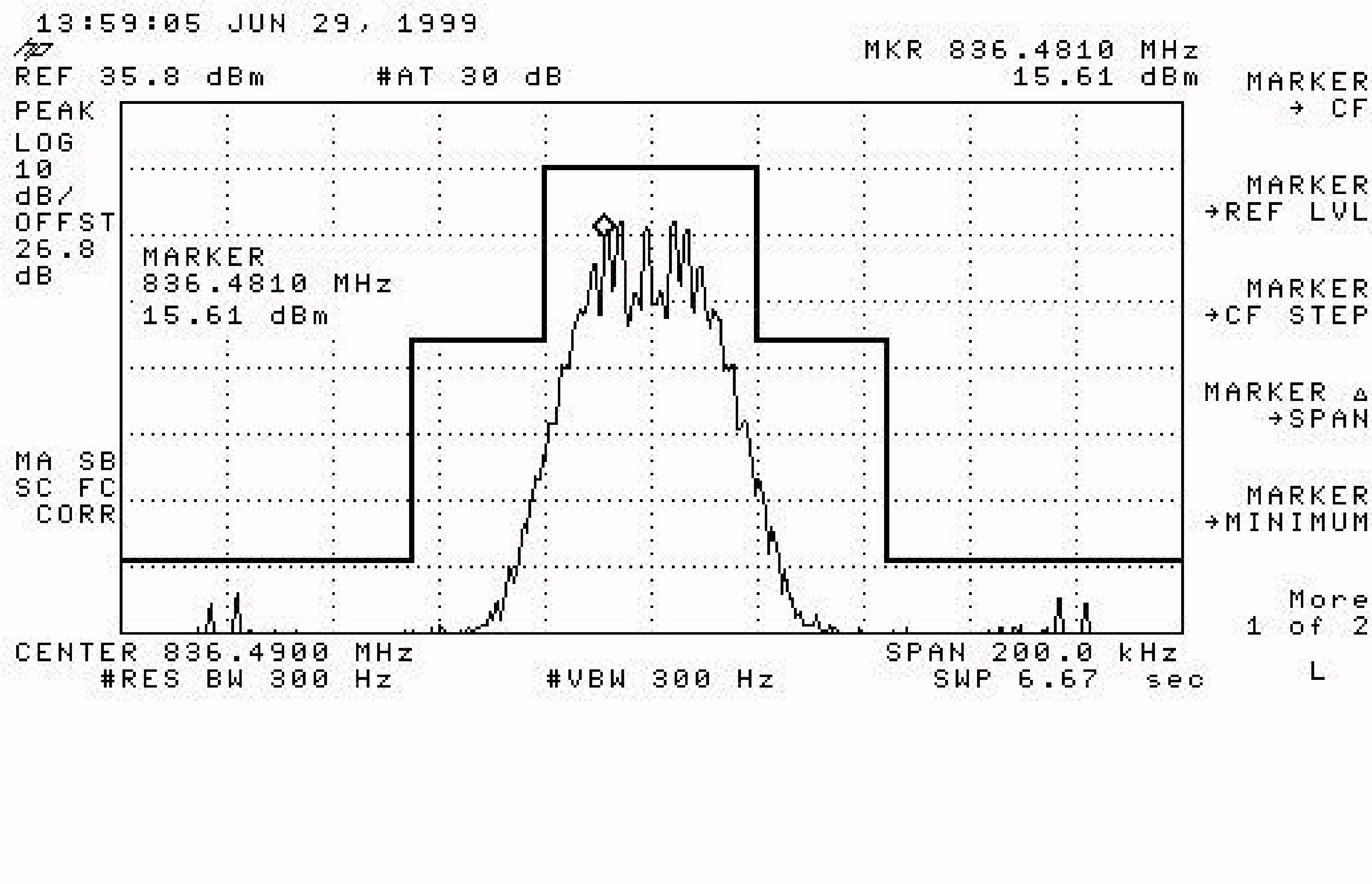
HP 8958A	Cellular Interface
HP 6623A	DC Power Supply
HP 8596E	Spectrum Analyzer
HP 437B	RF Power Meter
HP 8901B	Modulation Analyzer
HP 8903B	Audio Analyzer

Exhibit 6C2



Unmodulated Carrier. Power Level 0, Carrier Frequency 836.49 MHz, Carrier Power 25.43 dBm.

Exhibit 6C3

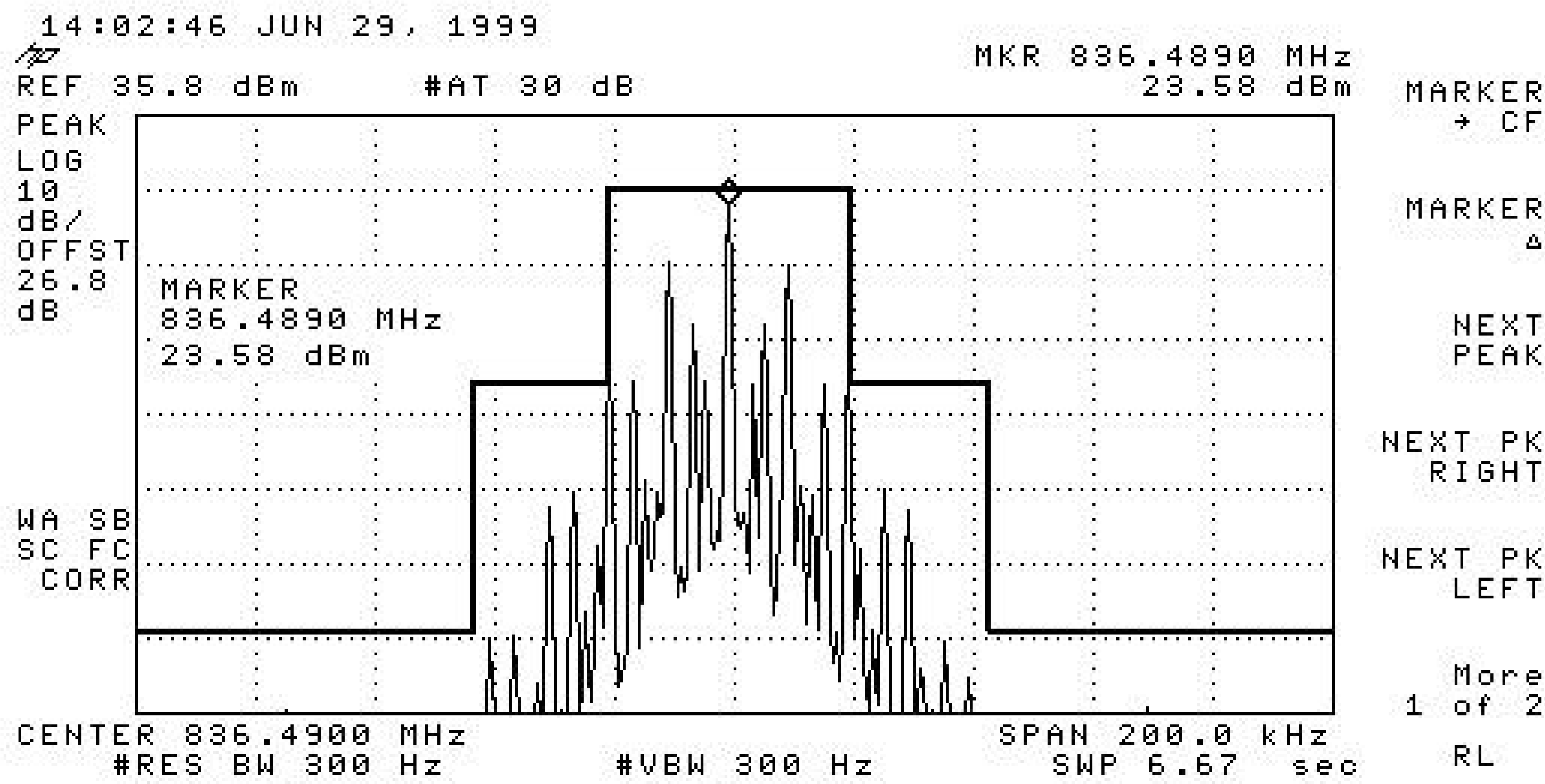


SAT and Voice. Power Level 0, Carrier Frequency 836.49 MHz, Carrier Power 25.48 dBm. Voice Tone 2500 Hz, SAT 6000 Hz, Total Deviation 11000Hz.
F3E Emissions Mask.

APPLICANT:
ERICSSON INC

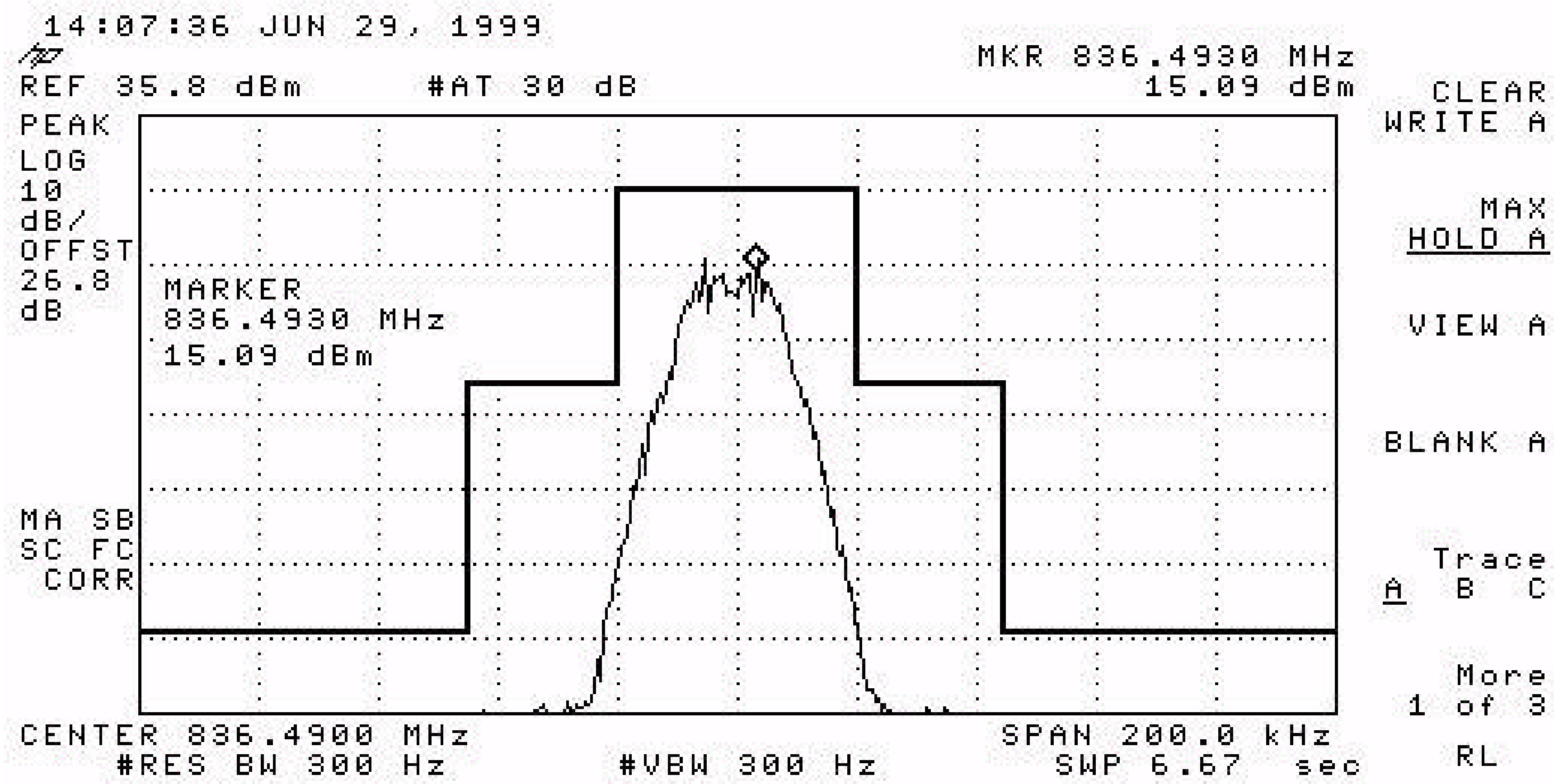
FCC ID NO:
AXATR-393-A2

Exhibit 6C4



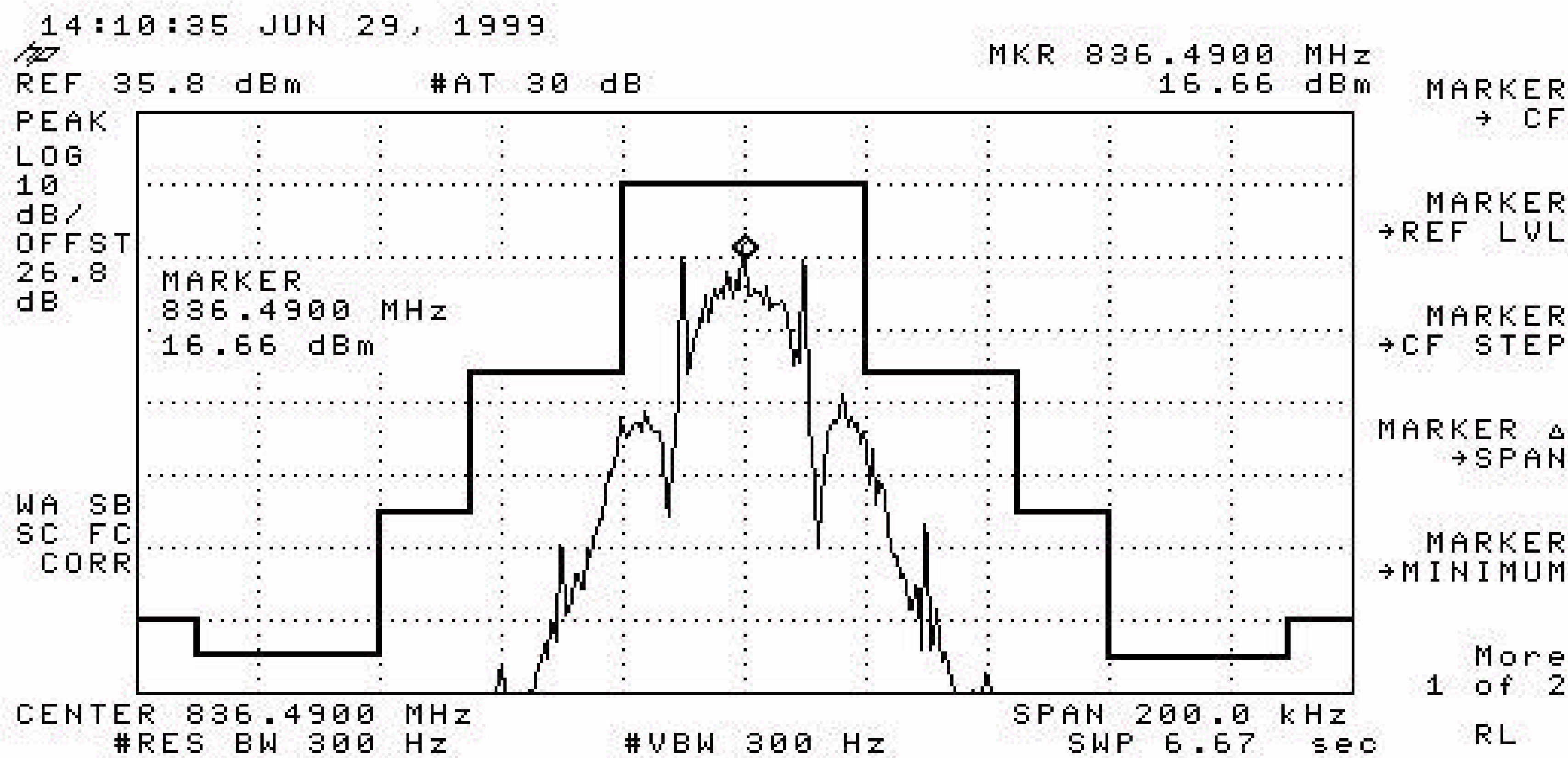
SAT and Signaling Tone. Power Level 0, Carrier Frequency 836.49 MHz, Carrier Power 25.48 dBm. F3E Emissions Mask.

Exhibit 6C5



SAT and DTMF #3. Power level 0, Carrier Frequency 836.49 MHz, Carrier Power 25.48 dBm. F3E Emissions mask.

Exhibit 6C6



SAT and Wideband 10 kb/S Digital data. Power Level 0, Carrier Frequency 836.49 MHz, Carrier Power 25.48 dBm. F1D Emissions Mask.

800 MHz AMPS SPURIOUS EMISSIONS (CONDUCTED)

Per 2.991 Spurious emissions at the antenna terminals (conducted) when properly loaded with an appropriate artificial antenna were measured per IS-137A.

EXHIBIT #	FREQUENCY	Output Power level
6D2	836.49	7
6D3	836.49	0

The measurements were made per IS-137A using the following equipment:

HP 8958A	Cellular Interface
HP 8901B	Modulation Analyzer
HP 8559A	Spectrum Analyzer

APPLICANT:
ERICSSON INC

FCC ID NO:
AXATR-393-A2

Exhibit 6D2

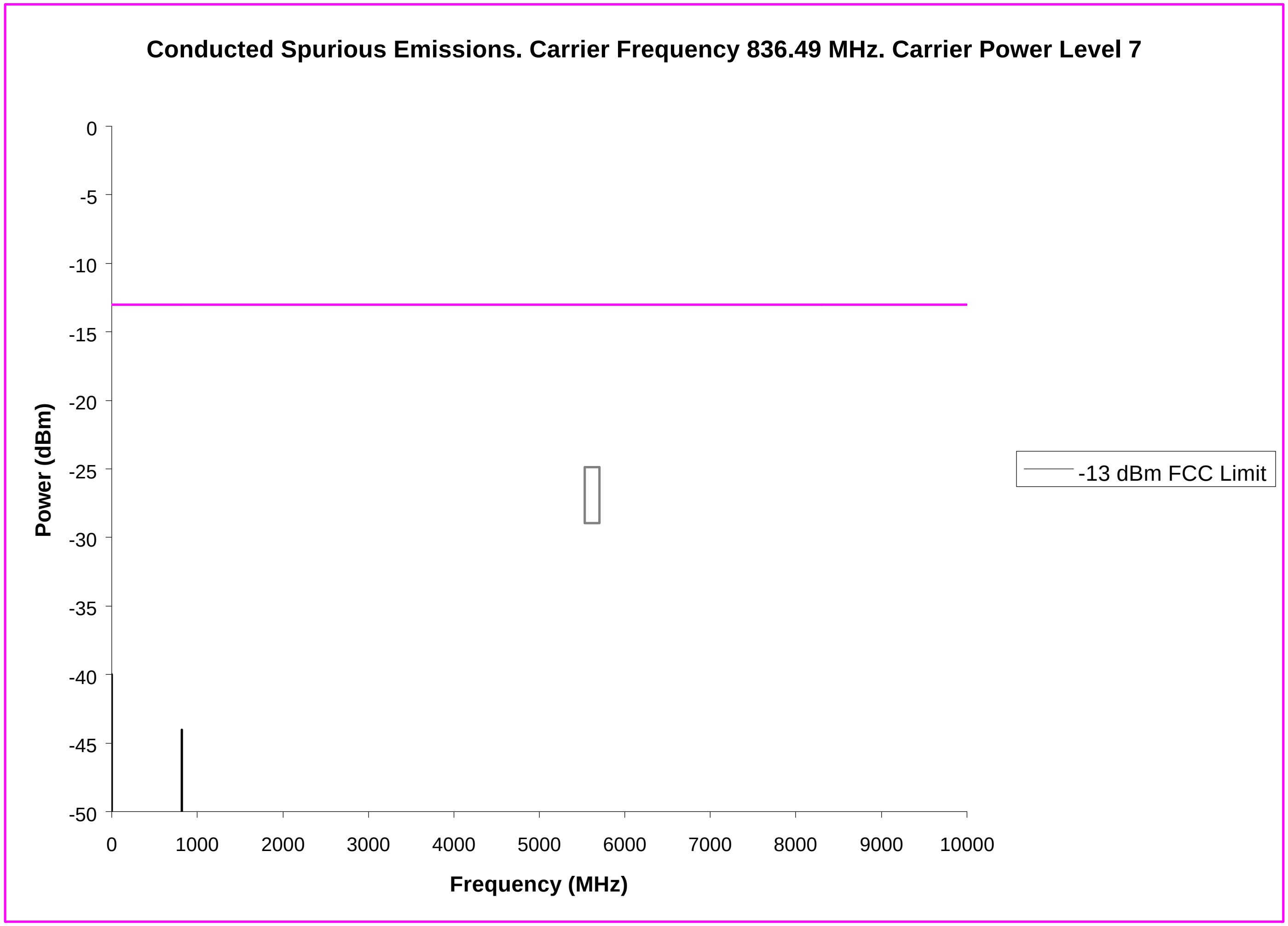
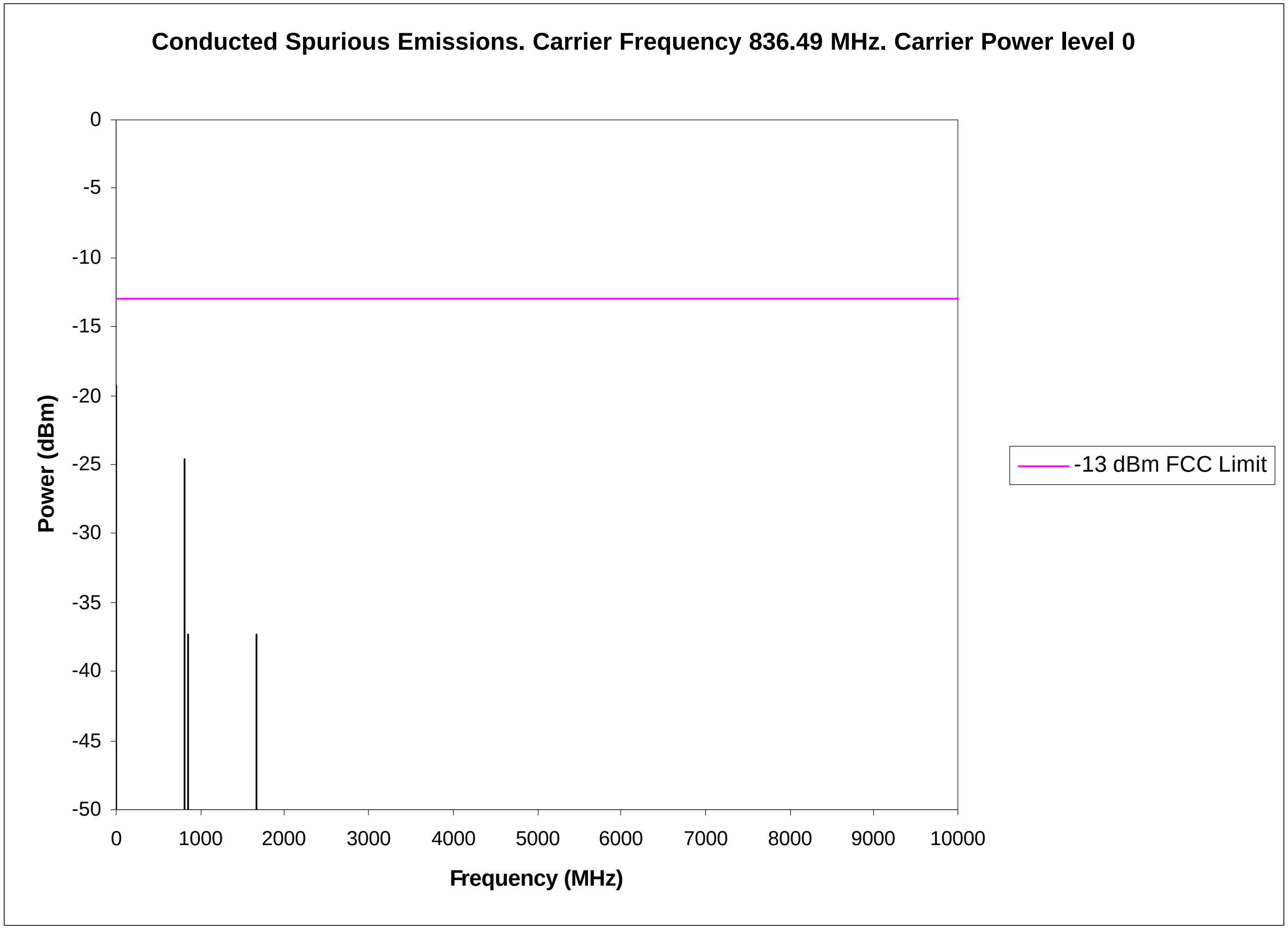


Exhibit 6D3


Conducted Spurious Emissions. Carrier Frequency 836.49 MHz. Carrier Power level 0
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
Power (dBm)
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
Frequency (MHz)
-13 dBm FCC Limit

800 MHz AMPS SPURIOUS EMISSIONS (Radiated)

Per 2.993 and 22.917 (e), field strength of spurious radiation was measured at Underwriters Laboratories Inc. Research Triangle Park, NC site. The measurement procedure is per EIA IS-137 conducted on a 3 meter test site. Results are shown on the following Exhibits.

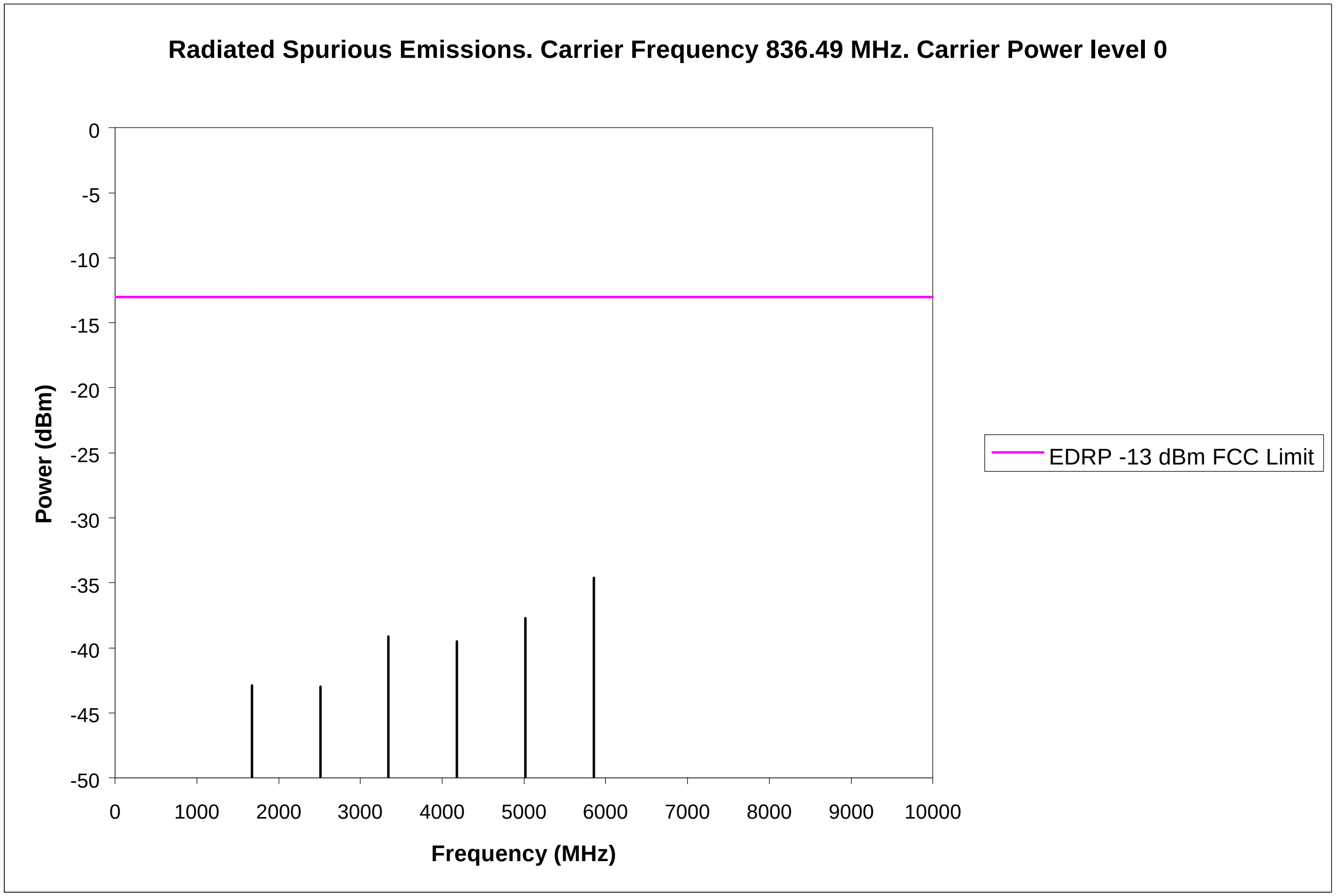
Note: The spectrum was examined through the 10^{th} harmonic of the carrier. Measurements recorded are peak measurements.

EXHIBIT	FREQUENCY	OUTPUT POWER LEVEL
6E2	836.49 MHz	0

The measurements were made per IS-137A using the following equipment:

8566B Spectrum Analyzer 100 Hz - 2.5GHz \ 2 - 22 GHz
85650A Quasi Peak Detector
HP Amplifier 8449B Opt H02 1 - 26.5 GHz
HP Signal Generator 8657B .1 - 2060 MHz

Exhibit 6E2


Radiated Spurious Emissions. Carrier Frequency 836.49 MHz. Carrier Power level 0
Power (dBm)
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
Frequency (MHz)
EDRP -13 dBm FCC Limit

800 MHz AMPS FREQUENCY STABILITY

Per 2.995 (a)(1),(b),(d)(1)

The 800 MHz AMPS and DAMPS modes employ the same frequency stability components to ensure stability. The data and plots shown in exhibit 6F also represent 800MHz DAMPS.

EXHIBIT #	Voltage	Temperature
6F2	4.3 to 5.3 Volts (varied)	+25 C
6F3	4.8 Volts	Varied

Note: The manufacturers rated voltage for the battery is 4.3 VDC to 5.3 VDC.

The measurements were made per IS-137A using a Hewlett Packard 8953DT North American Dual Mode Cellular Test System which includes the following equipment:

HP8958A Cellular Interface
HP 6623A DC Power Supply
HP 8596E Spectrum Analyzer
HP 437B RF Power Meter
HP 8901B Modulation Analyzer
HP 8903B Audio Analyzer
Thermotron SM-8C Temperature Chamber

Exhibit 6F2

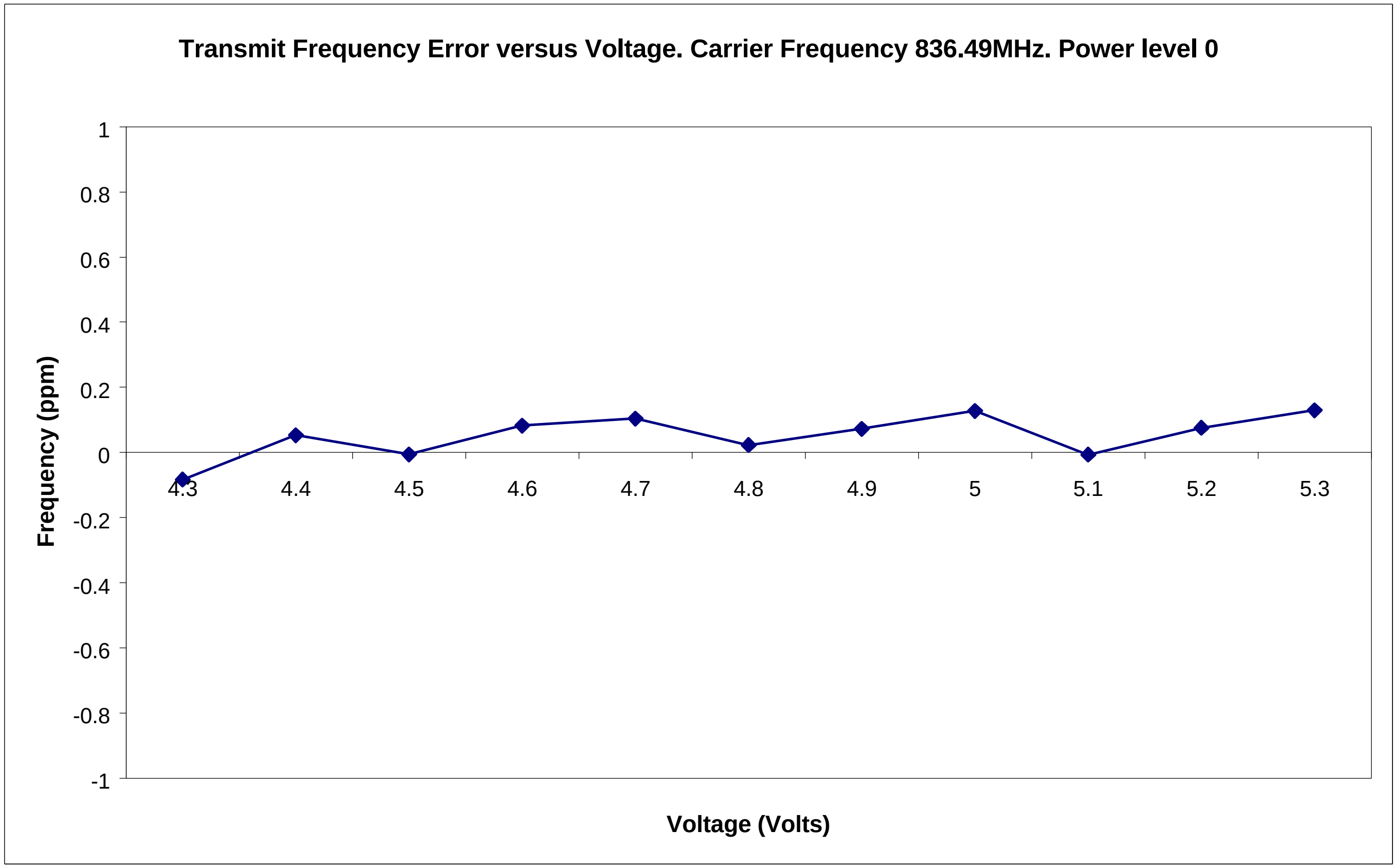
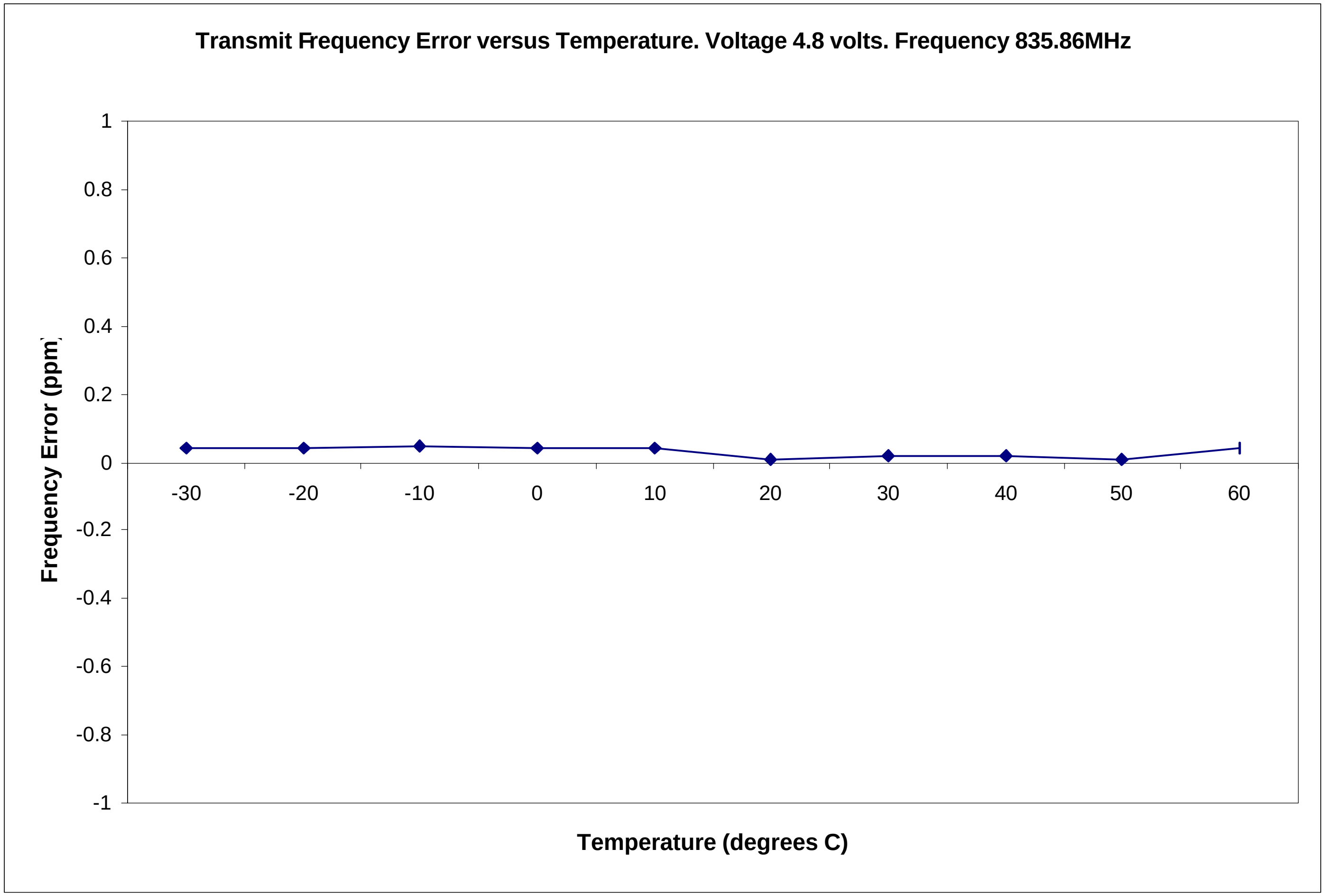

Transmit Frequency Error versus Voltage. Carrier Frequency 836.49MHz. Power level 0
Frequency (ppm)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
4.3
4.4
4.5
4.6
4.7
4.8
4.9
5
5.1
5.2
5.3
Voltage (Volts)

Exhibit 6F3


Transmit Frequency Error versus Temperature. Voltage 4.8 volts. Frequency 835.86MHz
Frequency Error (ppm)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-30
-20
-10
0
10
20
30
40
50
60
Temperature (degrees C)

800 MHz DAMPS RF POWER OUTPUT

Para. 2.985 (a) 22.913

The RF Power measured at the output terminals (antenna connector) is plotted against supply voltage variations at the highest levels.

EXHIBIT	SUPPLY VOLTAGE (V)	TEMPERATURE	POWER LEVEL	TX FREQ_t
6G2	4.8Volts	Varied	0	Mid Band
6G3	Varied	+ 25 C	0	Mid Band

Output power was measured conducted, via a standard antenna connector.

The measurements were made per IS137A using the following equipment:
Hewlett Packard 8593 E Spectrum Analyzer
Hewlett Packard 437B Power Meter
Hewlett Packard 8566 B Spectrum Analyzer
Thermotron SM-8C temperature Chamber

EFFECTIVE ISOTROPIC RADIATED POWER

The following is a description of the substitution method used to obtain accurate EIRP readings at the carrier fundamental frequency:

(1) EUT measurements are made at 3 m using calibrated antennas and equipment with known cable losses.
(2) A peak measurement is made by raising and lowering the antenna and rotating the EUT 360 degrees. Horizontal and Vertical Polarization data is recorded.
(3) A generator and dipole antenna are then substituted for the EUT. The dipole antenna is a half-wave dipole. If a dipole antenna cannot be used, then the designated antenna is referenced to a dipole antenna.
(4) Measurements are made through the dipole antenna at known power levels to determine the system calibration factors at a given frequency.
(5) At frequencies where no calibration data is taken, the value is interpolated between the closest data point above and below the transmit frequency. Calibration data is taken with a half-wave dipole antenna.

Table: Power comparison chart for all modes – SAR versus radiated power

Mode	f (MHz)	SAR (dBm)	* Radiated (dBm/mW)
AMPS	824	26.10	22.66 EDRP
	837	26.65	23.43 EDRP
	849	25.90	22.66 EDRP
D-AMPS	824	25.90	22.66 EDRP
	837	26.10	23.43 EDRP
	849	25.90	22.66 EDRP
D-AMPS	1850	25.50	25.99 EIRP
	1880	25.80	27.37 EIRP
	1910	26.00	24.57 EIRP

* Power used for declared power on Grant

Exhibit 6G2

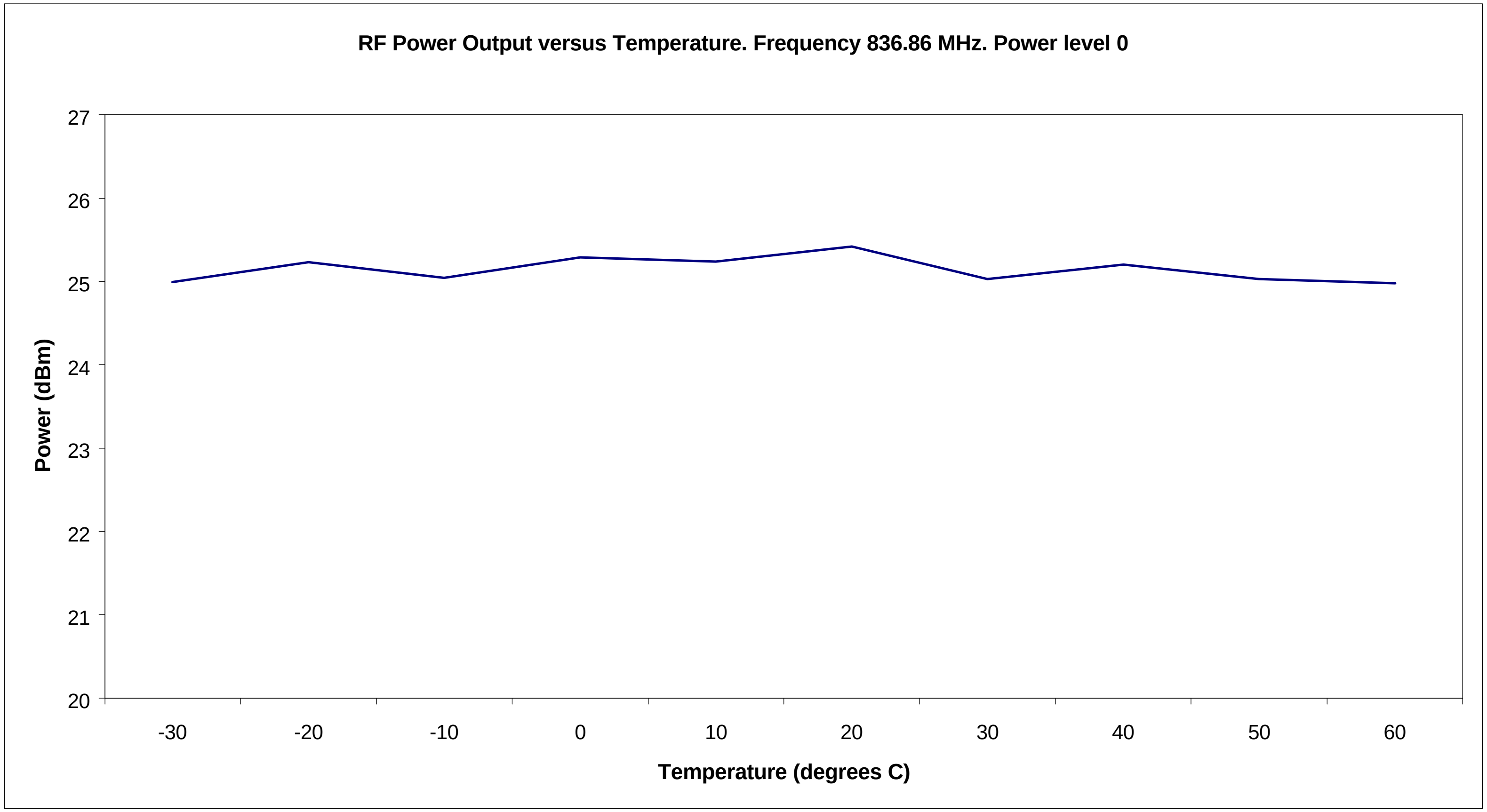
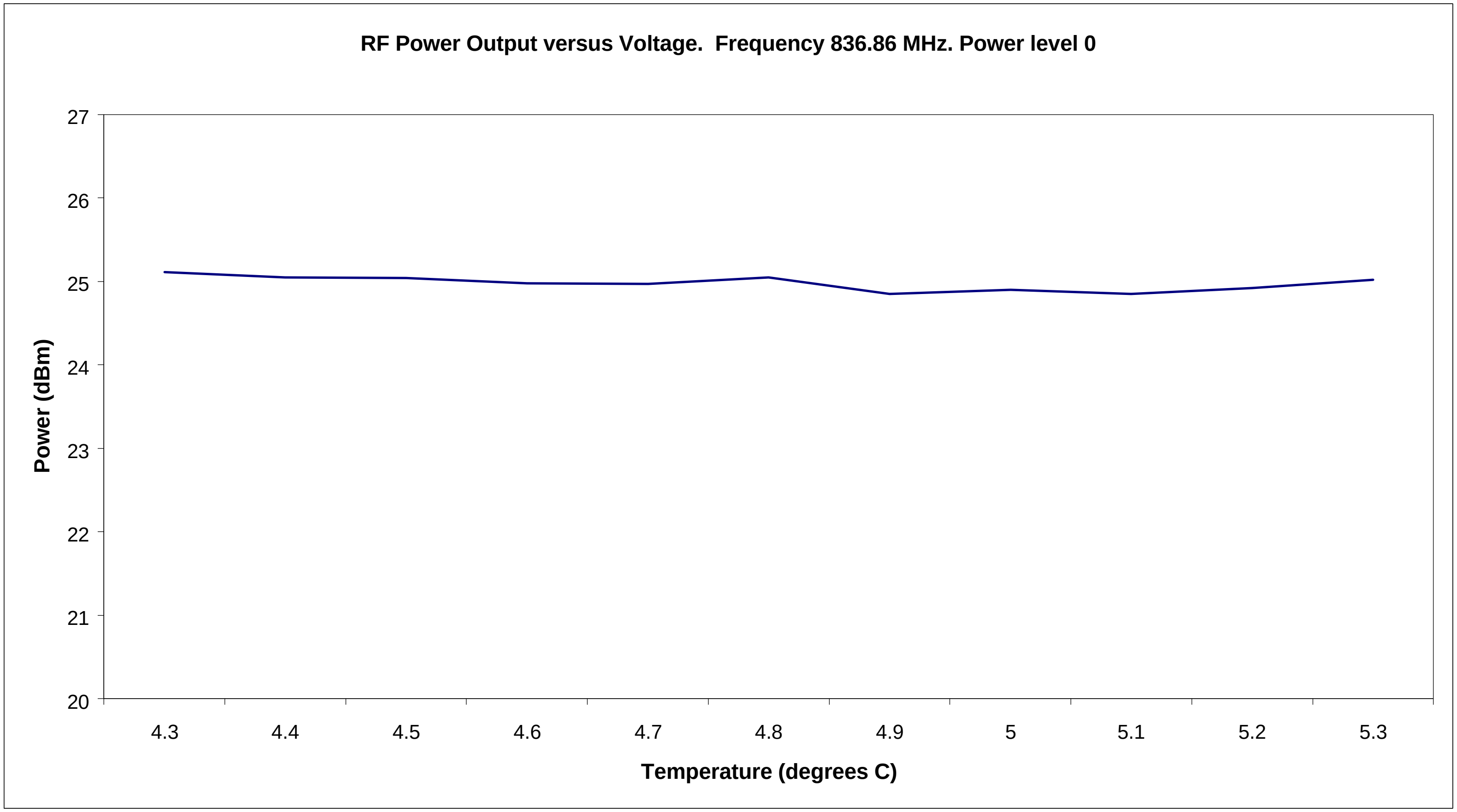

RF Power Output versus Temperature. Frequency 836.86 MHz. Power level 0
Power (dBm)
27
26
25
24
23
22
21
20
-30
-20
-10
0
10
20
30
40
50
60
Temperature (degrees C)

Exhibit 6G3


RF Power Output versus Voltage. Frequency 836.86 MHz. Power level 0
Power (dBm)
27
26
25
24
23
22
21
20
4.3
4.4
4.5
4.6
4.7
4.8
4.9
5
5.1
5.2
5.3
Temperature (degrees C)

800/1900 MHz: DAMPS MODULATION CHARACTERISTICS

Definition

The transceiver shall be capable of generating $\pi/4$ shifted differentially encoded quadrature phase shift keying signals. The transmitted signal is given by:

$$S(t) = \sum_n g(t-nT) \cos(\phi n) \cos(\omega ct) - \sum_n g(t-nT) \sin(\phi n) \sin(\omega ct)$$

where g(t) is the pulse shaping function that corresponds to a square root raised cosine baseband filter with roll off factor of 0.35, ωc is the radian carrier frequency, T is the symbol period, and ϕn is the absolute phase corresponding to the nth symbol interval. The symbol rate (1/T) is 24.3 k symbols /sec.

The modulation accuracy requirement is specified by setting limits on the RMS difference between the actual transmitted signal waveform and the ideal signal waveform. The ideal waveform is derived mathematically from the specification of modulation shown above. The specified requirement is error vector magnitude.

For this measurement, frequency accuracy shall meet the requirements of Section 3.1 prior to measurement.

The average carrier frequency error is the difference between the average carrier frequency of the actual transmitted waveform and the average signal waveform carrier frequency.

The ideal modulation is defined above. The definition is such that, observing an ideal transmitter through an ideal root raised-cosine receiver filter at the correct sampling instants one symbol apart would result in the sequence of values given by:

$$S(k)=S(k-1)e^{j\{\pi/4+B(k)*\pi/2\}}$$

where B(k) = 0,1,2,3 according to the following table:

Xk	Yk	B(k)
0	0	0
0	1	1
1	1	2
1	0	3

In the forward channel, S(k) forms part of a continuous data stream. In the reverse channel, the transit bursts from the mobile are truncated by power up and down ramping. In this case, S(6) is the first sample that enters into demodulation, which yields the first two information bits by comparing S(6) with S(7). The last information bits lie in the comparison of S(162) and S(161).

The ideal transmit and receive filters in cascade form a raised cosine Nyquist filter having an impulse response going through zero at symbol period intervals, so there is no inter-symbol interference at the ideal sampling points. The ideal signal sampler therefore, take on one of the eight values defined above, at the output of the receive filter.

This section defines how the output signal from a transmitter is to be evaluated against the ideal signal.

Let Z(k) be the complex vectors produced by observing the real transmitter through an ideal measuring receive filter at instants k, one symbol period apart. With S(k) defined as above, the transmitter is modeled as:

$$Z(k) = [C0 + C1 * [S(k)+E(k)]] * W^{k}$$

where:

k = n/24.3KHz

$W = e^{dr=jda}$ accounts for both a frequency offset giving “da” radians per symbol phase rotation and an amplitude changes of “dr” nepers per symbol:

C0 is a constant origin offset representing quadrature modulator imbalance,
C1 is a complex constant representing the arbitrary phase and output power of the transmitter, and
E(k) is the residual vector error on sample S(k)

The sum square vector error is then:

$$\sum_{k=MIN}^{k=MAX} |E(k)|2 \qquad \sum_{k=MIN}^{k=MAX} |\{[Z(k) * W \quad -C0]/C1\} -S(k)|$$

C0, C1 and W shall be chosen to minimize this expression and are then used to compute the individual vector errors E(k) on each symbol. The symbol timing phase of the receiver output samples used to compute the vector error shall also be chosen to give the lowest value.

The values of MAX and MIN for the reverse channel (mobile station transmitter) are:

MIN = 6
MAX = 162

The RMS vector error is then computed as the square root of the sum-square vector divided by the number of symbols in the slot, (157 in the reverse direction).

Method of Measurement

Connect the mobile station to the Standard Test Source and Modulation Accuracy Equipment. Modulate the Standard Test Source with pseudo-random Data Field bits. The mobile station shall transpond the Data Field bits using the TDMAON command. Use the Modulation Accuracy Measurement Equipment to measure the modulation accuracy of the mobile station.

Minimum Standard

The RMS vector error in any burst shall be less than 12.5%. In addition, the normalized error vector magnitude during the first 10 symbols (20 bits) of a burst following the ramp-up, must have an RMS value of less than 25% when averaged over 10 bursts within a 1 minute interval. The minimum standard for frequency offset is specified in section 3.1.2.2.3 of IS 137. The origin offset in any burst shall be less than -20 dBc.

800 MHz DAMPS OCCUPIED BANDWIDTH

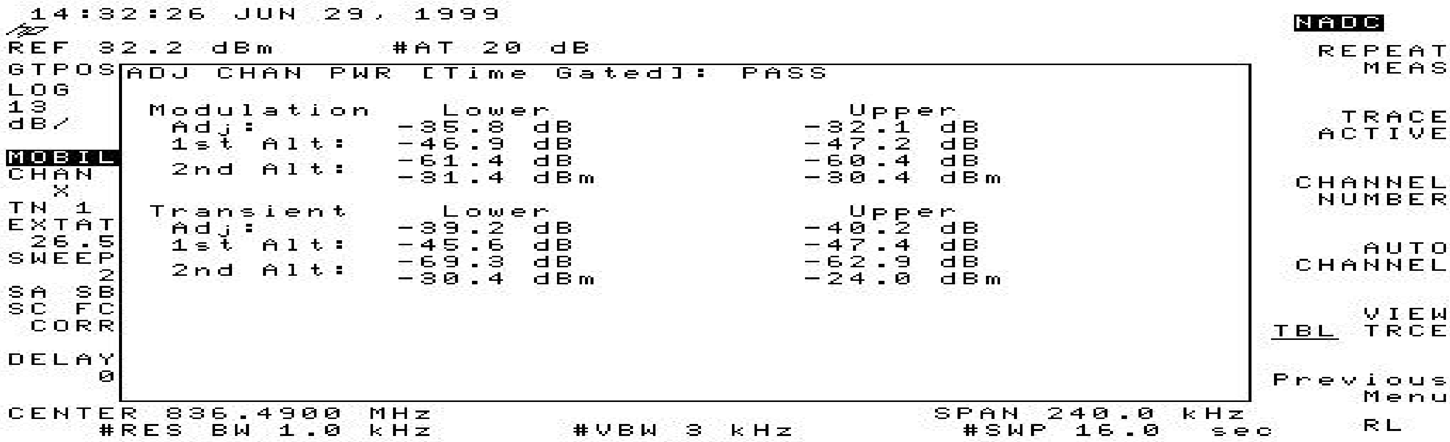
Part 22.917 (d)(1) the exhibits presented show the modulations that exist in a DAMPS cellular system:

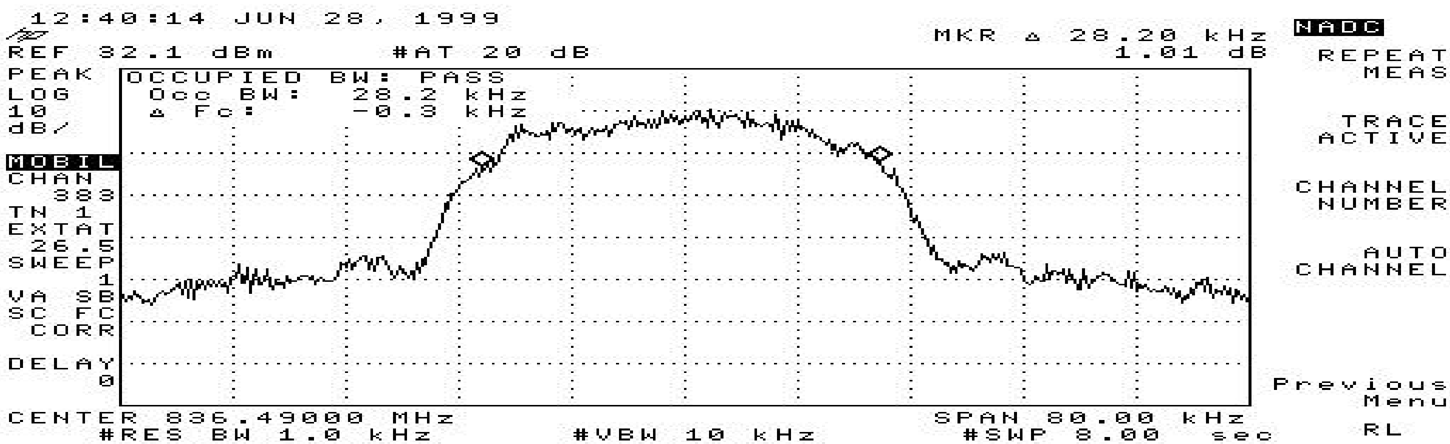
Exhibit #	Description	Power Level
6I2	48.6kb/s Wideband Data	0

These measurements were made per IS-137A using a Hewlett Packard 8953DT North American Dual Mode Cellular Test System which includes the following equipment:

HP 8958A	Cellular Interface
HP 6623A	DC Power Supply
HP 8596E	Spectrum Analyzer
HP 437B	RF Power Meter
HP 8901B	Modulation Analyzer
HP 8903B	Audio Analyzer

Exhibit 6I2





Wideband Data 48.6 kb/s switched (Data). Power Level 7, Carrier Frequency 836.49 MHz, Carrier Power 6.99 dBm.
Plots showing occupied bandwidth of 28.2 kHz and alternate and adjacent power.

800 MHz DAMPS SPURIOUS EMISSIONS (CONDUCTED)

Per 2.991 Spurious emissions at the antenna terminals (conducted) when properly loaded with an appropriate artificial antenna were measured per IS-137A.

EXHIBIT #	FREQUENCY	Output Power Level
6J2	836.49	10
6J3	836.49	0

The measurements were made per IS-137A using the following equipment:

Hp 8958A	Cellular Interface
Hp 8901B	Modulation Analyzer
Hp 8559A	Spectrum Analyzer

Exhibit 6J2

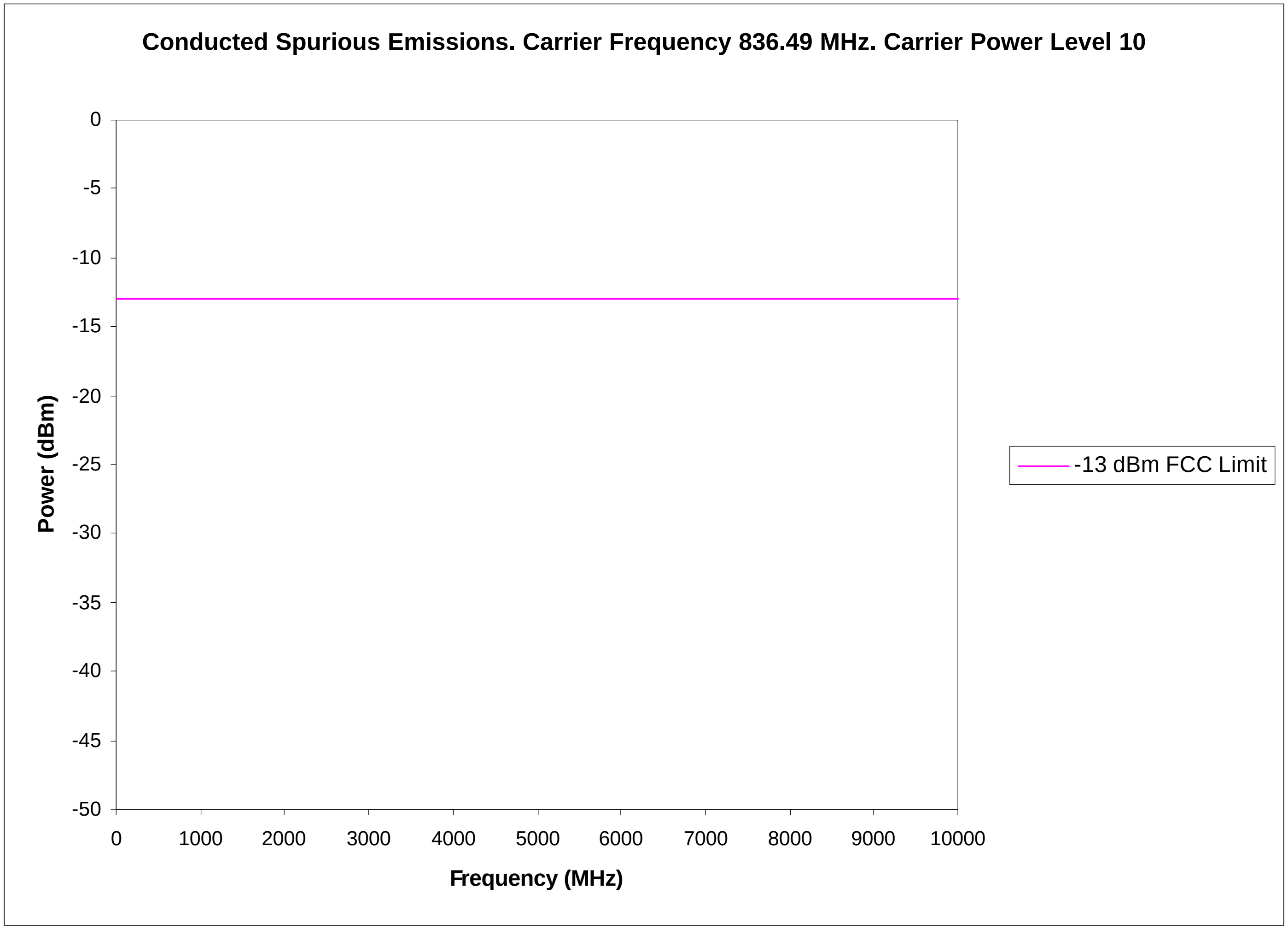

Conducted Spurious Emissions. Carrier Frequency 836.49 MHz. Carrier Power Level 10
Power (dBm)
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
Frequency (MHz)
-13 dBm FCC Limit

Exhibit 6J3

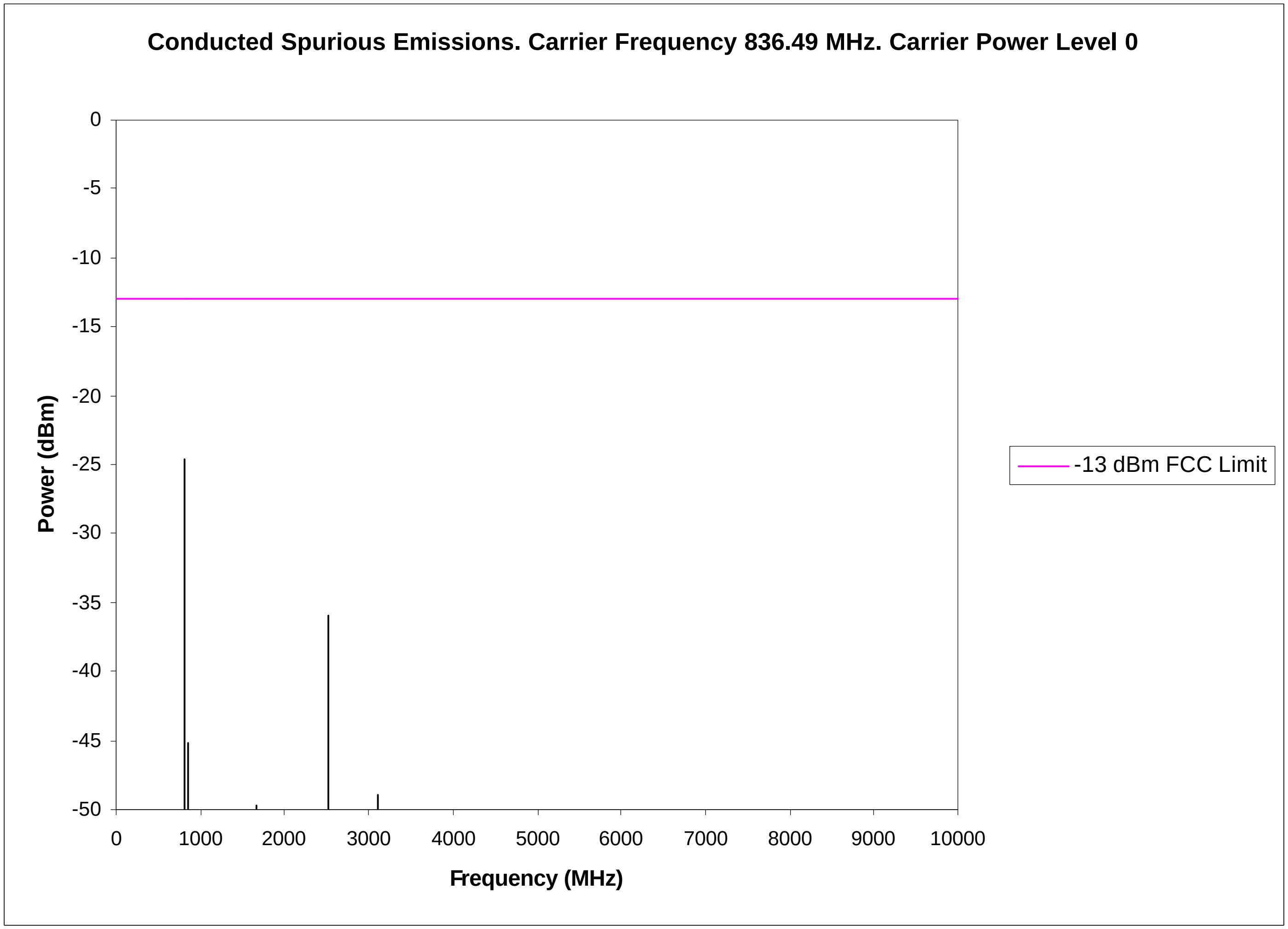

Conducted Spurious Emissions. Carrier Frequency 836.49 MHz. Carrier Power Level 0
Power (dBm)
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
Frequency (MHz)
-13 dBm FCC Limit

EXHIBIT 6K1

800 MHz DAMPS SPURIOUS EMISSIONS. RADIATED

Para: 2.993 and Part 22

Per 2.993 and Part 22, field strength of spurious radiation was measured at Underwriters Laboratories Inc. Research Triangle Park, NC site. The measurement procedure is per EIA IS-137 conducted on a 3 meter test site. Results are shown on the following Exhibits.

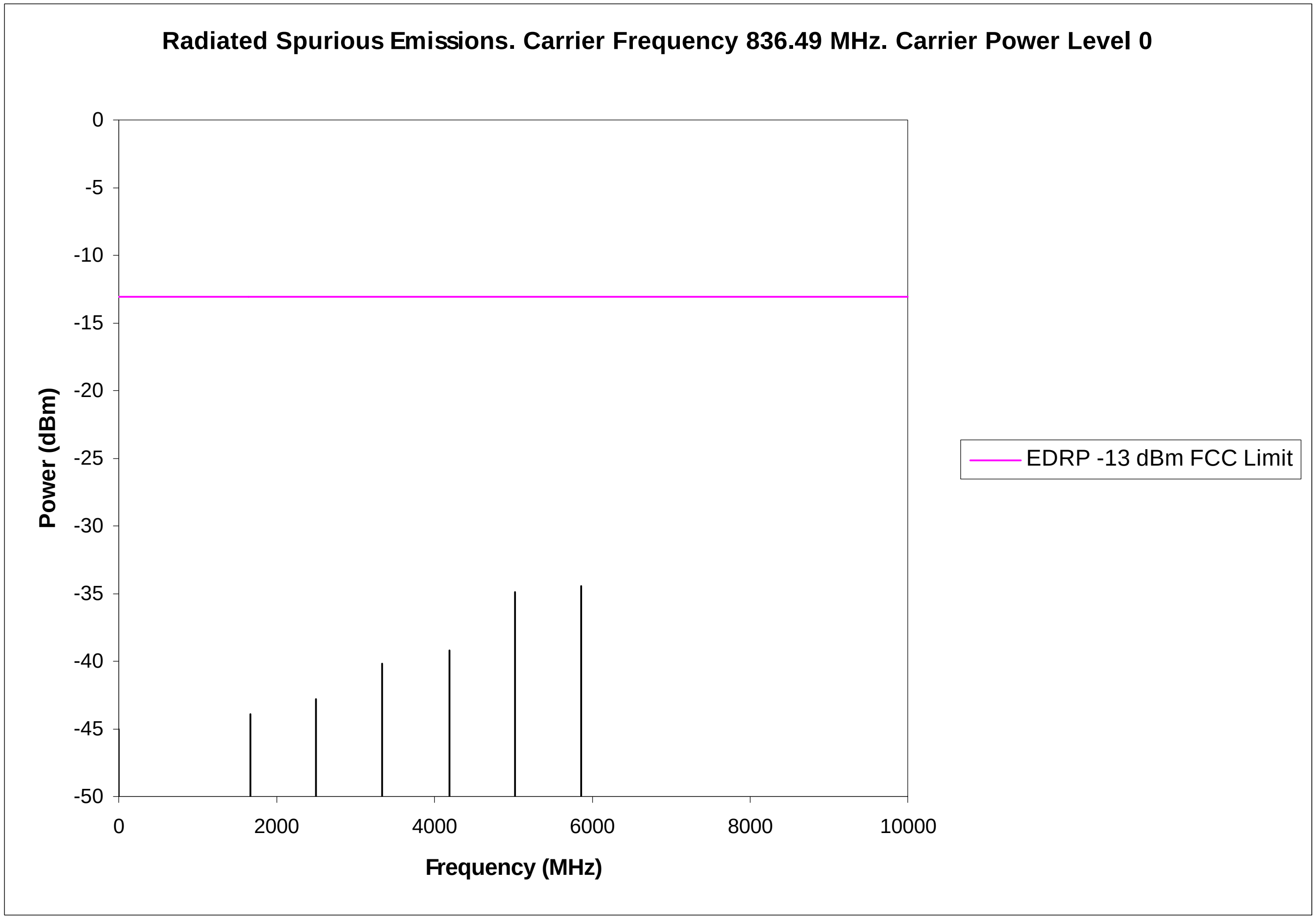
Note: The spectrum was examined through the 10th harmonic of the carrier. Measurements recorded are peak measurements.

Exhibit	Frequency (MHz)	Output Power Level
6K2	836.49	0

The measurements were made using the following equipment:

8566B Spectrum Analyzer 100 Hz - 2.5GHz \ 2 - 22 GHz
85650A Quasi Peak Detector
HP Amplifier 8449B Opt H02 1 - 26.5 GHz
HP Signal Generator 8657B .1 - 2060 MHz

Exhibit 6K2


Radiated Spurious Emissions. Carrier Frequency 836.49 MHz. Carrier Power Level 0
Power (dBm)
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
0
2000
4000
6000
8000
10000
Frequency (MHz)
EDRP -13 dBm FCC Limit

800 MHz DAMPS FREQUENCY STABILITY

Per 2.995 (a)(1),(b),(d)(1)

The 800 MHz AMPS and DAMPS modes employ the same frequency stability components to ensure stability. The data and plots shown in exhibit 6F also represent 800MHz DAMPS.

EXHIBIT 6M1

1900 MHz DAMPS RF POWER OUTPUT

Para. 2.1033 (c,6,7), 2.1046 and 24.232 (b,c)

The RF power measured at the output terminals (antenna connector) is plotted against supply voltage variation and temperature variations at the highest levels.

Exhibit	Voltage (V)	Temperature	TX Freq	Power Level
6M2	4.8	Varied	Mid Band	0
6M3	Varied	+25 C	Mid Band	0

The measurements were made per IS-137A using a Hewlett Packard 8953DT North American Dual Mode Cellular Test System which includes the following equipment:

HP8958A Cellular Interface
HP6623A DC Power Supply
Thermotron SM-8C Temperature Chamber
HP437B RF Power Meter
HP8596E Spectrum Analyzer

EFFECTIVE RADIATED POWER

The following is a description of the substitution method used in accordance with IS-137A to obtain accurate ERP readings at the carrier fundamental frequency:

(1) EUT measurements are made at 3 m using calibrated antennas and equipment with known cable losses.
(2) A peak measurement is made by raising and lowering the antenna and rotating the EUT 360 degrees. Horizontal and vertical polarization data is recorded.
(3) A generator and dipole antenna are then substituted for the EUT. The dipole antenna is a half-wave dipole. If a dipole antenna cannot be used, then the designated antenna is referenced to a dipole antenna.
(4) Measurements are made through the dipole antenna at known power levels to determine the system calibration factors at a given frequency.
(5) At frequencies where no calibration data is taken, the value is interpolated between the closest data point above and below the transmit frequency. Calibration data is taken with a half-wave dipole antenna.

Table: Power comparison chart for all modes – SAR versus radiated power

Mode	f (MHz)	SAR (dBm)	* Radiated (dBm/mW)
AMPS	824	26.10	22.66 EDRP
	837	26.65	23.43 EDRP
	849	25.90	22.66 EDRP
D-AMPS	824	25.90	22.66 EDRP
	837	26.10	23.43 EDRP
	849	25.90	22.66 EDRP
D-AMPS	1850	25.50	25.99 EIRP
	1880	25.80	27.37 EIRP
	1910	26.00	24.57 EIRP

* Power used for declared power on Grant

Exhibit 6M2

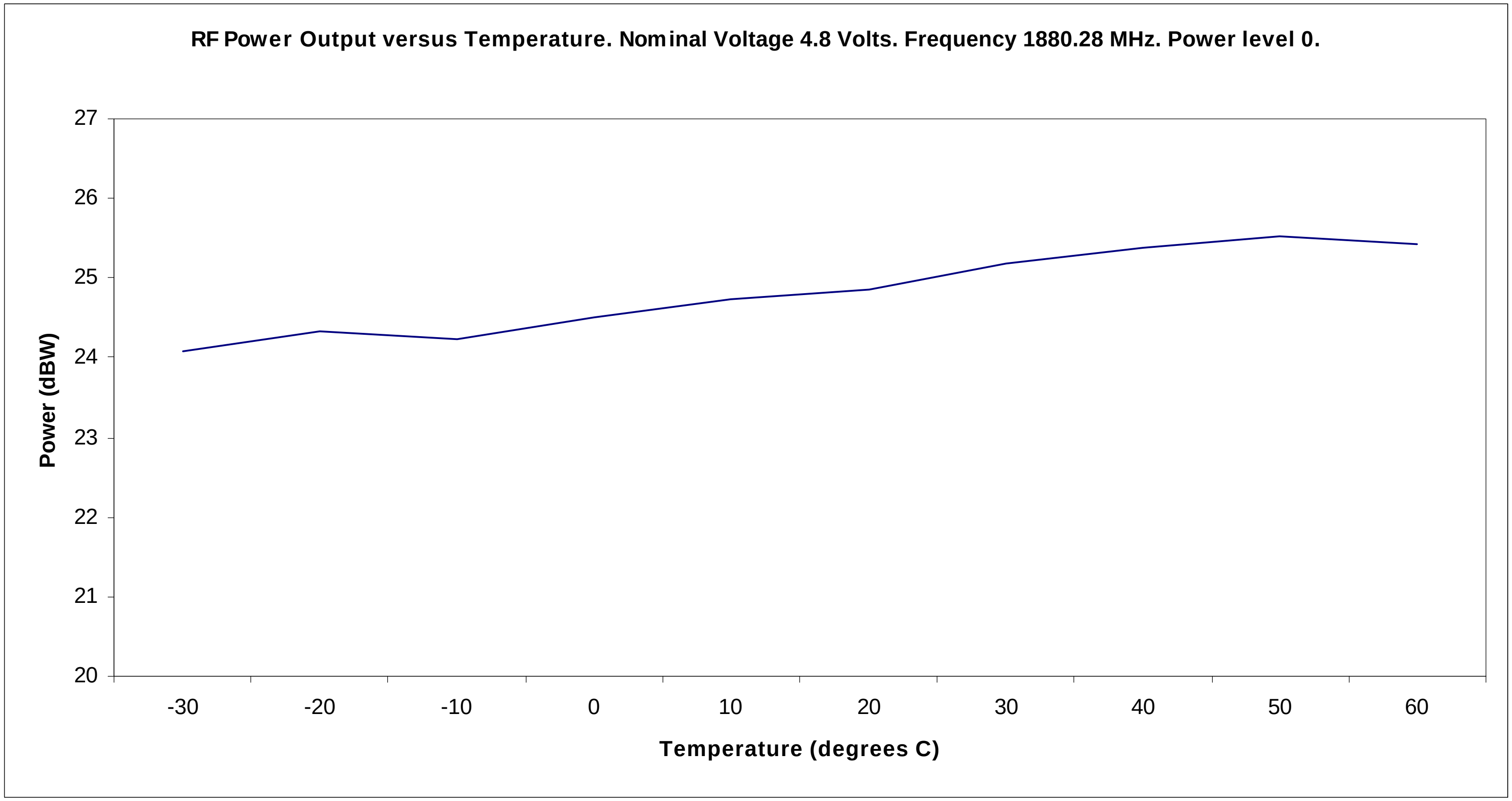
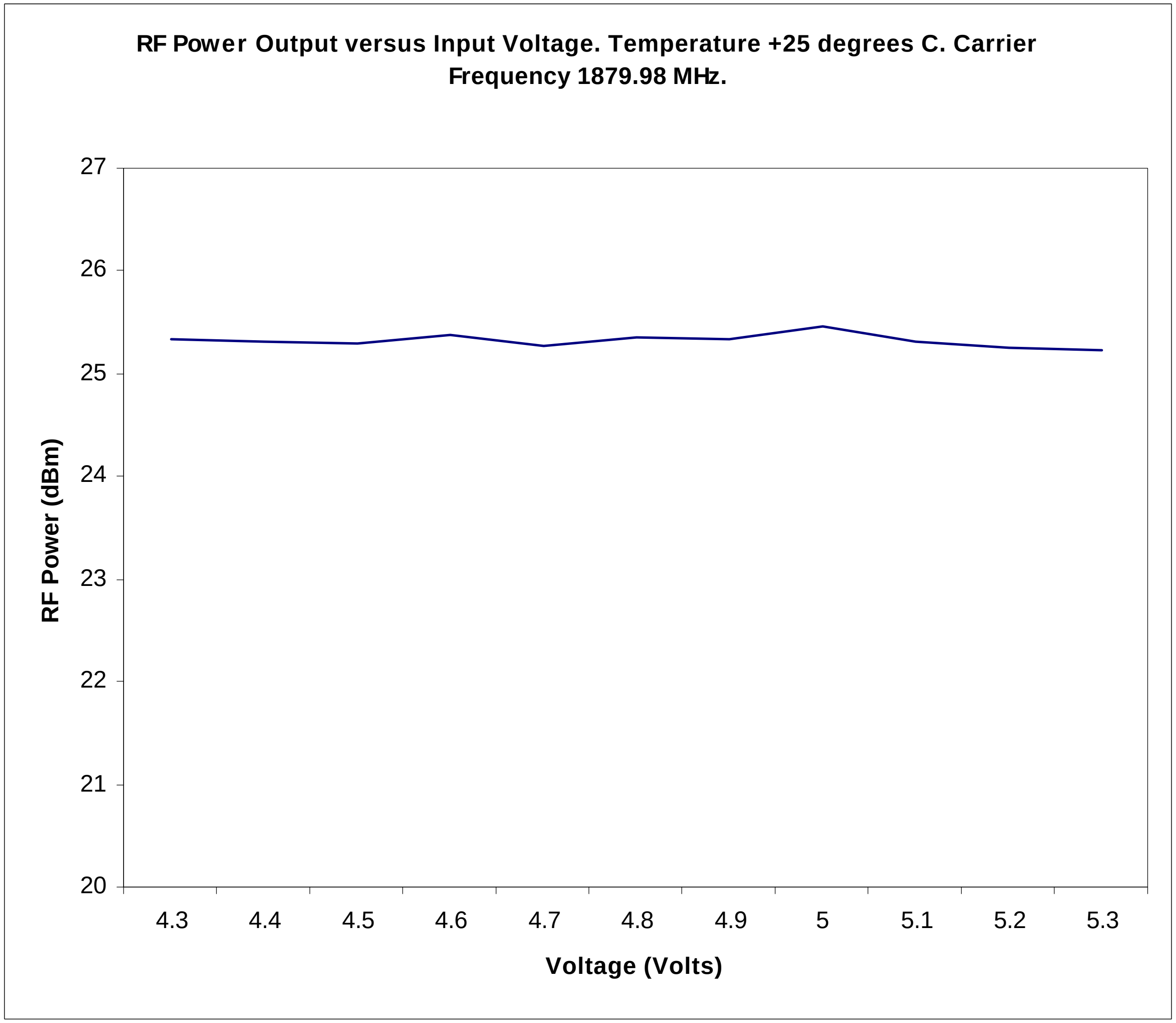

RF Power Output versus Temperature. Nominal Voltage 4.8 Volts. Frequency 1880.28 MHz. Power level 0.
Power (dBW)
27
26
25
24
23
22
21
20
-30
-20
-10
0
10
20
30
40
50
60
Temperature (degrees C)

Exhibit 6M3


RF Power Output versus Input Voltage. Temperature +25 degrees C. Carrier Frequency 1879.98 MHz.
RF Power (dBm)
27
26
25
24
23
22
21
20
4.3
4.4
4.5
4.6
4.7
4.8
4.9
5
5.1
5.2
5.3
Voltage (Volts)

800/1900 MHz: DAMPS MODULATION CHARACTERISTICS

Definition

The transceiver shall be capable of generating $\pi/4$ shifted differentially encoded quadrature phase shift keying signals. The transmitted signal is given by:

$$S(t) = \sum_n g(t-nT) \cos(\phi n) \cos(\omega ct) - \sum_n g(t-nT) \sin(\phi n) \sin(\omega ct)$$

where g(t) is the pulse shaping function that corresponds to a square root raised cosine baseband filter with roll off factor of 0.35, ωc is the radian carrier frequency, T is the symbol period, and ϕn is the absolute phase corresponding to the nth symbol interval. The symbol rate (1/T) is 24.3 k symbols /sec.

The modulation accuracy requirement is specified by setting limits on the RMS difference between the actual transmitted signal waveform and the ideal signal waveform. The ideal waveform is derived mathematically from the specification of modulation shown above. The specified requirement is error vector magnitude.

For this measurement, frequency accuracy shall meet the requirements of Section 3.1 prior to measurement.

The average carrier frequency error is the difference between the average carrier frequency of the actual transmitted waveform and the average signal waveform carrier frequency.

The ideal modulation is defined above. The definition is such that, observing an ideal transmitter through an ideal root raised-cosine receiver filter at the correct sampling instants one symbol apart would result in the sequence of values given by:

$$S(k)=S(k-1)e^{j\{\pi/4+B(k)*\pi/2\}}$$

where B(k) = 0,1,2,3 according to the following table:

Xk	Yk	B(k)
0	0	0
0	1	1
1	1	2
1	0	3

In the forward channel, S(k) forms part of a continuous data stream. In the reverse channel, the transit bursts from the mobile are truncated by power up and down ramping. In this case, S(6) is the first sample that enters into demodulation, which yields the first two information bits by comparing S(6) with S(7). The last information bits lie in the comparison of S(162) and S(161).

The ideal transmit and receive filters in cascade form a raised cosine Nyquist filter having an impulse response going through zero at symbol period intervals, so there is no inter-symbol interference at the ideal sampling points. The ideal signal sampler therefore, take on one of the eight values defined above, at the output of the receive filter.

This section defines how the output signal from a transmitter is to be evaluated against the ideal signal.

Let Z(k) be the complex vectors produced by observing the real transmitter through an ideal measuring receive filter at instants k, one symbol period apart. With S(k) defined as above, the transmitter is modeled as:

$$Z(k) = [C0 + C1 * [S(k)+E(k)]] * W^{k}$$

where:

k = n/24.3KHz

$W = e^{dr=jda}$ accounts for both a frequency offset giving "da" radians per symbol phase rotation and an amplitude changes of "dr" nepers per symbol:

C0 is a constant origin offset representing quadrature modulator imbalance,
C1 is a complex constant representing the arbitrary phase and output power of the transmitter, and
E(k) is the residual vector error on sample S(k)

The sum square vector error is then:

$$\sum_{k=MIN}^{k=MAX} |E(k)|2 \qquad \sum_{k=MIN}^{k=MAX} |\{[Z(k) * W \quad -C0]/C1\} -S(k)|$$

C0, C1 and W shall be chosen to minimize this expression and are then used to compute the individual vector errors E(k) on each symbol. The symbol timing phase of the receiver output samples used to compute the vector error shall also be chosen to give the lowest value.

The values of MAX and MIN for the reverse channel (mobile station transmitter) are:

MIN = 6
MAX = 162

The RMS vector error is then computed as the square root of the sum-square vector divided by the number of symbols in the slot, (157 in the reverse direction).

Method of Measurement

Connect the mobile station to the Standard Test Source and Modulation Accuracy Equipment. Modulate the Standard Test Source with pseudo-random Data Field bits. The mobile station shall transpond the Data Field bits using the TDMAON command. Use the Modulation Accuracy Measurement Equipment to measure the modulation accuracy of the mobile station.

Minimum Standard

The RMS vector error in any burst shall be less than 12.5%. In addition, the normalized error vector magnitude during the first 10 symbols (20 bits) of a burst following the ramp-up, must have an RMS value of less than 25% when averaged over 10 bursts within a 1 minute interval. The minimum standard for frequency offset is specified in section 3.1.2.2.3 of IS 137. The origin offset in any burst shall be less than -20 dBc.

1900 MHz: OCCUPIED BANDWIDTH

Per 2.989 (c, I, h) and 24.238 (a,b,c,d) the exhibits presented show the modulations that have to exist in a 1900 MHz Cellular System.

All the exhibits listed below are plots where the modulation condition is Psuedorandom Data (48.6 kb/s switched), operating in the DAMPS (TDMA) mode. All plots were taken while transmitting at Power Level 0. Any frequency span not covered at the exhibits below was found to be unaffected by the transmitter/modulation.

EXHIBIT

	Lower Channel (Channel 2)
	Normal bursted operation; data rate 48.6 kb/s, Output power level 0, 1850.04 MHz.
6O2	1 MHz Resolution Bandwidth reference plot.
6O3	Emission Bandwidth
6O4	1 MHz span, Center Frequency 1849.99 MHz.
	Upper Channel (Channel 1998)
	Normal bursted operation; data rate 48.6 kb/s, Output power level 0, 1909.92 MHz.
6O5	1 MHz Resolution Bandwidth reference plot.
6O6	Emission Bandwidth
6O7	1 MHz span, Center Frequency 1909.97 MHz.

The measurements were made per CFR 47, part 24 using the following equipment:

Hewlett Packard 8922 M System Simulator
Hewlett Packard 8593 E Spectrum Analyzer

Exhibit 6O2

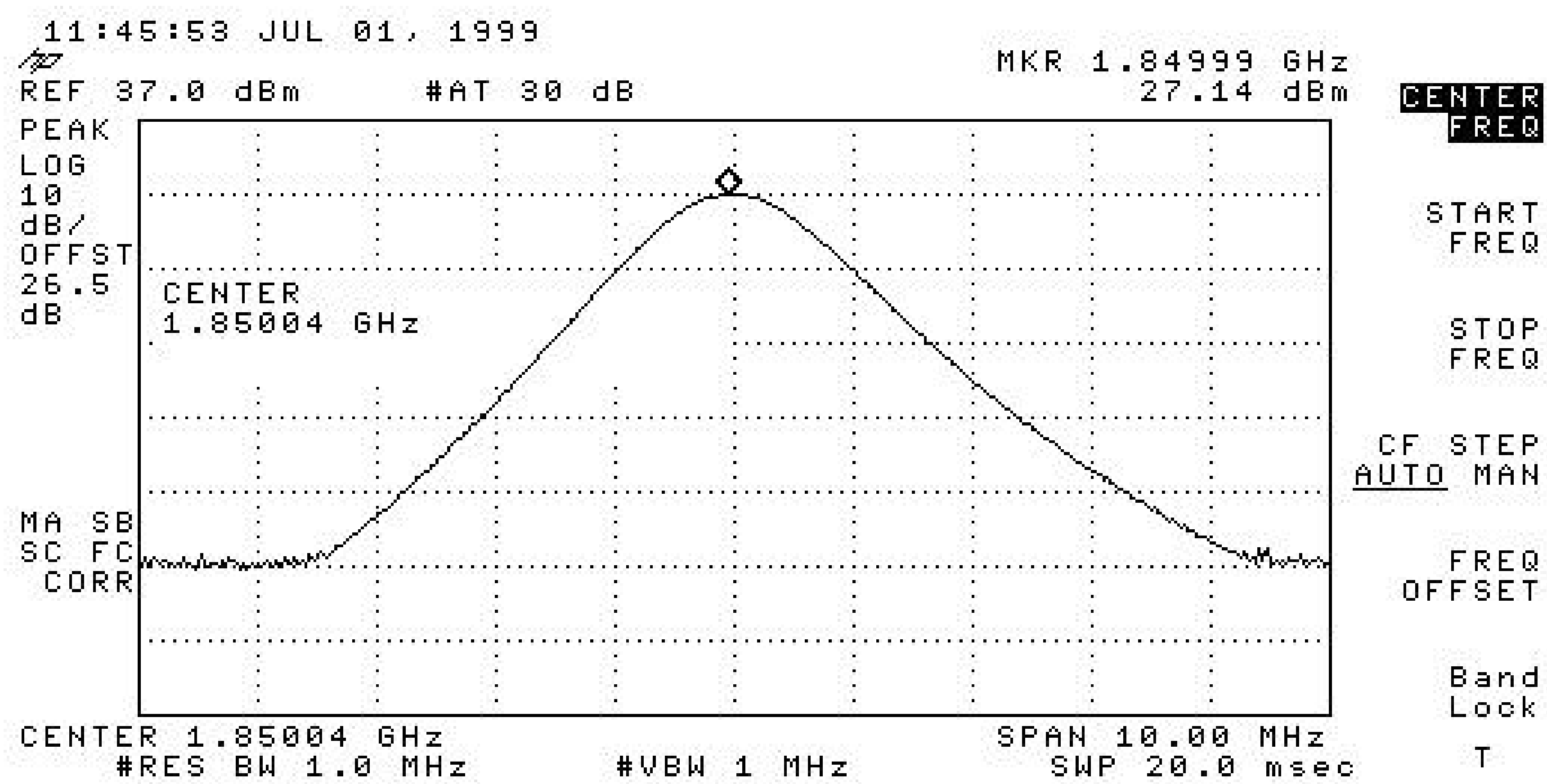

11:45:53 JUL 01, 1999
MKR 1.84999 GHz
27.14 dBm
REF 37.0 dBm
#AT 30 dB
PEAK
LOG
10
dB/
OFFST
26.5
dB
CENTER
1.85004 GHz
MA SB
SC FC
CORR
CENTER 1.85004 GHz
SPAN 10.00 MHz
#RES BW 1.0 MHz
#VBW 1 MHz
SWP 20.0 msec
CENTER FREQ
START FREQ
STOP FREQ
CF STEP
AUTO MAN
FREQ OFFSET
Band Lock
T

Exhibit 6O3

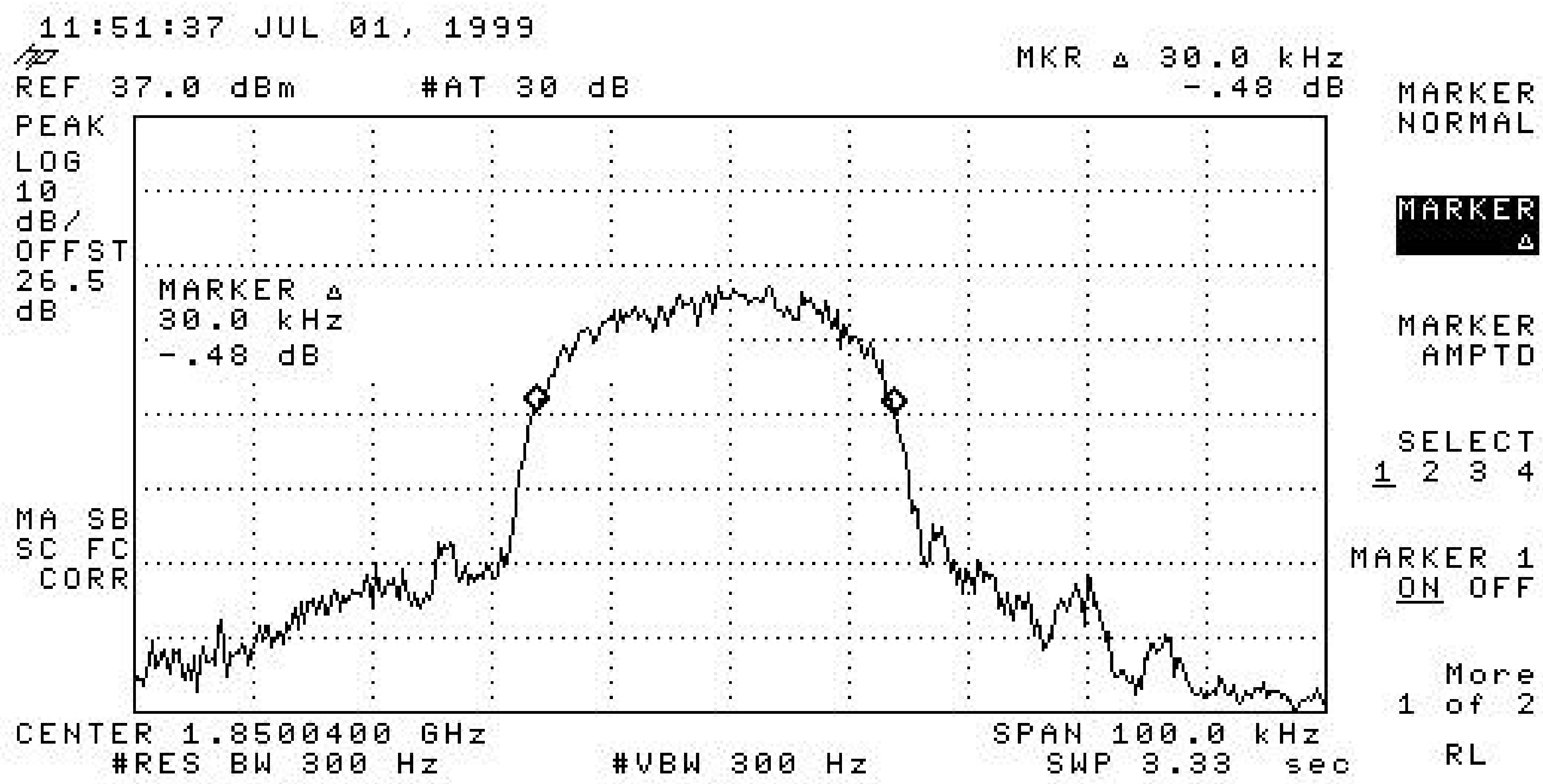

11:51:37 JUL 01, 1999
MKR Δ 30.0 kHz
-.48 dB
REF 37.0 dBm
#AT 30 dB
PEAK
LOG
10
dB/
OFFST
26.5
dB
MARKER Δ
30.0 kHz
-.48 dB
MA SB
SC FC
CORR
CENTER 1.8500400 GHz
#RES BW 300 Hz
#VBW 300 Hz
SPAN 100.0 kHz
SWP 3.33 sec
MARKER
NORMAL
MARKER
Δ
MARKER
AMPTD
SELECT
1 2 3 4
MARKER 1
ON OFF
More
1 of 2
RL

Exhibit 6O4

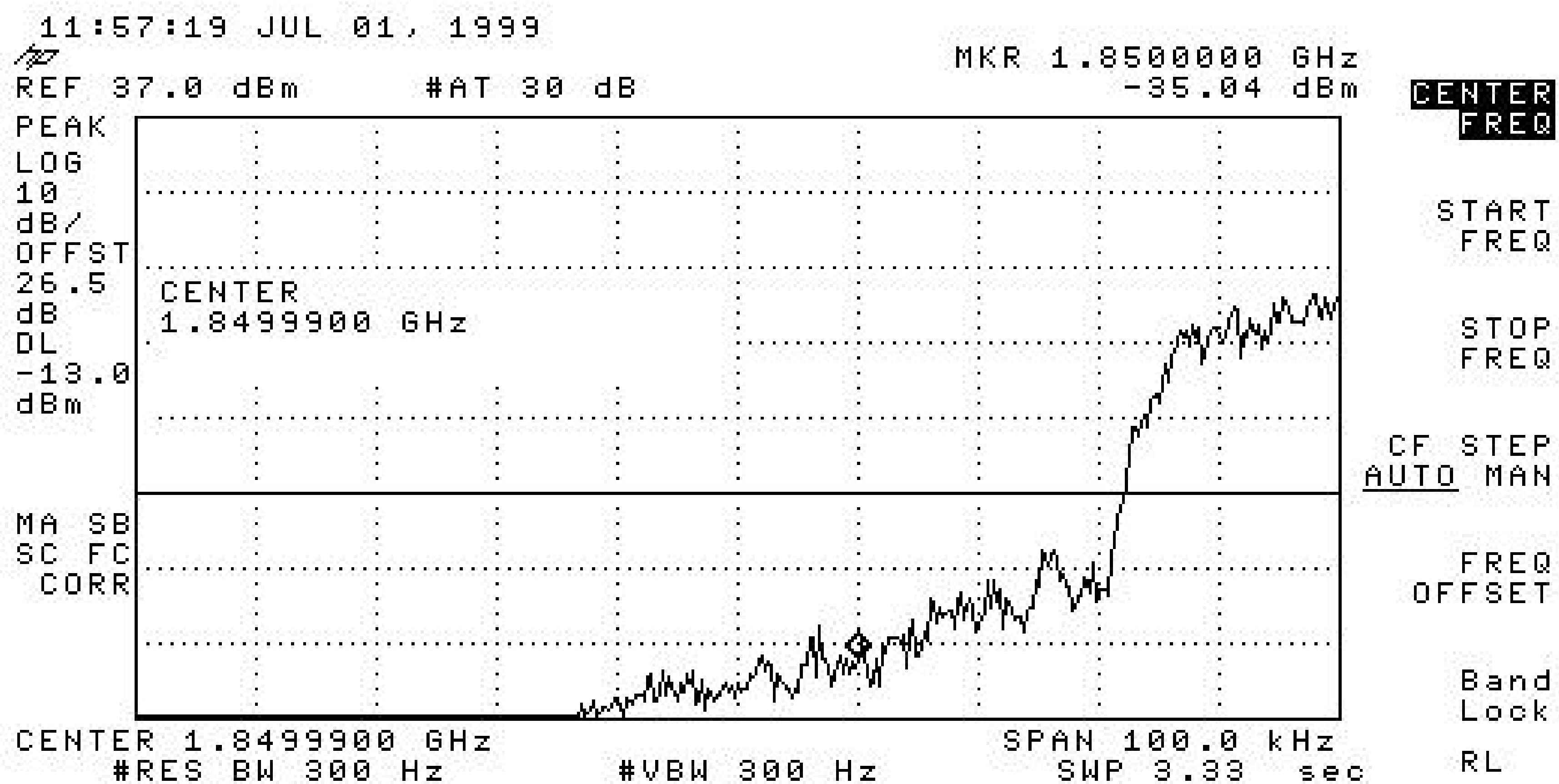
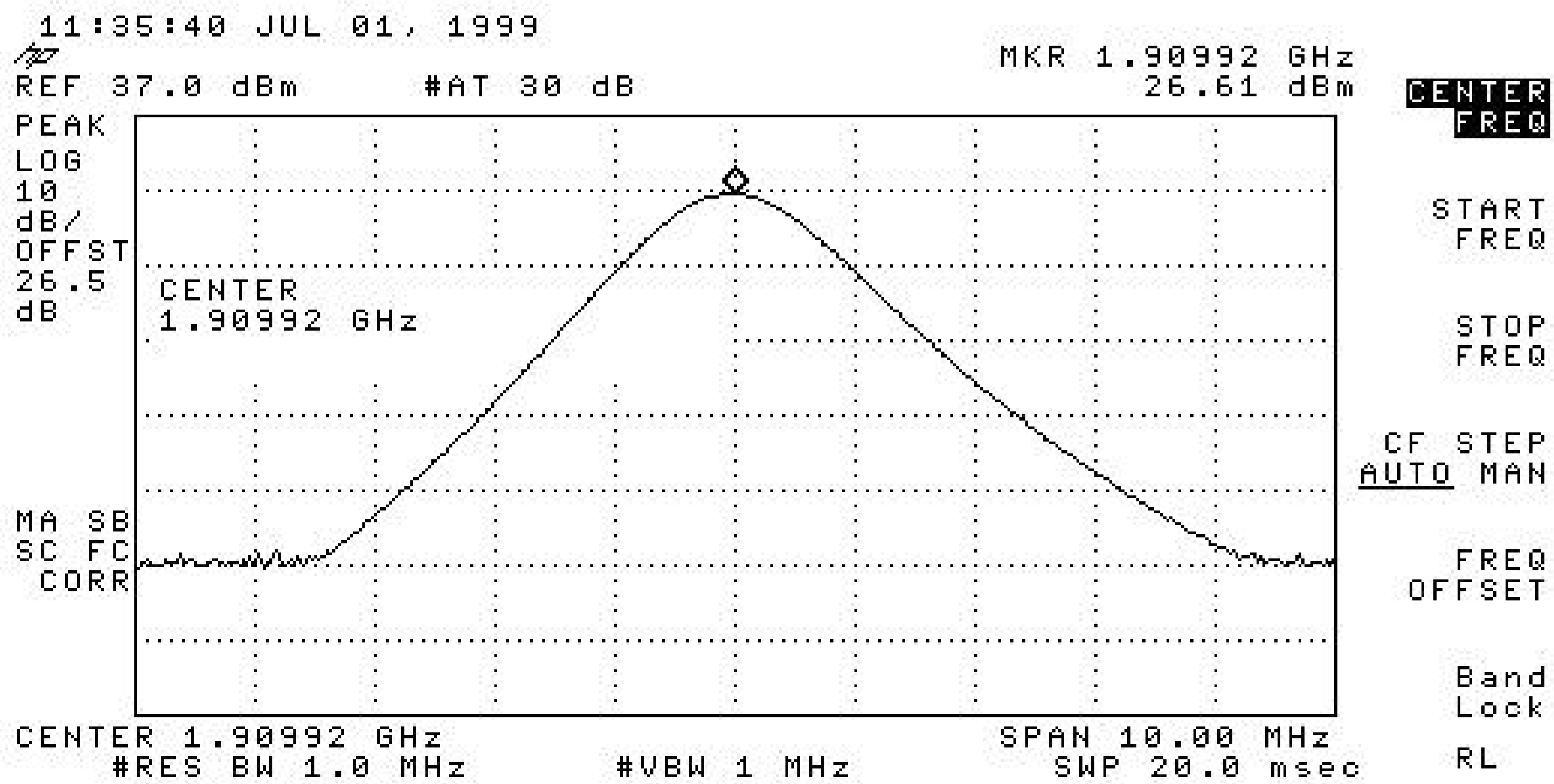

11:57:19 JUL 01, 1999
MKR 1.8500000 GHz
REF 37.0 dBm #AT 30 dB -35.04 dBm
PEAK
LOG
10
dB/
OFFST
26.5
dB
DL
-13.0
dBm
CENTER
1.8499900 GHz
MA SB
SC FC
CORR
CENTER 1.8499900 GHz SPAN 100.0 kHz
#RES BW 300 Hz #VBW 300 Hz SWP 3.33 sec
CENTER
FREQ
START
FREQ
STOP
FREQ
CF STEP
AUTO MAN
FREQ
OFFSET
Band
Lock
RL

Exhibit 6O5


11:35:40 JUL 01, 1999
REF 37.0 dBm
#AT 30 dB
MKR 1.90992 GHz
26.61 dBm
PEAK
LOG
10
dB/
OFFST
26.5
dB
CENTER
1.90992 GHz
MA SB
SC FC
CORR
CENTER 1.90992 GHz
#RES BW 1.0 MHz
#VBW 1 MHz
SPAN 10.00 MHz
SWP 20.0 msec
CENTER
FREQ
START
FREQ
STOP
FREQ
CF STEP
AUTO MAN
FREQ
OFFSET
Band
Lock
RL

APPLICANT:
ERICSSON INC

FCC ID NO:
AXATR-393-A2

Exhibit 6O6

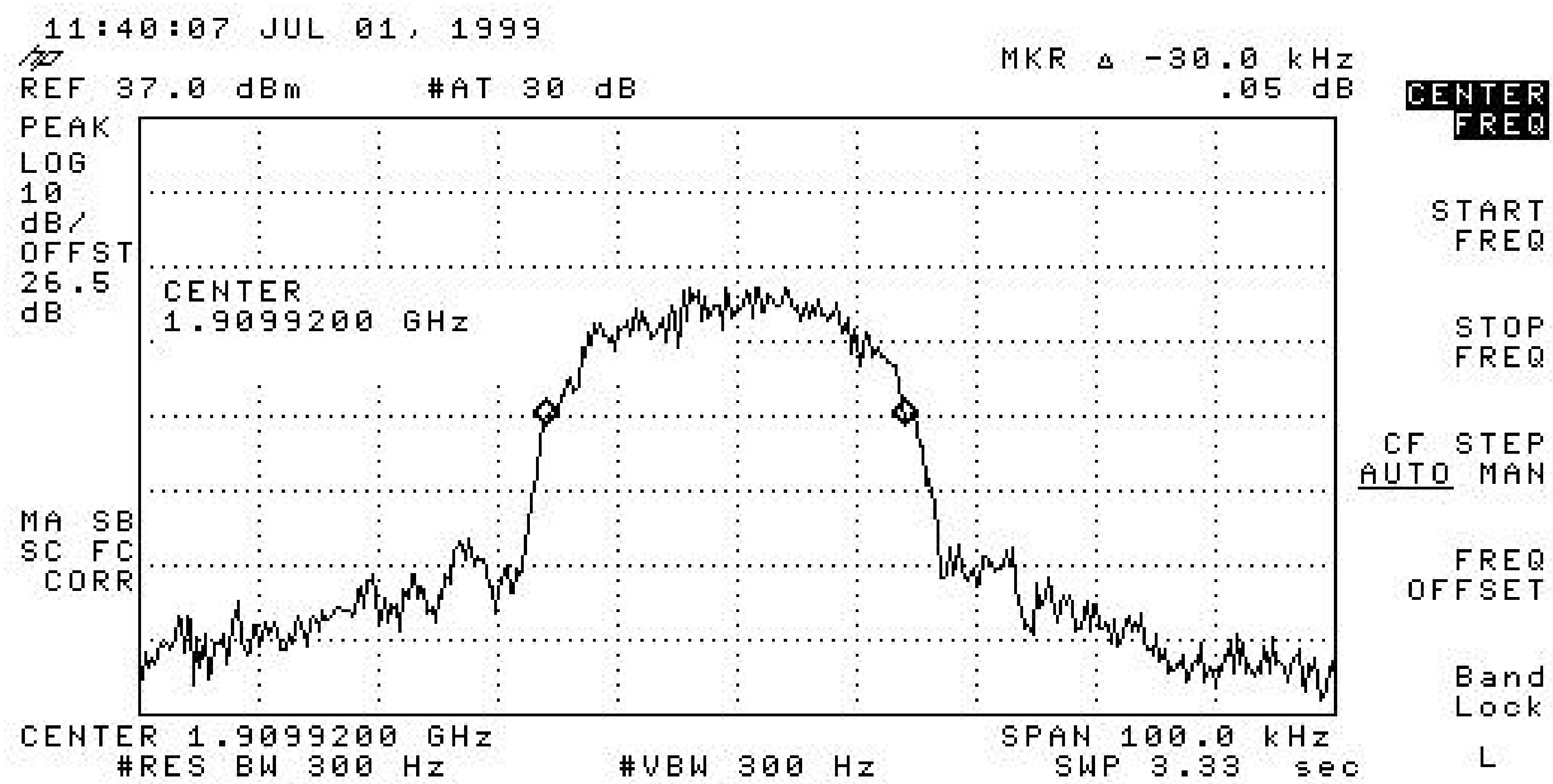
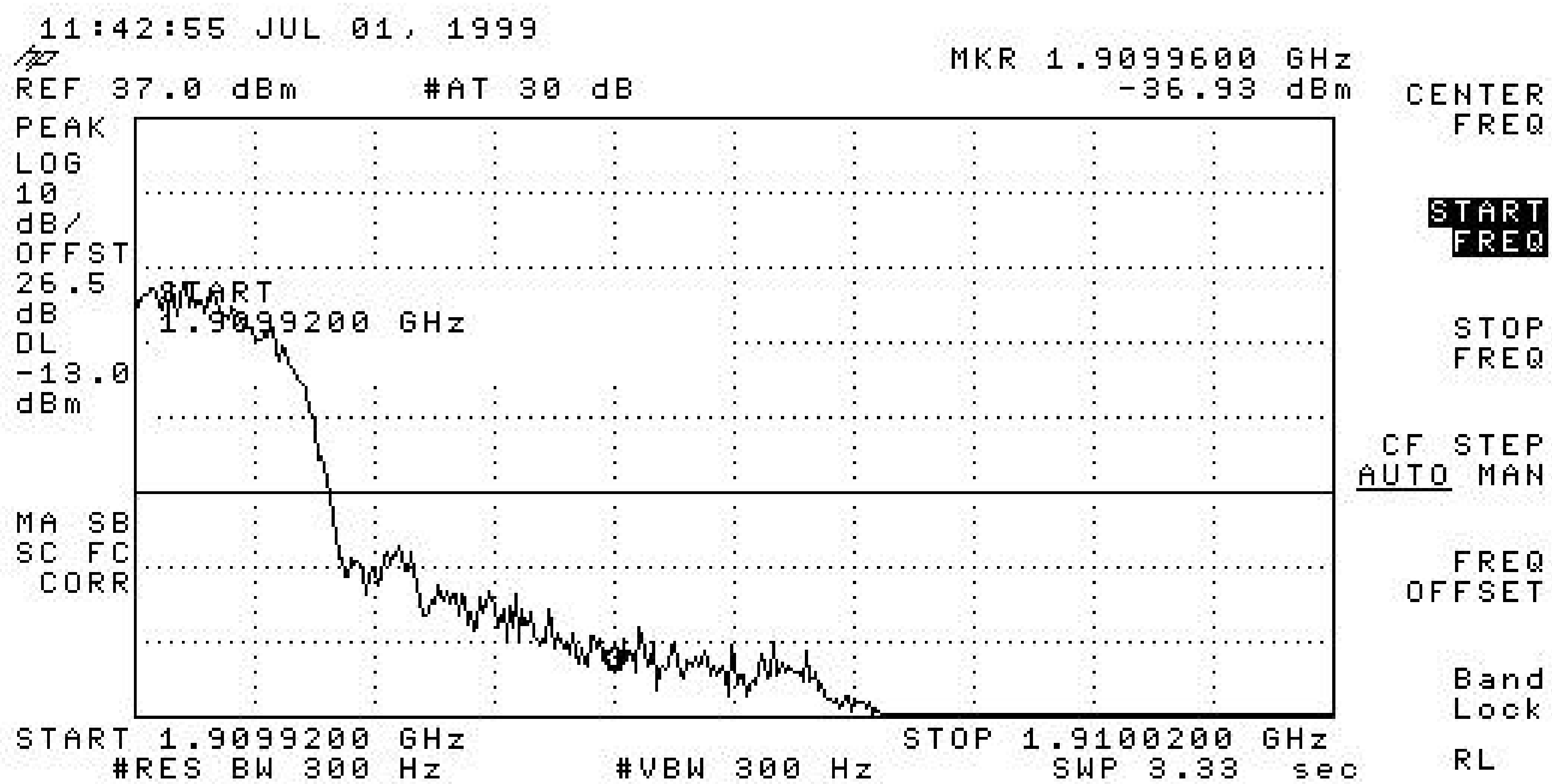


Exhibit 6O7


11:42:55 JUL 01, 1999
MKR 1.9099600 GHz
-36.93 dBm
REF 37.0 dBm
#AT 30 dB
PEAK
LOG
10
dB/
OFFST
26.5
dB
DL
-13.0
dBm
START
1.9099200 GHz
MA SB
SC FC
CORR
START 1.9099200 GHz
STOP 1.9100200 GHz
#RES BW 300 Hz
#VBW 300 Hz
SWP 3.33 sec
CENTER
FREQ
START
FREQ
STOP
FREQ
CF STEP
AUTO MAN
FREQ
OFFSET
Band
Lock
RL

1900MHz SPURIOUS EMISSIONS (CONDUCTED)

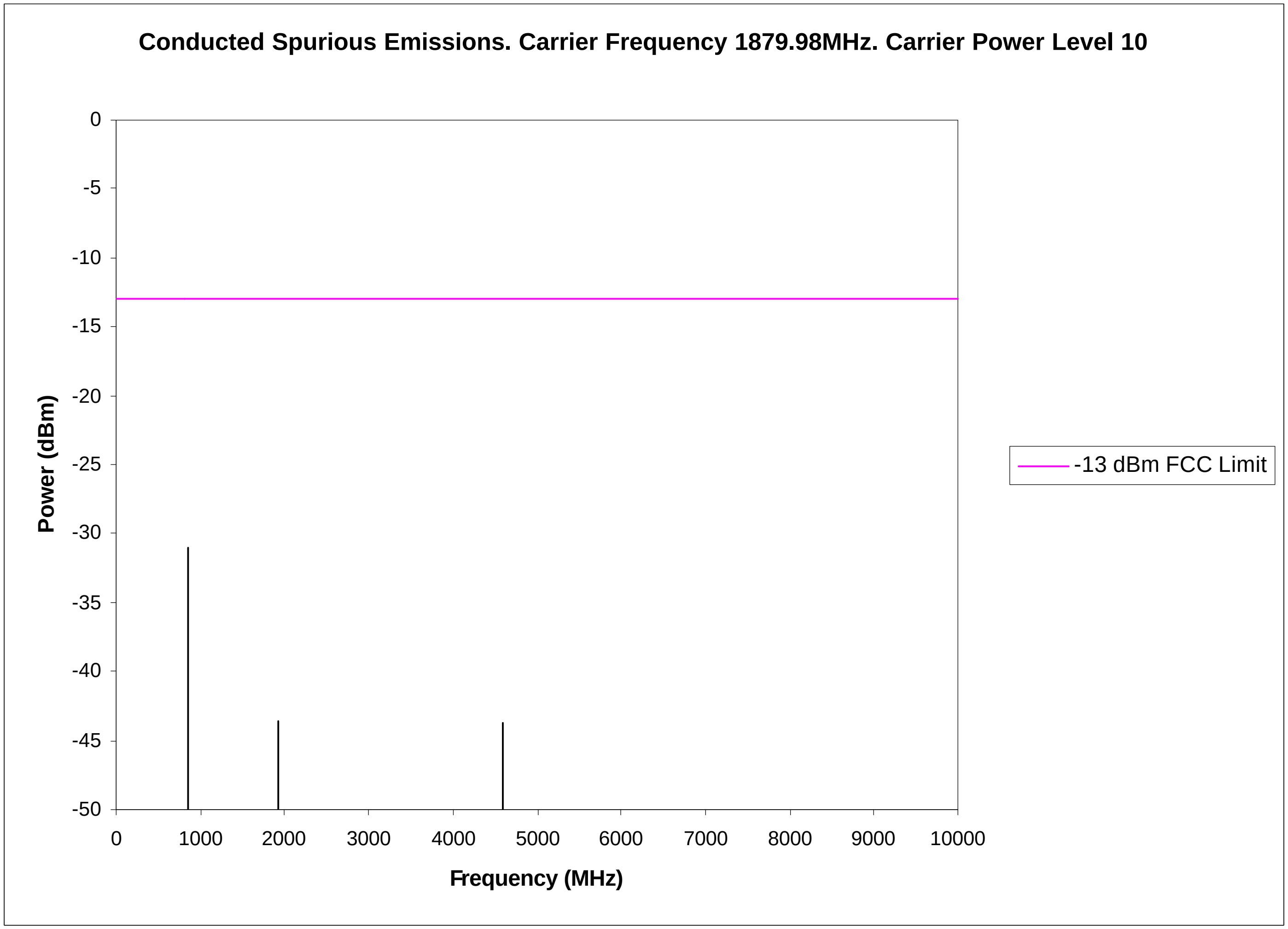
Per 2.991 Spurious emissions at the antenna terminals (conducted) when properly loaded with an appropriate artificial antenna were measured per IS-137A.

EXHIBIT #	FREQUENCY	Output Power level
6P2	1879.98	10
6P3	1879.98	0

The measurements were made per IS-137A using the following equipment:

HP 8958A	Cellular Interface
HP 8901B	Modulation Analyzer
HP 8559A	Spectrum Analyzer

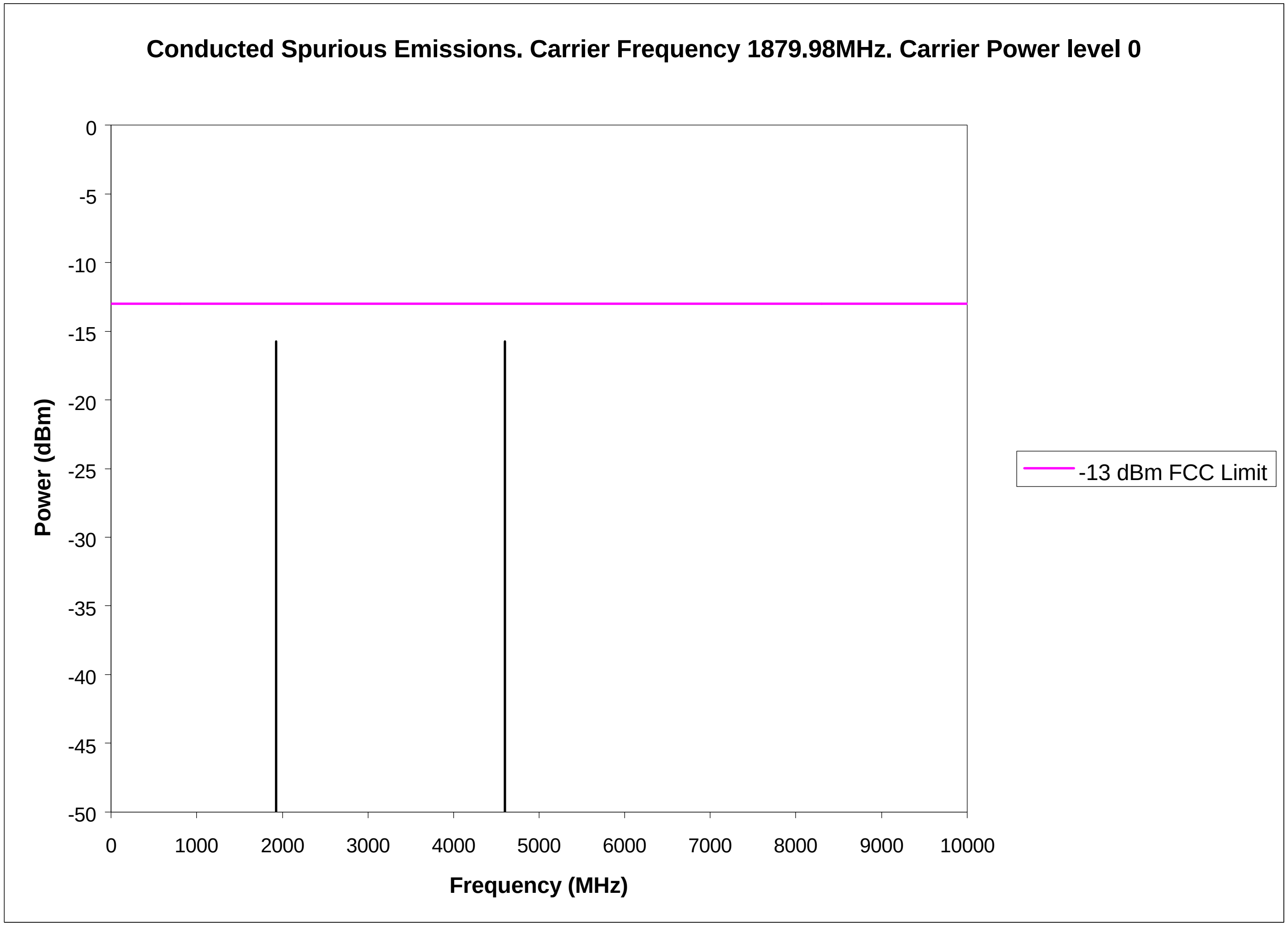
Exhibit 6P2


Conducted Spurious Emissions. Carrier Frequency 1879.98MHz. Carrier Power Level 10
Power (dBm)
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
Frequency (MHz)
-13 dBm FCC Limit

APPLICANT:
ERICSSON INC

FCC ID NO:
AXATR-393-A2

Exhibit 6P3



1900 MHz: SPURIOUS EMISSIONS (Radiated)

Per 2.993 and 22.917 (e), field strength of spurious radiation was measured at Underwriters Laboratories Inc. Research Triangle Park, NC site. The measurement procedure is per EIA IS-137 conducted on a 3 meter test site. Results are shown on the following Exhibits.

Note: The spectrum was examined through the 10th harmonic of the carrier. Measurements recorded are peak measurements.

EXHIBIT	FREQUENCY	OUTPUT POWER LEVEL
6Q2	1879.98	0

The measurements were made per IS-137A using the following equipment:

8566B Spectrum Analyzer 100 Hz - 2.5GHz \ 2 - 22 GHz
85650A Quasi Peak Detector
HP Amplifier 8449B Opt H02 1 - 26.5 GHz
HP Signal Generator 8657B .1 - 2060 MHz

Exhibit 6Q2

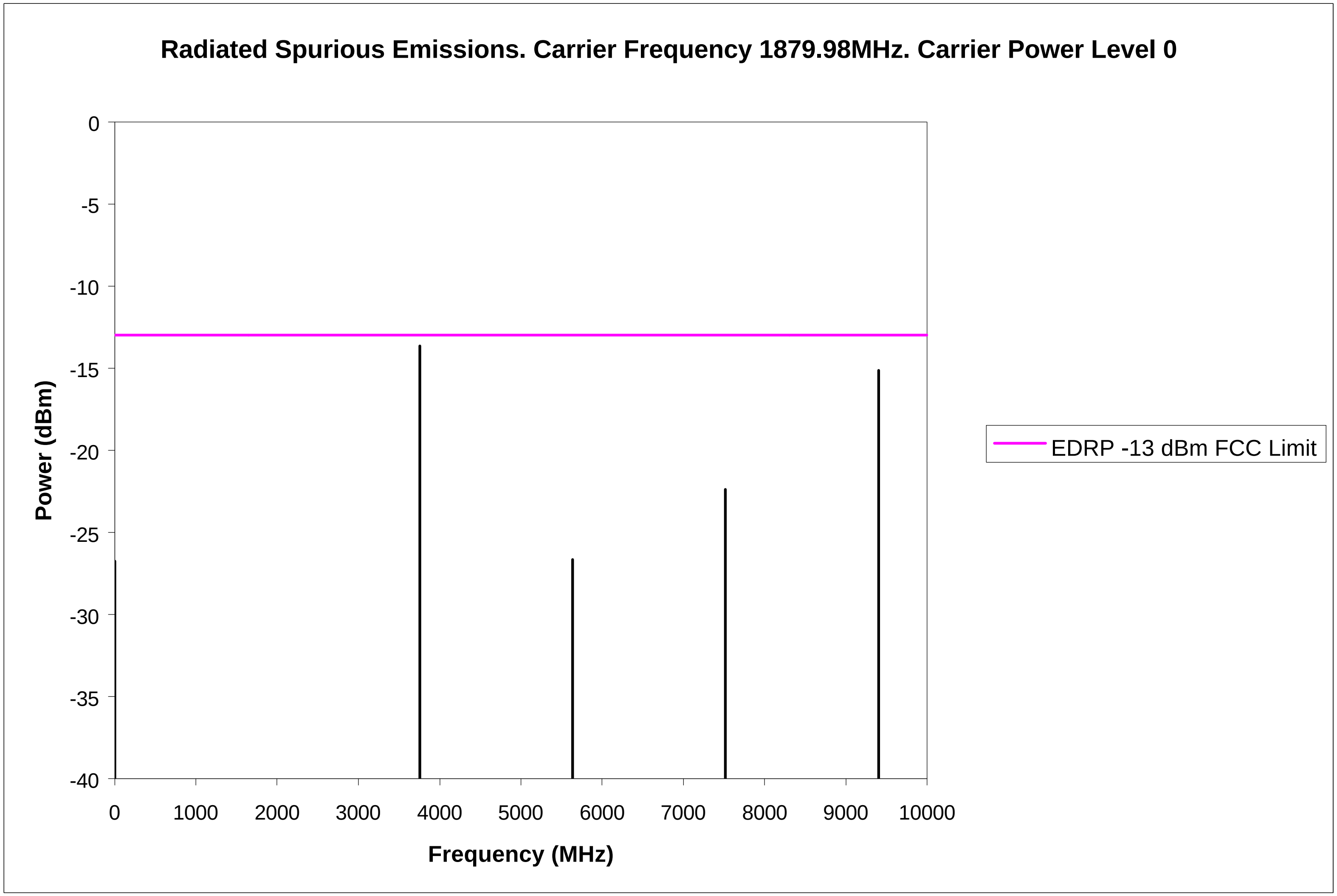

Radiated Spurious Emissions. Carrier Frequency 1879.98MHz. Carrier Power Level 0
0
-5
-10
-15
-20
-25
-30
-35
-40
Power (dBm)
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
Frequency (MHz)
EDRP -13 dBm FCC Limit

EXHIBIT 6R1

800 MHz: FREQUENCY STABILITY

Per 2.995 (a)(1),(b),(d)(1), 24.235

Variation of output frequency as a result of Varying either voltage or temperature is shown in Exhibit 6R2 and 6R3 respectively.

EXHIBIT #	Voltage	Temperature
6R2	Varied	+25 C
6R3	4.8 Volts	Varied

Note: The manufacturers rated voltage for the battery is 4.3 VDC to 5.3 VDC.

The measurements were made per IS-137A using a Hewlett Packard 8953DT North American Dual Mode Cellular Test System which includes the following equipment:

HP8958A Cellular Interface
HP 6623A DC Power Supply
HP 8596E Spectrum Analyzer
HP 437B RF Power Meter
HP 8901B Modulation Analyzer
HP 8903B Audio Analyzer
Thermotron SM-8C Temperature Chamber

Exhibit 6R2

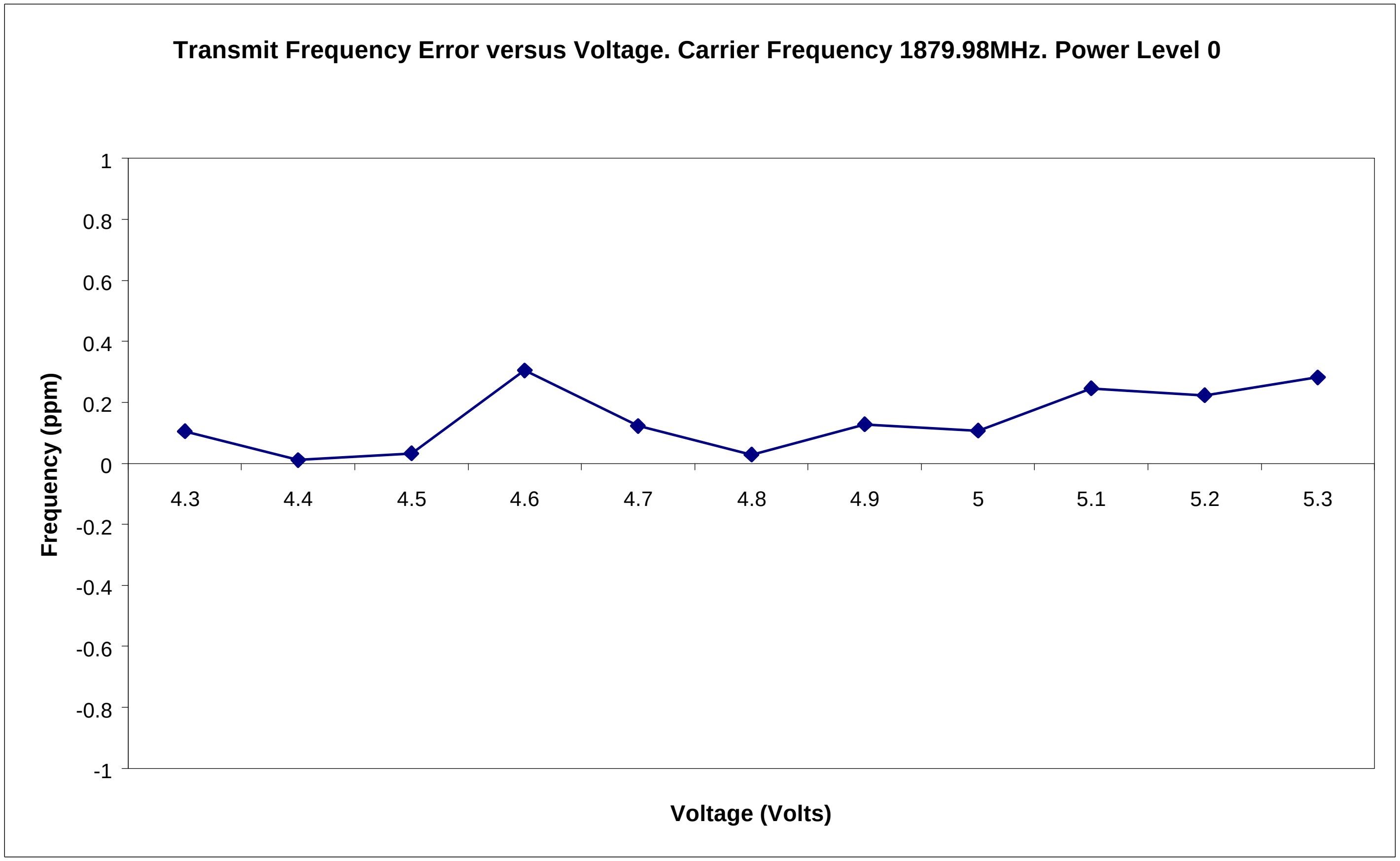
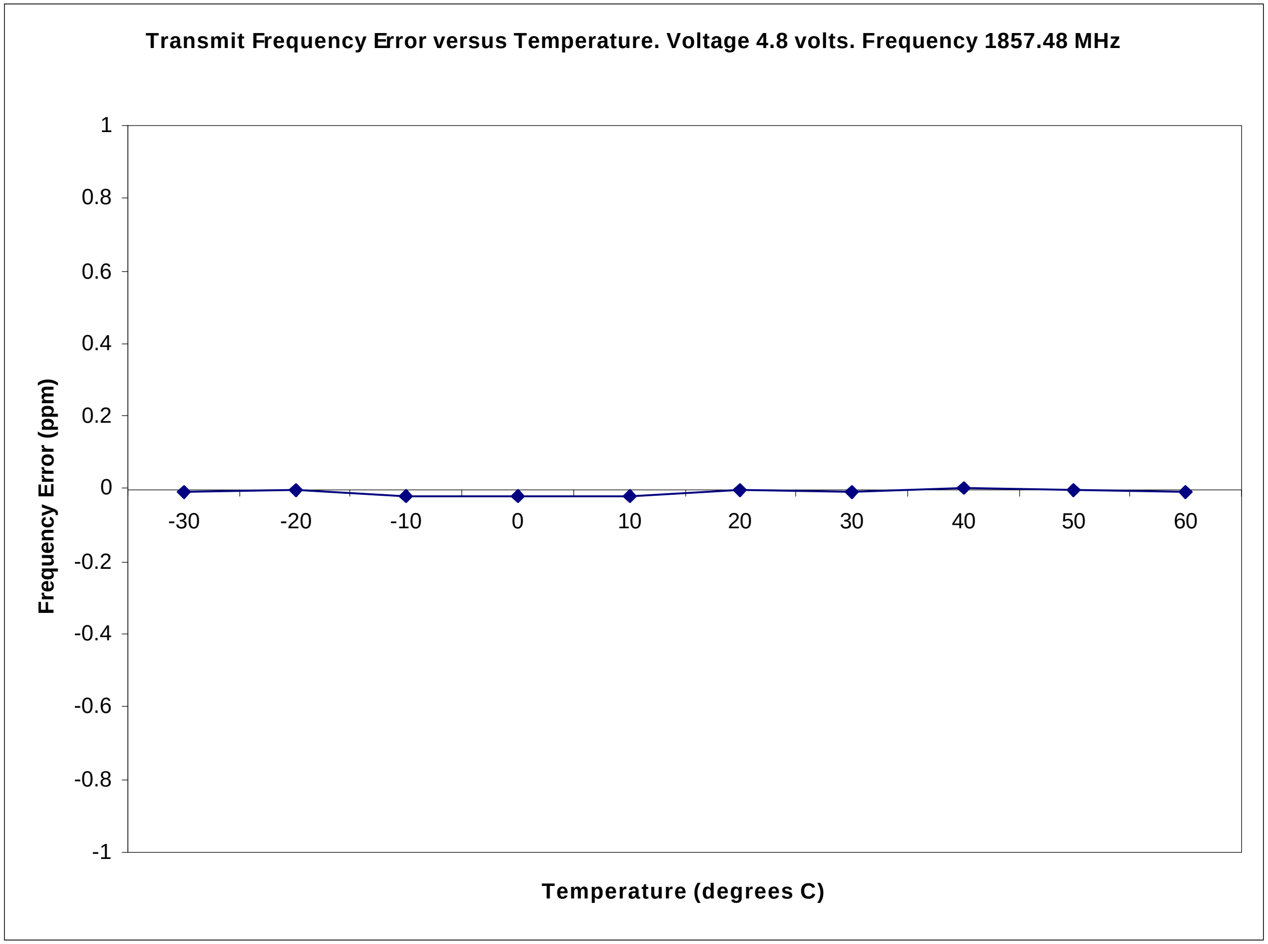

Transmit Frequency Error versus Voltage. Carrier Frequency 1879.98MHz. Power Level 0
Frequency (ppm)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
4.3
4.4
4.5
4.6
4.7
4.8
4.9
5
5.1
5.2
5.3
Voltage (Volts)

Exhibit 6R3


Transmit Frequency Error versus Temperature. Voltage 4.8 volts. Frequency 1857.48 MHz
Frequency Error (ppm)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-30
-20
-10
0
10
20
30
40
50
60
Temperature (degrees C)