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

EFFECTIVE RADIATED POWER

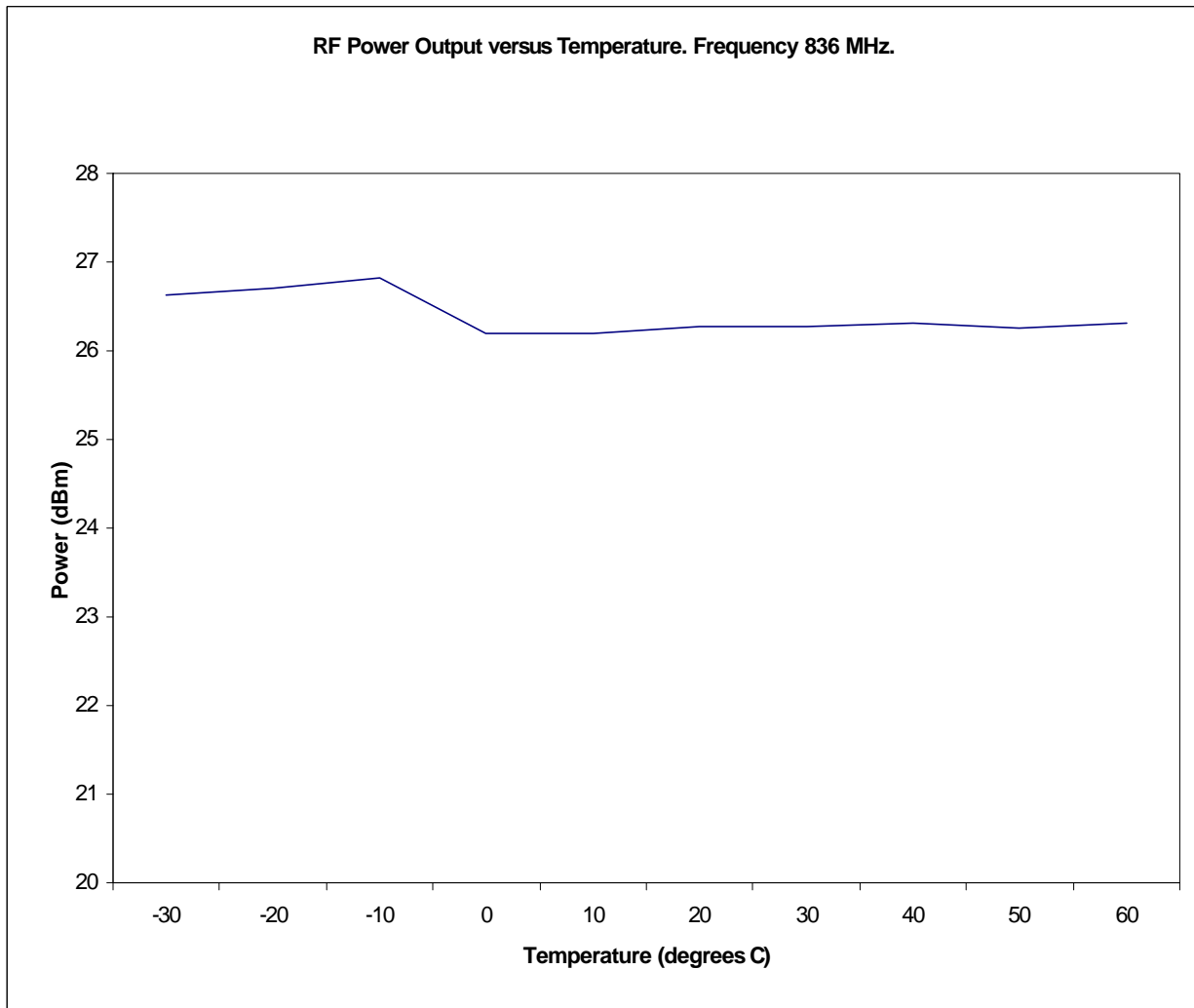
The following is a description of the substitution method used in accordance with IS-137A to obtain accurate ERP readings at the carrier fundamental frequency:

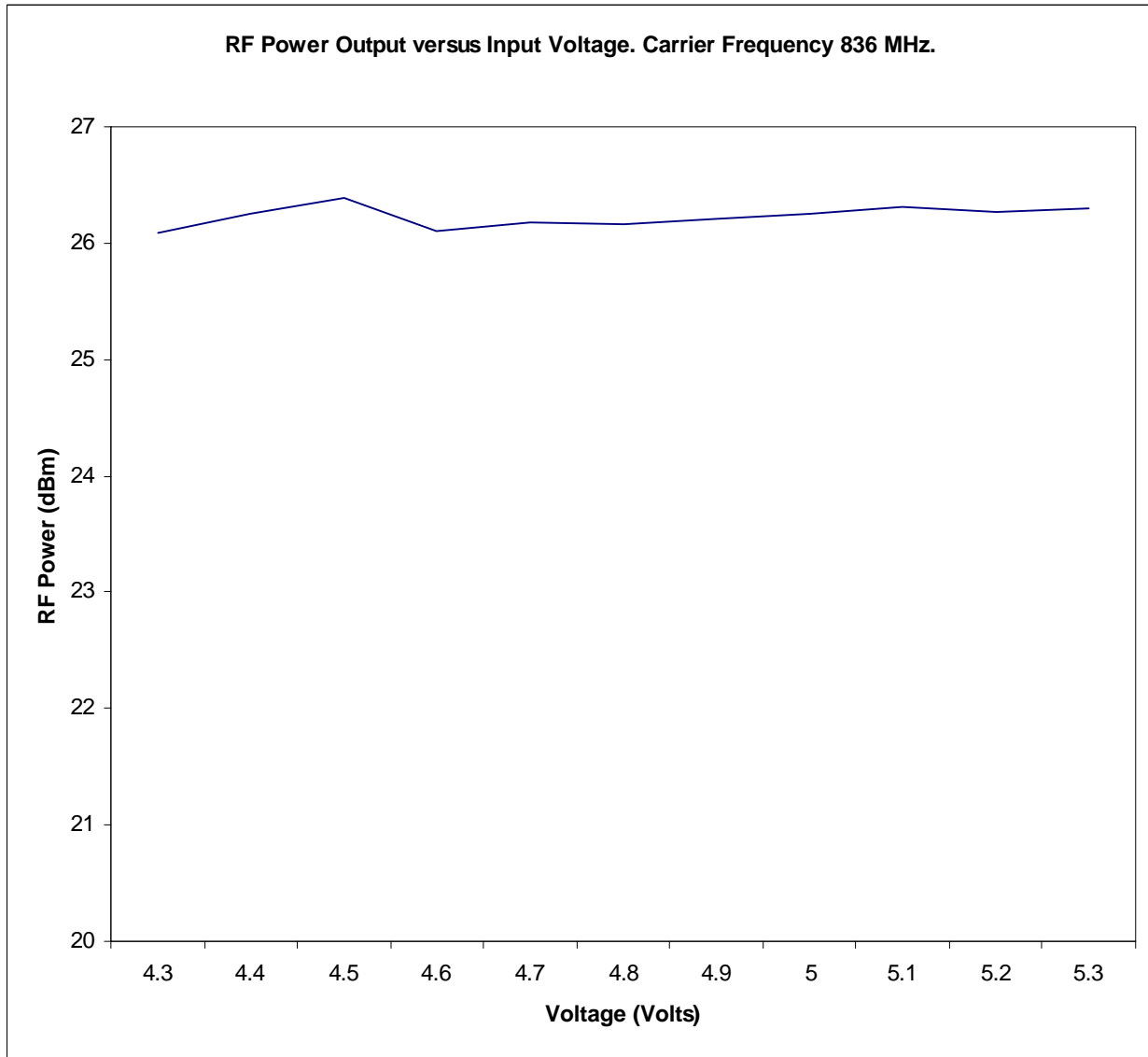
- (1) EUT measurements are made at 3 m using calibrated antennas and equipment with known cable losses.
- (2) A peak measurement is made by raising and lowering the antenna and rotating the EUT 360 degrees. Horizontal and vertical polarization data is recorded.
- (3) A generator and dipole antenna are 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

Mode	f (MHz)	*Radiated (dBm/mW)
AMPS	824	24.6 EDRP
	837	26.1 EDRP
	849	24.5 EDRP
D-AMPS	824	24.6 EDRP
	837	26.1 EDRP
	849	24.5 EDRP
D-AMPS	1850	26.6 EIRP
	1880	27.2EIRP
	1910	25.4 EIRP

* Power used for declared power on Grant





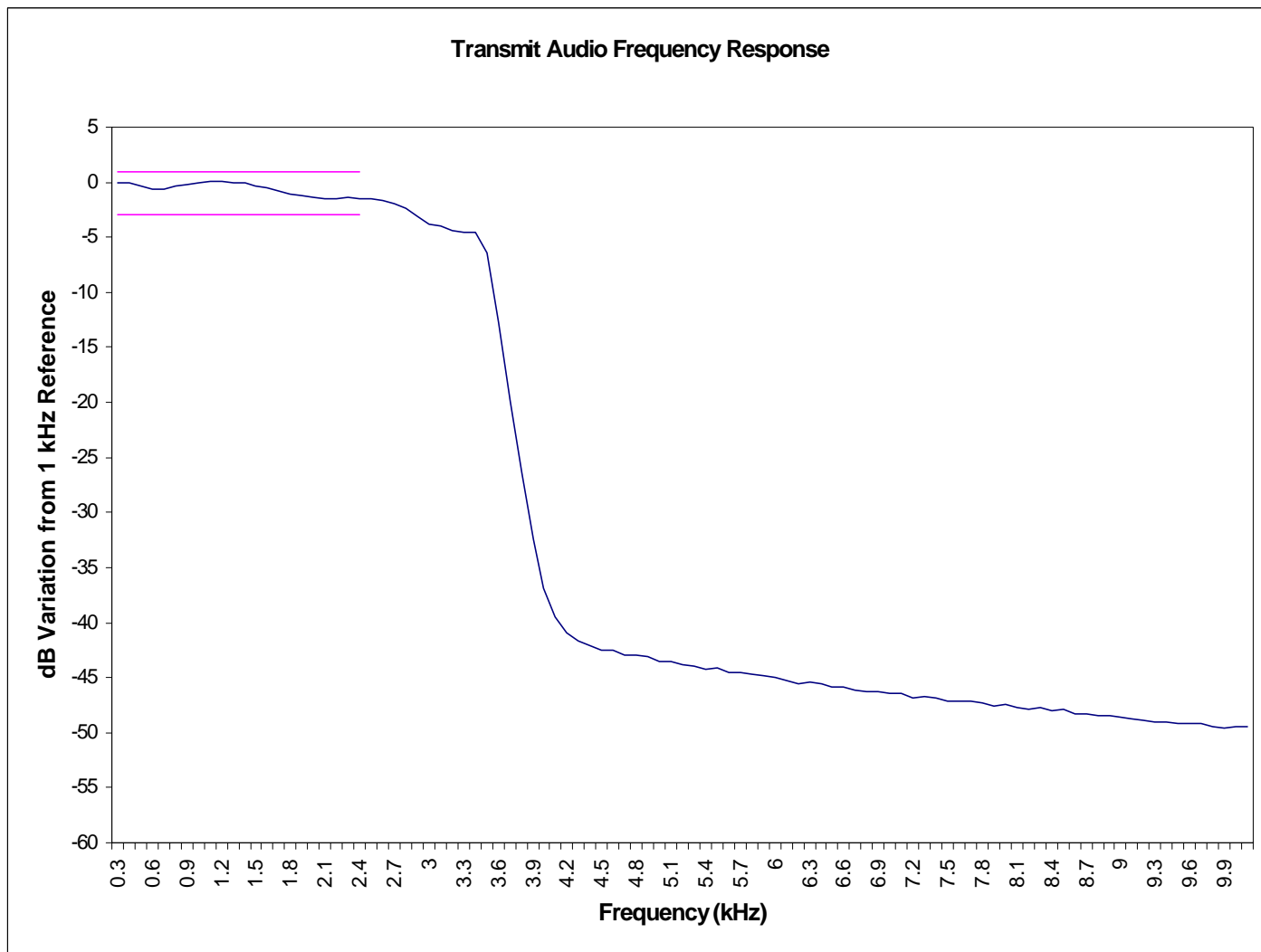
800 MHz AMPS MODULATION CHARACTERISTICS

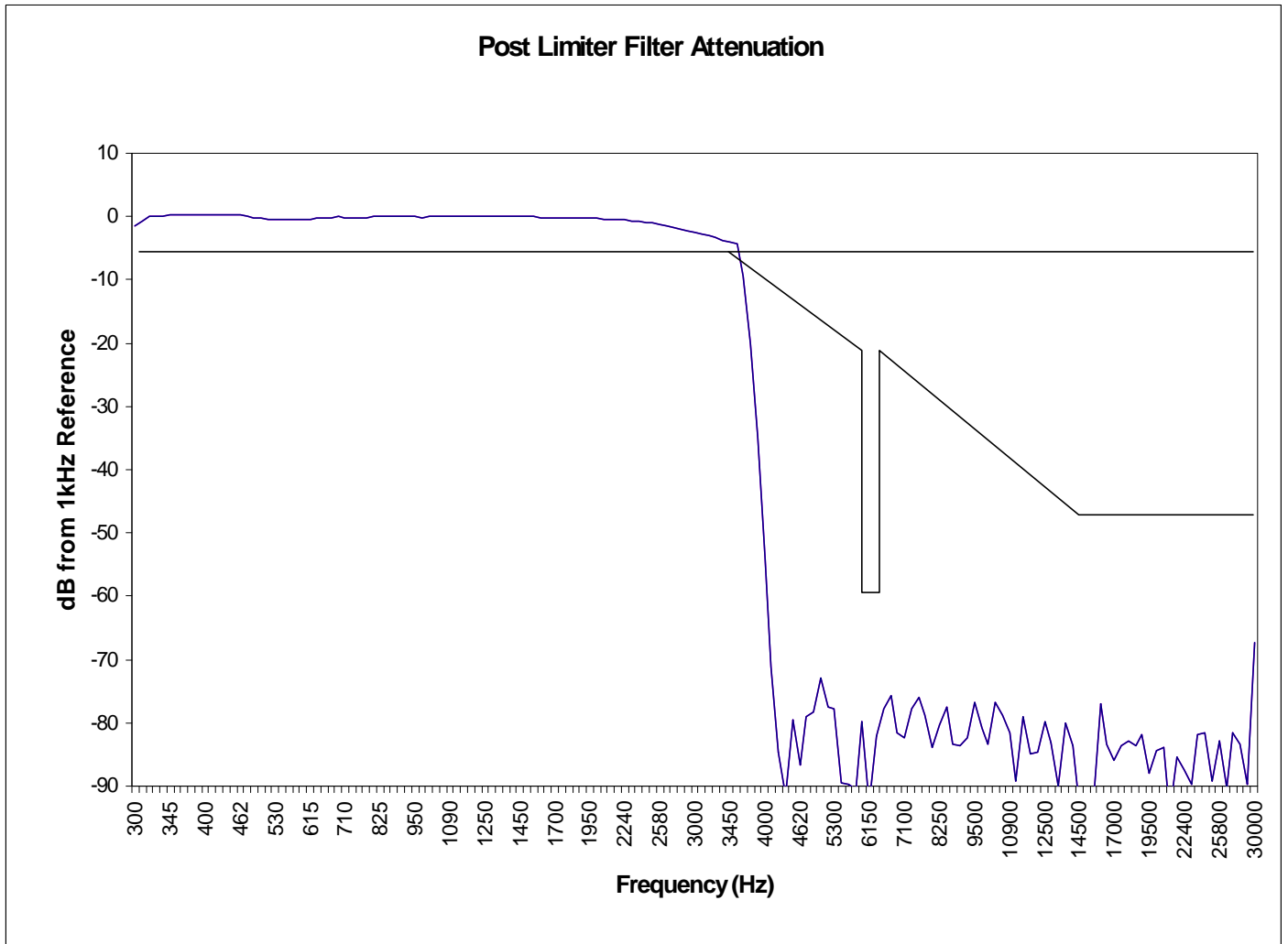
The frequency and amplitude response to audio inputs measured per IS-137A are shown on the following:

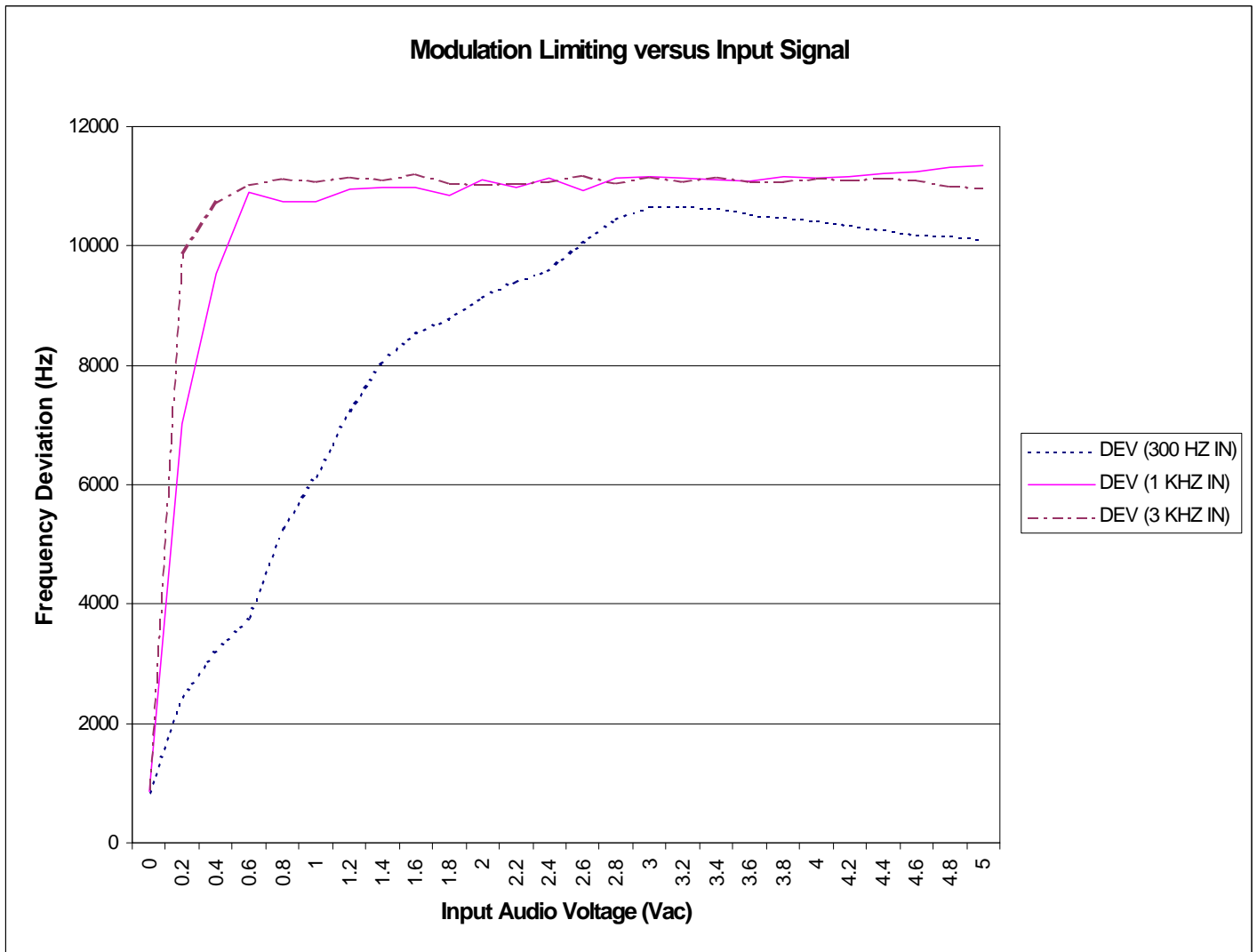
<u>Exhibit #</u>	<u>Description</u>	<u>Clause</u>
6B2	Transmit Audio Frequency Response	2.1047 (a,b)
6B3	Post Limiter Filter Attenuation	22.915 (d)
6B4	Modulation Limiting vs. Input Voltage	2.1047, 22.915 (b,1)

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







800 MHz AMPS OCCUPIED BANDWIDTH

Part 2.1049, 22.917 (d)(1) the exhibits presented show the modulations that co-exist in a cellular system:

<u>Exhibit #</u>	<u>Description</u>	<u>Power Level</u>
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
6C7	CDPD data	0

These measurements were made per IS-137A and CDPD Rev 1.1 Part 409 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

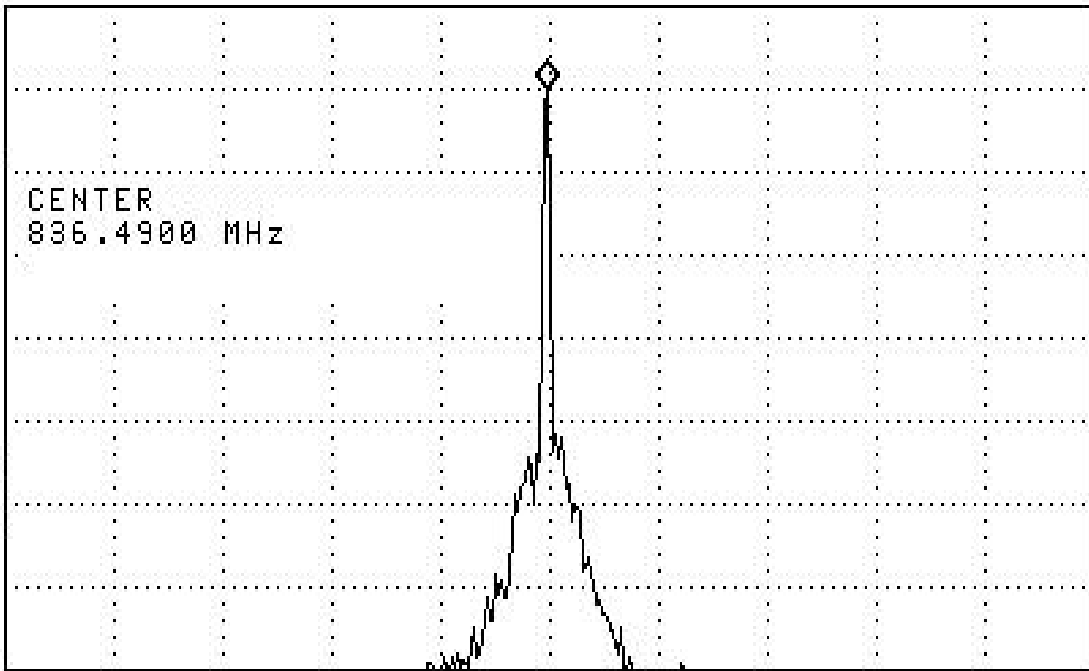
Exhibit 6C2

14:34:29 NOV 23, 1999

REF 35.2 dBm AT 30 dB

MKR 836.4895 MHz
25.39 dBm

PEAK
LOG
10
dB/
OFFST
21.2
dB



CENTER
FREQ

START
FREQ

STOP
FREQ

CF STEP
AUTO MAN

FREQ
OFFSET

Band
Lock

WA SB
SC FC
CORR

CENTER 836.4900 MHz
#RES BW 300 Hz

#VBW 300 Hz

SPAN 200.0 kHz
SWP 6.67 sec

RL

Unmodulated Carrier, power level 0

Exhibit 6C3

14:37:18 NOV 23, 1999

MRK 836.4895 MHz
12.98 dBm

REF 35.2 dBm AT 30 dB

PEAK
LOG
10
dB/
OFFST
21.2
dB

CLEAR
WRITE A

MAX
HOLD A

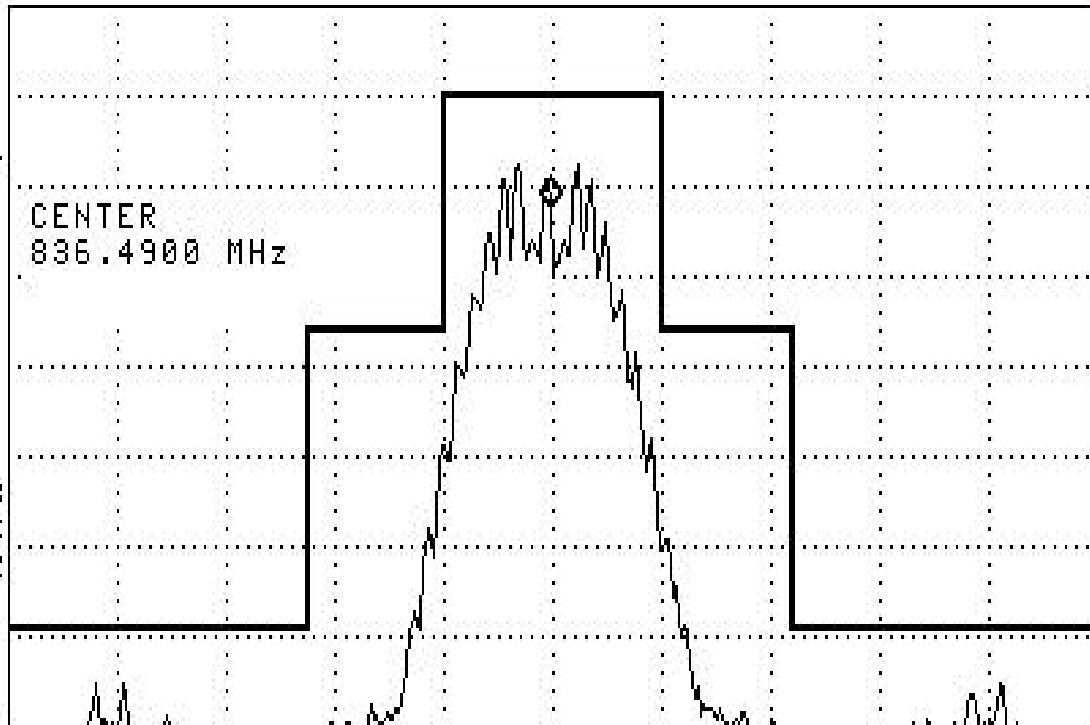
VIEW A

BLANK A

Trace
A B C

More
1 of 3

RL



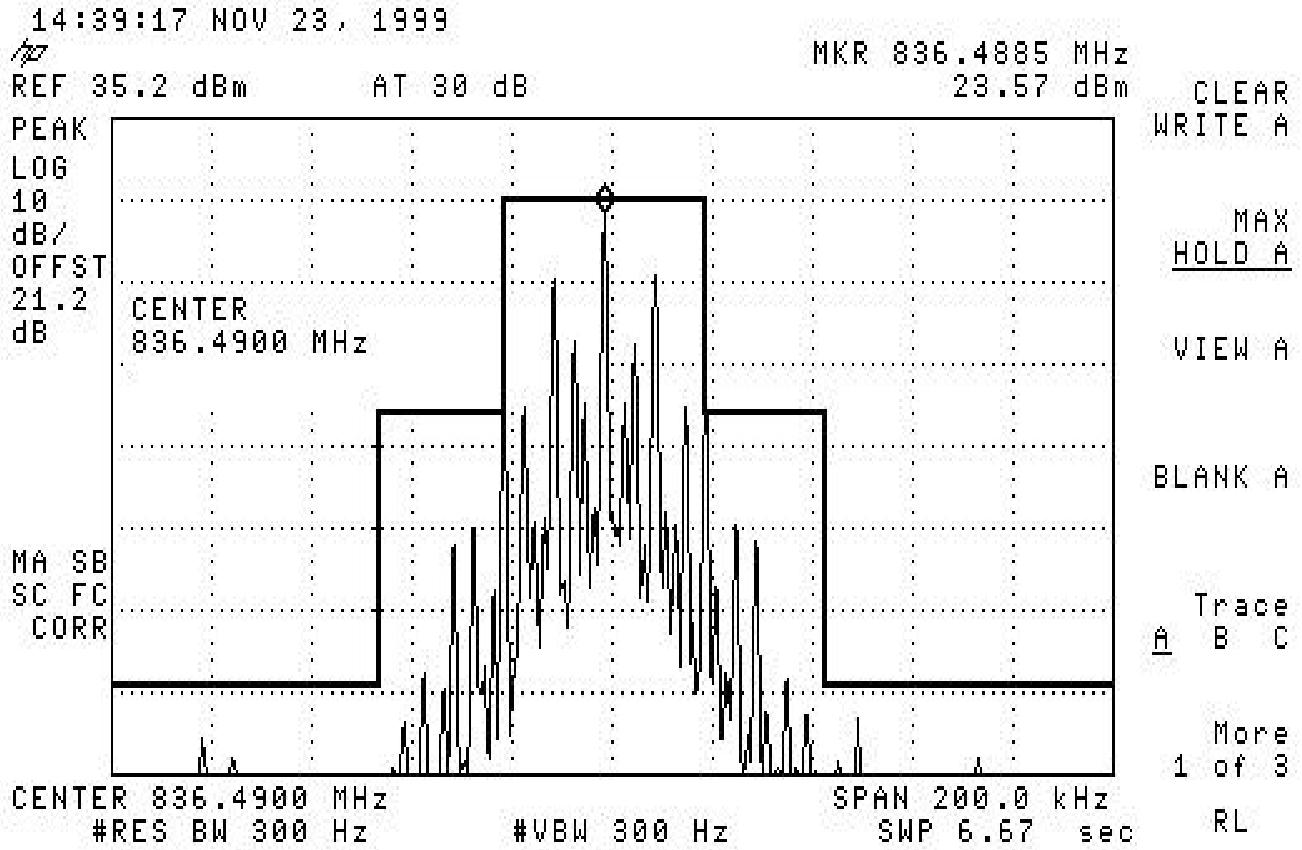
CENTER 836.4900 MHz
#RES BW 300 Hz

#VBW 300 Hz

SPAN 200.0 kHz
SWP 6.67 sec

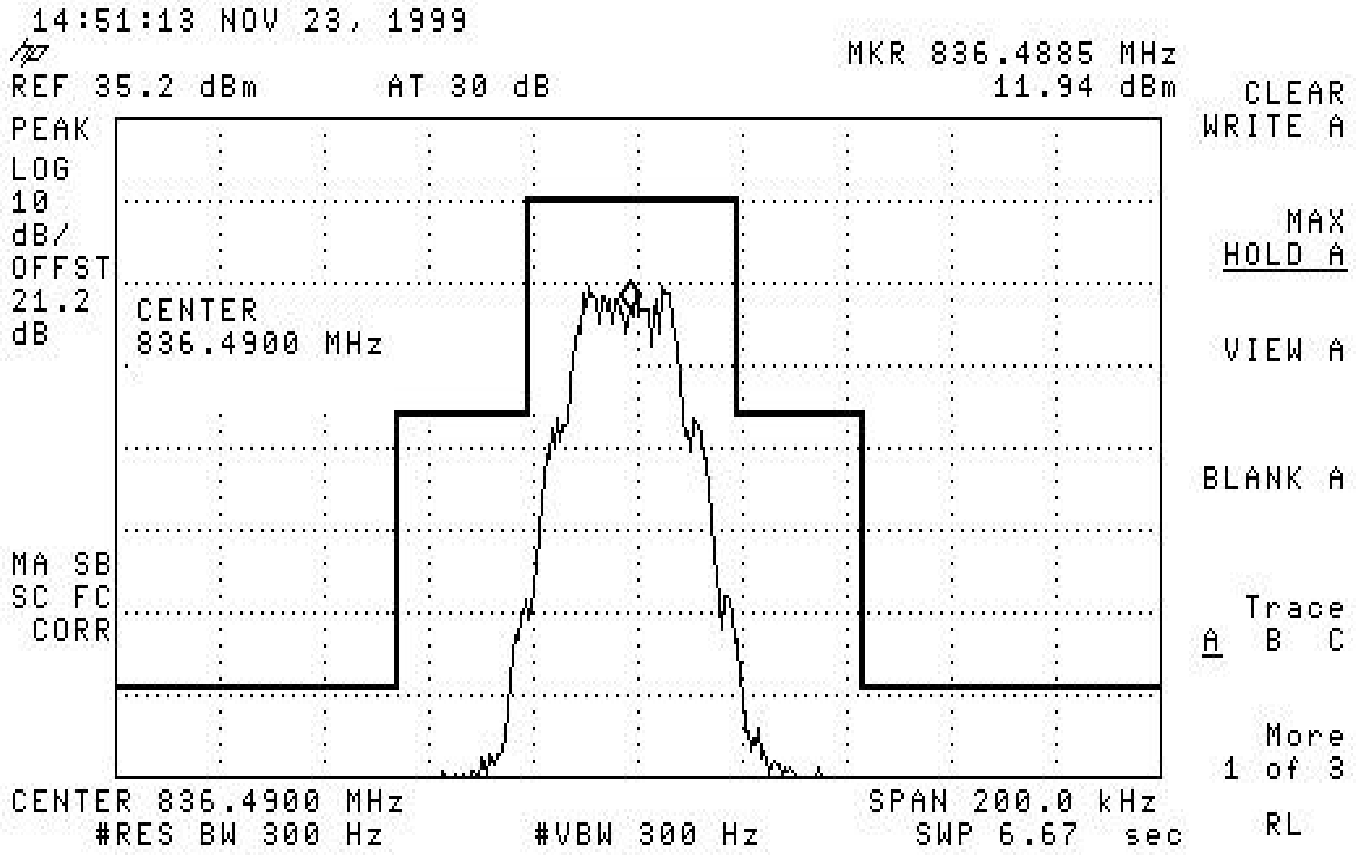
SAT and Voice, power level 0

Exhibit 6C4



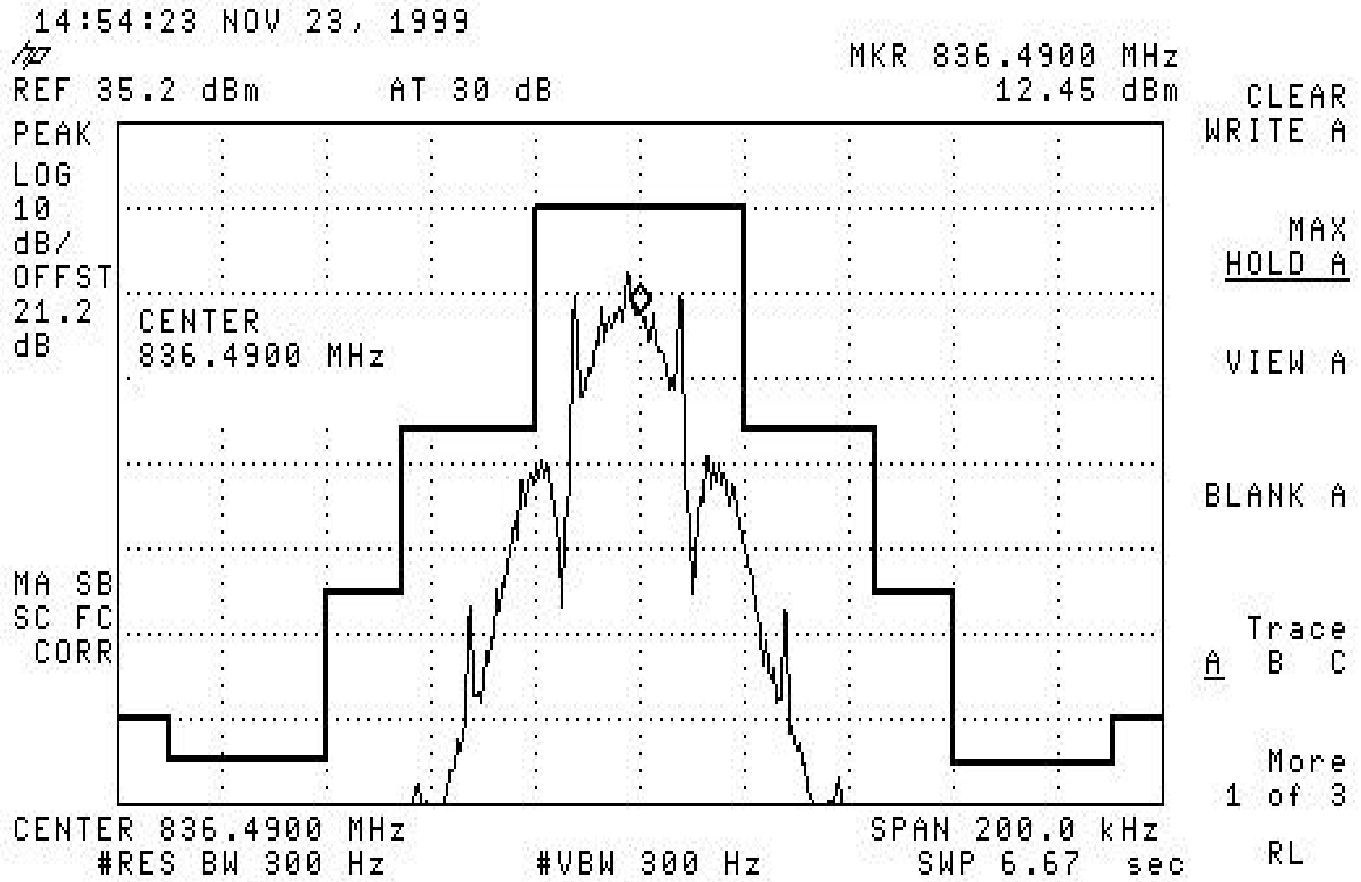
SAT and Signal Tone, power level 0

Exhibit 6C5



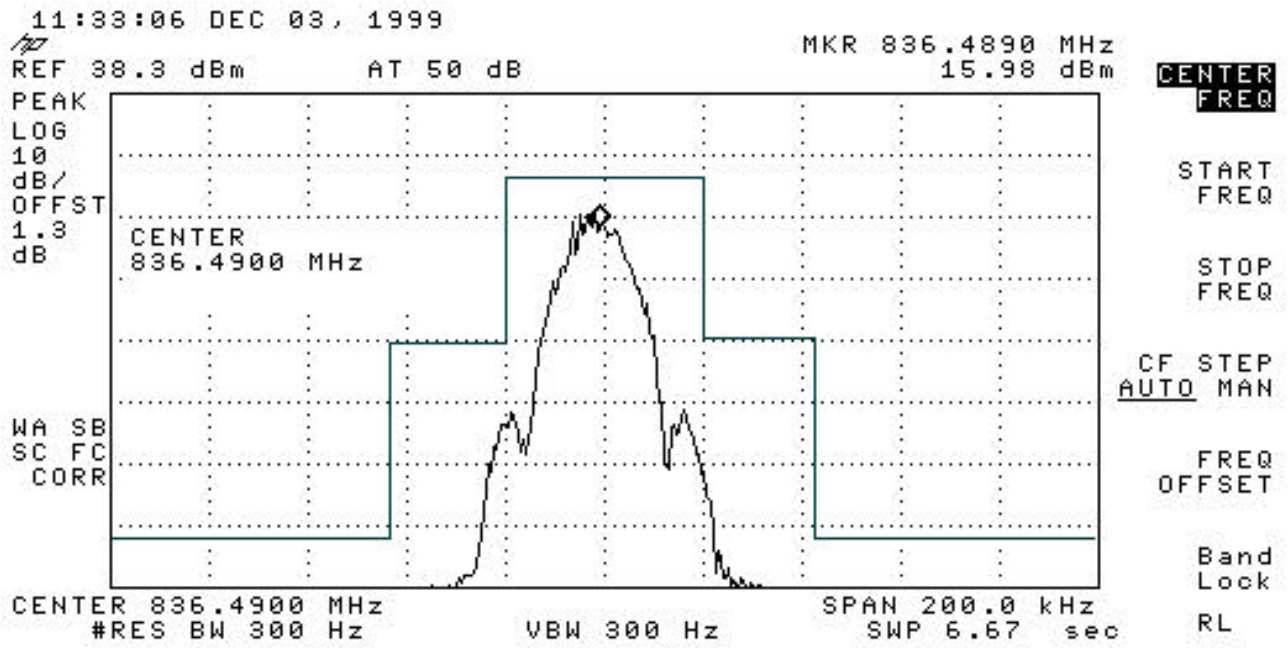
SAT and DTMF #3, power level 0

Exhibit 6C6



SAT and 10kb/s Wideband Data, power level 0

Exhibit 6C7



CDPD data, power level 0

800 MHz AMPS SPURIOUS EMISSIONS (CONDUCTED)

Per 2.1053 Spurious emissions at the antenna terminals (conducted) when properly loaded with an appropriate artificial antenna were measured per IS-137A.

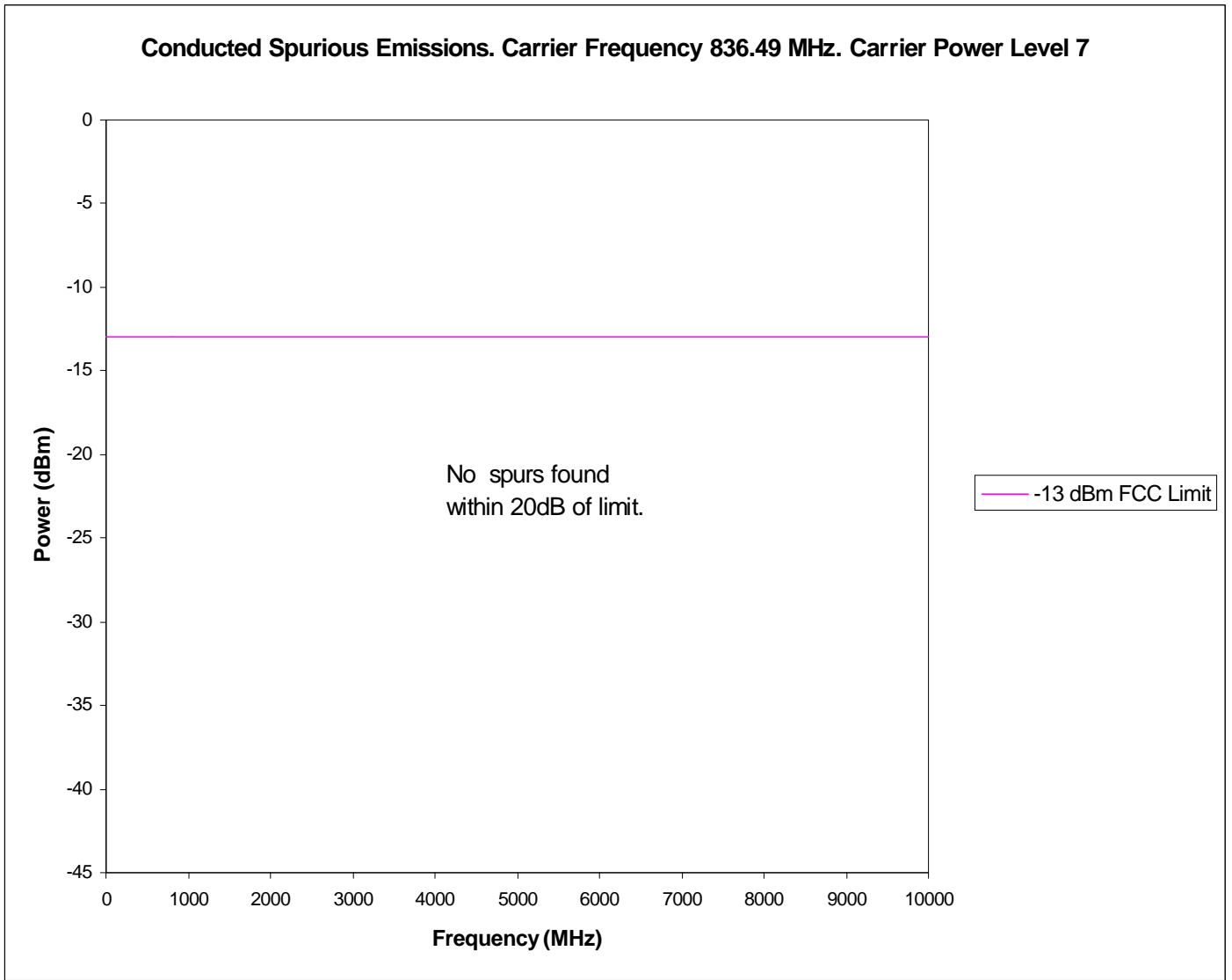
Per 22.917f, the mean power of any emissions from the mobile's transmit antenna connector does not exceed the - 80dBm level in the base station frequency range of 869MHz to 894MHz.

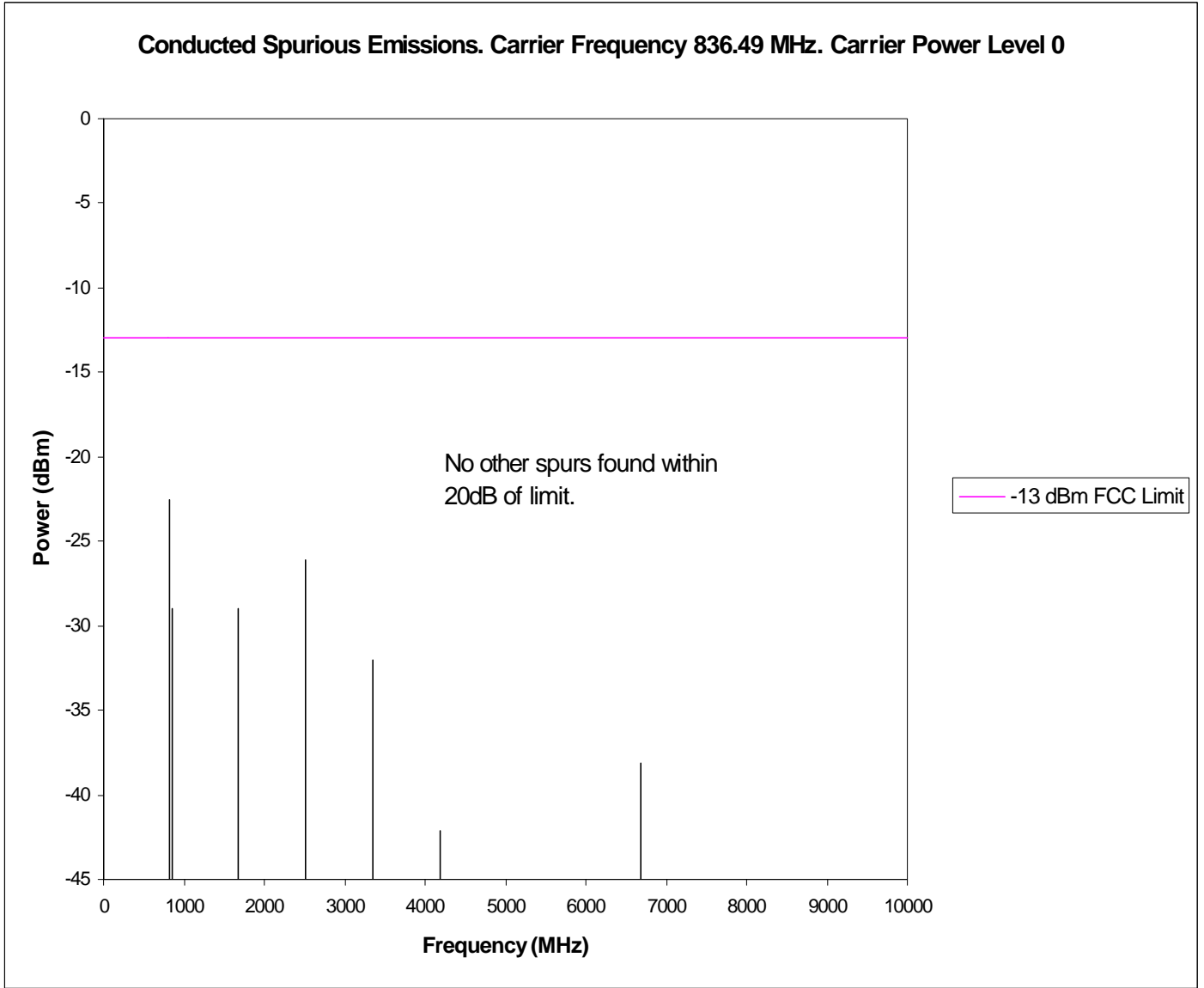
Note: The spectrum was examined through the 10th harmonic of the carrier. Measurements recorded are peak measurements.

<u>EXHIBIT #</u>	<u>FREQUENCY</u>	<u>Output Power level</u>
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





800 MHz AMPS SPURIOUS EMISSIONS (Radiated)

Per 2.1053 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.

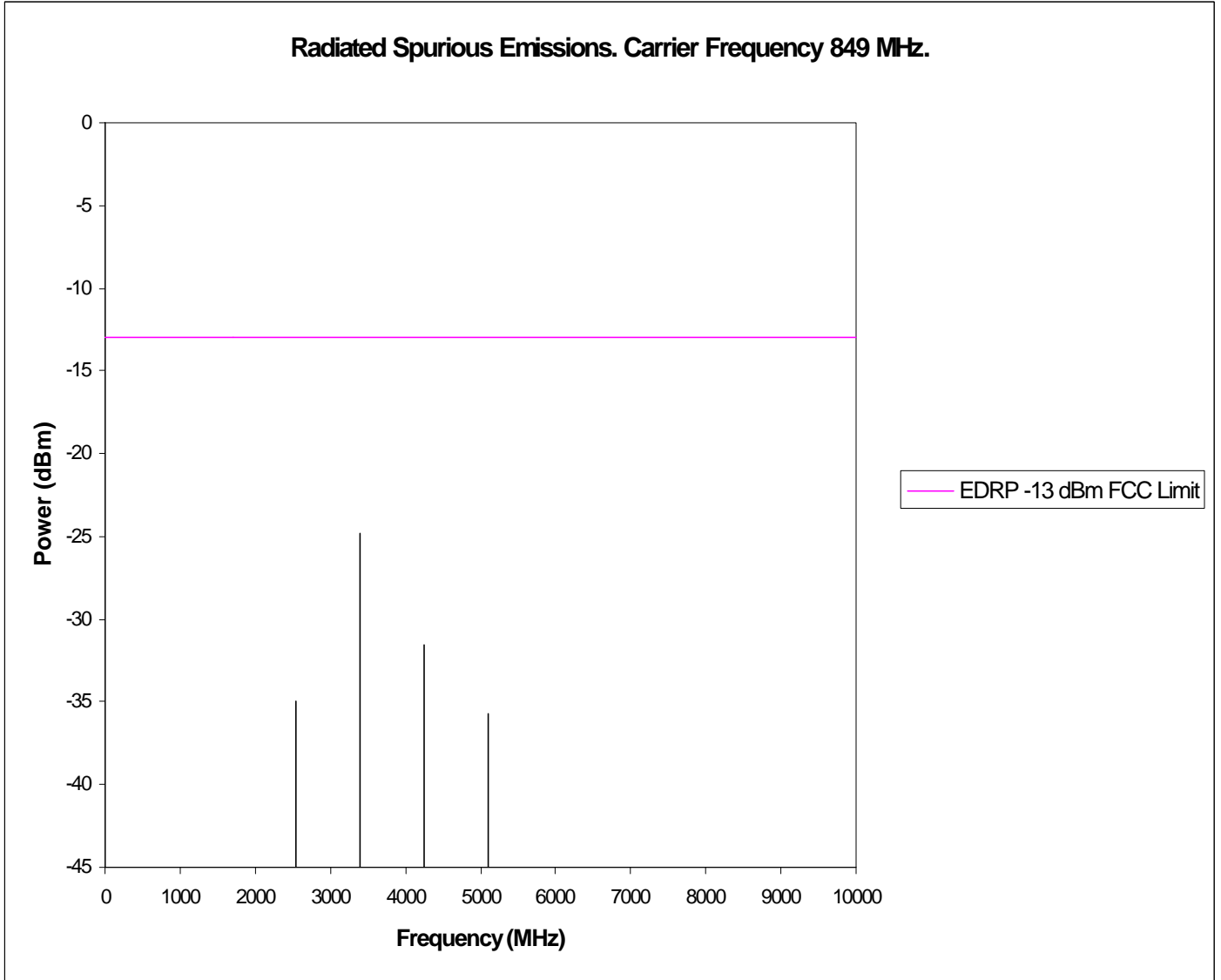
Note: The spectrum was examined through the 10th harmonic of the carrier. Measurements recorded are peak measurements.

<u>EXHIBIT</u>	<u>FREQUENCY</u>	<u>OUTPUT POWER LEVEL</u>
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



800 MHz AMPS FREQUENCY STABILITY

Per 2.1055 (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.

<u>EXHIBIT #</u>	<u>Voltage</u>	<u>Temperature</u>
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

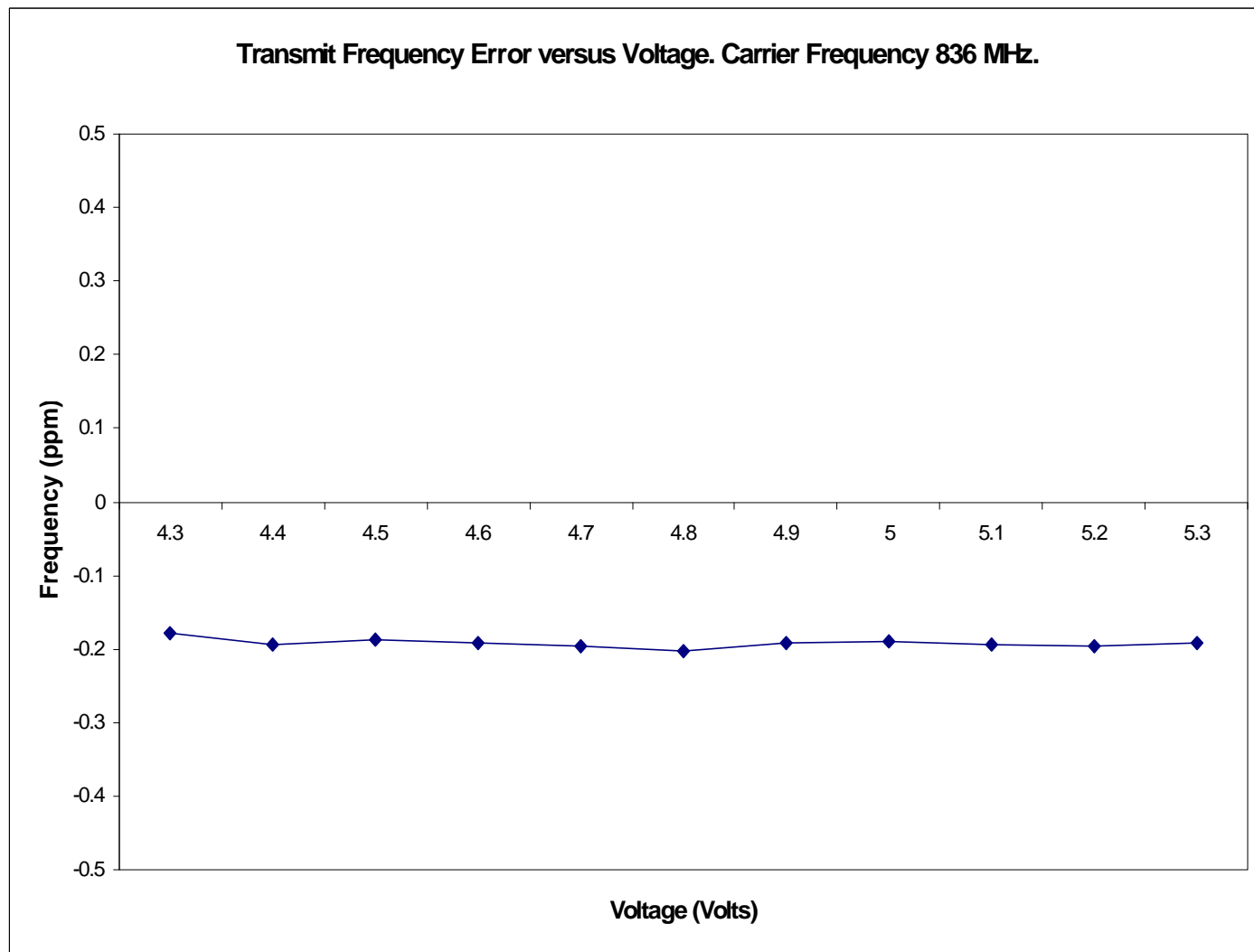
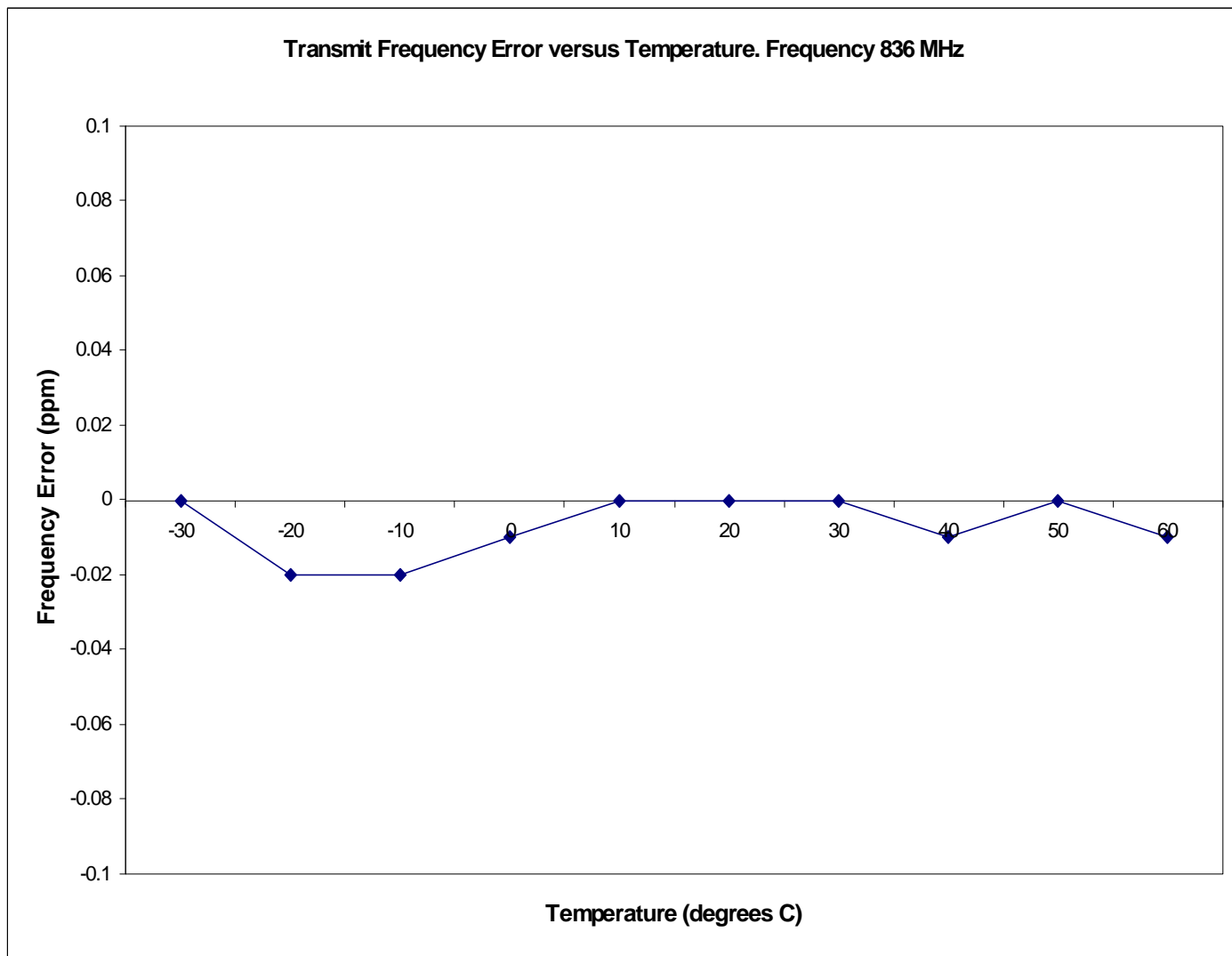


Exhibit 6F3



800 MHz DAMPS 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
6G2	4.8	Varied	Mid Band	0
6G3	Varied	+25 C	Mid Band	0

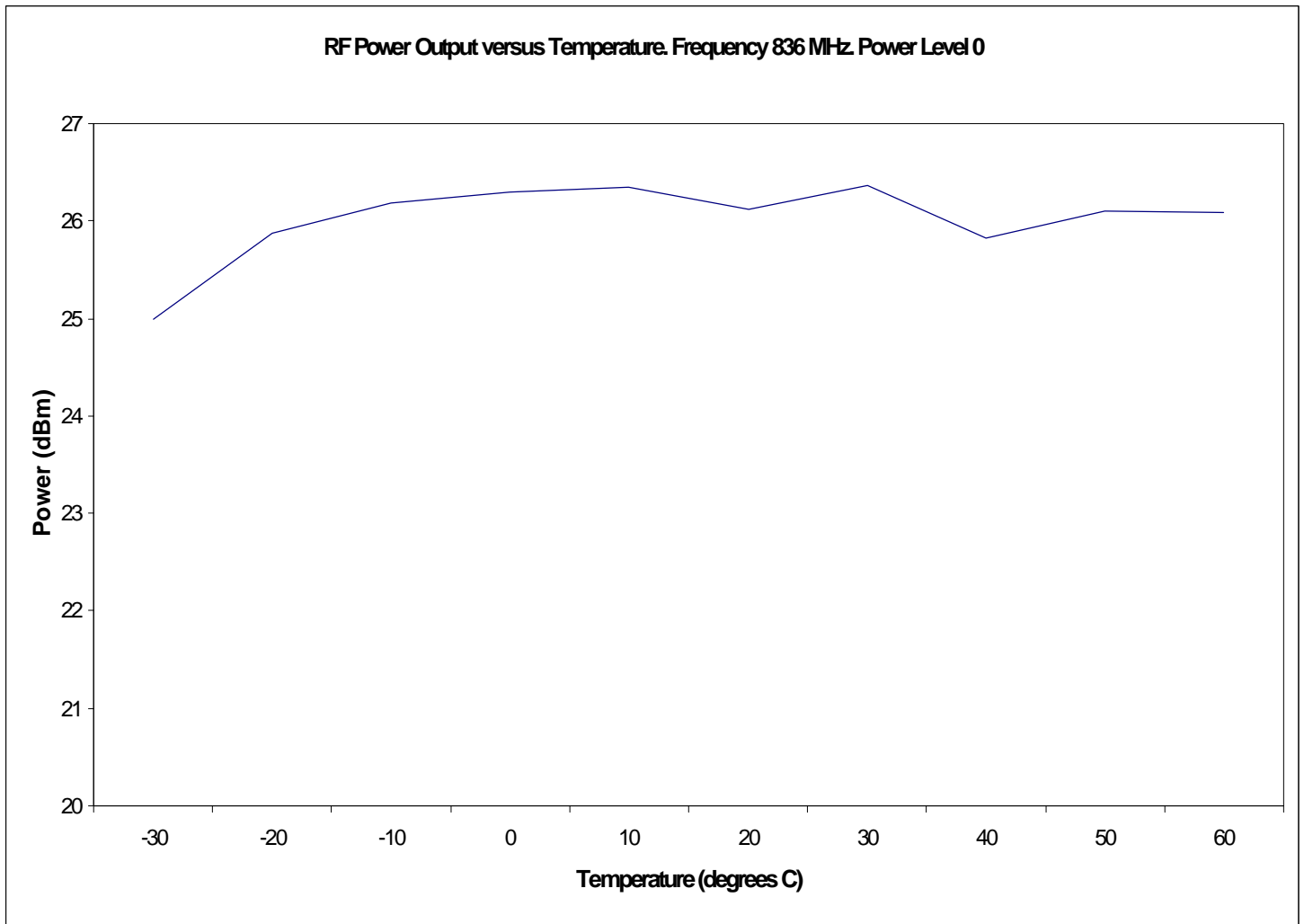
The measurements were made per IS-137A using a Hewlett Packard 8953DT North American Dual Mode Cellular Test System which includes the following equipment:

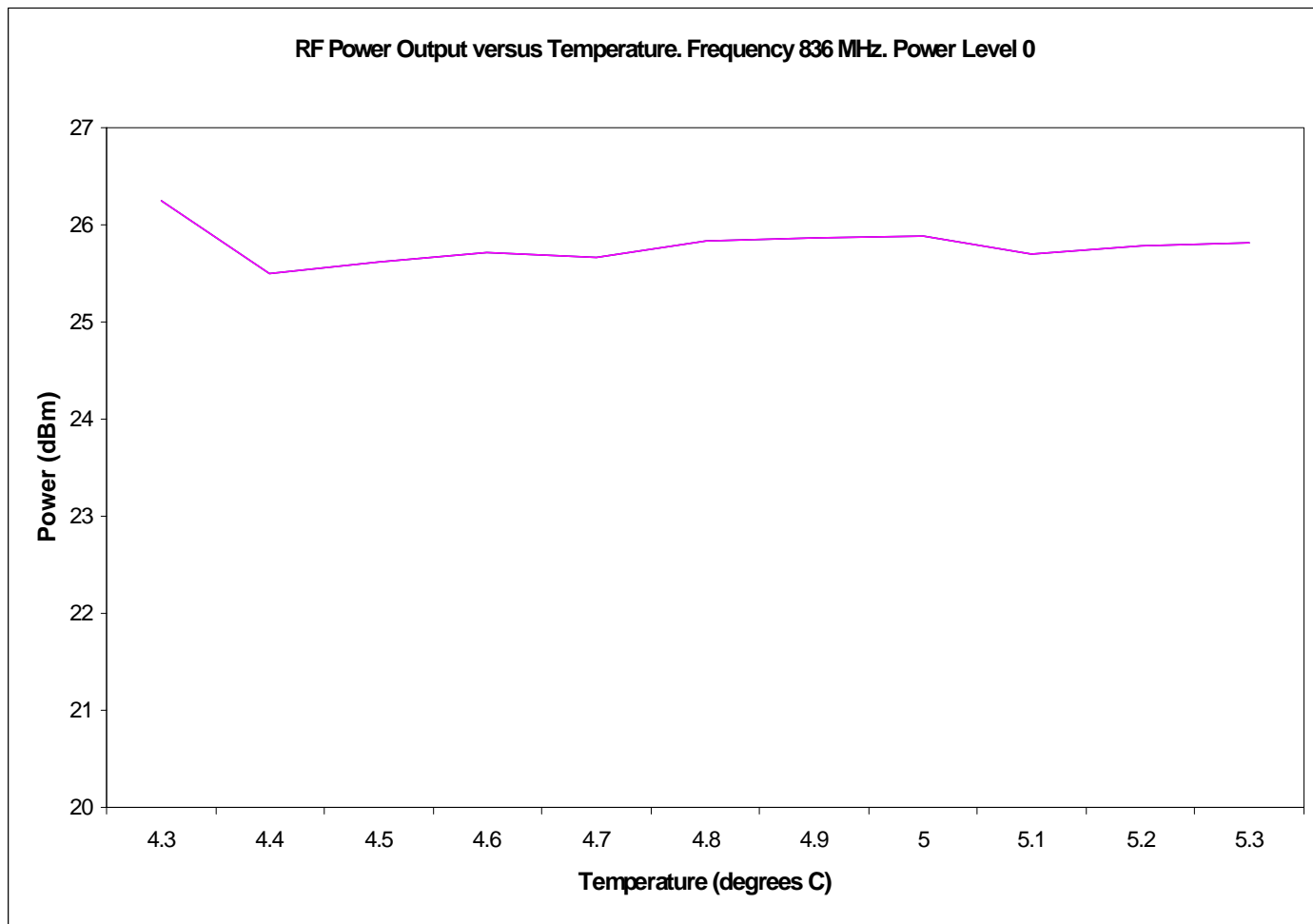
HP8958A Cellular Interface	HP437B RF Power Meter
HP6623A DC Power Supply	HP8596E Spectrum Analyzer
Thermotron SM-8C Temperature Chamber	

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.





800/1900 MHz: DAMPS MODULATION CHARACTERISTICS

Part 2.1047

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 ϕ_n is the absolute phase corresponding to the n th 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:

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

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:

$$Z(k) = [C_0 + C_1 * [S(k)+E(k)]] * W^k$$

where:

$$k = n/24.3\text{KHz}$$

$$dr = jda$$

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

C_0 is a constant origin offset representing quadrature modulator imbalance,
 C_1 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:

$$\sum_{k=MIN}^{k=MAX} |E(k)|^2 \qquad \sum_{k=MIN}^{k=MAX} |[Z(k) * W^{-C_0/C_1} - S(k)]|^2$$

C_0 , C_1 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:

$$\begin{aligned} \text{MIN} &= 6 \\ \text{MAX} &= 162 \end{aligned}$$

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

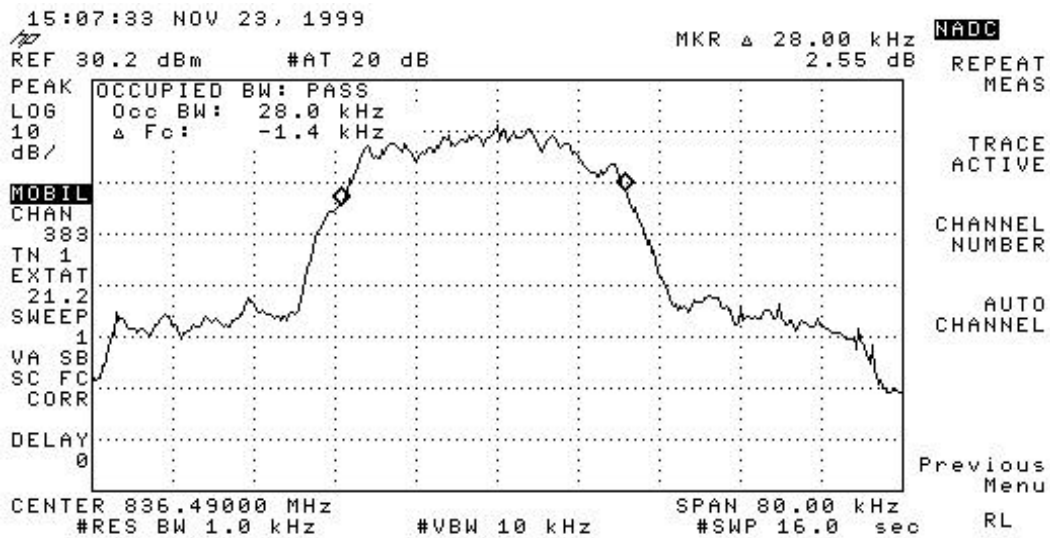
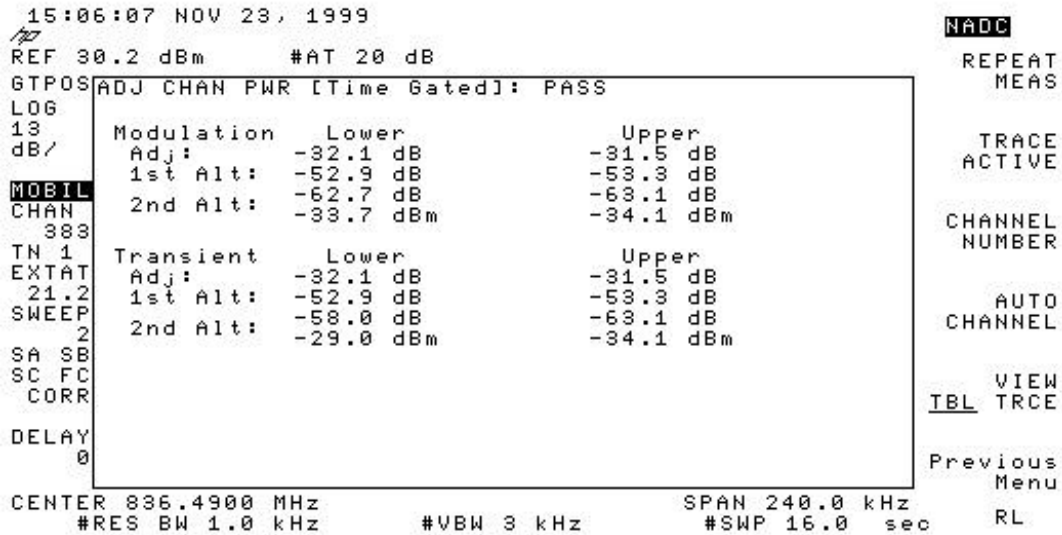
Part 22.1049 (d)(1) the exhibits presented show the modulations that exist in a DAMPS cellular system:

<u>Exhibit #</u>	<u>Description</u>	<u>Power Level</u>
612	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



Plots showing occupied bandwidth of 28 kHz and alternate and adjacent power.

800MHz DAMPS SPURIOUS EMISSIONS (CONDUCTED)

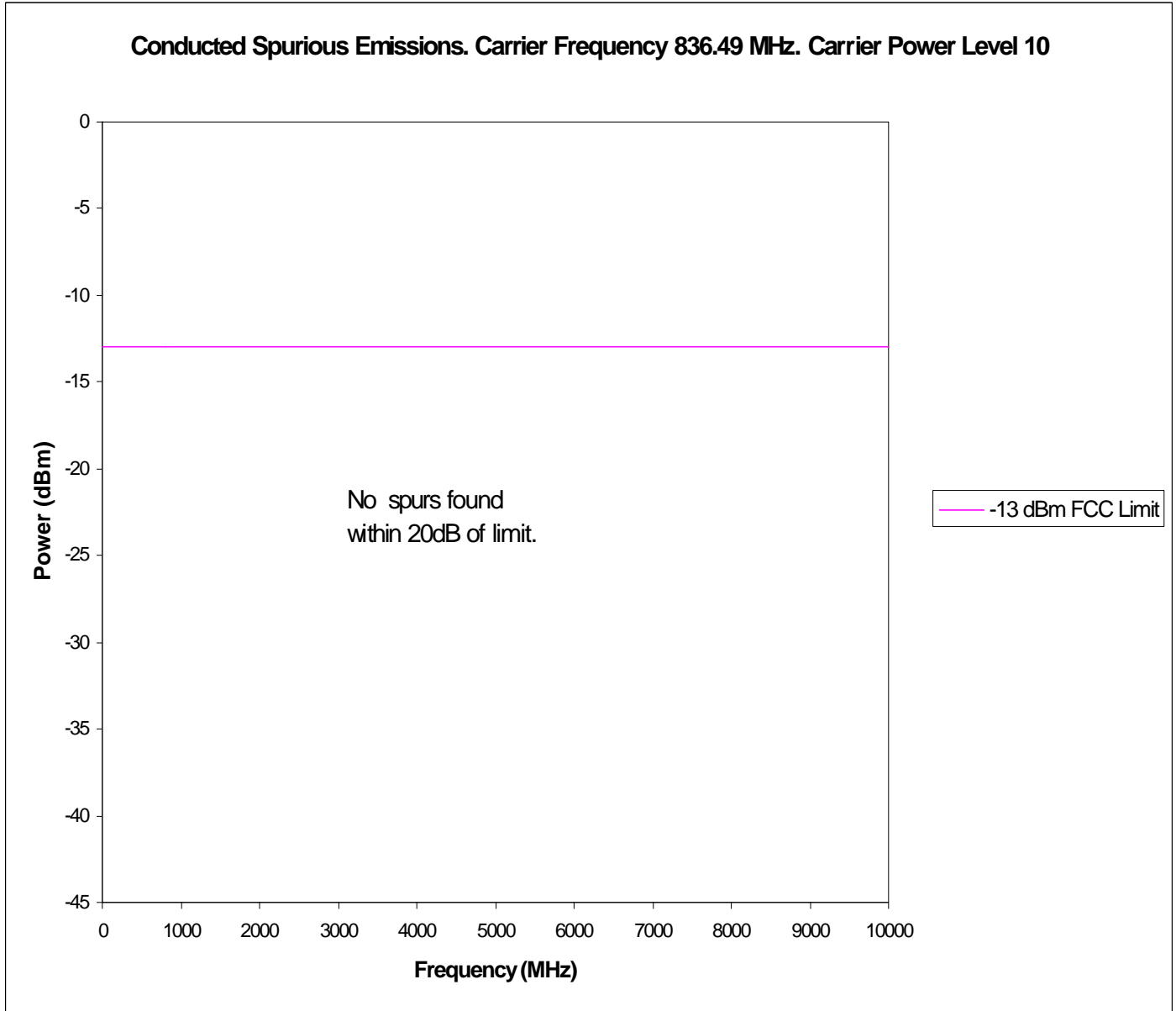
Per 2.1051 Spurious emissions at the antenna terminals (conducted) when properly loaded with an appropriate artificial antenna were measured per IS-137A.

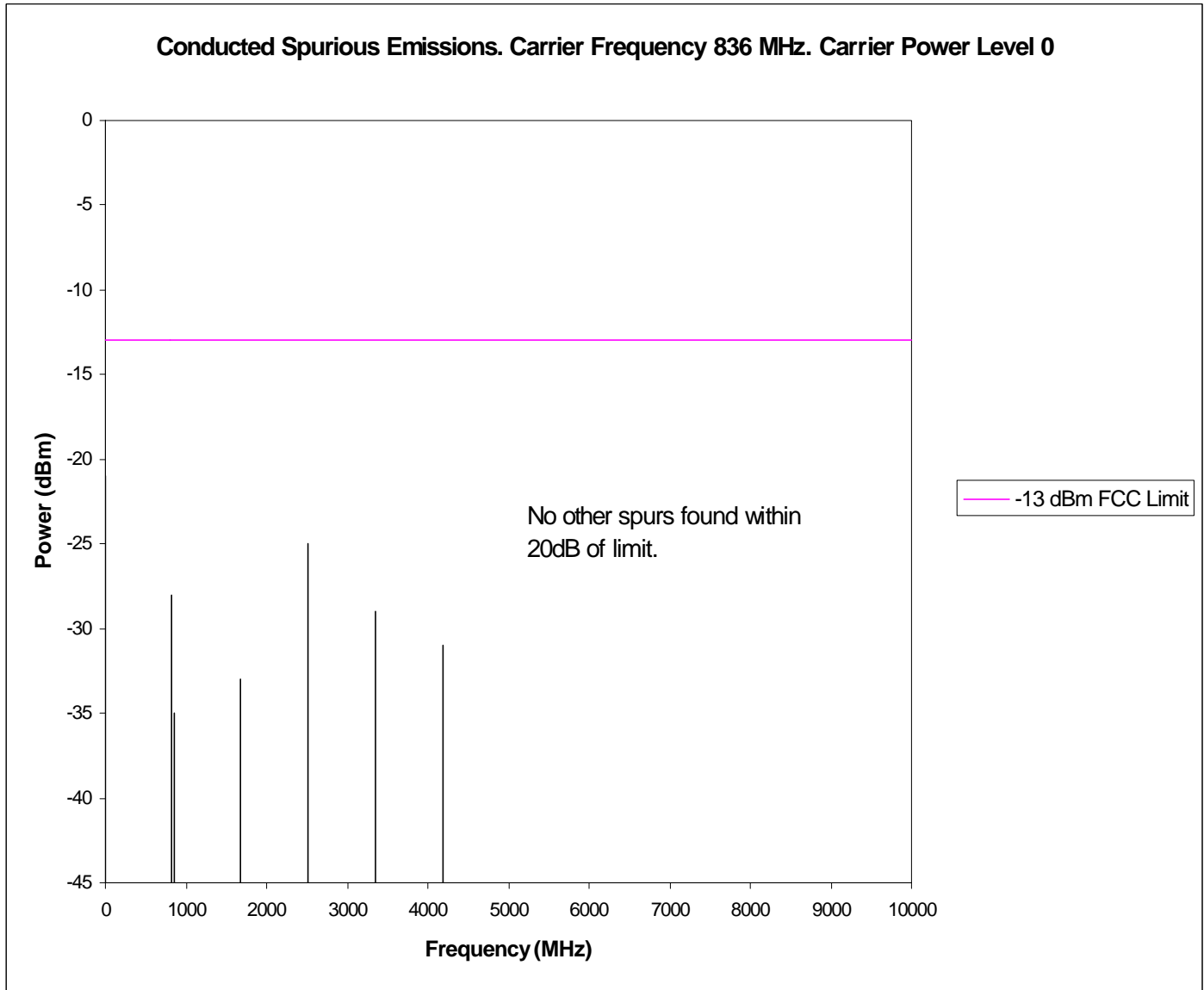
<u>EXHIBIT #</u>	<u>FREQUENCY</u>	<u>Output Power level</u>
6J2	836.49	10
6J3	836.49	0

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

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

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





800 MHz DAMPS SPURIOUS EMISSIONS. RADIATED

Para: 2.1053 and Part 22.917

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.

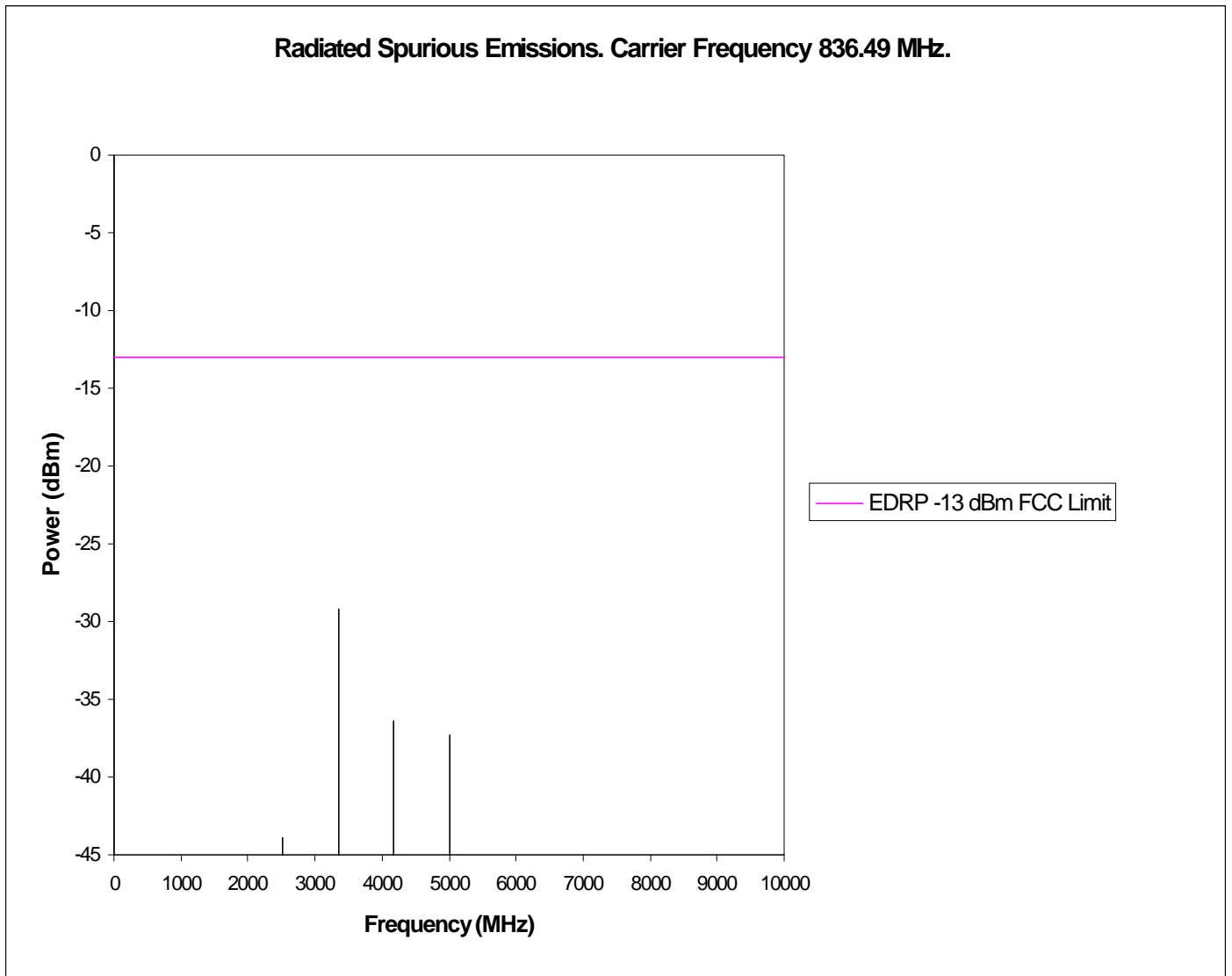
Note: The spectrum was examined through the 10th harmonic of the carrier. Measurements recorded are peak measurements.

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



800 MHz AMPS FREQUENCY STABILITY

Per 2.1055 (a)(1),(b),(d)(2)

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.

<u>EXHIBIT #</u>	<u>Voltage</u>	<u>Temperature</u>
6L2	4.3 to 5.3 Volts (varied)	+25 C
6L3	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 6L2

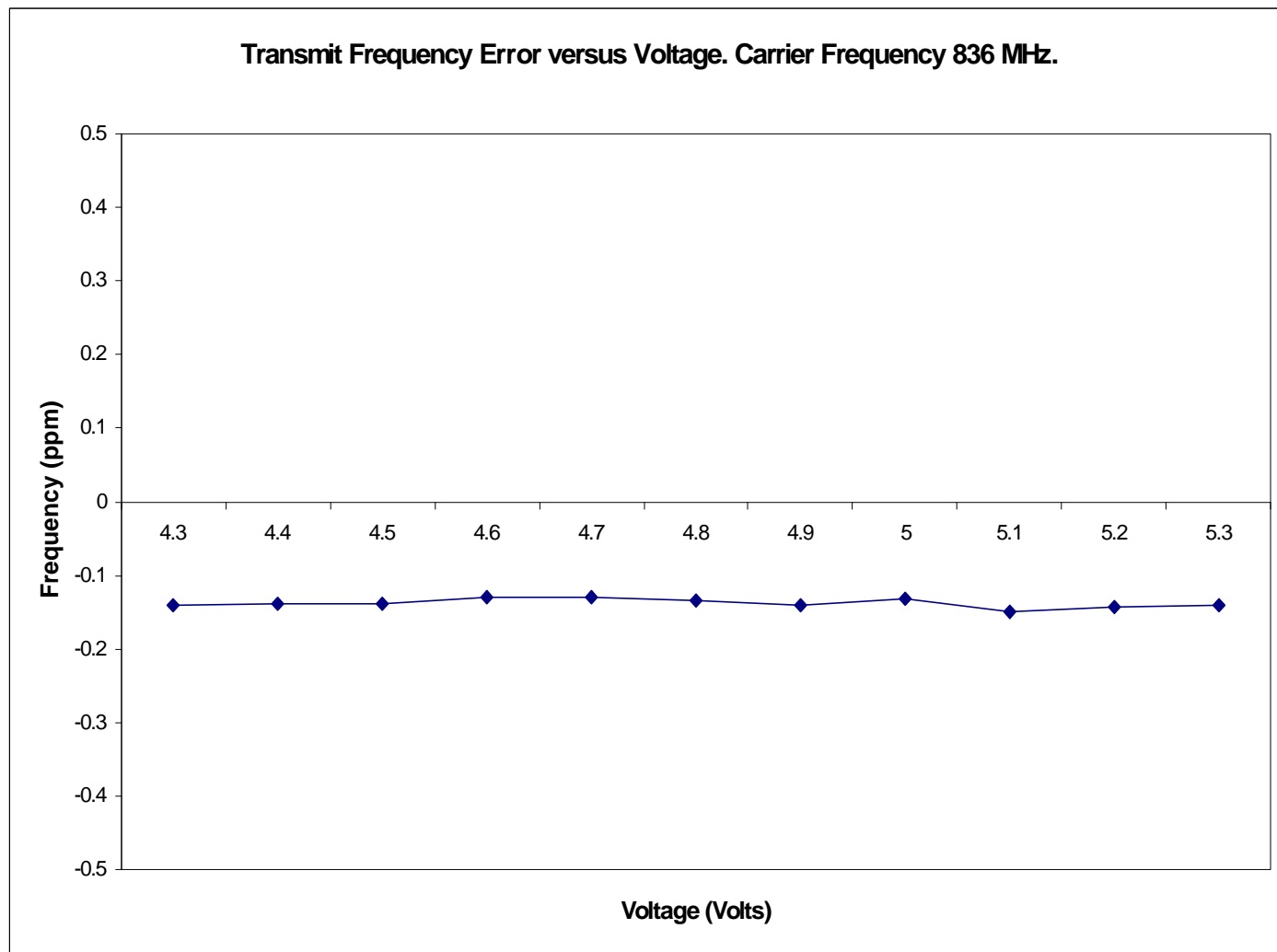
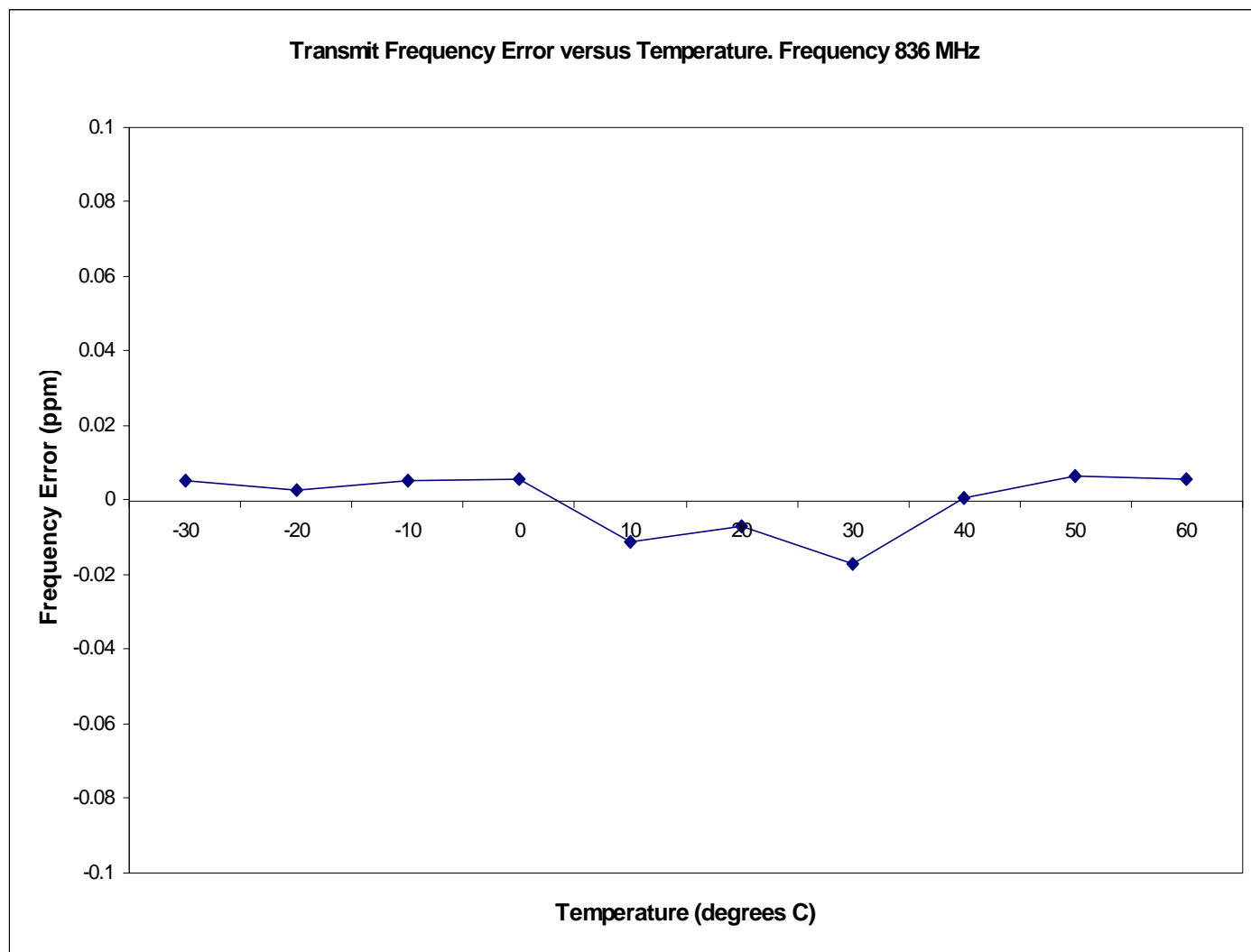


Exhibit 6L3



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

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.

Exhibit 6M2

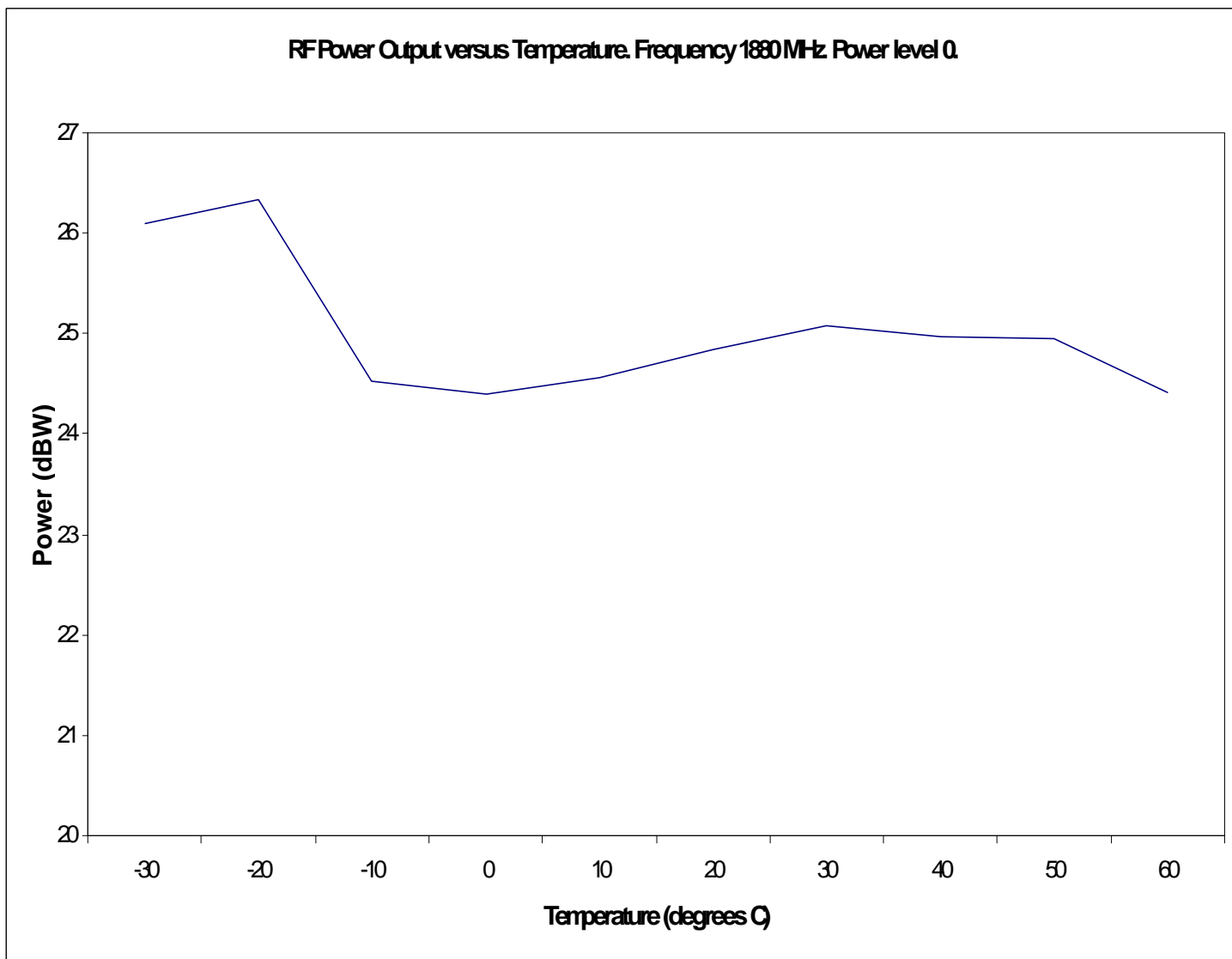
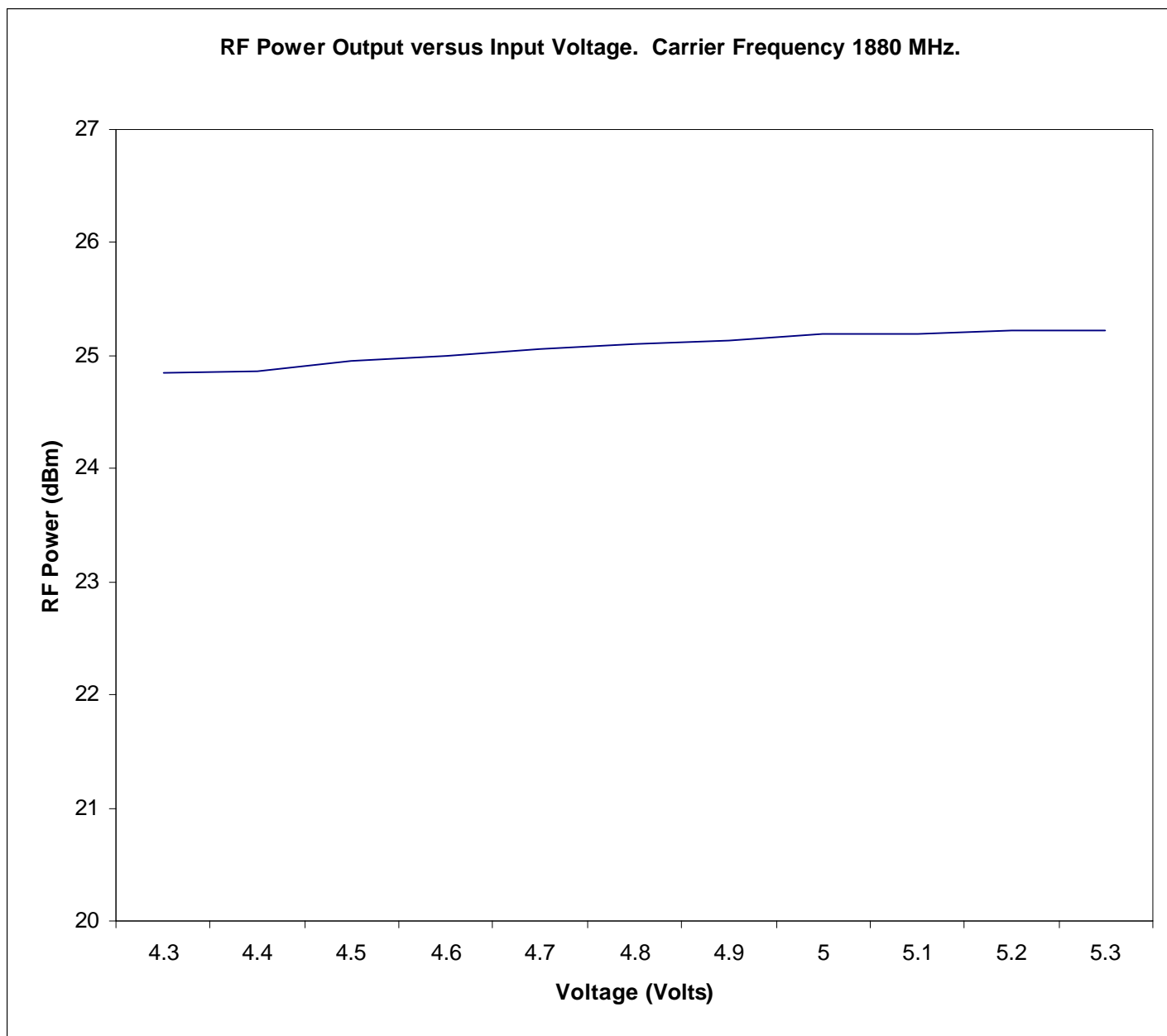


Exhibit 6M3



800/1900 MHz: DAMPS MODULATION CHARACTERISTICS

Part 2.1047

Definition

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

$$S(t) = \sum_n g(t-nT) \cos(\phi_n) \cos(\omega_c t) - \sum_n g(t-nT) \sin(\phi_n) \sin(\omega_c t)$$

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, ω_c is the radian carrier frequency, T is the symbol period, and ϕ_n is the absolute phase corresponding to the n th 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:

$$Z(k) = [C_0 + C_1 * [S(k)+E(k)]] * W^k$$

where:

$$k = n/24.3\text{KHz}$$

$$dr = jda$$

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

C_0 is a constant origin offset representing quadrature modulator imbalance,
 C_1 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:

$$\sum_{k=MIN}^{k=MAX} |E(k)|^2 \qquad \sum_{k=MIN}^{k=MAX} | \{ [Z(k) * W^{-C_0/C_1}] - S(k) \} |$$

C_0 , C_1 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:

$$\begin{aligned} \text{MIN} &= 6 \\ \text{MAX} &= 162 \end{aligned}$$

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 2.1049 (c, l, 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.
602 1 MHz Resolution Bandwidth reference plot.
603 Emission Bandwidth
604 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.
605 1 MHz Resolution Bandwidth reference plot.
606 Emission Bandwidth
607 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 602

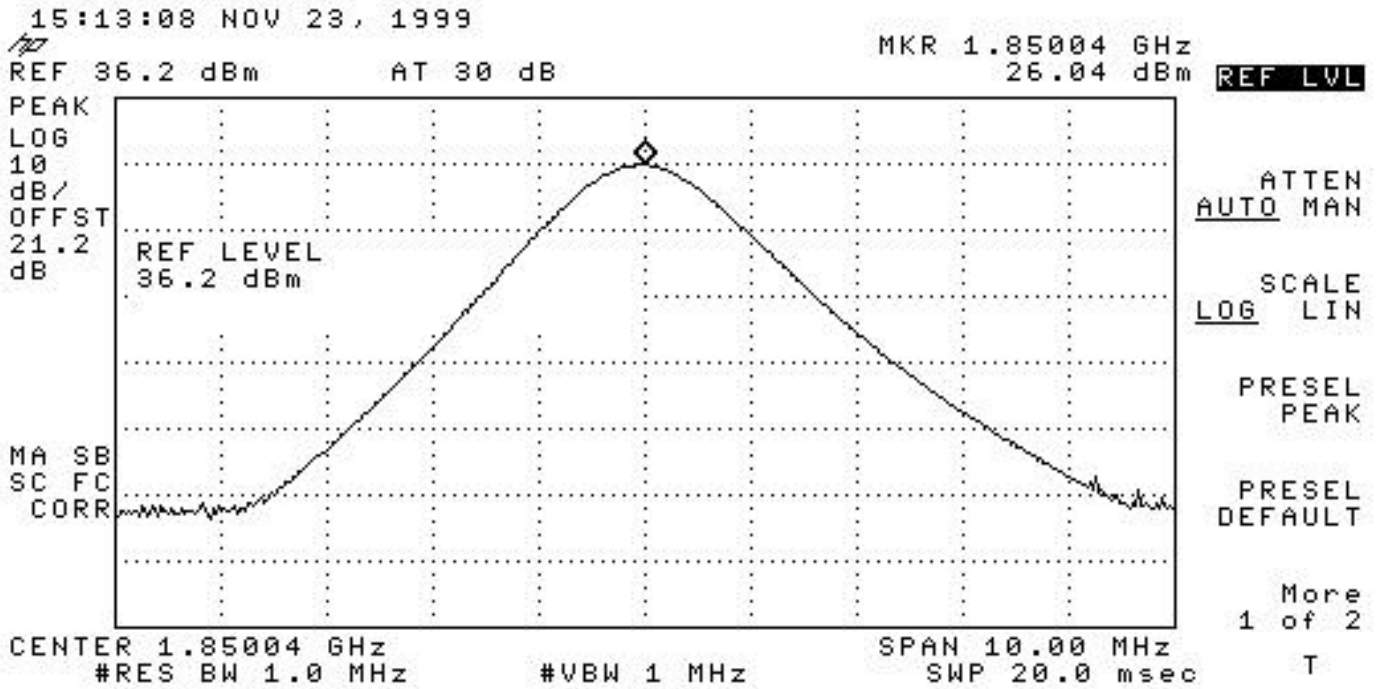


Exhibit 603

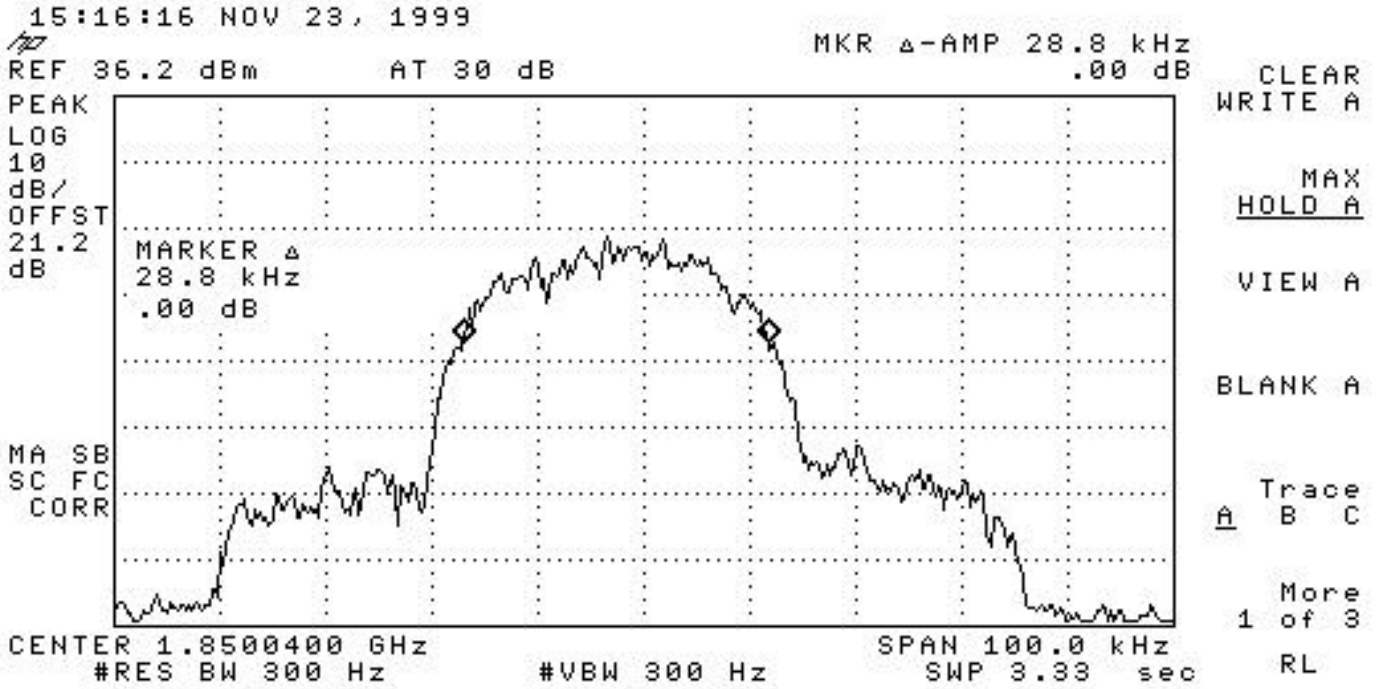


Exhibit 604

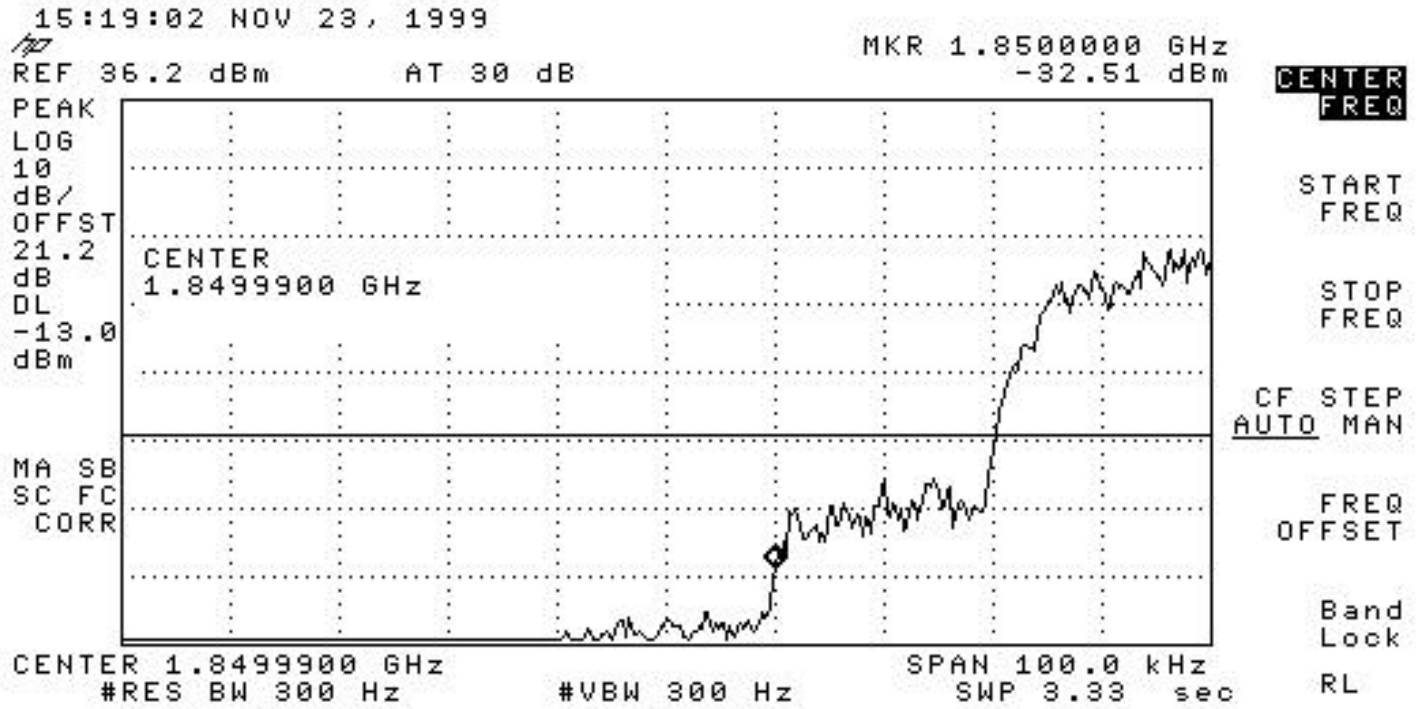


Exhibit 605

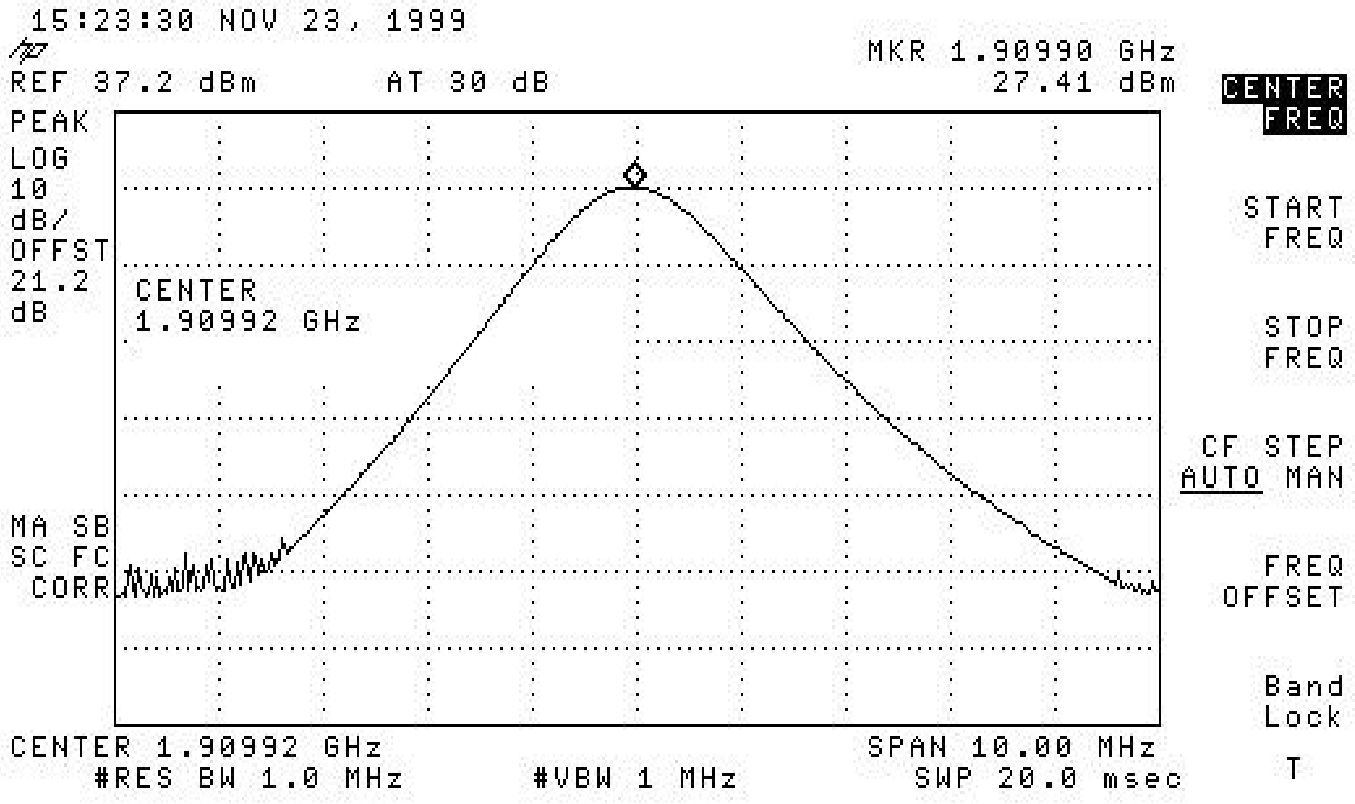


Exhibit 606

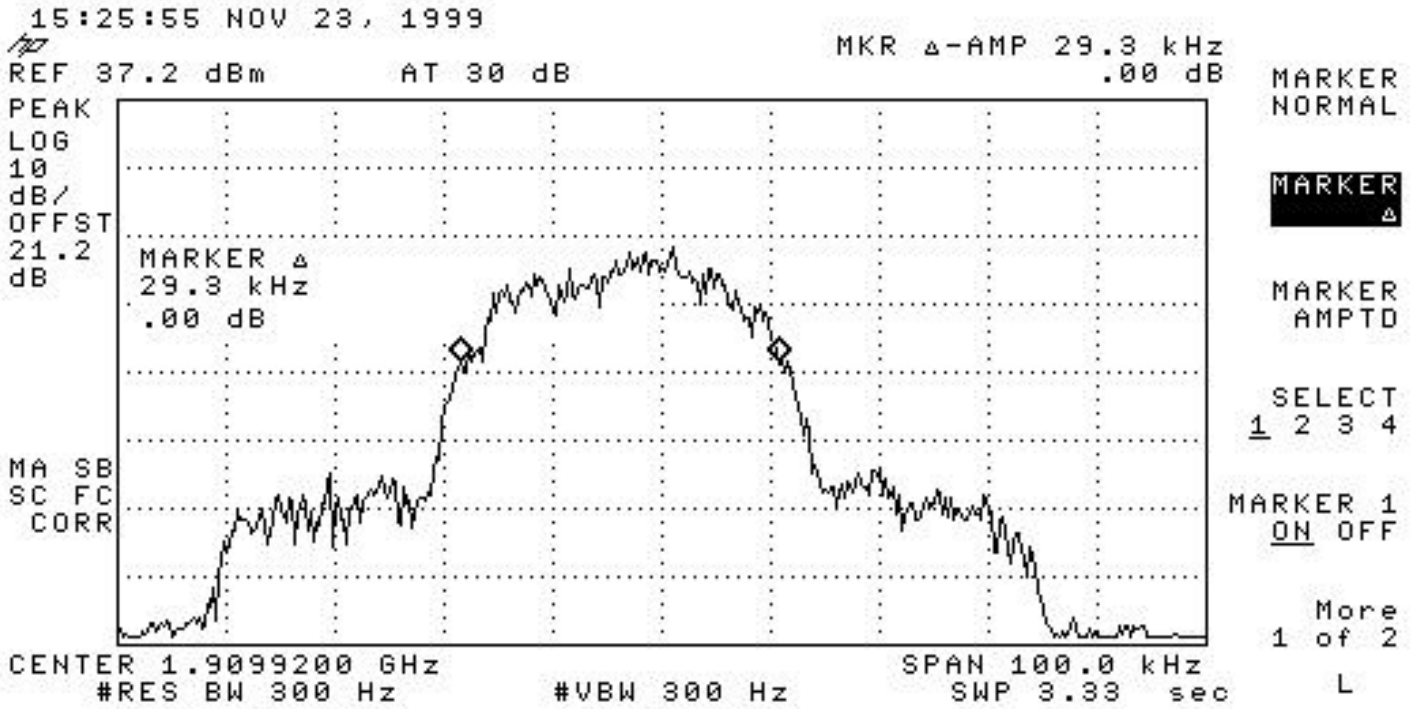
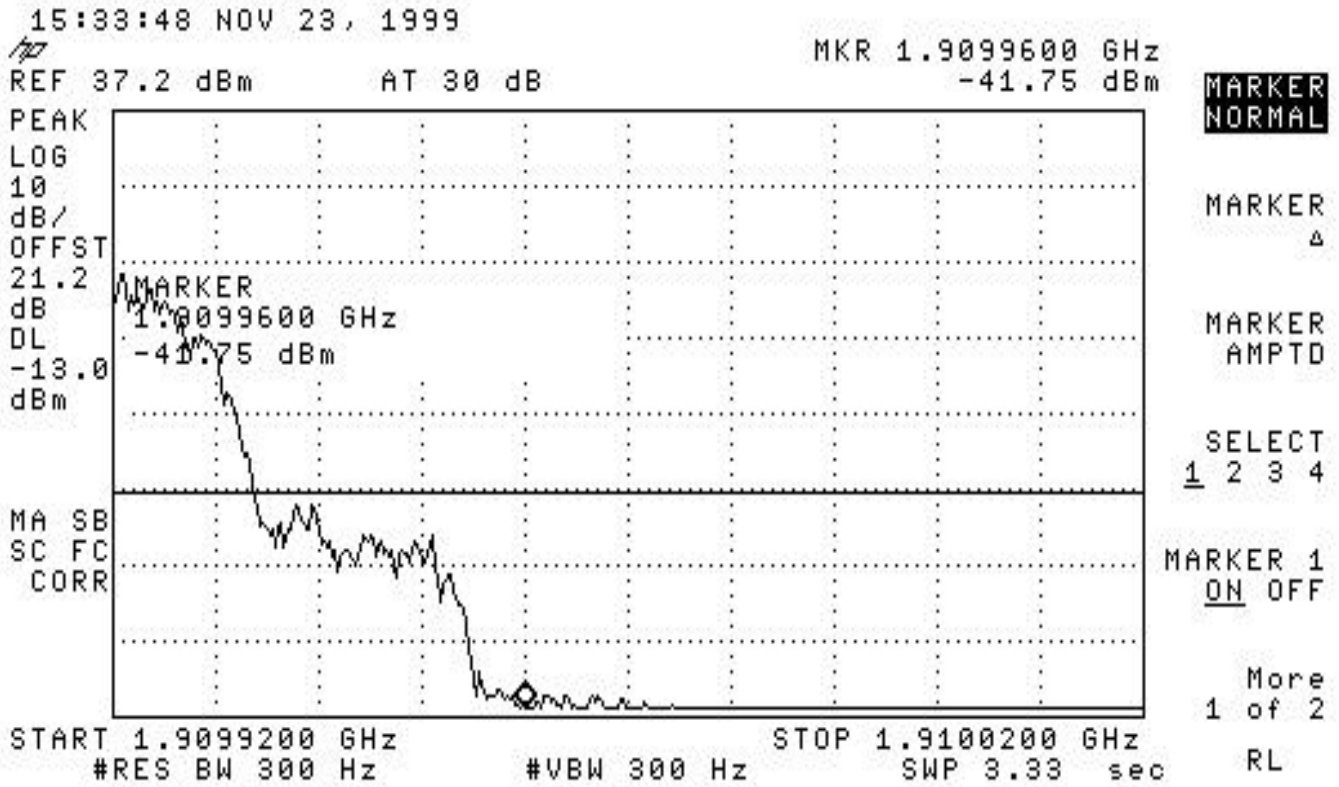


Exhibit 607



1900 MHz SPURIOUS EMISSIONS (CONDUCTED)

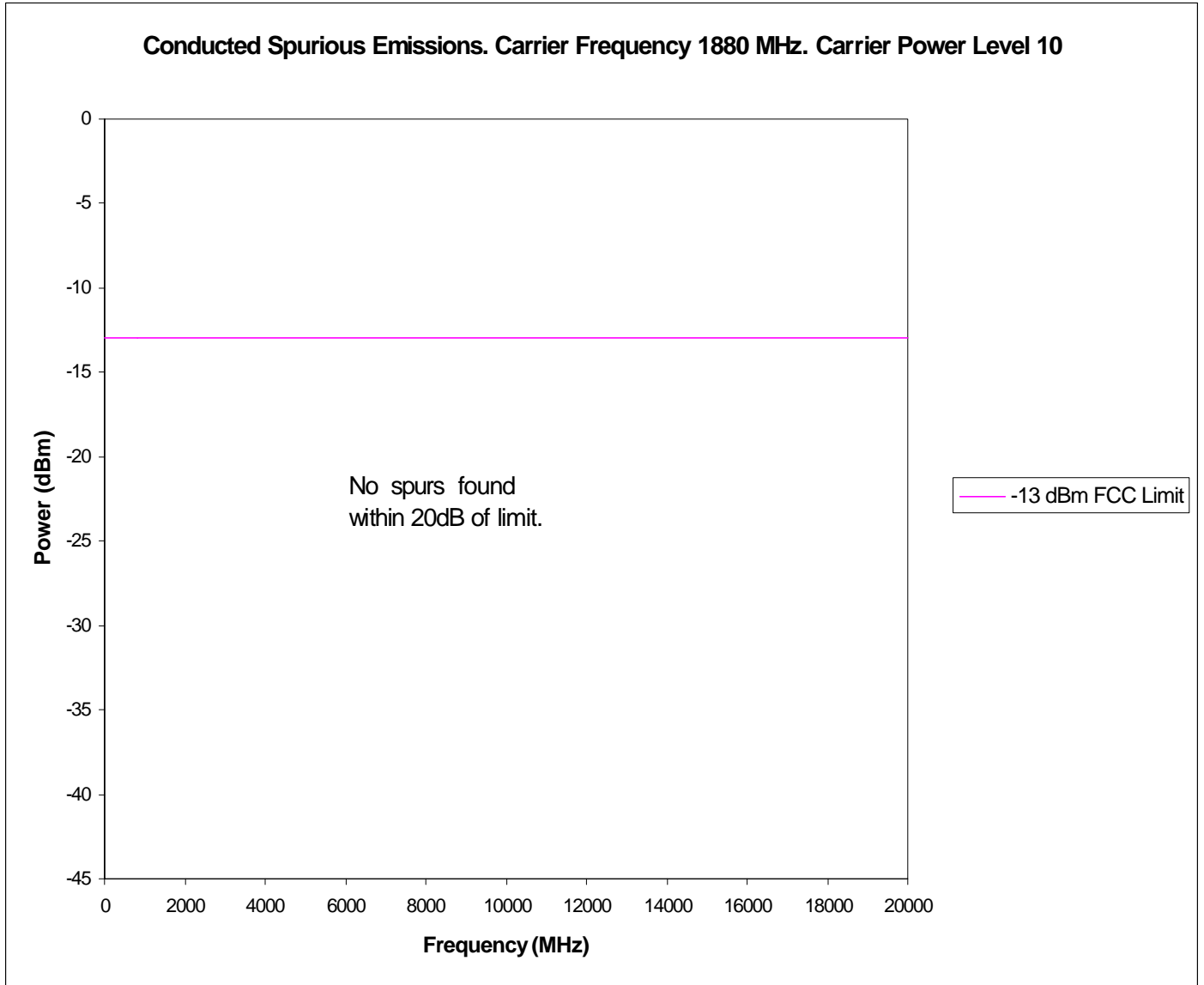
Per 2.1051 Spurious emissions at the antenna terminals (conducted) when properly loaded with an appropriate artificial antenna were measured per IS-137A.

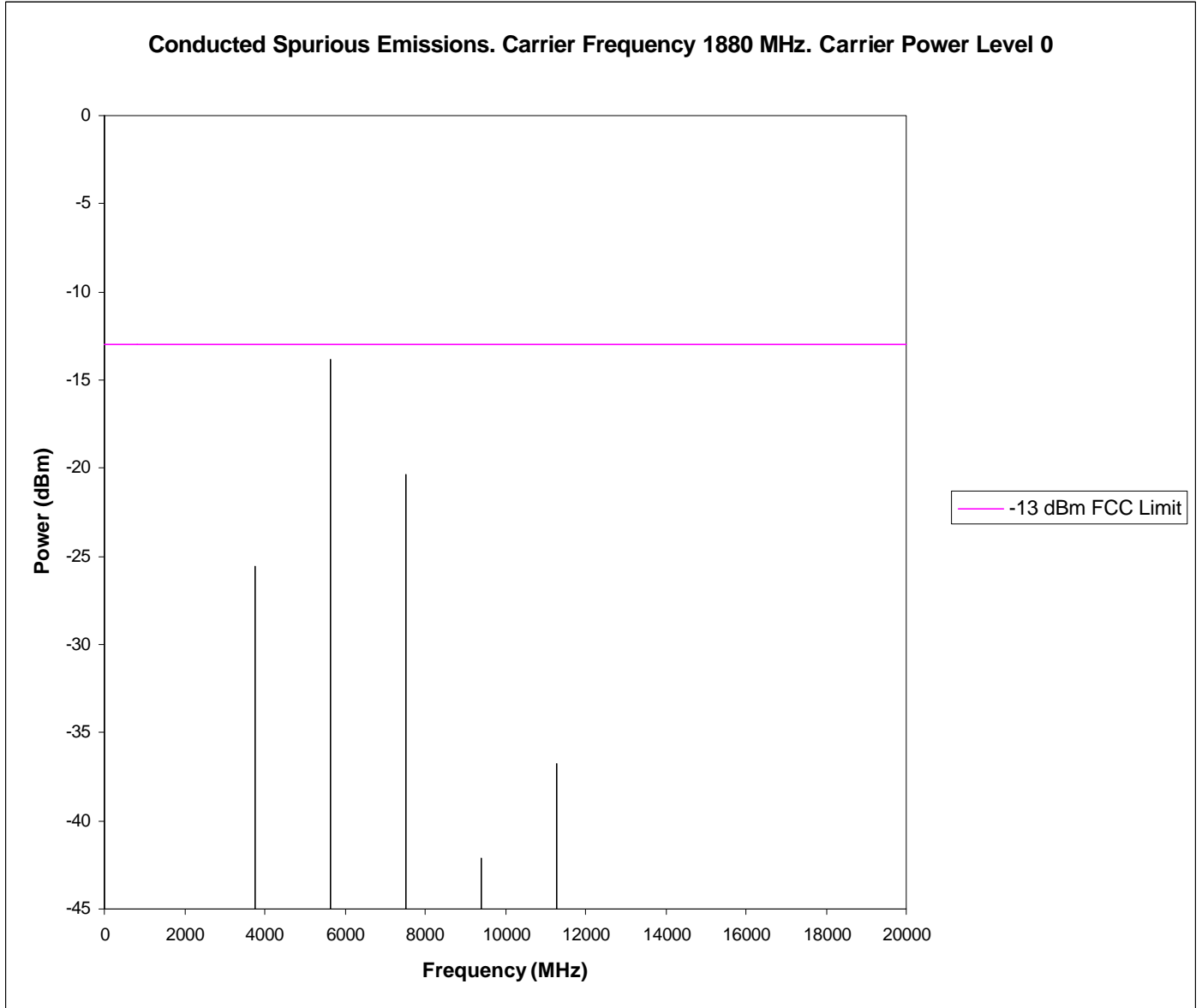
<u>EXHIBIT #</u>	<u>FREQUENCY</u>	<u>Output Power level</u>
6P2	1879.98	10
6P3	1879.98	0

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

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

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





1900 MHz: SPURIOUS EMISSIONS (Radiated)

Per 2.1053 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.

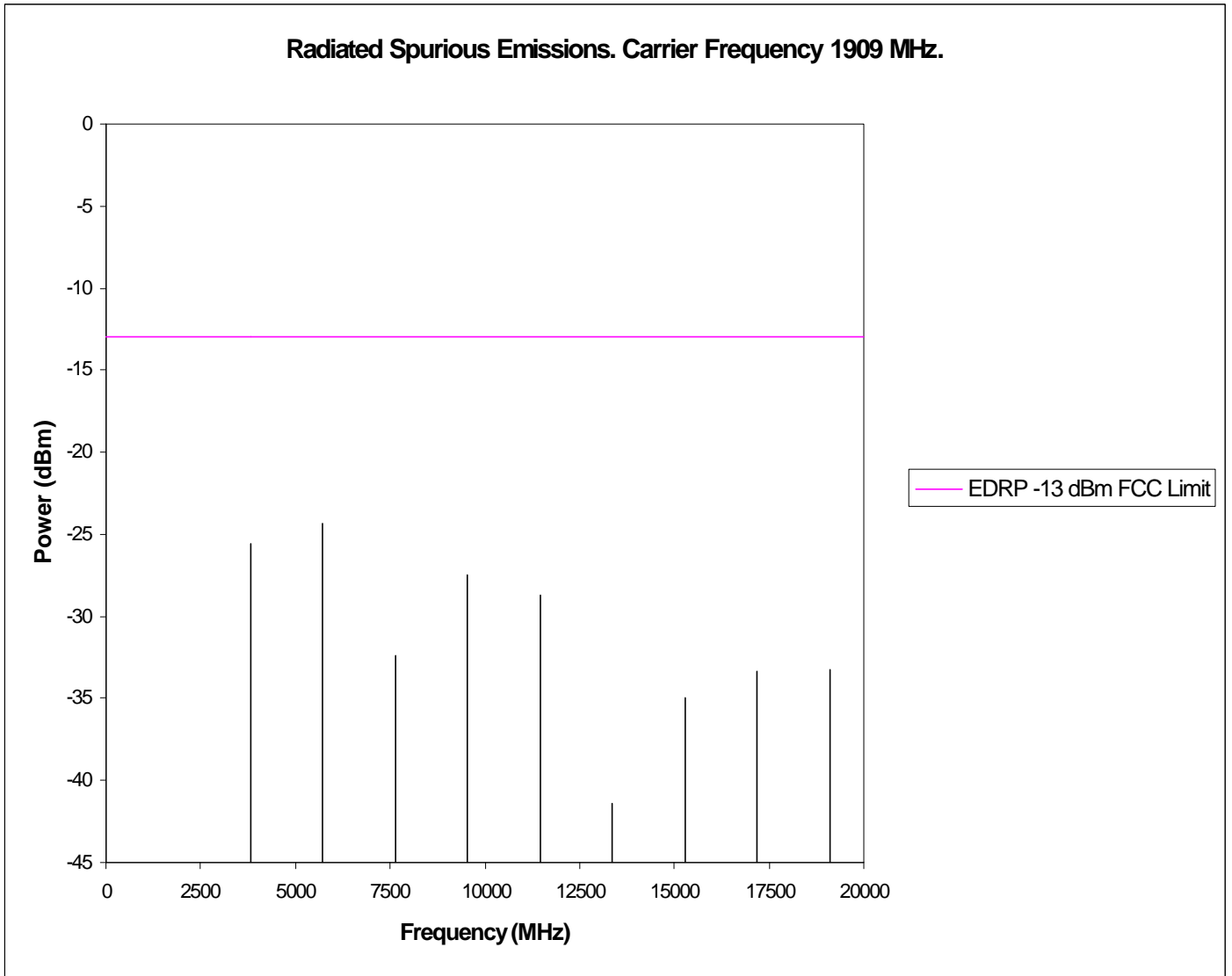
Note: The spectrum was examined through the 10th harmonic of the carrier. Measurements recorded are peak measurements.

<u>EXHIBIT</u>	<u>FREQUENCY</u>	<u>OUTPUT POWER LEVEL</u>
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



1900 MHz: FREQUENCY STABILITY

Per 2.1047 (a)(1),(b),(d)(2), 24.235

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

<u>EXHIBIT #</u>	<u>Voltage</u>	<u>Temperature</u>
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

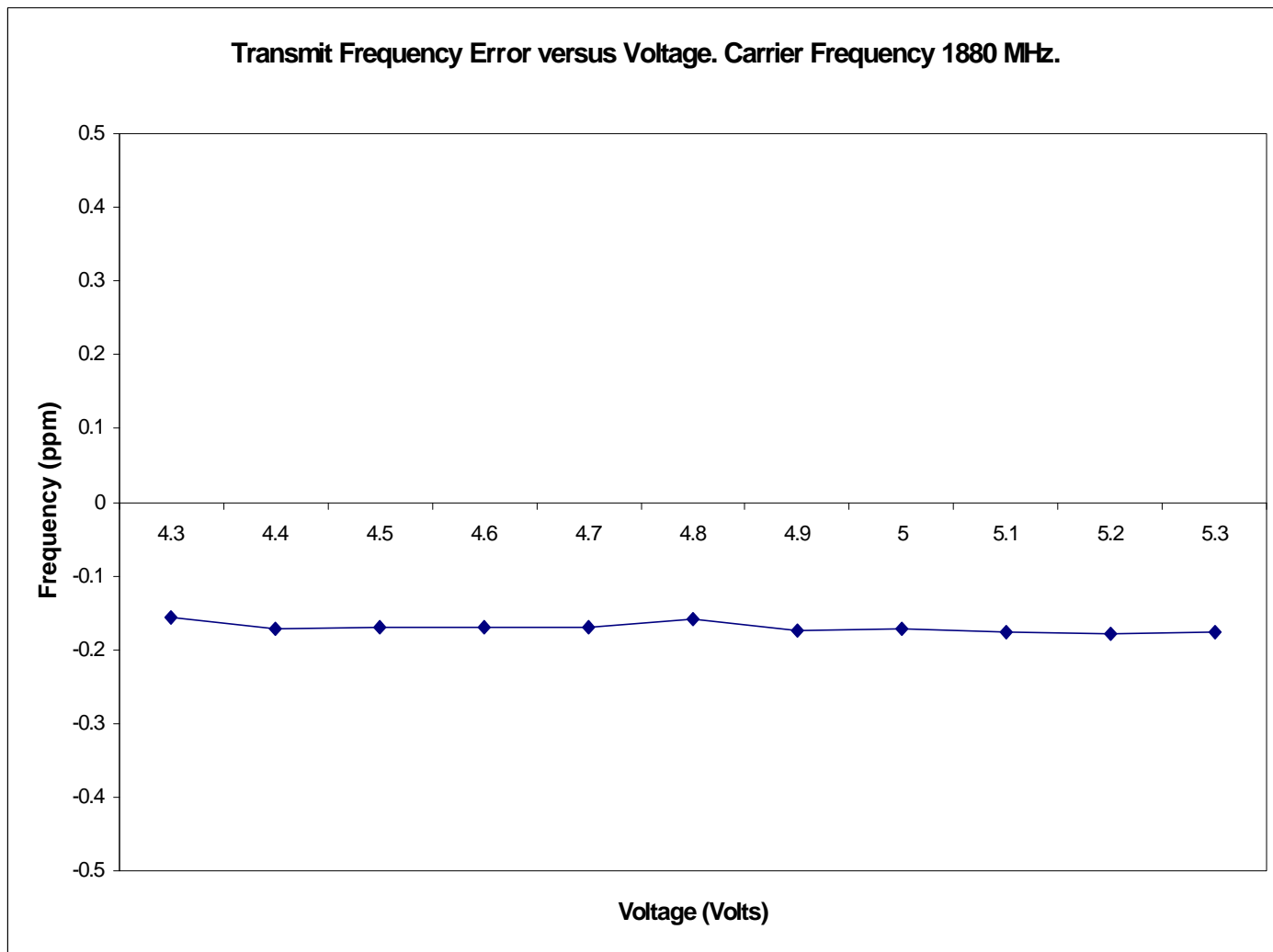


Exhibit 6R3

