Nemko Korea CO., Ltd.

300-2, Osan-Ri, Mohyun-Myun, Yongin-City, Gyunggi-Do, KOREA
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FCC EVALUATION REPORT FOR CERTIFICATION

Applicant :
CMOTech Co., Ltd.
5F BLD. Etronix 17-10, Yoido-dong, Youngdungpo-Gu
Seoul, Korea, (Post code : 150-874)

Dates of Issue : February, 20, 2006
Test Report No. : NK2GR003
Test Site : Nemko Korea Co., Ltd.

FCC ID	*TARCDU-550*
Brand Name	**CMOTECH**
CONTACT PERSON	**CMOTech Co., Ltd.** **5F BLD. Etronix 17-10, Yoido-dong,** **Youngdungpo-gu, Seoul Korea(150-874)** **Mr. Jae Ho Yang** **Telephone No. : +82 2 785-5540**

Applied Standard:	FCC 47 CFR Part 15 & 2 FCC 47 CFR Part 22H & Part 24E
Classification:	FCC Class B Device
Equipment Class:	Public Mobile Services
EUT Type:	Dual Band CDMA 1x EVDO Wireless USB Modem

The device bearing the brand name and FCC ID specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2003.
I attest to the accuracy of data and all measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Tested By : S. Lee
Engineer

Reviewed By : H.H. Kim
Manager & Chief Engineer

TABLE OF CONTENTS

1. Scope

Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission under FCC Part 15 & Part 22&24.

Responsible Party :	CMOTech Co., Ltd.
Contact Person :	Mr. Jae Ho Yang Tel No. : +82 2 785 5540
Manufacturer :	CMOTech Co., Ltd. 5F BLD. Etronix 17-10, Yoido-dog, Youngdungpo-gu, Seoul Korea(150-874)

- FCC ID: TARCDU-550
- Model: CDU-550
- Brand Name: CMOTECH
- EUT Type: Dual Band CDMA 1x EVDO Wireless USB Modem
- Electric Rating: +5.0Vdc from USB Host connector
- Port / Connector: USB, Earphone Jack
- Equipment Class: Public Mobile Services
- Classification: FCC Class B
- Applied Standard: FCC 47 CFR Part 15 & 2
FCC 47 CFR Part 22H &24E
- Test Procedure(s): ANSI C63.4 (2003), DA 02-2138(2002)
- Dates of Test: January 17, 2006 to February 17, 2006
- Place of Tests: Nemko Korea Co., Ltd.
- Test Report No.: NK2GR003

2. Introduction (Site Description)

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C63.4-2003) was used in determining radiated and conducted emissions emanating from **CMOTech Co., Ltd.**
FCC ID : **TARCDU-550**

These measurement tests were conducted at ***Nemko Korea Co., Ltd.***
The site address is 300-2, Osan-Ri, Mohyun-Myun, Yongin-City, GyungGi-Do, KOREA
The area of Nemko Korea Corporation Ltd. Test Site is located in a mountain area at 80 kilometers (48 miles) southeast and Incheon International Airport (Incheon Airport), 30 kilometers (18miles) south-southeast from central Seoul.
It is located in the valley surrounded by mountains in all directions where ambient radio signal conditions are quiet and a favorable area to measure the radio frequency interference on open field test site for the computing and ISM devices manufactures.
The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4 2003.

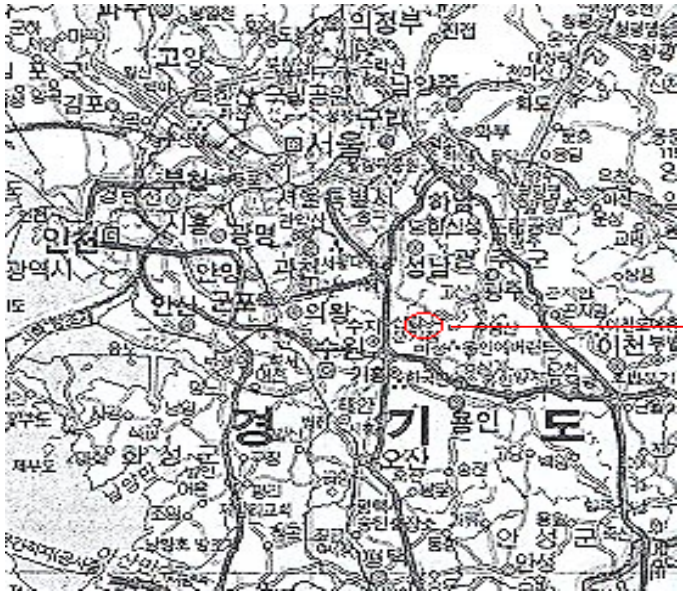

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Fig. 1. The map above shows the Seoul in Korea vicinity area.
The map also shows Nemko Korea Corporation Ltd. and Incheon Airport.

3. Test Conditions & EUT Information

Operating During Test

The EUT was tested at the lowest channel, middle channel and the highest channel with the maximum RF power and all data recorded in the report.

Environmental Conditions

Temperature	20℃ ~ 25℃
Relative Humidity	38% ~ 55%

Description of EUT

Clock	Y100 (32.768kHz), Y101 (48MHz)	
Chipset(s)	U100(MSM5500), U402(SIM8838),	
	U400(S1M8660A), U300(RFT-3100)	
Port(s)	USB, Earphone Jack	
Frequency	Tx	824.70 ~ 848.31MHz 1851.25 ~ 1908.75MHz
	Rx	869.70 ~ 893.31MHz 1931.25 ~ 1988.75MHz
Output Power	CDMA :ERP 0.327W(25.14dBm) US PCS : EIRP 0.121W(20.83dBm)	
Type of Oscillation	PLL Synthesizer & VCTCXO(19.2MHz)	
Modulation Method	Tx : OQPSK / Rx : QPSK	
Emission Designator	1M28F9W	
Number of channels	20CH for CDMA / 48CH for US PCS	
Antenna Type	Monopole Antenna	
Antenna Gain	CDMA : -4.0 dBi / US PCS : -6.5 dBi	
Dimensions	91mm X 41mm X 9.8mm	
Weight	Approx.30g	
Operating Conditions	-20℃ ~ +60℃ , 95%	
DC Input Voltage	+5.0Vdc from USB Host connector	

Support Equipment (Part 15)

EVDO USB MODEM (EUT)	CMOTech Co., Ltd. FCC ID: TARCDU-550 0.5m shielded USB cable	S/N: N/A
Earphone	Hyundai Model : N/A 1.1m unshielded stereo jack cable	S/N: N/A
Wireless Communications Test Set	Agilent Model : E5515C	S/N: GB43193659
Notebook Computer	Dell Computer Corporation Model: PPT(Latitude D400) Adaptor : Dongguan Samsung Electro-Mechanics Co., Ltd. Model : PA-10 1.2m unshielded AC cable, 1.8m unshielded DC cable with ferrite core at DC jack end.	S/N: N/A S/N: N/A
LCD Monitor	Hansol LCD Inc., Model : B15GF 1.5m shielded D-sub cable 1.8m unshielded AC power cable	S/N: N/A
Keyboard	Samsung Electro-Mechanics Co., Ltd. Model: TRI-350 1.5m unshielded Din cable	S/N: N/A
PS/2 Mouse	Samsung Electro-Mechanics Co., Ltd. Model: SMOP5000WX 1.2m unshielded Din cable	S/N: 3110042811
Serial Mouse	ALLSPIRIT, Model : WS-V1-400 1.2m shielded D-Sub cable	S/N:B050402
Printer	EPSON Engineering Shenzhen LTD. Model : C80 1.5m shielded Parallel cable 1.8m unshielded AC power cable	S/N: D3FE005162

Support Equipment (Part 22)

Laptop	SAMSUNG, Model : SENS X10 SE 0.5m Shielded USB cable	S/N : 184C93DY400118T

4. Measuring Instrument Calibration

All measurements were made with instruments calibrated according to the recommendation by manufacturer. Measurement of radiated emissions and conducted emissions were made with instruments conforming to American National Standards Institute, ANSI C63.4-2003.
The calibration of measuring instrument, including any accessories that may affect test results, were performed according to the recommendation by manufacturer.

- End of page -

5. Summary of Test Results

The EUT has been tested according to the following specification:

Description of Test	FCC Rule	Result
AC Power Line Conducted Emission	§15.207	Complies
Field Strength of Radiated Emission	§15.209(a)	Complies
ERP / EIRP Measurement	§2.1046 §22.913(a) §24.232(b)	Complies
Conducted Output Power	§2.1046(a) §22.913(a) §24.232(b)	Complies
Occupied Bandwidth / 26dB Emission Bandwidth	§2.1049(h) (i)	Complies
Field Strength of spurious Radiation	§2.1053 §22.917(a) §24.238(a)	Complies
Frequency Stability / Temperature Variation	§2.1055 §22.355 §24.235	Complies
Band Edge	§22.905 §24.229	Complies
Spurious Emission at antenna Terminals	§2.1051 §22.917(a) §24.238(a)	Complies

6. Recommendation / Conclusion

The data collected shows that the **CMOTech Co., Ltd.**
FCC ID : **TARCDU-550, Dual Band CDMA 1xEVDO Wireless USB Modem.**
The highest emission observed was at **0.18MHz** for conducted emissions with a Q.P margin of **17.1 dB,** at **854.98MHz** for radiated emissions with a margin of **17.7 dB.**

7. Sample Calculation

7.1 Radiation for Part 15

$$dB\,\mu N = 20 \log_{10}(\mu N/m)$$

$$\mu N = 10^{(dB\,\mu N/20)}$$

EX. 1.

@165.0 MHz Class B limit = 30.0 dB μN/m

Reading = 38.2 dB μN(calibrated level)

Antenna factor + Cable Loss + Amplifier Gain = -12.9 dB

Total = 25.30 dB μN/m

Margin = 30.0 – 25.30 = 4.70

4.70 dB below the limit

7.2 Radiation for Part 22 / 24

The formula below was used to calculate the ERP/EIRP of the EUT. $P_{subst\_TX[dBm]}$, $P_{subst\_RX[dBm]}$, $L_{Cable[dB]}$ and $G_{substitute\_antenna[dBd]/[dBi]}$ factors are combined in one correction factor.

$$P_{ERP[W]} = \frac{10^{(P_{sust\_Tx[dBm]}+P_{EUT[dBm]}-P_{subst\_Rx[dBm]})+G_{subst\_antenna[dBd]}-L_{cable[dB]})/10}}{1000}$$

where the variables are as follows:

$P_{EUT\ [dBm]}$	Measured power level from the EUT
$P_{Subst\_TX\ [dBm]}$	Power fed to the substituting antenna
$P_{Subst\_RX\ [dBm]}$	Power received with the spectrum analyzer
$G_{Substitute\_antenna\ [dBd]}$	Gain of the substitutive antenna over dipole (dBi – 2.15dB)
$L_{Cable\ [dB]}$	Loss of the cable between signal generator and the substituting antenna

8. Test Equipment List

No.	Instrument	Manufacturer	Model	Serial No.	Calibration Date	Calibration Interval
1	*Test Receiver	R & S	ESCS 30	833364/020	Aug. 17 2005	1year
2	*Test Receiver	R & S	ESCS 30	100302	Dec. 07 2005	1year
3	Amplifier	Agilent	8447F	3113A04549	Aug. 17 2005	1year
4	*Amplifier	HP	8447F	2944A03956	Aug. 17 2005	1year
5	*Amplifier	HP	8447F	2805A03351	Oct. 26 2005	1year
6	*Amplifier	HP	8449B	3008A00107	Mar. 06 2005	1year
7	*Spectrum Analyzer	HP	8566B	267A03469	Mar.16 2005	1year
8	Spectrum Analyzer	Advantest	R3265A	45060401	Dec.8 2005	1year
9	*Spectrum Analyzer	HP	8568B	1912A00573	Oct.25 2005	1year
10	*Biconical Log-Perio. Antenna	ARA	LBP-2520/A	1203	May. 02 2005	1year
11	*Double Ridged Broadband Horn Antenna	Schwarzbeck	BBHA 9120 D	9120D-474	Apr. 05 2005	1year
12	*Biconical Log Antenn	ARA	LPB-2520/A	1180	Jan. 17 2006	1year
13	Signal Generater	R & S	SMP02	833286/003	Aug. 17 2005	1year
14	*LISN	R & S	ESH3-Z5	833874/006	Oct. 25 2005	1year
15	*LISN	Kyoritsu	KNW-407	8-1034-10	Mar. 22 2005	1year
16	Injection Probe	FCC	NEM-32	411	Apr. 28 2005	1year
17	*Position Controller	DAEIL EMC	N/A	N/A	N/A	N/A
18	*Turn Table	DAEIL EMC	N/A	N/A	N/A	N/A
19	*Antenna Mast	DAEIL EMC	N/A	N/A	N/A	N/A
20	*Anechoic Chamber	EM Eng.	N/A	N/A	N/A	N/A
21	*Shielded Room	EM Eng.	N/A	N/A	N/A	N/A
22	*Position Controller	Seo-Young EMC	N/A	N/A	N/A	N/A
23	*Turn Table	Seo-Young EMC	N/A	N/A	N/A	N/A
24	*Antenna Mast	Seo-Young EMC	N/A	N/A	N/A	N/A
25	*Anechoic Chamber	Seo-Young EMC	N/A	N/A	N/A	N/A
26	*Double Ridged Broadband Horn Antenna	Schwarzbeck	BBHA 9120 D	9120D-508	Oct. 12 2005	1year
27	*Communications Test Set	Agilent	E5515C	GB43193659	Jun.09 2005	1year
28	*Spectrum Analyzer	Agilent	E4440A	MY44022567	Dec.31 2005	1year
29	*Signal Generator	Anritsu	68245B	983206	Jan.06 2006	1year

***) Test equipment used during the test**

9. Description of Tests

9.1 Conducted Emissions

The Line conducted emission test facility is located inside a 4 X 7 X 2.5 meter shielded enclosure.
It is manufactured by EM engineering. The shielding effectiveness of the shielded room is in accordance with MIL-STD-285 or NSA 65-6.
A 1m X 1.5m wooden table 0.8m height is placed 0.4m away from the vertical wall and 1.5m away from the side of wall of the shielded room
Rohde & Schwarz (ESH3-Z5) and Kyoritsu (KNW-407) of the 50ohm/50uH Line Impedance Stabilization Network(LISN) are bonded to the shielded room.
The EUT is powered from the Rohde & Schwarz LISN and the support equipment is powered from the Kyoritsu LISN. Power to the LISN s are filtered by high-current high insertion loss Power line filters. The purpose of filter is to attenuate ambient signal interference and this filter is also bonded to shielded enclosure. All electrical cables are shielded by tinned copper zipper tubing with inner diameter of 1/2".
If DC power device, power will be derived from the source power supply it normally will be powered from and this supply lines will be connected to the LISNs,
All interconnecting cables more than 1 meter were shortened by non inductive bundling (serpentine fashion) to a 1 meter length.
Sufficient time for EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer to determine the frequency producing the maximum EME from the EUT.
The spectrum was scanned from 150kHz to 30MHz with 20msec sweep time.
The frequency producing the maximum level was re-examined using the EMI test receiver. (Rohde & Schwarz ESCS30).
The detector function were set to CISPR quasi-peak mode & average mode.
The bandwidth of receiver was set to 9KHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission.
Each emission was maximized by; switching power lines; varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and of support equipment, and powering the monitor from the floor mounted outlet box and computer aux AC outlet, if applicable; which ever determined the worst case emission.
Each EME reported was calibrated using the R&S signal generator.

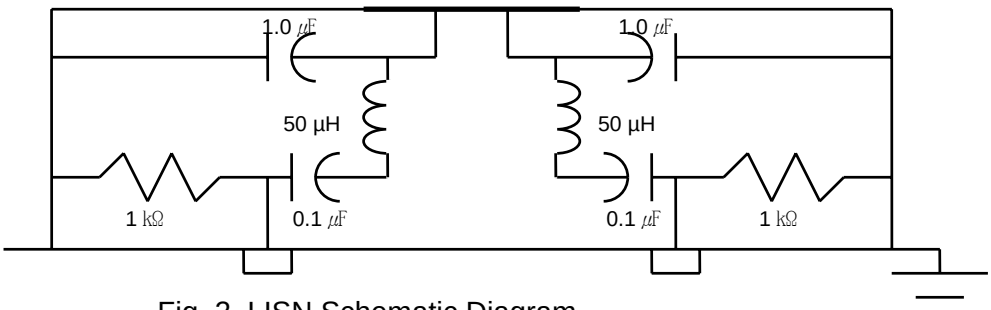


Fig. 2. LISN Schematic Diagram

9.2 Radiated Emissions

Preliminary measurement were made indoors at 3 meter using broad band antennas, broadband amplifier, and spectrum analyzer to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The Technology configuration, clock speed, mode of operation or video resolution, turntable azimuth with respect to the antenna was note for each frequency found. The spectrum was scanned from 30 to 1000MHz using Biconical log Antenna(ARA, LPB-2520/A).
Final Measurements were made outdoors at 3 or 10m test range using Logbicon Super Antenna(Schwarzbeck, VULB 9166).
The test equipment was placed on a wooden table.
Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition.
Each frequency found during pre-scan measurements was reexamined and investigated using EMI test receiver.(ESCS30)
The detector function were set to CISPR quasi-peak and peak mode and the bandwidth of the receiver were set to 120KHz and 1MHz depending on the frequency or type of signal.
The half wave dipole antenna was tuned to the frequency found during preliminary radiated measurements.
The EUT support equipment and interconnecting cables were re configured to the setup producing the maximum emission for the frequency and were placed on top of a 0.8m high non- metallic 1.0X 1.5 meter table.
The EUT, support equipment and interconnecting cables were re-arranged and manipulated to maximize each EME emission.
The turn table containing the Technology was rotated; the antenna height was varied 1 to 4meter and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by : switching power lines; varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and of support equipment, and powering the monitor from the floor mounted outlet box and computer aux AC outlet, if applicable; which ever determined the worst case emission.
Each EME reported was calibrated using the R/S signal generator.

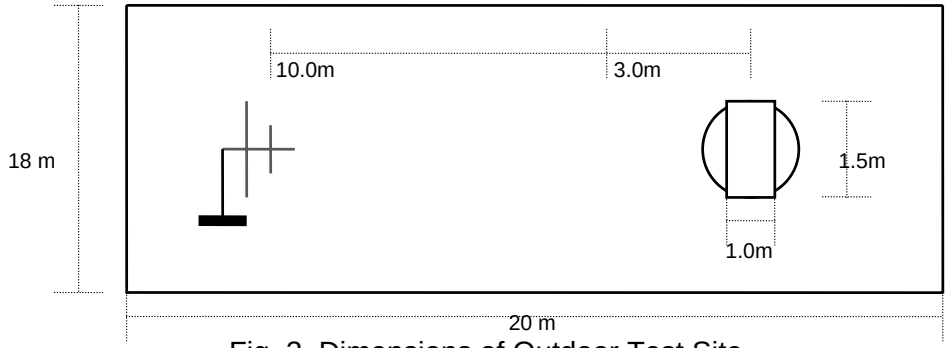


Fig. 3. Dimensions of Outdoor Test Site

9.3 Effective Radiated Power / Equivalent Isotropic Radiated Power

Test Set-up

Effective Radiated Power Output and Equivalent Isotropic Radiated Power output Measurements by Substitution Method according to ANSI/TIA/EIA-603-A-2003.

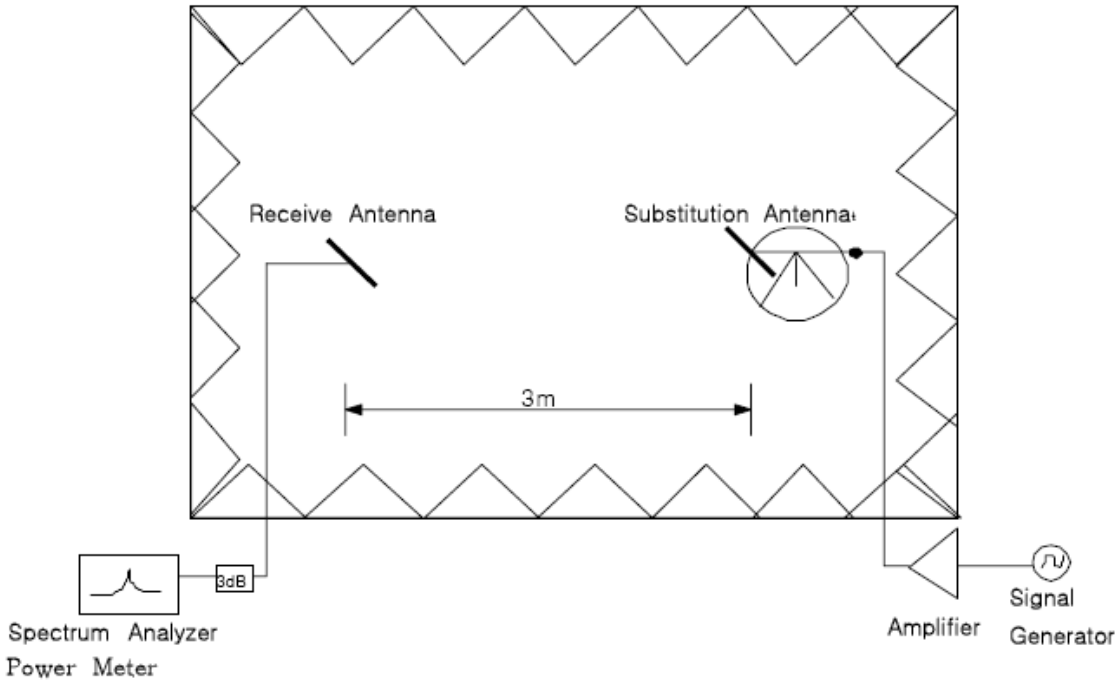


Figure 4. Diagram of ERP/EIRP test Set-up

The EUT was set on a non-conductive turntable in a semi anechoic chamber.
In the corner of the chamber there was a communication antenna, which was connected to the BS simulator located outside the chamber. The radiated power from the EUT was measured with an antenna fixed to a antenna tower.
The tower and turn table were remotely controlled to turn the EUT and change the antenna polarization. The measured signal was routed from the measuring antenna to the spectrum analyzer. The BS simulator was used to set the TX channel and power level and modulate the TX signal with different bit patterns.

Test Method

a) The maximum power level was searched by moving the turn table and measuring antenna and manipulating the EUT. This level (P_{EUT}) was recorded.
b) The EUT was replaced with a substituting antenna.
c) The substituting antenna was fed with the power (P_{Subst_TX}) giving a convenient reading on the spectrum analyzer. That reading (P_{Subst_RX}) on spectrum analyzer was recorded.

9.4 Radiated Spurious & Harmonic Emission

Test Set-up

Effective Radiated Power Output and Equivalent Isotropic Radiated Power output Measurements by Substitution Method according to ANSI/TIA/EIA-603-A-2003.

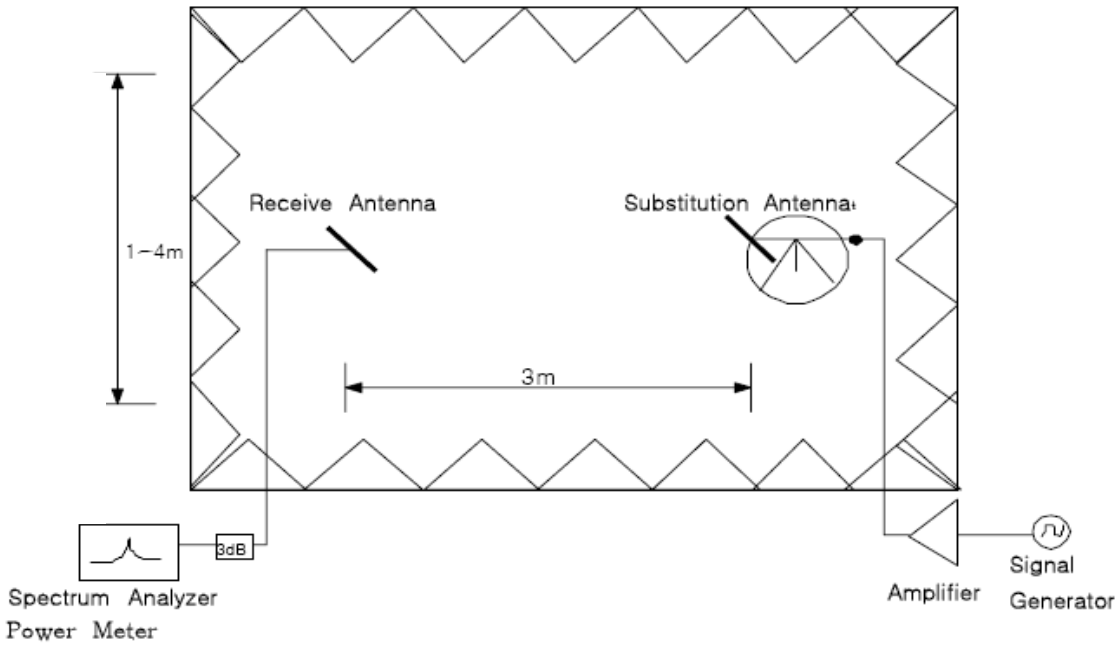


Figure 5. Diagram of Radiated Spurious & Harmonic test Set-up

The EUT was set on a non-conductive turntable in a semi anechoic chamber.
In the corner of the chamber there was a communication antenna, which was connected to the BS simulator located outside the chamber. The radiated power from the EUT was measured with an antenna fixed to a antenna tower.
The tower and turn table were remotely controlled to turn the EUT and change the antenna polarization. The measured signal was routed from the measuring antenna to the spectrum analyzer. The BS simulator was used to set the TX channel and power level and modulate the TX signal with different bit patterns.

Test Method

a) The maximum power level was searched by moving the turn table and measuring antenna and manipulating the EUT. This level (P_{EUT}) was recorded.
b) The EUT was replaced with a substituting antenna.
c) The substituting antenna was fed with the power (P_{Subst_TX}) giving a convenient reading on the spectrum analyzer. That reading (P_{Subst_RX}) on spectrum analyzer was recorded.

9.5 Occupied Bandwidth / 26dB Emission Bandwidth

Occupied Bandwidth

The EUT was setup to maximum output power at its lowest channel. The occupied bandwidth was measured using a spectrum analyzer. The measurements are repeated for the highest and a middle channel.
The EUT's occupied bandwidth is measured as the width of the signal between two points, one below the carrier center frequency and one above the carrier frequency, outside of which all emissions are attenuated at least 26dB below the transmitter power. Plots of the EUT's occupied bandwidth are shown herein.

26dB Emission Bandwidth

The transmitter output is connected to the spectrum analyzer.
The RBW of spectrum analyzer is set to approximately 1% of the emission bandwidth And peak detection is used. The emission bandwidth is defined as the total spectrum over which the power is higher than the peak power minus 26dB.

9.6 Spurious and Harmonic Emissions at Antenna Terminal

9.6.1 Occupied Bandwidth Emission Limits

(a) On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log(P) dB.

(b) Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater.
However, in the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 1% of the emission bandwidth of the fundamental emission of the transmitter may be employed.
The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

(c) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.

(d) The measurement of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

BLOCK	Frequency Range (MHz) Transmitter (Tx)	Frequency Range (MHz) Receiver (Rx)
A* Low +A	824 ~ 835	869 ~ 880
B	835 ~ 845	880 ~ 890
A* High	845 ~ 846.5	890 ~ 891.5
B*	846.5 ~ 849	891.5 ~ 894

Table 1. Cellular Service Frequency Blocks

BLOCK	Frequency Range (MHz) Transmitter (Tx)	Frequency Range (MHz) Receiver (Rx)
A	1850 ~ 1865	1930 ~ 1745
B	1870 ~ 1885	1950 ~ 1965
C	1895 ~ 1910	1975 ~ 1990
D	1865 ~ 1870	1945 ~ 1950
E	1885 ~ 1890	1965 ~ 1970
F	1890 ~ 1895	1970 ~ 1975

Table 2. Broadband PCS Service Frequency Blocks

9.6.2 Conducted Spurious Emission

Minimum standard:

On any frequency outside a license frequency block, the power of any emission shall be attenuated below the transmitter power(P) by at least 43+10log (P)dB. Limit equivalent to –13dBm, calculation shown below.
43 + 10log (0.527 W) = 40.22 dB
27.22 dBm – 40.22 dB = -13 dBm

Compliance with the out-of-band emissions requirement is based on test being performed with an analyzer resolution bandwidth of 1MHz. However in the 1MHz band immediately outside and adjacent to the frequency block a resolution bandwidth of at least 1% of the fundamental emissions bandwidth may be employed.

Test Procedure:

The EUT was setup to maximum output power at its lowest channel.
The Resolution BW of the analyzer is set to 1% of the emission bandwidth to show compliance with the -13dBm limit, in the 1MHz bands immediately outside and adjacent to the edge of the frequency block.
The measurements are repeated for the EUT's highest channel. For the Out-of-Band measurements a 1MHz RBW was used to scan from 10MHz to 20GHz.
A display line was placed at -13dBm to show compliance. The high, lowest and a middle channel were tested for out of band measurements.
Plots are shown.

9.7 Frequency Stability / Temperature Variation

The frequency stability of the transmitter is measured by:

a.) Temperature: The temperature is carried from -30°C to +60°C using an environmental chamber.
b.) Primary Supply Voltage: The primary supply voltage is varied from 85% to 115% of the voltage normally at the input to the device or at the power supply terminals if cables are not normally supplied.

Specification - The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5ppm) of the center frequency.

Time Period and Procedure:
1. The carrier frequency of the transmitter and the individual oscillators is measured at room temperature(20°C to 25°C to provide a reference).
2. The equipment is subjected to an overnight “soak” at -30°C without any power applied.
3. After the overnight “soak” at -30°C (Usually 14~16 hours), the equipment is turned on in a “standby” condition for one minute before applying power to the transmitter. Measurement of the carrier frequency of the transmitter and the individual oscillators is made within a three minute interval after applying to the transmitter.
4. Frequency measurements are made at 10°C interval up to room temperature. At least a period of one and one half-hour is provided to allow stabilization of the equipment at each temperature level.
5. Again the transmitter carrier frequency and the individual oscillators is measured at room temperature to begin measurement of the upper temperature levels.
6. Frequency measurements are at 10 intervals starting at -30°C up to +60°C allowing at least two hours at each temperature for stabilization. In all measurements the frequency is measured within three minutes after re-applying power to the transmitter.
7. The artificial load is mounted external to the temperature chamber.

10. Test Data

10.1 AC Power Line Conducted Emissions

FCC ID : TARCDU-550

▶CDMA TCH Mode

Frequency	Level(dBμV)		Line	Limit(dBμV)		Margin(dB)	
(MHz)	Q-Peak	Average		Q-Peak	Average	Q-Peak	Average
0.18	47.4	32.0	L	64.5	54.5	17.1	22.5
0.21	43.3	27.2	L	63.2	53.2	19.9	26.0
0.51	37.2	23.1	N	56.0	46.0	18.8	22.9
0.59	37.4	23.3	N	56.0	46.0	18.6	22.7
0.93	36.2	23.9	N	56.0	46.0	19.8	22.1
1.06	35.1	23.4	L	56.0	46.0	20.9	22.6

Table 1. Line Conducted Emissions Tabulated Data

▶PCS TCH Mode

Frequency	Level(dBμV)		Line	Limit(dBμV)		Margin(dB)	
(MHz)	Q-Peak	Average		Q-Peak	Average	Q-Peak	Average
0.19	45.1	29.1	N	64.0	54.0	18.9	24.9
0.21	43.3	34.0	N	63.2	53.2	19.9	19.2
0.50	35.5	22.9	L	56.0	46.0	20.5	23.1
0.51	37.4	25.7	N	56.0	46.0	18.6	20.3
0.57	35.2	23.0	L	56.0	46.0	20.8	23.0
0.61	38.2	25.9	N	56.0	46.0	17.8	20.1

Table 2. Line Conducted Emissions Tabulated Data

NOTES:

1. Measurements using CISPR quasi-peak mode & average mode.

2. All modes of operation were investigated and the worst -case emission are reported. See attached Plots.

3. LINE : L =Line , N = Neutral

4. The limit is on the FCC Part section 15.207(a).

- **Conducted Emission at the Mains port (CDMA TCH Mode, Line)**

NEMKO KOREA (NK-2G-R-003) 17 Jan 2006 14:25

Conducted Emissions

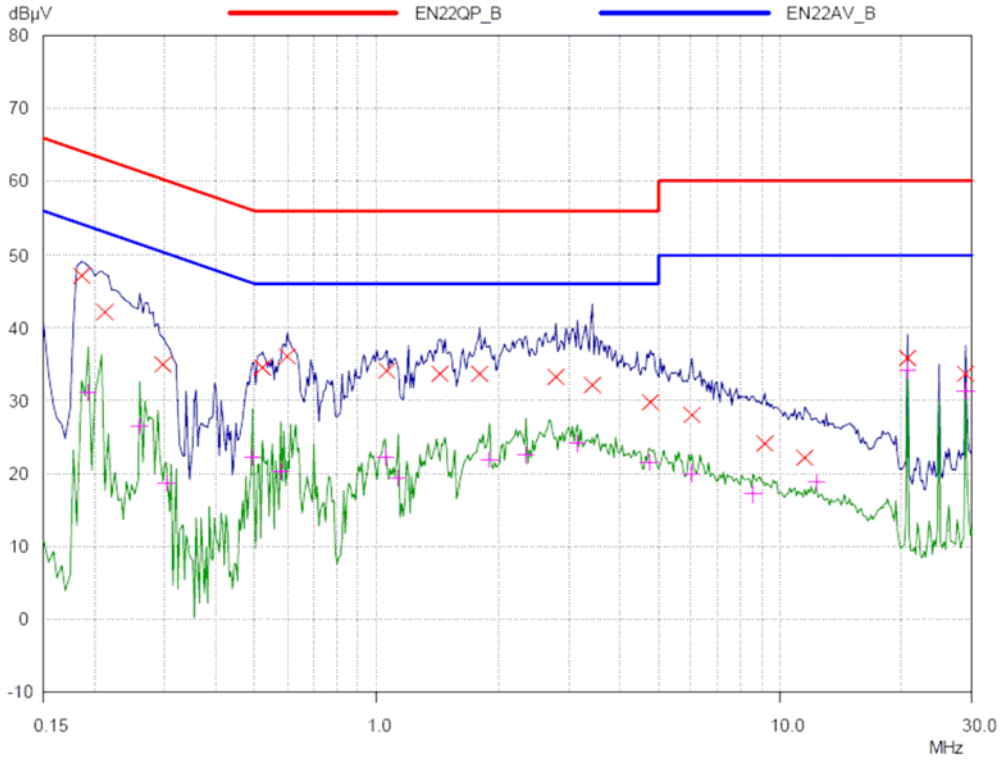
EUT:	EVDO USB MODEM
Manuf:	CMOTech Co., Ltd.
Op Cond:	AC 120V / 60Hz (CDMA TCH Mode)
Operator:	Lee, Sub
Test Spec:	CISPR 22 Class B
Comment:	MODEL : CDU-550
	LINE : LINE-PE
Result File:	r003l2.dat : CDU-550 (CDMA TCH Mode)

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	30MHz	3.9063kHz	9kHz	PK+AV	20msec	10 dB	OFF	60dB

Transducer	No.	Start	Stop	Name
	1	150kHz	30MHz	CE_LINE

Final Measurement: Detectors: X QP / + AV
Meas Time: 1sec
Subranges: 16
Acc Margin: 60 dB



- **Conducted Emission at the Mains port (CDMA TCH Mode, Neutral)**

NEMKO KOREA (NK-2G-R-003) 17 Jan 2006 14:15

Conducted Emissions

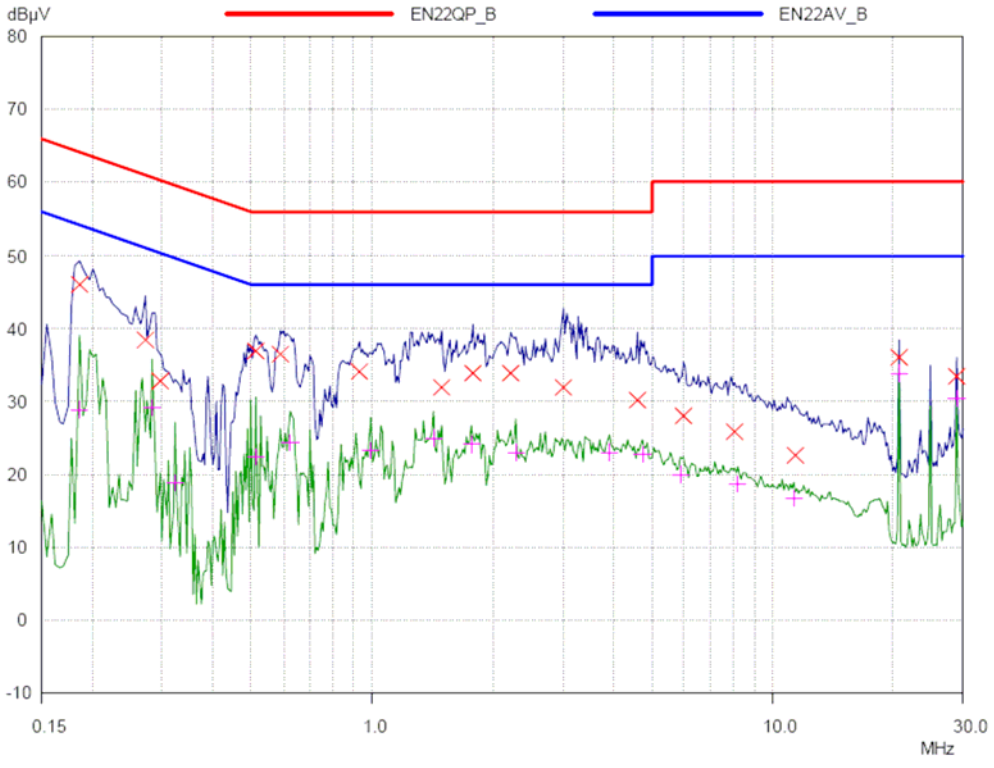
EUT:	EVDO USB MODEM
Manuf:	CMOTech Co., Ltd.
Op Cond:	AC 120V / 60Hz (CDMA TCH Mode)
Operator:	Lee, Sub
Test Spec:	CISPR 22 Class B
Comment:	MODEL : CDU-550 LINE : NEUTRAL-PE
Result File:	r003n2.dat : CDU-550 (CDMA TCH Mode)

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	30MHz	3.9063kHz	9kHz	PK+AV	20msec	10 dB	OFF	60dB

Transducer	No.	Start	Stop	Name
	1	150kHz	30MHz	CE_LINE

Final Measurement:		
	Detectors:	X QP / + AV
	Meas Time:	1sec
	Subranges:	16
	Acc Margin:	60 dB



- **Conducted Emission at the Mains port (PCS TCH Mode, Line)**

NEMKO KOREA (NK-2G-R-003) 17 Jan 2006 14:36

Conducted Emissions

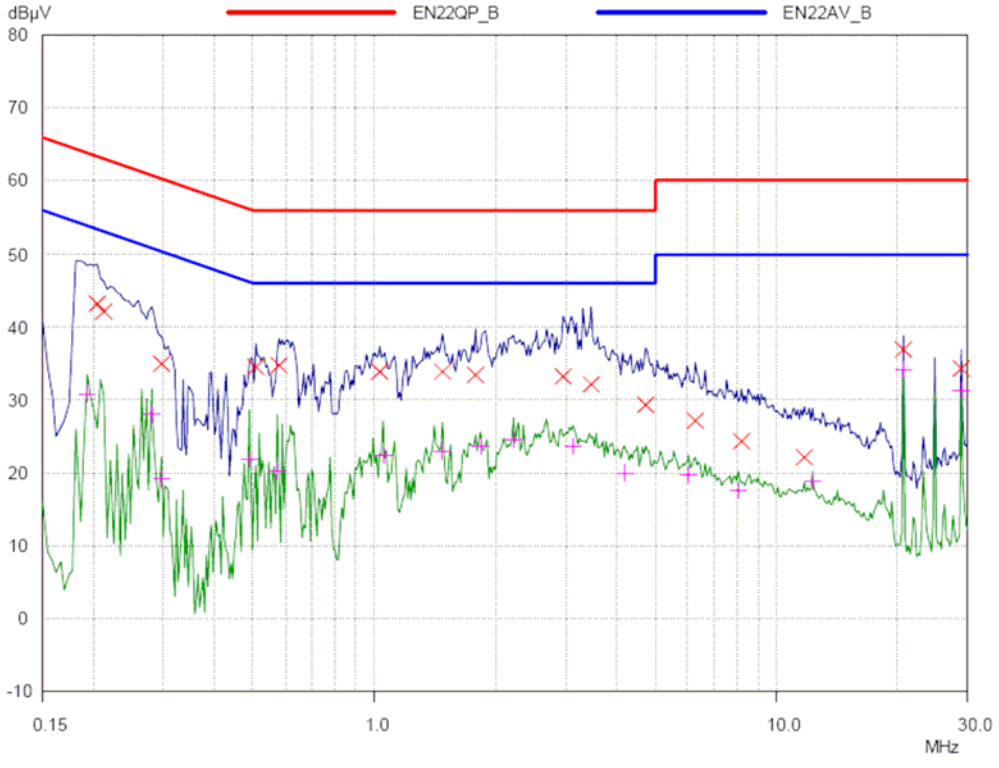
EUT:	EVDO USB MODEM
Manuf:	CMOTech Co., Ltd.
Op Cond:	AC 120V / 60Hz (PCS TCH Mode)
Operator:	Lee, Sub
Test Spec:	CISPR 22 Class B
Comment:	MODEL : CDU-550
	LINE : LINE-PE
Result File:	r003l3.dat : CDU-550 (PCS TCH Mode)

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	30MHz	3.9063kHz	9kHz	PK+AV	20msec	10 dB	OFF	60dB

Transducer	No.	Start	Stop	Name
	1	150kHz	30MHz	CE_LINE

Final Measurement:		
	Detectors:	X QP / + AV
	Meas Time:	1sec
	Subranges:	16
	Acc Margin:	60 dB



- **Conducted Emission at the Mains port (PCS TCH Mode, Neutral)**

NEMKO KOREA (NK-2G-R-003) 17 Jan 2006 14:47

Conducted Emissions

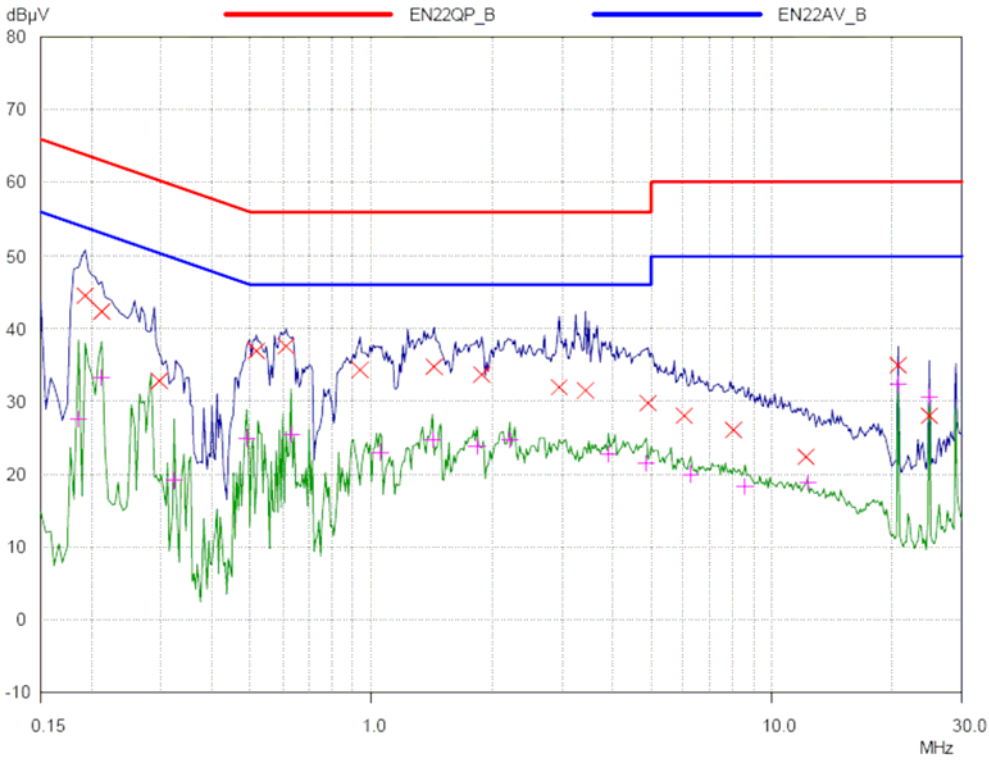
EUT:	EVDO USB MODEM
Manuf:	CMOTech Co., Ltd.
Op Cond:	AC 120V / 60Hz (PCS TCH Mode)
Operator:	Lee, Sub
Test Spec:	CISPR 22 Class B
Comment:	MODEL : CDU-550 LINE : NEUTRAL-PE
Result File:	r003n3.dat : CDU-550 (PCS TCH Mode)

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	30MHz	3.9063kHz	9kHz	PK+AV	20msec	10 dB	OFF	60dB

Transducer	No.	Start	Stop	Name
	1	150kHz	30MHz	CE_LINE

Final Measurement:		
	Detectors:	X QP / + AV
	Meas Time:	1sec
	Subranges:	16
	Acc Margin:	60 dB



10.2 Field Strength of Radiated Emission

FCC ID : TARCDU-550

▶30MHz~1GHz (CDMA TCH Mode)

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
108.20	41.5	H	-17.3	24.2	43.5	19.3
116.01	38.8	V	-17.3	21.5	43.5	22.0
258.66	36.9	V	-12.3	24.6	46.0	21.4
351.59	33.5	V	-10.0	23.5	46.0	22.5
393.21	35.2	V	-8.9	26.3	46.0	19.7
854.98	25.4	H	2.9	28.3	46.0	17.7

Table 3. Radiated Measurements at 3meters

▶30MHz~1GHz(PCS TCH Mode)

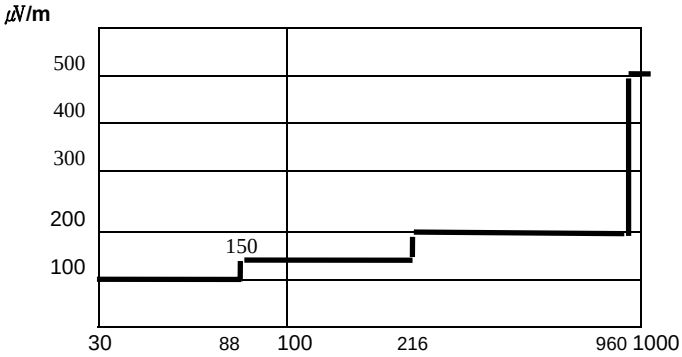
Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
108.20	22.0	H	-17.3	4.7	43.5	38.8
116.00	40.1	V	-17.3	22.8	43.5	20.7
129.17	36.6	V	-15.9	20.7	43.5	22.8
258.65	39.3	V	-12.3	27.0	46.0	19.0
351.60	31.7	V	-10.0	21.7	46.0	24.3
393.20	33.1	H	-8.9	24.2	46.0	21.8

Table 4. Radiated Measurements at 3meters

▶1GHz~2GHz(CDMA TCH & PCS TCH Mode)

Frequency (MHz)	Reading (dBμV)		Pol* (H/V)	AF+CL+Amp (dB)**	Limit (dBμV/m)		Final Result(dBμV/m)	
	Peak	Average			Peak	Average	Peak	Average
No significant emissions were detected in frequency range from 1GHz to 2GHz.								

Table 5. Radiated Measurements at 3meters



NOTES:

1. All modes were measured and the worst-case emission was reported.

2 The radiated limits are shown on Figure 4. Above 1GHz the limit is 500 μV/m.

Fig. 4. Limits at 3 meters

NOTES:

1. *Pol. H =Horizontal V=Vertical

2. **AF+CL+Amp. = Antenna Factor + Cable Loss + Amplifier.

3. Measurements using CISPR quasi-peak mode.

4. No significant emissions were detected in frequency range from 1GHz to 2GHz.

5. Above 1GHz, peak detector function mode is used using a resolution bandwidth of 1MHz and a video bandwidth of 1MHz. Peak mode is used with linearly polarized horn antenna and low-loss microwave cable.

6. The limit is on the FCC Part section 15.209(a).

10.3 Effective Radiated Power (ERP)

EUT Mode : CDMA

Measurement Results :

Frequency (MHz)	*EUT Pol.	Ant. Pol.	P_{EUT} (dBm)	P_{TX} (dBm)	P_{RX} (dBm)	$G_{antenna}$ (dBd)	L_{Cable} (dB)	ERP (dBm)	Limit (dBm)
824.70	E1	H	-16.38	0	-38.55	0.99	1.14	22.02	38.45
	H	V	-15.69	0	-38.48	0.99	1.14	22.64	
835.89	H	H	-15.03	0	-38.28	1.27	1.04	23.48	38.45
	H	V	-13.80	0	-38.71	1.27	1.04	25.14	
848.31	E1	H	-18.30	0	-37.51	1.60	1.03	19.78	38.45
	H	V	-15.34	0	-37.83	1.60	1.03	23.06	

Table 10.3 Radiated Measurements at 3meters

10.4 Equivalent Isotropic Radiated Power (EIRP)

EUT Mode : US PCS

Measurement Result:

Frequency (MHz)	*EUT Pol.	Ant. Pol.	P_{EUT} (dBm)	P_{TX} (dBm)	P_{RX} (dBm)	$G_{antenna}$ (dBi)	L_{Cable} (dB)	ERP (dBm)	Limit (dBm)
1851.25	E1	H	-25.21	0	-34.76	10.40	1.70	18.25	33.00
	H	V	-22.73	0	-34.86	10.40	1.70	20.83	
1880.00	H	H	-30.41	0	-36.17	10.43	1.66	14.53	33.00
	H	V	-28.08	0	-36.59	10.43	1.66	17.28	
1908.75	H	H	-28.38	0	-35.37	10.46	1.82	15.63	33.00
	H	V	-26.68	0	-34.41	10.46	1.82	16.37	

Table 10.4 Radiated Measurements at 3meters

Note 1 : Radiated measurements at 3 meters by Substitution Method
Note 2 : The test data show the worst emission level from the three-azimuth.

" * "Please see the Appendix B.

10.5 Conducted Output Power

Modulation : CDMA

Measurement Result:

Channel	Frequency (MHz)	Measurement Power (dBm)
1013	824.70	23.299
363	835.89	23.087
777	848.31	22.841

Modulation : US PCS

Measurement Result:

Channel	Frequency (MHz)	Measurement Power (dBm)
25	1851.25	23.301
600	1880.00	22.687
1175	1908.75	21.234

10.6 Occupied Bandwidth / 26dB Emission Bandwidth

Modulation : CDMA

Results

Channel	Frequency (MHz)	Occupied BW (MHz)	26dB Emission BW (MHz)
1013	824.70	1.27	1.43
363	835.89	1.27	1.42
777	848.31	1.27	1.43

Modulation : CDMA

Results

Channel	Frequency (MHz)	Occupied BW (MHz)	26dB Emission BW (MHz)
25	1851.25	1.27	1.43
600	1880.00	1.27	1.43
1175	1908.75	1.27	1.43

10.7 Radiated Spurious & Harmonic Emission (CDMA)

Measurement Result:

CH1013 (824.70MHz)

Freq. (MHz)	*EUT Pol.	Ant. Pol.	P_{EUT} (dBm)	P_{TX} (dBm)	P_{RX} (dBm)	$G_{antenna}$ (dBd)	L_{Cable} (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1649.40	H	H	-52.69	0	-2.55	7.63	1.51	-44.02	-13.0	31.02
1649.40	H	V	-51.86	0	-2.31	7.63	1.51	-43.43	-13.0	30.43
2474.10	H	H	-67.41	0	-3.35	8.35	1.74	-57.45	-13.0	44.45
2474.10	H	V	-66.23	0	-3.02	8.35	1.74	-56.60	-13.0	43.60
3298.80	E2	H	-69.53	0	-4.09	10.62	2.52	-57.34	-13.0	44.34
3298.80	H	V	-69.88	0	-4.14	10.62	2.52	-57.64	-13.0	44.64

CH363 (835.89MHz)

Freq. (MHz)	*EUT Pol.	Ant. Pol.	P_{EUT} (dBm)	P_{TX} (dBm)	P_{RX} (dBm)	$G_{antenna}$ (dBd)	L_{Cable} (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1671.78	H	H	-53.68	0	-0.35	7.78	1.61	-47.16	-13.0	34.16
1671.78	H	V	-52.08	0	-0.97	7.78	1.61	-44.94	-13.0	31.94
2507.67	E2	H	-67.36	0	-3.91	8.46	1.68	-56.67	-13.0	43.67
2507.67	H	V	-67.18	0	-4.20	8.46	1.68	-56.20	-13.0	43.20
3343.56	H	H	-69.08	0	-5.18	10.91	2.38	-55.37	-13.0	42.37
3343.56	E1	V	-69.24	0	-4.79	10.91	2.38	-55.92	-13.0	42.92

CH777 (848.31MHz)

Freq. (MHz)	*EUT Pol.	Ant. Pol.	P_{EUT} (dBm)	P_{TX} (dBm)	P_{RX} (dBm)	$G_{antenna}$ (dBd)	L_{Cable} (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1696.62	H	H	-55.44	0	-1.03	7.95	1.58	-48.04	-13.0	35.04
1696.62	H	V	-53.83	0	-1.48	7.95	1.58	-45.98	-13.0	32.98
2544.93	H	H	---							---
2544.93	E2	V	-68.34	0	-3.89	8.52	1.72	-57.65	-13.0	44.65
3393.24	H	H	---							---
3393.24	H	V	---							---

Note: The test data show the worst emission level from the three-azimuth.

Remark "---" means that the emission level is too low to be measured

" * "**Please see the Appendix B.**

- End of page -

10.8 Radiated Spurious & Harmonic Emission (US PCS)

Measurement Result :

CH25 (1851.25MHz)

Freq. (MHz)	*EUT Pol.	Ant. Pol.	P_{EUT} (dBm)	P_{TX} (dBm)	P_{RX} (dBm)	$G_{antenna}$ (dBi)	L_{Cable} (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
3702.50	H	H	-53.55	0	-10.20	12.69	2.41	-33.07	-13.0	20.07
3702.50	E1	V	-52.15	0	-9.97	12.69	2.41	-31.90	-13.0	18.90
5553.75	E2	H	-57.88	0	-10.35	13.15	2.93	-37.31	-13.0	24.31
5553.75	E2	V	-56.70	0	-10.38	13.15	2.93	-36.10	-13.0	23.10
7405.00	E1	H	-69.83	0	-19.25	11.02	3.75	-43.31	-13.0	30.31
7405.00	E1	V	-69.81	0	-18.47	11.02	3.75	-44.07	-13.0	31.07

CH600 (1880.00MHz)

Freq. (MHz)	*EUT Pol.	Ant. Pol.	P_{EUT} (dBm)	P_{TX} (dBm)	P_{RX} (dBm)	$G_{antenna}$ (dBi)	L_{Cable} (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
3760.00	E2	H	-50.41	0	-9.78	12.73	2.29	-30.19	-13.0	17.19
3760.00	E1	V	-49.43	0	-9.88	12.73	2.29	-29.11	-13.0	16.11
5640.00	H	H	-66.73	0	-10.64	13.14	3.14	-46.09	-13.0	33.09
5640.00	E1	V	-60.85	0	-10.40	13.14	3.14	-40.45	-13.0	27.45
7520.00	H	H	-71.59	0	-19.96	11.28	4.21	-44.56	-13.0	31.56
7520.00	H	V	-71.80	0	-19.50	11.28	4.21	-45.23	-13.0	32.23

CH1175 (1908.75MHz)

Freq. (MHz)	*EUT Pol.	Ant. Pol.	P_{EUT} (dBm)	P_{TX} (dBm)	P_{RX} (dBm)	$G_{antenna}$ (dBi)	L_{Cable} (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
3817.50	E2	H	-52.36	0	-12.44	12.74	2.77	-29.95	-13.0	16.95
3817.50	E1	V	-51.70	0	-12.59	12.74	2.77	-29.14	-13.0	16.14
5726.25	E2	H	-65.39	0	-10.70	13.11	3.20	-44.78	-13.0	31.78
5726.25	E2	V	-61.79	0	-11.15	13.11	3.20	-40.73	-13.0	27.73
7635.00	H	H	-69.86	0	-18.75	11.46	3.96	-43.61	-13.0	30.61
7635.00	E1	V	-69.62	0	-18.77	11.46	3.96	-43.35	-13.0	30.35

Note : The test data show the worst emission level from the three-azimuth.

" * "**Please see the Appendix B.**

- End of page -

10.9 Frequency Stability / Temperature Variation (CDMA)

Test Mode : Set to Middle channel (835.89MHz)

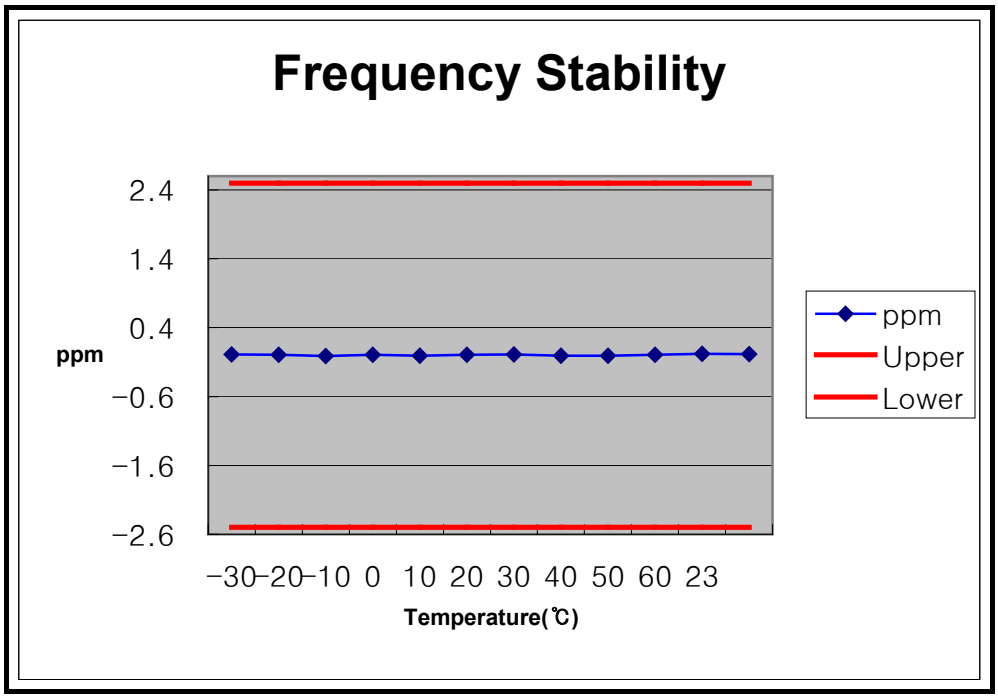
Deviation Limit : ±2.5ppm

Measurement Result :

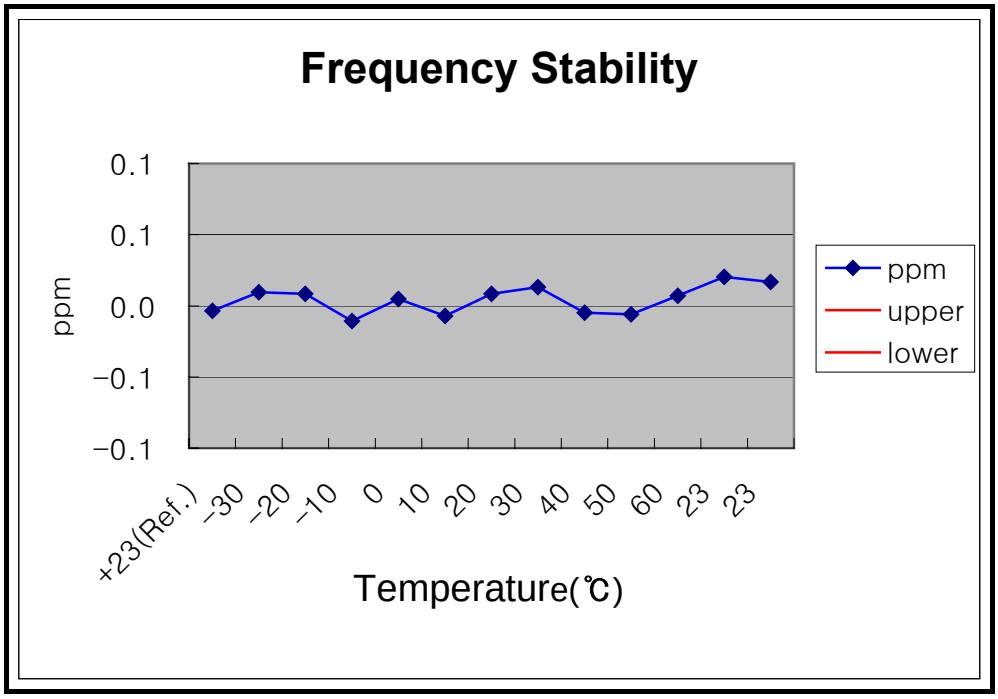
Voltage (%)	Power (Vdc)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	ppm
100%	5.00	+23(Ref.)	835,889,997	-3	-0.0036
100%		-30	835,890,008	8	0.0096
100%		-20	835,890,007	7	0.0084
100%		-10	835,889,991	-9	-0.0108
100%		0	835,890,004	4	0.0048
100%		+10	835,889,994	-6	-0.0072
100%		+20	835,890,007	7	0.0084
100%		+30	835,890,011	11	0.0132
100%		+40	835,889,996	-4	-0.0048
100%		+50	835,889,995	-5	-0.0060
100%		+60	835,890,006	6	0.0072
85%	4.25	+23	835,890,017	17	0.0203
115%	5.75	+23	835,890,014	14	0.0167

***The temperature is varied from -30°C to +60°C using an environmental chamber.**

Frequency Stability Graph



Zoom In



10.10 Frequency Stability / Temperature Variation (US PCS)

Test Mode : Set to Middle channel (1880.00MHz)

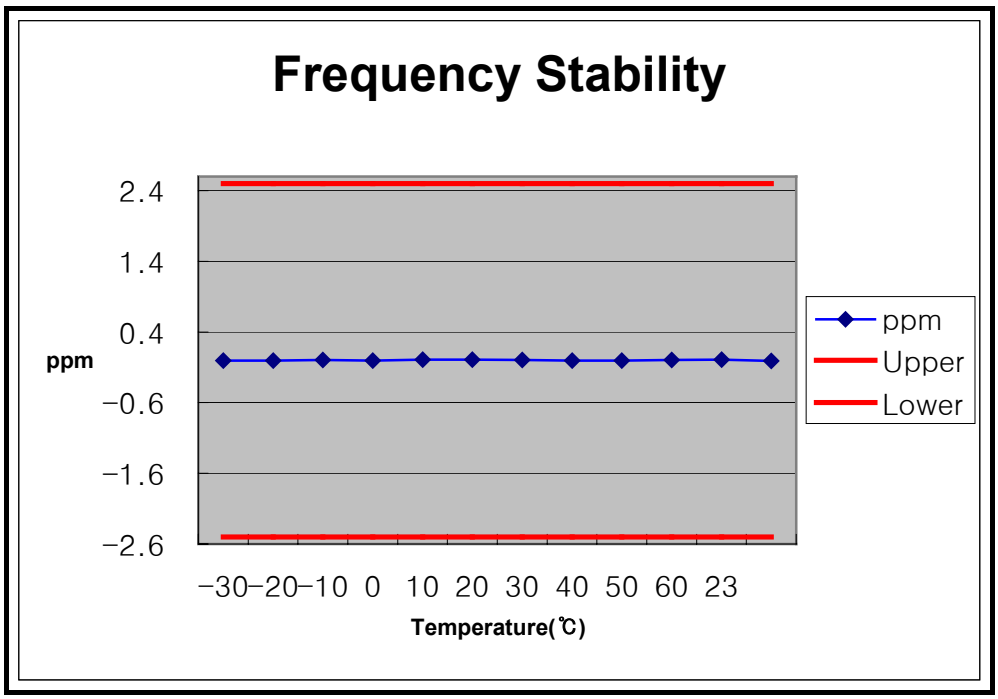
Deviation Limit : ±2.5ppm

Measurement Result :

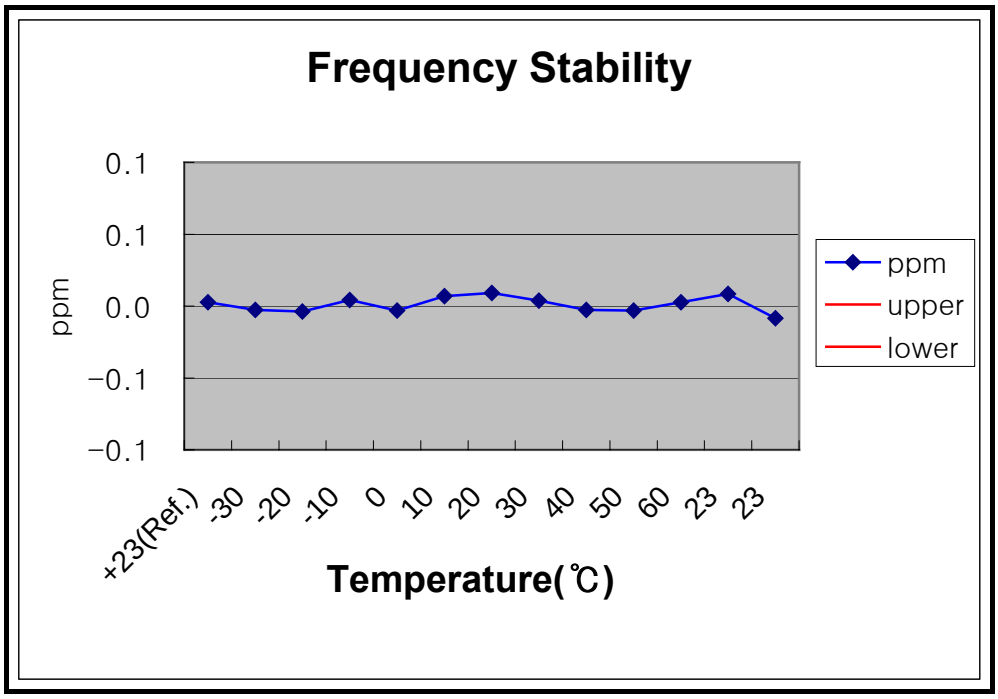
Voltage (%)	Power (Vdc)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	ppm
100%	5.00	+23(Ref.)	1,880,000,005	5	0.0027
100%		-30	1,879,999,995	-5	-0.0027
100%		-20	1,879,999,993	-7	-0.0037
100%		-10	1,880,000,008	8	0.0043
100%		0	1,879,999,994	-6	-0.0032
100%		+10	1,880,000,013	13	0.0069
100%		+20	1,880,000,017	17	0.0090
100%		+30	1,880,000,007	7	0.0037
100%		+40	1,879,999,995	-5	-0.0027
100%		+50	1,879,999,994	-6	-0.0032
100%		+60	1,880,000,005	5	0.0027
85%	4.25	+23	1,880,000,016	16	0.0085
115%	5.75	+23	1,879,999,984	-16	-0.0085

***The temperature is varied from -30°C to +60°C using an environmental chamber.**

Frequency Stability Graph (US PCS)



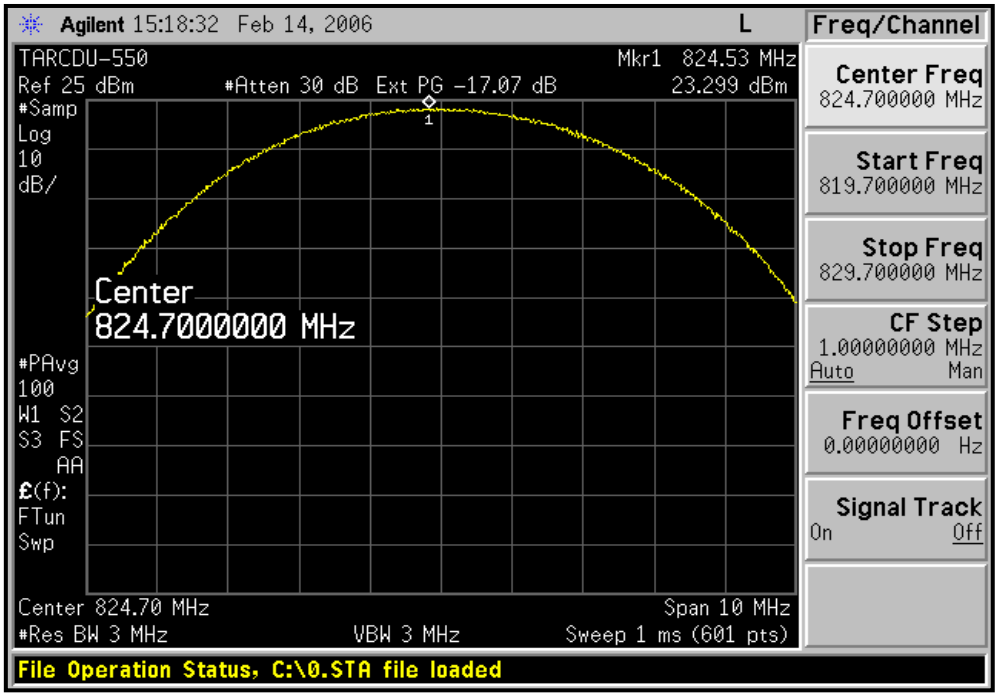
Zoom In



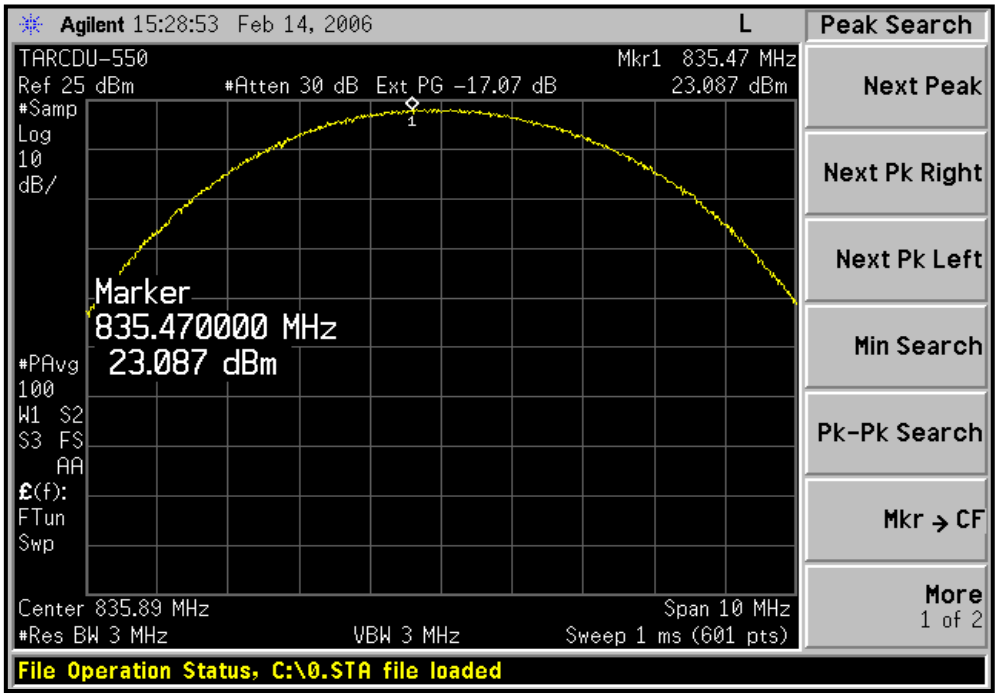
11. Test Plots (CDMA)

● **Conducted Output Power**

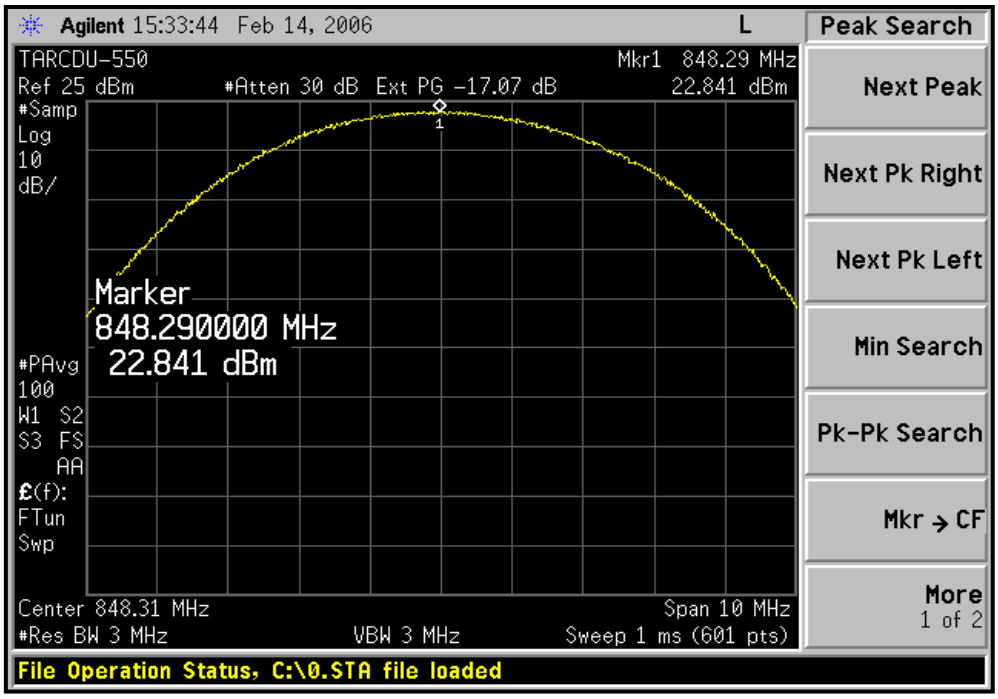
Low Channel



Middle Channel

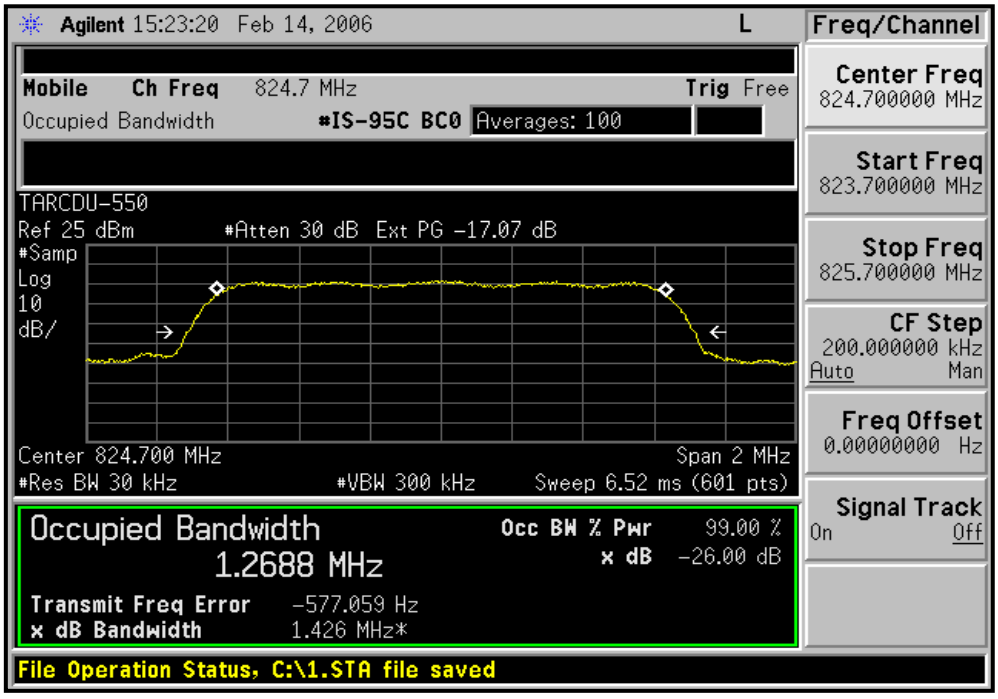


High Channel

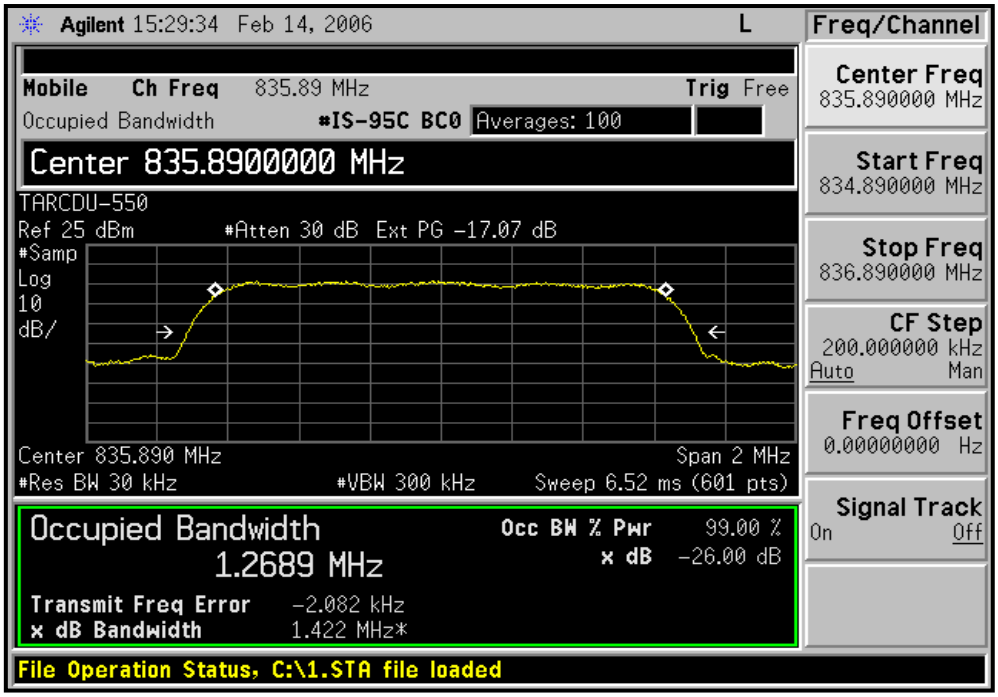


● Occupied Bandwidth / 26dB Bandwidth

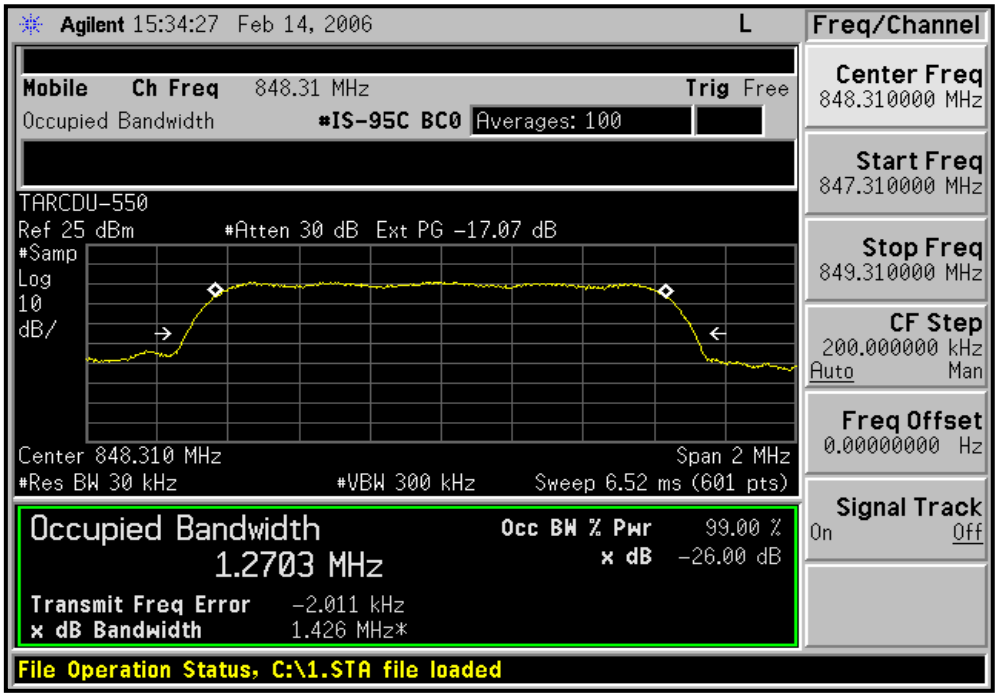
Low Channel



Middle Channel

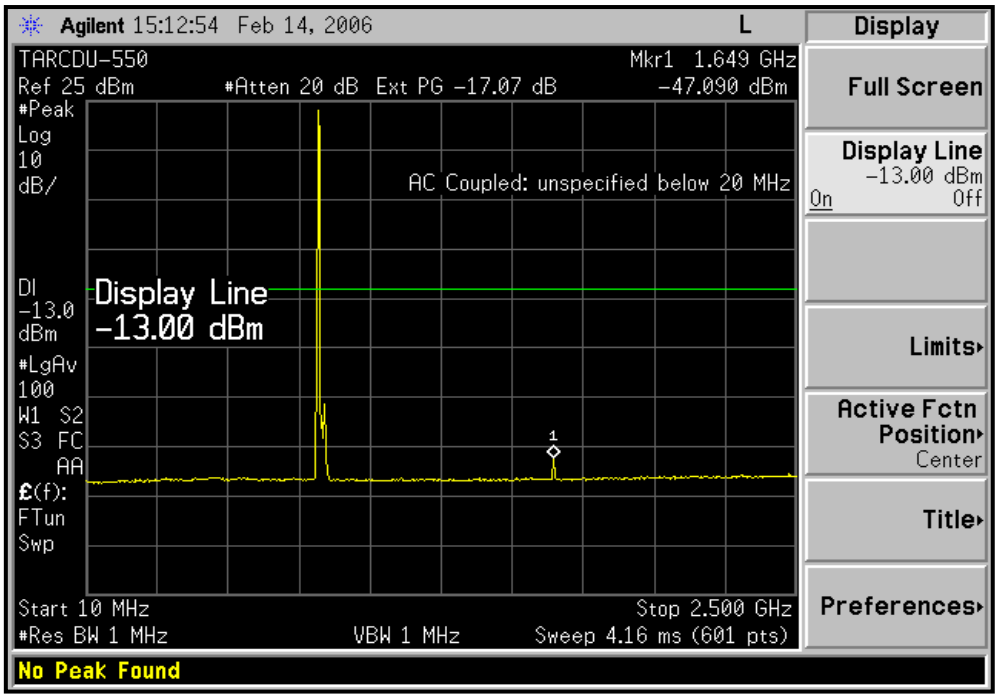


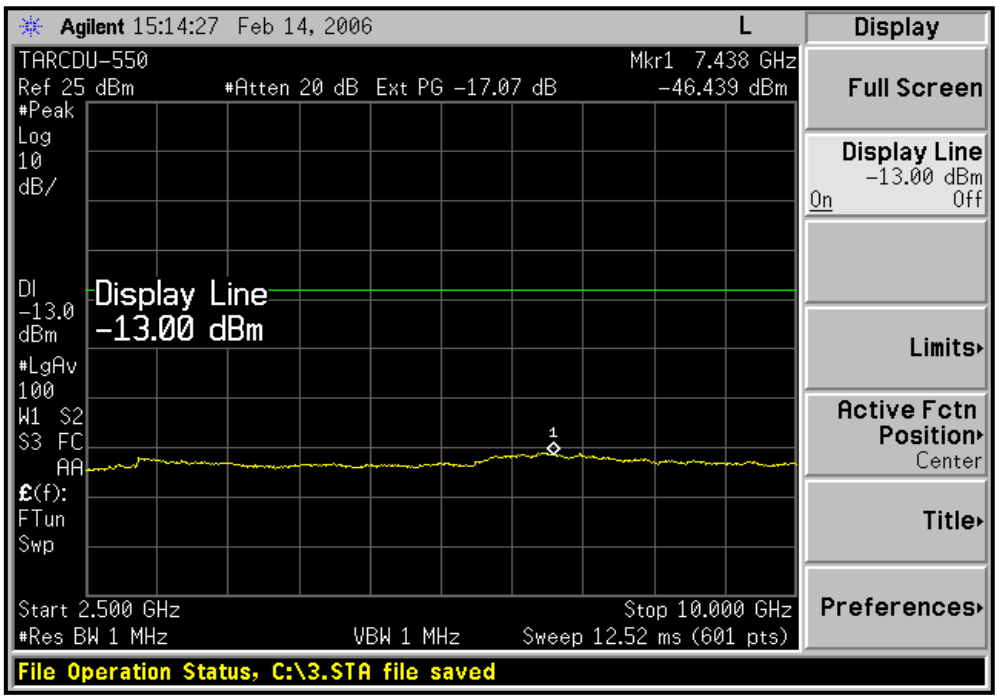
High Channel



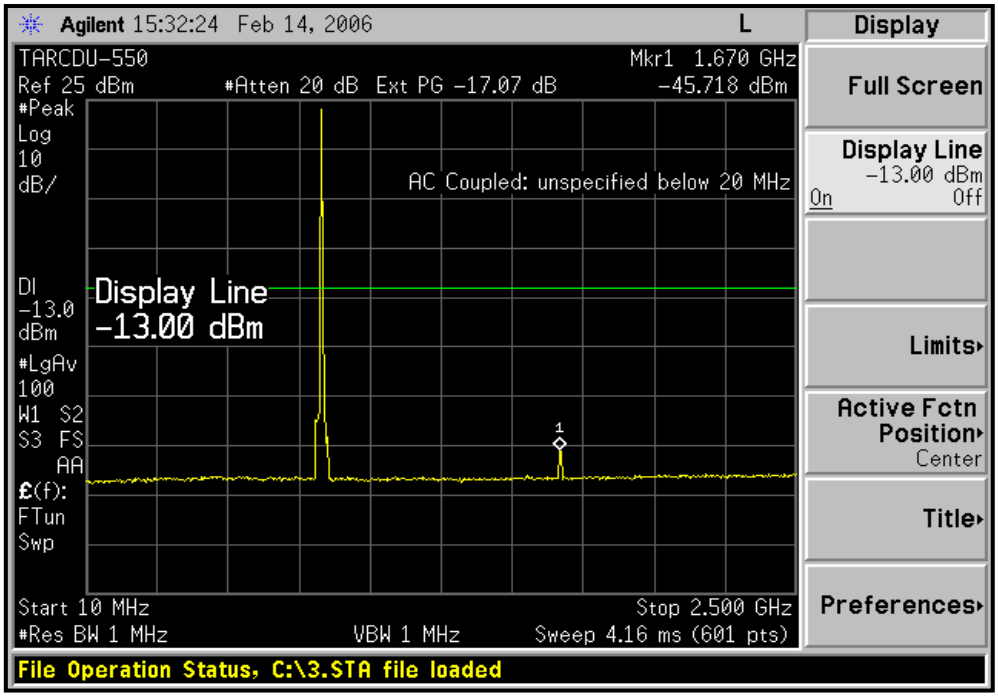
● Spurious Emission at antenna Terminals

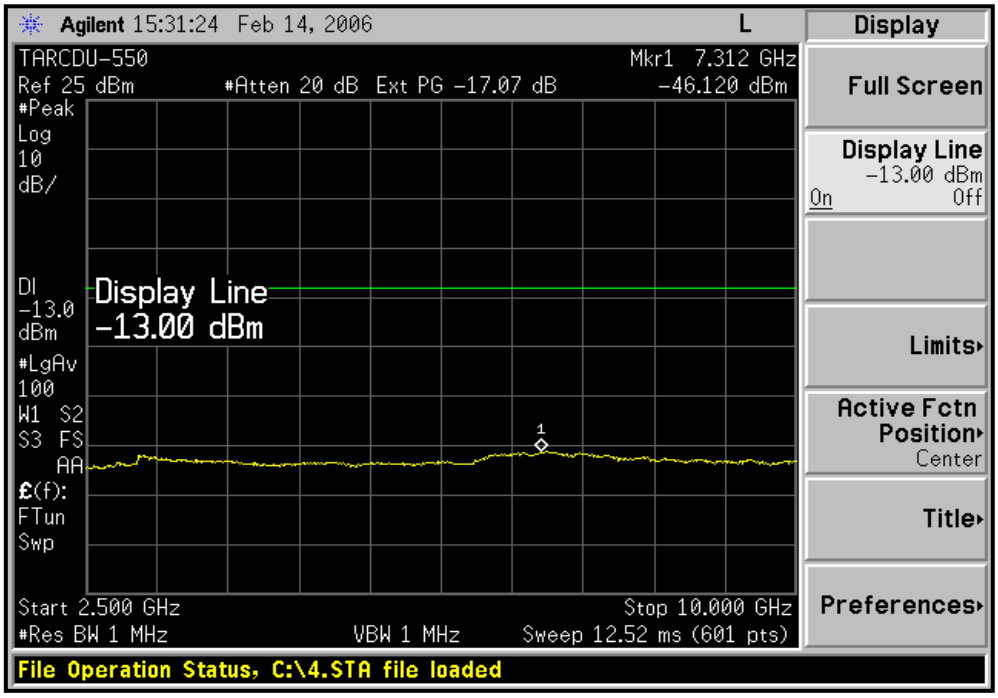
Low Channel



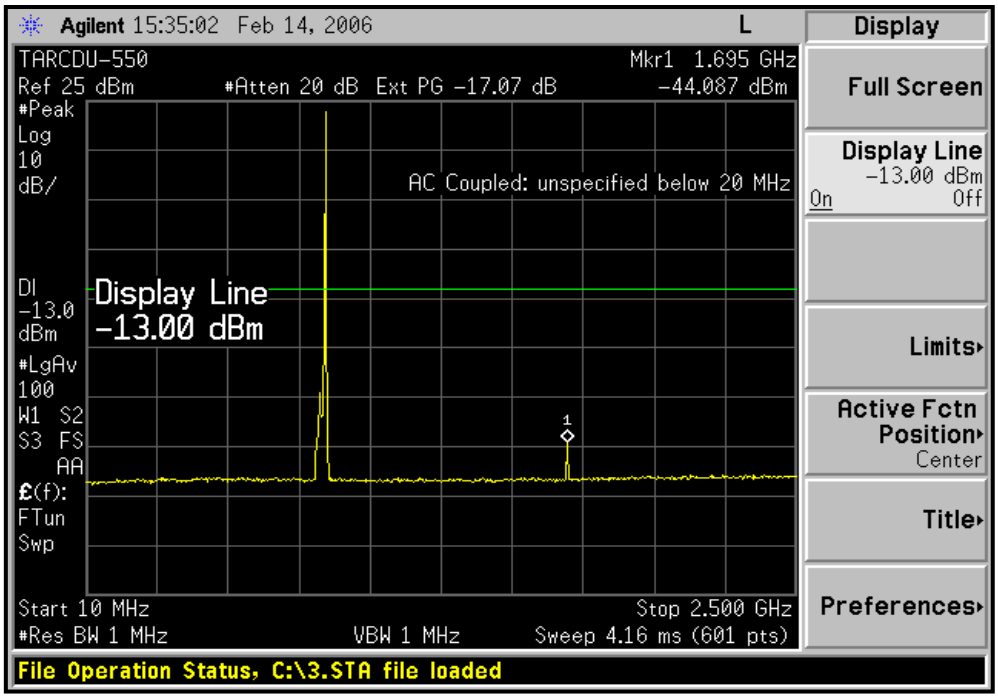


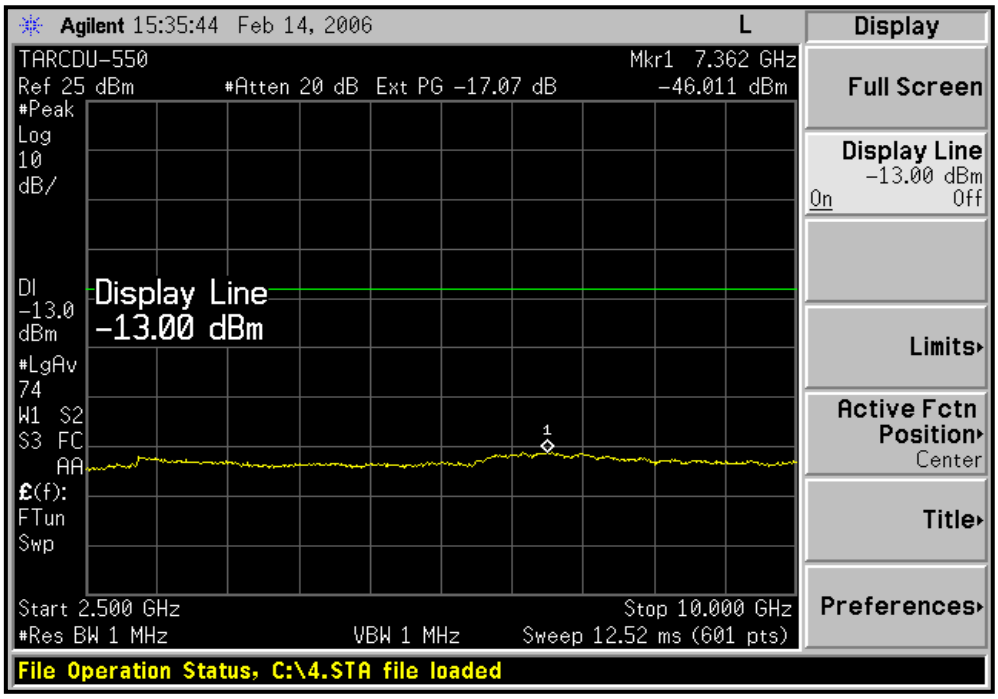
Middle Channel





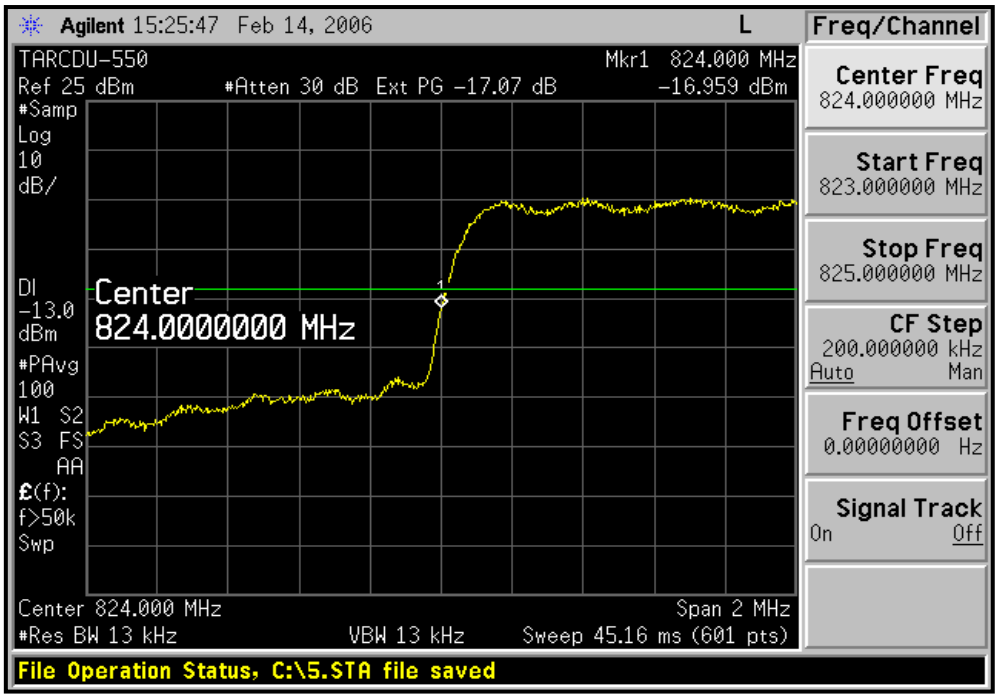
High Channel

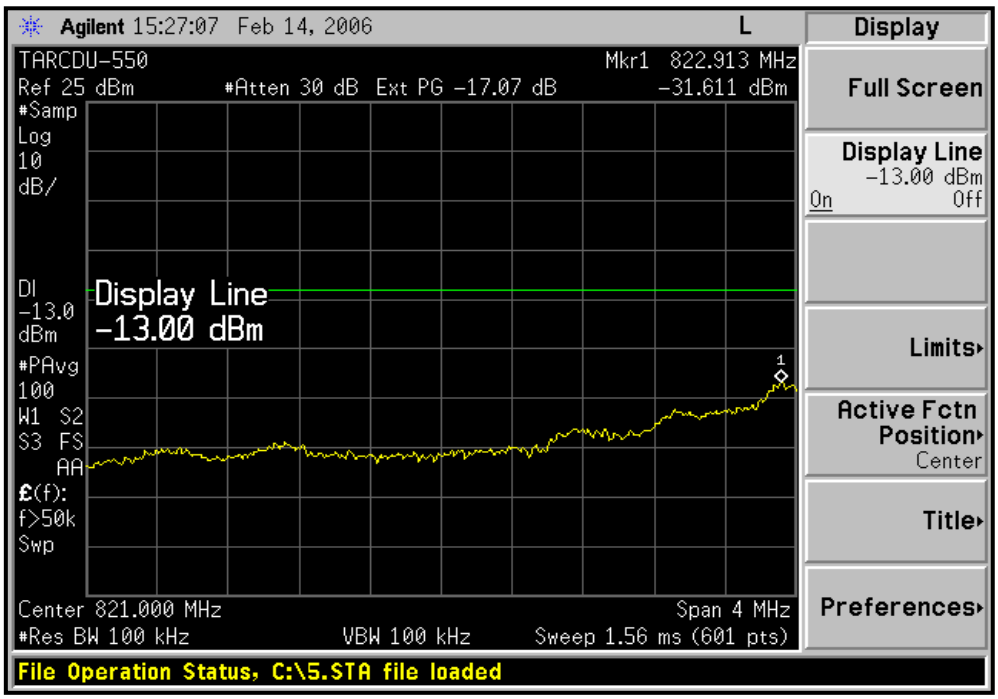




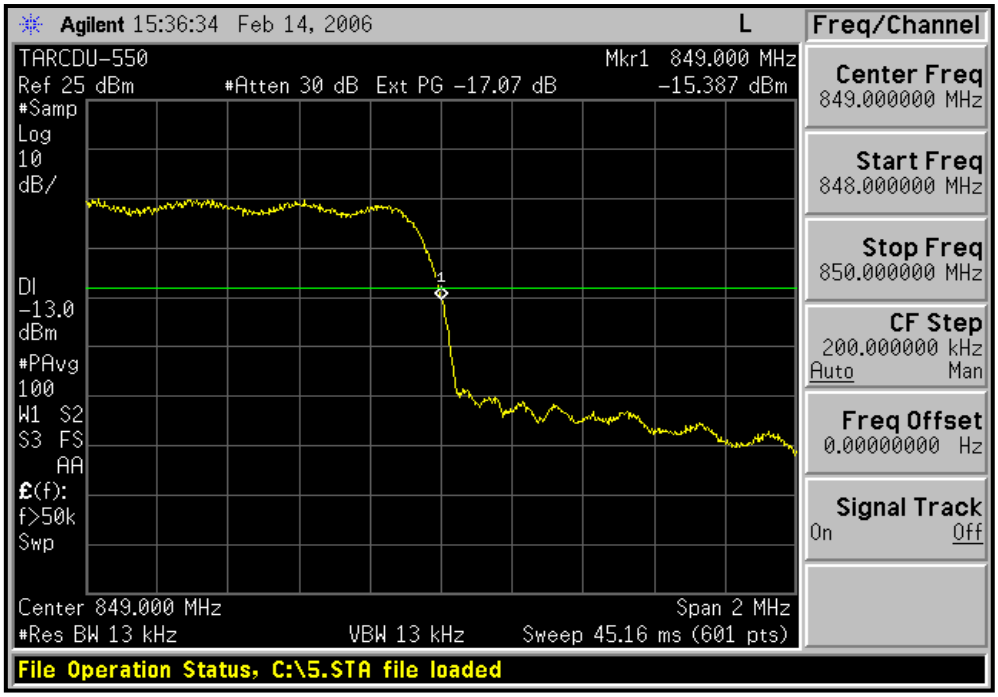
● **Band Edge**

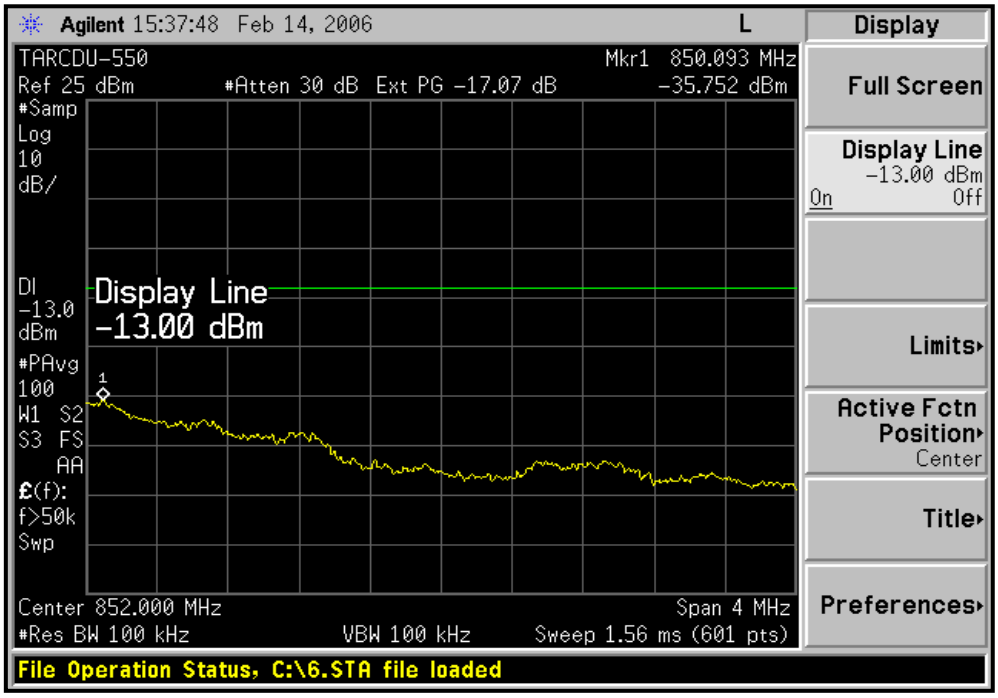
Low Channel





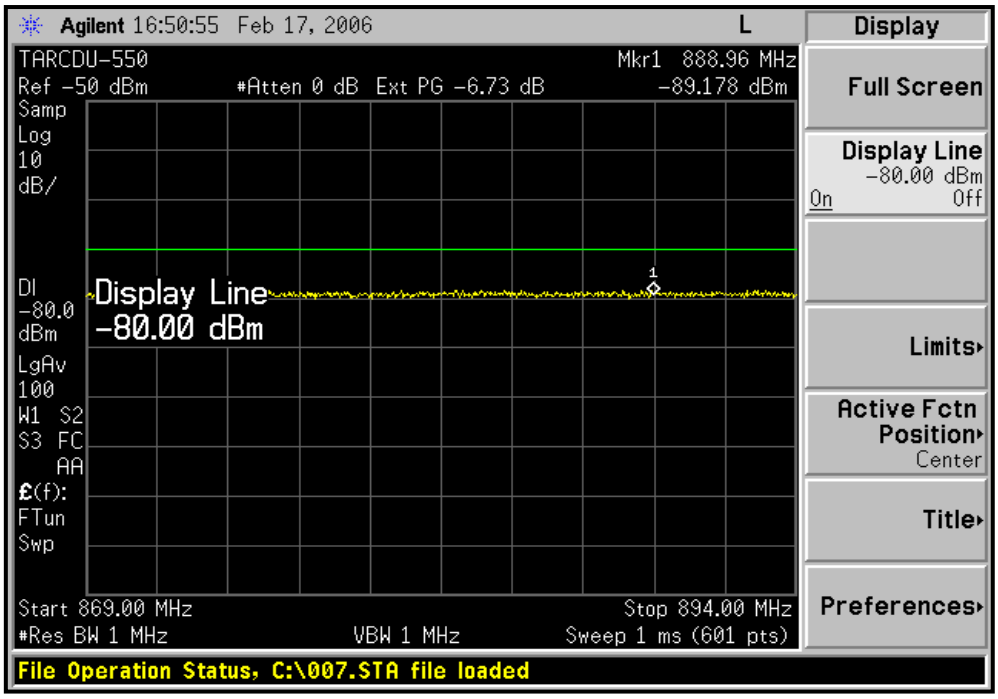
High Channel



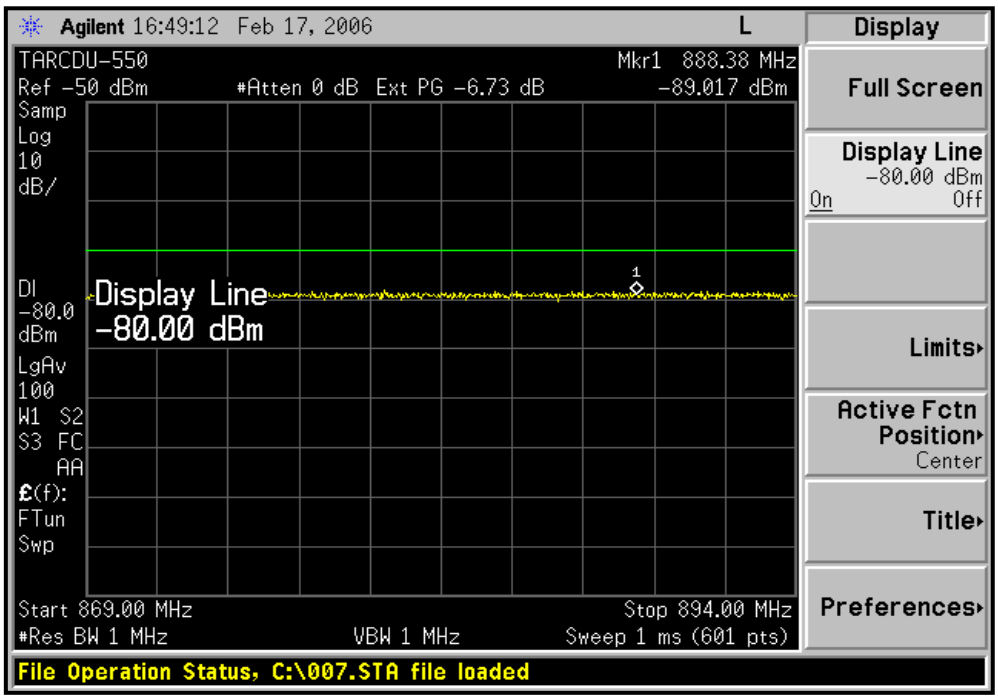


● Emission in Receiver Critical Band

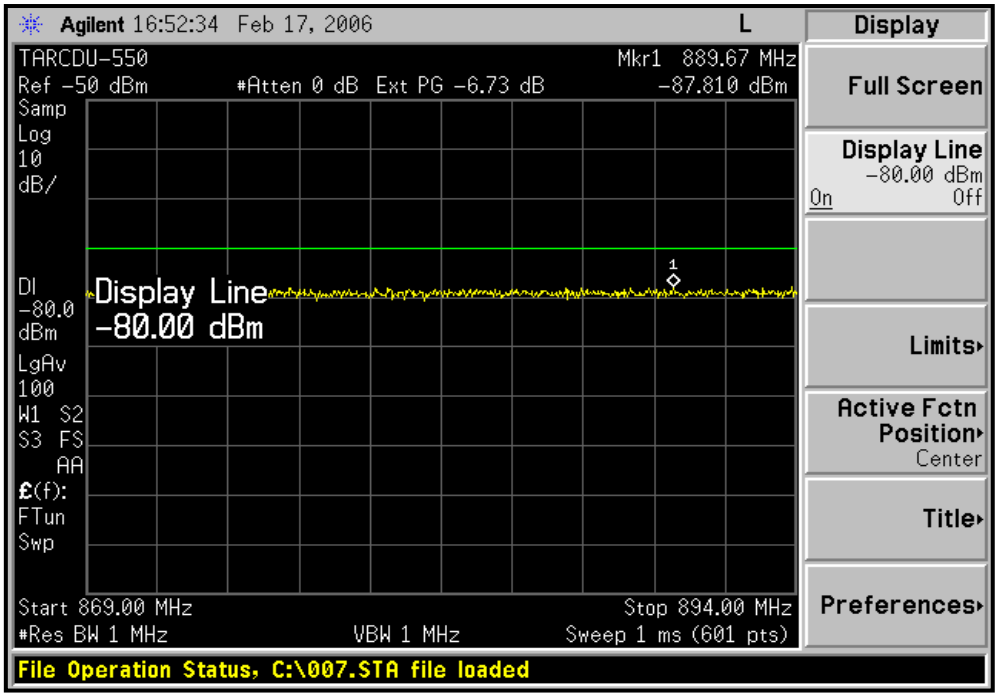
Low Channel



Middle Channel



High Channel

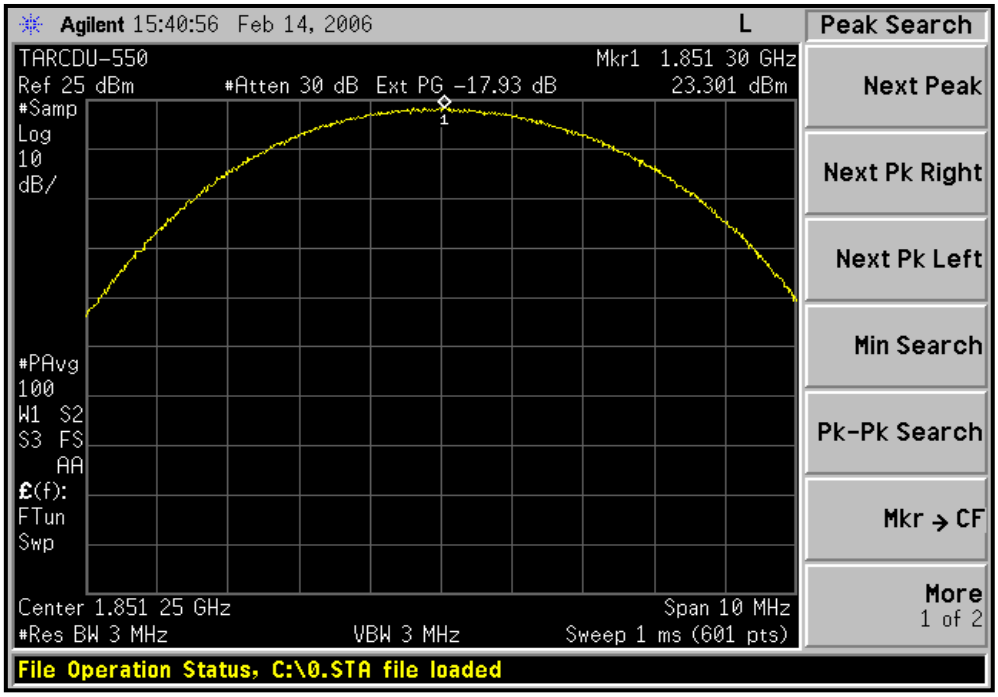


- End of page -

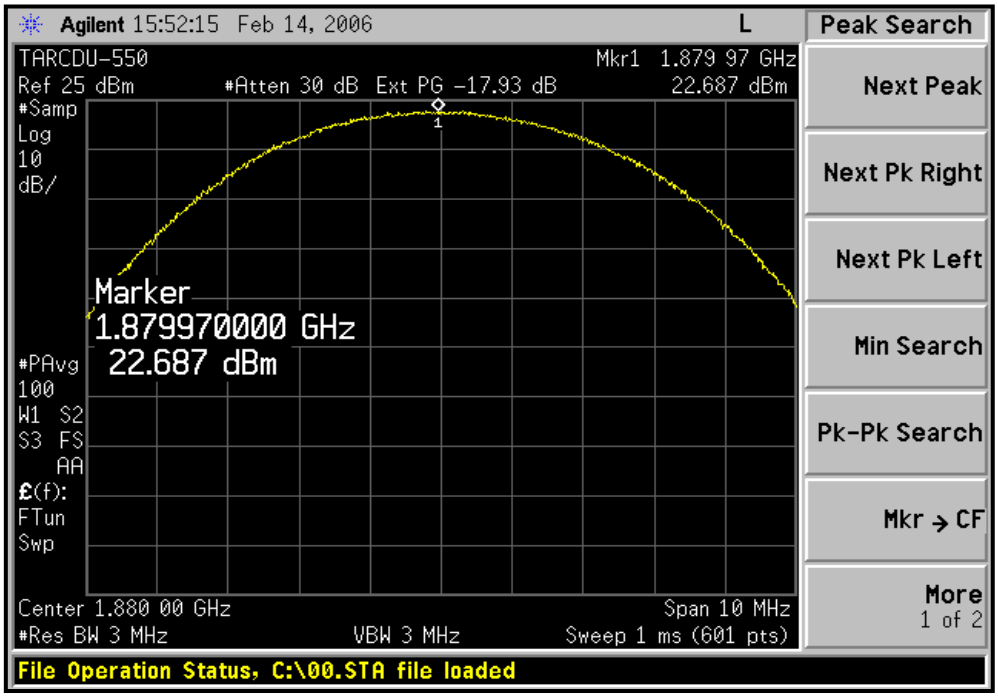
12. Test Plots (US PCS)

● **Conducted Output Power**

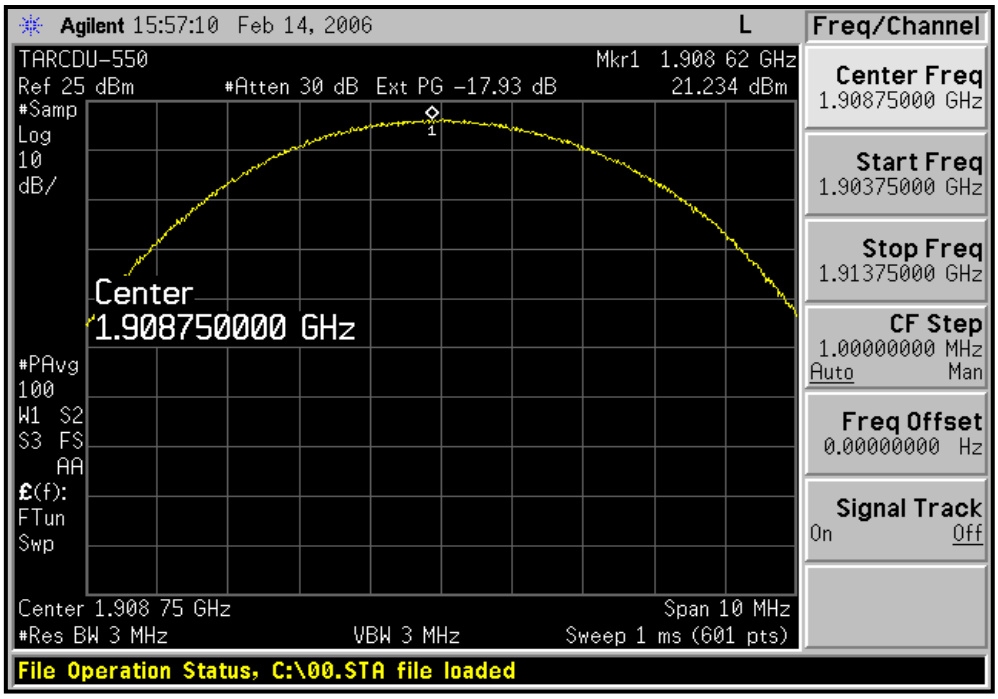
Low Channel



Middle Channel

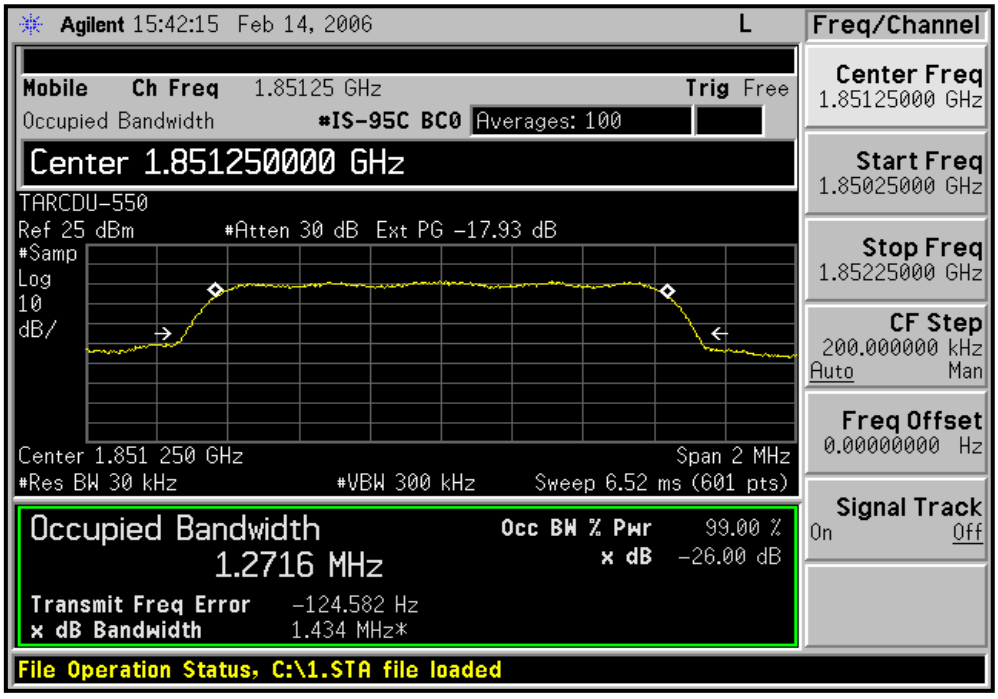


High Channel

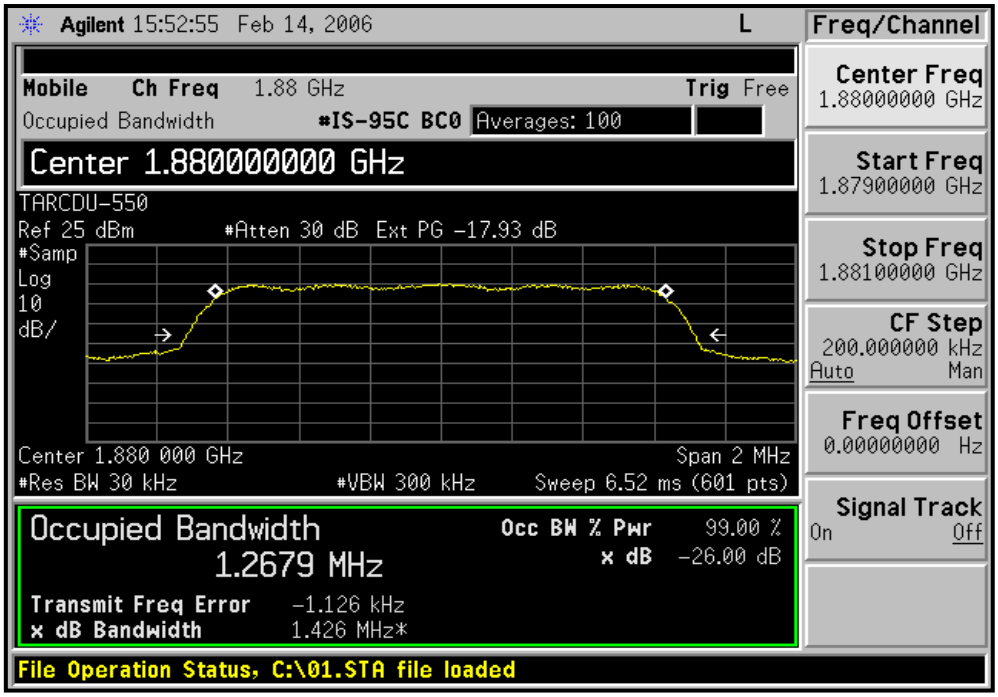


● Occupied Bandwidth / 26dB Bandwidth

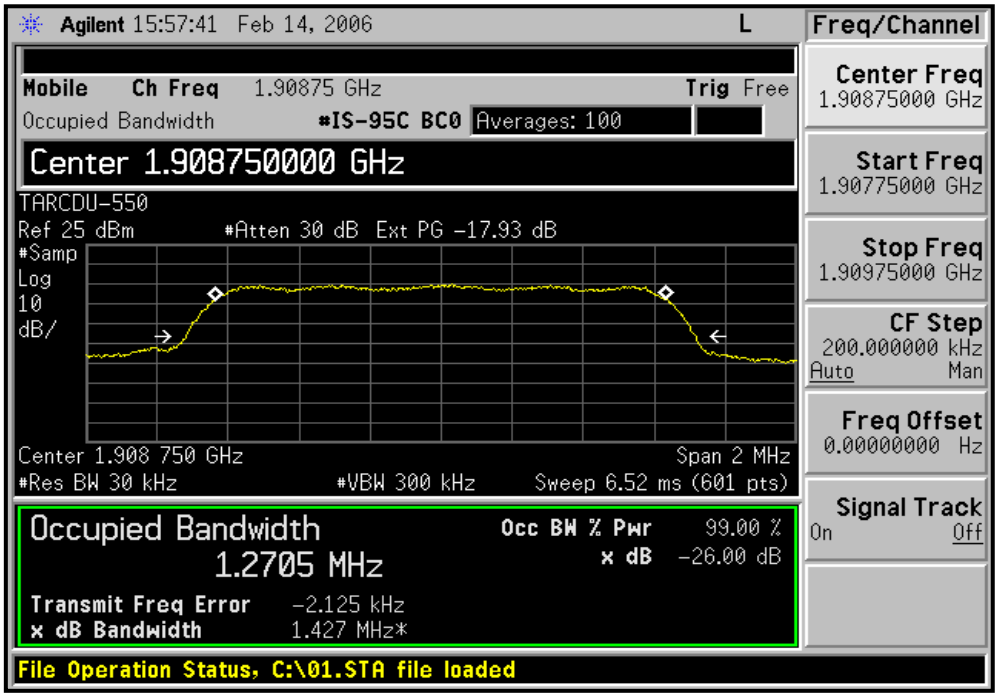
Low Channel



Middle Channel

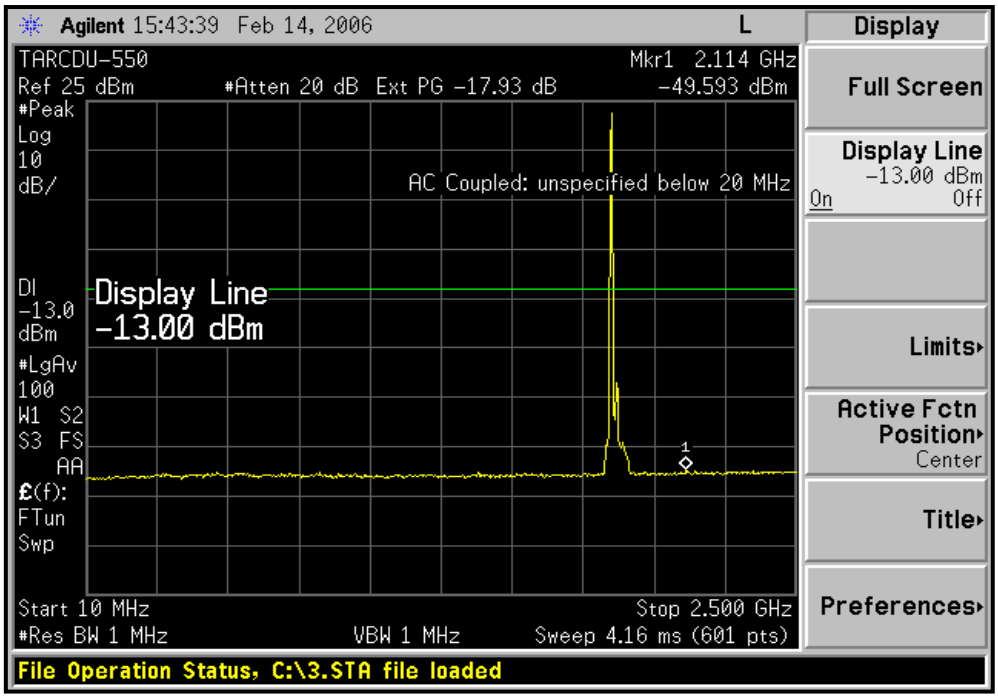


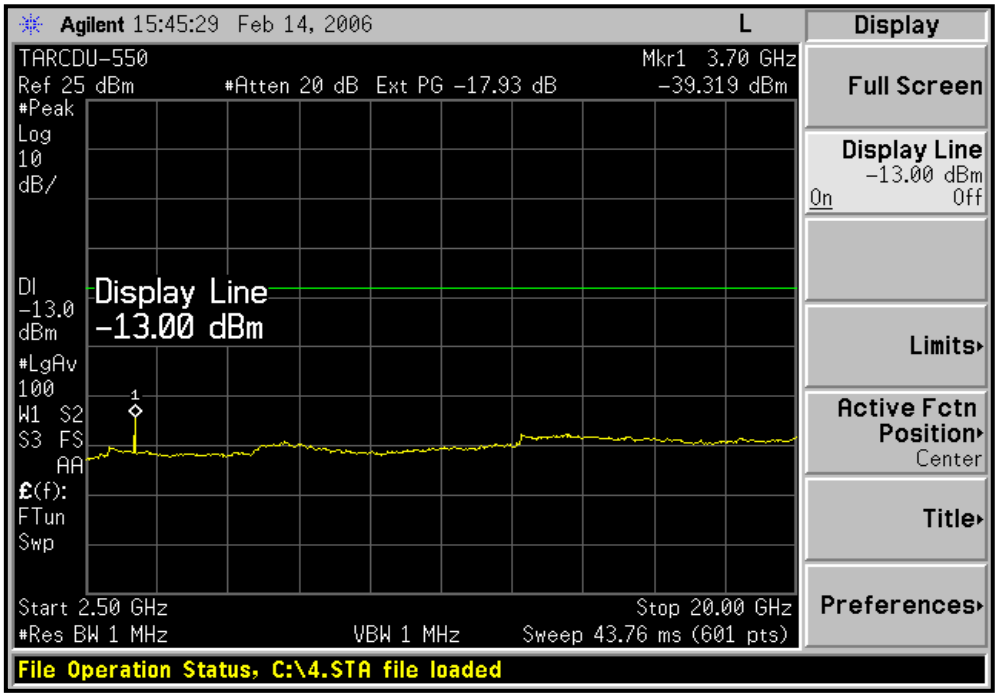
High Channel



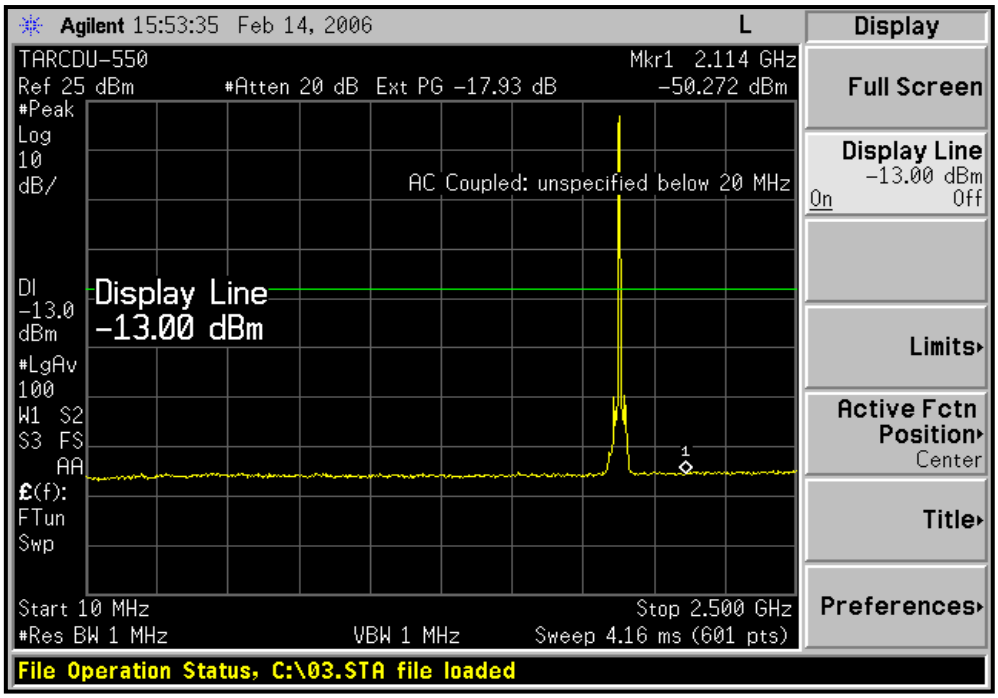
● Spurious Emission at antenna Terminals

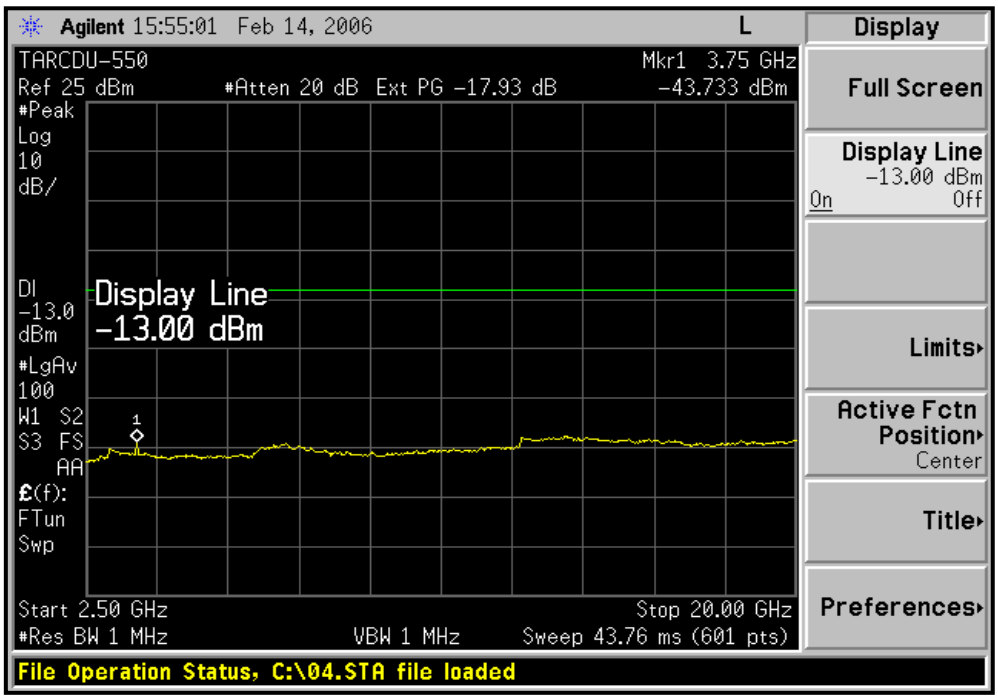
Low Channel



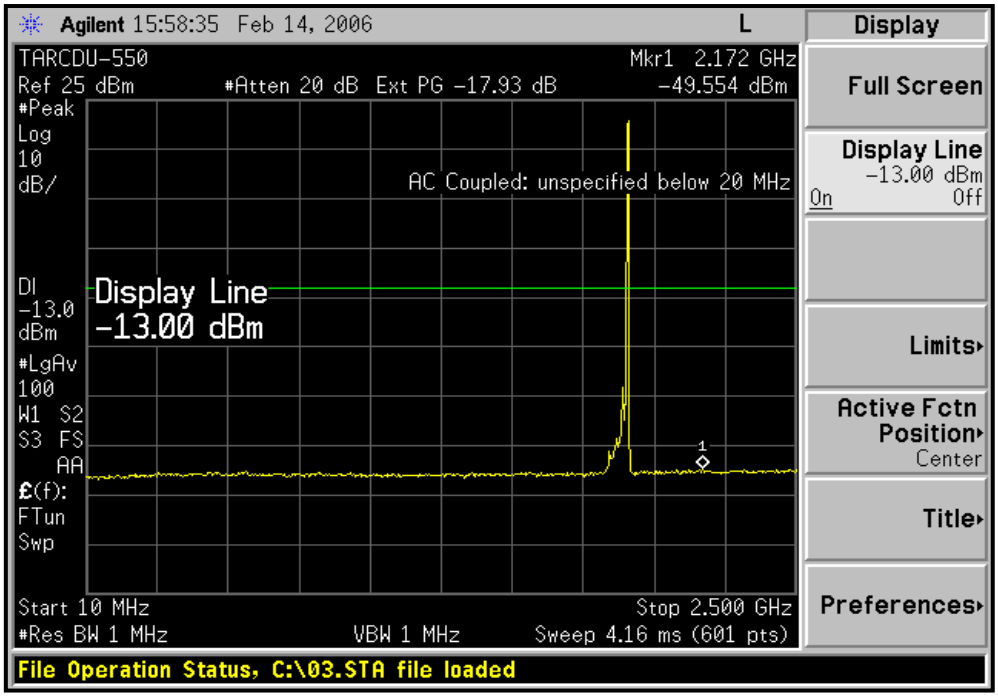


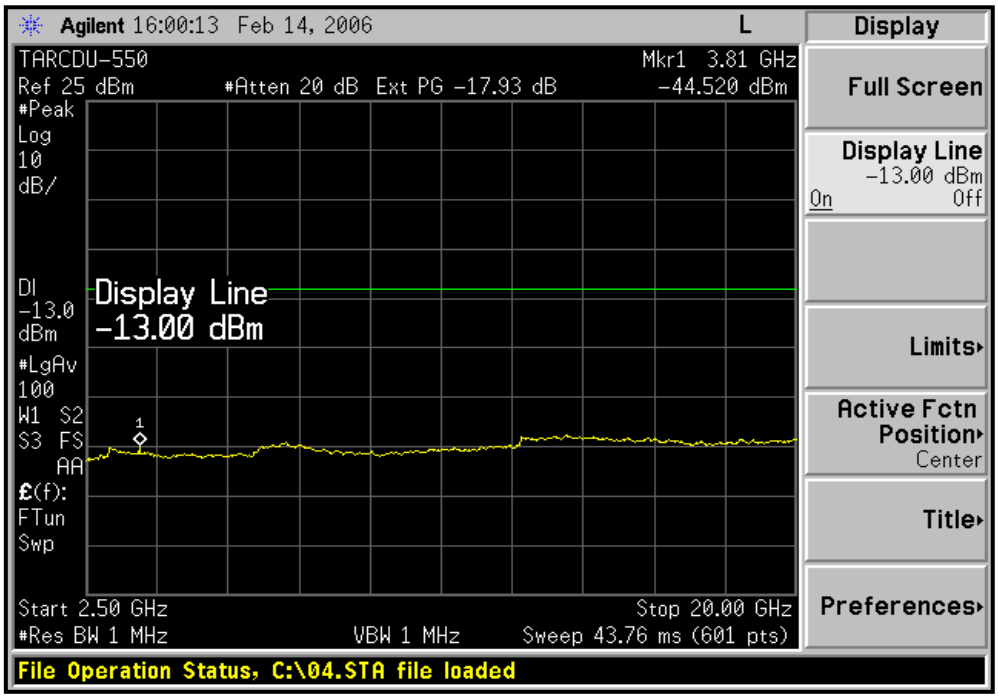
Middle Channel





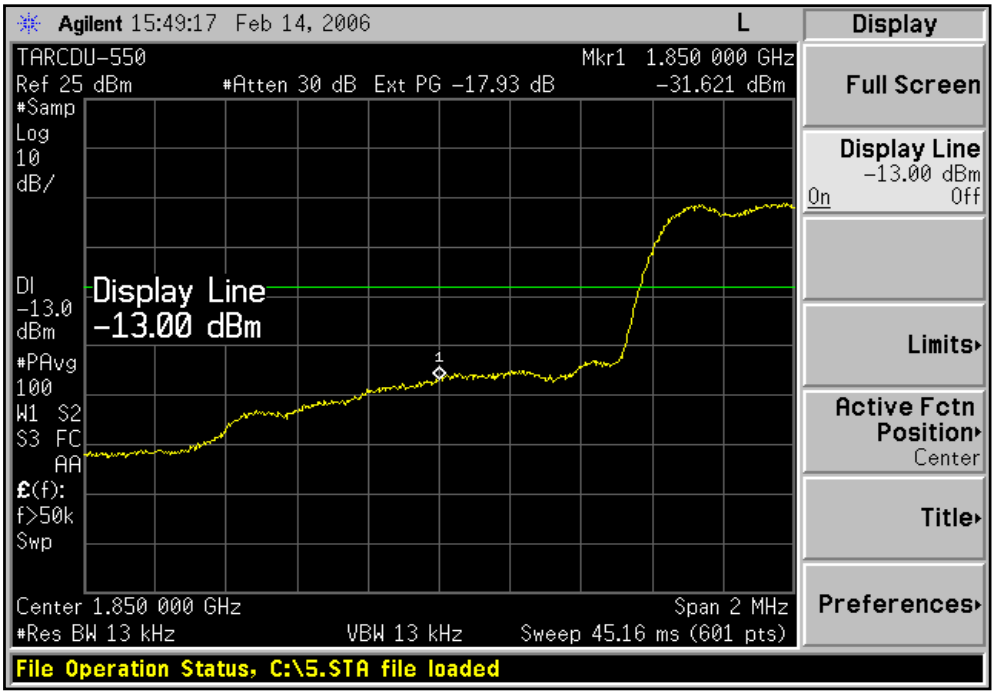
High Channel

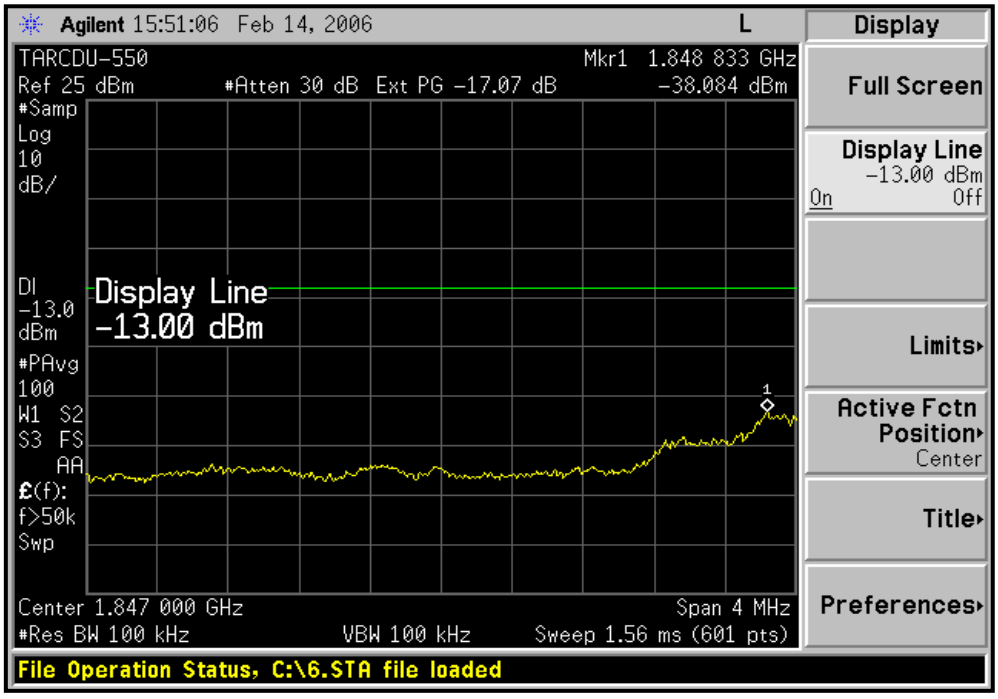




● **Band Edge**

Low Channel





High Channel