

TEST REPORT

Report Number: 3059176-001

Project Number: 3059176

6/3/2004

Evaluation of the

Mobile Manager

Model Number: MM904X

FCC ID:

MYAMM904X

FCC Part 2

FCC Part 22 Subpart H

FCC Part 24 Subpart E

For

Formation Inc.

Test Performed by:

Intertek
731 Enterprise Drive
Lexington, KY 40510

Test Authorized by:

Formation Inc.
121 Whittendale Drive
Moorsetown, NJ 08057

Prepared By: Jason Centers **Date:** 6/3/2004

Jason Centers, Project Engineer

Approved By: Bryan C. Taylor **Date:** 6/3/2004

Bryan C. Taylor, EMC Team Leader

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Intertek

731 Enterprise Drive, Lexington, KY 40510

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1 EXECUTIVE SUMMARY

Testing was performed for Formation Inc. on the model MM904X Navtrak Mobile Manager. The MM904X contains a CDMA module manufactured by Wavecom (FCCID: O9EQ2438F) which has previously been certified under FCC parts 22 and 24. Since the Wavecom CDMA module has already been certified only the conducted output power and the spurious emission tests were performed on the MM904X.

FCC RULE	IC RULE	DESCRIPTION OF TEST	RESULT	PAGE
§2.1046	RSS-129 §7.1, §9.1 RSS-133 §6.2	RF Power Output	Compliant	9
§22.913, §24.232	RSS-129 §7.1, §9.1 RSS-133 §6.2	ERP, EIRP	Note¹	-
§2.1049 §22.917(b)(d)	RSS-129 §6.3, RSS-129 §8.1	Emission Limitation, Occupied Bandwidth	Note¹	-
§2.1051 §22.917(e) §22.917(f) §24.238(a)	RSS-129 §6.3, §7.2.2, §8.1.1, §10 RSS-133 §6.3	Out of Band Emissions at Antenna Terminals Mobile Emissions In Base Frequency Range	Note¹	-
§2.1053	RSS-129 §8.1	Field Strength of Spurious Radiation	Compliant	10
§2.1091, §2.1093	RSS-129 §11, RSS-133 §8	Specific Absorption Rate	NA	See Note ²
§15.107, §15.207	IC ES-003	Power Line Conducted Emissions	Note¹	-
§15.109	IC ES-003 RSS-129 §10, RSS-133 §9	Receiver Spurious Emission	Note¹	-
§2.1055, §22.355, §24.235	RSS-133 §7	Frequency Stability vs. Temperature	Note¹	-
§2.1055, §22.355, §24.235	--	Frequency Stability vs. Voltage	Note¹	-

N/S: Not under scope of this evaluation

¹ Evaluation of the MM904X to this criteria was not performed. Results from the Wavecom CDMA module (FCC ID: O9EQ2438F) filing will be used to determine compliance.

² Specific Absorption Rate testing was not under the scope of this evaluation.

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2 JOB DESCRIPTION

2.1 Client information

The Mobile Manager has been tested at the request of

Company: Formation Inc.
121 Whittendale Drive
Moorsetown, NJ 08057

Name of contact: Josh Laing
Telephone: (856)234-5020
Fax: (856)234-8543

2.2 Test plan reference:

Tests were performed to the following standards:

- FCC Part 2
- FCC Part 15
- FCC Part 24 Subpart E rules for an intentional radiator
- FCC Part 22 Subpart H rules for an intentional radiator

The test procedures described in this test report and ANSI C63.4: 1992 were employed.

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2.3 Equipment Under Test (EUT)

The Equipment Under Test (EUT) was an Mobile Manager that operated in the CDMA800 and CDMA1900 modes.

Product	Mobile Manager	
EUT Model Number	MM904X	
EUT Serial Number	16921	
Whether quantity (>1) production is planned	Quantity production is planned.	
Cellular Phone standards	CDMA 800 and 1900	
Type(s) of Emission	1M28F9W	
RF Output Power	23.63 dBm – CDMA 800 24.23 dBm – CDMA1900	
Frequency Range	824.7 – 848.31 MHz CDMA800 1850 – 1910 MHz CDMA1900	
Antenna & Gain	Tri-Band Antenna with 26 dB gain active amplifier for GPS by Mobile Mark (Model Number SMV-UCE-1A2C)	824 – 894 MHz (2 dBi Gain) 1850 – 1990 MHz (1 dBi Gain)
Detachable Antenna	Yes – TNC Connector – Cell Yes – SMA Connector - GPS	
External input	<input type="checkbox"/> Audio <input checked="" type="checkbox"/> Digital Data	

EUT receive date: 6/1/2004

EUT receive condition: The EUT was received in good condition with no apparent damage.

Test start date: 6/1/2004

Test completion date: 6/3/2004

The test results in this report pertain only to the item tested.

2.3.1 System Support Equipment

Table 2-1 contains the details of the support equipment associated with the Equipment Under Test during the FCC testing.

Table 2-1: System Support Equipment

Description	Manufacturer	Model Number	Serial Number	FCC ID number
Tri-Band Antenna	Mobile Mark	SMV-UCE-1A2C	Not Labeled	Not Labeled
Laptop Computer	Compaq	Armanda 7800	7923CB630078	Not Labeled

2.3.2 Cables associated with EUT

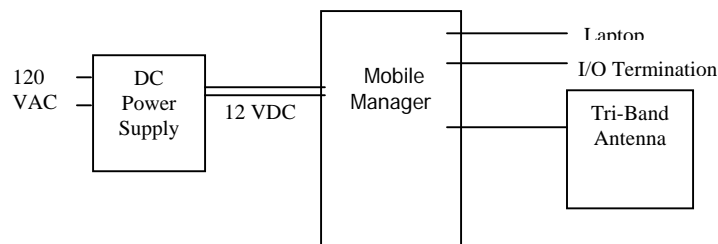
Table 2-2 contains the details of the cables associated with the EUT.

Table 2-2: Interconnecting cables to EUT

Description	Length	Shielding	Ferrites	Cables	
				Connection	
				From	To
Serial Cable	6 ft	None	None	Programming Port	Laptop
DC Power Cable	6 ft	None	None	DC Output of Power Supply	DC Input of the MM904X
I/O Cable	6ft	None	None	I/O Connector on MM904X	Termination
RG-58U Coax	15 ft	Yes	None	Cell Connector	Tri-Band Antenna
RG-174 Coax	15 ft	Yes	None	GPS Connector	Tri-Band Antenna

2.3.3 System Block Diagram

The diagram shown below details the interconnection of the EUT and its accessories during FCC testing. For specific layout, refer to the test configuration photograph in the relevant section of this report.



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2.3.4 Justification

The EUT was operated in the stand-alone configuration.

2.3.5 Mode(s) of operation

The Mobile Manager was powered by 12VDC supplied by a laboratory power supply.

2.4 Modifications required for compliance

No modifications were implemented by Intertek.

2.5 Related Submittal(s) Grants

Wavecom CDMA Modem – FCC ID: O9EQ2438F

3 TEST FACILITY

The INTERTEK-Lexington is located at 731 Enterprise Drive, Lexington Kentucky, 40510. The radiated emission test site is a 10-meter semi-anechoic chamber. The chamber meets the characteristics of CISPR 16-1: 1993 and ANSI C63.4: 1992. For measurements, a remotely controlled flush-mount metal-top turntable is used to rotate the EUT a full 360 degrees. A remote controlled non-conductive antenna mast is used to scan the antenna height from one to four meters. The Industry Canada filing number for this site is 2055.

Figure 3-1: 10-Meter EMC Site



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4 CONDUCTED RF POWER

FCC Rule: §2.1046

IC Rule: RSS-129 §7.1, §9.1 and RSS-133 §6.2

4.1 Test Procedure

The transmitter output was connected to a calibrated coaxial cable, the other end of which was connected to a CMU-200 Base Station Simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The EUT was placed into a call and the transmitter output was read off the CMU-200 in dBm. The power output at the transmitter antenna port was determined by adding the value of the cable insertion loss to the CMU-200 power reading.

Tests were performed at three frequencies (low, middle, and high channels) and on the highest power levels, which can be setup on the transmitters.

4.2 Test Equipment

Description	Manufacturer	Model Number	Serial Number	Calibration due date
Base Station Simulator	Rohde & Schwarz	CMU-200	1100.0008.02	8/2004
Power Supply	HP	6038A	2603A-01539	10/20/04

4.3 Test Results

The Mobile Manager met the RF power output requirements of FCC Part 22 Subpart H and FCC Part FCC Part 24 Subpart E. The test results are located in Table 4-1.

Table 4-1 RF Power

EUT Mode	TX Channel	Conducted Output Power (dBm)
CDMA 800	384	23.63
CDMA 800	777	23.33
CDMA 800	1013	23.63
CDMA 1900	25	23.93
CDMA 1900	600	24.23
CDMA 1900	1175	24.13

5 FIELD STRENGTH OF SPURIOUS RADIATION

FCC §2.1053

RSS-129 §8.1

5.1 Test Procedure

The EUT was placed on a non-conductive turntable. The measurement antenna was placed at a distance of 3 meters from the EUT. The Base Station Simulator was set to force the EUT to its maximum power setting. During the tests, the antenna height and EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

The frequency range up to tenth harmonic was investigated for each of three fundamental frequencies (low, middle, and high channels) in each operating band. Once spurious emissions were identified, the power of the emission was determined using the substitution method described in TIA-603-B section 2.2.12 (Radiated Spurious Emissions).

5.2 Test Equipment

Description	Manufacturer	Model Number	Serial Number	Calibration date
Base Station Simulator	Rohde & Schwarz	CMU-200	1100.0008.02	8/2004
Signal Generator	HP	83620B	3844A01327	8/20/2004
Horn Antenna	Antenna Research	DRG-118/A	1086	3/7/2004
Horn Antenna	EMCO	3115	6556	7/11/2004
EMI Receiver	Rohde & Schwarz	ESI 26	1088.7490	10/2/2004
Bilog Antenna	EMCO	3142B	1674	8/2004
Preamplifier	HP	8449B	3008A00775	12/2004
High Pass Filter	Microwave Circuits	H3G020G2	3986-01 DC0408	2/2005
Power Supply	HP	6038A	2603A-01539	10/20/04

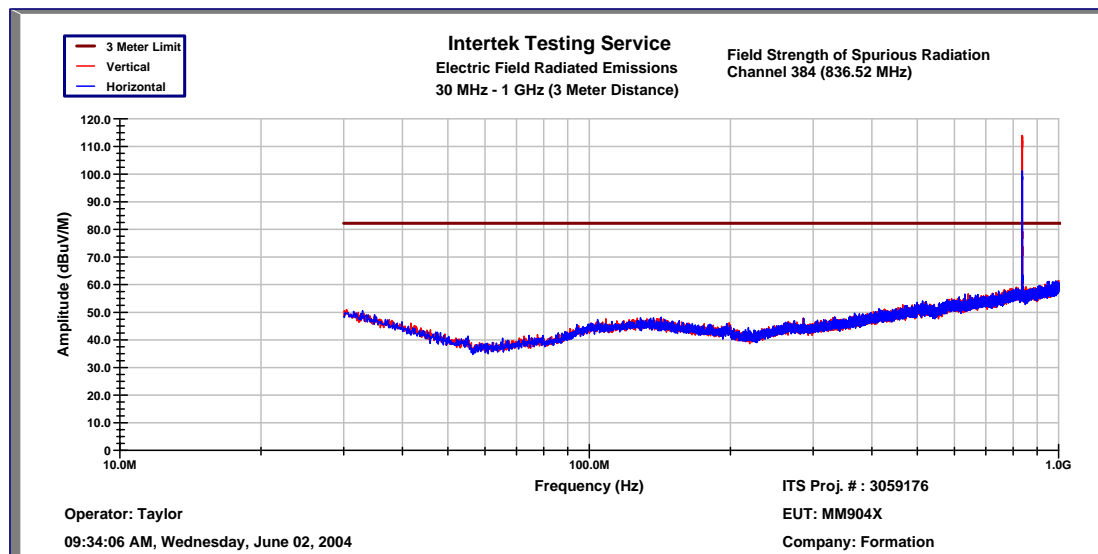
5.3 Test Results

The Mobile Manager met the field strength of spurious radiation requirements of FCC §2.1053. See Table 5-1 for measured radiated spurious emission power for emissions within 20 dB of the limit. See The Figure 5-1 through Figure 5-6 for the graphical test data.

Table 5-1: Radiated Power of Emissions Within 20dB of the Limit

EUT Mode	TX Channel	Frequency (GHz)	Vertical Reading (dBm)	Horizontal Reading (dBm)	Vertical Signal Generator (dBm)	Horizontal Signal Generator (dBm)	Cable Loss (dB)	Vertical Tx Antenna Gain (dBi)	Horizontal Tx Antenna Gain (dBi)	Vertical ERP (dBm)	Horizontal ERP (dBm)
CDMA 1900	1175	3.8175	-37.83	-43.79	-12.4	-19.1	15.54	10.0	9.7	-17.94	-24.94
CDMA 1900	1175	5.72625	-49.41	-52.56	-12.5	-14.6	24.12	11.0	10.7	-25.62	-28.02
CDMA 1900	600	3.76	-46.35	-51.5	-20.5	-26.2	15.12	10.0	9.7	-25.62	-31.62

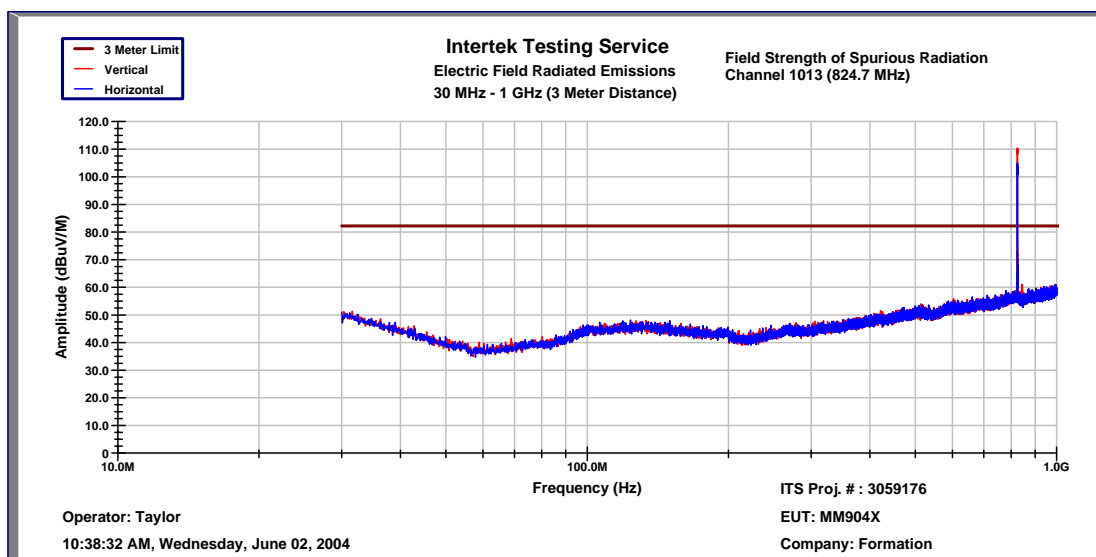
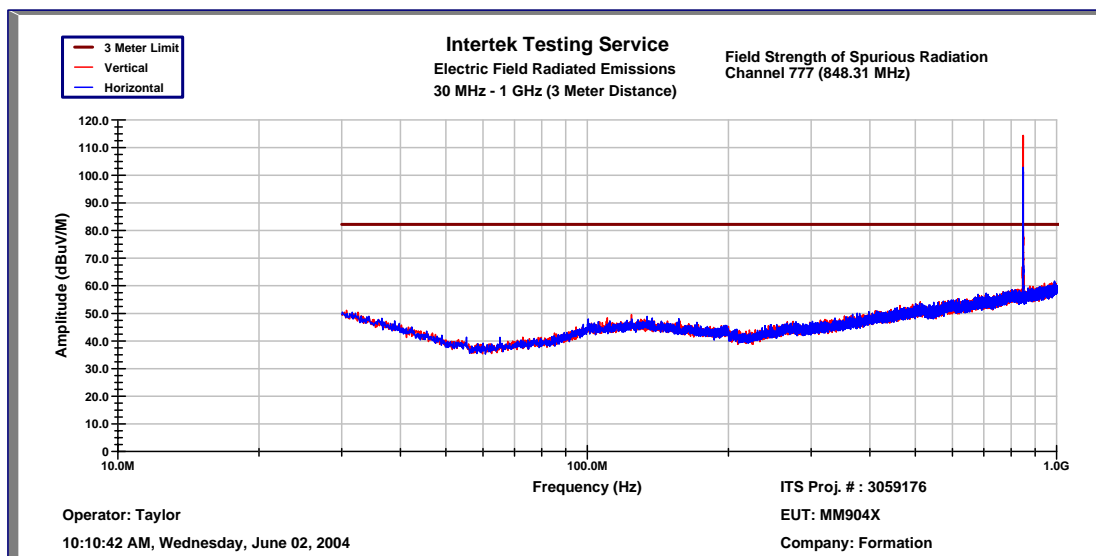
The Figure 5-1: Field Strength of Spurious Radiation (30 MHz – 1 GHz), CDMA 800 Channel 384, 777, and 1013³



³ The emission shown exceeding the limit in these three plots is the fundamental for channels 384, 777, and 1013.

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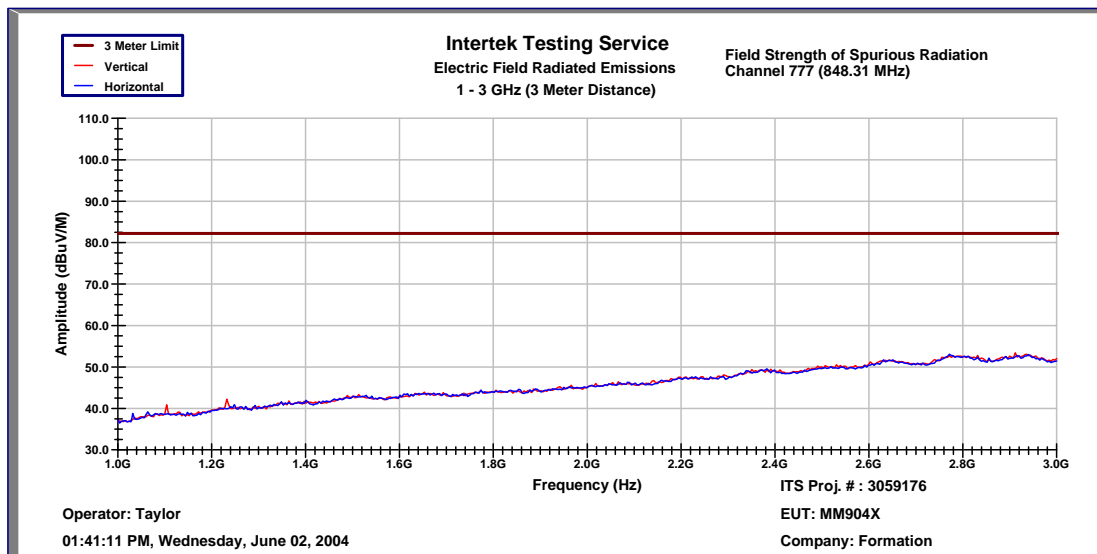
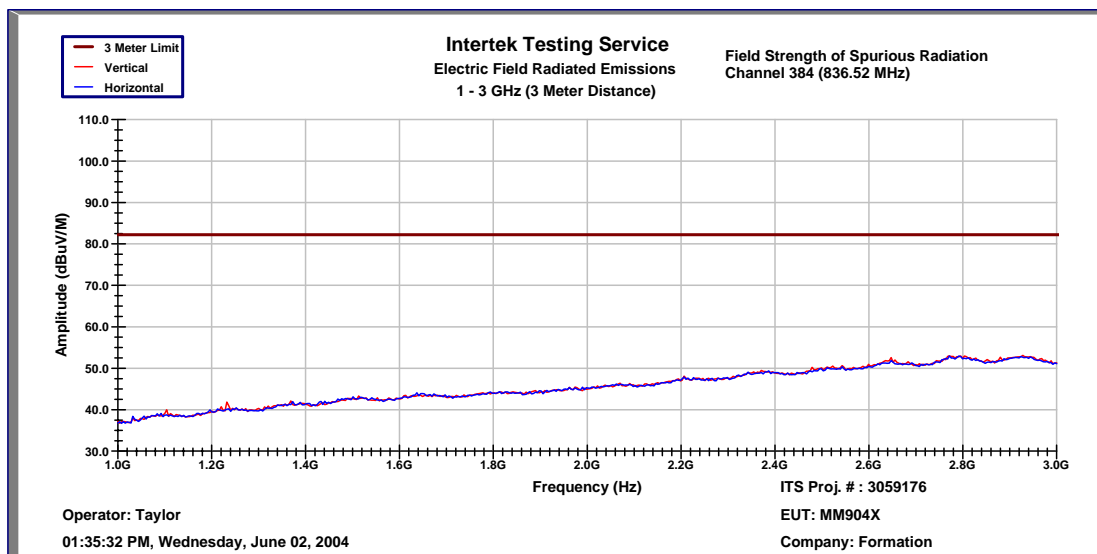


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Figure 5-2: Field Strength of Spurious Radiation (1 GHz – 3 GHz), CDMA 800 Channel 384,777, 1013



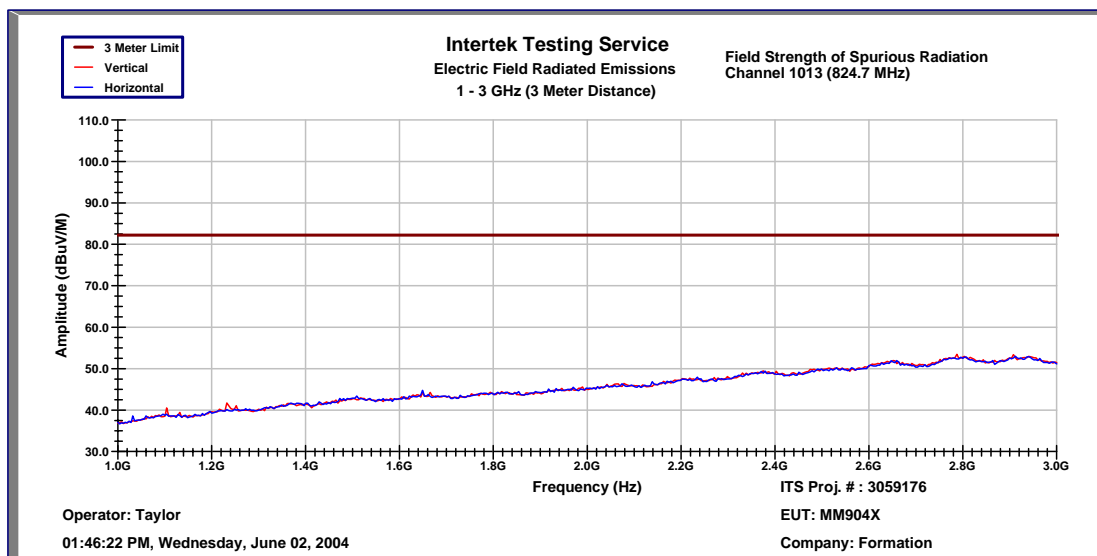
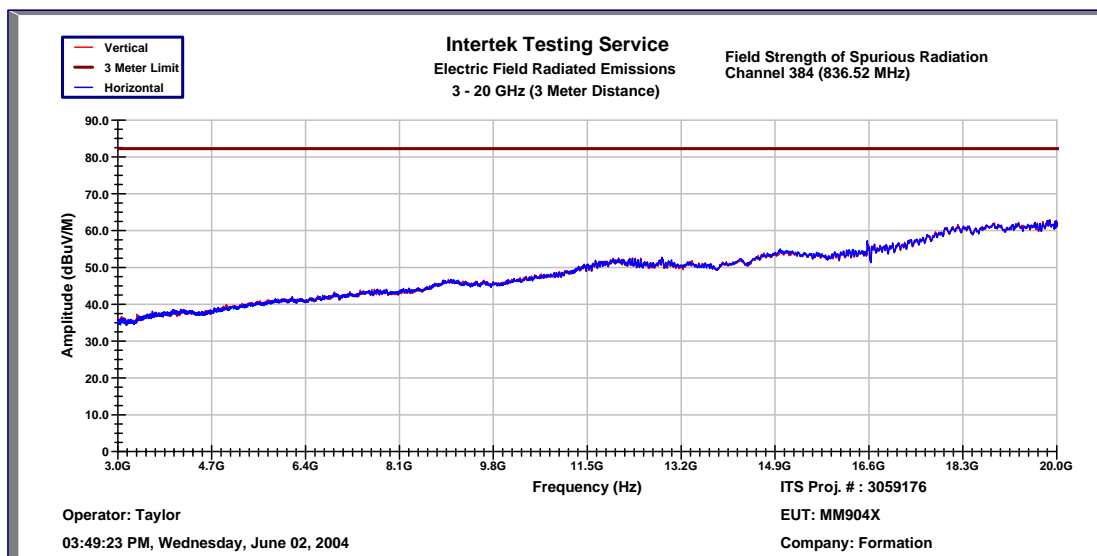
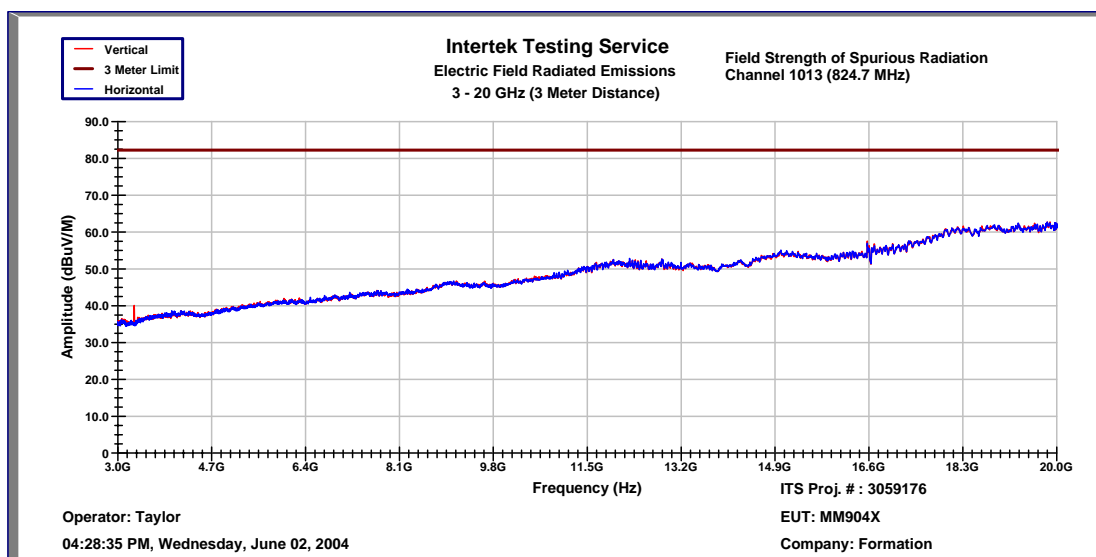
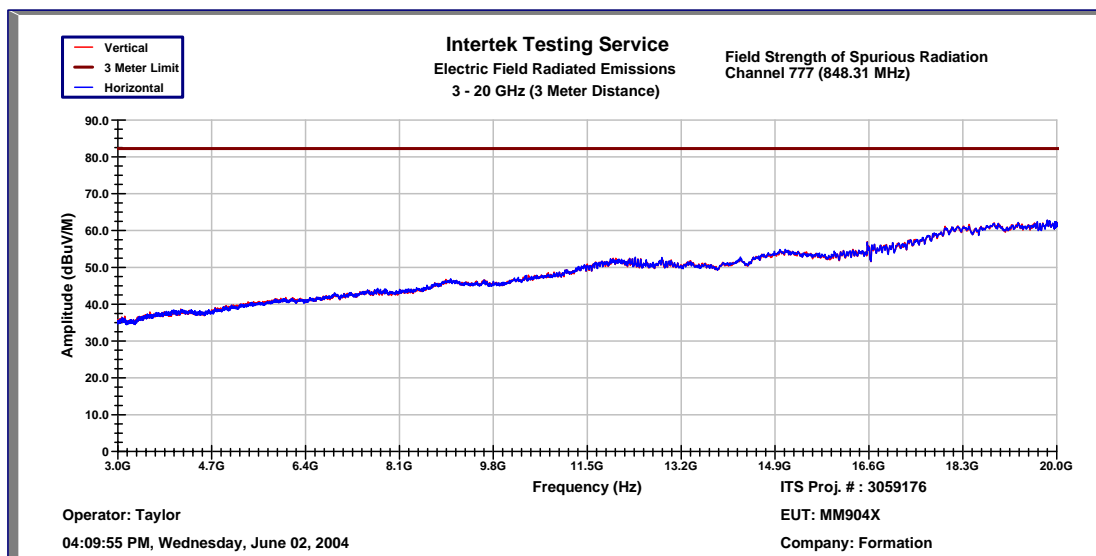


Figure 5-3: Field Strength of Spurious Radiation (3GHz – 20GHz), CDMA 800 Channel 384, 777, and 1013



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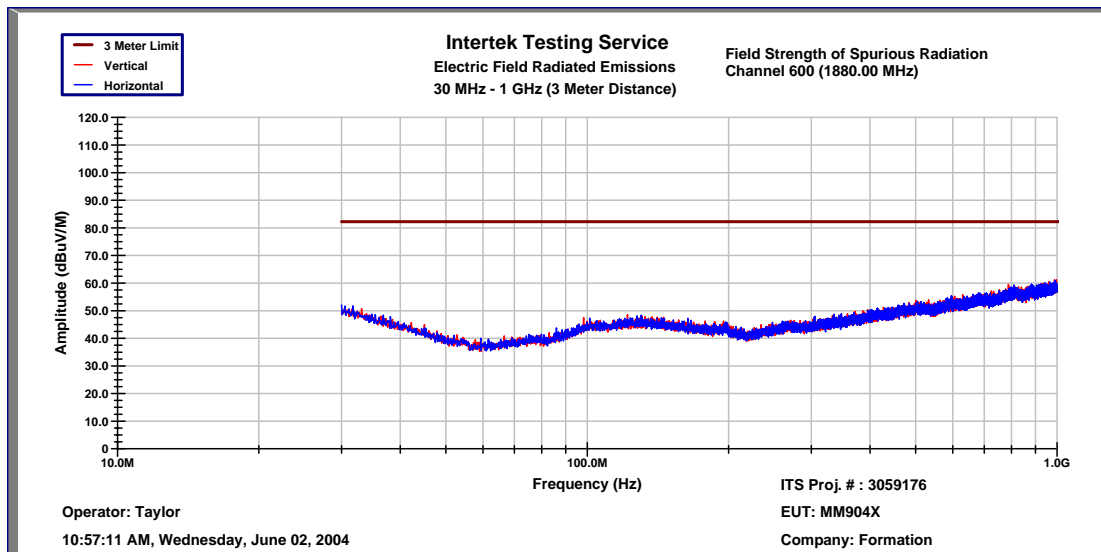
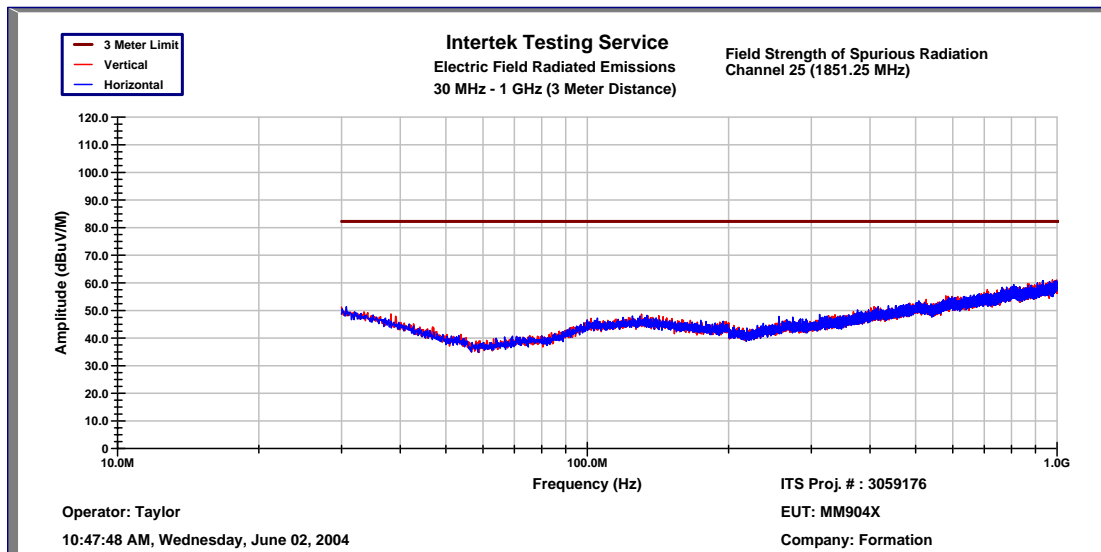


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Figure 5-4: Field Strength of Spurious Radiation (30 MHz – 1 GHz), CDMA 1900 Channel 25, 600, and 1175



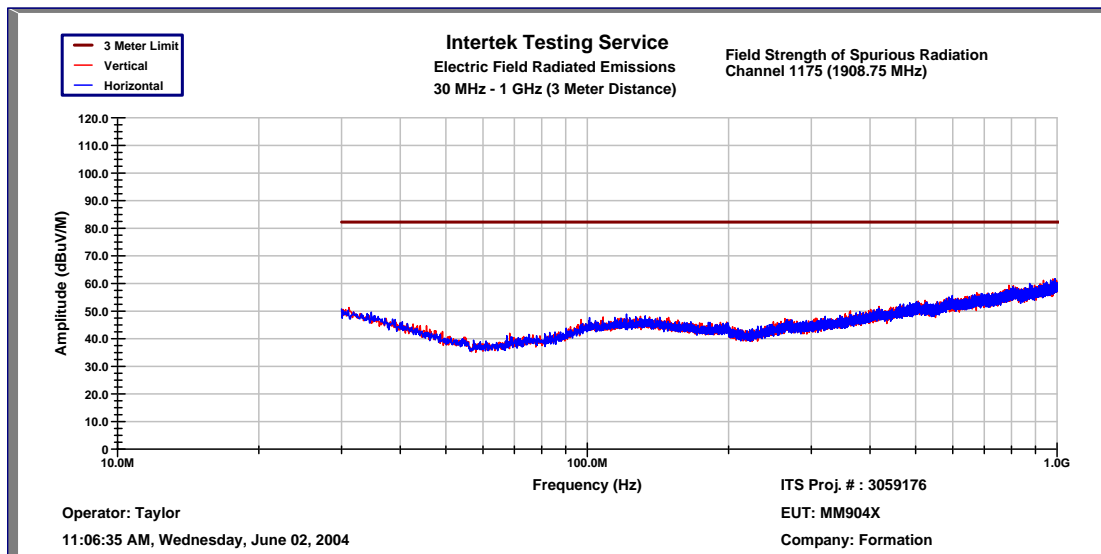
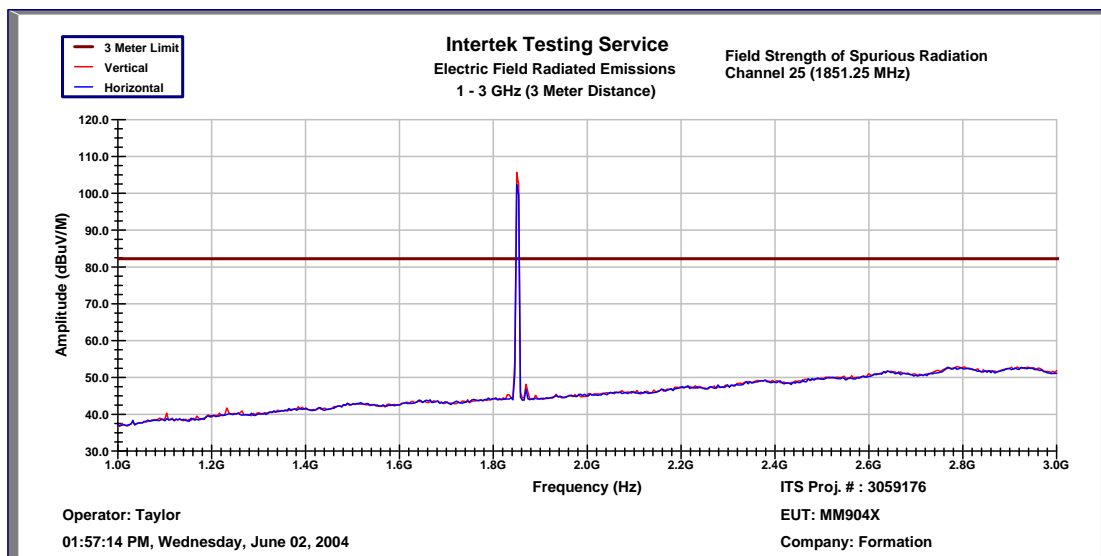


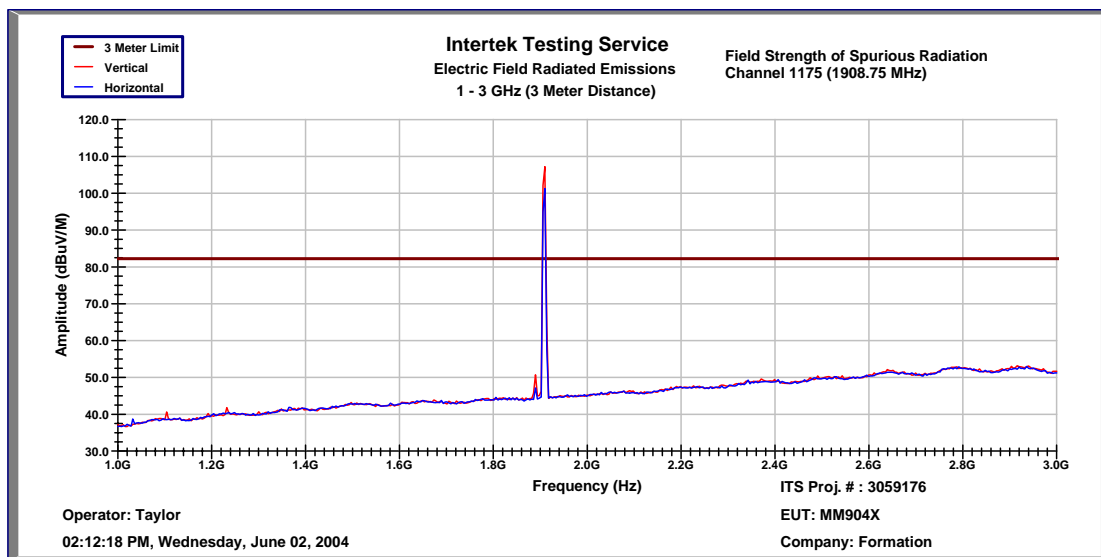
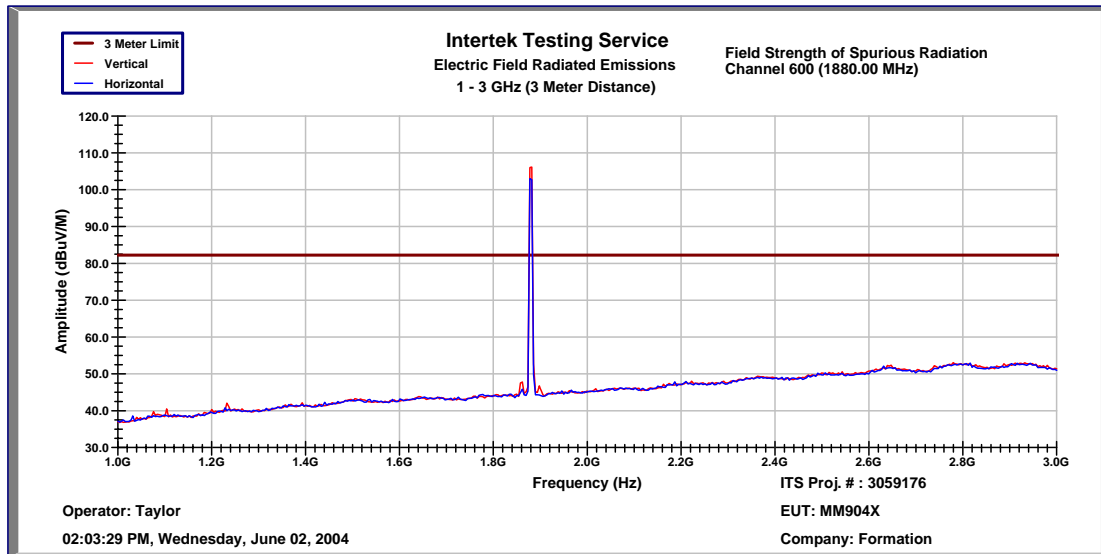
Figure 5-5: Field Strength of Spurious Radiation (1 GHz – 3 GHz), CDMA 1900 Channel 25, 600, and 1175⁴



⁴ The emission shown in these three plots is the fundamental for channels 25, 600, and 1175.

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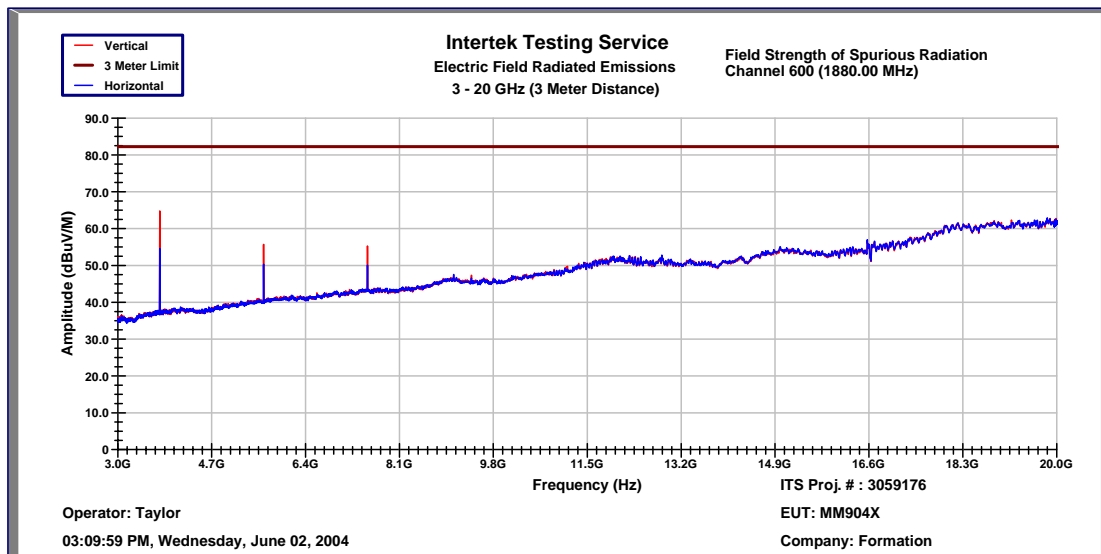
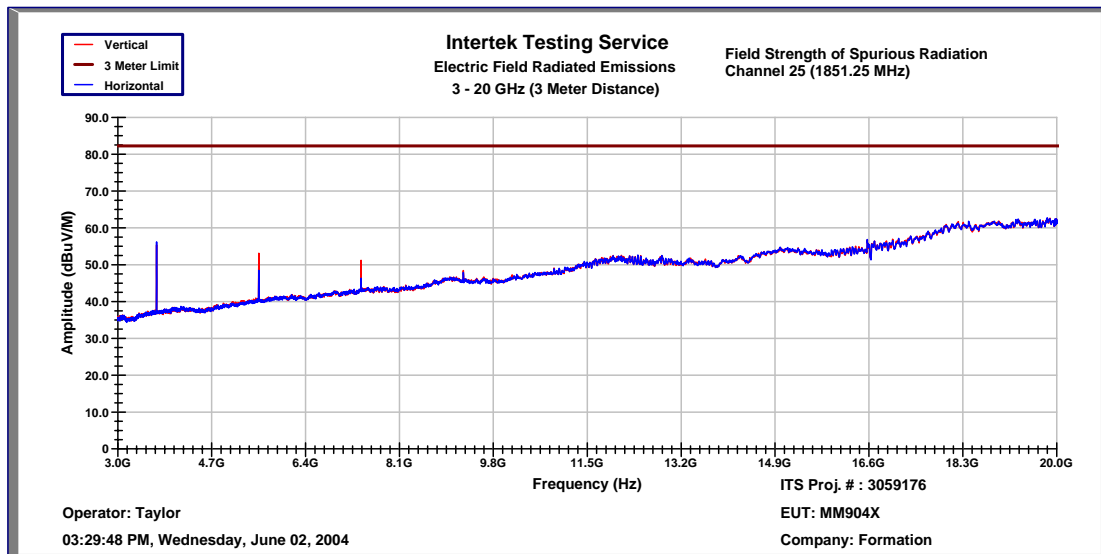


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Figure 5-6: Field Strength of Spurious Radiation (3GHz – 20GHz), CDMA 1900 Channel 25, 600, and 1175



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