TEST REPORT

Report Number: 3055914-001
Project Number: 3055914
3/28/2004

Evaluation of the
SX5T Fixed Wireless Terminal
Model Number: SX5T
FCC ID:
MTFCDMAFWT2004

FCC Part 2
FCC Part 22
FCC Part 24

For

Telular Corporation

Test Performed by:	Test Authorized by:
Intertek 731 Enterprise Drive Lexington, KY 40510	Telular Corporation 647 North Lakeview Parkway Vernon Hills, IL 60061

Prepared By:_____ **Date:**____3/28/2004_____

Jason Centers, Project Engineer

Approved By:_ _____ **Date:**____3/28/2004_____

Bryan C. Taylor, EMC Team Leader

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1 EXECUTIVE SUMMARY

Testing performed for: Telular Corporation

Equipment Under Test: SX5T

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**	10
§22.913, §24.232	RSS-129 §7.1, §9.1 RSS-133 §6.2	ERP, EIRP	**Compliant**	12
§1.1310, §2.1091, §2.1093	RSS-129 §11, RSS-133 §8	Maximum Permissible Exposure Calculations	**Compliant**	13
§2.1049 §22.917(b)(d)	RSS-129 §6.3, RSS-129 §8.1	Emission Limitation, Occupied Bandwidth	**Compliant**	14
§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	**Compliant**	19
§2.1053	RSS-129 §8.1	Field Strength of Spurious Radiation	**Compliant**	25
§2.1055, §22.355, §24.235	RSS-133 §7	Frequency Stability vs. Temperature	**Compliant**	39
§2.1055, §22.355, §24.235	--	Frequency Stability vs. Voltage	**Compliant**	40

N/S: Not under scope of this evaluation

2 JOB DESCRIPTION

2.1 Client information

The SX5T Fixed Wireless Terminal has been tested at the request of

Company: Telular Corporation
647 North Lakeview Parkway
Vernon Hills, IL 60061

Name of contact: Matthew McKiennan
Telephone: (847)-247-9400
Fax: None

2.2 Test plan reference:

Tests were performed to the following standards:

- FCC Part 2
- FCC Part 24 Subpart E rules for an intentional radiator
- FCC Part 22 Subpart H rules for an intentional radiator
- RSS-129
- RSS-133
- IC ES-003

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

2.3 Equipment Under Test (EUT)

The Equipment Under Test (EUT) was an SX5T Fixed Wireless Terminal that operated in the CDMA800 and CDMA1900 modes.

Product	SX5T Fixed Wireless Terminal	
EUT Model Number	SX5T	
EUT Serial Number	None	
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	26.09 dBm Conducted; 28.30 dBm – Radiated – CDMA 800 26.89 dBm Conducted; 29.93 dBm – Radiated – CDMA 1900	
Frequency Range	824.7 – 848.31 MHz CDMA800 1850 – 1910 MHz CDMA1900	
Antenna & Gain	Dual Band Dipole Like Antenna with a 90 Degree Swivel Joint Manufactured by Galtronics (Part Number 020356075-2098)	824 – 849 MHz (0-3dBi Gain) 1850 – 1910 MHz (0-3 dBi Gain)
Detachable Antenna	Yes – TNC Connector	
External input	[X] Audio [] Digital Data	

EUT receive date: 3/1/2004

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

Test start date: 3/1/2004

Test completion date: 3/26/2004

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
AC Power Adapter	Telular	TMG-0716	74007301	Not Labeled
Dual Band Dipole Like Antenna with 90 Degree Swivel Joint	Galtronics	020356075-2098	Not Labeled	Not Labeled
Standard Desk Phone	Gold Star	HAC2500-20M	Not Labeled	Not Labeled

2.3.2 Cables associated with EUT

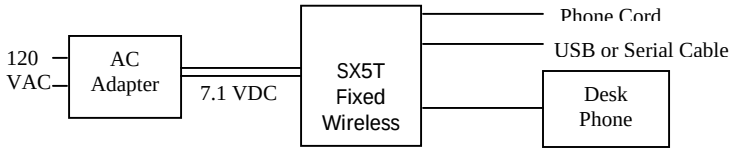
Table 2-2 contains the details of the cables associated with the EUT.

Table 2-2: Interconnecting cables between modules of EUT

Cables					
Description	Length	Shielding	Ferrites	Connection	
				From	To
Serial Cable	6 ft	None	None	Programming Port	Un-terminated
USB Cable	6 ft	None	None	Programming Port	Un-terminated
AC Power Cable	6 ft	None	None	120 VAC Power Source	AC Input of AC/DC Converter
DC Power Cable	6 ft	None	None	DC Output of AC/DC Converter	DC Input of the SX5T
Phone Cord (RJ11 to RJ11)	4 ft	None	None	Desk Phone	Phone Jack on SX5T
Phone Cord (RJ11 to RJ11)	4 ft	None	None	2nd Phone Jack on SX5T	Un-terminated

2.3.3 System Block Diagram

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



2.3.4 Justification

The EUT was operated in the stand-alone configuration.

2.3.5 Mode(s) of operation

The SX5T Fixed Wireless Terminal was powered by the AC to DC power supply provided with the sample.

2.4 Modifications required for compliance

No modifications were implemented by Intertek.

2.5 Related Submittal(s) Grants

None

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

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
Environmental Chamber	Thermotron	SM-8C	32692	12/18/2004

4.3 Test Results

The SX5T Fixed Wireless Terminal 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 Variation with temperature

Power Stability Vs. Temperature (dBm)						
Temp. (Celcius)	Cell Band			PCS Band		
	384	777	1013	25	600	1175
60	26.08	24.71	25.97	26.25	25.24	24.88
50	25.87	24.89	24.65	26.35	25.35	25.08
40	25.84	24.96	24.75	26.31	25.34	25.21
30	25.64	25.04	24.89	26.47	25.36	25.3
20	25.39	25.17	25	26.56	25.4	25.52
10	25.08	25.36	25.2	26.66	25.51	25.58
0	24.74	25.4	25.22	26.83	25.58	25.75
-10	24.38	25.7	25.48	26.89	25.97	26.04
-20	24.18	25.86	25.6	26.5	26.13	26.22
-30	24.1	26.09	25.76	25.46	26.23	26.37

5 RADIATED RF POWER

FCC Rule §22.913: The Effective Radiated Power (ERP) of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

FCC Rule §24.232; RSS-133 §6.2: The equivalent Isotropic Radiated Power (EIRP) must not exceed 2 Watts.

RSS-129 §7.1, §9.1

5.1 Test Procedure

The EUT was placed on a non-conductive turntable. The Base Station Simulator was set to force the EUT to its maximum power setting. The radiated emission at the fundamental frequency was measured at 3m with a test antenna and EMI receiver. This was performed with the antenna in both vertical and horizontal polarities.

During the measurement of the EUT, the receiver resolution bandwidth was set to 1 MHz and the video bandwidth was set to 3 MHz. The highest emission was recorded with the rotation of the turntable and the raising and lowering of the test antenna. The receiver reading was recorded (E in dBm).

ERP in the CDMA 800 band and EIRP in the CDMA 1900 band were measured using a substitution method as described in TIA-603-B Section 2.2.17 (Radiated Power Output). The EUT was replaced with a substitution antenna (tuned dipole below 1 GHz; Horn antenna above 1 GHz) and was fed with an input power of -10 dBm. The receiver reading was recorded and EIRP was calculated as follows:

$$EIRP = E_1 - E_2 + Vsub + G$$

where,

E_1 is the receiver reading in dBμV/m when measuring the field strength of the EUT

E_2 is the receiver reading in dBμV/m when measured field strength from the generator

V_{sub} is the power delivered to the substitution antenna (generator output in dBm – cable loss between the generator and the substitution antenna)

G is the gain of the transmitting antenna in dBi.

5.2 Test Equipment

Description	Manufacturer	Model Number	Serial Number	Calibration due date
Signal Generator	HP	83620B	3614A00199	8/21/2004
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
Base Station Simulator	Rohde & Schwarz	CMU-200	1100.0008.02	8/2004

5.3 Test Results

The SX5T Fixed Wireless Terminal met the radiated power requirements of FCC §24.232. The test results are located in Table 5-1. The maximum ERP for the CDMA 800 band was 28.51 dBm. The maximum EIRP for the CDMA 1900 band was 29.93 dBm.

Table 5-1 Radiated RF Power

EUT Mode	TX Channel	Frequency (MHz)	Vertical Reading (dBm)	Horizontal Reading (dBm)	Power Delivered to Sub. Antenna (dBm)	Vertical Substitution Reading (dBm)	Horizontal Substitution Reading (dBm)	Vertical Tx Antenna Gain (dBi)	Horizontal Tx Antenna Gain (dBi)	Vertical ERP (dBm)	Horizontal ERP (dBm)
CDMA 800	384	836.52	-6.51	-10.23	-5.86	-39.26	-39.26	0	0	26.89	23.17
CDMA 800	777	848.31	-4.38	-15.2	-5.86	-38.75	-39.61	0	0	28.51	18.55
CDMA 800	1013	824.7	-5.05	-16.11	-5.72	-39.07	-38.86	0	0	28.3	17.03
CDMA 1900	25	1851.25	-11.64	-22.03	-9.39	-43.76	-43.34	7.2	7.1	29.93	19.02
CDMA 1900	600	1880	-13.33	-22.83	-9.41	-43.96	-43.59	7.2	7.1	28.42	18.45
CDMA 1900	1175	1908.75	-14.53	-23.17	-9.49	-44.37	-44.03	7.2	7.1	27.55	18.47

6 MAXIMUM PERMISSIBLE EXPOSURE (MPE) CALCULATIONS

The § 1.1310 Radiofrequency radiation exposure limits are listed in the table below.

	Frequency Range (MHz)	Power Density Limit (mW/cm^2)
Limits for Occupational/Controlled Exposures	0.3-3.0	100
	3.0-30	900/ Frequency2
	30-300	1.0
	300-1500	Frequency/300
	1500-100,000	5.0
Limits for General Population/Uncontrolled Exposure	0.3-1.34	100
	1.34-30	180/Frequency2
	30-300	0.2
	300-1500	Frequency/1500
	1500-100,000	1.0

6.1 Test Procedure

The ERP and EIRP were measure in section 5, Radiated RF Power. The radiated RF power was used to calculate the maximum RF exposure at a 20 cm distance using the formula:

$$\text{Maximum RF Exposure at 20cm} = (\text{EIRP in mW})/(4\text{Pi}(20\text{cm})^2)$$

If ERP was measured in section 5, a 2.15dB conversion factor was added to the reading to convert it to EIRP before applying the Maximum RF Exposure formula above. Once the Maximum RF Exposure calculations were complete the results were compared to the MPE limits above.

6.2 Test Results

The following table shows the Maximum RF Exposure from the SX5T Fixed Wireless Terminal at 20cm. The maximum exposure for the SX5T Fixed Wireless Terminal is 0.23 mW/cm^2 which is well below the limit at that frequency (0.565 mW/cm^2)

EUT Mode	TX Channel	Frequency (MHz)	Vertical ERP (dBm)	Horizontal ERP (dBm)	Vertical ERP (mW)	Horizontal ERP (mW)	ERP to EIRP Factor	Vertical Max. Exposure at 20cm (mW/cm^2)	Horizontal Max Exposure at 20cm (mW/cm^2)
CDMA 800	384	836.52	26.89	23.17	488.65	207.49	2.15	0.16	0.07
CDMA 800	777	848.31	28.51	18.55	709.58	71.61	2.15	0.23	0.02
CDMA 800	1013	824.7	28.3	17.03	676.08	50.47	2.15	0.22	0.02
CDMA 1900	25	1851.25	29.93	19.02	984.01	79.80	0	0.20	0.02
CDMA 1900	600	1880	28.42	18.45	695.02	69.98	0	0.14	0.01
CDMA 1900	1175	1908.75	27.55	18.47	568.85	70.31	0	0.11	0.01

7 EMISSION LIMITATIONS, OCCUPIED BANDWIDTH

CFR 47 §2.1049: The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

RSS-129 §6.3; RSS-129 §8.1

7.1 Test Procedure

In both CDMA 800 and 1900 modes the antenna port of the EUT was connected to a spectrum analyzer using a calibrated coaxial cable and directional coupler. The EUT was placed into a call using a CMU – 200 base station simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The occupied bandwidth function of the analyzer was used to automatically generate the occupied bandwidth plots below.

7.2 Test Equipment

Description	Manufacturer	Model Number	Serial Number	Calibration due date
Base Station Simulator	Rohde & Schwarz	CMU-200	1100.0008.02	8/2004
EMI Receiver	Rohde & Schwarz	ESI 26	1088.7490	10/2/2004
Power Divider	Weinschel	1506A	E18106	3/2004

7.3 Test Results

The following is the occupied bandwidth data for the SX5T Fixed Wireless Terminal.

Table 7-1: Occupied bandwidth measurements for CDMA modes

Mode	Channel	Resolution Bandwidth	Video Bandwidth	Sweep time	Measured Bandwidth MHz
CDMA800	384	30 kHz	300 kHz	2s	1.2806
CDMA800	1013	30 kHz	300 kHz	2s	1.2745
CDMA800	777	30 kHz	300 kHz	2s	1.2745
CDMA1900	25	30 kHz	300 kHz	2s	1.28
CDMA1900	600	30 kHz	300 kHz	2s	1.2745
CDMA1900	1175	30 kHz	300 kHz	2s	1.2806

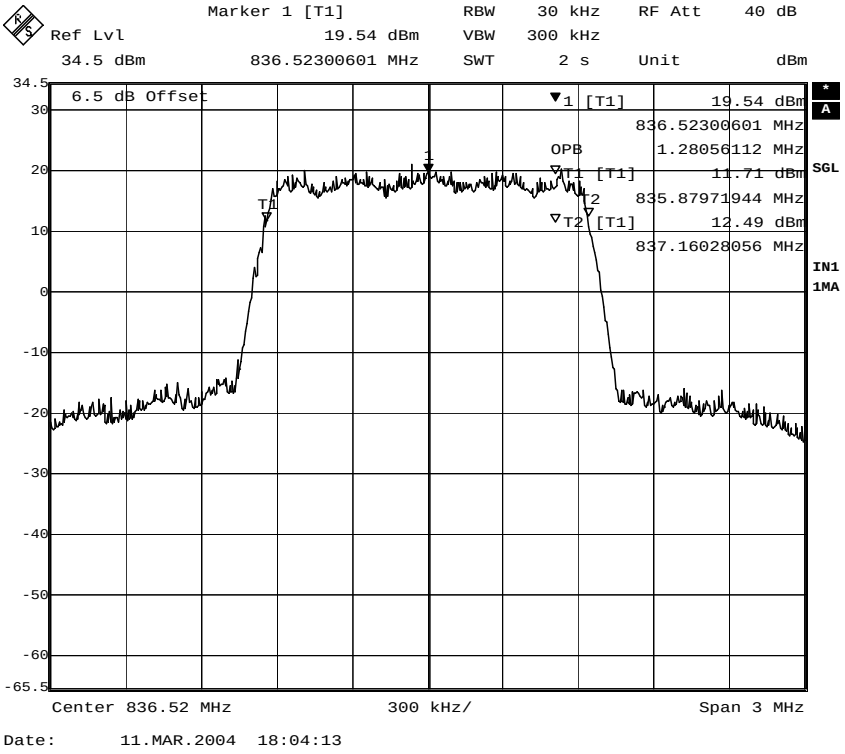


Figure 7-1: Occupied Bandwidth – Cell Channel 384

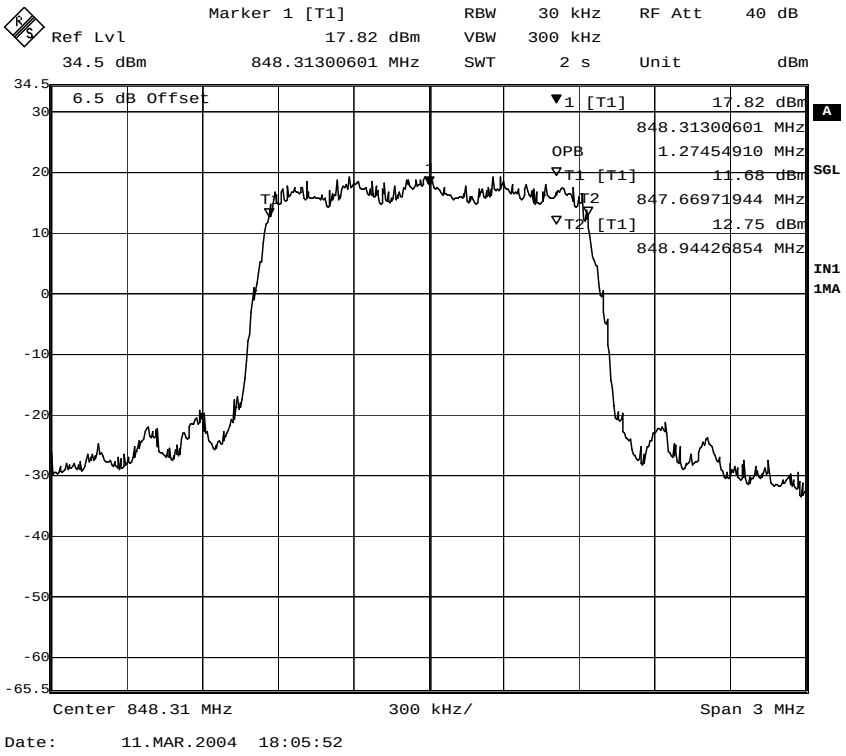


Figure 7-3: Occupied Bandwidth – Cell Channel 777

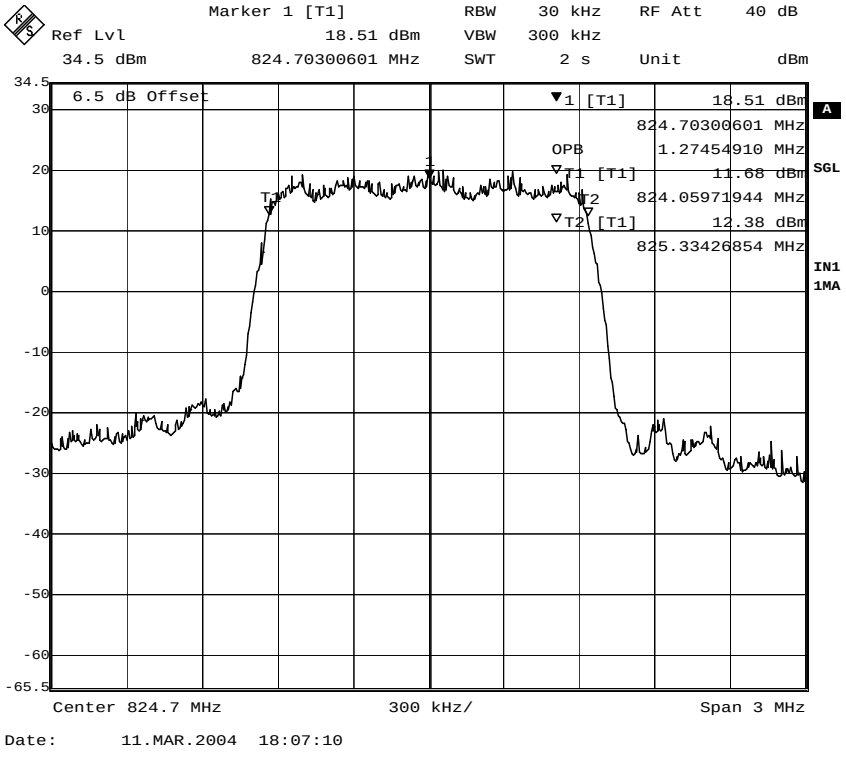


Figure 7-5: Occupied Bandwidth – Cell Channel 1013

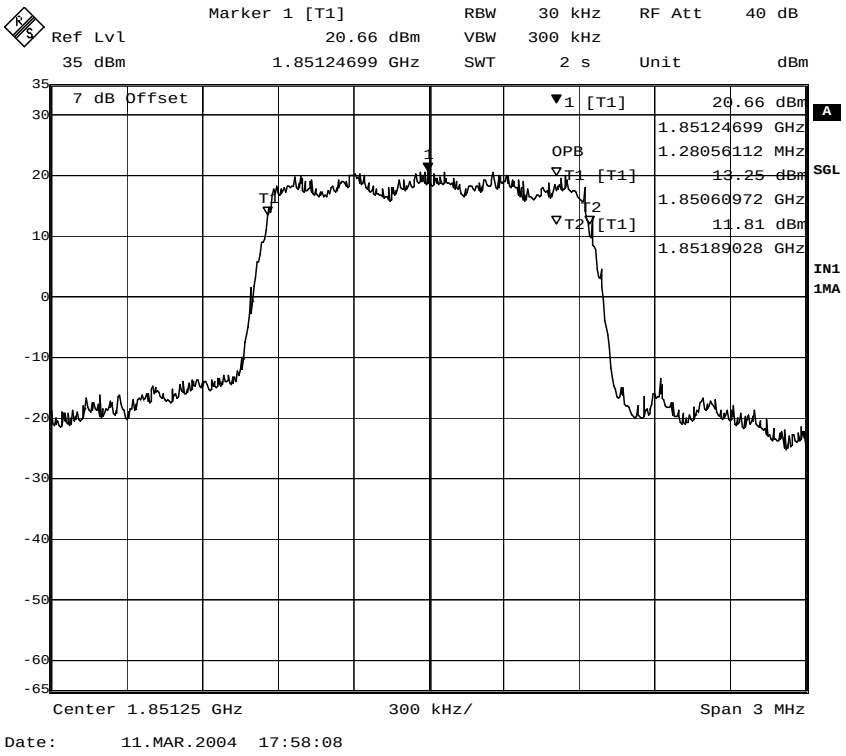


Figure 7-7: Occupied Bandwidth – PCS Channel 25

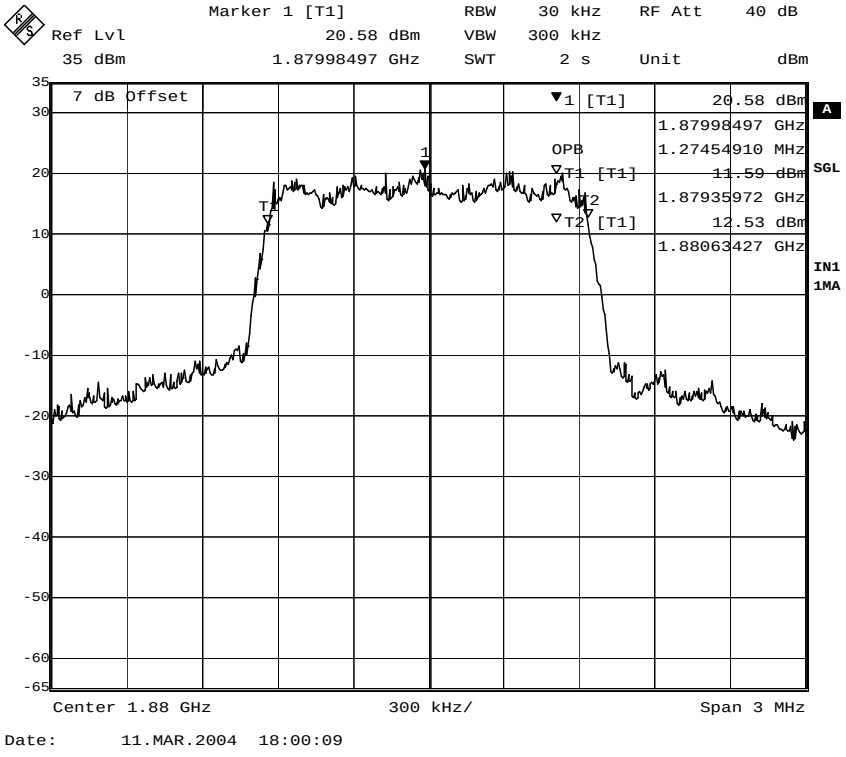


Figure 7-9: Occupied Bandwidth – PCS Channel 600

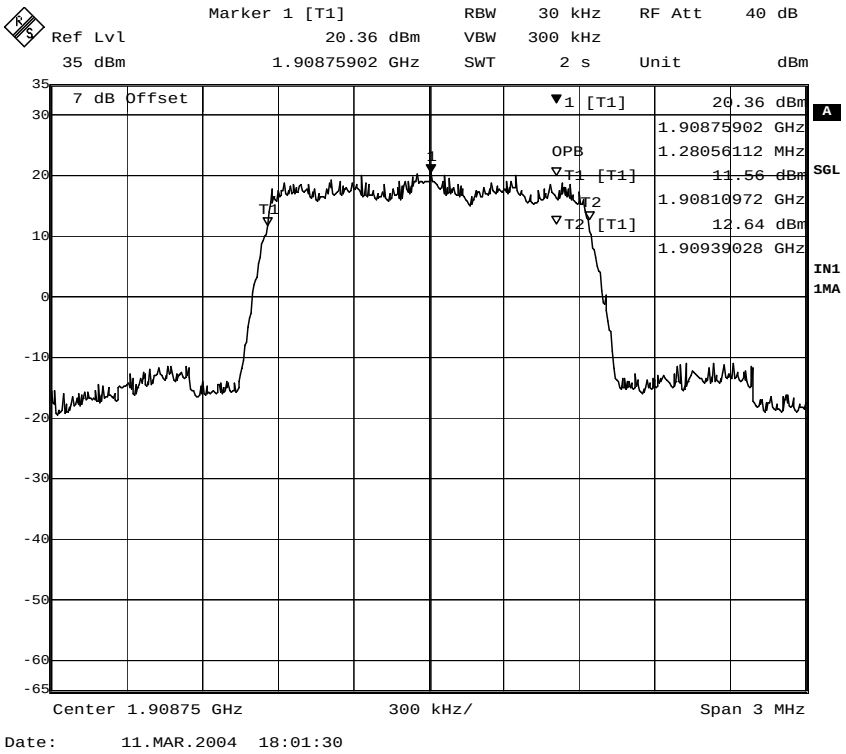


Figure 7-11: Occupied Bandwidth – PCS Channel 1175

8 OUT OF BAND EMISSION AT ANTENNA TERMINALS

FCC §2.1049, FCC §2.1051, §22.917(a), FCC §24.238(a)

RSS-129 §6.3, §7.2.2, §8.1.1, §10

RSS-133 §6.3

Out of Band Emissions: The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

8.1 Test Procedure

Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for the Cellular band and 1 MHz or greater in the PCS band. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (*i.e.* 100 kHz or 1 percent of emission bandwidth, as specified). 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 emissions are attenuated at least 26 dB below the transmitter power.

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The Base Station Simulator was set to force the EUT to its maximum power setting. The resolution bandwidth of the spectrum analyzer was set at 1 MHz. The audio modulating signal was adjusted as it is described in Section 6.1 of this report. Sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.

8.2 Test Equipment

Description	Manufacturer	Model Number	Serial Number	Calibration due date
Base Station Simulator	Rohde & Schwarz	CMU-200	1100.0008.02	8/2004
EMI Receiver	Rohde & Schwarz	ESI 26	1088.7490	10/2/2004
Power Divider	Weinschel	1506A	E18106	3/2004

8.3 Test Results

The SX5T Fixed Wireless Terminal met the out of band emission at antenna terminal requirements.

Table 8-1: Summary of test result locations

Location	Mode (Band)	Channel	Description
Figure 8-1	CDMA Cell	384, 777, 1013	Conducted spurious emissions, 30MHz to 20 GHz
Figure 8-2	CDMA Cell	384, 777, 1013	Zoom Graph of the Carrier Frequencies
Figure 8-3	CDMA PCS	25, 600, 1175	Conducted spurious emissions, 30MHz to 20 GHz
Figure 8-4	CDMA PCS	25, 600, 1175	Zoom Graph of the Carrier Frequencies
Figure 8-5	CDMA Cell	1013	Emissions within 1 MHz of band edge
Figure 8-6	CDMA Cell	777	Emissions within 1 MHz of band edge
Figure 8-7	CDMA PCS	25	Emissions within 1 MHz of band edge
Figure 8-8	CDMA PCS	1175	Emissions within 1 MHz of band edge

Figure 8-1: Out of band emissions at antenna terminals – CDMA 800 Channel 384, 777, and 1013

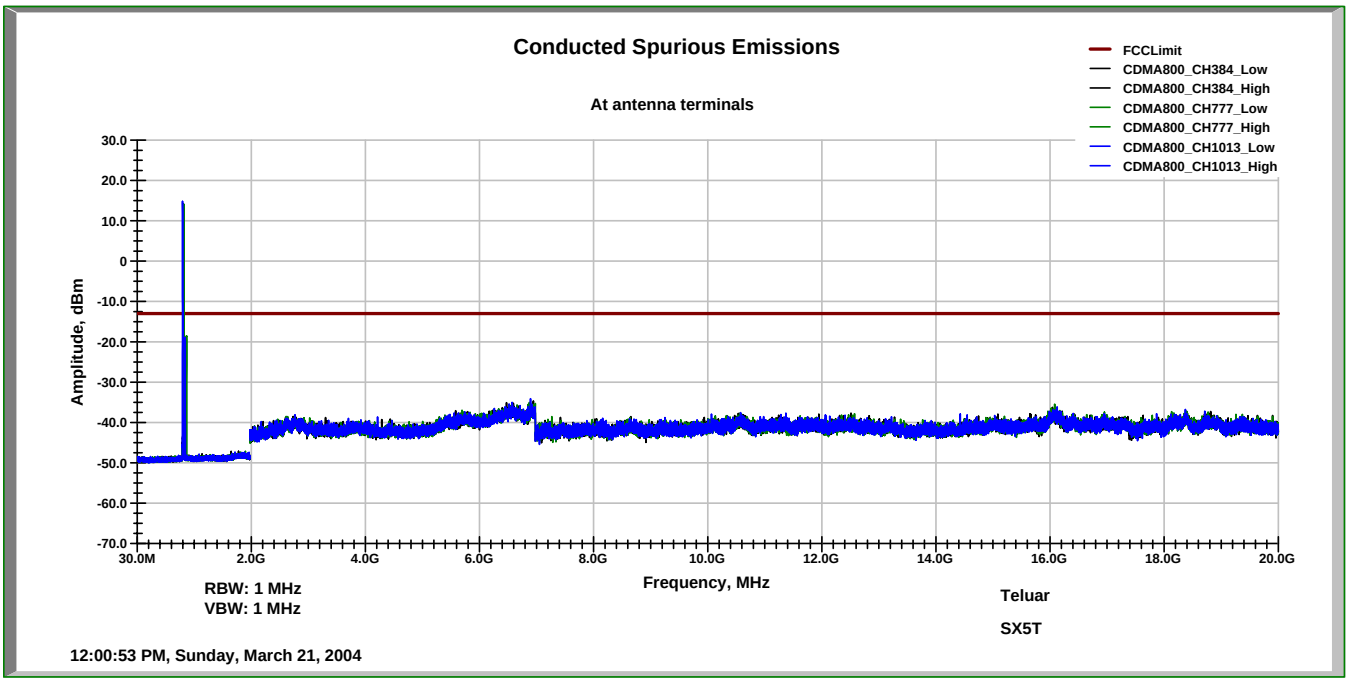


Figure 8-2: Out of band emissions at antenna terminals – CDMA 800 Channel 384, 777, and 1013 (Zoomed Around Carrier Frequencies)

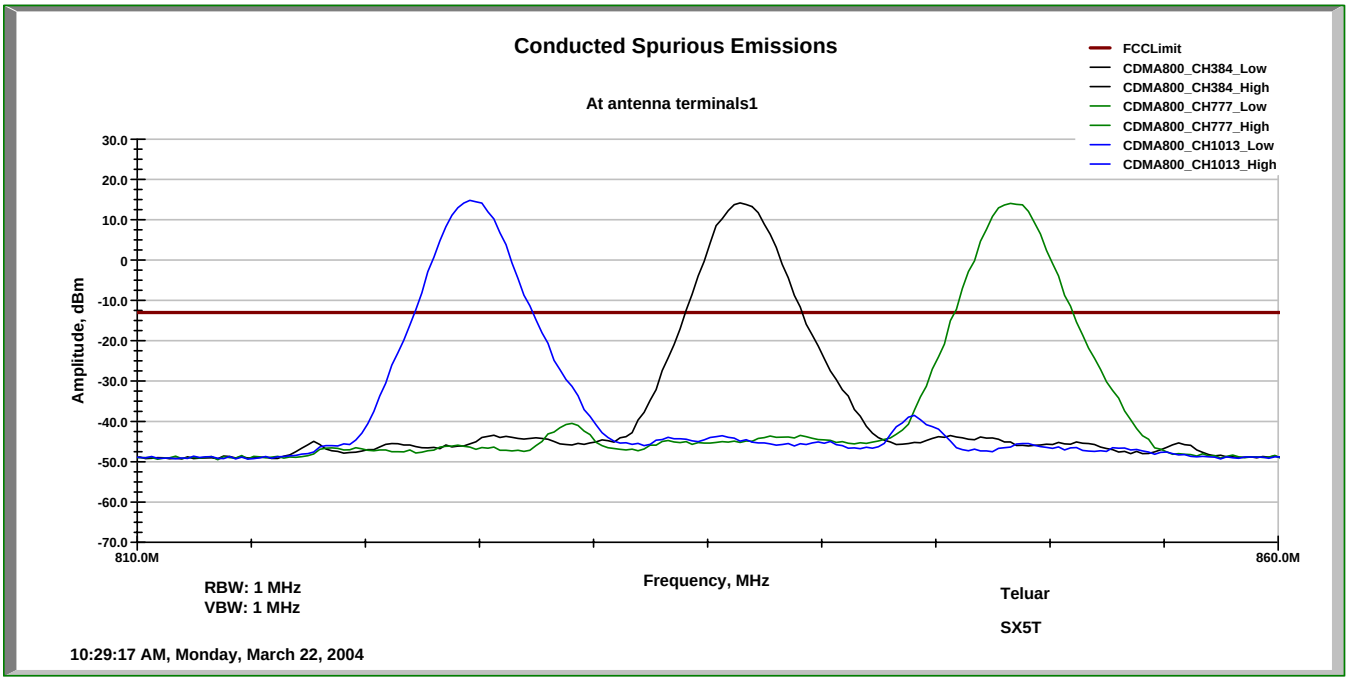


Figure 8-3: Out of band emissions at antenna terminals – CDMA1900 Channel 25, 600, 1175

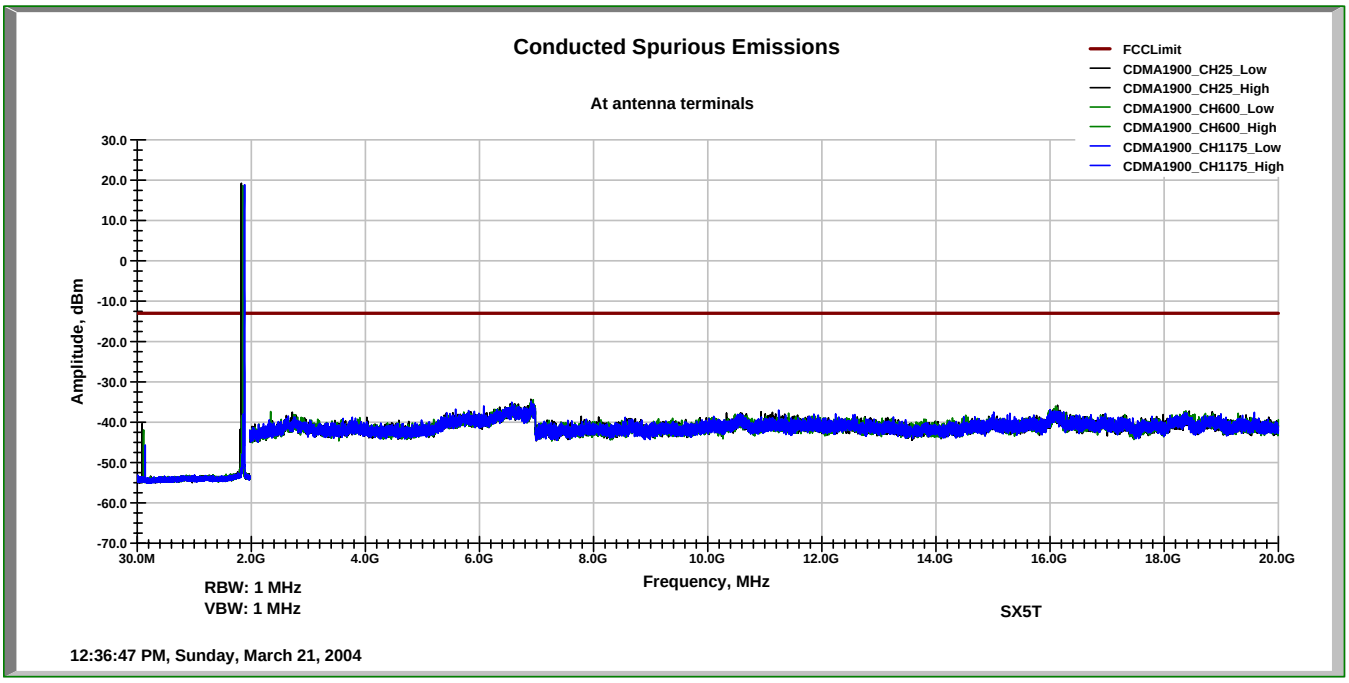


Figure 8-4: Out of band emissions at antenna terminals – CDMA1900 Channel 25, 600, 1175 (Zoomed In on Carrier Frequencies)

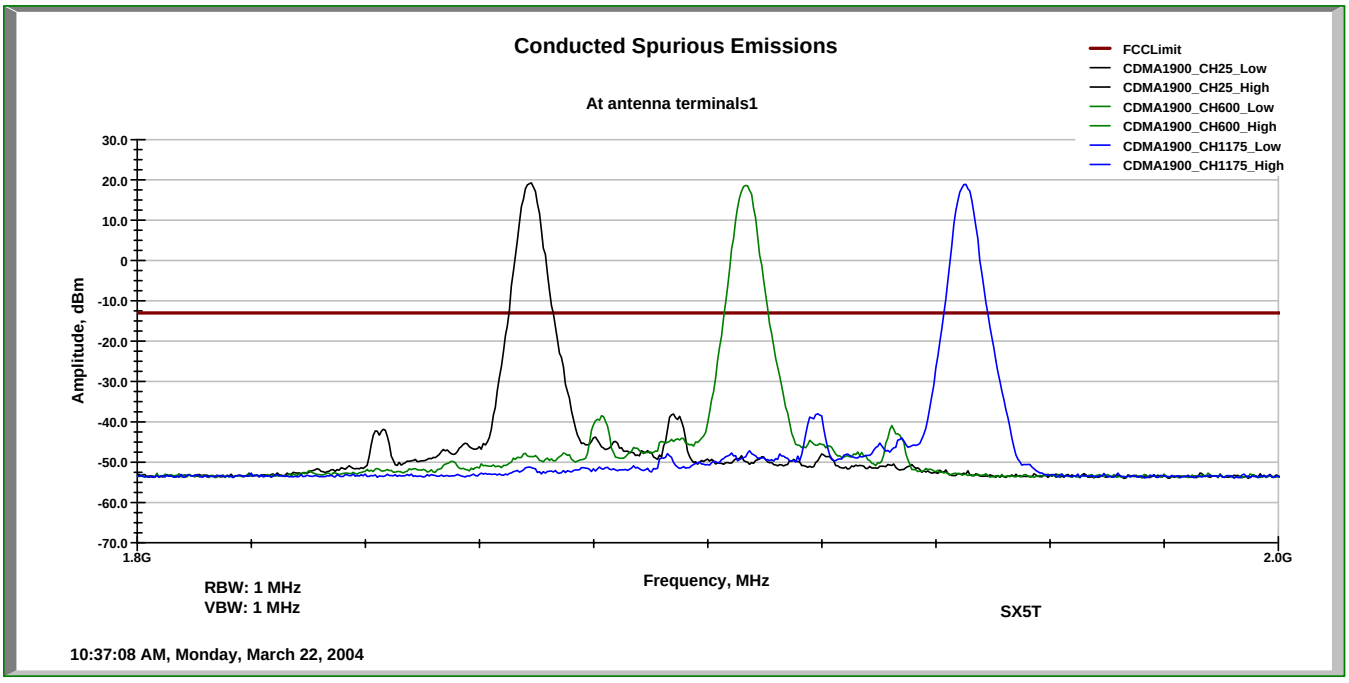


Figure 8-5: Emissions within 1 MHz of band edge, CDMA 800 Channel 1013

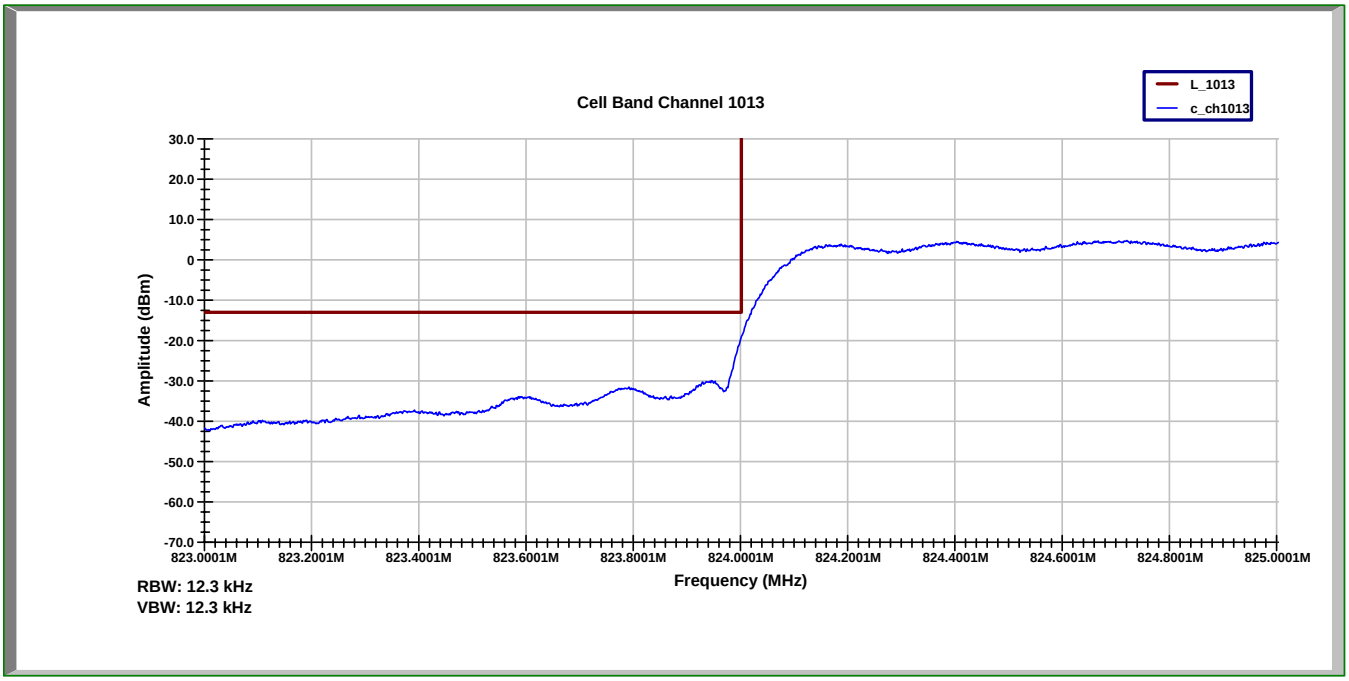


Figure 8-6: Emissions within 1 MHz of band edge, CDMA 800 Channel 777

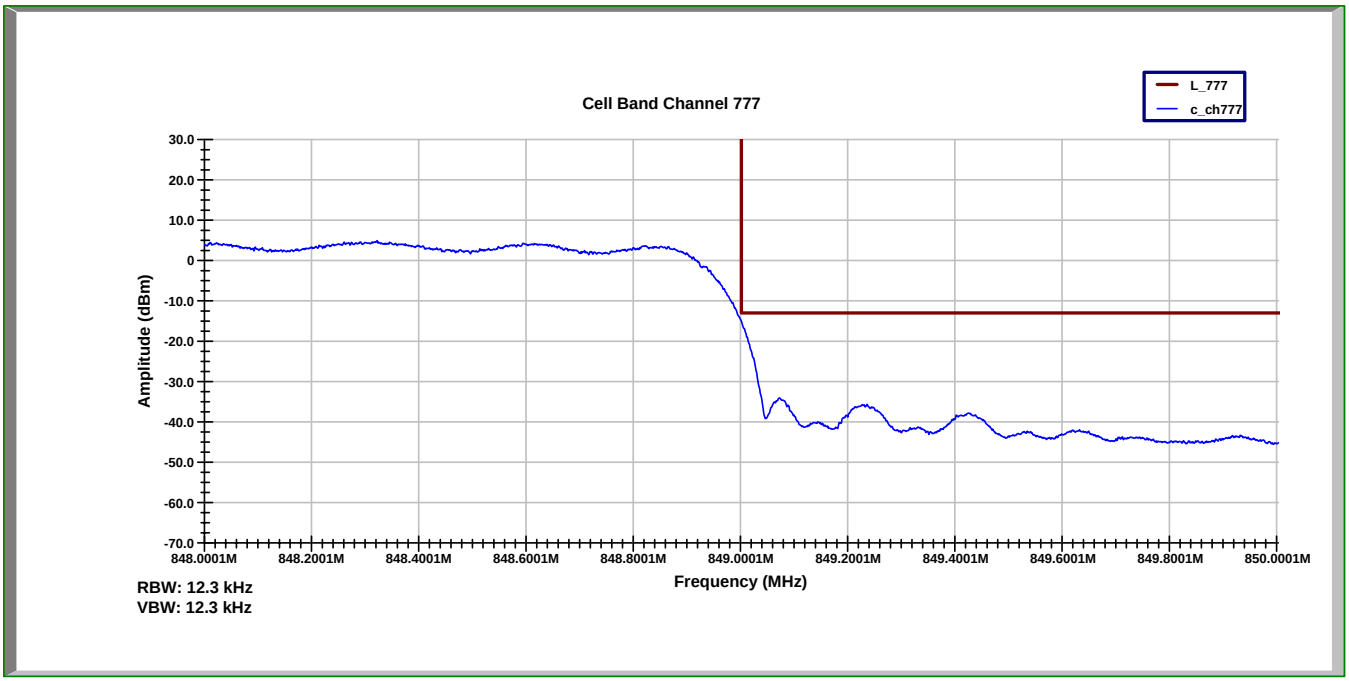


Figure 8-7: Emissions within 1 MHz of band edge, CDMA 1900 Channel 25

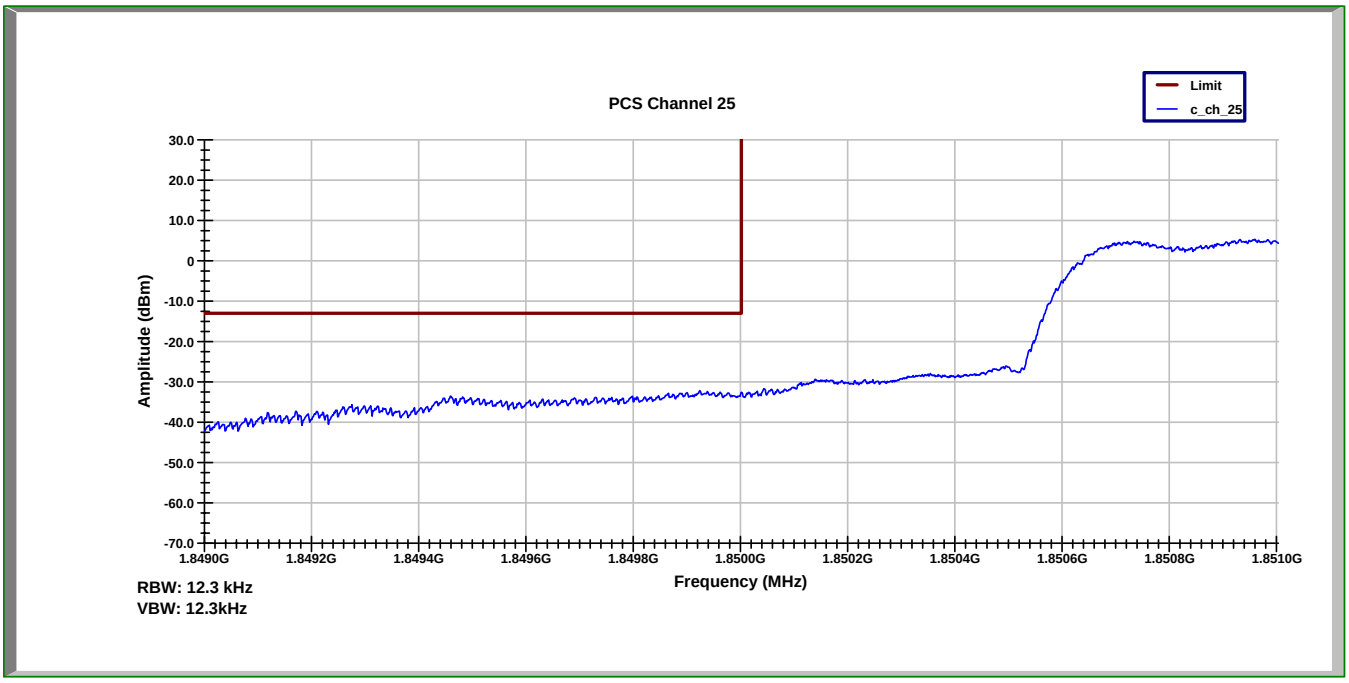
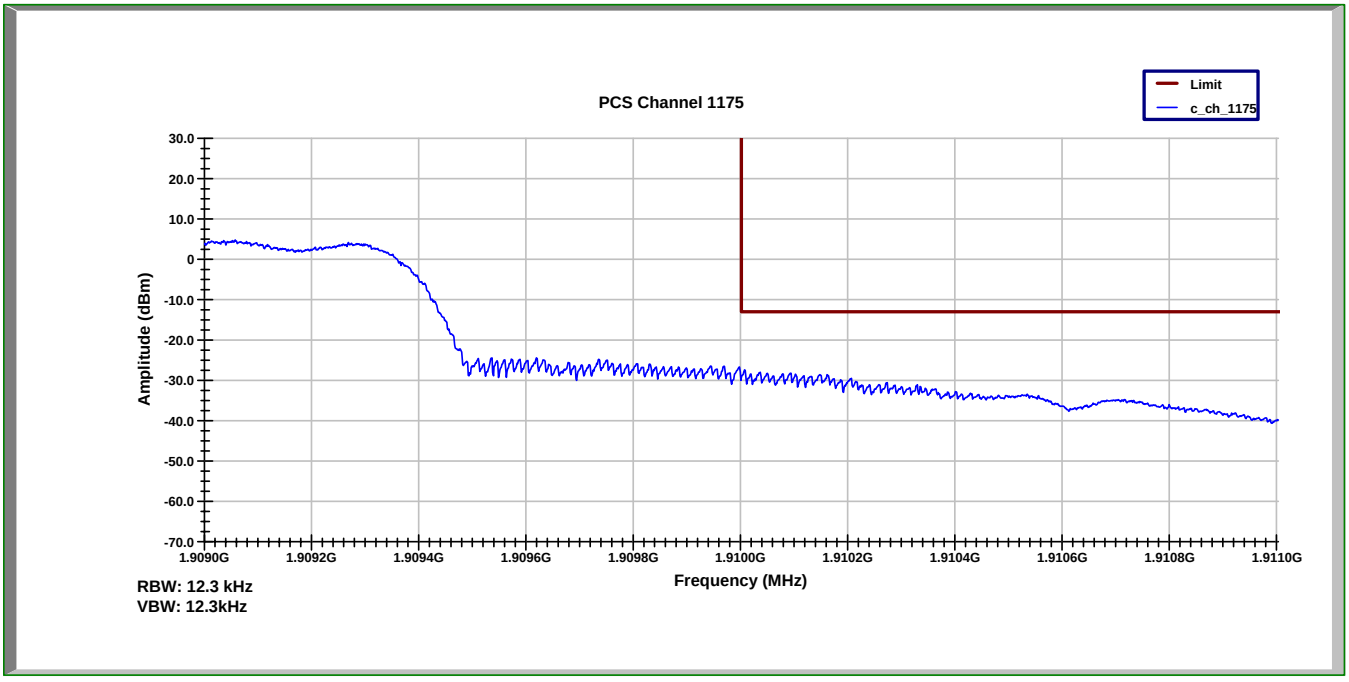


Figure 8-8: Emissions within 1 MHz of band edge, CDMA 1900 Channel 1175



9 FIELD STRENGTH OF SPURIOUS RADIATION

FCC §2.1053

RSS-129 §8.1

9.1 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).

The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and at the spurious emissions frequency.

9.2 Test Equipment

Description	Manufacturer	Model Number	Serial Number	Calibration due date
Base Station Simulator	Rohde & Schwarz	CMU-200	1100.0008.02	8/2004
Signal Generator	HP	83620B	3614A00199	8/21/2004
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

9.3 Test Results

The SX5T Fixed Wireless Terminal met the field strength of spurious radiation requirements of FCC §2.1053. See Table 9-1 for measured radiated spurious emission power for emissions within 20 dB of the limit. See The Figure 9-1 through Figure 9-6 for the graphical test data.

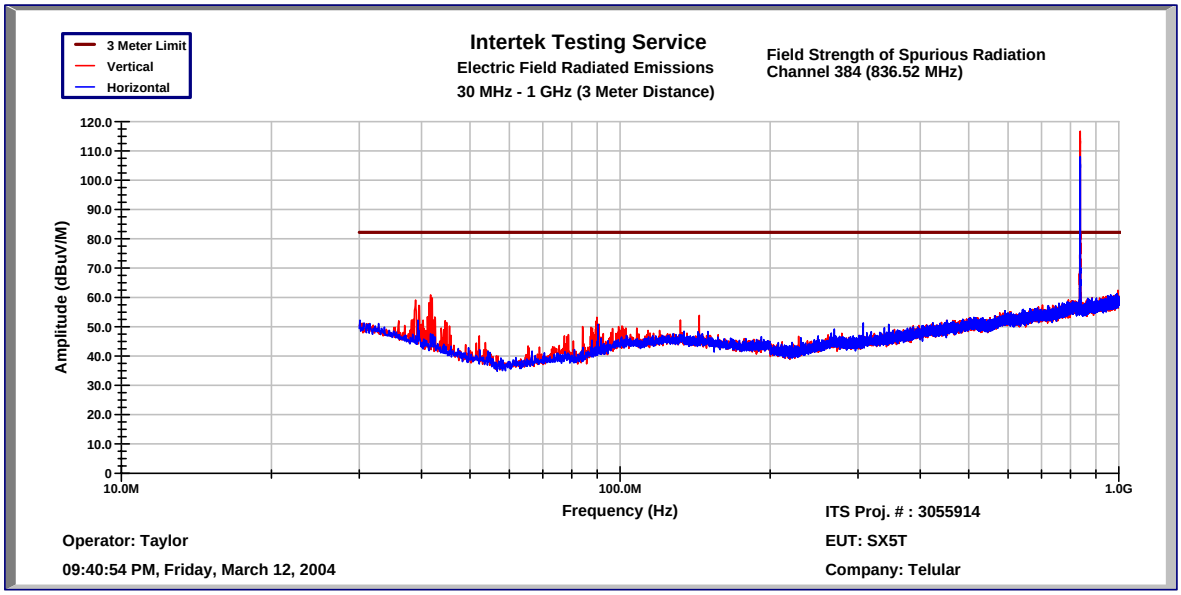
Table 9-1: Field Strength of Spurious Radiation

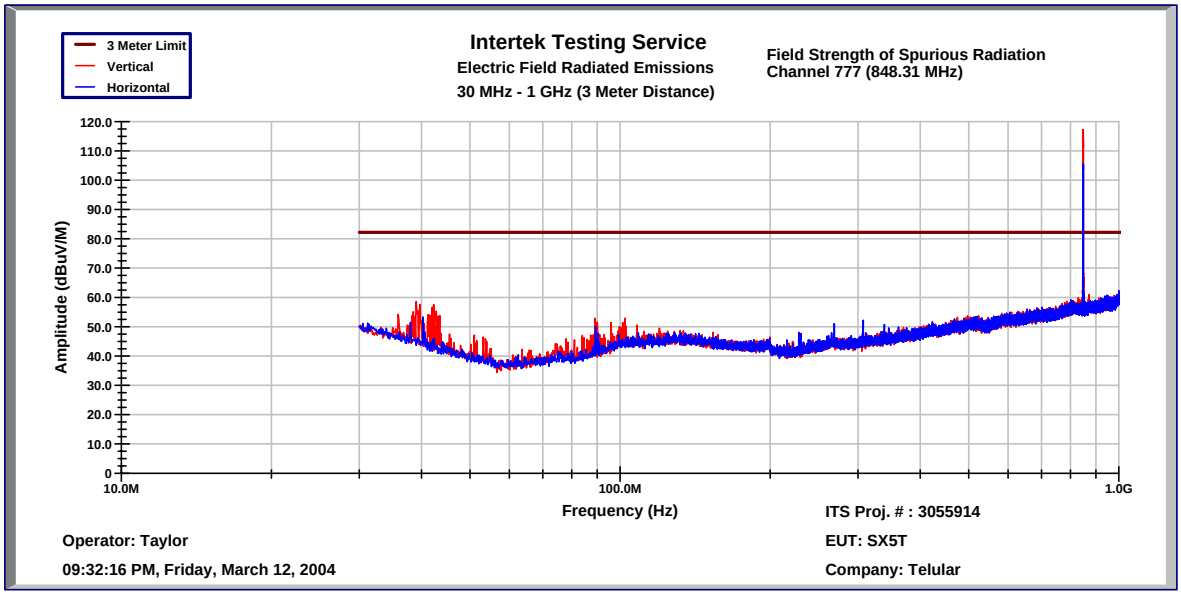
EUT Mode	TX Channel	Frequency (GHz)	Vertical Reading (dBm)	Horizontal Reading (dBm)	Vertical Signal Generator (dBm)	Horizontal Signal Generator (dBm)	Cable Loss (dB)	Vertical Tx Antenna Gain (dBi)	Horizontal Tx Antenna Gain (dBi)	Vertical ERP (dBm)	Horizontal ERP (dBm)
CDMA 1900	25	3.7025	-37.82	-39.15	-14.1	-16.6	15.01	10	9.7	-19.11	-21.91
CDMA 1900	25	5.5536	-43.34	-47.8	-9.2	-12.9	22.48	10.8	10.6	-20.88	-24.78
CDMA 1900	600	3.76	-38.73	-37.14	-14.9	-14.3	15.79	10	9.7	-20.69	-20.39
CDMA 1900	600	5.64	-45.13	-49.65	-11.3	-15.7	22.73	10.9	10.6	-23.13	-27.83
CDMA 1900	1175	3.8173	-39.5	-37.69	-15.4	-14.3	15.79	10	9.7	-21.19	-20.39
CDMA 1900	1175	5.7262	-46.27	-49.65	-13.8	-16.1	23.67	11	10.7	-26.47	-29.07

Table 9-2: Spurious Emission Attenuation from Fundamental Power

EUT Mode	TX Channel	Spurious Frequency (GHz)	Spurious Vertical ERP (dBm)	Spurious Horizontal ERP (dBm)	Fundamental Vertical ERP (dBm)	Fundamental Horizontal ERP (dBm)	Spurious Attenuation Vertical (dBm)	Spurious Attenuation Horizontal (dBm)
CDMA 1900	25	3.7025	-19.11	-21.91	29.93	19.02	49.04	40.93
CDMA 1900	25	5.5536	-20.88	-24.78	29.93	19.02	50.81	43.8
CDMA 1900	600	3.76	-20.69	-20.39	28.42	18.45	49.11	38.84
CDMA 1900	600	5.64	-23.13	-27.83	28.42	18.45	51.55	46.28
CDMA 1900	1175	3.8173	-21.19	-20.39	27.55	18.47	48.74	38.86
CDMA 1900	1175	5.7262	-26.47	-29.07	27.55	18.47	54.02	47.54

The Figure 9-1: Field Strength of Spurious Radiation (30 MHz – 1 GHz), CDMA 800 Channel 384, 777, and 1013[1]





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

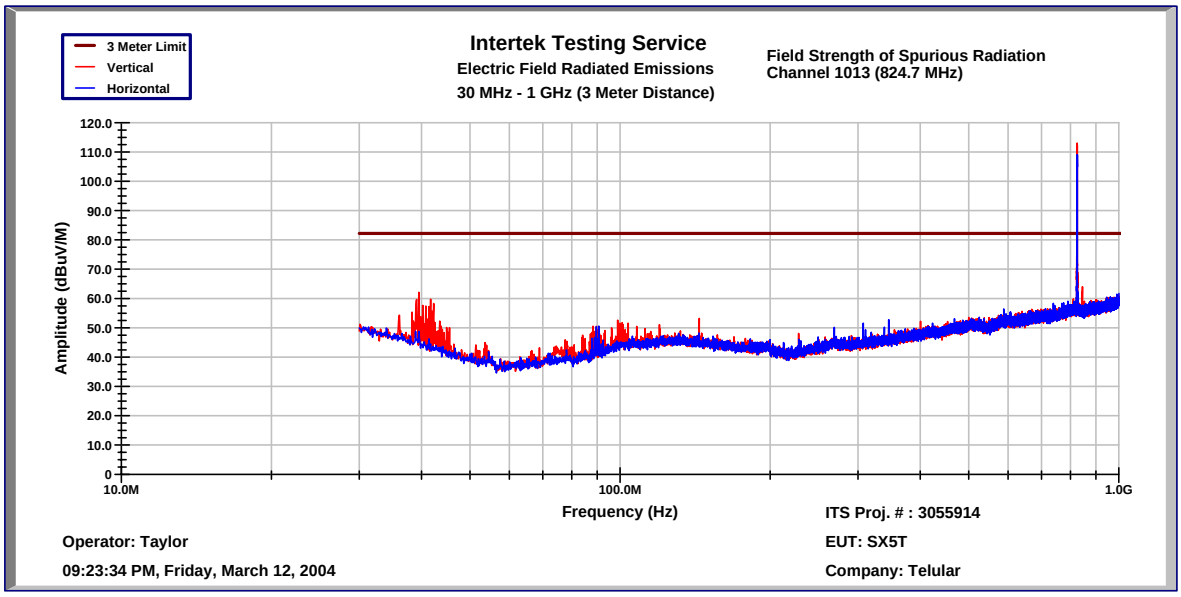
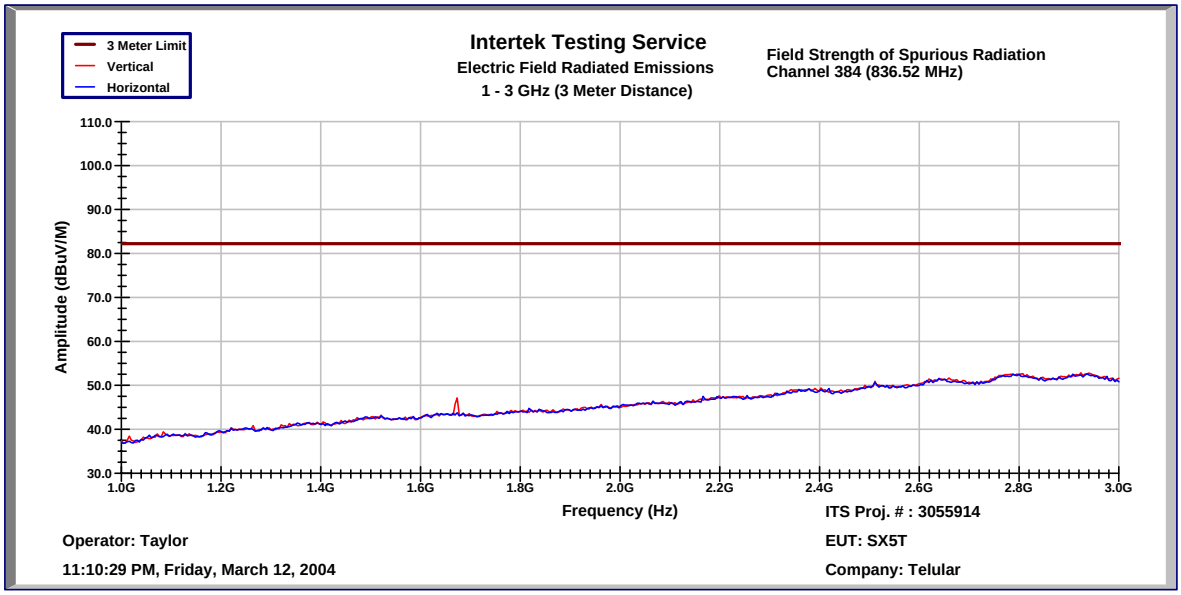
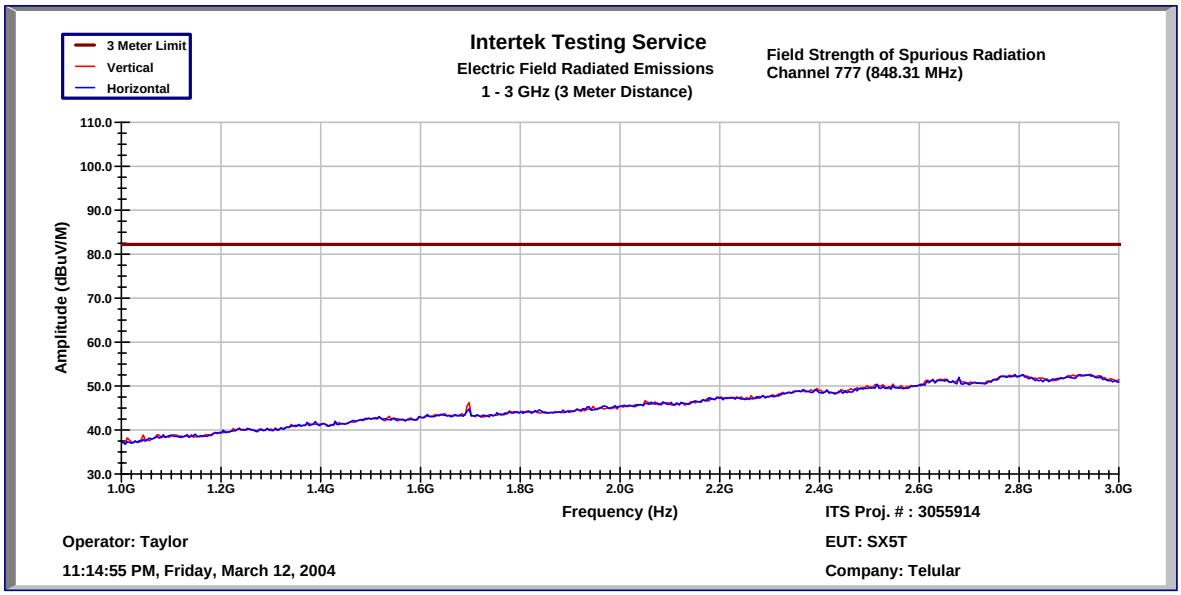

3 Meter Limit
Vertical
Horizontal
Intertek Testing Service
Electric Field Radiated Emissions
30 MHz - 1 GHz (3 Meter Distance)
Field Strength of Spurious Radiation
Channel 1013 (824.7 MHz)
Amplitude (dBuV/M)
120.0
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
10.0M
100.0M
1.0G
Frequency (Hz)
Operator: Taylor
09:23:34 PM, Friday, March 12, 2004
ITS Proj. # : 3055914
EUT: SX5T
Company: Telular

Figure 9-2: Field Strength of Spurious Radiation (1 GHz – 3 GHz), CDMA 800 Channel 384,777, 1013





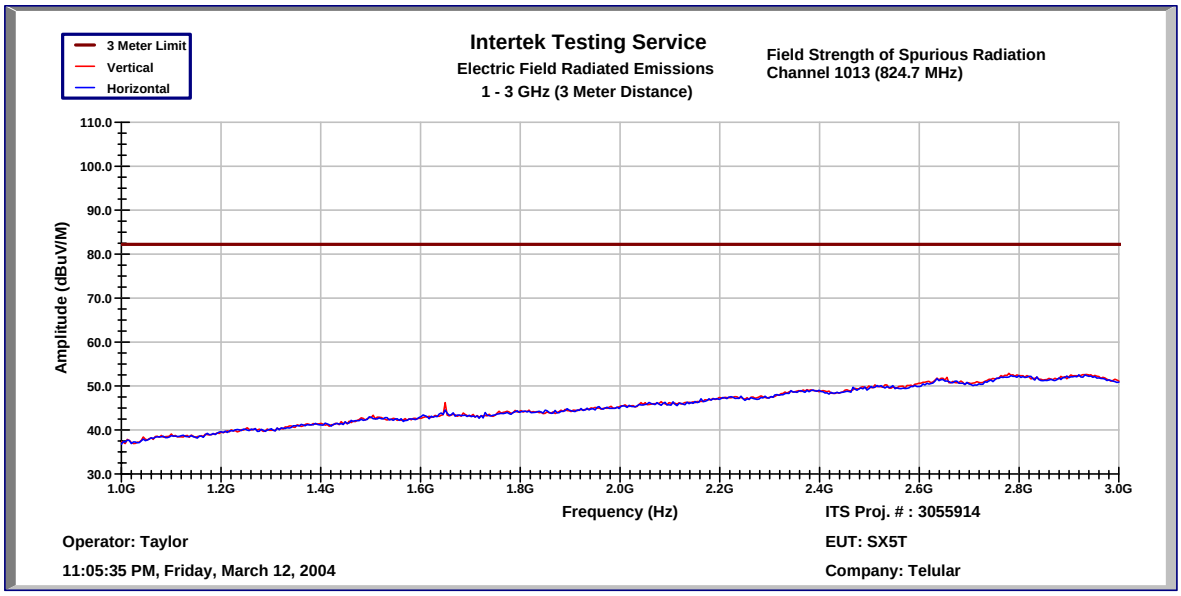
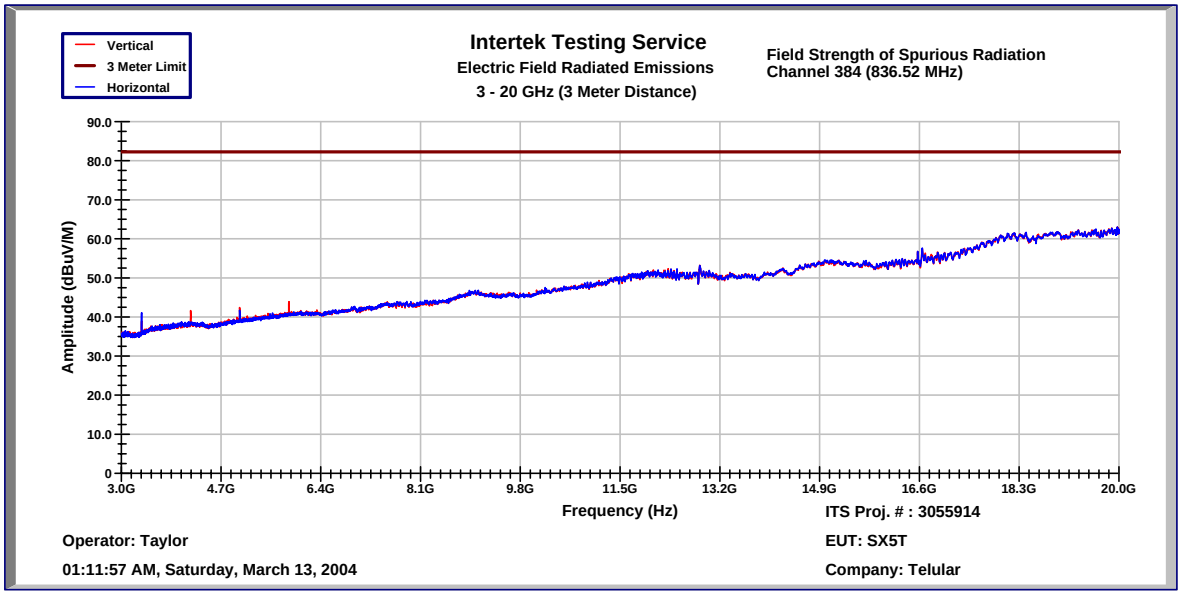
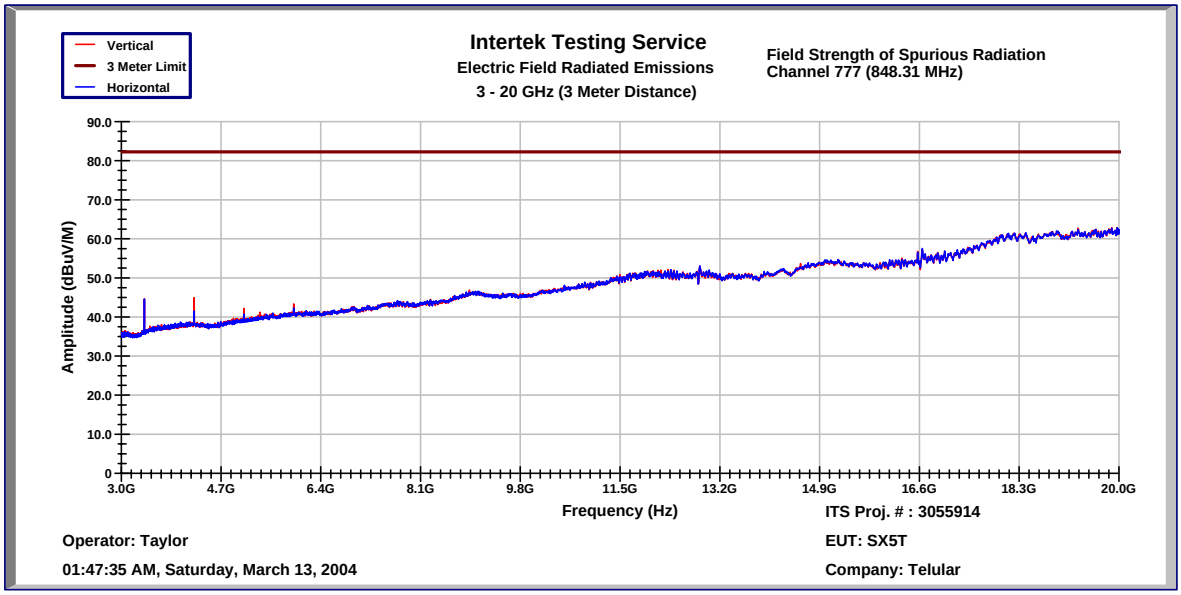

3 Meter Limit
Vertical
Horizontal
Intertek Testing Service
Electric Field Radiated Emissions
1 - 3 GHz (3 Meter Distance)
Field Strength of Spurious Radiation
Channel 1013 (824.7 MHz)
Amplitude (dBuV/M)
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
1.0G
1.2G
1.4G
1.6G
1.8G
2.0G
2.2G
2.4G
2.6G
2.8G
3.0G
Frequency (Hz)
ITS Proj. # : 3055914
Operator: Taylor
EUT: SX5T
11:05:35 PM, Friday, March 12, 2004
Company: Telular

Figure 9-3: Field Strength of Spurious Radiation (3GHz – 20GHz), CDMA 800 Channel 384, 777, and 1013





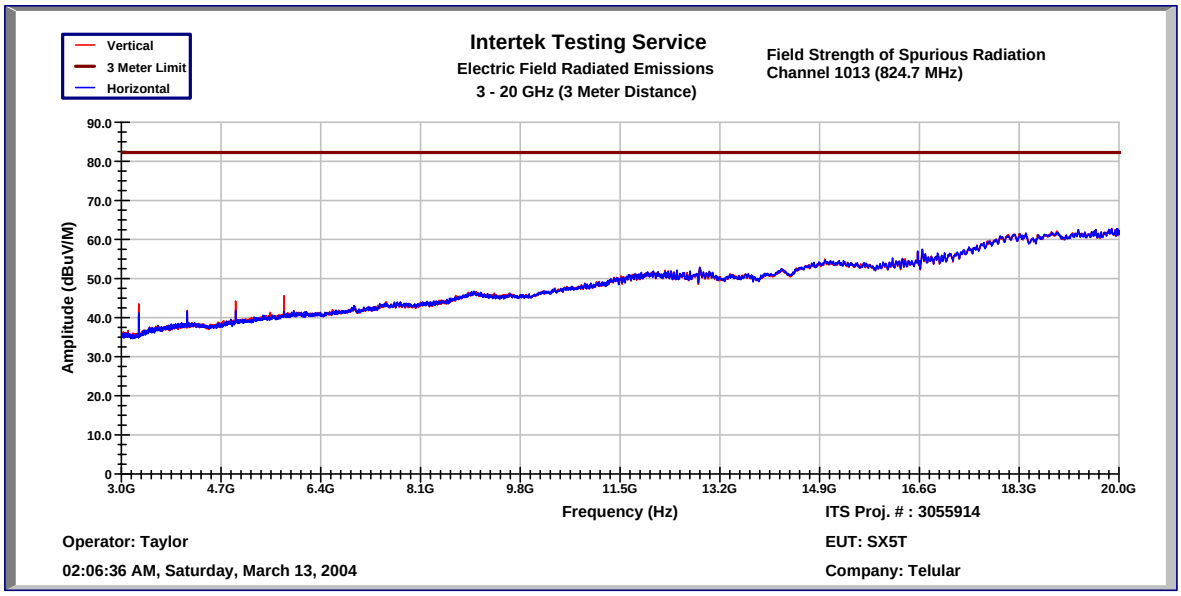
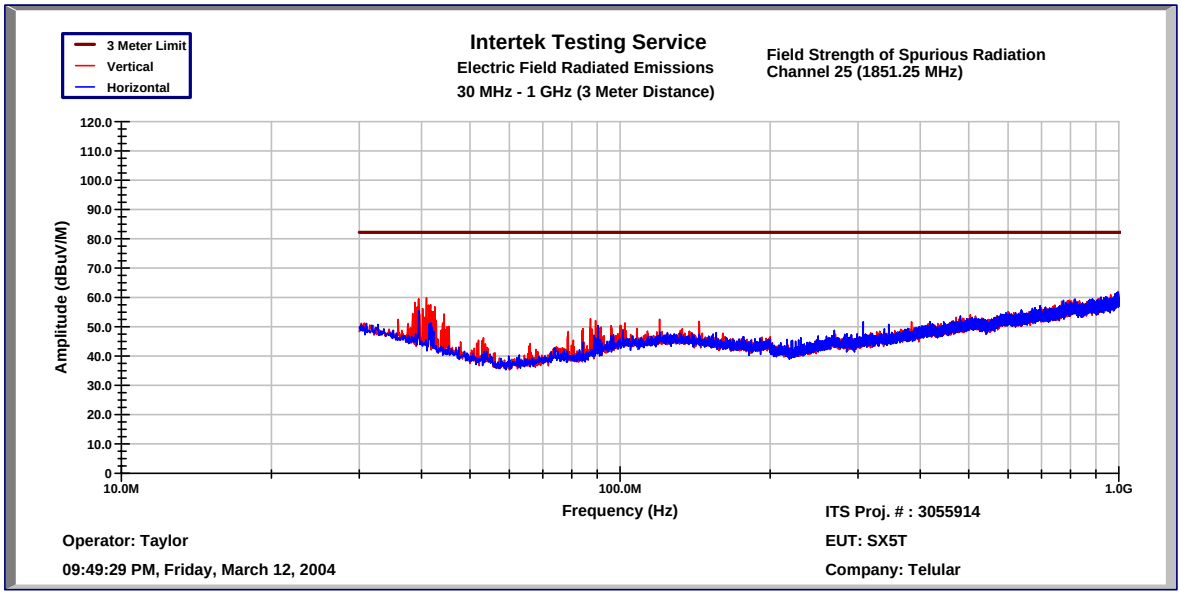
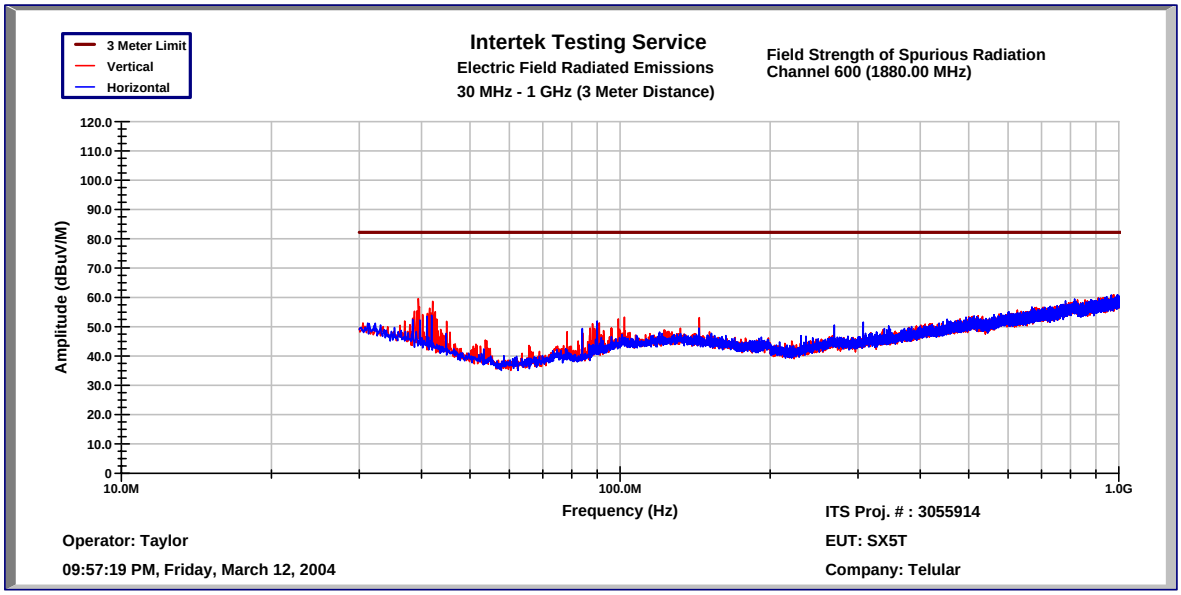

Vertical
3 Meter Limit
Horizontal
Intertek Testing Service
Electric Field Radiated Emissions
3 - 20 GHz (3 Meter Distance)
Field Strength of Spurious Radiation
Channel 1013 (824.7 MHz)
Amplitude (dBuV/M)
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
3.0G
4.7G
6.4G
8.1G
9.8G
11.5G
13.2G
14.9G
16.6G
18.3G
20.0G
Frequency (Hz)
ITS Proj. # : 3055914
Operator: Taylor
EUT: SX5T
02:06:36 AM, Saturday, March 13, 2004
Company: Telular

Figure 9-4: Field Strength of Spurious Radiation (30 MHz – 1 GHz), CDMA 1900 Channel 25, 600, and 1175





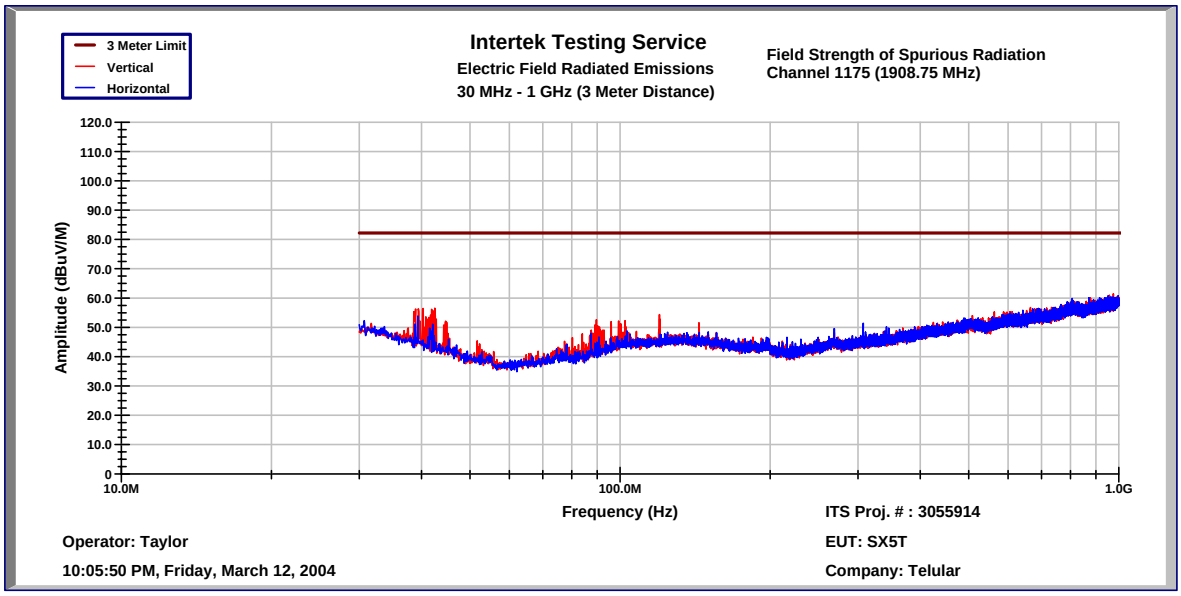
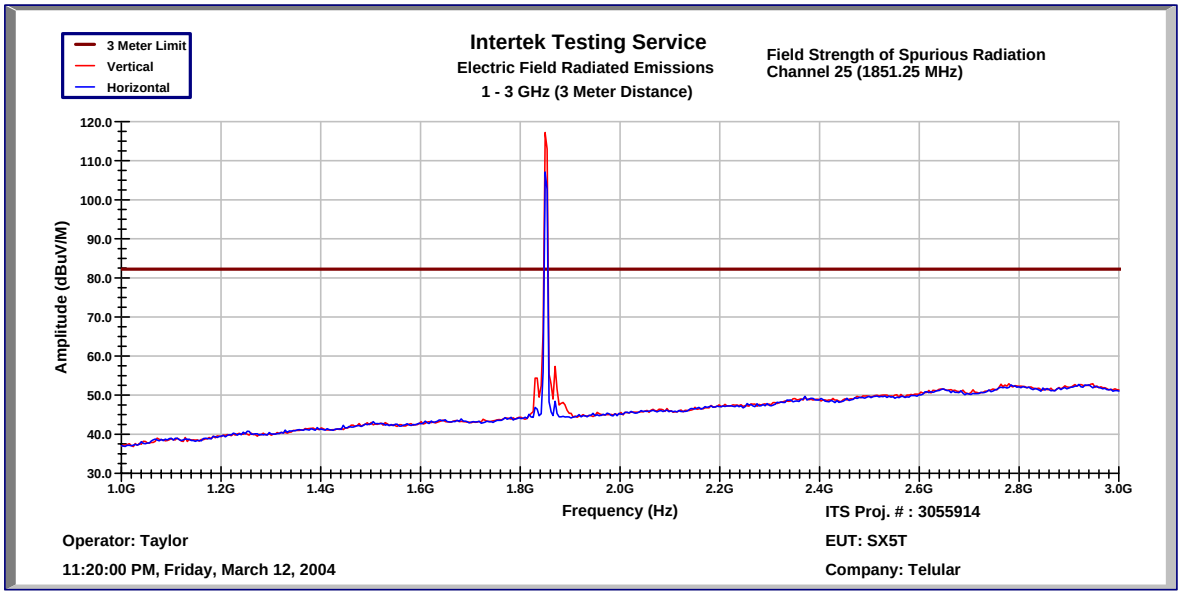
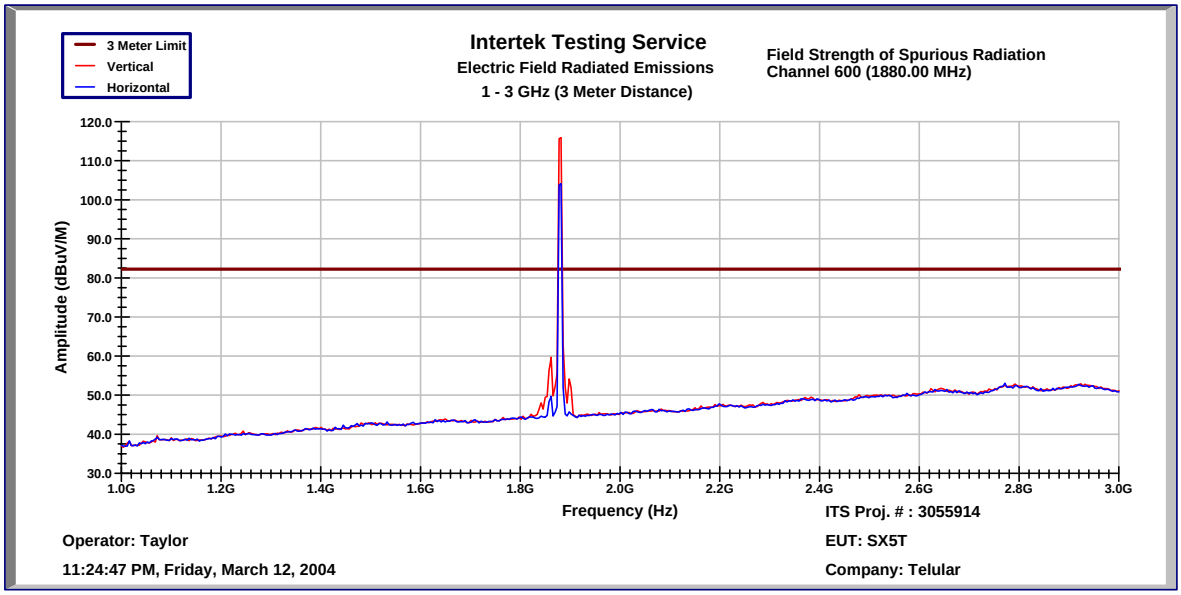

3 Meter Limit
Vertical
Horizontal
Intertek Testing Service
Electric Field Radiated Emissions
30 MHz - 1 GHz (3 Meter Distance)
Field Strength of Spurious Radiation
Channel 1175 (1908.75 MHz)
Amplitude (dBuV/M)
120.0
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
10.0M
100.0M
1.0G
Frequency (Hz)
Operator: Taylor
10:05:50 PM, Friday, March 12, 2004
ITS Proj. # : 3055914
EUT: SX5T
Company: Telular

Figure 9-5: Field Strength of Spurious Radiation (1 GHz – 3 GHz), CDMA 1900 Channel 25, 600, and 1175 [2]





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

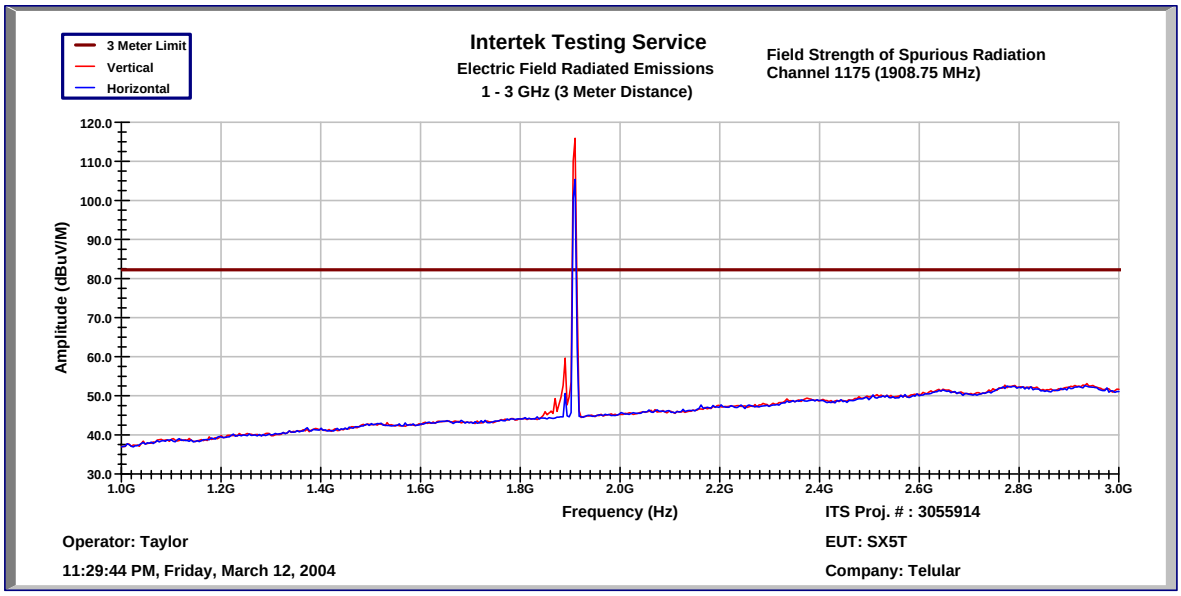
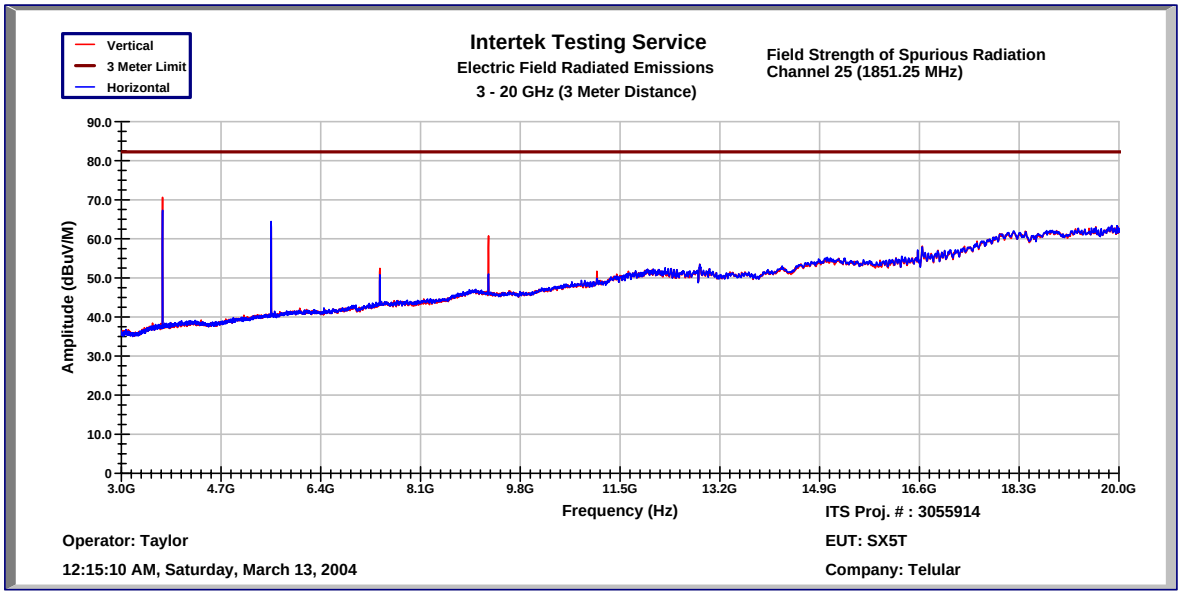
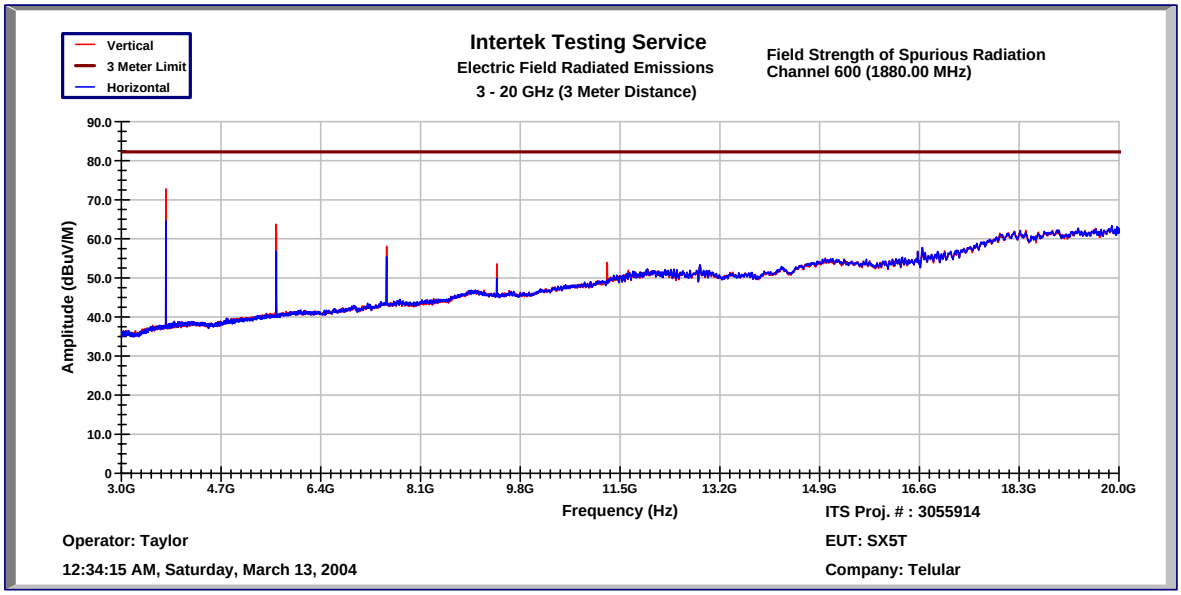
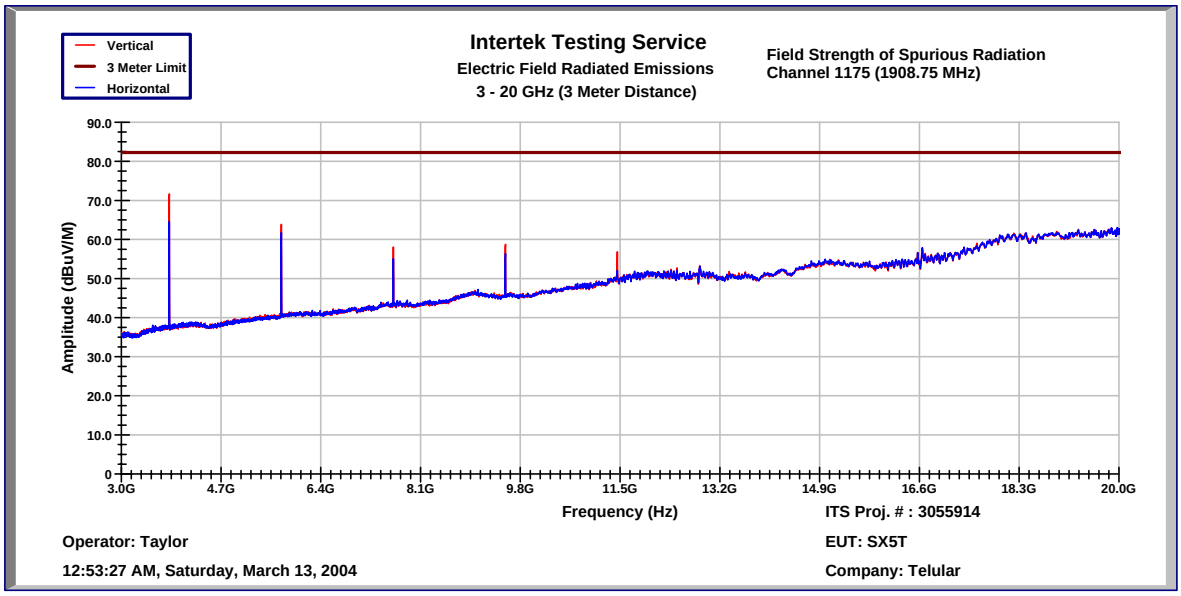

3 Meter Limit
Vertical
Horizontal
Intertek Testing Service
Electric Field Radiated Emissions
1 - 3 GHz (3 Meter Distance)
Field Strength of Spurious Radiation
Channel 1175 (1908.75 MHz)
Amplitude (dBuV/M)
120.0
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
1.0G
1.2G
1.4G
1.6G
1.8G
2.0G
2.2G
2.4G
2.6G
2.8G
3.0G
Frequency (Hz)
ITS Proj. # : 3055914
Operator: Taylor
EUT: SX5T
11:29:44 PM, Friday, March 12, 2004
Company: Telular

Figure 9-6: Field Strength of Spurious Radiation (3GHz – 20GHz), CDMA 1900 Channel 25, 600, and 1175






Vertical
3 Meter Limit
Horizontal
Intertek Testing Service
Electric Field Radiated Emissions
3 - 20 GHz (3 Meter Distance)
Field Strength of Spurious Radiation
Channel 1175 (1908.75 MHz)
Amplitude (dBuV/M)
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
3.0G
4.7G
6.4G
8.1G
9.8G
11.5G
13.2G
14.9G
16.6G
18.3G
20.0G
Frequency (Hz)
Operator: Taylor
12:53:27 AM, Saturday, March 13, 2004
ITS Proj. # : 3055914
EUT: SX5T
Company: Telular

10 FREQUENCY STABILITY VS TEMPERATURE

FCC §2.1055, FCC §22.355, FCC §24.235

RSS-133 §7

Frequency tolerance: 2.5ppm

10.1 Test Procedure

The equipment under test was connected to an external DC power supply and the RF output 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 inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for that purpose. After the temperature stabilized for approximately 30 minutes, the frequency error was read from the CMU-200.

10.2 Test Equipment

Description	Manufacturer	Model Number	Serial Number	Calibration due date
Base Station Simulator	Rohde & Schwarz	CMU-200	1100.0008.02	8/2004
Environmental Chamber	Thermotron	SM-8C	32692	12/18/2004

10.3 Test Results

The SX5T Fixed Wireless Terminal met the frequency stability requirements of FCC §2.1055, FCC §22.355and FCC §24.235. The test results are located in Table 10-1.

Table 10-1: Frequency stability vs. Temperature

Frequency Stability Vs. Temperature (Hz)						
Temp.	Cell Band			PCS Band		
(Celcius)	384	777	1013	25	600	1175
60	-1	-2	0	-5	-3	-2
50	7	-12	5	11	14	-22
40	8	55	8	-21	126	14
30	1	-10	-10	-9	-21	-21
20	-4	-6	-9	11	-26	-21
10	6	42	4	-12	-14	-19
0	8	8	-6	-21	-21	100
-10	-5	43	-12	-18	14	26
-20	-8	8	6	-21	17	-18
-30	8	-8	9	32	-18	-20

11 FREQUENCY STABILITY VS VOLTAGE

FCC §2.1055, FCC §22.355

Frequency tolerance: 2.5ppm

11.1 Test Procedure

An external DC power supply was connected to the battery terminals of the equipment under test. The Base Station Simulator was set to force the EUT to its maximum power setting. The voltage was set to 115% of the nominal value and was then decreased to 85% of the nominal value. The output frequency was recorded for each battery voltage.

11.2 Test Equipment

Description	Manufacturer	Model Number	Serial Number	Calibration due date
DC Power Supply	HP	6226	6M1203	5/20/2004
Temperature Chamber	Thermotron	SM-8C	32692	12/2004
Base Station Simulator	Rohde & Schwarz	CMU-200	1100.0008.02	8/2004

11.3 Test Results

The SX5T Fixed Wireless Terminal met the frequency stability requirements of FCC §2.1055 and FCC §22.355. The test results are located in Table 11-1.

Table 11-1: CDMA Frequency stability vs. input voltage

Frequency Stability (Hz) vs. Voltage						
	PCS Phone			Cell Phone		
Vdc	25	600	1175	384	777	1013
13.8	1	-1	1	3	3	4
12	1	-2	-1	5	5	4
10.2	1	-1	3	3	4	4