TEST REPORT

Report Number: 3062157-001
Project Number: 3062157
7/19/2004

Evaluation of the
SX6P GSM 850/1900 Deskphone
Model Number: SX6P
FCC ID:
MTFSX6PG060304

FCC Part 2
FCC Part 15
FCC Part 24 Subpart E

For

Telular, Inc.

Test Performed by:	Test Authorized by:
Intertek 731 Enterprise Drive Lexington, KY 40510	Telular, Inc. 580 Old Willets Path Hauppauge, NY 11788

Prepared By:_____**Date:**____7/19/2004_____

Jason Centers, Project Engineer

Approved By:_____**Date:**____7/19/2004_____

Bryan C. Taylor, EMC Team Leader

The results contained in this report were derived from measurements performed on the identified test samples. Any implied performance of other samples based on this report is dependent on the representative adequacy of the samples tested.

TABLE OF CONTENTS

1 EXECUTIVE SUMMARY

Testing performed for: Telular, Inc.

Equipment Under Test: SX6P

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
§15.107, §15.207	IC ES-003	Power Line Conducted Emissions	**Compliant**	28
§15.109	IC ES-003 RSS-129 §10, RSS-133 §9	Receiver Spurious Emission	**Compliant**	30
§2.1055, §22.355, §24.235	RSS-133 §7	Frequency Stability vs. Temperature	**Compliant**	33
§2.1055, §22.355, §24.235	--	Frequency Stability vs. Voltage	**Compliant**	34

N/S: Not under scope of this evaluation

2 JOB DESCRIPTION

2.1 Client information

The SX6P GSM 850/1900 Deskphone has been tested at the request of

Company:	Telular, Inc. 580 Old Willets Path Hauppauge, NY 11788
Name of contact:	Matthew McKiernan
Telephone:	(631)-232-6070
Fax:	(631)-232-6082

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
- 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 SX6P GSM 850/1900 Deskphone that operated in the GSM 850 and GSM 1900 modes.

Product	SX6P GSM 850/1900 Deskphone	
EUT Model Number	SX6P	
EUT Serial Number	None	
Whether quantity (>1) production is planned	Quantity production is planned.	
Cellular Phone standards	GSM 850 and 1900	
Type(s) of Emission	338KGXW	
RF Output Power	31.38 dBm – GSM 850 28.64 dBm – GSM 1900	
Frequency Range	824 – 849 MHz GSM 850 1850 – 1910 MHz GSM 1900	
Antenna & Gain	Dual Band Dipole Like Antenna with a 90 Degree Swivel Joint	824 – 849 MHz (2 dBi Gain) 1850 – 1910 MHz (2 dBi Gain)
Detachable Antenna	Yes – TNC Connector	
External input	[X] Audio [] Digital Data	

EUT receive date: 7/12/2004

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

Test start date: 7/12/2004

Test completion date: 7/16/2004

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 Part 15 testing.

Table 2-1: System Support Equipment

Description	Manufacturer	Model Number	Serial Number	FCC ID number
AC Power Adapter	Telular	TMG-D051	26379798	Not Labeled
Dual Band Dipole Like Antenna with 90 Degree Swivel Joint	Galtronics	020356075-2098	Not Labeled	Not Labeled

2.3.2 Cables associated with EUT

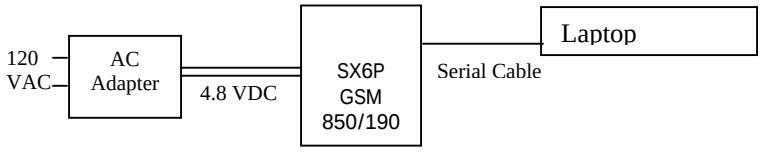
Table 2-2 contains the details of the cables associated with the EUT.

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
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 SX6P

2.3.3 System Block Diagram

The diagram shown below details the interconnection of the EUT and its accessories during FCC Part 15 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 SX6P GSM 850/1900 Deskphone 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 SX6P GSM 850/1900 Deskphone 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)	GSM 850			GSM 1900		
	128	190	251	512	661	810
60	31	31	31	27.67	27.58	27.2
50	31	31	31.1	27.8	27.7	27.3
40	31.1	31.1	31.2	27.9	27.9	27.45
30	31.1	31.14	31.1	28.1	28	27.6
20	31.2	31.2	31.3	28.2	28.2	27.75
10	31.28	31.3	31.4	28.35	28.3	27.85
0	31.33	31.35	31.5	28.57	28.47	28
-10	31.4	31.45	31.61	28.8	28.65	28.2
-20	31.5	31.5	31.7	29	28.9	28.4
-30	31.6	31.61	31.77	29	29	28.5

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 GSM 850 band and EIRP in the GSM 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	6/29/2004
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 SX6P GSM 850/1900 Deskphone met the radiated power requirements of FCC §24.232. The test results are located in Table 5-1. The maximum ERP for the GSM 850 band was 31.379 dBm (or 1373.7mW). The maximum EIRP for the GSM 1900 band was 28.64 dBm (or 731.8mW).

Table 5-1 Radiated RF Power

EUT Mode	TX Channel	Polarity	TX Frequency	Device Reading (dBuV)	Sub. Reading (dBuV)	Cable Loss (dB)	Tx Antenna Gain (dBi)	Signal Generator Output (dBm)	EIRP (dBm)
GSM 1900	512	V	1.8502 GHz	93.496	79.047	9.005	8.2	15	28.644
GSM 1900	661	V	1.88 GHz	92.935	78.337	9.106	8.14	15	28.632
GSM 1900	810	V	1.9099 GHz	90.287	76.868	9.052	8.08	15	27.447
GSM 1900	512	H	1.8502 GHz	83.291	77.67	9.005	8	15	19.616
GSM 1900	661	H	1.88 GHz	83.744	78.257	9.106	7.94	15	19.321
GSM 1900	810	H	1.9099 GHz	80.401	78.18	9.052	7.88	15	16.049
GSM 850	128	V	824.26 MHz	103.214	81.465	5.37	0	15	31.379
GSM 850	190	V	836.64 MHz	101.912	81.424	5.494	0	15	29.994
GSM 850	251	V	848.84 MHz	102.193	81.447	5.384	0	15	30.362
GSM 850	128	H	824.15 MHz	99.443	82.658	5.369	0	15	26.416
GSM 850	190	H	836.57 MHz	100.771	82.376	5.495	0	15	27.9
GSM 850	251	H	848.79 MHz	101.04	82.179	5.384	0	15	28.477

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 measured 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:

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

Where ERP was measured in section 5, Radiated RF Power, 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 calculations show the Maximum RF Exposure from the SX6P GSM 850/1900 Deskphone at 20cm for GSM_{850} and GSM_{1900} bands. Both bands are well below the limits for the general population described in the table above.

$$MPE_{GSM1900} = 731.8\text{mW} / (4\text{Pi}(20\text{cm})^2) = 0.145\ \text{mW/cm}^2$$

$$MPE_{GSM850} = 2253.7\text{mW} / (4\text{Pi}(20\text{cm})^2) = 0.448\ \text{mW/cm}^2$$

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

6.3 Test Procedure

In both GSM 850 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.

6.4 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	7/15/2004

6.5 Test Results

The following is the occupied bandwidth data for the SX6P GSM 850/1900 Deskphone .

Table 0-1: Occupied bandwidth measurements

Mode	Channel	Resolution Bandwidth	Video Bandwidth	Sweep time	Measured Bandwidth kHz
GSM 850	128	3 kHz	3 kHz	5s	248.5
GSM 850	190	3 kHz	3 kHz	5s	248.5
GSM 850	251	3 kHz	3 kHz	5s	250.5
GSM 1900	512	3 kHz	3 kHz	5s	244.5
GSM 1900	661	3 kHz	3 kHz	5s	250.5
GSM 1900	810	3 kHz	3 kHz	5s	246.5

Figure 0-1: Occupied Bandwidth – GSM 850 Channel 128

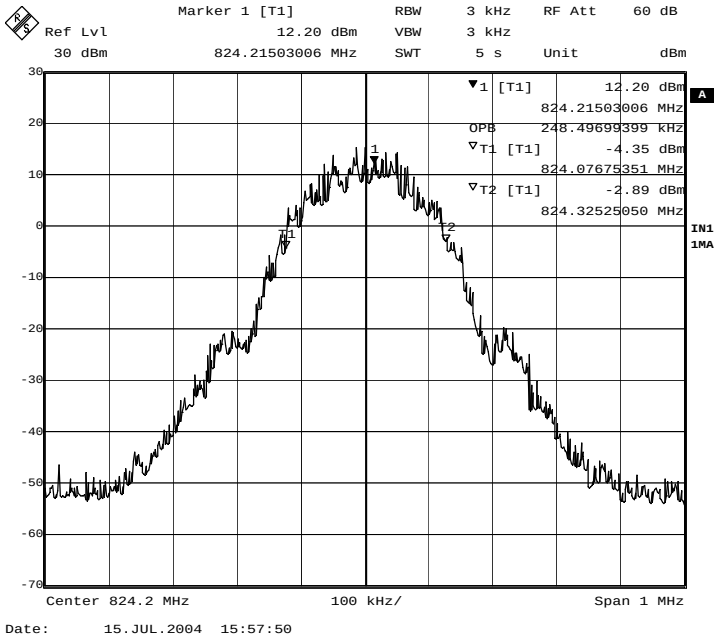


Figure 0-3: Occupied Bandwidth – GSM 850 Channel 190

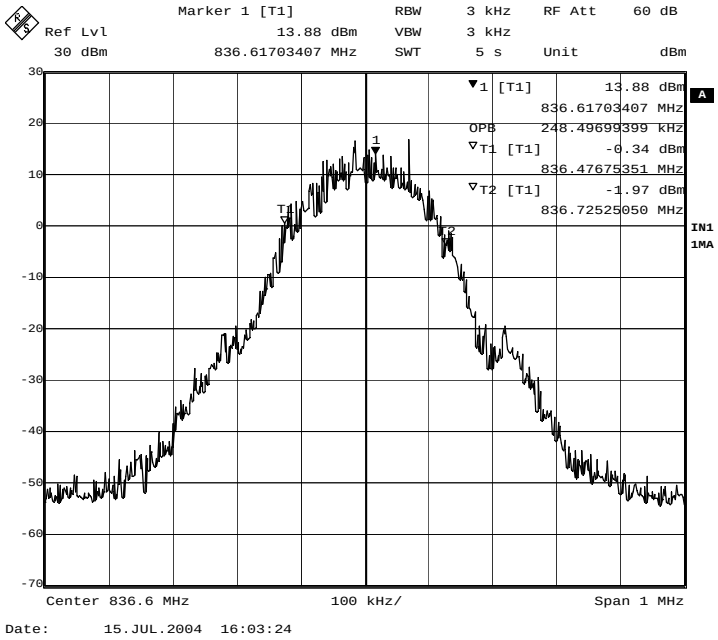


Figure 0-5: Occupied Bandwidth – GSM 850 Channel 251

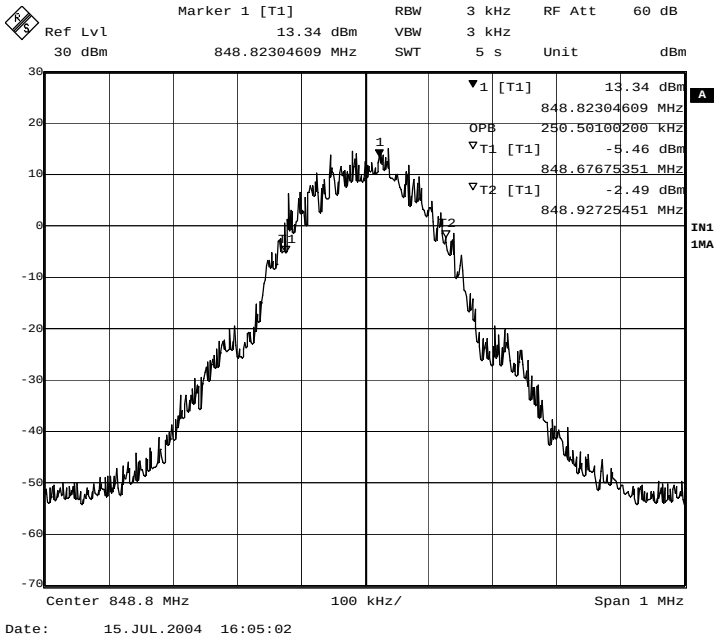


Figure 0-7: Occupied Bandwidth – GSM 1900 Channel 512

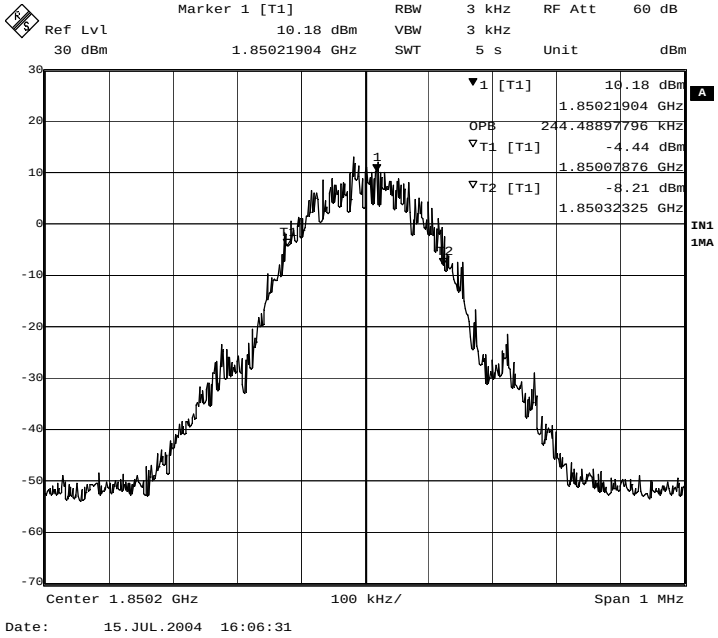


Figure 0-9: Occupied Bandwidth – GSM 1900 Channel 661

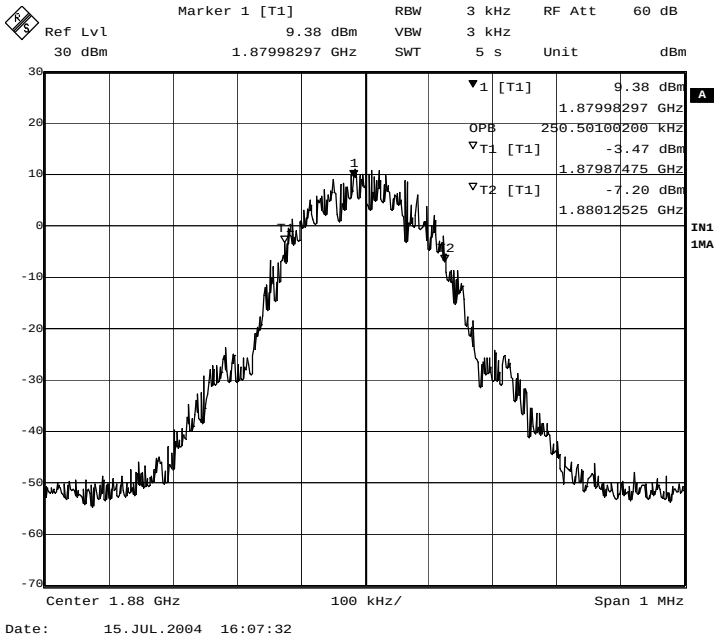
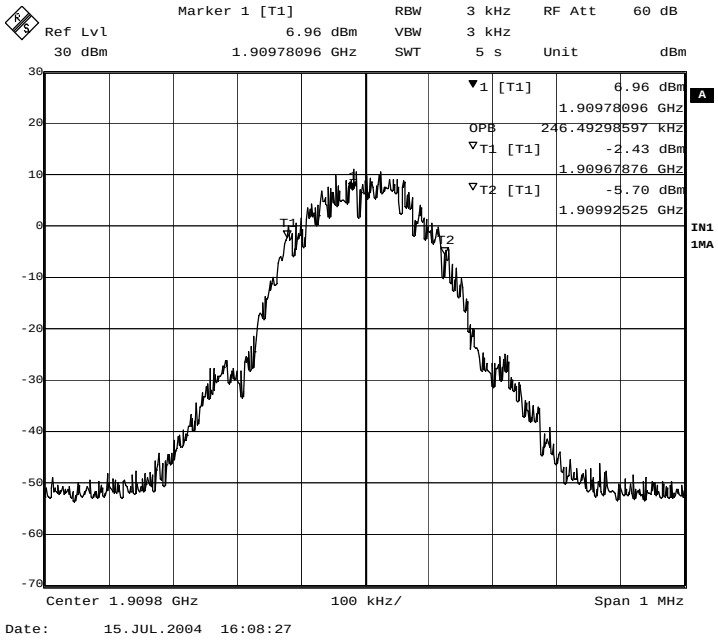


Figure 0-11: Occupied Bandwidth – GSM 1900 Channel 810



7 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.

7.1 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.

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	7/15/2004

7.3 Test Results

The SX6P GSM 850/1900 Deskphone met the out of band emission at antenna terminal requirements.

Table 7-1: Summary of test result locations

Location	Mode (Band)	Channel	Description
Figure 7-1	GSM 850	128, 190, 251	Conducted spurious emissions, 30MHz to 20 GHz
Figure 7-2	GSM 850	128, 190, 251	Zoom Graph of the Carrier Frequencies
Figure 7-3	GSM 1900	512, 661, 810	Conducted spurious emissions, 30MHz to 20 GHz
Figure 7-4	GSM 1900	512, 661, 810	Zoom Graph of the Carrier Frequencies
Figure 7-5	GSM 850	128	Emissions within 1 MHz of band edge
Figure 7-6	GSM 850	251	Emissions within 1 MHz of band edge
Figure 7-7	GSM 1900	512	Emissions within 1 MHz of band edge
Figure 7-8	GSM 1900	810	Emissions within 1 MHz of band edge

Figure 7-1: Out of band emissions at antenna terminals – GSM 850 Channel 128, 190, and 251

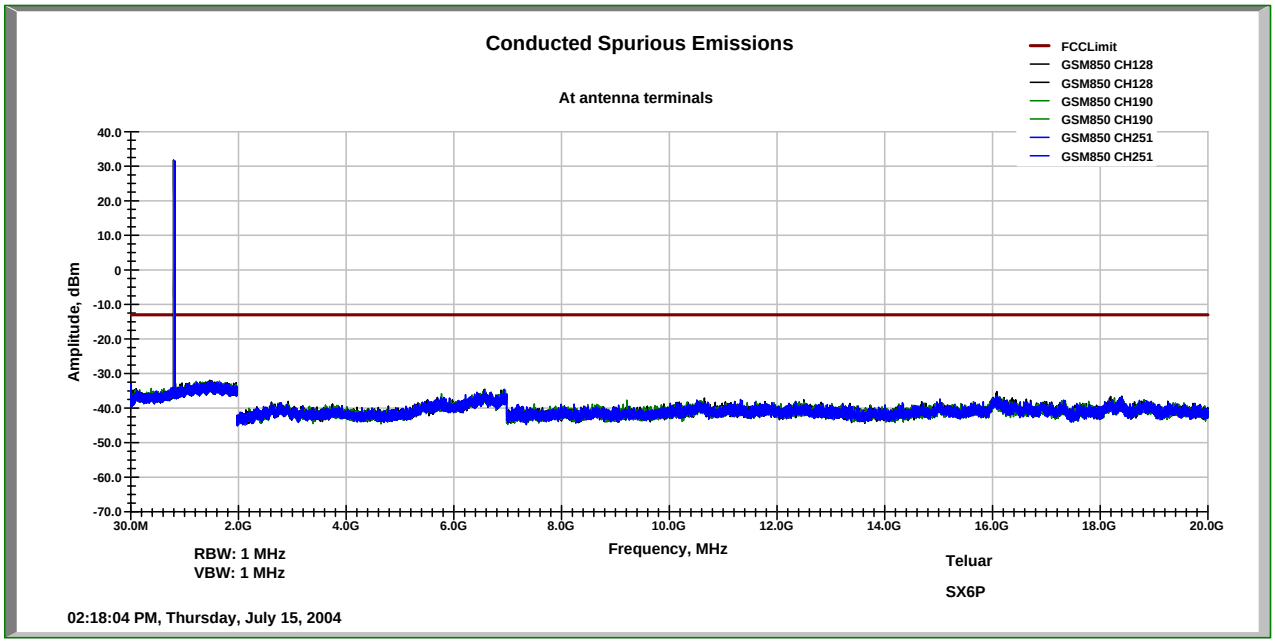


Figure 7-2: Out of band emissions at antenna terminals – GSM 850 Channel 128, 190, and 251 (Zoomed Around Carrier Frequencies)

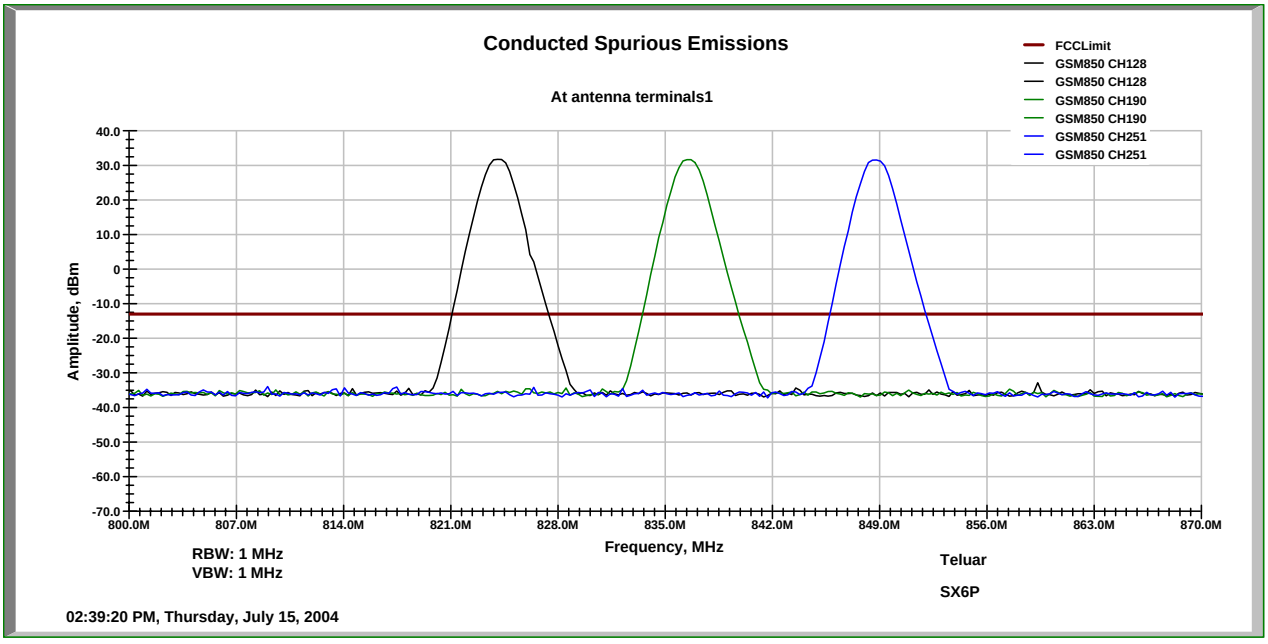


Figure 7-3: Out of band emissions at antenna terminals – GSM 1900 Channel 512, 661, 810

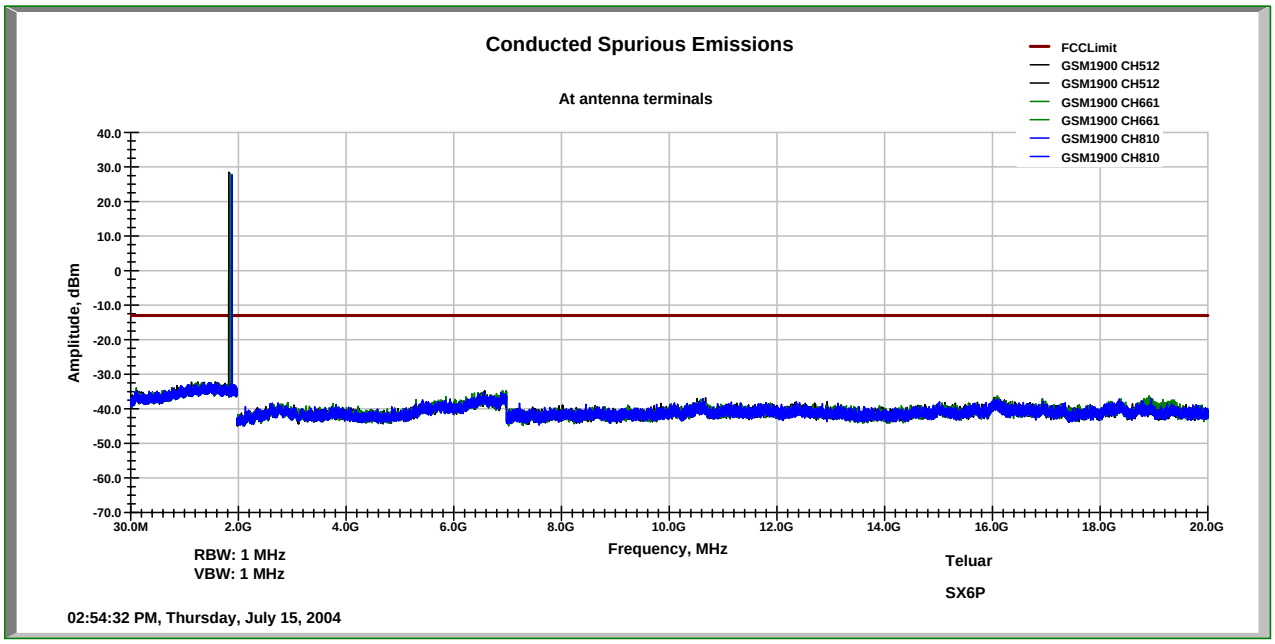


Figure 7-4: Out of band emissions at antenna terminals – GSM 1900 Channel 512, 661, 810 (Zoomed In on Carrier Frequencies)

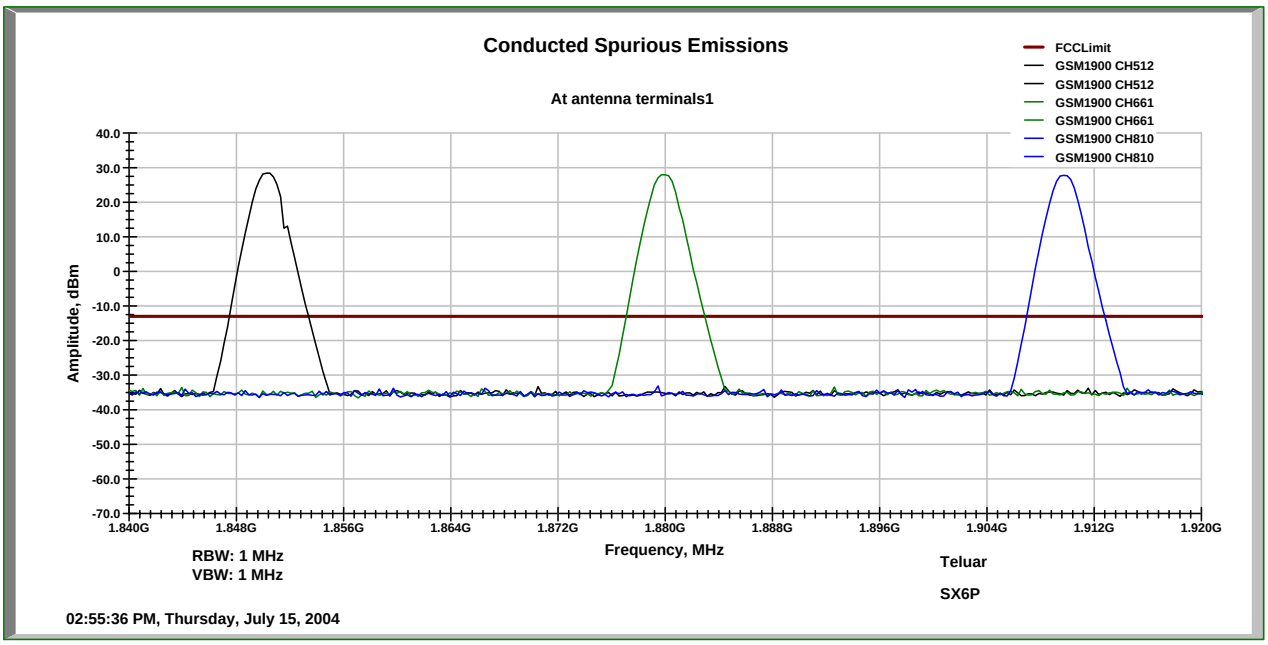


Figure 7-5: Emissions within 1 MHz of band edge, GSM 850 Channel 128

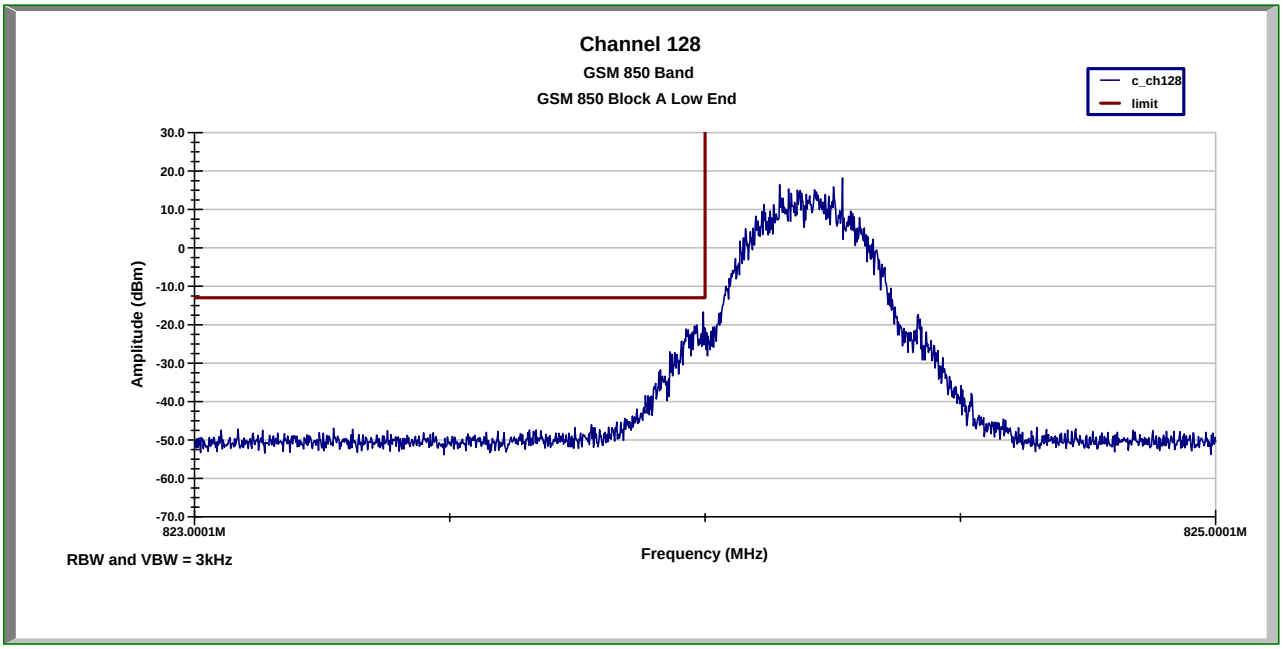


Figure 7-6: Emissions within 1 MHz of band edge, GSM 850 Channel 251

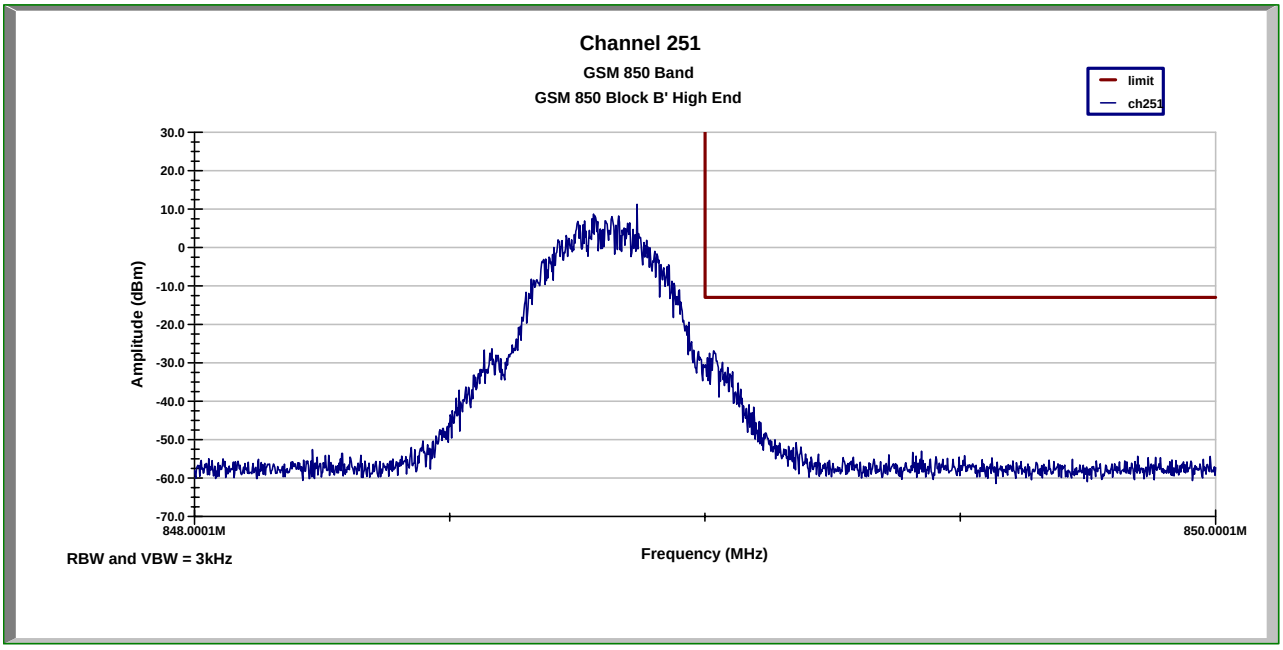


Figure 7-7: Emissions within 1 MHz of band edge, GSM 1900 Channel 512

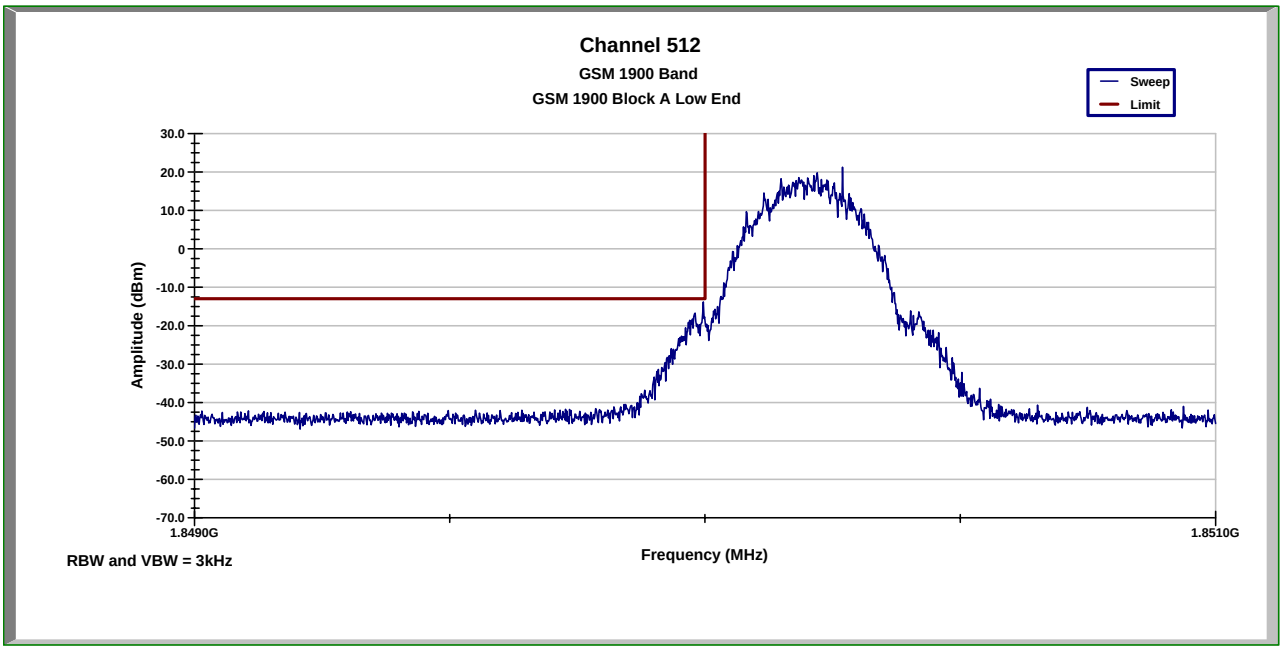
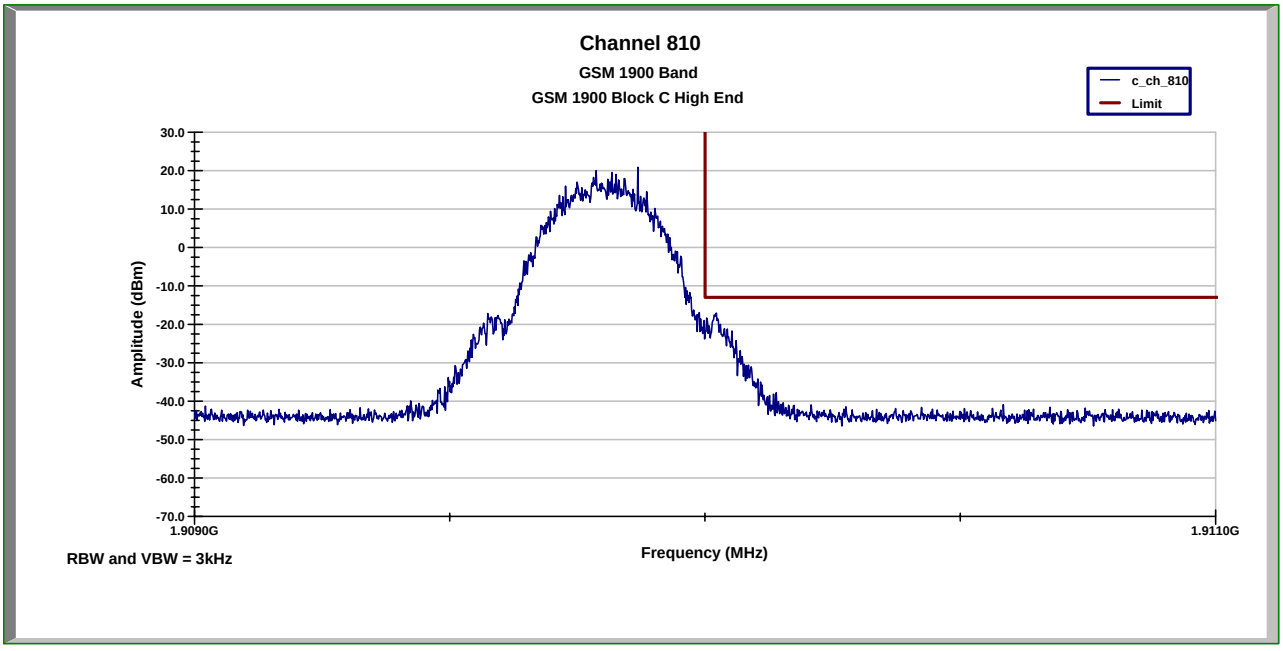


Figure 7-8: Emissions within 1 MHz of band edge, GSM 1900 Channel 810



8 FIELD STRENGTH OF SPURIOUS RADIATION

FCC §2.1053

RSS-129 §8.1

8.1 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.

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.

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
Signal Generator	HP	83620B	3614A00199	8/21/2004
Horn Antenna	Antenna Research	DRG-118/A	1086	6/29/2005
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

8.3 Test Results

The SX6P GSM 850/1900 Deskphone met the field strength of spurious radiation requirements of FCC §2.1053. See Table 8-1 for measured radiated spurious emission power for emissions within 20 dB of the limit. All other emissions not reported are at least 20dB below the limit.

Table 8-1: Field Strength of Spurious Radiation

EUT Mode	TX Channel	Polarity	TX Frequency (GHz)	Device Reading (dBuV)	Sub. Reading (dBuV)	Cable Loss (dB)	Tx Antenna Gain (dBi)	Signal Generator Output (dBm)	EIRP (dBm)
GSM 850	128	H	2.4725 GHz	37.8	75.514	10.497	9.306	15	-23.905
GSM 850	128	H	1.6484 GHz	40.062	81.452	8.241	8.403	15	-26.228
GSM 850	128	H	5.7697 GHz	60.79	94.993	20.802	10.808	15	-29.197
GSM 850	128	H	6.593 GHz	41.707	94.072	20.856	10.814	15	-47.407
GSM 850	128	V	2.4726 GHz	31.611	73.784	10.498	9.318	15	-28.353
GSM 850	128	V	6.5932 GHz	56.279	90.44	20.866	10.876	15	-29.151
GSM 850	128	V	1.6487 GHz	31.74	80.696	8.245	8.603	15	-33.598
GSM 850	128	V	5.77 GHz	56.61	96.063	20.799	11.016	15	-34.236
GSM 850	190	H	2.5098 GHz	33.836	74.842	10.524	9.4	15	-27.13
GSM 850	190	H	1.6732 GHz	36.779	80.639	8.243	8.354	15	-28.749
GSM 850	190	H	5.8562 GHz	58.365	95.685	21.026	10.842	15	-32.504
GSM 850	190	V	1.6733 GHz	41.583	80.314	8.244	8.553	15	-23.422
GSM 850	190	V	2.5099 GHz	31.254	73.886	10.522	9.4	15	-28.754
GSM 850	190	V	5.8563 GHz	57.615	94.444	21.036	11.085	15	-31.78
GSM 850	251	H	2.5463 GHz	38.916	74.041	10.714	9.4	15	-21.439
GSM 850	251	H	1.6976 GHz	37.418	80.41	8.353	8.305	15	-28.04
GSM 850	251	H	5.9418 GHz	54.957	93.094	21.158	10.877	15	-33.418
GSM 850	251	V	2.5452 GHz	40.527	73.466	10.716	9.4	15	-19.255
GSM 850	251	V	1.6976 GHz	44.674	79.974	8.353	8.505	15	-20.148
GSM 850	251	V	5.9414 GHz	59.348	93.798	21.109	11.153	15	-29.406
GSM 1900	512	H	9.2511 GHz	53.145	71.886	30.487	10.55	15	-23.678
GSM 1900	512	H	7.401 GHz	52.447	80.584	26.654	10.241	15	-29.55
GSM 1900	512	H	11.101 GHz	44.54	67.623	35.3	11.438	15	-31.945

(Continued)

EUT Mode	TX Channel	Polarity	TX Frequency (GHz)	Device Reading (dBuV)	Sub. Reading (dBuV)	Cable Loss (dB)	Tx Antenna Gain (dBi)	Signal Generator Output (dBm)	EIRP (dBm)
GSM 1900	512	H	3.7003 GHz	62.061	108.485	14.079	10.44	15	-35.063
GSM 1900	512	H	5.5506 GHz	39.926	96.11	20.223	10.72	15	-50.687
GSM 1900	512	V	5.5507 GHz	65.03	93.897	20.219	10.841	15	-23.245
GSM 1900	512	V	7.4008 GHz	56.889	83.637	26.654	10.06	15	-28.342
GSM 1900	512	V	9.2513 GHz	49.364	74.731	30.494	10.399	15	-30.462
GSM 1900	512	V	11.101 GHz	46.462	68.64	35.301	11.659	15	-30.82
GSM 1900	512	V	3.7003 GHz	62.5	106.673	14.077	10.64	15	-32.61
GSM 1900	661	H	11.28 GHz	49.496	60.627	34.599	11.151	15	-19.579
GSM 1900	661	H	9.4002 GHz	55.949	70.196	32.259	10.52	15	-20.986
GSM 1900	661	H	5.6401 GHz	68.164	96.653	21.005	10.756	15	-23.738
GSM 1900	661	H	7.5198 GHz	54.471	78.744	28.191	10.312	15	-27.152
GSM 1900	661	H	3.76 GHz	56.915	107.765	14.311	10.512	15	-39.649
GSM 1900	661	V	11.28 GHz	48.721	59.826	34.586	11.408	15	-19.283
GSM 1900	661	V	9.4 GHz	57.68	70.06	32.256	10.28	15	-19.356
GSM 1900	661	V	5.64 GHz	67.43	96.691	21.004	10.912	15	-24.353
GSM 1900	661	V	7.5198 GHz	52.525	80.757	28.194	10.12	15	-31.306
GSM 1900	661	V	3.7599 GHz	64.095	107.956	14.311	10.712	15	-32.46
GSM 1900	810	H	9.5493 GHz	55.478	70.755	33.068	10.52	15	-22.825
GSM 1900	810	H	11.459 GHz	46.818	60.629	35.974	10.866	15	-23.919
GSM 1900	810	H	7.6393 GHz	54.933	80.8	27.728	10.384	15	-28.211
GSM 1900	810	H	5.7295 GHz	62.896	97.334	20.566	10.792	15	-29.212
GSM 1900	810	H	3.8194 GHz	54.835	106.856	12.999	10.583	15	-39.437
GSM 1900	810	V	11.459 GHz	50.316	60.411	35.977	11.157	15	-19.915
GSM 1900	810	V	9.5486 GHz	56.966	72.457	33.077	10.249	15	-23.319
GSM 1900	810	V	5.7294 GHz	67.371	99.335	20.566	10.984	15	-26.546
GSM 1900	810	V	7.639 GHz	55.443	82.809	27.751	10.239	15	-29.878
GSM 1900	810	V	3.8196 GHz	63.604	108.215	13	10.783	15	-31.828

9 POWER LINE CONDUCTED EMISSIONS

FCC §15.107, FCC §15.207

IC ES-003

9.1 Test Procedure

Measurements are carried out using quasi-peak and average detector receivers in accordance with CISPR 16. An AMN is required to provide a defined impedance at high frequencies across the power feed at the point of measurement of terminal voltage and also to provide isolation of the circuit under test from the ambient noise on the power lines. An AMN as defined in CISPR 16 shall be used.

The EUT is located so that the distance between the boundary of the EUT and the closest surface of the AMN is 0.8m.

Where a flexible mains cord is provided by the manufacturer, this shall be 1m long or if in excess of 1m, the excess cable is folded back and forth as far as possible so as to form a bundle not exceeding 0.4m in length.

The EUT is arranged and connected with cables terminated in accordance with the product specification.

Conducted disturbance is measured between the phase lead and the reference ground, and between the neutral lead and the reference ground. Both measured values are reported.

The EUT, where intended for tabletop use, is placed on a table whose top is 0.8m above the ground plane. A vertical, metal reference plane is placed 0.4m from the EUT. The vertical metal reference-plane is at least 2m by 2m. The EUT shall be kept at least 0.8m from any other metal surface or other ground plane not being part of the EUT. The table is constructed of non-conductive materials. Its dimensions are 1m by 1.5m, but may be extended for larger EUT.

Floor standing EUTs are placed on a horizontal metal ground plane and isolated from the ground plane by 3 to 12 mm of insulating material. The metal ground plane extends at least 0.5m beyond the boundaries of the EUT and has minimum dimensions of 2m by 2m.

Equipment setup for conducted disturbance tests followed the guidelines of ANSI C63.4: 1992.

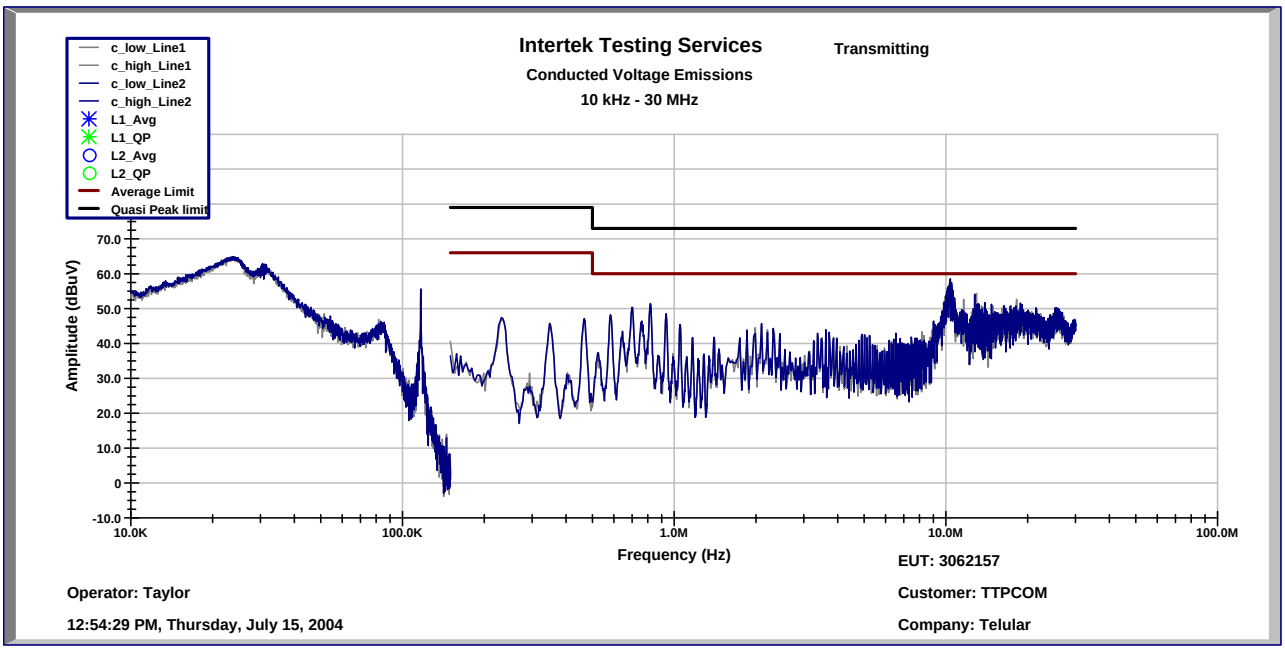
9.2 Test Equipment

Description	Manufacturer	Model Number	Serial Number	Calibration due date
Base Station Simulator	Rohde & Schwarz	CMU-200	1100.0008.02	8/2004
EMI Receiver	Rohde & Schwarz	ESI 26	1088.7490	10/2/2004
LISN	FCC	FCC-LISN-50-50-2M	1026	1/12/05

9.3 Test Results

The SX6P GSM 850/1900 Deskphone met the power line conducted emission requirements of FCC §15.107 and §15.207. The test results are located in Figure 9-1. The graphical data, measured with peak detection, was all below the class B quasi-peak and average limits.

Figure 9-1: FCC §15.107 and §15.207 power line conducted emissions (Lines 1 and 2)



10 RECEIVER SPURIOUS EMISSIONS

FCC §15.109

IC ES-003, RSS-129 §10, RSS-133 §9

10.1 Test Limits

Table 10-1 Radiated Emission Limit for FCC §15.109

Radiated Emission Limits at 3 meters	
Frequency (MHz)	**Quasi-Peak limits, dB (μV/m)**
30 to 88	40.0
88 to 216	43.5
216 to 960	46.0
960 and up	54.0

10.2 Test Equipment

Description	Manufacturer	Model Number	Serial Number	Calibration due date
Horn Antenna	Antenna Research	DRG-118/A	1086	3/7/2007
Horn Antenna	EMCO	3115	6556	7/11/2004
EMI Receiver	Rohde & Schwarz	ESI 26	1088.7490	11/27/2003
Bilog Antenna	EMCO	3142B	1674	8/2004
Preamplifier	HP	8449B	3008A00775	12/2004

10.3 Test Procedure

Measurements are made over the frequency range of 30 MHz to five times the highest frequency operating within the device. The measuring receiver meets the requirements of Section One of CISPR 16 and the measuring antenna correlates to a balanced dipole. From 30 to 1000 MHz, a quasi-peak detector was used for measurement. Above 1000 MHz, average measurements were performed.

Measurements of the radiated field are made with the antenna located at a distance of 3 meters from the EUT. If the field-strength measurements at 3m cannot be made because of high ambient noise level or for other reasons, measurements may be made at a closer distance, for example 1m. An inverse proportionality factor of 20 dB per decade should be used to normalize the measured data to the specified distance for determining compliance.

The antenna is adjusted between 1m and 4m in height above the ground plane for maximum meter reading at each test frequency.

The antenna-to-EUT azimuth is varied during the measurement to find the maximum field-strength readings.

The antenna-to-EUT polarization (horizontal and vertical) is varied during the measurements to find the maximum field-strength readings.

The EUT, where intended for tabletop use, is placed on a table whose top is 0.8m above the ground plane. The table is constructed of non-conductive materials. Its dimensions are 1m by 1.5m, but may be extended for larger EUT.

Equipment setup for radiated disturbance tests followed the guidelines of ANSI C63.4: 1992.

10.4 Test Results

The SX6P GSM 850/1900 Deskphone is **compliant** with the radiated disturbance requirements of FCC §15.109 for a class B device as of 3/26/2004. The maximized quasi peak data can be found in Figure 10-3.

Figure 10-1 FCC §15.109Worse Case Receiver Spurious Emission (Horizontal)

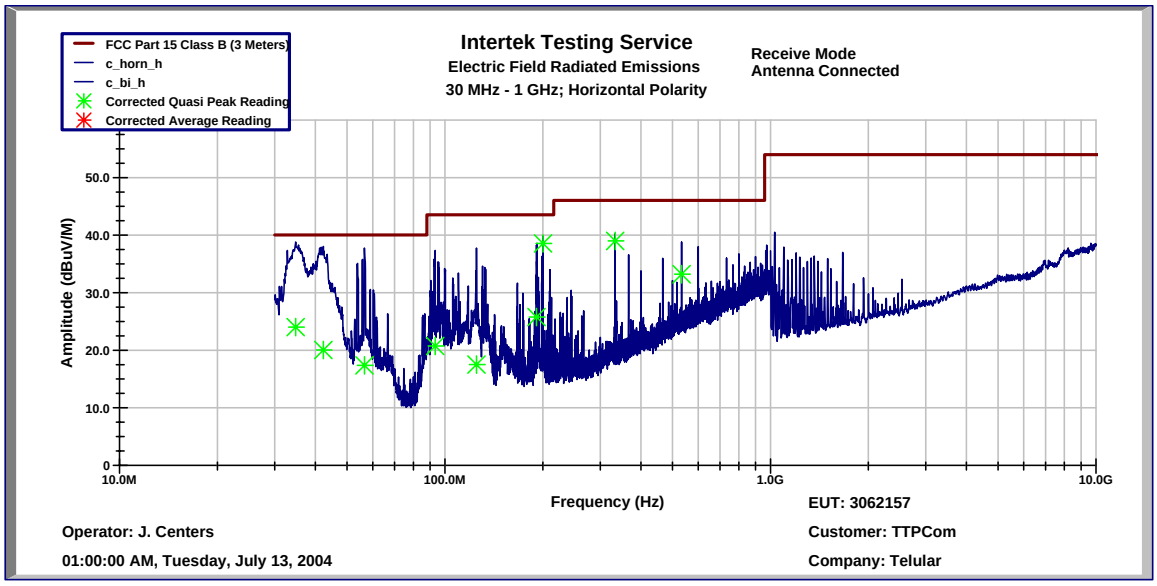


Figure 10-2 FCC §15.109Worse Case Receiver Spurious Emission (Vertical)

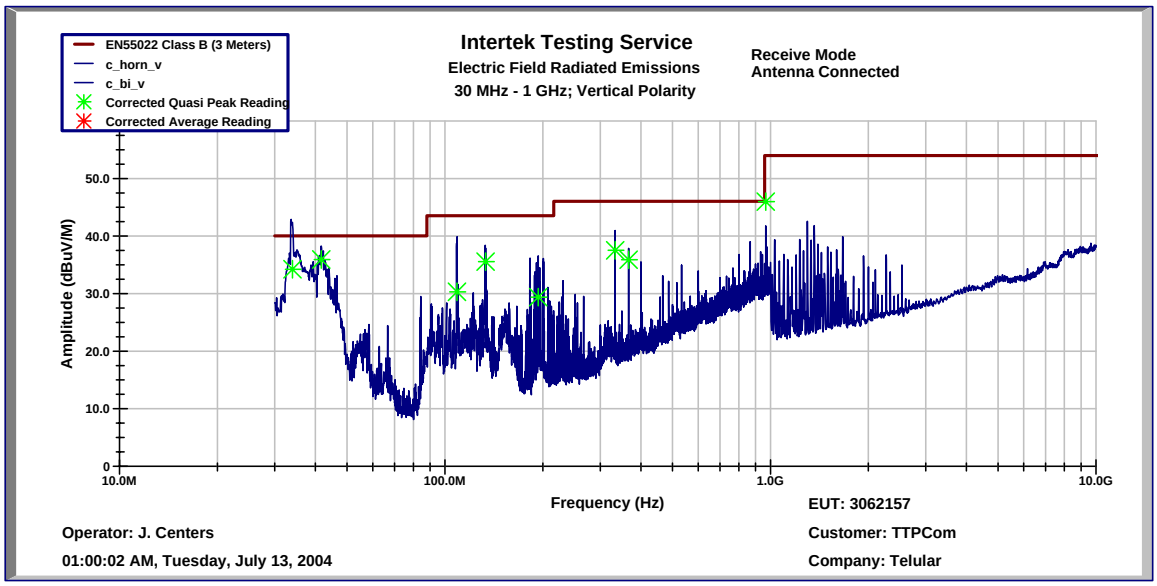


Figure 10-3 FCC §15.109 Maximized Quasi Peak and Average Emissions (Sorted by Delta)

Frequency (MHz)	Polarity (H/V)	Cab. (dB)	Ant. (dB)	Corr. Reading. (dBuV/m)	Limit (dBuV/m)	Delta (dB)	Azimuth (deg)	Tower (cm)	Results
41.7 MHz	V	0.52	12.2	35.91	40	-4.09	86	100	**Compliant**
200.02 MHz	H	1.4	11.19	38.54	43.52	-4.98	121	288	**Compliant**
34.007 MHz	V	0.47	16.24	34.22	40	-5.78	205	99	**Compliant**
333.38 MHz	H	1.74	15.3	38.97	46.02	-7.05	223	117	**Compliant**
133.34 MHz	V	1.16	7.75	35.54	43.52	-7.98	286	99	**Compliant**
966.78 MHz	V	2.8	24.5	45.97	53.98	-8.01	30	146	**Compliant**
333.39 MHz	V	1.74	15.3	37.5	46.02	-8.52	322	272	**Compliant**
366.71 MHz	V	1.82	16.33	35.88	46.02	-10.14	95	168	**Compliant**
533.4 MHz	H	2.14	19.65	33.2	46.02	-12.82	182	151	**Compliant**
108.78 MHz	V	0.89	9.48	30.3	43.52	-13.22	287	100	**Compliant**
193.45 MHz	V	1.38	11.17	29.37	43.52	-14.15	29	99	**Compliant**
34.804 MHz	H	0.47	15.73	24	40	-16	97	99	**Compliant**
191.0 MHz	H	1.37	10.85	25.75	43.52	-17.77	348	171	**Compliant**
42.305 MHz	H	0.52	11.96	20.03	40	-19.97	137	230	**Compliant**
56.602 MHz	H	0.62	8.9	17.36	40	-22.64	123	350	**Compliant**
93.298 MHz	H	0.81	8.67	20.72	43.52	-22.8	97	281	**Compliant**
125.0 MHz	H	1.07	7.94	17.51	43.52	-26.01	64	231	**Compliant**

11 FREQUENCY STABILITY VS TEMPERATURE

FCC §2.1055, FCC §22.355, FCC §24.235

RSS-133 §7

Frequency tolerance: 2.5ppm

11.1 Test Procedure

The equipment under test was powered 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 power lead 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.

11.2 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

11.3 Test Results

The SX6P GSM 850/1900 Deskphone met the frequency stability requirements of FCC §2.1055, FCC §22.355and FCC §24.235. The test results are located in Table 11-1.

Table 11-1: Frequency stability vs. Temperature

Frequency Stability Vs. Temperature (Hz)						
Temp. (Celcius)	GSM 850			GSM 1900		
	128	190	251	512	661	810
60	17	12	12	16	10	8
50	8	10	8	15	30	28
40	7	14	12	19	21	23
30	8	7	4	25	29	36
20	-6	-4	7	28	37	40
10	-9	-4	-2	21	24	32
0	-6	-6	-18	10	40	27
-10	-14	-17	-28	13	11	20
-20	-28	-12	4	16	27	15
-30	-20	-14	-18	21	5	5

12 FREQUENCY STABILITY VS VOLTAGE

FCC §2.1055, FCC §22.355

Frequency tolerance: 2.5ppm

12.1 Test Procedure

An external AC variable transformer was connected to the power input 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 input voltage.

12.2 Test Equipment

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

12.3 Test Results

The SX6P GSM 850/1900 Deskphone met the frequency stability requirements of FCC §2.1055 and FCC §22.355. The test results are located in Table 12-1.

Table 12-1: Frequency stability vs. input voltage

Frequency Stability Vs. Voltage						
Voltage (V)	GSM 850			GSM 1900		
	128	190	251	512	661	810
135.25	5	7	2	30	39	32
120	-6	-4	7	28	37	40
97.75	-3	2	11	17	21	29