MOBILE DEVICES BUSINESS

PRODUCT SAFETY AND COMPLIANCE
EMC LABORATORY

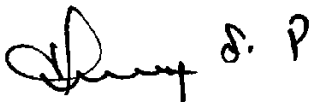
EMC TEST REPORT

Test Report Number – 18603-1

Report Date – June 14, 2006

The test results contained herein relate only to the model(s) identified. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics.

As the responsible EMC Engineer, I hereby declare that the equipment tested as specified in this report conforms to the requirements indicated.

Signature:  Name: Thanigaiselvan Palaniswami

Title: EMC Engineer Date: June 14, 2006

THIS REPORT MUST NOT BE USED TO CLAIM PRODUCT ENDORSEMENT BY A2LA OR ANY AGENCY OF THE U.S. GOVERNMENT.

A2LA Certificate Number: 1651-01

Table of Contents

Test Report Details

Tests Performed By:	Motorola Mobile Devices business (MDb) Product Safety and Compliance Group 600 North US Hwy 45 Libertyville, IL 60048 PH (847) 523-6167 Fax (847) 523-4538 Motorola MDb FRN: 0004321311 FCC Registration Number: 316588 Industry Canada Number: IC3908-1
Tests Requested By:	Motorola Inc. Mobile Devices business 600 North US Hwy 45 Libertyville, IL 60048
Product Type:	Cellular Phone
Signaling Capability:	GSM 850, 1900, Bluetooth
FCC ID Number:	IHDT56GW1
Serial Numbers:	004400013814692, 004400013814767, 004400013814684, 004400013814718
Testing Complete Date:	June 01, 2006

Applicable Standards

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J as well as the following parts:

__X__ Part 15 Subpart B – Unintentional Radiators
__X__ Part 22 Subpart H - Public Mobile Services
__X__ Part 24 - Personal Communications Services

Applicable Standards: TIA EIA 137-A, TIA EIA 98-C, ANSI 63.4 2001, RSS-118 (AMPS), RSS-128 (TDMA), RSS-129 (CDMA), RSS-133 (PCS)

Summary of Testing

Test #	Test Name	Pass/Fail
1	RF Power Output	NA
2	ERP (Effective Radiated Power)	Pass
3	Occupied Bandwidth	Pass
4	Spurious Emissions at Antenna Terminal	Pass
5	Field Strength of Spurious Emissions	Pass
6	Frequency Stability	Pass
7	Field Strength of Spurious Emissions from Unintentional Radiators	Pass

Test #	Test Name	Margin with respect to the Limit
1	RF Power Output	NA
2	ERP (Effective Radiated Power)	See results
3	Occupied Bandwidth	See Plots
4	Spurious Emissions at Antenna Terminal	33.1 dB
5	Field Strength of Spurious Emissions	7.8 dB
6	Frequency Stability	53 Hz
7	Field Strength of Spurious Emissions from Unintentional Radiators	Below noise floor

The margin with respect to the limit is the minimum margin for all modes and bands.

General and Special Conditions

The EUT was tested using a fully charged battery when applicable. Where a battery could not be used due to the need for a controlled variation of input voltage, an external power supply was utilized.

All testing was done in an indoor controlled environment with an average temperature of 22º C and relative humidity of 50%.

Equipment and Cable Configurations

The EUT was tested in a stand-alone configuration that is representative of typical use.

Manufacturer	Equipment Type	Model No.	Serial Number	Cal. Due Date
Rohde & Schwarz	Receiver	ESI26	838786/010	2/7/2006
Hewlett-Packard	EMC Analyzer	8593EM	3536A00118	10/2/2005
Hewlett-Packard	EMC Analyzer	7405	US39440191	11/13/2005
ETS	DRG Horn Antenna	265	2455	5/25/2006
ETS	DRG Horn Antenna	3115	6222	2/9/2006
ETS	Log-Periodic Antenna	3148	1188	6/14/2006
ETS	Biconical Antenna	3110B	3370	2/16/2006
Attenuator	Weinschel	AS-6	6675	10/14/2005
Attenuator	Weinschel	AS-6	6677	11/4/2005
Rohde & Schwarz	Mobile Test Set	CMD 80	DE29008	N/A
Hewlett-Packard	Signal Generator	83623B	3844A01195	5/23/2006
Thermotron	Environmental Chamber	S-4	31580	1/18/2006
Giga-Tronics	Power Meter	8651A	8650508	12/27/2005
ETS	LISN	3810/2	00023630	6/15/2006
ETS	LISN	3810/2	0010A02179	6/15/2006

Note: The above equipment list is for tests completed August 2005.

Rohde Schwarz	Receiver	ESI26	838786/010	6/17/2006
A.H. Systems Inc.	DRG Horn Antenna	SAS 200/571	365	5/12/2007
ETS	Log-Periodic Antenna	3148	1189	8/22/2006
ETS	Biconical Antenna	3110B	3369	8/15/2006
Attenuator	Weinschel	AS-6	6675	1/10/2007
Attenuator	Weinschel	AS-6	6677	11/14/2006
Miteq	Preamp	NSP2650-NFG	1084144	7/11/2006
Dell	Laptop Computer	M20	NA	NA
Iomega	Zip Drive	Z250S	P9HM1992CK	NA
Olympus	Camera	D-600L	4020727	NA

Note: The above equipment list is for tests completed June 2006.

All equipment is on a one-year calibration cycle.

Measurement Procedures and Data

RF POWER OUTPUT

Measurement Procedure

The RF output port of the equipment under test is directly coupled to the input of a Agilent power meter through a 10dB passive attenuator, adaptor (if needed), and specialized RF connector. The peak power output is measured for all channels.

CFR47 Part 2.1046

Measurement Results

GSM 850

Frequency (MHz)	Power (dBm)
824.2	33.06
836.6	33.93
848.8	33.98

GSM 1900

Frequency (MHz)	Power (dBm)
1850.20	30.01
1880.00	29.93
1909.80	30.03

RADIATED POWER (EIRP AND ERP)

Measurement Procedure

The phone was tested in a 16' anechoic chamber with a 2-axis position system that permits taking complete spherical scans of the EUT's radiation patterns. For all tests, the phone was supported in a free space type environment, vertically oriented in the chamber. Tests were done for GSM 850 three frequencies (824.2, 836.6 and 848.8 MHz) and GSM 1900 three frequencies (1850.2, 1880.00, and 1909.80 MHz) .

GSM measurements were made with the phone placed in a call using the CMU 200 mobile station test set. The phone was weakly coupled to the test set and configured to transmit in full data rate mode. Radiated power was measured at each 15 degree step. The radiated power was measured using a Gigatronics 8542C power meter in "Burst Avg" mode. From these measurements, the software calculates the angle at which maximum radiated power occurs for each case, and the radiated power at this angle was extracted from the data. The max radiated power results for IHDT56GW1 follows, as EIRP in dBm. To get ERP (effective radiated power referenced to a half-wave dipole), subtract 2.14 dB from these numbers.

Measurement Results

GSM 850:
824.2 MHz 33.94 dBm
836.6 MHz 34.66 dBm
848.8 MHz 35.66 dBm

GSM 1900:
1850.2 MHz: 31.23 dBm
1880.0 MHz: 32.03 dBm
1909.8 MHz: 30.06 dBm

For all measurements, calibration was performed via gain substitution with a half-wave dipole.

BAND/TECHNOLOGY	MAXIMUM EIRP(dBm)	MAXIMUM ERP (dBm)
850 GSM	35.66	**33.52**
1900 GSM	**32.03**	29.89

OCCUPIED BANDWIDTH

CFR Part 2.1049, 22.917, 24.238

Measurement Procedure

The RF output port of the equipment under test is directly coupled to the input of the EMC analyzer through a specialized RF connector and a 10dB passive attenuator. The amplitude of the spectrum analyzer is corrected for the attenuator and any other applicable losses. The analyzer is set for Peak Detector and each trace is set for Max Hold. A fully charged battery was used for the supply voltage.

The middle channel within the designated frequency block was measured. For digital modulation, the lower and upper band edge plots are displayed.

Equipment Settings

Plot	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Sweep Points (#)	Trace Mode	Detector	Samples (≥ #)
Reference Plot - GSM 850	300	Auto	1001	Max Hold	Peak	30
OCBW - GSM 850	3	Auto	1001	Max Hold	Peak	30
Lower Band Edge - GSM 850	1	Auto	2004	Max Hold	Peak	30
Upper Band Edge - GSM 850	1	Auto	2004	Max Hold	Peak	30
Reference Plot - GSM 1900	300	Auto	1001	Max Hold	Peak	30
OCBW - GSM 1900	3	Auto	1001	Max Hold	Peak	30
Lower Band Edge - GSM 1900	1	Auto	2004	Max Hold	Peak	30
Upper Band Edge - GSM 1900	1	Auto	2004	Max Hold	Peak	30

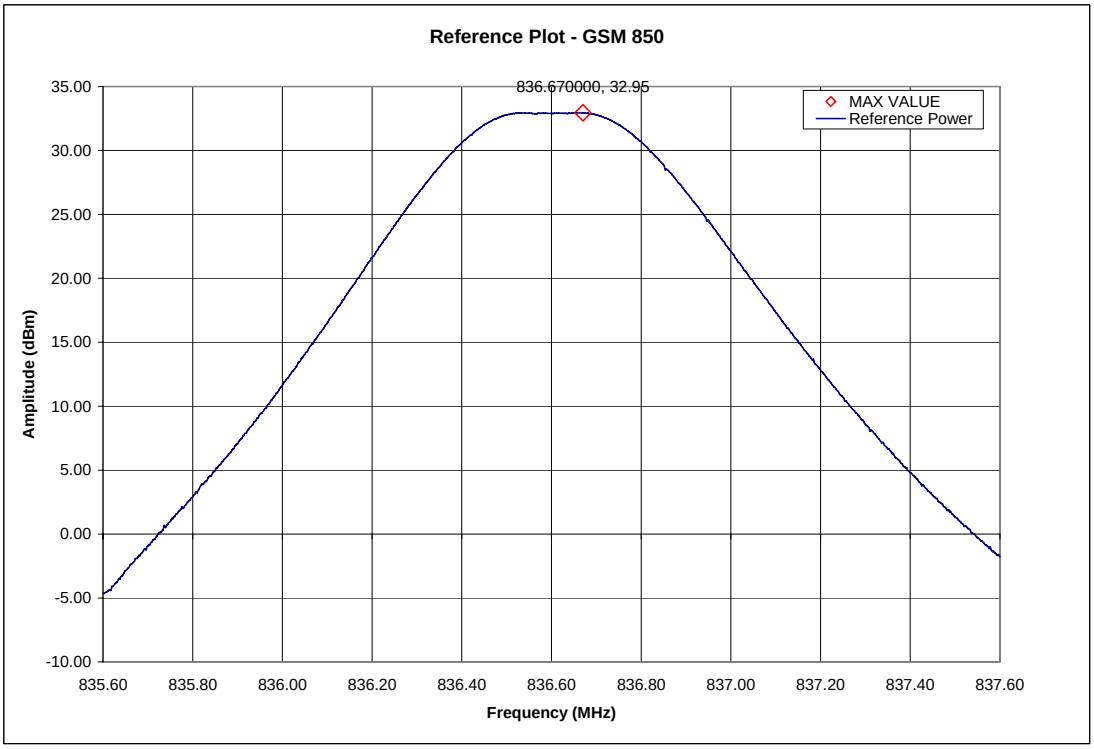
Notes: 1) When the video bandwidth is set to Auto the video bandwidth self adjusts for ³ the resolution bandwidth.
2) The plotted data shown for the band edge measurements is representative of data taken with a true 3 kHz resolution bandwidth filter. The raw data was taken using a 1 kHz resolution bandwidth and was integrated to produce a response representative of data taken using a true 3 kHz resolution bandwidth filter.

Measurement Results

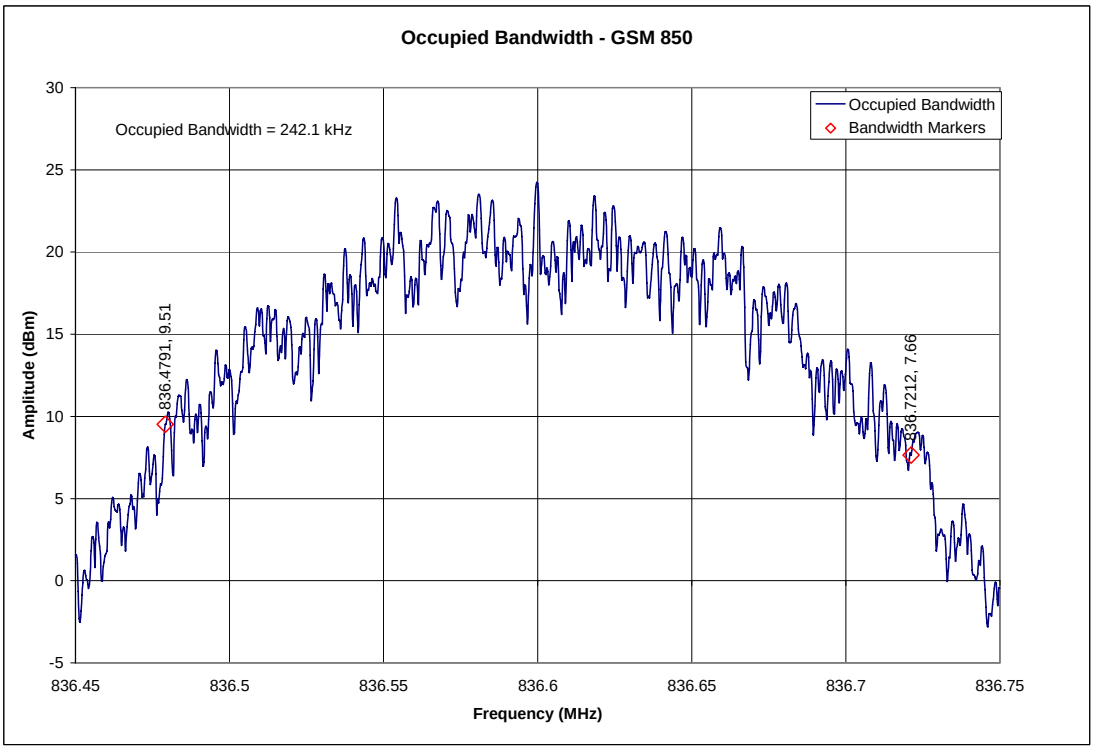
Attached

Measurement Results – GSM 850

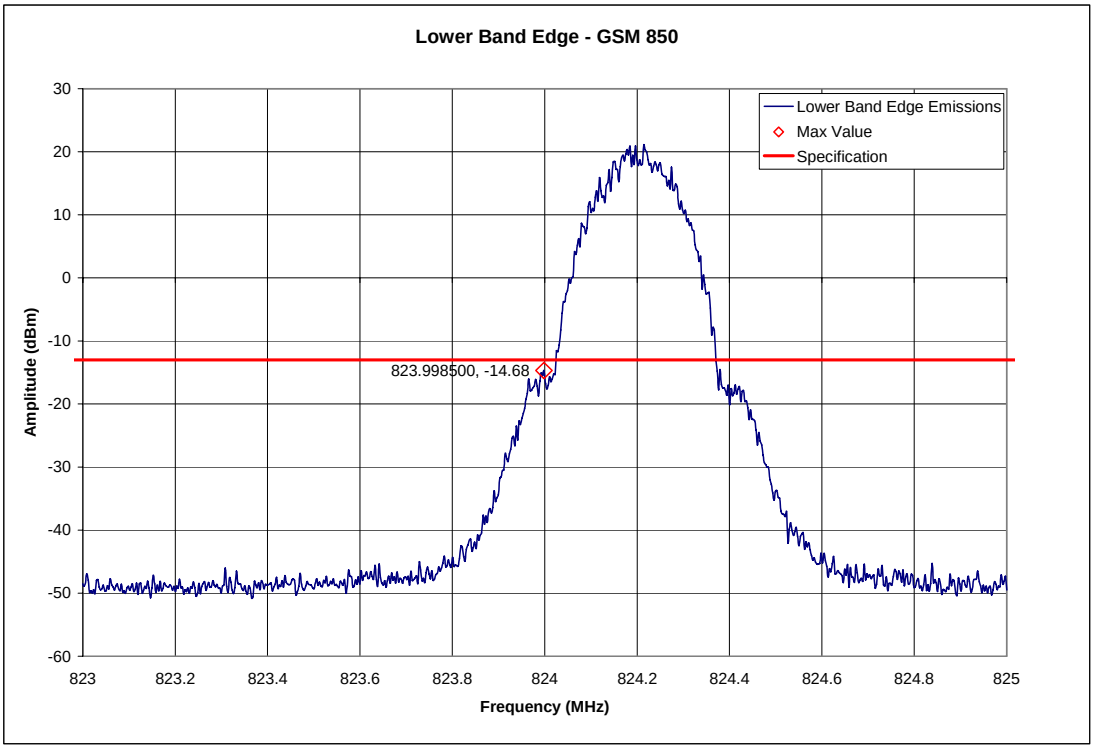
GSM 850 Reference Plot



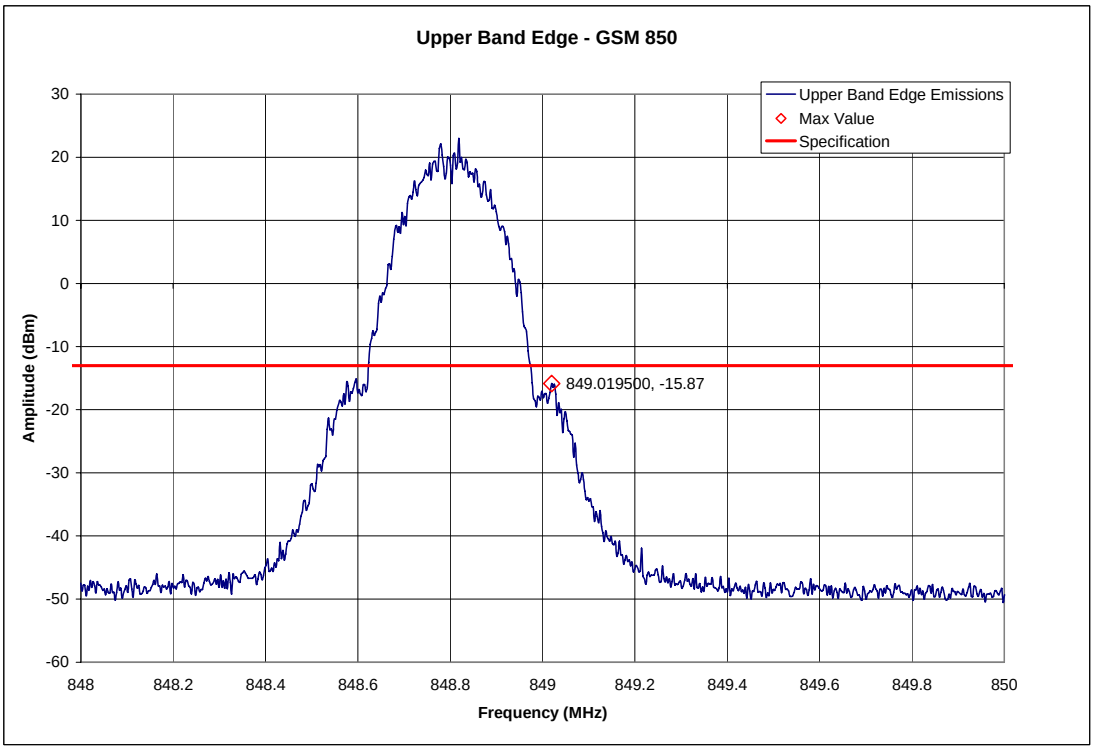
GSM 850 Occupied Bandwidth



GSM 850 Ch128 Lower Band Edge

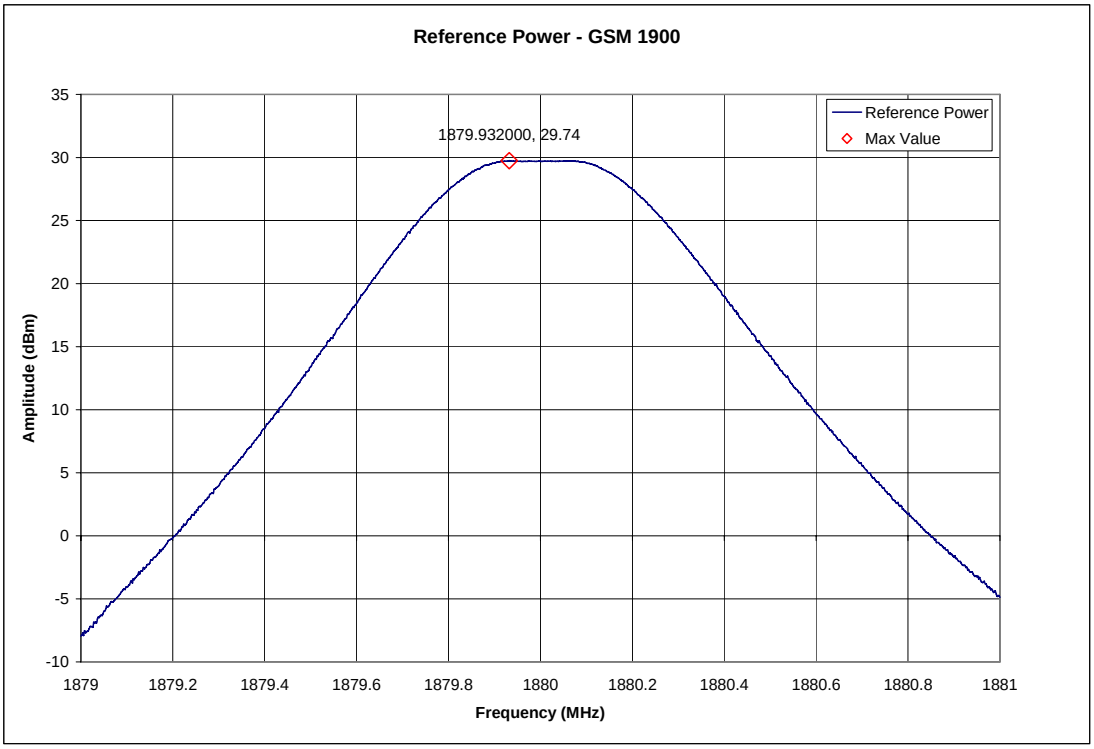


GSM 850 Ch251 Upper Band Edge

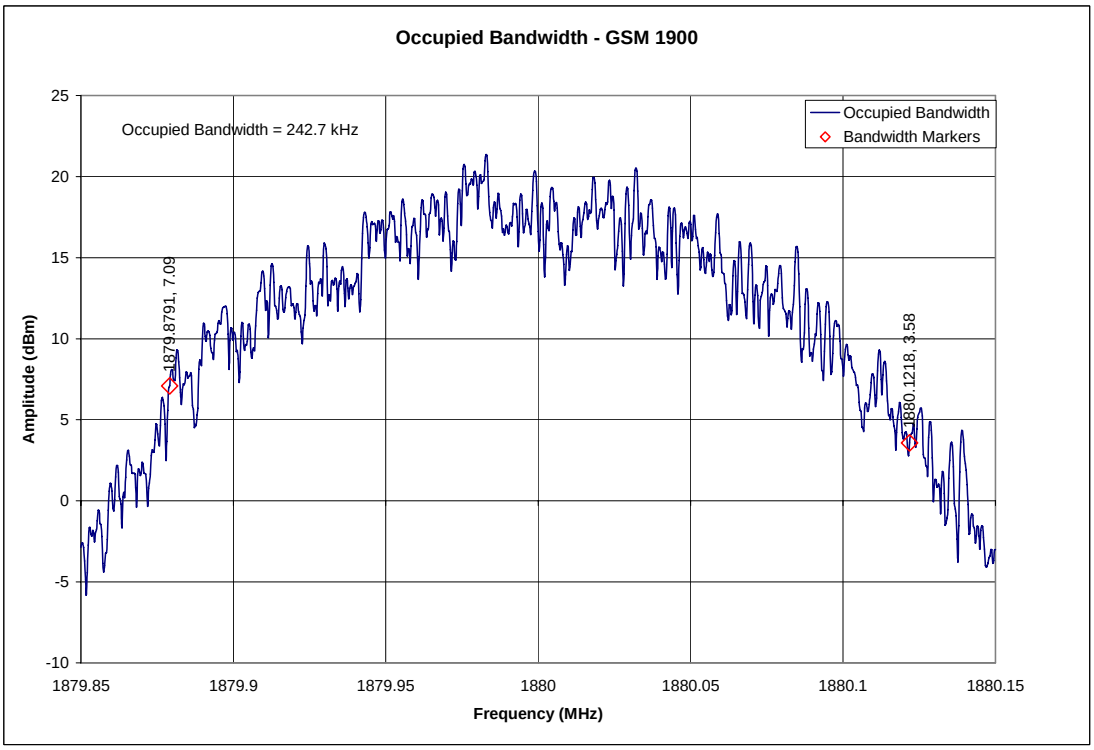


Measurement Results – GSM 1900

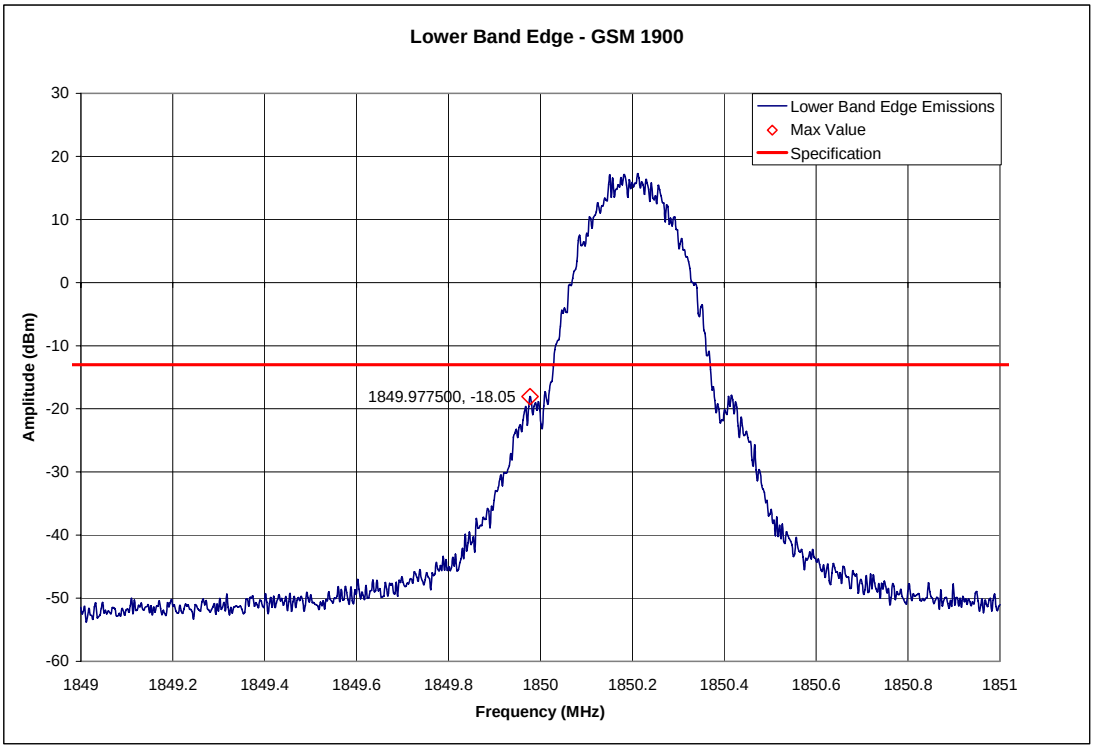
GSM 1900 Reference Plot



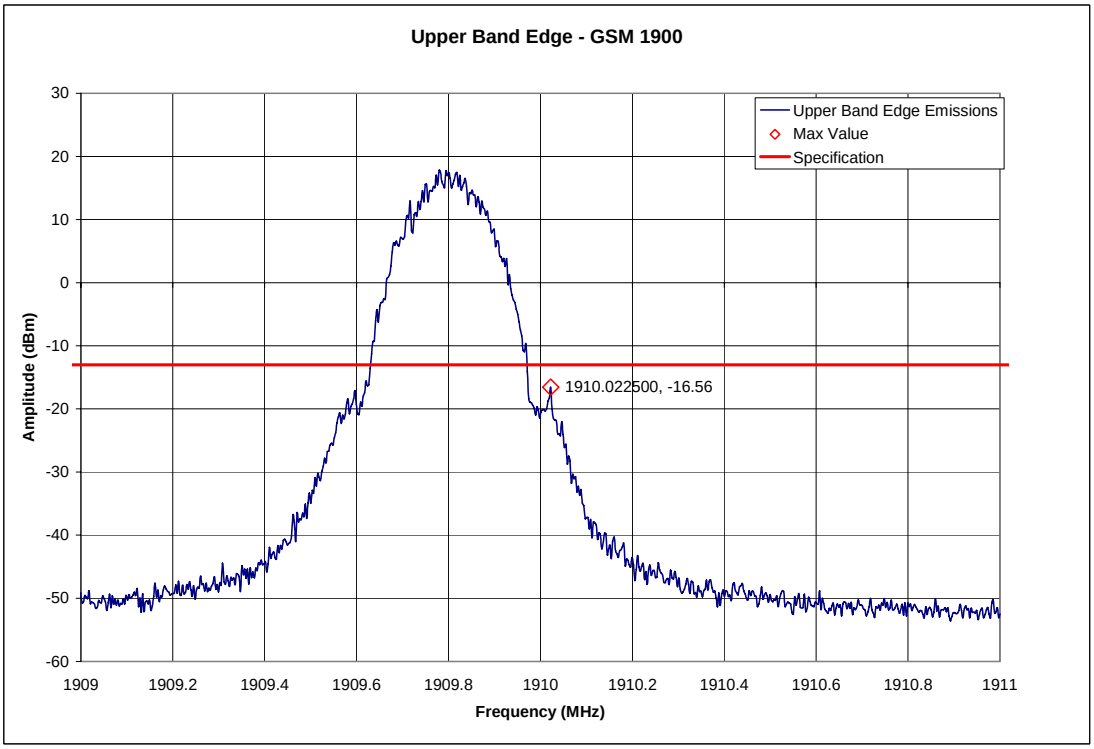
GSM 1900 Occupied Bandwidth



GSM/PCS 1900 Ch512 Lower Band Edge



GSM 1900 Ch810 Upper Band Edge



SPURIOUS EMISSIONS AT ANTENNA TERMINALS

CFR47 Part 2.1051, 24.238

Measurement Procedure

The RF output port of the Equipment Under Test is directly coupled to the input of the EMC analyzer through a specialized RF connector and a 10dB passive attenuator. A fully charged battery was used for the supply voltage.

The spectrum was investigated from the lowest frequency signal generated, without going below 9 kHz, up to at least the tenth harmonic of the fundamental or 40 GHz, whichever is lower.

The spectrum analyzer settings were as follows:

Units	dBm
Divisions	10 dB
Resolution Bandwidth	1 MHz
Video Bandwidth (AVG)	Auto
Sweep Time	Auto

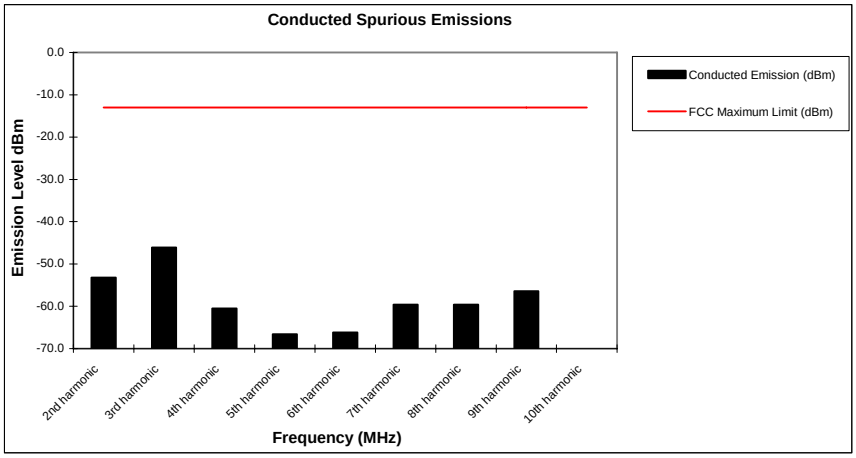
Measurement Results

Attached

Measurement Results
Modulation: GSM 850

Conducted Spurious and Harmonic Emissions

Harmonic of Fundamental	FCC Maximum Limit (dBm)	Conducted Emission (dBm)
2nd harmonic	-13	-53.2
3rd harmonic	-13	-46.1
4th harmonic	-13	-60.5
5th harmonic	-13	-66.6
6th harmonic	-13	-66.2
7th harmonic	-13	-59.6
8th harmonic	-13	-59.6
9th harmonic	-13	-56.4
10th harmonic	-13	*

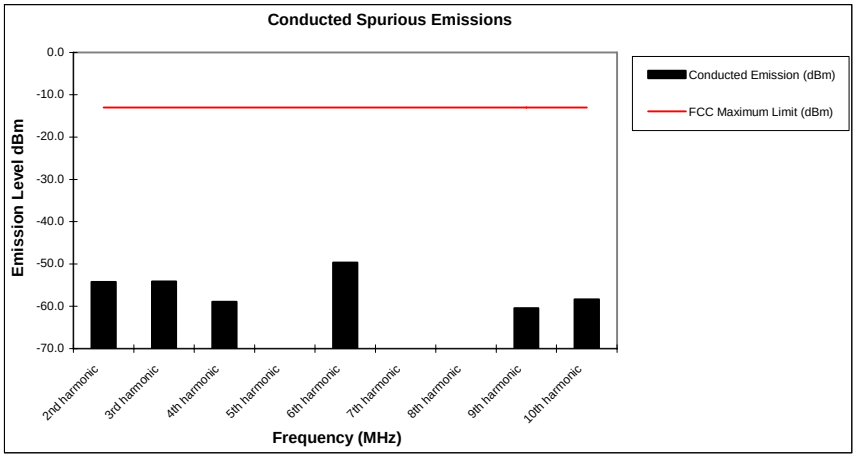


Notes:
1. * Indicates the spurious emission could not be detected due to noise limitations or ambients.
2. Each emission reported reflects the highest absolute level at the specific harmonic for the low, mid, and high channels at maximum power.
3. The Spectrum was investigated from 9 kHz to the tenth harmonic of the fundamental.

Measurement Results
Modulation: GSM 1900

Conducted Spurious and Harmonic Emissions

Harmonic of Fundamental	FCC Maximum Limit (dBm)	Conducted Emission (dBm)
2nd harmonic	-13	-54.3
3rd harmonic	-13	-54.2
4th harmonic	-13	-58.9
5th harmonic	-13	*
6th harmonic	-13	-49.7
7th harmonic	-13	*
8th harmonic	-13	*
9th harmonic	-13	-60.4
10th harmonic	-13	-58.4



Notes:
1. * Indicates the spurious emission could not be detected due to noise limitations or ambients.
2. Each emission reported reflects the highest absolute level at the specific harmonic for the low, mid, and high channels at maximum power.
3. The Spectrum was investigated from 9 kHz to the tenth harmonic of the fundamental.

FIELD STRENGTH OF SPURIOUS EMISSIONS

CFR47 Part 2.1053, 22.917, 24.238

Measurement Procedure

The equipment under test is placed inside the semi-anechoic chamber on a wooden table at the turntable center. For each spurious frequency, the antenna mast is raised and lowered from 1 to 4 meters and the turntable is rotated 360 degrees to obtain a maximum reading on the spectrum analyzer. This is repeated for both horizontal and vertical polarizations of the receive antenna.

The equipment under test is then replaced with a substitution antenna fed by a signal generator. With the signal generator tuned to a particular spurious frequency, the antenna mast is raised and lowered from 1 to 4 meters to obtain a maximum reading at the spectrum analyzer. The output of the signal generator is then adjusted until a reading identical to that obtained with the actual transmitter is achieved.

The power in dBm of each spurious emission is calculated by correcting the signal generator level for cable loss and gain of the substitution antenna referenced to a dipole. A fully charged battery was used for the supply voltage.

The settings of the receiver were as follows:

Units	dBm
Divisions	5 dB
Resolution Bandwidth	1 MHz
Video Bandwidth (AVG)	Auto
Sweep Time	Auto

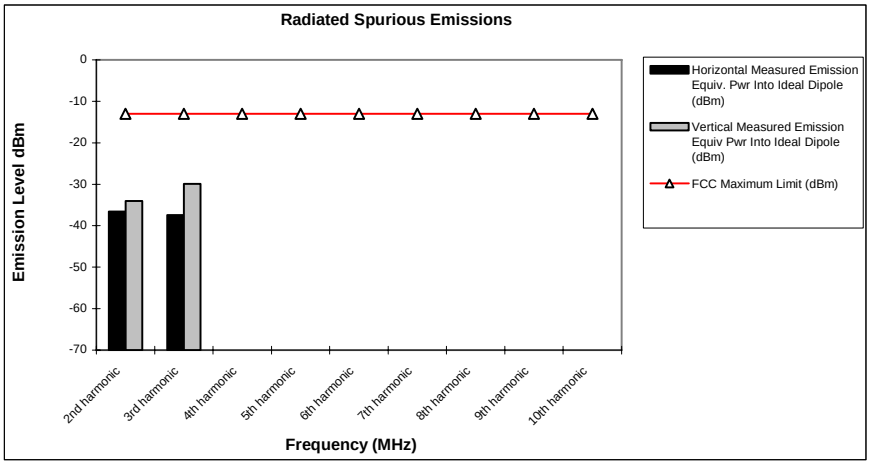
Measurement Results

Attached

Modulation: GSM 850

Radiated Spurious and Harmonic Emissions

Frequency (MHz)	FCC Maximum Limit (dBm)	Horizontal Measured Emission Equiv. Pwr Into Ideal Dipole (dBm)	Vertical Measured Emission Equiv Pwr Into Ideal Dipole (dBm)
2nd harmonic	-13	-36.6	-34.0
3rd harmonic	-13	-37.4	-29.9
4th harmonic	-13	*	*
5th harmonic	-13	*	*
6th harmonic	-13	*	*
7th harmonic	-13	*	*
8th harmonic	-13	*	*
9th harmonic	-13	*	*
10th harmonic	-13	*	*

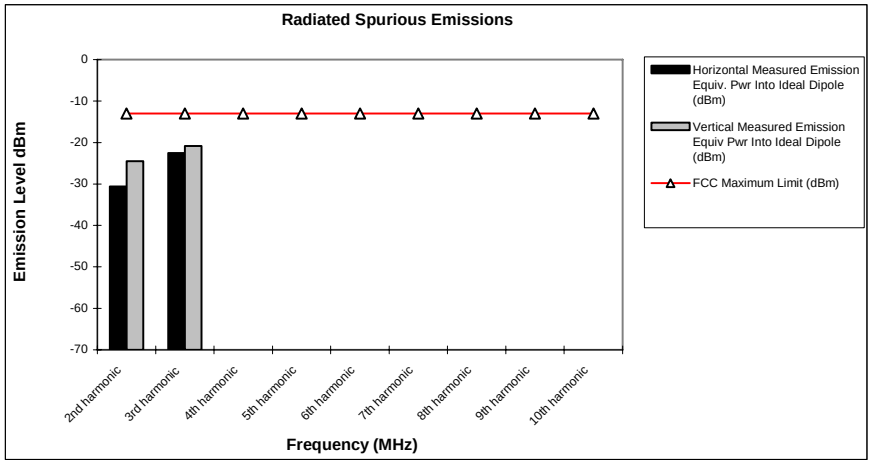


Notes:
1. * Indicates the spurious emission could not be detected due to noise limitations or ambients.
2. Each emission reported reflects the highest absolute level at the specific harmonic for the low, mid, and high channels at maximum power.
3. The Spectrum was investigated from 30 MHz to the tenth harmonic of the fundamental.

Modulation: GSM 1900

Radiated Spurious and Harmonic Emissions

Frequency (MHz)	FCC Maximum Limit (dBm)	Horizontal Measured Emission Equiv. Pwr Into Ideal Dipole (dBm)	Vertical Measured Emission Equiv Pwr Into Ideal Dipole (dBm)
2nd harmonic	-13	-30.6	-24.5
3rd harmonic	-13	-22.6	-20.8
4th harmonic	-13	*	*
5th harmonic	-13	*	*
6th harmonic	-13	*	*
7th harmonic	-13	*	*
8th harmonic	-13	*	*
9th harmonic	-13	*	*
10th harmonic	-13	*	*



Notes:
1. * Indicates the spurious emission could not be detected due to noise limitations or ambients.
2. Each emission reported reflects the highest absolute level at the specific harmonic for the low, mid, and high channels at maximum power.
3. The Spectrum was investigated from 30 MHz to the tenth harmonic of the fundamental.

FREQUENCY STABILITY

CFR47 Part 2.1055, 24.235

Measurement Procedure

The equipment under test is placed in an environmental chamber. The antenna port of the Equipment Under Test is directly coupled to the input of the measurement equipment through a specialized RF connector. A power supply is attached as the primary voltage supply.

Frequency measurements are made at the extremes of the temperature range -30º C to +60º C and at intervals of 10º C with the primary supply voltage set to the nominal battery operating voltage. A period of time sufficient to stabilize all components of the equipment is allowed at each frequency measurement. The maximum variation of frequency is measured.

At room temperature, the primary supply voltage is reduced to the battery operating endpoint of the equipment under test. The maximum variation of frequency is measured. A battery eliminator was used for the input supply voltage.

Measurement Results

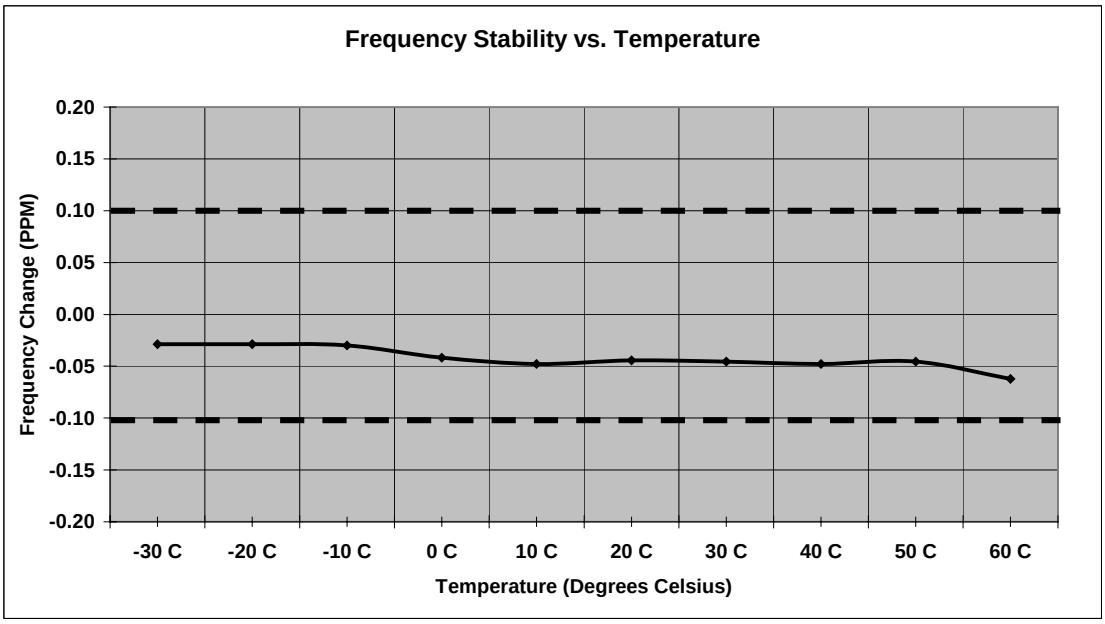
Attached

Measurement Results
Modulation: GSM850

Frequency Stability

Mode: GSM 850 **Operating Frequency:** 836.6 MHz
Channel: 190 **Deviation Limit (PPM):** 0.1 ppm

Temperature	Frequency Error	Frequency Error	Voltage	Voltage
C	HZ	(PPM)	(%)	(VDC)
-30 C	**-24.00**	**-0.029**	100%	3.60
-20 C	**-24.00**	**-0.029**	100%	3.60
-10 C	**-25.00**	**-0.030**	100%	3.60
0 C	**-35.00**	**-0.042**	100%	3.60
10 C	**-40.00**	**-0.048**	100%	3.60
20 C	**-37.00**	**-0.044**	100%	3.60
30 C	**-38.00**	**-0.045**	100%	3.60
40 C	**-40.00**	**-0.048**	100%	3.60
50 C	**-38.00**	**-0.045**	100%	3.60
60 C	**-52.00**	**-0.062**	100%	3.60
20 C	**-38.00**	**-0.045**	Battery Endpoint	2.85

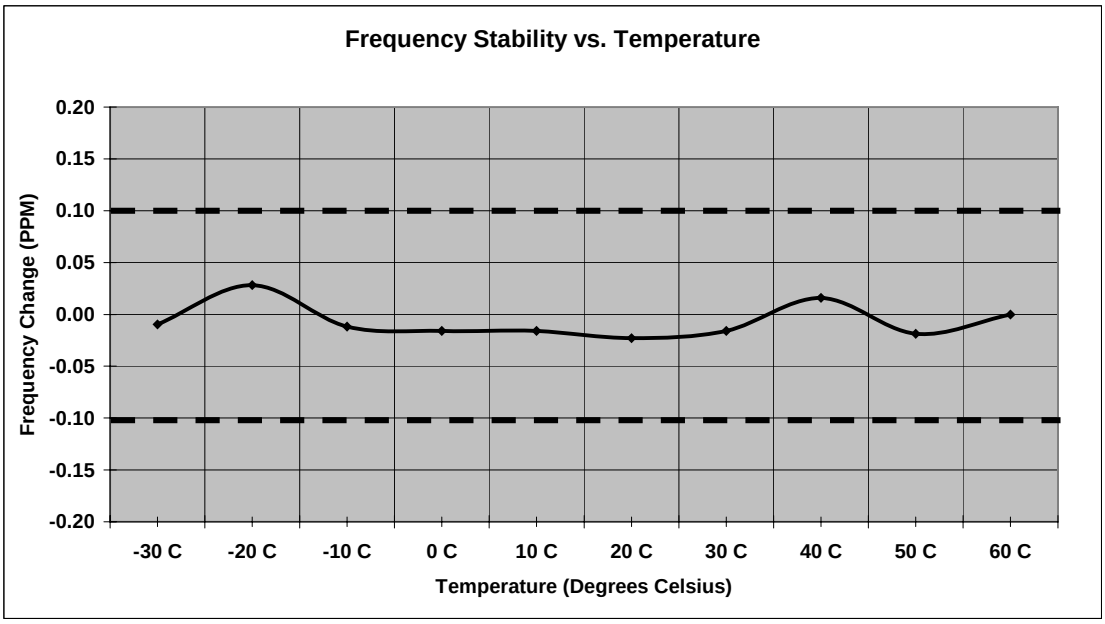


Measurement Results
Modulation: GSM1900

Frequency Stability

Mode: GSM 1900 **Operating Frequency:** 1880.0 MHz
Channel: 661 **Deviation Limit (PPM):** 0.1 ppm

Temperature	Frequency Error	Frequency Error	Voltage	Voltage
C	HZ	(PPM)	(%)	(VDC)
-30 C	**-18.00**	**-0.010**	100%	3.60
-20 C	**53.00**	**0.028**	100%	3.60
-10 C	**-22.00**	**-0.012**	100%	3.60
0 C	**-30.00**	**-0.016**	100%	3.60
10 C	**-30.00**	**-0.016**	100%	3.60
20 C	**-43.00**	**-0.023**	100%	3.60
30 C	**-30.00**	**-0.016**	100%	3.60
40 C	**30.00**	**0.016**	100%	3.60
50 C	**-35.00**	**-0.019**	100%	3.60
60 C		**0.000**	100%	3.60
20 C	**-28.00**	**-0.015**	Battery Endpoint	2.85



FIELD STRENGTH OF EMISSIONS FROM UNINTENTIONAL RADIATORS

CFR Part 15.109

Measurement Procedure

The equipment under test is placed inside the semi-anechoic chamber on a wooden table at the turntable center. For each radiated emission, the antenna mast is raised and lowered from 1 to 4 meters and the turntable is rotated 360 degrees to obtain a maximum peak reading on the spectrum analyzer. The radiated emissions are then measured using an EMI receiver employing a CISPR quasi-peak detector function below 1000 MHz and an average detector function above 1000 MHz. This is repeated for both horizontal and vertical polarizations of the receive antenna. A fully charged battery was used for the supply voltage.

The field strength of each radiated emission is calculated by correcting the EMI receiver level for cable loss, amplifier gain, and antenna correction factors.

Field Strength (dBuV/m) = EMI Receiver Level (dBuV) + Cable Loss (dB) - Amplifier Gain (dB) + Antenna Correction Factor (1/m)

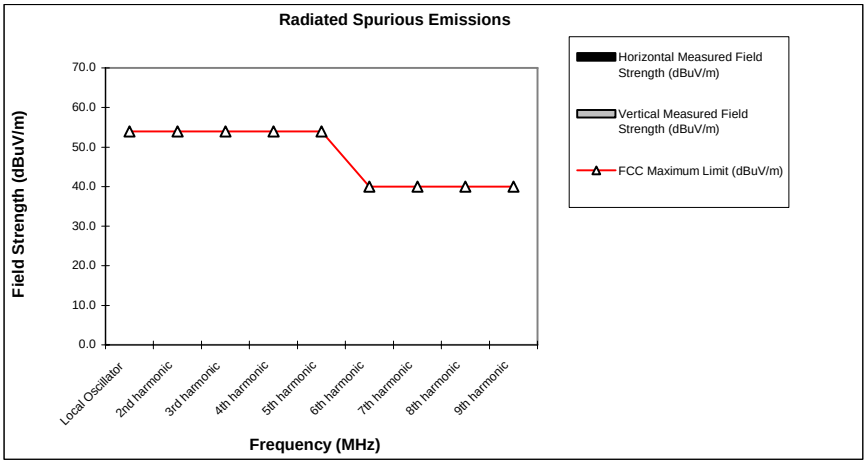
Measurement Results

Attached

Measurement Results
All Modulation Schemes

Receiver Radiated Spurious Emissions

Frequency (MHz)	FCC Maximum Limit (dBuV/m)	Horizontal Measured Field Strength (dBuV/m)	Vertical Measured Field Strength (dBuV/m)
Local Oscillator	54	*	*
2nd harmonic	54	*	*
3rd harmonic	54	*	*
4th harmonic	54	*	*
5th harmonic	54	*	*
6th harmonic	40	*	*
7th harmonic	40	*	*
8th harmonic	40	*	*
9th harmonic	40	*	*
10th harmonic	40	*	*



Notes:
1. * Indicates the spurious emission could not be detected due to noise limitations or ambients.
2. Each emission reported reflects the highest absolute level at the specific frequency for the low, mid, and high channels.

Measurement Results
Computer Peripheral Testing

Test Setup

The EUT and the host equipment were setup according to the procedures in ANSI C63.4-2003. The EUT was connected to a laptop computer using a USB data cable. The USB data cable is 1 m in length. The parallel and the serial ports of the computer were populated. The EUT was communicating with the laptop computer continuously.

Operating Mode – Rx Mode, Data Transfer Mode.

30 MHz – 1000 MHz

Frequency	Level	Measured	Antenna Factor	Cable Loss	Limit	Margin	Height	Angle	Pol.
MHz	dBuV/m	dBuV	dB	dB	dBuV/m	dB	cm	deg	
35.08	32.03	12.55	11.6	7.8	40	8	100	34	VERT
35.12	29.57	10.1	11.6	7.8	40	10.4	209	29	VERT
86.52	33.57	15.18	9.4	9	40	6.4	150	236	VERT
87.08	33.6	15.15	9.5	9	40	6.4	150	227	VERT
103.36	29.51	9.26	10.9	9.3	43.5	14	150	248	VERT
163.64	34.92	11.92	12.8	10.2	43.5	8.6	245	116	HORI
191.4	36.2	11.05	14.6	10.5	43.5	7.3	201	227	HORI
261.84	32.09	7.77	13	11.3	46	13.9	100	208	HORI
319	39.58	12.67	15	11.9	46	6.4	100	267	HORI
365.04	39.62	11.98	15.4	12.2	46	6.4	150	196	VERT
921.88	38.66	-1.01	23.7	16	46	7.3	249	327	HORI

Above 1 GHz

Frequency	Level	Measured	Antenna Factor	Gain	Limit	Margin	Height	Angle	Pol.
MHz	dBµV/m	dBµV	dB	dB	dBµV/m	dB	cm	deg	
1118.7	37.65	22.62	23.8	8.8	53.9	16.2	283	286	VERT
1122.2	37.34	22.26	23.8	8.8	53.9	16.6	100	106	VERT
1961.8	39.75	17.53	28.3	6.1	53.9	14.2	120	54	HORI
1987.1	40.94	18.19	28.7	5.9	53.9	13	350	55	HORI
1993.9	41.2	18.38	28.8	6	53.9	12.7	209	344	HORI
1998.2	41.37	18.54	28.9	6	53.9	12.5	350	129	HORI
2000.3	41.1	18.57	28.5	6	53.9	12.8	370	22	VERT

AC LINE CONDUCTED EMISSIONS

CFR 47 Part 15.207

Measurement Procedure

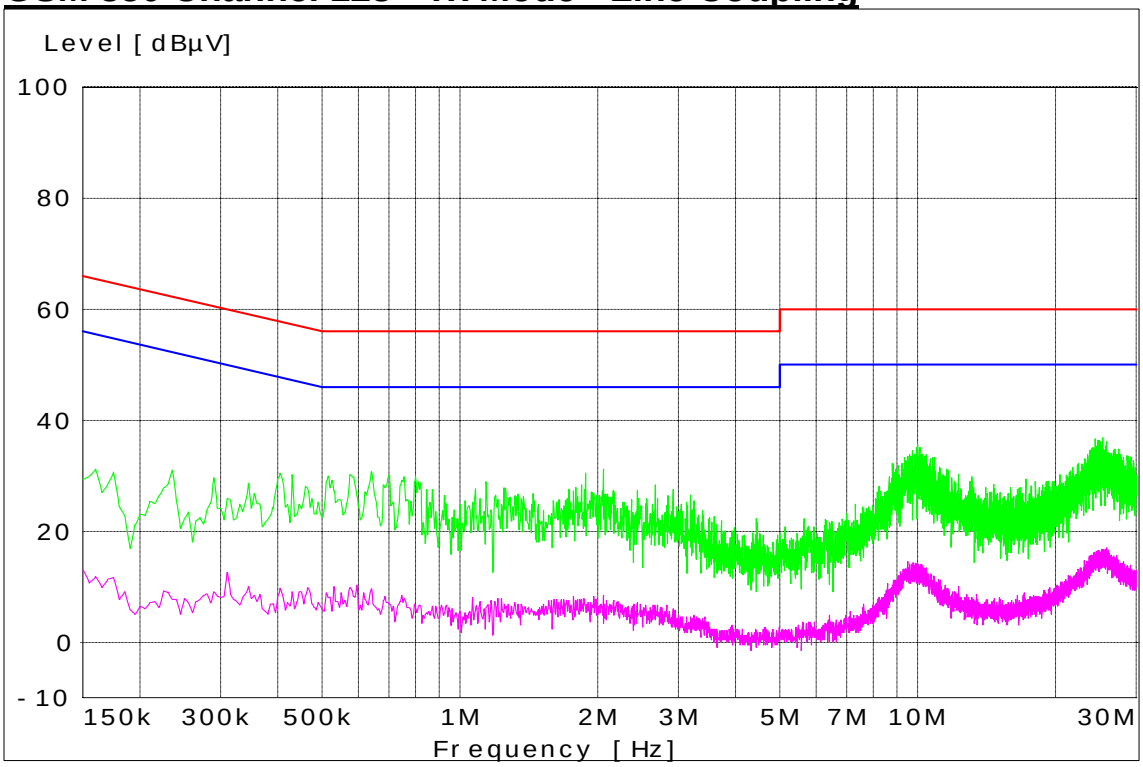
Measured levels of ac power line conducted emission shall be the radio-noise voltage from the line probe or across the 50 Ω LISN port, where permitted, terminated into a 50 Ω noise meter, or where permitted or required, the radio-noise current on the power line sensed by a current probe.

All radio-noise voltage and current measurements shall be made on each current-carrying conductor at the plug end of the EUT power cord or calibrated extension cord by the use of mating plugs and receptacles on the EUT and LISN. Equipment shall be tested with power cords that are normally supplied using an LISN, the 50 Ω measuring port is terminated by a 50 Ω radio-noise meter or a 50 Ω resistive load. All other ports are terminated in 50 Ω.

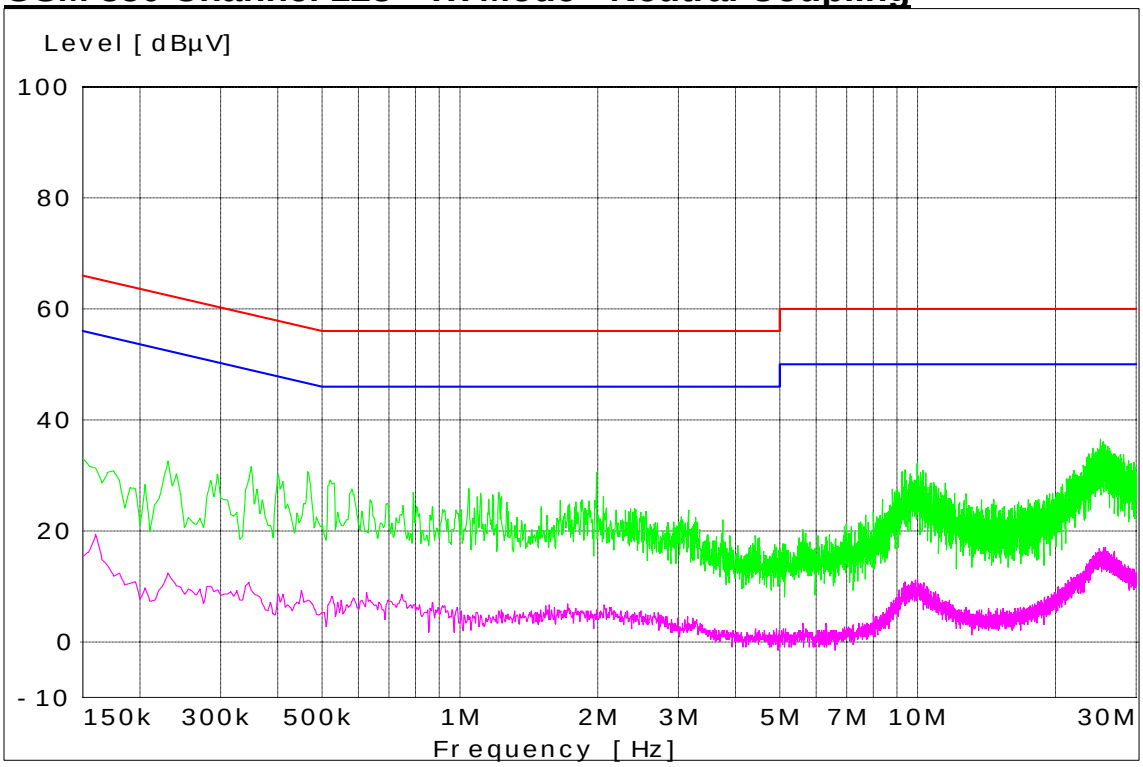
Measurement Results

See attached:

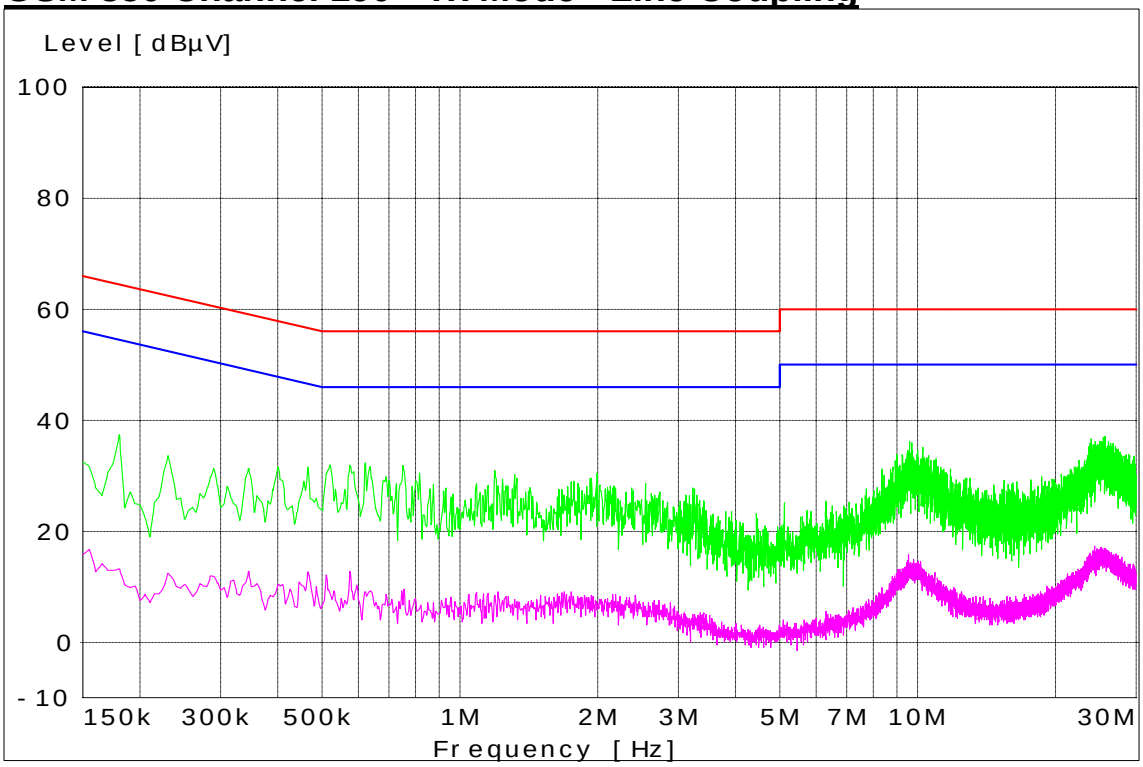
GSM 850 Channel 128 - Tx Mode - Line Coupling



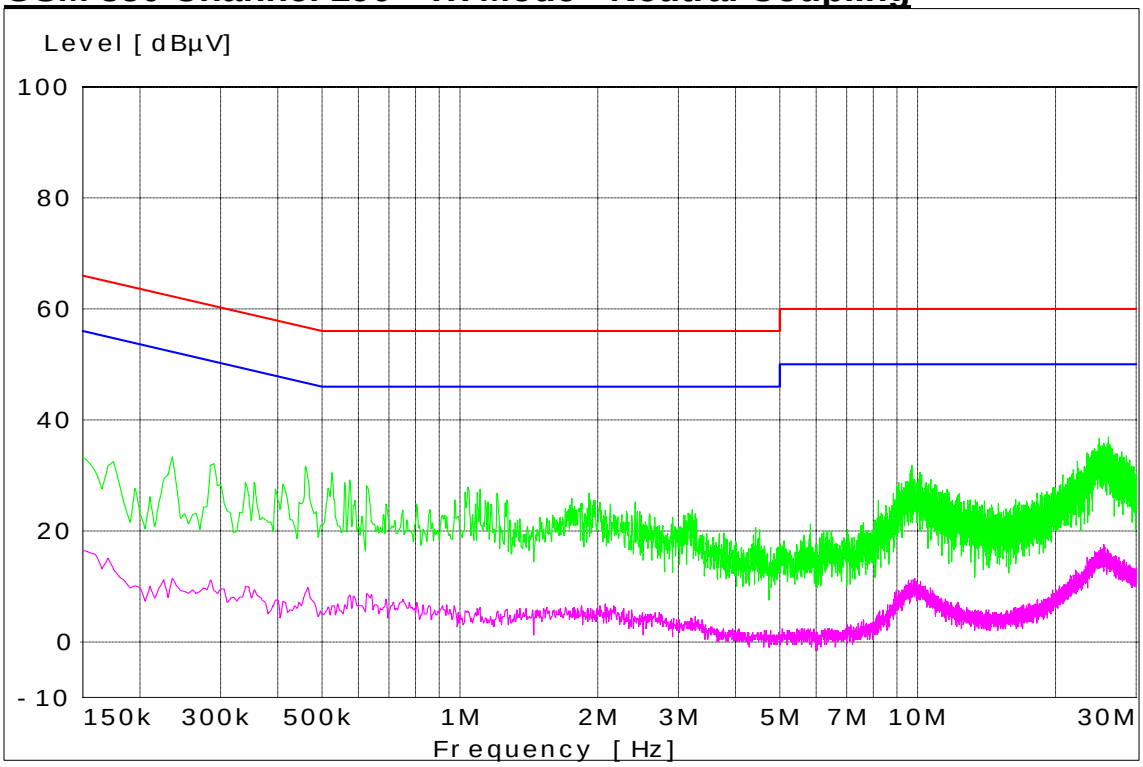
GSM 850 Channel 128 - Tx Mode - Neutral Coupling



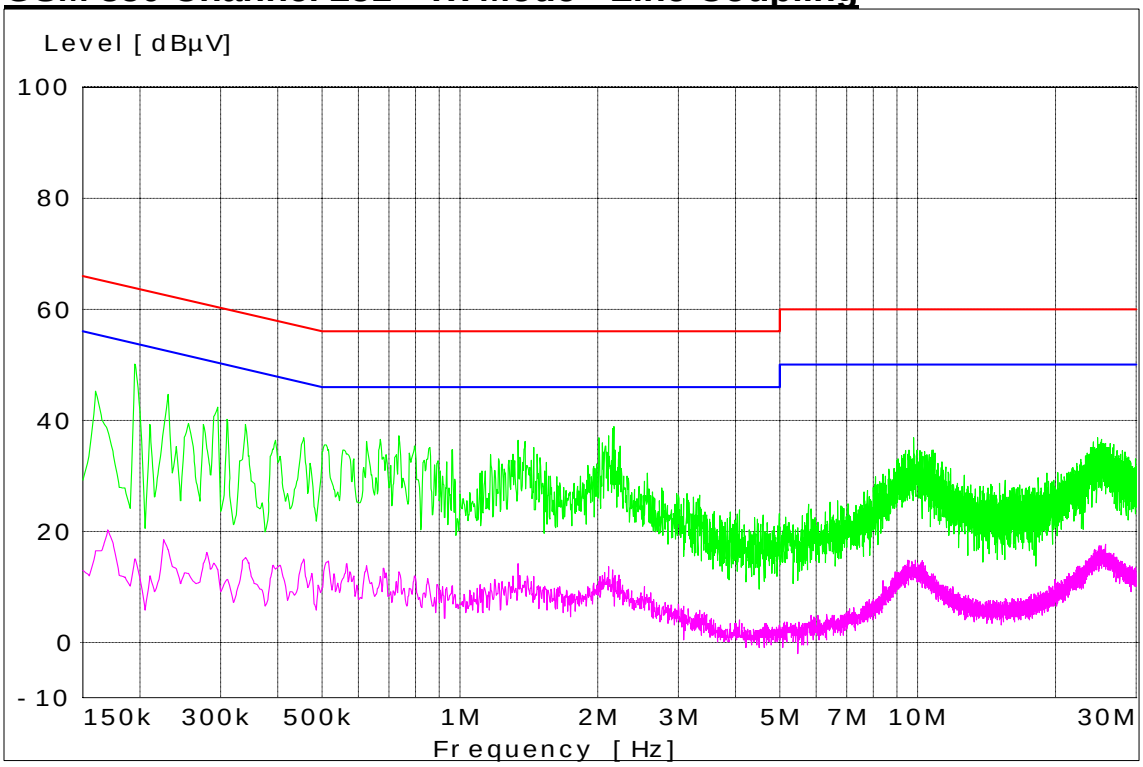
GSM 850 Channel 190 - Tx Mode - Line Coupling



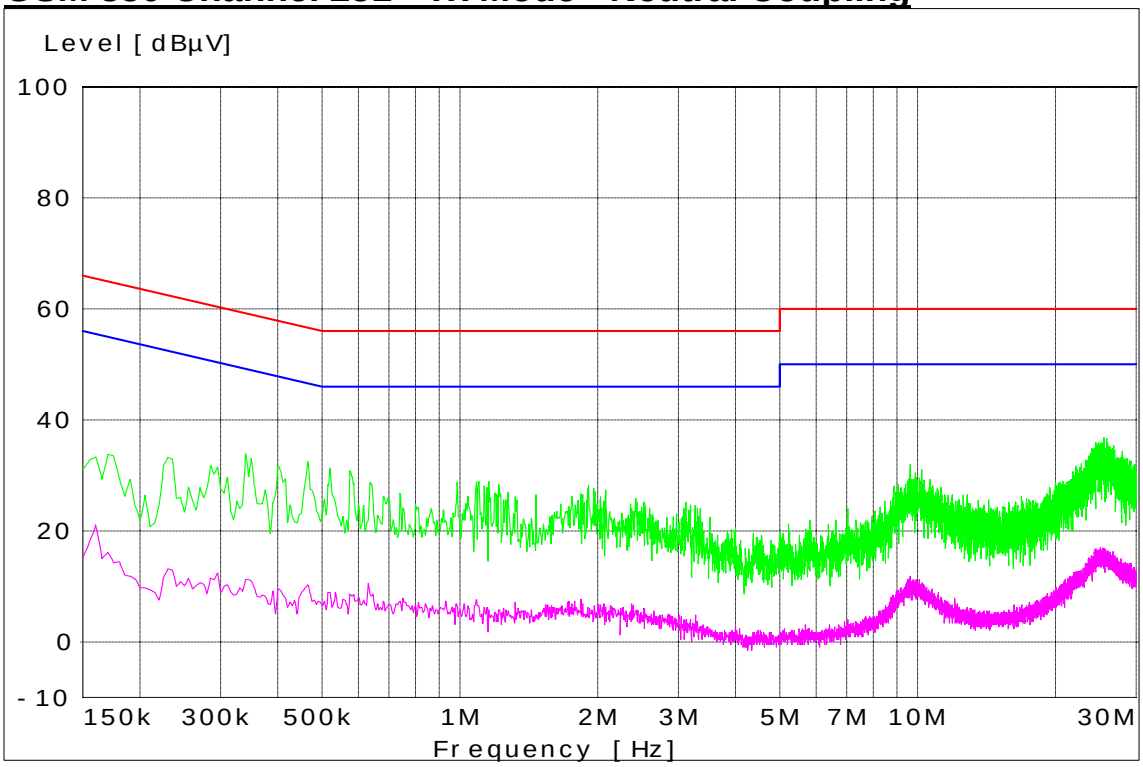
GSM 850 Channel 190 - Tx Mode - Neutral Coupling



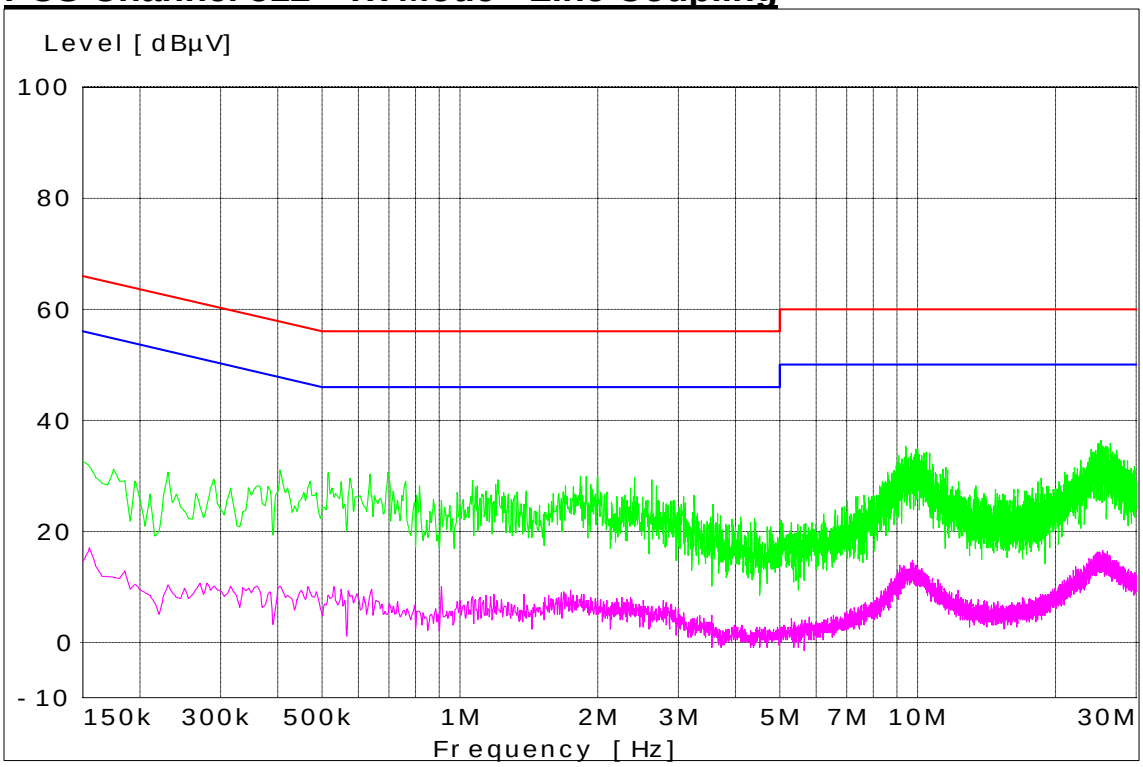
GSM 850 Channel 251 - Tx Mode - Line Coupling



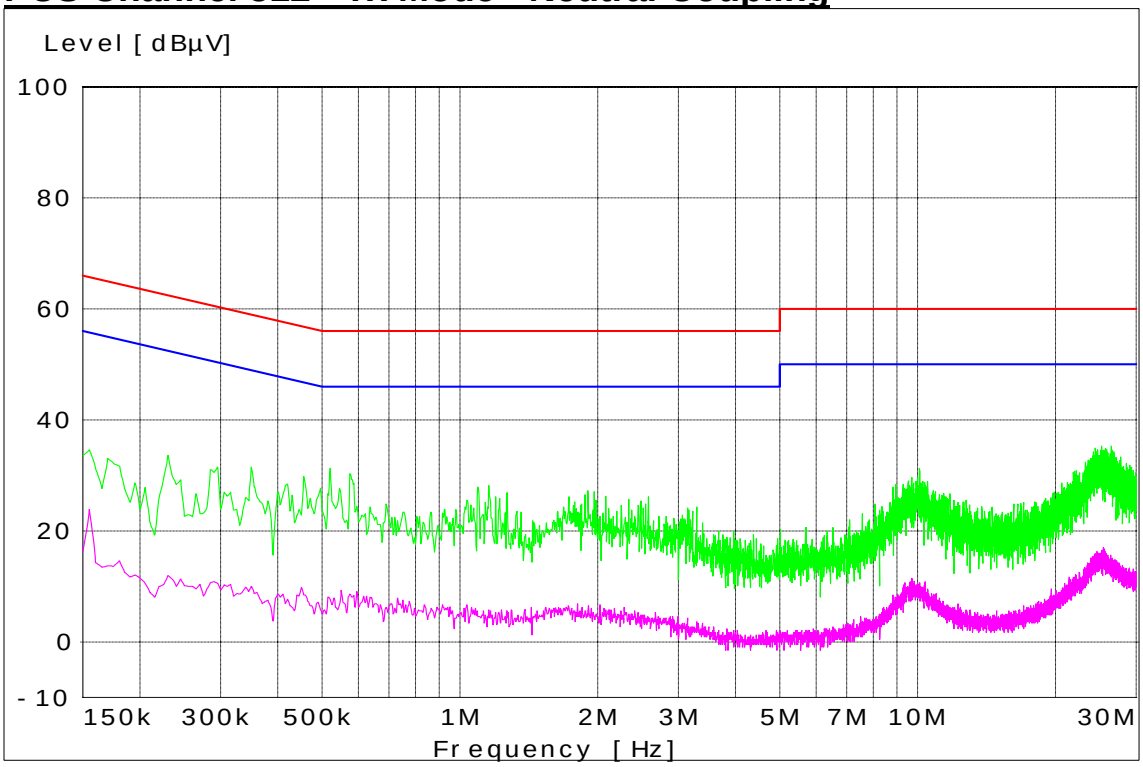
GSM 850 Channel 251 - Tx Mode - Neutral Coupling



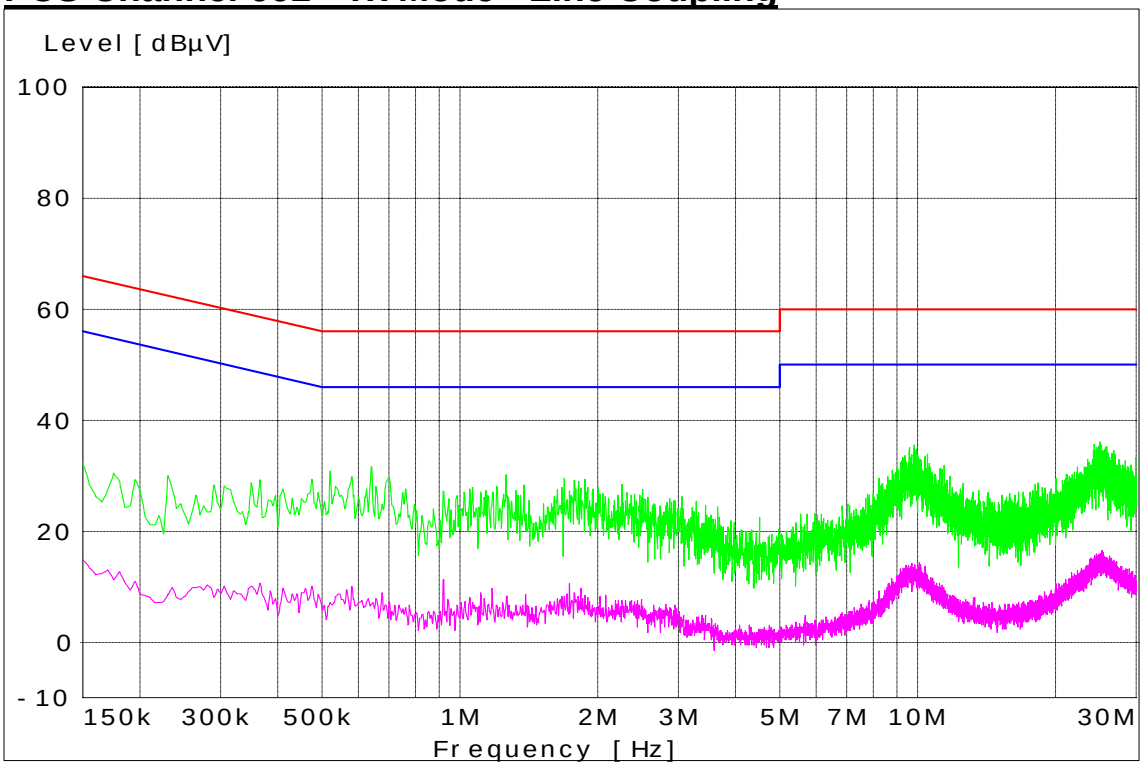
PCS Channel 512 - Tx Mode - Line Coupling



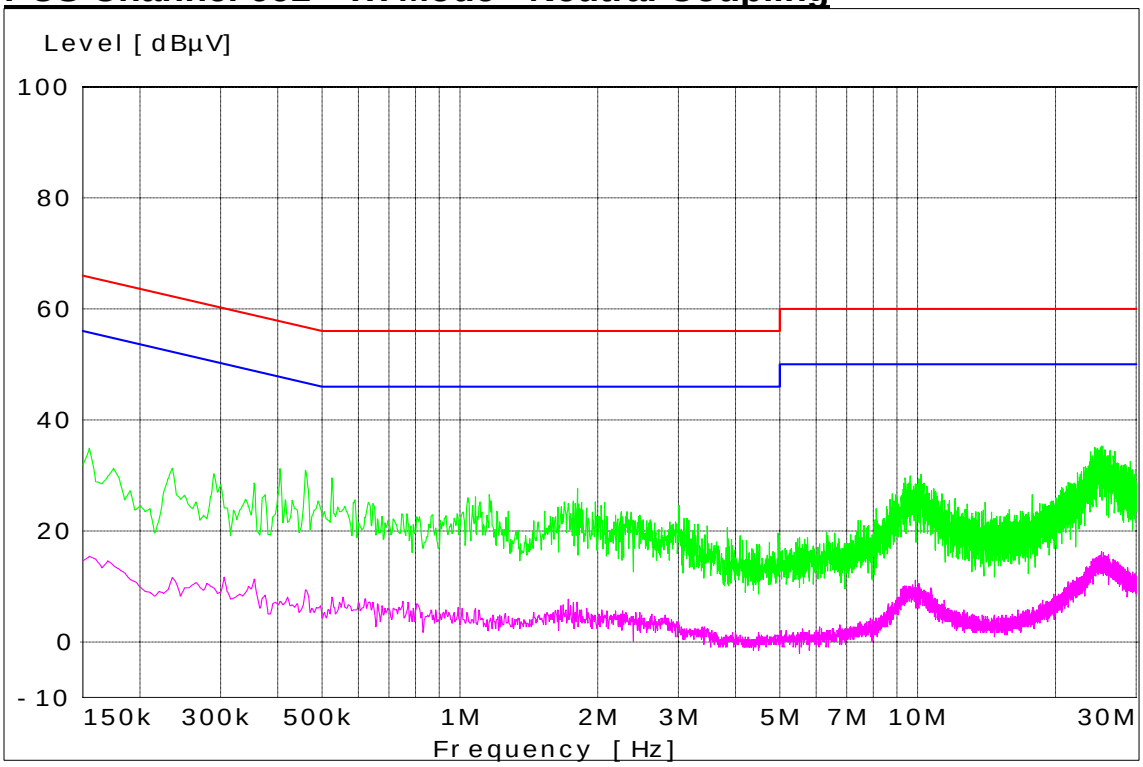
PCS Channel 512 - Tx Mode - Neutral Coupling



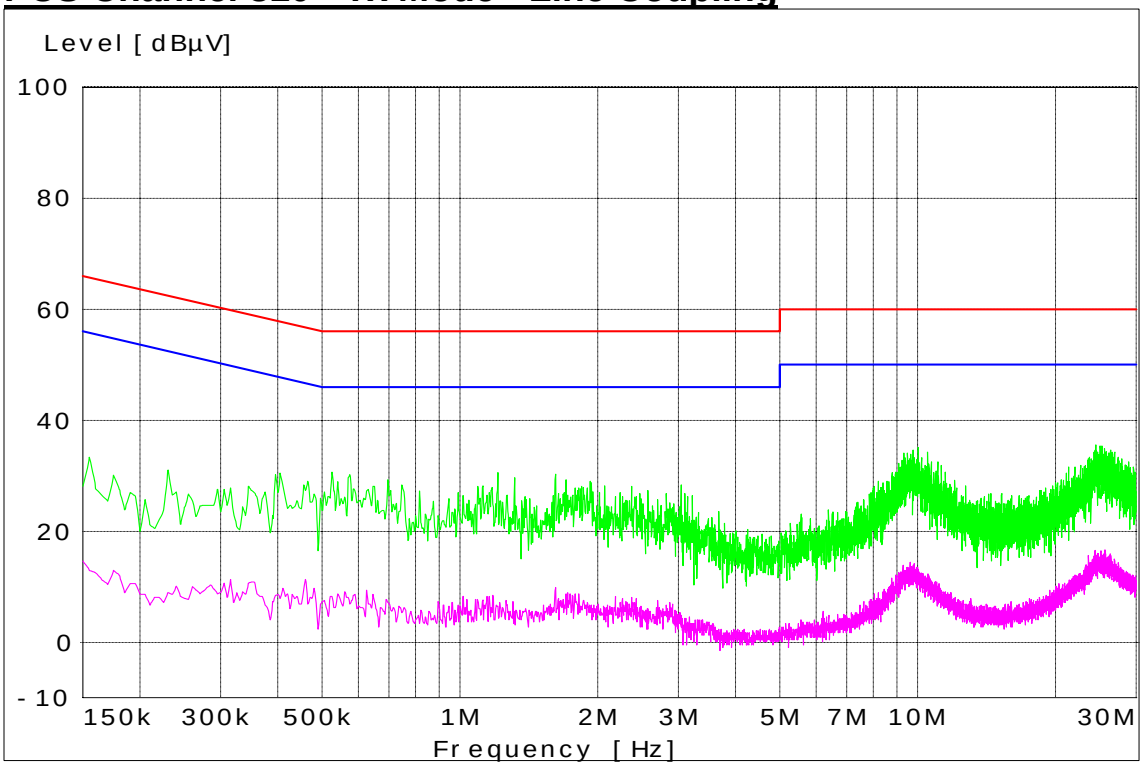
PCS Channel 661 - Tx Mode - Line Coupling



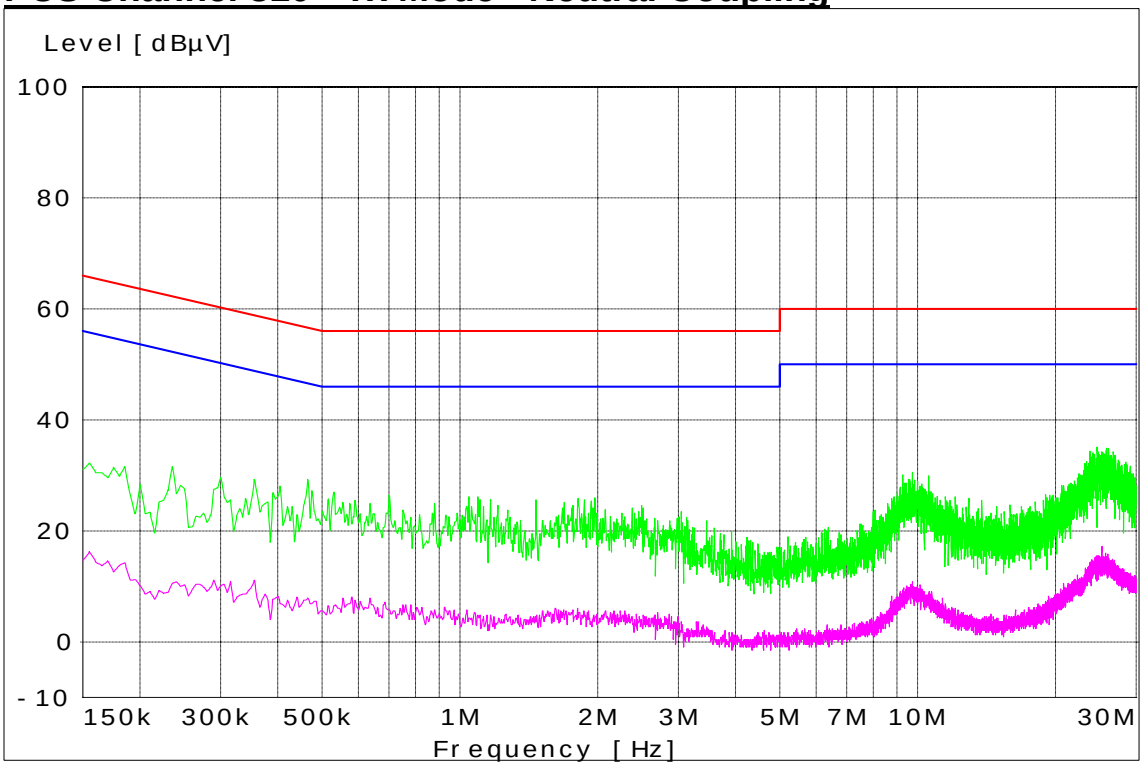
PCS Channel 661 - Tx Mode - Neutral Coupling



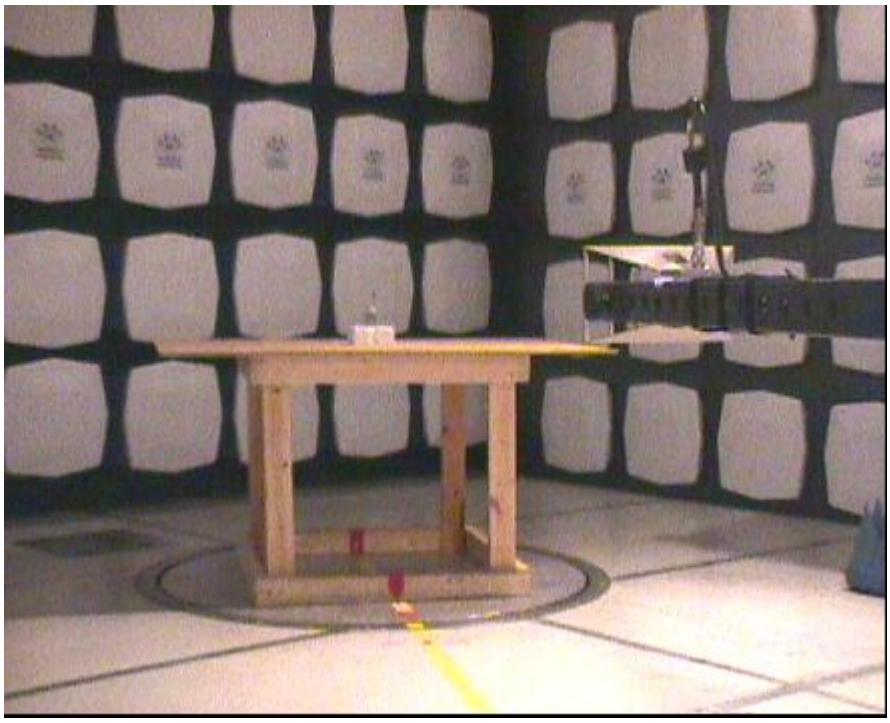
PCS Channel 810 - Tx Mode - Line Coupling



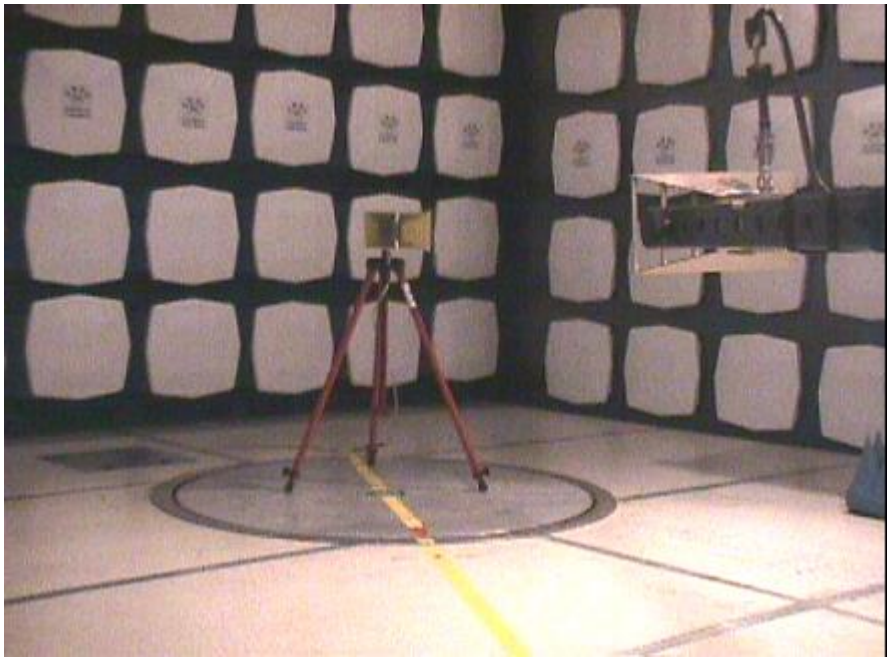
PCS Channel 810 - Tx Mode - Neutral Coupling



Appendix A – Radiated Emissions Test Setup Photos



A.1 Radiated Emissions Measurement



A.2 Substitution Measurement

End of Test Report