683-3, Yubang-Dong, Yongin-Si, Kyunggi-Do, Korea. 449-080
Tel: +82-31-321-2664 Fax: +82-31-321-1664
http://www.digitalemc.com

CERTIFICATE OF COMPLIANCE
FCC Part 24 Certification

Dates of Tests: February 13 ~ 17, 2006
Test Report S/N:DR50110602C
Test Site : DIGITAL EMC CO., LTD.

Model No. **SBWVK2010**

APPLICANT **VK Corporation**

Classification:	**Licensed Portable Transmitter Held to Ear (PCE)**
FCC Rule Part(s):	**§24(E), §2**
EUT Type:	**GSM900/1800/PCS1900 Tri-Band GPRS Terminal With Bluetooth Equipment**
Model name:	**VK2010**
Serial number:	**Identical prototype**
TX Frequency Range:	**1850.2 ~ 1909.8 MHz**
RX Frequency Range:	**1930.2 ~ 1989.8 MHz**
Max. RF Output Power:	**0.357 W EIRP GSM1900 (25.53dBm)**
Max. SAR Measurement:	**1.100W/kg GSM1900 Head SAR / 0.128W/kg GSM1900 Body SAR**
Date of Issue:	**February 17, 2006**

TABLE OF CONTENTS

MEASUREMENT REPORT

1. Scope

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

§2.1033 General Information

Applicant: VK Corporation

Address: VK B/D, 548-6, Anyang 8dong, Manan-gu, Anyang City, Kyonggi do, 430-716, Korea

Attention: Eric Won **(General Manager)**

- FCC ID: SBWVK2010
- Quantity: The mass product
- Tx Freq. Range: 1850.2 ~ 1909.8 MHz
- Rx Freq. Range: 1930.2 ~ 1989.8 MHz
- Max. Power Rating: 0.357 W ERP GSM1900 (25.53dBm)
- FCC Classification(s): Licensed Portable Transmitter Held to Ear (PCE)
- Equipment (EUT) Type: GSM900/1800/1900 Tri-Band GPRS Terminal With Bluetooth Equipment
- Modulation(s): GMSK
- Frequency Tolerance: ± 0.00025 % (2.5ppm)
- FCC Rule Part(s): §24(E), §2
- Dates of Tests: February 13 ~ 17, 2006
- Place of Tests: DIGITAL EMC
- Test Report S/N: DR50110602C

2. Introduction

This report contains the result of tests performed by:

DIGITAL EMC CO., LTD.
Address : 683-3, Yubang-Dong, Yongin-Si, Kyunggi-Do, Korea. 449-080
http://www.digitalemc.com E-mail : demc@unitel.co.kr
Tel: +82-31-321-2664 Fax: +82-31-321-1664

Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the "General requirements for the competent of calibration and testing laboratory".
This laboratory is accredited by NVLAP for NVLAP Lab. Code : 200559-0.

Test operator: engineer

Data	Name	Signature
February 17, 2006	Won-Jung LEE	

Report Reviewed By: manager

Data	Name	Signature
February 17, 2006	Harvey Sung	

Ordering party:

Company name	:	VK Corporation
Address	:	6F, Vk B/D, 548-6, Anyang 8dong, Manan-gu
Zipcode	:	430-716
City/town	:	Anyang City, Kyonggi do
Country	:	KOREA
Date of order	:	December 26, 2005

3. Test Report

3.1 Summary of tests

FCC Part Section(s)	Parameter	Status (note 1)
24.232(b)	Power Output	C
2.1049(h)(i)	Occupied Bandwidth	C
24.238(b)	Emission Bandwidth	C
2.1051 / 24.238	Emission Limits Transmitter	C
2.1053 (a)	Field Strength of Spurious Radiation	C
2.1053	Receiver Radiated Emissions	C
2.1055	Frequency Stability	C
2.1057	Conducted Spurious Emissions	C
Note 1: C= Complies NC=Not Complies NT=Not Tested NA=Not Applicable		

The sample was tested according to the following specification:

FCC Parts §24(E), §2; ANSI C-63.4-2003

3.2 Requirements

3.2.1 Output Power

FCC ID	:	**SBWVK2010**
Specification	:	47 CFR 2.1046 (a)
Tested Frequency	:	1850.2MHz, 1880.0MHz and 1909.8MHz for GSM1900

Measurement Procedure:

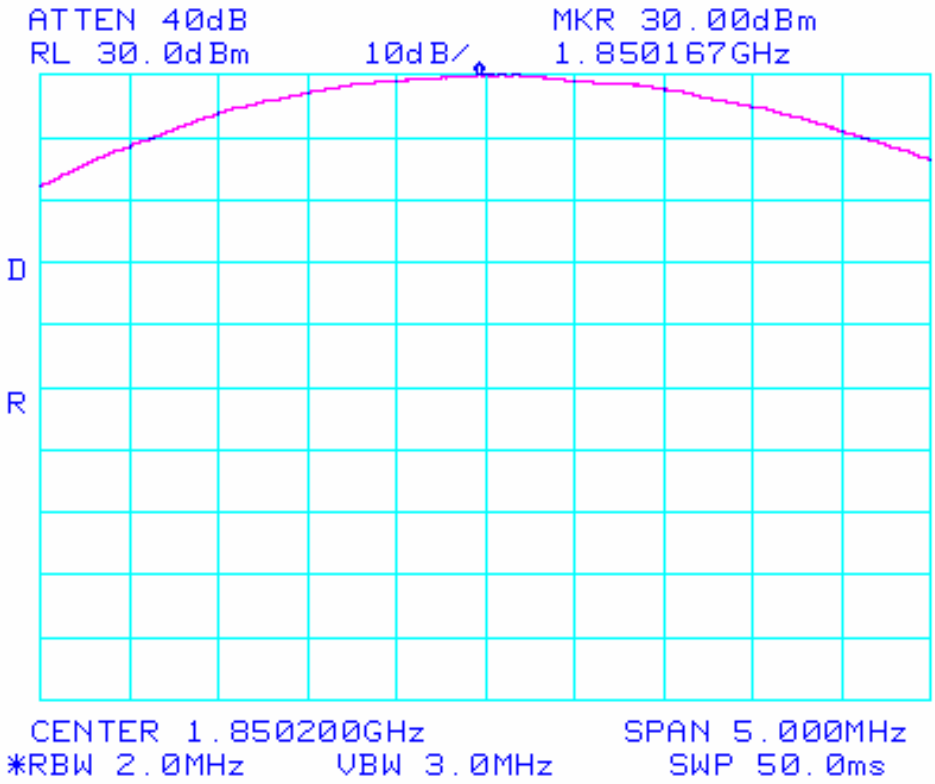
- During the process of testing, the EUT was controlled via Radio Communication tester to ensure max. power transmission and proper modulation.
- Power output was measured at the RF output terminals when the transmitter is adjusted in accordance with communication tester (or the tune-up procedure).

Measurement Data:

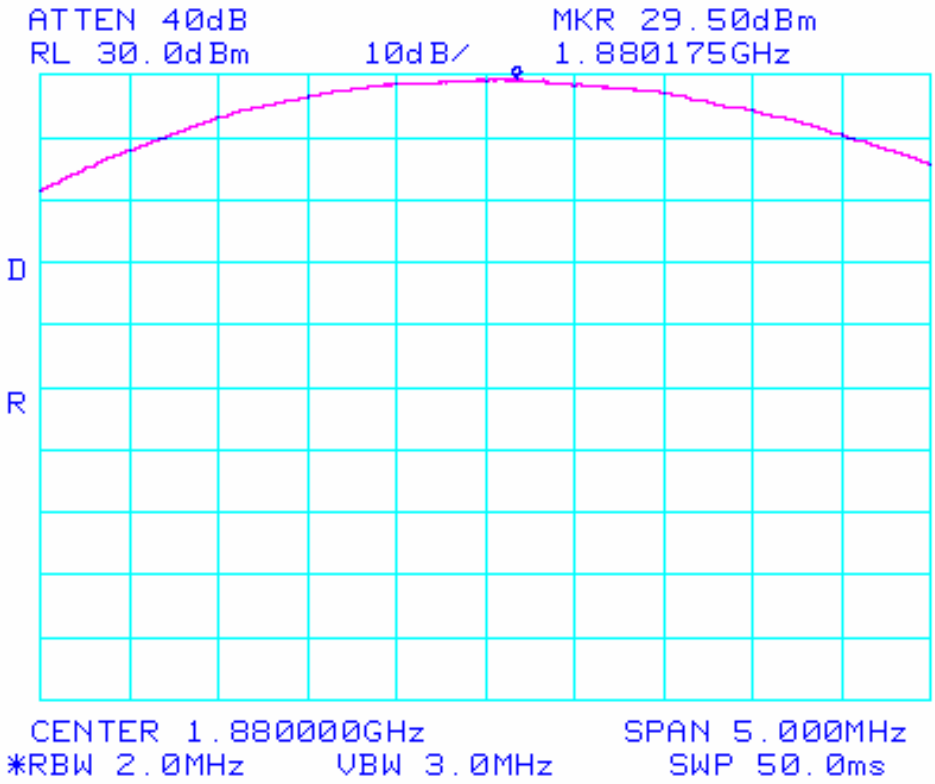
GSM1900

Channel	Frequency (MHz)	TEST CONDITIONS Power Step: 5
		(dBm)
512	1850.2	**30.00**
661	1880.0	**29.50**
810	1909.8	**28.33**

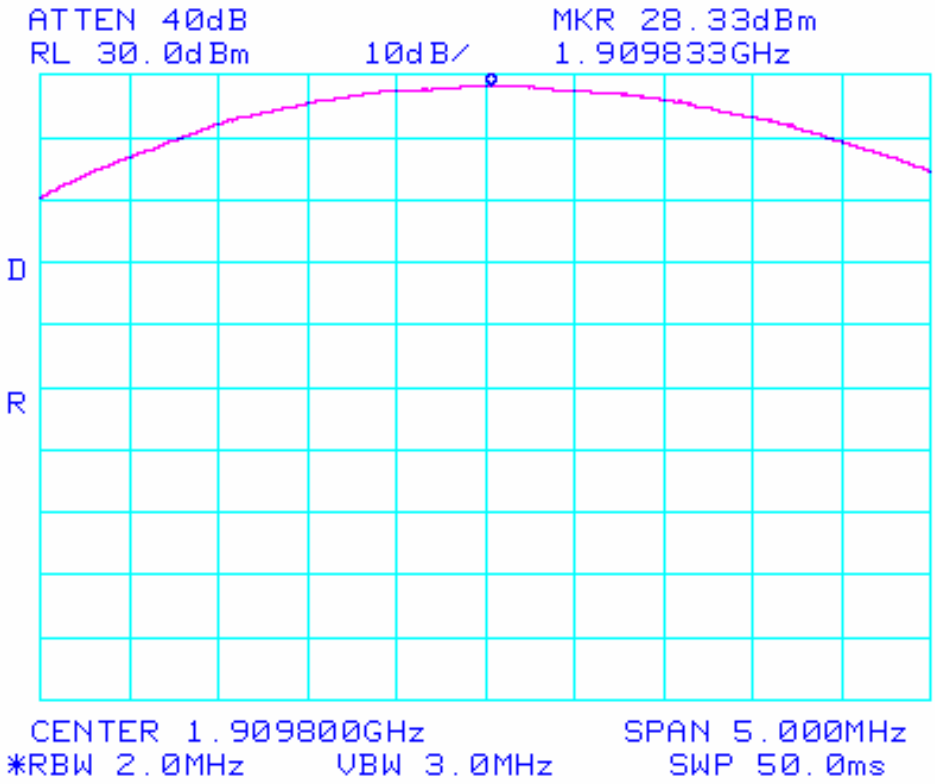
POWER OUT. GSM1900 Ch.512



POWER OUT. GSM1900 Ch.661



POWER OUT. GSM1900 Ch.850



EIRP (GSM1900)

FCC ID	:	**SBWVK2010**
Specification	:	47 CFR 24.232(b)
Tested Frequency	:	1850.2MHz, 1880.0MHz and 1909.8MHz for GSM1900
RBW=VBW	:	3MHz

Measurement Procedure:

Effective Radiated Power Output Measurements by Substitution Method

according to ANSI/TIA/EIA-603-A-2001, Aug. 15, 2001:

The EUT was placed on a wooden turntable 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. The conducted power at the terminals of the dipole is measured. The ERP is recorded.

Measurement Data:

GSM1900

Channel	Frequency (MHz)	TEST CONDITIONS				Power Step: 0
		Ref. level (dBm)	Pol. (H/V)	EIRP (dBm)	EIRP (W)	Battery
512	1850.2	-14.40	H	25.04	0.319	Standard
661	**1880.0**	**-13.00**	**H**	**25.53**	**0.357**	**Standard**
810	1909.8	-14.20	H	24.08	0.256	Standard

3.2.2 Occupied Bandwidth

FCC ID	:	**SBWVK2010**
Specification	:	47 CFR 2.1049 (h)(i)
Tested Frequency	:	1850.2MHz, 1880.0MHz and 1909.8MHz for GSM1900

Measurement Procedure:

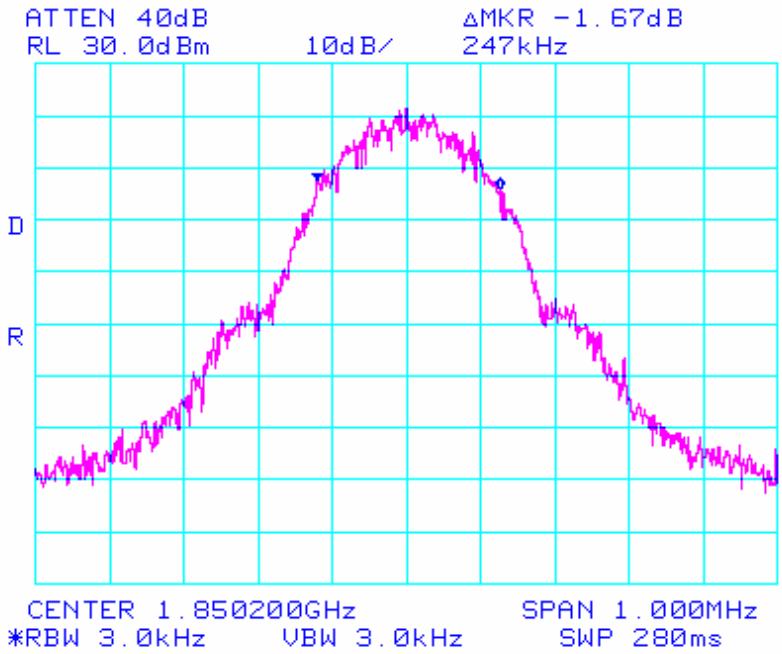
- The 99% power bandwidth was measured with a calibrated spectrum analyzer.
- Spectrum analyzer plots are included on the following pages.

Measurement Data:

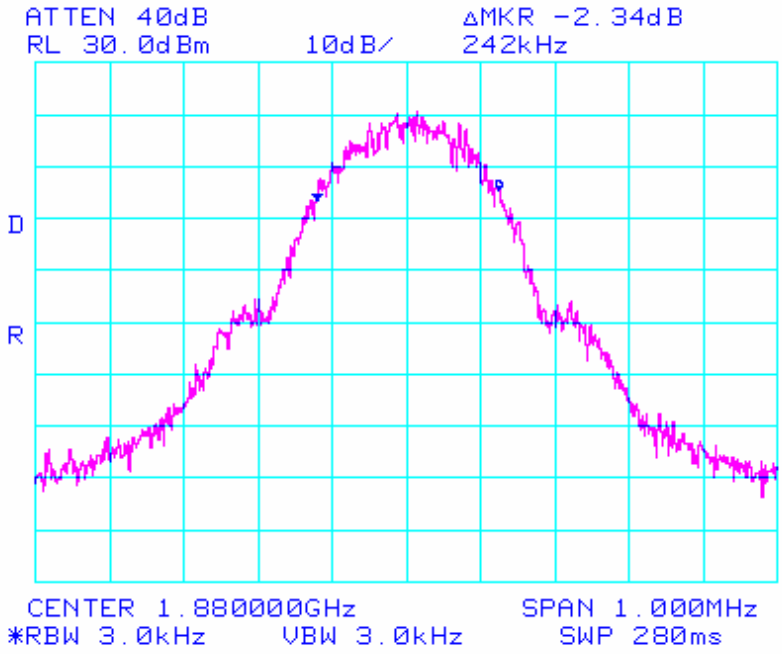
GSM1900

Channel	Frequency (MHz)	99% Bandwidth
		(kHz)
512	1850.2	**247**
661	1880.0	**242**
810	1909.8	**249**

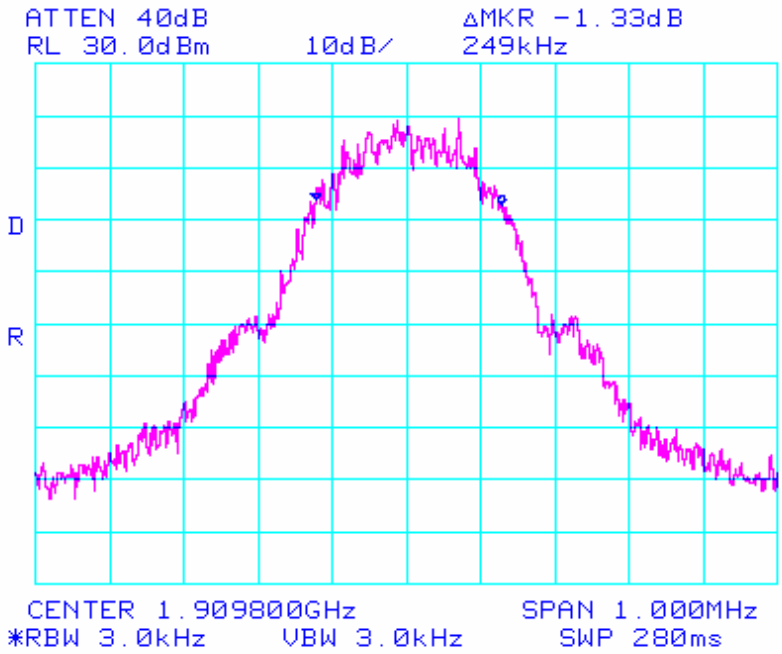
GSM1900 **99 % Bandwidth Ch. 512**



GSM1900 **99 % Bandwidth Ch. 661**



GSM1900 **99 % Bandwidth Ch. 810**



3.2.3 Occupied Bandwidth Emission Limits

FCC ID	:	**SBWVK2010**
Specification	:	47 CFR 24.238(b)
Tested Frequency	:	1850.2MHz, 1880.0MHz and 1909.8MHz for GSM1900

Measurement Procedure:

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

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

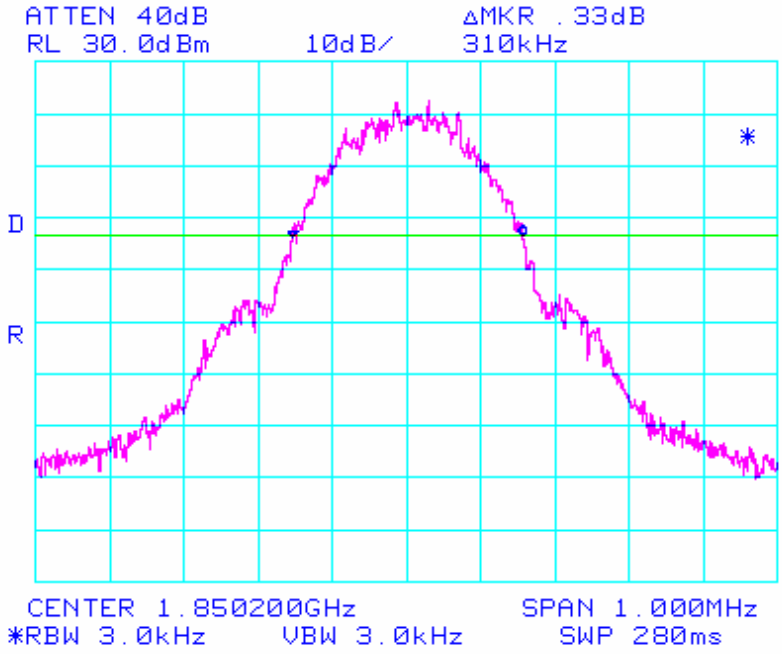
  (c) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.

- The measurement of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.
- Spectrum analyzer plots are included on the following pages.

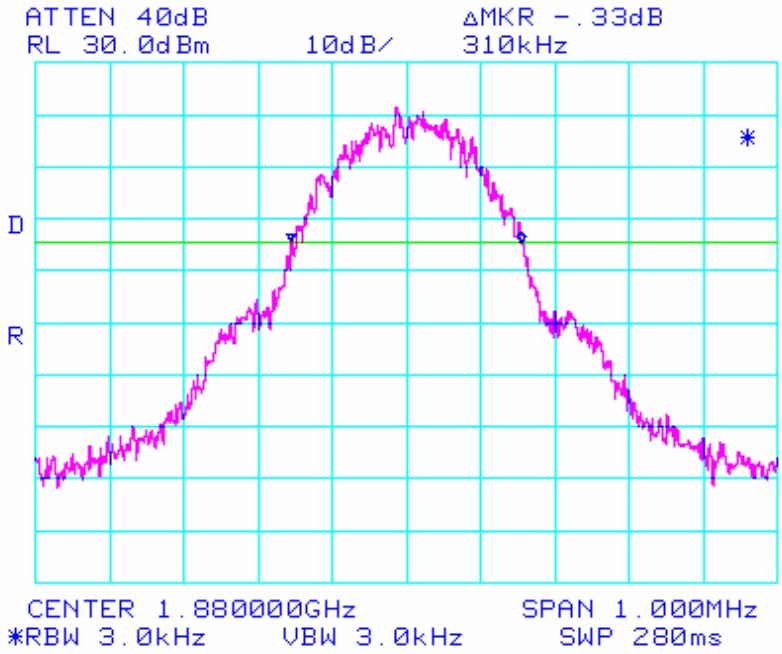
Measurement Data:

Channel	Frequency (MHz)	-26dBc Bandwidth (kHz)
512	1850.2	**310**
661	1880.0	**310**
810	1909.8	**313**

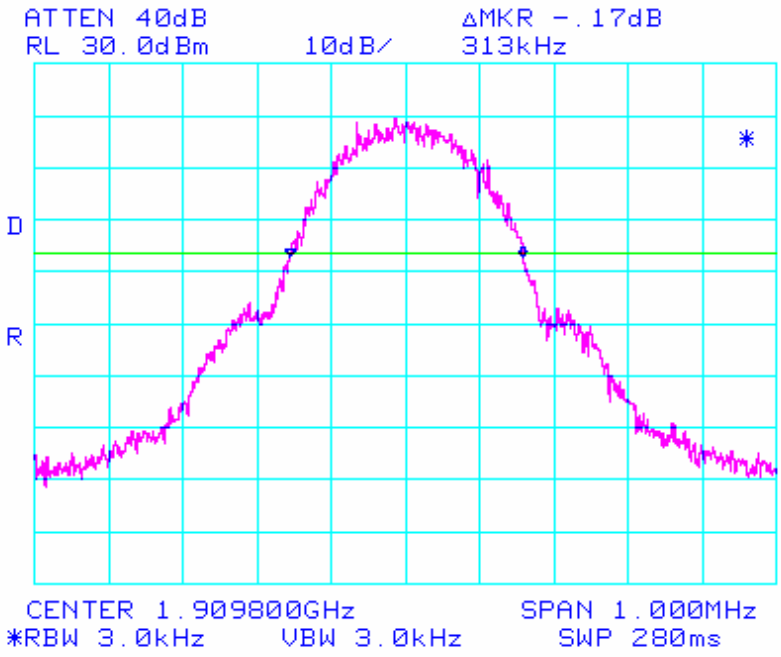
GSM1900 **-26dBc Bandwidth Ch. 512**



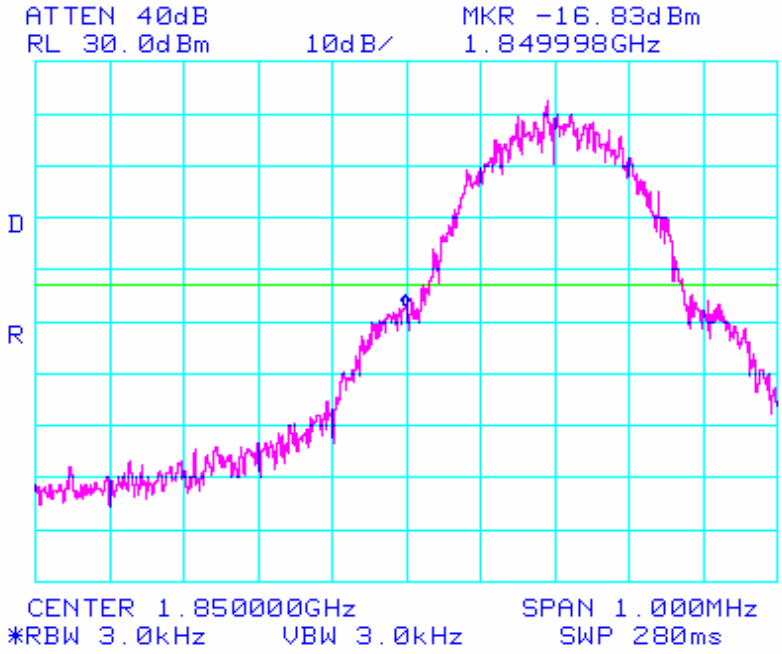
GSM1900 **-26dBc Bandwidth Ch. 661**



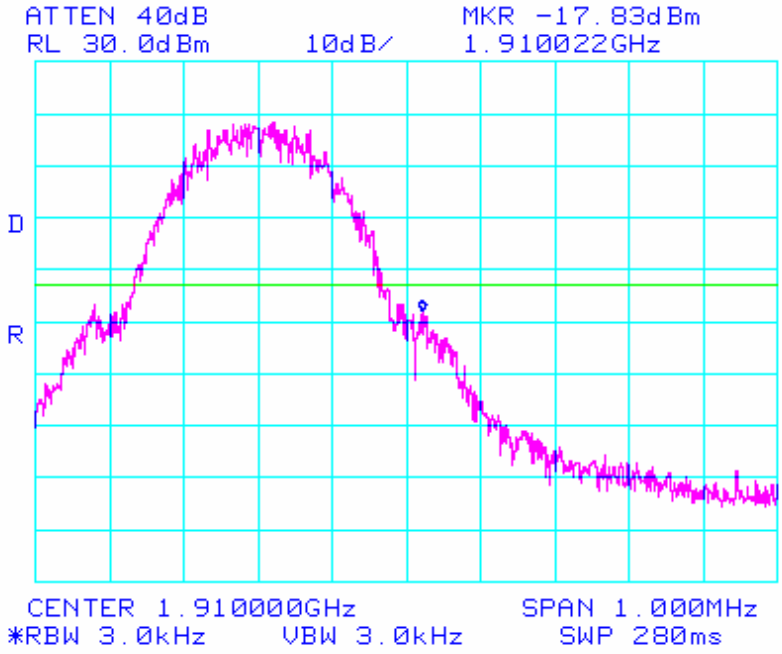
GSM1900 **-26dBc Bandwidth Ch. 810**



GSM1900 **Band Edge Ch. 512**



GSM1900 **Band Edge Ch. 810**



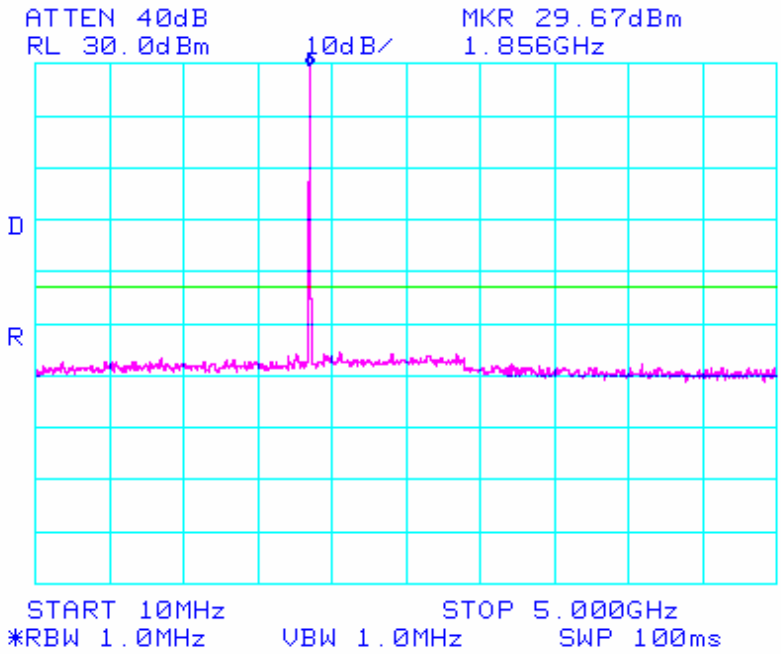
3.2.4 Spurious Emissions at Antenna Terminal

FCC ID	:	**SBWVK2010**
Specification	:	47 CFR 2.1051, 24.238(a)
Tested Frequency	:	1850.2MHz, 1880.0MHz and 1909.8MHz for GSM1900

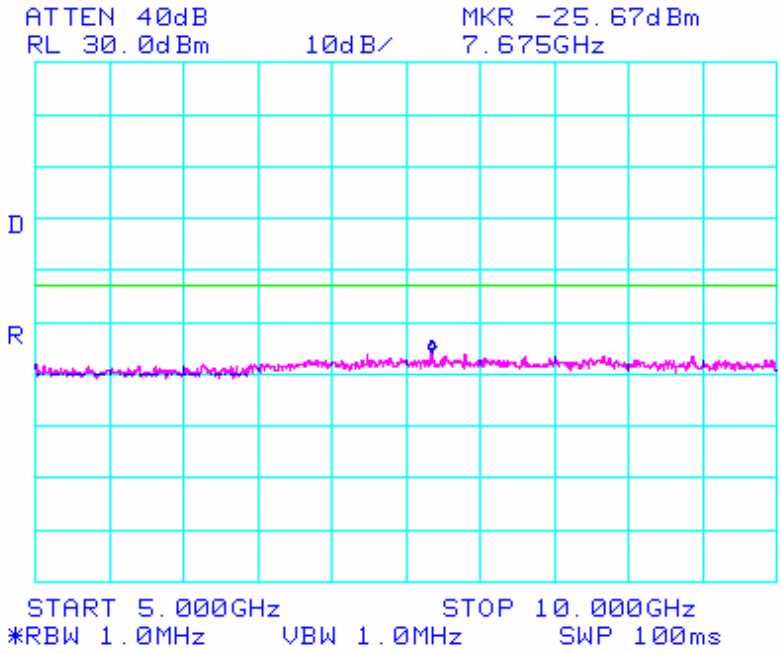
Measurement Procedure:

- The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer.
- The spectrum is scanned from the lowest frequency generated in the equipment up to 10’th harmonics of the highest frequency.
- Spectrum analyzer plots are included on the following pages.

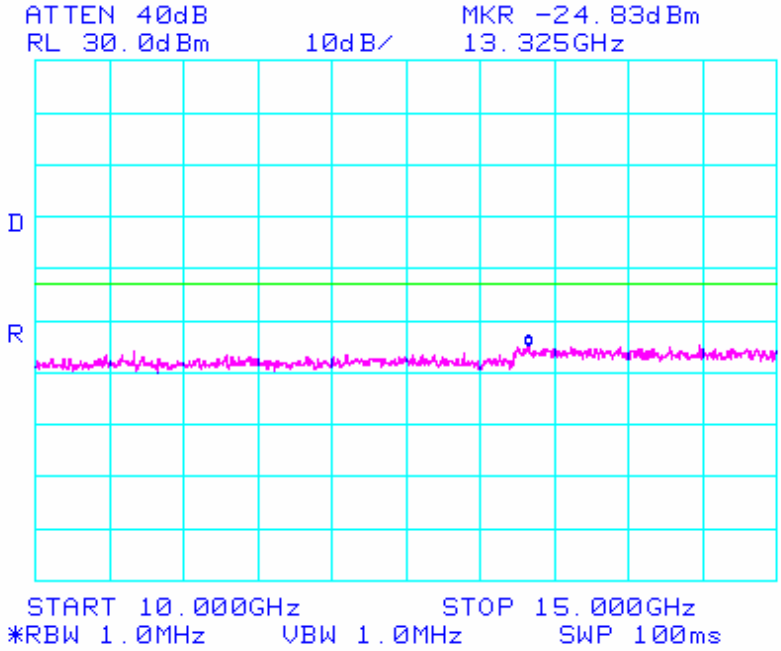
GSM1900 Spurious Emissions at Antenna Terminal / Ch.512 -1



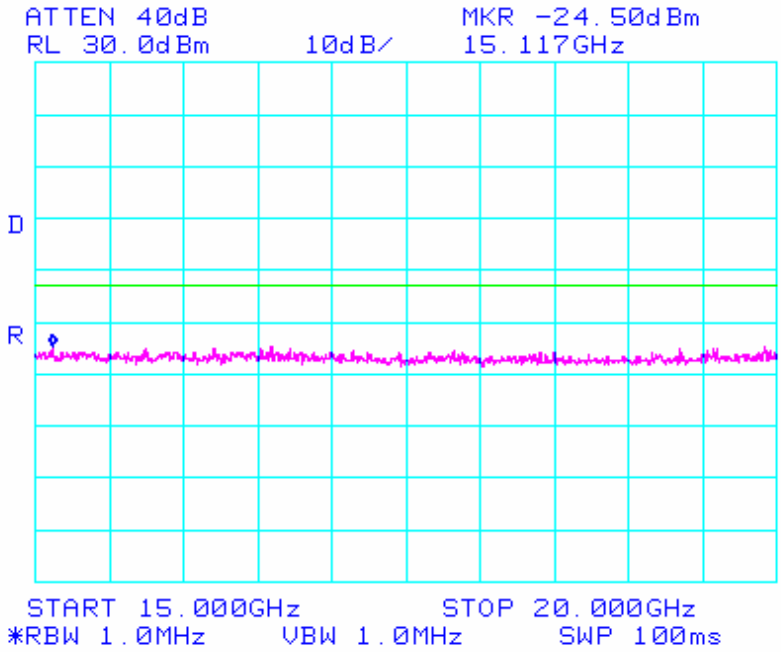
GSM1900 Spurious Emissions at Antenna Terminal / Ch.512 -2



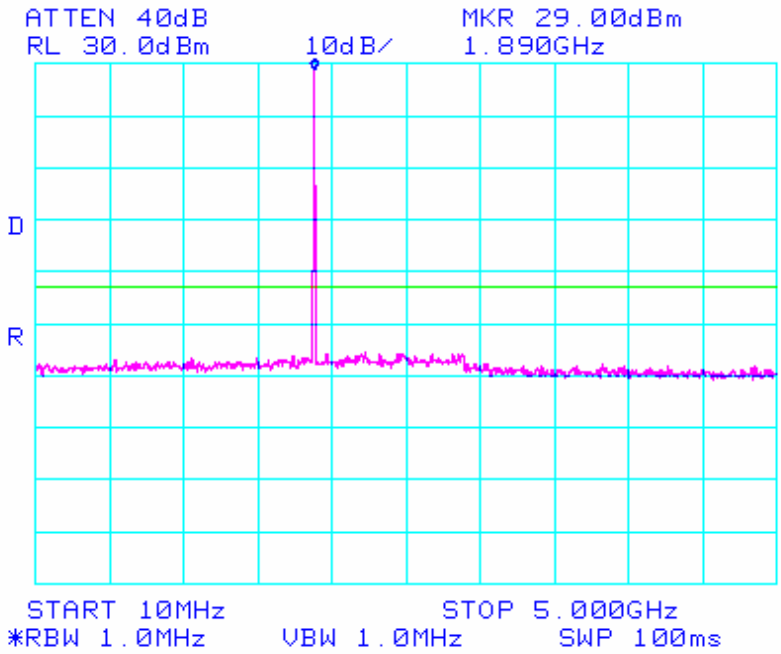
GSM1900 Spurious Emissions at Antenna Terminal / Ch.512 -3



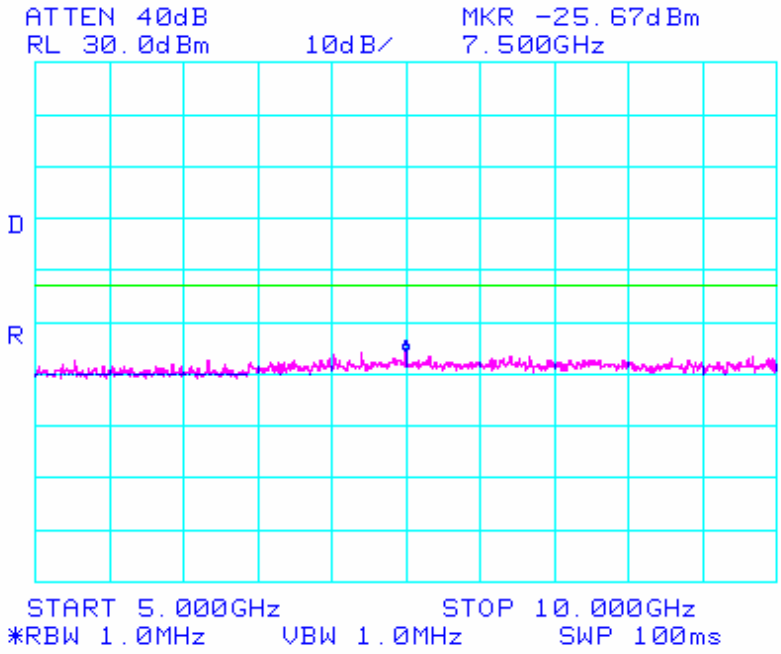
GSM1900 Spurious Emissions at Antenna Terminal / Ch.512 -4



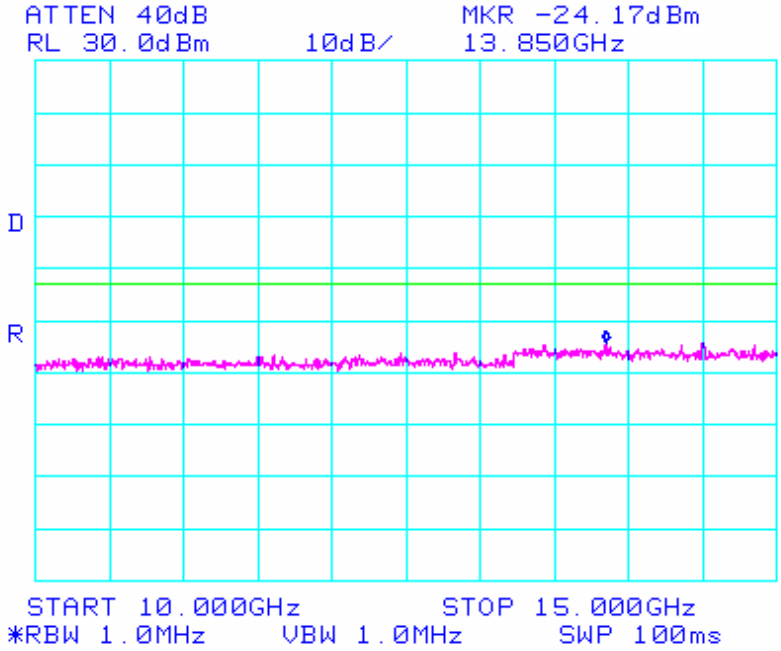
GSM1900 Spurious Emissions at Antenna Terminal / Ch.661-1



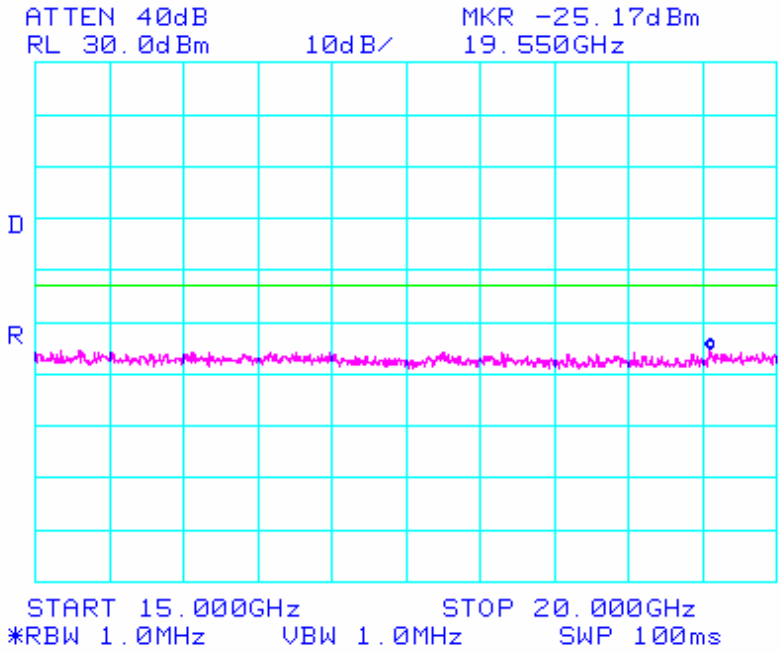
GSM1900 Spurious Emissions at Antenna Terminal / Ch.661-2



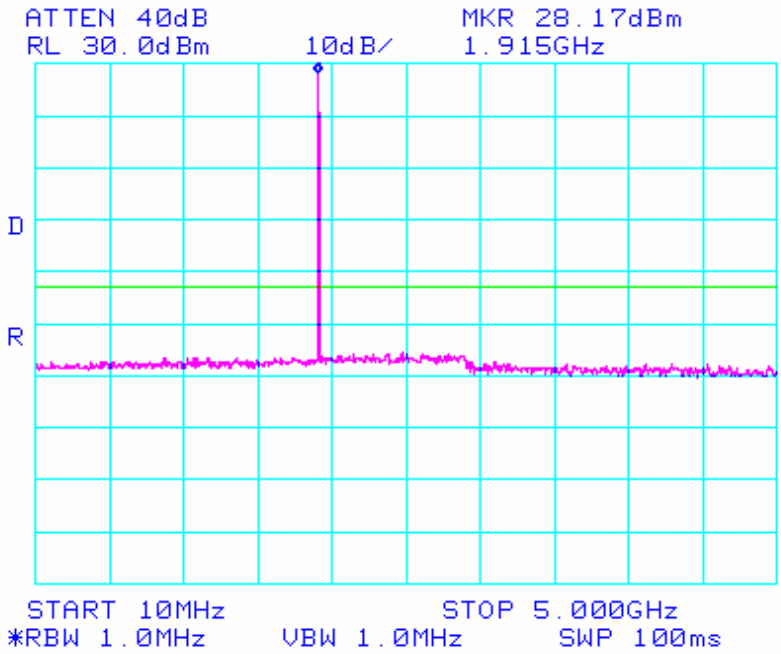
GSM1900 Spurious Emissions at Antenna Terminal / Ch.661-3



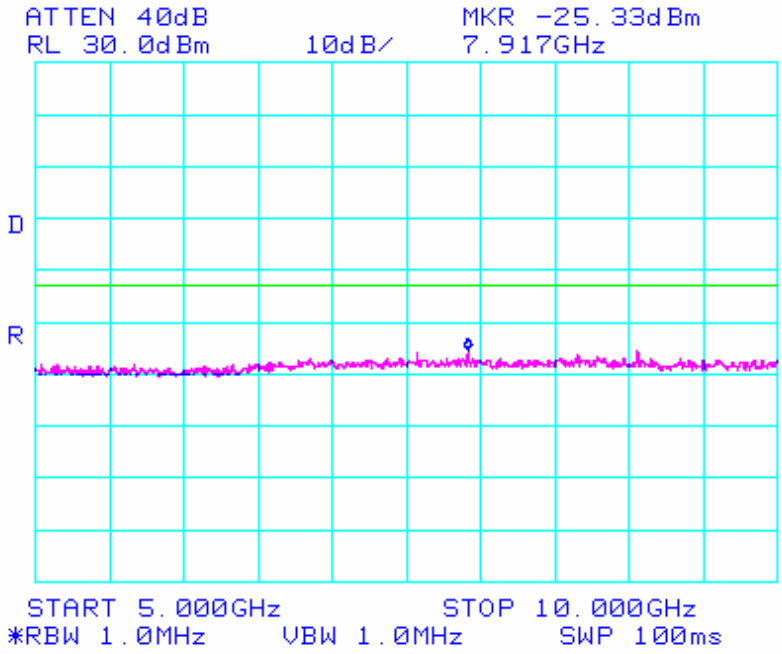
GSM1900 Spurious Emissions at Antenna Terminal / Ch.661 -4



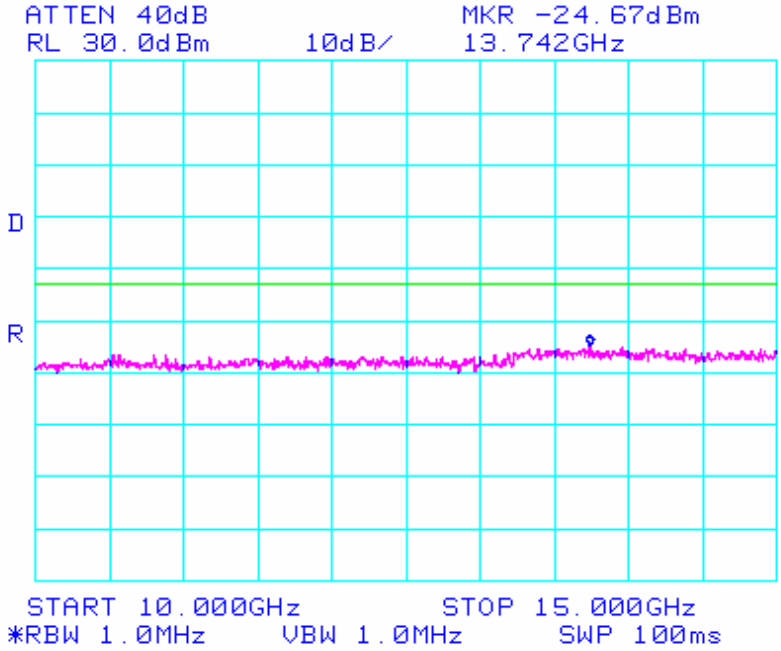
GSM1900 Spurious Emissions at Antenna Terminal / Ch.810 -1



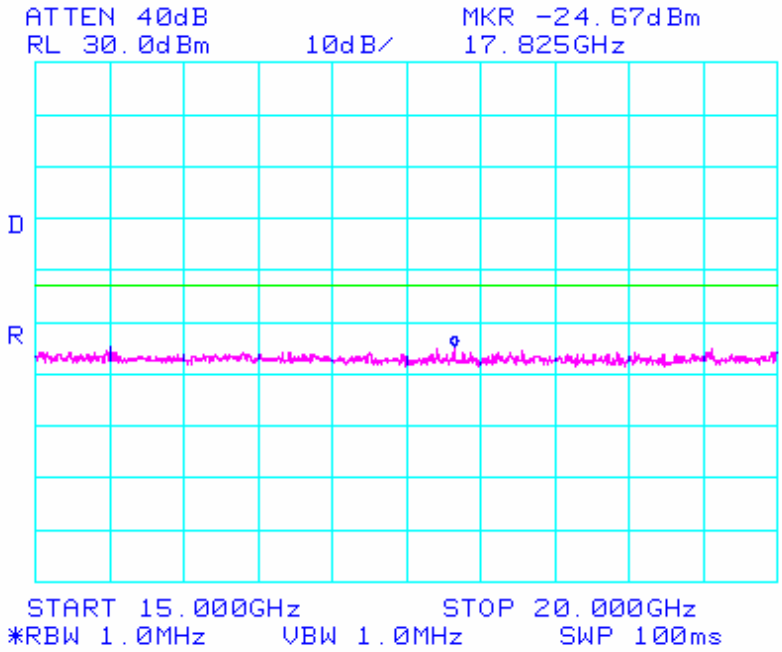
GSM1900 Spurious Emissions at Antenna Terminal / Ch.810-2



GSM1900 Spurious Emissions at Antenna Terminal / Ch.810 -3



GSM1900 Spurious Emissions at Antenna Terminal / Ch.810-4



3.2.5 Field Strength of Spurious Radiation

FCC ID	:	**SBWVK2010**
Specification	:	47 CFR 2.1053(a)
Tested Frequency	:	1850.2MHz, 1880.0MHz and 1909.8MHz for GSM1900

Measurement Procedure:

- Radiation and harmonic emissions are measured outdoors at our 3-meter test range. The equipment under test is placed on a wooden turntable 3-meters from the receive antenna.
  The receive antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer reading. This level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

GSM1900 Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY : 1850.2 MHz

CHANNEL : 512(Low)

MEASURED OUTPUT POWER : 25.53 dBm = 0.357 W

MODULATION SIGNAL : GSM (Internal)

DISTANCE : 3 meters

LIMIT : $43 + 10 \log_{10} (W)$ = 38.53 dBc

Freq. (MHz)	**LEVEL@ ANTENNA TERMINALS** (dBm)	**SUBSTITUTE ANTENNA GAIN** (dBd)	**CORRECT GENERATOR LEVEL** (dBm)	**POL** (H/V)	(dBc)
No emissions were detected at a level greater than 10dB below limit.					

NOTE

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-A-2001, Aug. 15, 2001:

The EUT was placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This spurious level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

GSM1900 Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY : 1880.0 MHz

CHANNEL : 661(Mid)

MEASURED OUTPUT POWER : 25.53 dBm = 0.357 W

MODULATION SIGNAL : GSM (Internal)

DISTANCE : 3 meters

LIMIT : 43 + 10 $\log_{10}$ (W) = 38.53 dBc

Freq. (MHz)	**LEVEL@ ANTENNA TERMINALS** (dBm)	**SUBSTITUTE ANTENNA GAIN** (dBd)	**CORRECT GENERATOR LEVEL** (dBm)	**POL** (H/V)	(dBc)
No emissions were detected at a level greater than 10dB below limit.					

NOTE

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-A-2001, Aug. 15, 2001:

The EUT was placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This spurious level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

GSM1900 Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY : 1909.8 MHz

CHANNEL : 810(High)

MEASURED OUTPUT POWER : 25.53 dBm = 0.357 W

MODULATION SIGNAL : GSM (Internal)

DISTANCE : 3 meters

LIMIT : 43 + 10 $\log_{10}$ (W) = 38.53 dBc

Freq. (MHz)	**LEVEL@ ANTENNA TERMINALS** (dBm)	**SUBSTITUTE ANTENNA GAIN** (dBd)	**CORRECT GENERATOR LEVEL** (dBm)	**POL** (H/V)	(dBc)
No emissions were detected at a level greater than 10dB below limit.					

NOTE

Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-A-2001, Aug. 15, 2001:

The EUT was placed on a wooden turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This spurious level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

3.2.6 Frequency Stability/Temperature Variation.

FCC ID	:	**SBWVK2010**
Specification	:	47 CFR 2.1055 , 24.235
Tested Frequency	:	1880.0MHz for GSM1900

Measurement Procedure:

The frequency stability of the transmitter is measured by:

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

Specification –The minimum frequency stability shall be +/- 0.00025% at any time during normal operation.

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

Time Period and Procedure:

1. The carrier frequency of the transmitter and the individual oscillators is measured at room temperature (25°C to 27 °C to provide a reference)
2. The equipment is subjected to an overnight “soak” at -30°C without any power applied.
3. After the overnight ”soak” at -30°C(usually 14-16 hours),the equipment is turned on in a “standby” condition for one minute before applying power to the transmitter. Measurement of the carrier frequency to the transmitter and the individual oscillators is made within a three minute interval after applying power to the transmitter.
4. Frequency measurements is made at 10°C interval up to room temperature. At least a period of one and one half hour is provided to allow stabilization of the equipment at each temperature level.
5. Again the transmitter carrier frequency and the individual oscillators is measured at room temperature to begin measurement of the upper temperature levels.
6. Frequency were made at 10 intervals starting at -30°C up to +50°C allowing at least two hours at each temperature for stabilization. In all measurements the frequency is measured within three minutes after applying power to the transmitter.
7. The artificial load is mounted external to the temperature chamber.

NOTE : The EUT is tested down to the battery endpoint.

Frequency Stability

OPERATING FREQUENCY : 1,879,999,966 Hz

CHANNEL : 661(Mid)

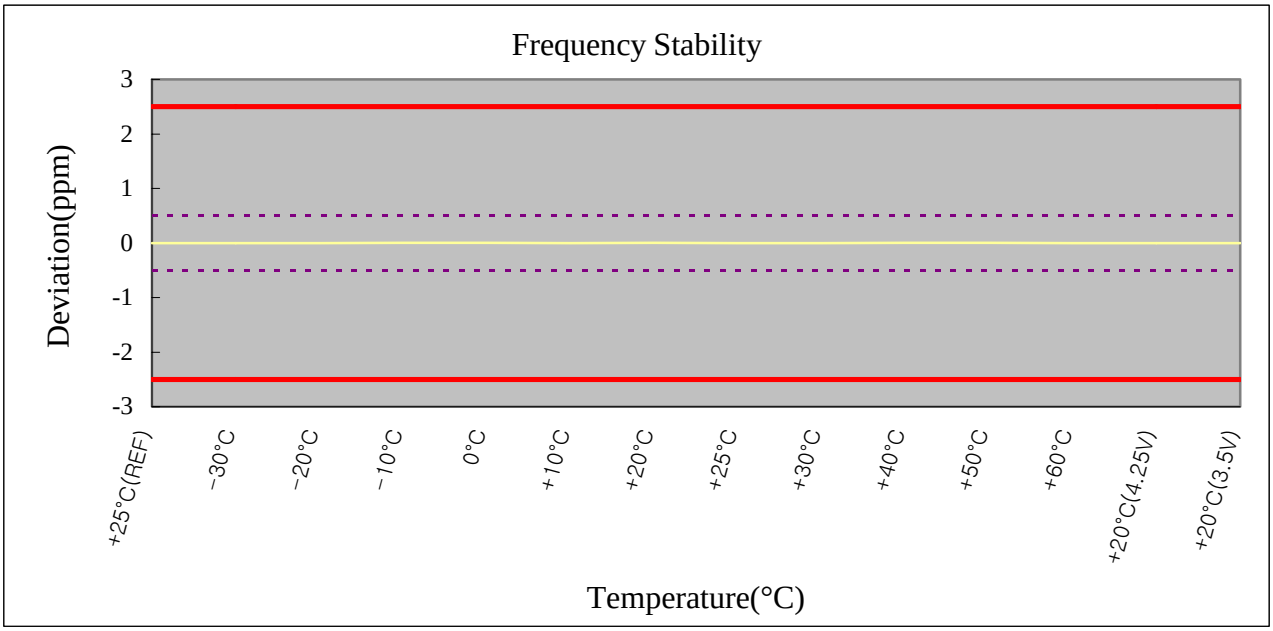
REFERENCE VOLTAGE : 3.7 VDC

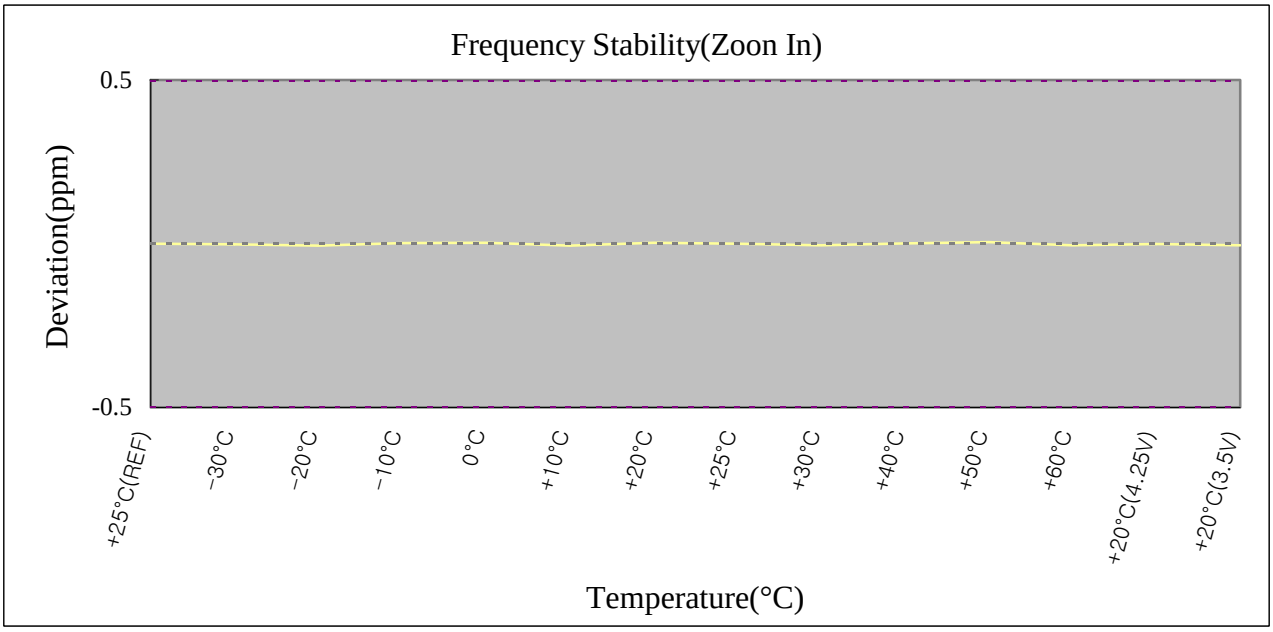
DEVIATION LIMIT : ± 0.00025 % or 2.5 ppm

VOLTAGE (%)	**POWER** (VDC)	TEMP (dB)	**FREQ** (Hz)	**Deviation** (%)
100%	3.7	REF(+25)	1,879,999,966	0.000000
100%		-30	1,879,999,963	0.000000
100%		-20	1,879,999,955	-0.000001
100%		-10	1,879,999,969	0.000000
100%		0	1,879,999,971	0.000000
100%		10	1,879,999,955	-0.000001
100%		20	1,879,999,971	0.000000
100%		25	1,879,999,966	0.000000
100%		30	1,879,999,956	-0.000001
100%		40	1,879,999,967	0.000000
100%		50	1,879,999,975	0.000000
100%		60	1,879,999,957	0.000000
85%	3.15V	20	-	-
115%	4.25V	20	1,879,999,965	0.000000
BATT.ENDPOINT	3.50V	20	1,879,999,957	0.000000

- This mobile phone does not working below 3.5V.

Frequency Stability **(continued…)**





4. TEST EQUIPMENT

	Type	Manufacturer	Model	Cal.Due.Date (dd/mm/yy)	S/N
01	Spectrum Analyzer	Agilent	E4404B	18/04/06	US41061134
02	Spectrum Analyzer	Agilent	E4440A	05/10/07	MY45304199
03	Spectrum Analyzer	H.P	8563E	06/10/07	3551A04634
04	Power Meter	H.P	EPM-442A	04/07/06	GB37170413
05	Power Sensor	H.P	8481A	05/07/06	3318A96332
06	Frequency Counter	H.P	5342A	21/10/06	2119A04450
07	Multifunction Synthesizer	H.P	8904A	21/10/06	3633A08404
08	Signal Generator	Rohde Schwarz	SMR20	17/05/06	101251
09	Signal Generator	H.P	E4421A	05/07/06	US37230529
10	Audio Analyzer	H.P	8903B	07/07/06	3011A0944B
11	Modulation Analyzer	H.P	8901B	05/07/06	3028A03029
12	Oscilloscope	Tektronix	TDS3052	01/10/06	B016821
13	CDMA Mobile Station Test Set	H.P	8924C	21/10/06	US35360688
14	Universal Radio communication tester	Rohde Schwarz	CMU200	28/04/06	107631
15	MULTISYSTEM UE TESTER	Japan Radio Co.,Ltd	NJZ-2000	14/11/06	ET00095
16	Power Splitter	WEINSCHEL	1593	21/10/06	332
17	BAND Reject Filter	Microwave Circuits	N0308372	21/10/06	3125-01DC0312
18	BAND Reject Filter	Wainwright	WRCG1750	21/10/06	SN2
19	AC Power supply	DAEKWANG	5KVA	18/04/06	N/A
20	DC Power Supply	H.P	6622A	18/04/06	465487
21	Attenuator (30dB)	H.P	8498A	21/10/06	50101
22	Attenuator (10dB)	WEINSCHEL	23-10-34	21/10/06	BP4387
23	HORN ANT	EMCO	3115	06/03/07	6419
24	HORN ANT	EMCO	3115	25/04/07	21097
25	HORN ANT	A.H.Systems	SAS-574	09/11/06	154
26	HORN ANT	A.H.Systems	SAS-574	09/11/06	155
27	Dipole Antenna	Schwarzbeck	VHA9103	18/10/06	2116
28	Dipole Antenna	Schwarzbeck	VHA9103	18/10/06	2117
29	Dipole Antenna	Schwarzbeck	UHA9105	18/10/06	2261
30	Dipole Antenna	Schwarzbeck	UHA9105	18/10/06	2262

4. TEST EQUIPMENT (CONTINUED)

	Type	Manufacturer	Model	Cal.Due.Date (dd/mm/yy)	S/N
31	RFI/FIELD Intensity Meter	Kyorits	KNM-504D	07/07/06	SN-161-4
32	Frequency Converter	Kyorits	KCV-604C	07/07/06	4-230-3
33	TEMP & HUMIDITY Chamber	JISCO	J-RHC2	13/09/06	021031
34	Log Periodic Antenna	Schwarzbeck	UHALP9108A1	29/09/06	1098
35	Biconical Antenna	Schwarzbeck	VHA9103	18/04/06	2233
36	Digital Multimeter	H.P	34401A	18/04/06	3146A13475
37	Attenuator (10dB)	WEINSCHEL	23-10-34	21/10/06	BP4386
38	High-Pass Filter	ANRITSU	MP526	12/05/06	M27756
39	Attenuator (3dB)	Agilent	8491B	21/10/06	58177
40	Amplifier (25dB)	Agilent	8447D	18/04/06	2944A10144
41	Amplifier (30dB)	Agilent	8449B	21/10/06	3008A01590
42	Position Controller	TOKIN	5901T	N/A	14173
43	Driver	TOKIN	5902T2	N/A	14174
44	Spectrum Analyzer	H.P	8591E	18/04/06	3649A05889
45	RFI/FIELD Intensity Meter	Kyorits	KNW-2402	04/07/06	4N-170-3
46	LISN	Kyorits	KNW-407	11/08/06	8-317-8
47	LISN	Kyorits	KNW-242	11/08/06	8-654-15
48	CVCF	NF Electronic	4400	N/A	344536 4420064
49	Software	ToYo EMI	EP5/RE	N/A	Ver 2.0.800
50	Software	ToYo EMI	EP5/CE	N/A	Ver 2.0.801
51	Software	AUDIX	e3	N/A	Ver 3.0
52	Software	Agilent	Benchlink	N/A	A.01.09 021211

5. SAMPLE CALCULATIONS

A. Emission Designator

GSM1900

Emission Designator = 249KGXW

GSM BW = 249 KHz

G = Phase Modulation

X = Cases not otherwise covered

W = Combination (Audio/Data)

(Measured at the 99.75% power bandwidth)

6. CONCLUSION

The data collected shows that the **VK Corporation.** Dual band GSM phone **FCC ID: SBWVK2010** complies with all the requirements of Parts 2 and 24 of the FCC rules.

