

HCT CO., LTD.

CERTIFICATE OF COMPLIANCE FCC Certification

Applicant Name:

Pantech Co., Ltd.

Address:

Pantech Bldg, I-2, DMC, Sangam-dong, Mapo-gu, Seoul, 121-792, Korea

Date of Issue: October 02, 2013 **Test Site/Location:** HCT CO., LTD., 105-1, Jangam-ri, Majang-Myeon, Icheon-si, Kyunggi-Do, Korea Report No.: HCTR1310FR01

HCT FRN: 0005866421

FCC ID:

JYCP6070

Pantech Co., Ltd. **APPLICANT:**

FCC Model(s):	P6070	
EUT Type:	GSM/WCDMA	Phone with Bluetooth
FCC Classification:	Licensed Porta	able Transmitter Held to Ear (PCE)
FCC Rule Part(s):	§22, §24, §2	
Tx Frequency:	826.40 - 846.6 1 850.20 - 1 9	30 MHz (GSM850) 50 MHz (WCDMA850) 09.80 MHz (GSM1900) 17.6 MHz (WCDMA1900)
Rx Frequency:	871.40 - 891.6 1 930.20 - 1 98	80 MHz (GSM850) 60 MHz (WCDMA850) 89.80 MHz (GSM1900) 67.6 MHz (WCDMA1900)
Max. RF Output Power:	Slide Up:	0.340 W GSM850 (25.32 dBm) / 0.809 W GSM1900 (29.08 dBm) 0.170 W EDGE850 (22.30 dBm) / 0.550 W EDGE1900 (27.40 dBm) 0.066 W WCDMA850 (18.18 dBm) / 0.351 W WCDMA1900 (25.45 dBm)
	Slide Down:	0.273 W GSM850 (24.36 dBm) / 0.419 W GSM1900 (26.22 dBm) 0.152 W EDGE850 (21.83 dBm) / 0.291 W EDGE1900 (24.64 dBm) 0.052 W WCDMA850 (17.12 dBm) / 0.110 W WCDMA1900 (20.43 dBm)
Emission Designator(s):		245 KGXW (GSM850) 249 KGXW (GSM1900) 244 KG7W (GSM850 EDGE) 242 KG7W (GSM1900 EDGE) 4M18F9W (WCDMA850) 4M18F9W (WCDMA1900)

The measurements shown in this report were made in accordance with the procedures specified in §2.947. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998,21 U.S. C.853(a)

Report prepared by : Kyung Soo Kang Test engineer of RF Team

Approved by : Chang Seok Choi Manager of RF Team

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Version

TEST REPORT NO.	DATE	DESCRIPTION
HCTR1310FR01	October 02, 2013	- First Approval Report

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MEASUREMENT REPORT

1. GENERAL INFORMATION

Applicant Name:	Pantech Co., I	_td.
Address:	Pantech Bldg,	I-2, DMC, Sangam-dong, Mapo-gu, Seoul, 121-792, Korea
FCC ID:	JYCP6070	
Application Type: FCC Classification:	Certification Licensed Porta	able Transmitter Held to Ear (PCE)
FCC Rule Part(s):	§22, §24, §2	
EUT Type:	GSM/WCDMA	Phone with Bluetooth
FCC Model(s):	P6070	
Tx Frequency:	826.40 - 846.6 1 850.20 - 1 90	80 MHz (GSM850) 60 MHz (WCDMA850) 09.80 MHz (GSM1900) 17.6 MHz (WCDMA1900)
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Max. RF Output Power:	Slide Up:	0.340 W GSM850 (25.32 dBm) / 0.809 W GSM1900 (29.08 dBm) 0.170 W EDGE850 (22.30 dBm) / 0.550 W EDGE1900 (27.40 dBm) 0.066 W WCDMA850 (18.18 dBm) / 0.351 W WCDMA1900 (25.45 dBm)
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Emission Designator(s):	244 KG7W (G	SM850) 249 KGXW (GSM1900) SM850 EDGE) 242 KG7W (GSM1900 EDGE) CDMA850) 4M18F9W (WCDMA1900)
Date(s) of Tests:	September 10	, 2013 ~ September 30, 2013
Antenna Specification	Manufacturer:	Advanced Technology & commucnications
	Antenna type:	ISA(Inserted Antenna) type
	Peak Gain: GS	SM850/WCDMA850 : -7.96 dBi
	GS	M1900/WCDMA1900 : -1.02 dBi

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2. INTRODUCTION

2.1. EUT DESCRIPTION

The Pantech Co., Ltd. P6070 GSM/WCDMA Phone with Bluetooth consists of GSM850, GSM1900, WCDMA850, WCDMA1900, GPRS Class10, EDGE and HSDPA.

2.2. MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

2.3. TEST FACILITY

The Fully-anechoic chamber and conducted measurement facility used to collect the radiated data are located at the 105-1, Jangam-ri , Majang-Myeon, Icheon-si, 467-811, KOREA.

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3. DESCRIPTION OF TESTS

3.1 ERP/EIRP RADIATED POWER AND RADIATED SPURIOUS EMISSIONS

Note: ERP(Effective Radiated Power), EIRP(Effective Isotropic Radiated Power)

Test Procedure

Radiated emission measurements are performed in the Fully-anechoic chamber. The equipment under test is placed on a non-conductive table 3-meters away from the receive antenna in accordance with ANSI/TIA-603-C-2004 Clause 2.2.17. The turntable is rotated through 360 degrees, and the receiving antenna scans in order to determine the level of the maximized emission. The level and position of the maximized emission is recorded with the spectrum analyzer using a positive peak detector.

A half wave dipole is then substituted in place of the EUT. For emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator and the previously recorded signal was duplicated.

The power is calculated by the following formula;

 $P_{d(dBm)} = Pg_{(dBm)} - cable loss_{(dB)} + antenna gain_{(dB)}$

Where: P_d is the dipole equivalent power and P_g is the generator output power into the substitution antenna.

The maximum EIRP is calculated by adding the forward power to the calibrated source plus its appropriate gain value. These steps are repeated with the receiving antenna in both vertical and horizontal polarization. the difference between the gain of the horn and an isotropic antenna are taken into consideration

Radiated spurious emissions

- 1. Frequency Range : 30 MHz \sim 10th Harmonics of highest channel fundamental frequency.
- The EUT was setup to maximum output power. The 100 kHz RBW was used to scan from 30 MHz to 1 GHz. Also, the 1 MHz RBW was used to scan from 1 GHz to 10 GHz(GSM850/WCDMA850) or 20 GHz(GSM1900/WCDMA1900). The high, low and a middle channel were tested for out of band measurements.

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3.2 PEAK- TO- AVERAGE RATIO

Test Procedure

Peak to Average Power Ratio is tested in accordance with KDB971168 D01 Power Meas License Digital Systems v02r01, June 7, 2013, Section 5.7.

- Section 5.7.1 CCDF Procedure

- a) Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
- b) Set the number of counts to a value that stabilizes the measured CCDF curve;
- c) Set the measurement interval as follows:
 - 1) for continuous transmissions, set to 1 ms,
 - 2) for burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time that is less than or equal to the burst duration.
- d) Record the maximum PAPR level associated with a probability of 0.1%.

- Section 5.7.2 Alternate Procedure

Use one of the procedures presented in 5.1 to measure the total peak power and record as P_{Pk} . Use one of the applicable procedures presented 5.2 to measure the total average power and record as P_{Avg} . Determine the P.A.R. from: P.A.R_(dB) = $P_{Pk (dBm)} - P_{Avg (dBm)}$ (P_{Avg} = Average Power + Duty cycle Factor)

5.1.1 Peak power measurements with a spectrum/signal analyzer or EMI receiver

The following procedure can be used to determine the total peak output power.

- a) Set the RBW \geq OBW.
- b) Set VBW \geq 3 × RBW.
- c) Set span $\ge 2 \times RBW$
- d) Sweep time = auto couple.
- e) Detector = peak.
- f) Ensure that the number of measurement points \geq span/RBW.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the peak amplitude level.

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5.2.2 Procedures for use with a spectrum/signal analyzer when EUT cannot be configured to transmit continuously and sweep triggering/signal gating cannot be properly implemented

If the EUT cannot be configured to transmit continuously (burst duty cycle < 98%), then one of the following procedures can be used. The selection of the applicable procedure will depend on the characteristics of the measured burst duty cycle.

Measure the burst duty cycle with a spectrum/signal analyzer or EMC receiver can be used in zero-span mode if the response time and spacing between bins on the sweep are sufficient to permit accurate measurement of the burst on/off time of the transmitted signal.

5.2.2.2 Constant burst duty cycle

If the measured burst duty cycle is constant (i.e., duty cycle variations are less than ± 2 percent), then:

- a) Set span to at least 1.5 times the OBW.
- b) Set RBW = 1-5% of the OBW, not to exceed 1 MHz.
- c) Set VBW \geq 3 x RBW.
- d) Number of points in sweep ≥ 2 × span / RBW. (This gives bin-to-bin spacing ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)
- e) Sweep time = auto.
- f) Detector = RMS (power averaging).
- g) Set sweep trigger to "free run".
- h) Trace average at least 100 traces in power averaging (i.e., RMS) mode.
- i) Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.
- j) Add 10 log (1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on and off times of the transmission).

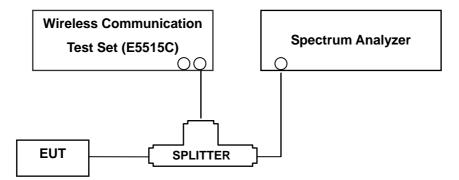
For example, add 10 log (1/0.25) = 6 dB if the duty cycle is a constant 25%.

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3.3 OCCUPIED BANDWIDTH.

Test set-up



(Configuration of conducted Emission measurement)

The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

Test Procedure

The EUT makes a call to the communication simulator. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels(low, middle and high operational range.)

The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth

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3.4 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL.

Test Procedure

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer.

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 + 10 log(P) dB. The RBW settings used in the testing are greater than 1 % of the occupied bw. The 1 MHz RBW was used to scan from 10 MHz to 10 GHz. (GSM1900 Mode: 10 MHz to 20 GHz). A display line was placed at – 13 dBm to show compliance. The high, lowest and a middle channel were tested for out of band measurements.

Measurements of all out of band are made on RBW = 1MHz and VBW \ge 3 MHz in the worst case despite RBW = 100 kHz and VBW \ge 300 kHz upon 1 GHz.

- RBW = 1 MHz
- VBW ≥ 3 MHz
- Detector = Peak
- Trace Mode = max hold
- Sweep time = auto
- Number of points in sweep ≥ 2 * Span / RBW

- Band Edge Requirement : According to FCC 22.917 , 24.238(a) specified that 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. 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.

The EUT makes a call to the communication simulator. The power was measured with R&S Spectrum Analyzer. All measurements were done at 2 channels(low and high operational frequency range.)

The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

The center frequency of spectrum is the band edge frequency and span is 1MHz RB of the spectrum is 3KHz and VB of the spectrum is 3KHz (GSM)

The center frequency of spectrum is the band edge frequency and span is 5MHz RB of the spectrum is 100KHz and VB of the spectrum is 100KHz(WCDMA)

NOTES: The analyzer plot offsets were determined by below conditions.

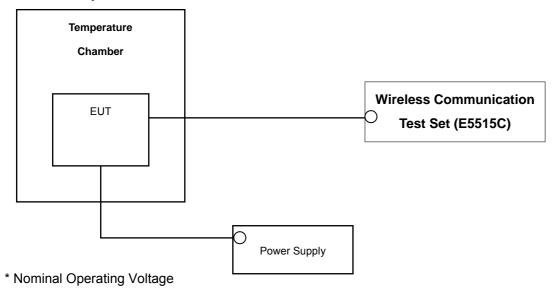
- For GSM850 & WCDMA850, total offset 26.9 dBm = 20 dBm attenuator + 6 dBm Divider + 0.9 dBm RF cables.
- For GSM1900 & WCDMA1900, total offset 27.7 dB = 20 dBm attenuator + 6 dBm Divider + 1.7 dBm RF cables.

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3.5 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

Test Set-up



Test Procedure

The frequency stability of the transmitter is measured by:

a.) Temperature: The temperature is varied from - 30 °C to + 50 °C using an environmental chamber.

b.) **Primary Supply Voltage:** The primary supply voltage is varied from battery end point 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 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 \pm 0.000 25 %(\pm 2.5 ppm) of the center frequency.

Time Period and Procedure:

The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).

1. The equipment is turned on in a "standby" condition for one minute before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.

2. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one halfhour is provided to allow stabilization of the equipment at each temperature level. **NOTE: The EUT is tested down to the battery endpoint.**

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4. LIST OF TEST EQUIPMENT

Manufacture	Model/ Equipment	Serial Number	Calibration Interval	Calibration Due
Agilent	E9327A/ Power Sensor	MY4442009	Annual	04/16/2014
MITEQ	AMF-6D-001180-35-20P/AMP	1081666	Annual	09/12/2014
Wainwright	WHK1.2/15G-10EF/H.P.F	4	Annual	06/24/2014
Wainwright	WHK3.3/18G-10EF/H.P.F	2	Annual	06/24/2014
Hewlett Packard	11667B / Power Splitter	10126	Annual	11/07/2013
Digital	EP-3010/ Power Supply	3110117	Annual	11/07/2013
Schwarzbeck	UHAP/ Dipole Antenna	557	Biennial	03/05/2015
Schwarzbeck	UHAP/ Dipole Antenna	558	Biennial	05/03/2015
Korea Engineering	KR-1005L / Chamber	KRAB05063-3CH	Annual	11/07/2013
Schwarzbeck	BBHA 9120D/ Horn Antenna	147	Biennial	05/15/2014
Schwarzbeck	BBHA 9120D/ Horn Antenna	937	Biennial	10/17/2013
Agilent	E4440A/Spectrum Analyzer	US45303008	Annual	04/25/2014
WEINSCHEL	ATTENUATOR	BR0592	Annual	11/07/2013
REOHDE&SCHWARZ	FSV40/Spectrum Analyzer	1307.9002K40-100931-NK	Annual	06/10/2014
Agilent	8960 (E5515C)/ Base Station	GB44400269	Annual	02/14/2014

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5. SUMMARY OF TEST RESULTS

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result
2.1049, 22.917(a), 24.238(a)	Occupied Bandwidth	N/A		PASS
2.1051, 22.917(a), 24.238(a)	Band Edge / Spurious and Harmonic Emissions at Antenna Terminal.	< 43 + 10log10 (P[Watts]) at Band Edge and for all out-of-band emissions		PASS
* 2.1046	Conducted Output Power	-	CONDUCTED	PASS
24.232(d)	Peak- to- Average Ratio	< 13 dB		PASS
2.1055, 22.355, 24.235	Frequency stability / variation of ambient temperature	< 2.5 ppm		PASS
22.913(a)(2)	Effective Radiated Power	< 7 Watts max. ERP		PASS
24.232(c)	Equivalent Isotropic Radiated Power	< 2 Watts max. EIRP	RADIATED	PASS
2.1053, 22.917(a), 24.238(a)	Radiated Spurious and Harmonic Emissions	< 43 + 10log10 (P[Watts]) for all out-of band emissions		PASS

*: See SAR Report

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6. SAMPLE CALCULATION

A. ERP Sample Calculation

Mode	Ch./ Freq.		Measured	Substitude	Ant. Gain	C.L	Pol.	EF	RP
Wode	channel	Freq.(MHz)	Level(dBm)	LEVEL(dBm)	(dBd)	C.L	P0I.	w	dBm
GSM850	128	824.20	-21.37	38.40	-10.61	0.95	Н	0.483	26.84

ERP = SubstitudeLEVEL(dBm) + Ant. Gain – CL(Cable Loss)

- 1) The EUT mounted on a non-conductive tuntable is 0.8 meter above test site ground level.
- 2) During the test, the turn table is rotated until the maximum signal is found.
- 3) Record the field strength meter's level.
- 4) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.
- 5) Increase the signal generator output till the field strength meter's level is equal to the item (3).

6) The signal generator output level with Ant. Gain and cable loss are the rating of effective radiated power (**ERP**).

B. Emission Designator

GSM Emission Designator

Emission Designator = 249KGXW

GSM BW = 249 kHz

- G = Phase Modulation
- X = Cases not otherwise covered
- W = Combination (Audio/Data)

WCDMA Emission Designator

Emission Designator = 4M17F9W

WCDMA BW = 4.17 MHz

- F = Frequency Modulation
- 9 = Composite Digital Info
- W = Combination (Audio/Data)

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7. TEST DATA

<u>Slide Up</u> 7.1 EFFECTIVE RADIATED POWER OUTPUT

(GSM850 Mode)

Ch./	Freq.	Measured	Substitude	Ant. Gain	C.L Pol.		ER	Р
channel	Freq.(MHz)	Level(dBm)	LEVEL (dBm)	(dBd)	U.L	P0I.	w	dBm
128	824.20	-23.80	35.97	-10.61	0.95	V	0.276	24.41
190	836.60	-23.36	36.82	-10.54	0.96	V	0.340	25.32
251	848.80	-23.95	36.47	-10.47	1.10	V	0.309	24.90
EDGE 251	848.80	-26.55	33.87	-10.47	1.10	V	0.170	22.30

(WCDMA850 Mode)

Ch./	Freq.	Measured	Substitude	Ant. Gain	C.L	Pol.	ER	Р
channel	Freq.(MHz)	Level(dBm)	LEVEL (dBm)	(dBd)	U.L	P0I.	w	dBm
4132	826.40	-30.03	29.72	-10.59	0.95	V	0.066	18.18
4183	836.60	-30.51	29.67	-10.54	0.96	V	0.066	18.17
4233	846.60	-32.36	27.99	-10.48	1.11	V	0.044	16.40

Note: Standard batteries are the only options for this phone. And a peak detector is used.

NOTES:

Effective Radiated Power Output Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a non-conductive styrofoam resin table 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. For CDMA signals, a peak detector is used, with RBW = VBW = 3 MHz. For WCDMA signals, a peak detector is used, with RBW = VBW = 3 MHz. For WCDMA signals, a peak detector is used, with RBW = VBW = 1 MHz. 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.

This device was tested under all configurations and the highest power is reported in WCDMA mode with HSDPA Inactive at 12.2 kbps RMC and TPC bits all set to "1" and in GSM mode and using a Power Control Level of "0" in the PCS Band and "5" in the Cellular Band. This unit was tested with its standard battery. Also, we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna. The worst case of the EUT is y plane in GSM850 and WCDMA850 mode. Also worst case of detecting Antenna is vertical polarization in GSM850 and WCDMA850 mode.

The EDGE mode testing were performed using 1Tx because 1Tx is highest power in EDGE mode.

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Slide Up 7.2 EQUIVALENT ISOTROPIC RADIATED POWER

(GSM1900 Mode)

Ch./	Freq.	Measured	Substitude	Ant. Gain	C.L	Pol.	EIRP	
channel	Freq.(MHz)	Level(dBm)	LEVEL (dBm)	(dBi)	U.L	FUI.	w	dBm
512	1,850.20	-11.56	20.47	10.02	1.41	V	0.809	29.08
661	1,880.00	-12.08	20.23	10.04	1.45	V	0.762	28.82
810	1,909.80	-12.33	19.92	10.05	1.44	V	0.713	28.53
EDGE 512	1,850.20	-13.24	18.79	10.02	1.41	V	0.550	27.40

(WCDMA1900 Mode)

Ch./	Freq.	Measured	Substitude	Ant. Gain		Del	EIRP	
channel	Freq.(MHz)	Level(dBm)	LEVEL (dBm)	(dBi)	C.L	Pol.	w	dBm
9262	1,852.40	-15.32	16.83	10.02	1.40	V	0.351	25.45
9400	1,880.00	-16.48	15.83	10.04	1.45	V	0.277	24.42
9538	1,907.60	-17.82	14.74	10.05	1.48	V	0.214	23.31

Note: Standard batteries are the only options for this phone. And a peak detector is used.

NOTES:

Equivalent Isotropic Radiated Power Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a non-conductive styrofoam resin 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. For CDMA signals, a peak detector is used, with RBW = VBW = 3 MHz. For WCDMA signals, a peak detector is used, with RBW = VBW = 3 MHz. For WCDMA signals, a peak detector is used, with RBW = VBW = 1 MHz. A Horn antenna was substituted in place of the EUT. This Horn 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 Horn antenna is measured. The difference between the gain of the horn and an isotropic antenna is taken into consideration and the EIRP is recorded.

This device was tested under all configurations and the highest power is reported in WCDMA mode with HSDPA Inactive at 12.2 kbps RMC and TPC bits all set to "1" and in GSM mode and using a Power Control Level of "0" in the PCS Band and "5" in the Cellular Band. This unit was tested with its standard battery. Also, we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna. The worst case of the EUT is z plane in GSM1900 and WCDMA1900 mode. Also worst case of detecting Antenna is in vertical polarization in GSM1900 and WCDMA1900 mode.

The EDGE mode testing were performed using 1Tx because 1Tx is highest power in EDGE mode.

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Slide Up 7.3 RADIATED SPURIOUS EMISSIONS 7.3.1 RADIATED SPURIOUS EMISSIONS (GSM850)

MEASURED OUTPUT POWER:	25.32 dBm = 0.340 W
MODULATION SIGNAL:	GSM850
DISTANCE:	<u>3 meters</u>
LIMIT: 43 + 10 log10 (W) =	<u>38.32 dBc</u>

Ch.	Freq.(MHz)	<u>Measured Level</u> [dBm]	Ant. Gain (dBd)	<u>Substitute</u> Level [dBm]	C.L	Pol.	ERP (dBm)	dBc
	1,648.40	-46.33	7.05	-53.17	1.18	V	-47.30	72.62
128 (824.2)	2,472.60	-48.11	7.90	-51.86	1.57	Н	-45.53	70.85
	3,296.80	-53.92	9.91	-57.80	1.99	V	-49.88	75.20
	1,673.20	-42.59	7.22	-49.59	1.20	V	-43.57	68.89
190 (836.6)	2,509.80	-48.34	8.51	-52.13	1.65	V	-45.27	70.59
	3,346.40	-54.28	10.09	-58.67	2.00	V	-50.58	75.90
	1,697.60	-36.41	7.34	-43.43	1.20	V	-37.29	62.61
251 (848.8)	2,546.40	-47.83	8.61	-51.37	1.65	Н	-44.41	69.73
	3,395.20	-54.16	10.22	-58.69	1.99	Н	-50.46	75.78

NOTES: <u>1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method</u> <u>according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:</u>

> <u>2. We are performed all frequency to 10th harmonics from 30 MHz. Measurements above show only up to 3</u> maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.</u>
> <u>3. we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.</u>

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7.3.2 RADIATED SPURIOUS EMISSIONS (GSM1900)

MEASURED OUTPUT POWER:	29.08 dBm = 0.809 W
MODULATION SIGNAL:	GSM1900
DISTANCE:	3 meters
LIMIT: 43 + 10 log10 (W) =	42.08 dBc

Ch.	Freq.(MHz)	Measured Level	Ant. Gain (dBi)	<u>Substitute</u> Level [dBm]	C.L	Pol.	EIRP (dBm)	dBc
	3,700.40	-40.87	12.27	-45.61	2.19	Н	-35.53	64.61
512 (1850.2)	5,550.60	-44.64	13.40	-44.31	2.88	V	-33.79	62.87
· · · /	7,400.80	-49.23	11.37	-38.94	3.29	Н	-30.86	59.94
	3,760.00	-41.01	12.31	-45.56	2.11	Н	-35.36	64.44
661 (1880.0)	5,640.00	-46.45	13.41	-45.78	2.92	Н	-35.29	64.37
	7,520.00	-44.95	11.55	-35.43	3.34	Н	-27.22	56.30
	3,819.60	-41.86	12.37	-46.34	2.14	V	-36.11	65.19
810 (1909.8)	5,729.40	-43.62	13.42	-42.18	3.02	Н	-31.78	60.86
	7,639.20	-42.23	11.70	-32.47	3.13	Н	-23.90	52.98

NOTES: <u>1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method</u> <u>according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:</u>

2. We are performed all frequency to 10th harmonics from 30 MHz. Measurements above show only up to 3 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

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7.3.3 RADIATED SPURIOUS EMISSIONS (WCDMA850)

MEASURED OUTPUT POWER:	18.18 dBm = 0.066 W
MODULATION SIGNAL:	WCDMA850
DISTANCE:	3 meters
LIMIT: 43 + 10 log10 (W) =	31.18 dBc

Ch.	Freq.(MHz)	Measured Level	Ant. Gain (dBd)	<u>Substitute</u> Level [dBm]	C.L	Pol.	ERP (dBm)	dBc
	1,652.80	-44.16	7.11	-51.09	1.20	Н	-45.18	63.36
4,132 (826.4)	2,479.20	-53.52	8.40	-57.41	1.62	Н	-50.63	68.81
, , , , , , , , , , , , , , , , , , ,	3,305.60	-53.68	9.95	-57.86	1.99	Н	-49.90	68.08
	1,673.20	-42.65	7.22	-49.65	1.20	Н	-43.63	61.81
4,183 (836.6)	2,509.80	-54.31	8.51	-58.10	1.65	Н	-51.24	69.42
	3,346.40	-51.87	10.09	-56.26	2.00	Н	-48.17	66.35
	1,693.20	-47.18	7.34	-54.20	1.20	V	-48.06	66.24
4,233 (846.6)	2,539.80	-51.83	8.58	-55.75	1.65	Н	-48.82	67.00
	3,386.40	-54.62	10.19	-59.05	1.98	Н	-50.84	69.02

NOTES: <u>1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method</u> <u>according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:</u>

2. We are performed all frequency to 10th harmonics from 30 MHz. Measurements above show only up to 3 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

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7.3.4 RADIATED SPURIOUS EMISSIONS (WCDMA1900)

MEASURED OUTPUT POWER:	25.45 dBm = 0.351 W
MODULATION SIGNAL:	WCDMA1900
DISTANCE:	<u>3 meters</u>
LIMIT: 43 + 10 log10 (W) =	<u>38.45 dBc</u>

Ch.	Freq.(MHz)	Measured Level	Ant. Gain (dBi)	<u>Substitute</u> Level [dBm]	C.L	Pol.	EIRP (dBm)	dBc
	3,704.80	-38.09	12.27	-42.83	2.19	Н	-32.75	58.20
9262	5,557.20	-50.15	13.40	-49.82	2.88	Н	-39.30	64.75
	7,409.60	-44.08	11.37	-33.79	3.29	Н	-25.71	51.16
	3,760.00	-36.16	12.31	-40.71	2.11	Н	-30.51	55.96
9400	5,640.00	-51.50	13.41	-50.83	2.92	V	-40.34	65.79
	7,520.00	-49.50	11.55	-39.98	3.34	Н	-31.77	57.22
	3,815.20	-34.74	12.37	-39.22	2.14	Н	-28.99	54.44
9538	5,722.80	-52.32	13.42	-50.88	3.02	Н	-40.48	65.93
	7,630.40	-45.65	11.70	-35.89	3.13	Н	-27.32	52.77

NOTES: <u>1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method</u> <u>according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:</u>

2. We are performed all frequency to 10th harmonics from 30 MHz. Measurements above show only up to 3 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

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Slide Down 7.4 EFFECTIVE RADIATED POWER OUTPUT

(GSM850 Mode)

Ch./	Freq.	Measured	Substitude	Ant. Gain	C.L Pol.		ER	Р
channel	Freq.(MHz)	Level(dBm)	LEVEL (dBm)	(dBd)	U.L	POI.	w	dBm
128	824.20	-24.05	35.72	-10.61	0.95	V	0.261	24.16
190	836.60	-24.32	35.86	-10.54	0.96	V	0.273	24.36
251	848.80	-25.66	34.76	-10.47	1.10	V	0.208	23.19
EDGE 190	836.60	-26.85	33.33	-10.54	0.96	V	0.152	21.83

(WCDMA850 Mode)

Ch./	Freq.	Measured	Substitude	Ant. Gain		Del	ER	Р
channel	Freq.(MHz)	Level(dBm)	LEVEL (dBm)	(dBd)	C.L	Pol.	w	dBm
4132	826.40	-31.09	28.66	-10.59	0.95	V	0.052	17.12
4183	836.60	-31.82	28.36	-10.54	0.96	V	0.049	16.86
4233	846.60	-33.28	27.07	-10.48	1.11	V	0.035	15.48

Note: Standard batteries are the only options for this phone. And a peak detector is used.

NOTES:

Effective Radiated Power Output Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a non-conductive styrofoam resin table 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. For CDMA signals, a peak detector is used, with RBW = VBW = 3 MHz. For WCDMA signals, a peak detector is used, with RBW = VBW = 3 MHz. For WCDMA signals, a peak detector is used, with RBW = VBW = 1 MHz. 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.

This device was tested under all configurations and the highest power is reported in WCDMA mode with HSDPA Inactive at 12.2 kbps RMC and TPC bits all set to "1" and in GSM mode and using a Power Control Level of "0" in the PCS Band and "5" in the Cellular Band. This unit was tested with its standard battery. Also, we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna. The worst case of the EUT is y plane in GSM850 and WCDMA850 mode. Also worst case of detecting Antenna is vertical polarization in GSM850 and WCDMA850 mode.

The EDGE mode testing were performed using 1Tx because 1Tx is highest power in EDGE mode.

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Slide Down 7.5 EQUIVALENT ISOTROPIC RADIATED POWER

(GSM1900 Mode)

Ch./	Freq.	Measured	Substitude	Ant. Gain	C.L	Pol.	EI	RP
channel	Freq.(MHz)	Level(dBm)	LEVEL (dBm)	(dBi)	U.L	FUI.	w	dBm
512	1,850.20	-16.00	16.03	10.02	1.41	Н	0.291	24.64
661	1,880.00	-15.69	16.62	10.04	1.45	Н	0.332	25.21
810	1,909.80	-14.64	17.61	10.05	1.44	Н	0.419	26.22
EDGE 810	1,909.80	-16.38	16.03	10.05	1.44	Н	0.291	24.64

(WCDMA1900 Mode)

Ch./	Freq.	Measured	Substitude	Ant. Gain		Del	EII	RP
channel	Freq.(MHz)	Level(dBm)	LEVEL (dBm)	(dBi)	C.L	Pol.	w	dBm
9262	1,852.40	-20.46	11.69	10.02	1.40	Н	0.107	20.31
9400	1,880.00	-20.80	11.51	10.04	1.45	Н	0.102	20.10
9538	1,907.60	-20.70	11.86	10.05	1.48	Н	0.110	20.43

Note: Standard batteries are the only options for this phone. And a peak detector is used.

NOTES:

Equivalent Isotropic Radiated Power Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a non-conductive styrofoam resin 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. For CDMA signals, a peak detector is used, with RBW = VBW = 3 MHz. For WCDMA signals, a peak detector is used, with RBW = VBW = 3 MHz. For WCDMA signals, a peak detector is used, with RBW = VBW = 1 MHz. A Horn antenna was substituted in place of the EUT. This Horn 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 Horn antenna is measured. The difference between the gain of the horn and an isotropic antenna is taken into consideration and the EIRP is recorded.

This device was tested under all configurations and the highest power is reported in WCDMA mode with HSDPA Inactive at 12.2 kbps RMC and TPC bits all set to "1" and in GSM mode and using a Power Control Level of "0" in the PCS Band and "5" in the Cellular Band. This unit was tested with its standard battery. Also, we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna. The worst case of the EUT is x plane in GSM1900 (z plane ch 512) and WCDMA1900 mode. Also worst case of detecting Antenna is in horizontal polarization in GSM1900 and WCDMA1900 mode.

The EDGE mode testing were performed using 1Tx because 1Tx is highest power in EDGE mode.

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Slide Down 7.6 RADIATED SPURIOUS EMISSIONS 7.6.1 RADIATED SPURIOUS EMISSIONS (GSM850)

MEASURED OUTPUT POWER:	24.36 dBm = 0.273 W
MODULATION SIGNAL:	GSM850
DISTANCE:	<u>3 meters</u>
LIMIT: 43 + 10 log10 (W) =	<u>37.36 dBc</u>

Ch.	Freq.(MHz)	Measured Level	Ant. Gain (dBd)	<u>Substitute</u> Level [dBm]	C.L	Pol.	ERP (dBm)	dBc
	1,648.40	-42.17	7.05	-49.01	1.18	V	-43.14	67.50
128 (824.2)	2,472.60	-48.49	7.90	-52.24	1.57	Н	-45.91	70.27
	3,296.80	-54.51	9.91	-58.39	1.99	Н	-50.47	74.83
	1,673.20	-36.88	7.22	-43.88	1.20	V	-37.86	62.22
190 (836.6)	2,509.80	-48.04	8.51	-51.83	1.65	Н	-44.97	69.33
	3,346.40	-54.81	10.09	-59.20	2.00	Н	-51.11	75.47
	1,697.60	-35.15	7.34	-42.17	1.20	Н	-36.03	60.39
251 (848.8)	2,546.40	-46.16	8.61	-49.70	1.65	Н	-42.74	67.10
	3,395.20	-54.51	10.22	-59.04	1.99	Н	-50.81	75.17

NOTES: <u>1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method</u> <u>according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:</u>

> <u>2. We are performed all frequency to 10th harmonics from 30 MHz. Measurements above show only up to 3</u> maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.</u>
> <u>3. we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.</u>

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7.6.2 RADIATED SPURIOUS EMISSIONS (GSM1900)

MEASURED OUTPUT POWER: 26.22 dBm = 0.419 W

MODULATION SIGNAL: GSM1900

DISTANCE: <u>3 meters</u>

LIMIT: 43 + 10 log10 (W) = <u>39.22 dBc</u>

Ch.	Freq.(MHz)	Measured Level	Ant. Gain (dBi)	<u>Substitute</u> Level [dBm]	C.L	Pol.	EIRP (dBm)	dBc
	3,700.40	-39.81	12.27	-44.55	2.19	V	-34.47	60.69
512 (1850.2)	5,550.60	-45.60	13.40	-45.27	2.88	V	-34.75	60.97
	7,400.80	-51.17	11.37	-40.88	3.29	V	-32.80	59.02
	3,760.00	-40.78	12.31	-45.33	2.11	V	-35.13	61.35
661 (1880.0)	5,640.00	-50.09	13.41	-49.42	2.92	Н	-38.93	65.15
	7,520.00	-45.28	11.55	-35.76	3.34	V	-27.55	53.77
	3,819.60	-42.99	12.37	-47.47	2.14	V	-37.24	63.46
810 (1909.8)	5,729.40	-50.18	13.42	-48.74	3.02	Н	-38.34	64.56
	7,639.20	-41.43	11.70	-31.67	3.13	V	-23.10	49.32

NOTES: <u>1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method</u> <u>according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:</u>

2. We are performed all frequency to 10th harmonics from 30 MHz. Measurements above show only up to 3 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

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7.6.3 RADIATED SPURIOUS EMISSIONS (WCDMA850)

MEASURED OUTPUT POWER:	17.12 dBm = 0.052 W
MODULATION SIGNAL:	WCDMA850
DISTANCE:	3 meters
LIMIT: 43 + 10 log10 (W) =	30.12 dBc

Ch.	Freq.(MHz)	Measured Level	Ant. Gain (dBd)	<u>Substitute</u> Level [dBm]	C.L	Pol.	ERP (dBm)	dBc
	1,652.80	-46.89	7.11	-53.82	1.20	Н	-47.91	65.03
4,132 (826.4)	2,479.20	-55.56	8.40	-59.45	1.62	V	-52.67	69.79
	3,305.60	-54.84	9.95	-59.02	1.99	Н	-51.06	68.18
	1,673.20	-43.65	7.22	-50.65	1.20	V	-44.63	61.75
4,183 (836.6)	2,509.80	-54.95	8.51	-58.74	1.65	V	-51.88	69.00
	3,346.40	-54.76	10.09	-59.15	2.00	Н	-51.06	68.18
	1,693.20	-49.05	7.34	-56.07	1.20	Н	-49.93	67.05
4,233 (846.6)	2,539.80	-55.16	8.58	-59.08	1.65	Н	-52.15	69.27
	3,386.40	-54.67	10.19	-59.10	1.98	V	-50.89	68.01

NOTES: <u>1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method</u> <u>according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:</u>

2. We are performed all frequency to 10th harmonics from 30 MHz. Measurements above show only up to 3 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

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7.6.4 RADIATED SPURIOUS EMISSIONS (WCDMA1900)

MEASURED OUTPUT POWER:	20.43 dBm = 0.110 W
MODULATION SIGNAL:	WCDMA1900
DISTANCE:	3 meters
LIMIT: 43 + 10 log10 (W) =	<u>33.43 dBc</u>

Ch.	Freq.(MHz)	Measured Level	Ant. Gain (dBi)	<u>Substitute</u> Level [dBm]	C.L	Pol.	EIRP (dBm)	dBc
	3,704.80	-41.19	12.27	-45.93	2.19	Н	-35.85	56.28
9262	5,557.20	-45.75	13.40	-45.42	2.88	V	-34.90	55.33
	7,409.60	-50.40	11.37	-40.11	3.29	Н	-32.03	52.46
	3,760.00	-41.06	12.31	-45.61	2.11	Н	-35.41	55.84
9400	5,640.00	-51.51	13.41	-50.84	2.92	V	-40.35	60.78
	7,520.00	-52.65	11.55	-43.13	3.34	Н	-34.92	55.35
	3,815.20	-37.35	12.37	-41.83	2.14	Н	-31.60	52.03
9538	5,722.80	-50.65	13.42	-49.21	3.02	Н	-38.81	59.24
	7,630.40	-47.20	11.70	-37.44	3.13	Н	-28.87	49.30

NOTES: <u>1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method</u> <u>according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:</u>

2. We are performed all frequency to 10th harmonics from 30 MHz. Measurements above show only up to 3 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

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7.7 PEAK-TO-AVERAGE RATIO

		Measured	Measured	PAV	_{'g} (Duty Cy	cle)	P.A.R. = P _{Pk} - P _{Avg} (dB)	Limit	Pass
Band	Ch.	P _{Pk} (dBm)	P _{Avg} (dBm)	Tx _{Total} (ms)	Tx _{On} (ms)	Factor (dB)		(dB)	/ Fail
GSM1900	661	29.74	20.1				0.40		Pass
GSM1900 EDGE	661	28.87	16.0	4.6232	0.5507	9.24	3.63	13	Pass
WCDMA1900	9400		CCDF	CCDF Procedure			3.55		Pass

- Plots of the EUT's Peak- to- Average Ratio are shown Page 39 ~ 41, 44.

NOTES:

Peak to Average Power Ratio was tested in accordance with KDB971168 D01 Power Meas License Digital Systems v02r01, June 7, 2013, Section 5.7.

Only GSM(include EDGE) Mode was tested by Section 5.7.2 Alternate Procedure

 $P.A.R_{(dB)} = P_{Pk (dBm)} - P_{Avg (dBm)} (P_{Avg} = Average Power + Duty cycle Factor)$

Duty cycle Factor = 10 log (1/x), x = Tx_{On} / Tx_{Total}

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7.8 OCCUPIED BANDWIDTH

Band	Channel	Frequency(MHz)	Data (GSM: kHz / WCDMA : MHz)
	128	824.20	245.3187
GSM850	190	836.60	245.0636
	251	848.80	243.6682
GSM850 EDGE	GSM850 EDGE 128 824.20		243.5701
	512	1850.20	239.4166
GSM1900	661	1880.00	242.8997
	810	1909.80	249.1038
GSM1900 EDGE	810	1909.80	242.1835
	4132	826.40	4.1741
WCDMA850	4183	836.60	4.1795
	4233	846.60	4.1535
	9262	1852.40	4.1836
WCDMA1900	9400	1880.00	4.1725
	9538	1907.60	4.1492

- Plots of the EUT's Occupied Bandwidth are shown Page $35 \sim 38$, $41 \sim 44$.

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7.9 CONDUCTED SPURIOUS EMISSIONS

Band	Channel	Frequency of Maximum Harmonic (GHz)	Maximum Data (dBm)
	128	4.586740	-29.44
GSM850	190	4.913270	-29.04
	251	4.980870	-29.03
	512	6.830290	-25.77
GSM1900	661	6.981330	-26.09
	810	5.403580	-25.89
	4132	4.818350	-28.92
WCDMA850	4183	4.804430	-28.45
	4233	4.844190	-28.75
	9262	6.976850	-25.96
WCDMA1900	9400	8.854700	-26.17
	9538	6.990310	-26.11

- Plots of the EUT's Conducted Spurious Emissions are shown Page 57 ~ 68.

7.9.1 BAND EDGE

- Plots of the EUT's Band Edge are shown Page 45 ~ 56.

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7.10 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE 7.10.1 FREQUENCY STABILITY (GSM850)

OPERATING FREQUENCY:

836,600,000 Hz

CHANNEL:

190

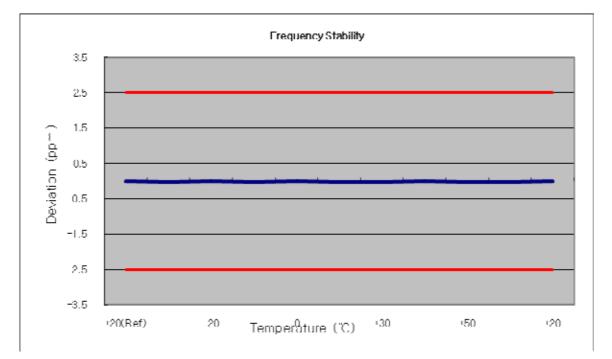
3.7 VDC

REFERENCE VOLTAGE:

DEVIATION LIM IT:

± 0.000 25 % or 2.5 ppm

Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	()	(Hz)	Error (Hz)	(%)	ppm
100%		+20(Ref)	836 600 024	0	0.000 000	0.000
100%		-30	836 600 006	-17.75	-0.000 002	-0.021
100%		-20	836 600 011	-12.81	-0.000 002	-0.015
100%		-10	836 600 001	-22.71	-0.000 003	-0.027
100%	3.700	0	836 600 013	-11.27	-0.000 001	-0.013
100%		+10	836 600 005	-19.38	-0.000 002	-0.023
100%		+30	836 600 002	-22.14	-0.000 003	-0.026
100%		+40	836 600 011	-13.33	-0.000 002	-0.016
100%		+50	836 600 007	-17.51	-0.000 002	-0.021
115%	4.255	+20	836 600 003	-21.23	-0.000 003	-0.025
85%	3.400	+20	836 600 010	-13.86	-0.000 002	-0.017



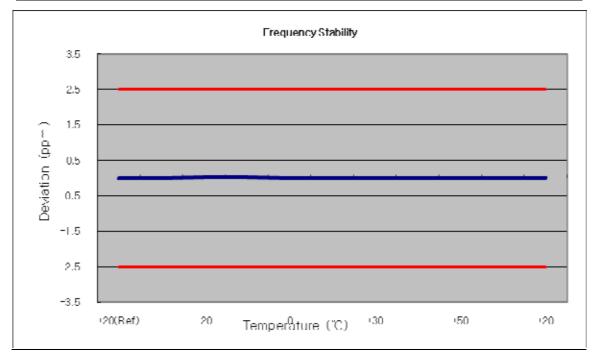
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7.10.2 FREQUENCY STABILITY (GSM1900)

OPERATING FREQUENCY:	1880,000,000 Hz
CHANNEL:	<u>661</u>
REFERENCE VOLTAGE:	3.7 VDC
DEVIATION LIM IT:	± 0.000 25 % or 2.5 ppm

Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	()	(Hz)	Error (Hz)	(%)	ppm
100%		+20(Ref)	1879 999 970	0	0.000 000	0.000
100%		-30	1880 000 001	30.06	0.000 002	0.016
100%		-20	1880 000 007	36.90	0.000 002	0.020
100%		-10	1880 000 005	34.14	0.000 002	0.018
100%	3.700	0	1879 999 999	28.51	0.000 002	0.015
100%		+10	1880 000 001	30.68	0.000 002	0.016
100%		+30	1880 000 003	32.65	0.000 002	0.017
100%		+40	1880 000 004	33.38	0.000 002	0.018
100%		+50	1879 999 997	26.87	0.000 001	0.014
115%	4.255	+20	1879 999 996	25.97	0.000 001	0.014
85%	3.400	+20	1880 000 002	31.89	0.000 002	0.017



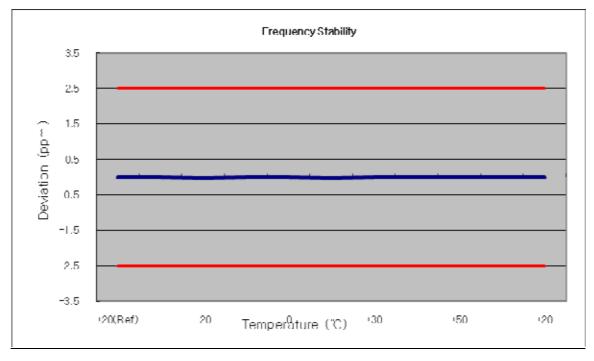
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7.10.3 FREQUENCY STABILITY (WCDMA850)

OPERATING FREQUENCY:	836,600,000 Hz
CHANNEL:	4183
REFERENCE VOLTAGE:	3.7 VDC
DEVIATION LIM IT:	± 0.000 25 % or 2.5 ppm

Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	()	(Hz)	Error (Hz)	(%)	ppm
100%		+20(Ref)	836 600 013	0	0.000 000	0.000
100%		-30	836 599 987	-13.50	-0.000 002	-0.016
100%		-20	836 599 985	-15.27	-0.000 002	-0.018
100%		-10	836 599 987	-12.81	-0.000 002	-0.015
100%	3.700	0	836 599 988	-12.46	-0.000 001	-0.015
100%		+10	836 599 985	-15.30	-0.000 002	-0.018
100%		+30	836 599 985	-14.83	-0.000 002	-0.018
100%		+40	836 599 989	-10.57	-0.000 001	-0.013
100%		+50	836 599 985	-14.88	-0.000 002	-0.018
115%	4.255	+20	836 599 989	-11.04	-0.000 001	-0.013
85%	3.400	+20	836 599 990	-9.80	-0.000 001	-0.012



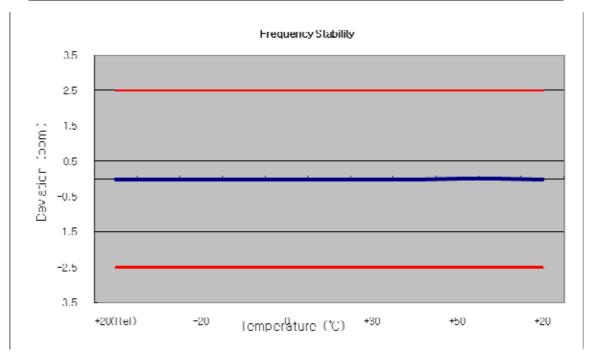
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7.10.4 FREQUENCY STABILITY (WCDMA1900)

OPERATING FREQUENCY:	1,880,000,000 Hz
CHANNEL:	9400
REFERENCE VOLTAGE:	3.7 VDC
DEVIATION LIM IT:	± 0.000 25 % or 2.5 ppm

Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	()	(Hz)	Error (Hz)	(%)	ppm
100%		+20(Ref)	1880 000 017	0	0.000 000	0.000
100%		-30	1879 999 975	-24.58	-0.000 001	-0.013
100%		-20	1879 999 982	-18.03	-0.000 001	-0.010
100%		-10	1879 999 981	-19.42	-0.000 001	-0.010
100%	3.700	0	1879 999 979	-21.20	-0.000 001	-0.011
100%		+10	1879 999 971	-29.30	-0.000 002	-0.016
100%		+30	1879 999 981	-18.87	-0.000 001	-0.010
100%		+40	1879 999 973	-27.29	-0.000 001	-0.015
100%		+50	1880 000 024	23.82	0.000 001	0.013
115%	4.255	+20	1880 000 026	26.48	0.000 001	0.014
85%	3.400	+20	1879 999 975	-24.91	-0.000 001	-0.013



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8. TEST PLOTS

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GSM850 MODE (128 CH.) Occupied Bandwidth



■ GSM850 MODE (190 CH.) Occupied Bandwidth



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GSM850 MODE (251 CH.) Occupied Bandwidth



■ GSM850 EDGE (128 CH.) Occupied Bandwidth



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🔆 Agilent RL Freg/Channel **Center Freq** Ch Freq 1.8502 GHz Trig Free 1.85020000 GHz Occupied Bandwidth Start Freq 1.84970000 GHz 0BW Ch.512 Ref 30 dBm Atten 20 dB Stop Freq #Peak 5 1.85070000 GHz Log ٥ ٥ 10 ⇒ ÷ **CF** Step dB/ 100.000000 kHz 0ffst 27.7 Man Auto de NY . . . dB Freq Offset 0.00000000 Hz Center 1.850 200 0 GHz Span 1 MHz #Res BW 3 kHz #VBW 9.1 kHz Sweep 106.1 ms (601 pts) Signal Track Occupied Bandwidth Occ BW % Pwr 99.00 % 0n Off x dB -26.00 dB 239.4166 kHz **Transmit Freq Error** -246.879 Hz x dB Bandwidth 312.672 kHz le Operation Status, C:\HCT.GIF file saved

■ GSM1900 MODE (512 CH.) Occupied Bandwidth

■ GSM1900 MODE (661 CH.) Occupied Bandwidth



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🔆 Agilent R Т Freg/Channel **Center Freq** Ch Freq 1.9098 GHz Trig Free 1.90980000 GHz Occupied Bandwidth Start Freq 1.90930000 GHz 0BW Ch.810 Ref 30 dBm Atten 20 dB Stop Freq #Peak 1.91030000 GHz Log 10 → 4 **CF** Step dB/ 0ffst 27.7 100.000000 kHz Man Auto dΒ Freq Offset 0.00000000 Hz Center 1.909 800 0 GHz Span 1 MHz #Res BW 3 kHz #VBW 9.1 kHz Sweep 106.1 ms (601 pts) Signal Track Occupied Bandwidth Occ BW % Pwr 99.00 % 0n Off x dB -26.00 dB 249.1038 kHz **Transmit Freq Error** 1.081 kHz x dB Bandwidth 311.097 kHz le Operation Status, C:\HCT.GIF file saved

■ GSM1900 MODE (810 CH.) Occupied Bandwidth

■ GSM1900 EDGE (810 CH.) Occupied Bandwidth

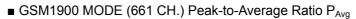


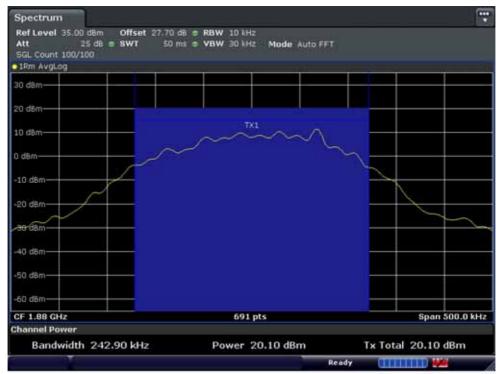
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Att 30 dB SWT 1.9	dB = RBW 1 MHz µs = VBW 3 MHz Mode Auto FF	T
1Pk: Max	M1[1]	29.74 dBr 1.88006950 GH
30 dBm		
20 dBm-		
10 dBm		
0 dBm		
-10 dBm		
20 d8m		
-30 dBm		
40 dBm		
50 dBm		
CF 1.88 GHz	691 pts	Span 2.0 MHz

■ GSM1900 MODE (661 CH.) Peak-to-Average Ratio P_{Pk}





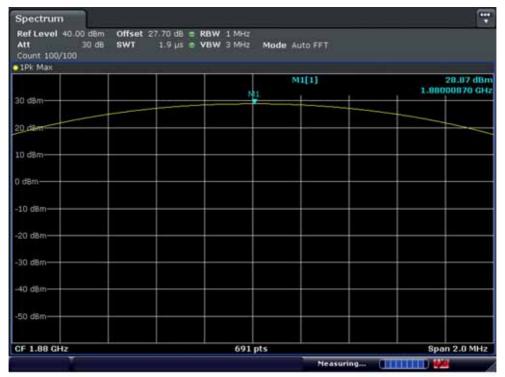
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Spectrum Ref Level 40.00 dBm Offset 27.70 dB = RBW 1 MHz Att 30 dB SWT 10 ms = VBW 3 MHz 1Pk Clrw D2[1] -0.13 dB MI 550.7 µs 30 dRm M1[1] 29,59 dBm 927.5 µs 20 dBm 10 dBm 0 dBm -10 dBm -20 dBm--30 dBm here remain and a real of the his hard a fer and a star and a sta -40 dBm -50 dBm-CF 1.88 GHz 691 pts 1.0 ms/ Marker Response Function µs 29.59 dBm ms -0.00 dB Type Ref Trc Stimulus Function Result 927.5 µs 4.6232 ms M1 1 D1 M1 M1 1 550.7 µs -0.13 dB Ready

■ GSM1900 MODE (661 CH.) Peak-to-Average Ratio PAvg

■ GSM1900 EDGE (661 CH.) Peak-to-Average Ratio P_{Pk}



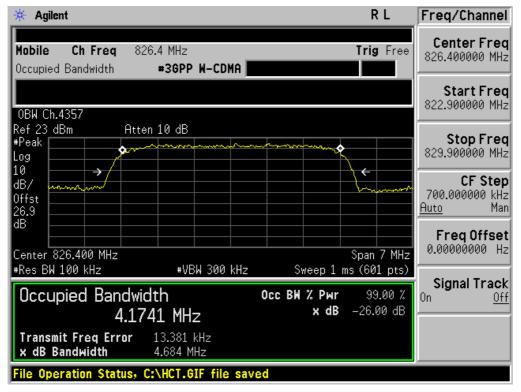
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■ GSM1900 EDGE (661 CH.) Peak-to-Average Ratio PAvg

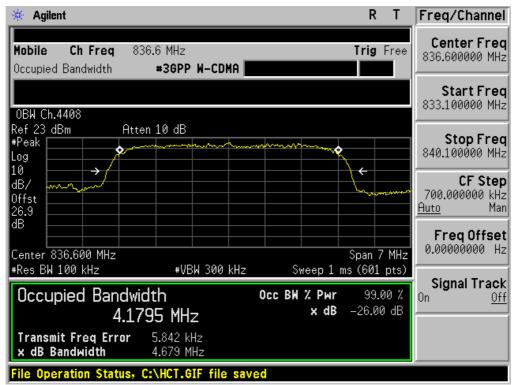
■ WCDMA850 MODE (4132 CH) Occupied Bandwidth



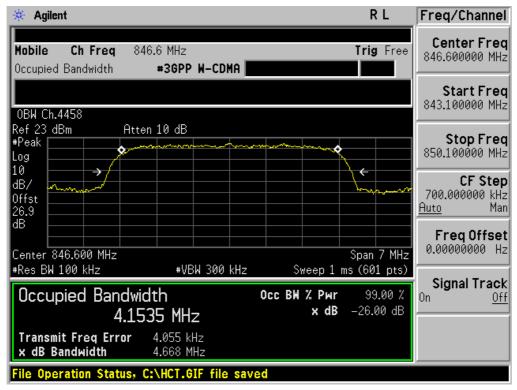
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■ WCDMA850 MODE (4183 CH.) Occupied Bandwidth



■ WCDMA850MODE (4233 CH.) Occupied Bandwidth

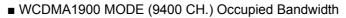


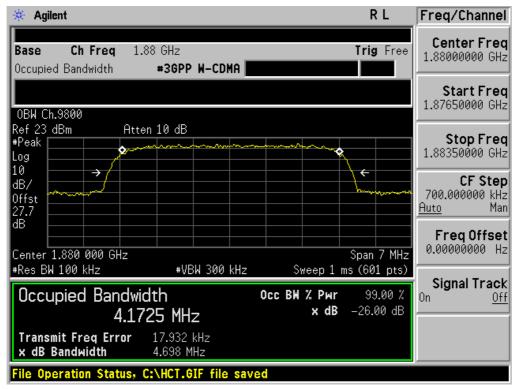
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🔆 Agilent RL Freg/Channel **Center Freq** Base Ch Freq 1.8524 GHz Trig Free 1.85240000 GHz Occupied Bandwidth #3GPP W-CDMA Start Freq 1.84890000 GHz 0BW Ch.9662 Ref 23_dBm Atten 10 dB Stop Freq #Peak 1.85590000 GHz Log 10 ÷ **CF** Step dB/ 700.000000 kHz 0ffst 27.7 Man Auto dB Freq Offset 0.00000000 Hz Center 1.852 400 GHz Span 7 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 1 ms (601 pts) Signal Track Occupied Bandwidth Occ BW % Pwr 99.00 % 0n Off x dB -26.00 dB 4.1836 MHz **Transmit Freq Error** 7.662 kHz x dB Bandwidth 4.671 MHz File Operation Status, C:\HCT.GIF file saved

■ WCDMA1900 MODE (9262 CH.) Occupied Bandwidth



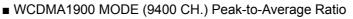


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🔆 Agilent RL Freg/Channel **Center Freq** Base Ch Freq 1.9076 GHz Trig Free 1.90760000 GHz Occupied Bandwidth #3GPP W-CDMA Start Freq 1.90410000 GHz 0BW Ch.9938 Ref 23 dBm Atten 10 dB Stop Freq #Peak Ò Δ 1.91110000 GHz Log 10 \rightarrow ÷ **CF** Step dB/ 700.000000 kHz 0ffst 27.7 Man Auto dB Freq Offset 0.00000000 Hz Center 1.907 600 GHz Span 7 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 1 ms (601 pts) Signal Track Occupied Bandwidth Occ BW % Pwr 99.00 % 0n Off x dB -26.00 dB 4.1492 MHz **Transmit Freq Error** -14.181 kHz x dB Bandwidth 4.670 MHz File Operation Status, C:\HCT.GIF file saved

■ WCDMA1900 MODE (9538 CH.) Occupied Bandwidth





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🔆 Agilent			R L	Freq/Channel
Band Edge Ch.128 Ref 33 dBm Atte	- 00 dP	Mkr1	823.985 2 MHz -15.73 dBm	Center Freq
#Avg	n 20 dB		-13./3 dDm	823.500000 MHz
Log 10				Start Freq
dB/				823.000000 MHz
Offst 26.9				Stop From
dB DI				Stop Freq 824.000000 MHz
-13.0			1	CF Step
dBm				100.000000 kHz
			<u>_</u>	<u>Auto</u> Man
M1 S2 S3 FC			/″I	Freq Offset 0.00000000 Hz
AA £(f):			. Man Y	
		and the Low Phylod		Signal Track
Swp wh. Alwron mallower bruch	wygryw ^a wywwywadan ^a jraada	Mar Mar Share		0n <u>0ff</u>
Center 823.500 0 MHz			Span 1 MHz	
⊭Res BW 3 kHz	#VB₩ 9.1 kl	lz – Sweep 335.6	6 ms (601 pts)	

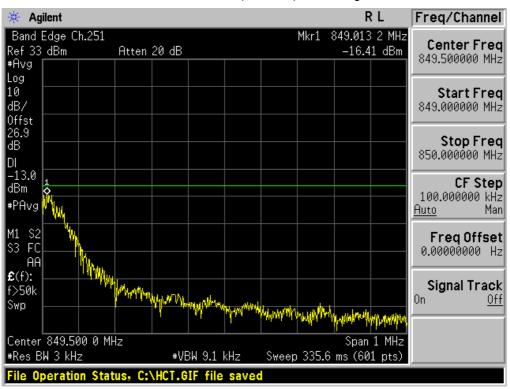
■ GSM850 MODE (128 CH.) Block Edge 1

■ GSM850 MODE (128 CH.) Block Edge 2



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■ GSM850 MODE (251 CH.) Block Edge 1

■ GSM850 MODE (251 CH.) Block Edge 2



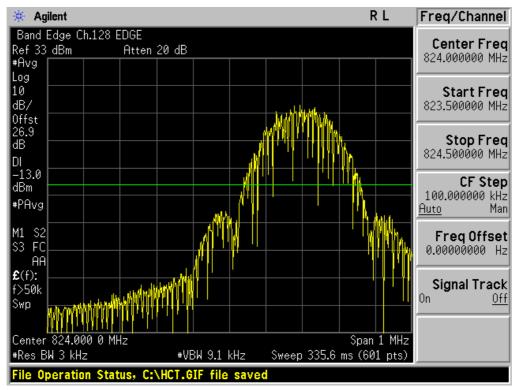
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Agilent			R L	Freq/Channel
Avg 🔤 🗌	E ten 20 dB	Mkr1 82	23.976 9 MHz -22.39 dBm	Center Freq 823.500000 MHz
og 0 B/ ffst				Start Freq 823.000000 MHz
6.9 B				Stop Freq 824.000000 MHz
13.0 Bm PAvg				CF Step 100.000000 kHz <u>Auto</u> Mar
11 S2 3 FC AA			J. Maring	Freq Offset 0.00000000 Hz
:(f): >50k wp	laniwaterateraterateration	white the property of the second s	water the second s	Signal Track On <u>Off</u>
enter 823,500 0 MHz			Span 1 MHz	
Res BW 3 kHz	₩VBW 9.1 kHz	Sweep 335.6 m		

■ EDGE MODE (128 CH.) Block Edge 1

■ EDGE MODE (128 CH.) Block Edge 2



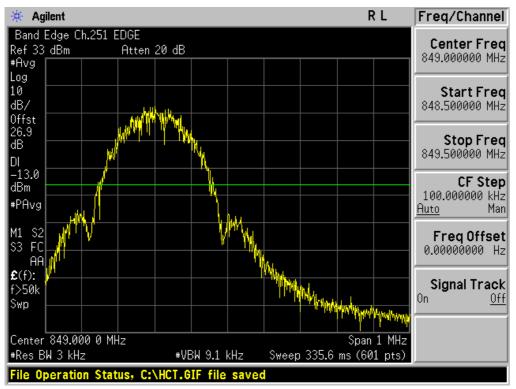
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			RL	Freq/Channel
Band Edge Ch.25 Ref 33 dBm	51 EDGE Atten 20 dB	Mkr1	849.001 6 MHz -24.36 dBm	Center Freq 849.500000 MHz
+Avg .og LØ JB/				Start Freq 849.000000 MHz
0ffst 26.9 JB 01				Stop Freq 850.000000 MHz
-13.0 JBm +PAvg1				CF Step 100.000000 kHz <u>Auto</u> Man
41 \$2 53 FC AA				FreqOffset 0.00000000 Hz
€(f): ₩ >50k Gwp	nafter and the second of the second	Malline and south and		Signal Track On <u>Off</u>
Center 849.500 0 #Res BW 3 kHz			<mark>տեխոչարինող</mark> Span 1 MHz .6 ms (601 pts)	

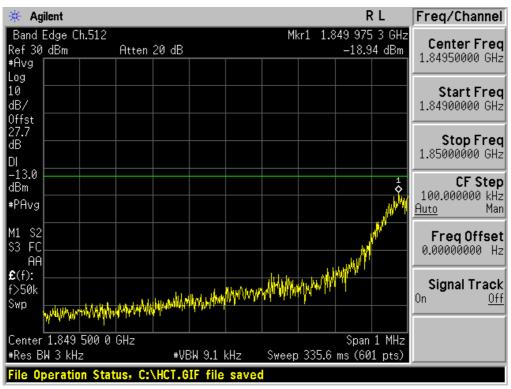
■ EDGE MODE (251 CH.) Block Edge 1

■ EDGE MODE (251 CH.) Block Edge 2



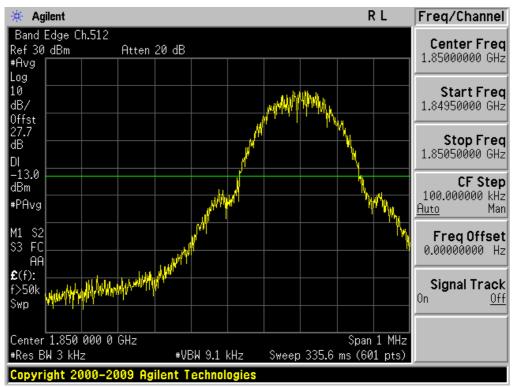
		FCC CERTIFICATION REPORT	www.hct.co.kr
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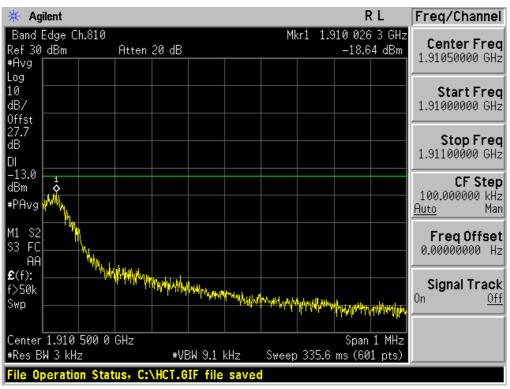
■ GSM1900 MODE (512 CH.) Block Edge 1

■ GSM1900 MODE (512 CH.) Block Edge 2



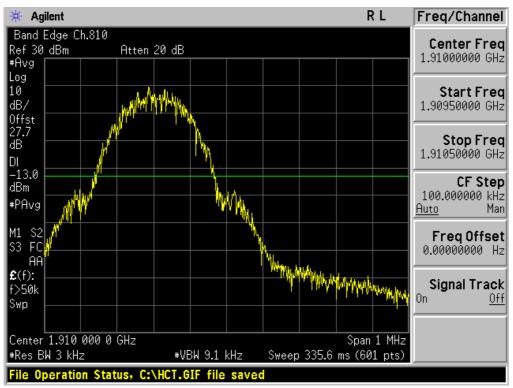
		FCC CERTIFICATION REPORT	www.hct.co.kr
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■ GSM1900 MODE (810 CH.) Block Edge 1

■ GSM1900 MODE (810 CH.) Block Edge 2



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🗧 Agilent				RL	Freq/Channel
Band Edge Ch.51	l2 EDGE	١	4kr1 1.849 97	'8 6 GHz	Conton From
kef 30_dBm	Atten 20 dB		-22	.54 dBm	Center Frec 1.84950000 GHz
Avg					1.04030000 01/2
.og					
.0					Start Fred
					1.84900000 GH:
)ffst 26.9					
IB					Stop Free
					1.85000000 GH:
-13.0					
IBm				1	CF Step
PAvg				\$	_100.000000 kH
				MAN	<u>Auto</u> Ma
11 S2				M	
3 FC				JA C	Freq Offse
AA				. I	0.00000000 H:
(f):					
>50k			A CONTRACT OF A CONTRACT OF		Signal Tracl
	atter at an	warm in water by the bulk the MAN	MMM	.	0n <u>Of</u>
North Martin	an waxaya an	Wedden official descent as			
Center 1.849 500	0 0 GHz		Spa	n 1 MHz	
Res BW 3 kHz		9.1 kHz Swee	p 335.6 ms (6		
	Status, C:\HCT.GIF				

■ EDGE MODE (512 CH.) Block Edge 1

■ EDGE MODE (512 CH.) Block Edge 2



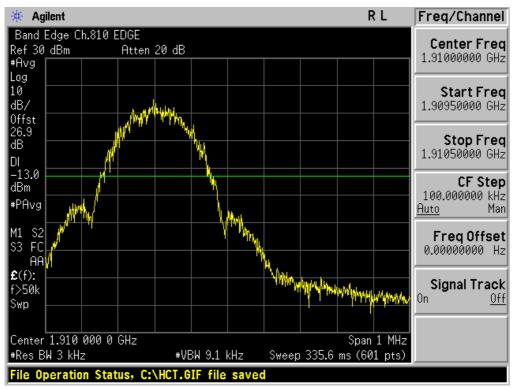
FCC CERTIFICATION REPORT				
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Agilent			RL	Freq/Channel
Band Edge Ch.810 EDGE ef 30 dBm Atte	n 20 dB	Mkr1	1.910 005 5 GHz -25.37 dBm	Center Fred
Avg og				1.91050000 GHz
0 0 B/				Start Fred 1.91000000 GHz
6.9 B II				Stop Fred 1.91100000 GHz
13.0 Bm 1 PAvg ∲				CF Step 100.000000 kHz <u>Auto</u> Mar
11 S2				Freq Offset 0.00000000 Hz
:(f): >50k wp	her with the many when the	www.angleyenyahyawang	white the state of	Signal Track On <u>Of</u>
enter 1.910 500 0 GHz Res BW 3 kHz	#VBW 9.1 kH:		Span 1 MHz .6 ms (601 pts)	

■ EDGE MODE (810 CH.) Block Edge 1

■ EDGE MODE (810 CH.) Block Edge 2



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🔆 Agilent				RL	Freq/Channel
Band Edge Ch.439 Ref 23 dBm #Avg	57 Atten 10 dB		Mkr1	824.000 MHz -25.504 dBm	Center Freq 824.000000 MHz
_og L0 dB∕ Dffst			n re han wanderda	Anne Miter - Land Land	Start Freq 820.500000 MHz
26.9 IB					Stop Fred 827.500000 MH;
-13.0 IBm PAvg	way many	1 ¢			CF Step 700.000000 kH: <u>Auto</u> Mai
00 41 S2 53 FS AA					Freq Offse 0.00000000 H;
2(f): >50k Swp					Signal Tracl
Center 824.000 Mł				Span 7 MHz	
Res BW 100 kHz File Operation St	#VBW atus, C:\HCT.GIF	300 kHz file saved		ms (601 pts)	

■ WCDMA850 MODE (4132 CH.) Block Edge

■ WCDMA850MODE (4233 CH.) Block Edge



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* Agilent					R	L	Freg/Channel
4MHz Span Ch.4357 Ref 23 dBm #Avg	Atten 10 dB					00 MHz 4 dBm	Center Freq 821.000000 MHz
Log 10 dB/ Offst							Start Freq 819.000000 MHz
26.9 dB DI						1	Stop Freq 823.000000 MHz
-13.0 dBm #PAvg 100		eesthetunessaater of the				- and a second	CF Step 400.000000 kHz <u>Auto</u> Man
W1 S2 S3 FC AA							Freq Offset 0.00000000 Hz
£(f): FTun Swp							Signal Track On <u>Off</u>
Center 821.000 MHz #Res BW 1 MHz		BW 3 MHz	Sw	eep 1 r		4 MHz 1 pts)	
File Operation Stat	us, C:\HCT.G	IF file sav	ed				

■ WCDMA850 MODE (4132 CH.) – 4 MHz Span

■ WCDMA850MODE (4233 CH.) – 4 MHz Span



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			RL	Freq/Channel
662 Atten 10 dB		Mkr1 1	850 000 GHz -24.402 dBm	Center Freq 1.85000000 GHz
				Start Freq 1.84650000 GHz
				Stop Frec 1.85350000 GHz
a manager and a man a man	1 ¢			CF Step 700.000000 kHz <u>Auto</u> Mar
				Freq Offset 0.00000000 Hz
				Signal Track On <u>Of</u> i
	300 kHz	Sweep 2.12	Span 7 MHz ms (601 pts)	
	Arrow and	Atten 10 dB	Atten 10 dB Atten 10 dB	Atten 10 dB24.402 dBm

■ WCDMA1900 MODE (9262 CH.) Block Edge

■ WCDMA1900 MODE (9538 CH.) Block Edge



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- -	
L Freq/Cha	innel
0 GHz . dBm 1.8470000	
Start 1.8450000	
Stop 1.8490000	
CF 400.00000 Auto	Step 10 kHz Man
Freq 01 0.0000000	
Signal T	rack
4 MHz	
	MHz pts)

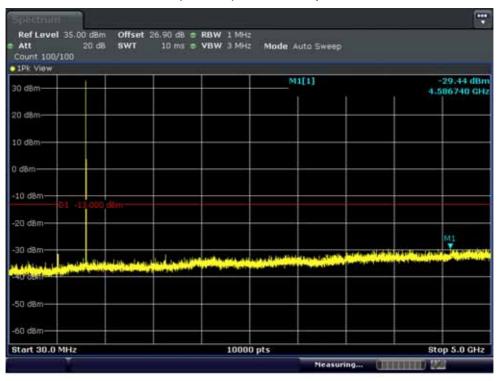
■ WCDMA1900 MODE (9262 CH.) – 4 MHz Span

■ WCDMA1900 MODE (9538 CH.) – 4 MHz Span



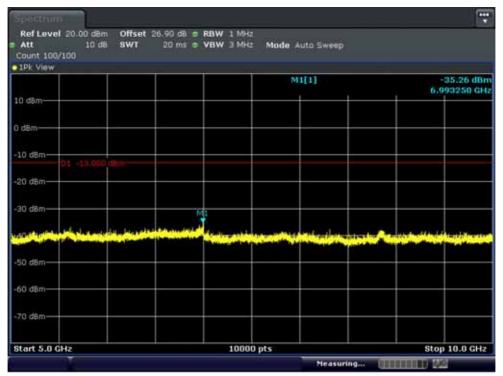
FCC CERTIFICATION REPORT				
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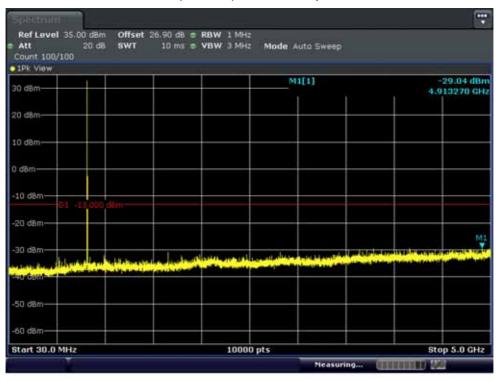
■ GSM850 MODE (128 CH.) Conducted Spurious Emissions1

■ GSM850 MODE (128 CH.) Conducted Spurious Emissions2



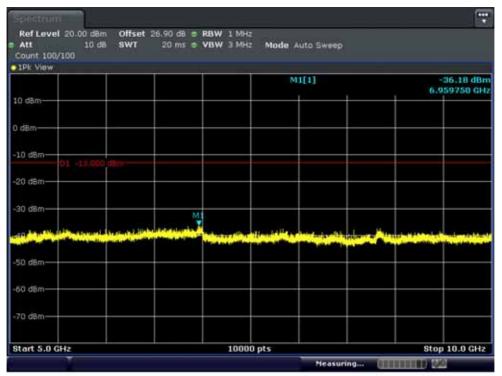
FCC CERTIFICATION REPORT				
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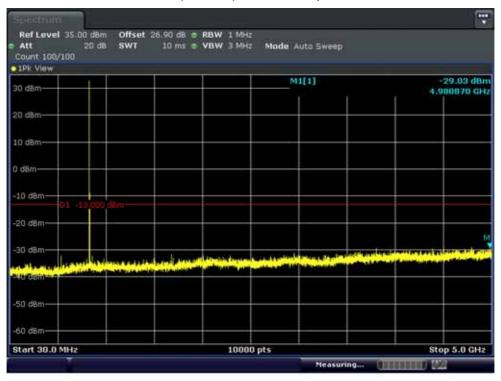
■ GSM850 MODE (190 CH.) Conducted Spurious Emissions1

■ GSM850 MODE (190 CH.) Conducted Spurious Emissions2



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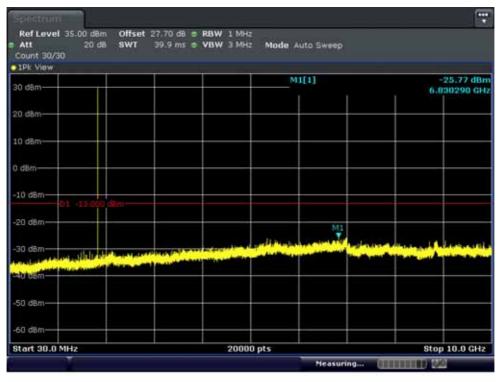
■ GSM850 MODE (251 CH.) Conducted Spurious Emissions1

■ GSM850 MODE (251 CH.) Conducted Spurious Emissions2



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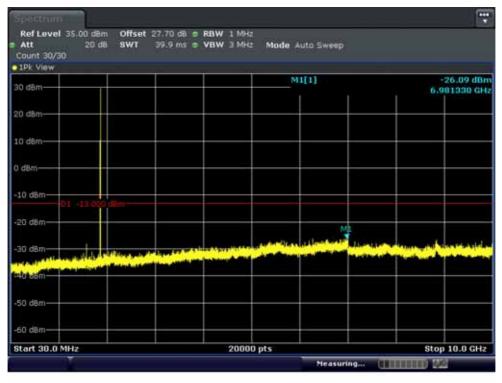
■ GSM1900 MODE (512 CH.) Conducted Spurious Emissions1

■ GSM1900 MODE (512 CH.) Conducted Spurious Emissions2



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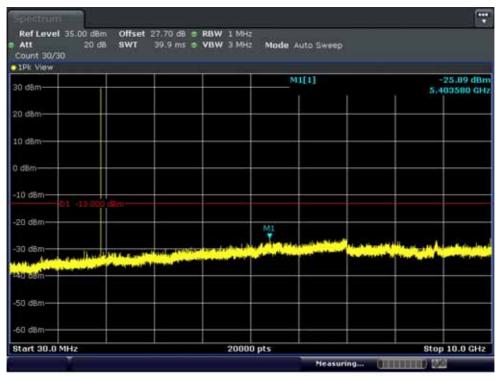
■ GSM1900 MODE (661 CH) Conducted Spurious Emissions1

■ GSM1900 MODE (661 CH.) Conducted Spurious Emissions2



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■ GSM1900 MODE (810 CH.) Conducted Spurious Emissions1

■ GSM1900 MODE (810 CH.) Conducted Spurious Emissions2



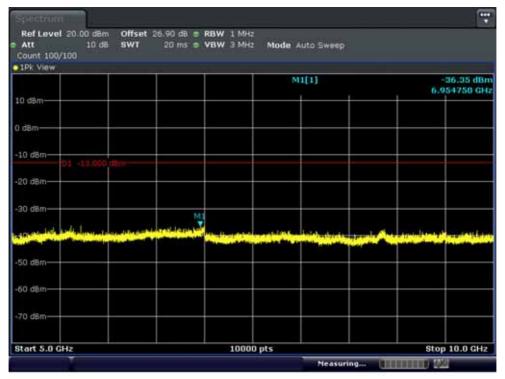
		FCC CERTIFICATION REPORT	www.hct.co.kr
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Ref Level 35.00 dBm Offset 26.90 dB RBW 1 MHz Att 20 dB SWT 10 ms VBW 3 MHz ALL Mode Auto Sweep Count 100/100 1Pk View M1[1] -28.92 dBm 30 d8m 4.818350 GHz 20 d8m 10 d8m-0 dBm -10 dBm--20 dBm MI -30 dBm and the second se and and the state of the sould as an 4.4 diam'r faltar -50 dBm -60 dBm-Start 30.0 MHz Stop 5.0 GHz 10000 pts Measuring... COLUMN TO A COLUMN

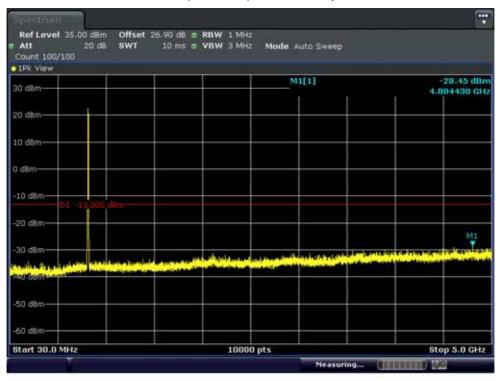
■ WCDMA850 MODE (4132 CH.) Conducted Spurious Emissions1

■ WCDMA850 MODE (4132 CH.) Conducted Spurious Emissions2



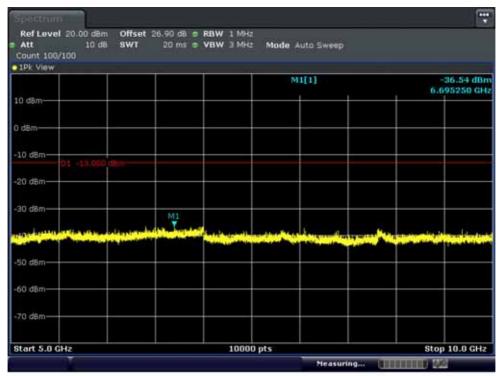
FCC CERTIFICATION REPORT			www.hct.co.kr	
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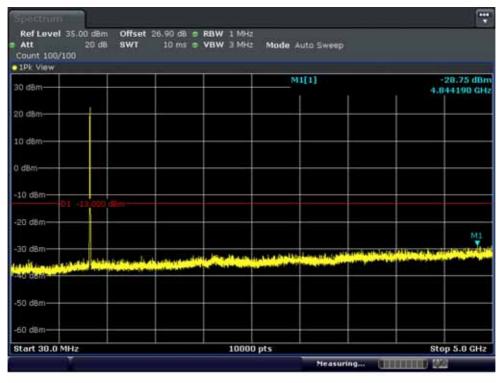
■ WCDMA850 MODE (4183 CH.) Conducted Spurious Emissions1

■ WCDMA850 MODE (4183 CH.) Conducted Spurious Emissions2



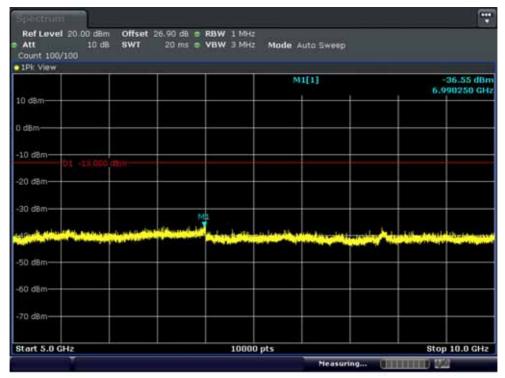
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■ WCDMA850MODE (4233 CH.) Conducted Spurious Emissions1

■ WCDMA850MODE (4233 CH.) Conducted Spurious Emissions2



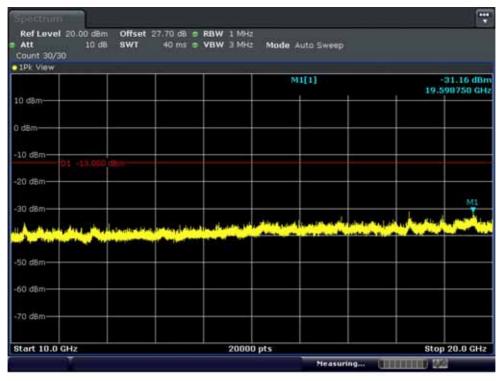
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Ref Level 35.00 dBm Offset 27.70 dB # RBW 1 MHz Att 20 dB SWT 39.9 ms # VBW 3 MHz ALL Mode Auto Sweep 1Pk View -25.96 dBm M1[1] 30 d8m 6.976850 GHz 20 d8m 10 dBm 0 dBm -10 d8m--20 dBm М -30 dBm-A Manager 1 Marca 40 CBm -50 dBm -60 dBm-Stop 10.0 GHz Start 30.0 MHz 20000 pts Neasuring..

■ WCDMA1900 MODE (9262 CH.) Conducted Spurious Emissions1

■ WCDMA1900 MODE (9262 CH.) Conducted Spurious Emissions2



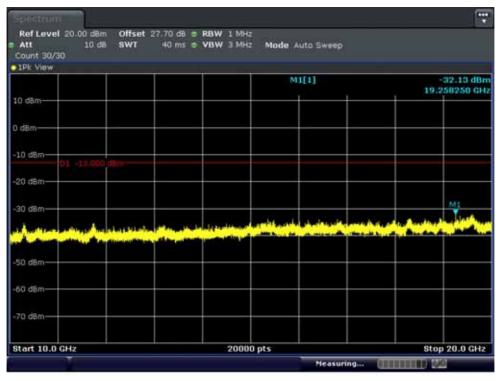
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Ref Level 35.00 dBm Offset 27.70 dB # RBW 1 MHz Att 20 dB SWT 39.9 ms # VBW 3 MHz ALL Mode Auto Sweep 1Pk View -26.17 dBm M1[1] 30 d8m 8.854700 GHz 20 d8m 10 d8m-0 dBm -10 d8m--20 dBm M1 -30 dBm Mar I 40 dBm -50 dBm -60 dBm-Stop 10.0 GHz Start 30.0 MHz 20000 pts Measuring.

■ WCDMA1900 MODE (9400 CH.) Conducted Spurious Emissions1

■ WCDMA1900 MODE (9400 CH.) Conducted Spurious Emissions2



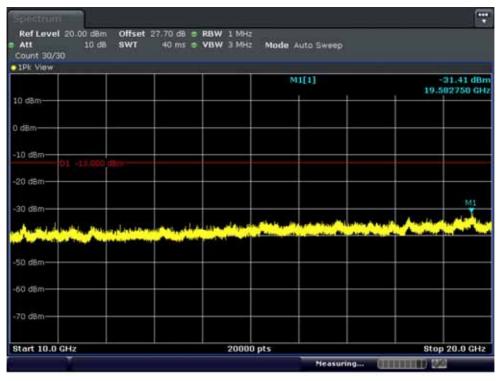
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Ref Level 35.00 dBm Offset 27.70 dB # RBW 1 MHz Att 20 dB SWT 39.9 ms # VBW 3 MHz ALL Mode Auto Sweep 1Pk View M1[1] -26.11 dBm 30 d8m 6.990310 GHz 20 d8m 10 d8m-0 dBm -10 d8m--20 dBm -30 dBm-Advertised. and a sublide state The star 40 68m--50 dBm -60 dBm-Stop 10.0 GHz Start 30.0 MHz 20000 pts Measuring.

■ WCDMA1900 MODE (9538 CH.) Conducted Spurious Emissions1

■ WCDMA1900 MODE (9538 CH.) Conducted Spurious Emissions2



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