7.2 EQUIVALENT ISOTROPIC RADIATED POWER (GSM)

(GSM1900 Mode)

Ch./ Freq.		Measured	Substitude	Ant. Gain	C.L	Pol.	EIRP	
channel	Freq.(MHz)	Level(dBm)	LEVEL (dBm)	(dBi)			W	dBm
512	1,850.20	-11.32	20.71	10.02	1.41	H	0.855	29.32
661	1,880.00	-11.15	21.16	10.04	1.45	H	0.944	29.75
810	1,909.80	-11.34	20.91	10.05	1.44	H	0.895	29.52

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 = 5MHz. For AMPS, GSM, and NADC TDMA 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 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 in x plane in GSM1900 mode. Also worst case of detecting Antenna is in horizontal polarization in GSM1900 mode.

FCC CERTIFICATION REPORT				www.hct.co.kr
Test Report No. HCTR1306FR13-1	**Date of Issue:** June 19, 2013	**EUT Type:** GSM/WCDMA Phone with Bluetooth3.0, WIFI802.11 b/g/n		**FCC ID:** ZNFE410F
		Page 16 of 46		

7.3 RADIATED SPURIOUS EMISSIONS

7.3.1 RADIATED SPURIOUS EMISSIONS (GSM850)

▣ MEASURED OUTPUT POWER: 28.02 dBm = 0.634 W

▣ MODULATION SIGNAL: GSM850

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 $\log_{10}$ (W) =   41.02 dBc

Ch.	Freq.(MHz)	Measured Level [dBm]	Ant. Gain (dBd)	Substitute Level [dBm]	C.L	Pol.	ERP (dBm)	dBc
128 (824.2)	1,648.40	-34.84	7.05	-41.68	1.18	V	-35.81	63.83
	2,472.60	-47.94	7.90	-51.69	1.57	V	-45.36	73.38
	3,296.80	-54.31	9.91	-58.19	1.99	H	-50.27	78.29
190 (836.6)	1,673.20	-40.11	7.22	-47.11	1.20	V	-41.09	69.11
	2,509.80	-51.76	8.51	-55.55	1.65	H	-48.69	76.71
	3,346.40	-50.09	10.09	-54.48	2.00	V	-46.39	74.41
251 (848.8)	1,697.60	-42.55	7.34	-49.57	1.20	H	-43.43	71.45
	2,546.40	-50.61	8.61	-54.15	1.65	V	-47.19	75.21
	3,395.20	-45.40	10.22	-49.93	1.99	V	-41.70	69.72

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

2. The magnitude of spurious emissions attenuated more than 20dB below the limit above 5th Harmonic for all channel.

3. we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

FCC CERTIFICATION REPORT				www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type:		FCC ID:
HCTR1306FR13-1	June 19, 2013	GSM/WCDMA Phone with Bluetooth3.0, WIFI802.11 b/g/n		ZNFE410F

Page 17 of 46

7.3.2 RADIATED SPURIOUS EMISSIONS (GSM1900)

▣ MEASURED OUTPUT POWER: 29.75 dBm = 0.944 W

▣ MODULATION SIGNAL: GSM1900

▣ DISTANCE: 3 meters

▣ LIMIT: $43 + 10 \log_{10}$ (W) = 42.75 dBc

Ch.	Freq.(MHz)	Measured Level [dBm]	Ant. Gain (dBi)	Substitute Level [dBm]	C.L	Pol.	EIRP (dBm)	dBc
512 (1850.2)	3,700.40	-47.97	12.27	-52.71	2.19	H	-42.63	72.38
	5,550.60	-53.11	13.40	-52.78	2.88	H	-42.26	72.01
	7,400.80	-56.74	11.37	-46.45	3.29	V	-38.37	68.12
661 (1880.0)	3,760.00	-48.45	12.31	-53.00	2.11	V	-42.80	72.55
	5,640.00	-50.83	13.41	-50.16	2.92	H	-39.67	69.42
	7,520.00	-53.59	11.55	-44.07	3.34	H	-35.86	65.61
810 (1909.8)	3,819.60	-46.44	12.37	-50.92	2.14	V	-40.69	70.44
	5,729.40	-47.09	13.42	-45.65	3.02	V	-35.25	65.00
	7,639.20	-50.61	11.70	-40.85	3.13	H	-32.28	62.03

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

2. The magnitude of spurious emissions attenuated more than 20dB below the limit above 5th Harmonic for all channel.

3. we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

FCC CERTIFICATION REPORT				www.hct.co.kr
Test Report No. HCTR1306FR13-1	Date of Issue: June 19, 2013	EUT Type: GSM/WCDMA Phone with Bluetooth3.0, WIFI802.11 b/g/n		FCC ID: ZNFE410F

Page 18 of 46

7.3.3 RADIATED SPURIOUS EMISSIONS (WCDMA850)

▣ MEASURED OUTPUT POWER: 20.44 dBm = 0.111 W

▣ MODULATION SIGNAL: WCDMA850

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 $\log_{10}$ (W) =   33.44 dBc

Ch.	Freq.(MHz)	Measured Level [dBm]	Ant. Gain (dBd)	Substitute Level [dBm]	C.L	Pol.	ERP (dBm)	dBc
4,132 (826.4)	1,652.80	-55.12	7.11	-62.05	1.20	H	-56.14	76.58
	2,479.20	-55.63	8.40	-59.52	1.62	H	-52.74	73.18
	3,305.60	-57.92	9.95	-62.10	1.99	H	-54.14	74.58
4,183 (836.6)	1,673.20	-52.96	7.22	-59.96	1.20	V	-53.94	74.38
	2,509.80	-54.46	8.51	-58.25	1.65	H	-51.39	71.83
	3,346.40	-57.71	10.09	-62.10	2.00	H	-54.01	74.45
4,233 (846.6)	1,693.20	-52.60	7.34	-59.62	1.20	H	-53.48	73.92
	2,539.80	-54.95	8.58	-58.87	1.65	H	-51.94	72.38
	3,386.40	-57.18	10.19	-61.61	1.98	V	-53.40	73.84

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

2. The magnitude of spurious emissions attenuated more than 20dB below the limit above 5th Harmonic for all channel.

3. we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

FCC CERTIFICATION REPORT				www.hct.co.kr
Test Report No. HCTR1306FR13-1	**Date of Issue:** June 19, 2013	**EUT Type:** GSM/WCDMA Phone with Bluetooth3.0, WIFI802.11 b/g/n		**FCC ID:** ZNFE410F

Page 19 of 46

7.4 PEAK-TO-AVERAGE RATIO

Band	Channel	Frequency(MHz)	Data (dBm)
GSM1900	661	1880.00	0.015

- Plots of the EUT's Peak- to- Average Ratio are shown Page 29~30.

7.5 OCCUPIED BANDWIDTH

Band	Channel	Frequency(MHz)	Data (GSM: kHz / WCDMA : MHz)
GSM850	128	824.20	247.1675
	190	836.60	245.0685
	251	848.80	253.0454
GSM1900	512	1850.20	249.6638
	661	1880.00	247.5450
	810	1909.80	244.5827
WCDMA850	4132	826.40	4.1641
	4183	836.60	4.1970
	4233	846.60	4.1597

- Plots of the EUT's Occupied Bandwidth are shown Page 26 ~ 28, 29 ~ 31.

FCC CERTIFICATION REPORT				www.hct.co.kr
Test Report No. HCTR1306FR13-1	**Date of Issue:** June 19, 2013	**EUT Type:** GSM/WCDMA Phone with Bluetooth3.0, WIFI802.11 b/g/n		**FCC ID:** ZNFE410F

Page 20 of 46

7.6 CONDUCTED SPURIOUS EMISSIONS

Band	Channel	Frequency of Maximum Harmonic (GHz)	Maximum Data (dBm)
GSM850	128	4.920730	-28.83
	190	3.649400	-29.12
	251	4.957010	-29.10
GSM1900	512	6.973190	-25.43
	661	10.293810	-24.73
	810	6.949050	-25.42
WCDMA850	4132	4.630980	-28.69
	4183	4.859100	-27.86
	4233	4.728390	-28.71

- Plots of the EUT's Conducted Spurious Emissions are shown Page 38 ~ 46.

7.6.1 BAND EDGE

- Plots of the EUT's Band Edge are shown Page 32 ~ 37.

FCC CERTIFICATION REPORT				www.hct.co.kr
Test Report No. HCTR1306FR13-1	**Date of Issue:** June 19, 2013	**EUT Type:** GSM/WCDMA Phone with Bluetooth3.0, WIFI802.11 b/g/n		**FCC ID:** ZNFE410F

Page 21 of 46

7.7 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

7.7.1 FREQUENCY STABILITY (GSM850)

◉ OPERATING FREQUENCY: 836,600,000 Hz

◉ CHANNEL: 190

◉ REFERENCE VOLTAGE: 3.8 VDC

◉ DEVIATION LIM IT: ± 0.000 25 % or 2.5 ppm
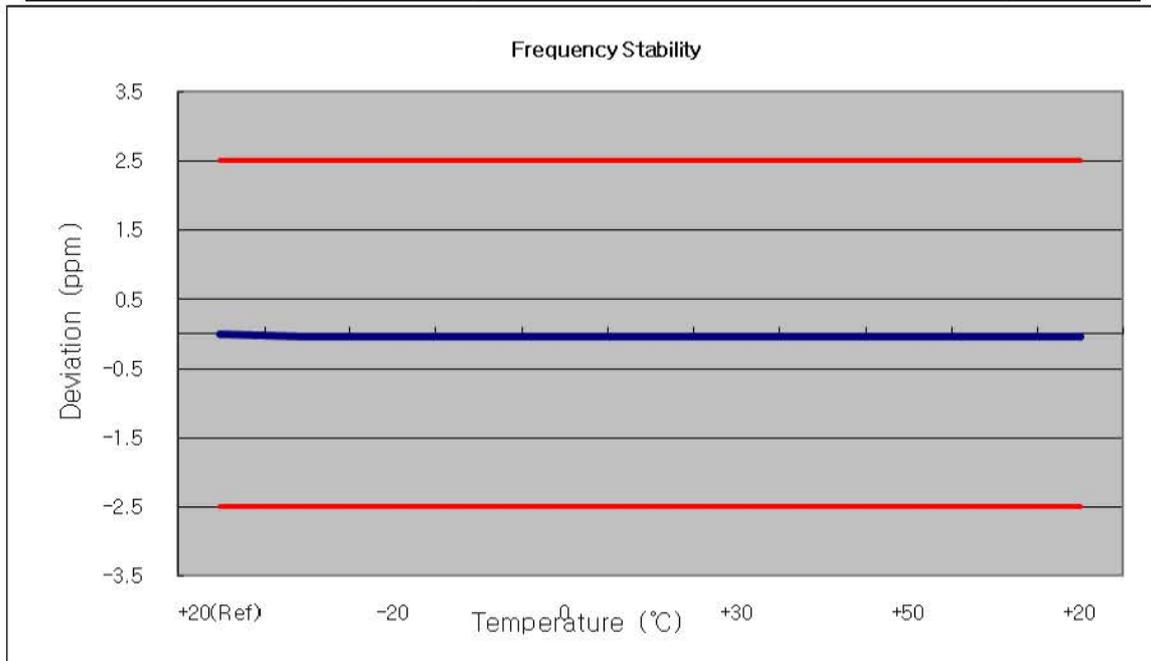
Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%		+20(Ref)	836 600 039	0	0.000 000	0.000
100%		−30	836 599 996	−42.90	−0.000 005	−0.051
100%		−20	836 599 998	−41.05	−0.000 005	−0.049
100%		−10	836 599 997	−41.89	−0.000 005	−0.050
100%	3.700	0	836 599 996	−43.52	−0.000 005	−0.052
100%		+10	836 599 998	−40.81	−0.000 005	−0.049
100%		+30	836 599 995	−43.96	−0.000 005	−0.053
100%		+40	836 599 996	−42.83	−0.000 005	−0.051
100%		+50	836 599 997	−42.34	−0.000 005	−0.051
115%	4.255	+20	836 599 996	−42.97	−0.000 005	−0.051
Batt. Endpoint	3.400	+20	836 599 993	−46.12	−0.000 006	−0.055

Frequency Stability
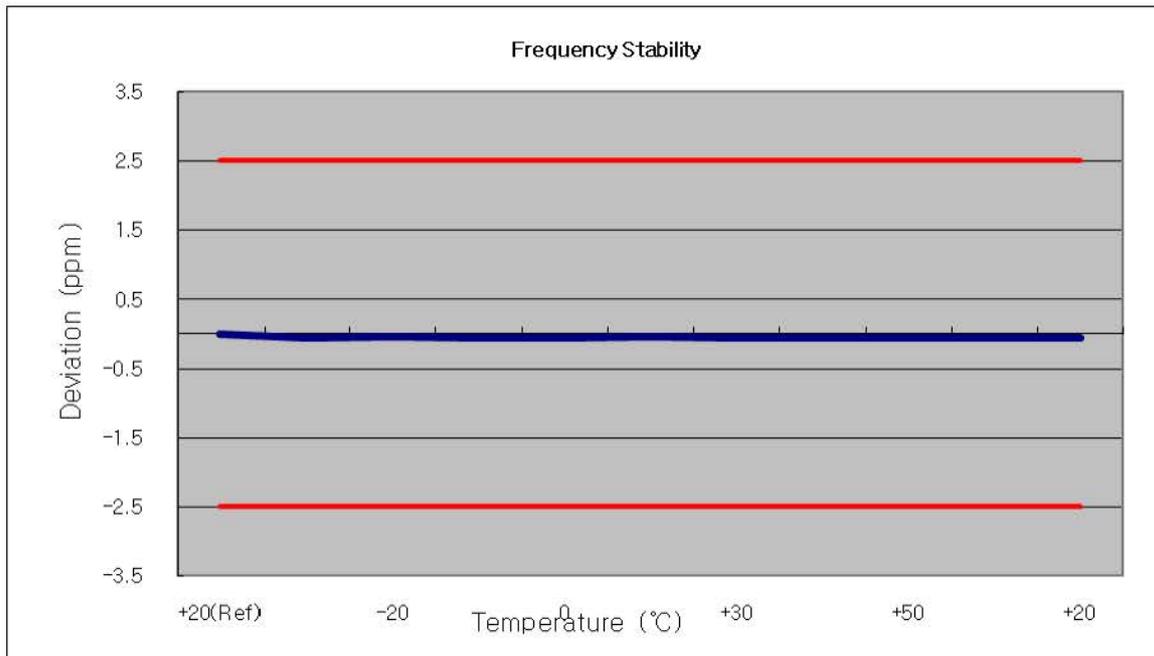
7.7.2 FREQUENCY STABILITY (GSM1900)

◉ OPERATING FREQUENCY: 1880,000,000 Hz

◉ CHANNEL: 661

◉ REFERENCE VOLTAGE: 3.8 VDC

◉ DEVIATION LIM IT: ± 0.000 25 % or 2.5 ppm
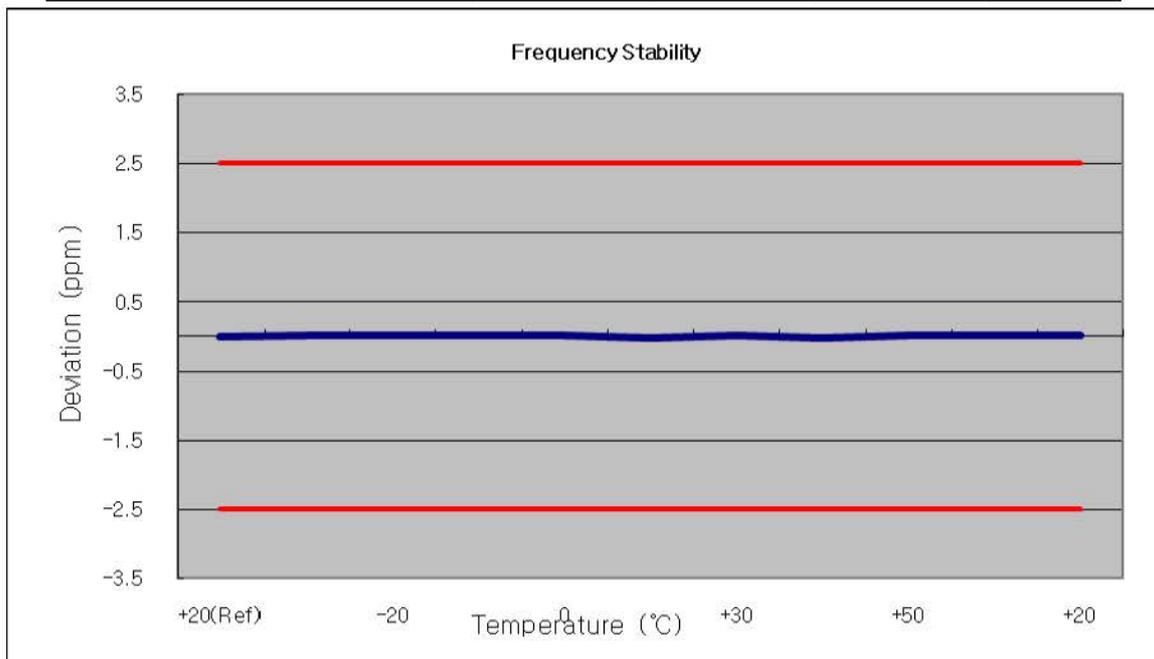
Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%		+20(Ref)	1880 000 072	0	0.000 000	0.000
100%		−30	1879 999 998	−74.43	−0.000 004	−0.040
100%		−20	1879 999 999	−72.77	−0.000 004	−0.039
100%		−10	1879 999 996	−75.93	−0.000 004	−0.040
100%	3.700	0	1879 999 994	−78.21	−0.000 004	−0.042
100%		+10	1880 000 001	−70.80	−0.000 004	−0.038
100%		+30	1879 999 999	−72.76	−0.000 004	−0.039
100%		+40	1879 999 999	−72.86	−0.000 004	−0.039
100%		+50	1880 000 000	−71.72	−0.000 004	−0.038
115%	4.255	+20	1879 999 998	−73.97	−0.000 004	−0.039
Batt. Endpoint	3.400	+20	1879 999 996	−76.45	−0.000 004	−0.041

Frequency Stability

FCC CERTIFICATION REPORT				www.hct.co.kr
Test Report No. HCTR1306FR13-1	Date of Issue: June 19, 2013	EUT Type: GSM/WCDMA Phone with Bluetooth3.0, WIFI802.11 b/g/n		FCC ID: ZNFE410F

Page 23 of 46

7.7.3 FREQUENCY STABILITY (WCDMA850)

▣ OPERATING FREQUENCY: 836,600,000 Hz

▣ CHANNEL: 4183

▣ REFERENCE VOLTAGE: 3.8 VDC

▣ DEVIATION LIM IT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%		+20(Ref)	836 599 988	0	0.000 000	0.000
100%		−30	836 600 010	10. 45	0.000 001	0.012
100%		−20	836 600 013	13. 36	0.000 002	0.016
100%		−10	836 600 012	12.30	0.000 001	0.015
100%	3.700	0	836 600 016	15.93	0.000 002	0.019
100%		+10	836 599 988	−12.44	−0.000 001	−0.015
100%		+30	836 600 013	13.41	0.000 002	0.016
100%		+40	836 599 984	−15.67	−0.000 002	−0.019
100%		+50	836 600 014	14.16	0.000 002	0.017
115%	4.255	+20	836 600 009	9.00	0.000 001	0.011
Batt. Endpoint	3.400	+20	836 600 009	9.27	0.000 001	0.011

Frequency Stability

FCC CERTIFICATION REPORT				www.hct.co.kr
Test Report No. HCTR1306FR13-1	Date of Issue: June 19, 2013	EUT Type: GSM/WCDMA Phone with Bluetooth3.0, WIFI802.11 b/g/n		FCC ID: ZNFE410F

Page 24 of 46

8. TEST PLOTS

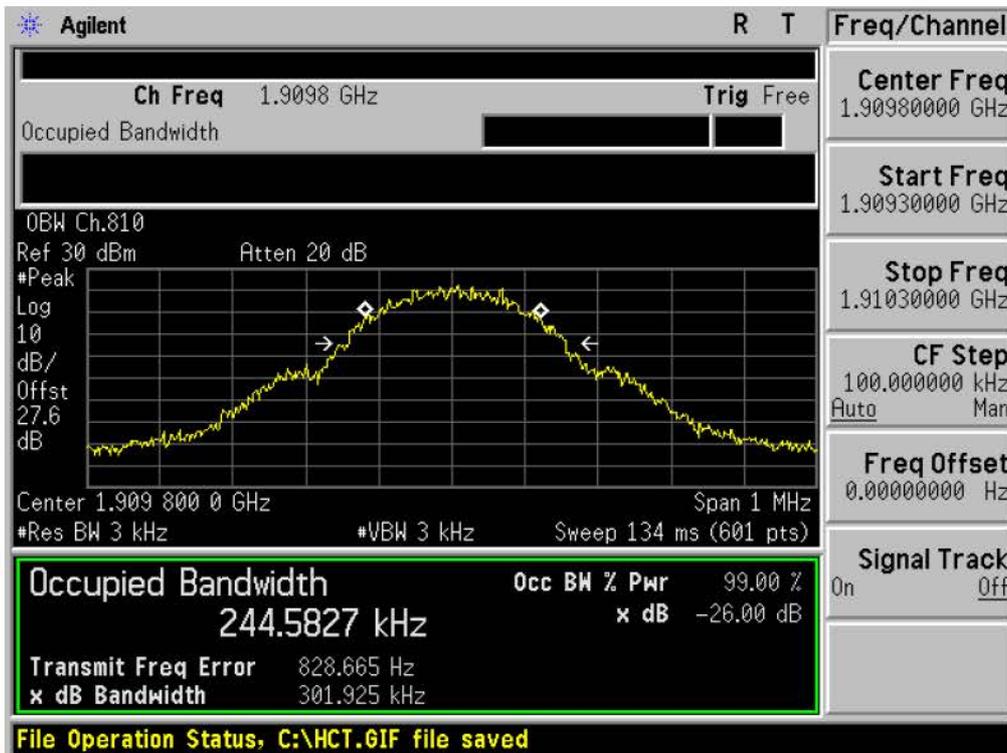| FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1306FR13-1	**Date of Issue:** June 19, 2013	**EUT Type:** GSM/WCDMA Phone with Bluetooth3.0, WIFI802.11 b/g/n	**FCC ID:** ZNFE410F

■ GSM850 MODE (128 CH.) Occupied Bandwidth

Ch Freq 824.2 MHz	**Trig** Free

Occupied Bandwidth

OBW Ch.128
Ref 33 dBm   Atten 20 dB
#Peak
Log
10
dB/
Offst
26.9
dB

Center 824.200 0 MHz   Span 1 MHz
#Res BW 3 kHz   #VBW 3 kHz   Sweep 134 ms (601 pts)

Occupied Bandwidth   Occ BW % Pwr   99.00 %
247.1675 kHz   x dB   −26.00 dB
Transmit Freq Error   441.062 Hz
x dB Bandwidth   309.066 kHz

Neg.Trig Delay unavailable in Swept Mode, zero delay used.

Freq/Channel
Center Freq 824.200000 MHz
Start Freq 823.700000 MHz
Stop Freq 824.700000 MHz
CF Step 100.000000 kHz Auto Man
Freq Offset 0.00000000 Hz
Signal Track On Off

■ GSM850 MODE (190 CH.) Occupied Bandwidth

Ch Freq 836.6 MHz	**Trig** Free

Occupied Bandwidth

OBW Ch.190
Ref 33 dBm   Atten 20 dB
#Peak
Log
10
dB/
Offst
26.9
dB

Center 836.600 0 MHz   Span 1 MHz
#Res BW 3 kHz   #VBW 3 kHz   Sweep 134 ms (601 pts)

Occupied Bandwidth   Occ BW % Pwr   99.00 %
245.0685 kHz   x dB   −26.00 dB
Transmit Freq Error   1.528 kHz
x dB Bandwidth   310.814 kHz

Neg.Trig Delay unavailable in Swept Mode, zero delay used.

Freq/Channel
Center Freq 836.600000 MHz
Start Freq 836.100000 MHz
Stop Freq 837.100000 MHz
CF Step 100.000000 kHz Auto Man
Freq Offset 0.00000000 Hz
Signal Track On Off

FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1306FR13-1	**Date of Issue:** June 19, 2013	**EUT Type:** GSM/WCDMA Phone with Bluetooth3.0, WIFI802.11 b/g/n	**FCC ID:** ZNFE410F

Page 26 of 46

■ GSM850 MODE (251 CH.) Occupied Bandwidth

■ GSM1900 MODE (512 CH.) Occupied Bandwidth

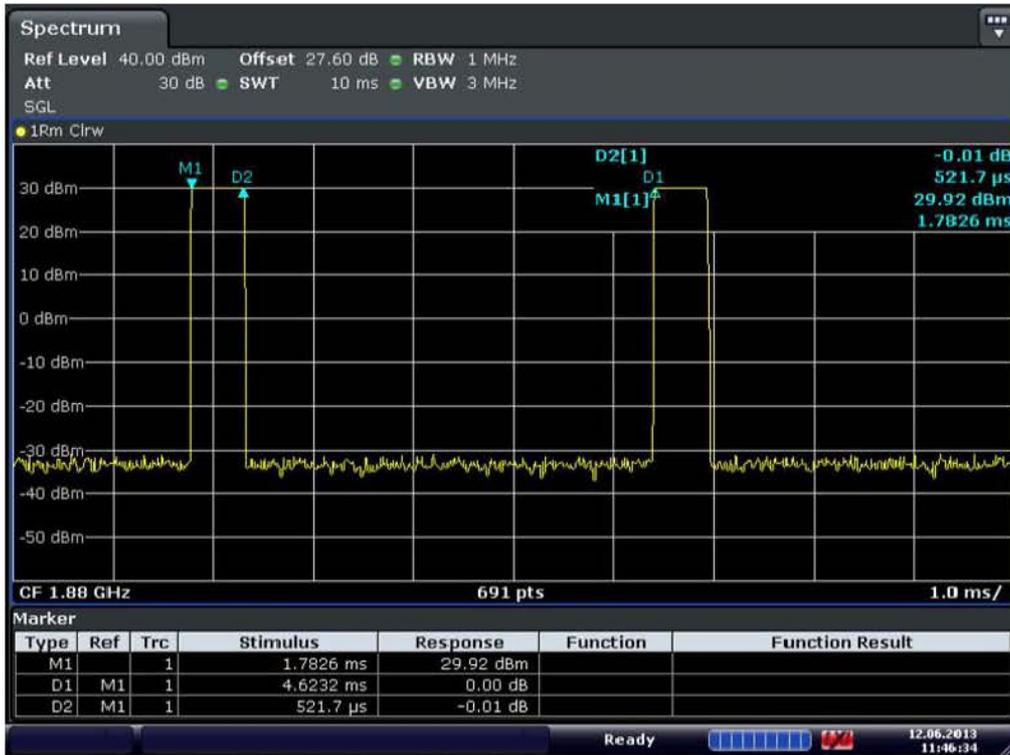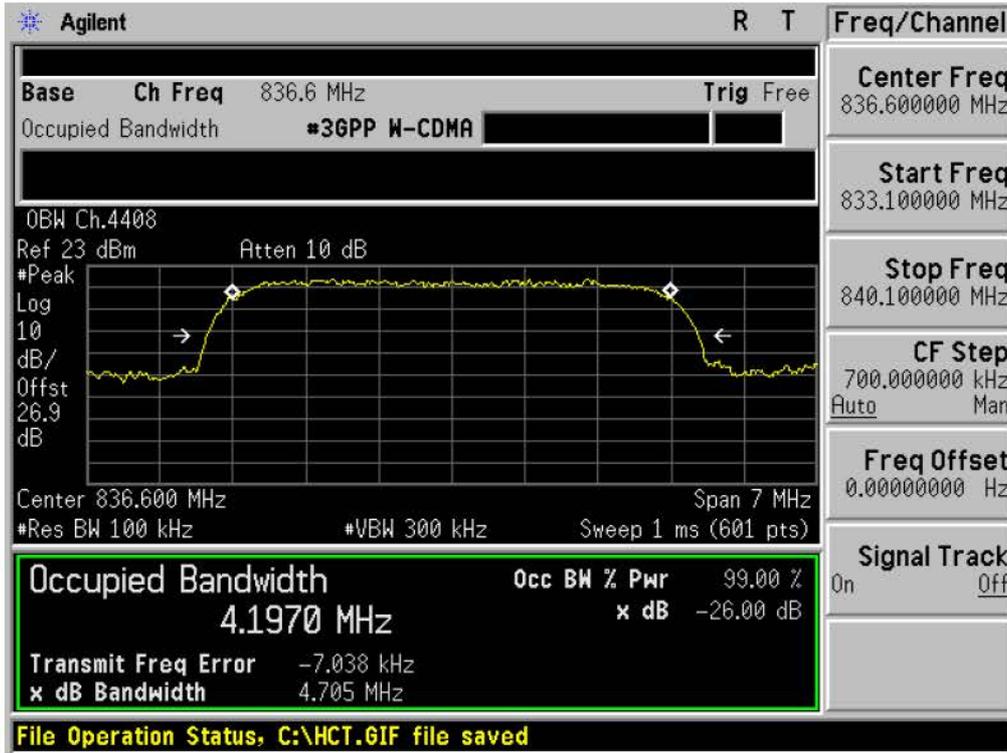| FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1306FR13-1	Date of Issue: June 19, 2013	EUT Type: GSM/WCDMA Phone with Bluetooth3.0, WIFI802.11 b/g/n	FCC ID: ZNFE410F

Page 27 of 46

■ GSM1900 MODE (661 CH.) Occupied Bandwidth

■ GSM1900 MODE (810 CH.) Occupied Bandwidth

		FCC CERTIFICATION REPORT	www.hct.co.kr
Test Report No. HCTR1306FR13-1	**Date of Issue:** June 19, 2013	**EUT Type:** GSM/WCDMA Phone with Bluetooth3.0, WIFI802.11 b/g/n	**FCC ID:** ZNFE410F
		Page 28 of 46	

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

■ GSM1900 MODE (661 CH.) Peak-to-Average Ratio P_Avg
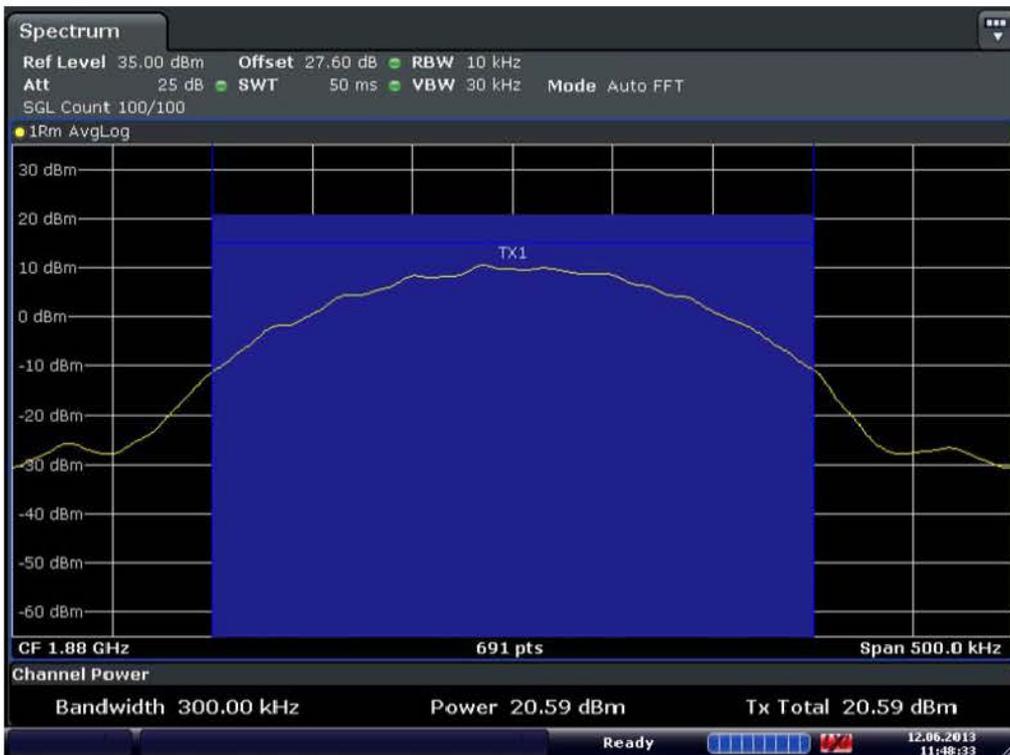
FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1306FR13-1	**Date of Issue:** June 19, 2013	**EUT Type:** GSM/WCDMA Phone with Bluetooth3.0, WIFI802.11 b/g/n	**FCC ID:** ZNFE410F

Page 29 of 46

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

■ WCDMA850 MODE (4132 CH.) Occupied Bandwidth

FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No.	Date of Issue:	EUT Type:	FCC ID:
HCTR1306FR13-1	June 19, 2013	GSM/WCDMA Phone with Bluetooth3.0, WIFI802.11 b/g/n	ZNFE410F
Page 30 of 46			
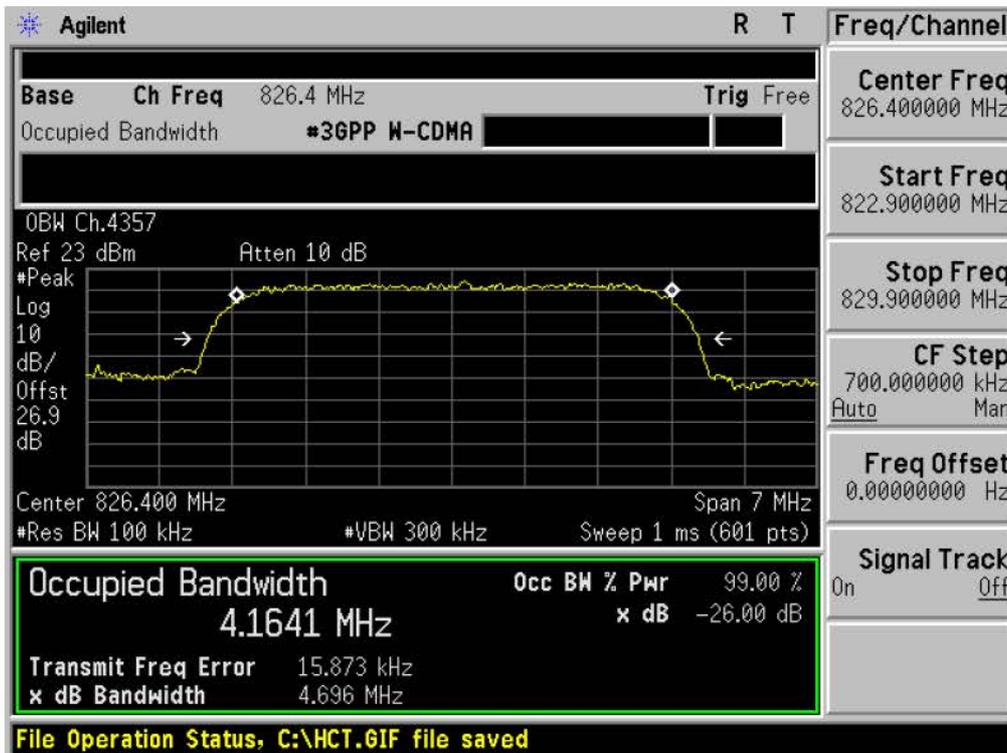
■ WCDMA850 MODE (4183 CH.) Occupied Bandwidth

■ WCDMA850MODE (4233 CH.) Occupied Bandwidth

FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1306FR13-1	**Date of Issue:** June 19, 2013	**EUT Type:** GSM/WCDMA Phone with Bluetooth3.0, WIFI802.11 b/g/n	**FCC ID:** ZNFE410F

Page 31 of 46