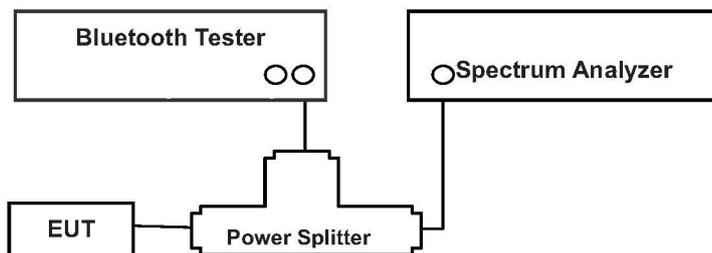


## 8.2 BAND EDGES

### LIMIT

According to §15.247(d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

### Test Configuration



### TEST PROCEDURE

**This test is performed with hopping off and hopping on.**

The Spectrum Analyzer is set to ( DA 00-705 )

Span = wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation

RBW  $\geq$  1% of the span

VBW  $\geq$  RBW

Sweep = Auto

Detector = Peak

Trace = Max hold

### TEST RESULTS

See attached.

Note :

1. The results in plot is already including the actual values of loss for the splitter and cable combination.
2. Spectrum offset = Power Splitter loss + Cable loss
3. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB. Actual value of loss for the splitter and cable combination is 7.18 dB at 2402 MHz and is 7.23 dB at 2480 MHz. So, 7.2 dB is offset. And the offset gap in the 2.4 GHz range do not affect the band edge measurement final result.

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		<a href="http://www.hct.co.kr">www.hct.co.kr</a>
Test Report No. HCTR1306FR02	Date of Issue: June 05, 2013	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 a/b/g/n(2.4/5GHz)/NFC	FCC ID: ZNFE989

**Test Data**

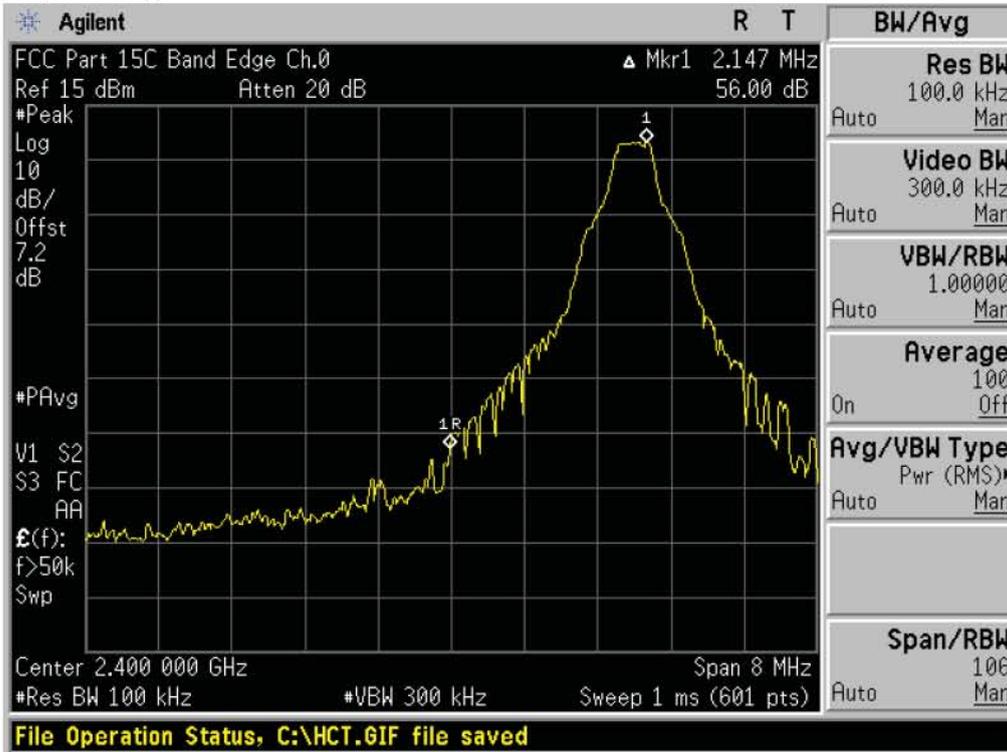
- Without hopping

Outside Frequency Band	GFSK	8DPSK	$\pi/4$ DQPSK	Limit (dBc)	Margin			Result
	(dB)	(dB)	(dB)		GFSK (dBc)	8DPSK (dBc)	$\pi/4$ DQPSK (dBc)	
Lower	56.00	49.25	49.30	20	36.00	29.25	29.30	PASS
Upper	64.75	64.61	65.03		44.75	44.61	45.03	PASS

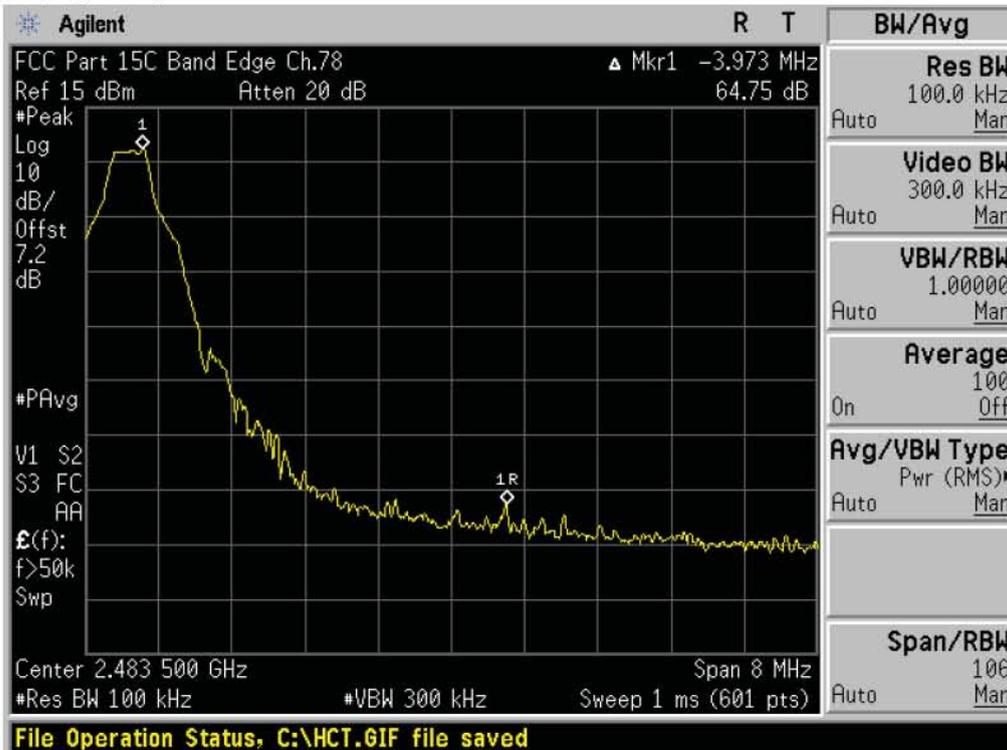
- With hopping

Outside Frequency Band	GFSK	8DPSK	$\pi/4$ DQPSK	Limit (dBc)	Margin			Result
	(dB)	(dB)	(dB)		GFSK (dBc)	8DPSK (dBc)	$\pi/4$ DQPSK (dBc)	
Lower	64.87	52.23	51.99	20	44.87	32.23	31.99	PASS
Upper	66.54	63.13	60.48		46.54	43.13	40.48	PASS

Test Plots without hopping (GFSK)  
Band Edges (Low-CH)

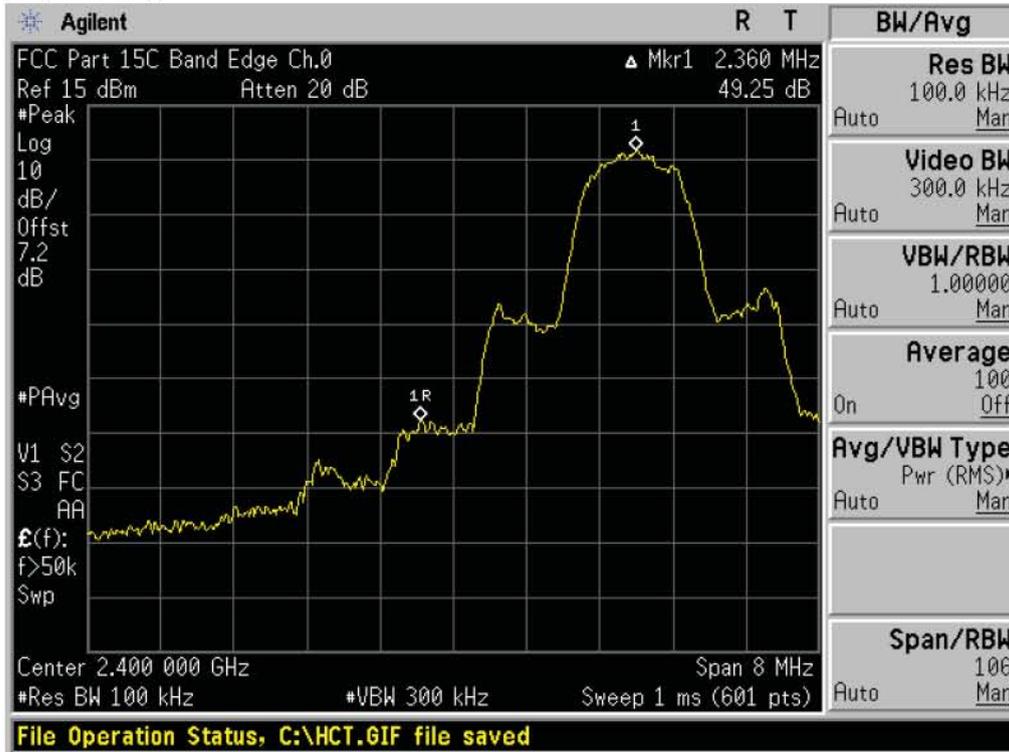


Test Plots without hopping (GFSK)  
Band Edges (High-CH)

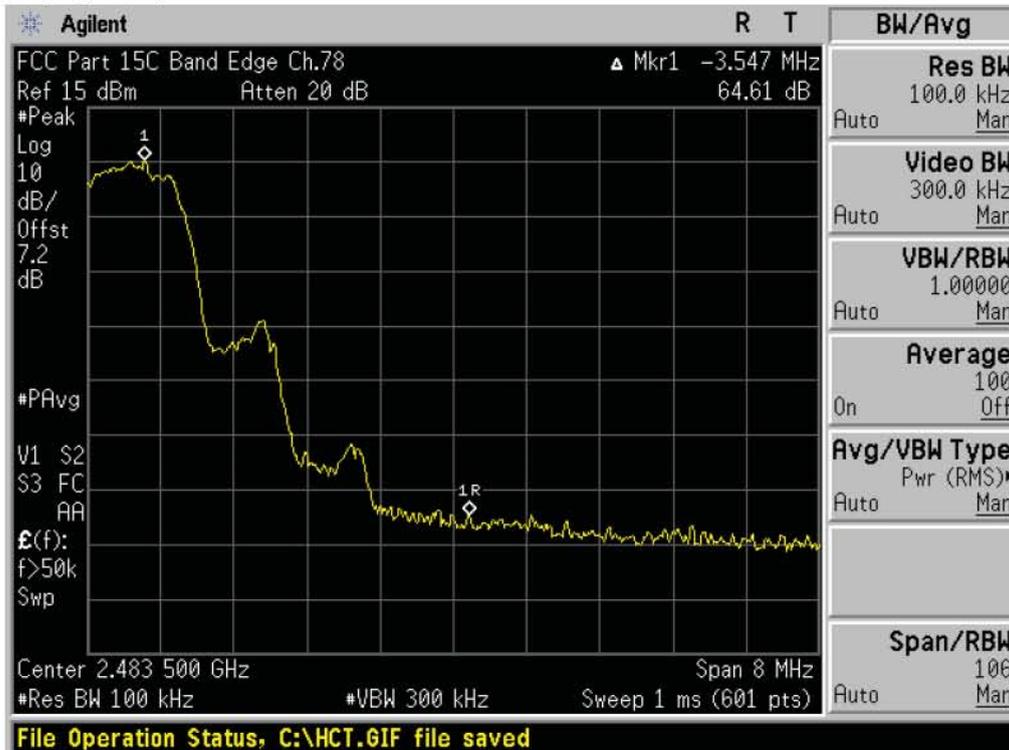


FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		<a href="http://www.hct.co.kr">www.hct.co.kr</a>
Test Report No. HCTR1306FR02	Date of Issue: June 05, 2013	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 a/b/g/n(2.4/5GHz)/NFC	FCC ID: ZNFE989

Test Plots without hopping (8DPSK)  
Band Edges (Low-CH)

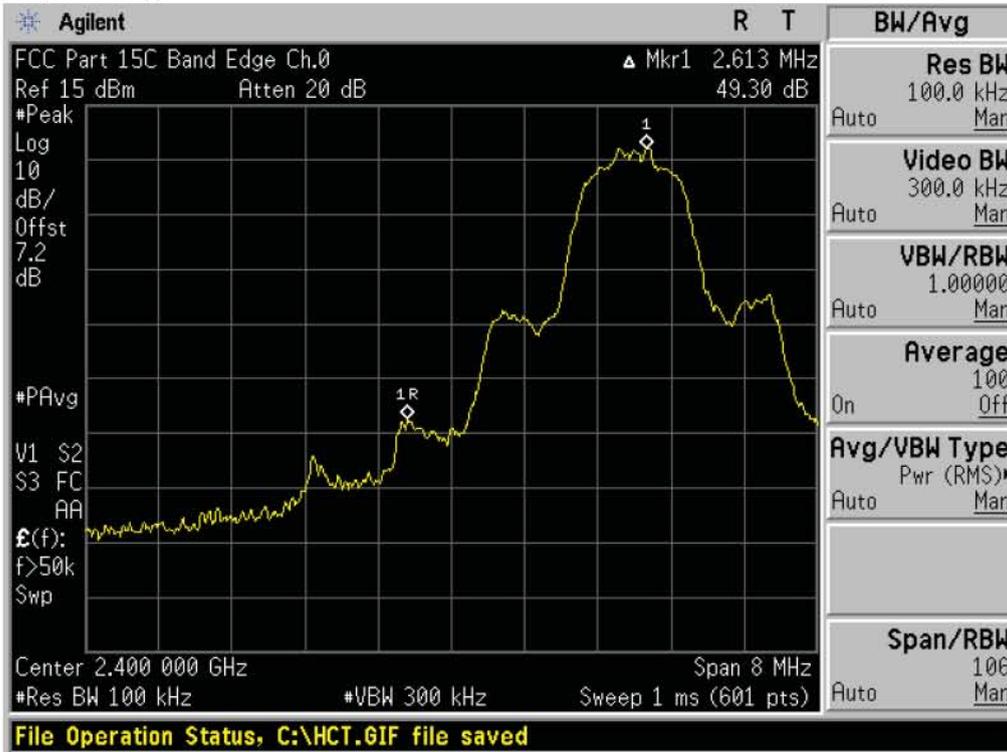


Test Plots without hopping (8DPSK)  
Band Edges (High-CH)

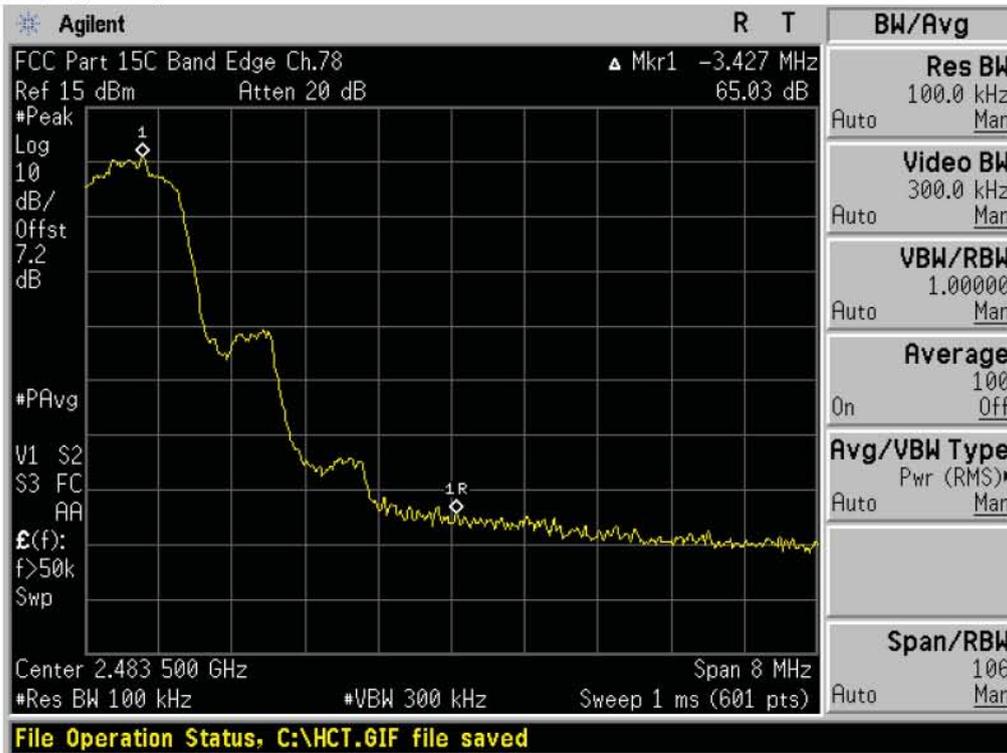


FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		<a href="http://www.hct.co.kr">www.hct.co.kr</a>
Test Report No. HCTR1306FR02	Date of Issue: June 05, 2013	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 a/b/g/n(2.4/5GHz)/NFC	FCC ID: ZNF989

Test Plots without hopping ( $\pi/4$ DQPSK)  
Band Edges (Low-CH)

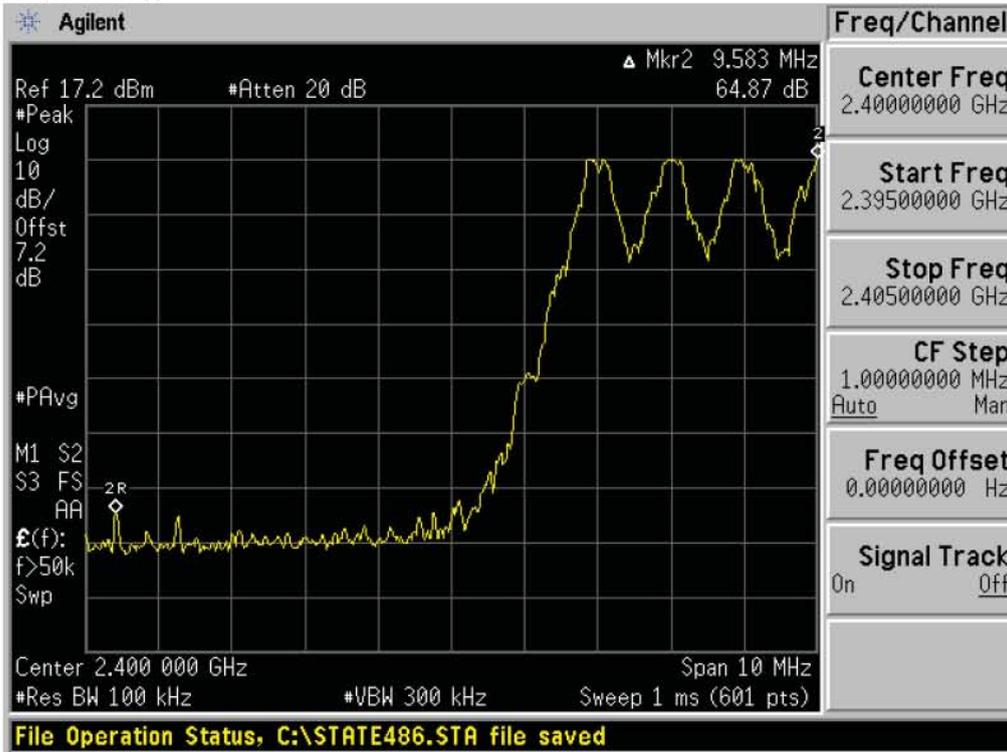


Test Plots without hopping ( $\pi/4$ DQPSK)  
Band Edges (High-CH)

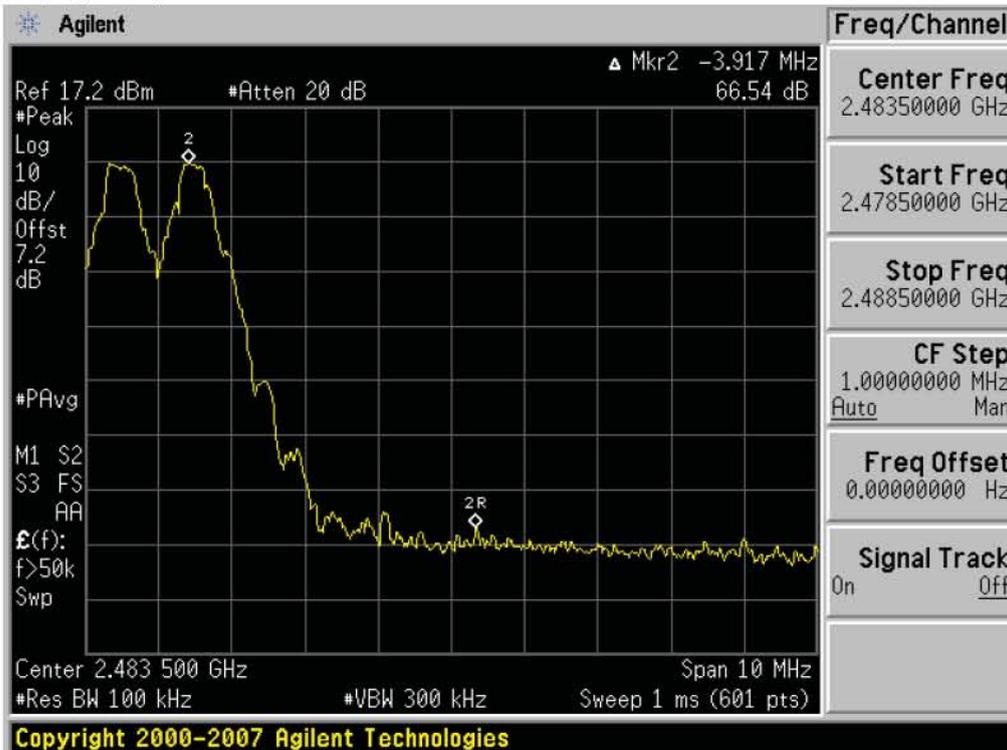


FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		<a href="http://www.hct.co.kr">www.hct.co.kr</a>
Test Report No. HCTR1306FR02	Date of Issue: June 05, 2013	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 a/b/g/n(2.4/5GHz)/NFC	FCC ID: ZNF989

Test Plots with hopping (GFSK)  
Band Edges (Low-CH)



Test Plots with hopping (GFSK)  
Band Edges (High-CH)

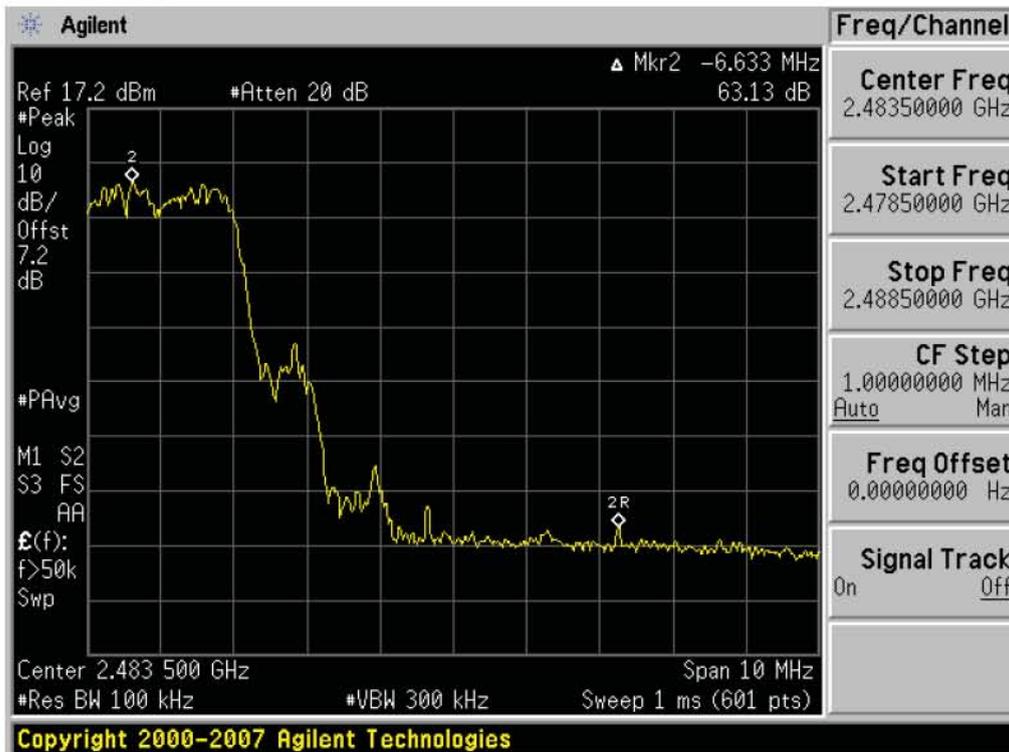


FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		<a href="http://www.hct.co.kr">www.hct.co.kr</a>
Test Report No. HCTR1306FR02	Date of Issue: June 05, 2013	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 a/b/g/n(2.4/5GHz)/NFC	FCC ID: ZNFE989

Test Plots with hopping (8DPSK)  
Band Edges (Low-CH)



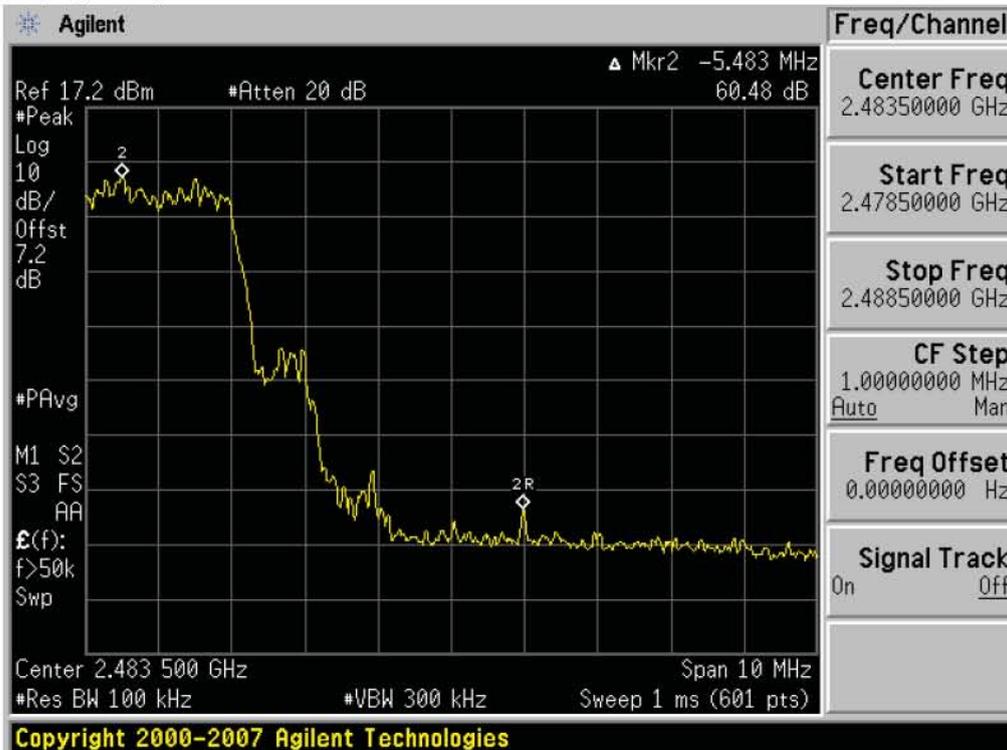
Test Plots with hopping (8DPSK)  
Band Edges (High-CH)



Test Plots with hopping ( $\pi/4$ DQPSK)  
Band Edges (Low-CH)



Test Plots with hopping ( $\pi/4$ DQPSK)  
Band Edges (High-CH)

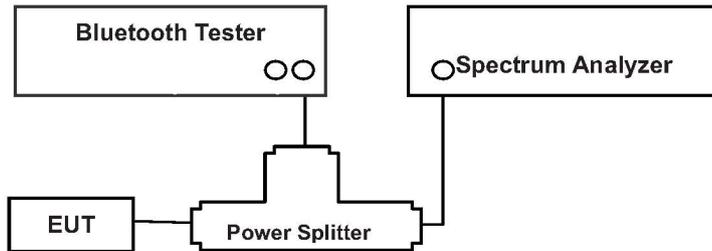


### 8.3 FREQUENCY SEPARATION / OCCUPIED BANDWIDTH (99% BW)

#### LIMIT

According to §15.247(a)(1), Frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

#### Test Configuration



#### TEST PROCEDURE

The Channel Separation test is performed with hopping on. And the 20 dB Bandwidth test is performed with hopping off.

The Spectrum Analyzer is set to ( DA 00-705 )

Span = wide enough to capture the peaks of two adjacent channels

RBW  $\geq$  1% of the span

VBW  $\geq$  RBW

Sweep = Auto

Detector = Peak

Trace = Max hold

The trace was allowed to stabilize. The marker-delta function was used to determine the separation between the peaks of the adjacent channels.

#### TEST RESULTS

No non-compliance noted

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		<a href="http://www.hct.co.kr">www.hct.co.kr</a>
Test Report No. HCTR1306FR02	Date of Issue: June 05, 2013	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 a/b/g/n(2.4/5GHz)/NFC	FCC ID: ZNFE989

**Test Data**

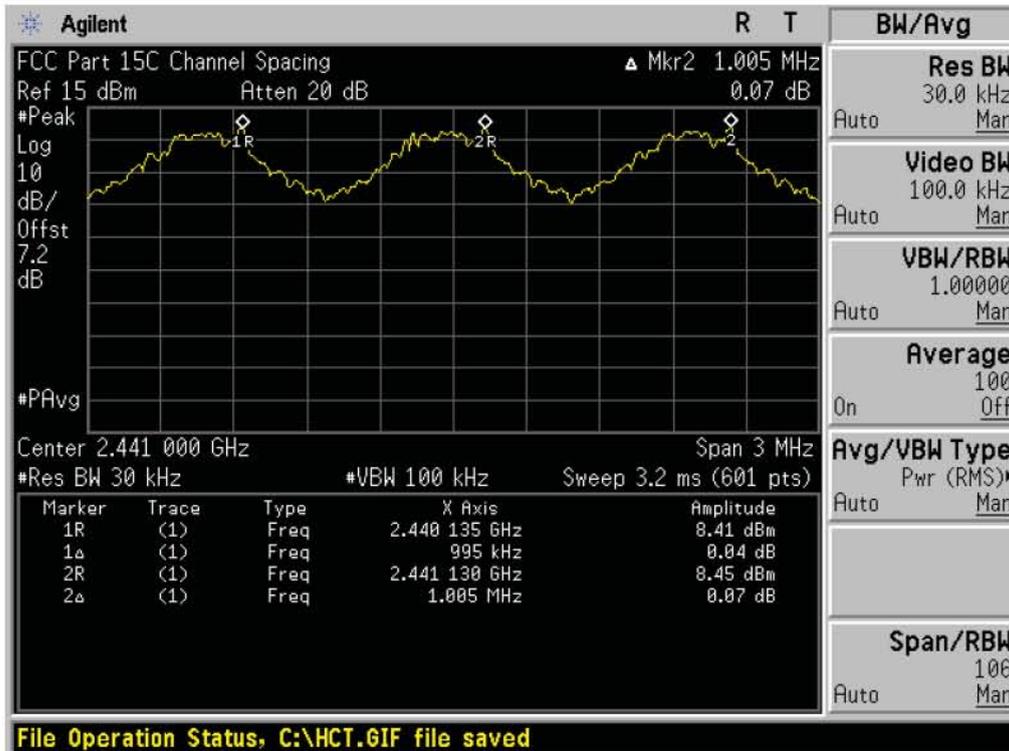
Channel Separation (kHz)			20dB Bandwidth (kHz)				Limit (kHz)	Result
GFSK	8DPSK	$\pi/4$ DQPSK	Channel	GFSK	8DPSK	4DQPSK		
995	990	985	Low CH	939.1	1304.0	1350.0	>25 or >2/3 of the 20dB BW	Pass
			Middle CH	936.3	1306.0	1348.0		
			High CH	935.9	1305.0	1347.0		

**Occupied Bandwidth (99% BW )**

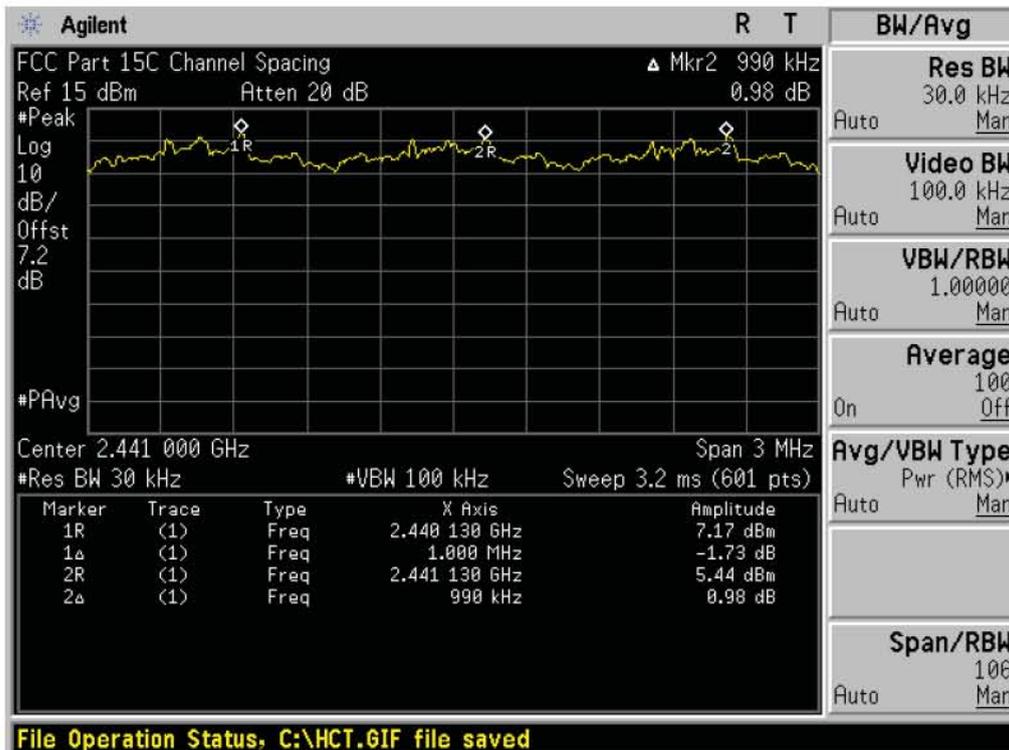
99% BW (kHz)			
Channel	GFSK	8DPSK	4DQPSK
Low CH	874.4	1223.8	1222.0
Middle CH	875.6	1213.7	1209.7
High CH	870.9	1206.7	1201.8

Note : We can not know what use channel in AFH mode. So, we can not test in AFH mode. Also, if the test performs some channel in AFH mode, the test result is not different with normal mode.

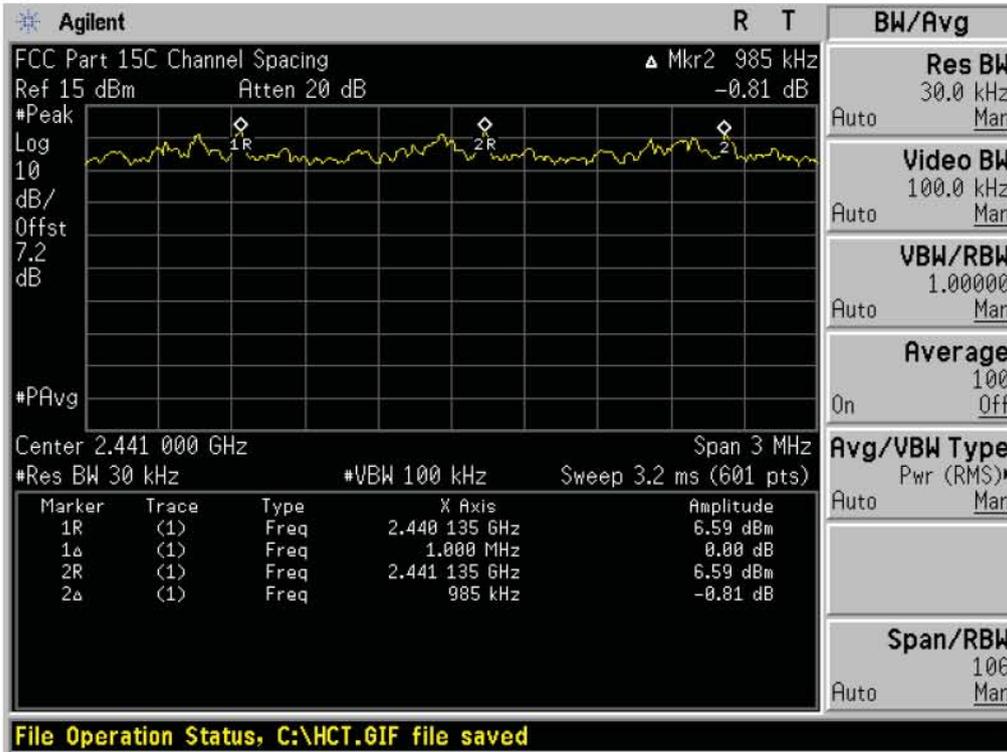
Test Plots (GFSK)  
Channel Separation



Test Plots (8DPSK)  
Channel Separation



Test Plots ( $\pi/4$ DQPSK)  
Channel Separation



FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		<a href="http://www.hct.co.kr">www.hct.co.kr</a>
Test Report No. HCTR1306FR02	Date of Issue: June 05, 2013	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 a/b/g/n(2.4/5GHz)/NFC	FCC ID: ZNFE989

Test Plots (GFSK)

20 dB Bandwidth & Occupied Bandwidth (Low-CH)



Test Plots (GFSK)

20 dB Bandwidth & Occupied Bandwidth (Mid-CH)



FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		<a href="http://www.hct.co.kr">www.hct.co.kr</a>
Test Report No. HCTR1306FR02	Date of Issue: June 05, 2013	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 a/b/g/n(2.4/5GHz)/NFC	FCC ID: ZNF989

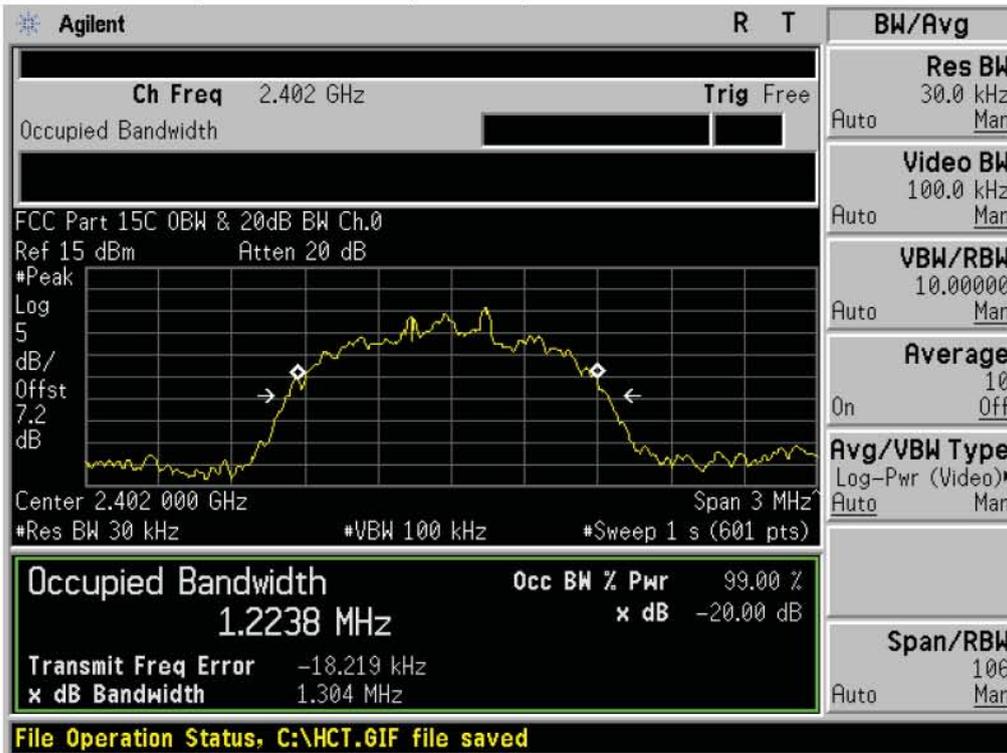
Test Plots (GFSK)

20 dB Bandwidth & Occupied Bandwidth (High-CH)



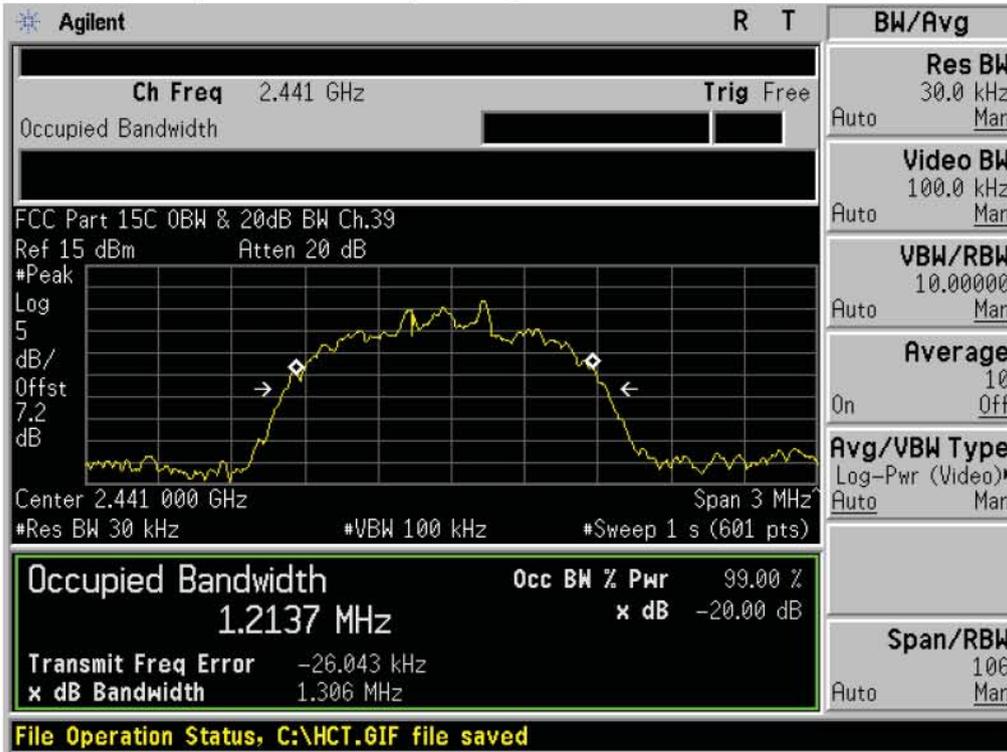
Test Plots (8DPSK)

20 dB Bandwidth & Occupied Bandwidth (Low-CH)

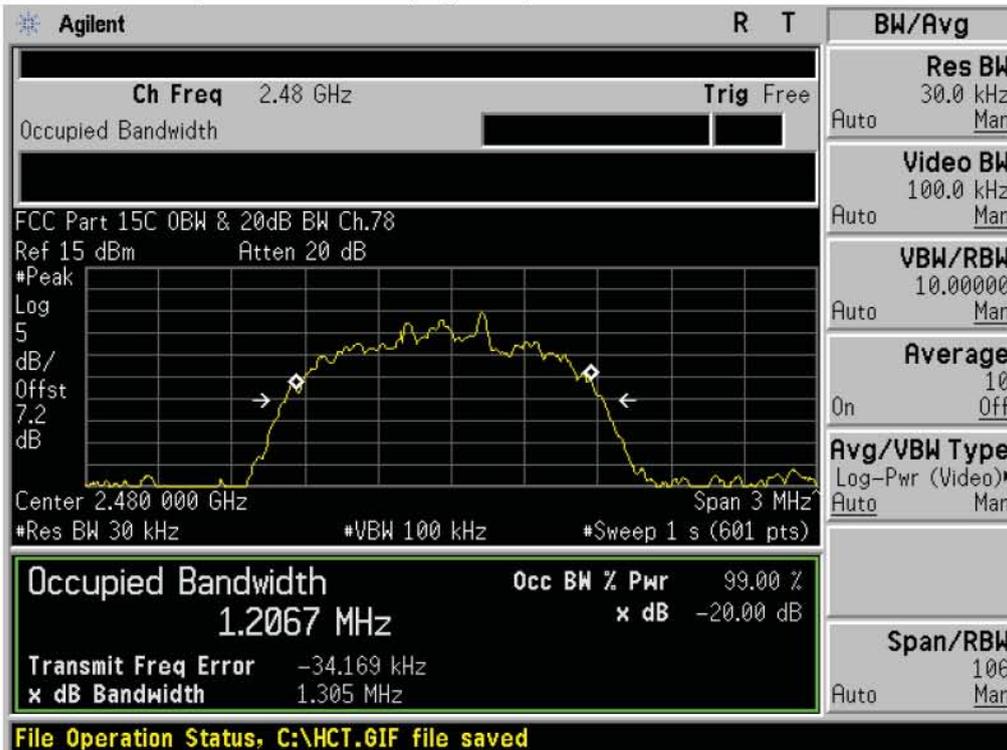


FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		<a href="http://www.hct.co.kr">www.hct.co.kr</a>
Test Report No. HCTR1306FR02	Date of Issue: June 05, 2013	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 a/b/g/n(2.4/5GHz)/NFC	FCC ID: ZNF989

Test Plots (8DPSK)  
20 dB Bandwidth & Occupied Bandwidth (Mid-CH)



Test Plots (8DPSK)  
20 dB Bandwidth & Occupied Bandwidth (High-CH)



FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		<a href="http://www.hct.co.kr">www.hct.co.kr</a>
Test Report No. HCTR1306FR02	Date of Issue: June 05, 2013	EUT Type: GSM/WCDMA Phone with Bluetooth4.0, WIFI802.11 a/b/g/n(2.4/5GHz)/NFC	FCC ID: ZNF989