



Conducted Output Power Measurements (802.11ac Mode: 5510~5710)

802.11ac Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5510	102	13.5	9.14	0.471	9.61	23.98
		27	8.64	0.806	9.45	23.98
		40.5	8.27	1.121	9.39	23.98
		54	7.97	1.393	9.36	23.98
		81	7.66	1.843	9.51	23.98
		108	7.22	2.329	9.55	23.98
		121.5	7.10	2.290	9.39	23.98
		135	7.00	2.482	9.48	23.98
		162	6.70	2.700	9.40	23.98
		180	6.69	2.771	9.46	23.98
5550	110	13.5	9.43	0.471	9.90	23.98
		27	8.97	0.806	9.77	23.98
		40.5	8.50	1.121	9.62	23.98
		54	8.40	1.393	9.80	23.98
		81	7.95	1.843	9.80	23.98
		108	7.64	2.329	9.97	23.98
		121.5	7.33	2.290	9.62	23.98
		135	7.29	2.482	9.77	23.98
		162	7.14	2.700	9.84	23.98
		180	6.86	2.771	9.63	23.98
5710	142	13.5	8.30	0.471	8.77	23.98
		27	8.21	0.806	9.01	23.98
		40.5	7.89	1.121	9.01	23.98
		54	7.38	1.393	8.77	23.98
		81	6.88	1.843	8.73	23.98
		108	6.62	2.329	8.95	23.98
		121.5	6.70	2.290	8.99	23.98
		135	6.50	2.482	8.98	23.98
		162	6.30	2.700	9.00	23.98
		180	5.95	2.771	8.72	23.98

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Conducted Output Power Measurements (802.11ac Mode: 5210)

802.11ac Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5210	42	29.3	8.65	0.865	9.52	16.99
		58.5	7.92	1.469	9.39	16.99
		87.8	7.53	1.919	9.45	16.99
		117	7.23	2.242	9.47	16.99
		175.5	6.65	2.771	9.42	16.99
		234	6.30	3.100	9.40	16.99
		263.3	6.10	3.297	9.40	16.99
		292.5	6.06	3.405	9.47	16.99
		351	5.80	3.705	9.50	16.99
		390	5.65	3.843	9.49	16.99

Conducted Output Power Measurements (802.11ac Mode: 5290)

802.11ac Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5290	58	29.3	8.47	0.865	9.34	23.98
		58.5	7.82	1.469	9.29	23.98
		87.8	7.42	1.919	9.34	23.98
		117	7.07	2.242	9.32	23.98
		175.5	6.56	2.771	9.33	23.98
		234	6.28	3.100	9.38	23.98
		263.3	6.12	3.297	9.42	23.98
		292.5	6.00	3.405	9.41	23.98
		351	5.73	3.705	9.43	23.98
		390	5.51	3.843	9.35	23.98

Conducted Output Power Measurements (802.11ac Mode: 5530~5690)

802.11ac Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5530	106	29.3	8.93	0.865	9.79	23.98
		58.5	8.40	1.469	9.87	23.98
		87.8	7.82	1.919	9.74	23.98
		117	7.60	2.242	9.84	23.98
		175.5	7.04	2.771	9.81	23.98
		234	6.72	3.100	9.82	23.98
		263.3	6.43	3.297	9.73	23.98
		292.5	6.44	3.405	9.84	23.98
		351	6.11	3.705	9.82	23.98
		390	5.94	3.843	9.79	23.98
5690	138	29.3	8.06	0.865	8.93	23.98
		58.5	7.47	1.469	8.94	23.98
		87.8	7.05	1.919	8.97	23.98
		117	6.75	2.242	8.99	23.98
		175.5	6.22	2.771	8.99	23.98
		234	5.90	3.100	9.00	23.98
		263.3	5.65	3.297	8.95	23.98
		292.5	5.58	3.405	8.98	23.98
		351	5.25	3.705	8.95	23.98
		390	5.06	3.843	8.90	23.98

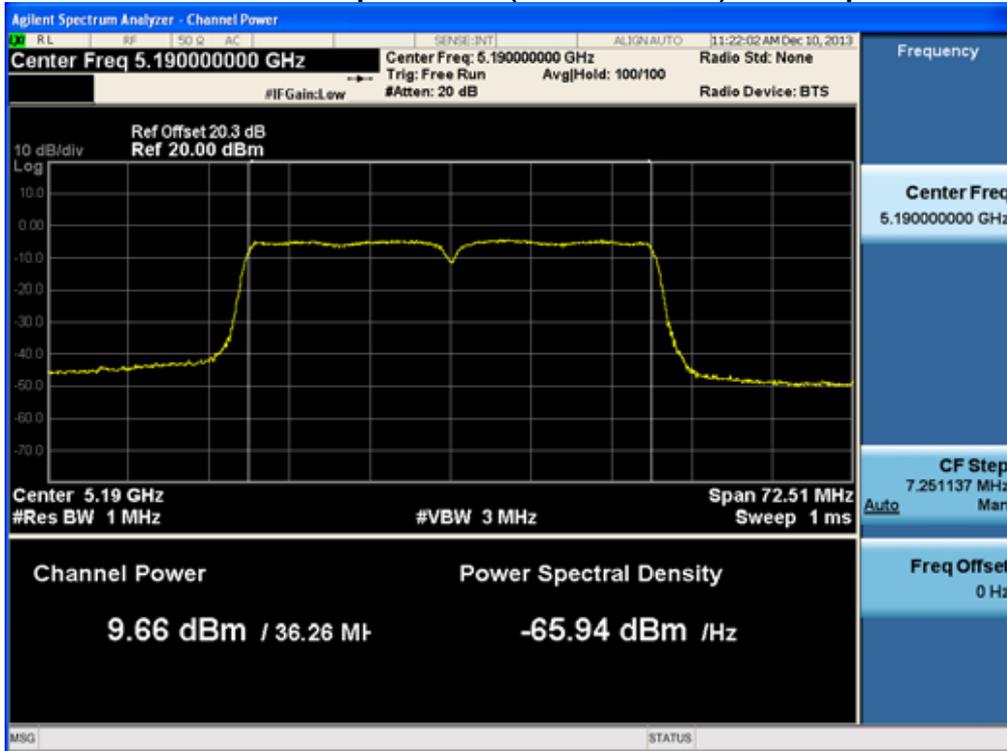
Note :

1. In order to simplify the report, attached plots were only the highest conducted power channel and data rate.
2. We applied the 15.407 for Ch.144, 142 and 138 in 802.11ac according to KDB 644545 D01 v01r01.

40 MHz BW

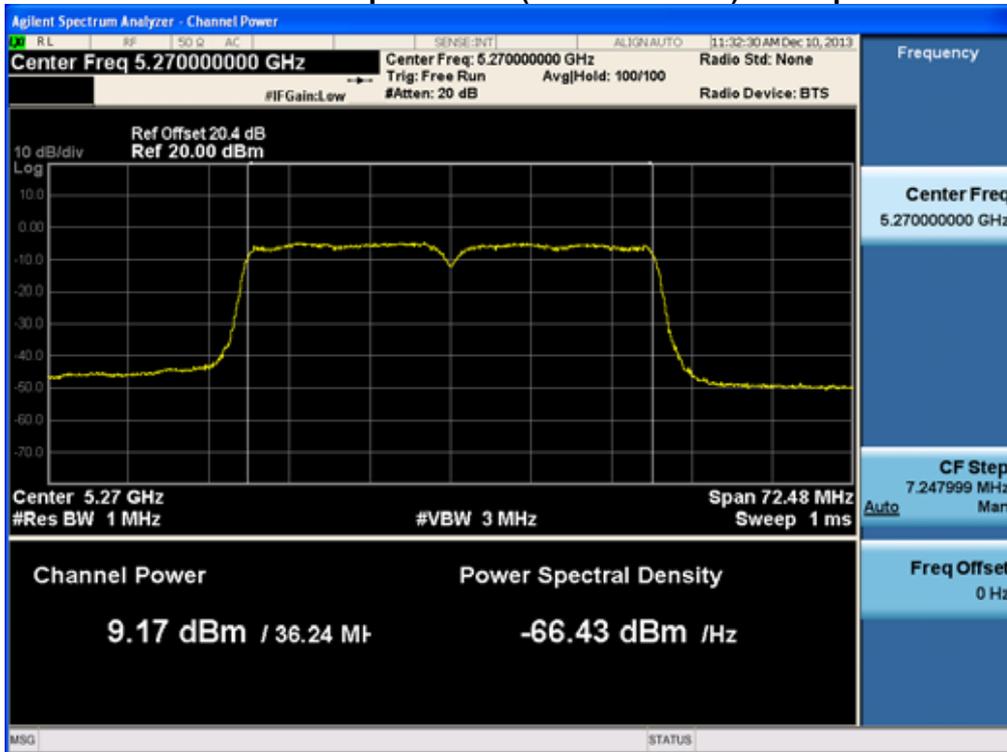
RESULT PLOTS (5190 MHz ~5230 MHz)

Conducted Output Power (802.11n-CH 38) 40.5 Mbps



RESULT PLOTS (5270 MHz ~5310 MHz)

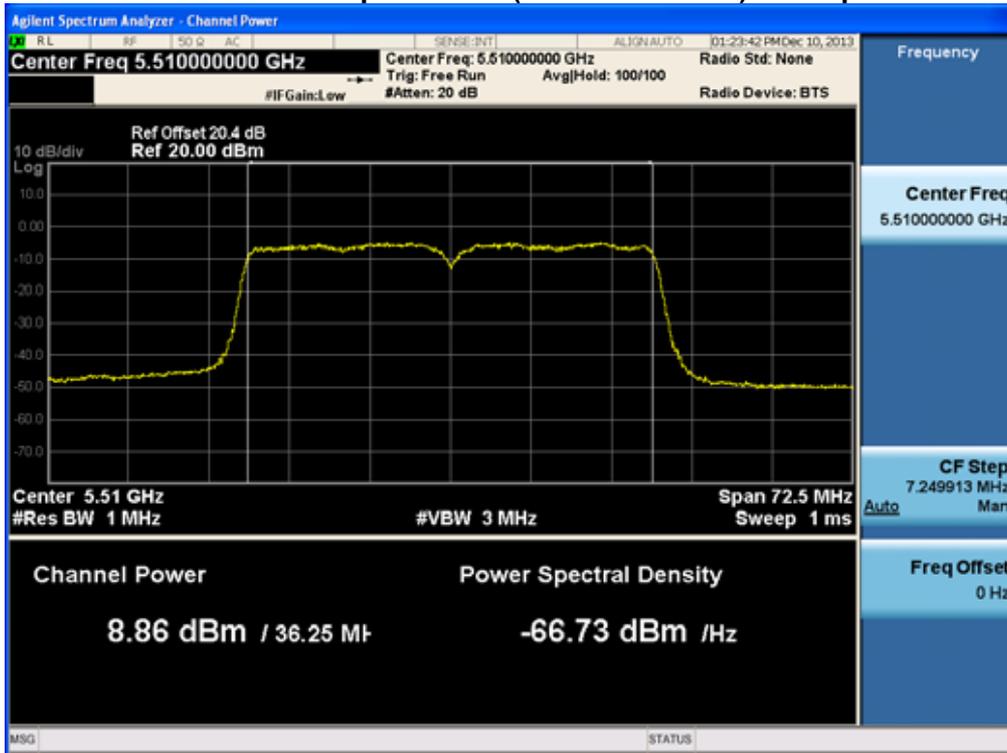
Conducted Output Power (802.11n-CH 54) 81 Mbps



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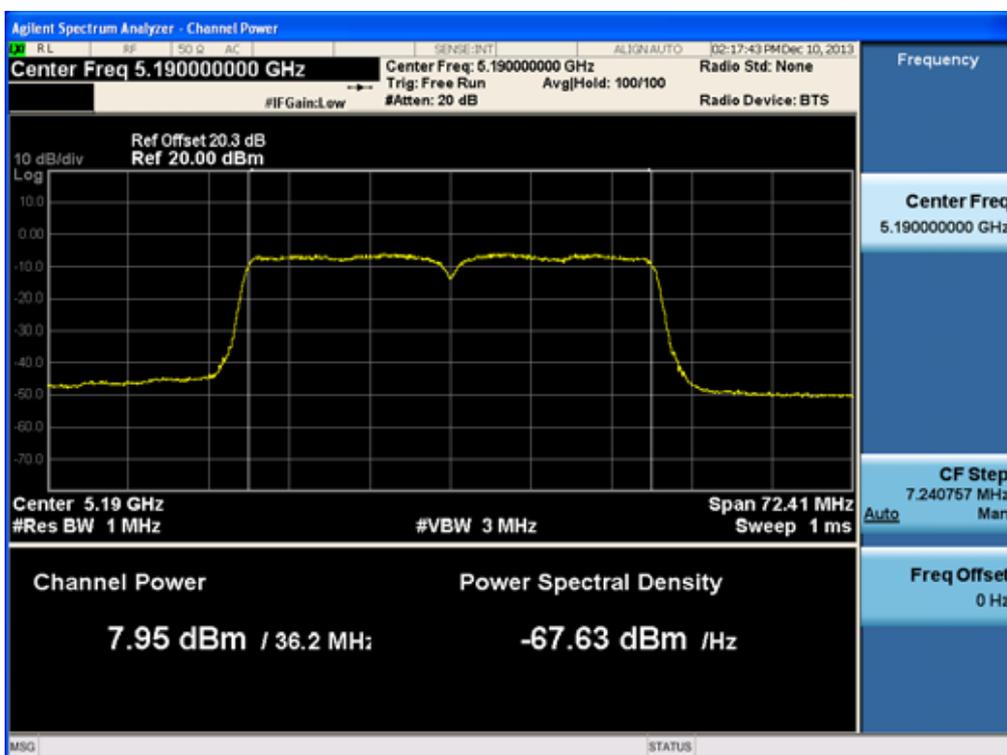
RESULT PLOTS (5510 MHz ~5670 MHz)

Conducted Output Power (802.11n-CH 102) 81 Mbps



RESULT PLOTS (5190 ~ 5230 MHz)

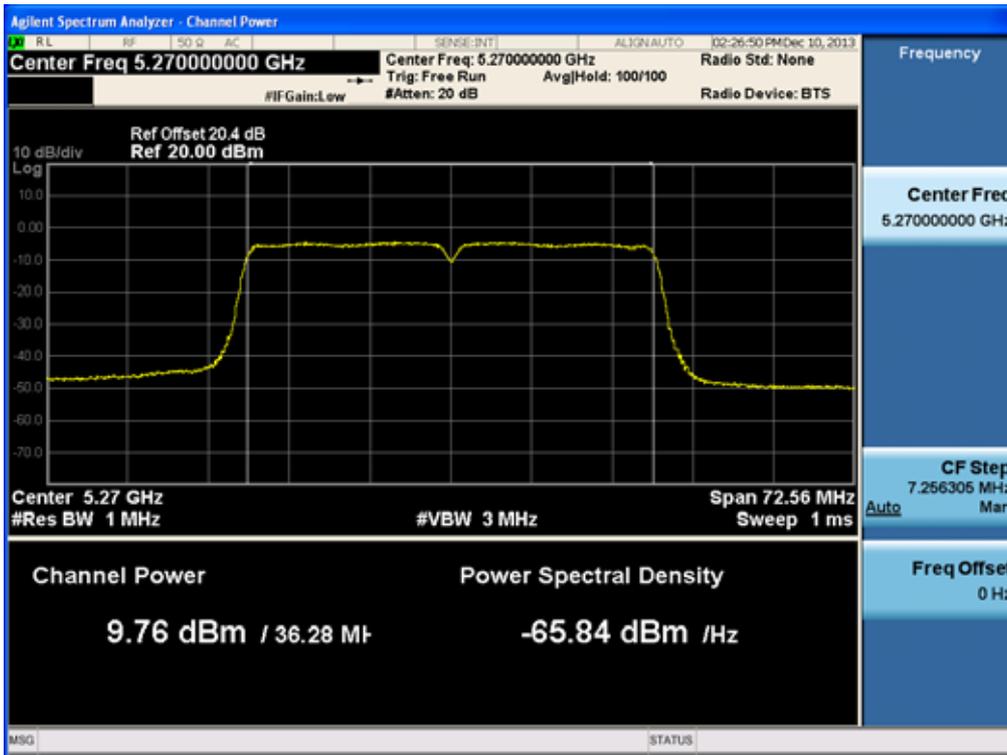
Conducted Output Power (802.11ac-CH 38) 81 Mbps





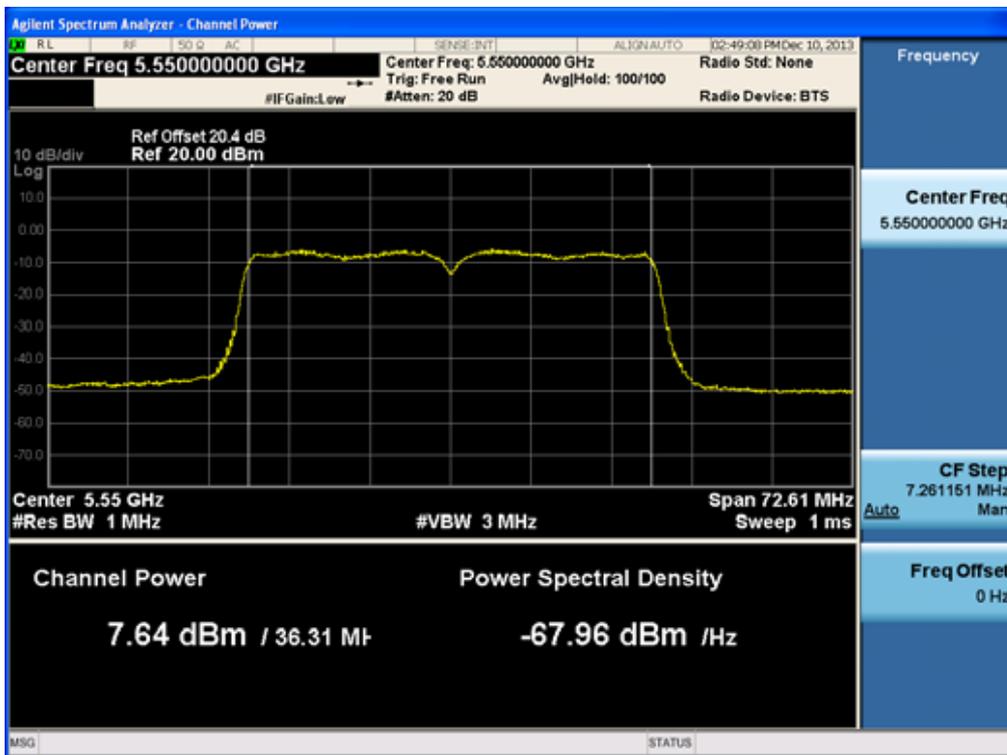
RESULT PLOTS (5270 ~ 5310 MHz)

Conducted Output Power (802.11ac-CH 54) 13.5 Mbps



RESULT PLOTS (5510 ~ 5710 MHz)

Conducted Output Power (802.11ac-CH 110) 108 Mbps

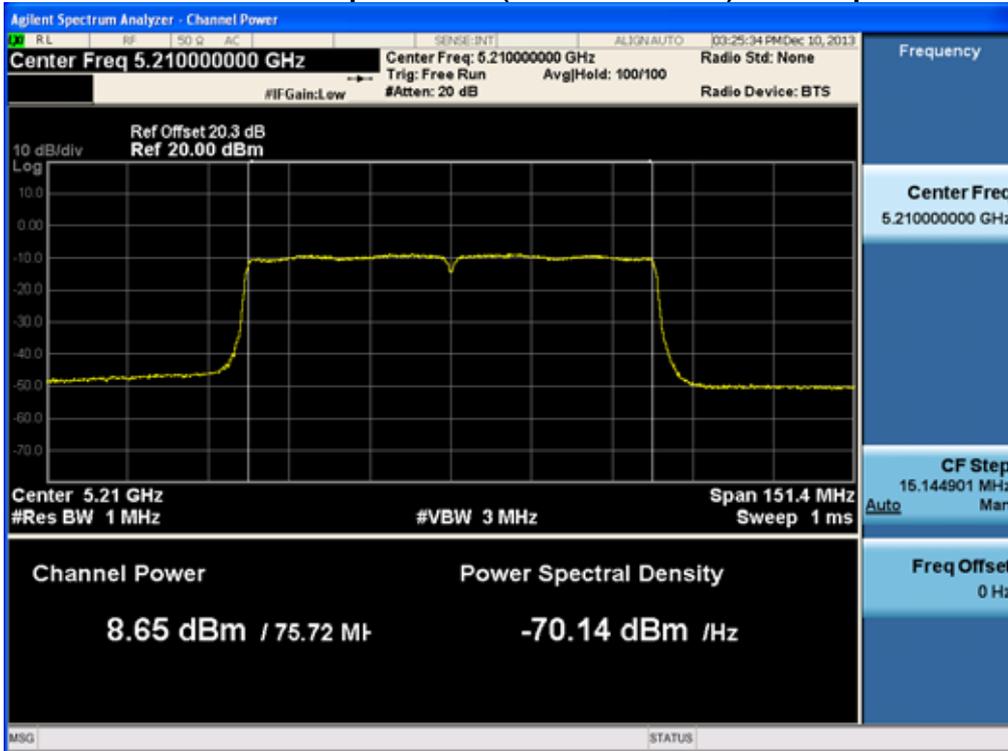


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80 MHz BW

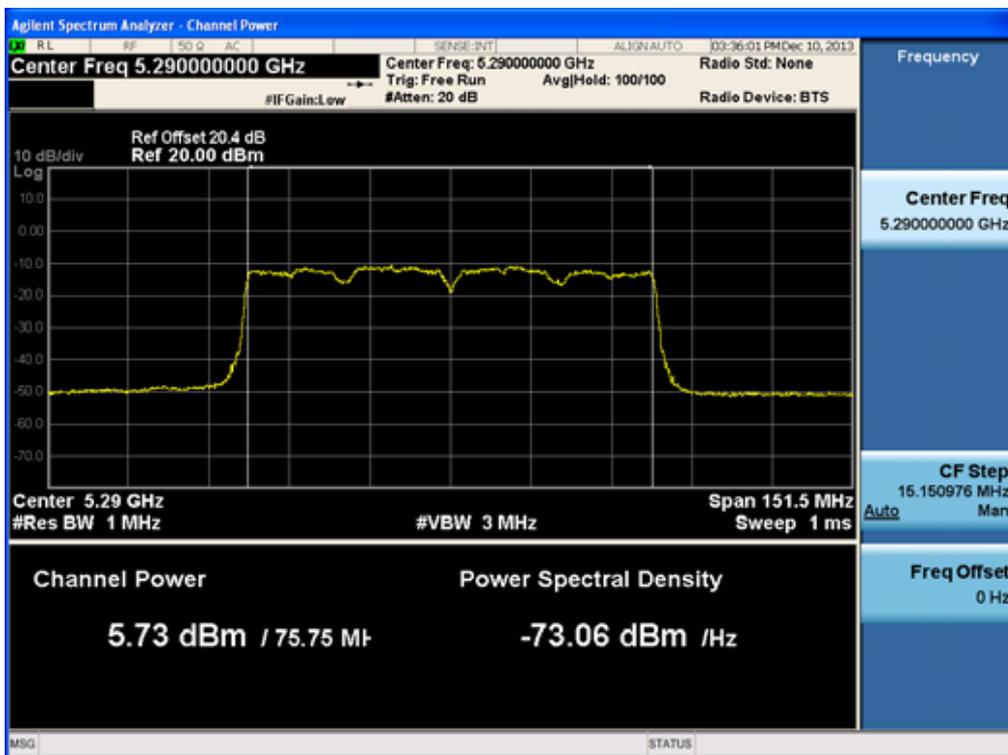
RESULT PLOTS (5210 MHz)

Conducted Output Power (802.11ac-CH 42) 29.3 Mbps



RESULT PLOTS (5290 MHz)

Conducted Output Power (802.11ac-CH 58) 351 Mbps

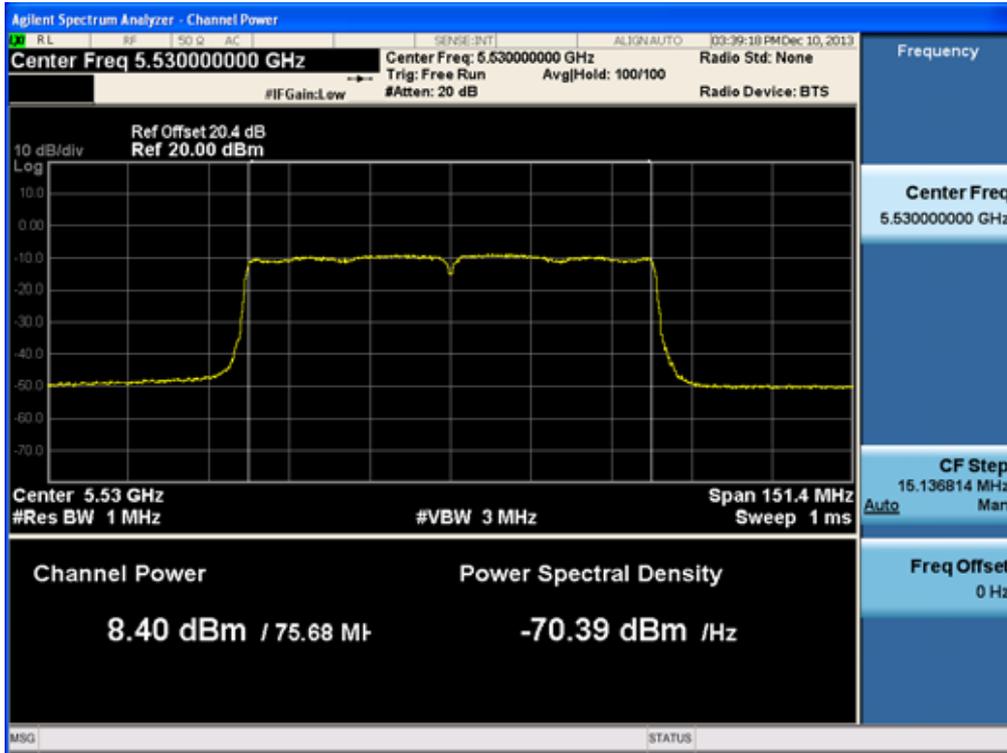


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RESULT PLOTS (5530 MHz ~ 5690 MHz)

Conducted Output Power (802.11ac-CH 106) 58.5Mbps

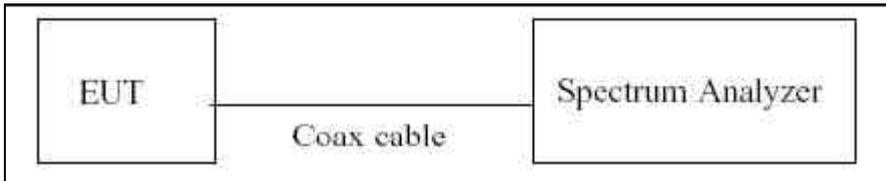


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8.4 POWER SPECTRAL DENSITY

The peak power density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies. The maximum permissible peak power spectral density is 4 dBm/ MHz in the 5.15 GHz – 5.25 GHz band and 11 dBm/ MHz in the 5.25 GHz – 5.35 GHz and 5.47 GHz – 5.725 GHz bands

TEST CONFIGURATION



TEST PROCEDURE

We tested according to Method in KDB 789033(issued 04/08/2013).

The spectrum analyzer is set to :

1. Set span to encompass the entire emission bandwidth(EBW) of the signal.
2. RBW = 1 MHz.
3. VBW ≥ 3 MHz.
4. Number of points in sweep ≥ 2*span/RBW.
5. Sweep time = auto.
6. Detector = RMS(i.e., power averaging), if available. Otherwise, use sample detector mode.
7. Do not use sweep triggering. Allow the sweep to “free run”.
8. Trace average at least 100 traces in power averaging(RMS) mode
9. Use the peak search function on the spectrum analyzer to find the peak of the spectrum.
10. If Method SA-2 was used, add $10 \log(1/x)$, where x is the duty cycle, to the peak of the spectrum.

Sample Calculation

PSD = Reading Value + ATT loss + Cable loss(1 ea) + Duty Cycle Factor

Output Power = -5 dBm + 10 dB + 0.8 dB + 0.21 dB = 16.01 dBm

Note :

1. Spectrum reading values are not plot data. The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss + Cable loss
3. We apply to the offset in the 5.2 GHz, 5.3 GHz and 5.6 GHz range that was rounded off to the closest tenth dB. Actual value of loss for the attenuator and cable combination is below table.

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Band	Frequency(MHz)	Loss(dB)
UNII 1	5180	20.30
	5190	20.29
	5200	20.28
	5230	20.29
	5240	20.34
UNII 2	5260	20.37
	5270	20.38
	5300	20.40
	5310	20.39
	5320	20.39
UNII 2e	5500	20.35
	5510	20.36
	5550	20.41
	5580	20.43
	5670	20.43
	5700	20.30

(Actual value of loss for the attenuator and cable combination)



TEST RESULTS

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result				
			Measured Power Density (dBm)	Duty Cycle Factor (dB)	Measured Power Density(dBm) + Duty Cycle Factor	Limit (dBm)	Pass/Fail
5180	36	802.11a	0.257	0.232254	0.489	4	Pass
5200	40		-0.468	0.778134	0.310	4	Pass
5240	48		-0.734	1.370087	0.636	4	Pass
5260	52	802.11a	0.451	0.232254	0.683	11	Pass
5300	60		-0.178	0.599979	0.422	11	Pass
5320	64		0.160	0.232254	0.392	11	Pass
5500	100	802.11a	-0.452	1.370087	0.918	11	Pass
5580	116		-0.497	0.778134	0.281	11	Pass
5720	144		-1.424	1.471276	0.047	11	Pass

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result				
			Measured Power Density (dBm)	Duty Cycle Factor (dB)	Measured Power Density(dBm) + Duty Cycle Factor	Limit (dBm)	Pass/Fail
5180	36	802.11n	-2.192	1.387395	-0.805	4	Pass
5200	40	20MHz BW	-1.981	1.098313	-0.883	4	Pass
5240	48		-2.301	1.518903	-0.782	4	Pass
5260	52	802.11n	-1.049	0.444191	-0.605	11	Pass
5300	60	20MHz	-1.180	0.231826	-0.948	11	Pass
5320	64	BW	-1.243	0.231826	-1.011	11	Pass
5500	100	802.11n	-1.557	0.622354	-0.935	11	Pass
5580	116	20MHz	-2.443	1.630875	-0.812	11	Pass
5720	144	BW	-2.627	1.630875	-0.996	11	Pass

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Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result				
			Measured Power Density (dBm)	Duty Cycle Factor (dB)	Measured Power Density(dBm) + Duty Cycle Factor	Limit (dBm)	Pass/Fail
5190	38	802.11n 40MHz BW	-4.831	1.13253	-3.698	4	Pass
5230	46		-4.435	0.812402	-3.623	4	Pass
5270	54	802.11n 40MHz BW	-4.367	1.852346	-2.515	11	Pass
5310	62		-5.139	2.340832	-2.798	11	Pass
5510	102	802.11n 40MHz BW	-4.798	1.852346	-2.946	11	Pass
5550	110		-5.222	1.852346	-3.370	11	Pass
5710	142		-5.484	2.507249	-2.977	11	Pass

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result				
			Measured Power Density (dBm)	Duty Cycle Factor (dB)	Measured Power Density(dBm) + Duty Cycle Factor	Limit (dBm)	Pass/Fail
5180	36	802.11ac 20MHz BW	-2.428	0.427107	-2.001	4	Pass
5200	40		-2.152	0.800254	-1.352	4	Pass
5240	48		-3.185	1.353208	-1.832	4	Pass
5260	52	802.11ac 20MHz BW	-2.310	0.626662	-1.683	11	Pass
5300	60		-2.120	0.230653	-1.889	11	Pass
5320	64		-3.093	1.775365	-1.318	11	Pass
5500	100	802.11ac 20MHz BW	-2.386	0.626662	-1.759	11	Pass
5580	116		-2.681	0.800254	-1.881	11	Pass
5720	144		-3.685	1.582585	-2.102	11	Pass



Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result				
			Measured Power Density (dBm)	Duty Cycle Factor (dB)	Measured Power Density(dBm) + Duty Cycle Factor	Limit (dBm)	Pass/Fail
5190	38	802.11ac 40MHz BW	-6.248	1.843495	-4.405	4	Pass
5230	46		-7.048	2.699958	-4.348	4	Pass
5270	54	802.11ac 40MHz BW	-4.494	0.471384	-4.023	11	Pass
5310	62		-6.372	2.329142	-4.043	11	Pass
5510	102	802.11ac 40MHz BW	-5.107	0.471384	-4.636	11	Pass
5550	110		-6.279	2.329142	-3.950	11	Pass
5710	142		-5.750	0.806411	-4.944	11	Pass

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result				
			Measured Power Density (dBm)	Duty Cycle Factor (dB)	Measured Power Density(dBm) + Duty Cycle Factor	Limit (dBm)	Pass/Fail
5210	42	802.11ac 80MHz BW	-8.582	0.865463	-7.717	4	Pass
5290	58	802.11ac 80MHz BW	-10.491	3.704514	-6.786	11	Pass
5530	106	802.11ac 80MHz BW	-8.498	1.468689	-7.029	11	Pass
5690	138	802.11ac 80MHz BW	-10.545	3.099848	-7.445	11	Pass

Note :

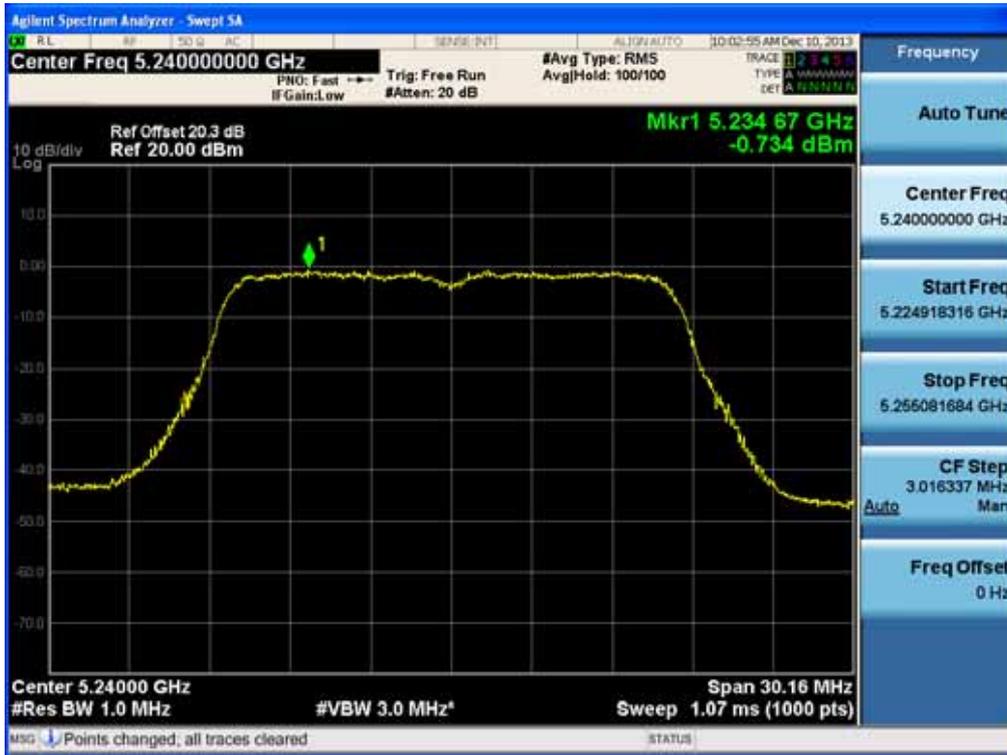
1. In order to simplify the report, attached plots were only the highest PSD channel.
2. We applied the 15.407 for Ch.144, 142 and 138 in 802.11ac according to KDB 644545 D01 v01r01.

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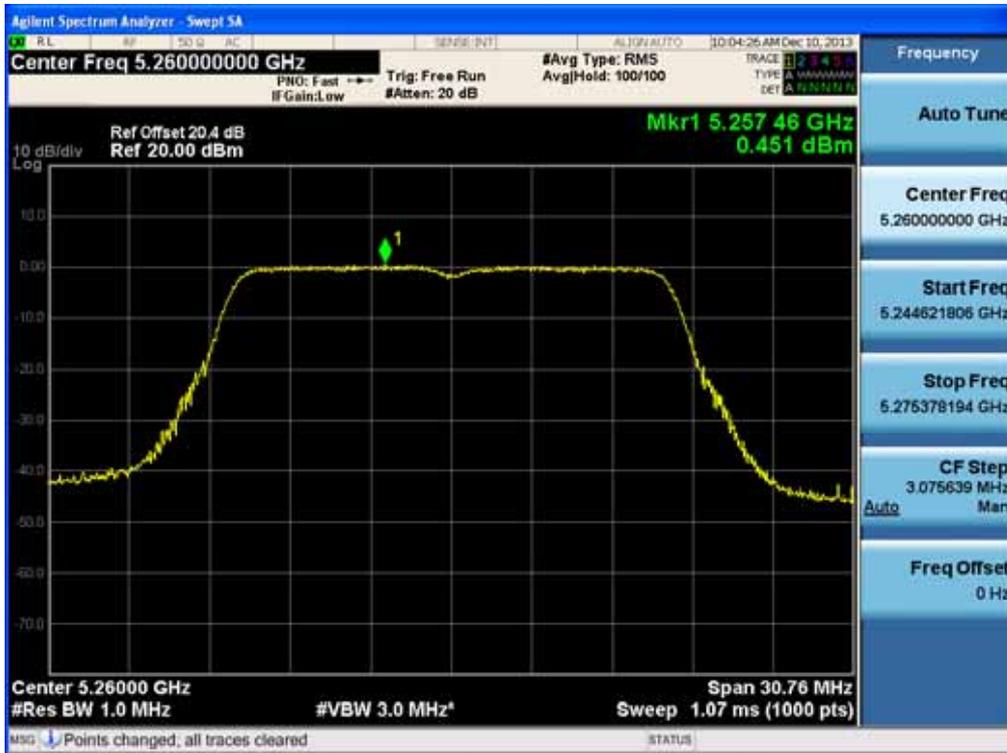


RESULT PLOTS
20 MHz BW

Power Spectral Density (802.11a-CH 48)

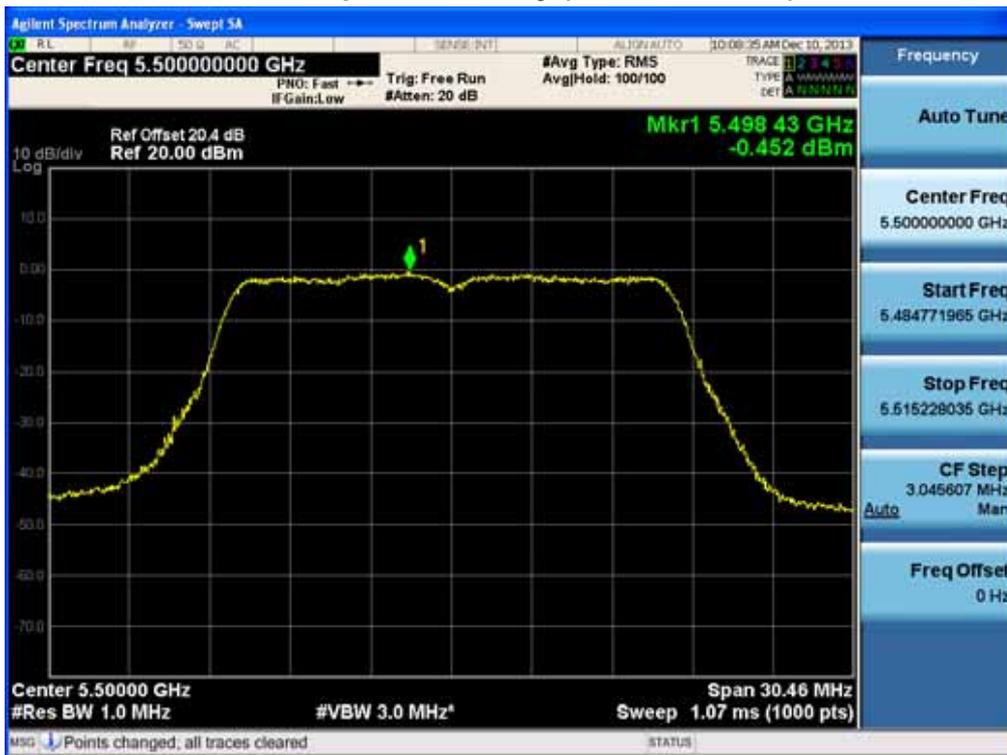


Power Spectral Density (802.11a-CH 52)

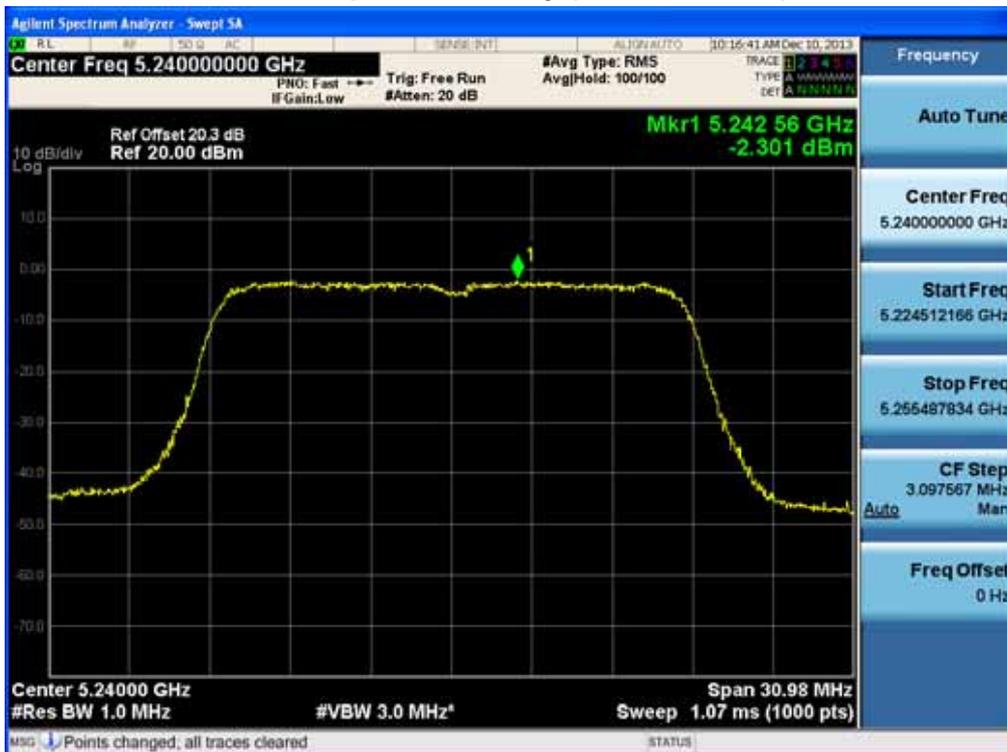


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Power Spectral Density (802.11a-CH 100)



Power Spectral Density (802.11n-CH 48)



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Power Spectral Density (802.11n-CH 52)

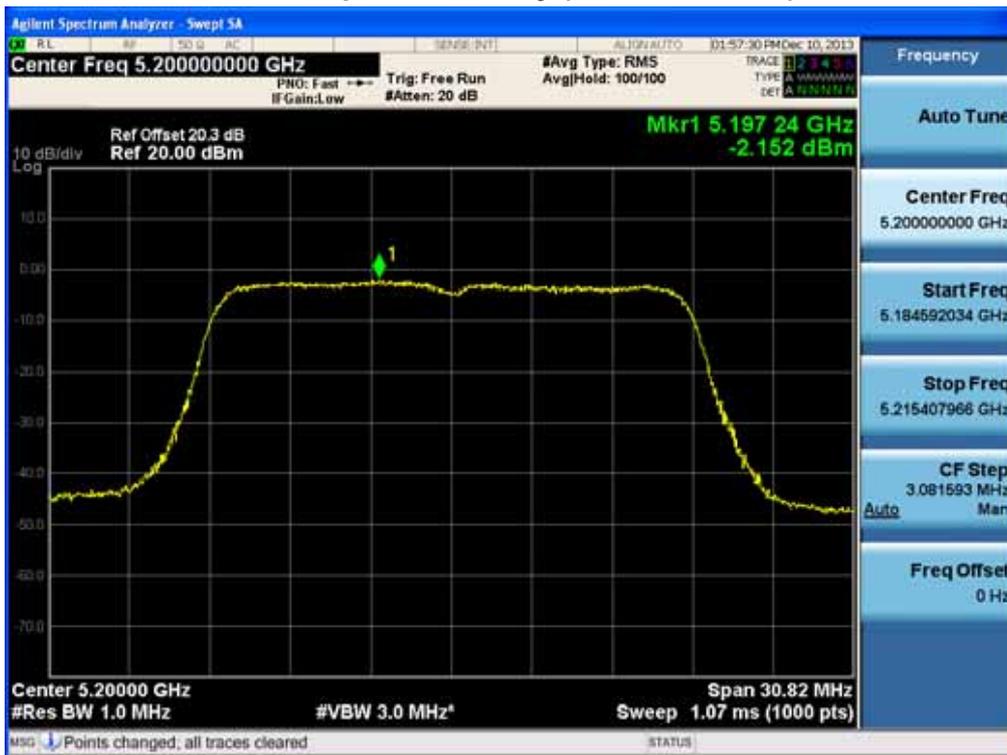


Power Spectral Density (802.11n-CH 100)

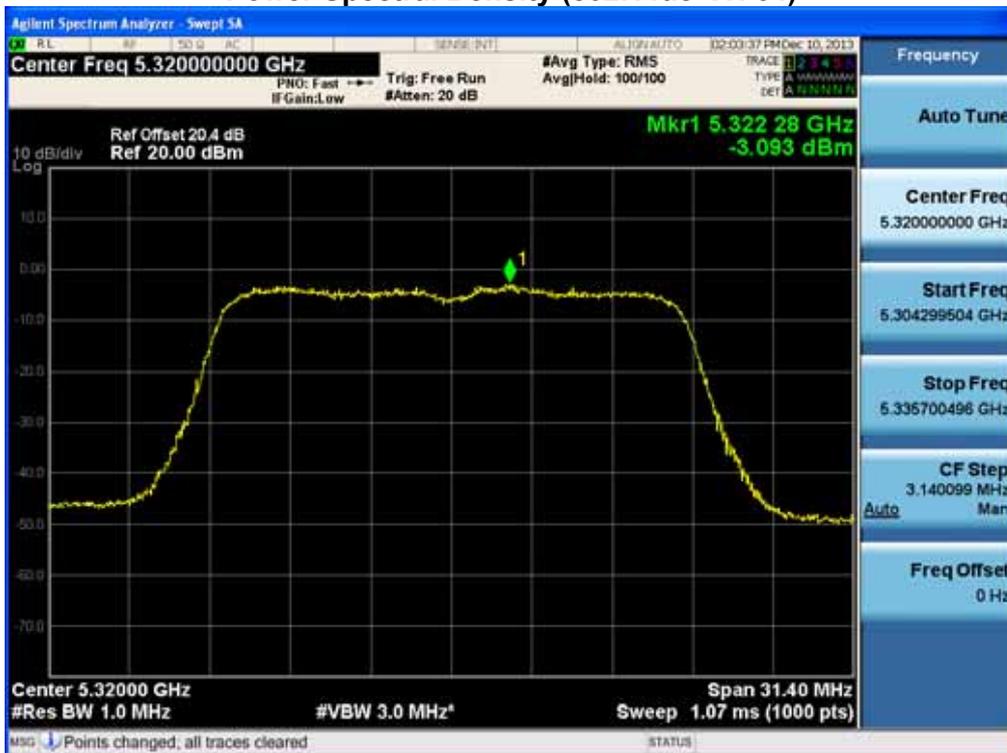


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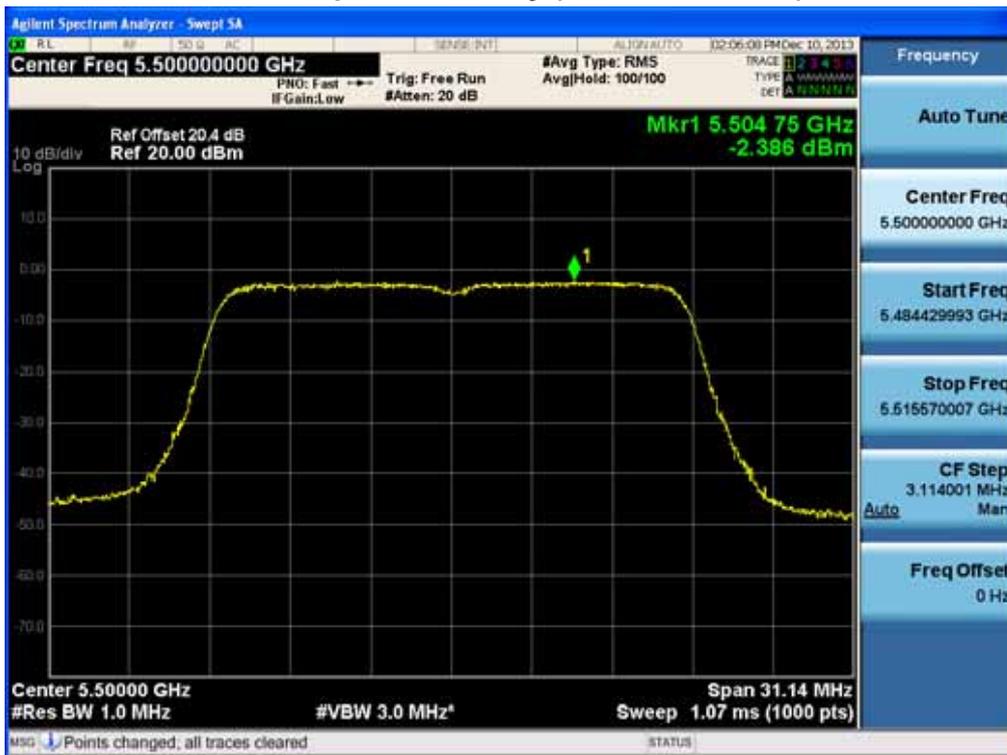
Power Spectral Density (802.11ac-CH 40)



Power Spectral Density (802.11ac-CH 64)

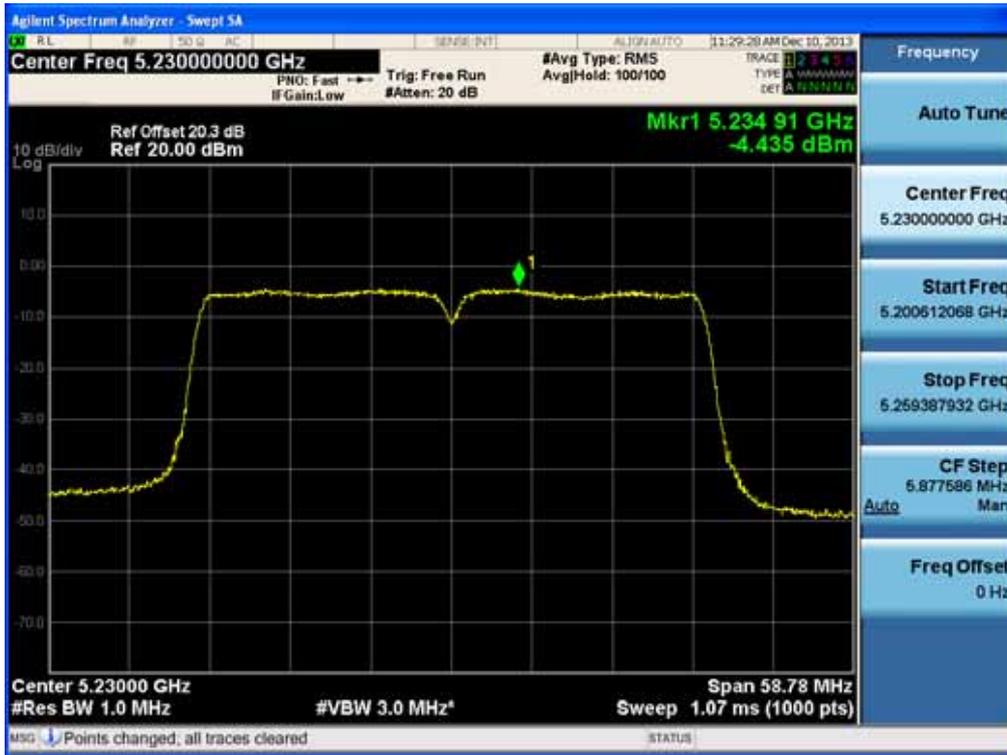


Power Spectral Density (802.11ac-CH 100)

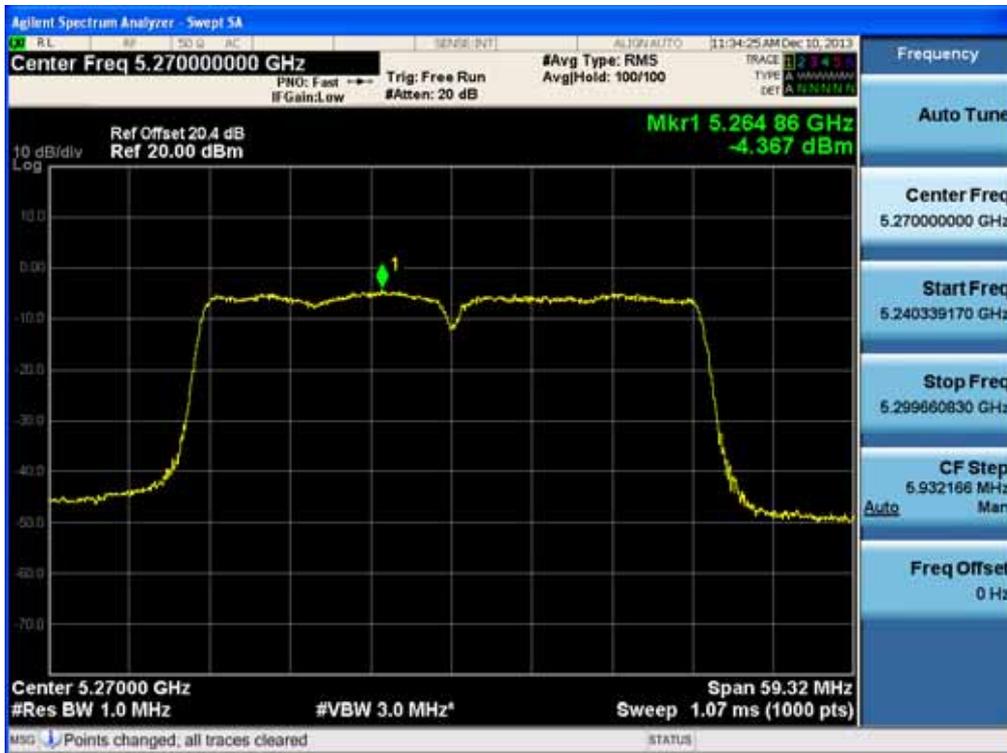


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Power Spectral Density (802.11n-CH 46)

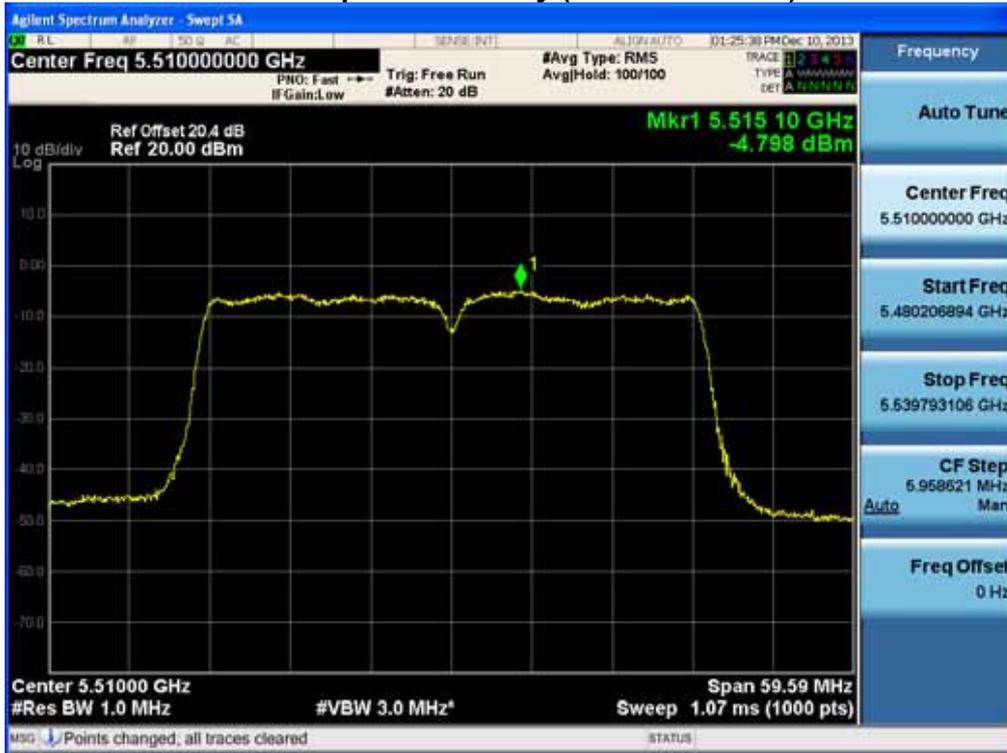


Power Spectral Density (802.11n-CH 54)

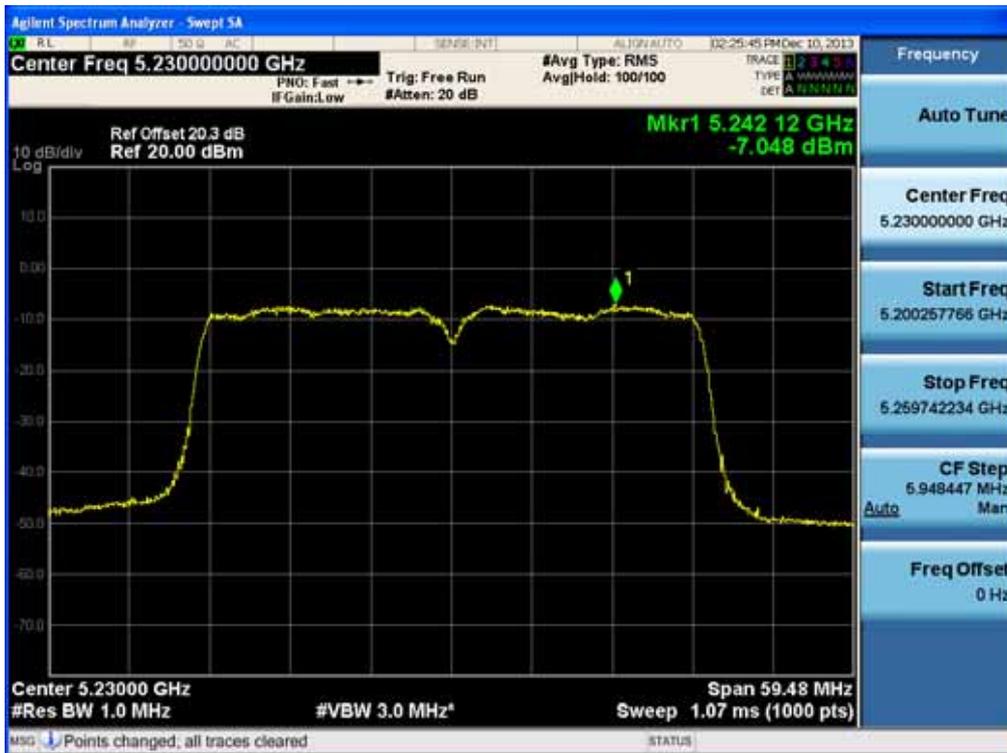


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Power Spectral Density (802.11n-CH 102)



Power Spectral Density (802.11ac-CH 46)

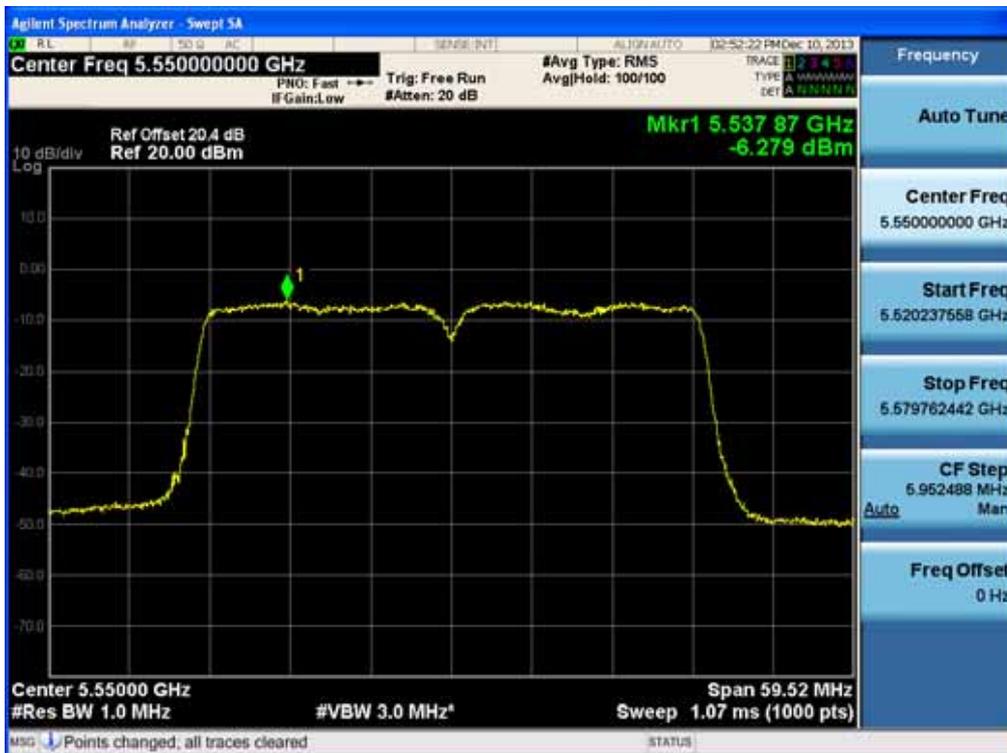


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Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID	FCC ID: ZNF956

Power Spectral Density (802.11ac-CH 54)

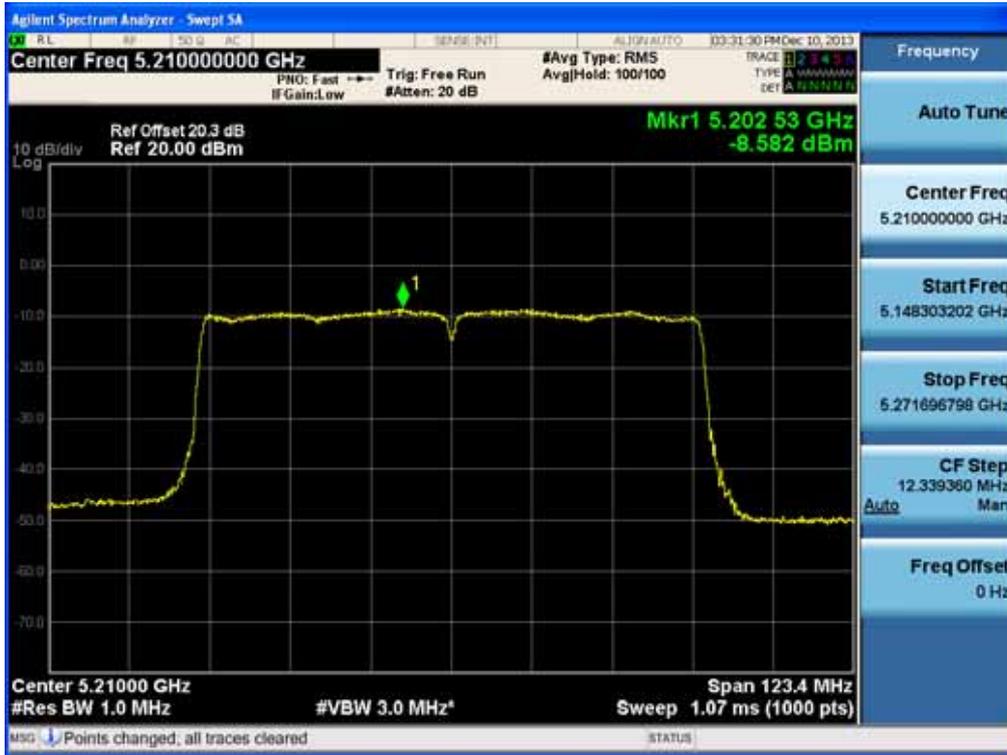


Power Spectral Density (802.11ac-CH 110)

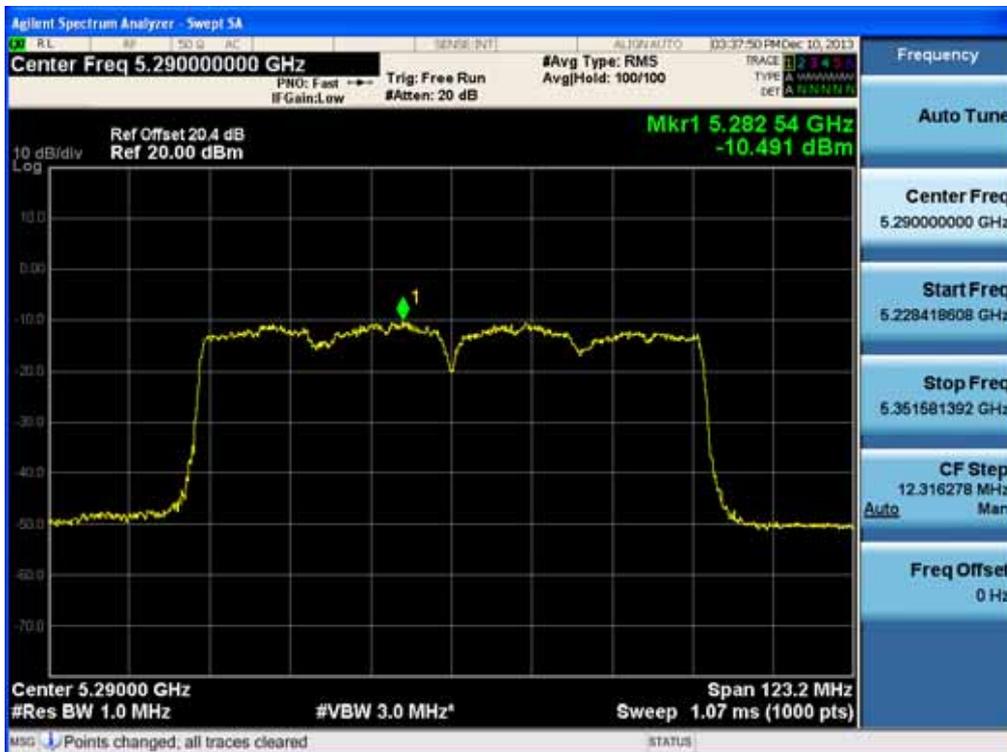


FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID	FCC ID: ZNF0956

Power Spectral Density (802.11ac-CH 42)

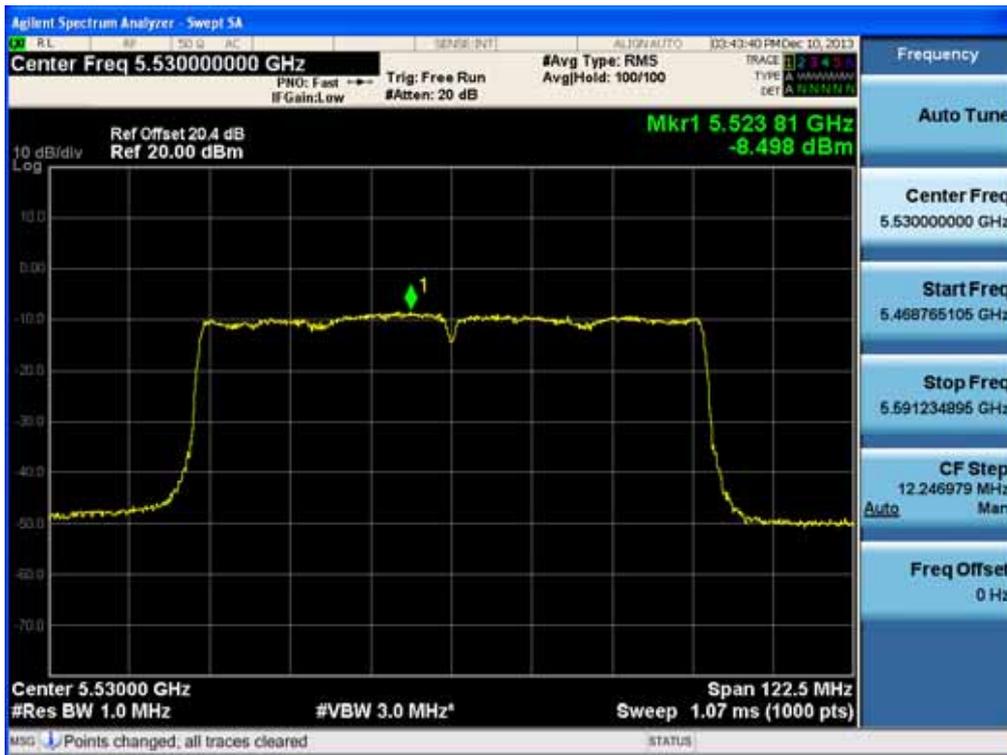


Power Spectral Density (802.11ac-CH 58)

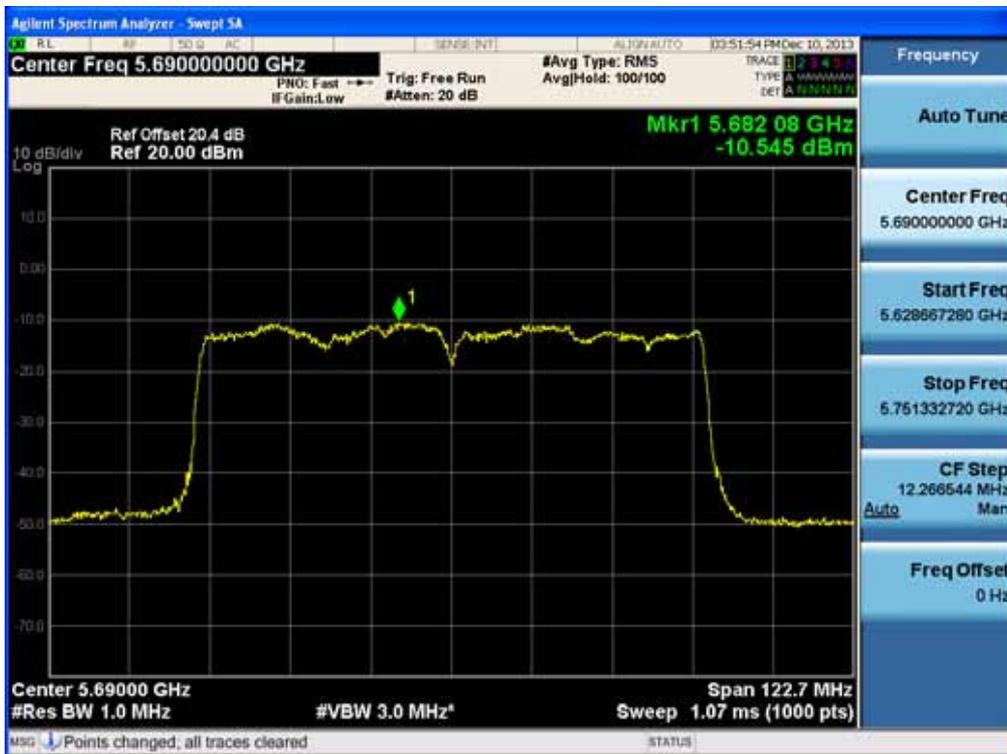


FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID		FCC ID: ZNFD956

Power Spectral Density (802.11ac-CH 106)



Power Spectral Density (802.11ac-CH 138)

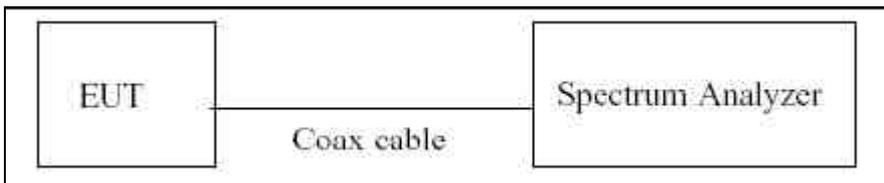


FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID	FCC ID: ZNF0956

8.5 PEAK EXCURSION RATIO

The spectrum analyzer was connected to the antenna terminal while the EUT was operating in the continuous transmission mode at the appropriate center frequencies. The largest permissible difference between the modulation envelope(measured using a peak hold function) and the maximum conducted output power 13 dB/MHz.

TEST CONFIGURATION



TEST PROCEDURE

We tested according to KDB 789033(issued 04/08/2013).

The spectrum analyzer is set to :

1. Span = Set the span to view the entire emission bandwidth.
2. RBW = 1 MHz
3. VBW \geq 3 MHz
4. Detector Mode = Peak
5. Trace Mode = Max hold
6. Allow the sweeps to continue until the trace stabilizes.
7. Use the peak search function to find the peak of the spectrum.
8. Use the procedure to measure the PPSD
9. Compute the ratio of the maximum of the peak-max-hold spectrum to the PPSD.

Note :

1. The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss + Cable loss
3. We apply to the offset in the 5.2 GHz, 5.3 GHz and 5.6 GHz range that was rounded off to the closest tenth dB. Actual value of loss for the attenuator and cable combination is below table.
4. We applied the 15.407 for Ch.144, 142 and 138 in 802.11ac according to KDB 644545 D01 v01r01.

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Band	Frequency(MHz)	Loss(dB)
UNII 1	5180	20.30
	5190	20.29
	5200	20.28
	5230	20.29
	5240	20.34
UNII 2	5260	20.37
	5270	20.38
	5300	20.40
	5310	20.39
	5320	20.39
UNII 2e	5500	20.35
	5510	20.36
	5550	20.41
	5580	20.43
	5670	20.43
	5700	20.30

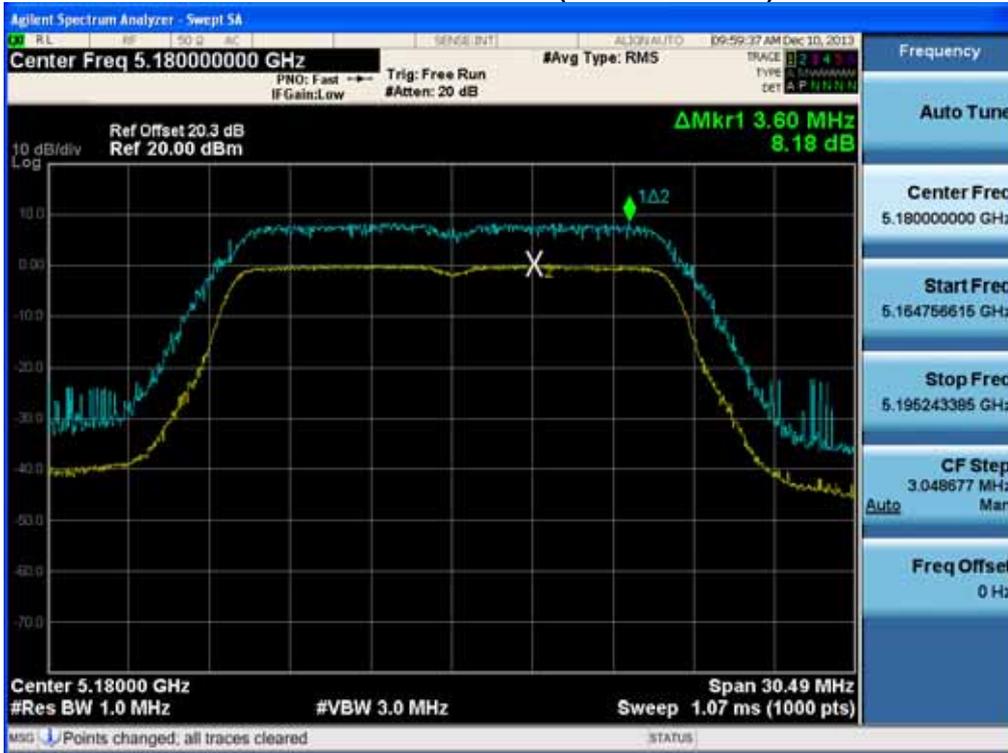
(Actual value of loss for the attenuator and cable combination)



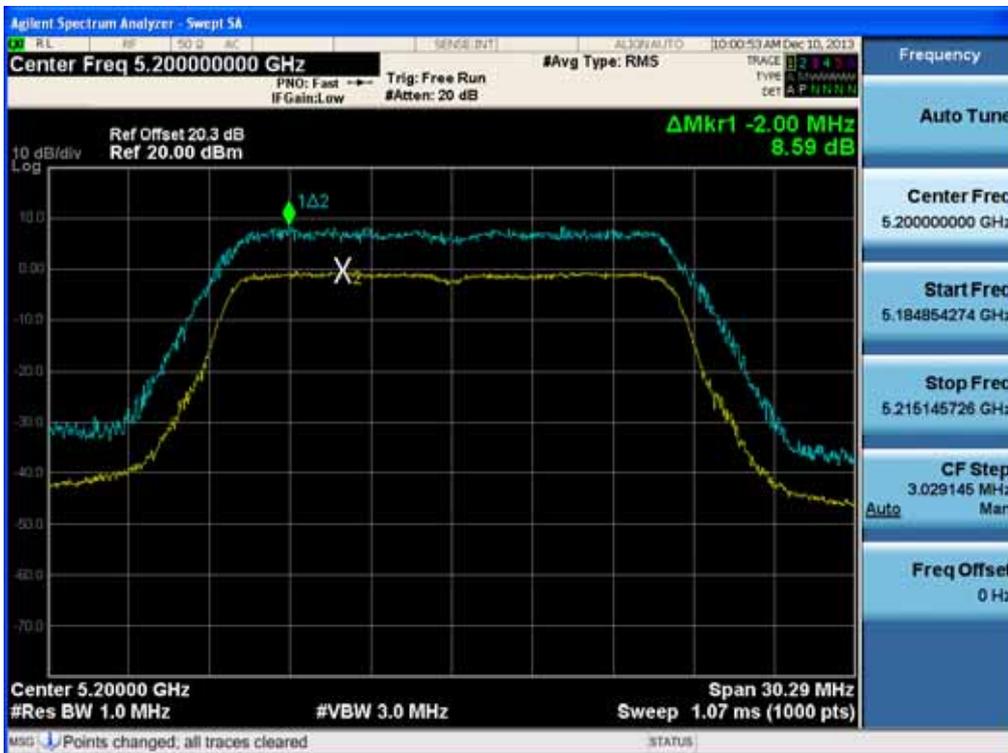
RESULT PLOTS

20 MHz BW

Peak Excursion Ratio (802.11a-CH 36)

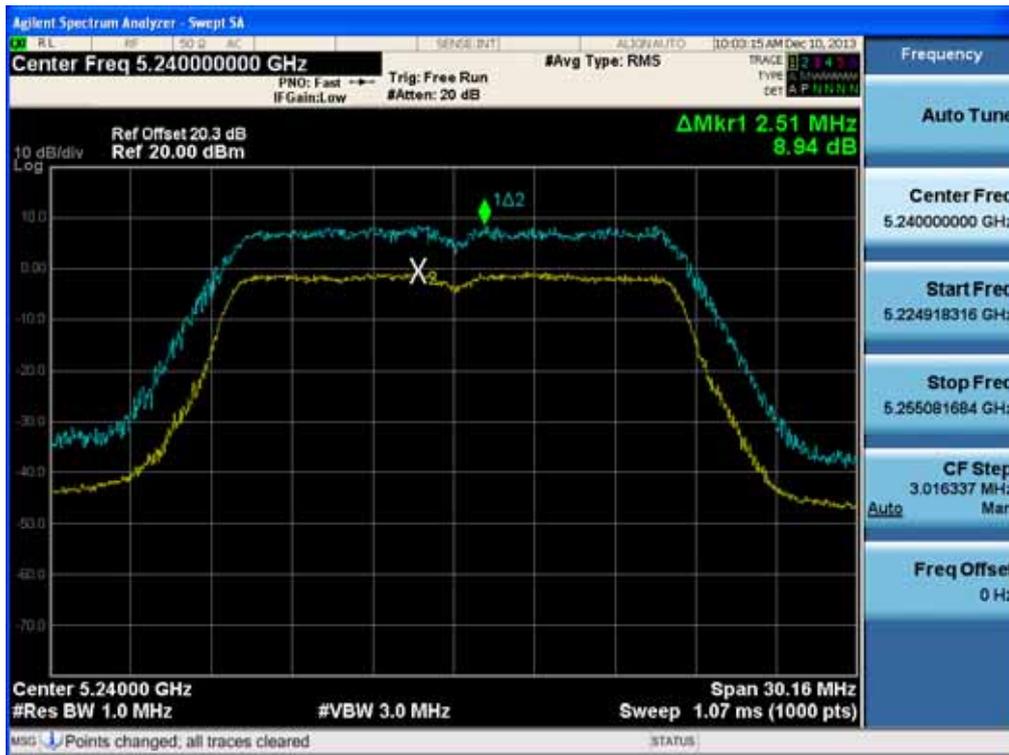


Peak Excursion Ratio (802.11a-CH 40)

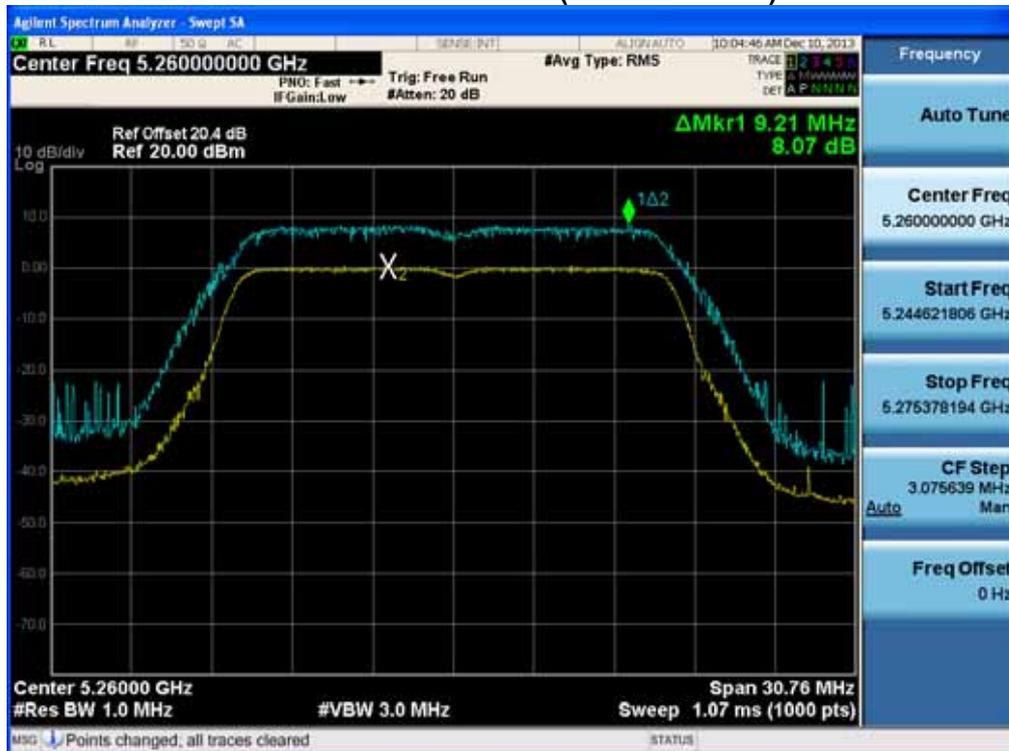


FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID	FCC ID: ZNFD956

Peak Excursion Ratio (802.11a-CH 48)

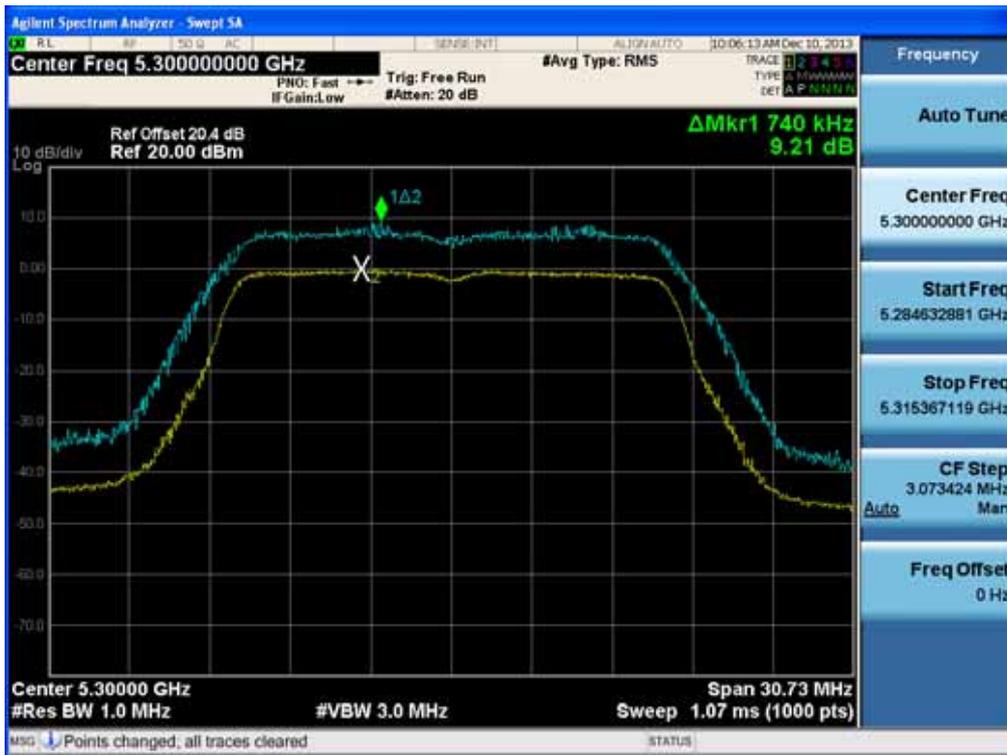


Peak Excursion Ratio (802.11a-CH 52)

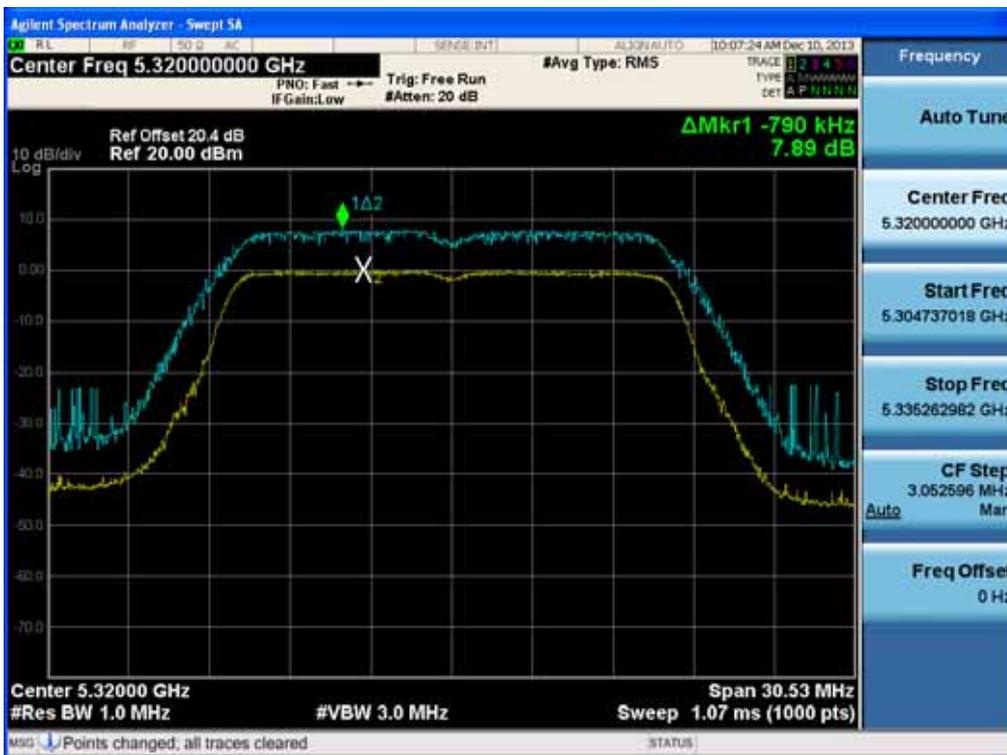


FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID	FCC ID: ZNFD956

Peak Excursion Ratio (802.11a-CH 60)

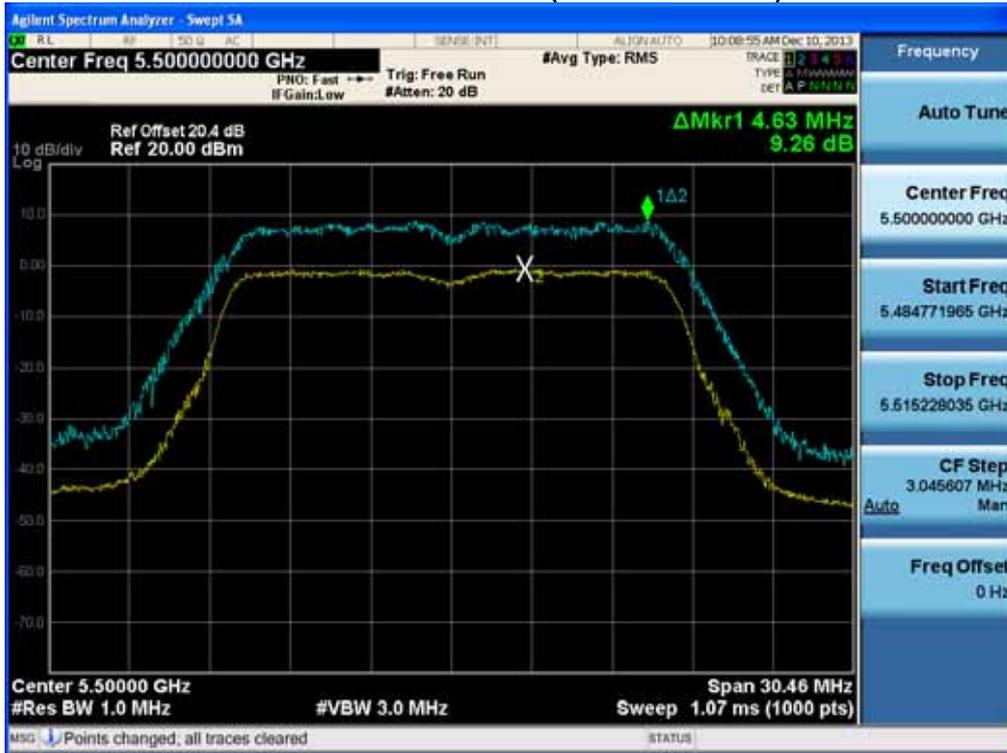


Peak Excursion Ratio (802.11a-CH 64)

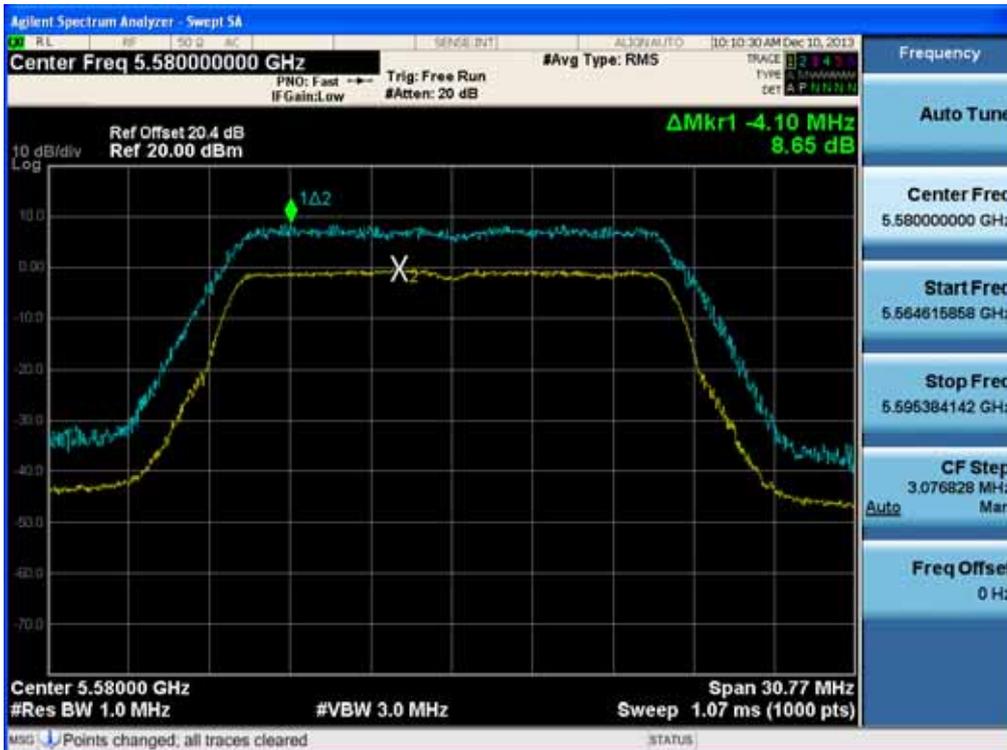


FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID	FCC ID: ZNF0956

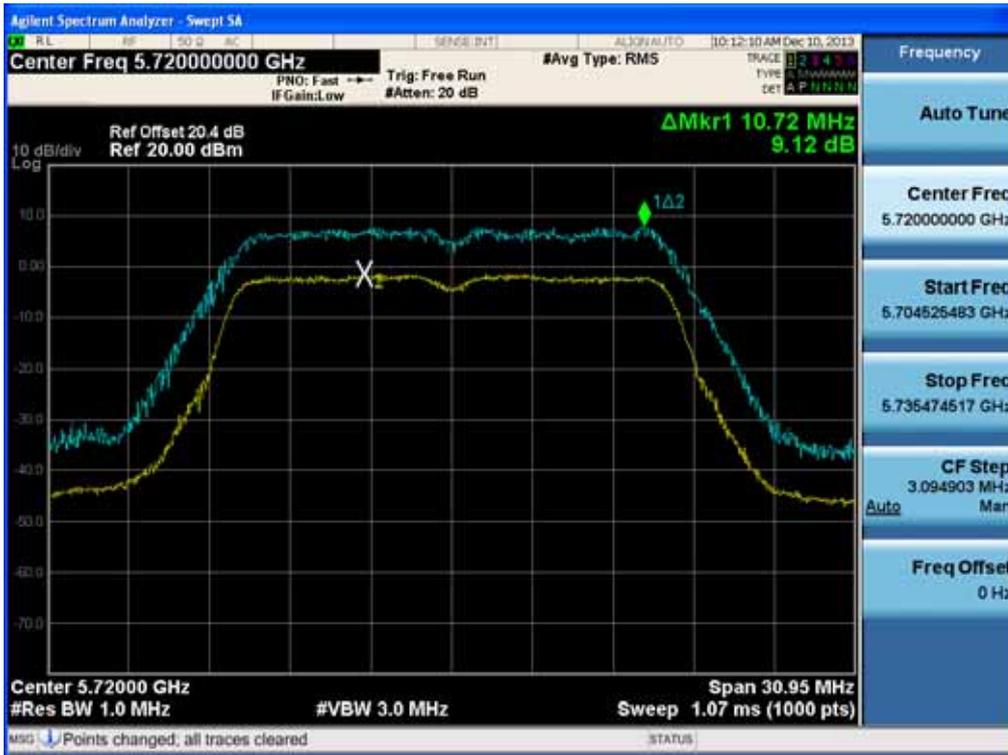
Peak Excursion Ratio (802.11a-CH 100)



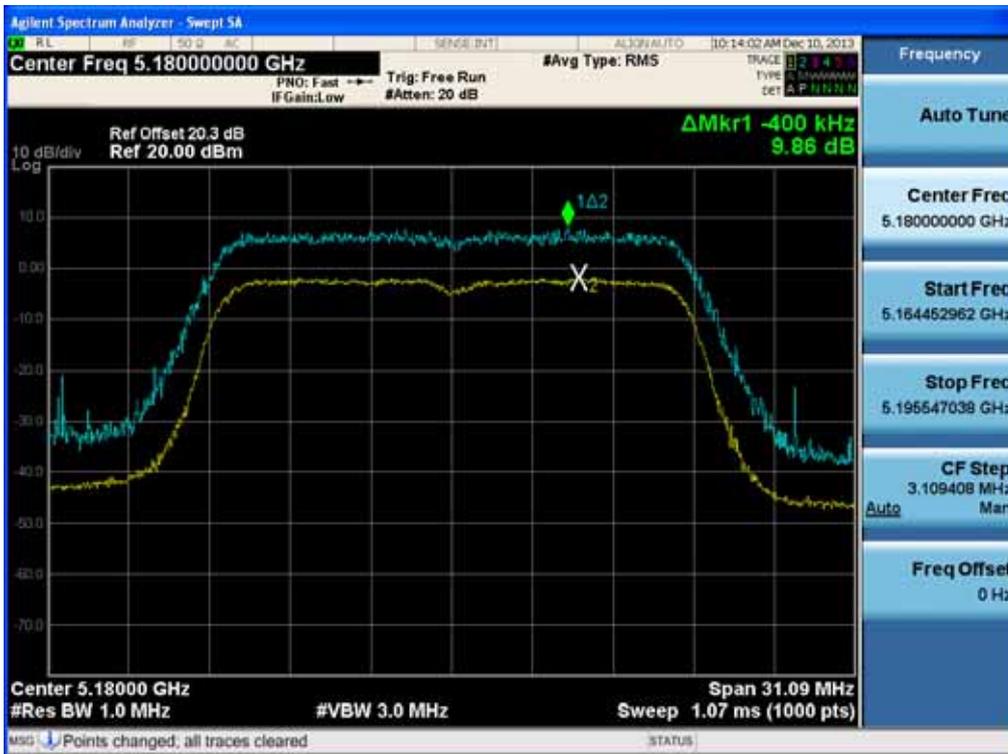
Peak Excursion Ratio (802.11a-CH 116)



Peak Excursion Ratio (802.11a-CH 144)

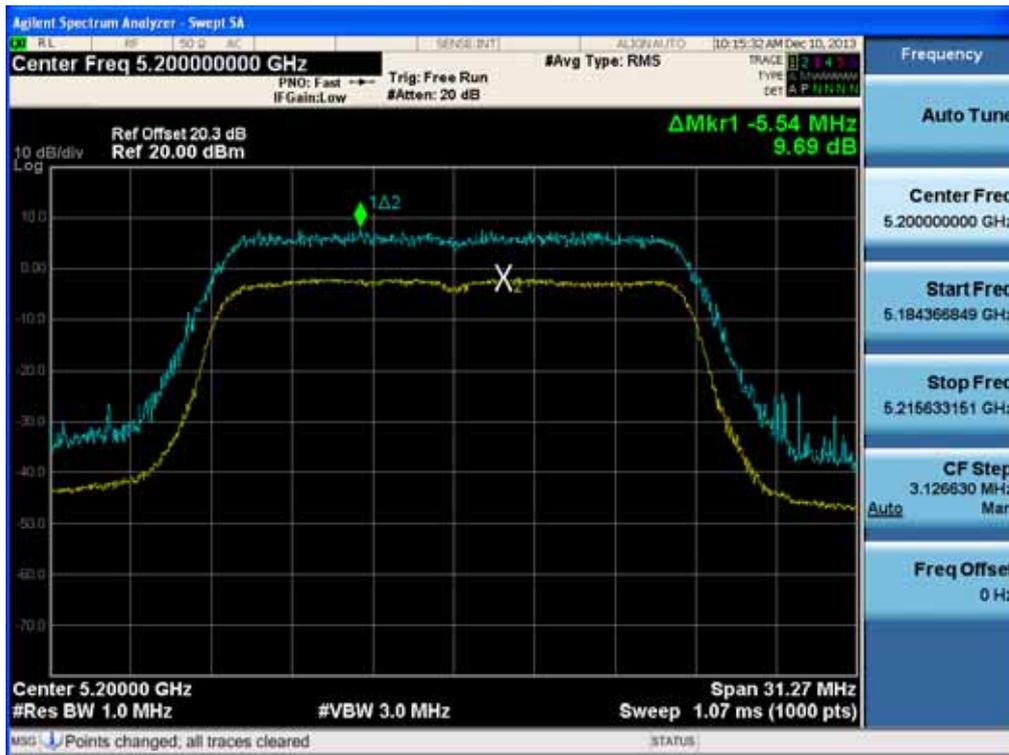


Peak Excursion Ratio (802.11n-CH 36)

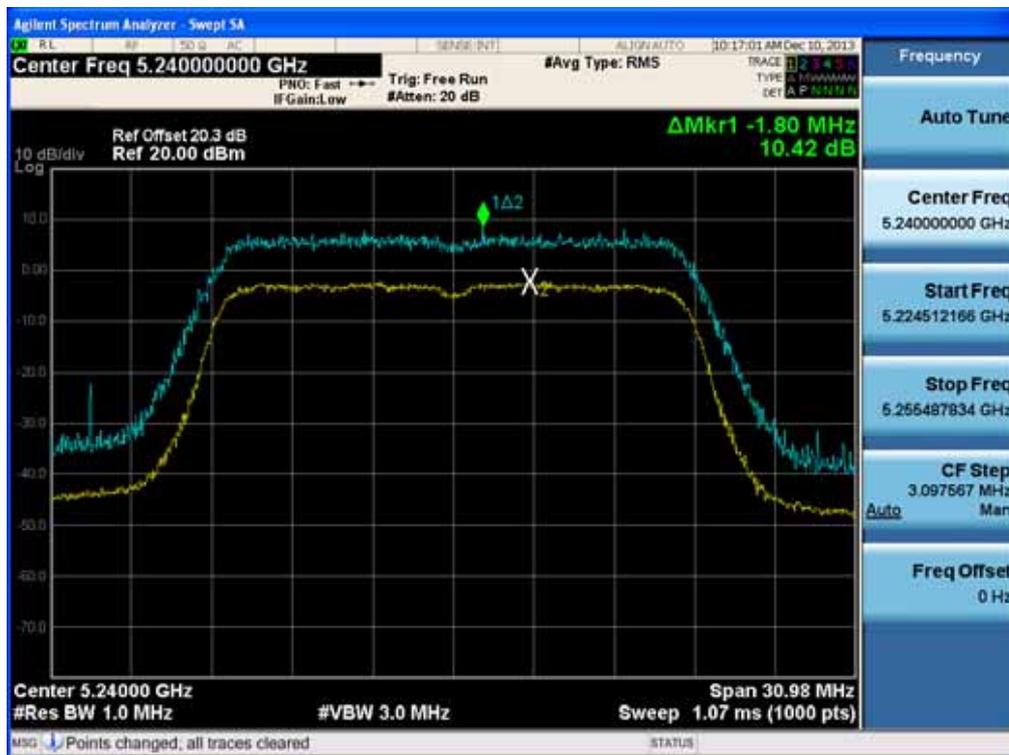


FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID	FCC ID: ZNF0956

Peak Excursion Ratio (802.11n-CH 40)



Peak Excursion Ratio (802.11n-CH 48)

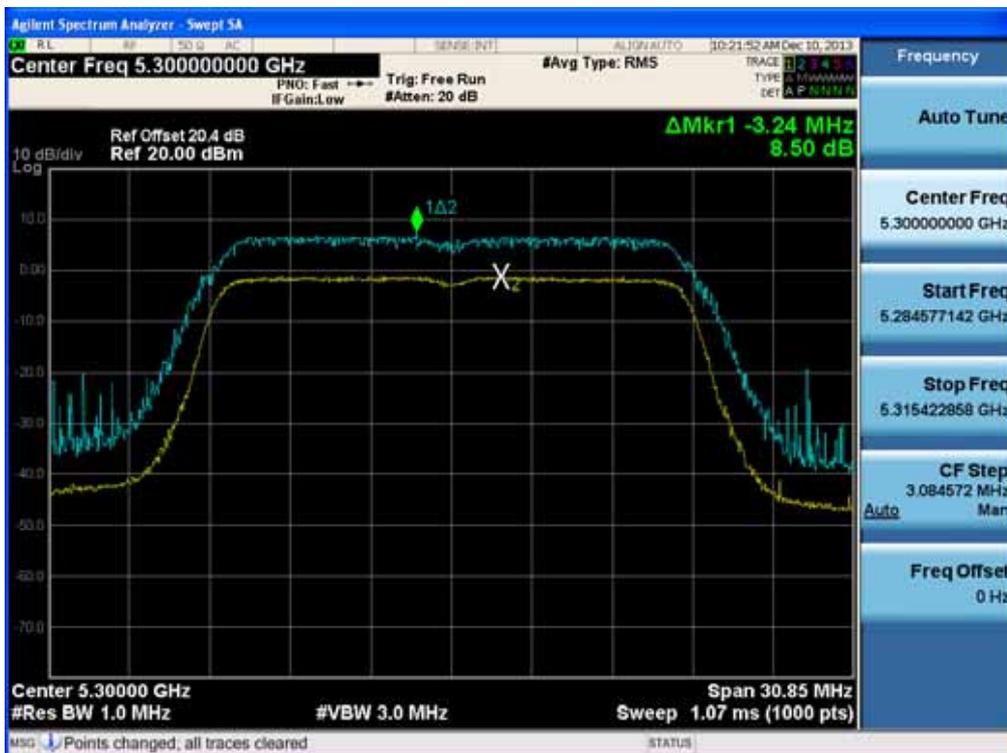


FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID	FCC ID: ZNFD956

Peak Excursion Ratio (802.11n-CH 52)

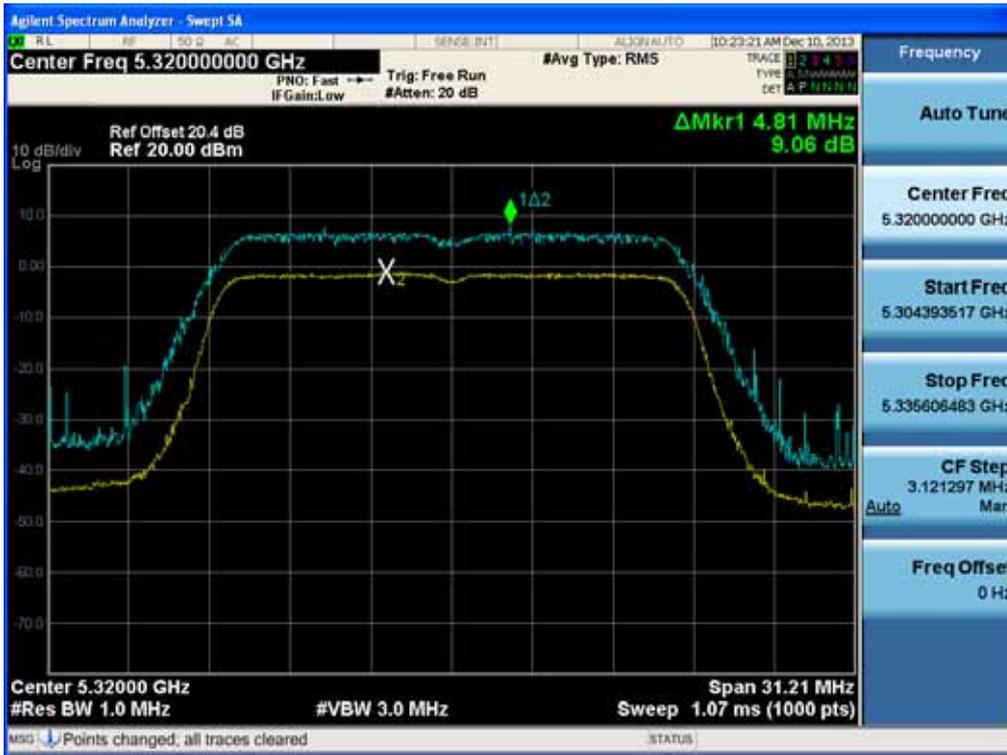


Peak Excursion Ratio (802.11n-CH 60)

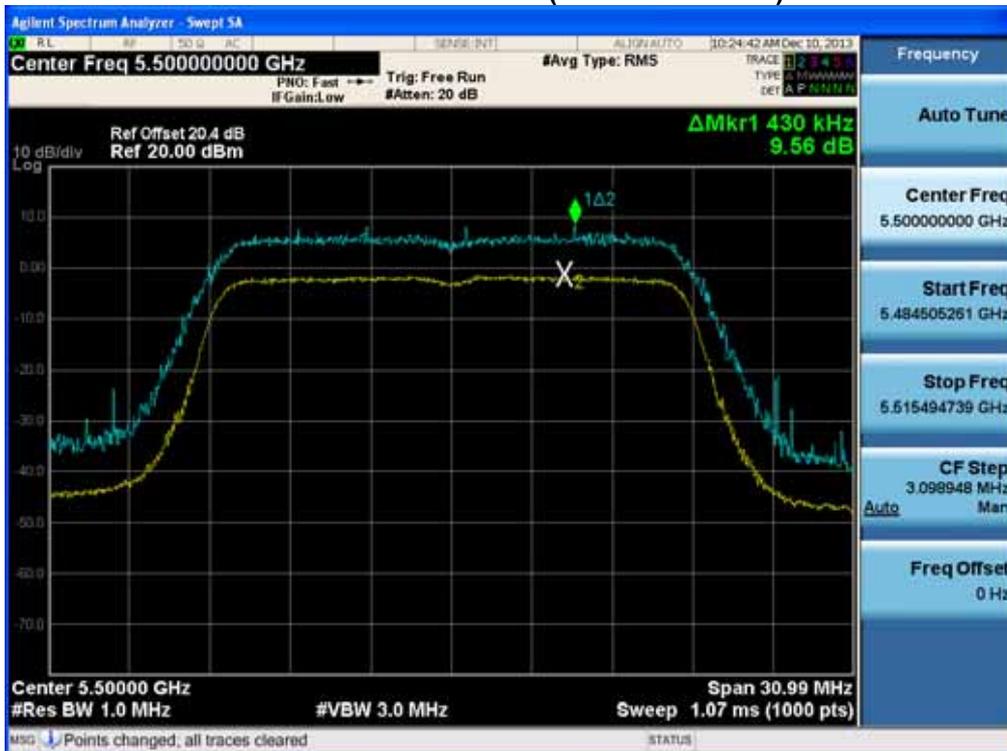


FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID	FCC ID: ZNFD956

Peak Excursion Ratio (802.11n-CH 64)

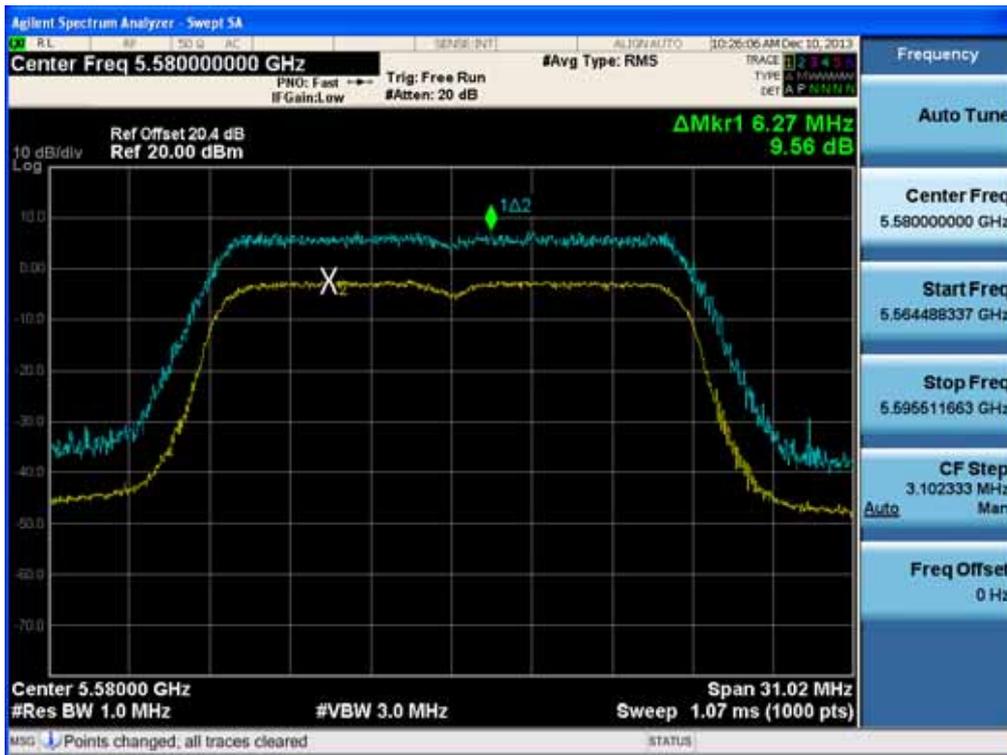


Peak Excursion Ratio (802.11n-CH 100)



FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID	FCC ID: ZNFD956

Peak Excursion Ratio (802.11n-CH 116)

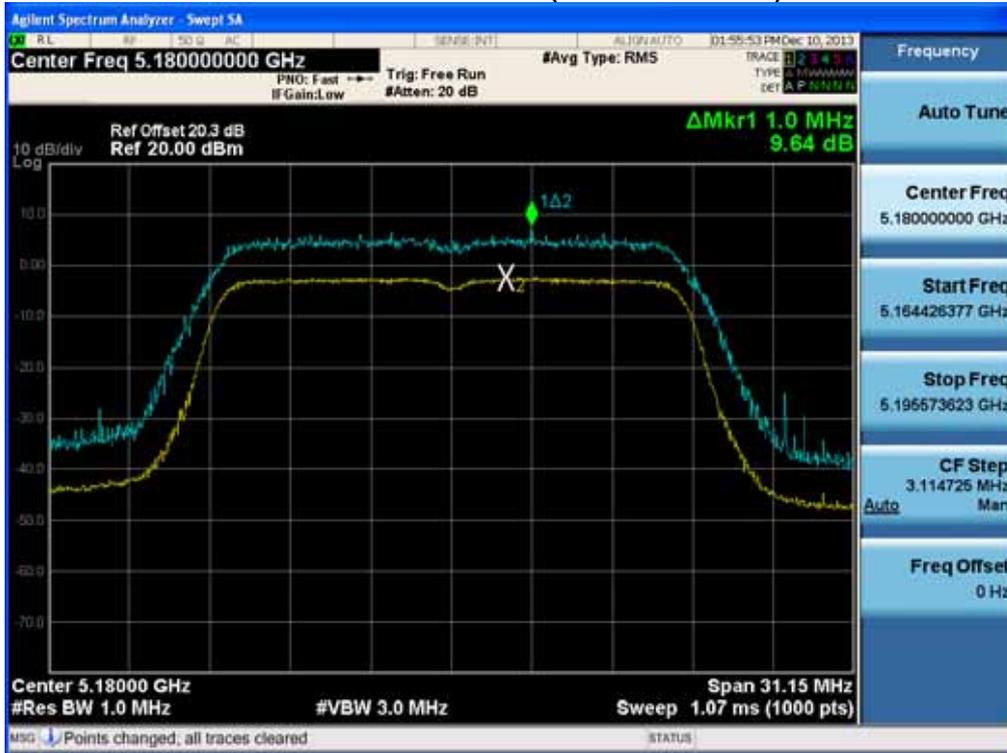


Peak Excursion Ratio (802.11n-CH 144)

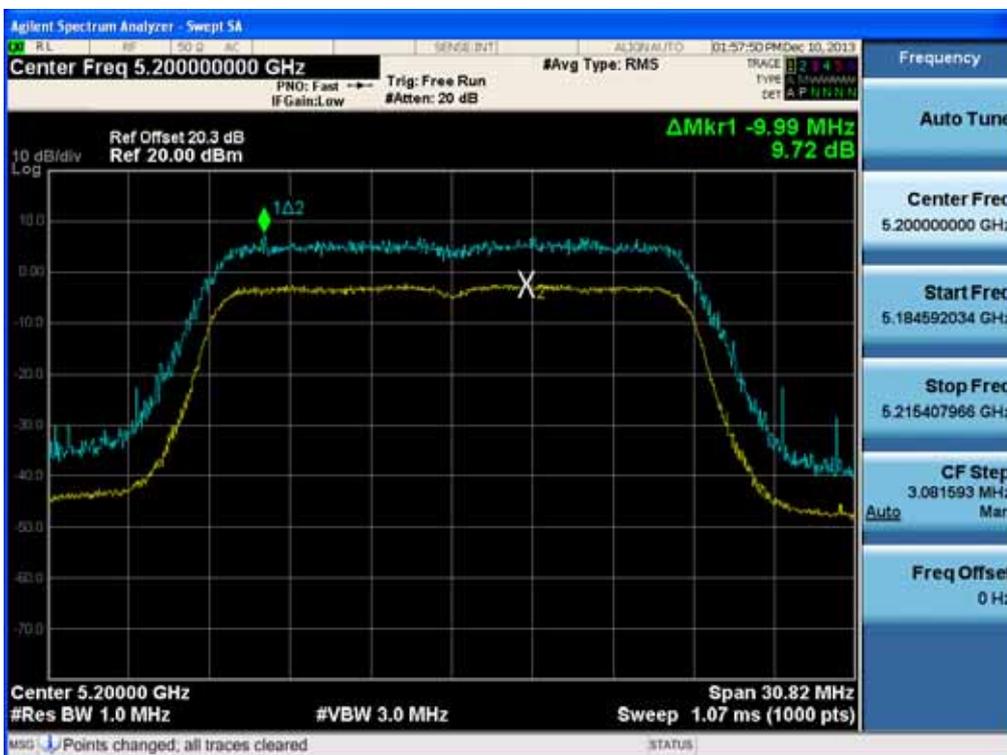


FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID	FCC ID: ZNF0956

Peak Excursion Ratio (802.11ac-CH 36)

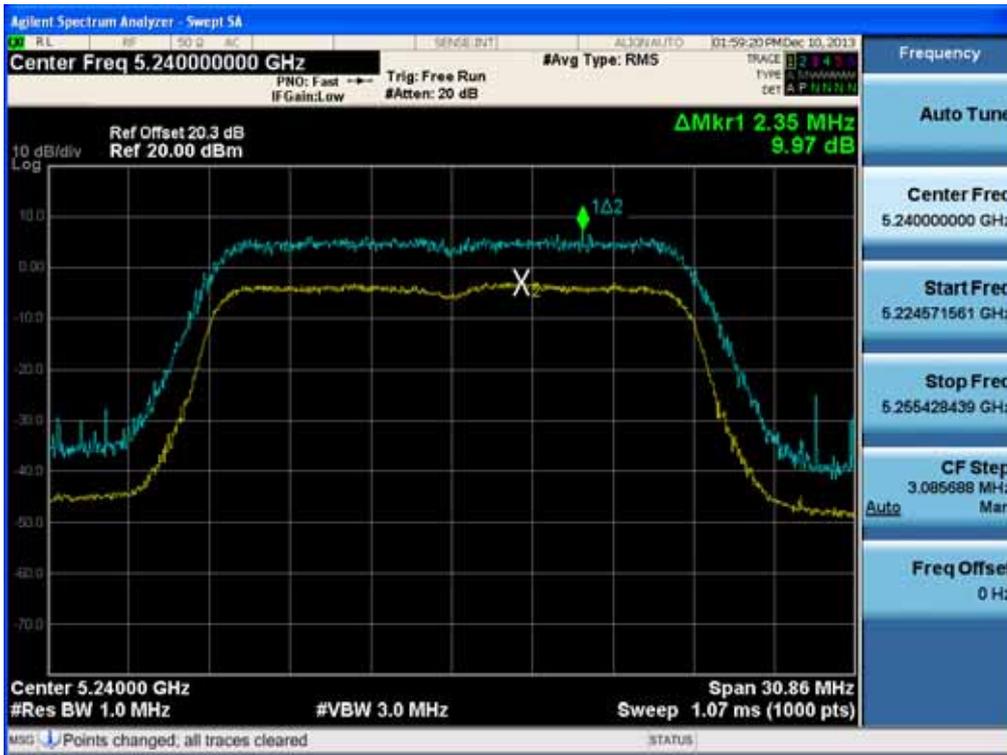


Peak Excursion Ratio (802.11ac-CH 40)

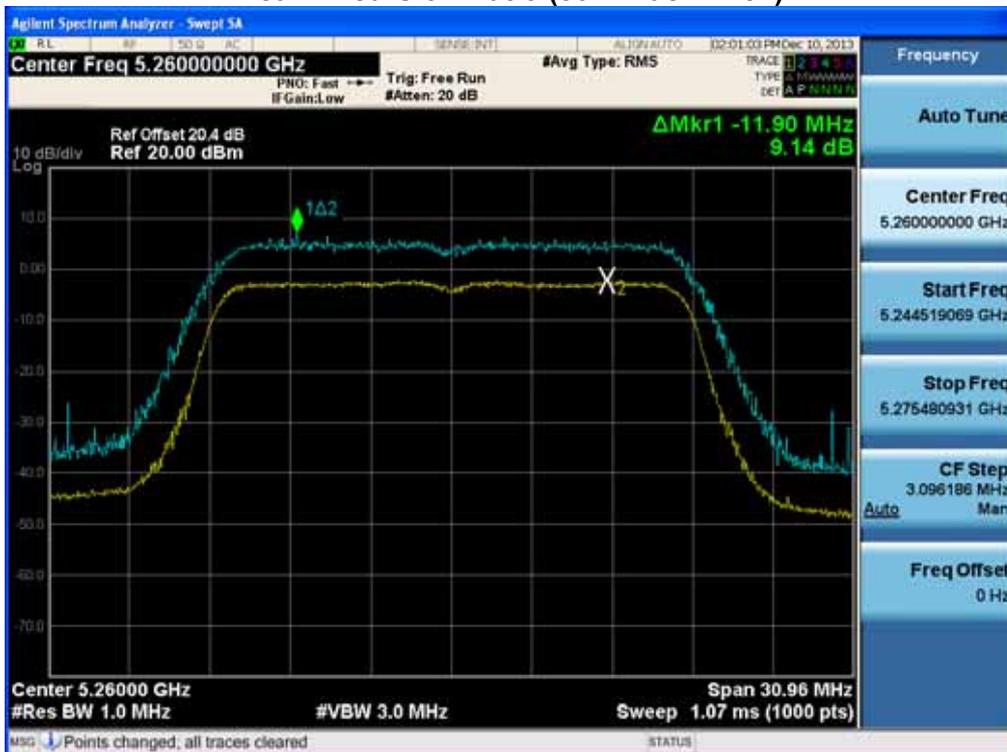


FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID	FCC ID: ZNFD956

Peak Excursion Ratio (802.11ac-CH 48)

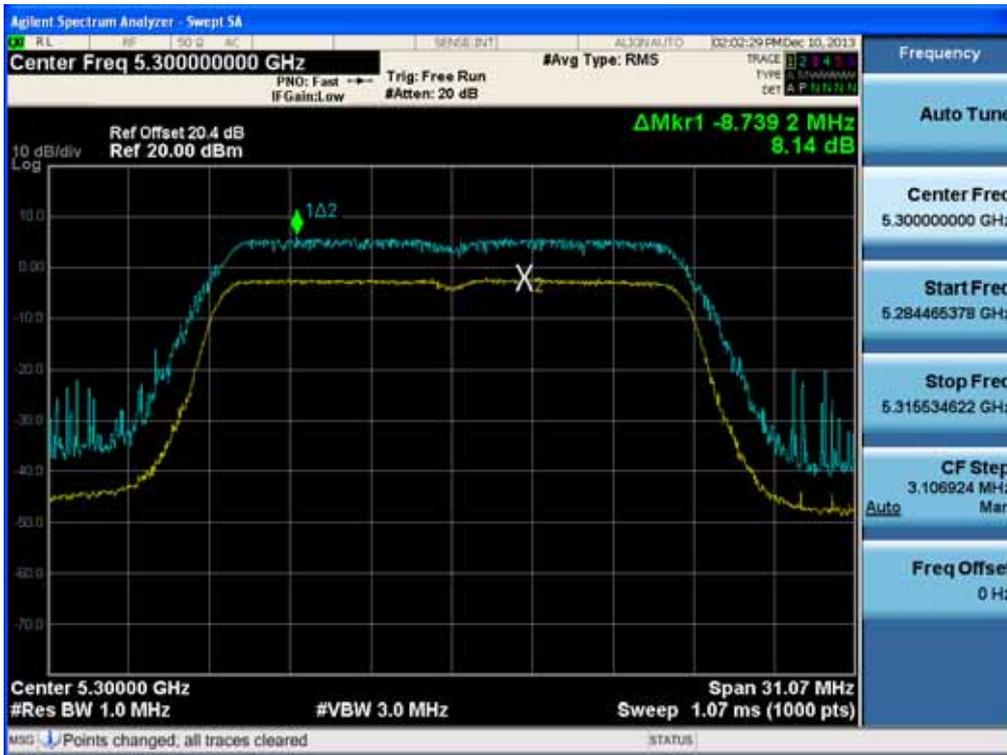


Peak Excursion Ratio (802.11ac-CH 52)

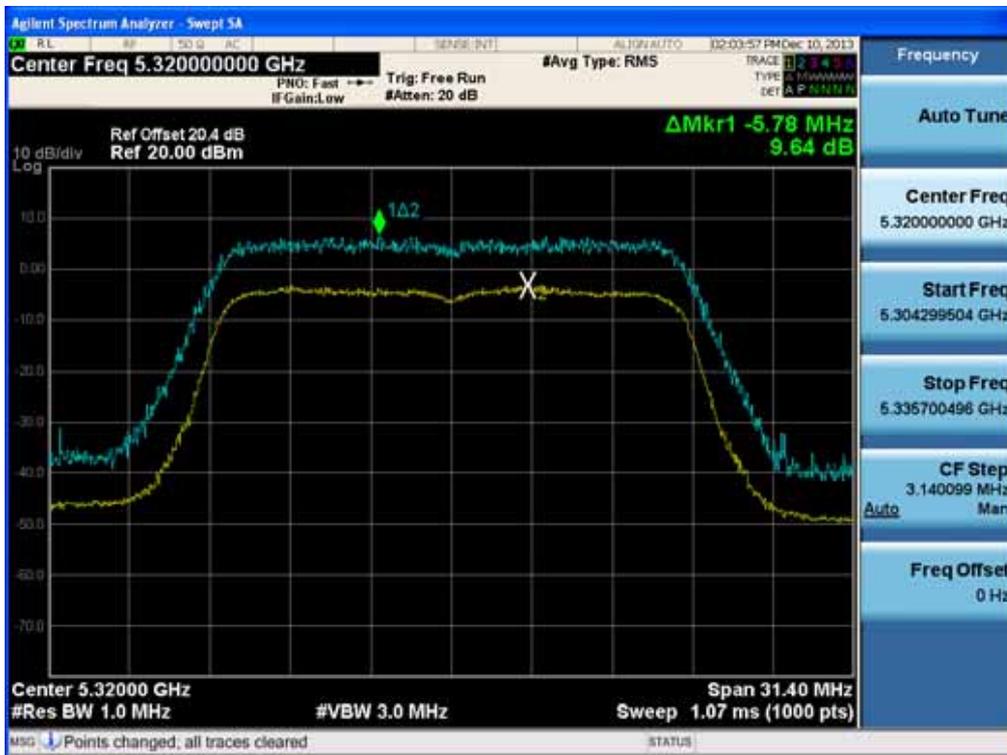


FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID	FCC ID: ZNF0956

Peak Excursion Ratio (802.11ac-CH 60)

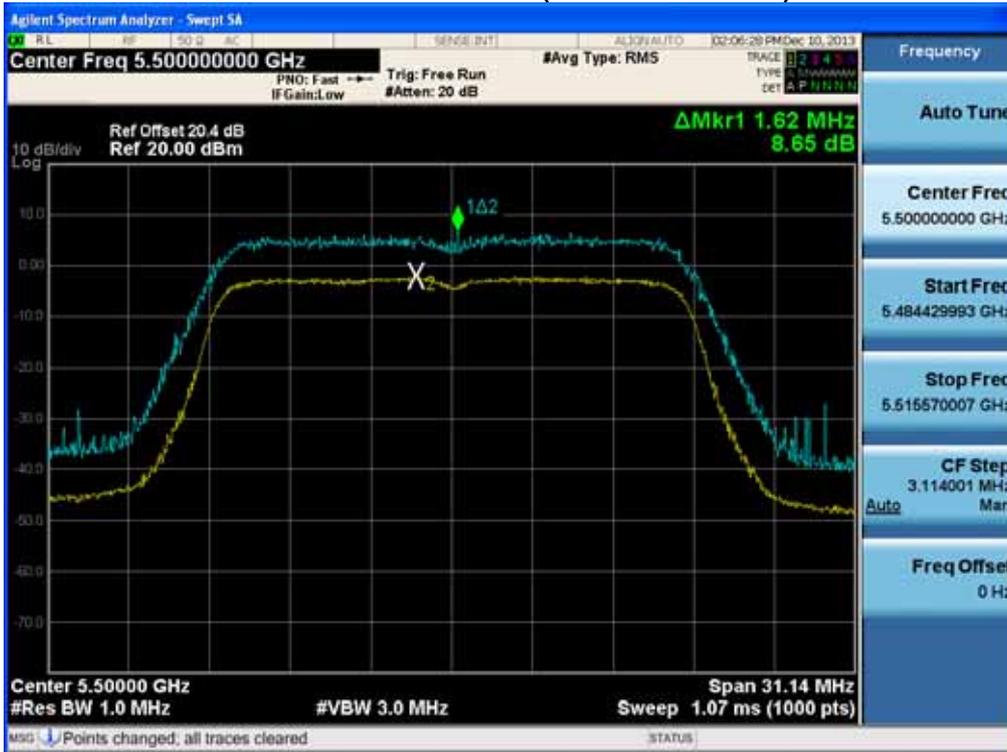


Peak Excursion Ratio (802.11ac-CH 64)

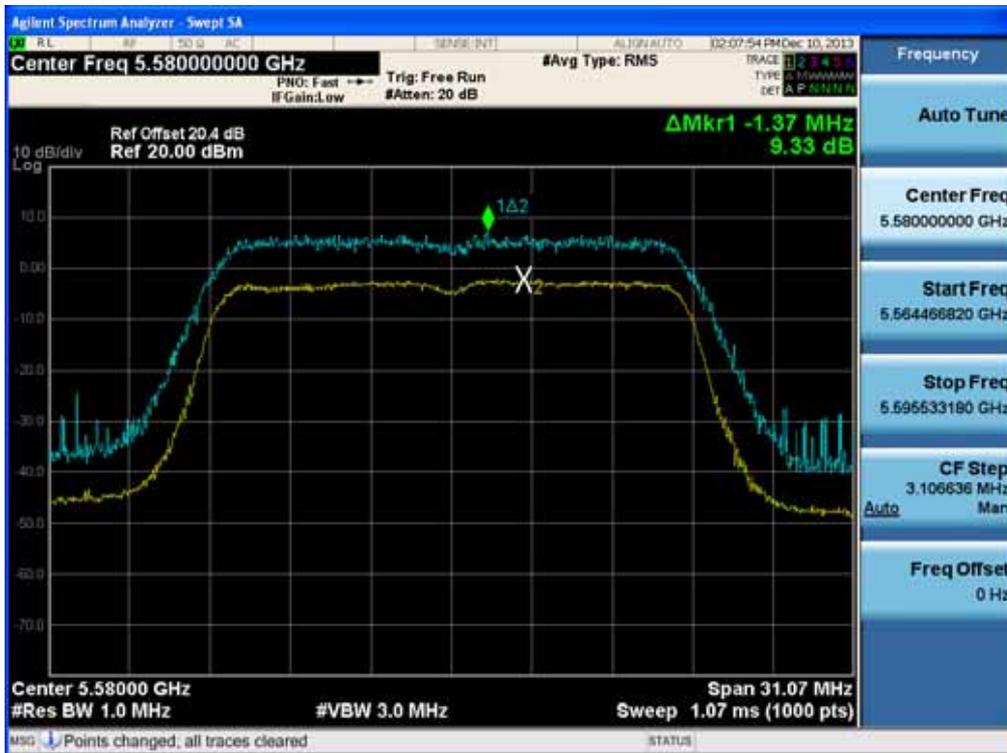


FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID	FCC ID: ZNFD956

Peak Excursion Ratio (802.11ac-CH 100)

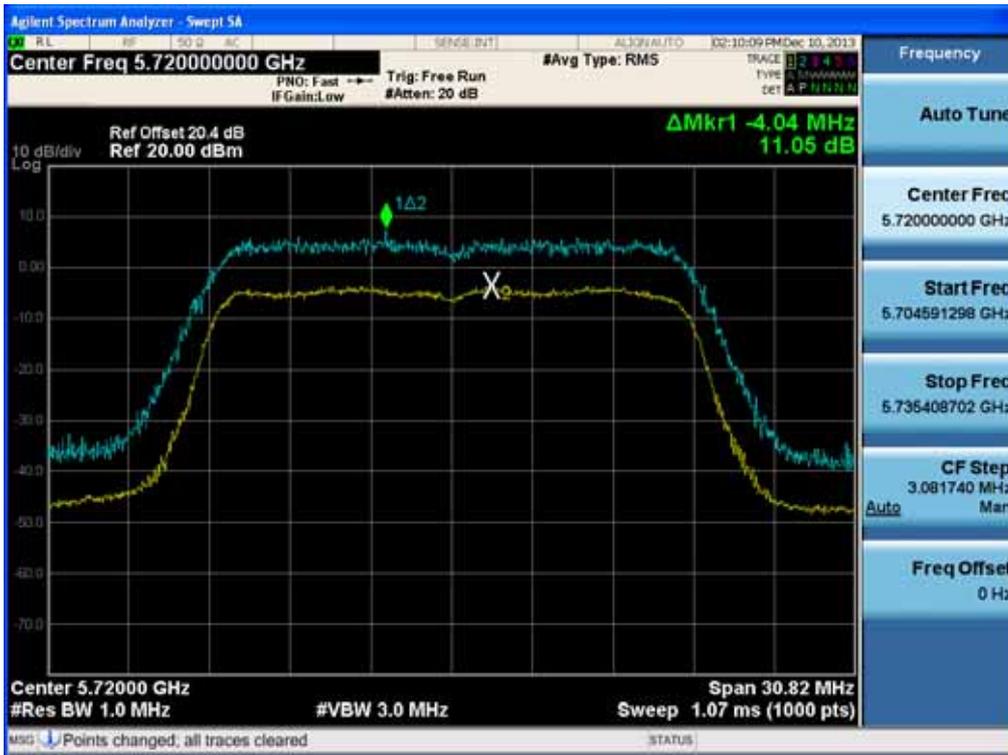


Peak Excursion Ratio (802.11ac-CH 116)



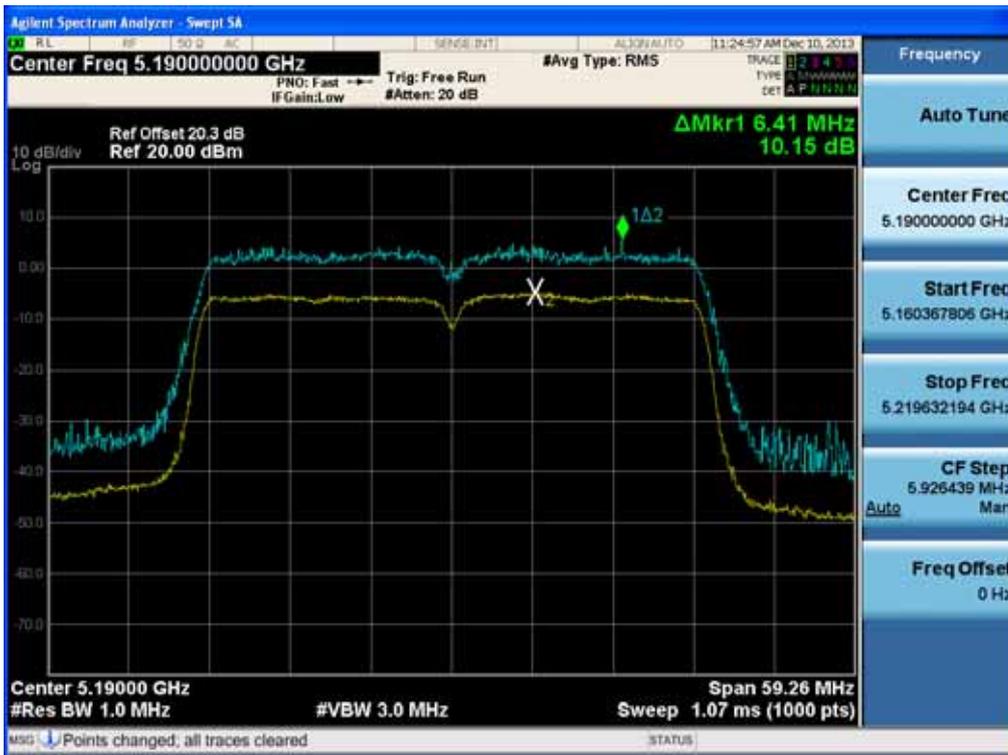
FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID	FCC ID: ZNFD956

Peak Excursion Ratio (802.11ac-CH 144)

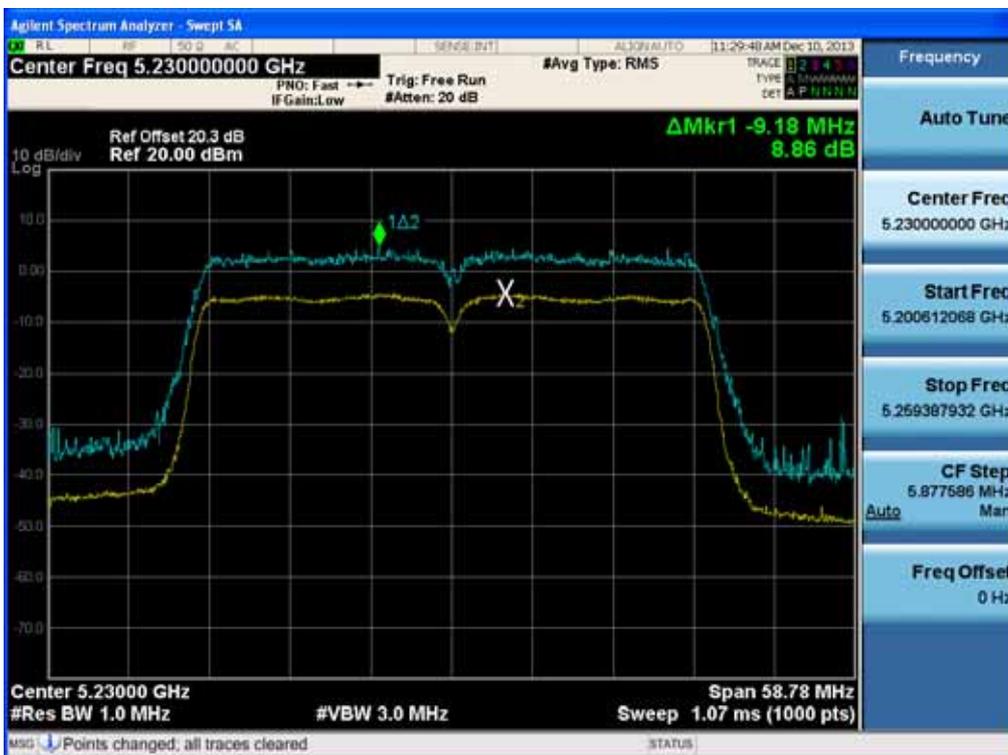


FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID	FCC ID: ZNF0956

Peak Excursion Ratio (802.11n-CH 38)

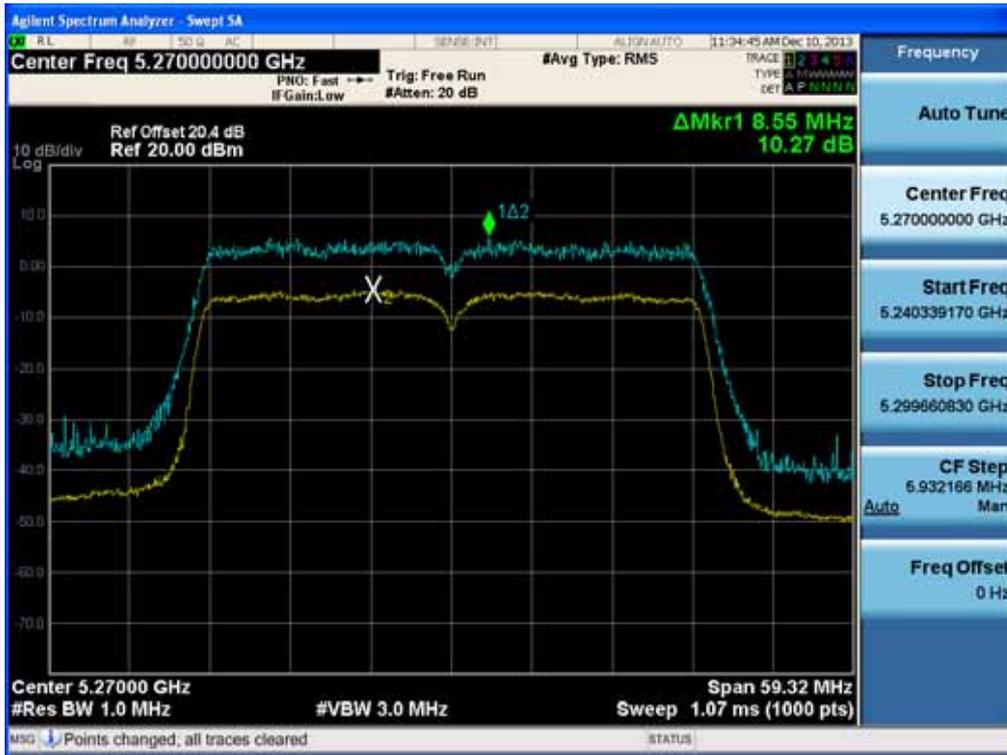


Peak Excursion Ratio (802.11n-CH 46)

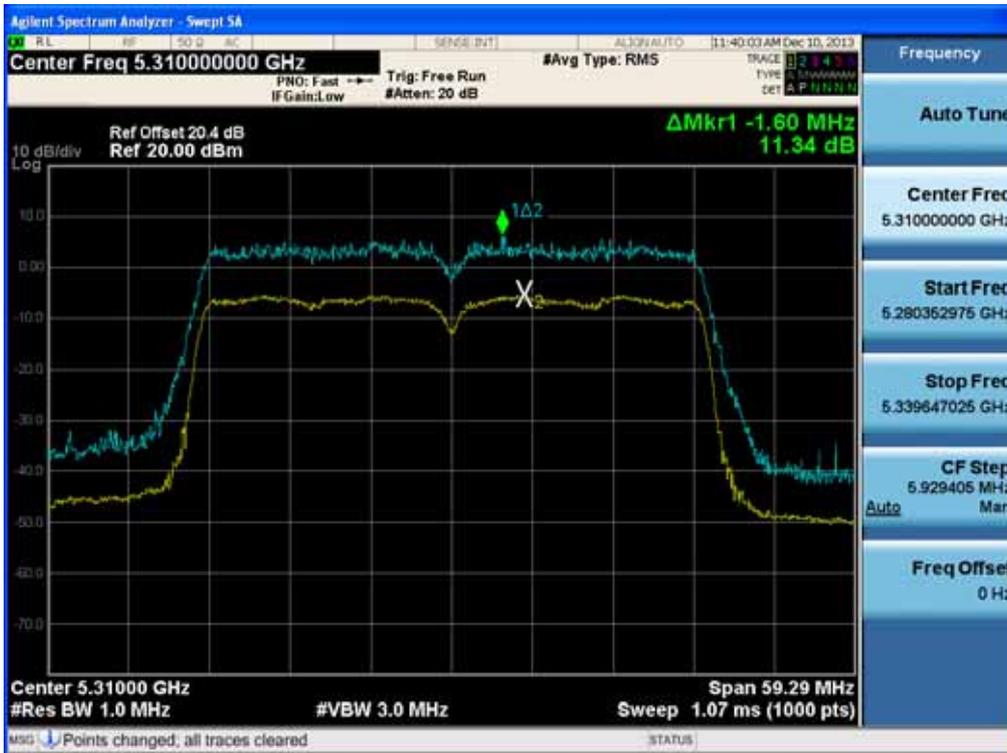


FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID	FCC ID: ZNFD956

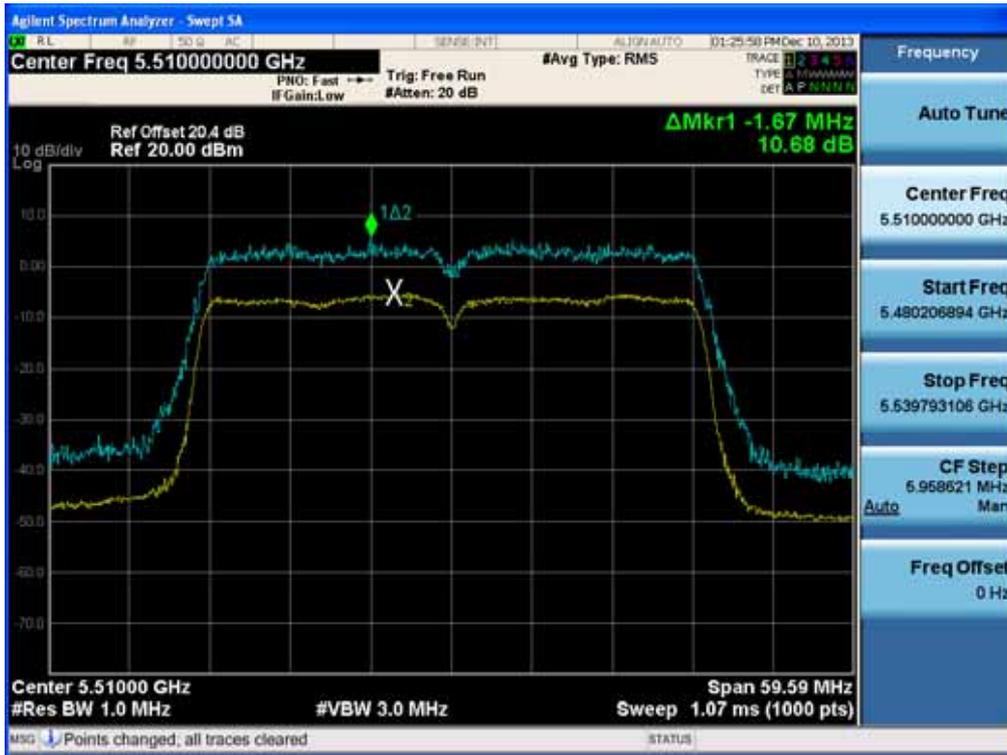
Peak Excursion Ratio (802.11n-CH 54)



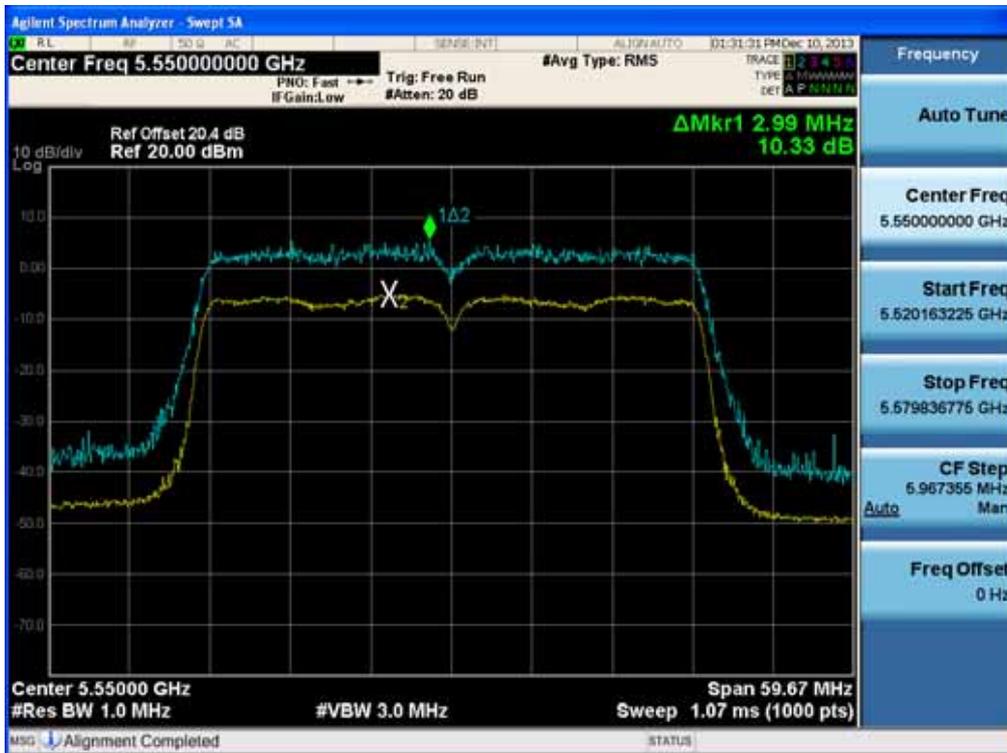
Peak Excursion Ratio (802.11n-CH 62)



Peak Excursion Ratio (802.11n-CH 102)

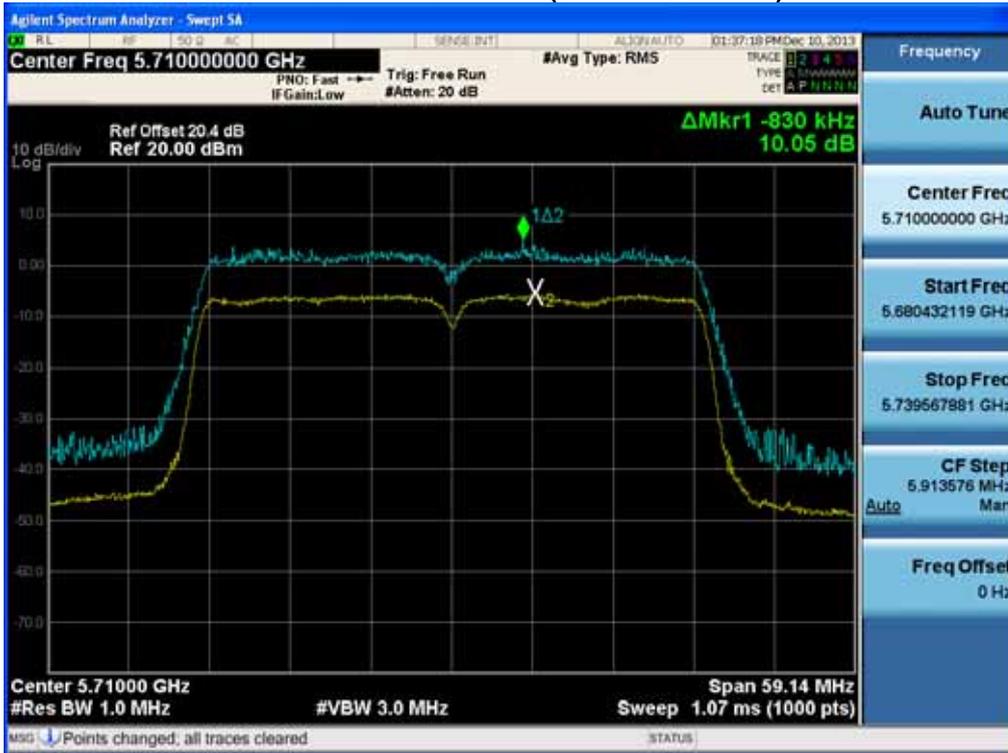


Peak Excursion Ratio (802.11n-CH 110)

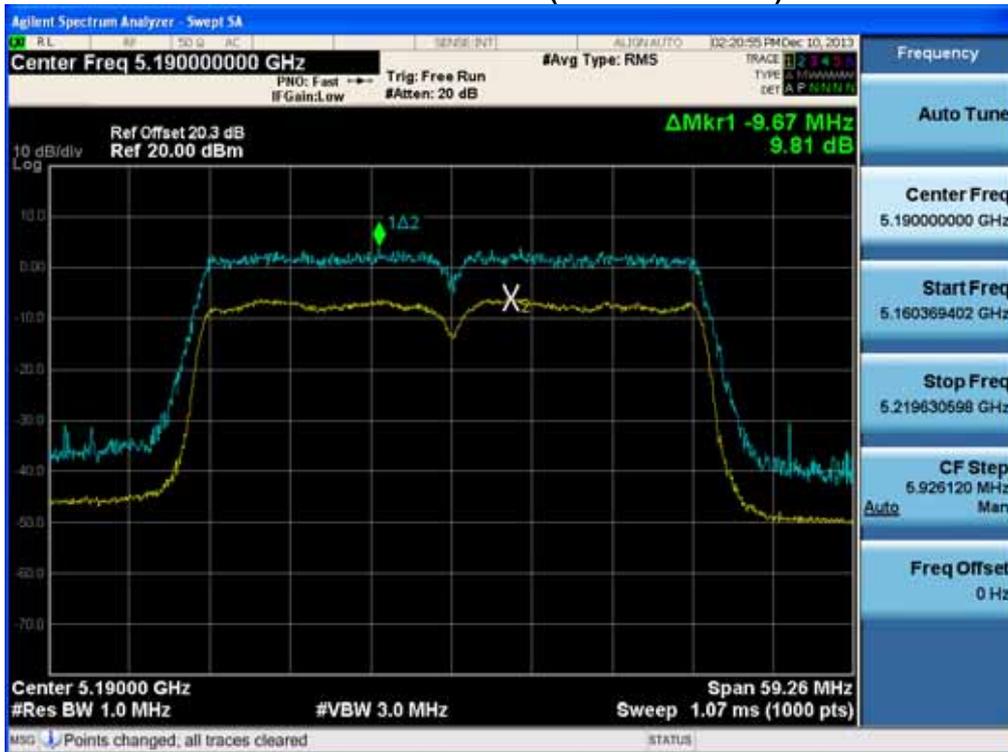


FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID	FCC ID: ZNF0956

Peak Excursion Ratio (802.11n-CH 142)

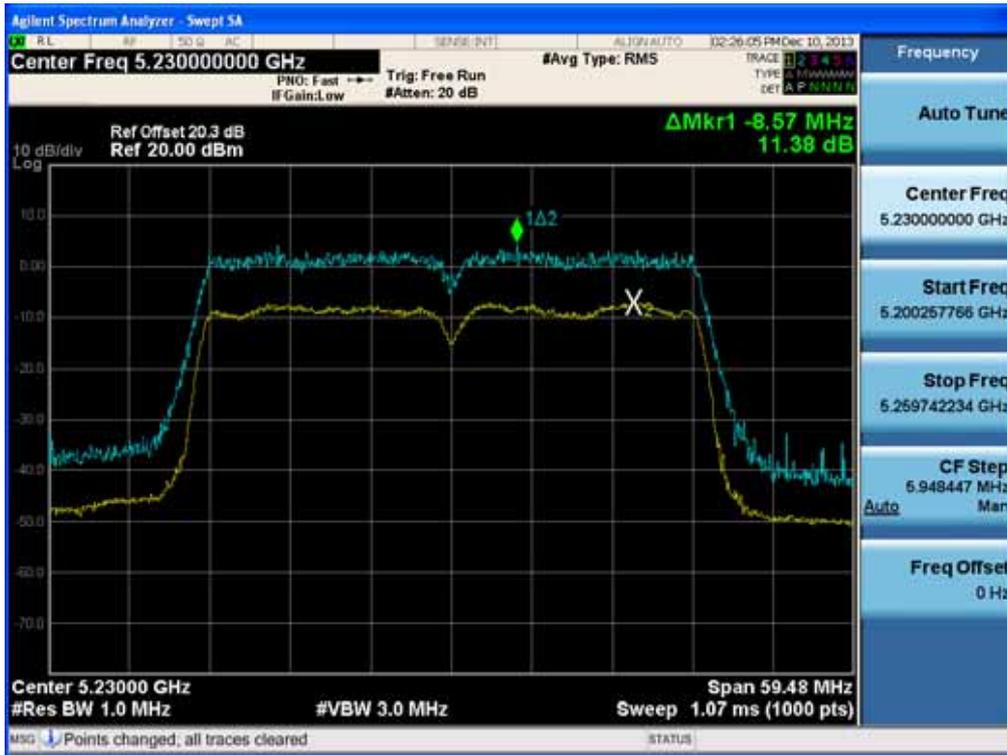


Peak Excursion Ratio (802.11ac-CH 38)



FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID	FCC ID: ZNFD956

Peak Excursion Ratio (802.11ac-CH 46)

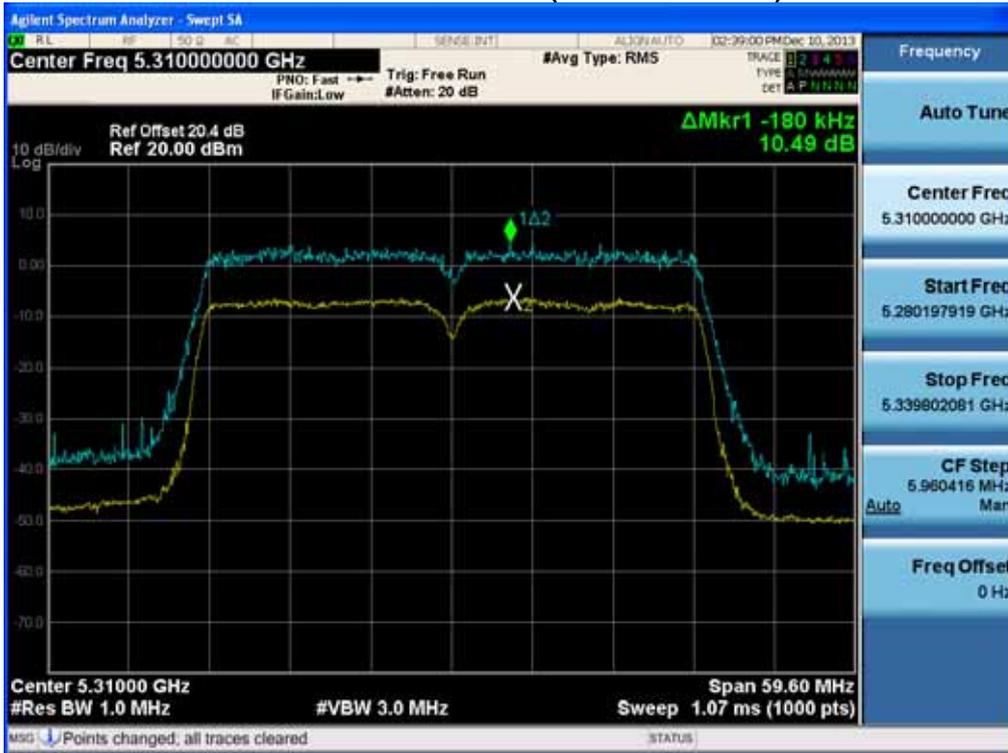


Peak Excursion Ratio (802.11ac-CH 54)

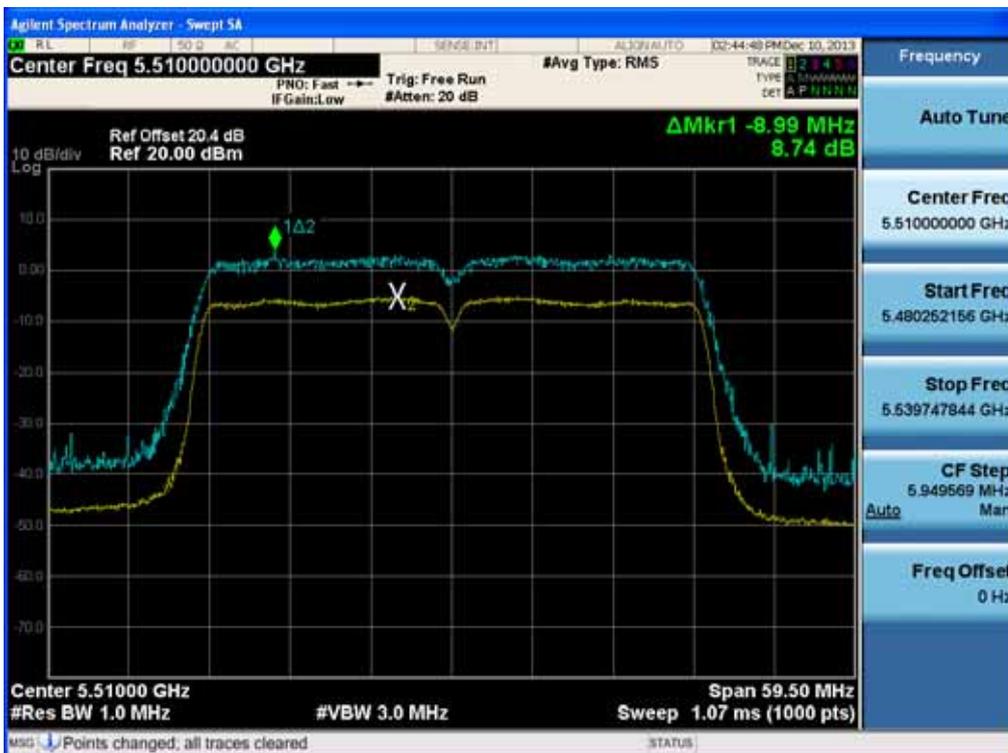


FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID	FCC ID: ZNF0956

Peak Excursion Ratio (802.11ac-CH 62)

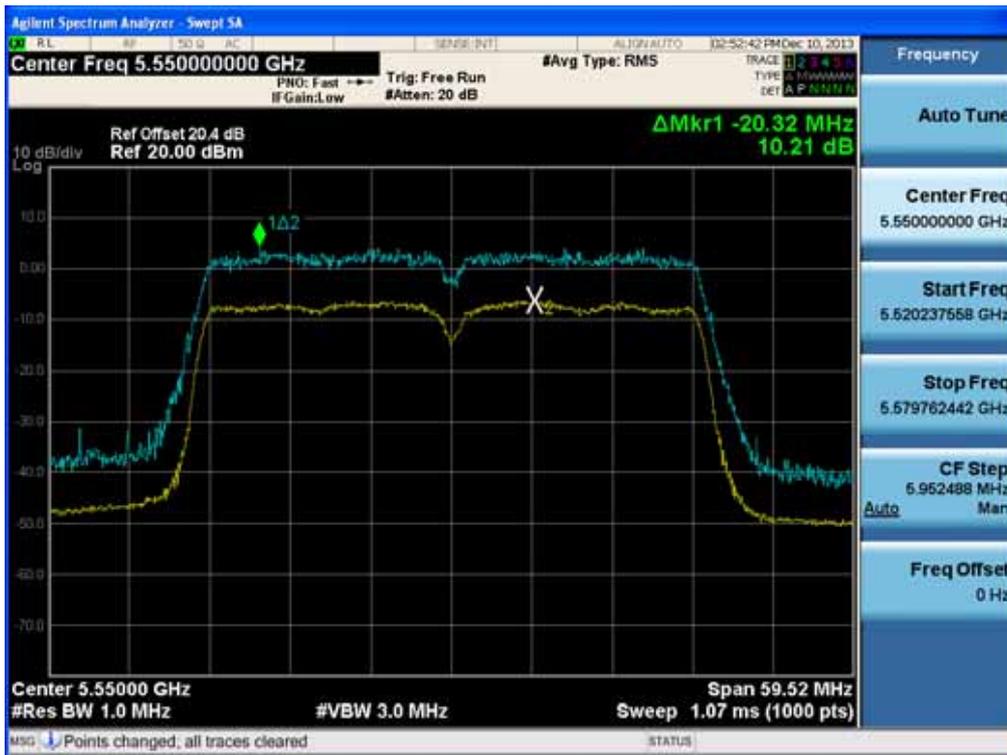


Peak Excursion Ratio (802.11ac-CH 102)

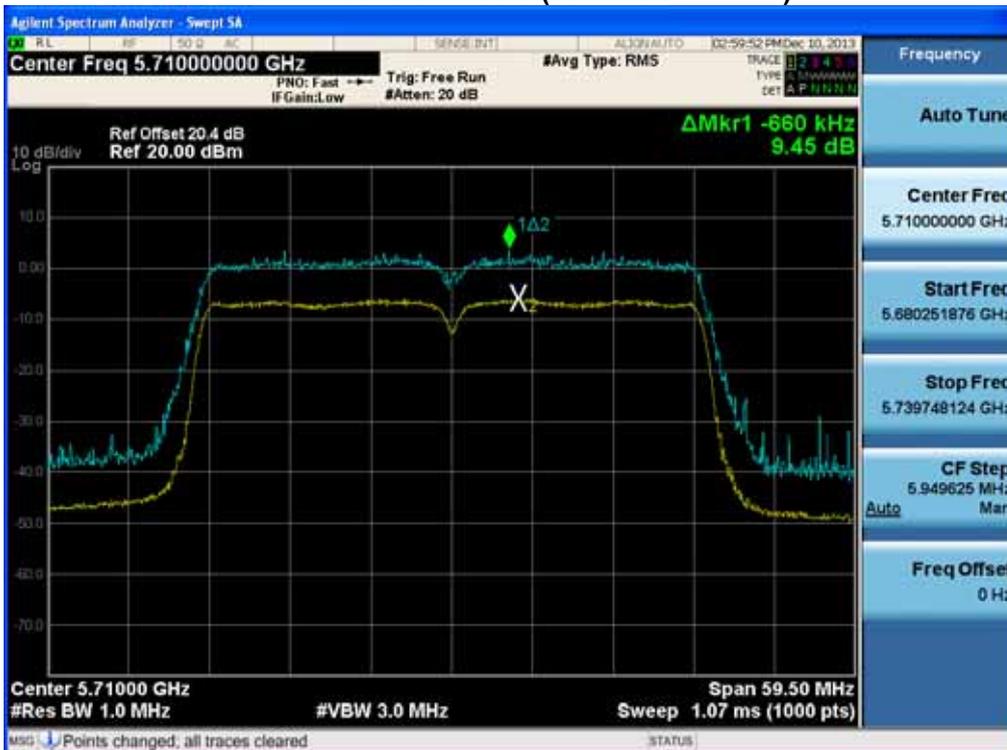


FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID	FCC ID: ZNFD956

Peak Excursion Ratio (802.11ac-CH 110)

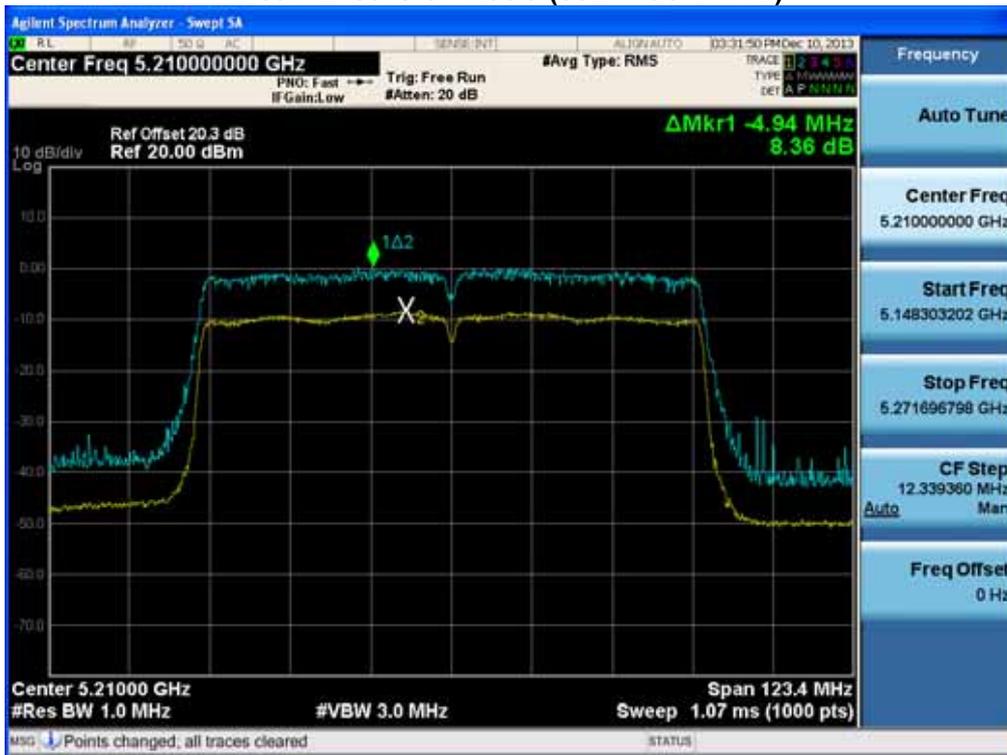


Peak Excursion Ratio (802.11ac-CH 142)



FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID	FCC ID: ZNFD956

Peak Excursion Ratio (802.11ac-CH 42)

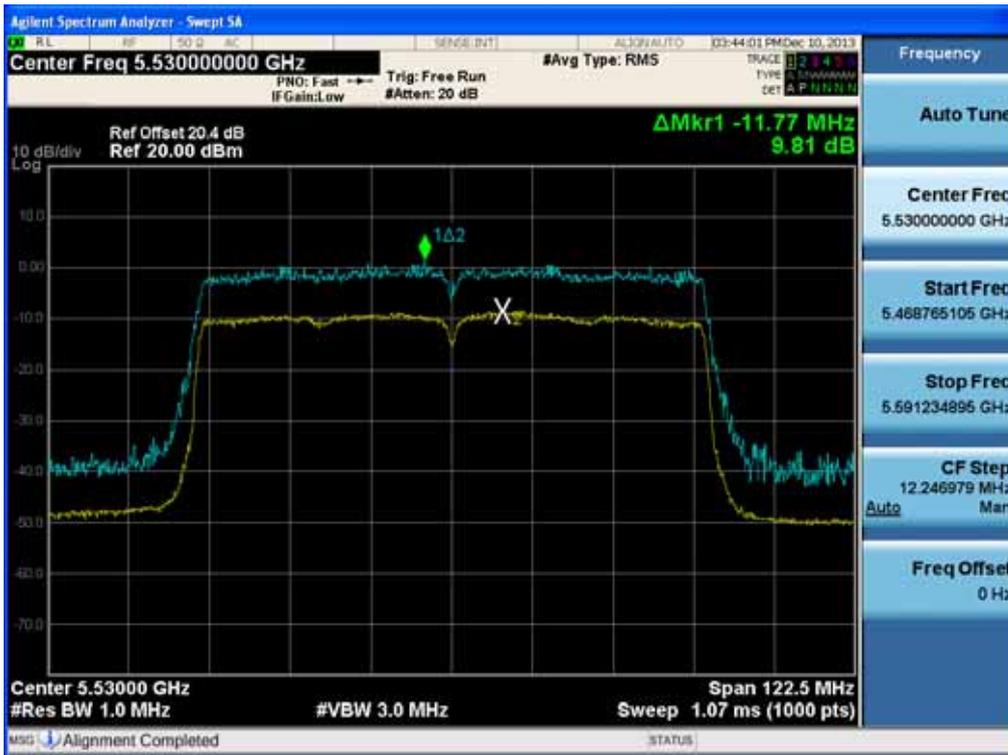


Peak Excursion Ratio (802.11ac-CH 58)

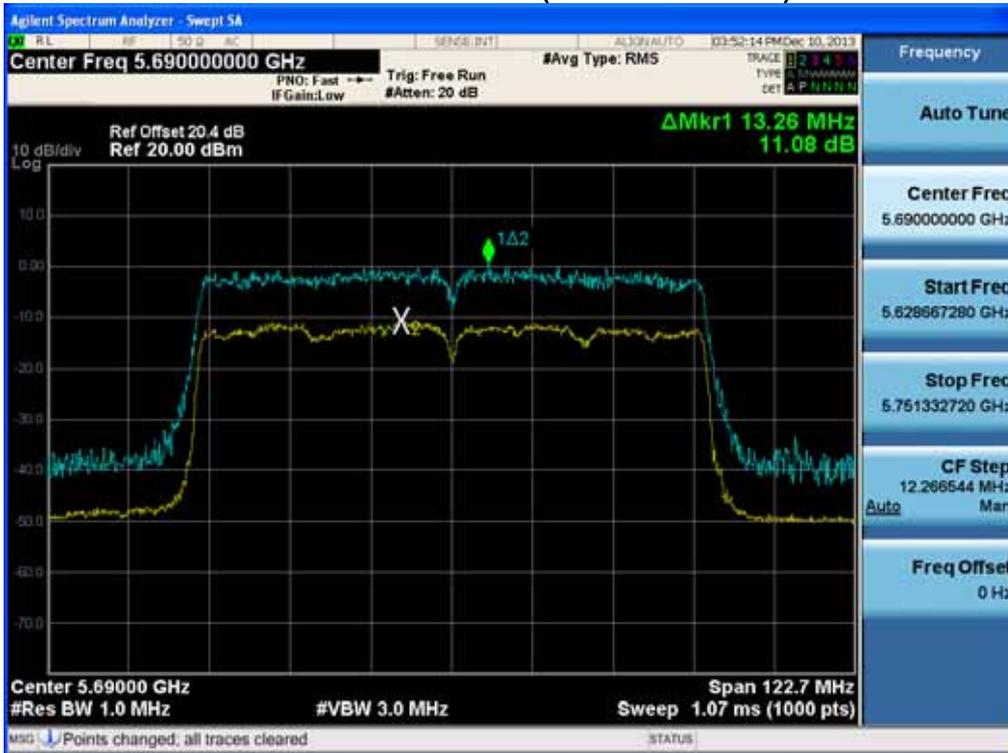


FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID	FCC ID: ZNFD956

Peak Excursion Ratio (802.11ac-CH 106)



Peak Excursion Ratio (802.11ac-CH 138)



FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
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8.6 FREQUENCY STABILITY.

The EUT was placed inside an environmental chamber as the temperature in the chamber was varied between -30 and 50 . The temperature was incremented by 10 intervals and the unit was allowed to stabilize at each temperature before each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded.

20 MHz BW

OPERATING BAND:	<u>UNII Band 1</u>
OPERATING FREQUENCY:	<u>5,180,000,000 Hz</u>
CHANNEL:	<u>36</u>
REFERENCE VOLTAGE:	<u>3.8 VDC</u>

Voltage (%)	Power (VDC)	Temp. ()	Frequency (kHz)	Frequency Error (kHz)
100%	3.80	+20(Ref)	5 180 003.98	3.98
100%		-30	5 179 993.85	-6.15
100%		-20	5 179 995.33	-4.67
100%		-10	5 179 992.89	-7.11
100%		0	5 179 997.69	-2.31
100%		+10	5 180 001.23	1.23
100%		+30	5 180 004.56	4.56
100%		+40	5 179 999.64	-0.36
100%		+50	5 179 995.44	-4.56
115%		4.37	+20	5 180 006.33
Batt. Endpoint	3.50	+20	5 180 004.56	4.56

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.



OPERATING BAND: UNII Band 2
 OPERATING FREQUENCY: 5,260,000,000 Hz
 CHANNEL: 52
 REFERENCE VOLTAGE: 3.8 VDC

Voltage (%)	Power (VDC)	Temp. ()	Frequency (kHz)	Frequency Error (kHz)
100%	3.80	+20(Ref)	5 260 006.46	6.46
100%		-30	5 259 994.88	-5.12
100%		-20	5 259 993.88	-6.12
100%		-10	5 259 995.06	-4.94
100%		0	5 259 998.33	-1.67
100%		+10	5 260 000.88	0.88
100%		+30	5 260 003.10	3.1
100%		+40	5 259 997.22	-2.78
100%		+50	5 259 995.31	-4.69
115%		4.37	+20	5 260 004.21
Batt. Endpoint	3.50	+20	5 260 005.89	5.89

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

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OPERATING BAND: UNII Band 3
 OPERATING FREQUENCY: 5,500,000,000 Hz
 CHANNEL: 100
 REFERENCE VOLTAGE: 3.8 VDC

Voltage (%)	Power (VDC)	Temp. ()	Frequency (kHz)	Frequency Error (kHz)
100%	3.80	+20(Ref)	5 500 001.46	1.46
100%		-30	5 499 998.36	-1.64
100%		-20	5 499 994.36	-5.64
100%		-10	5 499 995.87	-4.13
100%		0	5 499 997.67	-2.33
100%		+10	5 500 000.87	0.87
100%		+30	5 500 002.11	2.11
100%		+40	5 499 996.83	-3.17
100%		+50	5 499 996.01	-3.99
115%	4.37	+20	5 500 003.67	3.67
Batt. Endpoint	3.50	+20	5 500 004.58	4.58

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

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40 MHz BW

OPERATING BAND: UNII Band 1
 OPERATING FREQUENCY: 5,190,000,000 Hz
 CHANNEL: 38
 REFERENCE VOLTAGE: 3.8 VDC

Voltage (%)	Power (VDC)	Temp. ()	Frequency (kHz)	Frequency Error (kHz)
100%	3.80	+20(Ref)	5 190 001.65	1.65
100%		-30	5 189 997.44	-2.56
100%		-20	5 189 995.79	-4.21
100%		-10	5 189 996.67	-3.33
100%		0	5 189 998.46	-1.54
100%		+10	5 190 002.34	2.34
100%		+30	5 190 001.89	1.89
100%		+40	5 189 996.86	-3.14
100%		+50	5 189 996.32	-3.68
115%		4.37	+20	5 190 004.12
Batt. Endpoint	3.50	+20	5 190 004.38	4.38

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
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OPERATING BAND: UNII Band 2
 OPERATING FREQUENCY: 5,270,000,000 Hz
 CHANNEL: 54
 REFERENCE VOLTAGE: 3.8 VDC

Voltage (%)	Power (VDC)	Temp. ()	Frequency (kHz)	Frequency Error (kHz)
100%	3.80	+20(Ref)	5 270 002.13	2.13
100%		-30	5 269 997.36	-2.64
100%		-20	5 269 996.43	-3.57
100%		-10	5 269 995.03	-4.97
100%		0	5 269 997.66	-2.34
100%		+10	5 270 004.18	4.18
100%		+30	5 270 003.54	3.54
100%		+40	5 269 997.22	-2.78
100%		+50	5 269 996.36	-3.64
115%	4.37	+20	5 270 005.56	5.56
Batt. Endpoint	3.50	+20	5 270 002.45	2.45

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT		www.hct.co.kr
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OPERATING BAND: UNII Band 3
 OPERATING FREQUENCY: 5,510,000,000 Hz
 CHANNEL: 102
 REFERENCE VOLTAGE: 3.8 VDC

Voltage (%)	Power (VDC)	Temp. ()	Frequency (kHz)	Frequency Error (kHz)
100%	3.80	+20(Ref)	5 510 002.45	2.45
100%		-30	5 510 001.34	1.34
100%		-20	5 509 997.36	-2.64
100%		-10	5 509 996.41	-3.59
100%		0	5 509 997.52	-2.48
100%		+10	5 510 006.31	6.31
100%		+30	5 510 008.15	8.15
100%		+40	5 510 003.49	3.49
100%		+50	5 510 002.61	2.61
115%		4.37	+20	5 510 007.21
Batt. Endpoint	3.50	+20	5 510 005.64	5.64

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

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80 MHz BW

OPERATING BAND: UNII Band 1
 OPERATING FREQUENCY: 5,210,000,000 Hz
 CHANNEL: 42
 REFERENCE VOLTAGE: 3.8 VDC

Voltage (%)	Power (VDC)	Temp. ()	Frequency (kHz)	Frequency Error (kHz)
100%	3.80	+20(Ref)	5 210 006.45	6.45
100%		-30	5 209 998.66	-1.34
100%		-20	5 209 997.55	-2.45
100%		-10	5 209 995.84	-4.16
100%		0	5 209 999.85	-0.15
100%		+10	5 210 002.54	2.54
100%		+30	5 209 996.86	-3.14
100%		+40	5 209 994.88	-5.12
100%		+50	5 210 002.86	2.86
115%	4.37	+20	5 210 003.12	3.12
Batt. Endpoint	3.50	+20	5 210 003.45	3.45

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.



OPERATING BAND: UNII Band 2
 OPERATING FREQUENCY: 5,290,000,000 Hz
 CHANNEL: 52
 REFERENCE VOLTAGE: 3.8 VDC

Voltage (%)	Power (VDC)	Temp. ()	Frequency (kHz)	Frequency Error (kHz)
100%	3.80	+20(Ref)	5 290 002.31	2.31
100%		-30	5 289 997.78	-2.22
100%		-20	5 289 993.85	-6.15
100%		-10	5 289 996.79	-3.21
100%		0	5 289 999.11	-0.89
100%		+10	5 290 002.51	2.51
100%		+30	5 290 003.94	3.94
100%		+40	5 290 001.09	1.09
100%		+50	5 290 002.37	2.37
115%		4.37	+20	5 290 006.84
Batt. Endpoint	3.50	+20	5 290 003.65	3.65

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

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OPERATING BAND: UNII Band 3
 OPERATING FREQUENCY: 5,530,000,000 Hz
 CHANNEL: 100
 REFERENCE VOLTAGE: 3.8 VDC

Voltage (%)	Power (VDC)	Temp. ()	Frequency (kHz)	Frequency Error (kHz)
100%	3.80	+20(Ref)	5 530 001.36	1.36
100%		-30	5 529 996.36	-3.64
100%		-20	5 529 997.42	-2.58
100%		-10	5 529 996.81	-3.19
100%		0	5 530 000.54	0.54
100%		+10	5 530 002.39	2.39
100%		+30	5 530 004.54	4.54
100%		+40	5 530 003.84	3.84
100%		+50	5 530 002.15	2.15
115%	4.37	+20	5 530 003.18	3.18
Batt. Endpoint	3.50	+20	5 530 005.87	5.87

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

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8.7 RADIATED MEASUREMENT.

8.7.1 RADIATED SPURIOUS EMISSIONS.

Test Requirements and limit, §15.205, §15.209, §15.407

Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

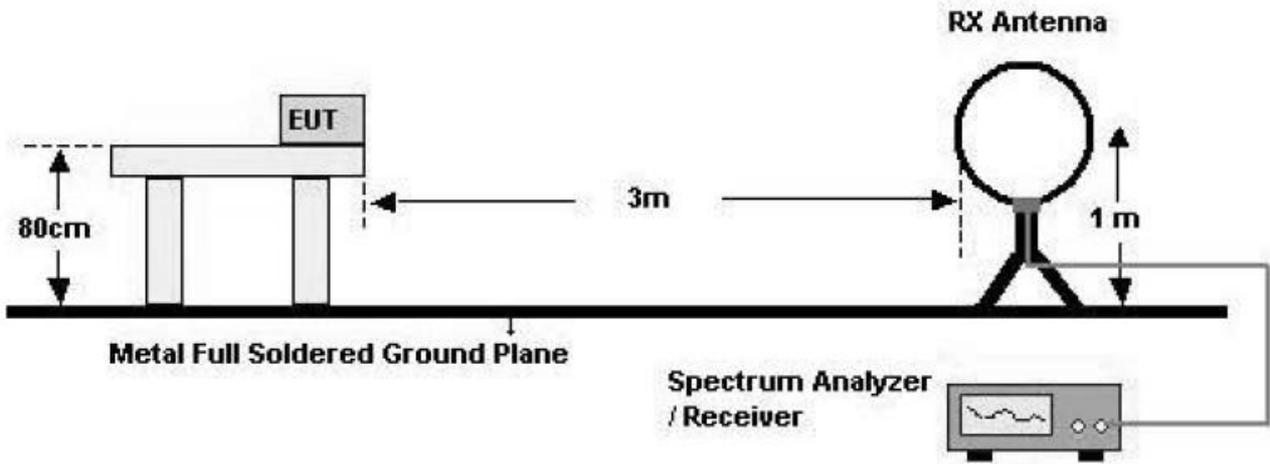
§15.407, KDB 789033

All harmonics that do not lie in a restricted band are subject to a peak limit of -27 dBm/MHz. At a distance of 3 meters the field strength limit in dBµV/m can be determined by adding a “conversion” factor of 95.2 dB to the EIRP limit of -27 dBm/MHz to obtain the limit for out of band spurious emissions of 68.2 dBµV/m.

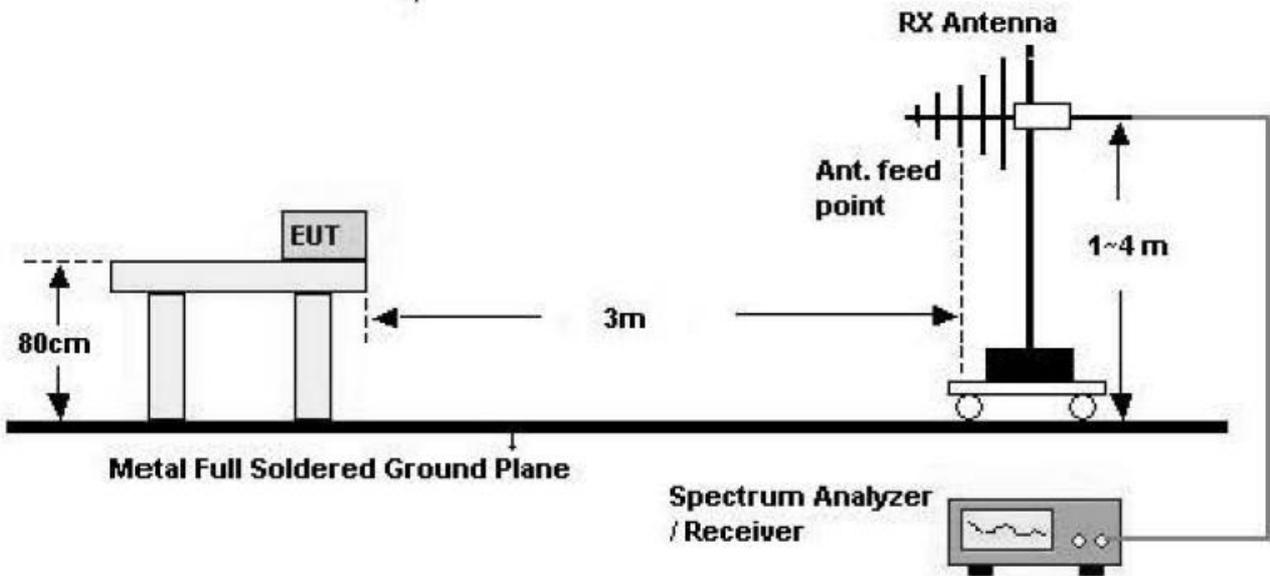
FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT		www.hct.co.kr
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Test Configuration

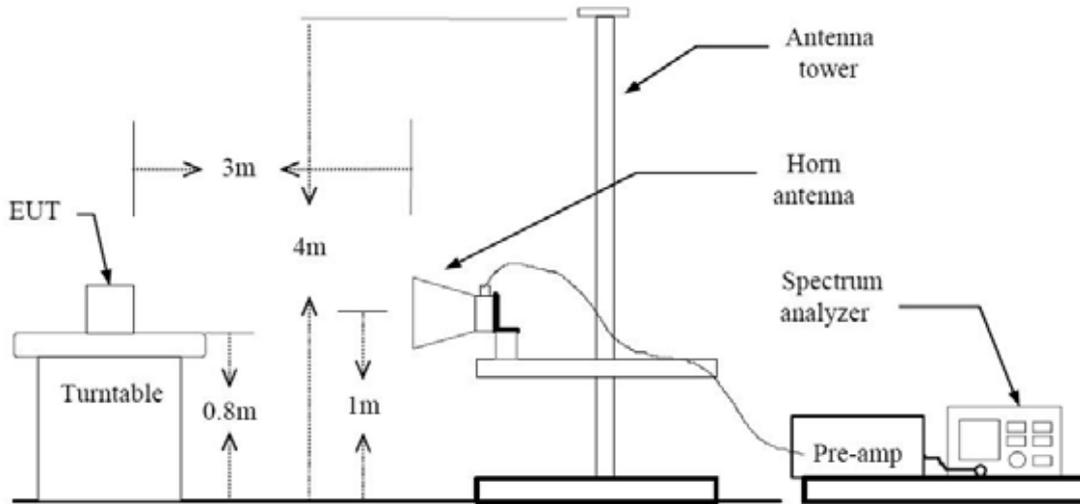
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



TEST PROCEDURE USED

ANSI C63.4(2003)

Method H)5) in KDB 789033, issued 04/08/2013 (Peak)

Method H)6)d) in KDB 789033, issued 04/08/2013 (Average)

. Spectrum setting:

- Peak.

1. RBW = 1 MHz
2. VBW \geq 3 MHz
3. Detector = Peak
4. Sweep Time = auto
5. Trace mode = max hold
6. Allow sweeps to continue until the trace stabilizes.
7. Note that if the transmission is not continuous, the time required for the trace to stabilize will increase by a factor of approximately 1/x, where x is the duty cycle.

- Average (Method VB :Averaging using reduced video bandwidth)

1. RBW = 1 MHz
2. VBW
 - 2.1. If the EUT is configured to transmit with duty cycle \geq 98 percent, set VBW \leq RBW/100(i.e., 10 kHz) but not less than 10 Hz.
 - 2.2. If the EUT duty cycle is < 98 percent, set VBW \geq 1/T, where T is the minimum transmission duration.
3. The analyzer is set to linear detector mode.
4. Detector = Peak.

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5. Sweep time = auto.
6. Trace mode = max hold.
7. Allow max hold to run for at least 50 traces if the transmitted signal is continuous or has at least 98 percent duty cycle. For lower duty cycles, increase the minimum number of traces by a factor of 1/x, where x is the duty cycle.

Note :

1. We used the case 2 for 802.11a/n_20/n_40/ac_20/ac_40/ac_80 to perform the average field strength measurements for RSE and radiated band edge test.
2. The actual setting value of VBW for 802.11a/n_20/n_40/ac_20/ac_40/ac_80.
3. We applied the 15.407 for Ch.144, 142 and 138 in 802.11ac according to KDB 644545 D01 v01r01.

Mode	Worst Data rate (Mbps)	T _{on} (ms)	T _{total} (ms)	Duty Cycle (%)	VBW(1/T) (Hz)	The actual setting value of VBW (Hz)
a	6	2.057	2.170	94.79	486	1000
n_20	6.5	1.915	2.020	94.80	522	1000
n_40	13.5	0.942	1.044	90.23	1062	3000
ac_20	6.5	1.925	2.030	94.83	519	1000
ac_40	13.5	0.942	1.050	89.71	1062	3000
ac_80	29.3	0.458	0.559	81.93	2183	3000



TEST RESULTS

9 kHz – 30MHz

Operation Mode: Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dB μ V	dB /m	dB	(H/V)	dB μ V/m	dB μ V/m	dB
No Critical peaks found							

Notes:

1. Measuring frequencies from 9 kHz to the 30MHz.
2. The reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.
3. Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB)
4. Limit line = specific Limits (dB μ V) + Distance extrapolation factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

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TEST RESULTS

Below 1 GHz

Operation Mode: Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dB μ V	dB /m	dB	(H/V)	dB μ V/m	dB μ V/m	dB
No Critical peaks found							

Notes:

1. Measuring frequencies from 30 MHz to the 1 GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Quasi peak detector mode.
3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

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Above 1 GHz

Band : UNII 1
 Operation Mode: 802.11 a
 Transfer Rate: 6 Mbps
 Operating Frequency 5180 MHz
 Channel No. 36 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10360	40.34	9.33	V	49.67	68.20	18.53	PK
15540	45.06	14.61	V	59.67	73.98	14.31	PK
15540	31.51	14.61	V	46.12	53.98	7.86	AV
10360	40.28	9.33	H	49.61	68.20	18.59	PK
15540	45.29	14.61	H	59.90	73.98	14.08	PK
15540	31.34	14.61	H	45.95	53.98	8.03	AV

Band : UNII 1
 Operation Mode: 802.11 a
 Transfer Rate: 6 Mbps
 Operating Frequency 5200 MHz
 Channel No. 40 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10400	40.32	10.13	V	50.45	68.20	17.75	PK
15600	44.70	14.60	V	59.30	73.98	14.68	PK
15600	31.51	14.60	V	46.11	53.98	7.87	AV
10400	40.06	10.13	H	50.19	68.20	18.01	PK
15600	44.98	14.60	H	59.58	73.98	14.40	PK
15600	31.62	14.60	H	46.22	53.98	7.76	AV



Band :	UNII 1
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5240 MHz
Channel No.	48 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10480	39.65	10.20	V	49.85	68.20	18.35	PK
15720	46.62	13.47	V	60.09	73.98	13.89	PK
15720	32.62	13.47	V	46.09	53.98	7.89	AV
10480	40.34	10.20	H	50.54	68.20	17.66	PK
15720	46.41	13.47	H	59.88	73.98	14.10	PK
15720	32.86	13.47	H	46.33	53.98	7.65	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11a. Worst case is 6 Mbps in 802.11a.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna

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Band : UNII 1
 Operation Mode: 802.11 n_20 MHz BW
 Transfer Rate: 6.5 Mbps
 Operating Frequency 5180 MHz
 Channel No. 36 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10360	41.28	9.33	V	50.61	68.20	17.59	PK
15540	46.88	14.61	V	61.49	73.98	12.49	PK
15540	32.37	14.61	V	46.98	53.98	7.00	AV
10360	40.59	9.33	H	49.92	68.20	18.28	PK
15540	45.26	14.61	H	59.87	73.98	14.11	PK
15540	32.45	14.61	H	47.06	53.98	6.92	AV

Band : UNII 1
 Operation Mode: 802.11 n_20 MHz BW
 Transfer Rate: 6.5 Mbps
 Operating Frequency 5200 MHz
 Channel No. 40 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10400	40.47	10.13	V	50.60	68.20	17.60	PK
15600	44.98	14.60	V	59.58	73.98	14.40	PK
15600	31.62	14.60	V	46.22	53.98	7.76	AV
10400	40.01	10.13	H	50.14	68.20	18.06	PK
15600	44.39	14.60	H	58.99	73.98	14.99	PK
15600	31.47	14.60	H	46.07	53.98	7.91	AV



Band :	UNII 1
Operation Mode:	802.11 n_20 MHz BW
Transfer Rate:	6.5 Mbps
Operating Frequency	5240 MHz
Channel No.	48 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10480	39.94	10.20	V	50.14	68.20	18.06	PK
15720	46.44	13.47	V	59.91	73.98	14.07	PK
15720	32.70	13.47	V	46.17	53.98	7.81	AV
10480	40.28	10.20	H	50.48	68.20	17.72	PK
15720	46.52	13.47	H	59.99	73.98	13.99	PK
15720	32.91	13.47	H	46.38	53.98	7.60	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11n_20 MHz BW. Worst case is 6.5 Mbps in 802.11n_20 MHz BW.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID		FCC ID: ZNFD956



Band : UNII 1
 Operation Mode: 802.11 ac_20 MHz BW
 Transfer Rate: 6.5 Mbps
 Operating Frequency 5180 MHz
 Channel No. 36 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10360	41.22	9.33	V	50.55	68.20	17.65	PK
15540	46.85	14.61	V	61.46	73.98	12.52	PK
15540	32.36	14.61	V	46.97	53.98	7.01	AV
10360	40.50	9.33	H	49.83	68.20	18.37	PK
15540	45.23	14.61	H	59.84	73.98	14.14	PK
15540	32.41	14.61	H	47.02	53.98	6.96	AV

Band : UNII 1
 Operation Mode: 802.11 ac_20 MHz BW
 Transfer Rate: 6.5 Mbps
 Operating Frequency 5200 MHz
 Channel No. 40 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10400	40.39	10.13	V	50.52	68.20	17.68	PK
15600	44.96	14.60	V	59.56	73.98	14.42	PK
15600	31.60	14.60	V	46.20	53.98	7.78	AV
10400	39.96	10.13	H	50.09	68.20	18.11	PK
15600	44.38	14.60	H	58.98	73.98	15.00	PK
15600	31.44	14.60	H	46.04	53.98	7.94	AV



Band :	UNII 1
Operation Mode:	802.11 ac_20 MHz BW
Transfer Rate:	6.5 Mbps
Operating Frequency	5240 MHz
Channel No.	48 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10480	39.90	10.20	V	50.10	68.20	18.10	PK
15720	46.40	13.47	V	59.87	73.98	14.11	PK
15720	32.68	13.47	V	46.15	53.98	7.83	AV
10480	40.23	10.20	H	50.43	68.20	17.77	PK
15720	46.48	13.47	H	59.95	73.98	14.03	PK
15720	32.88	13.47	H	46.35	53.98	7.63	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11ac_20 MHz BW. Worst case is 6.5 Mbps in 802.11ac_20 MHz BW.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID		FCC ID: ZNF0956



Band : UNII 1
 Operation Mode: 802.11n_40 MHz BW
 Transfer Rate: 13.5 Mbps
 Operating Frequency 5190 MHz
 Channel No. 38 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10380	41.21	9.70	V	50.91	68.20	17.29	PK
15570	46.75	14.62	V	61.37	73.98	12.61	PK
15570	32.33	14.62	V	46.95	53.98	7.03	AV
10380	40.46	9.70	H	50.16	68.20	18.04	PK
15570	45.19	14.62	H	59.81	73.98	14.17	PK
15570	32.38	14.62	H	47.00	53.98	6.98	AV

Band : UNII 1
 Operation Mode: 802.11n_40 MHz BW
 Transfer Rate: 13.5 Mbps
 Operating Frequency 5230 MHz
 Channel No. 46 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10460	40.05	10.26	V	50.31	68.20	17.89	PK
15690	46.35	14.33	V	60.68	73.98	13.30	PK
15690	32.59	14.33	V	46.92	53.98	7.06	AV
10460	40.11	10.26	H	50.37	68.20	17.83	PK
15690	46.42	14.33	H	60.75	73.98	13.23	PK
15690	32.84	14.33	H	47.17	53.98	6.81	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.

FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID		FCC ID: ZNFD956



- 4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
- 5. We have done all data rate in 802.11n_40 MHz BW. Worst case is 13.5 Mbps in 802.11n_40 MHz BW.
- 6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID	FCC ID: ZNFD956



Band : UNII 1
 Operation Mode: 802.11ac_40 MHz BW
 Transfer Rate: 13.5 Mbps
 Operating Frequency 5190 MHz
 Channel No. 38 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10380	41.19	9.70	V	50.89	68.20	17.31	PK
15570	46.64	14.62	V	61.26	73.98	12.72	PK
15570	32.39	14.62	V	47.01	53.98	6.97	AV
10380	40.64	9.70	H	50.34	68.20	17.86	PK
15570	45.26	14.62	H	59.88	73.98	14.10	PK
15570	32.33	14.62	H	46.95	53.98	7.03	AV

Band : UNII 1
 Operation Mode: 802.11ac_40 MHz BW
 Transfer Rate: 6.5 Mbps
 Operating Frequency 5230 MHz
 Channel No. 46 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10460	40.29	10.26	V	50.55	68.20	17.65	PK
15690	46.55	14.33	V	60.88	73.98	13.10	PK
15690	32.61	14.33	V	46.94	53.98	7.04	AV
10460	40.08	10.26	H	50.34	68.20	17.86	PK
15690	46.31	14.33	H	60.64	73.98	13.34	PK
15690	32.74	14.33	H	47.07	53.98	6.91	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.

FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID		FCC ID: ZNFD956



- 4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
- 5. We have done all data rate in 802.11ac_40 MHz BW. Worst case is 13.5 Mbps in 802.11ac_40 MHz BW.
- 6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID	FCC ID: ZNFD956



Band :	UNII 1
Operation Mode:	802.11ac_80 MHz BW
Transfer Rate:	29.3 Mbps
Operating Frequency	5210 MHz
Channel No.	42 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10420	41.23	10.43	V	51.66	68.20	16.54	PK
15630	46.51	14.15	V	60.66	73.98	13.32	PK
15630	32.41	14.15	V	46.56	53.98	7.42	AV
10420	40.81	10.43	H	51.24	68.20	16.96	PK
15630	45.33	14.15	H	59.48	73.98	14.50	PK
15630	32.36	14.15	H	46.51	53.98	7.47	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11ac_80 MHz BW. Worst case is 29.3 Mbps in 802.11ac_80 MHz BW.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID	FCC ID: ZNFD956



Band : UNII 2
 Operation Mode: 802.11 a
 Transfer Rate: 6 Mbps
 Operating Frequency 5260 MHz
 Channel No. 52 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10520	41.43	10.38	V	51.81	68.20	16.39	PK
15780	46.79	14.38	V	61.17	73.98	12.81	PK
15780	32.40	14.38	V	46.78	53.98	7.20	AV
10520	40.66	10.38	H	51.04	68.20	17.16	PK
15780	45.46	14.38	H	59.84	73.98	14.14	PK
15780	32.54	14.38	H	46.92	53.98	7.06	AV

Band : UNII 2
 Operation Mode: 802.11 a
 Transfer Rate: 6 Mbps
 Operating Frequency 5300 MHz
 Channel No. 60 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10600	39.80	10.39	V	50.19	73.98	23.79	PK
10600	26.29	10.39	V	36.68	53.98	17.30	AV
15900	44.22	14.00	V	58.22	73.98	15.76	PK
15900	31.06	14.00	V	45.06	53.98	8.92	AV
10600	39.42	10.39	H	49.81	73.98	24.17	PK
10600	26.20	10.39	H	36.59	53.98	17.39	AV
15900	44.34	14.00	H	58.34	73.98	15.64	PK
15900	31.21	14.00	H	45.21	53.98	8.77	AV



Band :	UNII 2
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5320 MHz
Channel No.	64 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10640	39.58	10.50	V	50.08	73.98	23.90	PK
10640	26.22	10.50	V	36.72	53.98	17.26	AV
15960	43.88	14.27	V	58.15	73.98	15.83	PK
15960	30.66	14.27	V	44.93	53.98	9.05	AV
10640	39.02	10.50	H	49.52	73.98	24.46	PK
10640	26.17	10.50	H	36.67	53.98	17.31	AV
15960	44.17	14.27	H	58.44	73.98	15.54	PK
15960	30.79	14.27	H	45.06	53.98	8.92	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11a. Worst case is 6 Mbps in 802.11a.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID		FCC ID: ZNFD956



Band : UNII 2
 Operation Mode: 802.11 n_20 MHz BW
 Transfer Rate: 6.5 Mbps
 Operating Frequency 5260 MHz
 Channel No. 52 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10520	41.62	10.38	V	52.00	68.20	16.20	PK
15780	46.77	14.38	V	61.15	73.98	12.83	PK
15780	32.61	14.38	V	46.99	53.98	6.99	AV
10520	40.51	10.38	H	50.89	68.20	17.31	PK
15780	45.52	14.38	H	59.90	73.98	14.08	PK
15780	32.61	14.38	H	46.99	53.98	6.99	AV

Band : UNII 2
 Operation Mode: 802.11 n_20 MHz BW
 Transfer Rate: 6.5 Mbps
 Operating Frequency 5300 MHz
 Channel No. 60 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10600	39.67	10.39	V	50.06	73.98	23.92	PK
10600	26.31	10.39	V	36.70	53.98	17.28	AV
15900	44.32	14.00	V	58.32	73.98	15.66	PK
15900	31.09	14.00	V	45.09	53.98	8.89	AV
10600	39.55	10.39	H	49.94	73.98	24.04	PK
10600	26.01	10.39	H	36.40	53.98	17.58	AV
15900	44.45	14.00	H	58.45	73.98	15.53	PK
15900	31.12	14.00	H	45.12	53.98	8.86	AV



Band :	UNII 2
Operation Mode:	802.11 n_20 MHz BW
Transfer Rate:	6.5 Mbps
Operating Frequency	5320 MHz
Channel No.	64 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10640	39.85	10.50	V	50.35	73.98	23.63	PK
10640	26.11	10.50	V	36.61	53.98	17.37	AV
15960	43.69	14.27	V	57.96	73.98	16.02	PK
15960	30.18	14.27	V	44.45	53.98	9.53	AV
10640	39.20	10.50	H	49.70	73.98	24.28	PK
10640	26.08	10.50	H	36.58	53.98	17.40	AV
15960	44.71	14.27	H	58.98	73.98	15.00	PK
15960	30.97	14.27	H	45.24	53.98	8.74	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11n_20 MHz BW. Worst case is 6.5 Mbps in 802.11n_20 MHz BW.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID		FCC ID: ZNFD956



Band : UNII 2
 Operation Mode: 802.11 ac_20 MHz BW
 Transfer Rate: 6.5 Mbps
 Operating Frequency 5260 MHz
 Channel No. 52 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10520	41.61	10.38	V	51.99	68.20	16.21	PK
15780	46.74	14.38	V	61.12	73.98	12.86	PK
15780	32.59	14.38	V	46.97	53.98	7.01	AV
10520	40.50	10.38	H	50.88	68.20	17.32	PK
15780	45.48	14.38	H	59.86	73.98	14.12	PK
15780	32.58	14.38	H	46.96	53.98	7.02	AV

Band : UNII 2
 Operation Mode: 802.11 ac_20 MHz BW
 Transfer Rate: 6.5 Mbps
 Operating Frequency 5300 MHz
 Channel No. 60 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10600	39.78	10.39	V	50.17	73.98	23.81	PK
10600	26.33	10.39	V	36.72	53.98	17.26	AV
15900	44.29	14.00	V	58.29	73.98	15.69	PK
15900	31.08	14.00	V	45.08	53.98	8.90	AV
10600	39.59	10.39	H	49.98	73.98	24.00	PK
10600	26.04	10.39	H	36.43	53.98	17.55	AV
15900	44.39	14.00	H	58.39	73.98	15.59	PK
15900	31.10	14.00	H	45.10	53.98	8.88	AV



Band :	UNII 2
Operation Mode:	802.11 ac_20 MHz BW
Transfer Rate:	6.5 Mbps
Operating Frequency	5320 MHz
Channel No.	64 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10640	39.81	10.50	V	50.31	73.98	23.67	PK
10640	26.08	10.50	V	36.58	53.98	17.40	AV
15960	43.52	14.27	V	57.79	73.98	16.19	PK
15960	30.15	14.27	V	44.42	53.98	9.56	AV
10640	39.22	10.50	H	49.72	73.98	24.26	PK
10640	26.01	10.50	H	36.51	53.98	17.47	AV
15960	44.67	14.27	H	58.94	73.98	15.04	PK
15960	30.94	14.27	H	45.21	53.98	8.77	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11ac_20 MHz BW. Worst case is 6.5 Mbps in 802.11ac_20 MHz BW.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

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Band : UNII 2
 Operation Mode: 802.11n_40 MHz BW
 Transfer Rate: 13.5 Mbps
 Operating Frequency 5270 MHz
 Channel No. 54 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10540	41.15	10.55	V	51.70	68.20	16.50	PK
15810	46.70	14.26	V	60.96	73.98	13.02	PK
15810	32.54	14.26	V	46.80	53.98	7.18	AV
10540	40.42	10.55	H	50.97	68.20	17.23	PK
15810	45.41	14.26	H	59.67	73.98	14.31	PK
15810	32.53	14.26	H	46.79	53.98	7.19	AV

Band : UNII 2
 Operation Mode: 802.11n_40 MHz BW
 Transfer Rate: 13.5 Mbps
 Operating Frequency 5310 MHz
 Channel No. 62 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10620	39.88	10.25	V	50.13	73.98	23.85	PK
10620	26.03	10.25	V	36.28	53.98	17.70	AV
15930	44.68	13.62	V	58.30	73.98	15.68	PK
15930	30.56	13.62	V	44.18	53.98	9.80	AV
10620	39.31	10.25	H	49.56	73.98	24.42	PK
10620	25.94	10.25	H	36.19	53.98	17.79	AV
15930	45.02	13.62	H	58.64	73.98	15.34	PK
15930	30.98	13.62	H	44.60	53.98	9.38	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an

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instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.

- 4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
- 5. We have done all data rate in 802.11n_40 MHz BW. Worst case is 13.5 Mbps in 802.11n_40 MHz BW.
- 6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

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Band : UNII 2
 Operation Mode: 802.11ac_40 MHz BW
 Transfer Rate: 6.5 Mbps
 Operating Frequency 5270 MHz
 Channel No. 54 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10540	41.36	10.55	V	51.91	68.20	16.29	PK
15810	46.12	14.26	V	60.38	73.98	13.60	PK
15810	32.60	14.26	V	46.86	53.98	7.12	AV
10540	40.94	10.55	H	51.49	68.20	16.71	PK
15810	45.99	14.26	H	60.25	73.98	13.73	PK
15810	32.61	14.26	H	46.87	53.98	7.11	AV

Band : UNII 2
 Operation Mode: 802.11ac_40 MHz BW
 Transfer Rate: 6.5 Mbps
 Operating Frequency 5310 MHz
 Channel No. 62 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10620	40.01	10.25	V	50.26	73.98	23.72	PK
10620	26.00	10.25	V	36.25	53.98	17.73	AV
15930	45.01	13.62	V	58.63	73.98	15.35	PK
15930	30.69	13.62	V	44.31	53.98	9.67	AV
10620	39.66	10.25	H	49.91	73.98	24.07	PK
10620	25.93	10.25	H	36.18	53.98	17.80	AV
15930	45.22	13.62	H	58.84	73.98	15.14	PK
15930	30.84	13.62	H	44.46	53.98	9.52	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an

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instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.

- 4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
- 5. We have done all data rate in 802.11ac_40 MHz BW. Worst case is 13.5 Mbps in 802.11ac_40 MHz BW.
- 6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

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Band :	UNII 2
Operation Mode:	802.11ac_80 MHz BW
Transfer Rate:	29.3 Mbps
Operating Frequency	5290 MHz
Channel No.	58 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
10580	41.45	10.42	V	51.87	68.20	16.33	PK
15870	46.35	13.96	V	60.31	73.98	13.67	PK
15870	32.77	13.96	V	46.73	53.98	7.25	AV
10580	41.22	10.42	H	51.64	68.20	16.56	PK
15870	46.03	13.96	H	59.99	73.98	13.99	PK
15870	32.51	13.96	H	46.47	53.98	7.51	AV

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11ac_80 MHz BW. Worst case is 13.5 Mbps in 802.11ac_80 MHz BW.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

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Band : UNII 2e
 Operation Mode: 802.11 a
 Transfer Rate: 6 Mbps
 Operating Frequency 5500 MHz
 Channel No. 100 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
11000	39.27	11.28	V	50.55	73.98	23.43	PK
11000	25.52	11.28	V	36.80	53.98	17.18	AV
16500	45.67	14.19	V	59.86	68.20	8.34	PK
11000	39.45	11.28	H	50.73	73.98	23.25	PK
11000	25.41	11.28	H	36.69	53.98	17.29	AV
16500	46.06	14.19	H	60.25	68.20	7.95	PK

Band : UNII 2e
 Operation Mode: 802.11 a
 Transfer Rate: 6 Mbps
 Operating Frequency 5580 MHz
 Channel No. 116 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
11160	39.20	11.10	V	50.30	73.98	23.68	PK
11160	25.26	11.10	V	36.36	53.98	17.62	AV
16740	46.02	15.70	V	61.72	68.20	6.48	PK
11160	38.34	11.10	H	49.44	73.98	24.54	PK
11160	25.31	11.10	H	36.41	53.98	17.57	AV
16740	45.04	15.70	H	60.74	68.20	7.46	PK



Band :	UNII 2e
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5720 MHz
Channel No.	144 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
11400	37.94	10.97	V	48.91	73.98	25.07	PK
11400	24.97	10.97	V	35.94	53.98	18.04	AV
17100	45.70	17.82	V	63.52	68.20	4.68	PK
11400	38.60	10.97	H	49.57	73.98	24.41	PK
11400	25.24	10.97	H	36.21	53.98	17.77	AV
17100	45.11	17.82	H	62.93	68.20	5.27	PK

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11a. Worst case is 6 Mbps in 802.11a.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

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Band : UNII 2e
 Operation Mode: 802.11 n_20 MHz BW
 Transfer Rate: 6.5 Mbps
 Operating Frequency 5500 MHz
 Channel No. 100 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
11000	39.72	11.28	V	51.00	73.98	22.98	PK
11000	25.47	11.28	V	36.75	53.98	17.23	AV
16500	45.66	14.19	V	59.85	68.20	8.35	PK
11000	39.64	11.28	H	50.92	73.98	23.06	PK
11000	25.19	11.28	H	36.47	53.98	17.51	AV
16500	46.84	14.19	H	61.03	68.20	7.17	PK

Band : UNII 2e
 Operation Mode: 802.11 n_20 MHz BW
 Transfer Rate: 6.5 Mbps
 Operating Frequency 5580 MHz
 Channel No. 116 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
11160	39.33	11.10	V	50.43	73.98	23.55	PK
11160	25.18	11.10	V	36.28	53.98	17.70	AV
16740	46.20	15.70	V	61.90	68.20	6.30	PK
11160	38.14	11.10	H	49.24	73.98	24.74	PK
11160	25.33	11.10	H	36.43	53.98	17.55	AV
16740	45.40	15.70	H	61.10	68.20	7.10	PK



Band :	UNII 2e
Operation Mode:	802.11 n_20 MHz BW
Transfer Rate:	6.5 Mbps
Operating Frequency	5720 MHz
Channel No.	144 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
11400	37.99	10.97	V	48.96	73.98	25.02	PK
11400	24.79	10.97	V	35.76	53.98	18.22	AV
17100	45.68	17.82	V	63.50	68.20	4.70	PK
11400	38.16	10.97	H	49.13	73.98	24.85	PK
11400	25.42	10.97	H	36.39	53.98	17.59	AV
17100	45.32	17.82	H	63.14	68.20	5.06	PK

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11n_20 MHz BW. Worst case is 6.5 Mbps in 802.11n_20 MHz BW.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

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Band : UNII 2e
 Operation Mode: 802.11 ac_20 MHz BW
 Transfer Rate: 6.5 Mbps
 Operating Frequency 5500 MHz
 Channel No. 100 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
11000	39.64	11.28	V	50.92	73.98	23.06	PK
11000	25.44	11.28	V	36.72	53.98	17.26	AV
16500	45.79	14.19	V	59.98	68.20	8.22	PK
11000	39.48	11.28	H	50.76	73.98	23.22	PK
11000	25.18	11.28	H	36.46	53.98	17.52	AV
16500	46.80	14.19	H	60.99	68.20	7.21	PK

Band : UNII 2e
 Operation Mode: 802.11 ac_20 MHz BW
 Transfer Rate: 6.5 Mbps
 Operating Frequency 5580 MHz
 Channel No. 116 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
11160	39.36	11.10	V	50.46	73.98	23.52	PK
11160	25.19	11.10	V	36.29	53.98	17.69	AV
16740	46.21	15.70	V	61.91	68.20	6.29	PK
11160	39.02	11.10	H	50.12	73.98	23.86	PK
11160	25.31	11.10	H	36.41	53.98	17.57	AV
16740	45.98	15.70	H	61.68	68.20	6.52	PK



Band :	UNII 2e
Operation Mode:	802.11 ac_20 MHz BW
Transfer Rate:	6.5 Mbps
Operating Frequency	5720 MHz
Channel No.	144 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
11400	37.96	10.97	V	48.93	73.98	25.05	PK
11400	24.89	10.97	V	35.86	53.98	18.12	AV
17100	45.61	17.82	V	63.43	68.20	4.77	PK
11400	38.12	10.97	H	49.09	73.98	24.89	PK
11400	25.40	10.97	H	36.37	53.98	17.61	AV
17100	45.31	17.82	H	63.13	68.20	5.07	PK

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11ac_20 MHz BW. Worst case is 6.5 Mbps in 802.11ac_20 MHz BW.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
7. We applied the 15.407 for Ch.144 in 802.11ac according to KDB 644545 D01 v01r01.

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Band : UNII 2e
 Operation Mode: 802.11n_40 MHz BW
 Transfer Rate: 13.5 Mbps
 Operating Frequency 5510 MHz
 Channel No. 102 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
11020	39.68	11.28	V	50.96	73.98	23.02	PK
11020	25.39	11.28	V	36.67	53.98	17.31	AV
16530	45.69	14.83	V	60.52	68.20	7.68	PK
11020	39.56	11.28	H	50.84	73.98	23.14	PK
11020	25.09	11.28	H	36.37	53.98	17.61	AV
16530	46.77	14.83	H	61.60	68.20	6.60	PK

Band : UNII 2e
 Operation Mode: 802.11n_40 MHz BW
 Transfer Rate: 13.5 Mbps
 Operating Frequency 5590 MHz
 Channel No. 118 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
11180	39.41	11.12	V	50.53	73.98	23.45	PK
11180	25.24	11.12	V	36.36	53.98	17.62	AV
16770	46.11	16.52	V	62.63	68.20	5.57	PK
11180	39.61	11.12	H	50.73	73.98	23.25	PK
11180	25.33	11.12	H	36.45	53.98	17.53	AV
16770	46.03	16.52	H	62.55	68.20	5.65	PK



Band :	UNII 2e
Operation Mode:	802.11n_40 MHz BW
Transfer Rate:	13.5 Mbps
Operating Frequency	5710 MHz
Channel No.	142 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
11340	38.84	10.86	V	49.70	73.98	24.28	PK
11340	24.97	10.86	V	35.83	53.98	18.15	AV
17010	45.77	18.15	V	63.92	68.20	4.28	PK
11340	39.01	10.86	H	49.87	73.98	24.11	PK
11340	25.33	10.86	H	36.19	53.98	17.79	AV
17010	45.33	18.15	H	63.48	68.20	4.72	PK

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11n_40 MHz BW. Worst case is 13.5 Mbps in 802.11n_40 MHz BW.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

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Band : UNII 2e
 Operation Mode: 802.11ac_40 MHz BW
 Transfer Rate: 6.5 Mbps
 Operating Frequency 5510 MHz
 Channel No. 102 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
11020	39.77	11.28	V	51.05	73.98	22.93	PK
11020	25.30	11.28	V	36.58	53.98	17.40	AV
16530	45.99	14.83	V	60.82	68.20	7.38	PK
11020	39.60	11.28	H	50.88	73.98	23.10	PK
11020	25.12	11.28	H	36.40	53.98	17.58	AV
16530	46.54	14.83	H	61.37	68.20	6.83	PK

Band : UNII 2e
 Operation Mode: 802.11ac_40 MHz BW
 Transfer Rate: 6.5 Mbps
 Operating Frequency 5590 MHz
 Channel No. 118 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
11180	39.51	11.12	V	50.63	73.98	23.35	PK
11180	25.30	11.12	V	36.42	53.98	17.56	AV
16770	46.23	16.52	V	62.75	68.20	5.45	PK
11180	39.70	11.12	H	50.82	73.98	23.16	PK
11180	25.41	11.12	H	36.53	53.98	17.45	AV
16770	46.11	16.52	H	62.63	68.20	5.57	PK



Band :	UNII 2e
Operation Mode:	802.11ac_40 MHz BW
Transfer Rate:	6.5 Mbps
Operating Frequency	5710 MHz
Channel No.	142 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
11420	39.22	10.73	V	49.95	73.98	24.03	PK
11420	25.01	10.73	V	35.74	53.98	18.24	AV
17130	45.88	18.11	V	63.99	68.20	4.21	PK
11420	39.63	10.73	H	50.36	73.98	23.62	PK
11420	25.30	10.73	H	36.03	53.98	17.95	AV
17130	45.69	18.11	H	63.80	68.20	4.40	PK

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. We have done all data rate in 802.11ac_40 MHz BW. Worst case is 13.5 Mbps in 802.11ac_40 MHz BW.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
7. We applied the 15.407 for Ch.142 in 802.11ac according to KDB 644545 D01 v01r01.

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Band : UNII 2e
 Operation Mode: 802.11ac_80 MHz BW
 Transfer Rate: 6.5 Mbps
 Operating Frequency 5530 MHz
 Channel No. 106 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
11060	39.71	11.48	V	51.19	73.98	22.79	PK
11060	25.12	11.48	V	36.60	53.98	17.38	AV
16590	46.35	14.42	V	60.77	68.20	7.43	PK
11060	39.60	11.48	H	51.08	73.98	22.90	PK
11060	25.15	11.48	H	36.63	53.98	17.35	AV
16590	46.89	14.42	H	61.31	68.20	6.89	PK

Band : UNII 2e
 Operation Mode: 802.11ac_80 MHz BW
 Transfer Rate: 6.5 Mbps
 Operating Frequency 5690 MHz
 Channel No. 138 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
11380	39.51	11.05	V	50.56	73.98	23.42	PK
11380	25.09	11.05	V	36.14	53.98	17.84	AV
17070	46.03	18.08	V	64.11	68.20	4.09	PK
11380	39.97	11.05	H	51.02	73.98	22.96	PK
11380	25.29	11.05	H	36.34	53.98	17.64	AV
17070	45.96	18.08	H	64.04	68.20	4.16	PK

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 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.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.

FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID		FCC ID: ZNFD956



- 4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
- 5. We have done all data rate in 802.11ac_80 MHz BW. Worst case is 13.5 Mbps in 802.11ac_80 MHz BW.
- 6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna
- 7. We applied the 15.407 for Ch.138 in 802.11ac according to KDB 644545 D01 v01r01.

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID	FCC ID: ZNFD956



8.7.2 RADIATED RESTRICTED BAND EDGE MEASUREMENTS

Test Requirements and limit, §15.247(d) §15.205, §15.209

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in section 15.209(a) (See section 15.205(c)).

Band :	UNII 1
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5180 MHz
Channel No.	36 Ch

Frequency [MHz]	Reading dBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
5150	60.82	-0.51	H	60.31	73.98	13.67	PK
5150	45.66	-0.51	H	45.15	53.98	8.83	AV
5150	60.35	-0.51	V	59.84	73.98	14.14	PK
5150	44.71	-0.51	V	44.20	53.98	9.78	AV

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID	FCC ID: ZNFD956



Band : UNII 1
 Operation Mode: 802.11 n_20 MHz BW
 Transfer Rate: 6.5 Mbps
 Operating Frequency 5180 MHz
 Channel No. 36 Ch

Frequency [MHz]	Reading dBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
5150	66.34	-0.51	H	65.83	73.98	8.15	PK
5150	45.25	-0.51	H	44.74	53.98	9.24	AV
5150	66.28	-0.51	V	65.77	73.98	8.21	PK
5150	45.11	-0.51	V	44.60	53.98	9.38	AV

Band : UNII 1
 Operation Mode: 802.11 ac_20 MHz BW
 Transfer Rate: 6.5 Mbps
 Operating Frequency 5180 MHz
 Channel No. 36 Ch

Frequency [MHz]	Reading dBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
5150	64.77	-0.51	H	64.26	73.98	9.72	PK
5150	44.51	-0.51	H	44.00	53.98	9.98	AV
5150	64.71	-0.51	V	64.20	73.98	9.78	PK
5150	44.25	-0.51	V	43.74	53.98	10.24	AV



Band : UNII 1
 Operation Mode: 802.11n_40 MHz BW
 Transfer Rate: 13.5 Mbps
 Operating Frequency 5190 MHz
 Channel No. 38 Ch

Frequency [MHz]	Reading dBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
5150	68.97	-0.51	H	68.46	73.98	5.52	PK
5150	46.82	-0.51	H	46.31	53.98	7.67	AV
5150	68.92	-0.51	V	68.41	73.98	5.57	PK
5150	46.75	-0.51	V	46.24	53.98	7.74	AV

Band : UNII 1
 Operation Mode: 802.11 ac_40 MHz BW
 Transfer Rate: 13.5 Mbps
 Operating Frequency 5190 MHz
 Channel No. 38 Ch

Frequency [MHz]	Reading dBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
5150	65.44	-0.51	H	64.93	73.98	9.05	PK
5150	46.11	-0.51	H	45.60	53.98	8.38	AV
5150	65.32	-0.51	V	64.81	73.98	9.17	PK
5150	46.02	-0.51	V	45.51	53.98	8.47	AV



Band : UNII 1
 Operation Mode: 802.11 ac_80 MHz BW
 Transfer Rate: 29.3 Mbps
 Operating Frequency 5210 MHz
 Channel No. 42 Ch

Frequency [MHz]	Reading dBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
5150	69.64	-0.51	H	69.13	73.98	4.85	PK
5150	48.45	-0.51	H	47.94	53.98	6.04	AV
5150	69.51	-0.51	V	69.00	73.98	4.98	PK
5150	48.28	-0.51	V	47.77	53.98	6.21	AV

Notes:

1. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + ATT
2. We have done all data rate in 802.11a/n/ac mode test. . Worst case of EUT is lowest data rate in 802.11a/n/ac
3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.



Band : UNII 2
 Operation Mode: 802.11 a
 Transfer Rate: 6 Mbps
 Operating Frequency 5320 MHz
 Channel No. 64 Ch

Frequency [MHz]	Reading dBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
5350	55.02	-0.19	H	54.83	73.98	19.15	PK
5350	41.12	-0.19	H	40.93	53.98	13.05	AV
5350	56.46	-0.19	V	56.27	73.98	17.71	PK
5350	42.09	-0.19	V	41.90	53.98	12.08	AV

Band : UNII 2
 Operation Mode: 802.11 n_20 MHz BW
 Transfer Rate: 6 Mbps
 Operating Frequency 5320 MHz
 Channel No. 64 Ch

Frequency [MHz]	Reading dBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
5350	57.61	-0.19	H	57.42	73.98	16.56	PK
5350	41.83	-0.19	H	41.64	53.98	12.34	AV
5350	57.66	-0.19	V	57.47	73.98	16.51	PK
5350	41.88	-0.19	V	41.69	53.98	12.29	AV



Band : UNII 2
 Operation Mode: 802.11 ac_20 MHz BW
 Transfer Rate: 6.5 Mbps
 Operating Frequency 5320 MHz
 Channel No. 62 Ch

Frequency [MHz]	Reading dBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
5350	59.01	-0.19	H	58.82	73.98	15.16	PK
5350	41.59	-0.19	H	41.40	53.98	12.58	AV
5350	59.09	-0.19	V	58.90	73.98	15.08	PK
5350	41.68	-0.19	V	41.49	53.98	12.49	AV

Band : UNII 2
 Operation Mode: 802.11n_40 MHz BW
 Transfer Rate: 13.5 Mbps
 Operating Frequency 5310 MHz
 Channel No. 62 Ch

Frequency [MHz]	Reading dBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
5350	57.88	-0.19	H	57.69	73.98	16.29	PK
5350	42.22	-0.19	H	42.03	53.98	11.95	AV
5350	58.02	-0.19	V	57.83	73.98	16.15	PK
5350	42.39	-0.19	V	42.20	53.98	11.78	AV



Band : UNII 2
 Operation Mode: 802.11 ac_40 MHz BW
 Transfer Rate: 13.5 Mbps
 Operating Frequency 5310 MHz
 Channel No. 62 Ch

Frequency [MHz]	Reading dBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
5350	57.97	-0.19	H	57.78	73.98	16.20	PK
5350	42.16	-0.19	H	41.97	53.98	12.01	AV
5350	58.06	-0.19	V	57.87	73.98	16.11	PK
5350	42.31	-0.19	V	42.12	53.98	11.86	AV

Band : UNII 2
 Operation Mode: 802.11 ac_80 MHz BW
 Transfer Rate: 29.3 Mbps
 Operating Frequency 5290 MHz
 Channel No. 58 Ch

Frequency [MHz]	Reading dBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
5350	61.47	-0.19	H	61.28	73.98	12.70	PK
5350	43.27	-0.19	H	43.08	53.98	10.90	AV
5350	61.57	-0.19	V	61.38	73.98	12.60	PK
5350	43.41	-0.19	V	43.22	53.98	10.76	AV

Notes:

1. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + ATT
2. We have done all data rate in 802.11a/n/ac mode test. . Worst case of EUT is lowest data rate in 802.11a/n/ac
3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.



Band : UNII 2e
 Operation Mode: 802.11 a
 Transfer Rate: 6 Mbps
 Operating Frequency 5500 MHz
 Channel No. 100 Ch

Frequency [MHz]	Reading DBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
5460	54.81	0.38	H	55.19	73.98	18.79	PK
5460	40.74	0.38	H	41.12	53.98	12.86	AV
*5470	54.44	0.24	H	54.68	68.20	13.52	PK
5460	54.78	0.38	V	55.16	73.98	18.82	PK
5460	40.28	0.38	V	40.66	53.98	13.32	AV
*5470	54.29	0.24	V	54.53	68.20	13.67	PK

Band : UNII 2e
 Operation Mode: 802.11 a
 Transfer Rate: 6 Mbps
 Operating Frequency 5700 MHz
 Channel No. 140 Ch

Frequency [MHz]	Reading DBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
*5725	61.71	1.05	H	62.76	68.20	5.45	PK
*5725	61.35	1.05	V	62.40	68.20	5.81	PK



Band : UNII 2e
 Operation Mode: 802.11 n_20 MHz BW
 Transfer Rate: 6 Mbps
 Operating Frequency 5500 MHz
 Channel No. 100 Ch

Frequency [MHz]	Reading DBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
5460	54.81	0.38	H	55.19	73.98	18.79	PK
5460	40.73	0.38	H	41.11	53.98	12.87	AV
*5470	56.67	0.24	H	56.91	68.20	11.29	PK
5460	54.75	0.38	V	55.13	73.98	18.85	PK
5460	40.51	0.38	V	40.89	53.98	13.09	AV
*5470	56.59	0.24	V	56.83	68.20	11.37	PK

Band : UNII 2e
 Operation Mode: 802.11 n_20 MHz BW
 Transfer Rate: 6.5 Mbps
 Operating Frequency 5700 MHz
 Channel No. 140 Ch

Frequency [MHz]	Reading DBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
*5725	64.05	1.05	H	65.10	68.20	3.11	PK
*5725	63.72	1.05	V	64.77	68.20	3.44	AV



Band : UNII 2e
 Operation Mode: 802.11 ac_20 MHz BW
 Transfer Rate: 6.5 Mbps
 Operating Frequency 5500 MHz
 Channel No. 100 Ch

Frequency [MHz]	Reading DBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
5460	54.27	0.38	H	54.65	73.98	19.33	PK
5460	40.54	0.38	H	40.92	53.98	13.06	AV
*5470	54.74	0.24	H	54.98	68.20	13.22	PK
5460	54.16	0.38	V	54.54	73.98	19.44	PK
5460	40.28	0.38	V	40.66	53.98	13.32	AV
*5470	54.61	0.24	V	54.85	68.20	13.35	PK

Band : UNII 2e
 Operation Mode: 802.11n_40 MHz BW
 Transfer Rate: 13.5 Mbps
 Operating Frequency 5510 MHz
 Channel No. 102 Ch

Frequency [MHz]	Reading dBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
5460	54.06	0.38	H	54.44	73.98	19.54	PK
5460	40.62	0.38	H	41.00	53.98	12.98	AV
*5470	55.11	0.24	H	55.35	68.20	12.85	PK
5460	53.94	0.38	V	54.32	73.98	19.66	PK
5460	40.39	0.38	V	40.77	53.98	13.21	AV
*5470	55.02	0.24	V	55.26	68.20	12.94	PK



Band :	UNII 2e
Operation Mode:	802.11 n_40 MHz BW
Transfer Rate:	13.5 Mbps
Operating Frequency	5670 MHz
Channel No.	134 Ch

Frequency [MHz]	Reading DBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
*5725	56.23	1.05	H	57.28	68.20	10.93	PK
*5725	56.07	1.05	V	57.12	68.20	11.09	AV

Band :	UNII 2e
Operation Mode:	802.11 ac_40 MHz BW
Transfer Rate:	13.5 Mbps
Operating Frequency	5510 MHz
Channel No.	102 Ch

Frequency [MHz]	Reading dBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
5460	54.06	0.38	H	54.44	73.98	19.54	PK
5460	40.63	0.38	H	41.01	53.98	12.97	AV
*5470	55.19	0.24	H	55.43	68.20	12.77	PK
5460	53.89	0.38	V	54.27	73.98	19.71	PK
5460	40.55	0.38	V	40.93	53.98	13.05	AV
*5470	55.02	0.24	V	55.26	68.20	12.94	PK



Band :	UNII 2e
Operation Mode:	802.11 ac_80 MHz BW
Transfer Rate:	29.3 Mbps
Operating Frequency	5530 MHz
Channel No.	106 Ch

Frequency [MHz]	Reading dBuV	AN.+CL+AMP+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
5460	54.61	0.38	H	54.99	73.98	18.99	PK
5460	41.61	0.38	H	41.99	53.98	11.99	AV
*5470	56.01	0.24	H	56.25	68.20	11.95	PK
5460	54.55	0.38	V	54.93	73.98	19.05	PK
5460	41.52	0.38	V	41.90	53.98	12.08	AV
*5470	59.79	0.24	V	60.03	68.20	8.17	PK

Notes:

1. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + ATT
2. We have done all data rate in 802.11a/n/ac mode test. . Worst case of EUT is lowest data rate in 802.11a/n/ac
3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
4. “*” is radiated band edge test frequency(not restricted band emissions).

FCC PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID		FCC ID: ZNF0956

8.8 POWERLINE CONDUCTED EMISSIONS

Test Requirements and limit, §15.207

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

Test Configuration

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

TEST PROCEDURE

1. The EUT is placed on a wooden table 80 cm above the reference groundplane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors – Quasi Peak and Average Detector.
5. We are performed the AC Power Line Conducted Emission test for 6 Mbps, Ch.52 and 802.11a mode in UNII 2. Because 802.11a mode in UNII 2 is worst case.



RESULT PLOTS

Conducted Emissions (Line 1)

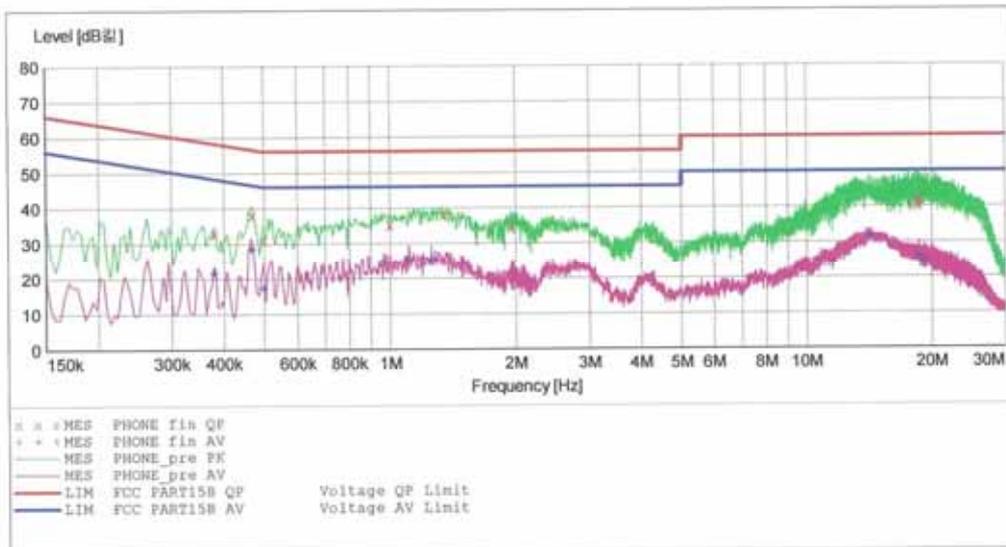
HCT

EMC

EUT: LG-D956
 Manufacturer: LG
 Operating Condition: WLAN MODE(UNII)
 Test Site: SHIELD ROOM
 Operator: JS LEE
 Test Specification: FCC PART15B
 Comment: H
 Start of Test: 2013-12-11 / 3:40:55 오후

SCAN TABLE: "FCC CLASS B(H)"

Short Description:			FCC CLASS B(H)			
Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	500.0 kHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
500.0 kHz	5.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
5.0 MHz	30.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			



MEASUREMENT RESULT: "PHONE_fin QP"

2013-12-11 3:43 오후

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.378001	32.90	9.8	58	25.4	---	---
0.466001	38.10	9.8	57	18.4	---	---
0.498001	31.10	9.8	56	24.9	---	---
1.000000	35.40	9.8	56	20.6	---	---
1.344000	38.20	9.9	56	17.8	---	---
1.952000	34.50	9.9	56	21.5	---	---
18.408000	41.00	10.9	60	19.0	---	---
18.604000	41.50	10.9	60	18.5	---	---
18.648000	40.30	10.9	60	19.7	---	---

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID	FCC ID: ZNFD956

MEASUREMENT RESULT: "PHONE_fin AV"

2013-12-11 3:43오.후

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.378001	21.50	9.8	48	26.9	---	---
0.466001	28.40	9.8	47	18.2	---	---
0.498001	17.30	9.8	46	28.7	---	---
0.968000	24.90	9.8	46	21.1	---	---
1.112000	25.20	9.9	46	20.8	---	---
1.256000	25.10	9.9	46	20.9	---	---
14.168000	31.50	10.7	50	18.5	---	---
18.612000	25.80	10.9	50	24.2	---	---
19.132000	24.50	10.9	50	25.5	---	---

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID	FCC ID: ZNFD956

Conducted Emissions (Line 2)

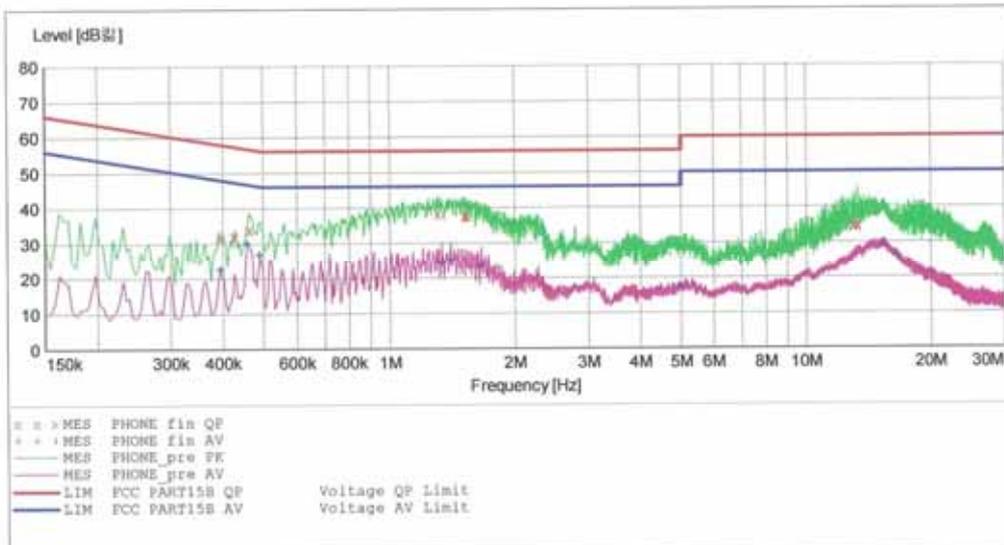
HCT

EMC

EUT: LG-D956
 Manufacturer: LG
 Operating Condition: WLAN MODE (UNII)
 Test Site: SHIELD ROOM
 Operator: JS LEE
 Test Specification: FCC PART15B
 Comment: N
 Start of Test: 2013-12-11 / 3:36:35 오후

SCAN TABLE: "FCC CLASS B(N)"

Short Description:		FCC CLASS B(N)					
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer	
150.0 kHz	500.0 kHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None	
			Average				
500.0 kHz	5.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None	
			Average				
5.0 MHz	30.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None	
			Average				



MEASUREMENT RESULT: "PHONE_fin_QP"

2013-12-11 3:39 오후

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.394001	31.70	10.0	58	26.3	---	---
0.426001	32.20	10.0	57	25.2	---	---
0.462001	33.90	10.0	57	22.7	---	---
1.308000	38.30	10.1	56	17.7	---	---
1.512000	37.80	10.1	56	18.2	---	---
1.532000	37.50	10.1	56	18.5	---	---
13.032000	34.80	10.9	60	25.2	---	---
13.304000	34.90	10.9	60	25.1	---	---
13.344000	34.50	10.9	60	25.5	---	---

MEASUREMENT RESULT: "PHONE_fin AV"

2013-12-11 3:39오.후

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.394001	22.50	10.0	48	25.5	---	---
0.458001	30.00	10.0	47	16.8	---	---
0.490001	26.80	10.0	46	19.3	---	---
1.336000	24.50	10.1	46	21.5	---	---
1.404000	25.10	10.1	46	20.9	---	---
1.664000	23.80	10.1	46	22.2	---	---
5.000000	17.40	10.4	46	28.6	---	---
15.340000	29.30	11.1	50	20.7	---	---
16.580000	25.80	11.1	50	24.2	---	---

FCC PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1312FR34	Date of Issue: December 24, 2013	EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA and LTE phone with Bluetooth, WLAN and RFID	FCC ID: ZNFD956

9. LIST OF TEST EQUIPMENT

Manufacturer	Model / Equipment	Calibration Interval	Calibration Due	Serial No.
Rohde & Schwarz	ENV216/ LISN	Annual	02/06/2014	100073
Schwarzbeck	VULB 9160/ TRILOG Antenna	Biennial	12/17/2014	3150
Rohde & Schwarz	ESI 40 / EMI TEST RECEIVER	Annual	04/16/2014	831564103
Agilent	E4440A/ Spectrum Analyzer	Annual	04/25/2014	US45303008
Agilent	N9020A/ SIGNAL ANALYZER	Annual	05/14/2014	MY51110063
HD	MA240/ Antenna Position Tower	N/A	N/A	556
EMCO	1050/ Turn Table	N/A	N/A	114
HD GmbH	HD 100/ Controller	N/A	N/A	13
HD GmbH	KMS 560/ SlideBar	N/A	N/A	12
Rohde & Schwarz	SCU-18/ Signal Conditioning Unit	Annual	09/10/2014	10094
CERNEX	CBL18265035 / POWER AMP	Annual	07/24/2014	22966
CERNEX	CBL26405040 / POWER AMP	Annual	04/16/2014	19660
Schwarzbeck	BBHA 9120D/ Horn Antenna	Biennial	07/05/2015	1151
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	Biennial	10/30/2014	BBHA9170124
Rohde & Schwarz	FSP / Spectrum Analyzer	Annual	02/08/2014	839117/011
Agilent	N1911A /Power Meter	Annual	01/22/2014	MY45100523
Agilent	N1921A /POWER SENSOR	Annual	07/11/2014	MY45241059
Wainwright Instrument	WHF3.0/18G-10EF / High Pass Filter	Annual	02/08/2014	F6
Wainwright Instrument	WHNX6.0/26.5G-6SS / High Pass Filter	Annual	04/16/2014	1
Wainwright Instrument	WHNX7.0/18G-8SS / High Pass Filter	Annual	04/16/2014	29
Wainwright Instrument	WRCJ2400/2483.5-2370/2520-60/14SS / Band Reject Filter	Annual	03/19/2014	1
Hewlett Packard	11636B/Power Divider	Annual	10/22/2014	11377
Agilent	87300B/Directional Coupler	Annual	12/18/2014	3116A03621
Hewlett Packard	11667B / Power Splitter	Annual	05/29/2014	05001
DIGITAL	EP-3010 /DC POWER SUPPLY	Annual	10/29/2014	3110117
ITECH	IT6720 / DC POWER SUPPLY	Annual	11/05/2014	010002156287001199
TESCOM	TC-3000C / BLUETOOTH TESTER	Annual	04/24/2014	3000C000276
Rohde & Schwarz	CBT / BLUETOOTH TESTER	Annual	04/25/2014	100422
EMCO	6502.LOOP ANTENNA	Biennial	01/11/2014	9009-2536
CERNEX	CBLU1183540 / POWER AMP	Annual	07/24/2014	21691
Agilent	8493C / Attenuator(10 dB)	Annual	07/24/2014	76649
WEINSCHL	2-3 / Attenuator(3 dB)	Annual	10/28/2014	BR0617