

Conducted Output Power (802.11ac-CH 54) 121.5 Mbps



Conducted Output Power (802.11ac-CH 54) 135 Mbps

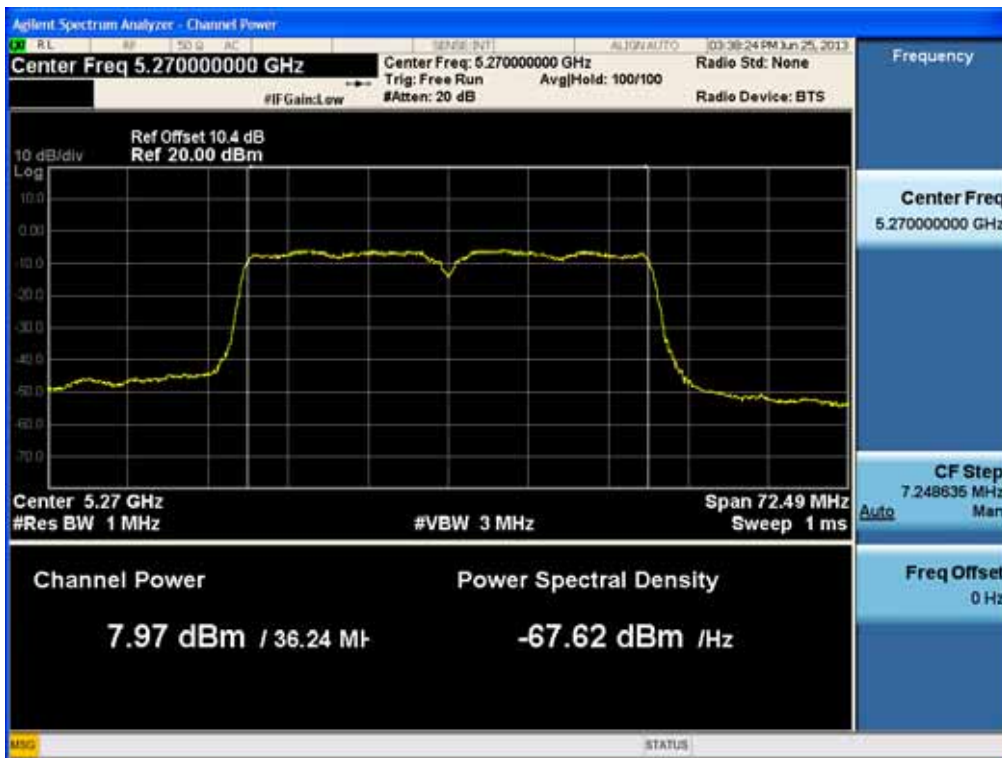


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| FCC PT.15.247 TEST REPORT | | FCC CERTIFICATION REPORT | | www.hct.co.kr |
| Test Report No. HCTR1306FR25-1 | Date of Issue: July 30, 2013 | EUT Type: Cellular/PCS NFC(Felica) | GSM/GPRS/WCDMA/HSDPA/HSUPA Phone with Bluetooth, WLAN and | FCC ID: ZNFL01F |

Conducted Output Power (802.11ac-CH 54) 162 Mbps



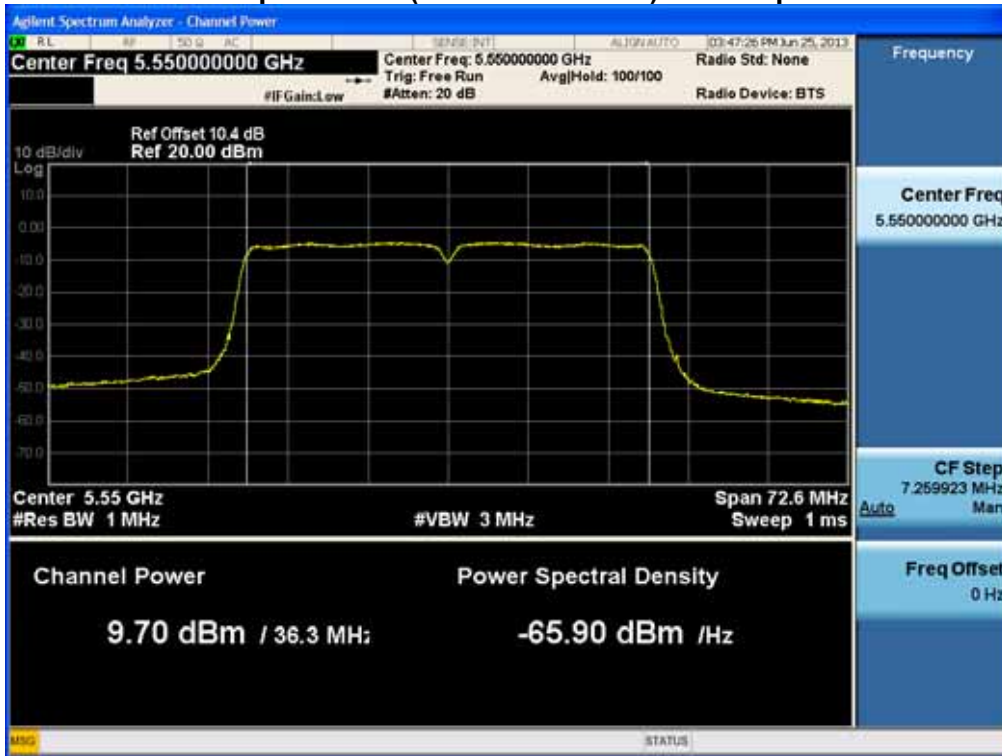
Conducted Output Power (802.11ac-CH 54) 180 Mbps



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RESULT PLOTS (5510 ~ 5710 MHz)

Output Power (802.11ac-CH 110) 13.5 Mbps



Conducted Output Power (802.11ac-CH 110) 27 Mbps



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Conducted Output Power (802.11ac-CH 110) 40.5 Mbps



Conducted Output Power (802.11ac-CH 110) 54 Mbps

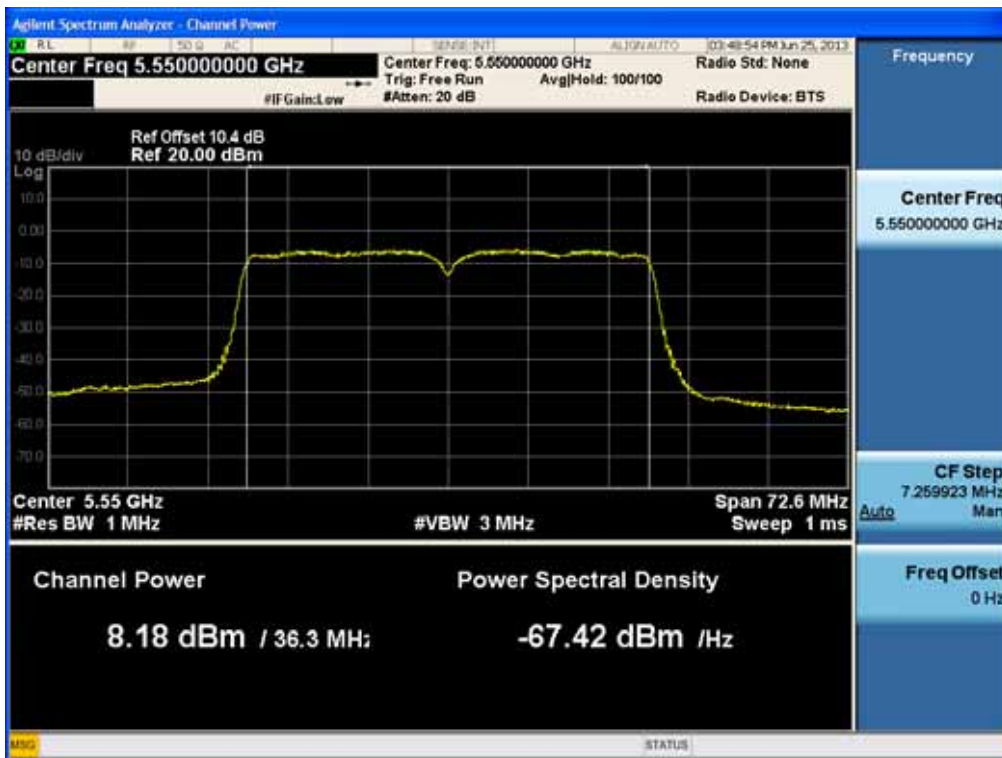


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Conducted Output Power (802.11ac-CH 110) 81 Mbps



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



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Conducted Output Power (802.11ac-CH 110) 121.5 Mbps

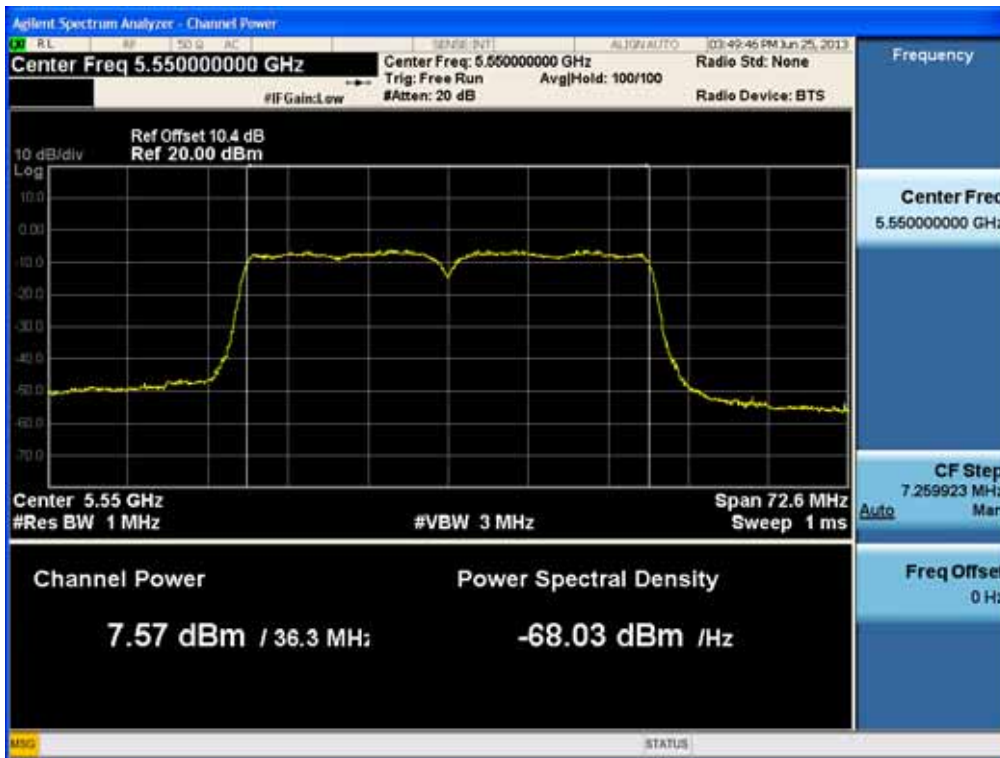


Conducted Output Power (802.11ac-CH 110) 135 Mbps



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Conducted Output Power (802.11ac-CH 110) 162 Mbps



Conducted Output Power (802.11ac-CH 110) 180 Mbps



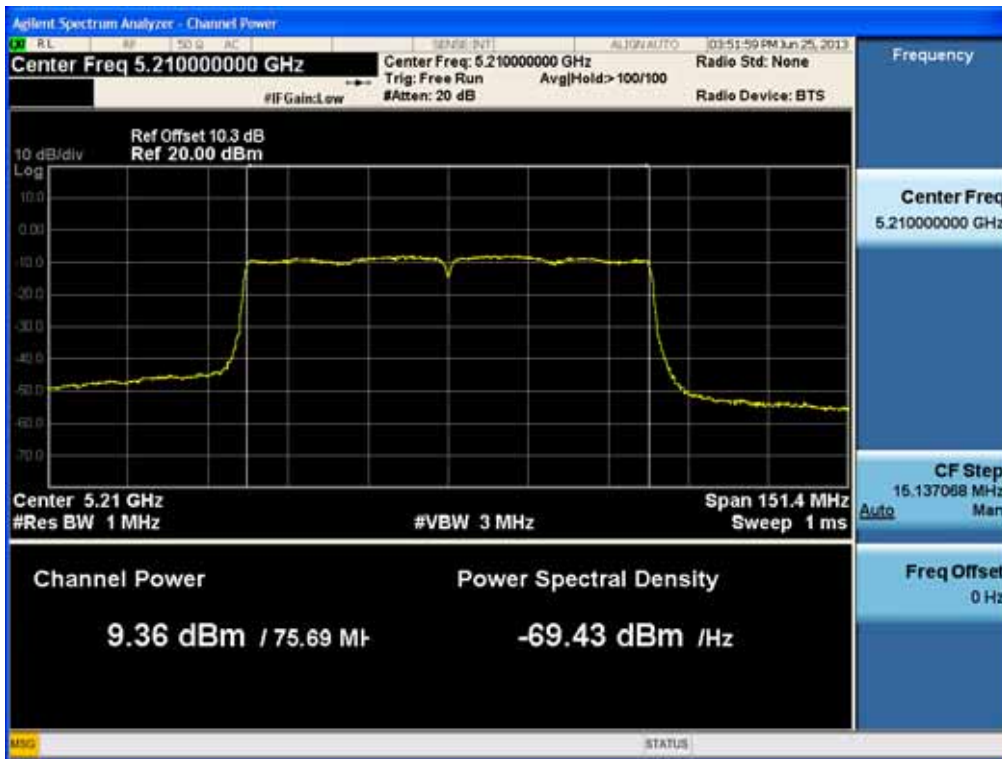
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RESULT PLOTS (5210 MHz)

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



Conducted Output Power (802.11ac-CH 42) 58.5 Mbps



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|-----------------------------------|---------------------------------|--|---|
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Conducted Output Power (802.11ac-CH 42) 87.8 Mbps

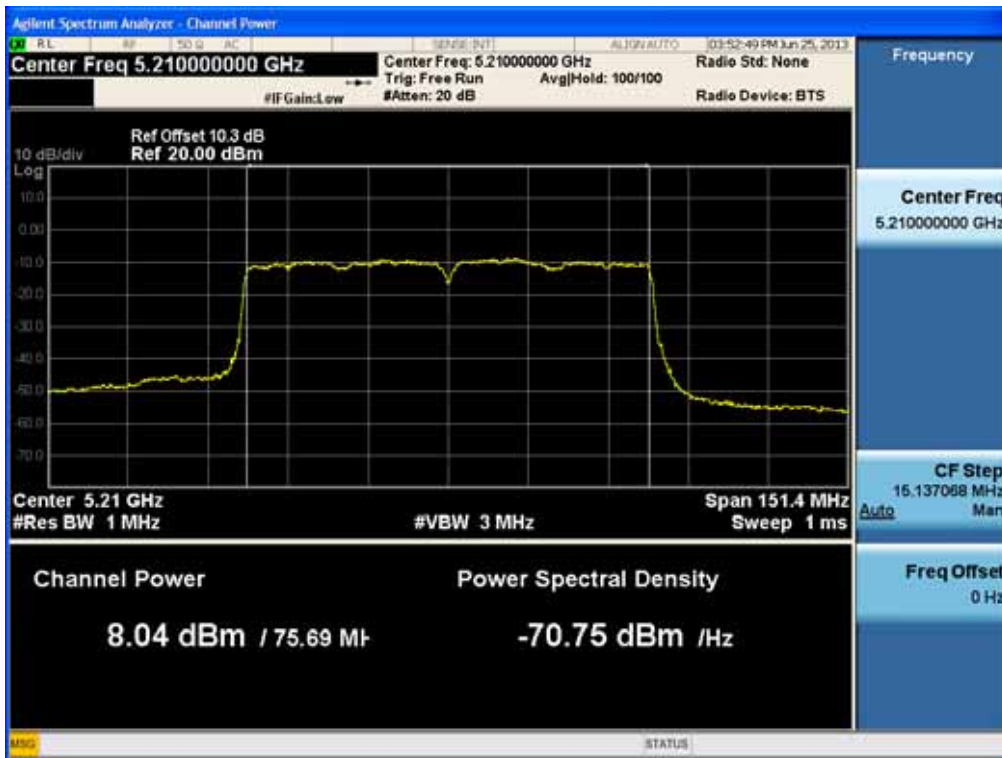


Conducted Output Power (802.11ac-CH 42) 117 Mbps

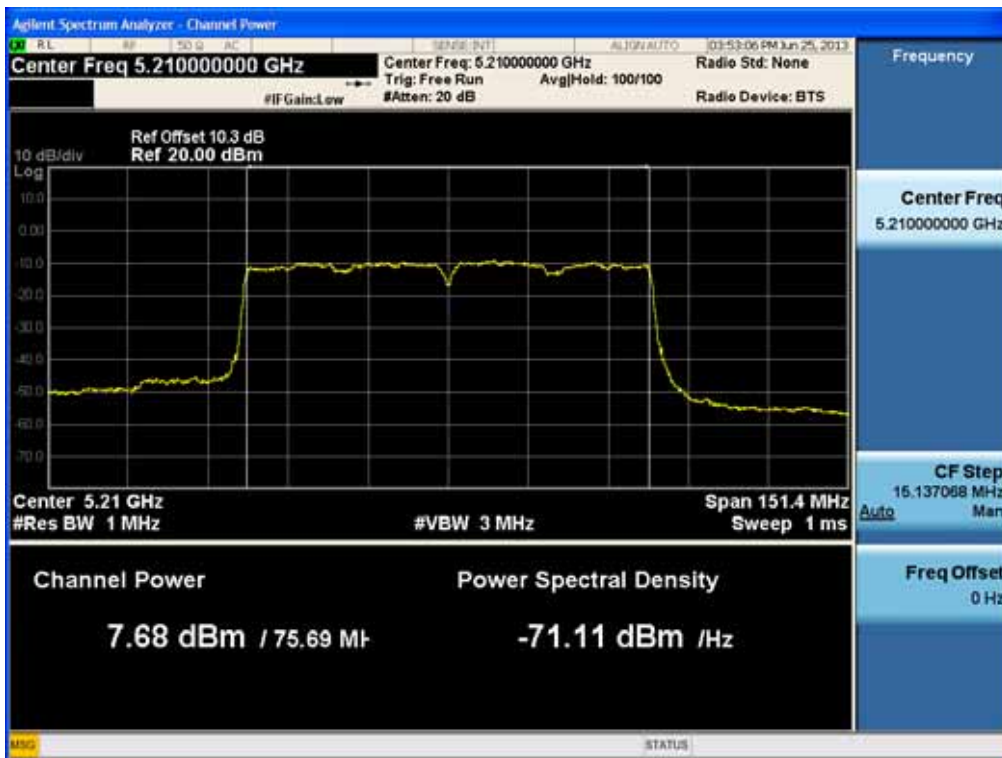


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Conducted Output Power (802.11ac-CH 42) 175.5 Mbps



Conducted Output Power (802.11ac-CH 42) 234 Mbps

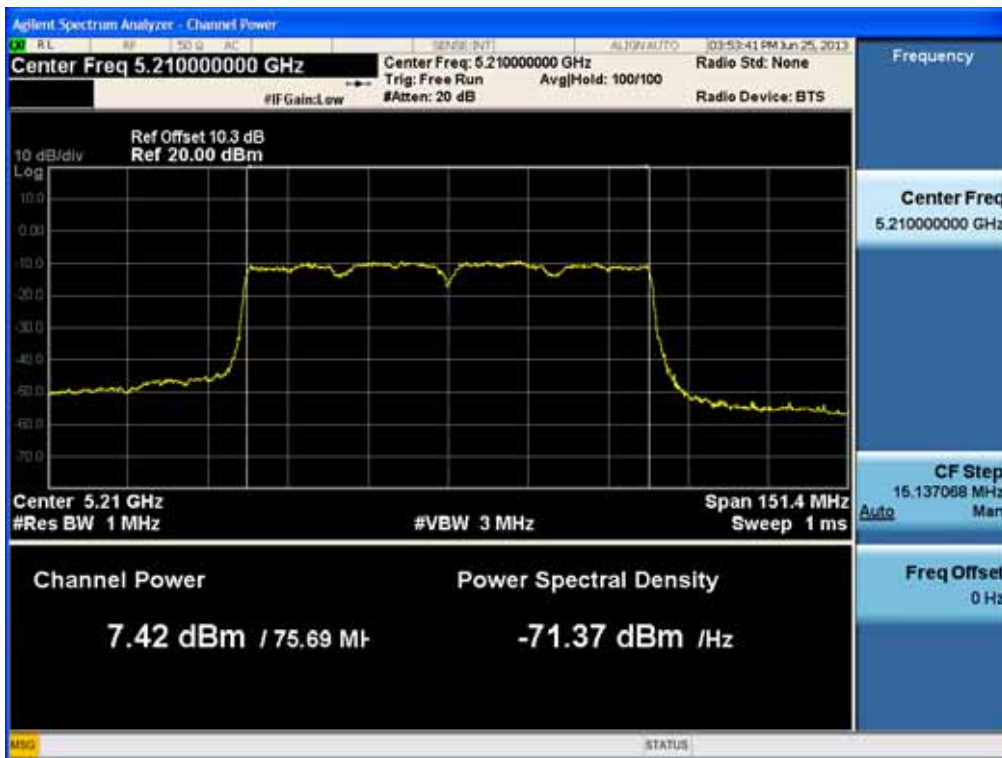


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Conducted Output Power (802.11ac-CH 42) 263.3 Mbps

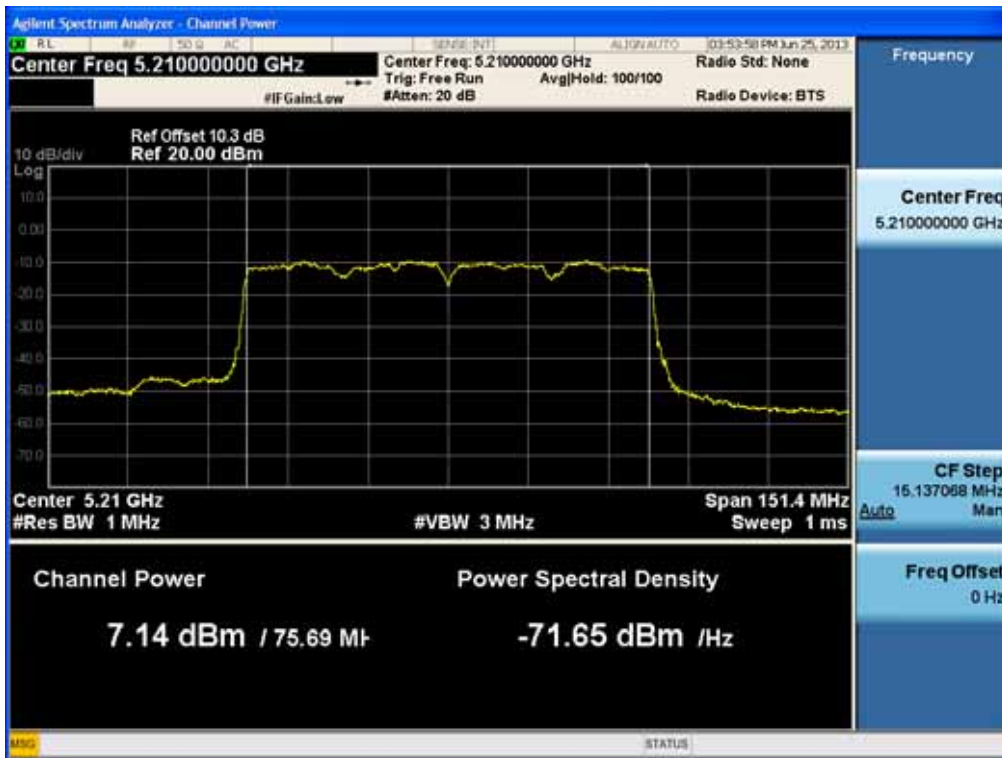


Conducted Output Power (802.11ac-CH 42) 292.5 Mbps

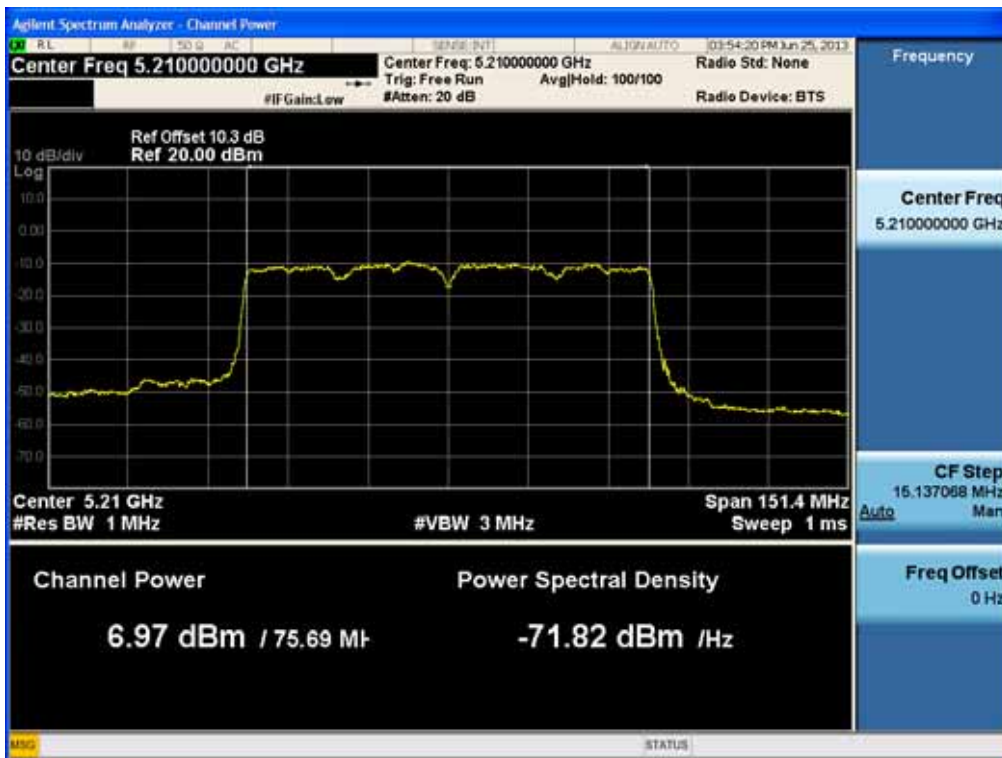


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Conducted Output Power (802.11ac-CH 42) 351 Mbps



Conducted Output Power (802.11ac-CH 42) 390 Mbps



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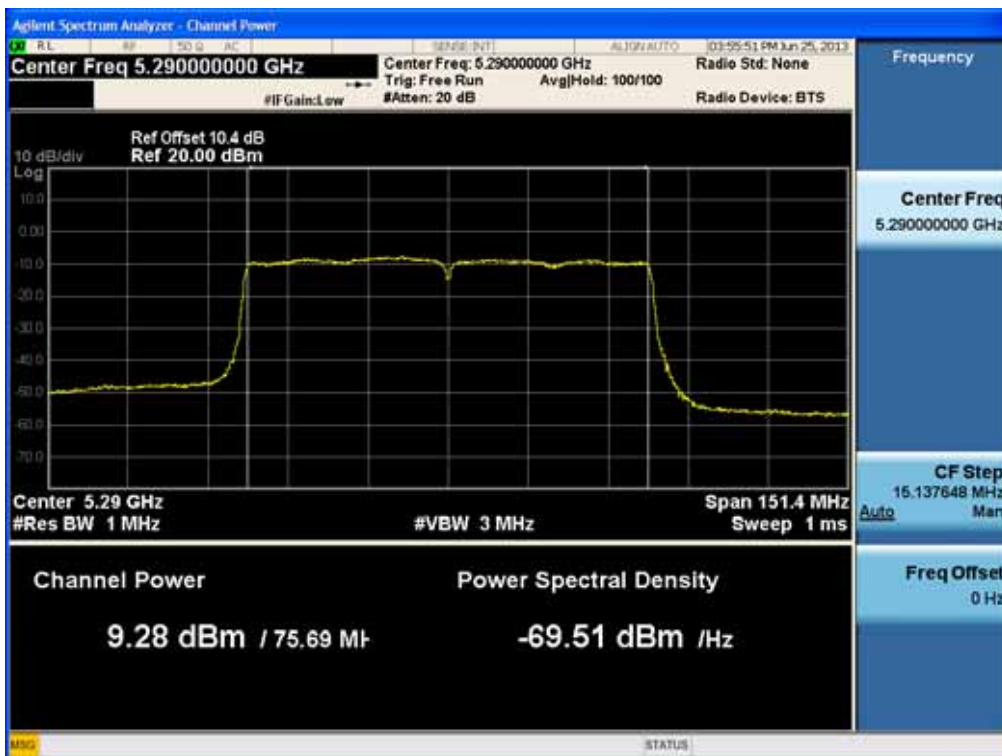


RESULT PLOTS (5290 MHz)

Conducted Output Power (802.11ac-CH 58) 29.3 Mbps



Conducted Output Power (802.11ac-CH 58) 58.5 Mbps

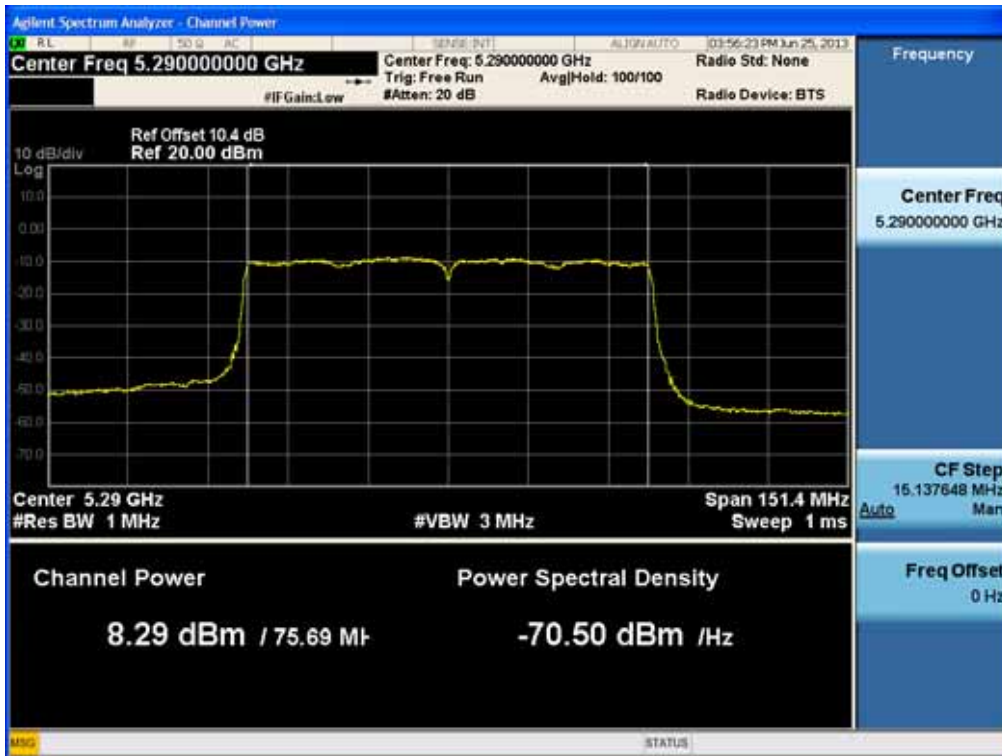


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Conducted Output Power (802.11ac-CH 58) 87.8 Mbps



Conducted Output Power (802.11ac-CH 58) 117 Mbps

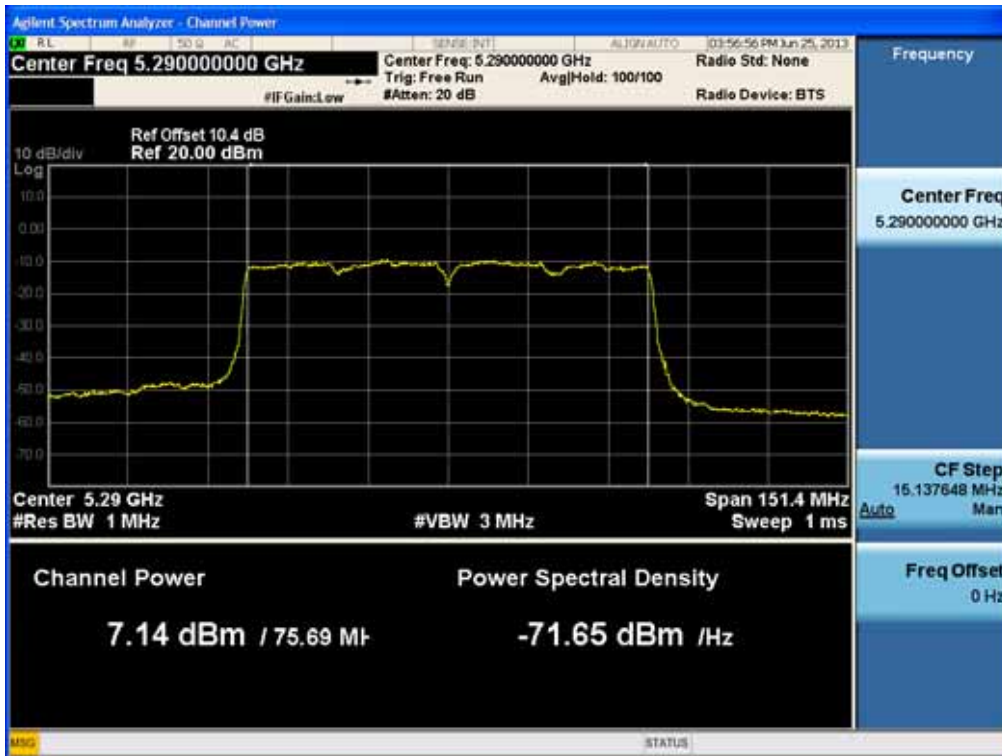


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Conducted Output Power (802.11ac-CH 58) 175.5 Mbps

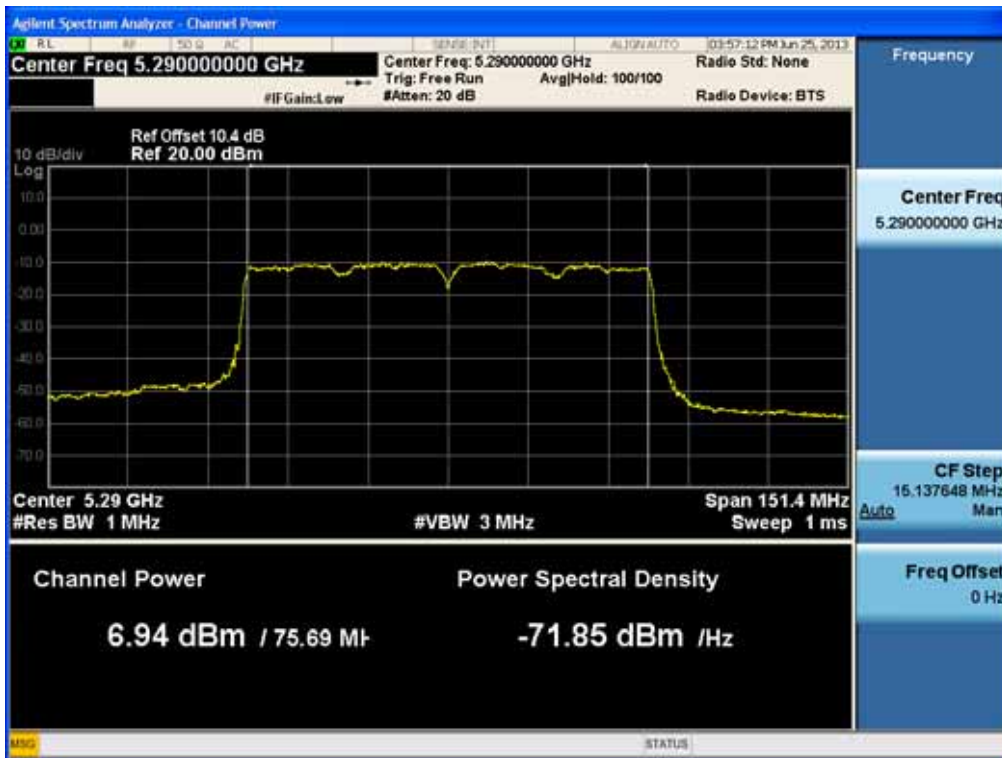


Conducted Output Power (802.11ac-CH 58) 234 Mbps



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Conducted Output Power (802.11ac-CH 58) 263.3 Mbps



Conducted Output Power (802.11ac-CH 58) 292.5 Mbps



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



Conducted Output Power (802.11ac-CH 58) 390 Mbps



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RESULT PLOTS (5530 MHz ~ 5690 MHz)

Conducted Output Power (802.11ac-CH 106) 29.3 Mbps



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



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Conducted Output Power (802.11ac-CH 106) 87.8 Mbps

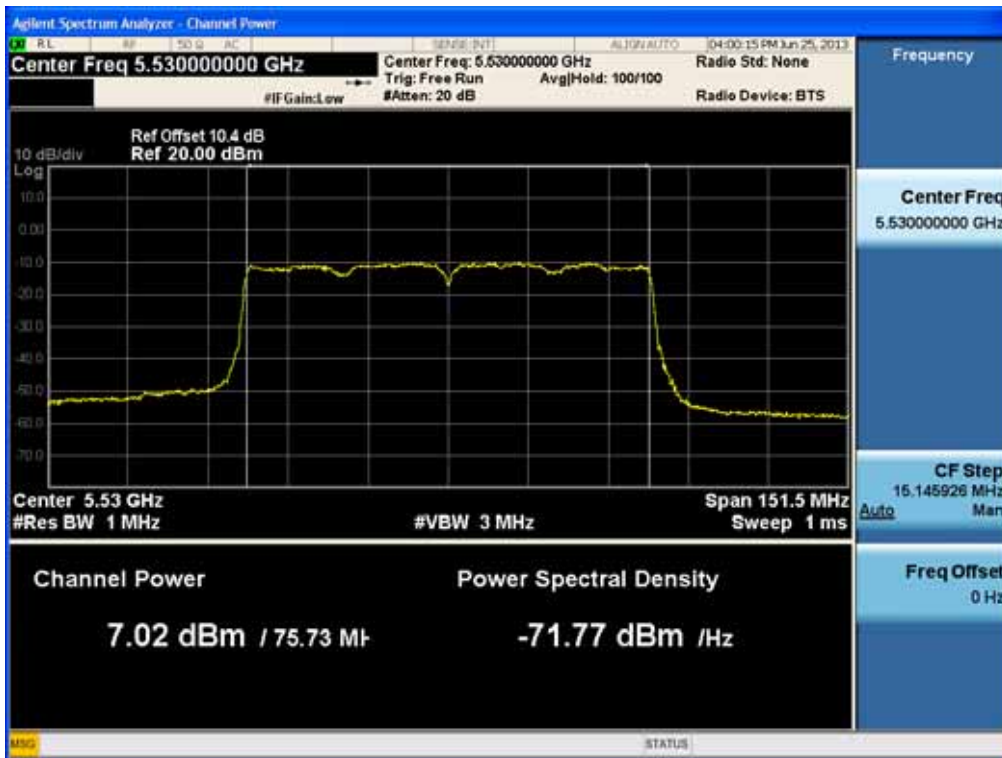


Conducted Output Power (802.11ac-CH 106) 117 Mbps

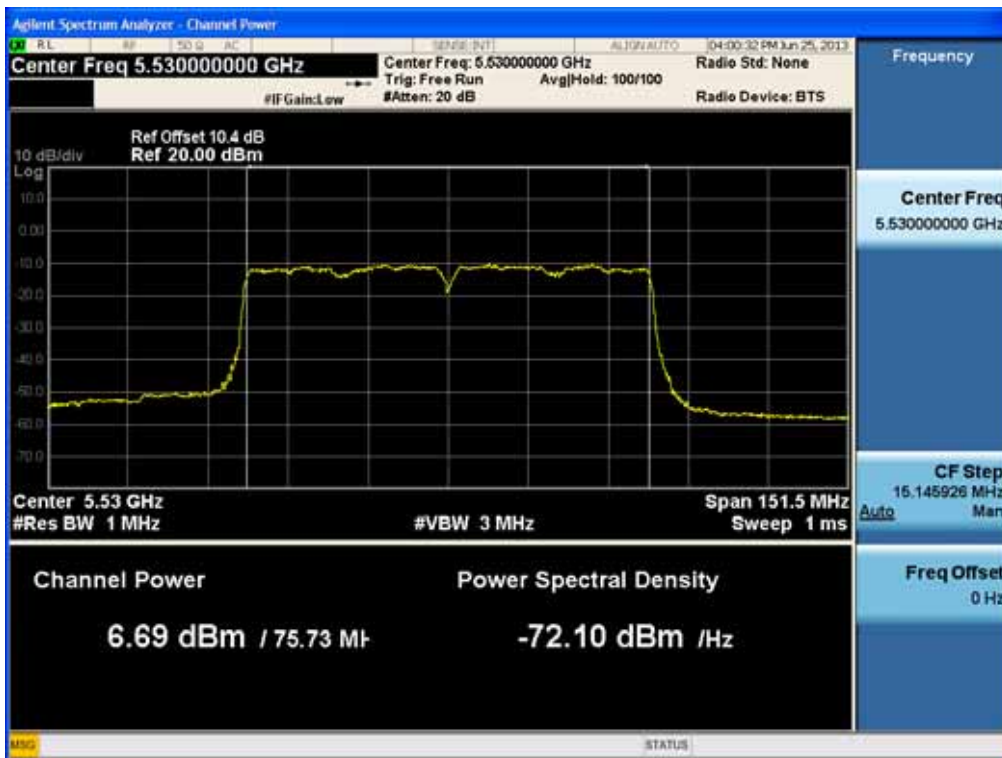


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Conducted Output Power (802.11ac-CH 106) 175.5 Mbps

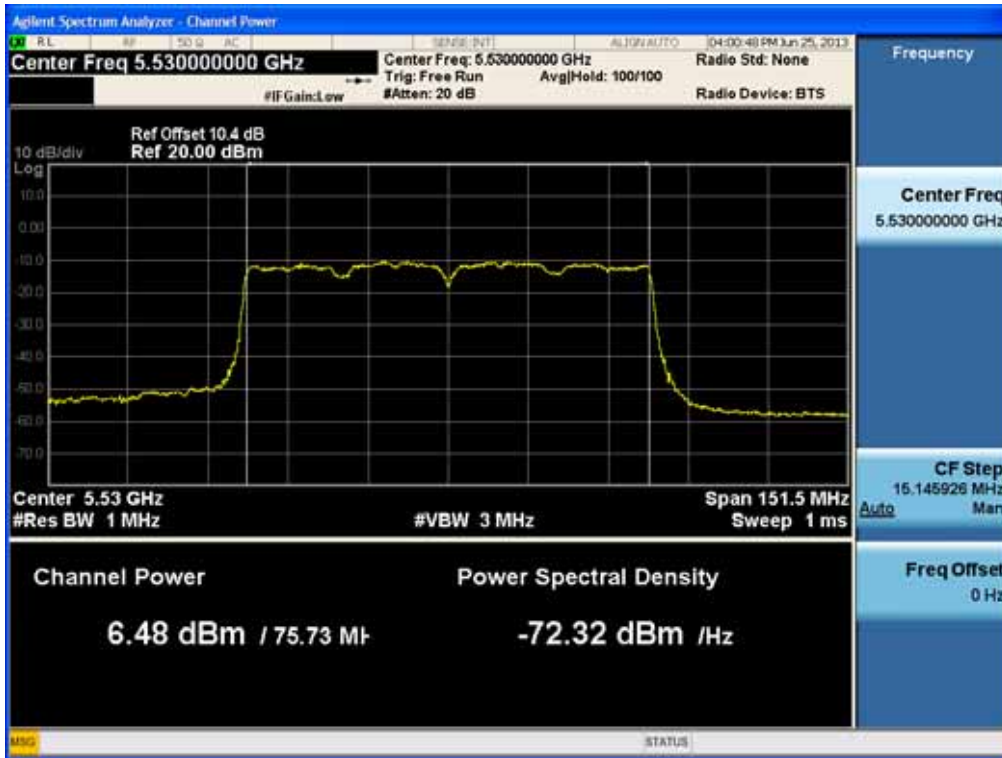


Conducted Output Power (802.11ac-CH 106) 234 Mbps

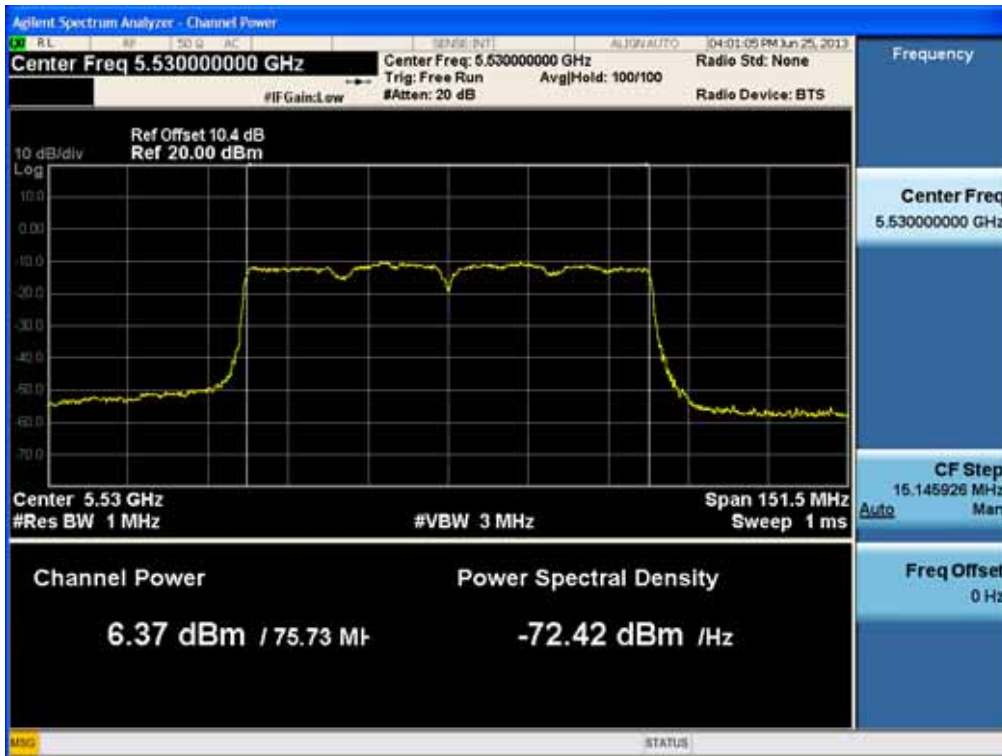


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Conducted Output Power (802.11ac-CH 106) 263.3 Mbps

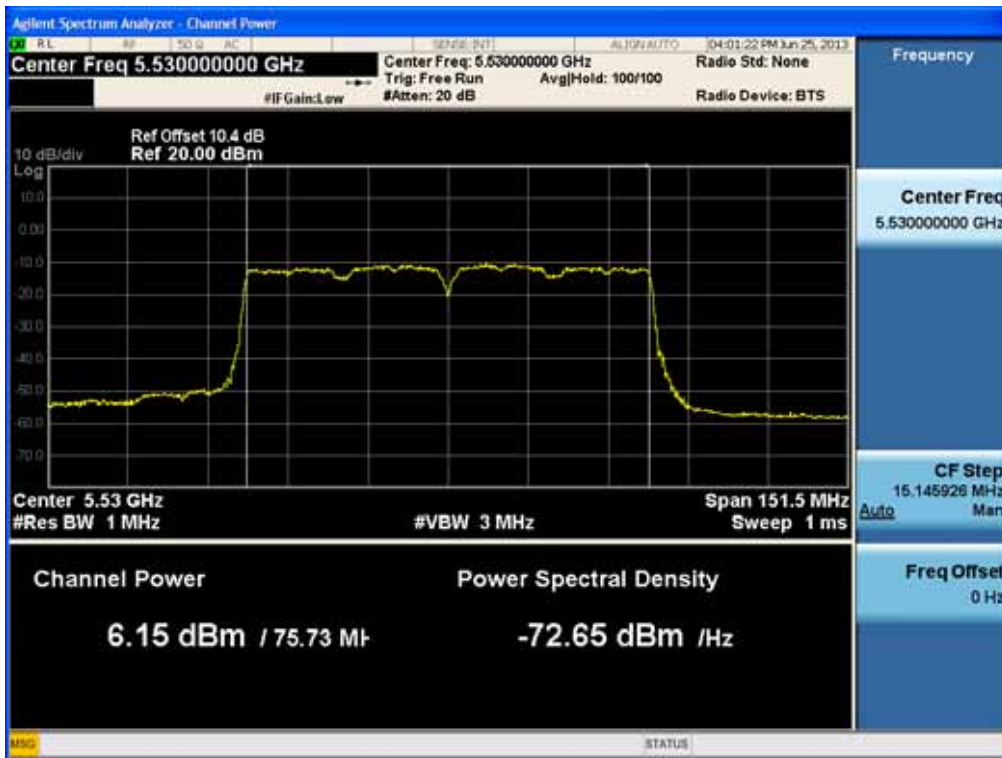


Conducted Output Power (802.11ac-CH 106) 292.5 Mbps

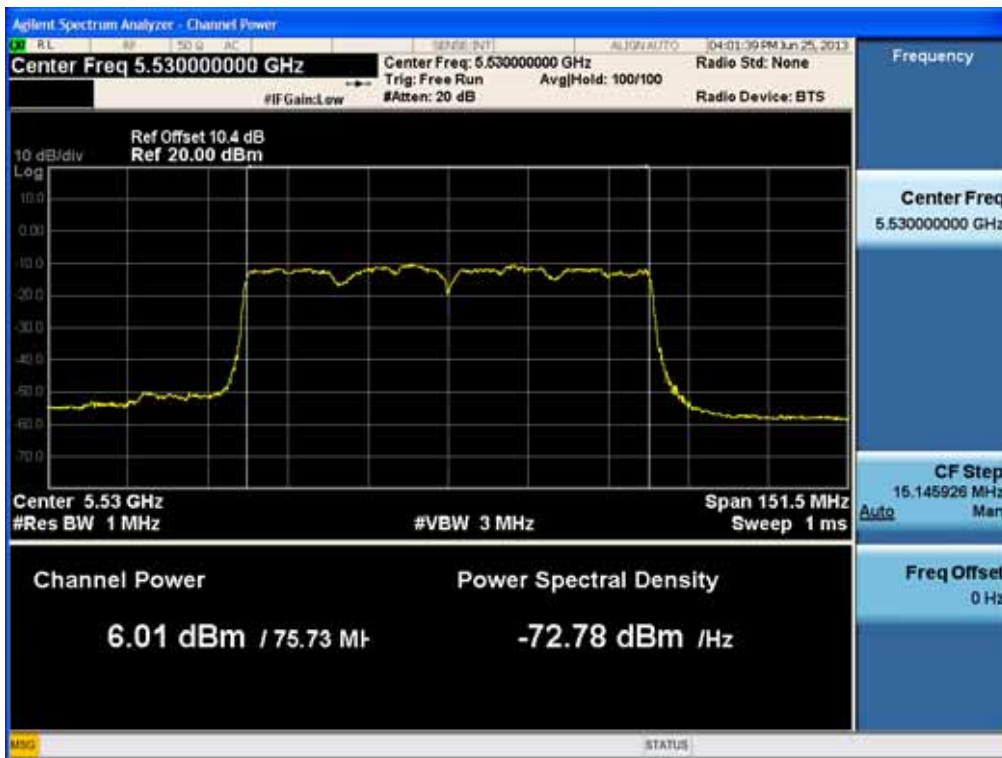


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Conducted Output Power (802.11ac-CH 106) 390 Mbps

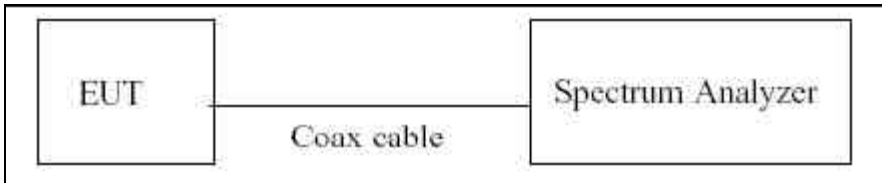


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8.4 POWER SPECTRAL DENSITY

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

$PSD = \text{Reading Value} + \text{ATT loss} + \text{Cable loss}(1 \text{ ea}) + \text{Duty Cycle Factor}$

$\text{Output Power} = -5 \text{ dBm} + 10 \text{ dB} + 0.8 \text{ dB} + 0.21 \text{ dB} = 16.01 \text{ dBm}$

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. $\text{Spectrum offset} = \text{Attenuator loss} + \text{Cable loss}$
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 | 10.30 |
| | 5190 | 10.29 |
| | 5200 | 10.28 |
| | 5230 | 10.29 |
| | 5240 | 10.34 |
| UNII 2 | 5260 | 10.37 |
| | 5270 | 10.38 |
| | 5300 | 10.40 |
| | 5310 | 10.39 |
| | 5320 | 10.39 |
| UNII 2e | 5500 | 10.35 |
| | 5510 | 10.36 |
| | 5550 | 10.41 |
| | 5580 | 10.43 |
| | 5670 | 10.43 |
| | 5700 | 10.30 |

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

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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 | 1.784 | 0.218 | 2.002 | 4 | Pass |
| 5200 | 40 | | 1.935 | 0.218 | 2.153 | 4 | Pass |
| 5240 | 48 | | 1.819 | 0.218 | 2.037 | 4 | Pass |
| 5260 | 52 | 802.11a | 1.981 | 0.218 | 2.199 | 11 | Pass |
| 5300 | 60 | | 1.660 | 0.218 | 1.878 | 11 | Pass |
| 5320 | 64 | | 0.939 | 0.218 | 1.157 | 11 | Pass |
| 5500 | 100 | 802.11a | 0.460 | 0.218 | 0.678 | 11 | Pass |
| 5580 | 116 | | 0.994 | 0.218 | 1.212 | 11 | Pass |
| 5700 | 140 | | 0.405 | 0.218 | 0.623 | 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 | 0.267 | 0.243 | 0.510 | 4 | Pass |
| 5200 | 40 | 20MHz BW | 0.063 | 0.243 | 0.306 | 4 | Pass |
| 5240 | 48 | | 0.073 | 0.243 | 0.316 | 4 | Pass |
| 5260 | 52 | 802.11n | 0.646 | 0.243 | 0.889 | 11 | Pass |
| 5300 | 60 | 20MHz BW | 0.274 | 0.243 | 0.517 | 11 | Pass |
| 5320 | 64 | | -0.025 | 0.243 | 0.218 | 11 | Pass |
| 5500 | 100 | 802.11n | -0.435 | 0.243 | -0.192 | 11 | Pass |
| 5580 | 116 | 20MHz BW | -0.266 | 0.243 | -0.023 | 11 | Pass |
| 5700 | 140 | | -0.590 | 0.243 | -0.347 | 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 | -2.935 | 0.432 | -2.503 | 4 | Pass |
| 5230 | 46 | 40MHz BW | -2.924 | 0.432 | -2.492 | 4 | Pass |
| 5270 | 54 | 802.11n | -2.277 | 0.432 | -1.845 | 11 | Pass |
| 5310 | 62 | 40MHz BW | -2.637 | 0.432 | -2.205 | 11 | Pass |
| 5510 | 102 | 802.11n 40MHz BW | -3.339 | 0.432 | -2.907 | 11 | Pass |
| 5550 | 110 | | -3.287 | 0.432 | -2.855 | 11 | Pass |
| 5670 | 134 | | -3.652 | 0.432 | -3.220 | 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 |
| 5180 | 36 | 802.11ac 20MHz BW | -0.637 | 0.235 | -0.402 | 4 | Pass |
| 5200 | 40 | | -0.596 | 0.235 | -0.361 | 4 | Pass |
| 5240 | 48 | | -0.682 | 0.235 | -0.447 | 4 | Pass |
| 5260 | 52 | 802.11ac 20MHz BW | -0.259 | 0.235 | -0.024 | 11 | Pass |
| 5300 | 60 | | -0.637 | 0.235 | -0.402 | 11 | Pass |
| 5320 | 64 | | -0.901 | 0.235 | -0.666 | 11 | Pass |
| 5500 | 100 | 802.11ac 20MHz BW | -1.292 | 0.235 | -1.057 | 11 | Pass |
| 5580 | 116 | | -1.135 | 0.235 | -0.900 | 11 | Pass |
| 5720 | 144 | | -1.260 | 0.235 | -1.025 | 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 | -3.594 | 0.430 | -3.164 | 4 | Pass |
| 5230 | 46 | | -4.558 | 0.430 | -4.128 | 4 | Pass |
| 5270 | 54 | 802.11ac 40MHz BW | -3.677 | 0.430 | -3.247 | 11 | Pass |
| 5310 | 62 | | -4.163 | 0.430 | -3.733 | 11 | Pass |
| 5510 | 102 | 802.11ac 40MHz BW | -4.816 | 0.430 | -4.386 | 11 | Pass |
| 5550 | 110 | | -4.205 | 0.430 | -3.775 | 11 | Pass |
| 5710 | 142 | | -4.385 | 0.430 | -3.955 | 11 | Pass |

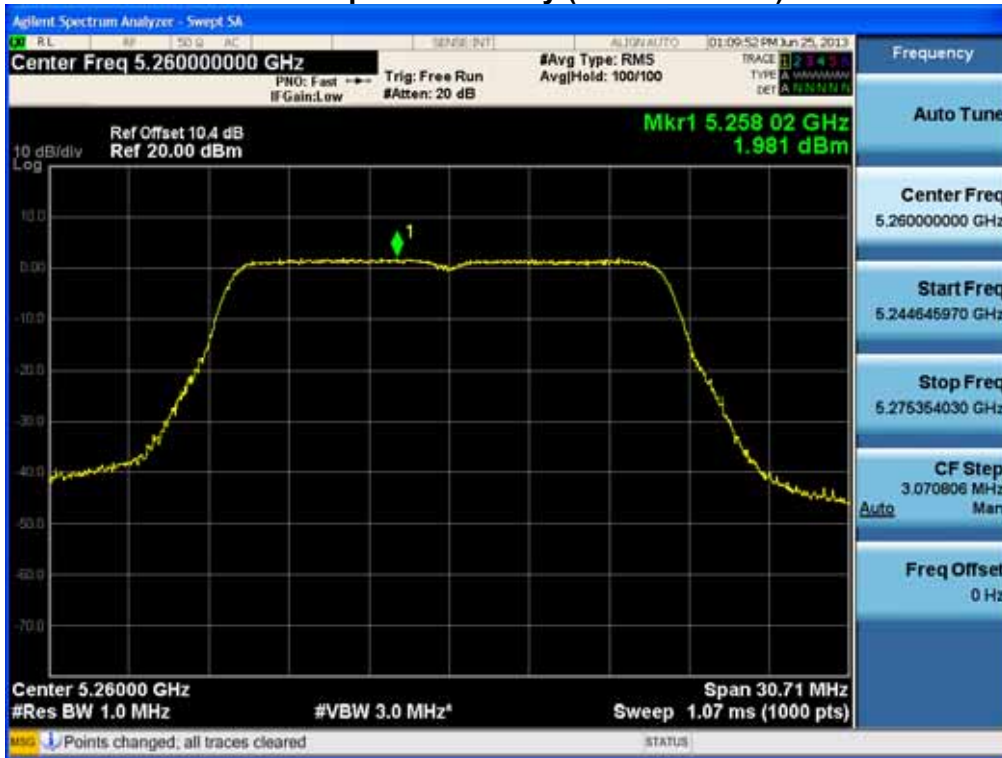
Conducted Power Density Measurements

| 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 | -7.380 | 0.838 | -6.542 | 4 | Pass |
| 5290 | 58 | 802.11ac 80MHz BW | -7.677 | 0.838 | -6.839 | 11 | Pass |
| 5530 | 106 | 802.11ac 80MHz BW | -7.964 | 0.838 | -7.126 | 11 | Pass |
| 5690 | 138 | 802.11ac 80MHz BW | -7.335 | 0.838 | -6.497 | 11 | Pass |

| | | | | | |
|-----------------------------------|---------------------------------|--|---|--|--|
| FCC PT.15.247 TEST REPORT | | FCC CERTIFICATION REPORT | | | www.hct.co.kr |
| Test Report No. HCTR1306FR25-1 | Date of Issue: July 30, 2013 | EUT Type: Cellular/PCS NFC(Felica) | GSM/GPRS/WCDMA/HSDPA/HSUPA Phone with Bluetooth, WLAN and | | FCC ID: ZNFL01F |

RESULT PLOTS

Power Spectral Density (802.11a-CH 52)

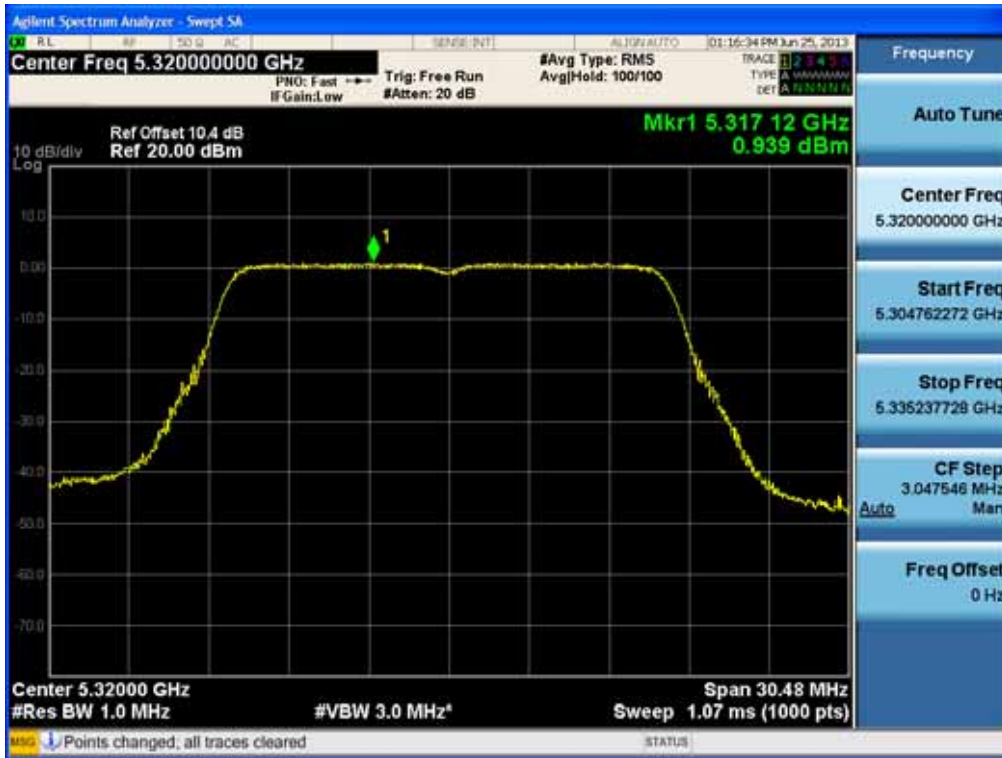


Power Spectral Density (802.11a-CH 60)



| | | | |
|-----------------------------------|---------------------------------|--|--|
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| Test Report No. HCTR1306FR25-1 | Date of Issue: July 30, 2013 | EUT Type: Cellular/PCS NFC(Felica) GSM/GPRS/WCDMA/HSDPA/HSUPA Phone with Bluetooth, WLAN and | FCC ID: ZNFL01F |

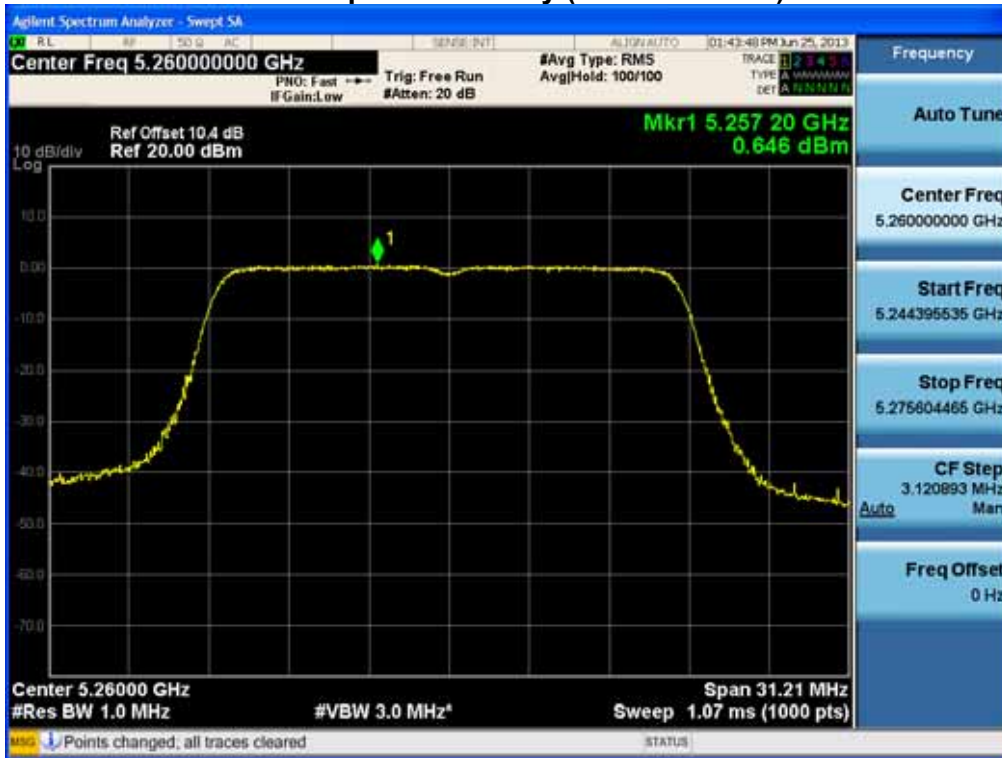
Power Spectral Density (802.11a-CH 64)



| | | | | |
|-----------------------------------|---------------------------------|--|---|--|
| FCC PT.15.247 TEST REPORT | | FCC CERTIFICATION REPORT | | www.hct.co.kr |
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20 MHz BW

Power Spectral Density (802.11n-CH 52)

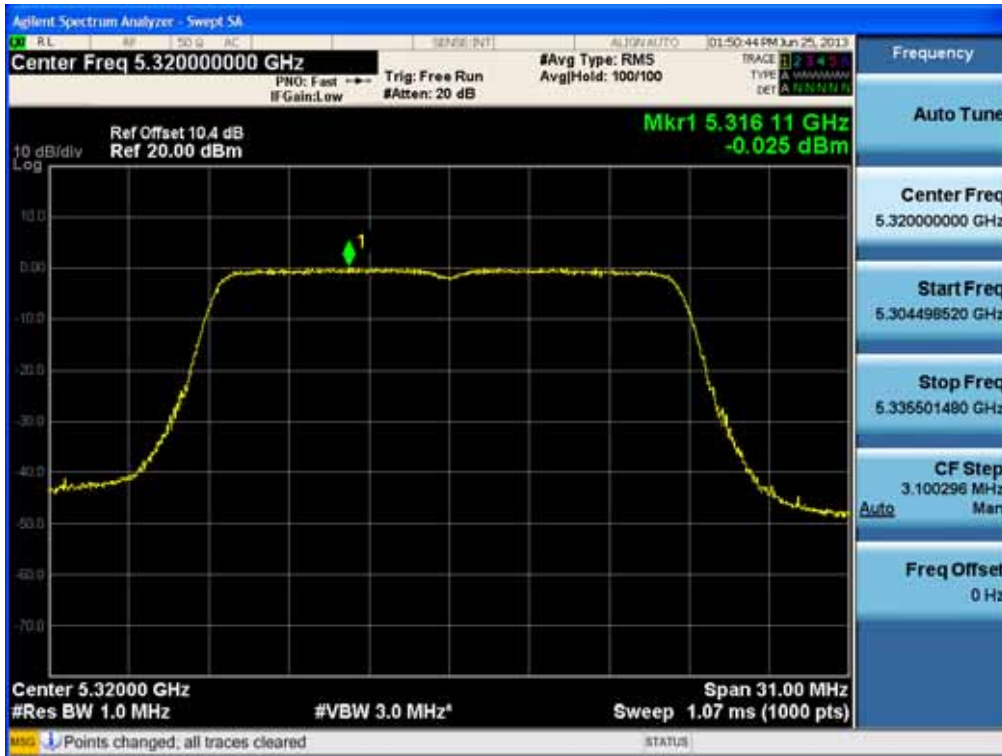


Power Spectral Density (802.11n-CH 60)



| | | | |
|-----------------------------------|---------------------------------|--|---|
| FCC PT.15.247 TEST REPORT | FCC CERTIFICATION REPORT | | www.hct.co.kr |
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Power Spectral Density (802.11n-CH 64)



| | | | |
|-----------------------------------|---------------------------------|--|--|
| FCC PT.15.247 TEST REPORT | FCC CERTIFICATION REPORT | | www.hct.co.kr |
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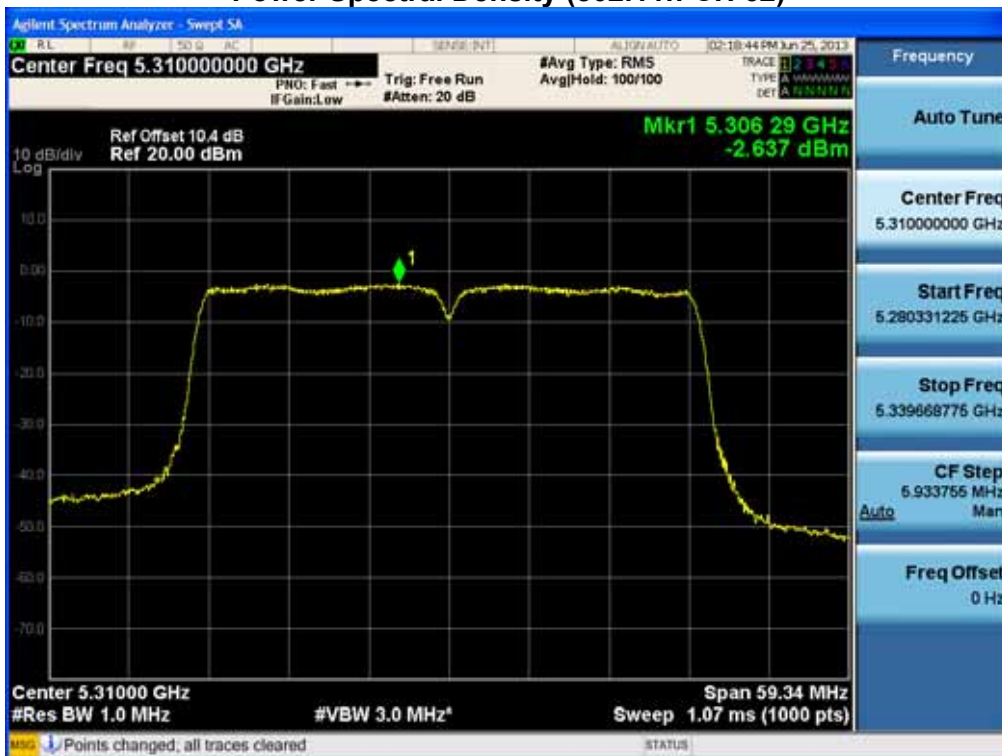


40 MHz BW

Power Spectral Density (802.11n-CH 54)



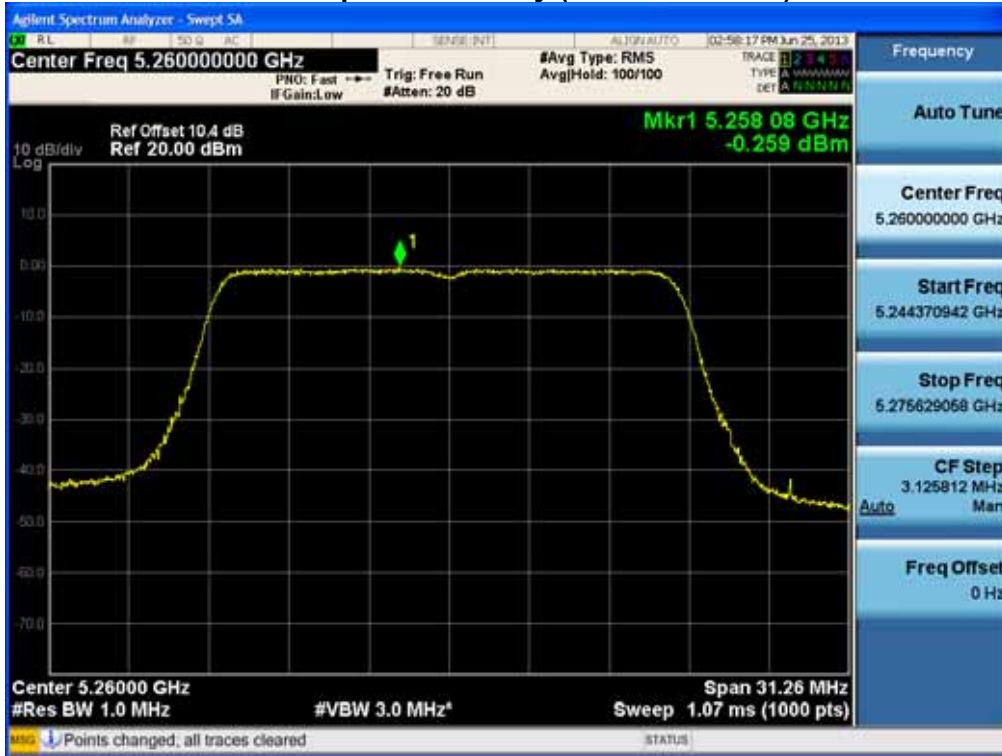
Power Spectral Density (802.11n-CH 62)



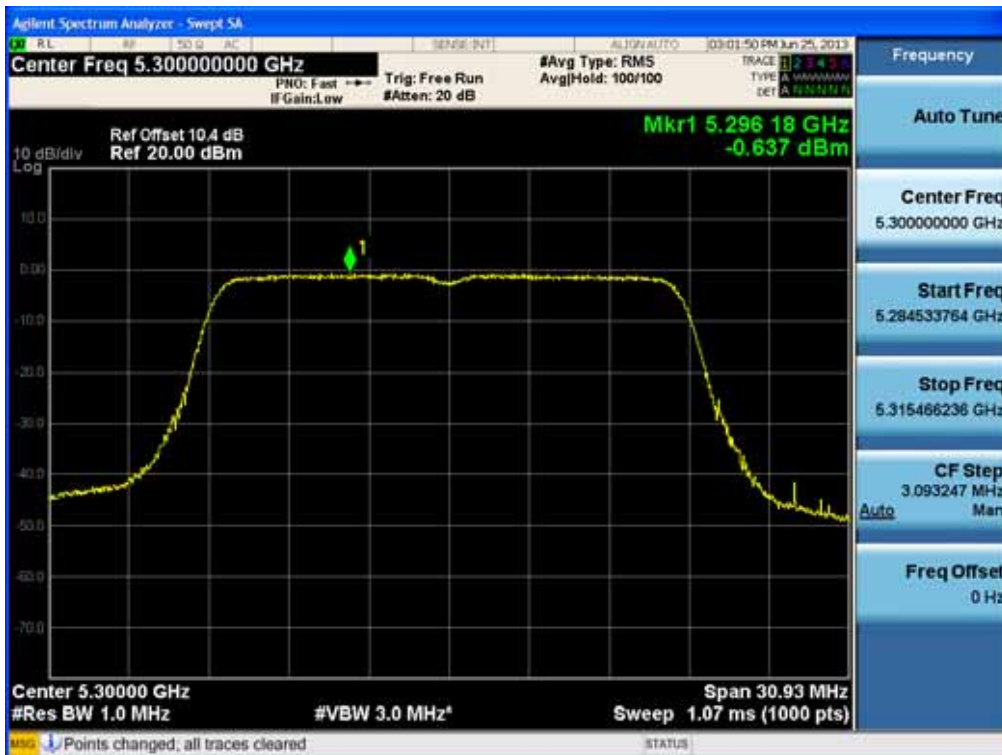
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|-----------------------------------|---------------------------------|--|---|--|
| FCC PT.15.247 TEST REPORT | FCC CERTIFICATION REPORT | | | www.hct.co.kr |
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20 MHz BW

Power Spectral Density (802.11ac-CH 52)

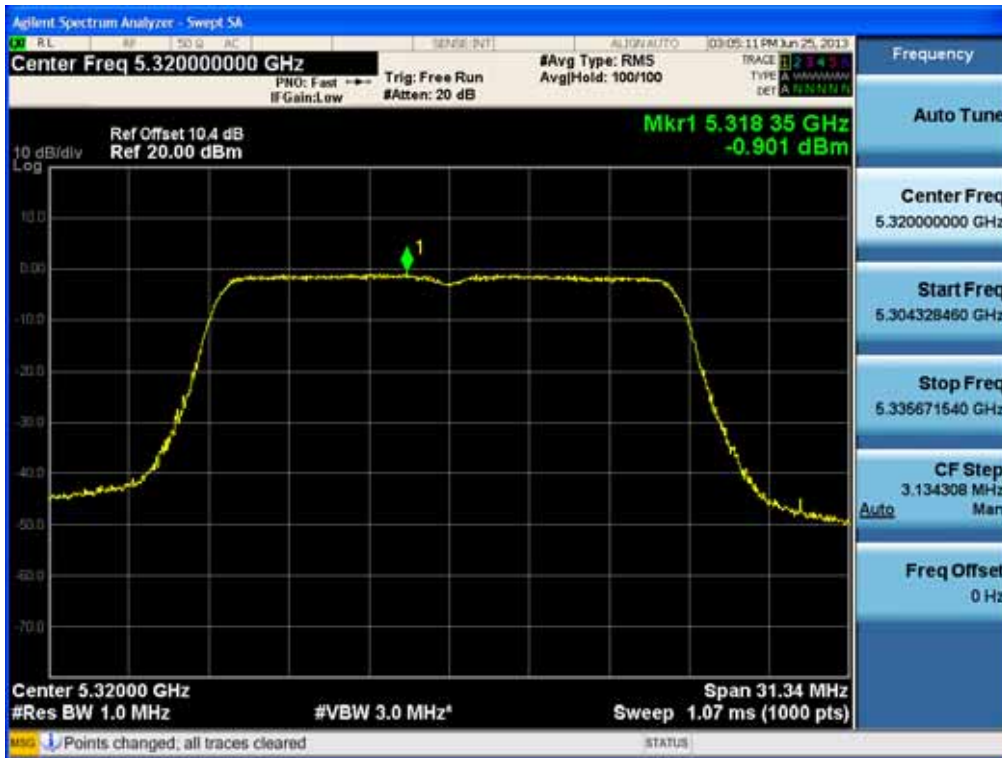


Power Spectral Density (802.11ac-CH 60)



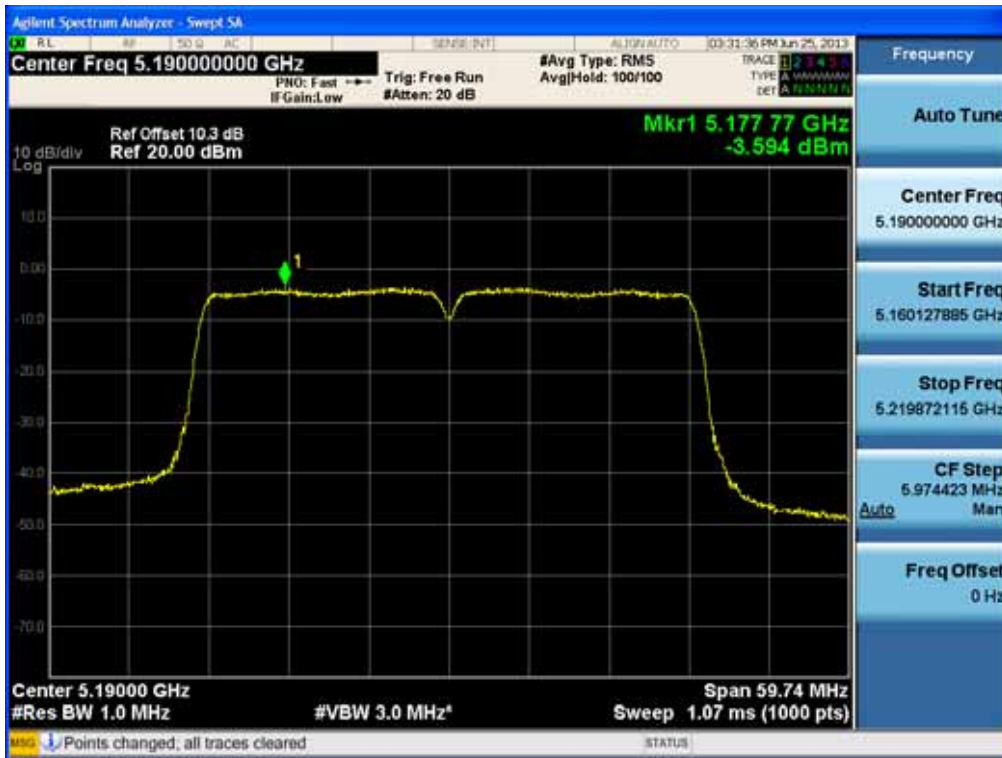
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|-----------------------------------|---------------------------------|--|--|
| FCC PT.15.247 TEST REPORT | FCC CERTIFICATION REPORT | | www.hct.co.kr |
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Power Spectral Density (802.11ac-CH 64)

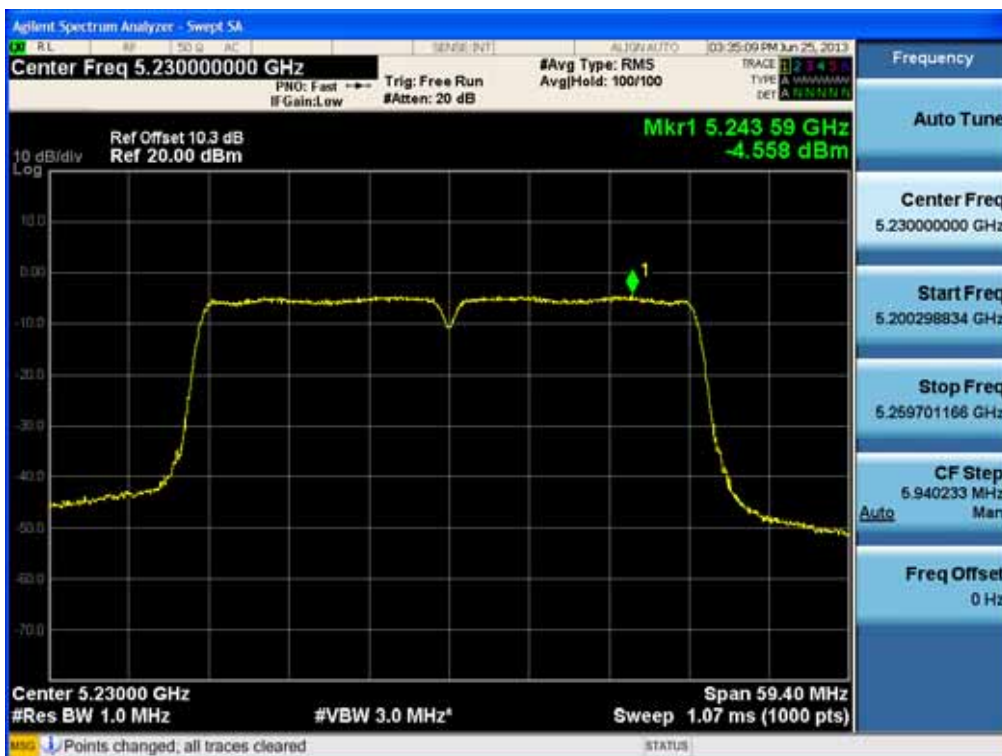


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|-----------------------------------|---------------------------------|--|---|
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Power Spectral Density (802.11ac-CH 38)



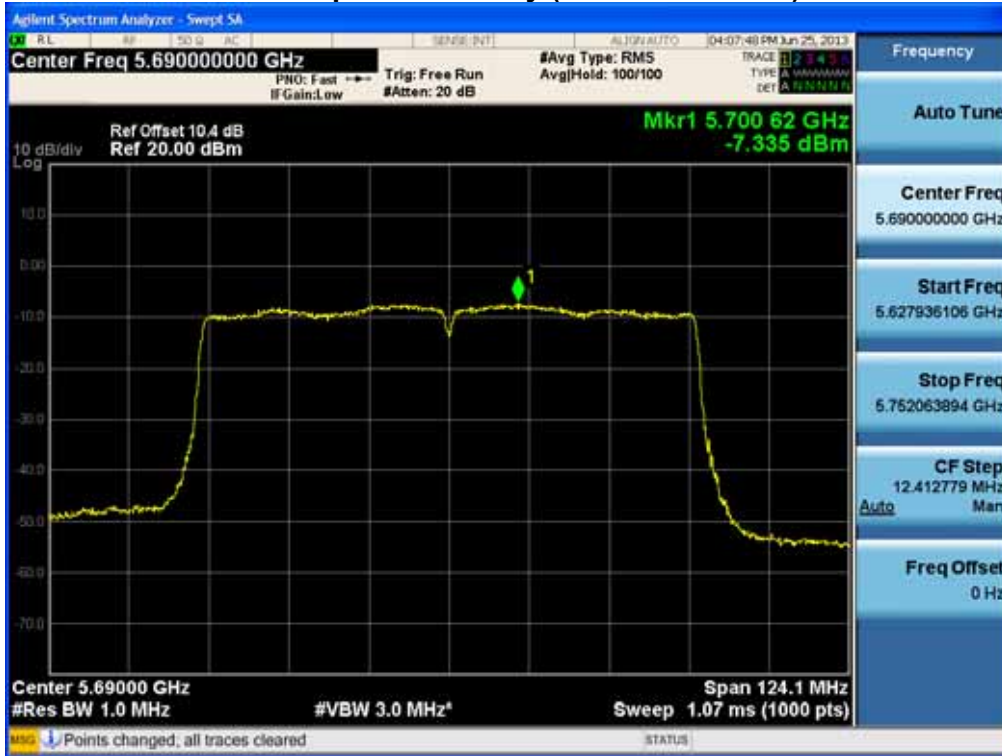
Power Spectral Density (802.11ac-CH 46)



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|-----------------------------------|---------------------------------|--|---|
| FCC PT.15.247 TEST REPORT | FCC CERTIFICATION REPORT | | www.hct.co.kr |
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80 MHz BW

Power Spectral Density (802.11ac-CH 138)

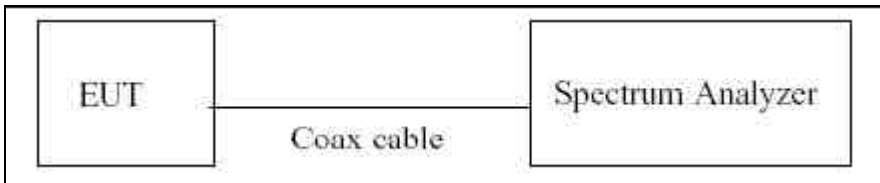


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| FCC PT.15.247 TEST REPORT | FCC CERTIFICATION REPORT | | www.hct.co.kr |
| Test Report No. HCTR1306FR25-1 | Date of Issue: July 30, 2013 | EUT Type: Cellular/PCS GSM/GPRS/WCDMA/HSDPA/HSUPA Phone with Bluetooth, WLAN and NFC(Felica) | FCC ID: ZNFL01F |

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.

| | | | | |
|-----------------------------------|---------------------------------|--|---|--|
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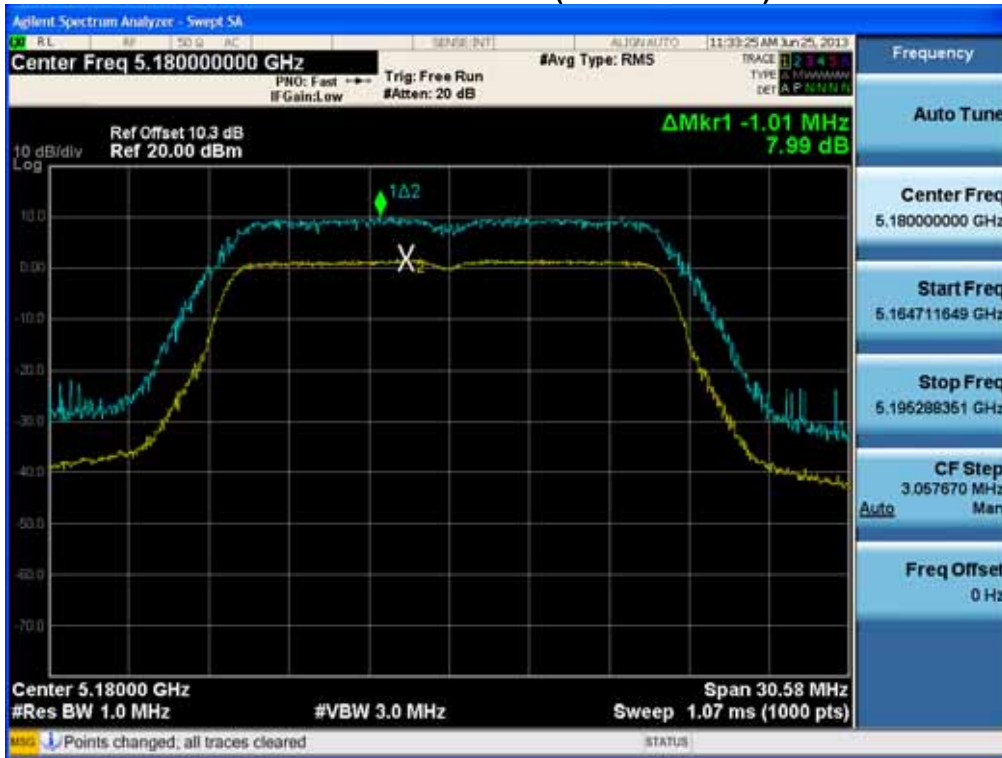
| Band | Frequency(MHz) | Loss(dB) |
|---------|----------------|----------|
| UNII 1 | 5180 | 10.30 |
| | 5190 | 10.29 |
| | 5200 | 10.28 |
| | 5230 | 10.29 |
| | 5240 | 10.34 |
| UNII 2 | 5260 | 10.37 |
| | 5270 | 10.38 |
| | 5300 | 10.40 |
| | 5310 | 10.39 |
| | 5320 | 10.39 |
| UNII 2e | 5500 | 10.35 |
| | 5510 | 10.36 |
| | 5550 | 10.41 |
| | 5580 | 10.43 |
| | 5670 | 10.43 |
| | 5700 | 10.30 |

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

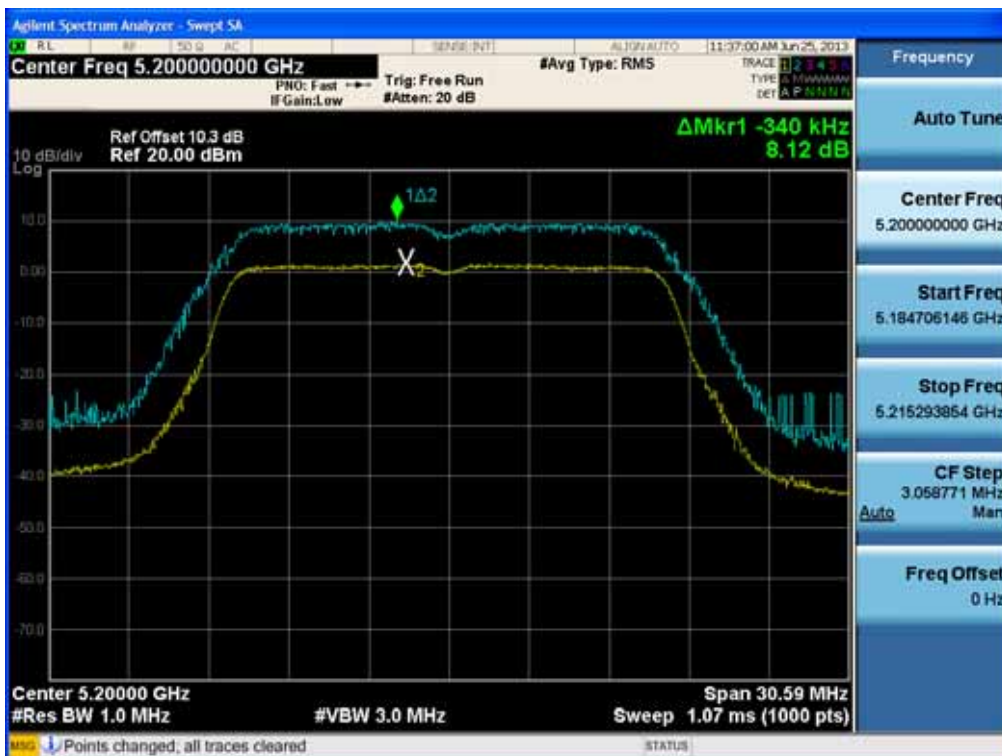
| | | | | |
|--|--|---|---|--|
| FCC PT.15.247 TEST REPORT | | FCC CERTIFICATION REPORT | | www.hct.co.kr |
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RESULT PLOTS

Peak Excursion Ratio (802.11a-CH 36)

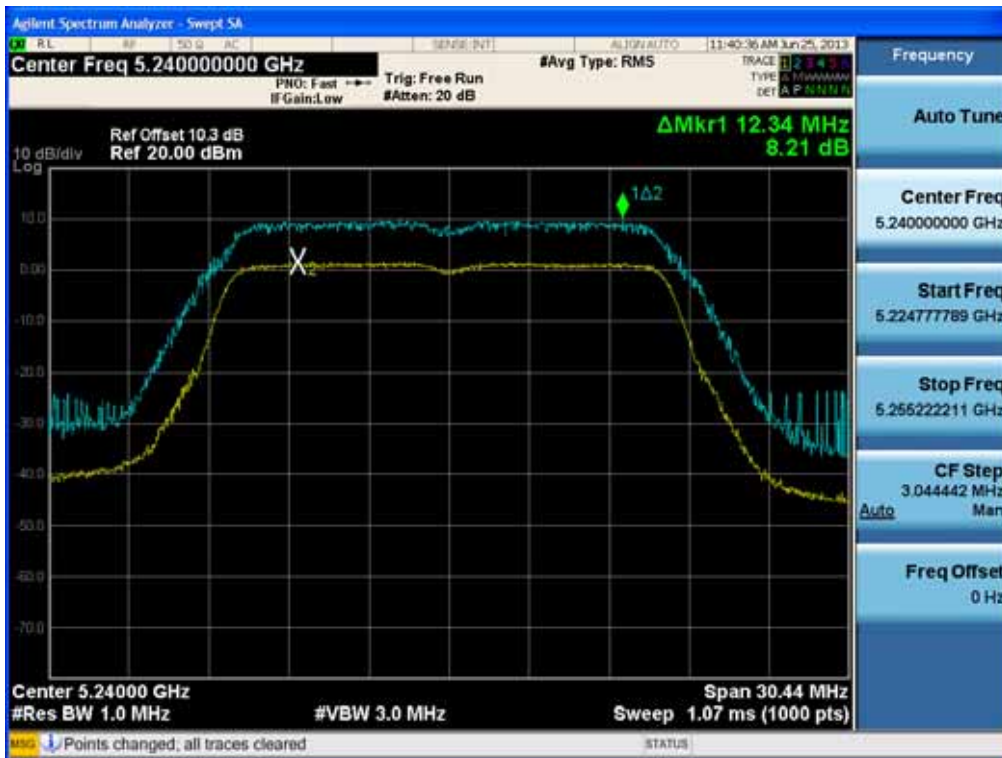


Peak Excursion Ratio (802.11a-CH 40)

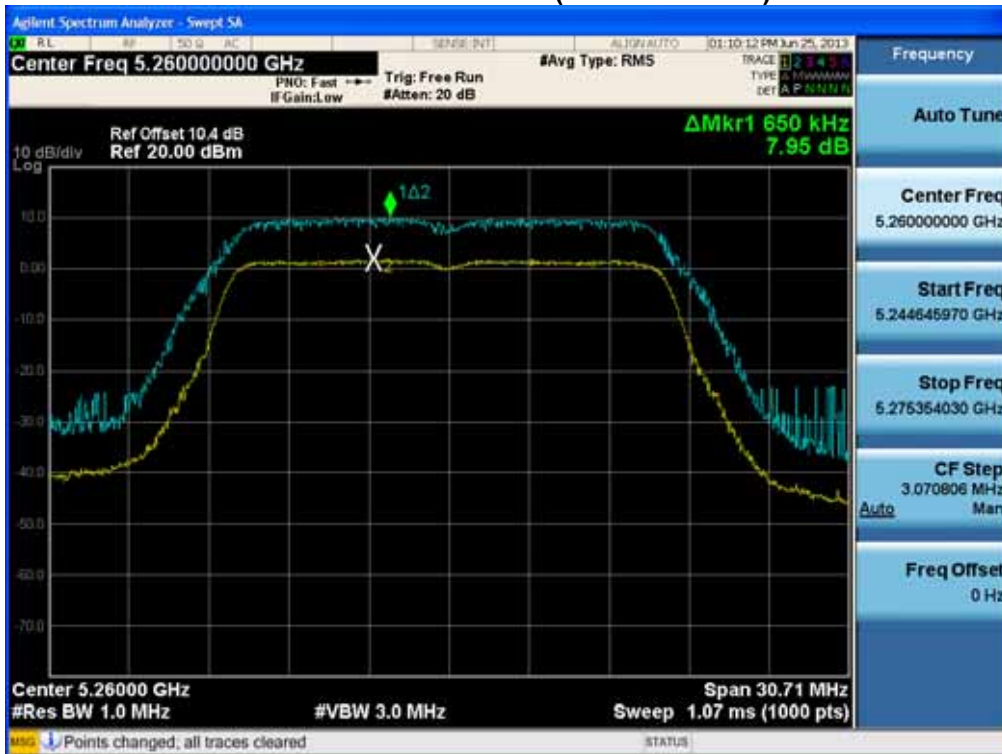


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|-----------------------------------|---------------------------------|--|---|--|
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Peak Excursion Ratio (802.11a-CH 48)

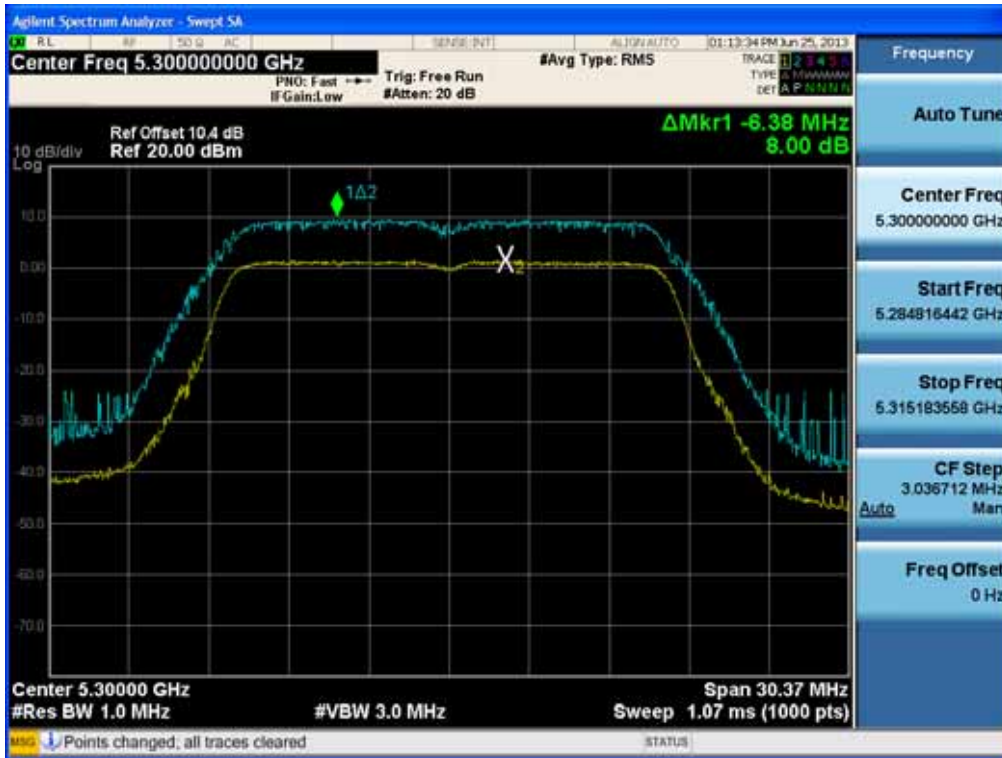


Peak Excursion Ratio (802.11a-CH 52)

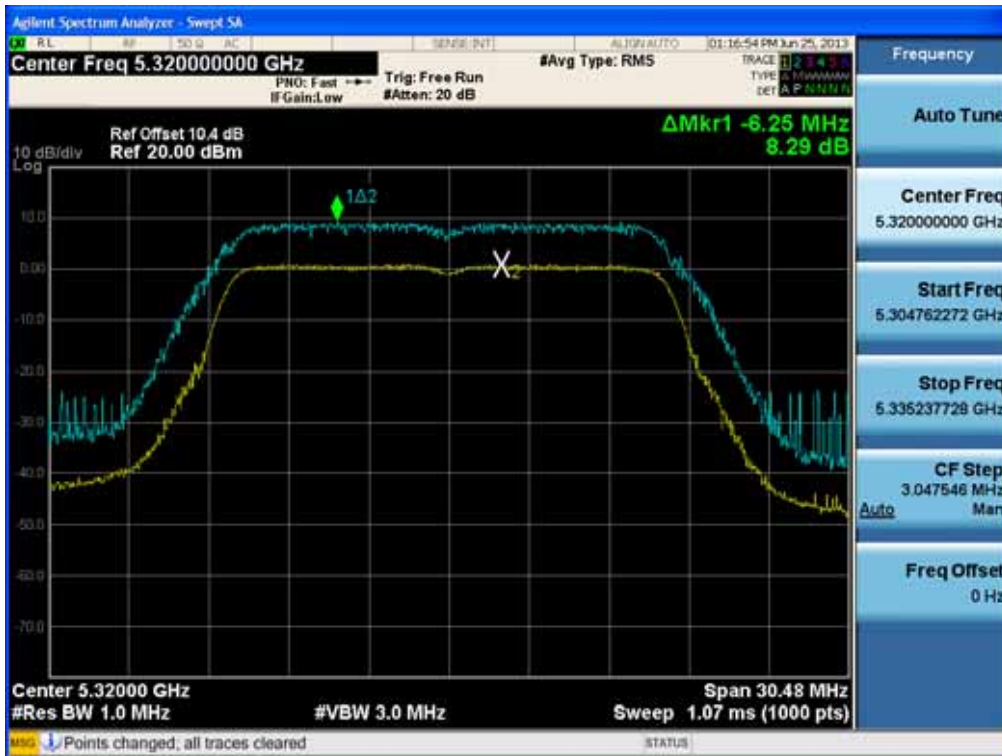


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Peak Excursion Ratio (802.11a-CH 60)

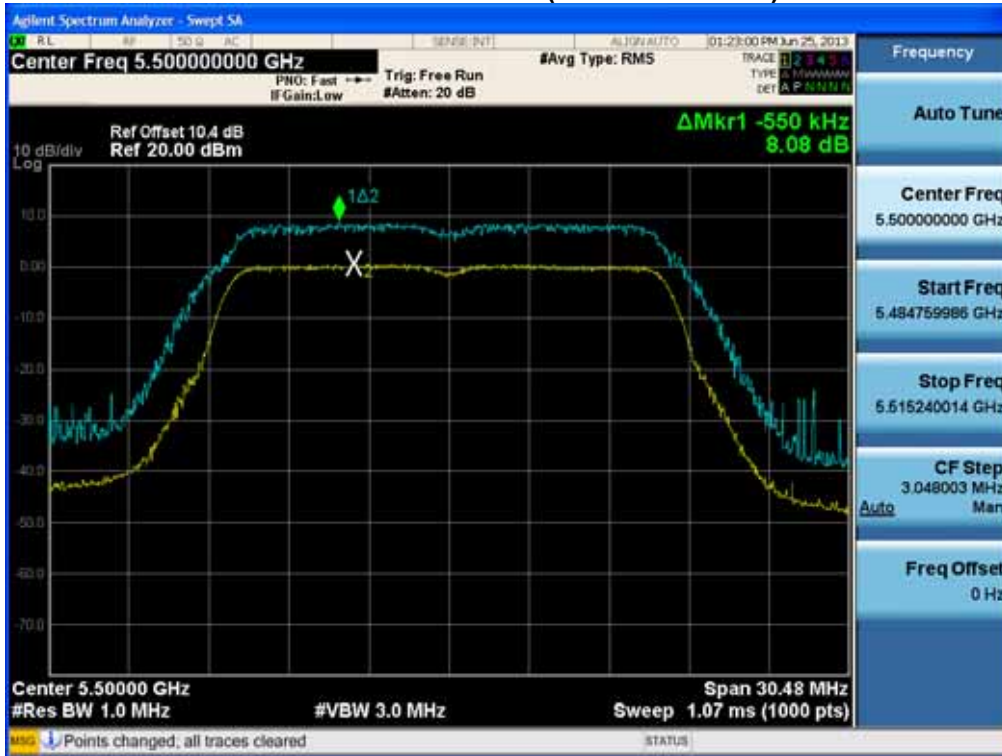


Peak Excursion Ratio (802.11a-CH 64)

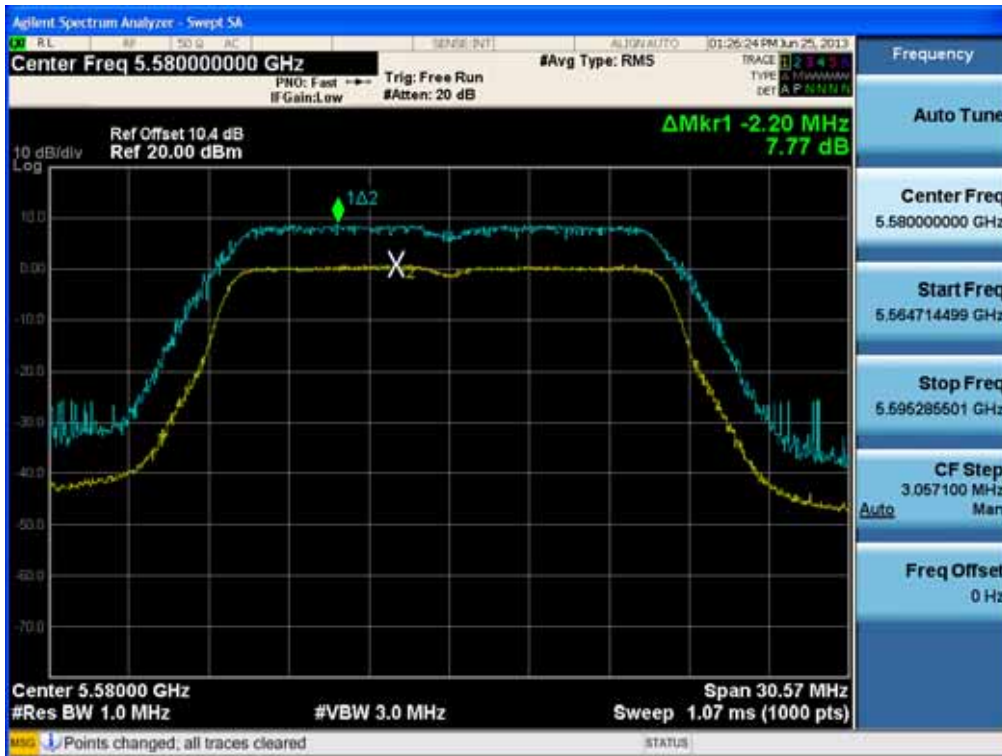


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Peak Excursion Ratio (802.11a-CH 100)



Peak Excursion Ratio (802.11a-CH 116)



| | | | |
|-----------------------------------|---------------------------------|--|--|
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Peak Excursion Ratio (802.11a-CH 140)

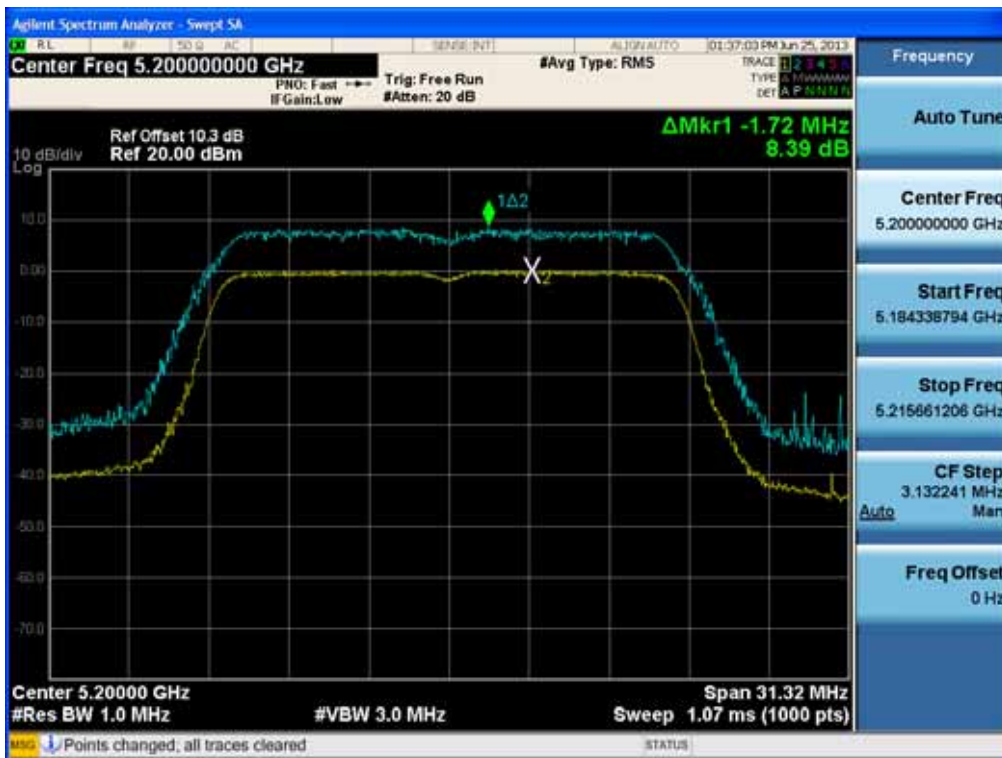


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|-----------------------------------|---------------------------------|--|---|--|
| FCC PT.15.247 TEST REPORT | | FCC CERTIFICATION REPORT | | www.hct.co.kr |
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Peak Excursion Ratio (802.11n-CH 36)



Peak Excursion Ratio (802.11n-CH 40)

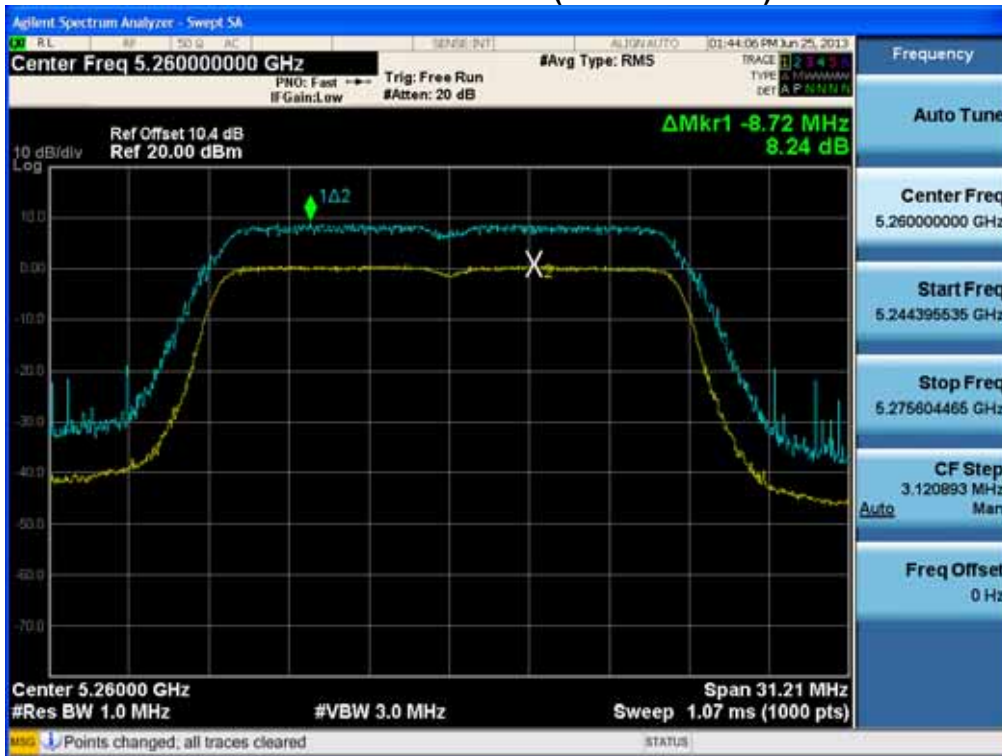


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Peak Excursion Ratio (802.11n-CH 48)

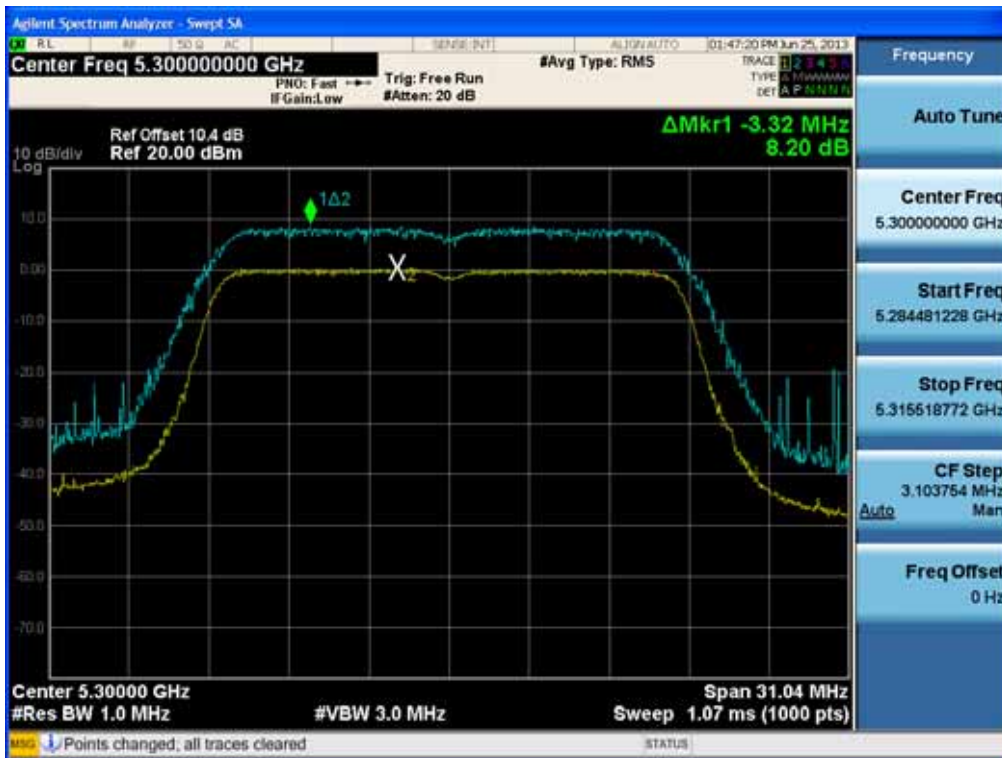


Peak Excursion Ratio (802.11n-CH 52)



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| FCC PT.15.247 TEST REPORT | FCC CERTIFICATION REPORT | | www.hct.co.kr |
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Peak Excursion Ratio (802.11n-CH 60)

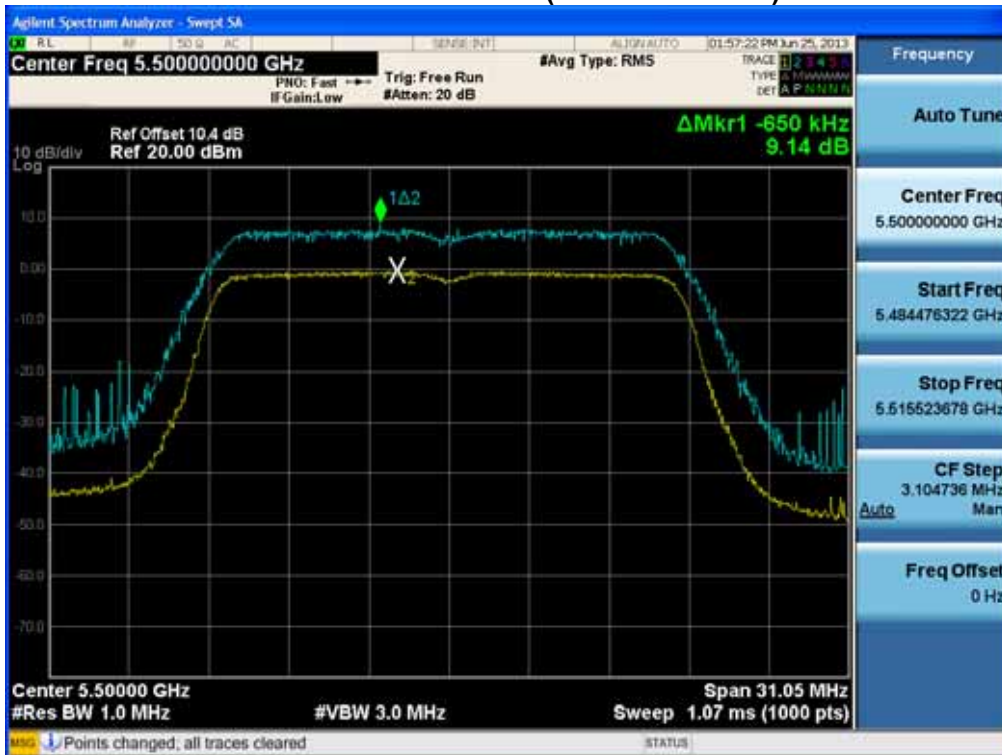


Peak Excursion Ratio (802.11n-CH 64)



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|-----------------------------------|---------------------------------|--|---|
| FCC PT.15.247 TEST REPORT | FCC CERTIFICATION REPORT | | www.hct.co.kr |
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Peak Excursion Ratio (802.11n-CH 100)



Peak Excursion Ratio (802.11n-CH 116)



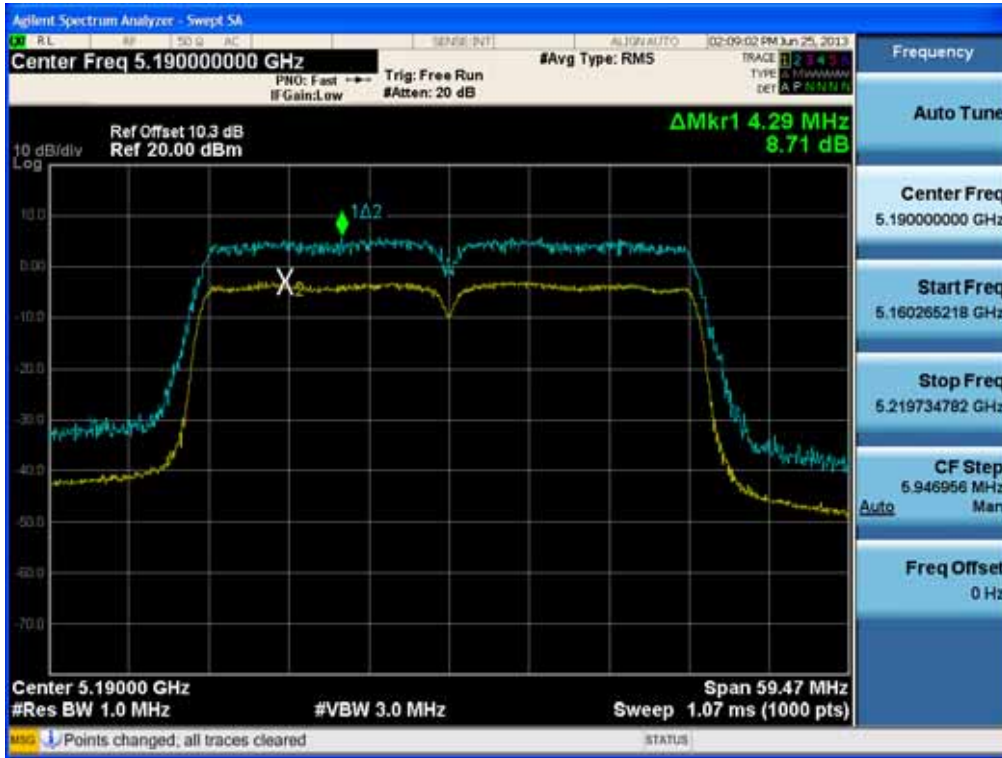
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Peak Excursion Ratio (802.11n-CH 140)

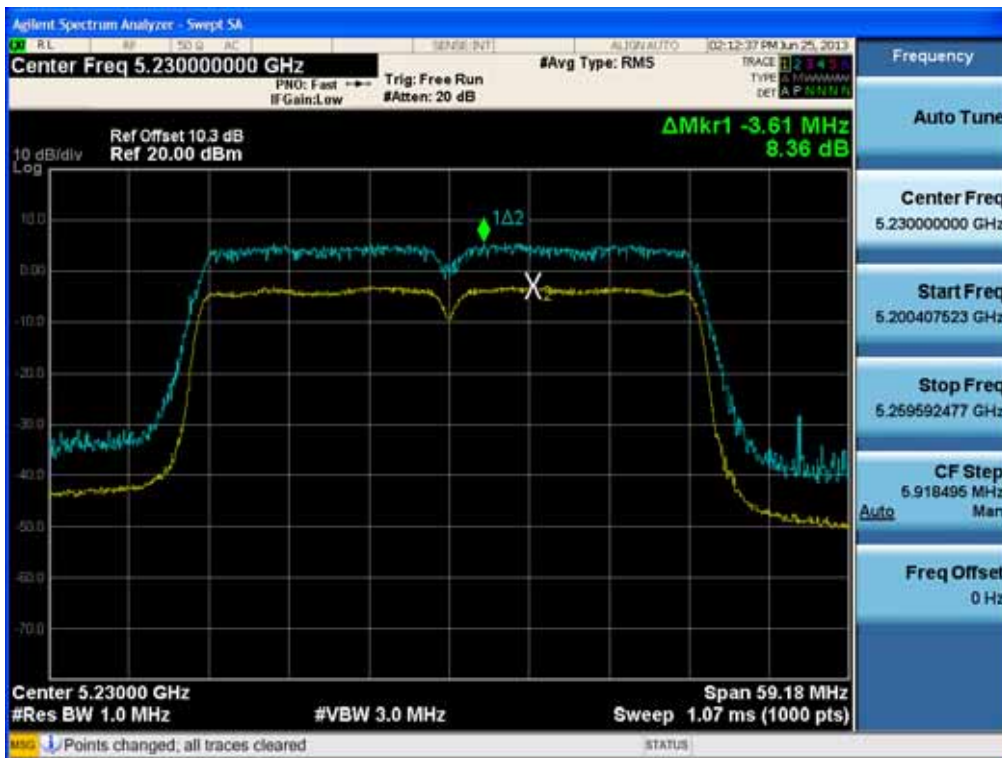


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Peak Excursion Ratio (802.11n-CH 38)

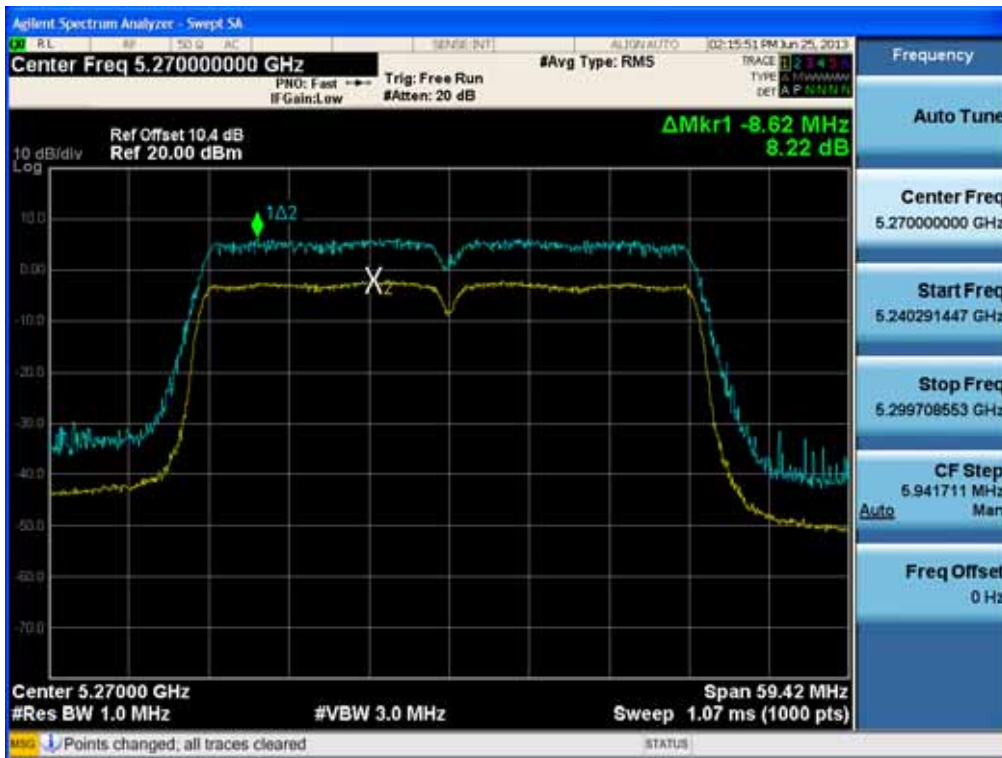


Peak Excursion Ratio (802.11n-CH 46)

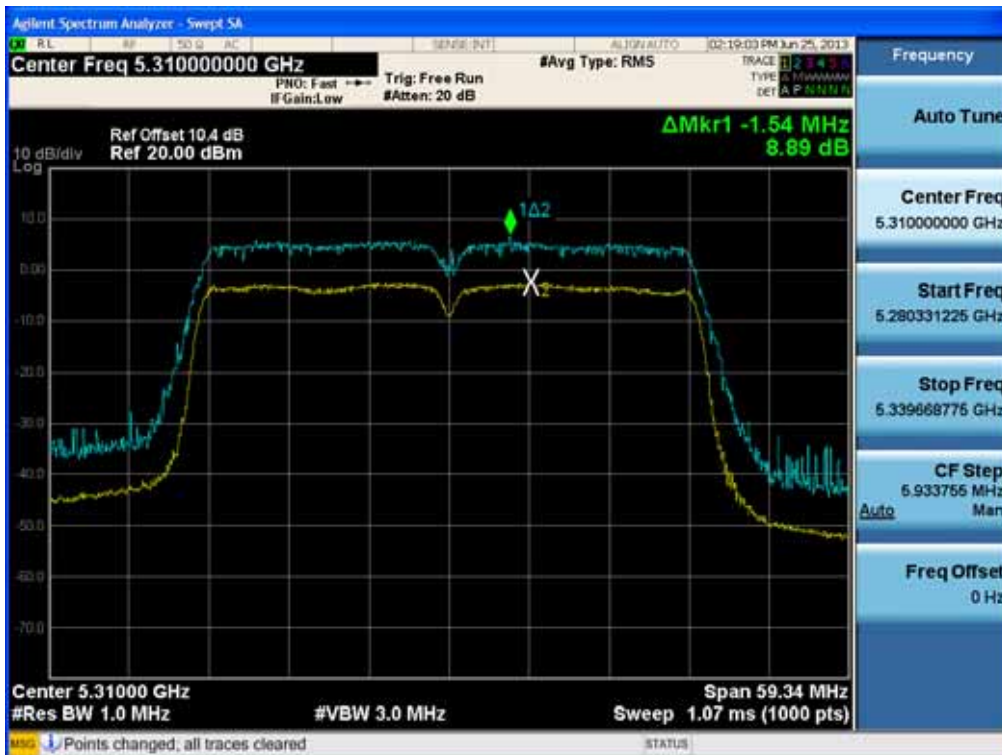


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|-----------------------------------|---------------------------------|--|---|--|
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Peak Excursion Ratio (802.11n-CH 54)

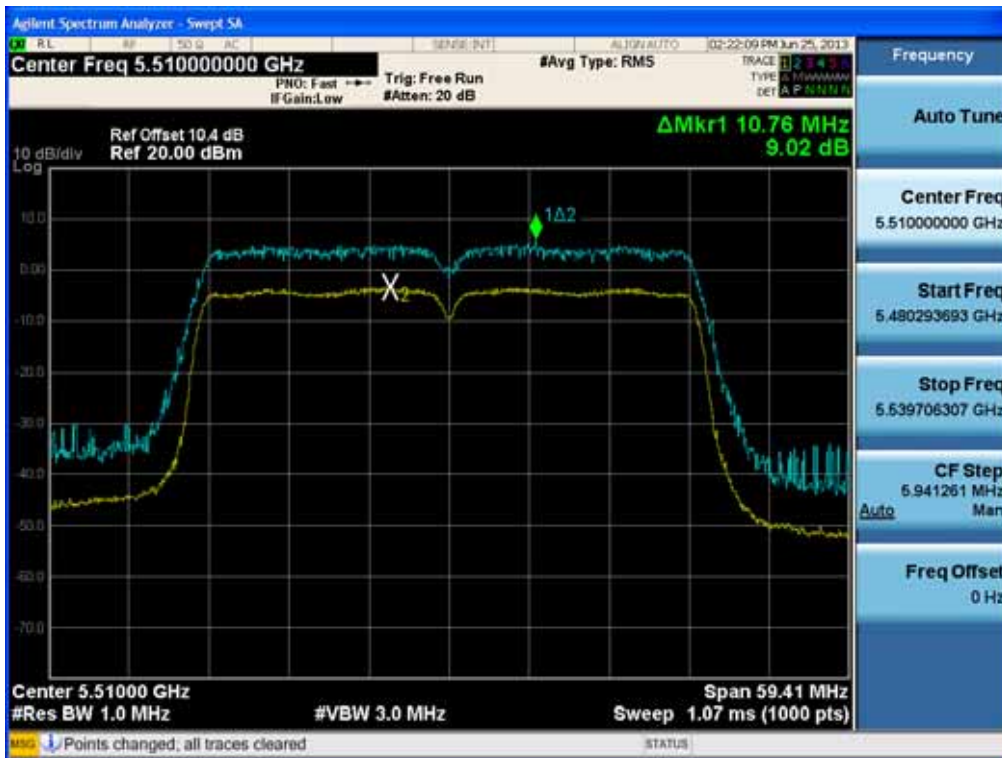


Peak Excursion Ratio (802.11n-CH 62)

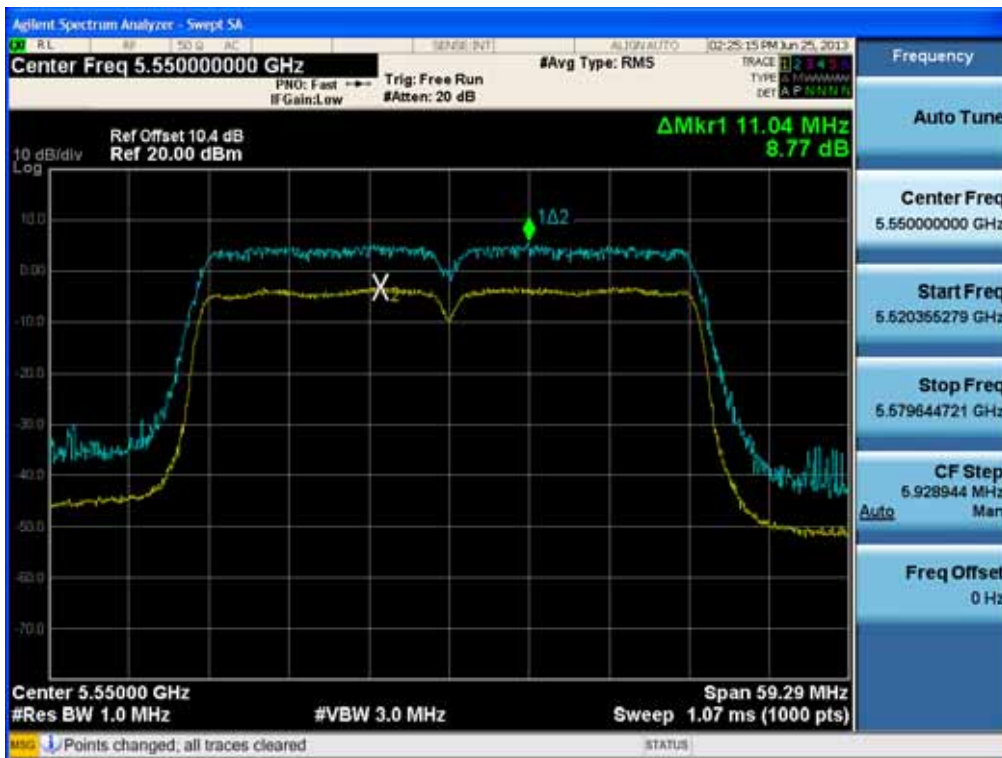


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Peak Excursion Ratio (802.11n-CH 102)

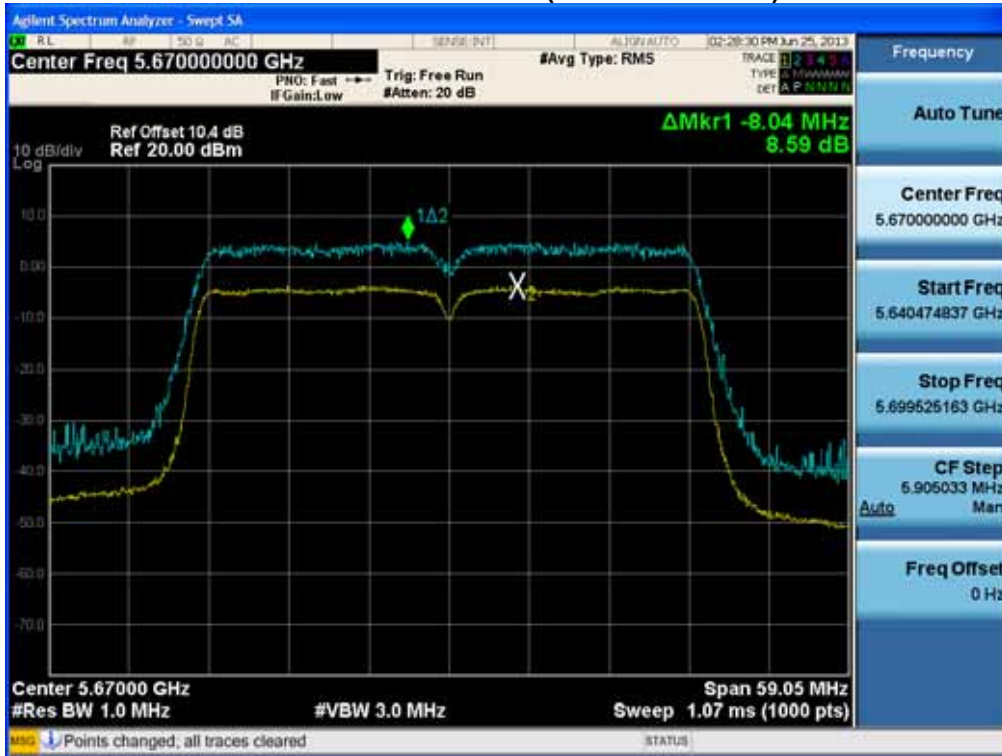


Peak Excursion Ratio (802.11n-CH 110)



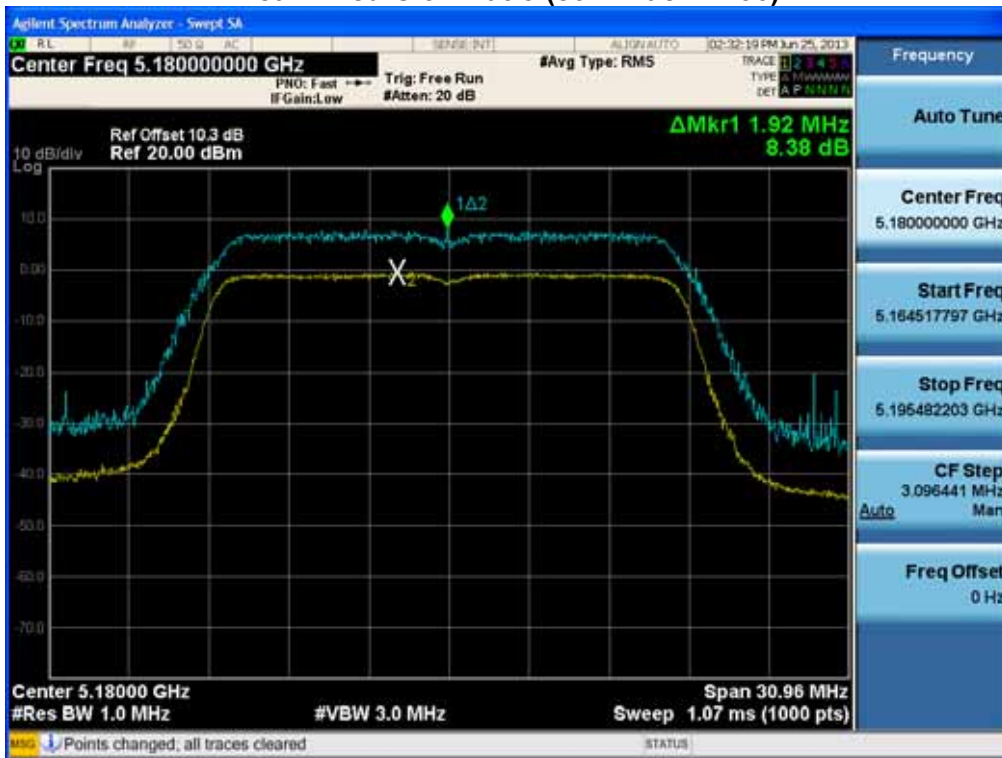
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| FCC PT.15.247 TEST REPORT | FCC CERTIFICATION REPORT | | www.hct.co.kr |
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Peak Excursion Ratio (802.11n-CH 134)

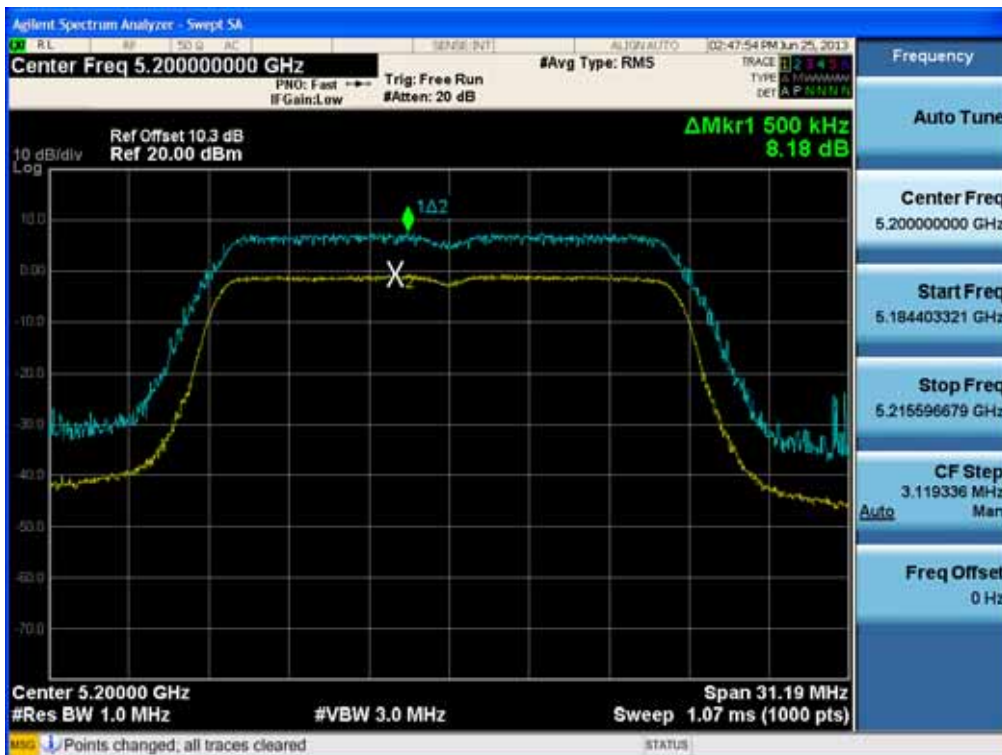


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|-----------------------------------|---------------------------------|--|---|--|
| FCC PT.15.247 TEST REPORT | | FCC CERTIFICATION REPORT | | www.hct.co.kr |
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Peak Excursion Ratio (802.11ac-CH 36)



Peak Excursion Ratio (802.11ac-CH 40)

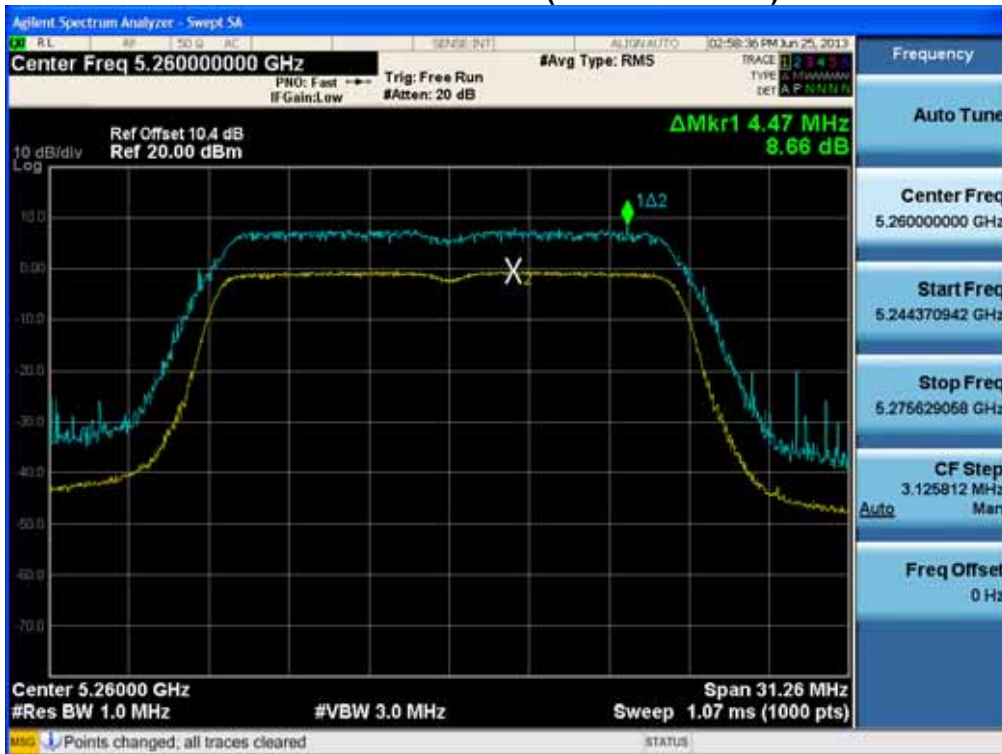


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|-----------------------------------|---------------------------------|--|--|
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Peak Excursion Ratio (802.11ac-CH 48)

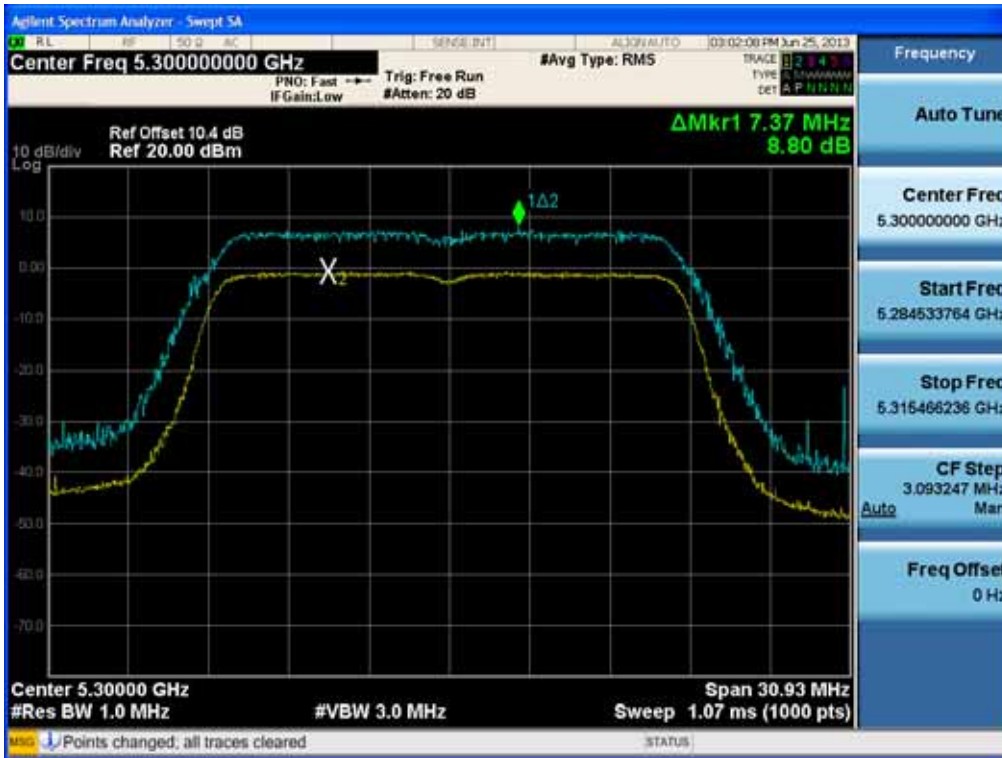


Peak Excursion Ratio (802.11ac-CH 52)

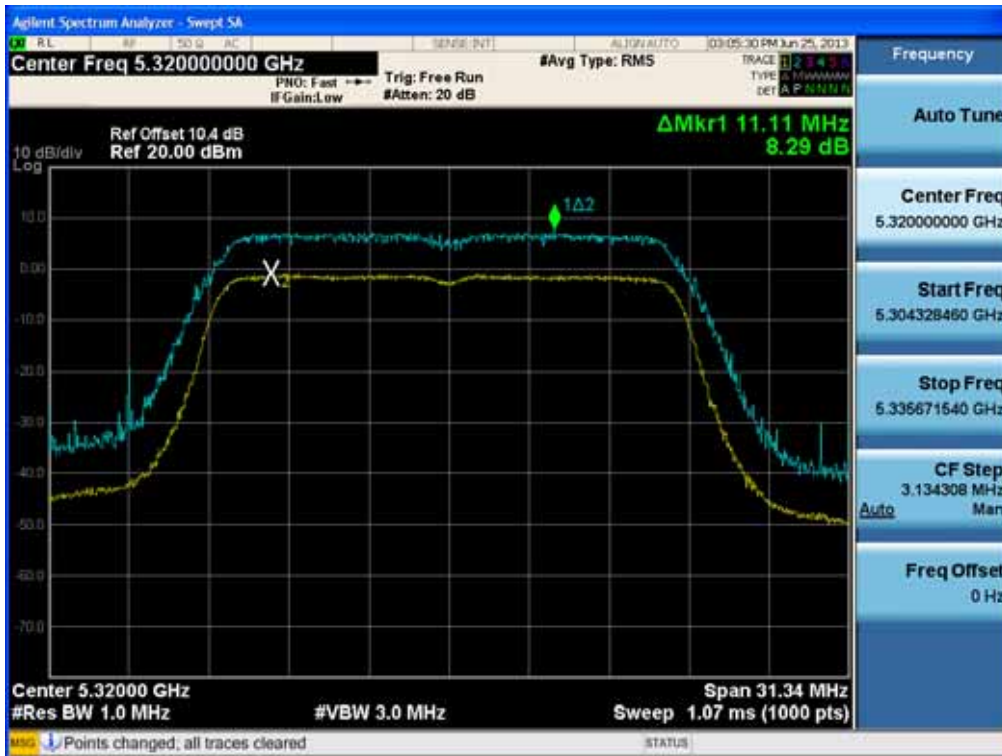


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| Test Report No. HCTR1306FR25-1 | Date of Issue: July 30, 2013 | EUT Type: Cellular/PCS NFC(Felica) | GSM/GPRS/WCDMA/HSDPA/HSUPA Phone with Bluetooth, WLAN and FCC ID: ZNFL01F |

Peak Excursion Ratio (802.11ac-CH 60)

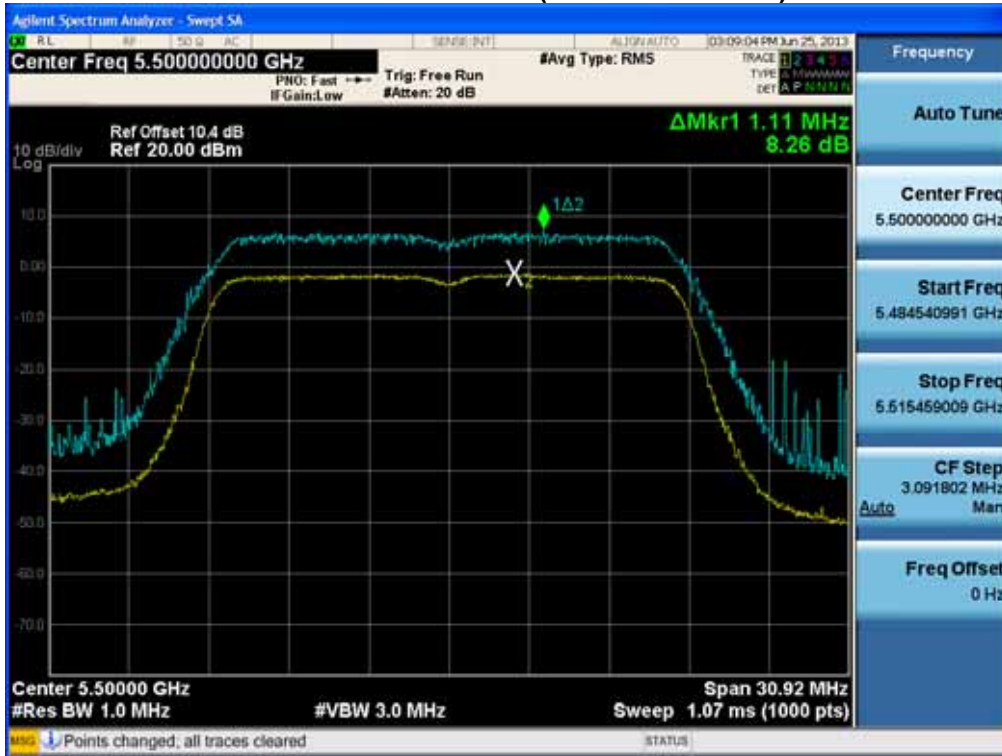


Peak Excursion Ratio (802.11ac-CH 64)



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|-----------------------------------|---------------------------------|--|---|
| FCC PT.15.247 TEST REPORT | FCC CERTIFICATION REPORT | | www.hct.co.kr |
| Test Report No. HCTR1306FR25-1 | Date of Issue: July 30, 2013 | EUT Type: Cellular/PCS NFC(Felica) | GSM/GPRS/WCDMA/HSDPA/HSUPA Phone with Bluetooth, WLAN and FCC ID: ZNFL01F |

Peak Excursion Ratio (802.11ac-CH 100)



Peak Excursion Ratio (802.11ac-CH 116)



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|-----------------------------------|---------------------------------|--|--|
| FCC PT.15.247 TEST REPORT | FCC CERTIFICATION REPORT | | www.hct.co.kr |
| Test Report No. HCTR1306FR25-1 | Date of Issue: July 30, 2013 | EUT Type: Cellular/PCS NFC(Felica) GSM/GPRS/WCDMA/HSDPA/HSUPA Phone with Bluetooth, WLAN and | FCC ID: ZNFL01F |