# ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR LOW-POWER, NON-LICENSED TRANSMITTER

| | |
|---|---|
| **Test Report No.** | **: W153R-D014** |
| **AGR No.** | **: A152A-125** |
| **Applicant** | **: LG Innotek Co., Ltd.** |
| **Address** | **: 978-1, Jangduk-dong, Gwangsan-gu, Gwangju, Korea. 506-731** |
| **Manufacturer** | **: LG Innotek Co., Ltd.** |
| **Address** | **: 978-1, Jangduk-dong, Gwangsan-gu, Gwangju, Korea. 506-731** |
| **Type of Equipment** | **: Wi-Fi module** |
| **FCC ID.** | **: YZP-TWFMK001D** |
| **Model Name** | **: TWFM-K001D** |
| **Multiple Model Name** | **: TWFM-K002D, TWFM-K003D** |
| **Serial number** | **: N/A** |
| **Total page of Report** | **: 292 pages (including this page)** |
| **Date of Incoming** | **: February 13, 2015** |
| **Date of issue** | **: March 23, 2015** |

## SUMMARY

The equipment complies with the regulation; ***FCC PART 15 SUBPART E Section 15.407***

This test report only contains the result of a single test of the sample supplied for the examination.

It is not a generally valid assessment of the features of the respective products of the mass-production.

Reviewed by: Ki-Hong, Nam / Asst, Chief Engineer
ONETECH Corp.

Approved by: Sung-Ik, Han/ Managing Director
ONETECH Corp.

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**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

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# Revision History

| Issued Report No. | Issued Date | Revisions | Effect Section |
|---|---|---|---|
| W153R-D014 | March 23, 2015 | Initial Issue | All |
| | | | |
| | | | |
| | | | |

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# 1. VERIFICATION OF COMPLIANCE

| | |
|---|---|
| Applicant | : LG Innotek Co., Ltd. |
| Address | : 978-1, Jangduk-dong, Gwangsan-gu, Gwangju, Korea. 506-731 |
| Contact Person | : IC Jeong / Senior engineer |
| Telephone No. | : +82-62-950-0332 |
| FCC ID | : YZP-TWFMK001D |
| Model Name | : TWFM-K001D |
| Serial Number | : N/A |
| Date | : March 23, 2015 |

| | |
|---|---|
| EQUIPMENT CLASS | Unlicensed National Information infrastructure(UNII) |
| E.U.T. DESCRIPTION | Modular Transmitter, Wi-Fi module |
| THIS REPORT CONCERNS | Original Grant |
| MEASUREMENT PROCEDURES | ANSI C63.10: 2013 |
| TYPE OF EQUIPMENT TESTED | Pre-Production |
| KIND OF EQUIPMENT AUTHORIZATION REQUESTED | Certification |
| EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S) | FCC PART 15 SUBPART E Section 15.407 |
| Modifications on the Equipment to Achieve Compliance | None |
| Final Test was Conducted On | 3 m, Semi Anechoic Chamber |

-. The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

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# 2. TEST SUMMARY

## 2.1 Test items and results

| SECTION | TEST ITEMS | RESULTS |
|---|---|---|
| 15.407(a) | 26 dB Bandwidth | PASS |
| 15.407(a) | Maximum Conducted Output Power | Met the Limit / PASS |
| 15.407(a) | Peak Power Spectral Density | Met the Limit / PASS |
| 15.407(a) | Peak Excursion | Met the Limit / PASS |
| 15.407(g) | Frequency Stability | Met the Limit / PASS |
| 15.407(b) | Undesirable Emissions | Met the Limit / PASS |
| 15.205, 15.407(b) | General Field Strength Limits<br>(Restricted Bandsand Radiated Emission Limits) | Met the Limit / PASS |
| 15.207 | AC Conducted Emissions 150 kHz-30 MHz | Met the Limit / PASS |
| 15.407(h) | Dynamic frequency Selection | Met the Limit / PASS |

## 2.2 Additions, deviations, exclusions from standards

No additions, deviations or exclusions have been made from standard.

## 2.3 Related Submittal(s) / Grant(s)

Original submittal only

## 2.4 Purpose of the test

To determine whether the equipment under test fulfills the requirements of the regulation stated in FCC PART 15 SUBPART E Section 15.407

## 2.5 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10: 2013. Radiated testing was performed at a distance of 3 m from EUT to the antenna.

## 2.6 Test Facility

The Onetech Corp. has been designated to perform equipment testing in compliance with ISO/IEC 17025.

The Electromagnetic compatibility measurement facilities are located at 301-14, Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do, 464-862 Korea.

-. Site Filing:

VCCI (Voluntary Control Council for Interference) – Registration No. R-4112/ C-4617/ G-666/ T-1842 IC (Industry Canada) – Registration No. Site# 3736-3

-. Site Accreditation:

KOLAS (Korea Laboratory Accreditation Scheme) - Accreditation No. 85

FCC (Federal Communications Commission) - Accreditation No. KR0013

RRA (Radio Research Agency) – Designation No. KR0013

# 3. GENERAL INFORMATION

## 3.1 Product Description

The LG Innotek Co., Ltd., Model TWFM-K001D (referred to as the EUT in this report) is a Wi-Fi module. Product specification information described herein was obtained from product data sheet or user's manual.

<table>
<tr><td>DEVICE TYPE</td><td colspan="3">Wi-Fi module</td></tr>
<tr><td rowspan="8">FREQUENCY RANGE</td><td colspan="2" rowspan="2">5 150 MHz ~ 5 250 MHz Band</td><td>5 180 MHz ~ 5 240 MHz_20 MHz BW</td></tr>
<tr><td>5 190 MHz ~ 5 230 MHz_40 MHz BW</td></tr>
<tr><td colspan="2" rowspan="2">5 250 MHz ~ 5 350 MHz Band</td><td>5 260 MHz ~ 5 320 MHz_20 MHz BW</td></tr>
<tr><td>5 270 MHz ~ 5 310 MHz_40 MHz BW</td></tr>
<tr><td colspan="2" rowspan="2">5 470 MHz ~ 5 725 MHz Band</td><td>5 500 MHz ~ 5 700 MHz_20 MHz BW</td></tr>
<tr><td>5 510 MHz ~ 5 670 MHz_40 MHz BW</td></tr>
<tr><td colspan="2" rowspan="2">5 725 MHz ~ 5 850 MHz Band</td><td>5 745 MHz ~ 5 825 MHz_20 MHz BW</td></tr>
<tr><td>5 755 MHz ~ 5 795 MHz_40 MHz BW</td></tr>
<tr><td rowspan="4">MAX. RF OUTPUT POWER</td><td rowspan="4">Ant.0</td><td>5 150 MHz ~ 5 250 MHz Band</td><td>Wi-Fi 802.11a (10.31 dBm)<br>Wi-Fi 802.11n_20 MHz (9.58 dBm)<br>Wi-Fi 802.11n_40 MHz (7.83 dBm)</td></tr>
<tr><td>5 250 MHz ~ 5 350 MHz Band</td><td>Wi-Fi 802.11a (10.43 dBm)<br>Wi-Fi 802.11n_20 MHz (9.97 dBm)<br>Wi-Fi 802.11n_40 MHz (7.70 dBm)</td></tr>
<tr><td>5 470 MHz ~ 5 725 MHz Band</td><td>Wi-Fi 802.11a (10.23 dBm)<br>Wi-Fi 802.11n_20 MHz (9.55 dBm)<br>Wi-Fi 802.11n_40 MHz (7.97 dBm)</td></tr>
<tr><td>5 725 MHz ~ 5 850 MHz Band</td><td>Wi-Fi 802.11a (9.60 dBm)<br>Wi-Fi 802.11n_20 MHz (8.94 dBm)<br>Wi-Fi 802.11n_40 MHz (7.46 dBm)</td></tr>
</table>

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| | | | |
|---|---|---|---|
| MAX. RF OUTPUT POWER | Ant.1 | 5 150 MHz ~ 5 250 MHz Band | Wi-Fi 802.11a (9.64 dBm)<br>Wi-Fi 802.11n_20 MHz (8.70 dBm)<br>Wi-Fi 802.11n_40 MHz (6.98 dBm) |
| | | 5 250 MHz ~ 5 350 MHz Band | Wi-Fi 802.11a (9.29 dBm)<br>Wi-Fi 802.11n_20 MHz (8.27 dBm)<br>Wi-Fi 802.11n_40 MHz (7.13 dBm) |
| | | 5 470 MHz ~ 5 725 MHz Band | Wi-Fi 802.11a (11.15 dBm)<br>Wi-Fi 802.11n_20 MHz (9.77 dBm)<br>Wi-Fi 802.11n_40 MHz (9.43 dBm) |
| | | 5 725 MHz ~ 5 850 MHz Band | Wi-Fi 802.11a (10.87 dBm)<br>Wi-Fi 802.11n_20 MHz (9.68 dBm)<br>Wi-Fi 802.11n_40 MHz (8.65 dBm) |
| MODULATION TYPE | 802.11a/g/n(HT20)/n(HT40): OFDM Modulation(BPSK/QPSK/16QAM/64QAM) | | |
| Antenna Gain | 2.4 GHz Band | Antenna 0 : 1.03 dBi | |
| | | Antenna 1 : 1.01 dBi | |
| | 5 GHz Band | Antenna 0 : 1.05 dBi | |
| | | Antenna 1 : 1.31 dBi | |
| List of each Osc. or crystal Freq.(Freq. >= 1 MHz) | 40 MHz | | |

### 3.2 Alternative type(s)/model(s); also covered by this test report.

-. The following lists consist of the added model and their differences.

| Model Name | Differences | Tested |
|---|---|---|
| TWFM-K001D | Basic Model | ☑ |
| TWFM-K002D,<br>TWFM-K003D | These models are identical to basic model except for the model name only. | ☐ |

Note: 1. Applicant consigns only basic model to test. Therefore this test report just guarantees the units, which have been tested.

2. The Applicant/manufacturer is responsible for the compliance of all variants.

## 4. EUT MODIFICATIONS

-. None


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# 5. SYSTEM TEST CONFIGURATION

## 5.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

| DEVICE TYPE | MANUFACTURER | MODEL/PART NUMBER | FCC ID |
|---|---|---|---|
| Main Board | LG Innotek Co., Ltd. | TWFM-K001D | N/A |

## 5.2 Peripheral equipment

**Defined as equipment needed for correct operation of the EUT, but not considered as tested:**

| Model | Manufacturer | Description | Connected to |
|---|---|---|---|
| TWFM-K001D | LG Innotek Co., Ltd. | Wi-Fi module (EUT) | Note PC |
| LGR51 | LG Electronics | Notebook PC | EUT |


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## 5.3 Mode of operation during the test

For the testing, software used to control the EUT for staying in continuous transmitting mode is programmed.

The worse case data rate for each modulation is determined 6 Mbps(Ant.0) / 6 Mbps(Ant.1) for IEEE 802.11a, 6.5 Mbps(Ant.0) / 6.5 Mbps(Ant.1) for HT20, 13 Mbps(Ant.0) / 13 Mbps(Ant.1) for HT40.

- To get a maximum emission levels from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes and the worst case is “XY” axis.

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## 5.4 Configuration of Test System

**Line Conducted Test**: The EUT was connected to USB and the power of USB was connected to Notebook PC. All supporting equipments were connected to another LISN. Preliminary Power line Conducted Emission test was performed by using the procedure in ANSI C63.10: 2013 to determine the worse operating conditions.

**Radiated Emission Test**: Preliminary radiated emissions test were conducted using the procedure in ANSI C63.10: 2013 to determine the worse operating conditions. Final radiated emission tests were conducted at 3 meter open area test site.

The turntable was rotated through 360 degrees and the EUT was tested by positioned three orthogonal planes to obtain the highest reading on the field strength meter. Once maximum reading was determined, the search antenna was raised and lowered in both vertical and horizontal polarization.

## 5.5 Antenna Requirement

For intentional device, according to section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

**Antenna Construction:**

The transmitter antenna of the EUT is a PIFA antenna, so no consideration of replacement by the user.


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# 6. PRELIMINARY TEST

## 6.1 AC Power line Conducted Emissions Tests

During Preliminary Test, the following operating mode was investigated.

| Operation Mode | The Worse operating condition (Please check one only) |
|---|---|
| Transmitting Mode | X |

## 6.2 General Radiated Emissions Tests

During Preliminary Test, the following operating mode was investigated.

| Operation Mode | The Worse operating condition (Please check one only) |
|---|---|
| Transmitting Mode | X |

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# 7. MIMIMUM 26 dB BANDWIDTH

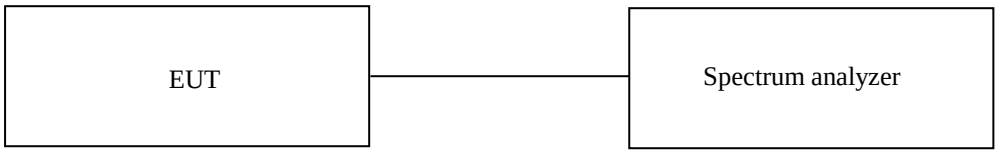
## 7.1 Operating environment

Temperature : 24 ℃

Relative humidity : 48 % R.H.

## 7.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz, and peak detection was used. The 26 dB bandwidth is defined as the total spectrum over which the power is higher than the peak power minus 26 dB.




## 7.3 Test equipment used

| | Model Number | Manufacturer | Description | Serial Number | Last Cal. |
|---|---|---|---|---|---|
| ■ - | FSV40 | Rohde & Schwarz | Signal Analyzer | 101009 | Jul. 30, 2014 (1Y) |

All test equipment used is calibrated on a regular basis.

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## 7.4.1 Test data for 802.11a RLAN Mode

### 7.4.1.1 Test data for Antenna 0

-. Test Date : March 11, 2015

-. Test Result : Pass

| FREQUENCY RANGE (MHz) | CHANNEL | FREQUENCY (MHz) | 26 dB Bandwidth (MHz) |
|---|---|---|---|
| 5 150 ~ 5 250 | Low | 5 180 | 19.10 |
| | Middle | 5 200 | 19.10 |
| | High | 5 240 | 19.10 |
| 5 250 ~ 5 350 | Low | 5 260 | 19.10 |
| | Middle | 5 300 | 19.02 |
| | High | 5 320 | 19.22 |
| 5 470 ~ 5 725 | Low | 5 500 | 19.18 |
| | Middle | 5 600 | 19.22 |
| | High | 5 700 | 19.22 |
| 5 725 ~ 5 850 | Low | 5 745 | 19.18 |
| | Middle | 5 785 | 19.10 |
| | High | 5 825 | 19.10 |

**Tested by: Tae-Ho, Kim / Senior Engineer**

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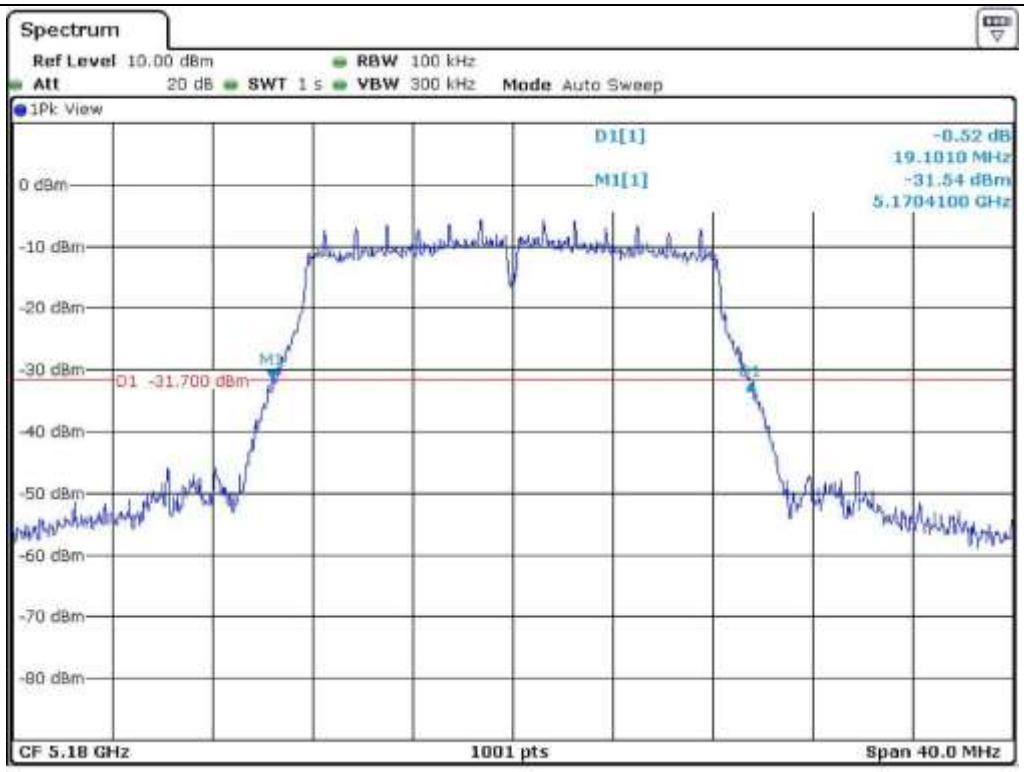
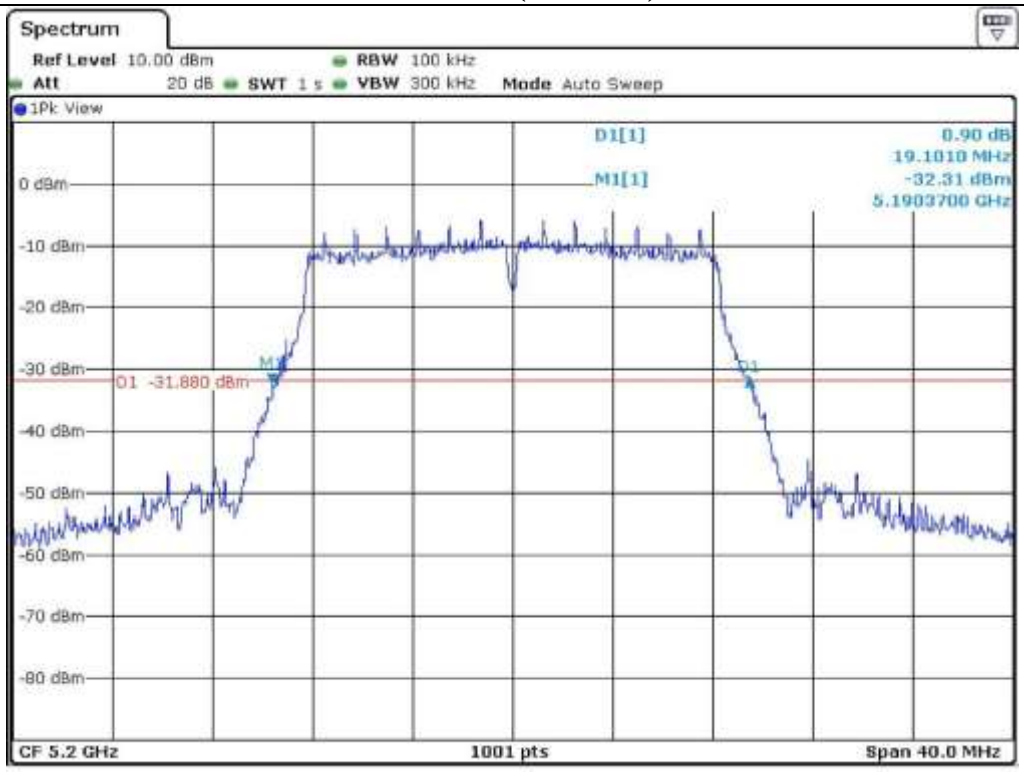



Low Channel (5 180 MHz)




Middle Channel (5 200 MHz)



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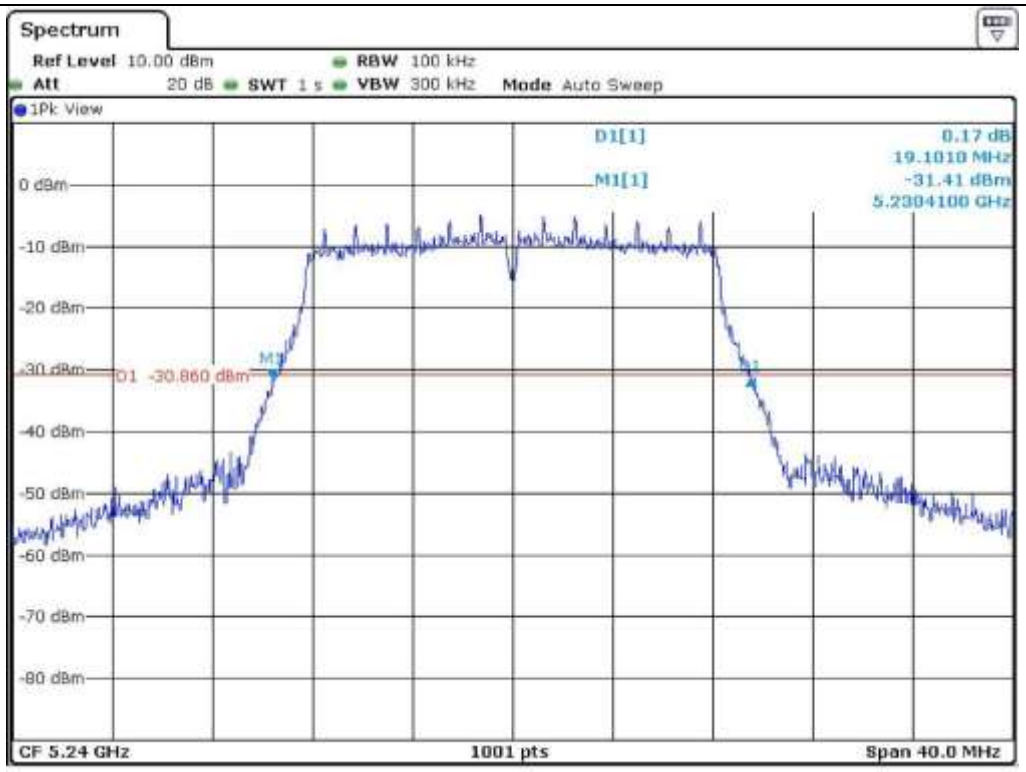


High Channel (5 240 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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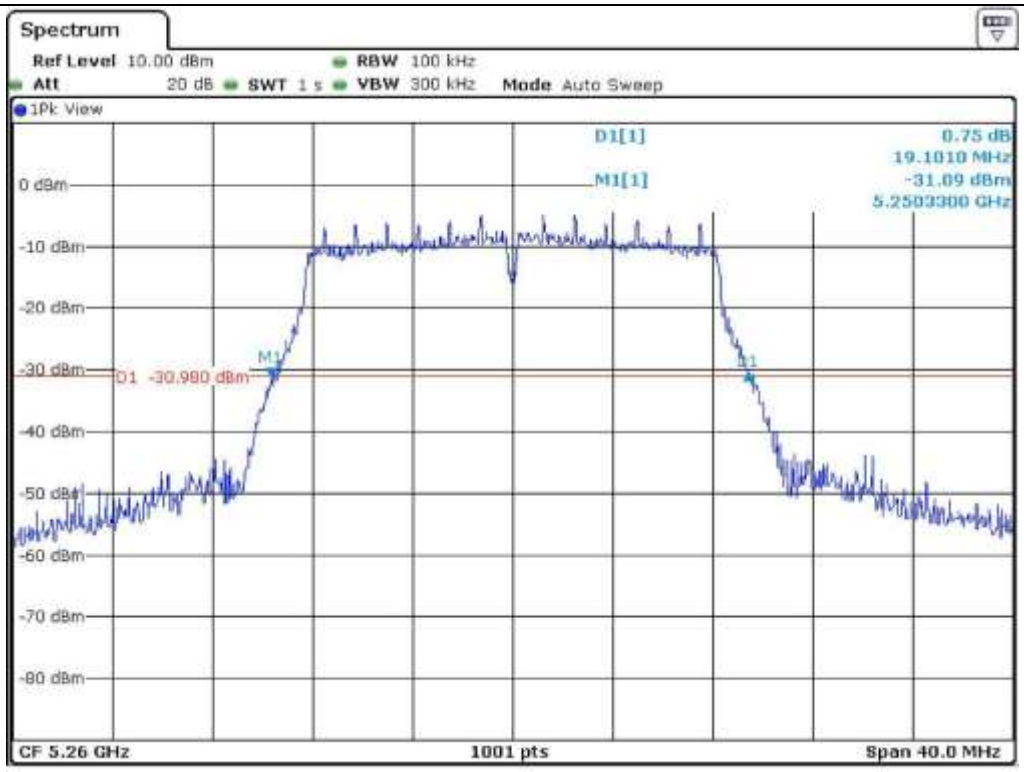
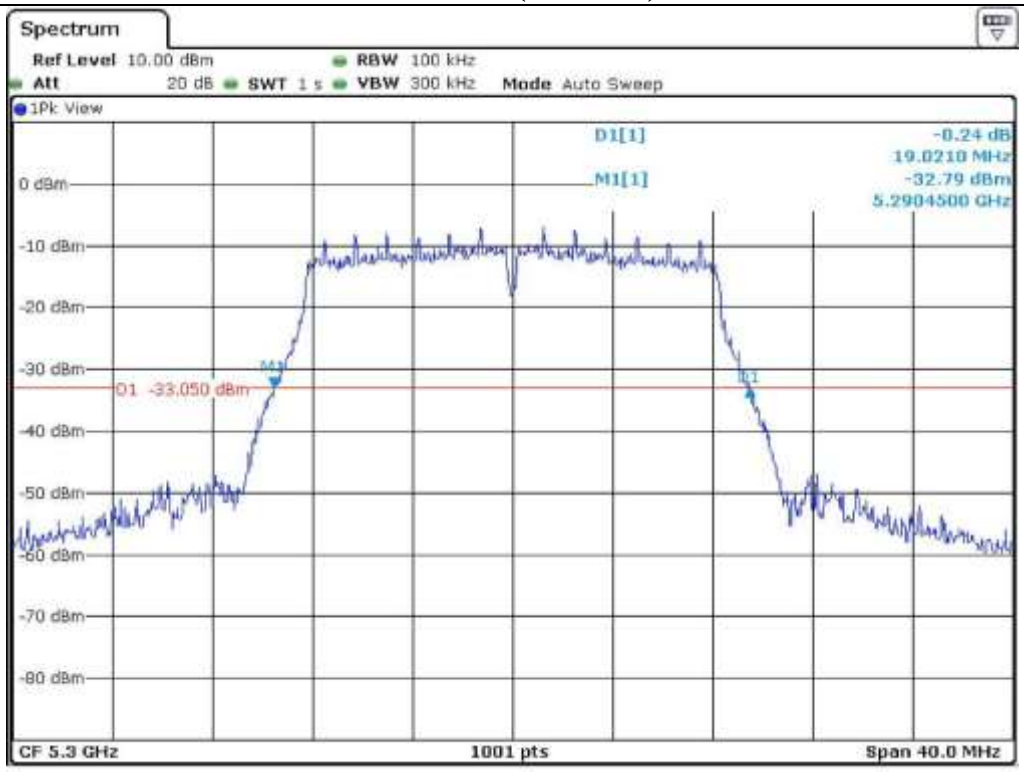



Low Channel (5 260 MHz)




Middle Channel (5 300 MHz)



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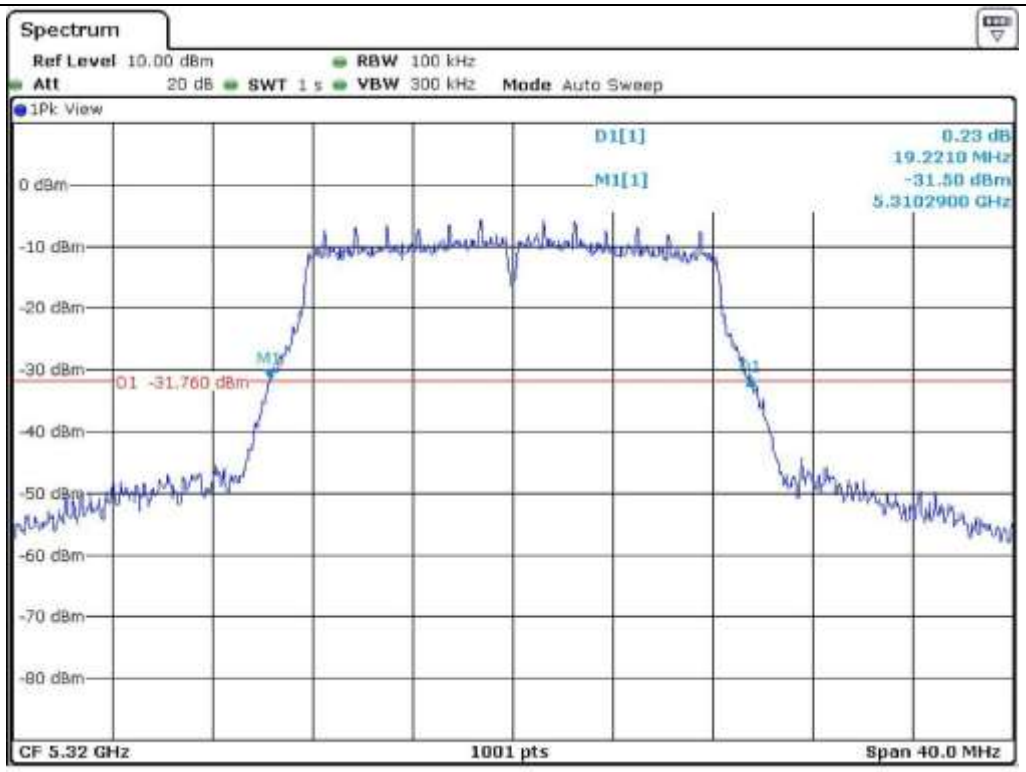


High Channel (5 320 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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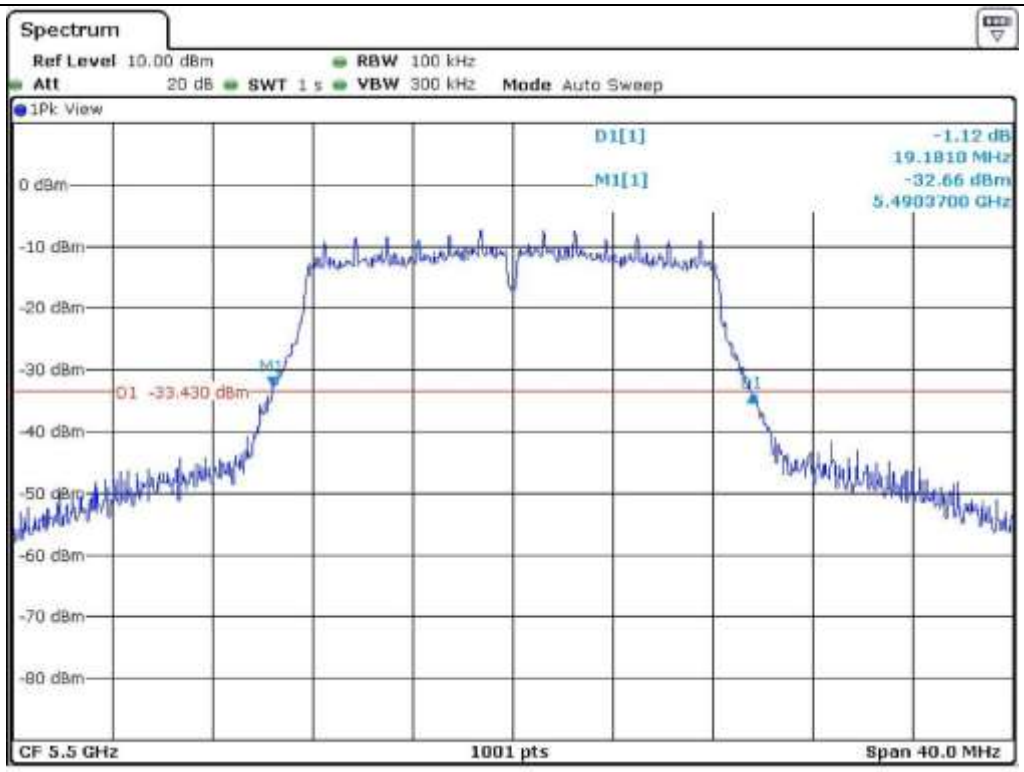
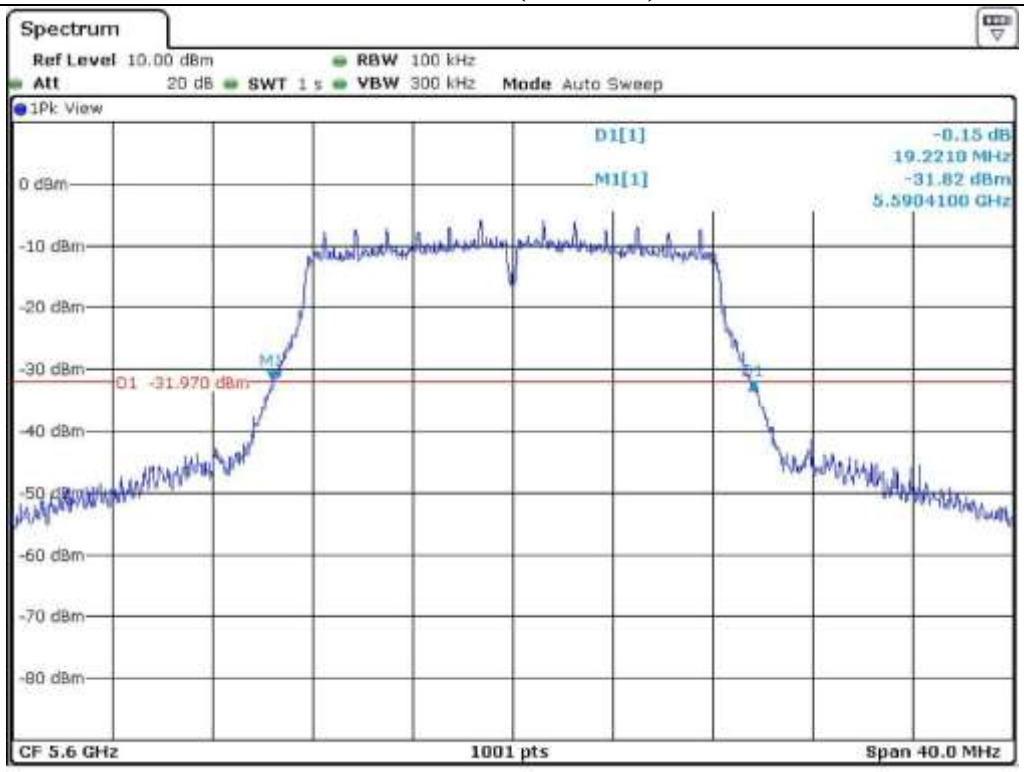



Low Channel (5 500 MHz)




Middle Channel (5 600 MHz)



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High Channel (5 700 MHz)



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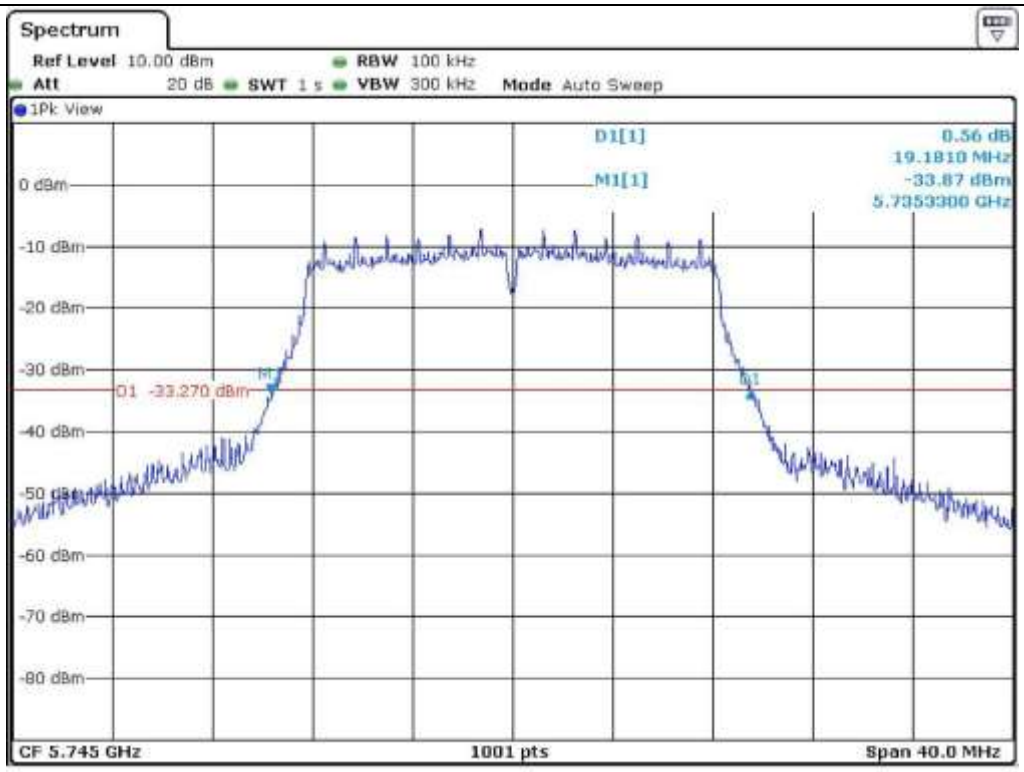
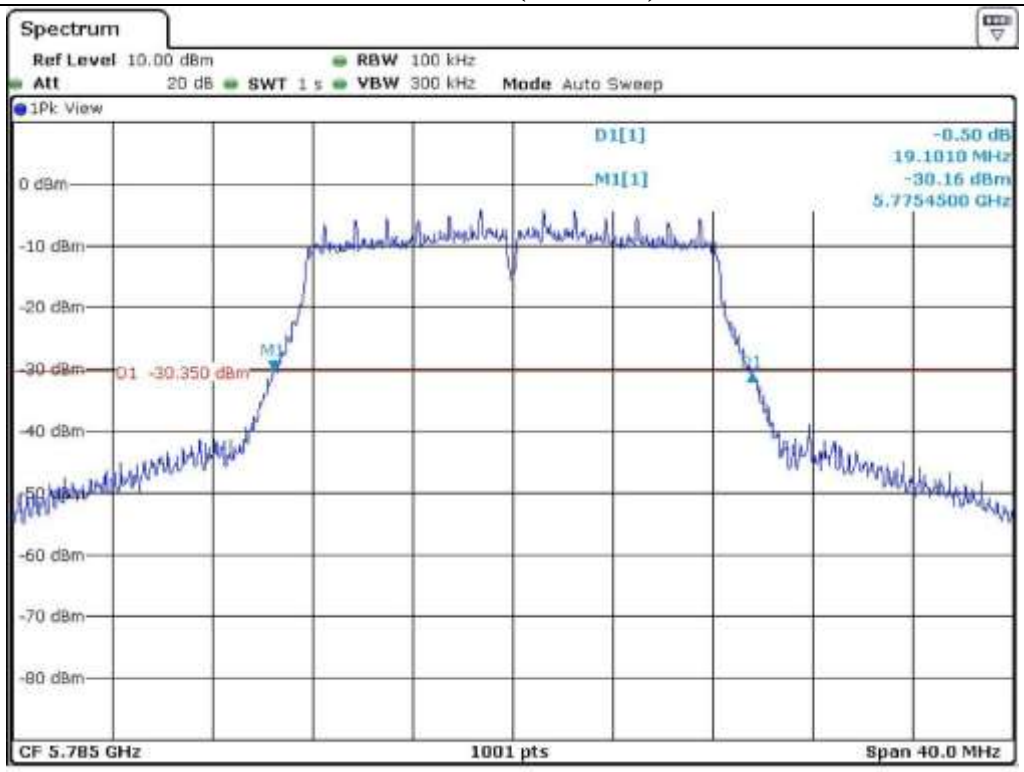



Low Channel (5 745 MHz)




Middle Channel (5 785 MHz)



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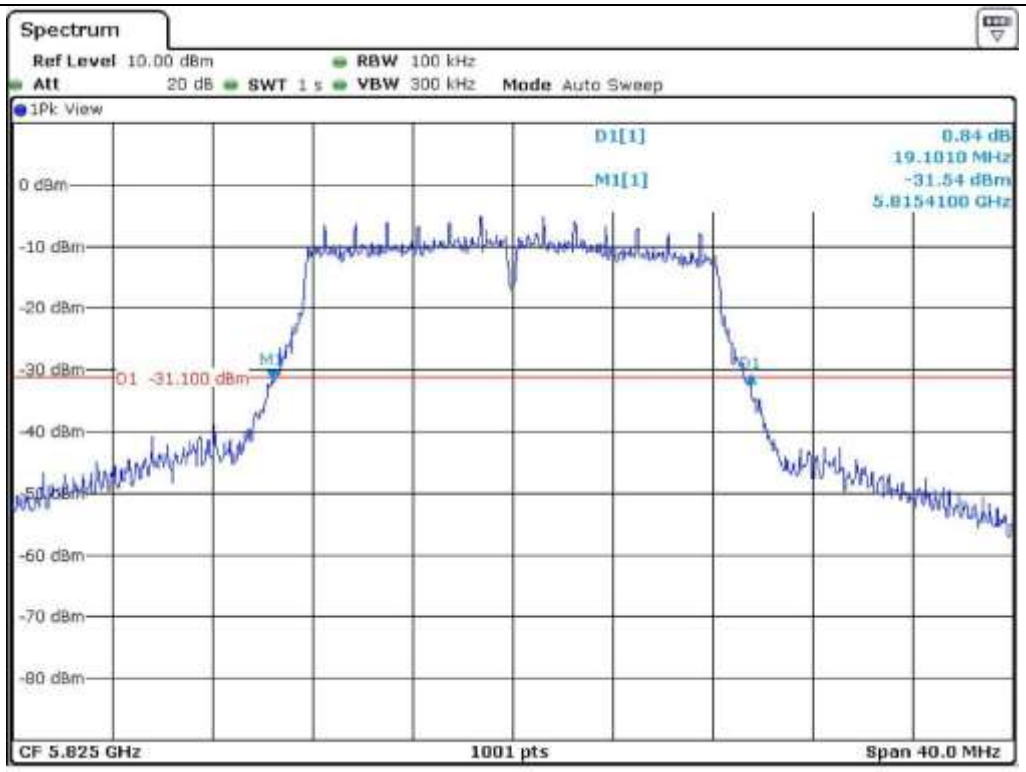


High Channel (5 825 MHz)



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**7.4.1.2 Test data for Antenna 1**

-. Test Date : March 11, 2015

-. Test Result : Pass

| FREQUENCY RANGE (MHz) | CHANNEL | FREQUENCY (MHz) | 26 dB Bandwidth (MHz) |
|---|---|---|---|
| 5 150 ~ 5 250 | Low | 5 180 | 19.34 |
| | Middle | 5 200 | 19.34 |
| | High | 5 240 | 19.34 |
| 5 250 ~ 5 350 | Low | 5 260 | 19.34 |
| | Middle | 5 300 | 19.10 |
| | High | 5 320 | 19.18 |
| 5 470 ~ 5 725 | Low | 5 500 | 18.47 |
| | Middle | 5 600 | 18.47 |
| | High | 5 700 | 18.47 |
| 5 725 ~ 5 850 | Low | 5 745 | 19.14 |
| | Middle | 5 785 | 19.26 |
| | High | 5 825 | 19.02 |

**Tested by: Tae-Ho, Kim / Senior Engineer**

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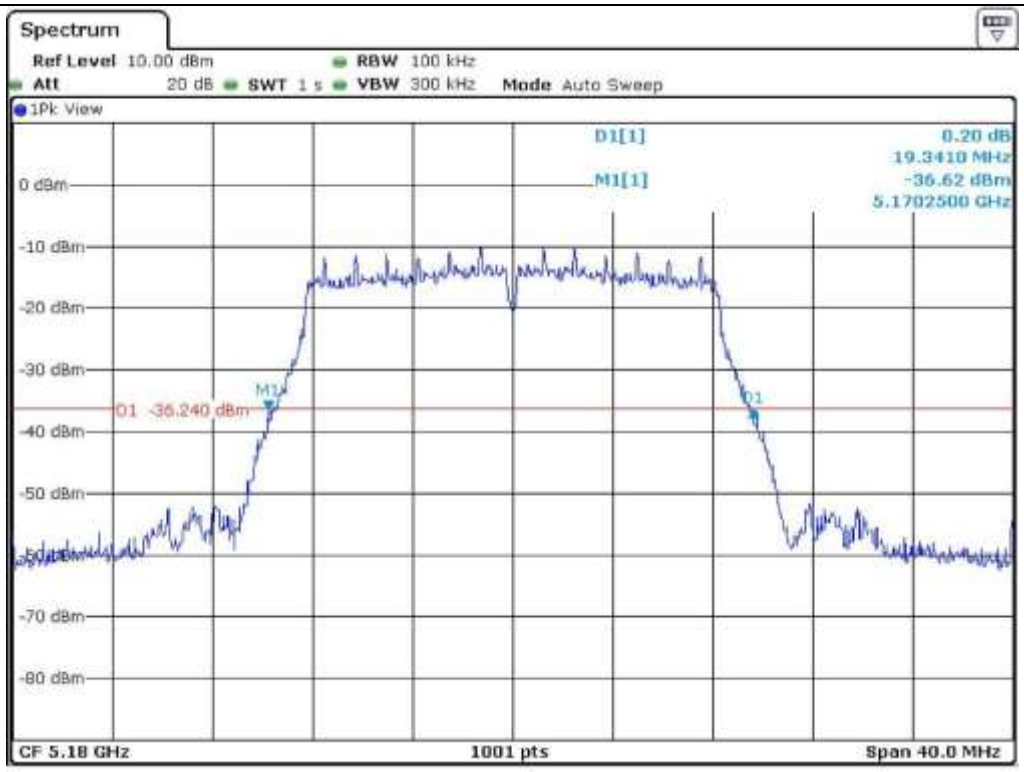
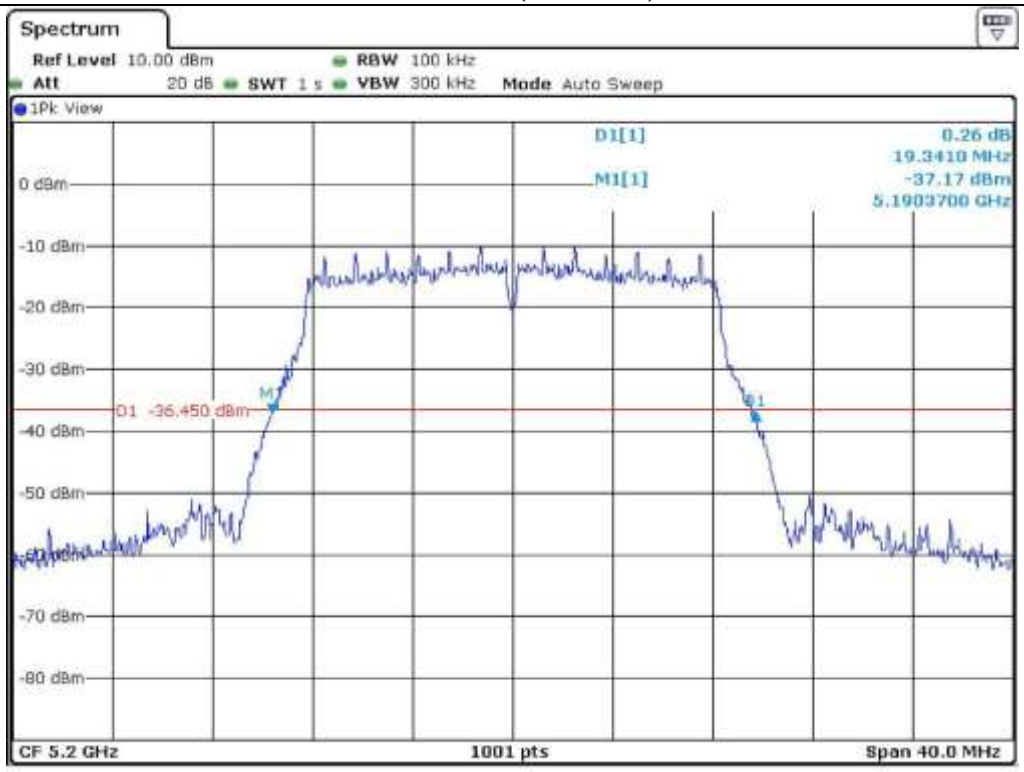



Low Channel (5 180 MHz)




Middle Channel (5 200 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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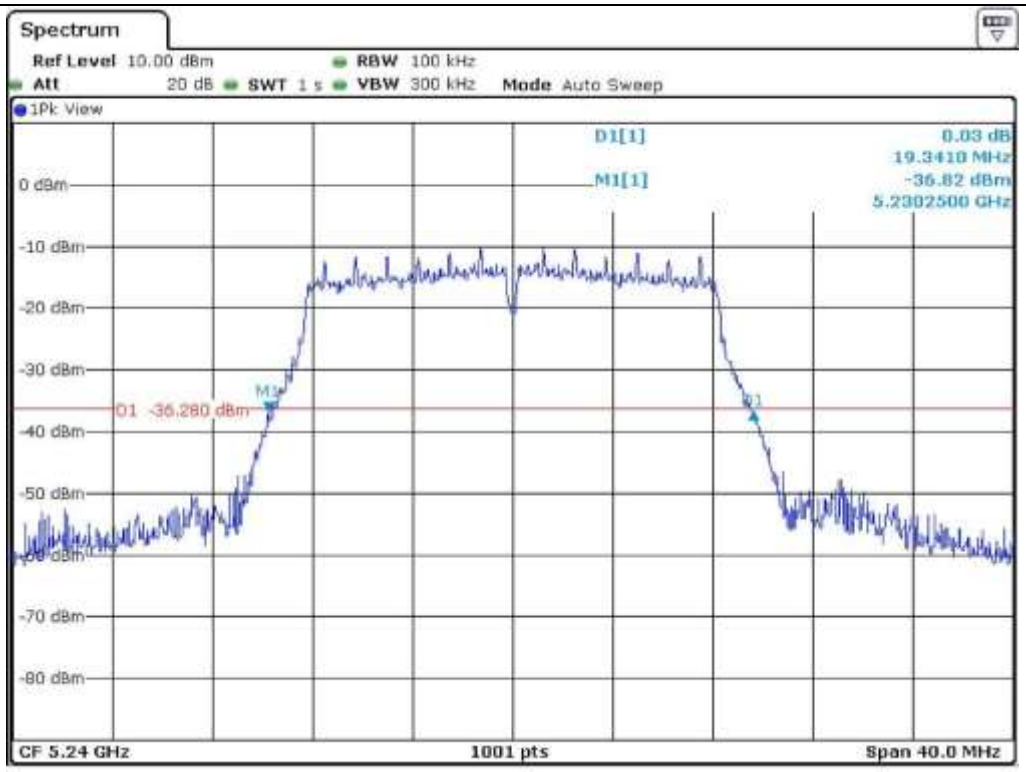


High Channel (5 240 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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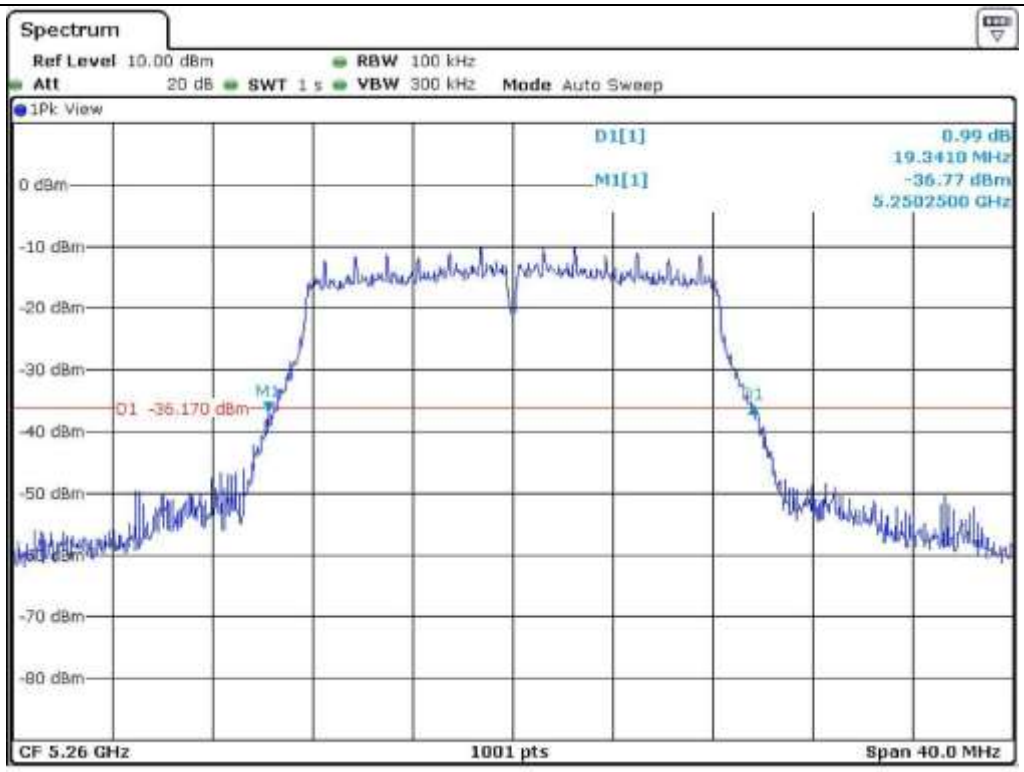
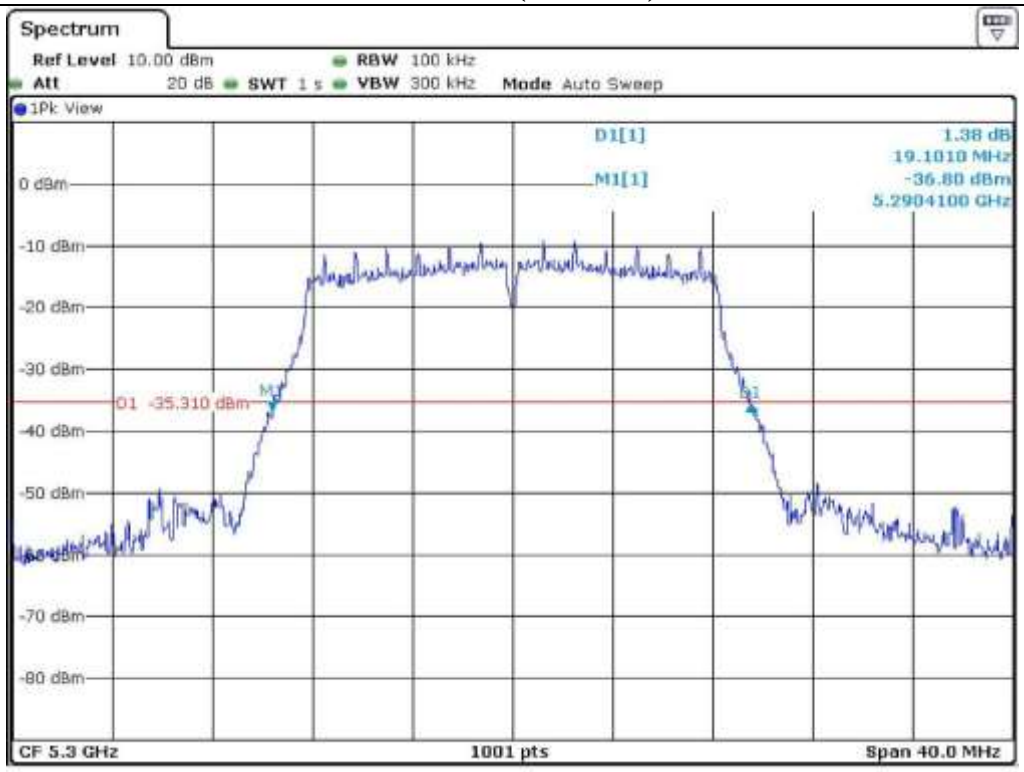



Low Channel (5 260 MHz)




Middle Channel (5 300 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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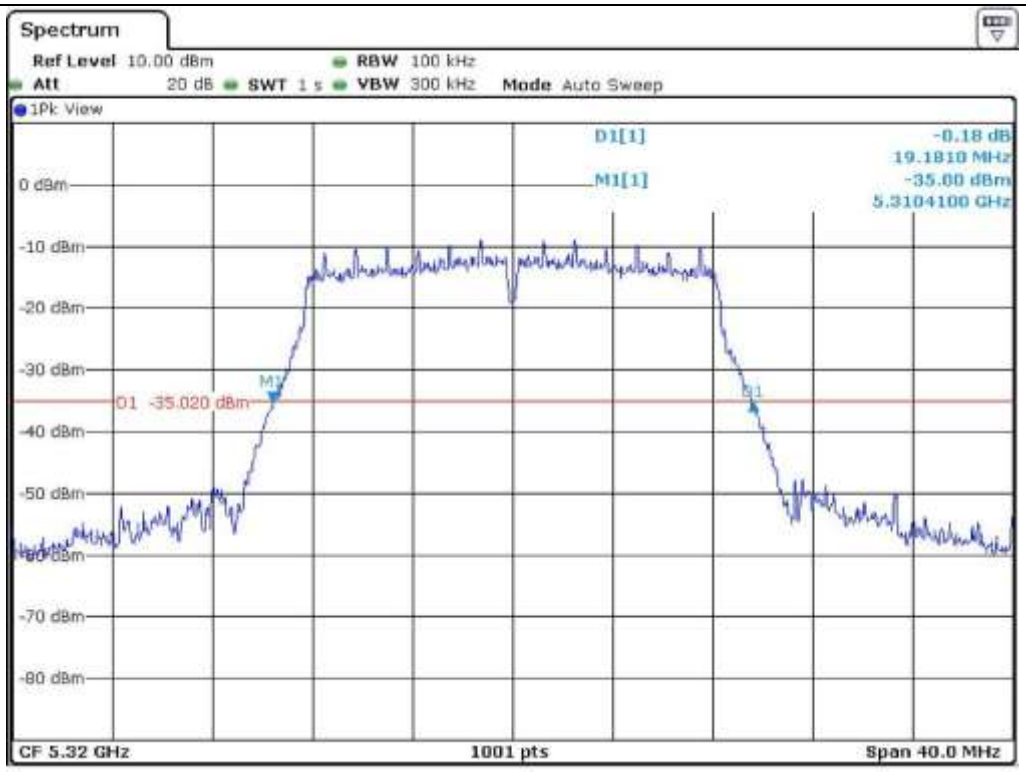


High Channel (5 320 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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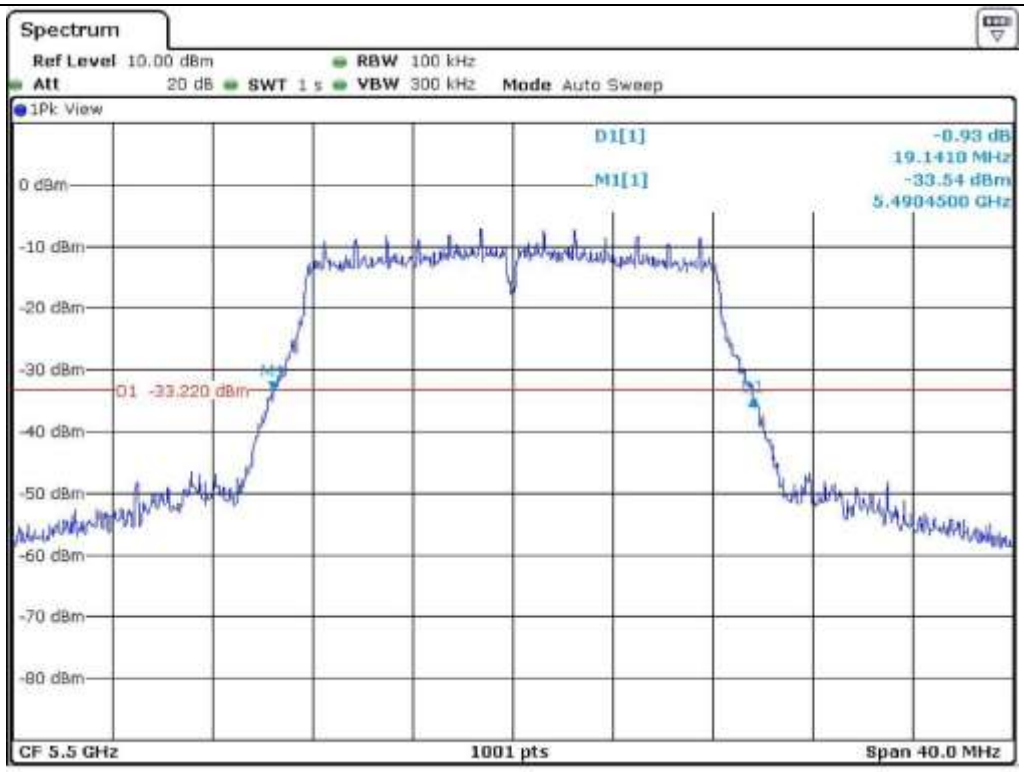
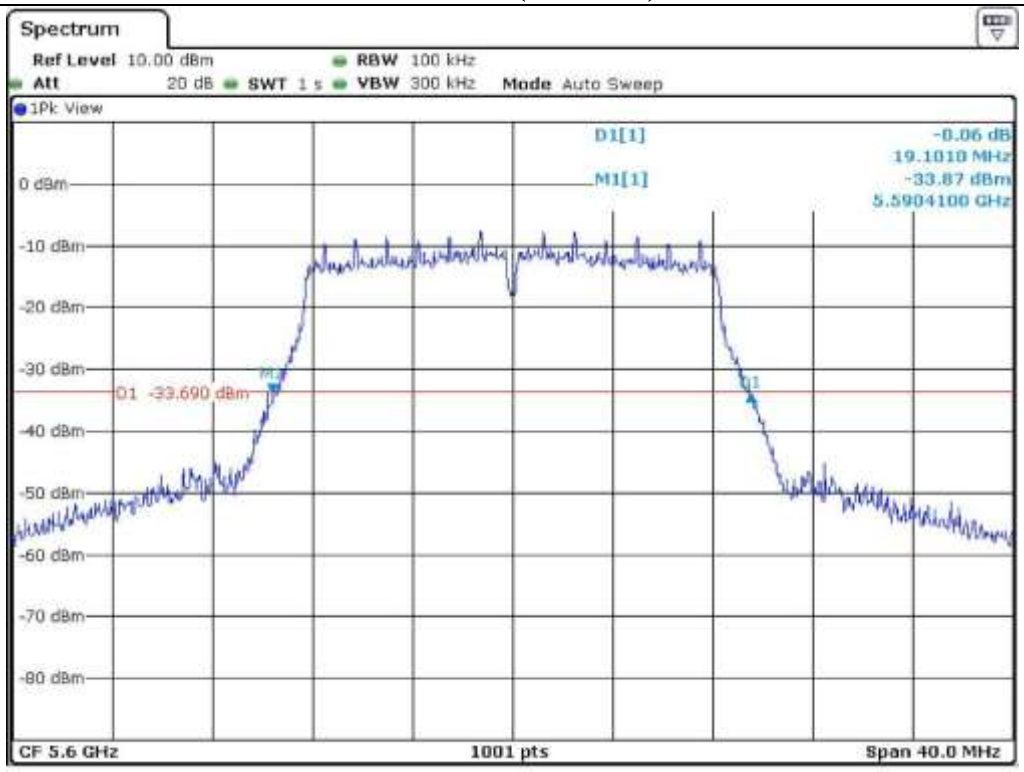



Low Channel (5 500 MHz)




Middle Channel (5 600 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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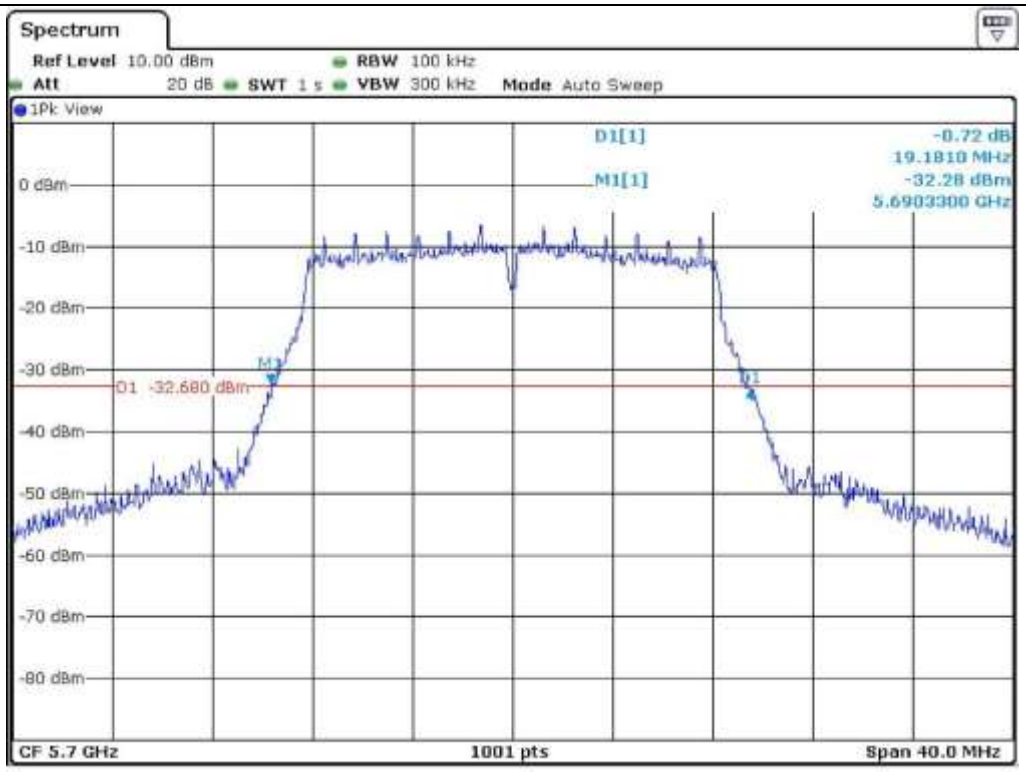
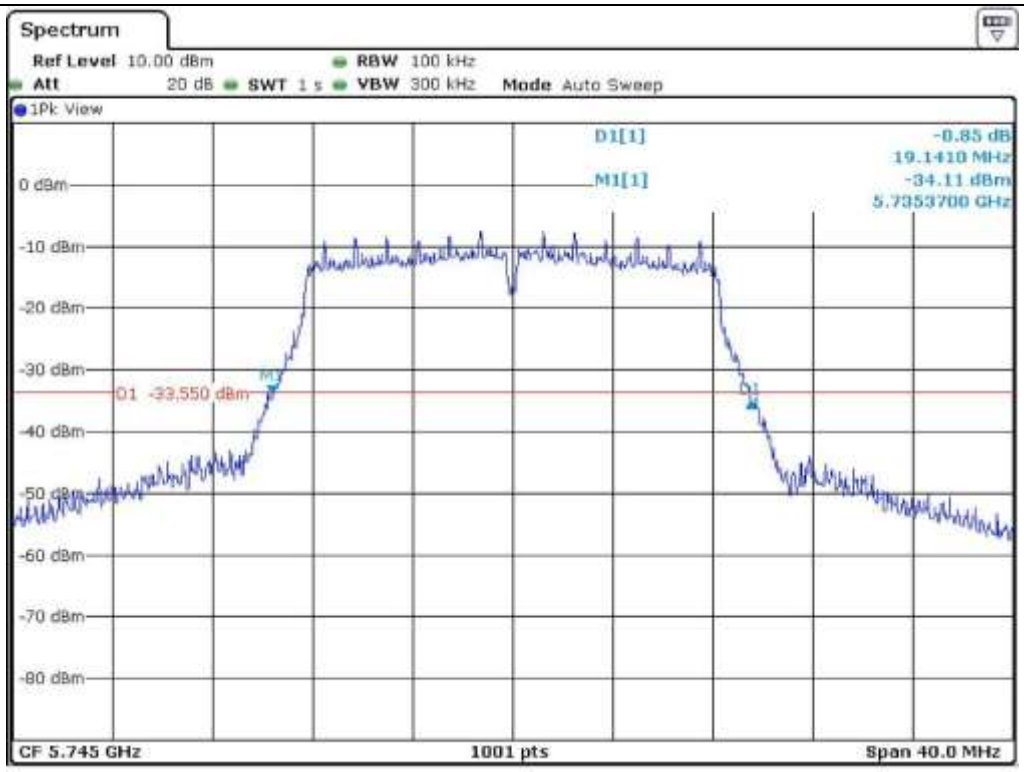


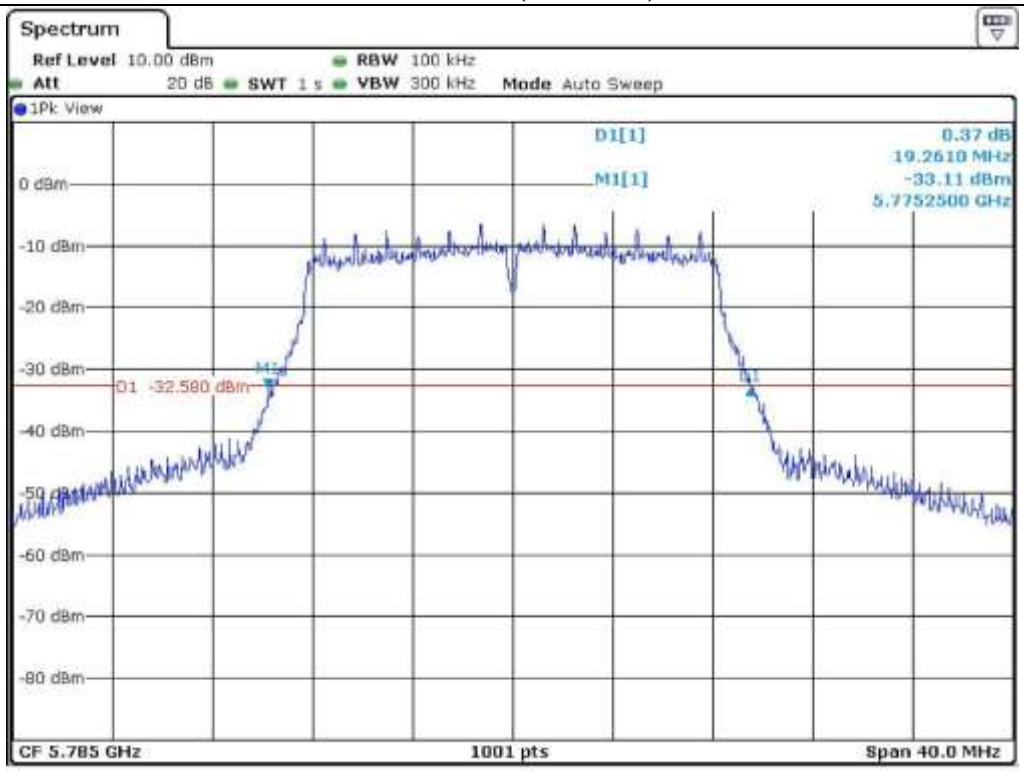

High Channel (5 700 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)




Low Channel (5 745 MHz)




Middle Channel (5 785 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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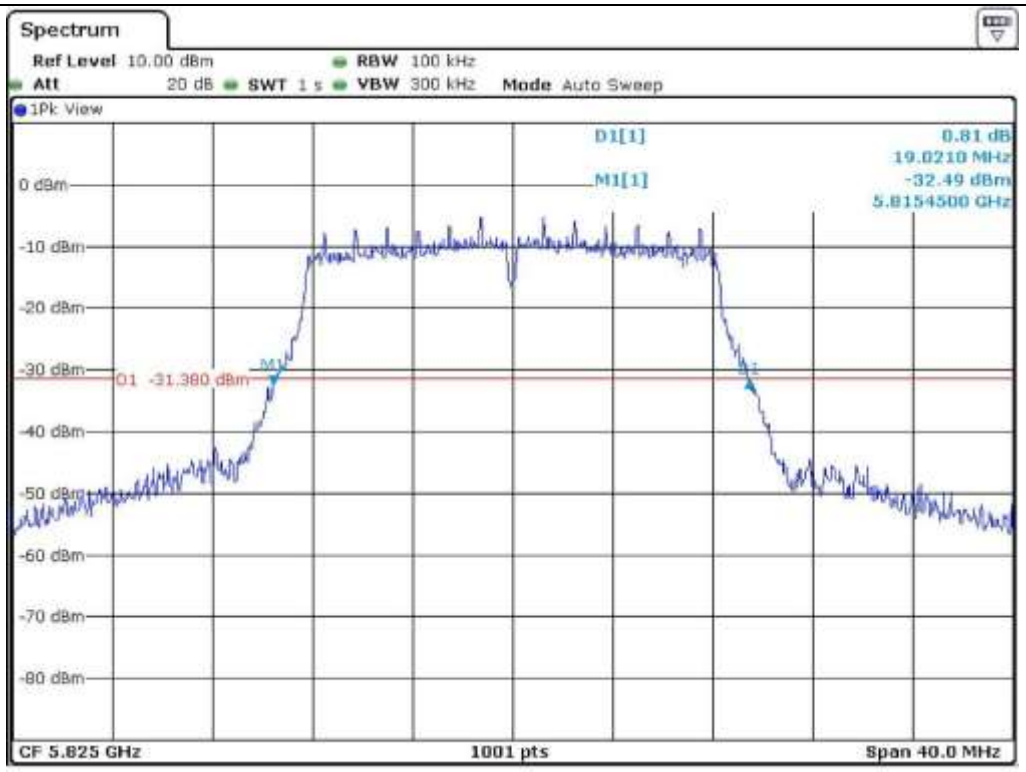


High Channel (5 825 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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### 7.4.2 Test data for 802.11n_HT20 RLAN Mode

-. Test Date : March 11, 2015

-. Test Result : Pass

| FREQUENCY RANGE (MHz) | CHANNEL | FREQUENCY (MHz) | 26 dB Bandwidth (MHz) |
|---|---|---|---|
| 5 150 ~ 5 250 | Low | 5 180 | 19.50 |
| | Middle | 5 200 | 19.54 |
| | High | 5 240 | 19.58 |
| 5 250 ~ 5 350 | Low | 5 260 | 19.58 |
| | Middle | 5 300 | 19.54 |
| | High | 5 320 | 19.54 |
| 5 470 ~ 5 725 | Low | 5 500 | 19.54 |
| | Middle | 5 600 | 19.54 |
| | High | 5 700 | 19.54 |
| 5 725 ~ 5 850 | Low | 5 745 | 19.54 |
| | Middle | 5 785 | 19.54 |
| | High | 5 825 | 19.54 |

**Tested by: Tae-Ho, Kim / Senior Engineer**

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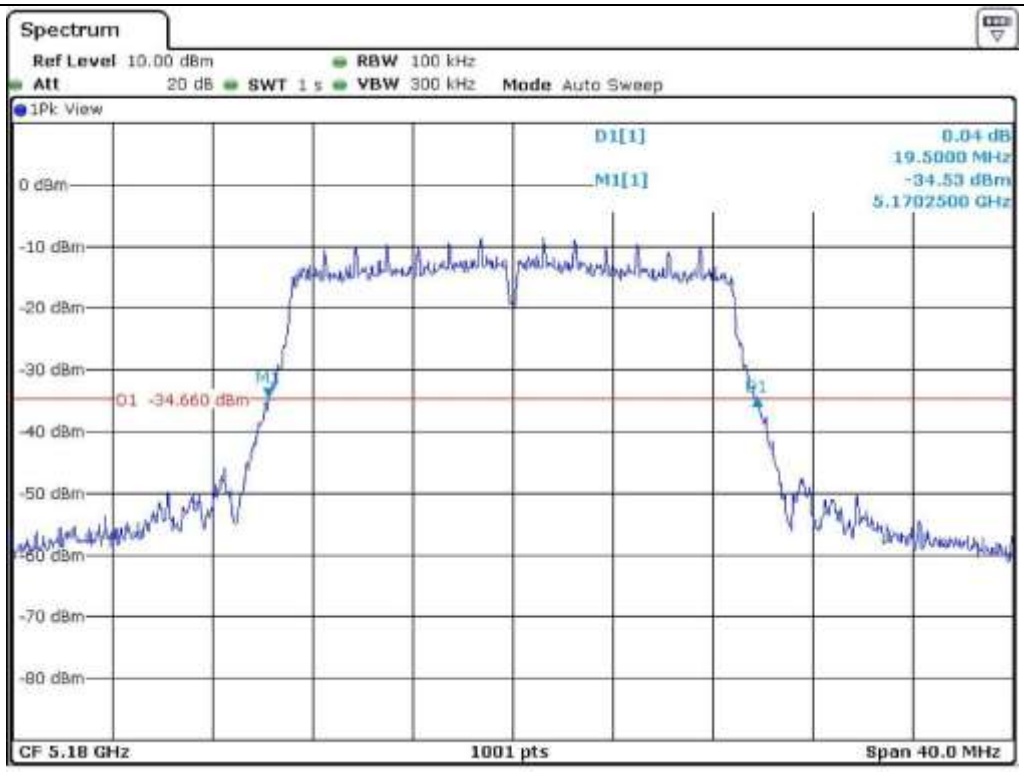
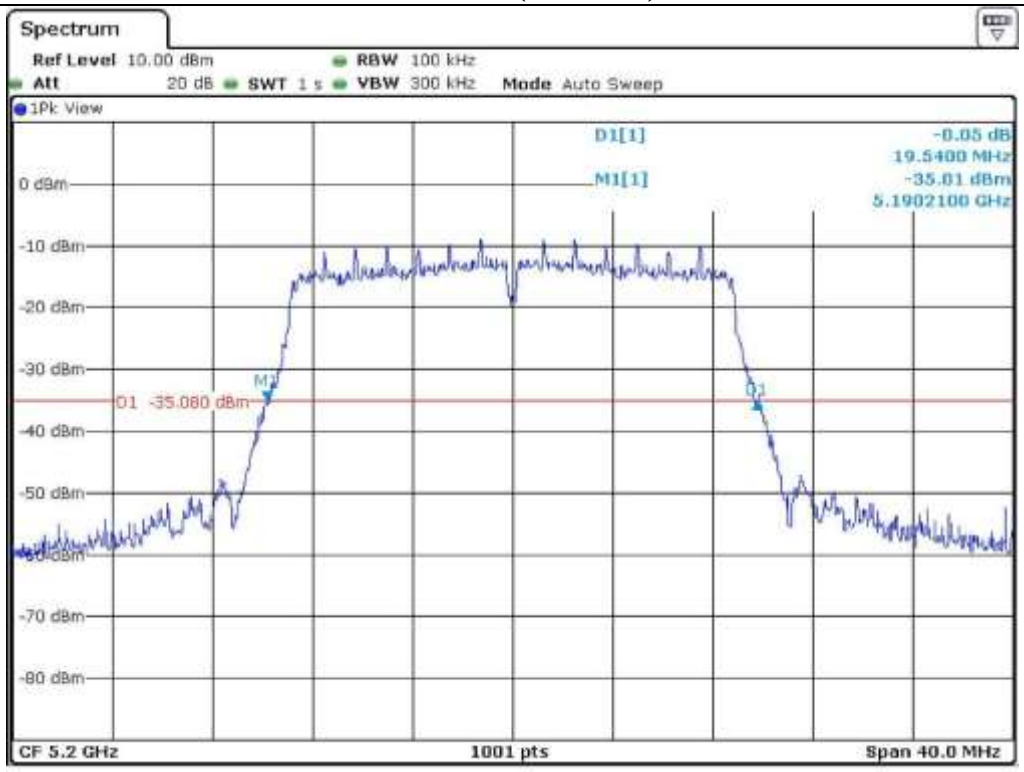



Low Channel (5 180 MHz)




Middle Channel (5 200 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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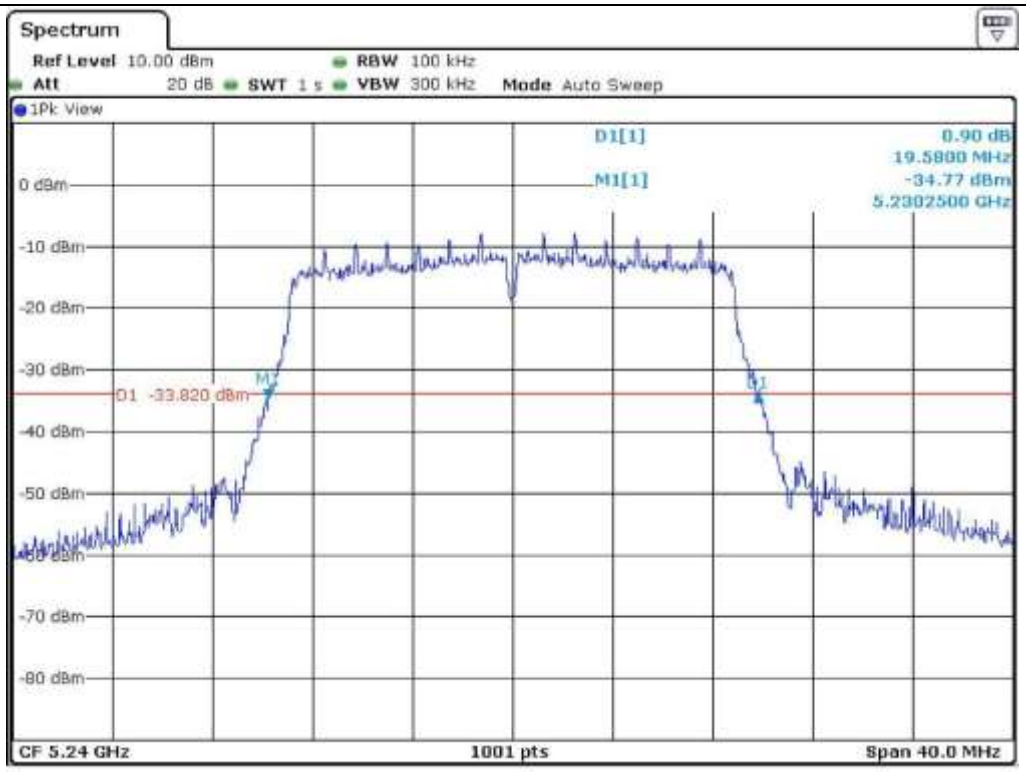


High Channel (5 240 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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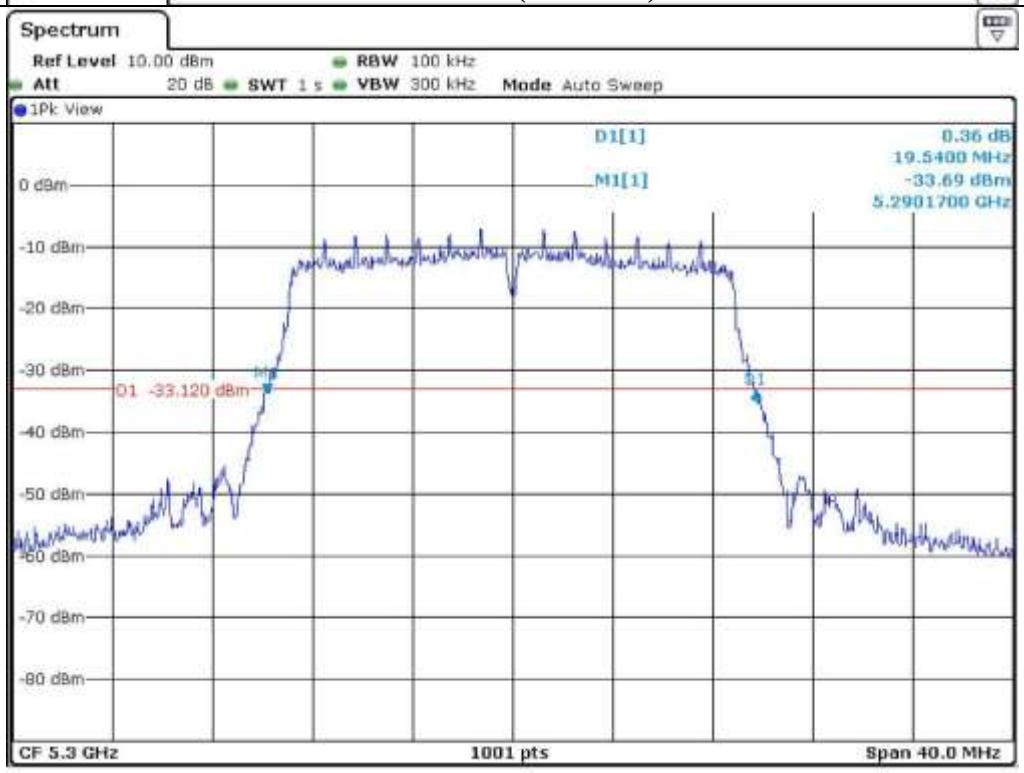
Low Channel (5 260 MHz)




Middle Channel (5 300 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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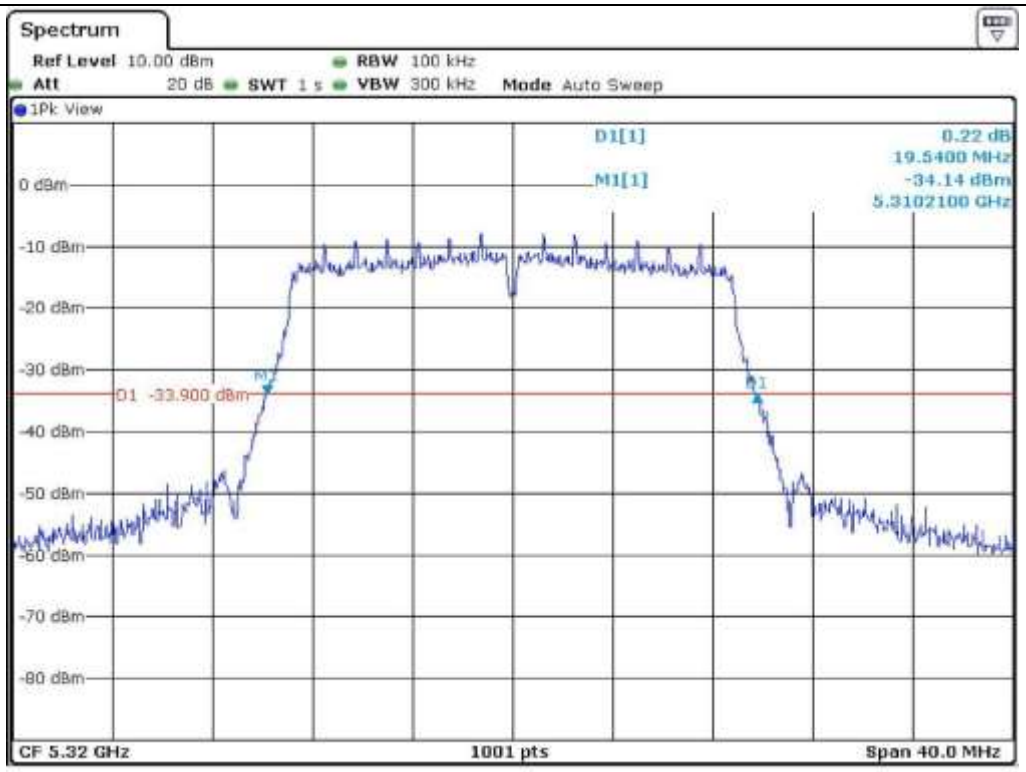


High Channel (5 320 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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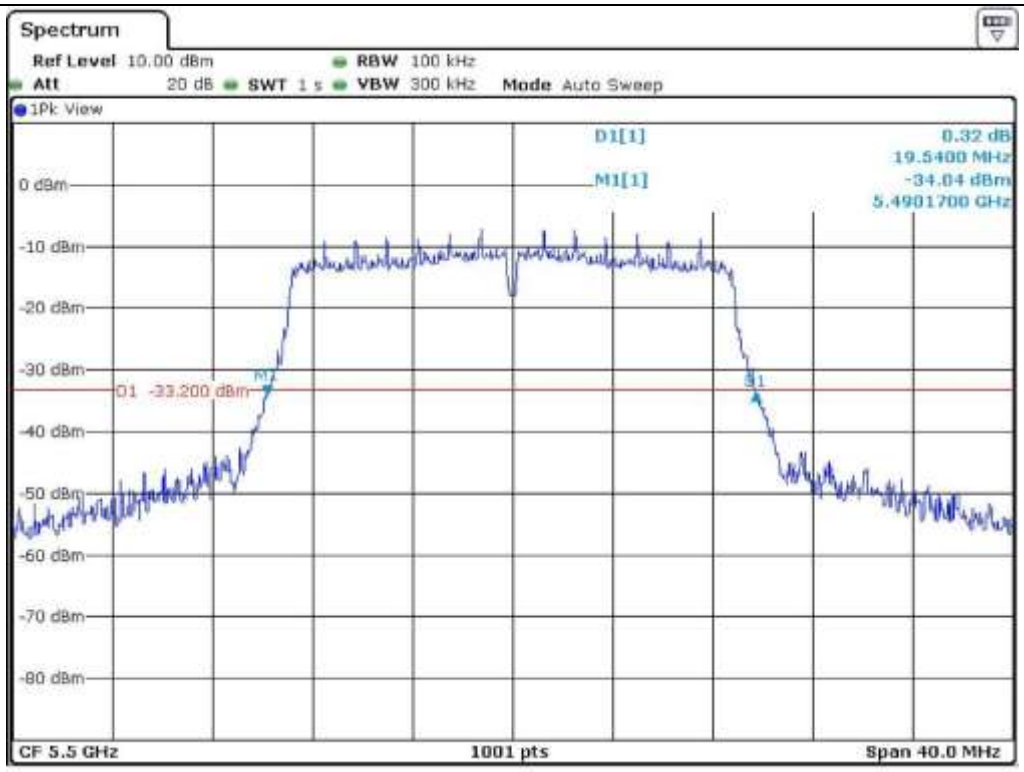
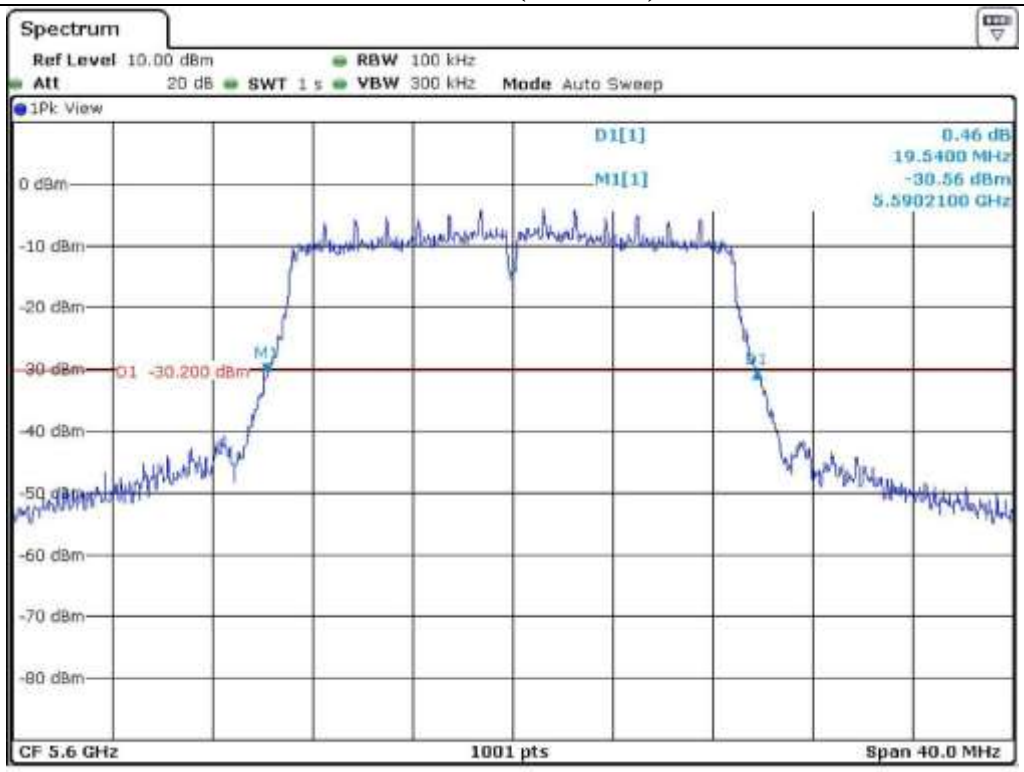



Low Channel (5 500 MHz)




Middle Channel (5 600 MHz)



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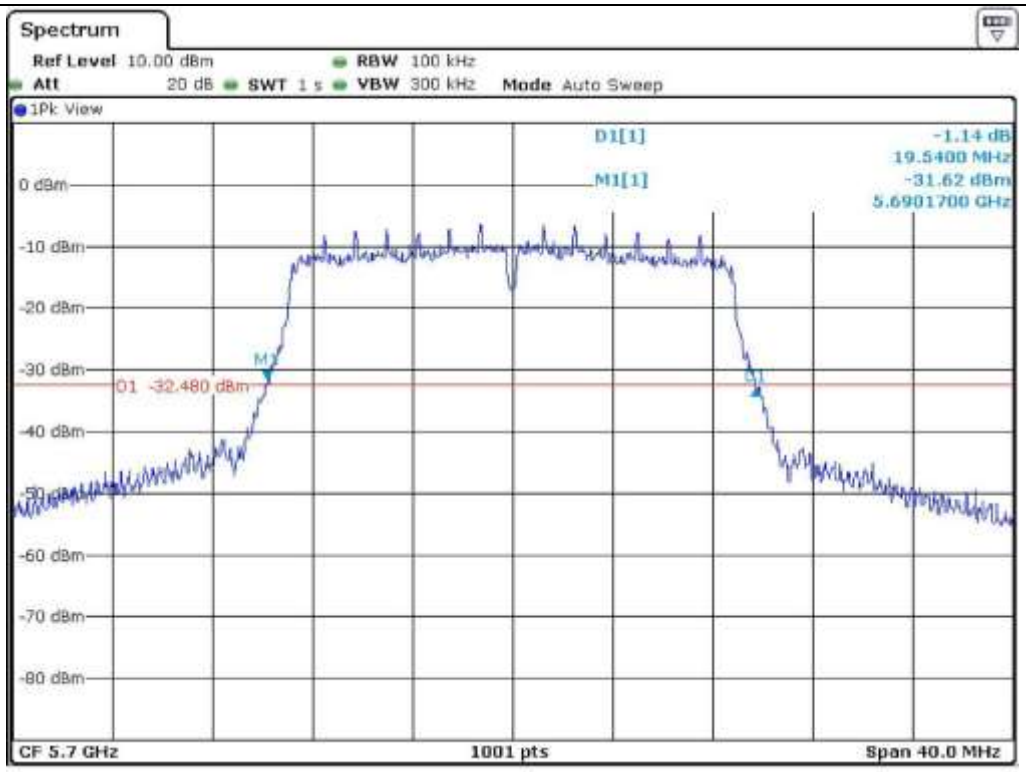
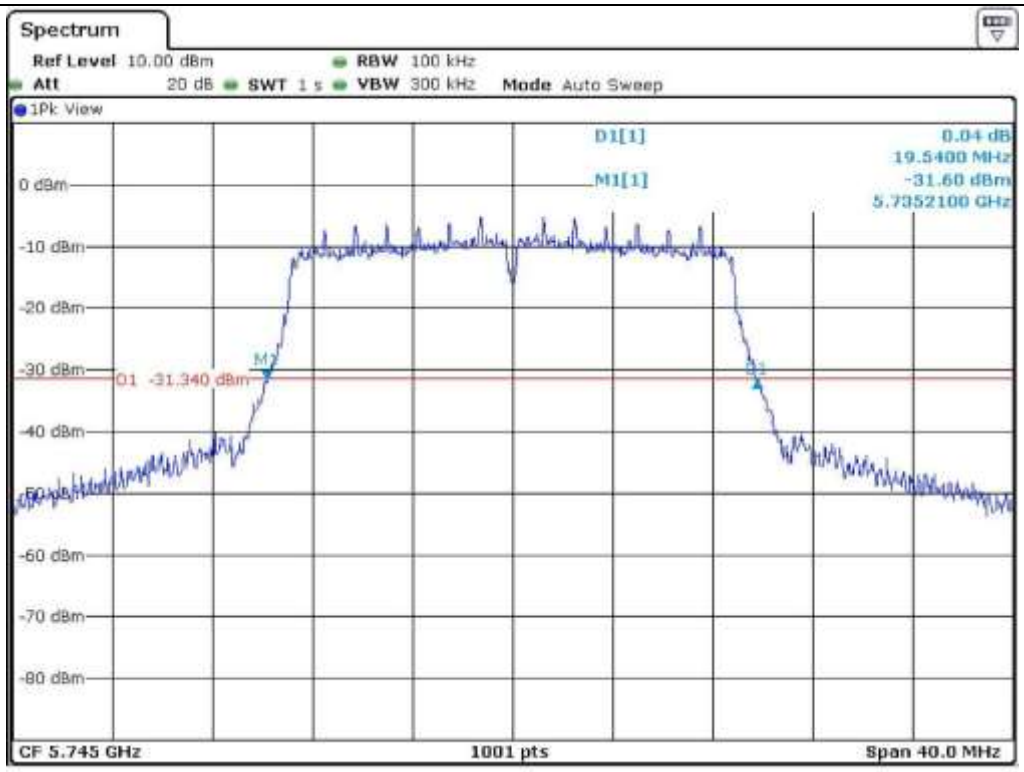


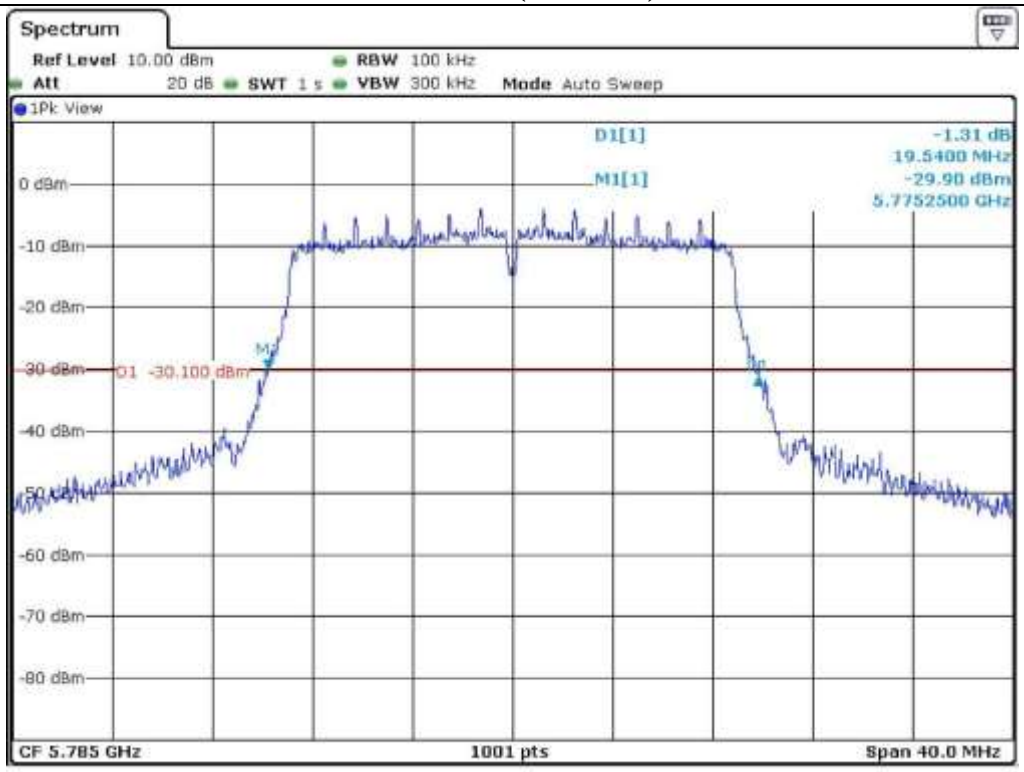

High Channel (5 700 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)




Low Channel (5 745 MHz)




Middle Channel (5 785 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

High Channel (5 825 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

**7.4.2.2 Test data for Antenna 1**

-. Test Date : March 11, 2015

-. Test Result : Pass

| FREQUENCY RANGE (MHz) | CHANNEL | FREQUENCY (MHz) | 26 dB Bandwidth (MHz) |
|---|---|---|---|
| 5 150 ~ 5 250 | Low | 5 180 | 19.46 |
| | Middle | 5 200 | 16.66 |
| | High | 5 240 | 19.50 |
| 5 250 ~ 5 350 | Low | 5 260 | 19.54 |
| | Middle | 5 300 | 19.54 |
| | High | 5 320 | 19.46 |
| 5 470 ~ 5 725 | Low | 5 500 | 19.58 |
| | Middle | 5 600 | 19.58 |
| | High | 5 700 | 19.58 |
| 5 725 ~ 5 850 | Low | 5 745 | 19.50 |
| | Middle | 5 785 | 19.50 |
| | High | 5 825 | 19.54 |

**Tested by: Tae-Ho, Kim / Senior Engineer**

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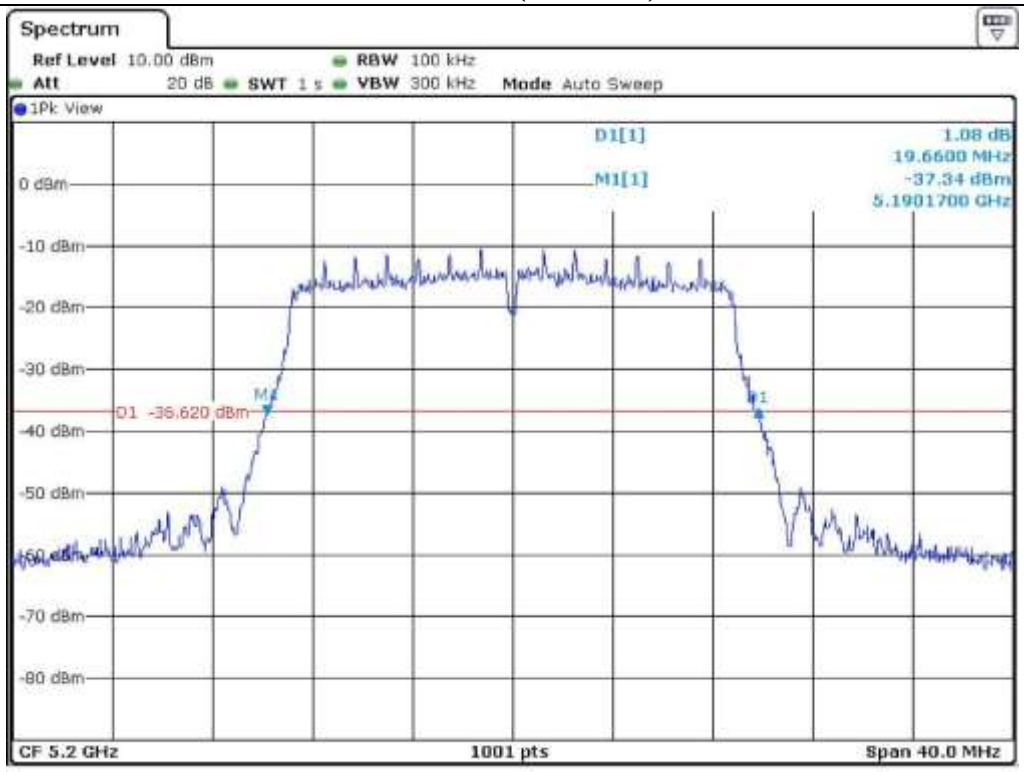
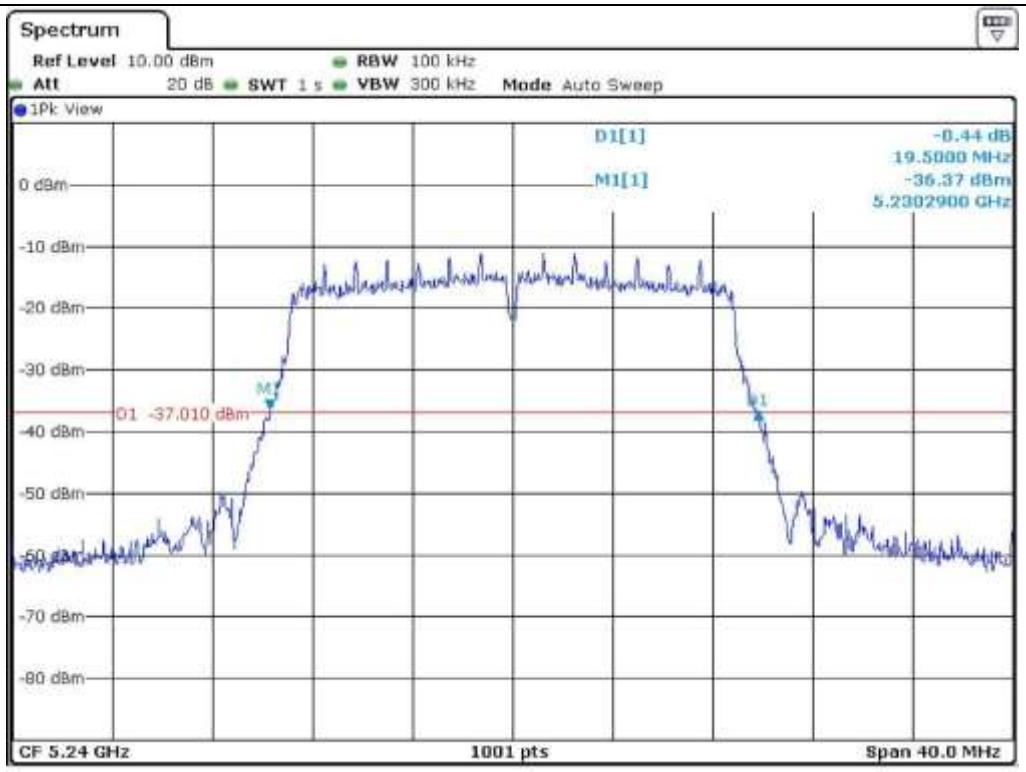
Low Channel (5 180 MHz)




Middle Channel (5 200 MHz)



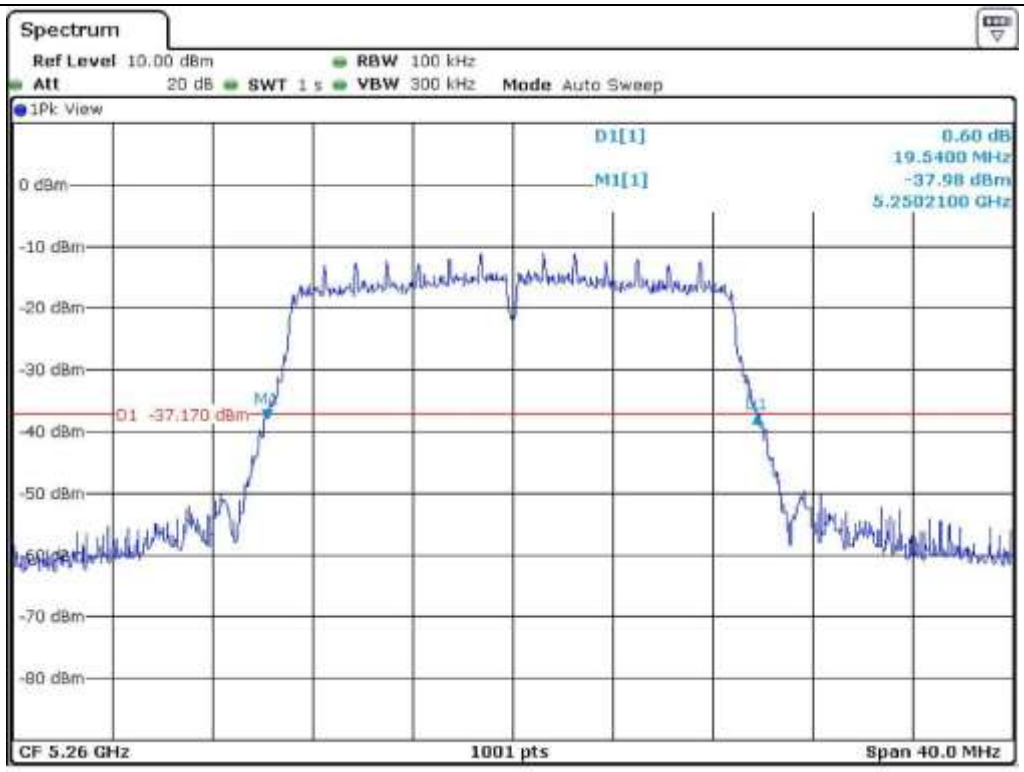
**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



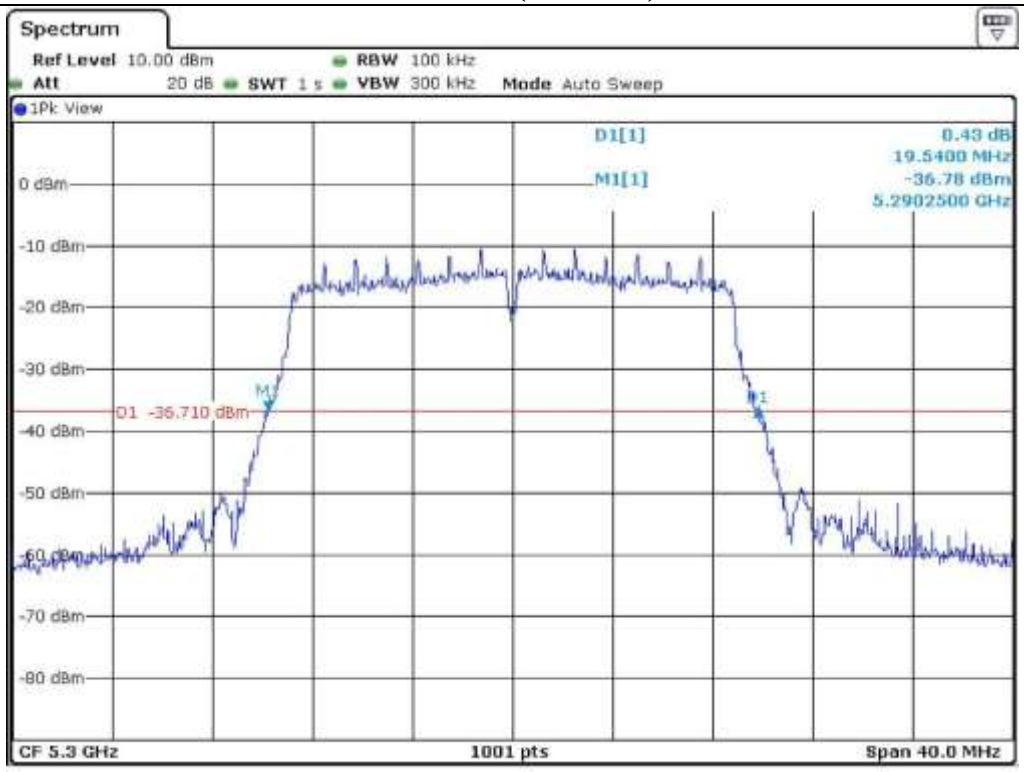

High Channel (5 240 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)




Low Channel (5 260 MHz)




Middle Channel (5 300 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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High Channel (5 320 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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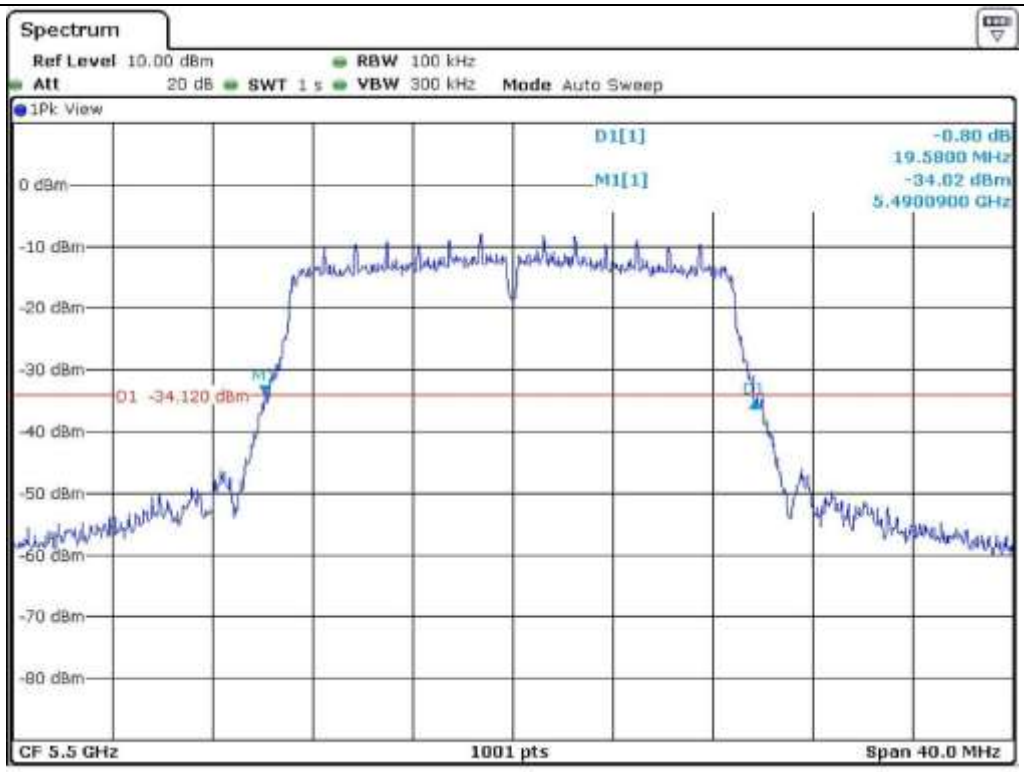
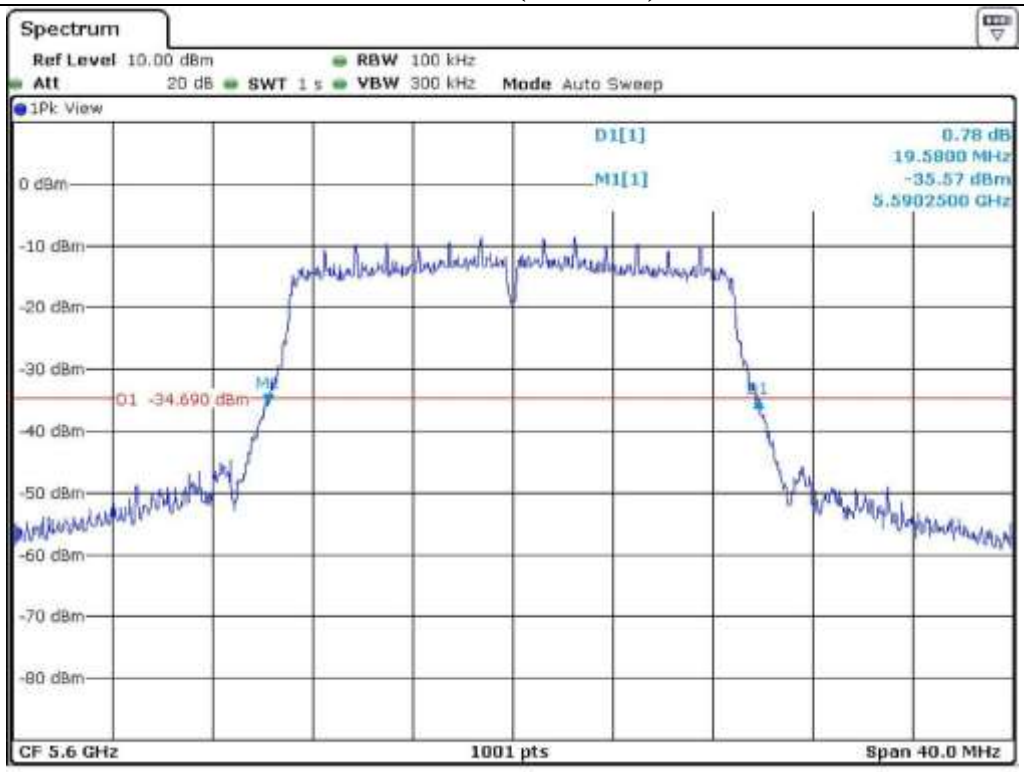



Low Channel (5 500 MHz)




Middle Channel (5 600 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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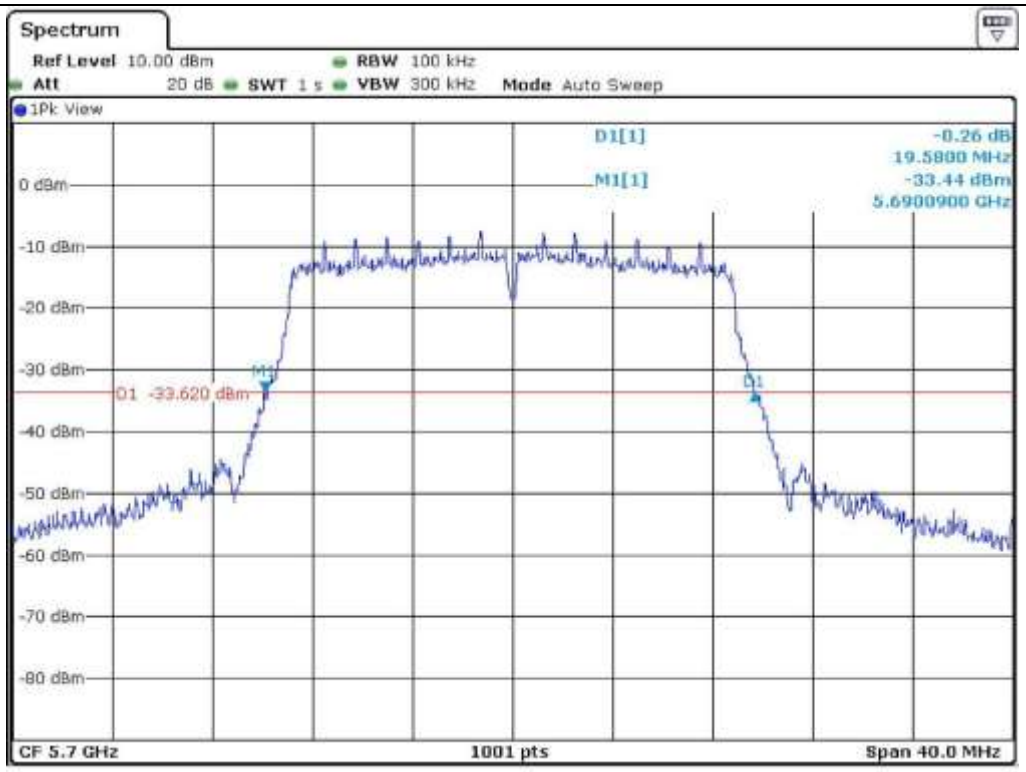


High Channel (5 700 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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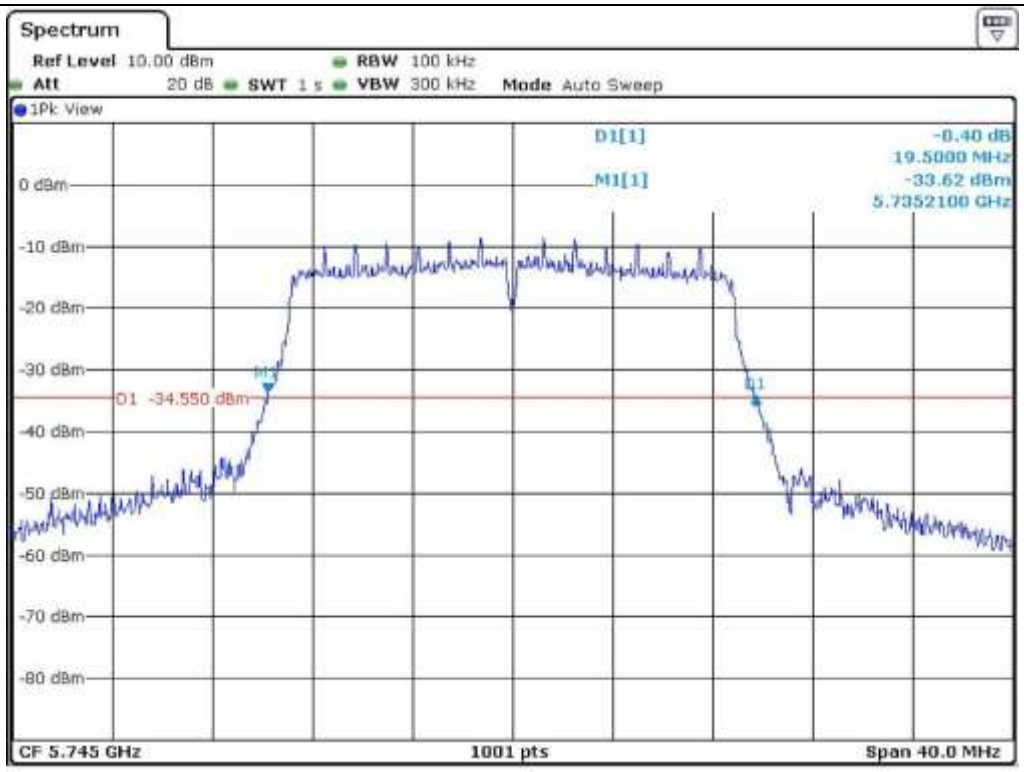
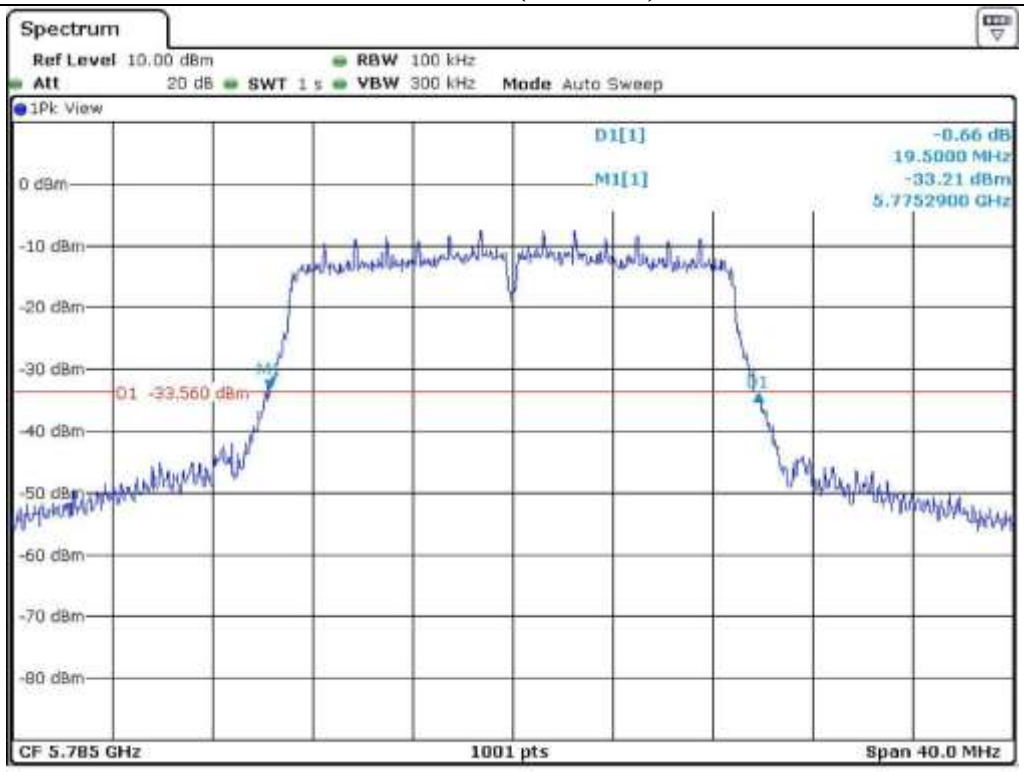



Low Channel (5 745 MHz)




Middle Channel (5 785 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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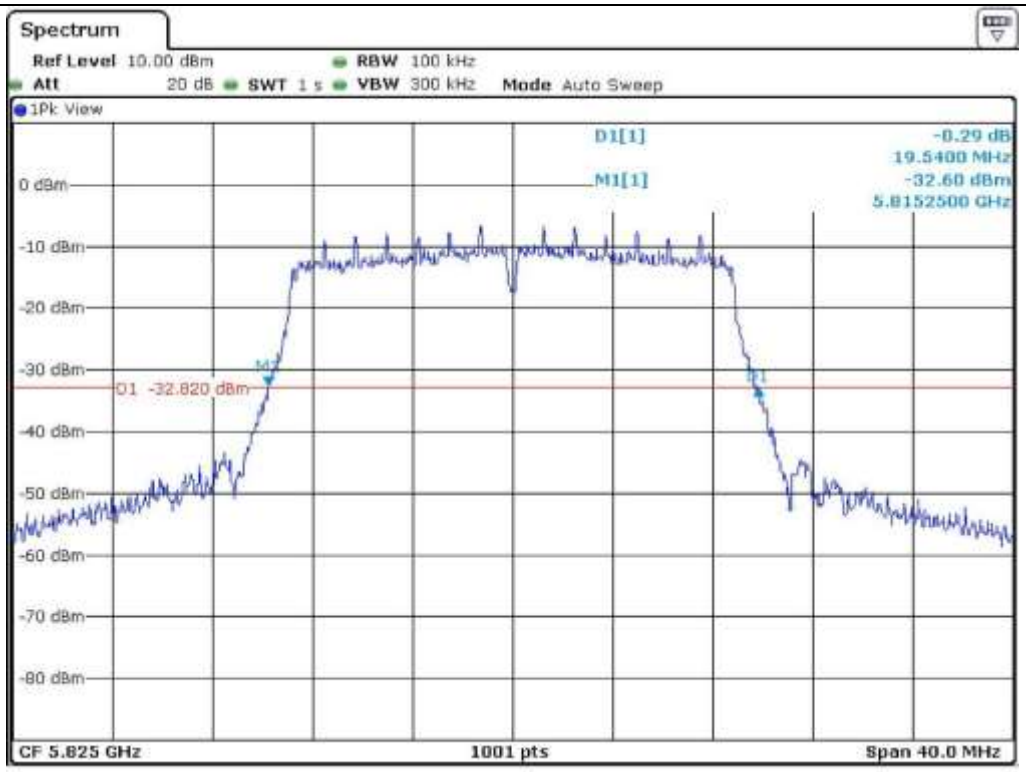


High Channel (5 825 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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### 7.4.3 Test data for 802.11n_HT40 RLAN Mode

#### 7.4.3.1 Test data for Antenna 0

-. Test Date : March 11, 2015

-. Test Result : Pass

| FREQUENCY RANGE (MHz) | CHANNEL | FREQUENCY (MHz) | 26 dB Bandwidth (MHz) |
|---|---|---|---|
| 5 150 ~ 5 250 | Low | 5 190 | 38.44 |
| | High | 5 230 | 38.44 |
| 5 250 ~ 5 350 | Low | 5 270 | 38.44 |
| | High | 5 310 | 38.44 |
| 5 470 ~ 5 725 | Low | 5 510 | 38.44 |
| | Middle | 5 590 | 38.44 |
| | High | 5 670 | 38.44 |
| 5 725 ~ 5 850 | Low | 5 755 | 38.44 |
| | High | 5 795 | 38.44 |

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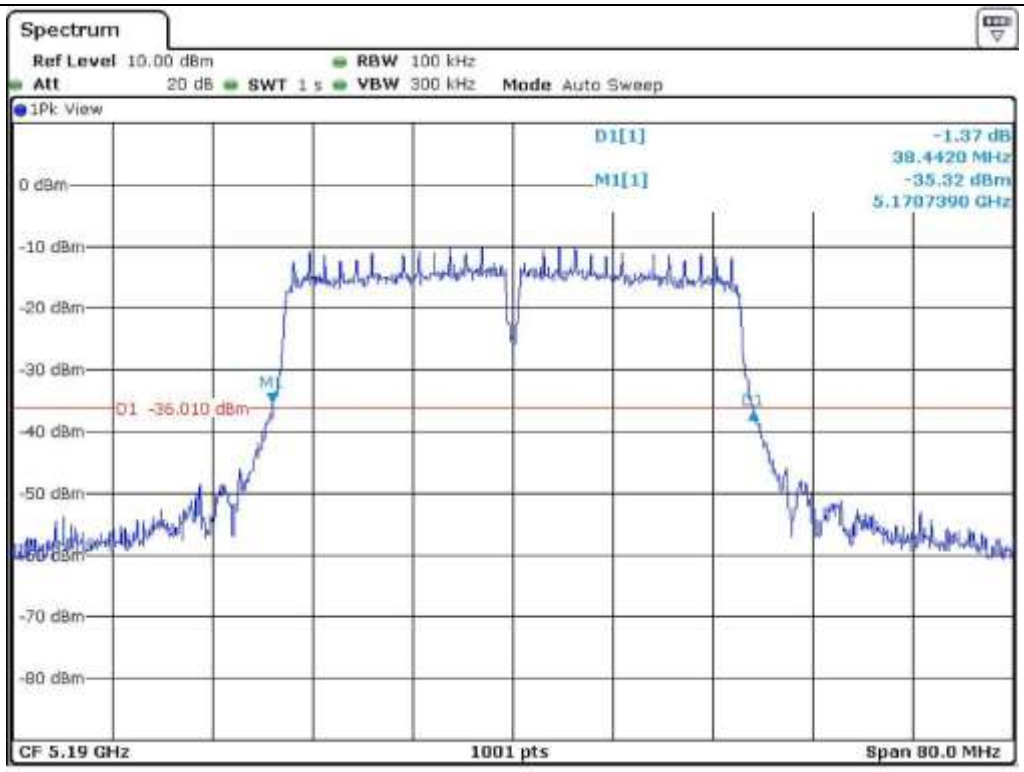
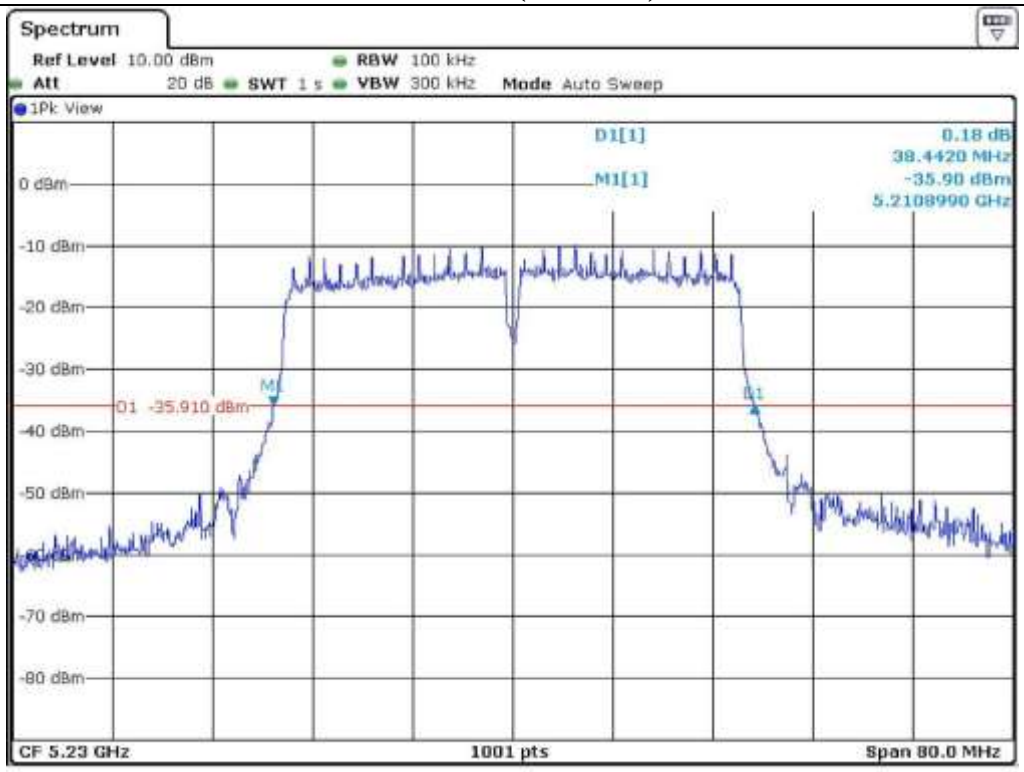


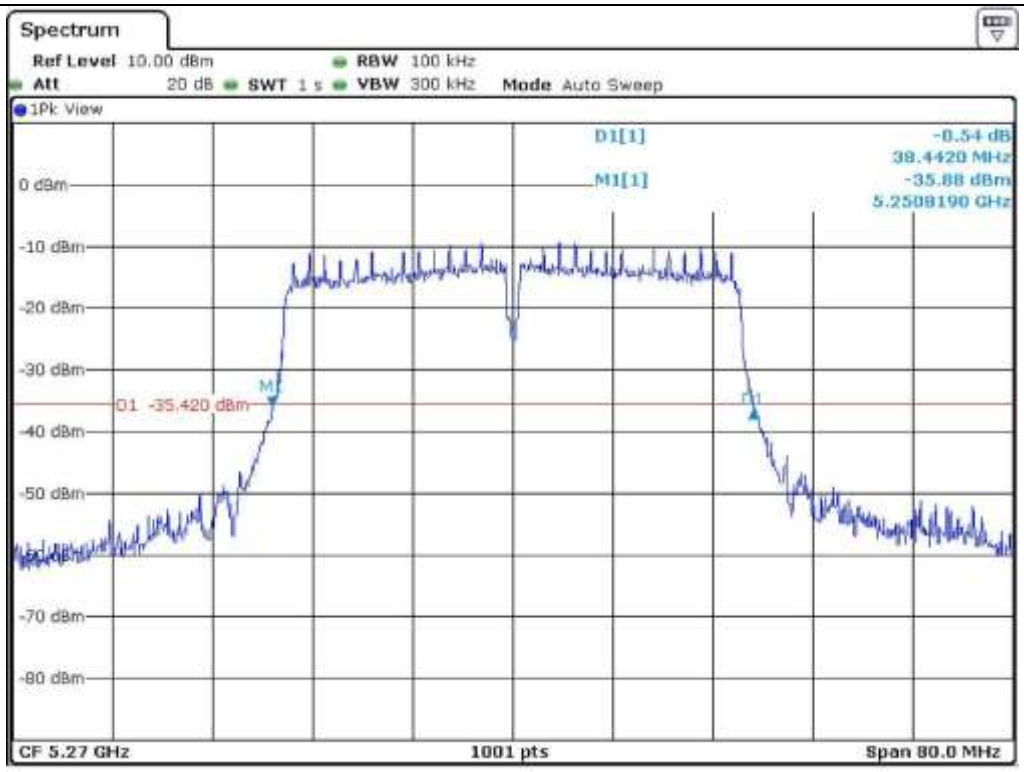

Low Channel (5 190 MHz)



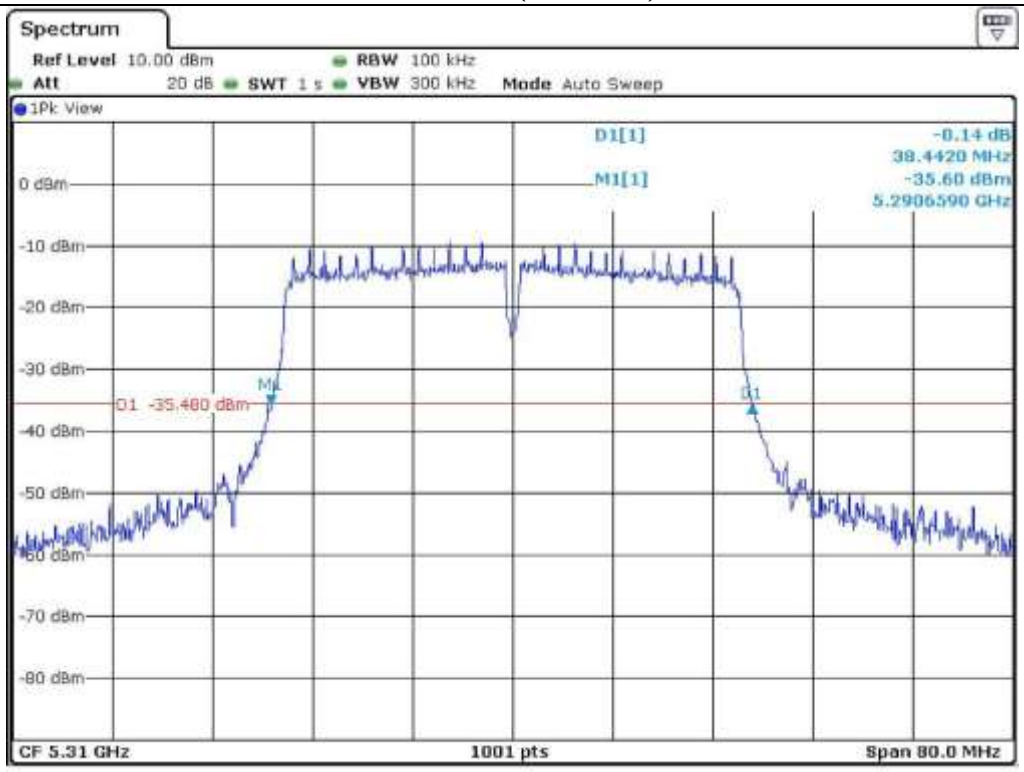

High Channel (5 230 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)




Low Channel (5 270 MHz)




High Channel (5 310 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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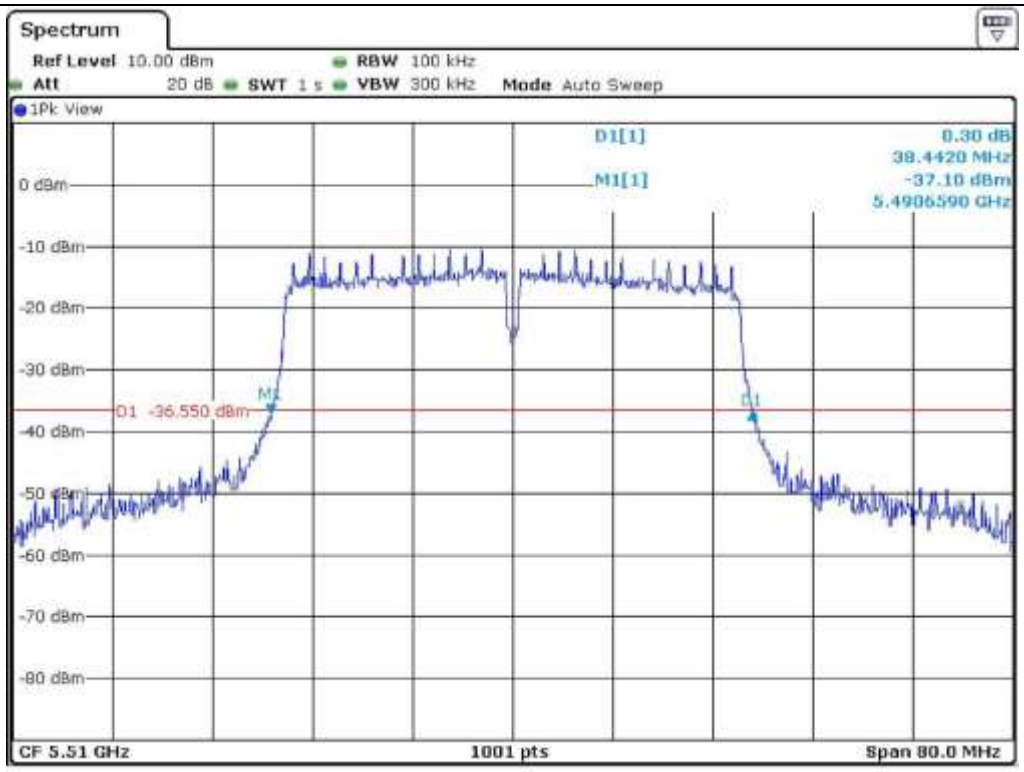
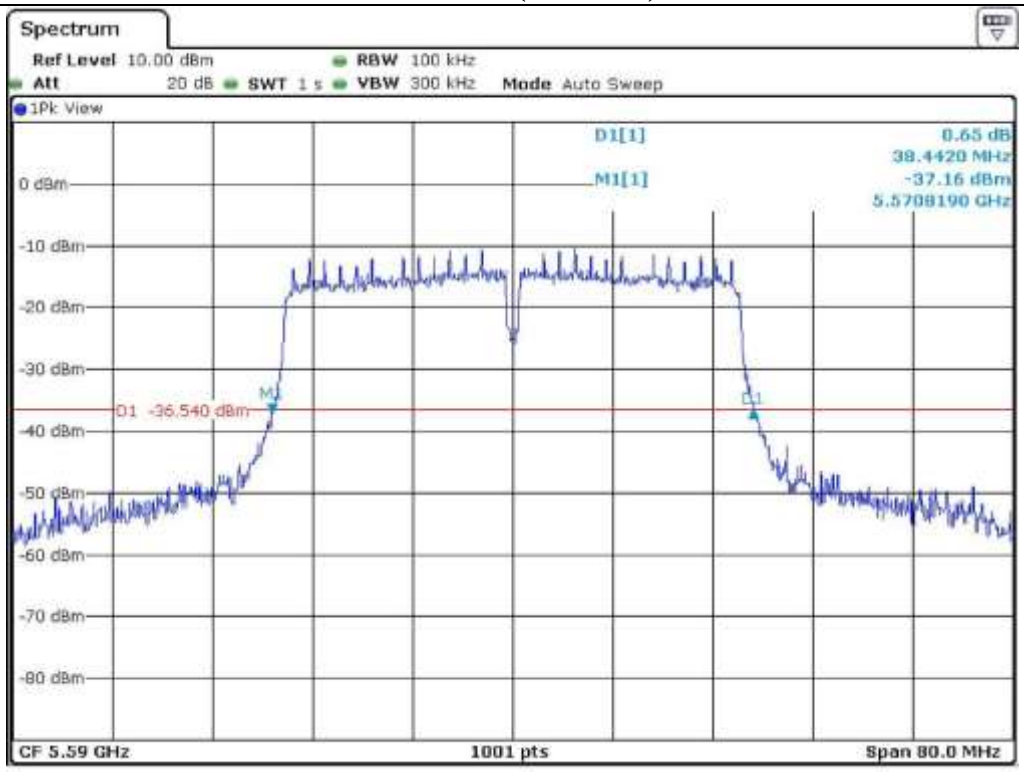



Low Channel (5 510 MHz)




Middle Channel (5 590 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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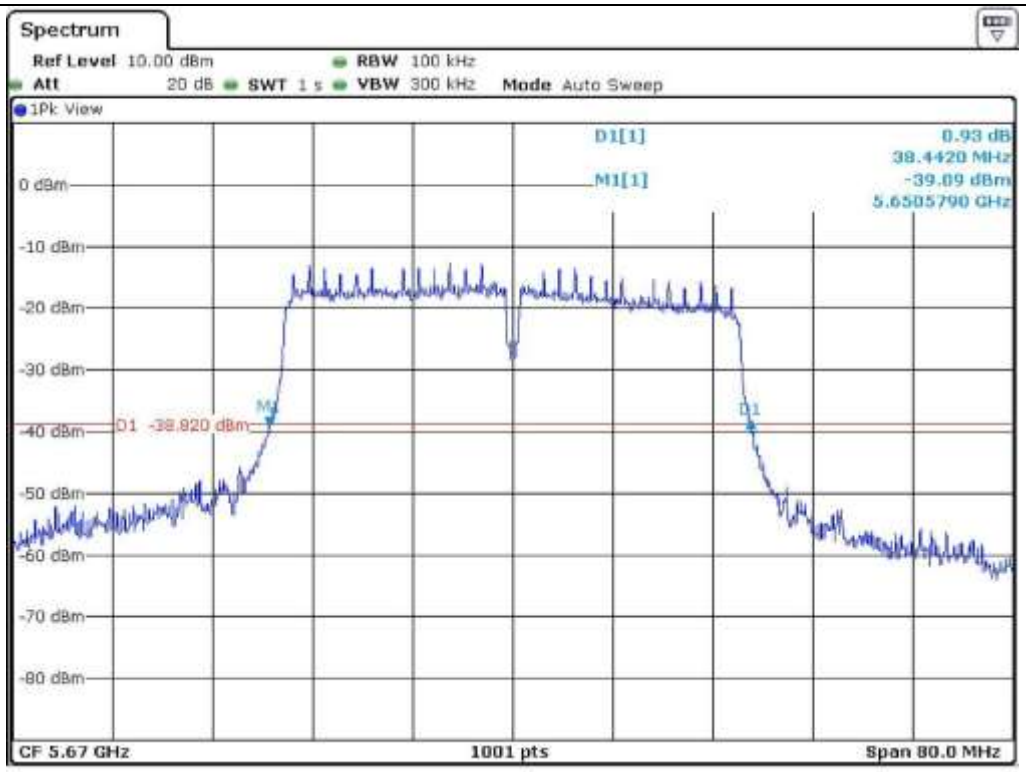
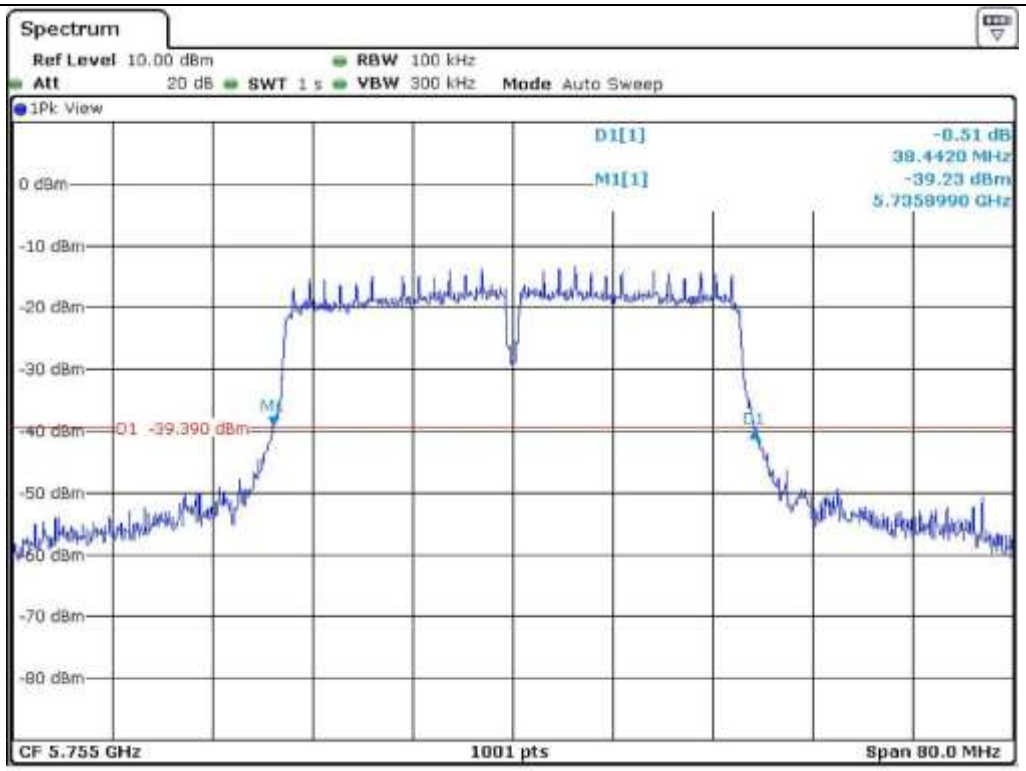


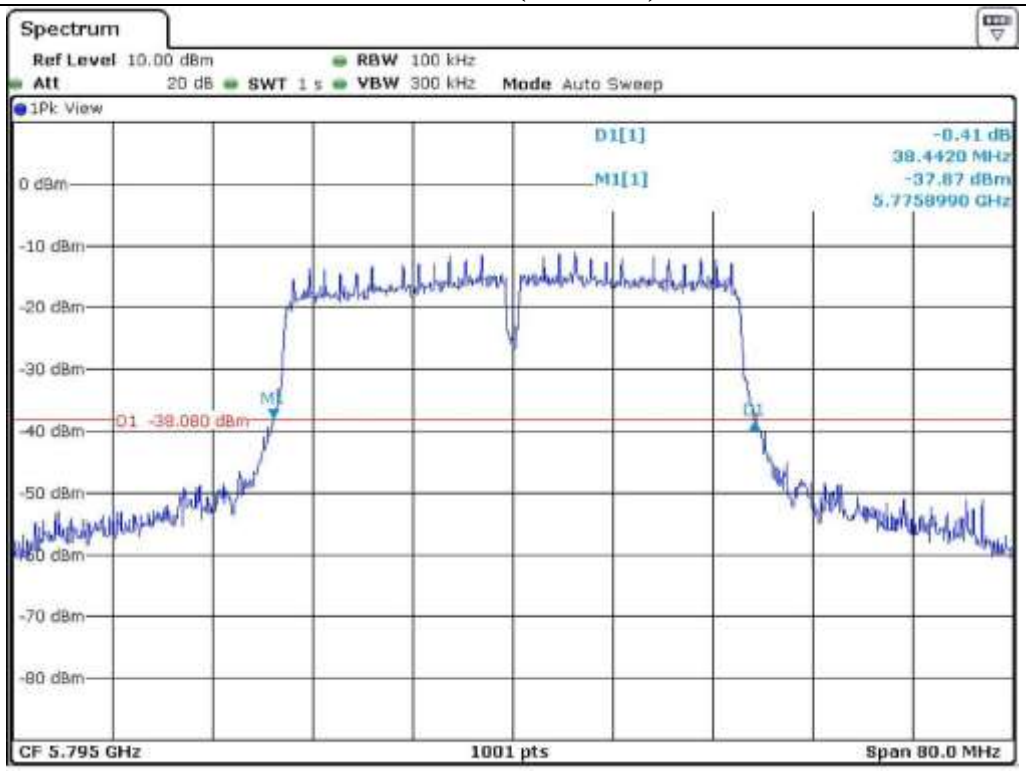

High Channel (5 670 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)




Low Channel (5 755 MHz)




High Channel (5 795 MHz)



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### 7.4.3.2 Test data for Antenna 1

-. Test Date : March 11, 2015

-. Test Result : Pass

| FREQUENCY RANGE (MHz) | CHANNEL | FREQUENCY (MHz) | 26 dB Bandwidth (MHz) |
|---|---|---|---|
| 5 150 ~ 5 250 | Low | 5 190 | 38.44 |
| | High | 5 230 | 38.44 |
| 5 250 ~ 5 350 | Low | 5 270 | 38.44 |
| | High | 5 310 | 38.44 |
| 5 470 ~ 5 725 | Low | 5 510 | 38.44 |
| | Middle | 5 590 | 38.44 |
| | High | 5 670 | 38.44 |
| 5 725 ~ 5 850 | Low | 5 755 | 38.44 |
| | High | 5 795 | 38.44 |

**Tested by: Tae-Ho, Kim / Senior Engineer**

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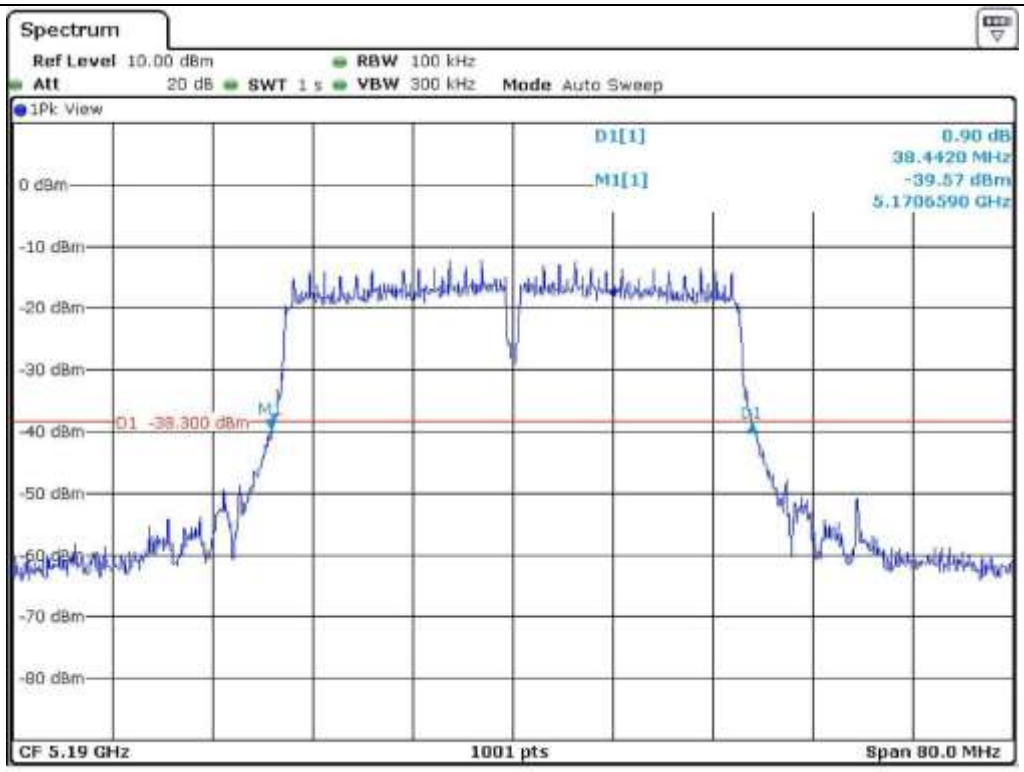
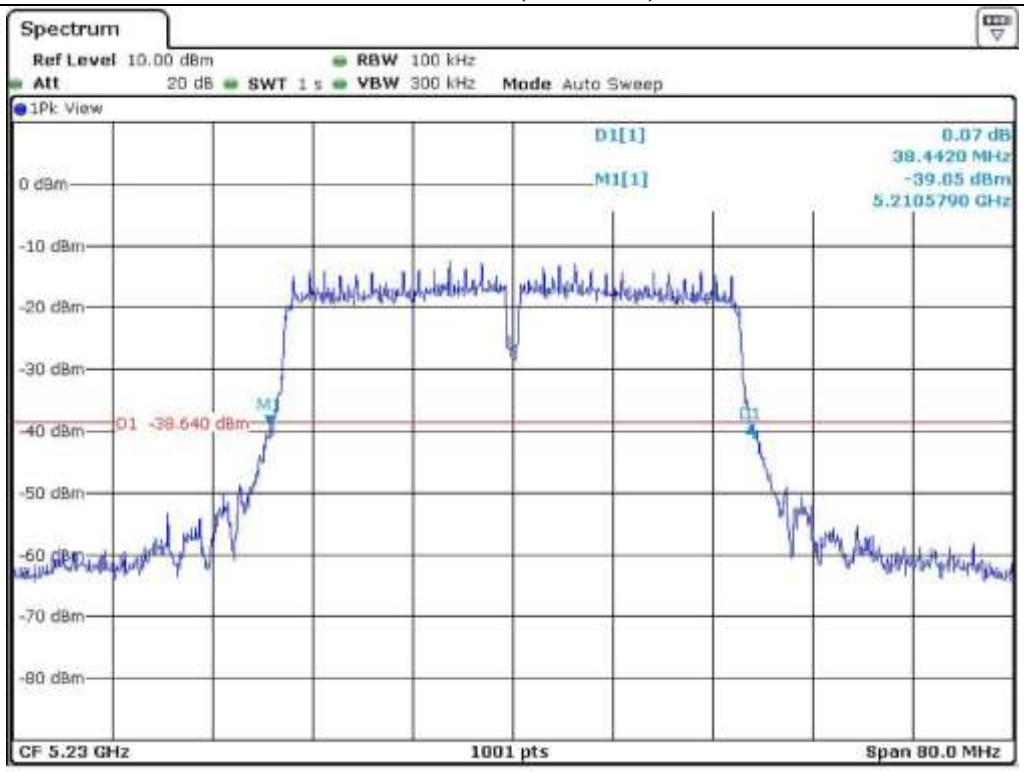



Low Channel (5 190 MHz)




High Channel (5 230 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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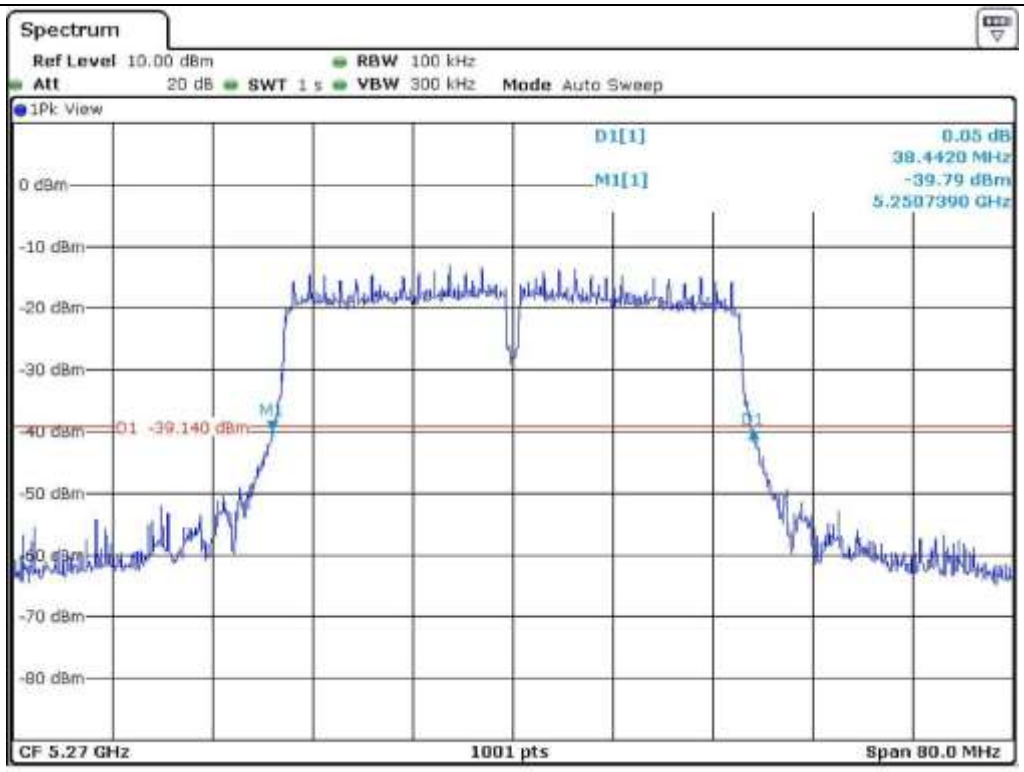
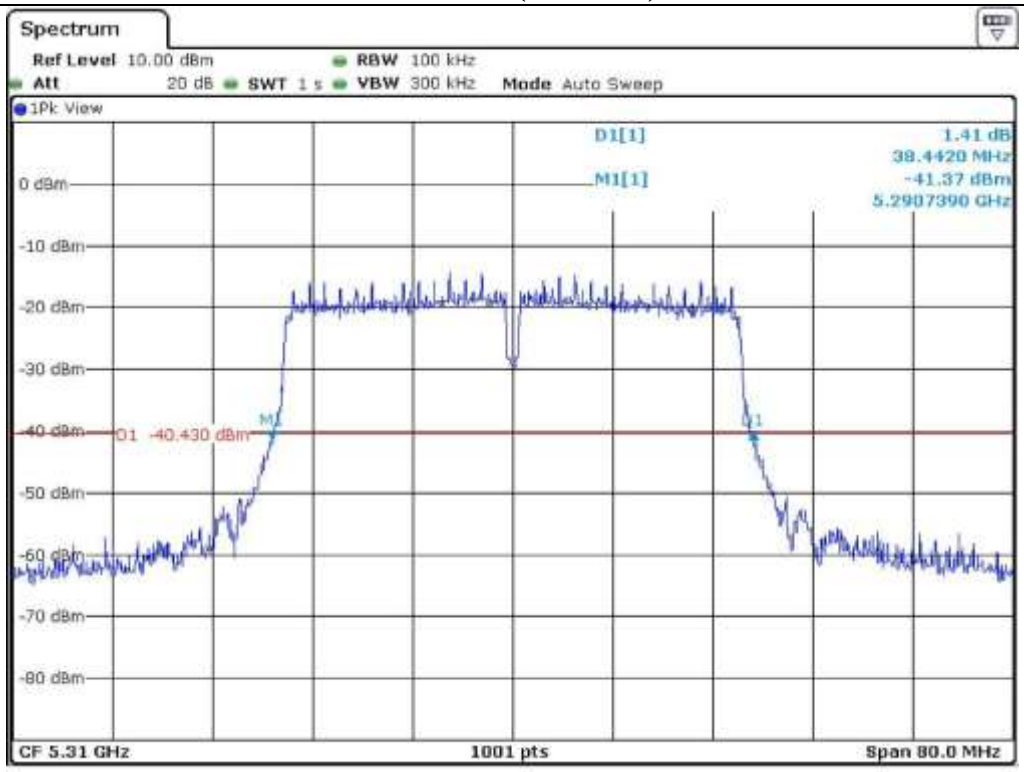



Low Channel (5 270 MHz)




High Channel (5 310 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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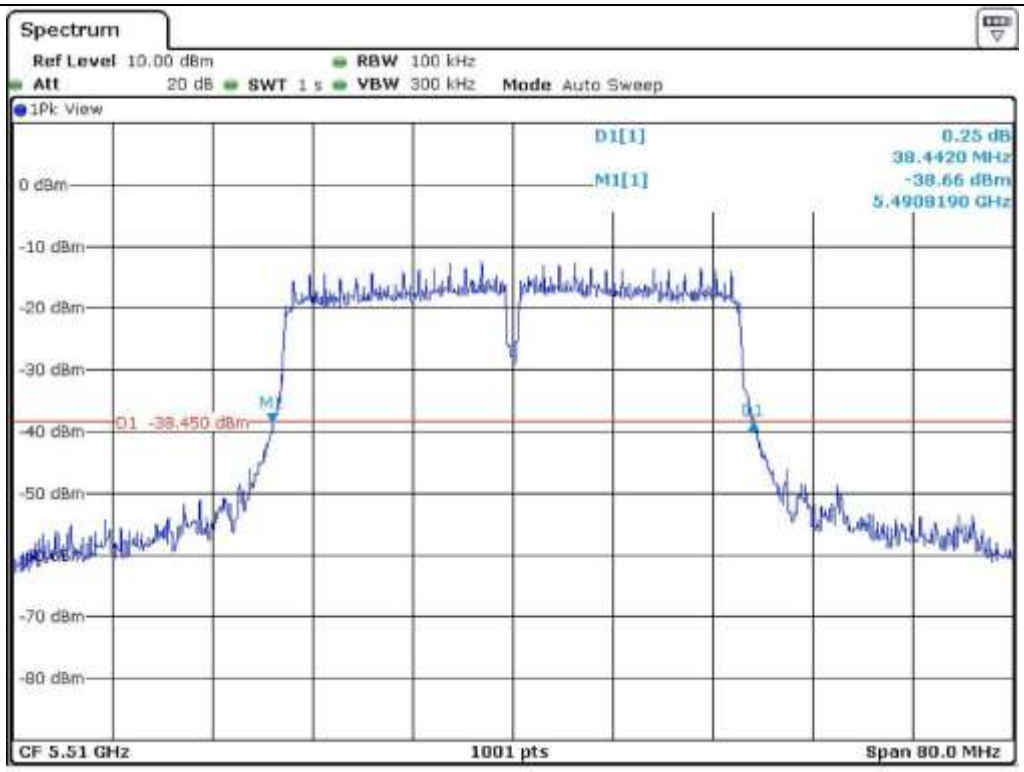
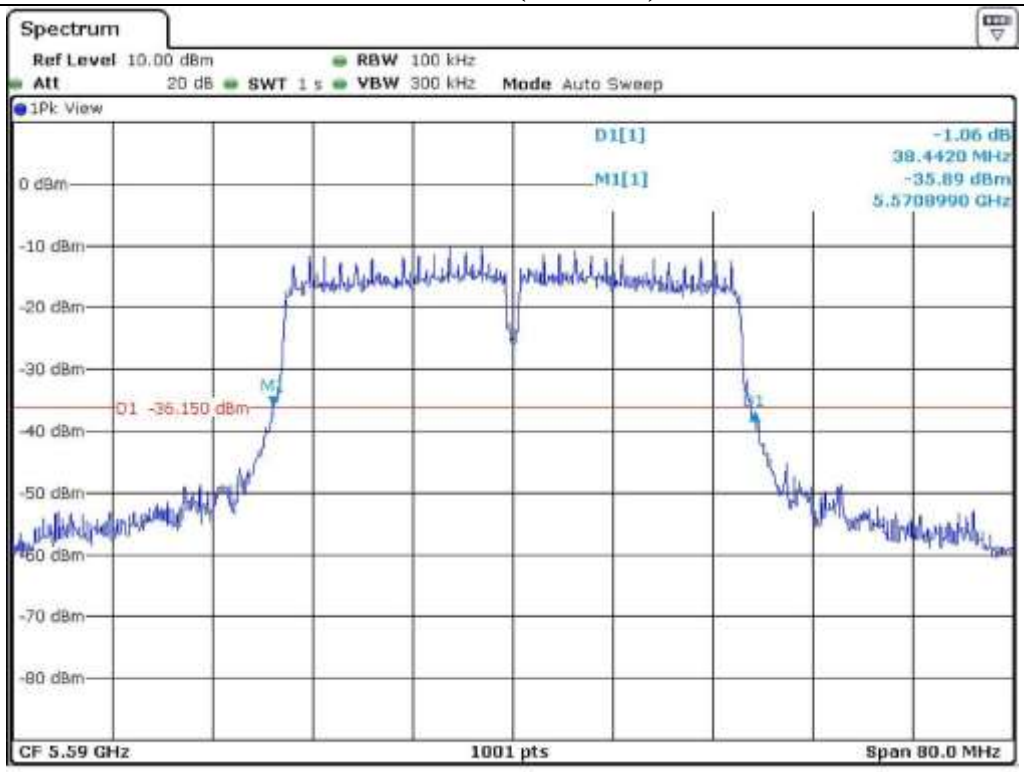


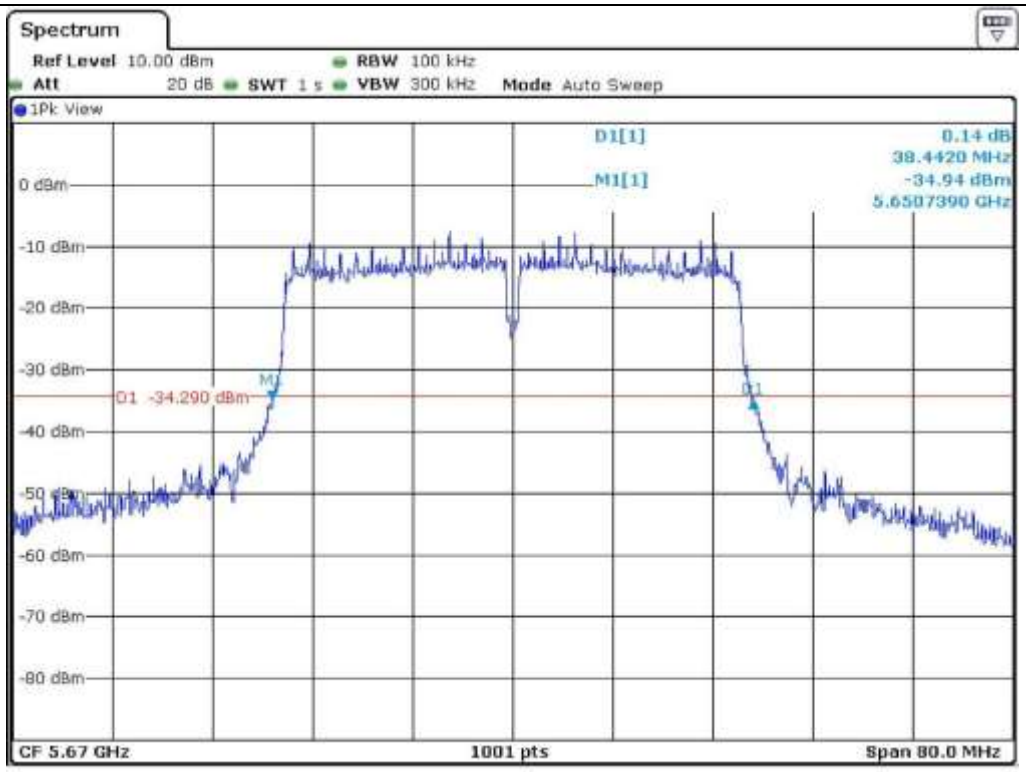

Low Channel (5 510 MHz)




Middle Channel (5 590 MHz)



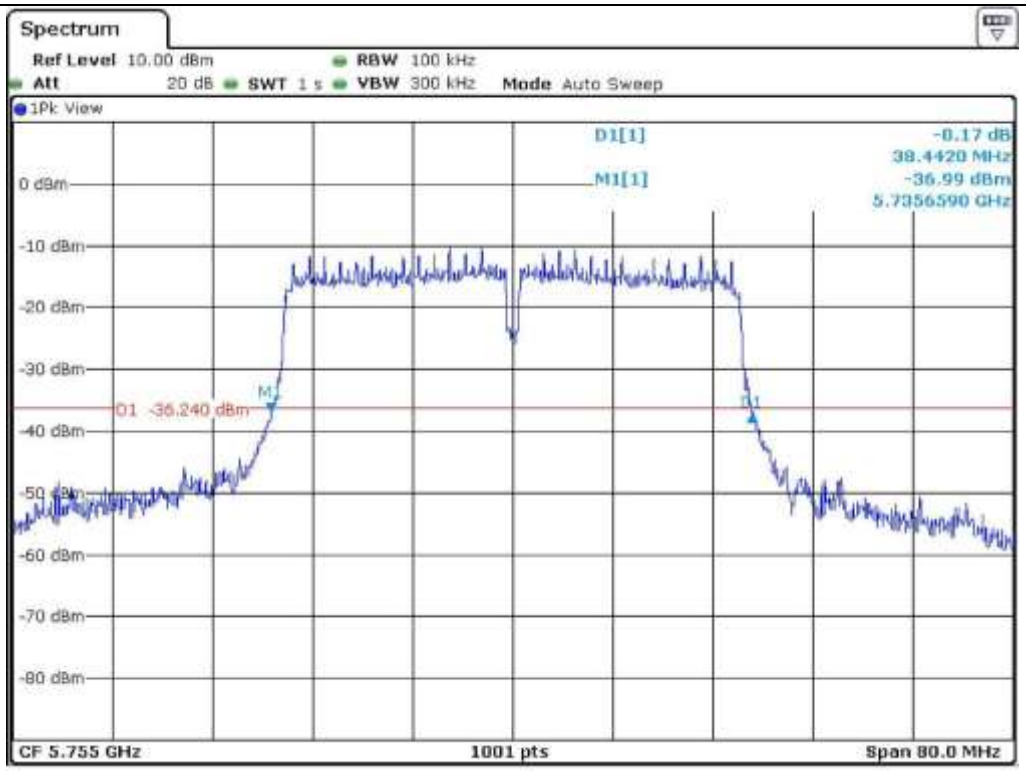
**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



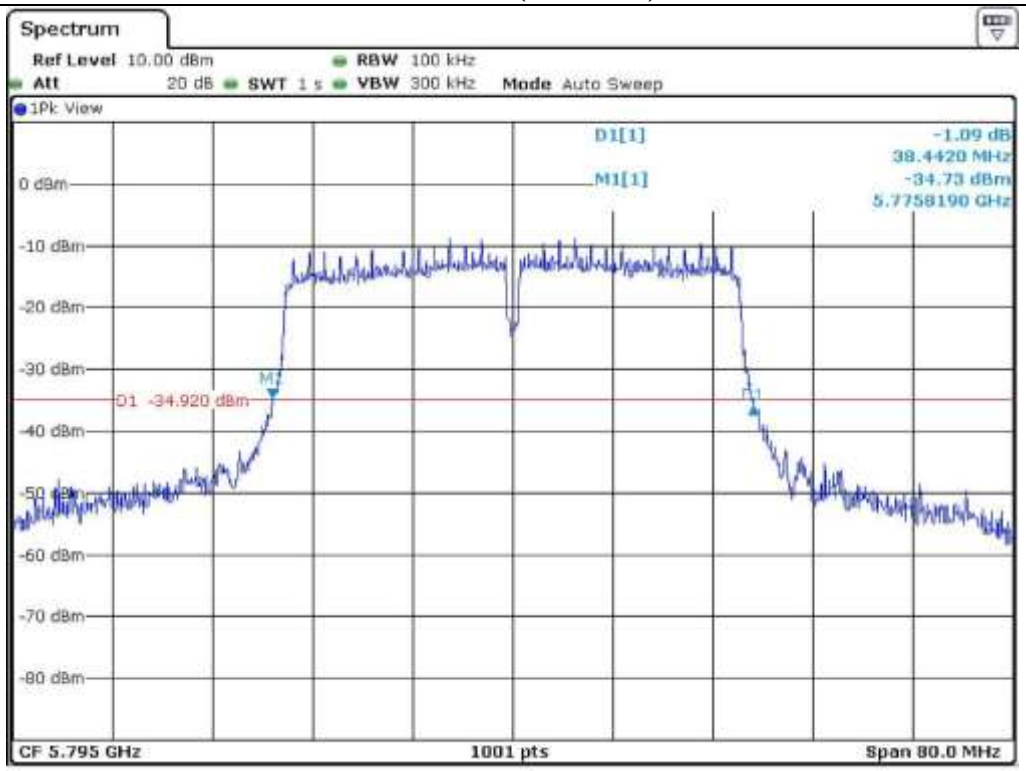

High Channel (5 670 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)




Low Channel (5 755 MHz)




High Channel (5 795 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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# 8. MAXIMUM PEAK OUTPUT POWER

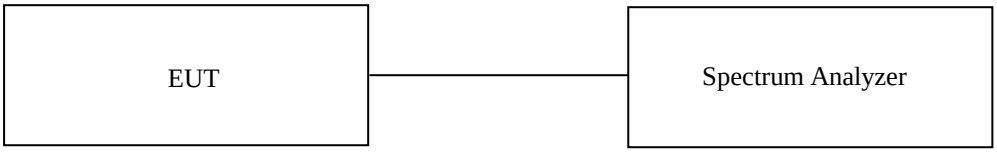
## 8.1 Operating environment

Temperature : 24℃

Relative humidity : 48 % R.H.

## 8.2 Test set-up

The maximum peak output power was measured with the spectrum analyzer connected to the antenna output of the EUT. The spectrum analyzer's internal channel power integration function is used to integrate the power over a bandwidth greater than or equal to the 99 % bandwidth. The EUT was operating in transmit mode at the appropriate center frequency.




## 8.3 Test equipment used

| | Model Number | Manufacturer | Description | Serial Number | Last Cal. |
|---|---|---|---|---|---|
| ■ - | FSV40 | Rohde & Schwarz | Signal Analyzer | 101009 | Jul. 30, 2014 (1Y) |

All test equipment used is calibrated on a regular basis.

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## 8.4 Test data for 802.11a RLAN Mode

### 8.4.1 Test data for Antenna 0

-. Test Date : March 11, 2015

-. Test Result : Pass

| FREQUENCY RANGE (MHz) | CHANNEL | FREQUENCY (MHz) | 26 dB Bandwidth (MHz) | MEASURED VLAUE (dBm) | LIMIT (dBm) | MARGIN (dB) |
|---|---|---|---|---|---|---|
| 5 150 ~ 5 250 | Low | 5 180 | 19.10 | 9.67 | 23.98 | 14.31 |
| | Middle | 5 200 | 19.10 | 10.31 | 23.98 | 13.67 |
| | High | 5 240 | 19.10 | 10.16 | 23.98 | 13.82 |
| 5 250 ~ 5 350 | Low | 5 260 | 19.10 | 9.89 | 23.98 | 14.09 |
| | Middle | 5 300 | 19.02 | 10.43 | 23.98 | 13.55 |
| | High | 5 320 | 19.22 | 7.49 | 23.98 | 16.49 |
| 5 470 ~ 5 725 | Low | 5 500 | 19.18 | 9.79 | 23.98 | 14.19 |
| | Middle | 5 600 | 19.22 | 9.70 | 23.98 | 14.28 |
| | High | 5 700 | 19.22 | 10.23 | 23.98 | 13.75 |
| 5 725 ~ 5 850 | Low | 5 745 | 19.18 | 9.60 | 30.00 | 20.40 |
| | Middle | 5 785 | 19.10 | 9.21 | 30.00 | 20.79 |
| | High | 5 825 | 19.10 | 8.76 | 30.00 | 21.24 |

Remark: See next page for measurement data.

**Tested by: Tae-Ho, Kim / Senior Engineer**


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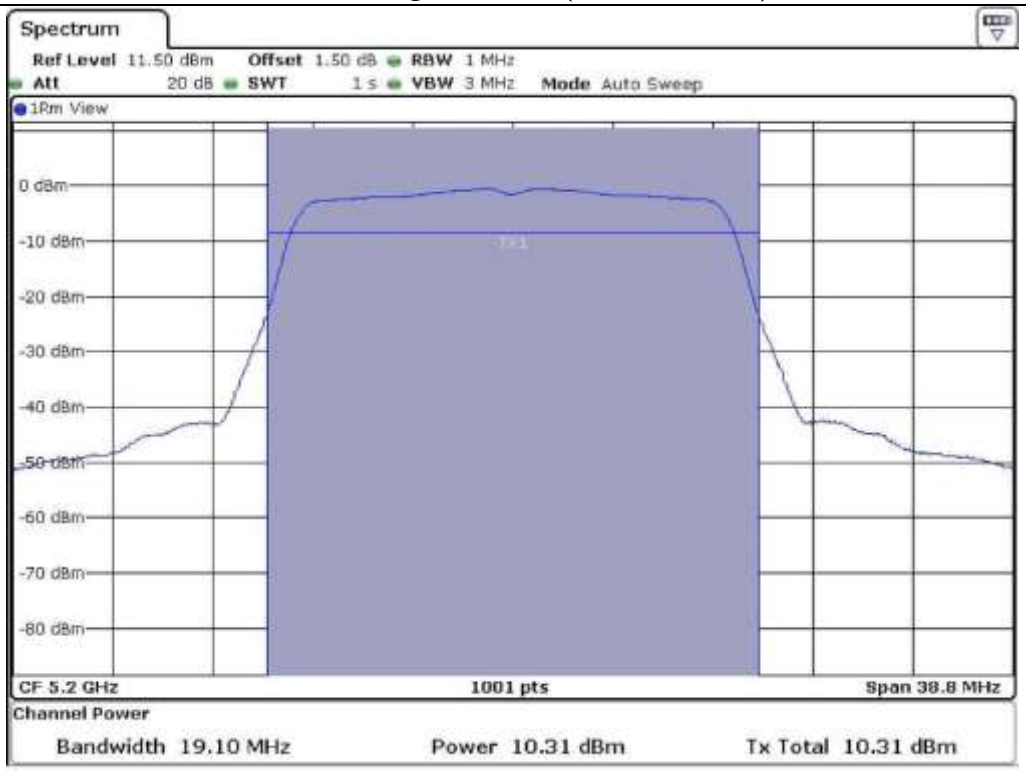
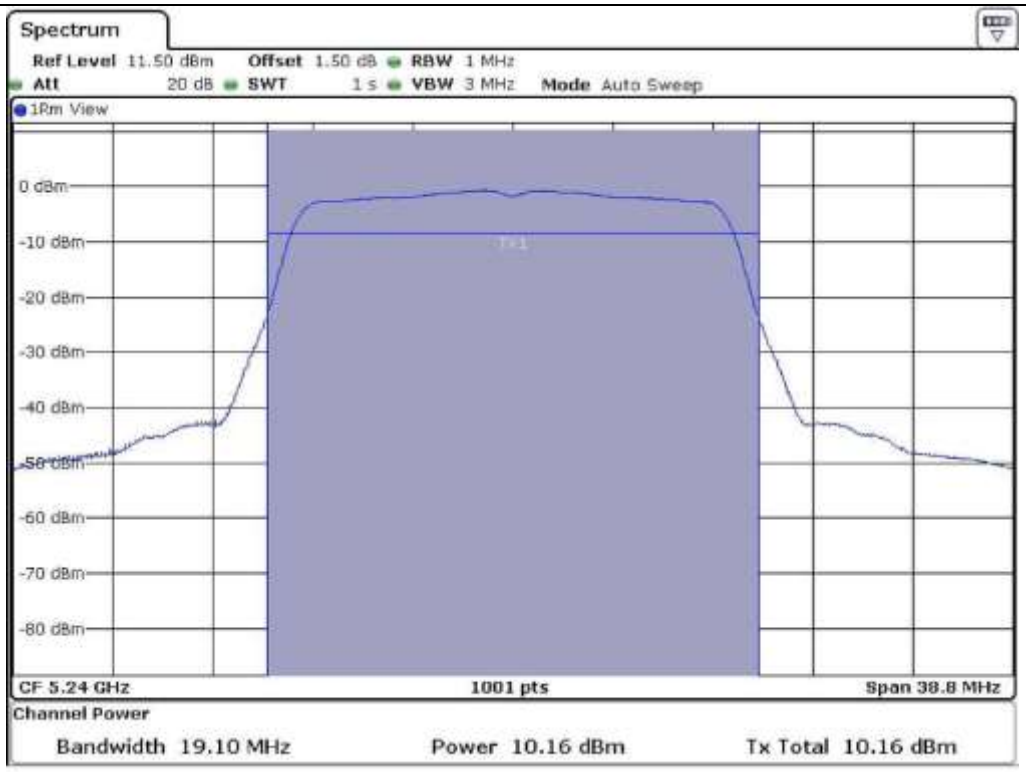
Low Channel @ 5 180 MHz (26 dB Bandwidth)



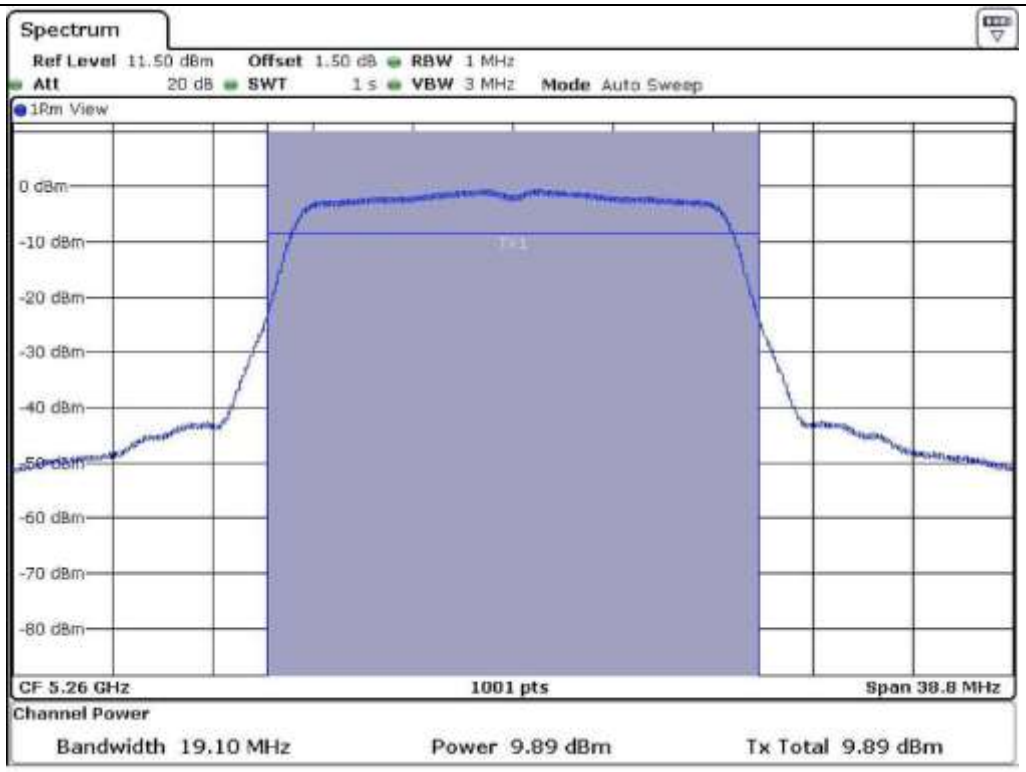

Middle Channel @ 5 200 MHz (26 dB Bandwidth)


**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

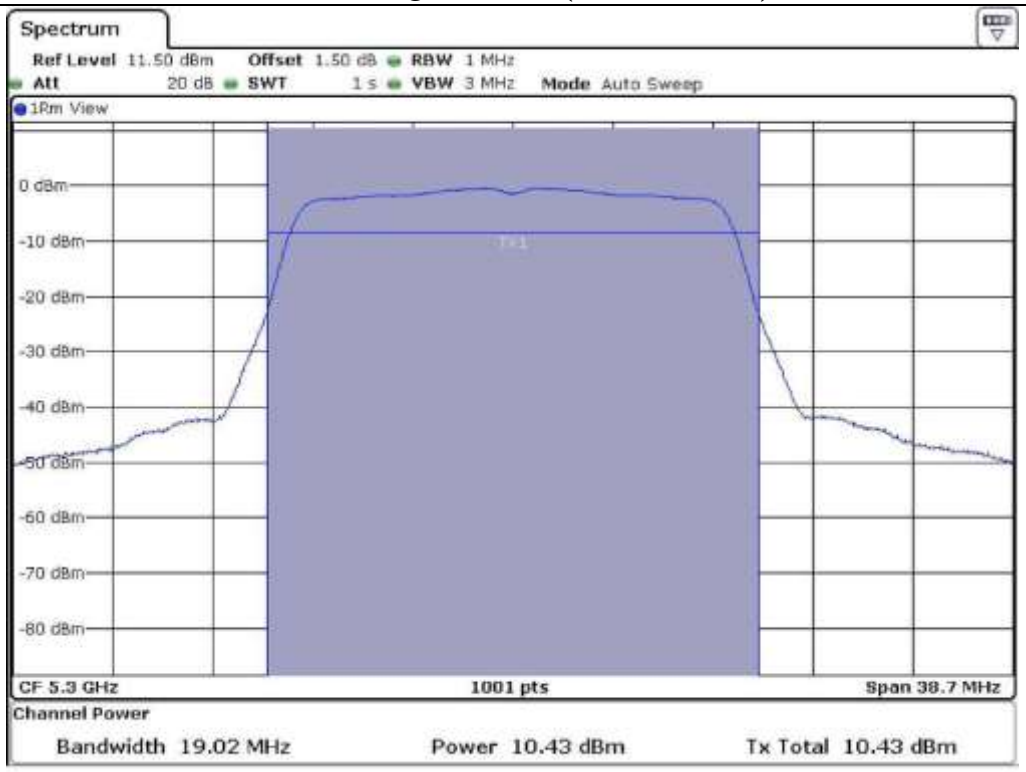



High Channel @ 5 240 MHz (26 dB Bandwidth)


**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)




Low Channel @ 5 260 MHz (26 dB Bandwidth)

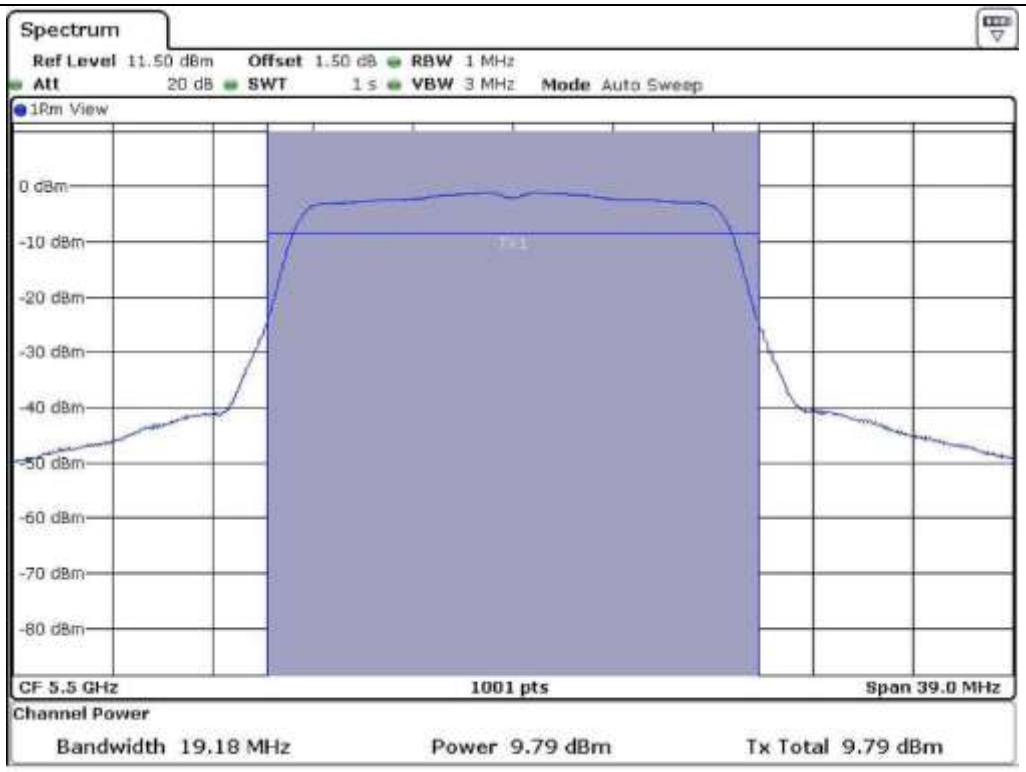



Middle Channel @ 5 300 MHz (26 dB Bandwidth)

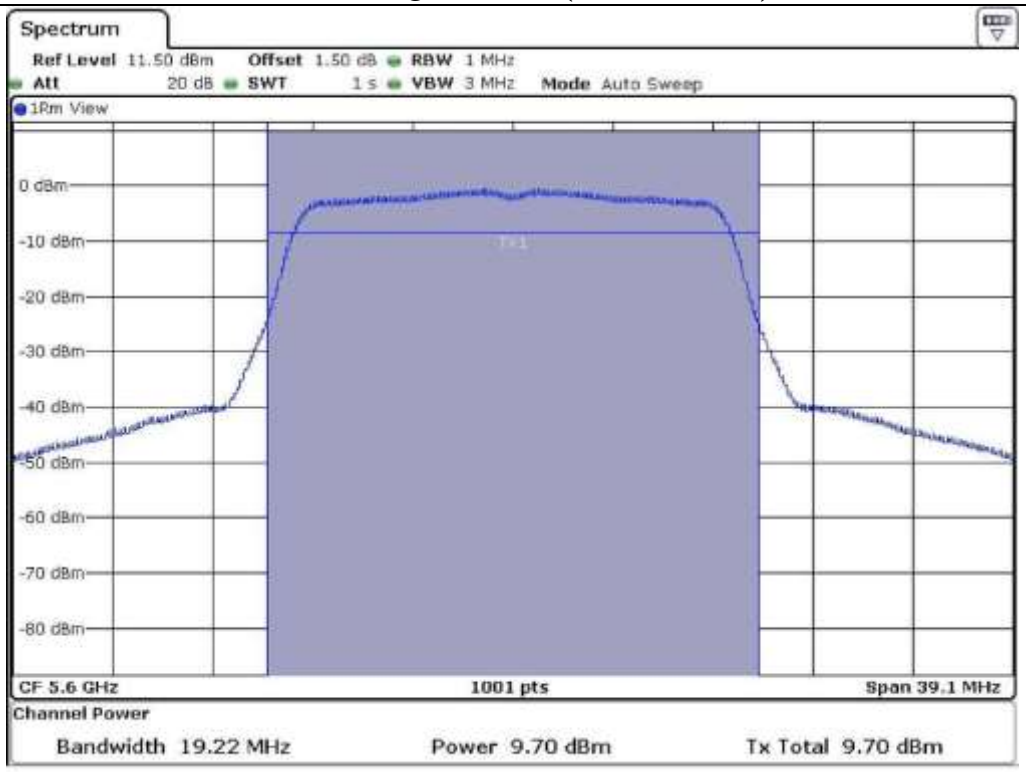

**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

High Channel @ 5 320 MHz (26 dB Bandwidth)


**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

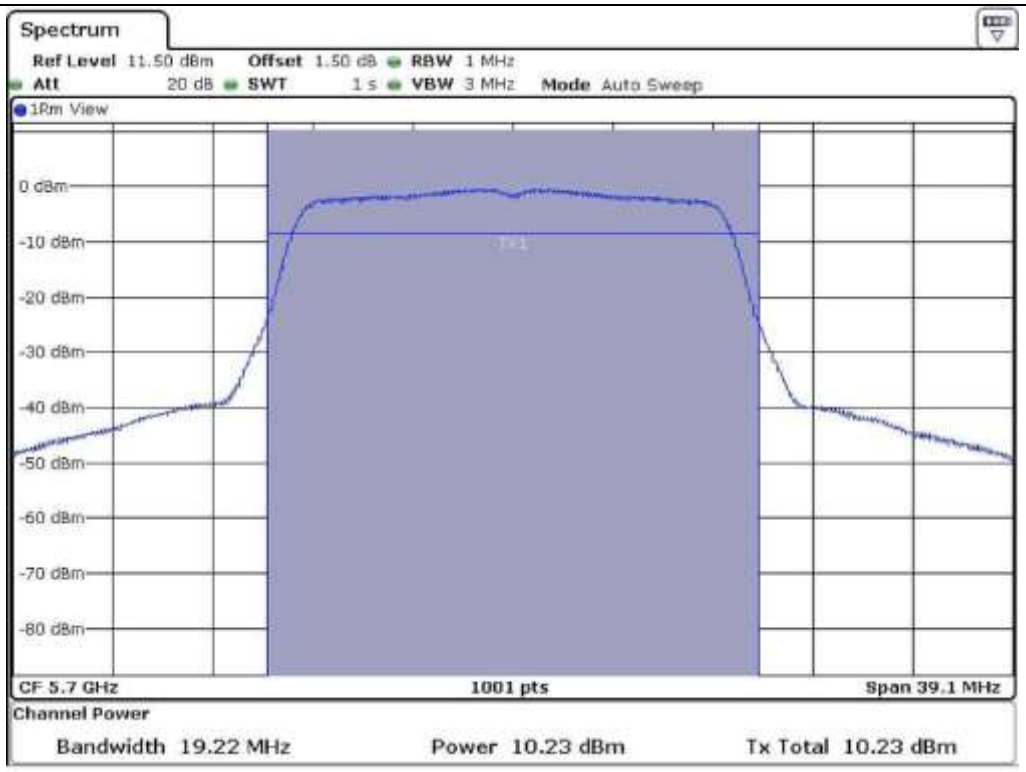



Low Channel @ 5 500 MHz (26 dB Bandwidth)



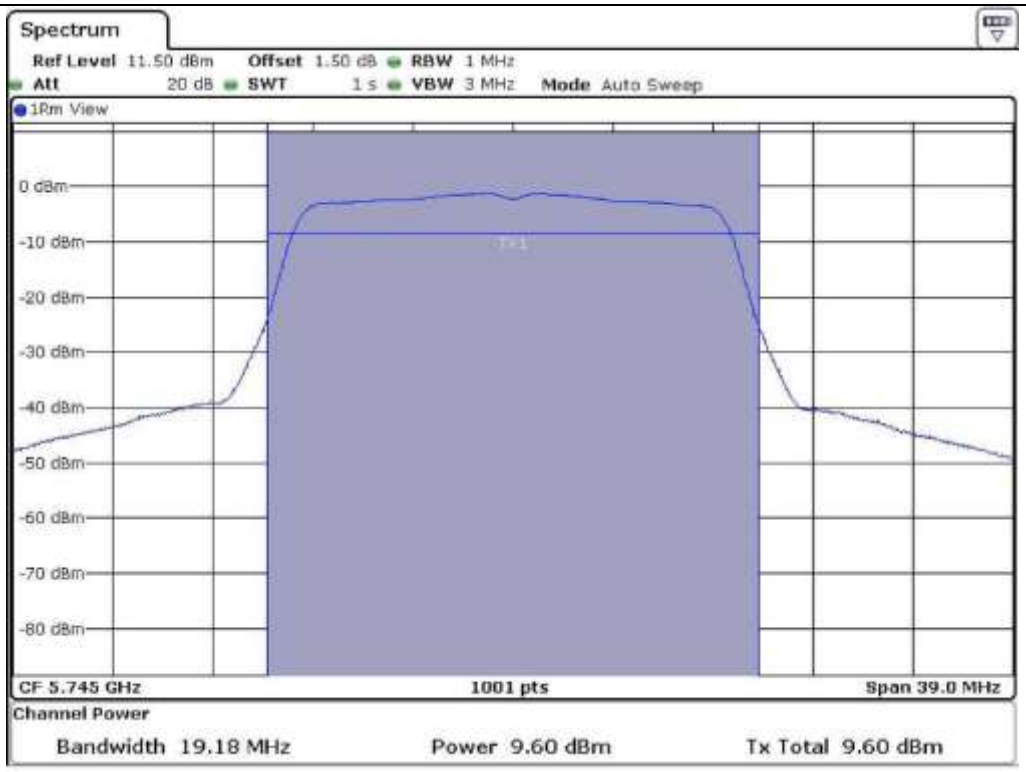

Middle Channel @ 5 600 MHz (26 dB Bandwidth)


**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

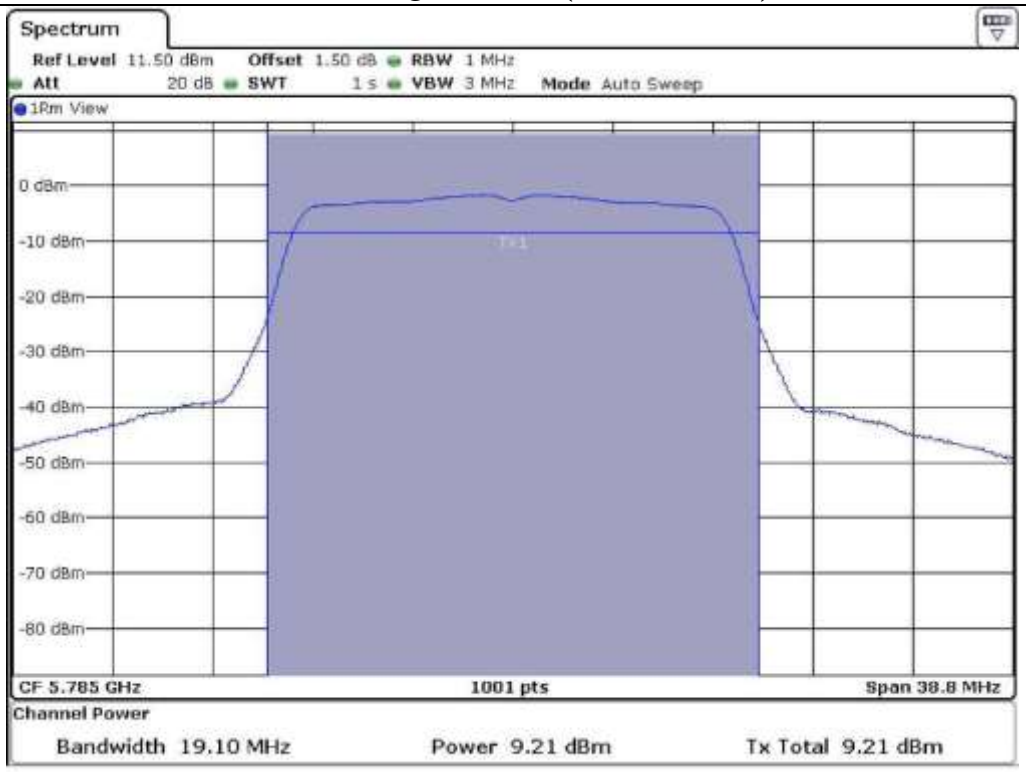



High Channel @ 5 700 MHz (26 dB Bandwidth)


**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)




Low Channel @ 5 745 MHz (26 dB Bandwidth)




Middle Channel @ 5 785 MHz (26 dB Bandwidth)

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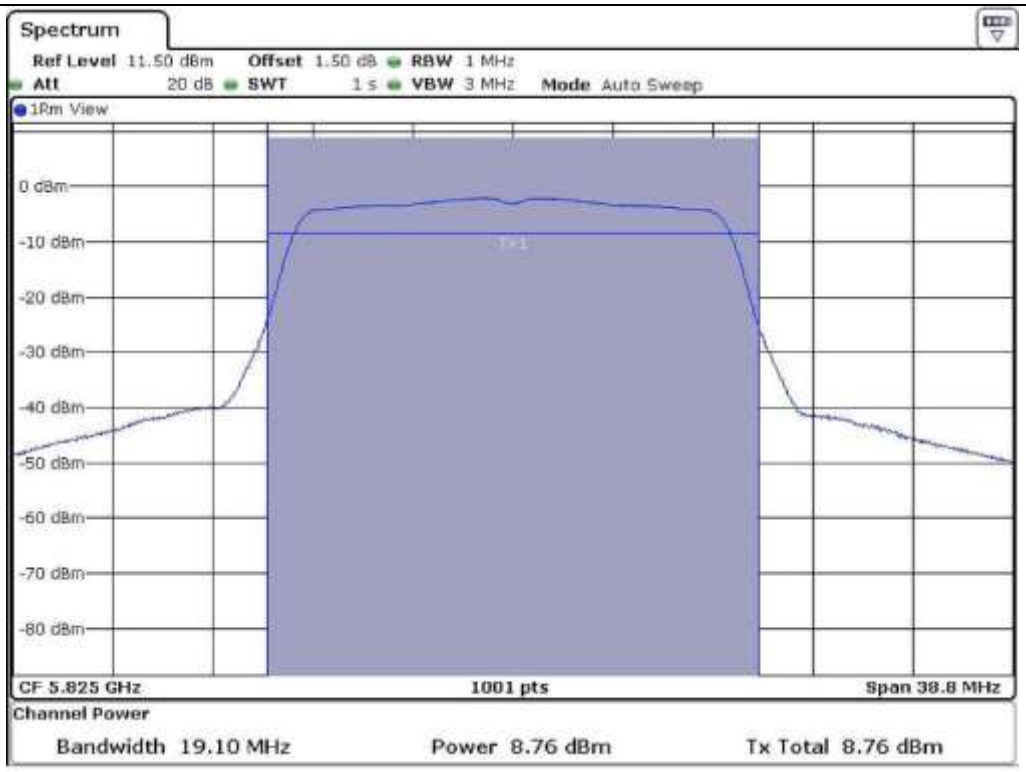
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)




High Channel @ 5 825 MHz (26 dB Bandwidth)


**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

### 8.4.2 Test data for Antenna 1

-. Test Date : March 11, 2015

-. Test Result : Pass

| FREQUENCY RANGE (MHz) | CHANNEL | FREQUENCY (MHz) | 26 dB Bandwidth (MHz) | MEASURED VLAUE (dBm) | LIMIT (dBm) | MARGIN (dB) |
|---|---|---|---|---|---|---|
| 5 150 ~ 5 250 | Low | 5 180 | 19.34 | 8.54 | 23.98 | 15.44 |
| | Middle | 5 200 | 19.34 | 9.64 | 23.98 | 14.34 |
| | High | 5 240 | 19.34 | 9.32 | 23.98 | 14.66 |
| 5 250 ~ 5 350 | Low | 5 260 | 19.34 | 8.84 | 23.98 | 15.14 |
| | Middle | 5 300 | 19.10 | 9.29 | 23.98 | 14.69 |
| | High | 5 320 | 19.18 | 9.11 | 23.98 | 14.87 |
| 5 470 ~ 5 725 | Low | 5 500 | 18.47 | 10.01 | 23.98 | 13.97 |
| | Middle | 5 600 | 18.47 | 10.28 | 23.98 | 13.70 |
| | High | 5 700 | 18.47 | 11.15 | 23.98 | 12.83 |
| 5 725 ~ 5 850 | Low | 5 745 | 19.14 | 10.87 | 30.00 | 19.13 |
| | Middle | 5 785 | 19.26 | 10.84 | 30.00 | 19.16 |
| | High | 5 825 | 19.02 | 10.75 | 30.00 | 19.25 |

Remark: See next page for measurement data.

**Tested by: Tae-Ho, Kim / Senior Engineer**


**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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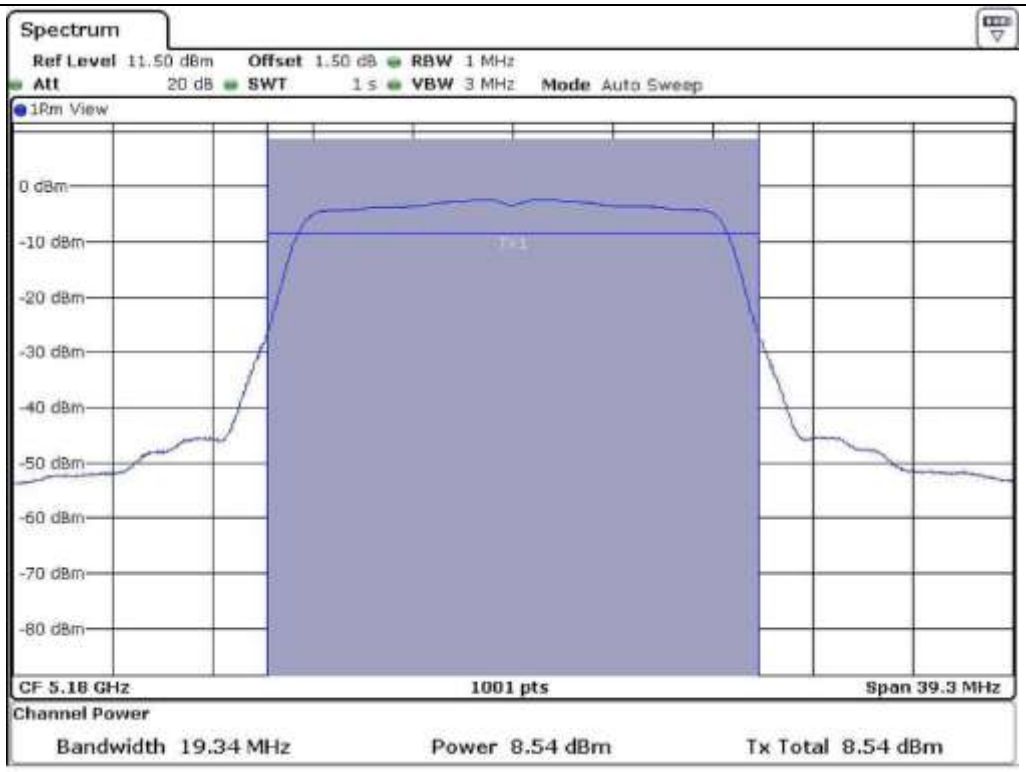
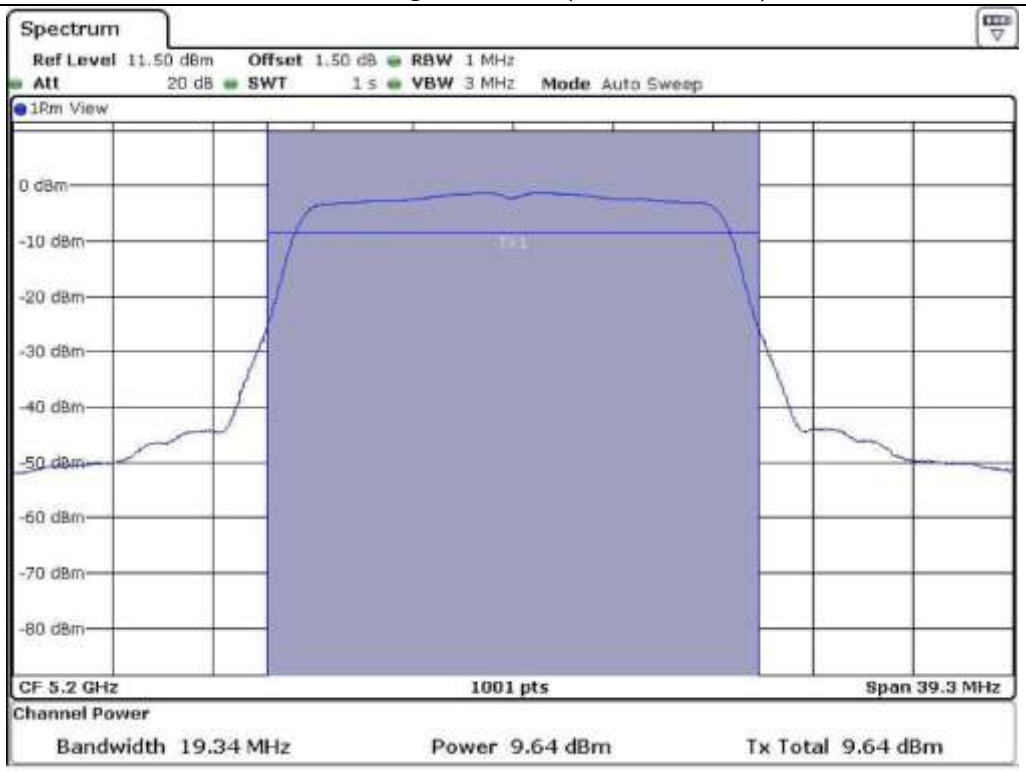



Low Channel @ 5 180 MHz (26 dB Bandwidth)




Middle Channel @ 5 200 MHz (26 dB Bandwidth)


**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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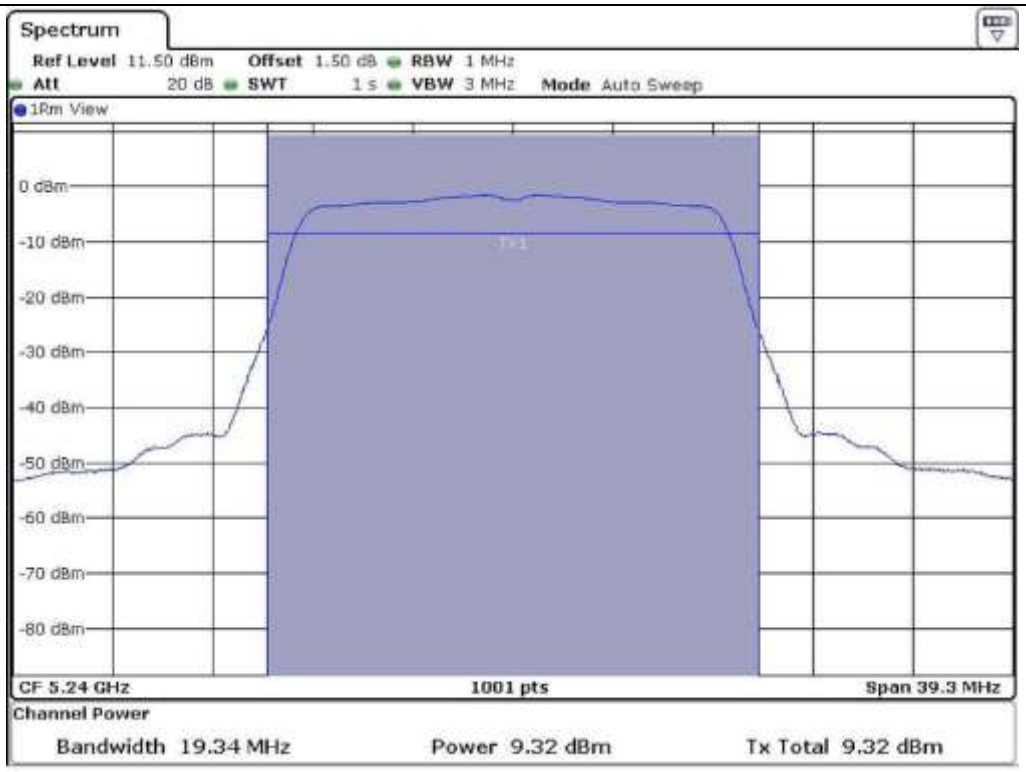


High Channel @ 5 240 MHz (26 dB Bandwidth)


**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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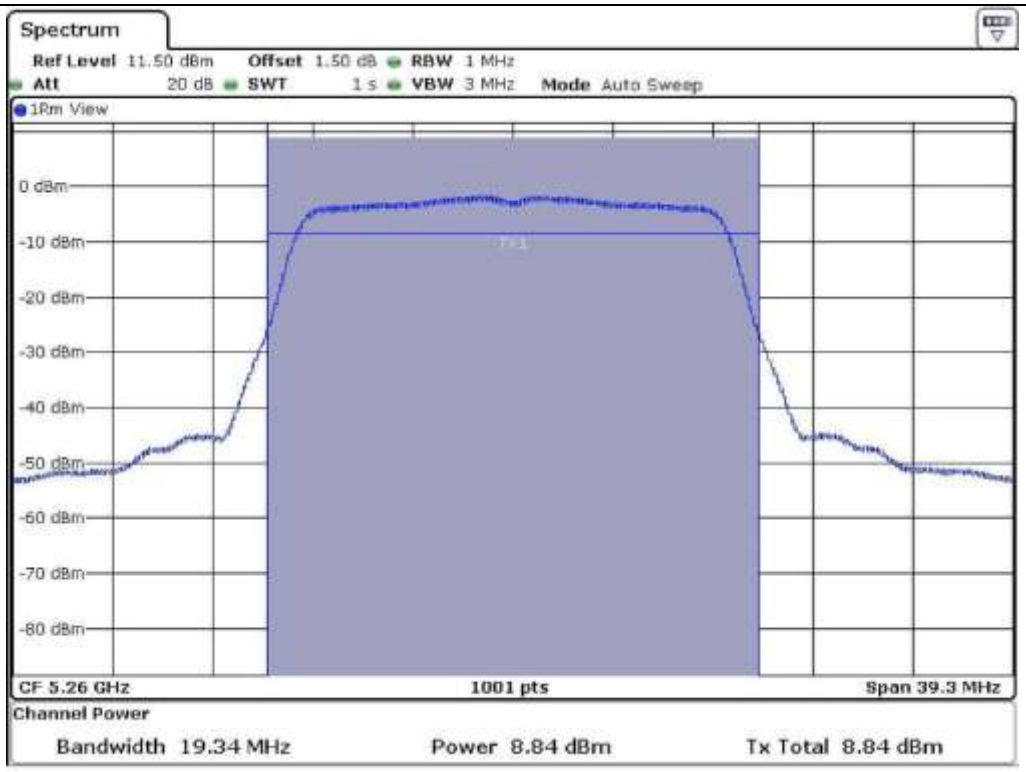
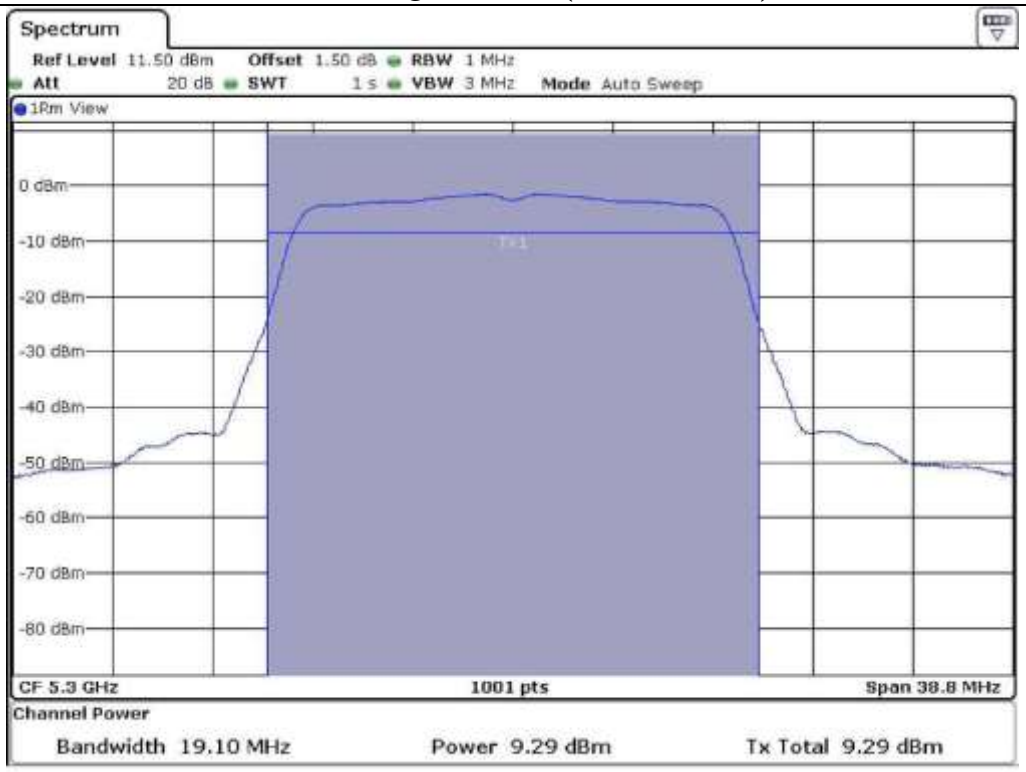



Low Channel @ 5 260 MHz (26 dB Bandwidth)




Middle Channel @ 5 300 MHz (26 dB Bandwidth)



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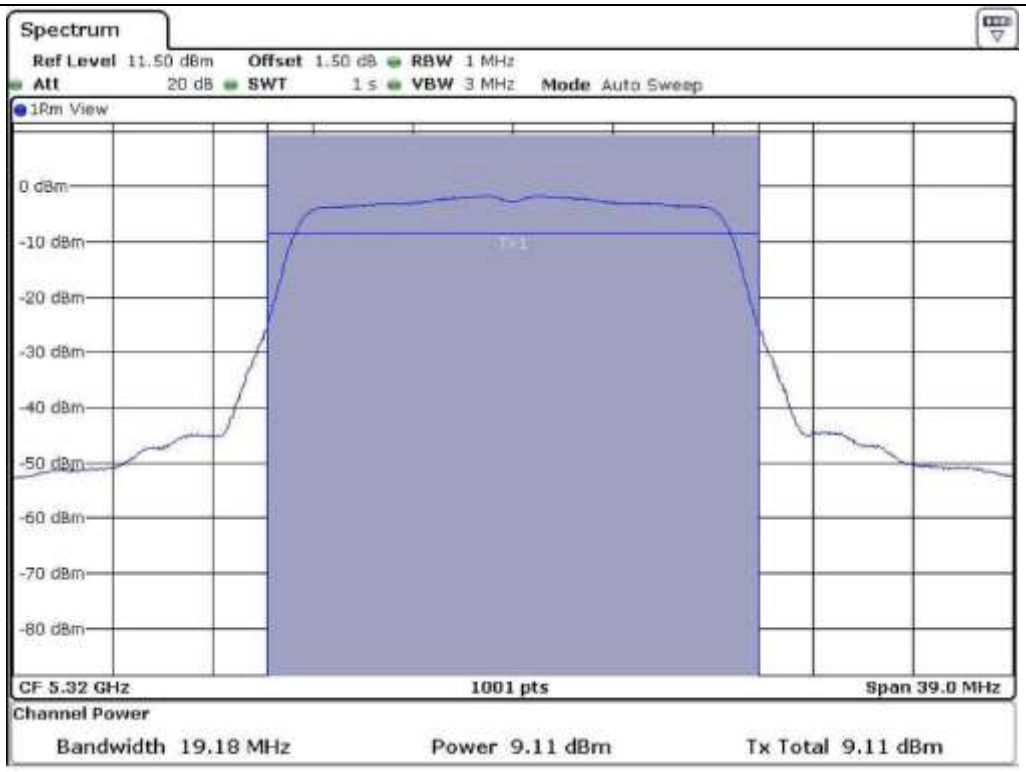


High Channel @ 5 320 MHz (26 dB Bandwidth)


**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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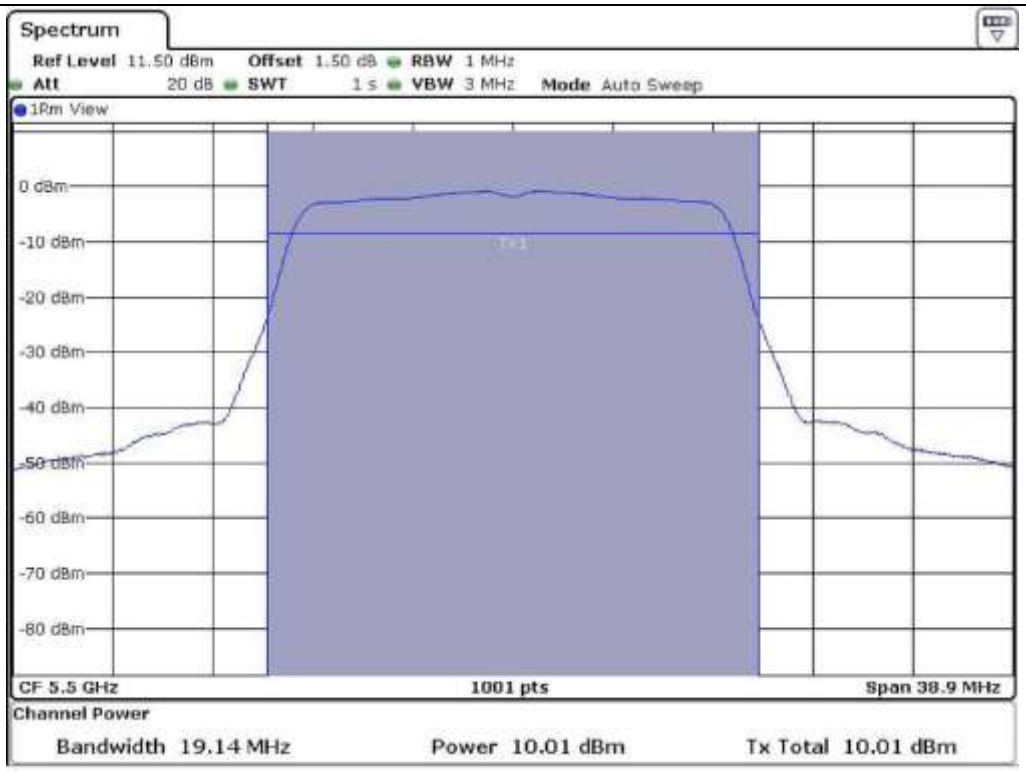
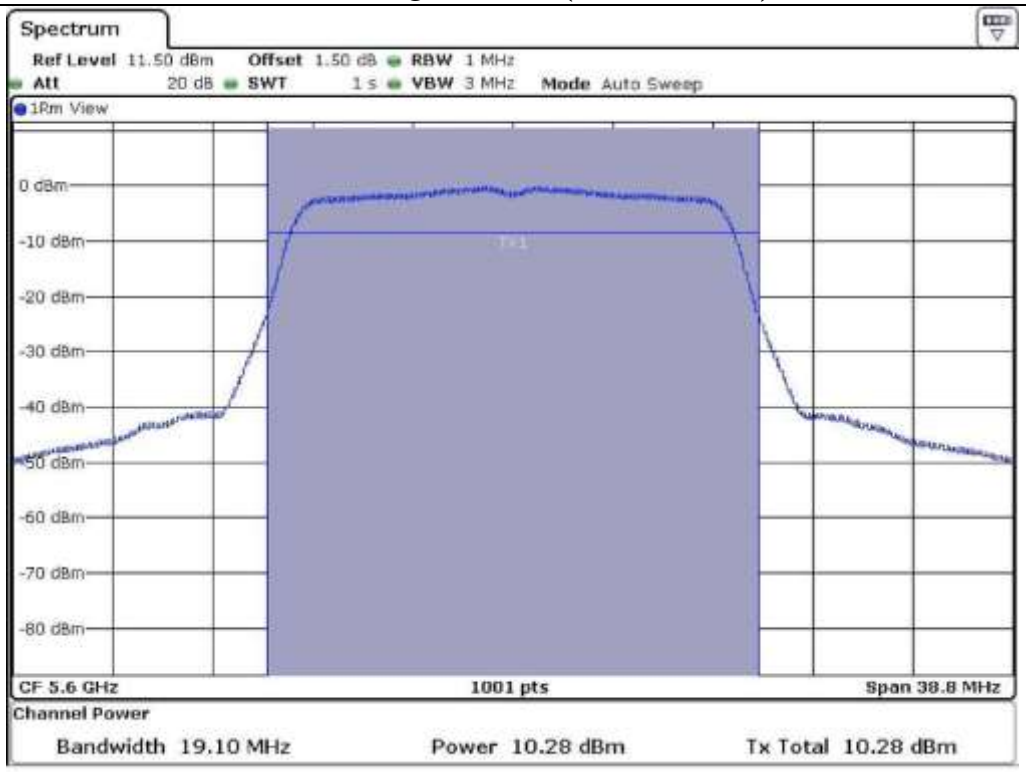
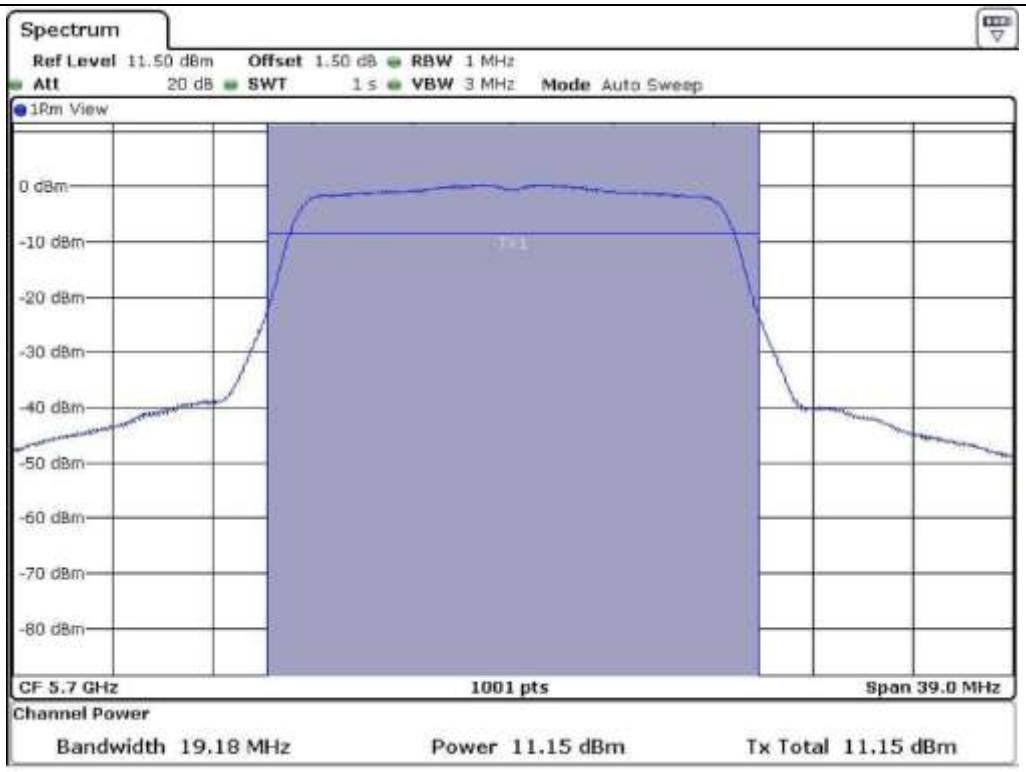



Low Channel @ 5 500 MHz (26 dB Bandwidth)




Middle Channel @ 5 600 MHz (26 dB Bandwidth)


**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)




High Channel @ 5 700 MHz (26 dB Bandwidth)


**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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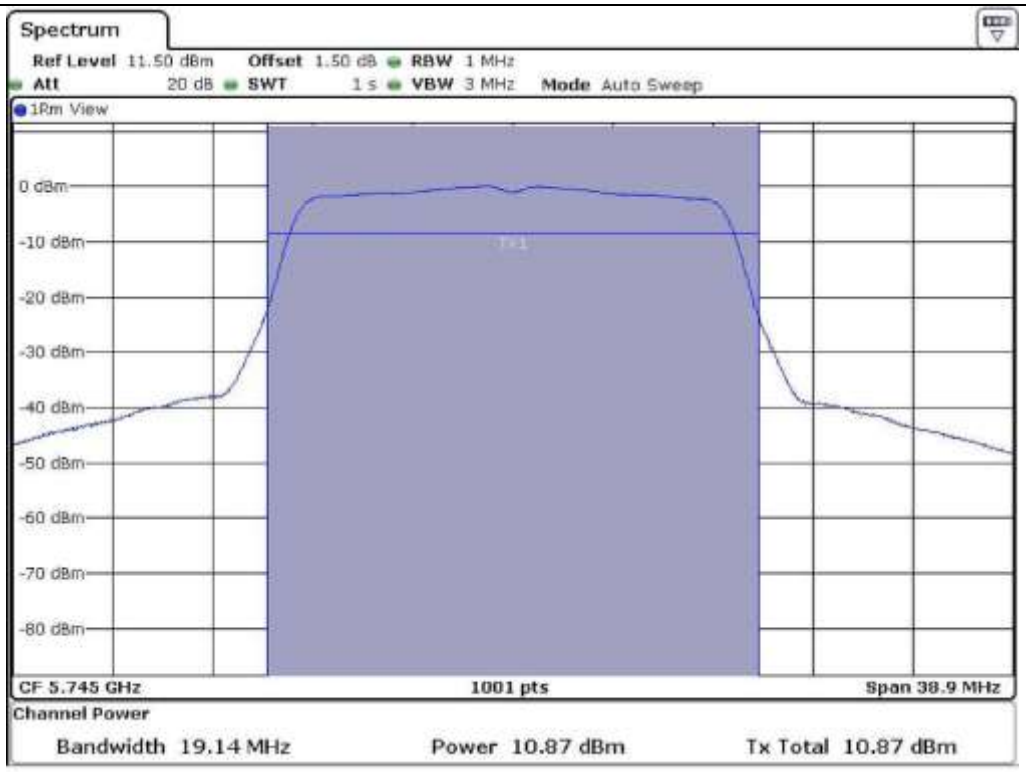
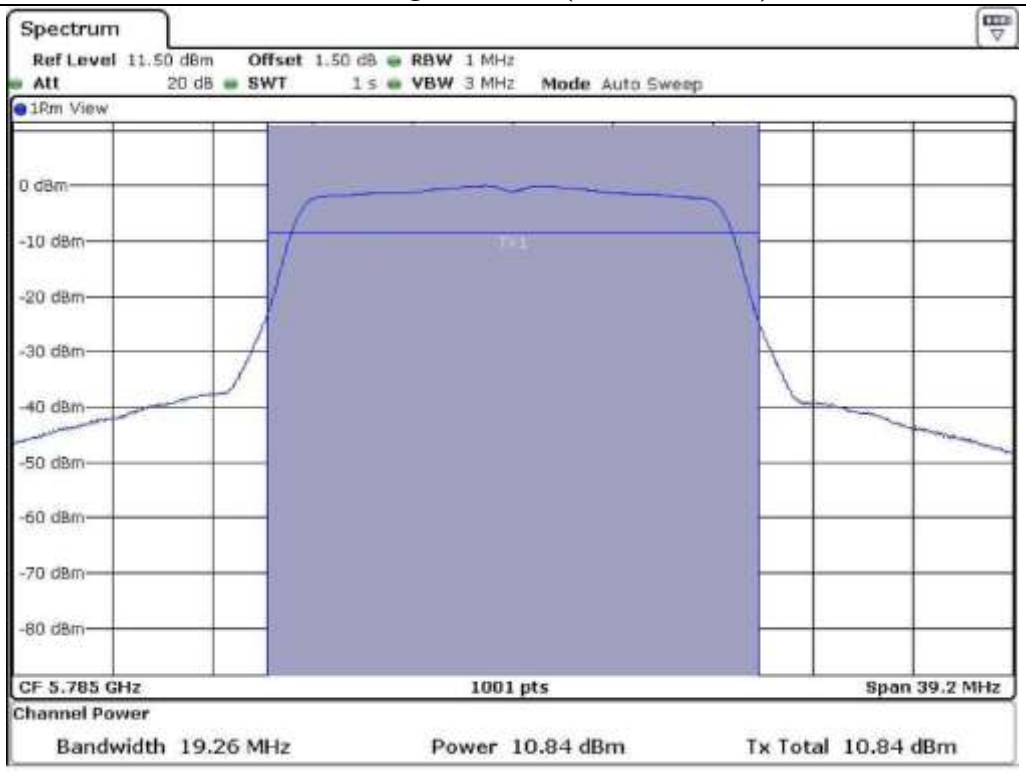



Low Channel @ 5 745 MHz (26 dB Bandwidth)




Middle Channel @ 5 785 MHz (26 dB Bandwidth)

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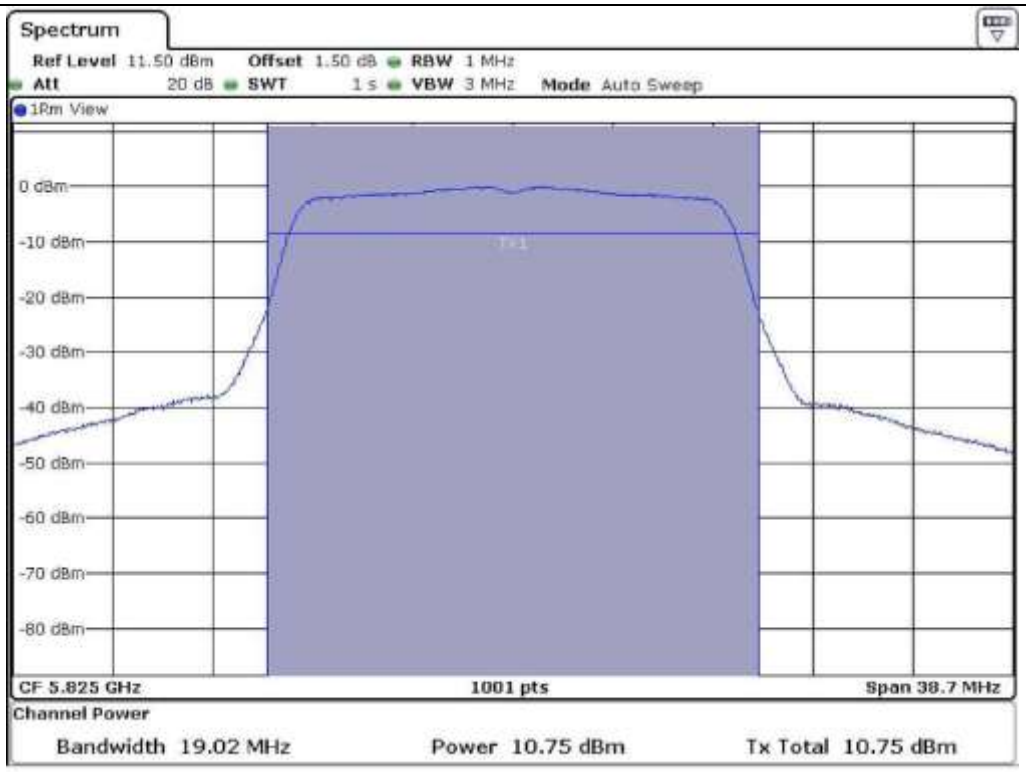
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)




High Channel @ 5 825 MHz (26 dB Bandwidth)


**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

### 8.4.3 Test data for Multiple Transmit

-. Test Date : March 11, 2015

-. Test Result : Pass

| FREQUENCY RANGE (MHz) | CHANNEL | FREQUENCY (MHz) | MEASURED VLAUE (dBm) | LIMIT (dBm) | MARGIN (dB) |
|---|---|---|---|---|---|
| 5 150 ~ 5 250 | Low | 5 180 | 12.15 | 23.98 | 11.83 |
| | Middle | 5 200 | 13.00 | 23.98 | 10.98 |
| | High | 5 240 | 12.77 | 23.98 | 11.21 |
| 5 250 ~ 5 350 | Low | 5 260 | 12.41 | 23.98 | 11.57 |
| | Middle | 5 300 | 12.91 | 23.98 | 11.07 |
| | High | 5 320 | 11.39 | 23.98 | 12.59 |
| 5 470 ~ 5 725 | Low | 5 500 | 12.91 | 23.98 | 11.07 |
| | Middle | 5 600 | 13.01 | 23.98 | 10.97 |
| | High | 5 700 | 13.72 | 23.98 | 10.26 |
| 5 725 ~ 5 850 | Low | 5 745 | 13.29 | 30.00 | 16.71 |
| | Middle | 5 785 | 13.11 | 30.00 | 16.89 |
| | High | 5 825 | 12.88 | 30.00 | 17.12 |

Remark 1 : Margin = Limit – Measured Value (=Receiver Reading + Cable Loss)

Remark 2 :Calculated Output Power= $10\log(10^{(\text{Antenna1 Output Power}/10)}+10^{(\text{Antenna2 Output Power}/10)})$

**Tested by: Tae-Ho, Kim / Senior Engineer**


**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

## 8.5 Test data for 802.11n_HT20 RLAN Mode

### 8.5.1 Test data for Antenna 0

-. Test Date : March 11, 2015

-. Test Result : Pass

| FREQUENCY RANGE (MHz) | CHANNEL | FREQUENCY (MHz) | 26 dB Bandwidth (MHz) | MEASURED VLAUE (dBm) | LIMIT (dBm) | MARGIN (dB) |
|---|---|---|---|---|---|---|
| 5 150 ~ 5 250 | Low | 5 180 | 19.50 | 9.16 | 23.98 | 14.82 |
| | Middle | 5 200 | 19.54 | 9.17 | 23.98 | 14.81 |
| | High | 5 240 | 19.58 | 9.58 | 23.98 | 14.40 |
| 5 250 ~ 5 350 | Low | 5 260 | 19.58 | 9.97 | 23.98 | 14.01 |
| | Middle | 5 300 | 19.54 | 9.36 | 23.98 | 14.62 |
| | High | 5 320 | 19.54 | 9.43 | 23.98 | 14.55 |
| 5 470 ~ 5 725 | Low | 5 500 | 19.54 | 9.20 | 23.98 | 14.78 |
| | Middle | 5 600 | 19.54 | 9.21 | 23.98 | 14.77 |
| | High | 5 700 | 19.54 | 9.55 | 23.98 | 14.43 |
| 5 725 ~ 5 850 | Low | 5 745 | 19.54 | 8.94 | 30.00 | 21.06 |
| | Middle | 5 785 | 19.54 | 8.37 | 30.00 | 21.63 |
| | High | 5 825 | 19.54 | 8.24 | 30.00 | 21.76 |

Remark: See next page for measurement data.

**Tested by: Tae-Ho, Kim / Senior Engineer**

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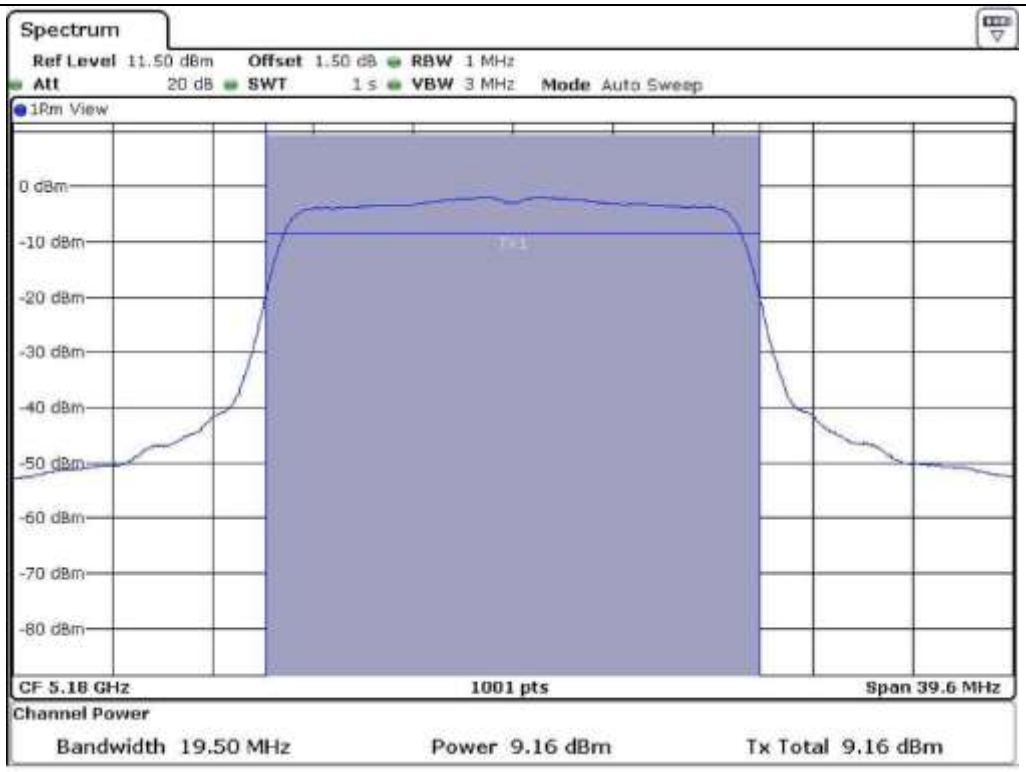
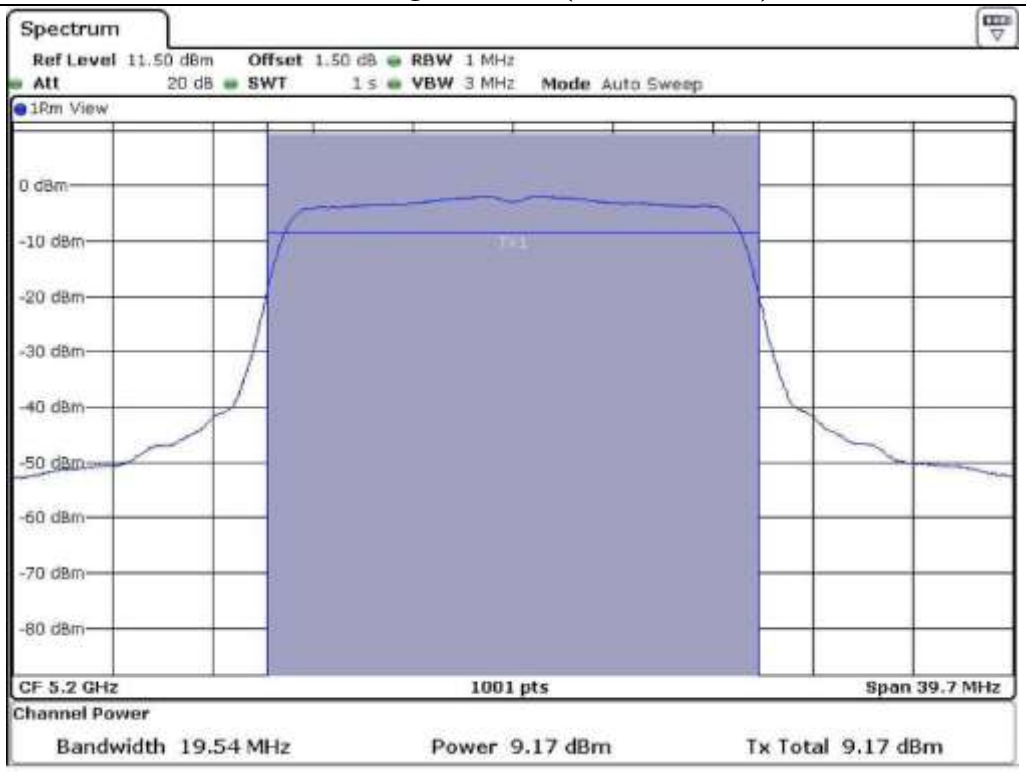
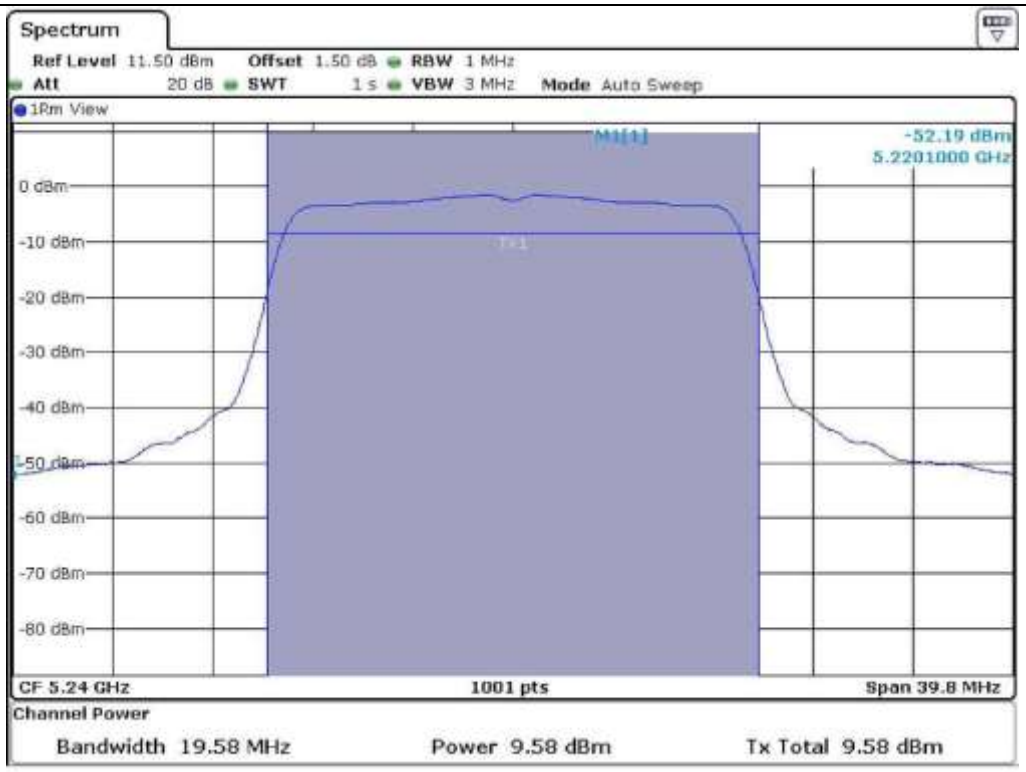



Low Channel @ 5 180 MHz (26 dB Bandwidth)




Middle Channel @ 5 200 MHz (26 dB Bandwidth)

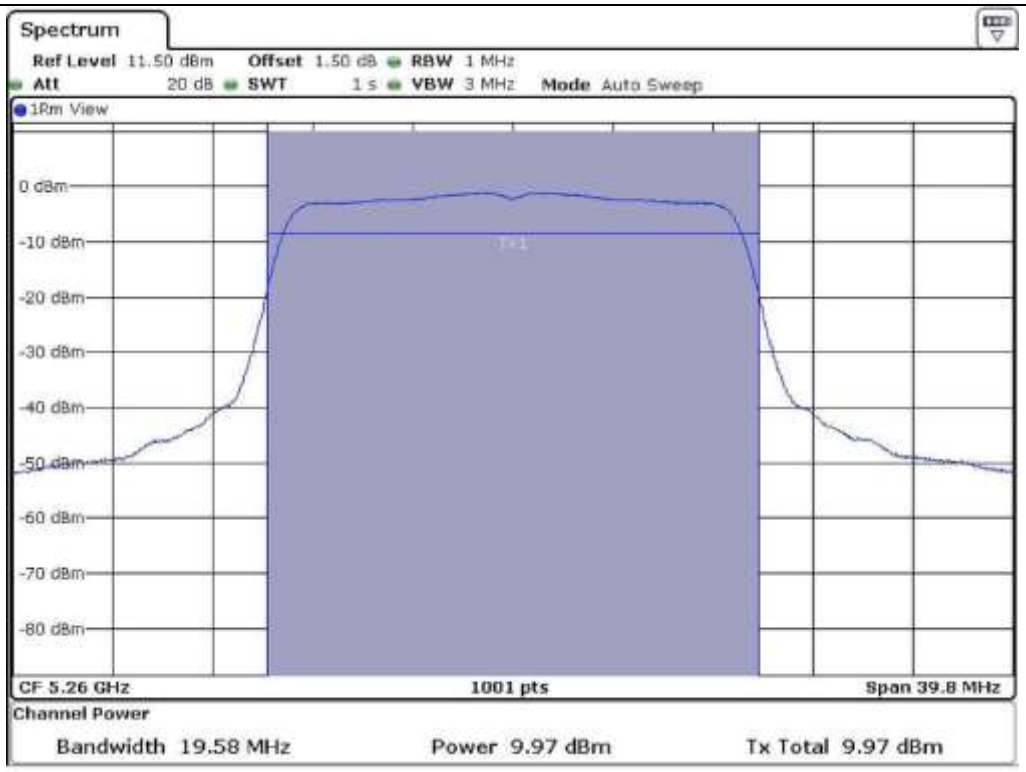

**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



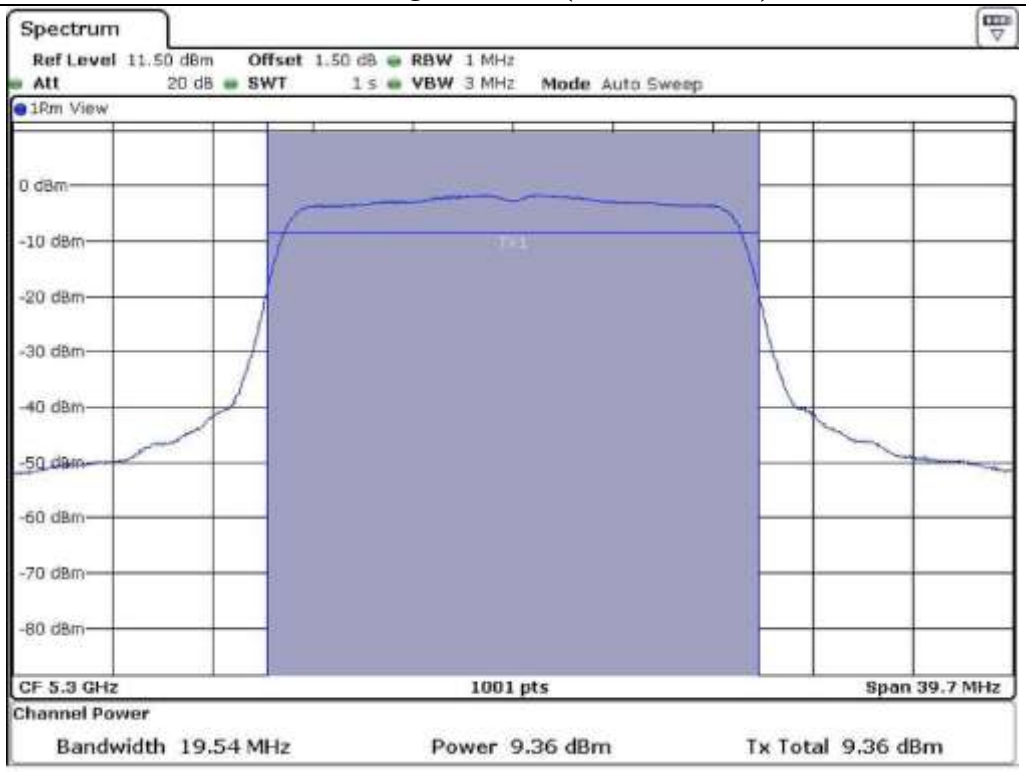

High Channel @ 5 240 MHz (26 dB Bandwidth)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

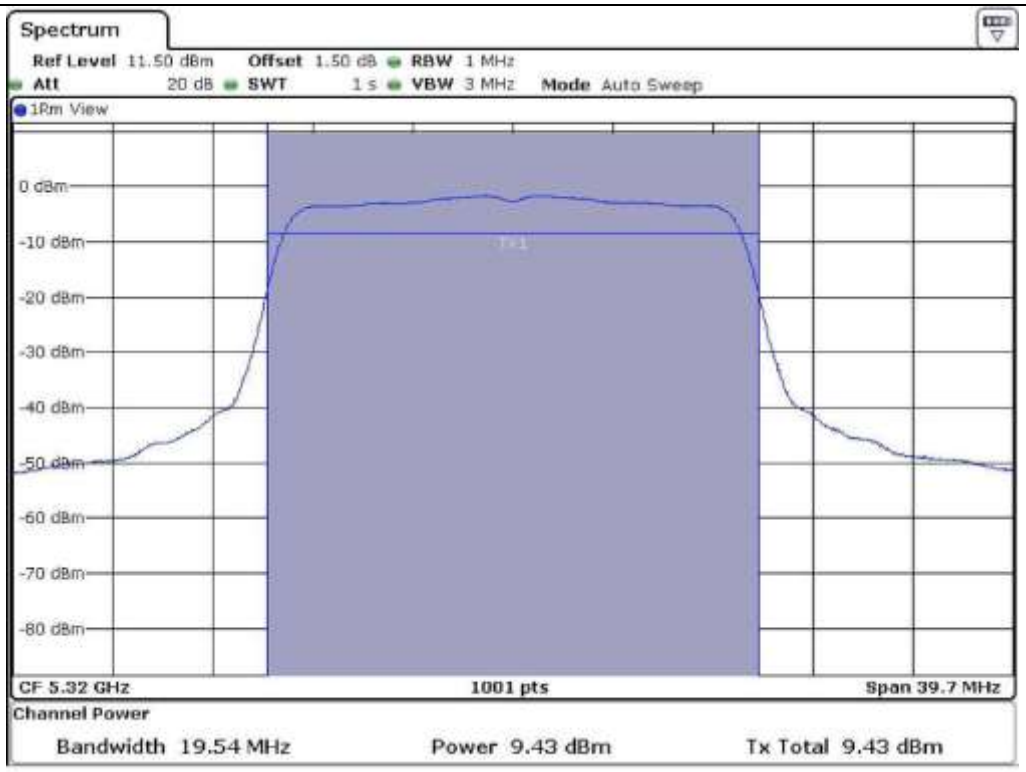



Low Channel @ 5 260 MHz (26 dB Bandwidth)



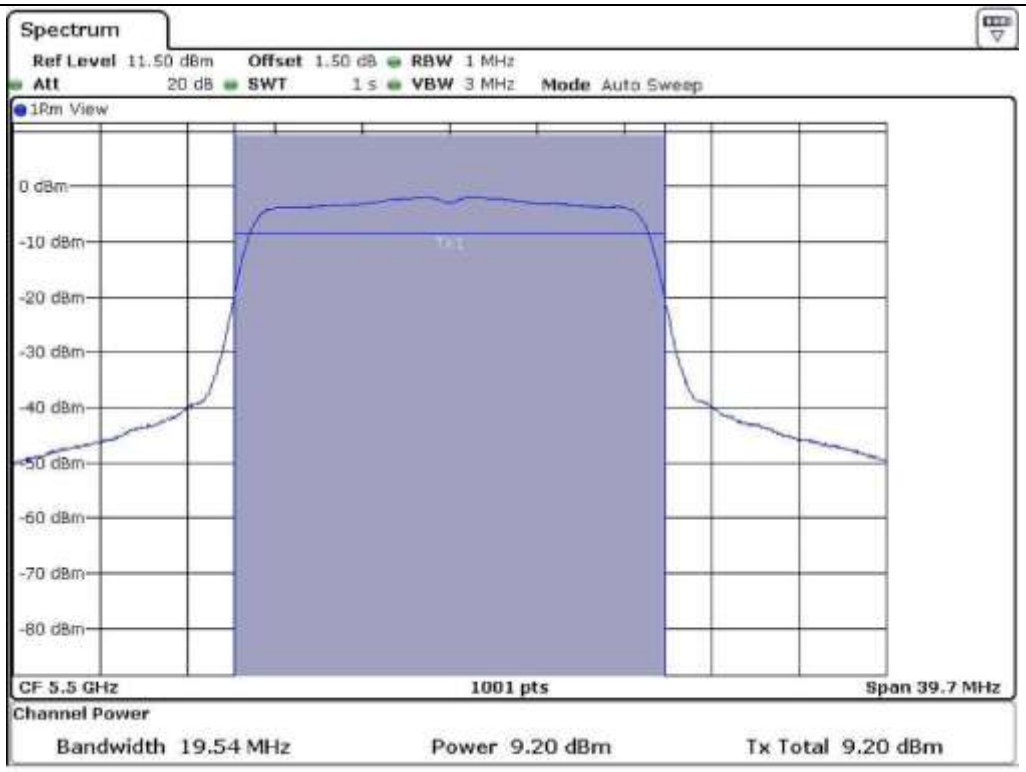

Middle Channel @ 5 300 MHz (26 dB Bandwidth)


**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

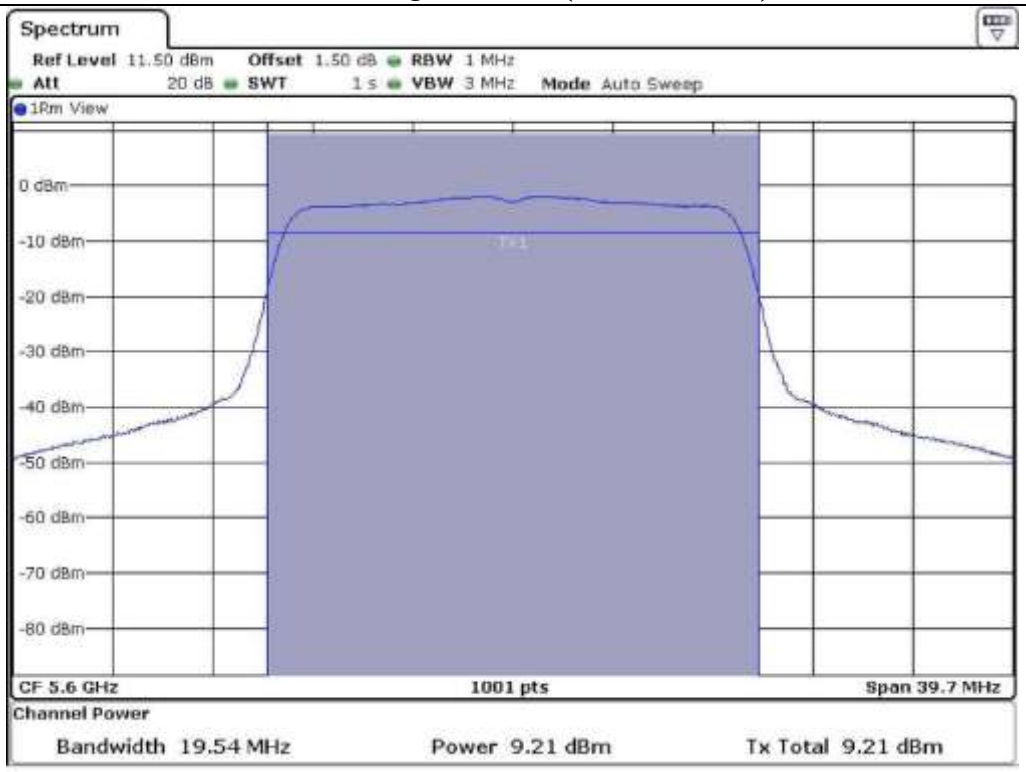



High Channel @ 5 320 MHz (26 dB Bandwidth)


**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)




Low Channel @ 5 500 MHz (26 dB Bandwidth)




Middle Channel @ 5 600 MHz (26 dB Bandwidth)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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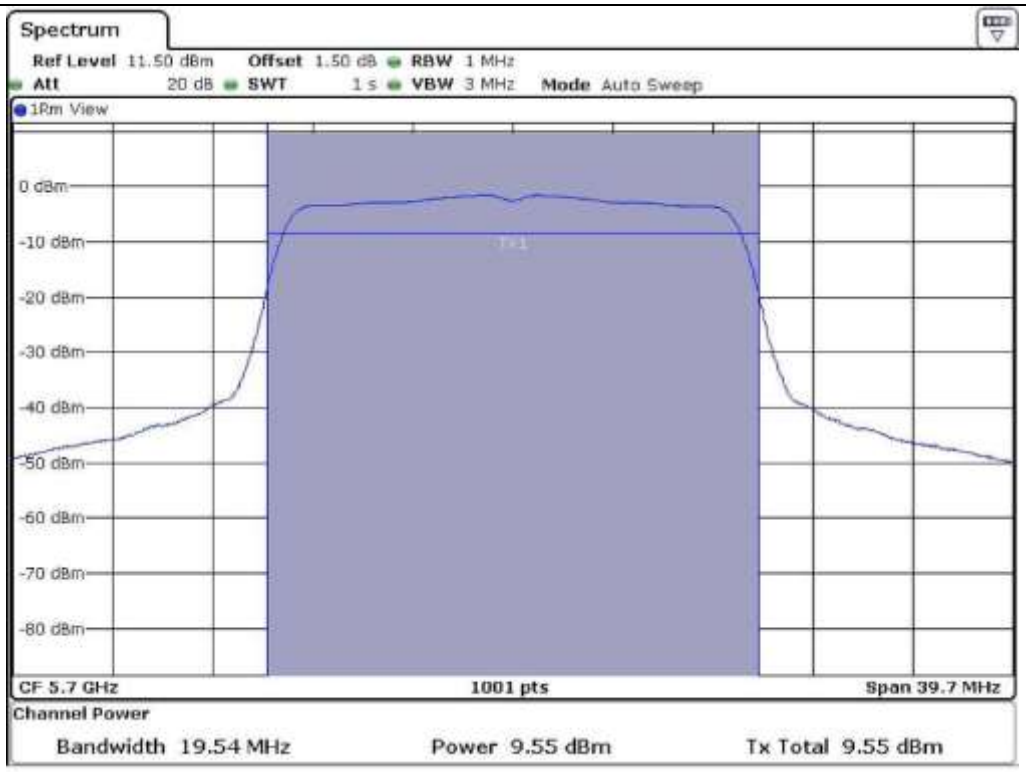
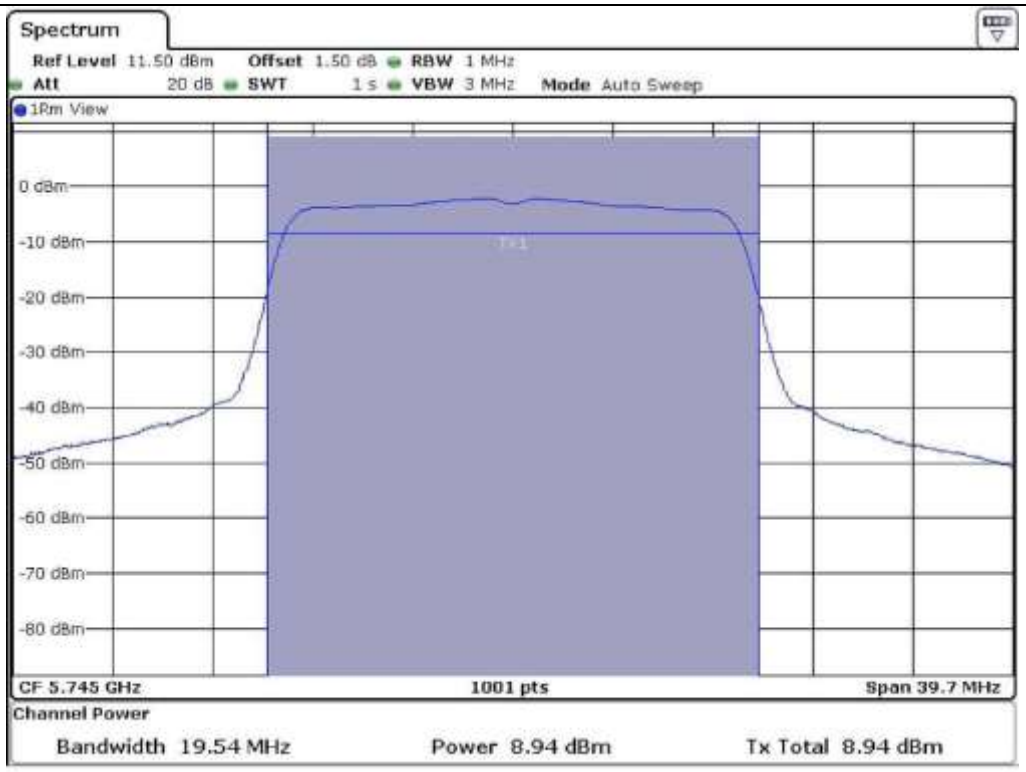


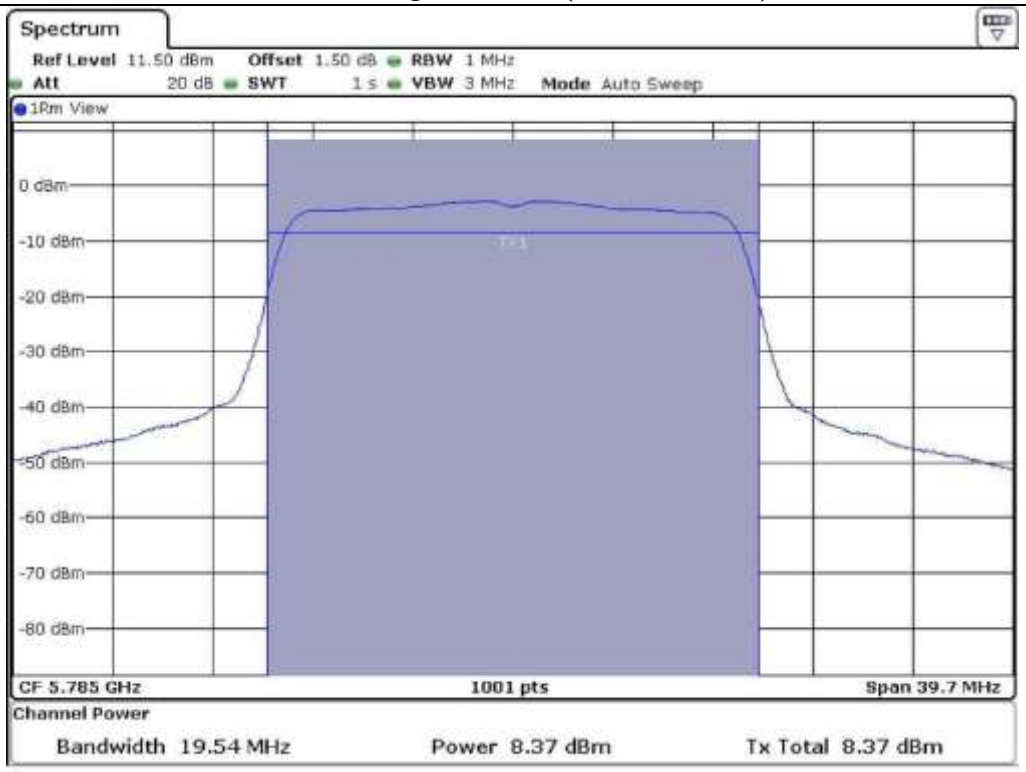

High Channel @ 5 700 MHz (26 dB Bandwidth)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)




Low Channel @ 5 745 MHz (26 dB Bandwidth)




Middle Channel @ 5 785 MHz (26 dB Bandwidth)

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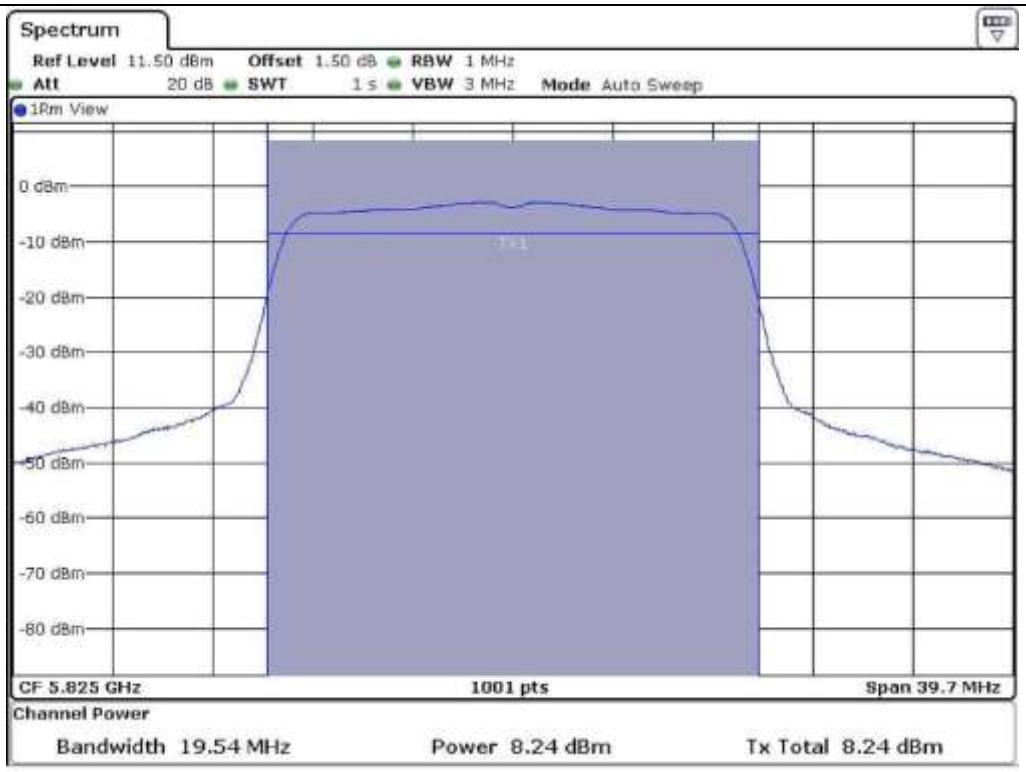


High Channel @ 5 825 MHz (26 dB Bandwidth)


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### 8.5.2 Test data for Antenna 1

-. Test Date : March 11, 2015

-. Test Result : Pass

| FREQUENCY RANGE (MHz) | CHANNEL | FREQUENCY (MHz) | 26 dB Bandwidth (MHz) | MEASURED VLAUE (dBm) | LIMIT (dBm) | MARGIN (dB) |
|---|---|---|---|---|---|---|
| 5 150 ~ 5 250 | Low | 5 180 | 19.46 | 7.68 | 23.98 | 16.30 |
| | Middle | 5 200 | 16.66 | 7.95 | 23.98 | 16.03 |
| | High | 5 240 | 19.5 | 8.70 | 23.98 | 15.28 |
| 5 250 ~ 5 350 | Low | 5 260 | 19.54 | 8.27 | 23.98 | 15.71 |
| | Middle | 5 300 | 19.54 | 8.06 | 23.98 | 15.92 |
| | High | 5 320 | 19.46 | 8.06 | 23.98 | 15.92 |
| 5 470 ~ 5 725 | Low | 5 500 | 19.58 | 8.60 | 23.98 | 15.38 |
| | Middle | 5 600 | 19.58 | 9.17 | 23.98 | 14.81 |
| | High | 5 700 | 19.58 | 9.77 | 23.98 | 14.21 |
| 5 725 ~ 5 850 | Low | 5 745 | 19.50 | 9.24 | 30.00 | 20.76 |
| | Middle | 5 785 | 19.50 | 9.68 | 30.00 | 20.32 |
| | High | 5 825 | 19.54 | 9.19 | 30.00 | 20.81 |

Remark: See next page for measurement data.

**Tested by: Tae-Ho, Kim / Senior Engineer**

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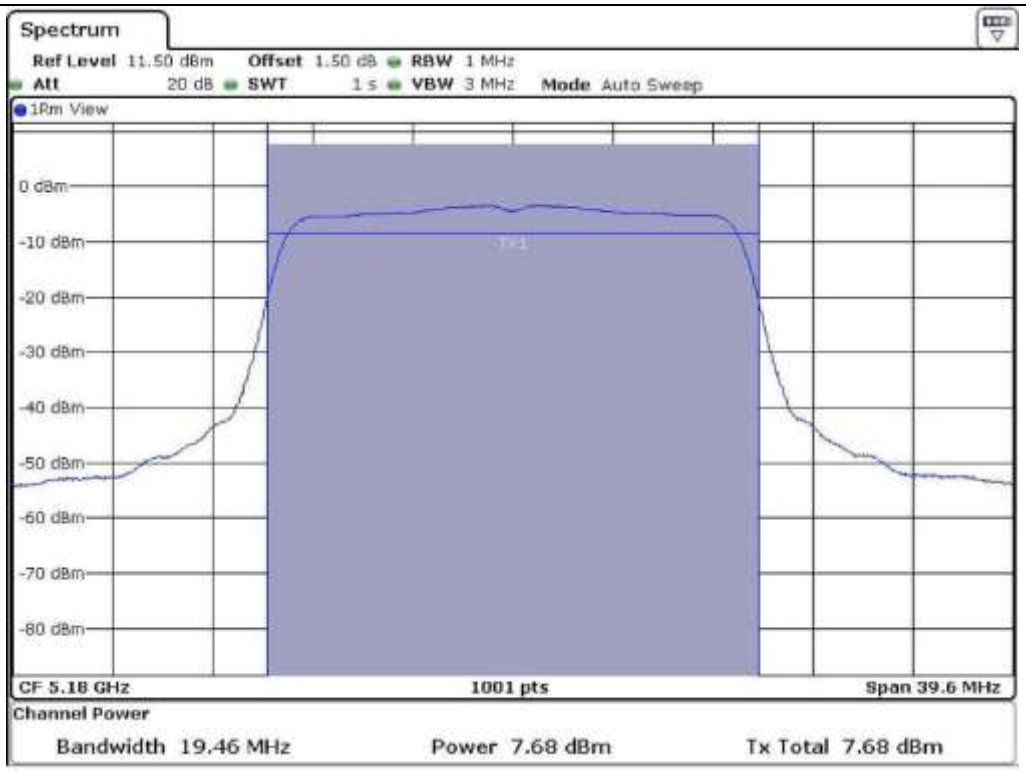
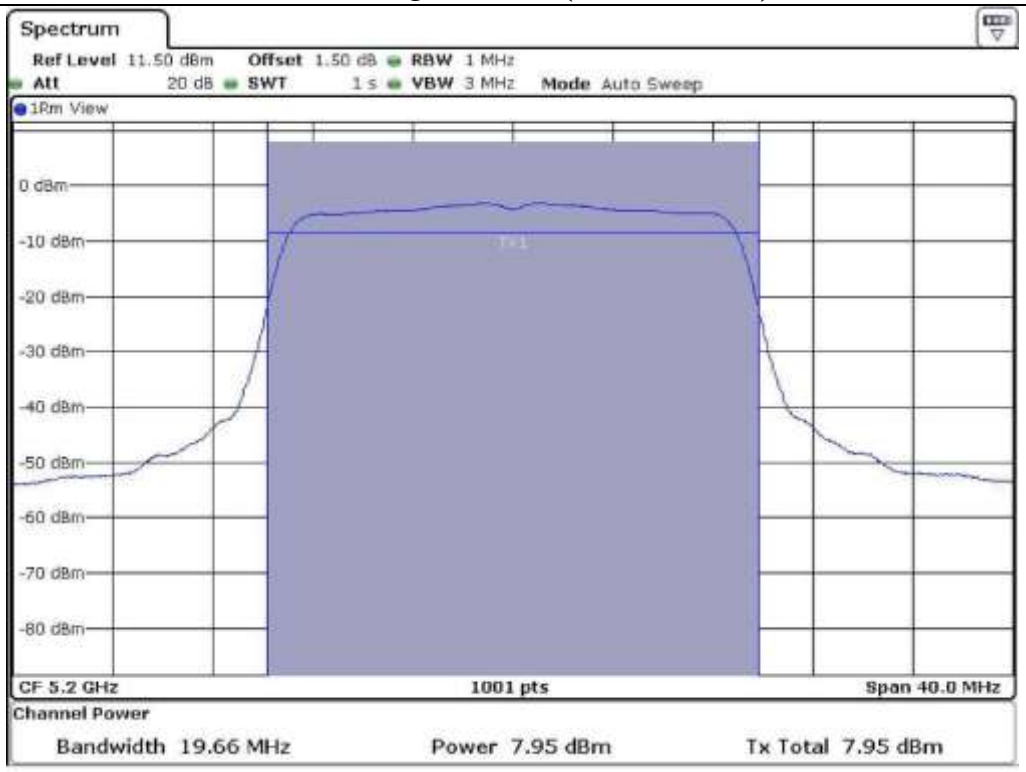



Low Channel @ 5 180 MHz (26 dB Bandwidth)




Middle Channel @ 5 200 MHz (26 dB Bandwidth)


**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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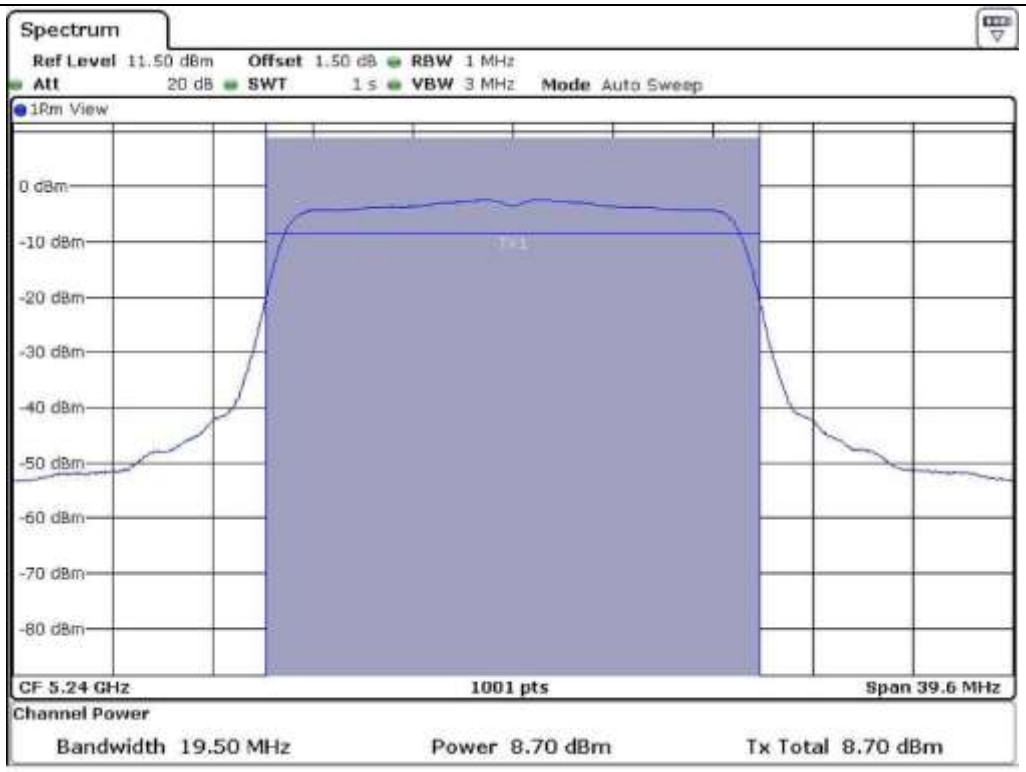


High Channel @ 5 240 MHz (26 dB Bandwidth)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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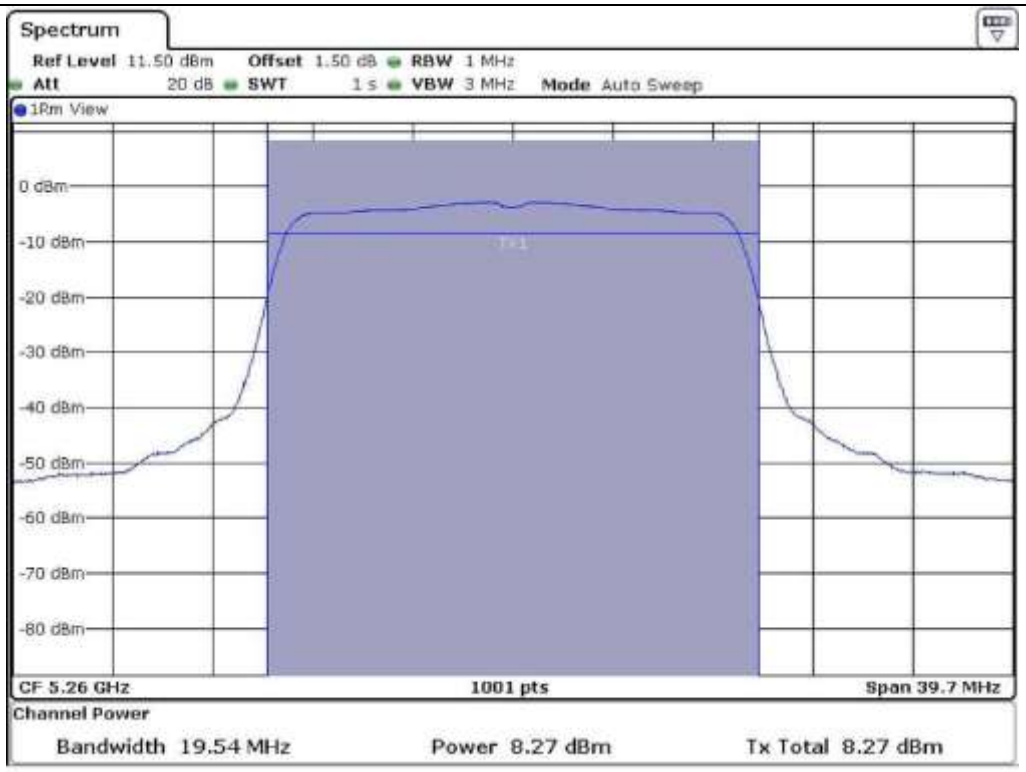
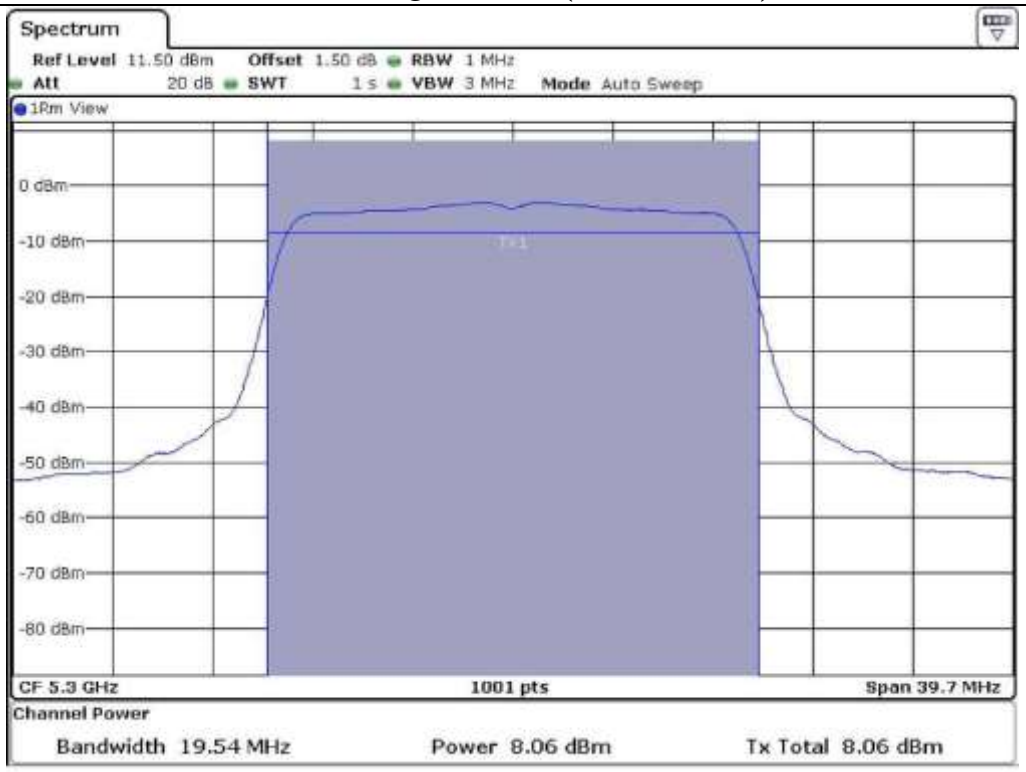
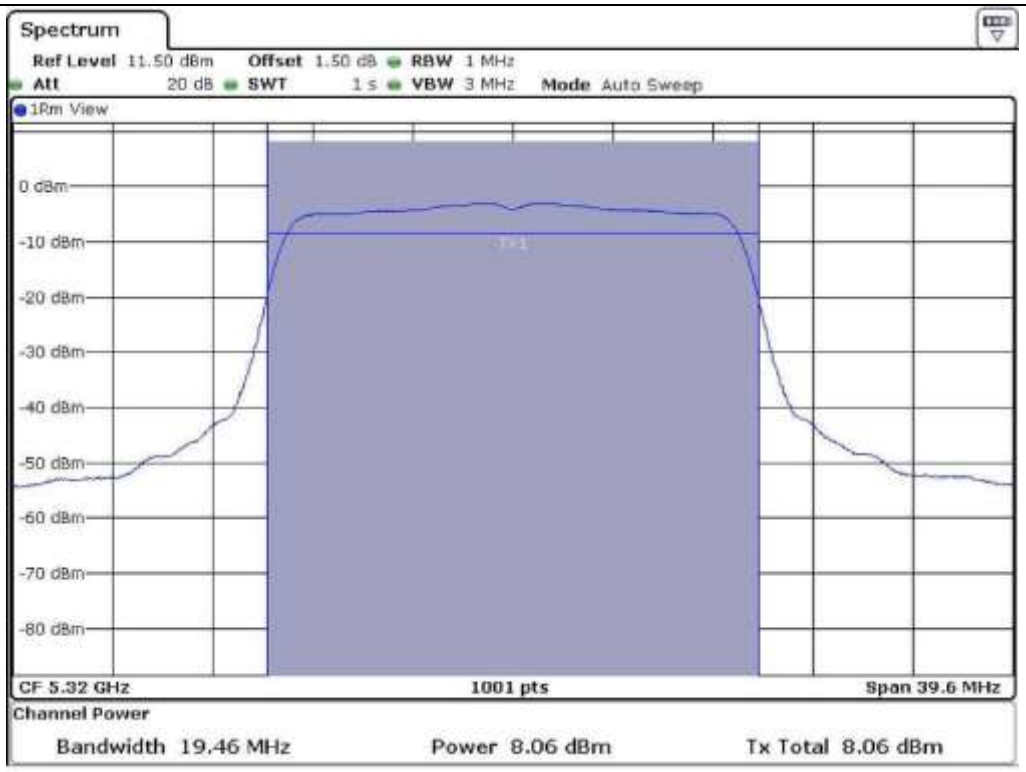



Low Channel @ 5 260 MHz (26 dB Bandwidth)




Middle Channel @ 5 300 MHz (26 dB Bandwidth)


**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)




High Channel @ 5 320 MHz (26 dB Bandwidth)


**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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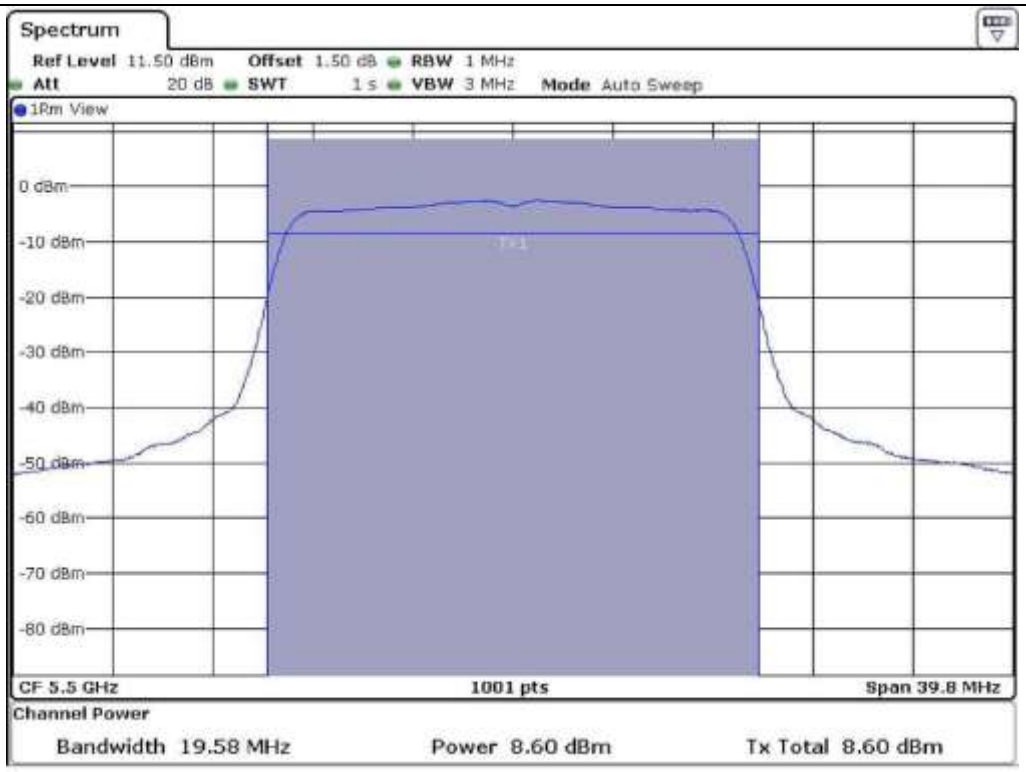
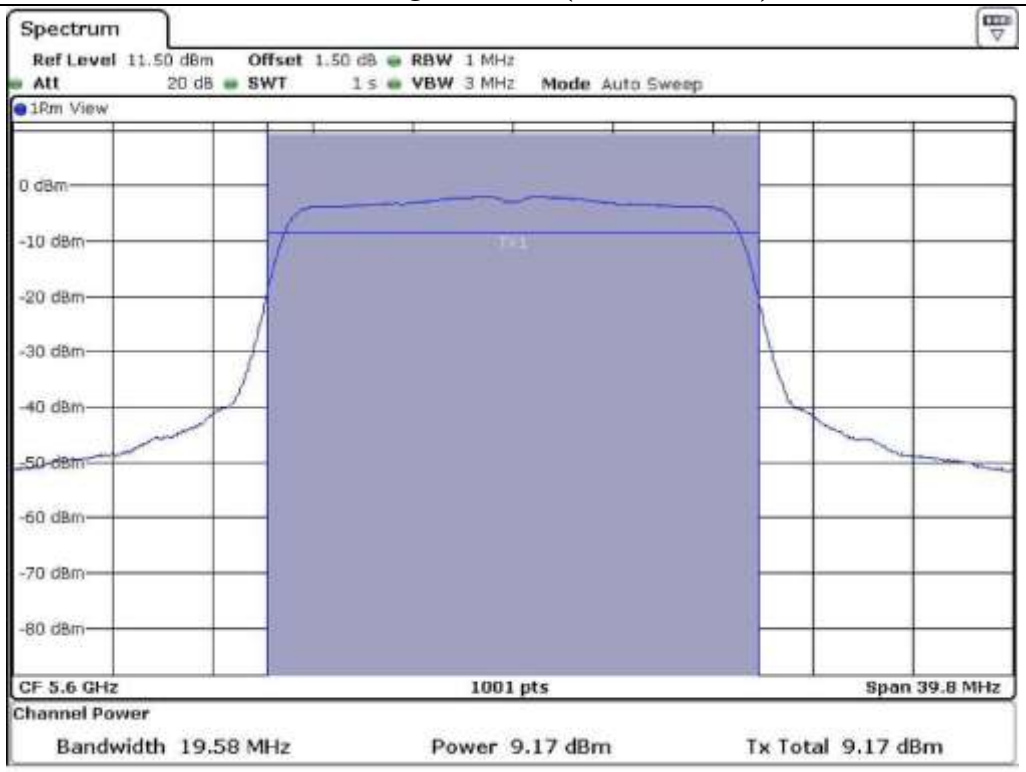



Low Channel @ 5 500 MHz (26 dB Bandwidth)



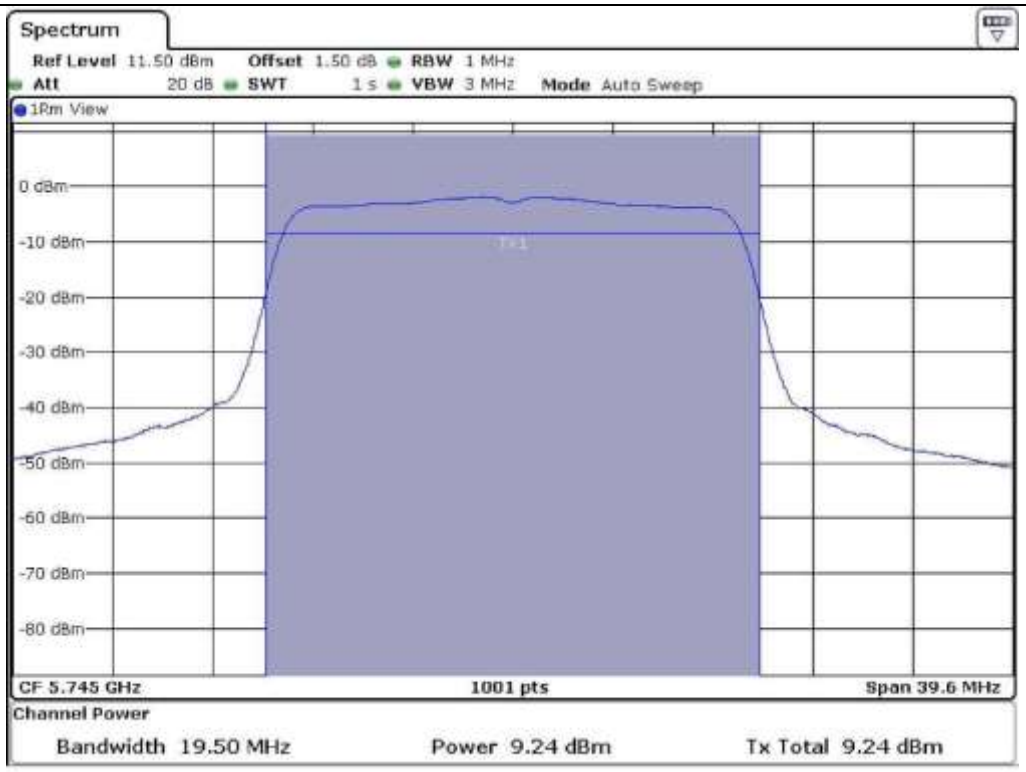

Middle Channel @ 5 600 MHz (26 dB Bandwidth)


**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

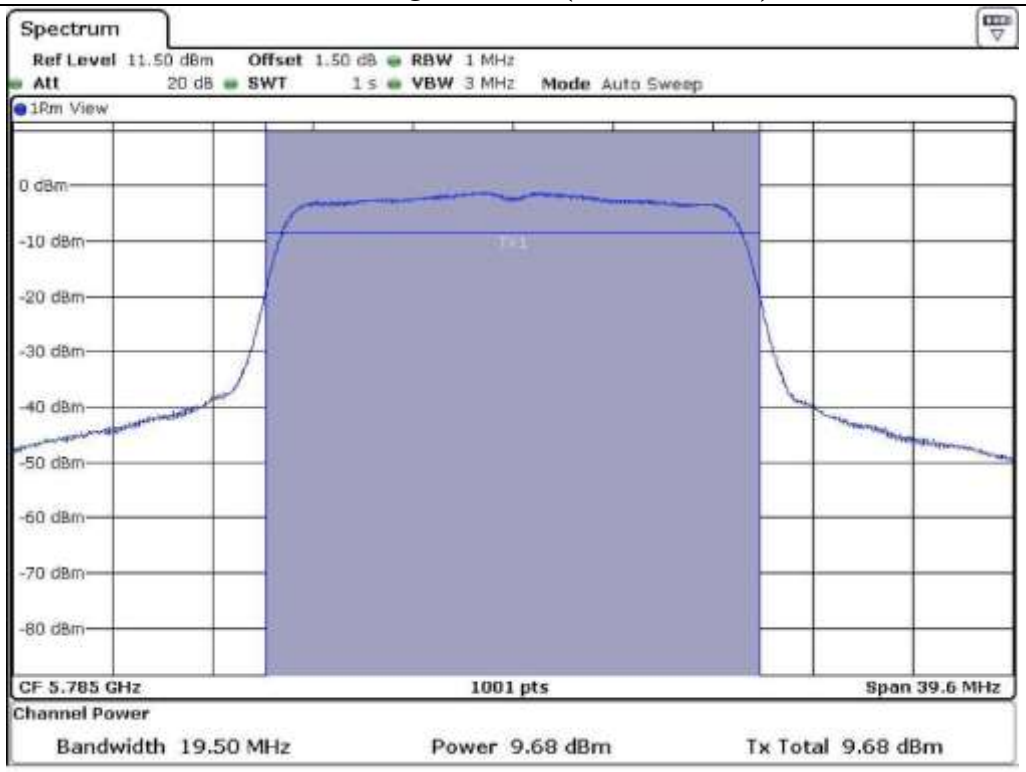
High Channel @ 5 700 MHz (26 dB Bandwidth)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

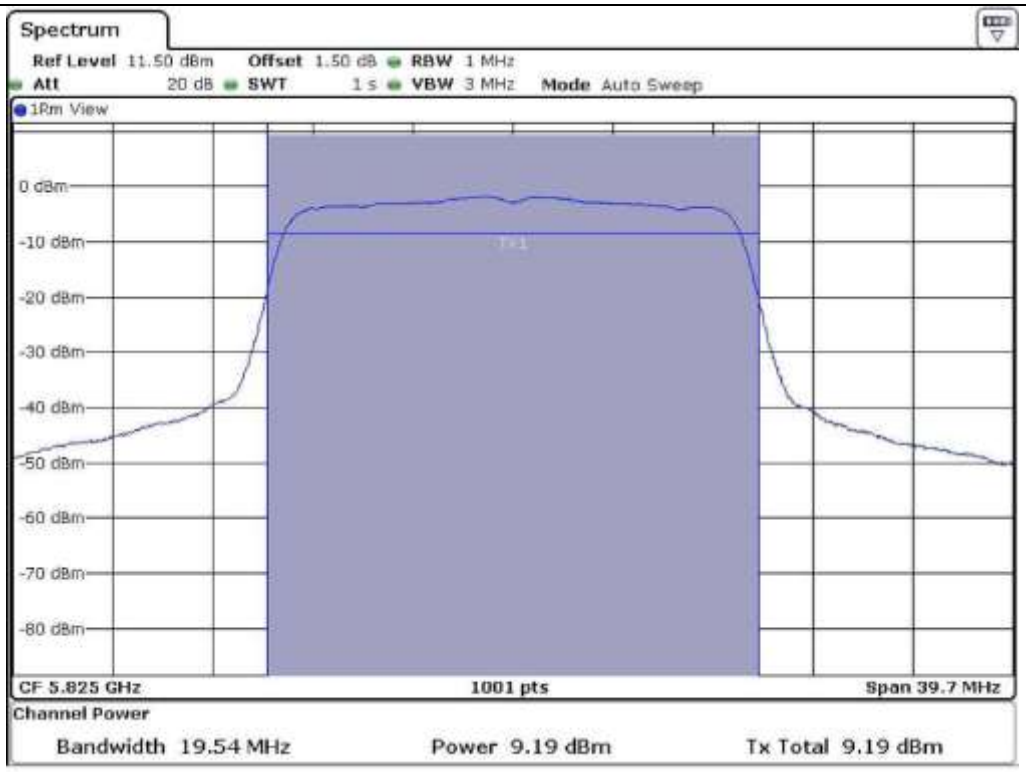



Low Channel @ 5 745 MHz (26 dB Bandwidth)




Middle Channel @ 5 785 MHz (26 dB Bandwidth)


**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)




High Channel @ 5 825 MHz (26 dB Bandwidth)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

### 8.5.3 Test data for Multiple transmit

-. Test Date : March 11, 2015

-. Test Result : Pass

| FREQUENCY RANGE (MHz) | CHANNEL | FREQUENCY (MHz) | MEASURED VLAUE (dBm) | LIMIT (dBm) | MARGIN (dB) |
|---|---|---|---|---|---|
| 5 150 ~ 5 250 | Low | 5 180 | 11.49 | 23.98 | 12.49 |
| | Middle | 5 200 | 11.61 | 23.98 | 12.37 |
| | High | 5 240 | 12.17 | 23.98 | 11.81 |
| 5 250 ~ 5 350 | Low | 5 260 | 12.21 | 23.98 | 11.77 |
| | Middle | 5 300 | 11.77 | 23.98 | 12.21 |
| | High | 5 320 | 11.81 | 23.98 | 12.17 |
| 5 470 ~ 5 725 | Low | 5 500 | 11.92 | 23.98 | 12.06 |
| | Middle | 5 600 | 12.20 | 23.98 | 11.78 |
| | High | 5 700 | 12.67 | 23.98 | 11.31 |
| 5 725 ~ 5 850 | Low | 5 745 | 12.10 | 30.00 | 17.90 |
| | Middle | 5 785 | 12.08 | 30.00 | 17.92 |
| | High | 5 825 | 11.75 | 30.00 | 18.25 |

Remark 1 : Margin = Limit – Measured Value (=Receiver Reading + Cable Loss)

Remark 2 :Calculated Output Power= $10\log(10^{(\text{Antenna1 Output Power}/10)}+10^{(\text{Antenna2 Output Power}/10)})$

**Tested by: Tae-Ho, Kim / Senior Engineer**


**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

## 8.6 Test data for 802.11n_HT40 RLAN Mode

### 8.6.1 Test data for Antenna 0

-. Test Date : March 11, 2015

-. Test Result : Pass

| FREQUENCY RANGE (MHz) | CHANNEL | FREQUENCY (MHz) | 26 dB Bandwidth (MHz) | MEASURED VLAUE (dBm) | LIMIT (dBm) | MARGIN (dB) |
|---|---|---|---|---|---|---|
| 5 150 ~ 5 250 | Low | 5 190 | 38.44 | 7.56 | 23.98 | 16.42 |
| | High | 5 230 | 38.44 | 7.83 | 23.98 | 16.15 |
| 5 250 ~ 5 350 | Low | 5 270 | 38.44 | 7.70 | 23.98 | 16.28 |
| | High | 5 310 | 38.44 | 7.64 | 23.98 | 16.34 |
| 5 470 ~ 5 725 | Low | 5 510 | 38.44 | 7.64 | 23.98 | 16.34 |
| | Middle | 5 590 | 38.44 | 7.97 | 23.98 | 16.01 |
| | High | 5 670 | 38.44 | 8.03 | 23.98 | 15.95 |
| 5 725 ~ 5 850 | Low | 5 755 | 38.44 | 7.46 | 30.00 | 22.54 |
| | High | 5 795 | 38.44 | 7.06 | 30.00 | 22.94 |

Remark: See next page for measurement data.

**Tested by: Tae-Ho, Kim / Senior Engineer**

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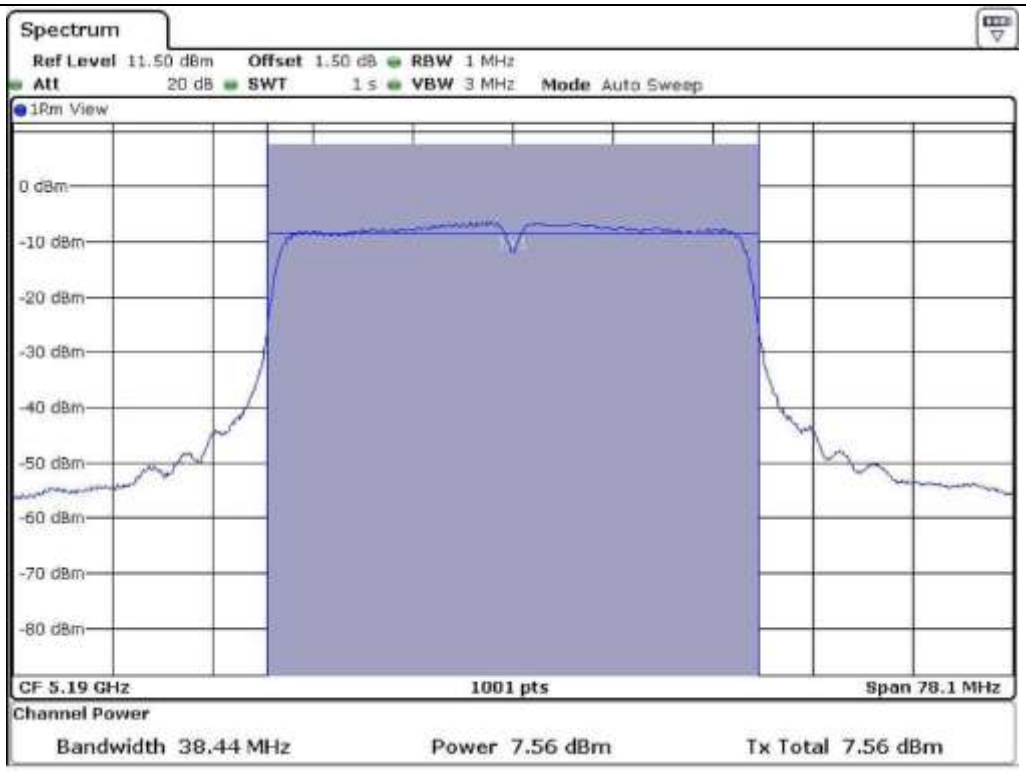
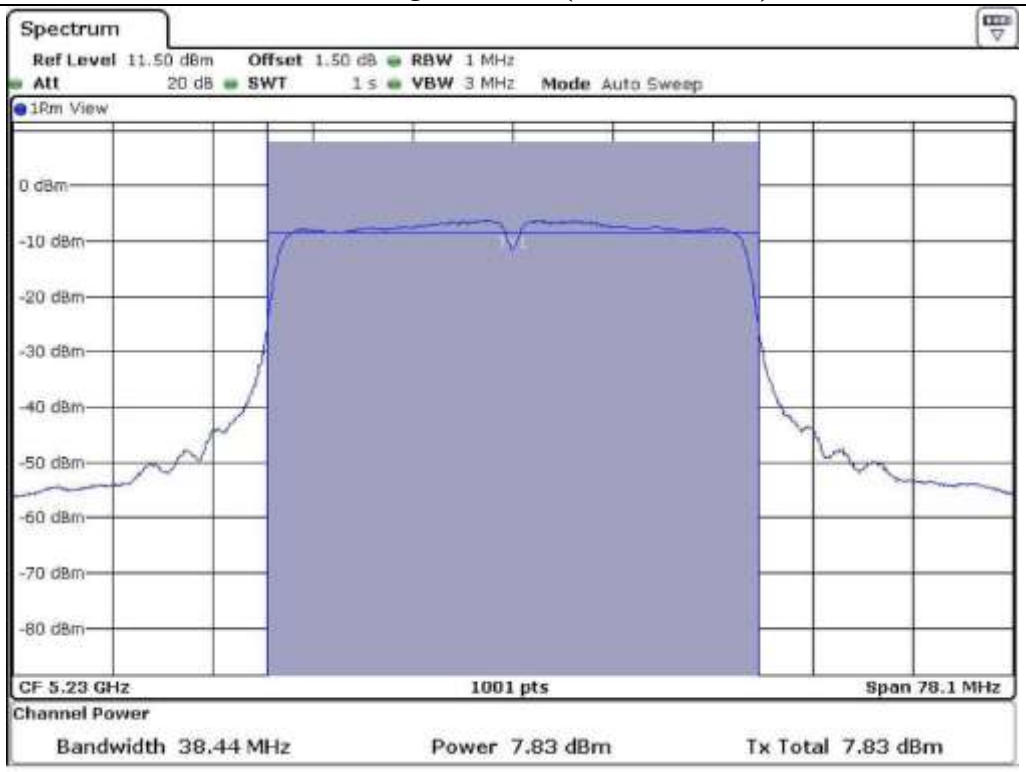
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)




Low Channel @ 5 190 MHz (26 dB Bandwidth)




High Channel @ 5 230 MHz (26 dB Bandwidth)

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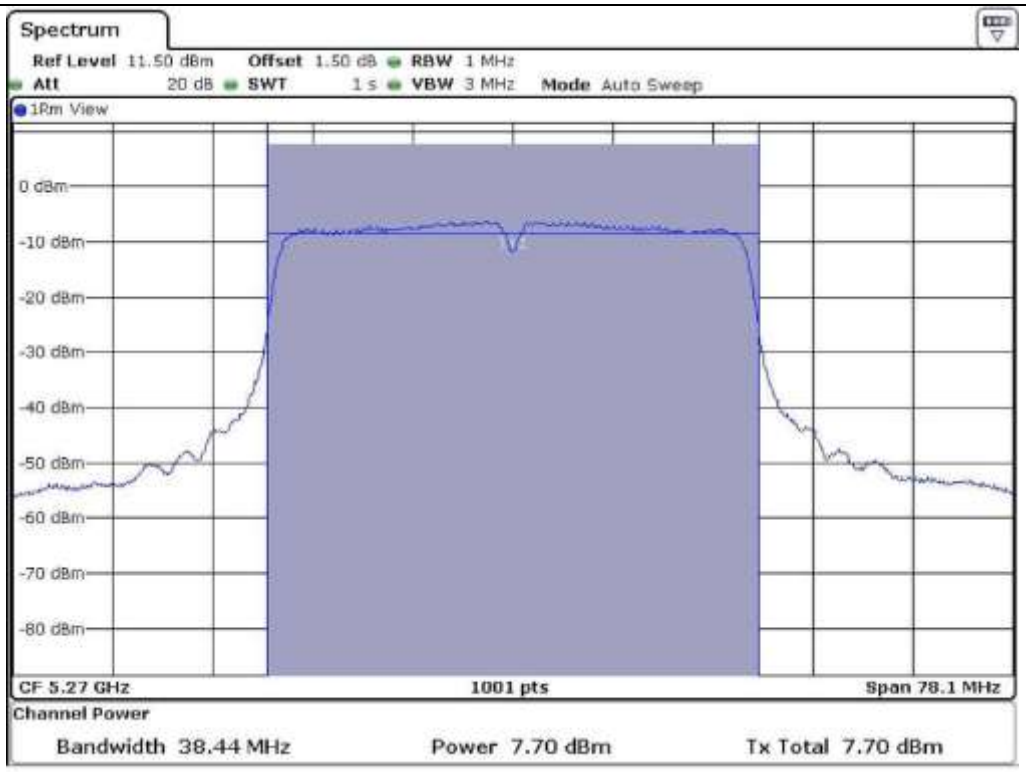
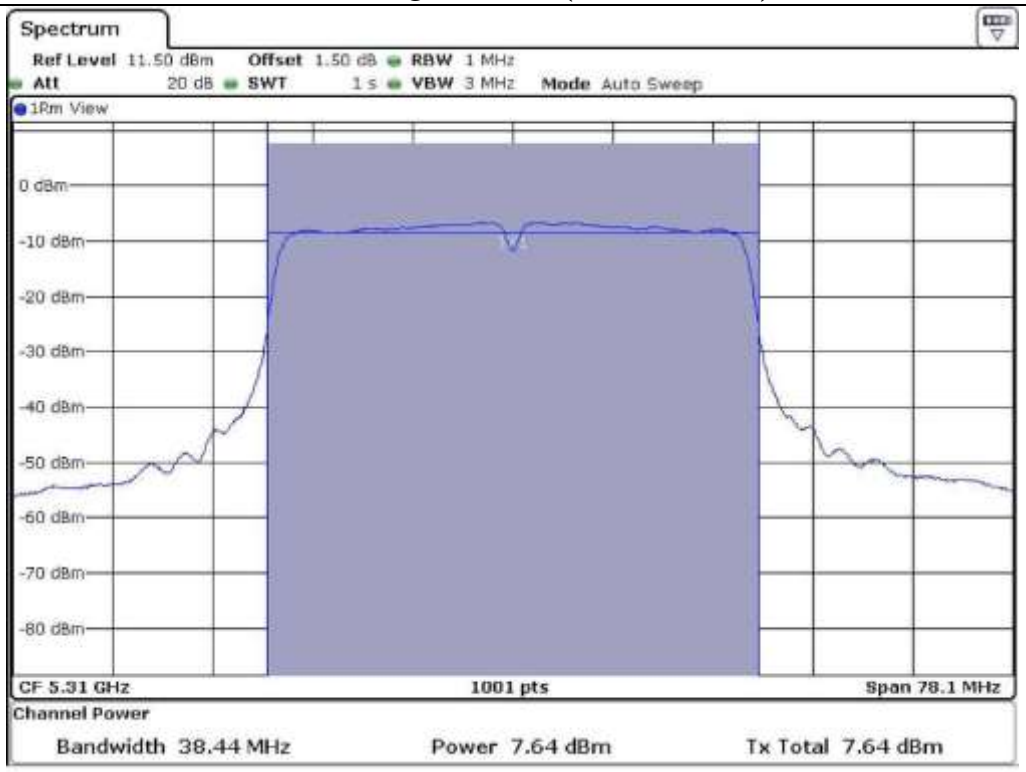
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)




Low Channel @ 5 270 MHz (26 dB Bandwidth)




High Channel @ 5 310 MHz (26 dB Bandwidth)

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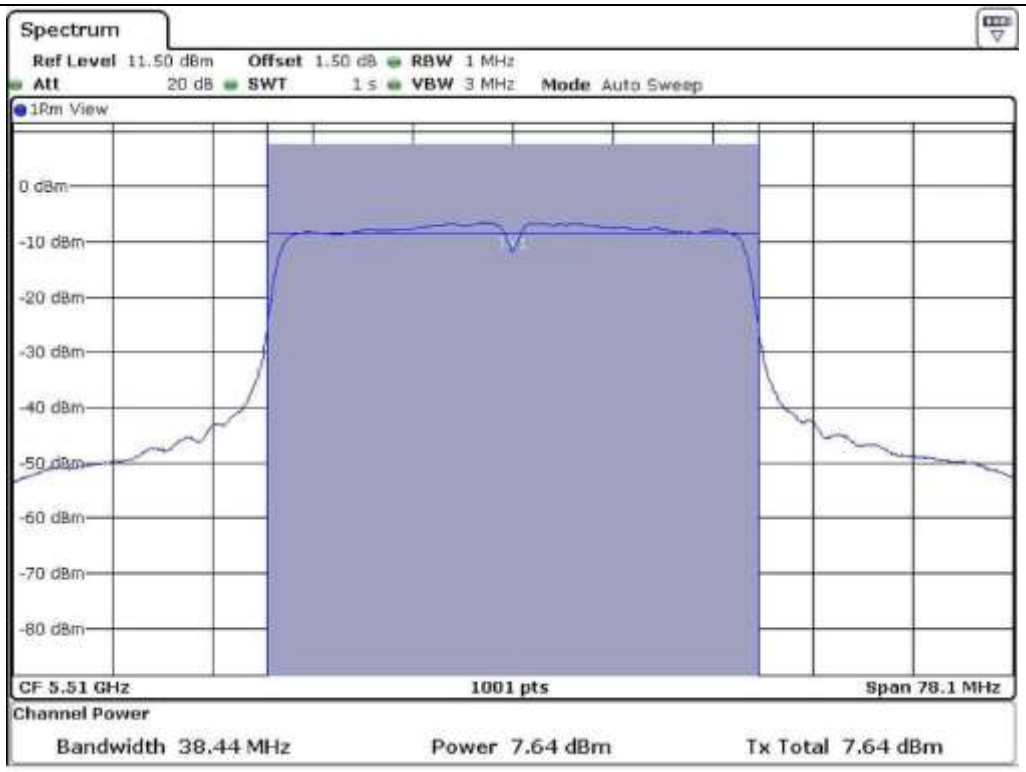
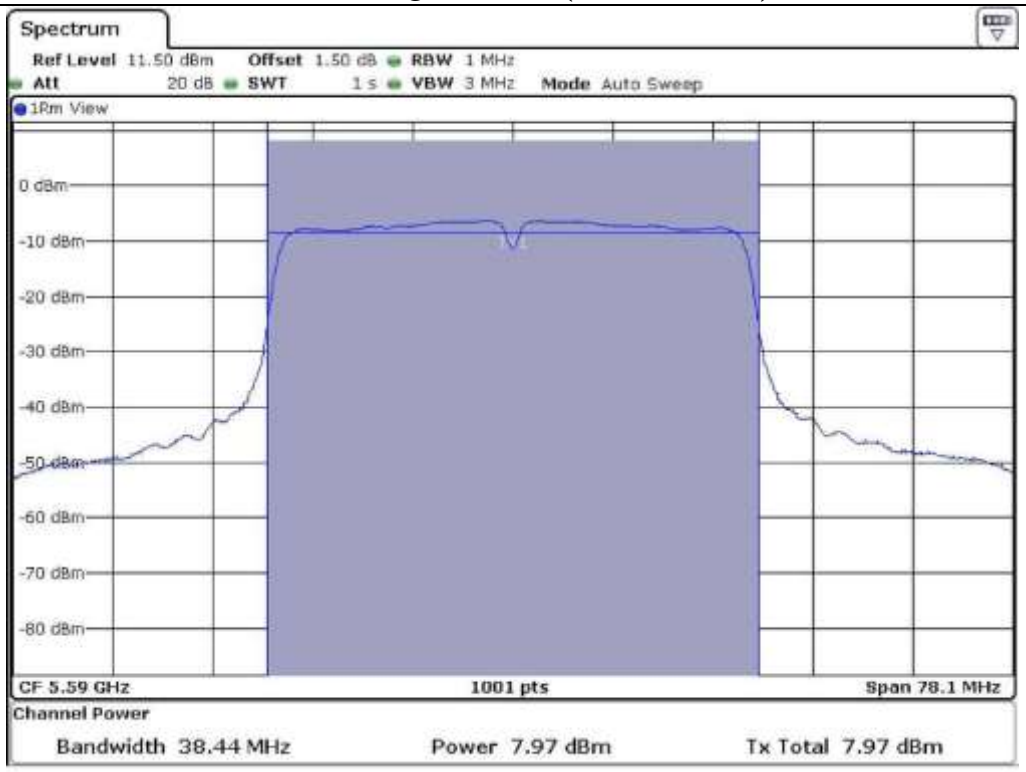
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

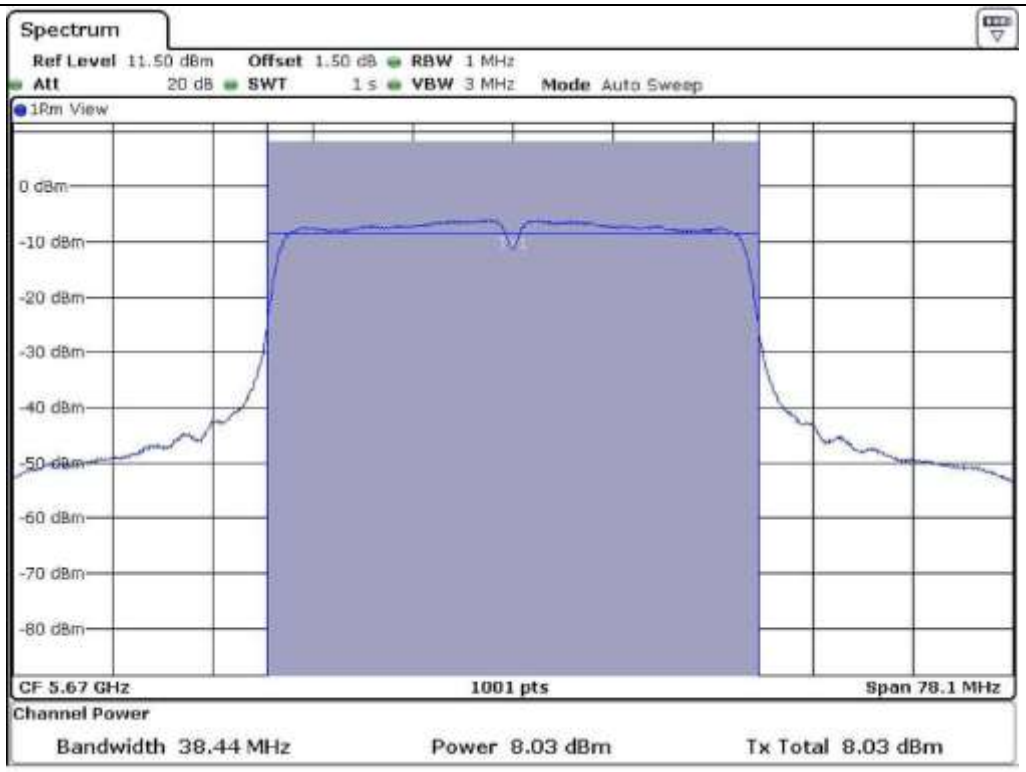



Low Channel @ 5 510 MHz (26 dB Bandwidth)



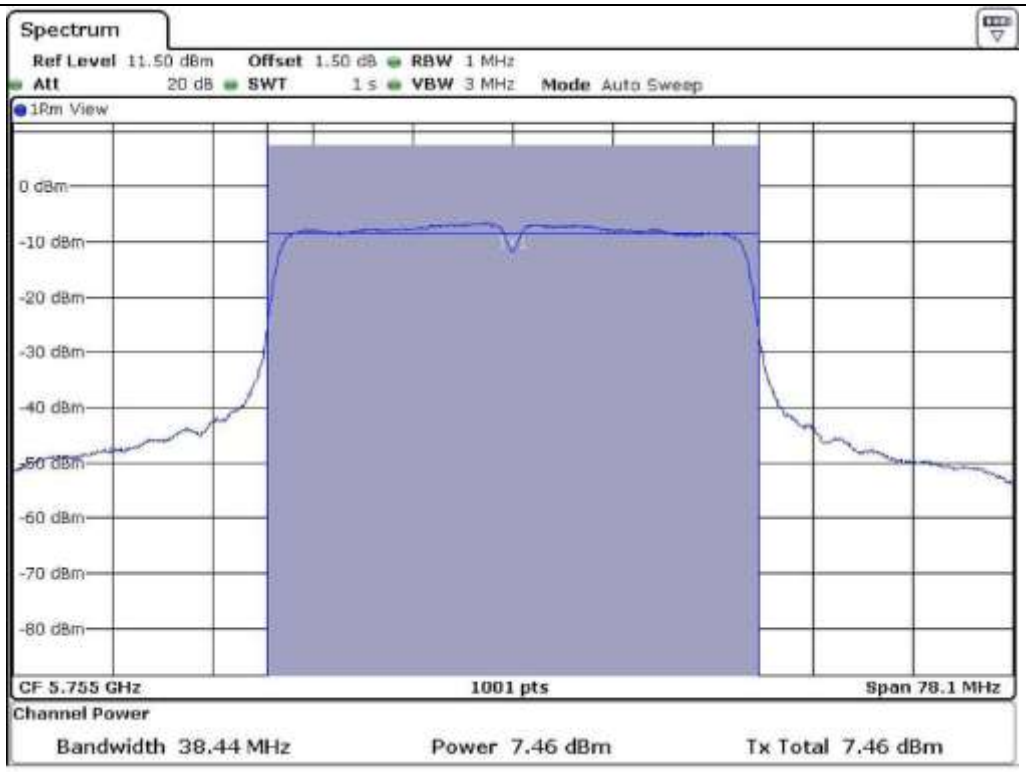

Middle Channel @ 5 590 MHz (26 dB Bandwidth)


**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

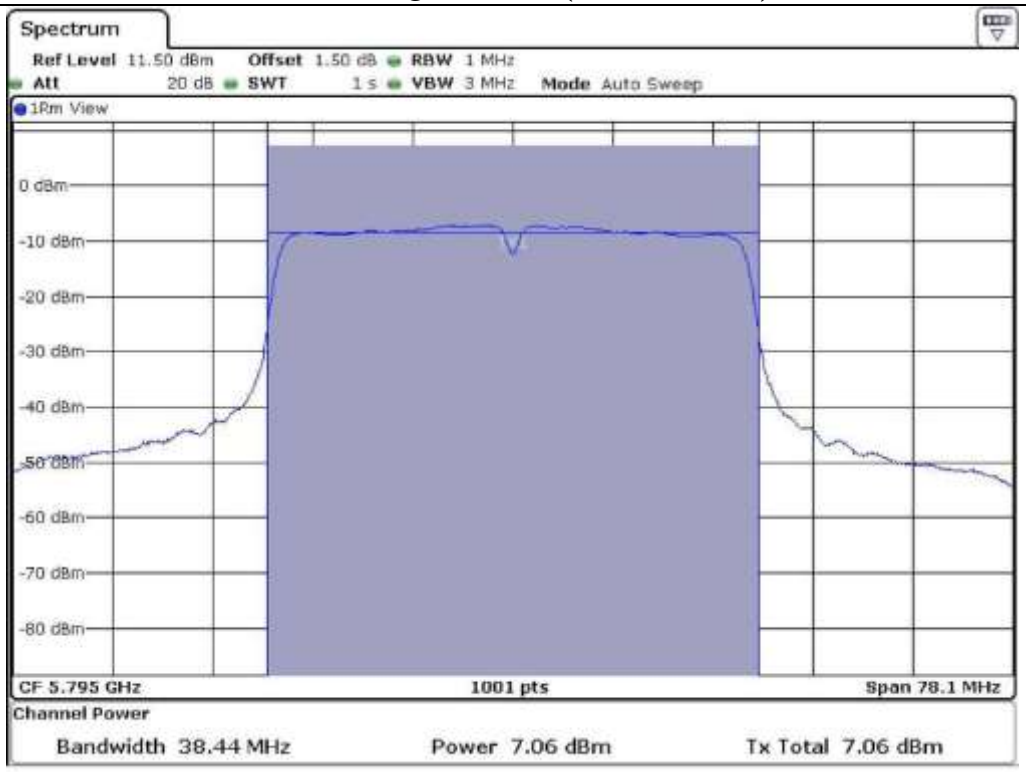



High Channel @ 5 670 MHz (26 dB Bandwidth)


**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)




Low Channel @ 5 755 MHz (26 dB Bandwidth)




Middle Channel @ 5 795 MHz (26 dB Bandwidth)


**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

### 8.6.2 Test data for Antenna 1

-. Test Date : March 11, 2015

-. Test Result : Pass

| FREQUENCY RANGE (MHz) | CHANNEL | FREQUENCY (MHz) | 26 dB Bandwidth (MHz) | MEASURED VLAUE (dBm) | LIMIT (dBm) | MARGIN (dB) |
|---|---|---|---|---|---|---|
| 5 150 ~ 5 250 | Low | 5 190 | 38.44 | 6.98 | 23.98 | 17.00 |
| | High | 5 230 | 38.44 | 6.87 | 23.98 | 17.11 |
| 5 250 ~ 5 350 | Low | 5 270 | 38.44 | 7.04 | 23.98 | 16.94 |
| | High | 5 310 | 38.44 | 7.13 | 23.98 | 16.85 |
| 5 470 ~ 5 725 | Low | 5 510 | 38.44 | 7.65 | 23.98 | 16.33 |
| | Middle | 5 590 | 38.44 | 8.82 | 23.98 | 15.16 |
| | High | 5 670 | 38.44 | 9.43 | 23.98 | 14.55 |
| 5 725 ~ 5 850 | Low | 5 755 | 38.44 | 8.44 | 30.00 | 21.56 |
| | High | 5 795 | 38.44 | 8.65 | 30.00 | 21.35 |

Remark: See next page for measurement data.

**Tested by: Tae-Ho, Kim / Senior Engineer**

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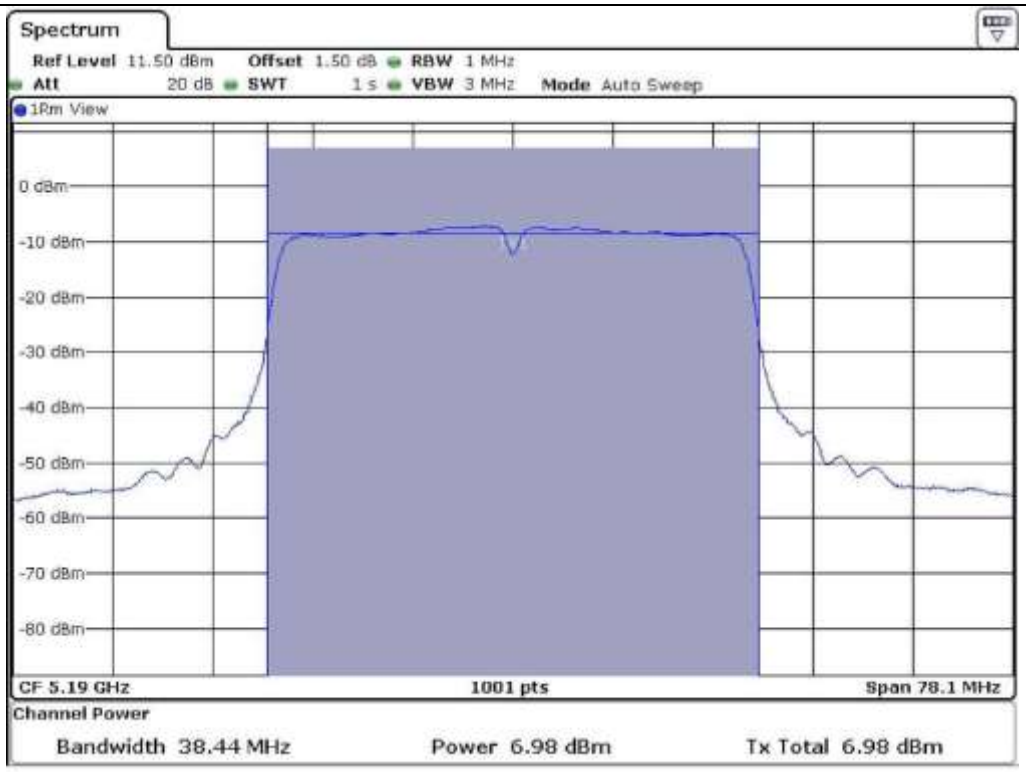
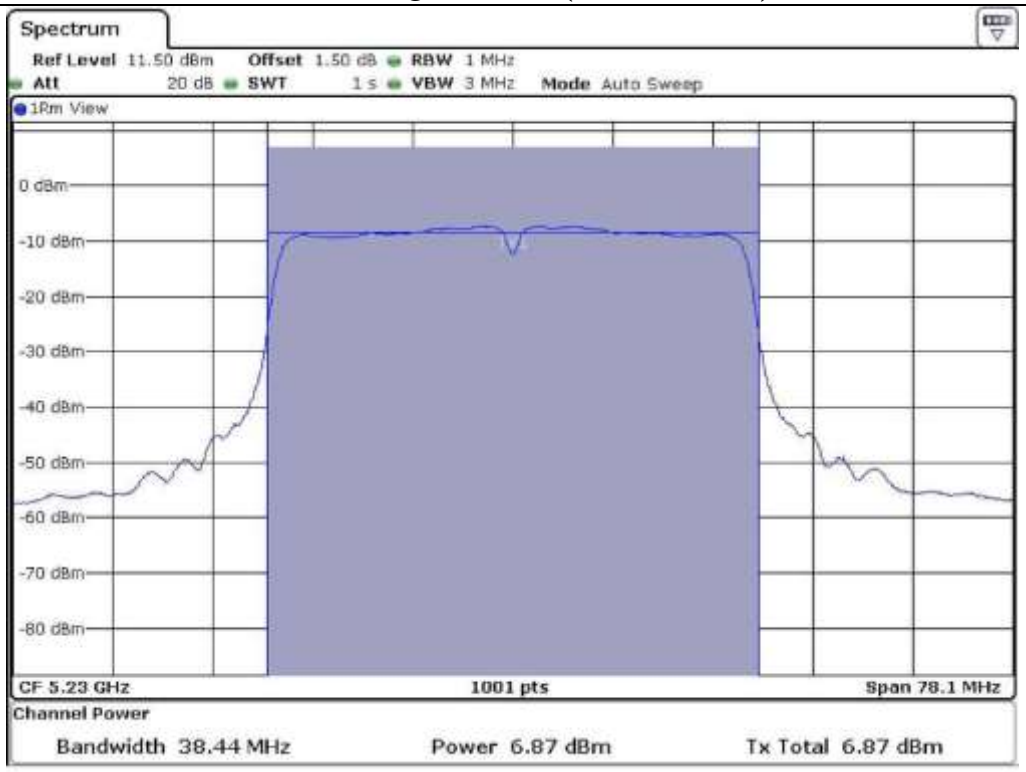
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)




Low Channel @ 5 190 MHz (26 dB Bandwidth)




High Channel @ 5 230 MHz (26 dB Bandwidth)


**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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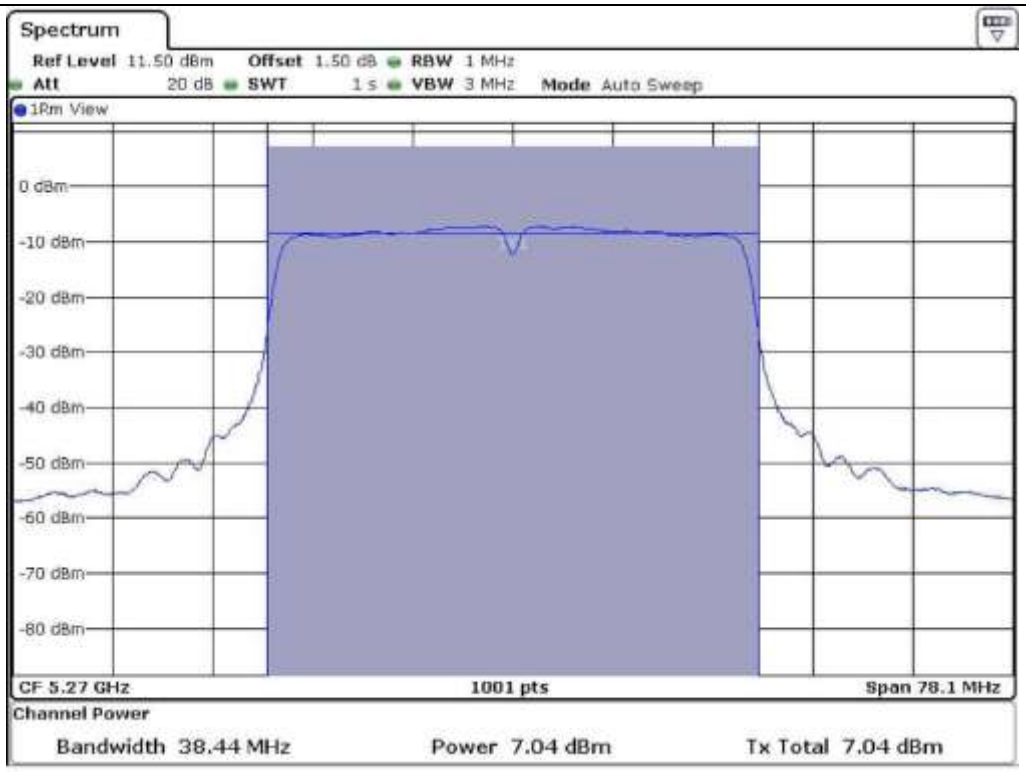
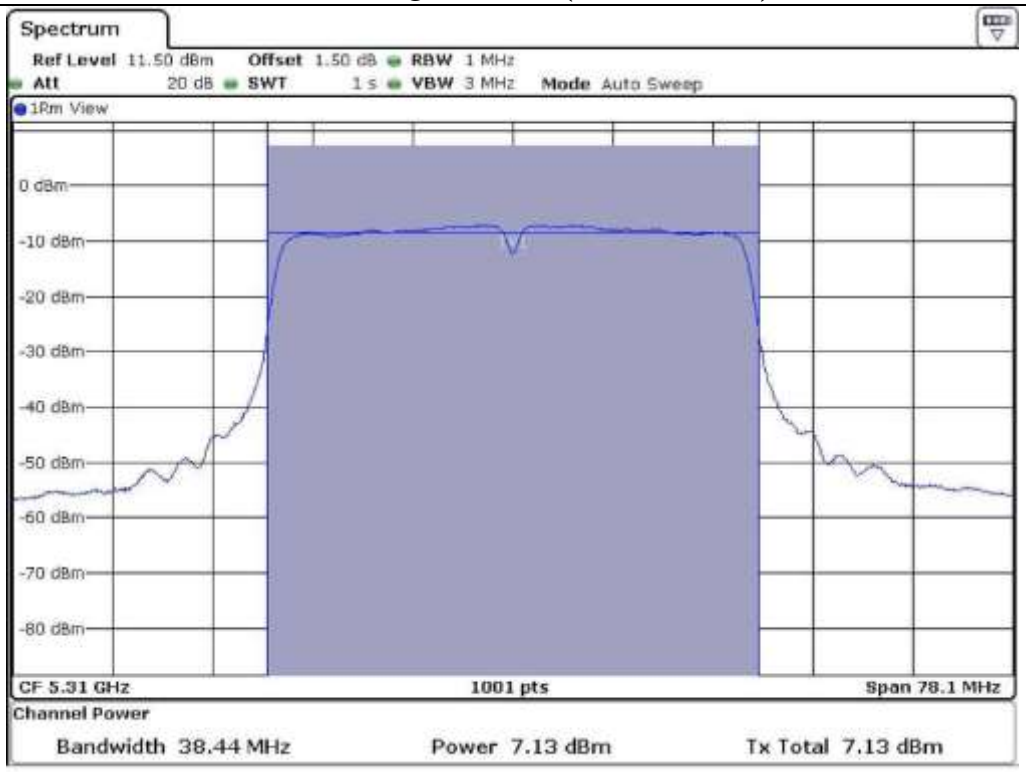
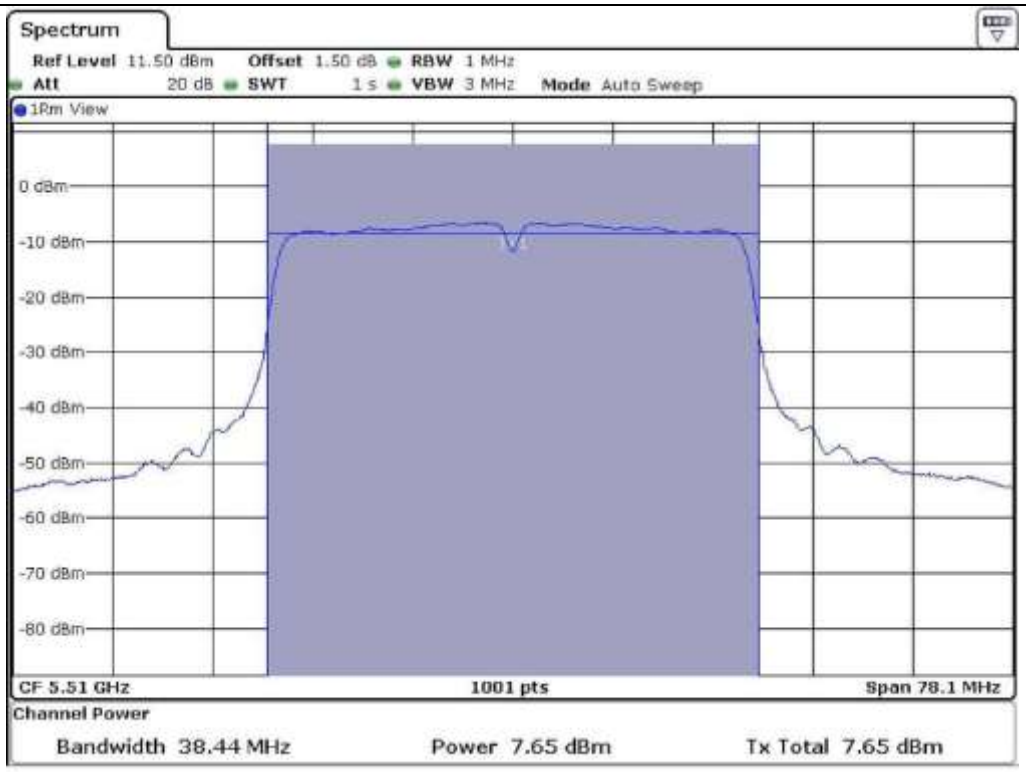



Low Channel @ 5 270 MHz (26 dB Bandwidth)

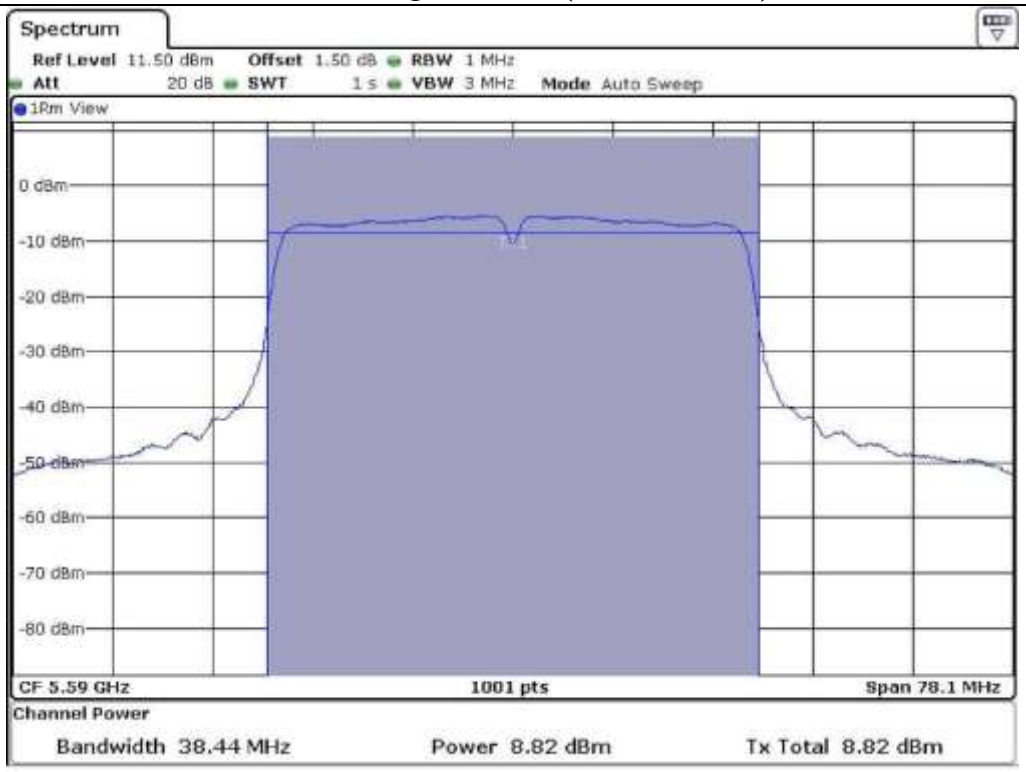



High Channel @ 5 310 MHz (26 dB Bandwidth)


**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

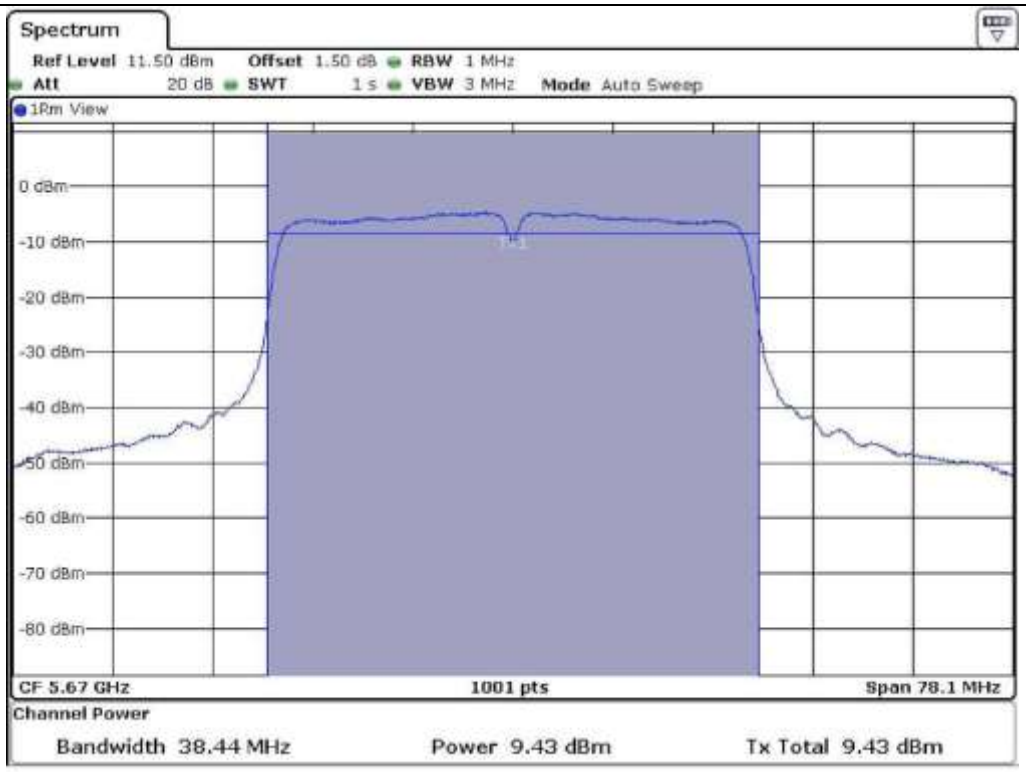



Low Channel @ 5 510 MHz (26 dB Bandwidth)




Middle Channel @ 5 590 MHz (26 dB Bandwidth)


**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)




High Channel @ 5 670 MHz (26 dB Bandwidth)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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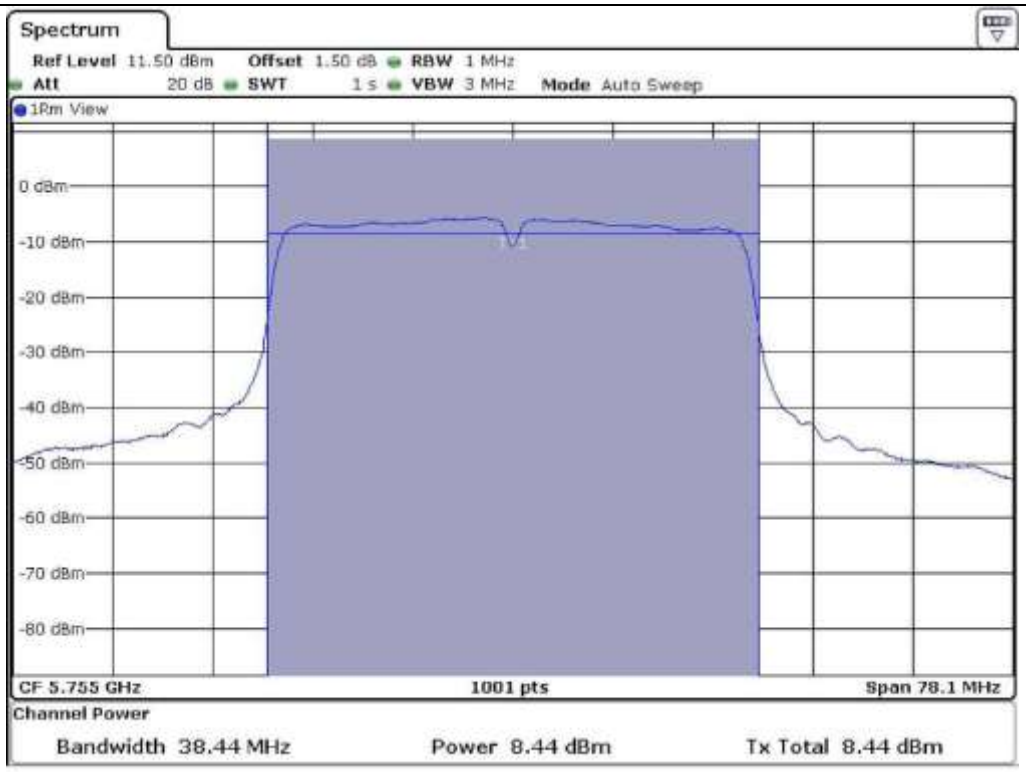
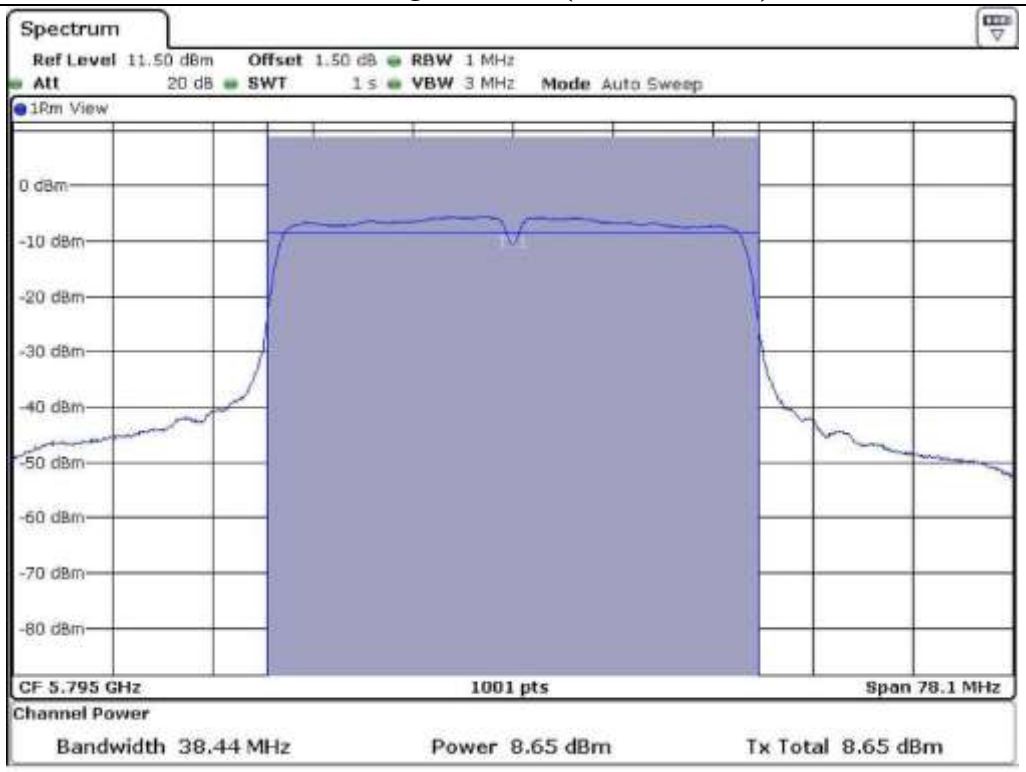



Low Channel @ 5 755 MHz (26 dB Bandwidth)




Middle Channel @ 5 795 MHz (26 dB Bandwidth)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

### 8.6.3 Test data for Multiple transmit

-. Test Date : March 11, 2015

-. Test Result : Pass

| FREQUENCY RANGE (MHz) | CHANNEL | FREQUENCY (MHz) | MEASURED VLAUE (dBm) | LIMIT (dBm) | MARGIN (dB) |
|---|---|---|---|---|---|
| 5 150 ~ 5 250 | Low | 5 190 | 10.29 | 23.98 | 13.69 |
| | High | 5 230 | 10.39 | 23.98 | 13.59 |
| 5 250 ~ 5 350 | Low | 5 270 | 10.39 | 23.98 | 13.59 |
| | High | 5 310 | 10.40 | 23.98 | 13.58 |
| 5 470 ~ 5 725 | Low | 5 510 | 10.66 | 23.98 | 13.32 |
| | Middle | 5 590 | 11.43 | 23.98 | 12.55 |
| | High | 5 670 | 11.80 | 23.98 | 12.18 |
| 5 725 ~ 5 850 | Low | 5 755 | 10.99 | 30.00 | 19.01 |
| | High | 5 795 | 10.94 | 30.00 | 19.06 |

Remark 1 : Margin = Limit – Measured Value (=Receiver Reading + Cable Loss)

Remark 2 :Calculated Output Power= $10\log(10^{(\text{Antenna1 Output Power}/10)}+10^{(\text{Antenna2 Output Power}/10)})$

**Tested by: Tae-Ho, Kim / Senior Engineer**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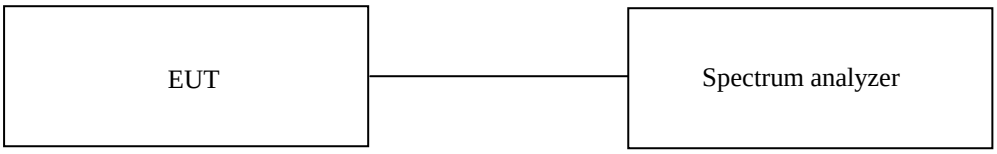
# 9. PEAK POWER SPECTRUL DENSITY

## 9.1 Operating environment

| | | |
|---|---|---|
| Temperature | : | 24 ℃ |
| Relative humidity | : | 48 % R.H. |

## 9.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz, the video bandwidth is set to 3 times the resolution bandwidth. The maximum level form the EUT in 1 MHz bandwidth was measured with above condition.




## 9.3 Test equipment used

| | Model Number | Manufacturer | Description | Serial Number | Last Cal. |
|---|---|---|---|---|---|
| ■ - | FSV40 | Rohde & Schwarz | Signal Analyzer | 101009 | Jul. 30, 2014 (1Y) |

All test equipment used is calibrated on a regular basis.

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## 9.4 Test data for 802.11a RLAN Mode

### 9.4.1 Test data for Antenna 0

-. Test Date : March 11, 2015

-. Operating condition : Highest Output Power Transmitting Mode

-. Test Result : Pass

| FREQUENCY RANGE (MHz) | CHANNEL | FREQUENCY (MHz) | MEASURED VLAUE (dBm) | LIMIT (dBm) | MARGIN (dB) |
|---|---|---|---|---|---|
| 5 150 ~ 5 250 | Low | 5 180 | -11.90 | 11.00 | 22.90 |
| | Middle | 5 200 | -5.50 | 11.00 | 16.50 |
| | High | 5 240 | -6.03 | 11.00 | 17.03 |
| 5 250 ~ 5 350 | Low | 5 260 | -5.38 | 11.00 | 16.38 |
| | Middle | 5 300 | -4.72 | 11.00 | 15.72 |
| | High | 5 320 | -4.47 | 11.00 | 15.47 |
| 5 470 ~ 5 725 | Low | 5 500 | -3.38 | 11.00 | 14.38 |
| | Middle | 5 600 | -3.68 | 11.00 | 14.68 |
| | High | 5 700 | -3.30 | 11.00 | 14.30 |
| 5 725 ~ 5 850 | Low | 5 745 | -4.61 | 30.00 | 34.61 |
| | Middle | 5 785 | -4.38 | 30.00 | 34.38 |
| | High | 5 825 | -4.28 | 30.00 | 34.28 |

Remark: See next page for measurement data.

**Tested by: Tae-Ho, Kim / Senior Engineer**

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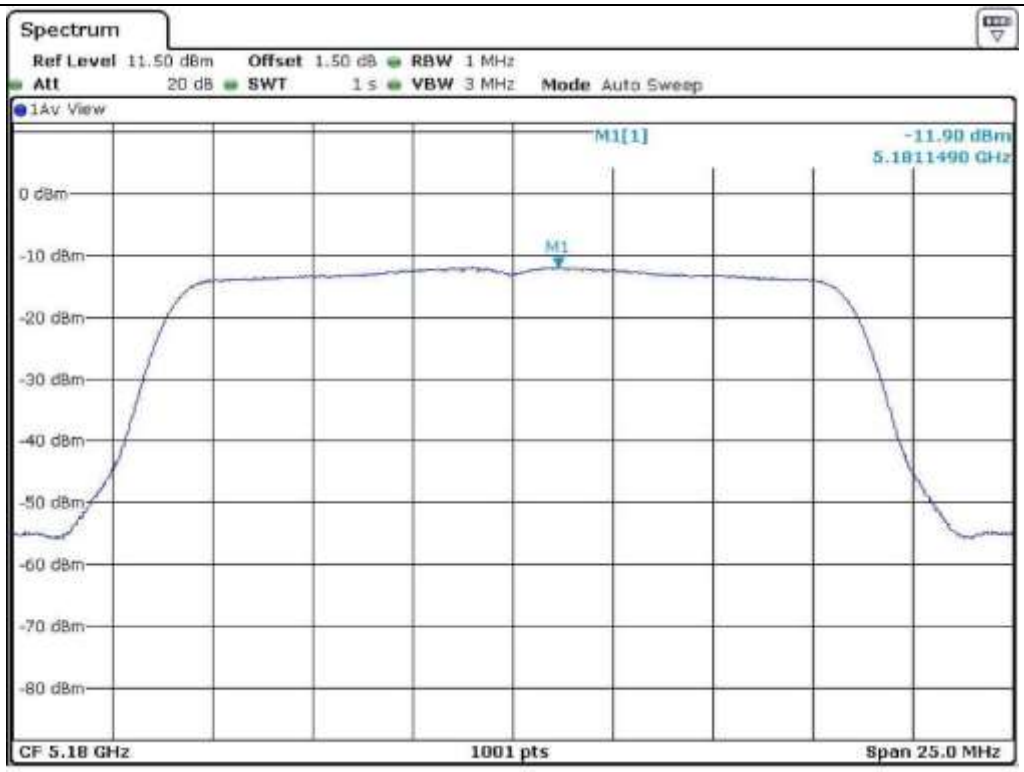
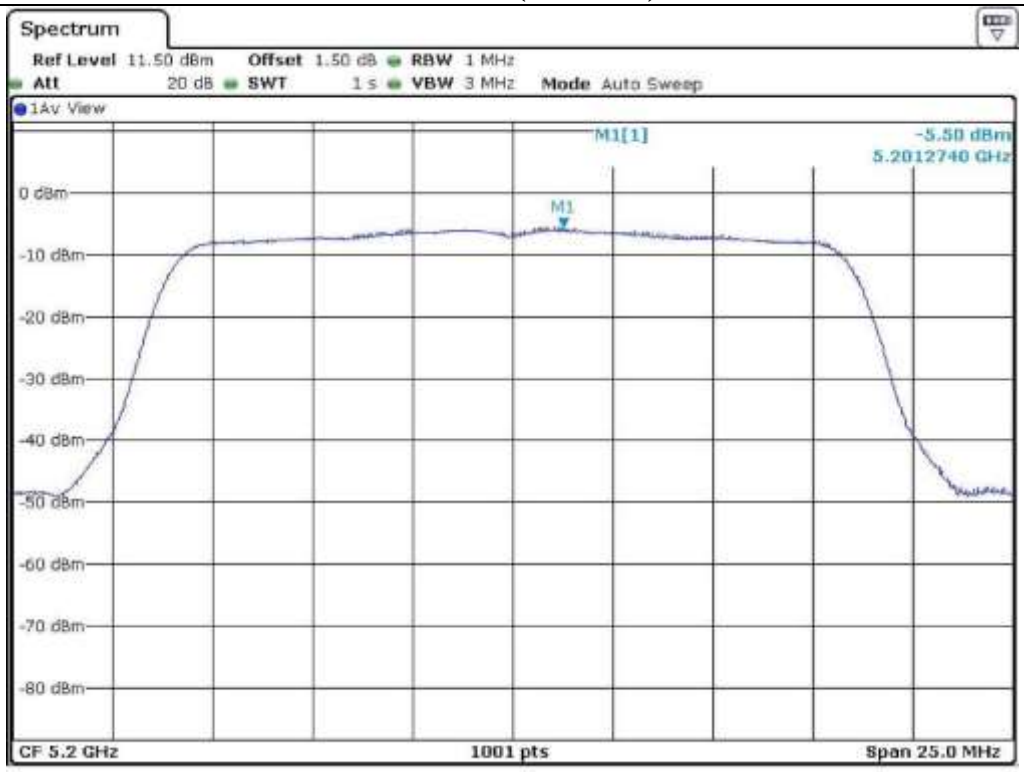



Low Channel (5 180 MHz)




Middle Channel (5 200 MHz)



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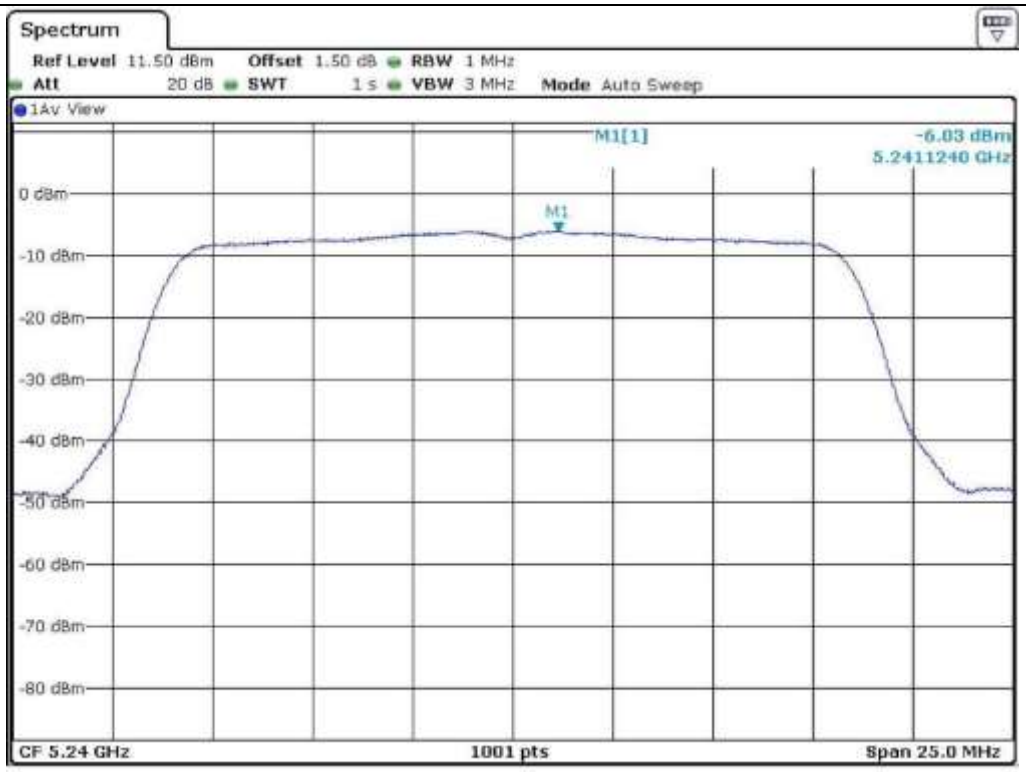


High Channel (5 240 MHz)



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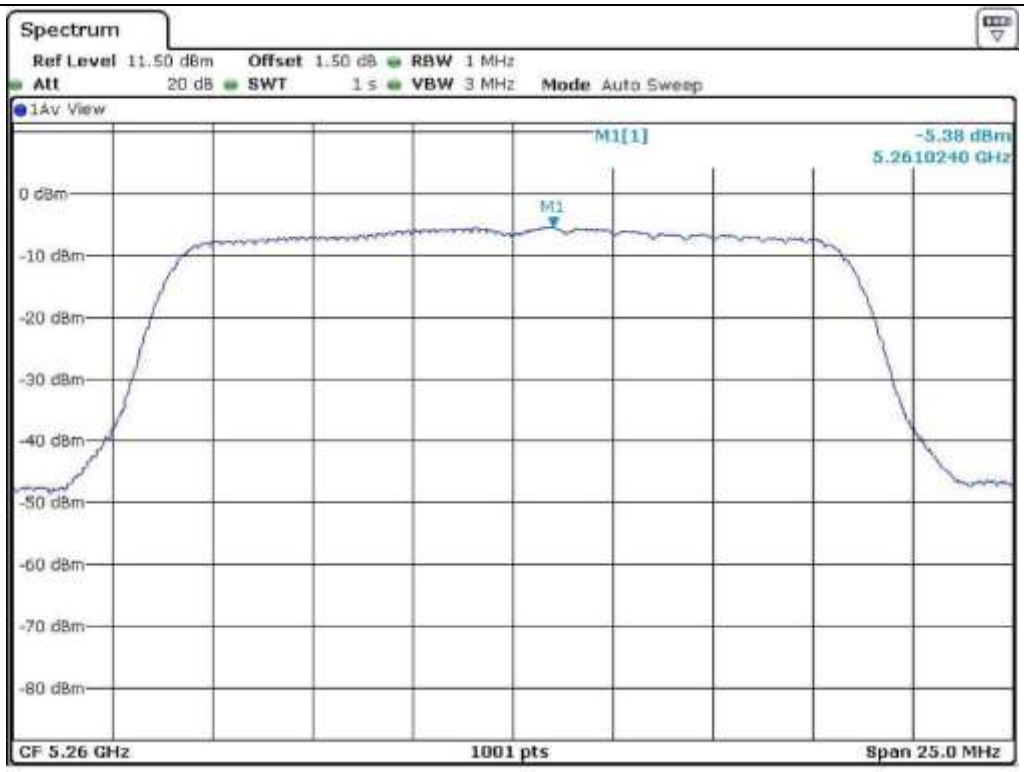


Low Channel (5 260 MHz)

Middle Channel (5 300 MHz)


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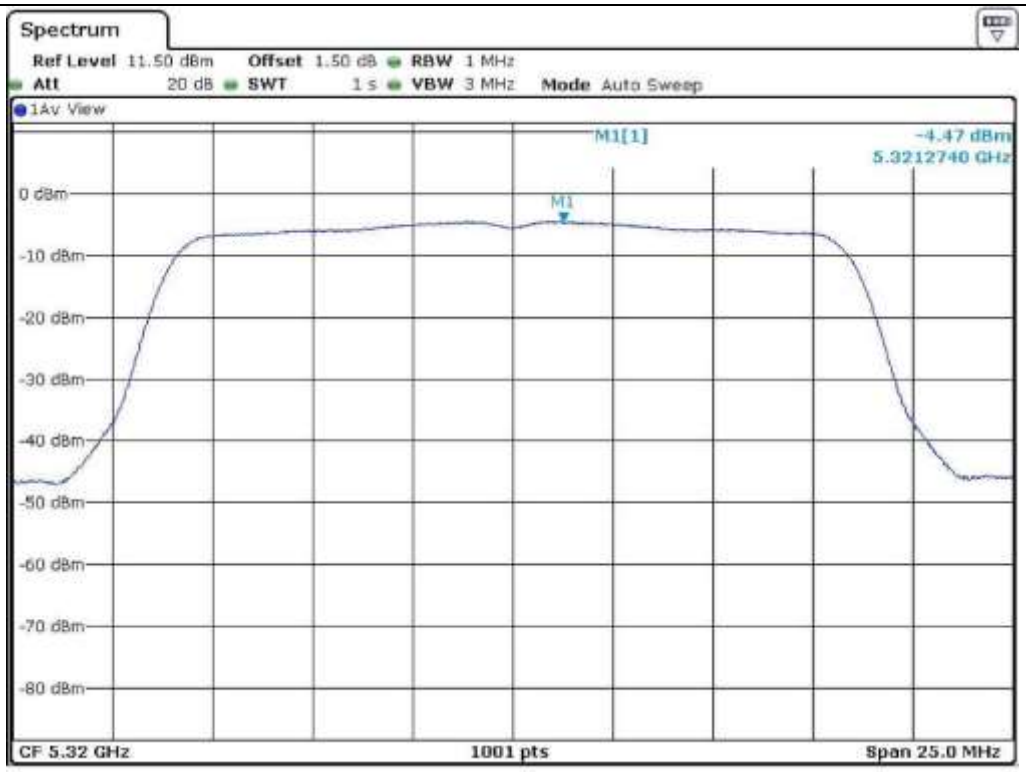


High Channel (5 320 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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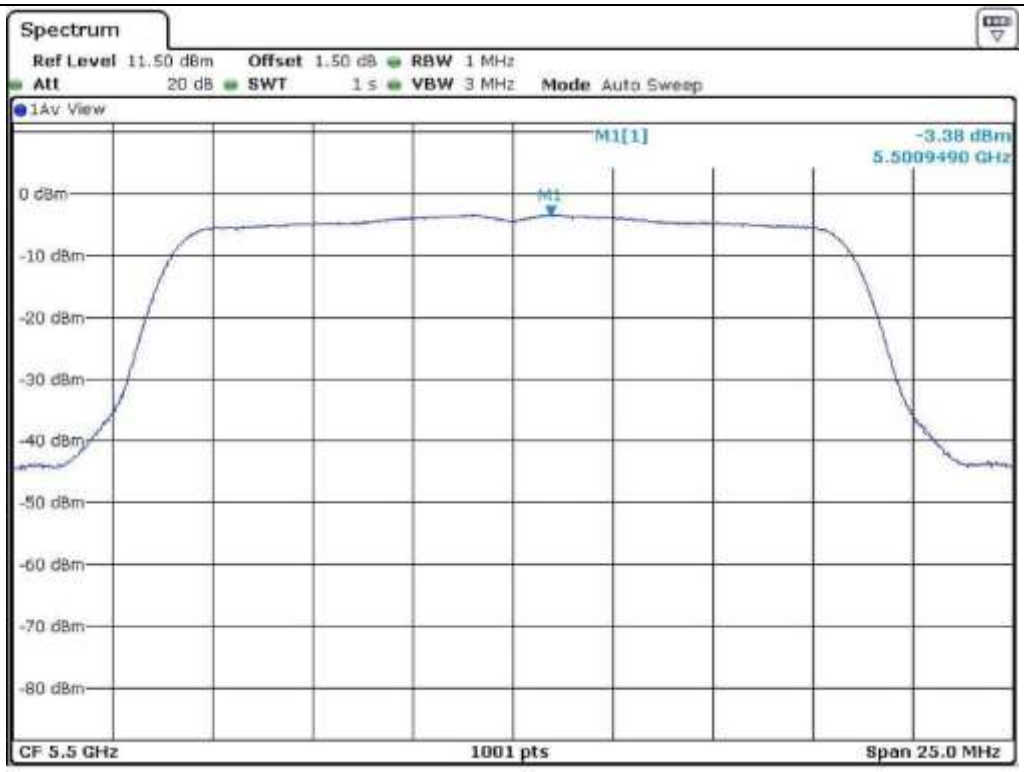
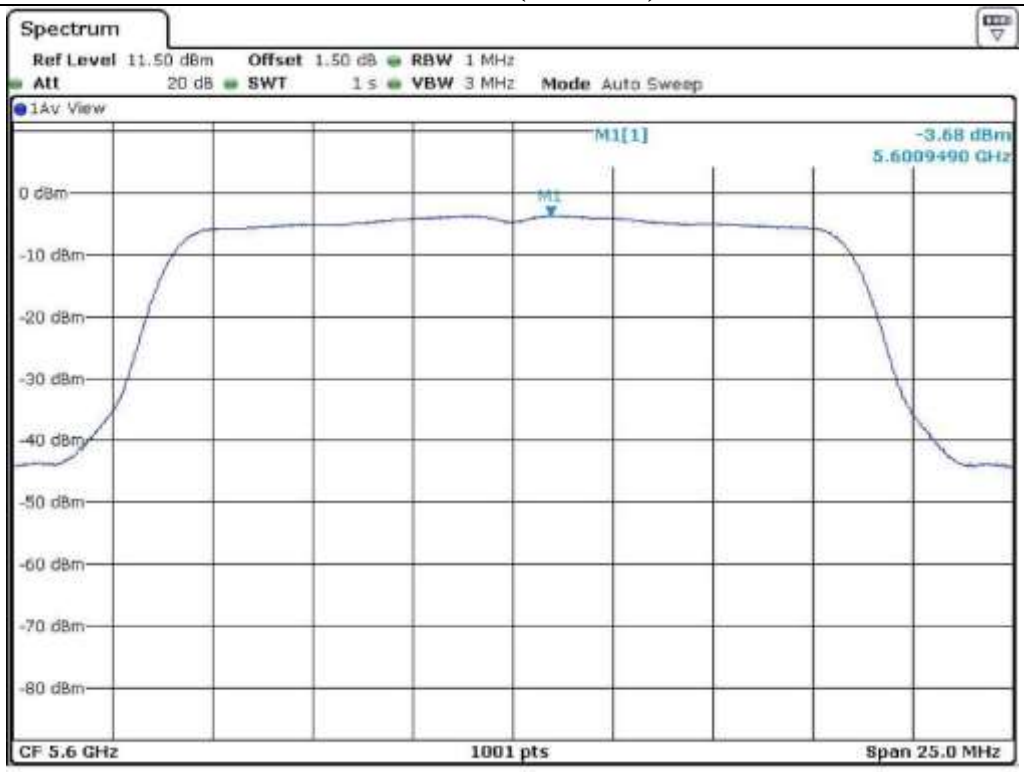



Low Channel (5 500 MHz)




Middle Channel (5 600 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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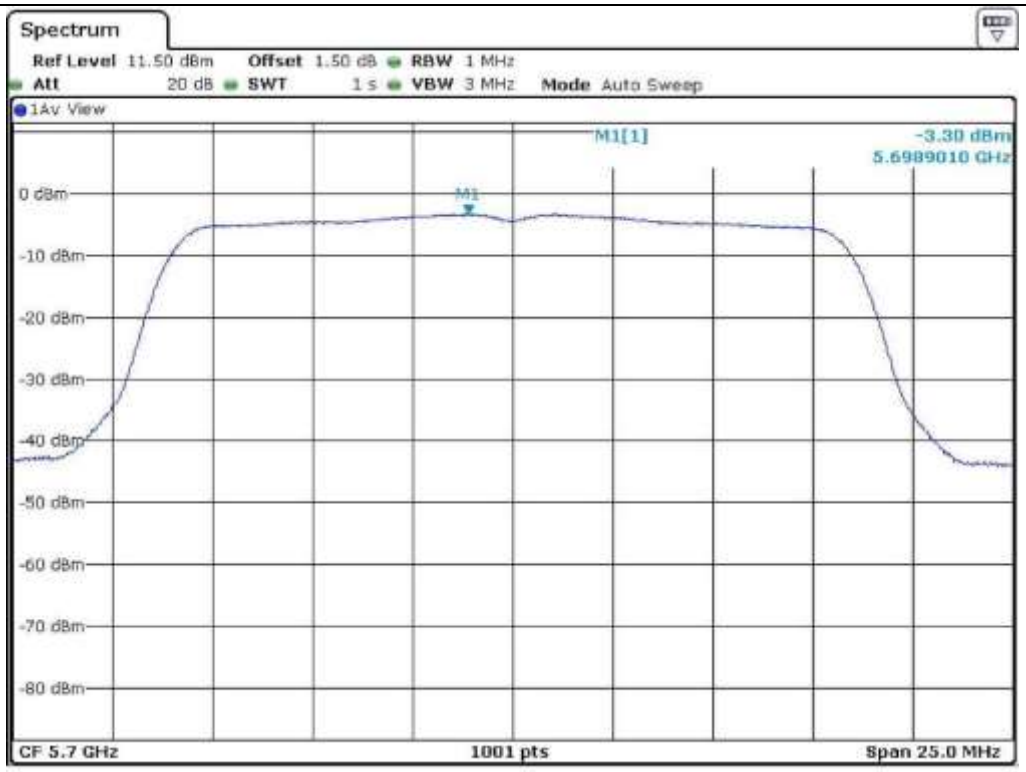


High Channel (5 700 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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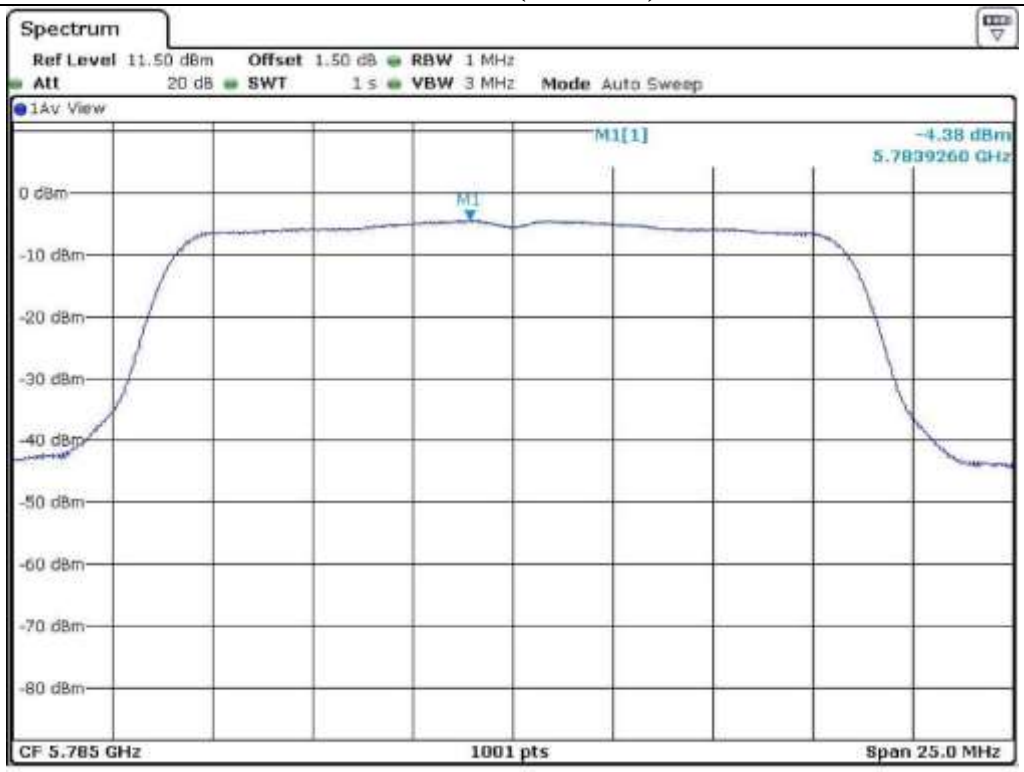
Low Channel (5 745 MHz)




Middle Channel (5 785 MHz)



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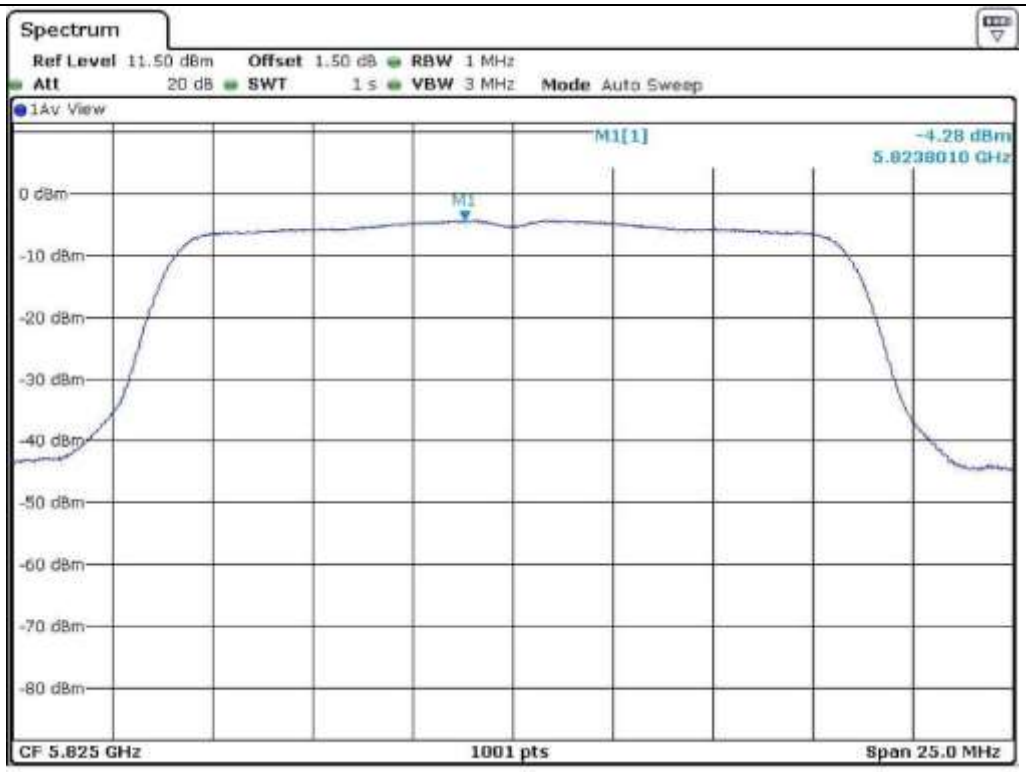


High Channel (5 825 MHz)



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### 9.4.2 Test data for Antenna 1

-. Test Date : March 11, 2015

-. Operating condition : Highest Output Power Transmitting Mode

-. Test Result : Pass

| FREQUENCY RANGE (MHz) | CHANNEL | FREQUENCY (MHz) | MEASURED VLAUE (dBm) | LIMIT (dBm) | MARGIN (dB) |
|---|---|---|---|---|---|
| 5 150 ~ 5 250 | Low | 5 180 | -8.84 | 11.00 | 19.84 |
| | Middle | 5 200 | -8.93 | 11.00 | 19.93 |
| | High | 5 240 | -9.71 | 11.00 | 20.71 |
| 5 250 ~ 5 350 | Low | 5 260 | -9.38 | 11.00 | 20.38 |
| | Middle | 5 300 | -10.04 | 11.00 | 21.04 |
| | High | 5 320 | -9.27 | 11.00 | 20.27 |
| 5 470 ~ 5 725 | Low | 5 500 | -6.06 | 11.00 | 17.06 |
| | Middle | 5 600 | -5.40 | 11.00 | 16.40 |
| | High | 5 700 | -4.55 | 11.00 | 15.55 |
| 5 725 ~ 5 850 | Low | 5 745 | -5.02 | 30.00 | 35.02 |
| | Middle | 5 785 | -4.31 | 30.00 | 34.31 |
| | High | 5 825 | -4.32 | 30.00 | 34.32 |

Remark: See next page for measurement data.

**Tested by: Tae-Ho, Kim / Senior Engineer**

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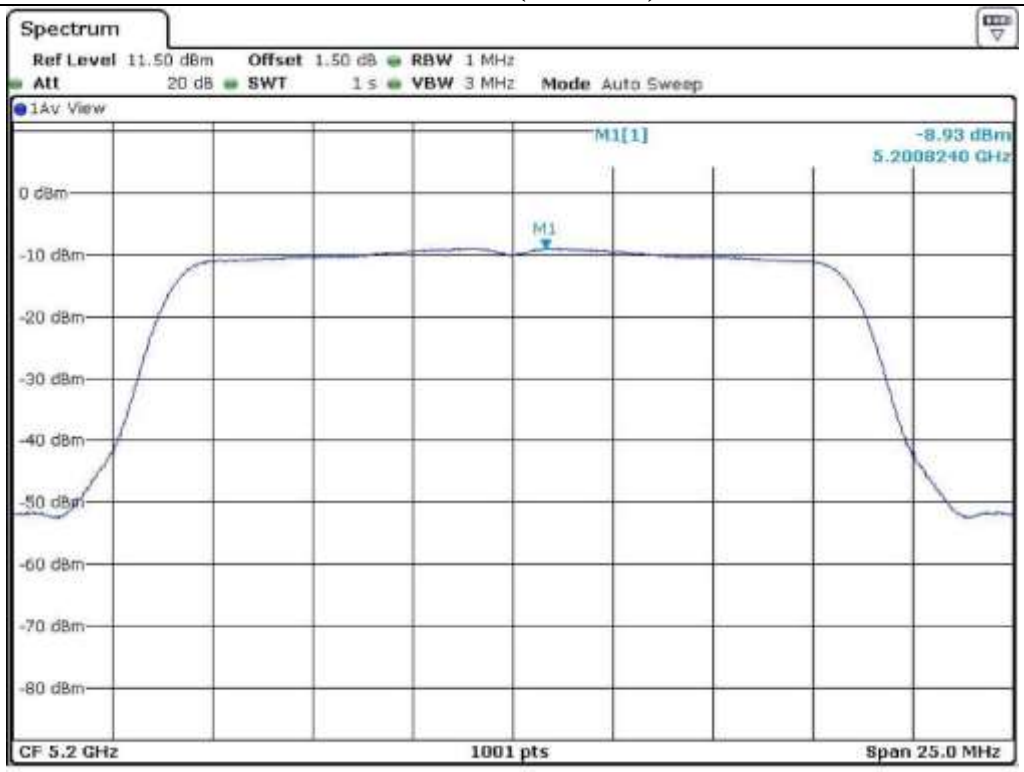
Low Channel (5 180 MHz)




Middle Channel (5 200 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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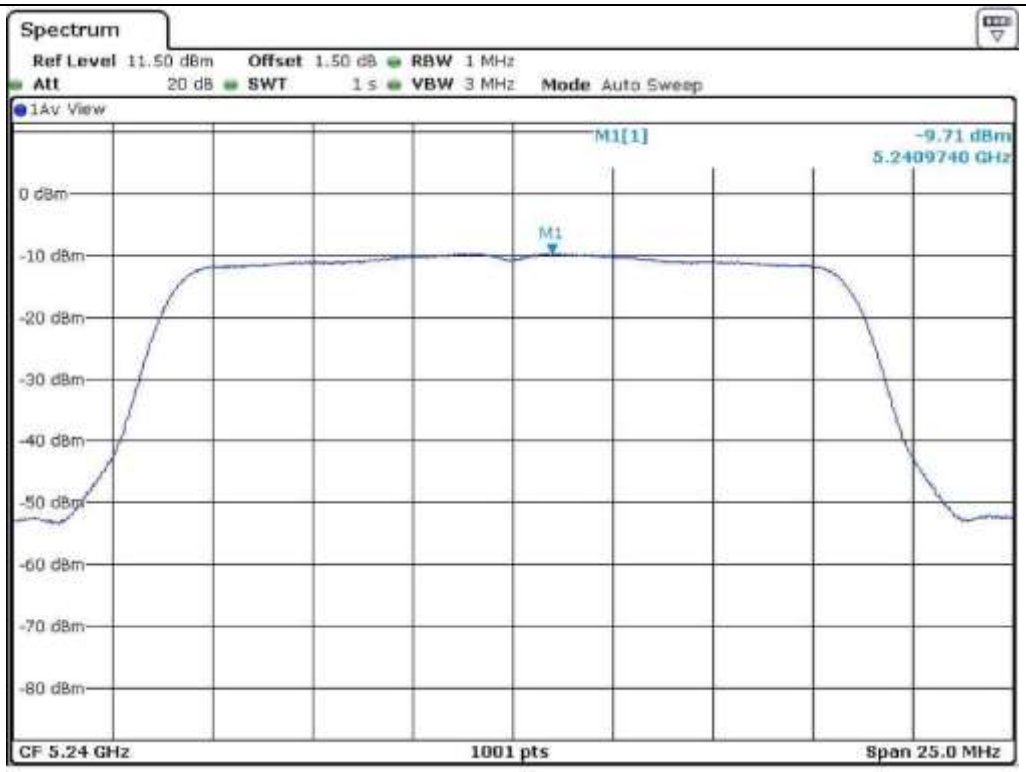


High Channel (5 240 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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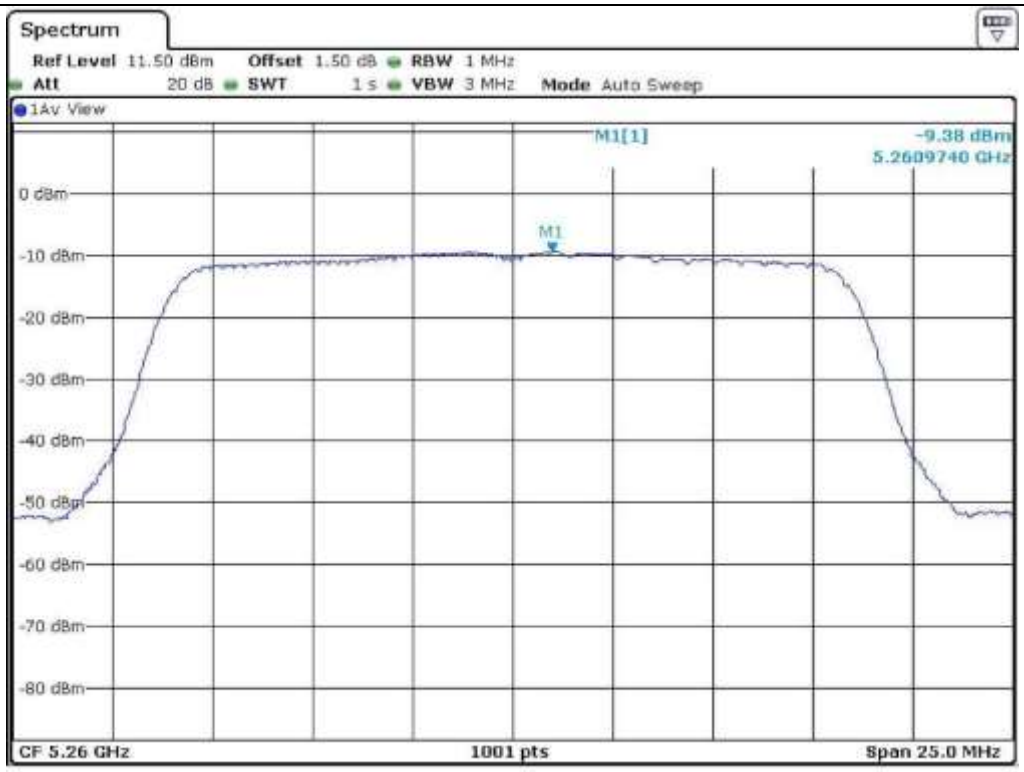
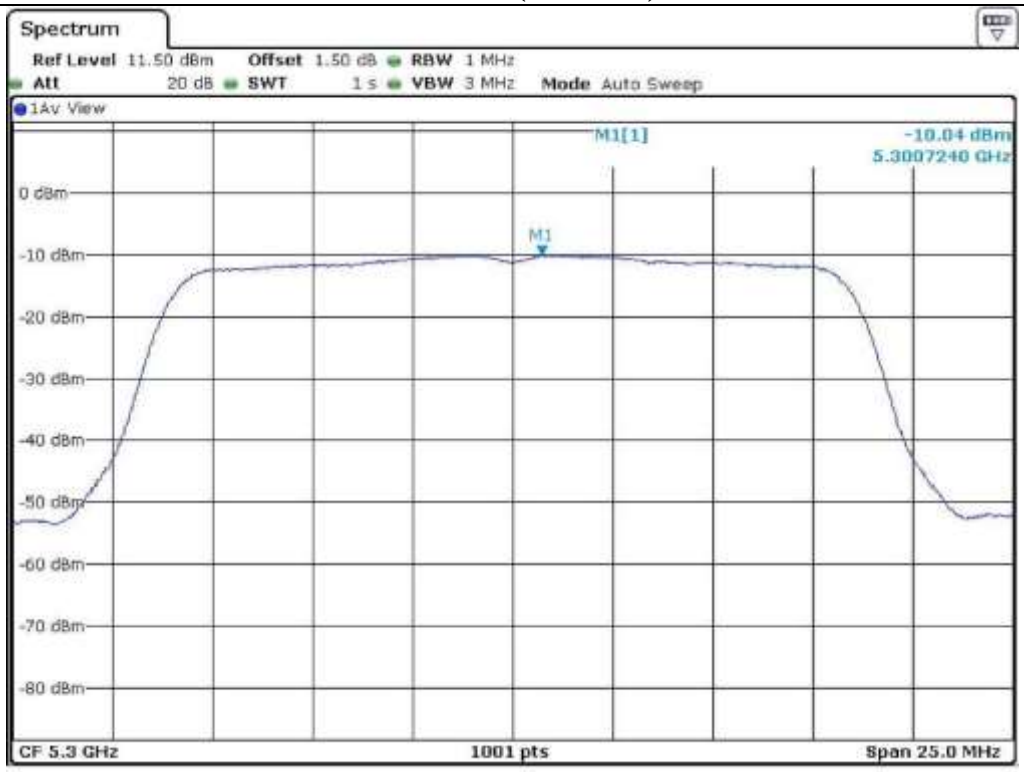



Low Channel (5 260 MHz)




Middle Channel (5 300 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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High Channel (5 320 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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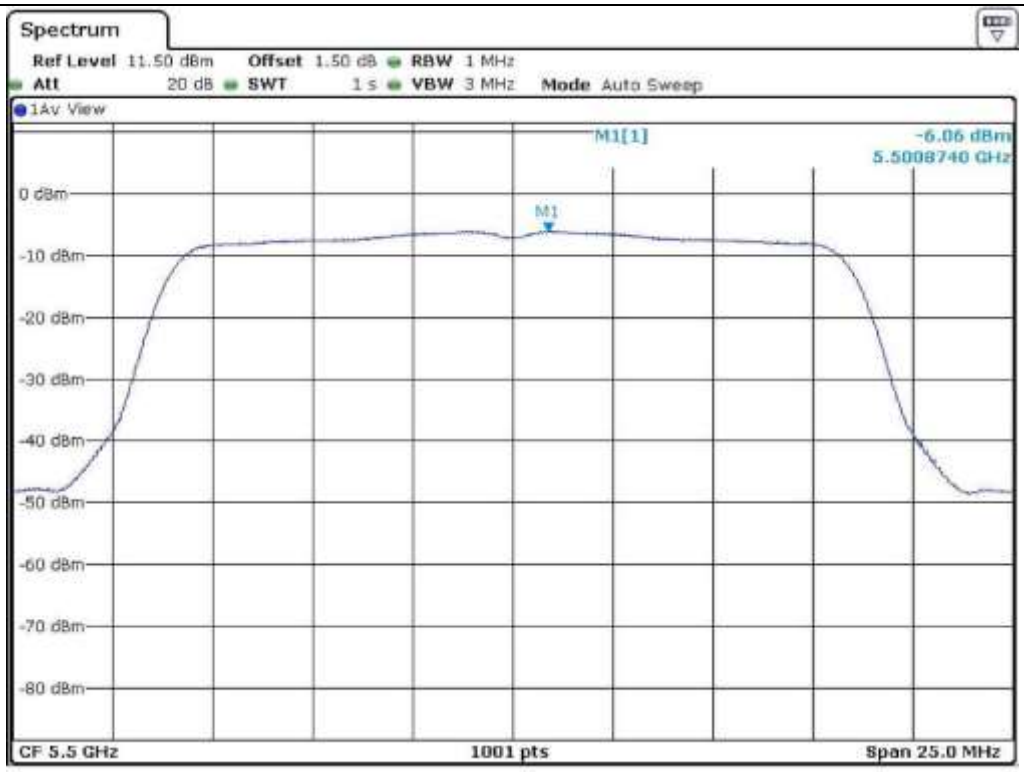


Low Channel (5 500 MHz)

Middle Channel (5 600 MHz)



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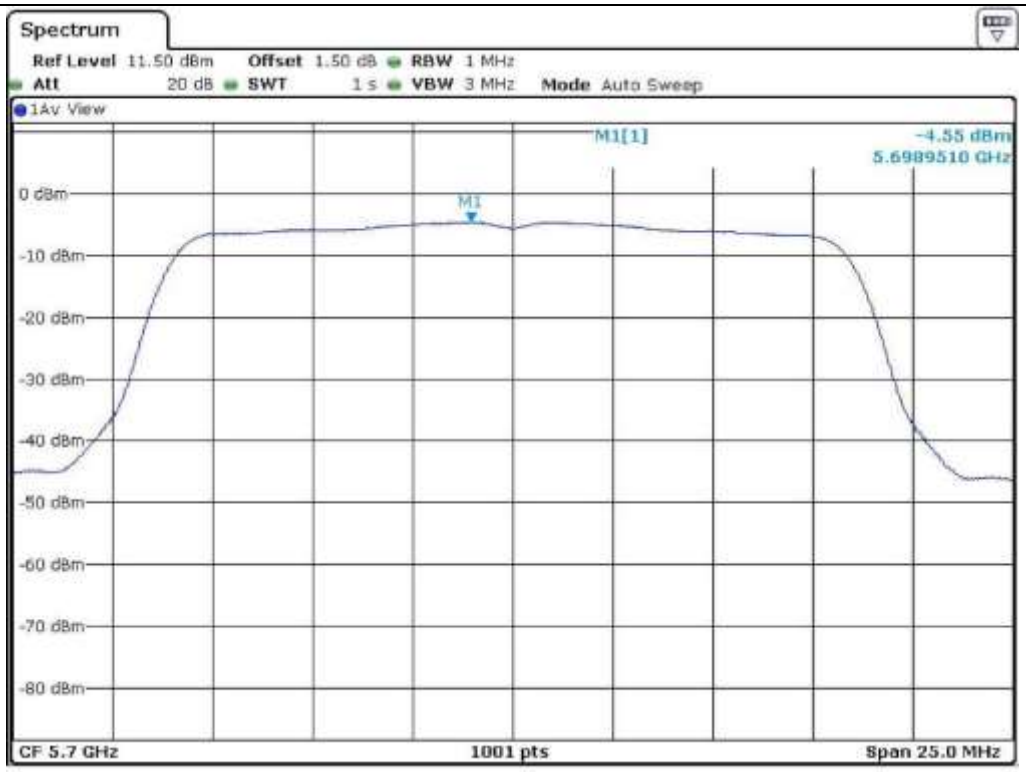


High Channel (5 700 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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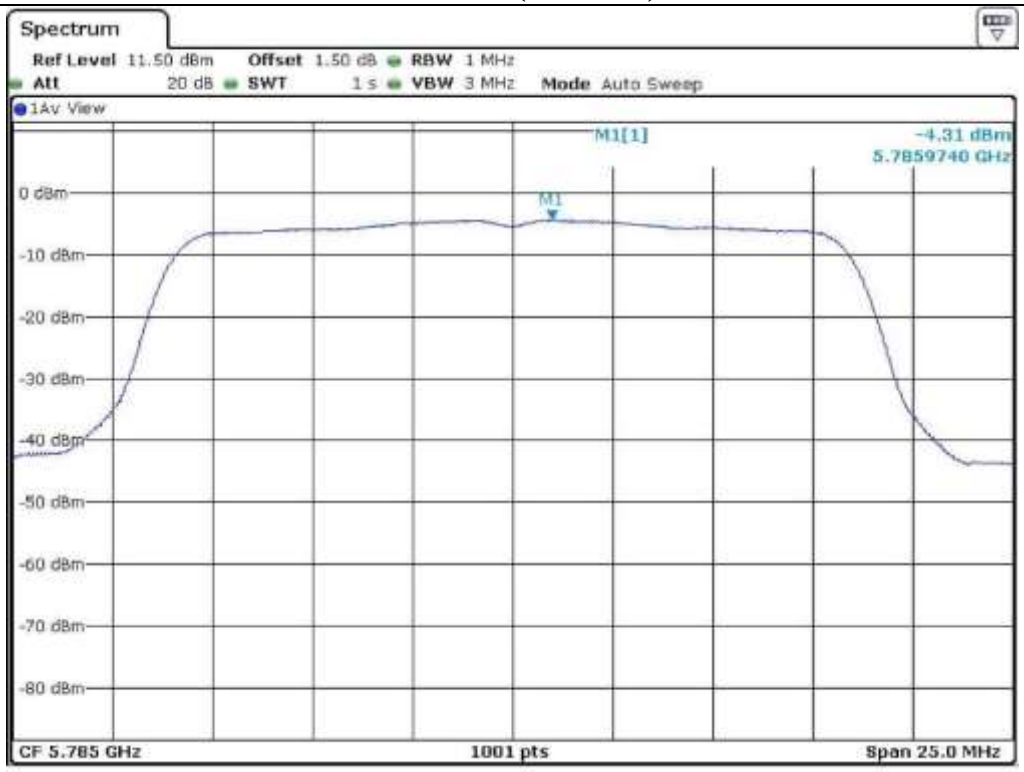
Low Channel (5 745 MHz)




Middle Channel (5 785 MHz)



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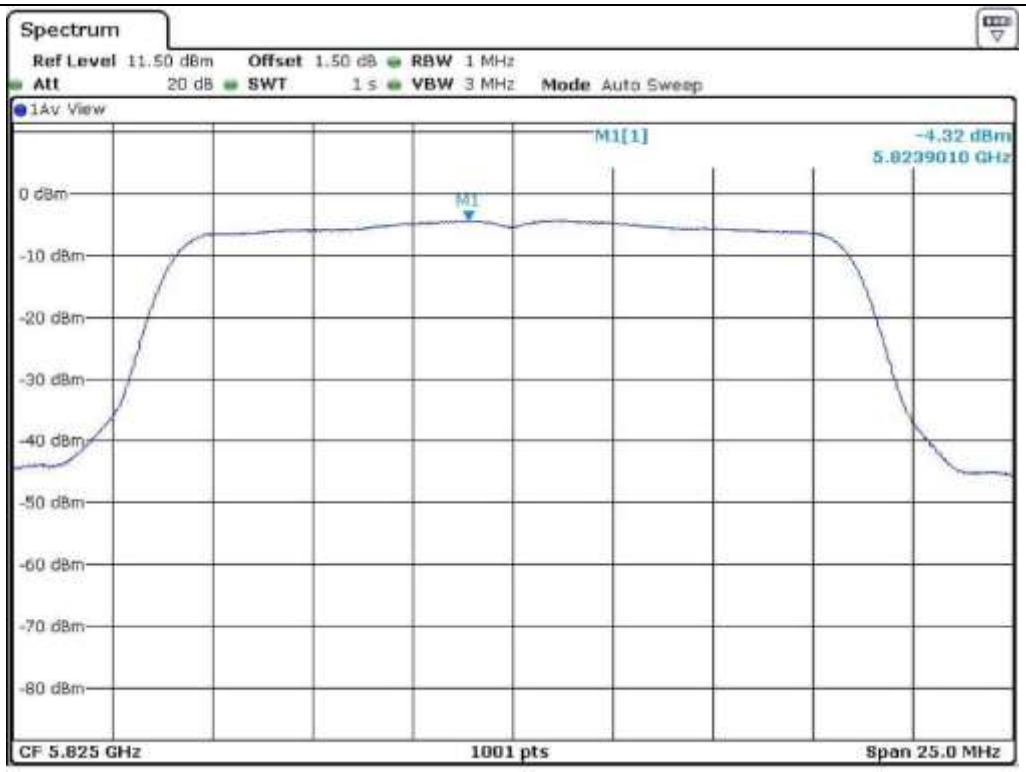


High Channel (5 825 MHz)



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**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

### 9.4.3 Test data for Multiple Transmit

-. Test Date : March 11, 2015

-. Operating condition : Highest Output Power Transmitting Mode

-. Test Result : Pass

| FREQUENCY RANGE (MHz) | CHANNEL | FREQUENCY (MHz) | MEASURED VLAUE (dBm) | LIMIT (dBm) | MARGIN (dB) |
|---|---|---|---|---|---|
| 5 150 ~ 5 250 | Low | 5 180 | -7.10 | 11.00 | 18.10 |
| | Middle | 5 200 | -3.87 | 11.00 | 14.87 |
| | High | 5 240 | -4.48 | 11.00 | 15.48 |
| 5 250 ~ 5 350 | Low | 5 260 | -3.92 | 11.00 | 14.92 |
| | Middle | 5 300 | -3.60 | 11.00 | 14.60 |
| | High | 5 320 | -3.23 | 11.00 | 14.23 |
| 5 470 ~ 5 725 | Low | 5 500 | -1.51 | 11.00 | 12.51 |
| | Middle | 5 600 | -1.45 | 11.00 | 12.45 |
| | High | 5 700 | -0.87 | 11.00 | 11.87 |
| 5 725 ~ 5 850 | Low | 5 745 | -1.80 | 30.00 | 31.80 |
| | Middle | 5 785 | -1.33 | 30.00 | 31.33 |
| | High | 5 825 | -1.29 | 30.00 | 31.29 |

Remark 1 : Margin = Limit – Measured value

Remark 2 : Calculated Power Density = $10\log(10^{(\text{Antenna1 Power Density}/10)}+10^{(\text{Antenna2 Power Density}/10)})$

**Tested by: Tae-Ho, Kim / Senior Engineer**


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## 9.5 Test data for 802.11n_HT20 RLAN Mode

### 9.5.1 Test data for Antenna 0

-. Test Date : March 11, 2015

-. Operating condition : Highest Output Power Transmitting Mode

-. Test Result : Pass

| FREQUENCY RANGE (MHz) | CHANNEL | FREQUENCY (MHz) | MEASURED VLAUE (dBm) | LIMIT (dBm) | MARGIN (dB) |
|---|---|---|---|---|---|
| 5 150 ~ 5 250 | Low | 5 180 | -5.92 | 11.00 | 16.92 |
| | Middle | 5 200 | -6.04 | 11.00 | 17.04 |
| | High | 5 240 | -6.08 | 11.00 | 17.08 |
| 5 250 ~ 5 350 | Low | 5 260 | -5.74 | 11.00 | 16.74 |
| | Middle | 5 300 | -4.96 | 11.00 | 15.96 |
| | High | 5 320 | -4.67 | 11.00 | 15.67 |
| 5 470 ~ 5 725 | Low | 5 500 | -3.26 | 11.00 | 14.26 |
| | Middle | 5 600 | -3.58 | 11.00 | 14.58 |
| | High | 5 700 | -3.31 | 11.00 | 14.31 |
| 5 725 ~ 5 850 | Low | 5 745 | -4.43 | 30.00 | 34.43 |
| | Middle | 5 785 | -4.47 | 30.00 | 34.47 |
| | High | 5 825 | -4.22 | 30.00 | 34.22 |

Remark: See next page for measurement data.

**Tested by: Tae-Ho, Kim / Senior Engineer**

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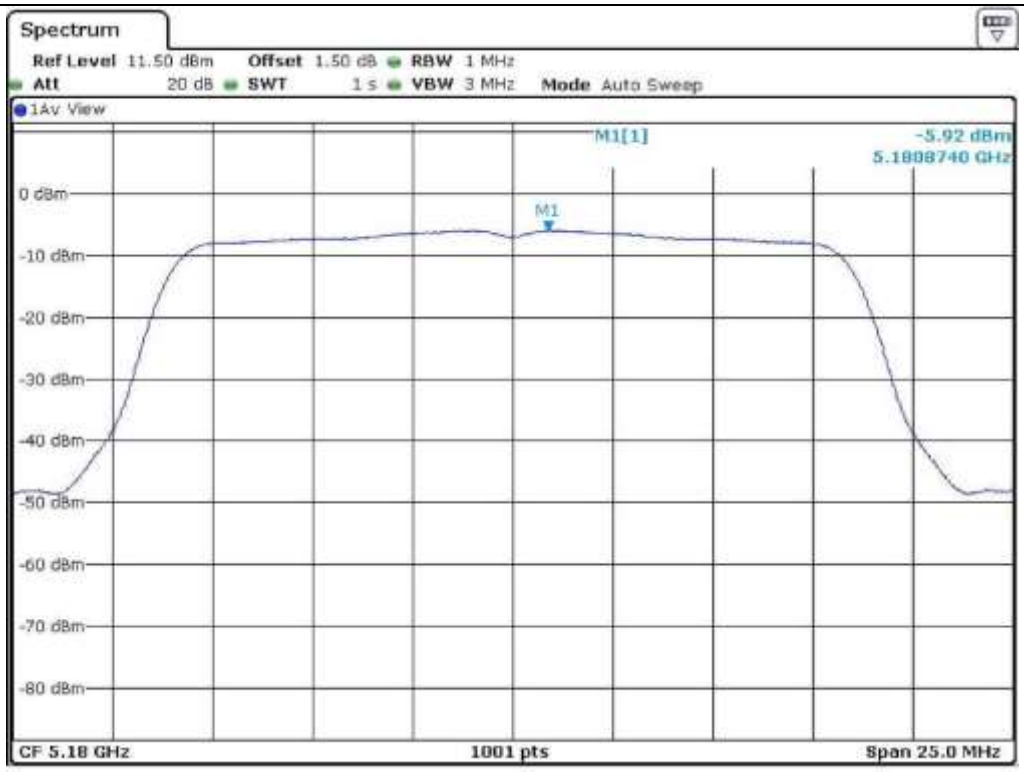
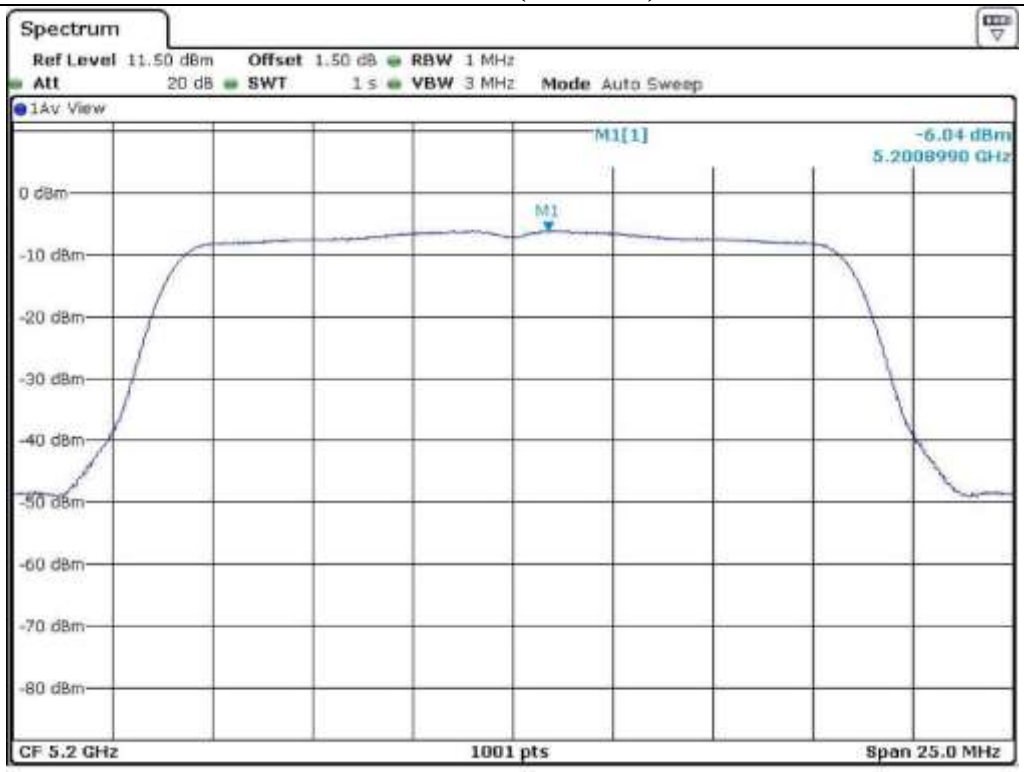



Low Channel (5 180 MHz)




Middle Channel (5 200 MHz)



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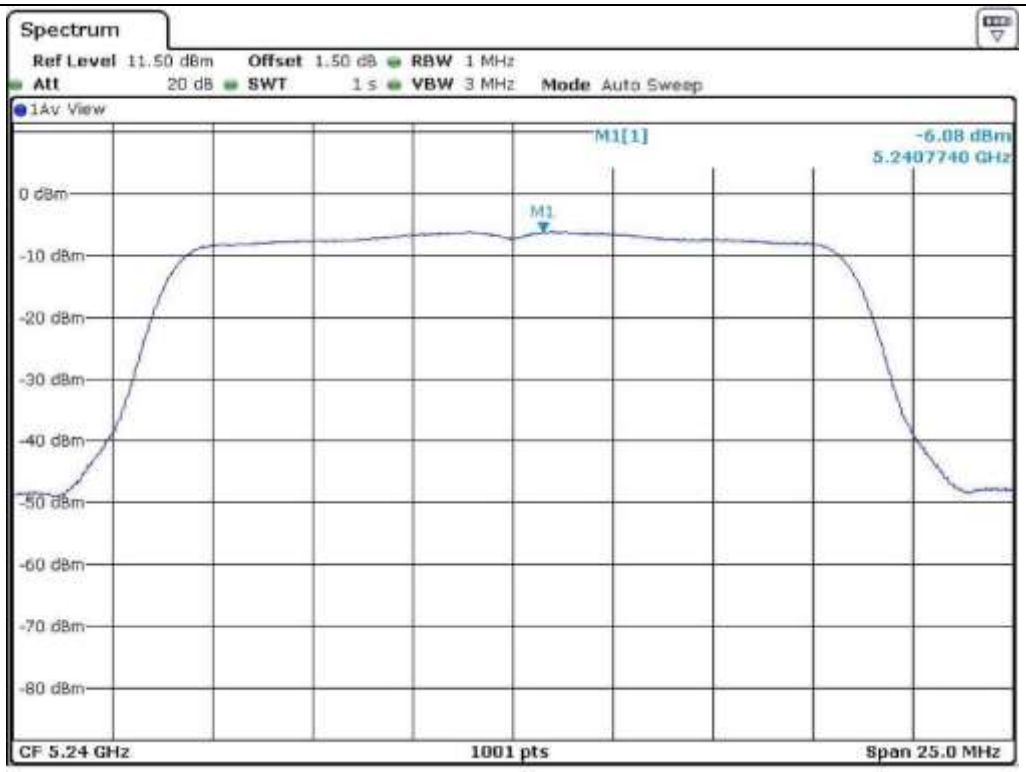


High Channel (5 240 MHz)


**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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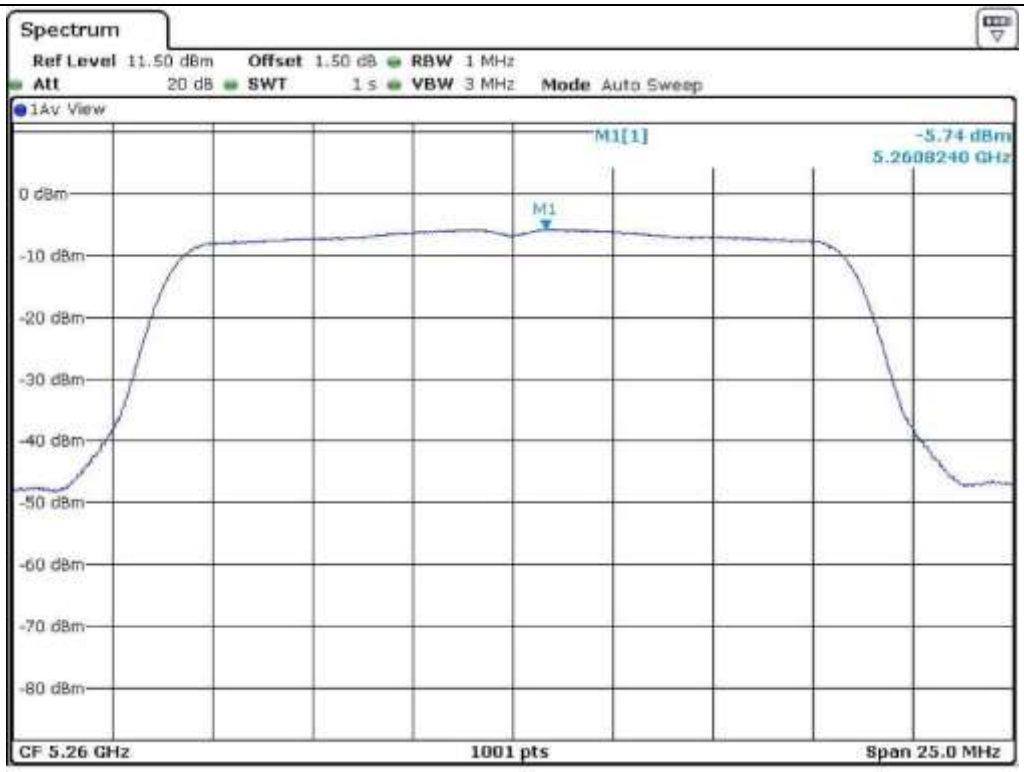
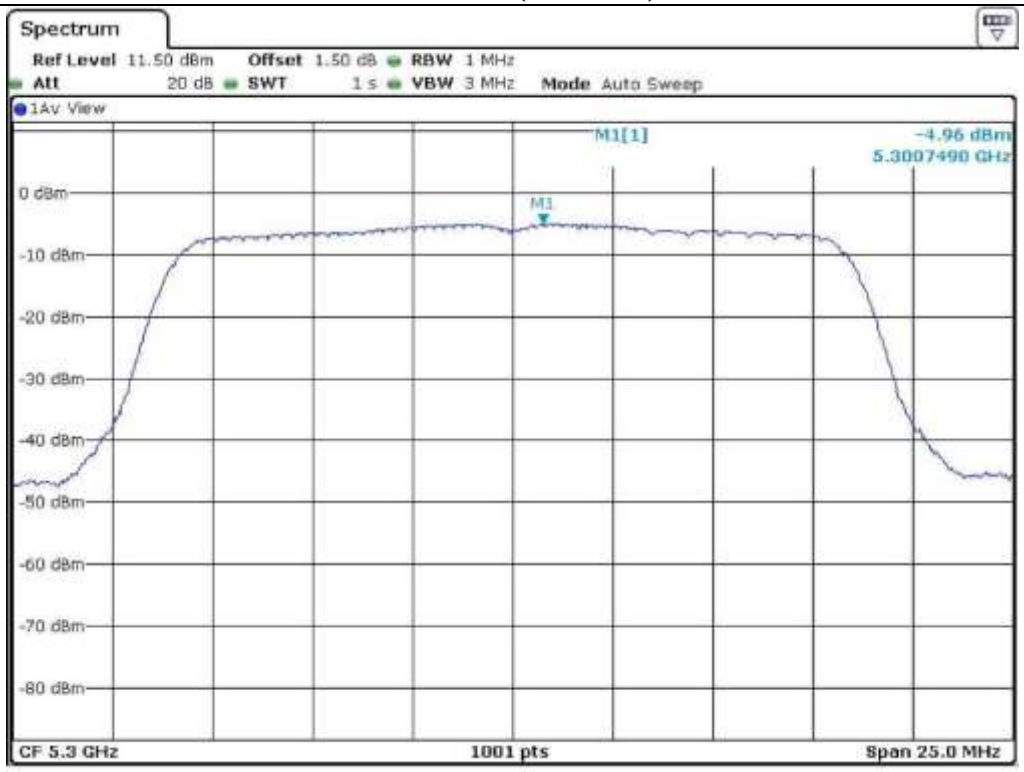



Low Channel (5 260 MHz)




Middle Channel (5 300 MHz)



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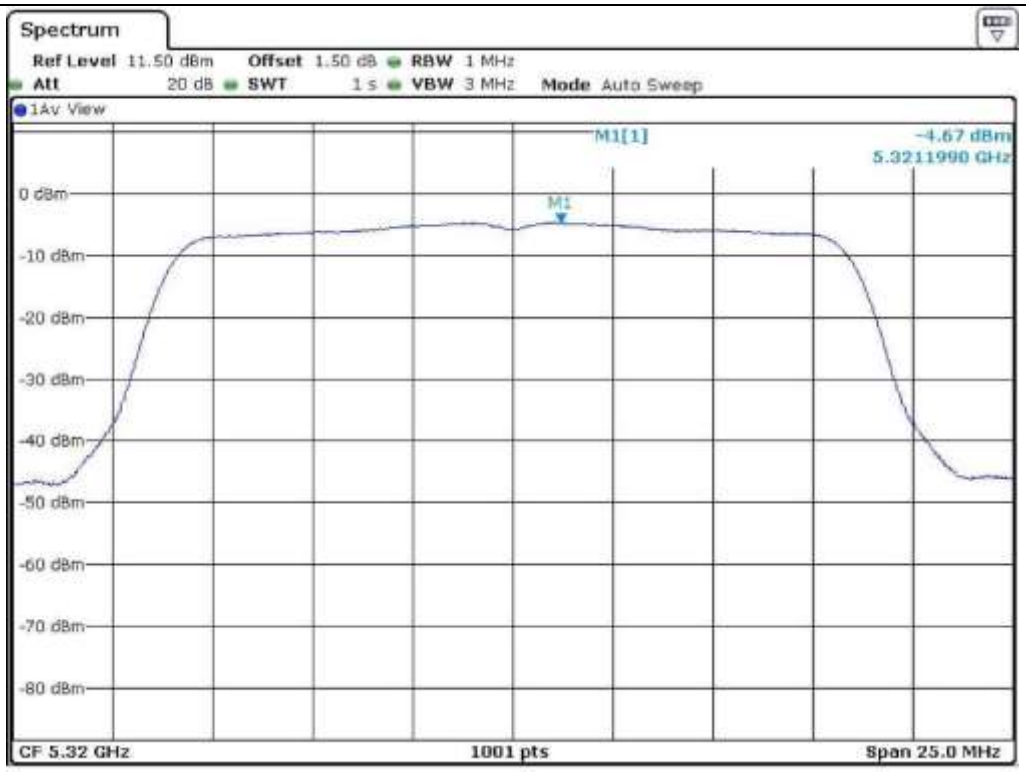


High Channel (5 320 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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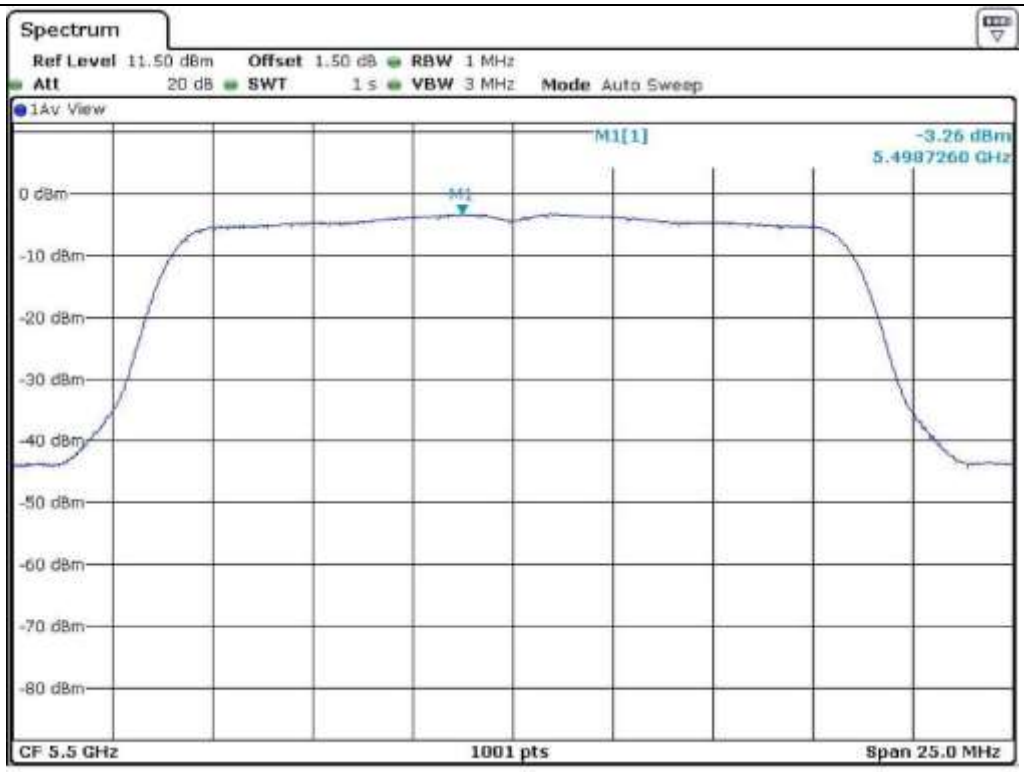
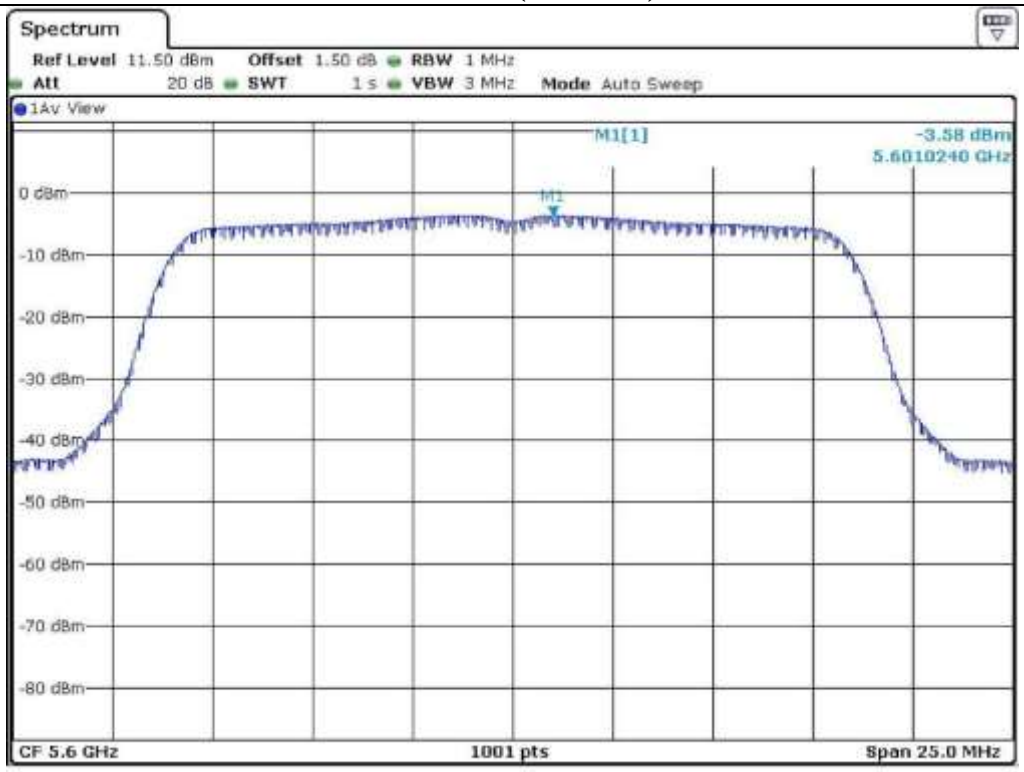
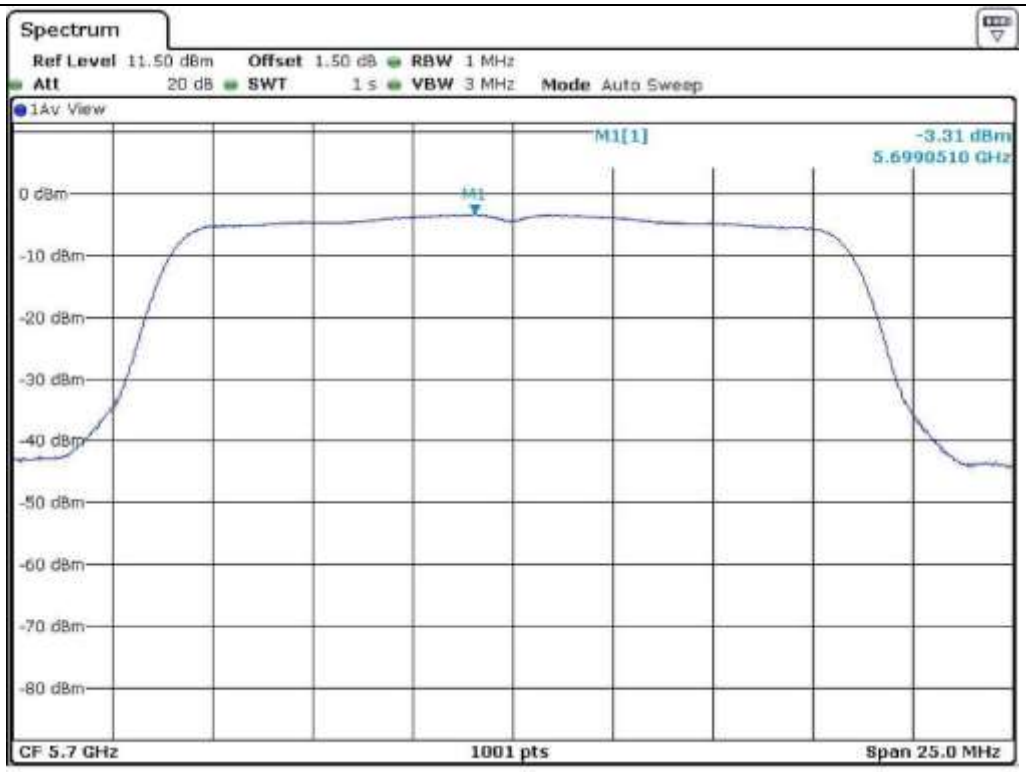



Low Channel (5 500 MHz)




Middle Channel (5 600 MHz)


**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

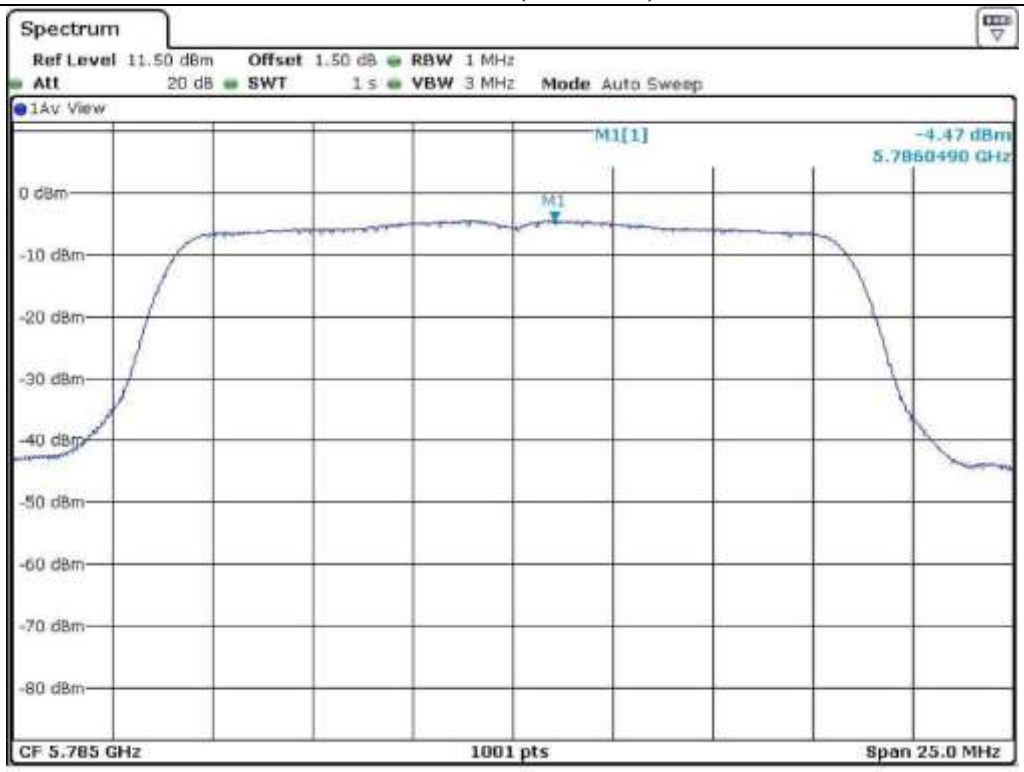



High Channel (5 700 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

Low Channel (5 745 MHz)




Middle Channel (5 785 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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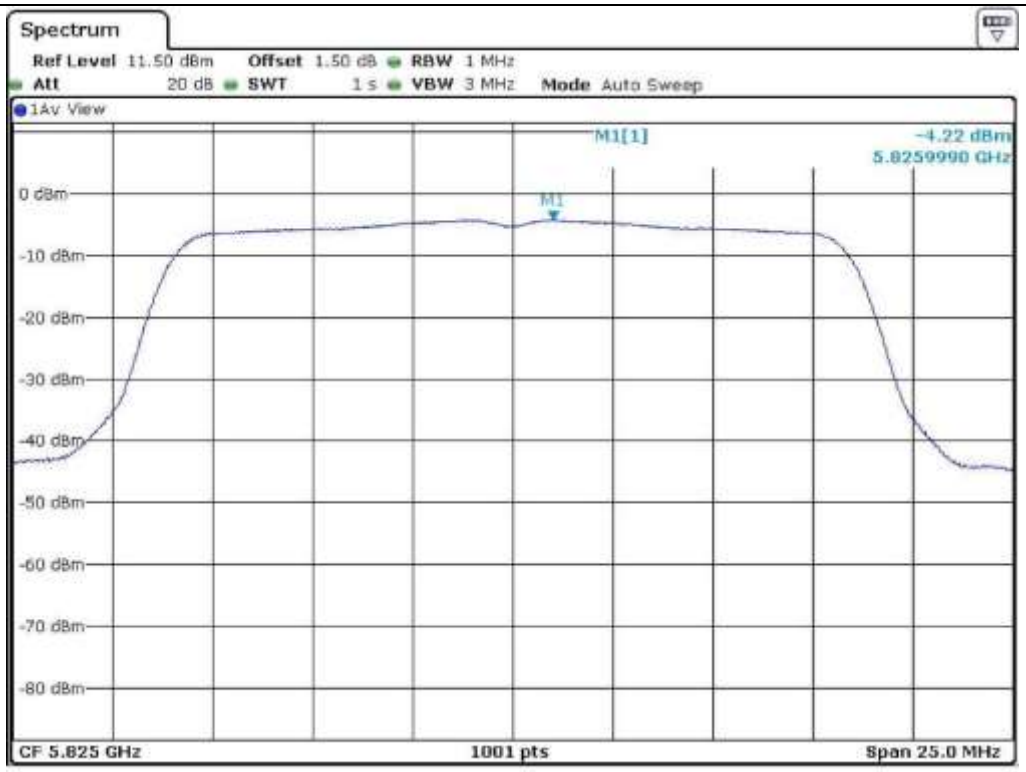


High Channel (5 825 MHz)



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### 9.5.2 Test data for Antenna 1

-. Test Date : March 11, 2015

-. Operating condition : Highest Output Power Transmitting Mode

-. Test Result : Pass

| FREQUENCY RANGE (MHz) | CHANNEL | FREQUENCY (MHz) | MEASURED VLAUE (dBm) | LIMIT (dBm) | MARGIN (dB) |
|---|---|---|---|---|---|
| 5 150 ~ 5 250 | Low | 5 180 | -10.99 | 11.00 | 21.99 |
| | Middle | 5 200 | -10.83 | 11.00 | 21.83 |
| | High | 5 240 | -11.12 | 11.00 | 22.12 |
| 5 250 ~ 5 350 | Low | 5 260 | -11.26 | 11.00 | 22.26 |
| | Middle | 5 300 | -10.00 | 11.00 | 21.00 |
| | High | 5 320 | -9.20 | 11.00 | 20.20 |
| 5 470 ~ 5 725 | Low | 5 500 | -6.61 | 11.00 | 17.61 |
| | Middle | 5 600 | -6.09 | 11.00 | 17.09 |
| | High | 5 700 | -5.40 | 11.00 | 16.40 |
| 5 725 ~ 5 850 | Low | 5 745 | -6.60 | 30.00 | 36.60 |
| | Middle | 5 785 | -6.05 | 30.00 | 36.05 |
| | High | 5 825 | -5.57 | 30.00 | 35.57 |

Remark: See next page for measurement data.

**Tested by: Tae-Ho, Kim / Senior Engineer**

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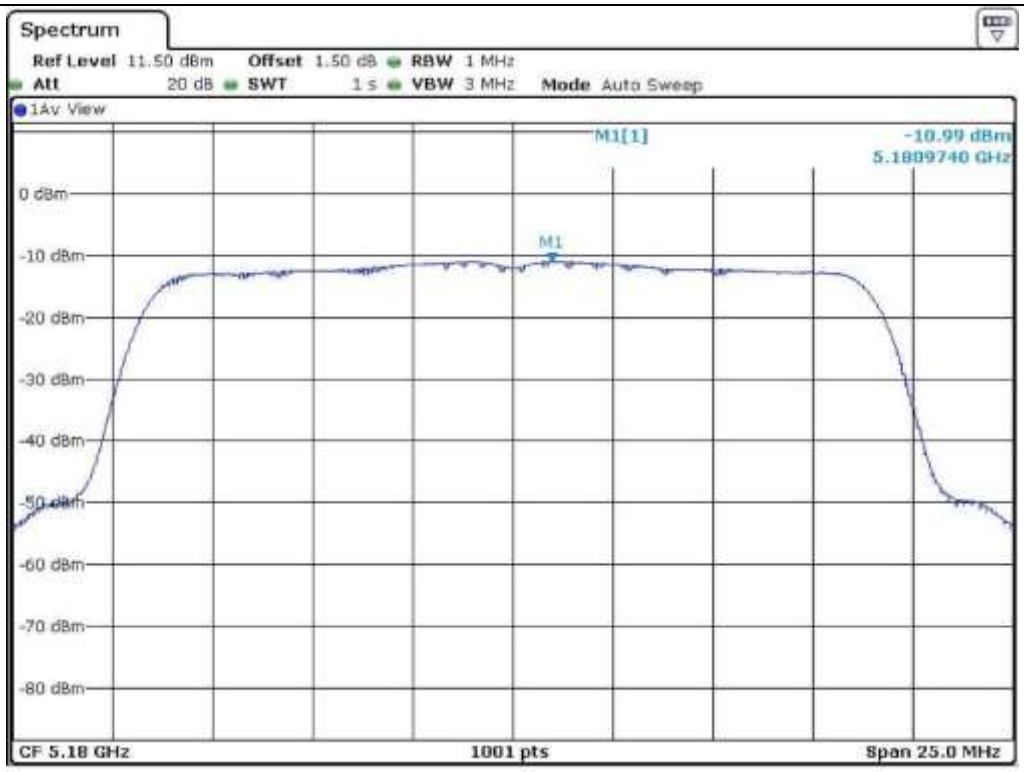
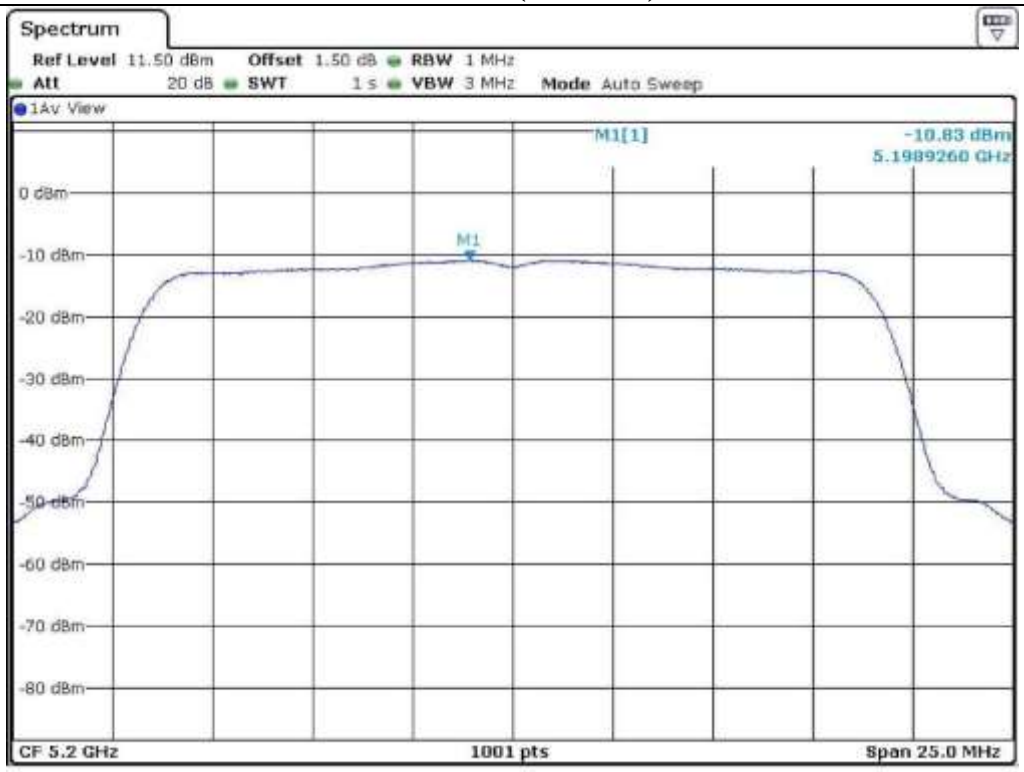



Low Channel (5 180 MHz)




Middle Channel (5 200 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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High Channel (5 240 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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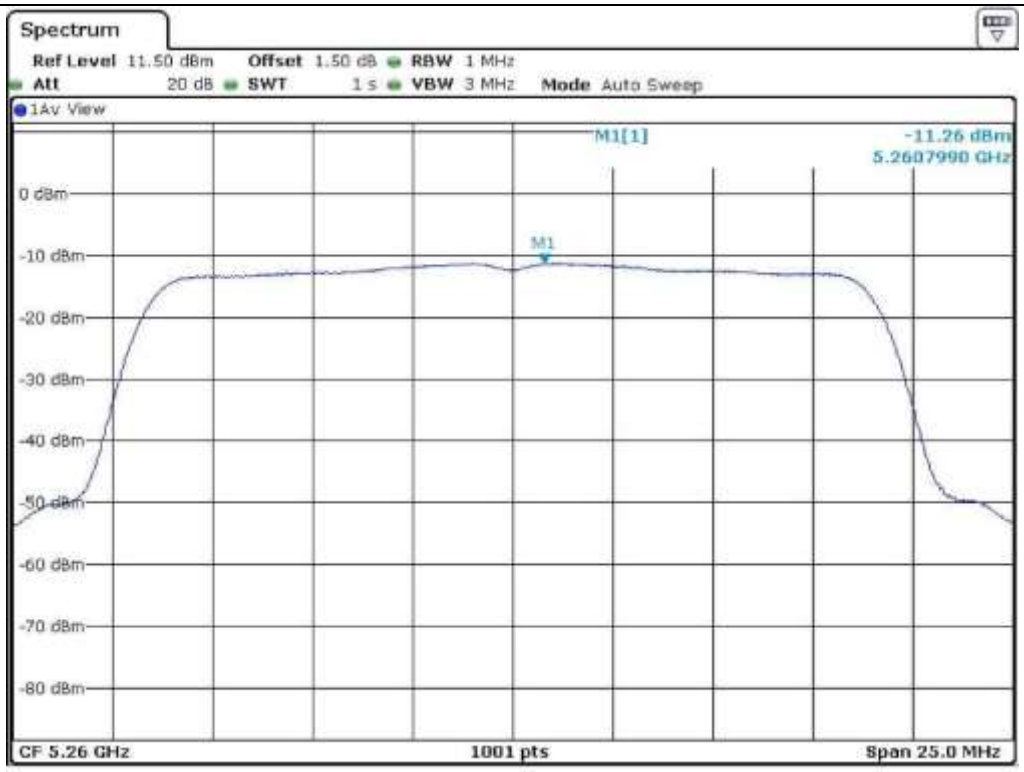
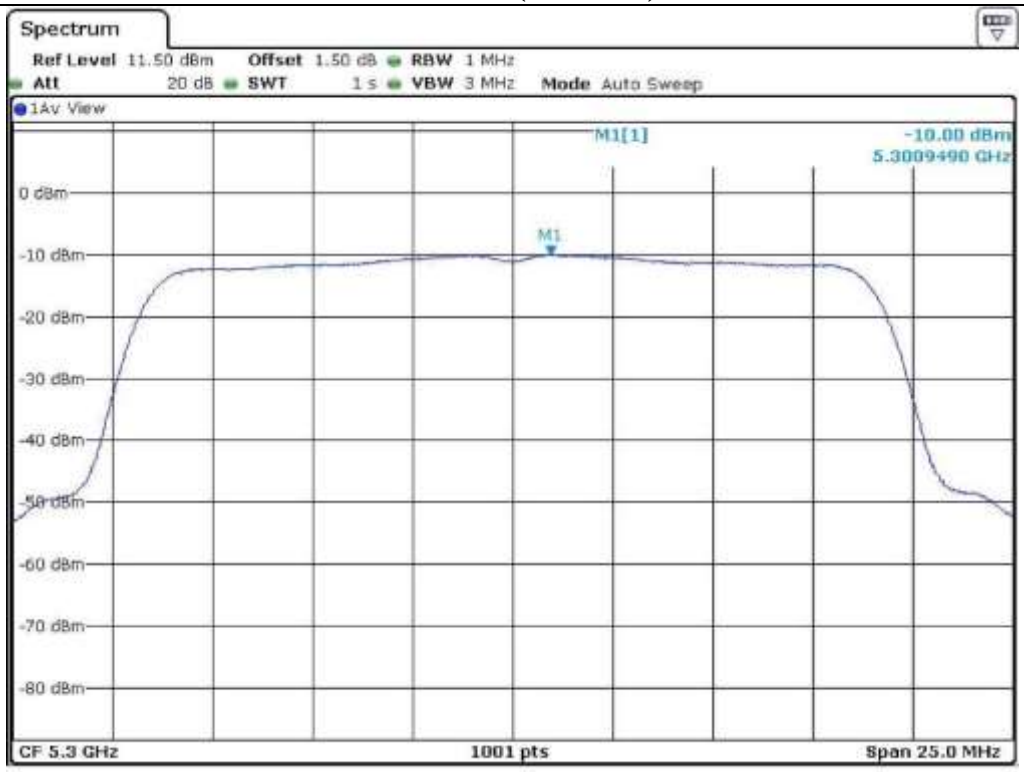



Low Channel (5 260 MHz)




Middle Channel (5 300 MHz)



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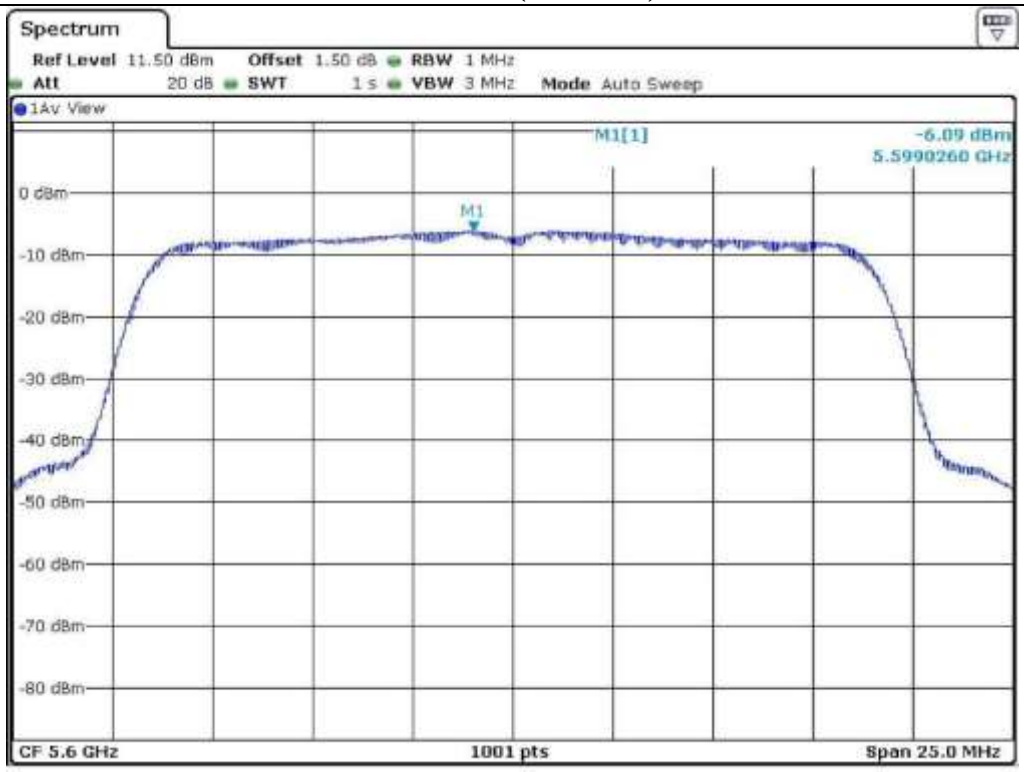
High Channel (5 320 MHz)


**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

Low Channel (5 500 MHz)




Middle Channel (5 600 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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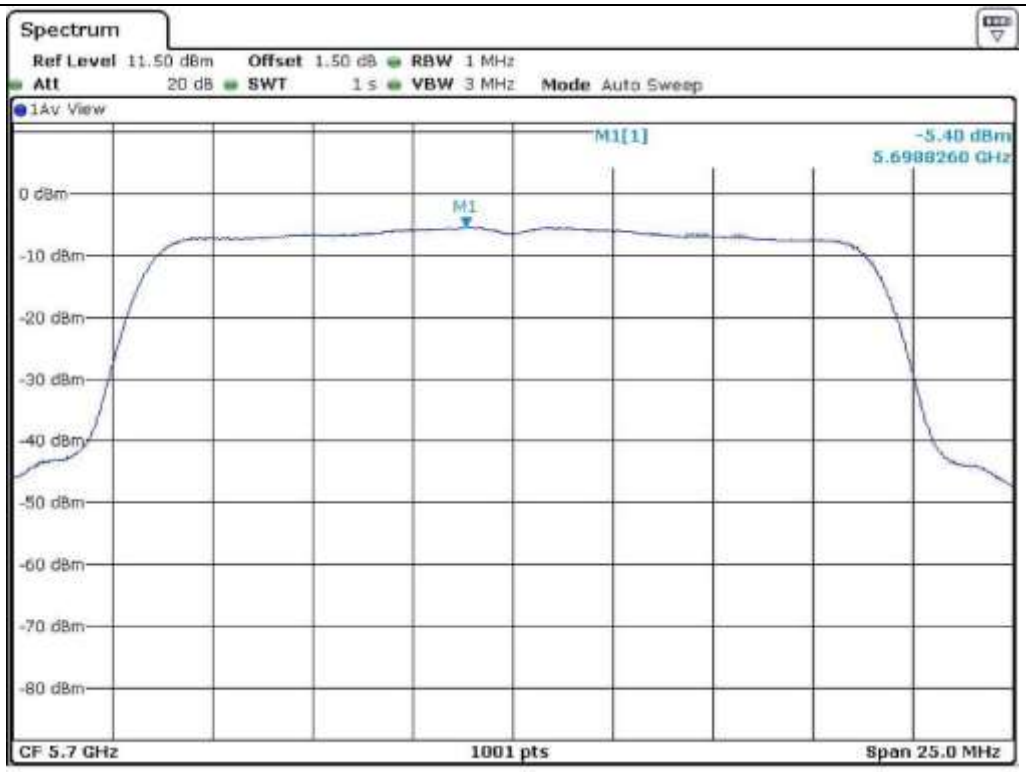


High Channel (5 700 MHz)



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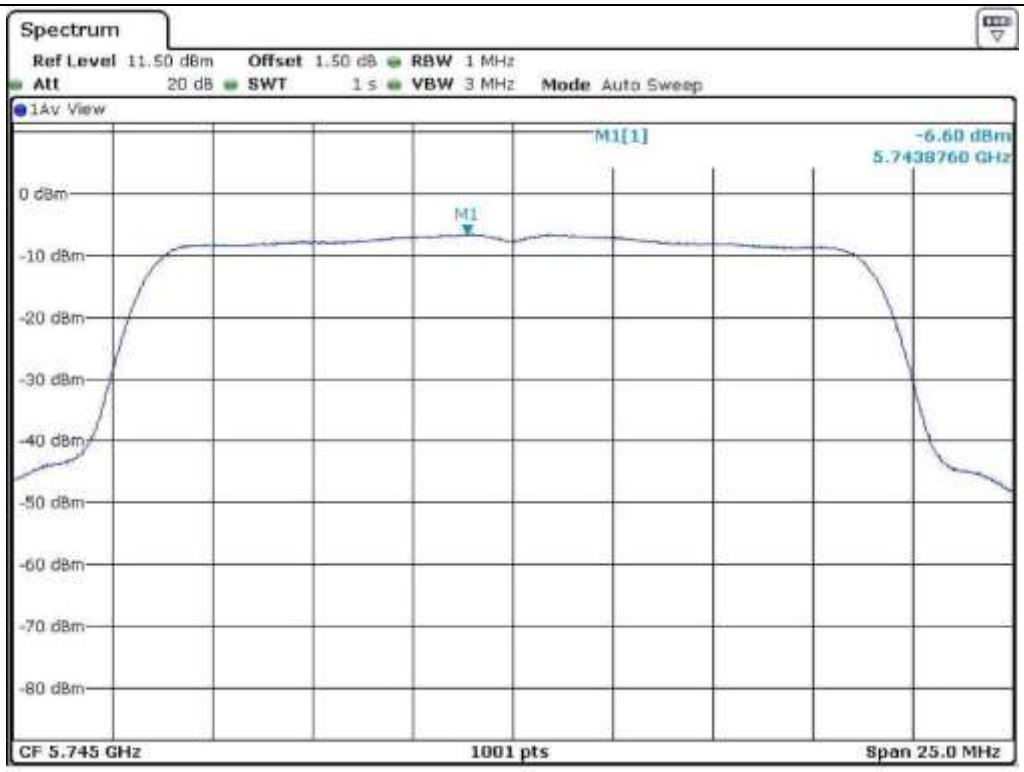
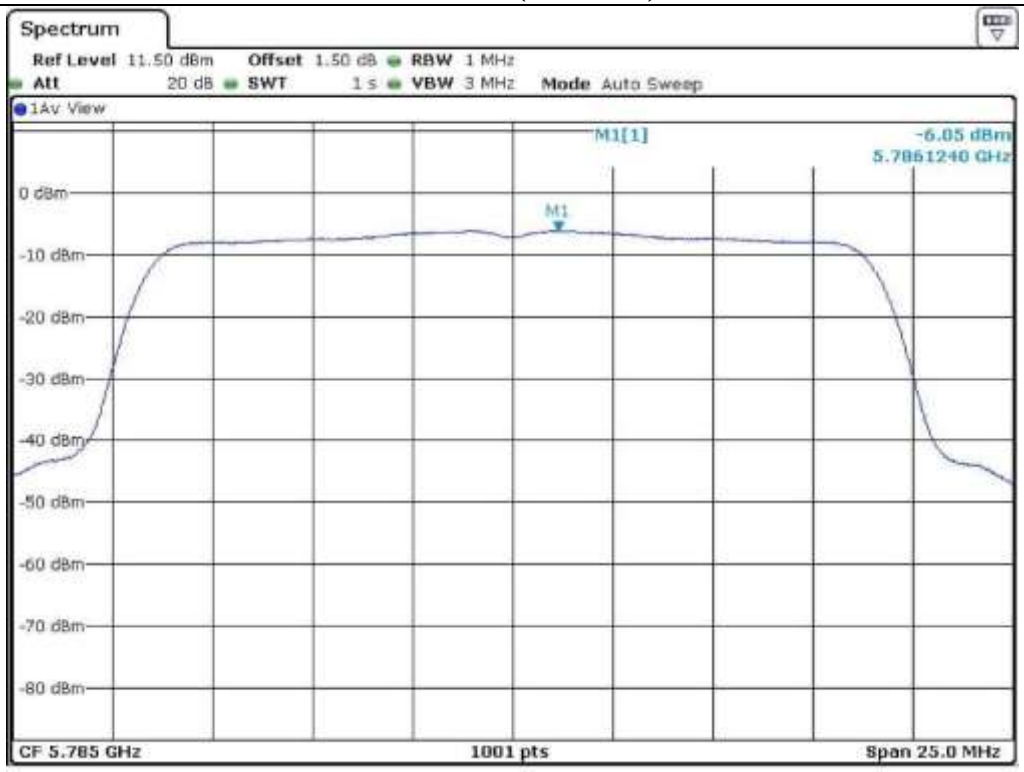



Low Channel (5 745 MHz)




Middle Channel (5 785 MHz)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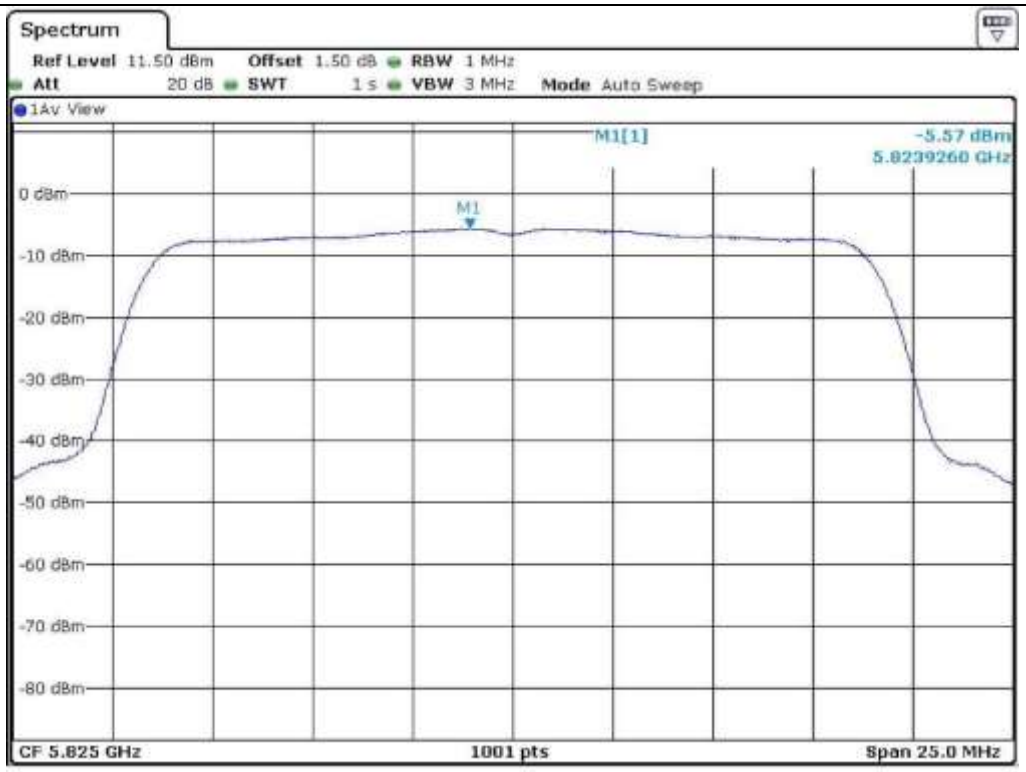
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)




High Channel (5 825 MHz)



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### 9.5.3 Test data for Multiple transmit

-. Test Date : March 11, 2015

-. Operating condition : Highest Output Power Transmitting Mode

-. Test Result : Pass

| FREQUENCY RANGE (MHz) | CHANNEL | FREQUENCY (MHz) | MEASURED VLAUE (dBm) | LIMIT (dBm) | MARGIN (dB) |
|---|---|---|---|---|---|
| 5 150 ~ 5 250 | Low | 5 180 | -4.74 | 11.00 | 15.74 |
| | Middle | 5 200 | -4.80 | 11.00 | 15.80 |
| | High | 5 240 | -4.90 | 11.00 | 15.90 |
| 5 250 ~ 5 350 | Low | 5 260 | -4.67 | 11.00 | 15.67 |
| | Middle | 5 300 | -3.78 | 11.00 | 14.78 |
| | High | 5 320 | -3.36 | 11.00 | 14.36 |
| 5 470 ~ 5 725 | Low | 5 500 | -1.61 | 11.00 | 12.61 |
| | Middle | 5 600 | -1.65 | 11.00 | 12.65 |
| | High | 5 700 | -1.22 | 11.00 | 12.22 |
| 5 725 ~ 5 850 | Low | 5 745 | -2.37 | 30.00 | 32.37 |
| | Middle | 5 785 | -2.18 | 30.00 | 32.18 |
| | High | 5 825 | -1.83 | 30.00 | 31.83 |

Remark 1 : Margin = Limit – Measured value

Remark 2 : Calculated Power Density = $10\log(10^{(\text{Antenna1 Power Density}/10)}+10^{(\text{Antenna2 Power Density}/10)})$

**Tested by: Tae-Ho, Kim / Senior Engineer**


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## 9.6 Test data for 802.11n_HT40 RLAN Mode

### 9.6.1 Test data for Antenna 0

-. Test Date : March 11, 2015

-. Operating condition : Highest Output Power Transmitting Mode

-. Test Result : Pass

| FREQUENCY RANGE (MHz) | CHANNEL | FREQUENCY (MHz) | MEASURED VLAUE (dBm) | LIMIT (dBm) | MARGIN (dB) |
|---|---|---|---|---|---|
| 5 150 ~ 5 250 | Low | 5 190 | -14.29 | 11.00 | 25.29 |
| | High | 5 230 | -13.78 | 11.00 | 24.78 |
| 5 250 ~ 5 350 | Low | 5 270 | -12.89 | 11.00 | 23.89 |
| | High | 5 310 | -12.35 | 11.00 | 23.35 |
| 5 470 ~ 5 725 | Low | 5 510 | -11.50 | 11.00 | 22.50 |
| | Middle | 5 590 | -11.69 | 11.00 | 22.69 |
| | High | 5 670 | -10.20 | 11.00 | 21.20 |
| 5 725 ~ 5 850 | Low | 5 755 | -11.53 | 30.00 | 41.53 |
| | High | 5 795 | -11.74 | 30.00 | 41.74 |

Remark: See next page for measurement data.

**Tested by: Tae-Ho, Kim / Senior Engineer**

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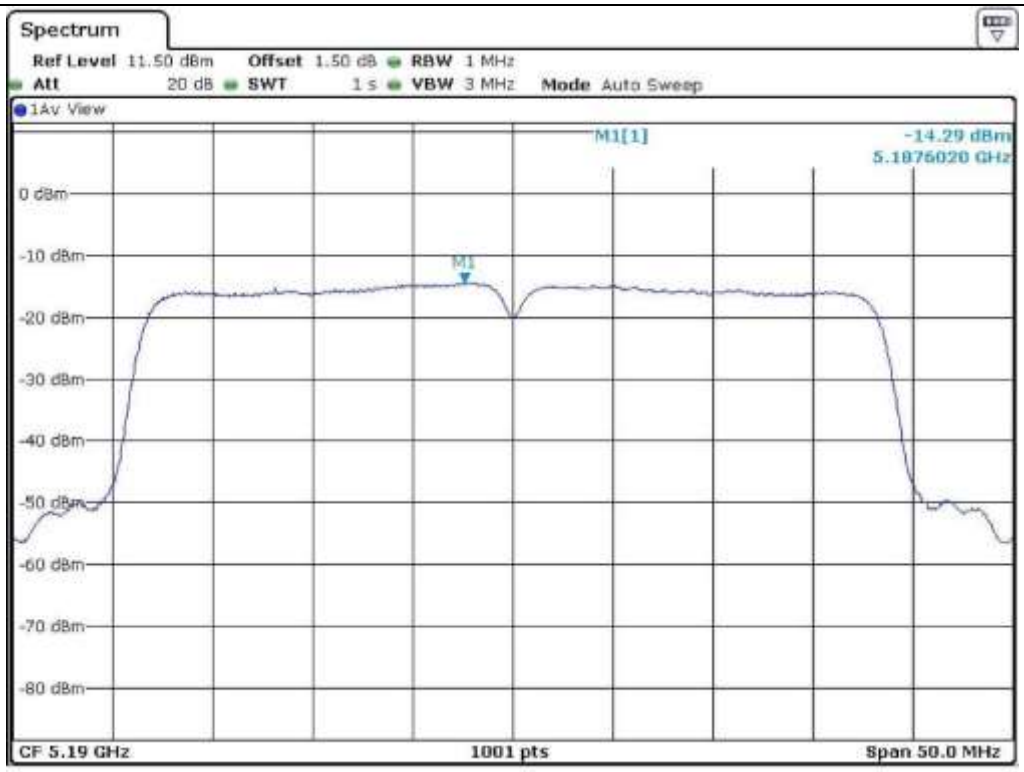
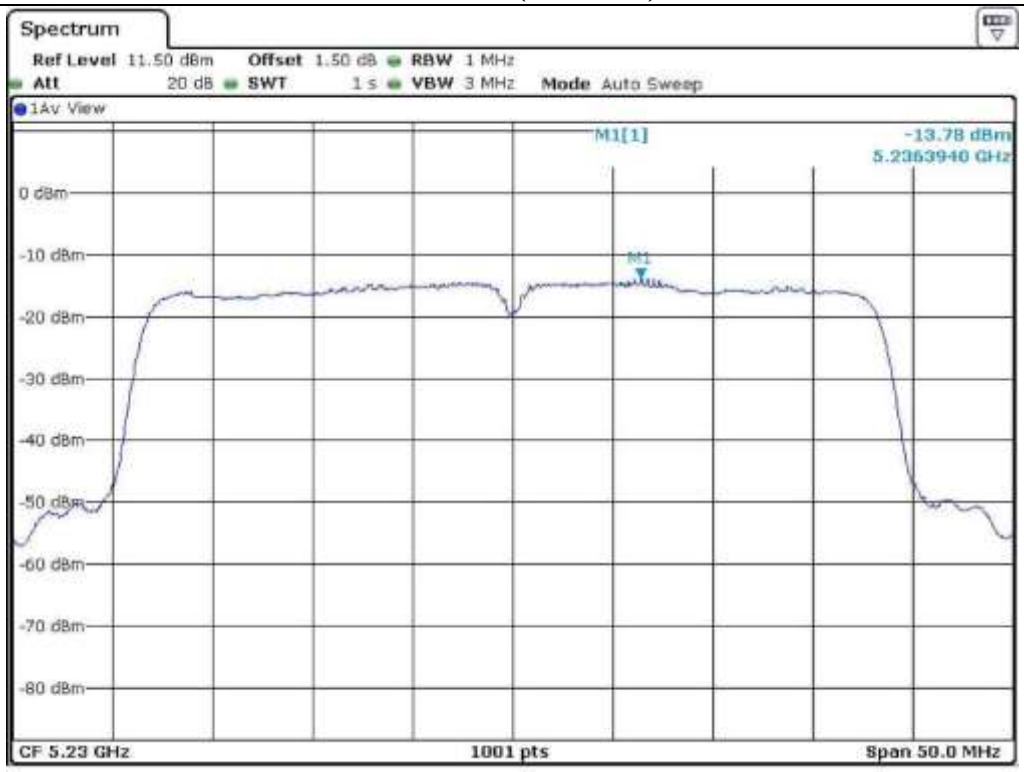



Low Channel (5 190 MHz)




High Channel (5 230 MHz)


**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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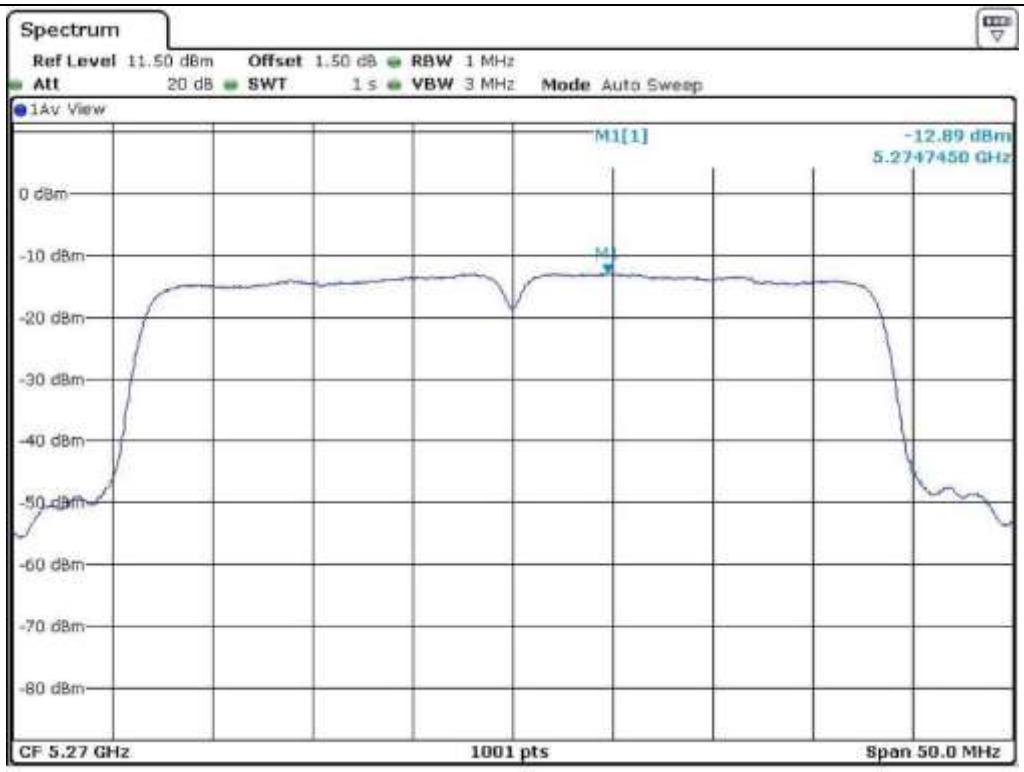
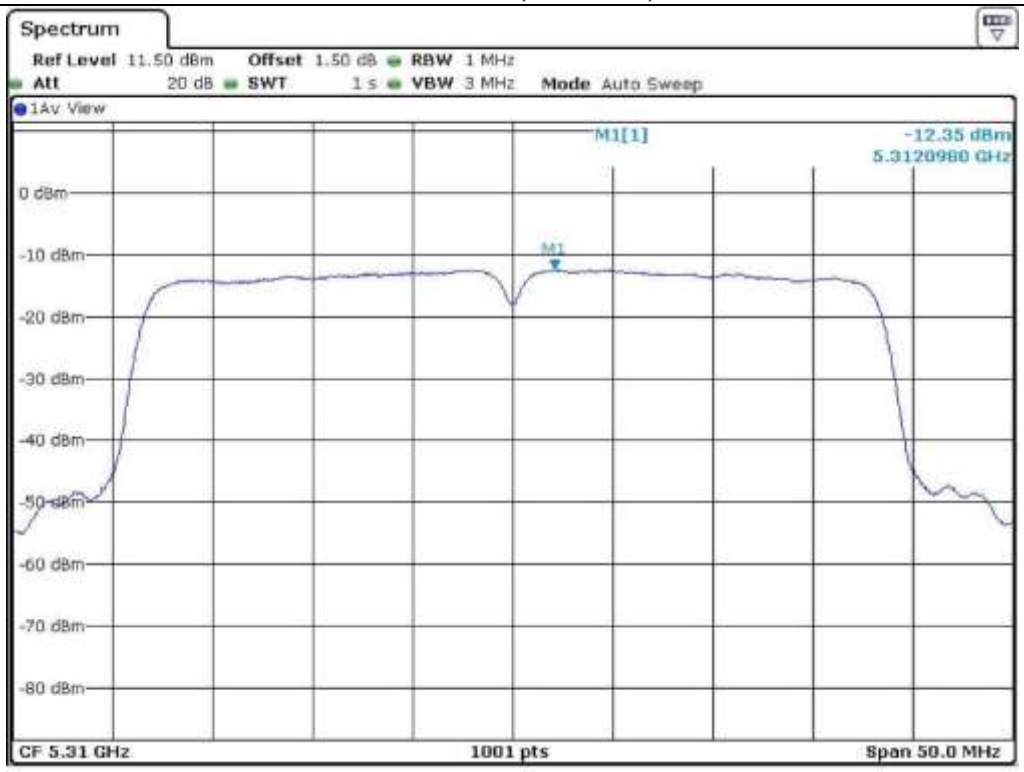



Low Channel (5 270 MHz)




High Channel (5 310 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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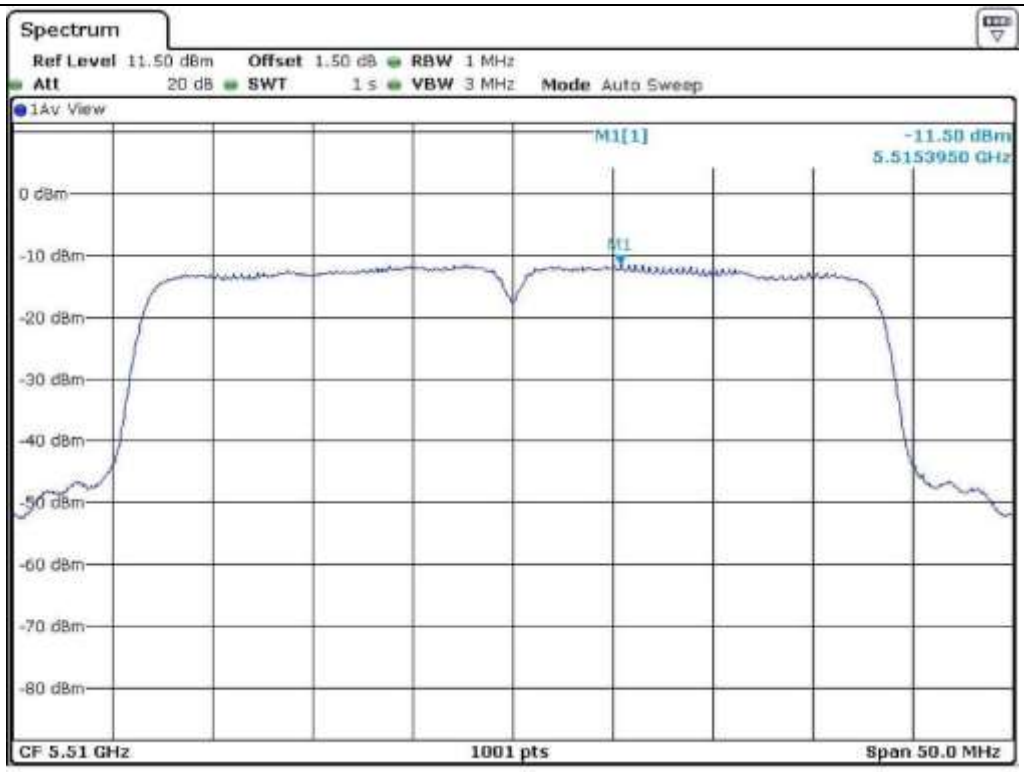
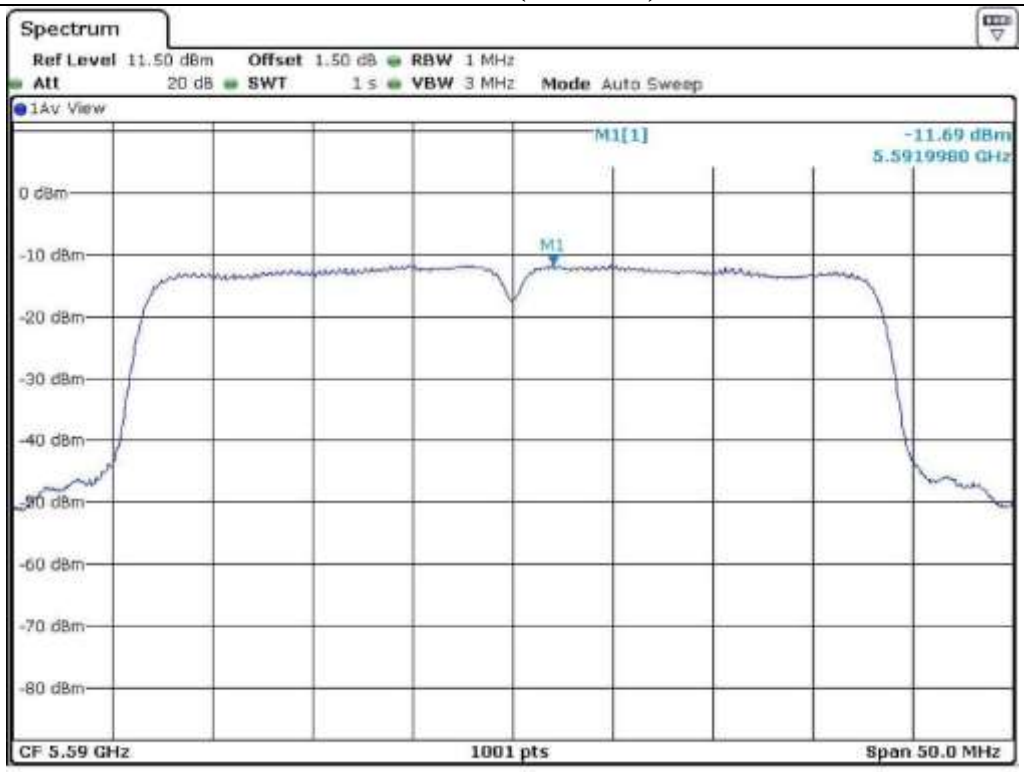



Low Channel (5 510 MHz)




Middle Channel (5 590 MHz)



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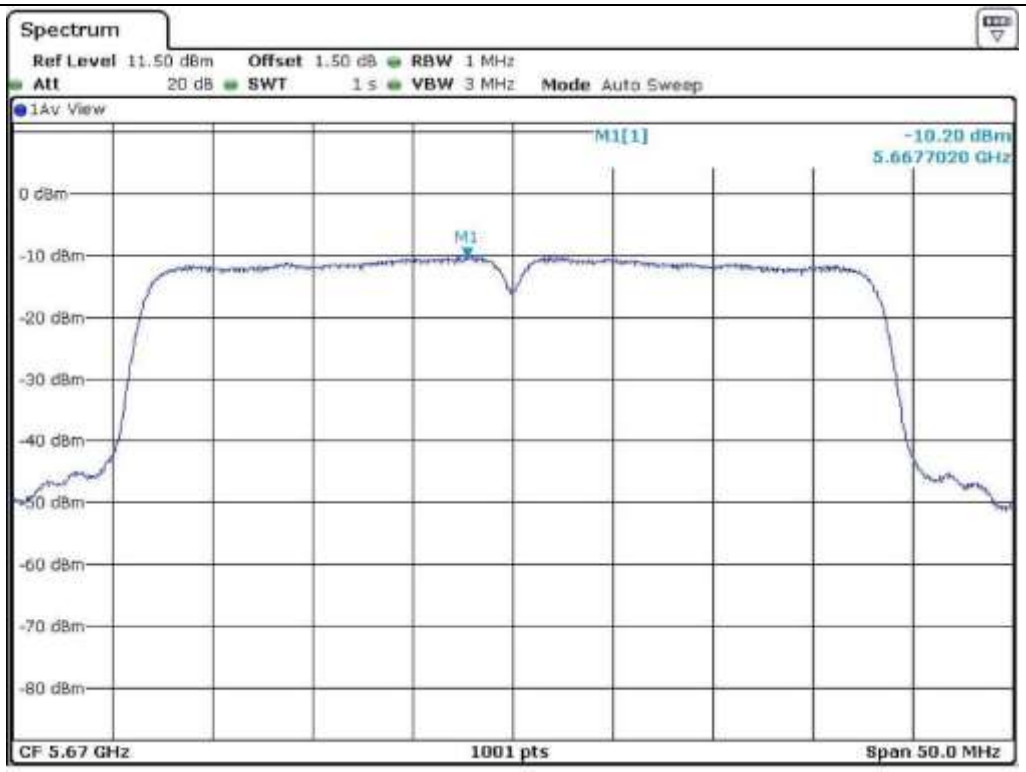


High Channel (5 670 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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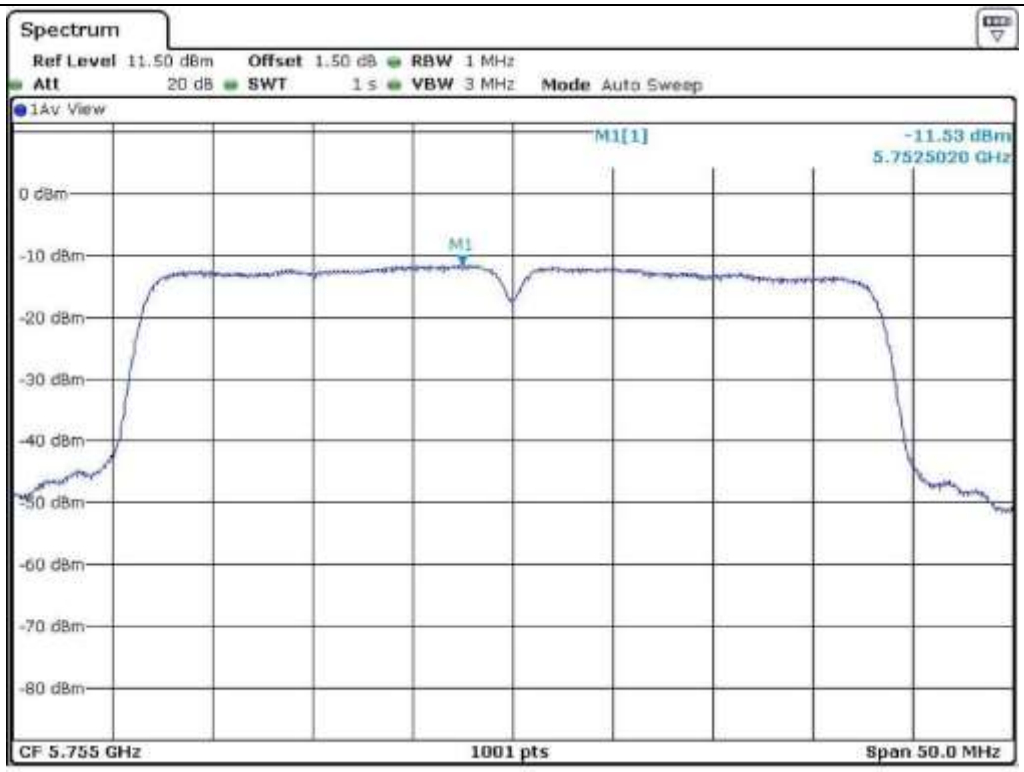
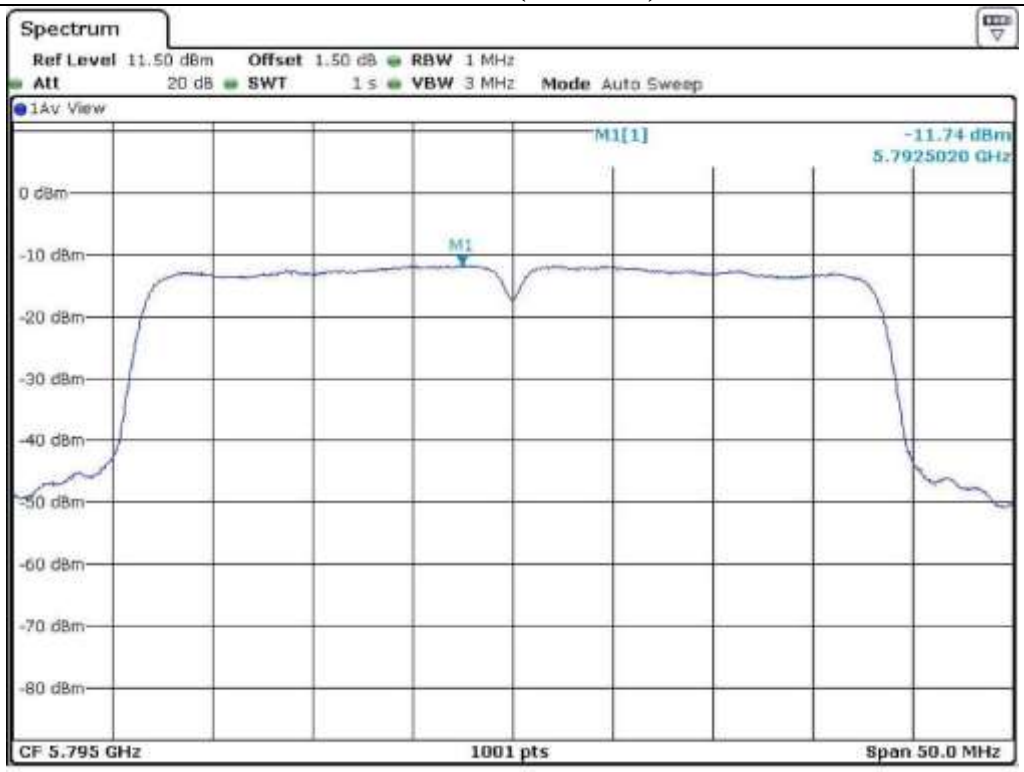



Low Channel (5 755 MHz)




High Channel (5 795 MHz)



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### 9.6.2 Test data for Antenna 1

-. Test Date : March 11, 2015

-. Operating condition : Highest Output Power Transmitting Mode

-. Test Result : Pass

| FREQUENCY RANGE (MHz) | CHANNEL | FREQUENCY (MHz) | MEASURED VLAUE (dBm) | LIMIT (dBm) | MARGIN (dB) |
|---|---|---|---|---|---|
| 5 150 ~ 5 250 | Low | 5 190 | -17.05 | 11.00 | 28.05 |
| | High | 5 230 | -17.23 | 11.00 | 28.23 |
| 5 250 ~ 5 350 | Low | 5 270 | -16.92 | 11.00 | 27.92 |
| | High | 5 310 | -15.85 | 11.00 | 26.85 |
| 5 470 ~ 5 725 | Low | 5 510 | -12.72 | 11.00 | 23.72 |
| | Middle | 5 590 | -12.38 | 11.00 | 23.38 |
| | High | 5 670 | -10.48 | 11.00 | 21.48 |
| 5 725 ~ 5 850 | Low | 5 755 | -11.93 | 30.00 | 41.93 |
| | High | 5 795 | -11.64 | 30.00 | 41.64 |

Remark: See next page for measurement data.

**Tested by: Tae-Ho, Kim / Senior Engineer**

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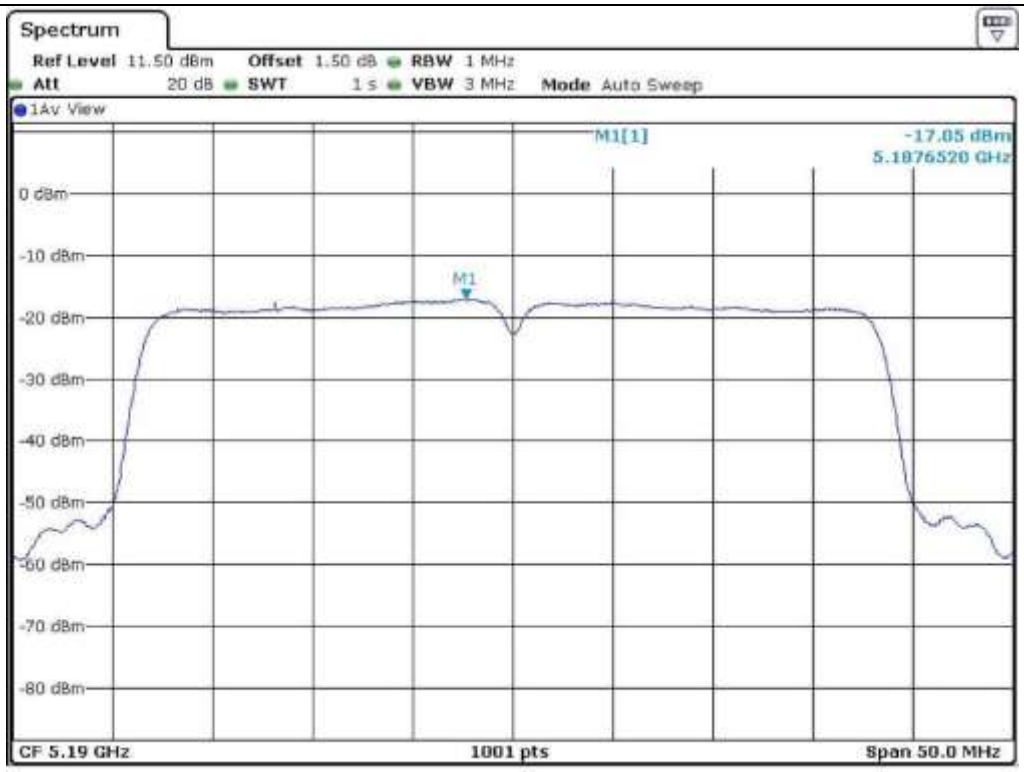
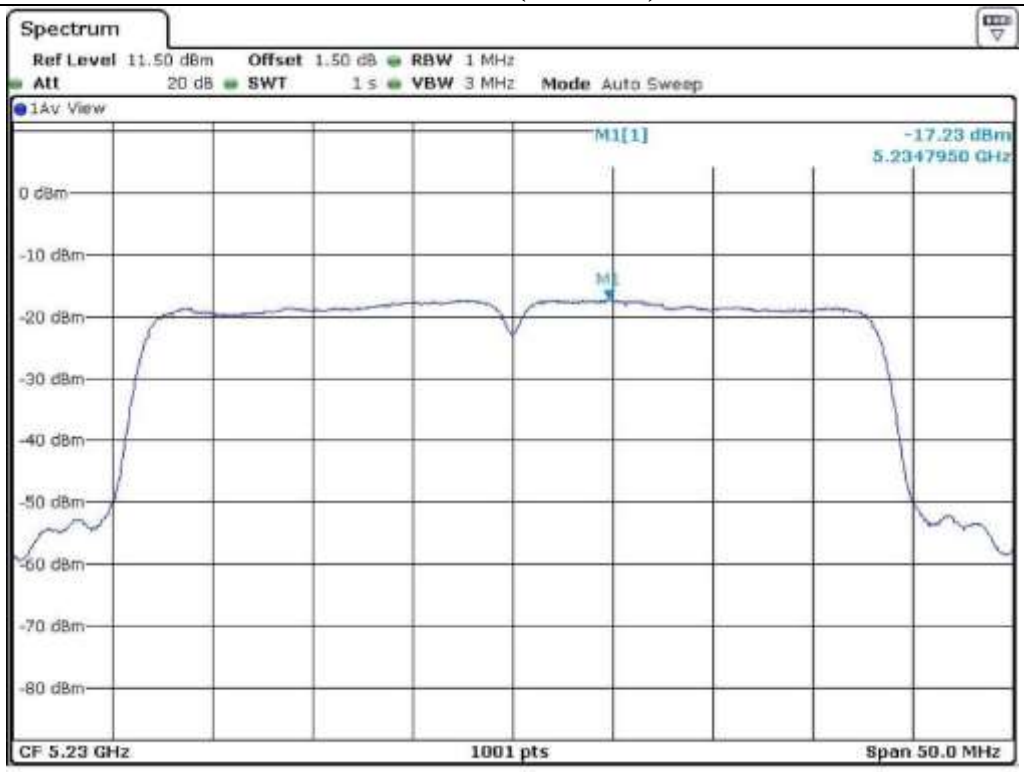



Low Channel (5 190 MHz)




High Channel (5 230 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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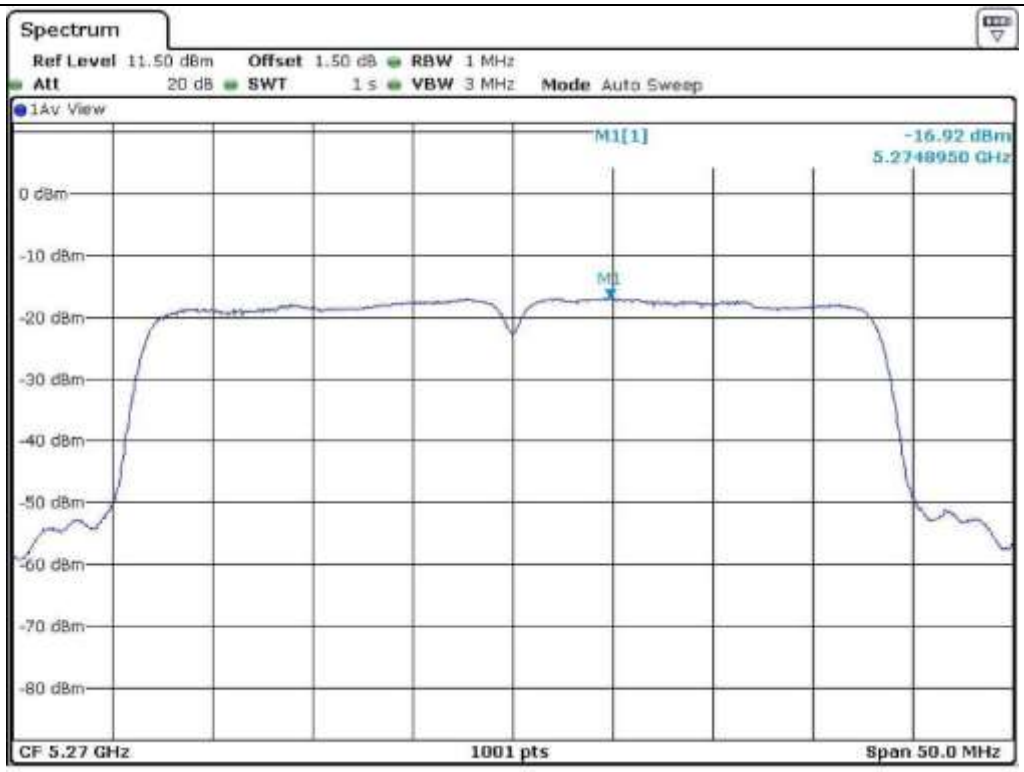
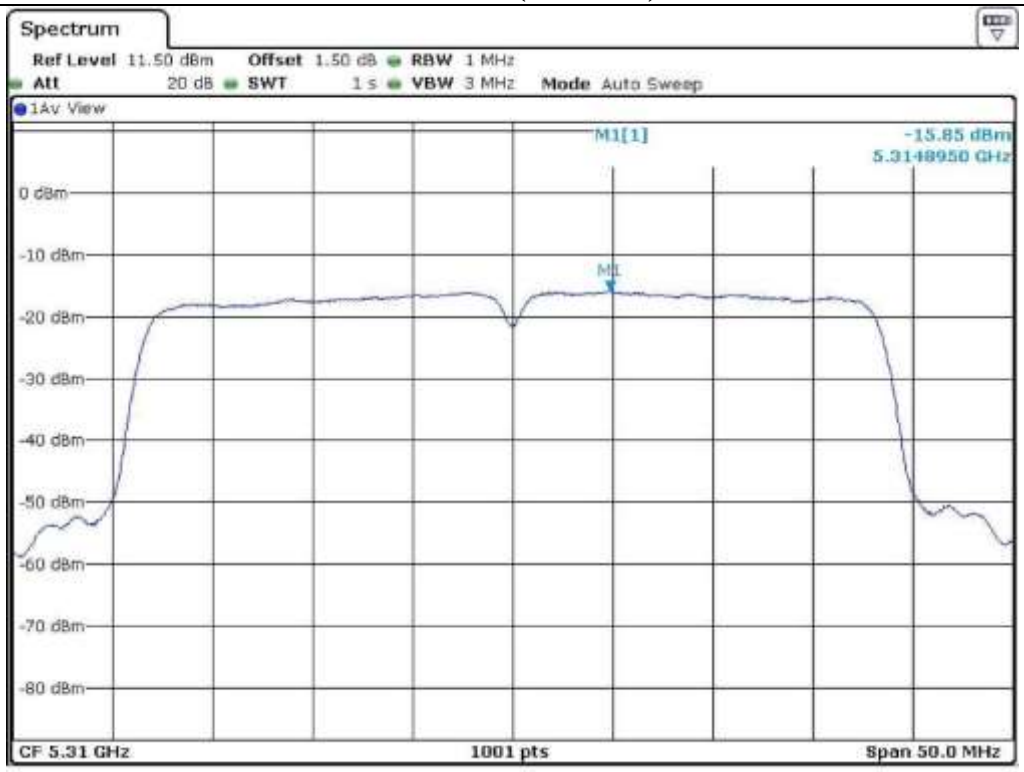



Low Channel (5 270 MHz)




High Channel (5 310 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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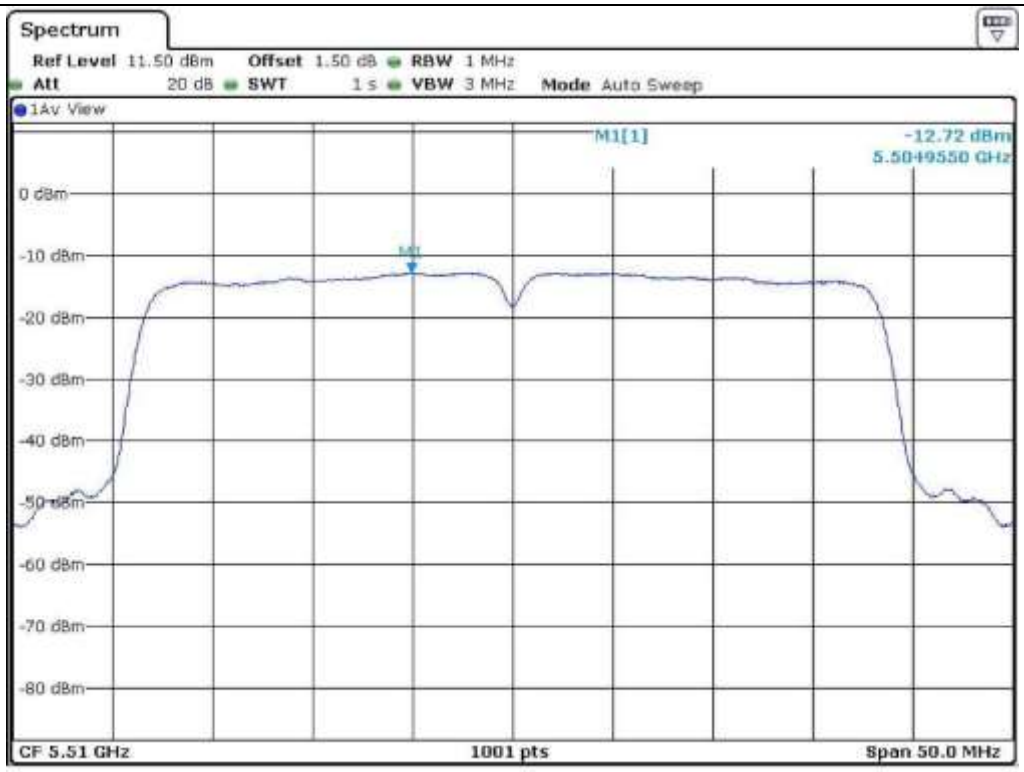
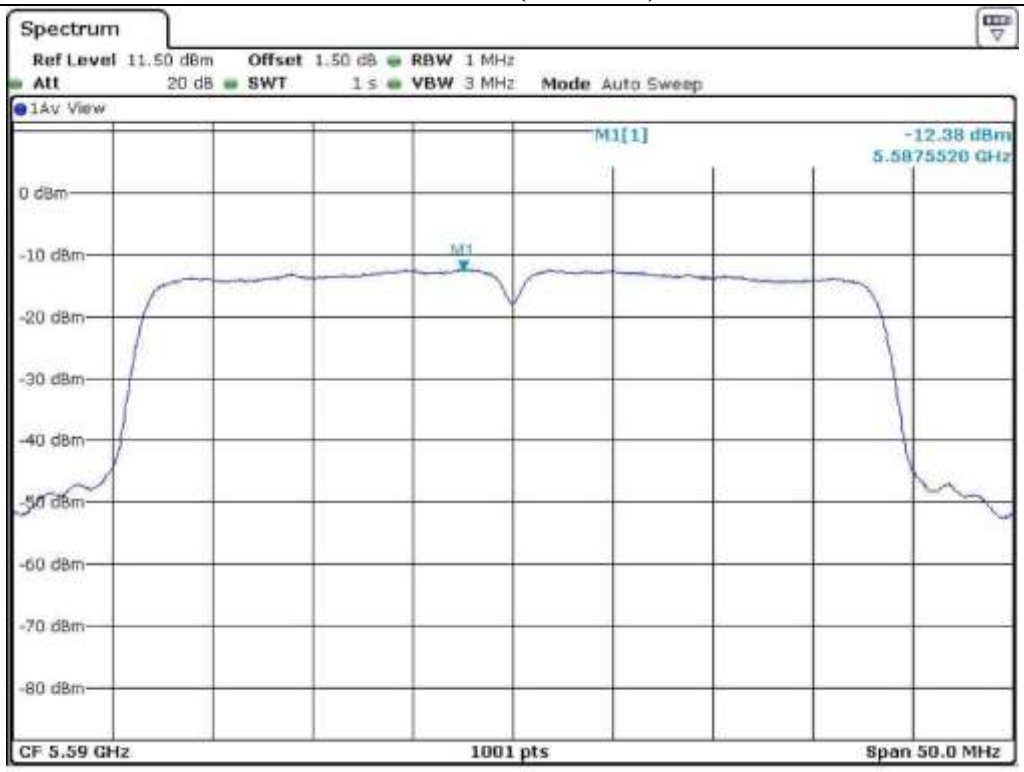



Low Channel (5 510 MHz)




Middle Channel (5 590 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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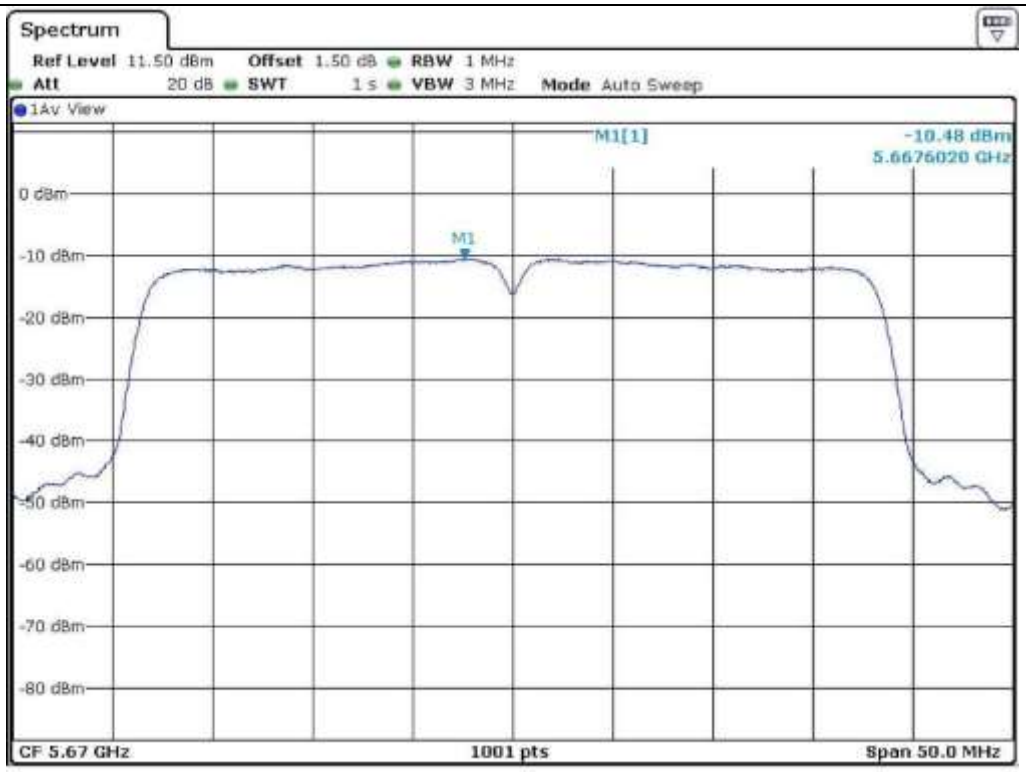


High Channel (5 670 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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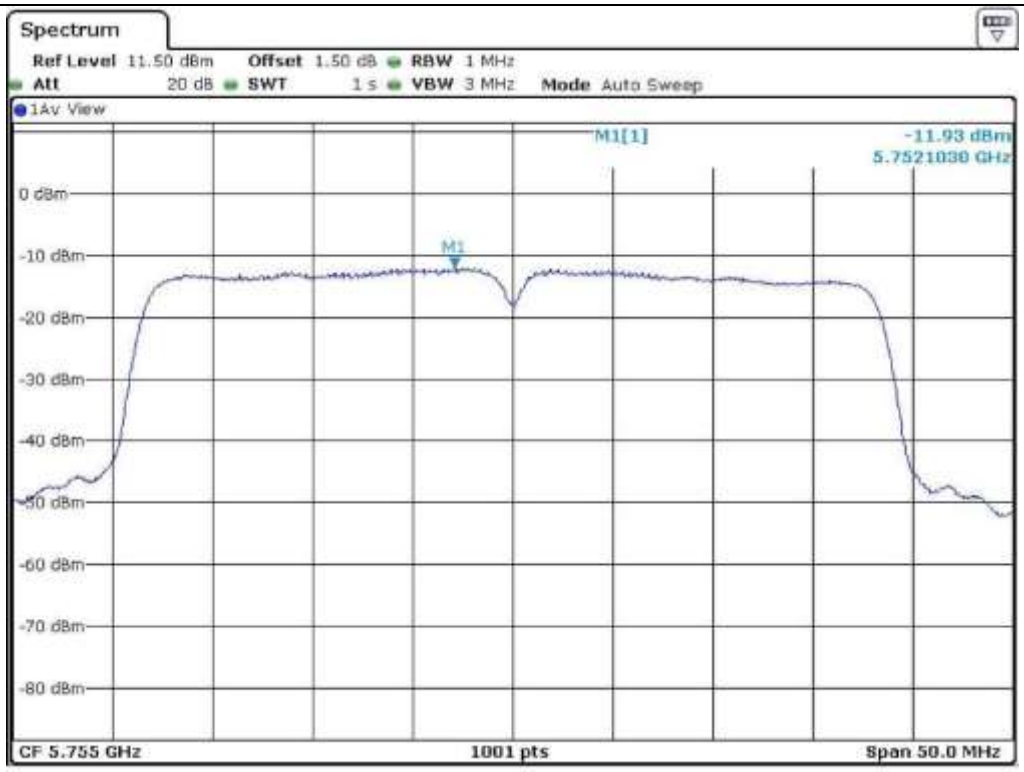
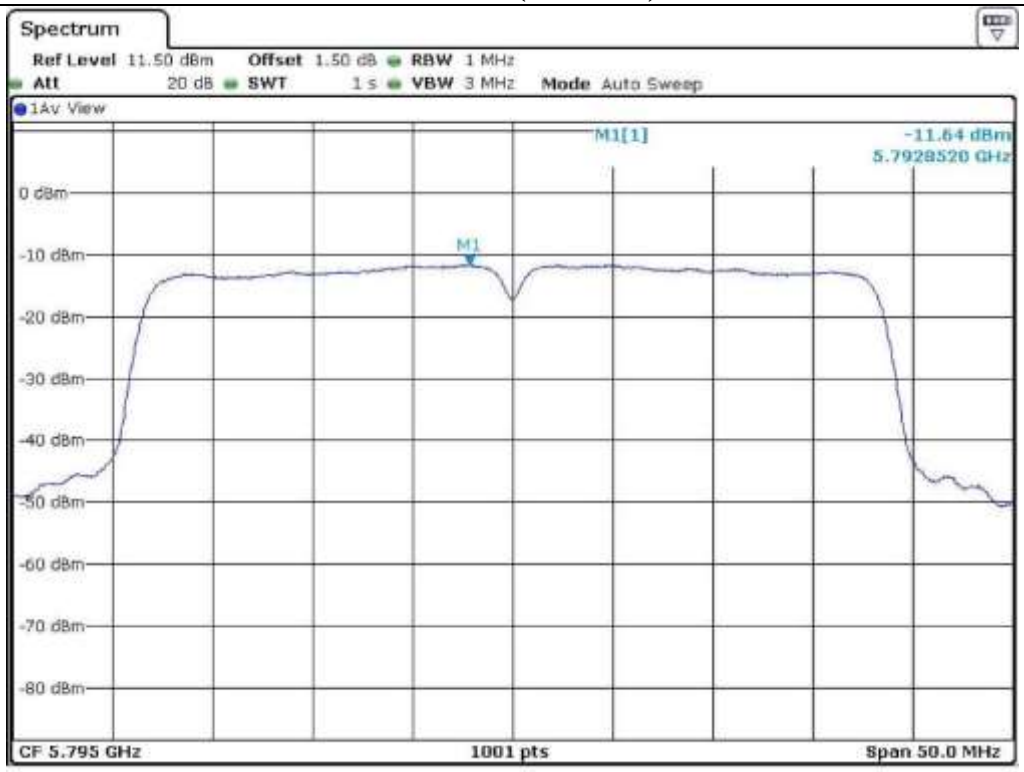



Low Channel (5 755 MHz)




High Channel (5 795 MHz)



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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### 9.6.3 Test data for Multiple transmit

-. Test Date : March 11, 2015

-. Operating condition : Highest Output Power Transmitting Mode

-. Test Result : Pass

| FREQUENCY RANGE (MHz) | CHANNEL | FREQUENCY (MHz) | MEASURED VLAUE (dBm) | LIMIT (dBm) | MARGIN (dB) |
|---|---|---|---|---|---|
| 5 150 ~ 5 250 | Low | 5 190 | -12.44 | 11.00 | 23.44 |
| | High | 5 230 | -12.16 | 11.00 | 23.16 |
| 5 250 ~ 5 350 | Low | 5 270 | -11.44 | 11.00 | 22.44 |
| | High | 5 310 | -10.75 | 11.00 | 21.75 |
| 5 470 ~ 5 725 | Low | 5 510 | -9.06 | 11.00 | 20.06 |
| | Middle | 5 590 | -9.01 | 11.00 | 20.01 |
| | High | 5 670 | -7.33 | 11.00 | 18.33 |
| 5 725 ~ 5 850 | Low | 5 755 | -8.72 | 30.00 | 38.72 |
| | High | 5 795 | -8.68 | 30.00 | 38.68 |

Remark 1 : Margin = Limit – Measured value

Remark 2 : Calculated Power Density = $10\log(10^{(\text{Antenna1 Power Density}/10)}+10^{(\text{Antenna2 Power Density}/10)})$

**Tested by: Tae-Ho, Kim / Senior Engineer**


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