

RADIO PERFORMANCE TEST REPORT

Test Report No. : OT-19D-RWD-056
AGR No. : A19NA-376
Applicant : Samsung Electronics Co Ltd
Address : 19 Chapin Rd., Building D, Pine Brook, New Jersey, 07058, United States
Manufacturer : Samsung Electronics Co., Ltd.
Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do 16677, Korea
Type of Equipment : Wi-Fi/BT Transceiver
FCC ID. : A3LWCT732M
Model Name : WCT732M
Serial number : N/A
Total page of Report : 274 pages (including this page)
Date of Incoming : November 29, 2019
Date of issue : December 16, 2019

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:



Yu-Seog Sim / Assistant Manager
 ONETECH Corp.

Approved by:



Jae-Ho Lee / Chief Engineer
 ONETECH Corp.

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Revision History

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-19D-RWD-056	December 16, 2019	Initial Release	All

1. VERIFICATION OF COMPLIANCE

Applicant : Samsung Electronics Co Ltd
 Address : 19 Chapin Rd., Building D, Pine Brook, New Jersey, 07058, United States
 Contact Person : Jenni Chun / General Manager
 Telephone No. : +82-31-277-2688
 FCC ID : A3LWCT732M
 Model Name : WCT732M
 Brand Name : 
 Serial Number : N/A
 Date : December 16, 2019

EQUIPMENT CLASS	Unlicensed National Information infrastructure(UNII)
E.U.T. DESCRIPTION	Modular Transmitter, Wi-Fi/BT Transceiver
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 789033 D02 General UNII Test Procedures New Rules v02r01
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.

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 (Restricted Bands and 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 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea

-. Site Filing:

VCCI (Voluntary Control Council for Interference) – Registration No. R-4112/ C-14617/ G-10666 / T-1842

-. Lab Accreditation:

KOLAS (Korea Laboratory Accreditation Scheme) - Accreditation NO. KT085

ISED (Innovation, Science and Economic Development Canada) – Registration No. Site# 3736A-3

FCC (Federal Communications Commission) - Accreditation No. KR0013

RRA (Radio Research Agency) – Designation No. KR0013

3. GENERAL INFORMATION

3.1 Product Description

The Samsung Electronics Co Ltd, Model WCT732M (referred to as the EUT in this report) is a Wi-Fi/BT Transceiver. The product specification described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	Wi-Fi/BT Transceiver	
Temperature Range	-20 °C ~ 50 °C	
OPERATING FREQUENCY	Bluetooth LE	2 402 MHz ~ 2 480 MHz
	Bluetooth	2 402 MHz ~ 2 480 MHz
	WLAN 2.4 GHz	2 412 MHz ~ 2 472 MHz (802.11b/g/n(HT20))
		2 422 MHz ~ 2 462 MHz (802.11n(HT40))
	5 150 MHz ~ 5 250 MHz Band	5 180 MHz ~ 5 240 MHz (802.11a/n(HT20)/ac(VHT20))
		5 190 MHz ~ 5 230 MHz (802.11n(HT40)/ac(VHT40))
		5 210 MHz (802.11ac(VHT80))
	5 250 MHz ~ 5 350 MHz Band	5 260 MHz ~ 5 320 MHz (802.11a/n(HT20)/ac(VHT20))
		5 270 MHz ~ 5 310 MHz (802.11n(HT40)/ac(VHT40))
		5 290 MHz (802.11ac(VHT80))
	5 470 MHz ~ 5 725 MHz Band	5 500 MHz ~ 5 700 MHz (802.11a/n(HT20)/ac(VHT20))
		5 510 MHz ~ 5 670 MHz (802.11n(HT40)/ac(VHT40))
		5 530 MHz (802.11ac(VHT80))
	5 725 MHz ~ 5 850 MHz Band	5 745 MHz ~ 5 825 MHz (802.11a/n(HT20)/ac(VHT20))
		5 755 MHz ~ 5 795 MHz (802.11n(HT40)/ac(VHT40))
		5 775 MHz (802.11ac(VHT80))
MODULATION TYPE	Bluetooth LE	GFSK for 1 Mbps / 2 Mbps
	Bluetooth	GFSK for 1Mbps, $\pi/4$ -DQPSK for 2Mbps, 8-DPSK for 3Mbps
	WLAN 2.4 GHz	802.11b: DSSS Modulation(DBPSK/DQPSK/CCK) 802.11g/n(HT20)/n(HT40): OFDM Modulation(BPSK/QPSK/16QAM/64QAM)
	WLAN 5 GHz	802.11a/n(HT20)/n(HT40)/ac(VHT80): OFDM Modulation(BPSK/QPSK/16QAM/64QAM)

RF OUTPUT POWER	Bluetooth LE	1 Mbps	12.27 dBm
		2 Mbps	12.26 dBm
	Bluetooth	1 Mbps	11.23 dBm
		2 Mbps	10.79 dBm
		3 Mbps	10.99 dBm
	WLAN 2.4 GHz	Antenna 0	19.25 dBm(802.11b) 15.07 dBm(802.11g) 14.01 dBm(802.11n_HT20) 12.23 dBm(802.11n_HT40)
		Antenna 1	20.53 dBm(802.11b) 16.02 dBm(802.11g) 14.99 dBm(802.11n_HT20) 13.61 dBm(802.11n_HT40)
		Multiple Antenna	18.53 dBm(802.11g) 17.49 dBm(802.11n_HT20) 15.95 dBm(802.11n_HT40)

RF OUTPUT POWER	5 150 MHz ~ 5 250 MHz Band	Antenna 0	11.73 dBm(802.11a) 10.58 dBm(802.11n_HT20) 9.20 dBm(802.11n_HT40) 8.70 dBm(802.11ac_VHT80)
		Antenna 1	11.46 dBm(802.11a) 10.27 dBm(802.11n_HT20) 8.87 dBm(802.11n_HT40) 8.43 dBm(802.11ac_VHT80)
		Multiple Antenna	14.61 dBm(802.11a) 13.44 dBm(802.11n_HT20) 12.05 dBm(802.11n_HT40) 11.58 dBm(802.11ac_VHT80)
	5 250 MHz ~ 5 350 MHz Band	Antenna 0	12.13 dBm(802.11a) 10.80 dBm(802.11n_HT20) 9.80 dBm(802.11n_HT40) 9.26 dBm(802.11ac_VHT80)
		Antenna 1	11.85 dBm(802.11a) 10.42 dBm(802.11n_HT20) 9.22 dBm(802.11n_HT40) 8.51 dBm(802.11ac_VHT80)
		Multiple Antenna	15.00 dBm(802.11a) 13.59 dBm(802.11n_HT20) 12.53 dBm(802.11n_HT40) 11.91 dBm(802.11ac_VHT80)

RF OUTPUT POWER	5 470 MHz ~ 5 725 MHz Band	Antenna 0	11.93 dBm(802.11a) 10.72 dBm(802.11n_HT20) 9.11 dBm(802.11n_HT40) 9.09 dBm(802.11ac_VHT80)
		Antenna 0_Straddle	10.89 dBm(802.11a) 10.44 dBm(802.11n_HT20) 9.48 dBm(802.11n_HT40) 8.78 dBm(802.11ac_VHT80)
		Antenna 1	12.09 dBm(802.11a) 11.10 dBm(802.11n_HT20) 9.45 dBm(802.11n_HT40) 9.20 dBm(802.11ac_VHT80)
		Antenna 1_Straddle	11.19 dBm(802.11a) 10.83 dBm(802.11n_HT20) 9.83 dBm(802.11n_HT40) 8.98 dBm(802.11ac_VHT80)
		Multiple Antenna	15.02 dBm(802.11a) 13.86 dBm(802.11n_HT20) 12.23 dBm(802.11n_HT40) 12.16 dBm(802.11ac_VHT80)
		Multiple Antenna _Straddle	14.05 dBm(802.11a) 13.65 dBm(802.11n_HT20) 12.67 dBm(802.11n_HT40) 11.89 dBm(802.11ac_VHT80)

RF OUTPUT POWER	5 725 MHz ~ 5 850 MHz Band	Antenna 0	11.98 dBm(802.11a) 10.75 dBm(802.11n_HT20) 9.56 dBm(802.11n_HT40) 9.15 dBm(802.11ac_VHT80)
		Antenna 0_Straddle	3.57 dBm(802.11a) 3.57 dBm(802.11n_HT20) -1.86 dBm(802.11n_HT40) -5.51 dBm(802.11ac_VHT80)
		Antenna 1	12.16 dBm(802.11a) 11.39 dBm(802.11n_HT20) 10.02 dBm(802.11n_HT40) 9.80 dBm(802.11ac_VHT80)
		Antenna 1_Straddle	4.09 dBm(802.11a) 3.89 dBm(802.11n_HT20) -1.53 dBm(802.11n_HT40) -5.42 dBm(802.11ac_VHT80)
		Multiple Antenna	15.08 dBm(802.11a) 14.09 dBm(802.11n_HT20) 12.81 dBm(802.11n_HT40) 12.50 dBm(802.11ac_VHT80)
		Multiple Antenna _Straddle	6.85 dBm(802.11a) 6.74 dBm(802.11n_HT20) 1.32 dBm(802.11n_HT40) -2.45 dBm(802.11ac_VHT80)

ANTENNA TYPE	Chip Antenna		
ANTENNA GAIN	Bluetooth LE	-0.94 dBi	
	Bluetooth	-0.94 dBi	
	WLAN 2.4 GHz	Antenna 0	2.01 dBi
		Antenna 1	2.06 dBi
		Multiple Antenna	5.05 dBi
	5 150 MHz ~ 5 250 MHz Band	Antenna 0	0.92 dBi
		Antenna 1	1.24 dBi
		Multiple Antenna	4.09 dBi
	5 250 MHz ~ 5 350 MHz Band	Antenna 0	1.79 dBi
		Antenna 1	2.66 dBi
		Multiple Antenna	5.25 dBi
	5 470 MHz ~ 5 725 MHz Band	Antenna 0	2.73 dBi
		Antenna 1	1.72 dBi
		Multiple Antenna	5.25 dBi
	5 725 MHz ~ 5 850 MHz Band	Antenna 0	1.71 dBi
		Antenna 1	0.69 dBi
		Multiple Antenna	4.23 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.

-. None

4. EUT MODIFICATIONS

-. None

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	Samsung Electronics Co., Ltd.	HDWB-2095S V2.2	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
WCT732M	Samsung Electronics Co., Ltd.	Wi-Fi/BT Transceiver (EUT)	
HP Probook	HP	Notebook PC	EUT
PPP009C	LIE-ON TECHNOLOGY (CHANGZHOU)CO.,LTD.	AC Adapter	

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.

UNII 1

Modulation	DATA RATE	OUTPUT POWER[dBm]	
		Antenna 0	Antenna 1
802.11 a (Middle Channel)	6 Mbps	11.82	11.16
	9 Mbps	11.66	10.98
	12 Mbps	11.45	10.65
	18 Mbps	11.21	10.44
	24 Mbps	10.92	10.21
	36 Mbps	10.76	10.02
	48 Mbps	10.52	9.85
	54 Mbps	10.34	9.67
HT 20 (Middle Channel)	6.5 Mbps	10.95	9.74
	13 Mbps	10.81	9.60
	19.5 Mbps	10.66	9.46
	26 Mbps	10.52	9.35
	39 Mbps	10.34	9.21
	52 Mbps	10.15	9.05
	58.5 Mbps	9.94	8.89
	65 Mbps	9.78	8.71
HT 40 (Low Channel)	13.5 Mbps	9.28	8.05
	27 Mbps	9.12	7.87
	40.5 Mbps	8.96	7.73
	54 Mbps	8.81	7.59
	81 Mbps	8.68	7.48
	108 Mbps	8.52	7.35
	121.5 Mbps	8.36	7.22
	135 Mbps	8.21	7.10

VHT80 (Low Channel)	29.3 Mbps	9.17	8.20
	58.5 Mbps	9.01	8.03
	87.8 Mbps	8.84	7.85
	117 Mbps	8.66	7.68
	175.5 Mbps	8.50	7.52
	234 Mbps	8.33	7.33
	263.3 Mbps	8.18	7.15
	292.5 Mbps	7.95	6.96
	351 Mbps	7.69	6.77
	390 Mbps	7.52	6.59

- The worse case data rate for each modulation is determined 6 Mbps(Ant.0/Ant.1) for IEEE 802.11a, 6.5 Mbps(Ant.0/Ant.1) for HT20, 13.5 Mbps(Ant.0/Ant.1) for HT40, 29.3 Mbps(Ant.0/Ant.1) for VHT80.
- 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 "XZ" axis.

UNII 2A

Modulation	DATA RATE	OUTPUT POWER[dBm]	
		Antenna 0	Antenna 1
802.11 a (Middle Channel)	6 Mbps	11.75	11.06
	9 Mbps	11.53	10.88
	12 Mbps	11.34	10.69
	18 Mbps	11.16	10.52
	24 Mbps	10.97	10.34
	36 Mbps	10.79	10.16
	48 Mbps	10.61	9.98
	54 Mbps	10.42	9.78
HT 20 (Middle Channel)	6.5 Mbps	11.53	10.22
	13 Mbps	11.45	10.01
	19.5 Mbps	11.26	9.83
	26 Mbps	11.08	9.64
	39 Mbps	10.90	9.46
	52 Mbps	10.72	9.27
	58.5 Mbps	10.53	9.08
	65 Mbps	10.34	8.82
HT 40 (Low Channel)	13.5 Mbps	9.78	8.22
	27 Mbps	9.69	8.08
	40.5 Mbps	9.57	7.95
	54 Mbps	9.47	7.81
	81 Mbps	9.35	7.67
	108 Mbps	9.21	7.50
	121.5 Mbps	9.10	7.26
	135 Mbps	8.96	7.11

VHT80 (Low Channel)	29.3 Mbps	9.86	8.25
	58.5 Mbps	9.76	8.09
	87.8 Mbps	9.55	7.93
	117 Mbps	9.37	7.78
	175.5 Mbps	9.18	7.63
	234 Mbps	9.00	7.44
	263.3 Mbps	8.82	7.28
	292.5 Mbps	8.71	7.15
	351 Mbps	8.52	7.04
	390 Mbps	8.32	6.90

- The worse case data rate for each modulation is determined 6 Mbps(Ant.0/Ant.1) for IEEE 802.11a, 6.5 Mbps(Ant.0/Ant.1) for HT20, 13.5 Mbps(Ant.0/Ant.1) for HT40, 29.3 Mbps(Ant.0/Ant.1) for VHT80.
- 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 "XZ" axis.

UNII 2C

Modulation	DATA RATE	OUTPUT POWER[dBm]	
		Antenna 0	Antenna 1
802.11 a (Middle Channel)	6 Mbps	11.58	11.13
	9 Mbps	11.40	10.97
	12 Mbps	11.22	10.80
	18 Mbps	11.06	10.63
	24 Mbps	10.87	10.46
	36 Mbps	10.60	10.30
	48 Mbps	10.43	10.17
	54 Mbps	10.27	10.03
HT 20 (Middle Channel)	6.5 Mbps	10.89	10.52
	13 Mbps	10.71	10.35
	19.5 Mbps	10.54	10.26
	26 Mbps	10.35	10.09
	39 Mbps	10.17	9.92
	52 Mbps	10.00	9.74
	58.5 Mbps	9.84	9.57
	65 Mbps	9.68	9.34
HT 40 (Low Channel)	13.5 Mbps	9.52	9.12
	27 Mbps	9.34	8.93
	40.5 Mbps	9.18	8.75
	54 Mbps	9.02	8.55
	81 Mbps	8.85	8.37
	108 Mbps	8.70	8.19
	121.5 Mbps	8.56	8.01
	135 Mbps	8.42	7.85

VHT80 (Low Channel)	29.3 Mbps	9.60	8.92
	58.5 Mbps	9.43	8.74
	87.8 Mbps	9.22	8.55
	117 Mbps	9.05	8.38
	175.5 Mbps	8.86	8.20
	234 Mbps	8.67	8.03
	263.3 Mbps	8.50	7.84
	292.5 Mbps	8.32	7.66
	351 Mbps	8.14	7.47
	390 Mbps	7.94	7.28

- The worse case data rate for each modulation is determined 6 Mbps(Ant.0/Ant.1) for IEEE 802.11a, 6.5 Mbps(Ant.0/Ant.1) for HT20, 13.5 Mbps(Ant.0/Ant.1) for HT40, 29.3 Mbps(Ant.0/Ant.1) for VHT80.
- 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 "XZ" axis.

UNII 3

Modulation	DATA RATE	OUTPUT POWER[dBm]	
		Antenna 0	Antenna 1
802.11 a (Middle Channel)	6 Mbps	10.85	11.28
	9 Mbps	10.70	11.12
	12 Mbps	10.54	10.97
	18 Mbps	10.37	10.80
	24 Mbps	10.22	10.63
	36 Mbps	10.08	10.45
	48 Mbps	9.90	10.30
	54 Mbps	9.76	10.17
HT 20 (Middle Channel)	6.5 Mbps	10.47	10.93
	13 Mbps	10.37	10.80
	19.5 Mbps	10.25	10.63
	26 Mbps	10.11	10.47
	39 Mbps	9.98	10.30
	52 Mbps	9.84	10.14
	58.5 Mbps	9.71	9.98
	65 Mbps	9.59	9.83
HT 40 (Low Channel)	13.5 Mbps	9.35	9.48
	27 Mbps	9.19	9.36
	40.5 Mbps	9.05	9.23
	54 Mbps	8.91	9.11
	81 Mbps	8.75	9.00
	108 Mbps	8.59	8.87
	121.5 Mbps	8.46	8.74
	135 Mbps	8.32	8.60

VHT80 (Low Channel)	29.3 Mbps	9.13	9.46
	58.5 Mbps	8.95	9.28
	87.8 Mbps	8.77	9.11
	117 Mbps	8.60	8.93
	175.5 Mbps	8.43	8.76
	234 Mbps	8.26	8.57
	263.3 Mbps	8.09	8.39
	292.5 Mbps	7.91	8.21
	351 Mbps	7.74	8.03
	390 Mbps	7.58	7.86

- . The worse case data rate for each modulation is determined 6 Mbps(Ant.0/Ant.1) for IEEE 802.11a, 6.5 Mbps(Ant.0/Ant.1) for HT20, 13.5 Mbps(Ant.0/Ant.1) for HT40, 29.3 Mbps(Ant.0/Ant.1) for VHT80.
- . 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 "XZ" axis.

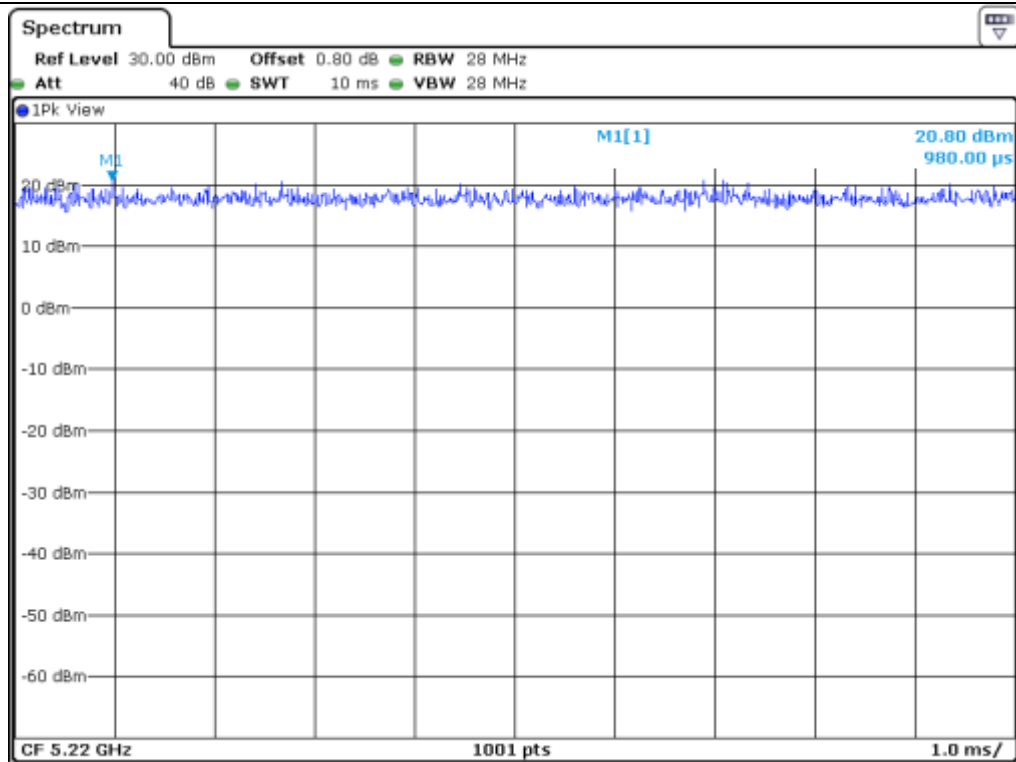
-. Duty Cycle

Band	Mode	Tx On Time [ms]	Tx Off Time [ms]	Duty Cycle [%]	Correction Factor [dB]
UNII 1	802.11a	-	-	100.00	-
	802.11n HT 20	-	-	100.00	-
	802.11n HT 40	-	-	100.00	-
	802.11ac VHT 80	-	-	100.00	-
UNII 2A	802.11a	-	-	100.00	-
	802.11n HT 20	-	-	100.00	-
	802.11n HT 40	-	-	100.00	-
	802.11ac VHT 80	-	-	100.00	-
UNII 2C	802.11a	-	-	100.00	-
	802.11n HT 20	-	-	100.00	-
	802.11n HT 40	-	-	100.00	-
	802.11ac VHT 80	-	-	100.00	-
UNII 3	802.11a	-	-	100.00	-
	802.11n HT 20	-	-	100.00	-
	802.11n HT 40	-	-	100.00	-
	802.11ac VHT 80	-	-	100.00	-

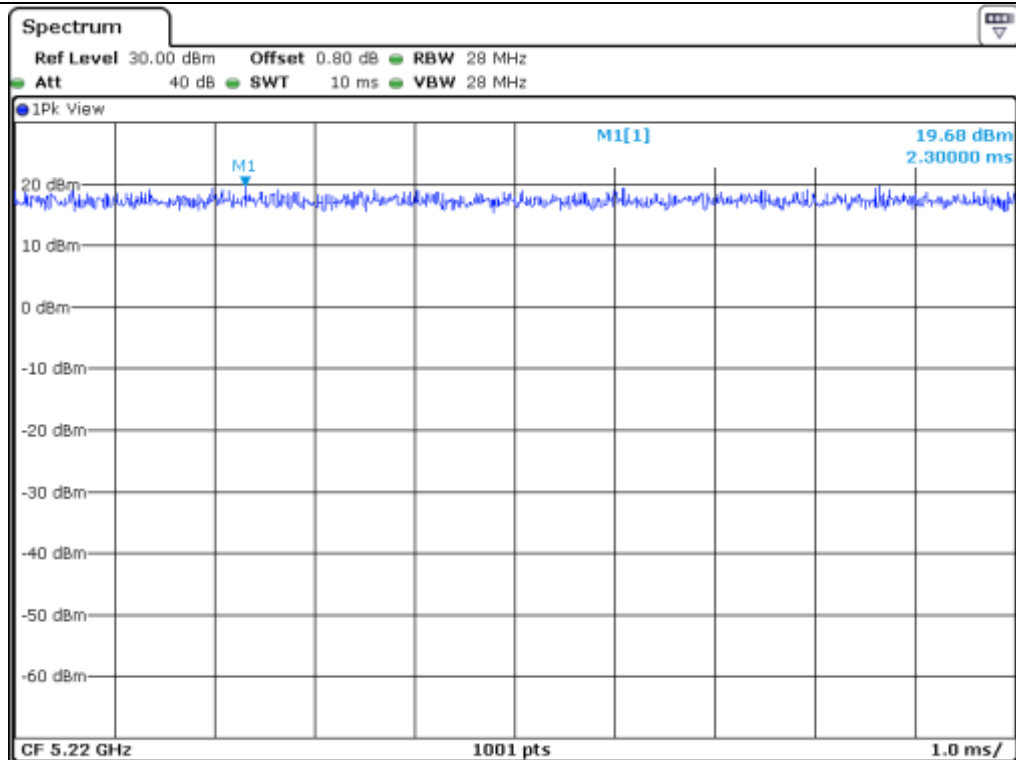
Note – Duty Cycle : (Tx On Time / (Tx On Time + Tx Off Time)) * 100

Correction Factor : $10 * \log(1 / (\text{Duty Cycle} / 100))$

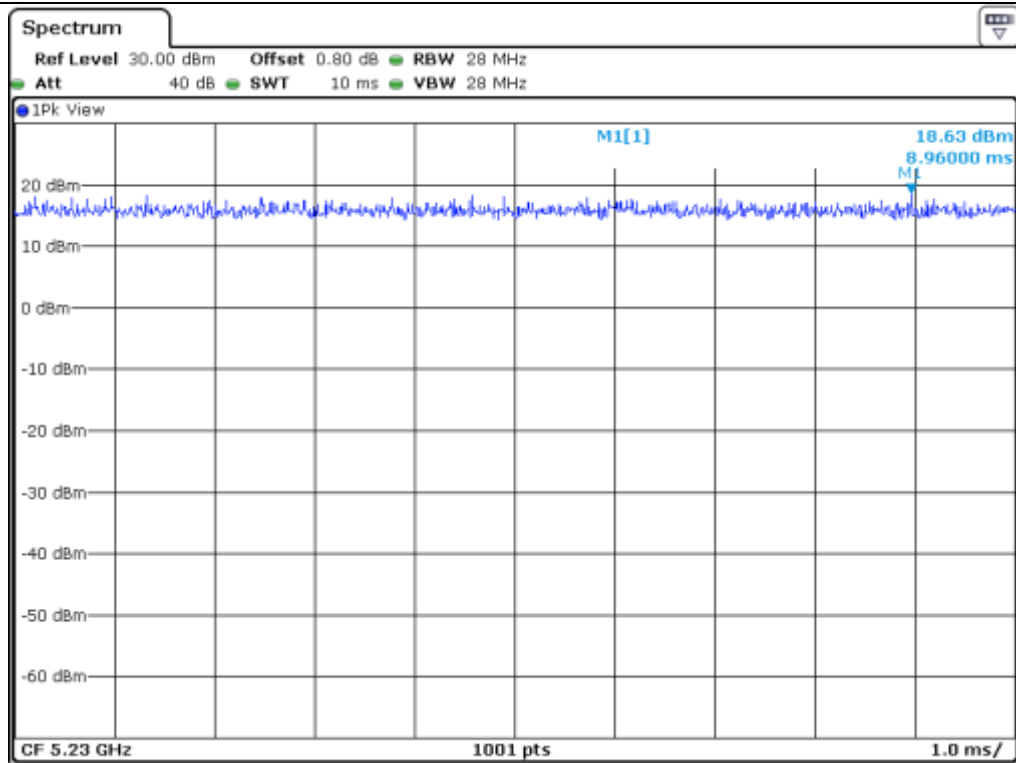
-. Test Plot



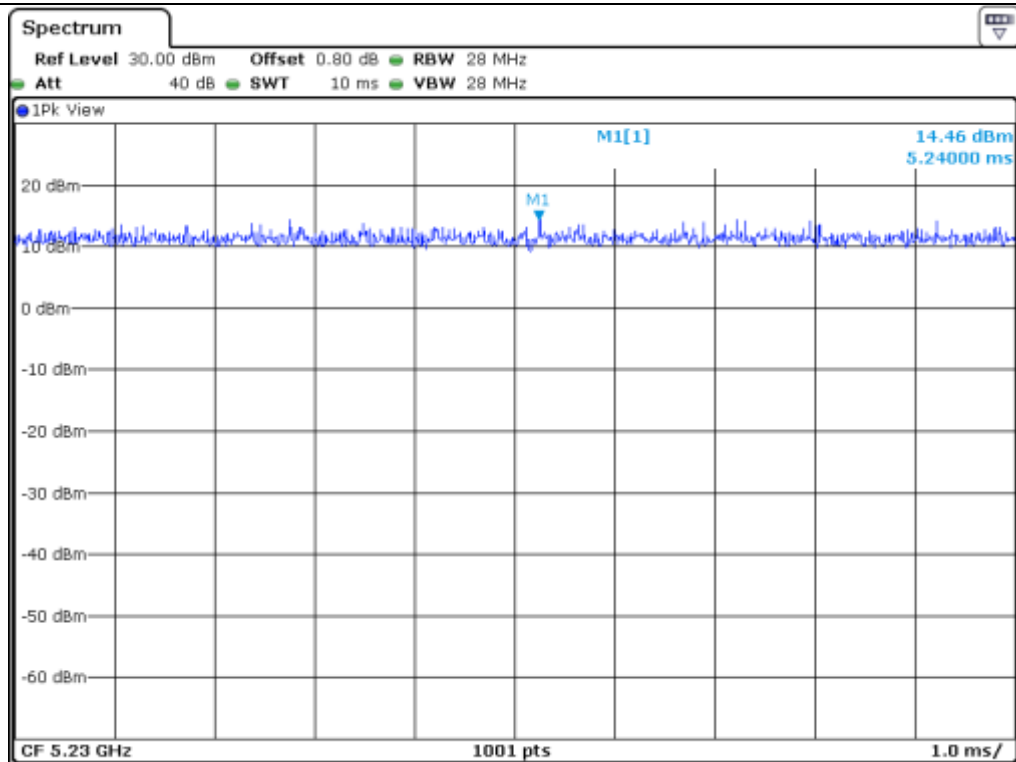
UNII 1_802.11a



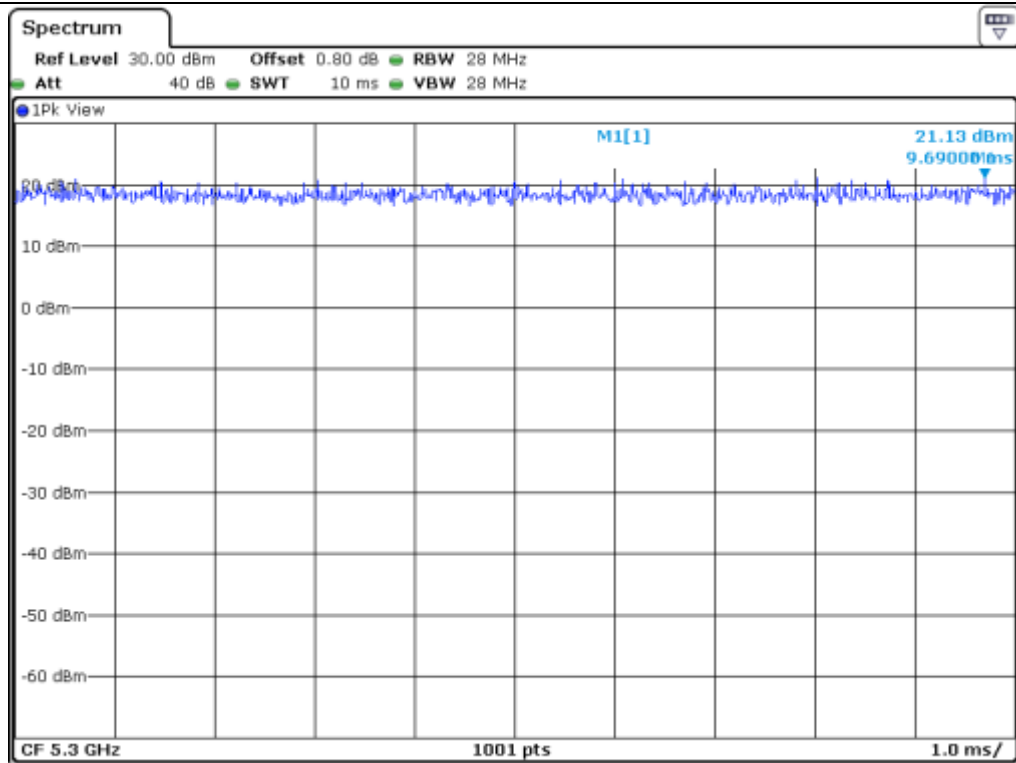
UNII 1_802.11n HT 20



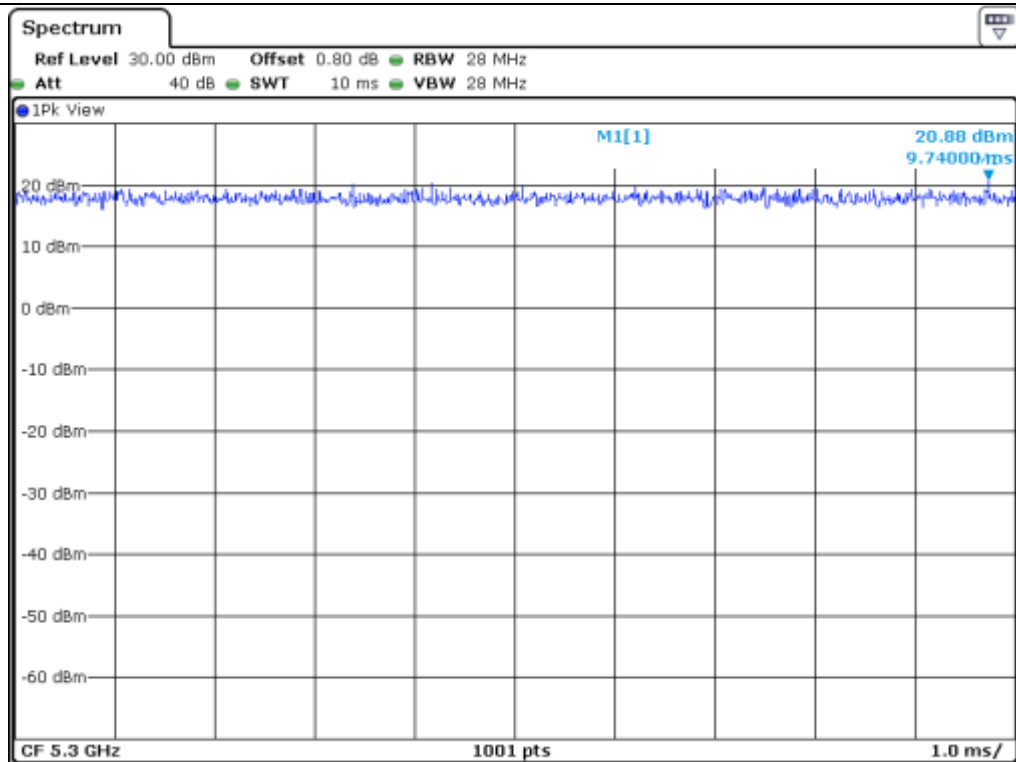
UNII 1_802.11n HT40



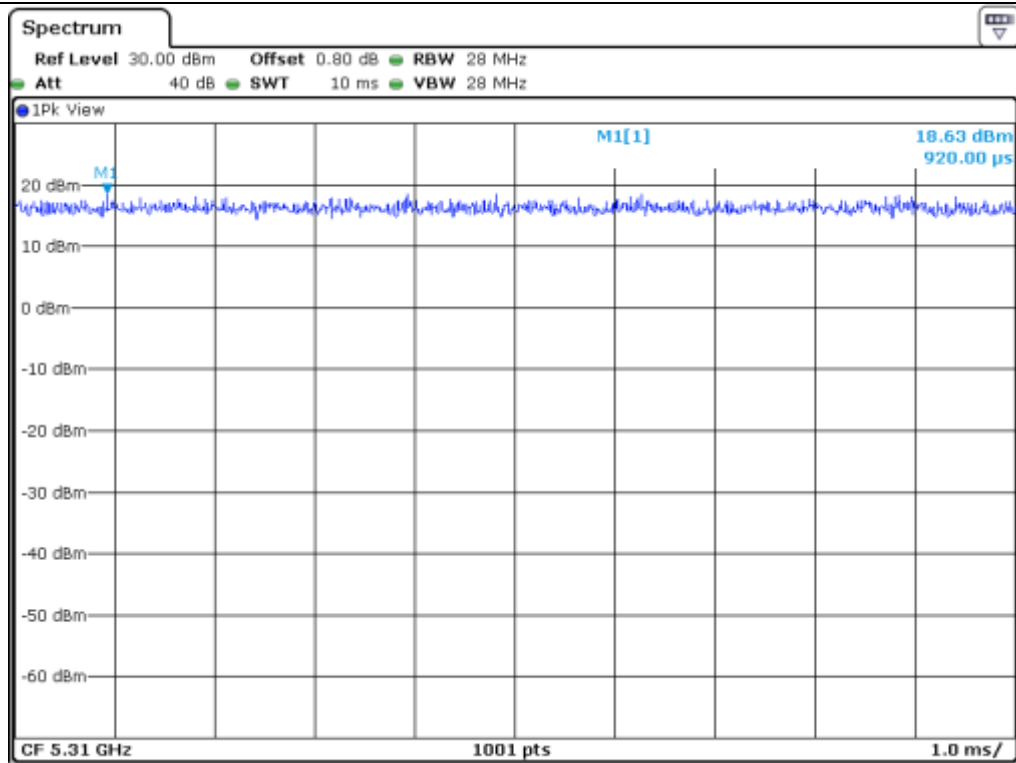
UNII 1_802.11ac VHT 80



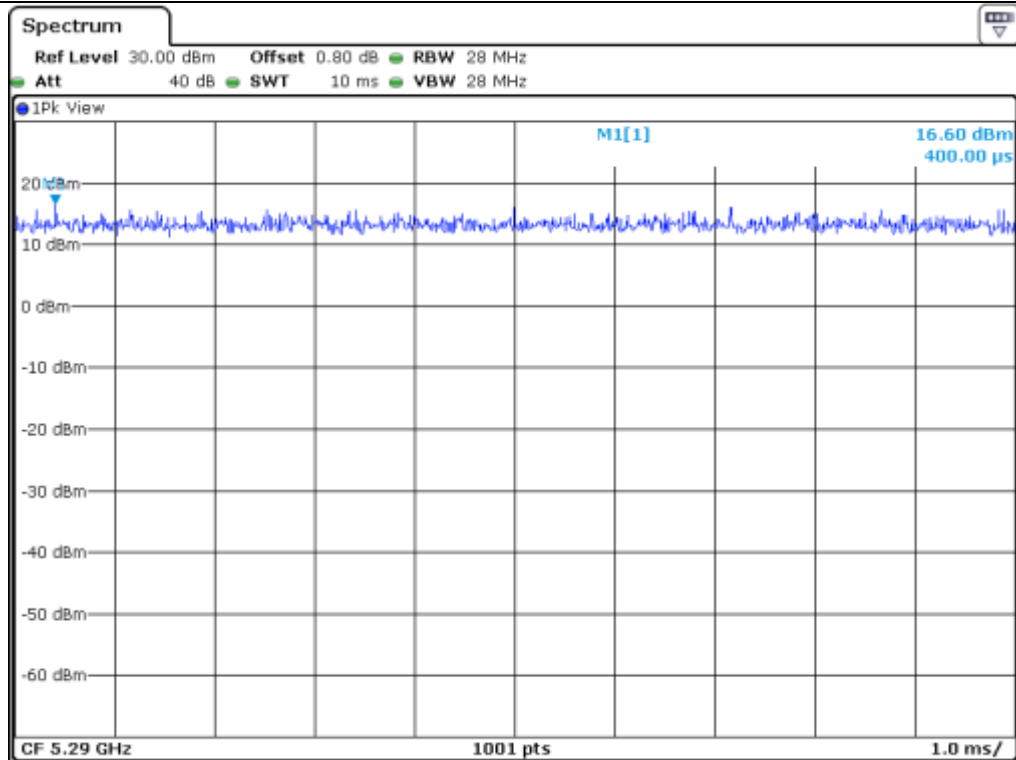
UNII 2A_802.11a



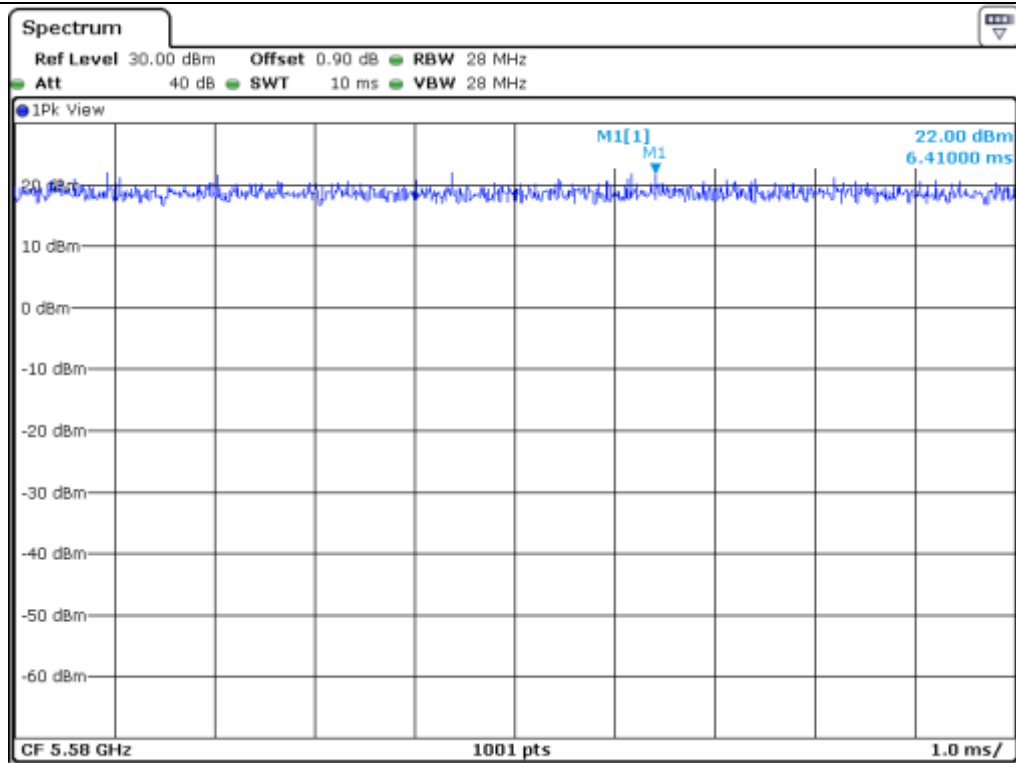
UNII 2A_802.11n HT 20



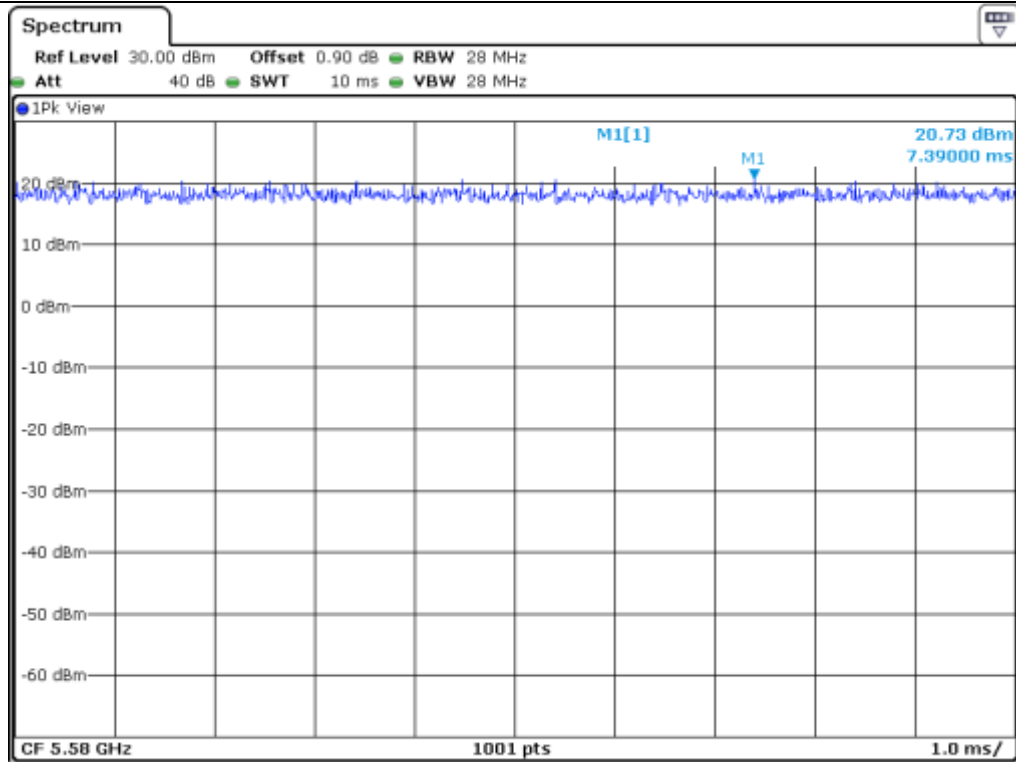
UNII 2A_802.11n HT40



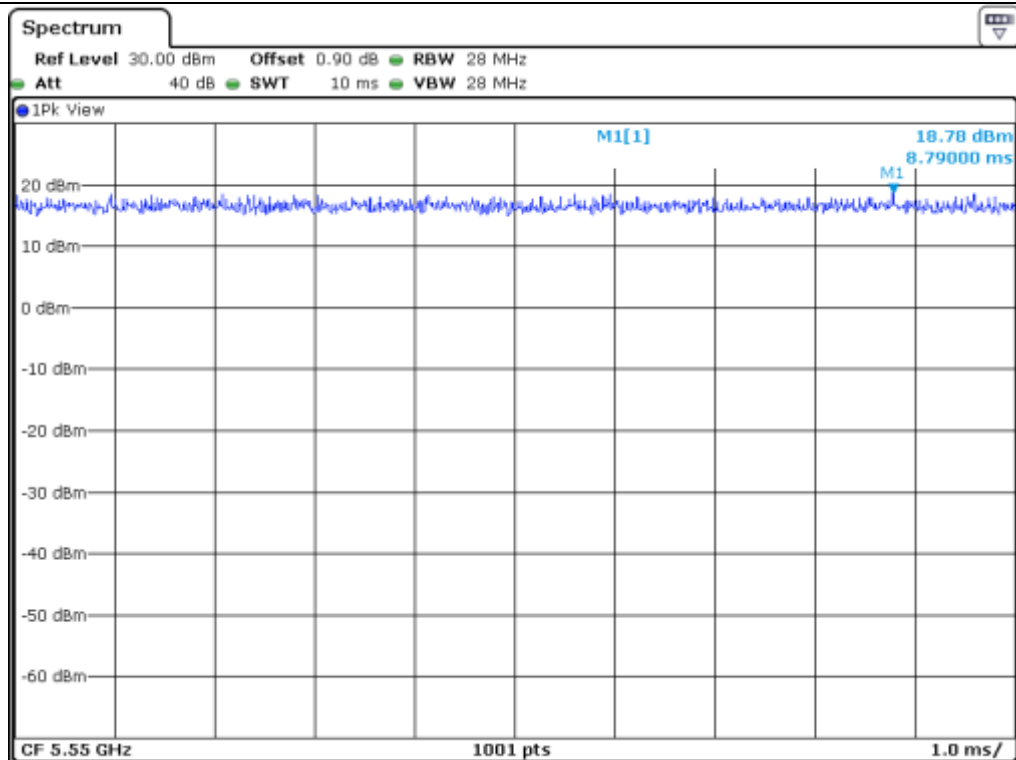
UNII 2A_802.11ac VHT 80



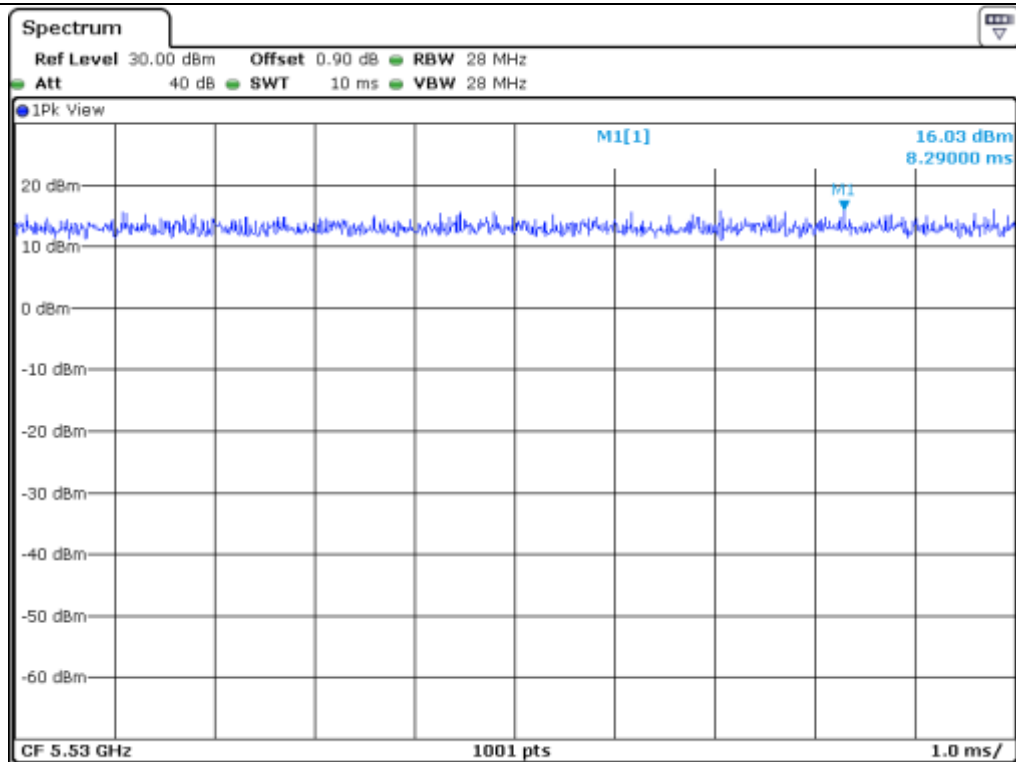
UNII 2C_802.11a



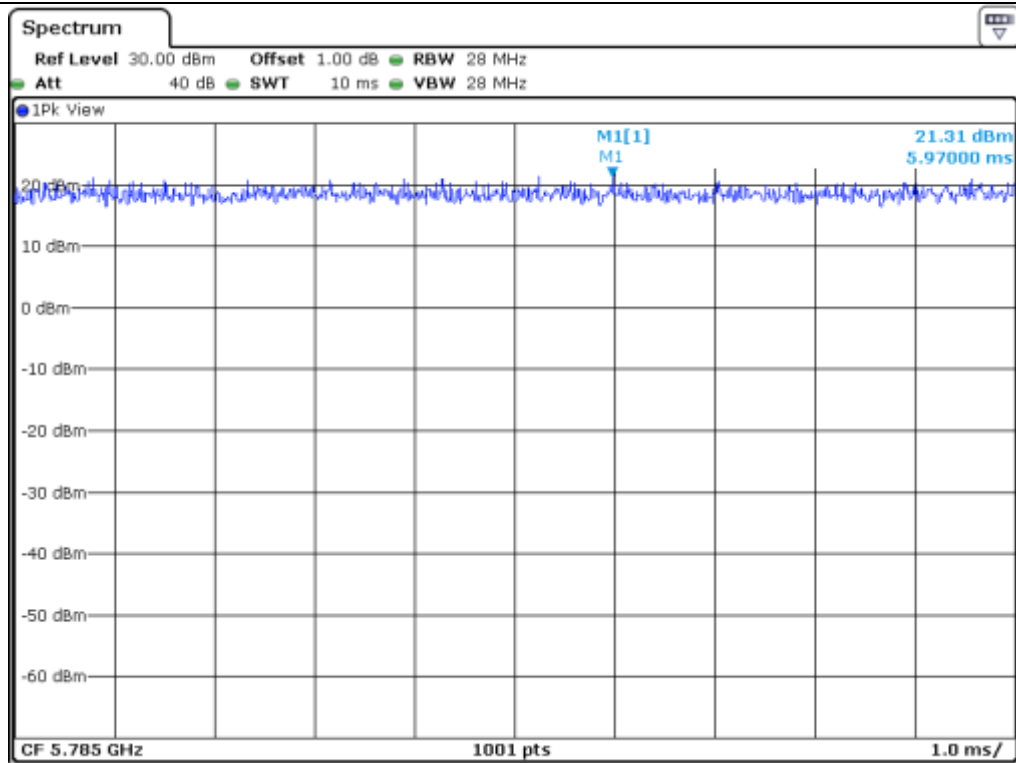
UNII 2C_802.11n HT 20



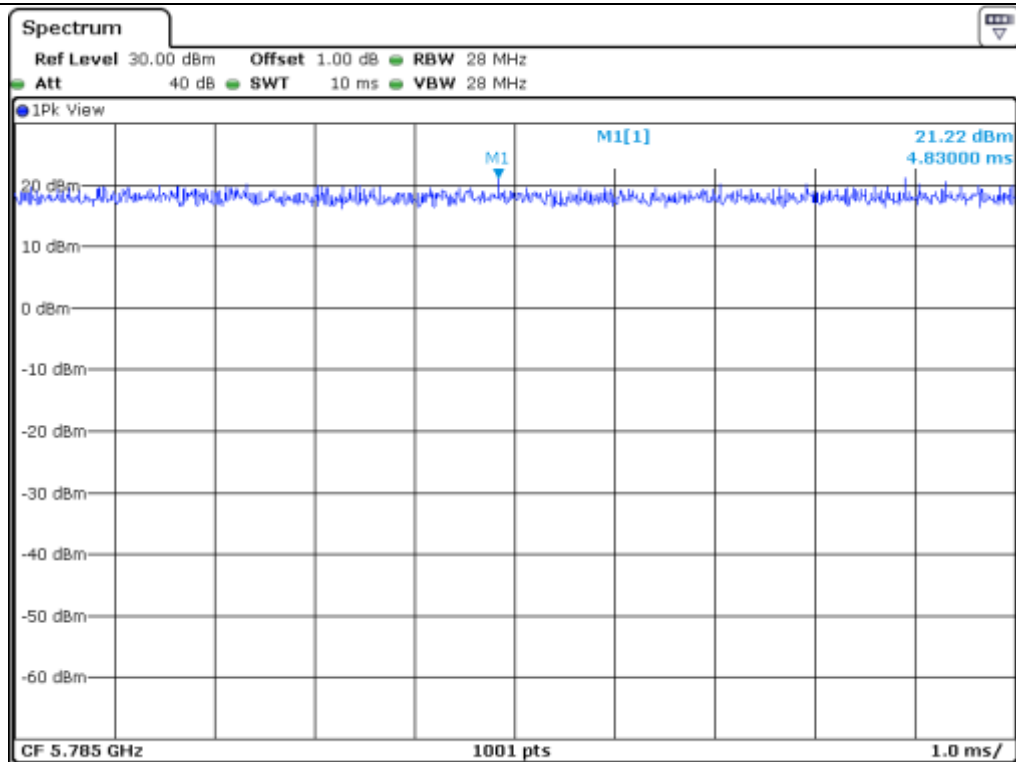
UNII 2C_802.11n HT40



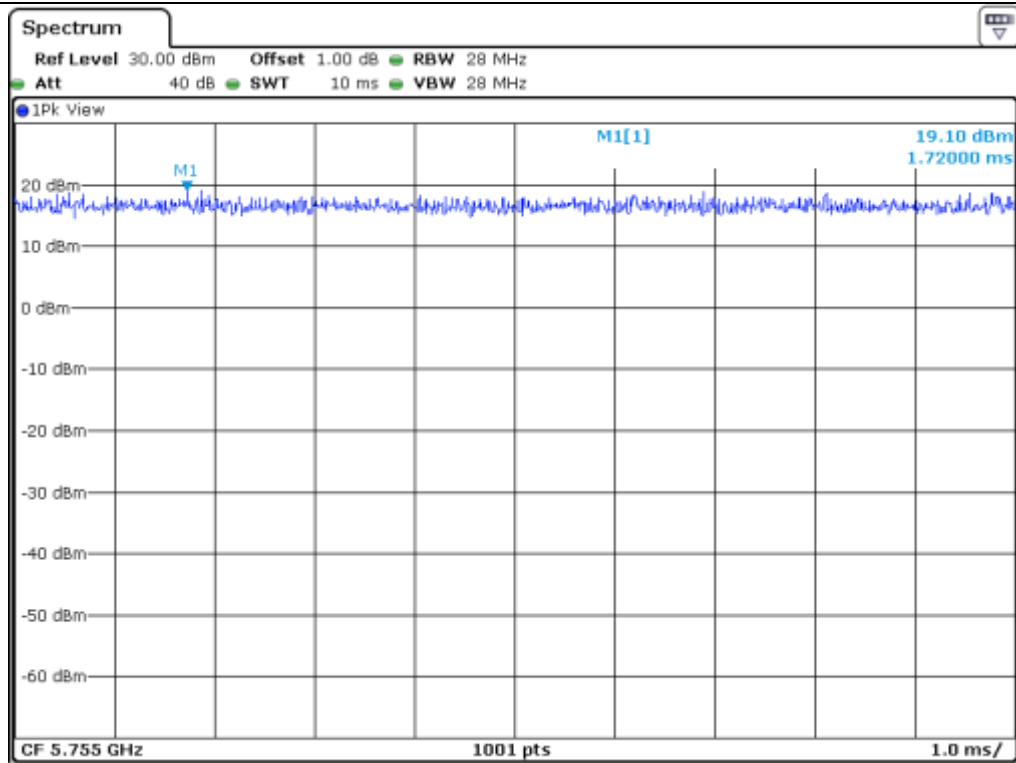
UNII 2C_802.11ac VHT 80



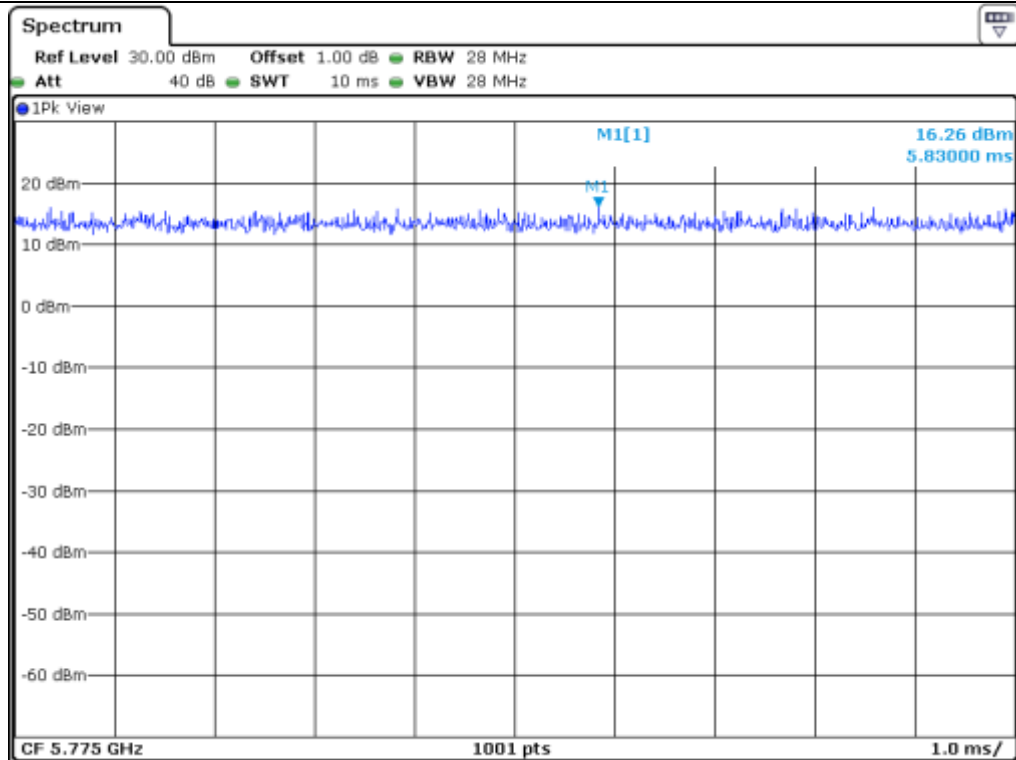
UNII 3_802.11a



UNII 3_802.11n HT 20



UNII 3_802.11n HT40



UNII 3_802.11ac VHT 80

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 Semi Anechoic Chamber.

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 antenna of the EUT is a Chip Antenna on the main board in the EUT, so no consideration of replacement by the user.

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

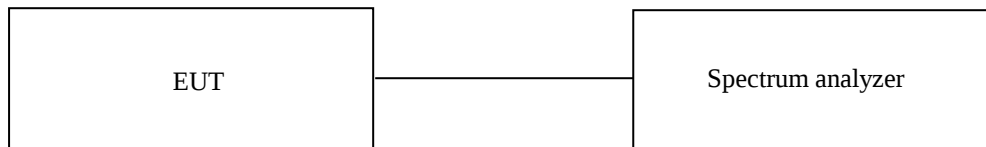
7. MINIMUM 26 dB BANDWIDTH

7.1 Operating environment

Temperature : 24 °C
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.
■ -	FSV30	Rohde & Schwarz	Signal Analyzer	101199	Mar. 11, 2019 (1Y)

All test equipment used is calibrated on a regular basis.

7.4 Test data for 802.11a RLAN Mode

7.4.1 Test data for Antenna 0

-. Test Date : December 02, 2019 ~ December 11, 2019

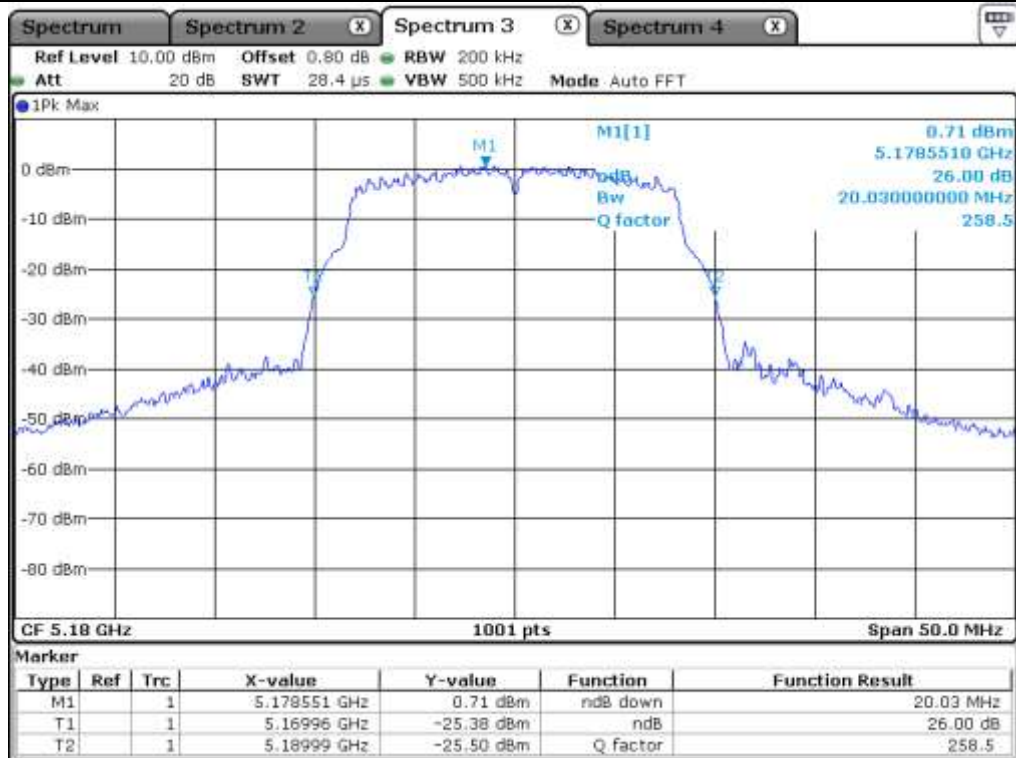
-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	26 dB Bandwidth (MHz)
5 150 ~ 5 250	Low	5 180.00	20.03
	Middle	5 220.00	19.88
	High	5 240.00	19.98
5 250 ~ 5 350	Low	5 260.00	19.83
	Middle	5 300.00	19.88
	High	5 320.00	19.93
5 470 ~ 5 725	Low	5 500.00	19.93
	Middle	5 580.00	19.88
	High	5 700.00	20.03
5 725 ~ 5 850	Low	5 745.00	19.83
	Middle	5 785.00	19.93
	High	5 825.00	19.93

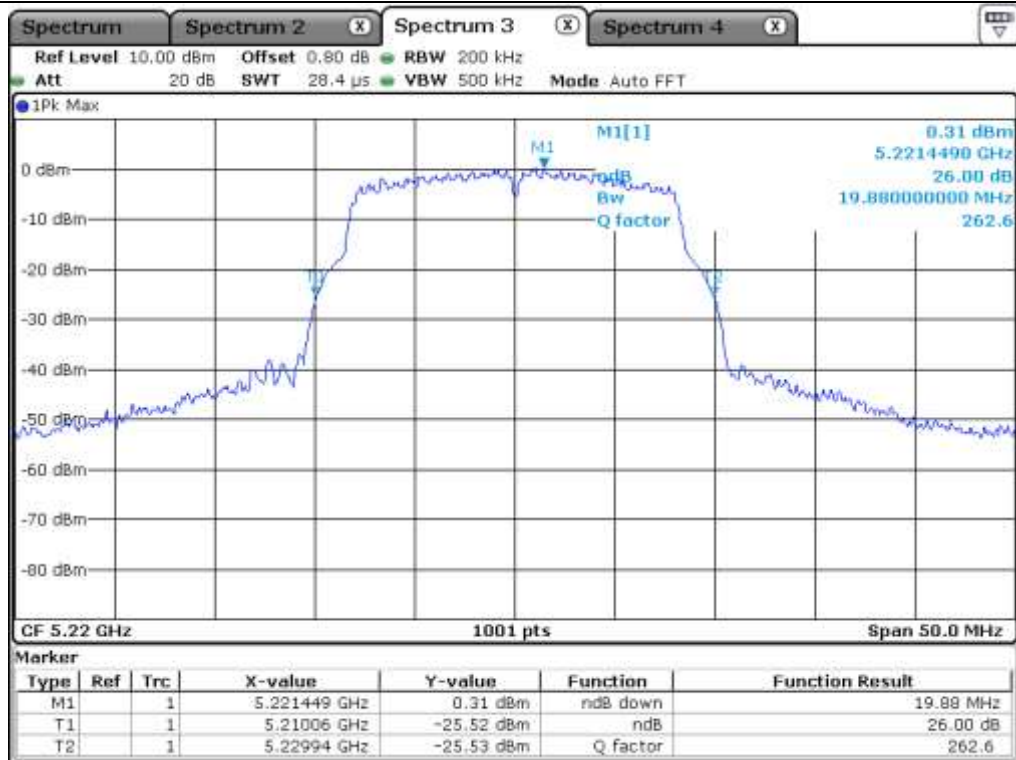
Remark: See next page for measurement data.



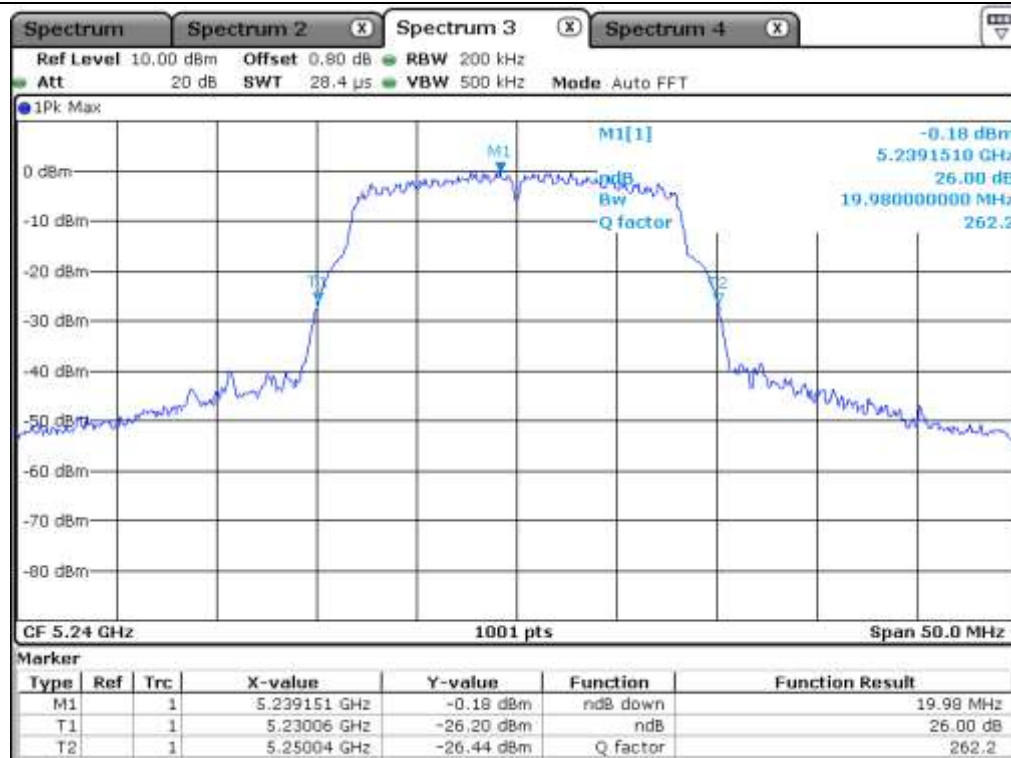
Tested by: Ha-Ram, Lee / Assistant Manager



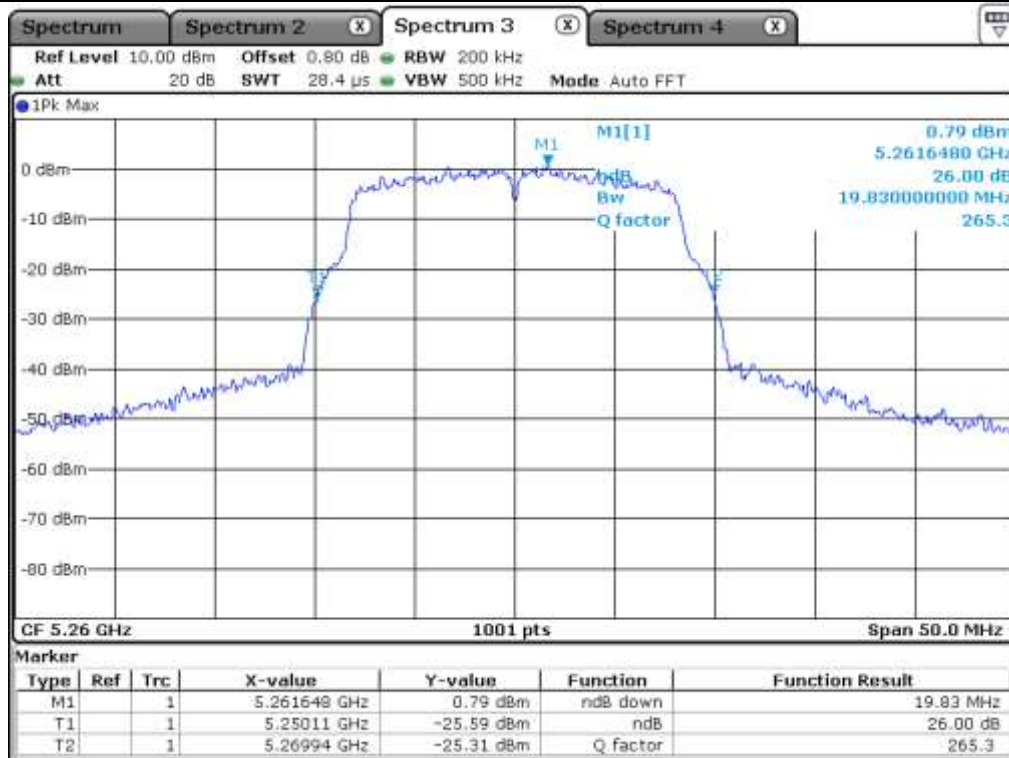
Low Channel (5 180 MHz)



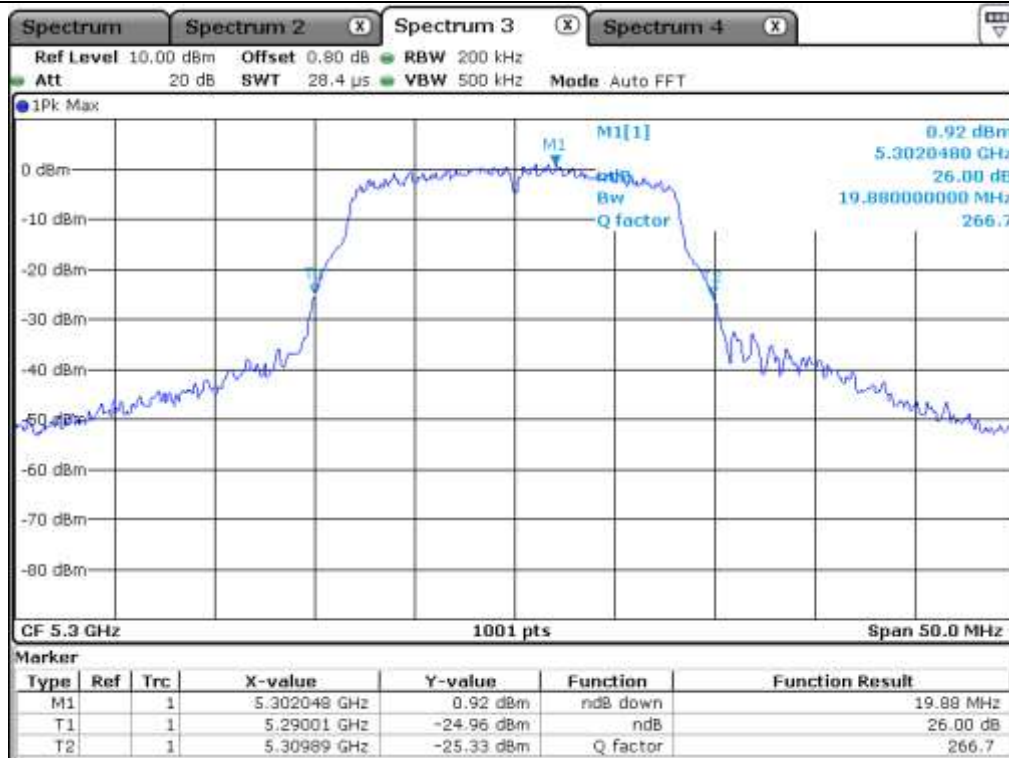
Middle Channel (5 220 MHz)



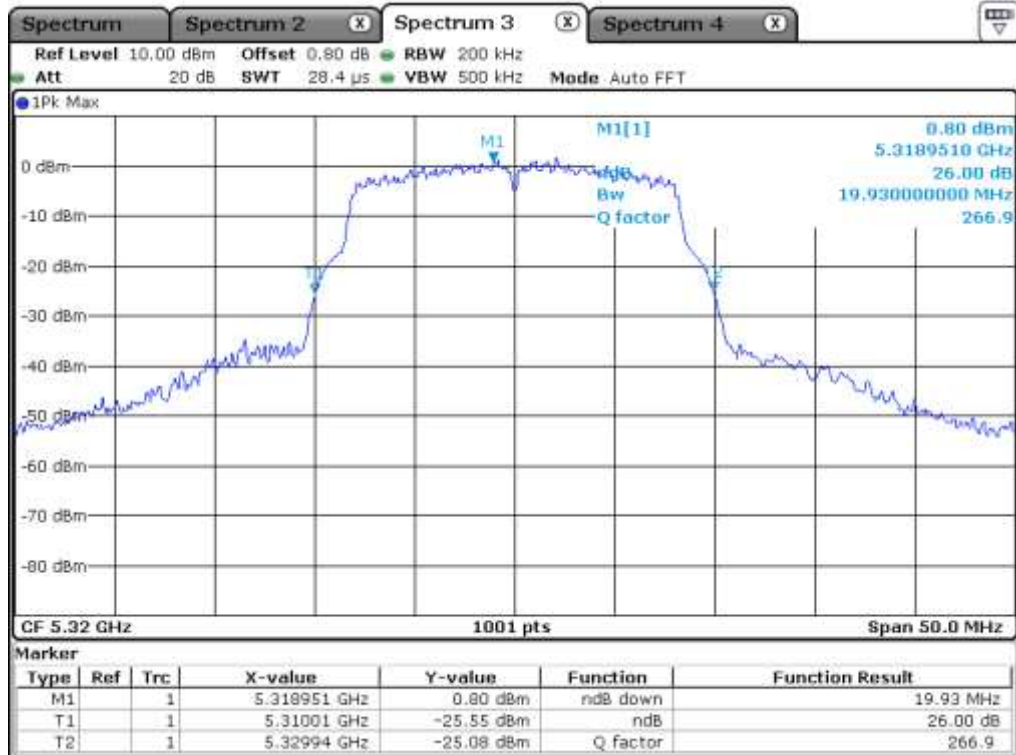
High Channel (5 240 MHz)



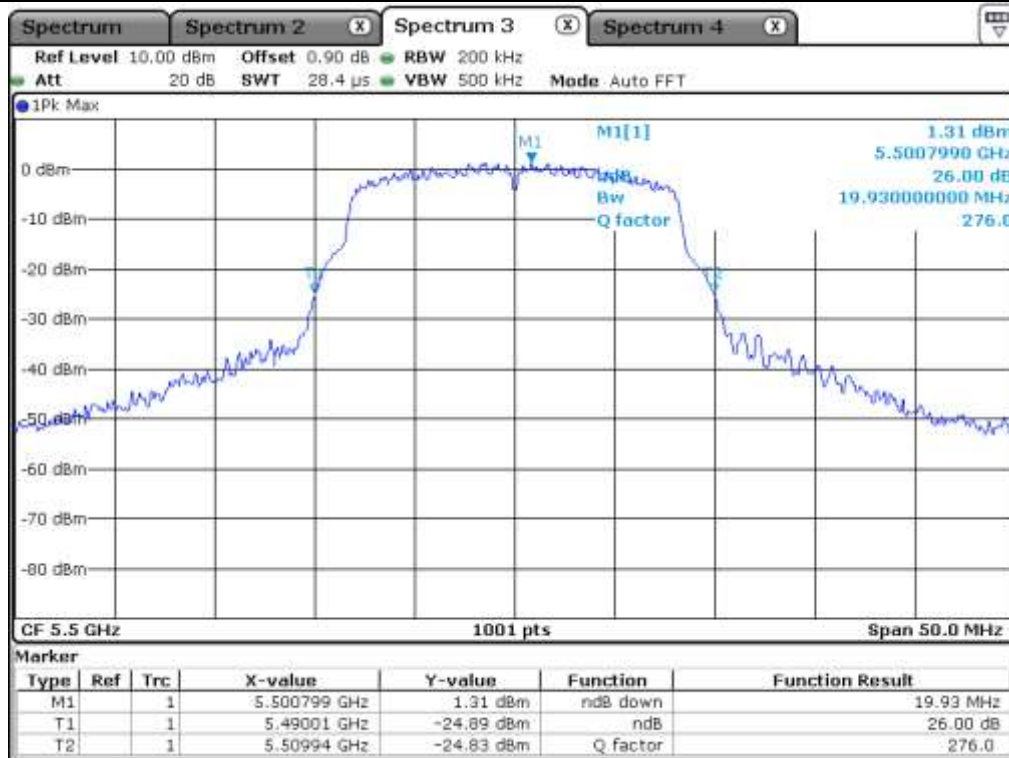
Low Channel (5 260 MHz)



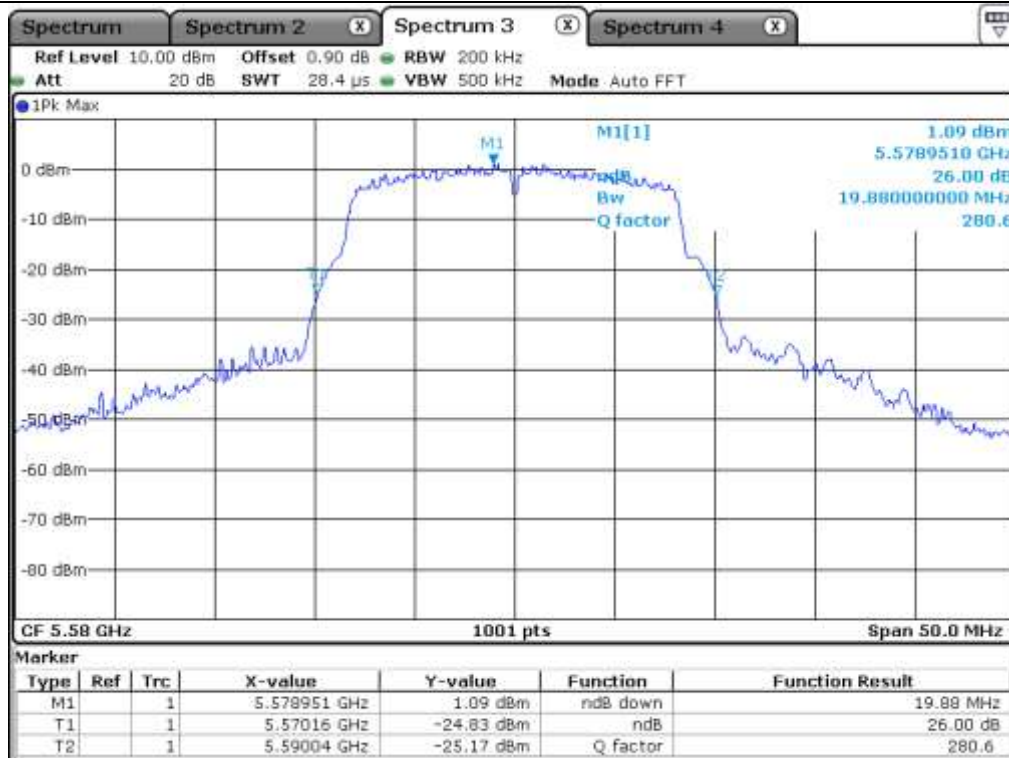
Middle Channel (5 300 MHz)



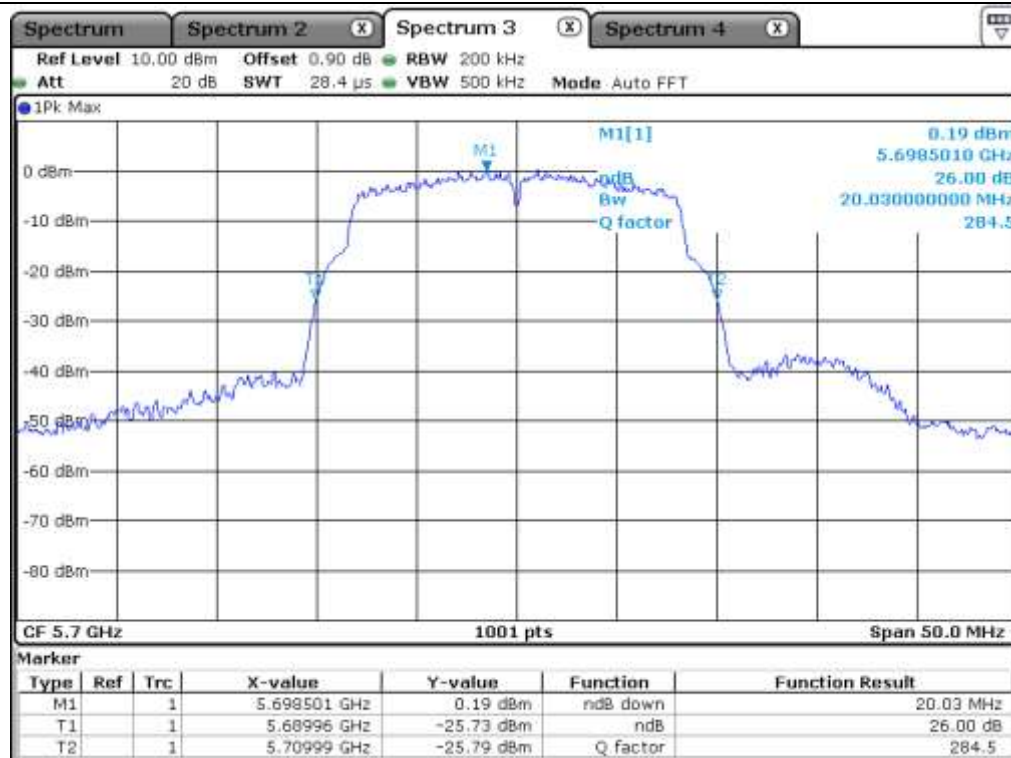
High Channel (5 320 MHz)



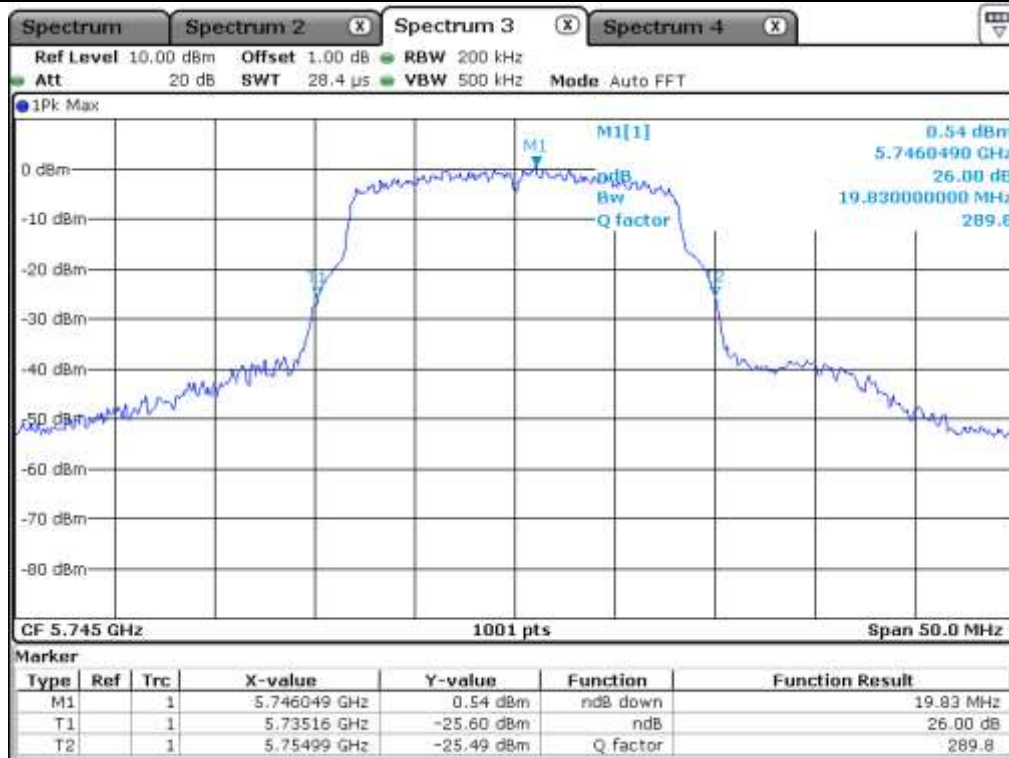
Low Channel (5 500 MHz)



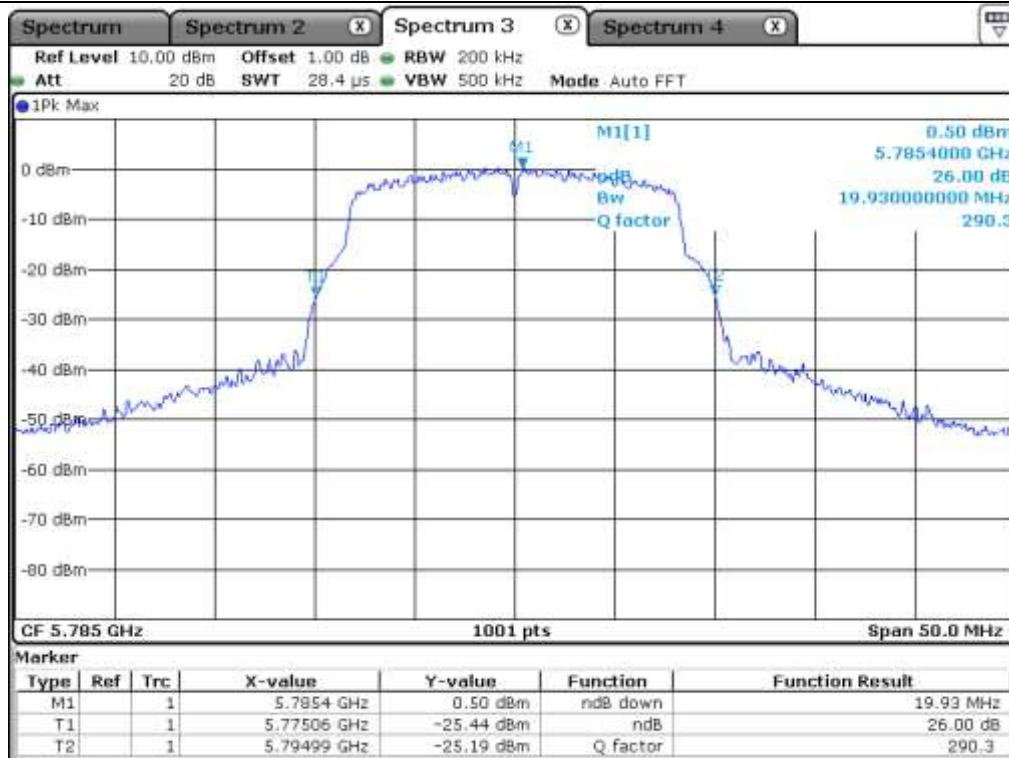
Middle Channel (5 580 MHz)



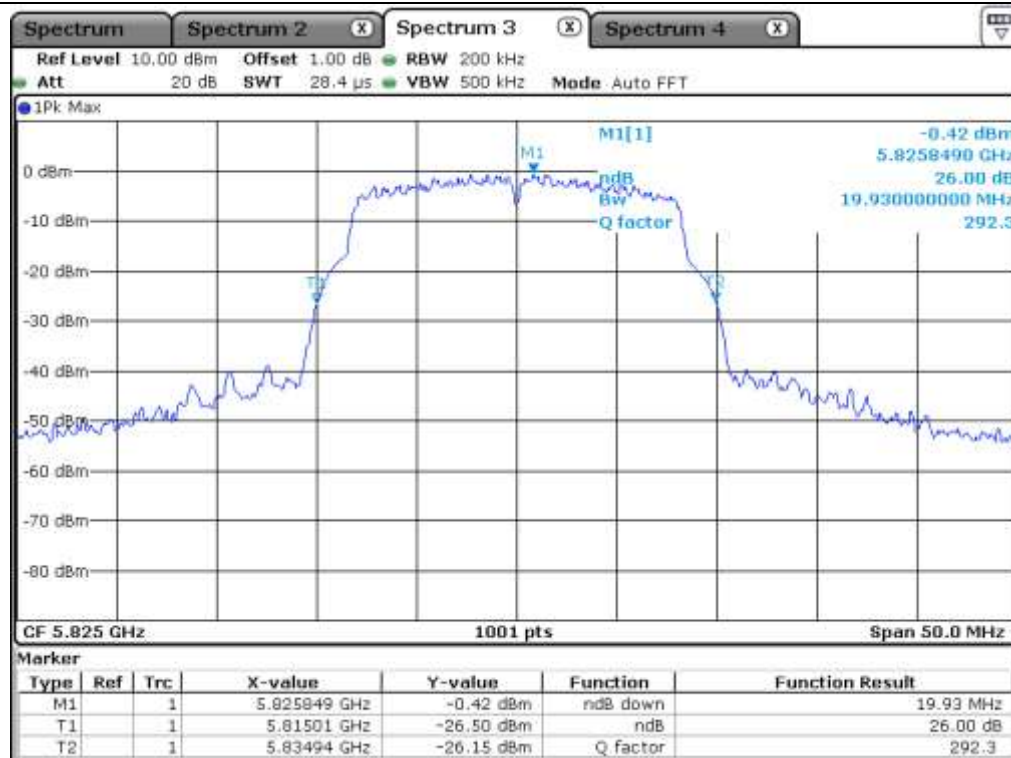
High Channel (5 700 MHz)



Low Channel (5 745 MHz)



Middle Channel (5 785 MHz)



High Channel (5 825 MHz)

7.4.2 Test data for Antenna 1

-. Test Date : December 02, 2019 ~ December 11, 2019

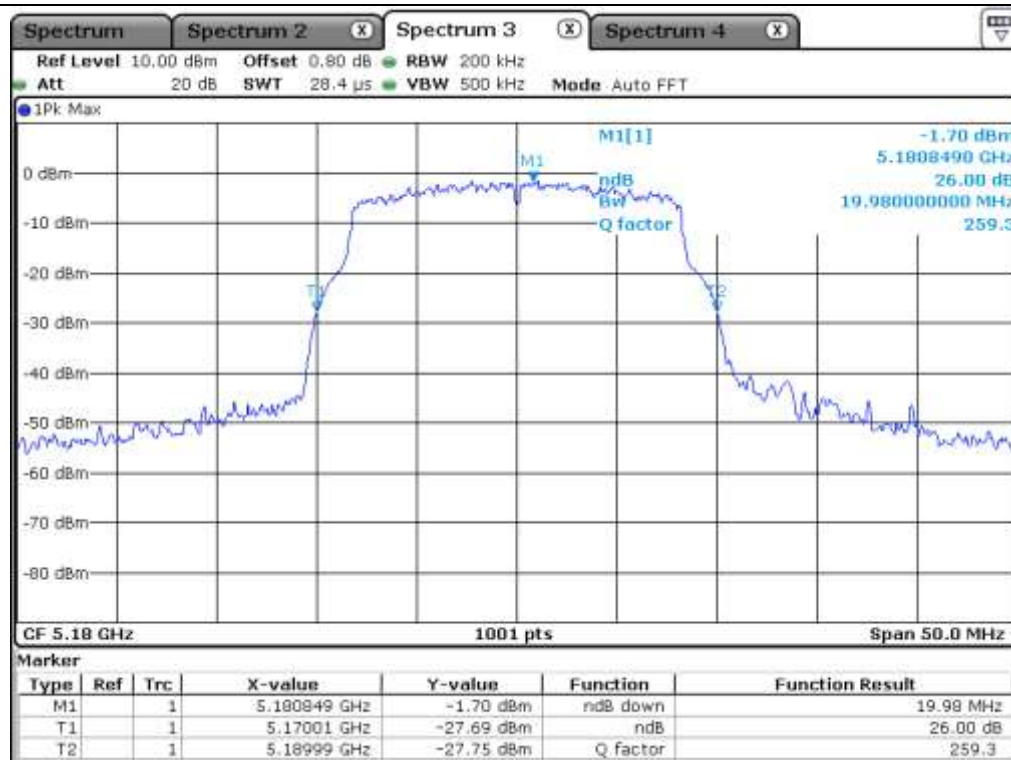
-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	26 dB Bandwidth (MHz)
5 150 ~ 5 250	Low	5 180.00	19.98
	Middle	5 220.00	19.63
	High	5 240.00	19.78
5 250 ~ 5 350	Low	5 260.00	19.83
	Middle	5 300.00	19.88
	High	5 320.00	19.83
5 470 ~ 5 725	Low	5 500.00	19.88
	Middle	5 580.00	19.78
	High	5 700.00	19.68
5 725 ~ 5 850	Low	5 745.00	19.78
	Middle	5 785.00	19.83
	High	5 825.00	19.78

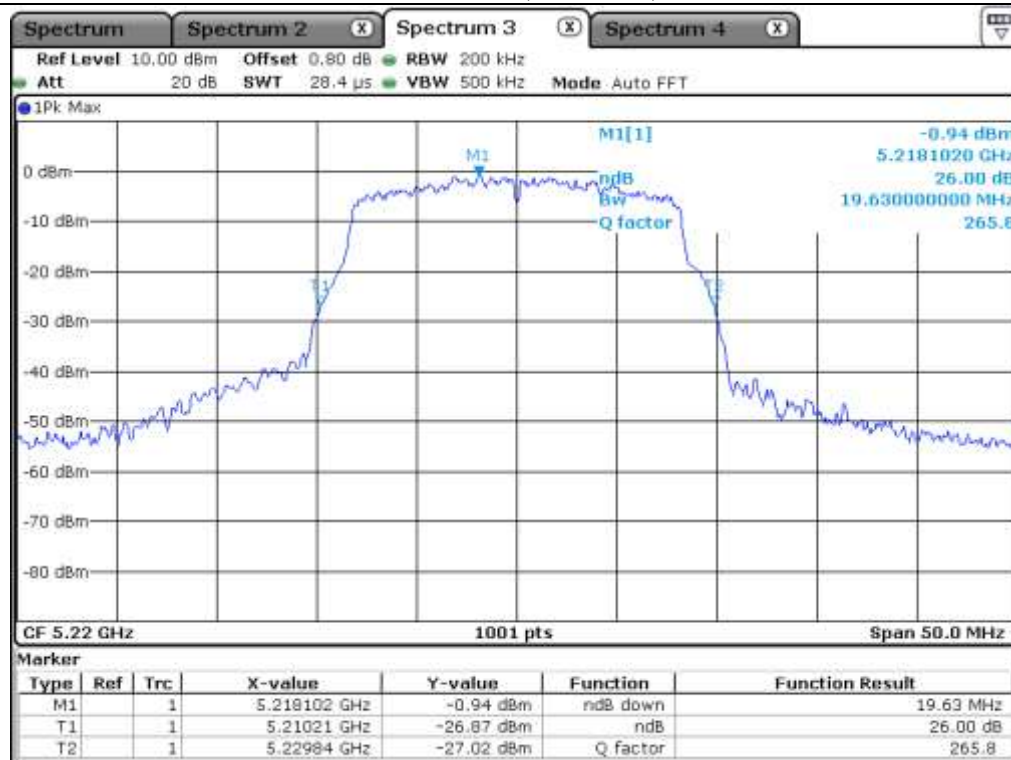
Remark: See next page for measurement data.



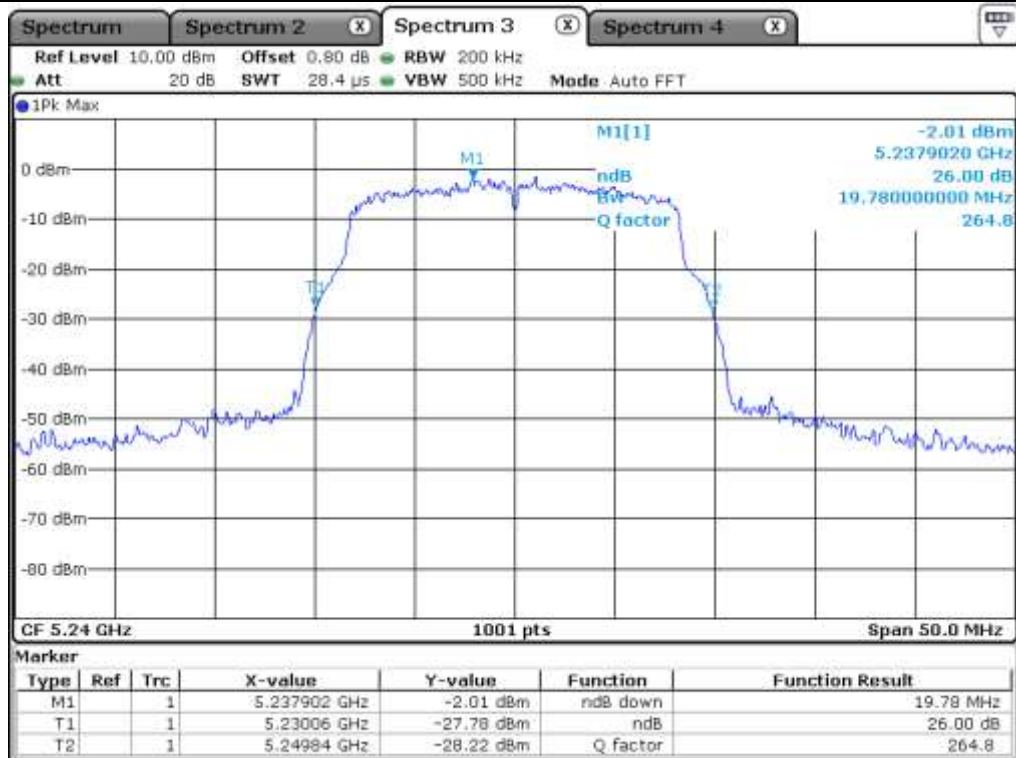
Tested by: Ha-Ram, Lee / Assistant Manager



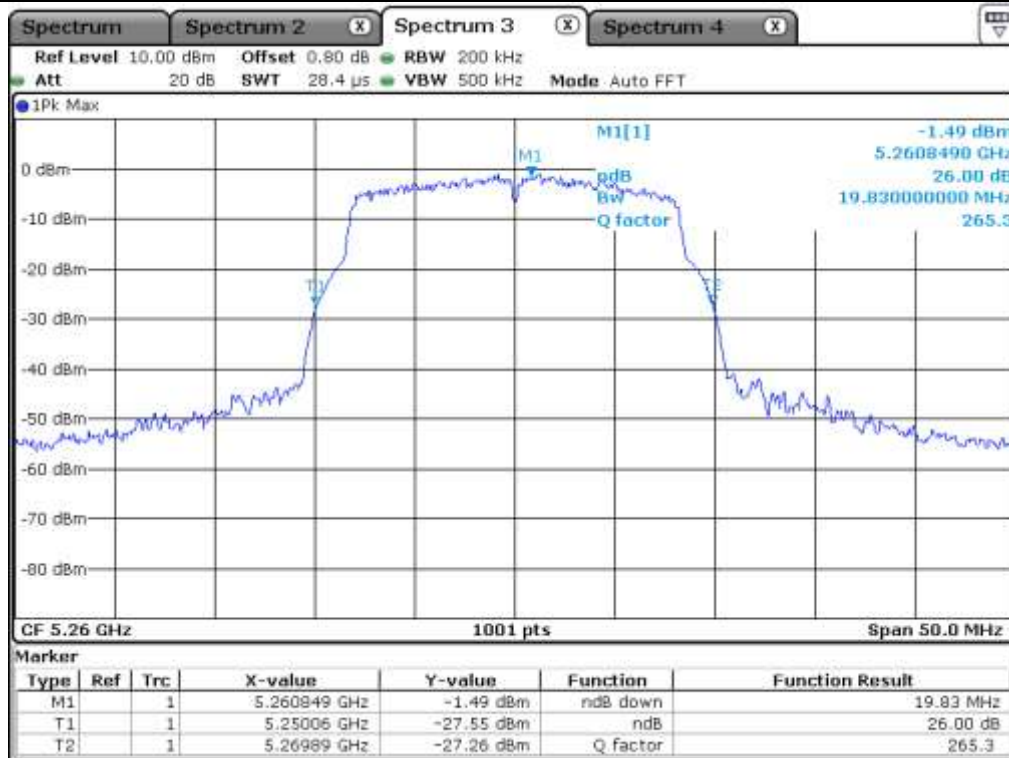
Low Channel (5 180 MHz)



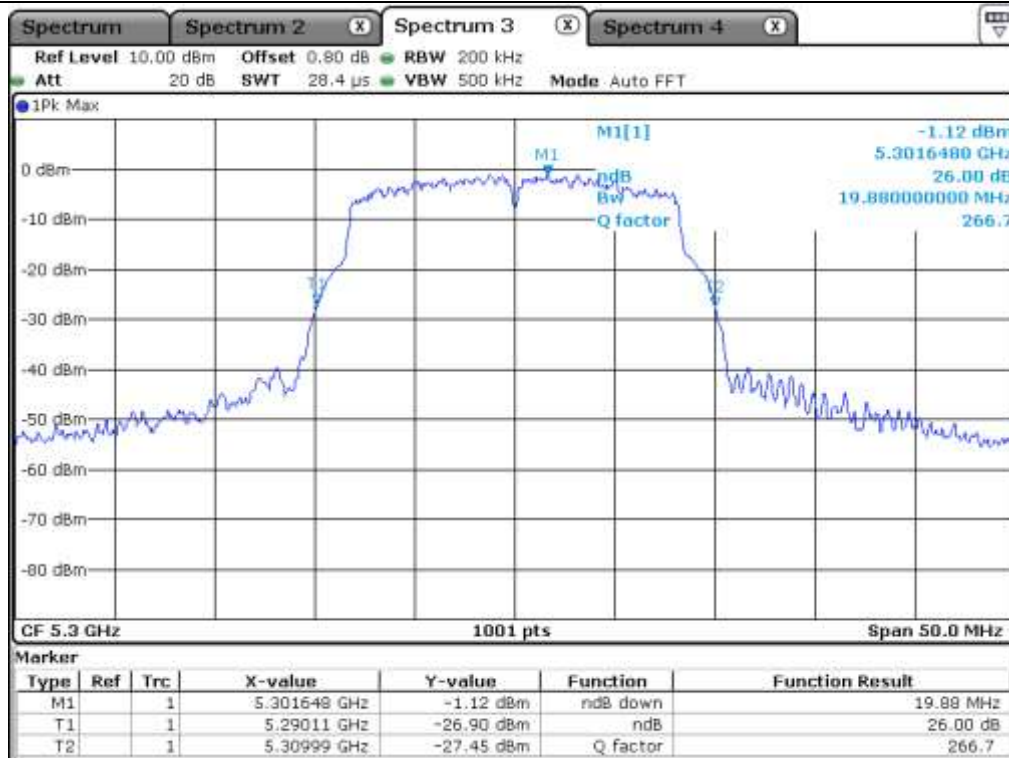
Middle Channel (5 220 MHz)



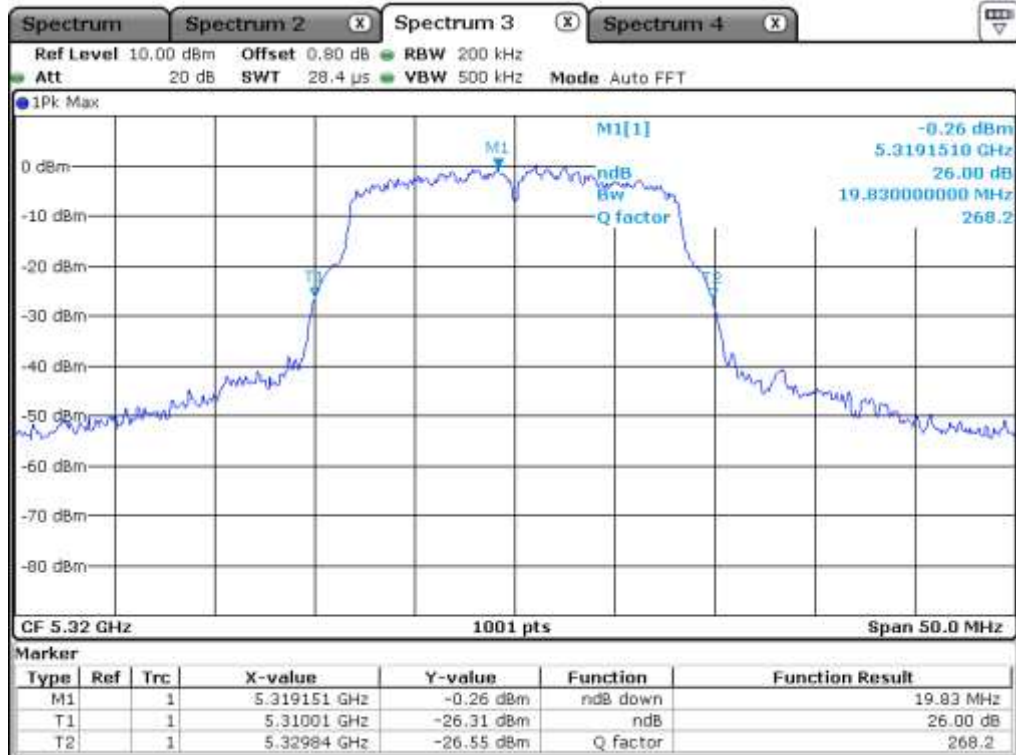
High Channel (5 240 MHz)



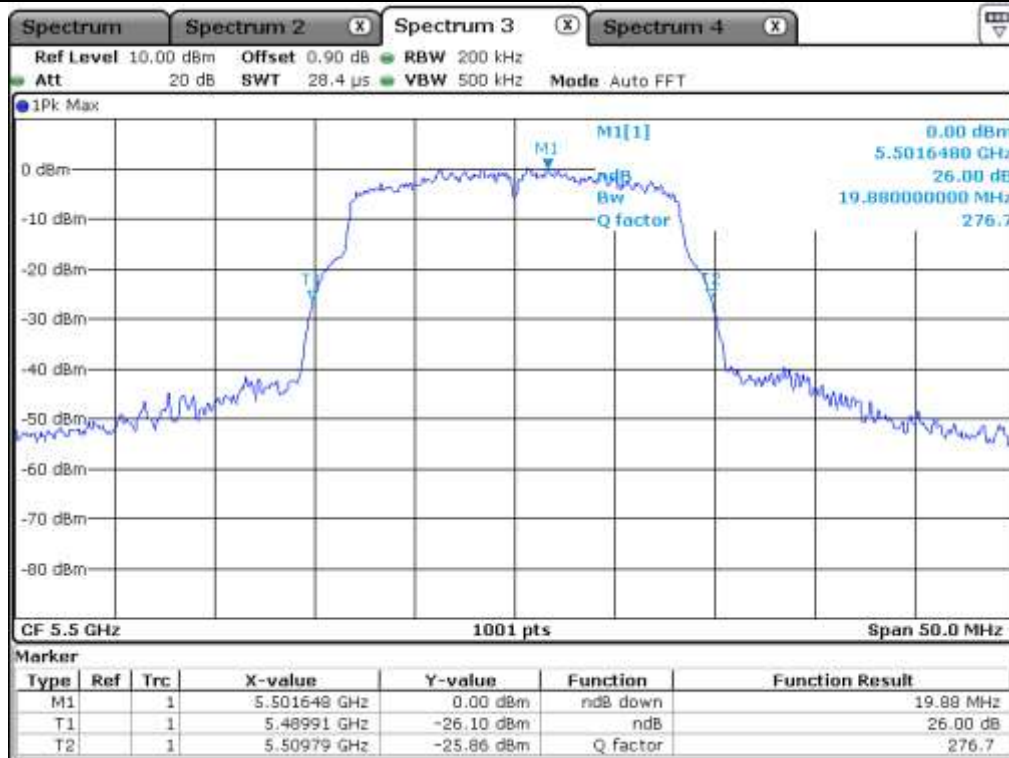
Low Channel (5 260 MHz)



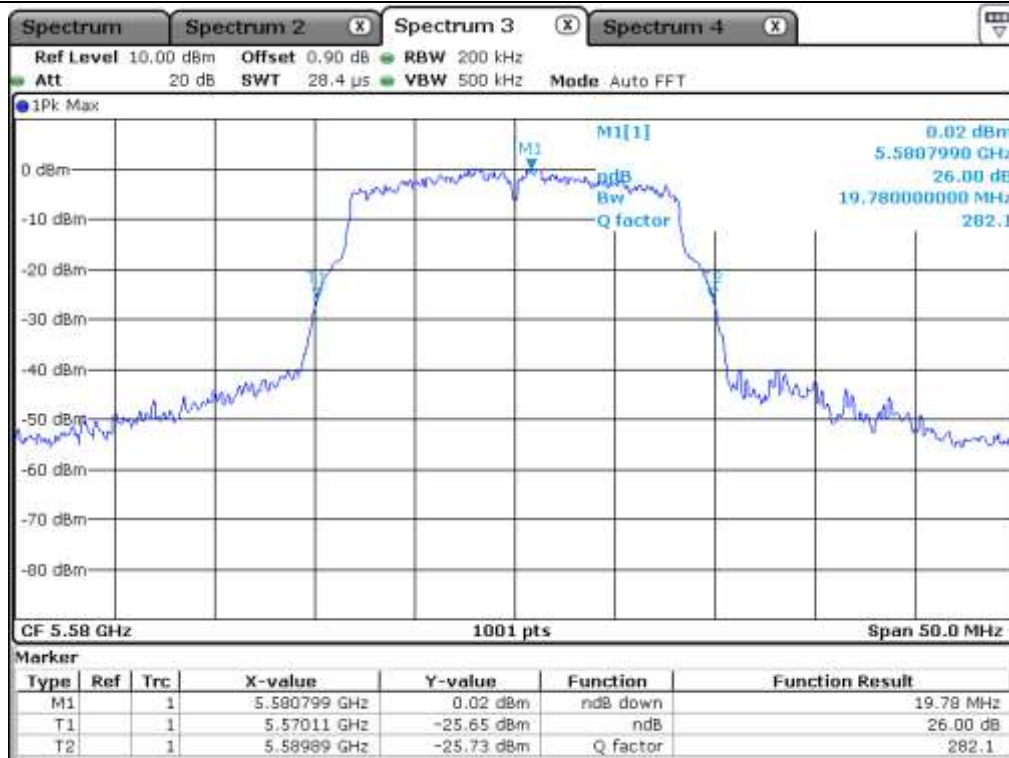
Middle Channel (5 300 MHz)



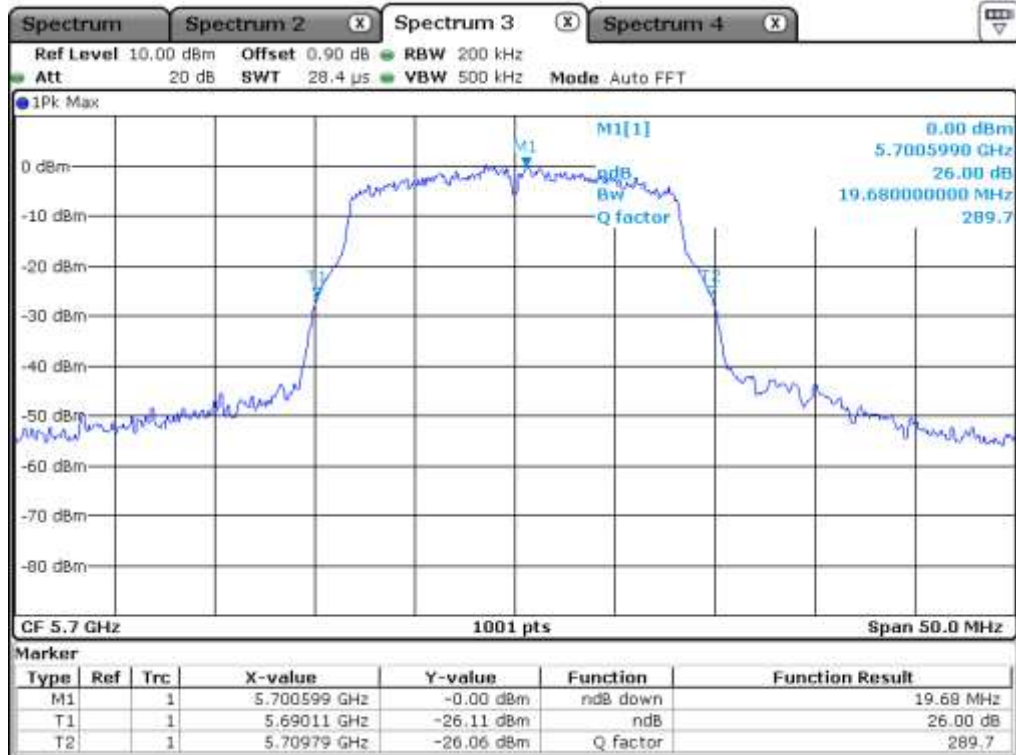
High Channel (5 320 MHz)



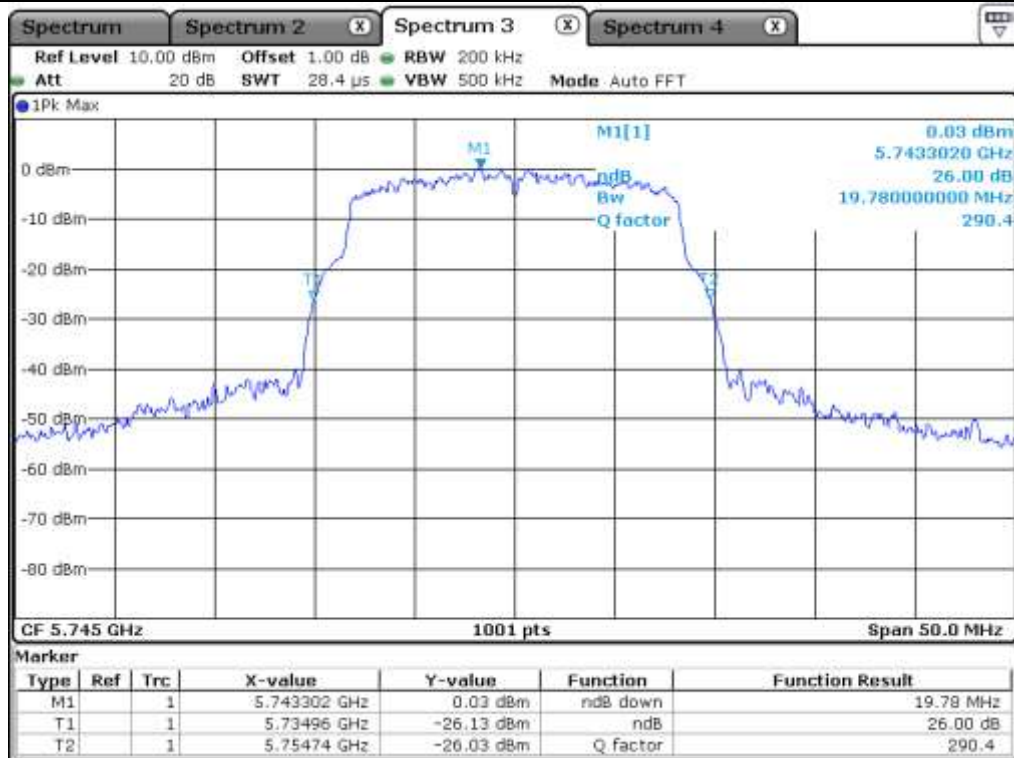
Low Channel (5 500 MHz)



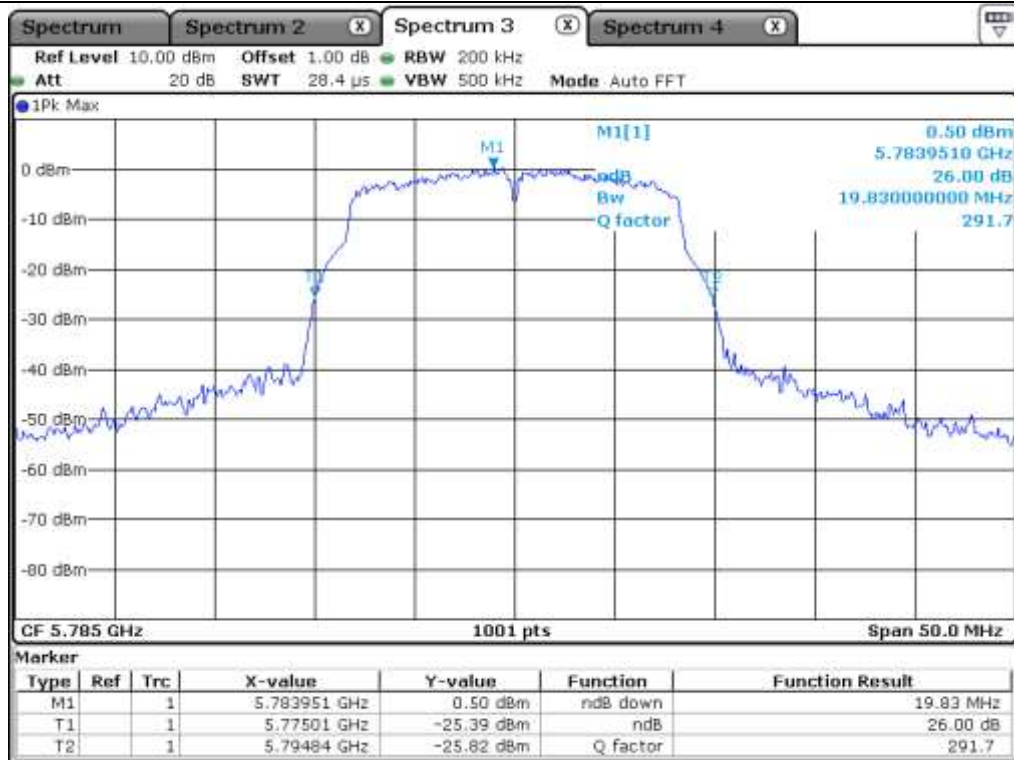
Middle Channel (5 580 MHz)



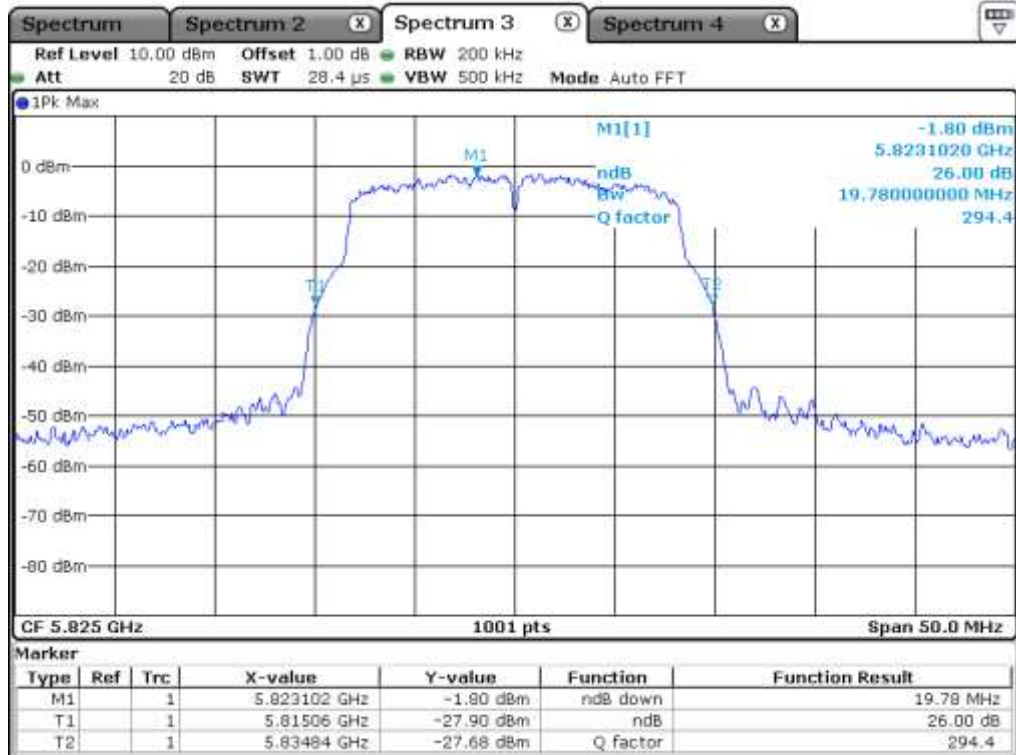
High Channel (5 700 MHz)



Low Channel (5 745 MHz)



Middle Channel (5 785 MHz)



High Channel (5 825 MHz)

7.4.3 Test data for Staddle Channel_Antenna 0

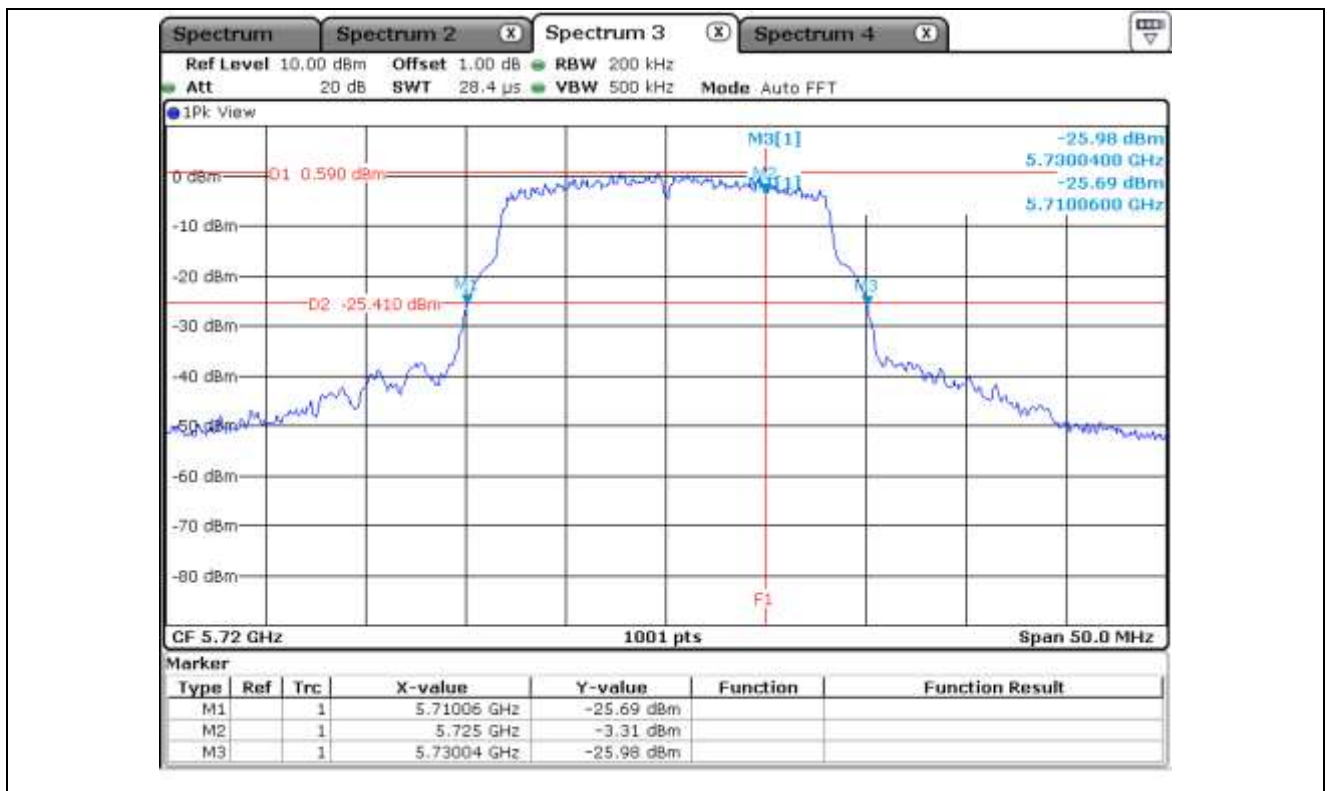
-. Test Date : December 02, 2019 ~ December 11, 2019

-. Test Result : Pass

FREQUENCY RANGE (MHz)	FREQUENCY (MHz)	26 dB Bandwidth (MHz)
5 470 ~ 5 725	5 720.00	14.94
5 725 ~ 5 850	5 720.00	5.04



Tested by: Ha-Ram, Lee / Assistant Manager



7.4.4 Test data for Staddle Channel_Antenna 1

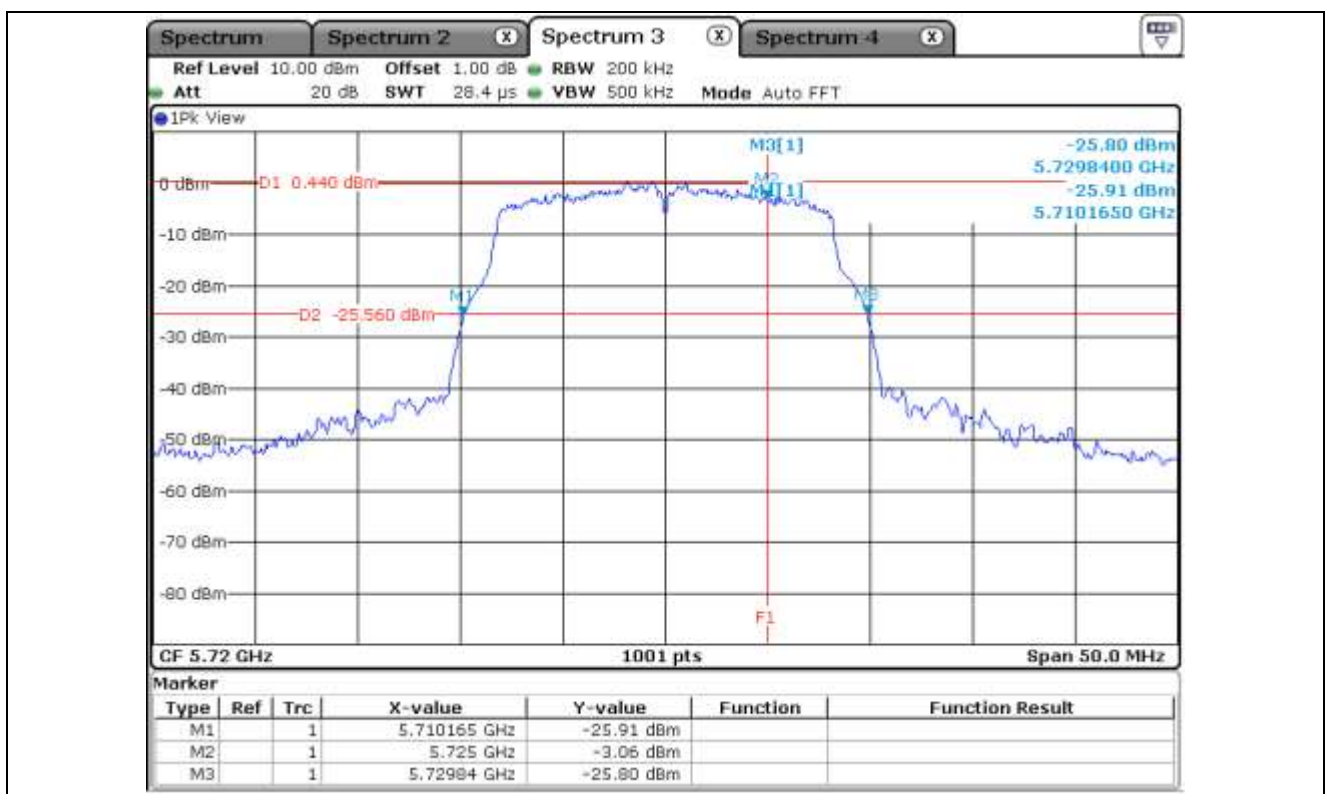
-. Test Date : December 02, 2019 ~ December 11, 2019

-. Test Result : Pass

FREQUENCY RANGE (MHz)	FREQUENCY (MHz)	26 dB Bandwidth (MHz)
5 470 ~ 5 725	5 720.00	14.84
5 725 ~ 5 850	5 720.00	4.84



Tested by: Ha-Ram, Lee / Assistant Manager



7.5 Test data for 802.11n_HT20 RLAN Mode

7.5.1 Test data for Antenna 0

-. Test Date : December 02, 2019 ~ December 11, 2019

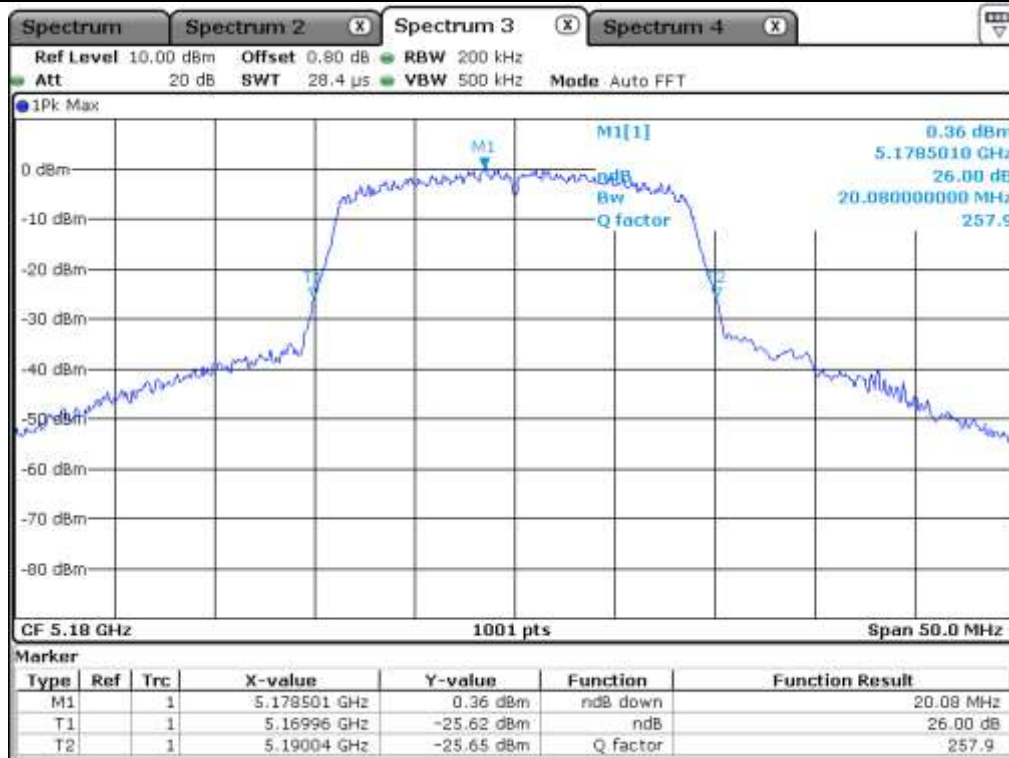
-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	26 dB Bandwidth (MHz)
5 150 ~ 5 250	Low	5 180.00	20.08
	Middle	5 220.00	20.28
	High	5 240.00	20.13
5 250 ~ 5 350	Low	5 260.00	20.18
	Middle	5 300.00	20.38
	High	5 320.00	20.18
5 470 ~ 5 725	Low	5 500.00	20.28
	Middle	5 580.00	20.33
	High	5 700.00	20.18
5 725 ~ 5 850	Low	5 745.00	20.23
	Middle	5 785.00	20.33
	High	5 825.00	20.18

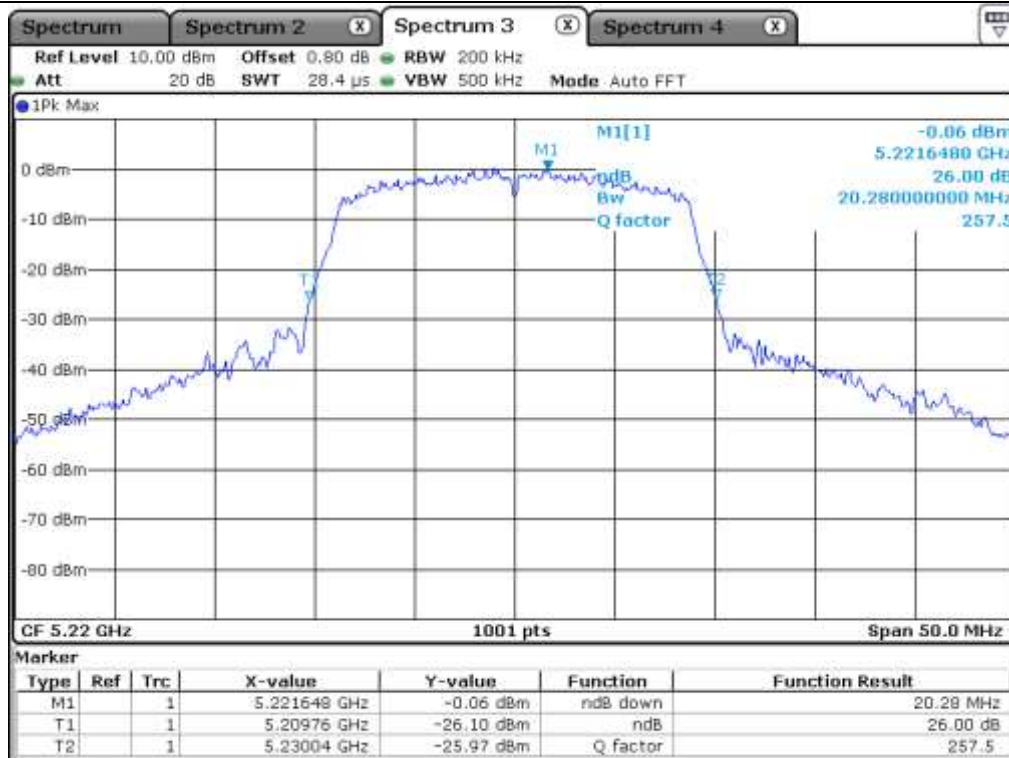
Remark: See next page for measurement data.



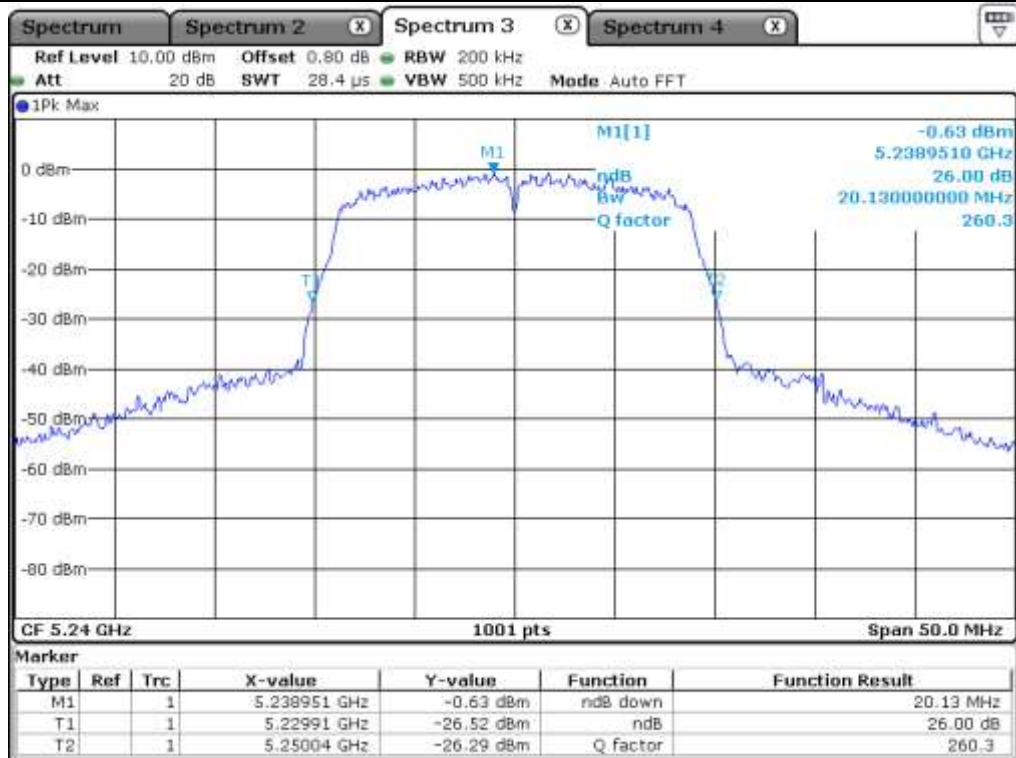
Tested by: Ha-Ram, Lee / Assistant Manager



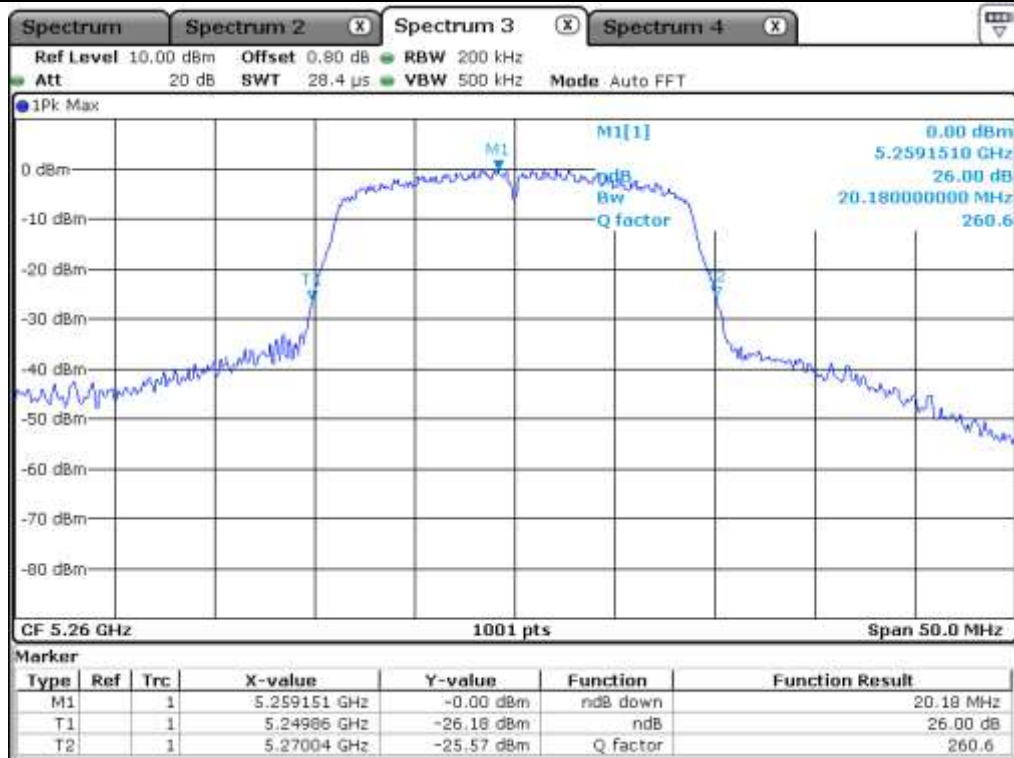
Low Channel (5 180 MHz)



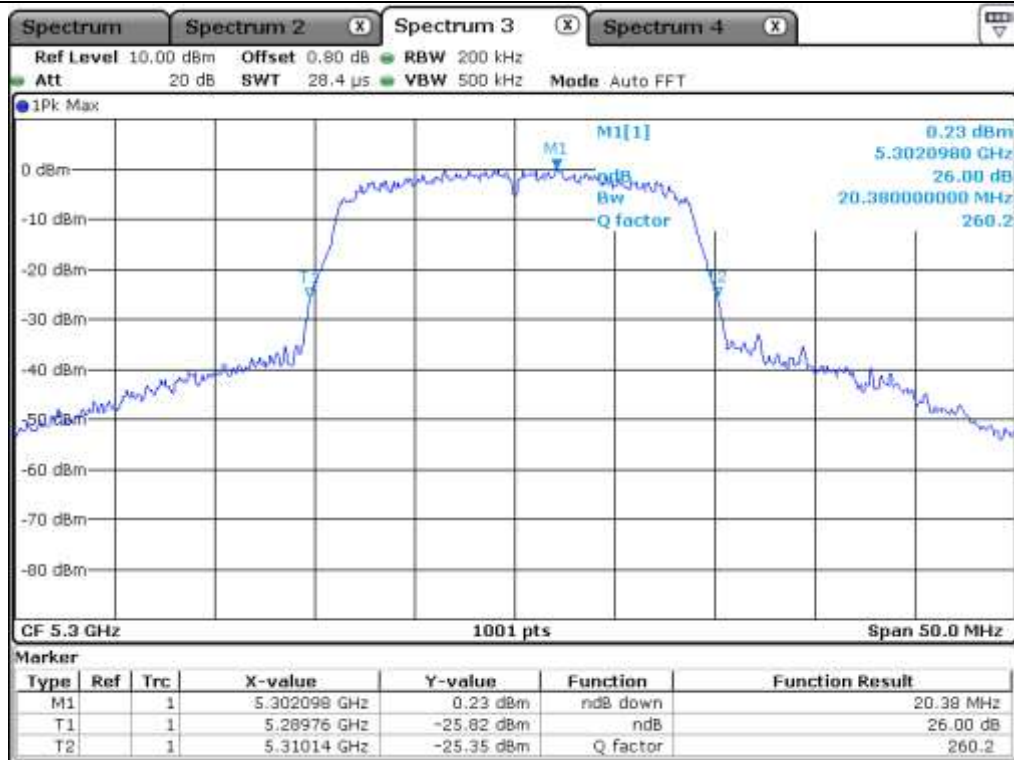
Middle Channel (5 220 MHz)



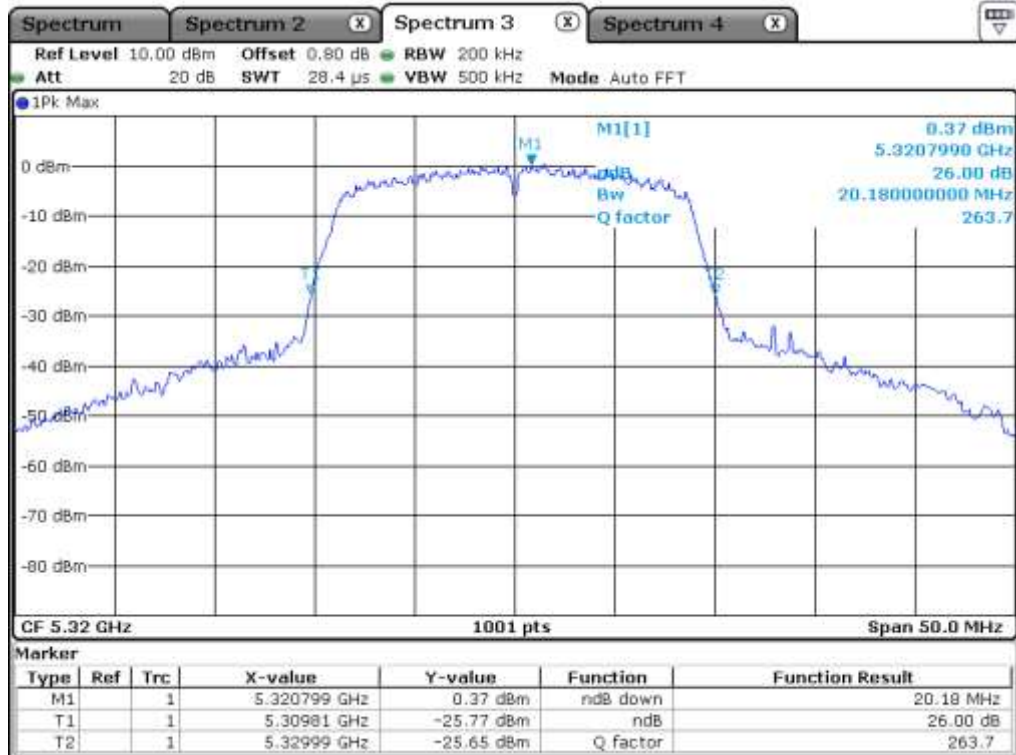
High Channel (5 240 MHz)



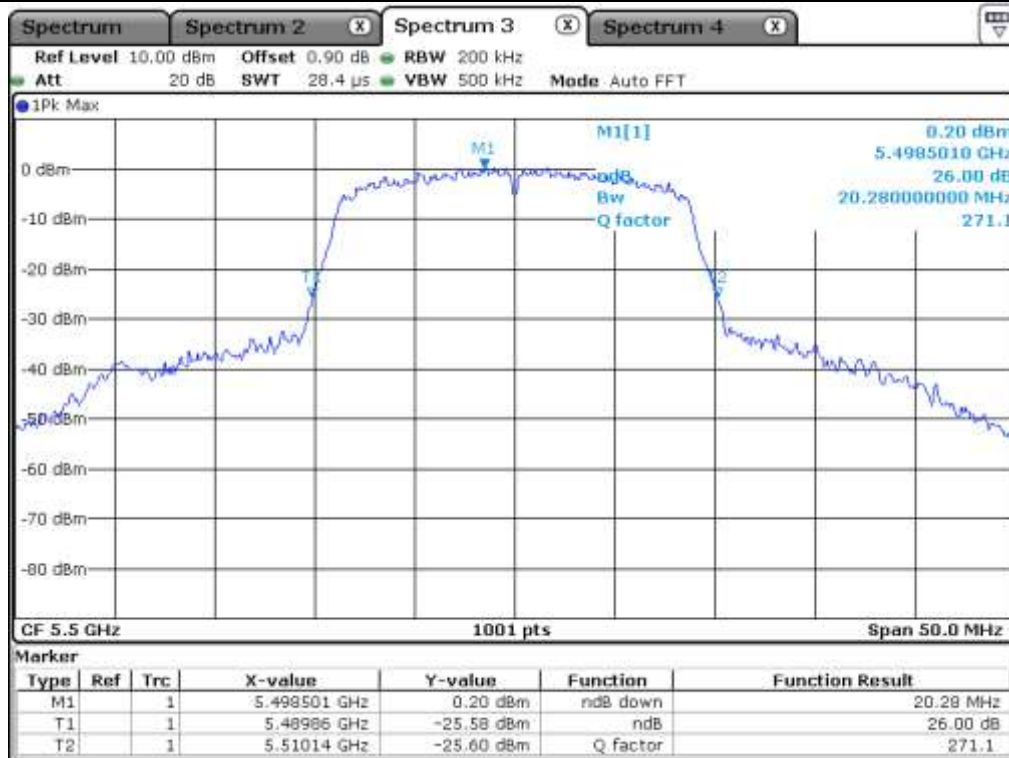
Low Channel (5 260 MHz)



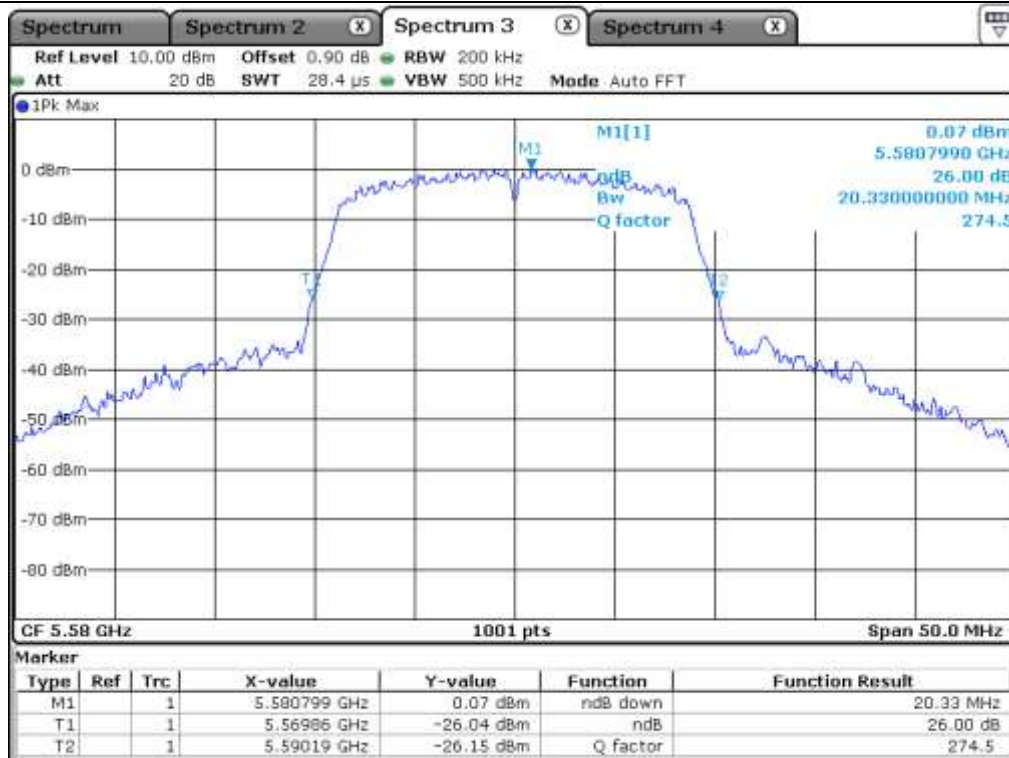
Middle Channel (5 300 MHz)



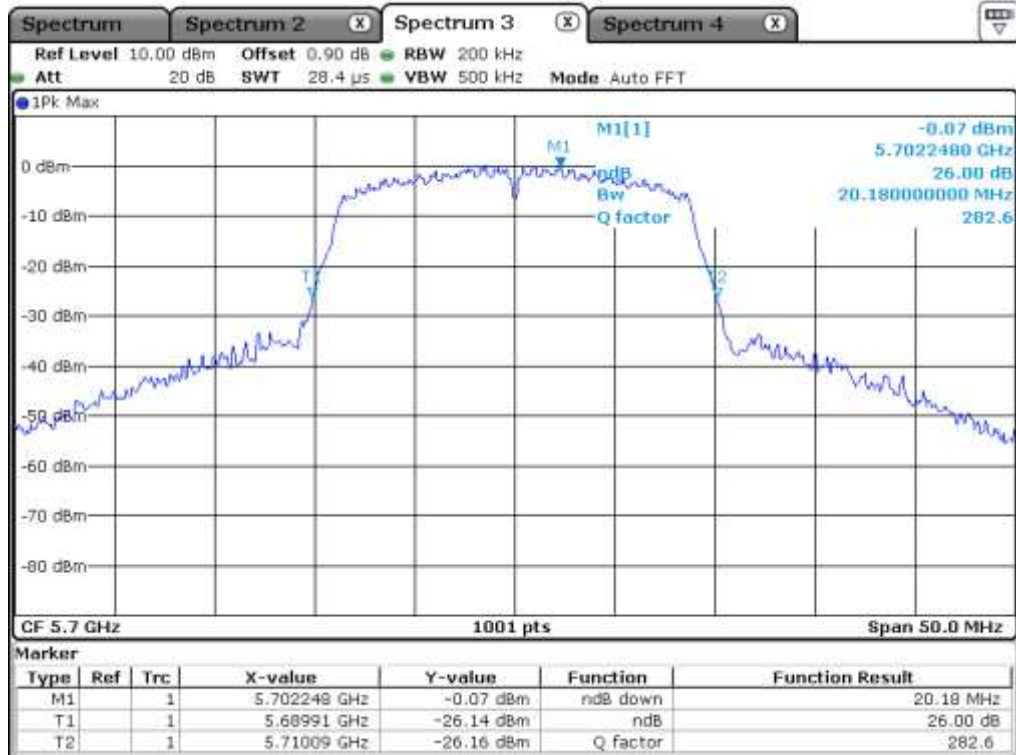
High Channel (5 320 MHz)



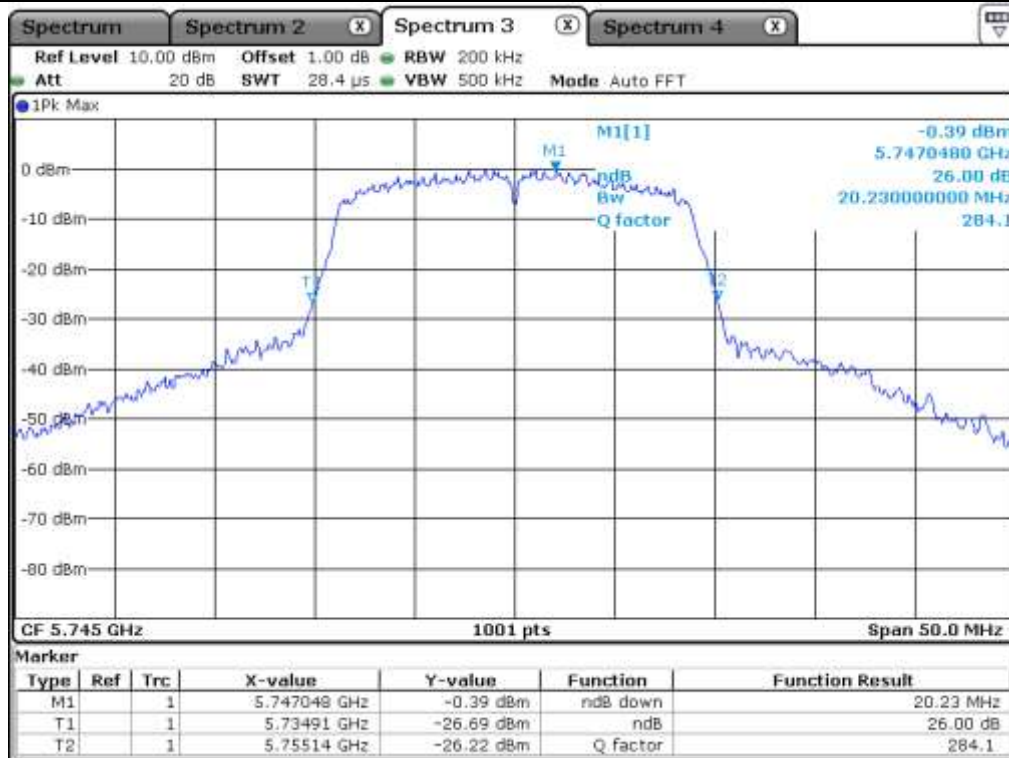
Low Channel (5 500 MHz)



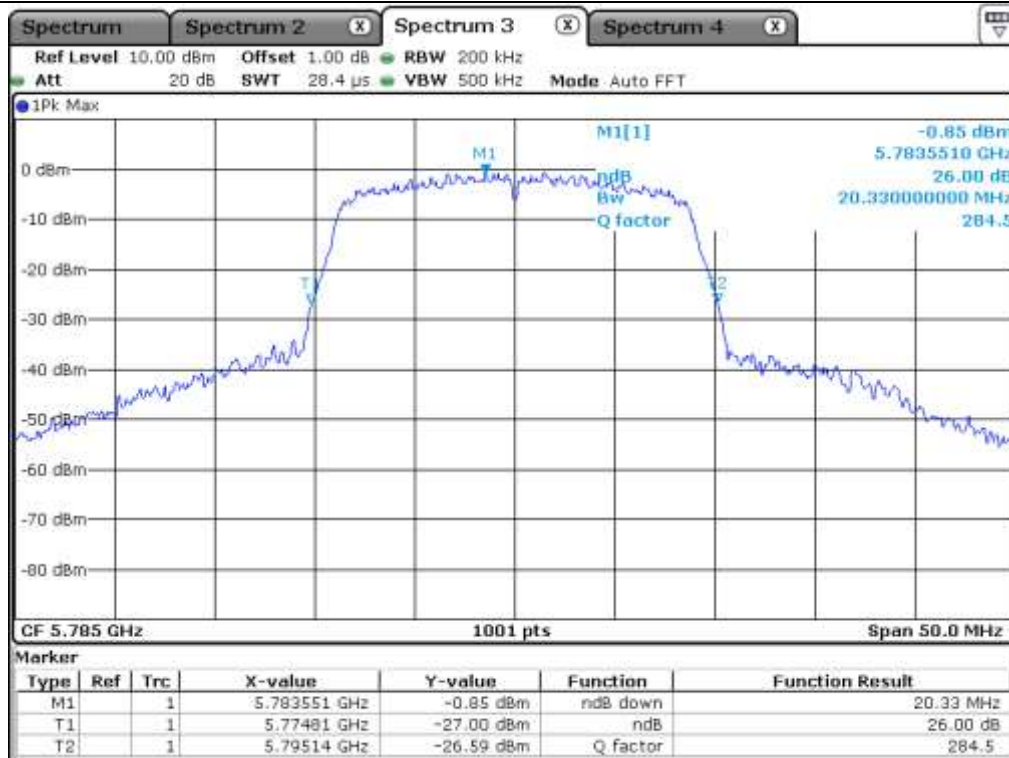
Middle Channel (5 580 MHz)



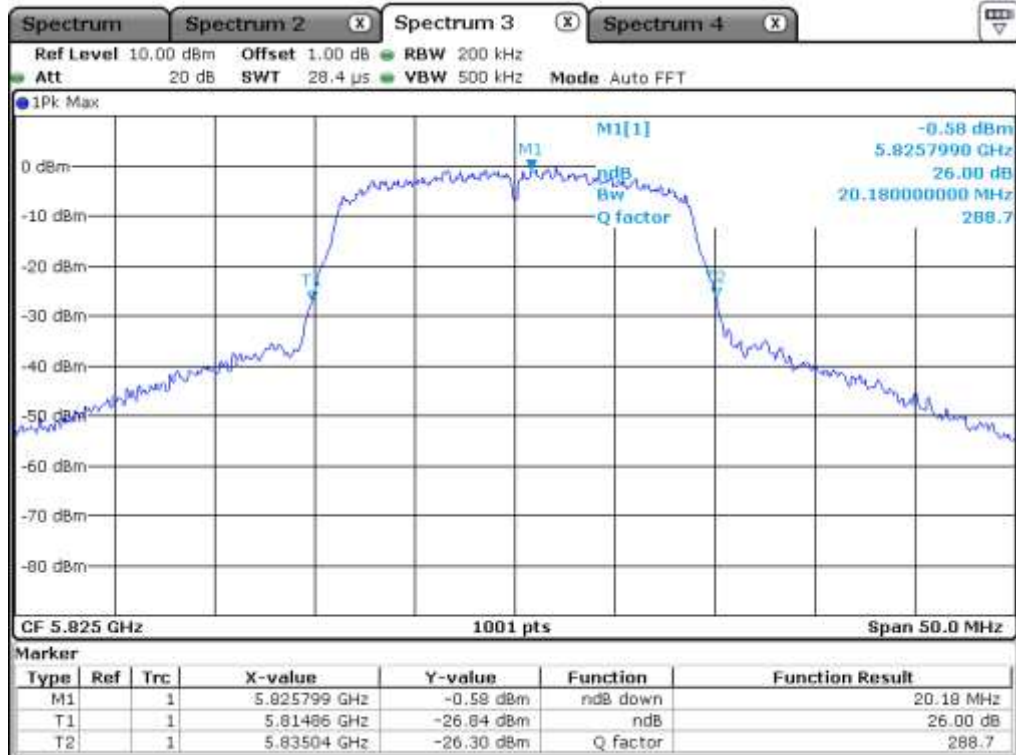
High Channel (5 700 MHz)



Low Channel (5 745 MHz)



Middle Channel (5 785 MHz)



High Channel (5 825 MHz)

7.5.2 Test data for Antenna 1

-. Test Date : December 02, 2019 ~ December 11, 2019

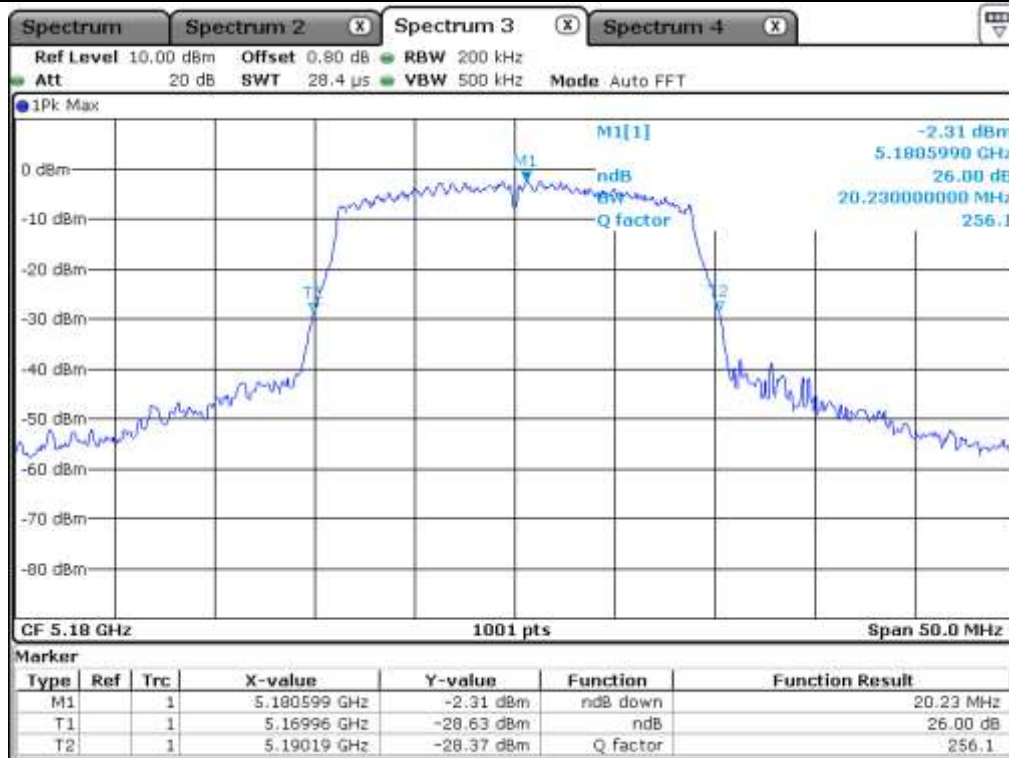
-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	26 dB Bandwidth (MHz)
5 150 ~ 5 250	Low	5 180.00	20.23
	Middle	5 220.00	20.03
	High	5 240.00	20.03
5 250 ~ 5 350	Low	5 260.00	20.03
	Middle	5 300.00	19.98
	High	5 320.00	20.03
5 470 ~ 5 725	Low	5 500.00	20.03
	Middle	5 580.00	20.18
	High	5 700.00	20.08
5 725 ~ 5 850	Low	5 745.00	19.93
	Middle	5 785.00	20.13
	High	5 825.00	19.98

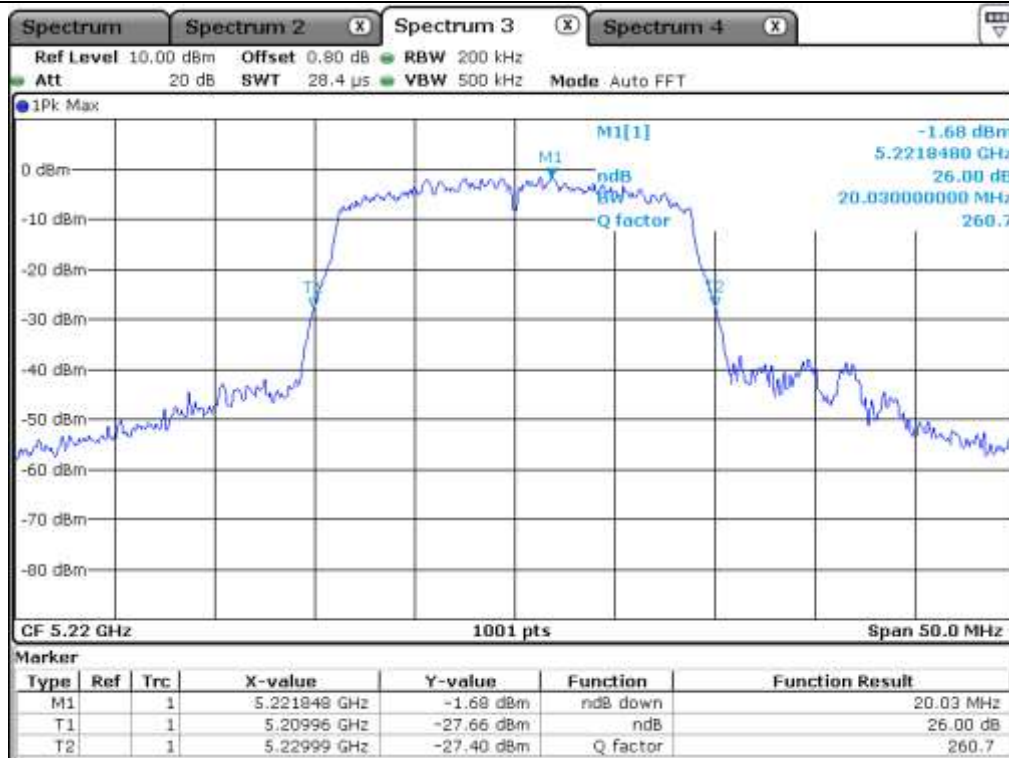
Remark: See next page for measurement data.



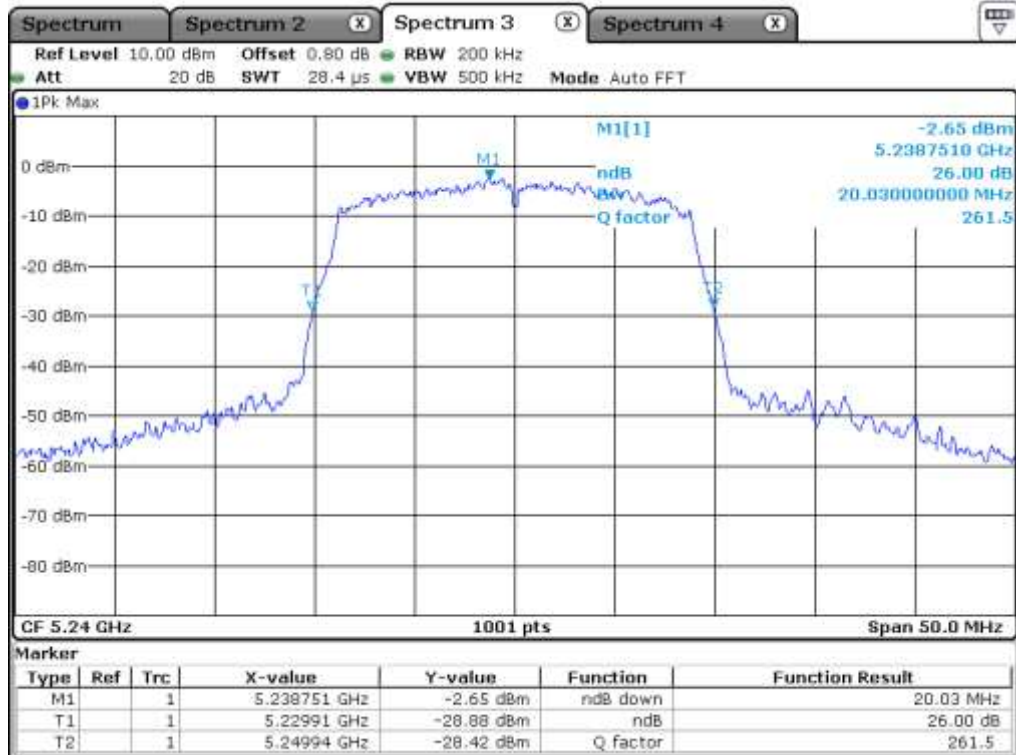
Tested by: Ha-Ram, Lee / Assistant Manager



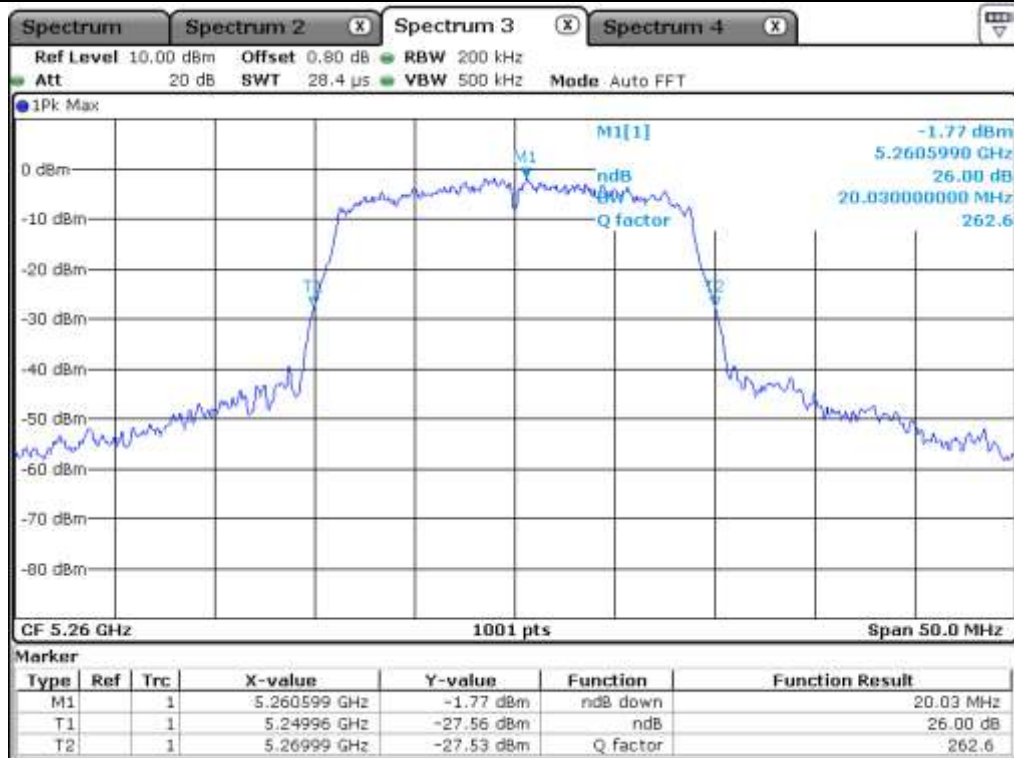
Low Channel (5 180 MHz)



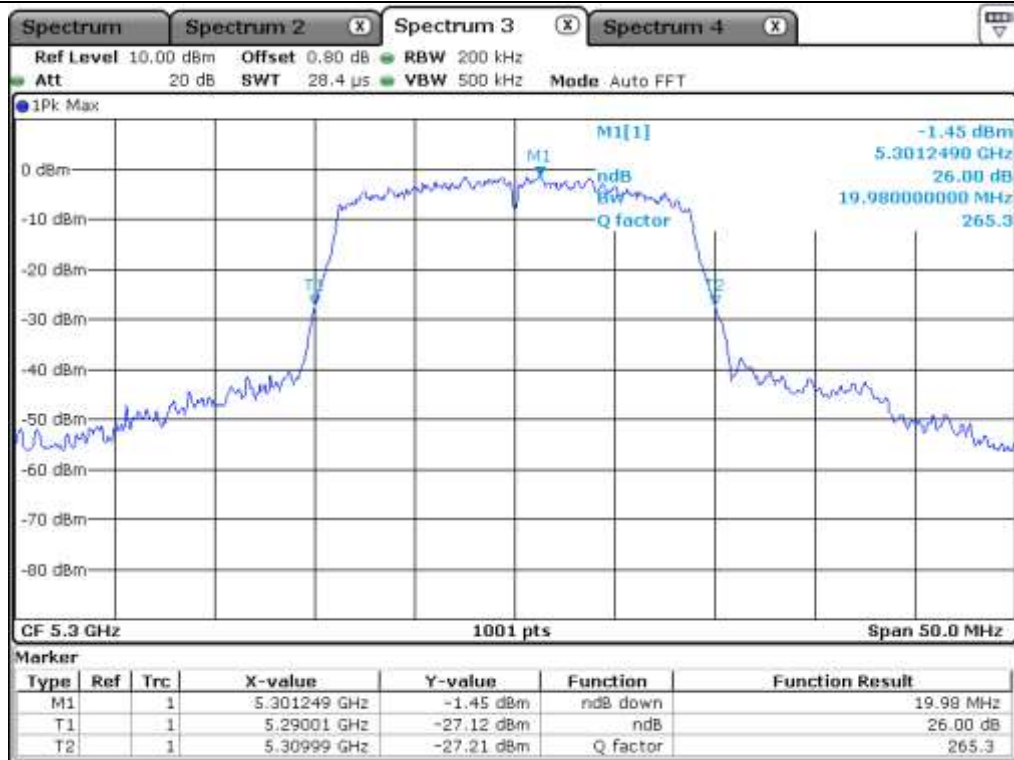
Middle Channel (5 220 MHz)



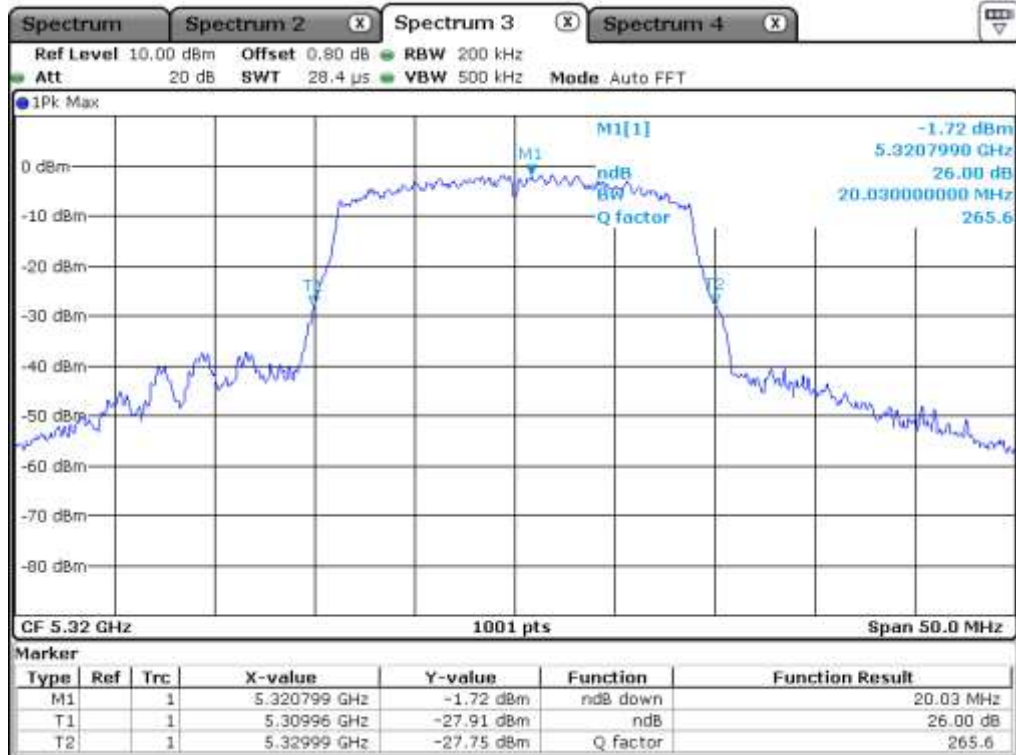
High Channel (5 240 MHz)



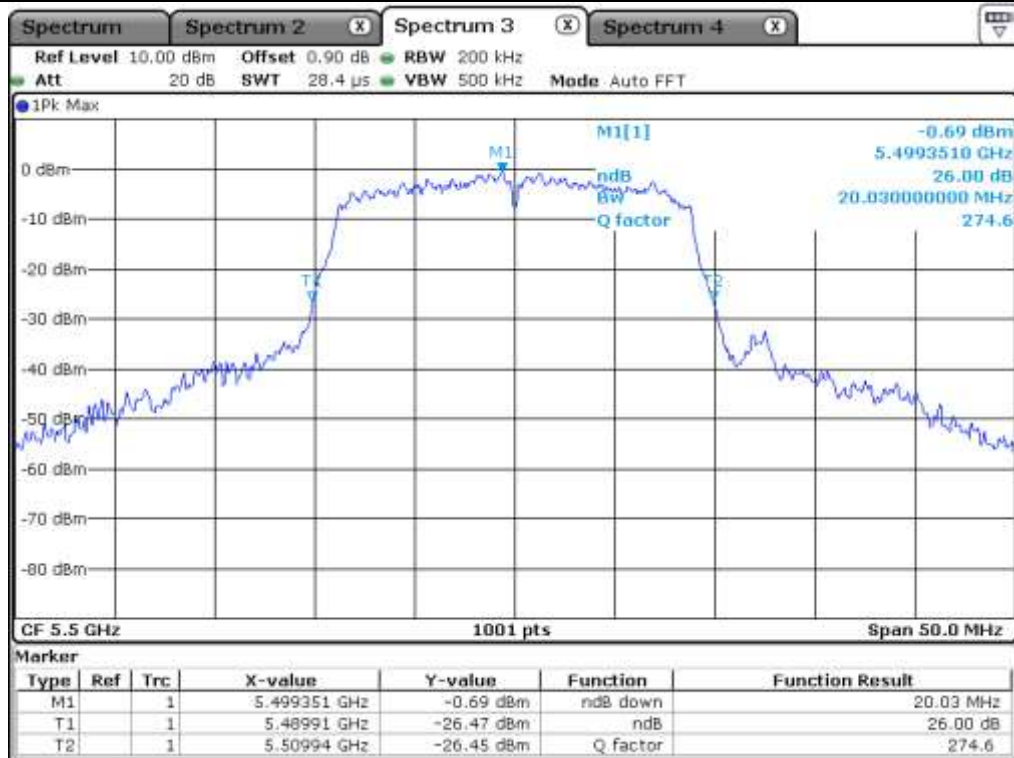
Low Channel (5 260 MHz)



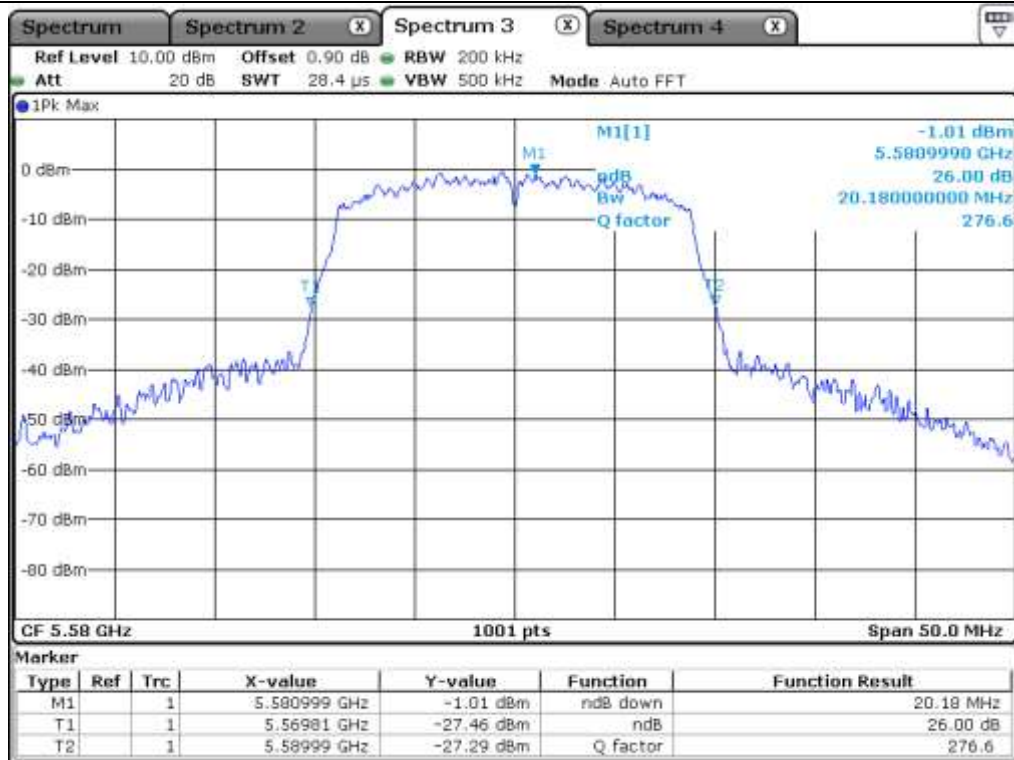
Middle Channel (5 300 MHz)



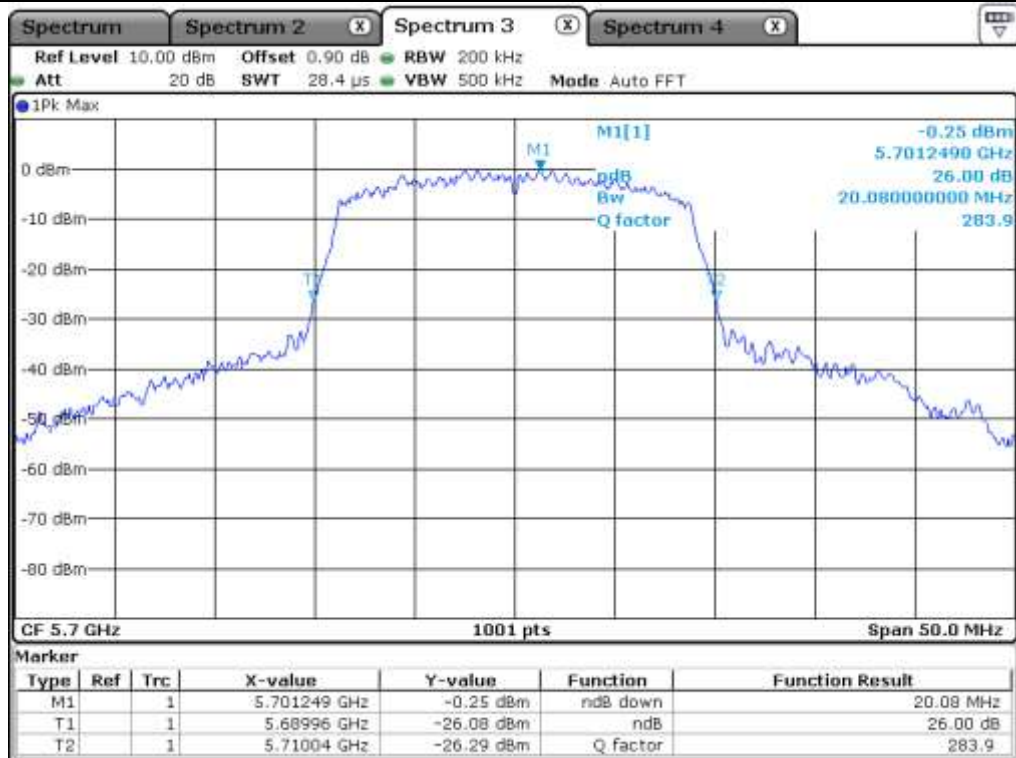
High Channel (5 320 MHz)



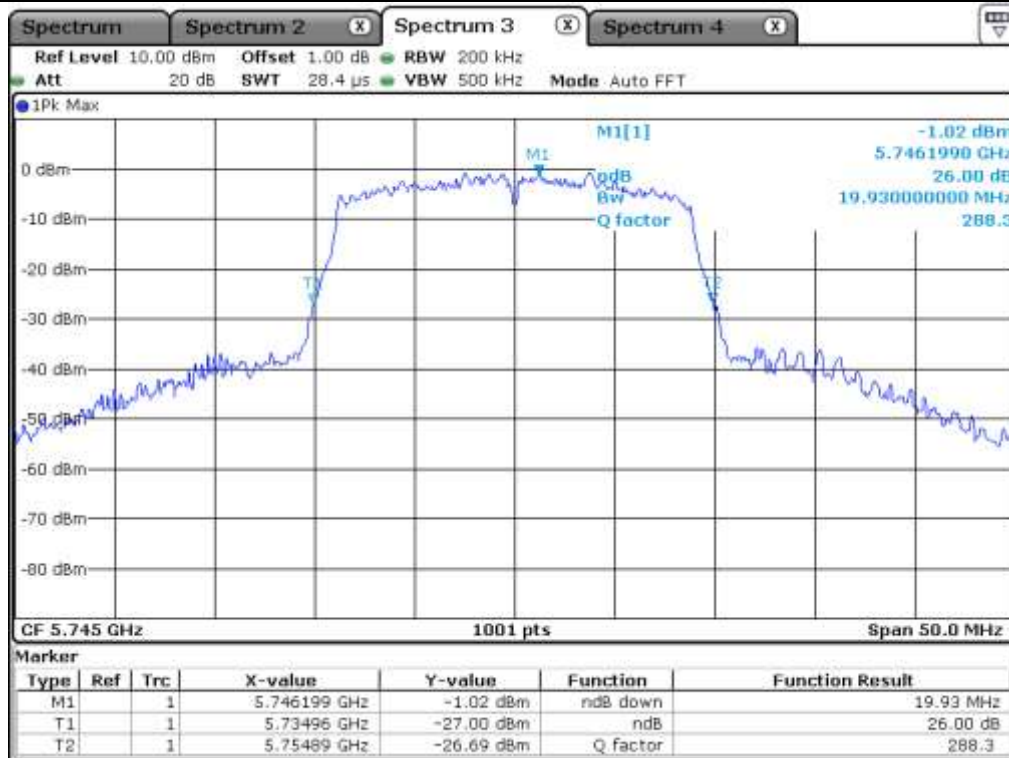
Low Channel (5 500 MHz)



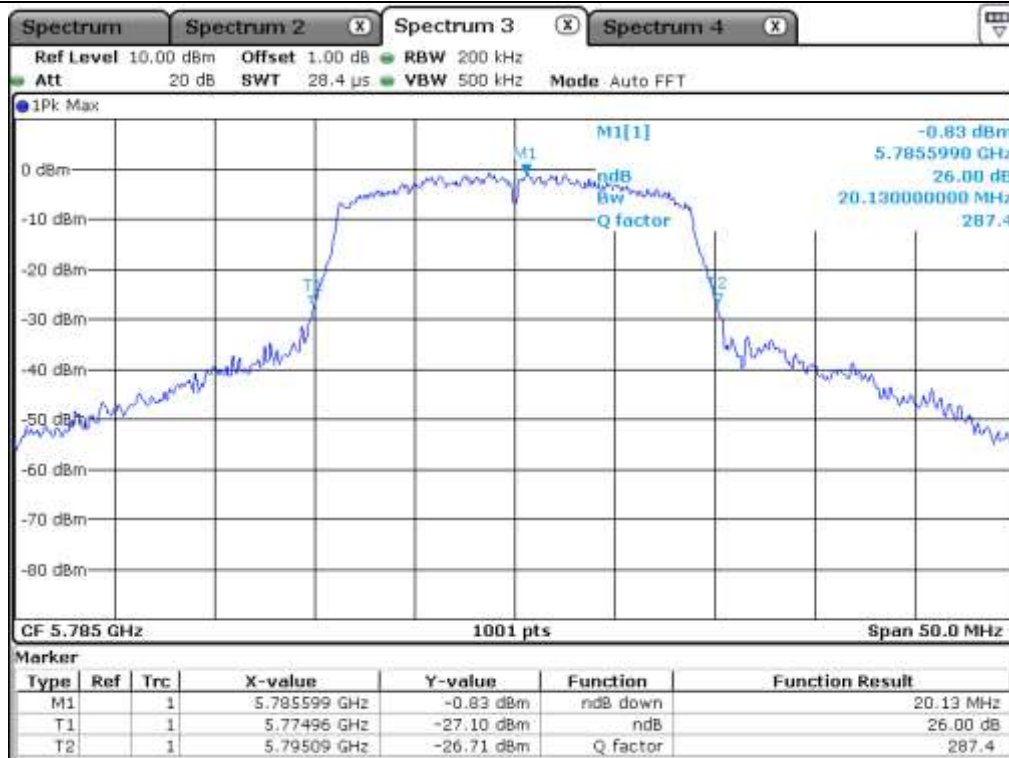
Middle Channel (5 580 MHz)



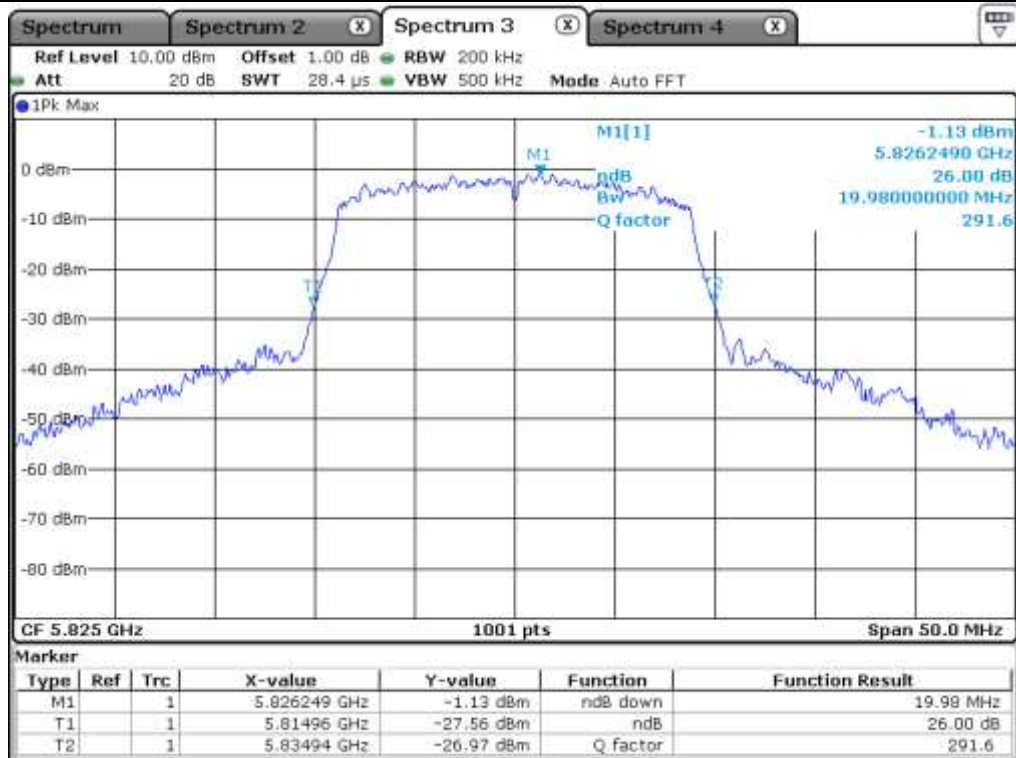
High Channel (5 700 MHz)



Low Channel (5 745 MHz)



Middle Channel (5 785 MHz)



High Channel (5 825 MHz)

7.4.3 Test data for Staddle Channel_Antenna 0

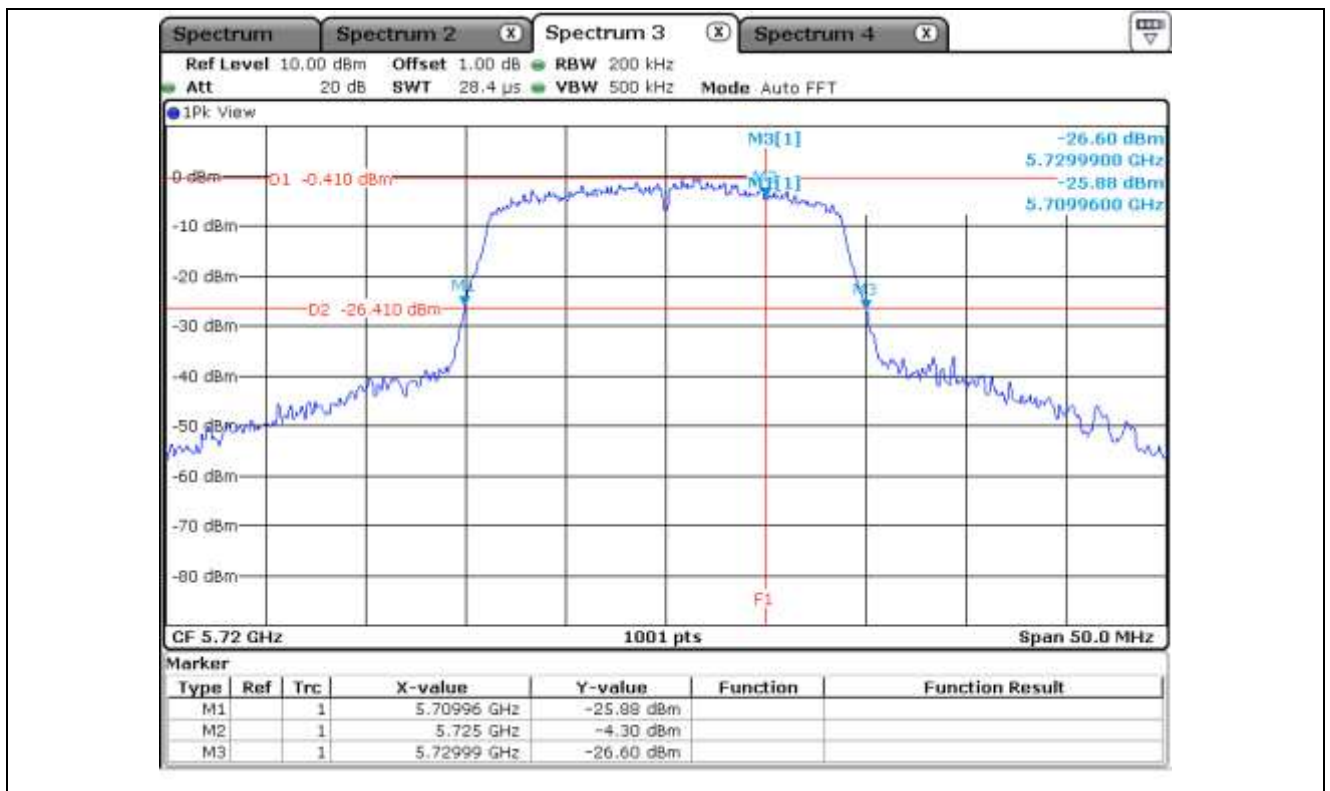
-. Test Date : December 02, 2019 ~ December 11, 2019

-. Test Result : Pass

FREQUENCY RANGE (MHz)	FREQUENCY (MHz)	26 dB Bandwidth (MHz)
5 470 ~ 5 725	5 720.00	15.04
5 725 ~ 5 850	5 720.00	4.99



Tested by: Ha-Ram, Lee / Assistant Manager



7.4.4 Test data for Staddle Channel_Antenna 1

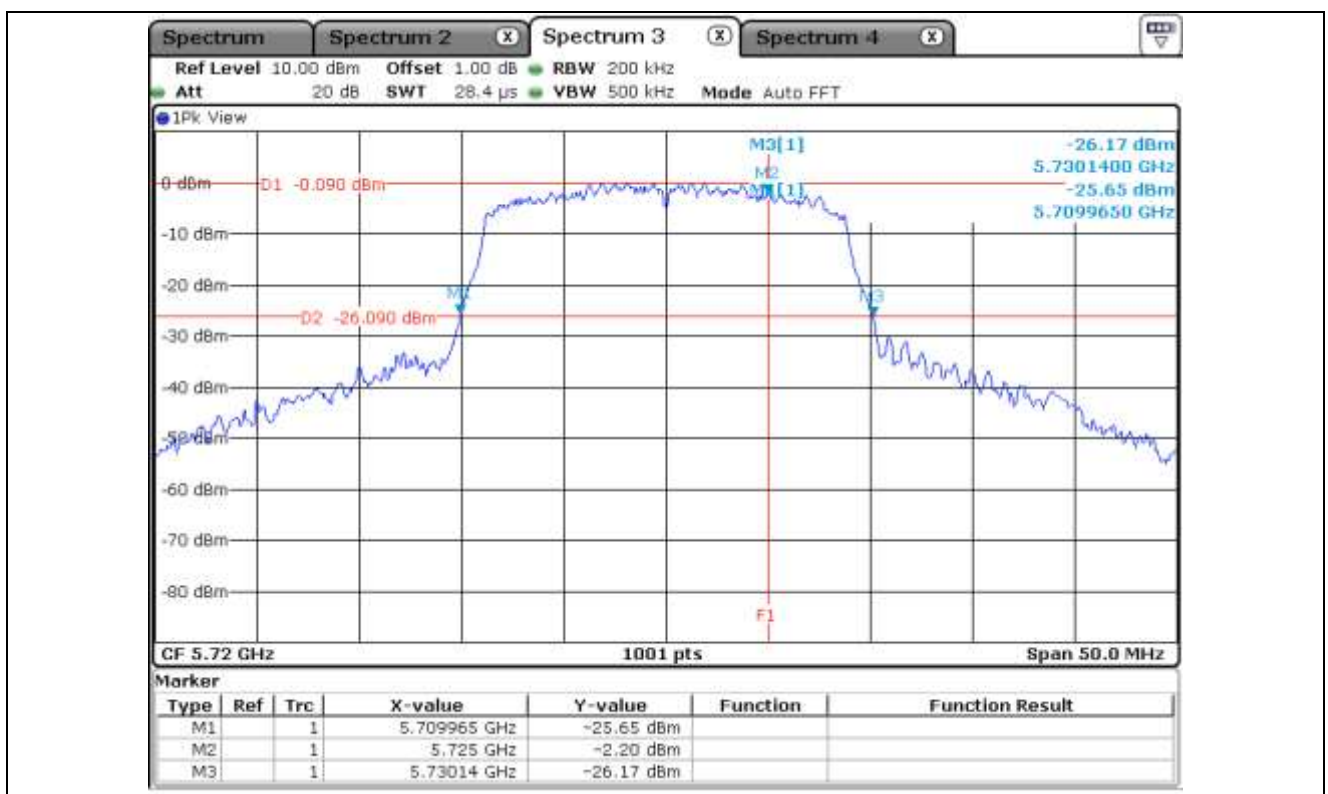
-. Test Date : December 02, 2019 ~ December 11, 2019

-. Test Result : Pass

FREQUENCY RANGE (MHz)	FREQUENCY (MHz)	26 dB Bandwidth (MHz)
5 470 ~ 5 725	5 720.00	15.04
5 725 ~ 5 850	5 720.00	5.14



Tested by: Ha-Ram, Lee / Assistant Manager



7.6 Test data for 802.11n_HT40 RLAN Mode

7.6.1 Test data for Antenna 0

-. Test Date : December 02, 2019 ~ December 11, 2019

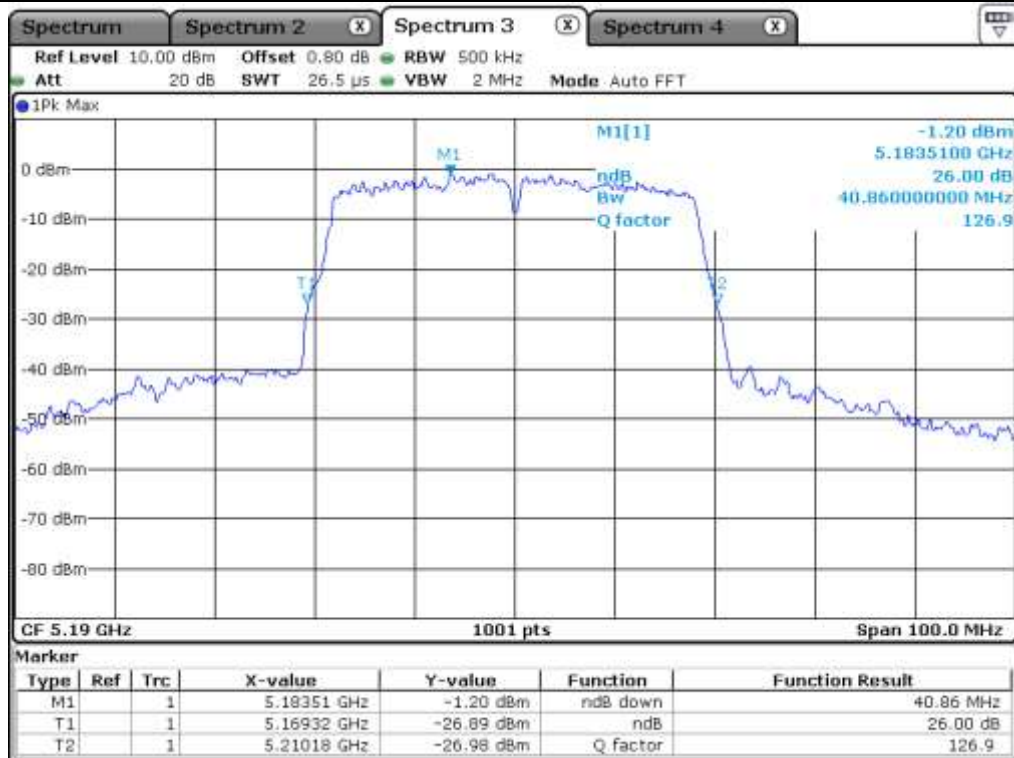
-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	26 dB Bandwidth (MHz)
5 150 ~ 5 250	Low	5 190.00	40.86
	High	5 230.00	40.66
5 250 ~ 5 350	Low	5 270.00	40.86
	High	5 310.00	40.86
5 470 ~ 5 725	Low	5 510.00	40.66
	Middle	5 550.00	40.86
	High	5 670.00	40.86
5 725 ~ 5 850	Low	5 755.00	40.76
	High	5 795.00	40.86

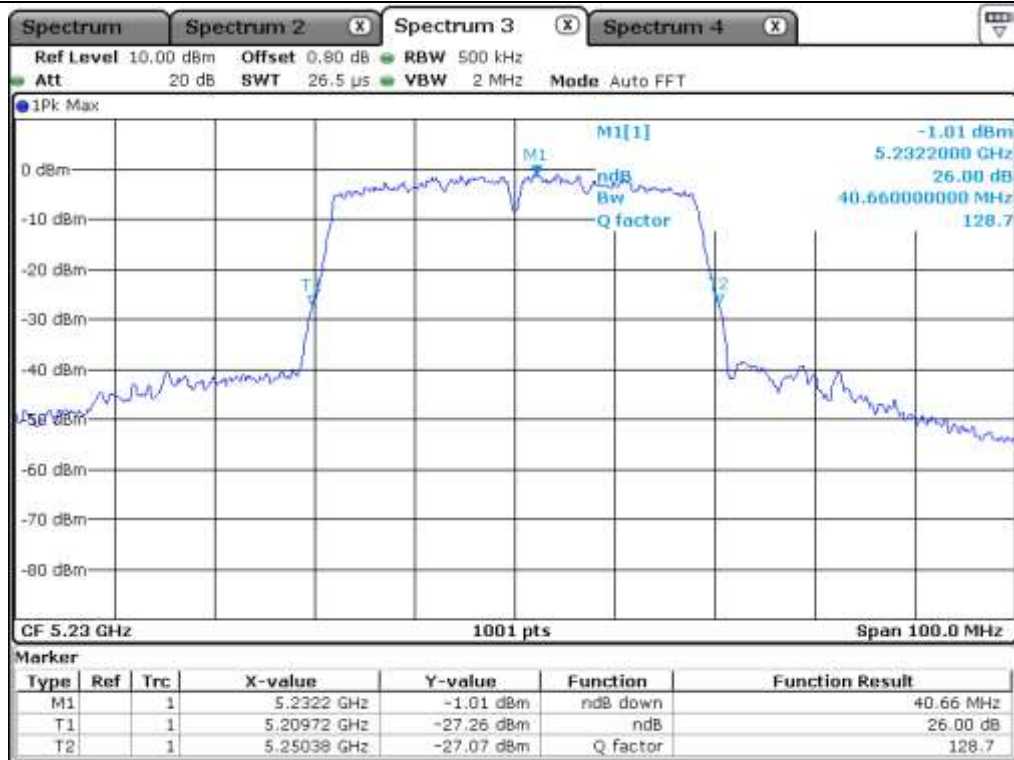
Remark: See next page for measurement data.



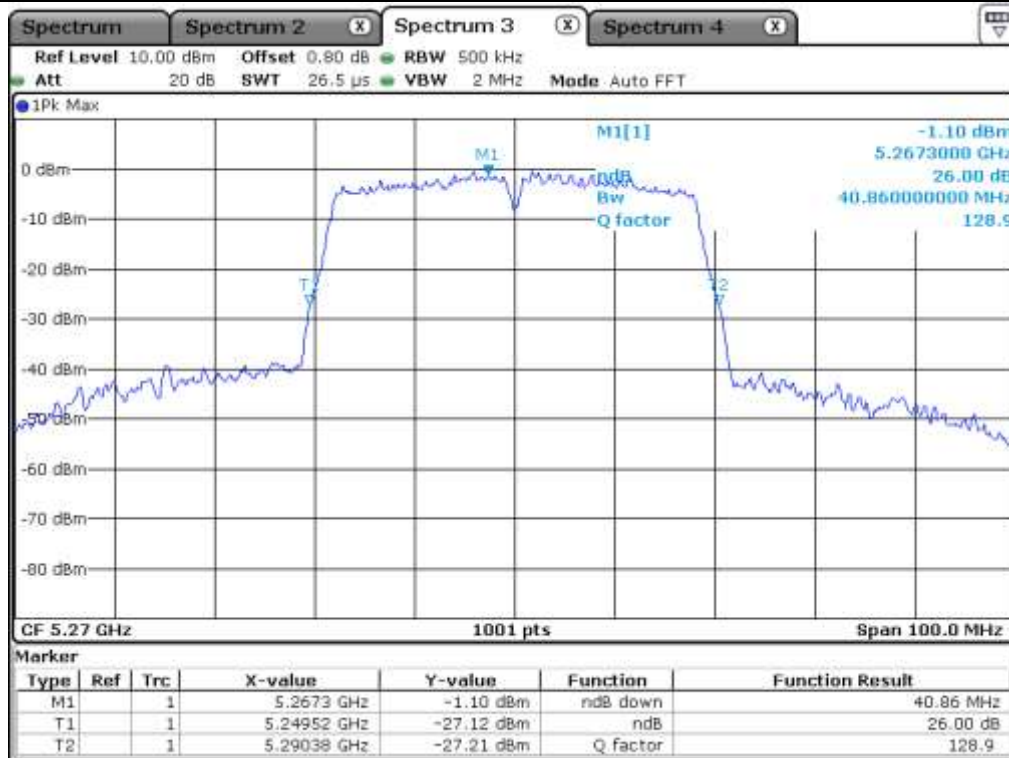
Tested by: Ha-Ram, Lee / Assistant Manager



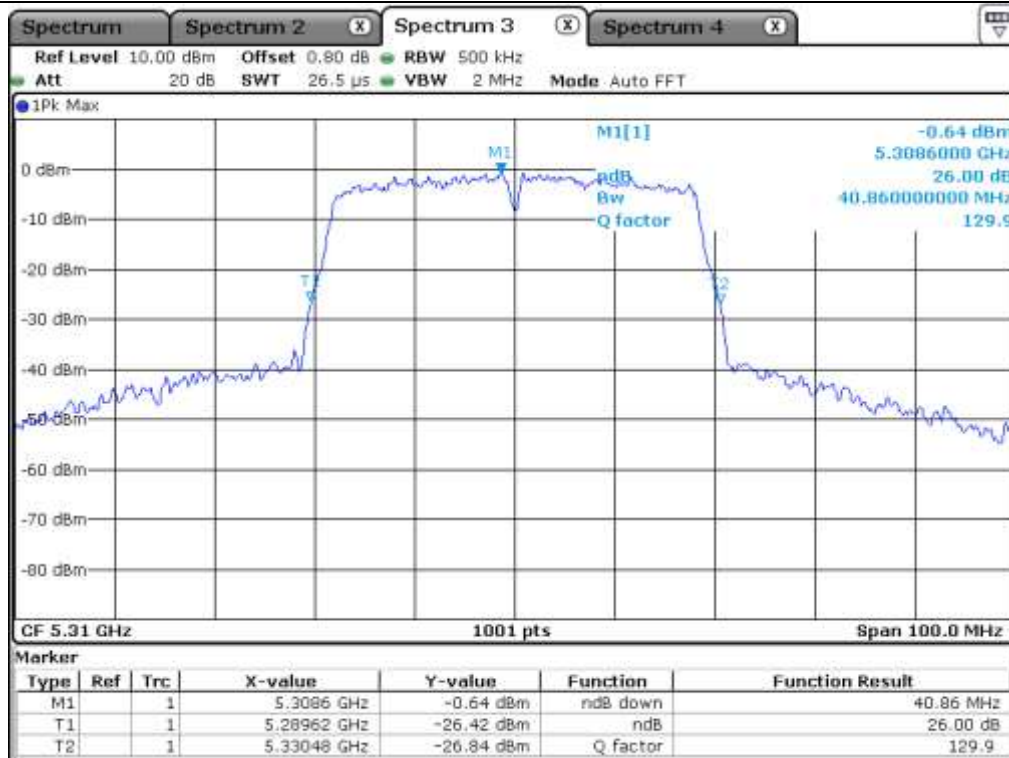
Low Channel (5 190 MHz)



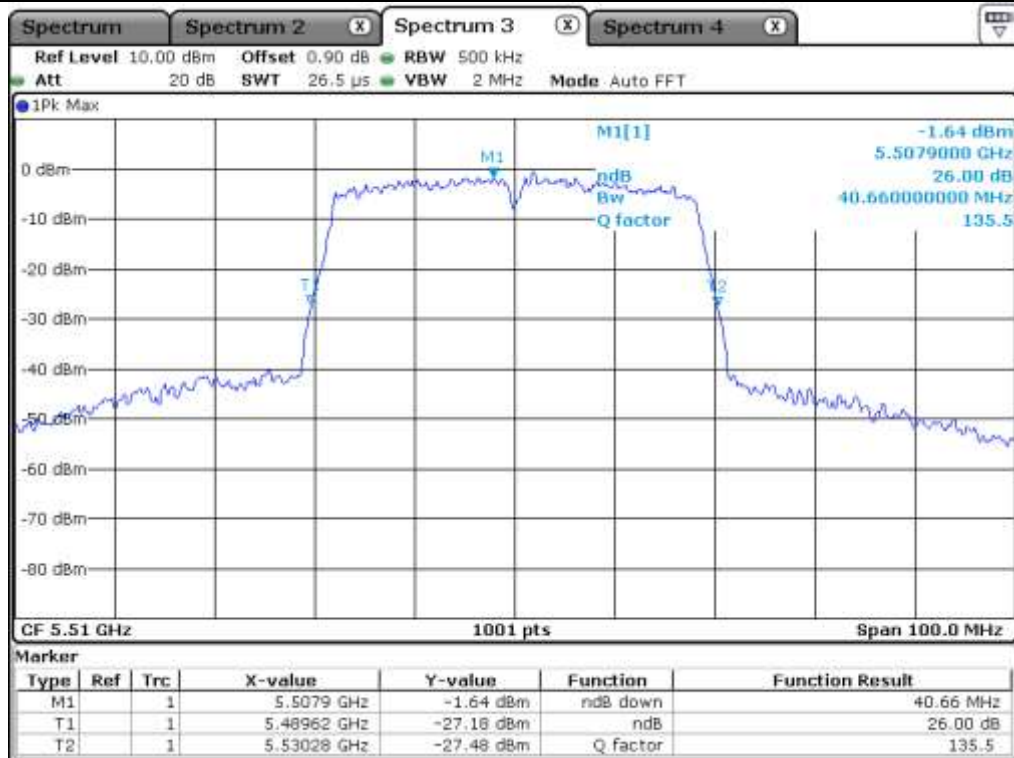
High Channel (5 230 MHz)



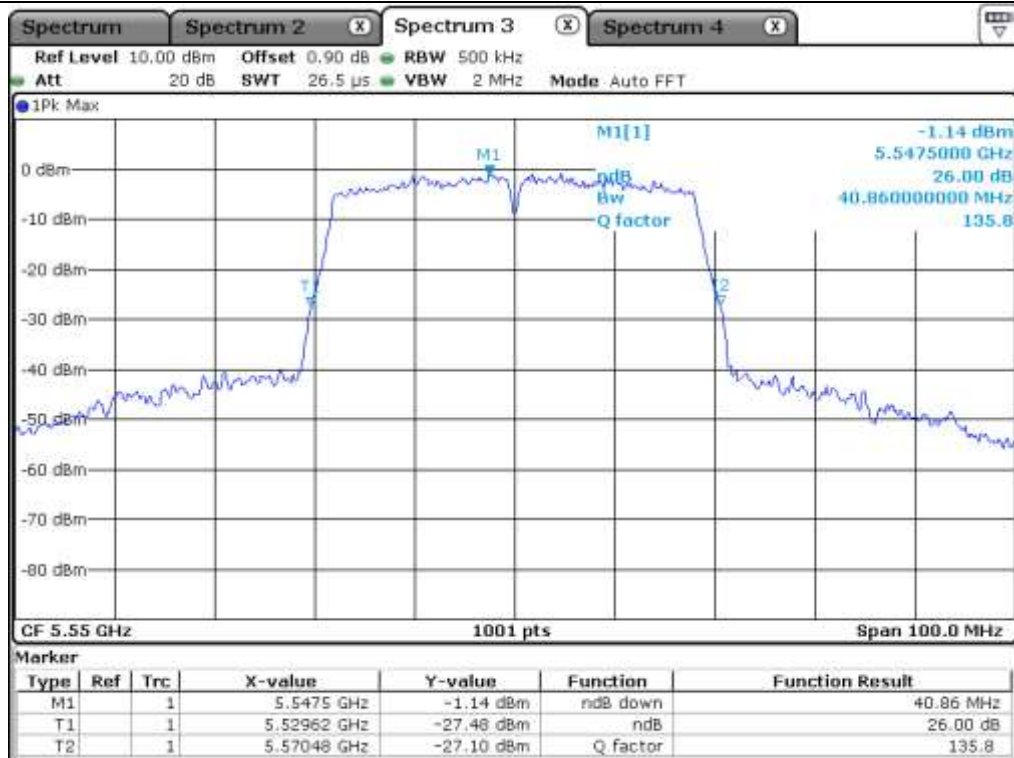
Low Channel (5 270 MHz)



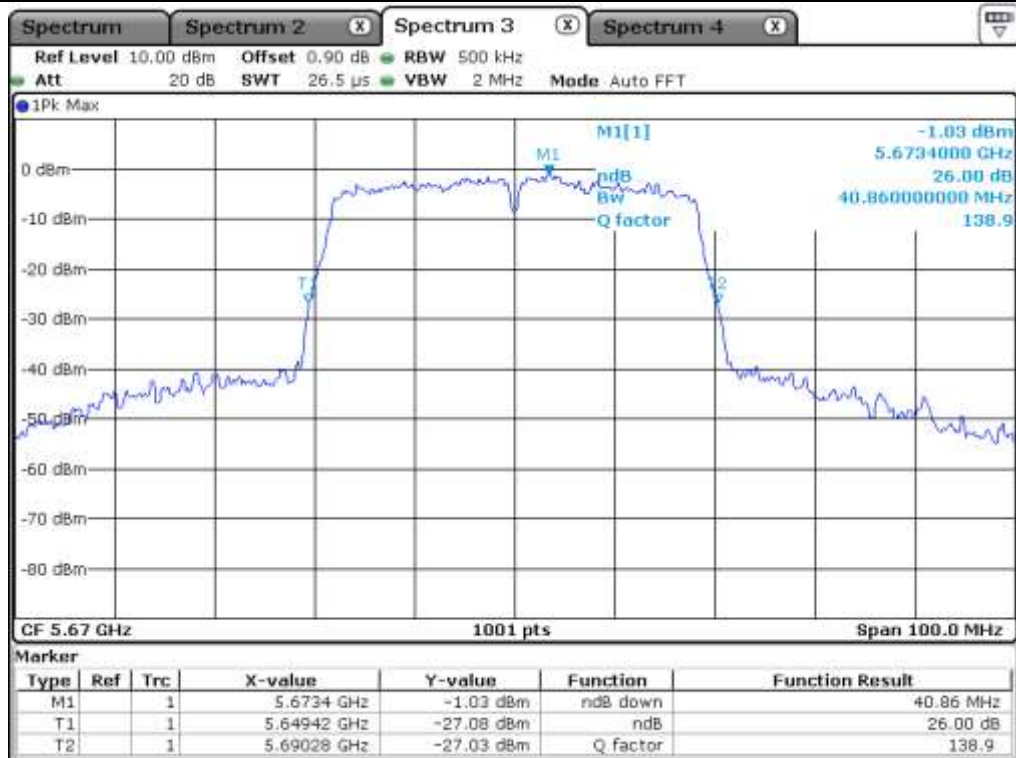
High Channel (5 310 MHz)



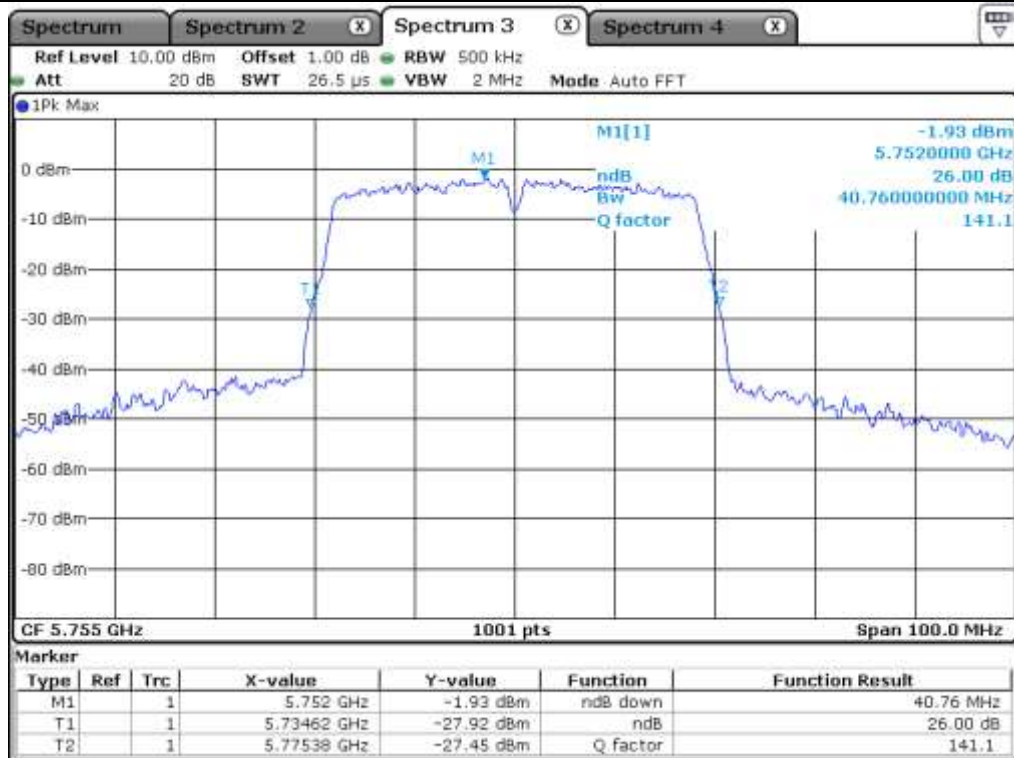
Low Channel (5 510 MHz)



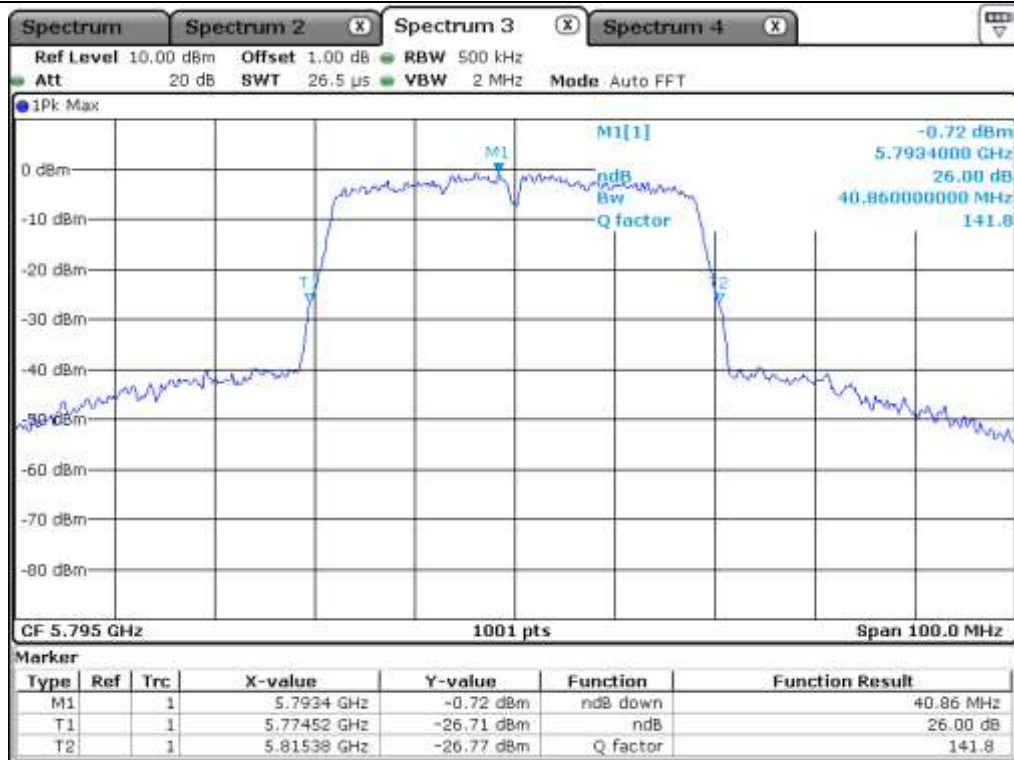
Middle Channel (5 550 MHz)



High Channel (5 670 MHz)



Low Channel (5 755 MHz)



High Channel (5 795 MHz)

7.6.2 Test data for Antenna 1

-. Test Date : December 02, 2019 ~ December 11, 2019

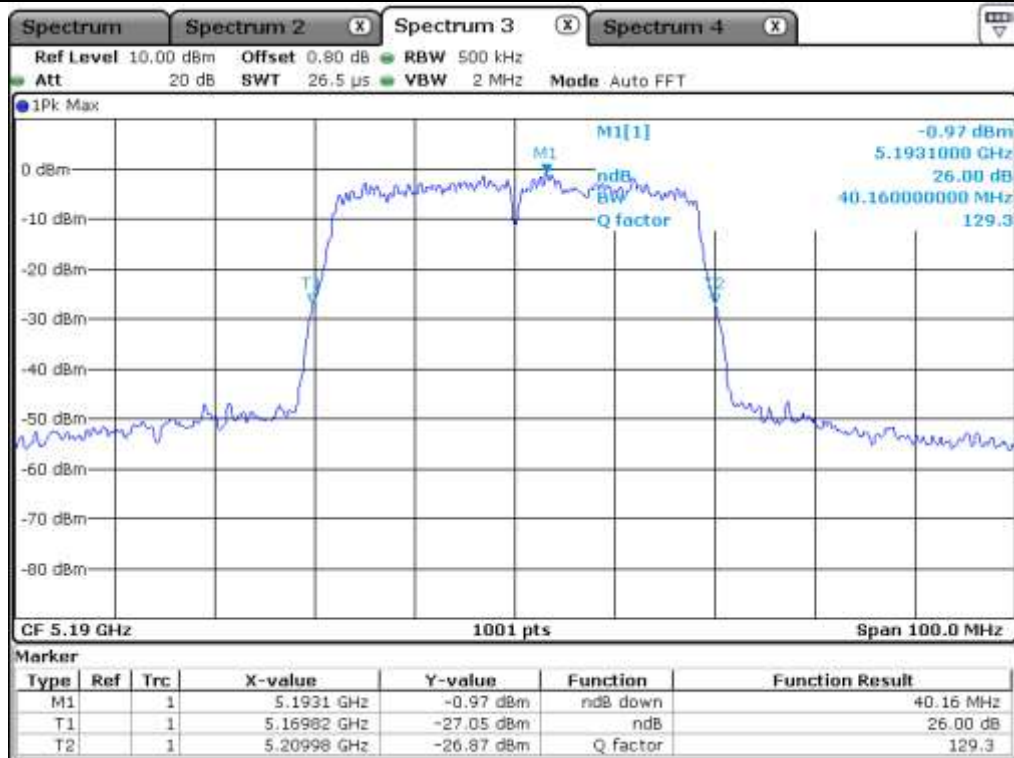
-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	26 dB Bandwidth (MHz)
5 150 ~ 5 250	Low	5 190.00	40.16
	High	5 230.00	40.26
5 250 ~ 5 350	Low	5 270.00	39.86
	High	5 310.00	40.66
5 470 ~ 5 725	Low	5 510.00	40.46
	Middle	5 550.00	40.36
	High	5 670.00	40.06
5 725 ~ 5 850	Low	5 755.00	40.26
	High	5 795.00	40.06

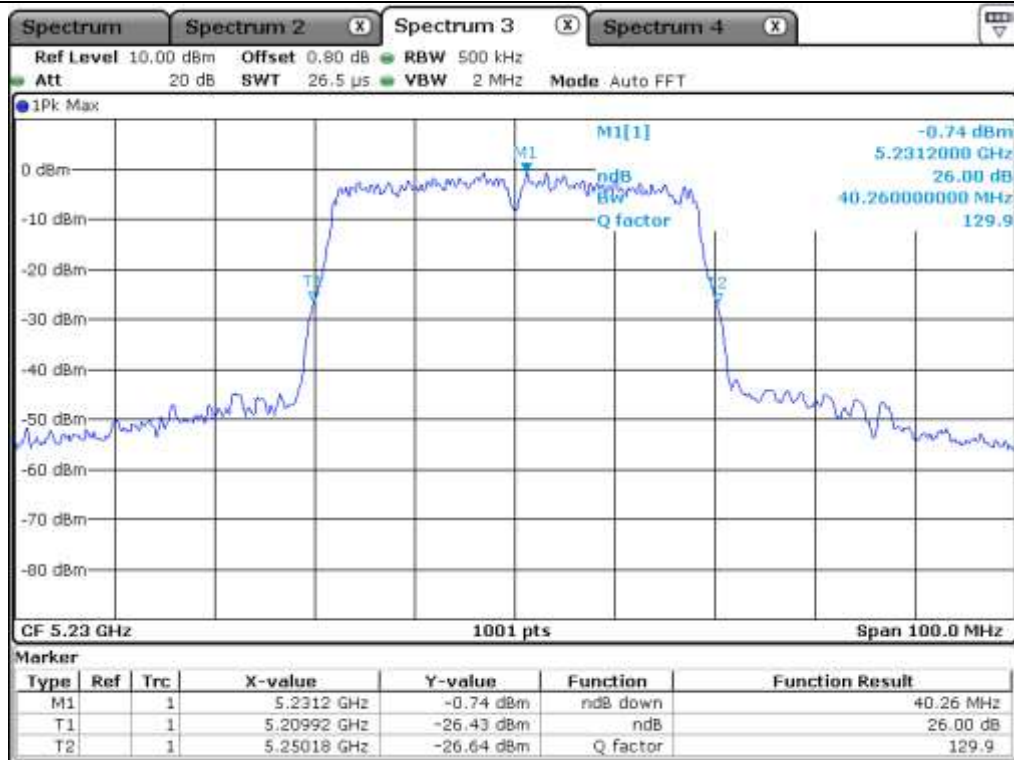
Remark: See next page for measurement data.



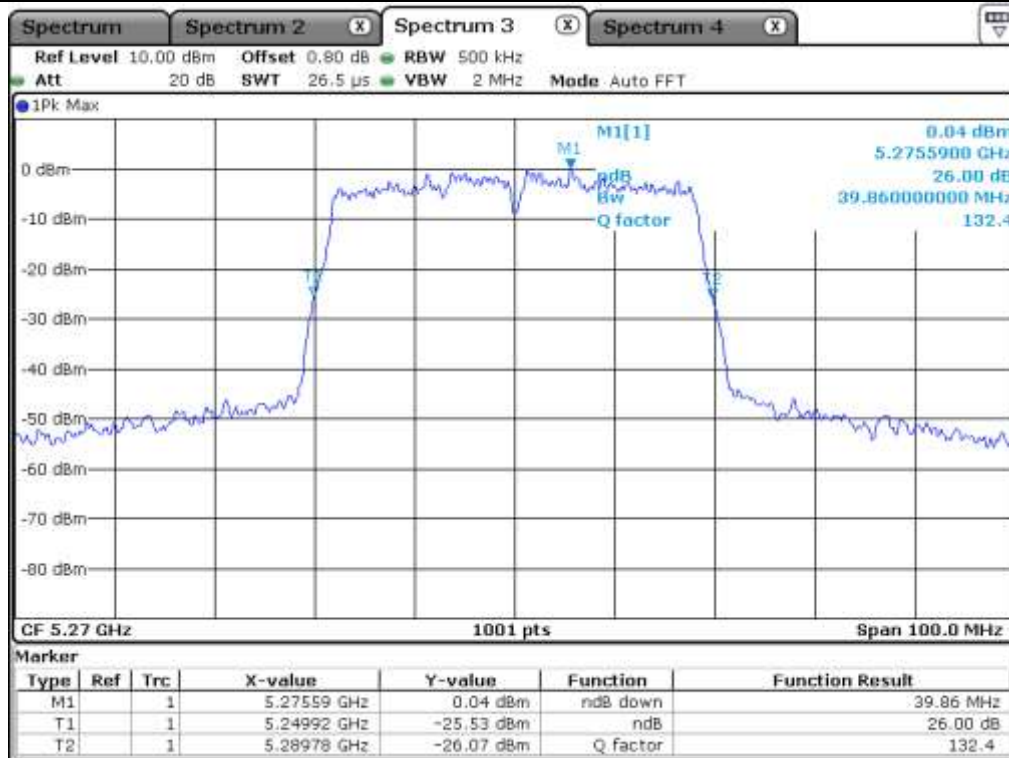
Tested by: Ha-Ram, Lee / Assistant Manager



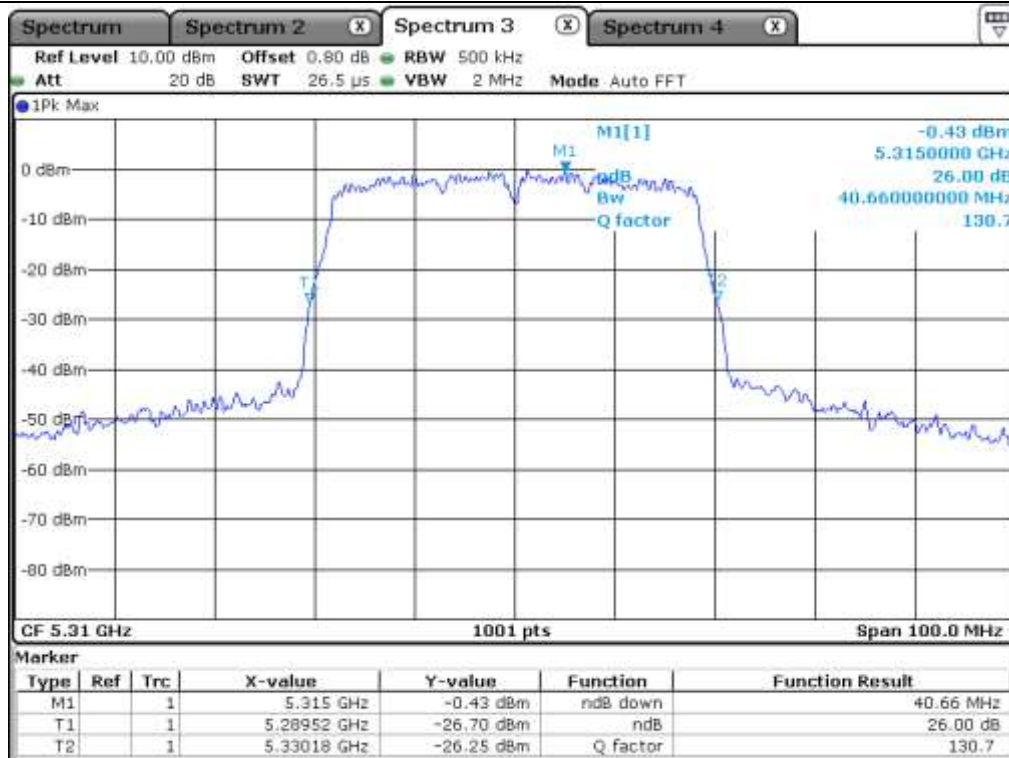
Low Channel (5 190 MHz)



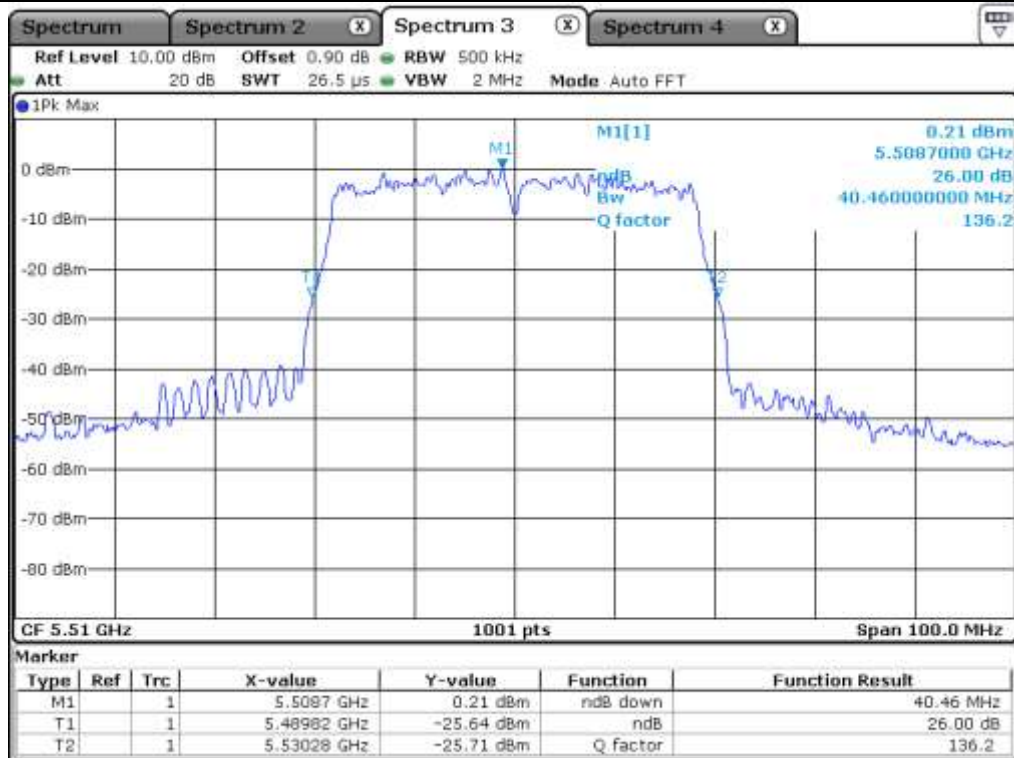
High Channel (5 230 MHz)



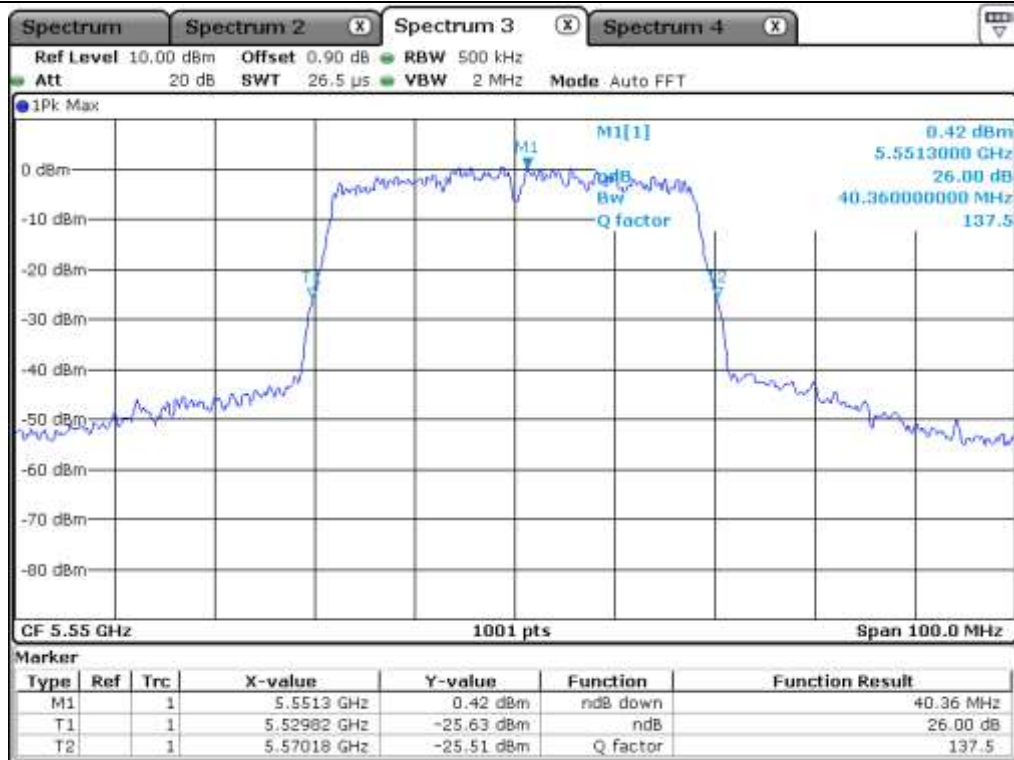
Low Channel (5 270 MHz)



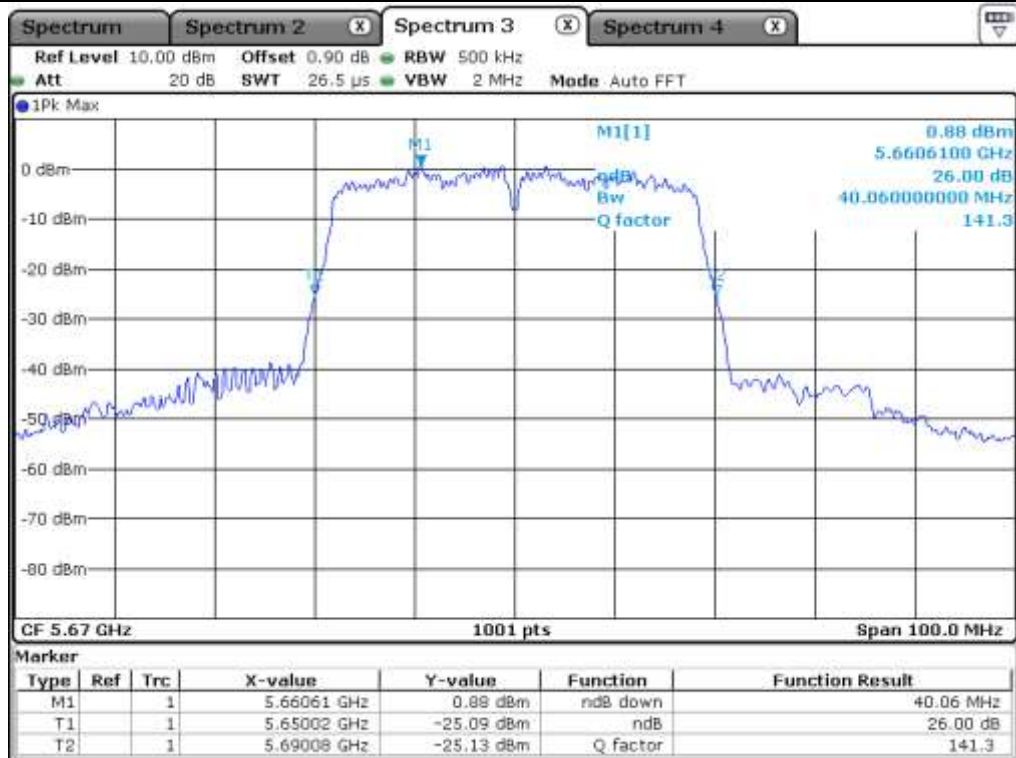
High Channel (5 310 MHz)



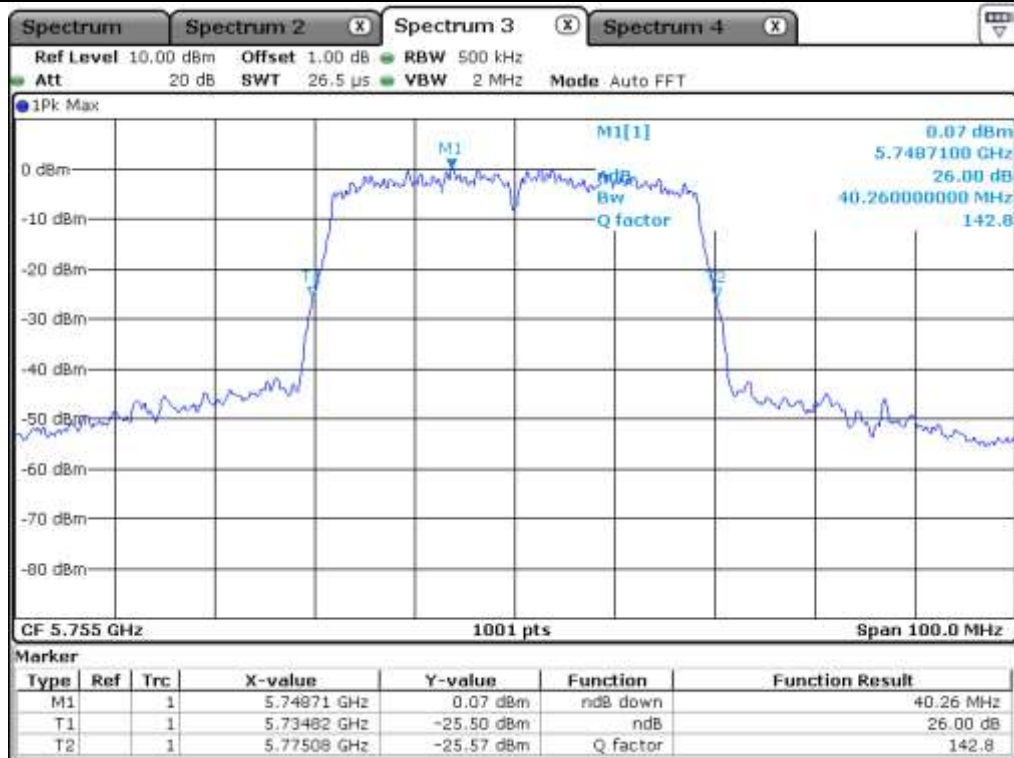
Low Channel (5 510 MHz)



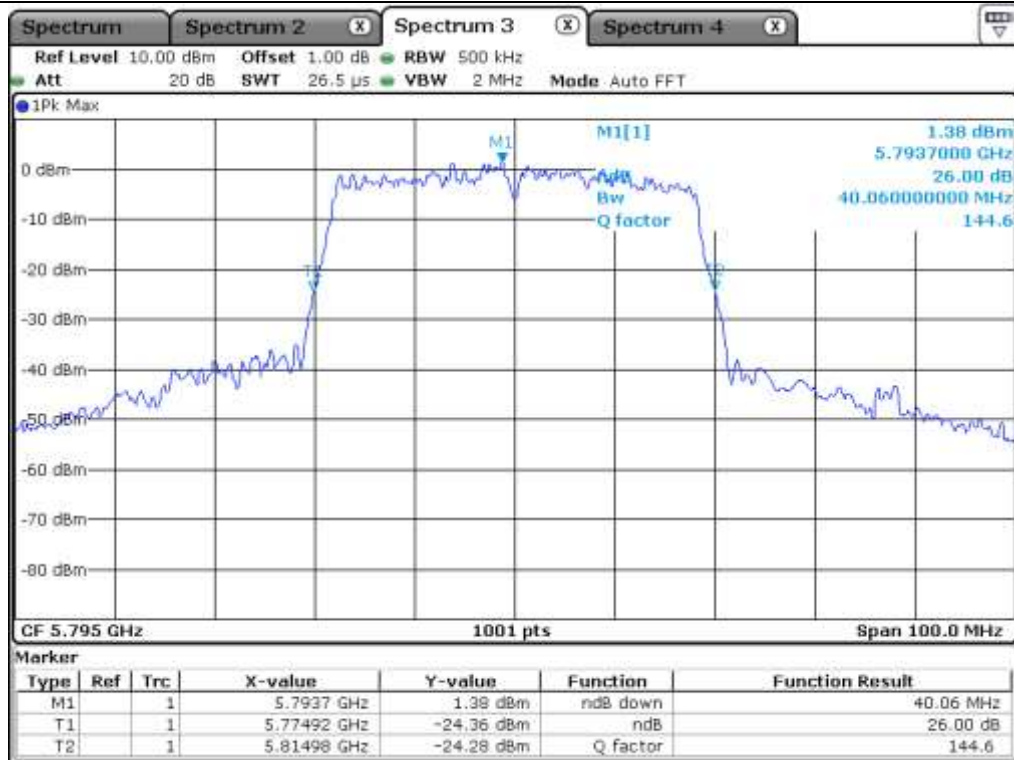
Middle Channel (5 550 MHz)



High Channel (5 670 MHz)



Low Channel (5 755 MHz)



High Channel (5 795 MHz)

7.6.3 Test data for Staddle Channel_Antenna 0

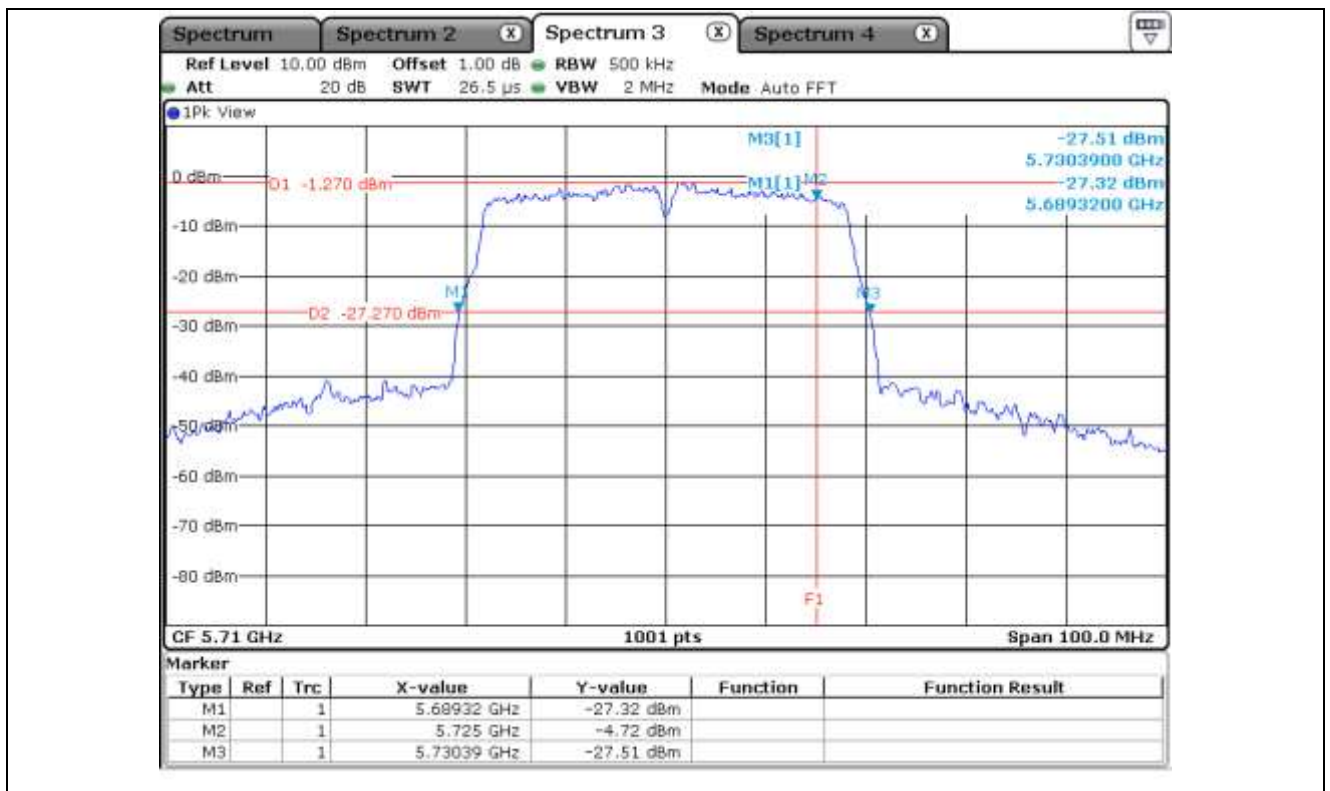
-. Test Date : December 02, 2019 ~ December 11, 2019

-. Test Result : Pass

FREQUENCY RANGE (MHz)	FREQUENCY (MHz)	26 dB Bandwidth (MHz)
5 470 ~ 5 725	5 710.00	35.68
5 725 ~ 5 850	5 710.00	5.39



Tested by: Ha-Ram, Lee / Assistant Manager



7.6.4 Test data for Staddle Channel_Antenna 1

-. Test Date : December 02, 2019 ~ December 11, 2019

-. Test Result : Pass

FREQUENCY RANGE (MHz)	FREQUENCY (MHz)	26 dB Bandwidth (MHz)
5 470 ~ 5 725	5 710.00	35.11
5 725 ~ 5 850	5 710.00	5.08



Tested by: Ha-Ram, Lee / Assistant Manager

