TEST REPORT

Dt&C

Dt&C Co., Ltd.
42, Yurim-ro, 154Beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea, 17042
Tel : 031-321-2664, Fax : 031-321-1664

1. Report No : DRTFCC2404-0040
2. Customer
   - Name (FCC) : DHAUTOWARE Co.,Ltd.
   - Address (FCC) : 278, Beotkkot-ro, Geumcheon-gu Seoul South Korea 08511
3. Use of Report : FCC Original Grant
4. Product Name / Model Name : 24MY BN7 8inch AVN / DM-S12101A
   FCC ID : 2BDNYJCHBN700AVNC
5. FCC Regulation(s): Part 15.407
   Test Method used: KDB789033 D02v02r01, KDB662911 D01v02r01, ANSI C63.10-2013
6. Date of Test : 2024.03.05 ~ 2024.03.18
7. Location of Test : ☒ Permanent Testing Lab ☐ On Site Testing
8. Testing Environment : See appended test report.
9. Test Result : Refer to the attached test result.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
This test report is not related to KOLAS accreditation.

Affirmation	Tested by Name : SeokHo Han (Signature)	Technical Manager Name : JaeJin Lee (Signature)

2024 . 04 . 09 .

Dt&C Co., Ltd.

If this report is required to confirmation of authenticity, please contact to report@dtnc.net

This test report is prohibited to copy or reissue in whole or in part without the approval of Dt&C Co., Ltd.

Test Report Version

Test Report No.	Date	Description	Revised by	Reviewed by
DRTFCC2404-0040	Apr. 09, 2024	Initial issue	SeokHo Han	JaeJin Lee

This test report is prohibited to copy or reissue in whole or in part without the approval of Dt&C Co., Ltd.

CONTENTS

1. General Information 4
1.1. Description of EUT 4
1.2. Declaration by the applicant / manufacturer 5
1.3. Testing Laboratory 5
1.4. Testing Environment 5
1.5. Measurement Uncertainty 5
1.6. Test Equipment List 6
2. Test Methodology 7
2.1. EUT Configuration 7
2.2. EUT Exercise 7
2.3. General Test Procedures 7
2.4. Instrument Calibration 7
2.5. Description of Test Modes 8
3. Antenna Requirements 9
4. Summary of Test Result 10
5. TEST RESULT 11
5.1 Unwanted Emissions 11
5.2 AC Power-Line Conducted Emissions 18
APPENDIX I 19
APPENDIX II 19
APPENDIX III 23
APPENDIX IIII 43

This test report is prohibited to copy or reissue in whole or in part without the approval of Dt&C Co., Ltd.

1. General Information

1.1. Description of EUT

Equipment Class	Unlicensed National Information Infrastructure Tx (NII)
Product Name	24MY BN7 8inch AVN
Model Name	DM-S12101A
Add Model Name	JCHBN700AVNC
EUT Serial Number	Conducted: 000024021613202600C8, Radiated: 000024021613300500CB
Power Supply	DC 14.4 V
Modulation Technique	OFDM
Antenna Specification	Antenna Type: PCB Antenna Gain Antenna 1: 5dBi (5150~5850MHz) Antenna 2: 5dBi (5150~5850MHz)
Frequency Range	U-NII 1(5150 ~ 5250 MHz) ▪ 802.11a/n(HT20)/ac(VHT20): 5180 ~ 5240 MHz ▪ 802.11n(HT40)/ac(VHT40): 5190 ~ 5230 MHz ▪ 802.11ac(VHT80): 5210 MHz U-NII 3(5725 ~ 5850MHz) ▪ 802.11a/n(HT20)/ac(VHT20): 5745 ~ 5825 MHz ▪ 802.11n(HT40)/ac(VHT40): 5755 ~ 5795 MHz ▪ 802.11ac(VHT80): 5775 MHz

This test report is prohibited to copy or reissue in whole or in part without the approval of Dt&C Co., Ltd.

1.2. Declaration by the applicant / manufacturer

N/A

1.3. Testing Laboratory

Dt&C Co., Ltd.		
The 3 m test site and conducted measurement facility used to collect the radiated data are located at the 42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 17042. The test site complies with the requirements of Part 2.948 according to ANSI C63.4-2014. **- FCC & IC MRA Designation No. : KR0034** **- ISED#: 5740A**		
www.dtnc.net		
Telephone	:	+ 82-31-321-2664
FAX	:	+ 82-31-321-1664

1.4. Testing Environment

Ambient Condition	
▪ Temperature	+20 ℃ ~ +23 ℃
▪ Relative Humidity	+40 % ~ +43 %

1.5. Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with requirements of ANSI C63.4-2014 and ANSI C63.10-2013. All measurement uncertainty values are shown with a coverage factor of *k* = 2 to indicate a 95 % level of confidence.

Parameter	Measurement uncertainty
Antenna-port conducted emission	1.0 dB (The confidence level is about 95 %, k = 2)
Radiated emission (1 GHz Below)	5.0 dB (The confidence level is about 95 %, k = 2)
Radiated emission (1 GHz ~ 18 GHz)	4.8 dB (The confidence level is about 95 %, k = 2)
Radiated emission (18 GHz Above)	5.7 dB (The confidence level is about 95 %, k = 2)

This test report is prohibited to copy or reissue in whole or in part without the approval of Dt&C Co., Ltd.

1.6. Test Equipment List

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent Technologies	N9020A	23/12/15	24/12/15	MY48010133
Spectrum Analyzer	Agilent Technologies	N9020A	23/06/23	24/06/23	US47360812
Spectrum Analyzer	Agilent Technologies	N9020A	23/06/23	24/06/23	MY46471622
Spectrum Analyzer	KEYSIGHT	N9030B	23/12/15	24/12/15	MY55480168
Receiver	Rohde Schwarz	ESCI3	23/06/23	24/06/23	100798
DC Power Supply	Agilent Technologies	66332A	23/06/23	24/06/23	US37474125
DC Power Supply	SM techno	SDP30-5D	23/06/23	24/06/23	305DMG288
Multimeter	FLUKE	17B+	23/12/15	24/12/15	36390701WS
Signal Generator	Rohde Schwarz	SMBV100A	23/12/15	24/12/15	255571
Signal Generator	ANRITSU	MG3695C	23/12/15	24/12/15	173501
Thermohygrometer	BODYCOM	BJ5478	23/12/15	24/12/15	120612-1
Thermohygrometer	BODYCOM	BJ5478	23/12/15	24/12/15	120612-2
Thermohygrometer	BODYCOM	BJ5478	23/06/23	24/06/23	N/A
Loop Antenna	ETS-Lindgren	6502	23/11/09	24/11/09	00060496
Hybrid Antenna	Schwarzbeck	VULB 9160	23/12/15	24/12/15	3362
Horn Antenna	ETS-Lindgren	3117	23/06/23	24/06/23	00143278
Horn Antenna	A.H.Systems Inc.	SAS-574	23/06/23	24/06/23	155
PreAmplifier	tsj	MLA-0118-B01-40	23/12/15	24/12/15	1852267
PreAmplifier	tsj	MLA-1840-J02-45	23/06/23	24/06/23	16966-10728
PreAmplifier	H.P	8447D	23/12/15	24/12/15	2944A07774
High Pass Filter	Wainwright Instruments	WHKX12-935-1000-15000-40SS	23/06/23	24/06/23	8
High Pass Filter	Wainwright Instruments	WHKX10-2838-3300-18000-60SS	23/06/23	24/06/23	1
High Pass Filter	Wainwright Instruments	WHNX8.0/26.5-6SS	23/06/23	24/06/23	3
Attenuator	Hefei Shunze	SS5T2.92-10-40	23/06/23	24/06/23	16012202
Attenuator	Aeroflex/Weinschel	56-3	23/06/23	24/06/23	Y2370
Attenuator	SMAJK	SMAJK-2-3	23/06/23	24/06/23	3
Attenuator	SMAJK	SMAJK-2-3	23/06/23	24/06/23	2
Attenuator	Aeroflex/Weinschel	86-10-11	23/06/23	24/06/23	408
Power Meter & Wide Bandwidth Sensor	Anritsu	ML2496A MA2411B	23/12/15	24/12/15	1338004 1911481
Cable	Dt&C	Cable	24/01/03	25/01/03	G-2
Cable	HUBER+SUHNER	SUCOFLEX 100	24/01/03	25/01/03	G-3
Cable	Dt&C	Cable	24/01/03	25/01/03	G-4
Cable	OMT	YSS21S	24/01/03	25/01/03	G-5
Cable	Junkosha	MWX241	24/01/03	25/01/03	mmW-1
Cable	Junkosha	MWX241	24/01/03	25/01/03	mmW-4
Cable	HUBER+SUHNER	SUCOFLEX100	24/01/03	25/01/03	M-01
Cable	HUBER+SUHNER	SUCOFLEX100	24/01/03	25/01/03	M-02
Cable	JUNFLON	MWX241/B	24/01/03	25/01/03	M-03
Cable	JUNFLON	J12J101757-00	24/01/03	25/01/03	M-07
Cable	HUBER+SUHNER	SUCOFLEX106	24/01/03	25/01/03	M-09
Cable	Radiall	TESTPRO3	24/01/03	25/01/03	RFC-70
Test Software (Radiated)	tsj	EMI Measurement	NA	NA	Version 2.00.0185

Note1: The measurement antennas were calibrated in accordance to the requirements of ANSI C63.5-2017.
Note2: The cable is not a regular calibration item, so it has been calibrated by Dt&C itself.

This test report is prohibited to copy or reissue in whole or in part without the approval of Dt&C Co., Ltd.

2. Test Methodology

The measurement procedures described in the ANSI C63.10-2013 and the guidance provided in KDB789033 D02v02r01 were used in measurement of the EUT.

The EUT was tested per the guidance of KDB789033 D02v02r01. And ANSI C63.10-2013 was used to reference appropriate EUT setup and maximizing procedures of radiated spurious emission and AC line conducted emission testing.

2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

2.2. EUT Exercise

The EUT was operated in the test mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.407 under the FCC Rules Part 15 Subpart E.

2.3. General Test Procedures

Conducted Emissions

The power-line conducted emission test procedure is not described on the KDB789033 D02v02r01.

So this test was fulfilled with the requirements in Section 6.2 of ANSI C63.10-2013.

The EUT is placed on the wooden table, which is 0.8 m above ground plane and the conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-peak and Average detector.

Radiated Emissions

Basically the radiated tests were performed with KDB789033 D02v02r01. But some requirements and procedures like test site requirements, EUT setup and maximizing procedure were fulfilled with the requirements in Section 5 and 6 of the ANSI C63.10-2013 as stated on KDB789033 D02v02r01.

The EUT is placed on a non-conductive table, which is 0.8 m above ground plane. For emission measurements above 1 GHz, the table height is 1.5 m. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 1 m or 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the highest emission, the relative positions of the EUT were rotated through three orthogonal axis.

2.4. Instrument Calibration

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

This test report is prohibited to copy or reissue in whole or in part without the approval of Dt&C Co., Ltd.

2.5. Description of Test Modes

The EUT has been tested with the operating condition for maximizing the emission characteristics. A test program is used to control the EUT for staying in continuous transmitting.

EUT Operation test setup

- Test Software: Tera Term 4.104.0.0

Transmitting Configuration of EUT

Mode	SISO		MIMO
	Ant 1	Ant 2	Ant 1 & 2
802.11a	O	O	X
802.11n(HT20)	O	O	O
802.11ac(VHT20)	O	O	O
802.11n(HT40)	O	O	O
802.11ac(VHT40)	O	O	O
802.11ac(VHT80)	O	O	O

O: Support, X: Not supported

Worst-case Tested Mode

Test Mode		ANT configuration	Worst data rate
TM 1	802.11a	SISO	6Mbps
TM 2	802.11ac(VHT20)	SISO / MIMO	MCS0
TM 3	802.11n(HT40)	SISO	MCS0
TM 4	802.11ac(VHT40)	MIMO	MCS0
TM 5	802.11ac(VHT80)	SISO / MIMO	MCS0

Note1: The worst case configuration was determined based on the certified module report.

This test report is prohibited to copy or reissue in whole or in part without the approval of Dt&C Co., Ltd.

3. Antenna Requirements

▣ **According to Part 15.203**

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

The antenna is attached on the PCB by means of unique connector.
Therefore this E.U.T complies with the requirement of Part 15.203

4. Summary of Test Result

FCC Part Section(s)	Test Description	Limit	Test Condition	Status Note 1
15.407(a)	Emission Bandwidth (26 dB Bandwidth)	N/A	Conducted	NT Note 2
15.407(e)	Minimum Emission Bandwidth (6 dB Bandwidth)	> 500 kHz in 5 725 ~ 5 850 MHz		NT Note 2
15.407(a)	Maximum Conducted Output Power	Part 15.407(a)		NT Note 2
15.407(a)	Peak Power Spectral Density	Part 15.407(a)		NT Note 2
15.407(h)	Dynamic Frequency Selection	Part 15.407(h)		NA Note 3
15.205 15.209 15.407(b)	Unwanted Emissions	Part 15.209, 15.407(b) (Refer to section 5.1)	Radiated	C
15.207	AC Conducted Emissions	Part 15.207 (Refer to section 5.2)	AC Line Conducted	NA Note 4
15.203	Antenna Requirements	Part 15.203 (Refer to section 3)	-	C

Note 1: **C** = Comply **NC** = Not Comply **NT** = Not Tested **NA** = Not Applicable
Note 2: This device uses the certified module. (FCC ID: 2ADQJ-YSP88459SM)
Please refer to the module test for conducted signal test items.
The conducted output power was verified to be the same as module.
Note 3: This device supports U-NII-1, U-NII 3 band only.
Note 4: This device is installed in a car. Therefore the power source is a battery of car.

This test report is prohibited to copy or reissue in whole or in part without the approval of Dt&C Co., Ltd.

5. TEST RESULT

5.1 Unwanted Emissions

▣ Test Requirements

- Part 15.407(b)

Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the **5.15 GHz - 5.25 GHz band**: all emissions outside of the **5.15 GHz - 5.35 GHz band** shall not exceed an **EIRP of -27 dBm/MHz**.

(2) For transmitters operating in the **5.25 GHz - 5.35 GHz band**: all emissions outside of the **5.15 GHz - 5.35 GHz band** shall not exceed an **EIRP of -27 dBm/MHz**.

(3) For transmitters operating in the **5.47 GHz - 5.725 GHz band**: all emissions outside of the **5.47 GHz - 5.725 GHz band** shall not exceed an **EIRP of -27 dBm/MHz.**

(4) For transmitters operating in the **5.725 GHz - 5.85 GHz band**: (i) All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge. The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

(5) Unwanted emissions **below 1 GHz** must comply with the general field strength limits set forth in **Section 15.209**.
Further, any U-NII devices using an **AC power line** are required to comply also with the conducted limits set forth in **Section 15.207**.

- Part 15.209: General requirements

Frequency (MHz)	FCC Limit (uV/m)	Measurement Distance (m)
0.009 – 0.490	2 400 / F (kHz)	300
0.490 – 1.705	2 4000 / F (kHz)	30
1.705 – 30.0	30	30

Frequency (MHz)	FCC Limit (uV/m)	Measurement Distance (m)
30 ~ 88	100 **	3
88 ~ 216	150 **	3
216 ~ 960	200 **	3
Above 960	500	3

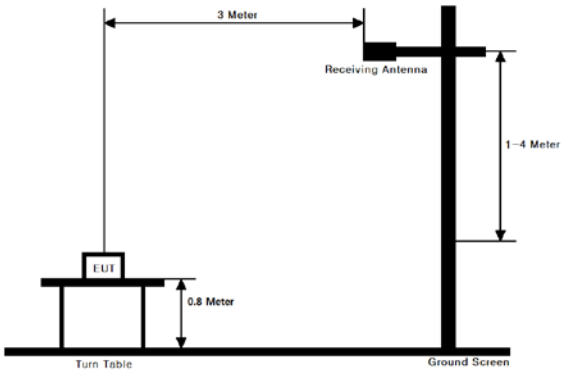
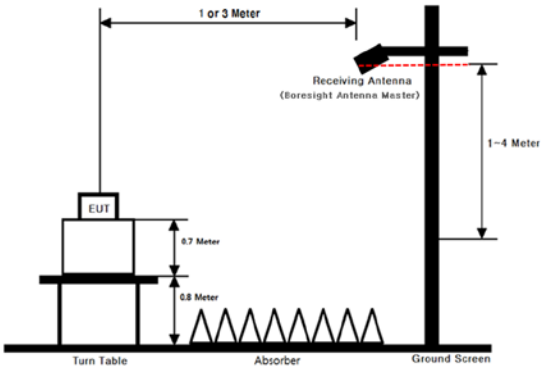
**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§15.231 and 15.241.

- Part 15.205(a): Restricted band of operation

MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	8.414 25 ~ 8.414 75	108 ~ 121.94	1 300 ~ 1 427	4.5 ~ 5.15	14.47 ~ 14.5
0.495 ~ 0.505	12.29 ~ 12.293	123 ~ 138	1 435 ~ 1 626.5	5.35 ~ 5.46	15.35 ~ 16.2
2.173 5 ~ 2.190 5	12.519 75 ~ 12.520 25	149.9 ~ 150.05	1 645.5 ~ 1 646.5	7.25 ~ 7.75	17.7 ~ 21.4
4.125 ~ 4.128	12.576 75 ~ 12.577 25	156.524 75 ~ 156.525 25	1 660 ~ 1 710	8.025 ~ 8.5	22.01 ~ 23.12
4.177 25 ~ 4.177 75	13.36 ~ 13.41	156.7 ~ 156.9	1 718.8 ~ 1 722.2	9.0 ~ 9.2	23.6 ~ 24.0
4.207 25 ~ 4.207 75	16.42 ~ 16.423	162.012 5 ~ 167.17	2 200 ~ 2 300	9.3 ~ 9.5	31.2 ~ 31.8
6.215 ~ 6.218	16.694 75 ~ 16.695 25	167.72 ~ 173.2	2 310 ~ 2 390	10.6 ~ 12.7	36.43 ~ 36.5
6.267 75 ~ 6.268 25	16.804 25 ~ 16.804 75	240 ~ 285	2 483.5 ~ 2 500	13.25 ~ 13.4	Above 38.6
6.311 75 ~ 6.312 25	25.5 ~ 25.67	322 ~ 335.4	2 655 ~ 2 900		
8.291 ~ 8.294	37.5 ~ 38.25	399.90 ~ 410	3 260 ~ 3 267		
8.362 ~ 8.366	73 ~ 74.6	608 ~ 614	3 332 ~ 3 339		
8.376 25 ~ 8.386 75	74.8 ~ 75.2	960 ~ 1240	3 345.8 ~ 3 358		
			3 600 ~ 4 400		

This test report is prohibited to copy or reissue in whole or in part without the approval of Dt&C Co., Ltd.

▣ Test Configuration

Below 1 GHz	Above 1 GHz
	

▣ Test Procedure

1. The EUT is placed on a non-conductive table. For emission measurements at or below 1 GHz, the table height is 80 cm. For emission measurements above 1 GHz, the table height is 1.5 m.
2. The turn table shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 1 m or 3 m away from the receiving antenna, which is varied from 1 m to 4 m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.

Radiated spurious emission measured using following Measurement Procedure **of KDB789033 D02v02r01**

► General Requirements for Unwanted Emissions Measurements

The following requirements apply to all unwanted emissions measurements, both in and outside of the restricted bands:

- EUT Duty Cycle

(1) The EUT shall be configured or modified to **transmit continuously** except as stated in (ii), below. The intent is to test at 100 percent duty cycle; however a small reduction in duty cycle (**to no lower than 98 percent**) is permitted if required by the EUT for amplitude control purposes. Manufacturers are expected to provide software to the test lab to permit such continuous operation.

(2) If **continuous transmission (or at least 98 percent duty cycle) cannot be achieved** due to hardware limitations of the EUT (e.g., overheating), the following additions to the measurement and reporting procedures are required:

- The EUT shall be configured to operate at the maximum achievable duty cycle.
- Measure the duty cycle, x, of the transmitter output signal.
- Adjustments to measurement procedures (e.g., increasing test time and number of traces averaged) shall be performed as described in the procedures below.
- The test report shall include the following additional information:
  - The reason for the duty cycle limitation.
  - The duty cycle achieved for testing and the associated transmit duration and interval between transmissions.
  - The sweep time and the amount of time used for trace stabilization during max-hold measurements for peak emission measurements.

(3) Reduction of the measured emission amplitude levels to account for operational duty factor is not permitted. Compliance is based on emission levels occurring during transmission - not on an average across on and off times of the transmitter.

► **Measurements below 1 000 MHz**

a) Follow the requirements in section II.G.3, "General Requirements for Unwanted Emissions Measurements".

b) Compliance shall be demonstrated using **CISPR quasi-peak detection**; however, **peak detection** is permitted as an alternative to quasi-peak detection.

► Measurements Above 1 000 MHz (Peak)

a) Follow the requirements in section II.G.3, "General Requirements for Unwanted Emissions Measurements".

b) Peak emission levels are measured by setting the analyzer as follows:

(i) **RBW = 1 MHz.**

(ii) **VBW ≥ 3 MHz.**

(iii) **Detector = Peak.**

(iv) Sweep time = Auto.

(v) Trace mode = Max hold.

(vi) Allow sweeps to continue until the trace stabilizes. Note that if the transmission is not continuous, the time required for the trace to stabilize will increase by a factor of approximately 1/x, where x is the duty cycle. For example, at 50 percent duty cycle, the measurement time will increase by a factor of two relative to measurement time for continuous transmission.

► **Measurements Above 1000 MHz (Method AD)**

(i) **RBW = 1 MHz.**

(ii) **VBW ≥ 3 MHz.**

(iii) **Detector = RMS**, if span / (# of points in sweep) ≤ RBW / 2. Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If the condition is not satisfied, the detector mode shall be set to peak.

(iv) Averaging type = power (i.e., RMS)

- As an alternative, the detector and averaging type may be set for linear voltage averaging. Some analyzers require linear display mode in order to use linear voltage averaging. Log or dB averaging shall not be used.

(v) Sweep time = Auto.

(vi) Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, the number of traces shall be increased by a factor of 1/x, where x is the duty cycle. For example, with 50 percent duty cycle, at least 200 traces shall be averaged.

(vii) If tests are performed with the EUT transmitting at a duty cycle less than 98 percent, a correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle. The correction factor is computed as follows:

- **If power averaging (RMS) mode was used in step (iv) above, the correction factor is 10 log(1/x), where x is the duty cycle.** For example, if the transmit duty cycle was 50 percent, then 3 dB must be added to the measured emission levels.
- If linear voltage averaging mode was used in step (iv) above, the correction factor is 20 log (1/x), where x is the duty cycle. For example, if the transmit duty cycle was 50 percent, then 6 dB must be added to the measured emission levels.
- If a specific emission is demonstrated to be continuous (100 percent duty cycle) rather than turning on and off with the transmit cycle, no duty cycle correction is required for that emission.

Duty Cycle Correction factor

Test Mode	Date rate	T_{on}(ms)	T_{on+off} (ms)	x = T_{on} / (T_{on+off})	DCCF = 10 log(1/x) (dB)
TM 1	6 Mbps	2.063	2.165	0.952 9	0.21
TM 2	MCS 0	1.930	2.033	0.949 3	0.23
TM 3	MCS 0	0.943	1.045	0.902 4	0.45
TM 4	MCS 0	0.952	1.053	0.903 6	0.44
TM 5	MCS 0	0.460	0.561	0.819 3	0.87

Note1: Where, T = Transmission duration / x = Duty cycle

Note2: Please refer to the appendix II for duty cycle plots.

This test report is prohibited to copy or reissue in whole or in part without the approval of Dt&C Co., Ltd.

▣ Test Results

Test Notes

1. The radiated emissions were investigated 9 kHz to 40 GHz. All EUT antenna configuration were investigated and the worst case data were reported.
2. Information of Distance Correction Factor
   For finding emissions, measurements may be performed at a distance closer than that specified in the regulations.
   In this case, the distance factor is applied to the result.
   - Calculation of distance correction factor
   At frequencies below 30 MHz = 40 log(tested distance / specified distance)
   At frequencies at or above 30 MHz = 20 log(tested distance / specified distance)
   When distance factor is "N/A", the measurements were performed at the specified distance and distance factor is not applied.
3. Sample Calculation.
   Margin = Limit – Result / Result = Reading + TF+ DCCF + DCF / TF = AF + CL + HL + AL – AG
   Where, TF = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain, HL = High pass filter Loss, AL = Attenuator Loss, DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
4. The limit is converted to field strength.
   E(dBuV/m) = EIRP(dBm) + 95.2 dB = -27 dBm + 95.2 = 68.2 dBuV/m

Unwanted Emissions data(9 kHz ~ 40 GHz) : *TM1 ANT1*

Band	Tested Frequency (MHz)	Freq. (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	TF (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
U-NII 1	5 180	5 147.62	H	X	PK	54.13	2.67	N/A	N/A	56.80	74.00	17.20
		5 148.07	H	X	AV	44.07	2.67	0.21	N/A	46.95	54.00	7.05
		10 359.52	H	X	PK	43.00	8.48	N/A	N/A	51.48	68.20	16.72
	5 200	10 399.55	H	X	PK	43.91	8.44	N/A	N/A	52.35	68.20	15.85
	5 240	10 480.11	H	X	PK	44.73	8.56	N/A	N/A	53.29	68.20	14.91
U-NII 3	5 745	5 645.85	H	X	PK	51.53	3.23	N/A	N/A	54.76	68.20	13.44
		5 698.30	H	X	PK	53.28	3.24	N/A	N/A	56.52	103.94	47.42
		11 489.75	H	X	PK	47.81	8.56	N/A	N/A	56.37	74.00	17.63
		11 490.00	H	X	AV	40.12	8.56	0.21	N/A	48.89	54.00	5.11
	5 785	11 570.07	H	X	PK	46.21	8.60	N/A	N/A	54.81	74.00	19.19
		11 570.03	H	X	AV	37.97	8.60	0.21	N/A	46.78	54.00	7.22
	5 825	5 875.44	H	X	PK	53.86	3.32	N/A	N/A	57.18	104.84	47.66
		5 958.46	H	X	PK	51.65	4.01	N/A	N/A	55.66	68.20	12.54
		11 649.97	H	X	PK	47.51	8.84	N/A	N/A	56.35	74.00	17.65
		11 649.95	H	X	AV	40.79	8.84	0.21	N/A	49.84	54.00	4.16

This test report is prohibited to copy or reissue in whole or in part without the approval of Dt&C Co., Ltd.

Unwanted Emissions data(9 kHz ~ 40 GHz) : *TM1 ANT2*

Band	Tested Frequency (MHz)	Freq. (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	TF (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
U-NII 1	5 180	5 148.99	H	X	PK	53.58	2.67	N/A	N/A	56.25	74.00	17.75
		5 148.99	H	X	AV	43.98	2.67	0.21	N/A	46.86	54.00	7.14
		10 359.87	V	X	PK	43.56	8.48	N/A	N/A	52.04	68.20	16.16
	5 200	10 399.10	V	X	PK	44.63	8.44	N/A	N/A	53.07	68.20	15.13
	5 240	10 479.55	V	X	PK	43.95	8.56	N/A	N/A	52.51	68.20	15.69
U-NII 3	5 745	5 644.93	H	X	PK	52.06	3.23	N/A	N/A	55.29	68.20	12.91
		5 694.63	H	X	PK	52.90	3.24	N/A	N/A	56.14	101.22	45.08
		11 490.21	V	X	PK	47.42	8.56	N/A	N/A	55.98	74.00	18.02
		11 490.00	V	X	AV	39.52	8.56	0.21	N/A	48.29	54.00	5.71
	5 785	11 569.84	V	X	PK	45.73	8.60	N/A	N/A	54.33	74.00	19.67
		11 569.86	V	X	AV	37.44	8.60	0.21	N/A	46.25	54.00	7.75
	5 825	5 875.22	H	X	PK	51.81	3.31	N/A	N/A	55.12	105.03	49.91
		5 954.64	H	X	PK	49.25	3.98	N/A	N/A	53.23	68.20	14.97
		11 649.90	V	X	PK	46.31	8.84	N/A	N/A	55.15	74.00	18.85
		11 649.95	V	X	AV	37.79	8.84	0.21	N/A	46.84	54.00	7.16

Unwanted Emissions data(9 kHz ~ 40 GHz) : *TM2 ANT1*

Band	Tested Frequency (MHz)	Freq. (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	TF (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
U-NII 1	5 180	5 149.13	H	X	PK	54.24	2.67	N/A	N/A	56.91	74.00	17.09
		5 148.57	H	X	AV	43.66	2.67	0.23	N/A	46.56	54.00	7.44
		10 360.40	H	X	PK	42.65	8.48	N/A	N/A	51.13	68.20	17.07
	5 200	10 400.33	H	X	PK	43.67	8.44	N/A	N/A	52.11	68.20	16.09
	5 240	10 480.36	H	X	PK	43.27	8.56	N/A	N/A	51.83	68.20	16.37
U-NII 3	5 745	5 642.45	H	X	PK	51.99	3.23	N/A	N/A	55.22	68.20	12.98
		5 698.78	H	X	PK	52.60	3.24	N/A	N/A	55.84	104.29	48.45
		11 490.03	H	X	PK	48.09	8.56	N/A	N/A	56.65	74.00	17.35
		11 490.02	H	X	AV	40.23	8.56	0.23	N/A	49.02	54.00	4.98
	5 785	11 569.97	H	X	PK	45.38	8.60	N/A	N/A	53.98	74.00	20.02
		11 569.94	H	X	AV	38.00	8.60	0.23	N/A	46.83	54.00	7.17
	5 825	5 876.59	H	X	PK	52.91	3.33	N/A	N/A	56.24	104.02	47.78
		5 931.28	H	X	PK	52.05	3.79	N/A	N/A	55.84	68.20	12.36
		11 649.89	H	X	PK	47.42	8.84	N/A	N/A	56.26	74.00	17.74
		11 649.97	H	X	AV	40.60	8.84	0.23	N/A	49.67	54.00	4.33

This test report is prohibited to copy or reissue in whole or in part without the approval of Dt&C Co., Ltd.

Unwanted Emissions data(9 kHz ~ 40 GHz) : *TM2 MIMO*

Band	Tested Frequency (MHz)	Freq. (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	TF (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
U-NII 1	5 180	5 149.76	H	X	PK	51.28	2.67	N/A	N/A	53.95	74.00	20.05
		5 149.94	H	X	AV	41.39	2.67	0.23	N/A	44.29	54.00	9.71
		10 359.90	V	X	PK	43.40	8.48	N/A	N/A	51.88	68.20	16.32
	5 200	10 399.69	V	X	PK	44.55	8.44	N/A	N/A	52.99	68.20	15.21
	5 240	10 479.90	V	X	PK	43.48	8.56	N/A	N/A	52.04	68.20	16.16
U-NII 3	5 745	5 643.13	H	X	PK	51.62	3.23	N/A	N/A	54.85	68.20	13.35
		5 670.03	H	X	PK	53.23	3.24	N/A	N/A	56.47	83.02	26.55
		11 489.86	V	X	PK	47.86	8.56	N/A	N/A	56.42	74.00	17.58
		11 490.00	V	X	AV	39.28	8.56	0.23	N/A	48.07	54.00	5.93
	5 785	11 570.00	V	X	PK	45.78	8.60	N/A	N/A	54.38	74.00	19.62
		11 569.97	V	X	AV	37.64	8.60	0.23	N/A	46.47	54.00	7.53
	5 825	5 880.34	H	X	PK	52.06	3.36	N/A	N/A	55.42	101.25	45.83
		5 954.61	H	X	PK	50.34	3.98	N/A	N/A	54.32	68.20	13.88
		11 650.04	V	X	PK	46.38	8.84	N/A	N/A	55.22	74.00	18.78
		11 650.00	V	X	AV	37.59	8.84	0.23	N/A	46.66	54.00	7.34

Unwanted Emissions data(9 kHz ~ 40 GHz) : *TM3 ANT1*

Band	Tested Frequency (MHz)	Freq. (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	TF (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
U-NII 1	5 190	5 149.82	H	X	PK	53.70	2.67	N/A	N/A	56.37	74.00	17.63
		5 149.96	H	X	AV	43.11	2.67	0.45	N/A	46.23	54.00	7.77
		10 380.78	H	X	PK	43.12	8.46	N/A	N/A	51.58	68.20	16.62
	5 230	10 460.55	H	X	PK	44.17	8.51	N/A	N/A	52.68	68.20	15.52
U-NII 3	5 755	5 649.15	H	X	PK	51.80	3.23	N/A	N/A	55.03	68.20	13.17
		5 695.78	H	X	PK	53.40	3.24	N/A	N/A	56.64	102.07	45.43
		11 509.58	H	X	PK	45.09	8.58	N/A	N/A	53.67	74.00	20.33
		11 508.91	H	X	AV	34.54	8.58	0.45	N/A	43.57	54.00	10.43
	5 795	5 901.92	H	X	PK	51.17	3.54	N/A	N/A	54.71	85.28	30.57
		5 939.48	H	X	PK	50.03	3.86	N/A	N/A	53.89	68.20	14.31
		11 588.96	H	X	PK	44.55	8.64	N/A	N/A	53.19	74.00	20.81
		11 589.73	H	X	AV	33.93	8.64	0.45	N/A	43.02	54.00	10.98

This test report is prohibited to copy or reissue in whole or in part without the approval of Dt&C Co., Ltd.

Unwanted Emissions data(9 kHz ~ 40 GHz) : *TM4 MIMO*

Band	Tested Frequency (MHz)	Freq. (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	TF (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
U-NII 1	5 190	5 149.37	H	X	PK	50.67	2.67	N/A	N/A	53.34	74.00	20.66
		5 149.52	H	X	AV	41.89	2.67	0.44	N/A	45.00	54.00	9.00
		10 381.25	V	X	PK	43.10	8.46	N/A	N/A	51.56	68.20	16.64
	5 230	10 458.81	V	X	PK	45.06	8.50	N/A	N/A	53.56	68.20	14.64
U-NII 3	5 755	5 647.58	H	X	PK	51.32	3.23	N/A	N/A	54.55	68.20	13.65
		5 696.13	H	X	PK	52.13	3.24	N/A	N/A	55.37	102.33	46.96
		11 509.31	V	X	PK	44.64	8.58	N/A	N/A	53.22	74.00	20.78
		11 509.67	V	X	AV	34.68	8.58	0.44	N/A	43.70	54.00	10.30
	5 795	5 878.56	H	X	PK	50.48	3.34	N/A	N/A	53.82	102.57	48.75
		5 943.16	H	X	PK	50.53	3.89	N/A	N/A	54.42	68.20	13.78
		11 589.51	V	X	PK	44.63	8.64	N/A	N/A	53.27	74.00	20.73
		11 589.17	V	X	AV	33.94	8.64	0.44	N/A	43.02	54.00	10.98

Unwanted Emissions data(9 kHz ~ 40 GHz) : *TM5 ANT1*

Band	Tested Frequency (MHz)	Freq. (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	TF (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
U-NII 1	5 210	5 145.51	H	X	PK	54.51	2.66	N/A	N/A	57.17	74.00	16.83
		5 145.93	H	X	AV	42.85	2.66	0.87	N/A	46.38	54.00	7.62
		10 421.49	H	X	PK	44.75	8.45	N/A	N/A	53.20	68.20	15.00
U-NII 3	5 755	5 646.40	H	X	PK	50.70	3.23	N/A	N/A	53.93	68.20	14.27
		5 699.05	H	X	PK	51.69	3.24	N/A	N/A	54.93	104.50	49.57
		5 923.84	H	X	PK	52.71	3.72	N/A	N/A	56.43	69.06	12.63
		5 931.60	H	X	PK	52.21	3.79	N/A	N/A	56.00	68.20	12.20
		11 548.37	H	X	PK	44.03	8.57	N/A	N/A	52.60	74.00	21.40
		11 548.92	H	X	AV	33.79	8.57	0.87	N/A	43.23	54.00	10.77

Unwanted Emissions data(9 kHz ~ 40 GHz) : *TM5 MIMO*

Band	Tested Frequency (MHz)	Freq. (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	TF (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
U-NII 1	5 210	5 148.70	H	X	PK	51.33	2.67	N/A	N/A	54.00	74.00	20.00
		5 148.98	H	X	AV	40.46	2.67	0.87	N/A	44.00	54.00	10.00
		10 419.61	V	X	PK	44.43	8.45	N/A	N/A	52.88	68.20	15.32
U-NII 3	5 755	5 638.33	H	X	PK	51.40	3.23	N/A	N/A	54.63	68.20	13.57
		5 678.85	H	X	PK	52.79	3.24	N/A	N/A	56.03	89.55	33.52
		5 902.00	H	X	PK	50.86	3.54	N/A	N/A	54.40	85.22	30.82
		5 930.72	H	X	PK	50.17	3.78	N/A	N/A	53.95	68.20	14.25
		11 549.13	V	X	PK	43.96	8.57	N/A	N/A	52.53	74.00	21.47
		11 549.27	V	X	AV	33.93	8.57	0.87	N/A	43.37	54.00	10.63

This test report is prohibited to copy or reissue in whole or in part without the approval of Dt&C Co., Ltd.

5.2 AC Power-Line Conducted Emissions

▣ Test Requirements, §15.207

An intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 uH/50 ohm line impedance stabilization network (LISN).

Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequency ranges.

Frequency Range (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 ~ 0.5	66 to 56 *	56 to 46 *
0.5 ~ 5.0	56	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency

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

▣ Test Configuration

NA

▣ Test Procedure

Conducted emissions from the EUT were measured according to the ANSI C63.10-2013.

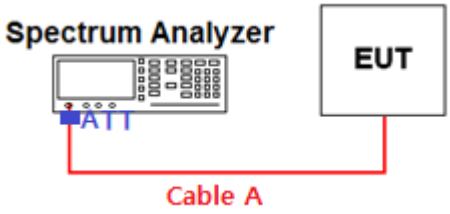
1. The test procedure is performed in a 6.5 m × 3.5 m × 3.5 m (L × W × H) shielded room. The EUT along with its peripherals were placed on a 1.0 m (W) × 1.5 m (L) and 0.8 m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.
2. The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room.
3. All peripherals were connected to the second LISN and the chassis ground also bounded to the horizontal ground plane of shielded room.
4. The excess power cable between the EUT and the LISN was bundled. The power cables of peripherals were unbundled. All connecting cables of EUT and peripherals were moved to find the maximum emission.

▣ Test Results: NA

APPENDIX I

Conducted Test set up Diagram

▪ Conducted Measurement



APPENDIX II

Duty Cycle Information

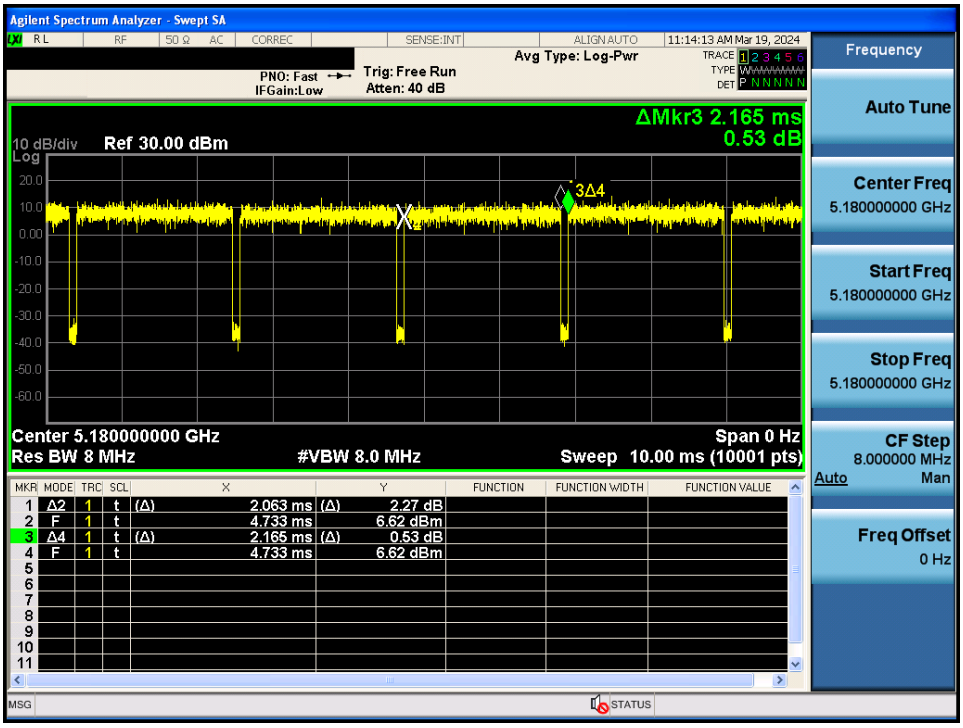
▣ Test Procedure

Duty Cycle [X = On Time / (On + Off time)] is measured using Measurement Procedure **of KDB789033 D02v02r01**

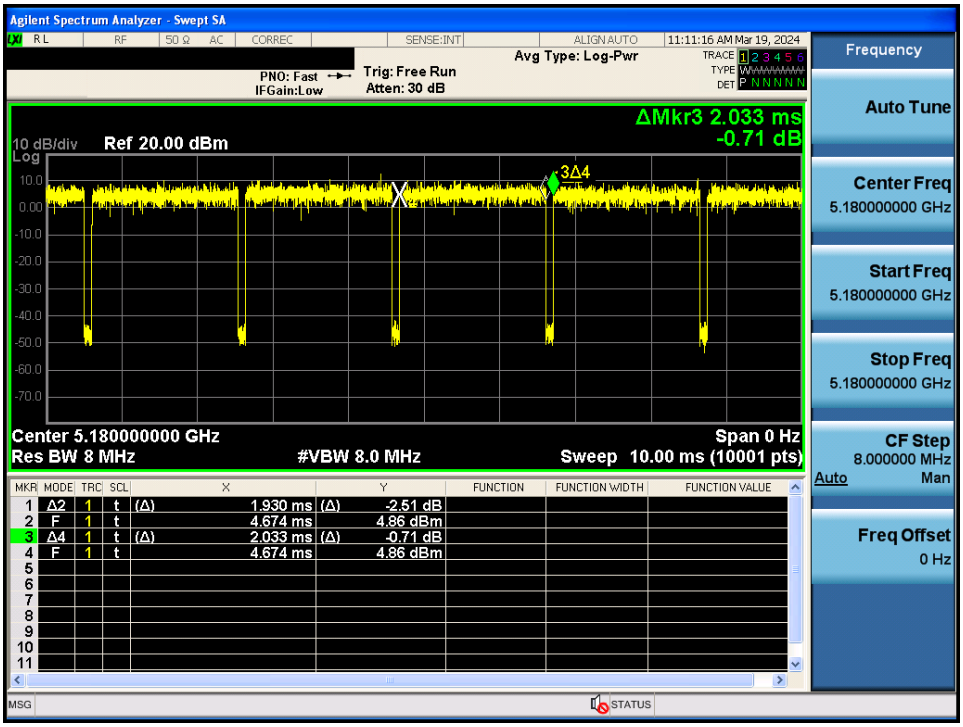
1. Set the center frequency of the spectrum analyzer to the center frequency of the transmission.
2. Set RBW ≥ EBW if possible; otherwise, set RBW to the largest available value.
3. Set VBW ≥ RBW. Set detector = peak.
4. Note : The zero-span measurement method shall not be used unless both **RBW and VBW are > 50 / *T***, where *T* is defined in section II.B.1.a), and **the number of sweep points across duration *T* exceeds 100**. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if *T* ≤ 16.7 microseconds.)

   T : The minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
   (***T* = On time** of the above table since the EUT operates with above fixed Duty Cycle and it is the minimum On time)

Duty Cycle Test Mode: TM 1 & Ch.36

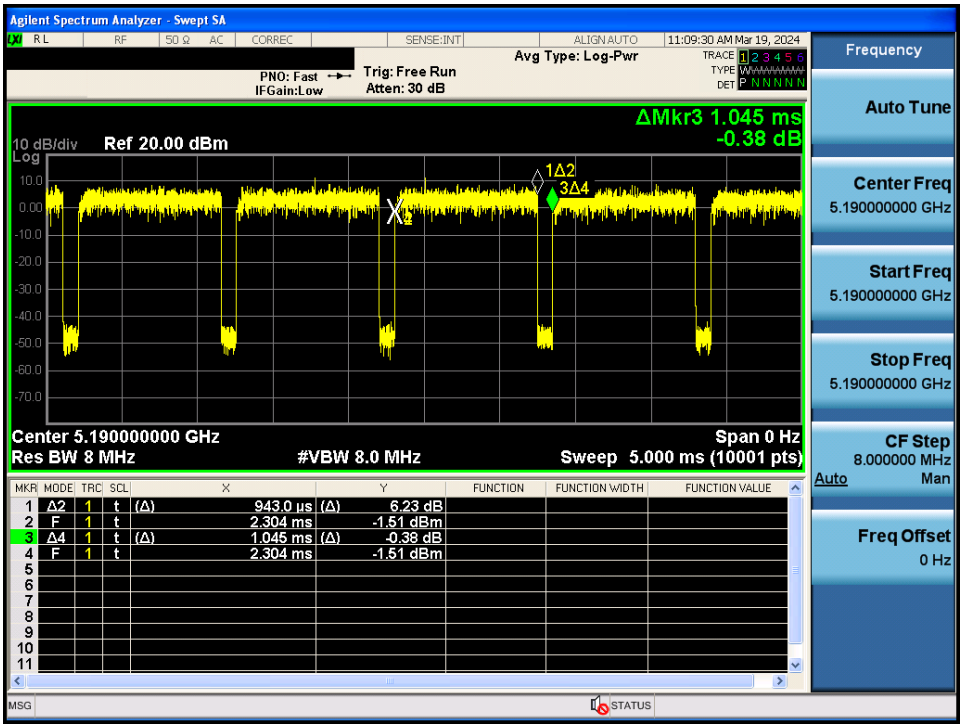


Duty Cycle Test Mode: TM 2 & Ch.36

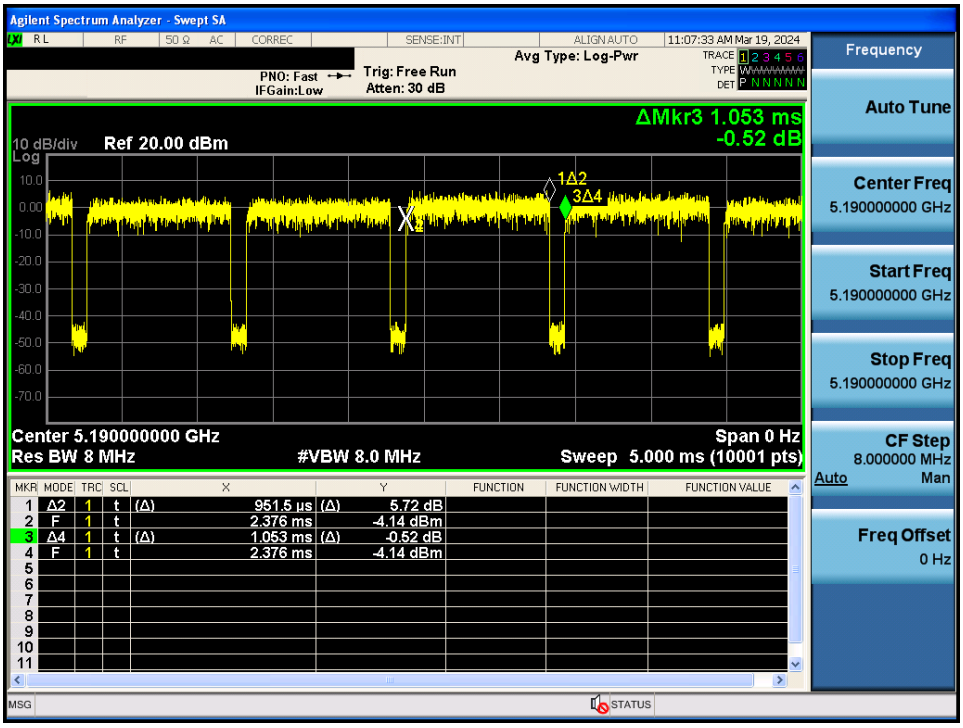


This test report is prohibited to copy or reissue in whole or in part without the approval of Dt&C Co., Ltd.

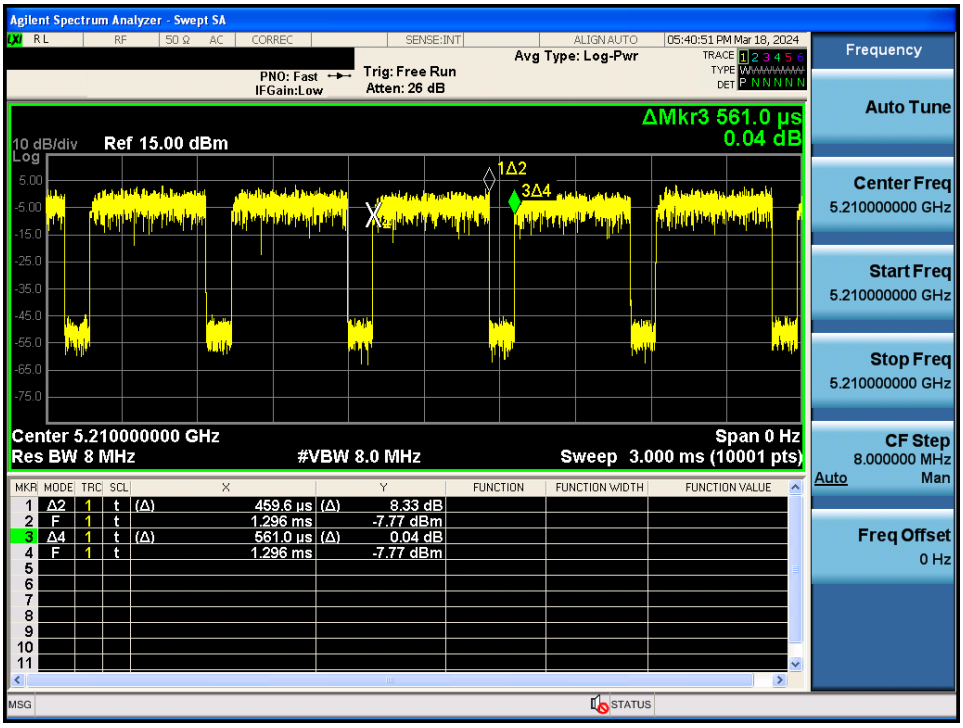
Duty Cycle Test Mode: TM 3 & Ch.38



Duty Cycle Test Mode: TM 4 & Ch.38



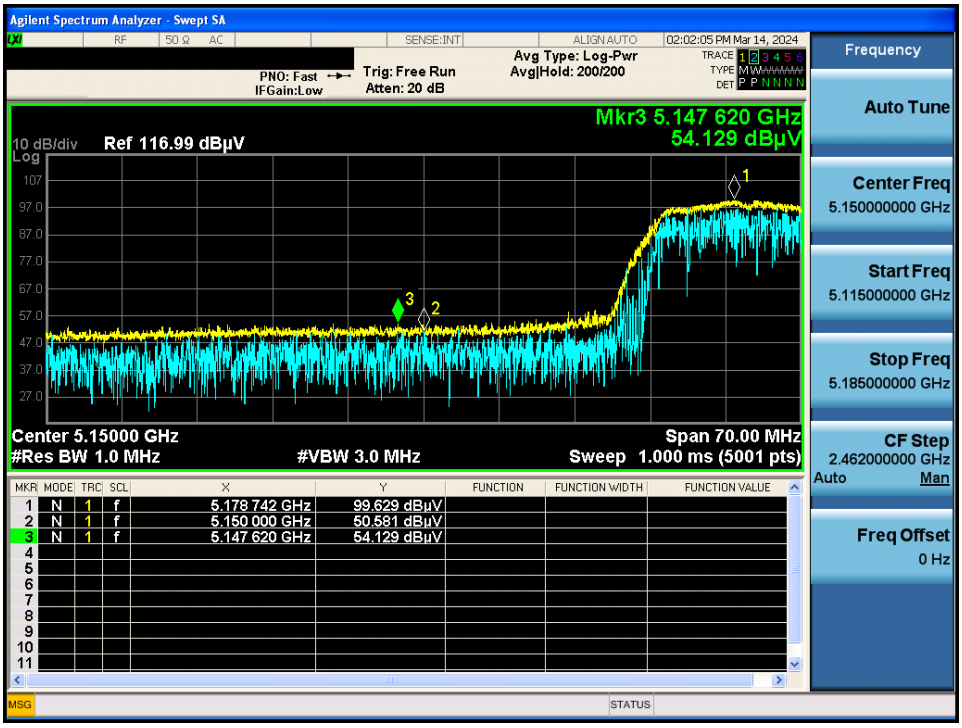
Duty Cycle Test Mode: TM 5 & Ch.42



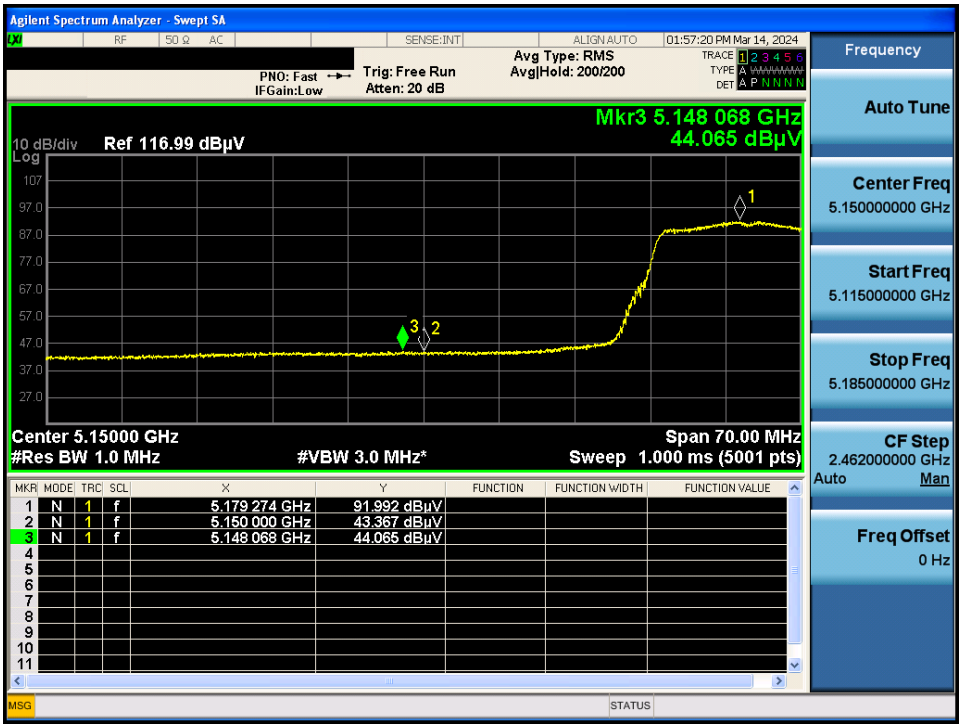
APPENDIX III

Unwanted Emissions (Radiated) Test Plot

TM 1 & ANT 1 & U-NII 1 & 5 180 & X axis & Hor **Detector Mode : PK**

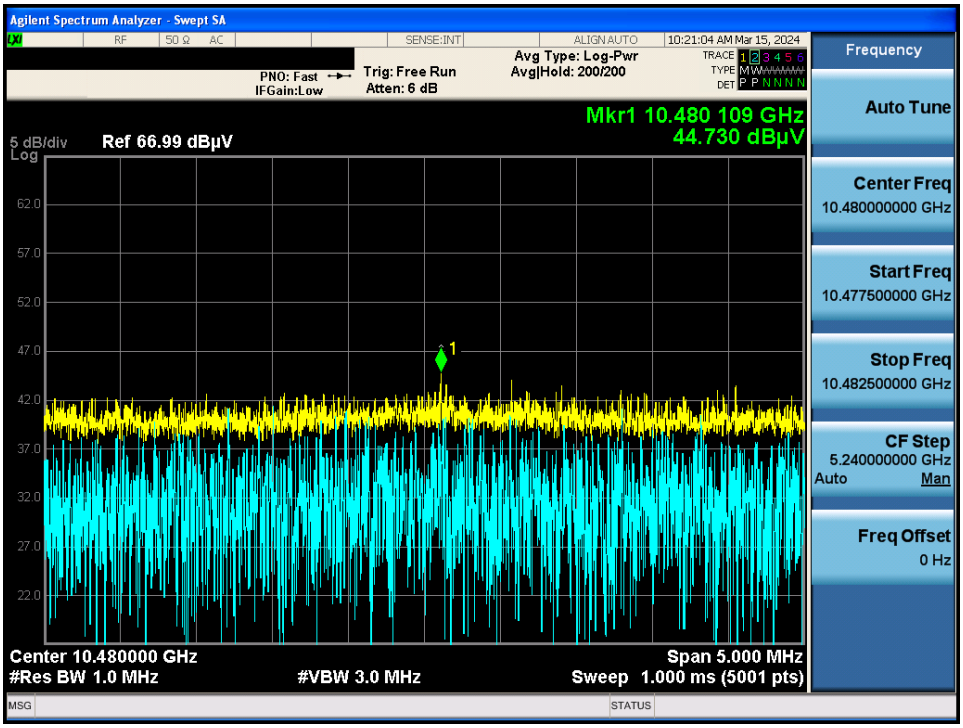


TM 1 & ANT 1 & U-NII 1 & 5 180 & X axis & Hor **Detector Mode : AV**

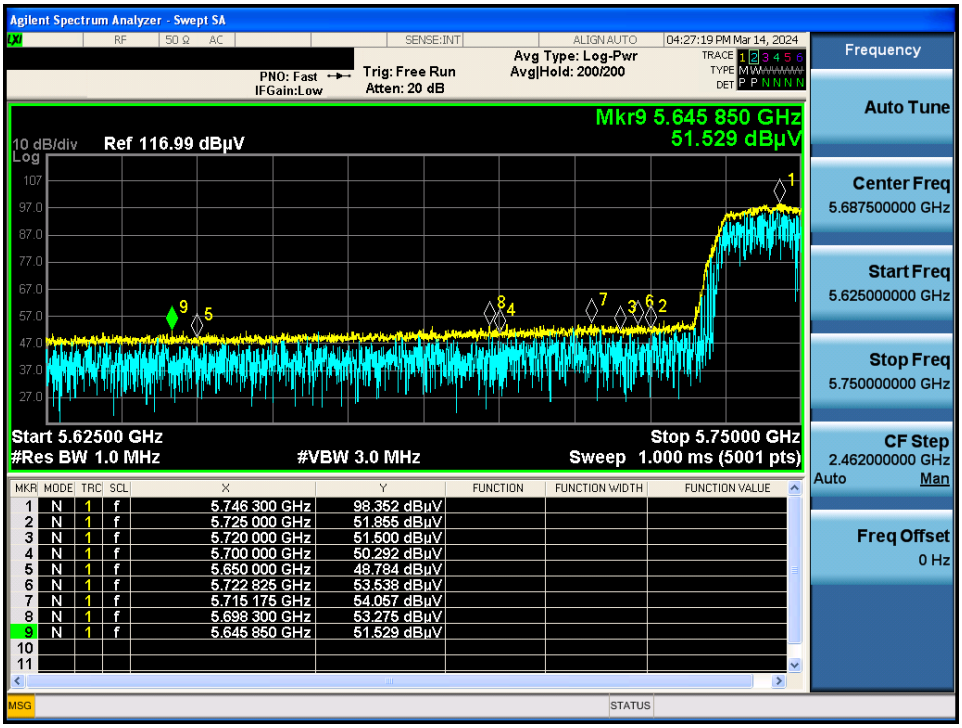


This test report is prohibited to copy or reissue in whole or in part without the approval of Dt&C Co., Ltd.

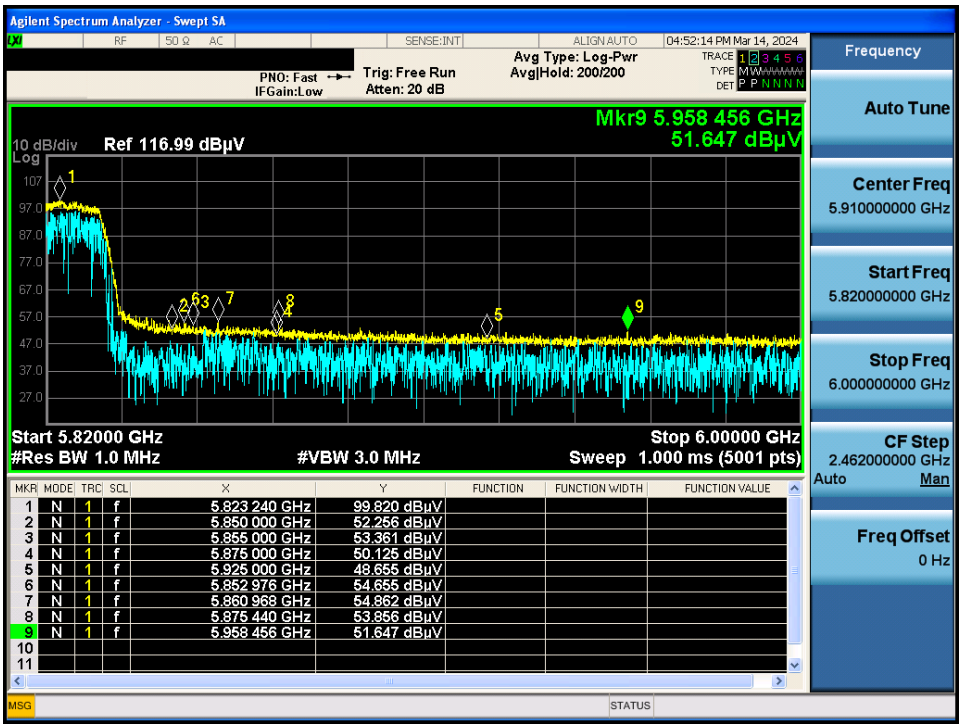
TM 1 & ANT 2 & U-NII 1 & 5 240 & X axis & Hor **Detector Mode : PK**



TM 1 & ANT 1 & U-NII 3 & 5 745 & X axis & Hor **Detector Mode : PK**

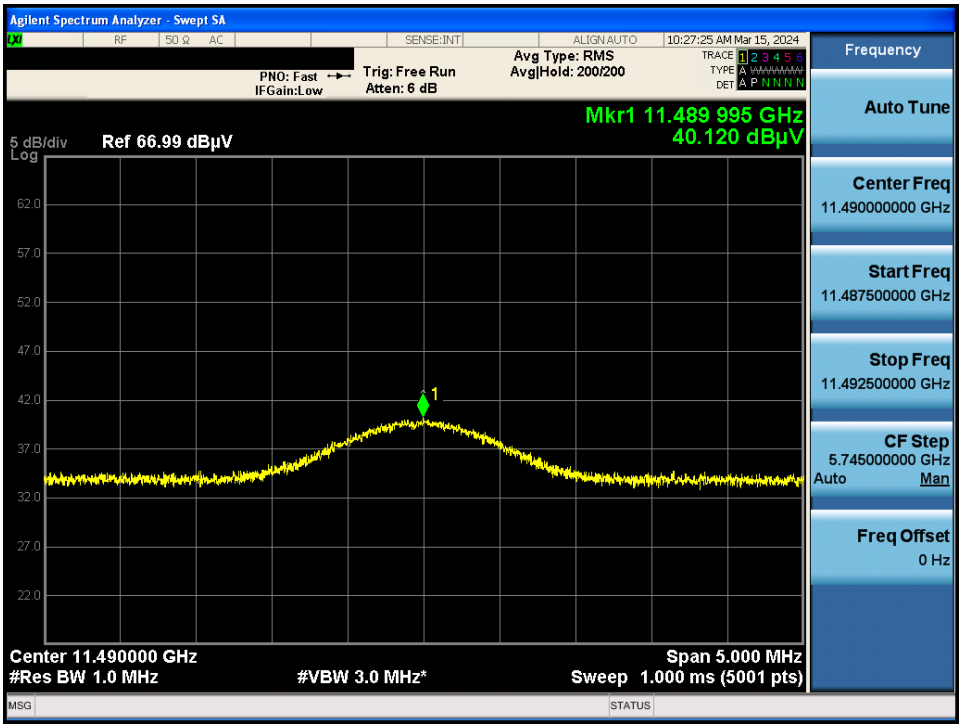


TM 1 & ANT 1 & U-NII 3 & 5 825 & X axis & Hor **Detector Mode : PK**

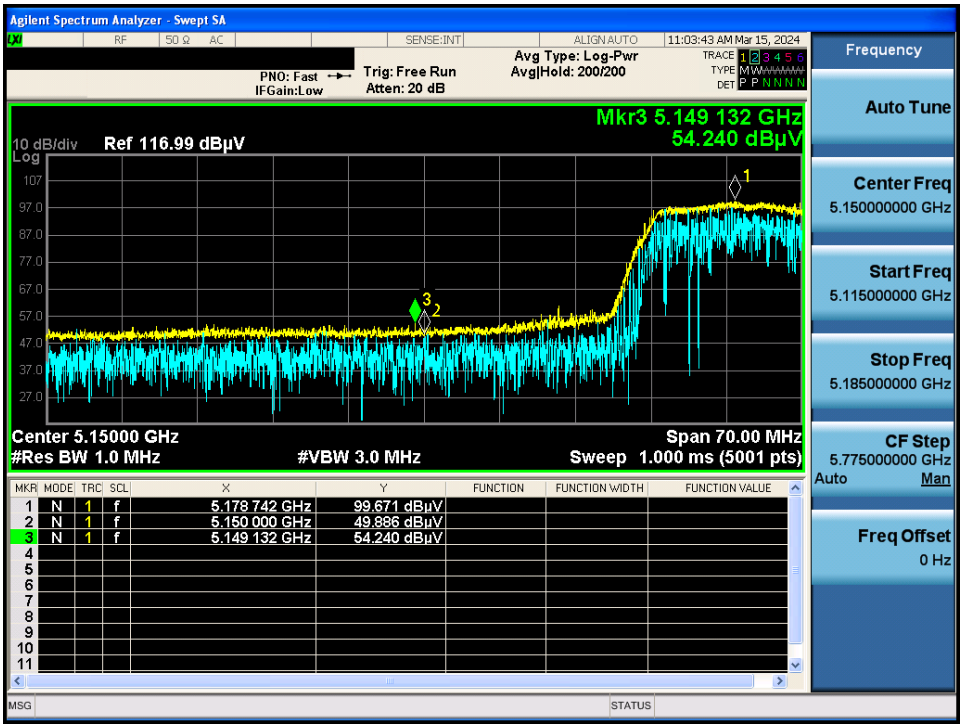


This test report is prohibited to copy or reissue in whole or in part without the approval of Dt&C Co., Ltd.

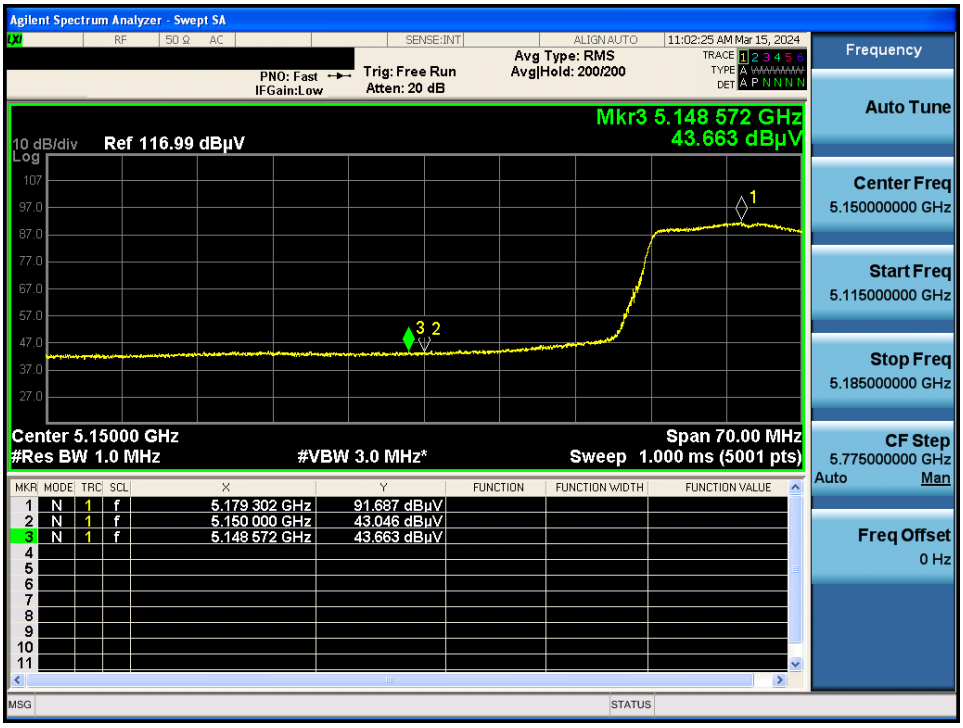
TM 1 & ANT 1 & U-NII 3 & 5 825 & X axis & Hor **Detector Mode : AV**



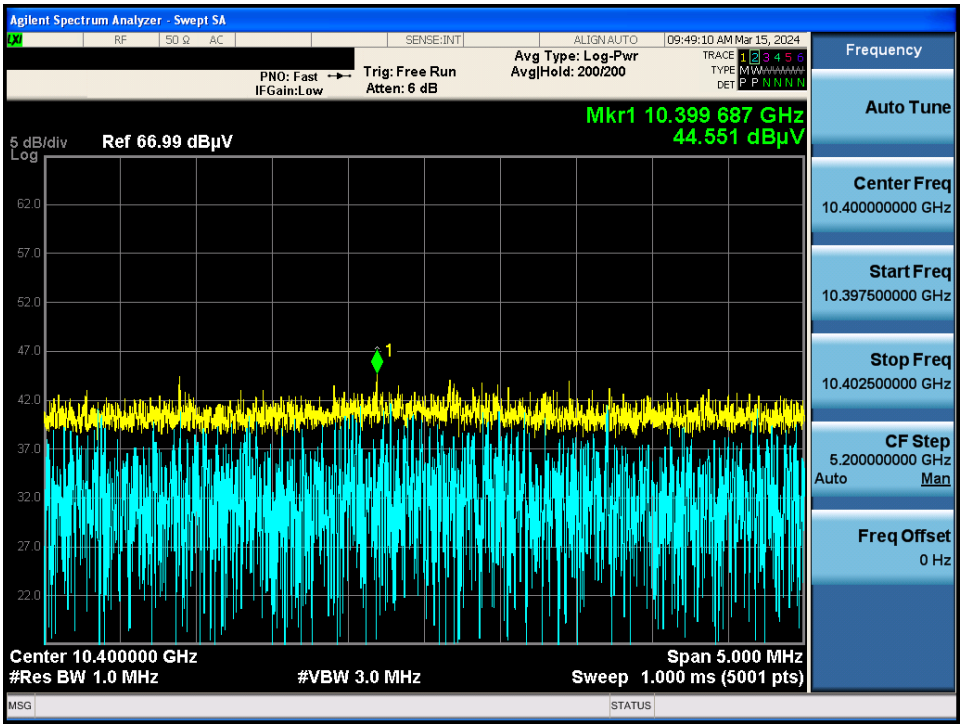
TM 2 & ANT 1 & U-NII 1 & 5 180 & X axis & Hor **Detector Mode : PK**



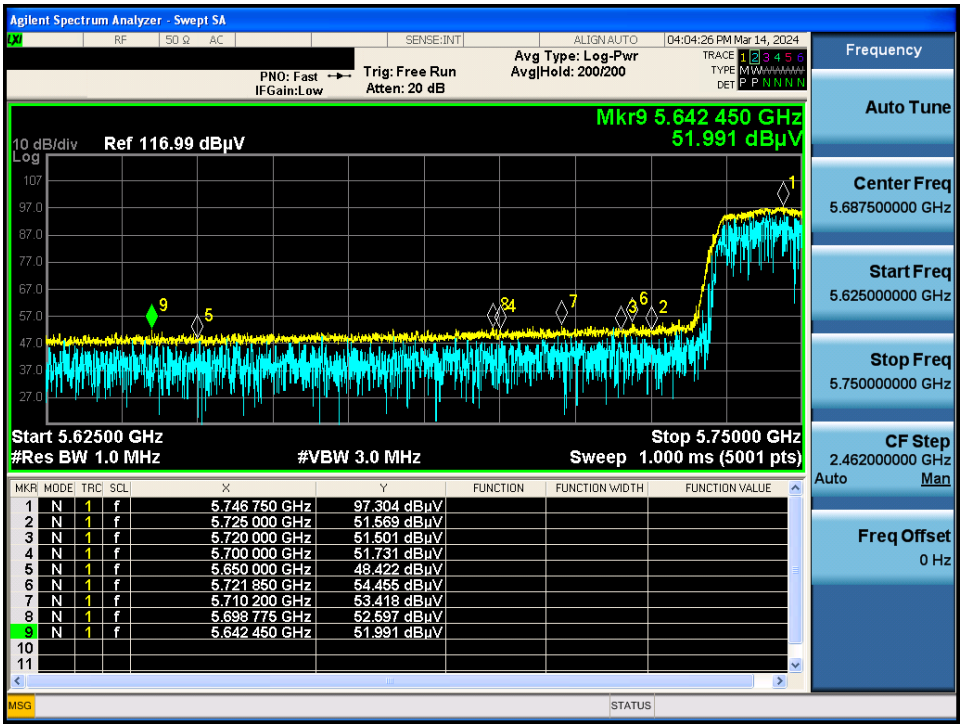
TM 2 & ANT 1 & U-NII 1 & 5 180 & X axis & Hor **Detector Mode : AV**



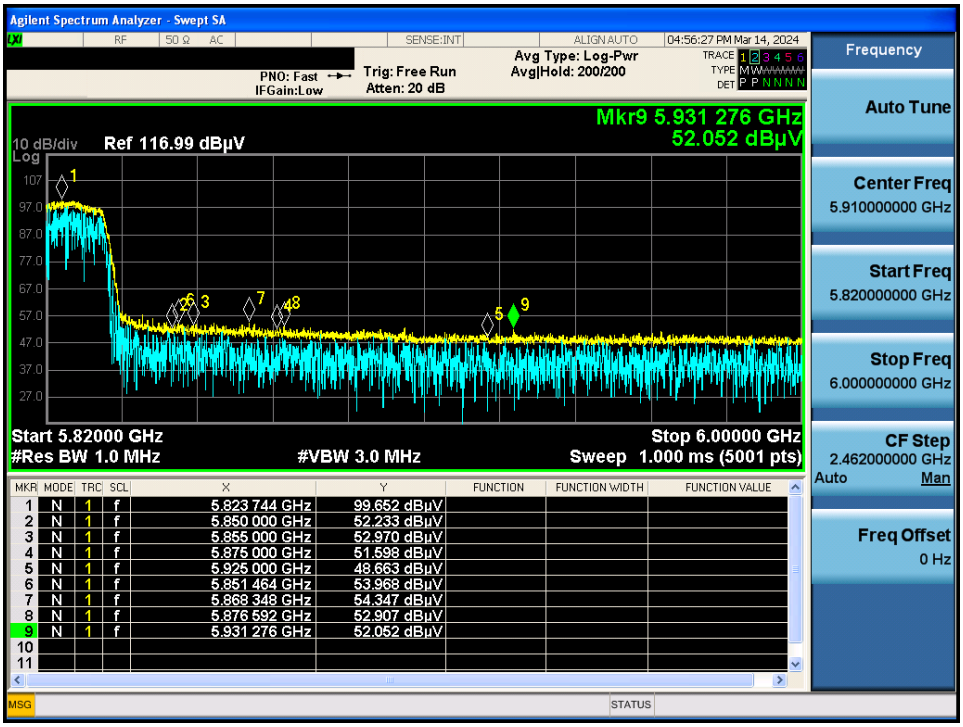
TM 2 & MIMO & U-NII 1 & 5 200 & X axis & Ver **Detector Mode : PK**



TM 2 & ANT 1 & U-NII 3 & 5 745 & X axis & Hor **Detector Mode : PK**

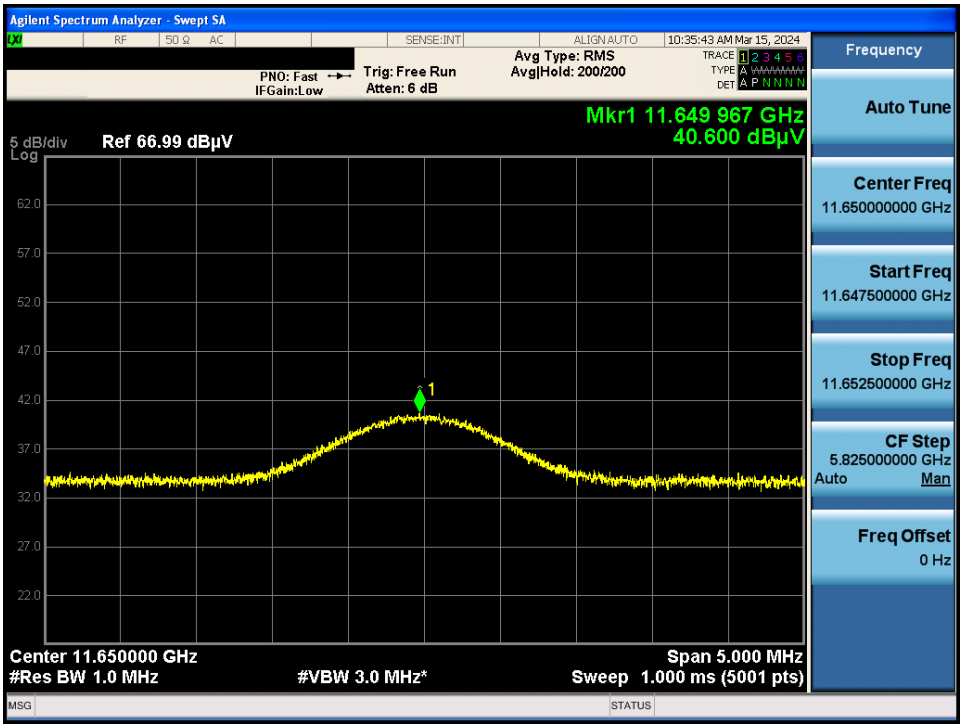


TM 2 & ANT 1 & U-NII 3 & 5 825 & X axis & Hor **Detector Mode : PK**

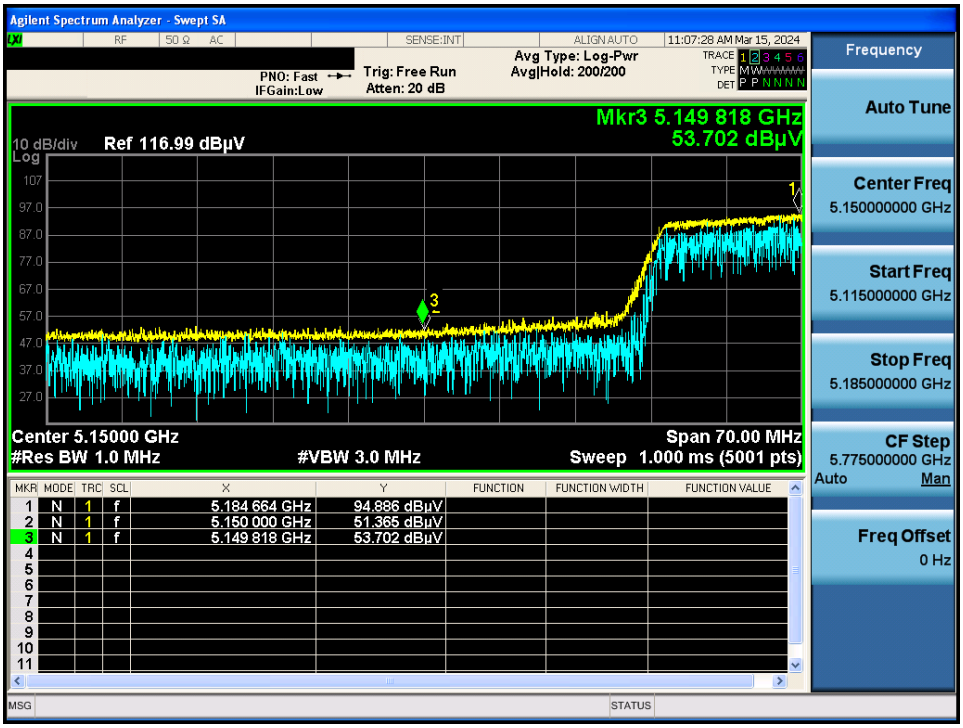


This test report is prohibited to copy or reissue in whole or in part without the approval of Dt&C Co., Ltd.

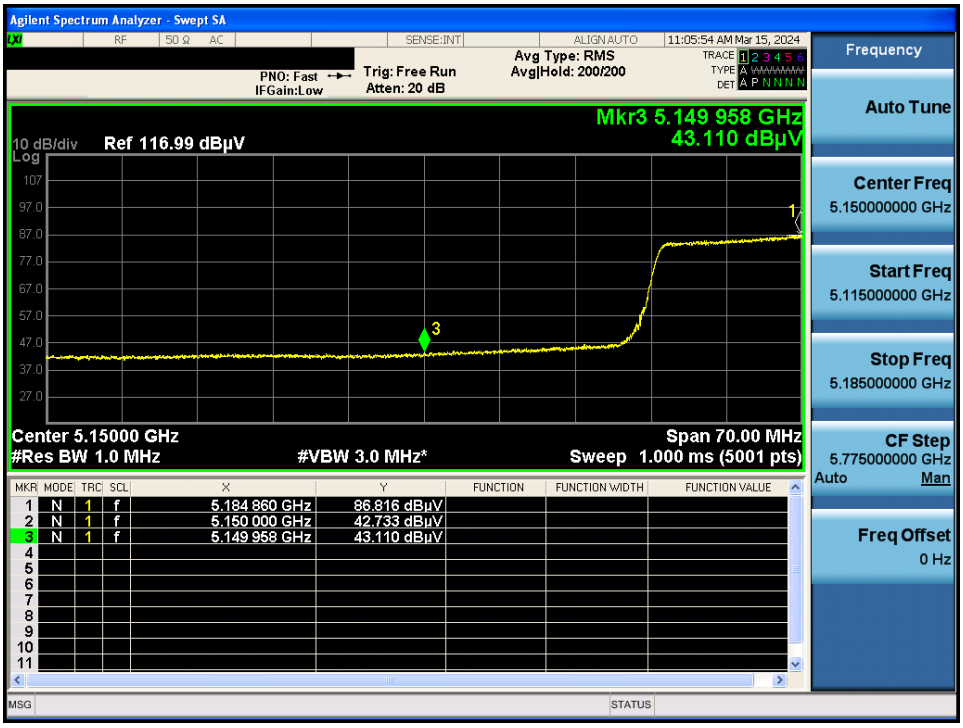
TM 2 & ANT 1 & U-NII 3 & 5 825 & X axis & Hor **Detector Mode : AV**



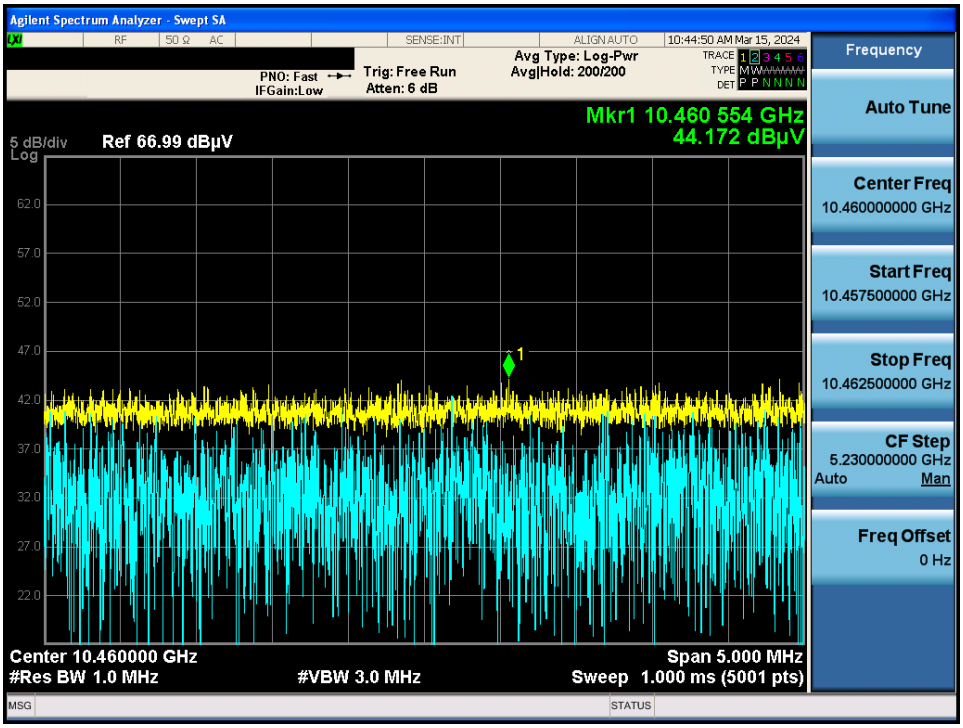
TM 3 & ANT 1 & U-NII 1 & 5 190 & X axis & Hor **Detector Mode : PK**



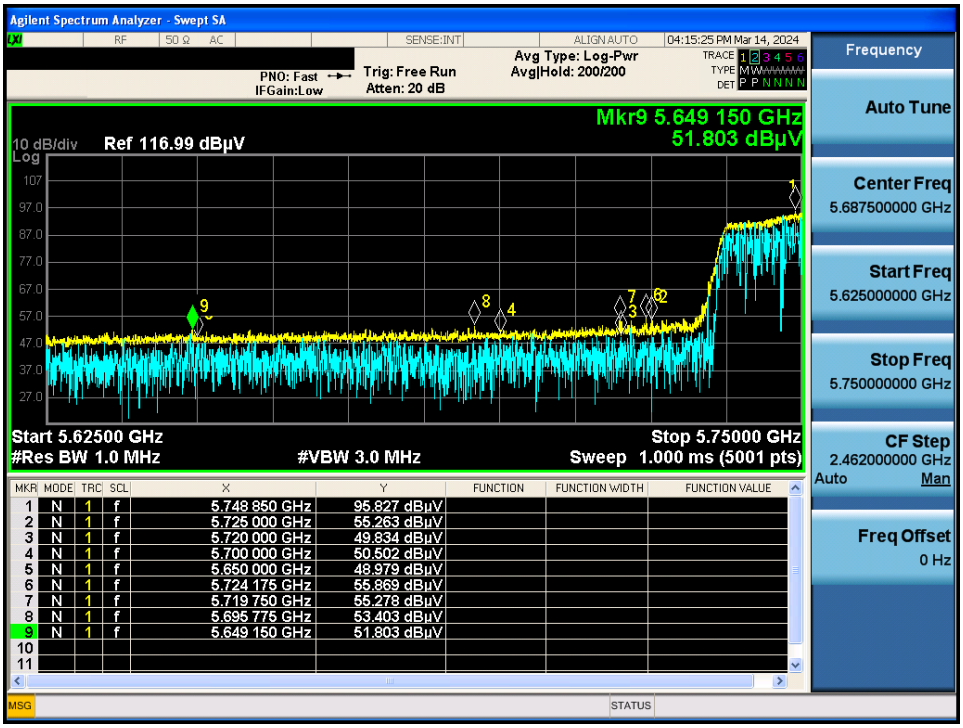
TM 3 & ANT 1 & U-NII 1 & 5 190 & X axis & Hor **Detector Mode : AV**



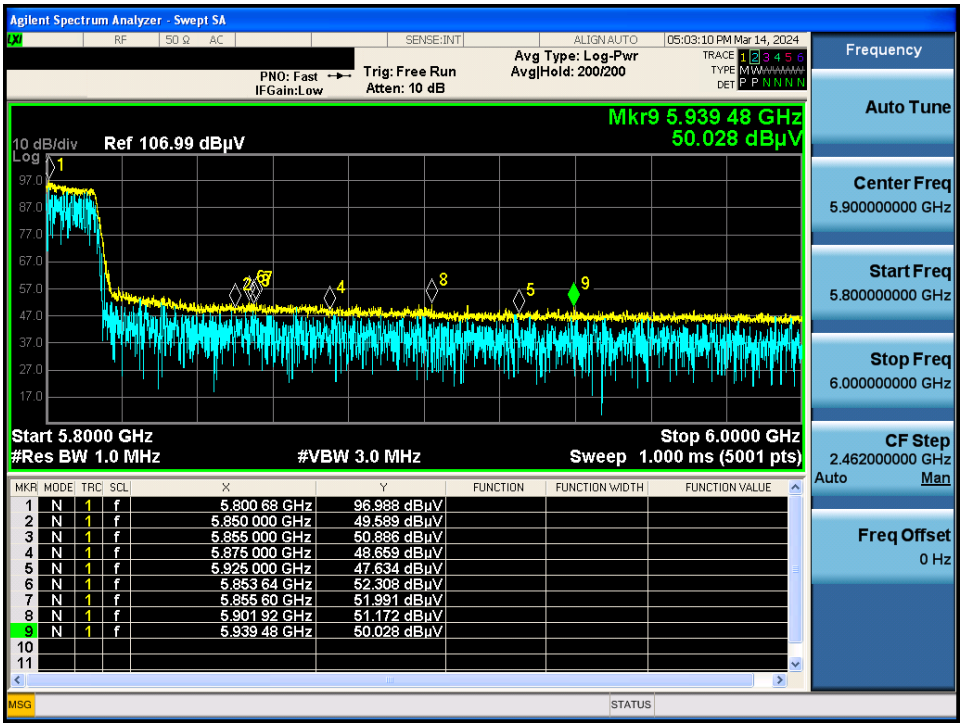
TM 3 & ANT 1 & U-NII 1 & 5 230 & X axis & Hor **Detector Mode : PK**



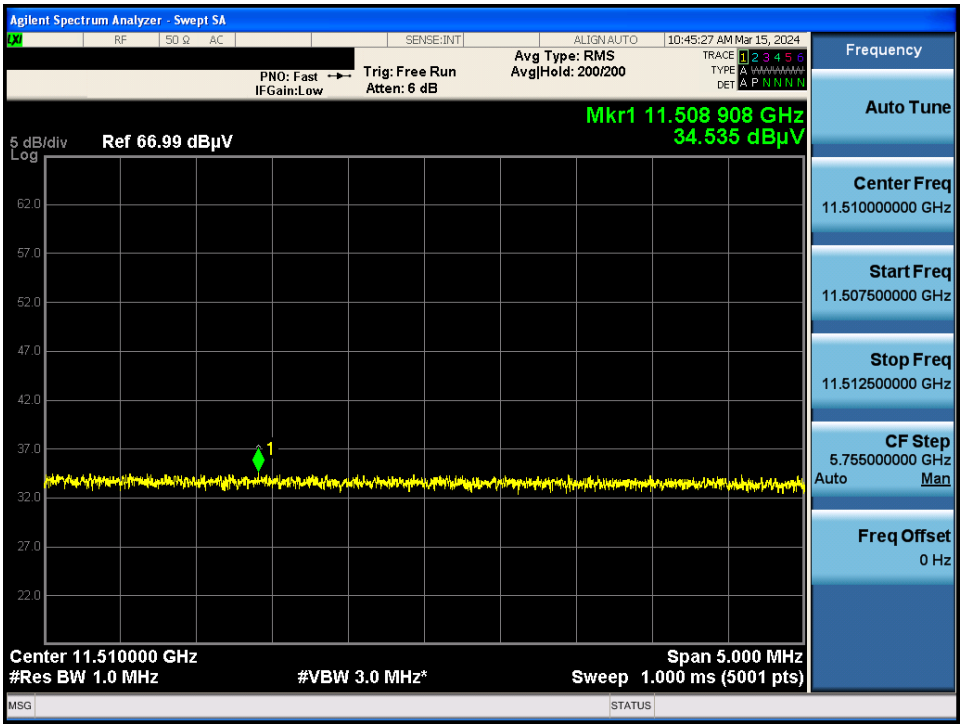
TM 3 & ANT 1 & U-NII 3 & 5 755 & X axis & Hor **Detector Mode : PK**



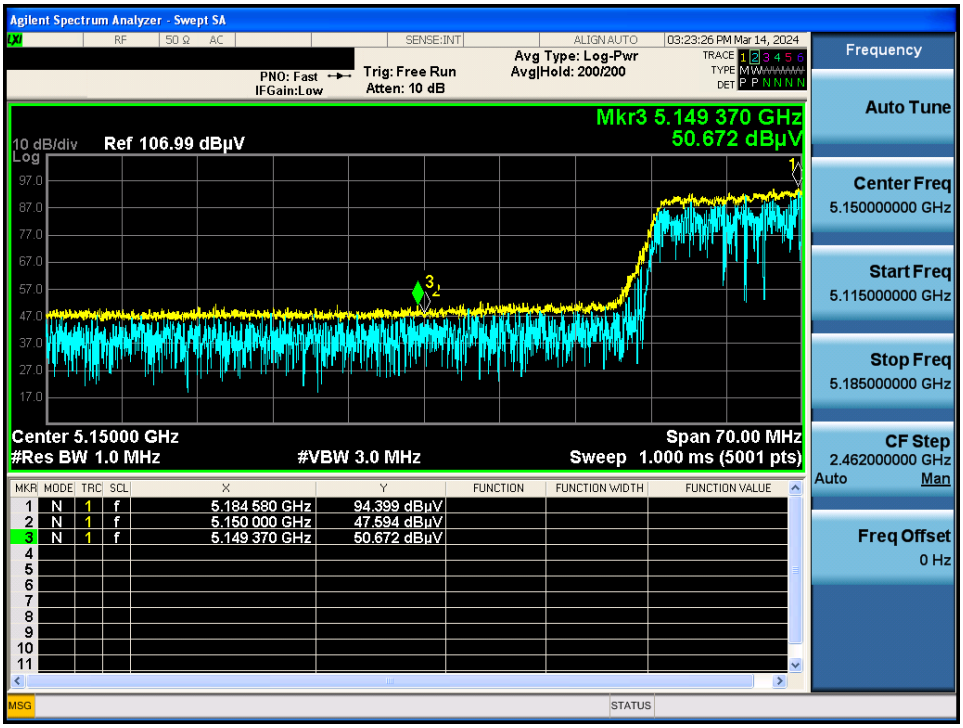
TM 3 & ANT 1 & U-NII 3 & 5 795 & X axis & Hor **Detector Mode : PK**



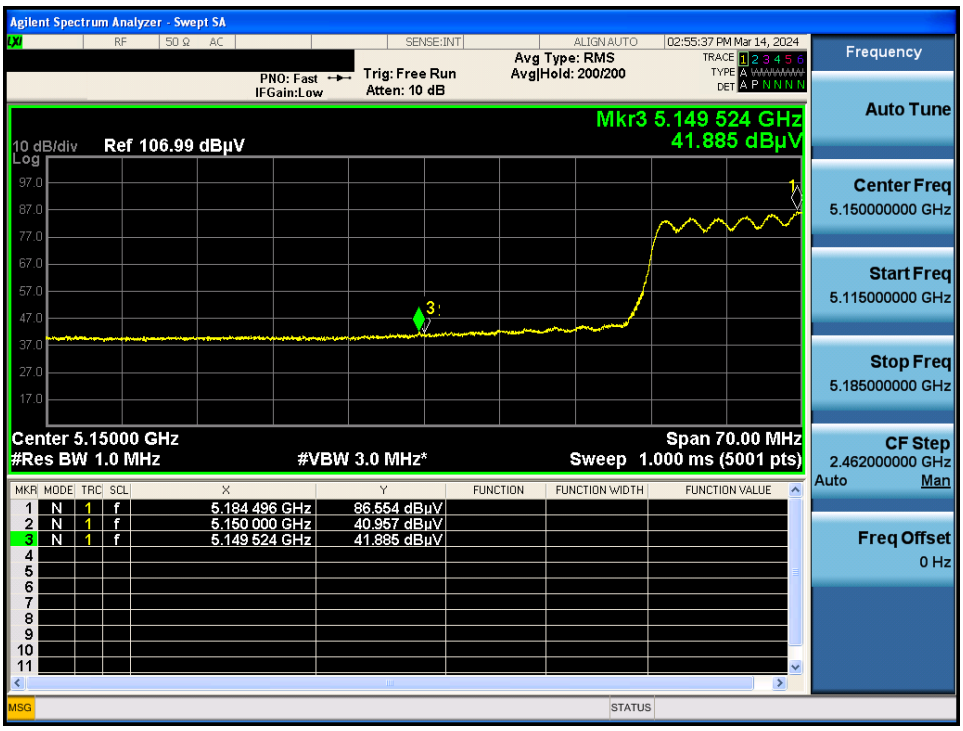
TM 3 & ANT 1 & U-NII 3 & 5 755 & X axis & Hor **Detector Mode : AV**



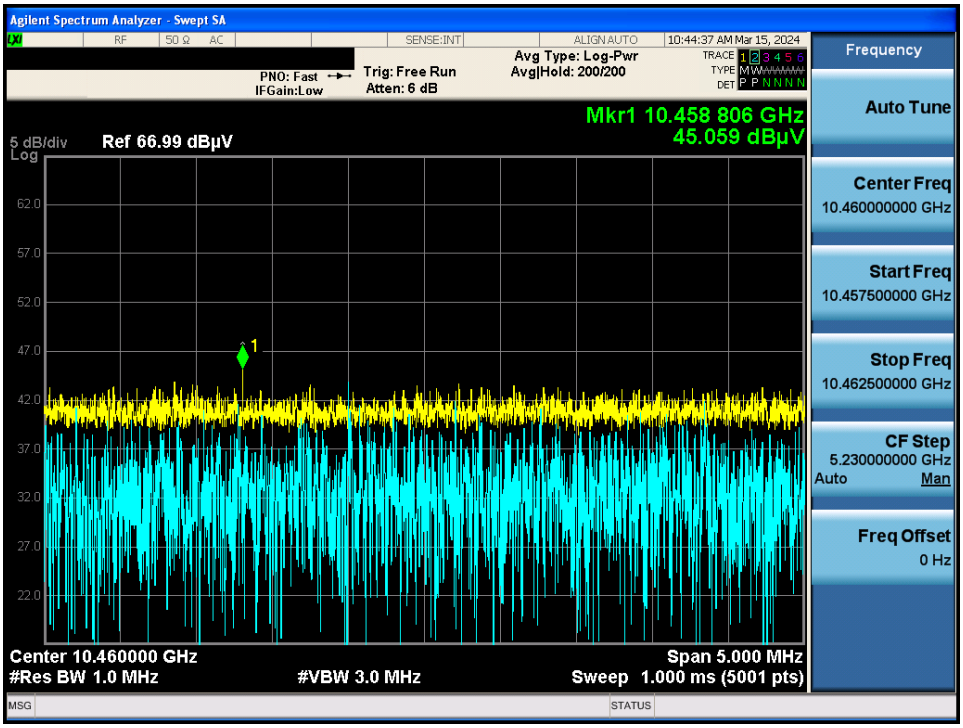
TM 4 & MIMO & U-NII 1 & 5 190 & X axis & Hor **Detector Mode : PK**



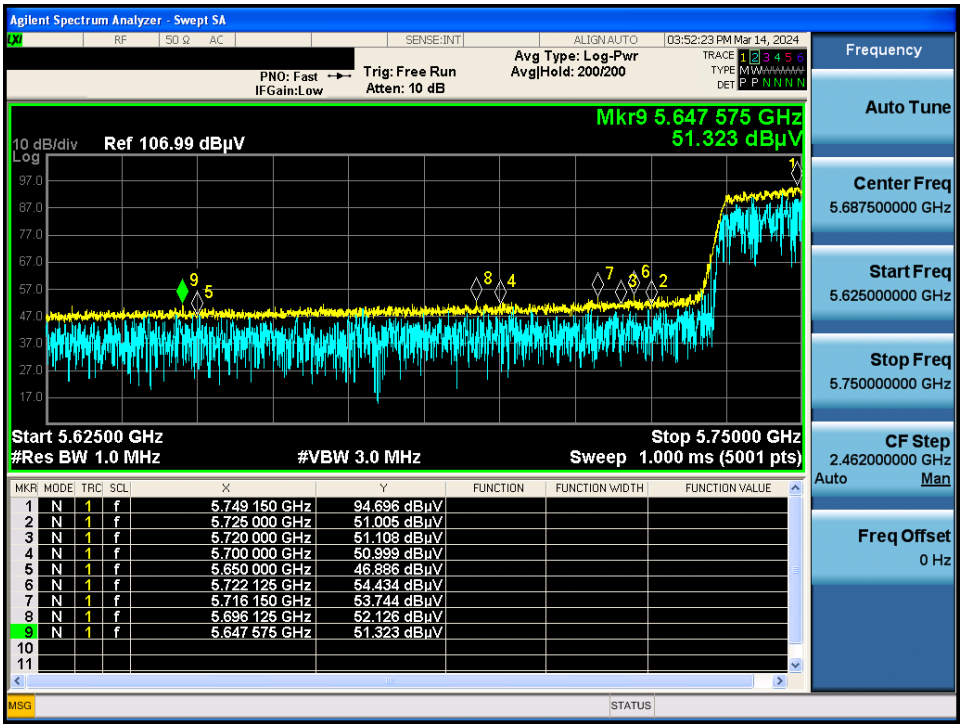
TM 4 & MIMO & U-NII 1 & 5 190 & X axis & Hor **Detector Mode : AV**



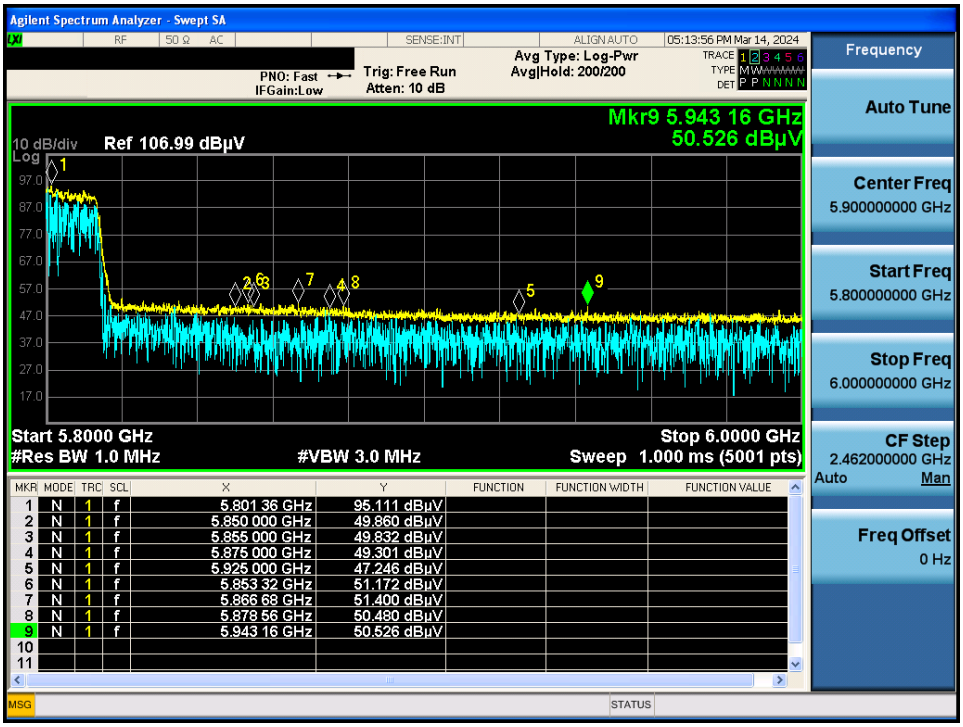
TM 4 & MIMO & U-NII 1 & 5 230 & X axis & Ver **Detector Mode : PK**



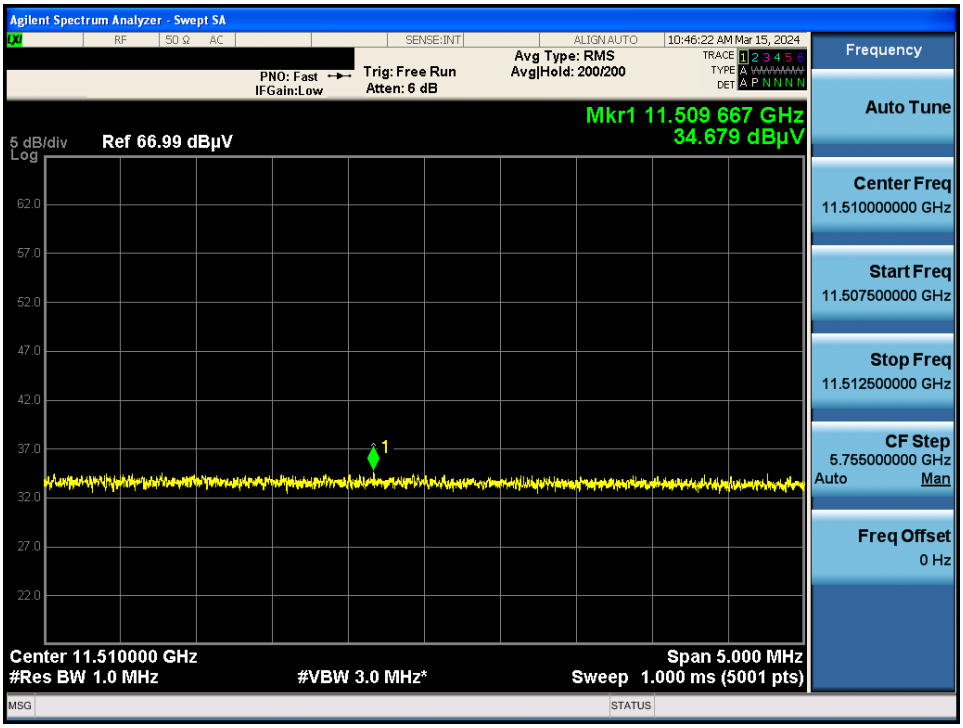
TM 4 & MIMO & U-NII 3 & 5 755 & X axis & Hor **Detector Mode : PK**



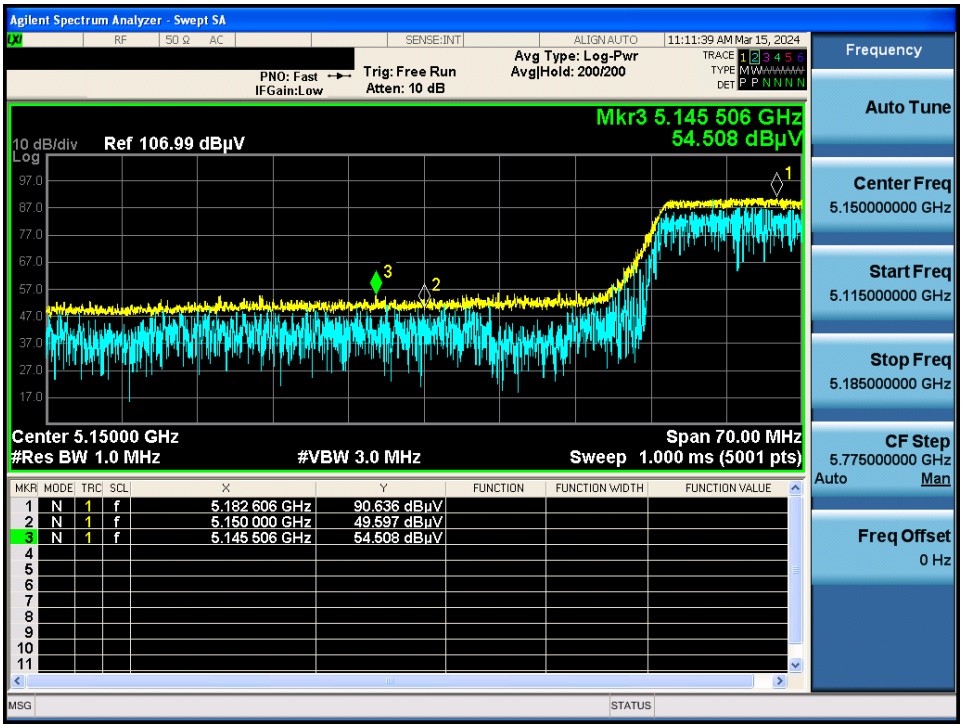
TM 4 & MIMO & U-NII 3 & 5 795 & X axis & Hor **Detector Mode : PK**



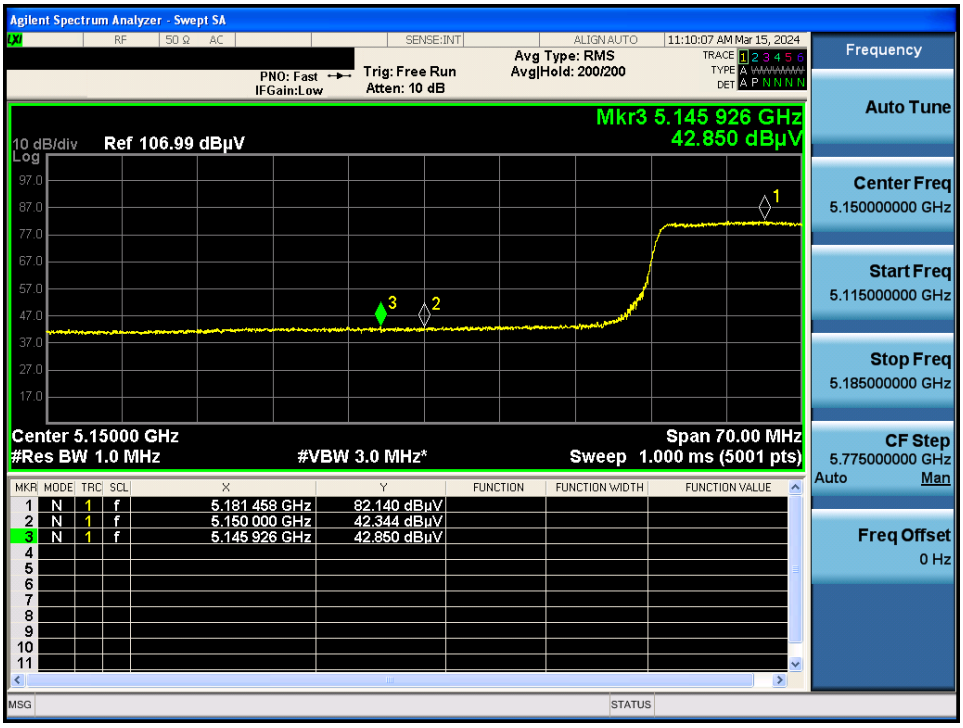
TM 4 & MIMO & U-NII 3 & 5 755 & X axis & Ver **Detector Mode : AV**



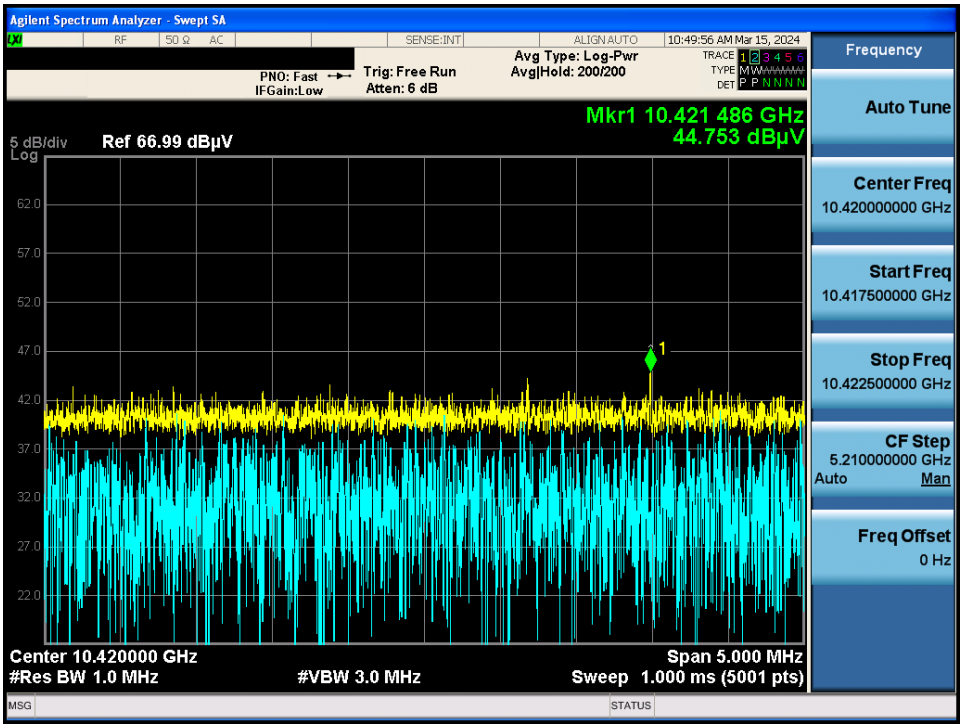
TM 5 & ANT 1 & U-NII 1 & 5 210 & X axis & Hor **Detector Mode : PK**



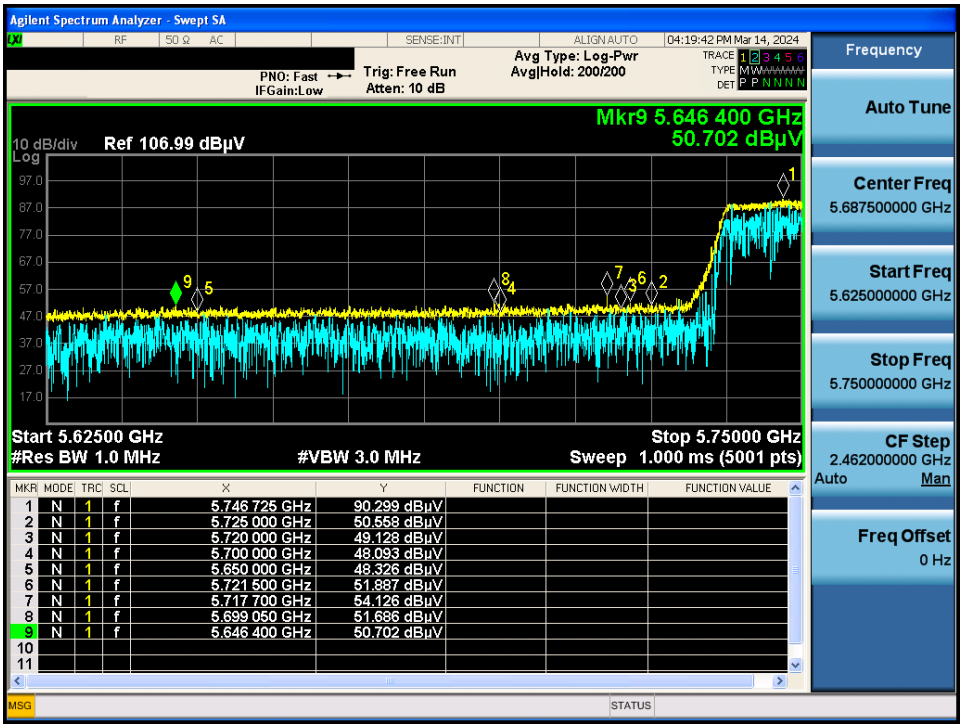
TM 5 & ANT 1 & U-NII 1 & 5 210 & X axis & Hor **Detector Mode : AV**



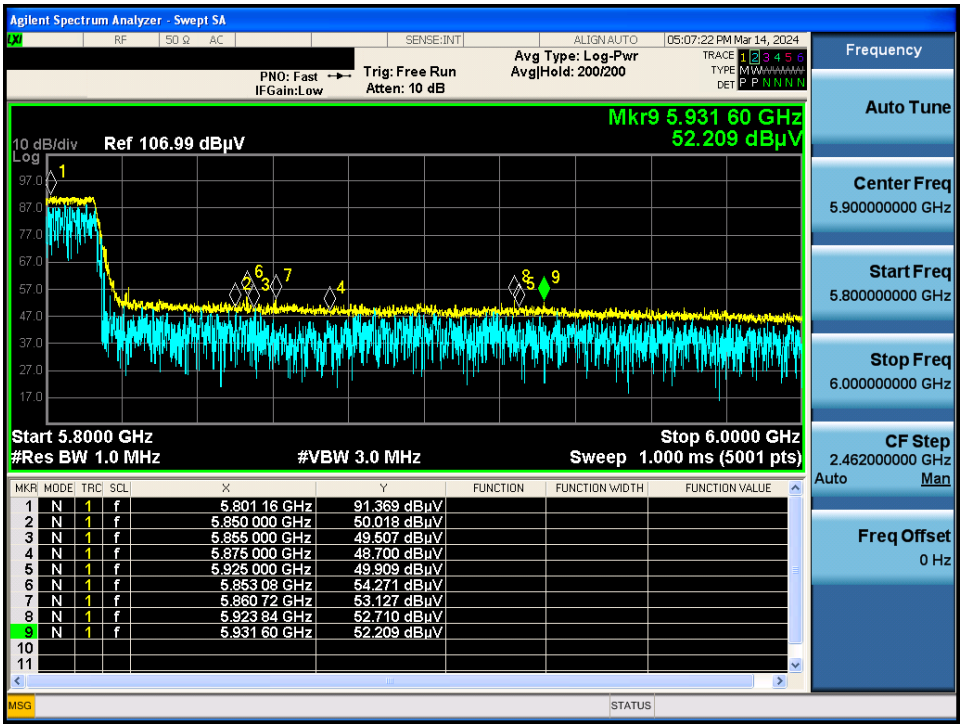
TM 5 & ANT 1 & U-NII 1 & 5 210 & X axis & Hor **Detector Mode : PK**



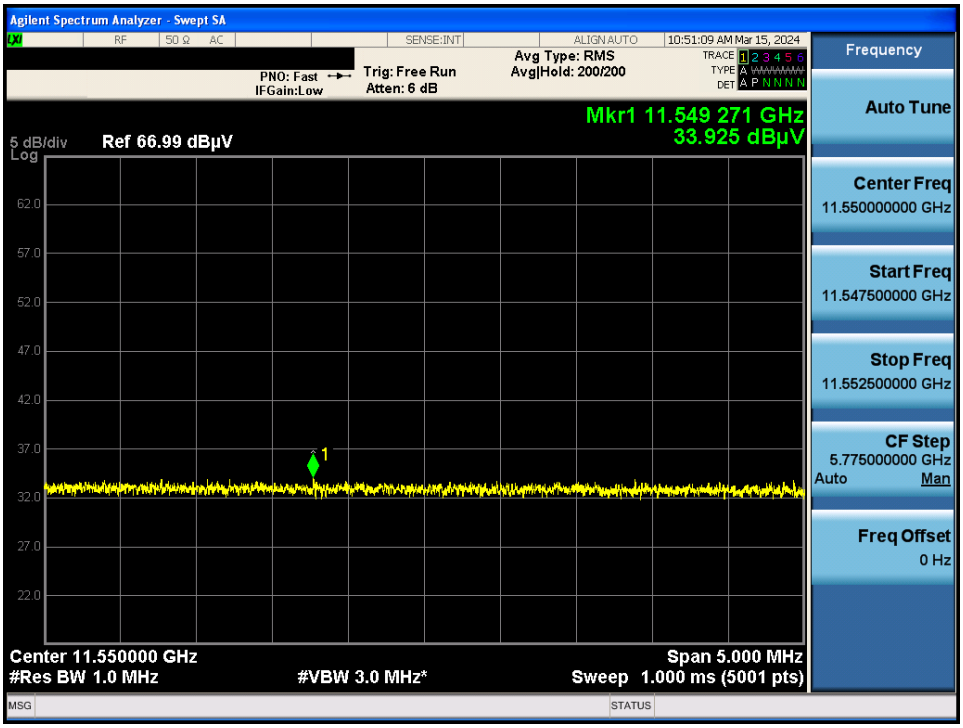
TM 5 & ANT 1 & U-NII 3 & 5 775 & X axis & Hor **Detector Mode : PK**



TM 5 & ANT 1 & U-NII 3 & 5 775 & X axis & Hor **Detector Mode : PK**



TM 5 & MIMO & U-NII 3 & 5 775 & X axis & Ver Detector Mode : AV



APPENDIX IIII

Output power verification

▣ Test Configuration

Method PM-G

▣ Test Procedure

Method PM-G of KDB789033 D02v02r01

Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

Mode	Band	Channel	Frequency (MHz)	Conducted Output Power(dBm) Antenna 1	Conducted Output Power(dBm) Antenna 2
802.11a	U-NII 1	36	5 180	7.78	5.85
		40	5 200	7.70	5.91
		48	5 240	7.58	6.08
	U-NII 3	149	5 745	5.25	7.03
		157	5 785	5.44	6.82
		165	5 825	6.43	6.62

All mode were measured and the worst-case results are reported.
NII-1: SISO, 802.11a, NII-3: SISO, 802.11a

This test report is prohibited to copy or reissue in whole or in part without the approval of Dt&C Co., Ltd.