



RADIO TEST REPORT

FCC ID

: RIWZAT600B

Equipment

: ATSC 3.0 STB

Brand Name

: ZINWELL

Model Name

: ZAT-600B

Applicant

: ZINWELL CORPORATION

No. 2 Wen-Hua Road, Hsinchu Industrial Park, Hsinchu, Taiwan

Manufacturer

: ZINWELL CORPORATION

No. 2 Wen-Hua Road, Hsinchu Industrial Park, Hsinchu, Taiwan

Standard

: 47 CFR FCC Part 15.407

The product was received on Jul. 27, 2023, and testing was started from Aug. 16, 2023 and completed on Aug. 22, 2023. We, Sporton International Inc. Hsinchu Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. Hsinchu Laboratory, the test report shall not be reproduced except in full.

Approved by: Sam Chen

Sporton International Inc. Hsinchu Laboratory

No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)

TEL: 886-3-656-9065

FAX: 886-3-656-9085

Report Template No.: CB-A12_1 Ver1.4

Page Number

: 1 of 29

Issued Date

: Sep. 15, 2023

Report Version

: 02

Table of Contents

Histo	ry of this test report	3
Sumn	mary of Test Result	4
1	General Description	5
1.1	Information	5
1.2	Applicable Standards	7
1.3	Testing Location Information	7
1.4	Measurement Uncertainty	8
2	Test Configuration of EUT	9
2.1	Test Channel Mode	9
2.2	The Worst Case Measurement Configuration	10
2.3	EUT Operation during Test	11
2.4	Accessories	11
2.5	Support Equipment	11
2.6	Test Setup Diagram	13
3	Transmitter Test Result	16
3.1	AC Power-line Conducted Emissions	16
3.2	Emission Bandwidth	18
3.3	Maximum Output Power	19
3.4	Power Spectral Density	21
3.5	Unwanted Emissions	24
4	Test Equipment and Calibration Data	28

Appendix A. Test Results of AC Power-line Conducted Emissions

Appendix B. Test Results of Emission Bandwidth

Appendix C. Test Results of Maximum Output Power

Appendix D. Test Results of Power Spectral Density

Appendix E. Test Results of Unwanted Emissions

Appendix G. Test Photos

Photographs of EUT v01

TEL: 886-3-656-9065 FAX: 886-3-656-9085

Report Template No.: CB-A12_1 Ver1.4

Page Number : 2 of 29

Issued Date : Sep. 15, 2023

Report No.: FR372002AB

Report Version : 02

History of this test report

Report No.: FR372002AB

Report No.	Version	Description	Issued Date
FR372002AB	01	Initial issue of report	Sep. 05, 2023
FR372002AB	02	Changing the brand name of antenna to "INPAQ" from "PSA" in section 1.1.2.	Sep. 15, 2023

TEL: 886-3-656-9065 Page Number : 3 of 29
FAX: 886-3-656-9085 Issued Date : Sep. 15, 2023

Summary of Test Result

Report No.: FR372002AB

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.2	15.203	Antenna Requirement	PASS	-
3.1	15.207	AC Power-line Conducted Emissions	PASS	-
3.2	15.407(a)	Emission Bandwidth	PASS	-
3.3	15.407(a)	Maximum Output Power	PASS	-
3.4	15.407(a)	Power Spectral Density	PASS	-
3.5	15.407(b)	Unwanted Emissions	PASS	-

Conformity Assessment Condition:

- 1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
- 2. The measurement uncertainty please refer to each test result in the chapter "Measurement Uncertainty".

Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

Reviewed by: Sam Chen Report Producer: Cathy Chiu

TEL: 886-3-656-9065 Page Number : 4 of 29
FAX: 886-3-656-9085 Issued Date : Sep. 15, 2023

1 General Description

1.1 Information

1.1.1 RF General Information

Frequency Range (MHz)	IEEE Std. 802.11	Ch. Frequency (MHz)	Channel Number
5150-5250	a, n (HT20), ac (VHT20)	5180-5240	36-48 [4]
5725-5850		5745-5825	149-165 [5]
5150-5250	n (HT40), ac (VHT40)	5190-5230	38-46 [2]
5725-5850		5755-5795	151-159 [2]
5150-5250	ac (VHT80)	5210	42 [1]
5725-5850		5775	155 [1]

Report No.: FR372002AB

Band	Mode	BWch (MHz)	Nant
5.15-5.25GHz	802.11a	20	1TX
5.15-5.25GHz	802.11n HT20	20	1TX
5.15-5.25GHz	802.11ac VHT20	20	1TX
5.15-5.25GHz	802.11n HT40	40	1TX
5.15-5.25GHz	802.11ac VHT40	40	1TX
5.15-5.25GHz	802.11ac VHT80	80	1TX
5.725-5.85GHz	802.11a	20	1TX
5.725-5.85GHz	802.11n HT20	20	1TX
5.725-5.85GHz	802.11ac VHT20	20	1TX
5.725-5.85GHz	802.11n HT40	40	1TX
5.725-5.85GHz	802.11ac VHT40	40	1TX
5.725-5.85GHz	802.11ac VHT80	80	1TX

Note:

- 11a, HT20 and HT40 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.
- VHT20, VHT40 and VHT80 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM modulation.

• BWch is the nominal channel bandwidth.

TEL: 886-3-656-9065 Page Number : 5 of 29
FAX: 886-3-656-9085 Issued Date : Sep. 15, 2023



1.1.2 Antenna Information

	A 4	Dont	D	Ma Ial Nama	A	0		Gain (dBi)	
Aı	nt.	Port	Brand	Model Name	Antenna Type	Connector	2.4GHz	5GHz UNII 1	5GHz UNII 3
	1	1	INPAQ	ZAT-600B	PCB Antenna	I-PEX	4.02	5.33	3.73

Report No.: FR372002AB

Note: The above information was declared by manufacturer.

<For 2.4GHz Band>

For IEEE 802.11b/g/n mode (1TX/1RX)

Only Port 1 can be used as transmitting/receiving antenna.

<For 5GHz Band UNII 1, UNII 3>

For IEEE 802.11a/n/ac mode (1TX/1RX)

Only Port 1 can be used as transmitting/receiving antenna.

1.1.3 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
802.11a_Nss 1	0.961	0.17	2.064m	1k
802.11ac VHT20_Nss 1	0.927	0.33	1.933m	1k
802.11ac VHT40_Nss 1	0.907	0.42	952.5u	3k
802.11ac VHT80_Nss 1	0.821	0.86	460.313u	3k

N	\triangle	۰
IN	o_{ic}	

- DC is Duty Cycle.
- DCF is Duty Cycle Factor.

1.1.4 EUT Operational Condition

EUT Power Type	From Power Adapter				
Beamforming Function	☐ With beamforming ☐ Without beamforming		Without beamforming		
		Outdoor P2M		Indoor P2M	
Function		Fixed P2P	\boxtimes	Client	
	\boxtimes	Point-to-multipoint		Point-to-point	
Channel Puncturing Function		Supported	\boxtimes	Unsupported	
Test Software Version		platfrom-tools_r34.0.3			

Note: The above information was declared by manufacturer.

 TEL: 886-3-656-9065
 Page Number
 : 6 of 29

 FAX: 886-3-656-9085
 Issued Date
 : Sep. 15, 2023

1.2 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

Report No.: FR372002AB

- 47 CFR FCC Part 15
- ANSI C63.10-2013
- FCC KDB 789033 D02 v02r01

The following reference test guidance is not within the scope of accreditation of TAF.

- FCC KDB 662911 D01 v02r01
- FCC KDB 412172 D01 v01r01
- FCC KDB 414788 D01 v01r01

1.3 Testing Location Information

Testing Location Information

Test Lab.: Sporton International Inc. Hsinchu Laboratory

Hsinchu ADD: No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)

(TAF: 3787) TEL: 886-3-656-9065 FAX: 886-3-656-9085

Test site Designation No. TW3787 with FCC.

Conformity Assessment Body Identifier (CABID) TW3787 with ISED.

Test Condition	Test Site No.	Test Engineer	Test Environment (°C / %)	Test Date
RF Conducted	TH01-CB	Eason Chen	24.2~25.1 / 62~71	Aug. 22, 2023
Radiated Below 1GHz	03CH01-CB	Chris Li	20~21 / 55-58	Aug. 16, 2023
Radiated Above 1GHz	03CH02-CB	Black Lu	22.6~23.2 / 59~63	Aug. 17, 2023~ Aug. 21, 2023
AC Conduction	CO01-CB	Gray Lee	23~24 / 53~54	Aug. 21, 2023

TEL: 886-3-656-9065 Page Number : 7 of 29
FAX: 886-3-656-9085 Issued Date : Sep. 15, 2023

1.4 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence

Report No.: FR372002AB

level (based on a coverage factor (k=2)

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	3.4 dB	Confidence levels of 95%
Radiated Emission (9kHz ~ 30MHz)	3.7 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	5.1 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	4.1 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	4.2 dB	Confidence levels of 95%
Conducted Emission	3.1 dB	Confidence levels of 95%
Output Power Measurement	0.8 dB	Confidence levels of 95%
Power Density Measurement	3.1 dB	Confidence levels of 95%
Bandwidth Measurement	2.2%	Confidence levels of 95%

TEL: 886-3-656-9065 Page Number : 8 of 29
FAX: 886-3-656-9085 Issued Date : Sep. 15, 2023

2 Test Configuration of EUT

2.1 Test Channel Mode

Mode	Power Setting
802.11a_Nss1,(6Mbps)_1TX	-
5180MHz	62
5200MHz	63
5240MHz	63
5745MHz	63
5785MHz	63
5825MHz	63
802.11ac VHT20_Nss1,(MCS0)_1TX	-
5180MHz	63
5200MHz	63
5240MHz	63
5745MHz	63
5785MHz	63
5825MHz	63
802.11ac VHT40_Nss1,(MCS0)_1TX	-
5190MHz	49
5230MHz	63
5755MHz	63
5795MHz	63
802.11ac VHT80_Nss1,(MCS0)_1TX	-
5210MHz	48
5775MHz	63

Report No.: FR372002AB

 TEL: 886-3-656-9065
 Page Number : 9 of 29

 FAX: 886-3-656-9085
 Issued Date : Sep. 15, 2023

2.2 The Worst Case Measurement Configuration

	The Worst Case Mode for Following Conformance Tests		
Tests Item	AC power-line conducted emissions		
Condition AC power-line conducted measurement for line and neutral Test Voltage: 120Vac / 60Hz			
Operating Mode Normal Link			
1	EUT with WLAN 2.4GHz + Coaxial port-Video + USB port-load + Adapter		
2	EUT with WLAN 5GHz + Coaxial port-Video + USB port-load + Adapter		
Mode 1 has been evaluated to be the worst case among Mode 1~2, thus measurement for Mode 3 will follow this same test mode.			
3	EUT with WLAN 2.4GHz + Coaxial port-load + USB port-Video + Adapter		
For operating mode 1 is the worst case and it was record in this test report.			

Report No.: FR372002AB

The Worst Case Mode for Following Conformance Tests	
Tests Item Emission Bandwidth Maximum Output Power Power Spectral Density	
Test Condition	Conducted measurement at transmit chains

	The Worst Case Mode for Following Conformance Tests		
Tests Item	Unwanted Emissions		
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.		
Operating Mode <	Normal Link		
1GHz	After evaluating, the worst case was found at Z axis, so it was selected to perform test and its test result was written in the report.		
1	EUT in Z axis with WLAN 2.4GHz + Coaxial port-Video + USB port-load + Adapter		
2	EUT in Z axis with WLAN 5GHz + Coaxial port-Video + USB port-load + Adapter		
Mode 1 has been evaluathis same test mode.	uated to be the worst case among Mode 1~2, thus measurement for Mode 3 will follow		
3	EUT in Z axis with WLAN 2.4GHz + Coaxial port-load + USB port-Video + Adapter		
For operating mode 3 is the worst case and it was record in this test report.			
Operating Mode > 1GHz	СТХ		
1	EUT in Z axis		

 TEL: 886-3-656-9065
 Page Number : 10 of 29

 FAX: 886-3-656-9085
 Issued Date : Sep. 15, 2023

2.3 EUT Operation during Test

For CTX Mode:

The EUT was programmed to be in continuously transmitting mode.

For Normal Link:

During the test, the EUT operation to normal function.

2.4 Accessories

		Accessories	
Equipment Name	Brand Name	Model Name	Rating
Adapter	APD	WB-18Q12FU1	INPUT: 100-240V~,50-60Hz,0.6AMax OUTPUT: 12V, 1.5A
		Other	
Remote controller*1			

Report No.: FR372002AB

2.5 Support Equipment

For AC Conduction:

	Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID	
Α	Flash disk3.0	Transcend	JetFlash-700	N/A	
В	Remote controller	GSD	RCR69X34B034C	N/A	
С	LCD Monitor	PHILIPS	288E2A/96	N/A	
D	LAN NB	DELL	T3400	N/A	
Е	AP Router	ASUS	RT-AX88U	MSQ-RTAXHP00	
F	Terminal system	ZINWELL	ZMA-9303	N/A	
G	DVD Player	Ploneer	DV-600AV-S	N/A	

TEL: 886-3-656-9065 Page Number : 11 of 29
FAX: 886-3-656-9085 Issued Date : Sep. 15, 2023

For Radiated (below 1GHz):

	Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID	
Α	WLAN AP	NETGEAR	N600	N/A	
В	LAN NB	DELL	E4300	N/A	
С	LCD Monitor	PHILIPS	288E2A/96	N/A	
D	AP Router	ASUS	RT-AX88U	MSQ-RTAXHP00	
Е	WLAN 2.4G NB	DELL	E4300	N/A	
F	Terminal System	ZINWELL	ZMA-9303	N/A	
G	Blu-ray Disc Player	Panasonic	DP-UB320GTK	N/A	
Н	Flash disk3.0	Transcend	JetFlash-700	N/A	
I	Remote controller	GSD	RCR69X34B034C	N/A	

Report No. : FR372002AB

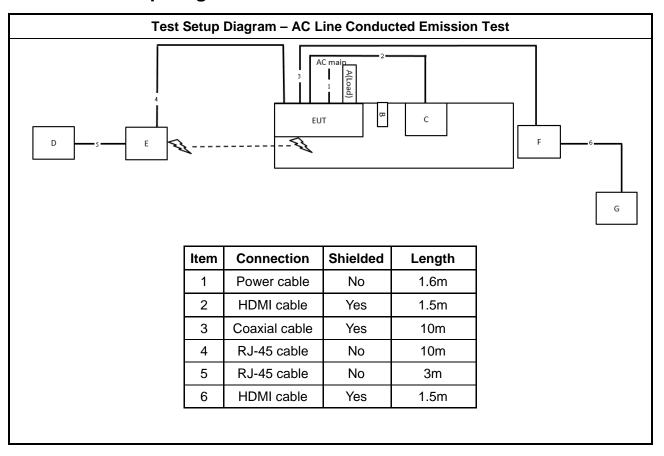
For Radiated (above 1GHz) and RF Conducted:

	Support Equipment			
No.	Equipment	Brand Name	Model Name	FCC ID
Α	NB	DELL	E4300	N/A

TEL: 886-3-656-9065 Page Number : 12 of 29
FAX: 886-3-656-9085 Issued Date : Sep. 15, 2023

RADIO TEST REPORT Report No. : FR372002AB

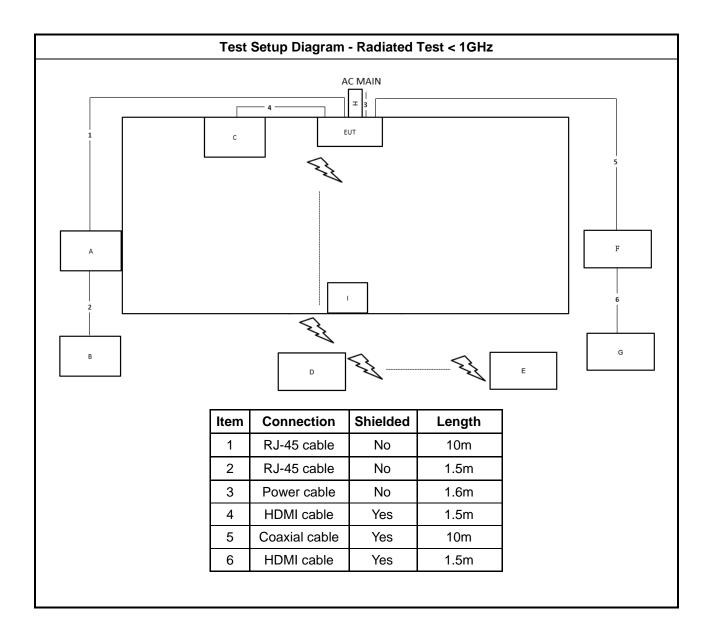
2.6 Test Setup Diagram



 TEL: 886-3-656-9065
 Page Number
 : 13 of 29

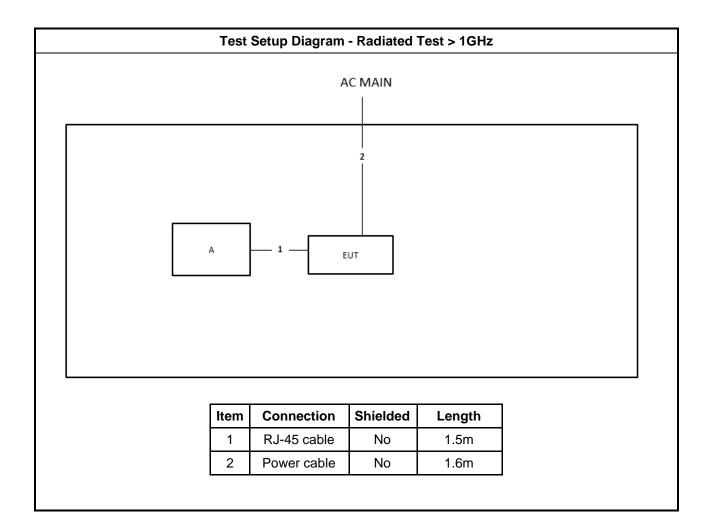
 FAX: 886-3-656-9085
 Issued Date
 : Sep. 15, 2023

Report No.: FR372002AB



TEL: 886-3-656-9065 Page Number : 14 of 29
FAX: 886-3-656-9085 Issued Date : Sep. 15, 2023

Report No.: FR372002AB



 TEL: 886-3-656-9065
 Page Number : 15 of 29

 FAX: 886-3-656-9085
 Issued Date : Sep. 15, 2023

3 Transmitter Test Result

3.1 AC Power-line Conducted Emissions

3.1.1 AC Power-line Conducted Emissions Limit

AC Power-line Conducted Emissions Limit		imit
Frequency Emission (MHz) Quasi-Peak Average		
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50
Note 1: * Decreases with the logarithm of the frequency.		

Report No.: FR372002AB

3.1.2 Measuring Instruments

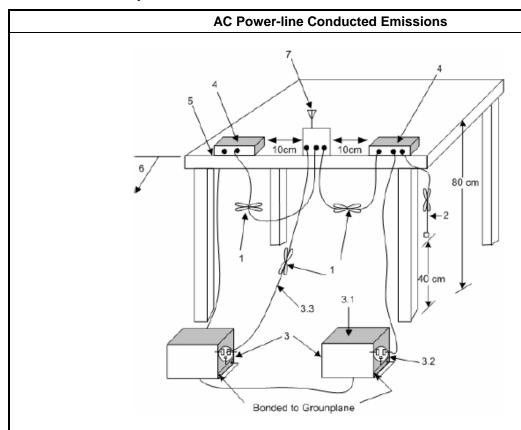
Refer a test equipment and calibration data table in this test report.

3.1.3 Test Procedures

	Test Method
\boxtimes	Refer as ANSI C63.10-2013, clause 6.2 for AC power-line conducted emissions.

TEL: 886-3-656-9065 Page Number : 16 of 29
FAX: 886-3-656-9085 Issued Date : Sep. 15, 2023

3.1.4 Test Setup



1—Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 cm to 40 cm long.

Report No.: FR372002AB

- 2—The I/O cables that are not connected to an accessory shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- 3—EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω loads. LISN may be placed on top of, or immediately beneath, reference ground plane.
- 3.1—All other equipment powered from additional LISN(s).
- 3.2—A multiple-outlet strip may be used for multiple power cords of non-EUT equipment.
- 3.3—LISN at least 80 cm from nearest part of EUT chassis.
- 4—Non-EUT components of EUT system being tested.
- 5—Rear of EUT, including peripherals, shall all be aligned and flush with edge of tabletop.
- 6—Edge of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.
- 7—Antenna can be integral or detachable. If detachable, then the antenna shall be attached for this test.

3.1.5 Measurement Results Calculation

The measured Level is calculated using:

- a. Corrected Reading: LISN Factor (LISN) + Attenuator (AT/AUX) + Cable Loss (CL) + Read Level (Raw) = Level
- b. Margin = -Limit + Level

3.1.6 Test Result of AC Power-line Conducted Emissions

Refer as Appendix A

TEL: 886-3-656-9065 Page Number : 17 of 29
FAX: 886-3-656-9085 Issued Date : Sep. 15, 2023

3.2 Emission Bandwidth

3.2.1 Emission Bandwidth Limit

	Emission Bandwidth Limit
UNI	I Devices
\boxtimes	For the 5.15-5.25 GHz band, N/A
	For the 5.25-5.35 GHz band, the maximum conducted output power shall not exceed the lesser of 250 mW or 11 dBm \pm 10 log B, where B is the 26 dB emission bandwidth in MHz.
	For the $5.47-5.725$ GHz band, the maximum conducted output power shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz.
\boxtimes	For the 5.725-5.85 GHz band, 26 dB emission bandwidth ,N/A. 6 dB emission bandwidth ≥ 500kHz.
LE-	LAN Devices
	For the band 5.15-5.25 GHz, the maximum e.i.r.p. shall not exceed 200 mW or $10 + 10 \log B$, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.
	For the 5.25-5.35 GHz band, the maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz
	For the 5.47-5.6 GHz band and 5.65-5.725 GHz band, the maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz
	For the 5.725-5.85 GHz band, 6 dB emission bandwidth ≥ 500kHz.

Report No.: FR372002AB

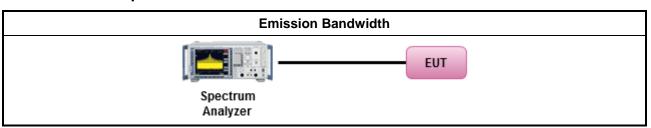
3.2.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.2.3 Test Procedures

		Test Method	
•	For the emission bandwidth shall be measured using one of the options below:		
	\boxtimes	Refer as FCC KDB 789033 D02, clause C for EBW and clause D for OBW measurement.	
		Refer as ANSI C63.10, clause 6.9.1 for occupied bandwidth testing.	
		Refer as IC RSS-Gen, clause 4.6 for bandwidth testing.	

3.2.4 Test Setup



3.2.5 Test Result of Emission Bandwidth

Refer as Appendix B

TEL: 886-3-656-9065 Page Number : 18 of 29
FAX: 886-3-656-9085 Issued Date : Sep. 15, 2023

3.3 Maximum Output Power

3.3.1 Limit

	Maximum Output Power Limit
UN	II Devices
\boxtimes	For the 5.15-5.25 GHz band:
	 Outdoor AP: the maximum conducted output power (P_{Out}) shall not exceed the lesser of 1 W. If G_{TX} > 6 dBi, then P_{Out} = 30 - (G_{TX} - 6). e.i.r.p. at any elevation angle above 30 degrees ≤ 125mW [21dBm]
	Indoor AP: the maximum conducted output power (P _{Out}) shall not exceed the lesser of 1 W. If G _{TX} > 6 dBi, then P _{Out} = 30 − (G _{TX} − 6)
	 Point-to-point AP: the maximum conducted output power (Pout) shall not exceed the lesser of 1 W If GTX > 23 dBi, then Pout = 30 - (GTX - 23).
	 Mobile or Portable Client: the maximum conducted output power (P_{Out}) shall not exceed the lesser of 250 mW. If G_{TX} > 6 dBi, then P_{Out} = 24 - (G_{TX} - 6).
	For the 5.25-5.35 GHz band, the maximum conducted output power (P_{Out}) shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. If $G_{TX} > 6$ dBi, then $P_{Out} = 24 - (G_{TX} - 6)$.
	For the 5.47-5.725 GHz band, the maximum conducted output power (P_{Out}) shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. If $G_{TX} > 6$ dBi, then $P_{Out} = 24 - (G_{TX} - 6)$.
\boxtimes	For the 5.725-5.85 GHz band:
	Point-to-multipoint systems (P2M): the maximum conducted output power (P _{Out}) shall not exceed the lesser of 1 W. If G _{TX} > 6 dBi, then P _{Out} = 30 − (G _{TX} − 6).
	 Point-to-point systems (P2P): the maximum conducted output power (Pout) shall not exceed the lesser of 1 W.
LE-	LAN Devices
	For the 5.15-5.25 GHz band, the maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.
	For the 5.25-5.35 GHz band, the maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz
	For the 5.47-5.6 GHz band and 5.65-5.725 GHz band, the maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz
	For the 5.725-5.85 GHz band:
	 Point-to-multipoint systems (P2M): the maximum conducted output power (P_{Out}) shall not exceed the lesser of 1 W. If G_{TX} > 6 dBi, then P_{Out} = 30 - (G_{TX} - 6).
	 Point-to-point systems (P2P): the maximum conducted output power (Pout) shall not exceed the lesser of 1 W.
	t = maximum conducted output power in dBm, t = the maximum transmitting antenna directional gain in dBi.

Report No.: FR372002AB

 TEL: 886-3-656-9065
 Page Number : 19 of 29

 FAX: 886-3-656-9085
 Issued Date : Sep. 15, 2023

3.3.2 Measuring Instruments

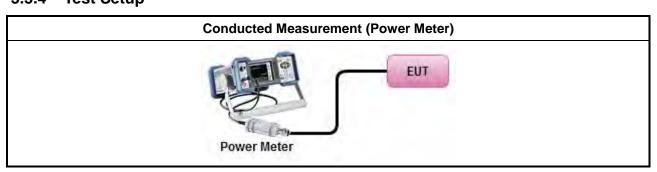
Refer a test equipment and calibration data table in this test report.

3.3.3 Test Procedures

		Test Method
	Ave	rage over on/off periods with duty factor
		Refer as FCC KDB 789033 D02, clause E Method SA-2 (spectral trace averaging).
		Refer as FCC KDB 789033 D02, clause E Method SA-2 Alt. (RMS detection with slow sweep speed)
	Wid	eband RF power meter and average over on/off periods with duty factor
	\boxtimes	Refer as FCC KDB 789033 D02, clause E Method PM-G (using an RF average power meter).
\boxtimes	For	conducted measurement.
	•	If the EUT supports multiple transmit chains using options given below: Refer as FCC KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them.
	•	If multiple transmit chains, EIRP calculation could be following as methods: $P_{total} = P_1 + P_2 + + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = P_{total} + DG$
	For	radiated measurement.
	•	Refer as FCC KDB 789033 D02 clause II A.1.F "Antenna-port Conducted versus Radiated Testing"
	•	Refer as ANSI C63.10, clause 6.6 for radiated emissions above 1GHz.
	•	Refer as FCC KDB 412172 D01 clause 2.2 for EIRP calculation.

Report No.: FR372002AB

3.3.4 Test Setup



3.3.5 Test Result of Maximum Output Power

Refer as Appendix C

TEL: 886-3-656-9065 Page Number : 20 of 29
FAX: 886-3-656-9085 Issued Date : Sep. 15, 2023

3.4 Power Spectral Density

3.4.1 Limit

	Peak Power Spectral Density Limit
UNI	I Devices
\boxtimes	For the 5.15-5.25 GHz band:
	 Outdoor AP: the peak power spectral density (PPSD) shall not exceed the lesser of 17dBm/MHz. If G_{TX} > 6 dBi, then P_{Out} = 17 - (G_{TX} - 6).
	• Indoor AP: the peak power spectral density (PPSD) shall not exceed the lesser of 17dBm/MHz. If G _{TX} > 6 dBi, then P _{Out} = 17 − (G _{TX} − 6).
	■ Point-to-point AP: the peak power spectral density (PPSD) shall not exceed the lesser of 17dBm/MHz. If $G_{TX} > 23$ dBi, then $P_{Out} = 17 - (G_{TX} - 23)$.
į	 Mobile or Portable Client: the peak power spectral density (PPSD) ≤ 11 dBm/MHz. If G_{TX} > 6 dBi, then PPSD= 11 - (G_{TX} - 6)
	For the 5.25-5.35 GHz band, the peak power spectral density (PPSD) \leq 11 dBm/MHz. If $G_{TX} > 6$ dBi, then PPSD= 11 – ($G_{TX} - 6$).
	For the 5.47-5.725 GHz band, the peak power spectral density (PPSD) \leq 11 dBm/MHz. If $G_{TX} > 6$ dBi, then PPSD= 11 – ($G_{TX} - 6$).
\boxtimes	For the 5.725-5.85 GHz band:
	Point-to-multipoint systems (P2M): the peak power spectral density (PPSD) \leq 30 dBm/500kHz. If $G_{TX} > 6$ dBi, then PPSD= $30 - (G_{TX} - 6)$.
	Point-to-point systems (P2P): the peak power spectral density (PPSD) ≤ 30 dBm/500kHz.
LE-	LAN Devices
	For the 5.15-5.25 GHz band, the e.i.r.p. peak power spectral density (PPSD) ≤ 10 dBm/MHz.
	For the 5.25-5.35 GHz band, the peak power spectral density (PPSD) ≤ 11 dBm/MHz.
	 e.i.r.p. greater than 200 mW shall comply with the following e.i.r.p. at different elevations, where θ is the angle above the local horizontal plane (of the Earth) as shown below: -13 dBW/MHz for 0° ≤ θ < 8°; -13 − 0.716 (θ-8) dBW/MHz for 8° ≤ θ < 40° -35.9 − 1.22 (θ-40) dBW/MHz for 40° ≤ θ ≤ 45°; -42 dBW/MHz for θ > 45°
	For the 5.47-5.6 GHz band and 5.65-5.725 GHz band, the peak power spectral density (PPSD) \leq 11 dBm/MHz.
	For the 5.725-5.85 GHz band:
	 Point-to-multipoint systems (P2M): the peak power spectral density (PPSD) ≤ 30 dBm/500kHz. If G_{TX} > 6 dBi, then PPSD= 30 - (G_{TX} - 6).
	 Point-to-point systems (P2P): the peak power spectral density (PPSD) ≤ 30 dBm/500kHz.
pow	SD = peak power spectral density that he same method as used to determine the conducted output ver shall be used to determine the power spectral density. And power spectral density in dBm/MHz = the maximum transmitting antenna directional gain in dBi.

Report No.: FR372002AB

3.4.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

TEL: 886-3-656-9065 Page Number : 21 of 29
FAX: 886-3-656-9085 Issued Date : Sep. 15, 2023

3.4.3 Test Procedures

		Test Method
•	outp func	k power spectral density procedures that the same method as used to determine the conducted ut power shall be used to determine the peak power spectral density and use the peak search tion on the spectrum analyzer to find the peak of the spectrum. For the peak power spectral density be measured using below options:
		Refer as FCC KDB 789033 D02, F)5) power spectral density can be measured using resolution bandwidths < 1 MHz provided that the results are integrated over 1 MHz bandwidth
	[duty	/ cycle ≥ 98% or external video / power trigger]
	\boxtimes	Refer as FCC KDB 789033 D02, clause E Method SA-1 (spectral trace averaging).
		Refer as FCC KDB 789033 D02, clause E Method SA-1 Alt. (RMS detection with slow sweep speed)
	duty	cycle < 98% and average over on/off periods with duty factor
		Refer as FCC KDB 789033 D02, clause E Method SA-2 (spectral trace averaging).
		Refer as FCC KDB 789033 D02, clause E Method SA-2 Alt. (RMS detection with slow sweep speed)
	For	conducted measurement.
	•	If the EUT supports multiple transmit chains using options given below:
		Option 1: Measure and sum the spectra across the outputs. Refer as FCC KDB 662911, In-band power spectral density (PSD). Sample all transmit ports simultaneously using a spectrum analyzer for each transmit port. Where the trace bin-by-bin of each transmit port summing can be performed. (i.e., in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3, and so on up to the NTX output to obtain the value for the first frequency bin of the summed spectrum.). Add up the amplitude (power) values for the different transmit chains and use this as the new data trace.
		Option 2: Measure and sum spectral maxima across the outputs. With this technique, spectra are measured at each output of the device at the required resolution bandwidth. The maximum value (peak) of each spectrum is determined. These maximum values are then summed mathematically in linear power units across the outputs. These operations shall be performed separately over frequency spans that have different out-of-band or spurious emission limits,
		Option 3: Measure and add 10 log(N) dB, where N is the number of transmit chains. Refer as FCC KDB 662911, In-band power spectral density (PSD). Performed at each transmit chains and each transmit chains shall be compared with the limit have been reduced with 10 log(N). Or each transmit chains shall be add 10 log(N) to compared with the limit.
	•	If multiple transmit chains, EIRP PPSD calculation could be following as methods: PPSD _{total} = PPSD ₁ + PPSD ₂ + + PPSD _n (calculated in linear unit [mW] and transfer to log unit [dBm]) EIRP _{total} = PPSD _{total} + DG
	For	radiated measurement.
	•	Refer as FCC KDB 789033 D02 clause II A.1.F "Antenna-port Conducted versus Radiated Testing"
	•	Refer as ANSI C63.10, clause 6.6 for radiated emissions above 1GHz.

Report No.: FR372002AB

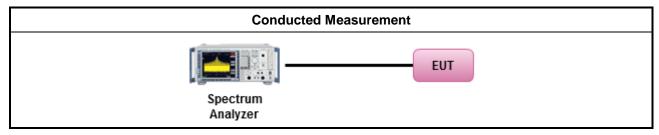
TEL: 886-3-656-9065 Page Number : 22 of 29
FAX: 886-3-656-9085 Issued Date : Sep. 15, 2023

Report No.: FR372002AB

Test Method

Refer as FCC KDB 412172 D01 clause 2.2 for EIRP calculation.

3.4.4 Test Setup



3.4.5 Test Result of Power Spectral Density

Refer as Appendix D

 TEL: 886-3-656-9065
 Page Number
 : 23 of 29

 FAX: 886-3-656-9085
 Issued Date
 : Sep. 15, 2023

3.5 Unwanted Emissions

3.5.1 Transmitter Unwanted Emissions Limit

Unwanted emissions below 1 GHz and restricted band emissions above 1GHz limit						
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)			
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300			
0.490~1.705	24000/F(kHz)	33.8 - 23	30			
1.705~30.0	30	29	30			
30~88	100	40	3			
88~216	150	43.5	3			
216~960	200	46	3			
Above 960	500	54	3			

Report No.: FR372002AB

- Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).
- Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

Note 3: Using the distance of 1m during the test for above 18 GHz, and the test value to correct for the distance factor at 3m.

Un-restricted band emissions above 1GHz Limit						
Operating Band	Limit					
⊠ 5.15 - 5.25 GHz	e.i.r.p27 dBm [68.2 dBuV/m@3m]					
☐ 5.25 - 5.35 GHz	e.i.r.p27 dBm [68.2 dBuV/m@3m]					
☐ 5.47 - 5.725 GHz	e.i.r.p27 dBm [68.2 dBuV/m@3m]					
⊠ 5.725 - 5.85 GHz	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.					

Note 1: Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of

TEL: 886-3-656-9065 Page Number : 24 of 29
FAX: 886-3-656-9085 Issued Date : Sep. 15, 2023

linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

Report No.: FR372002AB

3.5.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.5.3 Test Procedures

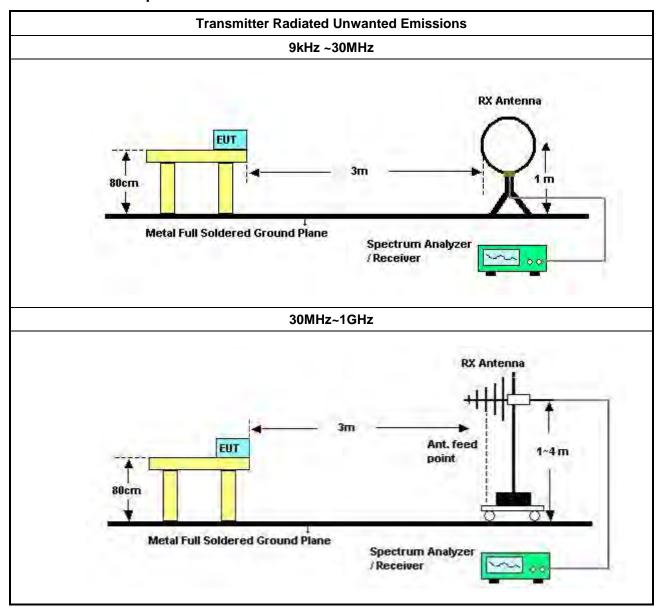
Test Method

- Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 m for frequencies above 30 MHz, unless it can be further demonstrated that measurements at a distance of 30 m or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).
- The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].
- For the transmitter unwanted emissions shall be measured using following options below:
 - Refer as FCC KDB 789033 D02, clause G)2) for unwanted emissions into non-restricted bands.
 - Refer as FCC KDB 789033 D02, clause G)1) for unwanted emissions into restricted bands.
 - Refer as FCC KDB 789033 D02, G)6) Method AD (Trace Averaging).
 - Refer as FCC KDB 789033 D02, G)6) Method VB (Reduced VBW).
 - Refer as ANSI C63.10, clause 11.12.2.5.3 (Reduced VBW). VBW ≥ 1/T, where T is pulse time.
 - Refer as ANSI C63.10, clause 7.5 average value of pulsed emissions.
 - Refer as FCC KDB 789033 D02, clause G)5) measurement procedure peak limit.
 - Refer as ANSI C63.10, clause 4.1.4.2.2 measurement procedure peak limit.
- For radiated measurement.
 - Refer as ANSI C63.10, clause 6.4 for radiated emissions below 30 MHz and test distance is 3m.
 - Refer as ANSI C63.10, clause 6.5 for radiated emissions 30 MHz to 1 GHz and test distance is 3m.
 - Refer as ANSI C63.10. clause 6.6 for radiated emissions above 1GHz.
- The any unwanted emissions level shall not exceed the fundamental emission level.
- All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

TEL: 886-3-656-9065 Page Number : 25 of 29
FAX: 886-3-656-9085 Issued Date : Sep. 15, 2023



3.5.4 Test Setup



TEL: 886-3-656-9065 Page Number : 26 of 29
FAX: 886-3-656-9085 Issued Date : Sep. 15, 2023

Report No.: FR372002AB

3.5.5 Measurement Results Calculation

The measured Level is calculated using:

Corrected Reading: Antenna factor (AF) + Cable loss (CL) + Read level (Raw) - Preamp factor (PA)(if applicable) = Level.

3.5.6 Transmitter Unwanted Emissions (Below 30MHz)

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to KDB414788 Radiated Test Site, and the result came out very similar.

All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

The radiated emissions were investigated from 9 kHz or the lowest frequency generated within the device, up to the 10th harmonic or 40 GHz, whichever is appropriate.

3.5.7 Test Result of Transmitter Unwanted Emissions

Refer as Appendix E

TEL: 886-3-656-9065 Page Number : 27 of 29
FAX: 886-3-656-9085 Issued Date : Sep. 15, 2023

4 Test Equipment and Calibration Data

					0-111	0-111	
Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
EMI Receiver	Agilent	N9038A	My52260123	9kHz ~ 8.4GHz	Feb. 20, 2023	Feb. 19, 2024	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-5 0-16-2	04083	150kHz ~ 100MHz	Feb. 16, 2023	Feb. 15, 2024	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Apr. 27, 2023	Apr. 26, 2024	Conduction (CO01-CB)
Pulse Limiter	Rohde&Schwarz	ESH3-Z2	100430	9kHz ~ 30MHz	Feb. 09, 2023	Feb. 08, 2024	Conduction (CO01-CB)
COND Cable	Woken	Cable	Low cable-CO01	9kHz ~ 30MHz	Oct. 18, 2022	Oct. 17, 2023	Conduction (CO01-CB)
Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Conduction (CO01-CB)
Loop Antenna	Teseq	HLA 6120	31244	9kHz - 30 MHz	Mar. 23, 2023	Mar. 22, 2024	Radiation (03CH01-CB)
3m Semi Anechoic Chamber NSA	TDK	SAC-3M	03CH01-CB	30 MHz ~ 1 GHz	Jan. 16, 2023	Jan. 15, 2024	Radiation (03CH01-CB)
BILOG ANTENNA with 6dB Attenuator	TESEQ & EMCI	CBL6112D N-6-06	37880 & AT-N0609	20MHz ~ 2GHz	Feb. 19, 2023	Feb. 18, 2024	Radiation (03CH01-CB)
Pre-Amplifier	SGH	SGH0301	20230109-2	10M~1GHz	Jun. 23, 2023	Jun. 22, 2024	Radiation (03CH01-CB)
Signal Analyzer	R&S	FSV3044	101437	10kHz ~ 44GHz	Nov. 29, 2022	Nov. 29, 2023	Radiation (03CH01-CB)
EMI Test Receiver	R&S	ESCS	826547/017	9kHz ~ 2.75GHz	Jun. 13, 2023	Jun. 12, 2024	Radiation (03CH01-CB)
RF Cable-low	Woken	RG402	Low Cable-16+17	30 MHz ~ 1 GHz	Oct. 03, 2022	Oct. 02, 2023	Radiation (03CH01-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Radiation (03CH01-CB)
3m Semi Anechoic Chamber VSWR	RIKEN	SAC-3M	03CH02-CB	1GHz ~18GHz	Mar. 25, 2023	Mar. 24, 2024	Radiation (03CH02-CB)
Horn Antenna	EMCO	3115	9610-4976	1GHz ~ 18GHz	Apr. 18, 2023	Apr. 17, 2024	Radiation (03CH02-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Aug. 22, 2022	Aug. 21, 2023	Radiation (03CH02-CB)
Pre-Amplifier	Agilent	83017A	MY39501305	1GHz ~ 26.5GHz	Jun. 30, 2023	Jun. 29, 2024	Radiation (03CH02-CB)
Pre-Amplifier	SGH	SGH184	20221107-3	18GHz ~ 40GHz	Nov. 16, 2022	Nov. 15, 2023	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSU	100015	9kHz~26GHz	Dec. 05, 2022	Dec. 04, 2023	Radiation (03CH02-CB)

TEL: 886-3-656-9065 FAX: 886-3-656-9085

Report Template No.: CB-A12_1 Ver1.4

Page Number : 28 of 29
Issued Date : Sep. 15, 2023

Report No.: FR372002AB

Report Version : 02

Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
RF Cable-high	Woken	RG402	High Cable-18	1GHz ~ 18GHz	Oct. 03, 2022	Oct. 02, 2023	Radiation (03CH02-CB)
RF Cable-high	Woken	RG402	High Cable-18+19	1GHz ~ 18GHz	Oct. 03, 2022	Oct. 02, 2023	Radiation (03CH02-CB)
High Cable	Woken	WCA0929M	40G#5+6	1GHz ~ 40 GHz	Dec. 07, 2022	Dec. 06, 2023	Radiation (03CH02-CB)
High Cable	Woken	WCA0929M	40G#5	1GHz ~ 40 GHz	Dec. 07, 2022	Dec. 06, 2023	Radiation (03CH02-CB)
High Cable	Woken	WCA0929M	40G#6	1GHz ~ 40 GHz	Dec. 07, 2022	Dec. 06, 2023	Radiation (03CH02-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Radiation (03CH02-CB)
Spectrum analyzer	R&S	FSV40	100979	9kHz~40GHz	May 29, 2023	May 28, 2024	Conducted (TH01-CB)
Switch	SPTCB	SP-SWI	SWI-01	1 GHz –26.5 GHz	Oct. 04, 2022	Oct. 03, 2023	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-06	1 GHz – 18 GHz	Oct. 03, 2022	Oct. 02, 2023	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-07	1 GHz – 18 GHz	Oct. 03, 2022	Oct. 02, 2023	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-08	1 GHz – 18 GHz	Oct. 03, 2022	Oct. 02, 2023	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-09	1 GHz – 18 GHz	Oct. 03, 2022	Oct. 02, 2023	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-10	1 GHz – 18 GHz	Oct. 03, 2022	Oct. 02, 2023	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-30	1 GHz – 18 GHz	Oct. 03, 2022	Oct. 02, 2023	Conducted (TH01-CB)
Power Sensor	Agilent	E9327A	US40442088	50MHz~18GHz	Feb. 22, 2023	Feb. 21, 2024	Conducted (TH01-CB)
Power Meter	Agilent	E4416A	GB41291199	50MHz~18GHz	Feb. 22, 2023	Feb. 21, 2024	Conducted (TH01-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Conducted (TH01-CB)

Report No.: FR372002AB

Note: Calibration Interval of instruments listed above is one year. NCR means Non-Calibration required.

 TEL: 886-3-656-9065
 Page Number : 29 of 29

 FAX: 886-3-656-9085
 Issued Date : Sep. 15, 2023



Conducted Emissions at Powerline

Appendix A

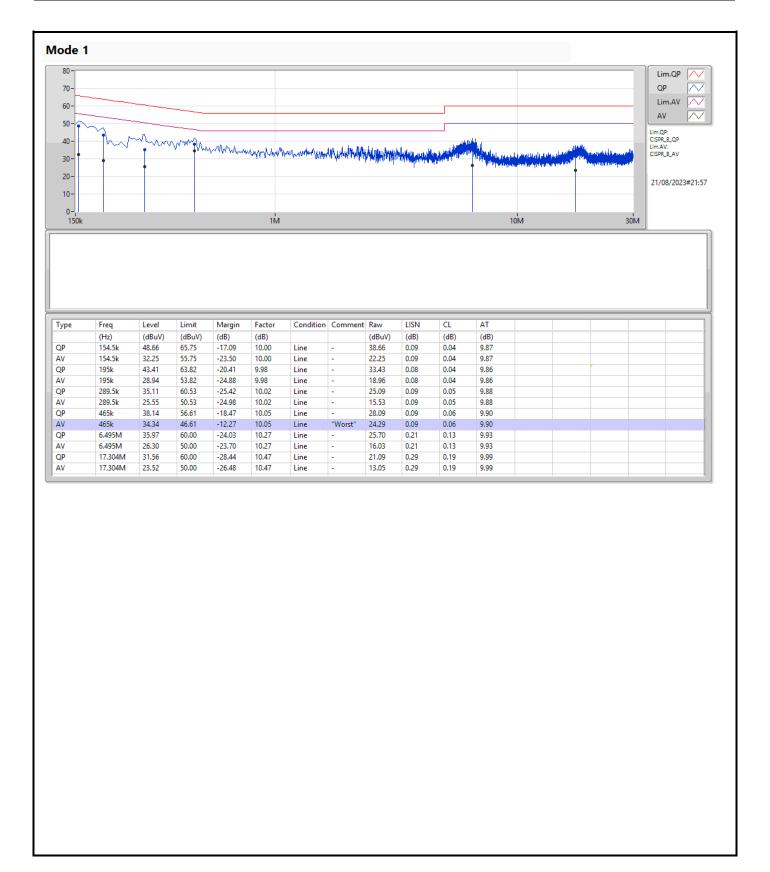
Summary

Mode	Result	Туре	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Condition
Mode 1	Pass	AV	465k	34.34	46.61	-12.27	Line

Sporton International Inc. Hsinchu Laboratory Page No. : 1 of 3

Report No. : FR372002AB

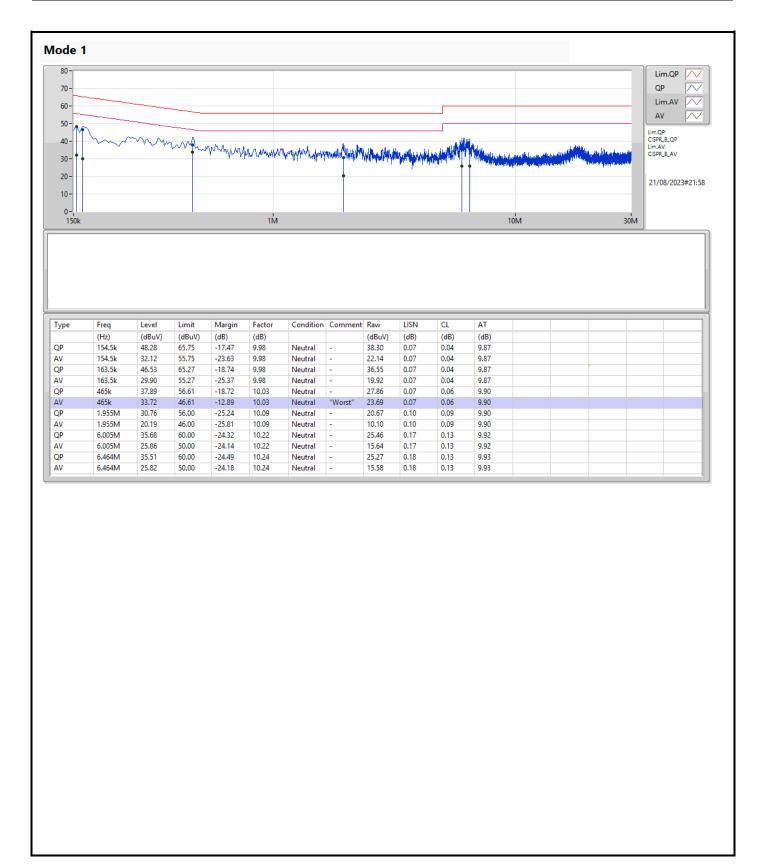




Page No. : 2 of 3

Report No. : FR372002AB





Page No. : 3 of 3

Report No. : FR372002AB



Appendix B **EBW**

Summary

Mode	Max-N dB	Max-OBW	ITU-Code	Min-N dB	Min-OBW
	(Hz)	(Hz)		(Hz)	(Hz)
5.15-5.25GHz	-	-	=	=	=
802.11a_Nss1,(6Mbps)_1TX	37.565M	18.6M	18M6D1D	32.505M	17.576M
802.11ac VHT20_Nss1,(MCS0)_1TX	39.6M	19.873M	19M9D1D	38.06M	18.989M
802.11ac VHT40_Nss1,(MCS0)_1TX	78.76M	37.73M	37M7D1D	42.46M	36.418M
802.11ac VHT80_Nss1,(MCS0)_1TX	83.16M	75.581M	75M6D1D	83.16M	75.581M
5.725-5.85GHz	-	-	·	ī	-
802.11a_Nss1,(6Mbps)_1TX	16.555M	27.339M	27M3D1D	16.445M	22.593M
802.11ac VHT20_Nss1,(MCS0)_1TX	17.71M	29.023M	29M0D1D	16.665M	23.82M
802.11ac VHT40_Nss1,(MCS0)_1TX	36.52M	50.151M	50M2D1D	36.3M	47.743M
802.11ac VHT80_Nss1,(MCS0)_1TX	75.24M	101.515M	102MD1D	75.24M	101.515M

 $\label{eq:max-NdB} \mbox{ Asximum 6dB down bandwidth for 5.725-5.85GHz band / Maximum 26dB down bandwidth for other band;} \mbox{ Max-OBW = Maximum 99% occupied bandwidth;} \mbox{ Min-N dB = Minimum 6dB down bandwidth for 5.725-5.85GHz band / Maximum 26dB down bandwidth for other band;} \mbox{ Min-OBW = Minimum 99% occupied bandwidth} \mbox{ } \mbox{ Coupled bandwidth} \mbox{ Min-OBW = Minimum 99% occupied bandwidth} \mbox{ } \mbox{ Min-OBW = Minimum 99% occupied bandwidth} \mbox{ } \mbox{ }$

Page No. Sporton International Inc. Hsinchu Laboratory Report No. : FR372002AB



EBW Appendix B

Result

Mode	Result	Limit	Port 1-N dB	Port 1-OBW
		(Hz)	(Hz)	(Hz)
802.11a_Nss1,(6Mbps)_1TX	-	-	-	-
5180MHz	Pass	Inf	32.505M	17.576M
5200MHz	Pass	Inf	37.18M	18.338M
5240MHz	Pass	Inf	37.565M	18.6M
5745MHz	Pass	500k	16.5M	22.593M
5785MHz	Pass	500k	16.555M	25.058M
5825MHz	Pass	500k	16.445M	27.339M
802.11ac VHT20_Nss1,(MCS0)_1TX	-	-	-	-
5180MHz	Pass	Inf	38.06M	19.873M
5200MHz	Pass	Inf	39.6M	19.604M
5240MHz	Pass	Inf	38.555M	18.989M
5745MHz	Pass	500k	17.71M	23.82M
5785MHz	Pass	500k	17.655M	25.714M
5825MHz	Pass	500k	16.665M	29.023M
802.11ac VHT40_Nss1,(MCS0)_1TX	-	-	-	-
5190MHz	Pass	Inf	42.46M	36.418M
5230MHz	Pass	Inf	78.76M	37.73M
5755MHz	Pass	500k	36.52M	47.743M
5795MHz	Pass	500k	36.3M	50.151M
802.11ac VHT80_Nss1,(MCS0)_1TX	-	-	-	-
5210MHz	Pass	Inf	83.16M	75.581M
5775MHz	Pass	500k	75.24M	101.515M

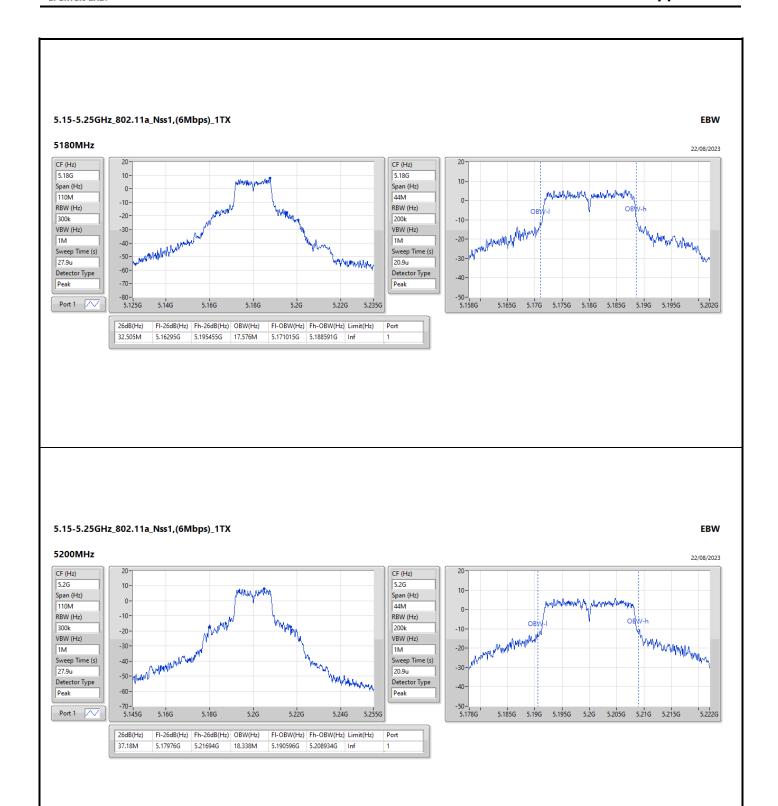
Port X-N dB = Port X 6dB down bandwidth for 5.725-5.85GHz band / 26dB down bandwidth for other band Port X-OBW = Port X 99% occupied bandwidth

Sporton International Inc. Hsinchu Laboratory

Page No. : 2 of 16

Report No. : FR372002AB

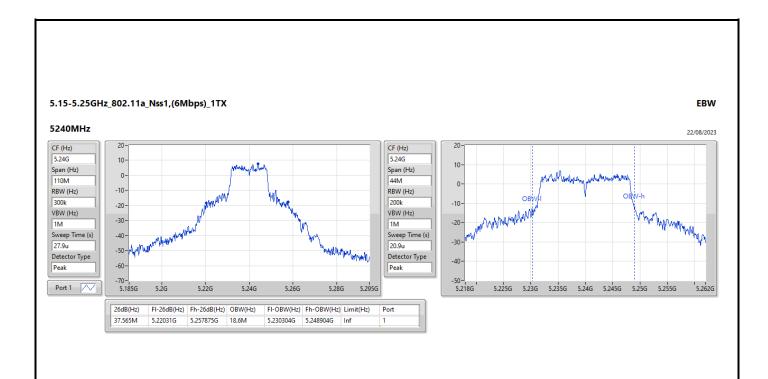
EBW Appendix B

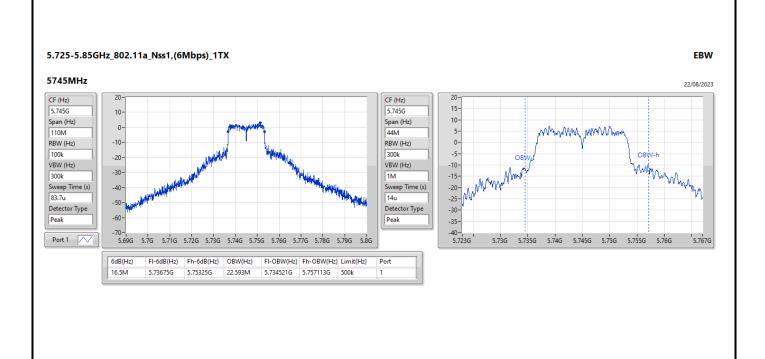


Page No. : 3 of 16

Report No. : FR372002AB

EBW Appendix B



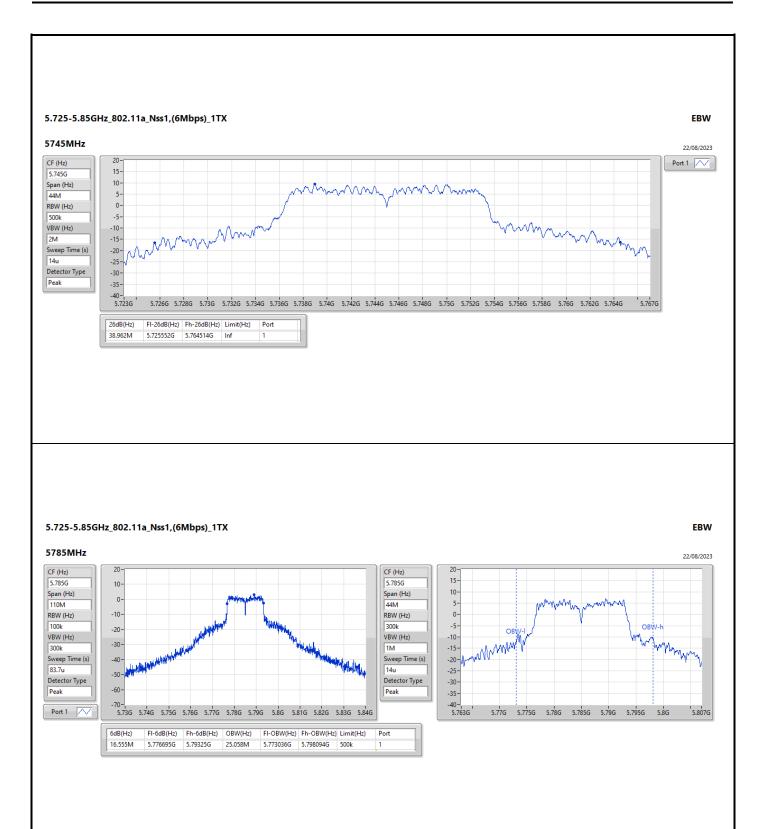


Page No. : 4 of 16

Report No. : FR372002AB

SPORTON LAB.

EBW Appendix B

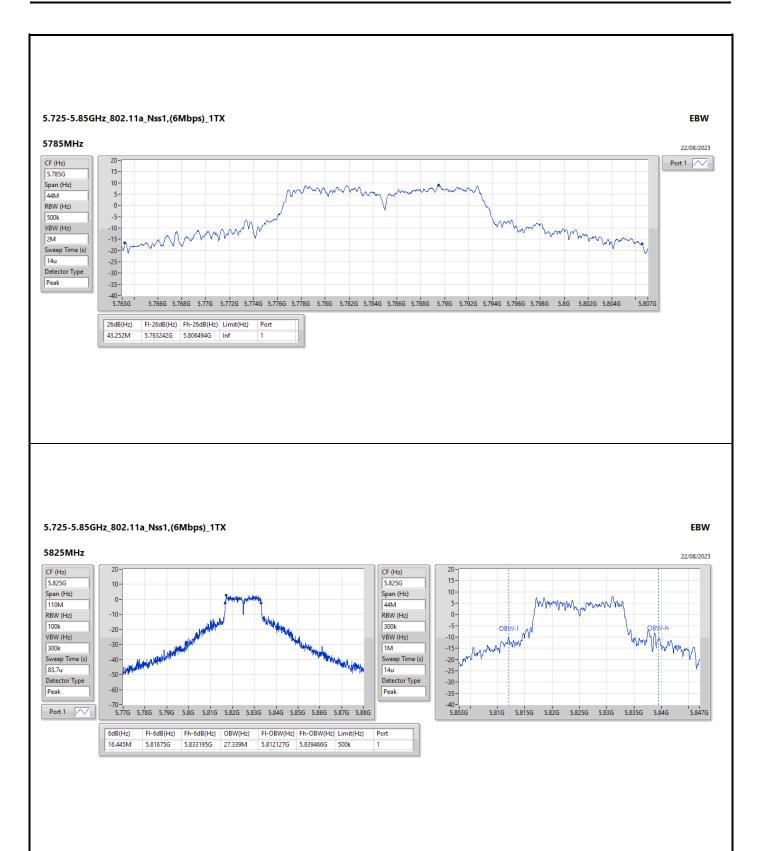


Page No. : 5 of 16

Report No. : FR372002AB

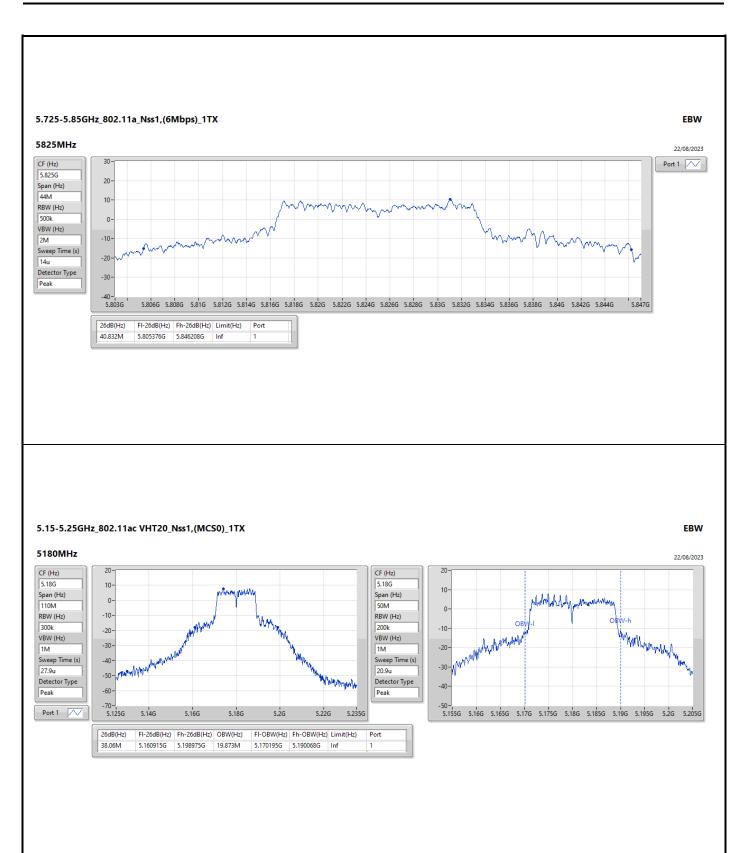
SPORTON LAB.

EBW Appendix B



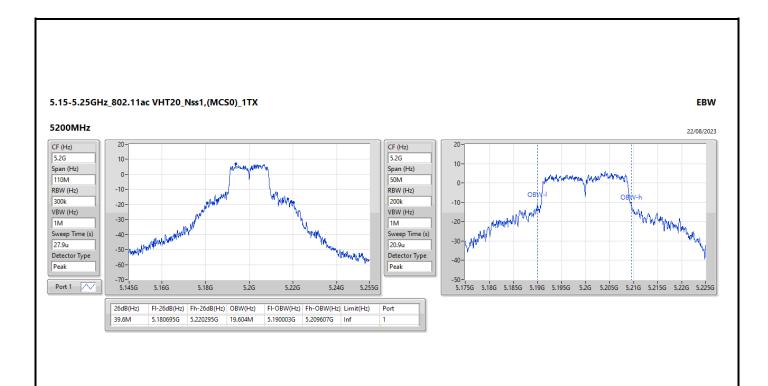
Page No. : 6 of 16

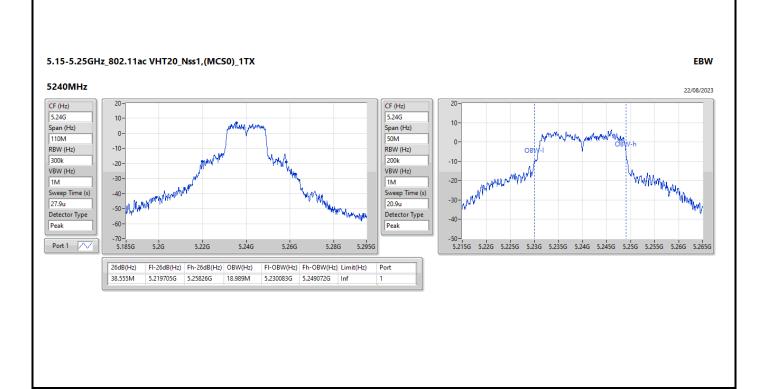
Report No. : FR372002AB



Page No. : 7 of 16

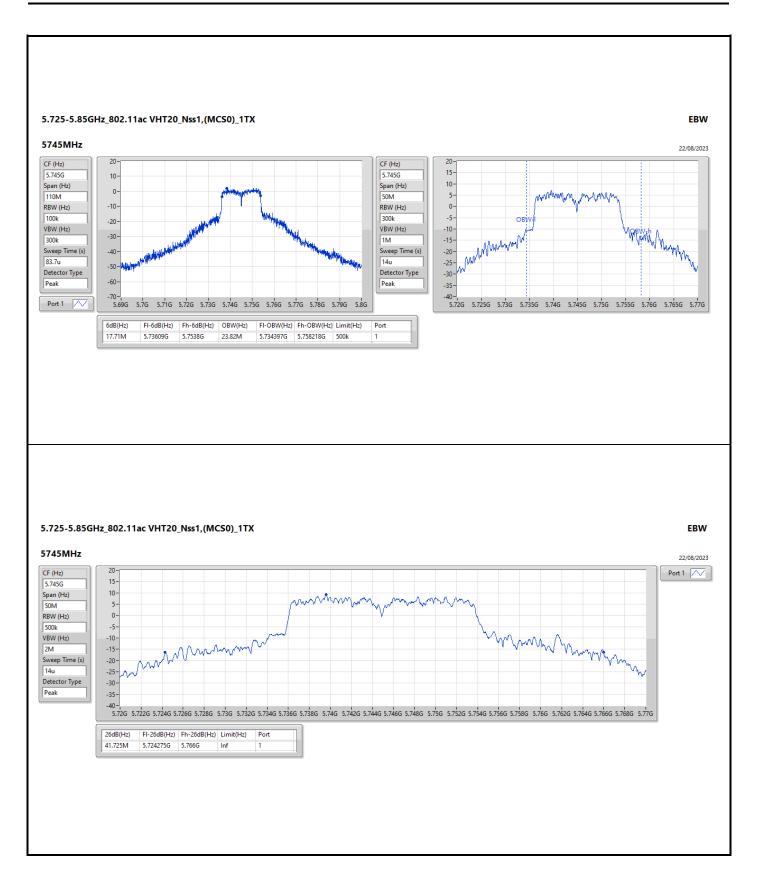
Report No. : FR372002AB





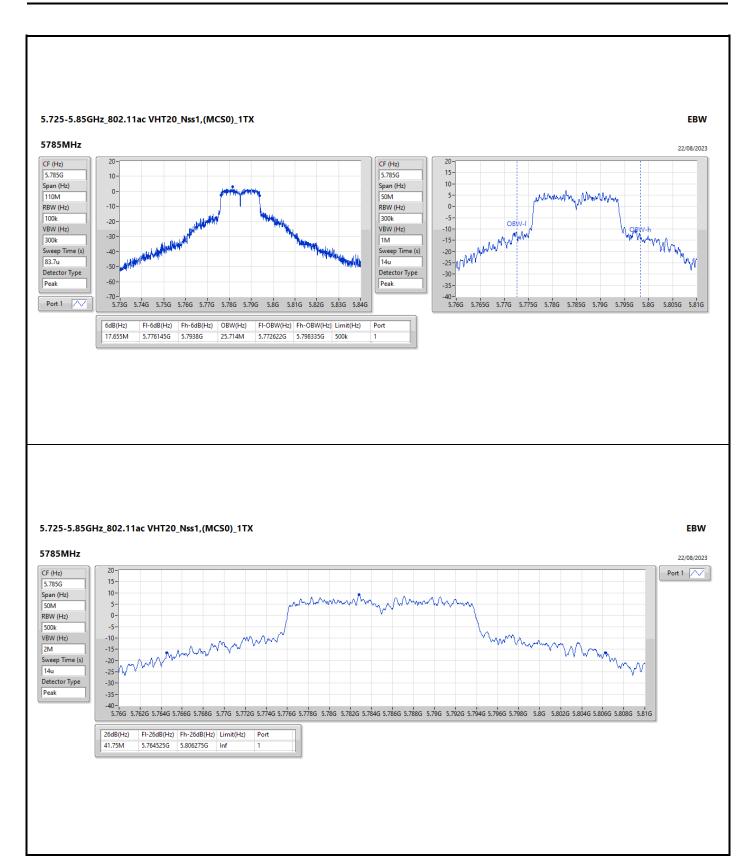
Page No. : 8 of 16

Report No. : FR372002AB



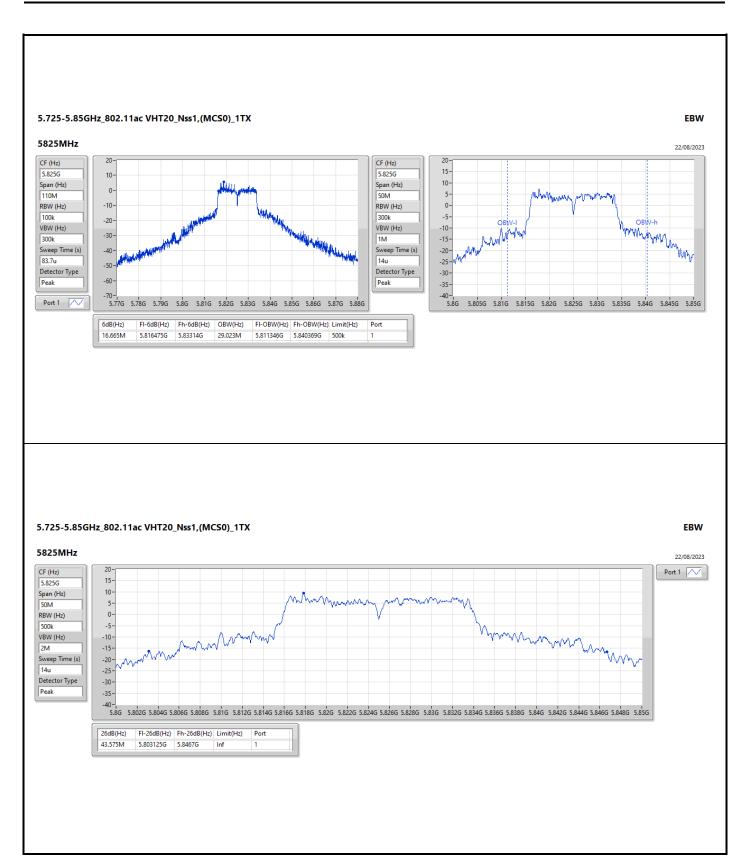
Page No. : 9 of 16

Report No. : FR372002AB



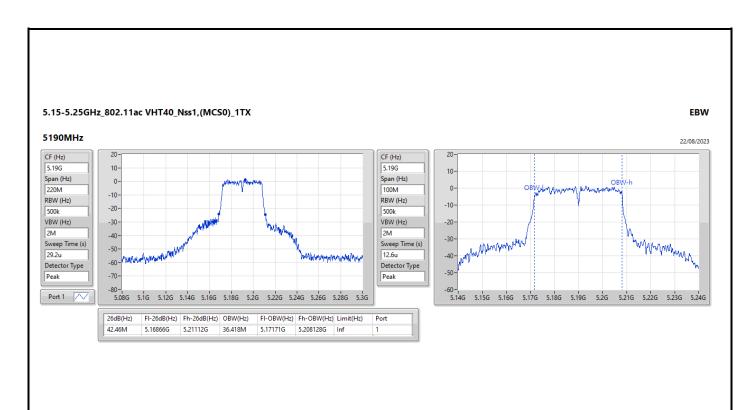
Page No. : 10 of 16

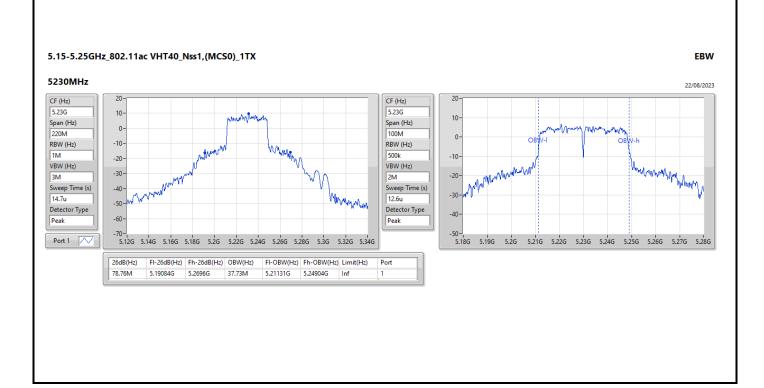
Report No. : FR372002AB



Page No. : 11 of 16

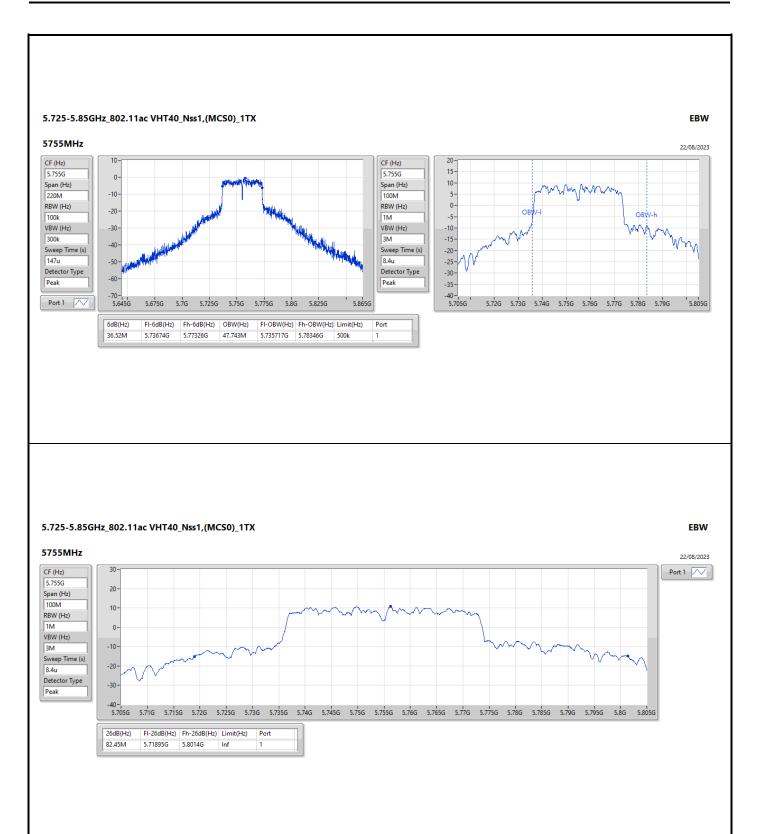
Report No. : FR372002AB





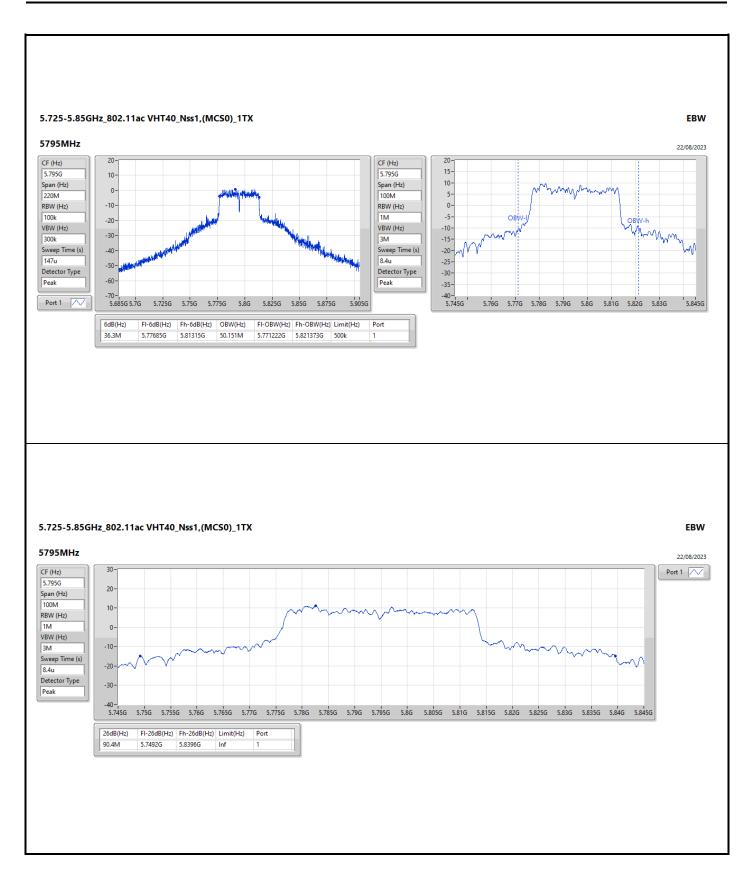
Page No. : 12 of 16

Report No. : FR372002AB



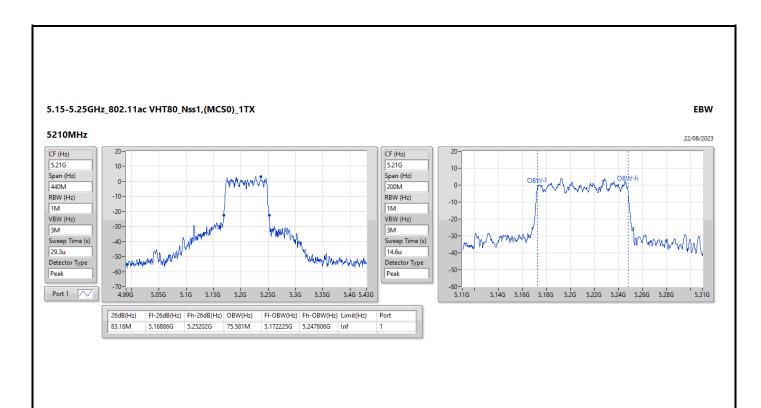
Page No. : 13 of 16

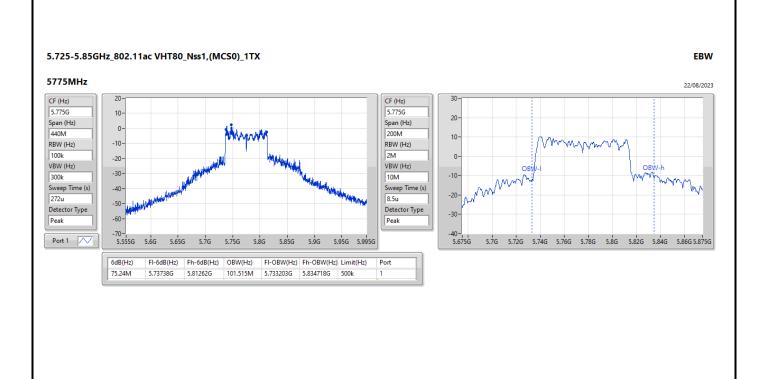
Report No. : FR372002AB



Page No. : 14 of 16

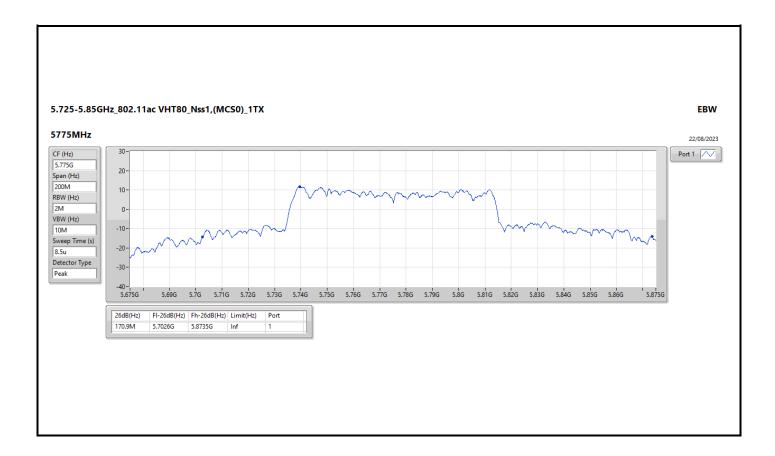
Report No. : FR372002AB





Page No. : 15 of 16

Report No. : FR372002AB



Page No. : 16 of 16

Report No. : FR372002AB



Average Power Appendix C

Summary

Mode	Total Power	Total Power	
	(dBm)	(W)	
5.15-5.25GHz	-	-	
802.11a_Nss1,(6Mbps)_1TX	17.99	0.06295	
802.11ac VHT20_Nss1,(MCS0)_1TX	18.25	0.06683	
802.11ac VHT40_Nss1,(MCS0)_1TX	17.79	0.06012	
802.11ac VHT80_Nss1,(MCS0)_1TX	13.63	0.02307	
5.725-5.85GHz	-	•	
802.11a_Nss1,(6Mbps)_1TX	18.02	0.06339	
802.11ac VHT20_Nss1,(MCS0)_1TX	17.74	0.05943	
802.11ac VHT40_Nss1,(MCS0)_1TX	17.72	0.05916	
802.11ac VHT80_Nss1,(MCS0)_1TX	18.03	0.06353	

Sporton International Inc. Hsinchu Laboratory Page No. : 1 of 2

Report No. : FR372002AB



Appendix C

Result

SPORTON LAB.

Mode	Result	DG	Port 1	Total Power	Power Limit	
		(dBi)	(dBm)	(dBm)	(dBm)	
802.11a_Nss1,(6Mbps)_1TX	-	-	=	-	-	
5180MHz	Pass	5.33	17.73	17.73	23.98	
5200MHz	Pass	5.33	17.99	17.99	23.98	
5240MHz	Pass	5.33	17.96	17.96	23.98	
5745MHz	Pass	3.73	17.85	17.85	30.00	
5785MHz	Pass	3.73	18.02	18.02	30.00	
5825MHz	Pass	3.73	17.87	17.87	30.00	
802.11ac VHT20_Nss1,(MCS0)_1TX	-	-	-	-	-	
5180MHz	Pass	5.33	18.25	18.25	23.98	
5200MHz	Pass	5.33	17.96	17.96	23.98	
5240MHz	Pass	5.33	17.79	17.79	23.98	
5745MHz	Pass	3.73	17.58	17.58	30.00	
5785MHz	Pass	3.73	17.74	17.74	30.00	
5825MHz	Pass	3.73	17.68	17.68	30.00	
802.11ac VHT40_Nss1,(MCS0)_1TX	-	-	=	-	-	
5190MHz	Pass	5.33	12.61	12.61	23.98	
5230MHz	Pass	5.33	17.79	17.79	23.98	
5755MHz	Pass	3.73	17.65	17.65	30.00	
5795MHz	Pass	3.73	17.72	17.72	30.00	
802.11ac VHT80_Nss1,(MCS0)_1TX	-	-	-	-	-	
5210MHz	Pass	5.33	13.63	13.63	23.98	
5775MHz	Pass	3.73	18.03	18.03	30.00	

DG = Directional Gain; Port X = Port X output power

Page No.

Report No. : FR372002AB



Summary

Mode	PD (dBm/RBW)
5.15-5.25GHz	-
802.11a_Nss1,(6Mbps)_1TX	4.93
802.11ac VHT20_Nss1,(MCS0)_1TX	5.29
802.11ac VHT40_Nss1,(MCS0)_1TX	1.88
802.11ac VHT80_Nss1,(MCS0)_1TX	-4.28
5.725-5.85GHz	-
802.11a_Nss1,(6Mbps)_1TX	3.27
802.11ac VHT20_Nss1,(MCS0)_1TX	3.15
802.11ac VHT40_Nss1,(MCS0)_1TX	0.10
802.11ac VHT80_Nss1,(MCS0)_1TX	-1.42

RBW = 500kHz for 5.725-5.85GHz band / 1MHz for other band;

Sporton International Inc. Hsinchu Laboratory Page No. : 1

Report No. : FR372002AB

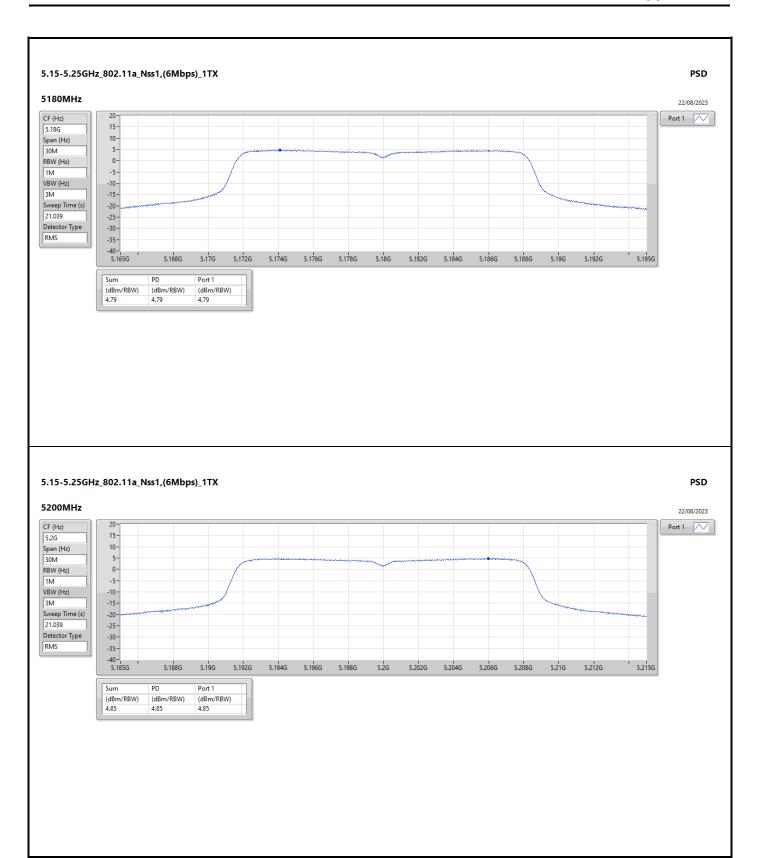
Appendix D **PSD**

Result

Mode	Result	DG	Port 1	PD	PD Limit	
		(dBi)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	
802.11a_Nss1,(6Mbps)_1TX	-	-	-	-	-	
5180MHz	Pass	5.33	4.79	4.79	11.00	
5200MHz	Pass	5.33	4.85	4.85	11.00	
5240MHz	Pass	5.33	4.93	4.93	11.00	
5745MHz	Pass	3.73	3.13	3.13	30.00	
5785MHz	Pass	3.73	3.21	3.21	30.00	
5825MHz	Pass	3.73	3.27	3.27	30.00	
802.11ac VHT20_Nss1,(MCS0)_1TX	-	-	-	-	-	
5180MHz	Pass	5.33	5.29	5.29	11.00	
5200MHz	Pass	5.33	4.74	4.74	11.00	
5240MHz	Pass	5.33	4.75	4.75	11.00	
5745MHz	Pass	3.73	2.88	2.88	30.00	
5785MHz	Pass	3.73	2.99	2.99	30.00	
5825MHz	Pass	3.73	3.15	3.15	30.00	
802.11ac VHT40_Nss1,(MCS0)_1TX	-	-	-	-	-	
5190MHz	Pass	5.33	-2.86	-2.86	11.00	
5230MHz	Pass	5.33	1.88	1.88	11.00	
5755MHz	Pass	3.73	-0.07	-0.07	30.00	
5795MHz	Pass	3.73	0.10	0.10	30.00	
802.11ac VHT80_Nss1,(MCS0)_1TX	-	-	-	-	-	
5210MHz	Pass	5.33	-4.28	-4.28	11.00	
5775MHz	Pass	3.73	-1.42	-1.42	30.00	

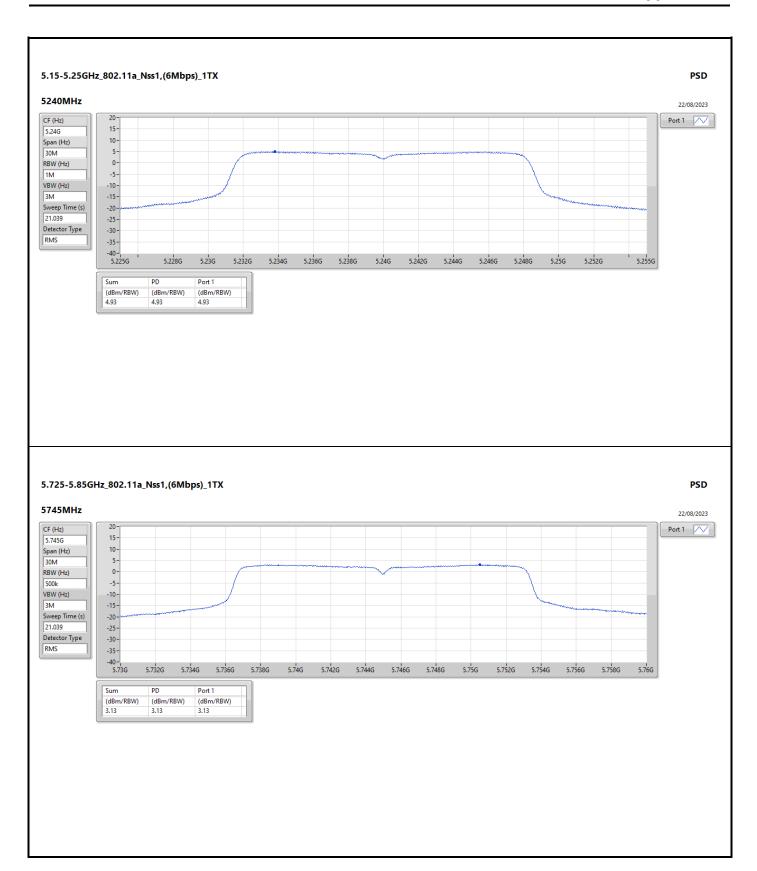
Page No. Report No. : FR372002AB

DG = Directional Gain; RBW = 500kHz for 5.725-5.85GHz band / 1MHz for other band; PD = trace bin-by-bin of each transmits port summing can be performed maximum power density; Port X = Port X Power Density;

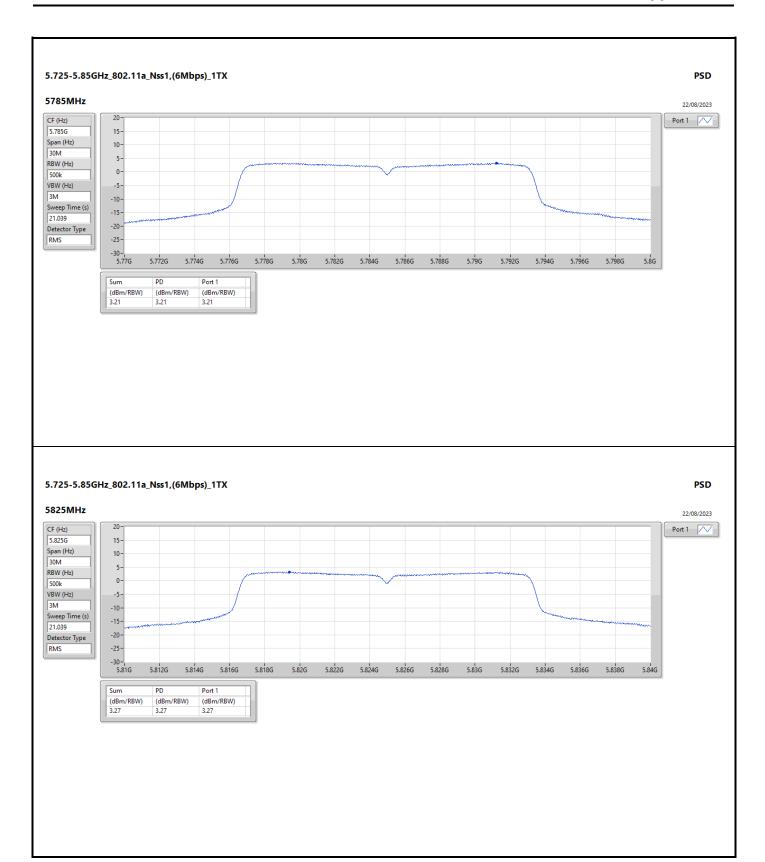


Page No. : 3 of 11

Report No. : FR372002AB

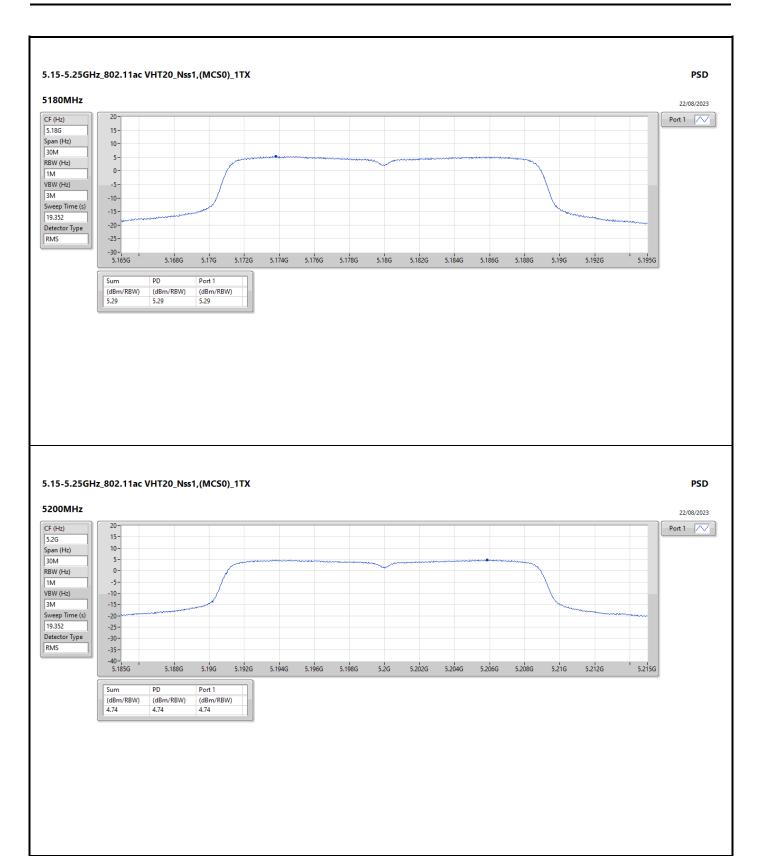


Page No. : 4 of 11 Report No. : FR372002AB



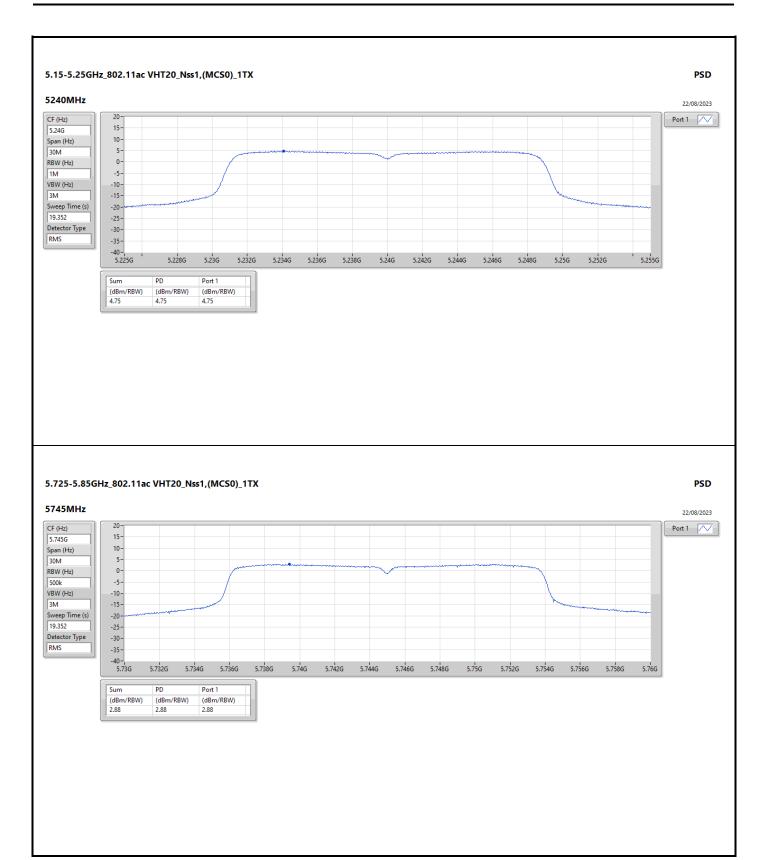
Page No. : 5 of 11

Report No. : FR372002AB



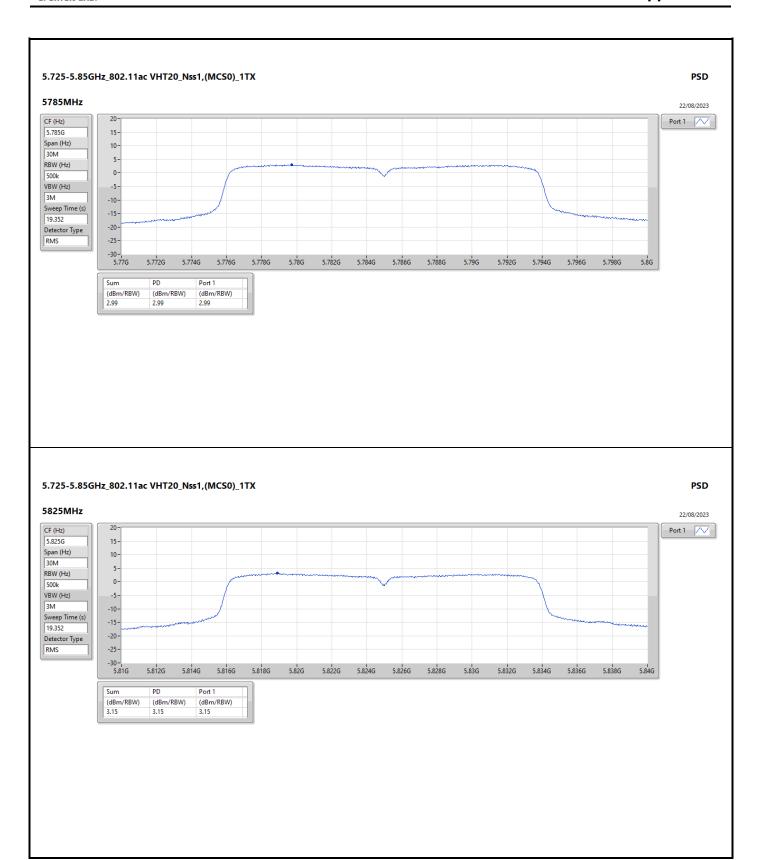
Page No. : 6 of 11

Report No. : FR372002AB



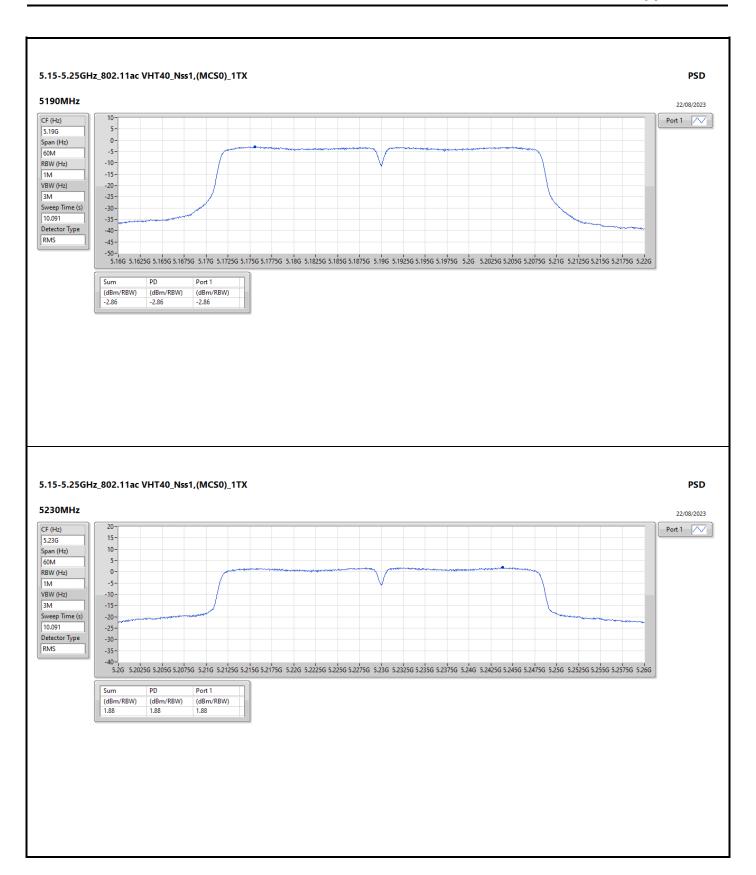
Page No. : 7 of 11

Report No. : FR372002AB



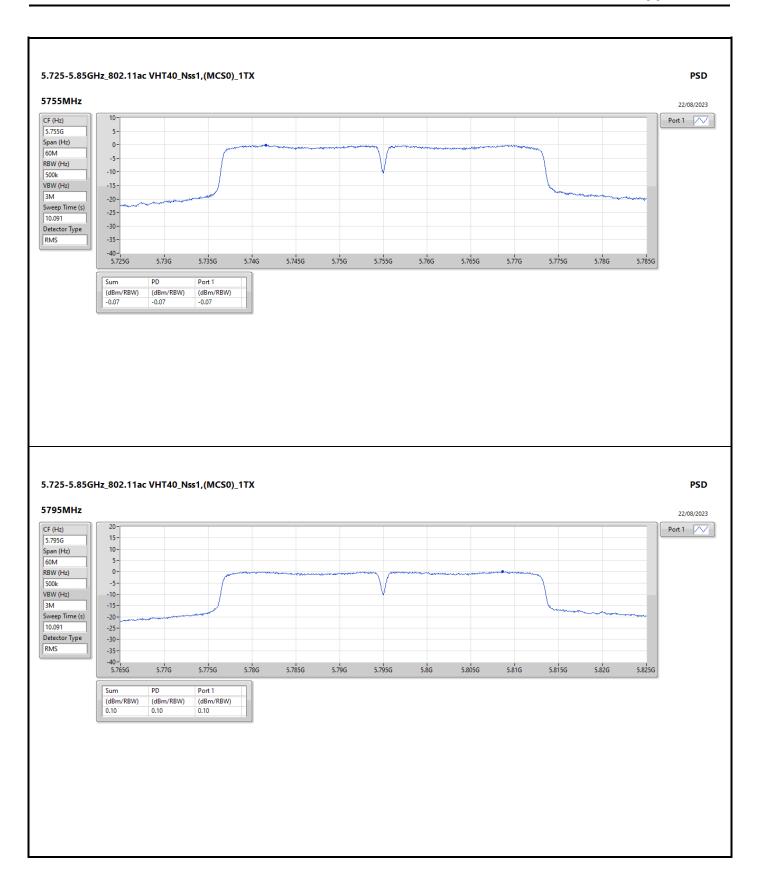
Page No. : 8 of 11

Report No. : FR372002AB



Page No. : 9 of 11

Report No. : FR372002AB



Page No. : 10 of 11

Report No. : FR372002AB



Page No. : 11 of 11

Report No. : FR372002AB



Radiated Emissions below 1GHz

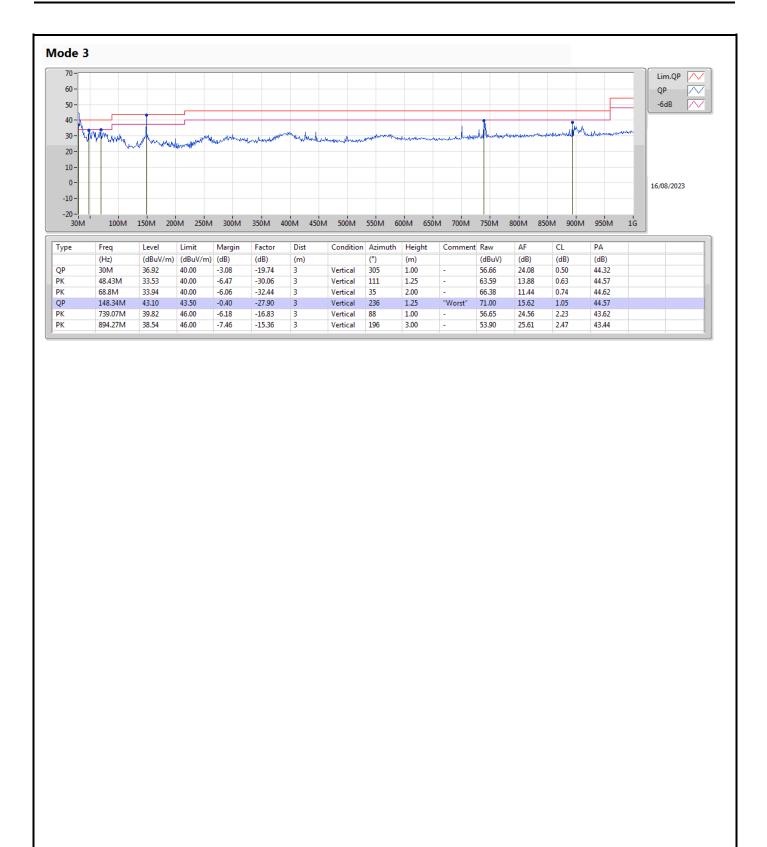
Appendix E.1

Summary

Mode	Result	Туре	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Condition
Mode 3	Pass	QP	148.34M	43.10	43.50	-0.40	Vertical

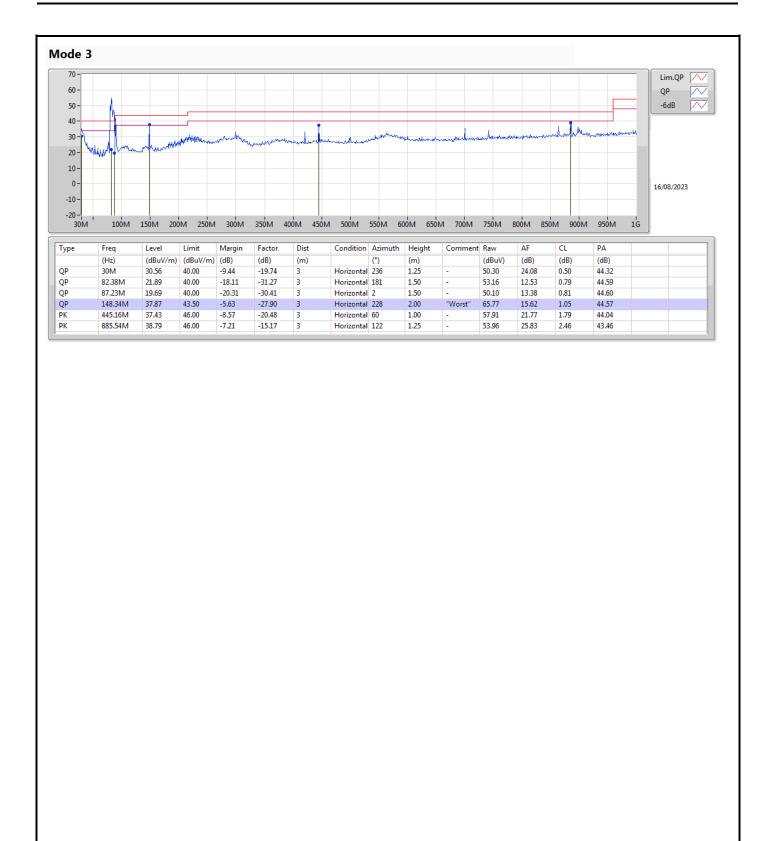
Sporton International Inc. Hsinchu Laboratory Page No. : 1 of 3

Report No. : FR372002AB



Page No. : 2 of 3

Report No. : FR372002AB



Page No. : 3 of 3

Report No. : FR372002AB



RSE TX above 1GHz

Appendix E.2

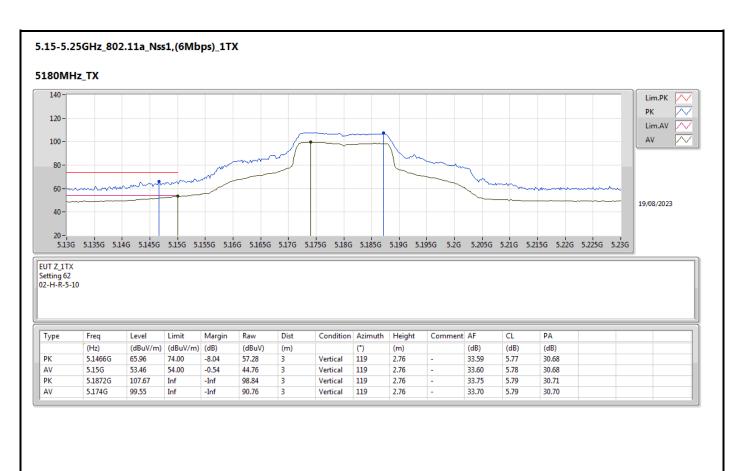
Summary

Mode	Result	Туре	Freq	Level	Limit	Margin	Dist	Condition	Azimuth	Height	Comments
			(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(m)		(°)	(m)	
5.725-5.85GHz	-	-	-	-	-	-	-	-	-	-	-
802.11ac VHT80_Nss1,(MCS0)_1TX	Pass	PK	5.94G	68.00	68.20	-0.20	3	Vertical	113	2.46	-

Sporton International Inc. Hsinchu Laboratory Page No. : 1 of 73

Report No. : FR372002AB

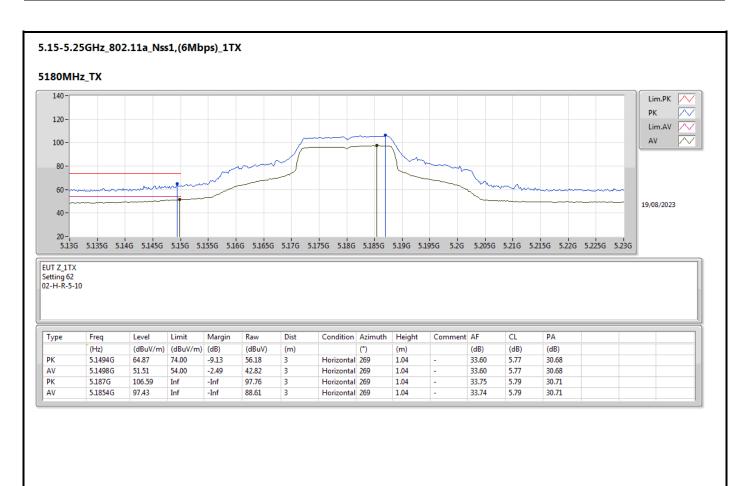




Page No. : 2 of 73

Report No. : FR372002AB

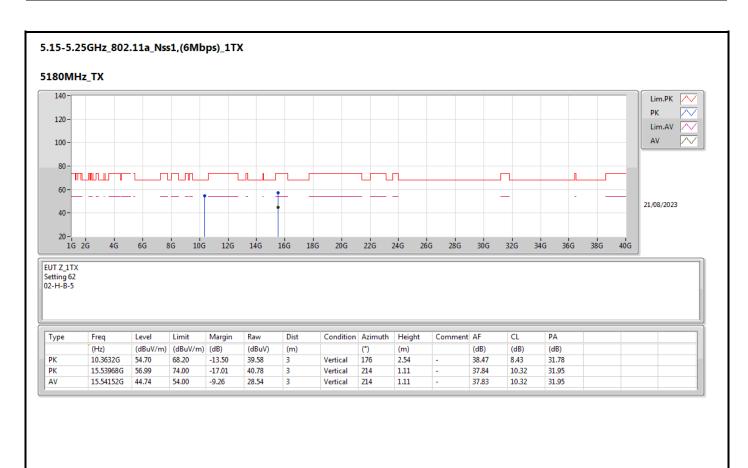




Page No. : 3 of 73

Report No. : FR372002AB

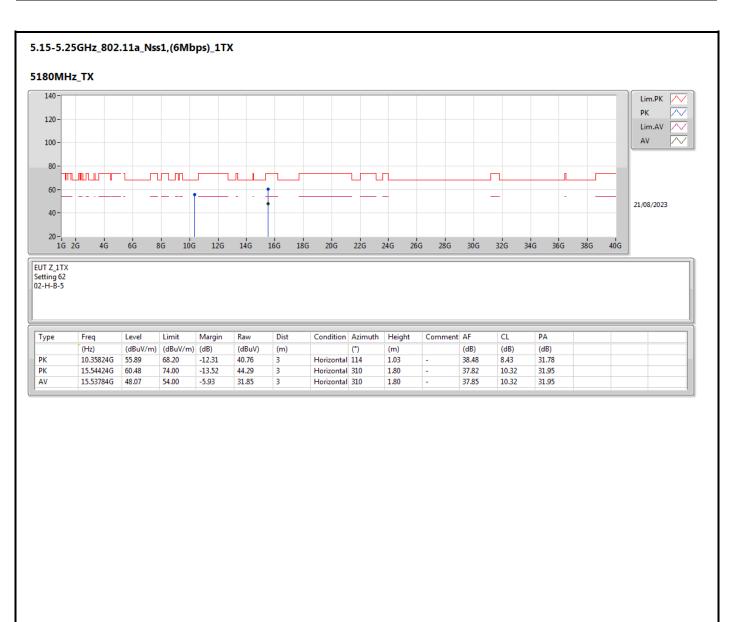




Page No. : 4 of 73

Report No. : FR372002AB

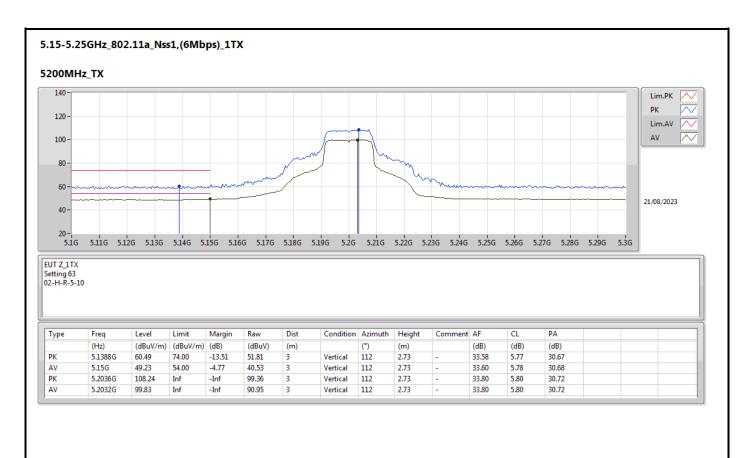




Page No. : 5 of 73

Report No. : FR372002AB

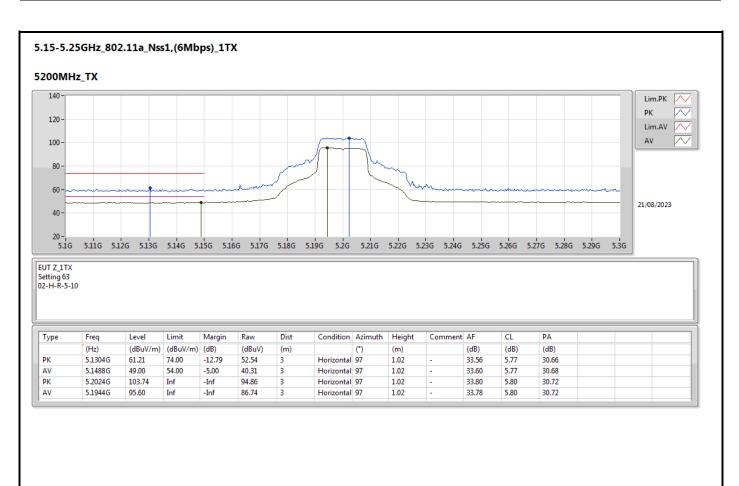




Page No. : 6 of 73

Report No. : FR372002AB

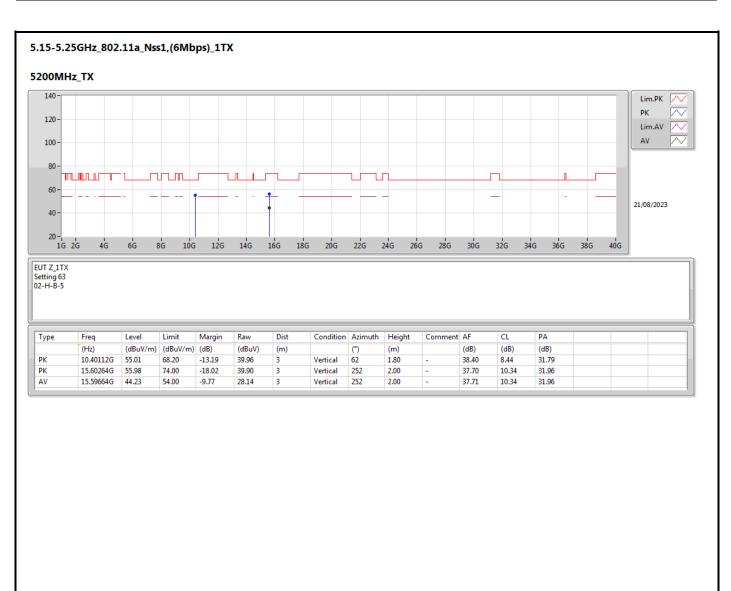




Page No. : 7 of 73

Report No. : FR372002AB

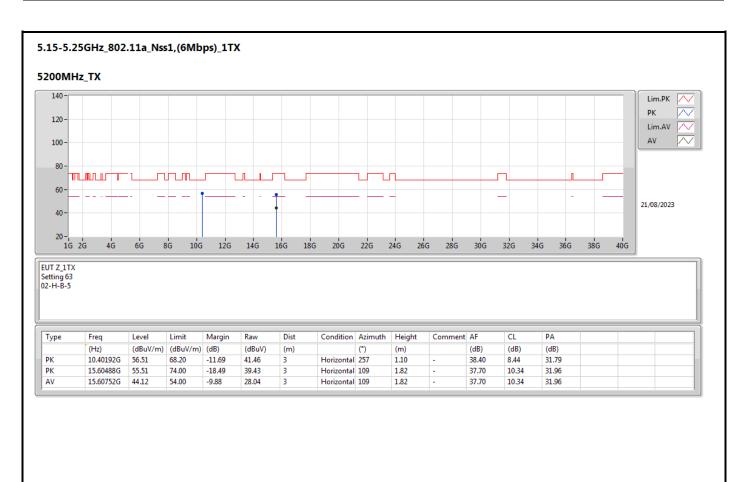




Page No. : 8 of 73

Report No. : FR372002AB

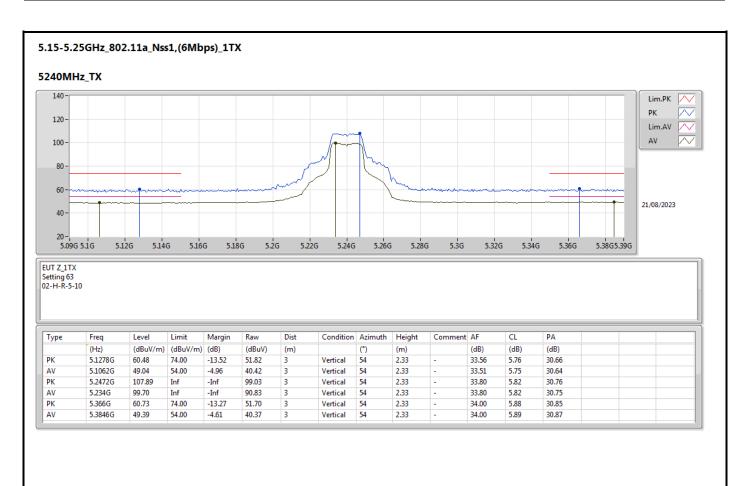




Page No. : 9 of 73

Report No. : FR372002AB

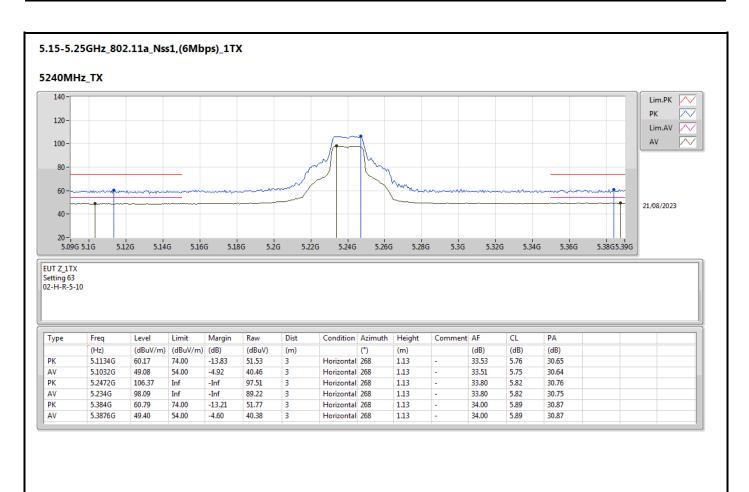




Page No. : 10 of 73

Report No. : FR372002AB

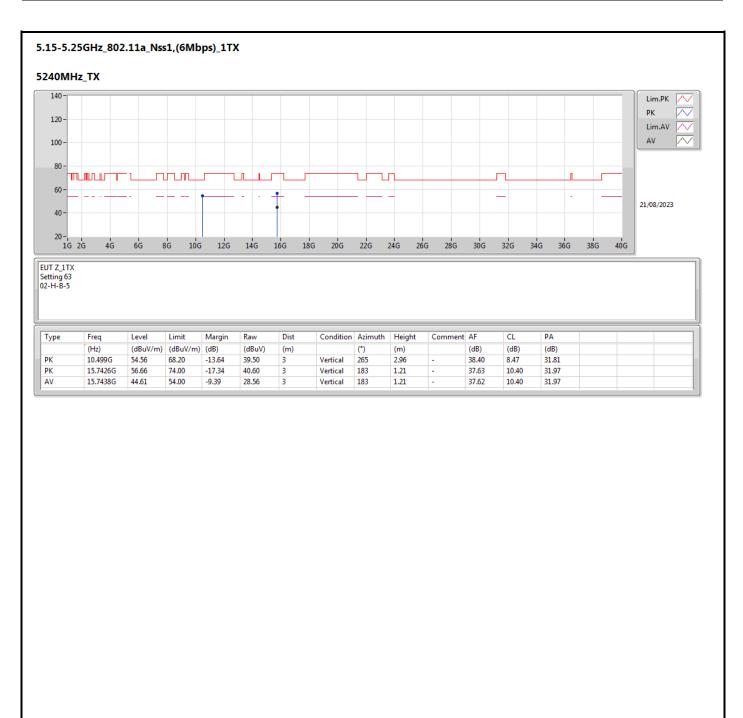




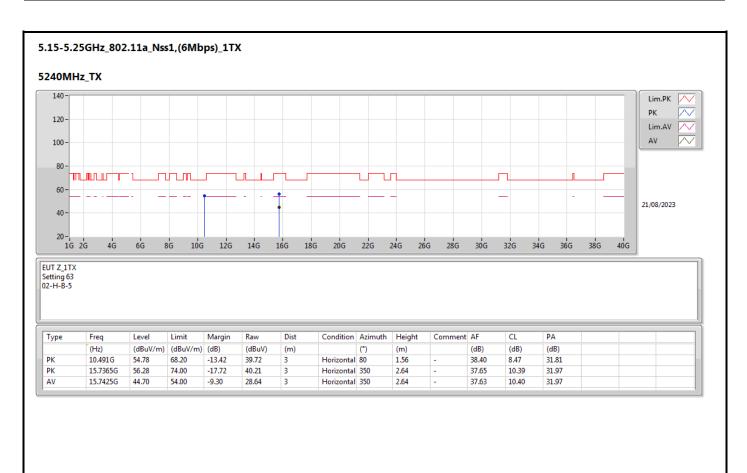
Page No. : 11 of 73

Report No. : FR372002AB





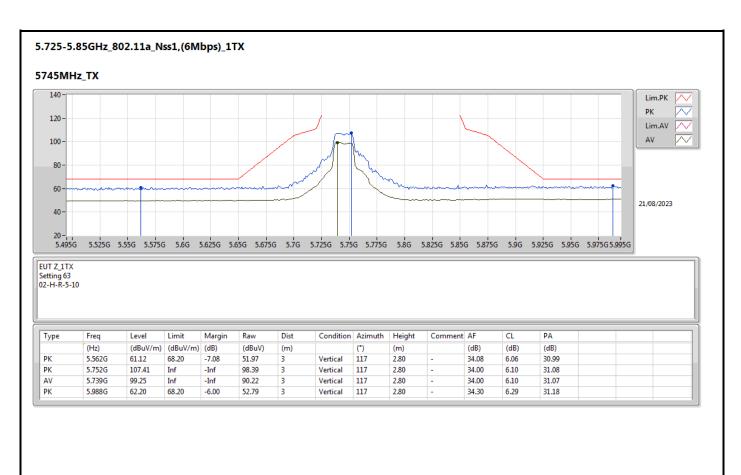




Page No. : 13 of 73

Report No. : FR372002AB

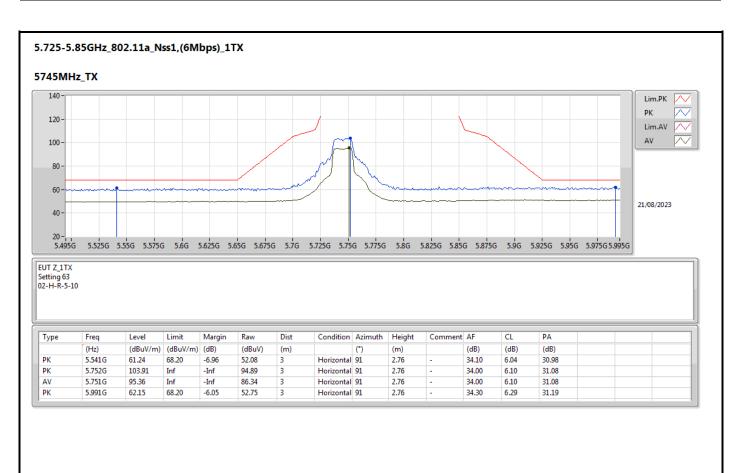




Page No. : 14 of 73

Report No. : FR372002AB

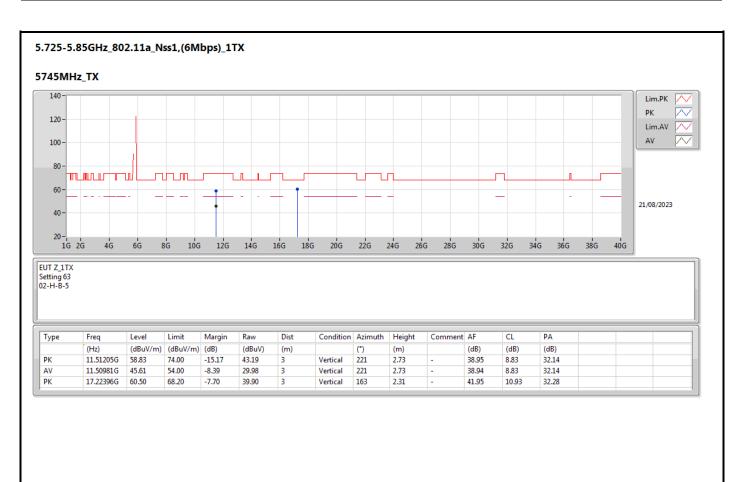




Page No. : 15 of 73

Report No. : FR372002AB

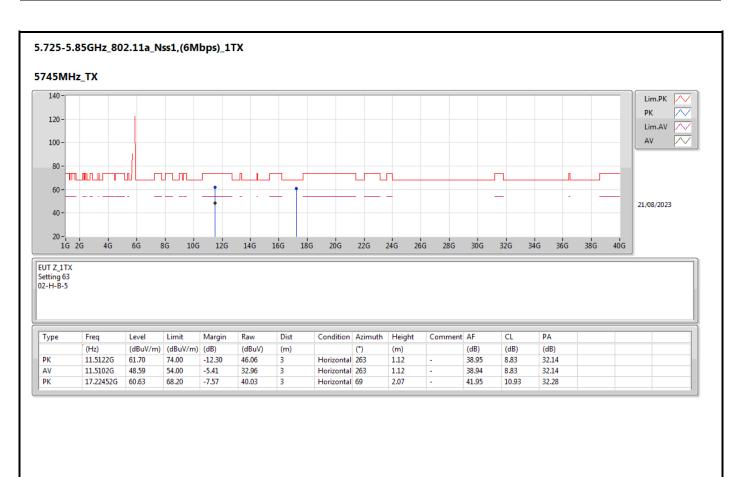




Page No. : 16 of 73

Report No. : FR372002AB

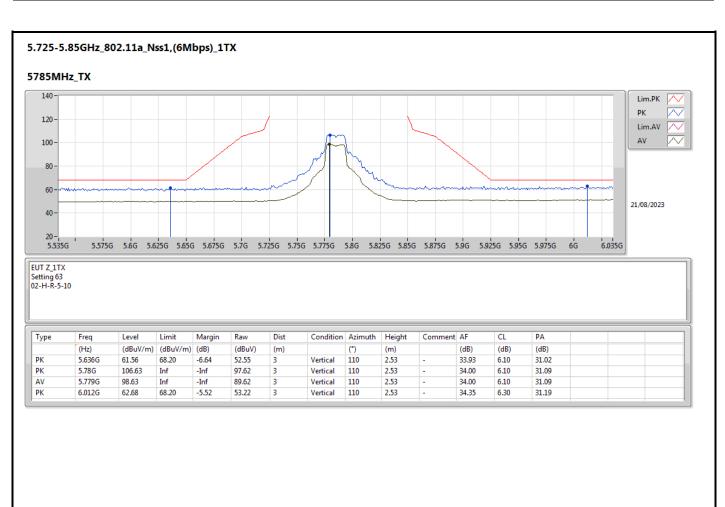




Page No. : 17 of 73

Report No. : FR372002AB

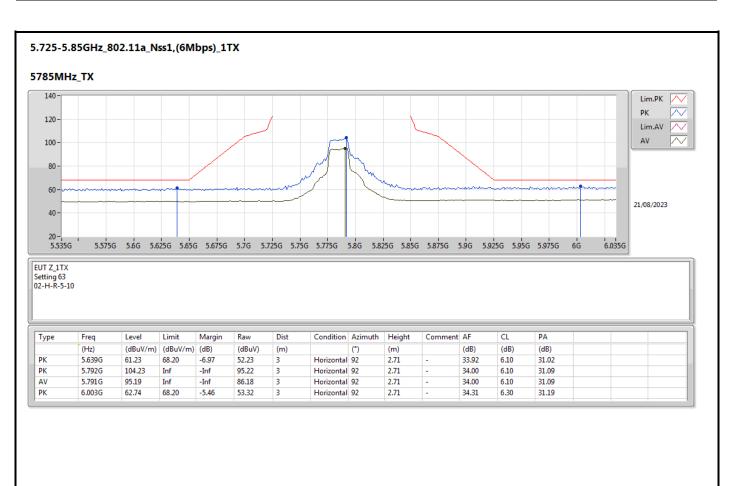




Page No. : 18 of 73

Report No. : FR372002AB

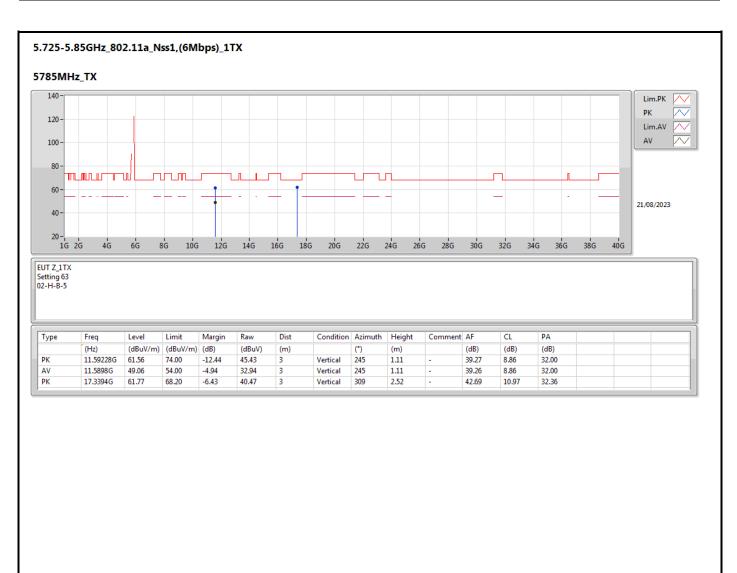




Page No. : 19 of 73

Report No. : FR372002AB

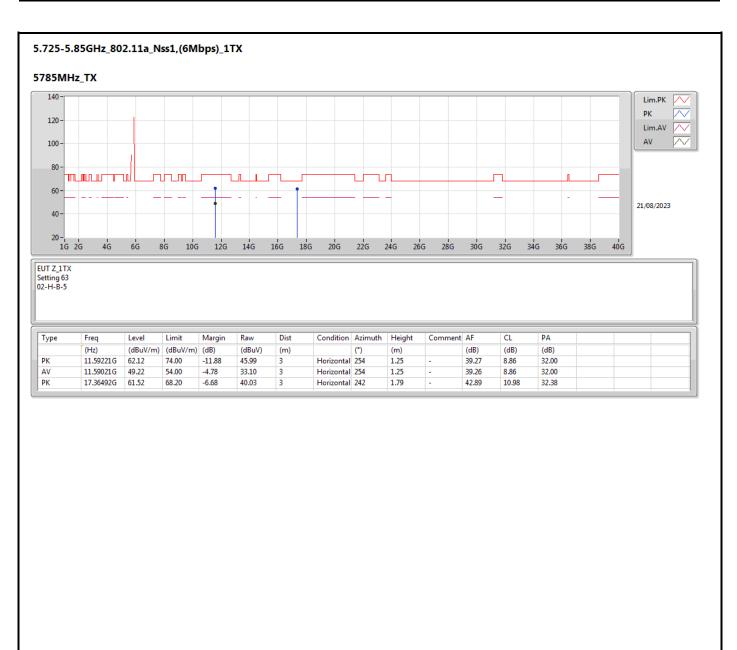




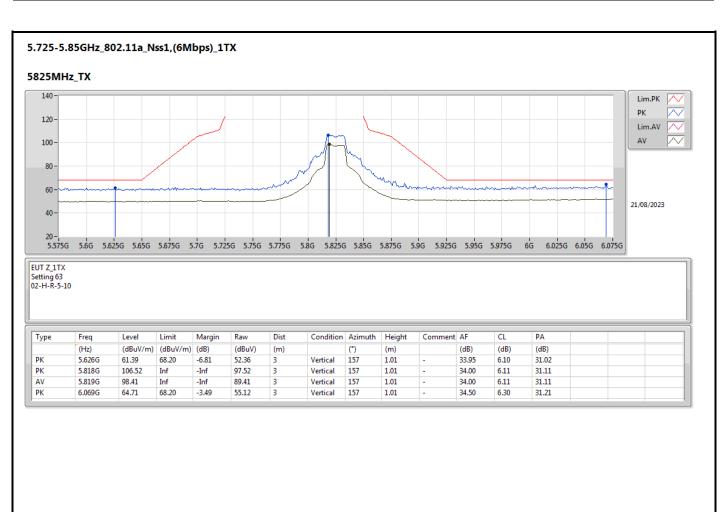
Page No. : 20 of 73

Report No. : FR372002AB





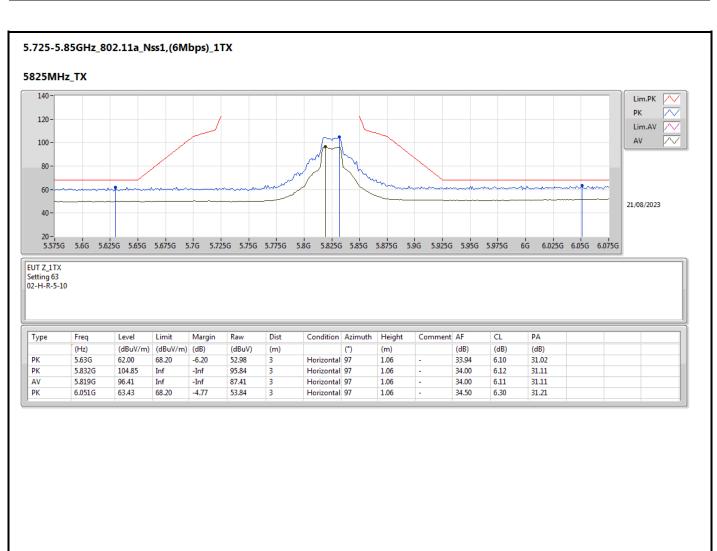




Page No. : 22 of 73

Report No. : FR372002AB

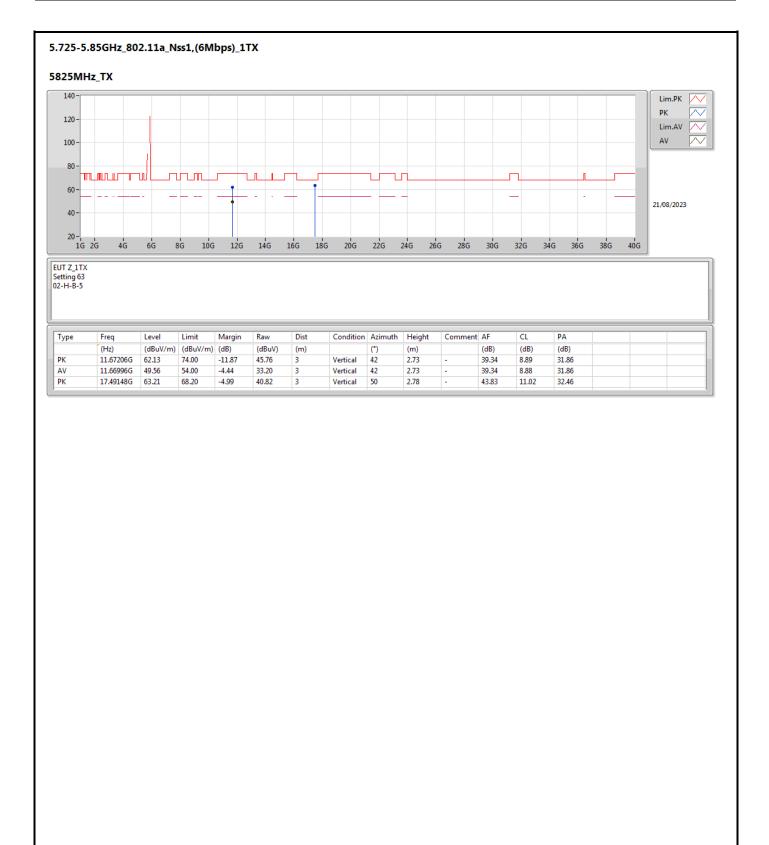




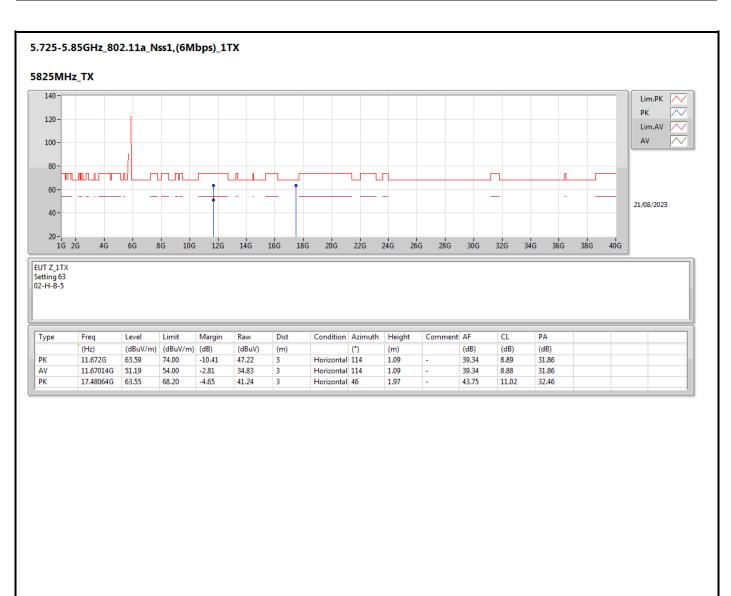
Page No. : 23 of 73

Report No. : FR372002AB





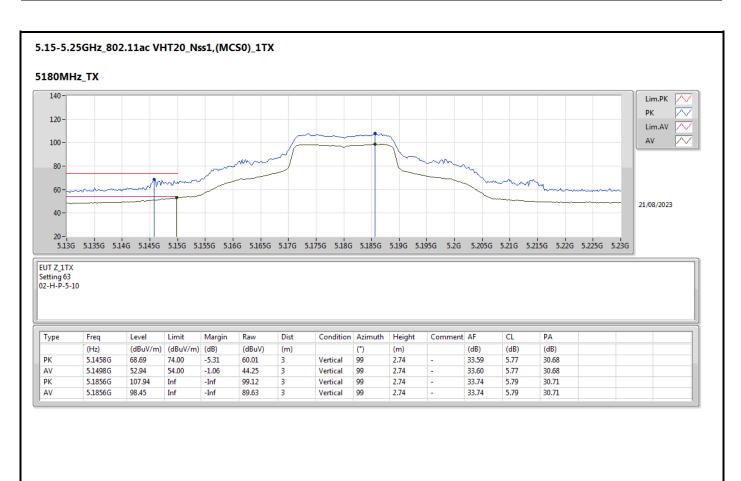




Page No. : 25 of 73

Report No. : FR372002AB

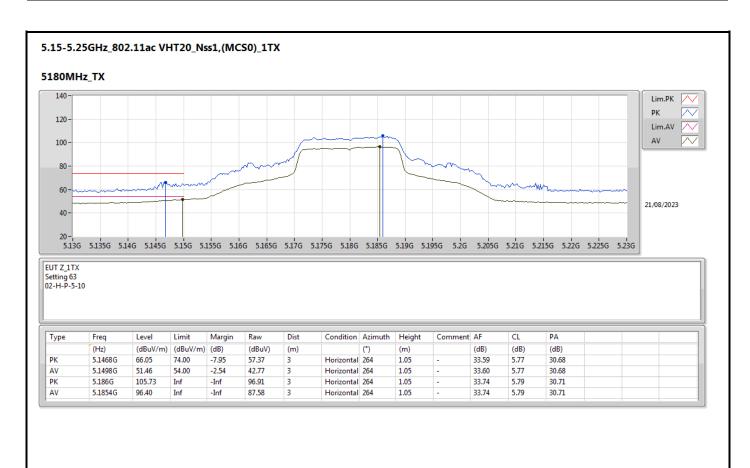




Page No. : 26 of 73

Report No. : FR372002AB

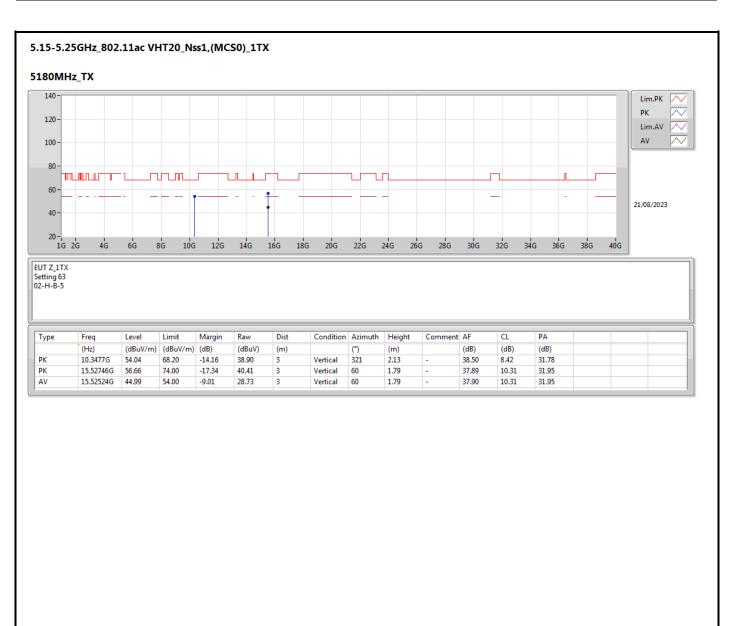




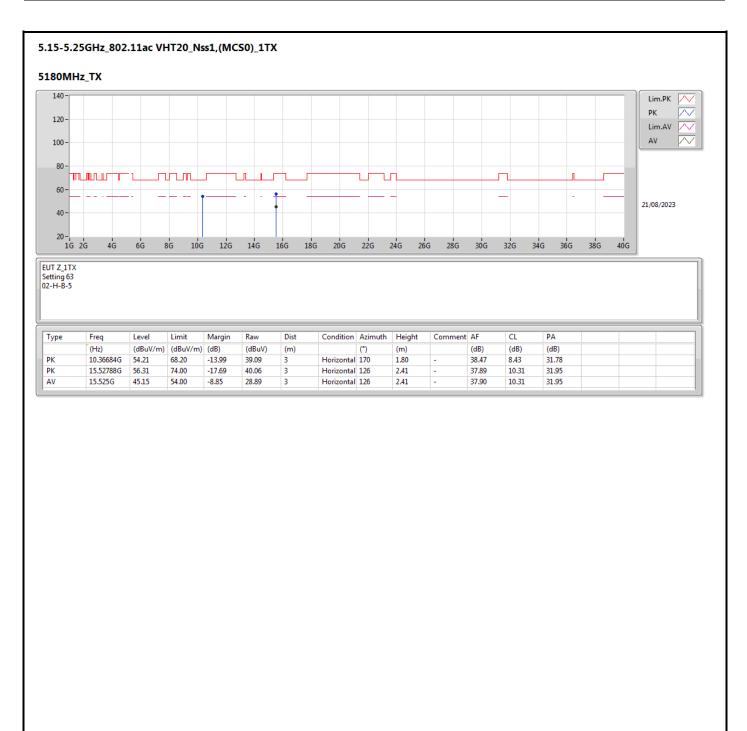
Page No. : 27 of 73

Report No. : FR372002AB





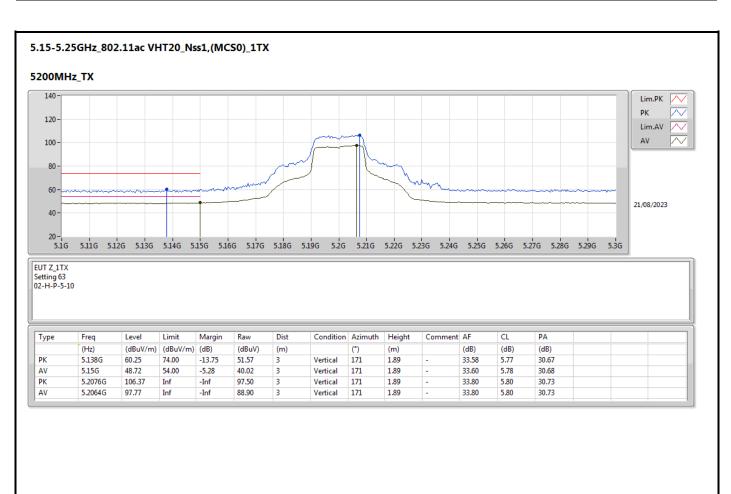




Page No. : 29 of 73

Report No. : FR372002AB

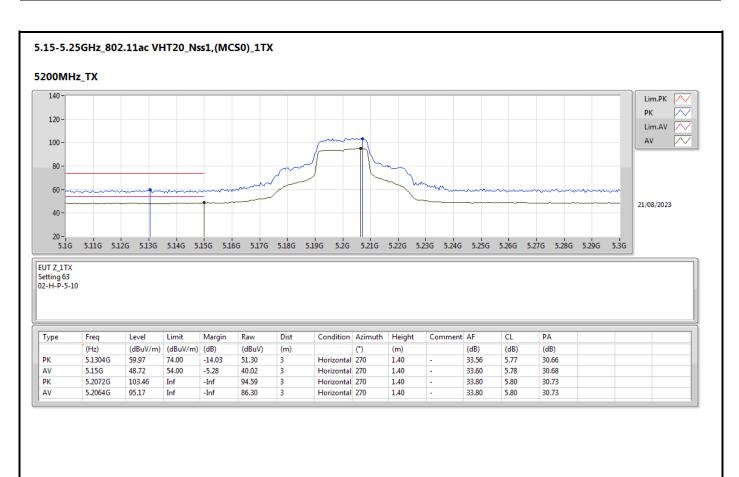




Page No. : 30 of 73

Report No. : FR372002AB

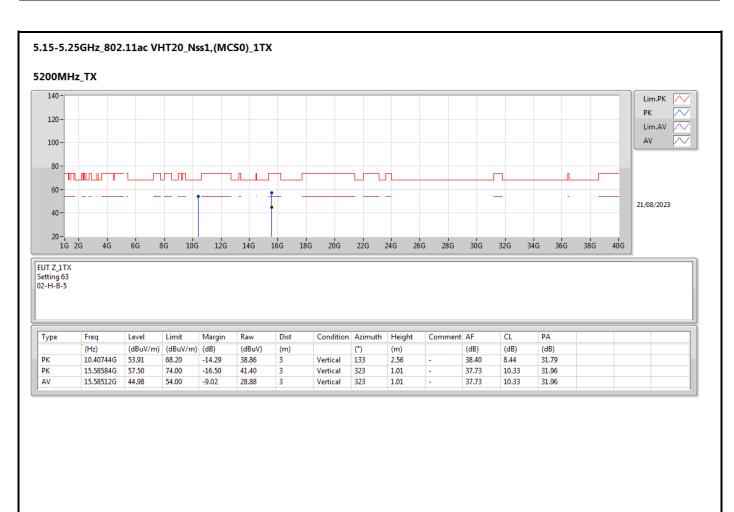




Page No. : 31 of 73

Report No. : FR372002AB

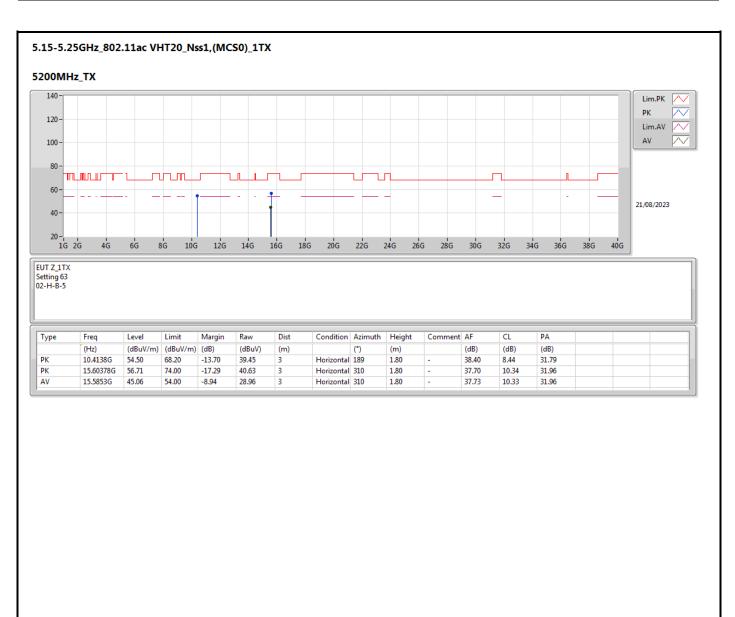




Page No. : 32 of 73

Report No. : FR372002AB

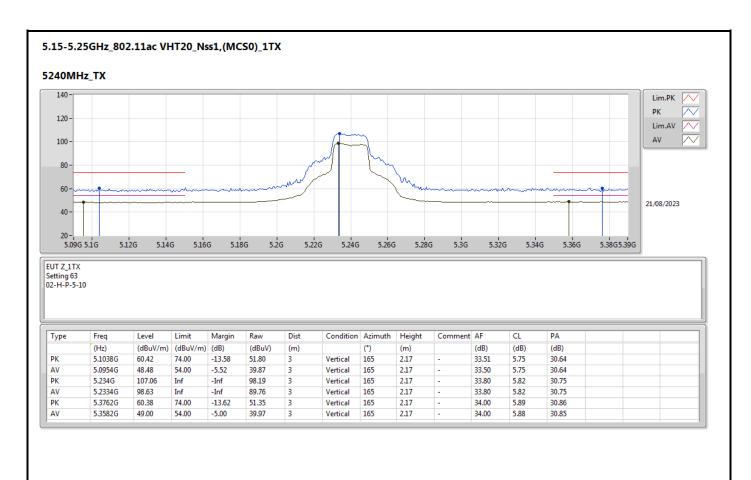




Page No. : 33 of 73

Report No. : FR372002AB

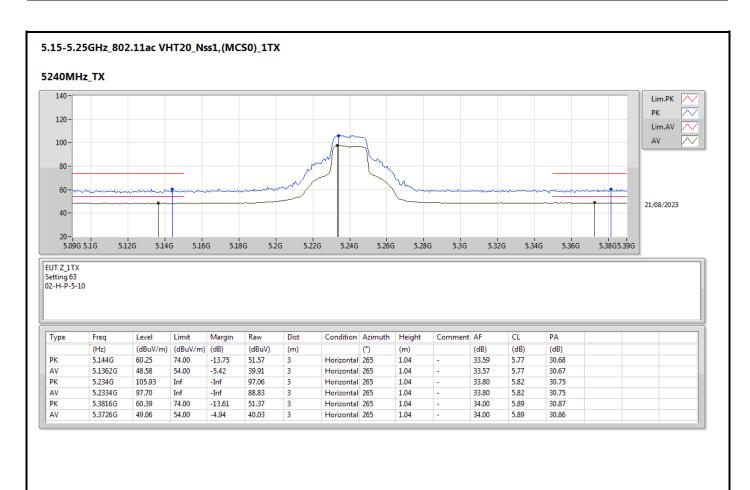




Page No. : 34 of 73

Report No. : FR372002AB

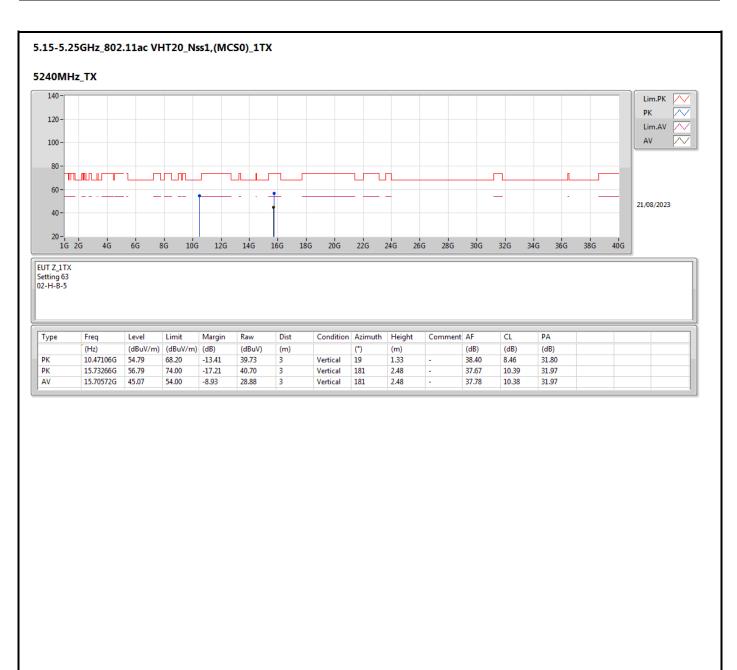




Page No. : 35 of 73

Report No. : FR372002AB

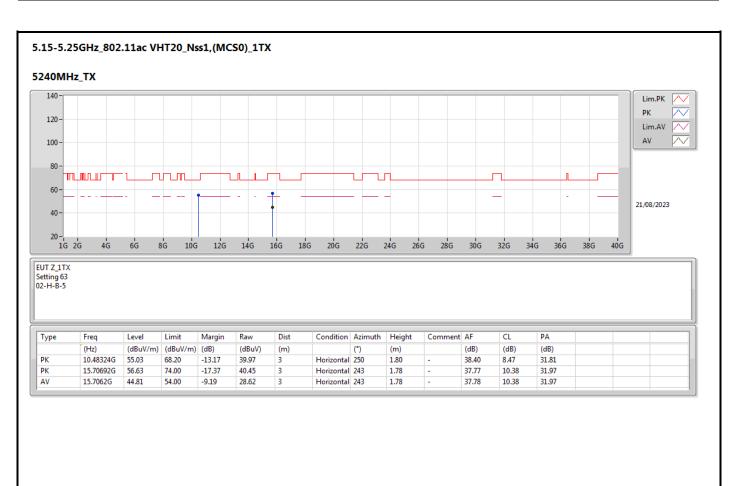




Page No. : 36 of 73

Report No. : FR372002AB

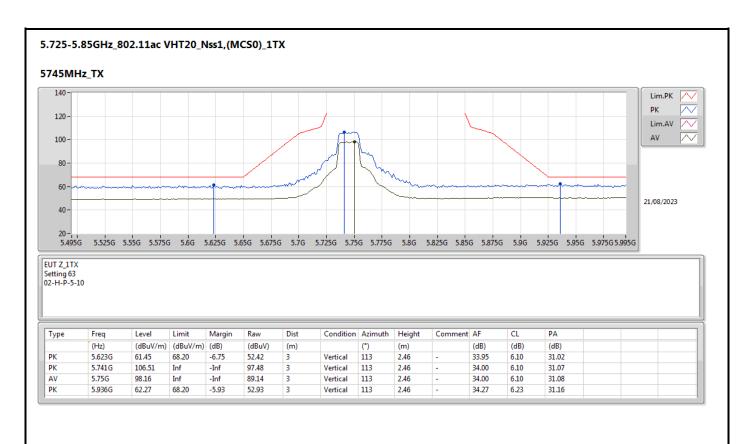




Page No. : 37 of 73

Report No. : FR372002AB

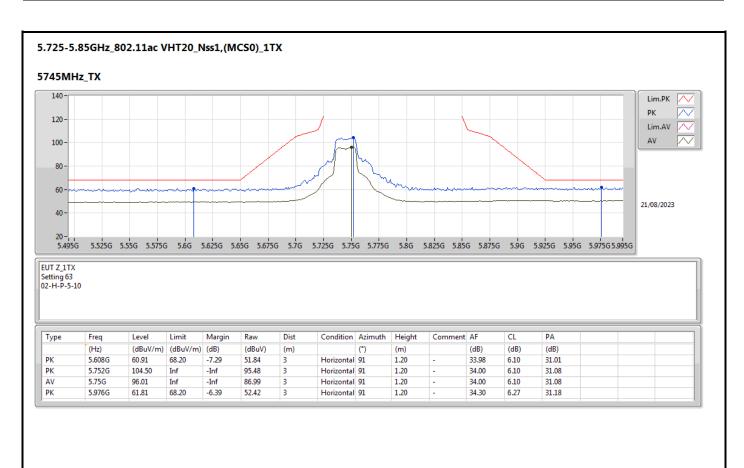




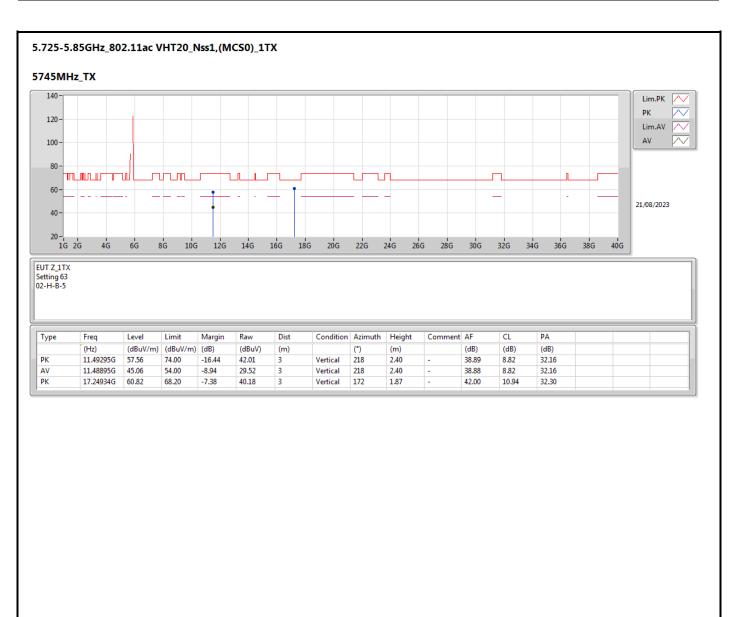
Page No. : 38 of 73

Report No. : FR372002AB





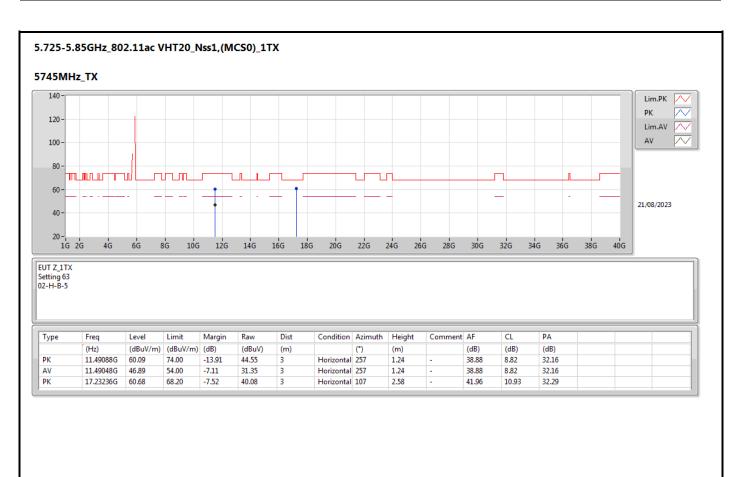




Page No. : 40 of 73

Report No. : FR372002AB

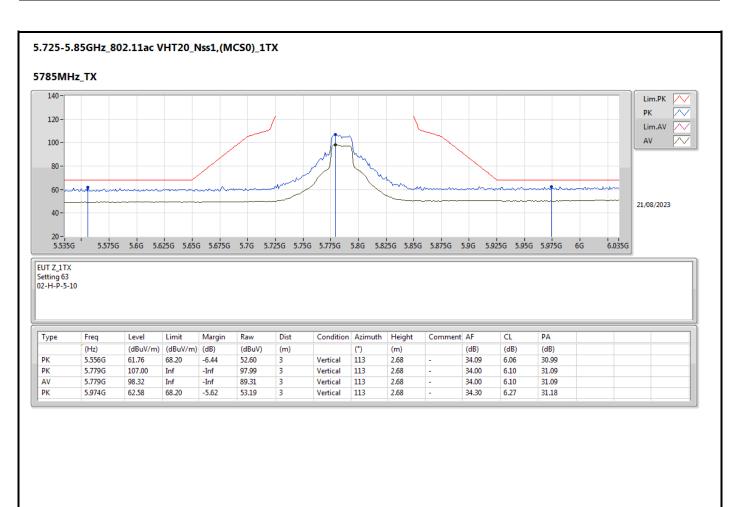




Page No. : 41 of 73

Report No. : FR372002AB

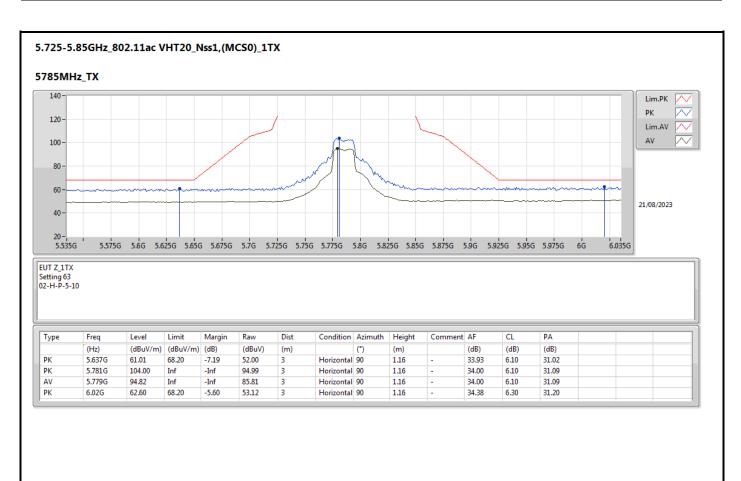




Page No. : 42 of 73

Report No. : FR372002AB

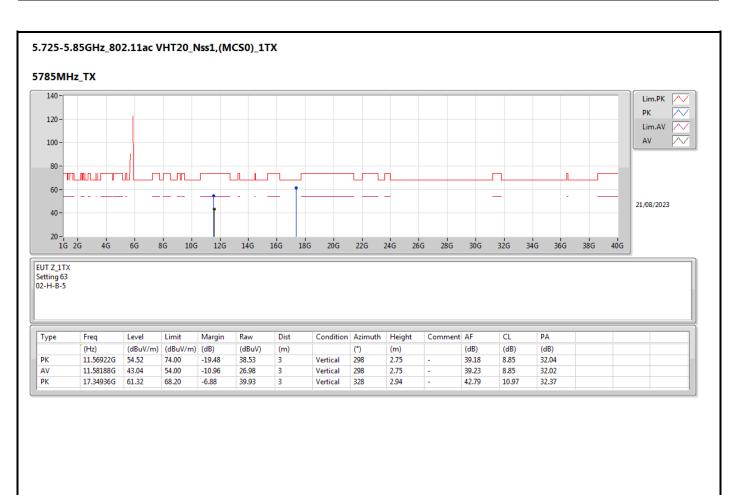




Page No. : 43 of 73

Report No. : FR372002AB

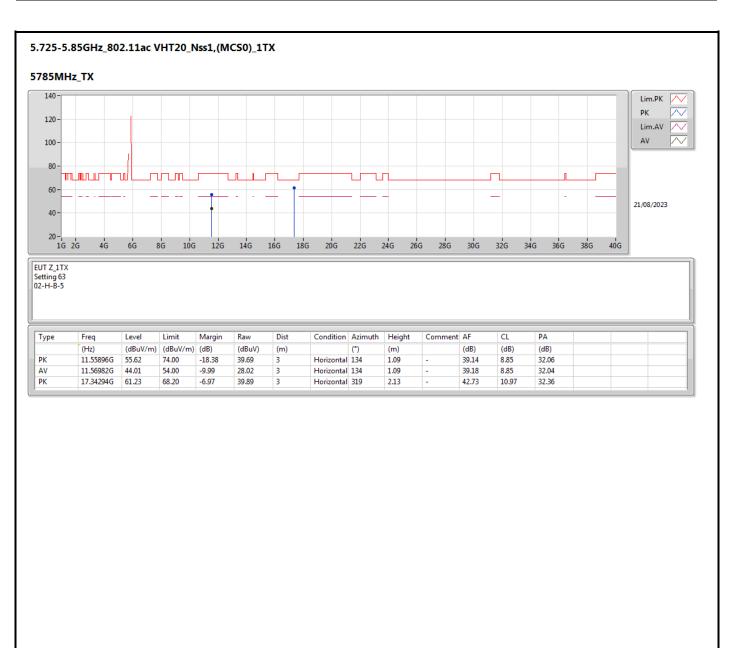




Page No. : 44 of 73

Report No. : FR372002AB

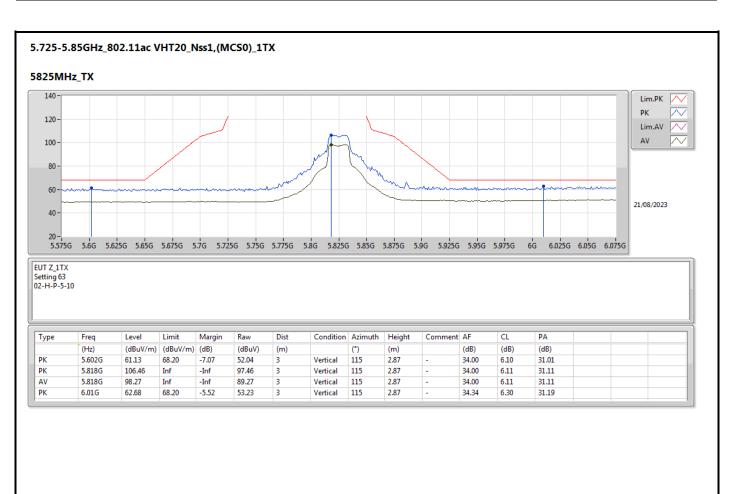




Page No. : 45 of 73

Report No. : FR372002AB

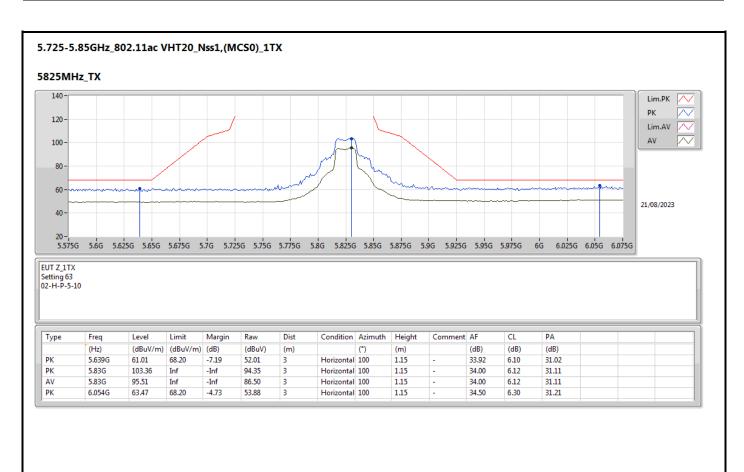




Page No. : 46 of 73

Report No. : FR372002AB

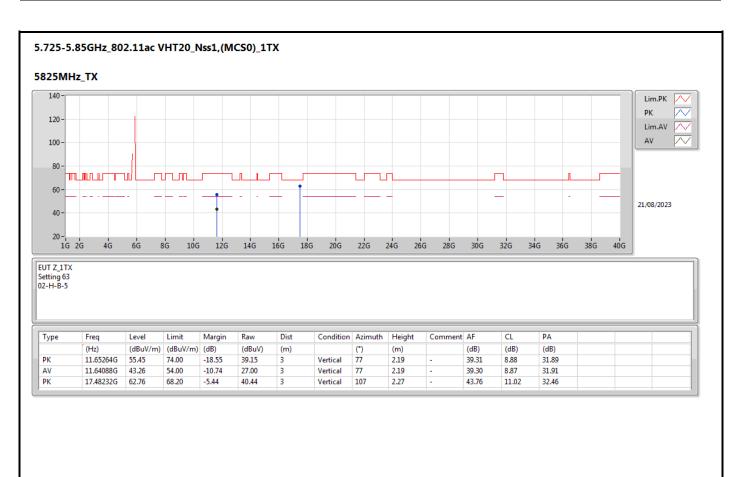




Page No. : 47 of 73

Report No. : FR372002AB

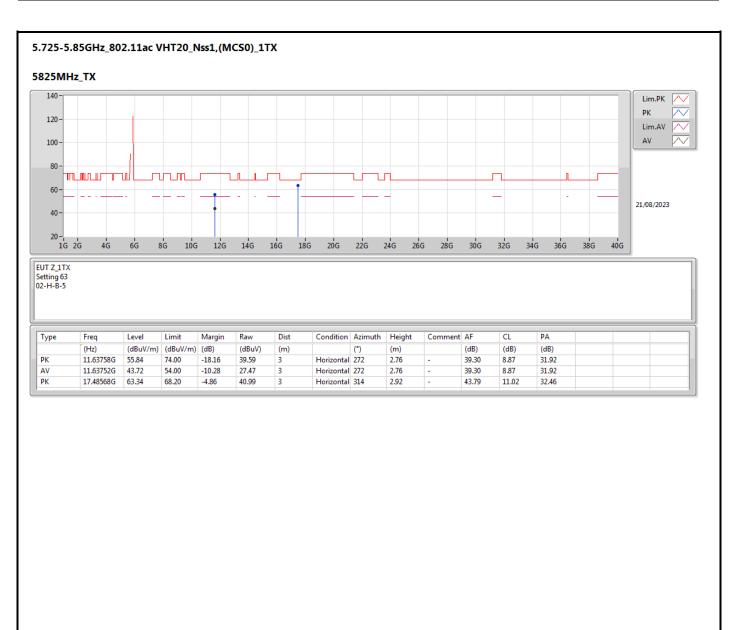




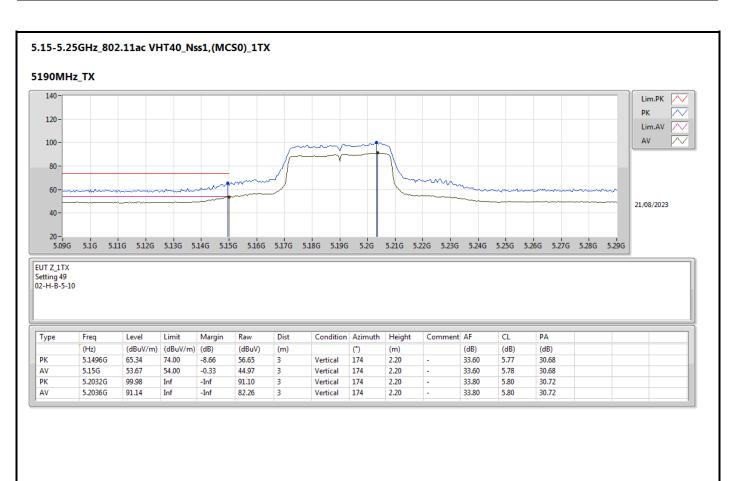
Page No. : 48 of 73

Report No. : FR372002AB

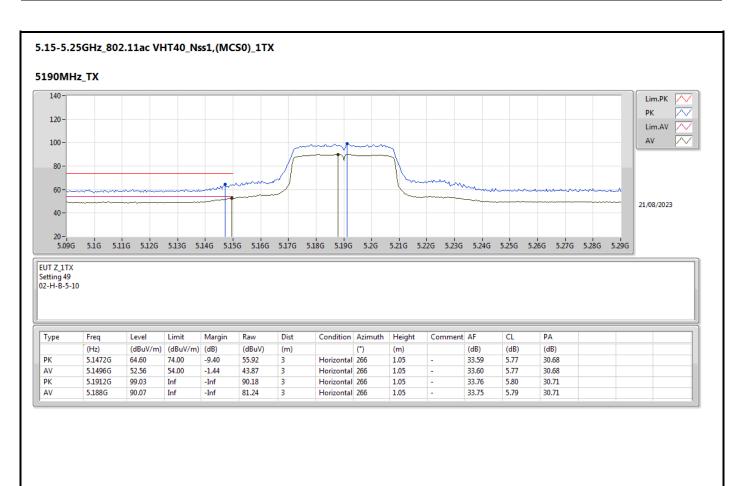








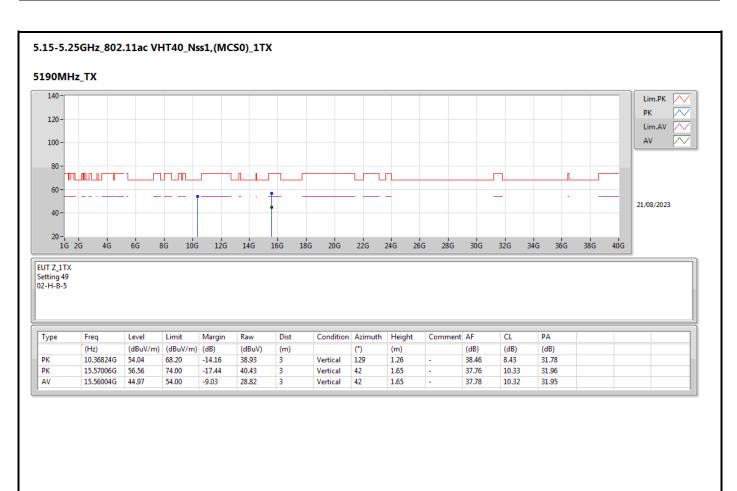




Page No. : 51 of 73

Report No. : FR372002AB

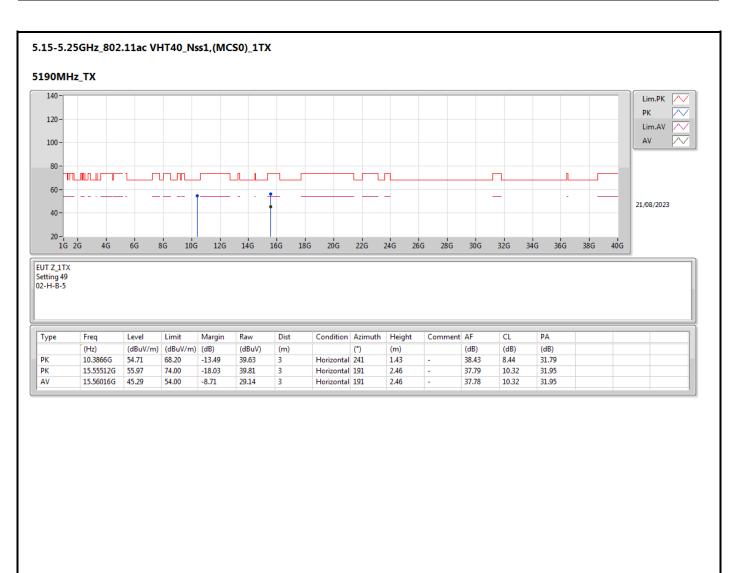




Page No. : 52 of 73

Report No. : FR372002AB

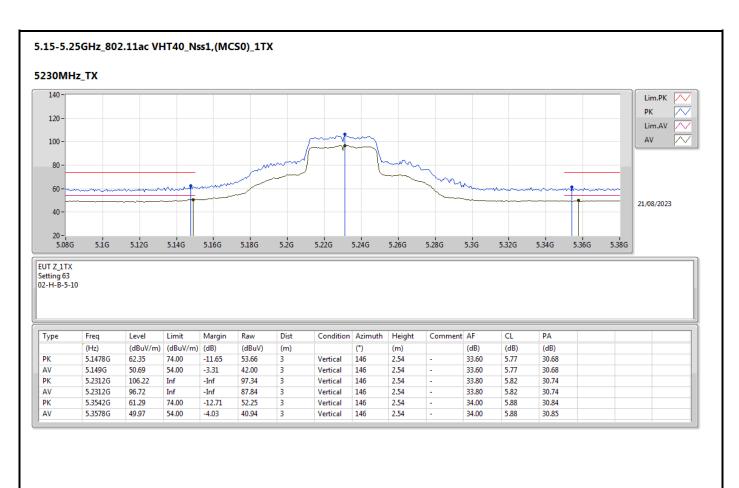




Page No. : 53 of 73

Report No. : FR372002AB

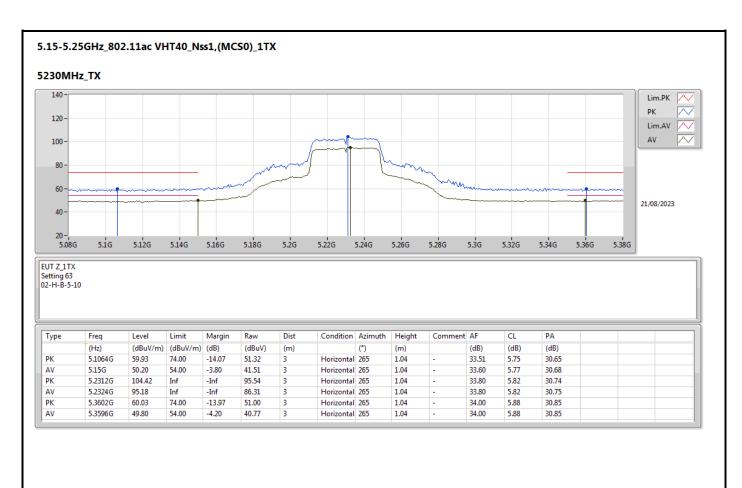




Page No. : 54 of 73

Report No. : FR372002AB

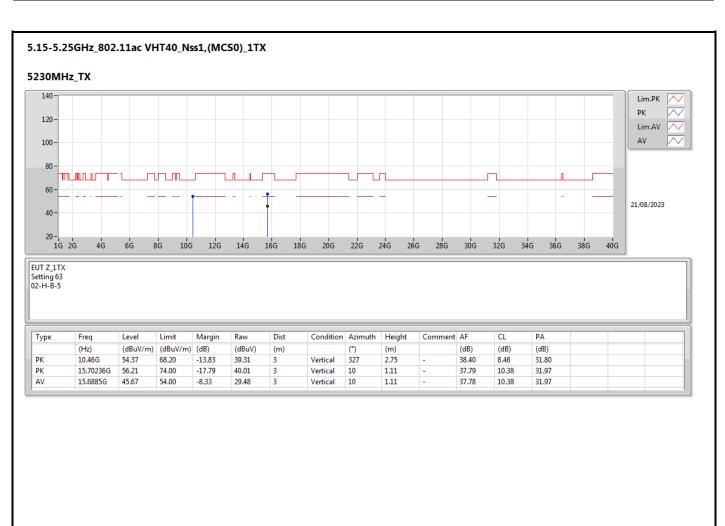




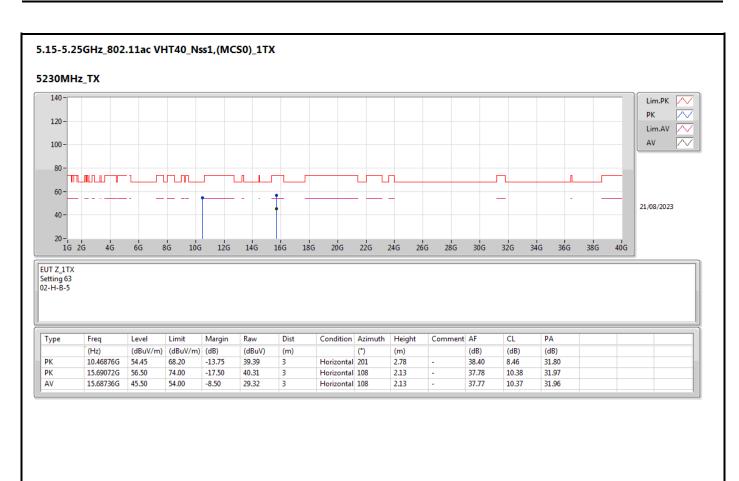
Page No. : 55 of 73

Report No. : FR372002AB





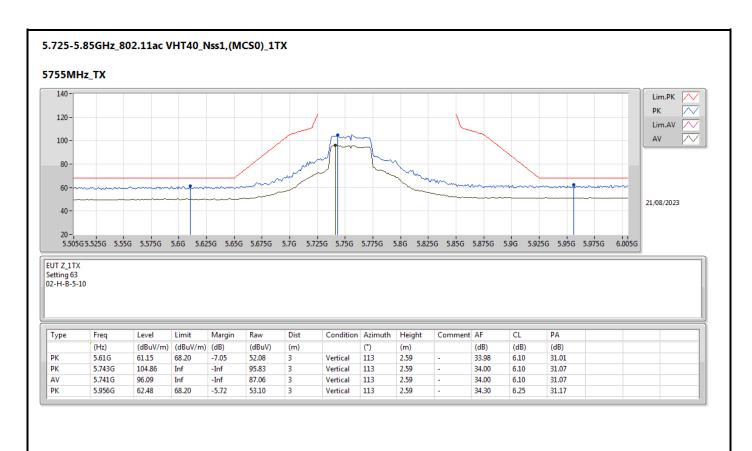




Page No. : 57 of 73

Report No. : FR372002AB

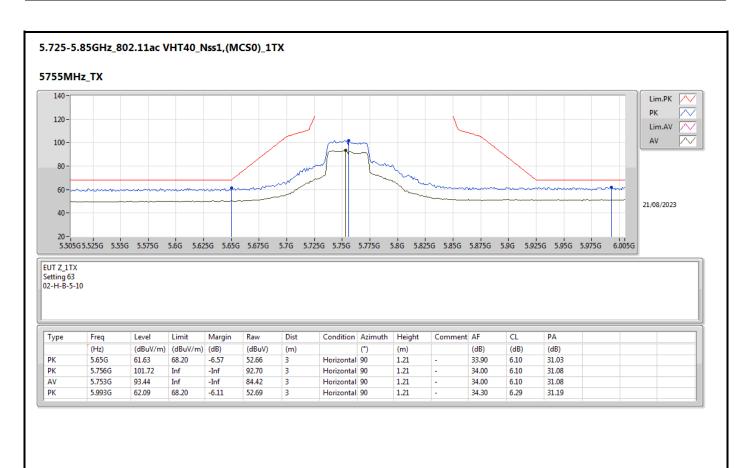




Page No. : 58 of 73

Report No. : FR372002AB

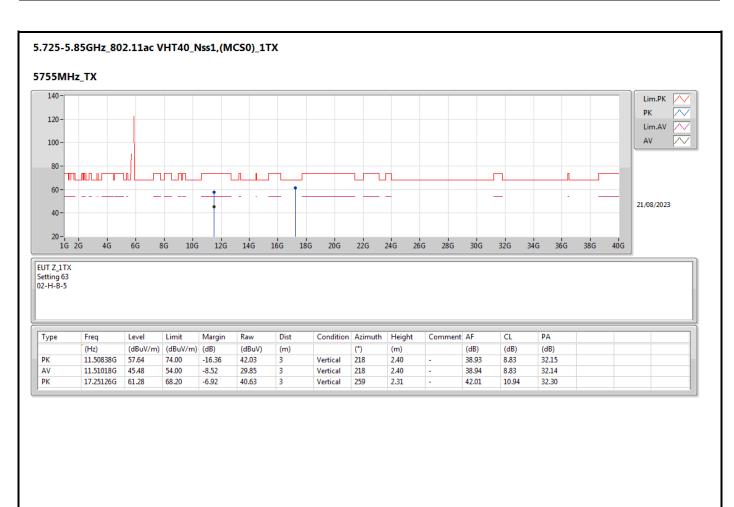




Page No. : 59 of 73

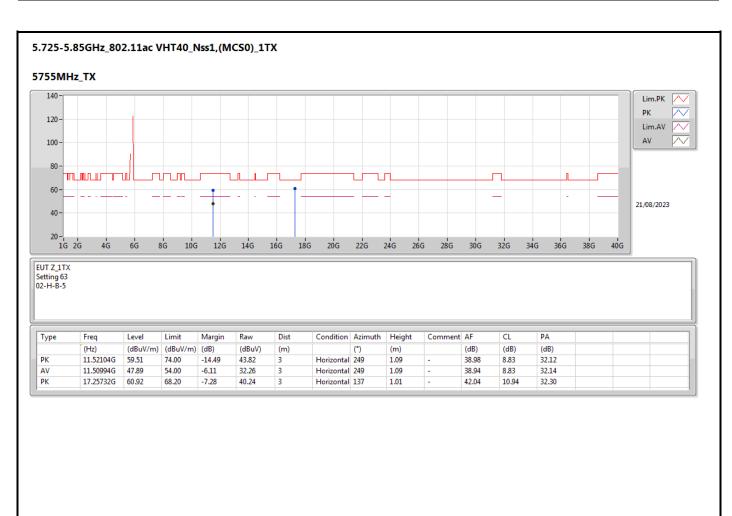
Report No. : FR372002AB



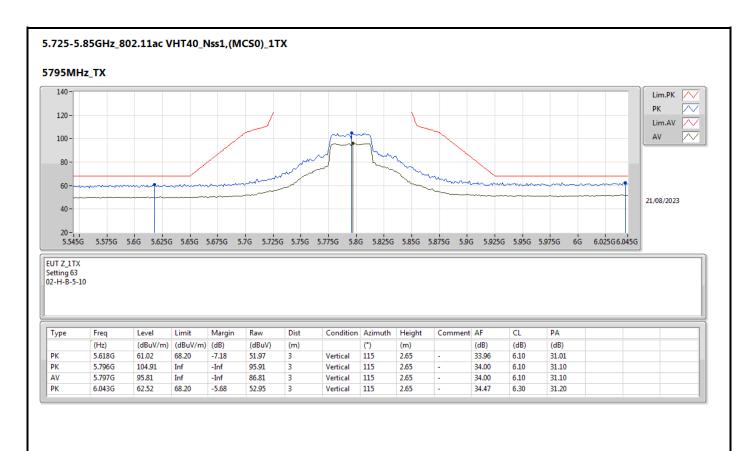


Page No. : 60 of 73 Report No. : FR372002AB





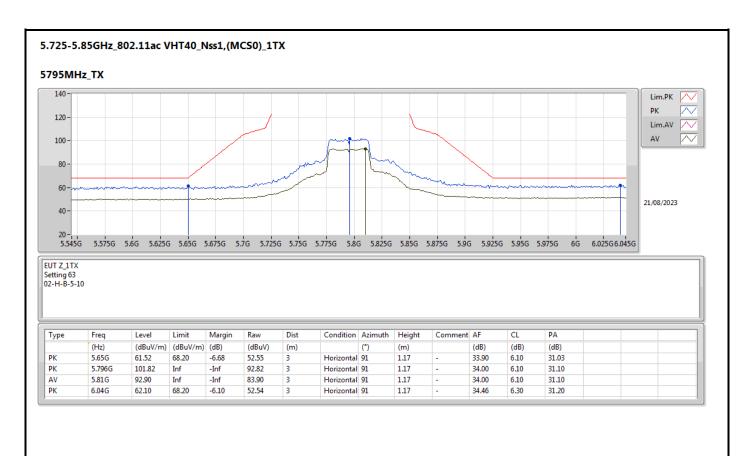




Page No. : 62 of 73

Report No. : FR372002AB

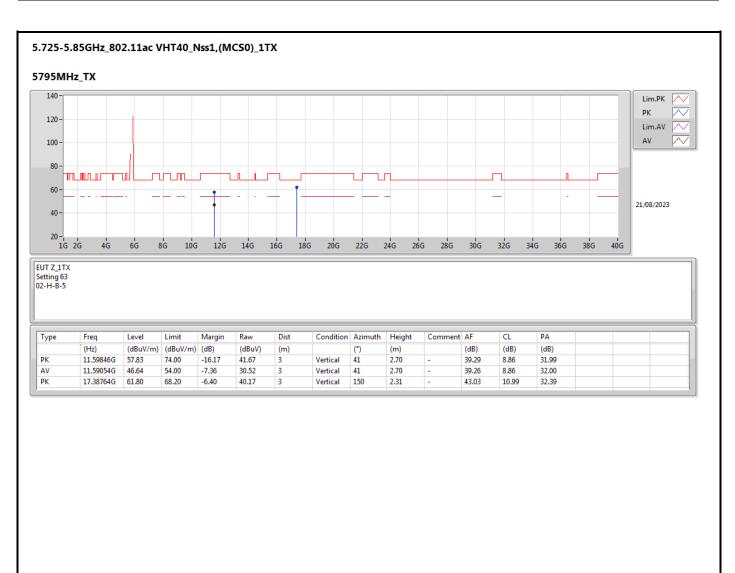




Page No. : 63 of 73

Report No. : FR372002AB

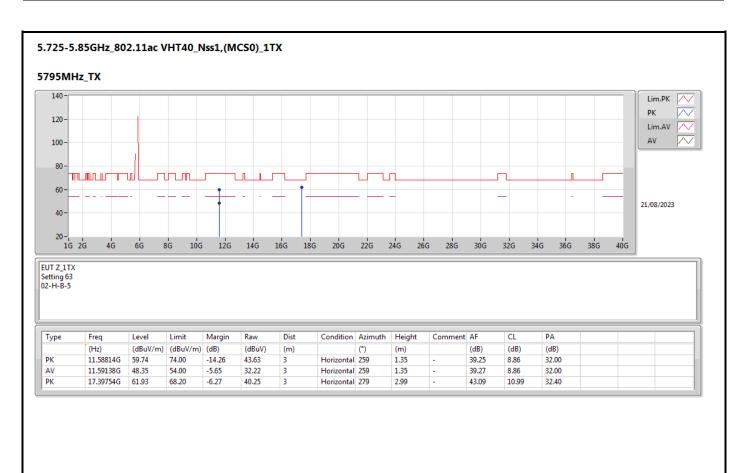




Page No. : 64 of 73

Report No. : FR372002AB

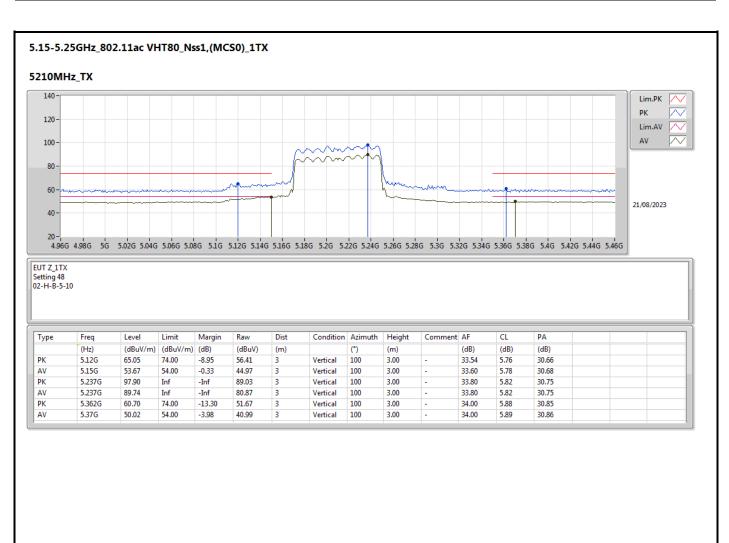




Page No. : 65 of 73

Report No. : FR372002AB

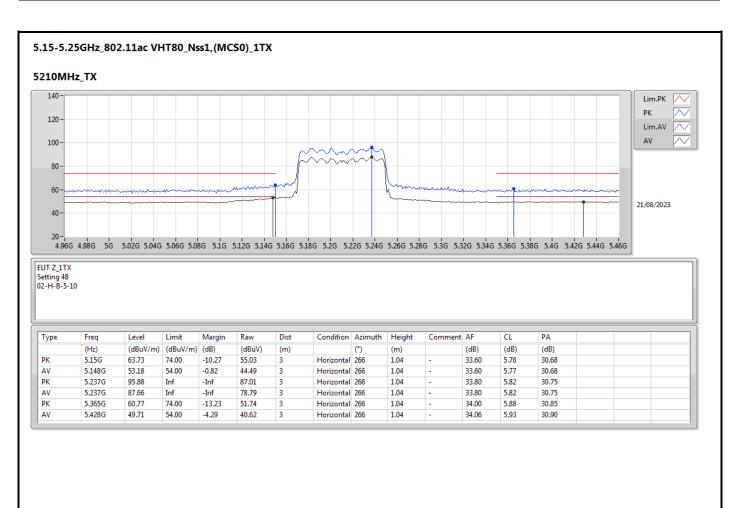




Page No. : 66 of 73

Report No. : FR372002AB

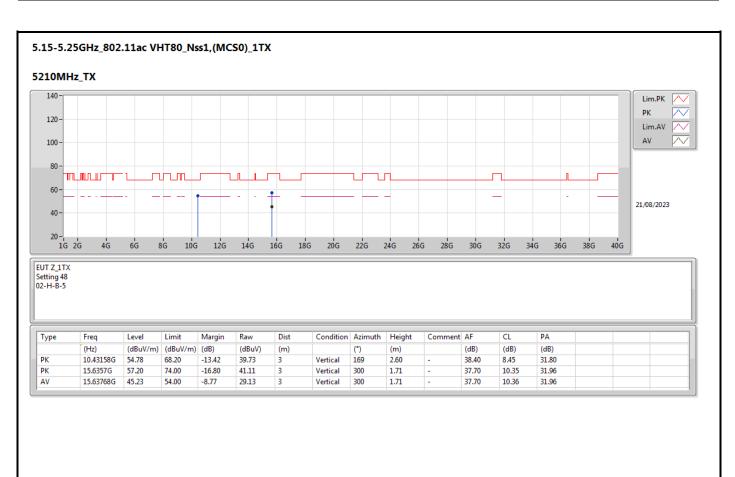




Page No. : 67 of 73

Report No. : FR372002AB

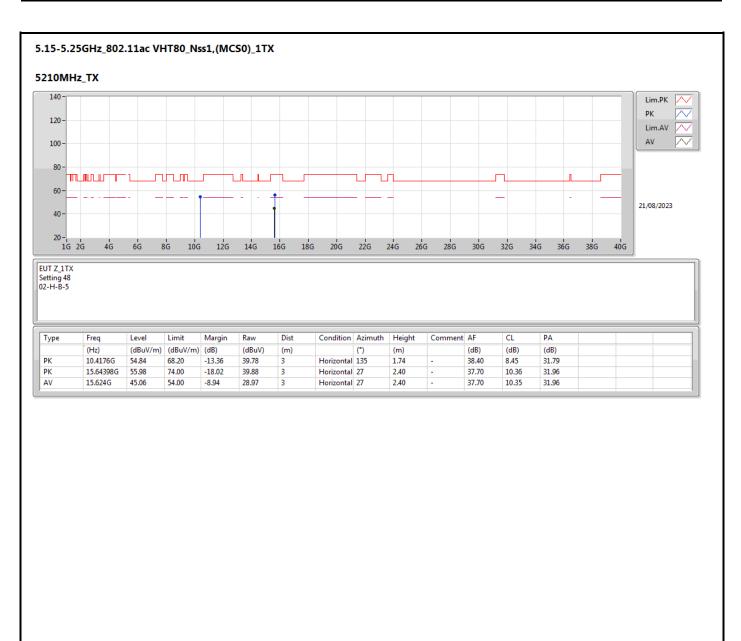




Page No. : 68 of 73

Report No. : FR372002AB

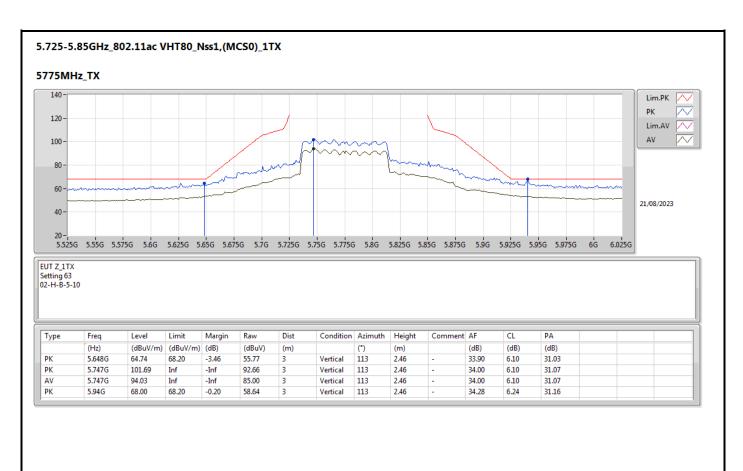




Page No. : 69 of 73

Report No. : FR372002AB

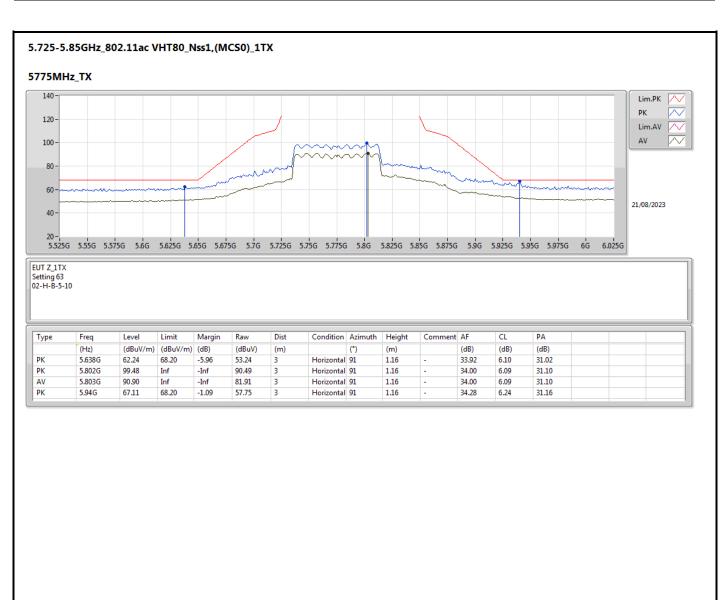




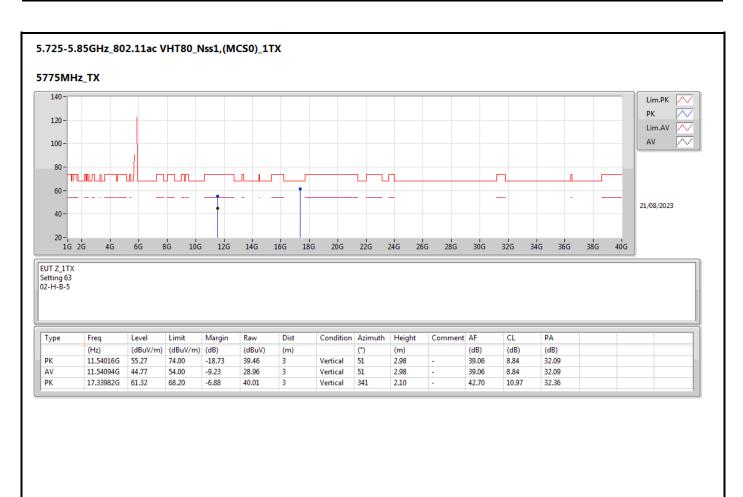
Page No. : 70 of 73

Report No. : FR372002AB





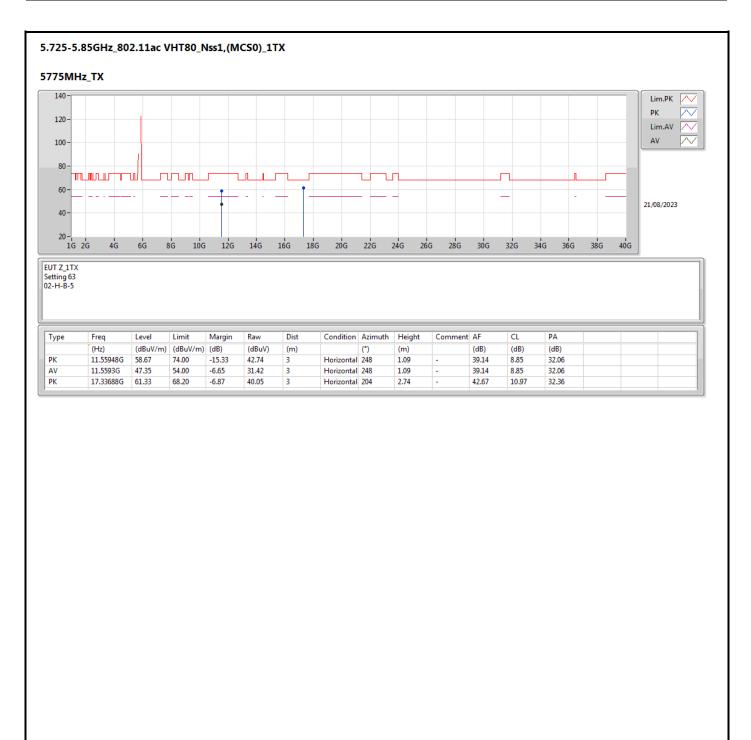




Page No. : 72 of 73

Report No. : FR372002AB





Page No. : 73 of 73

Report No. : FR372002AB