



FCC RADIO TEST REPORT

FCC ID : UZ7ET45CA
Equipment : Tablet
Brand Name : Zebra
Model Name : ET45CA
Applicant : Zebra Technologies Corporation
1 Zebra Plaza, Holtsville, NY 11742
Manufacturer : Zebra Technologies Corporation
1 Zebra Plaza, Holtsville, NY 11742
Standard : FCC Part 15 Subpart E §15.407

The product was received on Jun. 10, 2022 and testing was performed from Jun. 16, 2022 to Jul. 25, 2022. We, Sporton International Inc. Wensan Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

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

Louis Wu

Approved by: Louis Wu

Sporton International Inc. Wensan Laboratory

No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.)



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History of this test report

Report No.	Version	Description	Issue Date
FR1N2541F	01	Initial issue of report	Aug. 16, 2022



Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.403(i)	6dB & 26dB Bandwidth	Pass	-
3.1	2.1049	99% Occupied Bandwidth	Reporting only	-
3.2	15.407(a)	Maximum Conducted Output Power	Pass	-
3.3	15.407(a)	Power Spectral Density	Pass	-
3.4	15.407(b)	Unwanted Emissions	Pass	4.46 dB under the limit at 5648.000 MHz
3.5	15.207	AC Conducted Emission	Pass	19.83 dB under the limit at 0.258 MHz
3.6	15.203 15.407(a)	Antenna Requirement	Pass	-

Declaration of Conformity:

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers. It's means measurement values may risk exceeding the limit of regulation standards, if measurement uncertainty is include in test results.
2. The measurement uncertainty please refer to this report "Uncertainty of Evaluation".

Comments and Explanations:

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

Reviewed by: Keven Cheng

Report Producer: Michelle Chen



1 General Description

1.1 Product Feature of Equipment Under Test

Product Feature	
Equipment	Tablet
Brand Name	Zebra
Model Name	ET45CA
FCC ID	UZ7ET45CA
EUT supports Radios application	GSM/EGPRS/WCDMA/HSPA/LTE/5G NR/NFC/GNSS WLAN 11a/b/g/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80 WLAN 11ax HE20/HE40/HE80 Bluetooth BR/EDR/LE Note: 2.4G doesn't support BW 40/80.
HW Version	EV2-2
SW Version	ET45-userdebug 11 11-10-12.00-RG-U00-PRD-GSE MXJ release-keys
MFD	10MAY22
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer.

Specification of Accessories				
Battery	Brand Name	Zebra	Model Name	BT-000455

Supported Unit Used in Test Configuration and System				
AC Adapter	Brand Name	Zebra	Part Number	PWR-WUA5V12W0US
Earphone 1	Brand Name	Zebra	Part Number	HDST-35MM-PTVP-01
Earphone 2	Brand Name	Zebra	Part Number	HDST-USBC-PTT1-01
USB Cable (Type C to Type A)	Brand Name	Zebra	Part Number	CBL-TC5X-USBC2A-01
Type C-Audio Cable (Type C to 3.5mm)	Brand Name	Zebra	Part Number	ADP-USBC-35MM1-01



1.2 Product Specification of Equipment Under Test

Product Specification is subject to this standard										
Tx/Rx Frequency Range	5745 MHz ~ 5825 MHz									
Maximum Output Power to Antenna <CDD Mode>	MIMO <Ant. 6+7> 802.11a: 22.98 dBm / 0.1986 W 802.11n HT20: 22.80 dBm / 0.1905 W 802.11n HT40: 23.03 dBm / 0.2009 W 802.11ac VHT20: 22.80 dBm / 0.1905 W 802.11ac VHT40: 23.03 dBm / 0.2009 W 802.11ac VHT80: 22.78 dBm / 0.1897 W 802.11ax HE20: 22.90 dBm / 0.1950 W 802.11ax HE40: 23.13 dBm / 0.2056 W 802.11ax HE80: 22.88 dBm / 0.1941 W									
Maximum Output Power to Antenna <TXBF Mode>	MIMO <Ant. 6+7> 802.11n HT20: 22.77 dBm / 0.1892 W 802.11n HT40: 22.94 dBm / 0.1968 W 802.11ax HE20: 22.87 dBm / 0.1936 W 802.11ax HE40: 23.04 dBm / 0.2014 W 802.11ax HE80: 22.94 dBm / 0.1968 W									
99% Occupied Bandwidth <CDD Mode>	MIMO<Ant. 6> 802.11a: 17.98 MHz 802.11ax HE20: 19.18 MHz 802.11ax HE40: 38.16 MHz 802.11ax HE80: 77.68 MHz MIMO<Ant. 7> 802.11a: 18.98 MHz 802.11ax HE20: 19.58 MHz 802.11ax HE40: 38.46 MHz 802.11ax HE80: 77.68 MHz									
99% Occupied Bandwidth <TXBF Mode>	MIMO <Ant. 6> 802.11ax HE20: 19.13 MHz 802.11ax HE40: 38.06 MHz 802.11ax HE80: 77.44 MHz MIMO <Ant. 7> 802.11ax HE20: 19.33 MHz 802.11ax HE40: 38.16 MHz 802.11ax HE80: 77.56 MHz									
Antenna Type / Gain	Ant. 6 : IFA Antenna type with gain 1.52 dBi Ant. 7 : IFA Antenna type with gain 1.72 dBi									
Type of Modulation	802.11a/n: OFDM (BPSK/QPSK/16QAM/64QAM) 802.11ac: OFDM (BPSK/QPSK/16QAM/64QAM/256QAM) 802.11ax: OFDMA (BPSK/QPSK/16QAM/64QAM/256QAM/1024QAM)									
Antenna Function Description	<table border="1"> <thead> <tr> <th></th> <th>Ant. 6</th> <th>Ant. 7</th> </tr> </thead> <tbody> <tr> <td>802.11 a/n/ac/ax MIMO</td> <td>V</td> <td>V</td> </tr> <tr> <td>802.11 n/ax TXBF</td> <td>V</td> <td>V</td> </tr> </tbody> </table>		Ant. 6	Ant. 7	802.11 a/n/ac/ax MIMO	V	V	802.11 n/ax TXBF	V	V
	Ant. 6	Ant. 7								
802.11 a/n/ac/ax MIMO	V	V								
802.11 n/ax TXBF	V	V								

Note:

1. MIMO Ant. 6+7 Directional Gain is a calculated result from MIMO Ant. 6 and MIMO Ant. 7. The formula used in calculation is documented in section 3.7.
2. Power of MIMO Ant. 6 + Ant. 7 is a calculated result from sum of the power MIMO Ant. 6 and MIMO Ant. 7.
3. The above EUT's information was declared by manufacturer. Please refer to Comments and Explanations in report summary.



1.3 Modification of EUT

No modifications made to the EUT during the testing.

1.4 Testing Location

Test Site	Sporton International Inc. Wensan Laboratory
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	Sporton Site No. TH05-HY, 03CH16-HY, CO07-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

FCC designation No.: TW3786

1.5 Applicable Standards

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

- ♦ FCC Part 15 Subpart E
- ♦ FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
- ♦ FCC KDB 414788 D01 Radiated Test Site v01r01.
- ♦ FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ♦ ANSI C63.10-2013

Remark:

1. All the test items were validated and recorded in accordance with the standards without any modification during the testing.
2. The TAF code is not including all the FCC KDB listed without accreditation.
3. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.



2 Test Configuration of Equipment Under Test

- a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, the measured emission level of the EUT was maximized by rotating the EUT on a turntable, adjusting the orientation of the EUT and EUT antenna in three orthogonal axis (X: flat, Y: portrait, Z: landscape), and adjusting the measurement antenna orientation, following C63.10 exploratory test procedures and find X plane as worst plane.
- b. AC power line Conducted Emission was tested under maximum output power.

2.1 Carrier Frequency and Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5725-5850 MHz Band 4 (U-NII-3)	149	5745	157	5785
	151*	5755	159*	5795
	153	5765	161	5805
	155#	5775	165	5825

Note:

1. The above Frequency and Channel with "*" are 802.11n HT40 and 802.11ac VHT40 and 802.11ax HE40.
2. The above Frequency and Channel with "#" are 802.11ac VHT80 and 802.11ax HE80.



2.2 Test Mode

The 802.11ax mode is investigated among different tones, full resource units (RU), partial resource units. The partial RU has no higher power than full RU's, thus the full RU is chosen as main test configuration.

The CDD mode is chosen as worst case configuration for all test cases due to higher power than SISO mode.

The 802.11n/ac mode has no higher power and PSD than 802.11ax mode, thus the 802.11ax mode is chosen as main test configuration, and the 802.11n/ac mode is verified the power.

The final test modes consider the modulation and the worst data rates as shown in the table below.

CDD Mode

Modulation	Data Rate
802.11a	6 Mbps
802.11n HT20 (Covered by HE20)	MCS0
802.11n HT40 (Covered by HE40)	MCS0
802.11ac VHT20 (Covered by HE20)	MCS0
802.11ac VHT40 (Covered by HE40)	MCS0
802.11ac VHT80 (Covered by HE80)	MCS0
802.11ax HE20	MCS0
802.11ax HE40	MCS0
802.11ax HE80	MCS0

Remark: The conducted power level of each chain in MIMO mode is equal or higher than SISO mode.

TXBF Mode

Modulation	Data Rate
802.11n HT20 (Covered by HE20)	MCS0
802.11n HT40 (Covered by HE40)	MCS0
802.11ax HE20	MCS0
802.11ax HE40	MCS0
802.11ax HE80	MCS0

Test Cases	
AC Conducted Emission	Mode 1 : WLAN (5GHz) Link + Bluetooth Link + USB Cable (Charging from AC Adapter)



Ch. #		Band IV : 5725-5850 MHz			
		802.11a	802.11ax HE20	802.11ax HE40	802.11ac VHT80
L	Low	149	149	151	-
M	Middle	157	157	-	155
H	High	165	165	159	-

Remark: For radiation spurious emission, the modulation and the data rate picked for testing are determined by the Max. RF conducted power.

<CDD Mode>

MIMO <Ant. 6+7>

802.11a RF Output Power (dBm)										
Power vs. Channel			Power vs Data Rate							
Channel	Frequency (MHz)	Data Rate (bps)	Channel	Data Rate (bps)						
		6M		9M	12M	18M	24M	36M	48M	54M
CH 149	5745	22.81	CH 157	22.88	22.88	22.88	22.83	22.78	22.78	22.78
CH 157	5785	22.98								
CH 165	5825	22.87								

802.11n HT20 RF Output Power (dBm)										
Power vs. Channel			Power vs Data Rate							
Channel	Frequency (MHz)	MCS Index	Channel	MCS Index						
		MCS0		MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 149	5745	22.75	CH 157	22.70	22.70	22.70	22.70	22.70	22.60	22.60
CH 157	5785	22.80								
CH 165	5825	22.71								

802.11n HT40 RF Output Power (dBm)										
Power vs. Channel			Power vs Data Rate							
Channel	Frequency (MHz)	MCS Index	Channel	MCS Index						
		MCS0		MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 151	5755	22.97	CH 159	22.93	22.93	22.83	22.83	22.83	22.77	22.77
CH 159	5795	23.03								

802.11ac VHT20 RF Output Power (dBm)											
Power vs. Channel			Power vs Data Rate								
Channel	Frequency (MHz)	MCS Index	Channel	MCS Index							
		MCS0		MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8
CH 149	5745	22.75	CH 157	22.70	22.70	22.70	22.70	22.70	22.60	22.60	22.50
CH 157	5785	22.80									
CH 165	5825	22.71									



802.11ac VHT40 RF Output Power (dBm)												
Power vs. Channel			Power vs Data Rate									
Channel	Frequency (MHz)	MCS Index	Channel	MCS Index								
		MCS0		MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
CH 151	5755	22.97	CH 159	22.93	22.93	22.87	22.83	22.83	22.83	22.83	22.83	22.83
CH 159	5795	23.03										

802.11ac VHT80 RF Output Power (dBm)												
Power vs. Channel			Power vs Data Rate									
Channel	Frequency (MHz)	MCS Index	Channel	MCS Index								
		MCS0		MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
CH 155	5775	22.78	CH 155	22.68	22.68	22.68	22.64	22.58	22.58	22.58	22.58	22.58

802.11ax HE20 RF Output Power (dBm)													
Power vs. Channel				Power vs Data Rate									
Channel	Frequency (MHz)	RU Config.	MCS Index	Channel	MCS Index								
			MCS0		MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
CH 149	5745	Full	22.85	CH 157	22.80	22.80	22.74	22.74	22.74	22.70	22.70	22.70	22.70
CH 149	5745	26/0	15.32										
CH 149	5745	52/37	17.94										
CH 149	5745	106/53	20.97										
CH 157	5785	Full	22.90										
CH 157	5785	26/4	15.65										
CH 157	5785	52/38	17.87										
CH 157	5785	106/53	20.55										
CH 157	5785	Full	22.77										
CH 157	5785	26/8	14.78										
CH 157	5785	52/40	17.64										
CH 165	5825	106/54	20.68										

802.11ax HE40 RF Output Power (dBm)													
Power vs. Channel				Power vs Data Rate									
Channel	Frequency (MHz)	RU Config.	MCS Index	Channel	MCS Index								
			MCS0		MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
CH 151	5755	Full	23.07	CH 159	23.03	23.03	23.03	22.93	22.93	22.93	22.93	22.88	22.88
CH 151	5755	242/61	20.98										
CH 159	5795	Full	23.13										
CH 159	5795	242/62	20.68										

802.11ax HE80 RF Output Power (dBm)													
Power vs. Channel				Power vs Data Rate									
Channel	Frequency (MHz)	RU Config.	MCS Index	Channel	MCS Index								
			MCS0		MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
CH 155	5775	Full	22.88	CH 155	22.78	22.78	22.78	22.74	22.68	22.68	22.68	22.68	22.68
CH 155	5775	484/65	20.35										
CH 155	5775	484/66	20.24										



<TXBF Mode>
MIMO <Ant. 6+7>

802.11n HT20 RF Output Power (dBm)											
Power vs. Channel				Power vs Data Rate							
Channel	Frequency (MHz)	MCS Index		Channel	MCS Index						
		MCS0			MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 149	5745	22.77		CH 149	22.67	22.67	22.67	22.62	22.62	22.57	22.52
CH 157	5785	22.77									
CH 165	5825	22.55									

802.11n HT40 RF Output Power (dBm)											
Power vs. Channel				Power vs Data Rate							
Channel	Frequency (MHz)	MCS Index		Channel	MCS Index						
		MCS0			MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 151	5755	22.94		CH 151	22.84	22.84	22.84	22.80	22.74	22.74	22.74
CH 159	5795	22.71									

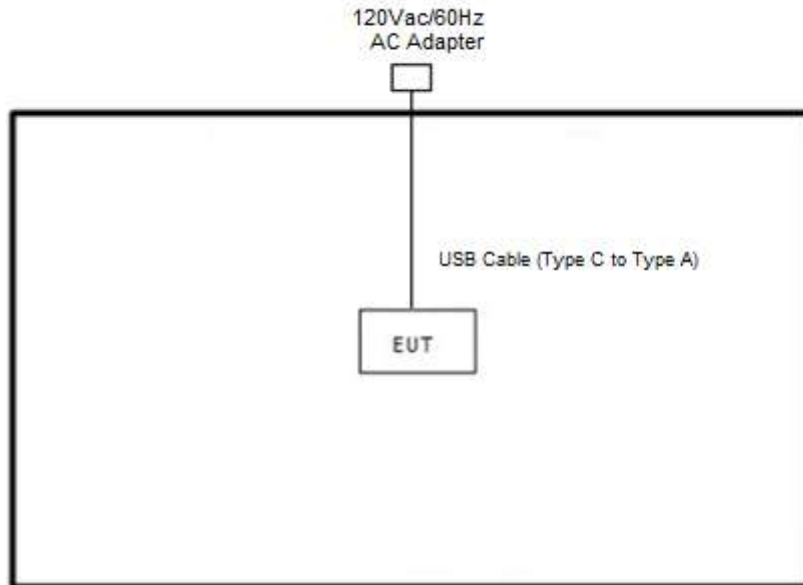
802.11ax HE20 RF Output Power (dBm)														
Power vs. Channel				Power vs Data Rate										
Channel	Frequency (MHz)	RU Config.	MCS Index		Channel	MCS Index								
			MCS0			MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
CH 149	5745	Full	22.87		CH 149	22.77	22.77	22.67	22.67	22.67	22.67	22.67	22.67	22.67
CH 157	5785	Full	22.87											
CH 165	5825	Full	22.65											

802.11ax HE40 RF Output Power (dBm)																
Power vs. Channel				Power vs Data Rate												
Channel	Frequency (MHz)	RU Config.	MCS Index		Channel	MCS Index										
			MCS0			MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9	MCS10	MCS11
CH 151	5755	Full	23.04		CH 151	22.94	22.94	22.94	22.88	22.90	22.90	22.90	22.80	22.80	22.80	22.80
CH 159	5795	Full	22.81													

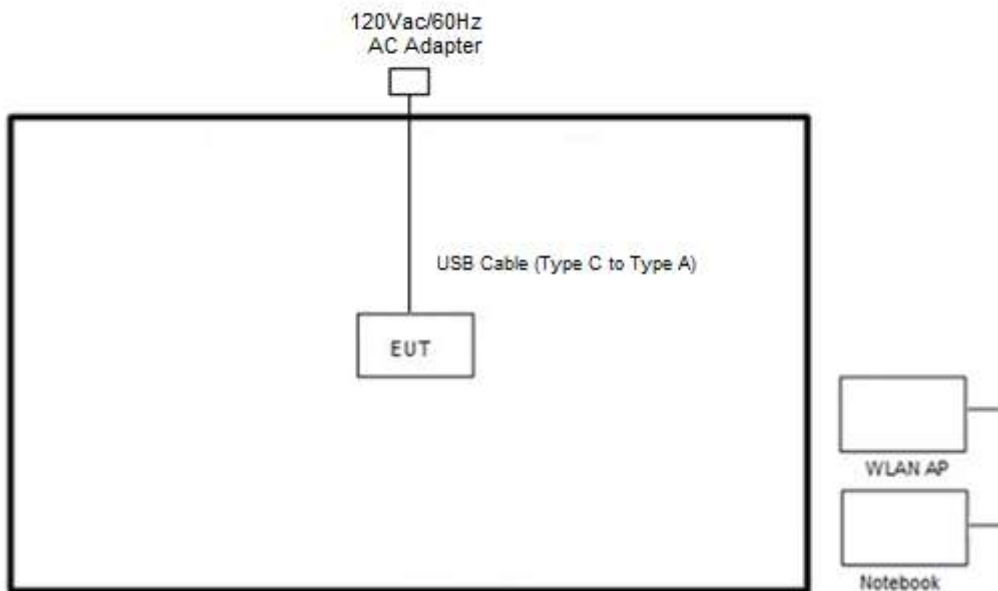
802.11ax HE80 RF Output Power (dBm)																
Power vs. Channel				Power vs Data Rate												
Channel	Frequency (MHz)	RU Config.	MCS Index		Channel	MCS Index										
			MCS0			MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9	MCS10	MCS11
CH 155	5775	Full	22.94		CH 155	22.84	22.84	22.78	22.78	22.80	22.74	22.74	22.80	22.80	22.74	22.78

2.3 Connection Diagram of Test System

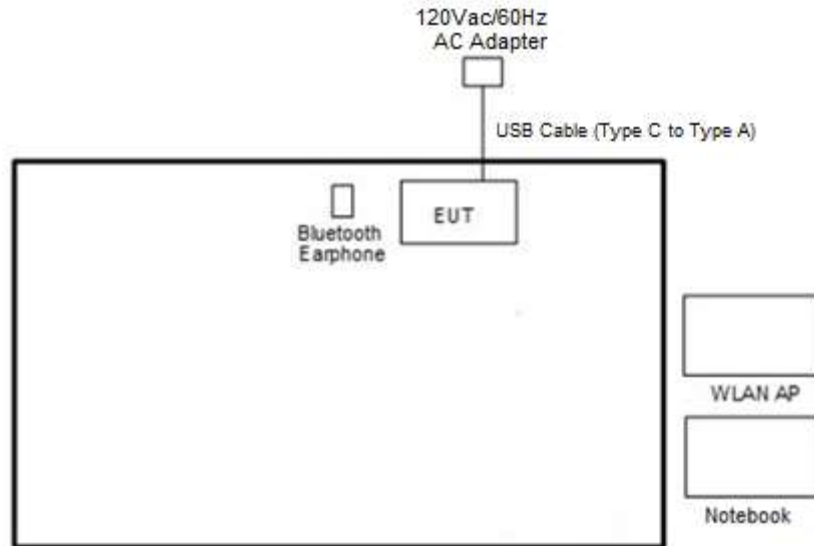
<CDD Mode>



<TXBF Mode>



<AC Conducted Emission Mode>



2.4 Support Unit used in test configuration and system

Item	Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Bluetooth Earphone	Kinyo	BTE-3622	N/A	N/A	N/A
2.	WLAN AP	ASUS	RT-AC58	N/A	N/A	Unshielded, 1.8m
3.	WLAN AP	ASUS	RT-AX88U	LCITHP000236	N/A	Unshielded, 1.8m
4.	Notebook	Dell	P79G	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
5.	Notebook	Lenovo	L570	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m



2.5 EUT Operation Test Setup

The RF test items, utility “cmd.exe (10.0.17763.1577)” was installed in Notebook which was programmed in order to make the EUT get into the engineering modes to provide channel selection, power level, data rate and the application type and for continuous transmitting signals.

For TXBF mode, the modulation modes and data rates manipulated by the command lines in the engineering program made the EUT link to another EUT by power under the normal operation. The “cmd.exe (10.0.17763.1577)” software tool was used to enable the EUT to transmit signals continuously.

2.6 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example :

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 4.2 dB and 10 dB attenuator.

$$\begin{aligned} \text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)}. \\ &= 4.2 + 10 = 14.2 \text{ (dB)} \end{aligned}$$

3 Test Result

3.1 6dB and 26dB and 99% Occupied Bandwidth Measurement

3.1.1 Description of 6dB and 26dB and 99% Occupied Bandwidth

The minimum 6 dB bandwidth shall be at least 500 kHz.

26dB and 99% Occupied bandwidth are reporting only.

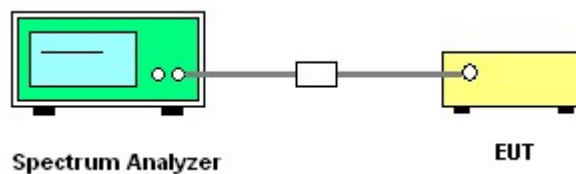
3.1.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.1.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01. Section C) Emission bandwidth for the band 5.725-5.85 GHz
2. Set RBW = 100 kHz.
3. Set the VBW $\geq 3 \times$ RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. Measure the maximum width of the emission that is 6 dB down from the peak of the emission.
7. Measure and record the results in the test report.

3.1.4 Test Setup





3.1.5 Test Result of 6dB and 26dB and 99% Occupied Bandwidth

Test Engineer :	Eason Huang	Temperature :	21~25°C
		Relative Humidity :	51~54%

<CDD Mode>

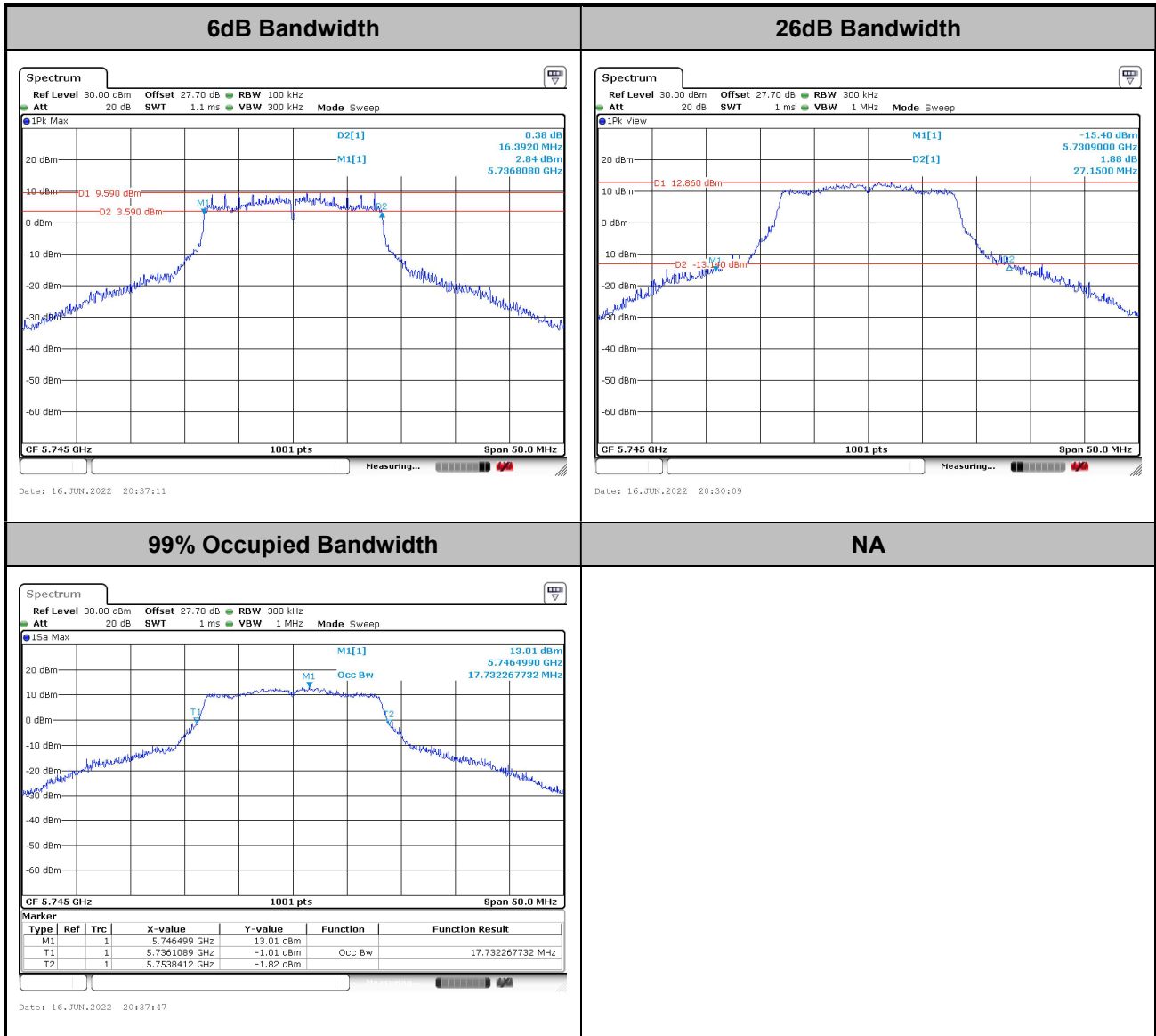
Band IV MIMO												
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Bandwidth (MHz)		26dB Bandwidth (MHz)		6 dB Bandwidth (MHz)		6 dB Bandwidth Min. Limit (MHz)	Pass/Fail
					Ant 6	Ant 7	Ant 6	Ant 7	Ant 6	Ant 7		
11a	6Mbps	2	149	5745	17.73	18.53	27.15	34.60	16.39	16.44	0.5	Pass
11a	6Mbps	2	157	5785	17.98	18.98	30.85	31.85	16.39	16.39	0.5	Pass
11a	6Mbps	2	165	5825	17.58	18.33	28.10	31.30	16.44	16.44	0.5	Pass

Band IV MIMO													
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	RU Config.	99% Bandwidth (MHz)		26dB Bandwidth (MHz)		6 dB Bandwidth (MHz)		6 dB Bandwidth Min. Limit (MHz)	Pass/Fail
						Ant 6	Ant 7	Ant 6	Ant 7	Ant 6	Ant 7		
HE20	MCS0	2	149	5745	Full	19.13	19.53	22.65	30.65	18.84	18.64	0.5	Pass
HE20	MCS0	2	157	5785	Full	19.18	19.58	30.95	33.50	18.19	18.29	0.5	Pass
HE20	MCS0	2	165	5825	Full	19.08	19.33	30.90	31.65	18.79	18.74	0.5	Pass
HE40	MCS0	2	151	5755	Full	38.16	38.46	43.74	56.25	38.14	37.87	0.5	Pass
HE40	MCS0	2	159	5795	Full	38.06	38.36	43.65	53.73	37.87	37.69	0.5	Pass
HE80	MCS0	2	155	5775	Full	77.68	77.68	147.56	132.80	77.88	77.72	0.5	Pass



<CDD Modes>

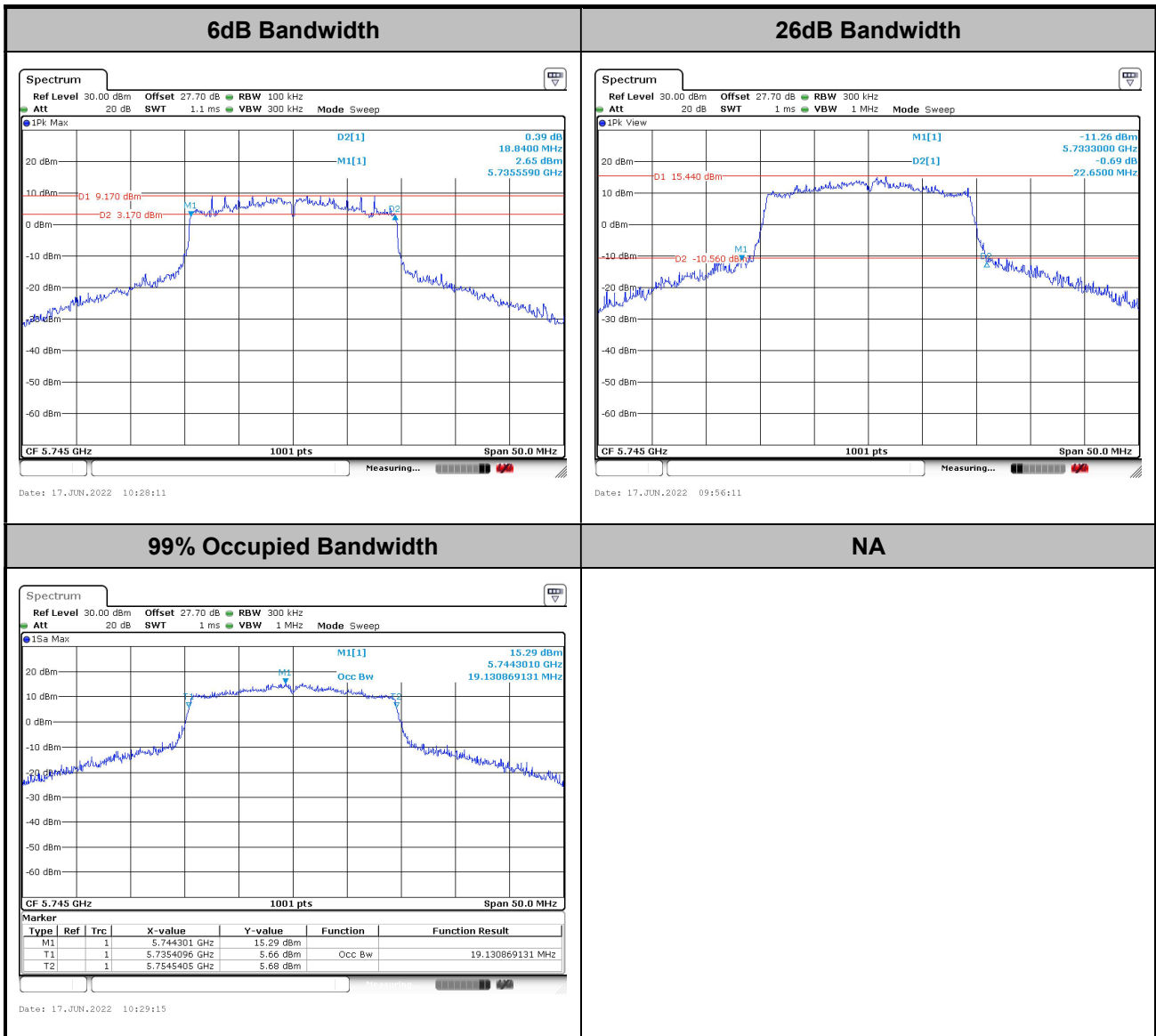
<802.11a>



Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.



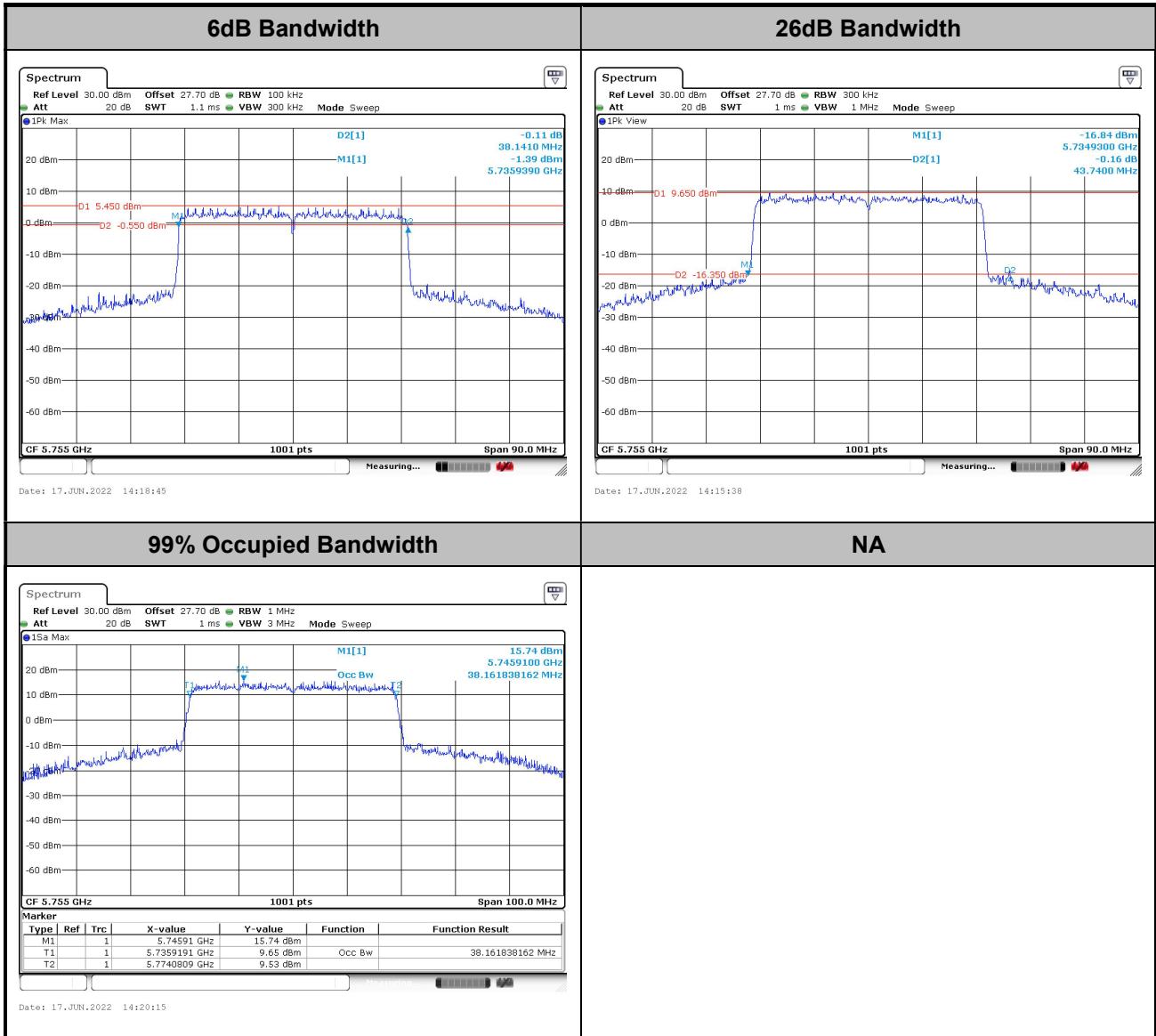
<802.11ax HE20>



Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.



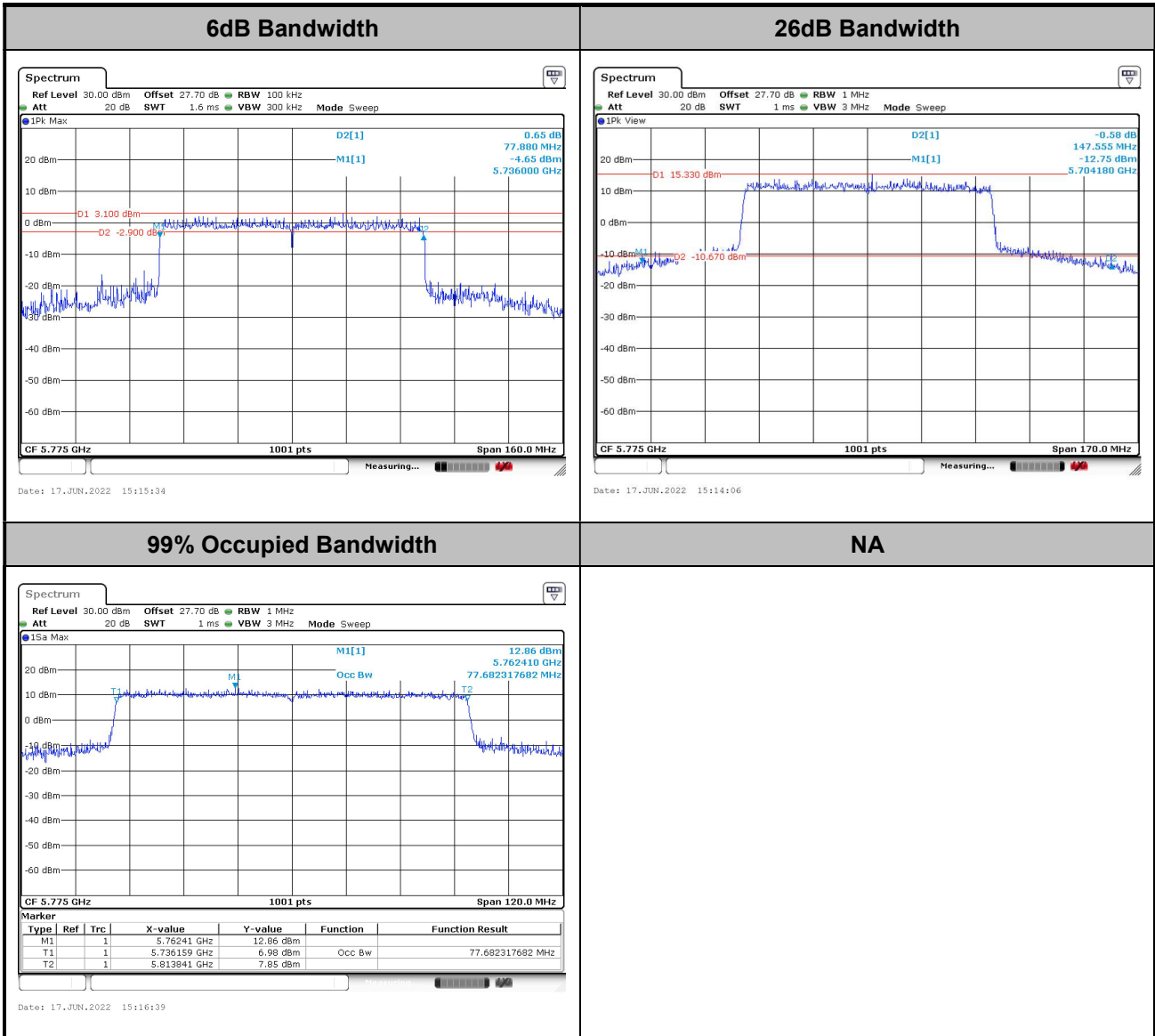
<802.11ax HE40>



Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.



<802.11ax HE80>



Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

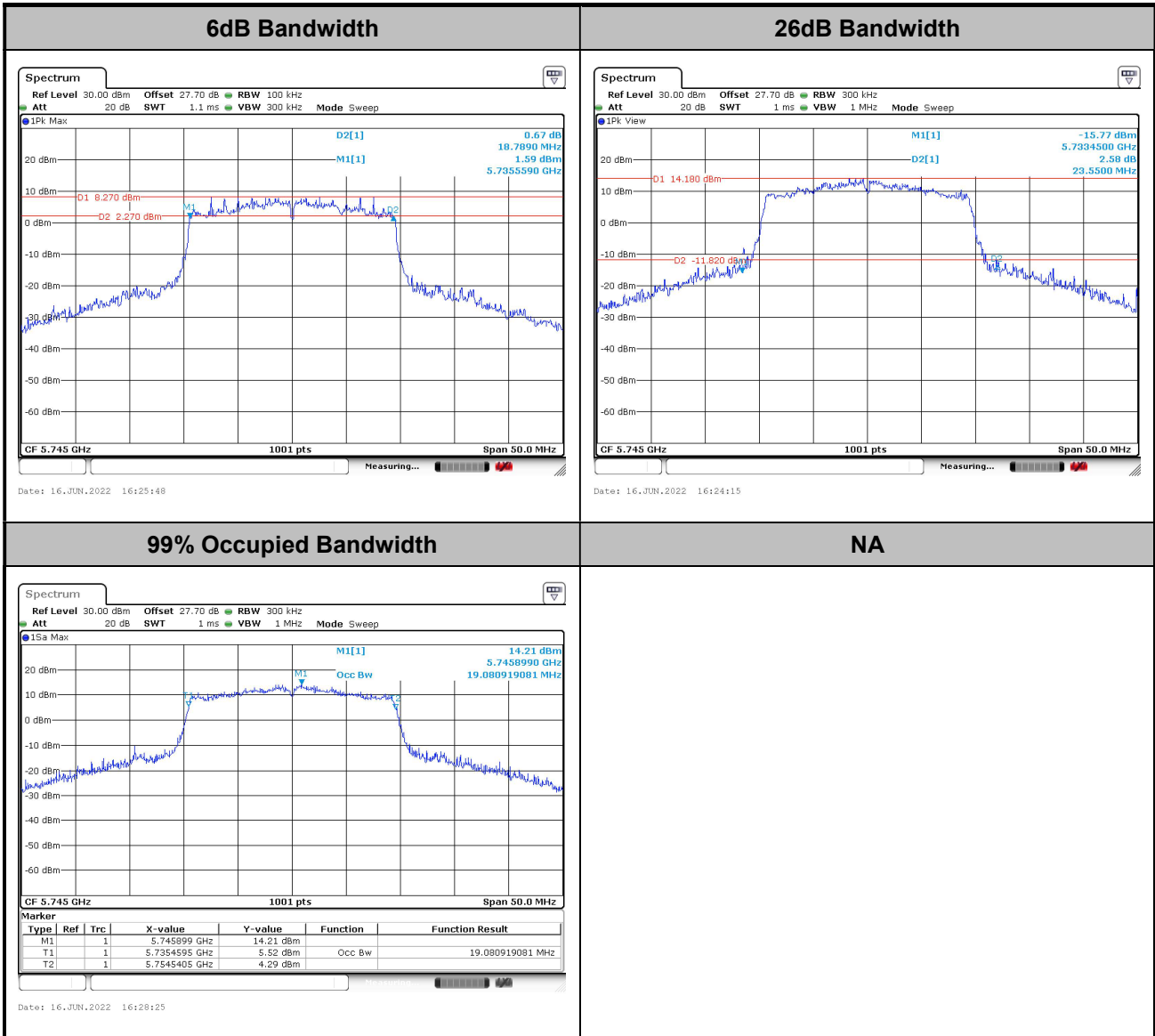


<TXBF Mode>

Band IV MIMO													
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	RU Config.	99% Bandwidth (MHz)		26dB Bandwidth (MHz)		6 dB Bandwidth (MHz)		6 dB Bandwidth Min. Limit (MHz)	Pass/Fail
						Ant 6	Ant 7	Ant 6	Ant 7	Ant 6	Ant 7		
HE20	MCS0	2	149	5745	Full	19.08	19.18	23.55	29.95	18.78	18.19	0.5	Pass
HE20	MCS0	2	157	5785	Full	19.13	19.33	23.55	30.55	18.49	18.38	0.5	Pass
HE20	MCS0	2	165	5825	Full	19.08	19.28	22.20	32.00	18.29	18.54	0.5	Pass
HE40	MCS0	2	151	5755	Full	38.06	38.16	40.14	55.44	37.87	37.78	0.5	Pass
HE40	MCS0	2	159	5795	Full	37.96	38.16	42.57	48.24	37.78	37.69	0.5	Pass
HE80	MCS0	2	155	5775	Full	77.44	77.56	85.76	121.60	77.88	77.88	0.5	Pass



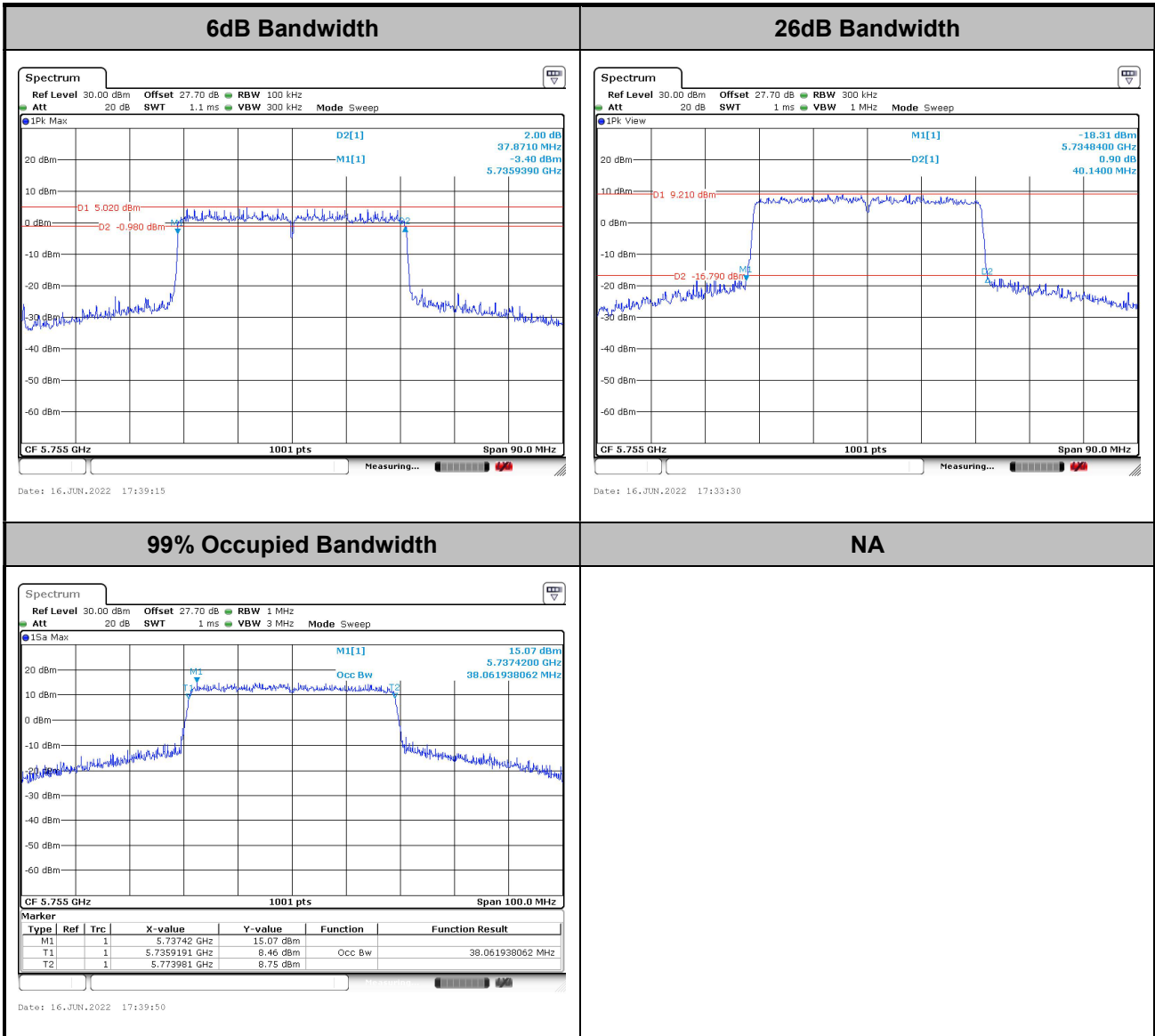
<802.11ax HE20>



Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.



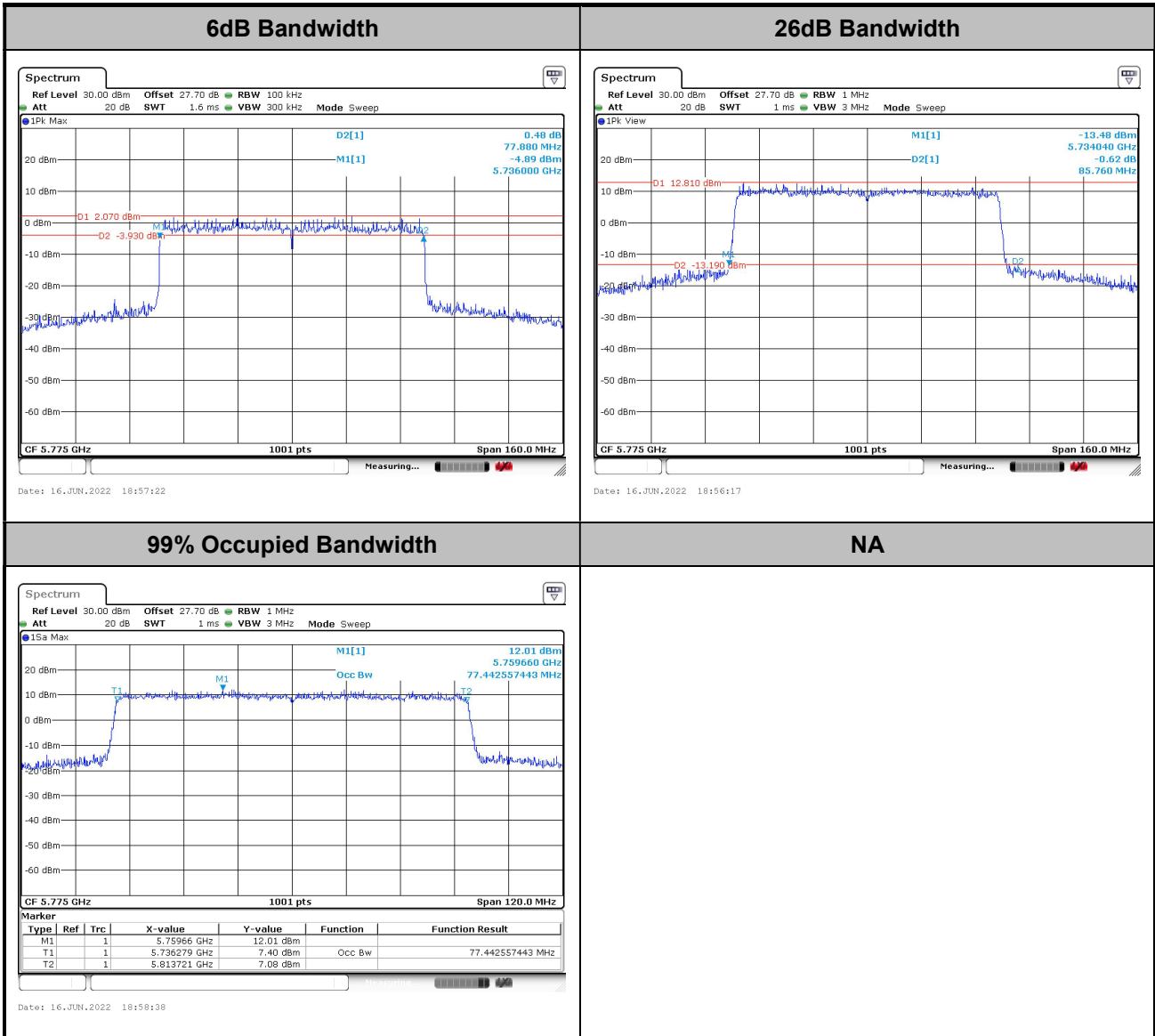
<802.11ax HE40>



Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.



<802.11ax HE80>



Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

3.2 Maximum Conducted Output Power Measurement

3.2.1 Limit of Maximum Conducted Output Power

For the band 5.725–5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.2.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

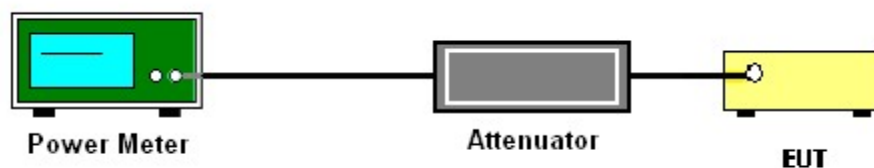
3.2.3 Test Procedures

The testing follows Method PM-G of FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

Method PM-G (Measurement using a gated RF average power meter):

1. Measurement is performed using a wideband RF power meter.
2. The EUT is configured to transmit at its maximum power control level.
3. Measure the average power of the transmitter.
4. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.
5. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01

3.2.4 Test Setup





3.2.5 Test Result of Maximum Conducted Output Power

Test Engineer :	Eason Huang	Temperature :	21~25°C
		Relative Humidity :	51~54%

<CDD Mode>

Band IV MIMO												
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)			FCC Conducted Power Limit (dBm)		DG (dBi)		Pass/Fail
					Ant 6	Ant 7	SUM	Ant 6	Ant 7	Ant 6	Ant 7	
11a	6Mbps	2	149	5745	19.10	20.40	22.81	30.00		1.72		Pass
11a	6Mbps	2	157	5785	19.50	20.40	22.98	30.00		1.72		Pass
11a	6Mbps	2	165	5825	19.10	20.50	22.87	30.00		1.72		Pass
HT20	MCS0	2	149	5745	19.10	20.30	22.75	30.00		1.72		Pass
HT20	MCS0	2	157	5785	19.20	20.30	22.80	30.00		1.72		Pass
HT20	MCS0	2	165	5825	19.00	20.30	22.71	30.00		1.72		Pass
HT40	MCS0	2	151	5755	19.60	20.30	22.97	30.00		1.72		Pass
HT40	MCS0	2	159	5795	19.60	20.40	23.03	30.00		1.72		Pass
VHT20	MCS0	2	149	5745	19.10	20.30	22.75	30.00		1.72		Pass
VHT20	MCS0	2	157	5785	19.20	20.30	22.80	30.00		1.72		Pass
VHT20	MCS0	2	165	5825	19.00	20.30	22.71	30.00		1.72		Pass
VHT40	MCS0	2	151	5755	19.60	20.30	22.97	30.00		1.72		Pass
VHT40	MCS0	2	159	5795	19.60	20.40	23.03	30.00		1.72		Pass
VHT80	MCS0	2	155	5775	19.30	20.20	22.78	30.00		1.72		Pass



Band IV MIMO													
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	RU Config.	Average Conducted Power (dBm)			FCC Conducted Power Limit (dBm)		DG (dBi)		Pass/Fail
						Ant 6	Ant 7	SUM	Ant 6	Ant 7	Ant 6	Ant 7	
HE20	MCS0	2	149	5745	Full	19.20	20.40	22.85	30.00		1.72	Pass	
HE20	MCS0	2	149	5745	26/0	11.50	13.00	15.32	30.00		1.72	Pass	
HE20	MCS0	2	149	5745	52/37	14.00	15.70	17.94	30.00		1.72	Pass	
HE20	MCS0	2	149	5745	106/53	17.20	18.60	20.97	30.00		1.72	Pass	
HE20	MCS0	2	157	5785	Full	19.30	20.40	22.90	30.00		1.72	Pass	
HE20	MCS0	2	157	5785	26/4	12.00	13.20	15.65	30.00		1.72	Pass	
HE20	MCS0	2	157	5785	52/38	14.10	15.50	17.87	30.00		1.72	Pass	
HE20	MCS0	2	157	5785	106/53	16.90	18.10	20.55	30.00		1.72	Pass	
HE20	MCS0	2	165	5825	Full	19.00	20.40	22.77	30.00		1.72	Pass	
HE20	MCS0	2	165	5825	26/8	10.90	12.50	14.78	30.00		1.72	Pass	
HE20	MCS0	2	165	5825	52/40	13.70	15.40	17.64	30.00		1.72	Pass	
HE20	MCS0	2	165	5825	106/54	16.80	18.40	20.68	30.00		1.72	Pass	
HE40	MCS0	2	151	5755	Full	19.70	20.40	23.07	30.00		1.72	Pass	
HE40	MCS0	2	151	5755	242/61	17.50	18.40	20.98	30.00		1.72	Pass	
HE40	MCS0	2	159	5795	Full	19.70	20.50	23.13	30.00		1.72	Pass	
HE40	MCS0	2	159	5795	242/62	17.20	18.10	20.68	30.00		1.72	Pass	
HE80	MCS0	2	155	5775	Full	19.40	20.30	22.88	30.00		1.72	Pass	
HE80	MCS0	2	155	5775	484/65	16.70	17.90	20.35	30.00		1.72	Pass	
HE80	MCS0	2	155	5775	484/66	16.70	17.70	20.24	30.00		1.72	Pass	



<TXBF Mode>

Band IV MIMO												
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)			FCC Conducted Power Limit (dBm)		DG (dBi)		Pass/Fail
					Ant 6	Ant 7	SUM	Ant 6	Ant 7	Ant 6	Ant 7	
HT20	MCS0	2	149	5745	19.40	20.10	22.77	30.00		4.63	Pass	
HT20	MCS0	2	157	5785	19.40	20.10	22.77	30.00		4.63	Pass	
HT20	MCS0	2	165	5825	18.90	20.10	22.55	30.00		4.63	Pass	
HT40	MCS0	2	151	5755	19.40	20.40	22.94	30.00		4.63	Pass	
HT40	MCS0	2	159	5795	19.00	20.30	22.71	30.00		4.63	Pass	

Band IV MIMO													
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	RU Config.	Average Conducted Power (dBm)			FCC Conducted Power Limit (dBm)		DG (dBi)		Pass/Fail
						Ant 6	Ant 7	SUM	Ant 6	Ant 7	Ant 6	Ant 7	
HE20	MCS0	2	149	5745	Full	19.50	20.20	22.87	30.00		4.63	Pass	
HE20	MCS0	2	157	5785	Full	19.50	20.20	22.87	30.00		4.63	Pass	
HE20	MCS0	2	165	5825	Full	19.00	20.20	22.65	30.00		4.63	Pass	
HE40	MCS0	2	151	5755	Full	19.50	20.50	23.04	30.00		4.63	Pass	
HE40	MCS0	2	159	5795	Full	19.10	20.40	22.81	30.00		4.63	Pass	
HE80	MCS0	2	155	5775	Full	19.40	20.40	22.94	30.00		4.63	Pass	



3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

For the band 5.725–5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.3.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.3.3 Test Procedures

The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01. Section F) Maximum power spectral density.

Method SA-3

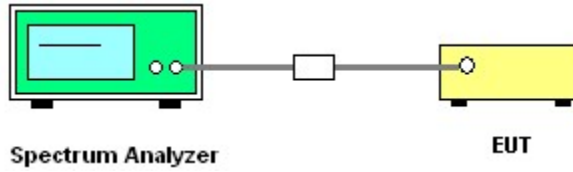
(power averaging (rms) detection with max hold):

- Set span to encompass the entire emission bandwidth (EBW) of the signal.
 - Set RBW = 300 kHz.
 - Set VBW \geq 1 MHz.
 - Number of points in sweep \geq 2 Span / RBW.
 - Add $10 \log(500 \text{ kHz/RBW})$ to the measured result, whereas RBW (<500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement
 - Sweep time \leq (number of points in sweep) \times T, when duty cycle is less than 98 percent where T is 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.
Detector = power averaging (rms).
 - Trace mode = max hold.
 - Allow max hold to run for at least 60 seconds, or longer as needed to allow the trace to stabilize.
1. The RF output of EUT is connected to the spectrum analyzer by a low loss cable.
 2. Each plot has already offset with cable loss, and attenuator loss. Measure the PPSD and record it.
 3. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

Method (c): Measure and add $10 \log(N_{\text{ANT}})$ dB.

With this technique, spectrum measurements are performed at each output of the device, but rather than summing the spectra or the spectral peaks across the outputs, the quantity $10 \log(N_{\text{ANT}})$ dB is added to each spectrum value before comparing to the emission limit. The addition of $10 \log(N_{\text{ANT}})$ dB serves to apportion the emission limit among the N_{ANT} outputs so that each output is permitted to contribute no more than $1/N_{\text{ANT}}^{\text{th}}$ of the PSD limit.

3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

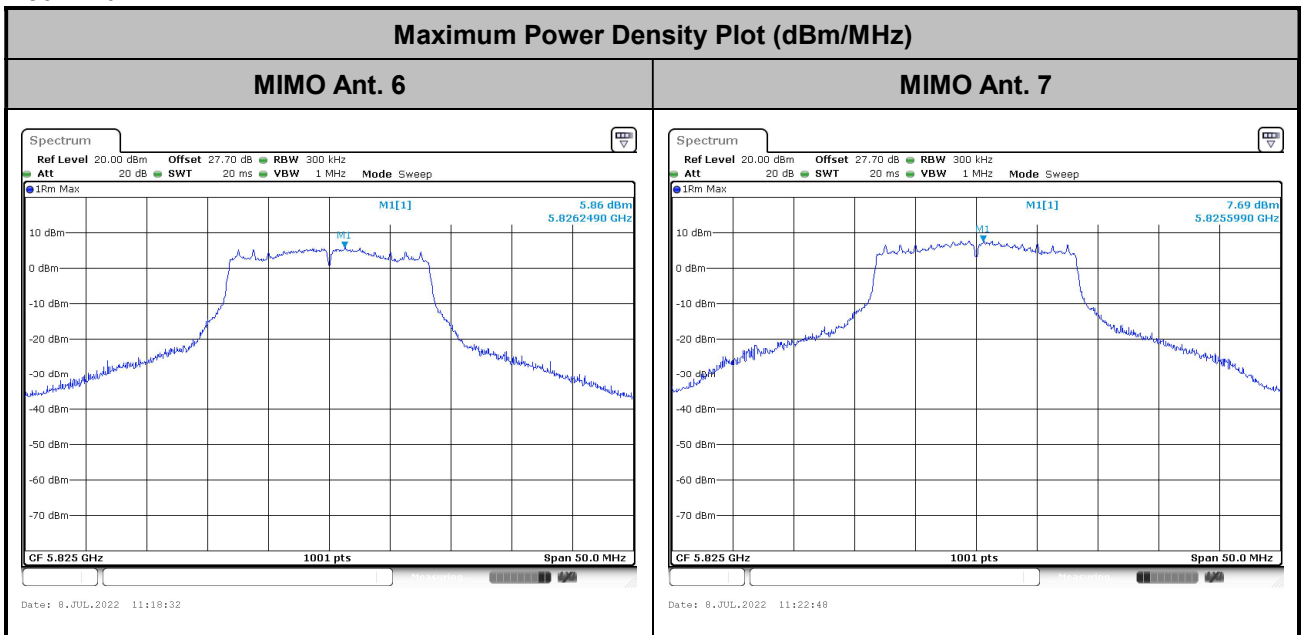
Test Engineer :	Eason Huang	Temperature :	21~25°C
		Relative Humidity :	51~54%

<CDD Mode>

Band IV MIMO														
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	10log (500kHz /RBW) Factor (dB)		Average Power Density (dBm/500kHz)			Average PSD Limit (dBm/500kHz)		DG (dBi)		Pass /Fail
					Ant 6	Ant 7	Ant 6	Ant 7	SUM	Ant 6	Ant 7	Ant 6	Ant 7	
11a	6Mbps	2	149	5745	2.22	8.18	9.62	12.63	30.00	4.63	Pass			
11a	6Mbps	2	157	5785	2.22	8.46	9.31	12.32	30.00	4.63	Pass			
11a	6Mbps	2	165	5825	2.22	8.08	9.91	12.92	30.00	4.63	Pass			

Note: PSD Sum = Max PSD (Ant. 6, Ant. 7) + 10 log (n)

<802.11a>





<802.11ax Mode>

Band IV MIMO															
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	RU Config.	10log (500kHz /RBW) Factor (dB)		Average Power Density (dBm/500kHz)			Average PSD Limit (dBm/500kHz)		DG (dBi)		Pass /Fail
						Ant 6	Ant 7	Ant 6	Ant 7	SUM	Ant 6	Ant 7	Ant 6	Ant 7	
HE20	MCS0	2	149	5745	Full	2.22	8.03	9.81	12.82	30.00	4.63	Pass			
HE20	MCS0	2	149	5745	26/0	2.22	7.79	9.75	12.76	30.00	4.63	Pass			
HE20	MCS0	2	149	5745	52/37	2.22	7.77	9.63	12.64	30.00	4.63	Pass			
HE20	MCS0	2	149	5745	106/53	2.22	7.72	9.55	12.56	30.00	4.63	Pass			
HE20	MCS0	2	157	5785	Full	2.22	8.31	9.46	12.47	30.00	4.63	Pass			
HE20	MCS0	2	157	5785	26/4	2.22	7.95	9.29	12.30	30.00	4.63	Pass			
HE20	MCS0	2	157	5785	52/38	2.22	7.93	9.25	12.26	30.00	4.63	Pass			
HE20	MCS0	2	157	5785	106/53	2.22	7.86	9.12	12.13	30.00	4.63	Pass			
HE20	MCS0	2	165	5825	Full	2.22	8.32	9.44	12.45	30.00	4.63	Pass			
HE20	MCS0	2	165	5825	26/8	2.22	7.90	9.29	12.30	30.00	4.63	Pass			
HE20	MCS0	2	165	5825	52/40	2.22	7.79	9.39	12.40	30.00	4.63	Pass			
HE20	MCS0	2	165	5825	106/54	2.22	8.18	9.26	12.27	30.00	4.63	Pass			
HE40	MCS0	2	151	5755	Full	2.22	5.17	5.93	8.94	30.00	4.63	Pass			
HE40	MCS0	2	151	5755	242/61	2.22	4.92	5.90	8.91	30.00	4.63	Pass			
HE40	MCS0	2	159	5795	Full	2.22	5.28	6.18	9.19	30.00	4.63	Pass			
HE40	MCS0	2	159	5795	242/62	2.22	5.27	6.02	9.03	30.00	4.63	Pass			
HE80	MCS0	2	155	5775	Full	2.22	-0.44	3.27	6.28	30.00	4.63	Pass			
HE80	MCS0	2	155	5775	484/65	2.22	-0.53	2.86	5.87	30.00	4.63	Pass			
HE80	MCS0	2	155	5775	484/66	2.22	-0.46	3.03	6.04	30.00	4.63	Pass			

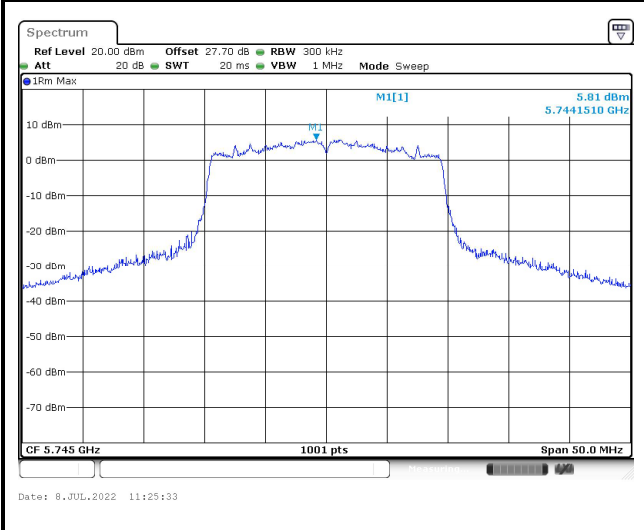
Note: PSD Sum = Max PSD (Ant. 6, Ant. 7) + 10 log (n)



<802.11ax HE20>

Maximum Power Density Plot (dBm/MHz)

MIMO Ant. 6



MIMO Ant. 7

