FCC RADIO TEST REPORT

FCC ID	:	**UZ7EM45A1**
Equipment	:	**Enterprise Mobile**
Brand Name	:	**Zebra**
Model Name	:	**EM45A1**
Applicant	:	**Zebra Technologies Corporation** **3 Overlook Point, Lincolnshire, IL 60069 USA**
Manufacturer	:	**Zebra Technologies Corporation** **3 Overlook Point, Lincolnshire, IL 60069 USA**
Standard	:	**FCC Part 15 Subpart E §15.407**

The product was received on Oct. 04, 2024 and testing was performed from Oct. 08, 2024 to Feb. 07, 2025. We, Sporton International Inc. EMC & Wireless Communications 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 partial report apply exclusively to the tested model / sample. Without written approval from Sporton International Inc. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Louis Wu

Approved by: Louis Wu

Sporton International Inc. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)

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History of this test report

Report No.	Version	Description	Issue Date
FR460408-02	01	Initial issue of report	Jan. 22, 2025
FR460408-02	02	Revise test data This report is an updated version, replacing the report issued on Jan. 22, 2025.	Feb. 10, 2025

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
2.1	15.407 KDB 987594 D02 Section II. L.	Proper Power Adjustment, Client Devices Connected to a Standard Power Access Point(APC)	Pass	-
2.2	15.407 KDB 987594 D02 Section II. K.	Dual Client Test, Demonstration of Proper Power Adjustment based on Associated AP	Pass	-

Conformity Assessment Condition:
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.
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: Wei Chen

Report Producer: Ming Chen

1 General Description

1.1 Product Feature of Equipment Under Test

Product Feature	
Equipment	Enterprise Mobile
Brand Name	Zebra
Model Name	EM45A1
FCC ID	UZ7EM45A1
EUT supports Radios application	WCDMA/HSPA/LTE/5G NR/ RFID UHF/GNSS/NFC WLAN 11a/b/g/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80/VHT160 WLAN 11ax HE20/HE40/HE80/HE160 Bluetooth BR/EDR/LE
HW Version	DV
SW Version	14-24-09.00-UG-U00-PRD-ATH-04
MFD	09DEC24
EUT Stage	Identical Prototype

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

Specification of Accessories				
AC Adapter 1 (Type C Wall Charger 1)	**Brand Name**	Zebra	**Model Name**	SAWA-102-22520A
			Part Number	PWR-WUA5V45W1US
AC Adapter 2 (Type A Wall Charger 2)	**Brand Name**	Zebra	**Model Name**	SAWA-65-20005A
			Part Number	PWR-WUA5V12W0US
Battery	**Brand Name**	Zebra	**Model Name**	BT-000501
			Part Number	BT-000501-2000
Earphone 1 (Wired headset USB-C)	**Brand Name**	Zebra	**Part Number**	HDST-USBC-PTT1-01
Earphone 2 (Rugged Bluetooth Headset)	**Brand Name**	Zebra	**Part Number**	HS3100-OTH
Earphone 3 (3.5mm PTT Headset)	**Brand Name**	Zebra	**Part Number**	HDST-35MM-PTT1-02
Earphone 4 (Rugged Headset)	**Brand Name**	Zebra	**Part Number**	HS2100-OTH
3.5mm to 3.5mm audio connector	**Brand Name**	Zebra	**Part Number**	CBL-HS2100-3MS1-01
Type C-Audio Cable (Type C to 3.5mm)	**Brand Name**	Zebra	**Part Number**	ADP-USBC-35MM1-01
USB Cable 1 (USB-C to C Cable)	**Brand Name**	Zebra	**Part Number**	CBL-EC5X-USBC3A-01
USB Cable 2 (USB-A to C Cable)	**Brand Name**	Zebra	**Part Number**	CBL-TC5X-USBC2A-01
EM45 Protective Case	**Brand Name**	Zebra	**Part Number**	SG-EM45EXO2-01

1.2 Product Specification of Equipment Under Test

Product Specification is subject to this standard	
Tx/Rx Channel Frequency Range	5925 MHz ~ 6425 MHz 6525 MHz ~ 6875 MHz
Antenna Type / Gain	**<5925 MHz ~ 6425 MHz>** <Ant. 8>: Monopole Antenna with gain 0.35 dBi <Ant. 10>: Monopole Antenna with gain -0.85 dBi **<6525 MHz ~ 6875 MHz>** <Ant. 8>: Monopole Antenna with gain 1.02 dBi <Ant. 10>: Monopole Antenna with gain 0.16 dBi
Type of Modulation	802.11a : OFDM (BPSK/QPSK/16QAM/64QAM) 802.11ax : OFDMA (BPSK/QPSK/16QAM/64QAM/256QAM/1024QAM)

Remark: The EUT's information above is declared by manufacturer. Please refer to Disclaimer 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. EMC & Wireless Communications Laboratory
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333 TEL: +886-3-327-3456 FAX: +886-3-328-4978
Test Site No.	**Sporton Site No.**
	DF02-HY
Temperature	22.1~24.1 ℃
Humidity	45.3~50.4 %
Test Engineer	Ray Wang

FCC designation No.: TW1190

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 987594 D02 U-NII 6 GHz EMC Measurement v03
- 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.

2 Test Result

2.1 Proper Power Adjustment, Client Devices Connected to a Standard Power Access Point (APC)

2.1.1 Limit of Standard Client Proper Power Adjustment

15.407 KDB 987594 D02 Section II. L. Power limits for standard client devices

c) The maximum power limits shall remain at least 6 dB below the power levels authorized for the associated standard-power access point

2.1.2 Test Procedures of Standard Client Proper Power Adjustment

The testing follows FCC KDB 987594 D02 U-NII 6 GHz EMC Measurement v3.

Section L. Proper Power Adjustment

2.1.3 Proper Power Adjustment, Client Devices Connected to a Standard Power Access Point

A client device that connects to a Standard Power AP must limit its power to a minimum of 6 dB lower than its associated Standard Power access point's authorized transmit power. The term "authorized" means the AFC-approved power level for the AP to use on a particular channel.

Test procedure to show that the client device can lower its power accordingly.

2.1.4 Test Procedure:

1. Connect equipment as shown in Figure 7 below.
2. Adjust Atten 1 to Std Power AP so as to facilitate error free communication with the Client but protect the Client receiver from overload or damage.
3. Configure the Client and AP so that they associate and start sending data (stream data). The AP should be configured such that its registered power is 36 dBm EIRP.
4. Verify transmission between Client and Std Power AP. Additional attenuators may be required to protect measurement equipment. Measure the Client RF power using any of the methods in C63.10 for NII devices.
5. Use this power, along with its antenna gain, to calculate the Client EIRP.
6. The Client EIRP should be minimally 6 dB lower than that of the AP.
7. Repeat Steps 2 through 5 at two other selected measurement points – the first at the midpoint and the second at the lowest rated power of the client as declared by the manufacturer.

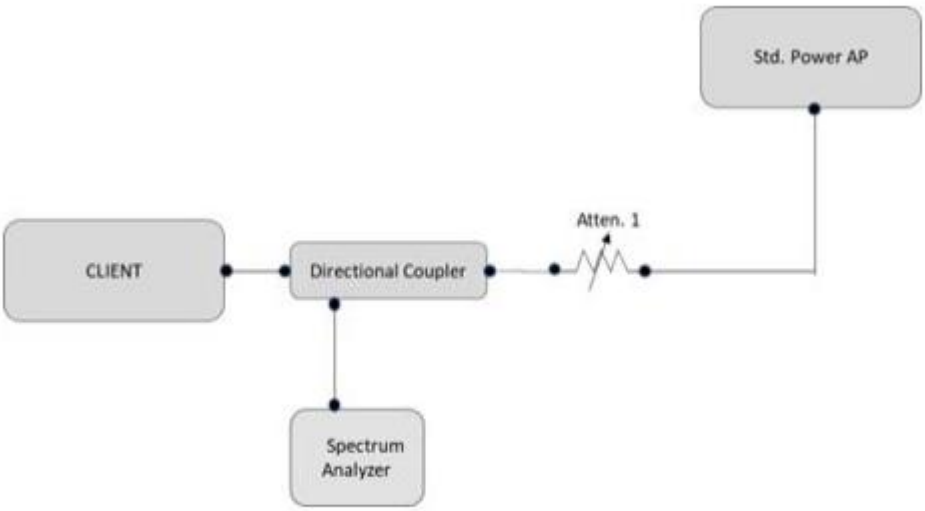


Figure 7. Test setup for conducted testing

2.1.5 Test Result Summary

Companion Standard Power AP: Brand name: Qualcomm, Model name: Wakiki

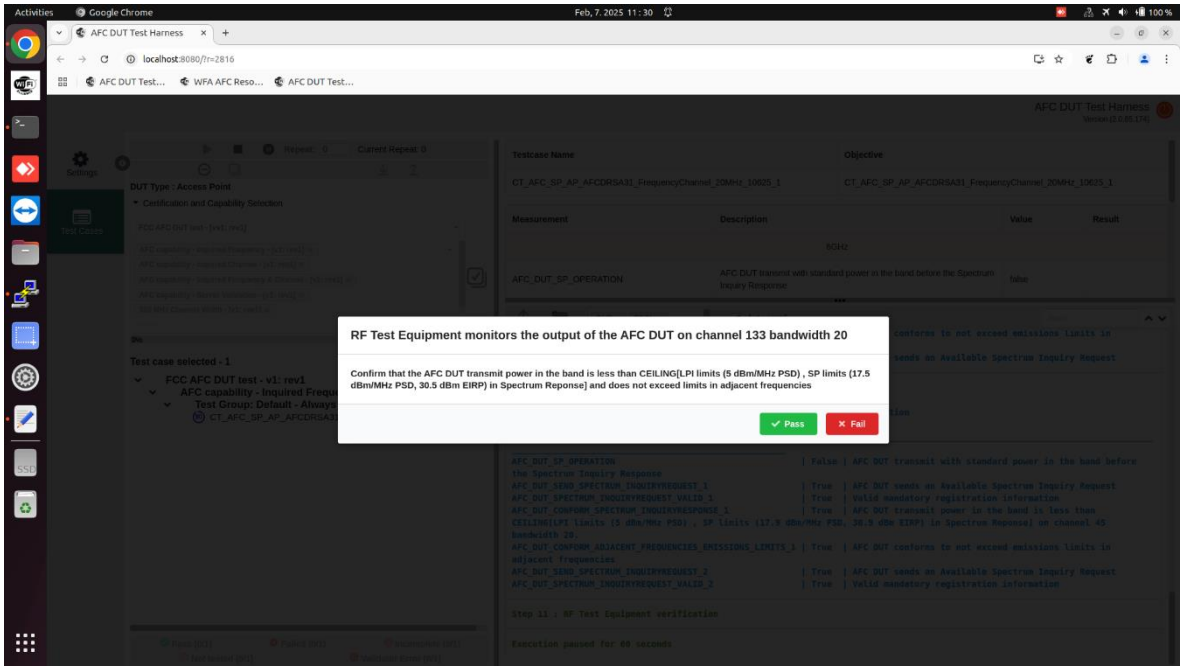
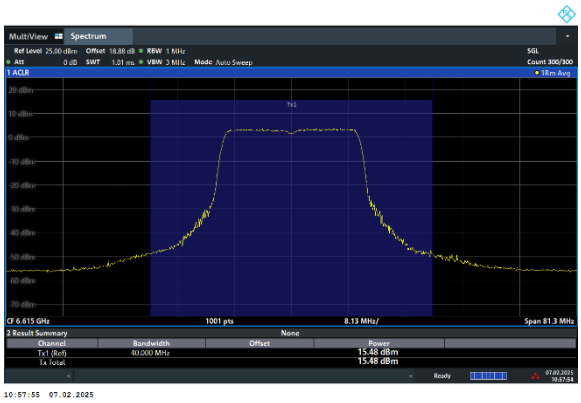
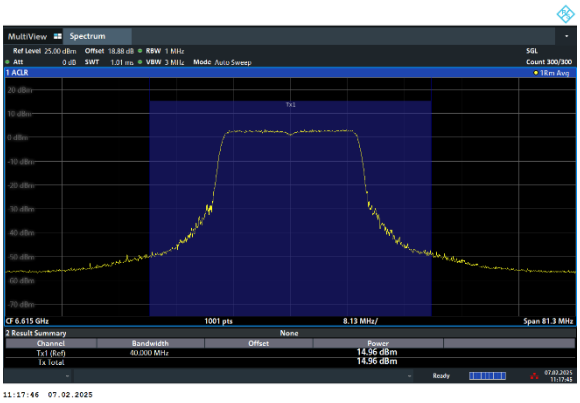
802.11ax 20MHz bandwidth

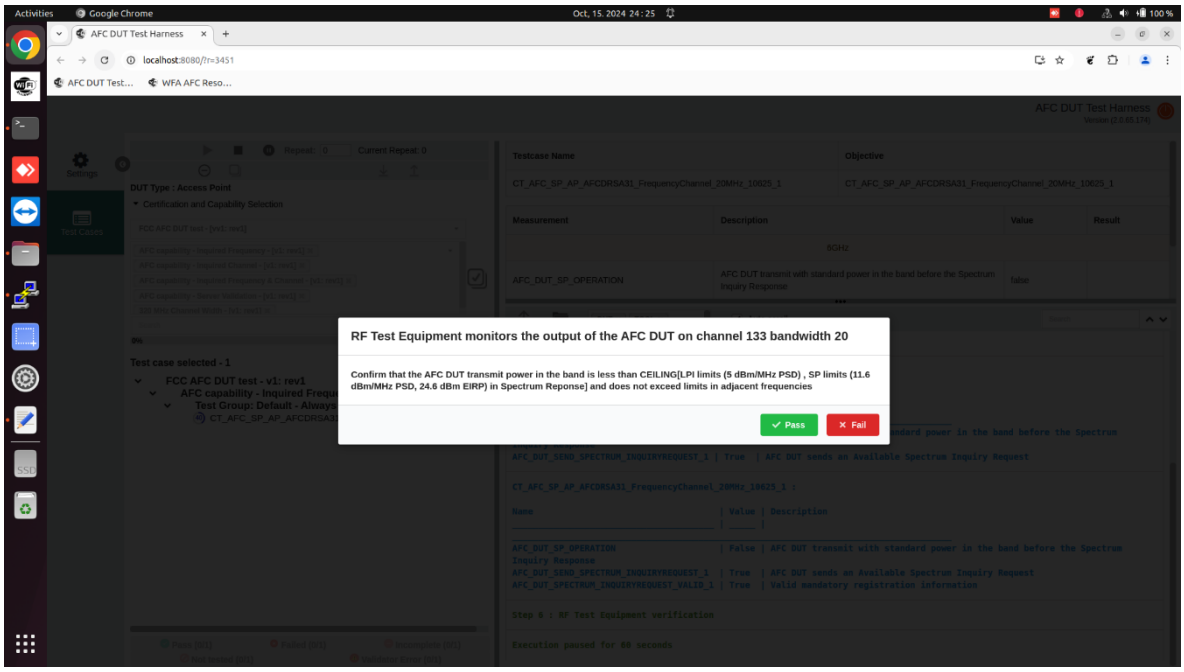
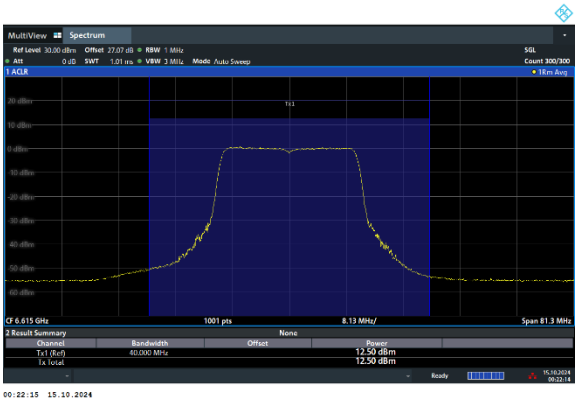
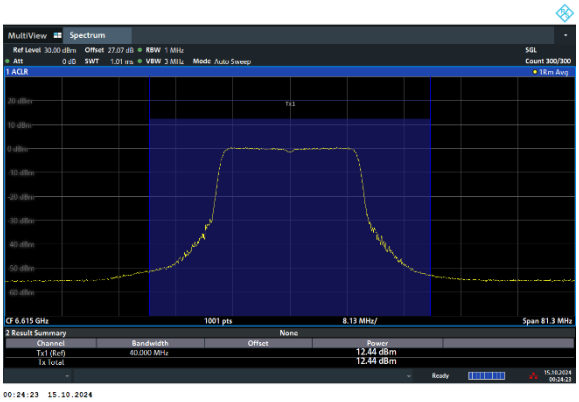
Test channel 133

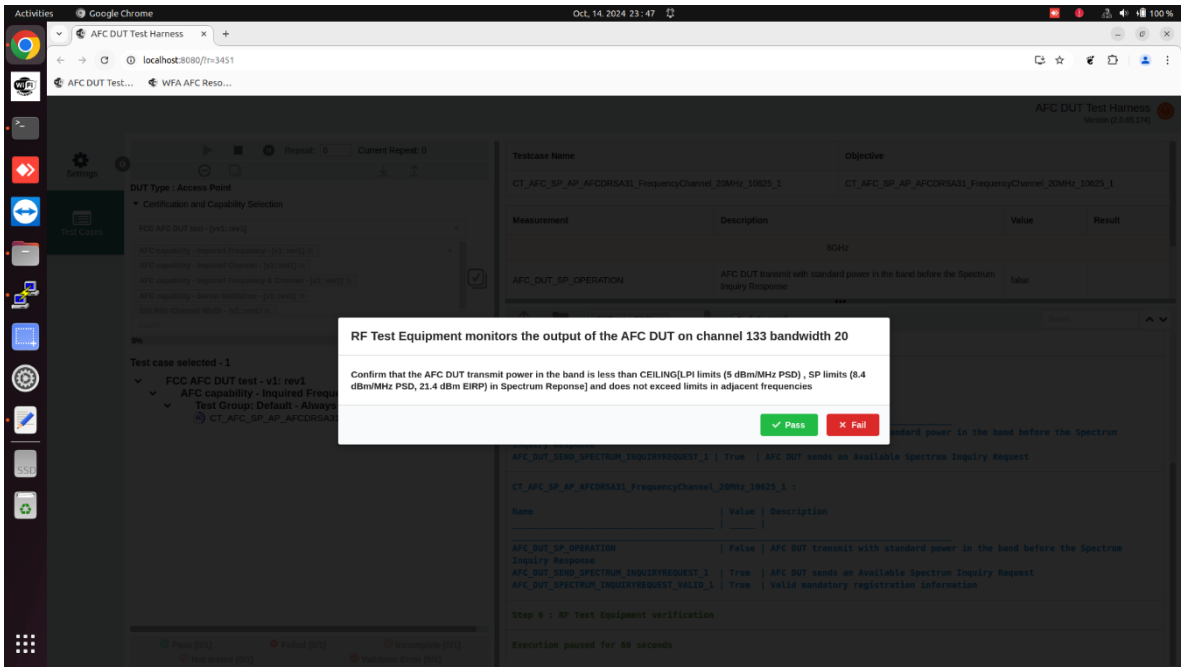
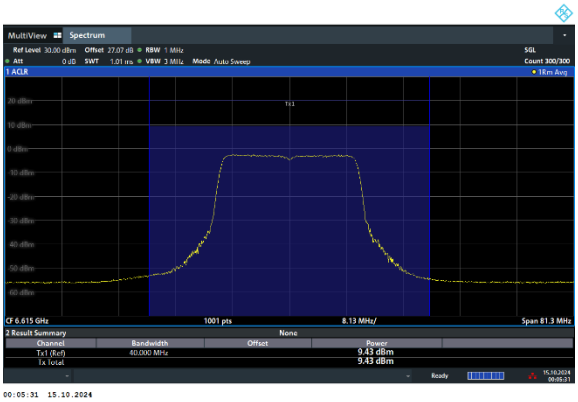
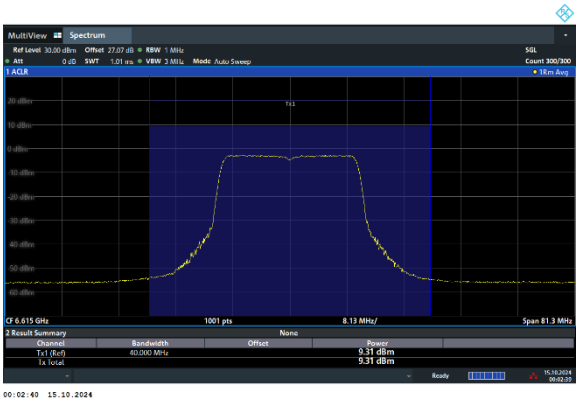
	Client Conducted Power (dBm)			Client EIRP (dBm)	AP EIRP (dBm)	AP to client EIRP Delta (dB)
	Ant8	Ant10	MIMO			
Maximum EIRP	15.48	14.96	18.24	19.26	30.5	11.24
Midpoint EIRP	12.50	12.44	15.48	16.50	24.6	8.10
Lowest EIRP	9.43	9.31	12.38	13.40	21.4	8.00
Requirement						At least 6 dB
Result						Pass

Note: Client EIRP = Client MIMO conducted power + antenna gain 1.02 dBi

2.1.6 Test Result Plot

Measured highest power	
AP EIRP 30.5dBm	
	
Client conducted power	
Ant8 15.48dBm	Ant10 14.96dBm
	

Measured mid-point power	
AP EIRP 24.6dBm	
	
Client conducted power	
Ant8 12.50dBm	Ant10 12.44dBm
	

Measured lowest power	
AP EIRP 21.4dBm	
	
Client conducted power	
Ant8 9.43dBm	Ant10 9.31dBm
	

2.2 Dual Client Test, Demonstration of Proper Power Adjustment based on Associated AP

2.2.1 Limit of Proper Power Adjustment

15.407 KDB 987594 D02 Section II. K. Power limits for standard client devices

A client device may connect to a Standard Power AP with a maximum power level of 30 dBm EIRP. A client may also connect to a Low Power indoor AP, but the power level is limited to a maximum of 24 dBm EIRP.

2.2.2 Test Procedures of Standard Client Proper Power Adjustment

The testing follows FCC KDB 987594 D02 U-NII 6 GHz EMC Measurement v03.

Section K. Dual Client Test, Demonstration of Proper Power Adjustment based on Associated AP

2.2.3 Test Procedure:

1. Connect equipment as shown in Figure 6 below..
2. Adjust Atten 2 to Std Power AP so as to facilitate error free communication with the Client (Atten 1 should be set to High on the RF path to the Low Power AP)
3. Configure the Client and APs so that they associate and start sending data (stream data). It is important that the client is configured to transmit at its highest power level. Initially, because the attenuation on Atten 1 is set high, the Client will only associate with the Std Power AP.
4. Verify transmission between Client and Std Power AP. Additional attenuators may be required to protect measurement equipment. Measure the Client RF power using any of the methods in C63.10 for NII devices.
5. Gradually increase Atten 2 while at the same time decreasing Atten 1. This simulates the Client moving from outdoors to indoors. At some level of attenuation the Client should associate with the Low Power indor AP.
6. Verify transmission between Client and Low Power AP.
7. Measure the RF power of the Client device using the same method as in step 4. Verify the power is no more than 24 dBm EIRP

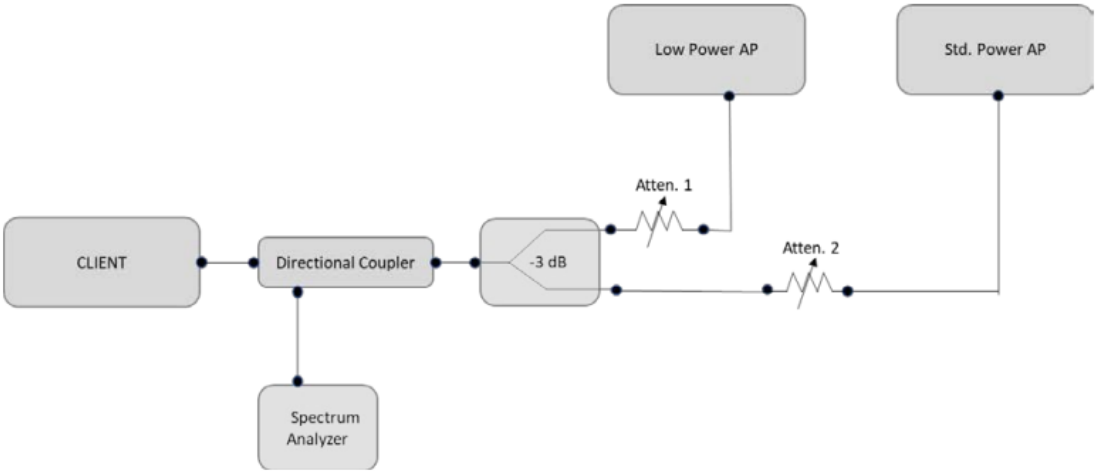


Figure 6. Test setup for conducted testing

2.2.4 Test Result Summary

Companion Standard Power AP: Brand name:Qualcomm, Model name:Wakiki

Companion Low Power indoor AP: Brand name: ASUS, Model name: GTAXE11000

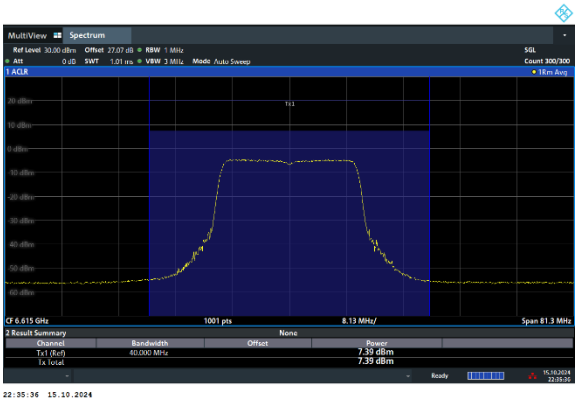
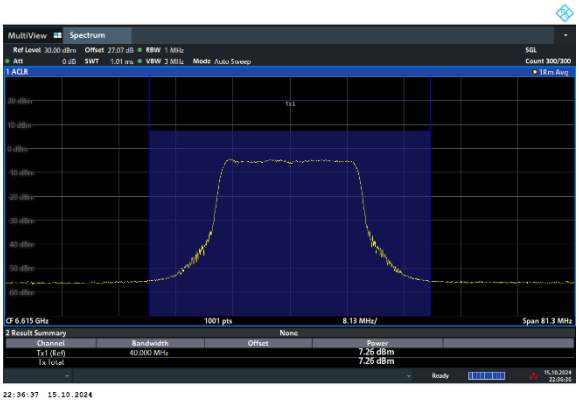
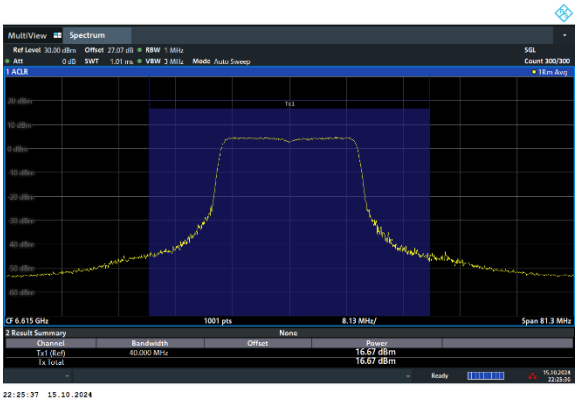
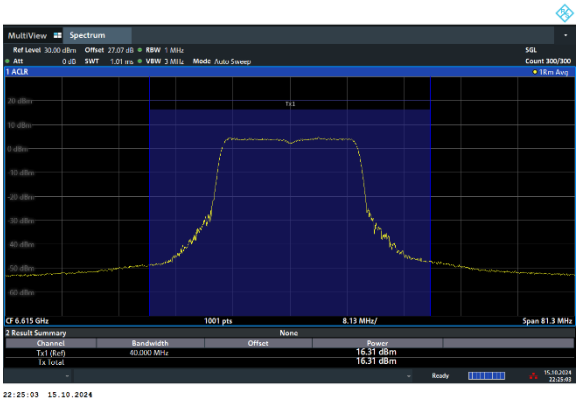
802.11ax 20MHz bandwidth

Test channel 133

	Client Conducted Power (dBm)			Client EIRP (dBm)	Limit EIRP (dBm)	Result
	Ant8	Ant10	MIMO			
Indoor EIRP	7.39	7.26	10.34	11.36	24	Pass
Standard EIRP	15.44	14.90	18.19	19.21	30	Pass

Note: Client EIRP = Client MIMO conducted power + antenna gain 1.02 dBi

2.2.5 Test Result Plot

Measured Indoor power	
Ant8 **7.39dBm**	**Ant10** **7.26dBm**
	
Measured Standard power	
Ant8 **15.44dBm**	**Ant10** **14.90dBm**
	

3 List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	Rohde & Schwarz	FSV3013	101549	10Hz~13.6GHz	Jan. 30, 2024	Oct. 08, 2024~ Oct. 15, 2024	Jan. 29, 2025	AFC (DF02-HY)
Spectrum Analyzer	Rohde & Schwarz	FSV3013	101550	10Hz~13.6GHz	Jan. 13, 2025	Oct. 08, 2024~ Feb. 07, 2025	Jan. 12, 2026	AFC (DF02-HY)
Power Divider	MTJ	SMA 2Way Power Divider	MD10003	0.5GHz-6GHz	Calibration from System	Oct. 08, 2024~ Feb. 07, 2025	Calibration from System	AFC (DF02-HY)
Power Divider	MTJ	SMA 2Way Power Divider	MD10016	0.5GHz-6GHz	Calibration from System	Oct. 08, 2024~ Feb. 07, 2025	Calibration from System	AFC (DF02-HY)
Power Divider	Woken	3Way SMA Power Divder Rated to 20W	STI08-0010 (#2)	2GHz-8GHz	Calibration from System	Oct. 08, 2024~ Feb. 07, 2025	Calibration from System	AFC (DF02-HY)
RF Cable	EM	SFL402	SFL402-30cm-#9	30 kHz~18GHz	Calibration from System	Oct. 08, 2024~ Feb. 07, 2025	Calibration from System	AFC (DF02-HY)
RF Cable	MTJ Cooperstion	SBF405-105FLEX	MTJ-30cm-02	30 kHz~18GHz	Calibration from System	Oct. 08, 2024~ Feb. 07, 2025	Calibration from System	AFC (DF02-HY)
RF Cable	MTJ Cooperstion	SBF405-105FLEX	MTJ-30cm-06	30 kHz~18GHz	Calibration from System	Oct. 08, 2024~ Feb. 07, 2025	Calibration from System	AFC (DF02-HY)
RF Cable	MVE	SPF141	SPF141-100cm-#13	30 kHz~18GHz	Calibration from System	Oct. 08, 2024~ Feb. 07, 2025	Calibration from System	AFC (DF02-HY)
RF Cable	MVE	SPF141	SPF141-100cm-#14	30 kHz~18GHz	Calibration from System	Oct. 08, 2024~ Feb. 07, 2025	Calibration from System	AFC (DF02-HY)
RF Cable	MVE	SPF141	SPF141-100cm-#15	30 kHz~18GHz	Calibration from System	Oct. 08, 2024~ Feb. 07, 2025	Calibration from System	AFC (DF02-HY)
RF Cable	EC	SLF405	EC-SFL405-100cm-#7	30 kHz~18GHz	Calibration from System	Oct. 08, 2024~ Feb. 07, 2025	Calibration from System	AFC (DF02-HY)
RF Cable	EC	SLF405	EC-SFL405-100cm-#11	30 kHz~18GHz	Calibration from System	Oct. 08, 2024~ Feb. 07, 2025	Calibration from System	AFC (DF02-HY)
RF Cable	EC	SS405	SS405-100cm-#13	30 kHz~18GHz	Calibration from System	Oct. 08, 2024~ Feb. 07, 2025	Calibration from System	AFC (DF02-HY)
RF Cable	EC	SS405	SS405-150cm-#6	30 kHz~18GHz	Calibration from System	Oct. 08, 2024~ Feb. 07, 2025	Calibration from System	AFC (DF02-HY)
RF Cable	EC	SS405	SS405-150cm-#13	30 kHz~18GHz	Calibration from System	Oct. 08, 2024~ Feb. 07, 2025	Calibration from System	AFC (DF02-HY)