ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

Testing Laboratory 3702

Applicant:	MegaChips Corporation 1-1-1, Miyahara, Yodogawa-ku, Osaka, 532-0003, Japan
Manufacturer:	MegaChips Corporation 1-1-1, Miyahara, Yodogawa-ku, Osaka, 532-0003, Japan
Product Name:	MRF61_FI_MCU_FLS, MRF61_FI_MCU_THS, MRF61_FI_MCU_FLN, MRF61_FI_MCU_THN
Brand Name:	MegaChips Corporation
Model No.: **/ISED HVIN:**	MFIM0003
Family Model No.: **/Family ISED HVIN:**	MFIM0004
Model Difference:	Please refer to section 1.4 for more details.
ISED PMN:	MRF61_FI_MCU_FLS, MRF61_FI_MCU_THS, MRF61_FI_MCU_FLN, MRF61_FI_MCU_THN
Report Number:	TERF2408002365E2
FCC ID	2AGYI-WM0151
IC:	29836-WM0151
Date of EUT Received:	August 8, 2024
Date of Test:	August 28, 2024～November 5, 2024
Issue Date:	April 9, 2025

Approved By _____
Vito Pei

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Central RF Lab The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10:2013 and the energy emitted by the sample EUT comply with FCC rule part §15.247, ISED RSS-Gen and RSS-247.

The results of this report relate only to the sample identified in this report.

Revision History

Report Number	Revision	Description	Issue Date	Revised By	Remark
TERF2408002365E2	00	Original	March 21, 2025	Susan Lin	
TERF2408002365E2	01	Update product name, MFIM0003 + Helical Tx RSE data and section 8.6 and 12.4.1	April 9, 2025	Susan Lin	*

Note:

1、The remark "*" indicates modification of the report upon requests from certification body.

2、Variant information of model numbers is provided by the applicant, test results of this report are applicable to the sample EUT(s) received.

Contents

1 GENERAL INFORMATION

1.1 Product Description

Product Name:	MRF61_FI_MCU_FLS, MRF61_FI_MCU_THS, MRF61_FI_MCU_FLN, MRF61_FI_MCU_THN
Brand Name:	MegaChips Corporation
Model No.: /ISED HVIN:	MFIM0003
Family Model No.: /Family ISED HVIN:	MFIM0004
Model Difference:	Please refer to section 1.4 for more details.
Hardware Version:	ES1
Firmware Version:	1.1.4
EUT Series No.:	MFIM0003_MRF61_FI_S (Conducted) MFIM0003 MRF61_FI_S, MFIM0004 MRF61_FI_N (Conduction) MFIM0003 MRF61_FI_S, MFIM0004 MRF61_FI_N (Radiated)
Power Supply:	3.3Vdc
Test Software (Name/Version):	Default

1.2 RF Specification

Radio Technology:	802.11ah
Frequency Range:	902 – 928MHz
Modulation type:	OFDM
Transmit Power:	802.11ah 1M: 26.75 dBm (Peak) 802.11ah 2M: 26.79 dBm (Peak) 802.11ah 4M: 26.83 dBm (Peak) 802.11ah 8M: 26.78 dBm (Peak)

1.3 Antenna Designation

Antenna Type	Supplier	Antenna Part No.	Freq. (MHz)	Peak Antenna Gain (dBi)
Helical	Linx Technologies	ANT-916-HETH	902-928	6.4
Chip	Kyocera	P822603		0.7
	Johanson Technology	0915AT43A0026001E		-1.0
Dipole	PulseLarsen Antennas	W1063		1.0
Monopole	Linx Technologies	ANT-916-CW-RCS		4.8
	molex	1052620002		1.5
	molex	2111400100		1.0
	molex	1052620001		1.6

Note:

1. Pre-scanned was done on the above antennas, measurements were demonstrated by using the antenna with the highest gain as the worst case scenarios.
2. Antenna information is provided by the applicant.

1.4 Model Difference

The list about difference between the original and series.

	Item	Original MRF61_FI_MCU_FLS, MRF61_FI_MCU_THS MFIM0003	Series MRF61_FI_MCU_FLN, MRF61_FI_MCU_THN MFIM0004	Remark
1	Circuit Diagram	-	- Secure IC nomount	
2	PCB Layout	-	- Same as Original	
3	Internal Component	-	- Secure IC nomount	
4	Appearance	-	- Only model name plinted on the label is different.	Because the secure IC is in the shield case. There is no difference in appearance.
5	Function/Capability	-	- No secure key.	
6	Others	-		

1.5 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.247

FCC KDB 558074 D01 15.247 Meas Guidance v05r02

RSS-247 issue 3 Aug. 2023

RSS-Gen, Issue 5 April 2018, Amendment 2 (February 2021)

1.6 Test Facility

Laboratory	Test Site Address	Test Site Name	FCC Designation number	IC CAB identifier
SGS Taiwan Ltd. Central RF Lab. (TAF code 3702)	No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan.	SAC 1	TW0027	TW3702
		SAC 2		
		SAC 3		
		Conduction 1		
		Conducted 1		
		Conducted 2		
		Conducted 3		
		Conducted 4		
		Conducted 5		
		Conducted 6		
	No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333	Conduction C	TW0028	
		SAC C		
		SAC D		
		SAC G		
		Conducted A		
		Conducted B		
		Conducted C		
		Conducted D		
		Conducted E		
		Conducted F		
		Conducted G		

Note: Test site name is remarked on the equipment list in each section of this report as an indication where measurements occurred in specific test site and address.

1.7 Special Accessories

There are no special accessories used while test was conducted.

1.8 Equipment Modifications

There was no modification incorporated into the EUT.

2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

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

2.2 EUT Exercise

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is a placed on a table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz. The CISPR Quasi-Peak and Average detector mode is employed. The two LISNs provide 50uH/50 ohm of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

2.3.2 Conducted Test (RF)

The active antenna port of the unlicensed wireless device is connected to the spectrum analyzer with attenuator to protect the instrumentation. If a second antenna port is available, it is tested at one operating frequency, with other port(s) appropriately terminated, to verify it has similar output characteristics as the fully tested port.

2.3.3 Radiated Emissions

The EUT is a placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna.

2.4 Measurement Results Explanation Example

2.4.1 Radiated Emission Test Sites For Measurements From 9 kHz To 30 MHz

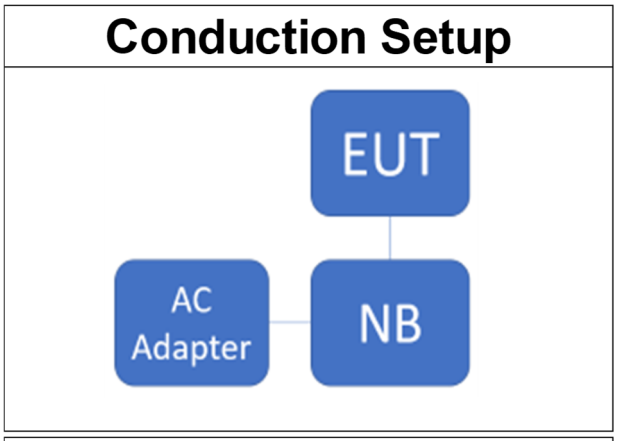
Radiated emission below 30MHz is measured in a 9m*6m*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field test site.

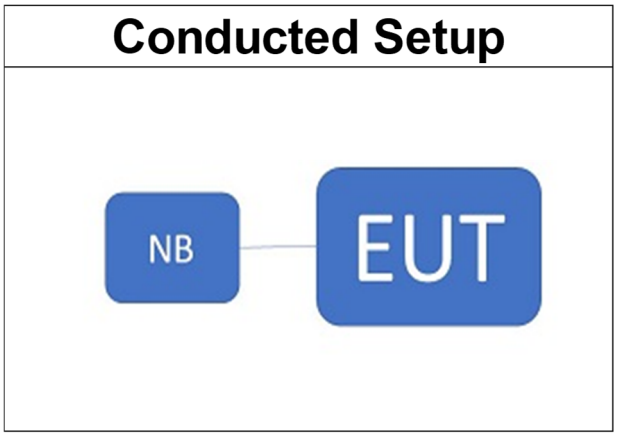
There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

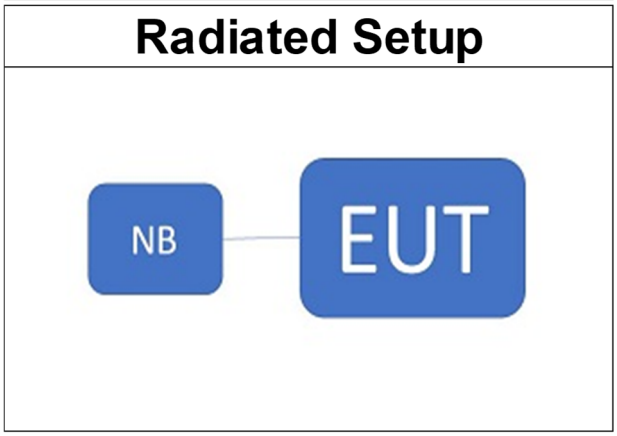
2.4.2 For all conducted test items:

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

2.5 Test Configuration







2.6 Control Unit(s)

AC Power-Line Conducted Emission Test Site: Conduction C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
NB Adapter	Lenovo	ADLX65YLC3A	8SSA10M13945L1C Z88N0F8W	N/A	N/A
Notebook	Lenovo	T14	P0003332	N/A	N/A
USB Cable	EDISON	VPC-70	N/A	N/A	N/A

Conducted Emission Test Site: Conducted C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Notebook	Lenovo	T14	P0003332	N/A	N/A

Radiated Emission Test Site: SAC D					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Notebook	Lenovo	T14	P0003332	N/A	N/A
USB Cable	EDISON	VPC-70	N/A	N/A	N/A

3 SUMMARY OF TEST RESULTS

FCC Rules	ISED Rules	Description Of Test	Result
§15.207(a)	RSS-Gen §8.8	AC Power Line Conducted Emission	Compliant
§15.247(b) (3)	RSS-247 §5.4 d	Peak Output Power	Compliant
§15.247(a)(2)	RSS-247 §5.2 a RSS-Gen §6.7	Emission Bandwidth	Compliant
§15.205 §15.209 §15.247(d)	RSS-247 §5.5	Conducted Band Edge and Spurious Emission	Compliant
§15.205 §15.209 §15.247(d)	RSS-247 §5.5	Radiated Band Edge and Spurious Emission	Compliant
§15.205	RSS-Gen § 8.10	Restricted Bands	Compliant
§15.247(e)	RSS-247 §5.2 b	Peak Power Density	Compliant
§15.203	N/A	Antenna Requirement	Compliant

4 DESCRIPTION OF TEST MODES

4.1 Operating Frequencies

	OFDM 1M		OFDM 2M		OFDM 4M		OFDM 8M	
	CH	Freq. (MHz)	CH	Freq. (MHz)	CH	Freq. (MHz)	CH	Freq. (MHz)
Channel List	3	903.5	6	905	8	906	12	908
	5	904.5	10	907	16	910	28	916
	7	905.5	14	909	24	914	44	924
	9	906.5	18	911	32	918		
	11	907.5	22	913	40	922		
	13	908.5	26	915	48	926		
	15	909.5	30	917				
	17	910.5	34	919				
	19	911.5	38	921				
	21	912.5	42	923				
	23	913.5	46	925				
	25	914.5						
	27	915.5						
	29	916.5						
	31	917.5						
	33	918.5						
	35	919.5						
	37	920.5						
	39	921.5						
	41	922.5						
	43	923.5						
	45	924.5						
	47	925.5						
	49	926.5						

4.2 The Worst Test Modes and Channel Details

1. The EUT has been tested under operating condition.
2. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.
3. Investigation has been done on all the possible configurations for searching the worst case. The given UE is pre-scanned among below modes.

CONDUCTED TEST				
MODE	AVAILABLE Frequency (MHz)	TESTED Frequency (MHz)	MODULATION	DATA RATE
802.11ah 1M	902 to 928	903.5,914.5,926.5	OFDM	MCS0
802.11ah 2M	902 to 928	905,915,925	OFDM	MCS0
802.11ah 4M	902 to 928	906,914,926	OFDM	MCS0
802.11ah 8M	902 to 928	908,916,924	OFDM	MCS0

RADIATED EMISSION TEST (BELOW 1 GHz)				
MODE	AVAILABLE FREQUENCY (MHz)	TESTED FREQUENCY (MHz)	MODULATION	DATA RATE (Mbps)
802.11ah 1M	903.5 to 926.5	914.5	OFDM	MCS0
802.11ah 2M	905 to 925	915	OFDM	MCS0
802.11ah 4M	906 to 926	914	OFDM	MCS0
802.11ah 8M	908 to 924	916	OFDM	MCS0

RADIATED EMISSION TEST (ABOVE 1 GHz)				
MODE	AVAILABLE FREQUENCY (MHz)	TESTED FREQUENCY (MHz)	MODULATION	DATA RATE (Mbps)
802.11ah 1M	903.5 to 926.5	903.5,914.5,926.5	OFDM	MCS0
802.11ah 2M	905 to 925	905,915,925	OFDM	MCS0
802.11ah 4M	906 to 926	906,914,926	OFDM	MCS0
802.11ah 8M	908 to 924	908,916,924	OFDM	MCS0

Note:

The field strength of radiated emission was measured as the EUT positioned in different orthogonal planes (E1/E2/H) based on actual usage of the EUT to pre-scan the emissions for determining the worst case scenario.

5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty		
AC Power Line Conducted Emission	+/-	1.54	dB
Output Power measurement	+/-	0.97	dB
Emission Bandwidth	+/-	1.38	Hz
Conducted emission measurement	+/-	0.77	dB
Peak Power Density	+/-	0.61	dB
Temperature	+/-	0.6	°C
Humidity	+/-	3	%
DC / AC Power Source	+/-	1	%

Radiated Spurious Emission Measurement Uncertainty				
Polarization: Vertical	**+/-**	**1.89**	**dB**	9kHz~30MHz
	+/-	**4.15**	**dB**	30MHz - 1000MHz
	+/-	**3.43**	**dB**	1GHz - 18GHz
	+/-	**3.86**	**dB**	18GHz - 40GHz
Polarization: Horizontal	**+/-**	**1.89**	**dB**	9kHz~30MHz
	+/-	**4.02**	**dB**	30MHz - 1000MHz
	+/-	**3.43**	**dB**	1GHz - 18GHz
	+/-	**3.86**	**dB**	18GHz - 40GHz
Radiated Spurious Emission	**+/-**	**2**	**dB**	33GHz-50GHz
	+/-	**1.59**	**dB**	50GHz-60GHz
	+/-	**1.7**	**dB**	60GHz-90GHz
	+/-	**1.64**	**dB**	90GHz-140GHz
	+/-	**3.83**	**dB**	140GHz-220GHz

Note:

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
2. The conformity assessment statement in this report is based solely on the test results, measurement uncertainty is excluded.

6 MEASUREMENT EQUIPMENT USED

6.1 Emission from AC power line

AC Power-Line Conducted Emission Test Site: Conduction C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Coaxial Cable	EC Lab	RF-HY-CAB-250	RF-HY-CAB-250-01	03/27/2024	03/26/2025
EMI Test Receiver	R&S	ESCI	101342	04/29/2024	04/28/2025
LISN	SCHWARZBECK Mess-Elektronik	NSLK8127	973	04/22/2024	04/21/2025
Pulse Limiter	EC Lab	VTSD 9561F-N	485	03/27/2024	03/26/2025
Test Software	audix	e3	E3 20923 SGS Ver.9 (C)	N.C.R	N.C.R

6.2 Conducted Measurement

Conducted Emission Test Site: Conducted C					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Attenuator	Woken	WATT-218FS-10	RF18	11/15/2023	11/14/2024
Attenuator	Woken	WATT-218FS-10	RF19	11/15/2023	11/14/2024
DC Block	PASTERNACK	PE8210	RF155	11/15/2023	11/14/2024
Power Meter	Anritsu	ML2496A	2138005	09/25/2023	09/24/2024
Power Sensor	Anritsu	MA2411B	1911395	09/25/2023	09/24/2024
Power Sensor	Anritsu	MA2411B	1911396	09/25/2023	09/24/2024
Power Meter	Anritsu	ML2496A	2138005	09/25/2024	09/24/2025
Power Sensor	Anritsu	MA2411B	1911395	09/25/2024	09/24/2025
Power Sensor	Anritsu	MA2411B	1911396	09/25/2024	09/24/2025
Spectrum Analyzer	KEYSIGHT	N9010B	MY59071573	05/24/2024	05/23/2025
Test Software	SGS Taiwan	Radio Test Software	Ver.21	N.C.R	N.C.R

6.3 Radiated Measurement

Radiated Emission Test Site: SAC D					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
3m Site NSA	SGS	966 chamber D	N/A	04/30/2024	04/29/2025
Active Loop Antenna	COM-POWER	AL-130R	10160105	12/04/2023	12/03/2024
Attenuator	Woken	WATT-218FS-10	RF17	11/15/2023	11/14/2024
Broadband Antenna	SCHWARZBECK	VULB 9168	9168-617	12/14/2023	12/13/2024
Coaxial Cable	Huber+Suhner	EMC106-SM-SM-7200	150703	11/15/2023	11/14/2024
Coaxial Cable	Huber+Suhner	RG 214/U	W21.01	11/15/2023	11/14/2024
Highpass Filter	WI	WHKX1.1/15G	RF172	11/15/2023	11/14/2024
Horn Antenna	Schwarzbeck	BBHA9120D	1341	05/30/2024	05/29/2025
Lowpass Filter	Woken	EWT-56-0019	RF173	11/15/2023	11/14/2024
Notch Filter	Woken	EWT-54-0037	RF177	11/15/2023	11/14/2024
Pre-Amplifier	EMC Instruments	EMC12630SE	980273	11/15/2023	11/14/2024
Pre-Amplifier	EMC Instruments	EMC9135	980234	11/15/2023	11/14/2024
Spectrum Analyzer	KEYSIGHT	N9010B	MY60240506	06/17/2024	06/16/2025
Test Software	audix	e3	E3 20923 SGS Ver.9 (C)	N.C.R	N.C.R

NOTE: *No Calibration Required.*

7 CONDUCTED EMISSION TEST

7.1 Standard Applicable:

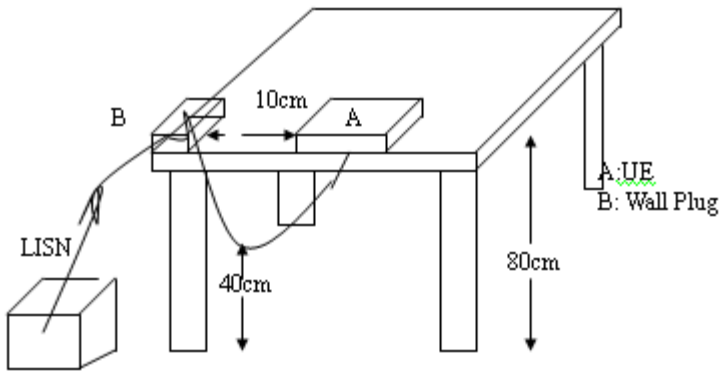
Frequency range within 150kHz to 30MHz shall not exceed the Limit table as below.

Frequency range MHz	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Note 1.The lower limit shall apply at the transition frequencies 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

7.2 EUT Setup:

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
3. The LISN was connected with 120Vac/60Hz power source.

7.3 Test Setup



7.4 Measurement Procedure:

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all phases of power being supplied by given UE are completed

7.5 Measurement Result:

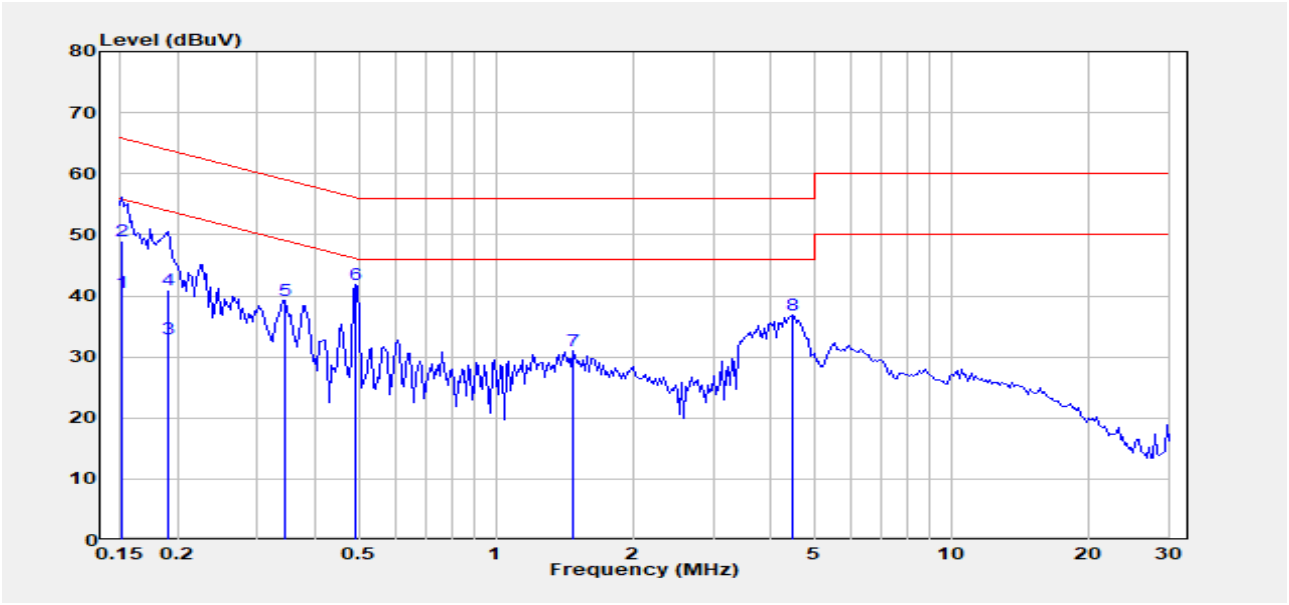
Note: Refer to next page for measurement data and plots.

Note2: The * reveals the worst-case results that closest to the limit.

AC POWER LINE CONDUCTED EMISSION TEST DATA

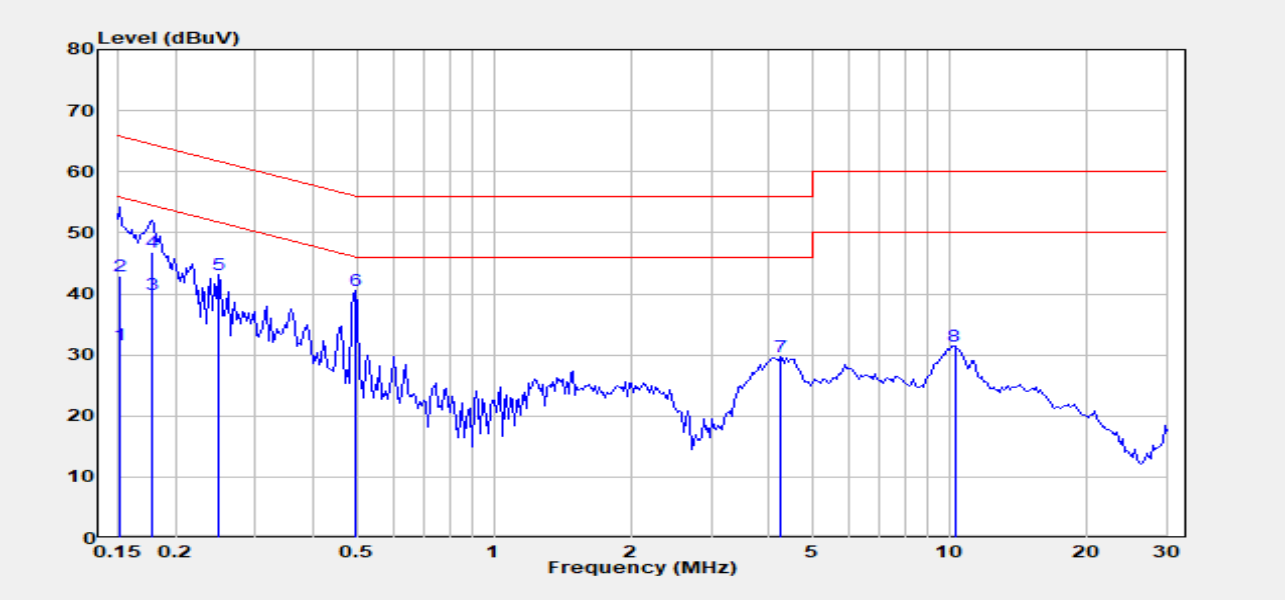
MFIM0003 + Helical

Report Number	:TERF2408002365E2	Test Site	:Conduction C
Test Mode	:900M	Test Date	:2024-09-05
Power	:120V/60Hz	Temp./Humi.	:24.7℃/58%
Probe	:L1	Engineer	:Howard Huang
Note:	:MFIM0003 + Helical		



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV	dBµV	dB
0.152	Average	29.80	10.69	40.49	55.91	-15.42
0.152	QP	38.30	10.69	48.99	65.91	-16.92
0.191	Average	22.20	10.68	32.88	53.98	-21.09
0.191	QP	30.20	10.68	40.88	63.98	-23.09
0.343	Peak	28.53	10.65	39.19	59.13	-19.95
0.491	Peak	31.13	10.63	41.77	56.14	-14.38
1.480	Peak	20.28	10.75	31.03	56.00	-24.97
4.501	Peak	25.86	10.94	36.80	56.00	-19.20

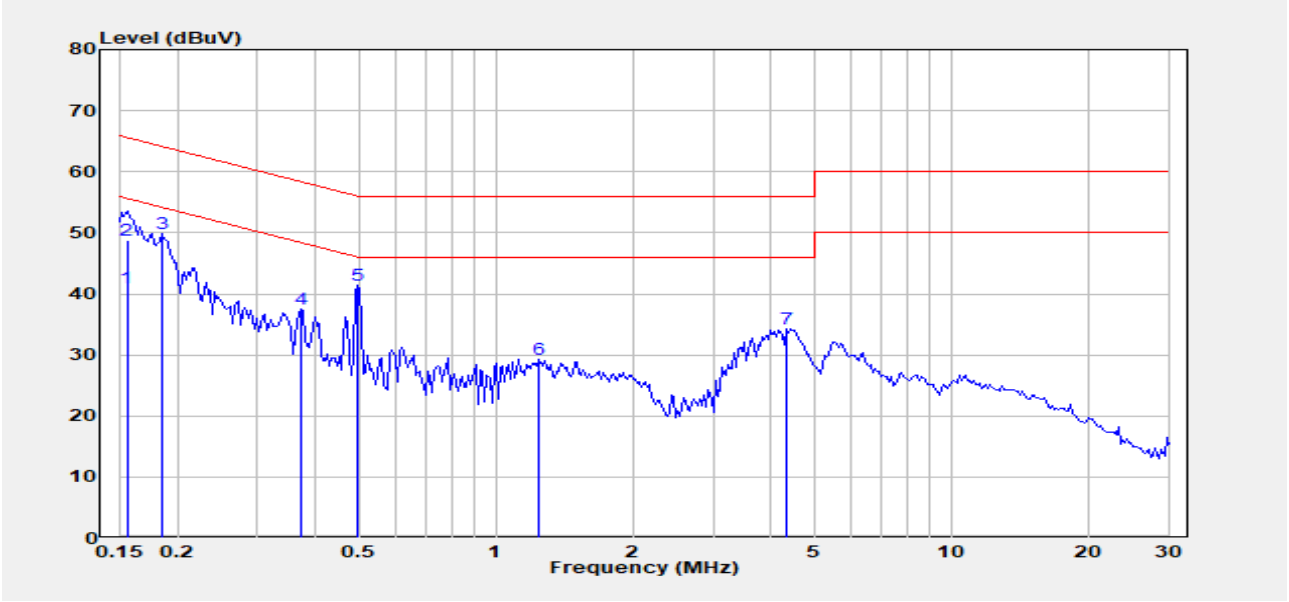
Report Number	:TERF2408002365E2	Test Site	:Conduction C
Test Mode	:900M	Test Date	:2024-09-05
Power	:120V/60Hz	Temp./Humi.	:24.7℃/58%
Probe	:N	Engineer	:Howard Huang
Note:	:MFIM0003 + Helical		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV	Limit dBµV	Margin dB
0.152	Average	21.00	10.67	31.67	55.91	-24.24
0.152	QP	32.20	10.67	42.87	65.91	-23.04
0.178	Average	29.20	10.67	39.87	54.59	-14.72
0.178	QP	36.10	10.67	46.77	64.59	-17.82
0.249	Peak	32.45	10.65	43.11	61.78	-18.67
0.497	Peak	29.88	10.62	40.49	56.05	-15.56
4.269	Peak	18.80	10.93	29.73	56.00	-26.27
10.288	Peak	20.50	11.02	31.52	60.00	-28.48

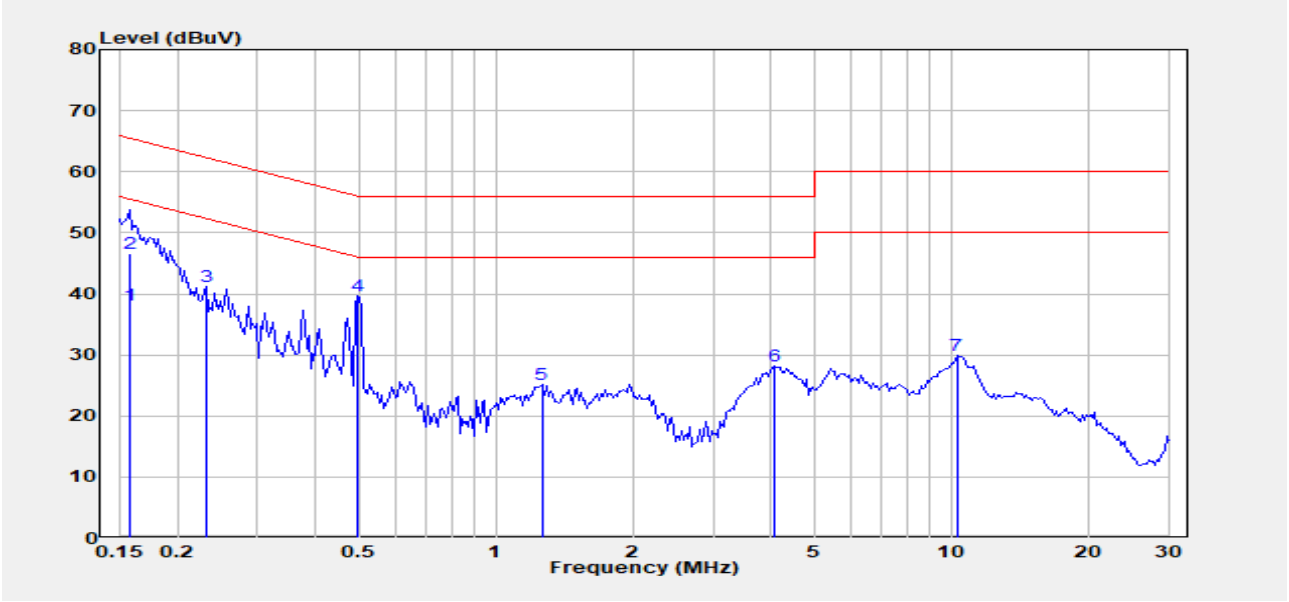
MFIM0004 + Helical

Report Number	:TERF2408002365E2	Test Site	:Conduction C
Test Mode	:900M	Test Date	:2024-09-20
Power	:120V/60Hz	Temp./Humi.	:24.0℃/61%
Probe	:L1	Engineer	:Howard Huang
Note:	:MFIM0004 + Helical		



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV	dBµV	dB
0.155	Average	30.30	10.69	40.99	55.74	-14.75
0.155	QP	38.00	10.69	48.69	65.74	-17.05
0.185	Peak	39.20	10.68	49.88	64.24	-14.36
0.373	Peak	26.86	10.65	37.50	58.43	-20.93
0.497	Peak	30.80	10.63	41.43	56.05	-14.63
1.249	Peak	18.62	10.73	29.35	56.00	-26.65
4.361	Peak	23.34	10.93	34.27	56.00	-21.73

Report Number	:TERF2408002365E2	Test Site	:Conduction C
Test Mode	:900M	Test Date	:2024-09-20
Power	:120V/60Hz	Temp./Humi.	:24.0℃/61%
Probe	:N	Engineer	:Howard Huang
Note:	:MFIM0004 + Helical		



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV	dBµV	dB
0.156	Average	27.50	10.67	38.17	55.65	-17.48
0.156	QP	36.00	10.67	46.67	65.65	-18.98
0.232	Peak	30.61	10.66	41.27	62.39	-21.12
0.497	Peak	29.09	10.62	39.71	56.05	-16.35
1.262	Peak	14.50	10.72	25.21	56.00	-30.79
4.092	Peak	17.18	10.92	28.10	56.00	-27.90
10.288	Peak	18.82	11.02	29.84	60.00	-30.16

8 PEAK OUTPUT POWER MEASUREMENT

8.1 Standard Applicable:

8.1.1 FCC

For systems using digital modulation in the 902-928 MHz bands, the limit for peak output power is 1Watt.

If the transmitting antenna of directional gain greater than 6dBi are used the peak output power form the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the Antenna exceeds 6dBi. (FCC only)

In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of Antenna exceeds 6dBi.

8.1.2 ISED

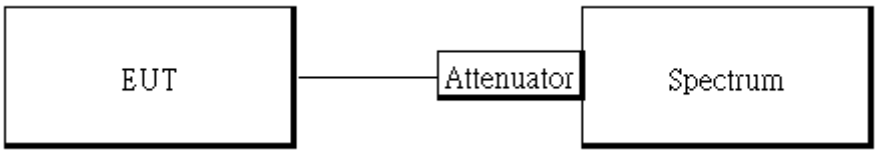
For systems using digital modulation in the 902-928 MHz bands, the limit for peak output power is 1Watt and the e.i.r.p. shall not exceed 4 W.

Note:

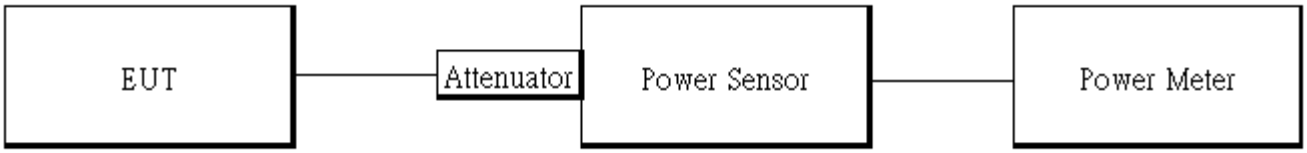
When the antenna gain is greater than 6 dBi, the power limit attenuated accordingly.

8.2 Test Setup

8.2.1 Duty Cycle



8.2.2 Output Power



8.3 Measurement Procedure:

8.3.1 Duty Cycle

1. Place the EUT on the table and set it in transmitting mode.
2. Set span = Zero
3. RBW = 8MHz, VBW = 8MHz,
4. Detector = Peak

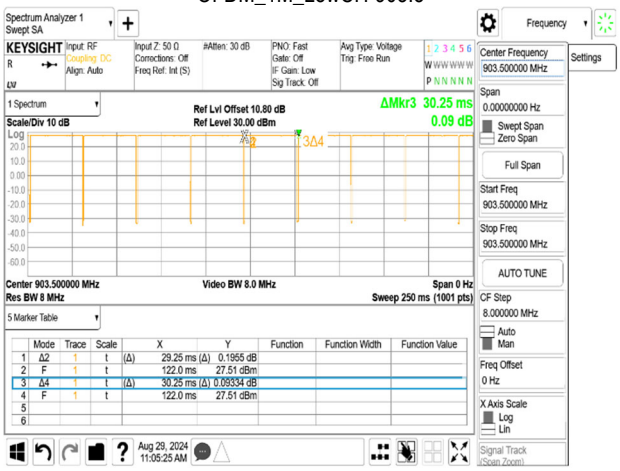
8.4 Output Power

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter.
4. Record the max. Reading as observed from Power Meter.
5. Repeat above procedures until all test default channel measured was complete.

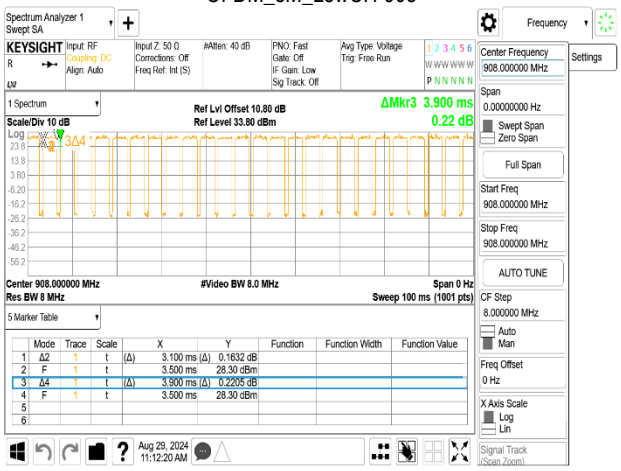
8.5 Duty Factor:

	Duty Cycle (%) = Ton / (Ton+Toff)	Duty Factor (dB) =10*log (1/Duty Cycle)	1/T (kHz)	VBW setting (kHz)
OFDM_1M	96.69	0.15	0.03	1.00
OFDM_2M	93.38	0.30	0.08	1.00
OFDM_4M	87.32	0.59	0.16	1.00
OFDM_8M	79.48	1.00	0.32	1.00

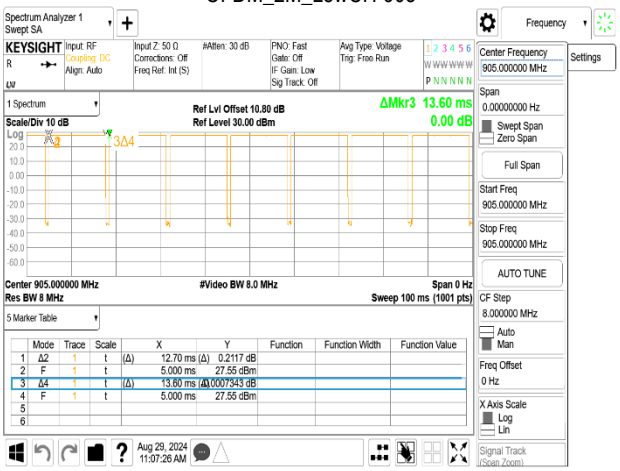
OFDM_1M_LowCH-903.5



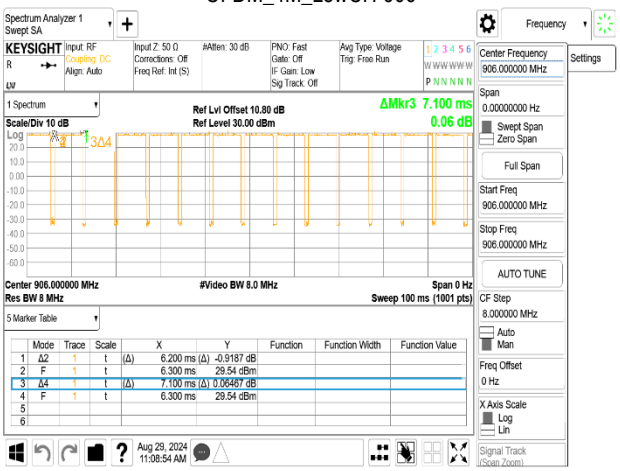
OFDM_8M_LowCH-908



OFDM_2M_LowCH-905



OFDM_4M_LowCH-906



8.6 Output Power:

8.6.1 Peak & Avg

FCC

OFDM 1M mode:

CH	Frequency (MHz)	Power Setting	Peak Output Power (dBm)	Required Limit (dBm)
3	903.5	0	**26.75**	29.6
25	914.5	0	26.51	29.6
49	926.5	0	26.63	29.6
CH	**Frequency (MHz)**	**Power Setting**	**Avg. Output Power (dBm)**	**Required Limit (dBm)**
3	903.5	0	20.67	29.6
25	914.5	0	20.36	29.6
49	926.5	0	20.48	29.6

Note:

1.Measured by power meter, cable loss 10.8 dB + Duty cycle factor has been offseted to the power meter for Avg. power and cable loss has been offseted for Peak power measurement.

2.The antenna gain is grater than 6 dBi, therefore the power limit attenuation has been applied in the test results. 30-(antenna gain-6)=29.6

OFDM 2M mode:

CH	Frequency (MHz)	Power set	Peak Output Power (dBm)	Required Limit (dBm)
Low	905	0	**26.79**	29.6
Mid	915	0	26.54	29.6
High	925	0	26.73	29.6
CH	**Frequency (MHz)**	**Power set**	**Avg. Output Power (dBm)**	**Required Limit (dBm)**
Low	905	0	20.63	29.6
Mid	915	0	20.37	29.6
High	925	0	20.50	29.6

Note:

1.Measured by power meter, cable loss 10.8 dB + Duty cycle factor has been offseted to the power meter for Avg. power and cable loss has been offseted for Peak power measurement.

2.The antenna gain is grater than 6 dBi, therefore the power limit attenuation has been applied in the test results. 30-(antenna gain-6)=29.6

OFDM 4M mode:

CH	Frequency (MHz)	Power set	Peak Output Power (dBm)	Required Limit (dBm)
Low	906	0	**26.83**	29.6
Mid	914	0	26.76	29.6
High	926	0	25.75	29.6
CH	**Frequency (MHz)**	**Power set**	**Avg. Output Power (dBm)**	**Required Limit (dBm)**
Low	906	0	20.54	29.6
Mid	914	0	20.20	29.6
High	926	0	17.15	29.6

Note:

1.Measured by power meter, cable loss 10.8 dB + Duty cycle factor has been offseted to the power meter for Avg. power and cable loss has been offseted for Peak power measurement.

2.The antenna gain is grater than 6 dBi, therefore the power limit attenuation has been applied in the test results. 30-(antenna gain-6)=29.6

OFDM 8M mode:

CH	Frequency (MHz)	Power set	Peak Output Power (dBm)	Required Limit (dBm)
Low	908	0	**26.78**	29.6
Mid	916	0	26.65	29.6
High	924	0	25.62	29.6
CH	**Frequency (MHz)**	**Power set**	**Avg. Output Power (dBm)**	**Required Limit (dBm)**
Low	908	0	20.35	29.6
Mid	916	0	20.07	29.6
High	924	0	16.72	29.6

Note:

1.Measured by power meter, cable loss 10.8 dB + Duty cycle factor has been offseted to the power meter for Avg. power and cable loss has been offseted for Peak power measurement.

2.The antenna gain is grater than 6 dBi, therefore the power limit attenuation has been applied in the test results. 30-(antenna gain-6)=29.6

IC

OFDM 1M mode:

CH	Frequency (MHz)	Power Setting	Peak Output Power (dBm)	Required Limit (dBm)
3	903.5	0	**26.75**	30
25	914.5	0	26.51	30
49	926.5	0	26.63	30
CH	**Frequency (MHz)**	**Power Setting**	**Avg. Output Power (dBm)**	**Required Limit (dBm)**
3	903.5	0	20.67	30
25	914.5	0	20.36	30
49	926.5	0	20.48	30

Note:

1.Measured by power meter, cable loss 10.8 dB + Duty cycle factor has been offseted to the power meter for Avg. power and cable loss has been offseted for Peak power measurement.

OFDM 2M mode:

CH	Frequency (MHz)	Power set	Peak Output Power (dBm)	Required Limit (dBm)
Low	905	0	**26.79**	30
Mid	915	0	26.54	30
High	925	0	26.73	30
CH	**Frequency (MHz)**	**Power set**	**Avg. Output Power (dBm)**	**Required Limit (dBm)**
Low	905	0	20.63	30
Mid	915	0	20.37	30
High	925	0	20.50	30

Note:

1.Measured by power meter, cable loss 10.8 dB + Duty cycle factor has been offseted to the power meter for Avg. power and cable loss has been offseted for Peak power measurement.

OFDM 4M mode:

CH	Frequency (MHz)	Power set	Peak Output Power (dBm)	Required Limit (dBm)
Low	906	0	**26.83**	30
Mid	914	0	26.76	30
High	926	0	25.75	30
CH	**Frequency (MHz)**	**Power set**	**Avg. Output Power (dBm)**	**Required Limit (dBm)**
Low	906	0	20.54	30
Mid	914	0	20.20	30
High	926	0	17.15	30

Note:

1.Measured by power meter, cable loss 10.8 dB + Duty cycle factor has been offseted to the power meter for Avg. power and cable loss has been offseted for Peak power measurement.

OFDM 8M mode:

CH	Frequency (MHz)	Power set	Peak Output Power (dBm)	Required Limit (dBm)
Low	908	0	**26.78**	30
Mid	916	0	26.65	30
High	924	0	25.62	30
CH	**Frequency (MHz)**	**Power set**	**Avg. Output Power (dBm)**	**Required Limit (dBm)**
Low	908	0	20.35	30
Mid	916	0	20.07	30
High	924	0	16.72	30

Note:

1.Measured by power meter, cable loss 10.8 dB + Duty cycle factor has been offseted to the power meter for Avg. power and cable loss has been offseted for Peak power measurement.

8.6.2 EIRP

EIRP OFDM 1M mode

CH	Frequency (MHz)	Power Setting	Avg. Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit		
3	903.5	0	20.67	6.40	27.07	4W=	36	dBm
25	914.5	0	20.36	6.40	26.76	4W=	36	dBm
49	926.5	0	20.48	6.40	26.88	4W=	36	dBm

* ***Note:*** EIRP = Average Power + Gain

EIRP OFDM 2M mode

CH	Frequency (MHz)	Power set	Avg. Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit		
Low	905	0	20.63	6.40	27.03	4W=	36	dBm
Mid	915	0	20.37	6.40	26.77	4W=	36	dBm
High	925	0	20.50	6.40	26.90	4W=	36	dBm

* ***Note:*** EIRP = Average Power + Gain

EIRP OFDM 4M mode

CH	Frequency (MHz)	Power set	Avg. Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit		
Low	906	0	20.54	6.40	26.94	4W=	36	dBm
Mid	914	0	20.20	6.40	26.60	4W=	36	dBm
High	926	0	17.15	6.40	23.55	4W=	36	dBm

* ***Note:*** EIRP = Average Power + Gain

EIRP OFDM 8M mode

CH	Frequency (MHz)	Power set	Avg. Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit		
Low	908	0	20.35	6.40	26.75	4W=	36	dBm
Mid	916	0	20.07	6.40	26.47	4W=	36	dBm
High	924	0	16.72	6.40	23.12	4W=	36	dBm

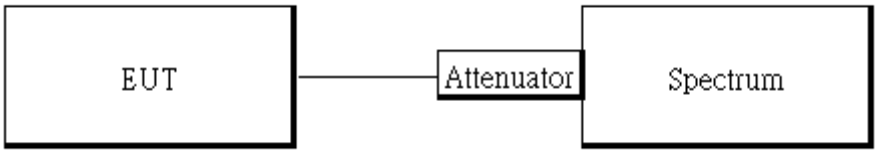
* ***Note:*** EIRP = Average Power + Gain

9 EMISSION BANDWIDTH MEASUREMENT

9.1 Standard Applicable

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

9.2 Test Setup



9.3 Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

9.3.1 6dB BW measurements

1. The testing follows the Measurement Procedure of the KDB 558074 D01.
2. Set the spectrum analyzer as
   RBW= 100 kHz ,
   VBW = 3 X RBW,
   Span= 2 to 5 times of the OBW,
   Sweep=auto, Detector = Peak, and Max hold.
3. Mark the upper and lower frequencies of -6dB.
4. Repeat above procedures until all test default channel is completed.

9.3.2 99% BW measurements

1. The testing follows the Measurement Procedure of the RSS-Gen section 6.7.
2. Set the spectrum analyzer as
   RBW= 1 % to 5% of 99%,
   VBW ≥ 3 X RBW,
   Span= large enough to capture all products of the modulation process
   Sweep=auto, Detector = Peak, and Max hold.
3. Mark the upper and lower frequencies of 99%.
4. Repeat above procedures until all test default channel is completed.

9.4 Measurement Result:

9.4.1 6dB BW measurements

OFDM 1M mode

Frequency (MHz)	6dB BW (MHz)	Required BW (MHz)	Result
903.5	0.808	≧ 0.5	PASS
914.5	0.8147	≧ 0.5	PASS
926.5	0.8178	≧ 0.5	PASS

OFDM 2M mode

Frequency (MHz)	6dB BW (MHz)	Required BW (MHz)	Result
905	1.736	≧ 0.5	PASS
915	1.72	≧ 0.5	PASS
925	1.723	≧ 0.5	PASS

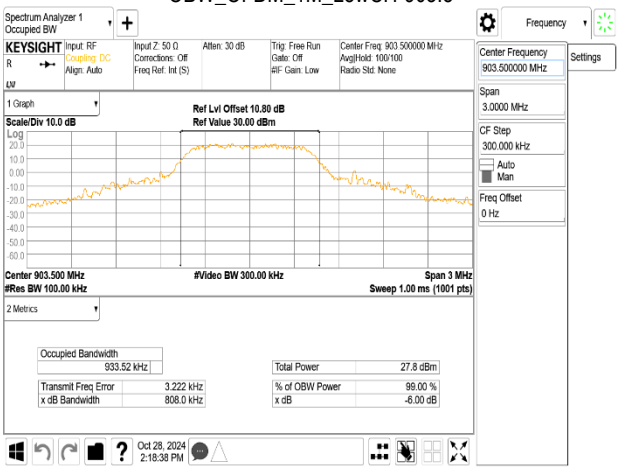
OFDM 4M mode

Frequency (MHz)	6dB BW (MHz)	Required BW (MHz)	Result
906	3.573	≧ 0.5	PASS
914	3.528	≧ 0.5	PASS
926	3.574	≧ 0.5	PASS

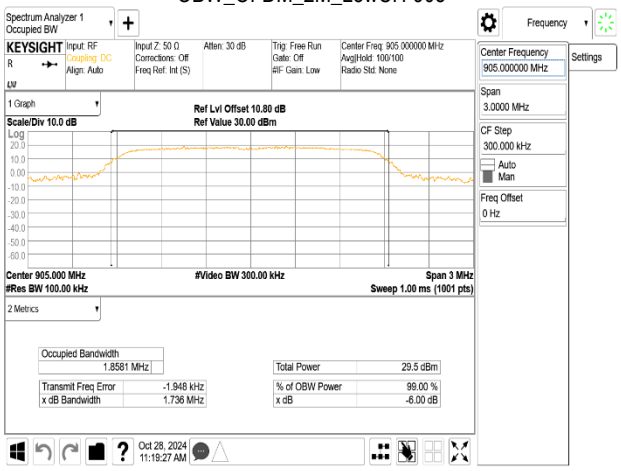
OFDM 8M mode

Frequency (MHz)	6dB BW (MHz)	Required BW (MHz)	Result
908	7.481	≧ 0.5	PASS
916	7.513	≧ 0.5	PASS
924	7.547	≧ 0.5	PASS

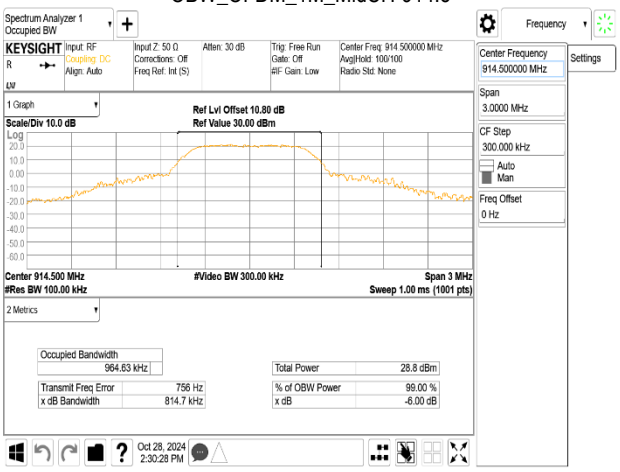
OBW_OFDM_1M_LowCH-903.5



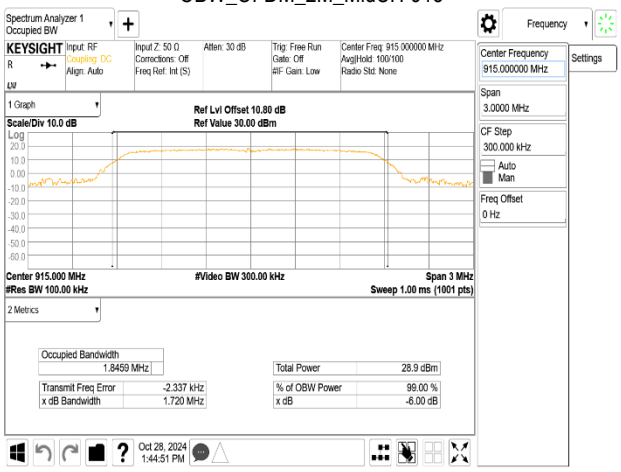
OBW_OFDM_2M_LowCH-905



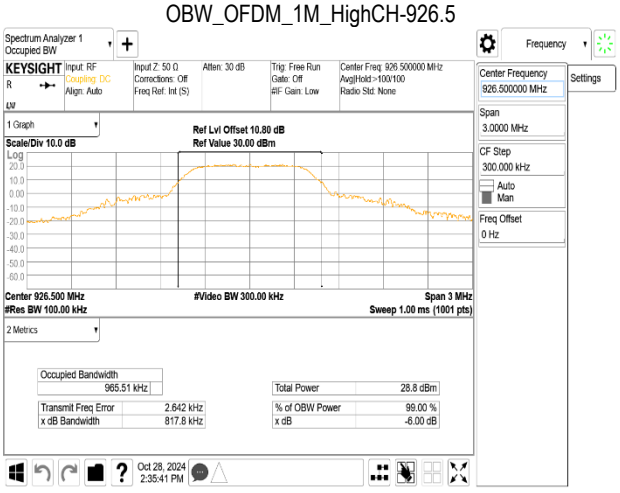
OBW_OFDM_1M_MidCH-914.5



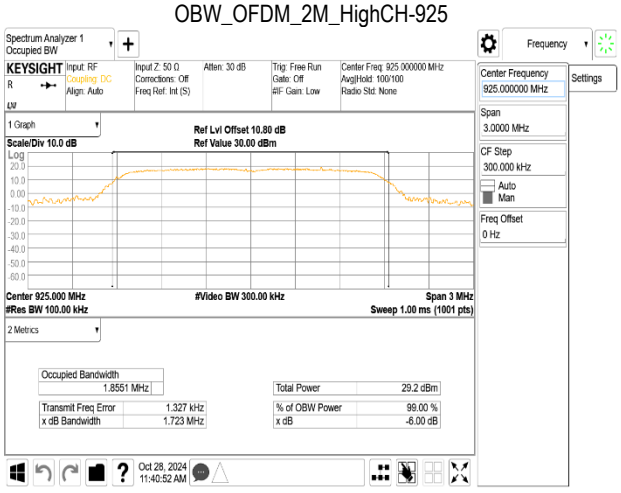
OBW_OFDM_2M_MidCH-915



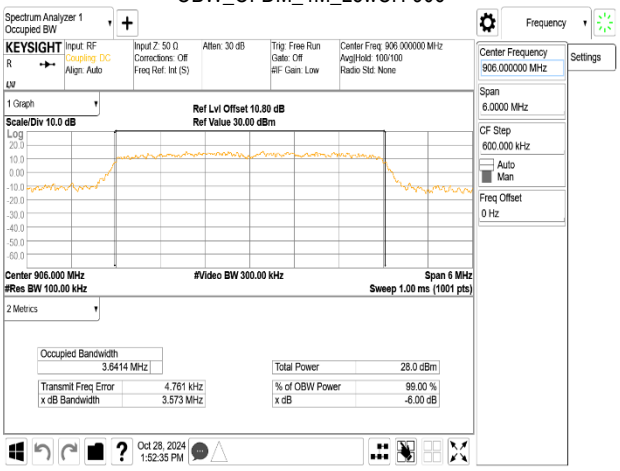
OBW_OFDM_1M_HighCH-926.5



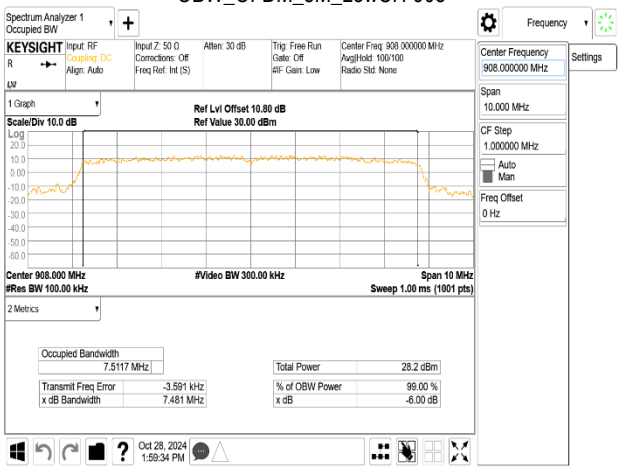
OBW_OFDM_2M_HighCH-925



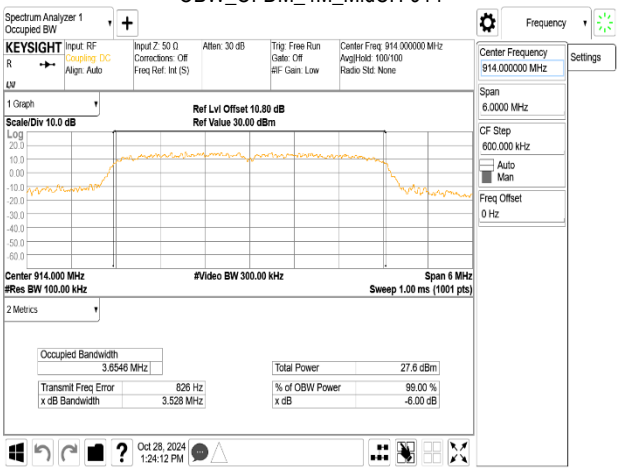
OBW_OFDM_4M_LowCH-906



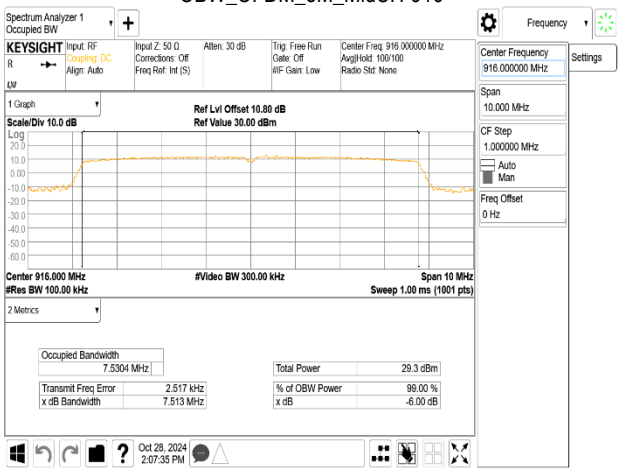
OBW_OFDM_8M_LowCH-908



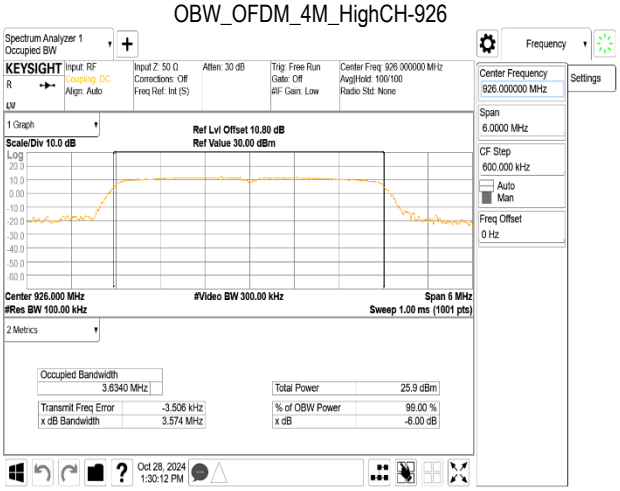
OBW_OFDM_4M_MidCH-914



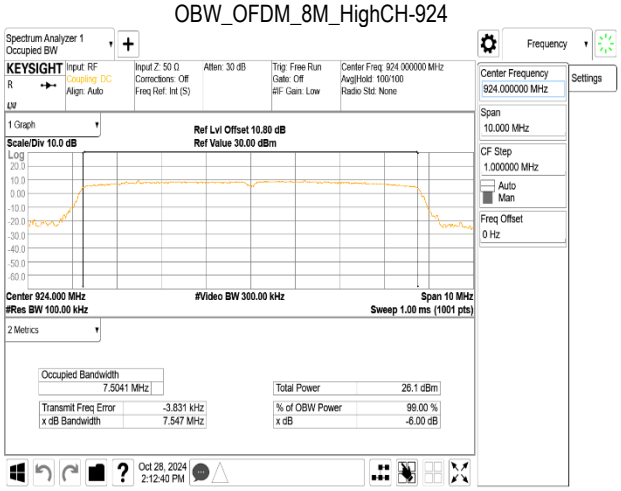
OBW_OFDM_8M_MidCH-916



OBW_OFDM_4M_HighCH-926



OBW_OFDM_8M_HighCH-924



9.4.2 99% Bandwidth

OFDM 1M mode

Frequency (MHz)	99%Bandwidth (MHz)
903.5	0.87883
914.5	0.87342
926.5	0.87521

OFDM 2M mode

Frequency (MHz)	99%Bandwidth (MHz)
905	1.8787
915	1.8542
925	1.8658

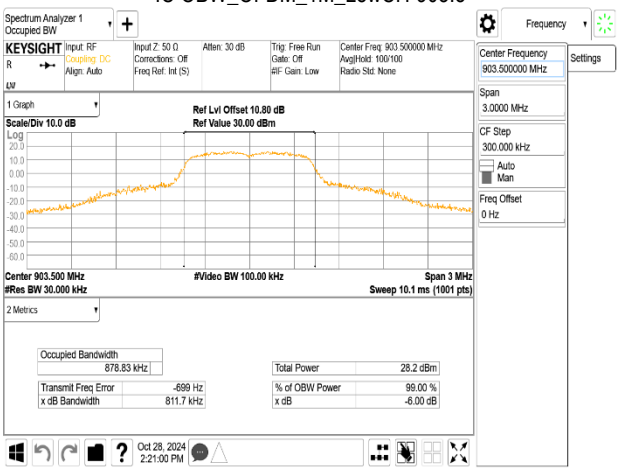
OFDM 4M mode

Frequency (MHz)	99%Bandwidth (MHz)
906	3.6414
914	3.6546
926	3.634

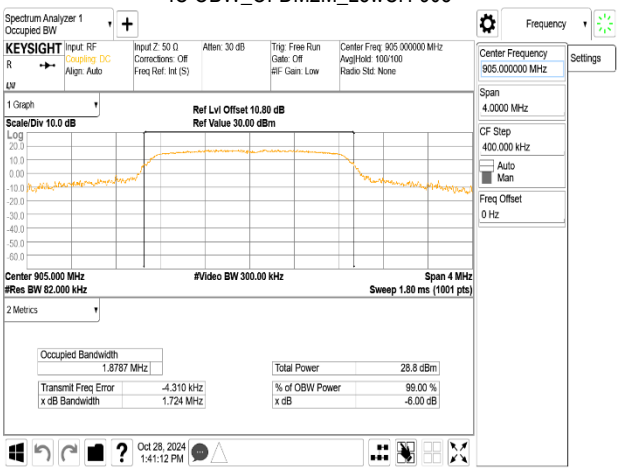
OFDM 8M mode

Frequency (MHz)	99%Bandwidth (MHz)
908	7.5117
916	7.5304
924	7.5041

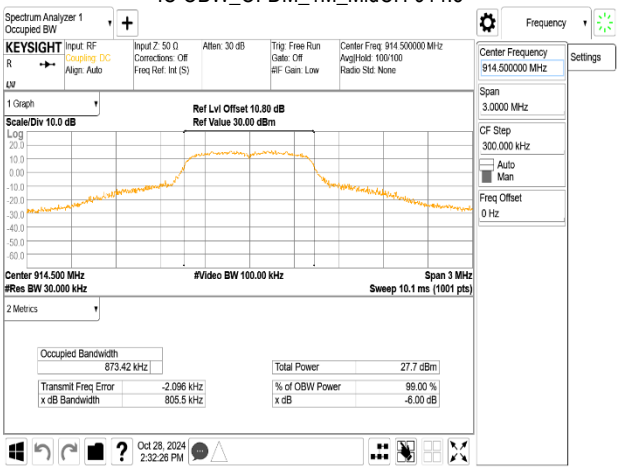
IC OBW_OFDM_1M_LowCH-903.5



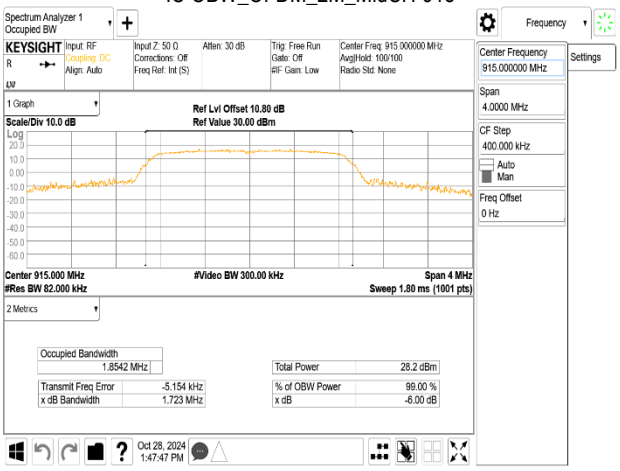
IC OBW_OFDM2M_LowCH-905



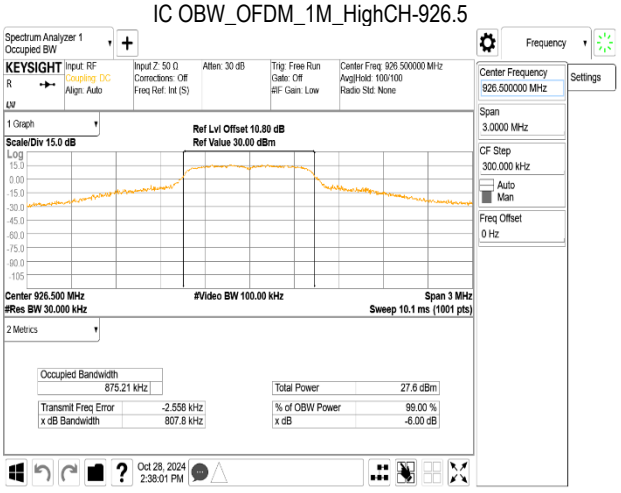
IC OBW_OFDM_1M_MidCH-914.5



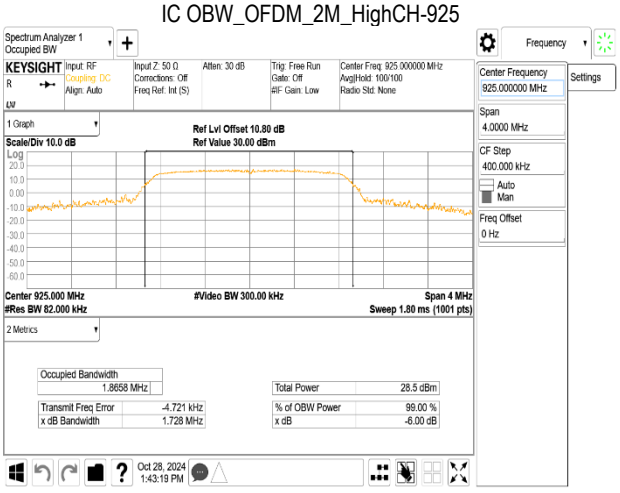
IC OBW_OFDM_2M_MidCH-915



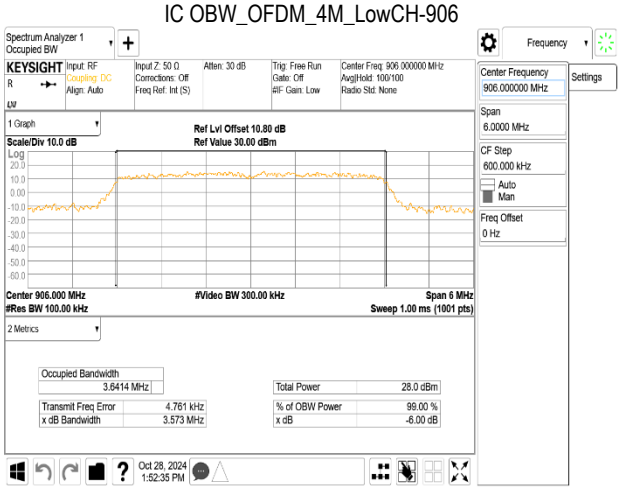
IC OBW_OFDM_1M_HighCH-926.5



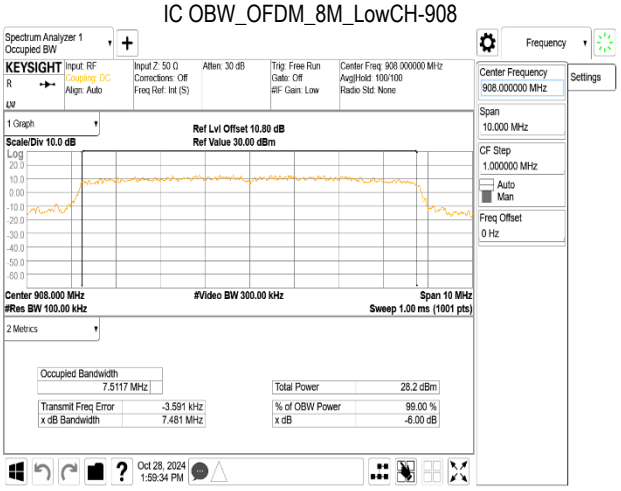
IC OBW_OFDM_2M_HighCH-925



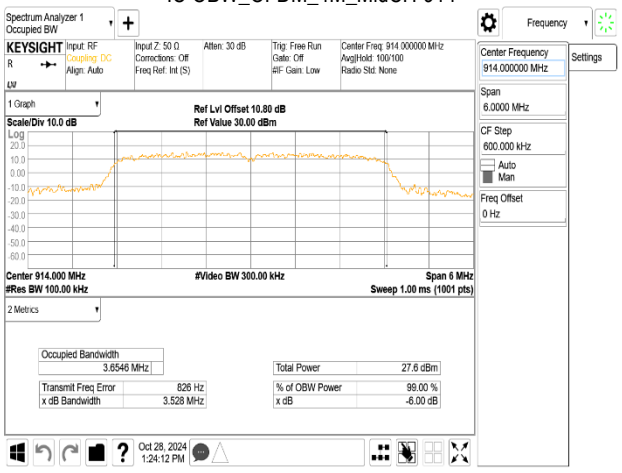
IC OBW_OFDM_4M_LowCH-906



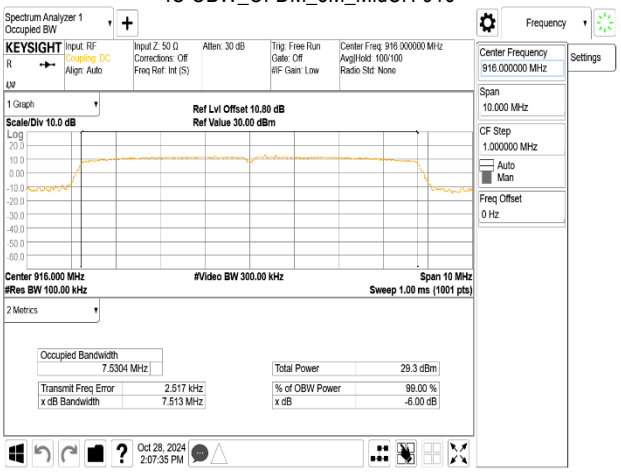
IC OBW_OFDM_8M_LowCH-908



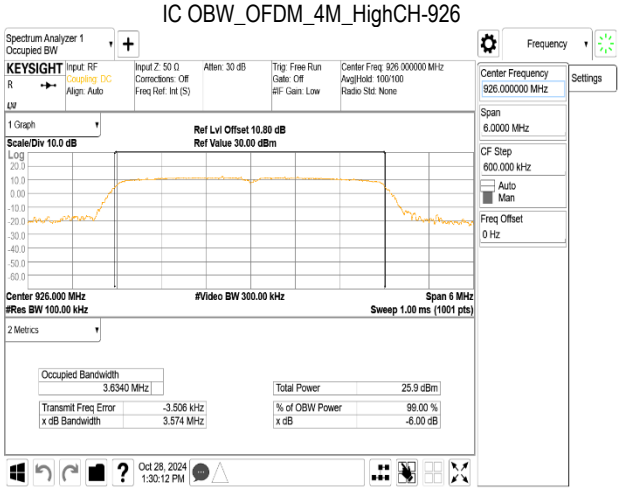
IC OBW_OFDM_4M_MidCH-914



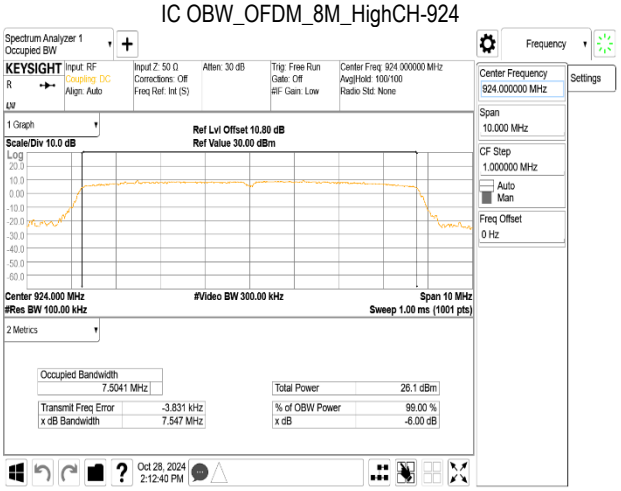
IC OBW_OFDM_8M_MidCH-916



IC OBW_OFDM_4M_HighCH-926



IC OBW_OFDM_8M_HighCH-924

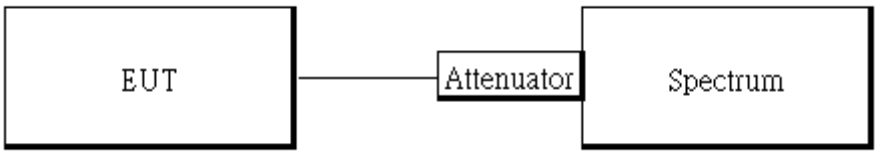


10 CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT

10.1 Standard Applicable

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a) & RSS-Gen §8.10, must also comply with the radiated emission limits specified in §15.209(a) & RSS-Gen §8.9.

10.2 Test Setup



10.3 Measurement Procedure

10.3.1 Reference Level of Emission Limit:

1. Set analyzer center frequency to DTS channel center frequency.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
3. Set the span to 1.5 times the DTS channel bandwidth.
4. Set the RBW = 100kHz & VBW = 300 kHz.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.

10.3.2 Conducted Band Edge:

1. To connect Antenna Port of EUT to Spectrum.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
4. Set start to edge frequency, and stop frequency of spectrum analyzer so as to encompass the spectrum to be examined.
5. Set the spectrum analyzer as RBW=100 kHz, VBW=300 kHz, Detector = Peak, Sweep = auto
6. Set DL as the limit =
   OFDM 1M reading on marker of reference level measurement – 30dBm
   OFDM 2M & 4M & 8M reading on marker of reference level measurement – 20dBm
7. Mark the highest readings of the emissions outside of 902-928 MHz.
8. Repeat above procedures until all default test channel (low, middle, and high) was complete.

10.3.3 Conducted Spurious Emission:

1. To connect Antenna Port of EUT to Spectrum.
2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
3. Set RBW = 100 kHz & VBW=300 kHz, Detector =Peak, Sweep = Auto
4. Allow trace to fully stabilize.
5. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.
6. Repeat above procedures until all default test channel measured were complete.

10.4 Measurement Result

OFDM 1M_Reference Level of Limit

Frequency (MHz)	RF Power Density (dBm)	Reference Level of Limit = PSD - 30dB (dBm)
903.5	21.74	-8.26
914.5	20.79	-9.21
926.5	21.74	-8.26

Note:

1.cable loss as 10.8dB that offsets in the spectrum
2.Refer to next page for plots.

OFDM 2M_Reference Level of Limit

Frequency (MHz)	RF Power Density (dBm)	Reference Level of Limit = PSD - 20dB (dBm)
905	19.72	-0.28
915	18.04	-1.96
925	18.58	-1.42

Note:

1.cable loss as 10.8dB that offsets in the spectrum
2.Refer to next page for plots.

OFDM 4M_Reference Level of Limit

Frequency (MHz)	RF Power Density (dBm)	Reference Level of Limit = PSD - 20dB (dBm)
906	16.19	-3.81
914	16.30	-3.70
926	12.26	-7.74

Note:

1.cable loss as 10.8dB that offsets in the spectrum
2.Refer to next page for plots.

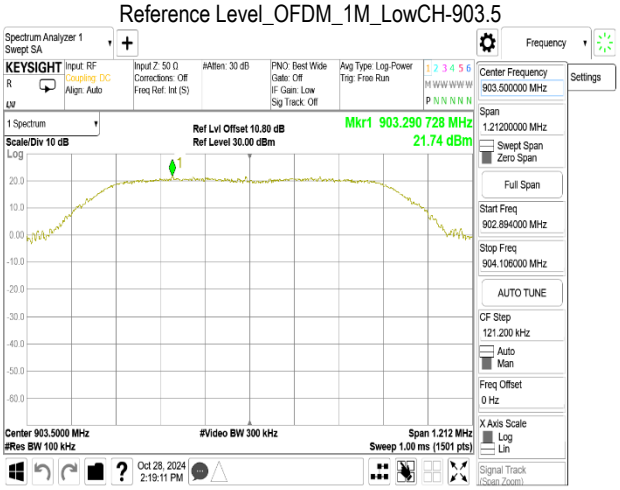
OFDM 8M_Reference Level of Limit

Frequency (MHz)	RF Power Density (dBm)	Reference Level of Limit = PSD - 20dB (dBm)
908	14.06	-5.94
916	11.98	-8.02
924	9.96	-10.04

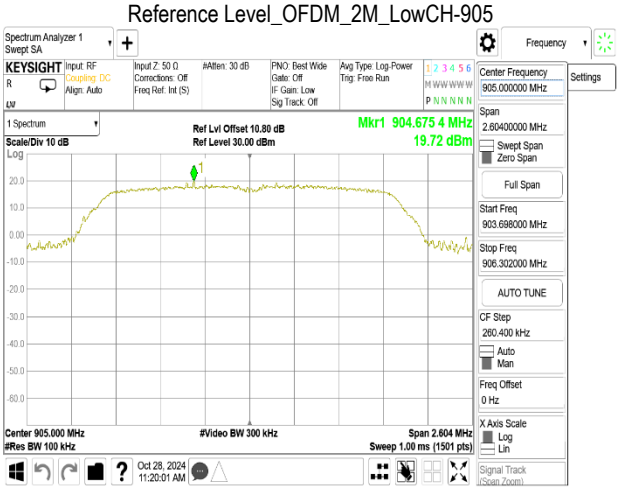
Note:

1.cable loss as 10.8dB that offsets in the spectrum
2.Refer to next page for plots.

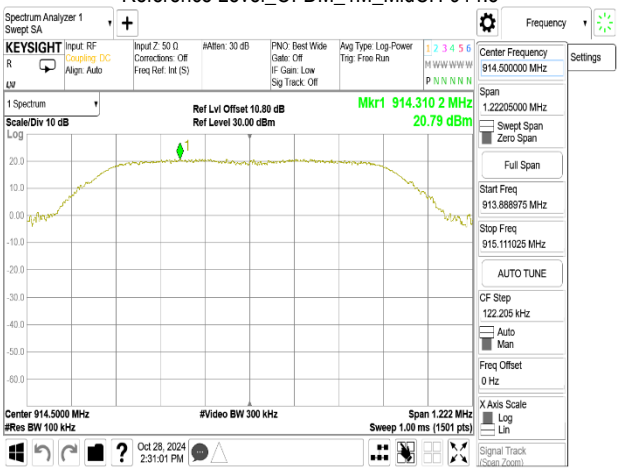
Reference Level_OFDM_1M_LowCH-903.5



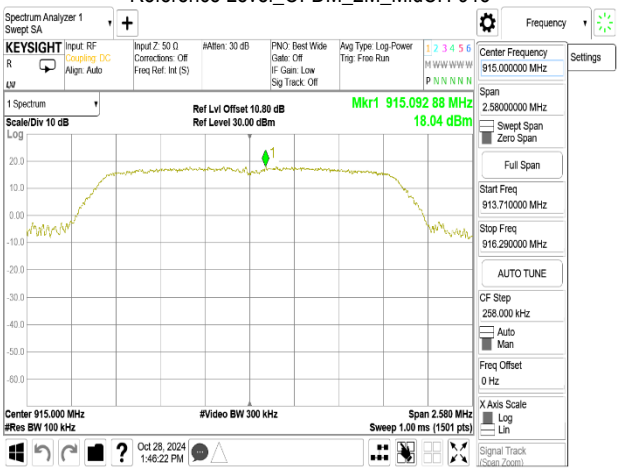
Reference Level_OFDM_2M_LowCH-905



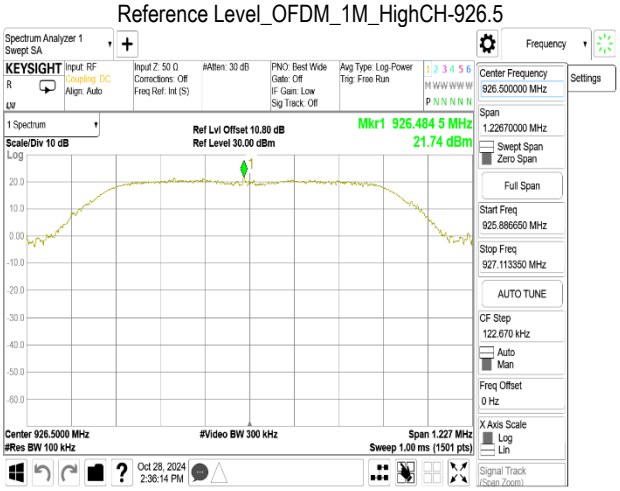
Reference Level_OFDM_1M_MidCH-914.5



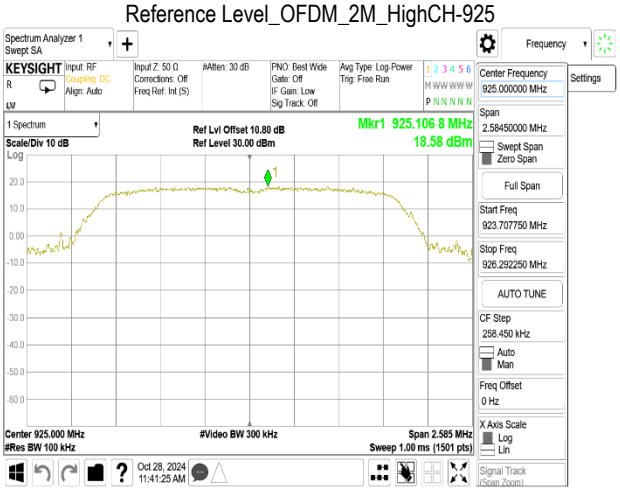
Reference Level_OFDM_2M_MidCH-915



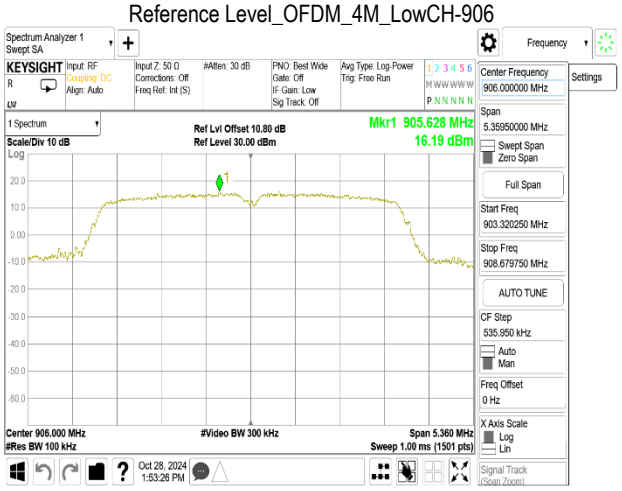
Reference Level_OFDM_1M_HighCH-926.5



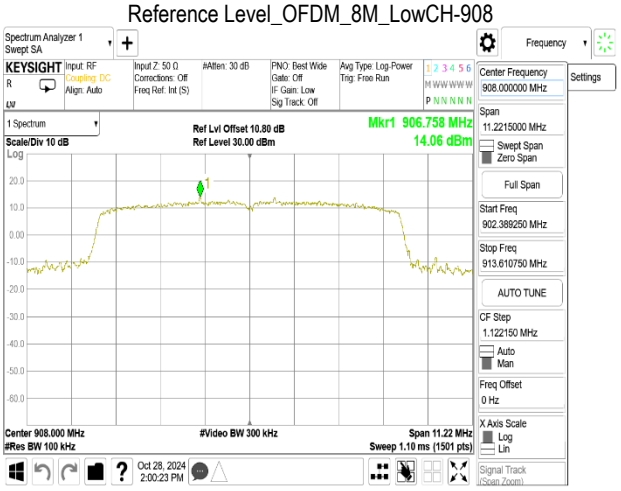
Reference Level_OFDM_2M_HighCH-925



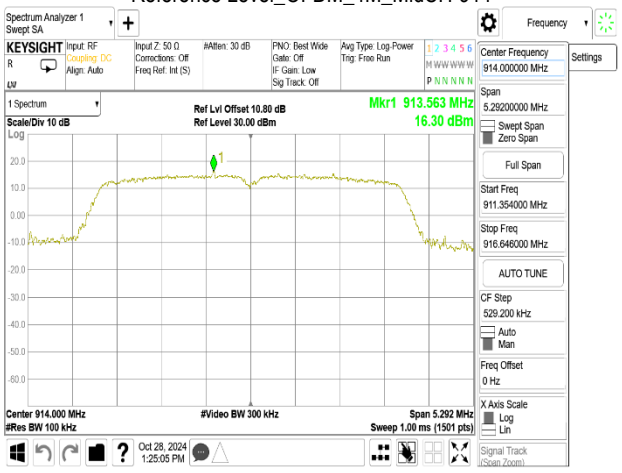
Reference Level_OFDM_4M_LowCH-906



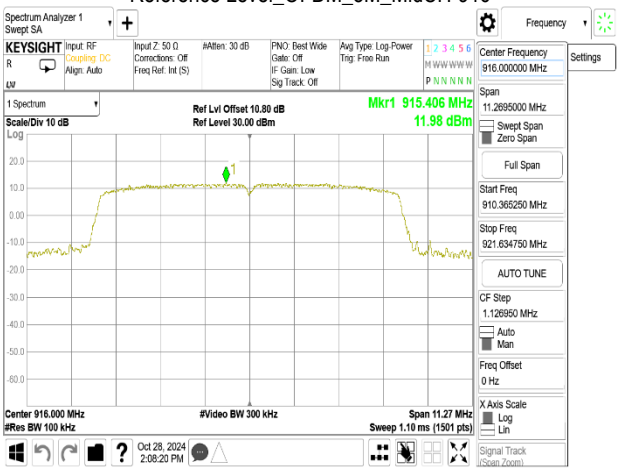
Reference Level_OFDM_8M_LowCH-908



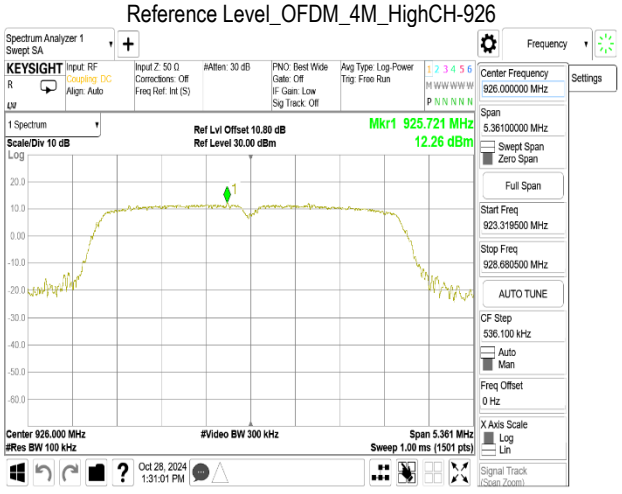
Reference Level_OFDM_4M_MidCH-914



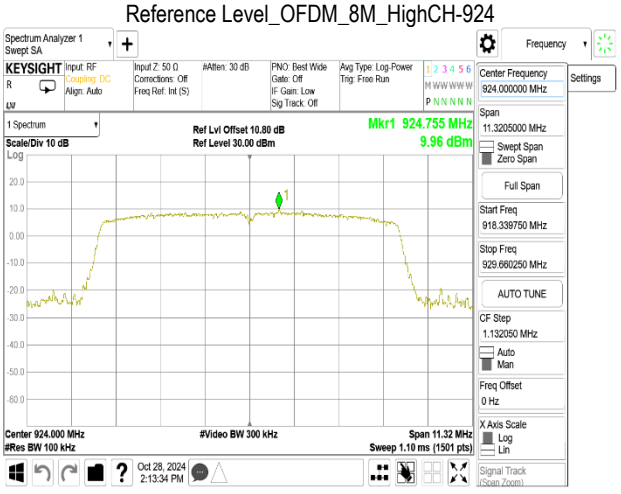
Reference Level_OFDM_8M_MidCH-916



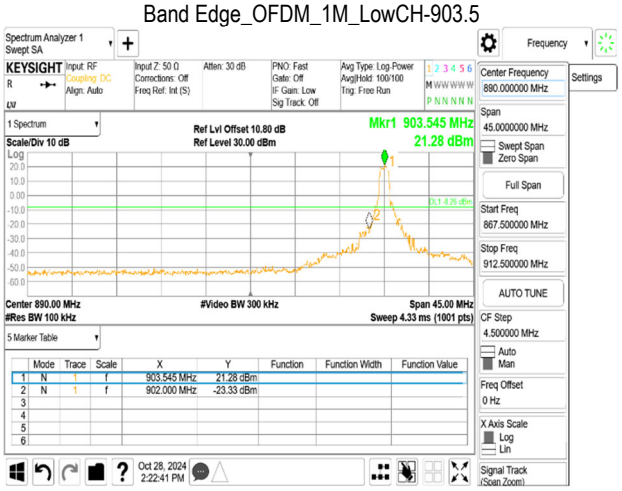
Reference Level_OFDM_4M_HighCH-926



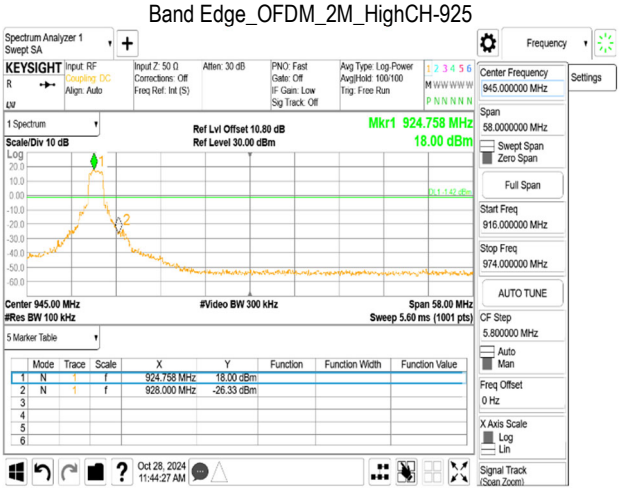
Reference Level_OFDM_8M_HighCH-924



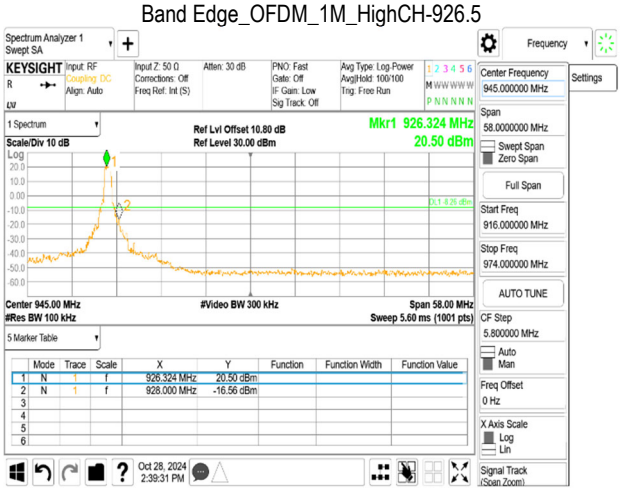
Band Edge_OFDM_1M_LowCH-903.5



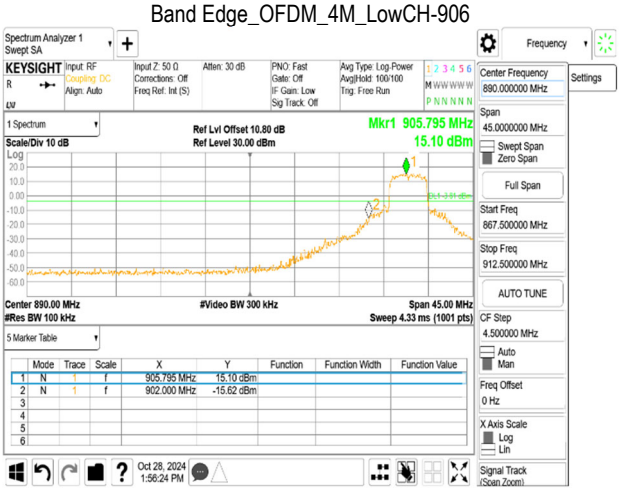
Band Edge_OFDM_2M_HighCH-925



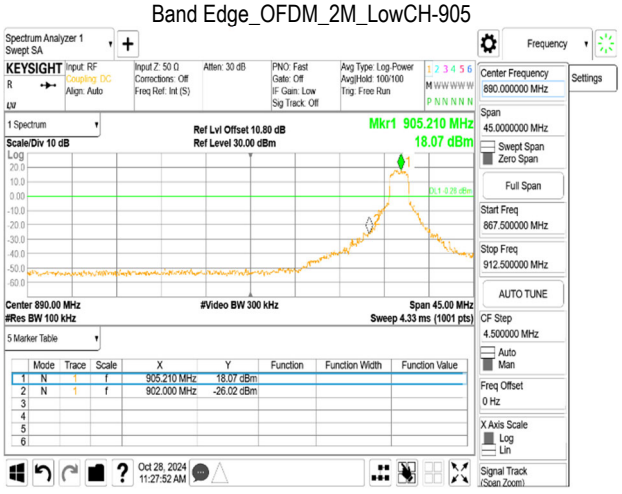
Band Edge_OFDM_1M_HighCH-926.5



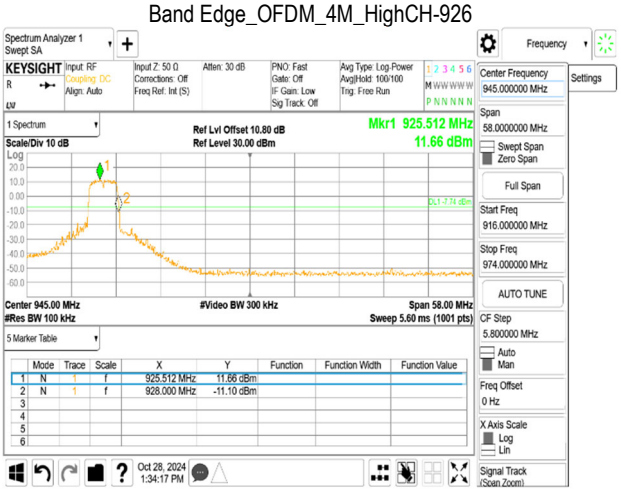
Band Edge_OFDM_4M_LowCH-906



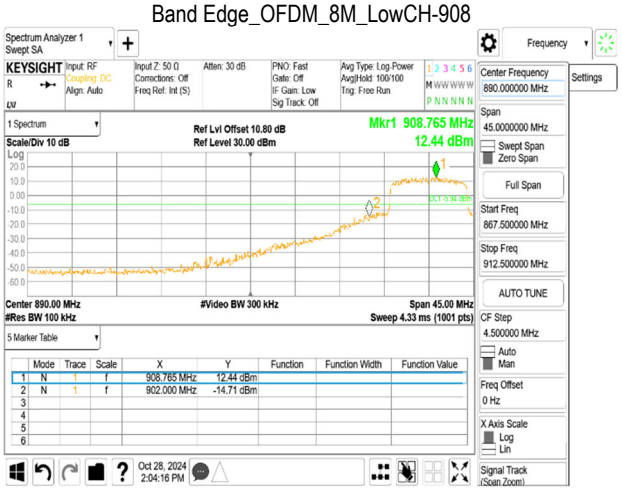
Band Edge_OFDM_2M_LowCH-905



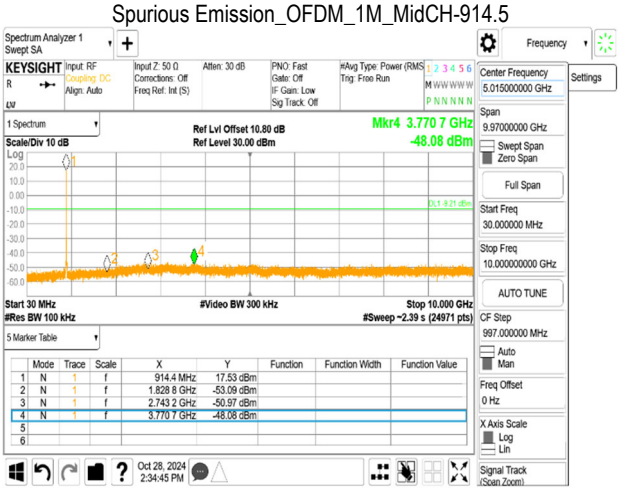
Band Edge_OFDM_4M_HighCH-926



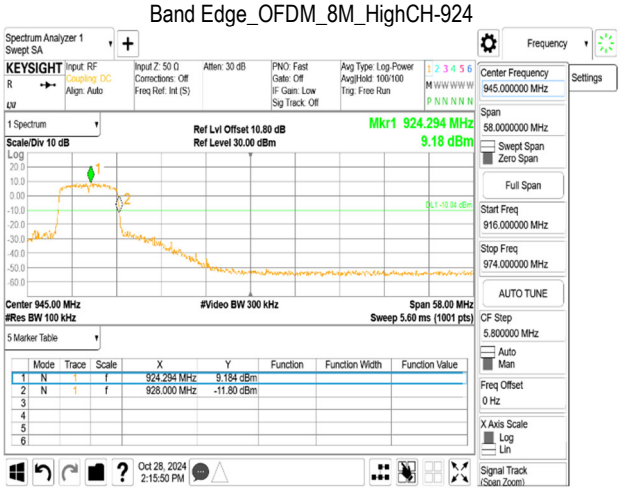
Band Edge_OFDM_8M_LowCH-908



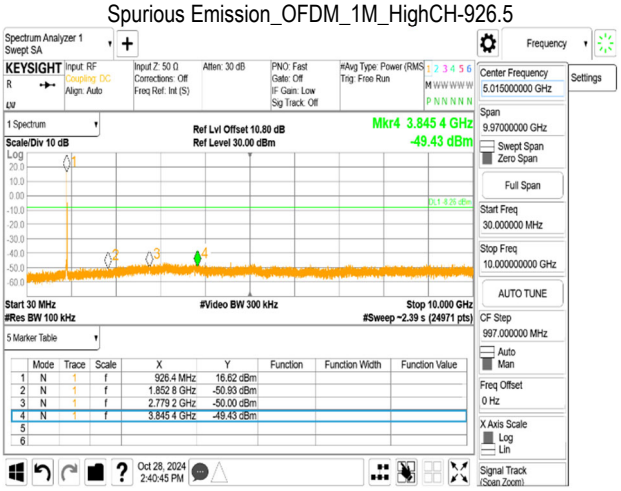
Spurious Emission_OFDM_1M_MidCH-914.5



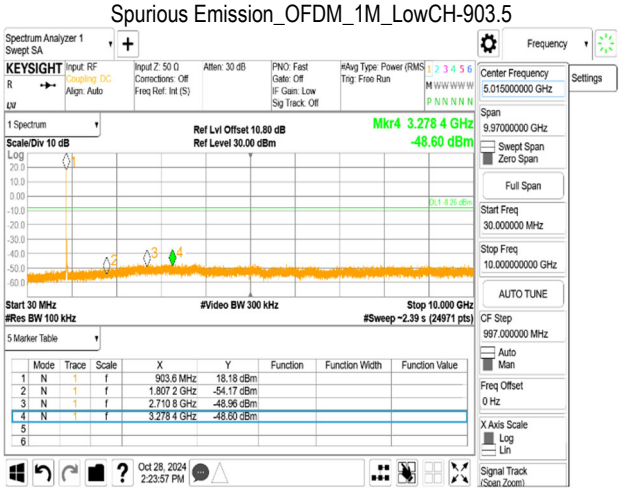
Band Edge_OFDM_8M_HighCH-924



Spurious Emission_OFDM_1M_HighCH-926.5



Spurious Emission_OFDM_1M_LowCH-903.5



Spurious Emission_OFDM_2M_LowCH-905