



# TEST REPORT

**APPLICANT** : MiMOMax Wireless Limited  
**PRODUCT NAME** : 900MHz TornadoXR Transceiver  
**MODEL NAME** : MWL-TORNADOX-BGCA  
**BRAND NAME** : Ubiik Mimomax  
**FCC ID** : XMK-MMXTRNXB013  
**STANDARD(S)** : 47 CFR Part 2  
                  : 47 CFR Part 24  
**RECEIPT DATE** : 2024-06-20  
**TEST DATE** : 2024-07-11 to 2025-01-08  
**ISSUE DATE** : 2025-07-21

Tested by:

Gan Jing ( Rapporteur)

Approved by:

Shen Junsheng( Supervisor)

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**MORLAB**

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Change History		
Issue	Date	Reason for change
1.0	2025-07-21	First edition



# 1. Technical Information

**Note:** Provide by applicant.

## 1.1. Applicant and Manufacturer Information

<b>Applicant:</b>	MiMOMax Wireless Limited
<b>Applicant Address:</b>	540 Wairakei Road, Christchurch 8053, New Zealand
<b>Manufacturer:</b>	MiMOMax Wireless Limited
<b>Manufacturer Address:</b>	540 Wairakei Road, Christchurch 8053, New Zealand

## 1.2. Equipment Under Test (EUT) Description

<b>Product Name:</b>	900MHz TornadoXR Transceiver		
<b>EUT Serial No:</b>	(N/A, marked 1# by test site)		
<b>Hardware Version:</b>	P001		
<b>Software Version:</b>	TRN_04.08.04		
<b>Operating Frequency Range:</b>	901-902 MHz, 2Tx/2Rx		
<b>Channel Bandwidth:</b>	12.5kHz; 25kHz; 50kHz		
<b>Modulation Type:</b>	QPSK; 16QAM; 64QAM; 256QAM		
<b>Operating Voltage:</b>	10.5-60Vdc		
<b>Antenna Gain:</b>	Omni Antenna	2.5 dBi	
		4.0 dBi	
		6.0 dBi	
		8.0 dBi	
	Panel Antenna	8.0 dBi	
		10.0 dBi	
		12.0 dBi	
<b>Emission Designator:</b>	Parabolic Antenna	16.0 dBi	
		21.5 dBi	
	BW(kHz)	Designator	
	12.5kHz	10K0W1W	
	25.0kHz	20K0W1W	
	50.0kHz	42K0W1W	



## 1.3. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 2 and Part 24 for the EUT FCC ID Certification:

No.	Identity	Document Title
1	47 CFR Part 2	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
2	47 CFR Part 24	Personal Communications Services

Test detailed items/section required by FCC rules and results are listed as below:

Section	Description	Test Engineer	Result	Method Determination /Remark
2.1046 24.132	Transmitter Conducted Output Power and ERP/EIRP	Gan Jing	PASS	No deviation
2.1049	Occupied Bandwidth	Gan Jing	PASS	No deviation
2.1051 24.133	Conducted Spurious Emissions	Gan Jing	PASS	No deviation
2.1053 24.133	Radiated Spurious Emissions	Li Hanbin	PASS	No deviation
2.1055 24.135	Frequency stability	Gan Jing	PASS	No deviation

**Note 1:** The TornadoXR Transceiver complies with FCC 47 CFR Part 2 and Part 24 when tested in accordance with the test methods described in 47 CFR Part 2 and Part 24.

**Note 2:** The TornadoXR Transceiver supports 2 Tx antenna ports, which was defined as Channel H & Channel V separately.

**Note 3:** The path loss during the conducted RF test is calibrated to correct the results by the Ext Gain setting. The Ext Gain contains two parts that cable loss of 0.7dB and attenuator of 30.0dB.

**Note 4:** When the test result is a critical value, we will use the measurement uncertainty give the judgment result based on the 95% confidence intervals.

**Note 5:** The prototype has two kinds of power under different conditions, we define Type 1 in the case of 28dBm power and Type 2 in the case of 34dBm power. In this report, we have recorded the test data of type 2.



## 1.4. Environmental Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	15 - 35
Relative Humidity (%):	30 -60



## 2. Summary Test Results And Description

### 2.1. Radio Frequency Power Output and E.R.P.

#### 2.1.1. Test result

Type 1:

Nominal Frequency: 901.5 MHz Tx Port: Channel H

Channel Bandwidth (kHz)	Modulation Type	Voltage (Vdc)	Measured Power (dBm)	Measured Power (Watt)	Rated Power (Watt)	E.R.P. (ANT Gain = 4.0dBi)		E.R.P. (ANT Gain = 12.0dBi)	
						dBm	Watt	dBm	Watt
12.5	QPSK	24	28.53	0.713	0.63	30.38	1.091	38.38	6.887
12.5	16QAM	24	28.19	0.659	0.63	30.04	1.009	38.04	6.368
12.5	64QAM	24	28.30	0.676	0.63	30.15	1.035	38.15	6.531
12.5	256QAM	24	28.57	0.719	0.63	30.42	1.102	38.42	6.950
25.0	QPSK	24	27.49	0.561	0.63	29.34	0.859	37.34	5.420
25.0	16QAM	24	27.39	0.548	0.63	29.24	0.839	37.24	5.297
25.0	64QAM	24	27.45	0.556	0.63	29.30	0.851	37.30	5.370
25.0	256QAM	24	27.53	0.566	0.63	29.38	0.867	37.38	5.470
50.0	QPSK	24	28.15	0.653	0.63	30.00	1.000	38.00	6.310
50.0	16QAM	24	28.42	0.695	0.63	30.27	1.064	38.27	6.714
50.0	64QAM	24	28.05	0.638	0.63	29.90	0.977	37.90	6.166
50.0	256QAM	24	28.42	0.695	0.63	30.27	1.064	38.27	6.714

Nominal Frequency: 901.5 MHz Tx Port: Channel V

Channel Bandwidth (kHz)	Modulation Type	Voltage (Vdc)	Measured Power (dBm)	Measured Power (Watt)	Rated Power (Watt)	E.R.P. (ANT Gain = 4.0dBi)		E.R.P. (ANT Gain = 12.0dBi)	
						dBm	Watt	dBm	Watt
12.5	QPSK	24	28.51	0.710	0.63	30.36	1.086	38.36	6.855
12.5	16QAM	24	28.55	0.716	0.63	30.40	1.096	38.40	6.918
12.5	64QAM	24	28.41	0.693	0.63	30.26	1.062	38.26	6.699
12.5	256QAM	24	28.47	0.703	0.63	30.32	1.076	38.32	6.792
25.0	QPSK	24	27.83	0.607	0.63	29.68	0.929	37.68	5.861



25.0	16QAM	24	27.53	0.566	0.63	29.38	0.867	37.38	5.470
25.0	64QAM	24	28.14	0.652	0.63	29.99	0.998	37.99	6.295
25.0	256QAM	24	28.26	0.670	0.63	30.11	1.026	38.11	6.471
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50.0	QPSK	24	28.36	0.685	0.63	30.21	1.050	38.21	6.622
50.0	16QAM	24	28.04	0.637	0.63	29.89	0.975	37.89	6.152
50.0	64QAM	24	28.35	0.684	0.63	30.20	1.047	38.20	6.607
50.0	256QAM	24	28.68	0.738	0.63	30.53	1.130	38.53	7.129

**Type 2:****Nominal Frequency: 901.5 MHz Tx Port: Channel H**

Channel Bandwidth (kHz)	Modulation Type	Voltage (Vdc)	Measured Power (dBm)	Measured Power (Watt)	Rated Power (Watt)	E.R.P. (ANT Gain = 4.0dBi)		E.R.P. (ANT Gain = 6.0dBi)	
						dBm	Watt	dBm	Watt
12.5	QPSK	24	33.84	2.421	2.50	35.69	3.707	37.69	5.875
12.5	16QAM	24	33.61	2.296	2.50	35.46	3.516	37.46	5.572
12.5	64QAM	24	33.86	2.432	2.50	35.71	3.724	37.71	5.902
12.5	256QAM	24	34.01	2.518	2.50	35.86	3.855	37.86	6.109
<hr/>									
25.0	QPSK	24	33.72	2.355	2.50	35.57	3.606	37.57	5.715
25.0	16QAM	24	33.61	2.296	2.50	35.46	3.516	37.46	5.572
25.0	64QAM	24	33.68	2.333	2.50	35.53	3.573	37.53	5.662
25.0	256QAM	24	34.03	2.529	2.50	35.88	3.873	37.88	6.138
<hr/>									
50.0	QPSK	24	33.96	2.489	2.50	35.81	3.811	37.81	6.039
50.0	16QAM	24	33.90	2.455	2.50	35.75	3.758	37.75	5.957
50.0	64QAM	24	33.83	2.415	2.50	35.68	3.698	37.68	5.861
50.0	256QAM	24	34.11	2.576	2.50	35.96	3.945	37.96	6.252

**Nominal Frequency: 901.5 MHz Tx Port: Channel V**

Channel Bandwidth (kHz)	Modulation Type	Voltage (Vdc)	Measured Power (dBm)	Measured Power (Watt)	Rated Power (Watt)	E.R.P. (ANT Gain = 4.0dBi)		E.R.P. (ANT Gain = 6.0dBi)	
						dBm	Watt	dBm	Watt
12.5	QPSK	24	33.98	2.500	2.50	35.83	3.828	37.83	6.067
12.5	16QAM	24	33.98	2.500	2.50	35.83	3.828	37.83	6.067
12.5	64QAM	24	33.83	2.415	2.50	35.68	3.698	37.68	5.861
12.5	256QAM	24	34.06	2.547	2.50	35.91	3.899	37.91	6.180



25.0	QPSK	24	33.79	2.393	2.50	35.64	3.664	37.64	5.808
25.0	16QAM	24	33.81	2.404	2.50	35.66	3.681	37.66	5.834
25.0	64QAM	24	33.85	2.427	2.50	35.70	3.715	37.70	5.888
25.0	256QAM	24	34.11	2.576	2.50	35.96	3.945	37.96	6.252
50.0	QPSK	24	34.17	2.612	2.50	36.02	3.999	38.02	6.339
50.0	16QAM	24	33.84	2.421	2.50	35.69	3.707	37.69	5.875
50.0	64QAM	24	33.94	2.477	2.50	35.79	3.793	37.79	6.012
50.0	256QAM	24	34.18	2.618	2.50	36.03	4.009	38.03	6.353

**Note1:** Measurements were carried out at the RF output terminals of the transmitter using spectrum analyzer. The path loss during the conducted RF test is calibrated to correct the results by the Ext Gain setting. The Ext Gain contains two parts that cable loss of 0.7dB and attenuator of 30.0dB.

**Note 2:** The transmitter has a rated output power of .2.512 Watt (34dBm).The measured power has been shown to be within +/- 1 dB of the rated power.

**Note3:** E.I.R.P. (dBm) = Conducted Output Power (dBm) + Antenna Gain (dBi); E.R.P. (dBm) = E.I.R.P. (dBm) - 2.15.

**Note4:** Part 24 does not specify the transmitter output power.

Stations transmitting in the 901-902 MHz band are limited to 7 watts e.r.p.

**Note 5:** The product's antenna is a special MIMO antenna with cross-polarization which is able to transmit and receive on both the vertical and horizontal polarizations at the same time, the MIMO antennas are essentially two antennas in one.

**Note 6:** According to KDB 662911, the MIMO directional gain is the gain of an individual antenna.

**Note 7:** The DUT transmitter ports are completely uncorrelated. According to KDB 662911 the conducted power or E.R.P is measured on each port individually and it complies with the regulations.

**Note 8:** This product is based on the interactive calculation of erp limits and conducted power. In the 901-902MHz range, an antenna with a maximum gain of 12dBi can be used when the conducted power is 28dBm, or an antenna with a maximum gain of 6dBi can be used when the conducted power is 34dBm to meet the erp requirements.



## 2.2. Occupied Bandwidth

### 2.2.1. Definition

#### Emission Designator:

Frequency (MHz)	BW(kHz)	Designator
901-902MHz	12.5kHz	10K0W1W
	25.0kHz	20K0W1W
	50.0kHz	42K0W1W

Note: The above data combined with uncertainty and rounding calculations are consistent with the actual test data.

According to FCC section 2.1049, the occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

Occupied bandwidth is also known as the 99% emission bandwidth.

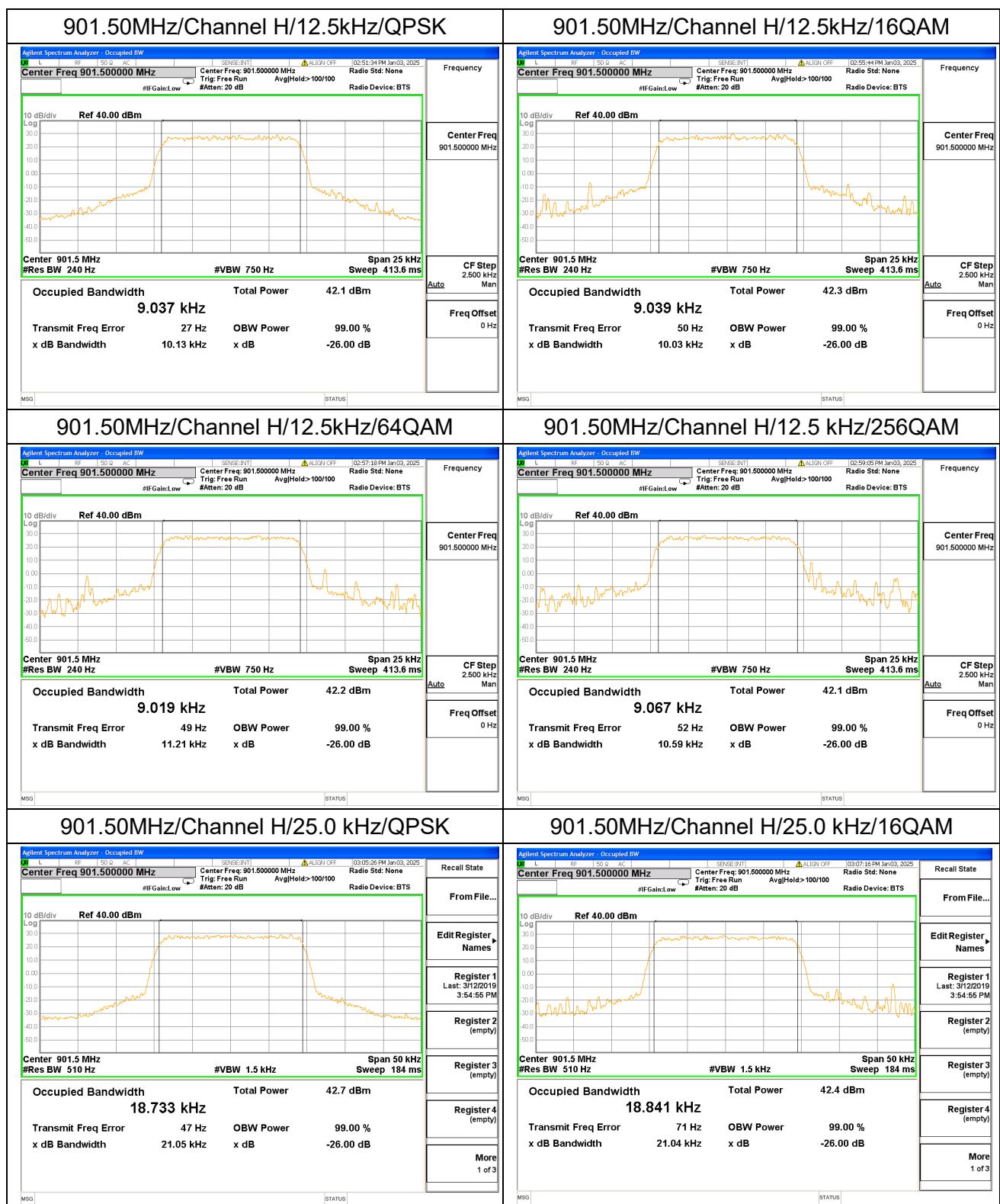
### 2.2.2. Test Description

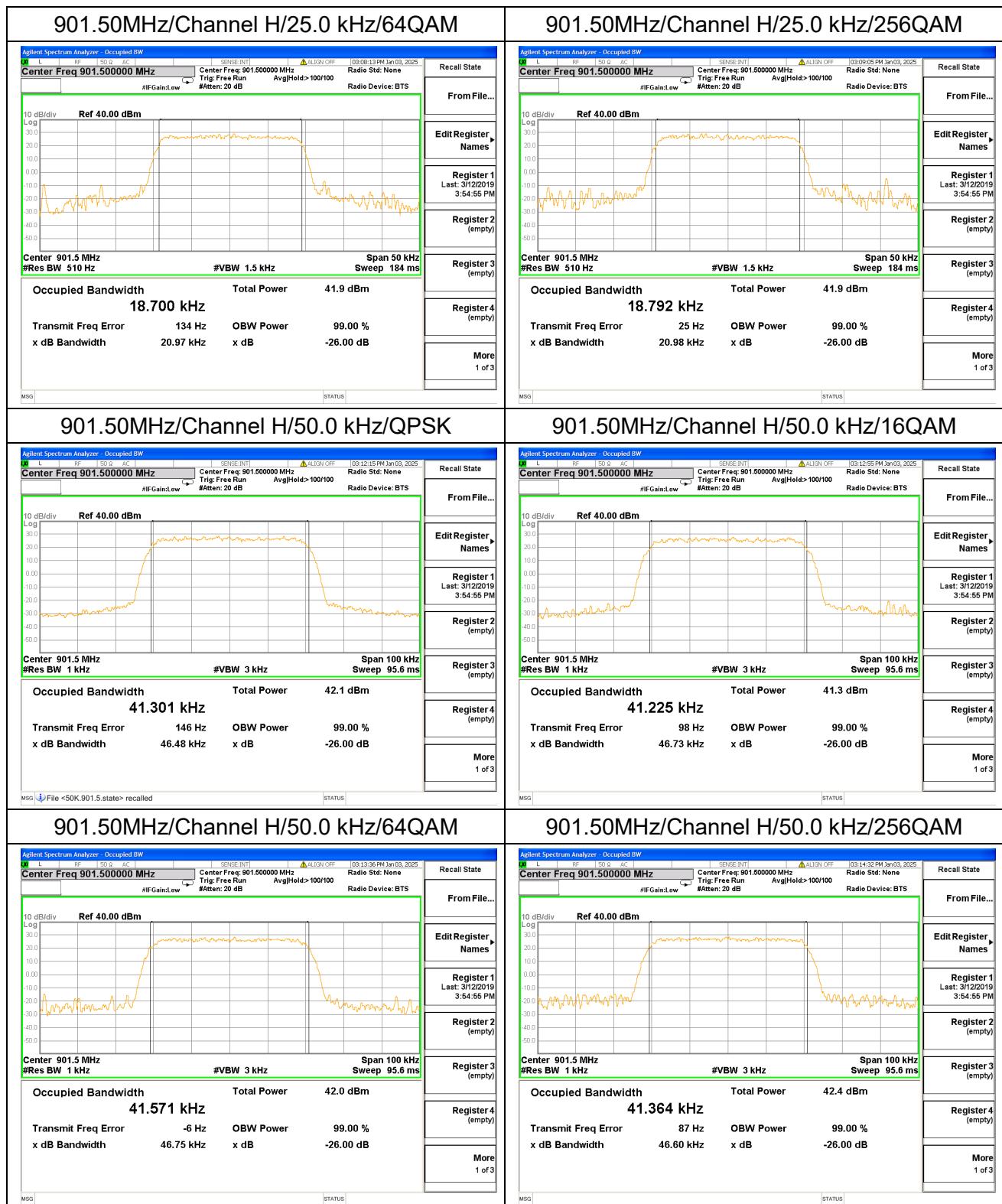
Measurements have been made of each modulation type using a spectrum analyzer operating in occupied bandwidth mode.

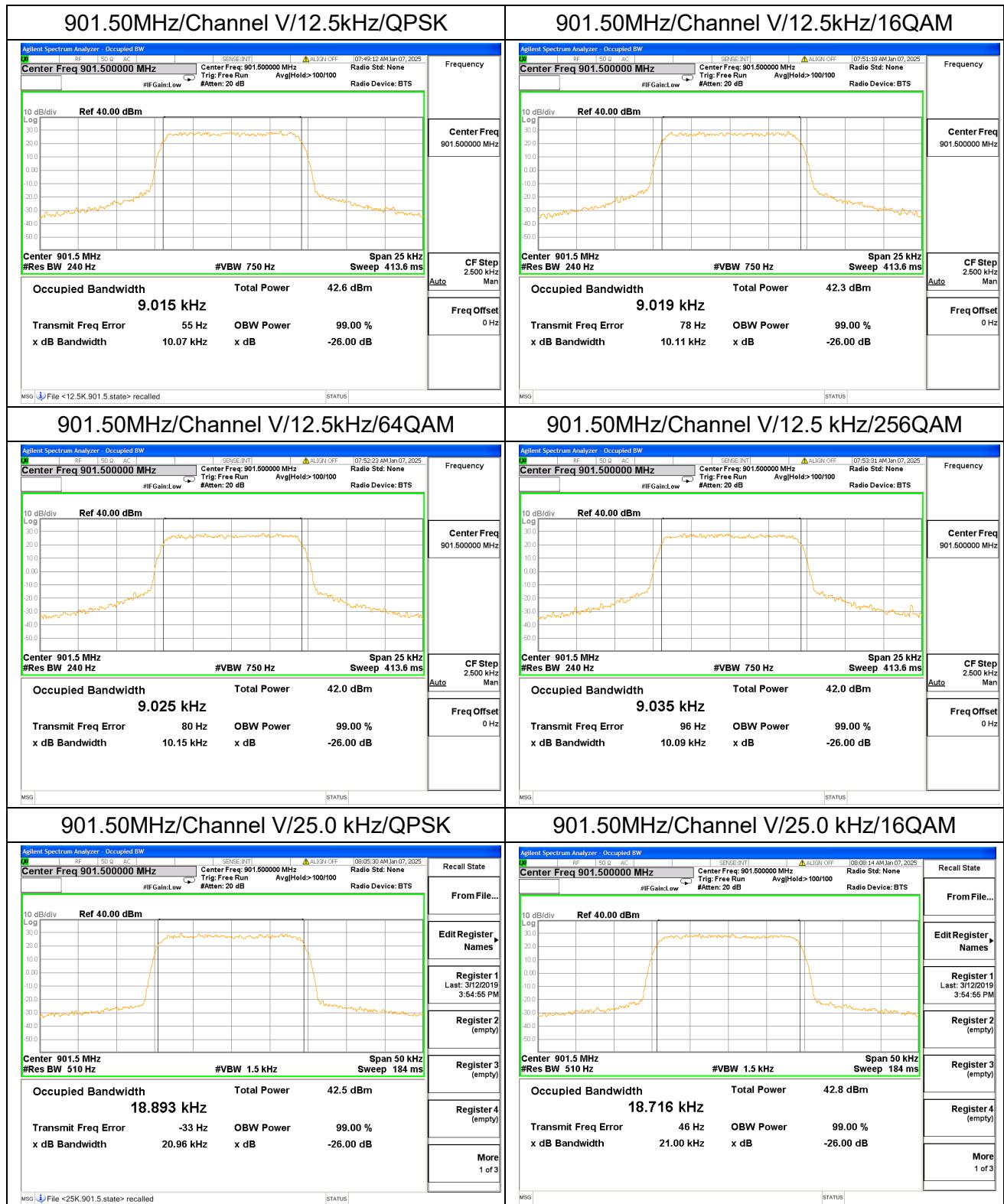


### 2.2.3. Test Result

901.50 MHz			
Tx Port	Channel Bandwidth(kHz)	Emission Type	Occupied Bandwidth(kHz)
H	12.5	QPSK	9.037
		16QAM	9.039
		64QAM	9.019
		256QAM	9.067
	25.0	QPSK	18.733
		16QAM	18.841
		64QAM	18.700
		256QAM	18.792
	50.0	QPSK	41.301
		16QAM	41.225
		64QAM	41.571
		256QAM	41.364
V	12.5	QPSK	9.015
		16QAM	9.019
		64QAM	9.025
		256QAM	9.035
	25.0	QPSK	18.893
		16QAM	18.716
		64QAM	18.719
		256QAM	18.713
	50.0	QPSK	41.380
		16QAM	41.108
		64QAM	41.267
		256QAM	41.154









REPORT No.: SZ24060164W01

**901.50MHz/Channel V/25.0 kHz/64QAM**

Agilent Spectrum Analyzer - Occupied BW

Center Freq 901.500000 MHz | SENSE-BW: 50 kHz | RF: 50 Q | AC: 100 | ALIGN OFF | 06:09:12 AM Jan 07, 2025

Ref 40.00 dBm

10 dB/div Log

10.00 20.00 30.00 40.00 50.00

Center 901.5 MHz | #Res BW 510 Hz | #VBW 1.5 kHz | Span 50 kHz | Sweep 184 ms

Occupied Bandwidth: 18.719 kHz | Total Power: 42.5 dBm

Transmit Freq Error: 55 Hz | OBW Power: 99.00 % | x dB Bandwidth: 20.98 kHz | x dB: -26.00 dB

MSG | STATUS

**901.50MHz/Channel V/25.0 kHz/256QAM**

Agilent Spectrum Analyzer - Occupied BW

Center Freq 901.500000 MHz | SENSE-BW: 50 kHz | RF: 50 Q | AC: 100 | ALIGN OFF | 06:12:41 AM Jan 07, 2025

Ref 40.00 dBm

10 dB/div Log

10.00 20.00 30.00 40.00 50.00

Center 901.5 MHz | #Res BW 510 Hz | #VBW 1.5 kHz | Span 50 kHz | Sweep 184 ms

Occupied Bandwidth: 18.713 kHz | Total Power: 43.5 dBm

Transmit Freq Error: 43 Hz | OBW Power: 99.00 % | x dB Bandwidth: 21.03 kHz | x dB: -26.00 dB

MSG | STATUS

**901.50MHz/Channel V/50.0 kHz/QPSK**

Agilent Spectrum Analyzer - Occupied BW

Center Freq 901.500000 MHz | SENSE-BW: 50 kHz | RF: 50 Q | AC: 100 | ALIGN OFF | 06:14:21 AM Jan 07, 2025

Ref 40.00 dBm

10 dB/div Log

10.00 20.00 30.00 40.00 50.00

Center 901.5 MHz | #Res BW 1 kHz | #VBW 3 kHz | Span 100 kHz | Sweep 95.6 ms

Occupied Bandwidth: 41.380 kHz | Total Power: 41.6 dBm

Transmit Freq Error: 58 Hz | OBW Power: 99.00 % | x dB Bandwidth: 46.38 kHz | x dB: -26.00 dB

MSG | File <50K.901.state> recalled | STATUS

**901.50MHz/Channel V/50.0 kHz/16QAM**

Agilent Spectrum Analyzer - Occupied BW

Center Freq 901.500000 MHz | SENSE-BW: 50 kHz | RF: 50 Q | AC: 100 | ALIGN OFF | 06:14:46 AM Jan 07, 2025

Ref 40.00 dBm

10 dB/div Log

10.00 20.00 30.00 40.00 50.00

Center 901.5 MHz | #Res BW 1 kHz | #VBW 3 kHz | Span 100 kHz | Sweep 95.6 ms

Occupied Bandwidth: 41.108 kHz | Total Power: 41.9 dBm

Transmit Freq Error: 14 Hz | OBW Power: 99.00 % | x dB Bandwidth: 46.44 kHz | x dB: -26.00 dB

MSG | STATUS

**901.50MHz/Channel V/50.0 kHz/64QAM**

Agilent Spectrum Analyzer - Occupied BW

Center Freq 901.500000 MHz | SENSE-BW: 50 kHz | RF: 50 Q | AC: 100 | ALIGN OFF | 06:15:17 AM Jan 07, 2025

Ref 40.00 dBm

10 dB/div Log

10.00 20.00 30.00 40.00 50.00

Center 901.5 MHz | #Res BW 1 kHz | #VBW 3 kHz | Span 100 kHz | Sweep 95.6 ms

Occupied Bandwidth: 41.267 kHz | Total Power: 42.1 dBm

Transmit Freq Error: 32 Hz | OBW Power: 99.00 % | x dB Bandwidth: 46.53 kHz | x dB: -26.00 dB

MSG | STATUS

**901.50MHz/Channel V/50.0 kHz/256QAM**

Agilent Spectrum Analyzer - Occupied BW

Center Freq 901.500000 MHz | SENSE-BW: 50 kHz | RF: 50 Q | AC: 100 | ALIGN OFF | 06:15:46 AM Jan 07, 2025

Ref 40.00 dBm

10 dB/div Log

10.00 20.00 30.00 40.00 50.00

Center 901.5 MHz | #Res BW 1 kHz | #VBW 3 kHz | Span 100 kHz | Sweep 95.6 ms

Occupied Bandwidth: 41.154 kHz | Total Power: 42.1 dBm

Transmit Freq Error: 108 Hz | OBW Power: 99.00 % | x dB Bandwidth: 46.40 kHz | x dB: -26.00 dB

MSG | STATUS

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## 2.3. Spurious Emissions At Antenna Terminals

### 2.3.1. Test Requirement

According to FCC section 2.1051, 24.131 and 24. 133(a) section

The authorized bandwidth of narrowband PCS channels will be 10 kHz for 12.5 kHz channels and 45 kHz for 50 kHz channels. For aggregated adjacent channels, a maximum authorized bandwidth of 5 kHz less than the total aggregated channel width is permitted.

For transmitters authorized a bandwidth greater than 10 kHz:

1. On any frequency outside the authorized bandwidth and removed from the edge of the authorized bandwidth by a displacement frequency (fd in kHz) of up to and including 40 kHz: at least  $116 \text{ Log10} ((fd + 10)/6.1)$  decibels or 50 plus  $10 \text{ Log10} (P)$  decibels or 70 decibels, whichever is the lesser attenuation;
2. On any frequency outside the authorized bandwidth and removed from the edge of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 40 kHz: at least  $43 + 10 \text{ Log10} (P)$  decibels or 80 decibels, whichever is the lesser attenuation;

For transmitters authorized a bandwidth of 10 kHz:

1. On any frequency outside the authorized bandwidth and removed from the edge of the authorized bandwidth by a displacement frequency (fd in kHz) of up to and including 20 kHz: at least  $116 \times \text{Log10} ((fd + 5)/3.05)$  decibels or  $50 + 10 \times \text{Log10} (P)$  decibels or 70 decibels, whichever is the lesser attenuation;
2. On any frequency outside the authorized bandwidth and removed from the edge of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 20 kHz: at least  $43 + 10 \text{ Log10} (P)$  decibels or 80 decibels, whichever is the lesser attenuation.

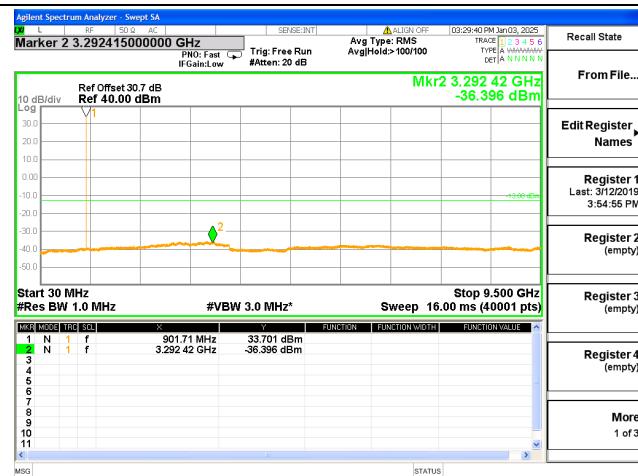
### 2.3.2. Test Result



## 12.5kHz/QPSK



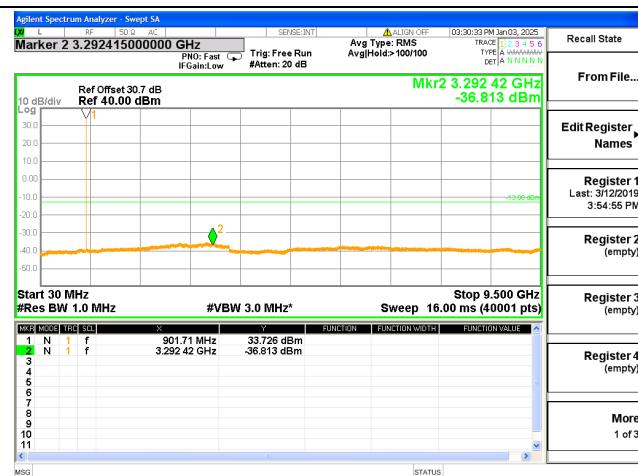
## 12.5kHz/16QAM



## 12.5kHz/64QAM



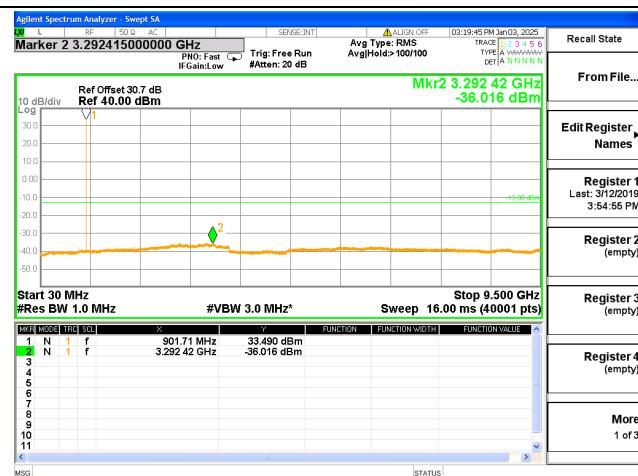
## 12.5kHz/256QAM



## 25.0kHz/QPSK



## 25.0kHz /16QAM

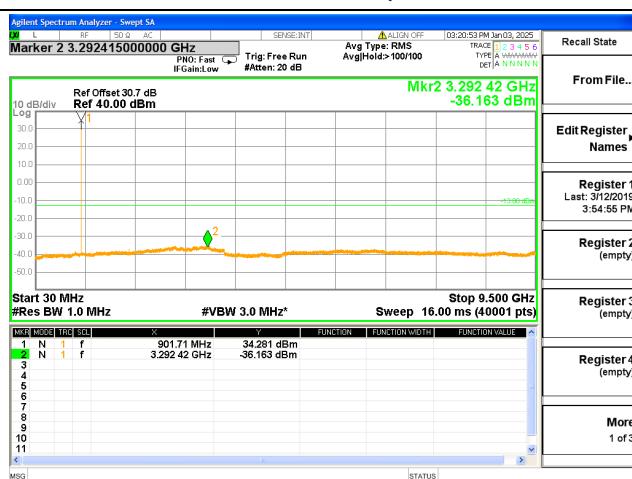




## 25.0kHz /64QAM



## 25.0kHz /256QAM



## 50.0kHz/QPSK



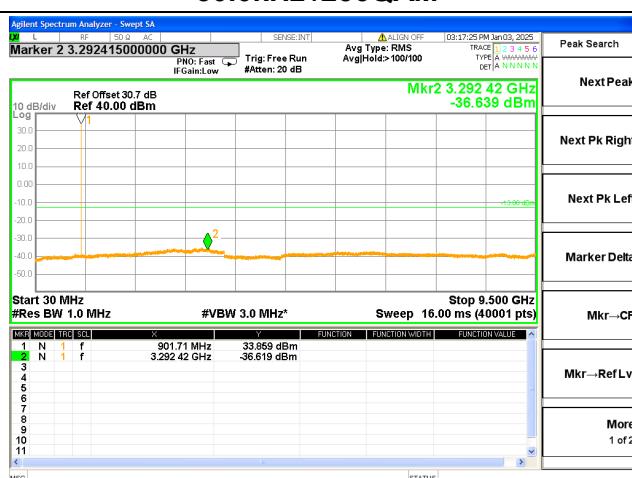
## 50.0kHz /16QAM



## 50.0kHz /64QAM



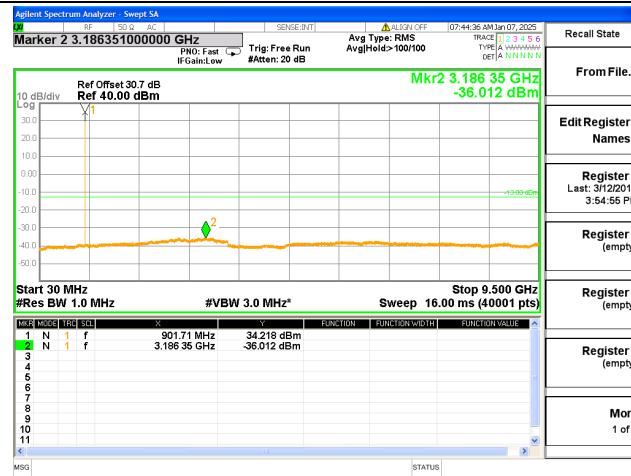
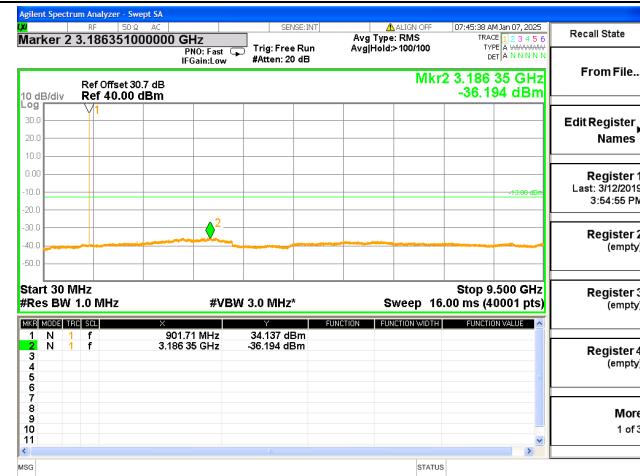
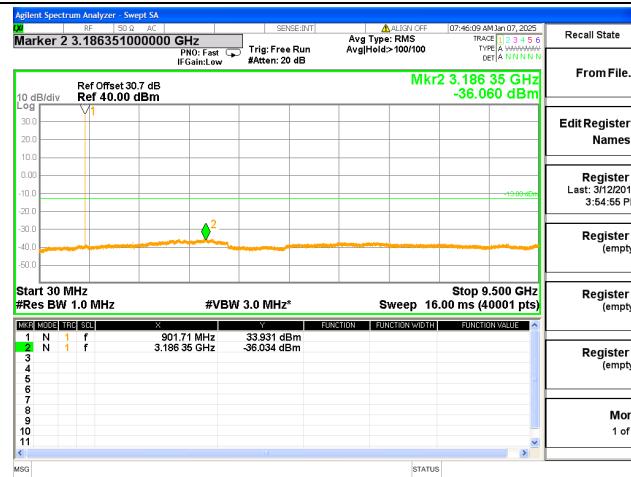
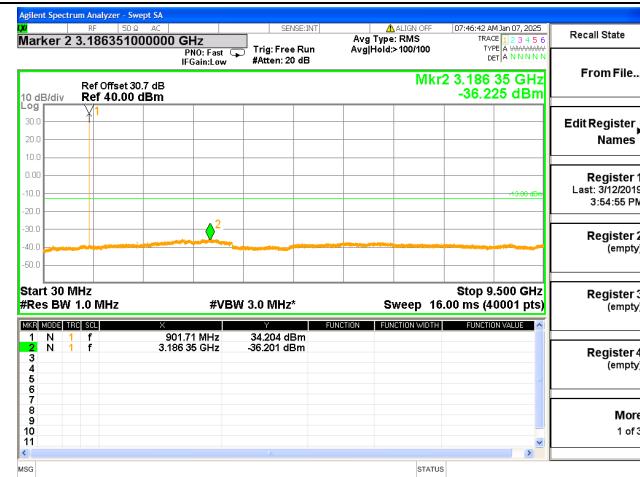
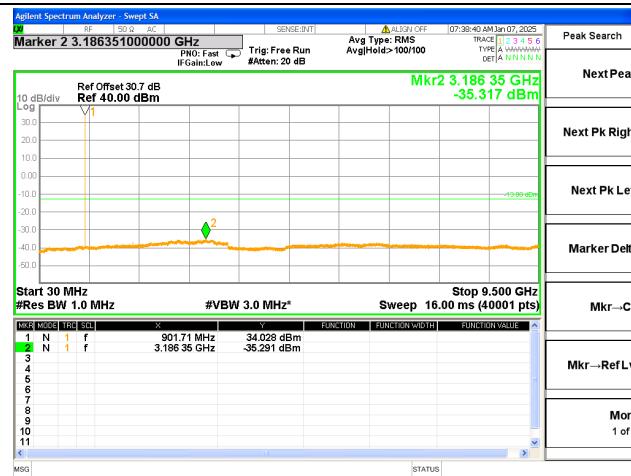
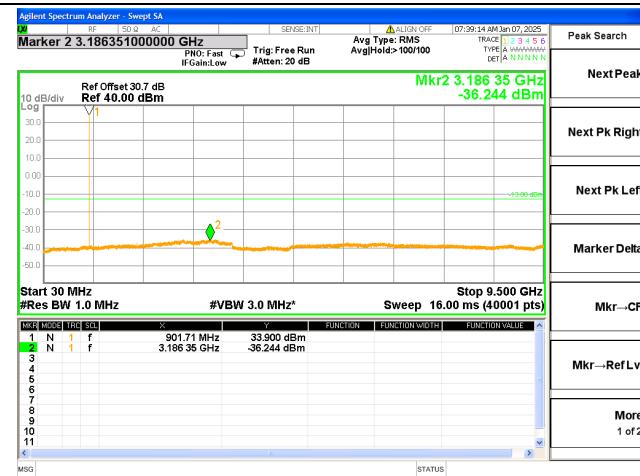
## 50.0kHz /256QAM





REPORT No.: SZ24060164W01

Nominal Frequency: 901.50 MHz Tx Port: Channel V

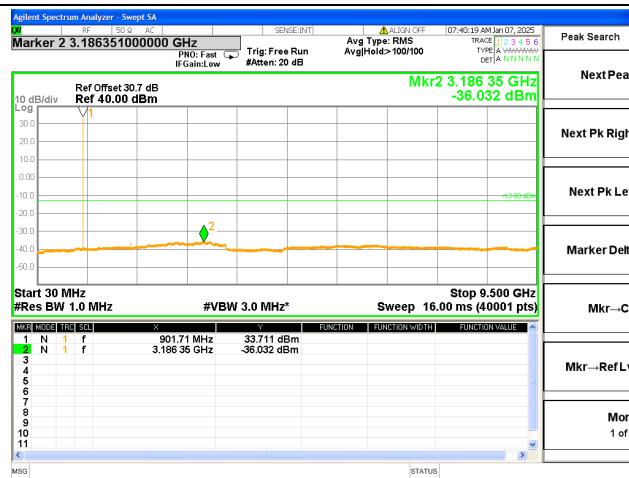
**12.5kHz/QPSK****12.5kHz/16QAM****12.5kHz/64QAM****12.5kHz/256QAM****25.0kHz/QPSK****25.0kHz /16QAM****MORLAB**

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Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China

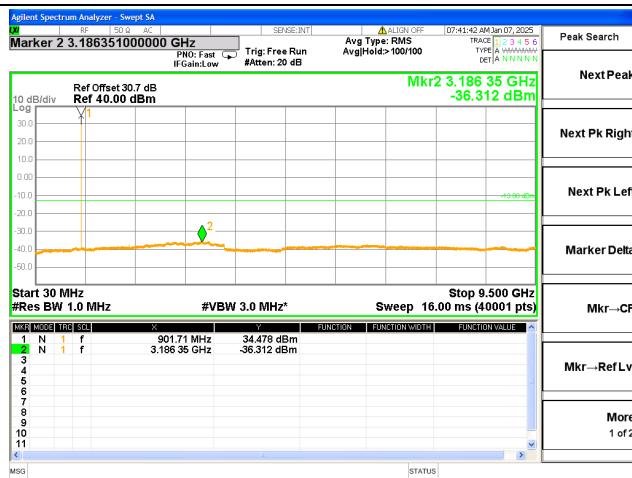
Tel: 86-755-36698555 Fax: 86-755-36698525  
Http://www.morlab.cn E-mail: service@morlab.cn



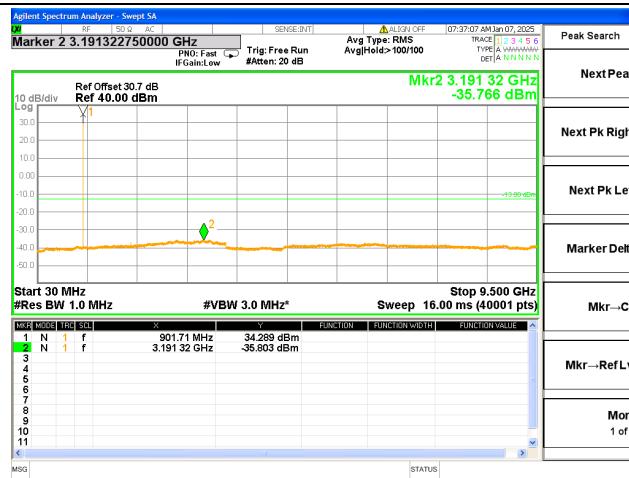
## 25.0kHz /64QAM



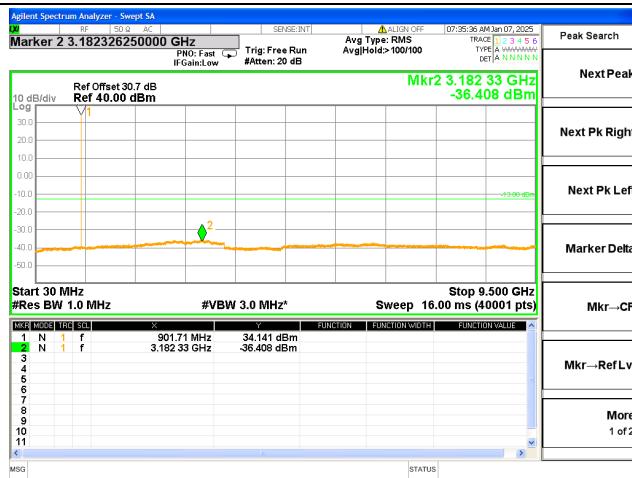
## 25.0kHz /256QAM



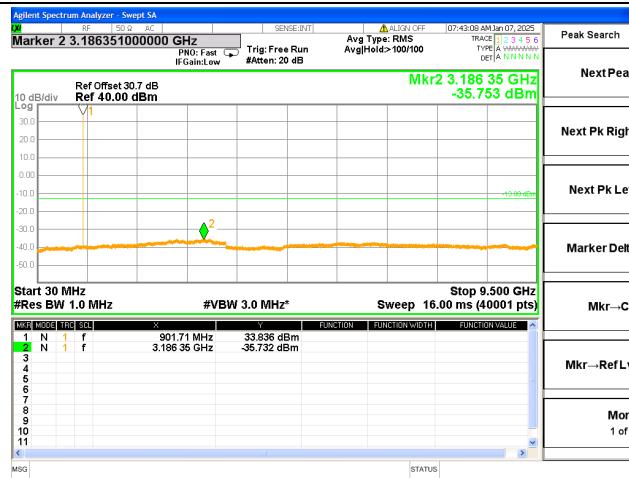
## 50.0kHz/QPSK



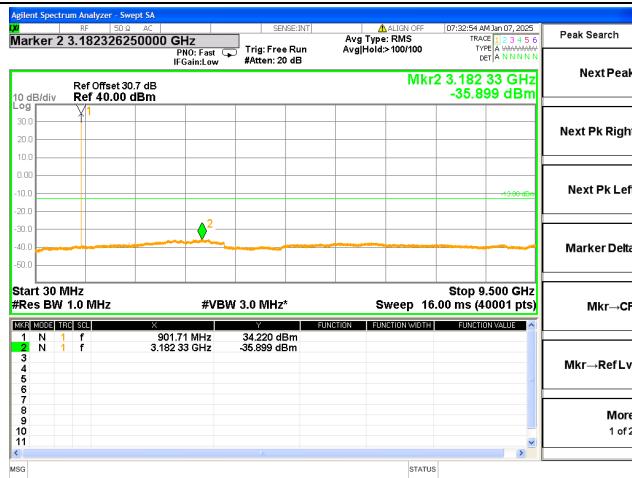
## 50.0kHz /16QAM



## 50.0kHz /64QAM



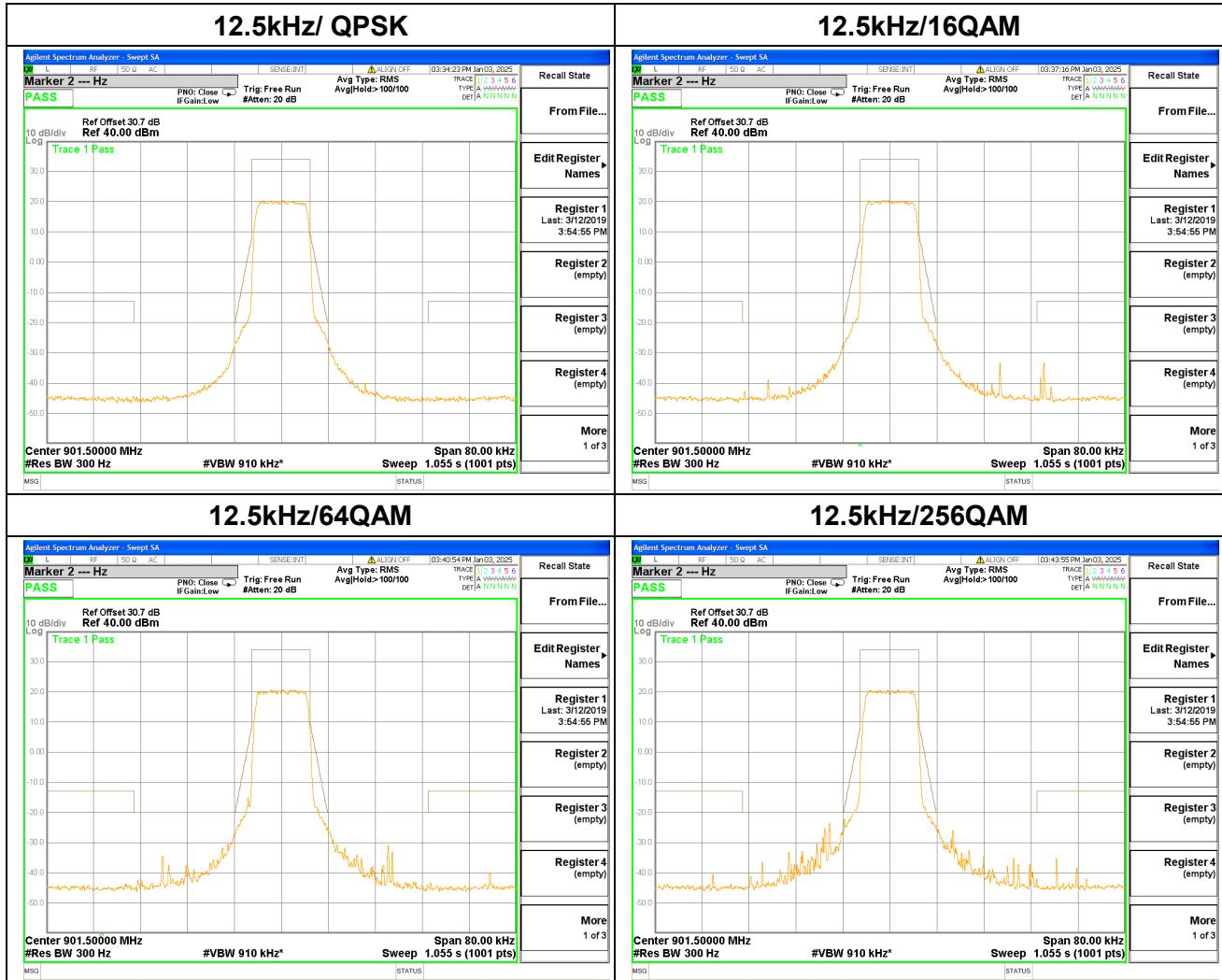
## 50.0kHz /256QAM





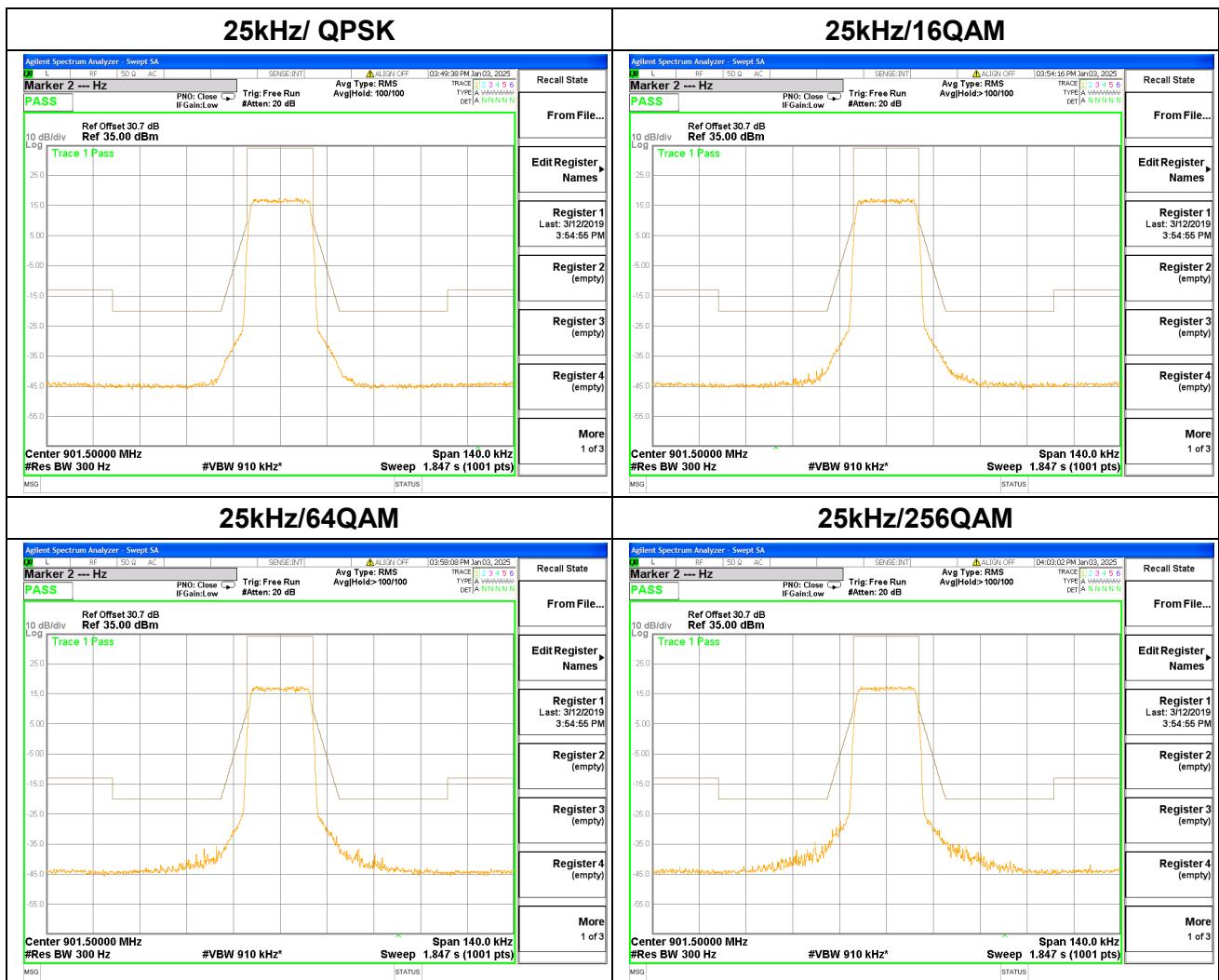
REPORT No.: SZ24060164W01

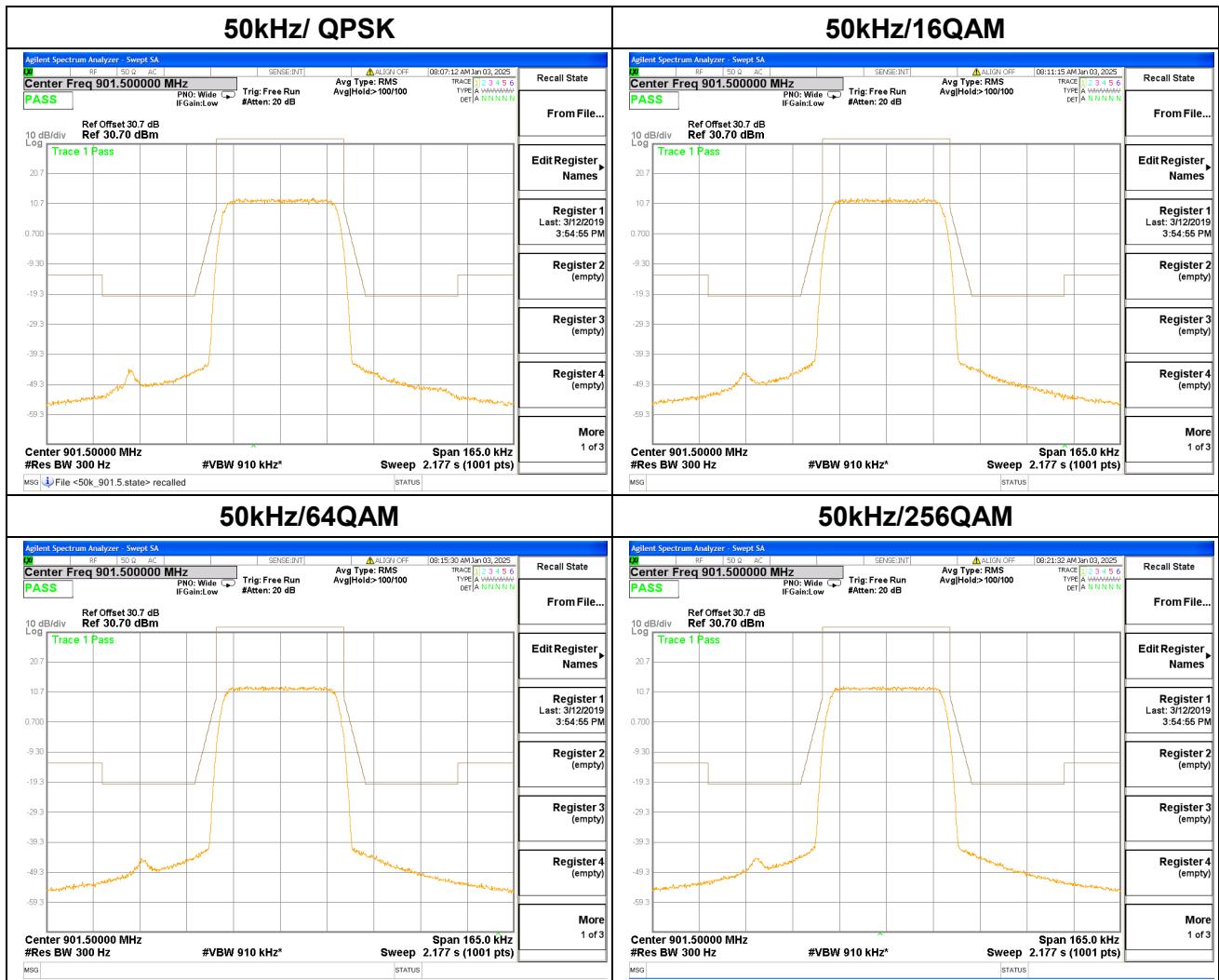
Nominal Frequency: 901.50 MHz Tx Port: Channel H

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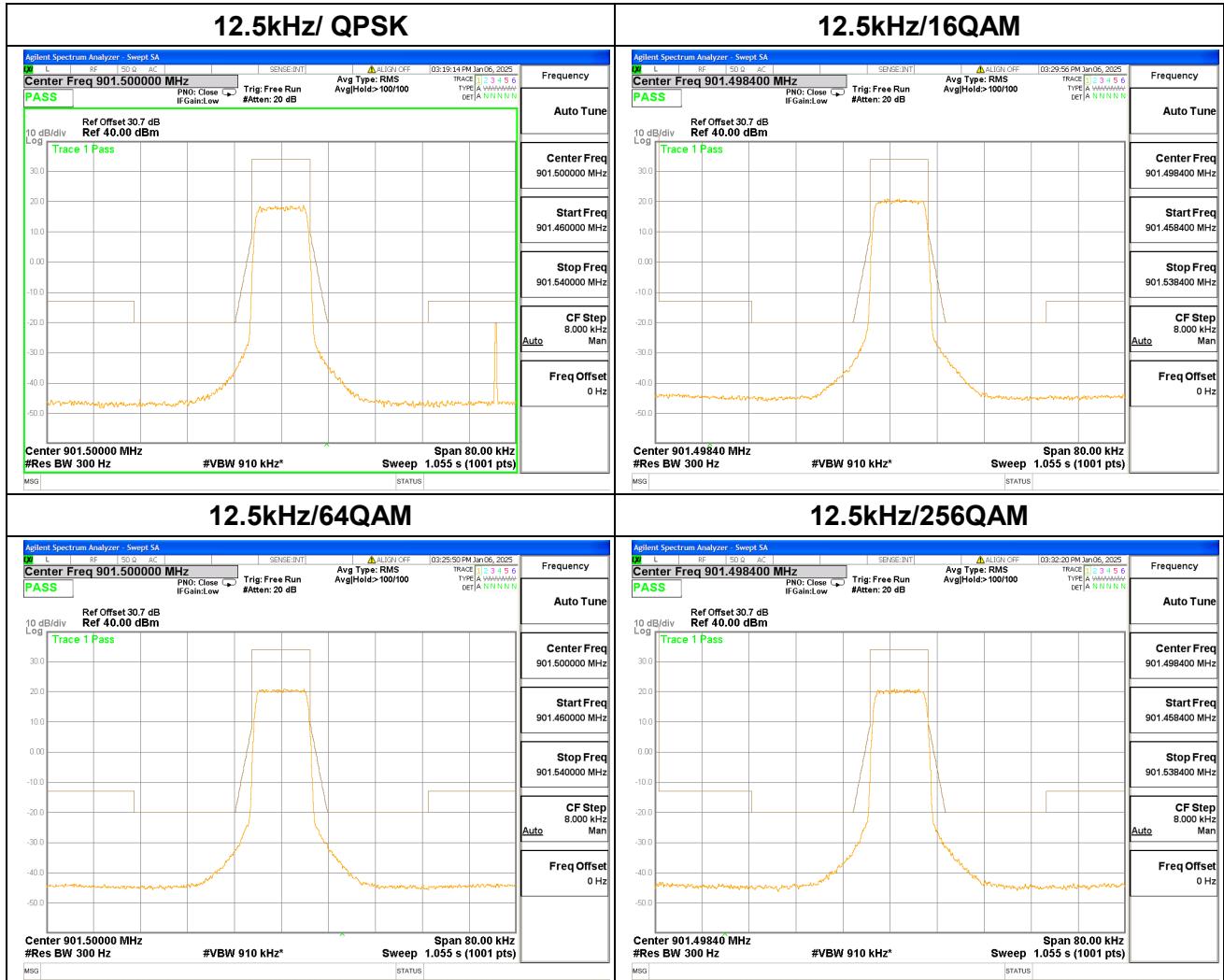






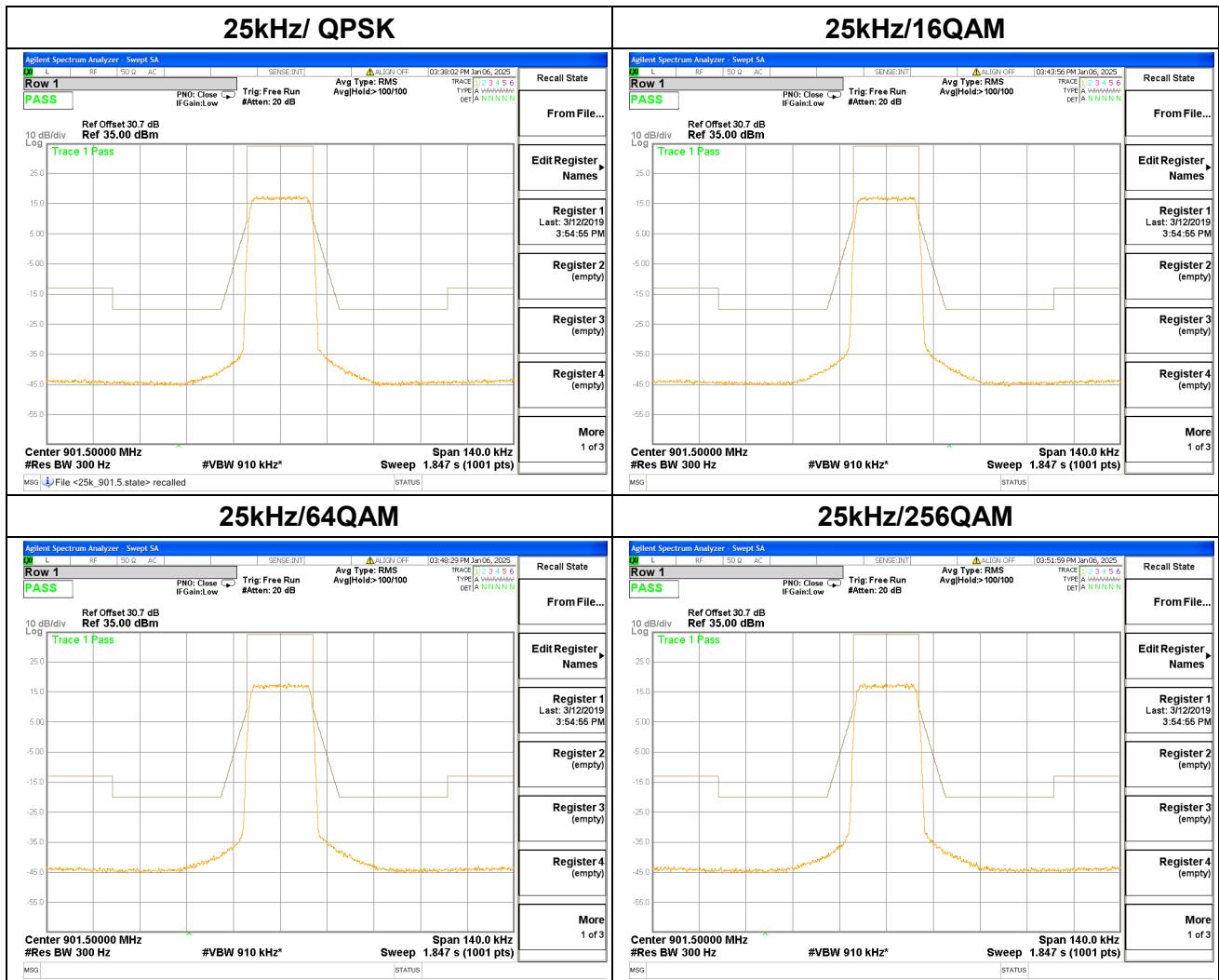
REPORT No.: SZ24060164W01

Nominal Frequency: 901.50 MHz Tx Port: Channel V

**MORLAB**

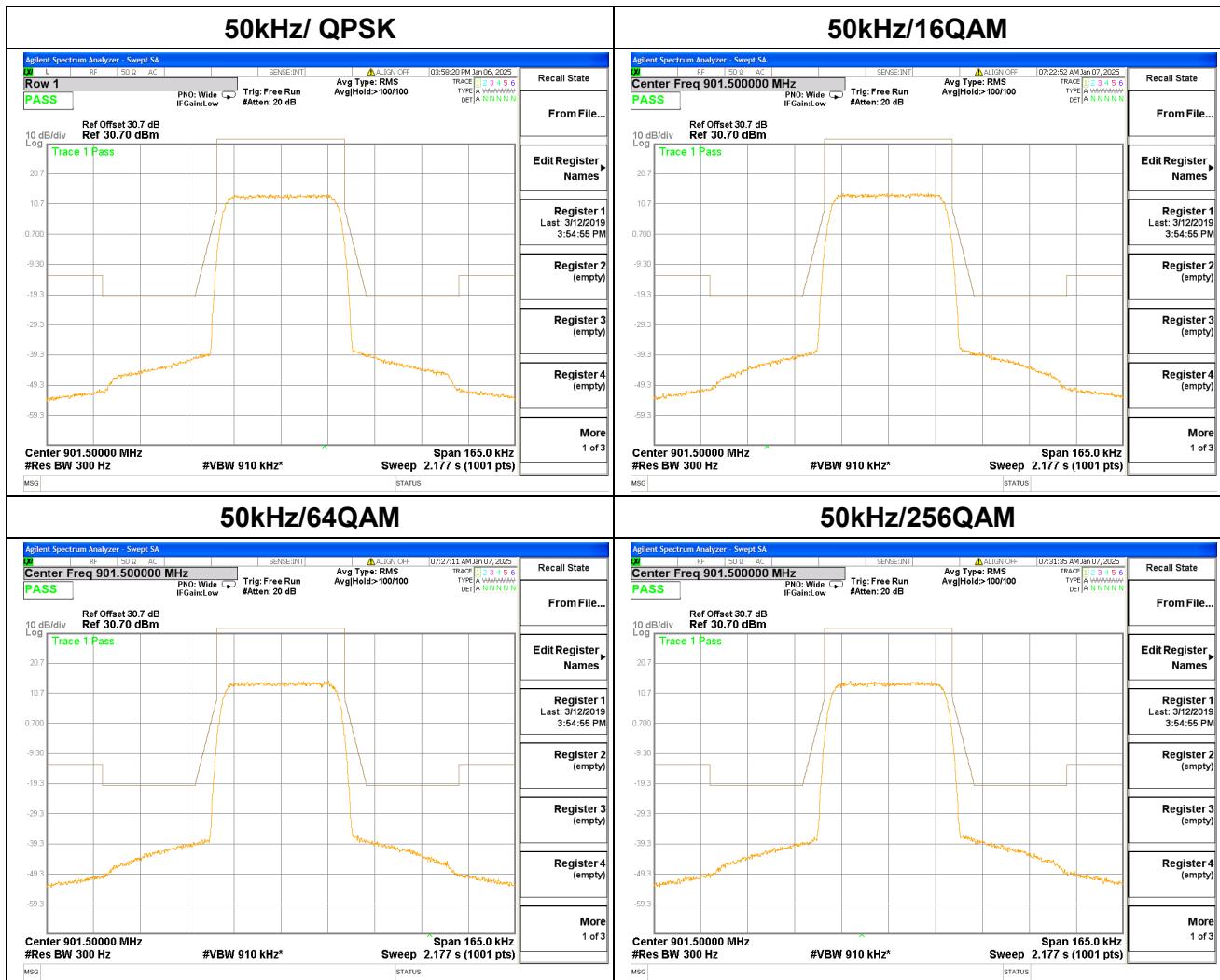
Shenzhen Morlab Communication Technology Co., Ltd.  
FL.1-3, Building A, FeiYang Science Park, No.8 LongChang Road,  
Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China

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## 2.4. Radiated Spurious Emissions

### 2.4.1. Requirement

According to FCC section 2.1053 and section 24.133(a). For operations in the 901-902 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power within the licensed band(s) of operation, measured in watts, in accordance with the following:

- (1) On any frequency outside the 901-902 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least  $43 + 10 \log (P)$  dB;

### 2.4.2. Test Result

**Note 1:** No discrete emissions were detected.

**Note 2:** The power of the EUT transmitting frequency should be ignored.

**Note 3:** N/A means the frequency is the basic frequency; they are no need to verdict.

**Note 4:** For measurements below 1GHz the resolution bandwidth is set to 100kHz for peak detection measurements. For measurements above 1GHz the resolution bandwidth is set to 1MHz for peak measurements.

**Note 5:** All bandwidth and modulation were considered and evaluated respectively by performing full test, only the worst cases were recorded in this test report.

**Note 6:** The received power level is the measured power adjusted for measurement antenna gain, connecting cable loss, and any external signal amplification or attenuation used in the test configuration. Mathematically, as in Equation:

$$P_R = P_{\text{meas}} - G_R + L_C - G_{\text{amp}}$$

where

$P_{\text{meas}}$  measured power level, in dBm;

$G_R$  gain of the receive (measurement) antenna, in dBi;

$L_C$  signal loss in the measurement cable, in dB;

$G_{\text{amp}}$  value of external amplification, in dB.

## Type 1:

Nominal Frequency 901.5MHz, 50kHz BW, 256QAM					
No.	Fre.(MHz)	PK (dBm)	Limit (dBm)	Antenna	Verdict
1	901.545	-20.45	-13.00	H	NA
2	1327.5	-50.76	-13.00	H	PASS
3	2164.25	-41.40	-13.00	H	PASS
4	3164.2957	-52.85	-13.00	H	PASS
5	3605.9928	-36.46	-13.00	H	PASS
6	3996.4998	-52.65	-13.00	H	PASS
7	7100.5675	-48.57	-13.00	H	PASS
8	12046.0148	-42.68	-13.00	H	PASS

Nominal Frequency 901.5MHz, 50kHz BW, 256QAM					
No.	Fre.(MHz)	PK (dBm)	Limit (dBm)	Antenna	Verdict
1	901.545	-32.01	-13.00	V	NA
2	2167.75	-39.88	-13.00	V	PASS
3	3172.0961	-48.40	-13.00	V	PASS
4	3605.9928	-27.26	-13.00	V	PASS
5	3664.0082	-46.31	-13.00	V	PASS
6	3995.0373	-46.93	-13.00	V	PASS
7	5325.4913	-49.77	-13.00	V	PASS



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8	6343.4422	-48.75	-13.00	V	PASS
9	11107.5304	-42.20	-13.00	V	PASS

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## Type 2:

Nominal Frequency 901.5MHz, 50kHz BW, 256QAM					
No.	Fre.(MHz)	PK (dBm)	Limit (dBm)	Antenna	Verdict
1	901.060	-44.39	-13.00	H	NA
2	1802.881	-39.34	-13.00	H	PASS
3	2185.114	-36.16	-13.00	H	PASS
4	3131.588	-54.71	-13.00	H	PASS
5	4737.425	-47.54	-13.00	H	PASS
6	10339.398	-38.34	-13.00	H	PASS

Nominal Frequency 901.5MHz, 50kHz BW, 256QAM					
No.	Fre.(MHz)	PK (dBm)	Limit (dBm)	Antenna	Verdict
1	901.060	-37.74	-13.00	V	NA
2	1465.466	-43.94	-13.00	V	PASS
3	1802.881	-35.82	-13.00	V	PASS
4	2183.193	-32.13	-13.00	V	PASS
5	4742.962	-46.72	-13.00	V	PASS
6	9901.946	-38.68	-13.00	V	PASS



## 2.5. Frequency Stability

### 2.5.1. Requirement

According to FCC section 2.1055 and FCC section 24.135.e frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. According to FCC section 24.135, the test conditions are:

The frequency stability of the transmitter shall be maintained within  $\pm 0.0001$  percent ( $\pm 1$  ppm) of the center frequency over a temperature variation of  $-30$  °Celsius to  $+ 50$  °Celsius at normal supply voltage, and over a variation in the primary supply voltage of 85 percent to 115 percent of the rated supply voltage at a temperature of  $20$  °Celsius.

### 2.5.2. Test Results

901.5MHz QPSK 12.5kHz					
Limit =Within Authorized Band					
Voltage (%)	Power (VDC)	Temp (°C)	Fre. Dev. (Hz)	Deviation (ppm)	Result
100	24.0	+20(Ref)	14	0.016	PASS
100		-40	0	0.000	
100		-30	14	0.016	
100		-20	18	0.020	
100		-10	6	0.007	
100		0	20	<b>0.022</b>	
100		+10	20	<b>0.022</b>	
100		+20	14	0.016	
100		+30	16	0.018	
100		+40	-17	-0.019	
100		+50	16	0.018	
100		+60	-12	-0.013	
100		+70	13	0.014	
115	60	+20	-2	-0.002	
85	10.5	+20	17	0.019	

**901.5MHz QPSK 25.0kHz****Limit =Within Authorized Band**

<b>Voltage (%)</b>	<b>Power (VDC)</b>	<b>Temp (°C)</b>	<b>Fre. Dev. (Hz)</b>	<b>Deviation (ppm)</b>	<b>Result</b>
100	24.0	+20(Ref)	13	0.014	PASS
100		-40	-12	-0.013	
100		-30	20	0.022	
100		-20	21	<b>0.023</b>	
100		-10	-5	-0.006	
100		0	20	0.022	
100		+10	-12	-0.013	
100		+20	19	0.021	
100		+30	13	0.014	
100		+40	-18	-0.020	
100		+50	-21	-0.023	
100		+60	19	0.021	
100		+70	21	<b>0.023</b>	
115	60	+20	9	0.010	
85	10.5	+20	18	0.020	

**901.5MHz QPSK 50.0kHz****Limit =Within Authorized Band**

<b>Voltage (%)</b>	<b>Power (VDC)</b>	<b>Temp (°C)</b>	<b>Fre. Dev. (Hz)</b>	<b>Deviation (ppm)</b>	<b>Result</b>
100	24.0	+20(Ref)	20	0.022	PASS
100		-40	-15	-0.017	
100		-30	23	<b>0.026</b>	
100		-20	9	0.010	
100		-10	13	0.014	
100		0	23	<b>0.026</b>	
100		+10	-1	-0.001	
100		+20	17	0.019	
100		+30	17	0.019	
100		+40	1	0.001	
100		+50	16	0.018	
100		+60	17	0.019	
100		+70	19	0.021	
115	60	+20	-9	-0.010	
85	10.5	+20	18	0.020	



## Annex A Test Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for test performed on the EUT as specified in CISPR 16-1-2:

Test items	Uncertainty
Output Power	±2.22 dB
Bandwidth	±5%
Conducted Spurious Emission	±2.77 dB
Band Edge	±2.77 dB
Equivalent Isotropic Radiated Power	±2.22 dB
Radiated Spurious Emissions	±6 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



## Annex B Testing Laboratory Information

### 1. Identification of the Responsible Testing Laboratory

<b>Company Name:</b>	Shenzhen Morlab Communications Technology Co., Ltd.
<b>Laboratory Address:</b>	FL.1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China
<b>Telephone:</b>	+86 755 36698555
<b>Facsimile:</b>	+86 755 36698525

### 2. Identification of the Responsible Testing Location

<b>Name:</b>	Shenzhen Morlab Communications Technology Co., Ltd.
<b>Address:</b>	FL.1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China

### 3. Facilities and Accreditations

All measurement facilities used to collect the measurement data are located at FL.3, Building A, FeiYang Science Park, Block 67, BaoAn District, Shenzhen, 518101 P. R. China. The test site is constructed in conformance with the requirements of ANSI C63.10-2013 and CISPR Publication 22; the FCC designation number is CN1192, the test firm registration number is 226174.



#### 4. Test Equipment Utilized

##### 4.1 Conducted Test Equipment

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal. Due
Attenuator 1	(N/A.)	30.0dB	Resnet	N/A	N/A
Attenuator 2	(N/A.)	30.0dB	Resnet	N/A	N/A
EXA Signal Analyzer	MY51511149	N9020A	Agilent	2024.06.19	2025.06.18
RF Cable (30MHz-26GHz)	CB01	RF01	Morlab	N/A	N/A
SMA Connector	CN01	RF03	HUBER-SUHNER	N/A	N/A
Temperature Chamber	S022177101 00089002	KMT-36LF 1A0	KOMEG	2024.09.11	2025.09.10

##### 4.2 List of Software Used

Description	Manufacturer	Software Version
MORLAB EMCR	MORLAB	V1.2



#### 4.3 Radiated Test Equipment

Equipment Name	Type	Serial No.	Manufacturer	Cal. Date	Cal. Due
Bi-Log Antenna	VULB 9163	9163-274	SCHWARZBECK	2024/6/29	2025/6/28
Horn Antenna	BBHA 9120D	9120D-963	SCHWARZBECK	2024/6/3	2025/6/2
Signal Analyzer	N9020A	MY56060145	Agilent	2024/5/30	2025/5/29
Preamplifier (2GHz-18GHz)	S020180L3203	61171/61172	LUCIX CORP.	2024/5/30	2025/5/29
Preamplifier (10MHz-6GHz)	S10M100L3802	46732	LUCIX CORP.	2024/5/30	2025/5/29
RF Coaxial Cable (DC-18GHz)	PE330	MRE001	Pasternack	2024/5/30	2025/5/29
RF Coaxial Cable (DC-18GHz)	CLU18	MRE002	Pasternack	2024/5/30	2025/5/29
RF Coaxial Cable (DC-18GHz)	CLU18	MRE003	Pasternack	2024/5/30	2025/5/29
RF Coaxial Cable (DC-40GHz)	QA360-40-KK-0.5	22290045	Qualwave	2024/7/3	2025/7/2
RF Coaxial Cable (DC-40GHz)	QA360-40-KKF-2	22290046	Qualwave	2024/7/3	2025/7/2
RF Coaxial Cable (DC-18GHz)	QA500-18-NN-5	22120181	Qualwave	2024/7/3	2025/7/2

— END OF REPORT —