



FCC RADIO TEST REPORT

FCC ID : 2AZULRS8682
Equipment : 5G n48 RRU 4x4 5W/Ch Outdoor
Brand Name : LIONS
Model Name : RS8682
Applicant : LIONS Taiwan Technology Inc.
3F.-2, No. 120, Sec. 2, Gongdao 5th Rd., East Dist.,
Hsinchu City 300031 , Taiwan (R.O.C.)
Manufacturer : LIONS Taiwan Technology Inc.
3F.-2, No. 120, Sec. 2, Gongdao 5th Rd., East Dist.,
Hsinchu City 300031 , Taiwan (R.O.C.)
Standard : FCC 47 CFR Part 2, 96

The product was received on Jan. 25, 2024 and testing was performed from Jan. 25, 2024 to Jan. 30, 2024. 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 given in ANSI / TIA-603-E and has been in compliance with the applicable technical standards.

The test results in this variant report apply exclusively to the tested model / sample. Without written approval of 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
FG3N0925-03A	01	Initial issue of report	Mar. 08, 2024

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
-	§2.1046	Conducted Output Power	Reporting only	-
-	§96.41	Peak-to-Average Ratio	Not Required	-
-	§96.41	Effective Isotropic Radiated Power	Not Required	-
		Power Density	Not Required	-
-	§2.1049 §96.41	Occupied Bandwidth	Not Required	-
-	§2.1051 §96.41	Conducted Band Edge Measurement	Not Required	-
-	§2.1051 §96.41	Conducted Spurious Emission	Not Required	-
-	§2.1055	Frequency Stability for Temperature & Voltage	Not Required	-
4.4	§2.1051 §96.41	Radiated Spurious Emission	Pass	11.03 dB under limit at 14466.00 MHz

Note:

1. Not required means after assessing, test items are not necessary to carry out.
2. This is a variant report by changing built-in PSU. All the test cases were performed on original report which can be referred to Sporton Report Number FG3N0925. Based on the original report, only worst case was verified.

Conformity Assessment Condition:

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

Disclaimer:

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

Reviewed by: William Chen

Report Producer: Michelle Chen



1 General Description

1.1 Product Feature of Equipment Under Test

Product Feature
General Specs 5G NR.
Antenna Type WWAN: High Gain Antenna

Remark:

1. The EUT's information above is declared by manufacturer. Please refer to Disclaimer in report summary.
2. The maximum allowable antenna gain is determined by the manufacturer.

1.2 Modification of EUT

No modifications are made to the EUT during all test items.

1.3 Testing Location

Test Site	Sporton International Inc. EMC & Wireless Communications Laboratory
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978
Test Site No.	Sporton Site No. TH02-HY
Test Engineer	Qiao Tan
Temperature (°C)	19.3~22.5
Relative Humidity (%)	51.5~62.2

Test Site	Sporton International Inc. Wensan Laboratory
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	Sporton Site No. 03CH12-HY (TAF Code: 3786)
Test Engineer	Bill Chang
Temperature (°C)	20~25
Relative Humidity (%)	50~60
Remark	The Radiated Spurious Emission test item subcontracted to Sporton International Inc. Wensan Laboratory.

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

FCC Designation No.: TW1190 and TW3786



1.4 Applied Standards

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

- ♦ ANSI C63.26-2015
- ♦ ANSI / TIA-603-E
- ♦ FCC 47 CFR Part 2, 96
- ♦ FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01
- ♦ FCC KDB 940660 D01 Part 96 CBRS Eqpt v03
- ♦ FCC KDB 412172 D01 Determining ERP and EIRP v01r01
- ♦ FCC KDB 414788 D01 Radiated Test Site v01r01

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. The TAF code is not including all the FCC KDB listed without accreditation.

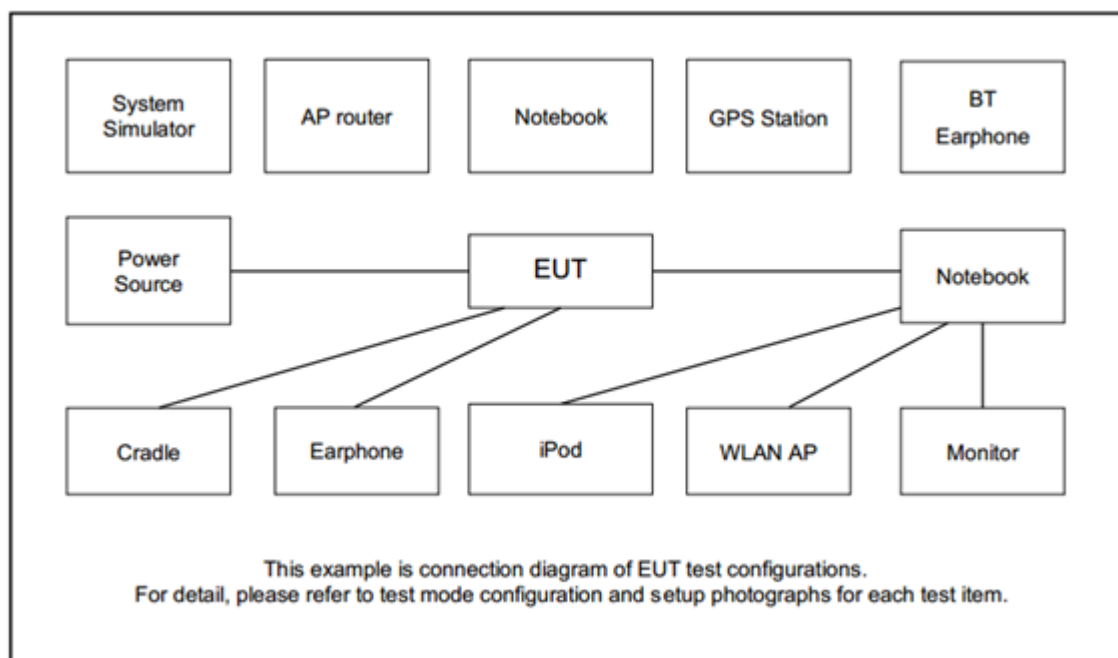
2 Test Configuration of Equipment Under Test

2.1 Test Mode

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas. License Digital Systems v03r01 with maximum output power.

For radiated measurement, the measured emission level of the EUT was maximized by rotating the EUT on a turntable, adjusting the orientation of the EUT and EUT antenna in two config (Ant. Horizontal and Ant. Vertical), and adjusting the measurement antenna orientation, following C63.26 exploratory test procedures and only the worst case emissions were reported in this report.

2.2 Connection Diagram of Test System



2.3 Frequency List of Low/Middle/High Channels

5G NR n48 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
40	Channel	638000	641666	645332
	Frequency	3570	3624.99	3679.98
20	Channel	637334	641666	646000
	Frequency	3560.01	3624.99	3690
10	Channel	637000	641666	646332
	Frequency	3555	3624.99	3694.98

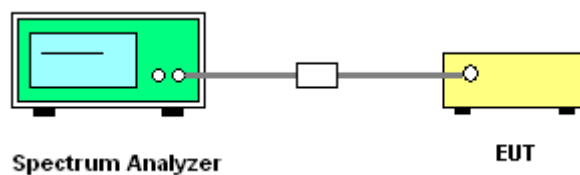
3 Conducted Test Items

3.1 Measuring Instruments

See list of measuring instruments of this test report.

3.1.1 Test Setup

3.1.2 Conducted Output Power



3.1.3 Test Result of Conducted Test

Please refer to Appendix A.



3.2 Conducted Output Power

3.2.1 Description of the Conducted Output Power Measurement

Command lines were set to force the EUT transmitting at maximum output power.

The measured power in the radio frequency on the transmitter output terminals shall be reported.

3.2.2 Test Procedures

1. Set EUT at maximum power.
2. Select lowest, middle, and highest channels for each band and different modulation.
3. Measure and record the power level.

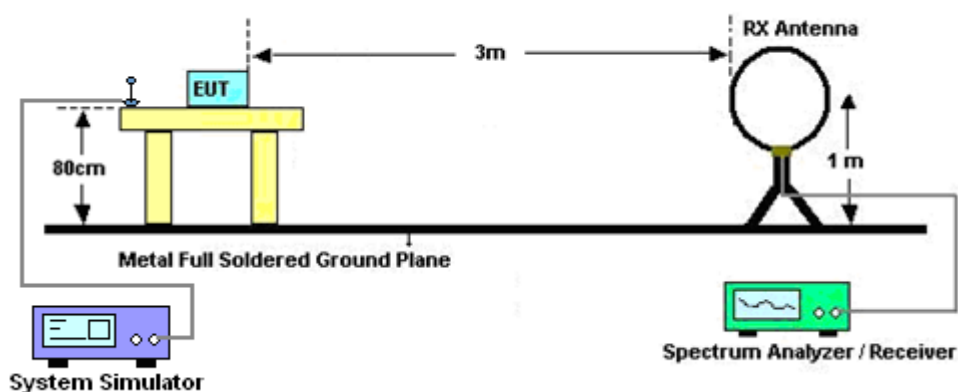
4 Radiated Test Items

4.1 Measuring Instruments

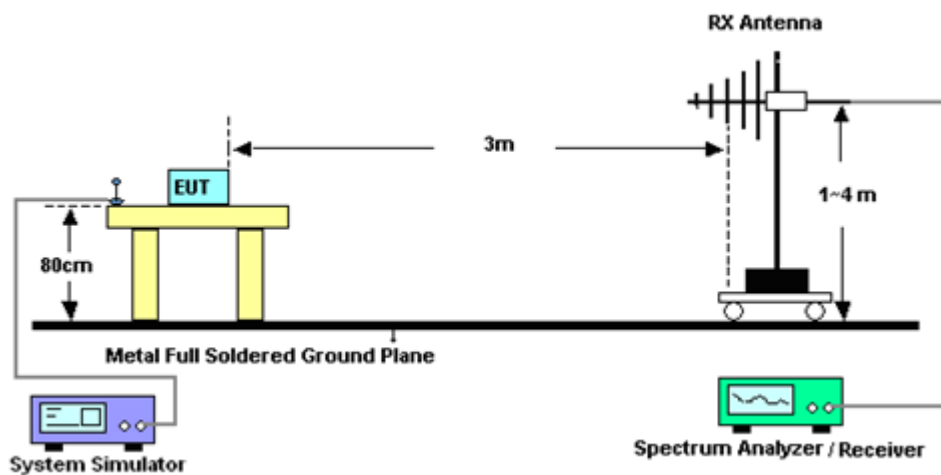
See list of measuring instruments of this test report.

4.2 Test Setup

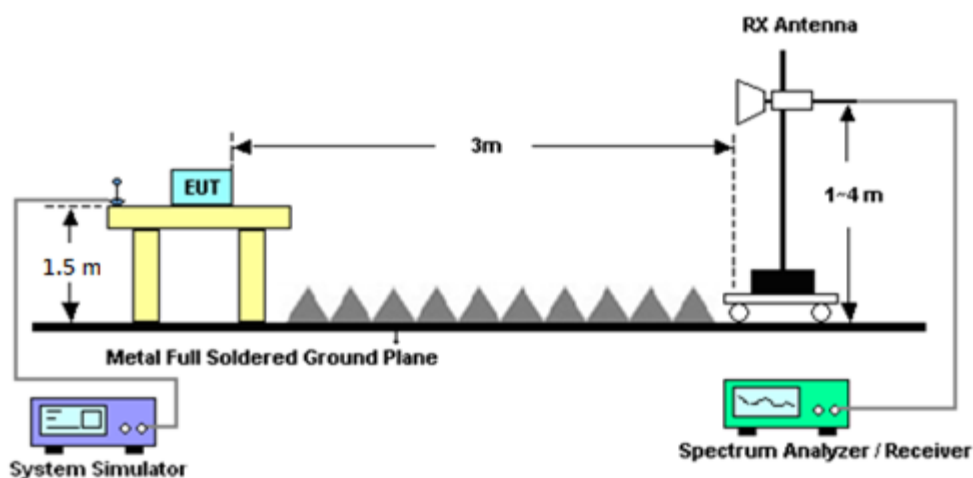
For radiated emissions below 30MHz



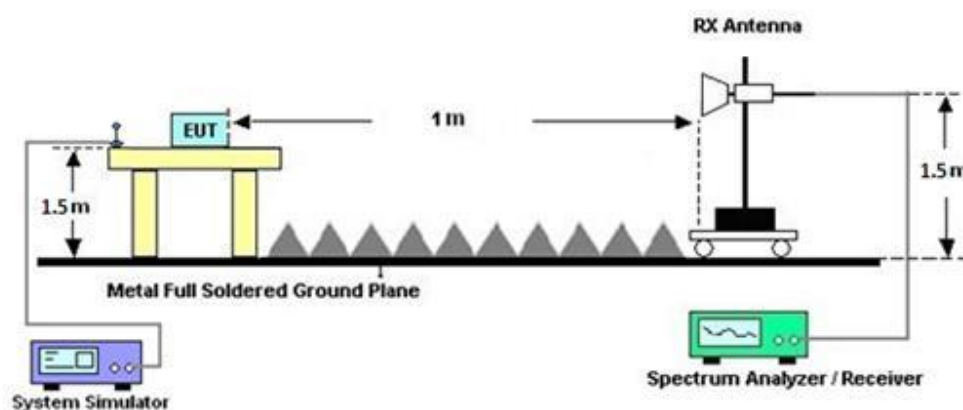
For radiated emissions from 30MHz to 1GHz



For radiated emissions from 1GHz to 18GHz



For radiated emissions above 18GHz



4.3 Test Result of Radiated Test

Please refer to Appendix B.

Note:

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is adequate comparison measurement of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.

4.4 Radiated Spurious Emission

4.4.1 Description of Radiated Spurious Emission Measurement

The radiated spurious emission was measured by substitution method according to ANSI / TIA-603-E.

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least -40dBm / MHz .

The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

4.4.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 7 and ANSI C63.26-2015 section 5.5.4

Radiated measurement using the field strength method

1. The EUT was placed on a turntable with 0.8 meter height for frequency below 1GHz and 1.5 meter height for frequency above 1GHz respectively above ground.
2. The EUT was set 3 meters from the receiving antenna mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between 1m to 4m to search the maximum spurious emission for both horizontal and vertical polarizations.
5. During the measurement, the system simulator parameters were set to force the EUT transmitting at maximum output power.
6. To convert spectrum reading E(dBuV/m) to EIRP(dBm)
$$\text{EIRP(dBm)} = \text{Level (dBuV/m)} + 20\log(d) - 104.77$$
, where d is the distance at which field strength limit is specified in the rules.
7.
$$\text{Field Strength Level (dBm)} = \text{Spectrum Reading (dBm)} + \text{Antenna Factor} + \text{Cable Loss} + \text{Read Level} - \text{Preamp Factor}.$$
8.
$$\text{ERP (dBm)} = \text{EIRP (dBm)} - 2.15$$
9. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

5 List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Feb. 28, 2023	Jan. 30, 2024	Feb. 27, 2024	Radiation (03CH12-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D01N-06	37059 & 01	30MHz~1GHz	Nov. 3, 2023	Jan. 30, 2024	Nov. 02, 2024	Radiation (03CH12-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-02114	1GHz~18GHz	Jul. 31, 2023	Jan. 30, 2024	Jul. 30, 2024	Radiation (03CH12-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA9170	00993	18GHz~40GHz	Nov. 24, 2023	Jan. 30, 2024	Nov. 23, 2024	Radiation (03CH12-HY)
Preamplifier	COM-POWER	PA-103A	161075	10MHz~1GHz	Mar. 21, 2023	Jan. 30, 2024	Mar. 20, 2024	Radiation (03CH12-HY)
Preamplifier	E-INSTRUMENT TECH LTD.	ERA-100M-18G-56-01-A70	EC1900249	1GHz~18GHz	Dec. 20, 2023	Jan. 30, 2024	Dec. 19, 2024	Radiation (03CH12-HY)
Preamplifier	EMEC	EM18G40G	060715	18GHz~40GHz	Dec. 07, 2023	Jan. 30, 2024	Dec. 06, 2024	Radiation (03CH12-HY)
Spectrum Analyzer	Agilent	N9010A	MY53470118	10Hz~44GHz	Jan. 10, 2024	Jan. 30, 2024	Jan. 09, 2025	Radiation (03CH12-HY)
Filter	Wainwright	WHKX8-5872.5-6750-18000-40ST	SN2	6.75GHz High Pass Filter	Mar. 14, 2023	Jan. 30, 2024	Mar. 13, 2024	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	803951/2	9kHz~30MHz	Mar. 07, 2023	Jan. 30, 2024	Mar. 06, 2024	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 126E	0058/126E	30MHz~18GHz	Dec. 18, 2023	Jan. 30, 2024	Dec. 17, 2024	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	505134/2	30MHz~40GHz	Dec. 18, 2023	Jan. 30, 2024	Dec. 17, 2024	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	803953/2	30MHz~40GHz	Dec. 18, 2023	Jan. 30, 2024	Dec. 17, 2024	Radiation (03CH12-HY)
Hygrometer	TECEPEL	DTM-303B	TP210117	N/A	Oct. 19, 2023	Jan. 30, 2024	Oct. 18, 2024	Radiation (03CH12-HY)
Controller	EMEC	EM1000	N/A	Control Turn table & Ant Mast	N/A	Jan. 30, 2024	N/A	Radiation (03CH12-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1m~4m	N/A	Jan. 30, 2024	N/A	Radiation (03CH12-HY)
Radio Communication Analyzer	Anritsu	MT8821C	6262257866	N/A	May 08, 2023	Jan. 30, 2024	May 07, 2024	Radiation (03CH12-HY)
Turn Table	EMEC	TT2000	N/A	0~360 Degree	N/A	Jan. 30, 2024	N/A	Radiation (03CH12-HY)
Software	Audix	E3 6.2009-8-24	RK-000989	N/A	N/A	Jan. 30, 2024	N/A	Radiation (03CH12-HY)
Signal Analyzer	Rohde & Schwarz	FSV3044	101104	10Hz~44GHz	Feb. 21, 2023	Jan. 25, 2024	Feb. 20, 2024	Conducted (TH02-HY)
Hygrometer	TECEPEL	DTM-303B	TP200886	Temperature & Humidity	Mar. 28, 2023	Jan. 25, 2024	Mar. 27, 2024	Conducted (TH02-HY)
DC Power Supply	GW Instek	SPS-606	GES842931	N/A	Dec. 29, 2023	Jan. 25, 2024	Dec. 28, 2024	Conducted (TH02-HY)

6 Measurement Uncertainty

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	3.07 dB
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Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	3.63 dB
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Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	4.14 dB
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Appendix A. Test Results of Conducted Test

Conducted Output Power

M_Channel (dBm)				
ANT1	QPSK	16QAM	64QAM	256QAM
10M	20.53	20.71	20.45	20.48
40M	25.47	25.43	25.64	25.60

M_Channel (dBm)				
ANT2	QPSK	16QAM	64QAM	256QAM
10M	20.13	20.32	20.04	20.29
40M	25.33	25.23	25.36	25.31

M_Channel (dBm)				
ANT3	QPSK	16QAM	64QAM	256QAM
10M	20.42	20.70	20.51	20.46
40M	25.46	25.22	25.45	25.56

M_Channel (dBm)				
ANT4	QPSK	16QAM	64QAM	256QAM
10M	20.79	20.75	20.53	20.77
40M	25.58	25.56	25.73	25.69



Appendix B. Test Results of Radiated Test

B1. Summary of each worse mode

Mode	Part	Band	Ch	Freq (MHz)	Level (dBm)	Det	Ant Factor (dB)	Amp\Cbl (dB)	Filter (dB)	EIRPCF (dB)	Reading (dBuV)	Limit (dBm)	Margin (dB)	Pol	Ant
1	Part 96	NR SA n48	M	14466	-51.03	RMS	40.80	-45.45	0.78	-95.23	48.07	-40.00	-11.03	V	0+1+2+3

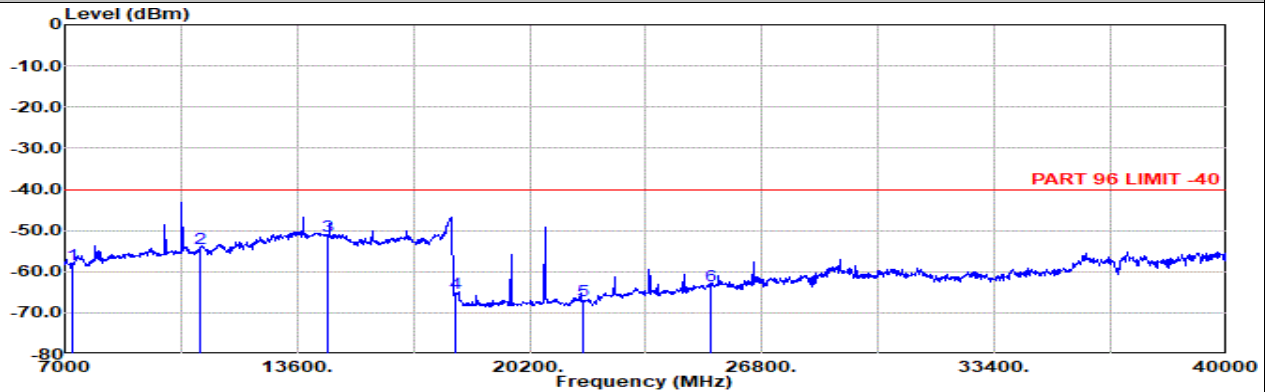


0+1+2+3

Part 96 Mode 1

NR SA n48 40M Ch641666 106RB0 QPSK

M

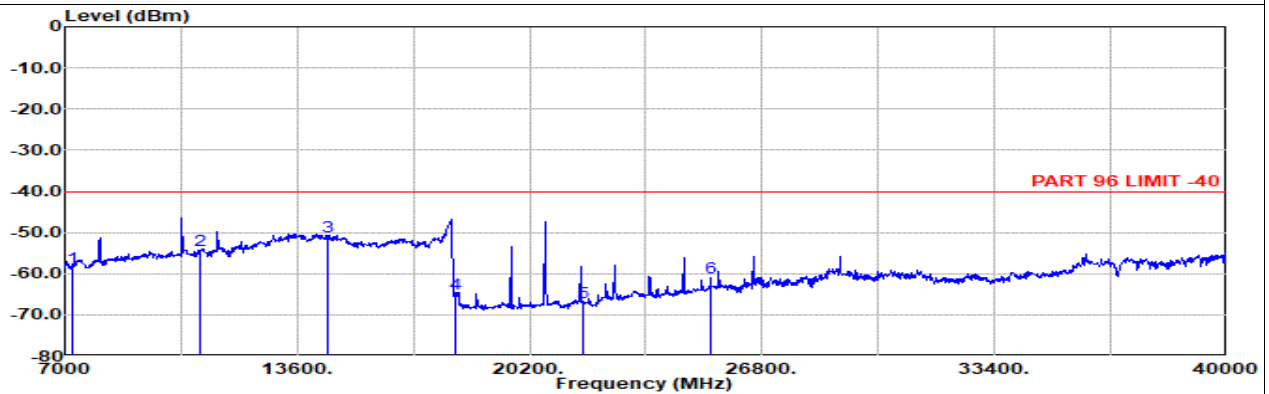


Site : 03CH12-HY

Condition: PART 96 LIMIT -40 1m SHF_00993_231124 Horizontal

NR SA n48 40M Ch641666 106RB0 QPSK

	Freq	Level	Detector	Ant Factor	Amp\Cb	Filter 1	EIRPCF	Readin g	Limit	Margin	Pol
	MHz	dBm									
1	7233.00	-58.12	RMS	37.17	-51.92	0.99	-95.23	50.87	-40.00	-18.12	Horizontal
2	10850.00	-54.21	RMS	39.30	-49.81	0.55	-95.23	50.97	-40.00	-14.21	Horizontal
3	14466.00	-51.33	RMS	40.80	-45.45	0.78	-95.23	47.77	-40.00	-11.33	Horizontal
4	18080.00	-65.13	RMS	37.80	-32.09	-9.54	-95.23	33.93	-40.00	-25.13	Horizontal
5	21699.00	-66.90	RMS	37.90	-29.60	-9.54	-95.23	29.57	-40.00	-26.90	Horizontal
6	25315.00	-63.26	RMS	39.10	-26.29	-9.54	-95.23	28.70	-40.00	-23.26	Horizontal



Site : 03CH12-HY

Condition: PART 96 LIMIT -40 1m SHF_00993_231124 Vertical

NR SA n48 40M Ch641666 106RB0 QPSK

	Freq	Level	Detector	Ant Factor	Amp\Cb	Filter 1	EIRPCF	Readin g	Limit	Margin	Pol
	MHz	dBm									
1	7233.00	-58.50	RMS	37.17	-51.92	0.99	-95.23	50.49	-40.00	-18.50	Vertical
2	10850.00	-54.34	RMS	39.30	-49.81	0.55	-95.23	50.84	-40.00	-14.34	Vertical
3	14466.00	-51.03	RMS	40.80	-45.45	0.78	-95.23	48.07	-40.00	-11.03	Vertical
4	18080.00	-64.99	RMS	37.80	-32.09	-9.54	-95.23	34.07	-40.00	-24.99	Vertical
5	21699.00	-66.88	RMS	37.90	-29.60	-9.54	-95.23	29.59	-40.00	-26.88	Vertical
6	25315.00	-60.94	RMS	39.10	-26.29	-9.54	-95.23	31.02	-40.00	-20.94	Vertical

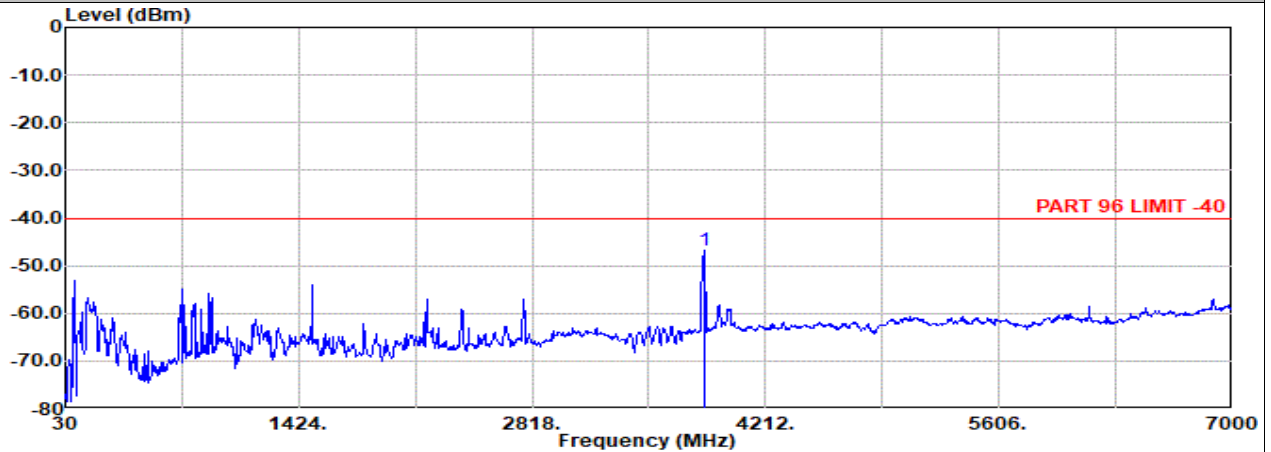


0+1+2+3

Part 96 Mode 1

NR SA n48 40M Ch641666 106RB0 QPSK

M

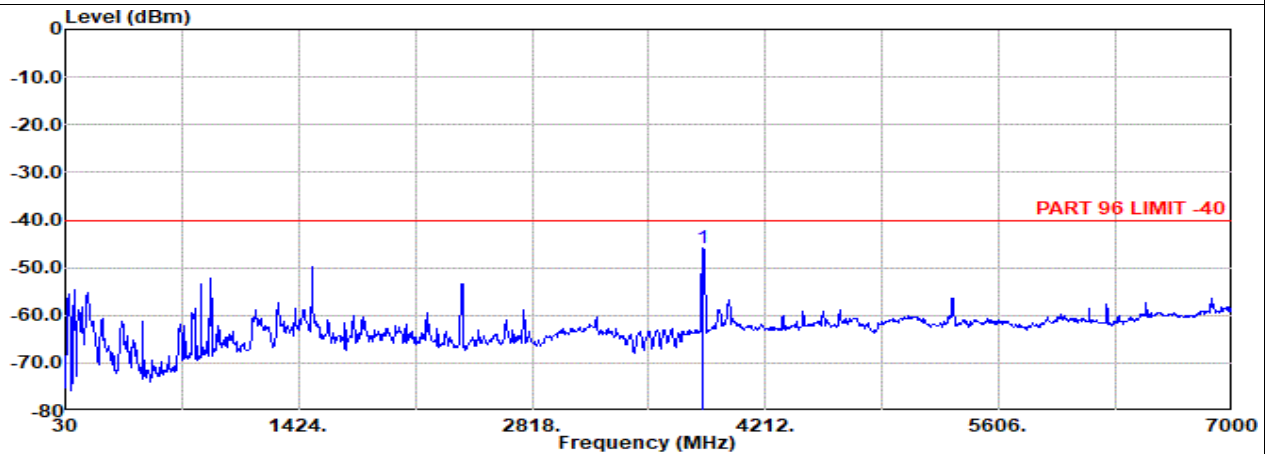


Site : 03CH12-HY

Condition: PART 96 LIMIT -40 3m 9120D-02114-230731 Horizontal

: NR SA n48 40M Ch641666 106RB0 QPSK

1	Freq	Level	Detector	Ant Amp\Cb Filter		EIRPCF	Readin	Limit	Margin Pol	
	MHz	dBm		Factor	1					
1	3850.00	-46.86	RMS	30.50	-57.31	0.60	-95.23	74.58	-----	----- Horizontal



Site : 03CH12-HY

Condition: PART 96 LIMIT -40 3m 9120D-02114-230731 Vertical

: NR SA n48 40M Ch641666 106RB0 QPSK

1	Freq	Level	Detector	Ant Amp\Cb Filter		EIRPCF	Readin	Limit	Margin Pol	
	MHz	dBm		Factor	1					
1	3838.00	-45.96	RMS	30.43	-57.37	0.61	-95.23	75.60	-----	----- Vertical