FCC Test Report

Product Name	SG500M2-X
Model No.	SG500M2-X
Contains FCC ID	2ACARSG500M2

Applicant	Tri Cascade Inc
Address	19200 Von Karman Ave, Ste 400, Irvine, CA 92612

Date of Receipt	Sep. 16, 2022
Issued Date	Dec. 21, 2022
Report No.	2290522R-RFUSWWAV06-B
Report Version	V1.0

Testing Laboratory
3023

The test results relate only to the samples tested.
The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.
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Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Test Report

Product Name	SG500M2-X
Applicant	Tri Cascade Inc
Address	19200 Von Karman Ave, Ste 400, Irvine, CA 92612
Manufacturer	Tri Cascade Inc
Model No.	SG500M2-X
FCC ID	2ACARSG500M2
Module Voltage	DC 3.3V (host equipment)
EUT Test Voltage	DC 5V (host equipment)
Trade Name	TRITOM
Applicable Standard	47 CFR FCC Part 96
Test Result	Complied

Documented By : Jinn Chen

(Supervisor / Jinn Chen)

Tested By : Jason Tuan

(Senior Engineer / Jason Tuan)

Approved By : Tim Sung

(Manager / Tim Sung)

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Revision History

Report No.	Version	Description	Issued Date
2290522R-RFUSWWAV06-B	V1.0	Initial issue of report.	Dec. 21, 2022

Class II Permissive Change (C2PC)

Permissive Change	Modifications
Class II (C2PC)	1. Removing the 5G NR n41 frequency. 2. The EUT was installed to the host (Brand: VOS / Model No.: VOS5-GC-1) to perform radiated spurious emission test. After evaluating, the worst result of original module report (Brand: Compal, Model No.: RXM-G1, FCC ID: GKRRXMG1) is selected to verify radiated spurious emission test and record in the report.

1. General Information

1.1. EUT Description

Product Name	SG500M2-X
Trade Name	TRITOM
Model No.	SG500M2-X
Contains FCC ID	2ACARSG500M2
Hardware Version	HW V01
Software Version	RXMG1.20.00.326_0R05
IMEI No.	01637100
Antenna Gain	Refer to the Antenna List

Note:

1. Regarding frequency band operation, the lowest, middle and highest frequency of channel were selected to perform the test, and the details were shown on this report.
2. The EUT description is from the customer declaration.
3. The RF specifications of EUT refer to SG500M2-X module, follow above FCC ID.

Antenna List

Ant.	Brand Name	Model No.	Type	Band	Gain (dBi)
0	INPAQ	ZX01	Dipole	Band 2	-2.4
				Band 4	-2.7
				Band 5	-3.4
				Band 7	-0.4
				Band 12	-9.6
				Band 13	-8.2
				Band 14	-7.9
				Band 25	-2.6
				Band 26	-3.5
				Band 30	-1.1
				Band 41	-0.8
				Band 66	-2.7
				Band 71	-11.5
				n2	-2.4
				n5	-3.4
				n66	-2.7
				n71	-11.5
1	INPAQ	ZX01	PIFA	Band 48	-2.1
				n2	-6.1
				n66	-11.0
2	INPAQ	ZX01	Dipole	Band 5	-8.3
				Band 12	-9.1
				Band 13	-8.0
				Band 14	-10.9
				Band 26	-8.4
				Band 41	-2.5
				Band 48	-2.3
				Band 71	-12.2
				n2	-3.2
				n5	-8.3
				n66	-3.3
				n71	-12.2
3	INPAQ	ZX01	PIFA	n2	-7.0
				n66	-12.0

1.2. Test Summary

Requirement – Test Item	Result
Radiated Emissions	Pass

Note:

1. Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
2. The EUT was performed at X axis, Y axis and Z axis position for radiated emission and band edge tests.
   The worst case was found at Y axis, so the measurement will follow this same test configuration.

Test Mode	Link LTE CA Band 48C

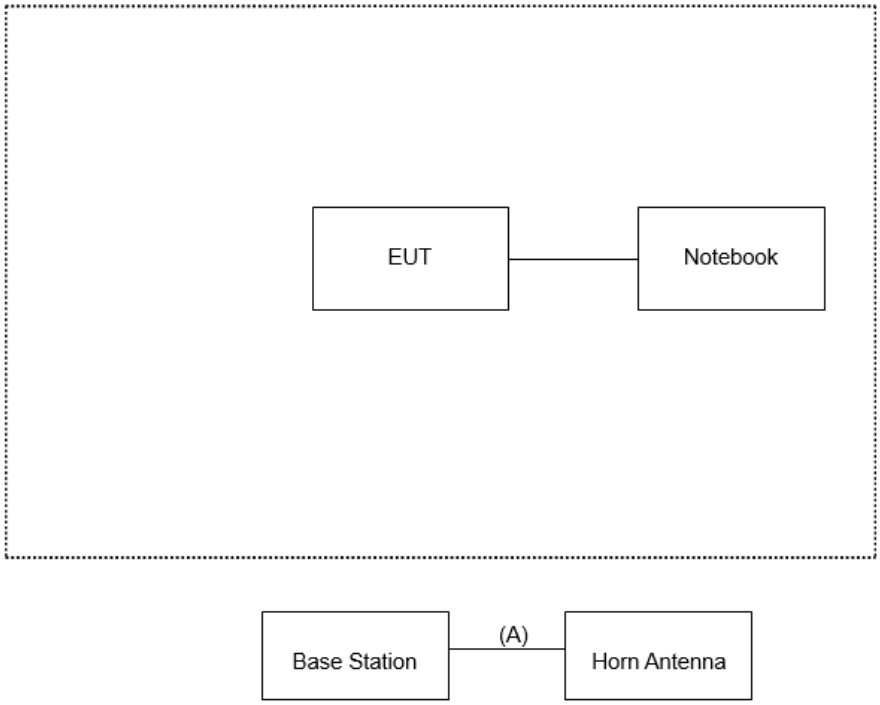
1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system.

Product		Manufacturer	Model No.	Serial No.
1	Base Station	Anritsu	MT8821C & MT8000	6262044740 & 6262134961
2	Horn Antenna	RF SPIN	DRH18-E	210503A18ES

1.4. Configuration of Tested System

Connection Diagram



Signal Cable Type		Signal cable Description
A	RF Cable	Non-Shielded, 10m

1.5. EUT Exercise Software

1	Setup the EUT and Base station as shown on.
2	Turn on the power of all equipment.
3	Configure test mode, test channel and data rate.
4	Keep the EUT and base station in Link mode.
5	Repeat the above procedure (3&4).

1.6. Test Facility

Ambient conditions in the laboratory:

Performed Item	Items	Required	Actual
Radiated Emission	Temperature (°C)	10~40 °C	25.3 °C
	Humidity (%RH)	10~90 %	66.1 %

USA : FCC Registration Number: TW0033

Canada : CAB Identifier Number: TW3023 / Company Number: 26930

Site Description : Accredited by TAF
Accredited Number: 3023

Test Laboratory : DEKRA Testing and Certification Co., Ltd
Address : No. 5-22, Ruishukeng Linkou District, New Taipei City, 24451, Taiwan
Performed Location : No. 26, Huaya 1st Rd., Guishan Dist.,Taoyuan City 333411, Taiwan, R.O.C.
Phone Number : +886-3-275-7255
Fax Number : +886-3-327-8031
Email Address : info.tw@dekra.com
Website : http://www.dekra.com.tw

1.7. List of Test Item and Equipment

For Radiated measurements /HY-CB02

Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
Loop Antenna	AMETEK	HLA6121	49611	2022/03/18	2023/03/17
Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-675	2021/08/11	2023/08/10
Horn Antenna	RF SPIN	DRH18-E	210503A18ES	2022/06/08	2023/06/07
Horn Antenna	Com-Power	AH-840	101101	2021/11/30	2023/11/29
Pre-Amplifier	SGH	EM330	60736	2022/07/28	2023/07/27
Pre-Amplifier	SGH	PRAMP118	20200203	2022/01/24	2023/01/23
Pre-Amplifier	EMCI	EMC05820SE	980285	2022/07/28	2023/07/27
Pre-Amplifier	EMCI	EMC184045SE	980369	2022/05/12	2023/05/11
Coaxial Cable	EMCI	EMC102-KM-KM-600	1160314		
Coaxial Cable	EMCI	EMC102-KM-KM-7000	170242		
Filter	MICRO TRONICS	BRM50702	G249	2022/07/27	2023/07/26
Filter	MICRO TRONICS	BRM50716	G187	2022/07/27	2023/07/26
EMI Test Receiver	R&S	ESR3	102793	2021/12/15	2022/12/14
Spectrum Analyzer	R&S	FSV3044	101113	2022/01/25	2023/01/24
Coaxial Cable	SGH	HA800	GD20110223-2	2022/03/17	2023/03/16
Coaxial Cable	SGH	HA800	GD20110222-4		
Coaxial Cable	SGH	SGH18	2021005-2		
Coaxial Cable	SGH	SGH18	202108-5		
Universal Radio Communication Tester	Anritsu	MT8000A	6262134961	2022/05/18	2023/05/17
Universal Radio Communication Tester	Anritsu	MT8821C	6262044740	2022/05/19	2023/05/18
Bluetooth tester	R&S	CBT	101238	2022/03/06	2023/03/05

Note: Test Software version: AUDIX e3 V9.

1.8. Uncertainty

Uncertainties have been calculated according to the DEKRA internal document, and is described in each test chapter of this report.

The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

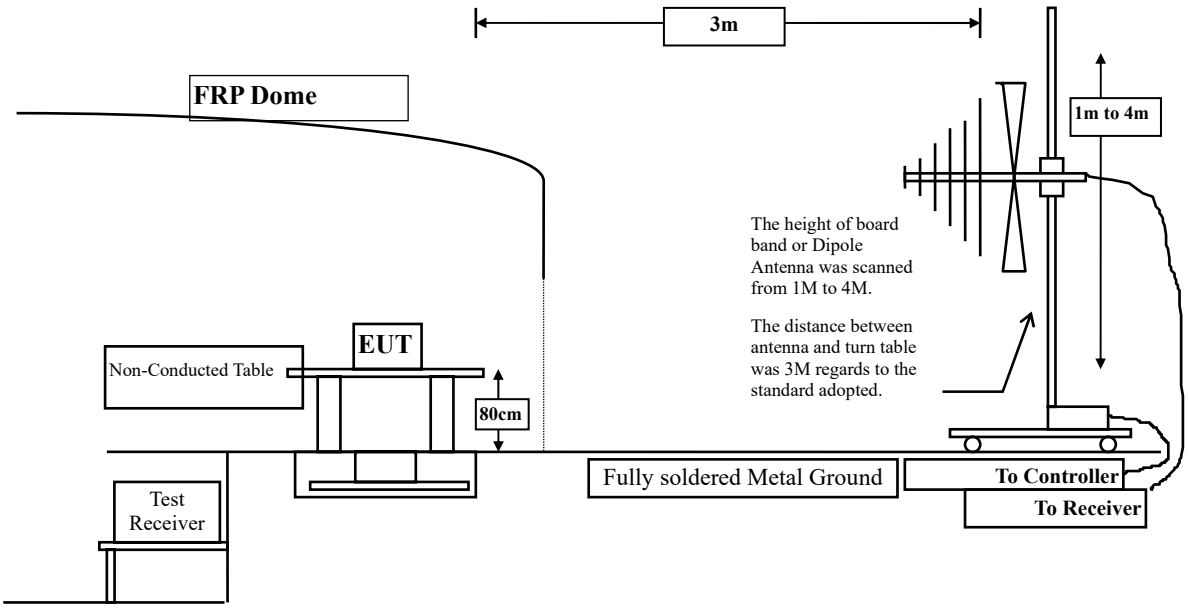
Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Test item	**Uncertainty**	
Radiated Emission	Under 1GHz ±4.05 dB	Above 1GHz ±3.73 dB

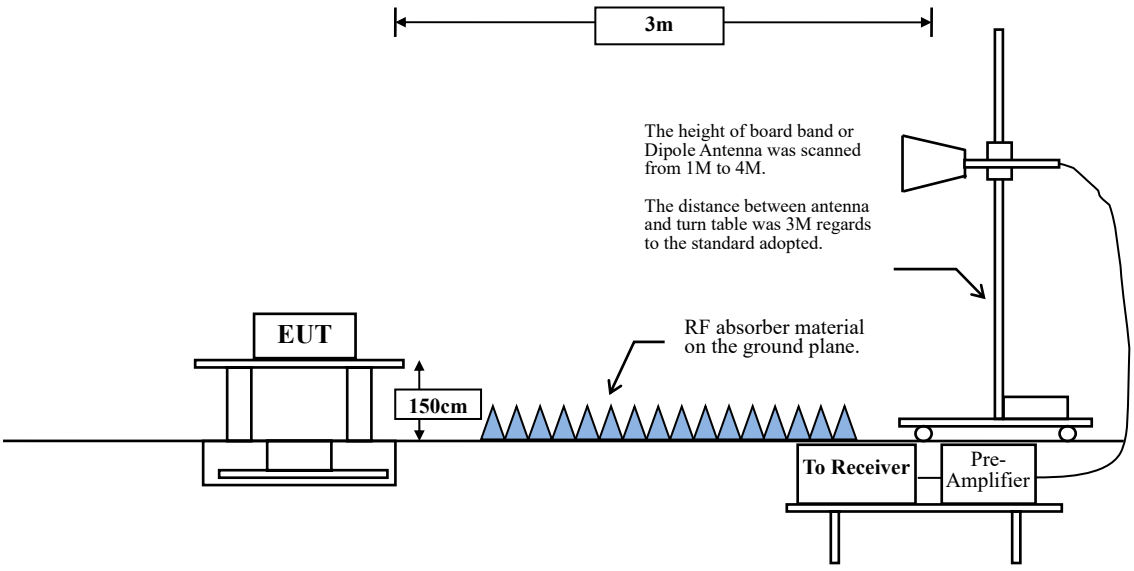
2. Radiated Emission

2.1. Test Setup

Below 1GHz



Above 1GHz



2.2. Limits

Limit: <-40 dBm

43 + 10Log(P) down on the carrier where P is the power in Watts.

2.3. Test Procedure

In accordance with Part 2.1051, 96.41, the spurious emissions from the antenna terminal were measured. The transmitter output power was attenuated using a combination of filters and attenuators and the frequency spectrum investigated from 30MHz to 40GHz. The EUT was set to transmit on full power. The EUT was tested on Low, middle and High channels for both power levels. The resolution and video bandwidth was set to 1MHz/3MHz in accordance with Part 2.1051, 96.41. The spectrum analyzer detector was set to Max Hold. In addition, measurements were made up to the 10th harmonic of the fundamental. The device was then replaced with a substitution antenna, which input signal was adjusted until the received level matched that of the previously detected emission.

(1) The EUT is tested with maximum rated TX power via the Base Station simulator.

(2) The EUT is tested in three orthogonal planes, The worst case was showing in this report.

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

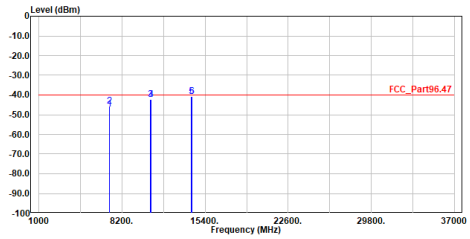
The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to TIA/EIA 603-E on radiated measurement.

2.4. Test Specification

According to Part 2.1051, 96.41

2.5. Test Result of Radiated Emission

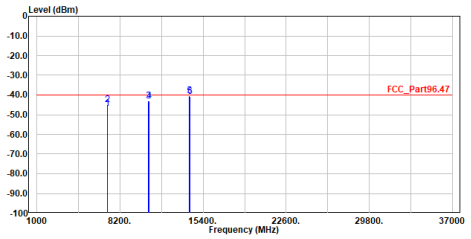
Site :HY-CB02
Condition :3m Horizontal
mode :LTE_CA_B48C_CH55273+CH55390
Test by :Peter



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	7106.600	-47.22	-40.00	-7.22	-54.04	6.82	Peak
2	7130.000	-45.66	-40.00	-5.66	-52.51	6.85	Peak
3	10659.900	-42.11	-40.00	-2.11	-49.38	7.27	Peak
4	10695.000	-42.11	-40.00	-2.11	-49.16	7.05	Peak
5	14213.200	-40.60	-40.00	-0.60	-53.26	12.66	Peak
6	14260.000	-40.81	-40.00	-0.81	-53.65	12.84	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor + Aux Factor
3. Over Limit = Level - Limit Line
4. Aux Factor = Convert E (dBuVm) to EIRP (dBm)
= 107 + 20log(3) - 104.8 = 11.8 dB
5. The other emission levels were very low against the limit.
6. The emission under 1GHz was not included since the emission levels are very low against the limit.

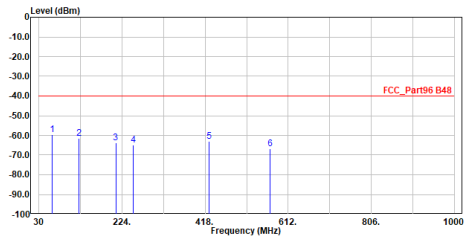
Site :HY-CB02
Condition :3m Vertical
mode :LTE_CA_B48C_CH55273+CH55390
Test by :Peter



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	7106.600	-46.81	-40.00	-6.81	-53.63	6.82	Peak
2	7130.000	-44.80	-40.00	-4.80	-51.65	6.85	Peak
3	10659.900	-43.05	-40.00	-3.05	-50.32	7.27	Peak
4	10695.000	-43.05	-40.00	-3.05	-50.10	7.05	Peak
5	14213.200	-40.56	-40.00	-0.56	-53.22	12.66	Peak
6	14260.000	-40.64	-40.00	-0.64	-53.48	12.84	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor + Aux Factor
3. Over Limit = Level - Limit Line
4. Aux Factor = Convert E (dBuVm) to EIRP (dBm)
= 107 + 20log(3) - 104.8 = 11.8 dB
5. The other emission levels were very low against the limit.
6. The emission under 1GHz was not included since the emission levels are very low against the limit.

Site :HY-CB02
Condition :3m Horizontal
mode :LTE_CA_B48C_CH55273+CH55390
Test by :Peter



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	60.458	-59.64	-40.00	-19.64	-49.52	-10.12	Peak
2	123.314	-61.68	-40.00	-21.68	-50.50	-11.18	Peak
3	209.450	-63.64	-40.00	-23.64	-51.22	-12.42	Peak
4	249.996	-64.78	-40.00	-24.78	-53.90	-10.88	Peak
5	427.506	-62.89	-40.00	-22.89	-57.00	-5.89	Peak
6	569.223	-66.92	-40.00	-26.92	-63.88	-3.04	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor + Aux Factor
3. Over Limit = Level - Limit Line
4. Aux Factor = Convert E (dBuVm) to EIRP (dBm)
= 107 + 20log(3) - 104.8 = 11.8 dB
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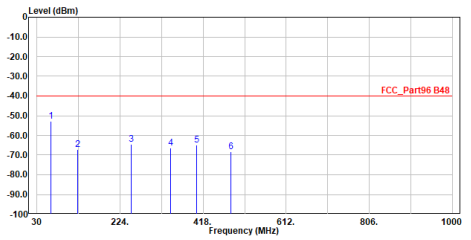
6. The emission under 1GHz was not included since the emission levels are very low against the limit.

Site :HY-CB02
Condition :3m Vertical
mode :LTE_CA_B48C_CH55273+CH55390
Test by :Peter



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	62.301	-52.78	-40.00	-12.78	-42.24	-10.54	Peak
2	124.866	-67.09	-40.00	-27.09	-55.99	-11.10	Peak
3	249.996	-64.67	-40.00	-24.67	-53.79	-10.88	Peak
4	341.467	-66.28	-40.00	-26.28	-58.25	-8.03	Peak
5	403.353	-64.82	-40.00	-24.82	-58.33	-6.49	Peak
6	482.796	-68.24	-40.00	-28.24	-63.50	-4.74	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor + Aux Factor
3. Over Limit = Level - Limit Line
4. Aux Factor = Convert E (dBuVm) to EIRP (dBm)
= 107 + 20log(3) - 104.8 = 11.8 dB
5. The other emission levels were very low against the limit.
6. The emission under 1GHz was not included since the emission levels are very low against the limit.

3. EMI Reduction Method During Compliance Testing

No modification was made during testing.