FCC Test Report

Product Name	:	SG500M2-X
Brand Name	:	TRITOM
Model No.	:	SG500M2-X
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-RFUSOTHV13-A
Report Version	:	V1.0

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 of the equipment and evaluated measurement uncertainty herein.
This report must not be used to claim product endorsement by TAF or any agency of the government.
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.

Product Name	:	SG500M2-X
Applicant	:	Tri Cascade Inc
Address	:	19200 Von Karman Ave, Ste 400, Irvine, CA 92612
Manufacturer	:	Tri Cascade Inc
Address	:	19200 Von Karman Ave, Ste 400, Irvine, CA 92612
Brand Name	:	TRITOM
Model No.	:	SG500M2-X
FCC ID	:	2ACARSG500M2
Module Voltage	:	DC 3.3V (host equipment)
System Voltage	:	DC 5V (host equipment)
Applicable Standard	:	FCC CFR Title 47 Part 22 Subpart H FCC CFR Title 47 Part 24 Subpart E FCC CFR Title 47 Part 27 Subpart D, Subpart F, Subpart L, Subpart M FCC CFR Title 47 Part 90 Subpart S, Subpart R ANSI/TIA-603-E-2016 ANSI C63.26-2015
Laboratory Name	:	DEKRA Testing and Certification Co., Ltd. Hsin Chu Laboratory
Address	:	No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 310, Taiwan, R.O.C.
Test Result	:	Complied

Documented By : Amelia Wu

(Amelia Wu / Project Specialist)

Approved By : Rueyyan.Lin

(Rueyyan Lin / Supervisor)

The test results relate only to the samples tested.

The test report shall not be reproduced except in full without the written approval of DEKRA Testing and Certification Co., Ltd.

Revision History

Version	Description	Issued Date
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.

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1. General Information

1.1. EUT Description

Product Name	SG500M2-X
Brand Name	TRITOM
Model No.	SG500M2-X
Hardware Version	01
Software Version	RXMG1.20.00.326_0R05
IMEI No.	01637100

WCDMA	
Tx Frequency Range (MHz)	WCDMA Band 2: 1852.4 ~ 1907.6 WCDMA Band 4: 1712.4 ~ 1752.6 WCDMA Band 5: 826.4 ~ 846.6
Rx Frequency Range (MHz)	WCDMA Band 2: 1932.4 ~ 1987.6 WCDMA Band 4: 2112.4 ~ 2152.6 WCDMA Band 5: 871.4 ~ 891.6
Function	WCDMA / HSDPA / DC-HSDPA / HSUPA / HSPA+
Type of Modulation	BPSK / QPSK / 16QAM / 64QAM

LTE	
Uplink Frequency Range (MHz)	LTE Band 2: 1850~1910 LTE Band 4: 1710~1755 LTE Band 5: 824~849 LTE Band 7: 2500~2570 LTE Band 12: 699~716 LTE Band 13: 777~787 LTE Band 14: 788~798 LTE Band 25: 1850~1915 LTE Band 26: 814~849 LTE Band 30: 2305~2315 LTE Band 41: 2496~2690 LTE Band 48: 3500 ~ 3700 LTE Band 66: 1710~1780 LTE Band 71: 663~698
Downlink Frequency Range (MHz)	LTE Band 2: 1930~1990 LTE Band 4: 2110~2115 LTE Band 5: 869~894 LTE Band 7: 2620~2690 LTE Band 12: 729~746 LTE Band 13: 746~756 LTE Band 14: 758~768 LTE Band 25: 1930~1995 LTE Band 26: 859~894 LTE Band 30: 2350~2360 LTE Band 41: 2496~2690 LTE Band 48: 3500 ~ 3700 LTE Band 66: 2110~2200 LTE Band 71: 617~652
Bandwidth (MHz)	LTE Band 2: 1.4 / 3 / 5 / 10 / 15 / 20 LTE Band 4: 1.4 / 3 / 5 / 10 / 15 / 20 LTE Band 5: 1.4 / 3 / 5 / 10 LTE Band 7: 5 / 10 / 15 / 20 LTE Band 12: 1.4 / 3 / 5 / 10 LTE Band 13: 5 / 10 LTE Band 14: 5 / 10 LTE Band 25: 1.4 / 3 / 5 / 10 / 15 / 20 LTE Band 26: 1.4 / 3 / 5 / 10 / 15 LTE Band 30: 5 / 10 LTE Band 41: 1.4 / 3 / 5 / 10 / 15 / 20 LTE Band 48: 5 / 10 / 15 / 20 LTE Band 66: 1.4 / 3 / 5 / 10 / 15 / 20 LTE Band 71: 5 / 10 / 15 / 20
CA Band	5B, 7C, 41C, 48C, 66B, 66C
Type of Modulation	QPSK / 16QAM / 64QAM / 256QAM

Test result of LTE band 48, please refer to the 47 CFR FCC Part 96 report (DEKRA Report No.: 2290522R-RFUSWWAV06-B).

5G NR			
Frequency Range	5G NR n2	1850~1910 MHz (Uplink) 1930~1990 MHz (Downlink)	
	5G NR n5	824~849 MHz (Uplink) 869~894 MHz (Downlink)	
	5G NR n66	1710~1780 MHz (Uplink) 2110~2200 MHz (Downlink)	
	5G NR n71	663~698 MHz (Uplink) 617~652 MHz (Downlink)	
Bandwidth	5G NR n2	SCS: 15 kHz	5 / 10 / 15 / 20 MHz
	5G NR n5	SCS: 15 kHz	5 / 10 / 15 / 20 MHz
	5G NR n66	SCS: 15 kHz	5 / 10 / 15 / 20 MHz
	5G NR n71	SCS: 15 kHz	5 / 10 / 15 / 20 MHz
Type of Modulation	pi/2 BPSK / QPSK / 16QAM / 64QAM / 256QAM		

ENDC	
Operation Mode	LTE Band 5 + 5G NR n2
	LTE Band 12 + 5G NR n2
	LTE Band 2 + 5G NR n5
	LTE Band 30 + 5G NR n5
	LTE Band 48 + 5G NR n5
	LTE Band 66 + 5G NR n5
	LTE Band 5 + 5G NR n66
	LTE Band 12 + 5G NR n66
	LTE Band 13 + 5G NR n66
	LTE Band 48 + 5G NR n66
	LTE Band 2 + 5G NR n71
	LTE Band 66 + 5G NR n71

Accessories Information		
No.	Equipment Name	Description
1	USB Type C Cable	Non-Shielded, 0.14m

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

Antenna 1 and Antenna 3 for RX only.

EUT Operational Condition	
Testing Voltage	AC 120V/60Hz

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.

1.2. Mode of Operation

DEKRA has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode	Mode 1: Link WCDMA Band 5 Mode 2: Link LTE Band 14 Mode 3: Link LTE Band 25 Mode 4: Link LTE Band 48 + 5G NR n66 (ENDC)

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.

1.3. Comments and Remarks

The product specification and testing instructions for the EUT declared in the report are provided by the manufacturer who will take all responsibilities for the accuracy.

1.4. Tested System Details

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

<WCDMA and LTE>

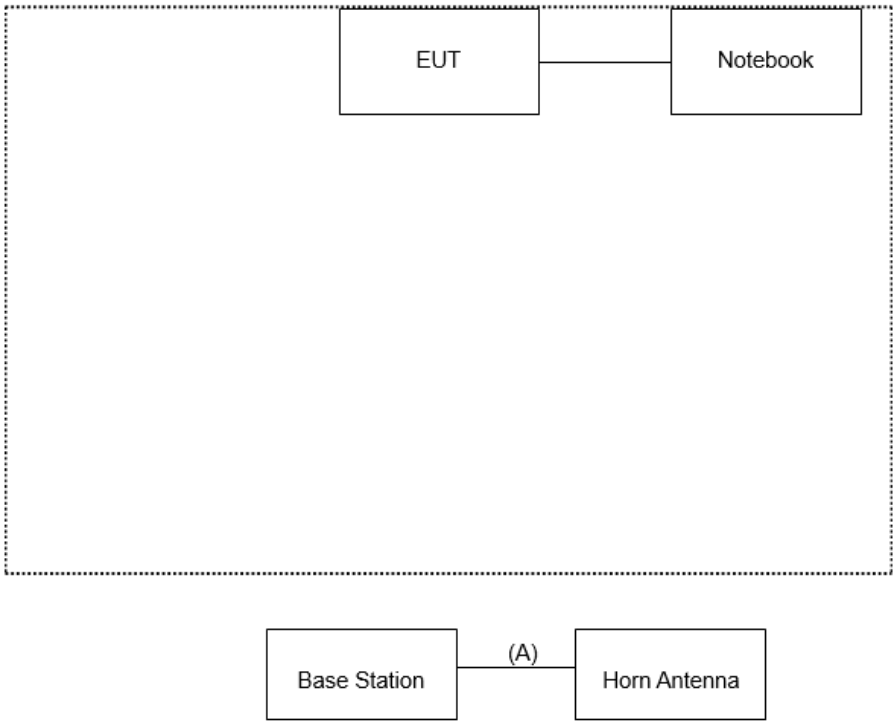
Product		Manufacturer	Model No.	Serial No.
1	Notebook	Acer	N16Q2	NXGGDTA0077171F3307600
2	Base Station	R&S	CMW500	157118
3	Horn Antenna	Schwarzbeck	BBHA 9120D	1640

<ENDC>

Product		Manufacturer	Model No.	Serial No.
1	Notebook	Acer	N16Q2	NXGGDTA0077171F3307600
2	Base Station	Anritsu	MT8821C & MT8000	6262044740 & 6262134961
3	Horn Antenna	Schwarzbeck	BBHA 9120D	1640

1.5. Configuration of Tested System

Connection Diagram



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

1.6. EUT Operation of during Test

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).

2. Technical Test

2.1. Summary of Test Result

☒ No deviations from the test standards

☐ Deviations from the test standards as below description:

WCDMA Band 5			
FCC Part 22 Subpart H			
Performed Item	FCC Reference Section	Limit	Result
Spurious Emission	§22.917	< -13 dBm	Pass

Note: Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

LTE Band 14			
FCC Part 90 Subpart R			
Performed Item	FCC Reference Section	Limit	Result
Spurious Emission	§90.543	< -13dBm < −70 dBW/MHz e.i.r.p. of all emissions, including harmonics in the band 1559-1610 MHz	Pass

Note: Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

LTE Band 25			
FCC Part 24 Subpart E			
Performed Item	FCC Reference Section	Limit	Result
Spurious Emission	§27.238	< -13 dBm	Pass

Note: Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

LTE Band 66, 5G NR n66			
FCC Part 27 Subpart L			
Performed Item	FCC Reference Section	Limit	Result
Spurious Emission	§27.53	< -13 dBm	Pass

Note: Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.2. Test Environment

Ambient conditions in the laboratory:

Items	Test Item	Actually	Tested by	Test Date	Test Site
Temperature (°C)	Radiated Spurious Emission	23 ~ 24	Cyril Chen	2022/10/31 ~ 2022/11/03	HC-CB02
Humidity (%RH)		59 ~ 61			

Note: Test site information refers to Laboratory Information.

Laboratory Information

USA	**:**	**FCC Registration Number: TW3024**
Canada		**CAB identifier : TW3024**

The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: http://www.dekra.com.tw

If you have any comments, please don't hesitate to contact us. Our test sites as below:

Test Laboratory	DEKRA Testing and Certification Co., Ltd.
Address	1. No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C. 2. No.372, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C.
Phone number	1. +886-3-582-8001 2. +886-3-582-8001
Fax number	1. +886-3-582-8958 2. +886-3-582-8958
E mail address	info.tw@dekra.com
Website	http://www.dekra.com.tw
Note: Test site for address 1 includes HC-SR02. Test site for address 2 includes HC-CB02, HC-CB03, HC-CB04, HC-SR10 and HC-SR12.	

2.3. List of Test Equipment

HC-CB02

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal Analyzer	R&S	FSVA40	101455	2022/09/29	2023/09/28
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2022/01/07	2023/01/06
Trilog Broadband Antenna	Schwarzbeck	VULB 9168	1272	2022/05/19	2023/05/18
Horn Antenna	Schwarzbeck	BBHA 9120D	639	2022/05/06	2023/05/05
Horn Antenna	Schwarzbeck	BBHA 9170	203	2022/02/23	2023/02/22
Pre-Amplifier	EMCI	EMC01820I	980365	2022/04/15	2023/04/14
Pre-Amplifier	EMEC	EM01G18GA	060741	2022/05/06	2023/05/05
Pre-Amplifier	DEKRA	AP-400C	201801231	2022/09/27	2023/09/26
Wireless Conn. Tester	R&S	CMW500	157118	2022/07/11	2023/07/10
Universal Radio Communication Tester	Anritsu	MT8821C	6262044740	2022/05/19	2023/05/18
Universal Radio Communication Tester	Anritsu	MT8000A	6262134961	2022/05/18	2023/05/17
Coaxial Cable(13m)	Suhner	SF104	HC-CB02	2022/08/15	2023/08/14
Coaxial Cable(3m)	Suhner,Rosnol	SF102_UP0264	HC-CB02_1	2022/08/14	2023/08/13
Radiated Software	AUDIX	e3 V9	HC-CB02_1	N/A	N/A

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

2.4. Measurement Uncertainty

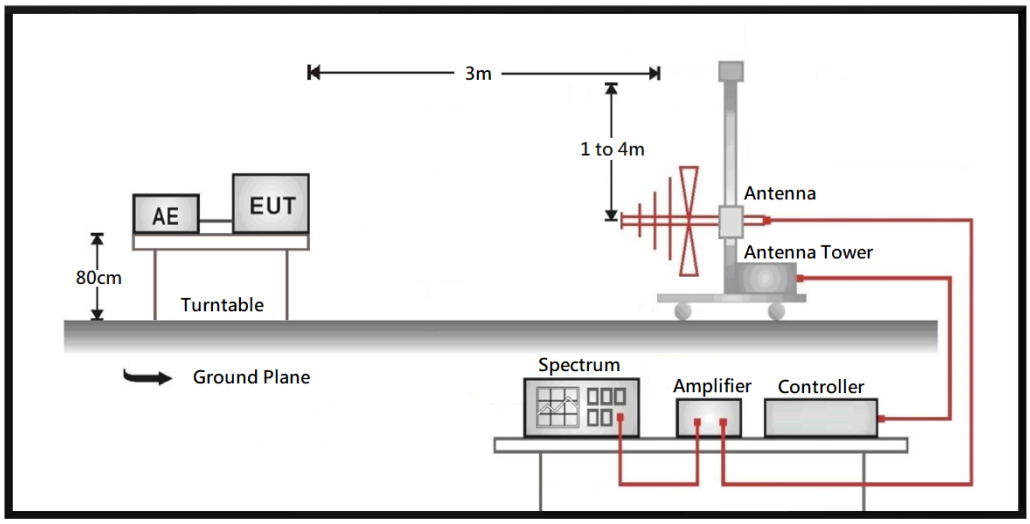
Uncertainties have been calculated according to the DEKRA internal document with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2).

Test Item	Uncertainty
Spurious Emissions	± 3.25 dB below 1 GHz ± 3.32 dB above 1 GHz

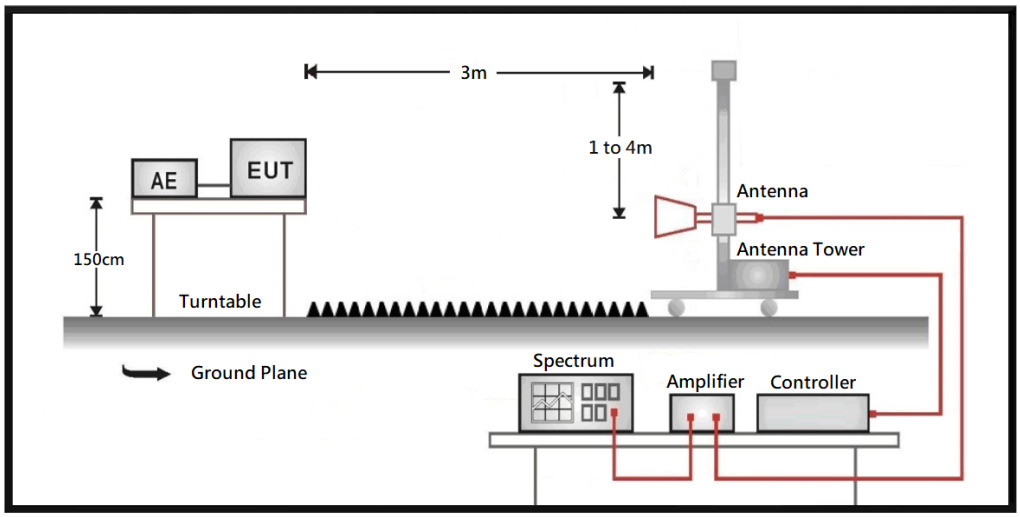
3. Spurious Emissions

3.1. Test Setup

Radiated Spurious Measurement: below 1GHz



Radiated Spurious Measurement: above 1GHz



3.2. Test Procedure

Radiated Spurious Measurement:

The EUT and its simulators are placed on a turn table which is 0.8 or 1.5 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations. The resolution bandwidth of the spectrum analyzer was set at 1 MHz, sufficient scans were taken to show the out of band Emission if any up to 10th harmonic. Taking the record of maximum spurious emission.

3.3. Test Methodology and Reference Procedures

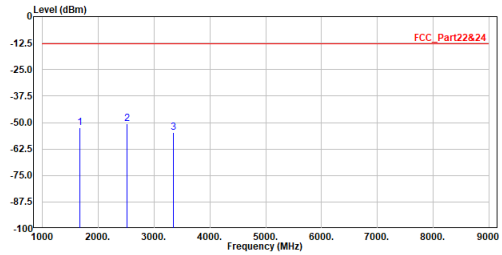
KDB 971168 D01 Power Meas License Digital Systems v03r01

ANSI C63.26-2015

3.4. Test Result of Radiated Spurious Emission

Mode 1: Link WCDMA Band 5

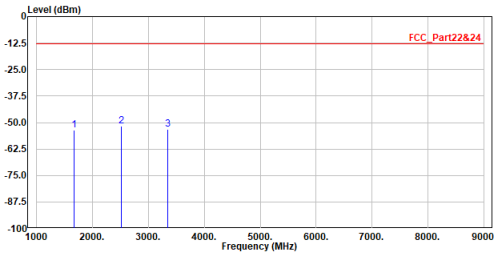
Site :HC-CB02
Condition :3m Horizontal
Mode :WCDMA_B5_Ch4183
Test By :Cyril



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	1673.200	-52.62	-13.00	-39.62	-39.92	-12.70	Peak
2	2509.800	-50.52	-13.00	-37.52	-41.26	-9.26	Peak
3	3346.400	-54.84	-13.00	-41.84	-48.08	-6.76	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 :HC-CB02
Condition :3m Vertical
Mode :WCDMA_B5_Ch4183
Test By :Cyril

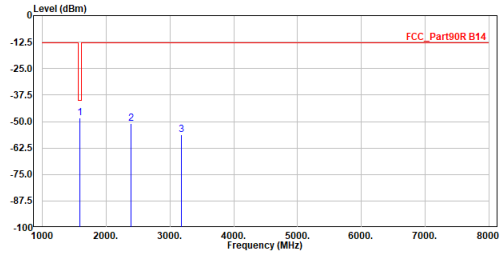


No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	1673.200	-53.77	-13.00	-40.77	-41.07	-12.70	Peak
2	2509.800	-51.84	-13.00	-38.84	-42.58	-9.26	Peak
3	3346.400	-53.08	-13.00	-40.08	-46.32	-6.76	Peak

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.

Mode 2: Link LTE Band 14

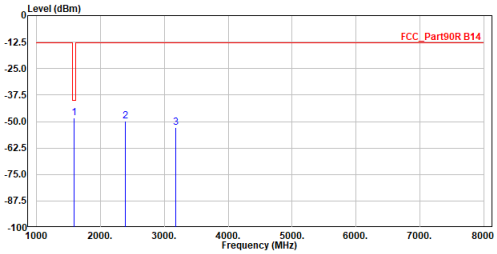
Site :HC-CB02
Condition :3m Horizontal
Mode :LTE_B14_Ch23355
Test By :Cyril



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	1591.000	-48.33	-40.00	-8.33	-35.34	-12.99	Peak
2	2386.500	-51.12	-13.00	-38.12	-41.31	-9.81	Peak
3	3182.000	-56.36	-13.00	-43.36	-49.38	-6.98	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 :HC-CB02
Condition :3m Vertical
Mode :LTE_B14_Ch23355
Test By :Cyril

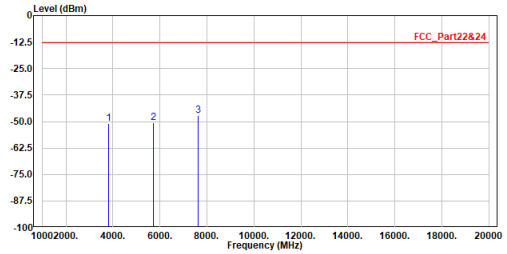


No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	1591.000	-48.37	-40.00	-8.37	-35.38	-12.99	Peak
2	2386.500	-49.66	-13.00	-36.66	-39.85	-9.81	Peak
3	3182.000	-52.66	-13.00	-39.66	-45.68	-6.98	Peak

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.

Mode 3: Link LTE Band 25

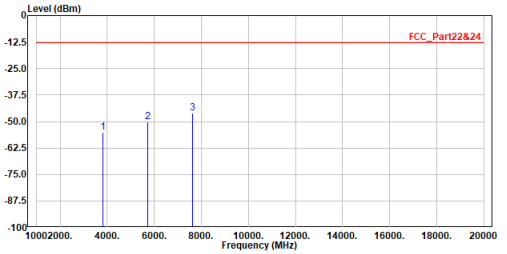
Site :HC-CB02
Condition :3m Horizontal
Mode :LTE_B25_Ch26590
Test By :Cyril



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	3810.000	-50.93	-13.00	-37.93	-45.56	-5.37	Peak
2	5715.000	-50.67	-13.00	-37.67	-52.03	1.36	Peak
3	7620.000	-47.09	-13.00	-34.09	-54.32	7.23	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 :HC-CB02
Condition :3m Vertical
Mode :LTE_B25_Ch26590
Test By :Cyril

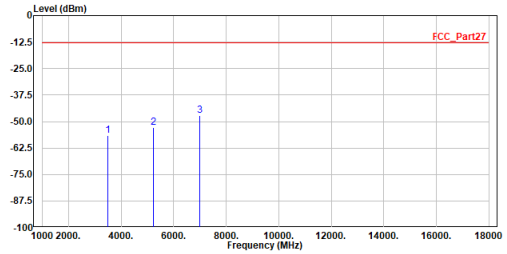


No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	3810.000	-55.02	-13.00	-42.02	-49.65	-5.37	Peak
2	5715.000	-50.19	-13.00	-37.19	-51.55	1.36	Peak
3	7620.000	-46.11	-13.00	-33.11	-53.34	7.23	Peak

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.

Mode 4: Link LTE Band 48 + 5G NR n66 (ENDC)

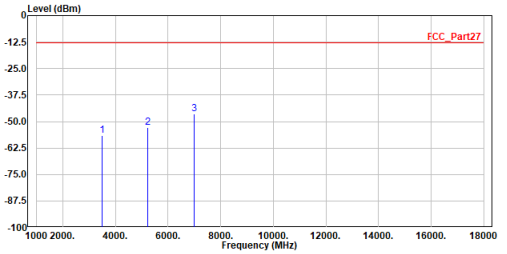
Site :HC-CB02
Condition :3m Horizontal
Mode :5G_ENDC_L48A+n66a_CH55990+CH349000
Test By :Cyril



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	3490.000	-56.55	-13.00	-43.55	-49.97	-6.58	Peak
2	5235.000	-52.93	-13.00	-39.93	-52.37	-0.56	Peak
3	6980.000	-47.02	-13.00	-34.02	-53.72	6.70	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 :HC-CB02
Condition :3m Vertical
Mode :5G_ENDC_L48A+n66a_CH55990+CH349000
Test By :Cyril



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	3490.000	-56.72	-13.00	-43.72	-50.14	-6.58	Peak
2	5235.000	-52.82	-13.00	-39.82	-52.26	-0.56	Peak
3	6980.000	-46.54	-13.00	-33.54	-53.24	6.70	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.