

TEST REPORT



CTK Co., Ltd.
(Ho-dong), 113, Yejik-ro, Cheoin-gu,
Yongin-si, Gyeonggi-do, Korea
Tel: +82-31-339-9970
Fax: +82-31-624-9501

Report No.:
CTK-2018-00486
Page (1) / (24) Pages

1. Client

- Name : S-winnus Co., Ltd
- Address : NO. 701, 702, Centum Sky Biz A, 97, Centum jungang-ro, Haeundae-gu, Busan, Korea
- Date of Receipt : 2018-02-20

2. Manufacturer

- Name : S-winnus Co., Ltd
- Address : NO. 701, 702, Centum Sky Biz A, 97, Centum jungang-ro, Haeundae-gu, Busan, Korea

3. Use of Report : For FCC Certification

4. Test Sample / Model: CTC-S100

5. Date of Test : 2018-02-21 to 2018-02-25

6. Test Standard(method) used : FCC 47 CFR PART 2, Subpart J

FCC 47 CFR PART 22, Subpart H

FCC 47 CFR PART 24, Subpart E

FCC 47 CFR PART 27

7. Testing Environment: Temp.: (23 ± 1) °C, Humidity: (48 ± 5) % R.H.

8. Test Results : Compliance

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This Test Report cannot be reproduced, except in full.

Affirmation	Tested by	Technical Manager
	Bongseok Kim: (Signature)	Young-taek Lee: (Signature)

2018-02-26

Republic of KOREA **CTK Co., Ltd.**



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REPORT REVISION HISTORY

Date	Revision	Page No
2018-02-26	Issued (CTK-2018-00486)	all

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1. General Information

1.1 Client Information

Company	S-winnus Co., Ltd
Contact Point	NO. 701, 702, Centum Sky Biz A, 97, Centum jungang-ro, Haeundae-gu, Busan, Korea
Contact Person	Name : Sunpyo Jeong E-mail : spjeong@swinnus.com Tel : +82-51-747-8933 Fax : +82-51-711-7433

1.2 Product Information

Product Description		Container Tracer Device		
FCC ID		2AJOX-CTC-S100		
Model name		CTC-S100		
Serial number		Identical prototype		
EUT condition		Pre-production, not damaged		
GSM/WCDMA Module		Manufacturer : Telit Communications S.p.A.		
		FCC ID : RI7HE910		
Frequency range	GSM	Band	TX Frequency (MHz)	RX Frequency (MHz)
		850	824.2 - 848.8	869.2 - 893.8
		1900	1850.2 - 1909.8	1930.2 - 1989.8
	WCDMA	Band	TX Frequency (MHz)	RX Frequency (MHz)
		II	1852.4 - 1907.6	1932.4 - 1987.6
		V	826.4 - 846.6	871.4 - 891.6
		IV	1712.4 - 1752.6	2112.4 - 2152.6
Output power (Peak, conducted) (Module test report reference)	GSM	Band 850 : 1.995 W (33 dBm), Band 850(EGPRS) : 0.977 W (29.90 dBm) Band 1 900 : 0.977 W (29.90 dBm) Band 1 900(EGPRS) : 0.724 W (28.60 dBm)		
	WCDMA	Band II : 0.436 W (26.39 dBm) Band V : 0.460 W (26.63 dBm) Band IV : 0.437 W (26.40 dBm)		
Antenna Type		PIFA		
Antenna Gain		Band 850 MHz : -2.32 dBi Band 1 900 MHz : 1.89 dBi Band 1 710 MHz : 0.88 dBi		
Output power(ERP, EIRP)	GSM	Band 850 : 0.713 W (28.53 dBm), Band 850(EGPRS) : 0.349 W (25.43 dBm) Band 1 900 : 1.510 W (31.79 dBm) Band 1 900(EGPRS) : 1.119 W (30.49 dBm)		
	WCDMA	Band II : 0.675 W (28.29 dBm) Band V : 0.164 W (22.16 dBm) Band IV : 0.535 W (27.28 dBm)		
Power Source		3.7 Vdc (Rechargeable Li-ion Battery)		

1.3 Peripheral Devices

Device	Manufacturer	Model No.	Serial No.
Wideband Radio Communication Tester	R&S	CMW500	114635

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2. Facility and Accreditations

2.1 Test Facility

The measurement facility is located at (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yong-in-si, Gyeonggi-do, Korea.

2.2 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Registration Number	Logo
USA	FCC	FCC Part 15 & 18 EMI (Electromagnetic Interference / Emission)	805871	
CANADA	ISED	ISED EMI (3/10m test site)	8737A-2	
JAPAN	VCCI	VCCI V-3 EMI (Electromagnetic Interference / Emission)	C-986 T-1843 R-3627 G-387	
KOREA	NRRA	EMI (Electromagnetic Interference / Emission) EMS (Electromagnetic Susceptibility / Immunity)	KR0025	

2.3 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

3. Test Specifications

3.1 Standards

Section in FCC	Requirement(s)	Status (note1)	Test condition
2.1053, 22.917, 24.238, 27.53	Field Strength of spurious radiation	C	Radiated
Other test requirements		NA(Note 3)	Conducted
<u>Note 1:</u> C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable			
<u>Note 2:</u> The data in this test report are traceable to the national or international standards.			
<u>Note 3:</u> The equipment contains an approved single module(FCC ID : RI7HE910). The test result is the same as the single module.			
<u>Note 4:</u> The tests were performed according to the method of measurements prescribed in KDB 971168 D01 v03.			

3.2 Mode of operation during the test

Test Mode
Mode 1 : GPRS 850 Link
Mode 2 : GPRS 1900 Link
Mode 3 : WCDMA Band II Link
Mode 4 : WCDMA Band V Link
Mode 5 : WCDMA Band IV Link

* Note :

- Regards to the frequency band operation : The lowest, middle and highest frequency of channel were selected to perform the test, then shown on this report.
- This device is equipped with an approved GSM/WCDMA module.
- This device cannot be used for voice-communication.

Test Channel and Frequency

Test Mode	Channel/Frequency	Low(L)	Middle(M)	High(H)
GSM 850	Channel	128	189	251
	Frequency [MHz]	824.2	836.4	848.8
GSM 1900	Channel	512	661	810
	Frequency [MHz]	1805.2	1880.0	1909.8
WCDMA Band II	Channel	9262	9400	9538
	Frequency [MHz]	1852.4	1880.0	1907.6
WCDMA Band V	Channel	4132	4182	4233
	Frequency [MHz]	826.4	836.4	846.6
WCDMA Band IV	Channel	1312	1450	1513
	Frequency [MHz]	1712.4	1740.0	1752.6

3.3 Measurement Uncertainty

Compliance of the product is based on the measured value.

However, the measurement uncertainty is included for information purposes.

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

Measurement type	Uncertainty
Conducted emission of mains ports(150 kHz to 30 MHz)	2.62 dB (C.L.: Approx. 95 %, $K=2$)
Radiated emission(30 MHz to 1 GHz)	4.54 dB (C.L.: Approx. 95 %, $K=2$)
Radiated emission(Above 1GHz)	4.98 dB (C.L.: Approx. 95 %, $K=2$)

4. Test Requirements

4.1 Field Strength of Emissions

FCC 2.1053 Measurements required: Field strength of spurious radiation.

(a) Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission.

Test Location

☒ Testing was performed at a test distance of 3 meter SAC

Test measurement procedure:

Based on ANSI/TIA-603-D-2010

The EUT was placed on a turn table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. This spurious level is recorded. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic or dipole antenna are taken into consideration.

Limit

- FCC 22.917 Emission limitations for cellular equipment.

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

- FCC 24.238 Emission limitations for Broadband PCS equipment.

The power of any emission shall be attenuated below the transmitter power (P) by a factor of at least $43 + 10 \log(P)$ dB.

- FCC 27.53 Emission limits.

For operations in the 1710-1755 MHz, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power(P) in watts by at least $43+10 \log(P)$ dB.

Note :

ERP(or EIRP) = Reading + Space Loss

Space Loss = $P_{SigGen} + G_T - ERP(or EIRP)$

P_{SigGen} : power setting of the signal generator that produces the same received power reading as the DUT, in dBm

G_T : gain of the substitute antenna, in dBd (ERP) or dBi (EIRP);

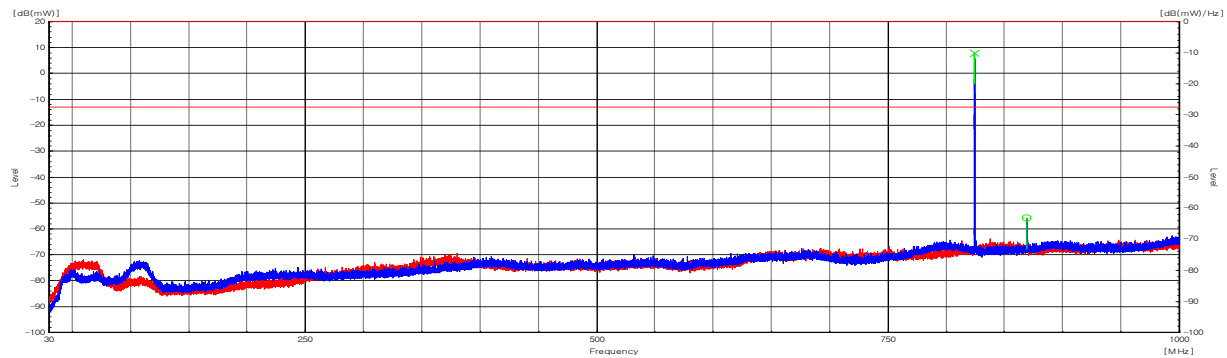
Test Results

The requirements are: ☒ Complies

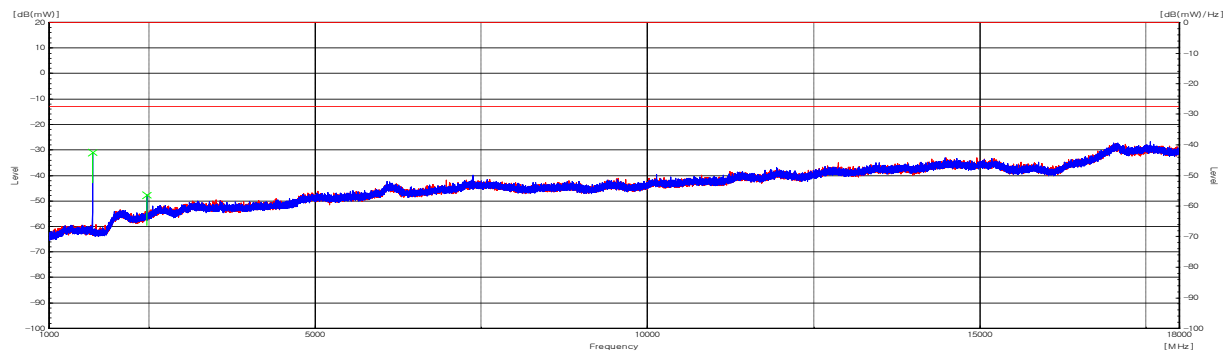
Test Data

[Mode 1 : GSM 850]

Channel : Low

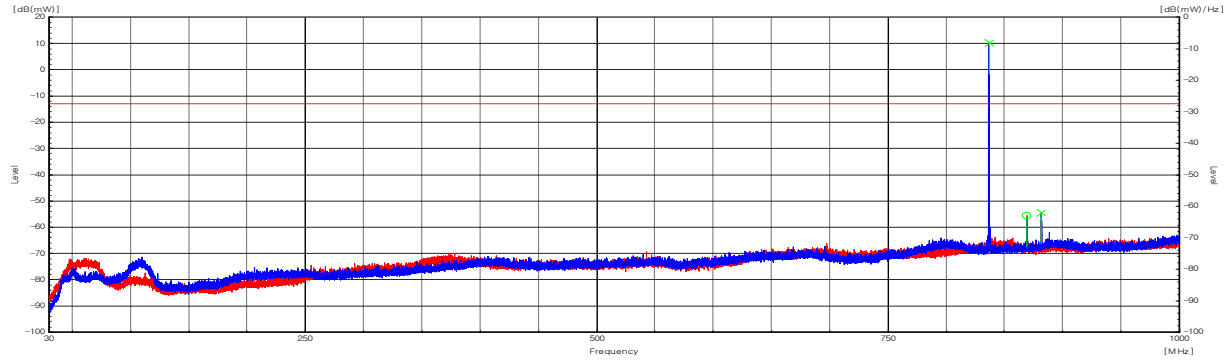


Frequency [MHz]	Pol.	Reading [dBm]	Space Loss [dB]	ERP[dBm]	Limit[dBm]	Margin[dB]	Remark
824.19	V	2.8	5.0	7.8	-13	-20.8	Carrier
869.24	H	-61.5	5.7	-55.8	-13	42.8	

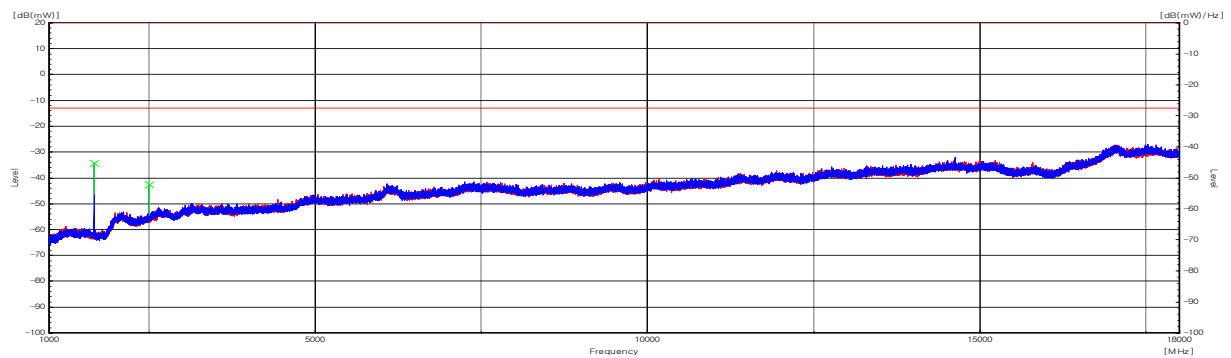


Frequency [MHz]	Pol.	Reading [dBm]	Space Loss [dB]	EIRP[dBm]	Limit[dBm]	Margin[dB]	Remark
1648.2	V	-34.2	3.3	-30.9	-13	17.9	
2472.2	V	-55.4	7.8	-47.6	-13	34.6	

Channel : Middle

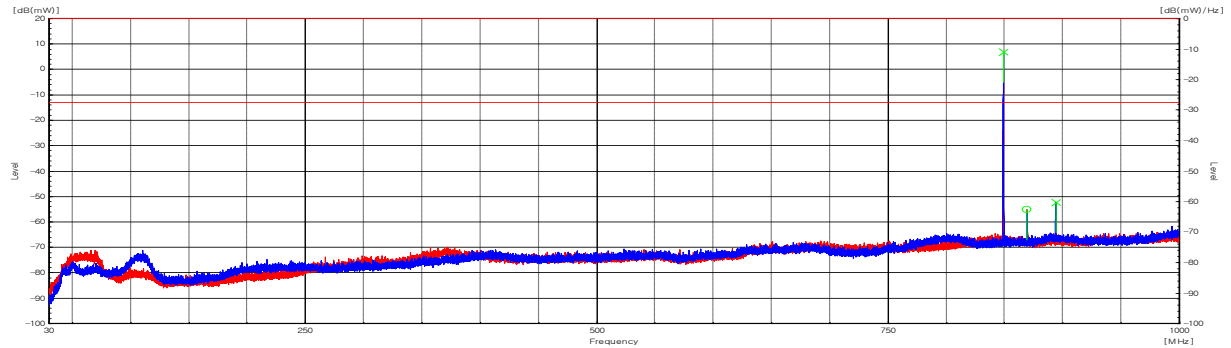


Frequency [MHz]	Pol.	Reading [dBm]	Space Loss [dB]	ERP[dBm]	Limit[dBm]	Margin[dB]	Remark
836.44	V	5.2	5.0	10.2	-13	-23.2	Carrier
869.24	H	-61.3	5.7	-55.6	-13	42.6	
881.39	V	-60.8	6.3	-54.5	-13	41.5	

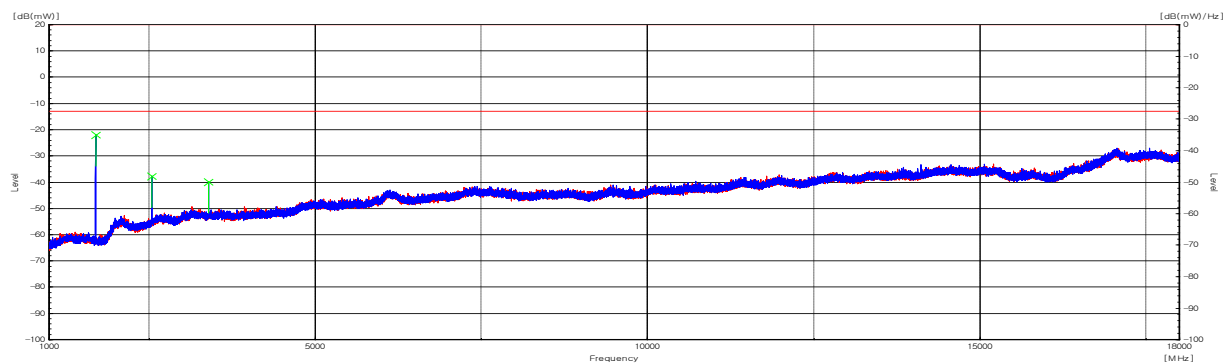


Frequency [MHz]	Pol.	Reading [dBm]	Space Loss [dB]	EIRP[dBm]	Limit[dBm]	Margin[dB]	Remark
1672.8	V	-37.3	2.9	-34.4	-13	21.4	
2509.1	V	-50.6	8.0	-42.6	-13	29.6	

Channel : High



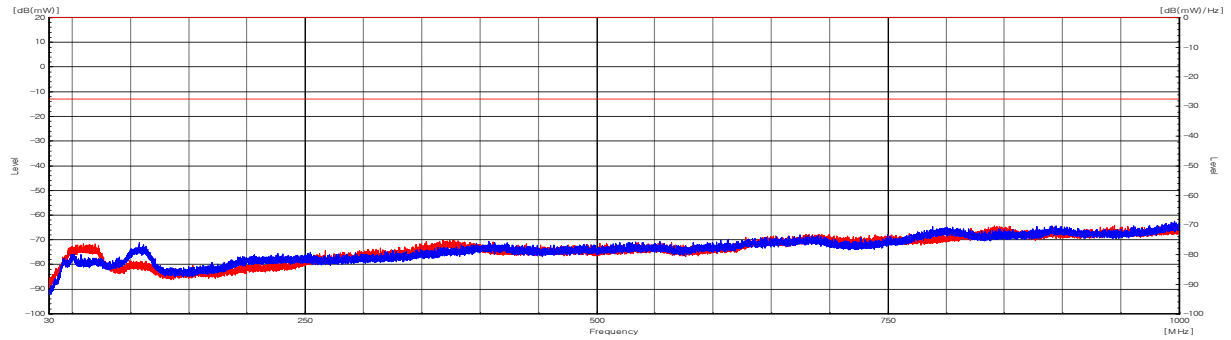
Frequency [MHz]	Pol.	Reading [dBm]	Space Loss [dB]	ERP[dBm]	Limit[dBm]	Margin[dB]	Remark
848.74	V	1.5	5.5	7.0	-13	-20.0	Carrier
869.14	H	-61	5.7	-55.3	-13	42.3	
893.80	V	-59.4	7.2	-52.2	-13	39.2	



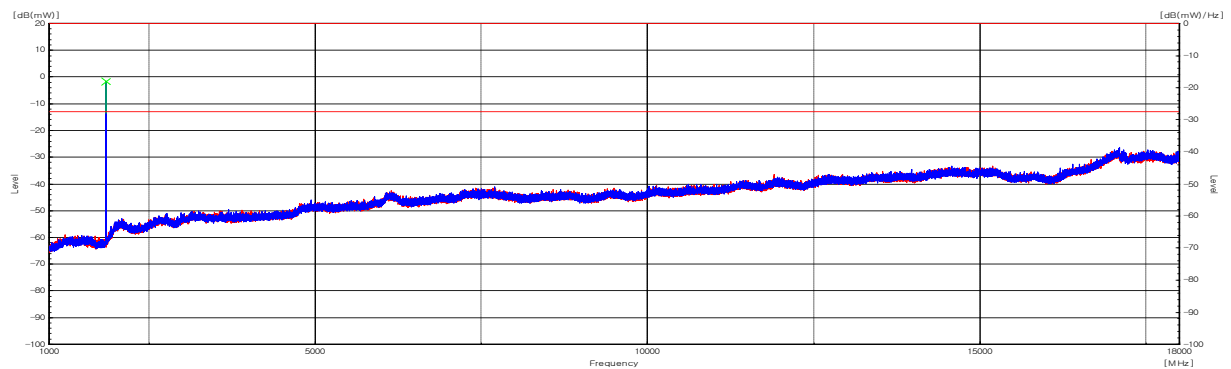
Frequency [MHz]	Pol.	Reading [dBm]	Space Loss [dB]	EIRP[dBm]	Limit[dBm]	Margin[dB]	Remark
1697.4	V	-24.6	2.7	-21.9	-13	8.9	
2546.0	V	-46.1	8.4	-37.7	-13	24.7	
3395.3	V	-50.9	11	-39.9	-13	26.9	

[Mode 2 : GSM 1900]

Channel : Low

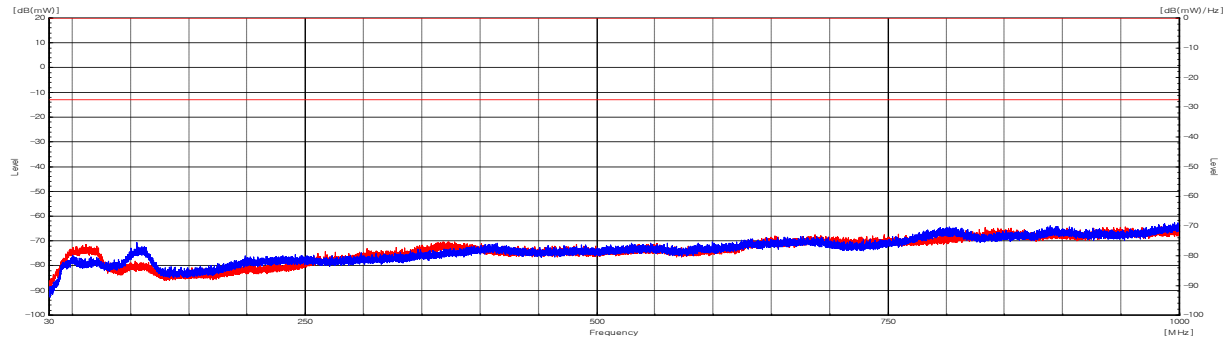


Frequency [MHz]	Pol.	Reading [dBm]	Space Loss [dB]	ERP[dBm]	Limit[dBm]	Margin[dB]	Remark
The emission is more than 20dB lower than the limit.							

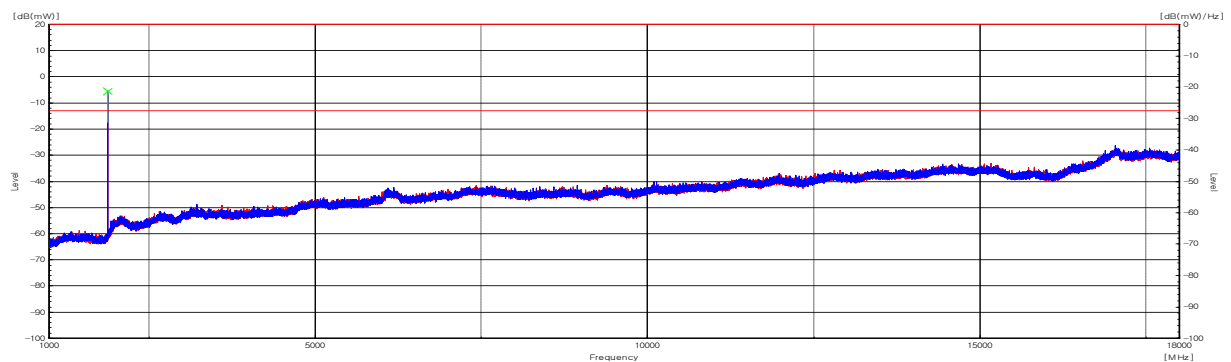


Frequency [MHz]	Pol.	Reading [dBm]	Space Loss [dB]	EIRP[dBm]	Limit[dBm]	Margin[dB]	Remark
1850.0	V	-4.8	3.2	-1.6	-13	-11.4	carrier

Channel : Middle

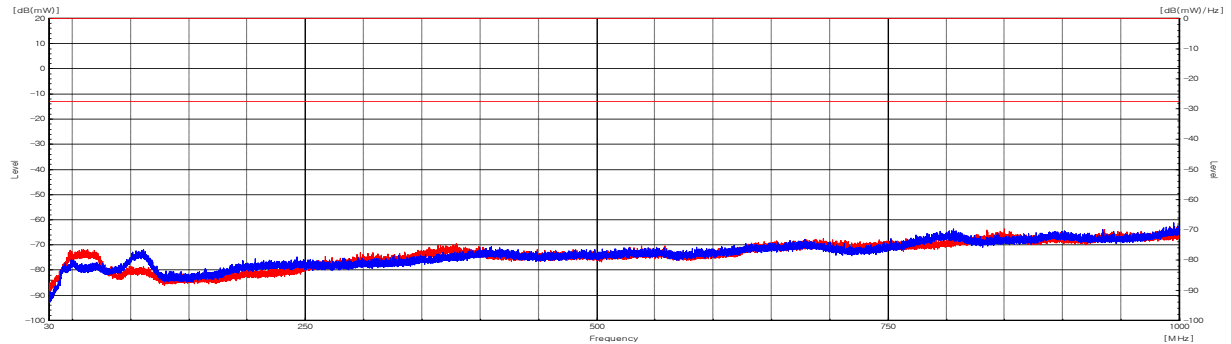


Frequency [MHz]	Pol.	Reading [dBm]	Space Loss [dB]	ERP[dBm]	Limit[dBm]	Margin[dB]	Remark
The emission is more than 20dB lower than the limit.							

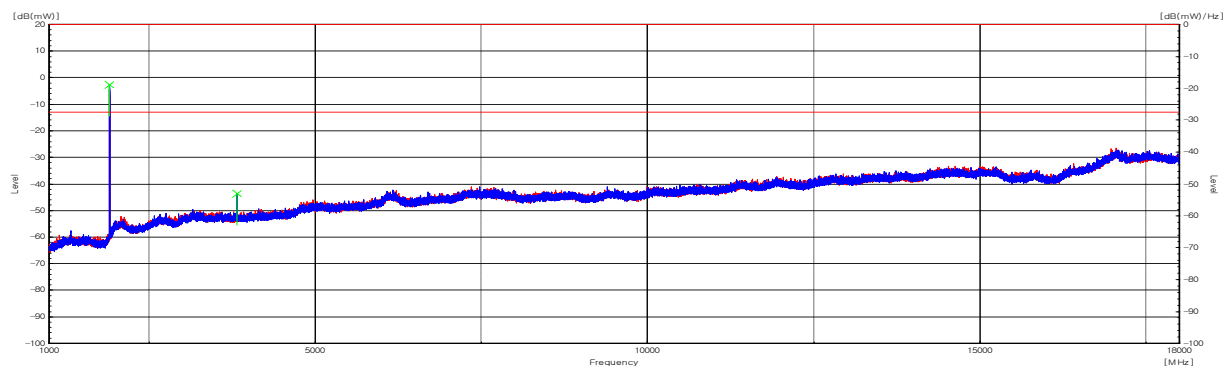


Frequency [MHz]	Pol.	Reading [dBm]	Space Loss [dB]	EIRP[dBm]	Limit[dBm]	Margin[dB]	Remark
1879.7	V	-9.4	4.0	-5.4	-13	-7.6	carrier

Channel : High



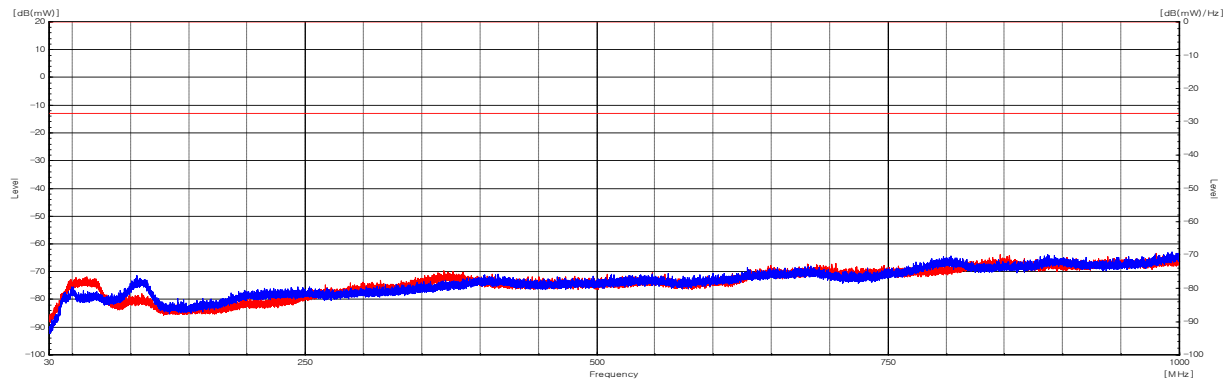
Frequency [MHz]	Pol.	Reading [dBm]	Space Loss [dB]	ERP[dBm]	Limit[dBm]	Margin[dB]	Remark
The emission is more than 20dB lower than the limit.							



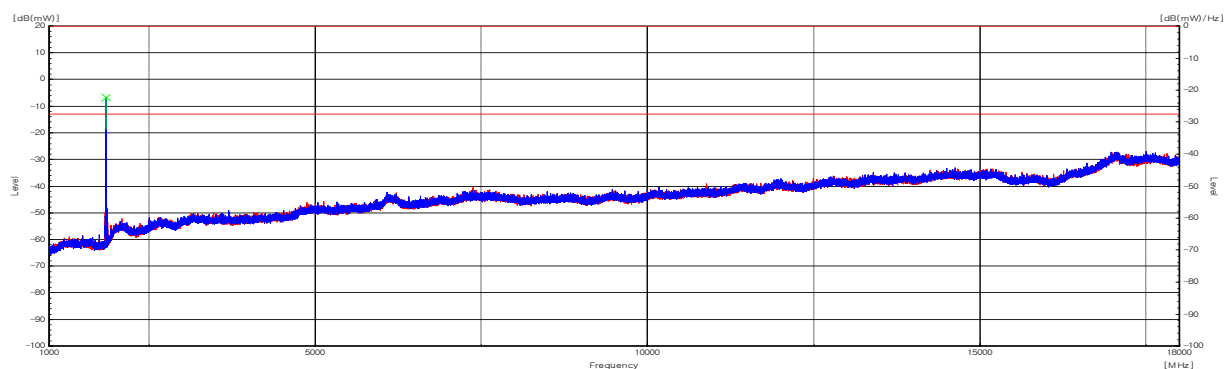
Frequency [MHz]	Pol.	Reading [dBm]	Space Loss [dB]	EIRP[dBm]	Limit[dBm]	Margin[dB]	Remark
1909.4	V	-7.8	5.2	-2.6	-13	-10.4	carrier
3819.2	V	-55.4	11.9	-43.5	-13	30.5	

[Mode 3 : WCDMA Band II]

Channel : Low

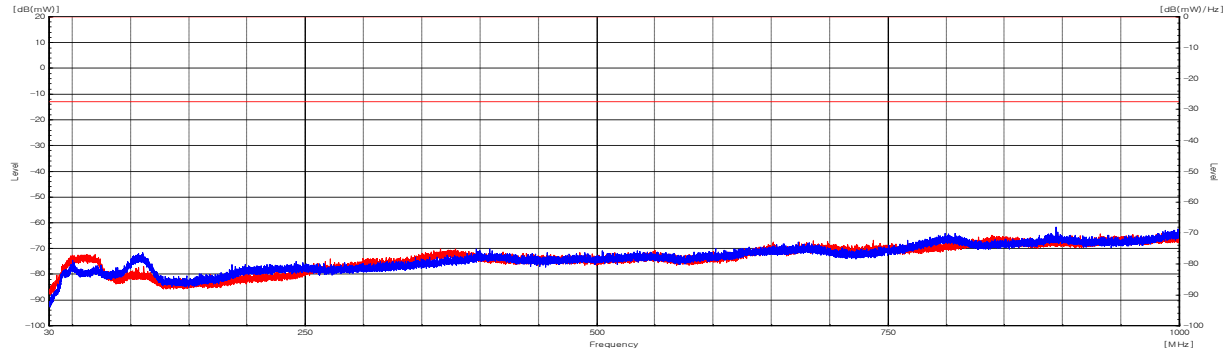


Frequency [MHz]	Pol.	Reading [dBm]	Space Loss [dB]	ERP[dBm]	Limit[dBm]	Margin[dB]	Remark
The emission is more than 20dB lower than the limit.							

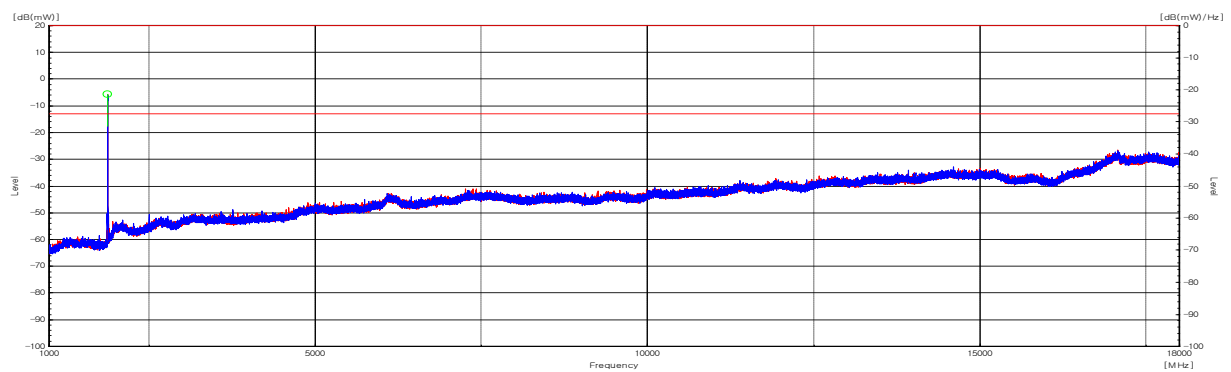


Frequency [MHz]	Pol.	Reading [dBm]	Space Loss [dB]	EIRP[dBm]	Limit[dBm]	Margin[dB]	Remark
1852.9	V	-9.9	3.3	-6.6	-13	-6.4	carrier

Channel : Middle

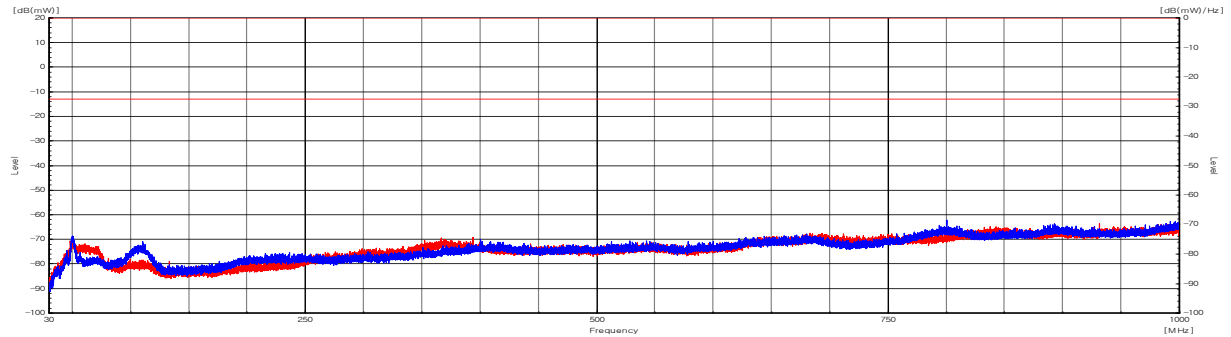


Frequency [MHz]	Pol.	Reading [dBm]	Space Loss [dB]	ERP[dBm]	Limit[dBm]	Margin[dB]	Remark
The emission is more than 20dB lower than the limit.							

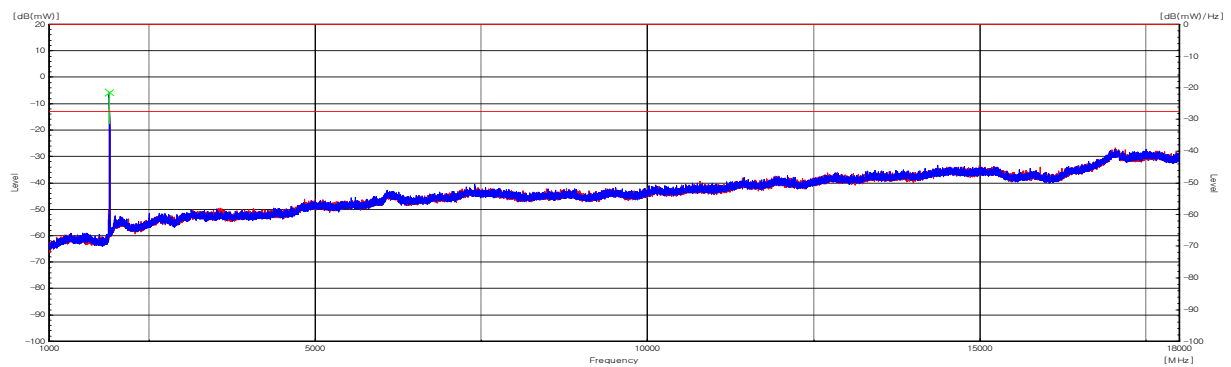


Frequency [MHz]	Pol.	Reading [dBm]	Space Loss [dB]	EIRP[dBm]	Limit[dBm]	Margin[dB]	Remark
1879.0	H	-9.7	3.9	-5.8	-13	-7.2	carrier

Channel : High



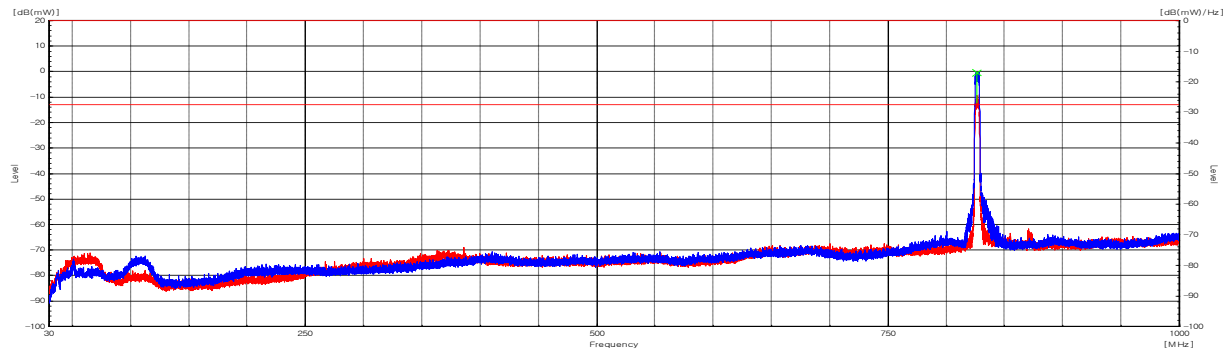
Frequency [MHz]	Pol.	Reading [dBm]	Space Loss [dB]	ERP[dBm]	Limit[dBm]	Margin[dB]	Remark
The emission is more than 20dB lower than the limit.							



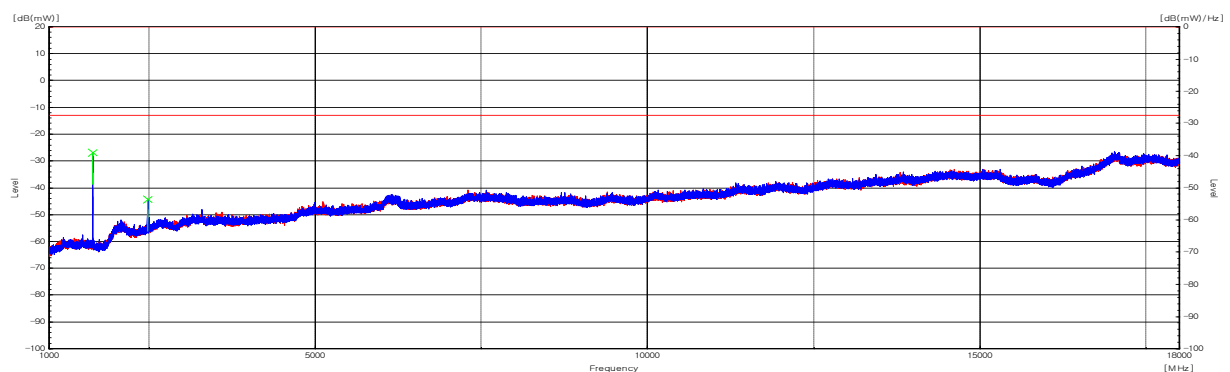
Frequency [MHz]	Pol.	Reading [dBm]	Space Loss [dB]	EIRP[dBm]	Limit[dBm]	Margin[dB]	Remark
1908.6	V	-10.8	5.2	-5.6	-13	-7.4	carrier

[Mode 4 : WCDMA Band V]

Channel : Low

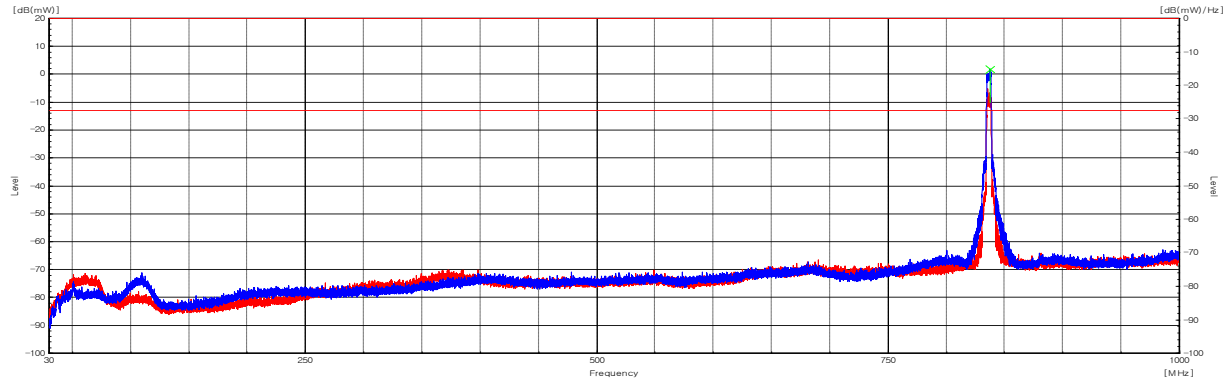


Frequency [MHz]	Pol.	Reading [dBm]	Space Loss [dB]	ERP[dBm]	Limit[dBm]	Margin[dB]	Remark
827.24	V	-5.2	4.9	-0.3	-13	-12.7	Carrier

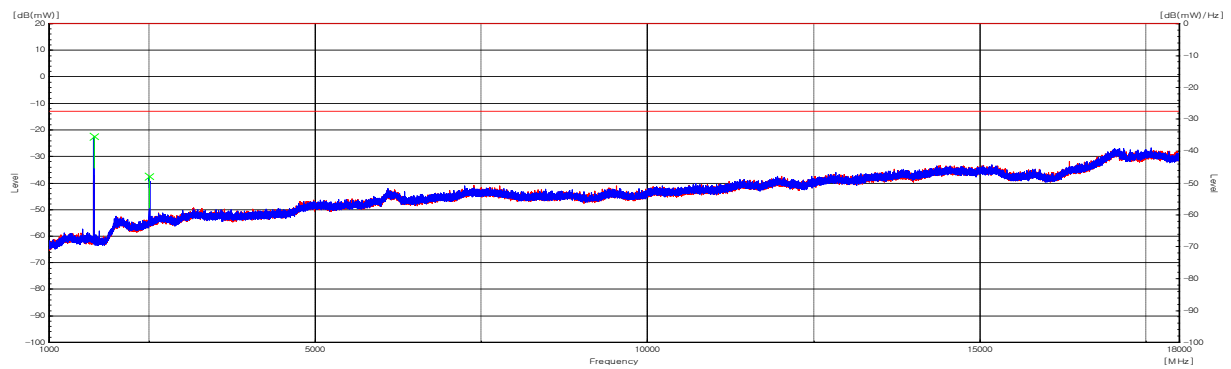


Frequency [MHz]	Pol.	Reading [dBm]	Space Loss [dB]	EIRP[dBm]	Limit[dBm]	Margin[dB]	Remark
1650.4	V	-30.1	3.3	-26.8	-13	13.8	
2475.1	V	-52.1	7.8	-44.3	-13	31.3	

Channel : Middle

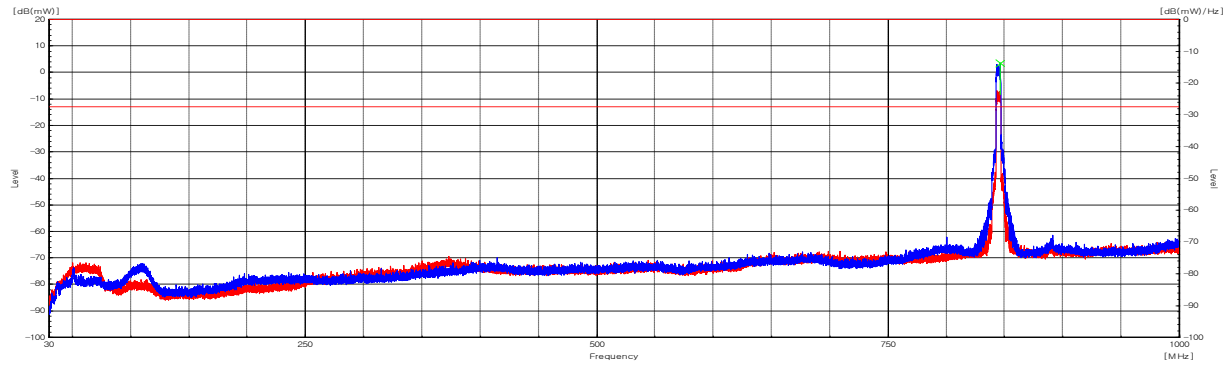


Frequency [MHz]	Pol.	Reading [dBm]	Space Loss [dB]	ERP[dBm]	Limit[dBm]	Margin[dB]	Remark
837.34	V	-3.1	5	1.9	-13	-14.9	Carrier

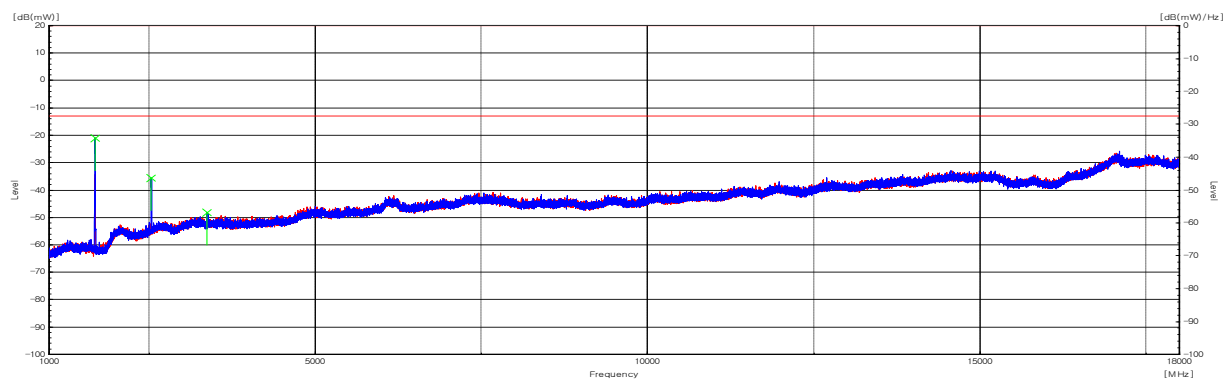


Frequency [MHz]	Pol.	Reading [dBm]	Space Loss [dB]	EIRP[dBm]	Limit[dBm]	Margin[dB]	Remark
1674.2	V	-25.2	2.9	-22.3	-13	9.3	
2506.9	V	-45.5	8	-37.5	-13	24.5	

Channel : High



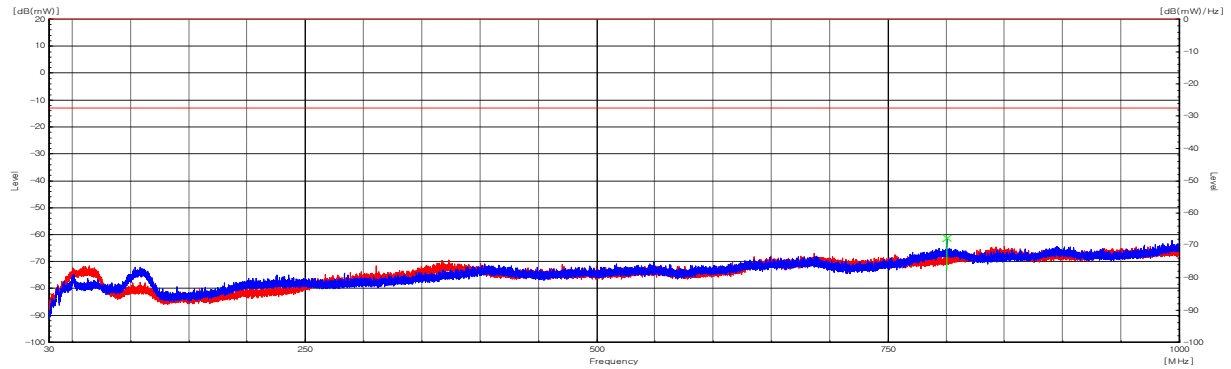
Frequency [MHz]	Pol.	Reading [dBm]	Space Loss [dB]	ERP[dBm]	Limit[dBm]	Margin[dB]	Remark
846.04	V	-1.8	5.4	3.6	-13	-16.6	Carrier



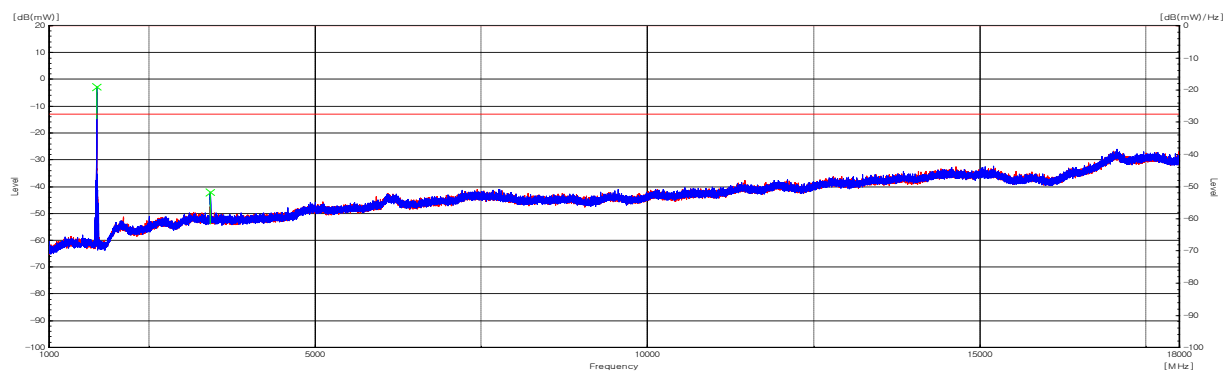
Frequency [MHz]	Pol.	Reading [dBm]	Space Loss [dB]	EIRP[dBm]	Limit[dBm]	Margin[dB]	Remark
1690.2	V	-23.6	2.7	-20.9	-13	7.9	
2536.6	V	-43.9	8.3	-35.6	-13	22.6	
3375.0	V	-59	10.9	-48.1	-13	35.1	

[Mode 5 : WCDMA Band IV]

Channel : Low

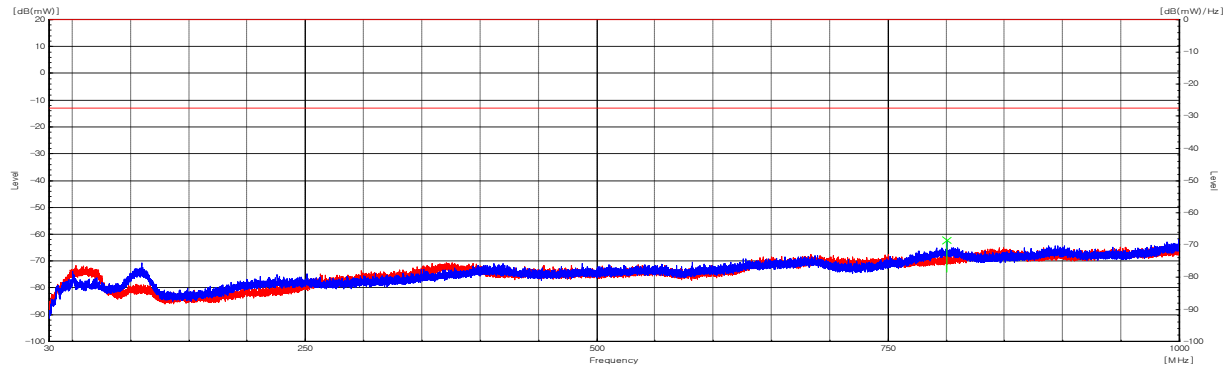


Frequency [MHz]	Pol.	Reading [dBm]	Space Loss [dB]	ERP[dBm]	Limit[dBm]	Margin[dB]	Remark
799.99	V	-68.2	6.9	-61.3	-13	48.3	

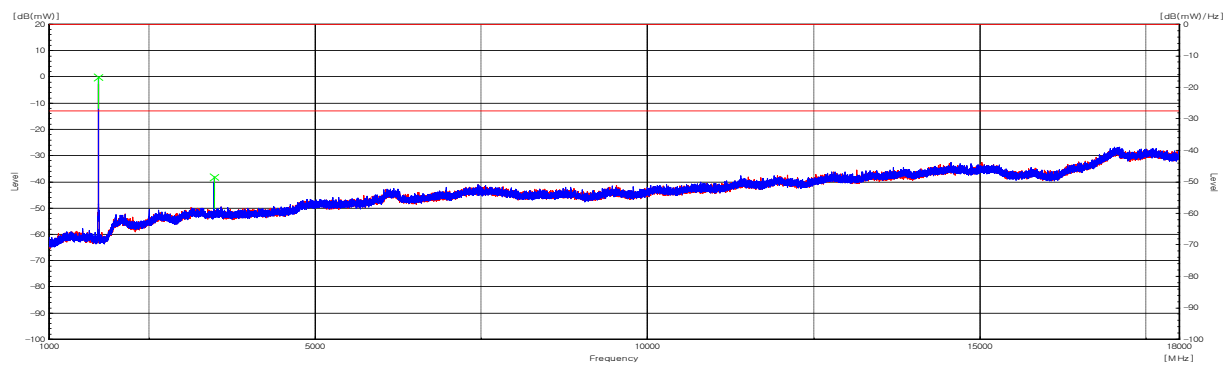


Frequency [MHz]	Pol.	Reading [dBm]	Space Loss [dB]	EIRP[dBm]	Limit[dBm]	Margin[dB]	Remark
1713.3	V	-5.6	2.7	-2.9	-13	-10.1	carrier
3427.1	V	-53.2	11.1	-42.1	-13	29.1	

Channel : Middle

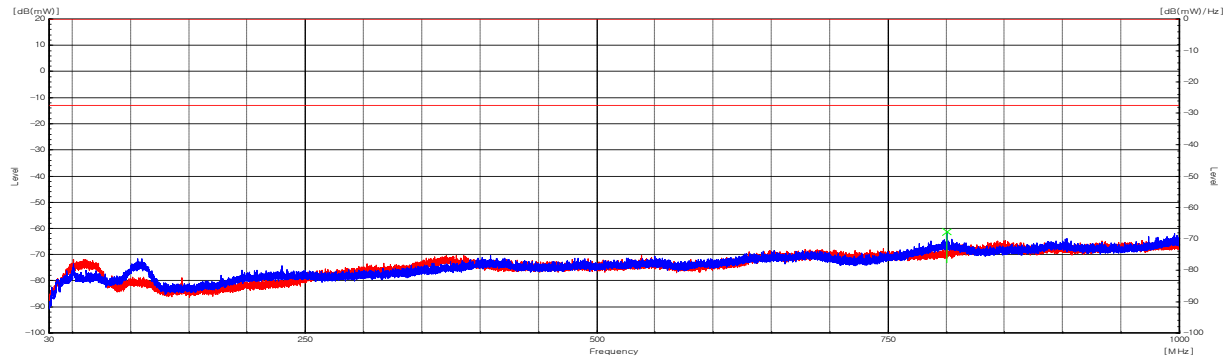


Frequency [MHz]	Pol.	Reading [dBm]	Space Loss [dB]	ERP[dBm]	Limit[dBm]	Margin[dB]	Remark
800.04	V	-69.2	6.9	-62.3	-13	49.3	

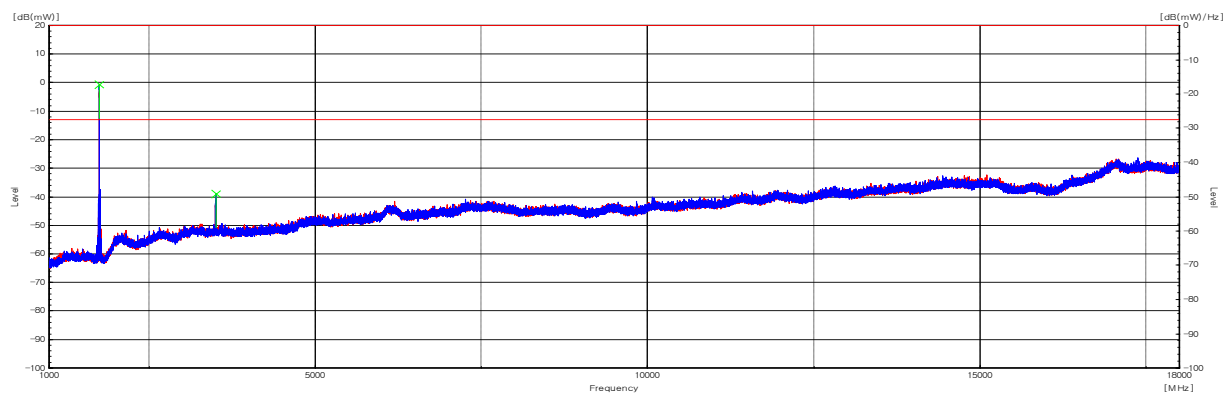


Frequency [MHz]	Pol.	Reading [dBm]	Space Loss [dB]	EIRP[dBm]	Limit[dBm]	Margin[dB]	Remark
1739.4	V	-2.9	2.7	-0.2	-13	-12.8	carrier
3482.1	V	-49.4	11.2	-38.2	-13	25.2	

Channel : High



Frequency [MHz]	Pol.	Reading [dBm]	Space Loss [dB]	ERP[dBm]	Limit[dBm]	Margin[dB]	Remark
799.99	V	-68.2	6.9	-61.3	-13	48.3	



Frequency [MHz]	Pol.	Reading [dBm]	Space Loss [dB]	EIRP[dBm]	Limit[dBm]	Margin[dB]	Remark
1753.1	V	-3.3	2.7	-0.6	-13	-12.4	carrier
3506.7	V	-50.2	11.2	-39	-13	26.0	

APPENDIX A – Test Equipment Used For Tests

	Name of Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Horn Antenna	ETS-Lindgren	3115	00078894	2017-12-04	2019-12-04
2	Horn Antenna	ETS-Lindgren	3115	00078895	2017-04-25	2019-04-25
3	Biconical Antenna	SCHWARZBECK	VUBA 9117	9117-280	2016-11-11	2018-11-11
4	PREAMPLIFIER	Agilent	8449B	3008A02307	2017-10-10	2018-10-10
5	OPT H64 AMPLIFIER	HP	8447F	3113A06814	2018-01-25	2019-01-25
6	Signal Analyzer	Agilent	N9020A	MY48011598	2017-11-01	2018-11-01
7	EMI Test Receiver	R&S	ESCI7	100814	2017-10-25	2018-10-25
8	Bilog Antenna	Schaffner	CBL6111C	2551	2016-05-13	2018-05-13