



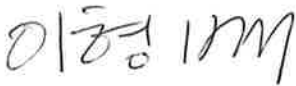
UMTS-FDD Spurious Test Report

Equipment : Gper G
Model No : Gper-G100
Applicant : Spacosa Corporation
11-41, Simin-daero 327beon-gil, Dongan-gu,
Anyang-si, Gyeonggi-do
Date of test : June 04, 2019 to September 30, 2019
FCC Rule Part(s) : FCC Part 22 Subpart H, FCC Part 24 Subpart E
Report Type : Original Report

The product was received on June 04, 2019 and testing was completed on September 30, 2019. We, BWS TECH Inc. would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of BWS TECH Inc. the test report shall not be reproduced except in full.

(Date) 09/30/2019



Tested by **Hyeong-Bae, Lee**

(Date) 09/30/2019



Reviewed by **Seung-Min, Mun**

BWS TECH INC.

#23, Gokhyeon-ro 480beon-gil, Mohyeon-eup, Cheoin-gu, Yongin-si,
Gyeonggi-do 17031, Republic of Korea
TEL: +82-31-333-5997, FAX: +82-31-333-0017
<http://www.bws.co.kr>

*This test report is not related to KS Q ISO/IEC 17025 and KOLAS accreditation.

*The authenticity of this test report can be confirmed in the Android app "DOCUQR" or www.docuqr.com

Report Revision

TEST REPORT NO.	DATE	DESCRIPTION
BWS-19-RF-0003	September 30, 2019	- First Approval Report

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1. General Information

Scope – Measurement and determination of electromagnetic emission(EME) of radio frequency devices including intentional radiators and/or unintentional radiators for compliance with the technical rules and regulations of the U.S Federal Communications Commission(FCC)

1.1 Applicant

● Company Name	: Spacosa Corporation
● Company Address	: 11-41, Simin-daero 327beon-gil, Dongan-gu, Anyang-si, Gyeonggi-do
● Phone/Fax	: Tel No. : +82-31-360-3655 Fax No. : N/A

1.2 Manufacturer

● Company Name	: Spacosa Corporation
● Company Address	: 11-41, Simin-daero 327beon-gil, Dongan-gu, Anyang-si, Gyeonggi-do
● Phone/Fax	: Tel No. : +82-31-360-3655 Fax No. : N/A

1.3 EUT Description

● Equipment	: Gper G
● Model(s)	: Gper-G100
● Operation Frequency	TX : (Band 2) 1852.4 MHz ~ 1907.6 MHz (Band 5) 826.4 ~ 846.6 MHz
	RX : (Band 2) 1932.4 MHz ~ 1987.6 MHz (Band 5) 871.4 ~ 891.6 MHz
● Modulation Method	: QPSK, 16QAM
● Input Voltage	: DC 3.7 V Battery
● Antenna Peak Gain	: 2.00 dBi

1.4 Other Information

● FCC Rule Part(s)	: FCC Part 22 Subpart H, FCC Part 24 Subpart E
● FCC ID	: 2AODFGPER-G100
● Test Procedure	: ANSI/TIA-603-D, TIA-102.CAAA-D, KDB971168
● Date of Test	: June 04, 2019 to September 27, 2019
● Place of Test	: BWS TECH Inc. (FCC Registration Number : 287786) #23, Gokhyeon-ro 480 Beon-gil, Mohyeon-eup, Cheoin-gu, Yongin-si, Gyeonggi-do 17031, South Korea TEL: +82 31 333 5997 FAX: +82 31 333 0017

2. Description of Test Facility

Site Description

Test Lab.	:	 NRRA Designation Number is KR0017.
	:	 The Certificate Designation Number is KR0017.
	:	 The Certificate Accreditation Number is KT174.
Name of Firm	:	BWS TECH Inc.
Site Location	:	#23, Gokhyeon-ro 480 Beon-gil, Mohyeon-eup, Cheoin-gu, Yongin-si, Gyeonggi-do 17031, South Korea

3. Test Methodology

The tests documented in this report were performed in accordance with ANSI/TIA-603-D and the requirements of FCC Rules Part 24 Subpart E.
Radio testing was performed according to KDB971168.

3.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and is operated in a manner that intends to maximize its emission characteristics in a continuous normal application.

3.2 EUT Exercise

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the FCC Rules Part 24 Subpart E.

3.3 Description of Test Modes

The EUT has been tested under operating condition.
After verification, all tests were carried out with the worst case test modes as shown below, and these were chosen for full testing.
For WCDMA, Channel Low ,Middle and High were chosen for full testing.

* The EUT also supports Bluetooth. So we applied the radiation limit to the worst condition Part 15 Subpart C. (The test method was applied by ANSI/TIA-603-D and KDB971168.)

4. Summary of Test Result

Clause	TEST Description	Standard Section	Requirements	Result
6.1	Field Strength of spurious Radiation	§ 2.1053; § 22.917(a); § 24.238(a);	§ 2.1053; § 22.917(a); § 24.238(a);	Pass

5. Test Equipment

Equipment	Model	Manufacturer	Serial number	Calibration Due date (year/month/date)
PROGRAMMABLE DC POWER SUPPLY	UDP-6015R	UNICORN	1301006	2020/08/26
SYNTHESIZED SIGNAL GENERATOR	68367C	ANRITSU	#004908	2020/05/20
Signal Analyzer	FSP	Rohde & Schwarz	100631	2019/11/07
TRILOG Broadband Antenna	VULB9163	Schwarzbeck	777	2020/04/13
Active Horn Antenna	AHA-118	COM-POWER CORP.	701064	2021/04/30
Antenna master	MA 2000	Innco systems GmbH	N/A	N/A
Turn table	DS 1200 S	Innco systems GmbH	N/A	N/A
MXG VECTOR SIGNAL GENERATOR	N5182A	AGILENT	MY46240037	2020/08/26
ATTENUATOR	F04-B1810-01	SRT	17060802	2020/06/07

6. Test Data

6.1 Field Strength of spurious Radiation

6.1.1 Test Limit

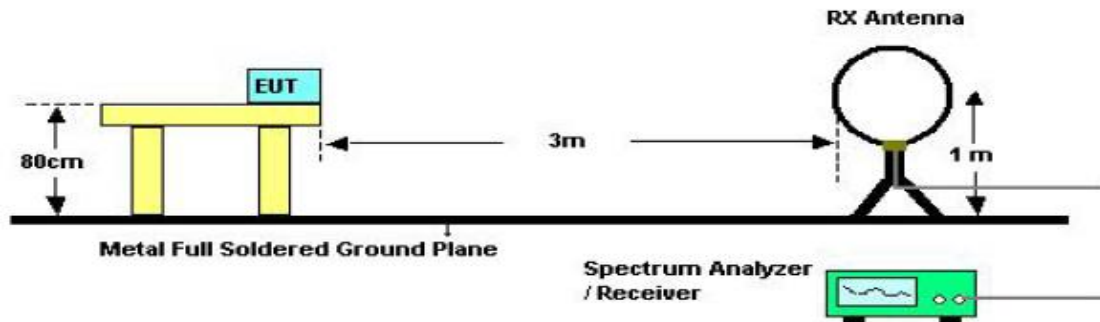
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least $43 + 10 \log (P)$ dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

6.1.2 Test Procedure

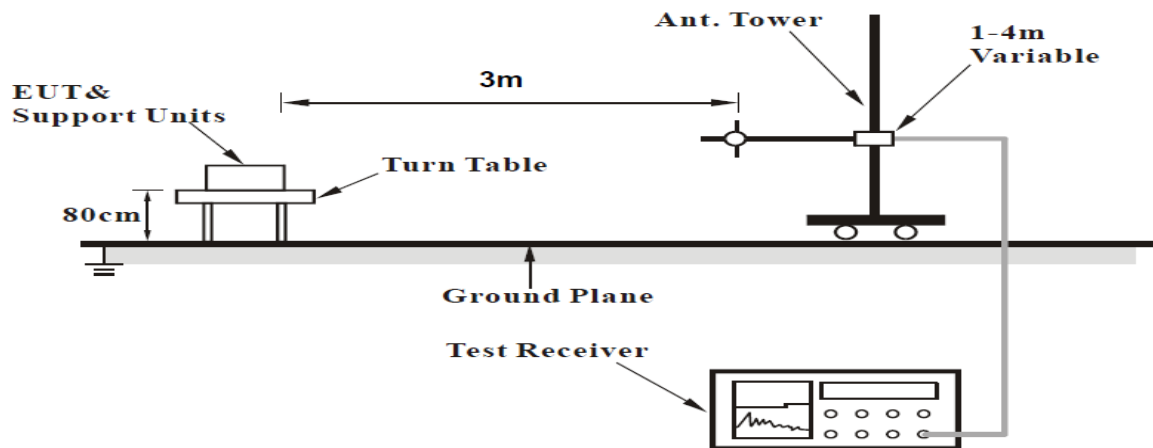
1. The testing follows FCC KDB 971168 v03 Section 5.8 and ANSI/TIA-603-E Section 2.2.12.
2. The EUT was placed on a rotatable wooden table 0.8 meters for frequency below 1 GHz and 1.5 meter for frequency above 1 GHz above the ground.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
5. The height of the receiving antenna is varied between one meter and four meters to search for the maximum spurious emission for both horizontal and vertical polarizations.
6. Make the measurement with the spectrum analyzer's RBW = 1 MHz, VBM = 3 MHz, taking record of maximum spurious emission.
7. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
8. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
9. Taking the record of output power at antenna port.
10. Repeat step 7 to step 8 for another polarization.
11. $EIRP \text{ (dBm)} = S.G. \text{ Power} - Tx \text{ Cable Loss} + Tx \text{ Antenna Gain}$
12. $EIRP \text{ (dBm)} = EIRP - 2.15$
13. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
14. The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P(Watts)
 $= P(W) - [43 + 10\log(P)] \text{ (dB)}$
 $= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)}$
 $= 13 \text{ dBm}$

6.1.3 Test SET-UP (Block Diagram of Configuration)

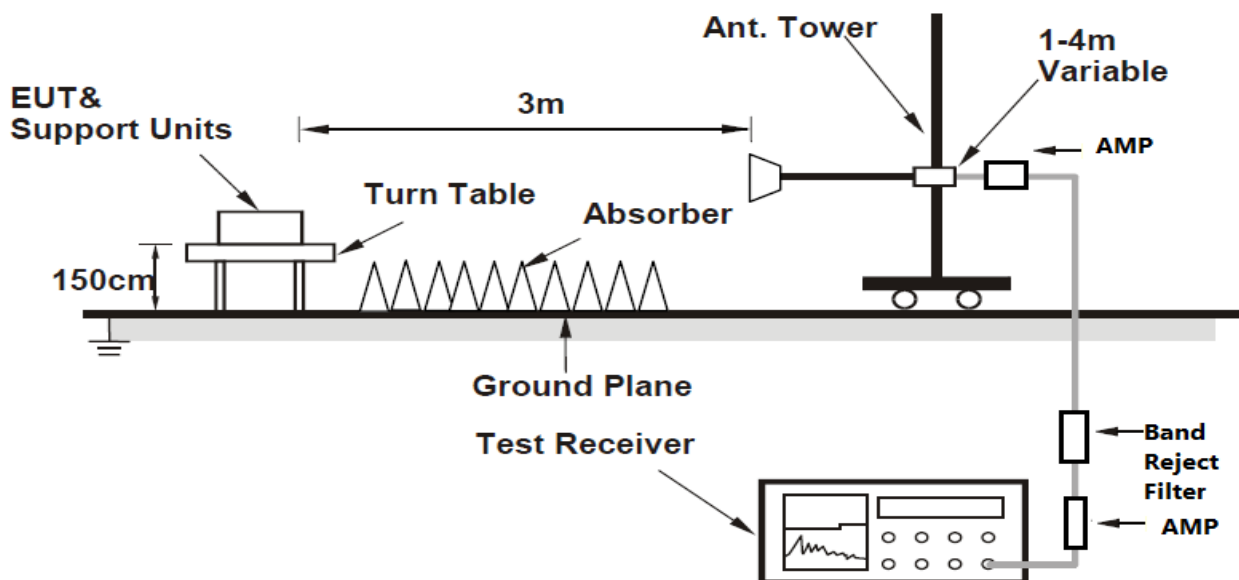
1. Radiated Emission Test Set-Up, Frequency Below 30 MHz



2. Radiated Emission Test Set-Up, Frequency Below 1000 MHz



3. Radiated Emission Test Set-Up, Frequency Above 1000 MHz.



6.1.4 Test Results

[Below 30MHz]

Frequency [MHz]	Reading [dB μ V]	Antenna Factor [dB]	Cable Loss [dB]	Preamp Factor [dB]	Level [dBuV/m]	Pol/Phase
No other emissions were detected at a level greater than 20 dB below limit.						

Remark: §15.31(o)_The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

[Below 1 GHz – 30 MHz ~ 1 GHz]

Test Mode : Band 2 WCDMA F1 (Worst case : Vertical)

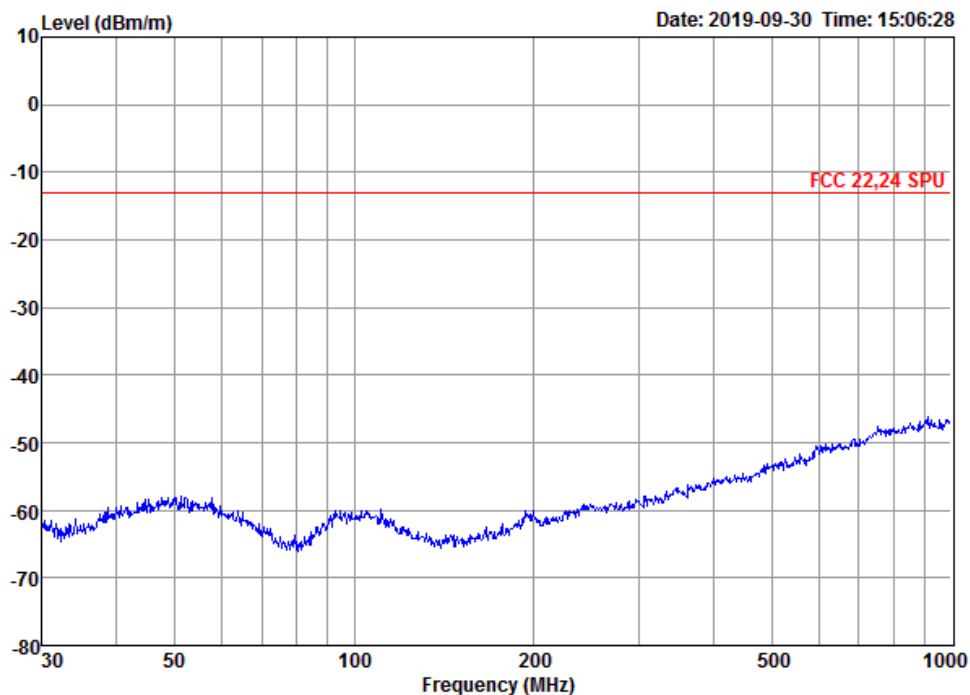


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Radiated Emission TEST ..test

EUT: SPACOSA
Manufacturer: Band2 F1
Operating Condition: Below 1GHz_V

Data: 20 File: C:\Users\user\Desktop\Test Data\이형배\FCC\Spacosa\Spacosa WCDMA.EM6 (65)



Note ⁽¹⁾ : Only the worst case plots for Radiated Spurious Emissions.

Note ⁽²⁾ : No other emissions were detected.

[Below 1 GHz – 30 MHz ~ 1 GHz]

Test Mode : Band 2 WCDMA F2 (Worst case : Vertical)

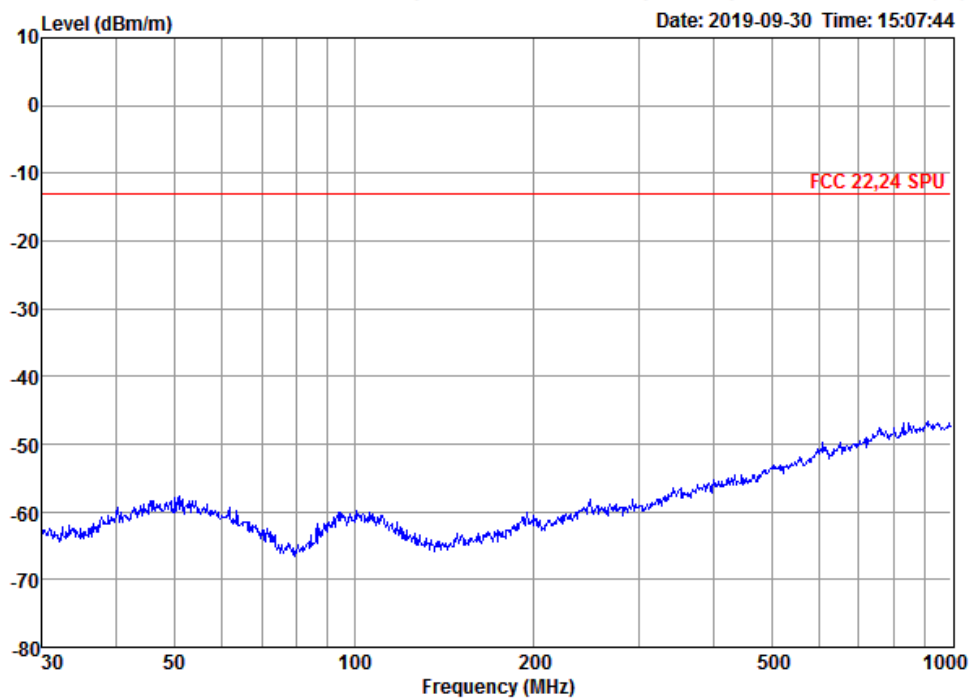


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Radiated Emission TEST ..test

EUT: SPACOSA
Manufacturer: Band2 F2
Operating Condition: Below 1GHz_V

Data: 22 File: C:\Users\user\Desktop\Test Data\이형배\FCC\Spacosa\Spacosa WCDMA.EM6 (65)



Note ⁽¹⁾ : Only the worst case plots for Radiated Spurious Emissions.

Note ⁽²⁾ : No other emissions were detected.

[Below 1 GHz – 30 MHz ~ 1 GHz]

Test Mode : Band 2 WCDMA F3 (Worst case : Horizontal)

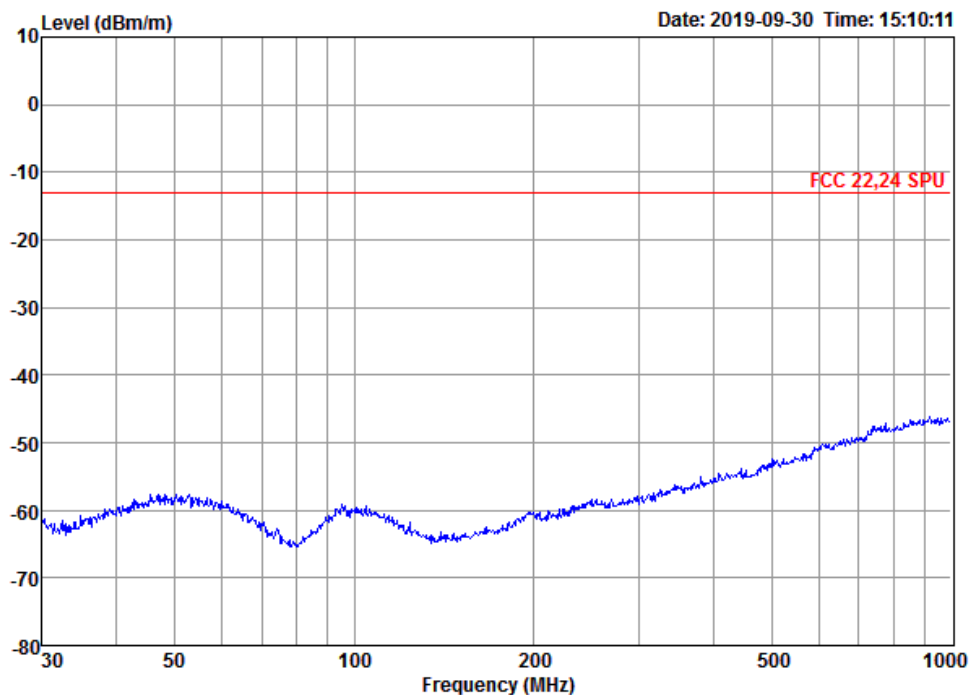


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Radiated Emission TEST ..test

EUT: SPACOSA
Manufacturer: Band2 F3
Operating Condition: Below 1GHz_H

Data: 23 File: C:\Users\user\Desktop\Test Data\이형배\FCC\Spacosa\Spacosa WCDMA.EM6 (65)



Note ⁽¹⁾ : Only the worst case plots for Radiated Spurious Emissions.

Note ⁽²⁾ : No other emissions were detected.

[Above 1 GHz – 1 GHz ~ 18 GHz]

Test Mode : Band 2 WCDMA F1 (Worst case : Horizontal)

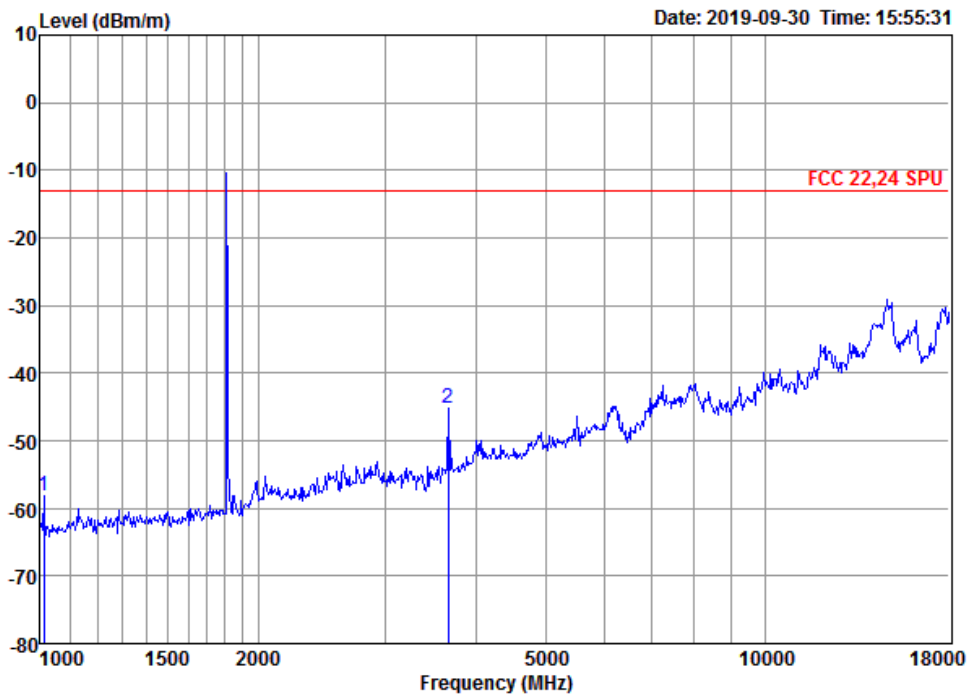


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Radiated Emission TEST ..test

EUT: SPACOSA
Manufacturer: Band2 F1
Operating Condition: Above 1GHz_H

Data: 34 File: C:\Users\user\Desktop\Test Data\이형배\FCC\Spacosa\Spacosa WCDMA.EM6 (65)



Freq. MHz	AntFac (dB/m)	CabLoss (dB)	Preamp (dB)	Reading (dBuV)	Measured (dBuV/m)	Over (dBuV/m)	Limit (dBuV/m)	Pol/Phase	Remark
1011.63	-15.28	2.40	0.00	-45.26	-58.14	-45.15	-12.99		Peak
3661.15	-10.02	4.73	0.00	-40.02	-45.31	-32.32	-12.99		Peak

Note: 1. Measured Level = Antenna Factor + Cable Loss - Preamp + Reading

Note : Only the worst case plots for Radiated Spurious Emissions.

[Above 1 GHz – 1 GHz ~ 18 GHz]

Test Mode : Band 2 WCDMA F2 (Worst case : Horizontal)

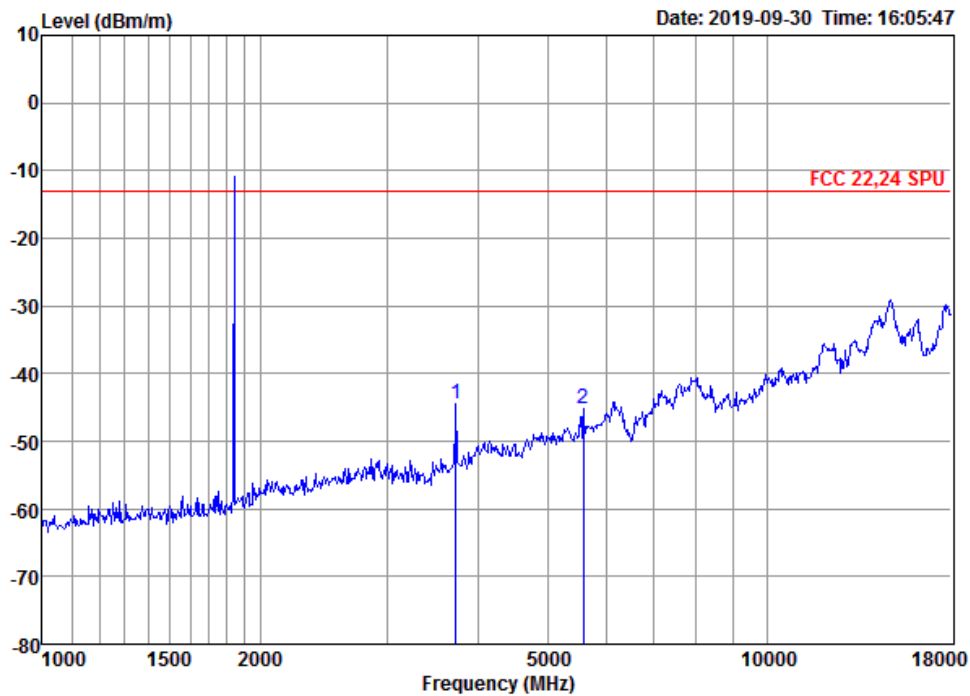


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Radiated Emission TEST ..test

EUT: SPACOSA
Manufacturer: Band2 F2
Operating Condition: Above 1GHz_H

Data: 36 File: C:\Users\user\Desktop\Test Data\이형배\FCC\Spacosa\Spacosa WCDMA.EM6 (65)



Freq. MHz	AntFac (dB/m)	CabLoss (dB)	Preamp (dB)	Reading (dBuV)	Measured (dBuV/m)	Over (dBuV/m)	Limit (dBuV/m)	Pol/Phase	Remark
3725.20	-10.10	4.93	0.00	-39.39	-44.56	-31.57	-12.99		Peak
5583.25	-5.33	5.61	0.00	-45.45	-45.17	-32.18	-12.99		Peak

Note: 1. Measured Level = Antenna Factor + Cable Loss - Preamp + Reading

Note : Only the worst case plots for Radiated Spurious Emissions.

[Above 1 GHz – 1 GHz ~ 18 GHz]

Test Mode : Band 2 WCDMA F3 (Worst case : Horizontal)

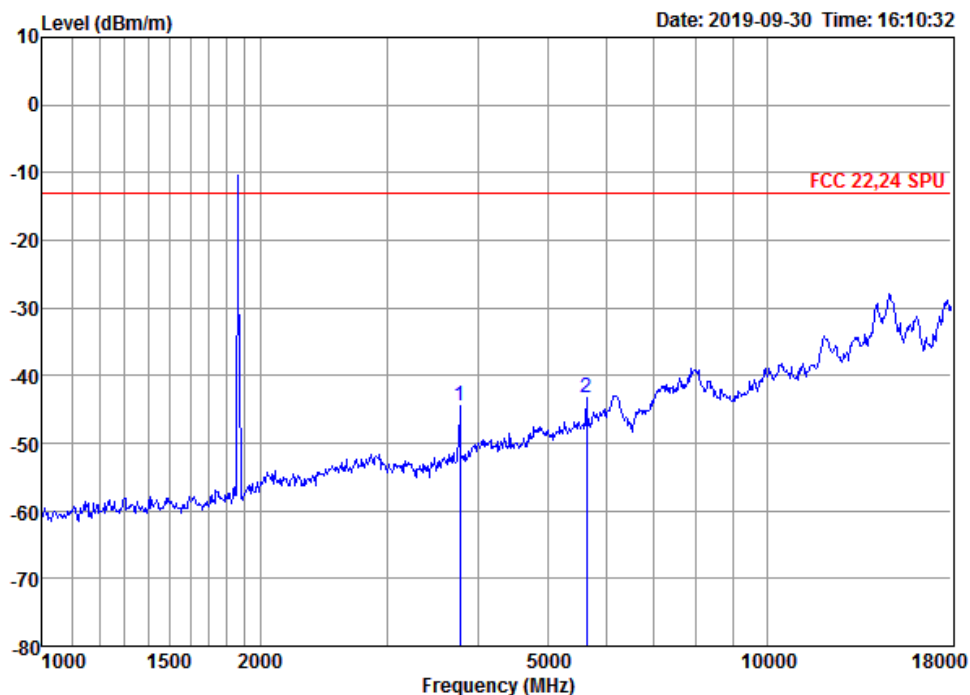


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Radiated Emission TEST ..test

EUT: SPACOSA
Manufacturer: Band2 F3
Operating Condition: Above 1GHz_H

Data: 38 File: C:\Users\user\Desktop\Test Data\이형배\FCC\Spacosa\Spacosa WCDMA.EM6 (65) Date: 2019-09-30 Time: 16:10:32



Freq. MHz	AntFac (dB/m)	CabLoss (dB)	Preamp (dB)	Reading (dBuV)	Measured (dBuV/m)	Over (dBuV/m)	Limit (dBuV/m)	Pol/Phase	Remark
3768.51	-10.10	5.06	0.00	-39.44	-44.48	-31.49	-12.99		Peak
5648.18	-4.72	5.70	0.00	-44.15	-43.17	-30.18	-12.99		Peak

Note: 1. Measured Level = Antenna Factor + Cable Loss - Preamp + Reading

Note : Only the worst case plots for Radiated Spurious Emissions.

[Above 1 GHz – 18 GHz ~ 26.5 GHz]

Test Mode : Band 2 WCDMA F1 (Worst case : Horizontal)

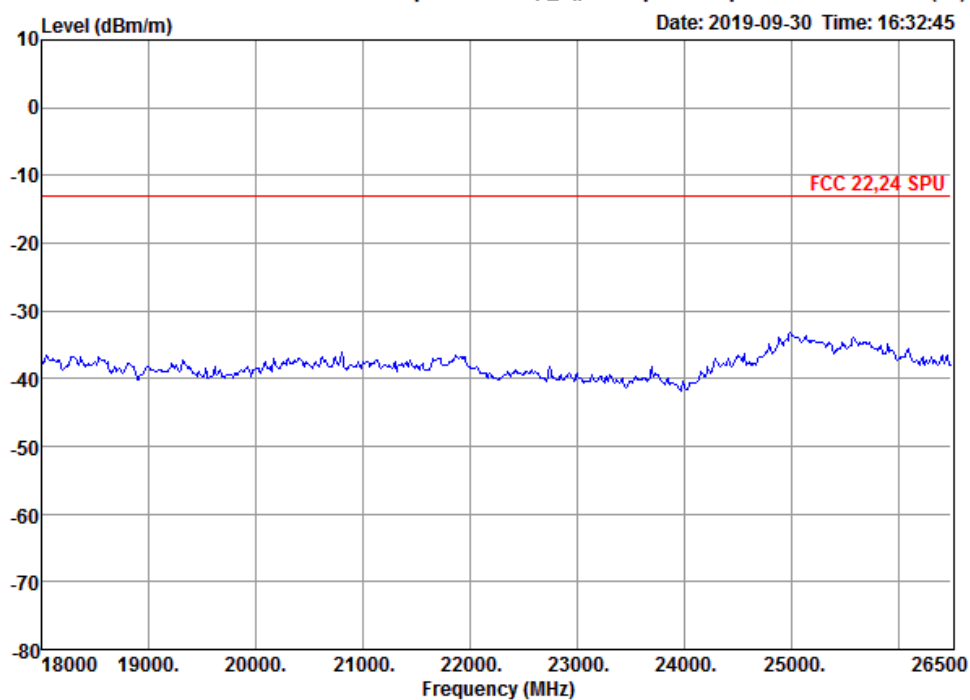


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Radiated Emission TEST ..test

EUT: SPACOSA
Manufacturer: Band2 F1
Operating Condition: Above 18GHz_H

Data: 47 File: C:\Users\user\Desktop\Test Data\이형배\FCC\Spacosa\Spacosa WCDMA.EM6 (65)



Note ⁽¹⁾ : Only the worst case plots for Radiated Spurious Emissions.

Note ⁽²⁾ : No other emissions were detected.

[Above 1 GHz – 18 GHz ~ 26.5 GHz]

Test Mode : Band 2 WCDMA F2 (Worst case : Vertical)

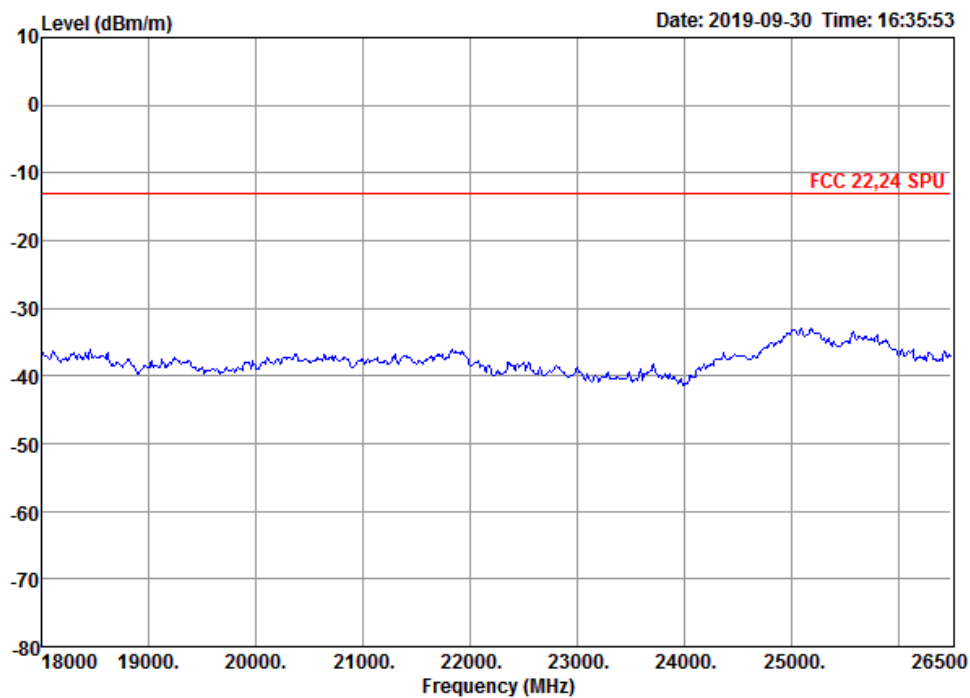


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Radiated Emission TEST ..test

EUT: SPACOSA
Manufacturer: Band2 F2
Operating Condition: Above 18GHz_V

Data: 50 File: C:\Users\user\Desktop\Test Data\이형배\FCC\Spacosa\Spacosa WCDMA.EM6 (65)



Note ⁽¹⁾ : Only the worst case plots for Radiated Spurious Emissions.

Note ⁽²⁾ : No other emissions were detected.

[Above 1 GHz – 18 GHz ~ 26.5 GHz]

Test Mode : Band 2 WCDMA F3 (Worst case : Vertical)

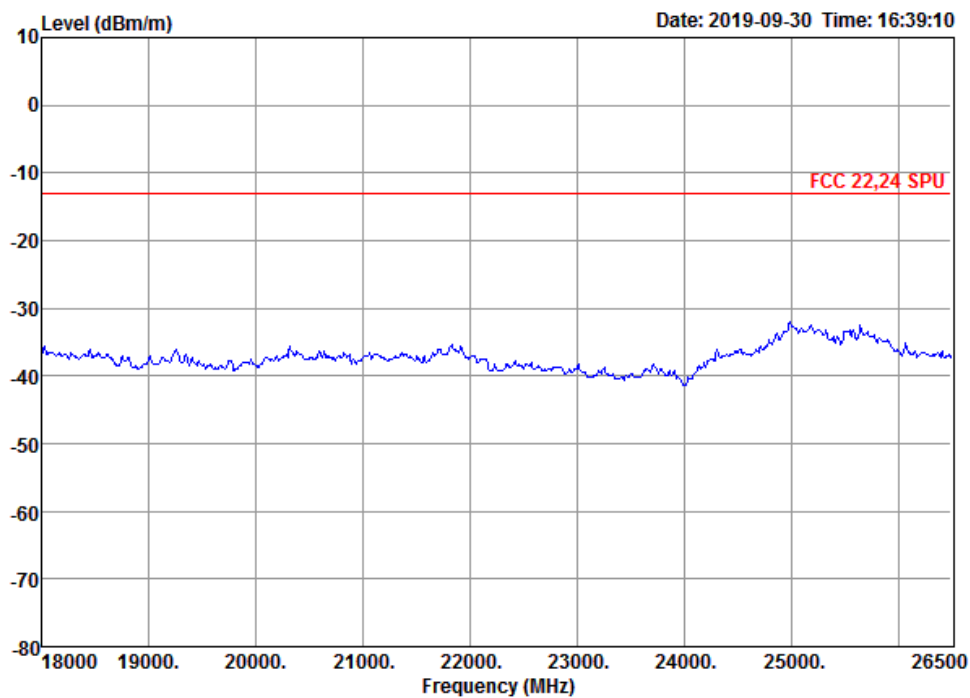


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Radiated Emission TEST ..test

EUT: SPACOSA
Manufacturer: Band2 F3
Operating Condition: Above 18GHz_V

Data: 52 File: C:\Users\user\Desktop\Test Data\이형배\FCC\Spacosa\Spacosa WCDMA.EM6 (65)



Note ⁽¹⁾ : Only the worst case plots for Radiated Spurious Emissions.

Note ⁽²⁾ : No other emissions were detected.

[Below 1 GHz – 30 MHz ~ 1 GHz]

Test Mode : Band 5 WCDMA F1 (Worst case : Vertical)

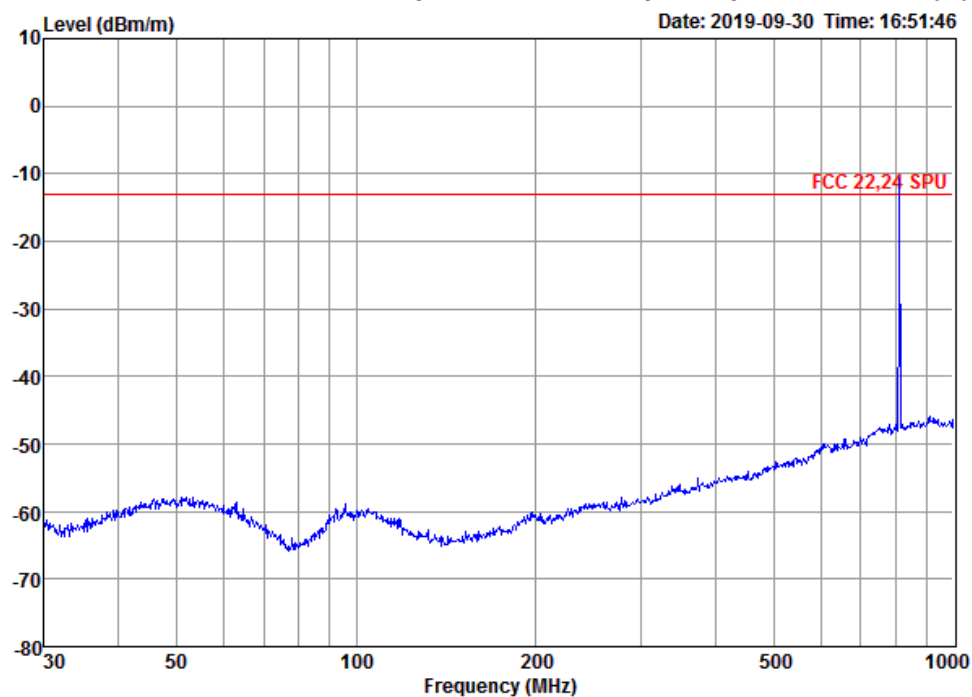


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Radiated Emission TEST ..test

EUT: SPACOSA
Manufacturer: Band5 F1
Operating Condition: Below 1GHz_V

Data: 61 File: C:\Users\user\Desktop\Test Data\이형배\FCC\Spacosa\Spacosa WCDMA.EM6 (65)



Note ⁽¹⁾ : Only the worst case plots for Radiated Spurious Emissions.

Note ⁽²⁾ : No other emissions were detected.

[Below 1 GHz – 30 MHz ~ 1 GHz]

Test Mode : Band 5 WCDMA F2 (Worst case : Vertical)

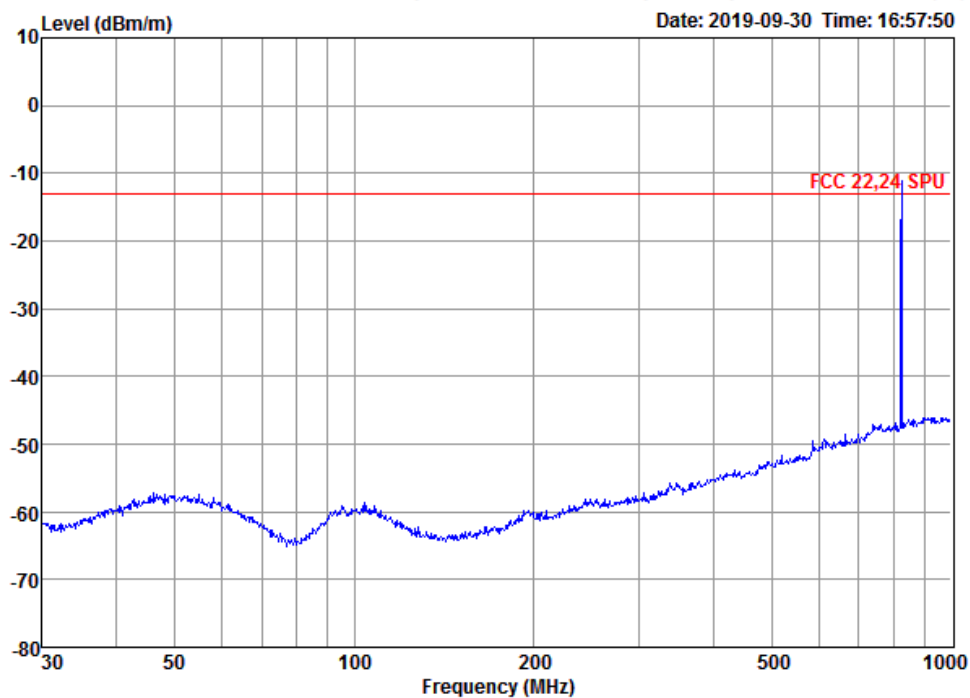


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Radiated Emission TEST ..test

EUT: SPACOSA
Manufacturer: Band5 F2
Operating Condition: Below 1GHz_V

Data: 63 File: C:\Users\user\Desktop\Test Data\이형배\FCC\Spacosa\Spacosa WCDMA.EM6 (65)



Note ⁽¹⁾ : Only the worst case plots for Radiated Spurious Emissions.

Note ⁽²⁾ : No other emissions were detected.

[Below 1 GHz – 30 MHz ~ 1 GHz]

Test Mode : Band 5 WCDMA F3 (Worst case : Vertical)

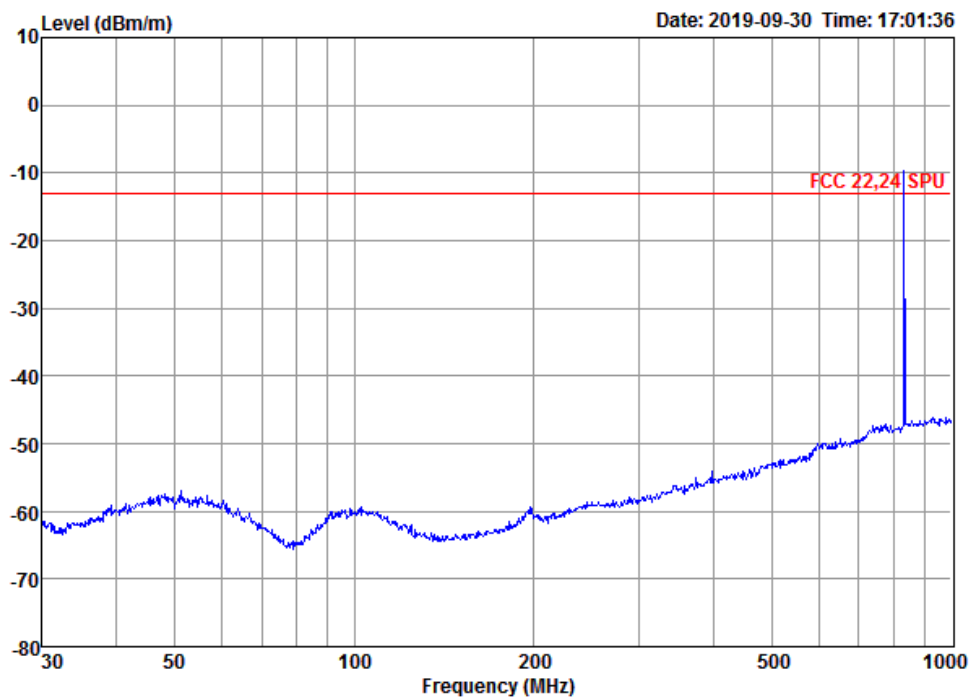


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Radiated Emission TEST ..test

EUT: SPACOSA
Manufacturer: Band5 F3
Operating Condition: Below 1GHz_V

Data: 65 File: C:\Users\user\Desktop\Test Data\이형배\FCC\Spacosa\Spacosa WCDMA.EM6 (65)



Note ⁽¹⁾ : Only the worst case plots for Radiated Spurious Emissions.

Note ⁽²⁾ : No other emissions were detected.

[Above 1 GHz – 1 GHz ~ 18 GHz]

Test Mode : Band 5 WCDMA F1 (Worst case : Horizontal)

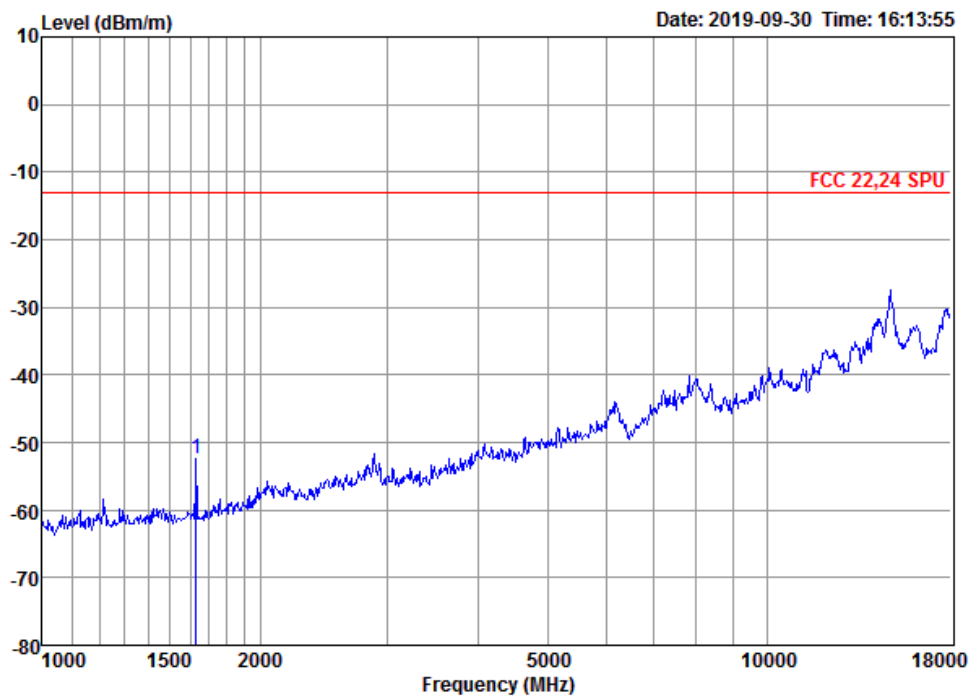


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Radiated Emission TEST ..test

EUT: SPACOSA
Manufacturer: Band5 F1
Operating Condition: Above 1GHz_H

Data: 41 File: C:\Users\user\Desktop\Test Data\이형배\FCC\Spacosa\Spacosa WCDMA.EM6 (65)



Freq. MHz	AntFac (dB/m)	CabLoss (dB)	Preamp (dB)	Reading (dBuV)	Measured (dBuV/m)	Over (dBuV/m)	Limit (dBuV/m)	Pol/Phase	Remark
1629.83	-13.88	2.22	0.00	-40.80	-52.46	-39.47	-12.99		Peak

Note: 1. Measured Level = Antenna Factor + Cable Loss - Preamp + Reading

Note : Only the worst case plots for Radiated Spurious Emissions.

[Above 1 GHz – 1 GHz ~ 18 GHz]

Test Mode : Band 5 WCDMA F2 (Worst case : Horizontal)

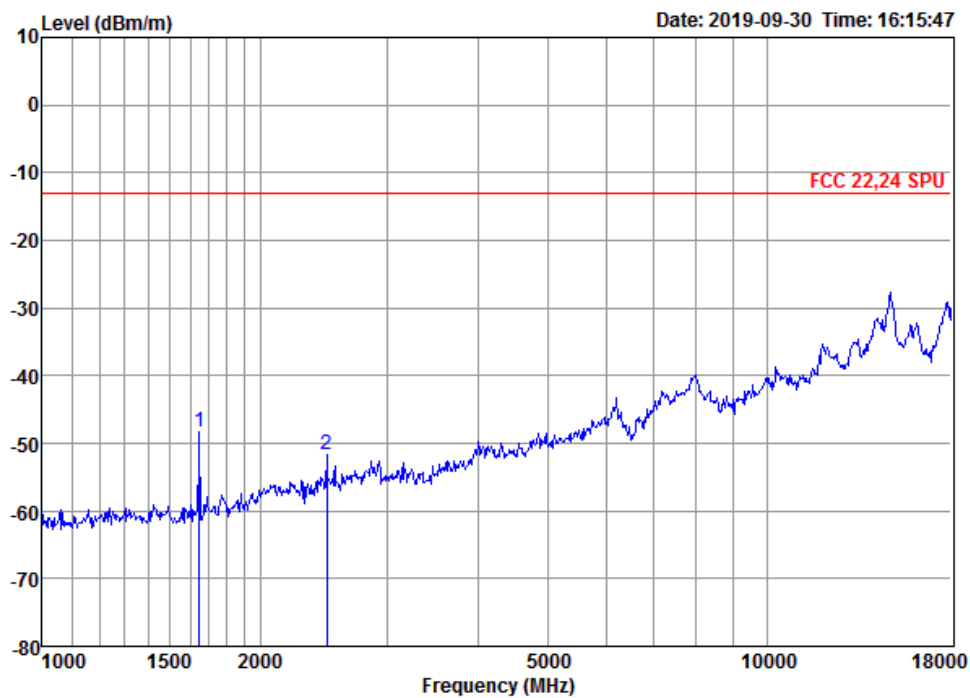


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Radiated Emission TEST ..test

EUT: SPACOSA
Manufacturer: Band5 F2
Operating Condition: Above 1GHz_H

Data: 43 File: C:\Users\user\Desktop\Test Data\이형배\FCC\Spacosa\Spacosa WCDMA.EM6 (65)



Freq. MHz	AntFac (dB/m)	CabLoss (dB)	Preamp (dB)	Reading (dBuV)	Measured (dBuV/m)	Over (dBuV/m)	Limit (dBuV/m)	Pol/Phase	Remark
1648.78	-13.80	2.23	0.00	-36.64	-48.21	-35.22	-12.99		Peak
2471.16	-11.26	3.77	0.00	-44.21	-51.70	-38.71	-12.99		Peak

Note: 1. Measured Level = Antenna Factor + Cable Loss - Preamp + Reading

Note : Only the worst case plots for Radiated Spurious Emissions.

[Above 1 GHz – 1 GHz ~ 18 GHz]

Test Mode : Band 5 WCDMA F3 (Worst case : Horizontal)

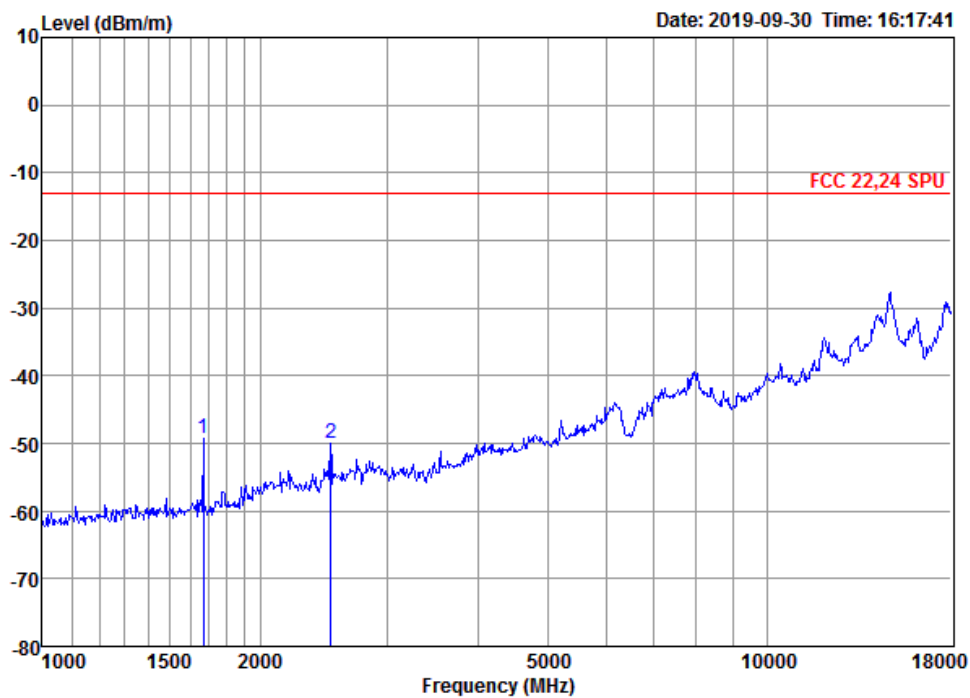


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Radiated Emission TEST ..test

EUT: SPACOSA
Manufacturer: Band5 F3
Operating Condition: Above 1GHz_H

Data: 45 File: C:\Users\user\Desktop\Test Data\이형배\FCC\Spacosa\Spacosa WCDMA.EM6 (65)



Freq. MHz	AntFac (dB/m)	CabLoss (dB)	Preamp (dB)	Reading (dBuV)	Measured (dBuV/m)	Over (dBuV/m)	Limit (dBuV/m)	Pol/Phase	Remark
1667.95	-13.73	2.25	0.00	-37.72	-49.20	-36.21	-12.99		Peak
2499.89	-11.20	3.85	0.00	-42.69	-50.04	-37.05	-12.99		Peak

Note: 1. Measured Level = Antenna Factor + Cable Loss - Preamp + Reading

Note : Only the worst case plots for Radiated Spurious Emissions.

[Above 1 GHz – 18 GHz ~ 26.5 GHz]

Test Mode : Band 5 WCDMA F1 (Worst case : Vertical)

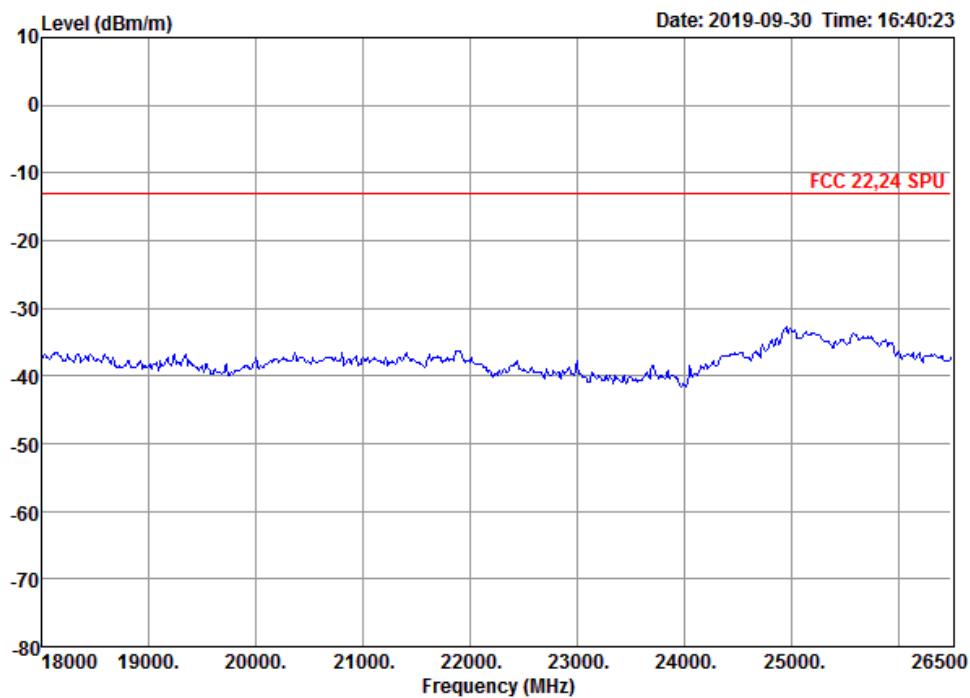


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Radiated Emission TEST ..test

EUT: SPACOSA
Manufacturer: Band5 F1
Operating Condition: Above 18GHz_V

Data: 54 File: C:\Users\user\Desktop\Test Data\이형배\FCC\Spacosa\Spacosa WCDMA.EM6 (65)



Note ⁽¹⁾ : Only the worst case plots for Radiated Spurious Emissions.

Note ⁽²⁾ : No other emissions were detected.

[Above 1 GHz – 18 GHz ~ 26.5 GHz]

Test Mode : Band 5 WCDMA F2 (Worst case : Vertical)

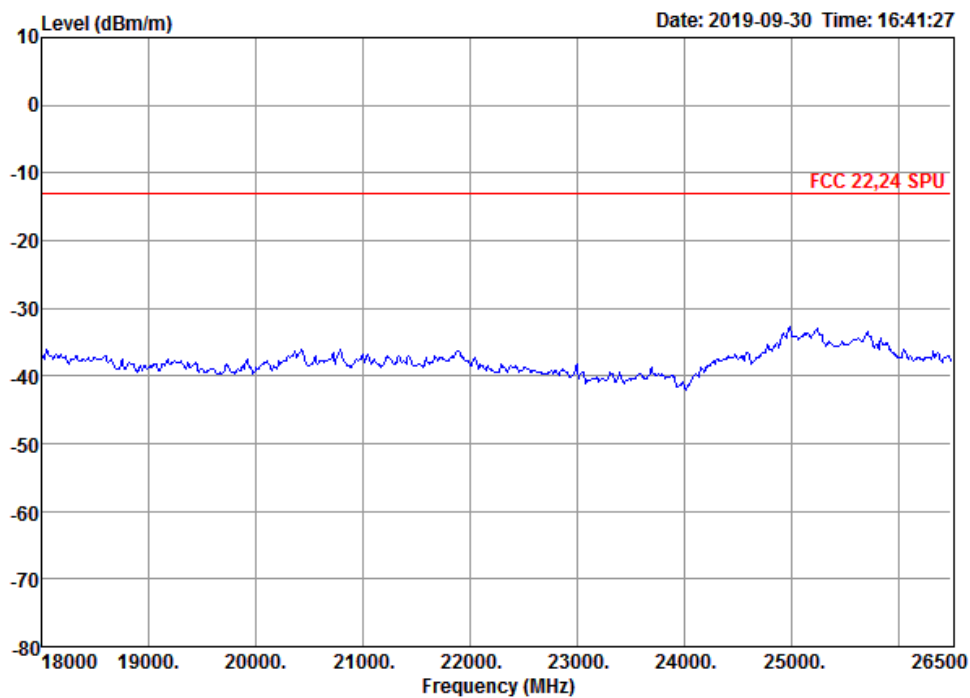


company
tel:12345678
fax:13572468
email:company.com
www.company.com
ext:123

Radiated Emission TEST ..test

EUT: SPACOSA
Manufacturer: Band5 F2
Operating Condition: Above 18GHz_V

Data: 56 File: C:\Users\user\Desktop\Test Data\이형배\FCC\Spacosa\Spacosa WCDMA.EM6 (65)



Note ⁽¹⁾ : Only the worst case plots for Radiated Spurious Emissions.

Note ⁽²⁾ : No other emissions were detected.

[Above 1 GHz – 18 GHz ~ 26.5 GHz]

Test Mode : Band 5 WCDMA F3 (Worst case : Horizontal)

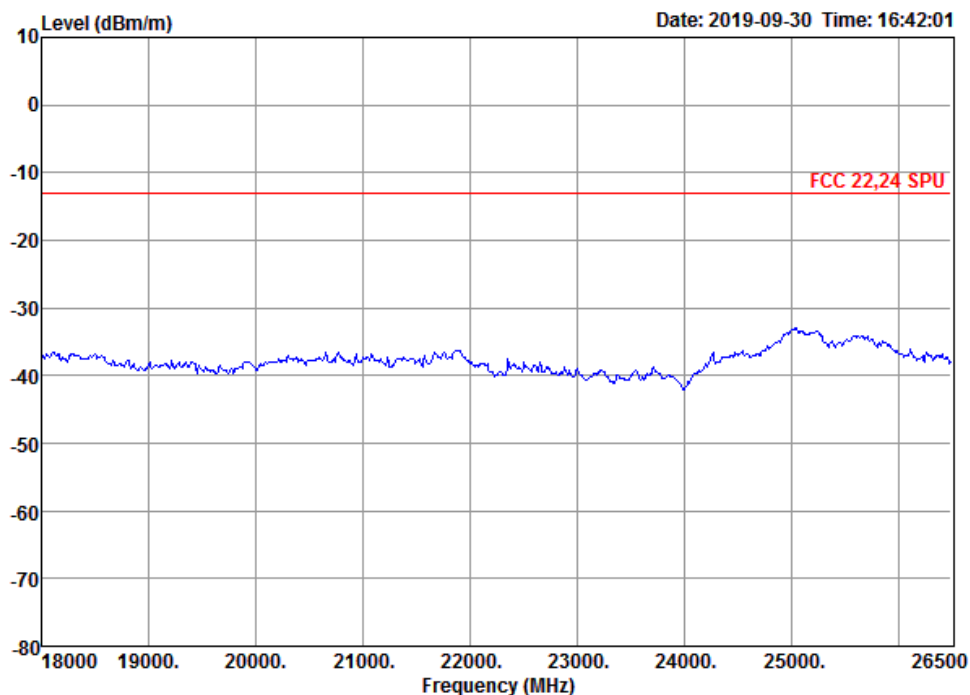


company
tel:12345678
fax:13572468
email:company.com
www.company.com
ext:123

Radiated Emission TEST ..test

EUT: SPACOSA
Manufacturer: Band5 F3
Operating Condition: Above 18GHz_H

Data: 57 File: C:\Users\user\Desktop\Test Data\이형배\FCC\Spacosa\Spacosa WCDMA.EM6 (65)



Note ⁽¹⁾ : Only the worst case plots for Radiated Spurious Emissions.

Note ⁽²⁾ : No other emissions were detected.