FCC RF Test Report

APPLICANT	:	Veea Inc.
EQUIPMENT	:	Wireless Edge Server
BRAND NAME	:	VeeaHub
MODEL NAME	:	VHC25-5G
FCC ID	:	2ARXK-VHC25-5G
STANDARD	:	47 CFR Part 90(R)
CLASSIFICATION	:	PCS Licensed Transmitter (PCB)
TEST DATE(S)	:	Jul. 23, 2024 ~ Sep. 11, 2024

This product installed a RF module (Brand Name: Quectel, Model Name: RM520N-GL, FCC ID: XMR2022RM520NGL) during the test, only Conducted Power, ERP and RSE test items are tested in this report, all the other test results are leveraged from module RF report.

We, Sporton International Inc. (Shenzhen), would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.26 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (Shenzhen), the test report shall not be reproduced except in full.

Jason Jia

Approved by: Jason Jia

ACCREDITED Cert #5145.01

Sporton International Inc. (ShenZhen)

1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055

People's Republic of China

TABLE OF CONTENTS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG452231K	Rev. 01	Initial issue of report	Sep. 18, 2024

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.2	§2.1046	Conducted Output Power	—	Reporting only	-
	§90.542 (a)(7)	Effective Radiated Power	ERP < 3Watt	PASS	-
-	-	Peak-to-Average Ratio	—	Reporting only	1
-	§2.1049	Occupied Bandwidth	—	Reporting only	1
-	§2.1053 §90.543 (e)(2)(3)	Conducted Band Edge Measurement	Refer standard	PASS	1
-	§2.1051 §90.210(n)	Emission Mask	Mask B	PASS	1
-	§2.1053 §90.543 (e)(3)	Conducted Spurious Emission	< $43+10\log_{10}$(P[Watts])	PASS	1
-	§2.1055 §90.539 (e)	Frequency Stability Temperature & Voltage	< ±1.25 ppm	PASS	1
4.4	§2.1053 §90.543 (e)(3) §90.543 (f)	Radiated Spurious Emission	< $43+10\log_{10}$(P[Watts])	PASS	Under limit 15.65 dB at 9222.000 MHz

Remark 1: All test results were leveraged from module RF report which can refer to Report No "SEWA2204000008RG02".

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/manufacturer 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.

1 General Description

1.1 Applicant

Veea Inc.
164 E 83rd Street, NEW YORK, United States 10028

1.2 Manufacturer

Veea Inc.
164 E 83rd Street, NEW YORK, United States 10028

1.3 Feature of Equipment Under Test

Product Feature	
Equipment	Wireless Edge Server
Brand Name	VeeaHub
Model Name	VHC25-5G
FCC ID	2ARXK-VHC25-5G
Tx Frequency	5G NR n14: 788 MHz ~ 798 MHz
Rx Frequency	5G NR n14: 758 MHz ~ 768 MHz
Bandwidth	n14: 5MHz / 10MHz
SCS	15kHz
Antenna Gain	**<Ant. 0>** : 1.82 dBi
Type of Modulation	CP-OFDM: QPSK / 16QAM / 64QAM / 256QAM DFT-s-OFDM: PI/2 BPSK / QPSK / 16QAM / 64QAM / 256QAM
SN Code	Radiation: C25DCW00000000006145
HW Version	1.0
SW Version	2.33.1-0.mfg.alpha.4.0.7
EUT Stage	Identical Prototype

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

2. 5G NR n14 support SA and NSA mode.

3. The EN-DC mode combination could be referred to the product spec.

1.4 Maximum ERP Power, and Emission Designator

5G NR n14		PI/2 BPSK / QPSK	16QAM / 64QAM / 256QAM
BW (MHz)	Frequency Range (MHz)	Maximum ERP(W)	Maximum ERP(W)
5	790.5~795.5	0.2203	0.1782
10	793	0.2208	0.1782

1.5 Testing Site

Sporton International Inc. (ShenZhen) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.01.

Test Firm	Sporton International Inc. (ShenZhen)		
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055 People's Republic of China TEL: +86-755-86379589 FAX: +86-755-86379595		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	TH01-SZ	CN1256	421272

Test Firm	Sporton International Inc. (ShenZhen)		
Test Site Location	101, 1st Floor, Block B, Building 1, No. 2, Tengfeng 4th Road, Fenghuang Community, Fuyong Street, Baoan District, Shenzhen City, Guangdong Province 518103 People's Republic of China TEL: +86-755-86066985		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	03CH03-SZ	CN1256	421272

1.6 Test Software

Item	Site	Manufacture	Name	Version
1.	03CH03-SZ	AUDIX	E3	6.2009-8-24al

1.7 Applied Standards

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

- 47 CFR Part 90(R)
- ANSI C63.26
- KDB 971168 D01 Power Meas License Digital Systems v03r01
- KDB 412172 D01 Determining ERP and EIRP v01r01

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

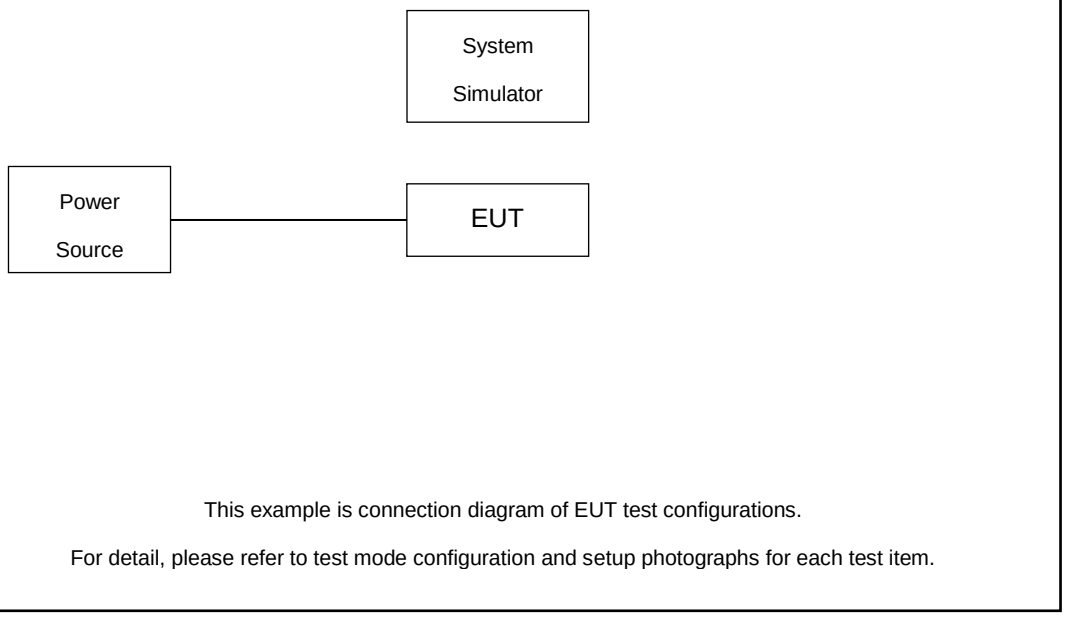
2.1 Test Mode

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.

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes to find the maximum emission.

Conducted Test Cases	Band	Bandwidth (MHz)						Modulation					RB #			Test Channel		
		1.4	3	5	10	15	20	PI/2 BPSK	QPSK	16QAM	64QAM	256QAM	1	Half	Full	L	M	H
Max. Output Power	14	-	-	V		-	-		V	V			V			V	V	V
	14	-	-		V	-	-	V	V	V	V	V	V		V		V	
E.R.P	14	-	-	V		-	-		V	V			V			V	V	V
	14	-	-		V	-	-	V	V	V	V	V	V		V		V	
Radiated Spurious Emission	14	Worst Case															V	
Note	1. The mark "**v** " means that this configuration is chosen for testing 2. The mark "-" means that this bandwidth is not supported. 3. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported.																	

2.2 Connection Diagram of Test System



This example is connection diagram of EUT test configurations.

For detail, please refer to test mode configuration and setup photographs for each test item.

2.3 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	NR Base Station	Anritsu	MT8000A	N/A	N/A	Unshielded, 1.8 m
2.	DC Power Supply	GW INSTEK	GPS-3030D	N/A	N/A	Unshielded, 1.8 m

2.4 Frequency List of Low/Middle/High Channels

5G NR n14 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
10	Channel	-	158600	-
	Frequency	-	793	-
5	Channel	158100	158600	159100
	Frequency	790.5	793	795.5

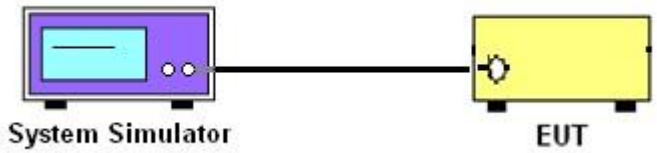
3 Conducted Test Items

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 and ERP

3.2.1 Description of the Conducted Output Power Measurement and ERP

A base station simulator was used to establish communication with the EUT. Its parameters were set to transmit the maximum power on the EUT. The measured power in the radio frequency on the transmitter output terminals shall be reported.

The ERP of mobile transmitters must not exceed 3 Watts for LTE Band 14.

According to KDB 412172 D01 Power Approach,

$EIRP = P_T + G_T – L_C$, $ERP = EIRP - 2.15$, where

P_T = transmitter output power in dBm

G_T = gain of the transmitting antenna in dBi

L_C = signal attenuation in the connecting cable between the transmitter and antenna in dB

3.2.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.2
2. The transmitter output port was connected to the system simulator.
3. Set EUT at maximum power through the system simulator.
4. Select lowest, middle, and highest channels for each band and different modulation.
5. Measure and record the power level from the system simulator.

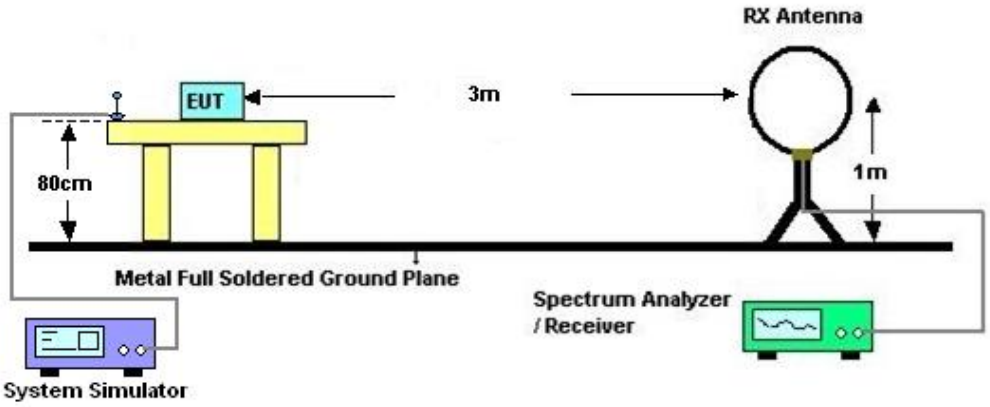
4 Radiated Test Items

4.1 Measuring Instruments

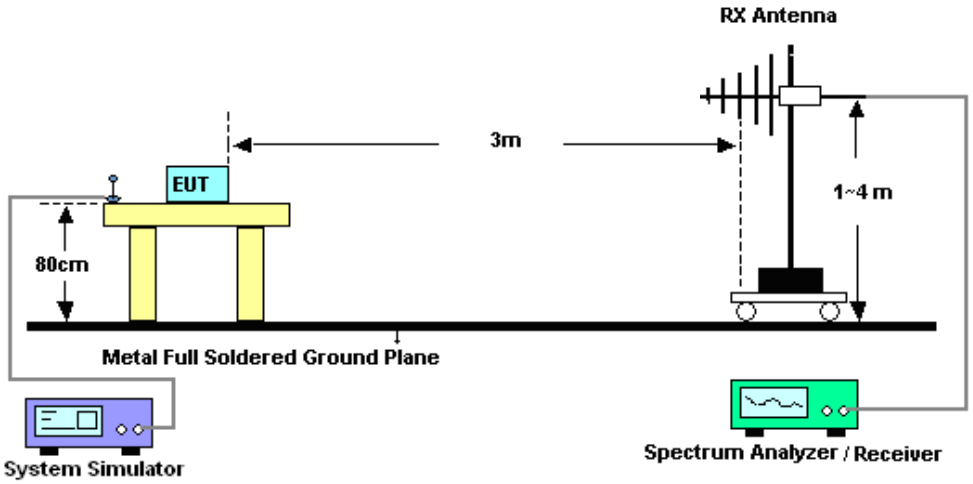
See list of measuring instruments of this test report.

4.2 Test Setup

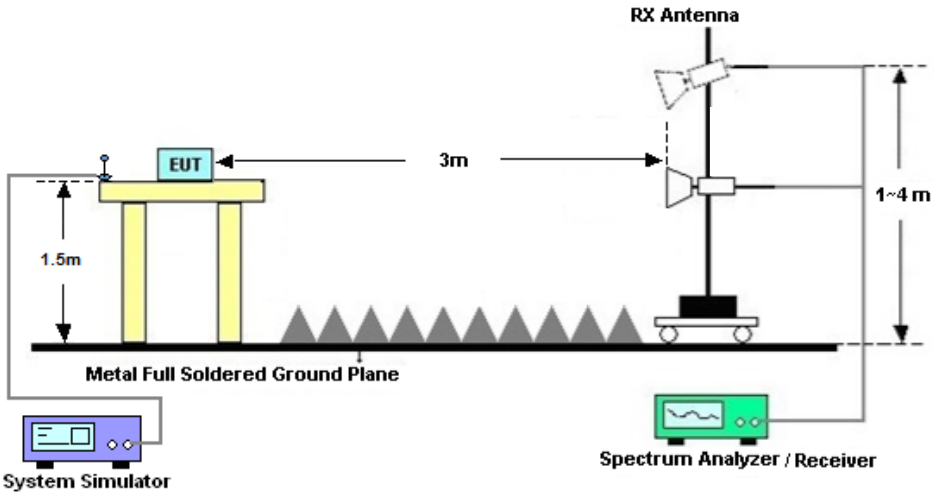
4.2.1 For radiated test below 30MHz



4.2.2 For radiated test from 30MHz to 1GHz



4.2.3 For radiated test above 1GHz



4.3 Test Result of Radiated Test

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.

Please refer to Appendix B.

4.4 Radiated Spurious Emission Measurement

4.4.1 Description of Radiated Spurious Emission

The radiated spurious emission was measured by substitution method according to ANSI C63.26.
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.

For operations in the 758-775 MHz and 788-805 MHz bands, all emissions including harmonics in the band 1559–1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

4.4.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.5
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. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the 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. EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
10. ERP (dBm) = EIRP - 2.15
11. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
    The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)
    = P(W)- [43 + 10log(P)] (dB)
    = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
    = -13dBm.

5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101078	10Hz~40GHz	Apr. 09, 2024	Sep. 11, 2024	Apr. 08, 2025	Conducted (TH01-SZ)
Power Divider	TOJOIN	PS-2SM-04265	60.06.020.0077	0.4GHz~26.5GHz	Dec. 25, 2023	Sep. 11, 2024	Dec. 24, 2024	Conducted (TH01-SZ)
EMI Test Receiver&SA	KEYSIGHT	N9038A	MY54450083	20Hz~8.4GHz	Apr. 09, 2024	Jul. 23, 2024	Apr. 08, 2025	Radiation (03CH03-SZ)
Loop Antenna	R&S	HFH2-Z2E	101141	9kHz~30MHz	Dec. 29, 2023	Jul. 23, 2024	Dec. 28, 2024	Radiation (03CH03-SZ)
EXA Spectrum Anaiyzer	KEYSIGHT	N9010A	MY55150246	10Hz~44GHz;	Apr. 09, 2024	Jul. 23, 2024	Apr. 08, 2025	Radiation (03CH03-SZ
Bilog Antenna	TeseQ	CBL6112D	35408	30MHz-2GHz	Aug. 20, 2023	Jul. 23, 2024	Aug. 19, 2025	Radiation (03CH03-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1355	1GHz~18GHz	Apr. 09, 2024	Jul. 23, 2024	Apr. 08, 2025	Radiation (03CH03-SZ)
Amplifier	Burgeon	BPA-530	102211	0.01Hz ~3000MHz	Oct. 18, 2023	Jul. 23, 2024	Oct. 17, 2024	Radiation (03CH03-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz	Jul. 03, 2024	Jul. 23, 2024	Jul. 02, 2025	Radiation (03CH03-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18Ghz-40GHz	Apr. 09, 2024	Jul. 23, 2024	Apr. 08, 2025	Radiation (03CH03-SZ)
Amplifier	Agilent Technologies	83017A	MY39501302	500MHz~26.5GHz	Dec. 27, 2023	Jul. 23, 2024	Dec. 26, 2024	Radiation (03CH03-SZ)
AC Power Source	Chroma	61601	616010002729	N/A	Oct. 18, 2023	Jul. 23, 2024	Oct. 17, 2024	Radiation (03CH03-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Jul. 23, 2024	NCR	Radiation (03CH03-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Jul. 23, 2024	NCR	Radiation (03CH03-SZ)

NCR: No Calibration Required

6 Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.26-2015. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

Uncertainty of Conducted Measurement

Test Item	Uncertainty
Conducted Power	±1.34 dB

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	±3.0 dB

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	±3.6 dB

Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	±3.8 dB

---------- THE END ----------

Appendix A. Test Results of Conducted Test

Test Engineer :	Khan	Temperature :	24~26℃
		Relative Humidity :	50~53%

Transmitter Conducted Output Power And ERP, (GT - LC)=1.82db

NR Band	SCS	BandWidth	Arfcn	Freq(MHz)	Modulation	RB	Conducted Power(dBm)	ERP(dBm)	ERP(W)
14	15	5	158100	790.5	DFT-s-OFDM QPSK	1@1	23.76	23.43	0.2203
14	15	5	158100	790.5	DFT-s-OFDM 16 QAM	1@1	22.84	22.51	0.1782
14	15	5	158600	793	DFT-s-OFDM QPSK	1@1	23.72	23.39	0.2183
14	15	5	158600	793	DFT-s-OFDM 16 QAM	1@1	22.76	22.43	0.1750
14	15	5	159100	795.5	DFT-s-OFDM QPSK	1@1	23.76	23.43	0.2203
14	15	5	159100	795.5	DFT-s-OFDM 16 QAM	1@1	22.75	22.42	0.1746
14	15	10	158600	793	DFT-s-OFDM PI/2 BPSK	25@12	23.68	23.35	0.2163
14	15	10	158600	793	DFT-s-OFDM PI/2 BPSK	1@1	23.59	23.26	0.2118
14	15	10	158600	793	DFT-s-OFDM PI/2 BPSK	1@50	23.51	23.18	0.2080
14	15	10	158600	793	DFT-s-OFDM QPSK	25@12	23.64	23.31	0.2143
14	15	10	158600	793	DFT-s-OFDM QPSK	1@1	23.77	23.44	0.2208
14	15	10	158600	793	DFT-s-OFDM QPSK	1@50	23.65	23.32	0.2148
14	15	10	158600	793	DFT-s-OFDM 16 QAM	25@12	22.55	22.22	0.1667
14	15	10	158600	793	DFT-s-OFDM 16 QAM	1@1	22.84	22.51	0.1782
14	15	10	158600	793	DFT-s-OFDM 16 QAM	1@50	22.66	22.33	0.1710
14	15	10	158600	793	DFT-s-OFDM 64 QAM	25@12	21.17	20.84	0.1213
14	15	10	158600	793	DFT-s-OFDM 64 QAM	1@1	21.49	21.16	0.1306
14	15	10	158600	793	DFT-s-OFDM 64 QAM	1@50	21.27	20.94	0.1242
14	15	10	158600	793	DFT-s-OFDM 256 QAM	25@12	19.06	18.73	0.0746
14	15	10	158600	793	DFT-s-OFDM 256 QAM	1@1	18.9	18.57	0.0719
14	15	10	158600	793	DFT-s-OFDM 256 QAM	1@50	18.81	18.48	0.0705
14	15	10	158600	793	CP-OFDM QPSK	26@13	22.09	21.76	0.1500
14	15	10	158600	793	CP-OFDM QPSK	1@1	22.22	21.89	0.1545
14	15	10	158600	793	CP-OFDM QPSK	1@50	21.8	21.47	0.1403

Appendix B. Test Results of Radiated Test

Field Strength of Spurious Radiated

Test Engineer :	Jia Kuang	Temperature :	22~25℃
		Relative Humidity :	48~52%

SA n14 / NR 10MHz / QPSK / ANT0									
Bandwidth	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	1577	-60.92	-42.15	-18.77	-69.83	-64.17	4.00	9.40	H
	2365.5	-63.03	-13	-50.03	-74.83	-66.60	4.88	10.60	H
	3154	-61.54	-13	-48.54	-76.13	-66.47	5.52	12.60	H
	1577	-62.94	-42.15	-20.79	-71.61	-66.19	4.00	9.40	V
	2365.5	-62.64	-13	-49.64	-74.38	-66.21	4.88	10.60	V
	3154	-61.93	-13	-48.93	-76.28	-66.86	5.52	12.60	V
	Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								
Test Result				PASS					

DC_30A_n14A / LTE 10MHz + NR 10MHz / QPSK(0+0)									
Bandwidth	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
NR n14 Middle	1577	-66.30	-42.15	-24.15	-46.30	-69.55	4.00	9.40	H
	2365.5	-48.91	-13	-35.91	-30.67	-52.48	4.88	10.60	H
	3154	-65.56	-13	-52.56	-49.60	-70.49	5.52	12.60	H
	1577	-66.00	-42.15	-23.85	-45.76	-69.25	4.00	9.40	V
	2365.5	-49.17	-13	-36.17	-30.87	-52.74	4.88	10.60	V
	3154	-65.11	-13	-52.11	-48.91	-70.04	5.52	12.60	V
LTE Band30 Middle	4611.00	-65.01	-40	-25.01	-51.08	-71.26	6.45	12.70	H
	6916.50	-60.96	-40	-20.96	-52.54	-64.36	8.40	11.80	H
	9222.00	-55.65	-40	-15.65	-52.79	-58.00	9.65	12.00	H
	4611.00	-64.22	-40	-24.22	-50.47	-70.47	6.45	12.70	V
	6916.50	-60.59	-40	-20.59	-52.48	-63.99	8.40	11.80	V
	9222.00	-56.10	-40	-16.10	-52.77	-58.45	9.65	12.00	V
	Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								
Test Result				PASS					