



# FCC RADIO TEST REPORT

**FCC ID** : ACJFZS1A20A  
**Equipment** : Radio module  
**Brand Name** : Panasonic  
**Model Name** : WW18A  
**Marketing Name** : WW18A  
**Applicant** : Panasonic Corporation of North America  
Two Riverfront Plaza, 9th Floor, Newark,  
NJ 07102-5490  
**Manufacturer** : Panasonic Mobile Communications Co., Ltd.  
600 Saedo-cho, Tsuzuki-ku, Yokohama-city,  
Kanagawa 224-8539, Japan  
**Standard** : FCC 47 CFR Part 2, 90(R)

The product was received on Dec. 08, 2020 and testing was started from Dec. 11, 2020 and completed on Jan. 06, 2021. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI / TIA-603-E and has been in compliance with the applicable technical standards.

The test results in this variant report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

*Louis Wu*

Approved by: Louis Wu

**SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory**  
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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### History of this test report

Report No.	Version	Description	Issued Date
FG0D1135-01C	01	Initial issue of report	Dec. 28, 2020
FG0D1135-01C	02	1. Revise Accessories Information for Host 2. Revise Antenna gain 3. Update Conducted power and ERP	Jan. 07, 2021



Summary of Test Result

Table with 5 columns: Report Clause, Ref Std. Clause, Test Items, Result (PASS/FAIL), Remark. Rows include test items like Conducted Output Power, Effective Radiated Power, Peak-to-Average Ratio, Occupied Bandwidth, etc.

Note:

- 1. Not required means after assessing, test items are not necessary to carry out.
2. This is a variant report by adding External antenna for Vehicle dock. All the test cases were performed on original report which can be referred to Sporton Report Number FG0D1135C. Based on the original report, the test cases were verified.

Declaration of Conformity: The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations: The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Wii Chang

Report Producer: Amy Chen



# 1 General Description

## 1.1 Product Feature of Equipment Under Test

WCDMA/LTE, and GNSS.

Product Specification subjective to this standard	
Host 1	FZ-S1
Host 2	FZ-S1 with 2nd USB
Host 3	FZ-S1 with BCR Landscape and 2nd USB
Host 4	FZ-S1 with BCR Portrait
Host 5	FZ-S1 with BCR Landscape
Integrated the Host	Equipment: Tablet Computer Brand Name: Panasonic Model Name: FZ-S1 Marketing Name: FZ-S1 FCC ID: ACJFZS1A
Antenna Type for Host	WWAN: Loop Antenna / External Antenna GNSS : PIFA Antenna / External Antenna
Antenna Gain for Host	<Loop Antenna> LTE Band 14 : 0.06 dBi <External Antenna> LTE Band 14 : 1.4 dBi

**Remark:**

1. The above EUT's information was declared by manufacturer. Please refer to Comments and Explanations in report summary.
2. The device (Model: FZ-S1) has two SKU (w connector for Vehicle dock and w/o connector), all test items were performed with SKU (w connector for Vehicle dock).

Accessories Information for Host		
AC Adapter	Brand Name	Panasonic
	Model Name	FZ-AAE184EM
Standard Battery	Brand Name	Panasonic
	Model Name	FZ-VZSUT10U
Extend Battery	Brand Name	Panasonic
	Model Name	FZ-VZSUT11U
Dual pass Antenna (External Antenna for Vehicle dock)	Brand Name	Airgain
	Model Name	AP-PAN-MMF-C-Q-BL
Vehicle dock	Brand Name	Gamber-Johnson LLC
	Model Name	7160-1314-02

## 1.2 Modification of EUT

No modifications are made to the EUT during all test items.



### 1.3 Testing Site

<b>Test Site</b>	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
<b>Test Site Location</b>	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978
<b>Test Site No.</b>	<b>Sporton Site No.</b>
	TH05-HY
<b>Test Engineer</b>	George Chen
<b>Temperature</b>	21~25°C
<b>Relative Humidity</b>	51~54%

<b>Test Site</b>	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
<b>Test Site Location</b>	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
<b>Test Site No.</b>	<b>Sporton Site No.</b>
	03CH15-HY
<b>Test Engineer</b>	Leo Lee, Mancy Chou and Bigshow Wang
<b>Temperature</b>	22.7~23.2°C
<b>Relative Humidity</b>	49~53%

**Note:** The test site complies with ANSI C63.4 2014 requirement.

FCC Designation No.: TW1190 and TW0007

### 1.4 Applied Standards

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

- ♦ ANSI C63.26-2015
- ♦ FCC 47 CFR Part 2, Part 90(R)
- ♦ ANSI / TIA-603-E
- ♦ FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01
- ♦ FCC KDB 412172 D01 Determining ERP and EIRP v01r01
- ♦ FCC KDB 414788 D01 Radiated Test Site v01r01

**Remark:**

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. The TAF code is not including all the FCC KDB listed without accreditation.

## 2 Test Configuration of Equipment Under Test

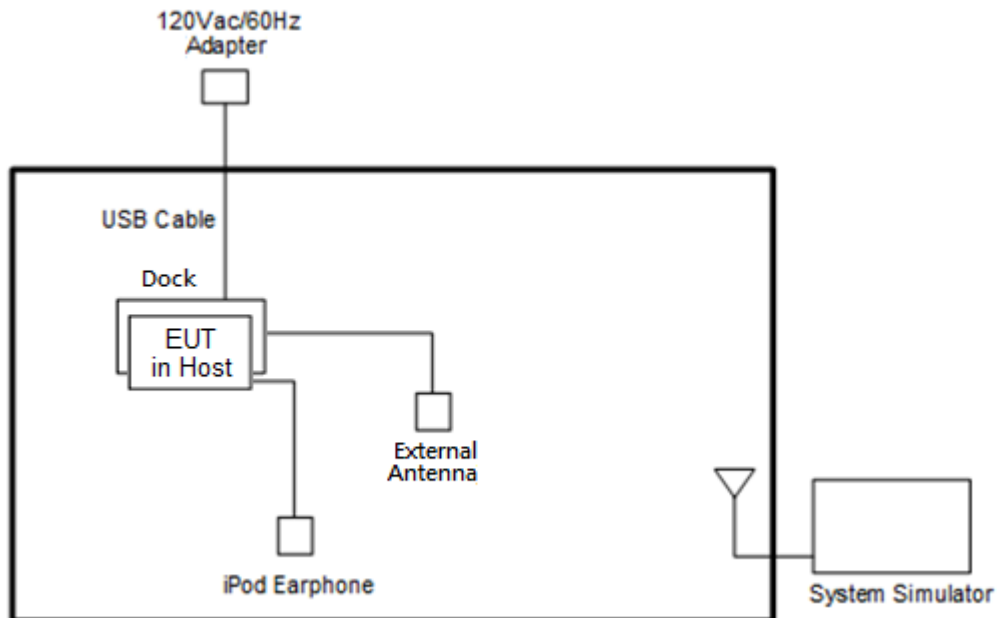
### 2.1 Test Mode

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.

For radiated measurement, pre-scanned in two Ant. degrees (0 or 90). The worst cases (Degree 90) were recorded in this report.

Conducted Test Cases	Band	Bandwidth (MHz)						Modulation			RB #			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	64QAM	1	Half	Full	L	M	H
Max. Output Power	14	-	-	v	v	-	-	v	v	v	v	v	v	v	v	v
E.R.P	14	-	-	v	v	-	-	v	v	v	v			v	v	v
Radiated Spurious Emission	14	Worst Case											v	v	v	
Remark	<ol style="list-style-type: none"> <li>The mark "v" means that this configuration is chosen for testing</li> <li>The mark "-" means that this bandwidth is not supported.</li> <li>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.</li> <li>All the radiated test cases were performed with Host 1, External Antenna and Standard Battery.</li> </ol>															

### 2.2 Connection Diagram of Test System





## 2.3 Support Unit used in test configuration and system

Item	Equipment	Brand Name	Model No.	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m
2.	iPod Earphone	Apple	N/A	Verification	Unshielded, 1.0 m	N/A
3.	Type-C USB Cable	LUXSHARE PRECISION LIMITED	L2UU3001-CS-R	N/A	Unshielded, 1.0 m	N/A

## 2.4 Frequency List of Low/Middle/High Channels

LTE Band 14 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
10	Channel	-	23330	-
	Frequency	-	793	-
5	Channel	23305	23330	23355
	Frequency	790.5	793	795.5



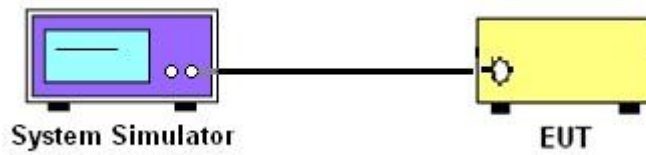
### 3 Conducted Test Items

#### 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 Measurement and ERP

### 3.2.1 Description of the Conducted Output Power Measurement and ERP Measurement

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 transmitter output port was connected to base station.
2. Set EUT at maximum power through base station.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure and record the power level from the system simulator.

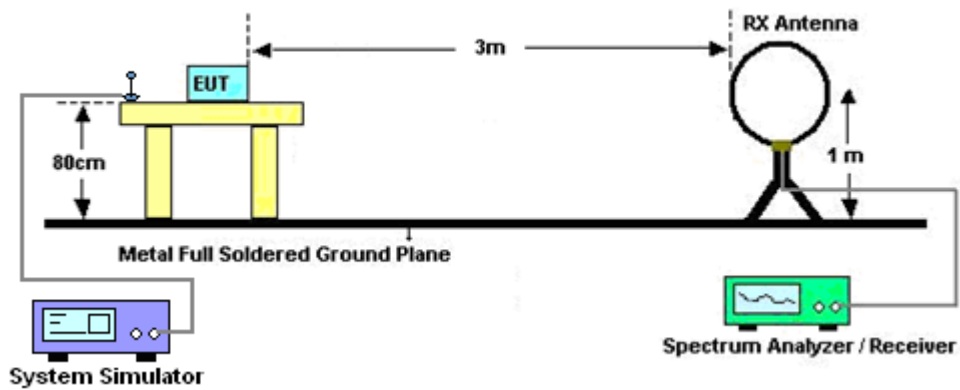
## 4 Radiated Test Items

### 4.1 Measuring Instruments

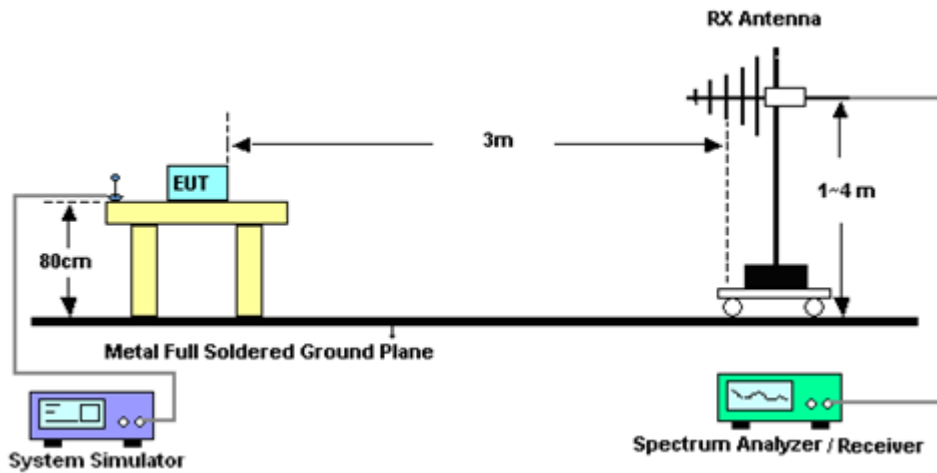
See list of measuring instruments of this test report.

#### 4.1.1 Test Setup

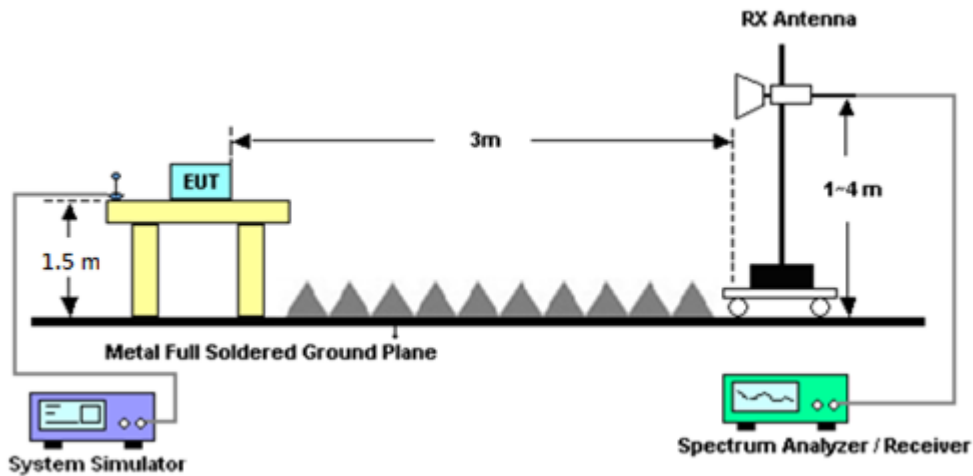
For radiated test below 30MHz



For radiated test from 30MHz to 1GHz



For radiated test above 1GHz



#### 4.1.2 Test Result of Radiated Test

Please refer to Appendix B.

**Note:**

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.

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.



## **4.2 Radiated Spurious Emission**

### **4.2.1 Description of Radiated Spurious Emission**

The radiated spurious emission was measured by substitution method according to ANSI / TIA-603-E. 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.

The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

### **4.2.2 Test Procedures**

The testing follows FCC KDB 971168 D01 v03r01 Section 7 and ANSI / TIA-603-E Section 2.2.12.

1. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
2. The EUT was set 3 meters from the receiving antenna, which was 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 one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, Sweep = 500ms, Taking the record of maximum spurious emission.
6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
8. Taking the record of output power at antenna port.
9. Repeat step 7 to step 8 for another polarization.
10. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
11. The limit line is derived from  $43 + 10\log(P)$ dB below the transmitter power P(Watts)



## 5 List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
LTE Base Station	Anritsu	MT8821C	6262116725	-	Sep. 09, 2020	Dec. 16, 2020~ Jan. 06, 2021	Sep. 08, 2021	Conducted (TH05-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D01N -06	37059 & 01	30MHz~1GHz	Oct. 11, 2020	Dec. 11, 2020~ Dec. 17, 2020	Oct. 10, 2021	Radiation (03CH15-HY)
Bilog Antenna	TESEQ	CBL6111D&00 800N1D01N-0 6	41912&05	30MHz to 1GHz	Feb. 09, 2020	Dec. 11, 2020~ Dec. 17, 2020	Feb. 08, 2021	Radiation (03CH15-HY)
Amplifier	SONOMA	310N	363440	9kHz~1GHz	Dec. 27, 2019	Dec. 11, 2020~ Dec. 17, 2020	Dec. 26, 2020	Radiation (03CH15-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120 D	9120D-02114	1-18GHz	Aug. 04, 2020	Dec. 11, 2020~ Dec. 17, 2020	Aug. 03, 2021	Radiation (03CH15-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120 D	9120D-1326	1GHz~18GHz	Nov. 03, 2020	Dec. 11, 2020~ Dec. 17, 2020	Nov. 02, 2021	Radiation (03CH15-HY)
Preamplifier	Jet-Power	JPA0118-55-3 03	1710001800 055006	1GHz~18GHz	May 07, 2020	Dec. 11, 2020~ Dec. 17, 2020	May 06, 2021	Radiation (03CH15-HY)
Preamplifier	Keysight	83017A	MY53270195	1GHz~26.5GHz	Aug. 21, 2020	Dec. 11, 2020~ Dec. 17, 2020	Aug. 20, 2021	Radiation (03CH15-HY)
Spectrum Analyzer	Keysight	N9010A	MY54200485	10Hz~44GHz	Feb. 10, 2020	Dec. 11, 2020~ Dec. 17, 2020	Feb. 09, 2021	Radiation (03CH15-HY)
Spectrum Analyzer	Agilent	E4446A	MY50180136	3Hz~44GHz	May 04, 2020	Dec. 11, 2020~ Dec. 17, 2020	May 03, 2021	Radiation (03CH15-HY)
Antenna Mast	ChainTek	MBS-520-1	N/A	1m~4m	N/A	Dec. 11, 2020~ Dec. 17, 2020	N/A	Radiation (03CH15-HY)
Turn Table	ChainTek	T-200-S-1	N/A	0~360 Degree	N/A	Dec. 11, 2020~ Dec. 17, 2020	N/A	Radiation (03CH15-HY)
Software	Audix	E3 6.2009-8-24 (k5)	RK-000451	N/A	N/A	Dec. 11, 2020~ Dec. 17, 2020	N/A	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104, 102E	MY36980/4, MY9838/4PE ,508405/2E	30MHz~18G	Nov. 16, 2020	Dec. 11, 2020~ Dec. 17, 2020	Nov. 15, 2021	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	505134/2	30MHz-40GHz	Feb. 25, 2020	Dec. 11, 2020~ Dec. 17, 2020	Feb. 24, 2021	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	800740/2	30MHz-40GHz	Feb. 25, 2020	Dec. 11, 2020~ Dec. 17, 2020	Feb. 24, 2021	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4PE	9kHz~30MHz	Mar. 12, 2020	Dec. 11, 2020~ Dec. 17, 2020	Mar. 11, 2021	Radiation (03CH15-HY)
Filter	Wainwright	WLK4-1000-15 30-8000-40SS	SN4	1.53G Low Pass	Jul. 03, 2020	Dec. 11, 2020~ Dec. 17, 2020	Jul. 02, 2021	Radiation (03CH15-HY)
Filter	Wainwright	WHKX12-1080 -1200-15000-6 OST	SN5	1.2GHz High Pass Filter	Jul. 01, 2020	Dec. 11, 2020~ Dec. 17, 2020	Jun. 30, 2021	Radiation (03CH15-HY)
Filter	Wainwright	WHKX12-2700 -3000-18000-6 OST	SN4	3GHz High Pass Filter	Sep. 16, 2020	Dec. 11, 2020~ Dec. 17, 2020	Sep. 15, 2021	Radiation (03CH15-HY)
Signal Generator	Anritsu	MG3694C	163401	0.1Hz~40GHz	Feb. 15, 2020	Dec. 11, 2020~ Dec. 17, 2020	Feb. 14, 2021	Radiation (03CH15-HY)



## 6 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	2.98
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### Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	3.31
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## Appendix A. Test Results of Conducted Test

### Conducted Output Power(Average power)

LTE Band 14 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
10	1	0	QPSK		<b>23.23</b>	
10	1	25			23.22	
10	1	49			23.12	
10	25	0			22.17	
10	25	12			22.27	
10	25	25			22.17	
10	50	0			22.25	
10	1	0	16-QAM	-	22.47	-
10	1	25			22.51	
10	1	49			22.33	
10	25	0			21.19	
10	25	12			21.26	
10	25	25			21.20	
10	50	0			21.27	
10	1	0	64-QAM		21.36	
10	1	25			21.40	
10	1	49			21.32	
10	25	0			20.22	
10	25	12			20.27	
10	25	25			20.18	
10	50	0			20.24	
5	1	0	QPSK	23.18	23.20	23.18
5	1	12		23.20	23.14	23.15
5	1	24		23.12	23.13	23.15
5	12	0		22.21	22.22	22.19
5	12	7		22.20	22.21	22.16
5	12	13		22.19	22.16	22.12
5	25	0		22.15	22.21	22.21
5	1	0	16-QAM	22.33	22.46	22.40
5	1	12		22.39	22.41	22.43
5	1	24		22.38	22.39	22.36
5	12	0		21.22	21.26	21.25
5	12	7		21.18	21.20	21.24
5	12	13		21.19	21.22	21.16
5	25	0		21.19	21.20	21.17
5	1	0	64-QAM	21.38	21.43	21.31
5	1	12		21.33	21.40	21.42
5	1	24		21.39	21.36	21.28
5	12	0		20.22	20.29	20.22
5	12	7		20.26	20.26	20.25
5	12	13		20.28	20.26	20.20
5	25	0		20.16	20.23	20.20





## Appendix B. Test Results of ERP and Radiated Test

### ERP

LTE Band 14 / 5MHz (Average) (GT - LC = 1.4 dB)							
Channel	Mode	RB		Conducted		ERP	
		Size	Offset	EIRP(dBm)	EIRP(W)	ERP(dBm)	ERP(W)
Lowest	QPSK	1	0	23.18	0.2080	22.43	0.1750
Middle		1	0	23.20	0.2089	22.45	0.1758
Highest		1	0	23.18	0.2080	22.43	0.1750
Lowest	16QAM	1	0	22.33	0.1710	21.58	0.1439
Middle		1	0	22.46	0.1762	21.71	0.1483
Highest		1	0	22.40	0.1738	21.65	0.1462
Lowest	64QAM	1	0	21.38	0.1374	20.63	0.1156
Middle		1	0	21.43	0.1390	20.68	0.1169
Highest		1	0	21.31	0.1352	20.56	0.1138
Limit	ERP < 3W			Result		PASS	

LTE Band 14 / 10MHz (Average) (GT - LC = 1.4 dB)							
Channel	Mode	RB		Conducted		ERP	
		Size	Offset	EIRP(dBm)	EIRP(W)	ERP(dBm)	ERP(W)
Lowest	QPSK	-	-	-	-	-	-
Middle		1	0	23.23	0.2104	22.48	0.1770
Highest		-	-	-	-	-	-
Lowest	16QAM	-	-	-	-	-	-
Middle		1	25	22.51	0.1782	21.76	0.1500
Highest		-	-	-	-	-	-
Lowest	64QAM	-	-	-	-	-	-
Middle		1	25	21.40	0.1380	20.65	0.1161
Highest		-	-	-	-	-	-
Limit	ERP < 3W			Result		PASS	



**Radiated Spurious Emission**

**LTE Band 14**

LTE Band 14 / 5MHz / QPSK									
Channel	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)
Lowest	1576	-51.46	-42.15	-9.31	-63.27	-56.27	1.79	8.76	H
	2365	-37.95	-13	-24.95	-53.93	-43.55	2.20	9.95	H
	3153	-46.75	-13	-33.75	-65.37	-53.46	2.55	11.41	H
									H
									H
	1576	-52.61	-42.15	-10.46	-64.69	-57.42	1.79	8.76	V
	2365	-40.89	-13	-27.89	-57.58	-46.49	2.20	9.95	V
	3153	-46.78	-13	-33.78	-65.89	-53.49	2.55	11.41	V
									V
									V
Middle	1581	-52.30	-42.15	-10.15	-64.06	-57.14	1.80	8.79	H
	2372	-37.77	-13	-24.77	-53.75	-43.44	2.20	10.02	H
	3163	-47.01	-13	-34.01	-65.69	-53.75	2.56	11.45	H
									H
									H
	1581	-51.20	-42.15	-9.05	-63.27	-56.04	1.80	8.79	V
	2372	-36.81	-13	-23.81	-53.52	-42.48	2.20	10.02	V
	3163	-46.75	-13	-33.75	-65.91	-53.49	2.56	11.45	V
									V
									V



Highest	1586	-51.92	-42.15	-9.77	-63.65	-56.79	1.80	8.82	H
	2380	-42.53	-13	-29.53	-58.53	-48.28	2.20	10.10	H
	3173	-47.40	-13	-34.40	-66.15	-54.18	2.56	11.49	H
									H
									H
	1586	-51.92	-42.15	-9.77	-63.99	-56.79	1.80	8.82	V
	2380	-43.11	-13	-30.11	-59.82	-48.86	2.20	10.10	V
	3173	-46.78	-13	-33.78	-66.00	-53.56	2.56	11.49	V
									V
									V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.



LTE Band 14 / 10MHz / QPSK									
Channel	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	-52.53	-42.15	-10.38	-64.34	-57.35	1.79	8.76	H
	2365	-39.14	-13	-26.14	-55.12	-44.74	2.20	9.95	H
	3154	-47.02	-13	-34.02	-65.64	-53.73	2.55	11.42	H
									H
									H
	1577	-52.84	-42.15	-10.69	-64.92	-57.66	1.79	8.76	V
	2365	-38.11	-13	-25.11	-54.8	-43.71	2.20	9.95	V
	3154	-45.79	-13	-32.79	-64.91	-52.50	2.55	11.42	V
									V
									V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.