



RF TEST REPORT

Applicant Quectel Wireless Solutions Co., Ltd
FCC ID XMR201808EC25AF
Product LTE Module
Brand Quectel
Model EC25-AF; EC25-AF MINIPCI-E
Report No. R1806A0301-R3V1
Issue Date July 31, 2018

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 2 (2017)/ FCC CFR47 Part 27C (2017)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

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Summary of Measurement Results

Number	Test Case	Clause in FCC rules	Verdict
1	RF power output	2.1046	PASS
2	Effective Isotropic Radiated power	27.50(d)(4) /27.50(b)(10) /27.50(c)(10) /27.50(h)(2)	PASS
3	Occupied Bandwidth	2.1049	PASS
4	Band Edge Compliance	27.53(h) /27.53(g) /27.53(f) /27.53(c) /27.53(m)	PASS
5	Peak-to-Average Power Ratio	27.50(d)/KDB971168 D01(5.7)	PASS
6	Frequency Stability	2.1055 / 27.54	PASS
7	Spurious Emissions at Antenna Terminals	2.1051 /27.53(h) /27.53(g) /27.53(f)	PASS
8	Radiates Spurious Emission	2.1053 /27.53(h) /27.53(g) /27.53(f)	PASS
Date of Testing: June 29, 2018~ July 16, 2018 and July 30, 2018~ July 31, 2018			
Note: PASS: The EUT complies with the essential requirements in the standard. FAIL: The EUT does not comply with the essential requirements in the standard.			

1 Test Laboratory

1.1 Notes of the Test Report

This report shall not be reproduced in full or partial, without the written approval of **TA technology (shanghai) co., Ltd.** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein .Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above.

1.2 Test facility

CNAS (accreditation number: L2264)

TA Technology (Shanghai) Co., Ltd. has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS).

FCC (Designation number: CN1179, Test Firm Registration Number: 446626)

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

IC (recognition number is 8510A)

TA Technology (Shanghai) Co., Ltd. has been listed by industry Canada to perform electromagnetic emission measurement.

VCCI (recognition number is C-4595, T-2154, R-4113, G-10766)

TA Technology (Shanghai) Co., Ltd. has been listed by industry Japan to perform electromagnetic emission measurement.

A2LA (Certificate Number: 3857.01)

TA Technology (Shanghai) Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

1.3 Testing Location

Company: TA Technology (Shanghai) Co., Ltd.
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2 General Description of Equipment under Test

Client Information

Applicant	Quectel Wireless Solutions Co., Ltd
Applicant address	7th Floor, Hongye Building, No.1801 Hongmei Road, Xuhui District, Shanghai 200233, China
Manufacturer	Quectel Wireless Solutions Co., Ltd
Manufacturer address	7th Floor, Hongye Building, No.1801 Hongmei Road, Xuhui District, Shanghai 200233, China

General information

EUT Description			
Model	EC25-AF; EC25-AF MINIPCIE		
IMEI	EC25-AF :866834040000767 EC25-AF MINIPCIE: 866834040002375		
Hardware Version	R1.0		
Software Version	EC25AFFAR07A02M4G		
Power Supply	External Power Supply		
Antenna Type	The EUT don't have standard Antenna, The Antenna used for testing in this report is the after-market accessory (Dipole Antenna)		
Antenna Gain	4dBi		
Test Mode(s)	WCDMA Band IV; LTE Band 4/12/13/ 66/ 71;		
Test Modulation	(WCDMA)QPSK; (LTE)QPSK 16QAM;		
HSDPA UE Category	24		
HSUPA UE Category	6		
LTE Category	4		
Maximum E.I.R.P./ E.R.P.	WCDMA Band IV:	25.62dBm	
	LTE Band 4:	26.08dBm	
	LTE Band 12:	20.48dBm	
	LTE Band 13:	23.63dBm	
	LTE Band 66:	27.51dBm	
	LTE Band 71:	22.72dBm	
Rated Power Supply Voltage:	3.8V		
Extreme Voltage	Minimum: 3.3V Maximum: 4.3V		
Extreme Temperature	Lowest: -40°C Highest: +85°C		
Operating Frequency Range(s)	Mode	Tx (MHz)	Rx (MHz)
	WCDMA Band IV	1710 ~ 1755	2110 ~ 2155
	LTE Band 4	1710 ~ 1755	2110 ~ 2155



	LTE Band 12	699 ~ 716	729 ~ 746
	LTE Band 13	777 ~ 787	746 ~ 756
	LTE Band 66	1710 ~ 1780	2110 ~ 2200
	LTE Band 71	663 ~ 698	617 ~ 652

Note: 1. The information of the EUT is declared by the manufacturer.

Accessory equipment	
Evaluation Board	RF Cable
RS232-to-USB Cable	Antenna: Dipole Antenna
Headset	DC 5V Adaptor

EC25-AF and EC25-AF MINIPCIE are all LTE modules. They support the same frequency bands, use the same chipset and share the same software & hardware design. The main difference is on the carrier board.

EC25-AF MINIPCIE makes up of EC25-AF module and PCIe transferred board.

The transferred board switches EC25-AF module to follow PCI Express Mini Card 1.2 standard connector protocol. No any other internal changes in EC25-AF module.

Two models are identical in interior structure and components, and just connector interface is different for the marketing requirement.

3 Applied Standards

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

Test standards

FCC CFR47 Part 2 (2017)

FCC CFR47 Part 27C (2017)

ANSI/TIA-603-E (2016)

KDB 971168 D01 Power Meas License Digital Systems v03r01

4 Test Configuration

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes. EUT stand-up position (Z axis), lie-down position (X, Y axis). Receiver antenna polarization (horizontal and vertical), the worst emission was found in position (Xaxis, horizontal polarization) and the worst case was recorded.

All mode and data rates and positions and RB size and modulations were investigated.

Subsequently, only the worst case emissions are reported.

The following testing in WCDMA/LTE is set based on the maximum RF Output Power.

The following testing in different Bandwidth is set to detailin the following table:

Test modes are chosen to be reported as the worst case configuration below for WCDMA Band IV:

Test items	Modes/Modulation
	WCDMA Band IV
RF power output	RMC HSDPA/HSUPA DC-HSDPA
Effective Isotropic Radiated power	RMC
Occupied Bandwidth	RMC
Band Edge Compliance	RMC
Peak-to-Average Power Ratio	RMC
Frequency Stability	RMC
Spurious Emissions at Antenna Terminals	RMC
Radiates Spurious Emission	RMC

Test modes are chosen to be reported as the worst case configuration below for LTE Band 4/12/13/66/71:

Test items	Modes	Bandwidth (MHz)						Modulation		RB			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	1	50%	100%	L	M	H
RF power output	LTE 4	O	O	O	O	O	O	O	O	O	O	O	O	O	O
	LTE 12	O	O	O	O	-	-	O	O	O	O	O	O	O	O
	LTE 13	-	-	O	O	-	-	O	O	O	O	O	O	O	O
	LTE 66	O	O	O	O	O	O	O	O	O	O	O	O	O	O
	LTE 71	-	-	O	O	O	O	O	O	O	O	O	O	O	O
Effective Isotropic	LTE 4	O	O	O	O	O	O	O	O	O	O	O	O	O	O
	LTE 12	O	O	O	O	-	-	O	O	O	O	O	O	O	O



Radiated power	LTE 13	-	-	O	O	-	-	O	O	O	O	O	O	O	O
	LTE 66	O	O	O	O	O	O	O	O	O	O	O	O	O	O
	LTE 71	-	-	O	O	O	O	O	O	O	O	O	O	O	O
Occupied Bandwidth	LTE 4	O	O	O	O	O	O	O	O	-	-	O	O	O	O
	LTE 12	O	O	O	O	-	-	O	O	-	-	O	O	O	O
	LTE 13	-	-	O	O	-	-	O	O	-	-	O	O	O	O
	LTE 66	O	O	O	O	O	O	O	O	-	-	O	O	O	O
	LTE 71	-	-	O	O	O	O	O	O	-	-	O	O	O	O
Band Edge Compliance	LTE 4	O	O	O	O	O	O	O	O	O	-	O	O	-	O
	LTE 12	O	O	O	O	-	-	O	O	O	-	O	O	-	O
	LTE 13	-	-	O	O	-	-	O	O	O	-	O	O	-	O
	LTE 66	O	O	O	O	O	O	O	O	O	-	O	O	-	O
	LTE 71	-	-	O	O	O	O	O	O	O	-	O	O	-	O
Peak-to-Average Power Ratio	LTE 4	O	O	O	O	O	O	O	O	-	-	O	O	O	O
	LTE 12	O	O	O	O	-	-	O	O	-	-	O	O	O	O
	LTE 13	-	-	O	O	-	-	O	O	-	-	O	O	O	O
	LTE 66	O	O	O	O	O	O	O	O	-	-	O	O	O	O
	LTE 71	-	-	O	O	O	O	O	O	-	-	O	O	O	O
Frequency Stability	LTE 4	O	O	O	O	O	O	O	O	-	-	O	O	-	O
	LTE 12	O	O	O	O	-	-	O	O	-	-	O	O	-	O
	LTE 13	-	-	O	O	-	-	O	O	-	-	O	O	-	O
	LTE 66	O	O	O	O	O	O	O	O	-	-	O	O	-	O
	LTE 71	-	-	O	O	O	O	O	O	-	-	O	O	-	O
Spurious Emissions at Antenna Terminals	LTE 4	O	O	O	O	O	O	O	-	O	O	O	O	O	O
	LTE 12	O	O	O	O	-	-	O	-	O	O	O	O	O	O
	LTE 13	-	-	O	O	-	-	O	-	O	O	O	O	O	O
	LTE 66	O	O	O	O	O	O	O	-	O	O	O	O	O	O
	LTE 71	-	-	O	O	O	O	O	-	O	O	O	O	O	O
Radiates Spurious Emission	LTE 4	O	-	O	-	-	O	O	-	O	-	-	O	O	O
	LTE 12	O	-	O	O	-	-	O	-	O	-	-	O	O	O
	LTE 13	-	-	O	O	-	-	O	-	O	-	-	O	O	O
	LTE 66	O	-	O	-	-	O	O	-	O	-	-	O	O	O
	LTE 71	-	-	O	O	-	O	O	-	O	-	-	O	O	O
Note	1. The mark "O" means that this configuration is chosen for testing. 2. The mark "-" means that this configuration is not testing.														

5 Test Case Results

5.1 RF Power Output

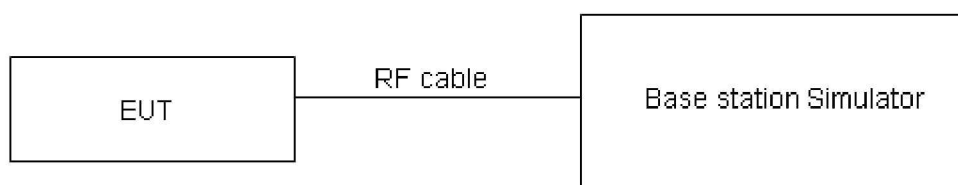
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Methods of Measurement

During the process of the testing, The EUT is controlled by the Base Station Simulator to ensure max power transmission and proper modulation.

Test Setup



The loss between RF output port of the EUT and the input port of the tester has been taken into consideration.

Limits

No specific RF power output requirements in part 2.1046.

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$, $U=0.4$ dB.

**Test Results**

WCDMA Band IV		AV Conducted Power(dBm)		
		Channel 1312	Channel 1413	Channel 1513
		1712.4 (MHz)	1732.6 (MHz)	1752.6(MHz)
RMC		23.46	23.35	23.37
HSDPA	Sub - Test 1	22.46	22.31	22.30
	Sub - Test 2	22.50	22.31	22.38
	Sub - Test 3	21.92	21.83	21.91
	Sub - Test 4	21.91	21.81	21.90
HSUPA	Sub - Test 1	22.22	22.27	22.21
	Sub - Test 2	21.95	21.81	21.91
	Sub - Test 3	22.51	22.40	22.37
	Sub - Test 4	22.53	22.38	22.37
	Sub - Test 5	22.50	22.31	22.39
DC-HSDPA	Sub - Test 1	23.33	23.22	23.24
	Sub - Test 2	23.31	23.21	23.23
	Sub - Test 3	22.80	22.70	22.72
	Sub - Test 4	22.79	22.69	22.71

LTE Band 4				AV Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				19957/1710.7	20175/1732.5	20393/1754.3
1.4MHz	QPSK	1	0	23.55	23.20	23.42
		1	2	23.44	23.53	23.46
		1	5	23.20	23.54	23.68
		3	0	23.32	23.22	23.55
		3	2	23.28	23.33	23.40
		3	3	23.31	23.42	23.39
		6	0	22.30	22.40	22.64
	16QAM	1	0	22.45	22.25	23.27
		1	2	22.52	22.79	23.15
		1	5	22.38	22.98	23.37
		3	0	22.23	22.32	22.43
		3	2	22.32	22.39	22.26
		3	3	22.39	22.47	22.47
		6	0	21.34	21.48	21.68
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				19965/1711.5	20175/1732.5	20385/1753.5
3MHz	QPSK	1	0	23.57	23.24	23.45
		1	7	23.47	23.58	23.50
		1	14	23.23	23.59	23.72
		8	0	22.42	22.34	22.68
		8	4	22.40	22.43	22.52
		8	7	22.41	22.53	22.49
		15	0	22.33	22.44	22.67
	16QAM	1	0	22.48	22.27	23.30
		1	7	22.55	22.84	23.19
		1	14	22.40	23.02	23.40
		8	0	21.34	21.45	21.55
		8	4	21.43	21.52	21.38
		8	7	21.49	21.59	21.60
		15	0	21.37	21.52	21.71
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				19975/1712.5	20175/1732.5	20375/1752.5
5MHz	QPSK	1	0	23.54	23.22	23.41
		1	13	23.45	23.54	23.47
		1	24	23.20	23.54	23.68
		12	0	22.39	22.29	22.64
		12	6	22.38	22.39	22.47
		12	13	22.39	22.51	22.45
		25	0	22.31	22.43	22.65



	16QAM	1	0	22.45	22.23	23.27
		1	13	22.52	22.82	23.16
		1	24	22.37	23.00	23.36
		12	0	21.32	21.41	21.52
		12	6	21.40	21.47	21.34
		12	13	21.46	21.54	21.56
		25	0	21.35	21.48	21.66
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				20000/1715	20175/1732.5	20350/1750
10MHz	QPSK	1	0	23.56	23.23	23.44
		1	25	23.48	23.59	23.51
		1	49	23.22	23.58	23.71
		25	0	22.42	22.34	22.68
		25	13	22.41	22.44	22.51
		25	25	22.41	22.55	22.50
		50	0	22.39	22.45	22.69
	16QAM	1	0	22.47	22.26	23.29
		1	25	22.55	22.86	23.19
		1	49	22.40	23.02	23.39
		25	0	21.35	21.46	21.56
		25	13	21.42	21.51	21.37
		25	25	21.49	21.59	21.60
		50	0	21.38	21.53	21.70
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				20025/1717.5	20175/1732.5	20325/1747.5
15MHz	QPSK	1	0	23.55	23.19	23.42
		1	38	23.46	23.58	23.48
		1	74	23.19	23.53	23.67
		36	0	22.40	22.30	22.65
		36	18	22.38	22.39	22.47
		36	39	22.38	22.52	22.46
		75	0	22.37	22.41	22.64
	16QAM	1	0	22.42	22.24	23.27
		1	38	22.53	22.83	23.17
		1	74	22.37	22.98	23.36
		36	0	21.32	21.44	21.53
		36	18	21.39	21.46	21.33
		36	39	21.47	21.55	21.57
		75	0	21.35	21.48	21.66
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				20050/1720	20175/1732.5	20300/1745
20MHz	QPSK	1	0	23.52	23.15	23.39
		1	50	23.45	23.54	23.46



		1	99	23.17	23.52	23.64
		50	0	22.37	22.25	22.61
		50	25	22.36	22.35	22.44
		50	50	22.35	22.47	22.42
		100	0	22.34	22.36	22.60
	16QAM	1	0	22.40	22.20	23.22
		1	50	22.49	22.81	23.13
		1	99	22.35	22.95	23.34
		50	0	21.29	21.40	21.50
		50	25	21.36	21.44	21.30
		50	50	21.44	21.50	21.53
		100	0	21.33	21.44	21.63

LTE Band 12				AV Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				23017/699.7	23095/707.5	23173/715.3
1.4MHz	QPSK	1	0	23.63	23.64	23.61
		1	2	23.67	23.57	23.69
		1	5	23.61	23.50	23.70
		3	0	23.50	23.54	23.63
		3	2	23.45	23.50	23.54
		3	3	23.66	23.62	23.63
		6	0	22.61	22.57	22.65
	16QAM	1	0	22.95	22.18	22.96
		1	2	22.94	22.55	23.20
		1	5	22.76	22.36	22.86
		3	0	22.58	22.60	22.74
		3	2	22.52	22.50	22.51
		3	3	22.52	22.58	22.46
		6	0	21.71	21.63	21.84
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				23025/700.5	23095/707.5	23165/714.5
3MHz	QPSK	1	0	23.65	23.68	23.64
		1	7	23.70	23.62	23.73
		1	14	23.64	23.55	23.74
		8	0	22.60	22.66	22.76
		8	4	22.57	22.60	22.66
		8	7	22.76	22.73	22.73
		15	0	22.64	22.61	22.68
	16QAM	1	0	22.98	22.20	22.99
		1	7	22.97	22.60	23.24



		1	14	22.78	22.40	22.89
		8	0	21.69	21.73	21.86
		8	4	21.63	21.63	21.63
		8	7	21.62	21.70	21.59
		15	0	21.74	21.67	21.87
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				23035/701.5	23095/707.5	23155/713.5
5MHz	QPSK	1	0	23.63	23.63	23.61
		1	13	23.69	23.62	23.71
		1	24	23.60	23.49	23.69
		12	0	22.58	22.62	22.73
		12	6	22.55	22.56	22.61
		12	13	22.73	22.72	22.70
		25	0	22.68	22.58	22.65
	16QAM	1	0	22.92	22.17	22.96
		1	13	22.95	22.59	23.22
		1	24	22.75	22.36	22.85
		12	0	21.67	21.72	21.84
		12	6	21.59	21.57	21.58
		12	13	21.60	21.66	21.56
		25	0	21.72	21.63	21.82
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				23060/704	23095/707.5	23130/711
10MHz	QPSK	1	0	23.60	23.59	23.58
		1	25	23.68	23.58	23.69
		1	49	23.58	23.48	23.66
		25	0	22.55	22.57	22.69
		25	13	22.53	22.52	22.58
		25	25	22.70	22.67	22.66
		50	0	22.65	22.53	22.61
	16QAM	1	0	22.90	22.13	22.91
		1	25	22.91	22.57	23.18
		1	49	22.73	22.33	22.83
		25	0	21.64	21.68	21.81
		25	13	21.56	21.55	21.55
		25	25	21.57	21.61	21.52
		50	0	21.70	21.59	21.79

LTE Band 13				Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				23205/779.5	23230/782	23255/784.5
5MHz	QPSK	1	0	23.72	23.63	23.78
		1	13	23.79	23.68	23.77
		1	24	23.58	23.69	23.65
		12	0	22.87	22.77	22.82
		12	6	22.85	22.80	22.86
		12	13	22.75	22.82	22.83
		25	0	22.81	22.74	22.80
	16QAM	1	0	23.06	22.41	22.60
		1	13	23.14	22.45	22.35
		1	24	23.03	22.16	22.43
		12	0	21.50	21.52	21.68
		12	6	21.63	21.75	21.65
		12	13	21.76	21.60	21.57
		25	0	21.74	21.96	21.62
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				/	23230/782	/
10MHz	QPSK	1	0	/	23.76	/
		1	25	/	23.85	/
		1	49	/	23.71	/
		25	0	/	22.87	/
		25	13	/	22.79	/
		25	25	/	22.88	/
		50	0	/	22.74	/
	16QAM	1	0	/	23.11	/
		1	25	/	23.41	/
		1	49	/	22.94	/
		25	0	/	21.78	/
		25	13	/	21.83	/
		25	25	/	21.88	/
		50	0	/	21.82	/

LTE Band 66				Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				131979/1710.7	132322/1745	132665/1779.3
1.4MHz	QPSK	1	0	23.42	23.57	23.56
		1	2	23.30	23.76	23.57
		1	5	23.37	23.64	23.45
		3	0	23.47	23.58	23.26



		3	2	23.35	23.75	23.33
		3	3	23.59	23.55	23.36
		6	0	22.51	22.73	22.34
	16QAM	1	0	22.84	22.38	22.20
		1	2	22.43	22.76	22.57
		1	5	22.57	22.42	22.22
		3	0	22.53	22.57	22.27
		3	2	22.32	22.76	22.43
		3	3	22.69	22.62	22.45
		6	0	21.65	21.84	21.45
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				131987/1711.5	132322/1745	132657/1778.5
3MHz	QPSK	1	0	23.44	23.61	23.59
		1	7	23.33	23.81	23.61
		1	14	23.40	23.69	23.49
		8	0	22.57	22.70	22.39
		8	4	22.47	22.85	22.45
		8	7	22.69	22.66	22.46
		15	0	22.54	22.77	22.37
	16QAM	1	0	22.87	22.40	22.23
		1	7	22.46	22.81	22.61
		1	14	22.59	22.46	22.25
		8	0	21.64	21.70	21.39
		8	4	21.43	21.89	21.55
		8	7	21.79	21.74	21.58
		15	0	21.68	21.88	21.48
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				131997/1712.5	132322/1745	132647/1777.5
5MHz	QPSK	1	0	23.41	23.59	23.55
		1	13	23.31	23.77	23.58
		1	24	23.37	23.64	23.45
		12	0	22.54	22.65	22.35
		12	6	22.45	22.81	22.40
		12	13	22.67	22.64	22.42
		25	0	22.52	22.76	22.35
	16QAM	1	0	22.84	22.36	22.20
		1	13	22.43	22.79	22.58
		1	24	22.56	22.44	22.21
		12	0	21.62	21.66	21.36
		12	6	21.40	21.84	21.51
		12	13	21.76	21.69	21.54
		25	0	21.66	21.84	21.43
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		