



# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 1 of 99

## FCC Test Report (4G)

**FCC ID** : 2AIV5CWELL001

**Applicant** : CWELL INTERNATIONAL CO.,LTD.

Room 2810-2814, Building A, Qunxing Plaza, Huaqiang North Rd,  
Futian District, Shenzhen, 518031,China .

### Sample Description

**Product Name** : Rugged Smartphone

**Model No.** : HG06

**Serial No.** : N/A

**Trademark** : AngelLira

**Receipt Date** : 2016-06-26

**Test Date** : 2016-06-27 to 2016-07-05

**Issue Date** : 2016-07-06

**Test Standard(s)** : FCC PART 2; FCC PART 27

**Conclusions** : PASSED\*

\*In the configuration tested, the EUT complied with the standards specified above.

**Test/Witness Engineer**

: Jason Deng

**Approved & Authorized**

: Frank Zhang

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.



# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 2 of 99

## Contents

<b>CONTENTS.....</b>	<b>2</b>
<b>1. GENERAL INFORMATION .....</b>	<b>4</b>
1.1 Client Information .....	4
1.2 General Description of EUT (Equipment Under Test).....	4
1.3 Description of Test Mode .....	5
1.4 Test Instruments List.....	6
1.5 Laboratory Location .....	7
<b>2. TEST SUMMARY .....</b>	<b>8</b>
<b>3. CONDUCTED OUTPUT POWER .....</b>	<b>9</b>
3.1. Test Setup.....	9
3.2. Limit.....	9
3.3. Test Procedure.....	9
3.4. Test Result.....	10
<b>4. EFFECTIVE (ISOTROPIC) RADIATED POWER .....</b>	<b>22</b>
4.1 Test Setup .....	22
4.2 Limit .....	22
4.3 Test Procedure .....	22
4.4 Test Data .....	24
<b>5. OCCUPIED BANDWIDTH.....</b>	<b>36</b>
5.1. Limit.....	36
5.2. Test Setup.....	36
5.3. Test Procedure.....	36
5.4. Test Data.....	37
5.5. Test Plot .....	38
<b>6. FREQUENCY STABILITY .....</b>	<b>56</b>
6.1. Limit.....	56
6.2. Test Setup.....	56
6.3. Test Procedure.....	56
6.4. Test Data.....	57
<b>7. CONDUCTED SPURIOUS EMISSION.....</b>	<b>58</b>
7.1. Limit.....	58
7.2. Test Setup.....	58
7.3. Test Procedure.....	58
7.4. Test Plot .....	59
<b>8. RADIATED SPURIOUS EMISSION.....</b>	<b>77</b>
8.1. Limit.....	77
8.2. Test Setup.....	77



# ATA Testing Technology Service Co., Ltd.

---

Report No.: ATA160705017F	Page: 3 of 99
8.3. Test Procedure.....	77
8.4. Test Result.....	78
<b>9. BAND EDGE REQUIREMENT .....</b>	<b>81</b>
9.1. Limit.....	81
9.2. Test Setup.....	81
9.3. Test Procedure.....	81
9.4. Test Plot .....	82
<b>10. POWER LINE CONDUCTED EMISSION .....</b>	<b>94</b>
11.1. Test Standard and Limit.....	94
11.2. Test Setup.....	94
11.3. Test Procedure.....	94
11.4. Test Data.....	95
<b>11 PEAK-TO-AVERAGE RATIO.....</b>	<b>98</b>
11.1 Limit .....	98
11.2 Test Setup.....	98
11.3 Test Procedure.....	98
11.4Test Result.....	98



# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 4 of 99

## 1. General Information

### 1.1 Client Information

Applicant	:	CWELL INTERNATIONAL CO.,LTD.
Address	:	Room 24, 7/F. Nan Fung Commercial Centre, 19 Lam Lok Street, Kowloon Bay, Hong Kong, China.
Manufacturer	:	CWELL INTERNATIONAL CO.,LTD.
Address	:	Room 24, 7/F. Nan Fung Commercial Centre, 19 Lam Lok Street, Kowloon Bay, Hong Kong, China.

### 1.2 General Description of EUT (Equipment Under Test)

Product Name	:	Rugged Smartphone	
Models No.	:	HG06	
Difference	:	N/A	
Trademark	:	AngelLira	
Product Description	Operation Band:	LTE B2	
	Operation frequency	LTE B2 1850-1910MHz	
	Modulation Technology:	16QAM, QPSK	
	Antenna Type:	Integral Antenna	
	Antenna Gain:	1dBi	
Power Supply	:	USB DC 5V from PC, DC 3.7V from Li-ion battery	

**Note:**

- (1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.



## 1.3 Description of Test Mode

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned follow was evaluated respectively.

Test Mode	Description
Transmitting mode(QPSK)	Keep the EUT in continuous transmitting with modulation
Transmitting mode(16QAM)	Keep the EUT in continuous transmitting with modulation

**Remark:** The sample was placed 0.8m above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows: During all testing, EUT is in link mode with base station emulator at maximum power level in each test mode and channel as below:

Mode	Channel	Frequency(MHz)
LTE B2(1.4MHz)	18607	1850.7
	18900	1880.0
	19193	1909.3
LTE B2(1.4MHz)	18615	1851.5
	18900	1880
	19185	1908.5
LTE B2((5MHz)	18625	1852.5
	18900	1880.0
	19175	1907.5
LTE B2 (10MHz)	18650	1855
	18900	1880.0
	19150	1905
LTE B2 (15MHz)	18675	1857.5
	18900	1880.0
	19125	1902.5
LTE B2 (20MHz)	18700	1860
	18900	1880.0
	19100	1900



## 1.4 Test Instruments List

	Test Equipment	Manufacturer	Model No.	Cal. Date	Cal. Due date
1	Bilog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	May 22, 2016	May 21, 2017
2	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA9120D	May 27, 2016	May 26, 2017
3	Coaxial Cable	N/A	N/A	Mar. 28, 2016	Mar. 27, 2017
4	Coaxial Cable	N/A	N/A	Mar. 29, 2016	Mar. 29, 2017
5	Coaxial cable	N/A	N/A	Mar. 29, 2016	Mar. 29, 2017
6	Coaxial Cable	N/A	N/A	Mar. 29, 2016	Mar. 29, 2017
7	Coaxial Cable	N/A	N/A	Mar. 29, 2016	Mar. 29, 2017
8	Amplifier (10kHz-1.3GHz)	HP	8447D	Mar. 29, 2016	Mar. 29, 2017
9	Amplifier (1GHz-18GHz)	Compliance Direction Systems Inc.	PAP-1G18	Jun. 06, 2016	Mar. 29, 2017
10	Pre-amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	Mar. 29, 2016	Mar. 29, 2017
11	Horn Antenna	ETS-LINDGREN	3160	Mar. 27, 2016	Mar. 27, 2017
12	Positioning Controller	UC	UC3000	N/A	N/A
13	Spectrum analyzer 9kHz-30GHz	Rohde & Schwarz	FSP	May 26, 2016	May 27, 2017
14	EMI Test Receiver	Rohde & Schwarz	ESPI	Mar. 29, 2016	Mar. 30, 2017
15	Loop antenna	Laplace instrument	RF300	May 22,, 2016	May 23, 2017
16	Universal radio communication tester	Rhode & Schwarz	CMU200	May 26, 2016	May 27, 2017
17	Signal Analyzer	Rohde & Schwarz	FSIQ3	May 26, 2016	May 27, 2017
18	L.I.S.N.#1	Rohde & Schwarz	NSLK8126	May 26, 2016	May 27, 2017
19	L.I.S.N.#2	Rohde & Schwarz	ENV216	May 26, 2016	May 27, 2017
20	Power Meter	Anritsu	ML2495A	May 26, 2016	May 27, 2017
21	Power sensor	Anritsu	ML2491A	May 26, 2016	May 27, 2017
22	Base station	Agilent	E5515C	May 26, 2016	May 27, 2017



# ATA Testing Technology Service Co., Ltd.

---

Report No.: ATA160705017F

Page: 7 of 99

## 1.5 Laboratory Location

Shenzhen TOBY technology Co., Ltd

Address: 1 A/F., Bldg.6, Yusheng Industrial Zone The National Road No.107 Xixiang Section 467,

Xixiang, Bao'an, Shenzhen, Guangdong, 518057, China

At the time of testing, the Laboratory is accredited. It is listed in the United States of American Federal Communications Commission (FCC), and the registration number is 811562 7.

Tel:0086-755-26509301 Fax: 0086-755-26509195



# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 8 of 99

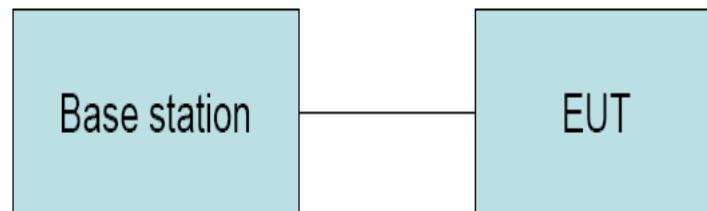
## 2. Test Summary

Description of Test Item	Standard	Results
Conducted Output power	FCC PART 2: 2.1046 FCC PART 24E: 24.232 (c)	PASS
Radiated Output power(erp/eirp)	FCC PART 24E:24.232(c)	PASS
Occupied bandwidth	FCC PART 2: 2.1049 FCC PART 24E: 24.238 (b)	PASS
Frequency stability	FCC PART 2: 2.1055 FCC PART 24E: 24.235	PASS
Conducted spurious emission (Antenna terminal)	FCC PART 2: 2.1051 FCC PART 24E: 24.238	PASS
Radiated spurious emissions	FCC PART 2: 2.1053 FCC PART 24E: 24.238	PASS
Band edge compliance	FCC PART 24E: 24.238 (b)	PASS
Power Line Conducted Emission Test	FCC Part 15: 15.207 ANSI C63.4: 2014	PASS



## 3. Conducted Output Power

### 3.1. Test Setup



### 3.2. Limit

LTE Band2
30m(ERP)

### 3.3. Test Procedure

- (1) The EUT's RF output port was connected to base station.
- (2) A call is set up by the SS according to the generic call set up procedure
- (3) Set EUT at maximum power level through base station by power level command
- (4) Measure the maximum output power of EUT at each frequency band and mode by base station.



# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 10 of 99

## 3.4. Test Result

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	1.4MHz	LCH	RB1#0	22.35	30	Pass
				RB1#3	22.27	30	Pass
				RB1#5	22.47	30	Pass
				RB3#0	22.17	30	Pass
				RB3#2	22.27	30	Pass
				RB3#3	22.45	30	Pass
				RB6#0	20.77	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	1.4MHz	MCH	RB1#0	22.12	30	Pass
				RB1#3	22.46	30	Pass
				RB1#5	22.54	30	Pass
				RB3#0	22.36	30	Pass
				RB3#2	22.42	30	Pass
				RB3#3	22.19	30	Pass
				RB6#0	20.87	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	1.4MHz	HCH	RB1#0	22.43	30	Pass
				RB1#3	22.61	30	Pass
				RB1#5	22.54	30	Pass
				RB3#0	22.28	30	Pass
				RB3#2	22.15	30	Pass
				RB3#3	22.42	30	Pass
				RB6#0	20.35	30	Pass



# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 11 of 99

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	3MHz	LCH	RB1#0	22.12	30	Pass
				RB1#7	22.23	30	Pass
				RB1#14	22.41	30	Pass
				RB8#0	22.56	30	Pass
				RB8#4	21.43	30	Pass
				RB8#7	21.35	30	Pass
				RB15#0	21.56	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	3MHz	MCH	RB1#0	22.24	30	Pass
				RB1#7	22.37	30	Pass
				RB1#14	22.51	30	Pass
				RB8#0	22.27	30	Pass
				RB8#4	21.16	30	Pass
				RB8#7	21.46	30	Pass
				RB15#0	21.86	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	3MHz	HCH	RB1#0	22.36	30	Pass
				RB1#7	22.57	30	Pass
				RB1#14	22.39	30	Pass
				RB8#0	22.12	30	Pass
				RB8#4	21.09	30	Pass
				RB8#7	21.87	30	Pass
				RB15#0	21.79	30	Pass



# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 12 of 99

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	5MHz	LCH	RB1#0	21.64	30	Pass
				RB1#13	21.89	30	Pass
				RB1#24	21.22	30	Pass
				RB12#0	20.85	30	Pass
				RB12#6	20.95	30	Pass
				RB12#13	20.68	30	Pass
				RB25#0	20.81	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	5MHz	MCH	RB1#0	21.69	30	Pass
				RB1#13	21.82	30	Pass
				RB1#24	21.32	30	Pass
				RB12#0	20.78	30	Pass
				RB12#6	20.81	30	Pass
				RB12#13	20.57	30	Pass
				RB25#0	20.78	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	5MHz	HCH	RB1#0	21.35	30	Pass
				RB1#13	21.54	30	Pass
				RB1#24	21.26	30	Pass
				RB12#0	20.61	30	Pass
				RB12#6	20.22	30	Pass
				RB12#13	20.21	30	Pass
				RB25#0	20.46	30	Pass



# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 13 of 99

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	10MHz	LCH	RB1#0	21.22	30	Pass
				RB1#25	21.46	30	Pass
				RB1#49	21.26	30	Pass
				RB25#0	20.61	30	Pass
				RB25#13	20.22	30	Pass
				RB25#25	20.21	30	Pass
				RB50#0	20.46	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	10MHz	MCH	RB1#0	21.34	30	Pass
				RB1#25	21.53	30	Pass
				RB1#49	20.56	30	Pass
				RB25#0	20.49	30	Pass
				RB25#13	20.58	30	Pass
				RB25#25	20.38	30	Pass
				RB50#0	20.42	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	10MHz	HCH	RB1#0	21.49	30	Pass
				RB1#25	21.72	30	Pass
				RB1#49	20.91	30	Pass
				RB25#0	20.37	30	Pass
				RB25#13	20.56	30	Pass
				RB25#25	20.71	30	Pass
				RB50#0	20.87	30	Pass



# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 14 of 99

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	15MHz	LCH	RB1#0	21.02	30	Pass
				RB1#38	21.34	30	Pass
				RB1#74	21.11	30	Pass
				RB38#0	20.63	30	Pass
				RB38#19	20.71	30	Pass
				RB25#39	20.52	30	Pass
				RB75#0	20.66	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	15MHz	MCH	RB1#0	21.25	30	Pass
				RB1#38	21.47	30	Pass
				RB1#74	21.32	30	Pass
				RB38#0	20.59	30	Pass
				RB38#19	20.82	30	Pass
				RB25#39	20.59	30	Pass
				RB75#0	20.74	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	15MHz	HCH	RB1#0	21.46	30	Pass
				RB1#38	21.73	30	Pass
				RB1#74	21.51	30	Pass
				RB38#0	20.78	30	Pass
				RB38#19	20.86	30	Pass
				RB25#39	20.65	30	Pass
				RB75#0	20.89	30	Pass



# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 15 of 99

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	20MHz	LCH	RB1#0	21.15	30	Pass
				RB1#50	21.45	30	Pass
				RB1#99	21.17	30	Pass
				RB50#0	20.74	30	Pass
				RB50#25	20.79	30	Pass
				RB50#50	20.54	30	Pass
				RB100#0	20.73	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	20MHz	MCH	RB1#0	21.26	30	Pass
				RB1#50	21.57	30	Pass
				RB1#99	21.31	30	Pass
				RB50#0	20.79	30	Pass
				RB50#25	20.84	30	Pass
				RB50#50	20.46	30	Pass
				RB100#0	20.83	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	20MHz	HCH	RB1#0	21.32	30	Pass
				RB1#50	21.63	30	Pass
				RB1#99	21.42	30	Pass
				RB50#0	20.85	30	Pass
				RB50#25	20.91	30	Pass
				RB50#50	20.55	30	Pass
				RB100#0	20.87	30	Pass



# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 16 of 99

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	1.4MHz	LCH	RB1#0	22.22	30	Pass
				RB1#3	22.31	30	Pass
				RB1#5	22.41	30	Pass
				RB3#0	22.24	30	Pass
				RB3#2	22.35	30	Pass
				RB3#3	22.51	30	Pass
				RB6#0	20.79	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	1.4MHz	MCH	RB1#0	22.16	30	Pass
				RB1#3	22.43	30	Pass
				RB1#5	22.14	30	Pass
				RB3#0	22.35	30	Pass
				RB3#2	22.28	30	Pass
				RB3#3	22.31	30	Pass
				RB6#0	20.95	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	1.4MHz	HCH	RB1#0	22.24	30	Pass
				RB1#3	22.45	30	Pass
				RB1#5	22.28	30	Pass
				RB3#0	22.23	30	Pass
				RB3#2	22.32	30	Pass
				RB3#3	22.16	30	Pass
				RB6#0	20.78	30	Pass



# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 17 of 99

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	3MHz	LCH	RB1#0	22.34	30	Pass
				RB1#7	22.52	30	Pass
				RB1#14	22.67	30	Pass
				RB8#0	22.51	30	Pass
				RB8#4	21.25	30	Pass
				RB8#7	21.61	30	Pass
				RB15#0	21.36	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	3MHz	MCH	RB1#0	22.28	30	Pass
				RB1#7	22.13	30	Pass
				RB1#14	22.43	30	Pass
				RB8#0	22.53	30	Pass
				RB8#4	21.22	30	Pass
				RB8#7	21.25	30	Pass
				RB15#0	21.97	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	3MHz	HCH	RB1#0	22.31	30	Pass
				RB1#7	22.17	30	Pass
				RB1#14	22.09	30	Pass
				RB8#0	22.16	30	Pass
				RB8#4	21.21	30	Pass
				RB8#7	21.33	30	Pass
				RB15#0	21.45	30	Pass



# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 18 of 99

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	16QAM	5MHz	LCH	RB1#0	21.45	30	Pass
				RB1#13	21.63	30	Pass
				RB1#24	21.11	30	Pass
				RB12#0	20.57	30	Pass
				RB12#6	20.79	30	Pass
				RB12#13	20.53	30	Pass
				RB25#0	20.68	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	16QAM	5MHz	MCH	RB1#0	21.54	30	Pass
				RB1#13	21.67	30	Pass
				RB1#24	21.21	30	Pass
				RB12#0	20.51	30	Pass
				RB12#6	20.63	30	Pass
				RB12#13	20.36	30	Pass
				RB25#0	20.44	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	16QAM	5MHz	HCH	RB1#0	21.28	30	Pass
				RB1#13	21.38	30	Pass
				RB1#24	21.12	30	Pass
				RB12#0	20.46	30	Pass
				RB12#6	20.05	30	Pass
				RB12#13	20.15	30	Pass
				RB25#0	20.34	30	Pass



# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 19 of 99

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	16QAM	10MHz	LCH	RB1#0	21.46	30	Pass
				RB1#25	21.53	30	Pass
				RB1#49	21.35	30	Pass
				RB25#0	20.51	30	Pass
				RB25#13	20.02	30	Pass
				RB25#25	20.11	30	Pass
				RB50#0	20.23	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	16QAM	10MHz	MCH	RB1#0	21.16	30	Pass
				RB1#25	21.26	30	Pass
				RB1#49	20.34	30	Pass
				RB25#0	20.27	30	Pass
				RB25#13	20.34	30	Pass
				RB25#25	20.13	30	Pass
				RB50#0	20.26	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	16QAM	10MHz	HCH	RB1#0	21.34	30	Pass
				RB1#25	21.59	30	Pass
				RB1#49	20.81	30	Pass
				RB25#0	20.09	30	Pass
				RB25#13	20.34	30	Pass
				RB25#25	20.46	30	Pass
				RB50#0	20.67	30	Pass



# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 20 of 99

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	16QAM	15MHz	LCH	RB1#0	21.12	30	Pass
				RB1#38	21.25	30	Pass
				RB1#74	21.31	30	Pass
				RB38#0	20.43	30	Pass
				RB38#19	20.56	30	Pass
				RB25#39	20.42	30	Pass
				RB75#0	20.53	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	16QAM	15MHz	MCH	RB1#0	21.34	30	Pass
				RB1#38	21.56	30	Pass
				RB1#74	21.18	30	Pass
				RB38#0	20.43	30	Pass
				RB38#19	20.37	30	Pass
				RB25#39	20.51	30	Pass
				RB75#0	20.78	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	16QAM	15MHz	HCH	RB1#0	21.54	30	Pass
				RB1#38	21.46	30	Pass
				RB1#74	21.56	30	Pass
				RB38#0	20.91	30	Pass
				RB38#19	20.76	30	Pass
				RB25#39	20.57	30	Pass
				RB75#0	20.83	30	Pass



# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 21 of 99

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	16QAM	20MHz	LCH	RB1#0	21.24	30	Pass
				RB1#50	21.55	30	Pass
				RB1#99	21.23	30	Pass
				RB50#0	20.77	30	Pass
				RB50#25	20.87	30	Pass
				RB50#50	20.62	30	Pass
				RB100#0	20.84	30	Pass

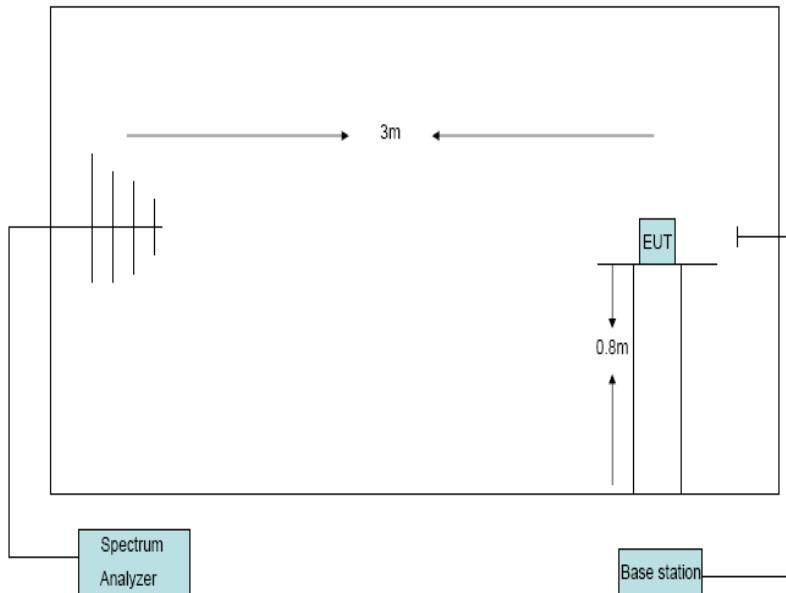
Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	16QAM	20MHz	MCH	RB1#0	21.53	30	Pass
				RB1#50	21.42	30	Pass
				RB1#99	21.29	30	Pass
				RB50#0	20.56	30	Pass
				RB50#25	20.49	30	Pass
				RB50#50	20.35	30	Pass
				RB100#0	20.54	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	16QAM	20MHz	HCH	RB1#0	21.24	30	Pass
				RB1#50	21.54	30	Pass
				RB1#99	21.23	30	Pass
				RB50#0	20.57	30	Pass
				RB50#25	20.62	30	Pass
				RB50#50	20.43	30	Pass
				RB100#0	20.76	30	Pass



## 4. Effective (Isotropic) Radiated Power

### 4.1 Test Setup



### 4.2 Limit

LTE Band 2
33dBm(EIRP)

### 4.3 Test Procedure

1. The EUT was placed on a non-conductive rotating platform with 0.8 meter height in an anechoic chamber. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and a spectrum analyzer with RBW= 3MHz, VBW= 3MHz and peak detector settings.
2. During the measurement, the EUT was enforced in maximum power and linked with a base station. The highest emission was recorded from analyzer power level (LVL) from the 360 degrees rotation of the turntable and the test antenna raised and lowered over a range from 1 to 4 meters in both horizontally and vertically polarized orientations
3. Effective Isotropic Radiated Power (EIRP) was measured by substitution method according to TIA/EIA-603-C. The EUT was replaced by dipole antenna (for frequency below 1GHz) or Horn antenna (for frequency above 1GHz) at same location with same polarization of receiver antenna and then a known power of each measure frequency from S.G. was applied into the dipole antenna or Horn antenna through a Tx cable, and then recorded the maximum Analyzer reading through raised and lowered the test antenna.



# ATA Testing Technology Service Co., Ltd.

---

**Report No.: ATA160705017F**

**Page: 23 of 99**

The correction factor (in dB) = S.G. - Tx Cable loss + Substitution antenna gain -Substitution antenna Loss(only for Dipole antenna) - Analyzer reading. Then the EUT's EIRP was calculated with the correction factor,  $EIRP = LVL + \text{Correction factor}$  and  $ERP = EIRP - 2.15$



## 4.4 Test Data

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	1.4MHz	LCH	RB1#0	23.35	30	Pass
				RB1#3	23.27	30	Pass
				RB1#5	23.47	30	Pass
				RB3#0	23.17	30	Pass
				RB3#2	23.27	30	Pass
				RB3#3	23.45	30	Pass
				RB6#0	21.77	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	1.4MHz	MCH	RB1#0	23.12	30	Pass
				RB1#3	23.46	30	Pass
				RB1#5	23.54	30	Pass
				RB3#0	23.36	30	Pass
				RB3#2	23.42	30	Pass
				RB3#3	23.19	30	Pass
				RB6#0	21.87	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	1.4MHz	HCH	RB1#0	23.43	30	Pass
				RB1#3	23.61	30	Pass
				RB1#5	23.54	30	Pass
				RB3#0	23.28	30	Pass
				RB3#2	23.15	30	Pass
				RB3#3	23.42	30	Pass
				RB6#0	21.35	30	Pass



# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 25 of 99

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	3MHz	LCH	RB1#0	23.12	30	Pass
				RB1#7	23.23	30	Pass
				RB1#14	23.41	30	Pass
				RB8#0	23.56	30	Pass
				RB8#4	22.43	30	Pass
				RB8#7	22.35	30	Pass
				RB15#0	22.56	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	3MHz	MCH	RB1#0	23.24	30	Pass
				RB1#7	23.37	30	Pass
				RB1#14	23.51	30	Pass
				RB8#0	23.27	30	Pass
				RB8#4	22.16	30	Pass
				RB8#7	22.46	30	Pass
				RB15#0	22.86	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	3MHz	HCH	RB1#0	23.36	30	Pass
				RB1#7	23.57	30	Pass
				RB1#14	23.39	30	Pass
				RB8#0	23.12	30	Pass
				RB8#4	22.09	30	Pass
				RB8#7	22.87	30	Pass
				RB15#0	22.79	30	Pass



# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 26 of 99

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	5MHz	LCH	RB1#0	22.64	30	Pass
				RB1#13	22.89	30	Pass
				RB1#24	22.22	30	Pass
				RB12#0	21.85	30	Pass
				RB12#6	21.95	30	Pass
				RB12#13	21.68	30	Pass
				RB25#0	21.81	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	5MHz	MCH	RB1#0	22.69	30	Pass
				RB1#13	22.82	30	Pass
				RB1#24	22.32	30	Pass
				RB12#0	21.78	30	Pass
				RB12#6	21.81	30	Pass
				RB12#13	21.57	30	Pass
				RB25#0	21.78	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	5MHz	HCH	RB1#0	22.35	30	Pass
				RB1#13	22.54	30	Pass
				RB1#24	22.26	30	Pass
				RB12#0	21.61	30	Pass
				RB12#6	21.22	30	Pass
				RB12#13	21.21	30	Pass
				RB25#0	21.46	30	Pass



# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 27 of 99

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	10MHz	LCH	RB1#0	22.22	30	Pass
				RB1#25	22.46	30	Pass
				RB1#49	22.26	30	Pass
				RB25#0	21.61	30	Pass
				RB25#13	21.22	30	Pass
				RB25#25	21.21	30	Pass
				RB50#0	21.46	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	10MHz	MCH	RB1#0	22.34	30	Pass
				RB1#25	22.53	30	Pass
				RB1#49	21.56	30	Pass
				RB25#0	21.49	30	Pass
				RB25#13	21.58	30	Pass
				RB25#25	21.38	30	Pass
				RB50#0	21.42	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	10MHz	HCH	RB1#0	22.49	30	Pass
				RB1#25	22.72	30	Pass
				RB1#49	21.91	30	Pass
				RB25#0	21.37	30	Pass
				RB25#13	21.56	30	Pass
				RB25#25	21.71	30	Pass
				RB50#0	21.87	30	Pass



# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 28 of 99

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	15MHz	LCH	RB1#0	22.02	30	Pass
				RB1#38	22.34	30	Pass
				RB1#74	22.11	30	Pass
				RB38#0	21.63	30	Pass
				RB38#19	21.71	30	Pass
				RB25#39	21.52	30	Pass
				RB75#0	21.66	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	15MHz	MCH	RB1#0	22.25	30	Pass
				RB1#38	22.47	30	Pass
				RB1#74	22.32	30	Pass
				RB38#0	21.59	30	Pass
				RB38#19	21.82	30	Pass
				RB25#39	21.59	30	Pass
				RB75#0	21.74	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	15MHz	HCH	RB1#0	22.46	30	Pass
				RB1#38	22.73	30	Pass
				RB1#74	22.51	30	Pass
				RB38#0	21.78	30	Pass
				RB38#19	21.86	30	Pass
				RB25#39	21.65	30	Pass
				RB75#0	21.89	30	Pass



# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 29 of 99

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	20MHz	LCH	RB1#0	22.15	30	Pass
				RB1#50	22.45	30	Pass
				RB1#99	22.17	30	Pass
				RB50#0	21.74	30	Pass
				RB50#25	21.79	30	Pass
				RB50#50	21.54	30	Pass
				RB100#0	21.73	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	20MHz	MCH	RB1#0	22.26	30	Pass
				RB1#50	22.57	30	Pass
				RB1#99	22.31	30	Pass
				RB50#0	21.79	30	Pass
				RB50#25	21.84	30	Pass
				RB50#50	21.46	30	Pass
				RB100#0	21.83	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	20MHz	HCH	RB1#0	22.32	30	Pass
				RB1#50	22.63	30	Pass
				RB1#99	22.42	30	Pass
				RB50#0	21.85	30	Pass
				RB50#25	21.91	30	Pass
				RB50#50	21.55	30	Pass
				RB100#0	21.87	30	Pass



# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 30 of 99

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	1.4MHz	LCH	RB1#0	23.22	30	Pass
				RB1#3	23.31	30	Pass
				RB1#5	23.41	30	Pass
				RB3#0	23.24	30	Pass
				RB3#2	23.35	30	Pass
				RB3#3	23.51	30	Pass
				RB6#0	21.79	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	1.4MHz	MCH	RB1#0	23.16	30	Pass
				RB1#3	23.43	30	Pass
				RB1#5	23.14	30	Pass
				RB3#0	23.35	30	Pass
				RB3#2	23.28	30	Pass
				RB3#3	23.31	30	Pass
				RB6#0	21.95	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	1.4MHz	HCH	RB1#0	23.24	30	Pass
				RB1#3	23.45	30	Pass
				RB1#5	23.28	30	Pass
				RB3#0	23.23	30	Pass
				RB3#2	23.32	30	Pass
				RB3#3	23.16	30	Pass
				RB6#0	21.78	30	Pass



# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 31 of 99

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	3MHz	LCH	RB1#0	23.34	30	Pass
				RB1#7	23.52	30	Pass
				RB1#14	23.67	30	Pass
				RB8#0	23.51	30	Pass
				RB8#4	22.25	30	Pass
				RB8#7	22.61	30	Pass
				RB15#0	22.36	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	3MHz	MCH	RB1#0	23.28	30	Pass
				RB1#7	23.13	30	Pass
				RB1#14	23.43	30	Pass
				RB8#0	23.53	30	Pass
				RB8#4	22.22	30	Pass
				RB8#7	22.25	30	Pass
				RB15#0	22.97	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	QPSK	3MHz	HCH	RB1#0	23.31	30	Pass
				RB1#7	23.17	30	Pass
				RB1#14	23.09	30	Pass
				RB8#0	23.16	30	Pass
				RB8#4	22.21	30	Pass
				RB8#7	22.33	30	Pass
				RB15#0	22.45	30	Pass



# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 32 of 99

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	16QAM	5MHz	LCH	RB1#0	22.45	30	Pass
				RB1#13	22.63	30	Pass
				RB1#24	22.11	30	Pass
				RB12#0	21.57	30	Pass
				RB12#6	21.79	30	Pass
				RB12#13	21.53	30	Pass
				RB25#0	21.68	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	16QAM	5MHz	MCH	RB1#0	22.54	30	Pass
				RB1#13	22.67	30	Pass
				RB1#24	22.21	30	Pass
				RB12#0	21.51	30	Pass
				RB12#6	21.63	30	Pass
				RB12#13	21.36	30	Pass
				RB25#0	21.44	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	16QAM	5MHz	HCH	RB1#0	22.28	30	Pass
				RB1#13	22.38	30	Pass
				RB1#24	22.12	30	Pass
				RB12#0	21.46	30	Pass
				RB12#6	21.05	30	Pass
				RB12#13	21.15	30	Pass
				RB25#0	21.34	30	Pass



# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 33 of 99

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	16QAM	10MHz	LCH	RB1#0	22.46	30	Pass
				RB1#25	22.53	30	Pass
				RB1#49	22.35	30	Pass
				RB25#0	21.51	30	Pass
				RB25#13	21.02	30	Pass
				RB25#25	21.11	30	Pass
				RB50#0	21.23	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	16QAM	10MHz	MCH	RB1#0	22.16	30	Pass
				RB1#25	22.26	30	Pass
				RB1#49	21.34	30	Pass
				RB25#0	21.27	30	Pass
				RB25#13	21.34	30	Pass
				RB25#25	21.13	30	Pass
				RB50#0	21.26	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	16QAM	10MHz	HCH	RB1#0	22.34	30	Pass
				RB1#25	22.59	30	Pass
				RB1#49	21.81	30	Pass
				RB25#0	21.09	30	Pass
				RB25#13	21.34	30	Pass
				RB25#25	21.46	30	Pass
				RB50#0	21.67	30	Pass



# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 34 of 99

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	16QAM	15MHz	LCH	RB1#0	22.12	30	Pass
				RB1#38	22.25	30	Pass
				RB1#74	22.31	30	Pass
				RB38#0	21.43	30	Pass
				RB38#19	21.56	30	Pass
				RB25#39	21.42	30	Pass
				RB75#0	21.53	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	16QAM	15MHz	MCH	RB1#0	22.34	30	Pass
				RB1#38	22.56	30	Pass
				RB1#74	22.18	30	Pass
				RB38#0	21.43	30	Pass
				RB38#19	21.37	30	Pass
				RB25#39	21.51	30	Pass
				RB75#0	21.78	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	16QAM	15MHz	HCH	RB1#0	22.54	30	Pass
				RB1#38	22.46	30	Pass
				RB1#74	22.56	30	Pass
				RB38#0	21.91	30	Pass
				RB38#19	21.76	30	Pass
				RB25#39	21.57	30	Pass
				RB75#0	21.83	30	Pass



# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 35 of 99

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	16QAM	20MHz	LCH	RB1#0	22.24	30	Pass
				RB1#50	22.55	30	Pass
				RB1#99	22.23	30	Pass
				RB50#0	21.77	30	Pass
				RB50#25	21.87	30	Pass
				RB50#50	21.62	30	Pass
				RB100#0	21.84	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	16QAM	20MHz	MCH	RB1#0	22.53	30	Pass
				RB1#50	22.42	30	Pass
				RB1#99	22.29	30	Pass
				RB50#0	21.56	30	Pass
				RB50#25	21.49	30	Pass
				RB50#50	21.35	30	Pass
				RB100#0	21.54	30	Pass

Band	Test Mode	Test bandwidth	Channel	RB	Output Power	Limit	Result
Band 2	16QAM	20MHz	HCH	RB1#0	22.24	30	Pass
				RB1#50	22.54	30	Pass
				RB1#99	22.23	30	Pass
				RB50#0	21.57	30	Pass
				RB50#25	21.62	30	Pass
				RB50#50	21.43	30	Pass
				RB100#0	21.76	30	Pass

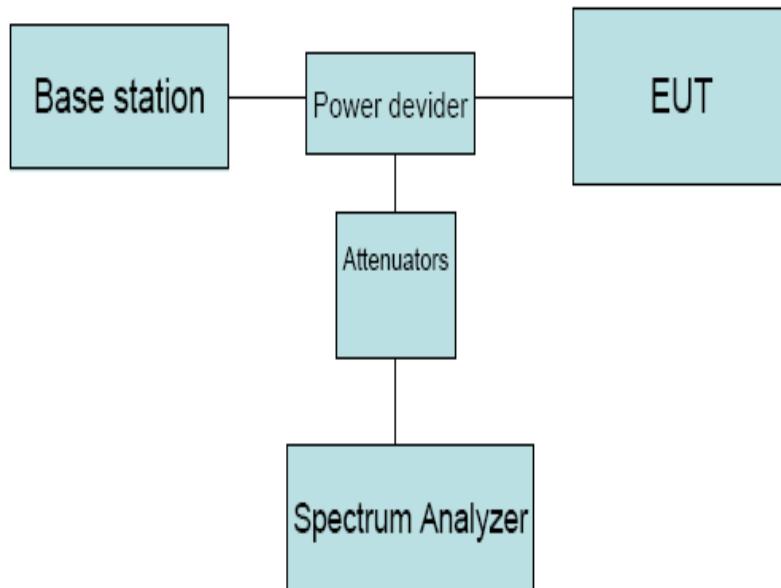


## 5. Occupied Bandwidth

### 5.1. Limit

N/A

### 5.2. Test Setup



### 5.3. Test Procedure

1. The EUT's RF output port was connected to Spectrum Analyzer and Base Station via power divider.
2. Spectrum analyzer's occupied bandwidth measure function was used to measure 99% bandwidth and -26dBc bandwidth



## 5.4. Test Data

BW [MHz]	Mod	Bandwidth [MHz]					
		Lowest		Middle		Highest	
		26dB BW	99% BW	26dB BW	99% BW	26dB BW	99% BW
1.4	QPSK	1.239	1.0931	1.239	1.0940	1.243	1.0971
1.4	16QAM	1.240	1.0951	1.233	1.0918	1.239	1.0931
3.0	QPSK	2.972	2.7052	2.979	2.8045	2.983	2.7072
3.0	16QAM	2.973	2.7152	2.991	2.7110	2.995	2.7107
5	QPSK	4.970	4.5167	4.973	4.5164	4.970	4.5230
5	16QAM	4.989	4.5175	4.961	4.5165	4.959	4.5122
10	QPSK	9.928	8.9887	9.902	8.9988	9.949	8.9985
10	16QAM	9.990	9.0078	9.973	9.0052	9.949	9.0210
15	QPSK	15.00	13.480	15.02	13.520	15.14	13.497
15	16QAM	15.09	13.500	15.01	13.480	14.97	13.529
20	QPSK	19.71	17.967	19.85	17.985	19.67	17.956
20	16QAM	19.86	17.985	19.83	18.025	19.86	18.012

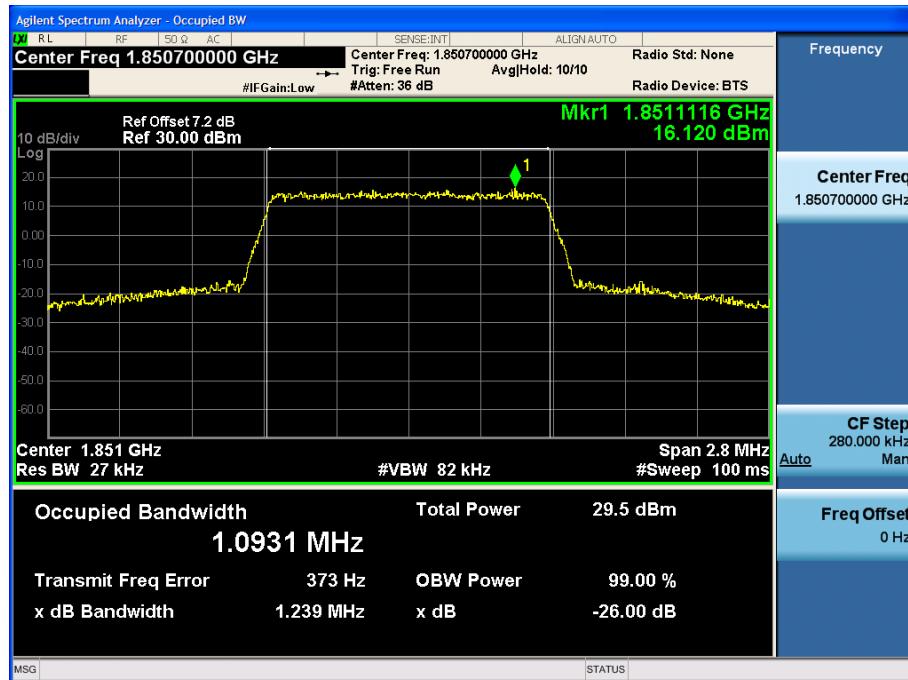


Report No.: ATA160705017F

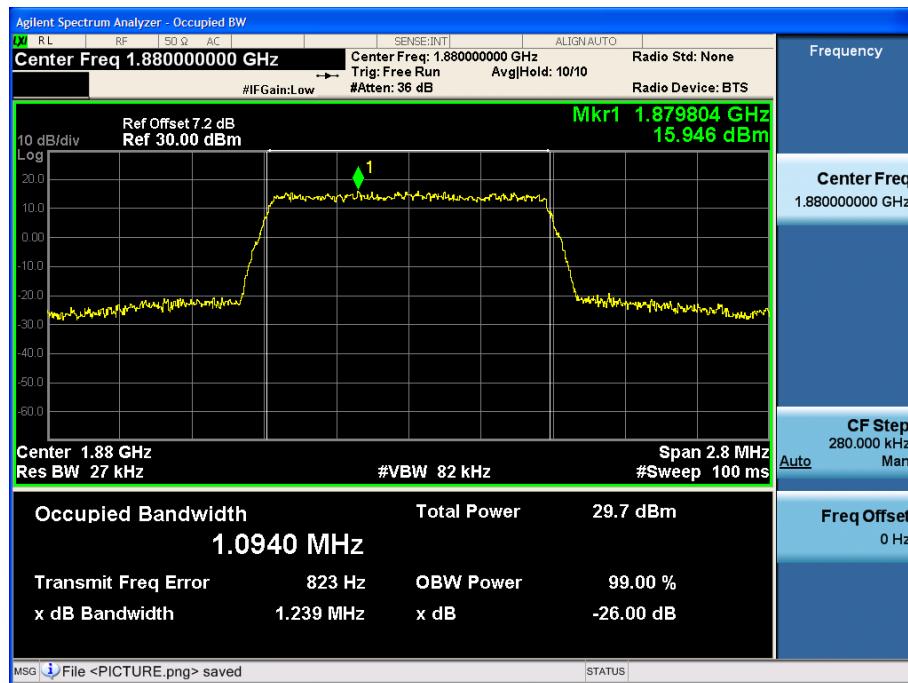
Page: 38 of 99

## 5.5. Test Plot

### 1.4MHz Lowest QPSK



### 1.4MHz Middle QPSK

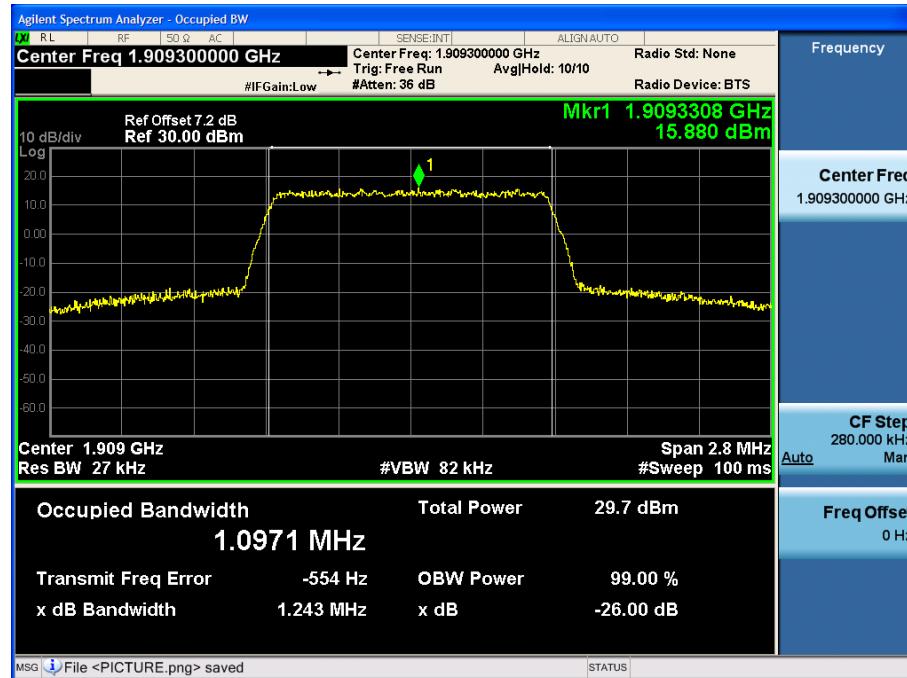




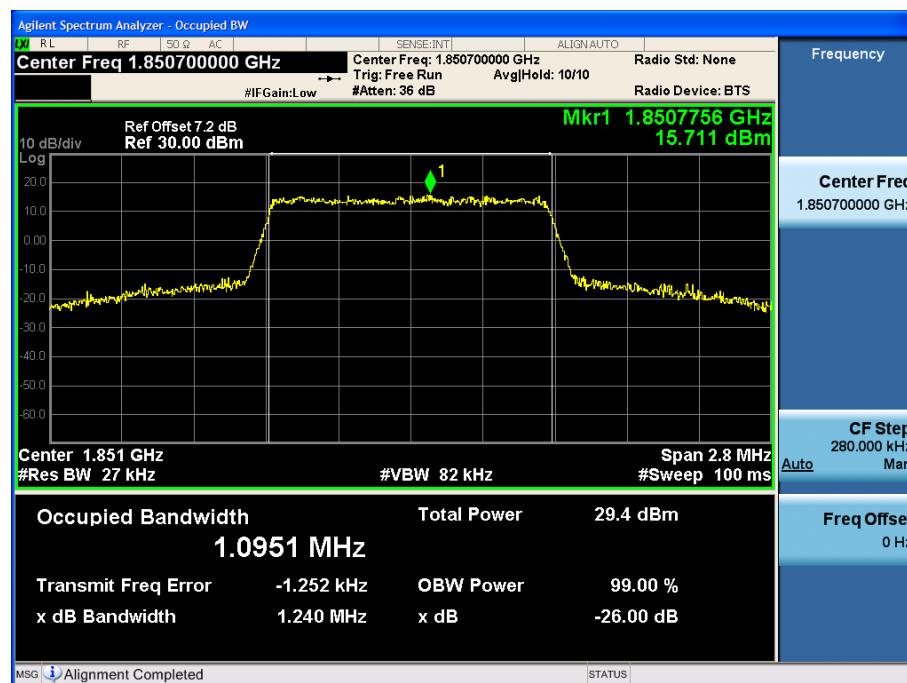
Report No.: ATA160705017F

Page: 39 of 99

## 1.4MHz Highest QPSK



## 1.4MHz Lowest 16QAM

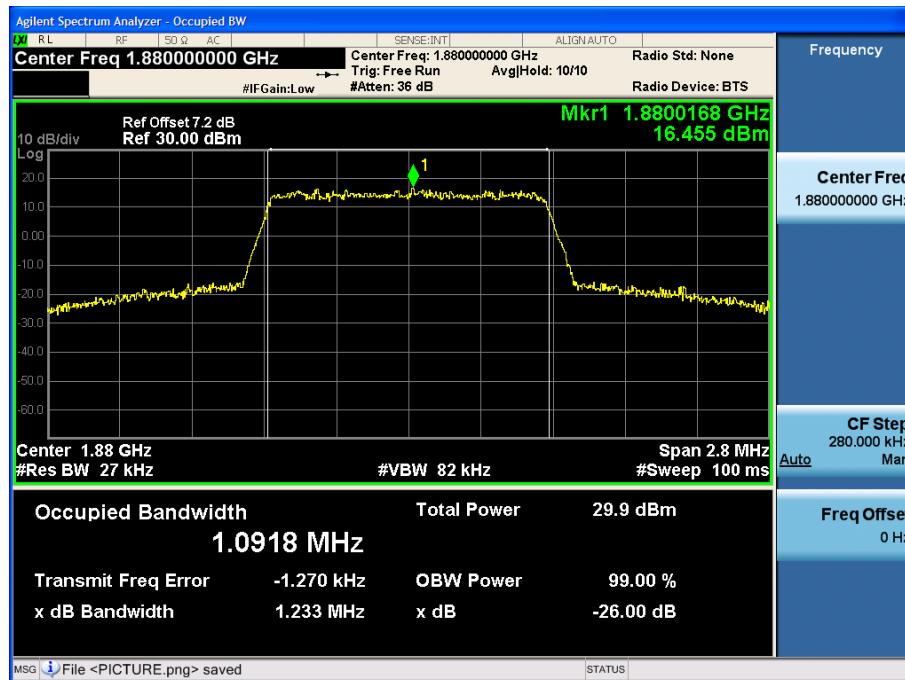




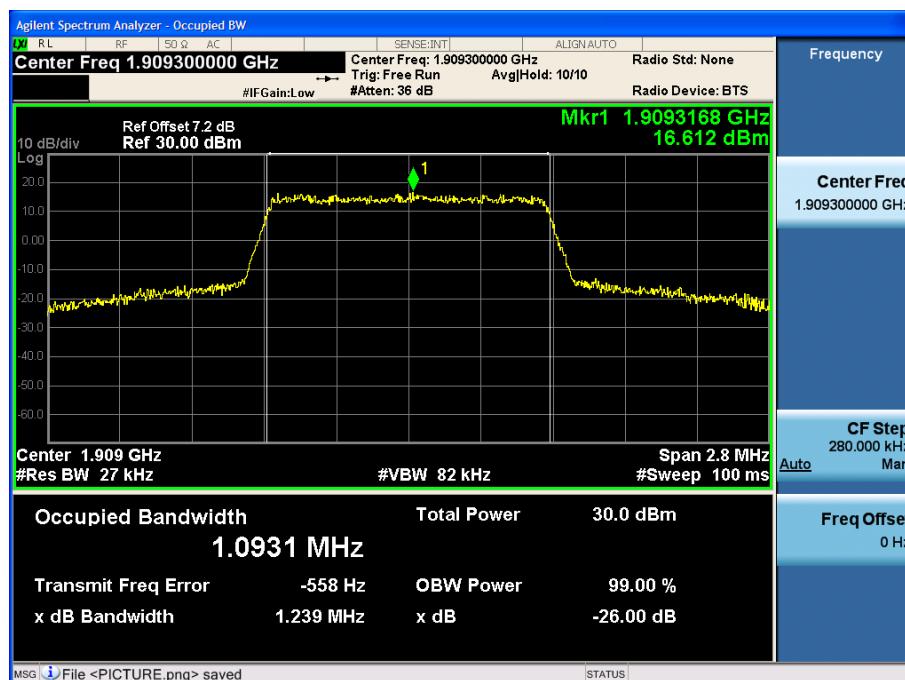
Report No.: ATA160705017F

Page: 40 of 99

## 1.4MHz Middle 16QAM



## 1.4MHz Highest 16QAM

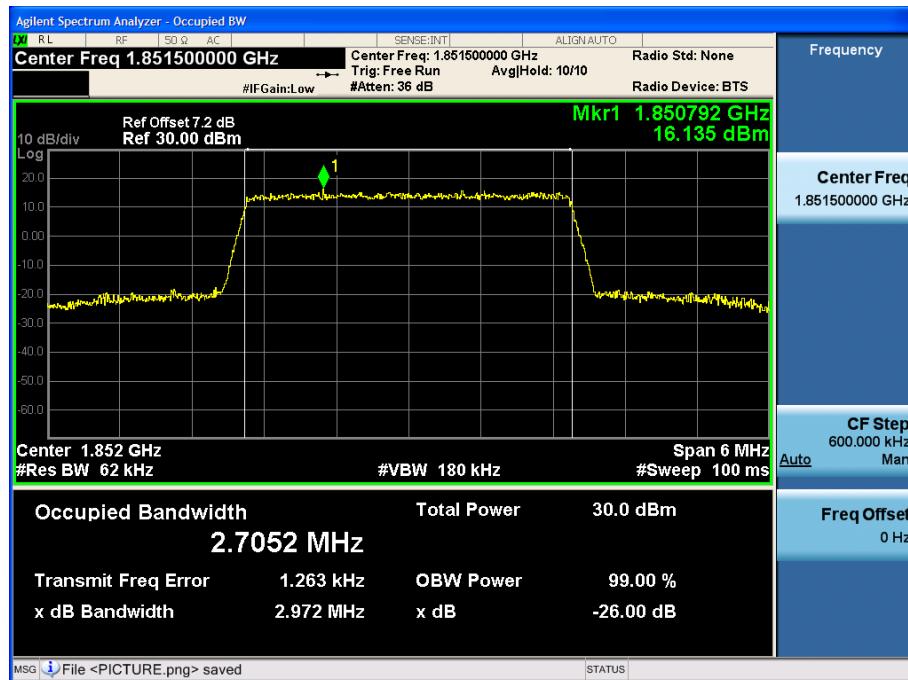




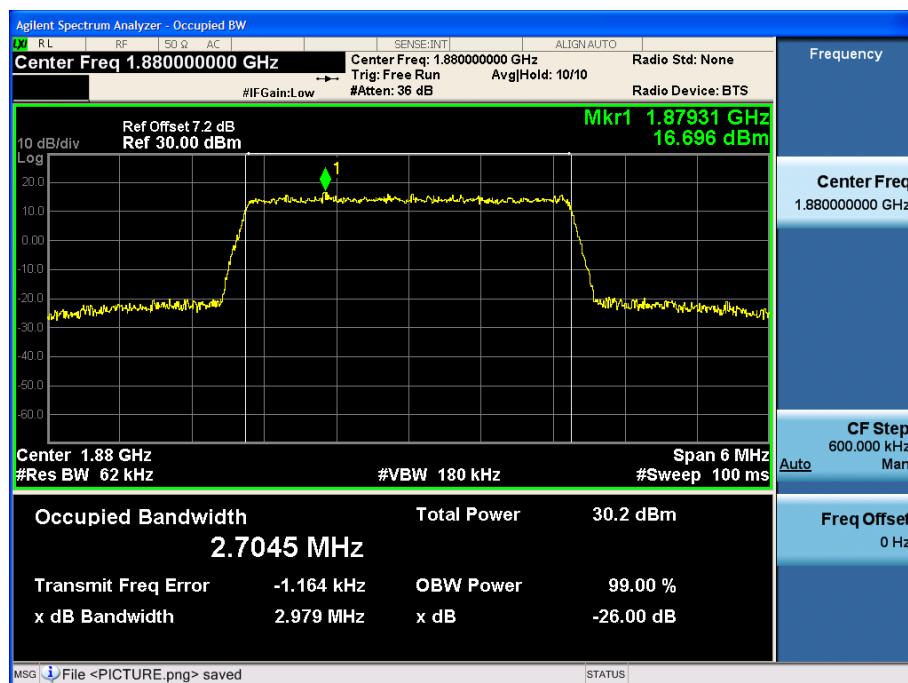
Report No.: ATA160705017F

Page: 41 of 99

## 3MHz Lowest QPSK



## 3MHz Middle QPSK

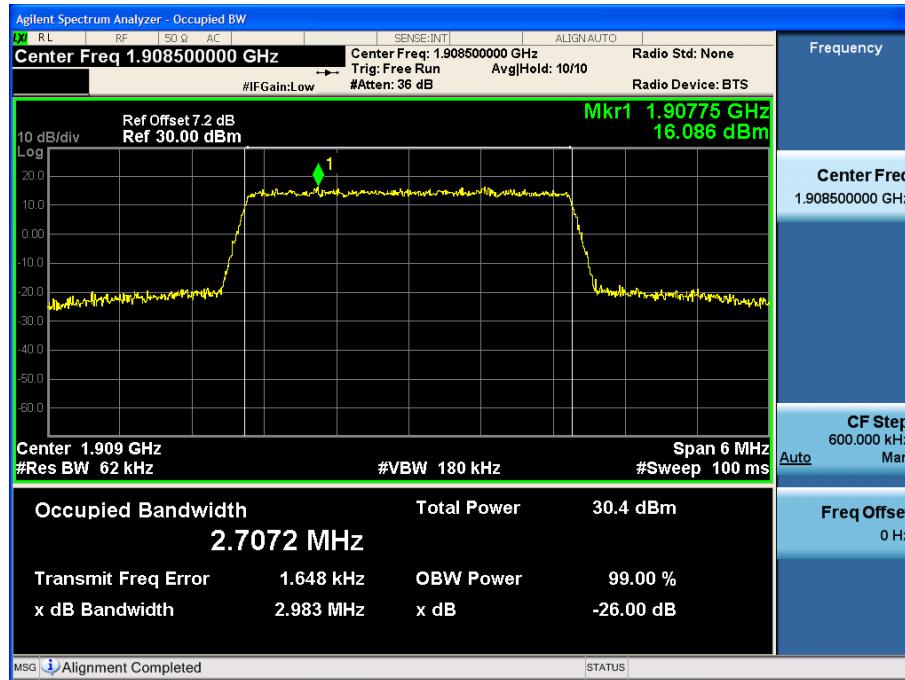




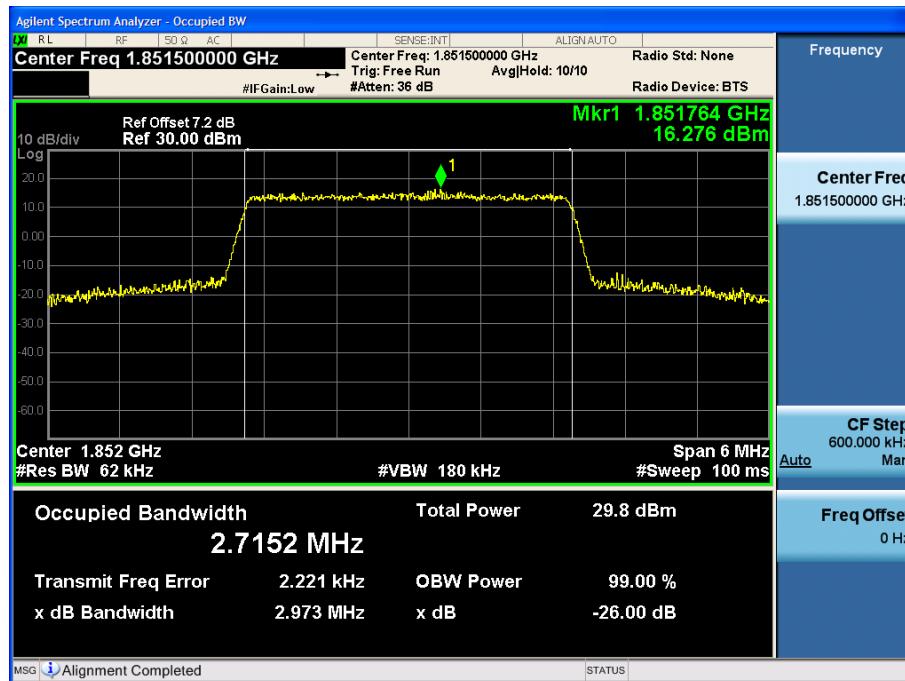
Report No.: ATA160705017F

Page: 42 of 99

## 3MHz Highest QPSK



## 3MHz Lowest 16QAM



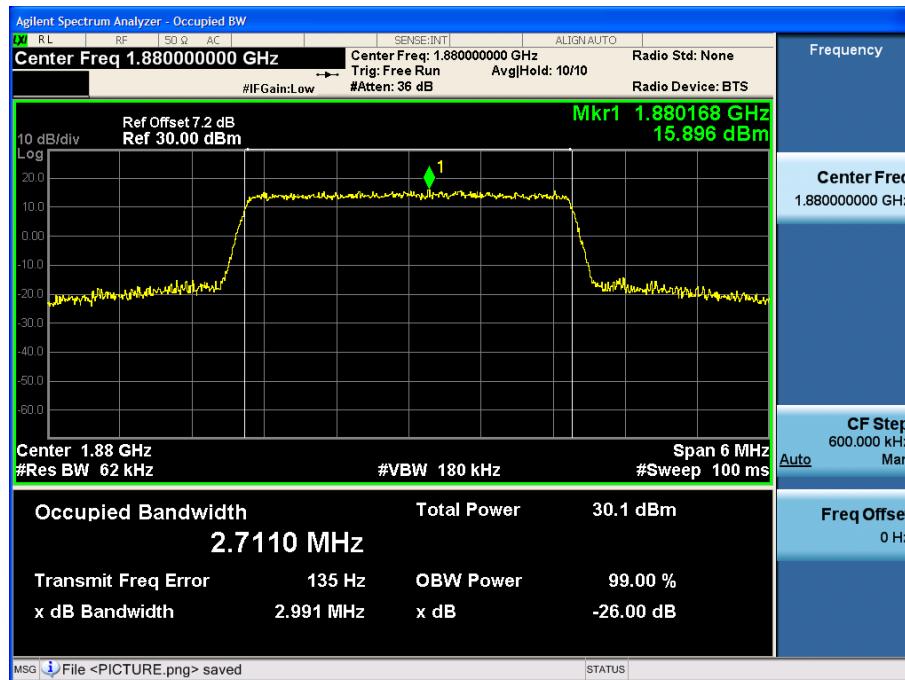


# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 43 of 99

## 3MHz Middle 16QAM



## 3MHz Highest 16QAM

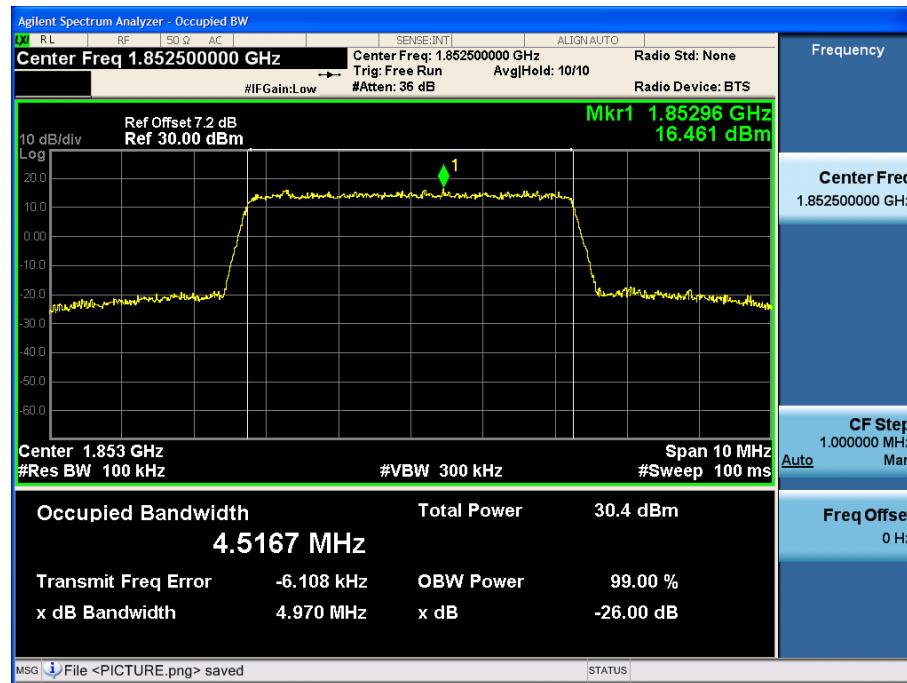




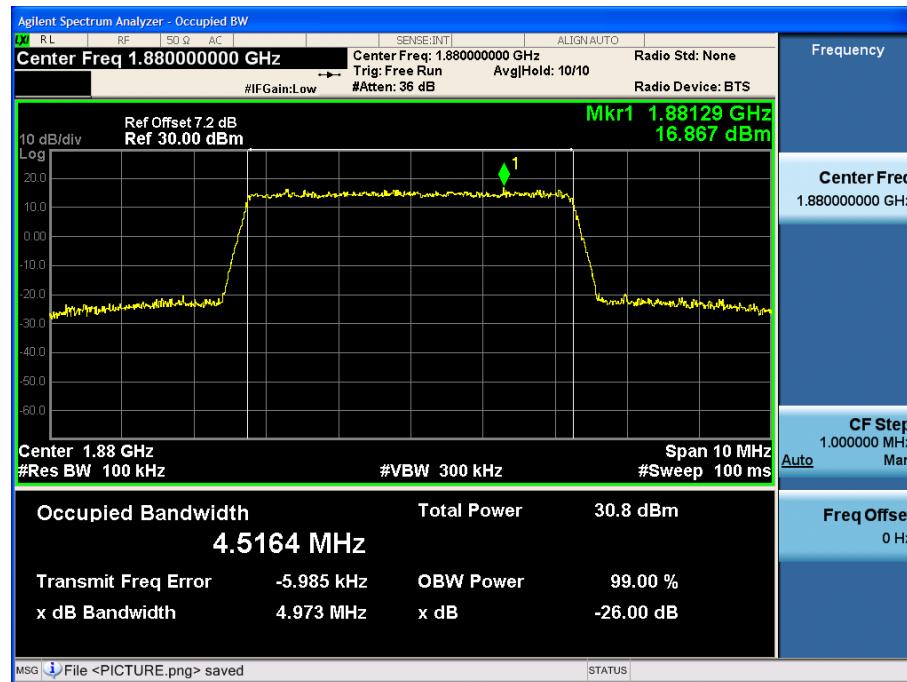
Report No.: ATA160705017F

Page: 44 of 99

## 5MHz Lowest QPSK



## 5MHz Middle QPSK

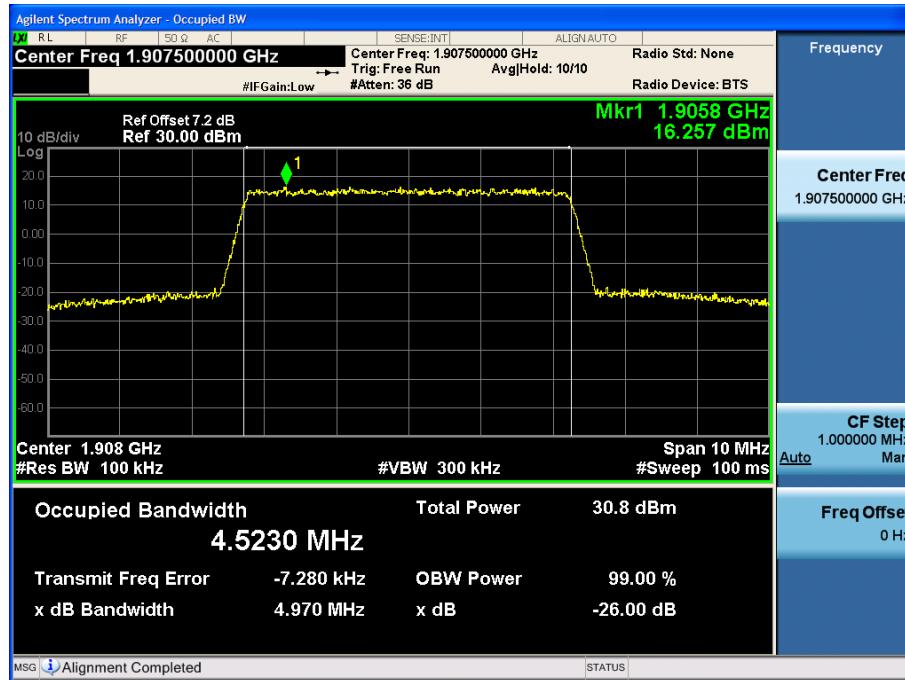




Report No.: ATA160705017F

Page: 45 of 99

## 5MHz Highest QPSK



## 5MHz Lowest 16QAM

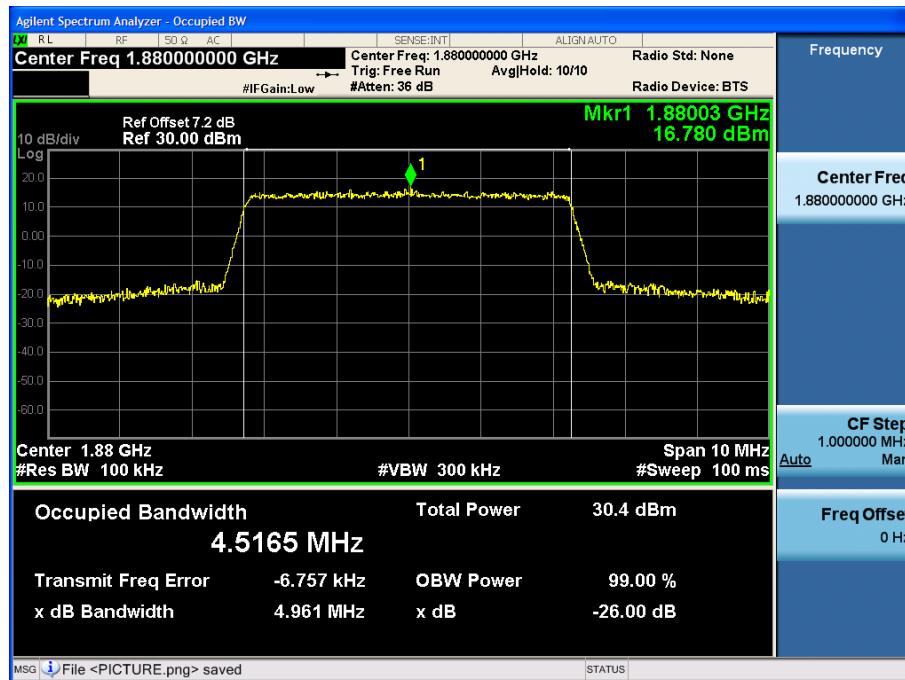




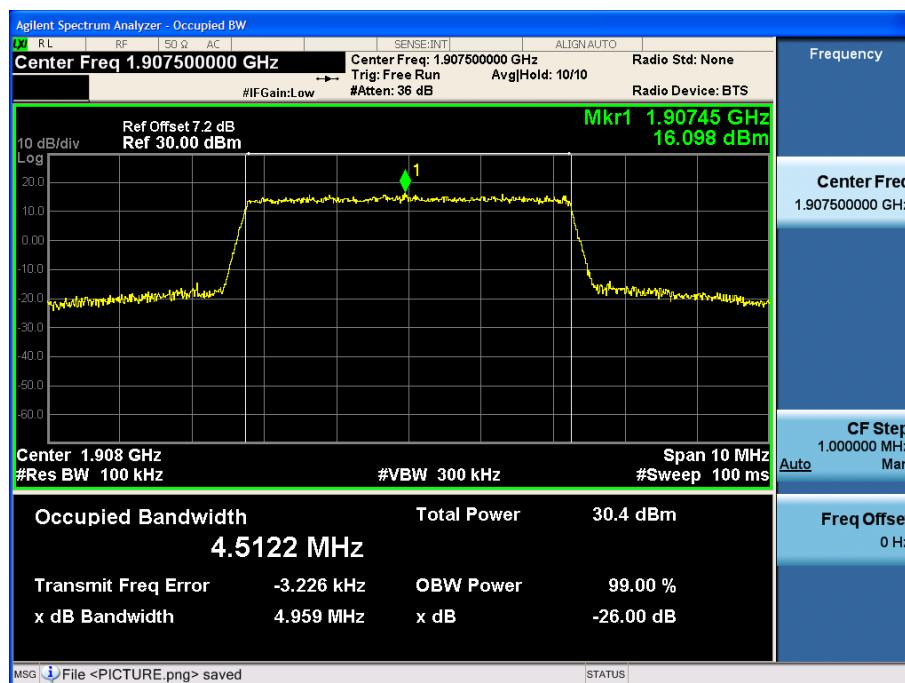
Report No.: ATA160705017F

Page: 46 of 99

## 5MHz Middle 16QAM



## 5MHz Highest 16QAM

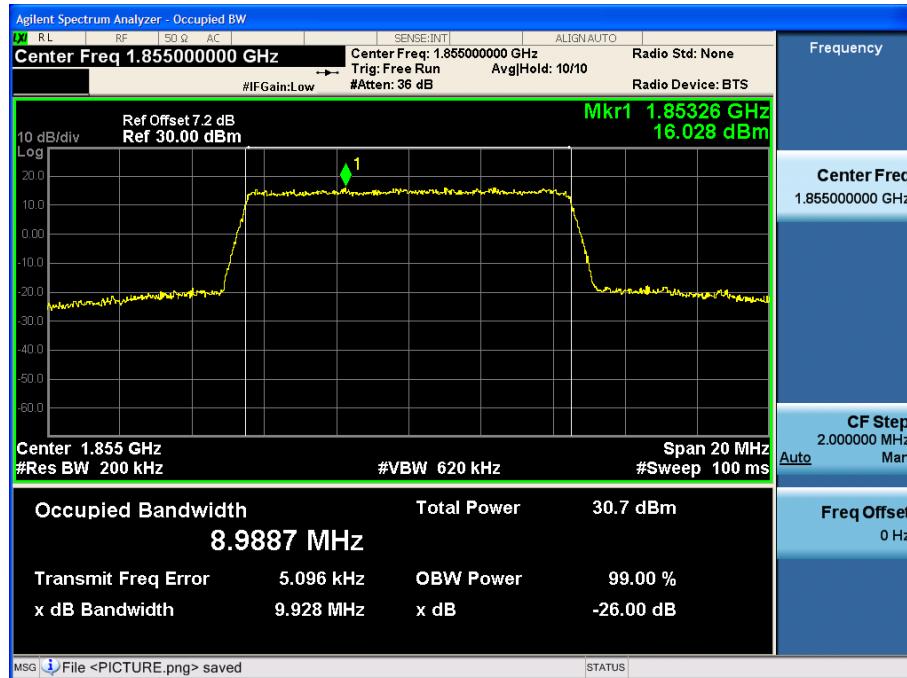




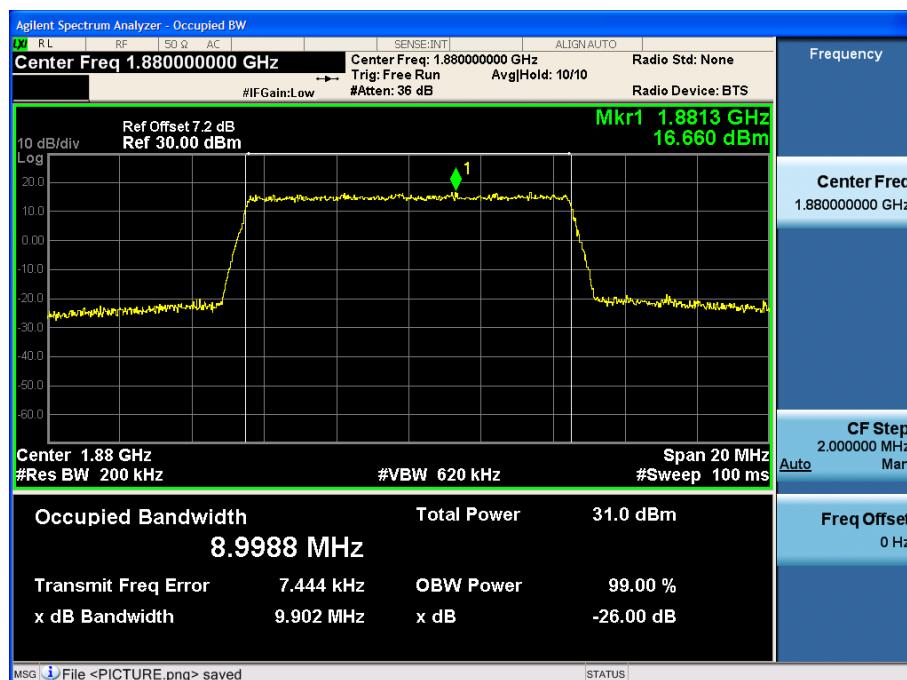
Report No.: ATA160705017F

Page: 47 of 99

## 10MHz Lowest QPSK



## 10MHz Middle QPSK



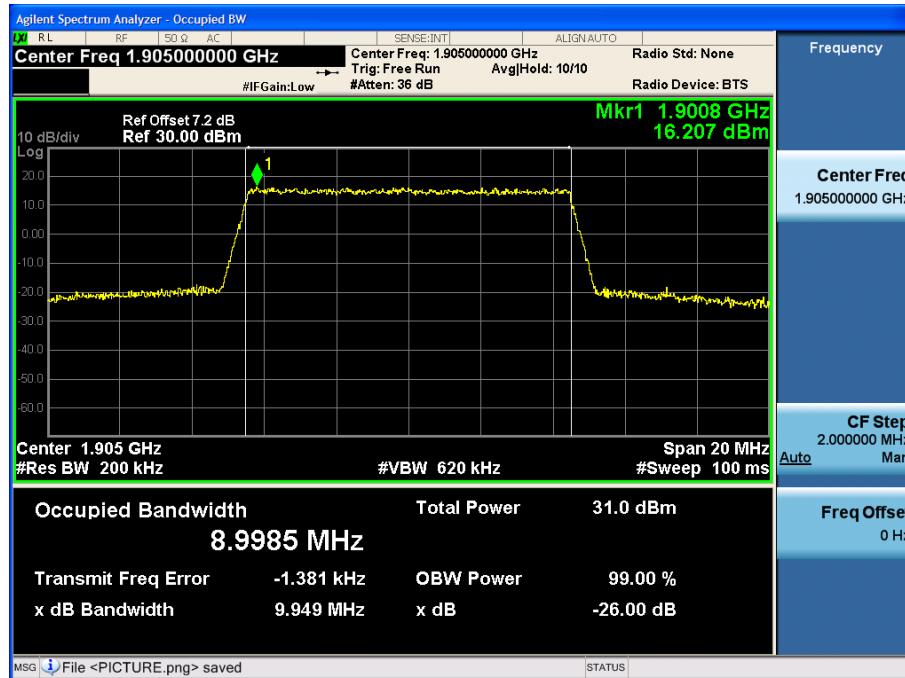


# ATA Testing Technology Service Co., Ltd.

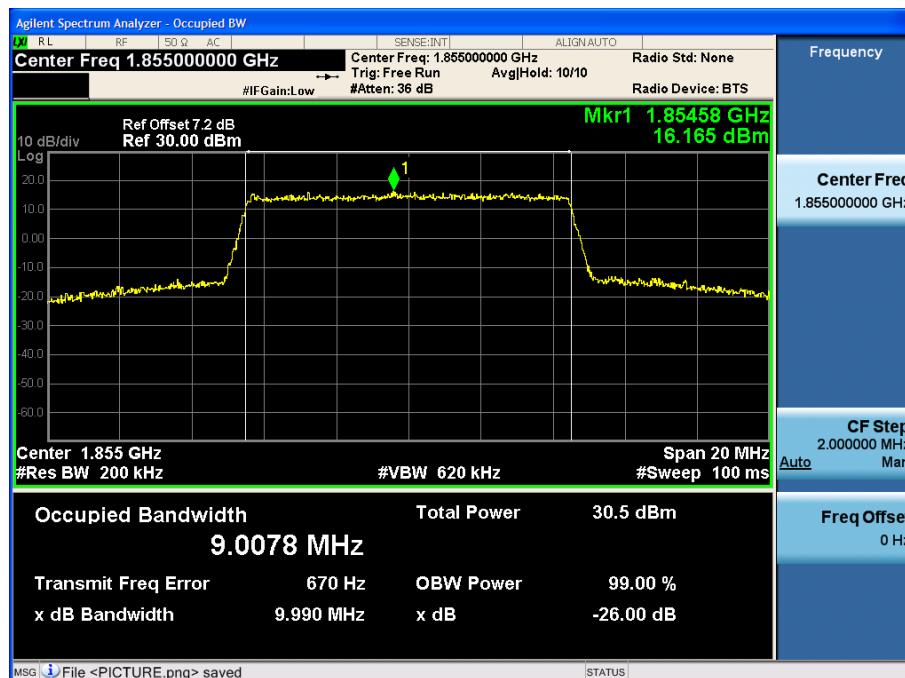
Report No.: ATA160705017F

Page: 48 of 99

## 10MHz Highest QPSK



## 10MHz Lowest 16QAM





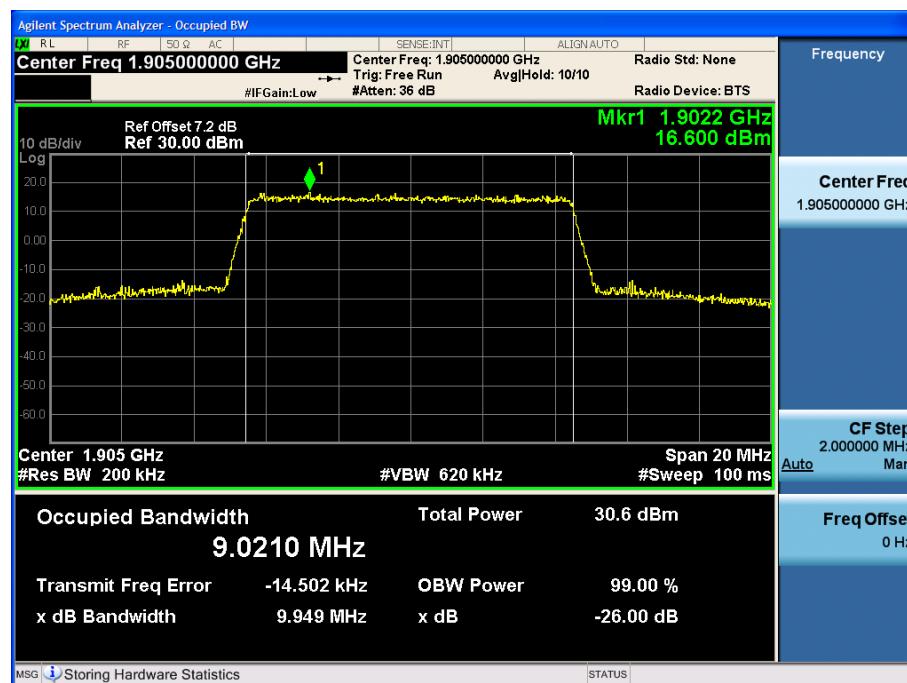
Report No.: ATA160705017F

Page: 49 of 99

## 10MHz Middle 16QAM



## 10MHz Highest 16QAM





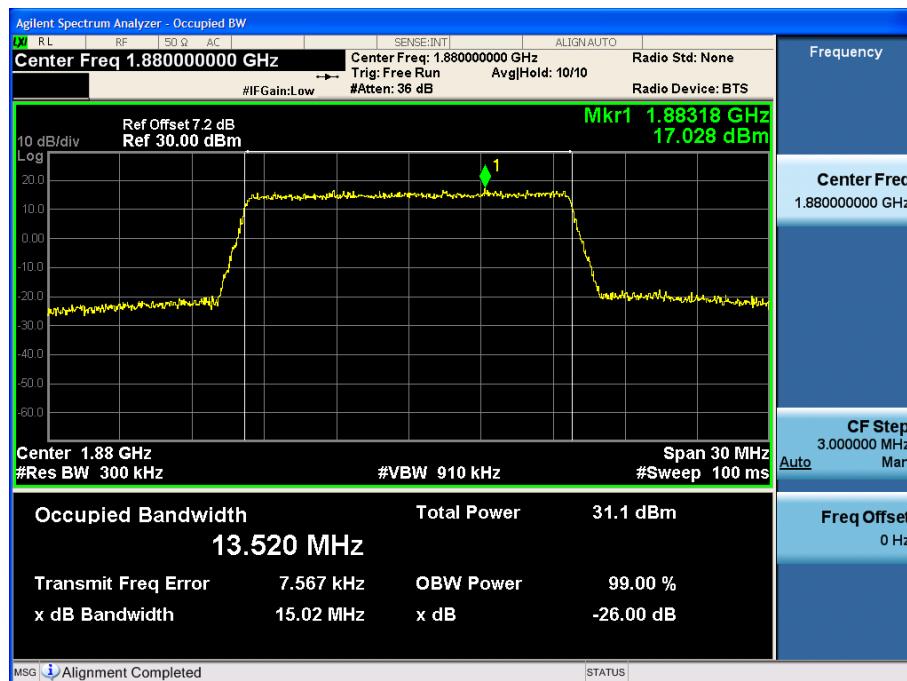
Report No.: ATA160705017F

Page: 50 of 99

## 15MHz Lowest QPSK



## 15MHz Middle QPSK





Report No.: ATA160705017F

Page: 51 of 99

## 15MHz Highest QPSK



## 15MHz Lowest 16QAM



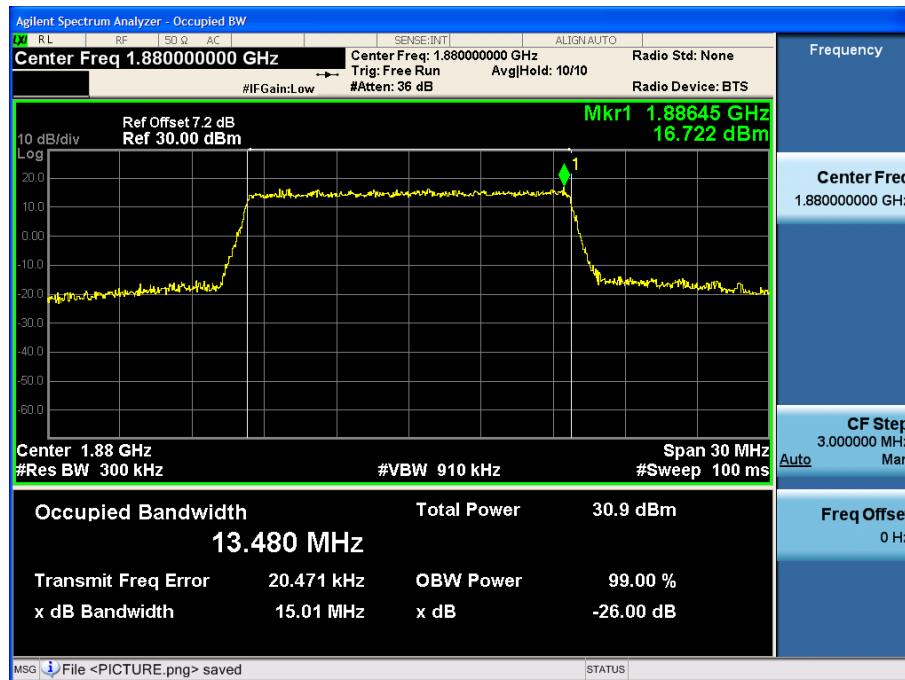


# ATA Testing Technology Service Co., Ltd.

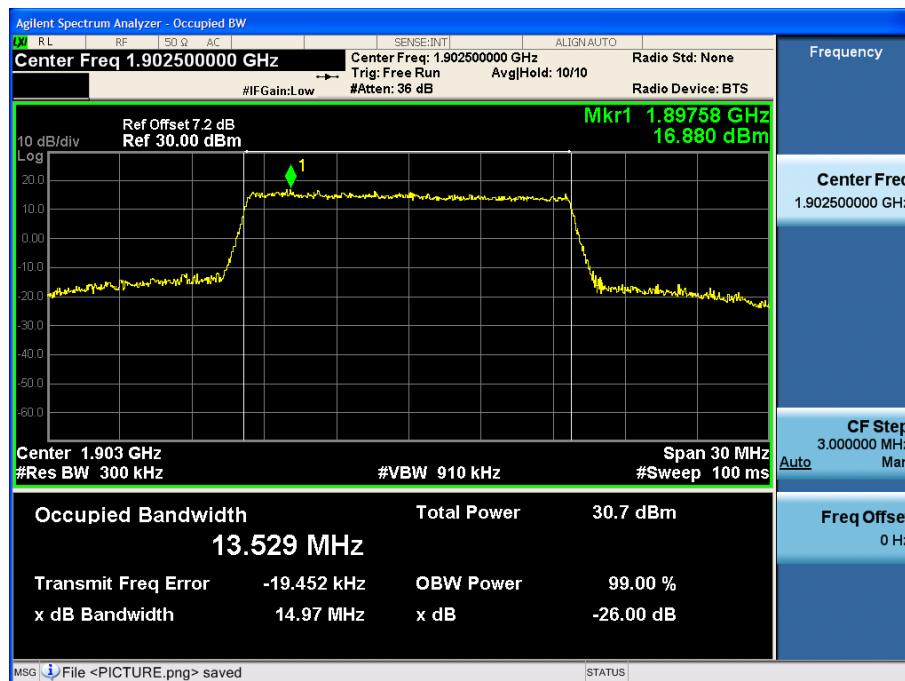
Report No.: ATA160705017F

Page: 52 of 99

## 15MHz Middle 16QAM



## 15MHz Highest 16QAM



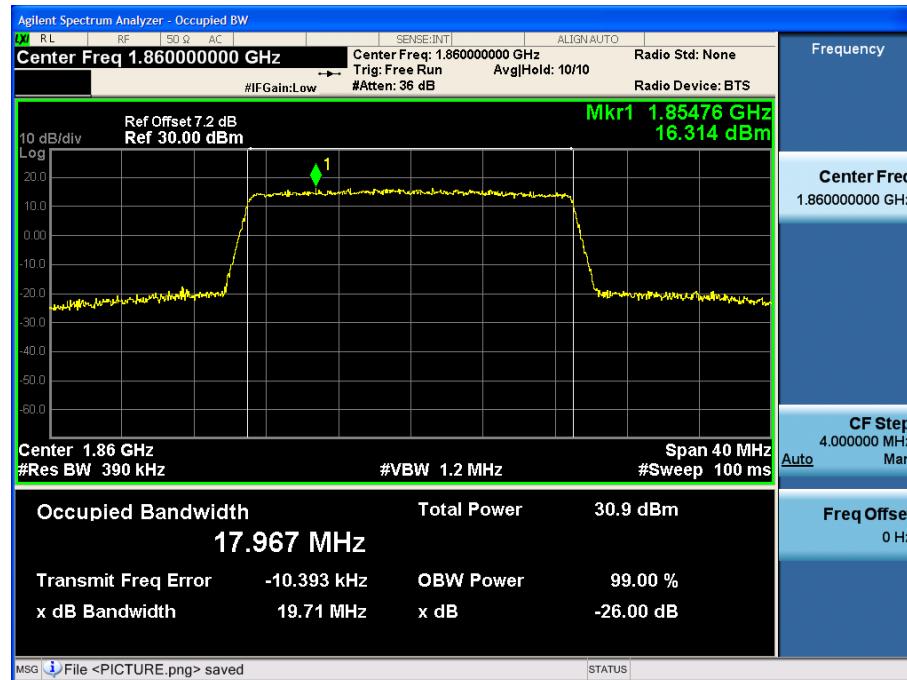


# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 53 of 99

## 20MHz Lowest QPSK



## 20MHz Middle QPSK





# ATA Testing Technology Service Co., Ltd.

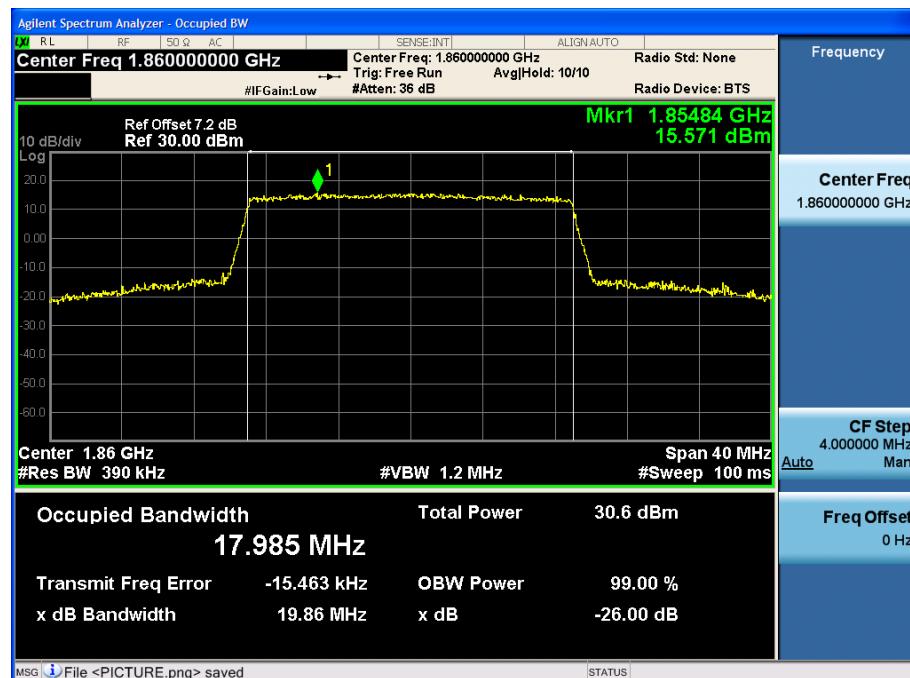
Report No.: ATA160705017F

Page: 54 of 99

## 20MHz Highest QPSK



## 20MHz Lowest 16QAM





# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 55 of 99

## 20MHz Middle 16QAM



## 20MHz Highest 16QAM



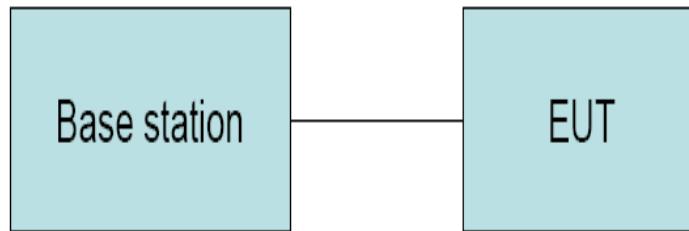


## 6. Frequency Stability

### 6.1. Limit

LTE Band2
Must stay within the authorized frequency block

### 6.2. Test Setup



### 6.3. Test Procedure

#### Test Procedures for Temperature Variation:

1. The EUT was set up in the thermal chamber and connected with the base station.
2. With power OFF, the temperature was decreased to -10°C and the EUT was stabilized for three hours. Power was applied and the maximum change in frequency was recorded within one minute.
3. With power OFF, the temperature was raised in 10°C step up to 45°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.
4. If the EUT can not be turned on at -10°C, the testing lowest temperature will be raised in 10°C step until the EUT can be turned on.

#### Test Procedures for Voltage Variation

1. The EUT was placed in a temperature chamber at 25±5° C and connected with the base station.
2. The power supply voltage to the EUT was varied from DC 5V to 3.5V
3. The variation in frequency was measured for the worst case.



# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 57 of 99

## 6.4. Test Data

Test Conditions		(QPSK) / Middle Channel		Limit
Temperature (°C)	Voltage (Volt)	BW 10MHz		Note
		Deviation (Hz)	Deviation (ppm)	Result
50°C	Normal Voltage	25	0.013	PASS
30°C	Normal Voltage	22	0.012	
20°C	Normal Voltage	31	0.016	
10°C	Normal Voltage	-22	-0.012	
0°C	Normal Voltage	-23	-0.012	
-10°C	Normal Voltage	23	0.012	
-20°C	Normal Voltage	32	0.017	
-30°C	Normal Voltage	31	0.016	
25°C	Maximum Voltage	-32	-0.017	
25°C	Normal Voltage	-26	-0.014	
25°C	Minimum Voltage	-21	-0.011	

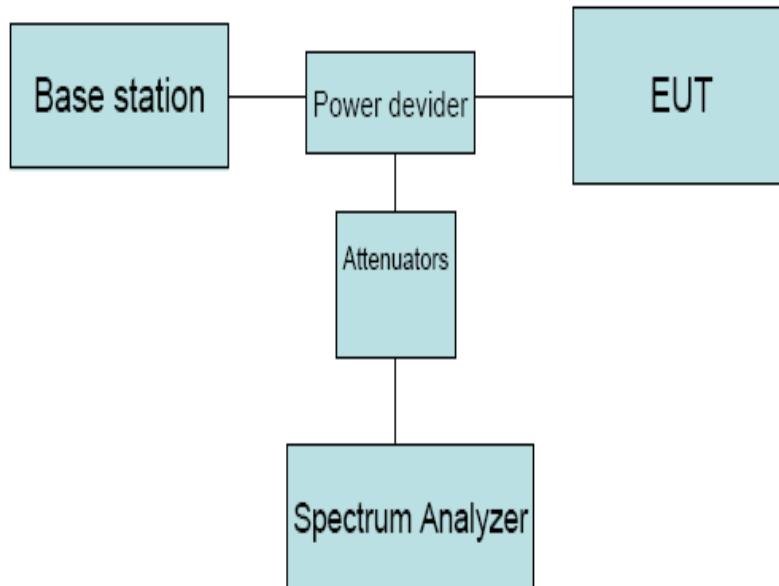


## 7. Conducted Spurious Emission

### 7.1. Limit

The mean power of emissions must be attenuated below the mean power of the unmodulated carrier ( $P$ ) on any frequency outside the frequency band by at least  $(43 + 10 \log P)$  dB, in this case, -13dBm.

### 7.2. Test Setup



### 7.3. Test Procedure

1. The EUT was connected to spectrum analyzer and base station via power divider.
2. The low, middle and high channels of each band and mode's spurious emissions for 30MHz to 10th Harmonic were measured by Spectrum analyzer.

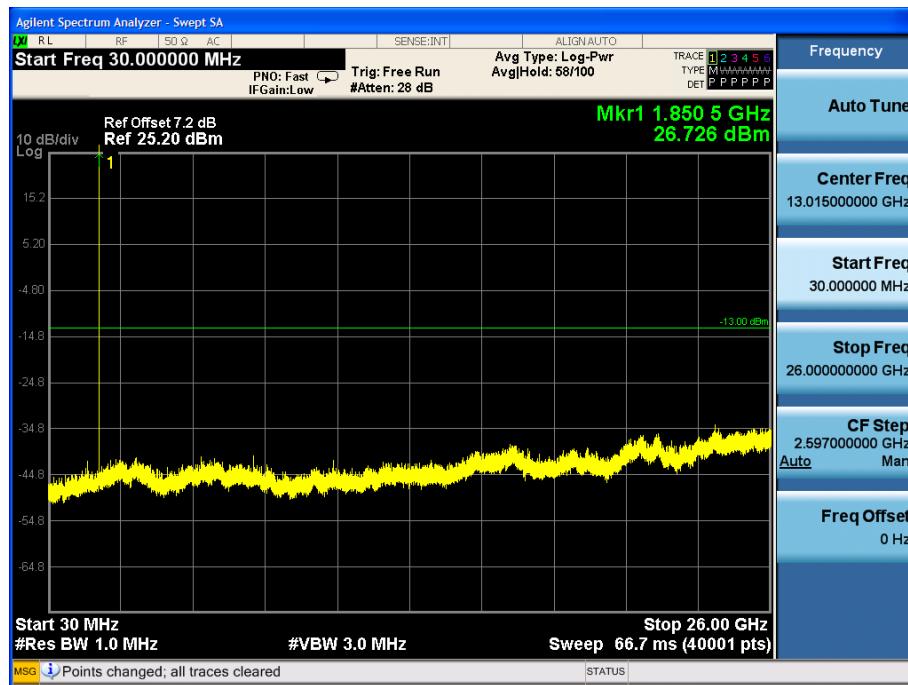


Report No.: ATA160705017F

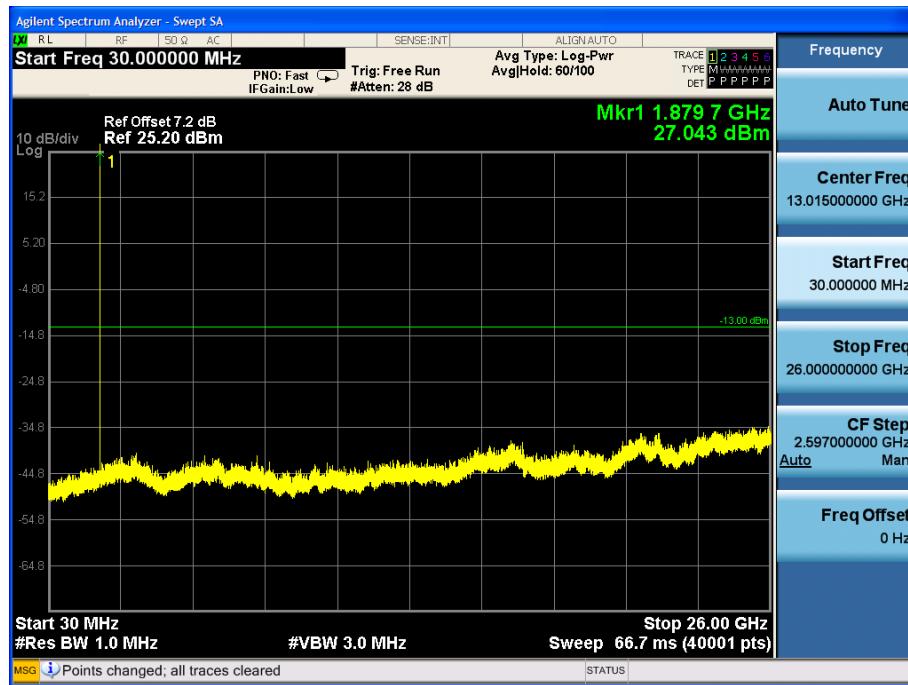
Page: 59 of 99

## 7.4. Test Plot

QPSK 1.4MHz Low



QPSK 1.4MHz Middle



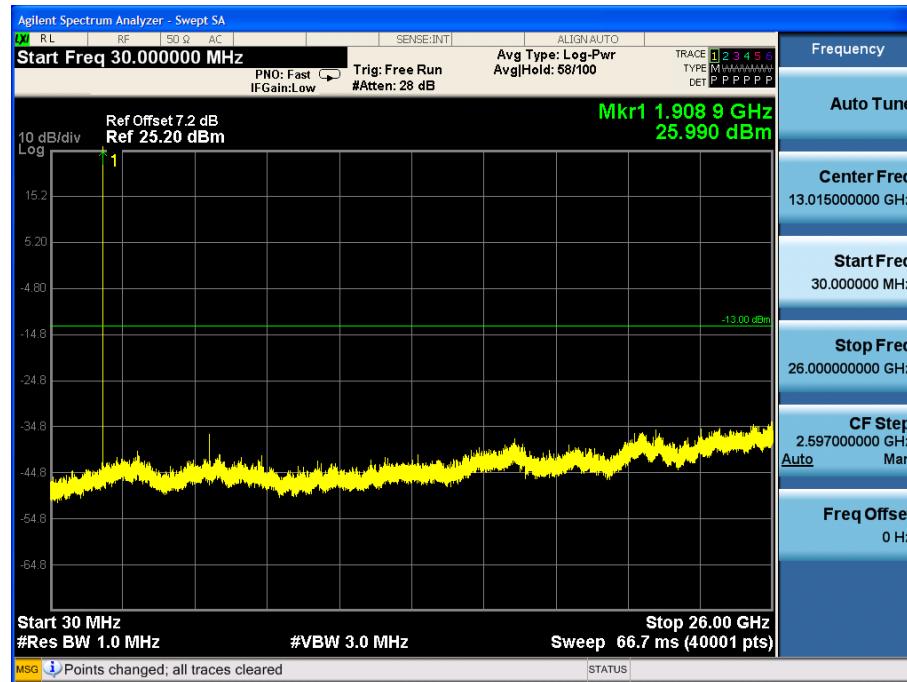


# ATA Testing Technology Service Co., Ltd.

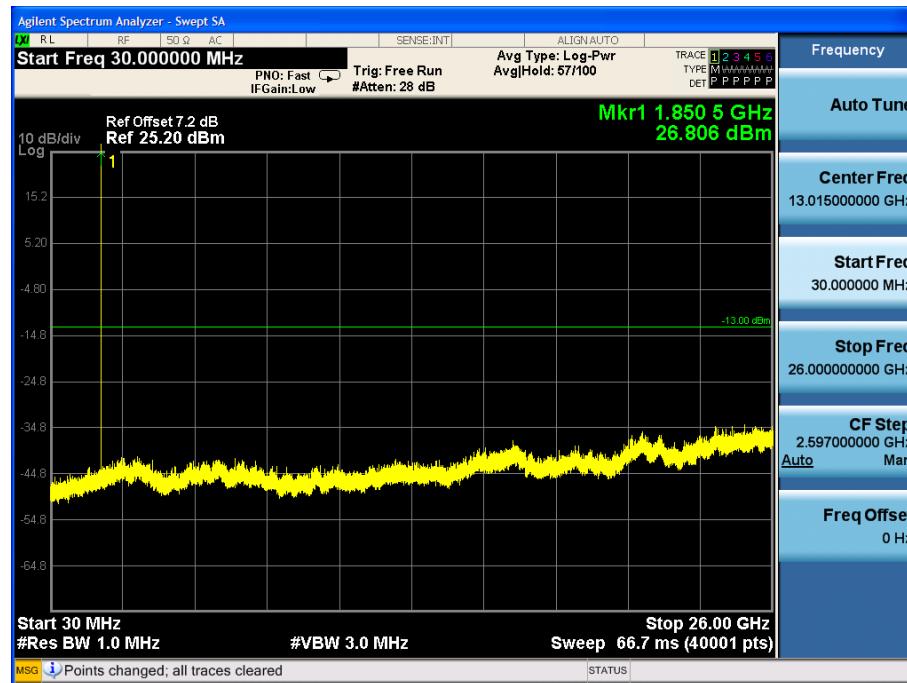
Report No.: ATA160705017F

Page: 60 of 99

QPSK 1.4MHz High



16QAM 1.4MHz Low



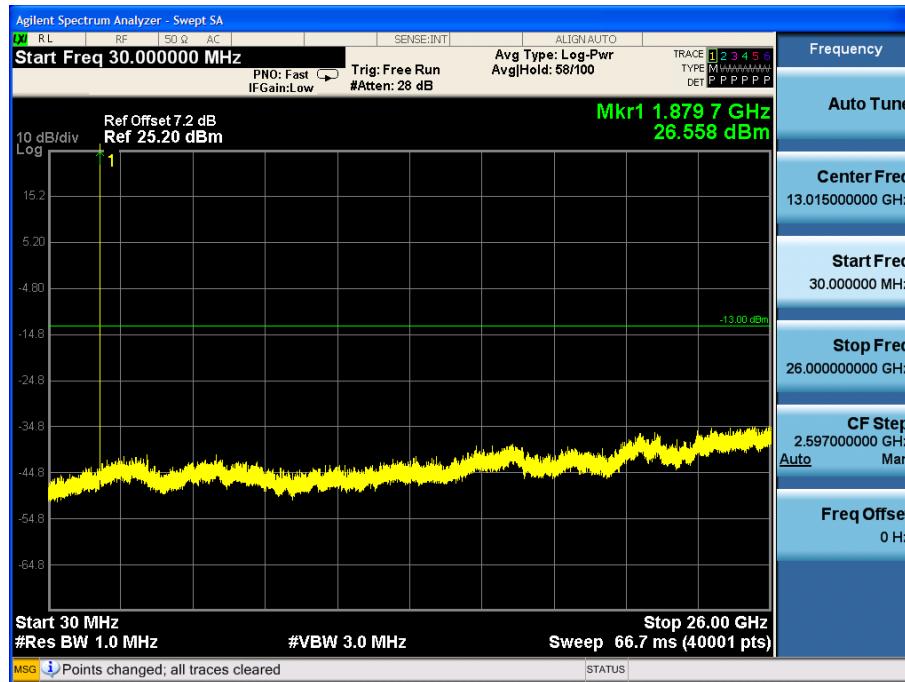


# ATA Testing Technology Service Co., Ltd.

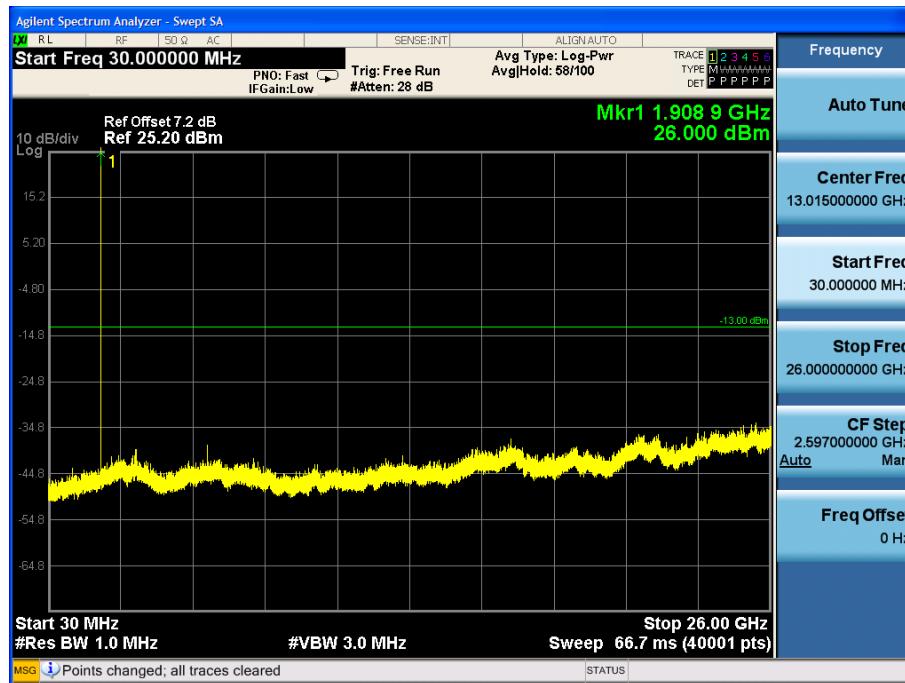
Report No.: ATA160705017F

Page: 61 of 99

## 16QAM 1.4MHz Middle



## 16QAM 1.4MHz High



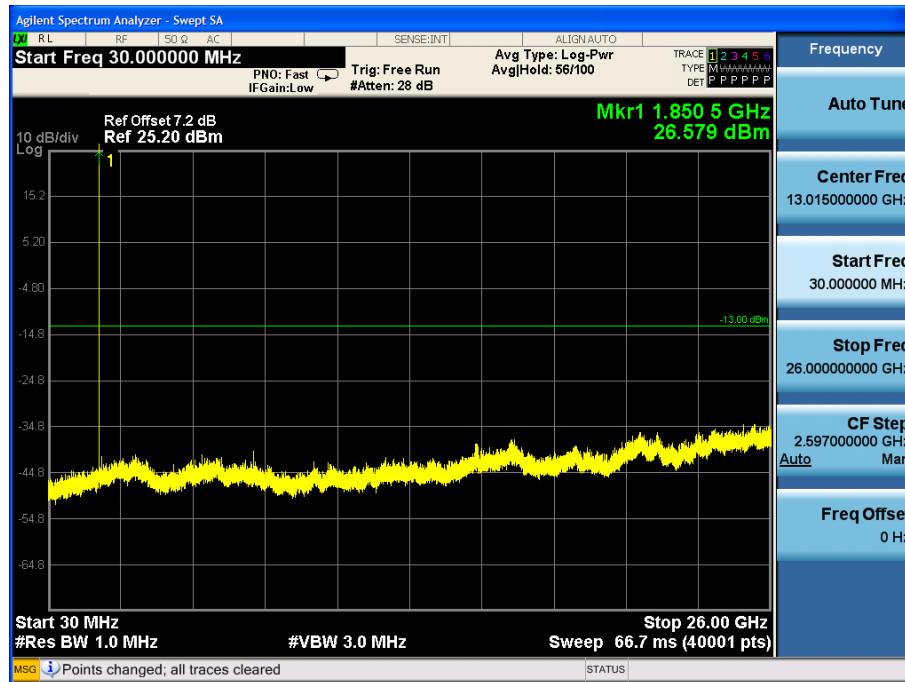


# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 62 of 99

## QPSK 3MHz Low



## QPSK 3MHz Middle



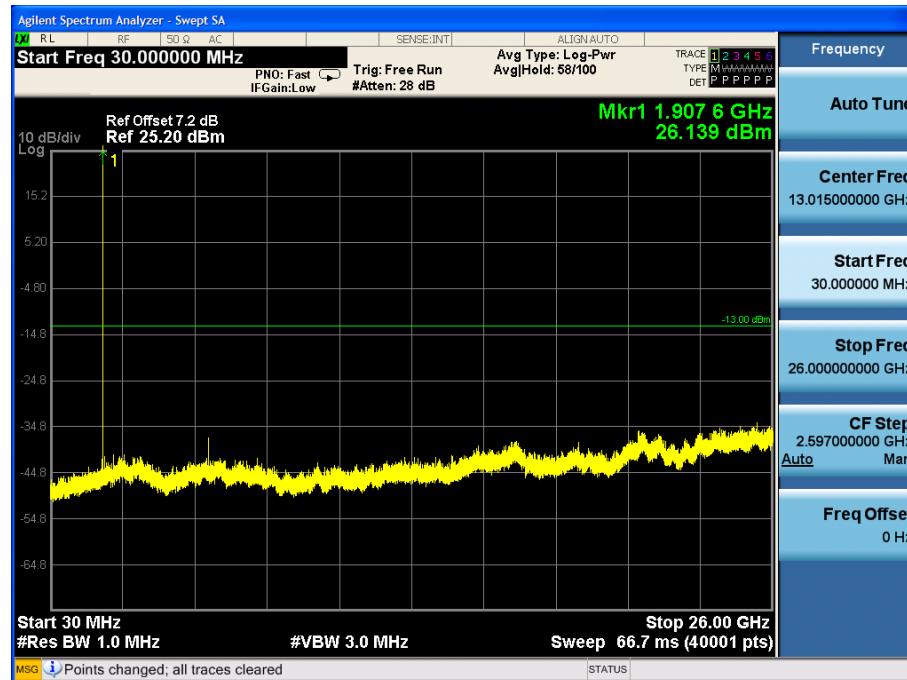


# ATA Testing Technology Service Co., Ltd.

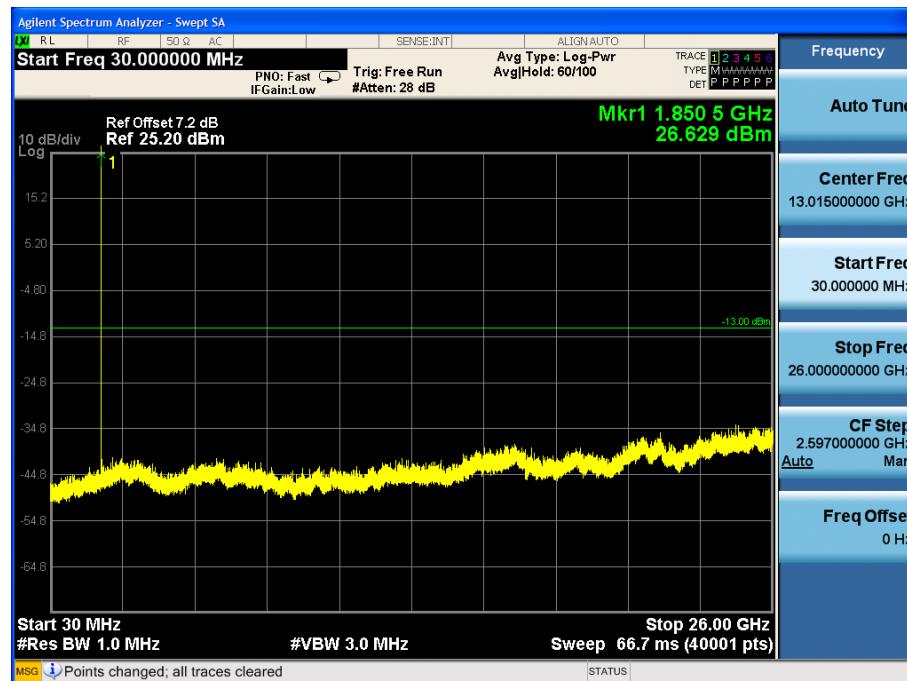
Report No.: ATA160705017F

Page: 63 of 99

QPSK 3MHz High



16QAM 3MHz Low



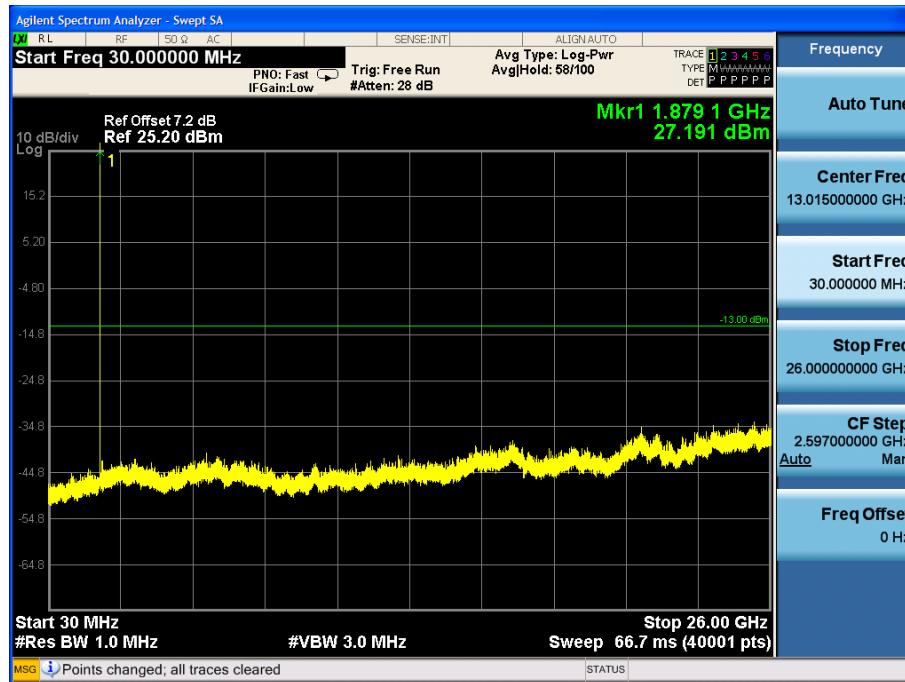


# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 64 of 99

## 16QAM 3MHz Middle



## 16QAM 3MHz High



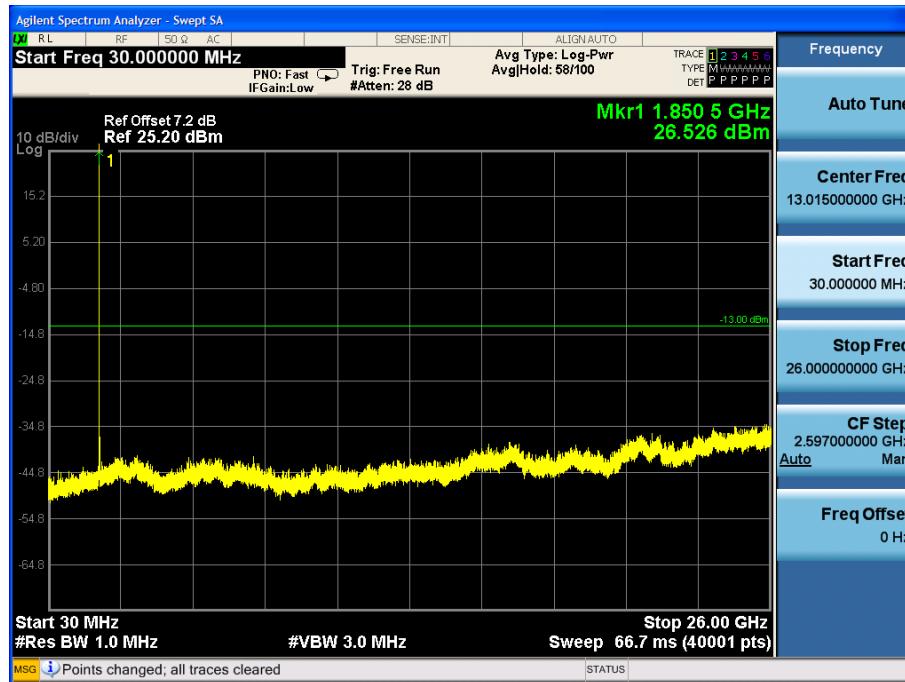


# ATA Testing Technology Service Co., Ltd.

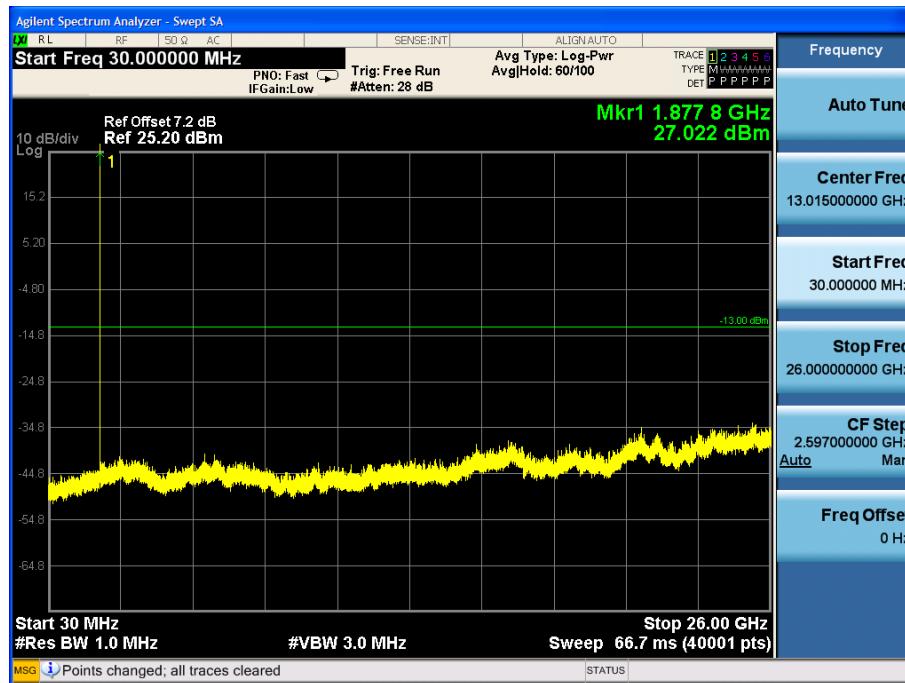
Report No.: ATA160705017F

Page: 65 of 99

## QPSK 5MHz Low



## QPSK 5MHz Middle



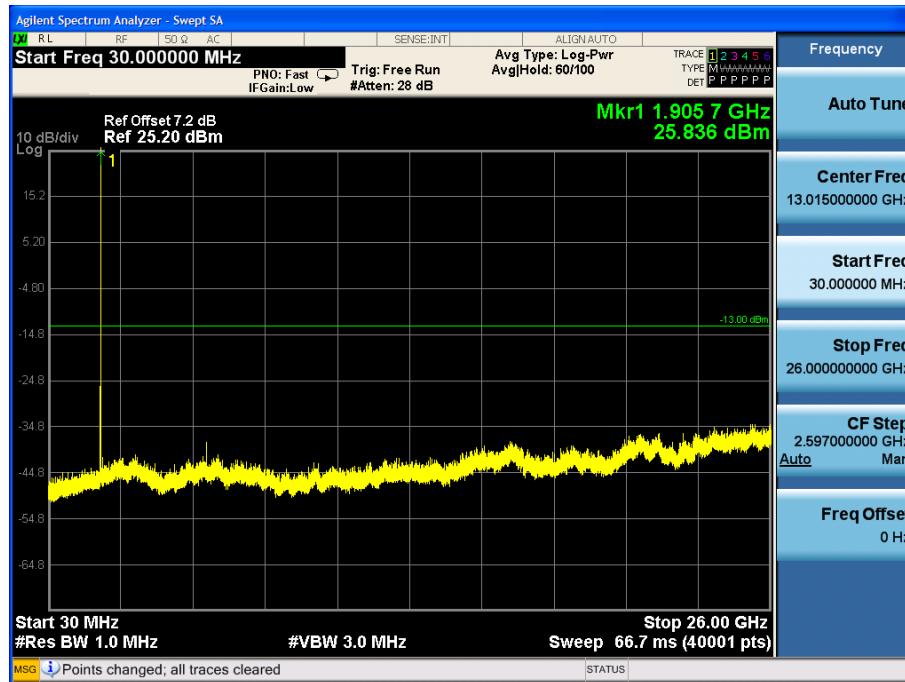


# ATA Testing Technology Service Co., Ltd.

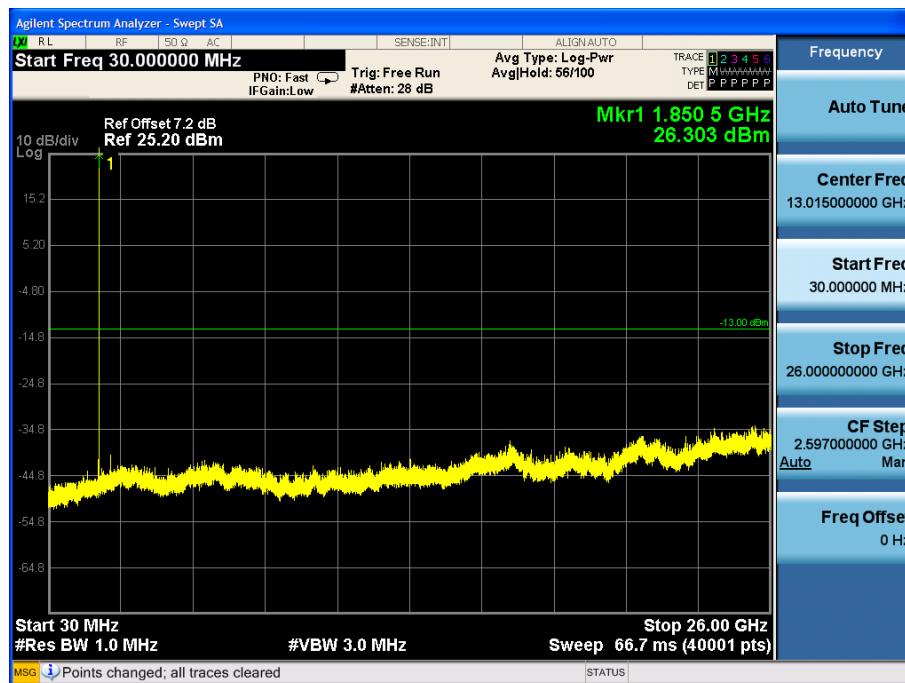
Report No.: ATA160705017F

Page: 66 of 99

QPSK 5MHz High



16QAM 5MHz Low



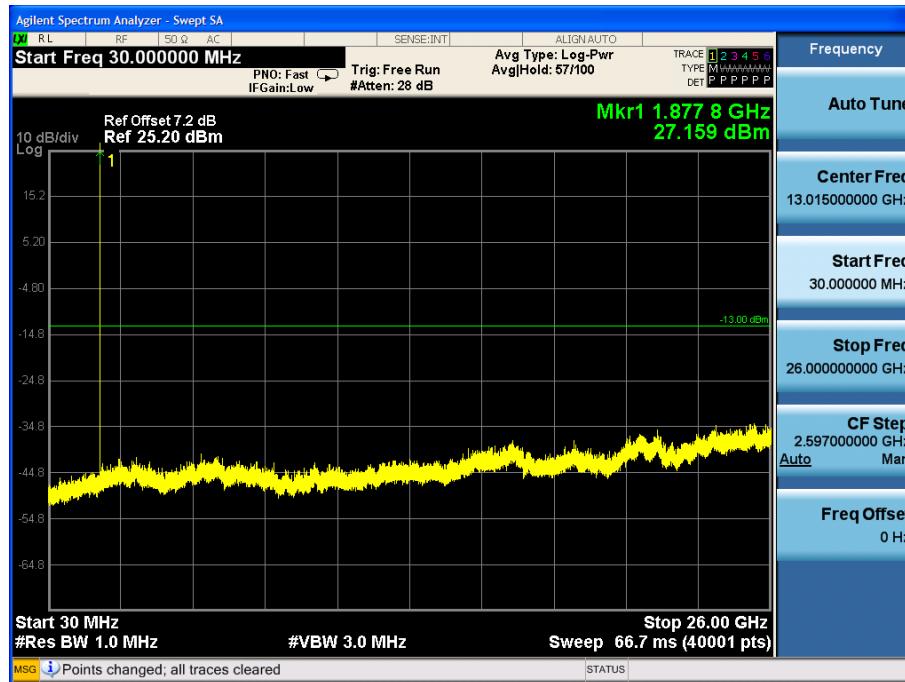


# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 67 of 99

## 16QAM 5MHz Middle



## 16QAM 5MHz High



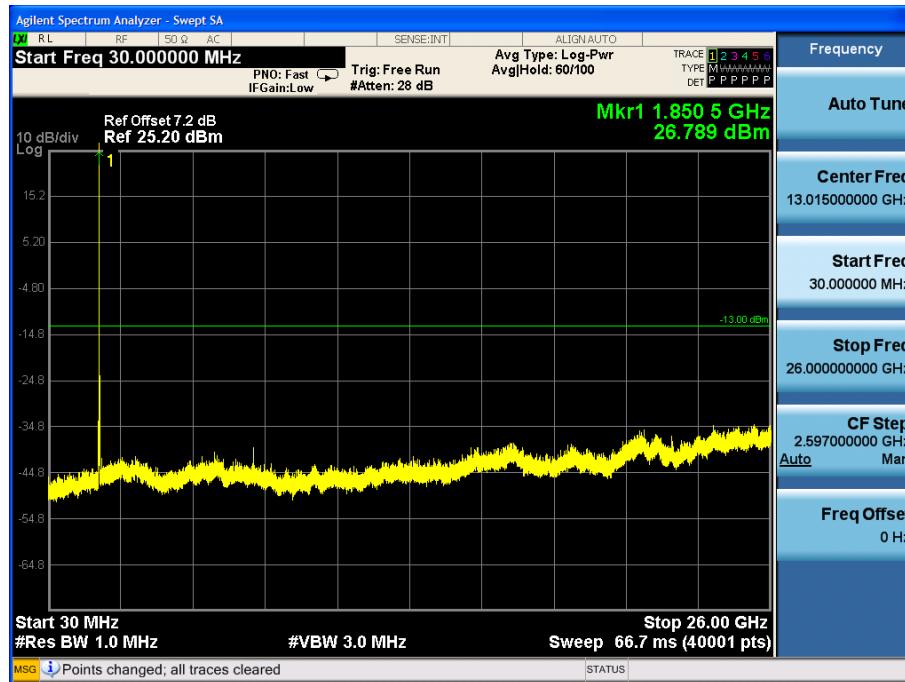


# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 68 of 99

QPSK 10MHz Low



QPSK 10MHz Middle



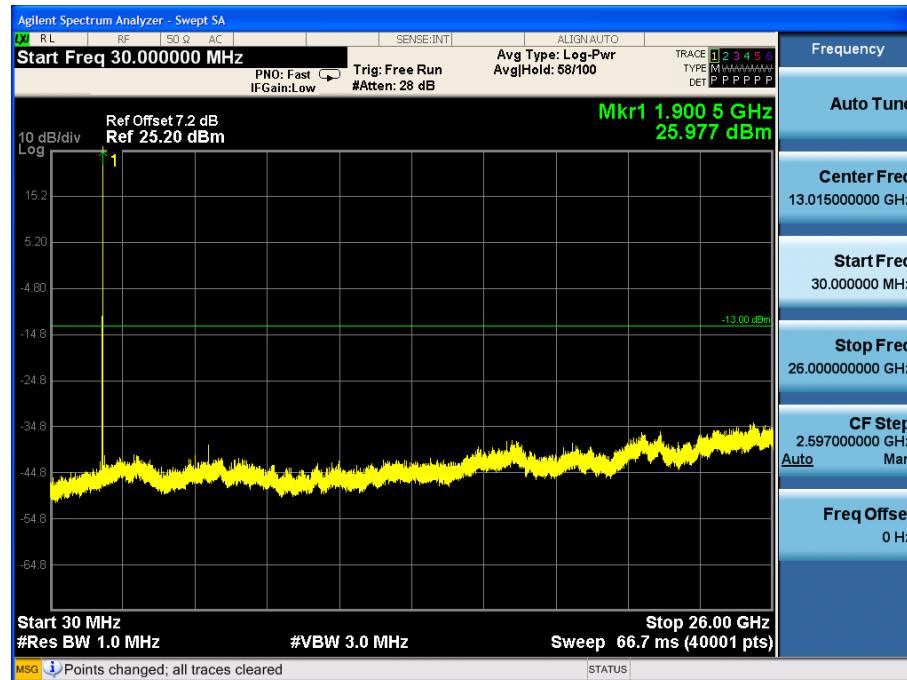


# ATA Testing Technology Service Co., Ltd.

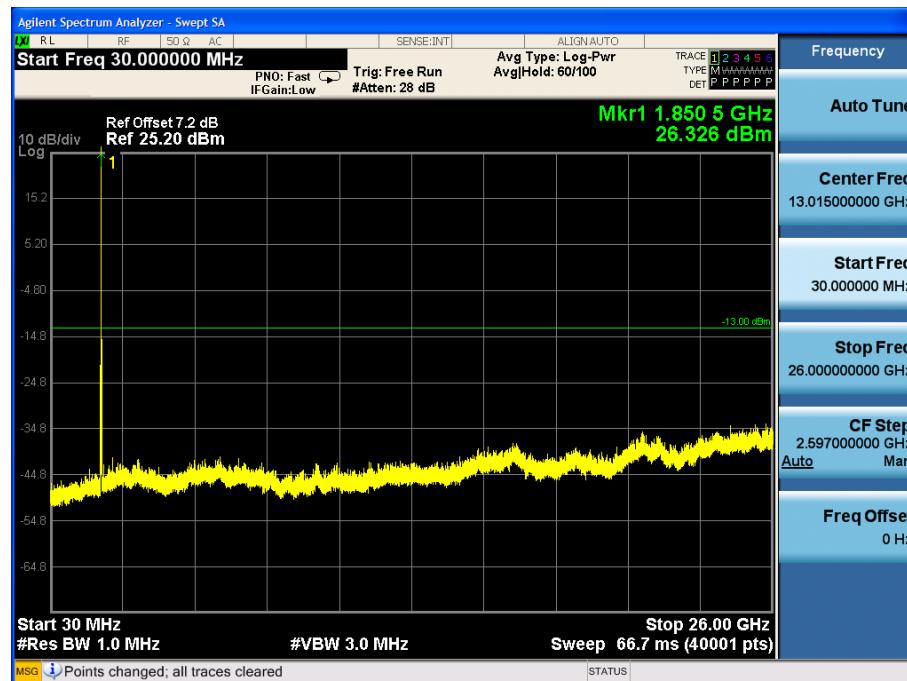
Report No.: ATA160705017F

Page: 69 of 99

QPSK 10MHz High



16QAM 10MHz Low



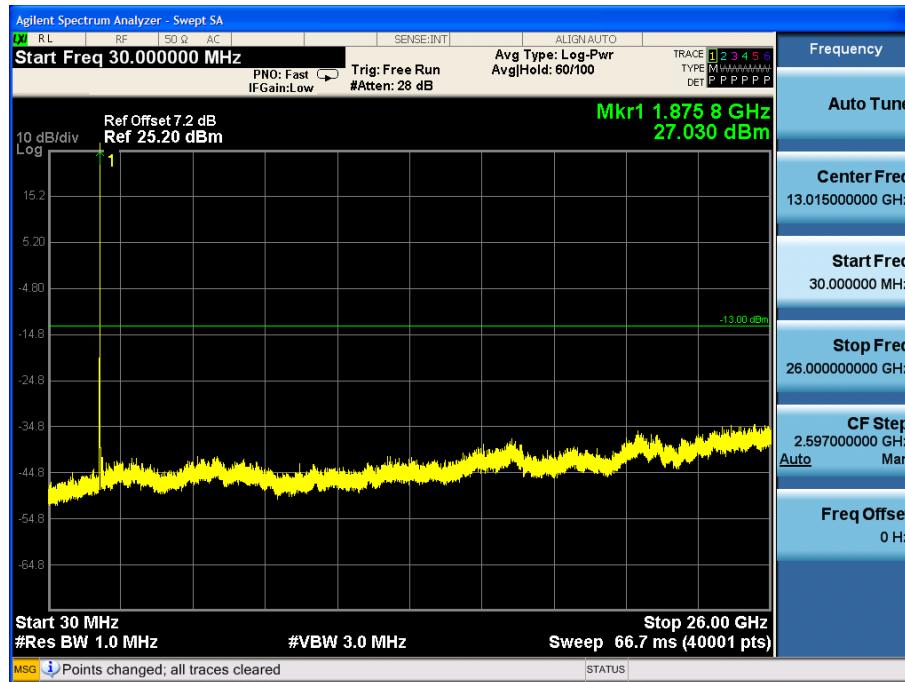


# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 70 of 99

## 16QAM 10MHz Middle



## 16QAM 10MHz High



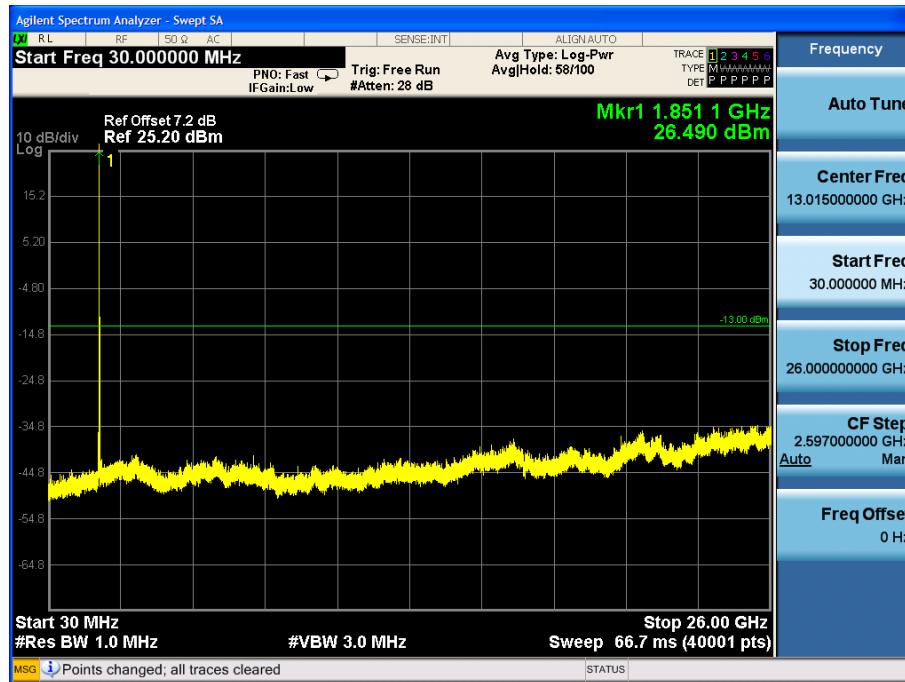


# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 71 of 99

QPSK 15MHz Low



QPSK 15MHz Middle



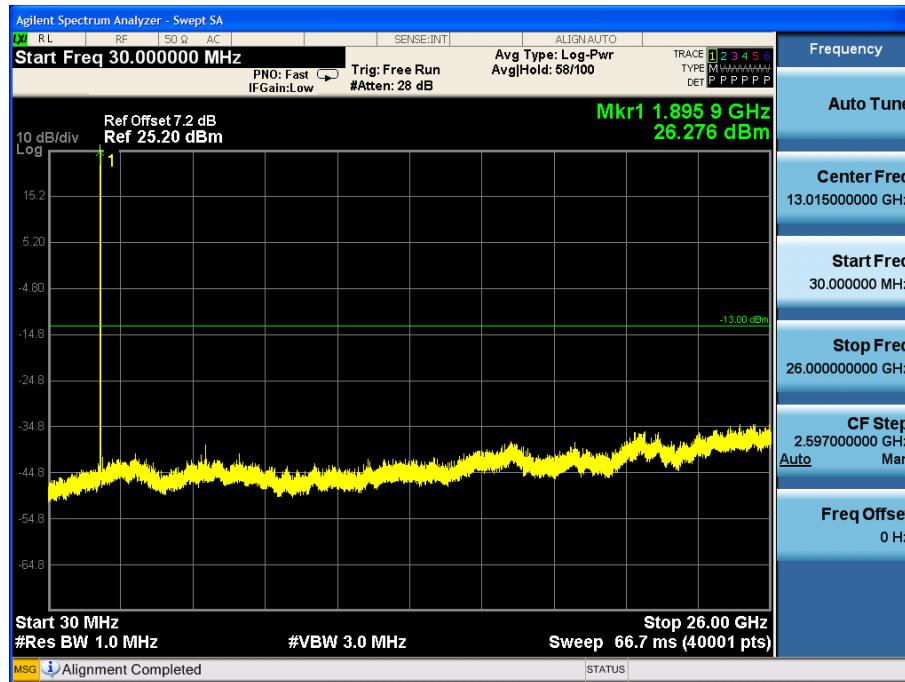


# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 72 of 99

QPSK 15MHz High



16QAM 15MHz Low



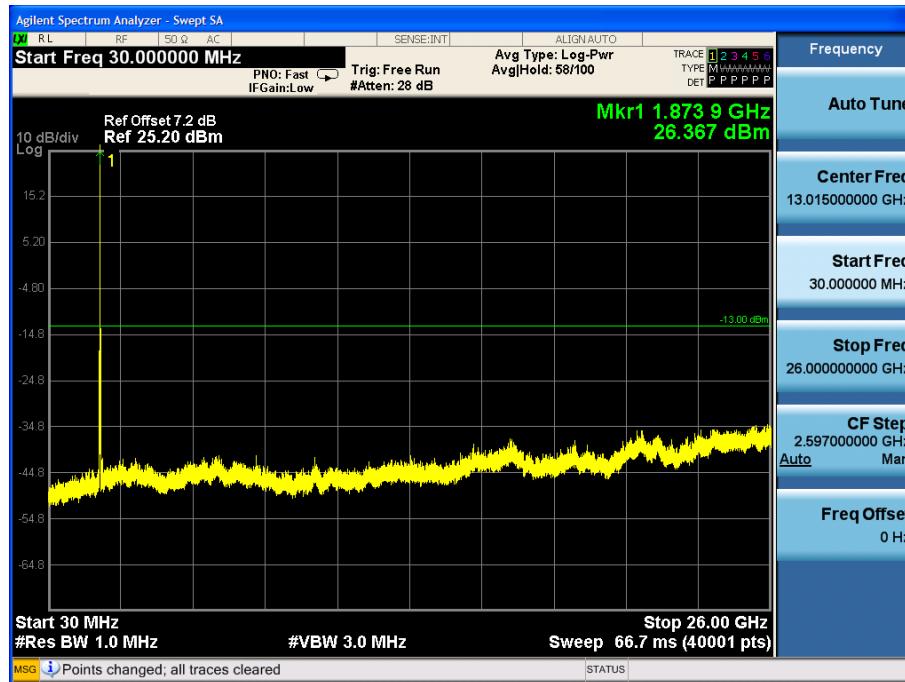


# ATA Testing Technology Service Co., Ltd.

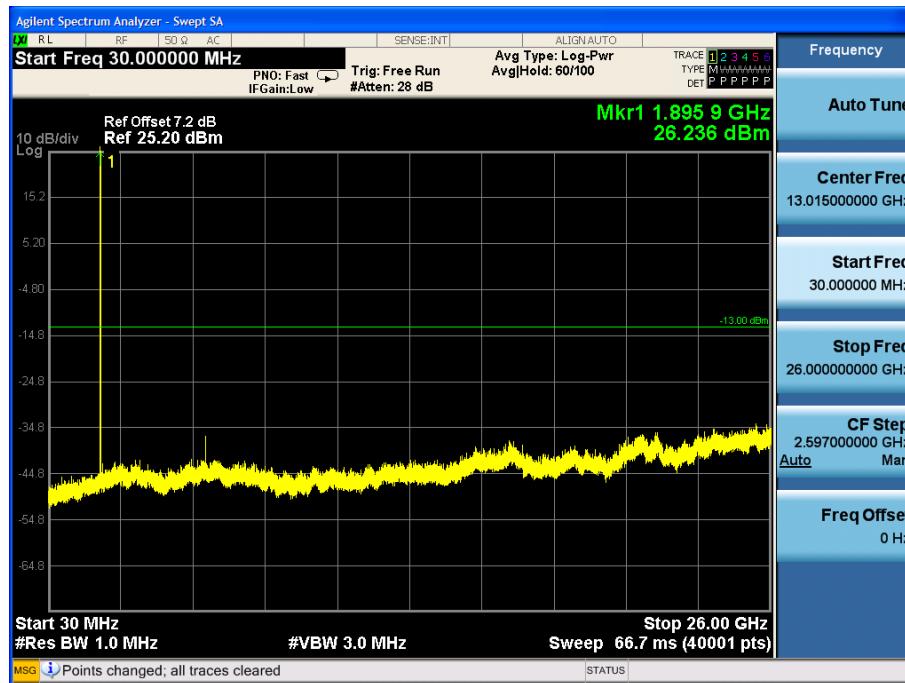
Report No.: ATA160705017F

Page: 73 of 99

## 16QAM 15MHz Middle



## 16QAM 15MHz High



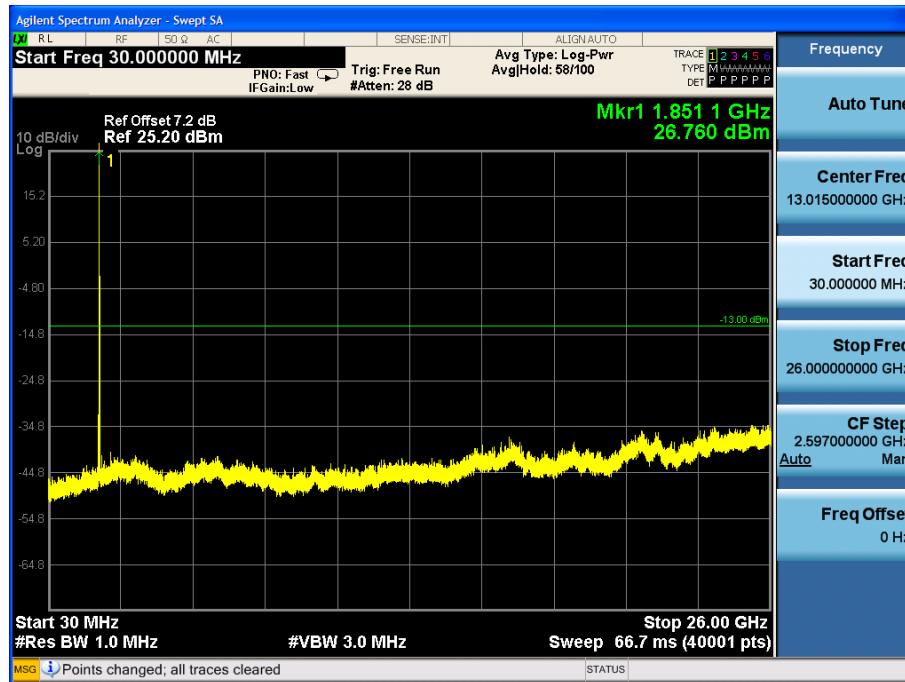


# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 74 of 99

QPSK 20MHz Low



QPSK 20MHz Middle



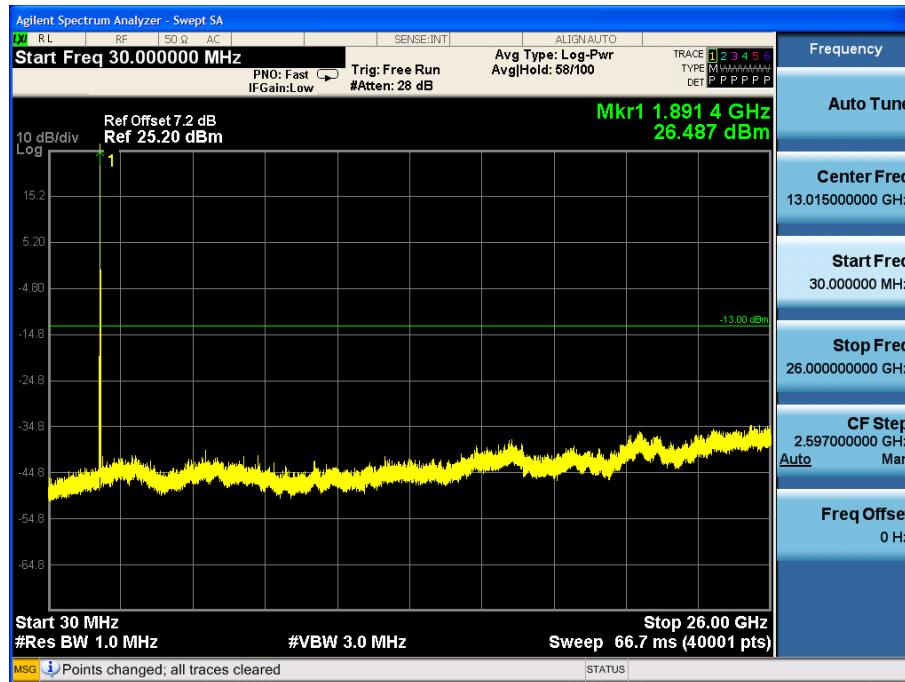


# ATA Testing Technology Service Co., Ltd.

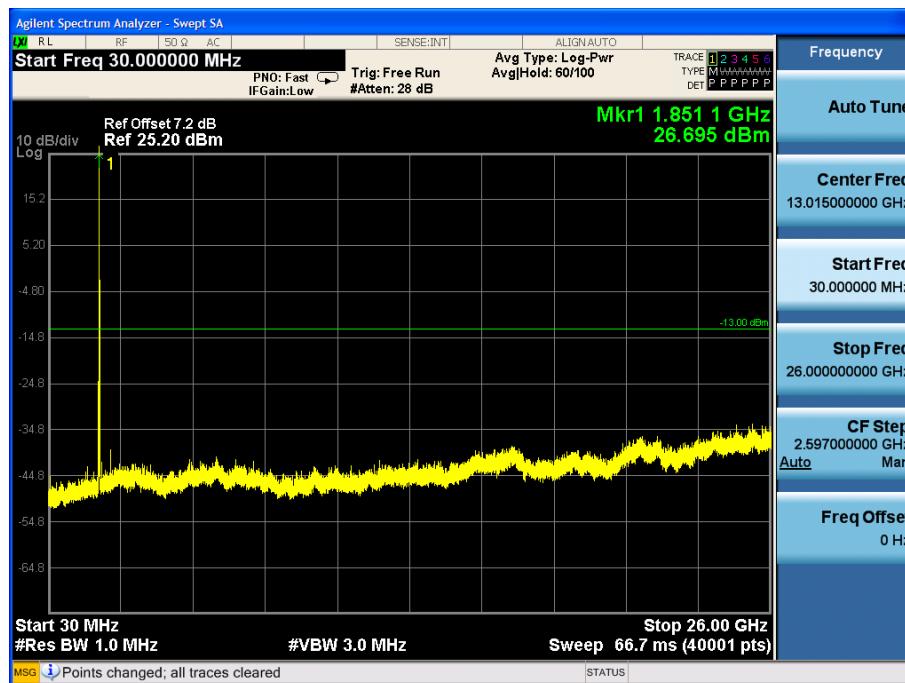
Report No.: ATA160705017F

Page: 75 of 99

QPSK 20MHz High



16QAM 20MHz Low



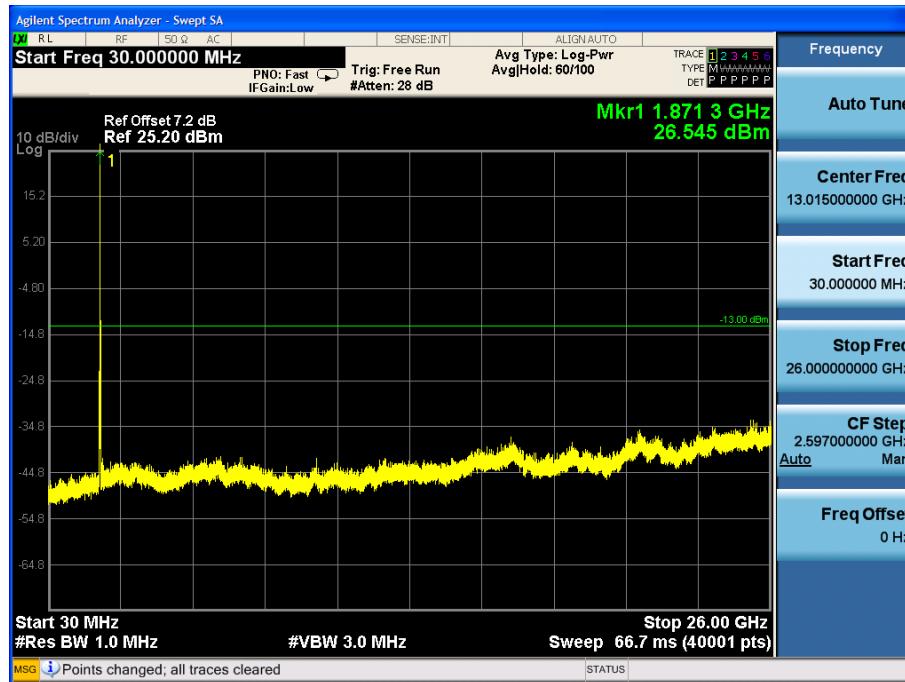


# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 76 of 99

## 16QAM 20MHz Middle



## 16QAM 20MHz High



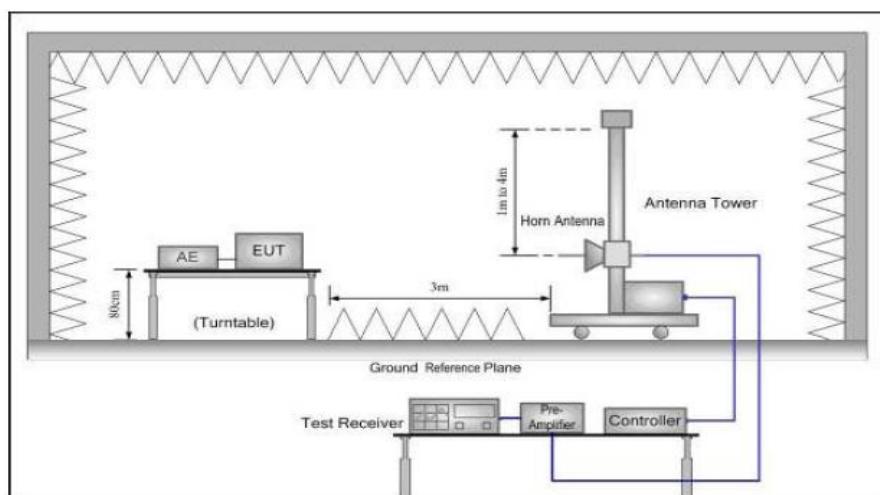


## 8. Radiated Spurious Emission

### 8.1. Limit

The mean power of emissions must be attenuated below the mean power of the unmodulated carrier ( $P$ ) on any frequency outside the frequency band by at least  $(43 + 10 \log P)$  dB, in this case, -13dBm.

### 8.2. Test Setup



### 8.3. Test Procedure

1. The EUT was placed on a non-conductive rotating platform with 0.8 meter height in an anechoic chamber. The radiated spurious emissions from 30MHz to 10th harmonious of fundamental frequency were measured at 3m with a test antenna and a spectrum analyzer with RBW= 1MHz, VBW= 1MHz ,peak detector settings.
2. During the measurement, the EUT was enforced in maximum power and linked with a base station. All the spurious emissions (record as LVL) at 3m were measured by rotation of the turntable and the test antenna raised and lowered over a range from 1 to 4 meters in both horizontally and vertically polarized orientations.
3. Final spurious emissions levels were measured by substitution method according to TIA/EIA-603-C. The EUT was replaced by dipole antenna (for frequency below 1GHz) or Horn antenna (for frequency above 1GHz) at same location with same polarize of receiver antenna and then a known power of each measure frequency from S.G. was applied into the dipole antenna or Horn antenna through a Tx cable, and then recorded the maximum Analyzer reading through raised and lowered the test antenna. The correction factor (in dB) = S.G. - Tx Cable loss + Substitution antenna gain -Substitution antenna Loss(only for Dipole antenna) - Analyzer reading. Then final

spurious emissions were calculated with the correction factor,  $EIRP = LVL + \text{Correction factor}$  and



# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 78 of 99

ERP = EIRP – 2.15

## 8.4. Test Result

Test result for Lowest Channel QPSK(1.4MHz)						
Frequency (MHz)	Antenna polarization	LVL (dBm)	Correction factor(dB)	Result (ERP)(dB m)	Limit (dBm)	Margin (dB)
1232.9	H	-55.58	4.25	-51.33	-13.00	38.33
3701.4	H	-57.93	6.50	-51.43	-13.00	38.43
1232.9	V	-53.27	4.25	-49.02	-13.00	36.02
3701.4	V	-58.61	6.50	-52.11	-13.00	39.11
/	/	/	/	/	/	/

Test result for Lowest Channel 16QAM(1.4MHz)						
Frequency (MHz)	Antenna polarization	LVL (dBm)	Correction factor(dB)	Result (ERP)(dB m)	Limit (dBm)	Margin (dB)
1232.9	H	-55.85	4.25	-51.6	-13.00	38.60
3701.4	H	-57.67	6.50	-51.17	-13.00	38.17
1232.9	V	-53.27	4.25	-49.02	-13.00	36.02
3701.4	V	-58.39	6.50	-51.89	-13.00	38.89
/	/	/	/	/	/	/



# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 79 of 99

Test result for Middle Channel QPSK(1.4MHz)						
Frequency (MHz)	Antenna polarization	LVL (dBm)	Correction factor(dB)	Result (ERP)(dB m)	Limit (dBm)	Margin (dB)
1232.9	H	-55.68	4.25	-51.43	-13.00	38.43
3760	H	-57.43	6.65	-50.78	-13.00	37.78
1232.9	V	-53.41	4.25	-49.16	-13.00	36.16
3760	V	-58.54	6.65	-51.89	-13.00	38.89
/	/	/	/	/	/	/

Test result for Middle Channel 16QAM(1.4MHz)						
Frequency (MHz)	Antenna polarization	LVL (dBm)	Correction factor(dB)	Result (ERP)(dB m)	Limit (dBm)	Margin (dB)
1232.9	H	-55.82	4.25	-51.57	-13.00	38.57
3760	H	-57.59	6.65	-50.94	-13.00	37.94
1232.9	V	-53.38	4.25	-49.13	-13.00	36.13
3760	V	-58.19	6.65	-51.54	-13.00	38.54
/	/	/	/	/	/	/



# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 80 of 99

Test result for Highest Channel QPSK(1.4MHz)						
Frequency (MHz)	Antenna polarization	LVL (dBm)	Correction factor(dB)	Result (ERP)(dB m)	Limit (dBm)	Margin (dB)
1232.9	H	-55.68	4.25	-51.43	-13.00	38.43
3818.6	H	-57.43	6.93	-50.5	-13.00	37.50
1232.9	V	-53.41	4.25	-49.16	-13.00	36.16
3818.6	V	-58.54	6.93	-51.61	-13.00	38.61
/	/	/	/	/	/	/

Test result for Highest Channel 16QAM(1.4MHz)						
Frequency (MHz)	Antenna polarization	LVL (dBm)	Correction factor(dB)	Result (ERP)(dB m)	Limit (dBm)	Margin (dB)
1232.9	H	-55.46	4.25	-51.21	-13.00	38.21
3818.6	H	-57.76	6.93	-50.83	-13.00	37.83
1232.9	V	-53.87	4.25	-49.62	-13.00	36.62
3818.6	V	-58.26	6.93	-51.33	-13.00	38.33
/	/	/	/	/	/	/

Note1: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

Note2: Only worst data of 5MHz mode was listed in report..

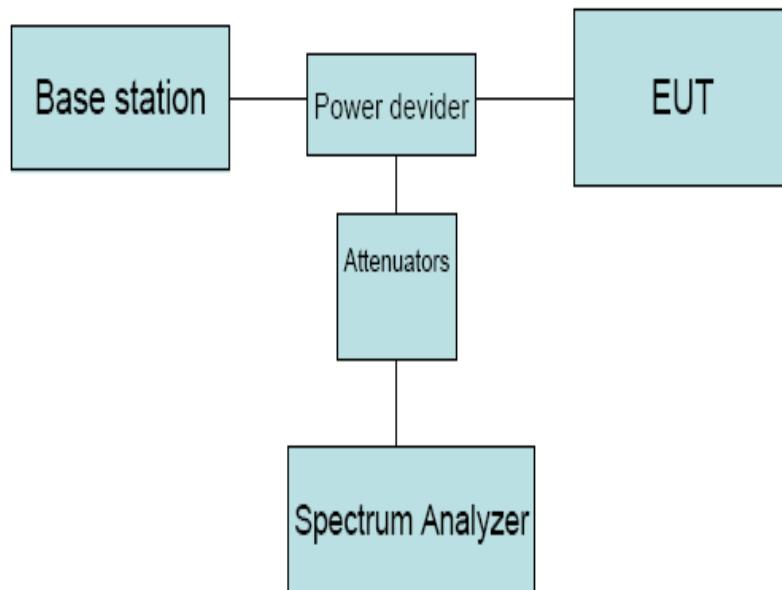


## 9. Band Edge Requirement

### 9.1. Limit

The mean power of emissions must be attenuated below the mean power of the unmodulated carrier (P) on any frequency outside the frequency band by at least  $(43 + 10 \log P)$  dB, in this case, -13dBm.

### 9.2. Test Setup



### 9.3. Test Procedure

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The band edges of low and high channels for the highest RF powers were measured.

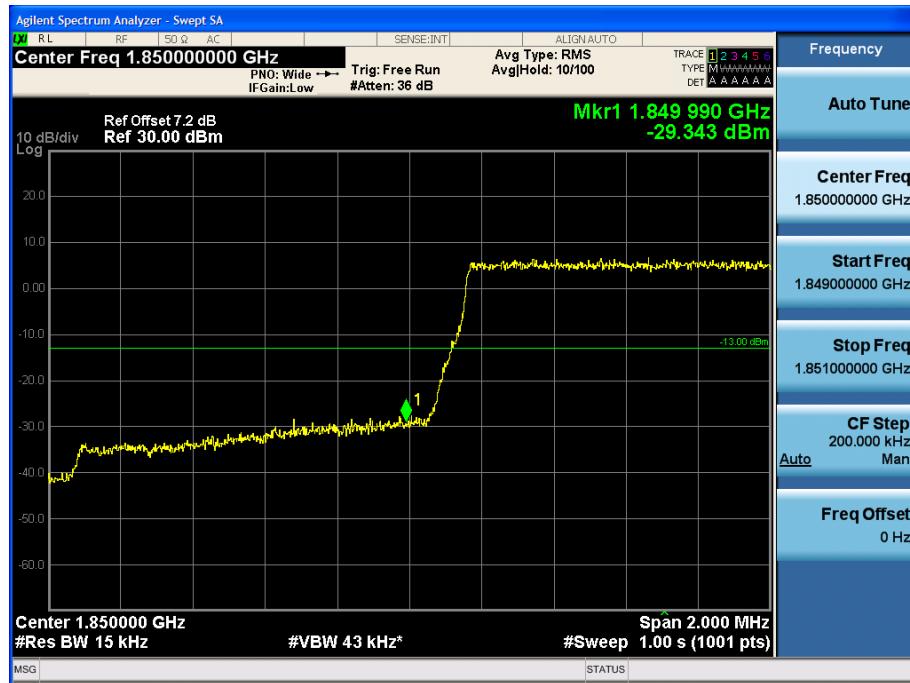


Report No.: ATA160705017F

Page: 82 of 99

## 9.4. Test Plot

### 1.4MHz Lowest QPSK



### 1.4MHz Highest QPSK

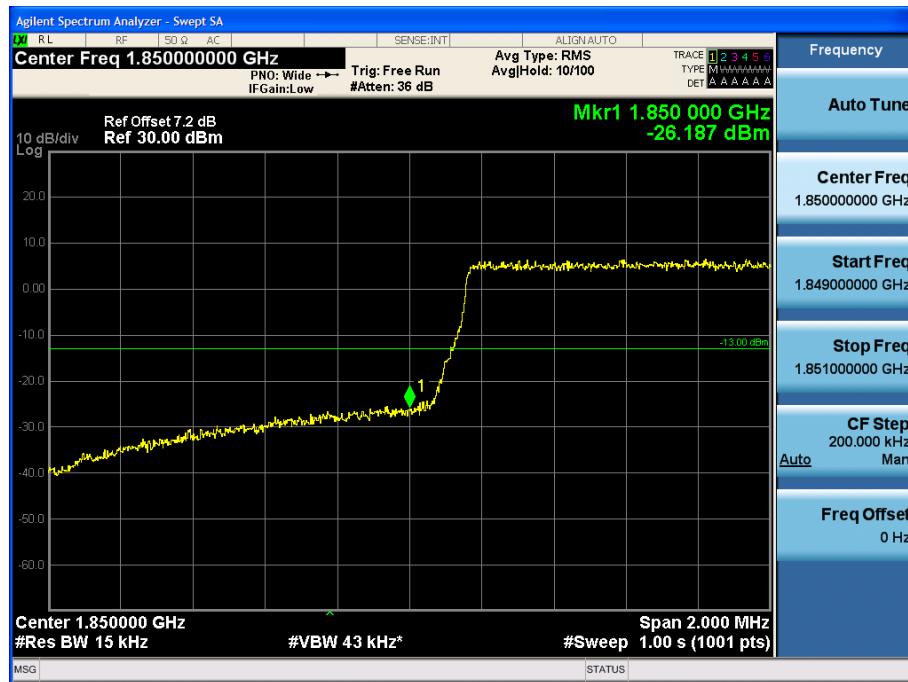




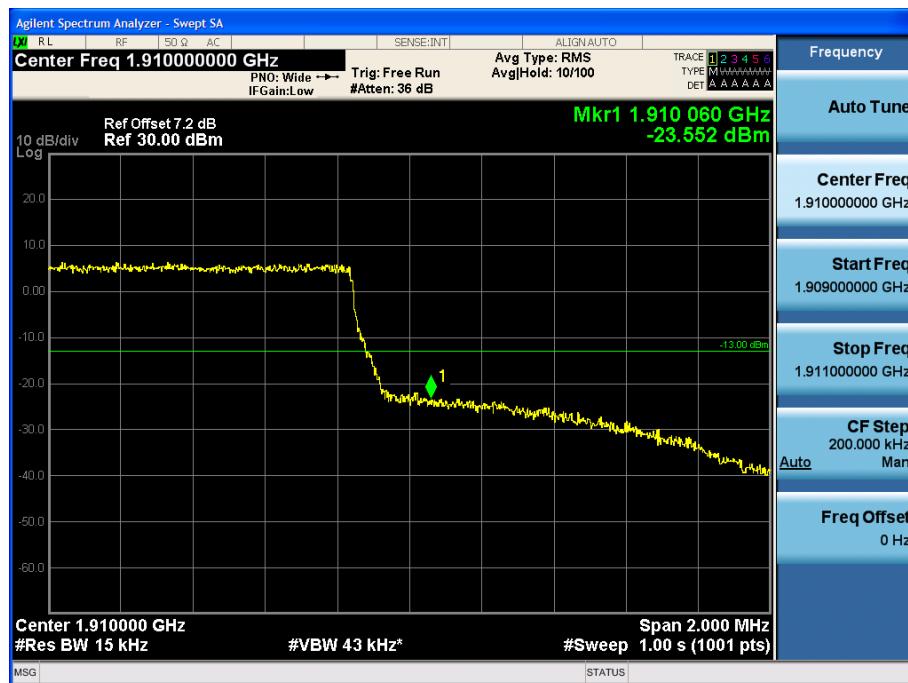
Report No.: ATA160705017F

Page: 83 of 99

## 1.4MHz Lowest 16QAM



## 1.4MHz Highest 16QAM

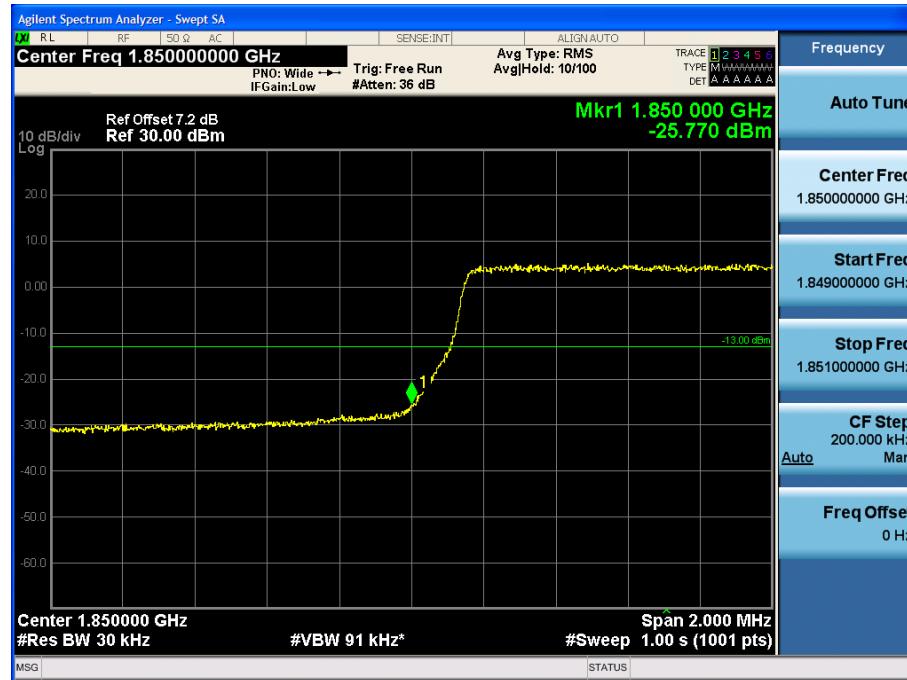




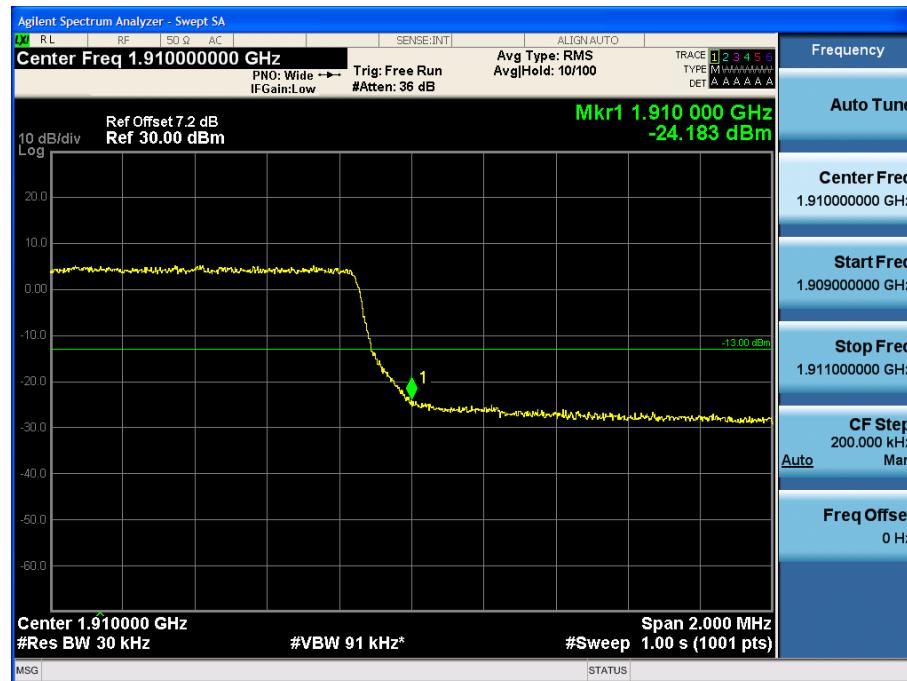
Report No.: ATA160705017F

Page: 84 of 99

## 3MHz Lowest QPSK



## 3MHz Highest QPSK

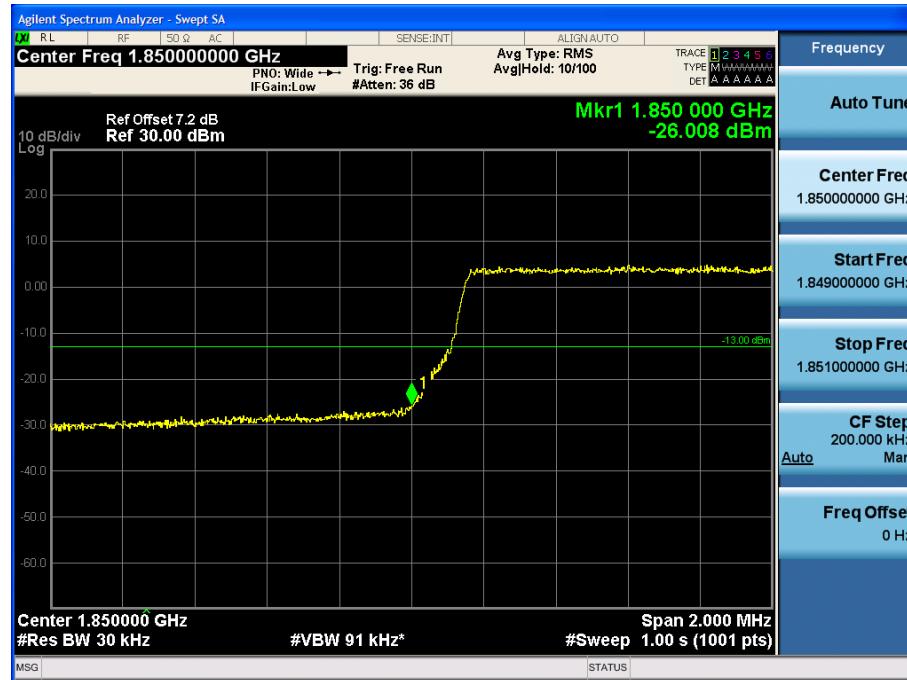




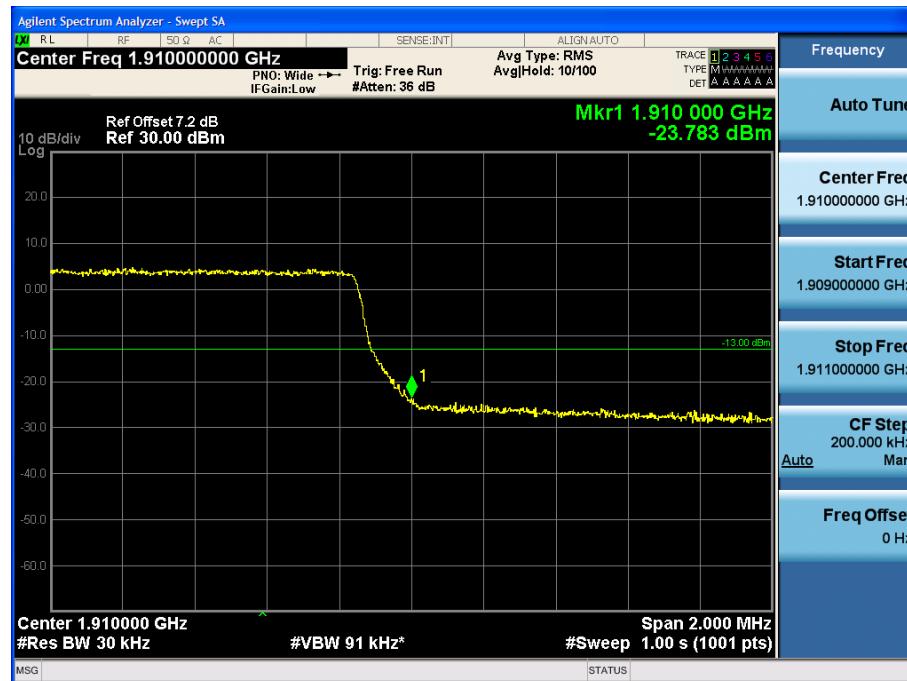
Report No.: ATA160705017F

Page: 85 of 99

## 3MHz Lowest 16QAM



## 3MHz Highest 16QAM





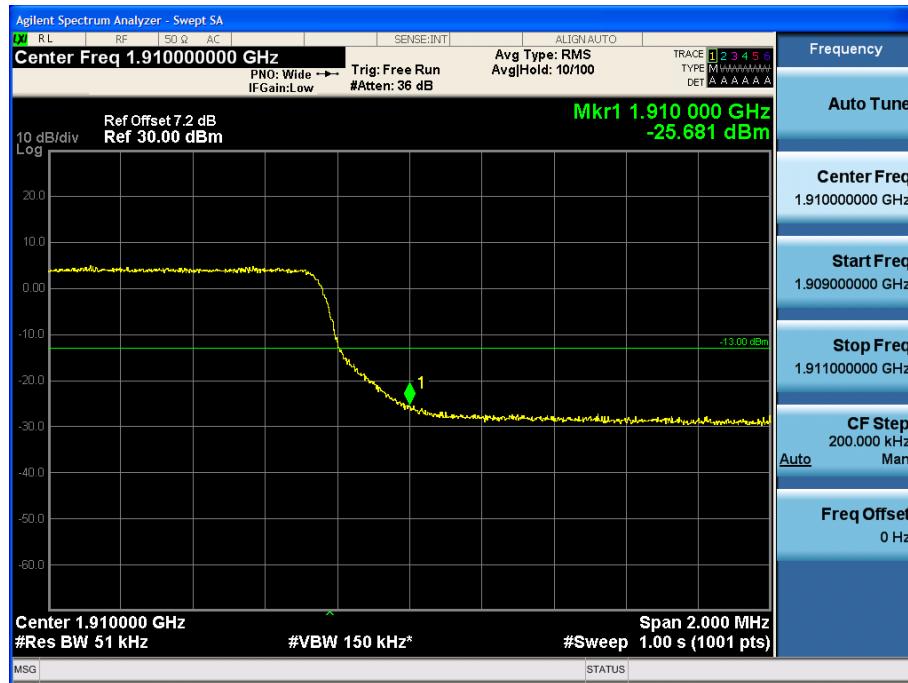
Report No.: ATA160705017F

Page: 86 of 99

## 5MHz Lowest QPSK



## 5MHz Highest QPSK





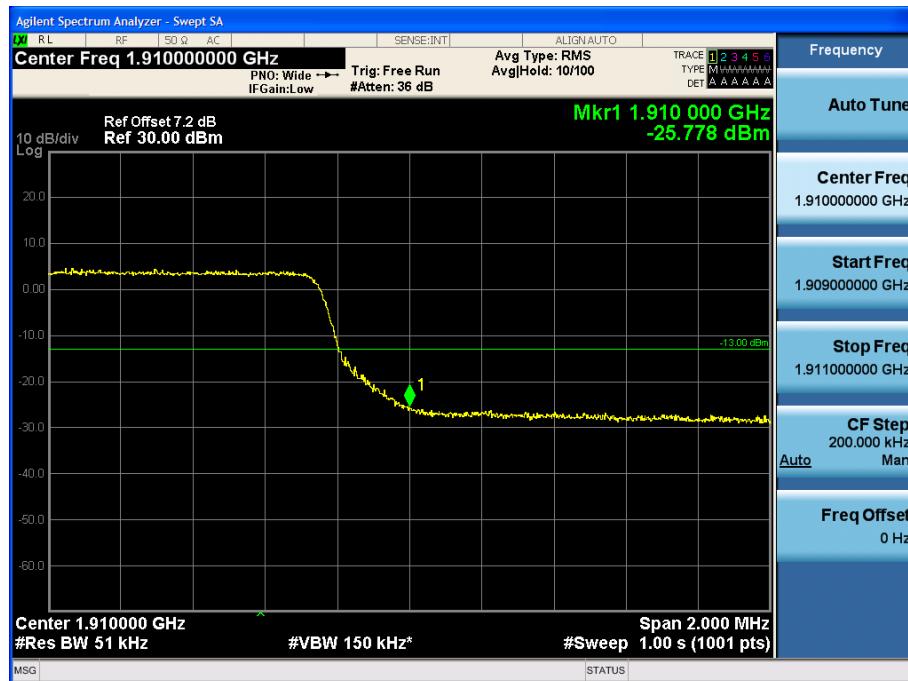
Report No.: ATA160705017F

Page: 87 of 99

## 5MHz Lowest 16QAM



## 5MHz Highest 16QAM





Report No.: ATA160705017F

Page: 88 of 99

## 10MHz Lowest QPSK



## 10MHz Highest QPSK





# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 89 of 99

## 10MHz Lowest 16QAM



## 10MHz Highest 16QAM





Report No.: ATA160705017F

Page: 90 of 99

## 15MHz Lowest QPSK



## 15MHz Highest QPSK





# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 91 of 99

## 15MHz Lowest 16QAM



## 15MHz Highest 16QAM





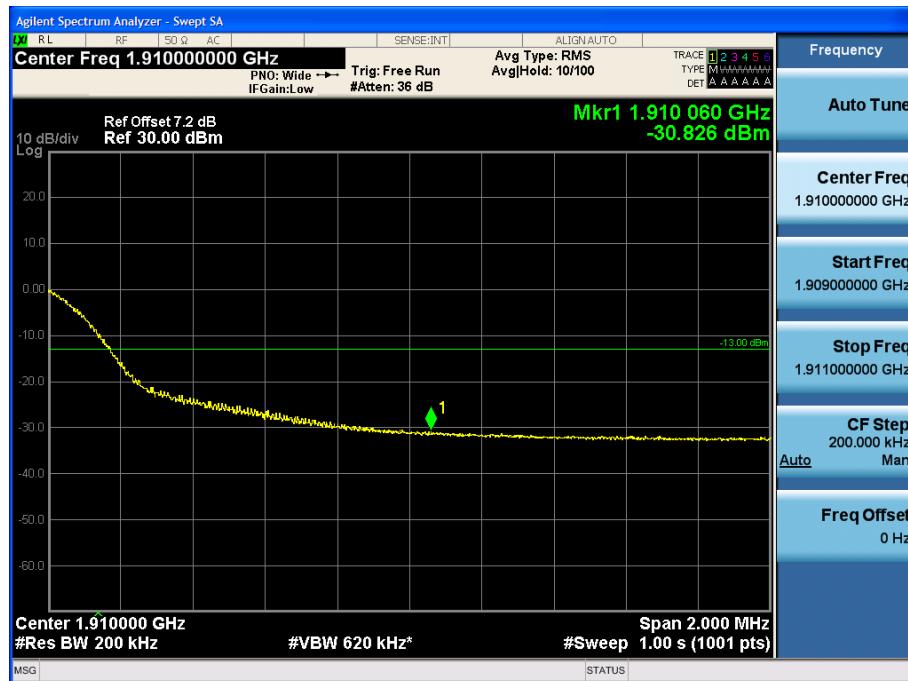
Report No.: ATA160705017F

Page: 92 of 99

## 20MHz Lowest QPSK



## 20MHz Highest QPSK



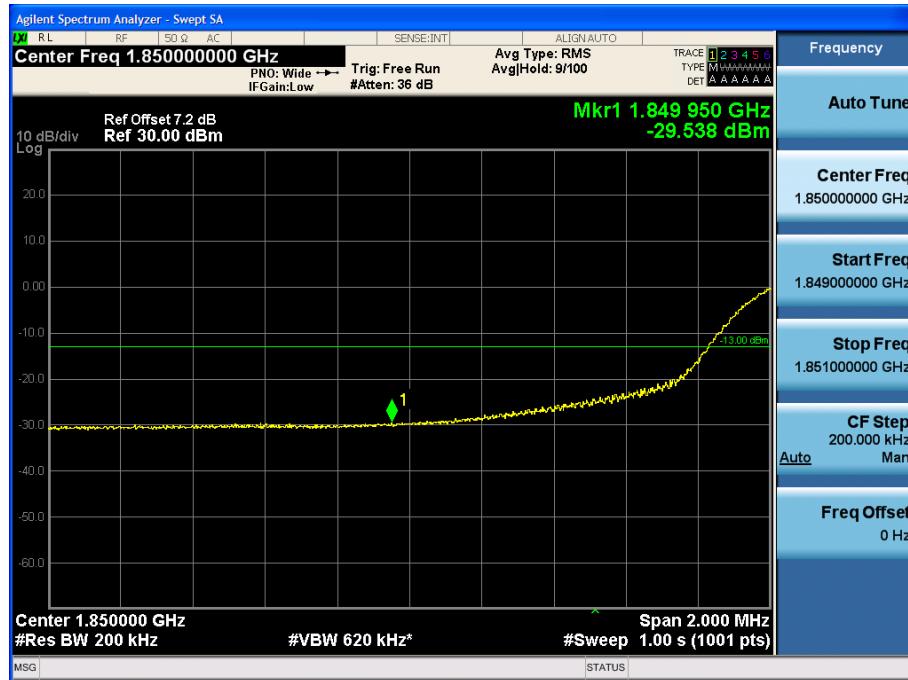


# ATA Testing Technology Service Co., Ltd.

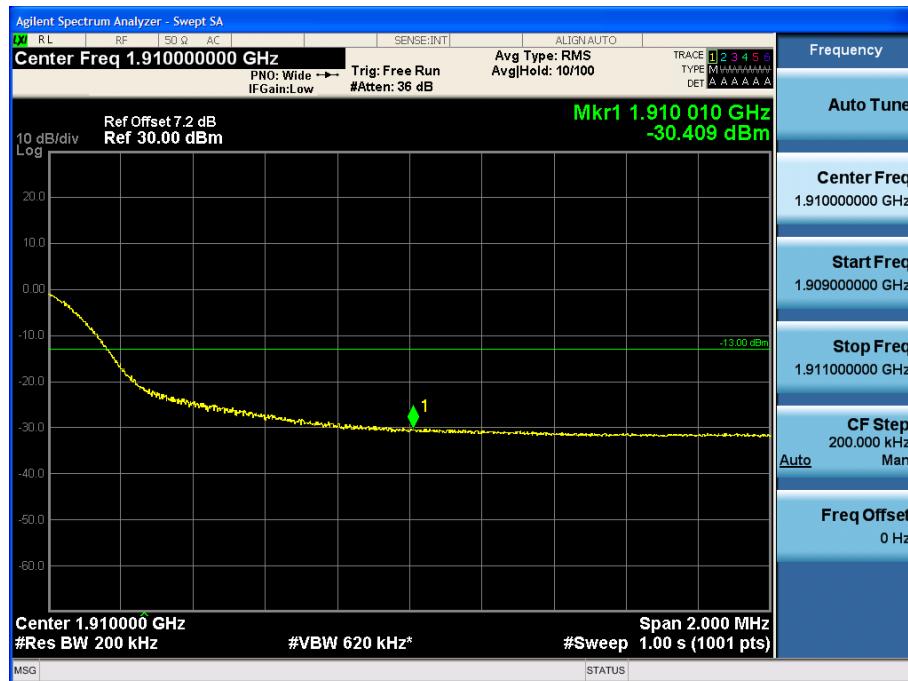
Report No.: ATA160705017F

Page: 93 of 99

## 20MHz Lowest 16QAM



## 20MHz Highest 16QAM





## 10. Power Line Conducted Emission

### 11.1. Test Standard and Limit

#### 11.1.1 Test Standard

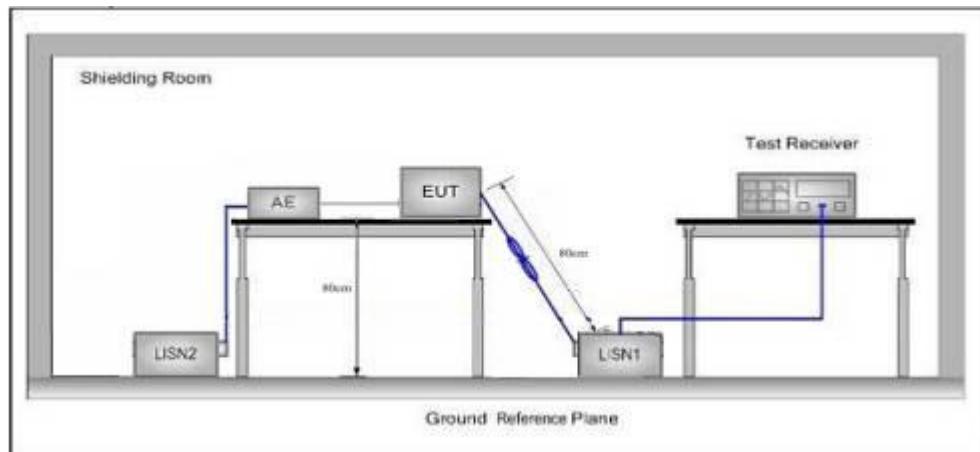
FCC Part15 C Section 15.207

#### 11.1.2 Test Limit

Frequency	Maximum RF Line Voltage (dB $\mu$ V)	
	Quasi-peak Level	Average Level
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Remark: (1) \*Decreasing linearly with logarithm of the frequency.  
(2) The lower limit shall apply at the transition frequencies.

### 11.2. Test Setup



### 11.3. Test Procedure

- 1) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a  $50\Omega /50\mu\text{H} + 5\Omega$  linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
- 2) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane.

The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal



# ATA Testing Technology Service Co., Ltd.

**Report No.: ATA160705017F**

**Page: 95 of 99**

ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.

The Test Receiver setup: RBW=9kHz, VBW=30kHz, Sweep time= auto

## 11.4. Test Data

Please to see the following pages

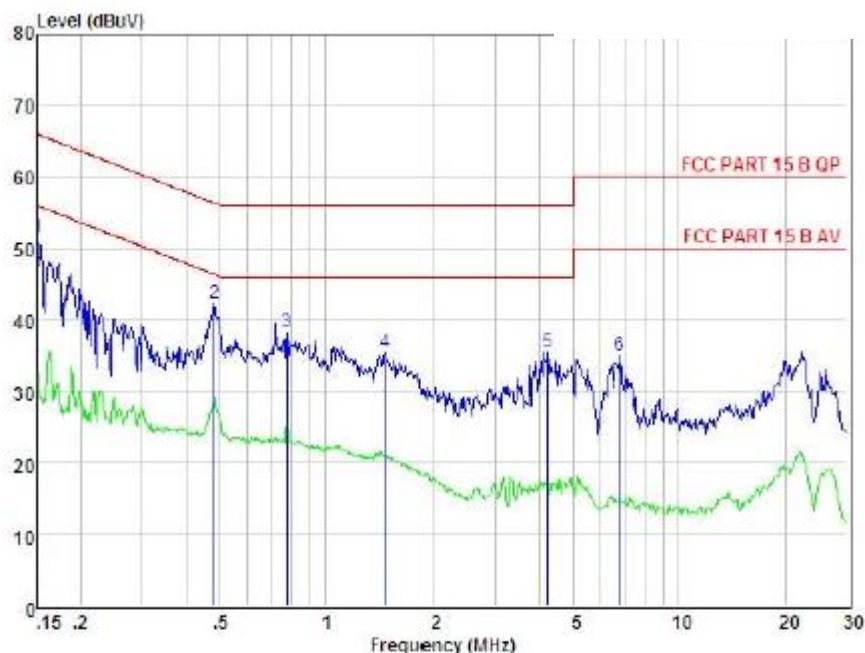


# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F  
Conducted Emission Test Data

Page: 96 of 99

EUT: Rugged Smartphone M/N: HG06  
Operating Condition: Charging & Working mode  
Test Site: Shielded room  
Operator: Jason  
Test Specification: AC120V/60Hz  
Polarization: Line  
Note Tem:25°C Hum:50%



Condition	FCC PART 15 B QP				POL: LINE		Temp:25.7 °C Hum:51 %		Margin	Remark
	Item	Freq	Read	LISN	Preamp	Cable	Level	Limit		
	MHz	dBuV	dB	Factor	Factor	dB	dBuV	dBuV		
1	0.150	41.83	0.03	-9.49	0.10	51.45	66.00	-14.55		Peak
2	0.481	32.53	0.03	-9.58	0.10	42.24	56.32	-14.08		Peak
3	0.775	28.48	0.00	-9.60	0.10	38.18	56.00	-17.82		Peak
4	1.480	25.50	0.05	-9.68	0.10	35.33	56.00	-20.67		Peak
5	4.224	25.32	0.08	-9.89	0.12	35.41	56.00	-20.59		Peak
6	6.805	24.66	0.12	-9.97	0.15	34.90	60.00	-25.10		Peak

Remarks: Level = Read + LISN Factor - Preamp Factor + Cable loss

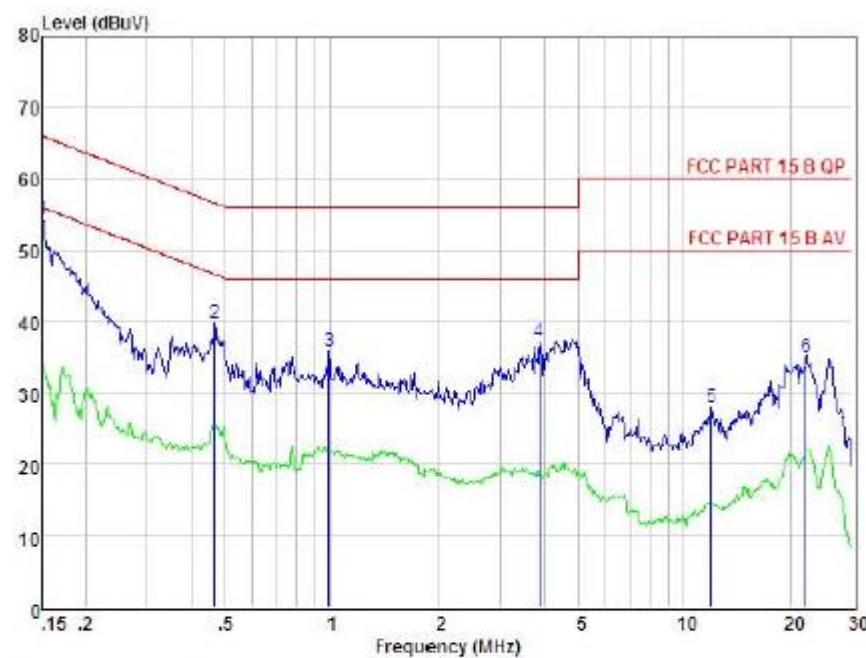


# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F  
Conducted Emission Test Data

Page: 97 of 99

EUT: Rugged Smartphone M/N: HG06  
Operating Condition: Charging & Working mode  
Test Site: Shielded room  
Operator: Jason  
Test Specification: AC 120V/60Hz  
Polarization: Neutral  
Note Tem:25°C Hum:50%



Condition : FCC PART 15 B QB		POL: NEUTRAL Temp:25.7 °C Hum:51 %							
Item	Freq	Read	LISM	Preamp	Cable	Level	Limit	Margin	Remark
	MHz	dBuV	Factor	Factor	Loss	dBuV	dBuV	dBuV	
1	0.150	41.63	0.03	-9.49	0.10	34.25	66.00	-31.75	Peak
2	0.466	50.00	0.03	-9.58	0.10	39.71	56.58	-16.87	Peak
3	0.989	26.02	0.04	-9.63	0.10	35.79	56.00	-20.21	Peak
4	3.881	26.94	0.08	-9.87	0.12	37.01	56.00	-18.99	Peak
5	11.996	17.42	0.26	-9.90	0.22	27.20	60.00	-32.20	Peak
6	22.298	24.43	0.40	-9.81	0.40	35.04	60.00	-24.96	Peak

Remarks: Level = Read + LISM Factor - Preamp Factor + Cable loss

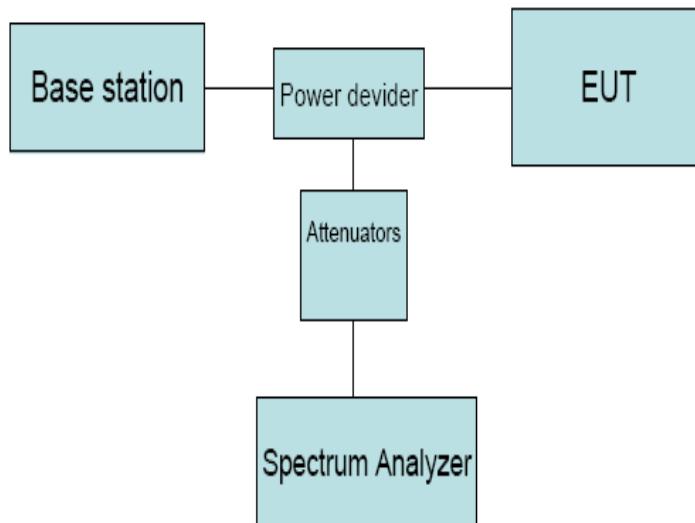


## 11 Peak-to-Average Ratio

### 11.1 Limit

In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

### 11.2 Test Setup



### 11.3 Test Procedure

The EUT' RF output port was connected to Measurement Instrument(s) and Base Station via power divider, and then measure the test data.

### 11.4 Test Result

Test Band	Test Mode	Test Channel	Measured[dB]	Limit [dB]	Verdict
LTE BAND2	QPSK	LCH	6.24	13	PASS
		MCH	6.25	13	PASS
		HCH	6.19	13	PASS
	16QAM	LCH	6.57	13	PASS
		MCH	7.11	13	PASS
		HCH	6.82	13	PASS



# ATA Testing Technology Service Co., Ltd.

Report No.: ATA160705017F

Page: 99 of 99

Test plots of worst case  
QPSK



16QAM

