
TEST REPORT FOR RF TESTING

Report No: SRTC2019-9004(F)-19012901(C)

Product Name: Fi Smart Collar

Product Model: FC1

Applicant: Barking Labs Corp.

Manufacturer: Barking Labs Corp.

Specification: FCC CFR47 PART 2, 22H, 24E, 27L (2019)

FCC ID: 2ARXN-FC1

The State Radio_monitoring_center Testing Center (SRTC)

15th Building, No.30, Shixing Street, Shijingshan District,

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CONTENTS

1. GENERAL INFORMATION	2
1.1 Notes of the test report	2
1.2 Information about the testing laboratory.....	2
1.3 Applicant's details	2
1.4 Manufacturer's details	2
1.5 Test Environment.....	3
2 DESCRIPTION OF THE EQUIPMENT UNDER TEST.....	4
2.1 Final Equipment Build Status	4
2.2 Summary table	4
2.3 Support Equipment	5
3 REFERENCE SPECIFICATION	6
4 KEY TO NOTES AND RESULT CODES	7
5 RESULT SUMMARY	8
6 TEST RESULT	9
6.1 RF Power Output	9
6.2 Effective Radiated Power.....	10
6.3 Occupied Bandwidth	11
6.4 Emission Bandwidth.....	12
6.5 Peak-Average Ratio	13
6.6 Spurious Emissions at antenna terminal.....	14
6.7 Band Edges Compliance	15
6.8 Frequency Stability	16
6.9 Radiated Spurious Emissions	17
7 MEASUREMENT UNCERTAINTIES	19
8 TEST EQUIPMENTS.....	20
APPENDIX A – TEST DATA OF CONDUCTED EMISSION	21
APPENDIX B – TEST DATA OF RADIATED EMISSION.....	94

1. GENERAL INFORMATION

1.1 Notes of the test report

The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written permission of The State Radio_monitoring_center Testing Center (SRTC).

The test results relate only to individual items of the samples which have been tested.

The certification and accreditation identifiers used in this report shall not be applicable to the tested or calibrated samples thereof. The manufacturer shall not mark the tested samples or items (or a separate part of the item) with the identifiers of certification and accreditation to mislead relevant parties about the tested samples or items.

1.2 Information about the testing laboratory

Company:	The State Radio_monitoring_center Testing Center (SRTC)
Address:	15th Building, No.30 Shixing Street, Shijingshan District, P.R.China
City:	Beijing
Country or Region:	P.R.China
Contacted person:	Liu Jia
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1.3 Applicant's details

Company:	Barking Labs Corp.
Address:	53 Bridge St., Suite 103
City:	Brooklyn, NY
Country or Region:	USA
Contacted person:	Bob Blake
Tel:	+1-914-249-9347
Fax:	---
Email:	bob@tryfi.com

1.4 Manufacturer's details

Company:	Barking Labs Corp.
Address:	53 Bridge St., Suite 103
City:	Brooklyn, NY
Country or Region:	USA
Contacted person:	Bob Blake
Tel:	+1-914-249-9347
Fax:	---
Email:	bob@tryfi.com

1.5 Test Environment

Date of Receipt of test sample at SRTC:	2019-01-29
Testing Start Date:	2019-01-29
Testing End Date:	2019-02-26

Environmental Data:	Temperature (°C)	Humidity (%)
Ambient	25	30
Maximum Extreme	60	---
Minimum Extreme	-20	---

Normal Supply Voltage (V d.c.):	3.85
Maximum Extreme Supply Voltage (V d.c.):	4.35
Minimum Extreme Supply Voltage (V d.c.):	3.00

2 DESCRIPTION OF THE EQUIPMENT UNDER TEST

2.1 Final Equipment Build Status

Frequency Range	LTE_CAT-M1 Band 2: Tx:1850~1910MHz Rx:1930~1990MHz LTE_CAT-M1 Band 4: Tx:1710~1755MHz Rx:2110~2155MHz LTE_CAT-M1 Band 12: Tx:699~716 MHz Rx:729~746 MHz
Modulation Type	QPSK 16QAM
Antenna Type	IFA Antenna
Power Supply	Battery/Charge
HW Version	Rev.A
SW Version	1.0
SN	Sample 1#

2.2 Summary table

FCC Rule Part	Frequency Range(MHz)	EIRP/ERP (W)	Frequency Tolerance (ppm)	Emission Designator	Emission Bandwidth (MHz)	Measured 26dBC Bandwidth (MHz)	Communication Type
BAND2							
24E	1850.7-1909.3	0.189	0.020	1M13G7D	1.4M	1.279	QPSK
	1850.7-1909.3	0.149	0.020	939KD7W	1.4M	1.076	16QAM
	1851.5-1908.5	0.188	0.016	1M29G7D	3M	1.421	QPSK
	1851.5-1908.5	0.149	0.016	1M28D7W	3M	1.410	16QAM
	1852.5-1907.5	0.188	0.017	1M10G7D	5M	1.488	QPSK
	1852.5-1907.5	0.150	0.017	928KD7W	5M	1.856	16QAM
	1855-1905	0.190	0.020	1M13G7D	10M	1.705	QPSK
	1855-1905	0.150	0.020	967KD7W	10M	1.526	16QAM
	1857.5-1902.5	0.190	0.019	1M11G7D	15M	1.705	QPSK
	1857.5-1902.5	0.149	0.019	970KD7W	15M	1.601	16QAM
	1860-1900	0.192	0.020	1M14G7D	20M	1.755	QPSK
	1860-1900	0.150	0.020	959KD7W	20M	1.451	16QAM
BAND4							
27L	1710.7-1754.3	0.134	0.020	1M12G7D	1.4M	1.277	QPSK
	1710.7-1754.3	0.101	0.020	1M11D7W	1.4M	1.238	16QAM
	1711.5-1753.5	0.138	0.017	1M28G7D	3M	1.431	QPSK
	1711.5-1753.5	0.103	0.017	1M27D7W	3M	1.421	16QAM
	1712.5-1752.5	0.138	0.018	1M10G7D	5M	1.383	QPSK
	1712.5-1752.5	0.104	0.018	932KD7W	5M	1.427	16QAM
	1715-1750	0.142	0.020	1M13G7D	10M	1.513	QPSK
	1715-1750	0.111	0.020	960KD7W	10M	1.555	16QAM
	1717.5-1747.5	0.145	0.019	1M12G7D	15M	1.597	QPSK
	1717.5-1747.5	0.113	0.019	959KD7W	15M	1.486	16QAM
	1720-1745	0.148	0.020	1M12G7D	20M	1.658	QPSK
	1720-1745	0.116	0.020	942KD7W	20M	1.416	16QAM

BAND12							
27H	699.7-715.3	0.090	0.016	1M11G7D	1.4M	1.261	QPSK
	699.7-715.3	0.068	0.016	1M12D7W	1.4M	1.229	16QAM
	700.5-714.5	0.090	0.017	1M28G7D	3M	1.447	QPSK
	700.5-714.5	0.069	0.017	1M28D7W	3M	1.420	16QAM
	701.5-713.5	0.090	0.018	1M10G7D	5M	1.370	QPSK
	701.5-713.5	0.069	0.018	937KD7W	5M	1.488	16QAM
	704-711	0.091	0.019	1M12G7D	10M	1.611	QPSK
	704-711	0.070	0.019	954KD7W	10M	1.649	16QAM

2.3 Support Equipment

The following support equipment was used to exercise the EUT during testing:

Equipment	Notebook
Manufacturer	LENOVO
Model Number	E420
SN	---

Equipment	Charger
Manufacturer	DEE VAN ENTERPRISE CO., LTD.
Model Number	DSA-5PF03-05 FUS 050100
SN	---

Equipment	USB cable
Manufacturer	SuZhou KELI TECHNOLOGY DEVELOPMENT CO., LTD.
Model Number	KLC-3103
SN	---

3 REFERENCE SPECIFICATION

The tests documented in this report were performed in accordance with ANSI C63.26:2015, FCC CFR 47 Part 2, FCC KDB 971168 D01 v02r02, KDB 971168 D02 v01, Part 22, Part 24, Part 27.

Specification	Version	Title
ANSI C63.26:2015	11 December 2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
FCC CFR 47 Part 2	2019	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS
FCC CFR 47 Part 22	2019	PUBLIC MOBILE SERVICES
FCC CFR 47 Part 24	2019	PERSONAL COMMUNICATIONS SERVICES
FCC CFR 47 Part 27	2019	MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES
KDB 971168 D01	v03r01	MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS
KDB 971168 D02	v02r01	MISCELLANEOUS AND BASIC REVIEW AND APPROVAL ITEMS FOR TRANSMITTING EQUIPMENT USED IN LICENSED RADIO SERVICES
ANSI C63.26	2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
KDB 971168 D01	April 9, 2018	MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS

4 KEY TO NOTES AND RESULT CODES

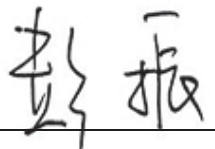
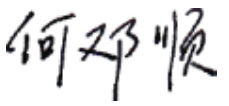
The following are the definition of the test result.

Code	Meaning
PASS	Test result shows that the requirements of the relevant specification have been met.
FAIL	Test result shows that the requirements of the relevant specification have not been met.
N/T	Test case is not tested.
NTNV	Nominal voltage, Normal Temperature
HV	High voltage, Normal Temperature
LV	Low voltage, Normal Temperature
HTHV	high voltage, High Temperature
LTHV	High voltage, Low Temperature
HTLV	Low voltage, High Temperature
LTLV	Low voltage, Low Temperature

5 RESULT SUMMARY

The following table summarizes the test results obtained.

No.	Test case	FCC reference	Verdict
1	RF Power Output	2.1046	Pass
2	Effective Radiated Power and Effective Isotropic Radiated Power	22.913, 24.232, 27.50	Pass
3	Occupied Bandwidth	2.1049	Pass
4	Peak-Average Ratio	22.913, 24.232, 27.50	Pass
5	Emission Bandwidth	2.1049	Pass
6	Spurious Emissions at antenna terminals	2.1051, 22.901, 22.917, 24.238, 27.53	Pass
7	Band Edges Compliance	2.1051, 22.359, 22.917, 24.238, 27.53	Pass
8	Frequency Stability	2.1055, 22.355, 24.235, 27.54	Pass
9	Radiated Spurious Emissions	2.1053, 22.917, 24.238, 27.53	Pass

This Test Report Is Issued by: Mr. Peng Zhen 	Checked by: Mr. Li Bin 
Tested by: Mr. He Dengshun 	Issued date: 20190228

6 TEST RESULT

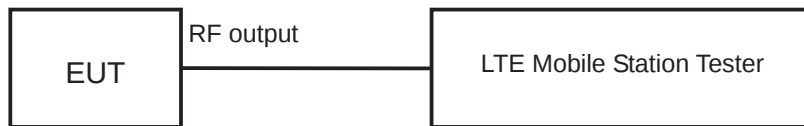
6.1 RF Power Output

Rule Part(s)
FCC: 2.1046

Ambient condition:

Temperature	Relative humidity	Pressure
23°C	42%	101.9kPa

Test Setup:



Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. Then the test data can be read at the tester screen. The loss between RF output port of the EUT and the input port of the tester will be taken into consideration.

Limits	≤30dBm
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Test result:

The test results are shown in Appendix A.

6.2 Effective Radiated Power

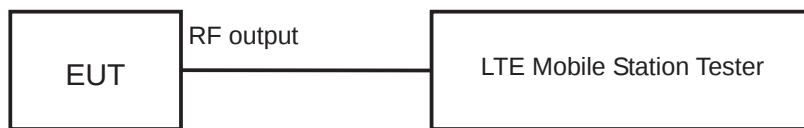
Rule Part(s)

FCC: 22.913, 24.232, 27.50

Ambient condition:

Temperature	Relative humidity	Pressure
20.8°C	36.5%	100.9kPa

Test setup:



ERP/EIRP LIMIT

This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15dB) and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole, $ERP = EIRP - 2.15 \text{ (dB)}$.

22.913(a) - The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7Watts.

24.232(c) - Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

27.50 (c) (10) the following power and antenna height requirements apply to stations transmitting in the 698–746 MHz band, the portable stations (hand-held devices) are limited to 3 watts ERP.

27.50 (b)(10) Portable stations (hand-held devices) transmitting in the 746–757 MHz, 758–763 MHz, 776–793 MHz, and 805–806 MHz bands are limited to 3 watts ERP.

27.50 (d)(4) The following power and antenna height requirements apply to stations transmitting in the 1710–1755 MHz and 2110–2155 MHz bands: Fixed, mobile, and portable (hand-held) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP

27.50 (h) The following power limits shall apply in the BRS and EBS: (2) Mobile and other user stations. Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

Test result:

The test results are shown in Appendix A.

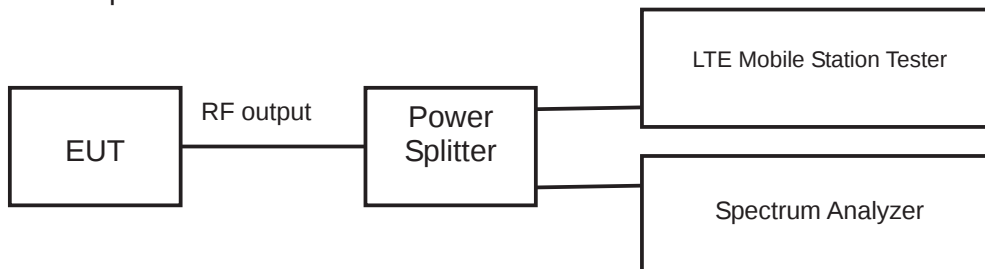
6.3 Occupied Bandwidth

Rule Part(s)
FCC: 2.1049

Ambient condition:

Temperature	Relative humidity	Pressure
23°C	42%	101.9kPa

Test Setup:



Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The occupied bandwidth is measured using spectrum analyzer. RBW is set to 30kHz on spectrum analyzer. The bandwidth of 99% power can be read on spectrum analyzer.

The measurement will be conducted at three channels (Bottom, middle and top channels of LTE band)

Limits: No specific occupied bandwidth requirements in part 2.1049

Test result:

The test results are shown in Appendix A.

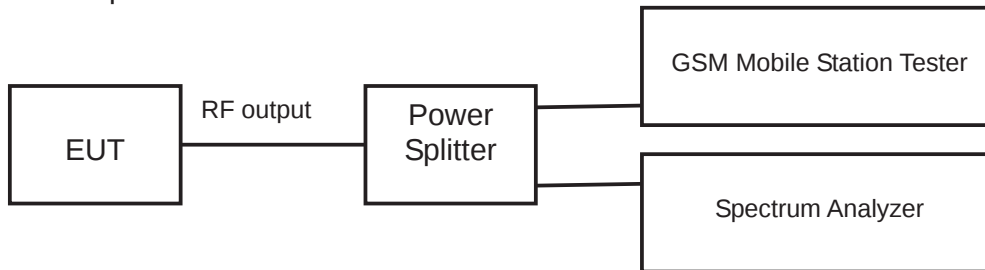
6.4 Emission Bandwidth

Rule Part(s)
FCC: 2.1049

Ambient condition:

Temperature	Relative humidity	Pressure
23℃	42%	101.9kPa

Test Setup:



Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The emission bandwidth is measured using spectrum analyzer. RBW is set to 3 kHz on spectrum analyzer. The bandwidth of -26dB transmitter power can be read on spectrum analyzer.

Limits: No specific emission bandwidth requirements in part 22.917(b)

Test result:

The test results are shown in Appendix A.

6.5 Peak-Average Ratio

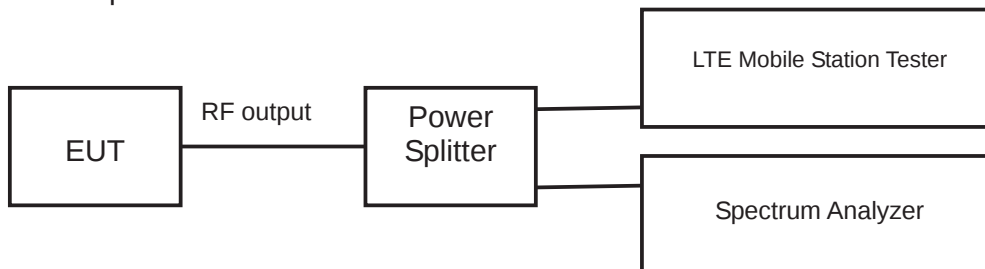
Rule Part(s)

FCC: 22.913, 24.232, 27.50

Ambient condition:

Temperature	Relative humidity	Pressure
23°C	42%	101.9kPa

Test Setup:



Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The Peak-Average Ratio is measured using spectrum analyzer. RBW is set to 30 kHz on spectrum analyzer. The Peak-Average Ratio can be read on spectrum analyzer.

Limits	$\leq 13\text{dB}$
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Test result:

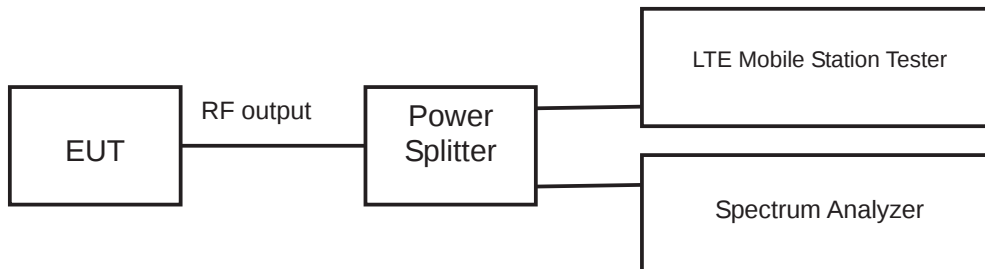
The test results are shown in Appendix A.

6.6 Spurious Emissions at antenna terminal

Ambient condition:

Temperature	Relative humidity	Pressure
23°C	42%	101.9kPa

Test Setup:



Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The measurement is carried out using a spectrum analyzer. The spectrum analyzer scans from 30MHz to 20GHz (higher than the 10th harmonic of the carrier). The peak detector is used and RBW is set to 1MHz on spectrum analyzer.

Limits	$\leq -13\text{dBm}$
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Test result:

The test results are shown in Appendix A.

6.7 Band Edges Compliance

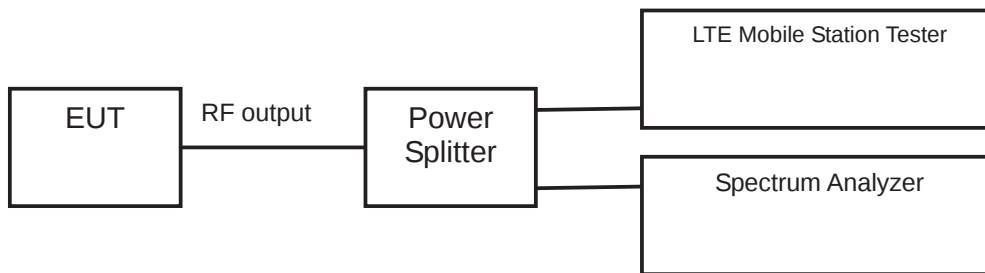
Rule Part(s)

FCC: 2.1051, 22.359, 22.917, 24.238, 27.53

Ambient condition:

Temperature	Relative humidity	Pressure
23°C	42%	101.9kPa

Test Setup:



Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The measurement is carried out using a spectrum analyzer. The peak detector is used and RBW is set to at least 1% of the emission bandwidth on spectrum analyzer.

Limits	$\leq -13\text{dBm}$
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Test result:

The test results are shown in Appendix A.

6.8 Frequency Stability

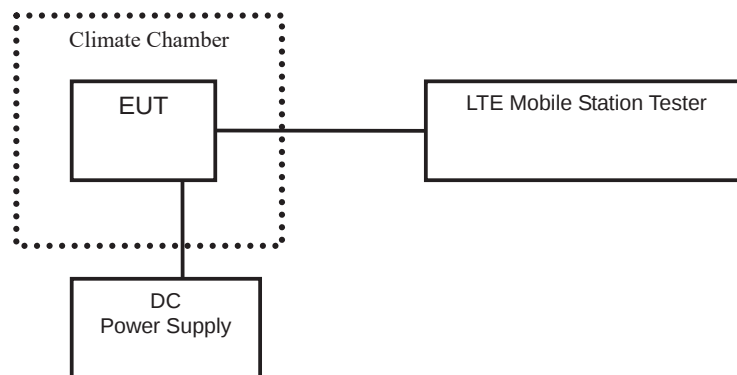
Rule Part(s)

FCC: 2.1055, 22.355, 24.235, 27.54

Ambient condition:

Temperature	Relative humidity	Pressure
23°C	42%	101.9kPa

Test setup:



Test Procedure:

A radio link shall be established between EUT and Tester. The tester will sample the transmitter RF output signal and measure its frequency. The temperature inside the climate chamber is varied from -30 to +50°C in 10°C step size, and also the DC power supply voltage to the EUT is varied from LV to HV. The measurement will be conducted at three channels No18100, No18300 and No18500 (Bottom, middle and top channels of LTE band I).

Limits: No specific frequency stability requirements in part 2.1055 and part 22.355.

Test result:

The test results are shown in Appendix A.

6.9 Radiated Spurious Emissions

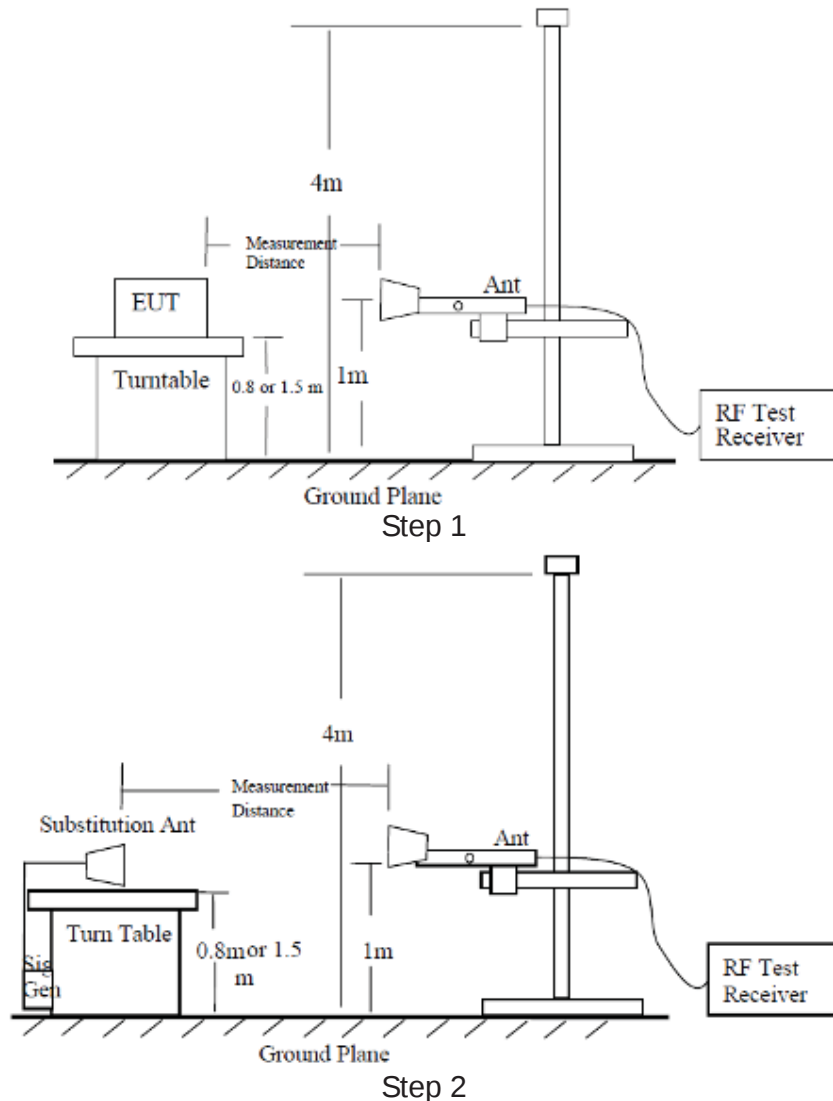
Rule Part(s)

FCC: 2.1053, 22.917, 24.238, 27.53

Ambient condition:

Temperature	Relative humidity	Pressure
20.8°C	36.5%	100.9kPa

Test Setup:



Test procedure:

The measurements procedures in TIA-603C-2004 are used.

The spectrum was scanned from 30MHz to the 10th harmonic of the highest frequency generated within the equipment.

Step 1:

The measurement is carried out in the fully anechoic chamber. EUT was placed on a 2.4 meter high non-conductive table at a 3 meter test distance from the test receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT. The height of receiving antenna is 2.4m and varies in certain range to find the maximum power value. A radio link shall be established between EUT and Tester. The output power of the cell signal of the tester will be decreased until the output power of the EUT reach a maximum value. The measurement is carried out using a spectrum analyzer or receiver. The spectrum analyzer scans from 30MHz to 20GHz (higher than the 10th harmonic of the carrier). The peak detector is used and RBW is set to 1MHz on spectrum analyzer. Then the antenna height and turn table rotation is adjusted till the maximum power value is founded on spectrum analyzer or receiver. A notch filter is necessary in the band near to the carrier frequency. A high pass filter is needed to avoid the distortion of the testing equipment in the band above the carrier frequency.

Step 2:

A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.

A power (P_{mea}) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (P_r). The power of signal source (P_{mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

A "reference path loss" should be calculated after test. The attenuation of "reference path loss" is the cable loss between the Signal Source with the Substitution Antenna (P_{ca}) and the Substitution Antenna Gain (G_a).

Calculation procedure:

The data of cable loss and antenna gain has been calibrated in full testing frequency range before the testing.

The power of the Radiated Spurious Emissions is calculated by adding the cable loss and antenna gain. The basic equation with a sample calculation is as followed:

$$\text{Power(EIRP)} = P_{mea} + P_{ca} + G_a$$

This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15dB) and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole, $ERP = EIRP - 2.15$ (dB).

Assumed the power of signal source record is -20dBm. A cable loss of -30dB, and an antenna gain of 11dB are added.

$$P = P_{mea} + P_{ca} + G_a = (-20\text{dBm}) + (-30\text{dB}) + (11\text{dB}) = -39\text{dBm}$$

Test result:

The test results are shown in Appendix B.

7 MEASUREMENT UNCERTAINTIES

Items	Uncertainty	
RF Power Output	0.6 dB	
Occupied Bandwidth	3 kHz	
Spurious Emissions	30MHz~1GHz	2.83 dB
	1GHz~12.75GHz	2.50 dB
	12.75GHz~25GHz	2.75 dB
Band Edges Compliance	1.2dB	
Frequency Stability	4 Hz	

8 TEST EQUIPMENTS

No.	Name/Model	Manufacturer	S/N	Calibration Date	Calibration Due Date
1	CMW500 Mobile Station Tester	R&S	134669	2018.8.20	2019.8.19
2	FSV40 Spectrum Analyzer	R&S	101065	2018.8.20	2019.8.19
2	N9020A Spectrum Analyzer	Agilent	MY48010771	2018.08.20	2019.08.19
3	6007 Power Divider	Weinschel	6007-GJ-1	2018.08.20	2019.08.19
4	DC Power Supply E3645A	Agilent	MY40000741	2018.3.01	2019.2.28
5	Temperature chamber SH241	ESPEC	92013758	2018.8.20	2019.8.19
6	12.65m×8.03m×7.50m Fully-Anechoic Chamber	FRANKONIA	-----	-----	-----
7	23.18m×16.88m×9.60m Semi-Anechoic Chamber	FRANKONIA	---	-----	-----
8	Turn table Diameter: 1m	FRANKONIA	-----	-----	-----
9	Turn table Diameter: 5m	FRANKONIA	-----	-----	-----
10	Antenna master FAC(MA4.0)	MATURO	-----	-----	-----
11	Antenna master SAC(MA4.0)	MATURO	-----	-----	-----
12	9.080m×5.255m×3.525m Shielding room	FRANKONIA	-----	-----	-----
13	HF 907 Double-Ridged Waveguide Horn Antenna	R&S	100512	2018.08.20	2019.08.19
14	HF 907 Double-Ridged Waveguide Horn Antenna	R&S	100513	2018.08.20	2019.08.19
15	HL562 Ultra log antenna	R&S	100016	2018.08.20	2019.08.19
16	3160-09 Receive antenna	SCHWARZ-BECK	002058-002	2018.08.20	2019.08.19
17	ESI 40 EMI test receiver	R&S	100015	2018.08.20	2019.08.19
18	ESCS30 EMI test receiver	R&S	100029	2018.08.20	2019.08.19
19	HL562 Receive antenna	R&S	100167	2018.08.20	2019.08.19
20	ENV216 AMN	R&S	3560.6550.12	2018.08.20	2019.08.19

APPENDIX A – TEST DATA OF CONDUCTED EMISSION

LTE_CAT.M1_ Band 2

1 RF Power Output

Test result:

Antenna Gain: 0.40dBi

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted Power (dBm)	EIRP (W)
QPSK	1850.7	18607	1.4	1	0	22.37	0.189
				6	0	20.26	0.116
	1880	18900		1	0	22.07	0.177
				6	0	20.15	0.114
	1909.3	19193		1	0	22.03	0.175
				6	0	20.16	0.114
16QAM	1850.7	18607	1.4	1	0	21.32	0.149
				1	5	21.21	0.145
				5	0	20.06	0.111
				5	1	20.08	0.112
	1880	18900		1	0	21.26	0.147
				1	5	21.19	0.144
				5	0	20.04	0.111
				5	1	20.06	0.111
	1909.3	19193		1	0	21.28	0.147
				1	5	21.19	0.144
				5	0	20.01	0.110
				5	1	20.05	0.111
QPSK	1851.7	18615	3	1	0	22.34	0.188
				6	0	20.24	0.116
	1880	18900		1	0	22.06	0.176
				6	0	20.17	0.114
	1908.5	19185		1	0	22.02	0.175
				6	0	20.21	0.115
16QAM	1851.7	18615	3	1	0	21.33	0.149
				1	5	21.22	0.145
				5	0	20.07	0.111
				5	1	20.08	0.112
	1880	18900		1	0	21.27	0.147
				1	5	21.21	0.145
				5	0	20.02	0.110
				5	1	20.06	0.111
	1908.5	19185		1	0	21.26	0.147
				1	5	21.20	0.145
				5	0	20.03	0.110
				5	1	20.06	0.111

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted Power (dBm)	EIRP (W)
QPSK	1852.5	18625	5	1	0	22.34	0.188
				6	0	20.27	0.117
	1880	18900		1	0	22.07	0.177
				6	0	20.16	0.114
	1907.5	19175		1	0	22.03	0.175
				6	0	20.18	0.114
16QAM	1852.5	18625	5	1	0	21.35	0.150
				1	5	21.25	0.146
				5	0	20.06	0.111
				5	1	20.09	0.112
	1880	18900		1	0	21.28	0.147
				1	5	21.21	0.145
				5	0	20.04	0.111
				5	1	20.06	0.111
	1907.5	19175		1	0	21.32	0.149
				1	5	21.19	0.144
				5	0	20.03	0.110
				5	1	20.07	0.111
QPSK	1855	18650	10	1	0	22.38	0.190
				6	0	20.25	0.116
	1880	18900		1	0	22.11	0.178
				6	0	20.15	0.114
	1905	19150		1	0	22.08	0.177
				6	0	20.21	0.115
16QAM	1855	18650	10	1	0	21.36	0.150
				1	5	21.22	0.145
				5	0	20.12	0.113
				5	1	20.17	0.114
	1880	18900		1	0	21.31	0.148
				1	5	21.21	0.145
				5	0	20.06	0.111
				5	1	20.08	0.112
	1905	19150		1	0	21.29	0.148
				1	5	21.121	0.142
				5	0	20.03	0.110
				5	1	20.06	0.111

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted Power (dBm)	EIRP (W)
QPSK	1857.5	18675	15	1	0	22.39	0.190
				6	0	20.24	0.116
	1880	18900		1	0	22.12	0.179
				6	0	20.16	0.114
	1902.5	19125		1	0	22.11	0.178
				6	0	20.21	0.115
16QAM	1857.5	18675	15	1	0	21.34	0.149
				1	5	21.26	0.147
				5	0	20.12	0.113
				5	1	20.16	0.114
	1880	18900		1	0	21.34	0.149
				1	5	21.24	0.146
				5	0	20.12	0.113
				5	1	20.23	0.116
	1902.5	19125		1	0	21.31	0.148
				1	5	21.25	0.146
				5	0	20.12	0.113
				5	1	20.24	0.116
QPSK	1860	18700	20	1	0	22.43	0.192
				6	0	20.25	0.116
	1880	18900		1	0	22.13	0.179
				6	0	20.21	0.115
	1900	19100		1	0	22.14	0.179
				6	0	20.12	0.113
16QAM	1860	18700	20	1	0	21.36	0.150
				1	5	21.24	0.146
				5	0	20.13	0.113
				5	1	20.21	0.115
	1880	18900		1	0	21.32	0.149
				1	5	21.24	0.146
				5	0	20.21	0.115
				5	1	20.06	0.111
	1900	19100		1	0	21.32	0.149
				1	5	21.25	0.146
				5	0	20.15	0.114
				5	1	20.18	0.114

2 Occupied Bandwidth

Test result

Band	Carrier frequency (MHz)	Channel	BW (MHz)	Modulation	RB Size	RB Offset	Bandwidth of 99% Power (MHz)	Bandwidth of -26dB transmitter power (MHz)	Plot
2	1880.0	18900	1.4	QPSK	6	0	1.126	1.279	Fig.1
				16QAM	5	1	0.939	1.076	Fig.2
			3	QPSK	6	0	1.289	1.421	Fig.3
				16QAM	5	1	1.280	1.410	Fig.4
			5	QPSK	6	0	1.098	1.488	Fig.5
				16QAM	5	1	0.928	1.856	Fig.6
			10	QPSK	6	0	1.126	1.705	Fig.7
				16QAM	5	1	0.967	1.526	Fig.8
			15	QPSK	6	0	1.110	1.705	Fig.9
				16QAM	5	1	0.970	1.601	Fig.10
			20	QPSK	6	0	1.143	1.755	Fig.11
				16QAM	5	1	0.959	1.451	Fig.12

Fig.1

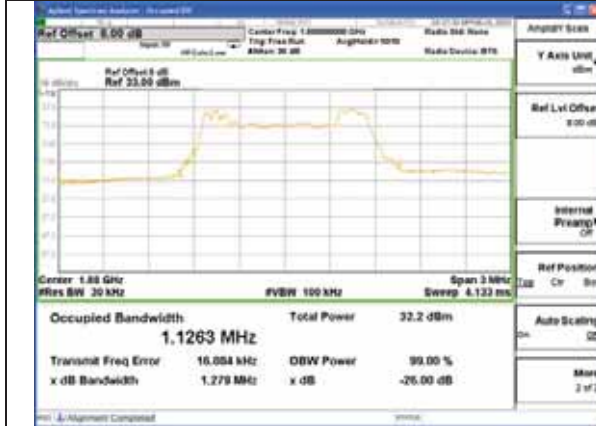


Fig.2

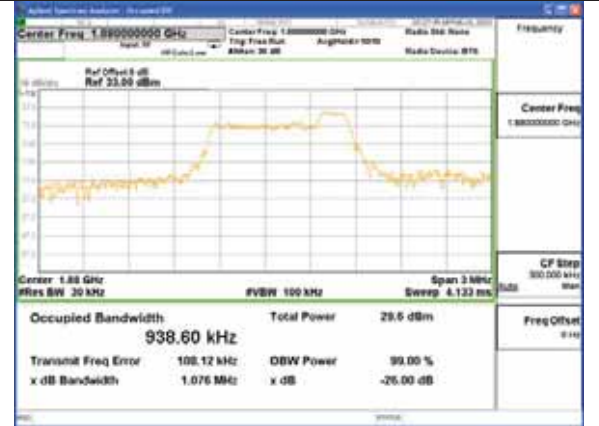


Fig.3

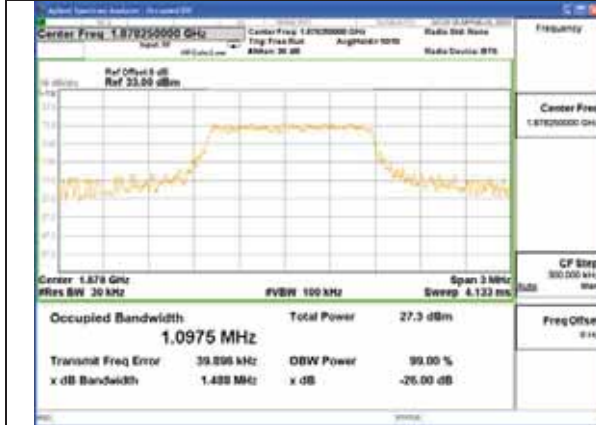


Fig.4



Fig.5

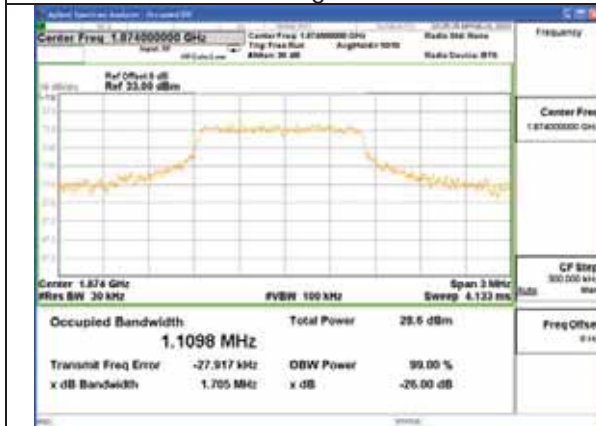


Fig.6



Fig.7



Fig.8

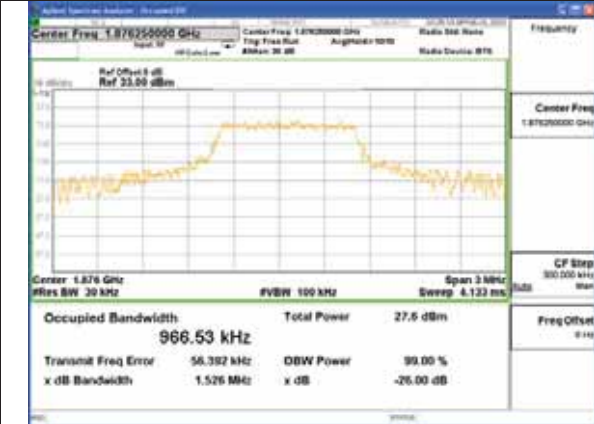


Fig.9

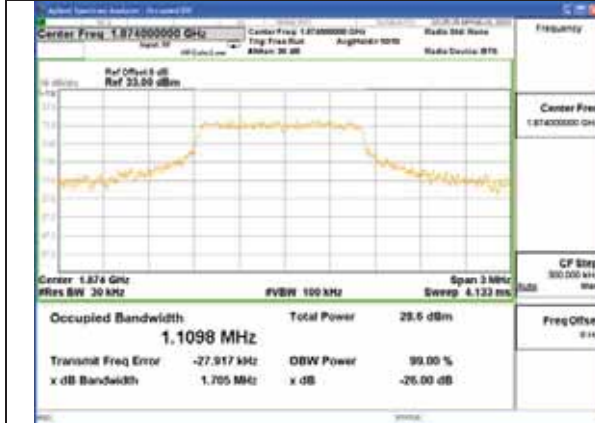


Fig.10

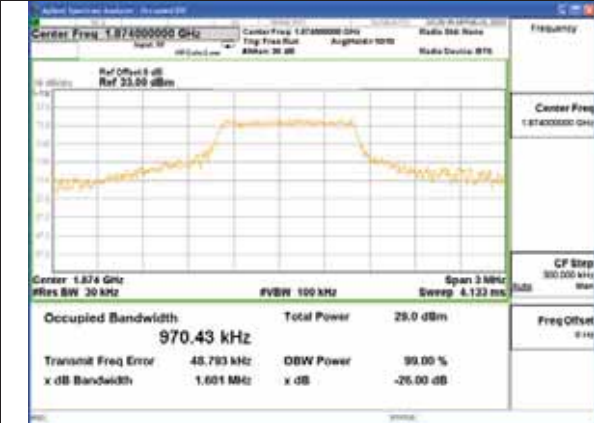


Fig.11

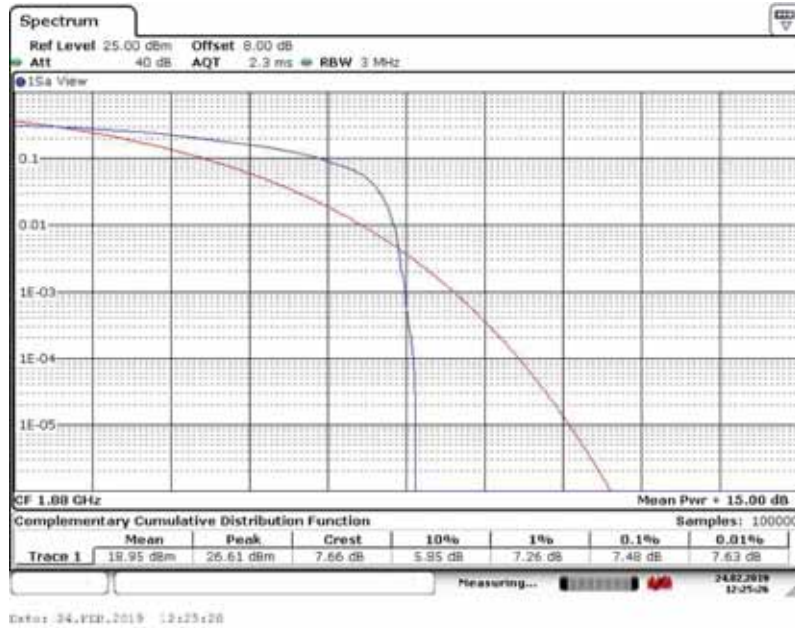


Fig.12

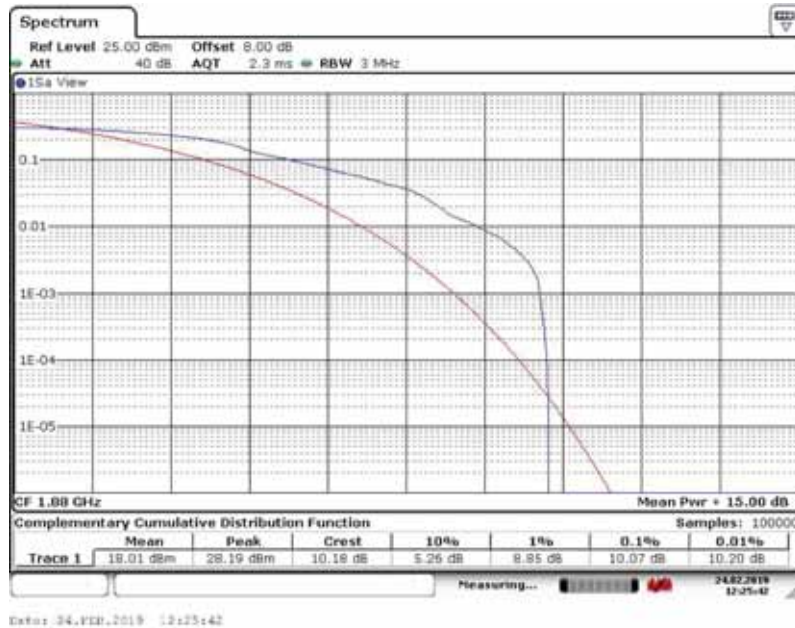


4 Peak-Average Ratio

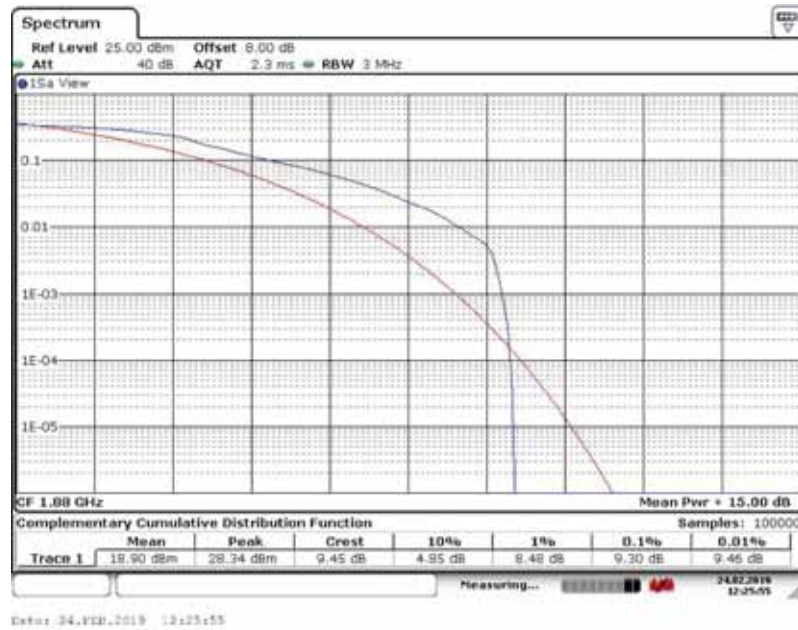
Test result:



Peak-Average Ratio Plot(1.4MHz BW,QPSK,Band 2-mid Channel)



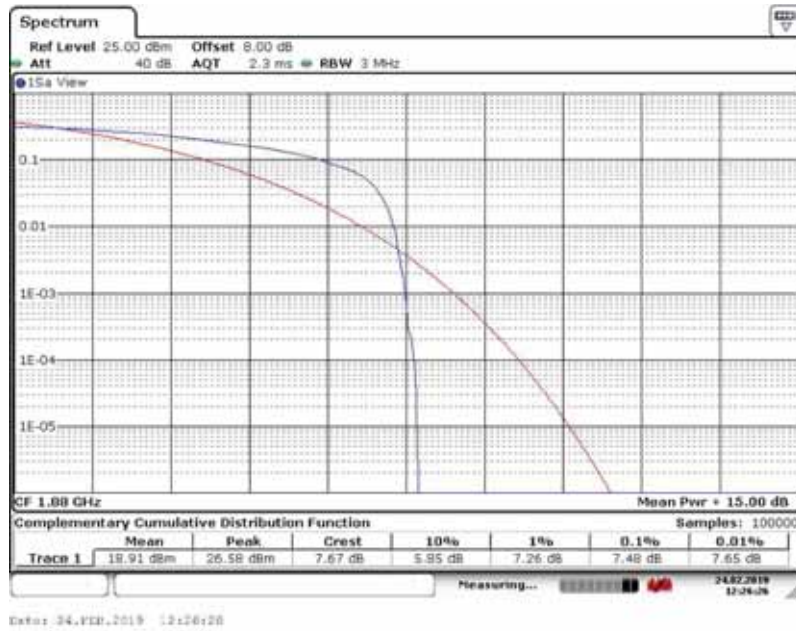
Peak-Average Ratio Plot(1.4MHz BW,16QAM,Band 2-mid Channel)



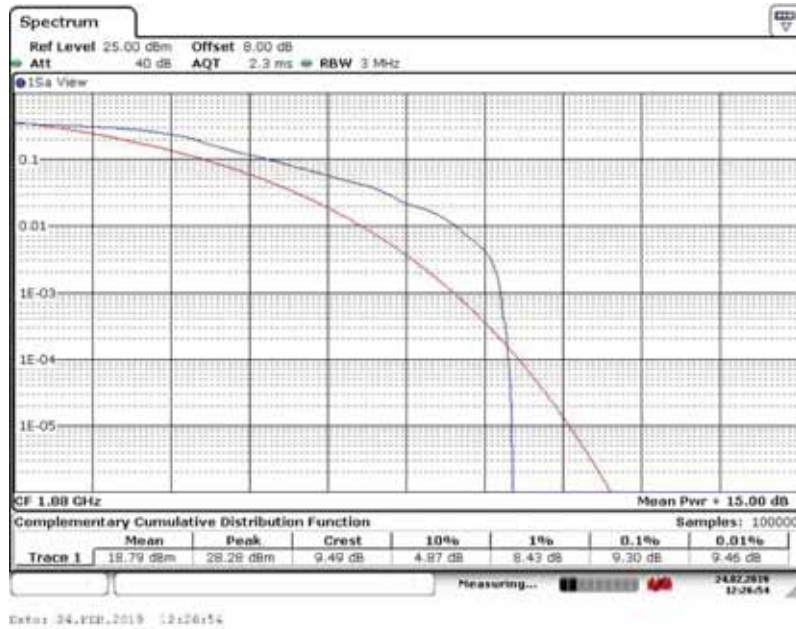
Peak-Average Ratio Plot(3MHz BW,QPSK,Band 2-mid Channel)



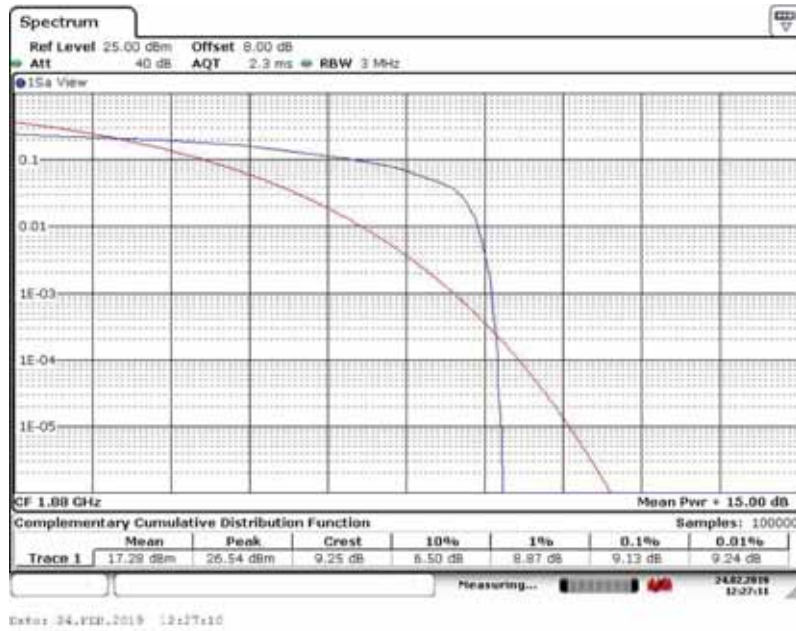
Peak-Average Ratio Plot(3MHz BW,16QAM,Band 2-mid Channel)



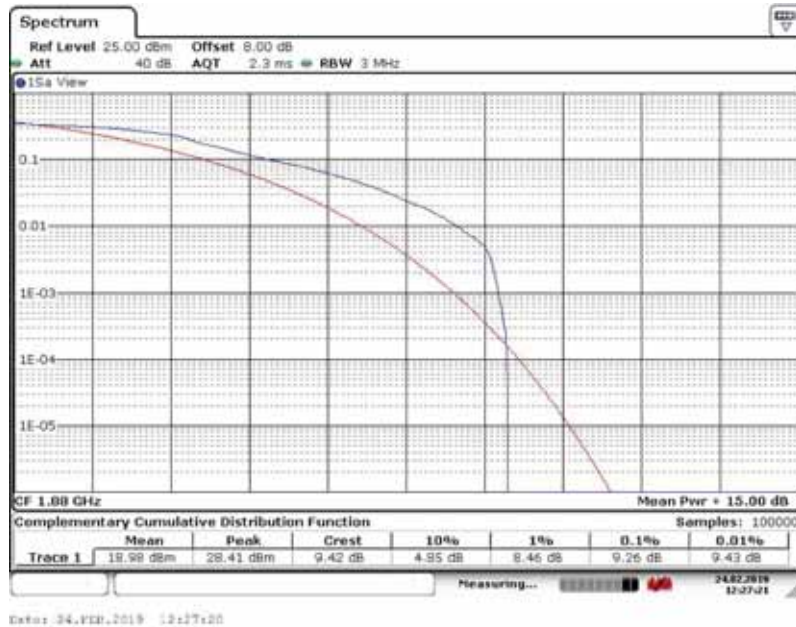
Peak-Average Ratio Plot(5MHz BW,QPSK,Band 2-mid Channel)



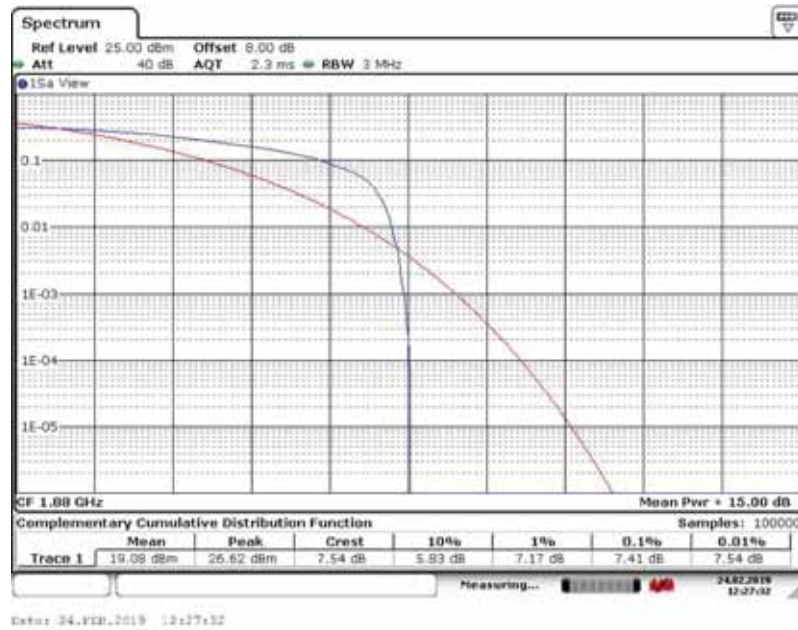
Peak-Average Ratio Plot(5MHz BW,16QAM,Band 2-mid Channel)



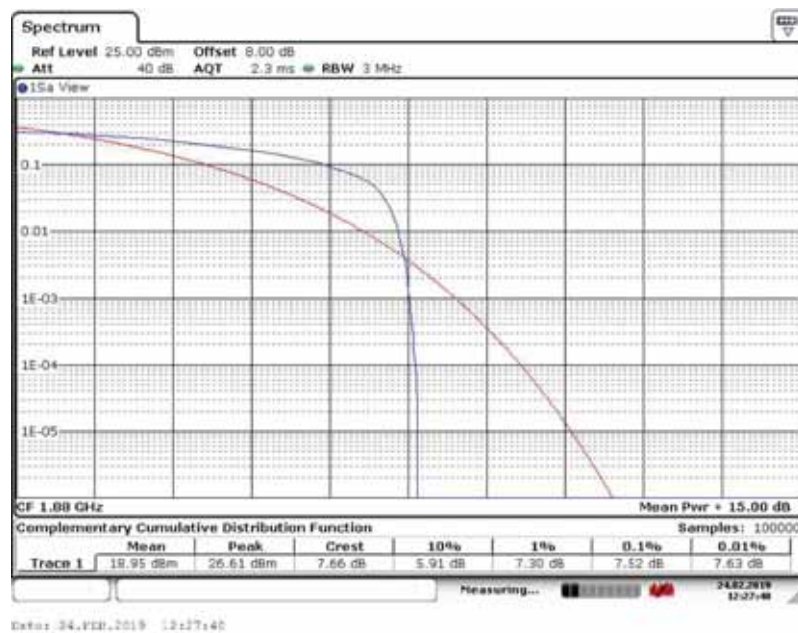
Peak-Average Ratio Plot(10MHz BW,QPSK,Band 2-mid Channel)



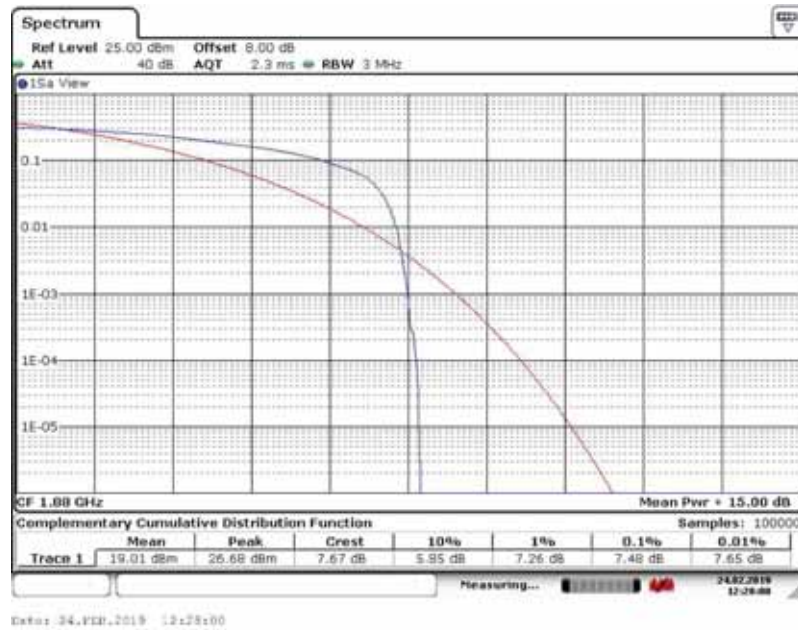
Peak-Average Ratio Plot(10MHz BW,16QAM,Band 2-mid Channel)



Peak-Average Ratio Plot(15MHz BW,QPSK,Band 2-mid Channel)



Peak-Average Ratio Plot(15MHz BW,16QAM,Band 2-mid Channel)



Peak-Average Ratio Plot(20MHz BW,QPSK,Band 2-mid Channel)



Peak-Average Ratio Plot(20MHz BW,16QAM,Band 2-mid Channel)

5 Spurious Emissions at antenna terminal

Band	Carrier frequency (MHz)	Channel(Low)	BW	RB Size	RB Offset	Conducted Spurious Plot
						QPSK
2	1860	18700	20	1	0	Fig.1



Fig.1

Band	Carrier frequency (MHz)	Channel(Low)	BW	RB Size	RB Offset	Conducted Spurious Plot
						QPSK
2	1880	18900	20	1	0	Fig.1

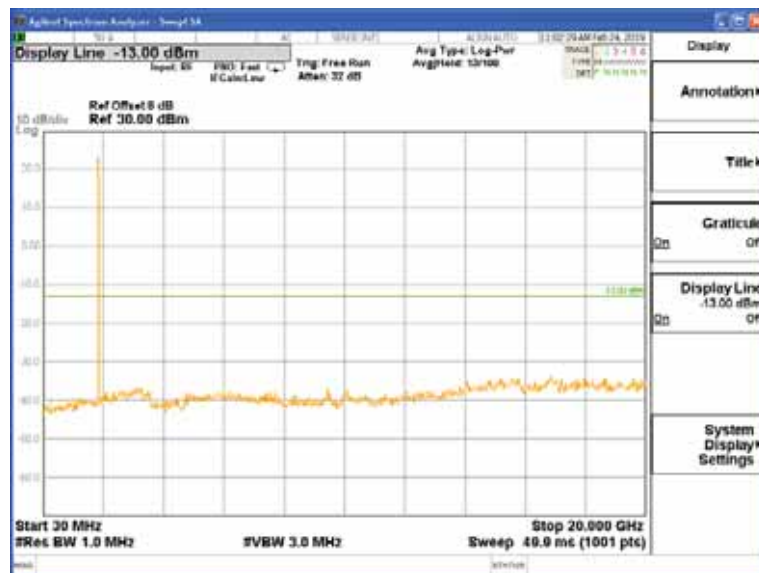


Fig.1

Band	Carrier frequency (MHz)	Channel(Low)	BW	RB Size	RB Offset	Conducted Spurious Plot
						QPSK
2	1900	19100	20	1	0	Fig.1

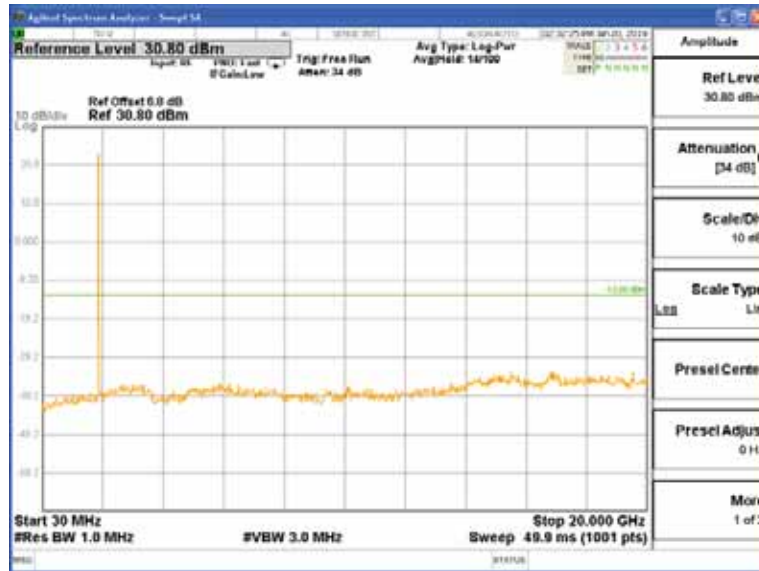


Fig.1

6 Band Edges Compliance

Test result

Band	Carrier frequency (MHz)	Channel (Low)	BW	RB Size	RB Offset	Band Edges Plot
						QPSK
2	1850.7	18607	1.4	1	0	Fig.1
				6	0	Fig.4

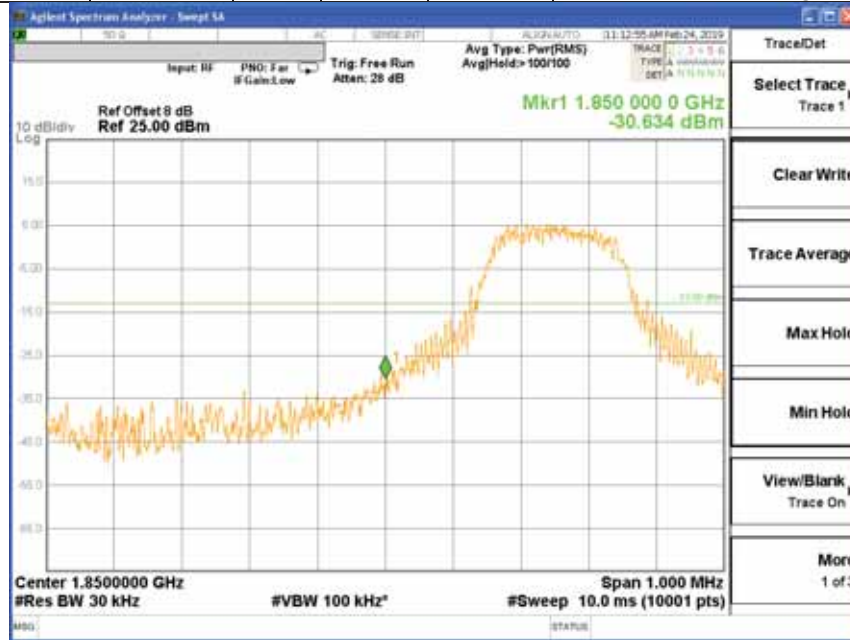


Fig.1

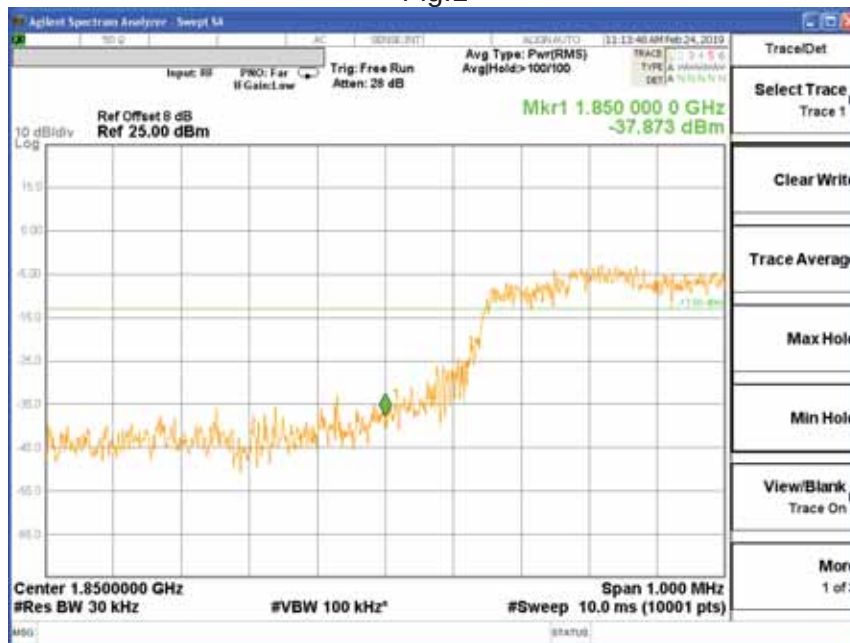


Fig.4

Band	Carrier frequency (MHz)	Channel (High)	BW	RB Size	RB Offset	Band Edges Plot
						QPSK
2	1909.3	19193	1.4	1	0	Fig.1
				6	0	Fig.4

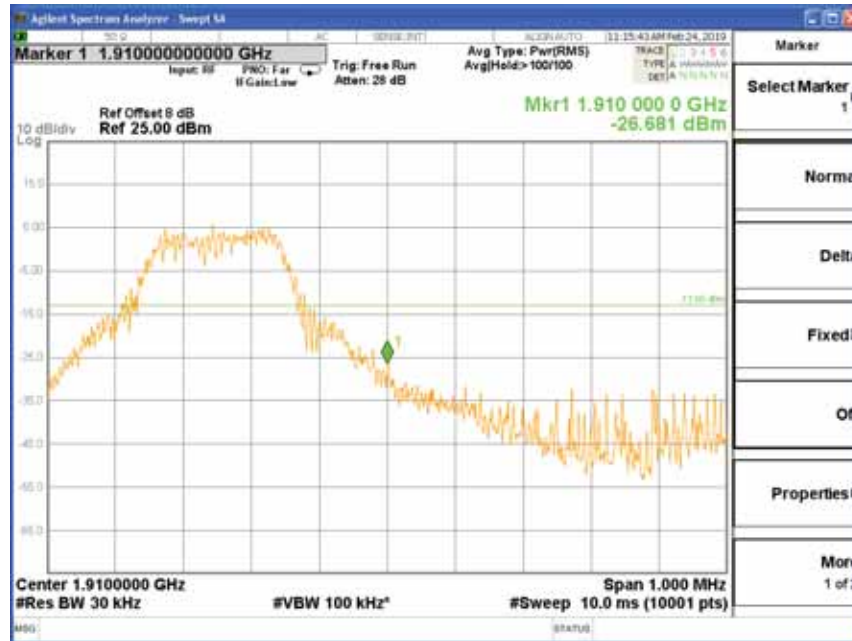


Fig.1

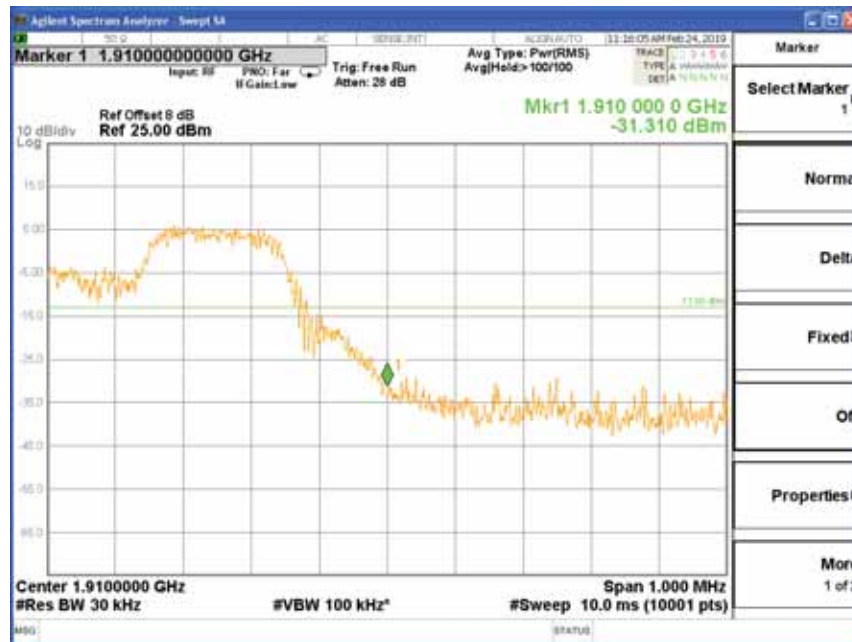


Fig.4

Band	Carrier frequency (MHz)	Channel (Low)	BW	RB Size	RB Offset	Band Edges Plot
						QPSK
2	1851.5	18615	3	1	0	Fig.1
				6	0	Fig.4

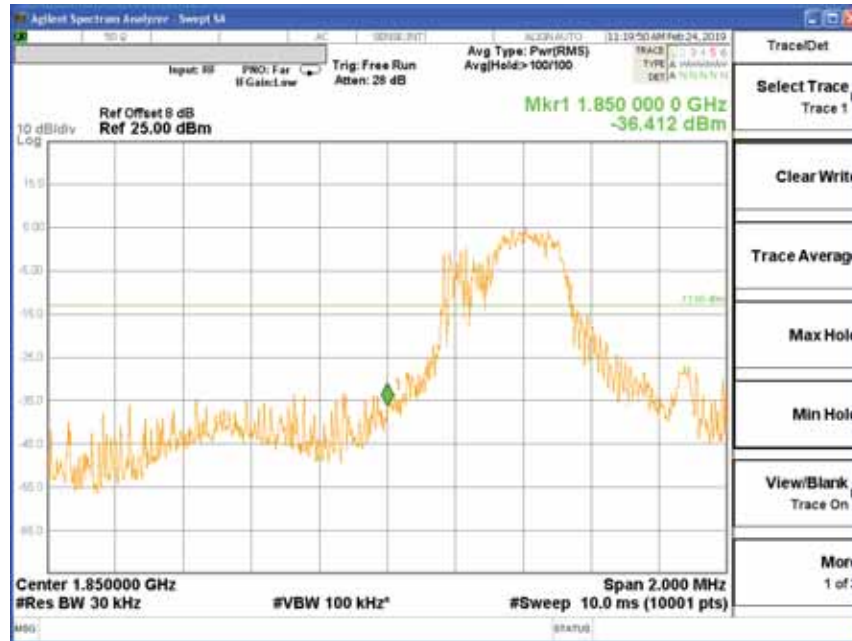


Fig.1

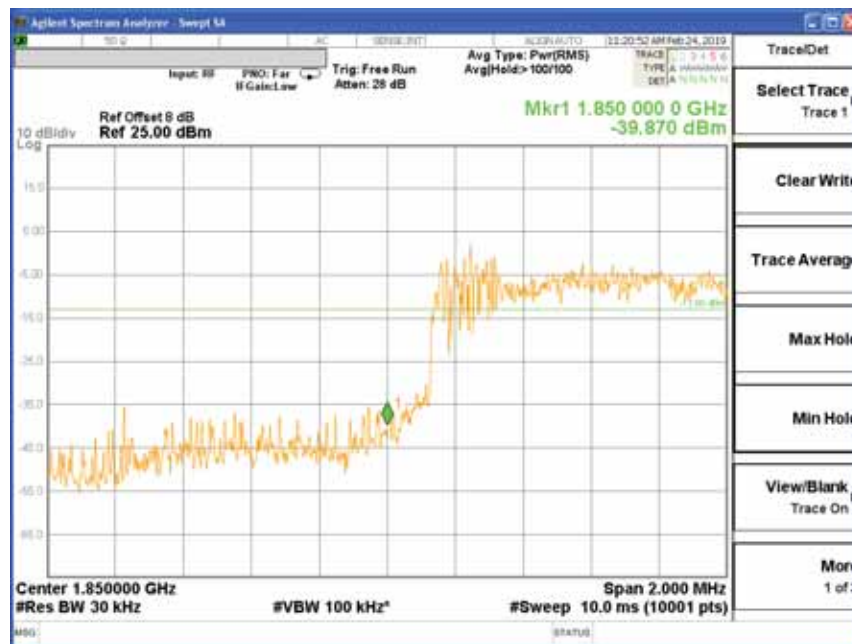


Fig.4

Band	Carrier frequency (MHz)	Channel (High)	BW	RB Size	RB Offset	Band Edges Plot
						QPSK
2	1908.5	19185	3	1	0	Fig.1
				6	0	Fig.4

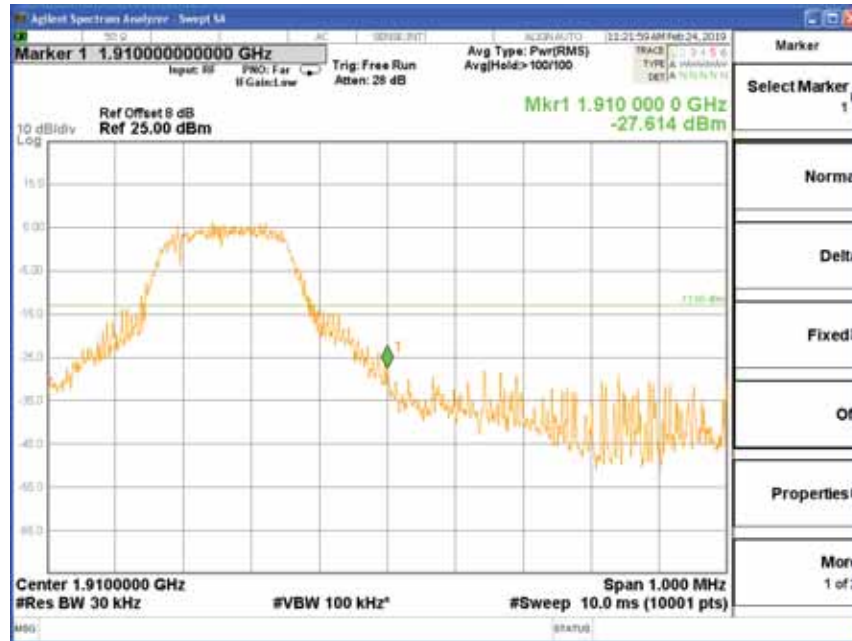


Fig.1

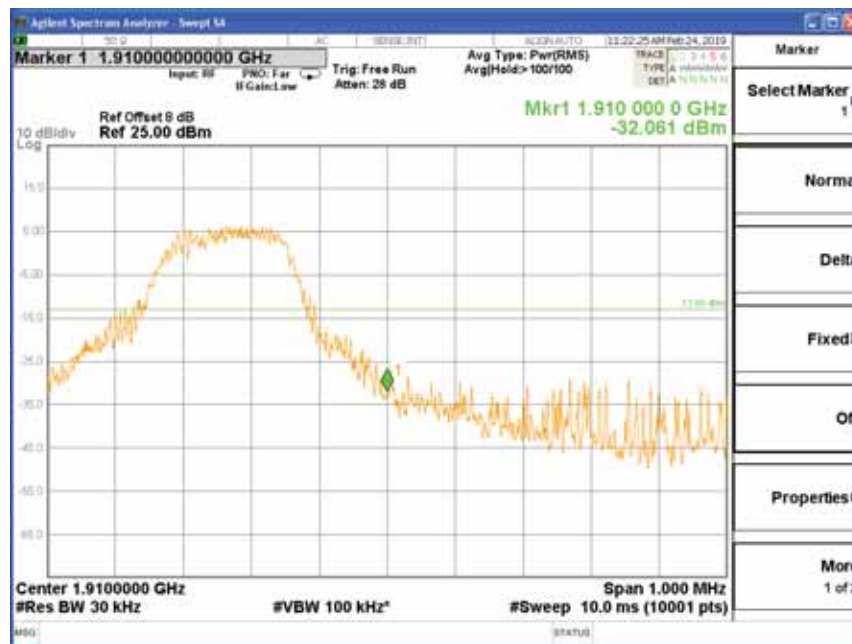


Fig.4

Band	Carrier frequency (MHz)	Channel (Low)	BW	RB Size	RB Offset	Band Edges Plot
						QPSK
2	1852.5	18625	5	1	0	Fig.1
				6	0	Fig.4

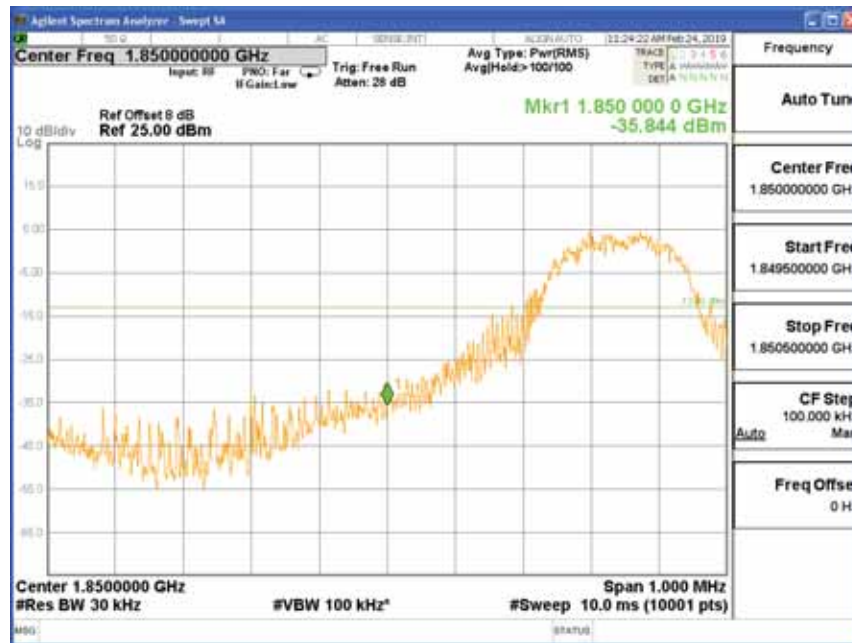


Fig.1

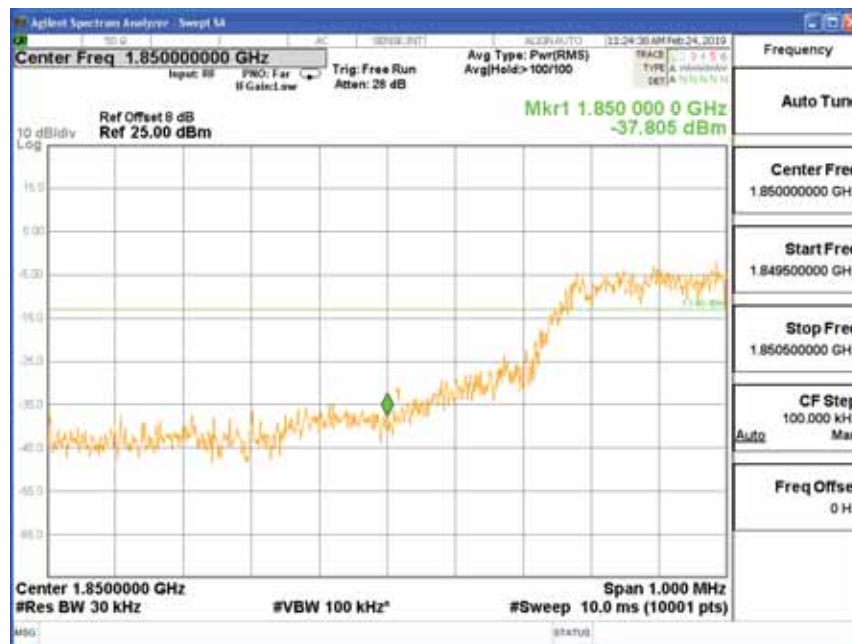


Fig.4

Band	Carrier frequency (MHz)	Channel (High)	BW	RB Size	RB Offset	Band Edges Plot
						QPSK
2	1907.5	19175	5	1	0	Fig.1
				6	0	Fig.4

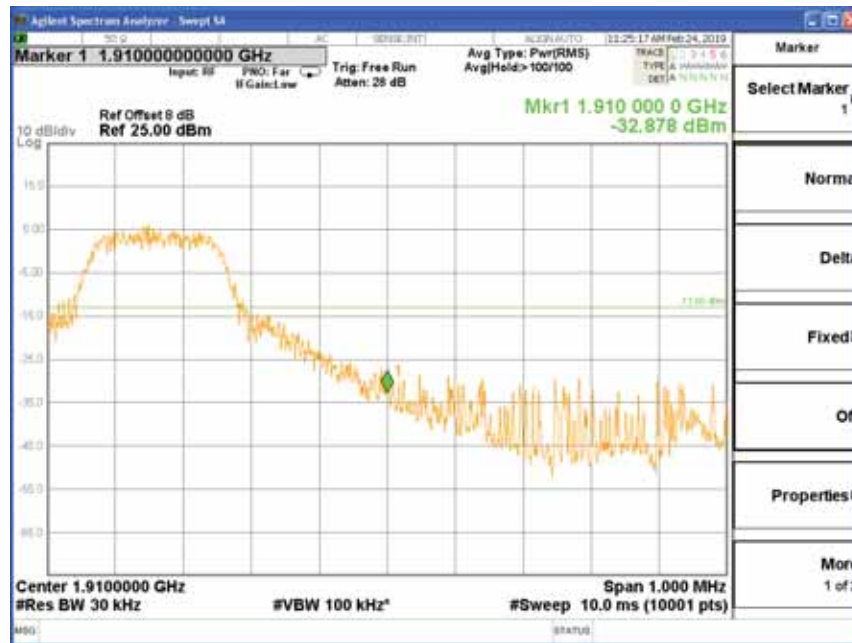


Fig.1

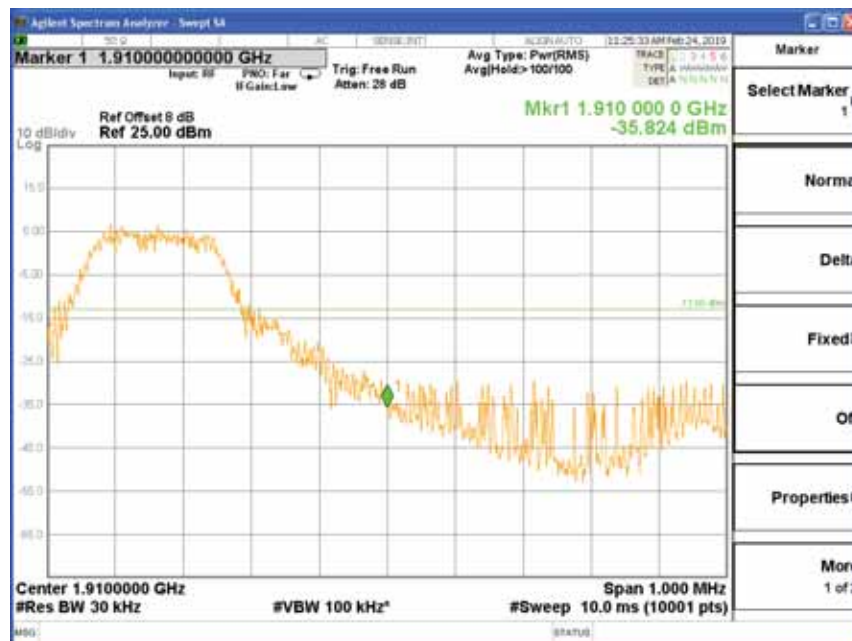


Fig.4

Band	Carrier frequency (MHz)	Channel (Low)	BW	RB Size	RB Offset	Band Edges Plot
						QPSK
2	1855	18650	10	1	0	Fig.1
				6	0	Fig.4

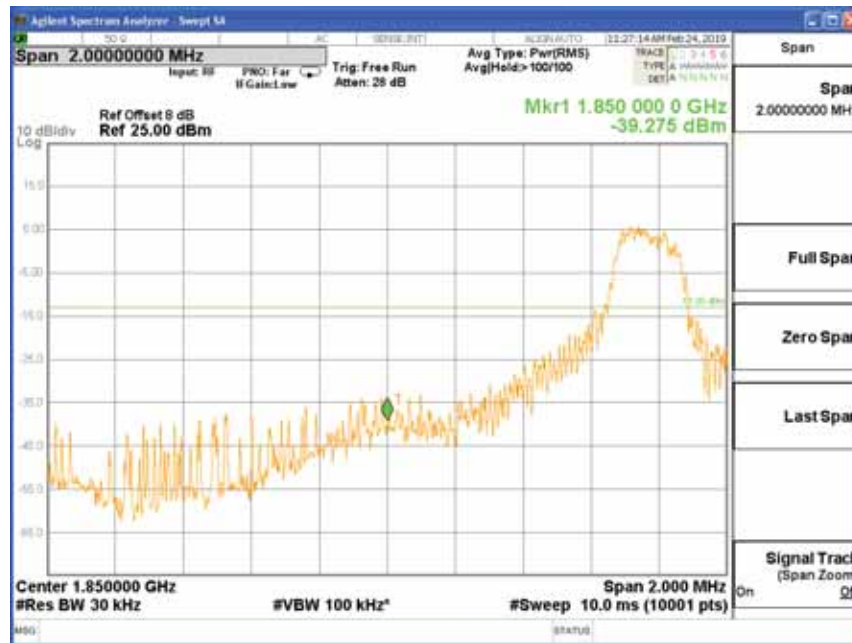


Fig.1

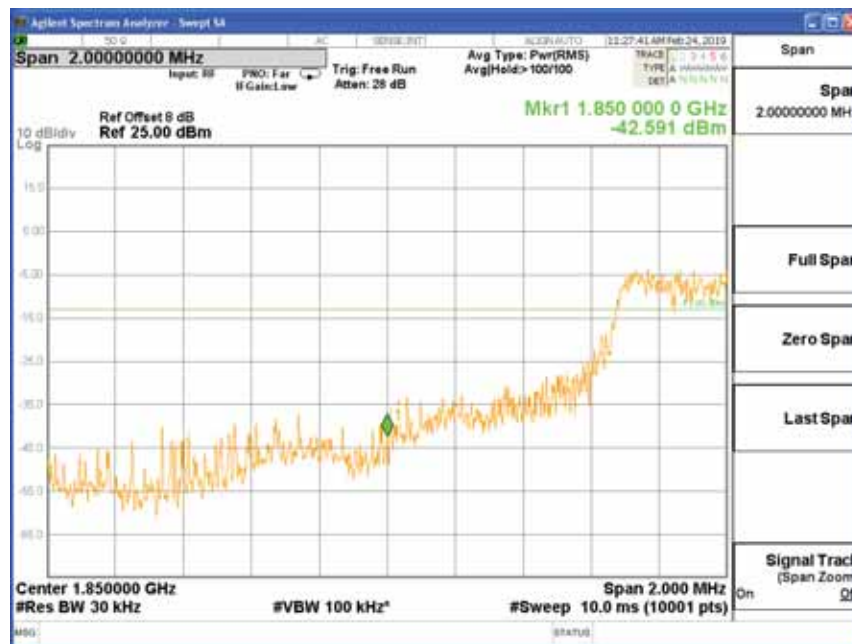


Fig.4

Band	Carrier frequency (MHz)	Channel (High)	BW	RB Size	RB Offset	Band Edges Plot
						QPSK
2	1905	19150	10	1	0	Fig.1
				6	0	Fig.4

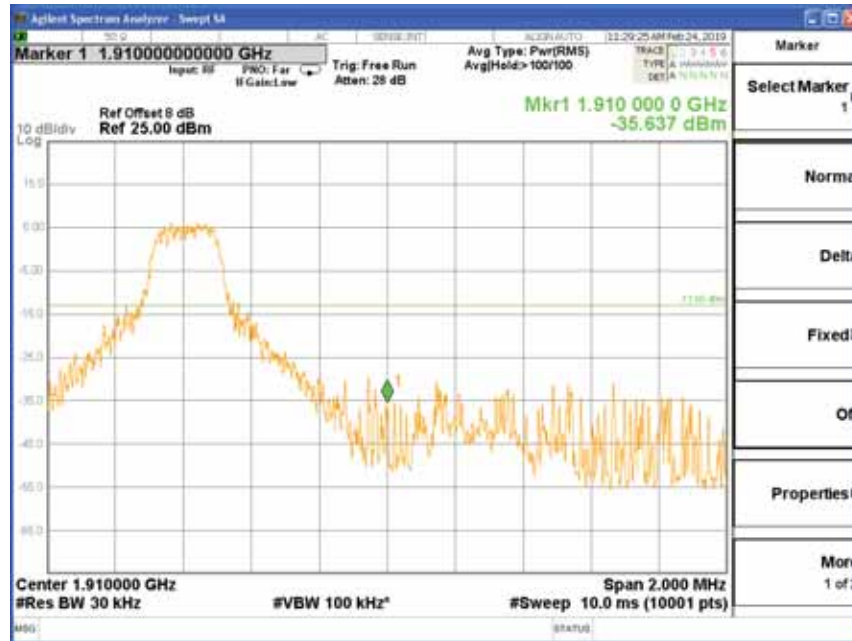


Fig.1

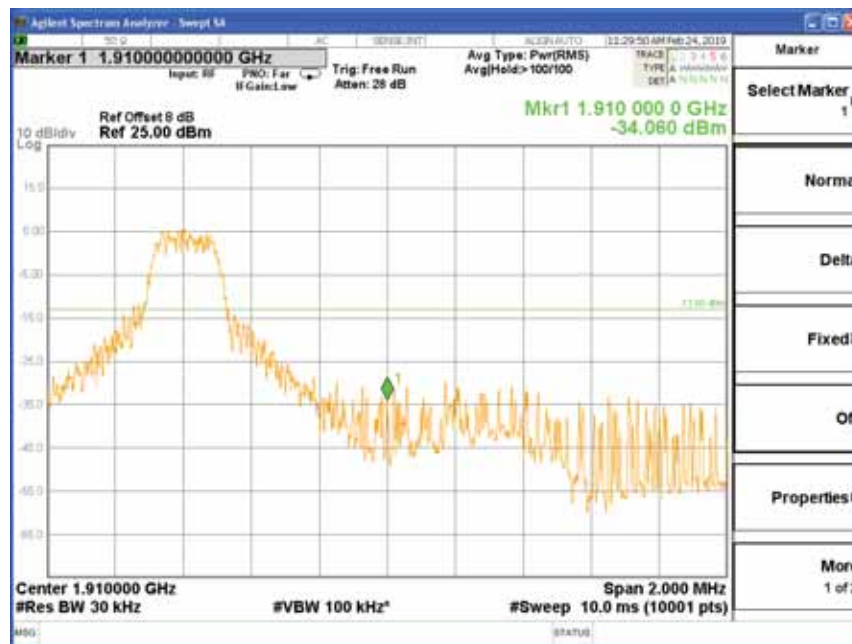


Fig.4

Band	Carrier frequency (MHz)	Channel (Low)	BW	RB Size	RB Offset	Band Edges Plot
						QPSK
2	1857.5	18675	15	1	0	Fig.1
				6	0	Fig.4

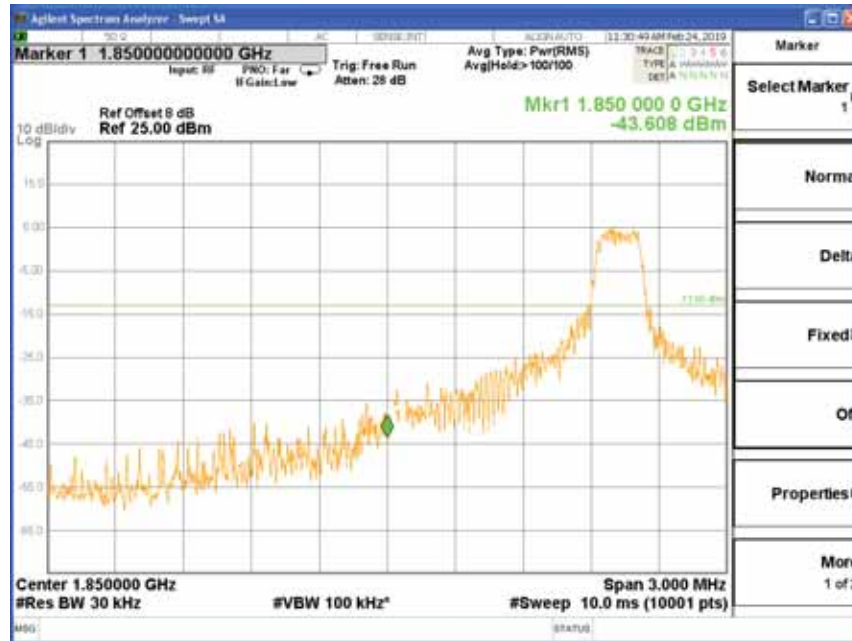


Fig.1

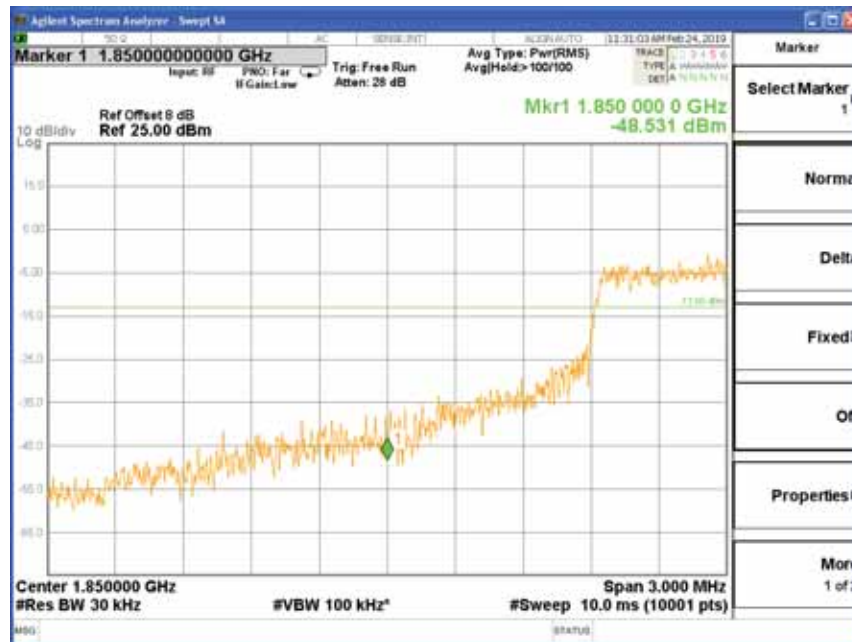


Fig.4

Band	Carrier frequency (MHz)	Channel (High)	BW	RB Size	RB Offset	Band Edges Plot
						QPSK
2	1902.5	19125	15	1	0	Fig.1
				6	0	Fig.4

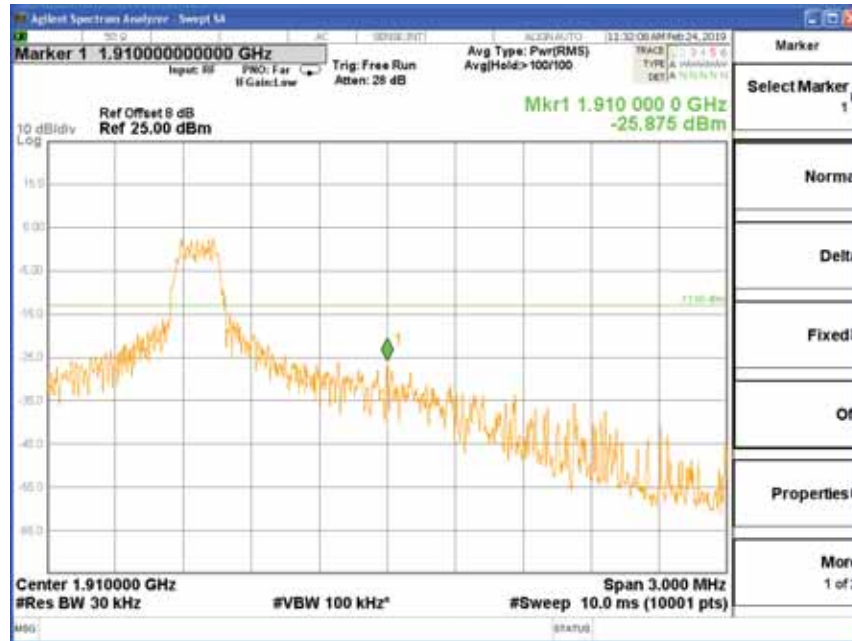


Fig.1

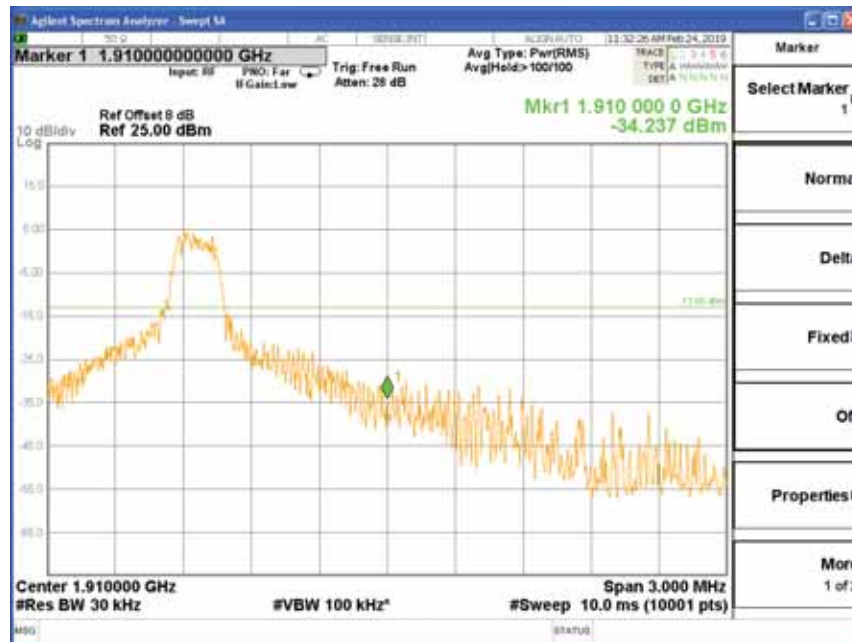


Fig.4

Band	Carrier frequency (MHz)	Channel (Low)	BW	RB Size	RB Offset	Band Edges Plot
						QPSK
2	1860	18700	20	1	0	Fig.1
				6	0	Fig.4

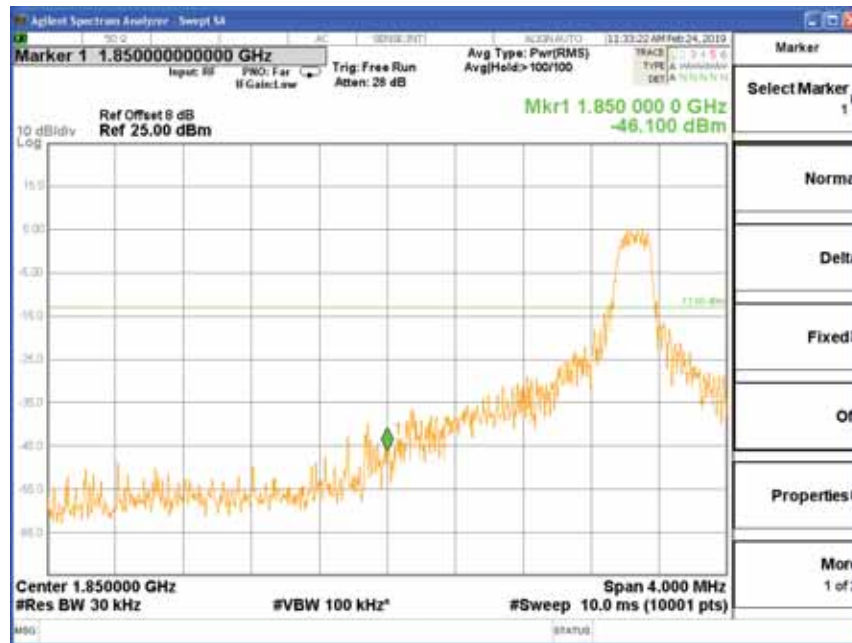


Fig.1

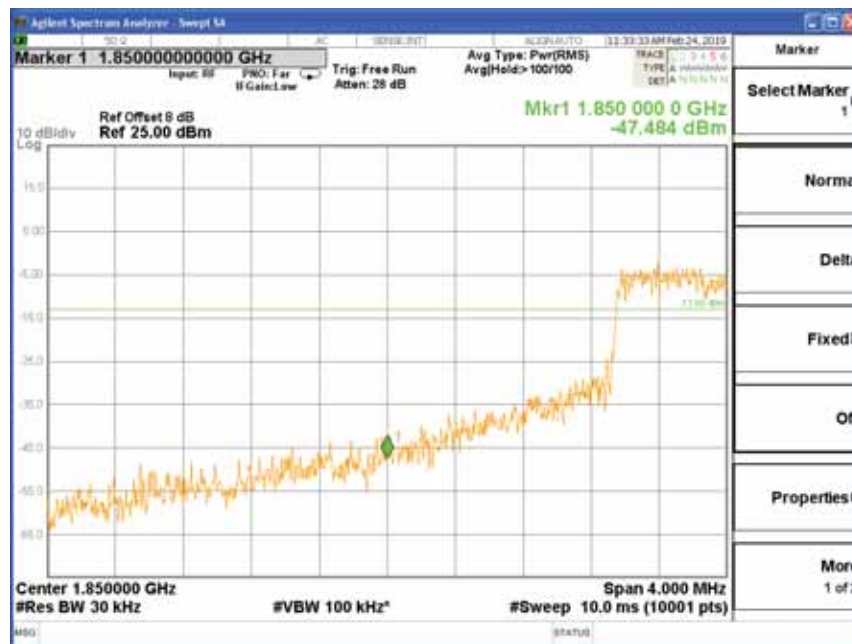


Fig.4

Band	Carrier frequency (MHz)	Channel (High)	BW	RB Size	RB Offset	Band Edges Plot
						QPSK
2	1900	19100	20	1	0	Fig.1
				6	0	Fig.4

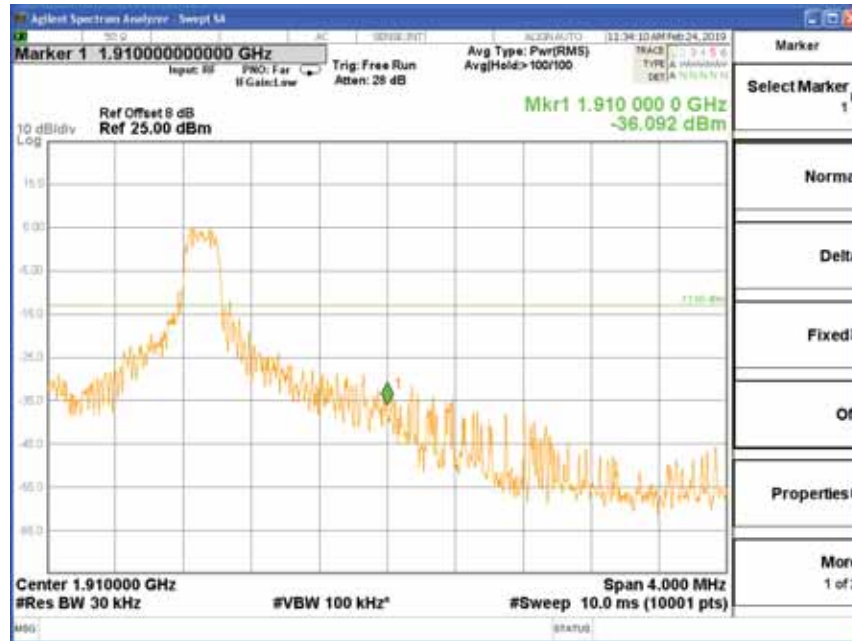


Fig.1

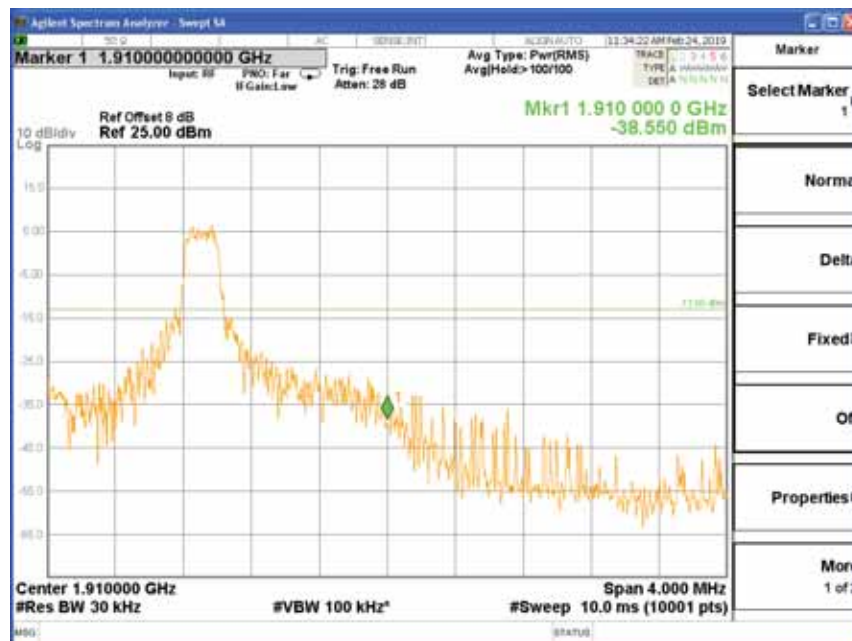


Fig.4

7 Frequency Stability

Test result:

Temperature(°C)	Voltage	Test Result (ppm) Band2 Low Channel					
		1.4M	3M	5M	10M	15M	20M
-20	NV	0.016	0.007	0.007	0.019	0.016	0.018
-10	NV	0.020	-0.012	0.010	0.018	0.012	0.010
0	NV	-0.012	0.015	-0.006	0.017	0.015	-0.013
+10	NV	0.010	0.004	0.013	0.007	0.012	0.004
+20	NV	0.007	0.001	0.011	0.020	-0.016	0.020
+30	NV	0.018	0.006	0.006	0.003	0.002	0.004
+40	NV	0.014	0.016	0.003	-0.003	0.013	0.006
+50	NV	0.007	-0.009	-0.011	0.002	0.008	-0.003
+60	NV	0.003	0.008	0.001	0.010	0.013	0.002
+20	LV	0.010	0.008	0.003	0.003	0.011	-0.017
+20	HV	0.016	0.001	0.011	0.002	0.015	0.001

Temperature(°C)	Voltage	Test Result (ppm) Band2 High Channel					
		1.4M	3M	5M	10M	15M	20M
-20	NV	0.010	0.006	0.013	0.015	0.004	0.005
-10	NV	-0.005	0.012	-0.008	0.006	0.005	0.019
0	NV	0.014	0.014	0.016	0.018	0.012	0.011
+10	NV	0.008	0.010	0.017	0.016	-0.016	0.007
+20	NV	0.004	-0.002	0.009	0.008	0.018	0.005
+30	NV	-0.015	0.016	0.008	0.016	0.010	0.014
+40	NV	0.002	0.012	0.007	-0.016	0.015	0.017
+50	NV	0.002	0.016	0.010	0.013	0.015	0.011
+60	NV	0.006	0.001	0.001	0.013	0.013	0.015
+20	LV	0.019	0.017	0.017	0.017	0.011	-0.010
+20	HV	0.011	0.005	0.016	0.001	0.019	0.004
+20	HV	0.010	0.006	0.013	0.015	-0.004	0.005

APPENDIX A – TEST DATA OF CONDUCTED EMISSION

LTE_CAT.M1_ Band 4

1 RF Power Output

Test result:

Antenna Gain: -1.75dBi

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted Power (dBm)	EIRP (W)
QPSK	1710.5	19957	1.4	1	0	23.02	0.134
				6	0	20.93	0.083
	1732.5	20175		1	0	22.86	0.129
				6	0	20.84	0.081
	1754.3	20393		1	0	22.85	0.129
				6	0	20.79	0.080
16QAM	1710.5	19957	1.4	1	0	21.78	0.101
				1	5	21.64	0.097
				5	0	20.89	0.082
				5	1	20.93	0.083
	1732.5	20175		1	0	21.62	0.097
				1	5	21.57	0.096
				5	0	20.83	0.081
				5	1	20.86	0.081
	1754.3	20393		1	0	21.60	0.097
				1	5	21.58	0.096
				5	0	20.81	0.081
				5	1	20.84	0.081
QPSK	1711.5	19965	3	1	0	23.14	0.138
				6	0	21.05	0.085
	1732.5	20175		1	0	22.98	0.133
				6	0	20.96	0.083
	1753.5	20385		1	0	22.97	0.132
				6	0	20.91	0.082
16QAM	1711.5	19965	3	1	0	21.87	0.103
				1	5	21.76	0.100
				5	0	21.01	0.084
				5	1	21.08	0.086
	1732.5	20175		1	0	21.74	0.100
				1	5	21.69	0.099
				5	0	20.95	0.083
				5	1	20.98	0.084
	1753.5	20385		1	0	21.72	0.099
				1	5	21.70	0.099
				5	0	20.93	0.083
				5	1	20.96	0.083

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted Power (dBm)	EIRP (W)
QPSK	1712.5	19975	5	1	0	23.15	0.138
				6	0	21.06	0.085
	1732.5	20175		1	0	22.99	0.133
				6	0	20.97	0.084
	1752.5	20375		1	0	22.98	0.133
				6	0	20.92	0.083
16QAM	1712.5	19975	5	1	0	21.91	0.104
				1	5	21.77	0.100
				5	0	21.02	0.085
				5	1	21.06	0.085
	1732.5	20175		1	0	21.75	0.100
				1	5	21.72	0.099
				5	0	20.96	0.083
				5	1	20.98	0.084
	1752.5	20375		1	0	21.73	0.100
				1	5	21.71	0.099
				5	0	20.94	0.083
				5	1	20.97	0.084
QPSK	1715	20000	10	1	0	23.27	0.142
				6	0	21.18	0.088
	1732.5	20175		1	0	23.11	0.137
				6	0	21.09	0.086
	1750	20350		1	0	23.12	0.137
				6	0	21.04	0.085
16QAM	1715	20000	10	1	0	22.21	0.111
				1	5	21.89	0.103
				5	0	21.14	0.087
				5	1	21.16	0.087
	1732.5	20175		1	0	21.87	0.103
				1	5	21.82	0.102
				5	0	21.08	0.086
				5	1	21.11	0.086
	1750	20350		1	0	21.85	0.102
				1	5	21.83	0.102
				5	0	21.06	0.085
				5	1	21.07	0.086

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted Power (dBm)	EIRP (W)
QPSK	1717.5	20025	15	1	0	23.35	0.145
				6	0	21.26	0.089
	1732.5	20175		1	0	23.19	0.139
				6	0	21.17	0.087
	1747.5	20325		1	0	23.22	0.140
				6	0	21.12	0.086
16QAM	1717.5	20025	15	1	0	22.29	0.113
				1	5	21.97	0.105
				5	0	21.22	0.089
				5	1	21.24	0.089
	1732.5	20175		1	0	21.95	0.105
				1	5	21.97	0.105
				5	0	21.16	0.087
				5	1	21.19	0.088
	1747.5	20325		1	0	21.93	0.104
				1	5	21.91	0.104
				5	0	21.14	0.087
				5	1	21.15	0.087
QPSK	1720	20050	20	1	0	23.44	0.148
				6	0	21.35	0.091
	1732.5	20175		1	0	23.28	0.142
				6	0	21.26	0.089
	1745	20300		1	0	23.29	0.143
				6	0	21.21	0.088
16QAM	1720	20050	20	1	0	22.38	0.116
				1	5	22.06	0.107
				5	0	21.31	0.090
				5	1	21.33	0.091
	1732.5	20175		1	0	22.04	0.107
				1	5	21.99	0.106
				5	0	21.25	0.089
				5	1	21.28	0.090
	1745	20300		1	0	22.02	0.106
				1	5	22.08	0.108
				5	0	21.23	0.089
				5	1	21.24	0.089

2 Occupied Bandwidth

Test result

Band	Carrier frequency (MHz)	Channel	BW (MHz)	Modulation	RB Size	RB Offset	Bandwidth of 99% Power (MHz)	Bandwidth of -26dB transmitter power (MHz)	Plot
4	1732.5	20175	1.4	QPSK	6	0	1.118	1.277	Fig.1
				16QAM	5	1	1.106	1.238	Fig.2
			3	QPSK	6	0	1.278	1.431	Fig.3
				16QAM	5	1	1.274	1.421	Fig.4
			5	QPSK	6	0	1.102	1.383	Fig.5
				16QAM	5	1	0.932	1.427	Fig.6
			10	QPSK	6	0	1.134	1.513	Fig.7
				16QAM	5	1	0.960	1.555	Fig.8
			15	QPSK	6	0	1.115	1.597	Fig.9
				16QAM	5	1	0.959	1.486	Fig.10
			20	QPSK	6	0	1.120	1.658	Fig.11
				16QAM	5	1	0.942	1.416	Fig.12

Fig.1

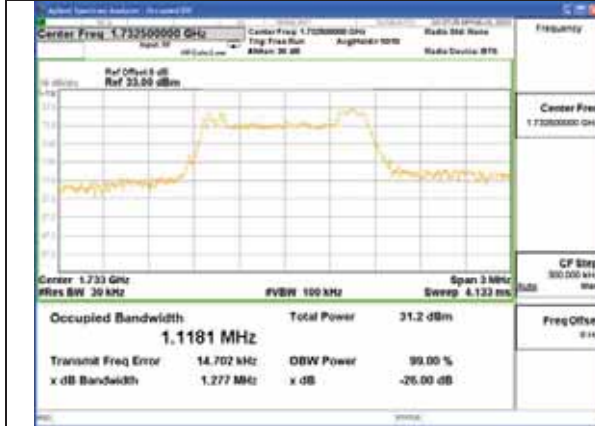


Fig.2

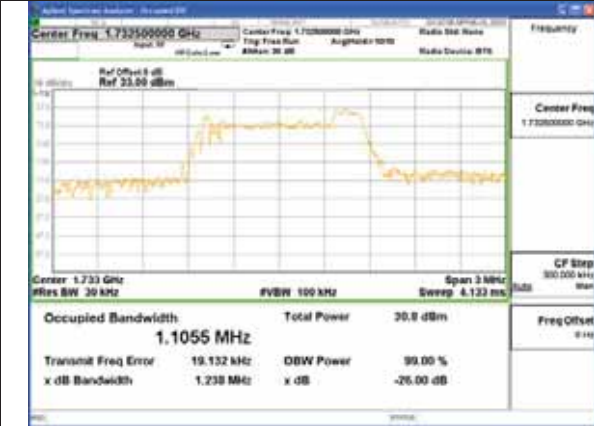


Fig.3

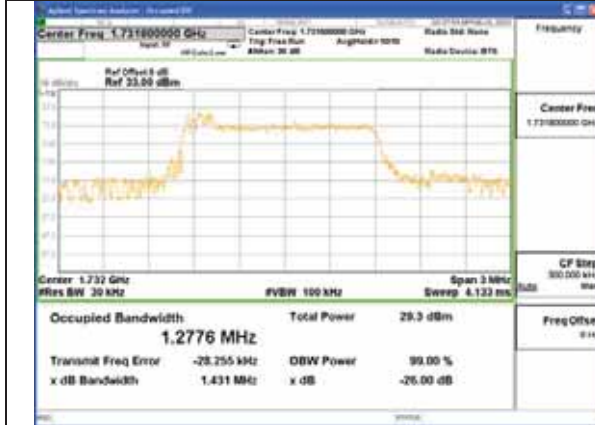


Fig.4

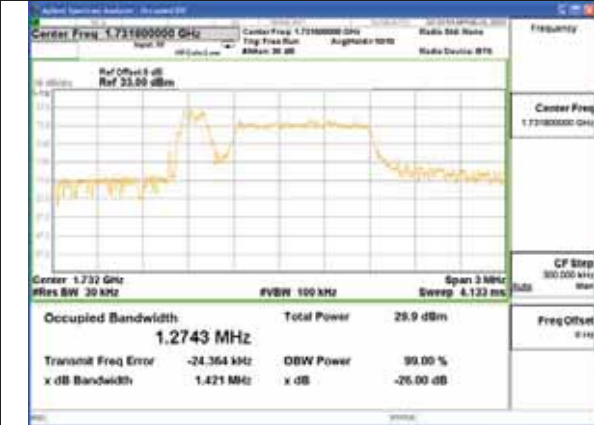


Fig.5



Fig.6



Fig.7

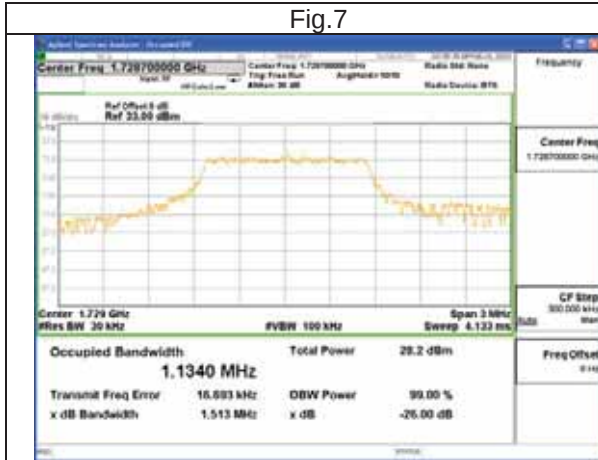


Fig.8

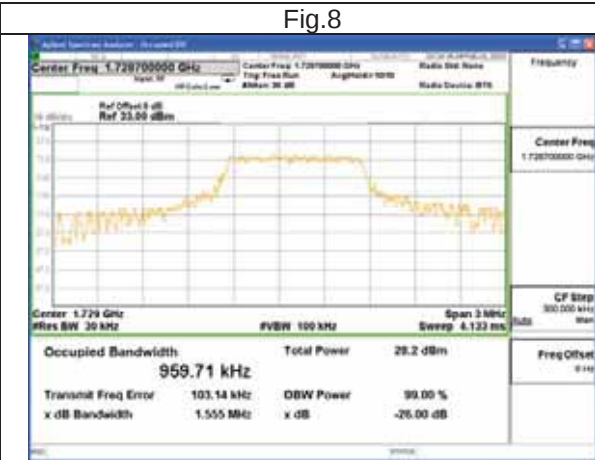


Fig.9

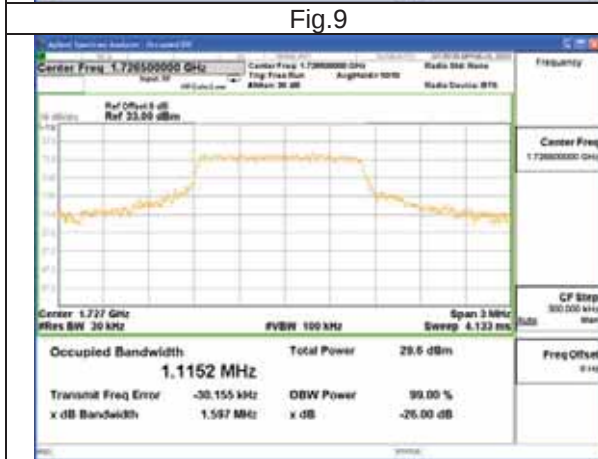


Fig.10

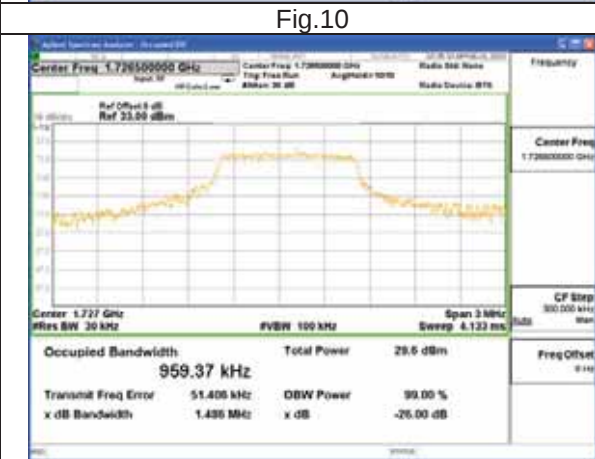


Fig.11

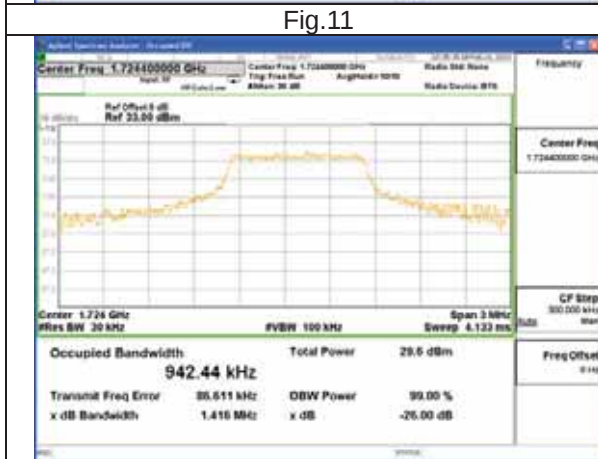
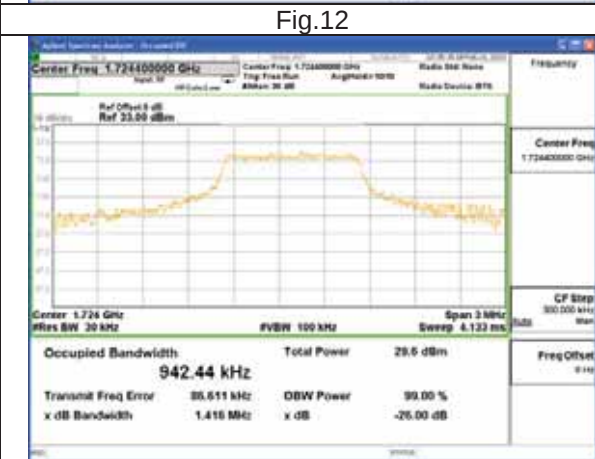
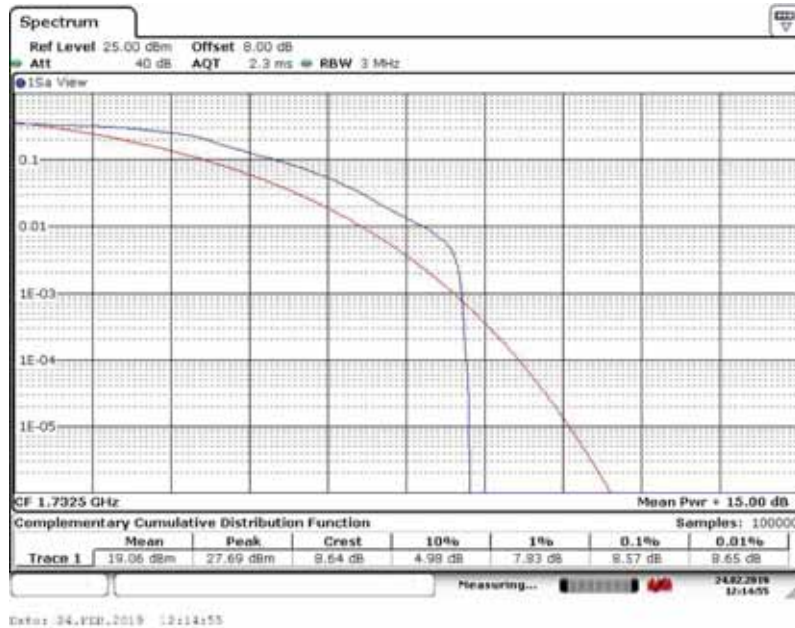


Fig.12

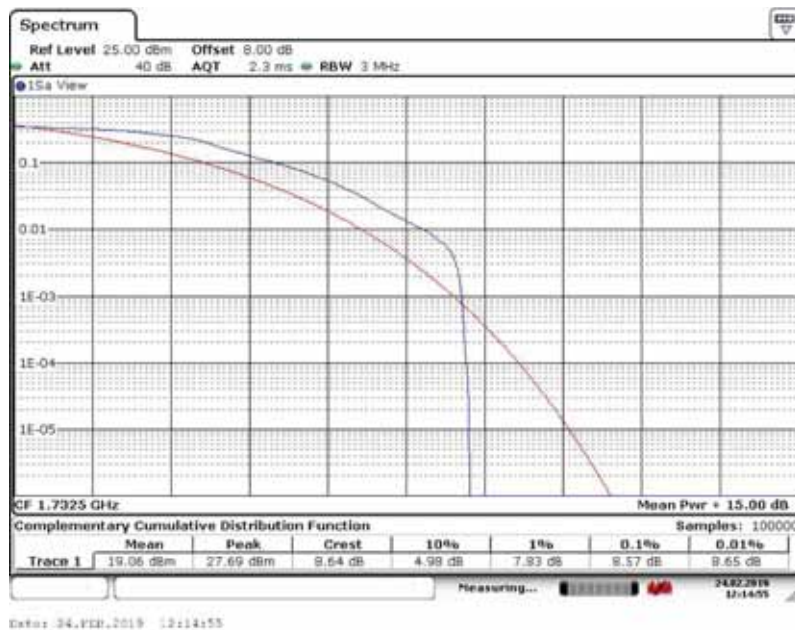


4 Peak-Average Ratio

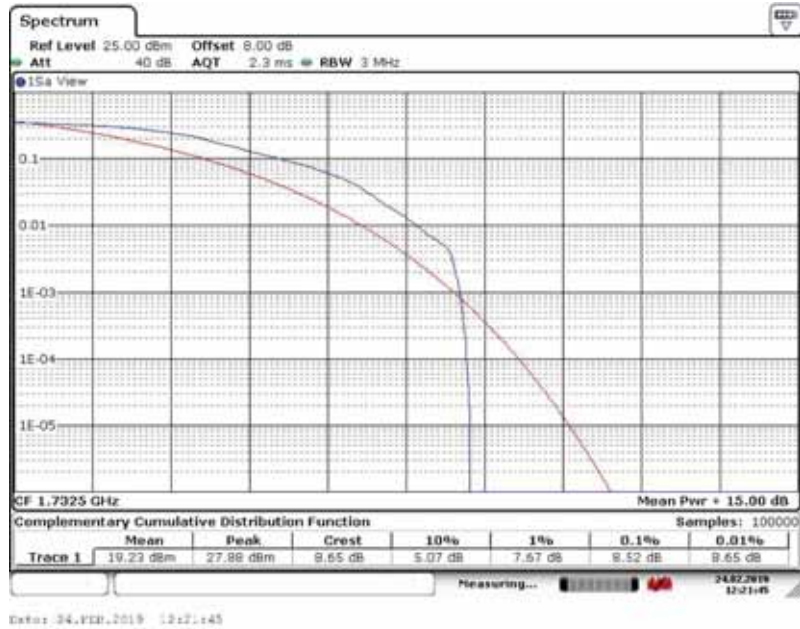
Test result:



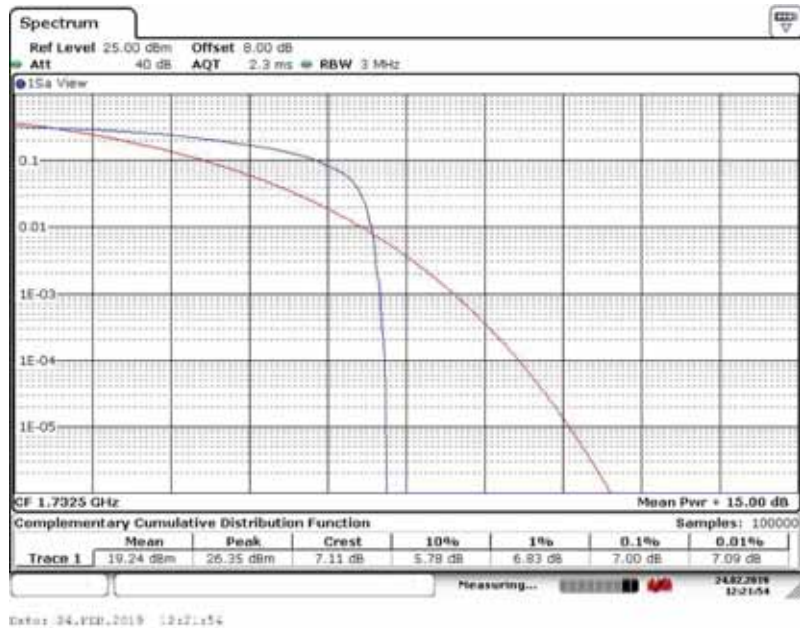
Peak-Average Ratio Plot(1.4MHz BW,QPSK,Band 4-mid Channel)



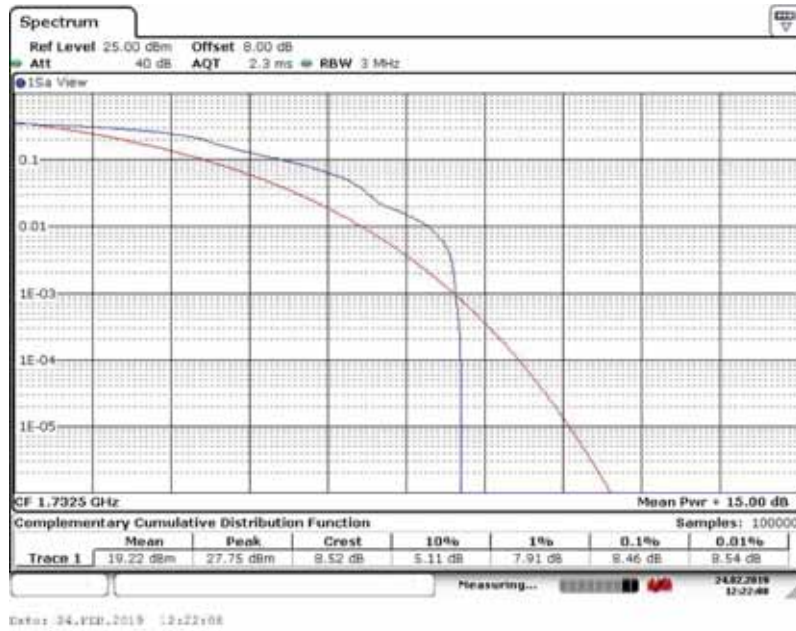
Peak-Average Ratio Plot(1.4MHz BW,16QAM,Band 4-mid Channel)



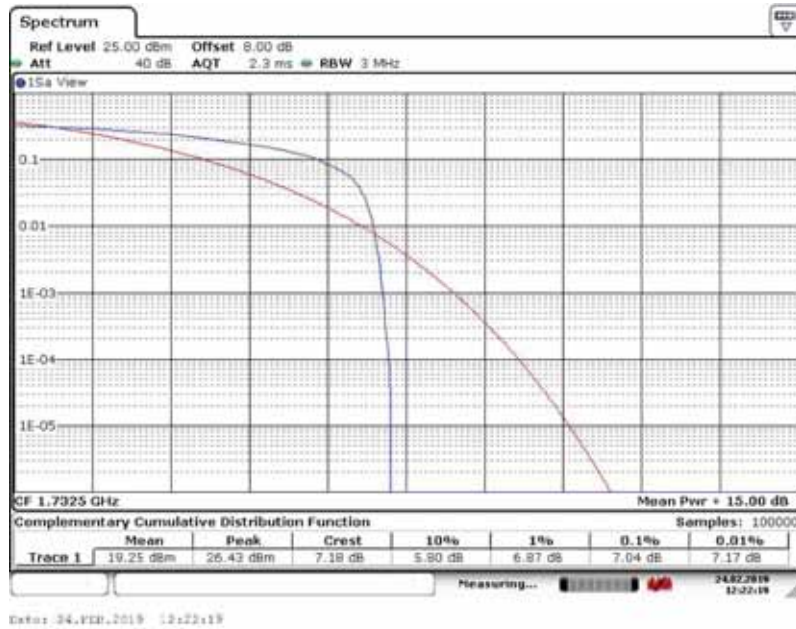
Peak-Average Ratio Plot(3MHz BW,QPSK,Band 4-mid Channel)



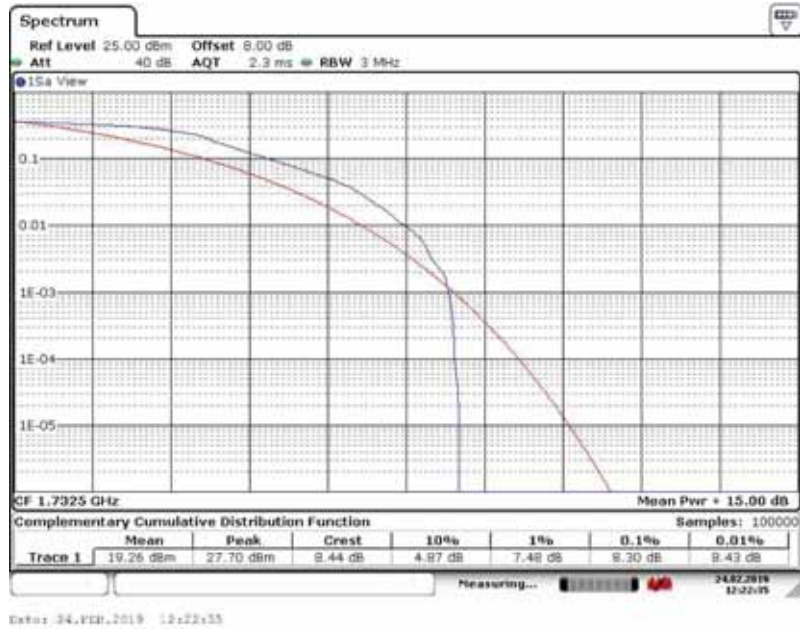
Peak-Average Ratio Plot(3MHz BW,16QAM,Band 4-mid Channel)



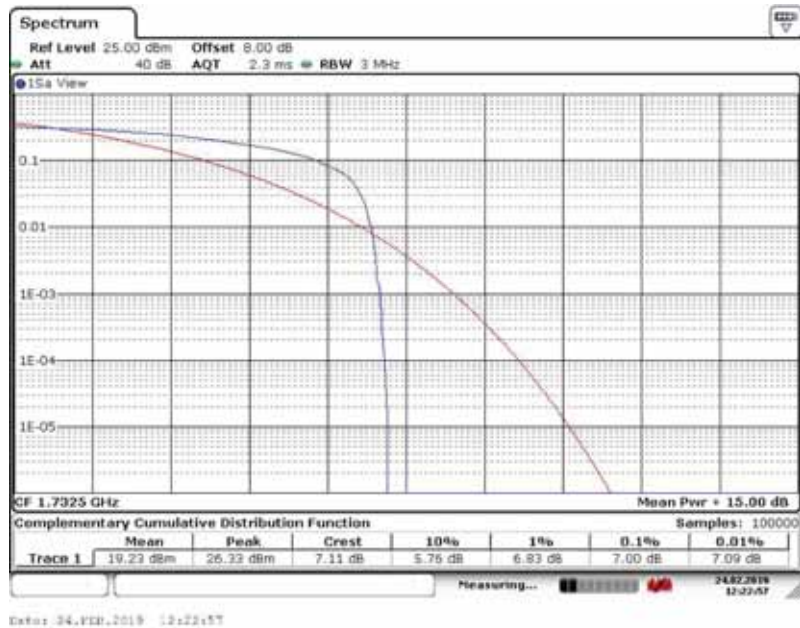
Peak-Average Ratio Plot(5MHz BW,QPSK,Band 4-mid Channel)



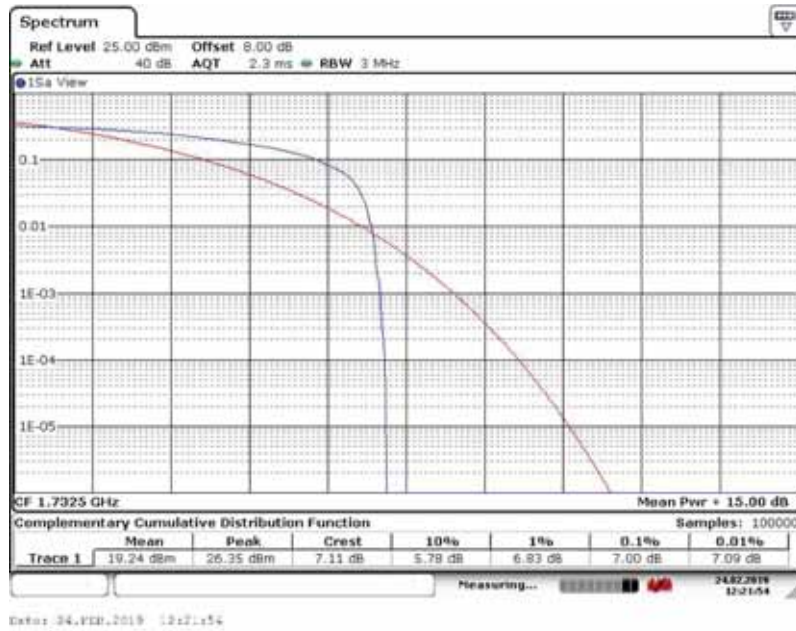
Peak-Average Ratio Plot(5MHz BW,16QAM,Band 4-mid Channel)



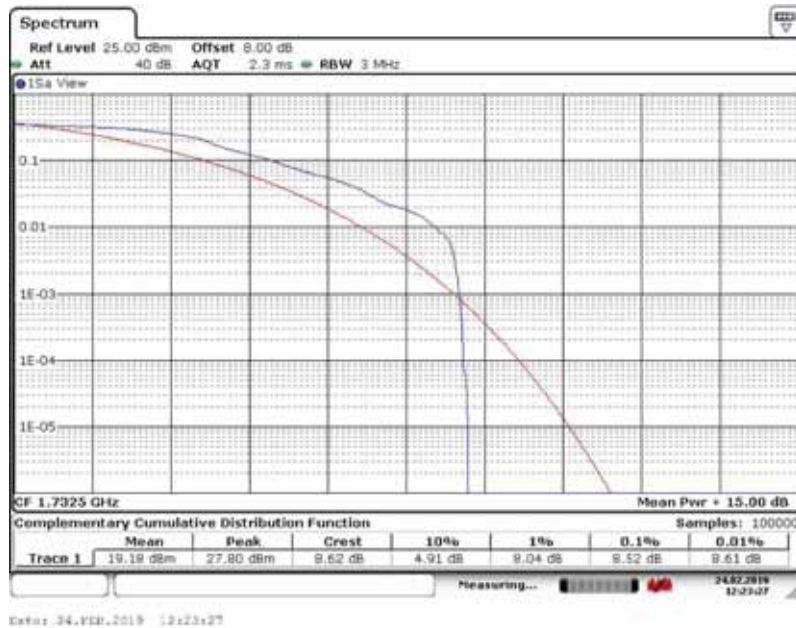
Peak-Average Ratio Plot(10MHz BW,QPSK,Band 4-mid Channel)



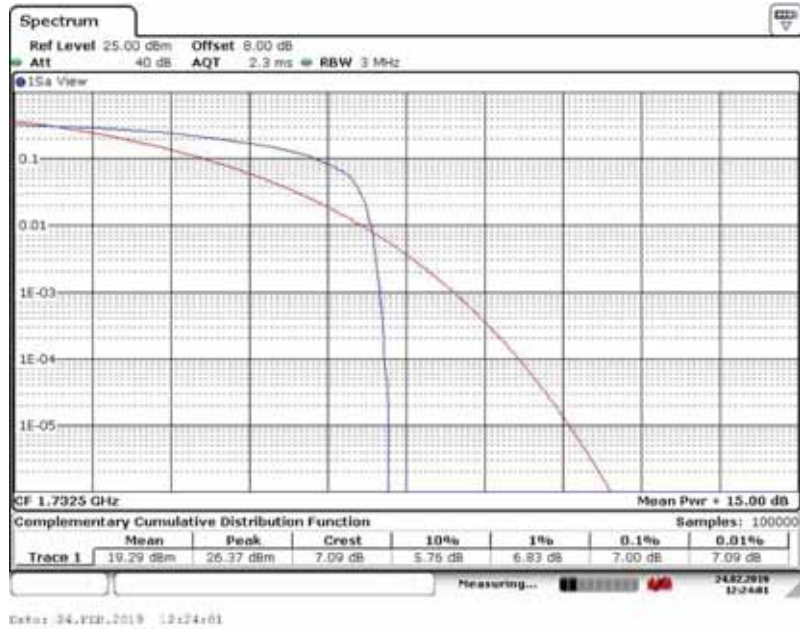
Peak-Average Ratio Plot(10MHz BW,16QAM,Band 4-mid Channel)



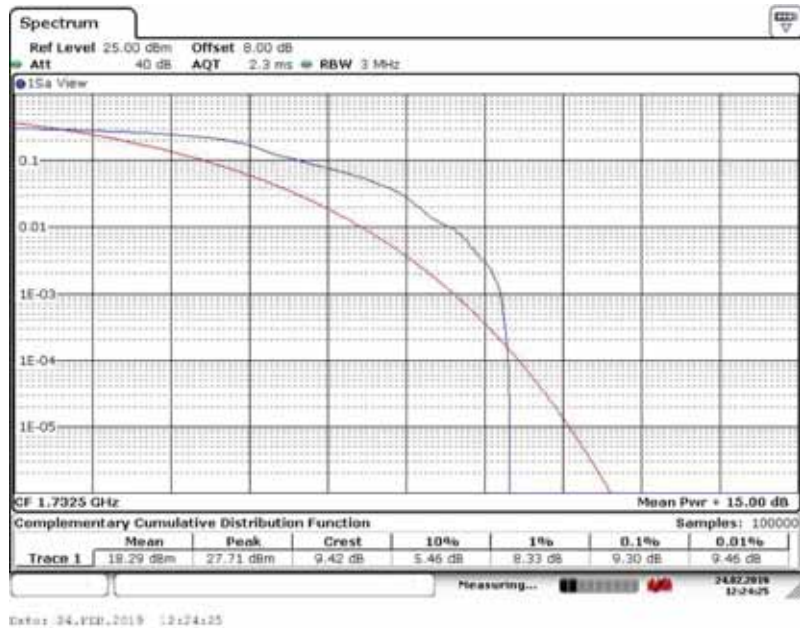
Peak-Average Ratio Plot(15MHz BW,QPSK,Band 4-mid Channel)



Peak-Average Ratio Plot(15MHz BW,16QAM,Band 4-mid Channel)



Peak-Average Ratio Plot(20MHz BW,QPSK,Band 4-mid Channel)



Peak-Average Ratio Plot(20MHz BW,16QAM,Band 4-mid Channel)

5 Spurious Emissions at antenna terminal

Band	Carrier frequency (MHz)	Channel (Low)	BW	RB Size	RB Offset	Conducted Spurious Plot
						QPSK
4	1720	20050	20	1	0	Fig.1

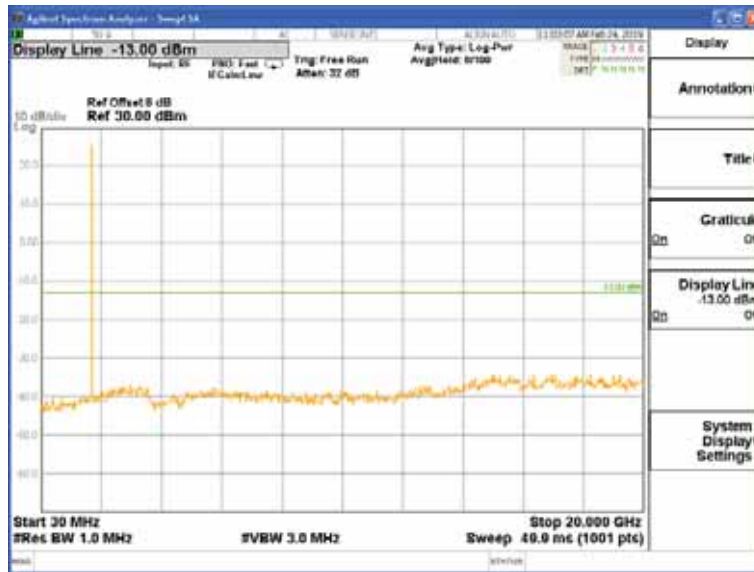


Fig.1

Band	Carrier frequency (MHz)	Channel (Mid)	BW	RB Size	RB Offset	Conducted Spurious Plot
						QPSK
4	1732.5	20175	20	1	0	Fig.1

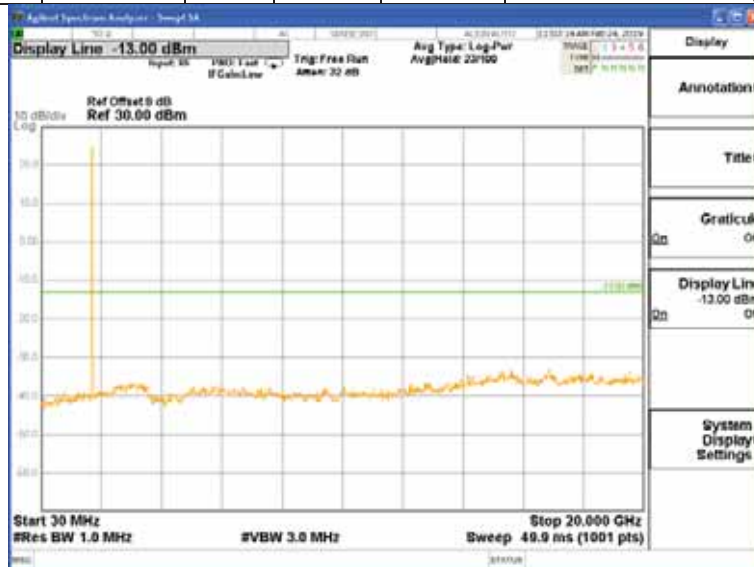


Fig.1

Band	Carrier frequency (MHz)	Channel (High)	BW	RB Size	RB Offset	Conducted Spurious Plot
						QPSK
4	1745	20300	20	1	0	Fig.1

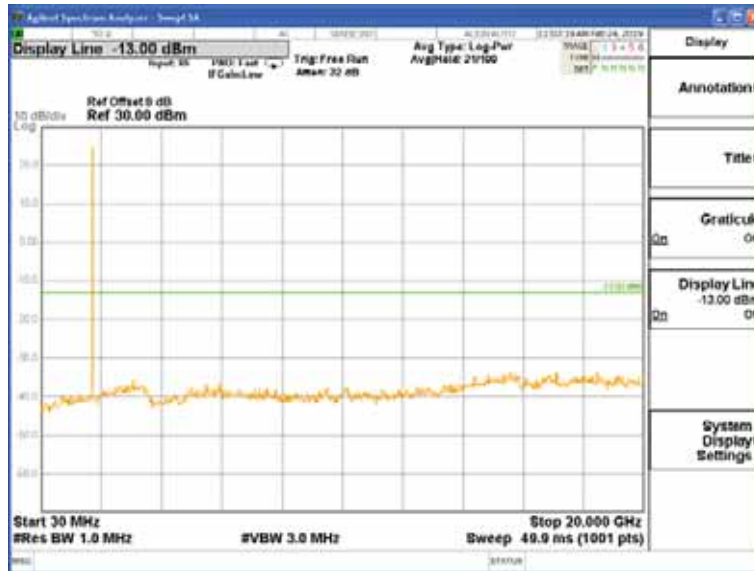


Fig.1

6 Band Edges Compliance

Test result

Band	Carrier frequency (MHz)	Channel (Low)	BW	RB Size	RB Offset	Band EdgesPlot
						QPSK
4	1710.7	19957	1.4	1	0	Fig.1
				6	0	Fig.4

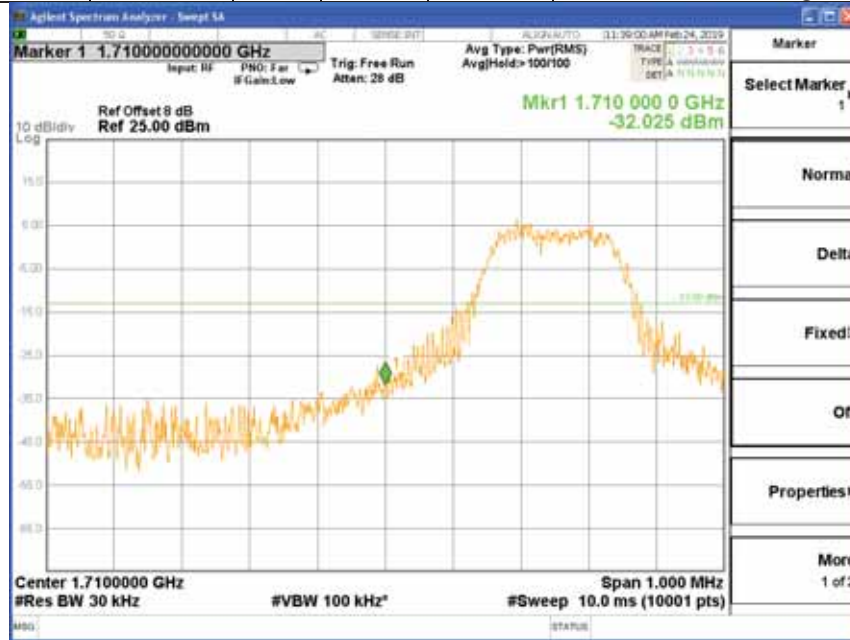


Fig.1

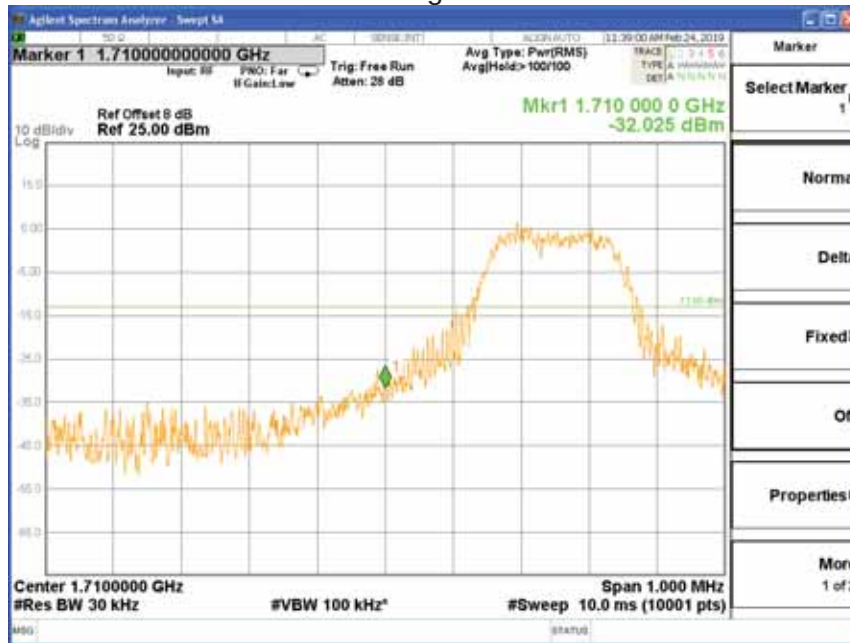


Fig.4

Band	Carrier frequency (MHz)	Channel (High)	BW	RB Size	RB Offset	Band EdgesPlot
						QPSK
4	1754.3	20393	1.4	1	0	Fig.1
				6	0	Fig.4

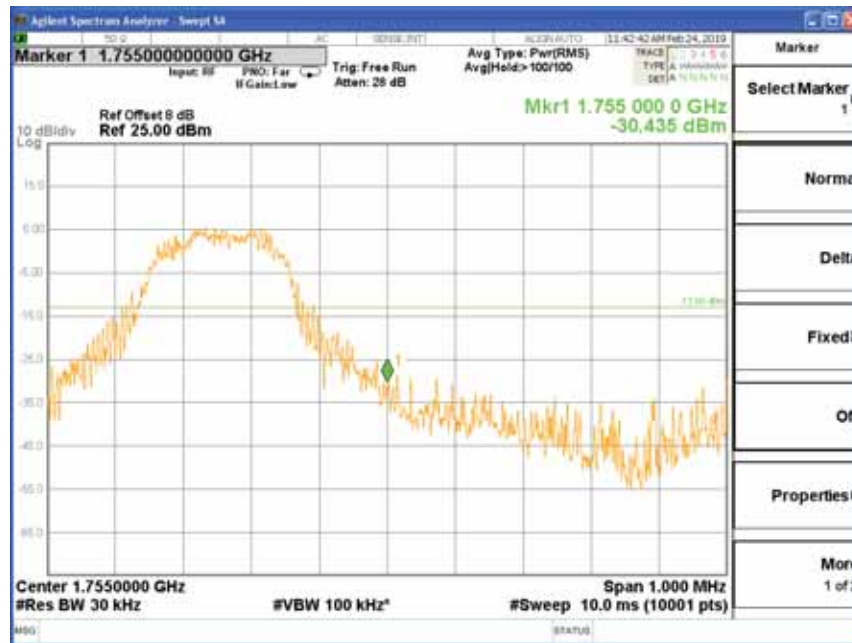


Fig.1

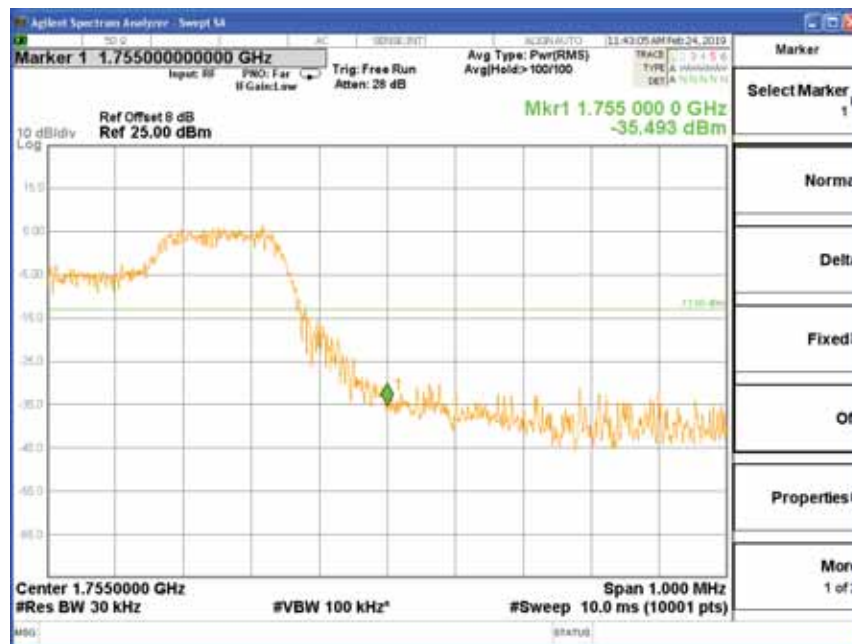


Fig.4

Band	Carrier frequency (MHz)	Channel (Low)	BW	RB Size	RB Offset	Band EdgesPlot
						QPSK
4	1711.5	19965	3	1	0	Fig.1
				6	0	Fig.4

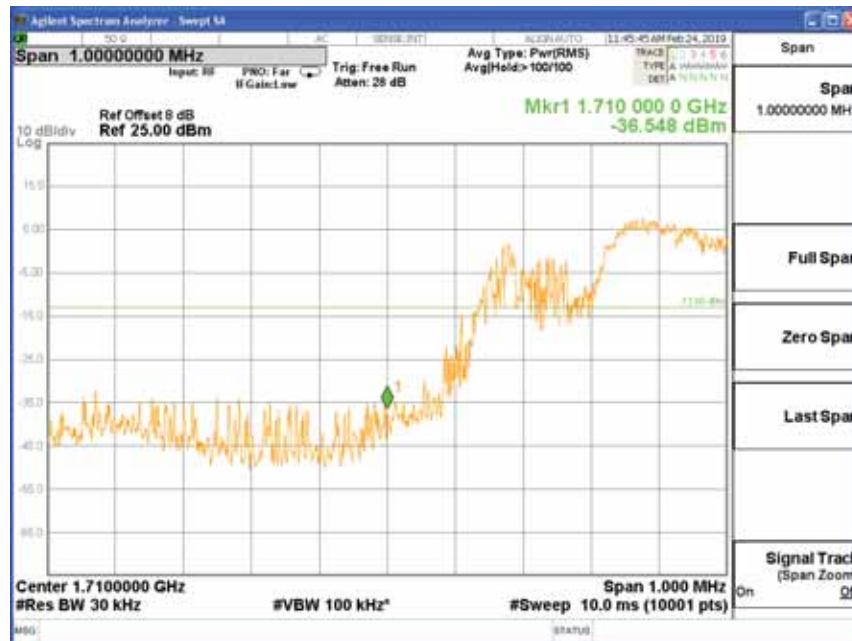


Fig.1

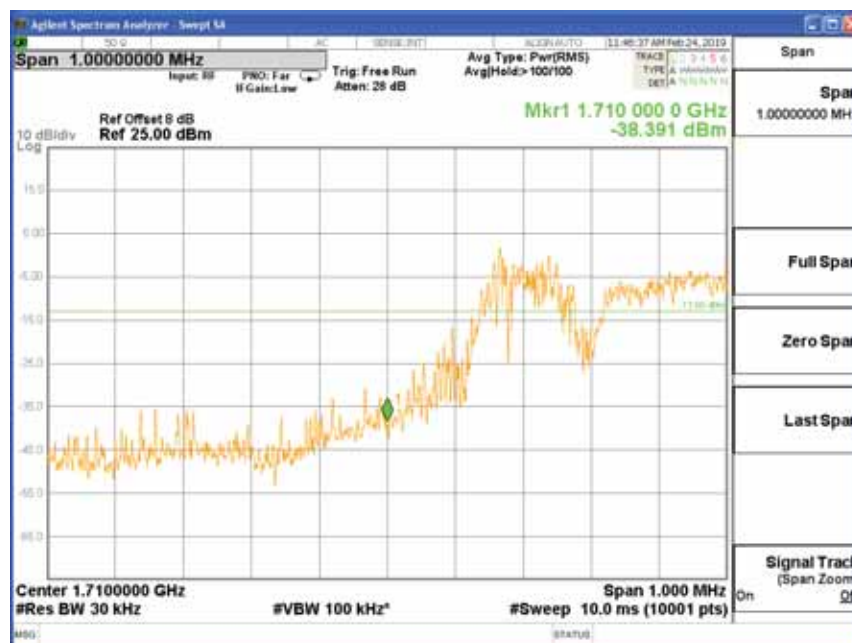


Fig.4

Band	Carrier frequency (MHz)	Channel (High)	BW	RB Size	RB Offset	Band EdgesPlot
						QPSK
4	1753.5	20385	3	1	0	Fig.1
				6	0	Fig.4

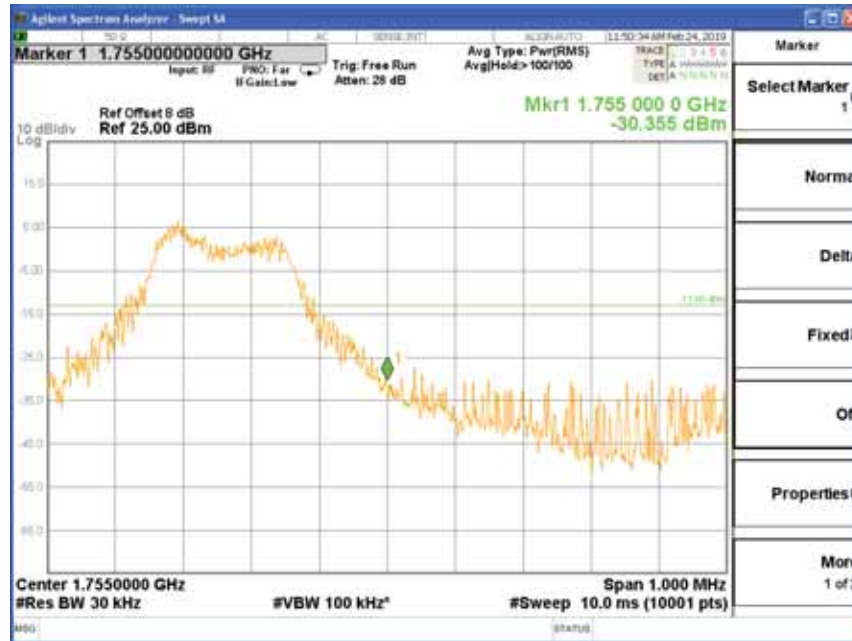


Fig.1

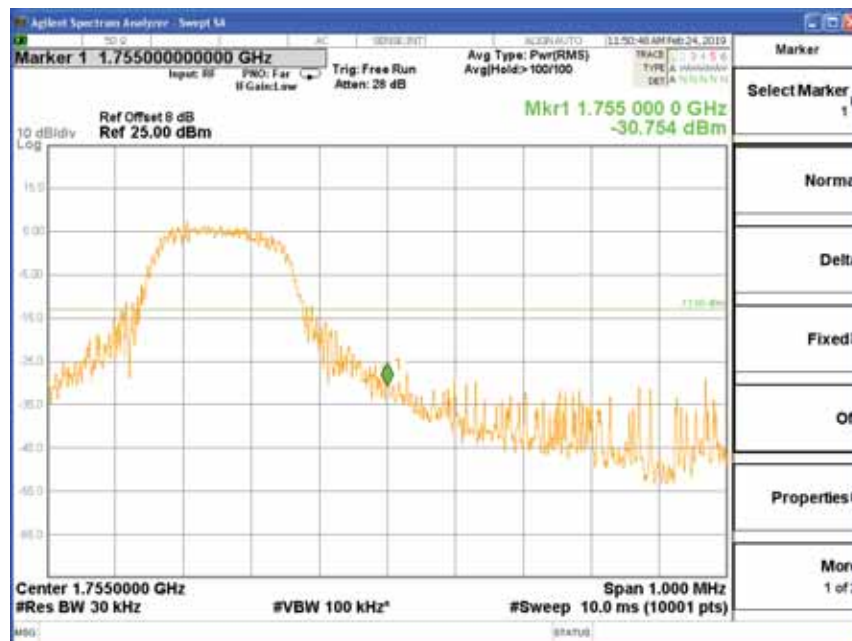


Fig.4

Band	Carrier frequency (MHz)	Channel (Low)	BW	RB Size	RB Offset	Band EdgesPlot
						QPSK
4	1712.5	19975	5	1	0	Fig.1
				6	0	Fig.4

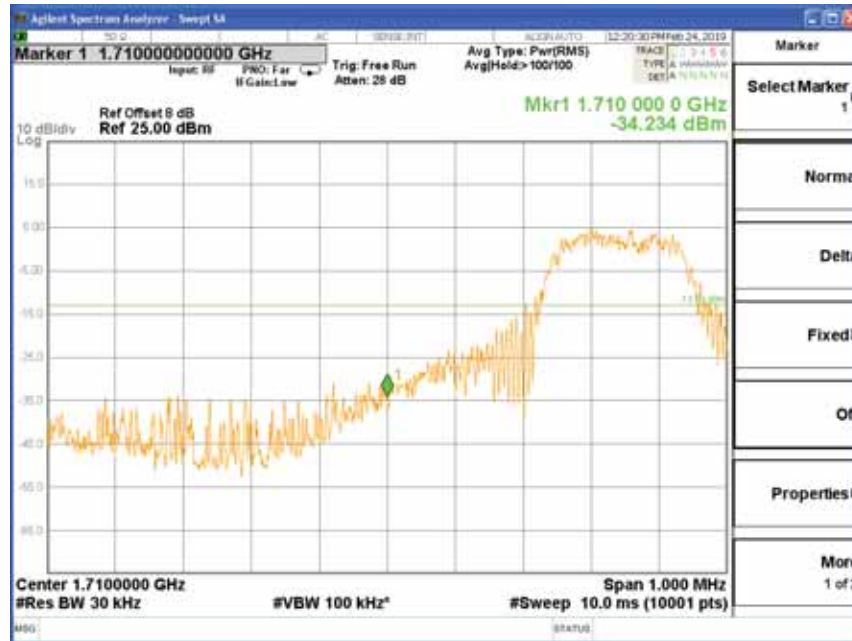


Fig.1

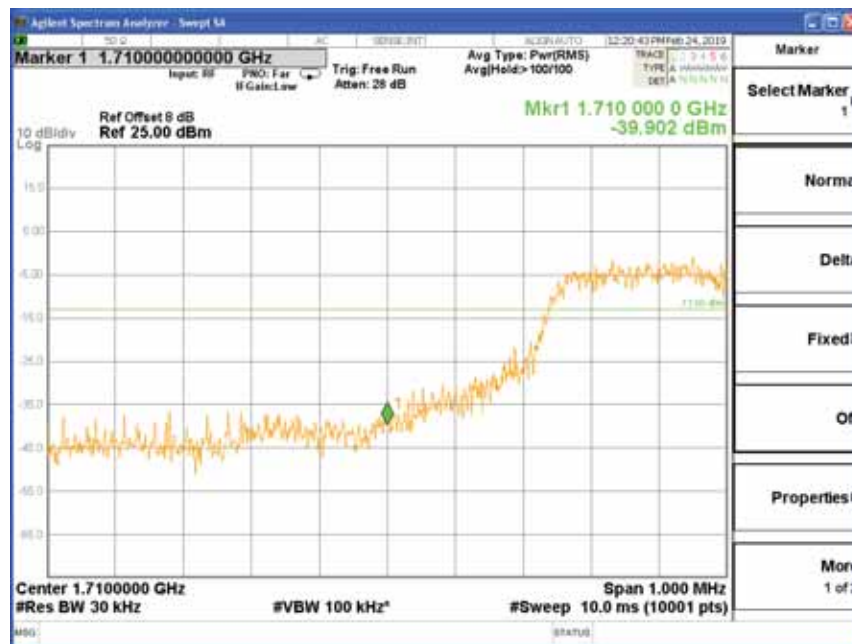


Fig.4

Band	Carrier frequency (MHz)	Channel (High)	BW	RB Size	RB Offset	Band EdgesPlot
						QPSK
4	1752.5	20375	5	1	0	Fig.1
				6	0	Fig.4

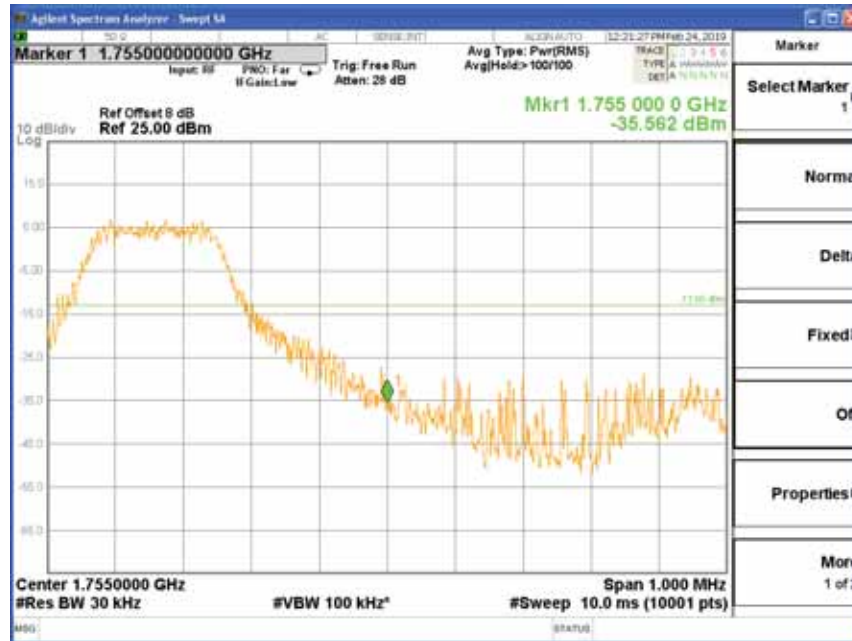


Fig.1

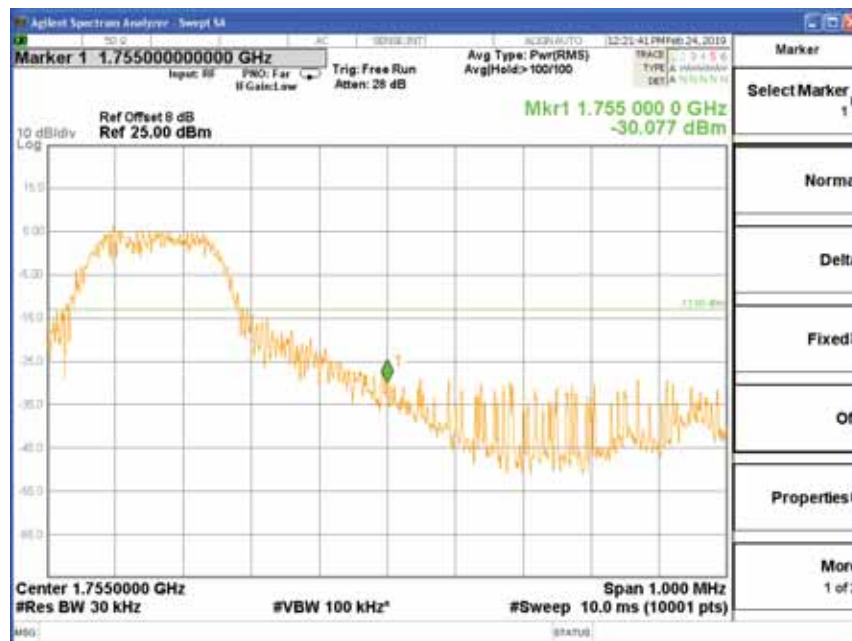


Fig.4

Band	Carrier frequency (MHz)	Channel (Low)	BW	RB Size	RB Offset	Band EdgesPlot
						QPSK
4	1715	20000	10	1	0	Fig.1
				6	0	Fig.4

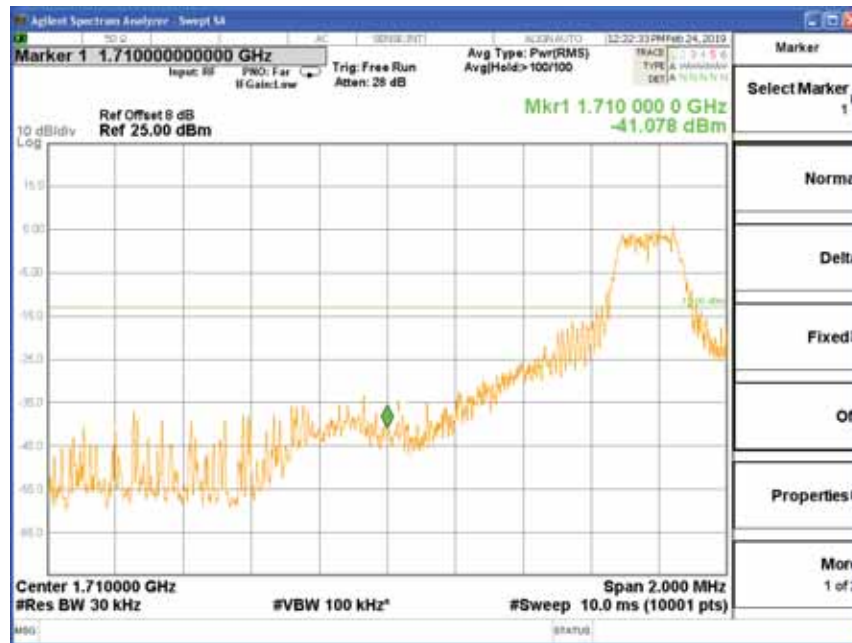


Fig.1

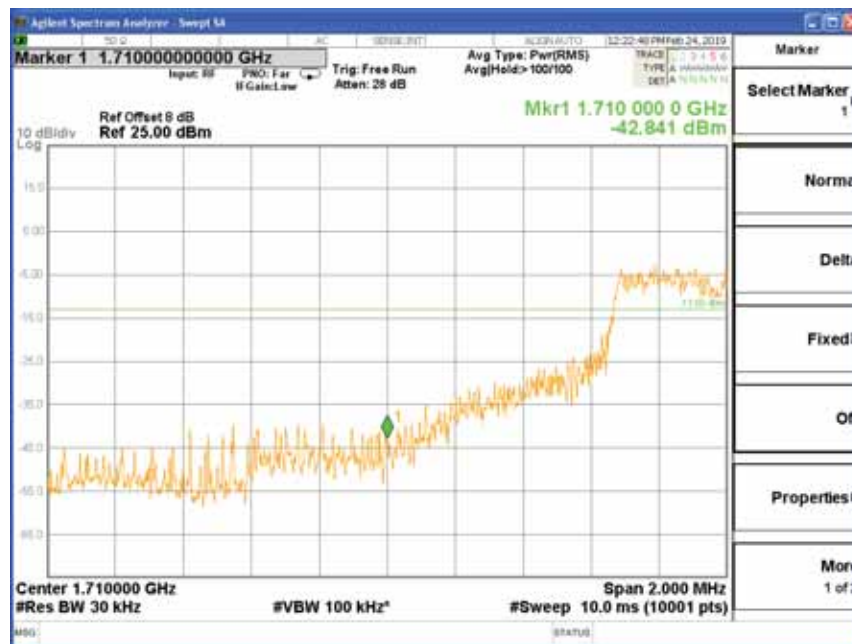


Fig.4

Band	Carrier frequency (MHz)	Channel (High)	BW	RB Size	RB Offset	Band EdgesPlot
						QPSK
4	1750	20350	10	1	0	Fig.1
				6	0	Fig.4

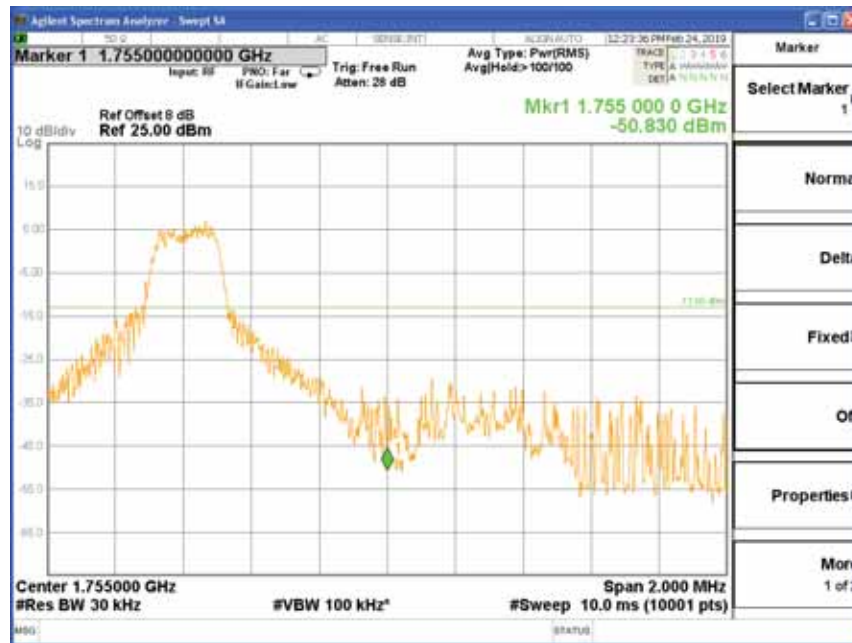


Fig.1

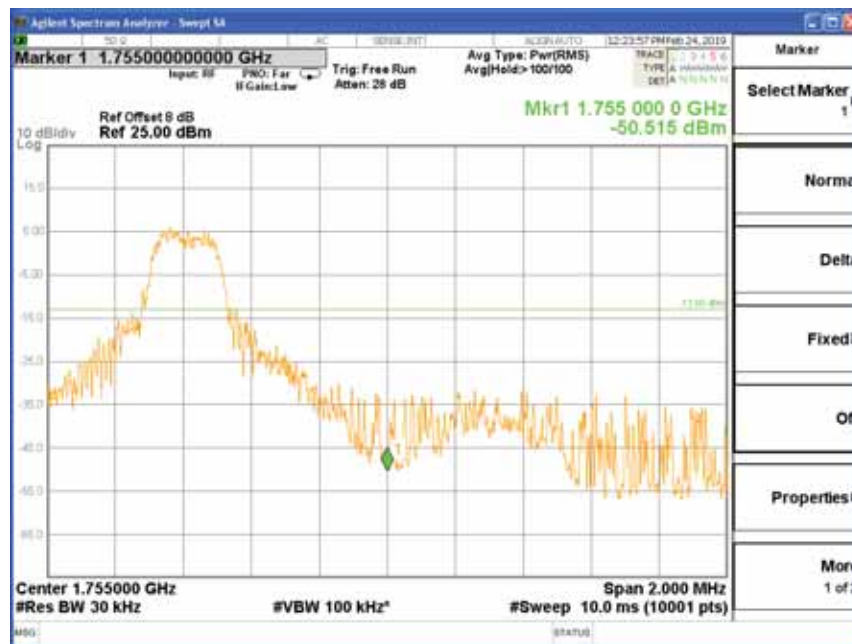


Fig.4

Band	Carrier frequency (MHz)	Channel (Low)	BW	RB Size	RB Offset	Band EdgesPlot
						QPSK
4	1717.5	20025	15	1	0	Fig.1
				6	0	Fig.4

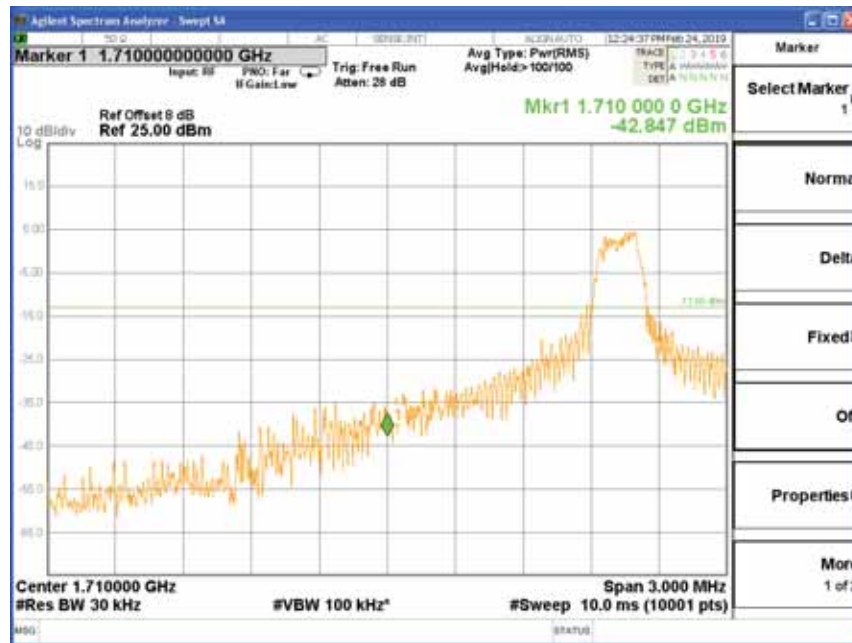


Fig.1

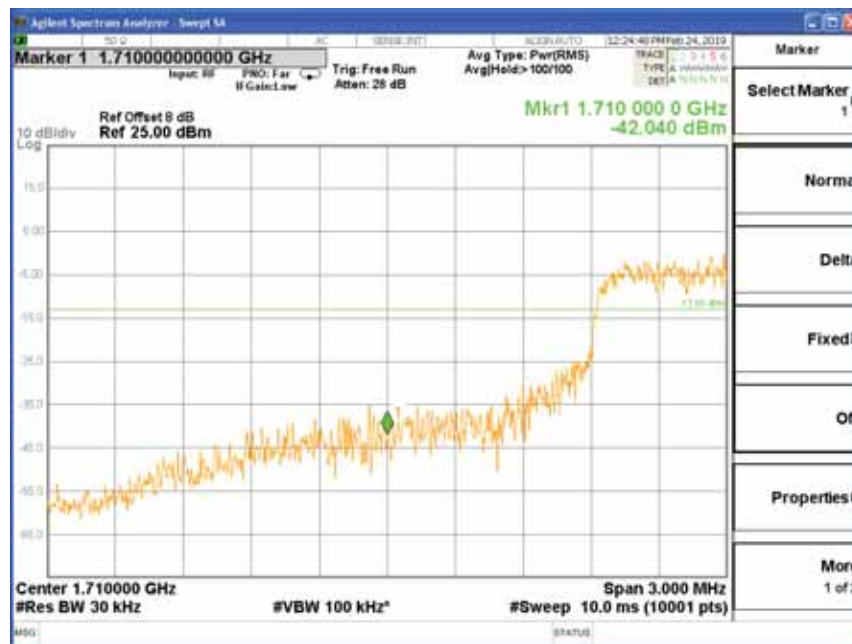


Fig.4

Band	Carrier frequency (MHz)	Channel (High)	BW	RB Size	RB Offset	Band EdgesPlot
						QPSK
4	1747.5	20325	15	1	0	Fig.1
				6	0	Fig.4

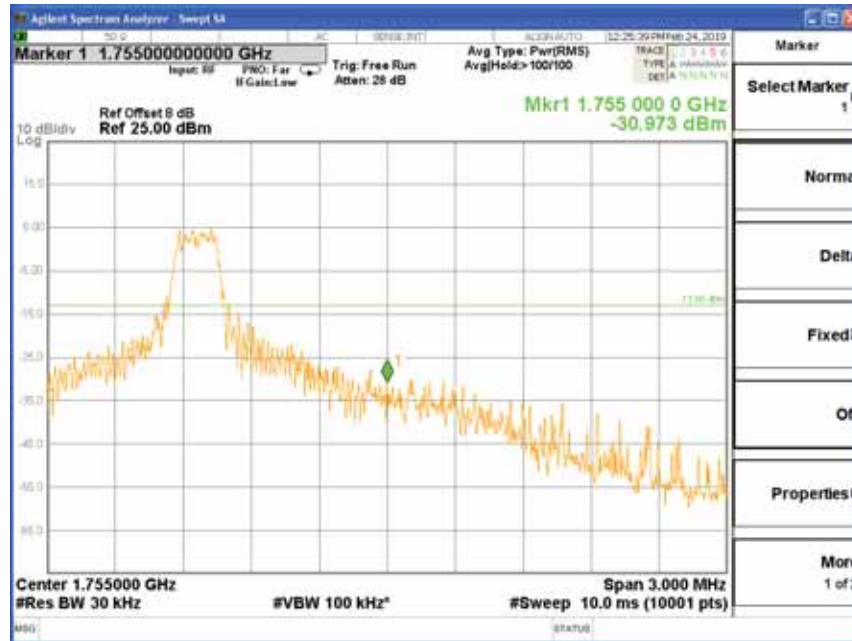


Fig.1

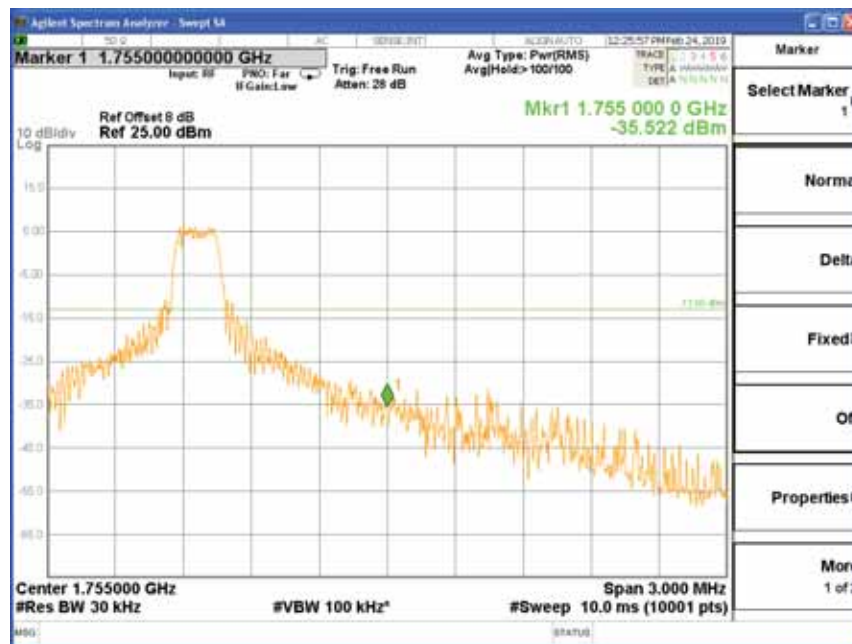


Fig.4

Band	Carrier frequency (MHz)	Channel (Low)	BW	RB Size	RB Offset	Band EdgesPlot
						QPSK
4	1720	20050	20	1	0	Fig.1
				6	0	Fig.4

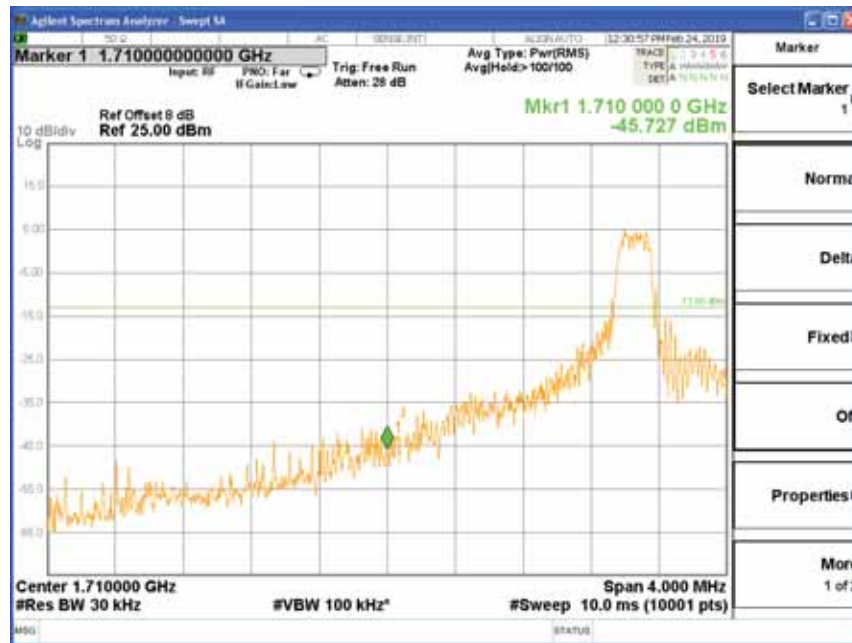


Fig.1

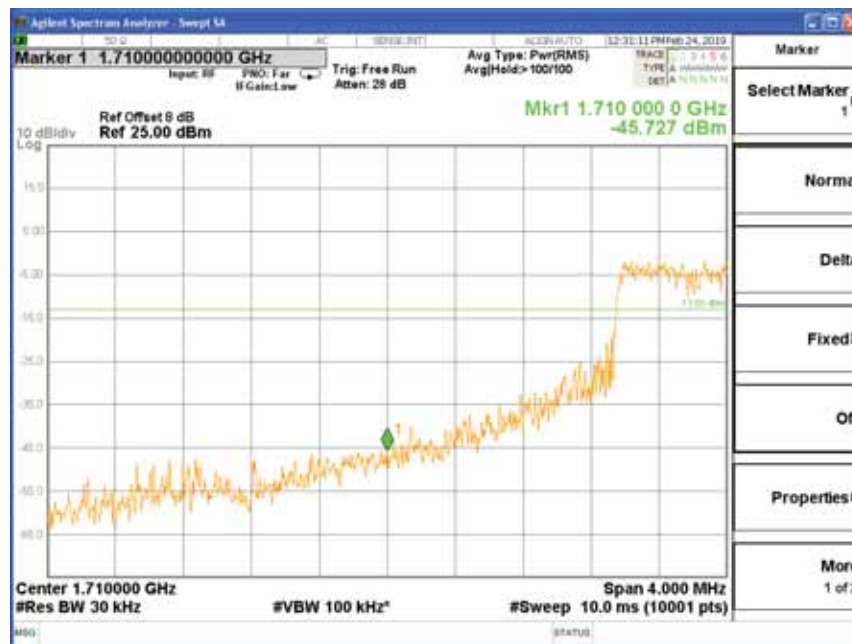


Fig.4

Band	Carrier frequency (MHz)	Channel (High)	BW	RB Size	RB Offset	Band EdgesPlot
						QPSK
4	1745	20300	20	1	0	Fig.1
				6	0	Fig.4

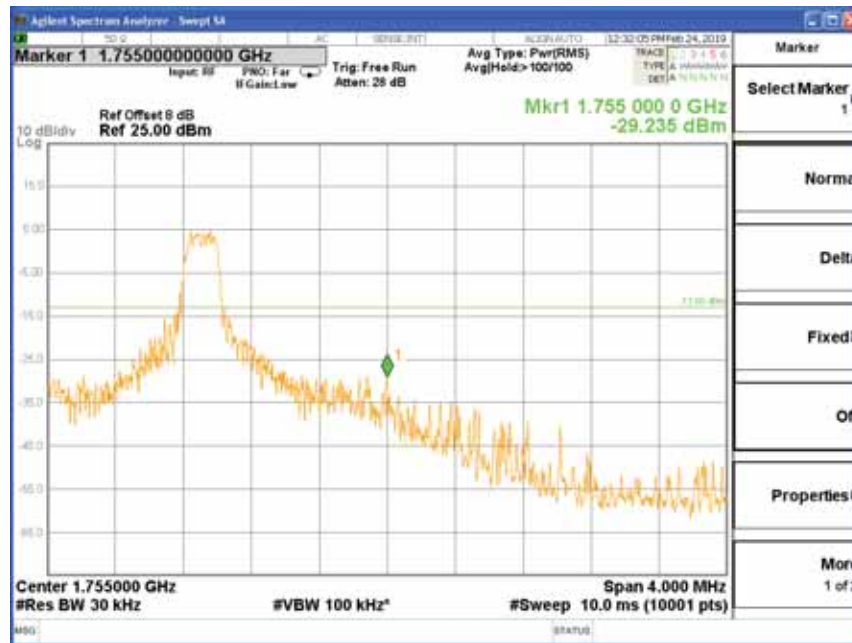


Fig.1

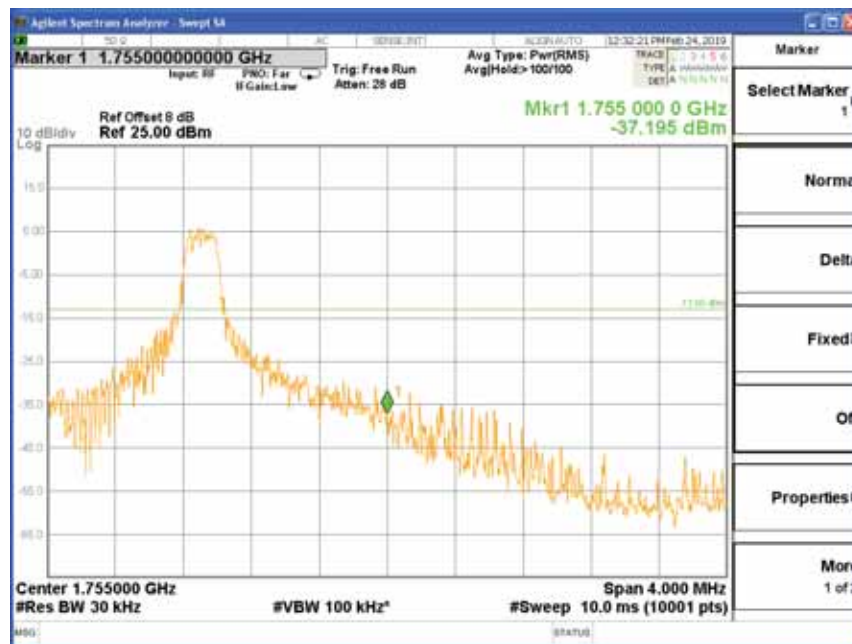


Fig.4

7 Frequency Stability

Test result:

Temperature(°C)	Voltage	Test Result (ppm) Band4 Low Channel					
		1.4M	3M	5M	10M	15M	20M
-20	NV	-0.001	0.006	-0.008	0.015	0.002	0.020
-10	NV	0.017	0.004	0.011	0.020	-0.016	0.018
0	NV	0.009	-0.010	0.011	0.012	0.015	-0.019
+10	NV	0.003	0.007	0.012	0.015	-0.014	0.017
+20	NV	0.005	0.004	-0.005	0.007	0.013	0.006
+30	NV	0.014	0.004	0.012	-0.006	0.013	0.016
+40	NV	0.015	0.013	0.014	0.016	0.018	0.017
+50	NV	0.012	0.001	0.009	0.017	-0.018	-0.019
+60	NV	0.003	0.016	0.013	0.010	0.019	0.020
+20	LV	0.008	0.016	-0.016	0.004	0.019	-0.012
+20	HV	0.007	0.006	0.011	0.012	0.010	0.017

Temperature(°C)	Voltage	Test Result (ppm) Band4 High Channel					
		1.4M	3M	5M	10M	15M	20M
-20	NV	0.012	-0.006	0.017	-0.006	0.004	0.002
-10	NV	-0.005	0.017	0.014	0.016	0.010	0.010
0	NV	0.020	0.011	0.004	0.012	-0.009	0.001
+10	NV	0.008	-0.016	0.014	0.008	0.019	0.007
+20	NV	0.016	0.007	0.018	0.010	0.006	0.020
+30	NV	0.010	0.011	0.014	0.015	0.005	-0.001
+40	NV	0.005	0.007	0.006	0.020	-0.005	0.006
+50	NV	0.005	0.017	0.014	-0.012	0.010	0.008
+60	NV	0.015	0.010	0.007	0.012	0.019	0.019
+20	LV	0.004	0.003	0.017	0.002	0.007	-0.011
+20	HV	0.007	0.015	0.003	0.020	0.004	0.005

APPENDIX A – TEST DATA OF CONDUCTED EMISSION

LTE_CAT.M1_ Band 12

1 RF Power Output

Test result:

Antenna Gain: -2.07dBi

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted Power (dBm)	ERP (W)
QPSK	699.7	23017	1.4	1	0	23.49	0.085
				6	0	21.65	0.055
	707.5	23095		1	0	23.63	0.087
				6	0	21.65	0.055
	715.3	23173		1	0	23.74	0.090
				6	0	21.78	0.057
16QAM	699.7	23017	1.4	1	0	22.38	0.065
				1	5	22.34	0.065
				5	0	21.58	0.054
				5	1	21.59	0.055
	707.5	23095		1	0	22.51	0.067
				1	5	22.48	0.067
				5	0	21.67	0.056
				5	1	21.68	0.056
	715.3	23173		1	0	22.57	0.068
				1	5	22.54	0.068
				5	0	21.70	0.056
				5	1	21.72	0.056
QPSK	700.5	23025	3	1	0	23.50	0.085
				6	0	21.66	0.055
	707.5	23095		1	0	23.64	0.087
				6	0	21.66	0.055
	714.5	23165		1	0	23.75	0.090
				6	0	21.79	0.057
16QAM	700.5	23025	3	1	0	22.39	0.066
				1	5	22.35	0.065
				5	0	21.59	0.055
				5	1	21.60	0.055
	707.5	23095		1	0	22.52	0.068
				1	5	22.49	0.067
				5	0	21.68	0.056
				5	1	21.69	0.056
	714.5	23165		1	0	22.58	0.069
				1	5	22.55	0.068
				5	0	21.71	0.056
				5	1	21.73	0.056

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted Power (dBm)	ERP (W)
QPSK	701.5	23035	5	1	0	23.51	0.085
				6	0	21.67	0.056
	707.5	23095		1	0	23.65	0.088
				6	0	21.67	0.056
	713.5	23155		1	0	23.76	0.090
				6	0	21.80	0.057
16QAM	701.5	23035	5	1	0	22.40	0.066
				1	5	22.36	0.065
				5	0	21.60	0.055
				5	1	21.61	0.055
	707.5	23095		1	0	22.53	0.068
				1	5	22.50	0.067
				5	0	21.69	0.056
				5	1	21.70	0.056
	713.5	23155		1	0	22.59	0.069
				1	5	22.56	0.068
				5	0	21.72	0.056
				5	1	21.74	0.056
QPSK	704	23060	10	1	0	23.57	0.086
				6	0	21.73	0.056
	707.5	23095		1	0	23.71	0.089
				6	0	21.73	0.056
	711	23130		1	0	23.82	0.091
				6	0	21.86	0.058
16QAM	704	23060	10	1	0	22.46	0.067
				1	5	22.42	0.066
				5	0	21.66	0.055
				5	1	21.67	0.056
	707.5	23095		1	0	22.59	0.069
				1	5	22.56	0.068
				5	0	21.75	0.057
				5	1	21.76	0.057
	711	23130		1	0	22.65	0.070
				1	5	22.62	0.069
				5	0	21.78	0.057
				5	1	21.80	0.057

2 Occupied Bandwidth

Band	Carrier frequency (MHz)	Channel	BW (MHz)	Modulation	RB Size	RB Offset	Bandwidth of 99% Power (MHz)	Bandwidth of -26dB transmitter power (MHz)	Plot
12	707.5	23095	1.4	QPSK	6	0	1.109	1.261	Fig.1
				16QAM	5	1	1.117	1.229	Fig.2
			3	QPSK	6	0	1.283	1.447	Fig.3
				16QAM	5	1	1.284	1.420	Fig.4
			5	QPSK	6	0	1.104	1.370	Fig.5
				16QAM	5	1	0.937	1.488	Fig.6
			10	QPSK	6	0	1.123	1.611	Fig.7
				16QAM	5	1	0.954	1.649	Fig.8

Fig.1

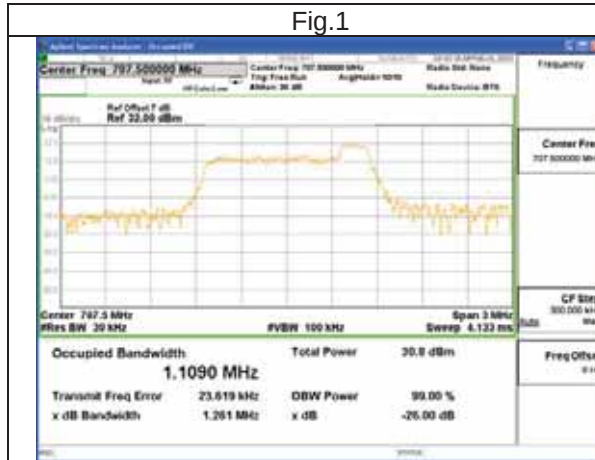


Fig.2

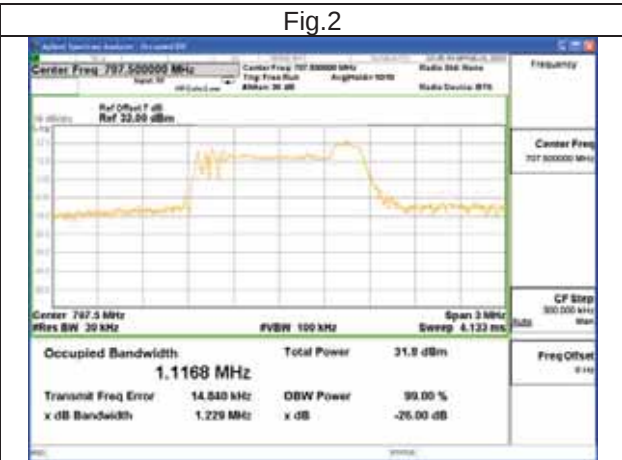


Fig.3

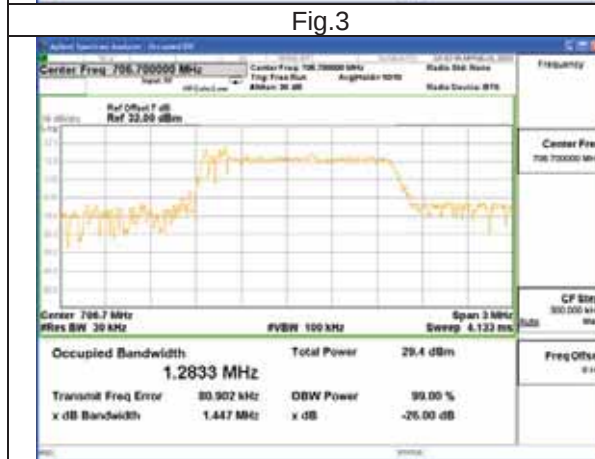


Fig.4

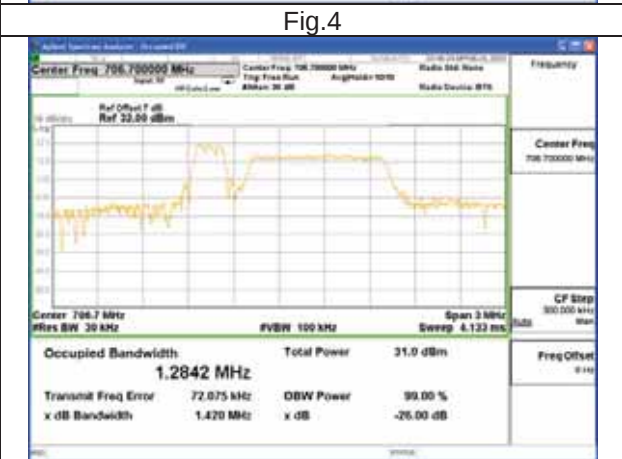


Fig.5

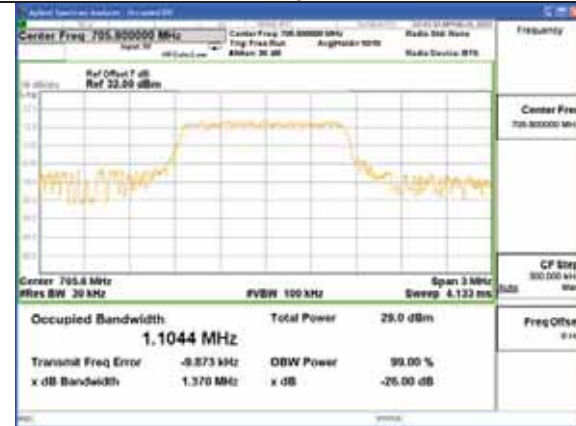


Fig.6

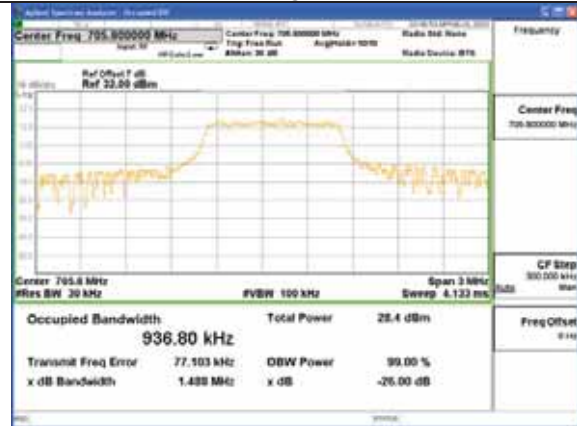


Fig.7

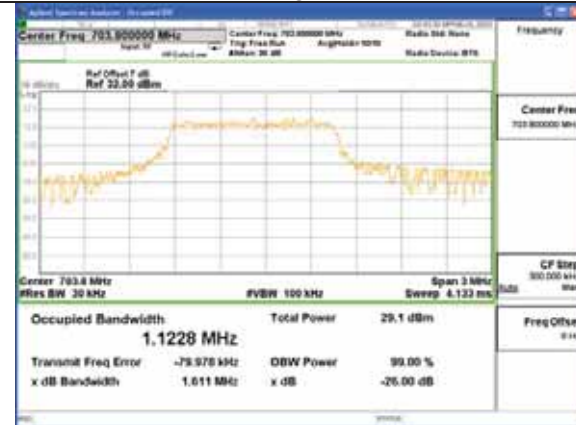
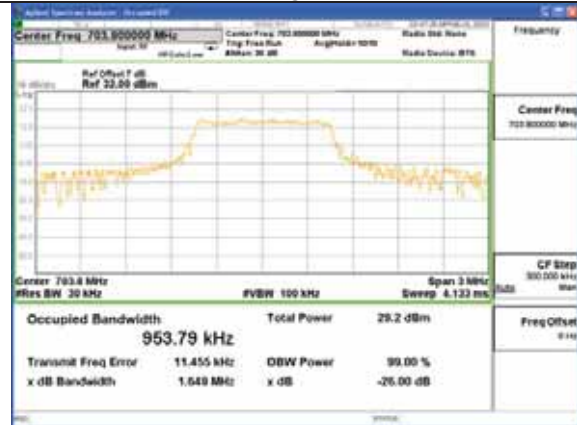
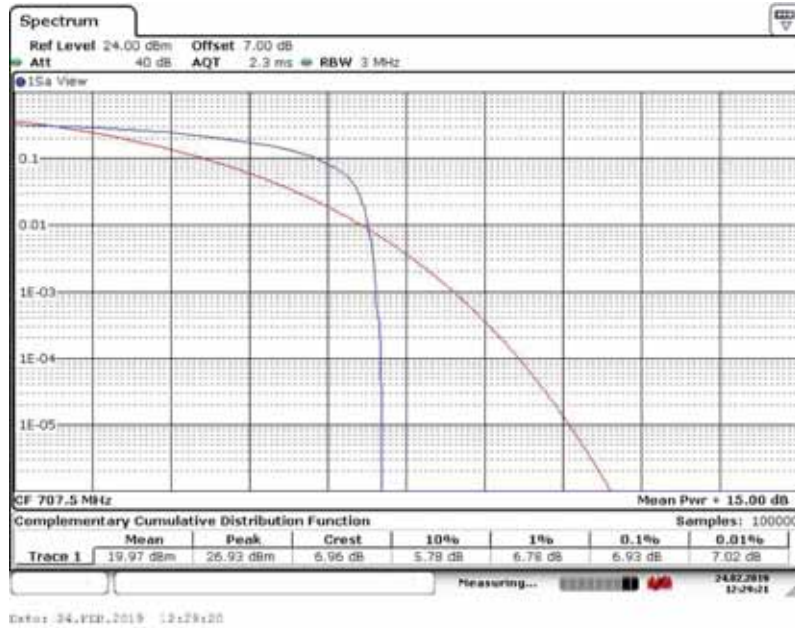


Fig.8

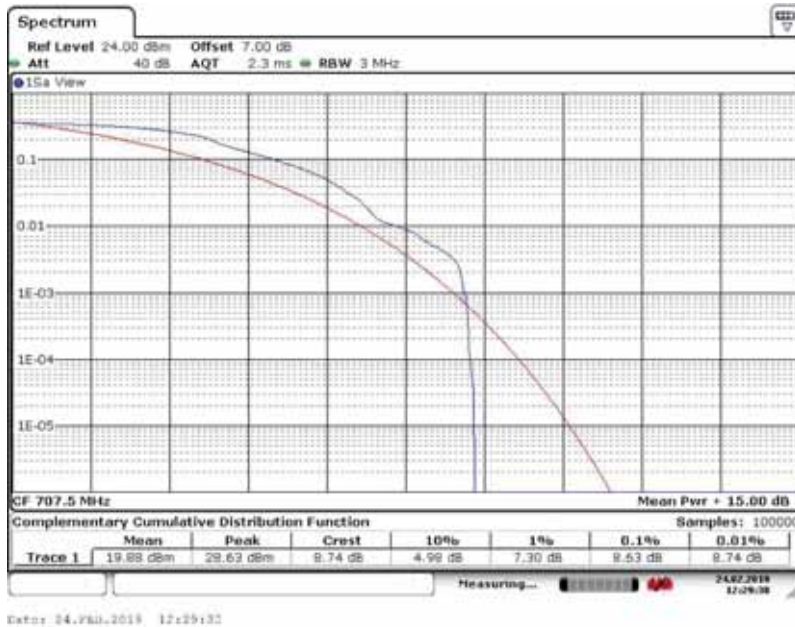


4 Peak-Average Ratio

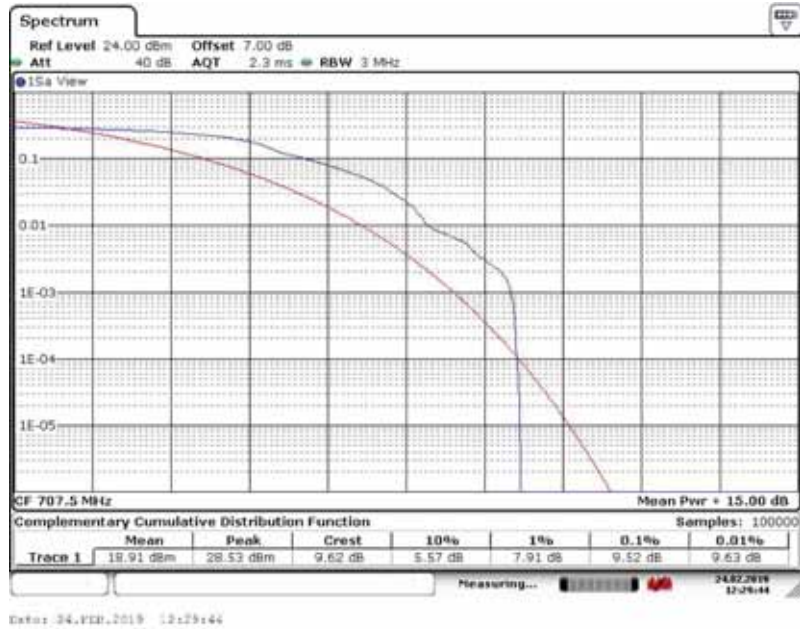
Test result:



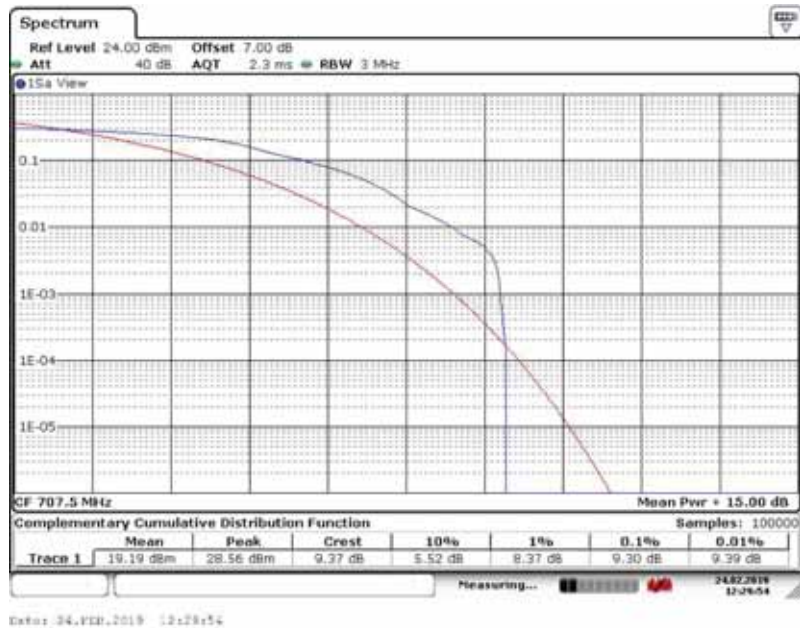
Peak-Average Ratio Plot(1.4MHz BW,QPSK,Band 12-mid Channel)



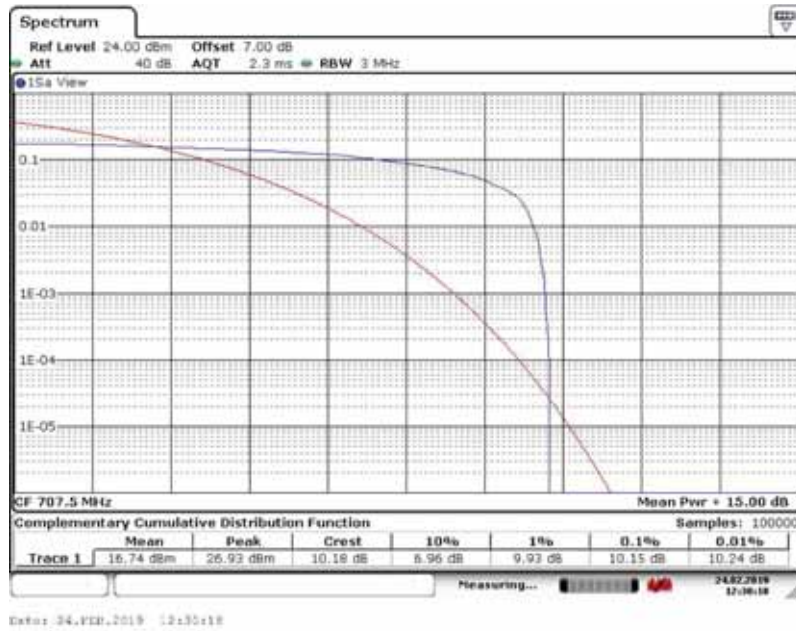
Peak-Average Ratio Plot(1.4MHz BW,16QAM,Band 12-mid Channel)



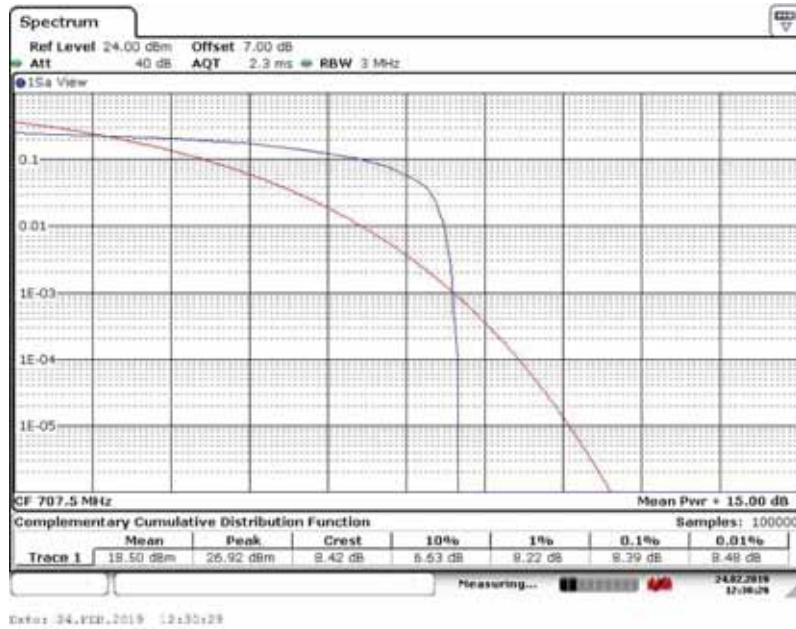
Peak-Average Ratio Plot(3MHz BW,QPSK,Band 12-mid Channel)



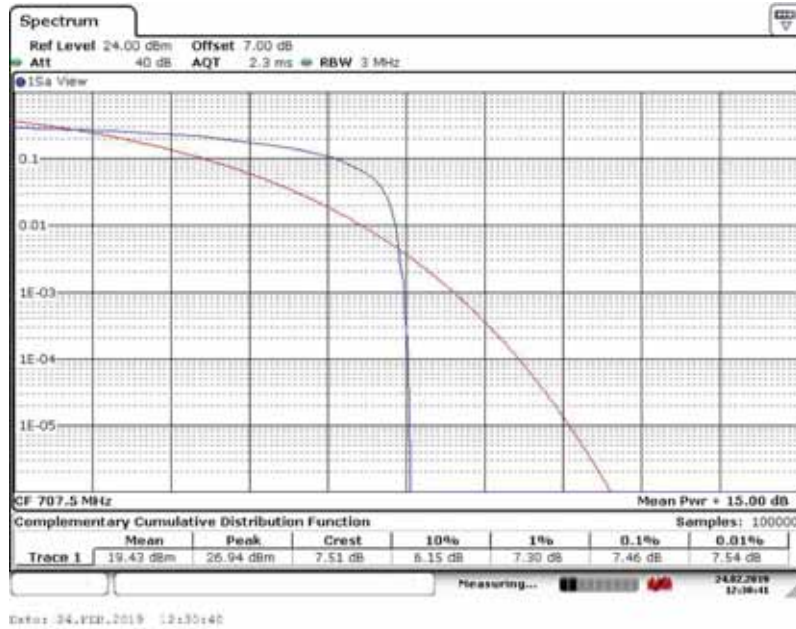
Peak-Average Ratio Plot(3MHz BW,16QAM,Band 12-mid Channel)



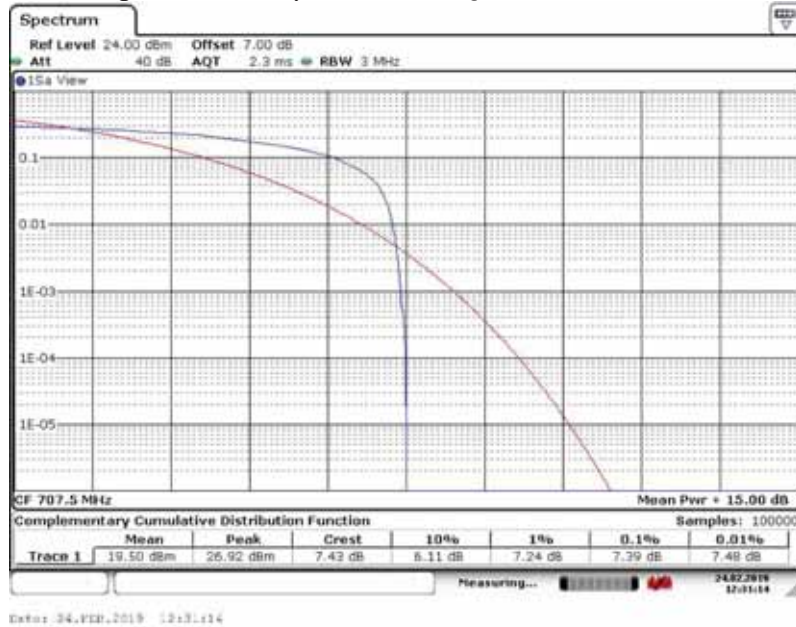
Peak-Average Ratio Plot(5MHz BW,QPSK,Band 12-mid Channel)



Peak-Average Ratio Plot(5MHz BW,16QAM,Band 12-mid Channel)



Peak-Average Ratio Plot(10MHz BW,QPSK,Band 12-mid Channel)



Peak-Average Ratio Plot(10MHz BW,16QAM,Band 12-mid Channel)

5 Spurious Emissions at antenna terminal

Test result

Band	Carrier frequency (MHz)	Channel(Low)	BW	RB Size	RB Offset	Conducted Spurious Plot
						QPSK
12	704	23060	10	1	0	Fig.1

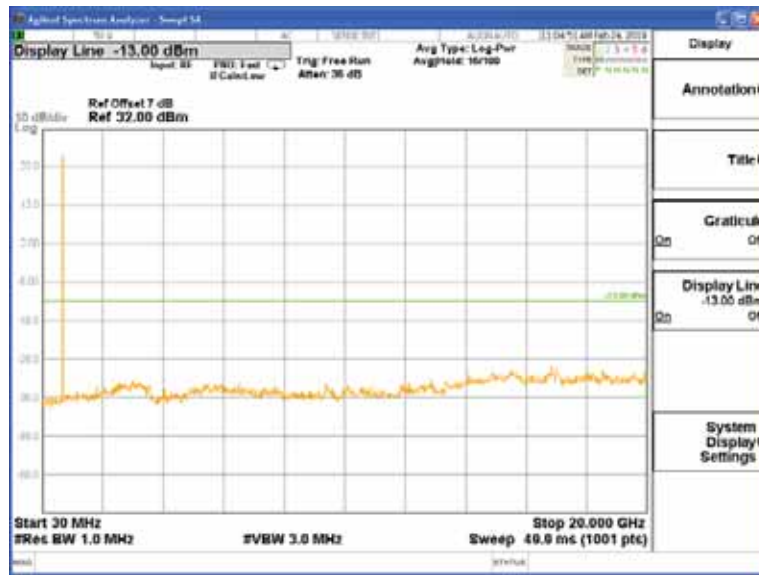


Fig.1

Band	Carrier frequency (MHz)	Channel(Mid)	BW	RB Size	RB Offset	Conducted Spurious Plot
						QPSK
12	707.5	23095	10	1	0	Fig.1

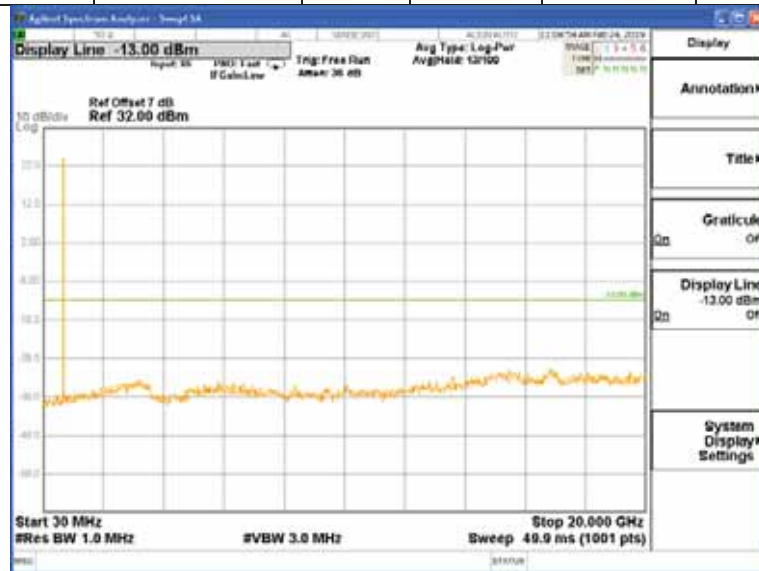


Fig.1

Band	Carrier frequency (MHz)	Channel (High)	BW	RB Size	RB Offset	Conducted Spurious Plot	
						QPSK	16-QAM
12	711	23130	10	1	0	Fig.1	Fig.8

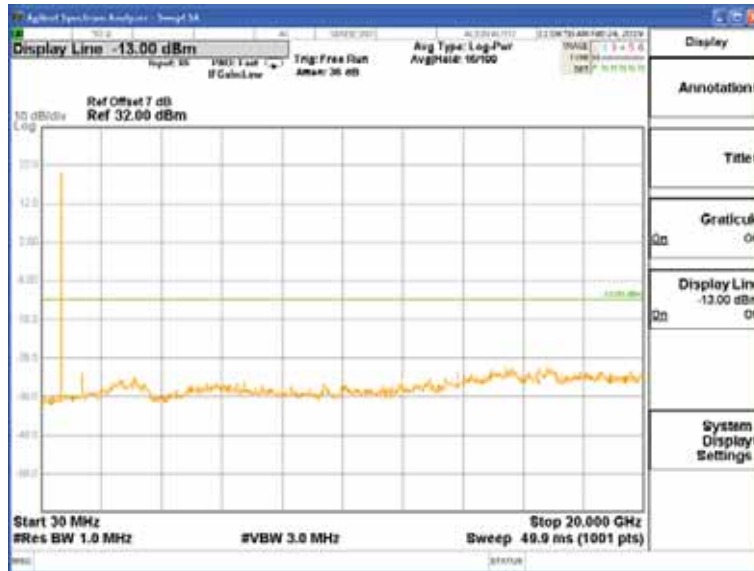


Fig.1

6 Band Edges Compliance

Test result

Band	Carrier frequency (MHz)	Channel (Low)	BW	RB Size	RB Offset	Band EdgesPlot
						QPSK
12	699.7	23017	1.4	1	0	Fig.1
				6	0	Fig.4

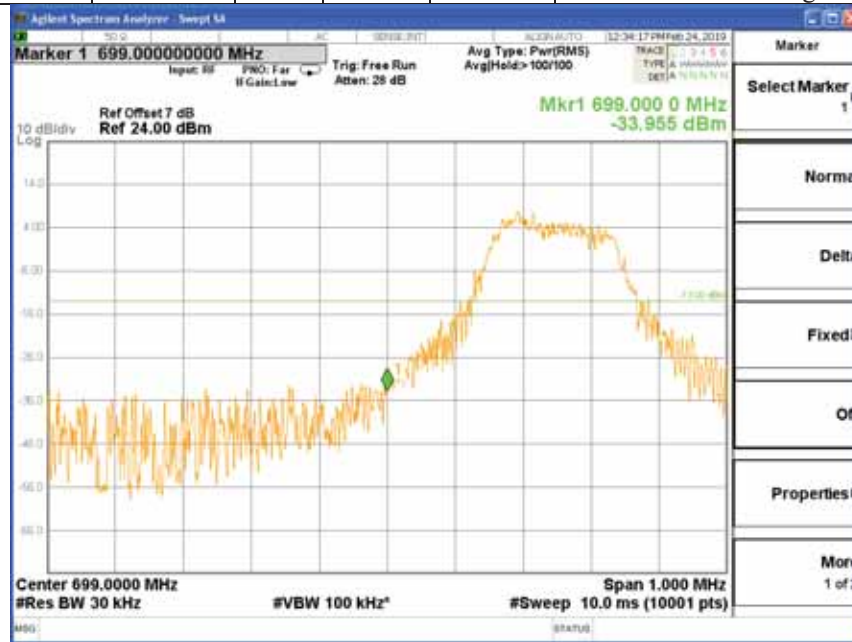


Fig.1

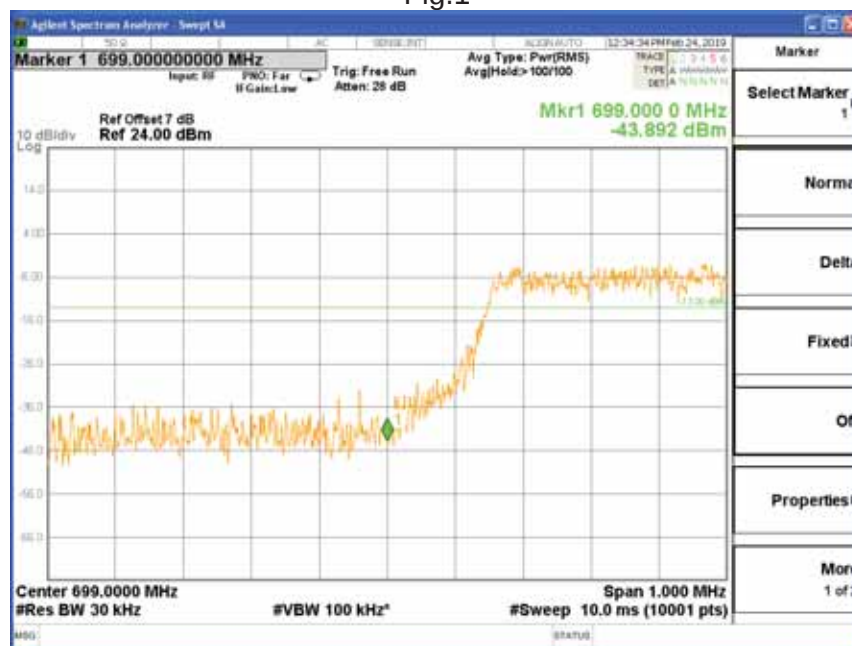


Fig.4

Band	Carrier frequency (MHz)	Channel (High)	BW	RB Size	RB Offset	Band EdgesPlot
						QPSK
12	715.3	23173	1.4	1	0	Fig.1
				6	0	Fig.4

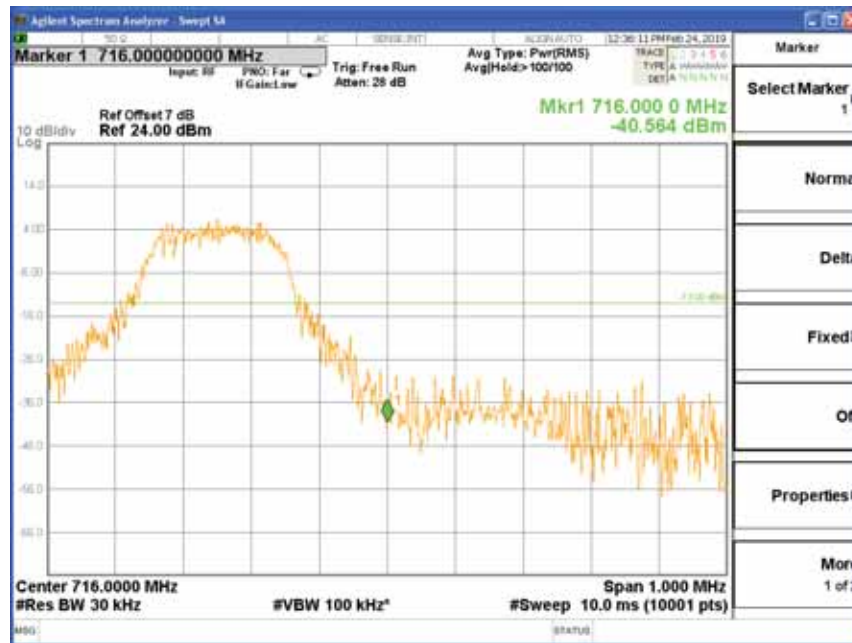


Fig.1

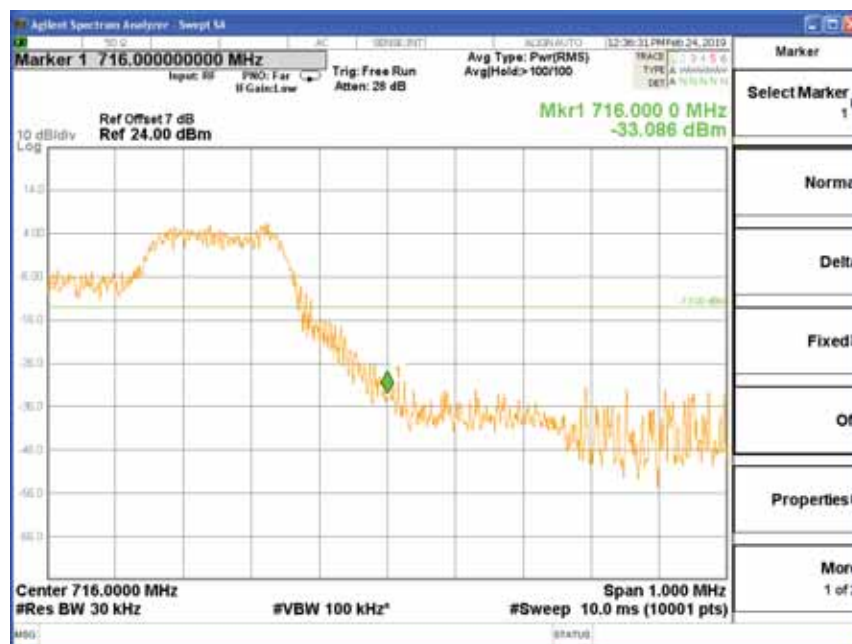


Fig.4

Band	Carrier frequency (MHz)	Channel (Low)	BW	RB Size	RB Offset	Band EdgesPlot
						QPSK
12	700.5	23025	3	1	0	Fig.1
				6	0	Fig.4

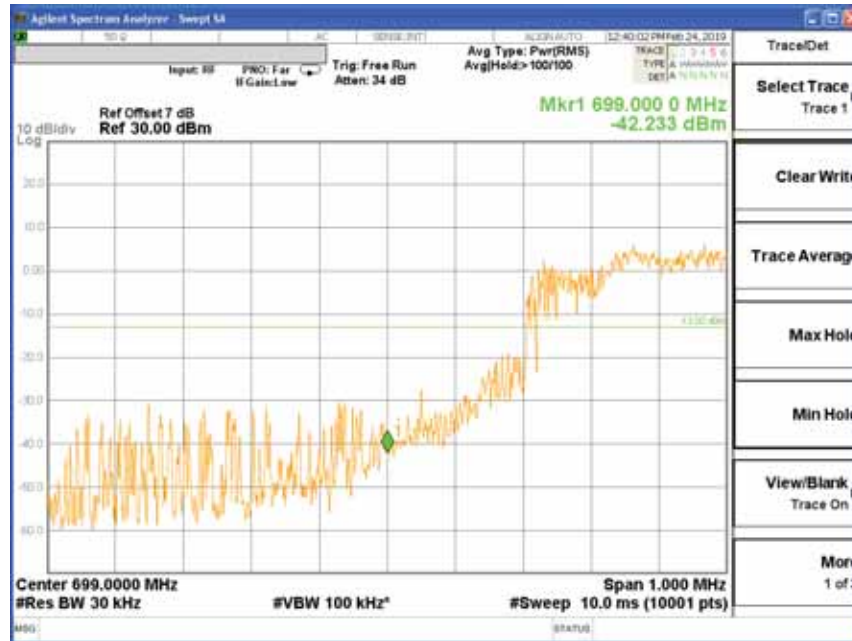


Fig.1

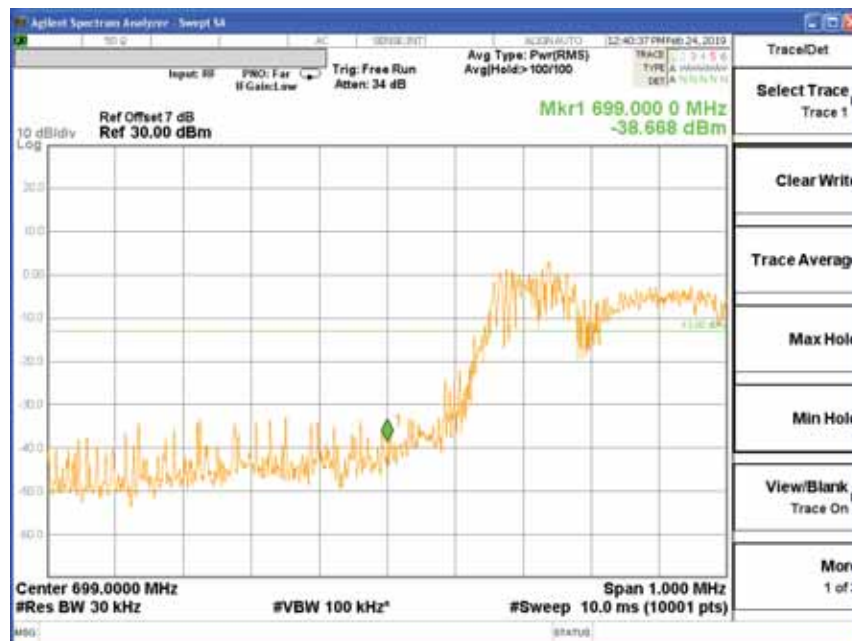


Fig.4

Band	Carrier frequency (MHz)	Channel (High)	BW	RB Size	RB Offset	Band EdgesPlot
						QPSK
12	714.5	23165	3	1	0	Fig.1
				6	0	Fig.4

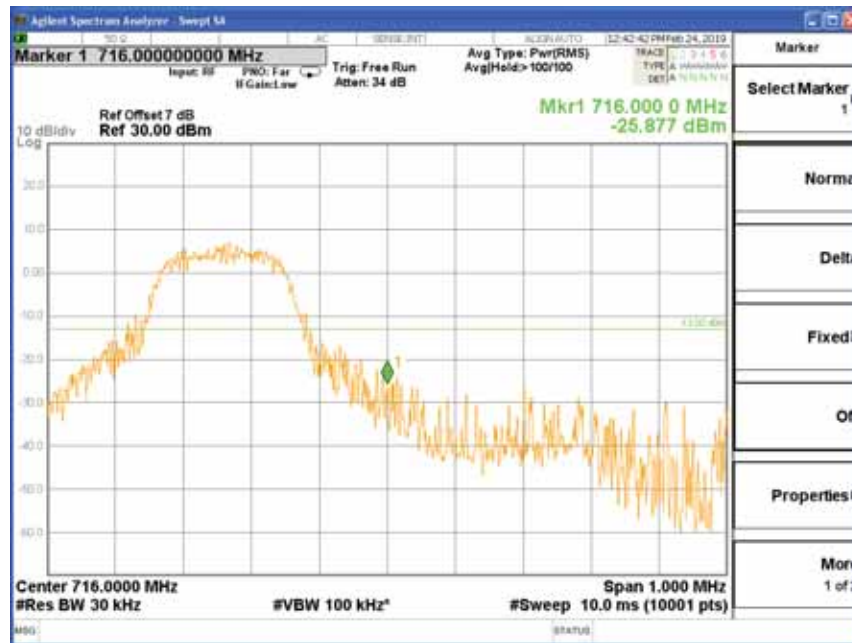


Fig.1

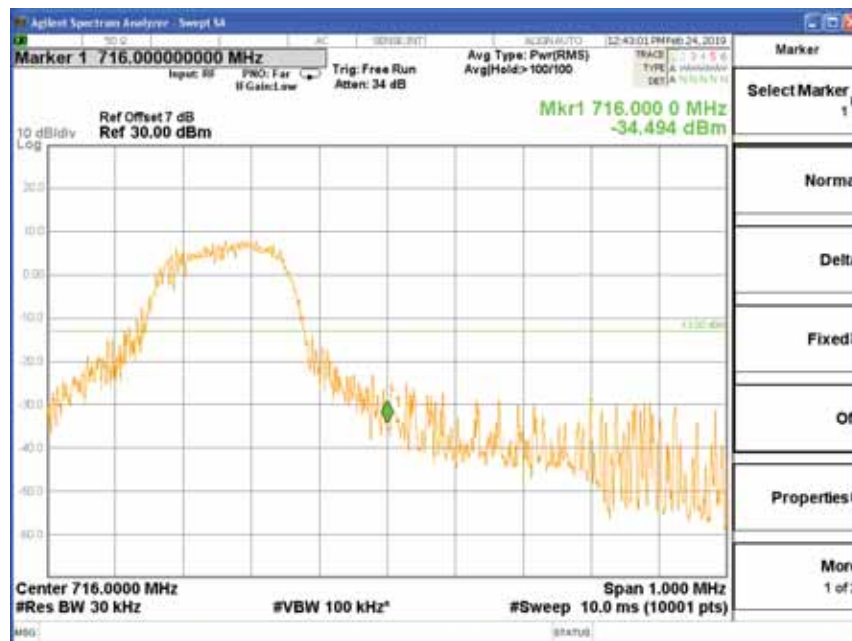


Fig.4

Band	Carrier frequency (MHz)	Channel (Low)	BW	RB Size	RB Offset	Band EdgesPlot
						QPSK
12	701.5	23035	5	1	0	Fig.1
				6	0	Fig.4

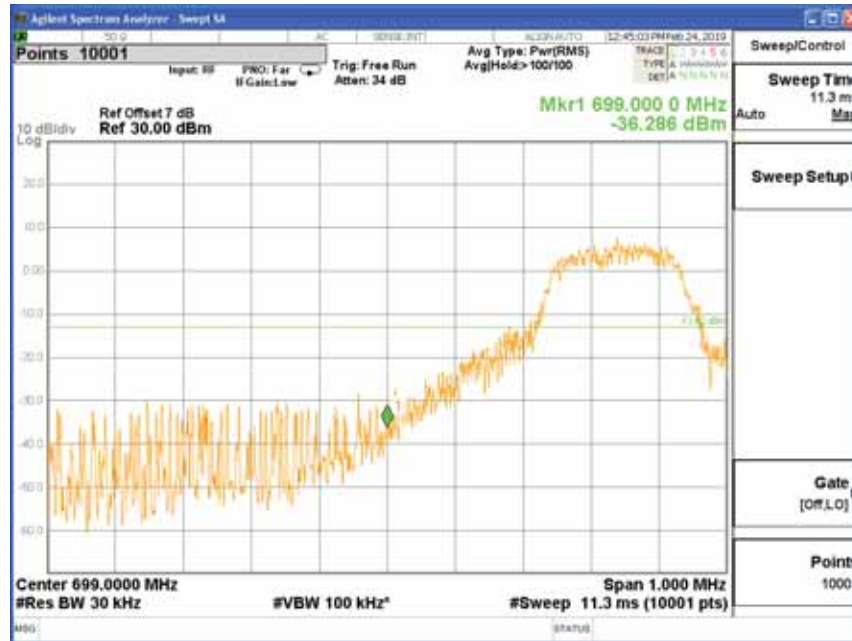


Fig.1

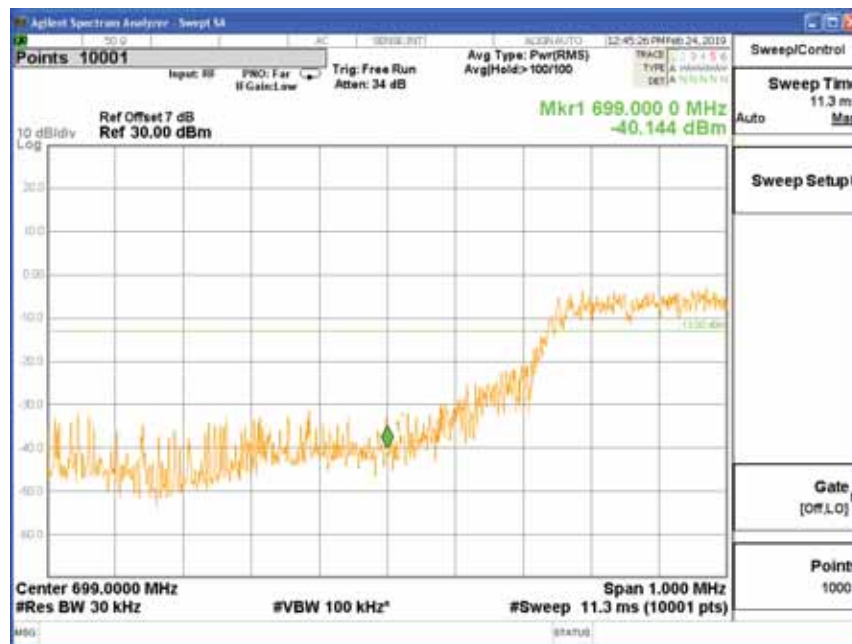


Fig.4

Band	Carrier frequency (MHz)	Channel (High)	BW	RB Size	RB Offset	Band EdgesPlot
						QPSK
12	713.5	23155	5	1	0	Fig.1
				6	0	Fig.4

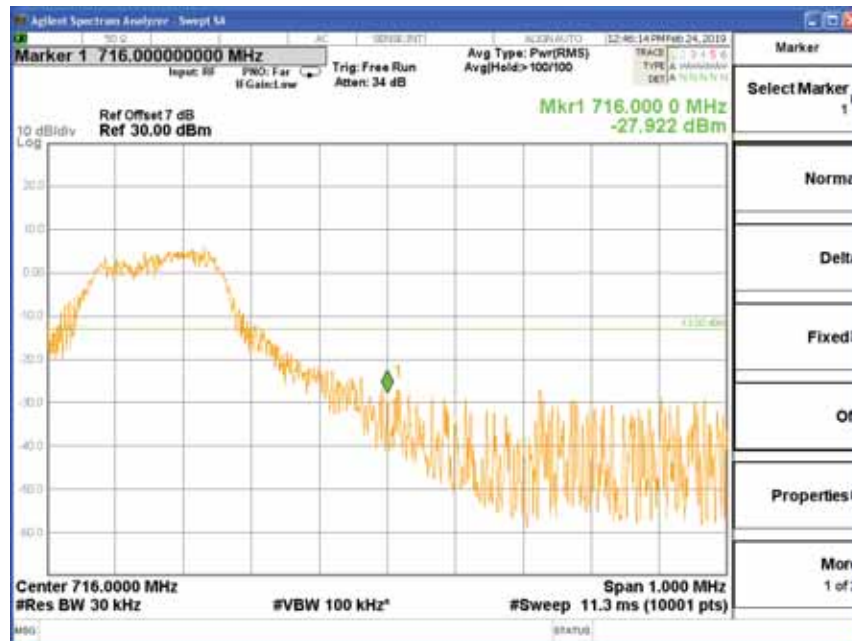


Fig.1

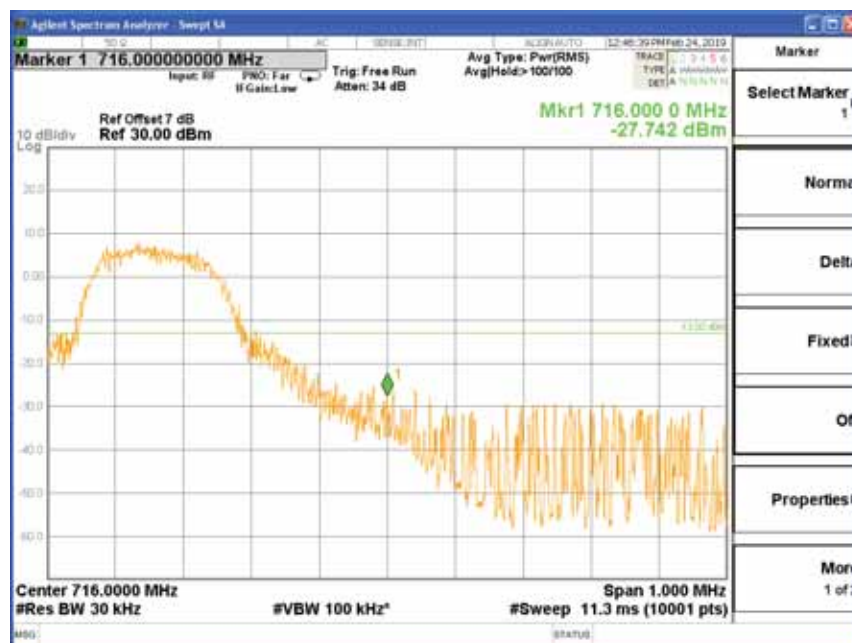


Fig.4

Band	Carrier frequency (MHz)	Channel (Low)	BW	RB Size	RB Offset	Band EdgesPlot
						QPSK
12	704	23060	10	1	0	Fig.1
				6	0	Fig.4

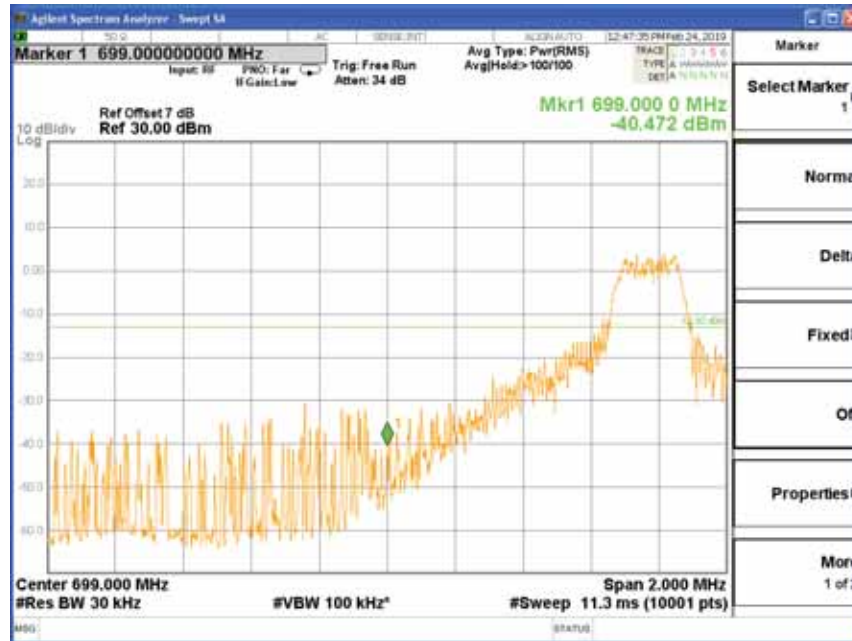


Fig.1

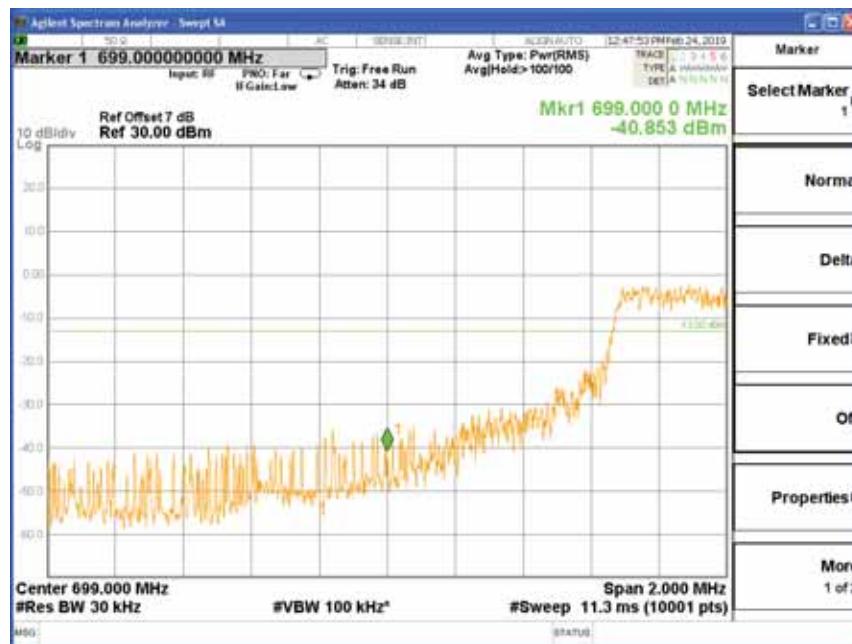


Fig.4

Band	Carrier frequency (MHz)	Channel (High)	BW	RB Size	RB Offset	Band EdgesPlot
						QPSK
12	711	23130	10	1	0	Fig.1
				6	0	Fig.4

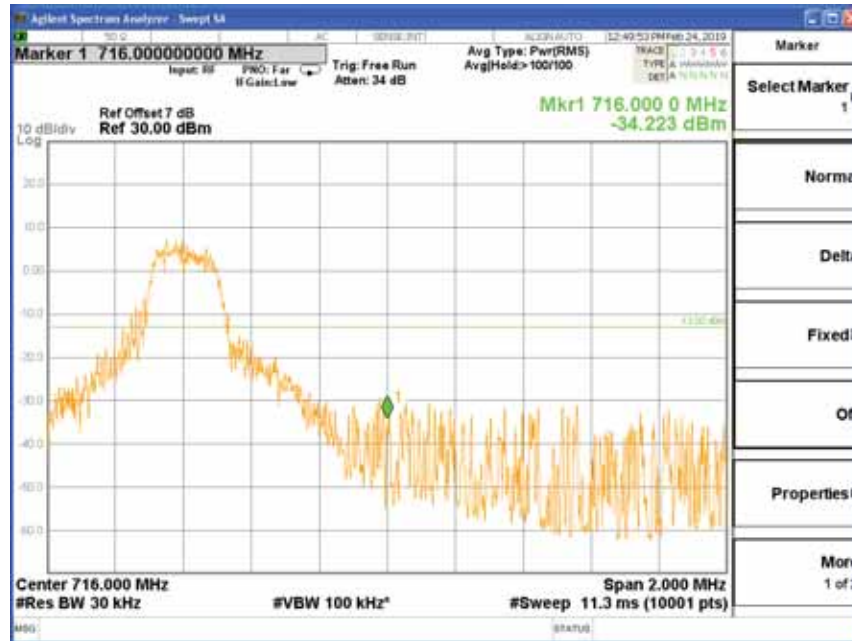


Fig.1

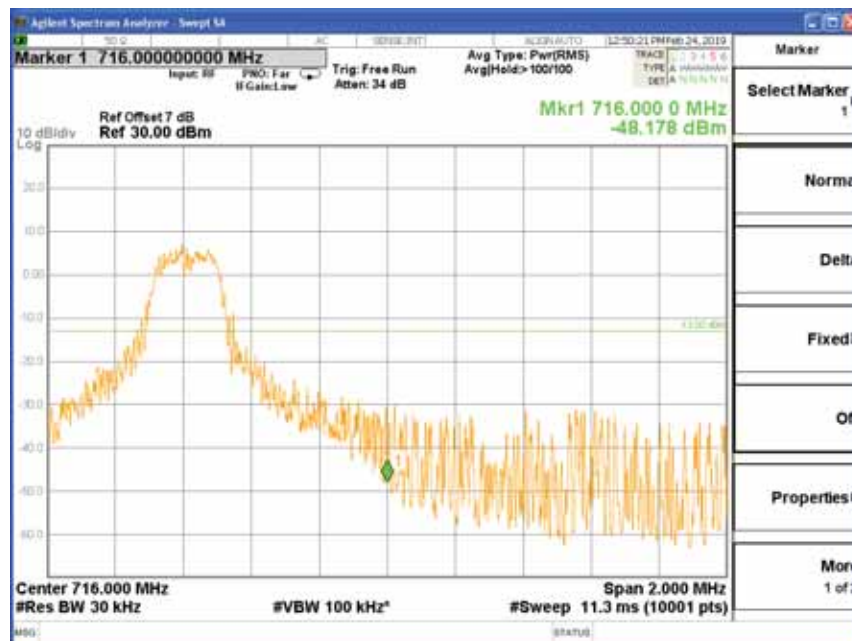


Fig.4

7 Frequency Stability

Test result:

Temperature(°C)	Voltage	Test Result (ppm) Band12 Low Channel			
		1.4M	3M	5M	10M
-20	NV	-0.005	0.012	-0.016	0.019
-10	NV	0.003	0.014	0.010	0.003
0	NV	0.013	-0.007	0.006	0.012
+10	NV	0.016	0.016	0.006	-0.015
+20	NV	0.016	0.005	0.008	0.015
+30	NV	0.005	0.003	0.011	0.005
+40	NV	0.014	0.001	0.009	0.005
+50	NV	0.015	-0.006	-0.009	0.018
+60	NV	0.006	0.016	0.011	0.001
+20	LV	0.016	-0.002	0.007	0.013
+20	HV	0.003	0.017	0.016	0.009
+20	HV	0.005	0.012	0.016	0.018

Temperature(°C)	Voltage	Test Result (ppm) Band12 High Channel			
		1.4M	3M	5M	10M
-20	NV	0.009	0.013	0.018	0.002
-10	NV	0.009	0.002	0.006	-0.014
0	NV	0.014	0.015	0.011	0.012
+10	NV	-0.018	0.007	-0.003	0.005
+20	NV	0.008	-0.002	0.009	0.014
+30	NV	0.009	0.009	0.001	0.009
+40	NV	-0.016	-0.003	0.006	0.017
+50	NV	0.014	0.015	-0.016	0.015
+60	NV	0.003	0.006	0.013	-0.006
+20	LV	0.009	0.002	0.016	-0.009
+20	HV	0.013	0.008	0.010	0.007
+20	HV	0.009	0.013	0.018	-0.002

APPENDIX B – TEST DATA OF RADIATED EMISSION

LTE band 2 (20MHz)

Test result:

Channel 18615

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2456.22	-45.38	-13	Horizontal
2775.48	-43.83	-13	Vertical
3725.94	-37.83	-13	Vertical
6674.82	-37.30	-13	Vertical
9958.41	-35.28	-13	Vertical
17821.58	-31.75	-13	Vertical

Channel 18900

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2456.02	-45.85	-13	Vertical
2780.36	-44.46	-13	Horizontal
3729.98	-37.22	-13	Vertical
6679.49	-37.16	-13	Vertical
9962.86	-35.38	-13	Vertical
17823.19	-32.63	-13	Vertical

Channel 19175

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2456.89	-45.78	-13	Vertical
2777.77	-45.20	-13	Vertical
3726.55	-37.03	-13	Vertical
6677.33	-36.96	-13	Vertical
9962.20	-35.18	-13	Vertical
17820.54	-32.48	-13	Vertical

LTE band 4 (20MHz)

Test result:
Channel 19957

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2458.33	-45.25	-13	Vertical
2777.77	-44.66	-13	Horizontal
3730.81	-37.40	-13	Horizontal
6678.05	-37.19	-13	Vertical
9961.08	-35.43	-13	Vertical
17824.97	-33.17	-13	Vertical

Channel 20175

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2458.02	-45.20	-13	Vertical
2779.16	-43.91	-13	Vertical
3728.65	-37.71	-13	Vertical
6677.61	-37.49	-13	Vertical
9963.75	-35.93	-13	Horizontal
17823.08	-32.35	-13	Vertical

Channel 20393

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2458.22	-45.61	-13	Vertical
2775.82	-43.81	-13	Vertical
3728.35	-37.51	-13	Vertical
6677.17	-37.45	-13	Vertical
9963.37	-35.71	-13	Horizontal
17822.78	-32.31	-13	Vertical

LTE band 12 (10MHz)

Test result:
Channel 23017

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1647.02	-53.45	-13	Vertical
1668.15	-51.14	-13	Vertical
2535.86	-44.02	-13	Horizontal
2577.57	-44.13	-13	Vertical
8962.58	-39.89	-13	Vertical
9971.99	-36.24	-13	Vertical

Channel 23095

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1645.16	-52.57	-13	Vertical
1666.25	-50.88	-13	Vertical
2535.03	-43.78	-13	Vertical
2576.04	-43.57	-13	Vertical
8964.16	-39.75	-13	Vertical
9971.40	-36.44	-13	Horizontal

Channel 23173

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1649.67	-52.72	-13	Vertical
1666.36	-50.89	-13	Vertical
2535.01	-43.40	-13	Vertical
2574.71	-44.04	-13	Horizontal
8963.64	-40.15	-13	Vertical
9968.68	-35.96	-13	Vertical

---End of Test Report---