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TEST REPORT

Application No.:	GZEM1803001395CR
Applicant:	Comba Telecom Ltd
FCC ID:	PX8COMFLEX-6900
Product Description:	ComFlex Series Distributed Antenna System
Model No.:	ComFlex-6900
Standards:	FCC Part 27, FCC Part 2
Date of Receipt:	2018-03-22
Date of Test:	2018-03-27 to 2018-03-30
Date of Issue:	2018-04-10
Test Result :	**Pass***

Authorized Signature:

Kobe Jian

Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.
If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.
The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

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2 Version

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
00		2018-04-10		Original

Authorized for issue by:				
Tested By		(Lily Kuang) /Project Engineer		2018-03-27 and 2018-03-30 **Date**
Checked By		(Ricky Liu) / Reviewer		2018-04-10 **Date**

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3 Test Summary

Test Item	Test Requirement	Test Method	Result ♣
AGC Threshold Level	Not specified	KDB935210 D05	PASS
Out of Band Rejection	KDB935210 D05	KDB935210 D05	PASS
99% Occupied Bandwidth	FCC part 2.1049	FCC part 2.1049 KDB935210 D05	PASS
Output Power & PAPR & Gain	FCC part 27.50(a) FCC part 27.50(h)	FCC part 2.1046 KDB935210 D05	PASS
Band Edge & Intermodulation	FCC part 27.53(a) FCC part 27.53(m)	FCC part 2.1051 KDB935210 D05	PASS
Conducted Spurious Emissions	FCC part 27.53(a) FCC part 27.53(m)	FCC part 2.1051 KDB935210 D05	PASS
Frequency Stablility	FCC part 27.54	FCC part 2.1055	PASS
Radiated Spurious Emissions	FCC part 27.53(a) FCC part 27.53(m)	FCC part 2.1053 KDB935210 D05	PASS

Remark:

Tx: (or tx) means Transmitter in this whole report.

Rx: (or rx) means Receiver in this whole report.

EUT: means Equipment Under Test in this whole report.

♣ Measurement results,unless otherwise noted, are only attached worst case (e.g., occupied bandwidth comparison and intermodulation tests were done with and without any AGC circuitry activated, only report worst case results; moreover, the EUT was supported power supply both of AC and DC, only worst results were reported. etc.).

The term “signal booster” as used in the Order and the associated rule sections includes all manner of distributed antenna systems and in-building radiation systems that serve to amplify signals between a device and a wireless network. A distributed antenna system (DAS) is a system of spatially separated antennas connected via cables (i.e., coaxial or fiber optic cable) to a signal source, such as a base station or an external antenna capable of communicating with a base station wirelessly. DAS are used to distribute wireless signals through large structures such as skyscrapers, hospitals, hotels, arenas and tunnels where the signal coverage may be lacking or to increase the capacity of the wireless system by achieving channel reuse on a smaller scale. Some DAS configurations may be considered signal boosters when the network of internal antennas achieves communication through the use of an amplifier that is connected to an external antenna that communicates with a base station wirelessly.**So the EUT belongs to Industrial Booster and B2I class.**

According to the declaration from manufacturer, the EUT can connect directly to BTS via coaxial cable and coupler without air radiation, therefore **only downlink was tested and uplink was ignored in this report.**

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4 Contents

Page

1 COVER PAGE **1**

2 VERSION **2**

3 TEST SUMMARY **3**

4 CONTENTS **4**

5 GENERAL INFORMATION **5**

5.1 CLIENT INFORMATION 5
5.2 GENERAL DESCRIPTION OF E.U.T. 5
5.3 DETAILS OF E.U.T. 5
5.4 PRODUCT DESCRIPTION 6
5.5 STANDARDS APPLICABLE FOR TESTING 6
5.6 TEST LOCATION 6
5.7 OTHER INFORMATION REQUESTED BY THE CUSTOMER 6
5.8 TEST FACILITY 7

6 EQUIPMENT USED DURING TEST **8**

7 TEST RESULTS **10**

7.1 E.U.T. TEST CONDITIONS 10
7.2 TEST PROCEDURE & MEASUREMENT DATA 11
7.2.1 AGC Threshold level *12*
7.2.2 Out of Band Rejection *14*
7.2.3 99% Occupied Bandwidth *17*
7.2.4 RF Output Power & PAPR & Gain *38*
7.2.5 Band Edge & Intermodulation *62*
7.2.6 Conducted Spurious Emissions *81*
7.2.7 Frequency Stability *93*
7.2.8 Radiated Spurious Emissions *96*

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5 General Information

5.1 Client Information

Applicant Name:	Comba Telecom Ltd.
Applicant Address:	611 East Wing, No. 8 Science Park West Avenue, Hong Kong Science Park, Tai Po, Hong Kong.
Manufacturer:	Comba Telecom Systems(China) Ltd.
Address of Manufacturer:	No.10 Shenzhou Road, Guangzhou Science City, Guangzhou 510663, Guangdong, P.R. China

5.2 General Description of E.U.T.

Product Name:	ComFlex Series Distributed Antenna System.
Model No.:	ComFlex-6900
Power Supply:	MU: AC 100-240V 50/60Hz RU: AC 100-240V 47/60Hz DC -68 to -40V
Test power:	AC 120V 60Hz DC -48V
Operating Temperature:	-40 °C to +70°C
Operating Humidity:	≤ 95%

5.3 Details of E.U.T.

Type of Modulation	LTE
Emission Designator:	G7D
Frequency Band:	Downlink 2350MHz to 2360MHz include the Modulation:LTE MIMO:Downlink 2350MHz to 2360MHz include the Modulation: LTE Downlink 2496MHz to 2690MHz include the Modulation:LTE MIMO: 2496MHz to 2690MHz include the Modulation: LTE
Nominal Power Output:	46dBm for downlink
Nominal System Gain:	36dB for downlink

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5.4 Product Description

The ComFlex series Distributed Antenna System is an RF over fiber solution that enhances a wireless network's coverage by extending cellular services from existing cell sites to an outdoor environment. The system consists of the Master Unit (MU) and high power Remote Unit (RU). The MU includes the Chassis, Power Supply Unit (PSU), Fibre Optical Unit (FOU) and RF Unit (RFU). With a modular design, it can support up to 8 independent RF inputs and 8 Remote Units. The Remote Unit is designed with a compact and slim form factor for easy installation. This solution is an effective point-to-multipoint distributed antenna system that provides flexible and scalable solution of multi-band, multi-operator coverage extension applications, such as citywide enhancement, highway, canyons, campus, underground tunnels, airports, convention centers, etc.

5.5 Standards Applicable for Testing

The standard used was FCC part 20 & FCC part 2 & FCC part 27

5.6 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch E&E Lab

No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China 518057

Telephone: +86 (0) 755 2601 2053 Fax: +86 (0) 755 2671 0594

FCC – Designation Number: CN1178

Test Firm Registration Number:406779.

No tests were sub-contracted.

5.7 Other Information Requested by the Customer

None.

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5.8 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **NVLAP (Lab Code: 200611-0)**

  SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

  The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

- **ACMA**

  SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our NVLAP accreditation.

- **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

  Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

- **CNAS (Lab Code: L0167)**

  SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2006 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of Testing Laboratories.

- **FCC Recognized Accredited Test Firm(Registration No.: 486818)**

  SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: CN5016, Test Firm Registration Number: 486818, Jul 13, 2017.

- **Industry Canada (Registration No.: 4620B-1)**

  The 3m/10m Alternate Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Certification and Engineering of Industry Canada for radio equipment testing with Registration No. 4620B-1.

- **VCCI (Registration No.: R-2460, C-2584, G-449 and T-1179)**

  The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co. Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-2460, C-2584，G-449 and T-1179 respectively.

- **CBTL (Lab Code: TL129)**

  SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2005, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.

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6 Equipment Used during Test

RE in Chamber						
No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. date (YYYY-MM-DD)	Cal.Due date (YYYY-MM-DD)
EMC0525	Compact Semi-Anechoic Chamber	ChangZhou ZhongYu	N/A	N/A	2016-12-04	2019-12-03
EMC0522	EMI Test Receiver	Rohde & Schwarz	ESIB26	100283	2018-01-19	2019-01-18
EMC0056	EMI Test Receiver	Rohde & Schwarz	ESCI	100236	2018-01-19	2019-01-18
EMC0528	RI High frequency Cable	SGS	20 m	N/A	2016-04-19	2018-04-18
EMC2025	Trilog Broadband Antenna 30-1000MHz	SCHWARZBECK MESS-ELEKTRONIK	VULB 9160	9160-3372	2016-09-08	2019-09-07
SEM003-18	Trilog Broadband Antenna 25-2000MHz	SCHWARZBECK MESS-ELEKTRONIK	VULB 9168	665	2016-06-29	2019-06-28
EMC0524	Bi-log Type Antenna	Schaffner -Chase	CBL6112B	2966	2016-09-08	2019-09-07
EMC0519	Bilog Type Antenna	Schaffner -Chase	CBL6143	5070	2017-05-04	2020-05-03
EMC2026	Horn Antenna 1-18GHz	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	9120D-841	2016-09-09	2019-09-08
EMC0521	1-26.5 GHz Pre-Amplifier	Agilent	8449B	3008A01649	2018-01-08	2019-01-07
EMC2065	Amplifier	HP	8447F	N/A	2017-06-19	2018-06-18
EMC2086	PRE AMPLIFIER MH648A	ANRITSU CORP	MH648A	N/A	2017-11-20	2018-11-19
EMC2063	Pre-amplifier 1GHz-26GHz	Compliance Direction Systems Lnc.	PAP-1G26-48	6279.628	2017-11-20	2018-11-19
EMC0523	Active Loop Antenna	EMCO	6502	42963	2018-03-05	2020-03-04
EMC2041	Broad-Band Horn Antenna (14)15-26.5(40)GHz	SCHWARZBECK MESS-ELEKTRONI	BBHA 9170	9170-375	2017-05-23	2020-05-22
EMC2079	High Pass Filter(915MHz)	FSY MICROWAVE	HM1465-9SS	009	2018-01-19	2019-01-18
EMC2142	966 Anechoic Chamber	C.R.T	9mX6mX6m	NA	2017-11-29	2018-11-28
EMC2139	MXE EMI Receiver	Keysight	N9038A	MY57290121	2017-11-15	2018-11-14
EMC2138	EXA Signal Analyzer	Keysight	N9010A	MY57120105	2017-11-15	2018-11-14
EMC2069	2.4GHz Filter	Micro-Tronics	BRM 50702	149	2018-01-08	2019-01-07
EMC0530	10m Semi-Anechoic Chamber	ETS	N/A	N/A	2016-04-30	2018-04-29

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Other Equipment

No:	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (dd-mm-yy)	Cal. Due Date (dd-mm-yy)
NA	Power Meter	Agilent	E4419B	MY45100856	2017-06-12	2018-06-11
NA	Signal Generator	Agilent	E4437B	US39260800	2017-6-17	2018-06-16
NA	Signal Generator	Agilent	E4438C	US39260800	2017-6-14	2018-06-13
NA	Spectrum Analyzer	Agilent	N9020A	MY48011385	2017-06-14	2018-06-13
NA	Spectrum Analyzer	Rohde&Schwarz	FSQ 8	SN0805772	2017-06-14	2018-06-13
NA	Attenuator	SHX manufacturer	30dB/50W	09031816	----	----
NA	Attenuator	SHX manufacturer	40dB/50W	09031312	----	----
NA	Attenuator	SHX manufacturer	50dB/50W	09053023	----	----
NA	Signal Generator	Rohde&Schwarz	SMU 200A	08103303	2017-06-12	2018-06-11

General used equipment

No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. date (YYYY-MM-DD)	Cal.Due date (YYYY-MM-DD)
EMC0006	DMM	Fluke	73	70681569	2017-07-01	2018-06-31
EMC0007	DMM	Fluke	73	70671122	2017-07-22	2018-07-21

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7 Test Results

7.1 E.U.T. test conditions

Input Voltage:	AC 120V 60Hz DC -48V
Operating Environment:	
Temperature:	22°C ~26°C
Humidity:	46%~56% RH
Atmospheric Pressure:	990~1005M Modulationbar
Test Requirement:	The RF output power of the EUT was measured at the antenna port, by adjusting the input power of signal generter to drive the EUT to get to maximum output power point and keep the EUT at maximum gain setteing for all tests. The device should be tested on downlink. For detail test Modulation and Frequency, please refer to 7.2.

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7.2 Test Procedure & Measurement Data

Test Modulation and Frequency

Downlink: 2350MHz to 2360MHz(5M Modulation)

Modulation	Lowest frequency	Middle frequency	Highest frequency
LTE	2352.5	2355	2357.5

Downlink: 2350MHz to 2360MHz((10M Modulation)

Modulation	Middle frequency
LTE	2355

Downlink:MIMO: 2350MHz to 2360MHz(5M Modulation)

Modulation	Lowest frequency	Middle frequency	Highest frequency
LTE	2352.5	2355	2357.5

Downlink: MIMO:2350MHz to 2360MHz((10M Modulation)

Modulation	Middle frequency
LTE	2355

Downlink: 2496MHz to 2690MHz(5M Modulation)

Modulation	Lowest frequency	Middle frequency	Highest frequency
LTE	2498.5	2593	2687.5

Downlink: 2496MHz to 2690MHz(20M Modulation)

Modulation	Lowest frequency	Middle frequency	Highest frequency
LTE	2506	2593	2680

Downlink: MIMO:2496MHz to 2690MHz(5M Modulation)

Modulation	Lowest frequency	Middle frequency	Highest frequency
LTE	2498.5	2593	2687.5

Downlink: MIMO:2496MHz to 2690MHz(20M Modulation)

Modulation	Lowest frequency	Middle frequency	Highest frequency
LTE	2506	2593	2680

Remark:

1) We test the downlink in the lowest band; the middle band; the hightest band and test the respective frequency as above table;

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7.2.1 AGC Threshold level

Test Method: KDB935210 D05

Test Requirement: Not specified

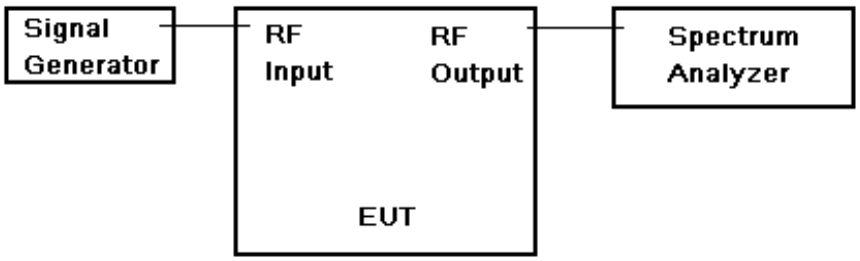
EUT Operation:

Status: Drive the EUT to maximum output power. Pretest was performed in both channels, only kept the final measurement data of worse case.

Conditions: Normal conditions

Application: Cellular Band RF output ports

Test Configuration:



AGC threshold test configuration

Test Procedure:

a) Connect a signal generator to the input of the EUT.

b) Connect a spectrum analyzer or power meter to the output of the EUT using appropriate attenuation as necessary.

c) The signal generator should initially be configured to produce either of the required test signals (i.e., broadband or narrowband).

d) Set the signal generator frequency to the center frequency of the EUT operating band.

e) While monitoring the output power of the EUT, measured using the methods of 3.5.3 or 3.5.4, increase the input level until a 1 dB increase in the input signal power no longer causes a 1 dB increase in the output signal power.

f) Record this level as the AGC threshold level.

g) Repeat the procedure with the remaining test signal.

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7.2.1.1 Measurement Record:

Downlink: 2350MHz ~2360MHz(5M Modulation)

Test items	Modulation	Lowest frequency	Middle frequency	Highest frequency
AGC Threshold	LTE	9.86dBm	10.00dBm	9.89 dBm

Downlink: 2350MHz ~2360MHz(10M Modulation)

Test items	Modulation	Middle frequency
AGC Threshold	LTE	9.83dBm

Downlink:MIMO: 2350MHz ~2360MHz(5M Modulation)

Test items	Modulation	Lowest frequency	Middle frequency	Highest frequency
AGC Threshold	LTE	9.93dBm	9.91dBm	10.00dBm

Downlink: MIMO: 2350MHz ~2360MHz(10M Modulation)

Test items	Modulation	Middle frequency
AGC Threshold	LTE	9.79dBm

Downlink: 2496MHz ~ 2690MHz(5M Modulation)

Test items	Modulation	Lowest frequency	Middle frequency	Highest frequency
AGC Threshold	LTE	9.65dBm	9.50dBm	9.57dBm

Downlink: 2496MHz ~ 2690MHz(20M Modulation)

Test items	Modulation	Lowest frequency	Middle frequency	Highest frequency
AGC Threshold	LTE	9.81dBm	9.99dBm	9.90dBm

Downlink:MIMO: 2496MHz ~ 2690MHz(5M Modulation)

Test items	Modulation	Lowest frequency	Middle frequency	Highest frequency
AGC Threshold	LTE	9.64dBm	9.75dBm	9.85dBm

Downlink: MIMO:2496MHz ~ 2690MHz(20M Modulation)

Test items	Modulation	Lowest frequency	Middle frequency	Highest frequency
AGC Threshold	LTE	9.80dBm	9.65dBm	9.42dBm

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7.2.2 Out of Band Rejection

Test Requirement: KDB935210 D05

Test for rejection of out of band signals. Filter frequency response plots are acceptable.

Test Method: KDB935210 D05

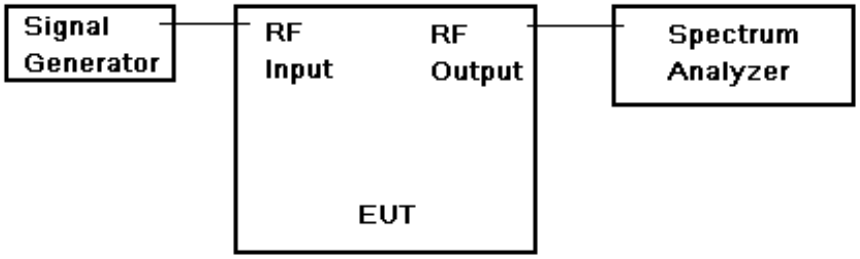
EUT Operation:

Status: Drive the EUT to maximum output power. .

Conditions: Normal conditions

Application: Cellular Band RF output ports

Test Configuration:



Out of Band rejection test configuration

Test Procedure:

1. Connect the equipment as illustrated;
2. Test the background noise level with all the test facilities;
3. Keep one transmitting path, all other connectors shall be connected by normal power or RF leads;
4. Select the attenuator to avoid the test receiver or spectrum analyzer being destroied;
5. Keep the EUT continuously transmitting in max power;
6. Signal generator sweep from the frequency more lower than the product frequency to the frequency more higher than it, find the product band filter characteristic;

· CW signal rather than typical signal is acceptable (for FM).

· Multiple band filter will need test each other.

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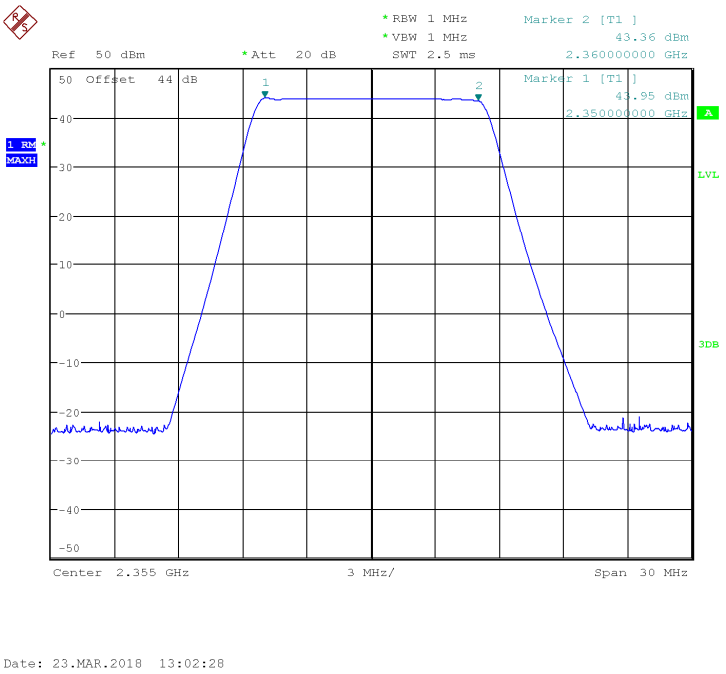
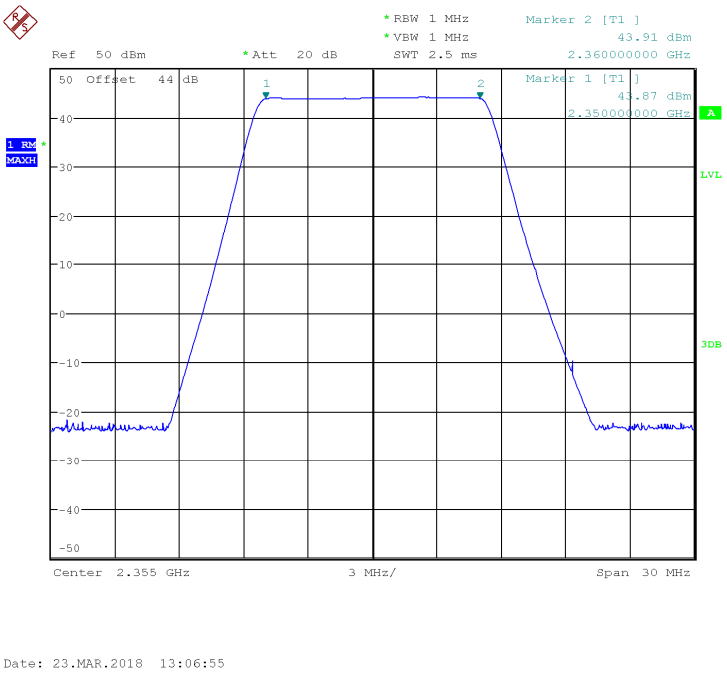
7.2.2.1 Measurement Record:

1.Test for Downlink: 2350MHz to 2360MHz



2. Test for Downlink:MIMO:2350MHz to 2360MHz



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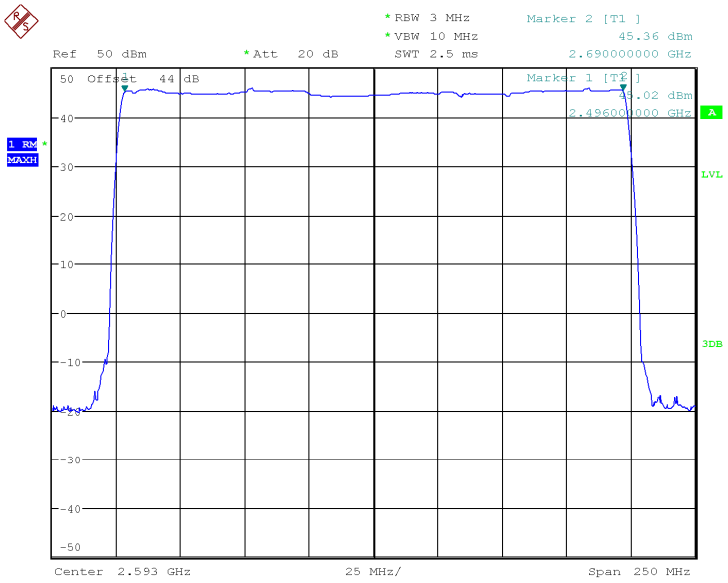
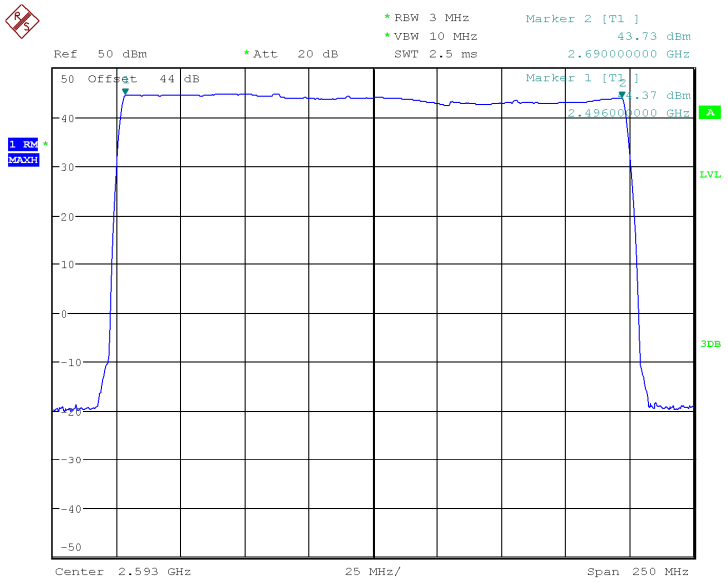
3. Test for Downlink: 2496MHz to 2690MHz



Date: 23.MAR.2018 13:00:51

4. Test for Downlink:MIMO: 2496MHz to 2690MHz



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7.2.3 99% Occupied Bandwidth

Test Requirement: KDB935210 D02

Test Method: FCC part 2.1049

The spectral shape of the output should look similar to input for all modulations.

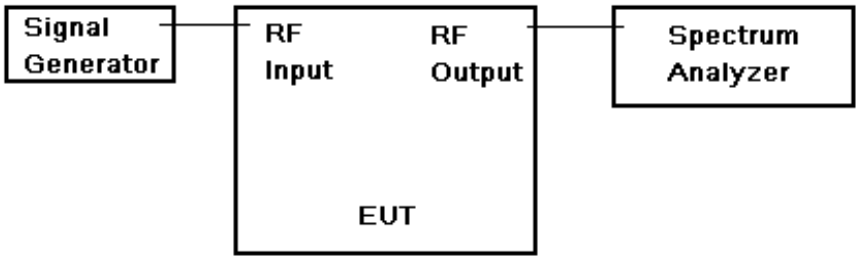
EUT Operation:

Status: Drive the EUT to maximum output power. .

Conditions: Normal conditions

Application: Cellular Band RF output ports

Test Configuration:



Occupied Bandwidth test configuration

Test Procedure:

a) Set the spectrum analyzer RBW 300 Hz or >1%&<2% emission bandwidth of carrier.

b) Capture the trace of input signal;

c) Connect the equipment as illustrated;

d) Capture the trace of output signal;

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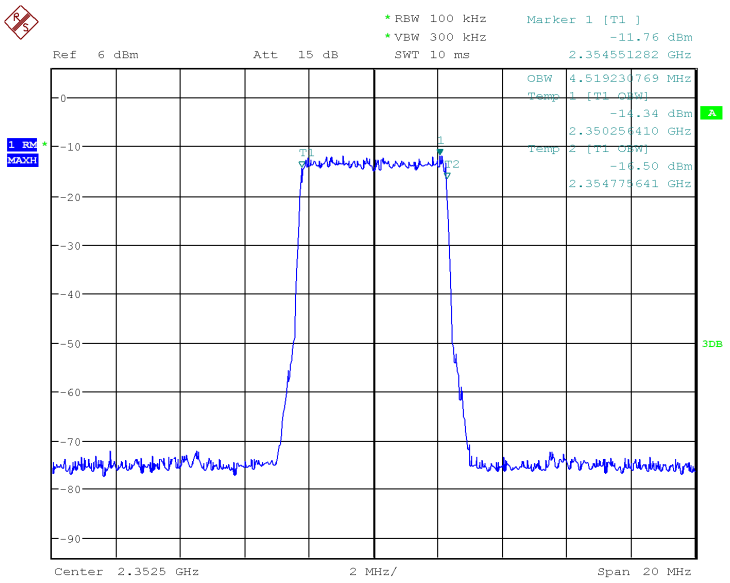
7.2.3.1 Measurement Record:

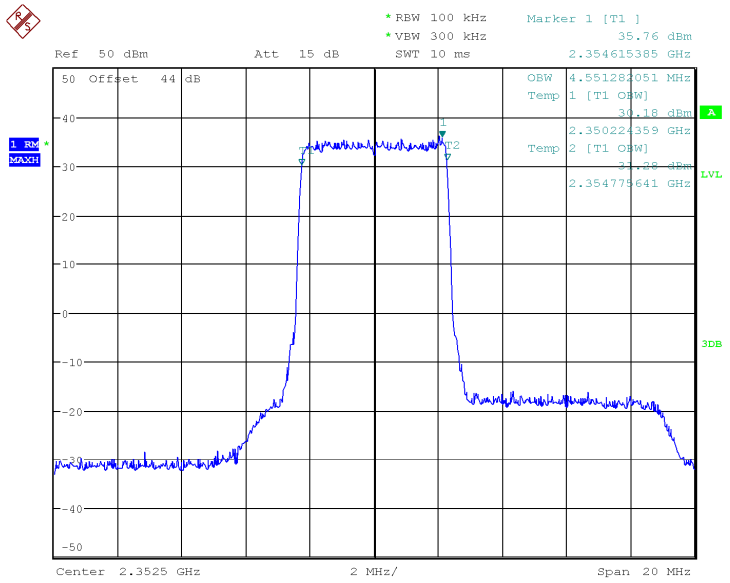
1.Downlink:2350MHz to 2360MHz(LTE mode)

1.1 lowest frequency – Input



Date: 23.MAR.2018 14:18:59

1.2 lowest frequency—Output



Date: 23.MAR.2018 13:25:04

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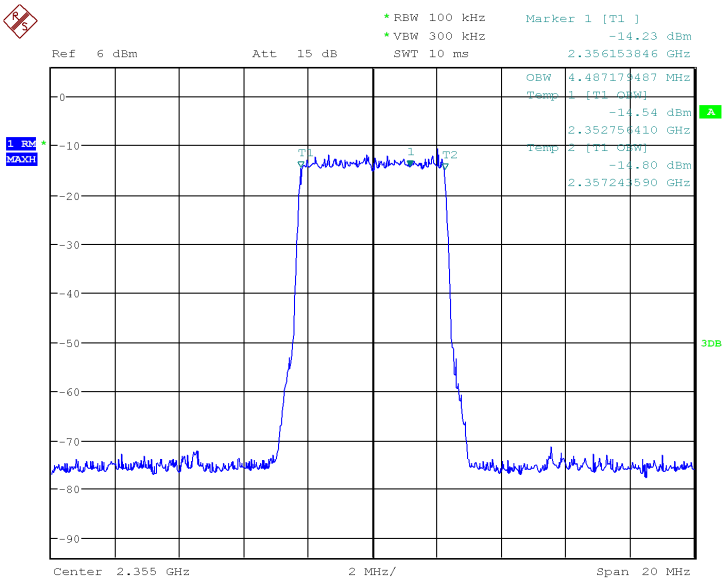
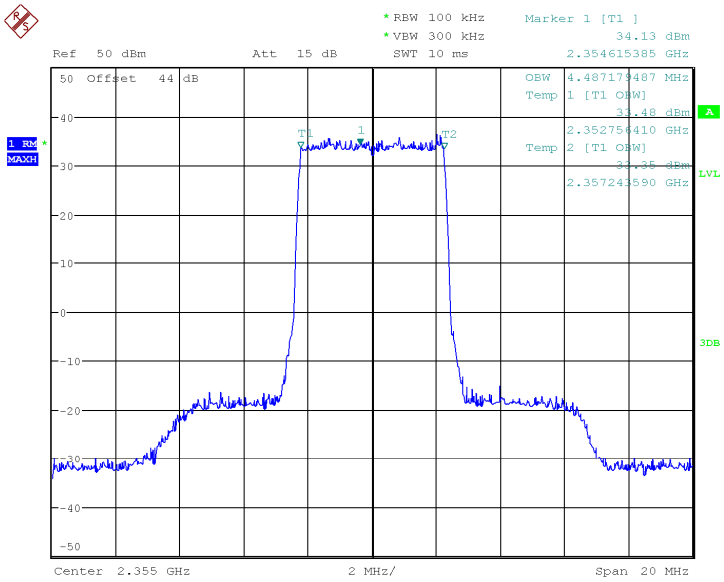
1.3 middle frequency—Input



Date: 23.MAR.2018 14:19:51

1.4 middle frequency—Output



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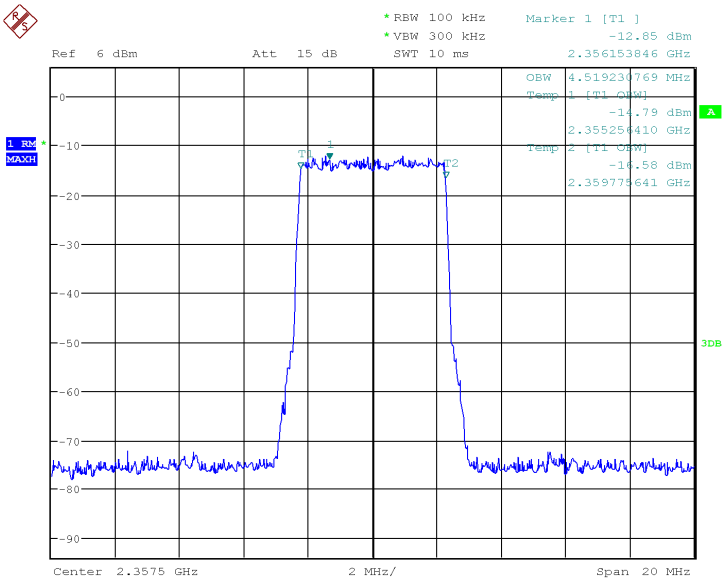
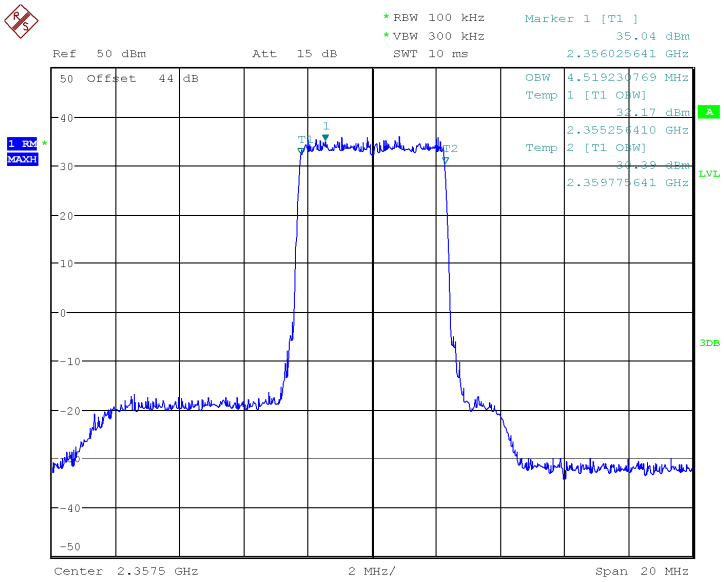
1.5 highest frequency—Input



Date: 23.MAR.2018 14:19:26

1.6 highest frequency—Output(Change right marker)



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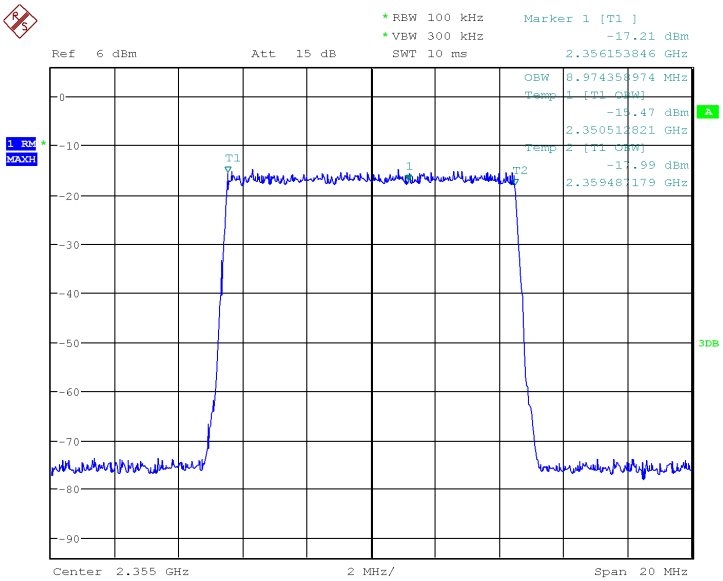
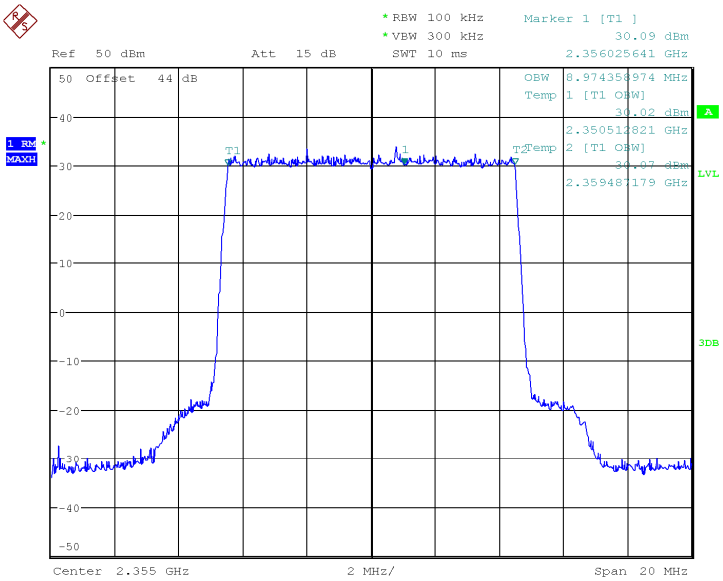
1.1 middle frequency – Input(10M Modulation)



Date: 23.MAR.2018 14:20:20

1.2 middle frequency—Output



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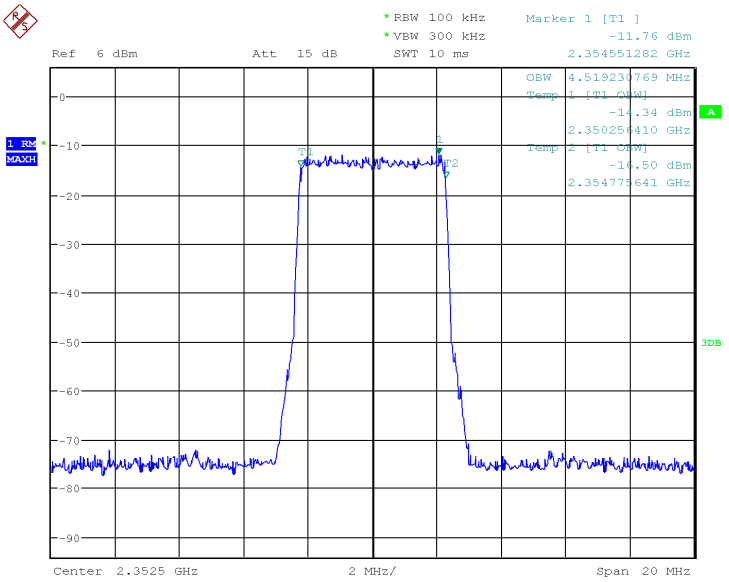
7.2.3.2 Measurement Record:

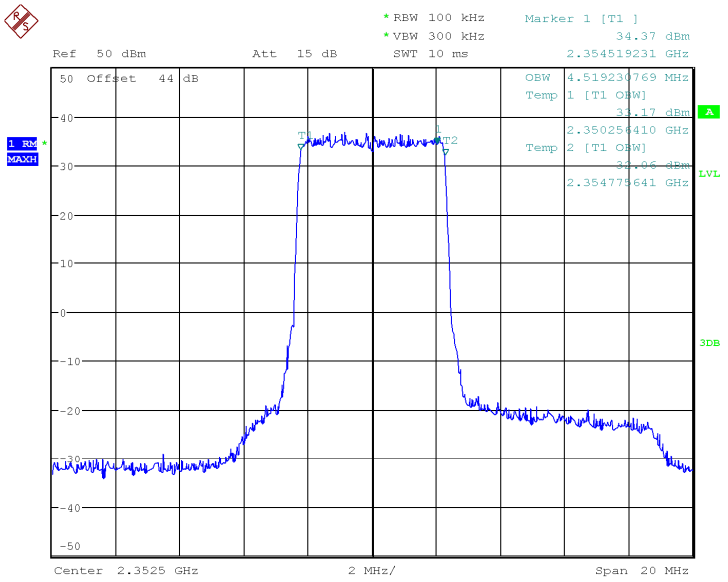
1.Downlink: MIMO: 2350MHz to 2360MHz

1.3.1 Lowest frequency—Input(5M Modulation)



Date: 23.MAR.2018 14:18:59

1.3.2 Lowest frequency—Output



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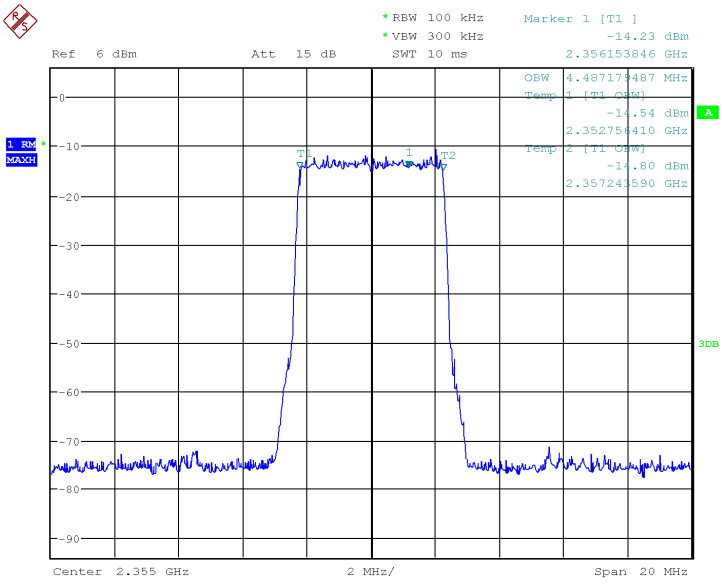
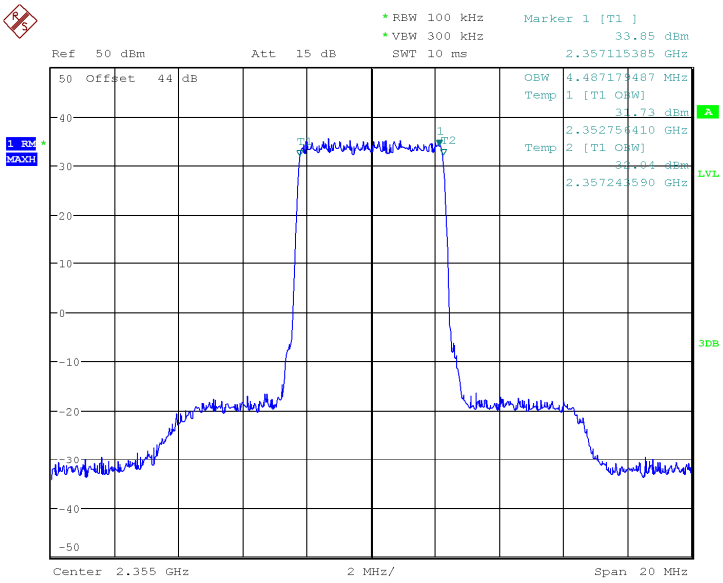
1.3.3 middle frequency-- Input



Date: 23.MAR.2018 14:19:51

1.3.4 middle frequency-- Output



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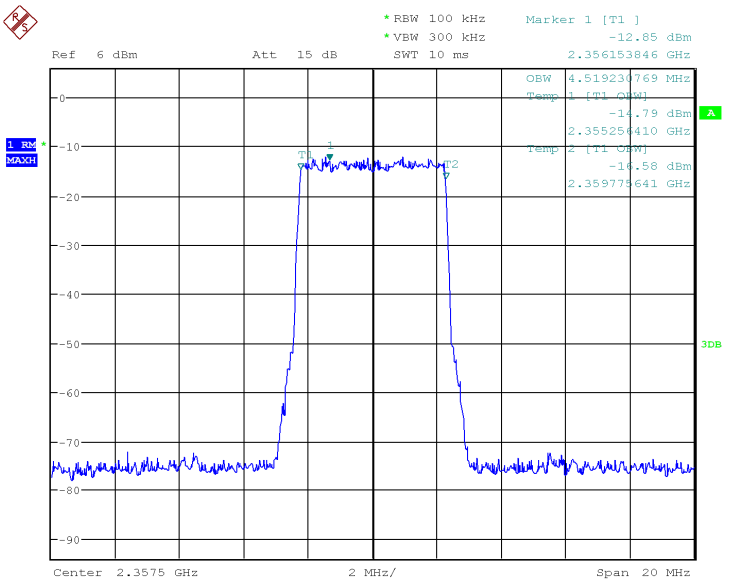
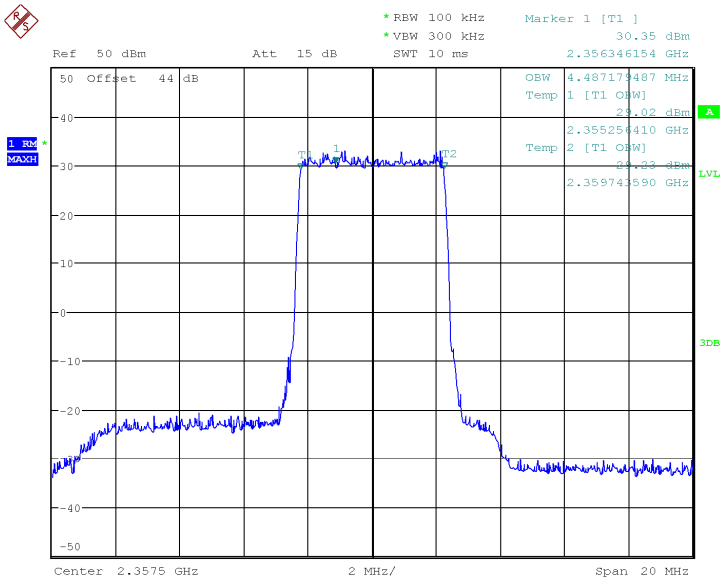
1.3.5 highest frequency-- Input



Date: 23.MAR.2018 14:19:26

1.3.6 highest frequency-- Output



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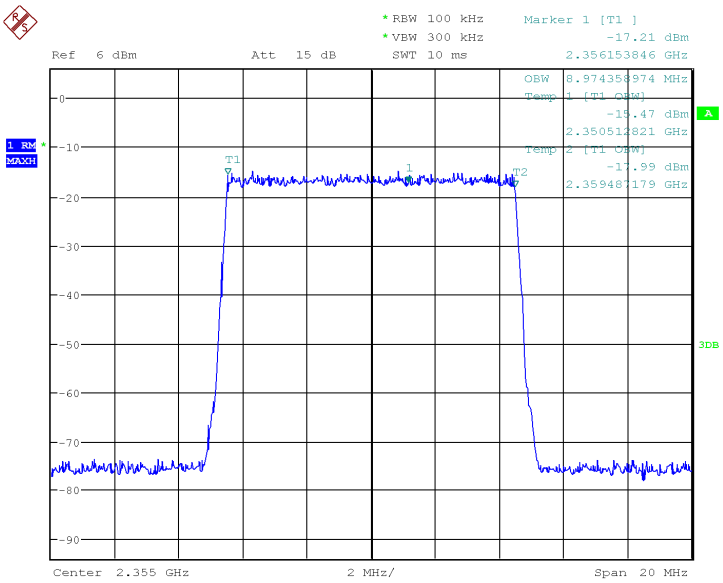
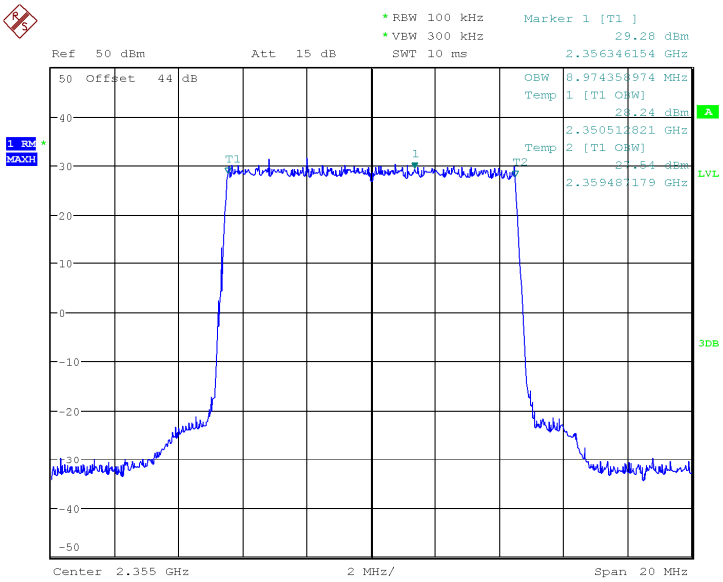
1.4 middle frequency – Input(10M Modulation)



Date: 23.MAR.2018 14:20:20

1.4 middle frequency—Output



Date: 23.MAR.2018 14:06:38

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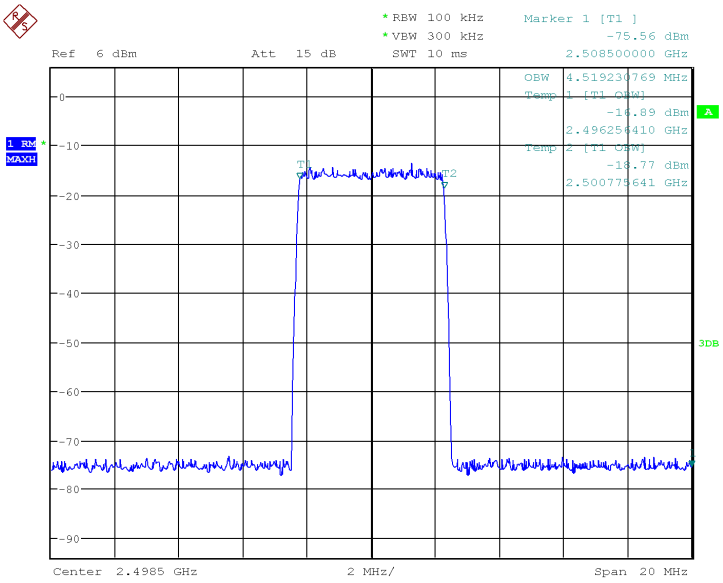
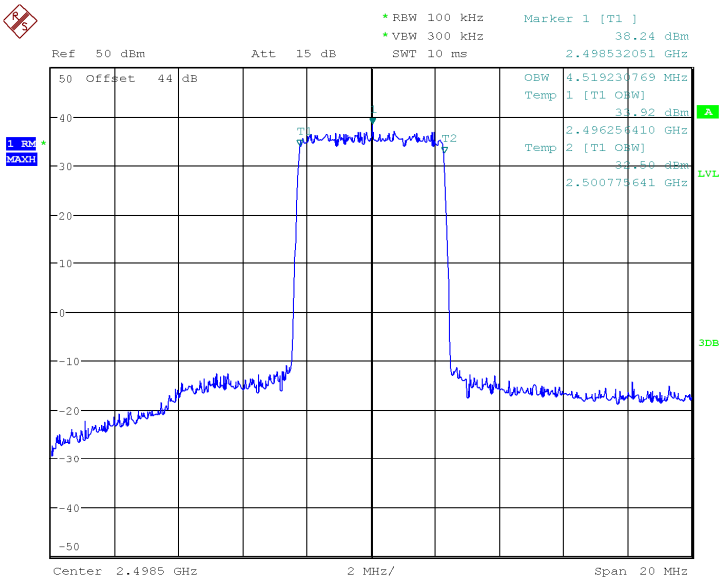
3.Downlink: 2496MHz to 2690MHz(LTE)

3.4.1 lowest frequency– Input(5M Modulation)



Date: 23.MAR.2018 14:14:46

3.4.2 lowest frequency-- Output



Date: 23.MAR.2018 13:31:23

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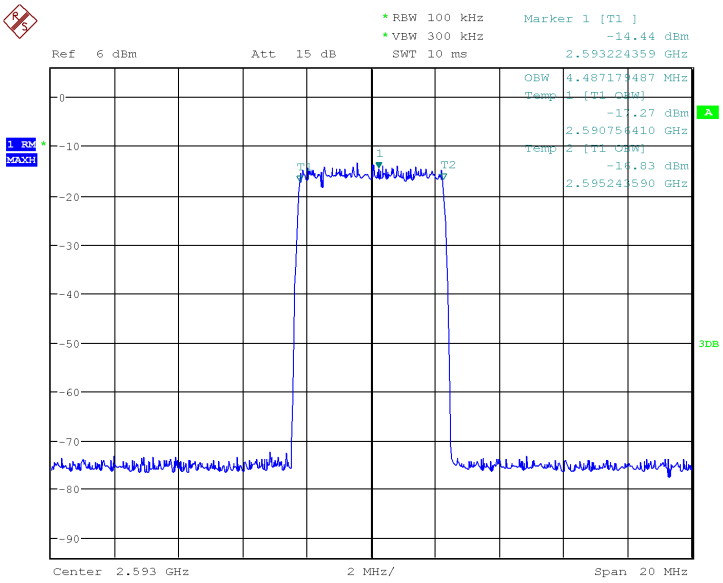
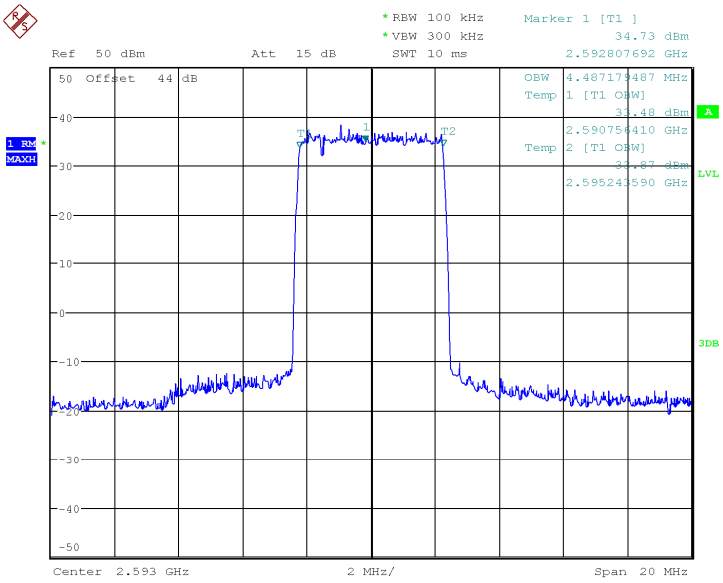
3.4.3 middle frequency-- Input



Date: 23.MAR.2018 14:14:27

3.4.4 middle frequency-- Output



Date: 23.MAR.2018 13:32:17

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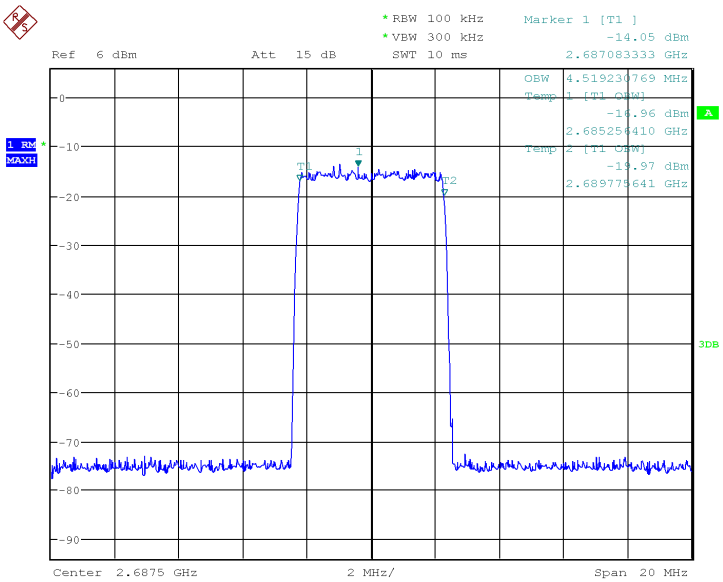
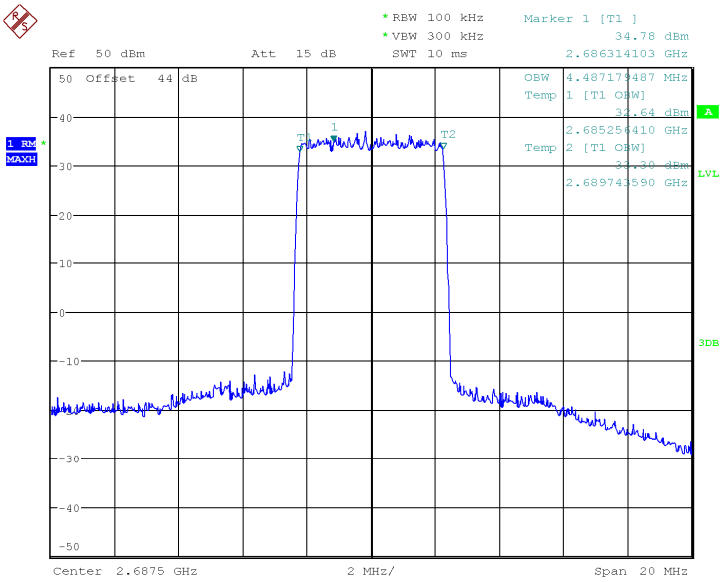
3.4.5 highest frequency—Input



Date: 23.MAR.2018 14:13:57

3.4.6 highest frequency--Output



Date: 23.MAR.2018 13:33:02

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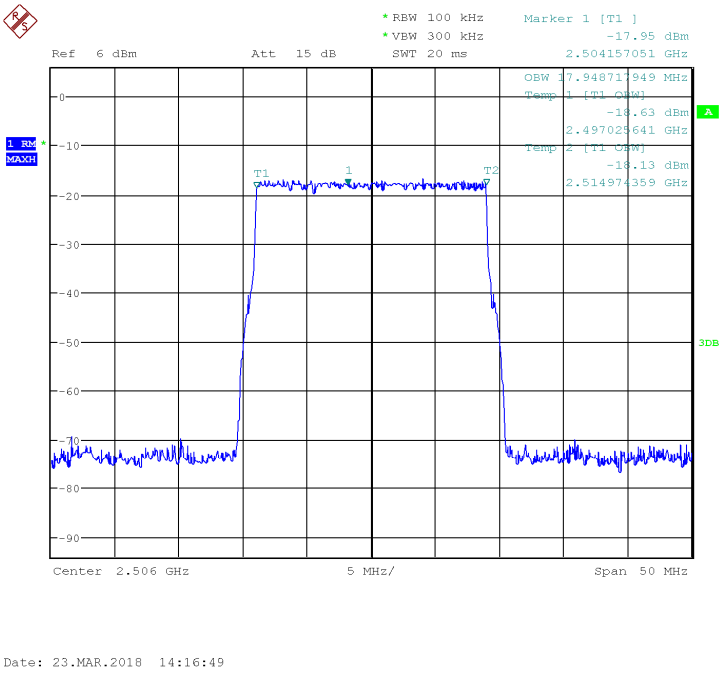
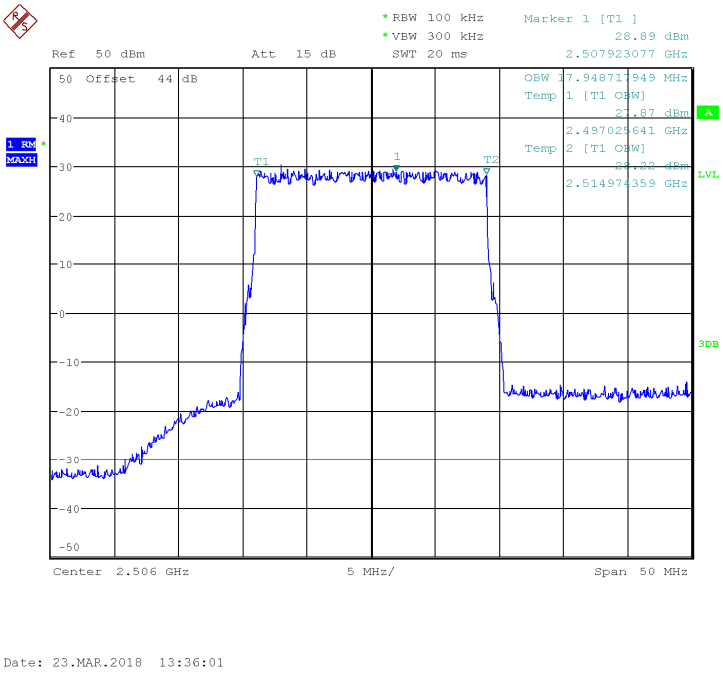
3.4 LTE Mode:20M Modulation

3.4.1 lowest frequency– Input



3.4.2 lowest frequency-- Output



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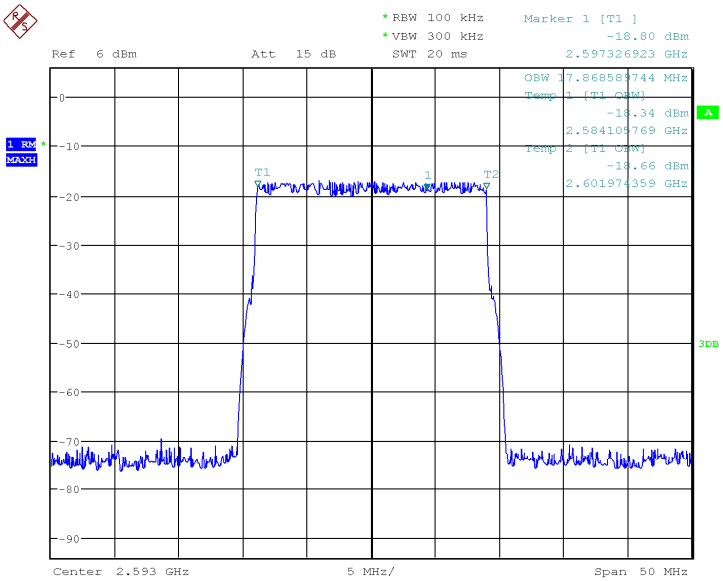
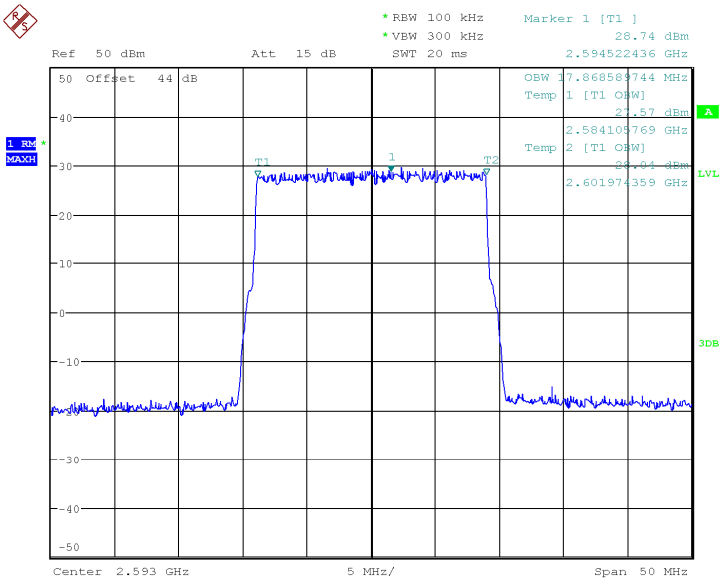
3.4.3 middle frequency-- Input



Date: 23.MAR.2018 14:17:20

3.4.4 middle frequency-- Output



Date: 23.MAR.2018 13:35:19

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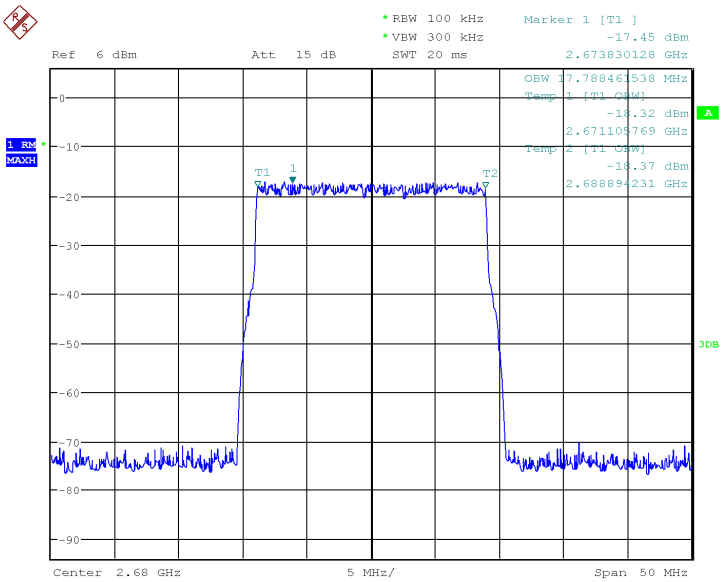
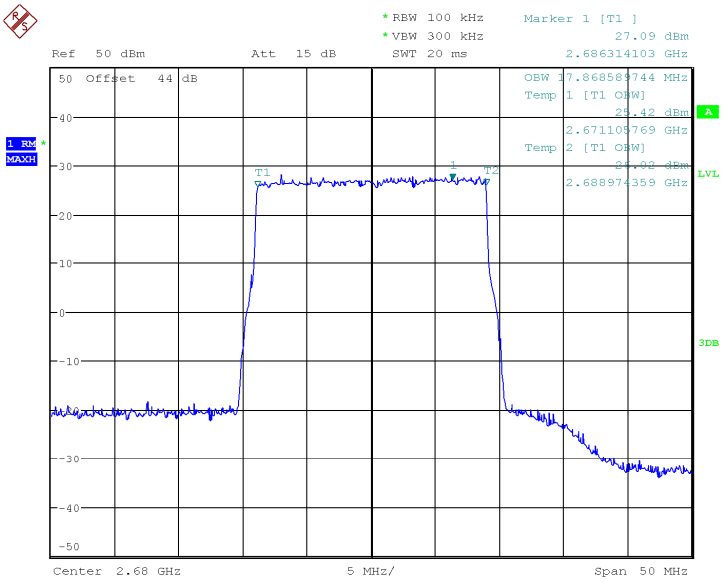
3.4.5 highest frequency—Input



Date: 23.MAR.2018 14:17:54

3.4.6 highest frequency--Output



Date: 23.MAR.2018 13:34:42

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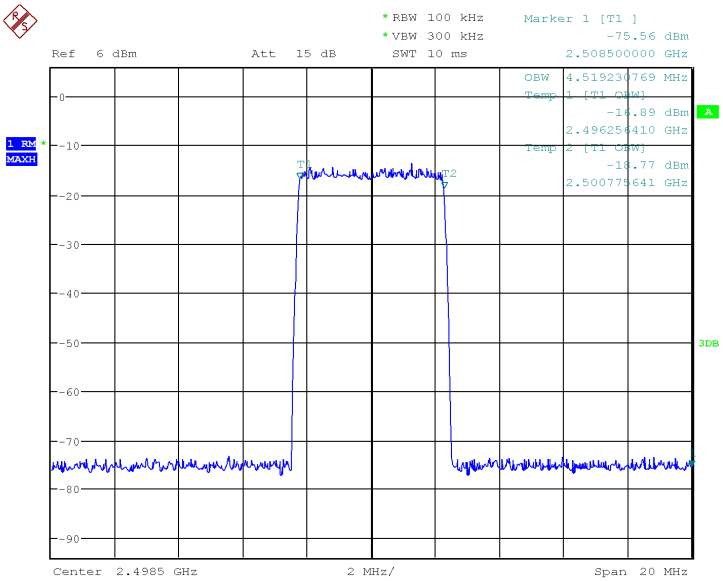
4.Downlink: MIMO:2496MHz to 2690MHz(LTE)

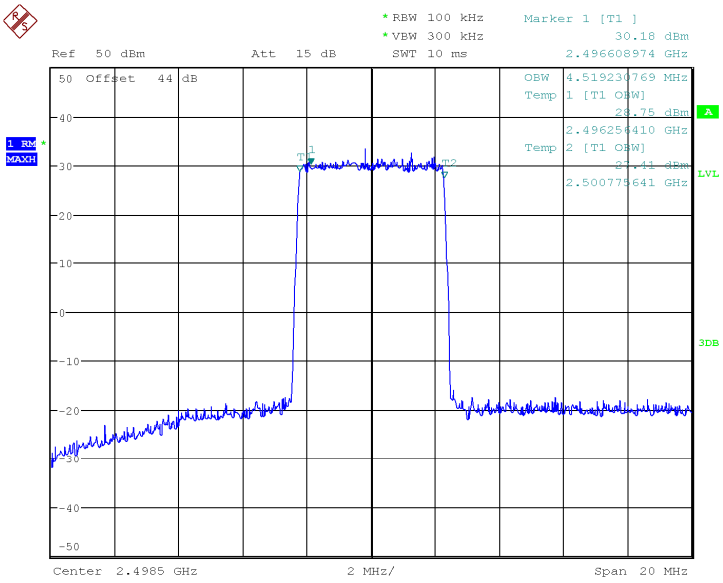
4.3 LTEMode:5M Modulation modulation

4.3.1 lowest frequency– Input



Date: 23.MAR.2018 14:14:46

4.3.2 lowest frequency—Output



Date: 23.MAR.2018 14:09:49

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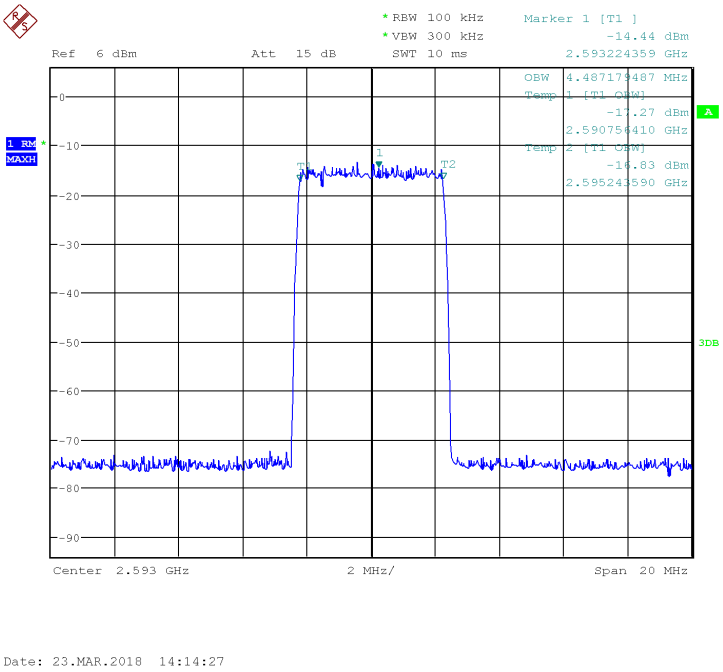
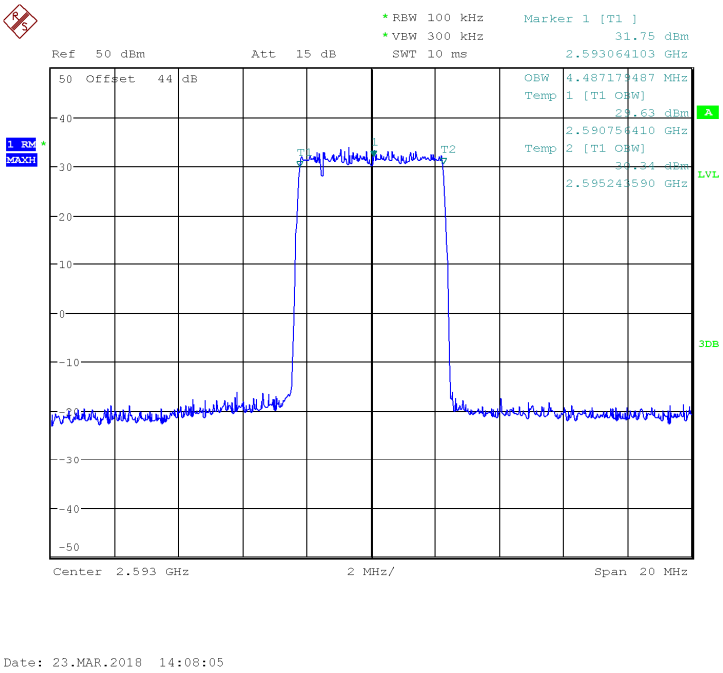
4.3.3 middle frequency-- Input



4.3.4 middle frequency-- Output



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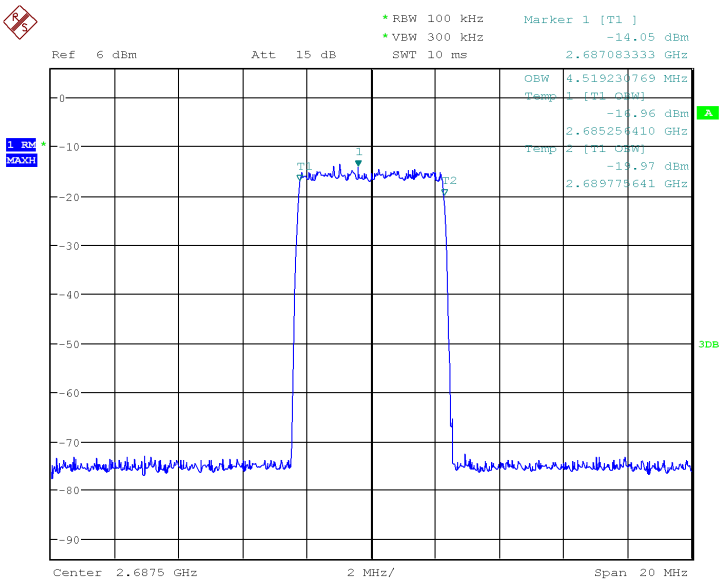
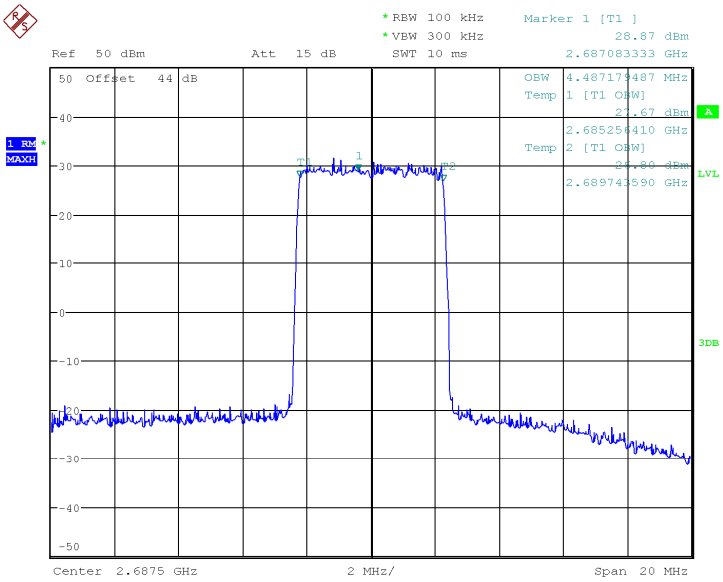
4.3.5 highest frequency—Input



Date: 23.MAR.2018 14:13:57

4.3.6 highest frequency--Output



Date: 23.MAR.2018 14:11:42

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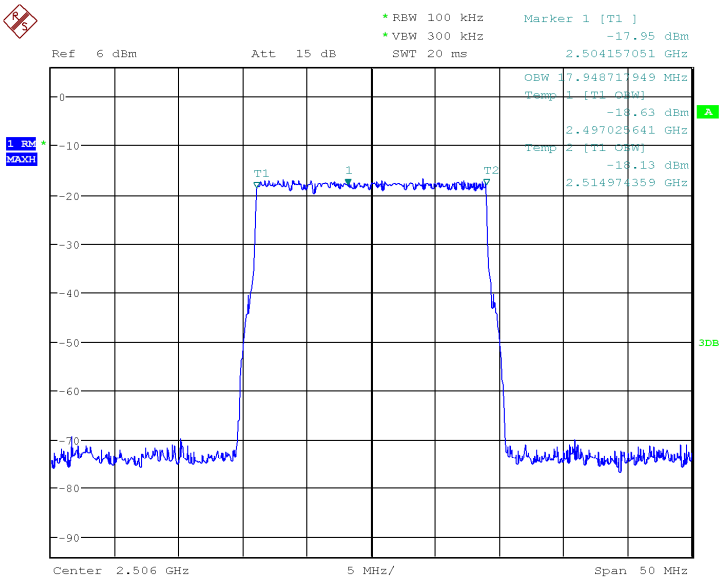
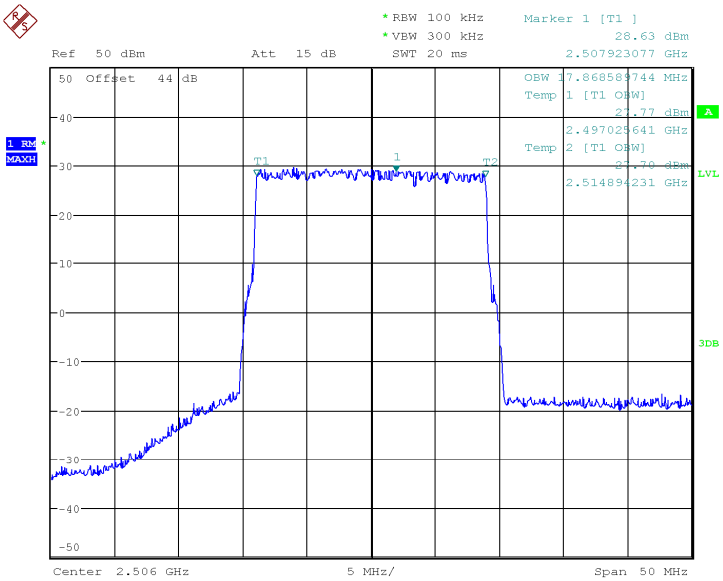
4.3 LTEMode:20M Modulation modulation

4.3.1 lowest frequency– Input



Date: 23.MAR.2018 14:16:49

4.3.2 lowest frequency-- Output



Date: 23.MAR.2018 13:38:23

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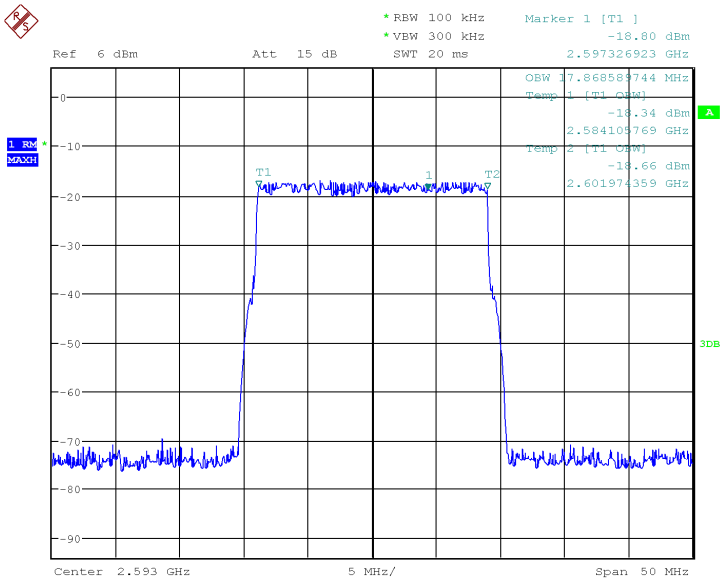
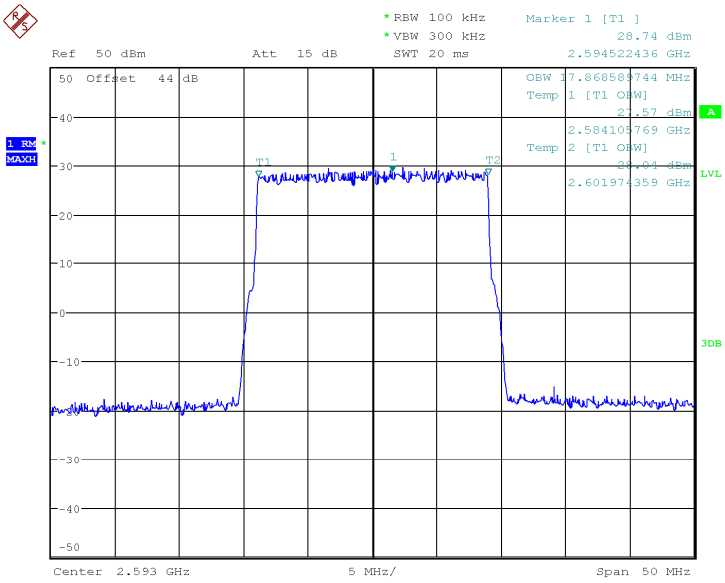
4.3.3 middle frequency-- Input



Date: 23.MAR.2018 14:17:20

4.3.4 middle frequency-- Output



Date: 23.MAR.2018 13:35:19

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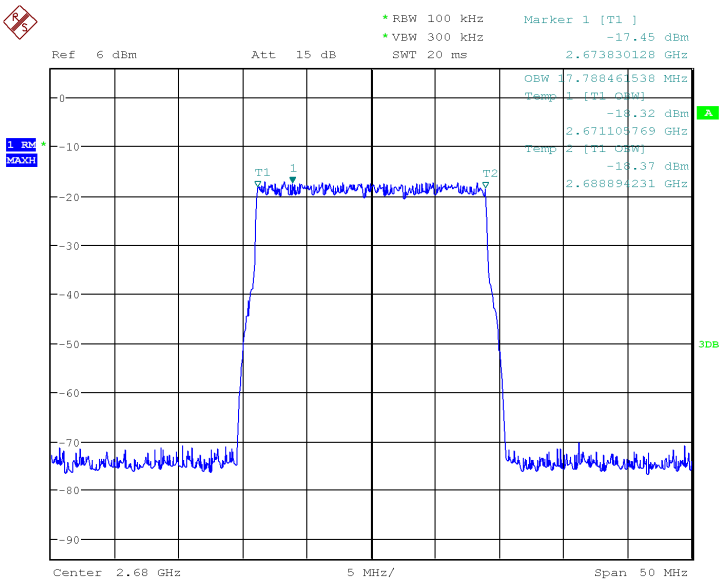
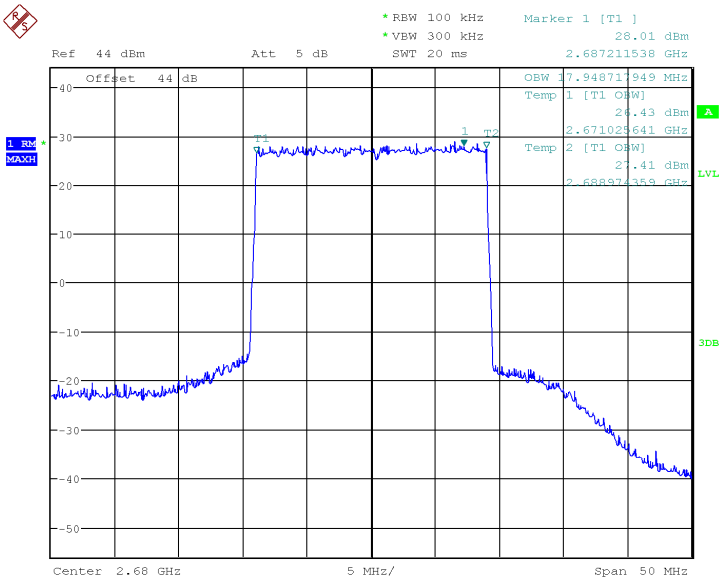
4.3.5 highest frequency—Input



Date: 23.MAR.2018 14:17:54

4.3.6 highest frequency--Output



Date: 24.MAR.2018 09:27:08

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7.2.4 RF Output Power & PAPR & Gain

Test Requirement: FCC part 27.50(a) and part 27.50(h)

WCS:2350-2360MHz

(a) The following power limits and related requirements apply to stations transmitting in the 2305-2320 MHz band or the 2345-2360 MHz band.
(1) *Base and fixed stations.* (i) For base and fixed stations transmitting in the 2305-2315 MHz band or the 2350-2360 MHz band:
(A) The average equivalent isotropically radiated power (EIRP) must not exceed 2,000 watts within any 5 megahertz of authorized bandwidth and must not exceed 400 watts within any 1 megahertz of authorized bandwidth.
(B) The peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB. The PAPR measurements should be made using either an instrument with complementary cumulative distribution function (CCDF) capabilities to determine that PAPR will not exceed 13 dB for more than 0.1 percent of the time or other Commission approved procedure. The measurement must be performed using a signal corresponding to the highest PAPR expected during periods of continuous transmission.

(ii) For base and fixed stations transmitting in the 2315-2320 MHz band or the 2345-2350 MHz band, the peak EIRP must not exceed 2,000 watts.

BRS and EBS: 2496-2690MHz

(h) The following power limits shall apply in the BRS and EBS:

(1)*Main, booster and base stations.*

(i) The maximum EIRP of a main, booster or base station shall not exceed 33 dBW+10log(X/Y) dBW, where X is the actual channel width in MHz and Y is either 6 MHz if prior to transition or the station is in the MBS following transition or 5.5 MHz if the station is
in the LBS and UBS following transition, except as provided in paragraph (h)(1)(ii) of this section.
(ii) If a main or booster station sectorizes or otherwise uses one or more transmitting antennas with a non-omnidirectional horizontal plane radiation pattern, the maximum EIRP in dBW in a given direction shall be determined by the following formula: EIRP = 33 dBW+10 log(X/Y) dBW +10 log(360/beamwidth) dBW, where X is the actual channel width in
MHz, Y is either (i) 6 MHz if prior to transition or the station is in the MBS following transition or (ii) 5.5 MHz if the station is in the LBS and UBS following transition, and beamwidth is the total horizontal plane beamwidth of the individual transmitting antenna for the station or any sector measured at the half-power points.

Test Method: FCC part 2.1046

EUT Operation:

Status: Drive the EUT to maximum output power. Pretest was performed in both channels, only kept the final measurement data of worse case.

Conditions: Normal conditions

Application: Cellular Band RF output ports

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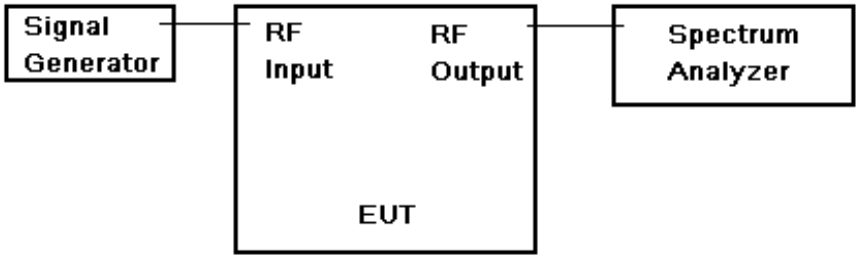
Test Configuration:



RF Output Power test configuration

Test Procedure: RF output power test procedure:

1.

a) Connect the equipment as illustrated, when the output power is over the max value of the Spectrum Analyzer, add the attenuator to avoid destroying the facility.

b) Set the center frequency of the spectrum analyzer to the assigned transmitter frequency, key the transmitter, and set the level of the carrier to the full scale reference line.

c) do not apply any tone to modulate the EUT.

d1) Adjust the spectrum analyzer for the following settings:

1) Resolution Bandwidth >> the carrier bandwidth,

2) Video Bandwidth refer to standard requirement.

d2) Use spectrum analyzer channel power measurement function;

e) Record the frequencies and levels of carrier power;

f) Calculate the signal link way loss and final power value.

Or 2.

a) Connect the equipment as illustrated;

b) Read the value from the power meter;

c) Calculate the signal link way loss and final power value.

Calculating Gain

After the output power have been measured, the gain of the EUT can be determined from :

Gain (dB) = output power (dBm) - input power (dBm).

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7.2.4.1 Measurement Record:

The graph will be showed at later page

Downlink: 2350MHz ~2360MHz(5M Modulation)

Test items	Modulation	Lowest frequency	Middle frequency	Highest frequency
Output Power	LTE	46.19dBm (41.59W)	46.28dBm (42.46W)	46.31dBm (42.76W)
PAPR	LTE	7.82dB	7.79 dB	7.82 dB
Gain	LTE	36.33 dB	36.28 dB	36.42 dB

Downlink: 2350MHz ~2360MHz(10M Modulation)

Test items	Modulation	Middle frequency
Output Power	LTE	46.27dBm (42.36W)
PAPR	LTE	7.79 dB
Gain	LTE	36.44 dB

Downlink:MIMO: 2350MHz ~2360MHz(5M Modulation)

Test items	Modulation	Lowest frequency	Middle frequency	Highest frequency
Output Power	LTE	45.91dBm (38.99W)	45.90dBm (38.90W)	45.98dBm (39.63mW)
PAPR	LTE	7.82 dB	7.85 dB	7.82 dB
Gain	LTE	35.98 dB	35.99 dB	35.98 dB

Downlink: MIMO: 2350MHz ~2360MHz(10M Modulation)

Test items	Modulation	Middle frequency
Output Power	LTE	45.94dBm (39.26W)
PAPR	LTE	7.85 dB
Gain	LTE	36.15 dB

Downlink: 2496MHz ~ 2690MHz(5M Modulation)

Test items	Modulation	Lowest frequency	Middle frequency	Highest frequency
Output Power	LTE	46.17dBm (41.40W)	45.95dBm (39.36W)	45.79dBm (37.93W)
PAPR	LTE	7.82 dB	7.85 dB	7.79 dB
Gain	LTE	36.52 dB	36.45 dB	36.22 dB

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Downlink: 2496MHz ~ 2690MHz(20M Modulation)

Test items	Modulation	Lowest frequency	Middle frequency	Highest frequency
Output Power	LTE	45.85dBm (38.46W)	45.88dBm (38.73W)	46.00dBm (39.81W)
PAPR	LTE	7.72 dB	7.72 dB	7.72 dB
Gain	LTE	36.04 dB	35.89 dB	36.10 dB

Downlink:MIMO: 2496MHz ~ 2690MHz(5M Modulation)

Test items	Modulation	Lowest frequency	Middle frequency	Highest frequency
Output Power	LTE	45.91dBm (38.99W)	45.94dBm (39.26W)	45.81dBm (38.11W)
PAPR	LTE	7.85 dB	7.82 dB	7.79 dB
Gain	LTE	36.27 dB	36.19 dB	35.96 dB

Downlink: MIMO:2496MHz ~ 2690MHz(20M Modulation)

Test items	Modulation	Lowest frequency	Middle frequency	Highest frequency
Output Power	LTE	45.88dBm (38.73W)	45.88dBm (38.73W)	45.74dBm (37.50W)
PAPR	LTE	7.76 dB	7.76 dB	7.72 dB
Gain	LTE	36.08 dB	36.23 dB	36.32 dB

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7.2.4.2 Measurement Record:

1) Output power

1.Downlink:2350MHz to 2360MHz(5M Modulation)

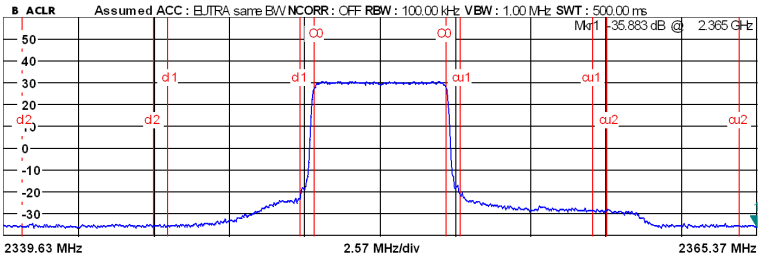
1.1 lowest frequency

EUTRA/LTE					
Freq:	2.3525 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	44.5 dB
Mode:	DL FDD, 25 RB (5 MHz), Auto (CP)			Capture Time:	20.1 ms

CONTINUOUS TRG : EXT RF

A ACLR List Ref 54.5 dBm Att/El 5.00 / 0.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	4.515 MHz	...		46.19 dBm	...
Adjacent	4.515 MHz	5.00 MHz	-58.91 dB	-56.55 dB	-44.20 dB
Alternate	4.515 MHz	10.00 MHz	-65.59 dB	-62.84 dB	-44.20 dB
	...	...			...



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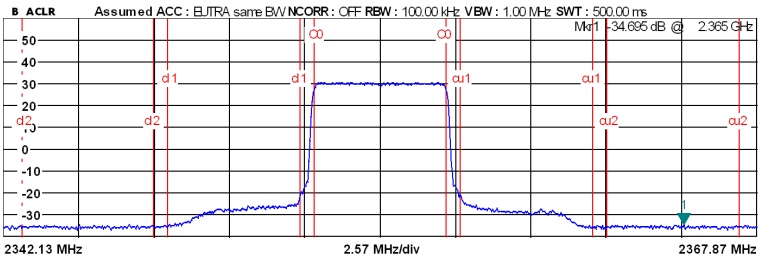
1.2 middle frequency

EUTRA/LTE					
Freq:	2.355 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	44.5 dB
Mode:	DL FDD, 25 RB (5 MHz), Auto (CP)			Capture Time:	20.1 ms

CONTINUOUS TRG : EXT RF

A ACLR List Ref 54.5 dBm Att/El 5.00 / 0.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	4.515 MHz	...		46.28 dBm	...
Adjacent	4.515 MHz	5.00 MHz	-57.98 dB	-58.49 dB	-44.20 dB
Alternate	4.515 MHz	10.00 MHz	-65.68 dB	-65.61 dB	-44.20 dB
	...	...			...



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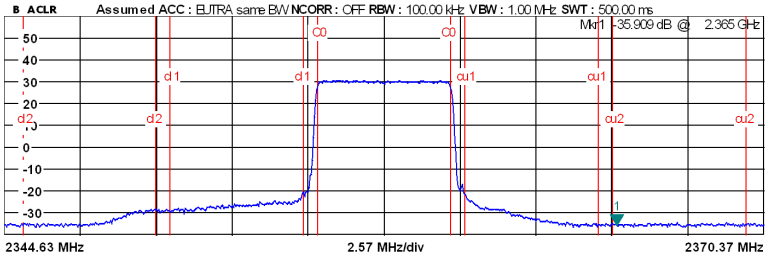
1.3 highest frequency

EUTRA/LTE					
Freq:	2.3575 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	44.5 dB
Mode:	DL FDD, 25 RB (5 MHz), Auto (CP)			Capture Time:	20.1 ms

CONTINUOUS TRG : EXT RF

A ACLR List Ref 54.5 dBm Att/El 5.00 / 0.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	4.515 MHz	...		46.31 dBm	...
Adjacent	4.515 MHz	5.00 MHz	-56.66 dB	-60.29 dB	-44.20 dB
Alternate	4.515 MHz	10.00 MHz	-63.09 dB	-65.63 dB	-44.20 dB
	...	...			...



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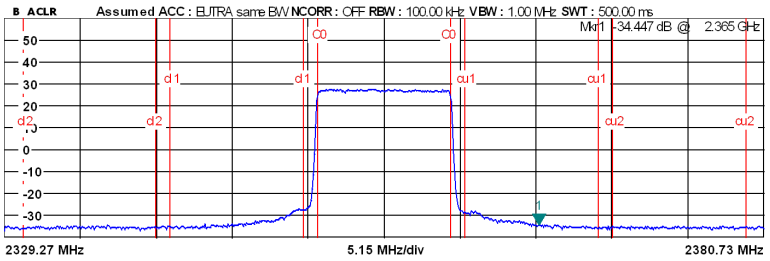
1.4 Middle frequency(10M Modulation)

EUTRA/LTE					
Freq:	2.355 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	44.5 dB
Mode:	DL FDD, 50 RB (10 MHz), Auto (CP)			Capture Time:	20.1 ms

CONTINUOUS TRG : EXT RF

A ACLR List Ref 54.5 dBm Att/El 5.00 / 0.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	9.015 MHz	...		46.27 dBm	...
Adjacent	9.015 MHz	10.00 MHz	-59.71 dB	-59.86 dB	-44.20 dB
Alternate	9.015 MHz	20.00 MHz	-62.57 dB	-62.58 dB	-44.20 dB
	...	...			...



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2.Downlink: MIMO: 2350MHz to 2360MHz

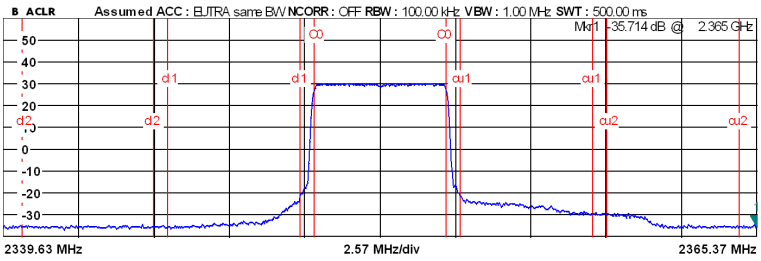
2.1 Lowest frequency (5M Modulation)

EUTRA/LTE					
Freq:	2.3525 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	44.5 dB
Mode:	DL FDD, 25 RB (5 MHz), Auto (CP)			Capture Time:	20.1 ms

CONTINUOUS TRG : EXT RF

A ACLR List Ref 54.5 dBm Att/El 5.00 / 0.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	4.515 MHz	...		45.91 dBm	...
Adjacent	4.515 MHz	5.00 MHz	-61.26 dB	-55.66 dB	-44.20 dB
Alternate	4.515 MHz	10.00 MHz	-65.27 dB	-62.85 dB	-44.20 dB
	...	...			...



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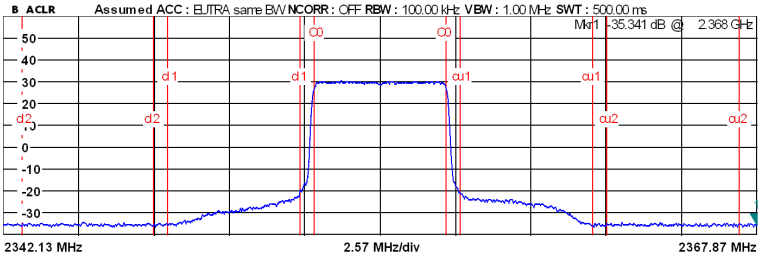
2.2 middle frequency

EUTRA/LTE					
Freq:	2.355 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	44.5 dB
Mode:	DL FDD, 25 RB (5 MHz), Auto (CP)			Capture Time:	20.1 ms

CONTINUOUS TRG : EXT RF

A ACLR List Ref 54.5 dBm Att/El 5.00 / 0.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	4.515 MHz	...		45.90 dBm	...
Adjacent	4.515 MHz	5.00 MHz	-57.67 dB	-55.55 dB	-44.20 dB
Alternate	4.515 MHz	10.00 MHz	-65.21 dB	-65.19 dB	-44.20 dB
	...	...			...



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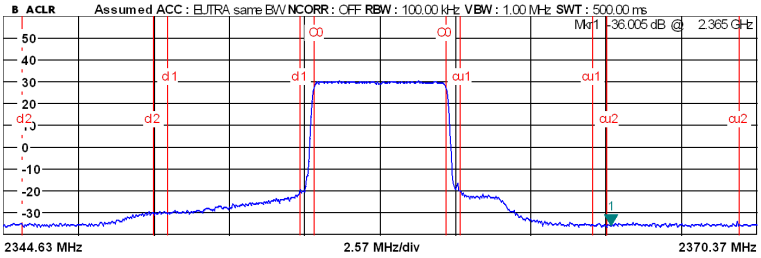
2.3 highest frequency

EUTRA/LTE					
Freq:	2.3575 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	44.5 dB
Mode:	DL FDD, 25 RB (5 MHz), Auto (CP)			Capture Time:	20.1 ms

CONTINUOUS TRG : EXT RF

A ACLR List Ref 54.5 dBm Att/El 5.00 / 0.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	4.515 MHz	...		45.98 dBm	...
Adjacent	4.515 MHz	5.00 MHz	-55.98 dB	-56.52 dB	-44.20 dB
Alternate	4.515 MHz	10.00 MHz	-63.73 dB	-65.33 dB	-44.20 dB
	...	...			...



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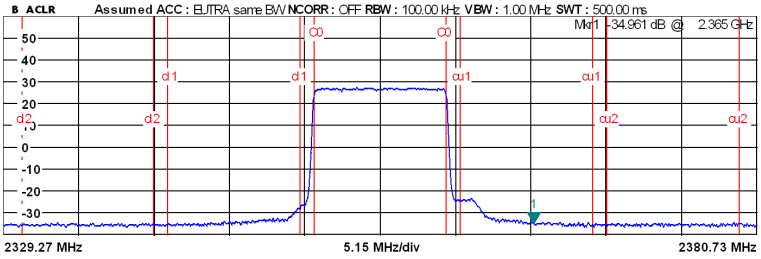
2.4 middle frequency – Input(10M Modulation)

EUTRA/LTE					
Freq:	2.355 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	44.5 dB
Mode:	DL FDD, 50 RB (10 MHz), Auto (CP)			Capture Time:	20.1 ms

CONTINUOUS TRG : EXT RF

A ACLR List Ref 54.5 dBm Att/El 5.00 / 0.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	9.015 MHz	...		45.94 dBm	...
Adjacent	9.015 MHz	10.00 MHz	-60.56 dB	-57.49 dB	-44.20 dB
Alternate	9.015 MHz	20.00 MHz	-62.25 dB	-62.22 dB	-44.20 dB
	...	...			...



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3.Downlink: 2496MHz to 2690MHz

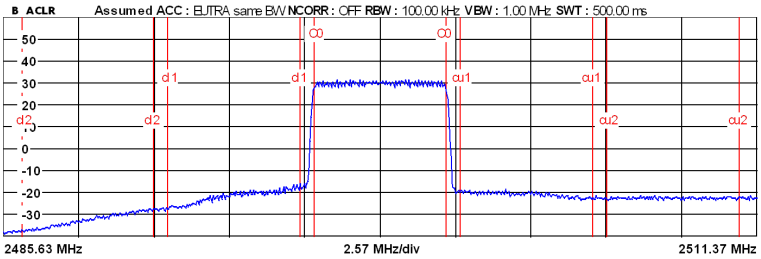
3. 1 lowest frequency (5M Modulation)

EUTRA/LTE					
Freq:	2.4985 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	46 dB
Mode:	DL TDD, 25 RB (5 MHz), Auto (CP)			Capture Time:	40.1 ms

CONTINUOUS GAT : EXT RF

A ACLR List Ref 50.8 dBm Att/El 0.00 / 5.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	4.515 MHz	...		46.17 dBm	...
Adjacent	4.515 MHz	5.00 MHz	-51.04 dB	-50.71 dB	-44.20 dB
Alternate	4.515 MHz	10.00 MHz	-61.58 dB	-52.44 dB	-44.20 dB
	...	...			...



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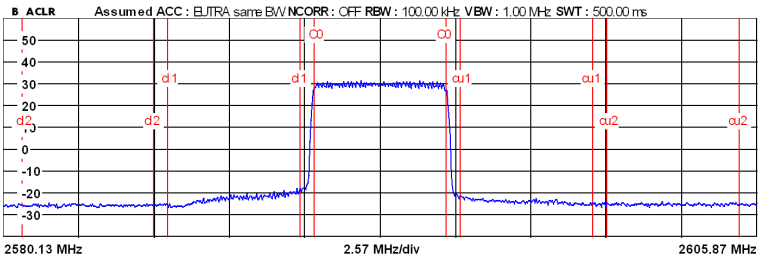
3.2 middle frequency

EUTRA/LTE					
Freq:	2.593 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	46 dB
Mode:	DL TDD, 25 RB (5 MHz), Auto (CP)			Capture Time:	40.1 ms

CONTINUOUS GAT : EXT RF

A ACLR List Ref 50.7 dBm Att/El 0.00 / 5.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	4.515 MHz	...		45.95 dBm	...
Adjacent	4.515 MHz	5.00 MHz	-51.96 dB	-53.56 dB	-44.20 dB
Alternate	4.515 MHz	10.00 MHz	-55.39 dB	-54.89 dB	-44.20 dB
	...	...			...



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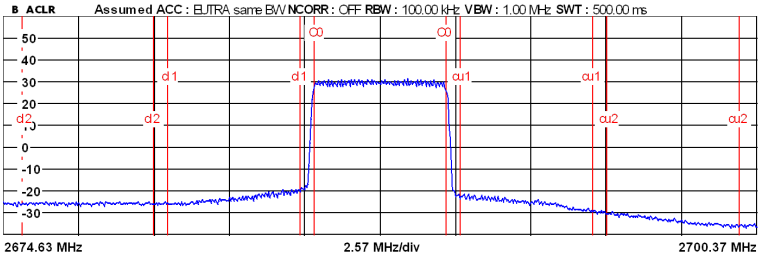
3.3 highest frequency

EUTRA/LTE					
Freq:	2.6875 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	46 dB
Mode:	DL TDD, 25 RB (5 MHz), Auto (CP)			Capture Time:	40.1 ms

CONTINUOUS GAT : EXT RF

A ACLR List Ref 51.9 dBm Att/El 0.00 / 10.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	4.515 MHz	...		45.79 dBm	...
Adjacent	4.515 MHz	5.00 MHz	-52.61 dB	-54.39 dB	-44.20 dB
Alternate	4.515 MHz	10.00 MHz	-55.33 dB	-62.61 dB	-44.20 dB
	...	...			...



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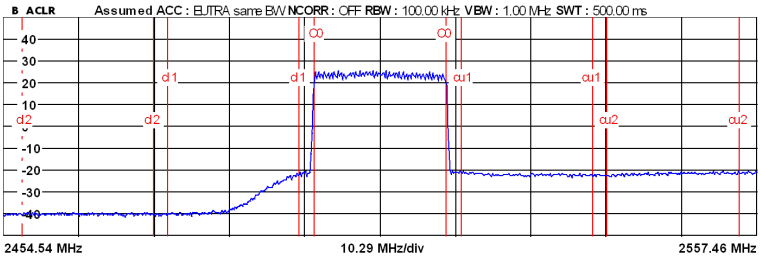
3.4 lowest frequency (20M Modulation)

EUTRA/LTE					
Freq:	2.506 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	46 dB
Mode:	DL TDD, 100 RB (20 MHz), Auto (CP)			Capture Time:	40.1 ms

CONTINUOUS GAT : EXT RF

A ACLR List Ref 49.1 dBm Att/El 0.00 / 5.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	18.015 MHz	...		45.84 dBm	...
Adjacent	18.015 MHz	20.00 MHz	-53.23 dB	-45.62 dB	-44.20 dB
Alternate	18.015 MHz	40.00 MHz	-63.70 dB	-45.23 dB	-44.20 dB
	...	...			...



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Date: 24.MAR.2018 07:48:30

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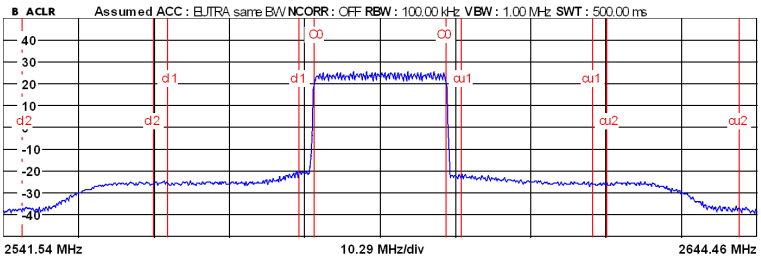
3.5 middle frequency

EUTRA/LTE					
Freq:	2.593 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	46 dB
Mode:	DL TDD, 100 RB (20 MHz), Auto (CP)			Capture Time:	40.1 ms

CONTINUOUS GAT : EXT RF

A ACLR List Ref 46.9 dBm Att/El 0.00 / 5.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	18.015 MHz	...		45.88 dBm	...
Adjacent	18.015 MHz	20.00 MHz	-48.32 dB	-48.03 dB	-44.20 dB
Alternate	18.015 MHz	40.00 MHz	-52.05 dB	-52.06 dB	-44.20 dB
	...	...			...



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Date: 24.MAR.2018 07:09:39

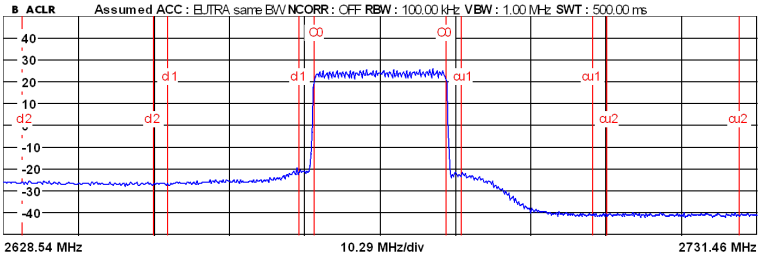
3.6 highest frequency

EUTRA/LTE					
Freq:	2.68 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	46 dB
Mode:	DL TDD, 100 RB (20 MHz), Auto (CP)			Capture Time:	40.1 ms

CONTINUOUS GAT : EXT RF

A ACLR List Ref 47.9 dBm Att/El 0.00 / 5.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	18.015 MHz	...		46.00 dBm	...
Adjacent	18.015 MHz	20.00 MHz	-48.79 dB	-53.01 dB	-44.20 dB
Alternate	18.015 MHz	40.00 MHz	-50.31 dB	-64.73 dB	-44.20 dB
	...	...			...



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Date: 24.MAR.2018 07:00:46

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4.Downlink: MIMO:2496MHz to 2690MHz

4.1 LTEMode:5M Modulation

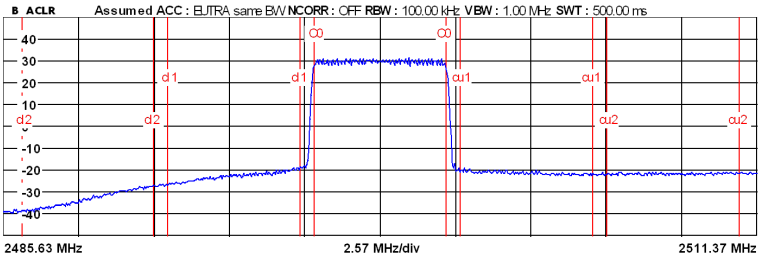
4.1.1 lowest frequency

EUTRA/LTE					
Freq:	2.4985 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	46 dB
Mode:	DL TDD, 25 RB (5 MHz), Auto (CP)			Capture Time:	40.1 ms

CONTINUOUS GAT : EXT RF

A ACLR List Ref 50.2 dBm Att/El 0.00 / 5.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	4.515 MHz	...		45.91 dBm	...
Adjacent	4.515 MHz	5.00 MHz	-52.11 dB	-50.92 dB	-44.20 dB
Alternate	4.515 MHz	10.00 MHz	-61.52 dB	-51.36 dB	-44.20 dB
	...	...			...



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Date: 24.MAR.2018 07:52:55

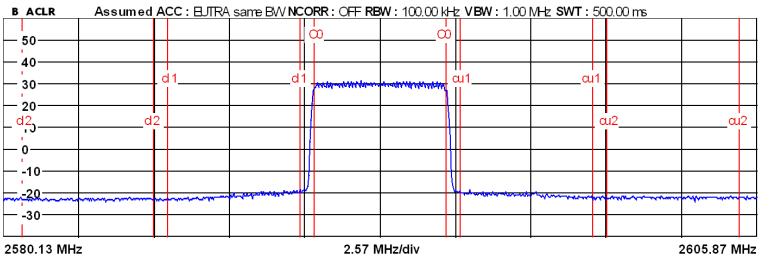
4.1.2 middle frequency

EUTRA/LTE					
Freq:	2.593 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	46 dB
Mode:	DL TDD, 25 RB (5 MHz), Auto (CP)			Capture Time:	40.1 ms

CONTINUOUS GAT : EXT RF

A ACLR List Ref 52.5 dBm Att/El 0.00 / 10.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	4.515 MHz	...		45.94 dBm	...
Adjacent	4.515 MHz	5.00 MHz	-51.02 dB	-50.64 dB	-44.20 dB
Alternate	4.515 MHz	10.00 MHz	-52.58 dB	-51.84 dB	-44.20 dB
	...	...			...



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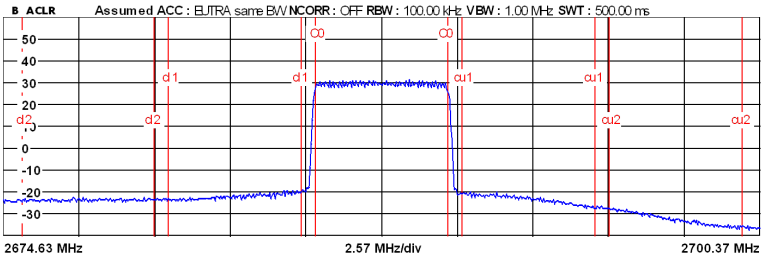
4.1.3 highest frequency

EUTRA/LTE					
Freq:	2.6875 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	46 dB
Mode:	DL TDD, 25 RB (5 MHz), Auto (CP)			Capture Time:	40.1 ms

CONTINUOUS GAT : EXT RF

A ACLR List Ref 51.4 dBm Att/El 0.00 / 10.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	4.515 MHz	...		45.81 dBm	...
Adjacent	4.515 MHz	5.00 MHz	-51.59 dB	-52.56 dB	-44.20 dB
Alternate	4.515 MHz	10.00 MHz	-53.25 dB	-61.22 dB	-44.20 dB
	...	...			...



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Date: 24.MAR.2018 07:59:36

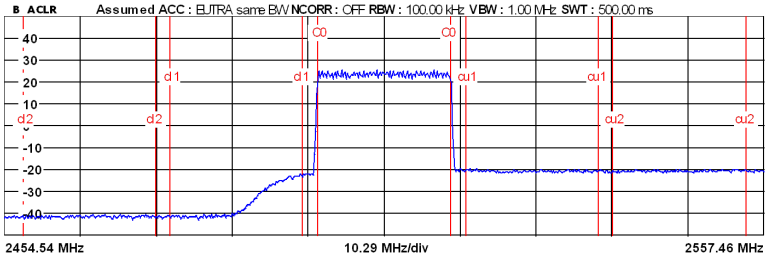
4.1.4 lowest frequency(20M Modulation)

EUTRA/LTE					
Freq:	2.506 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	46 dB
Mode:	DL TDD, 100 RB (20 MHz), Auto (CP)			Capture Time:	40.1 ms

CONTINUOUS GAT : EXT RF

A ACLR List Ref 47.2 dBm Att/El 0.00 / 5.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	18.015 MHz	...		45.88 dBm	...
Adjacent	18.015 MHz	20.00 MHz	-53.10 dB	-44.32 dB	-44.20 dB
Alternate	18.015 MHz	40.00 MHz	-65.10 dB	-44.29 dB	-44.20 dB
	...	...			...



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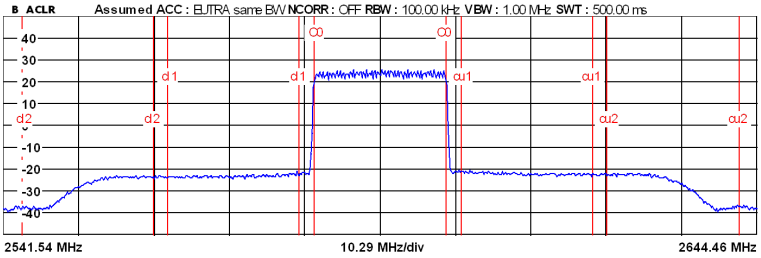
4.1.5 middle frequency

EUTRA/LTE					
Freq:	2.593 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	46 dB
Mode:	DL TDD, 100 RB (20 MHz), Auto (CP)			Capture Time:	40.1 ms

CONTINUOUS GAT : EXT RF

A ACLR List Ref 49.5 dBm Att/El 0.00 / 5.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	18.015 MHz	...		45.88 dBm	...
Adjacent	18.015 MHz	20.00 MHz	-46.84 dB	-45.72 dB	-44.20 dB
Alternate	18.015 MHz	40.00 MHz	-50.07 dB	-48.97 dB	-44.20 dB
	...	...			...



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Date: 24.MAR.2018 07:56:16

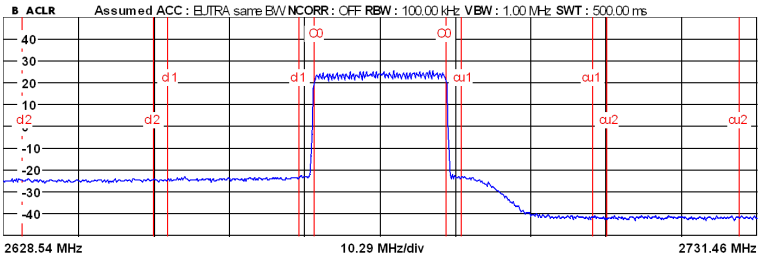
4.1.6 highest frequency

EUTRA/LTE					
Freq:	2.68 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	46 dB
Mode:	DL TDD, 100 RB (20 MHz), Auto (CP)			Capture Time:	40.1 ms

CONTINUOUS GAT : EXT RF

A ACLR List Ref 46.6 dBm Att/El 0.00 / 5.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	18.015 MHz	...		45.74 dBm	...
Adjacent	18.015 MHz	20.00 MHz	-47.60 dB	-53.45 dB	-44.20 dB
Alternate	18.015 MHz	40.00 MHz	-48.35 dB	-65.28 dB	-44.20 dB
	...	...			...



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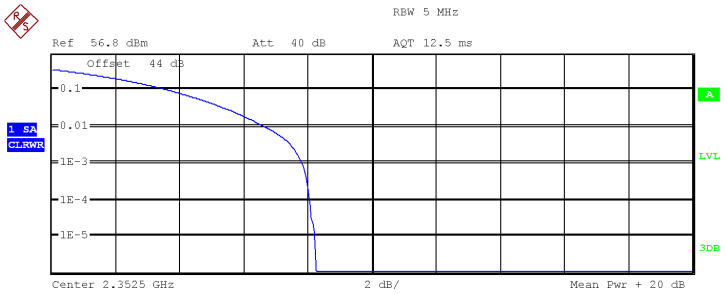
2) The peak-to-average power ratio **(PAPR):**

1 Downlink:2350MHz to 2360MHz(5M Modulation)

1.1 lowest frequency

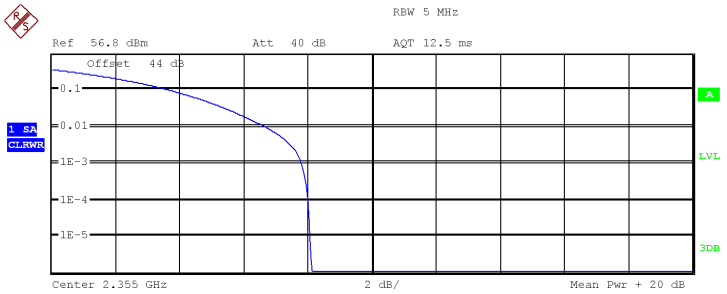


Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 7.1MHz

	Trace 1
Mean	45.23 dBm
Peak	53.47 dBm
Crest	8.24 dB
10 %	3.65 dB
1 %	6.67 dB
.1 %	7.82 dB
.01 %	8.04 dB

Date: 24.MAR.2018 12:13:48

1.2 middle frequency



Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 7.1MHz

	Trace 1
Mean	45.15 dBm
Peak	53.26 dBm
Crest	8.11 dB
10 %	3.69 dB
1 %	6.67 dB
.1 %	7.79 dB
.01 %	8.01 dB

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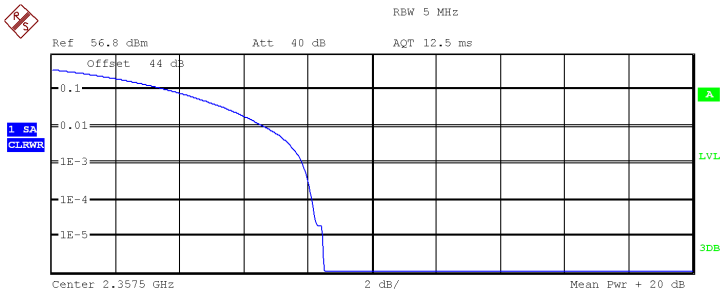
1.3 highest frequency

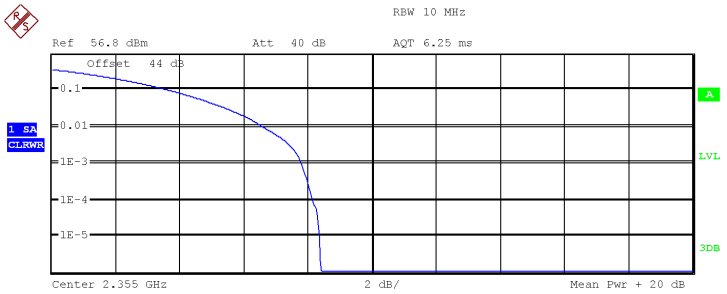


Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 7.1MHz

	Trace 1
Mean	45.26 dBm
Peak	53.75 dBm
Crest	8.49 dB
10 %	3.69 dB
1 %	6.67 dB
.1 %	7.82 dB
.01 %	8.14 dB

Date: 24.MAR.2018 12:17:12

1.4 Middle frequency(10M Modulation)



Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

	Trace 1
Mean	45.38 dBm
Peak	53.77 dBm
Crest	8.39 dB
10 %	3.69 dB
1 %	6.60 dB
.1 %	7.79 dB
.01 %	8.14 dB

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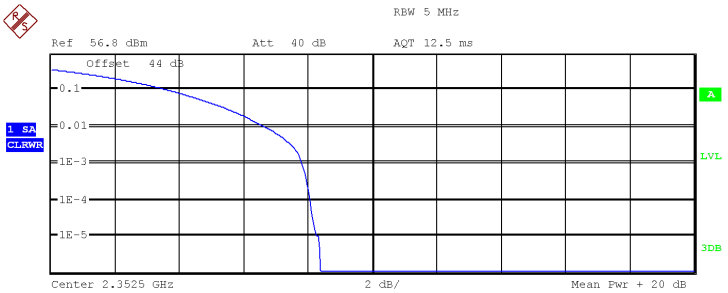
2.Downlink: MIMO: 2350MHz to 2360MHz

2.1 Lowest frequency (5M Modulation)

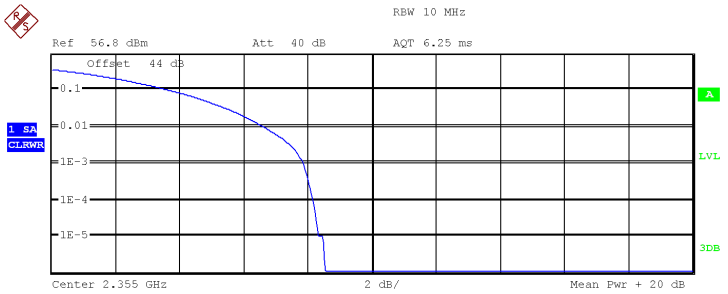


Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 7.1MHz

	Trace 1
Mean	45.08 dBm
Peak	53.47 dBm
Crest	8.39 dB
10 %	3.69 dB
1 %	6.67 dB
.1 %	7.82 dB
.01 %	8.08 dB

Date: 24.MAR.2018 12:15:59

2.2 Middle frequency



Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

	Trace 1
Mean	45.32 dBm
Peak	53.84 dBm
Crest	8.53 dB
10 %	3.69 dB
1 %	6.60 dB
.1 %	7.85 dB
.01 %	8.17 dB

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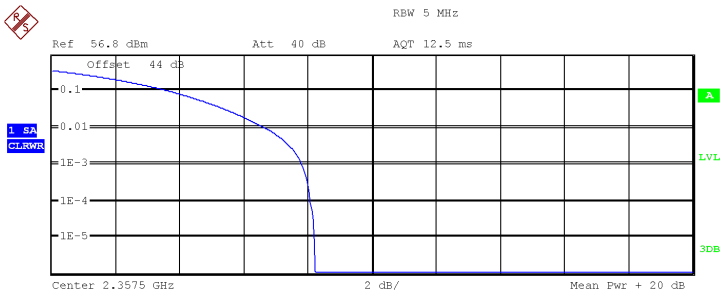
2.3 highest frequency

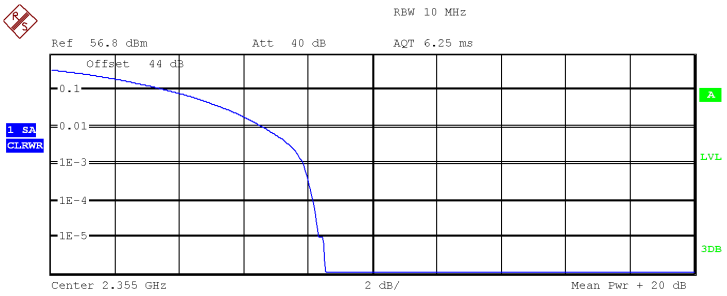


Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 7.1MHz

	Trace 1
Mean	45.13 dBm
Peak	53.33 dBm
Crest	8.20 dB
10 %	3.69 dB
1 %	6.63 dB
.1 %	7.82 dB
.01 %	8.08 dB

Date: 24.MAR.2018 12:17:36

2.4 middle frequency – Input(10M Modulation)



Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

	Trace 1
Mean	45.32 dBm
Peak	53.84 dBm
Crest	8.53 dB
10 %	3.69 dB
1 %	6.60 dB
.1 %	7.85 dB
.01 %	8.17 dB

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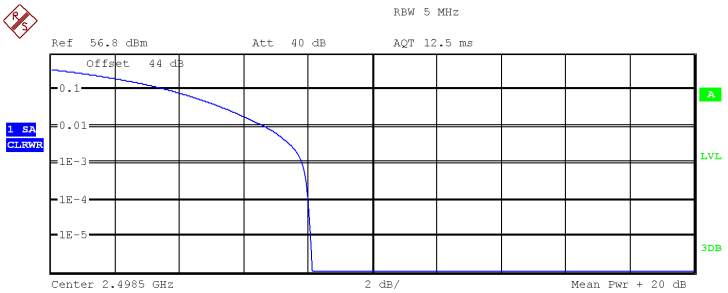
3.Downlink: 2496MHz to 2690MHz

3.1 lowest frequency (5M Modulation)

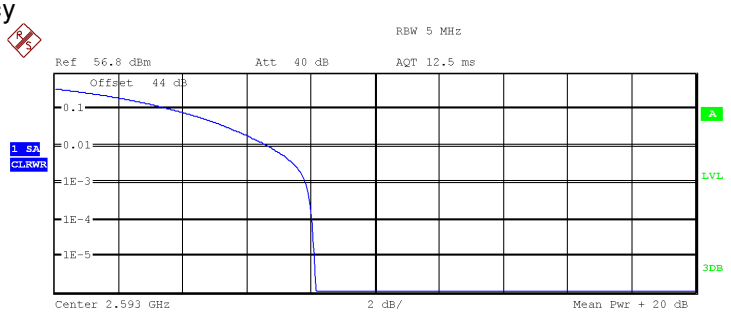


Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 7.1MHz

	Trace 1
Mean	45.64 dBm
Peak	53.75 dBm
Crest	8.11 dB
10 %	3.69 dB
1 %	6.67 dB
.1 %	7.82 dB
.01 %	8.01 dB

Date: 24.MAR.2018 12:10:11

3.2 middle frequency



Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 7.1MHz

	Trace 1
Mean	46.25 dBm
Peak	54.39 dBm
Crest	8.14 dB
10 %	3.69 dB
1 %	6.67 dB
.1 %	7.85 dB
.01 %	8.04 dB

Date: 24.MAR.2018 12:05:44

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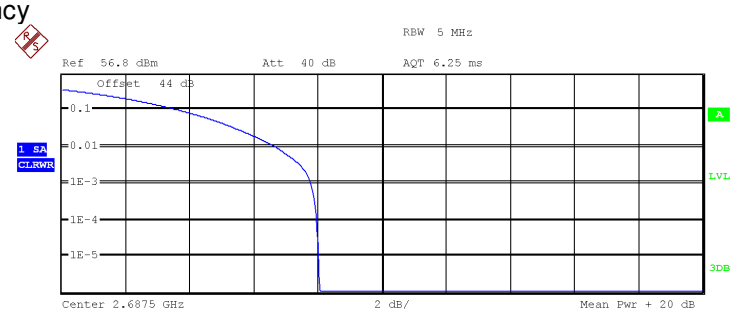
3.3 highest frequency

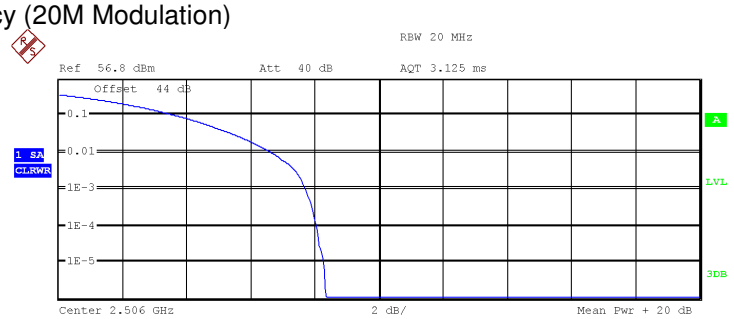


Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

	Trace 1
Mean	45.11 dBm
Peak	53.14 dBm
Crest	8.04 dB
10 %	3.69 dB
1 %	6.67 dB
.1 %	7.79 dB
.01 %	7.95 dB

Date: 24.MAR.2018 12:01:07

3.4 lowest frequency (20M Modulation)



Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

	Trace 1
Mean	46.29 dBm
Peak	54.62 dBm
Crest	8.33 dB
10 %	3.69 dB
1 %	6.63 dB
.1 %	7.72 dB
.01 %	8.04 dB

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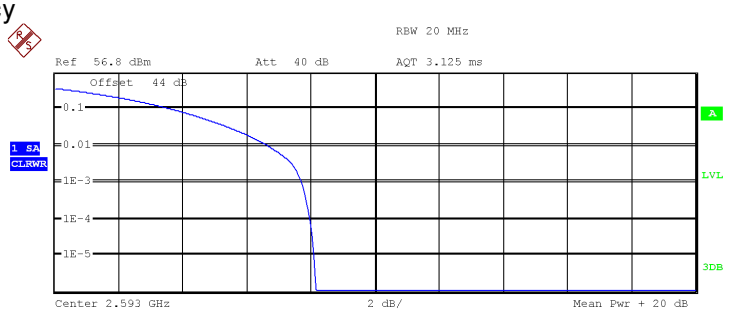
3.5 middle frequency

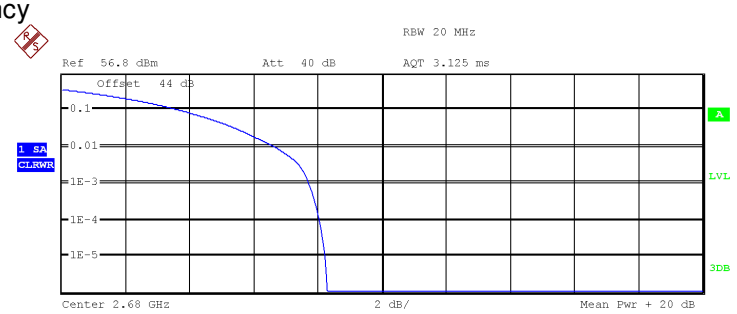


Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

	Trace 1
Mean	45.59 dBm
Peak	53.74 dBm
Crest	8.15 dB
10 %	3.69 dB
1 %	6.67 dB
.1 %	7.72 dB
.01 %	7.98 dB

Date: 24.MAR.2018 11:48:58

3.6 highest frequency



Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

	Trace 1
Mean	46.04 dBm
Peak	54.31 dBm
Crest	8.28 dB
10 %	3.72 dB
1 %	6.63 dB
.1 %	7.72 dB
.01 %	8.04 dB

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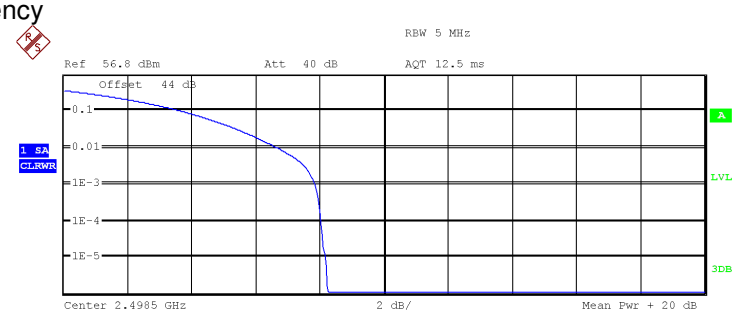
4.Downlink: MIMO:2496MHz to 2690MHz

4.1 LTEMode:5M Modulation

4.1.1 lowest frequency

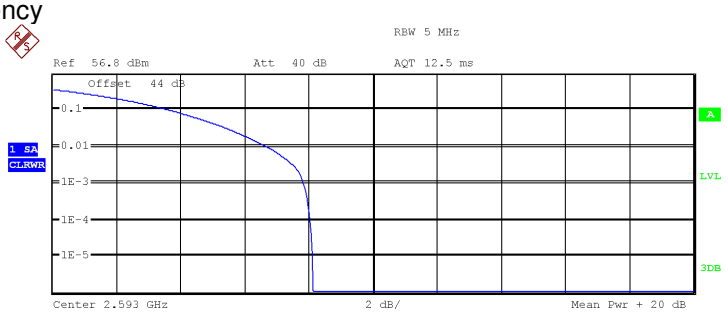


Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 7.1MHz

	Trace 1
Mean	45.94 dBm
Peak	54.18 dBm
Crest	8.23 dB
10 %	3.69 dB
1 %	6.67 dB
.1 %	7.85 dB
.01 %	8.04 dB

Date: 24.MAR.2018 12:09:56

4.1.2 middle frequency



Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 7.1MHz

	Trace 1
Mean	45.85 dBm
Peak	53.96 dBm
Crest	8.11 dB
10 %	3.69 dB
1 %	6.70 dB
.1 %	7.82 dB
.01 %	8.04 dB

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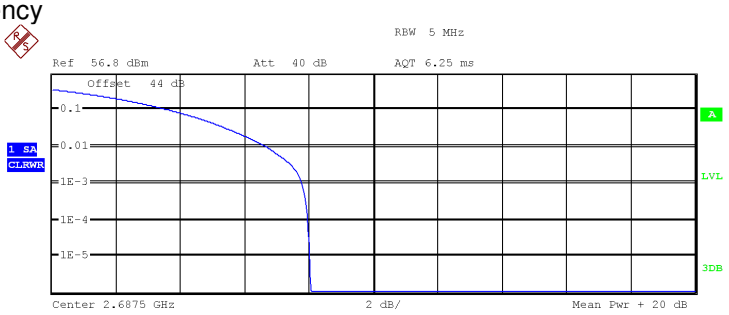
4.1.3 highest frequency

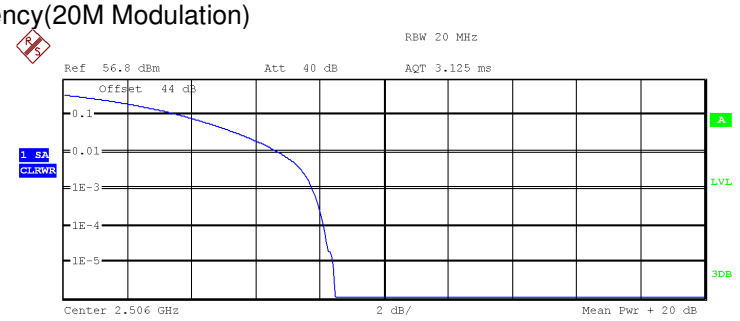


Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

	Trace 1
Mean	45.11 dBm
Peak	53.14 dBm
Crest	8.04 dB
10 %	3.69 dB
1 %	6.67 dB
.1 %	7.79 dB
.01 %	7.95 dB

Date: 24.MAR.2018 12:02:26

4.1.4 lowest frequency(20M Modulation)



Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

	Trace 1
Mean	45.81 dBm
Peak	54.27 dBm
Crest	8.47 dB
10 %	3.69 dB
1 %	6.73 dB
.1 %	7.76 dB
.01 %	8.11 dB

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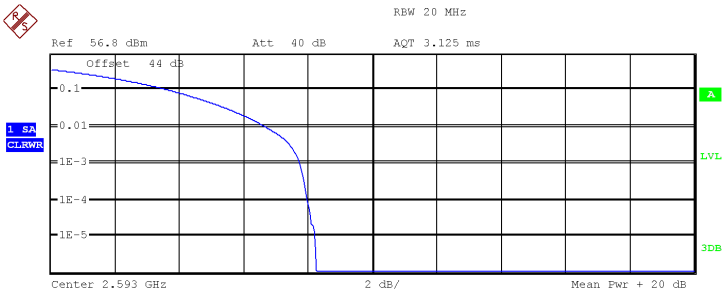
4.1.5 middle frequency

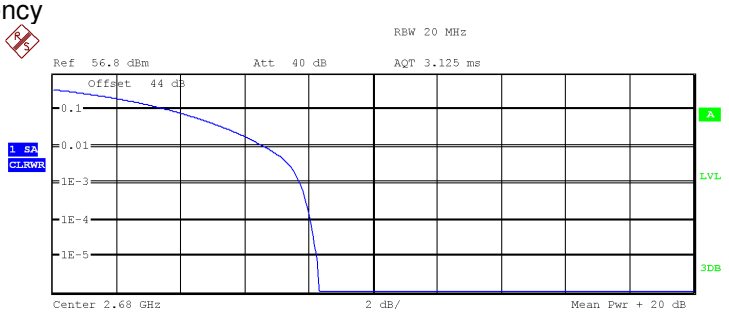


Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

	Trace 1
Mean	46.13 dBm
Peak	54.38 dBm
Crest	8.24 dB
10 %	3.69 dB
1 %	6.67 dB
.1 %	7.76 dB
.01 %	7.98 dB

Date: 24.MAR.2018 11:49:18

4.1.6 highest frequency



Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

	Trace 1
Mean	45.80 dBm
Peak	54.10 dBm
Crest	8.31 dB
10 %	3.69 dB
1 %	6.60 dB
.1 %	7.72 dB
.01 %	8.04 dB

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7.2.5 Band Edge & Intermodulation

Test Requirement: FCC part 27.53(a) **&** FCC part 27.53(m) (v)

WCS:2350-2360MHz:

(a) For operations in the 2305-2320 MHz band and the 2345-2360 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power P (with averaging performed only during periods of transmission) within the licensed band(s) of operation, in watts, by the following amounts:
(1) For base and fixed stations' operations in the 2305-2320 MHz band and the 2345-2360 MHz band:
(i) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, and not less than 75 + 10 log (P) dB on all frequencies between 2320 and 2345 MHz;
(ii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2300 and 2305 MHz, 70 + 10 log (P) dB on all frequencies between 2287.5 and 2300 MHz, 72 + 10 log (P) dB on all frequencies between 2285 and 2287.5 MHz, and 75 + 10 log (P) dB below 2285 MHz; .

(iii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2362.5 MHz, 55 + 10 log (P) dB on all frequencies between 2362.5 and 2365 MHz, 70 + 10 log (P) dB on all frequencies between 2365 and 2367.5 MHz, 72 + 10 log (P) dB on all frequencies between 2367.5 and 2370 MHz, and 75 + 10 log (P) dB above 2370 MHz.

(2) For fixed customer premises equipment (CPE) stations operating in the 2305-2320 MHz band and the 2345-2360 MHz band transmitting with more than 2 watts per 5 megahertz average EIRP:
(i) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, and not less than 75 + 10 log (P) dB on all frequencies between 2320 and 2345 MHz;

(ii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2300 and 2305 MHz, 70 + 10 log (P) dB on all frequencies between 2287.5 and 2300 MHz, 72 + 10 log (P) dB on all frequencies between 2285 and 2287.5 MHz, and 75 + 10 log (P) dB below 2285 MHz;
(iii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2362.5 MHz, 55 + 10 log (P) dB on all frequencies between 2362.5 and 2365 MHz, 70 + 10 log (P) dB on all frequencies between 2365 and 2367.5 MHz, 72 + 10 log (P) dB on all frequencies between 2367.5 and 2370 MHz, and 75 + 10 log (P) dB above 2370 MHz.

BRS and EBS: 2496-2690MHz

(m) For BRS and EBS stations, the power of any emissions outside the licensee's frequency bands of operation shall be attenuated below the transmitter power (P) measured in watts in accordance with the standards below. If a licensee has multiple contiguous channels, out-of-band emissions shall be measured from the upper and lower edges of the contiguous channels.
(v) For all fixed digital user stations, the attenuation factor shall be not less than 43 + 10 log (P) dB at the channel edge.

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Test Method: FCC part 2.1051

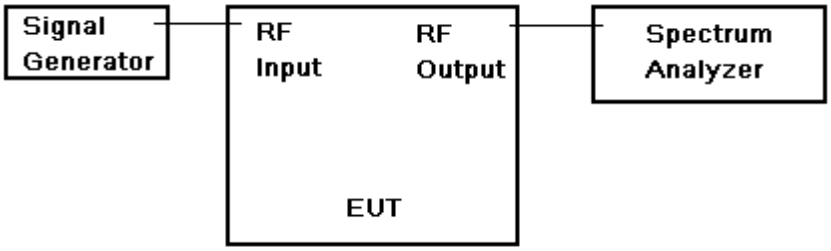
EUT Operation:

Status: Drive the EUT to maximum output power.

Conditions: Normal conditions

Application: Cellular Band RF output ports

Test Configuration:



Band edge and Intermodulation test configuration

Test Procedure: Conducted Emissions test procedure:

a) Connect the equipment as illustrated, with the notch filter by-passed, when the output power is over the max value of the Spectrum Analyzer, add the attenuator to avoid destroying the facility.

b) Set the center frequency of the spectrum analyzer to the assigned transmitter frequency, key the transmitter, and set the level of the carrier to the full scale reference line.

c) do not apply any tone to modulate the EUT.

d) Adjust the spectrum analyzer for the following settings:

1) Resolution Bandwidth,(base the standard, apply the different set),here is 100KHz for frequency band less than 1GHz, 1MHz for frequency over 1GHz;

2) Video Bandwidth refer to standard requirement.

e) Adjust the center frequency of the spectrum analyzer for incremental coverage of the range from:

1) the lowest radio frequency generated in the equipment, it can be 9KHz base the test method, here select 30MHz as lowest frequency start point;

2) the highest radion frequency shall higher than 10 times of carrier frequency;

f) Record the frequencies and levels of spurious emissions from step e)

Remark:

The notch filter is used for avoid the EUT fundamental carrier output power making the spectrum overload and the harmonic spurious brought by it.

When the EUT fundamental carrier is not enough to make the status, the notch filter could be not used.

Intermodulation Test Procedure:

1. Connect the equipment as illustrated;

2. Test the background noise level with all the test facilities;

3. Keep one transmitting path, all other connectors shall be connected by normal power or RF leads;

4. Select the attenuator to avoid the test receiver or spectrum analyzer being destroied;

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5. Keep the EUT continuously transmitting in max power;

6. Keep two signals are same in modulation type and level;

7. Measure the 3 order intermodulated product by the EUT(the sum of the two unwanted signal should be rated power);

8. Correct for all losses in the RF path;

9. Read the conducted spurious emissioins of the EUT antenna port.

Remark:

CW signal rather than typical signal is acceptable (for FM).

· At maximum drive level, for each modulation: one test with three tones, or two tests (high-, low-band edge) with two tones

· Limit usually is -13dBm conducted.

· Not needed for Single Channel systems.

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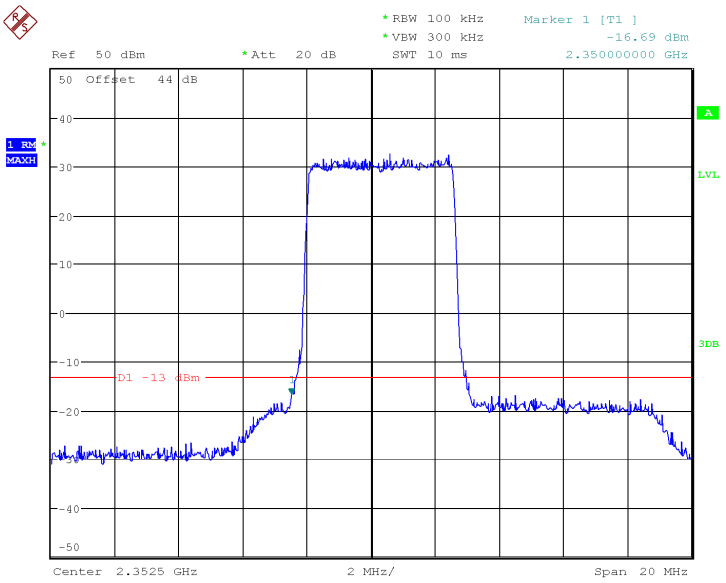
7.2.5.1 Measurement Record:

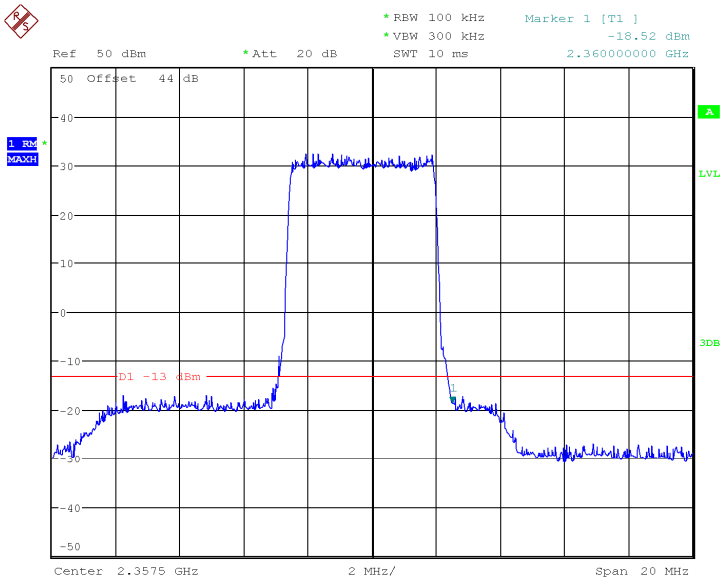
1) Downlink: 2350MHz to 2360MHz(LTE Mode)

1.1 one signal input —Lower Edge



Date: 23.MAR.2018 12:08:03

1.2 one signal input —Upper Edge



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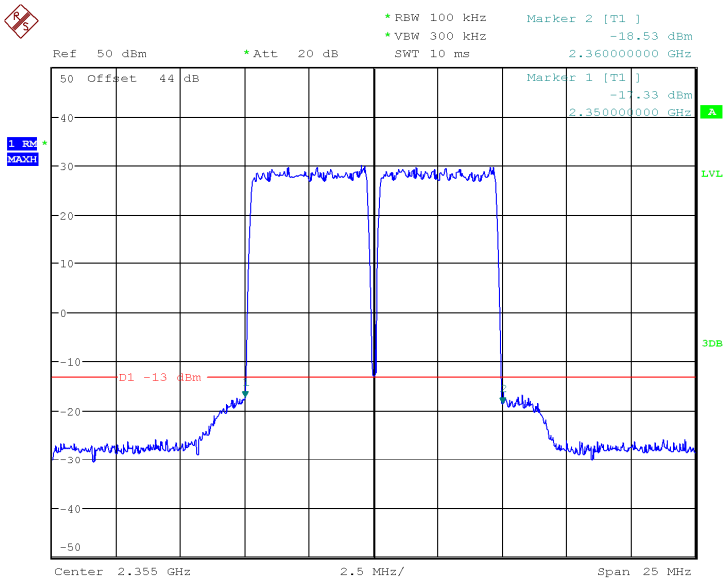
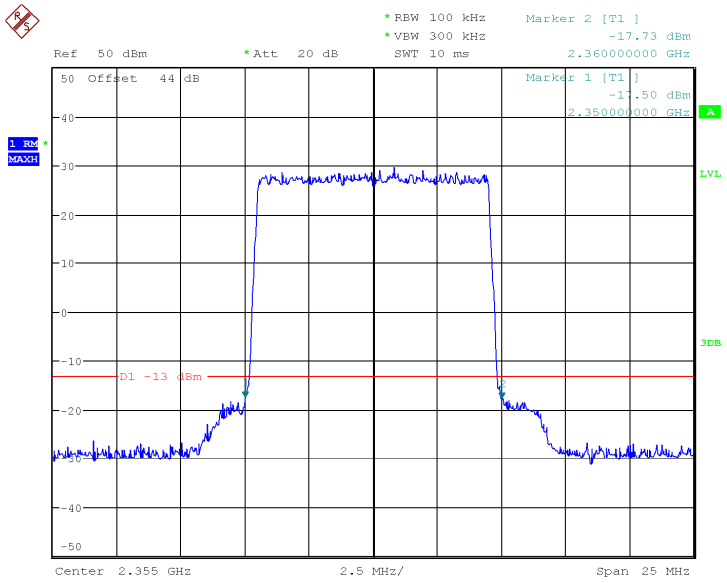
1.3 two signal input —Lower and Upper Edge



Date: 23.MAR.2018 12:12:14

1.4 one signal input —Lower and Upper Edge(10M Modulation)



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1.5intermodulation spurious emissioins

For LTE mode:

1.5.1 Input frequency:

1)in lower edge test:f1 is the lower edge frequency +1 channel frequency, and f2 is +2 channel frequency

f1=2352.5MHz,f2=2357.5MHz

2)in higher edge test:f1 is the higher edge frequency -2 channel frequency, and f2 is -1 channel frequency

f1=2352.5MHz,f2=2357.5MHz

base the 3rd product frequency F1= 2f1-f2 and F2=2f2-f1, when the f1 and f2 frequency select above,

a) in lower edge test, F1=2f1-(f1+Δf)=f1-Δf=lower edge frequency;
b) in higher edge test, F2=2f2-(f2-Δf)=f2+Δf=higher edge frequency.

F1=2350MHz,F2=2360MHz

base the 5rd product frequency F1= 3f1-2f2 and F2=3f2-2f1, when the f1 and f2 frequency select above,

a) in lower edge test, F1=3f1-2(f1+Δf)=f1-2Δf=lower edge frequency;
b) in higher edge test, F2=3f2-2(f2-Δf)=f2+2Δf=higher edge frequency.

F1=2347.5MHz,F2=2362.5MHz

base the 7rd product frequency F1= 4f1-3f2 and F2=4f2-3f1, when the f1 and f2 frequency select above,

a) in lower edge test, F1=4f1-3(f1+Δf)=f1-3Δf=lower edge frequency;
b) in higher edge test, F2=4f2-3(f2-Δf)=f2+3Δf=higher edge frequency.

F1=2342.5MHz,F2=2367.5MHz

1.5.2 Input power:+10dBm

measure frequency		product Value (dBm)	Limit (dBm)	Magin (dB)
3rd	Lower:2350MHz	-17.33	-13dBm	-4.33
	Higher:2360MHz	-18.53		-5.53
5rd	Lower:2345MHz	-21.37	-13dBm	-8.37
	Higher:2365MHz	-22.72		-9.72
7rd	Lower:2340MHz	-23.57	-13dBm	-10.57
	Higher:2370MHz	-24.29		-11.29

Remark:

No other intermodulation spurious emissioins of above 7rd have been found,so only record the test data about the 3rd, 5rdand 7rd

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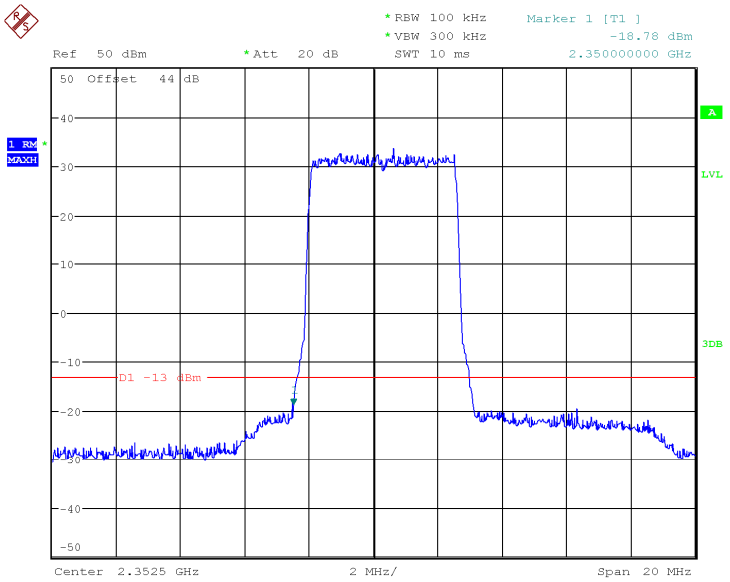
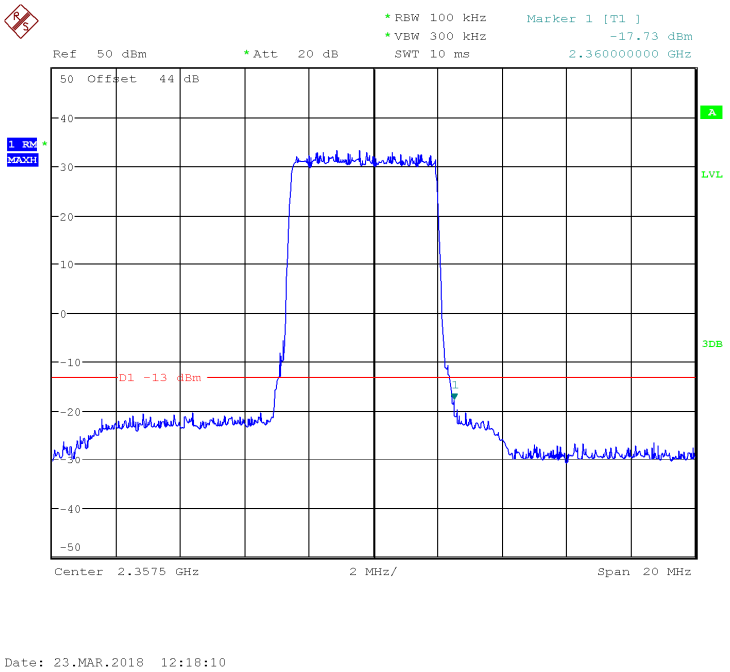
7.2.5.2 Measurement Record:

2) Downlink:MIMO: 2350MHz to 2360MHz(LTE)

1.1 one signal input —Lower Edge



1.2 one signal input — Upper Edge



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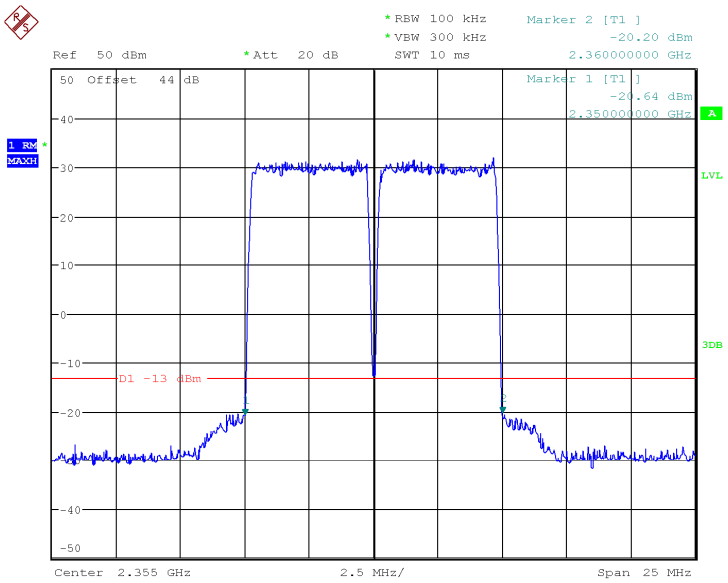
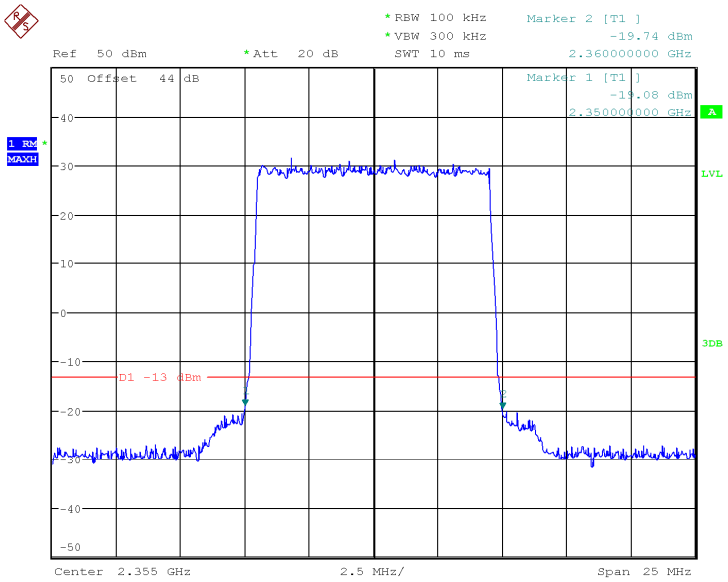
1.3 two signal input —Lower and Upper Edge



Date: 23.MAR.2018 12:16:22

1.4 one signal input —Lower and Upper Edge(10M Modulation)



Date: 23.MAR.2018 12:15:37

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1.5intermodulation spurious emissioins

For LTE mode:

1.5.1 Input frequency:

1)in lower edge test:f1 is the lower edge frequency +1 channel frequency, and f2 is +2 channel frequency

f1=2352.5MHz,f2=2357.5MHz

2)in higher edge test:f1 is the higher edge frequency -2 channel frequency, and f2 is -1 channel frequency

f1=2352.5MHz,f2=2357.5MHz

base the 3rd product frequency F1= 2f1-f2 and F2=2f2-f1, when the f1 and f2 frequency select above,

c) in lower edge test, F1=2f1-(f1+△f)=f1-△f=lower edge frequency;

d) in higher edge test, F2=2f2-(f2-△f)=f2+△f=higher edge frequency.

F1=2350MHz,F2=2360MHz

base the 5rd product frequency F1= 3f1-2f2 and F2=3f2-2f1, when the f1 and f2 frequency select above,

c) in lower edge test, F1=3f1-2(f1+△f)=f1-2△f=lower edge frequency;

d) in higher edge test, F2=3f2-2(f2-△f)=f2+2△f=higher edge frequency.

F1=2347.5MHz,F2=2362.5MHz

base the 7rd product frequency F1= 4f1-3f2 and F2=4f2-3f1, when the f1 and f2 frequency select above,

c) in lower edge test, F1=4f1-3(f1+△f)=f1-3△f=lower edge frequency;

d) in higher edge test, F2=4f2-3(f2-△f)=f2+3△f=higher edge frequency.

F1=2342.5MHz,F2=2367.5MHz

1.5.2 Input power:+10dBm

measure frequency		product Value (dBm)	Limit (dBm)	Magin (dB)
3rd	Lower:2350MHz	-20.64	-13dBm	-7.64
	Higher:2360MHz	-20.20		-7.20
5rd	Lower:2345MHz	-21.83	-13dBm	-8.83
	Higher:2365MHz	-22.07		-9.07
7rd	Lower:2340MHz	-23.76	-13dBm	-10.76
	Higher:2370MHz	-24.73		-11.73

Remark:

No other intermodulation spurious emissioins of above 7rd have been found,so only record the test data about the 3rd, 5rdand 7rd

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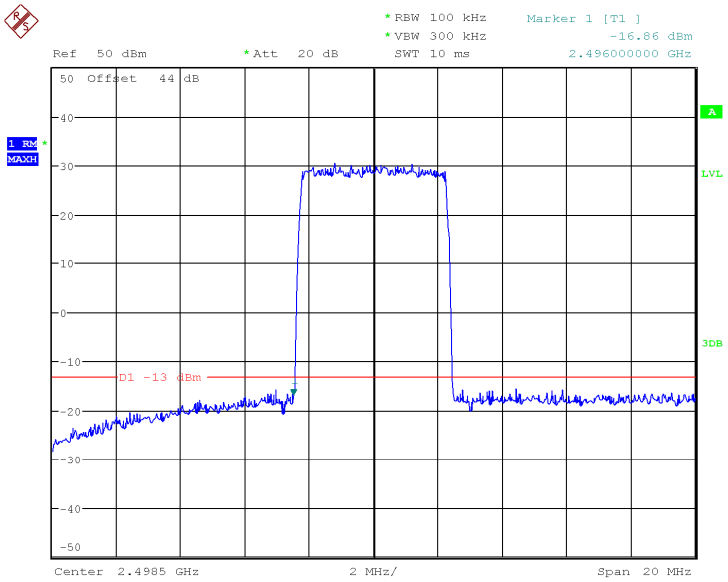
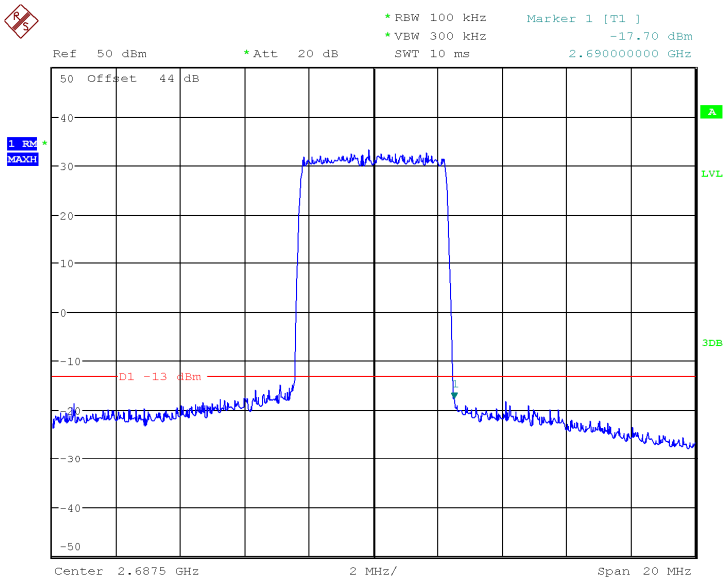
3) Downlink: 2496MHz to 2690MHz(5M Modulation)

1.1 one signal input —Lower Edge



Date: 23.MAR.2018 11:44:32

1.2 one signal input — Upper Edge



Date: 23.MAR.2018 12:36:33

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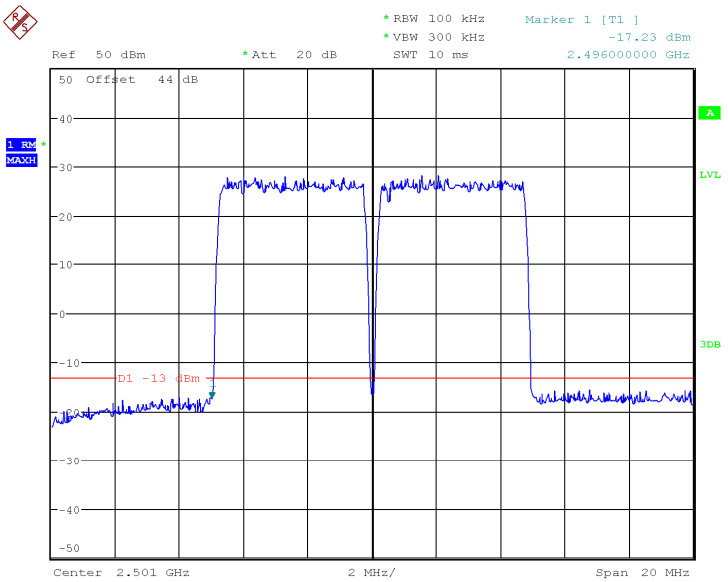
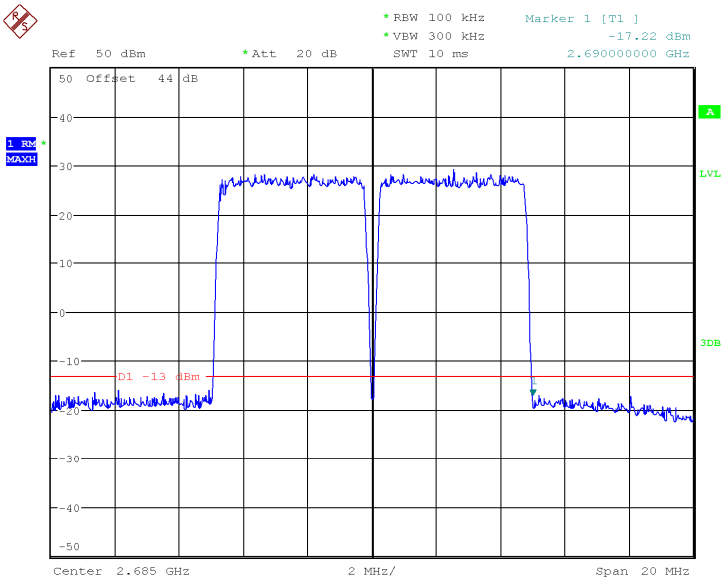
1.3 two signal input —Lower Edge



1.4 two signal input —Upper Edge



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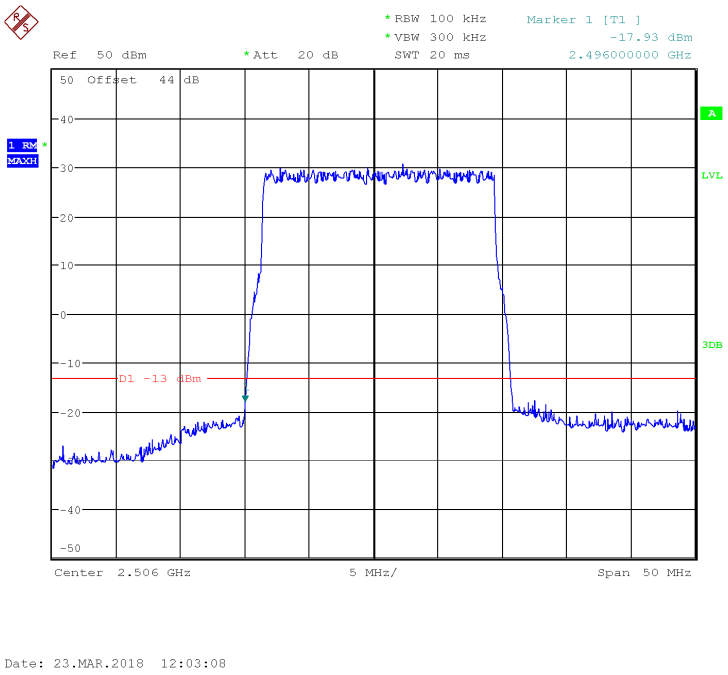
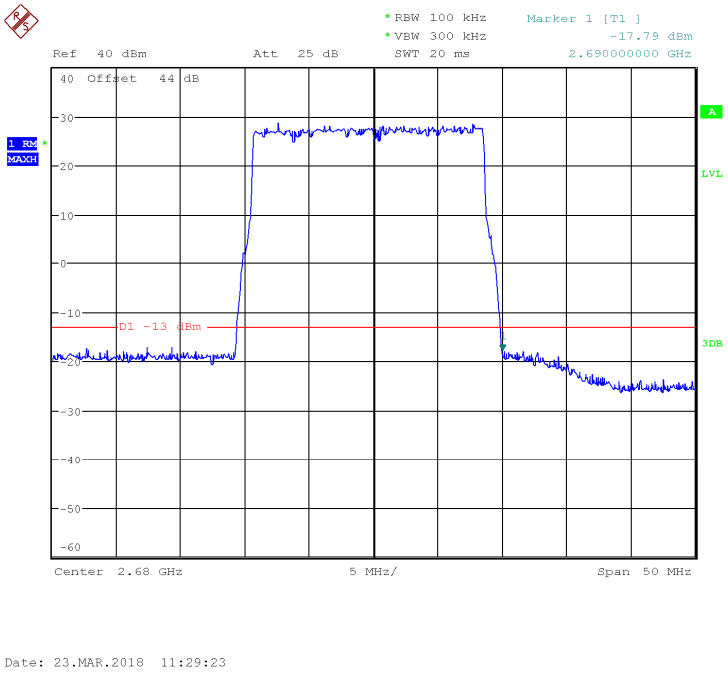
1.5 one signal input —Lower Edge(20M Modulation)



1.6 one signal input — Upper Edge



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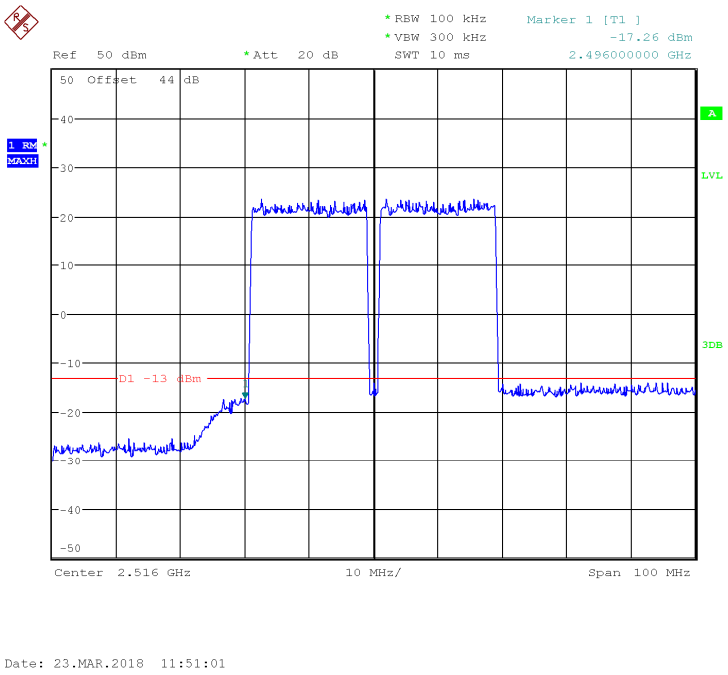
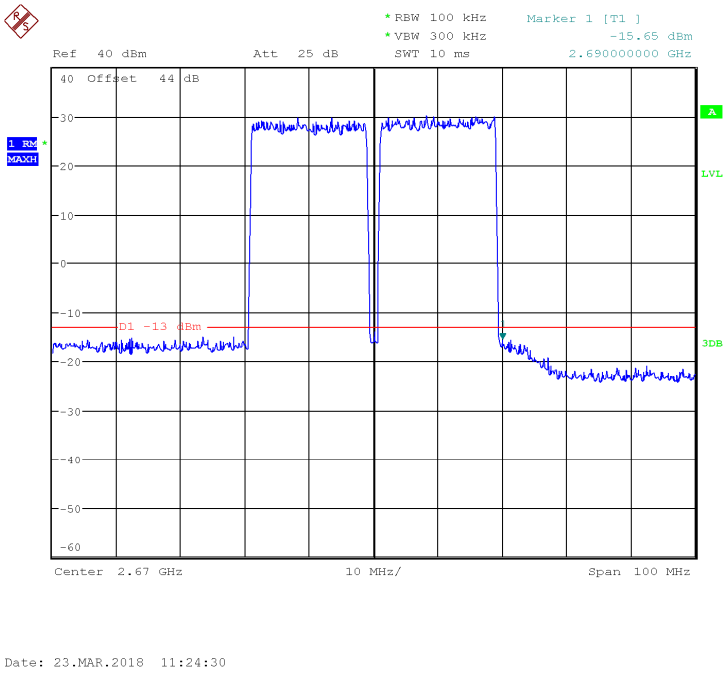
1.7 two signal input —Lower Edge



1.8 two signal input —Upper Edge



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1.9 intermodulation spurious emissioins

For LTE mode:

1.9.1 Input frequency:

1)in lower edge test:f1 is the lower edge frequency +1 channel frequency, and f2 is +2 channel frequency

f1=2498.5MHz,f2=2503.5MHz

2)in higher edge test:f1 is the higher edge frequency -2 channel frequency, and f2 is -1 channel frequency

f1=2682.5MHz,f2=2687.5MHz

base the 3rd product frequency F1= 2f1-f2 and F2=2f2-f1, when the f1 and f2 frequency select above,

e) in lower edge test, F1=2f1-(f1+△f)=f1-△f=lower edge frequency;

f) in higher edge test, F2=2f2-(f2-△f)=f2+△f=higher edge frequency.

F1=2496MHz,F2=2690MHz

base the 5rd product frequency F1= 3f1-2f2 and F2=3f2-2f1, when the f1 and f2 frequency select above,

e) in lower edge test, F1=3f1-2(f1+△f)=f1-2△f=lower edge frequency;

f) in higher edge test, F2=3f2-2(f2-△f)=f2+2△f=higher edge frequency.

F1=2491MHz,F2=2695MHz

base the 7rd product frequency F1= 4f1-3f2 and F2=4f2-3f1, when the f1 and f2 frequency select above,

e) in lower edge test, F1=4f1-3(f1+△f)=f1-3△f=lower edge frequency;

f) in higher edge test, F2=4f2-3(f2-△f)=f2+3△f=higher edge frequency.

F1=2486MHz,F2=2700MHz

1.9.2 Input power:+10dBm

measure frequency		product Value (dBm)	Limit (dBm)	Magin (dB)
3rd	Lower:2496MHz	-17.26	-13dBm	-4.26
	Higher:2690MHz	-15.56		-5.56
5rd	Lower:2491MHz	-23.21	-13dBm	-10.21
	Higher: 2695MHz	-22.75		-9.75
7rd	Lower: 2486MHz	-25.21	-13dBm	-12.21
	Higher: 2700MHz	-24.39		-11.39

Remark:

No other intermodulation spurious emissioins of above 7rd have been found,so only record the test data about the 3rd, 5rdand 7rd

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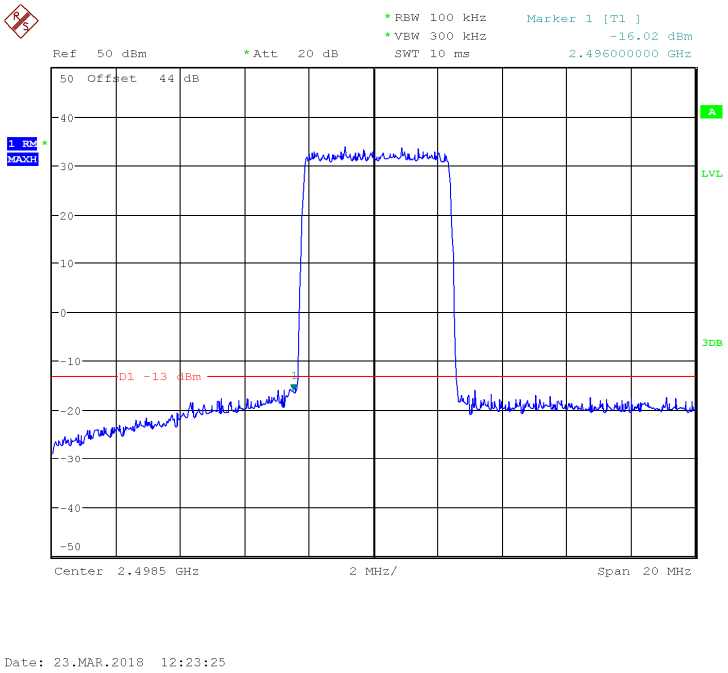
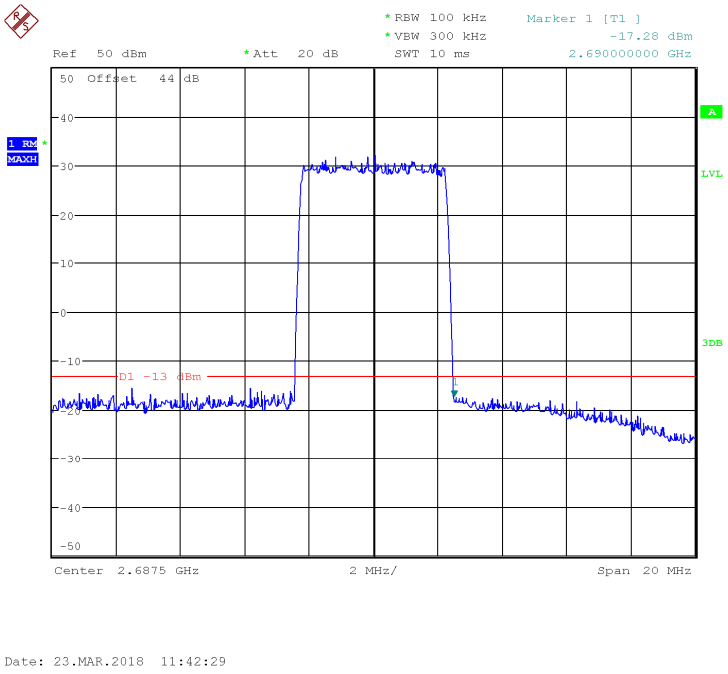
4) Downlink: MIMO:2496MHz to 2690MHz(LTE)

1.1 one signal input —Lower Edge



1.2 one signal input — Upper Edge



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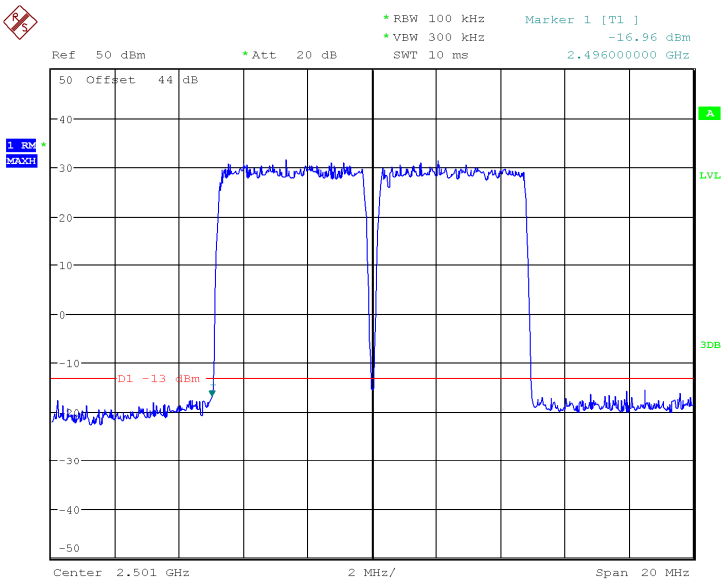
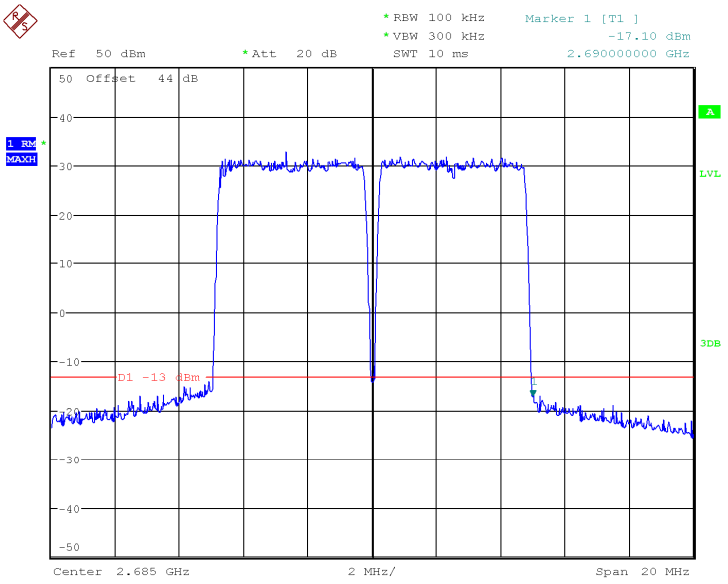
1.3 two signal input —Lower Edge



1.4 two signal input —Upper Edge



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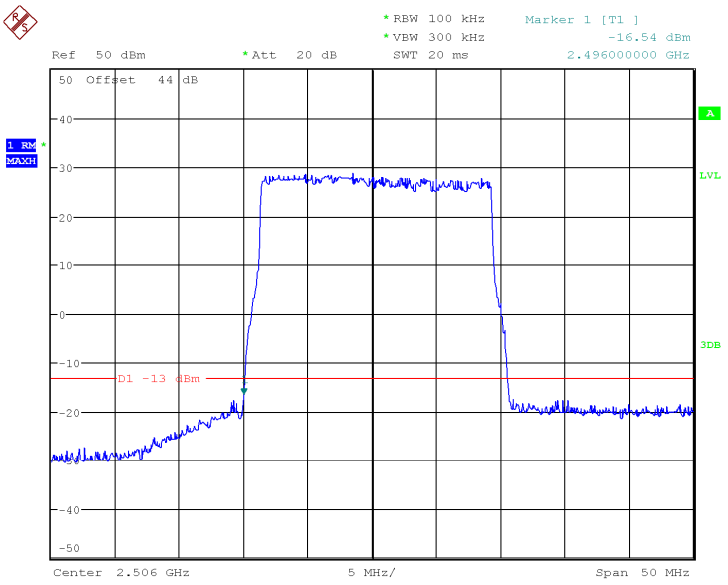
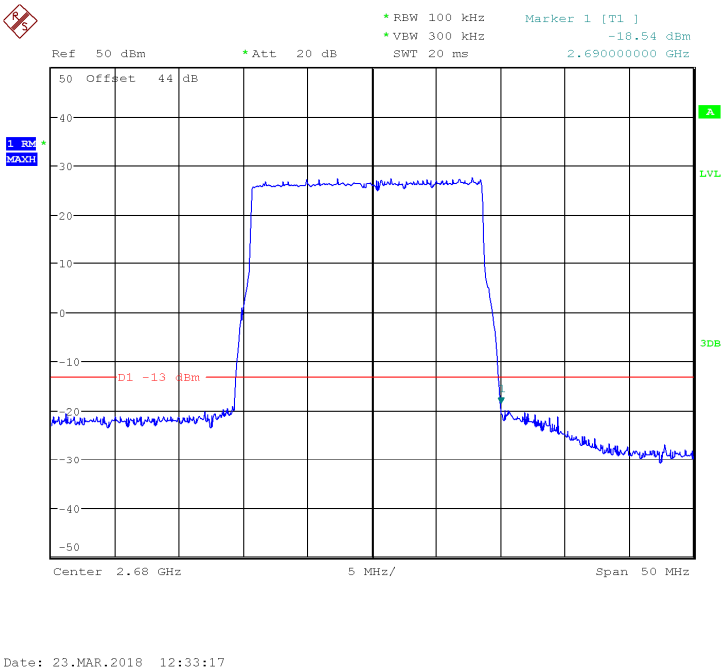
1.5 one signal input —Lower Edge(20M Modulation)



1.6 one signal input — Upper Edge



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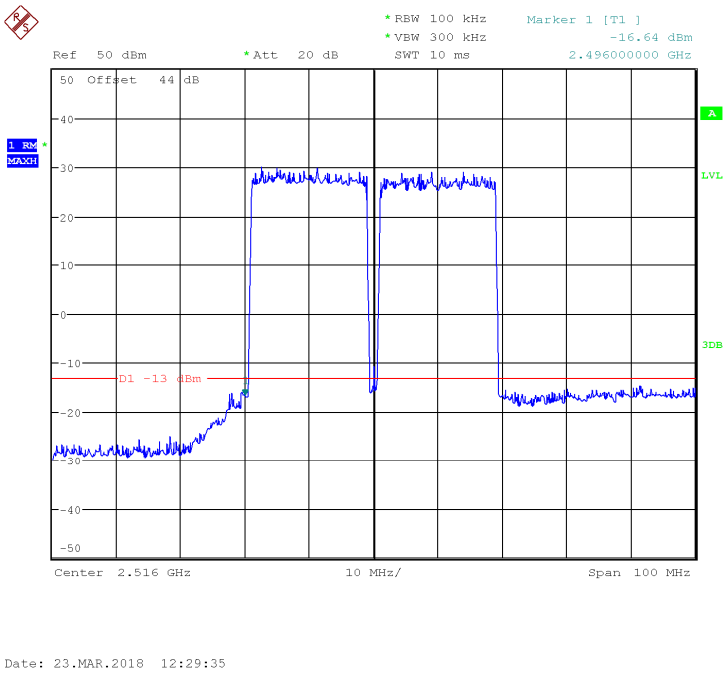
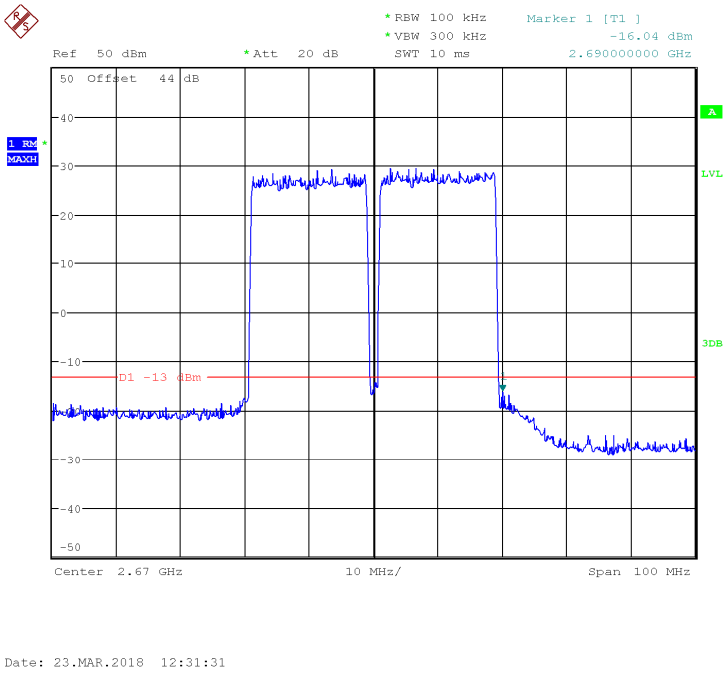
1.7 two signal input —Lower Edge



1.8 two signal input —Upper Edge



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1.9 intermodulation spurious emissioins

For LTE mode:

1.9.1 Input frequency:

1)in lower edge test:f1 is the lower edge frequency +1 channel frequency, and f2 is +2 channel frequency

f1=2498.5MHz,f2=2503.5MHz

2)in higher edge test:f1 is the higher edge frequency -2 channel frequency, and f2 is -1 channel frequency

f1=2682.5MHz,f2=2687.5MHz

base the 3rd product frequency F1= 2f1-f2 and F2=2f2-f1, when the f1 and f2 frequency select above,

g) in lower edge test, F1=2f1-(f1+Δf)=f1-Δf=lower edge frequency;

h) in higher edge test, F2=2f2-(f2-Δf)=f2+Δf=higher edge frequency.

F1=2496MHz,F2=2690MHz

base the 5rd product frequency F1= 3f1-2f2 and F2=3f2-2f1, when the f1 and f2 frequency select above,

g) in lower edge test, F1=3f1-2(f1+Δf)=f1-2Δf=lower edge frequency;

h) in higher edge test, F2=3f2-2(f2-Δf)=f2+2Δf=higher edge frequency.

F1=2491MHz,F2=2695MHz

base the 7rd product frequency F1= 4f1-3f2 and F2=4f2-3f1, when the f1 and f2 frequency select above,

g) in lower edge test, F1=4f1-3(f1+Δf)=f1-3Δf=lower edge frequency;

h) in higher edge test, F2=4f2-3(f2-Δf)=f2+3Δf=higher edge frequency.

F1=2486MHz,F2=2700MHz

1.9.2 Input power:+10dBm

measure frequency		product Value (dBm)	Limit (dBm)	Magin (dB)
3rd	Lower:2496MHz	-16.64	-13dBm	-3.64
	Higher:2690MHz	-16.04		-3.04
5rd	Lower:2491MHz	-21.92	-13dBm	-8.92
	Higher: 2695MHz	-20.87		-7.87
7rd	Lower: 2486MHz	-22.21	-13dBm	-9.21
	Higher: 2700MHz	-22.78		-9.78

Remark:

No other intermodulation spurious emissioins of above 7rd have been found,so only record the test data about the 3rd, 5rdand 7rd

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7.2.6 Conducted Spurious Emissions

Test Requirement: FCC part 27.53(a) and 27.53(m)

WCS:2350-2360MHz

(a) For operations in the 2305-2320 MHz band and the 2345-2360 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power P (with averaging performed only during periods of transmission) within the licensed band(s) of operation, in watts, by the following amounts:
(1) For base and fixed stations' operations in the 2305-2320 MHz band and the 2345-2360 MHz band:
(i) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, and not less than 75 + 10 log (P) dB on all frequencies between 2320 and 2345 MHz;
(ii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2300 and 2305 MHz, 70 + 10 log (P) dB on all frequencies between 2287.5 and 2300 MHz, 72 + 10 log (P) dB on all frequencies between 2285 and 2287.5 MHz, and 75 + 10 log (P) dB below 2285 MHz; .

(iii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2362.5 MHz, 55 + 10 log (P) dB on all frequencies between 2362.5 and 2365 MHz, 70 + 10 log (P) dB on all frequencies between 2365 and 2367.5 MHz, 72 + 10 log (P) dB on all frequencies between 2367.5 and 2370 MHz, and 75 + 10 log (P) dB above 2370 MHz.

(2) For fixed customer premises equipment (CPE) stations operating in the 2305-2320 MHz band and the 2345-2360 MHz band transmitting with more than 2 watts per 5 megahertz average EIRP:
(i) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, and not less than 75 + 10 log (P) dB on all frequencies between 2320 and 2345 MHz;

(ii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2300 and 2305 MHz, 70 + 10 log (P) dB on all frequencies between 2287.5 and 2300 MHz, 72 + 10 log (P) dB on all frequencies between 2285 and 2287.5 MHz, and 75 + 10 log (P) dB below 2285 MHz;
(iii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2362.5 MHz, 55 + 10 log (P) dB on all frequencies between 2362.5 and 2365 MHz, 70 + 10 log (P) dB on all frequencies between 2365 and 2367.5 MHz, 72 + 10 log (P) dB on all frequencies between 2367.5 and 2370 MHz, and 75 + 10 log (P) dB above 2370 MHz.

BRS and EBS: 2496-2690MHz

§ 27.53 Emission limits
(m) For BRS and EBS stations, the power of any emissions outside the licensee's frequency bands of operation shall be attenuated below the transmitter power (P) measured in watts in accordance with the standards below. If a licensee has multiple contiguous channels, out-of-band emissions shall be measured from the upper and lower edges of the contiguous channels.

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(2) For digital base stations, the attenuation shall be not less than 43 +10 log (P) dB,unless a documented interference complaint is received from an adjacent channel licensee with an overlapping Geographic Service Area. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS No. 1 on the same terms and conditions as adjacent channel BRS or EBS licensees. Provided that a documented interference complaint cannot be mutually resolved between the parties prior to the applicable deadline,then the following additional attenuation requirements shall apply:

(i) If a pre-existing base station suffers harmful interference from emissions caused by a new or modified base station located 1.5 km or more away, within 24 hours of the receipt of a documented interference complaint the licensee of the new or modified base station must attenuate its emissions by at least 67 +10 log (P) dB measured at 3 megahertz, above or below, from the channel edge of its frequency block and shall immediately notify the complaining licensee upon implementation of the additional attenuation. No later than 60 days after the implementation of such additional attenuation, the licensee of the complaining base station must attenuate its base station emissions by at least 67 +10 log(P) dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the new or modified base station.

(ii) If a pre-existing base station suffers harmful interference from emissions caused by a new or modified base station located less than 1.5 km away, within 24 hours of receipt of a documented interference complaint the licensee of the new or modified base station must attenuate its emissions by at least 67 +10 log (P)−20 log (Dkm/1.5) dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the complaining licensee, or if both base stations are co-located, limit its undesired signal level at the pre-existing base station receiver(s) to no more than −107 dBm measured in a 5.5 megahertz bandwidth and shall immediately notify the complaining licensee upon such reduction in the undesired signal level. No later than 60 days after such reduction in the undesired signal level, the complaining licensee must attenuate its base station emissions by at least 67 +10 log (P) dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the new or modified base station.

(iii) If a new or modified base station suffers harmful interference from emissions caused by a pre-existing base station located 1.5 km or more away, within 60 days of receipt of a documented interference complaint the licensee of each base station must attenuate its base station emissions by at least 67 +10 log (P) dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the other licensee.

(iv) If a new or modified base station suffers harmful interference from emissions caused by a pre-existing base station located less than 1.5 km away, within 60 days of receipt of a documented interference complaint: (a) The licensee of the new or modified base station must attenuate its OOBE by at least 67 +10 log (P)−20 log (Dkm/1.5) measured 3 megahertz above or below, from the channel edge of its frequency block of the other licensee, or if the base stations are co-located, limit its undesired signal level at the other base station receiver(s) to no more than −107 dBm measured in a 5.5-megahertz bandwidth; and (b) the licensee causing the interference must attenuate its emissions by at least 67 +10 log (P) dB measured at 3 megahertz, above or below, from the channel edge of its frequency block of the new or modified base station.

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(v) For all fixed digital user stations, the attenuation factor shall be not less than 43 +10 log (P) dB at the channel edge

(4) For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P)dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55+ 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

Test Method: FCC part 2.1051

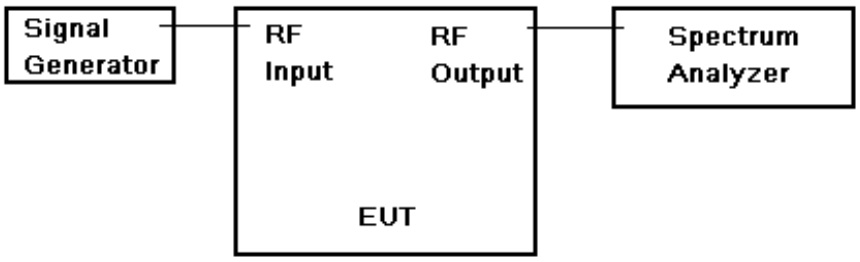
EUT Operation:

Status: Drive the EUT to maximum output power. Pretest was performed in both channels, only kept the final measurement data of worse case.

Conditions: Normal conditions

Application: Cellular Band RF output ports

Test Configuration:



Conducted Spurious Emissions test configuration

Test Procedure: Conducted Emissions test procedure:

a) Connect the equipment as illustrated, with the notch filter by-passed, when the output power is over the max value of the Spectrum Analyzer, add the attenuator to avoid destroying the facility.

b) Set the center frequency of the spectrum analyzer to the assigned transmitter frequency, key the transmitter, and set the level of the carrier to the full scale reference line.

c) do not apply any tone to modulate the EUT.

d) Adjust the spectrum analyzer for the following settings:

1) Resolution Bandwidth,(base the standard, apply the different set),her is 100KHz for frequency band less than 1GHz, 1MHz for frequency over 1GHz;

2) Video Bandwidth refer to standard requirement.

e) Adjust the center frequency of the spectrum analyzer for incremental

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coverage of the range from:

1) the lowest radio frequency generated in the equipment, it can be 9KHz base the test method, here select 30MHz as lowest frequency start point;

2) the highest radion frequency shall higher than 10 times of carrier frequency;

f) Record the frequencies and levels of spurious emissions from step e)

Remark:

The notch filter is used for avoid the EUT fundamental carrier output power making the spectrum overload and the harmonic spurious brought by it.

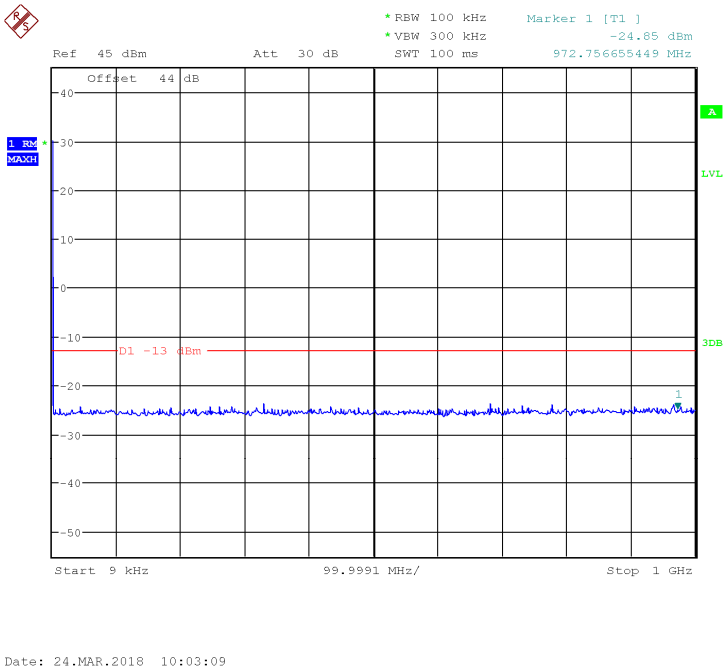
When the EUT fundamental carrier is not enough to make the status, the notch filter could be not used.

7.2.6.1 Measurement Record:

1 Downlink: 2350MHz ~ 2360MHz

1) Middle frequency

9KHz to 1GHz



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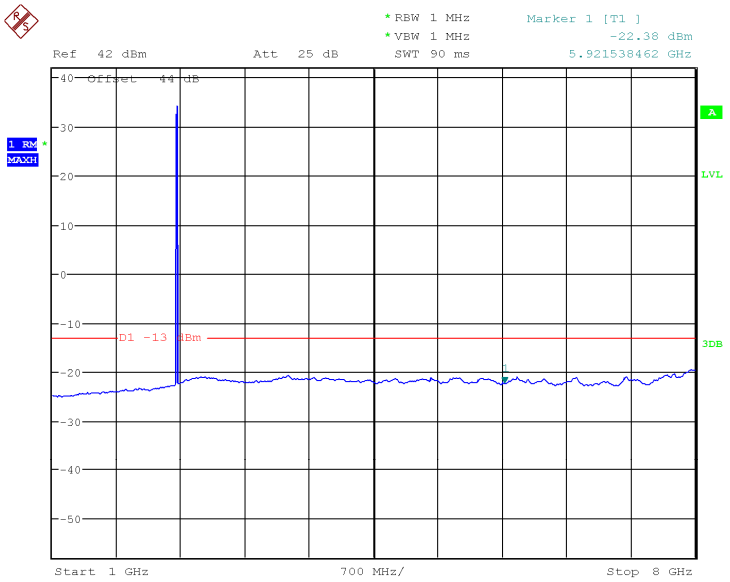
1GHz to 8GHz

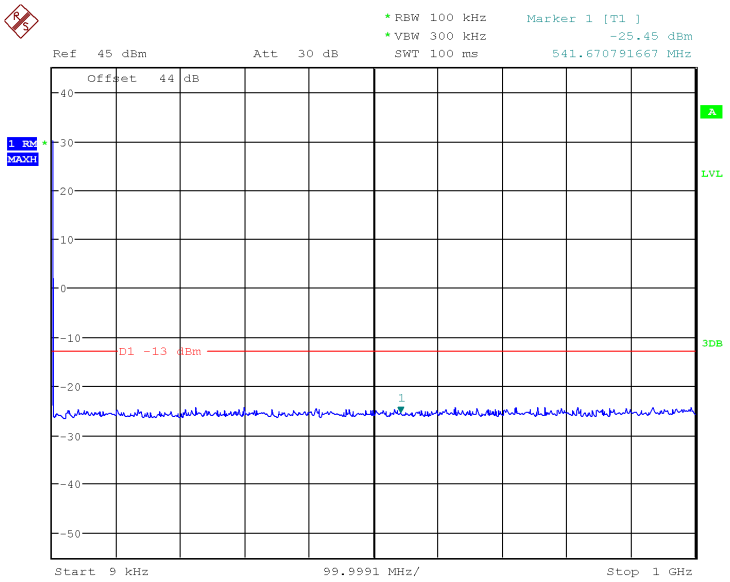


Date: 24.MAR.2018 10:34:34

2.Downlink: MIMO:2350MHz ~ 2360MHz

1) Middle frequency

9KHz to 1GHz



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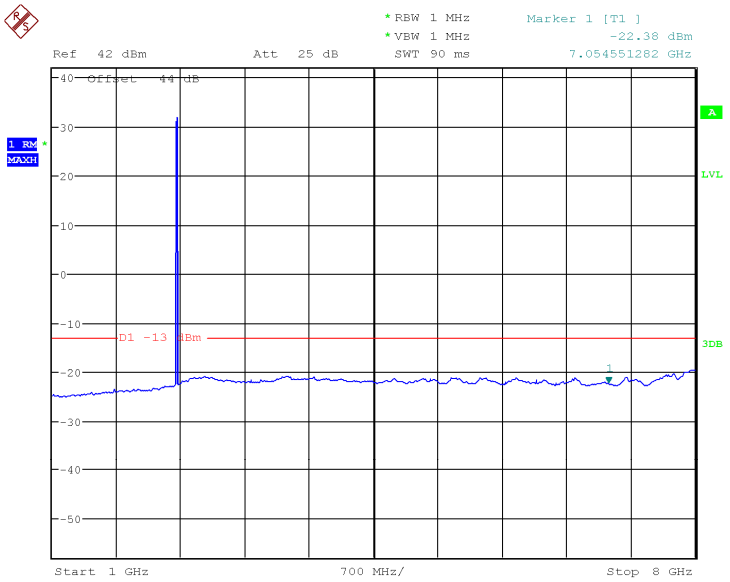
1GHz to 8GHz



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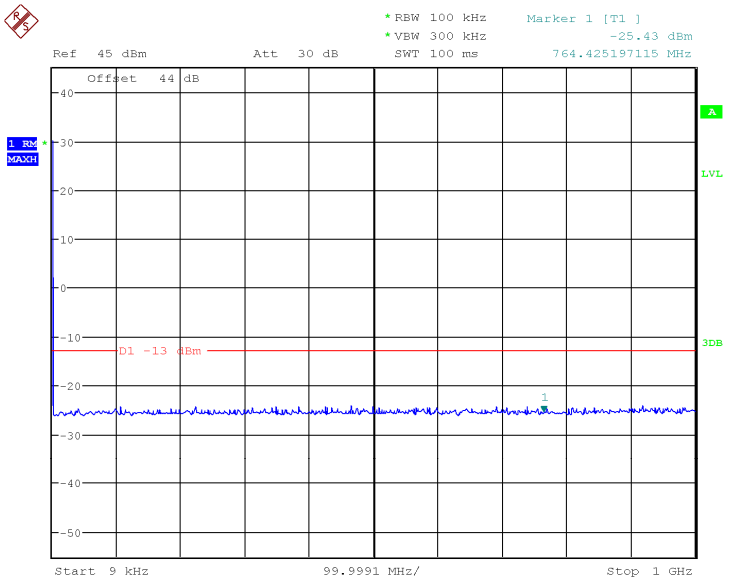
3.Downlink: 2496MHz ~ 2690MHz

1)lowest frequency

9KHz to 1GHz



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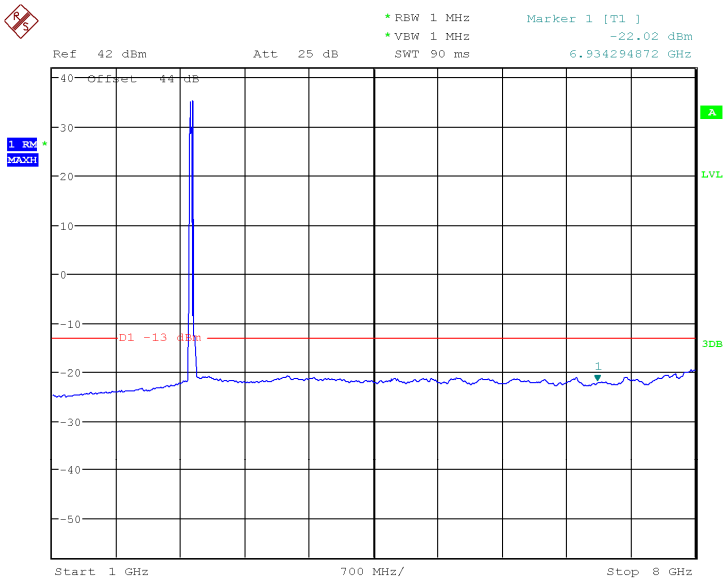
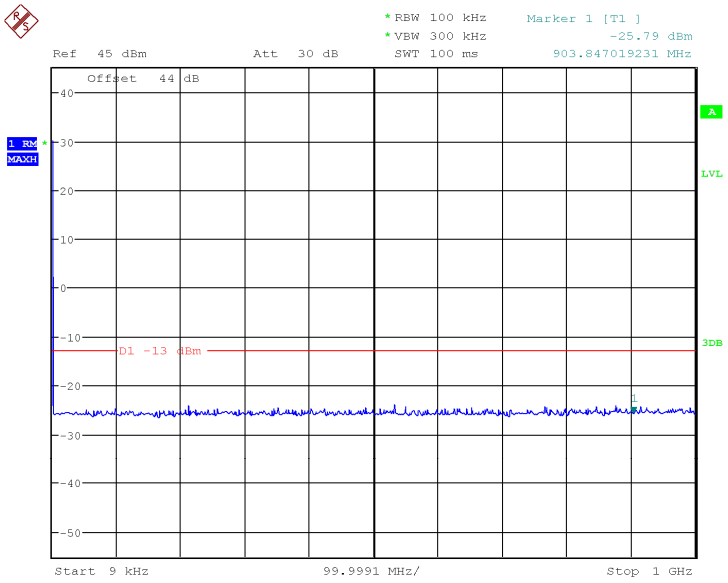
1GHz to 8GHz



Date: 24.MAR.2018 10:33:01

2)Middle frequency

9KHz to 1GHz



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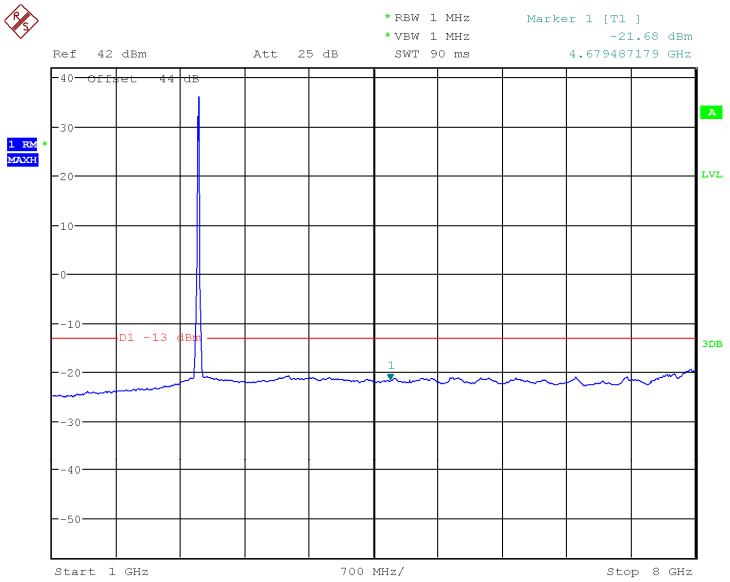
1GHz to 8GHz



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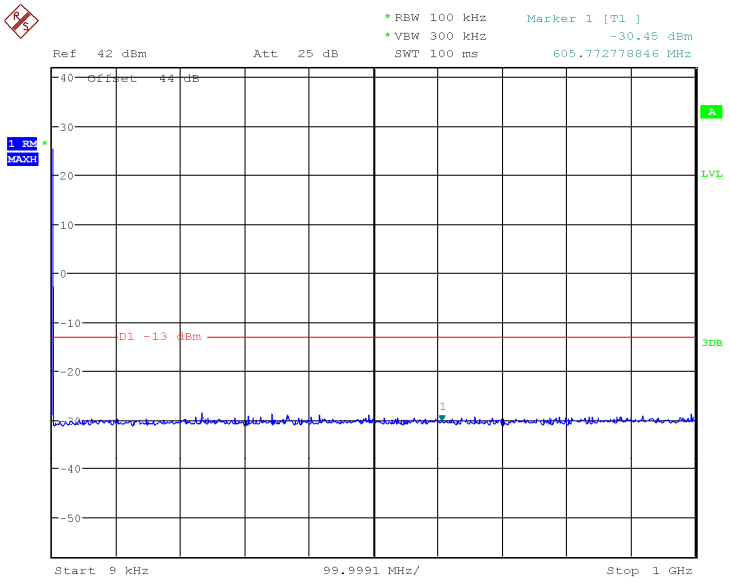
3)highest frequency

9KHz to 1GHz



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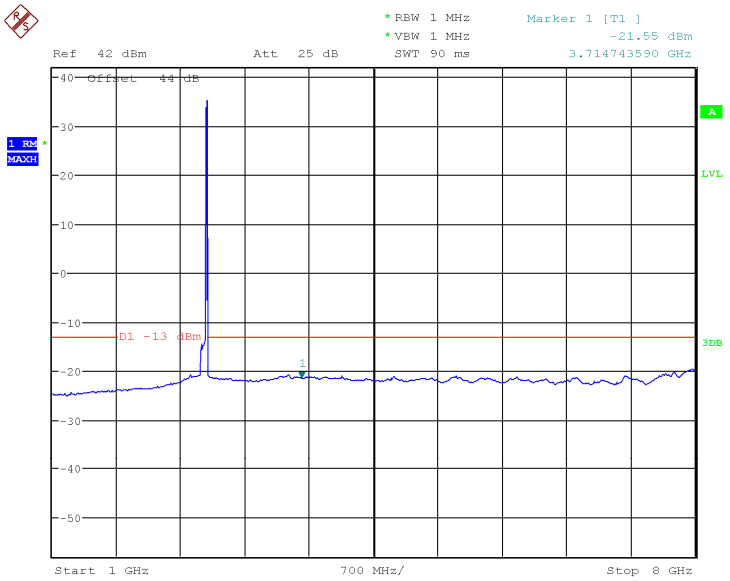
1GHz to 8GHz

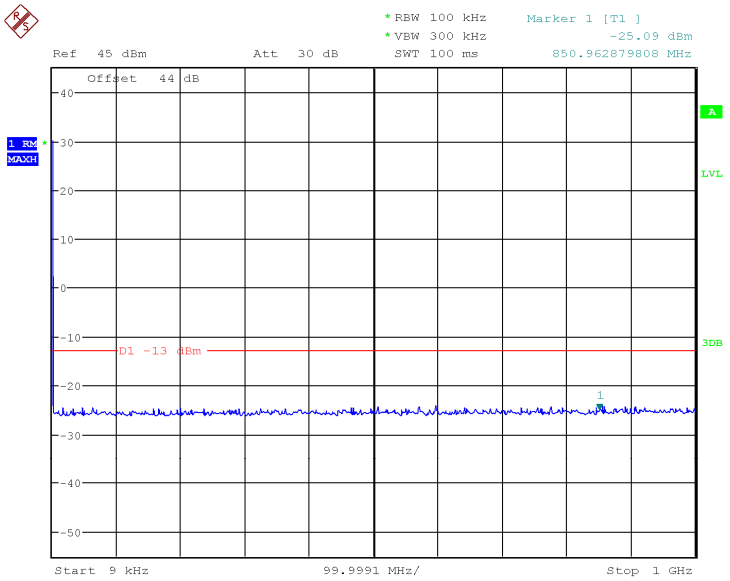


Date: 24.MAR.2018 10:30:27

4.Downlink: MIMO:2496MHz ~ 2690MHz

1) lowest frequency

9KHz to 1GHz



Date: 24.MAR.2018 09:54:16

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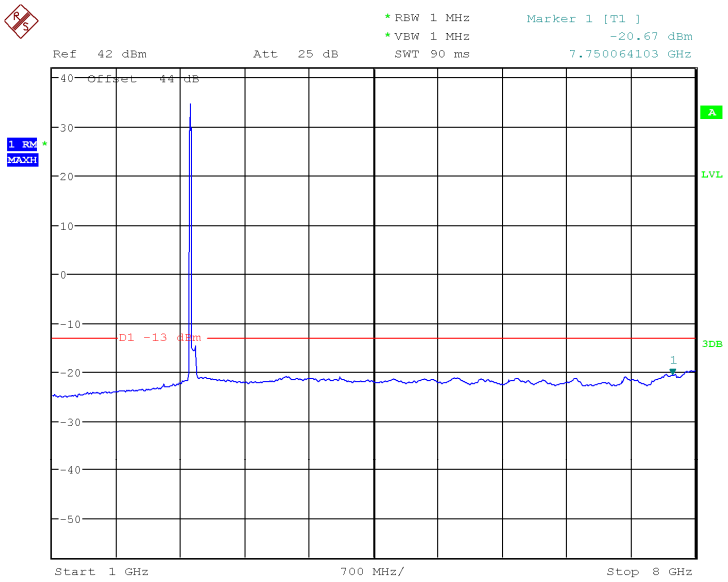
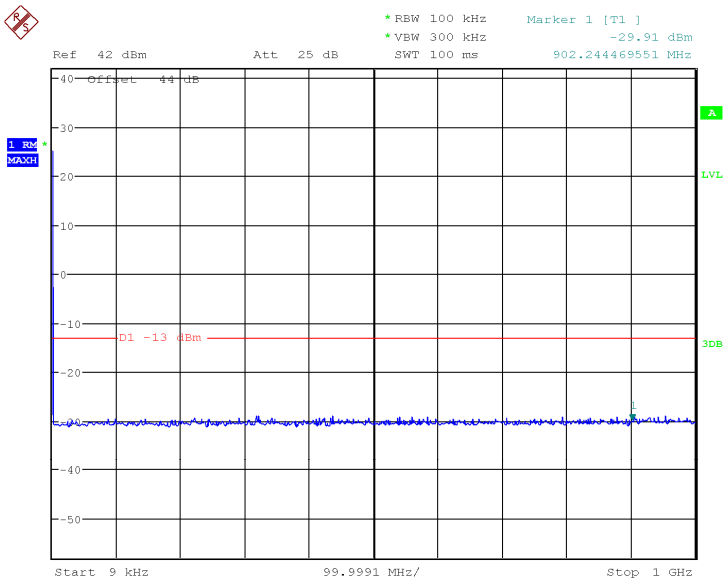
1GHz to 8GHz



Date: 24.MAR.2018 10:38:46

2)Middle frequency

9KHz to 1GHz



Date: 24.MAR.2018 10:42:37

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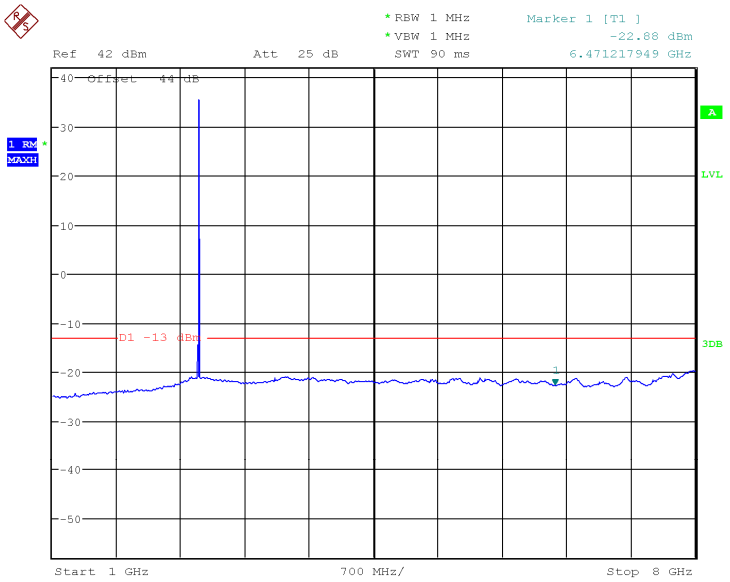
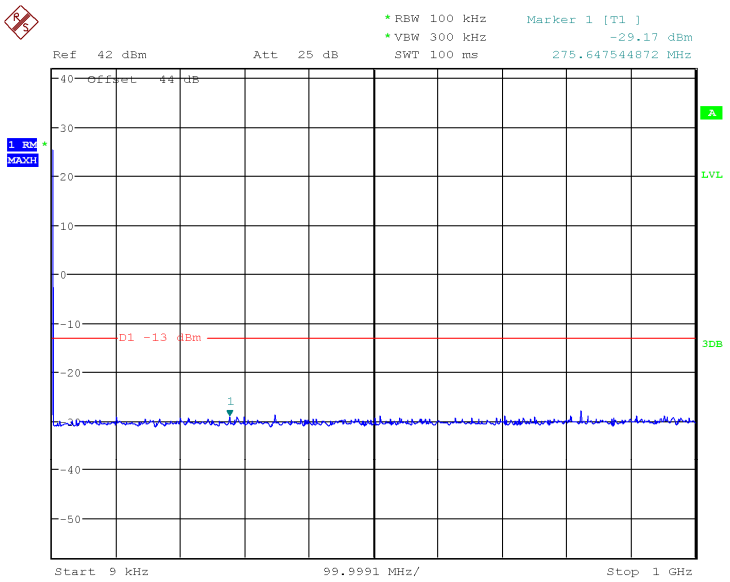
1GHz to 8GHz



Date: 24.MAR.2018 10:39:48

3)highest frequency

9KHz to 1GHz



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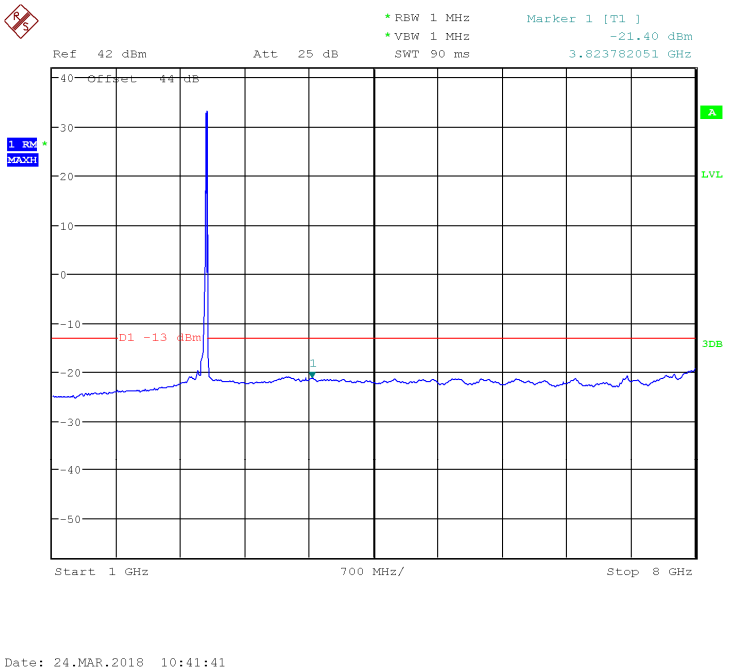
1GHz to 8GHz



Remark:

No other spurious emissioins of above 8GHz have been found,so only record the test data below 8GHz.

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7.2.7 Frequency Stability

Test Requirement: FCC part 27.54

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

Test Method: FCC part 2.1055

EUT Operation:

Status: Drive the EUT to maximum output power.

Conditions: Temperature conditions, voltage conditions

Application: Cellular Band RF output ports

Test Procedure:

1. Temperature conditions:
   a) The RF output port of the EUT was connected to Frequency Meter;
   b) Set the working Frequency in the middle channel;
   c) record the 20℃ and norminal voltage frequency value as reference point;
   d) vary the temperature from -40℃ to 50℃ with step 10℃
   e) when reach a temperature point, keep the temperature banlance at least 1 hour to make the product working in this status;
   f) read the frequency at the relative temperature.

2. Voltage conditions:
   a) record the 20℃ and norminal voltage frequency value as reference point;
   b) vary the voltage from -15% norminal voltage to +15% voltage;
   c) read the frequency at the relative voltage.

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7.2.7.1 Measurement Record:

1) Frequency Stability vs temperature:

1.1) Test for Downlink: 2350~2360MHz (middle channel 2355MHz Modulation)

Temperature(℃)	Frequency(MHz)	Tolerance(ppm)
50	2355.0000019	0.00012739
40	2355.0000021	0.00021231
30	2355.0000017	0.00004246
20	2355.0000016	Reference
10	2355.0000020	0.00016985
0	2355.0000022	0.00025478
-10	2355.0000023	0.00029724
-20	2355.0000018	0.00008493
-30	2355.0000016	0
-40	2355.0000020	0.00016985

1.2) Test for Downlink:MIMO: 2350~2360MHz (middle channel 2355M ModulationHz)

Temperature(℃)	Frequency(MHz)	Tolerance(ppm)
50	2355.0000012	-0.00012739
40	2355.0000013	-0.00008493
30	2355.0000017	-0.00008493
20	2355.0000015	Reference
10	2355.0000019	0.00016985
0	2355.0000015	0
-10	2355.0000018	0.00012739
-20	2355.0000016	-0.00004246
-30	2355.0000010	-0.00021231
-40	2355.0000014	0.00004246

1.3) Test for Downlink: 2496~2690MHz (middle channel 2593MHz)

Temperature(℃)	Frequency(MHz)	Tolerance(ppm)
50	2593.0000011	-0.00030852
40	2593.0000012	-0.00026996
30	2593.0000015	-0.00015426
20	2593.0000019	Reference
10	2593.0000021	0.00007713
0	2593.0000020	0.00003857
-10	2593.0000017	-0.00015426
-20	2593.0000018	-0.00003857
-30	2593.0000023	-0.00015426
-40	2593.0000022	0.00011570

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1.4) Test for Downlink:MIMO: 2496~2690MHz (middle channel 2593MHz)

Temperature(℃)	Frequency(MHz)	Tolerance(ppm)
50	2593.0000021	0.00015426
40	2593.0000022	0.00019282
30	2593.0000019	0.00007713
20	2593.0000017	Reference
10	2593.0000013	-0.00015426
0	2593.0000016	-0.00007713
-10	2593.0000019	0.00011570
-20	2593.0000020	0.00003857
-30	2593.0000018	0
-40	2593.0000016	-0.00003857

2) Frequency Stability vs voltage:

2.1) **For AC supplied:**

2.1.1) Test for Downlink: 2350~2360MHz (middle channel 2355M ModulationHz)

Voltage(V AC)	Frequency(MHz)	Tolerance(ppm)
102 (120*0.85)	2355.0000020	0.00004246
120	2355.0000021	Reference
138 (120*1.15)	2355.0000019	0.00008493

2.1.2) Test for Downlink:MIMO: 2350~2360MHz (middle channel 2355M ModulationHz)

Voltage(V AC)	Frequency(MHz)	Tolerance(ppm)
102 (120*0.85)	2355.0000023	0.00012739
120	2355.0000020	Reference
138 (120*1.15)	2355.0000018	-0.00008493

2.1.3) Test for Downlink: 2496~2690MHz (middle channel 2593MHz)

Voltage(V AC)	Frequency(MHz)	Tolerance(ppm)
102 (120*0.85)	2593.0000018	0.00007713
120	2593.0000016	Reference
138 (120*1.15)	2593.0000013	-0.00011570

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2.1.4) Test for Downlink: MIMO: 2496~2690MHz (middle channel 2593MHz)

Voltage(V AC)	Frequency(MHz)	Tolerance(ppm)
102 (120*0.85)	2593.0000021	0.00007713
120	2593.0000019	Reference
138 (120*1.15)	2593.0000018	-0.00003857

7.2.8 Radiated Spurious Emissions

Test Requirement: FCC part 27.53(a) **&** FCC part 27.53(m)(v)

WCS:2350-2360MHz

(a) For operations in the 2305-2320 MHz band and the 2345-2360 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power P (with averaging performed only during periods of transmission) within the licensed band(s) of operation, in watts, by the following amounts:
(1) For base and fixed stations' operations in the 2305-2320 MHz band and the 2345-2360 MHz band:
(i) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, and not less than 75 + 10 log (P) dB on all frequencies between 2320 and 2345 MHz;
(ii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2300 and 2305 MHz, 70 + 10 log (P) dB on all frequencies between 2287.5 and 2300 MHz, 72 + 10 log (P) dB on all frequencies between 2285 and 2287.5 MHz, and 75 + 10 log (P) dB below 2285 MHz; .

(iii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2362.5 MHz, 55 + 10 log (P) dB on all frequencies between 2362.5 and 2365 MHz, 70 + 10 log (P) dB on all frequencies between 2365 and 2367.5 MHz, 72 + 10 log (P) dB on all frequencies between 2367.5 and 2370 MHz, and 75 + 10 log (P) dB above 2370 MHz.

(2) For fixed customer premises equipment (CPE) stations operating in the 2305-2320 MHz band and the 2345-2360 MHz band transmitting with more than 2 watts per 5 megahertz average EIRP:
(i) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, and not less than 75 + 10 log (P) dB on all frequencies between 2320 and 2345 MHz;

(ii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2300 and 2305 MHz, 70 + 10 log (P) dB on all frequencies between 2287.5 and 2300 MHz, 72 + 10 log (P) dB on all frequencies between 2285 and 2287.5 MHz, and 75 + 10 log (P) dB below 2285 MHz;
(iii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2362.5 MHz, 55 + 10 log (P) dB on all frequencies between 2362.5 and 2365 MHz, 70 + 10 log (P) dB on all frequencies between 2365 and

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2367.5 MHz, 72 + 10 log (P) dB on all frequencies between 2367.5 and 2370 MHz, and 75 + 10 log (P) dB above 2370 MHz.

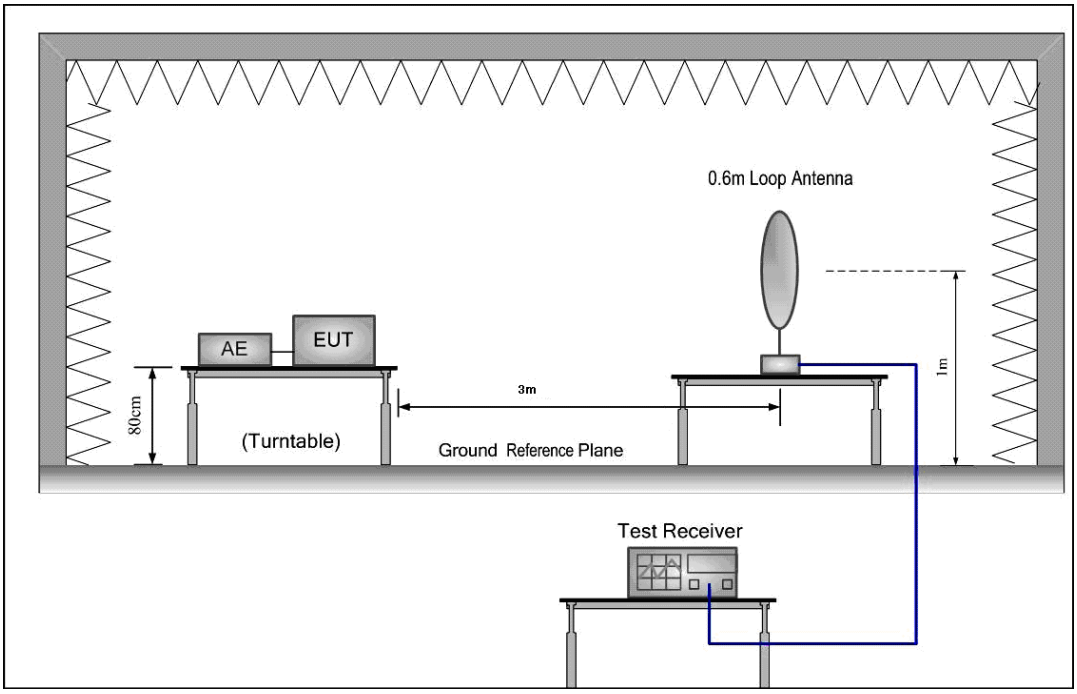
BRS and EBS: 2496-2690MHz

(v) For all fixed digital user stations, the attenuation factor shall be not less than 43 + 10 log (P) dB at the channel edge.

Test Method: FCC part 2.1053
TIA 603-E-2016

EUT Operation:
Status: Drive the EUT to maximum output power of both channels.
Conditions: Normal conditions
Application: Enclosure

Test Configuration:
9 kHz to 30 MHz emissions:



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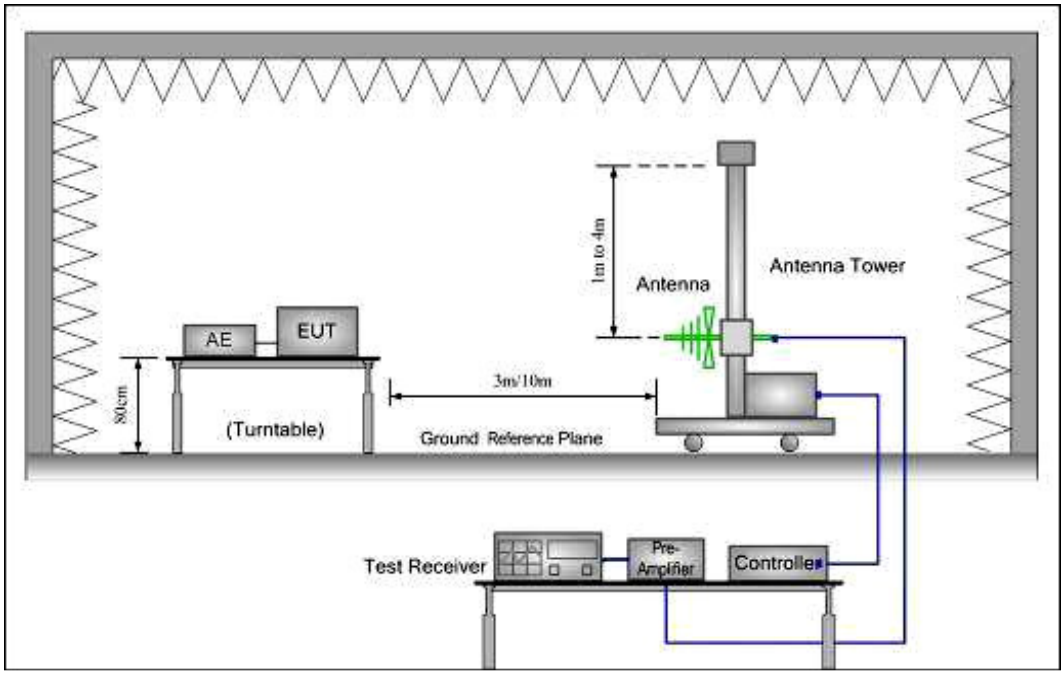
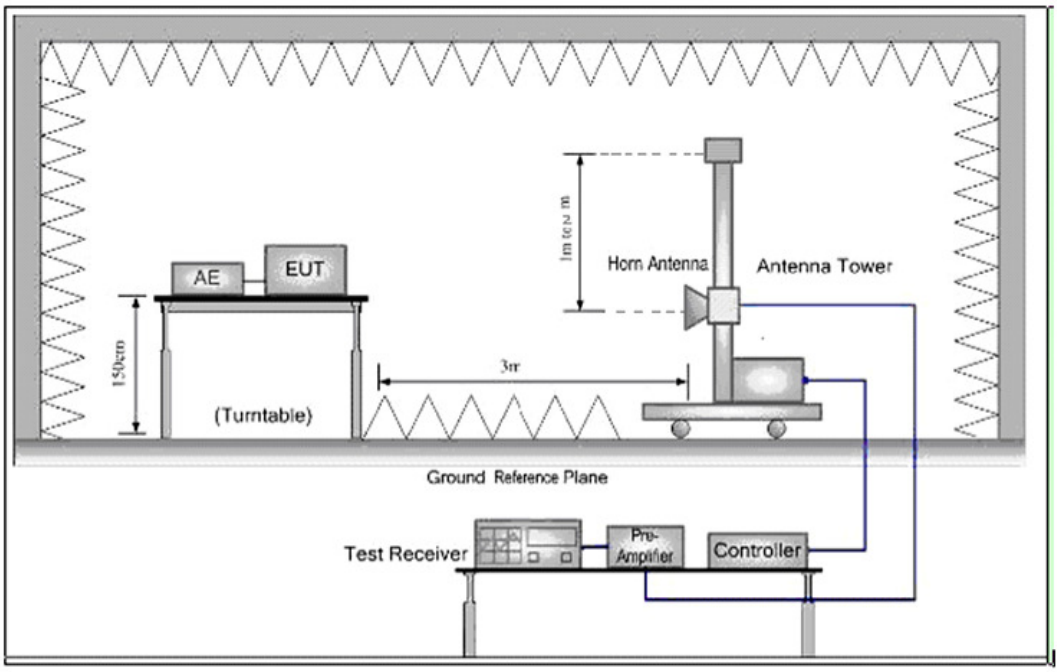
30MHz to 1GHz emissions:



1GHz to 40GHz emissions:



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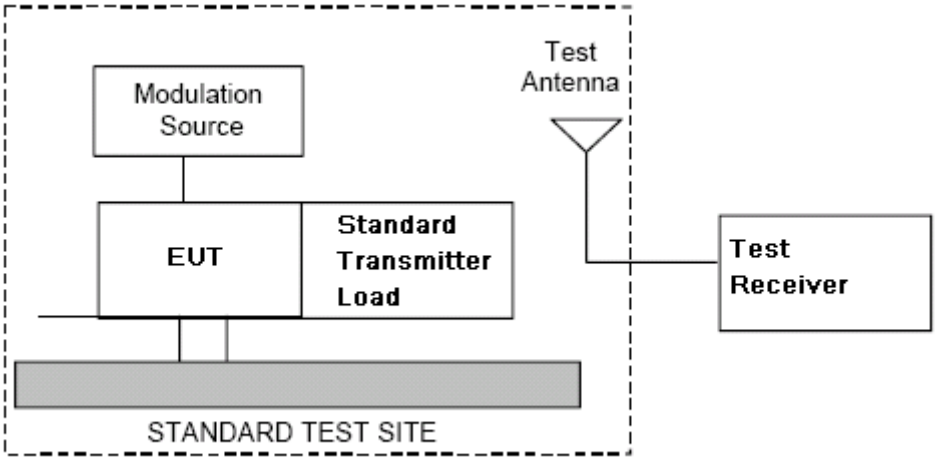
Test Procedure:

1. Test the background noise level with all the test facilities;
2. Keep one transmitting path, all other connectors shall be connected by normal power or RF leads;
3. Select the suitable RF notch filter to avoid the test receiver or spectrum analyzer produce unwanted spurious emissions;
4. Keep the EUT continuously transmitting in max power;
5. Read the radiated emissioins of the EUT enclosure.

Radiated Emissions Test Procedure:



a) Connect the equipment as illustrated.

b) Adjust the spectrum analyzer for the following settings:

1) Resolution Bandwidth = 100 kHz for spurious emissions below 1 GHz, and 1 MHz for spurious emissions above 1GHz.

2) Video Bandwidth = 300 kHz for spurious emissions below 1 GHz, and 3 MHz for spurious emissions above 1 GHz.

3) Sweep Speed slow enough to maintain measurement calibration.

4) Detector Mode = Positive Peak.

c) Place the transmitter to be tested on the turntable in the standard test site, The transmitter is transmitting into a nonradiating load that is placed on the turntable. The RF cable to this load should be of minimum length.

d) Measurements shall be made from30MHz to 10 tims of fundamental carrier, except for the region close to the carrier equal to ± the carrier bandwidth.

e) Key the transmitter without modulation or normal modulation base the standard.

f) For each spurious frequency, raise and lower the test antenna from 1 m to 4 m to obtain a maximum reading on the spectrum analyzer with the test antenna at horizontal polarity. Then the turntable should be rotated 360° to determine the maximum reading. Repeat this procedure to obtain the highest possible reading. Record this maximum reading.

g) Repeat step f) for each spurious frequency with the test antenna polarized vertically.

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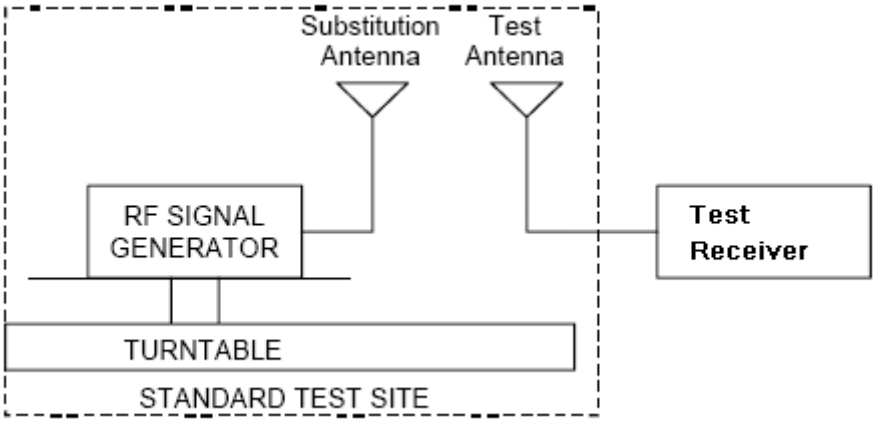

h) Reconnect the equipment as illustrated.

i) Keep the spectrum analyzer adjusted as in step b).

j) Remove the transmitter and replace it with a substitution antenna (the antenna should be half-wavelength for each frequency involved). The center of the substitution antenna should be approximately at the same location as the center of the transmitter. At the lower frequencies, where

the substitution antenna is very long, this will be impossible to achieve when the antenna is polarized vertically. In such case the lower end of the antenna should be 0.3 m above the ground.

k) Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a nonradiating cable. With the antennas at both ends horizontally polarized, and with the signal generator tuned to a particular spurious frequency, raise and lower the test antenna to

obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output.

l) Repeat step k) with both antennas vertically polarized for each spurious frequency.

m) Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in steps k) and l) by the power loss in the cable between the generator and the antenna, and further corrected for the gain of the substitution antenna used relative to an ideal half-wave dipole

antenna by the following formula:

Pd(dBm) = *Pg*(dBm) – *cable loss* (dB) + *antenna gain* (dB)

where:

Pd is the dipole equivalent power and

Pg is the generator output power into the substitution antenna.

NOTE: It is permissible to use other antennas provided they can be referenced to a dipole.

NOTE: Effective radiated power (e.r.p) refers to the radiation of a half wave tuned dipole instead of an isotropic antenna. There is a constant difference of 2.15 dB between e.i.r.p. and e.r.p.
e.r.p (dBm) = e.i.r.p. (dBm) – 2.15

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7.2.8.1 Measurement Record:

No emissions were detected within 20dB below the limit for the Downlink direction.

Test Result:

9K**Hz~1000 MHz Field Strength of Unwanted Emissions. Peak Measurement**

9KHz~1000 MHz Field Strength of Unwanted Emissions. Peak Measurement

The measurements with Loop and Log antennas were greater than 20dB below the limit, so the test data were only recorded one worst mode test graph in the test report.

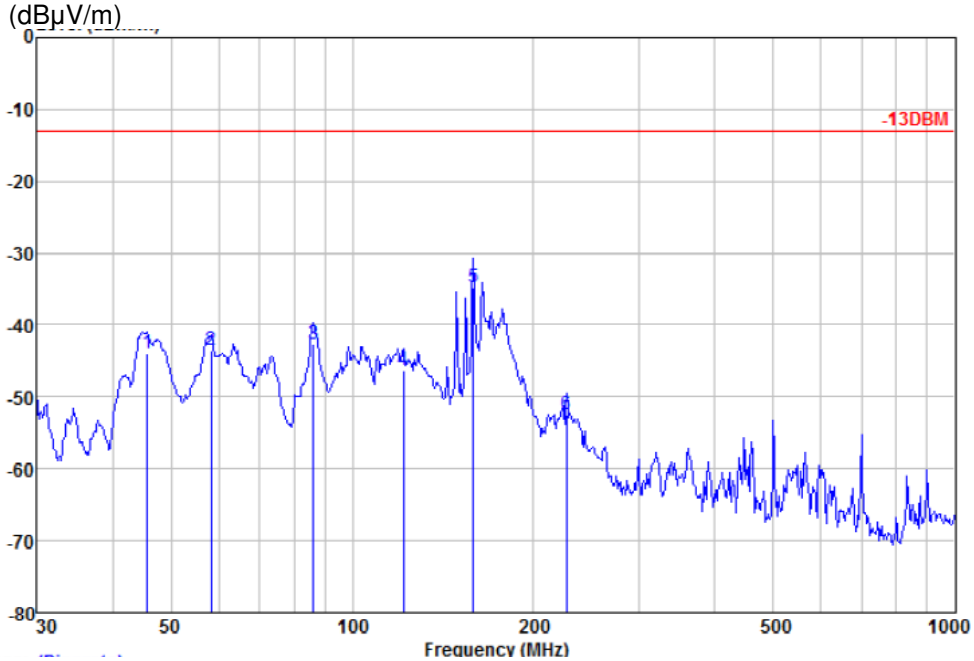
Test at Frequency (2593MHz) in transmitting status

30 MHz~1 GHz Spurious Emissions .Peak Measurement

Vertical:

Peak scan

Level (dBμV/m)



Peak measurement

	Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit
	MHz	dBm	dB/m	dB	dB	dBm/m	dBm/m	dB
1	45.695	-50.50	33.55	0.00	27.00	-43.95	-12.99	-30.96
2	58.407	-44.60	28.11	0.00	27.00	-43.49	-12.99	-30.50
3	86.200	-46.54	30.85	0.00	26.97	-42.66	-12.99	-29.67
4	121.549	-60.26	40.88	0.00	26.90	-46.28	-12.99	-33.29
5	158.668	-51.97	43.92	0.00	26.74	-34.79	-12.99	-21.80
6	226.894	-61.03	34.93	0.00	26.47	-52.57	-12.99	-39.58

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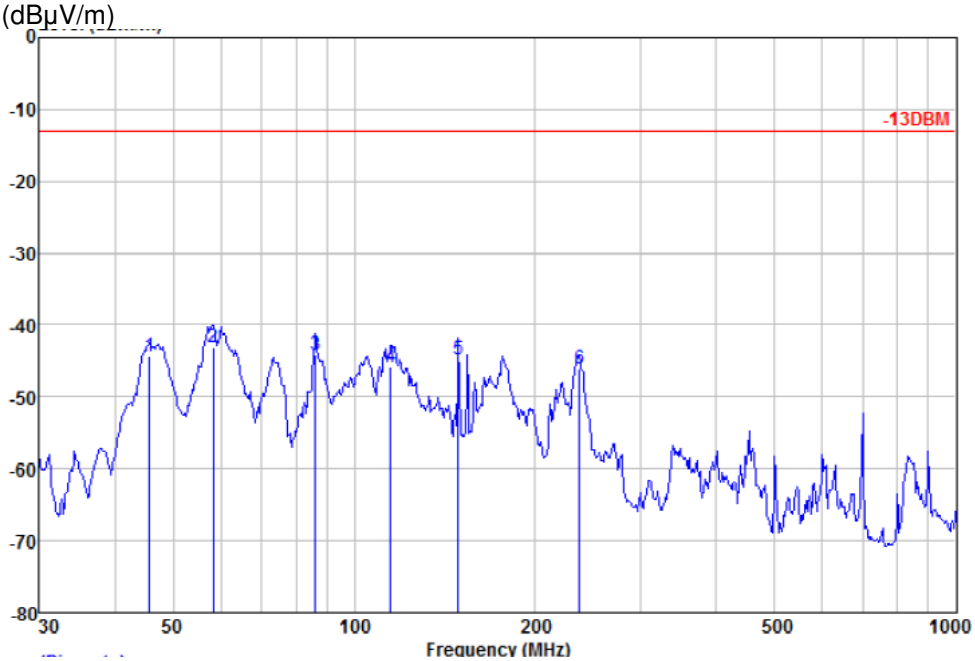
Horizontal:

Peak scan

Level (dBµV/m)



Peak measurement

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit
	MHz	dBm	dB/m	dB	dB	dBm/m	dBm/m	dB
1	45.695	-59.85	42.42	0.00	27.00	-44.43	-12.99	-31.44
2	58.407	-47.98	31.96	0.00	27.00	-43.02	-12.99	-30.03
3	86.200	-49.10	31.98	0.00	26.97	-44.09	-12.99	-31.10
4	114.917	-60.42	41.52	0.00	26.90	-45.80	-12.99	-32.81
5	148.963	-57.37	39.43	0.00	26.78	-44.72	-12.99	-31.73
6	236.645	-58.45	38.68	0.00	26.41	-46.18	-12.99	-33.19

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Frequency (MHz)	Antenna factors (dB/m)	Preamp factor (dB)	Reading Level (dBm)	Emission Level (dBm/m)	Limit (dBm/m)	Over limit (dB)	Antenna polarization
2980.327	46.68	39.4	-55.94	-48.66	-13.00	-35.66	Vertical
3151.992	47.04	39.58	-47.00	-39.54	-13.00	-26.54	V
5191.168	51.03	40.18	-37.05	-26.2	-13.00	-13.20	V
2980.327	48.26	39.4	-53.31	-44.45	-13.00	-31.45	Horizontal
3151.992	48.61	39.58	-46.81	-37.78	-13.00	-24.78	H
5191.168	53.98	40.18	-37.92	-24.12	-13.00	-11.12	H

Remark:

The cabinet radiation was measured with the equipment transmitting a CW signal into a non-radiating 50 Ohm load at maximum output power on a signal frequency .

Measured were performed in the lowest, middle and hightest frequency for the Downlink of products which included AC and DC Unit.

The spectrum was searched from 9KHz to 27GHz (10th Harmonic) for downlink and only record some worse cases.

--The End of Report--

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