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TEST REPORT

Application No.:	GZEM1708004932CR
Applicant:	Corning Optical Communications Wireless
FCC ID:	OJFGX2325
Product Description:	High Power Remote Unit 2.3/2.5 GHz
Model No.:	GX-WCSM2500M-40 and GX-WCSM2500M-40-DC; GX-WCSS2500M-40 and GX-WCSS2500M-40-DC ♣
♣	Please refer to section 3 of this report for further details.
Standards:	FCC Part 27, FCC Part 2
Date of Receipt:	2017-08-16
Date of Test:	2017-08-18 and 2017-08-25
Date of Issue:	2017-09-01
Test Result :	**Pass***

Ricky Liu
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		2017-09-01		Original

Authorized for issue by:				
Tested By		(Lily Kuang) /Project Engineer		2017-08-18 and 2017-08-25 **Date**
Checked By		(Ricky Liu) / Reviewer		2017-09-01 **Date**

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3 Test Summary

Test Item	Test Requirement	Test Method	Result
Output Power&PAPR	FCC part 27.50(a) FCC part 27.50(h)	FCC part 2.1046 2-11-04/EAB/RF KDB935210 D05	PASS
Conducted Spurious Emissions	FCC part 27.53(a) FCC part 27.53(m)	FCC part 2.1051 2-11-04/EAB/RF KDB935210 D05	PASS
Band Edge& Intermodulation	FCC part 27.53(a) FCC part 27.53(m)	FCC part 2.1051 2-11-04/EAB/RF KDB935210 D05	PASS
Radiated Spurious Emissions	FCC part 27.53(a) FCC part 27.53(m)	FCC part 2.1053 2-11-04/EAB/RF KDB935210 D05	PASS
Occupied Bandwidth	FCC part 2.1049	FCC part 2.1049 2-11-04/EAB/RF KDB935210 D05	PASS
Out of Band Rejection	2-11-04/EAB/RF	2-11-04/EAB/RF KDB935210 D05	PASS
Frequency Stablility	FCC part 27.54	FCC part 2.1055	PASS

Remark:
Tx: In this whole report Tx (or tx) means Transmitter.
Rx: In this whole report Rx (or rx) means Receiver.

No need to implement uplink test as it is cable connect to BTS (No air radiation), then the test about Uplink would be ignored.

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♣ **Model No:** GX-WCSM2500M-40 and GX-WCSM2500M-40-DC; GX-WCSS2500M-40 and GX-WCSS2500M-40-DC

According to the confirmation from the applicant, the only difference between above two models is the power supply unit(PSU).

GX-WCSM2500M-40 is with 100-240VAC power supply, while GX-WCSM2500M-40-DC is with -48VDC power supply. The electrical circuit design, RF modules and optical module used for above models are all identical, the output power and other RF specifications are the same.

According to the above differences , the GX-WCSM2500M-40 was performed full tests and the new model GX-WCSM2500M-40-DC was tested the Radiated Emission test in this report.

The software of GX-WCSS2500M-40 and GX-WCSS2500M-40-DC is based on the software of GX-WCSM2500M-40 and GX-WCSM2500M-40-DC and forbidden the MIMO funcation. The electrical circuit design, RF modules and optical module used for above models are all identical, the output power and other RF specifications are the same.so, the test needn't be assessed.

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5 General Information

5.1 Client Information

Applicant Name:	Corning Optical Communications Wireless
Applicant Address:	13221 Woodland Park Rd,Suite 400,Herndon,VA, 20171, USA
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:	High Power Remote Unit 2.3/2.5 GHz
Model No.:	GX-WCSM2500M-40 and GX-WCSM2500M-40-DC; GX-WCSS2500M-40 and GX-WCSS2500M-40-DC
Power Supply:	AC 100-240V 50/60Hz or DC -48V
Test power:	AC 120V 60Hz and 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:	68dB for downlink

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5.4 Product Description

GX-WCSM2500M-40 and GX-WCSM2500M-40-DC; GX-WCSS2500M-40 and GX-WCSS2500M-40-DC offer a scalable, cost-effective 40W (46dBm) high power remote outdoor coverage solution for Multi-Band High Power DAS Remote Unit(DAS). It is a fiber-fed, compact, multi-service, multi-operator remote designed to complement the lower power, standard remotes or installable as a dedicated deployment solution in a new site, providing complete RF coverage options for open indoor, tunnel and adjacent outdoor spaces in larger venues such as stadiums, convention centers, metro-rails and malls.

5.5 Standards Applicable for Testing

The standard used was FCC part 2 & FCC part 27

5.6 Test Location

All tests were performed at:
SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,
198 Kezhu Road, Scientech Park, Guangzhou Economic & Technology Development District,
Guangzhou, China 510663
Tel: +86 20 82155555 Fax: +86 20 82075059
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 (Registration No.: 282399)**

  SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 282399, May 31, 2002.

- **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	2017-01-20	2018-01-19
EMC0056	EMI Test Receiver	Rohde & Schwarz	ESCI	100236	2017-01-20	2018-01-19
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	2017-01-20	2018-01-19
EMC2065	Amplifier	HP	8447F	N/A	2017-06-19	2018-06-18
EMC2086	PRE AMPLIFIER MH648A	ANRITSU CORP	MH648A	N/A	2016-12-02	2017-12-01
EMC2063	Pre-amplifier 1GHz-26GHz	Compliance Direction Systems Lnc.	PAP-1G26-48	6279.628	2016-12-02	2017-12-01
EMC0523	Active Loop Antenna	EMCO	6502	42963	2016-02-27	2018-02-26
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	2017-01-20	2018-01-19
EMC2069	2.4GHz Filter	Micro-Tronics	BRM 50702	149	2017-01-20	2018-01-19
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 and 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.

Remark:

FIBER-OPTIC AND OTHER SIMILAR RF DISTRIBUTION SYSTEMS

Fiber-optic distribution systems are a type of in-building radiation system that receives RF signals from an antenna, distributes the signal over fiber-optic cable, and then retransmits at another location for example within a building or tunnel. Most fiber-optic systems are signal boosters; however, some may be repeaters. These systems generally have two enclosures typically called host (or local or donor unit) and remote. Some systems may also have an optional expander box for fan-out to multiple remotes. The system transmits downlink signals from the remote unit to handsets, portables, or clients, and transmits uplink signals via from the host unit. Usually but not always the uplink goes through an intermediate amplifier to a “donor” antenna. Therefore both uplink and downlink must be tested, unless filing effectively documents how connection of uplink to donor antenna with or without an intermediate amplifier will be prevented, such as for always only a cabled connection to a base station. Fiber-optic systems are not amplifiers (AMP equipment class) – they are equipment class TNB or PCB. The same approval procedures also apply for multiple-enclosure systems connected by coax cable.

Synonyms and related terms: in-building radiation system, coverage enhancer, distributed antenna system, fiber-optic distribution system, converter, donor anten

Typical in-building or distributed antenna systems can consist of five different components (enclosures), not counting antennas:

1) host unit

a) transmits uplink to base station via antenna thru coax, ***passive interface unit*** , or ***active interface unit*** (amplifier)
b) sends base-station downlink via fiber-optic or coax to ***remote***
c) receives handset uplink via fiber-optic or coax from ***remote***
d) optional connection to ***expansion unit*** via fiber-optic
e) separate FCC ID from ***remote***, unless electrically identical
f) ***non-transmitting host unit***
i) connects directly to a base station via coax cable but does not connect to antenna or amplifier
ii) Part 15 digital device subject to Verification, no FCC ID

2) remote unit

a) receives base-station downlink via fiber-optic or coax from ***host***, transmits via antenna to handsets
b) returns handset uplink via fiber-optic or coax to ***host***
c) separate FCC ID from ***remote***, unless electrically identical

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3) expansion unit
a) fiber-optic or coax from ***host***
b) fiber-optic or coax fan-out to ***remote(s)***
c) Part 15 digital device subject to Verification, no FCC ID
4) *passive interface unit*
a) contains attenuators, splitters, combiners
b) coax cable connection between ***host*** and base-station
c) passive device, no FCC ID
5) *active interface unit*
a) amplifies uplink signal from ***host unit*** for transmit by donor antenna
b) attenuates downlink from donor antenna
c) coax cable connection between ***host*** and ***active interface unit***
d) usually has separate FCC ID; in some cases could be combined/included with ***host*** as one enclosure

GENERAL DEFINITIONS FOR CERTIFICATION PURPOSES:
The following three general definitions follow from those stated in the Part 22, 24, and 90 rule sections as listed above. Two of the definitions replace previous EAB internal definitions given for booster, repeater and extender. The general term “extender” is the same as booster, but booster should be used rather than extender. The general term “translator” is the same as repeater, but repeater should be used rather than translator.
External radio frequency power amplifier (ERFPA) - any device which, (1) when used in conjunction with a radio transmitter signal source, is capable of amplification of that signal, and (2) is not an integral part of a radio transmitter as manufactured. The EAS equipment class AMP is used only for an ERFPA device inserted between a transmitter (TNB/PCB) and an antenna (has only one antenna port)
Booster is a device that automatically reradiates signals from base transmitters without channel translation, for the purpose of improving the reliability of existing service by increasing the signal strength in dead spots. An “in-building radiation system” is a signal booster. These devices are not intended to extend the size of coverage from the originating base station. A booster can be either single or multiple channels***.***
Repeater is a device that retransmits the signals of other stations. Repeaters are different from boosters in that they can include frequency translation and can extend coverage beyond the design of the original base station. A repeater is typically single channel but can also be multiple channels.
ERFPA (AMP) and boosters/repeaters (TNB/PCB) can generally be authorized for all rule parts except 15 and 18.
Tests should be done with each typical signal. e.g., for F3E emissions use 2500 Hz with 2.5 or 5 kHz deviation. Use of CW signal for some tests is acceptable in lieu of actual emission, in some cases when CW signal gives worst case.
The GX system working principle: the RF signal coupled from BTS is transferred into optical signal, and then transmitted via a fiber to remote unit.the remote re-transfers the optical signal back to RF signal, through the frequency translation and after power amplifiers,can extend the BTS coverage to another desired area, the GX system is compliant with the description about repeater in FCC rules, So **the Equipment belongs to the repeater and TNB class.**

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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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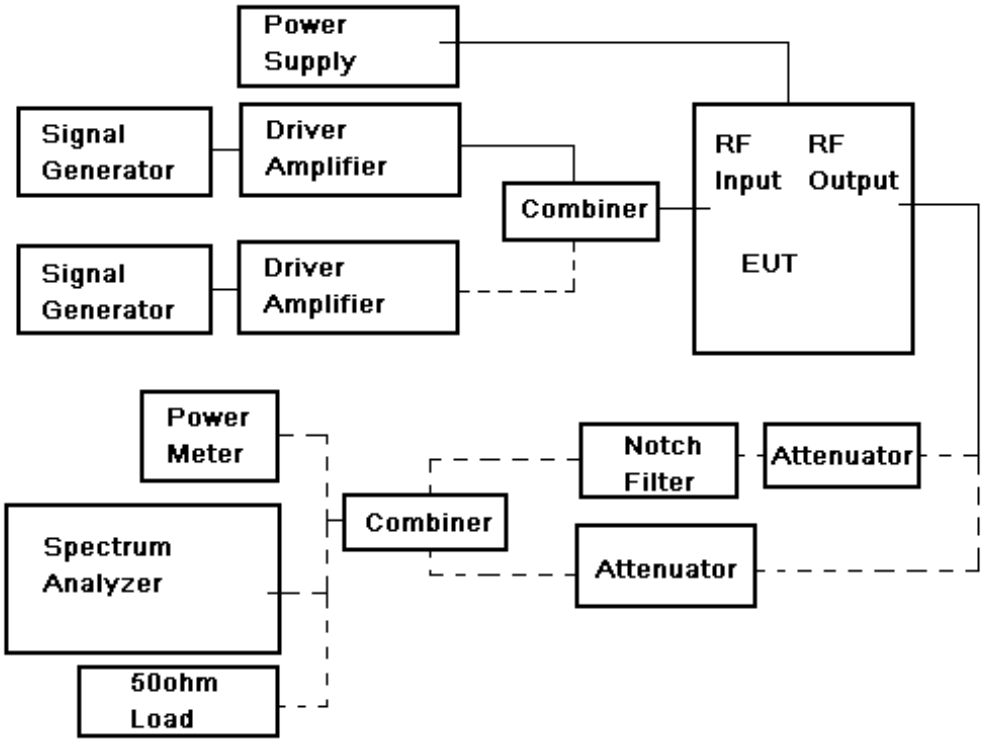
General Test Setup:



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7.2.1 RF Output Power&PAPR

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:

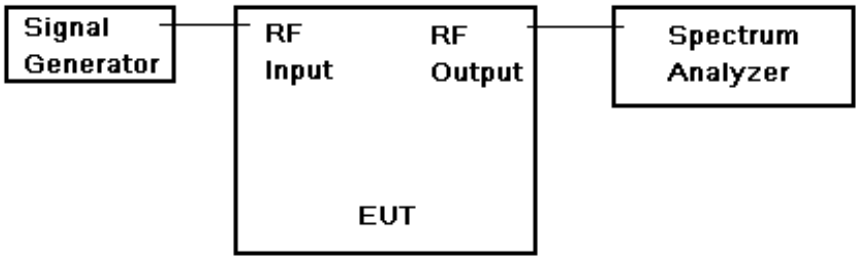

Fig.1 RF Output Power test configuration

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.

Remark: Output power –

Power on Form 731 should be clearly understood as either composite of multichannels or per carrier. If power is composite include in comments field: "Power output listed is composite for multi-channel operation."

Check that the input drive level is at maximum input rating and maximum gain settings for all tests. Check both uplink and downlink input levels. See manual or brochures/technical description for maximum rating. May need to check FCC identifier of transmitter used for tests.

Confirm device can not operate in saturation. Are there means to control maximum power and to assure linear operation (use in system configuration may be necessary)? How is saturation or over-modulation prevented for pulsed signal inputs?

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7.2.1.1 Measurement Record:

The graph will be showed at later page

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

Per channel Power Input=-22dBm for downlink				
Test items	**Modulation**	**Lowest frequency**	**Middle frequency**	**Highest frequency**
Output Power(mW)	LTE	46.24dBm (42072.66mW)	46.29dBm (42559.84mW)	46.45dBm (44157.04mW)
PAPR(dB)	LTE	7.69	7.74	7.75

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

Per channel Power Input=-22dBm for downlink		
Test items	**Modulation**	**Middle frequency**
Output Power(mW)	LTE	46.54dBm (45081.67mW)
PAPR(dB)	LTE	7.79

Downlink:MIMO: 2350MHz ~2360MHz

Per channel Power Input=-22dBm for downlink				
Test items	**Modulation**	**Lowest frequency**	**Middle frequency**	**Highest frequency**
Output Power(mW)	LTE	46.32dBm (42854.85mW)	46.37dBm (43351.09mW)	46.34dBm (43052.66mW)
PAPR(dB)	LTE	7.74	7.76	7.74

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

Per channel Power Input=-22dBm for downlink		
Test items	**Modulation**	**Middle frequency**
Output Power(mW)	LTE	46.33dBm (42952.64mW)
PAPR(dB)	LTE	7.80

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

Per channel Power Input=-22dBm for downlink				
Test items	**Modulation**	**Lowest frequency**	**Middle frequency**	**Highest frequency**
Output Power(mW)	LTE	46.41dBm (43752.21mW)	46.30dBm (42657.95mW)	46.33dBm (42953.64mW)
PAPR(dB)	LTE	7.77	7.93	7.90

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

Per channel Power Input=-22dBm for downlink				
Test items	**Modulation**	**Lowest frequency**	**Middle frequency**	**Highest frequency**
Output Power(mW)	LTE	46.29dBm (42559.84mW)	46.22dBm (41879.36mW)	46.17dBm (41399.97mW)
PAPR(dB)	LTE	8.41	7.89	7.95

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

Per channel Power Input=-22dBm for downlink				
Test items	**Modulation**	**Lowest frequency**	**Middle frequency**	**Highest frequency**
Output Power(mW)	LTE	46.54dBm (45081.67mW)	46.47dBm (44360.84mW)	46.12dBm (40926.07mW)
PAPR(dB)	LTE	7.77	8.15	7.90

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

Per channel Power Input=-22dBm for downlink				
Test items	**Modulation**	**Lowest frequency**	**Middle frequency**	**Highest frequency**
Output Power(mW)	LTE	46.42dBm (43853.07mW)	46.62dBm (45919.80mW)	46.38dBm (43451.02mW)
PAPR(dB)	LTE	8.06	7.89	7.95

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7.2.1.2 Measurement Record:

1) Output power

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

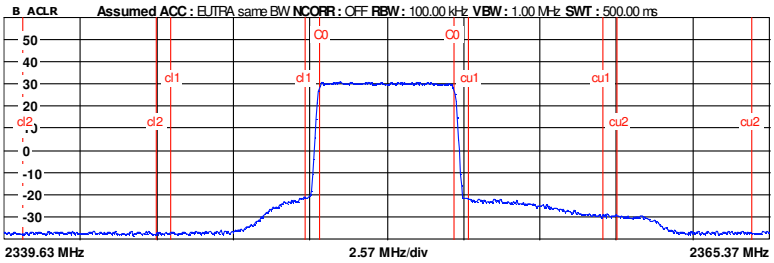
1.1 lowest frequency

EUTRA/LTE					
Freq:	2.3525 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	53 dB
Mode:	DL FDD, 25 RB (5 MHz), Normal (CP)			Capture Time:	20.1 ms

SINGLE TRG : FREE RUN **EXT REF** RF

A ACLR List Ref 52.4 dBm Att/El 0.00 / 0.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	4.515 MHz	...		46.24 dBm	...
Adjacent	4.515 MHz	5.00 MHz	-58.48 dB	-54.67 dB	-44.20 dB
Alternate	4.515 MHz	10.00 MHz	-67.31 dB	-63.71 dB	-44.20 dB
	...	...			...



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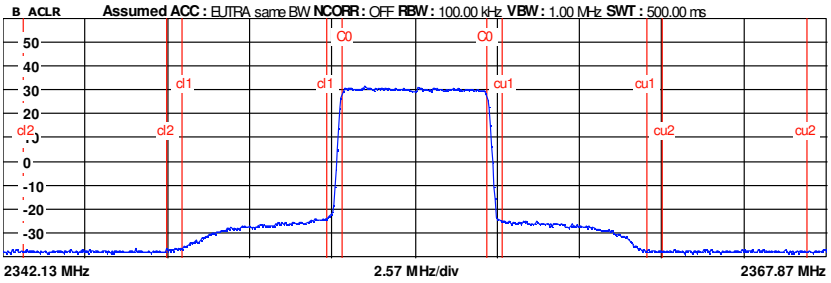
1.2 middle frequency

EUTRA/LTE					
Freq:	2.355 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	53 dB
Mode:	DL FDD, 25 RB (5 MHz), Auto (CP)			Capture Time:	20.1 ms

SINGLE TRG : FREE RUN **EXT REF** RF

A ACLR List Ref 51.8 dBm Att/El 0.00 / 0.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	4.515 MHz	...		46.29 dBm	...
Adjacent	4.515 MHz	5.00 MHz	-57.33 dB	-57.54 dB	-44.20 dB
Alternate	4.515 MHz	10.00 MHz	-67.75 dB	-67.70 dB	-44.20 dB
	...	...			...



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1.3 highest frequency

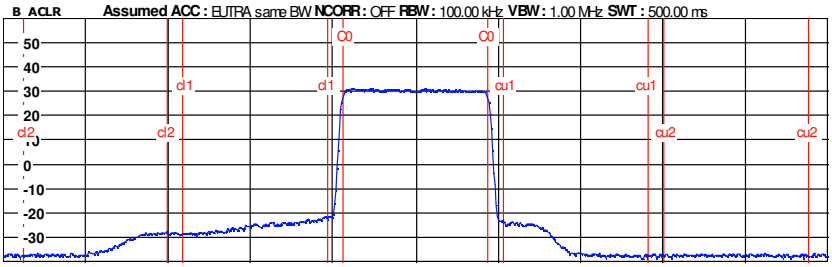
EUTRA/LTE					
Freq:	2.3575 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	53 dB
Mode:	DL FDD, 25 RB (5 MHz), Normal (CP)			Capture Time:	20.1 ms

SINGLE TRG : FREE RUN **EXT REF** RF

A ACLR List Ref 52 dBm Att/El 0.00 / 0.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	4.515 MHz	...		46.45 dBm	...
Adjacent	4.515 MHz	5.00 MHz	-55.40 dB	-59.51 dB	-44.20 dB
Alternate	4.515 MHz	10.00 MHz	-63.06 dB	-67.69 dB	-44.20 dB
	...	...			...

B ACLR **Assumed ACC :** EUTRA same BW **NCORR :** OFF **RBW :** 100.00 kHz **VBW :** 1.00 MHz **SWT :** 500.00 ms



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1.4 Middle frequency(10M Modulation)

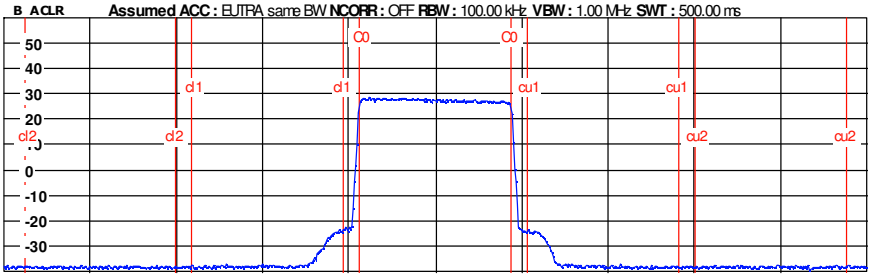
EUTRA/LTE					
Freq:	2.355 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	53 dB
Mode:	DL FDD, 50 RB (10 MHz), Normal (CP)			Capture Time:	20.1 ms

SINGLE TRG : FREE RUN **EXT REF** RF

A ACLR List Ref 51 dBm Att/El 0.00 / 0.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	9.015 MHz	...		46.54 dBm	...
Adjacent	9.015 MHz	10.00 MHz	-60.15 dB	-59.81 dB	-44.20 dB
Alternate	9.015 MHz	20.00 MHz	-65.61 dB	-65.57 dB	-44.20 dB
	...	...			...

B ACLR **Assumed ACC :** EUTRA same BW **NCORR :** OFF **RBW :** 100.00 kHz **VBW :** 1.00 MHz **SWT :** 500.00 ms



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2.Downlink: MIMO: 2350MHz to 2360MHz

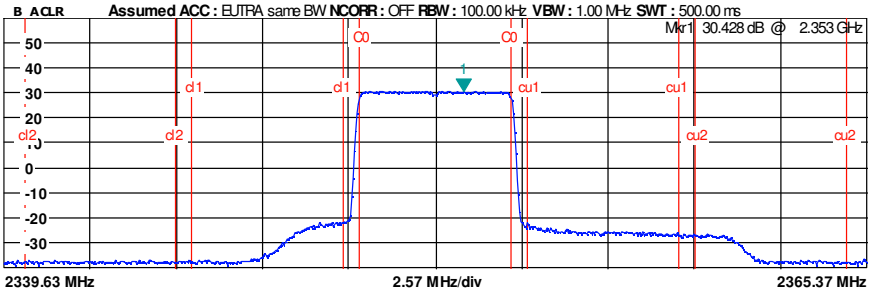
2.1 Lowest frequency (5M Modulation)

EUTRA/LTE					
Freq:	2.3525 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	53 dB
Mode:	DL FDD, 25 RB (5 MHz), Auto (CP)			Capture Time:	20.1 ms

SINGLE TRG : FREE RUN **EXT REF** RF

A ACLR List Ref 51.6 dBm Att/El 0.00 / 0.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	4.515 MHz	...		46.32 dBm	...
Adjacent	4.515 MHz	5.00 MHz	-57.69 dB	-55.78 dB	-44.20 dB
Alternate	4.515 MHz	10.00 MHz	-67.91 dB	-62.06 dB	-44.20 dB
	...	...			...



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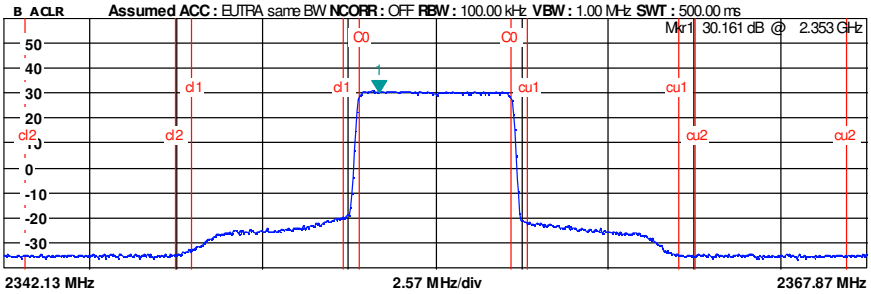
2.2 middle frequency

EUTRA/LTE					
Freq:	2.355 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	53 dB
Mode:	DL FDD, 25 RB (5 MHz), Auto (CP)			Capture Time:	20.1 ms

SINGLE TRG : FREE RUN **EXT REF** RF

A ACLR List Ref 53.3 dBm Att/El 0.00 / 5.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	4.515 MHz	...		46.37 dBm	...
Adjacent	4.515 MHz	5.00 MHz	-54.52 dB	-55.26 dB	-44.20 dB
Alternate	4.515 MHz	10.00 MHz	-65.27 dB	-65.29 dB	-44.20 dB
	...	...			...



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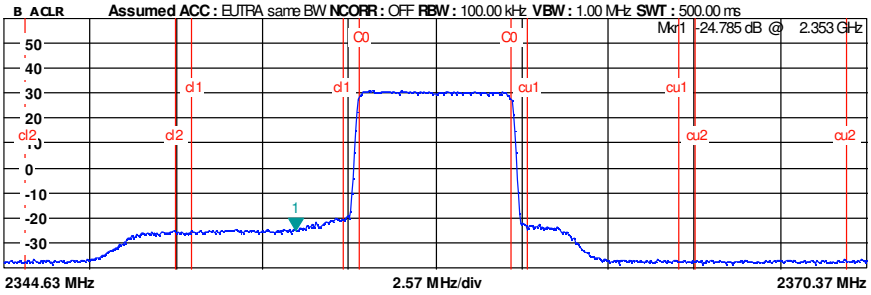
2.3 highest frequency

EUTRA/LTE					
Freq:	2.3575 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	53 dB
Mode:	DL FDD, 25 RB (5 MHz), Auto (CP)			Capture Time:	20.1 ms

SINGLE TRG : FREE RUN **EXT REF** RF

A ACLR List Ref 52.1 dBm Att/El 0.00 / 0.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	4.515 MHz	...		46.34 dBm	...
Adjacent	4.515 MHz	5.00 MHz	-54.18 dB	-58.92 dB	-44.20 dB
Alternate	4.515 MHz	10.00 MHz	-60.39 dB	-67.56 dB	-44.20 dB
	...	...			...



Date: 13.AUG.2017 13:23:07

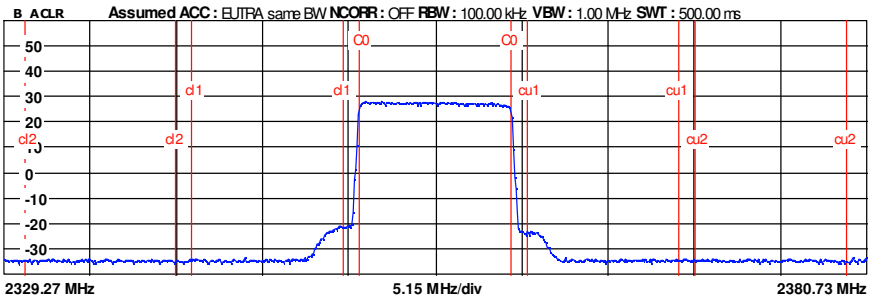
2.4 middle frequency – Input(10M Modulation)

EUTRA/LTE					
Freq:	2.355 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	53 dB
Mode:	DL FDD, 50 RB (10 MHz), Normal (CP)			Capture Time:	20.1 ms

SINGLE TRG : FREE RUN **EXT REF** RF

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

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	9.015 MHz	...		46.33 dBm	...
Adjacent	9.015 MHz	10.00 MHz	-56.63 dB	-58.16 dB	-44.20 dB
Alternate	9.015 MHz	20.00 MHz	-61.72 dB	-61.67 dB	-44.20 dB
	...	...			...



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3.Downlink: 2496MHz to 2690MHz

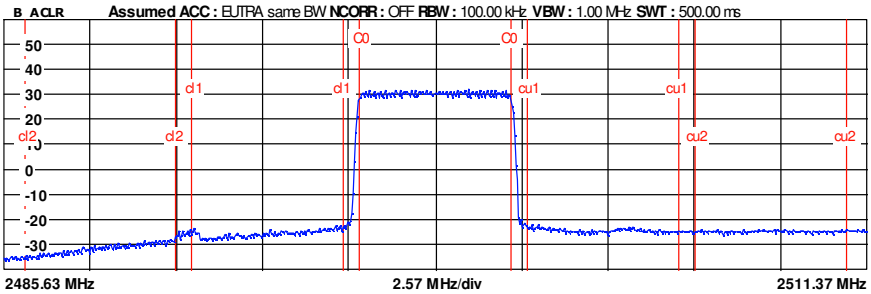
3. 1 lowest frequency (5M Modulation)

EUTRA/LTE					
Freq:	2.4985 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	53 dB
Mode:	DL TDD, 25 RB (5 MHz), Auto (CP)			Capture Time:	40.1 ms

CONTINUOUS GAT : EXT **EXT REF** RF

A ACLR List Ref 51.6 dBm Att/El 0.00 / 0.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	4.515 MHz	...		46.41 dBm	...
Adjacent	4.515 MHz	5.00 MHz	-55.75 dB	-54.52 dB	-44.20 dB
Alternate	4.515 MHz	10.00 MHz	-61.44 dB	-54.97 dB	-44.20 dB
	...	...			...



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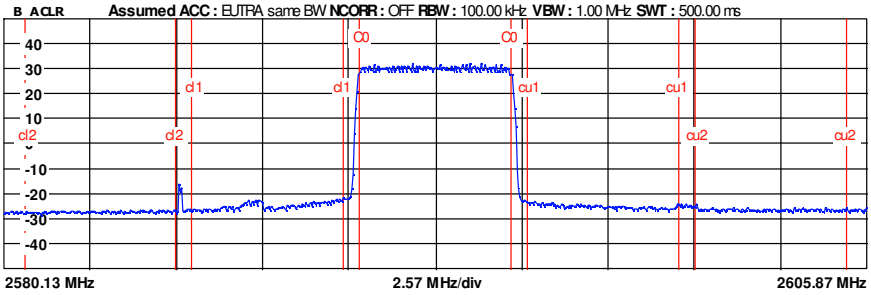
3.2 middle frequency

EUTRA/LTE					
Freq:	2.593 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	53 dB
Mode:	DL TDD, 25 RB (5 MHz), Auto (CP)			Capture Time:	40.1 ms

CONTINUOUS GAT : EXT **EXT REF** RF

A ACLR List Ref 49.2 dBm Att/El 0.00 / 0.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	4.515 MHz	...		46.30 dBm	...
Adjacent	4.515 MHz	5.00 MHz	-54.73 dB	-55.04 dB	-44.20 dB
Alternate	4.515 MHz	10.00 MHz	-57.30 dB	-56.42 dB	-44.20 dB
	...	...			...



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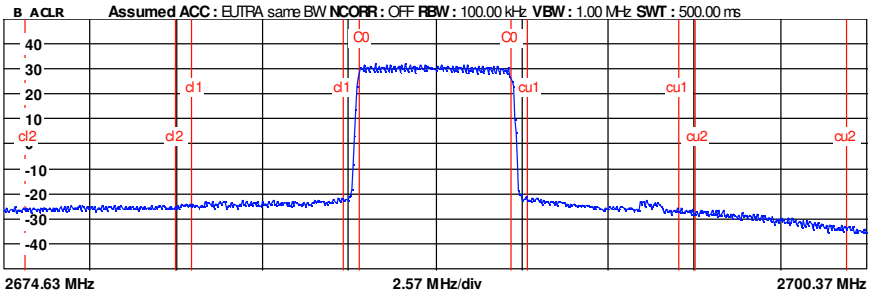
3.3 highest frequency

EUTRA/LTE					
Freq:	2.6875 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	53 dB
Mode:	DL TDD, 25 RB (5 MHz), Auto (CP)			Capture Time:	40.1 ms

CONTINUOUS GAT : EXT **EXT REF** RF

A ACLR List Ref 48.6 dBm Att/El 0.00 / 0.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	4.515 MHz	...		46.33 dBm	...
Adjacent	4.515 MHz	5.00 MHz	-53.84 dB	-54.55 dB	-44.20 dB
Alternate	4.515 MHz	10.00 MHz	-55.65 dB	-59.79 dB	-44.20 dB
	...	...			...



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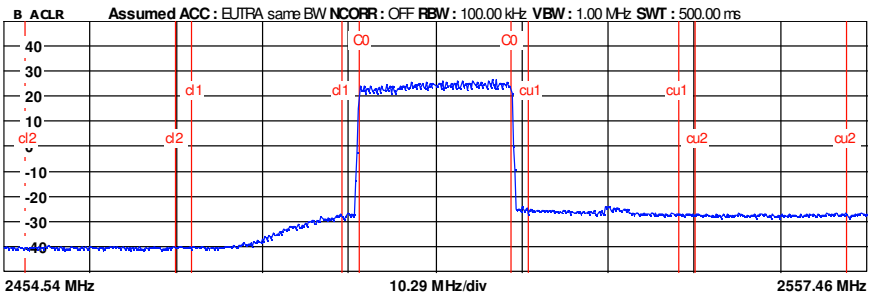
3.4 lowest frequency (20M Modulation)

EUTRA/LTE					
Freq:	2.506 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	53 dB
Mode:	DL TDD, 100 RB (20 MHz), Normal (CP)			Capture Time:	40.1 ms

CONTINUOUS GAT : EXT **EXT REF** RF

A ACLR List Ref 47.4 dBm Att/El 0.00 / 0.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	18.015 MHz	...		46.29 dBm	...
Adjacent	18.015 MHz	20.00 MHz	-57.20 dB	-50.15 dB	-44.20 dB
Alternate	18.015 MHz	40.00 MHz	-64.61 dB	-51.50 dB	-44.20 dB
	...	...			...



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3.5 middle frequency

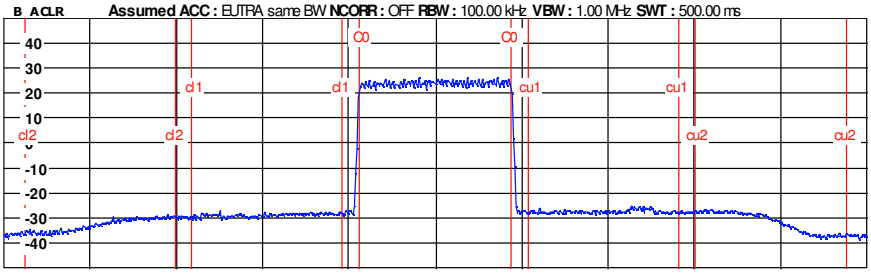
EUTRA/LTE					
Freq:	2.593 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	53 dB
Mode:	DL TDD, 100 RB (20 MHz), Normal (CP)			Capture Time:	40.1 ms

CONTINUOUS GAT : EXT **EXT REF** RF

A ACLR List Ref 49 dBm Att/El 0.00 / 0.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	18.015 MHz	...		46.22 dBm	...
Adjacent	18.015 MHz	20.00 MHz	-52.59 dB	-51.12 dB	-44.20 dB
Alternate	18.015 MHz	40.00 MHz	-55.96 dB	-53.93 dB	-44.20 dB
	...	...			...

B ACLR **Assumed ACC :** EUTRA same BW **NCORR :** OFF **RBW :** 100.00 kHz **VBW :** 1.00 MHz **SWT :** 500.00 ms



2541.54 MHz **10.29 MHz/div** **2644.46 MHz**

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Date: 14.AUG.2017 06:19:20

3.6 highest frequency

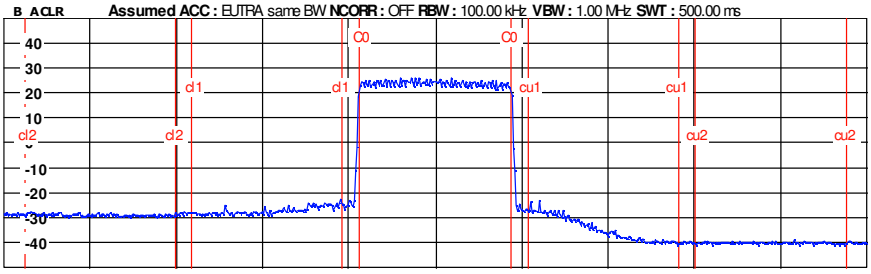
EUTRA/LTE					
Freq:	2.68 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	53 dB
Mode:	DL TDD, 100 RB (20 MHz), Normal (CP)			Capture Time:	40.1 ms

CONTINUOUS GAT : EXT **EXT REF** RF

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

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	18.015 MHz	...		46.17 dBm	...
Adjacent	18.015 MHz	20.00 MHz	-50.76 dB	-55.55 dB	-44.20 dB
Alternate	18.015 MHz	40.00 MHz	-52.73 dB	-64.08 dB	-44.20 dB
	...	...			...

B ACLR **Assumed ACC :** EUTRA same BW **NCORR :** OFF **RBW :** 100.00 kHz **VBW :** 1.00 MHz **SWT :** 500.00 ms



2628.54 MHz **10.29 MHz/div** **2731.46 MHz**

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4.Downlink: MIMO:2496MHz to 2690MHz

4.1 LTEMode:5M Modulation

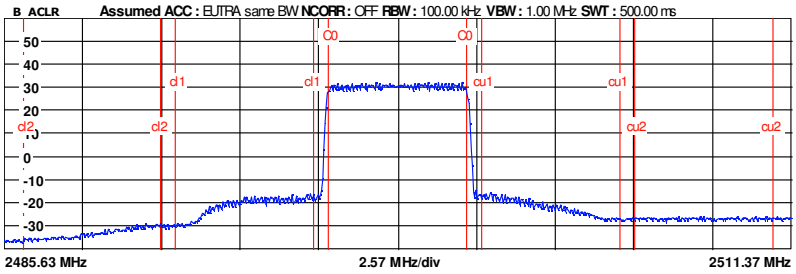
4.1.1 lowest frequency

EUTRA/LTE					
Freq: 2.4985 GHz		Meas Setup:	1 TX x 1 RX	Ext. Att:	53 dB
Mode: DL TDD, 25 RB (5 MHz), Normal (CP)				Capture Time:	40.1 ms

CONTINUOUS GAT : EXT **EXT REF** RF

A ACLR List Ref 52 dBm Att/El 0.00 / 0.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	4.515 MHz	...		46.54 dBm	...
Adjacent	4.515 MHz	5.00 MHz	-50.30 dB	-50.97 dB	-44.20 dB
Alternate	4.515 MHz	10.00 MHz	-63.19 dB	-57.23 dB	-44.20 dB
	...	...			...



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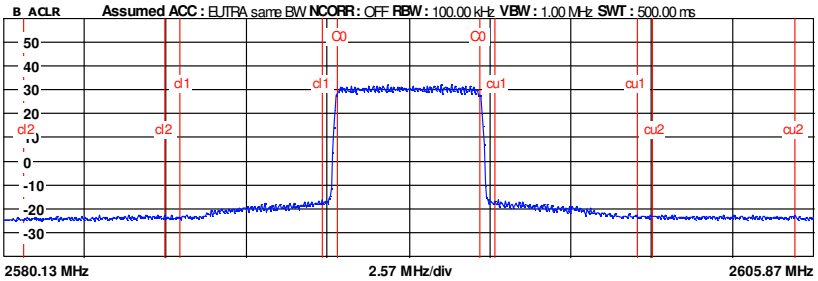
4.1.2 middle frequency

EUTRA/LTE					
Freq: 2.593 GHz		Meas Setup:	1 TX x 1 RX	Ext. Att:	53 dB
Mode: DL TDD, 25 RB (5 MHz), Normal (CP)				Capture Time:	40.1 ms

CONTINUOUS GAT : EXT **EXT REF** RF

A ACLR List Ref 51.7 dBm Att/El 0.00 / 0.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	4.515 MHz	...		46.47 dBm	...
Adjacent	4.515 MHz	5.00 MHz	-50.08 dB	-50.05 dB	-44.20 dB
Alternate	4.515 MHz	10.00 MHz	-54.05 dB	-53.70 dB	-44.20 dB
	...	...			...



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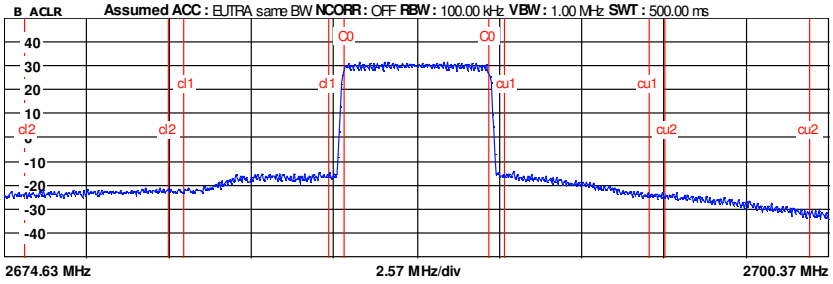
4.1.3 highest frequency

EUTRA/LTE					
Freq:	2.6875 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	53 dB
Mode:	DL TDD, 25 RB (5 MHz), Normal (CP)			Capture Time:	40.1 ms

CONTINUOUS GAT : EXT **EXT REF** RF

A ACLR List Ref 48.1 dBm Att/El 0.00 / 0.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	4.515 MHz	...		46.12 dBm	...
Adjacent	4.515 MHz	5.00 MHz	-47.41 dB	-48.68 dB	-44.20 dB
Alternate	4.515 MHz	10.00 MHz	-52.79 dB	-56.94 dB	-44.20 dB
	...	...			...



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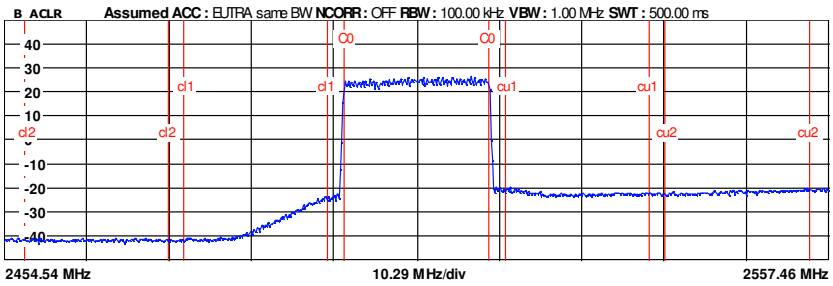
4.1.4 lowest frequency(20M Modulation)

EUTRA/LTE					
Freq:	2.506 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	53 dB
Mode:	DL TDD, 100 RB (20 MHz), Auto (CP)			Capture Time:	40.1 ms

CONTINUOUS GAT : EXT **EXT REF** RF

A ACLR List Ref 45 dBm Att/El 0.00 / 0.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	18.015 MHz	...		46.42 dBm	...
Adjacent	18.015 MHz	20.00 MHz	-55.70 dB	-46.44 dB	-44.20 dB
Alternate	18.015 MHz	40.00 MHz	-65.95 dB	-45.85 dB	-44.20 dB
	...	...			...



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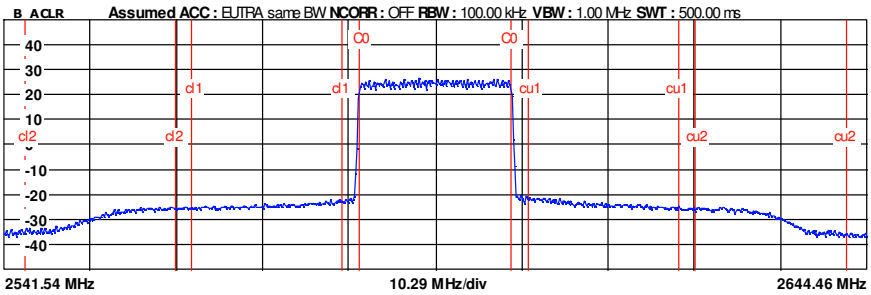
4.1.5 middle frequency

EUTRA/LTE					
Freq:	2.593 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	53 dB
Mode:	DL TDD, 100 RB (20 MHz), Auto (CP)			Capture Time:	40.1 ms

CONTINUOUS GAT : EXT **EXT REF** RF

A ACLR List Ref 46.3 dBm Att/El 0.00 / 0.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	18.015 MHz	...		46.62 dBm	...
Adjacent	18.015 MHz	20.00 MHz	-48.69 dB	-48.03 dB	-44.20 dB
Alternate	18.015 MHz	40.00 MHz	-52.73 dB	-52.72 dB	-44.20 dB
	...	...			...



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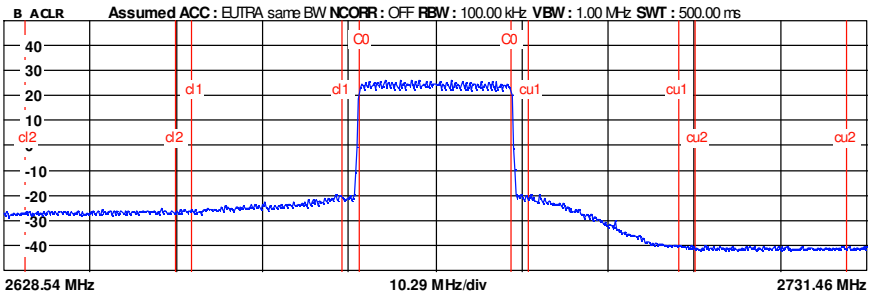
4.1.6 highest frequency

EUTRA/LTE					
Freq:	2.68 GHz	Meas Setup:	1 TX x 1 RX	Ext. Att:	53 dB
Mode:	DL TDD, 100 RB (20 MHz), Auto (CP)			Capture Time:	40.1 ms

CONTINUOUS GAT : EXT **EXT REF** RF

A ACLR List Ref 46 dBm Att/El 0.00 / 0.00 dB

Channel	Bandwidth	Spacing	Lower	Upper	Limit
TX	18.015 MHz	...		46.38 dBm	...
Adjacent	18.015 MHz	20.00 MHz	-47.86 dB	-50.82 dB	-44.20 dB
Alternate	18.015 MHz	40.00 MHz	-50.88 dB	-65.27 dB	-44.20 dB
	...	...			...



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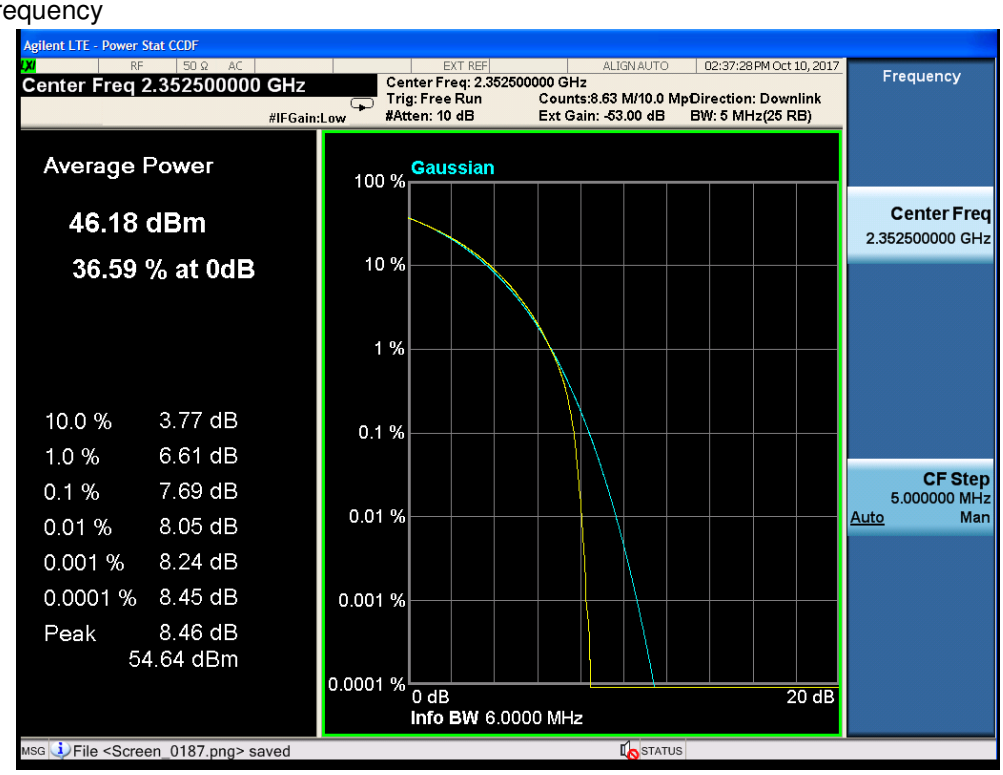
2) The peak-to-average power ratio **(PAPR):**

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

1.1 lowest frequency



1.2 middle frequency

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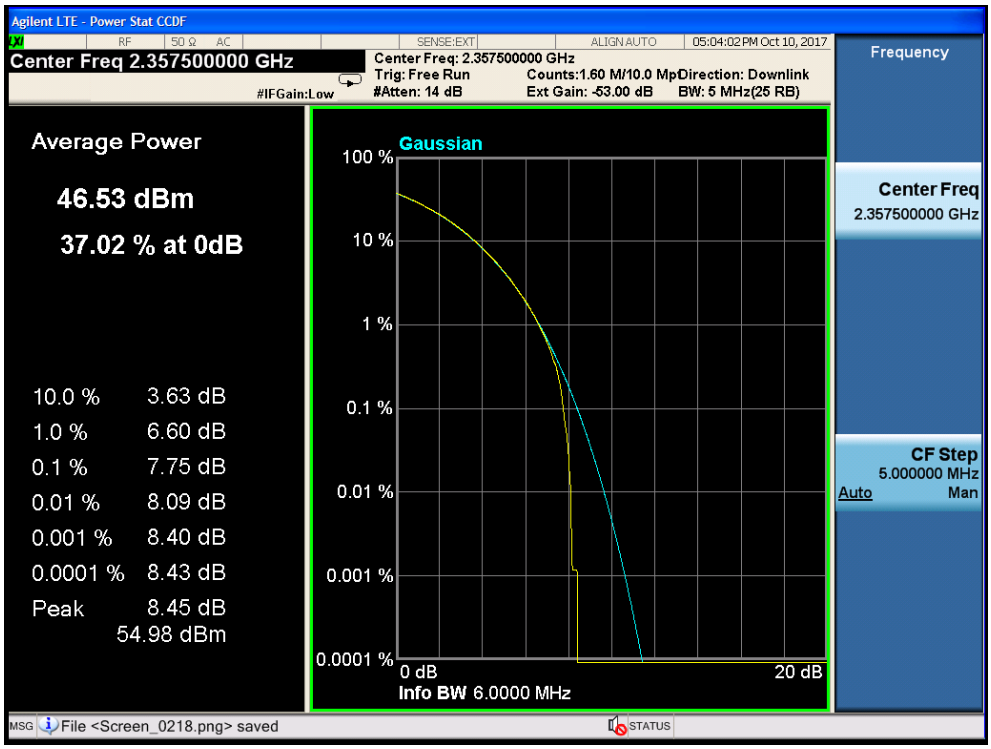
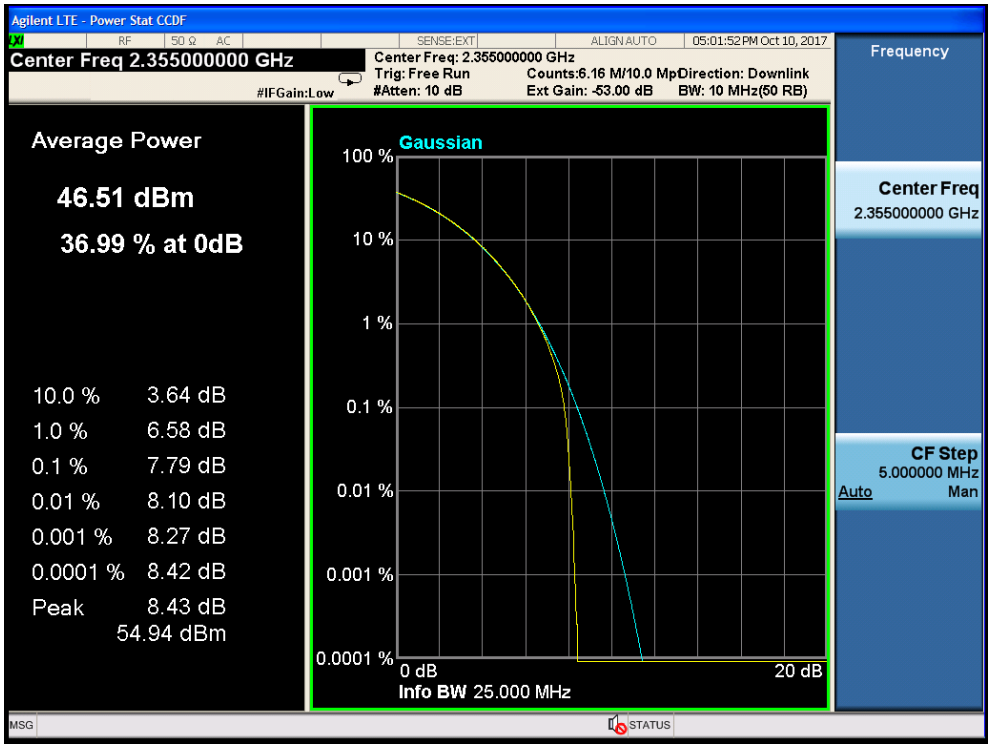
1.3 highest frequency



1.4 Middle frequency(10M Modulation)



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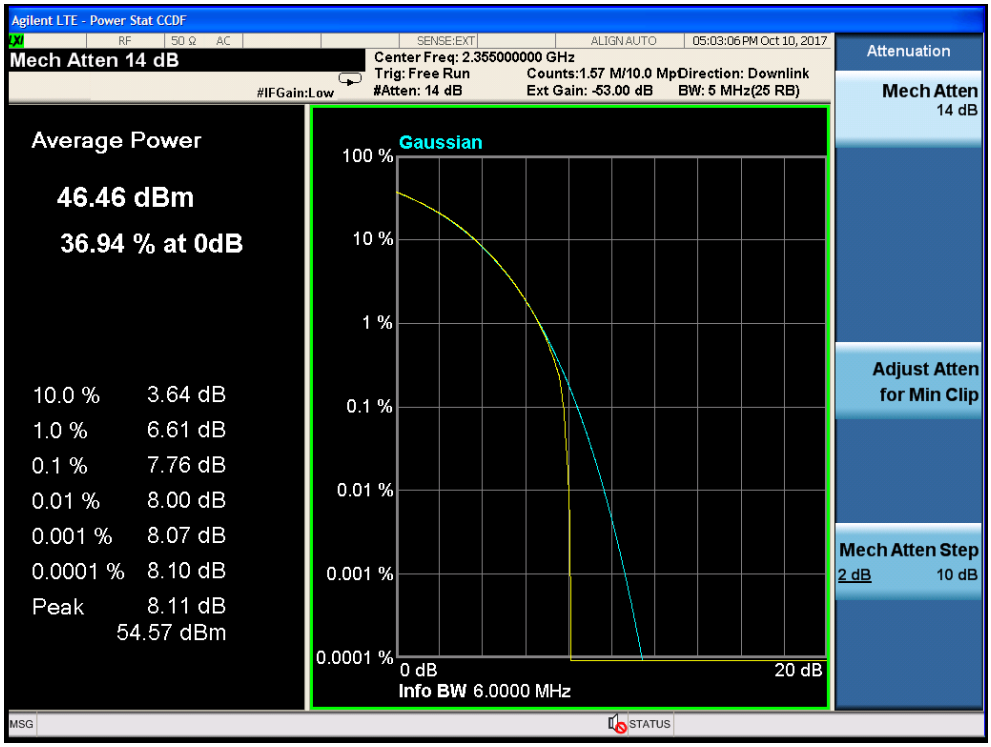
2.Downlink: MIMO: 2350MHz to 2360MHz

2.1 Lowest frequency (5M Modulation)

2.2



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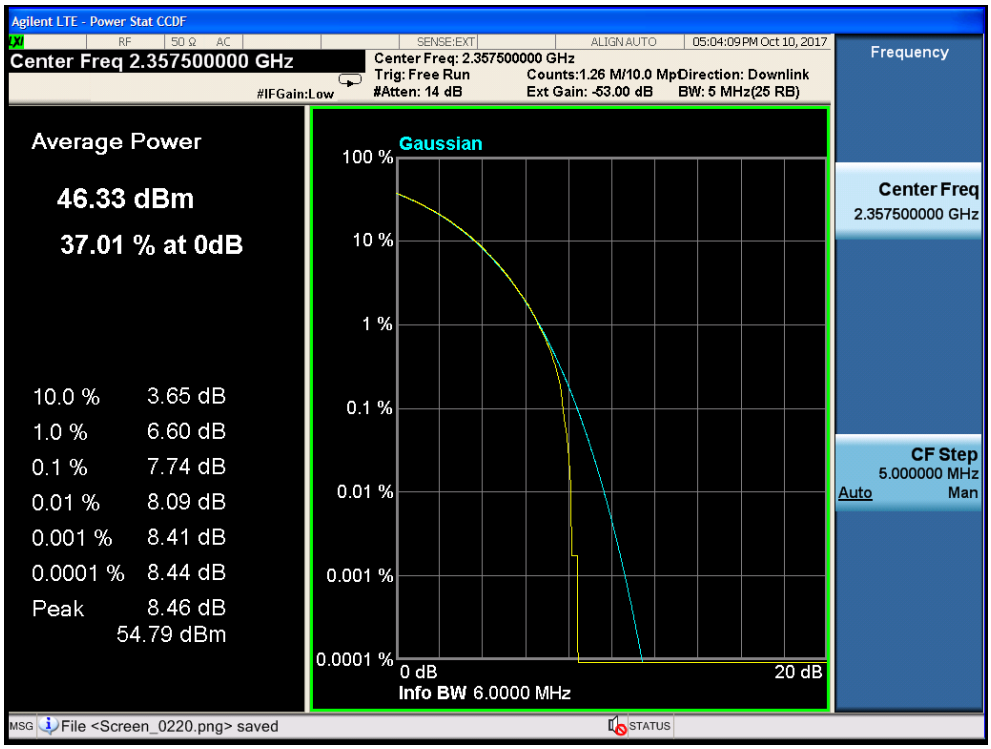
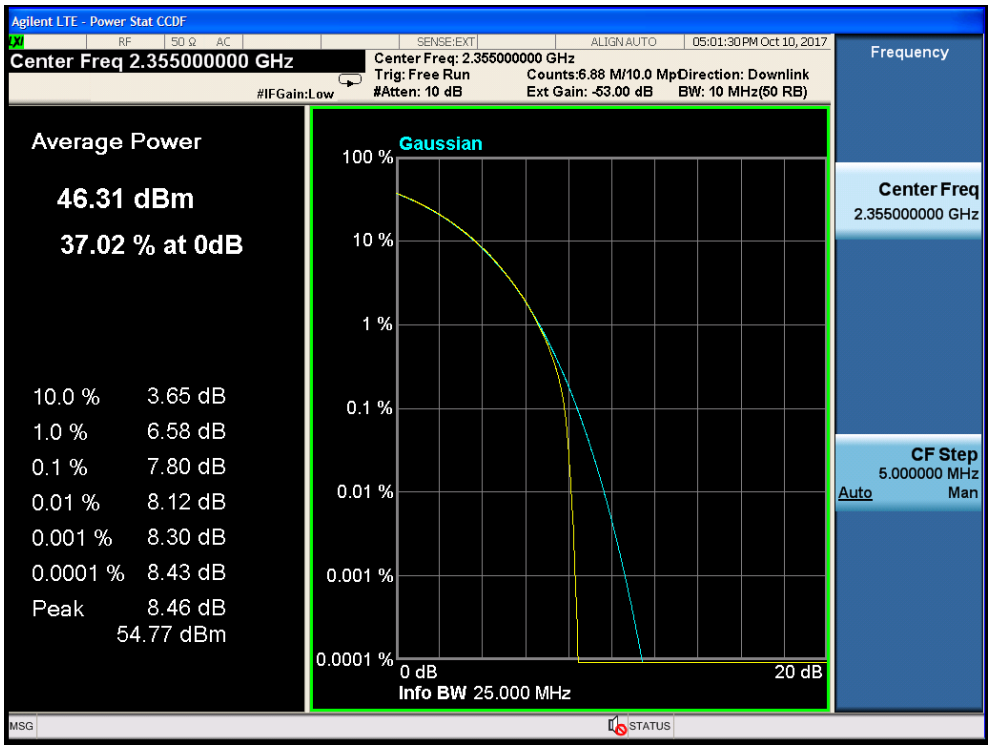
2.3 highest frequency



2.4 middle frequency – Input(10M Modulation)



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3.Downlink: 2496MHz to 2690MHz

3.1 lowest frequency (5M Modulation)

3.2 middle frequency

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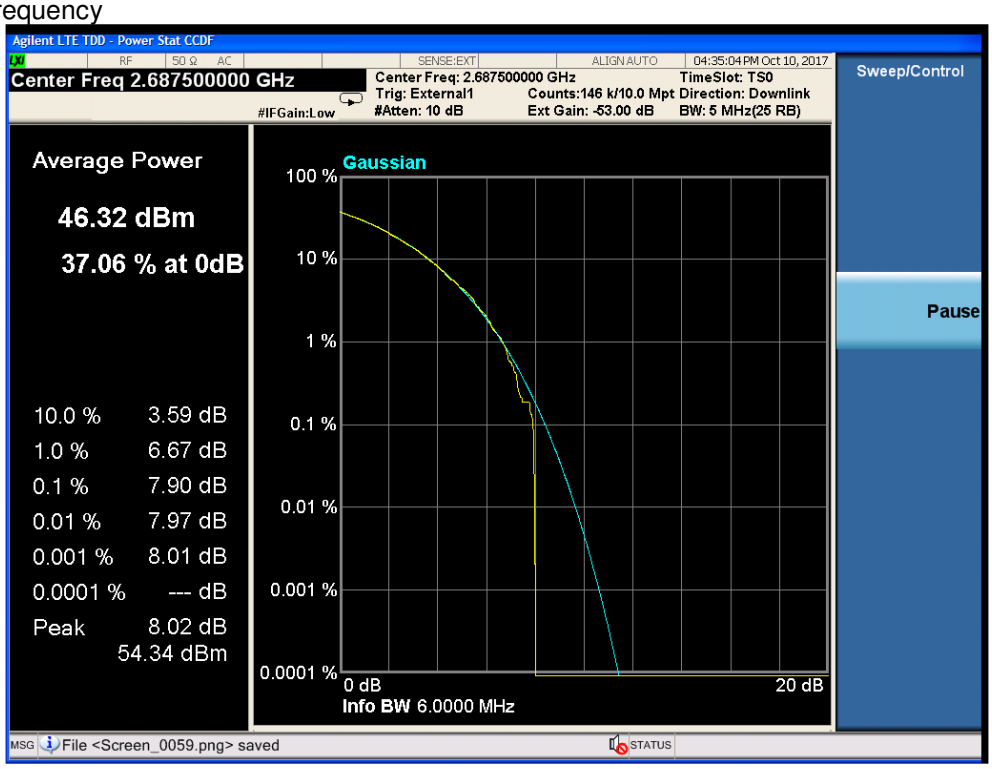
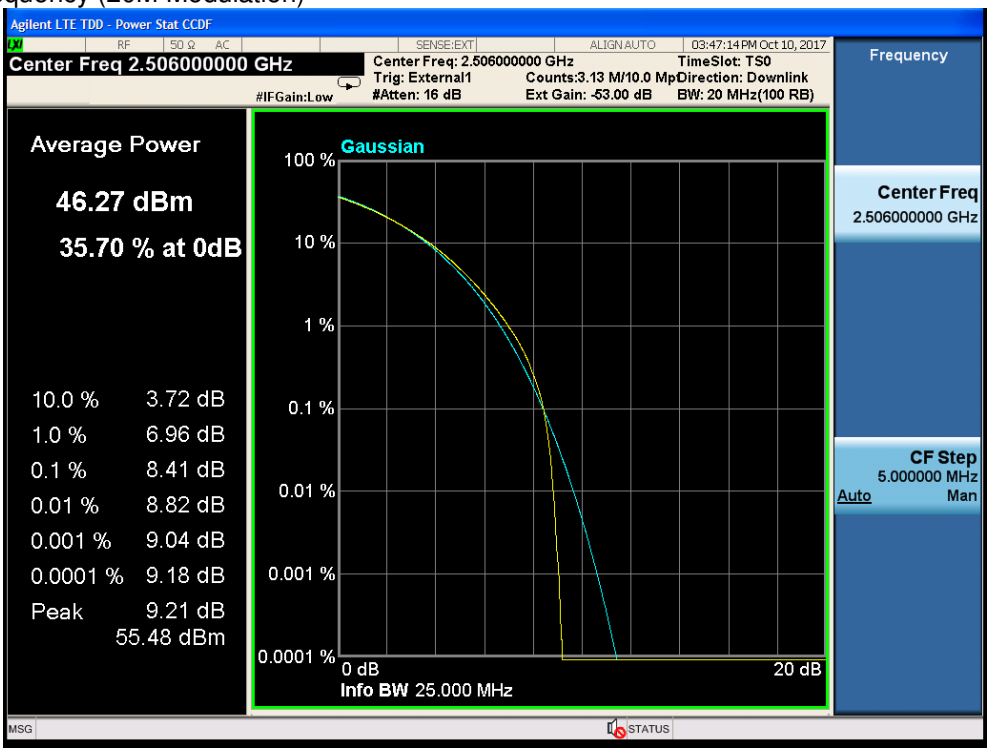
3.3 highest frequency



3.4 lowest frequency (20M Modulation)



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3.5 middle frequency

3.6 highest frequency

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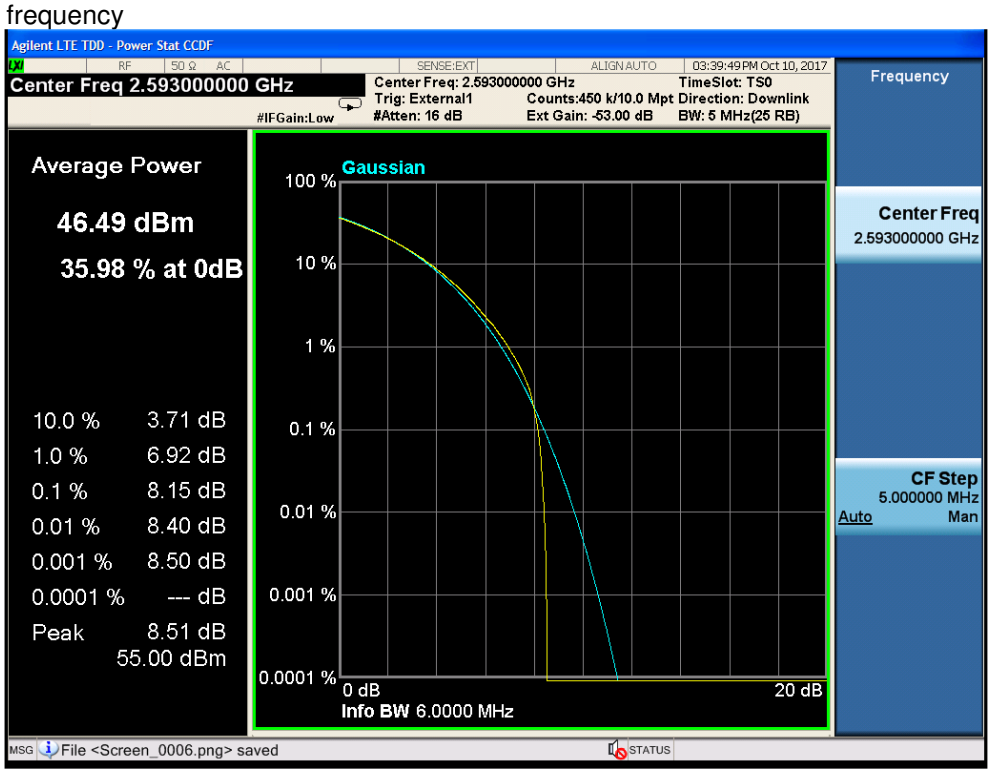
4.Downlink: MIMO:2496MHz to 2690MHz
4.1 LTEMode:5M Modulation
4.1.1 lowest frequency

4.1.2 middle frequency



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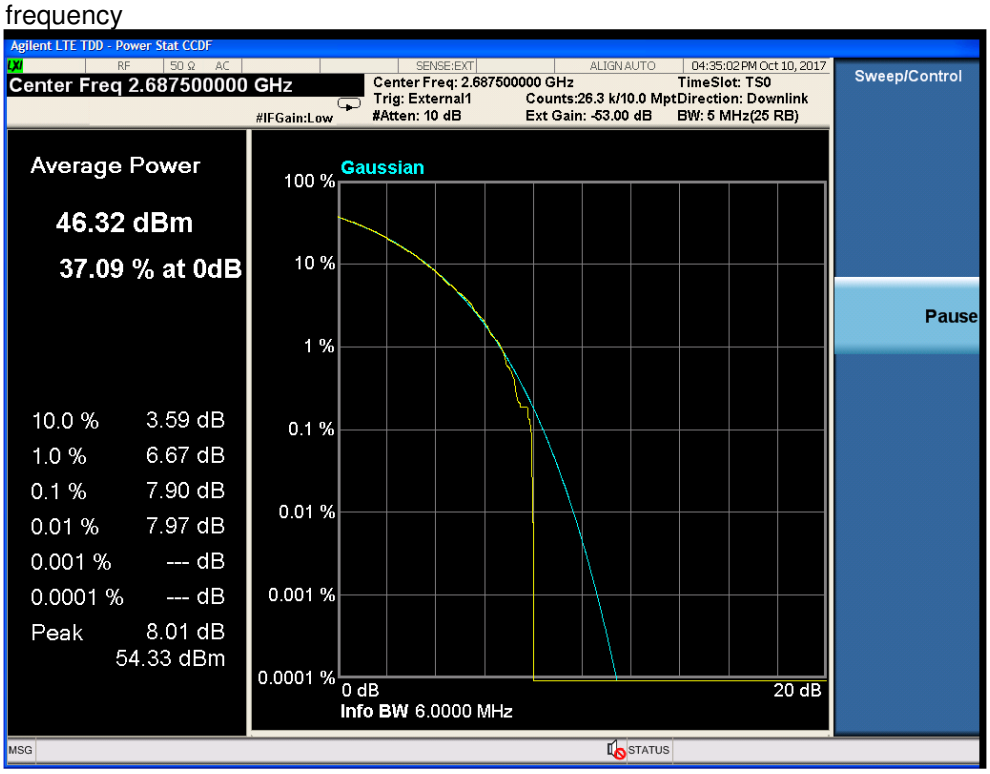
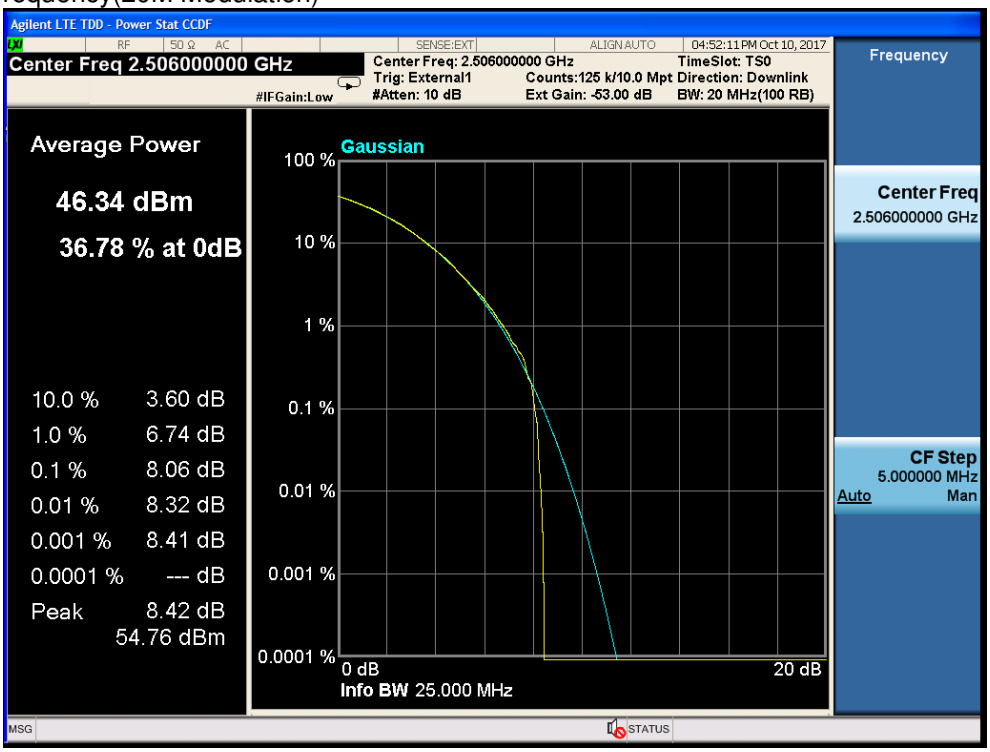
4.1.3 highest frequency



4.1.4 lowest frequency(20M Modulation)



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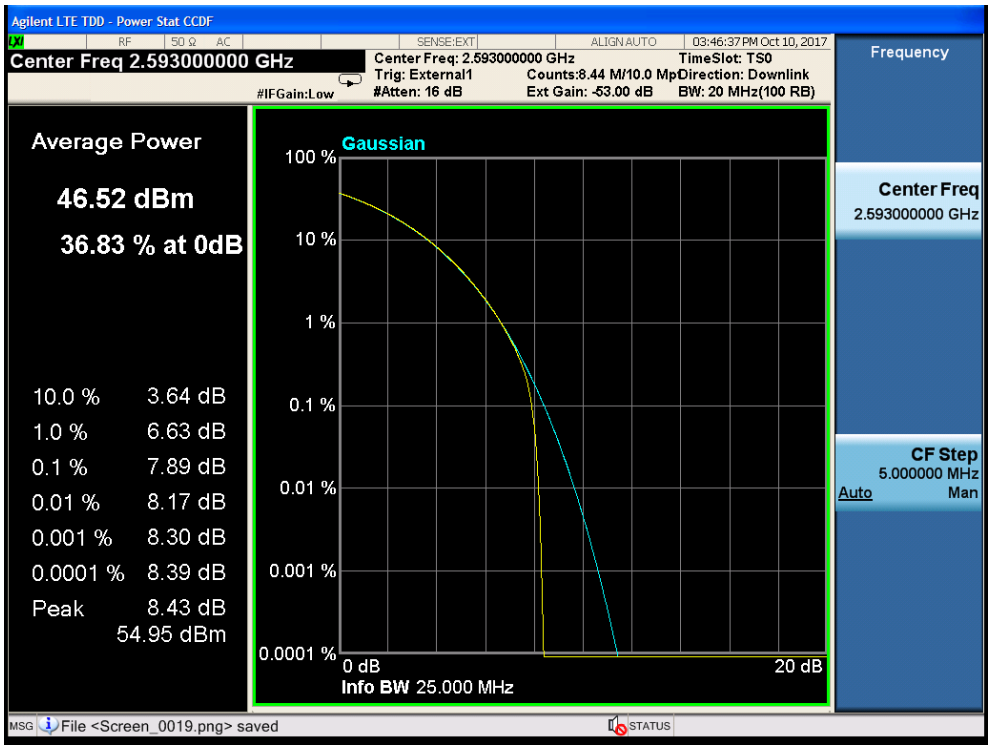
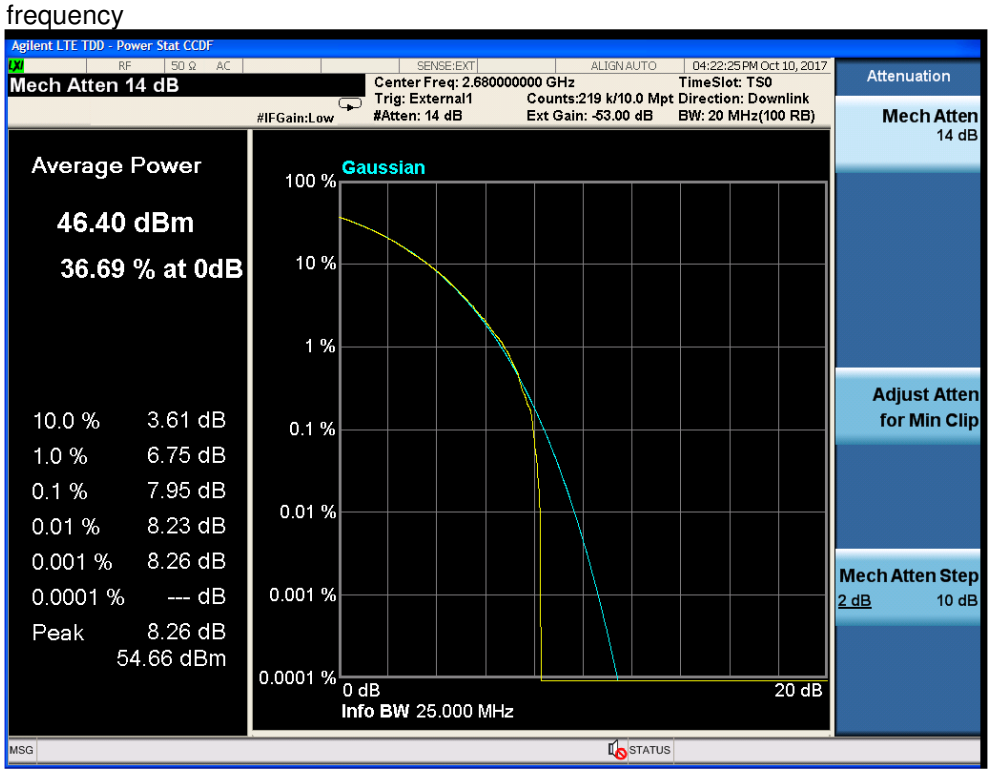
4.1.5 middle frequency



4.1.6 highest frequency



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7.2.2 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.

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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.

(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

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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.

(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:

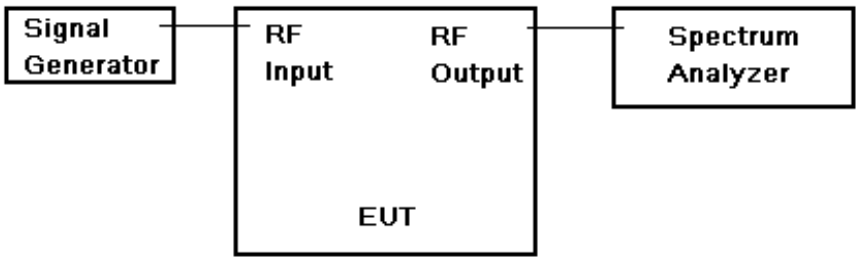

Fig.2. Conducted Spurious Emissions test configuration

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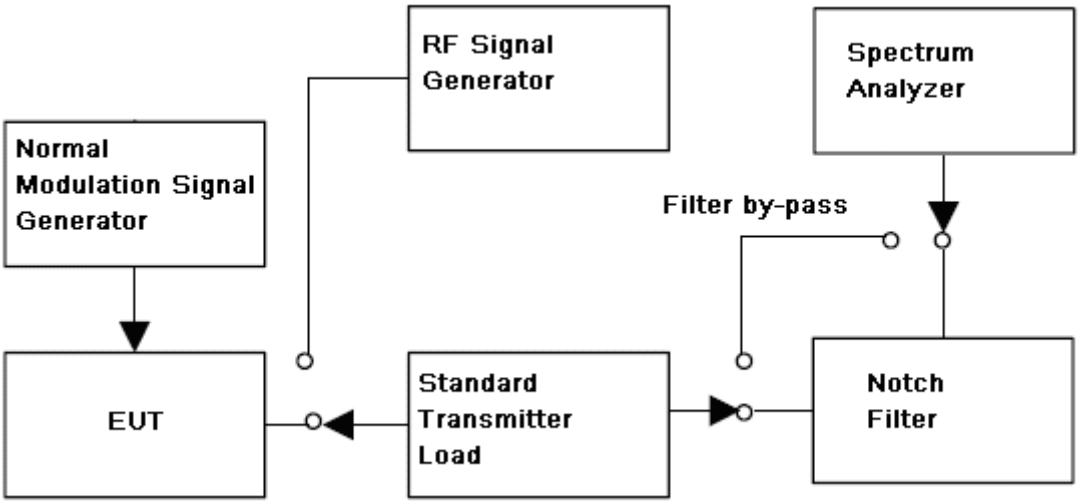

Test Procedure: Conducted Emissions test procedure:

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 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.

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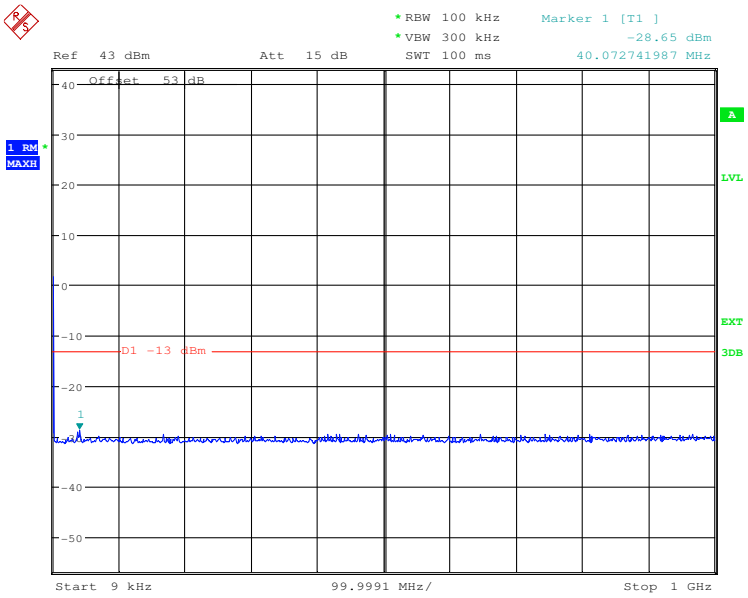
7.2.2.1 Measurement Record:

1 Downlink: 2350MHz ~ 2360MHz

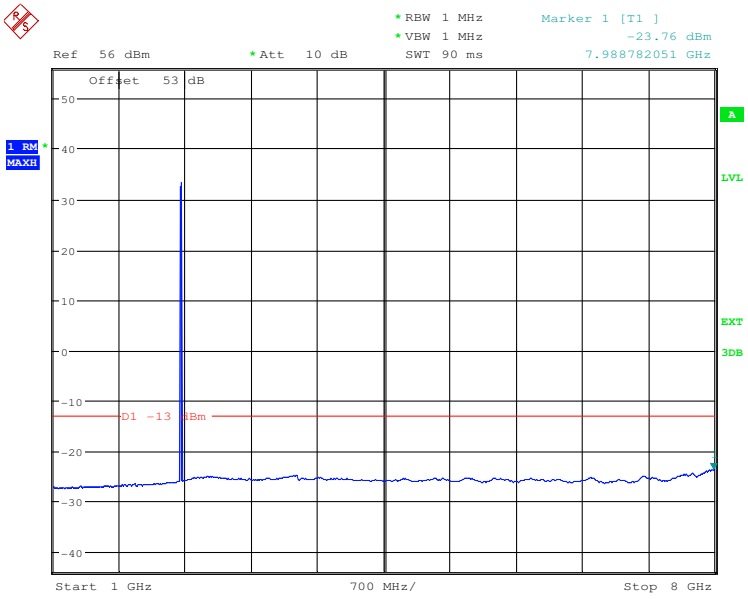
1) Middle frequency

9KHz to 1GHz



Date: 13.AUG.2017 12:44:43

1GHz to 8GHz



Date: 15.AUG.2017 06:52:11

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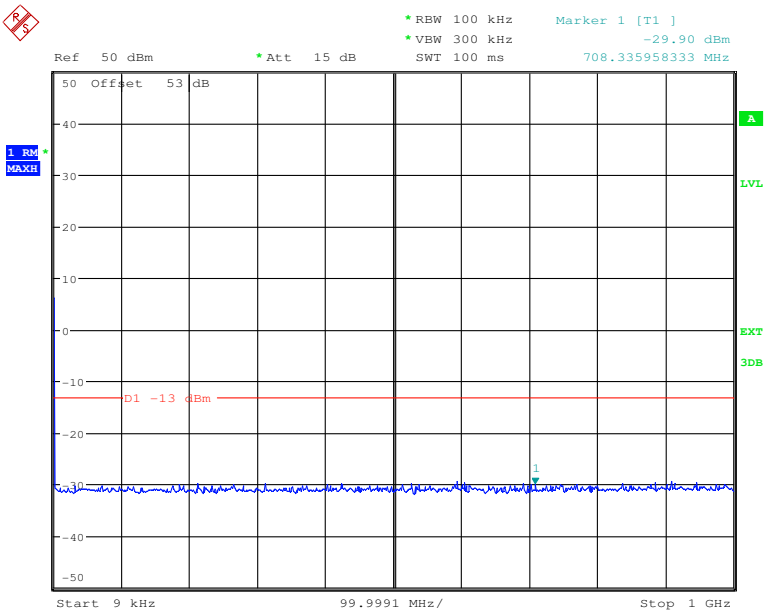
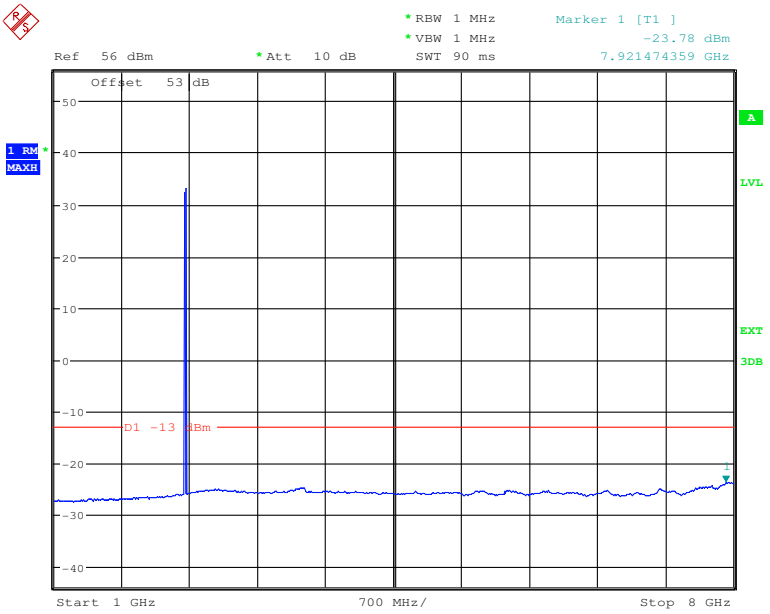
2.Downlink: MIMO:2350MHz ~ 2360MHz

1) Middle frequency

9KHz to 1GHz



1GHz to 8GHz



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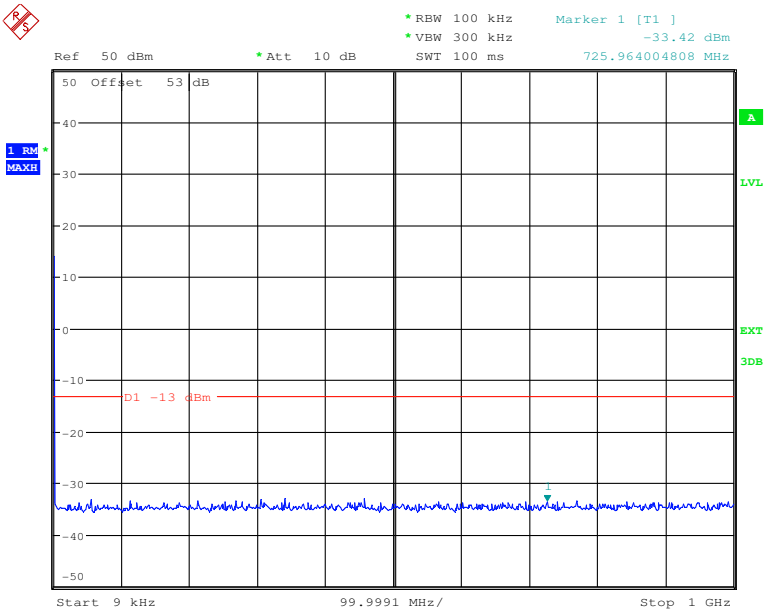
3.Downlink: 2496MHz ~ 2690MHz

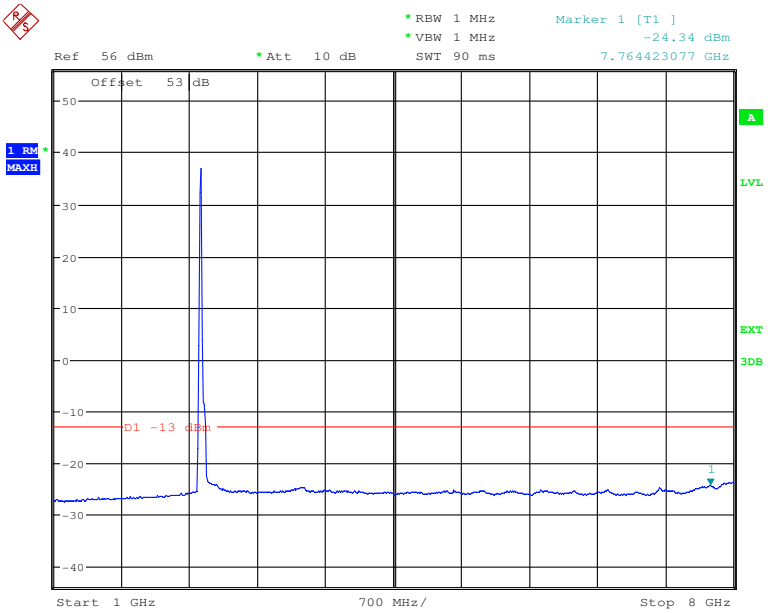
1)lowest frequency

9KHz to 1GHz



Date: 15.AUG.2017 07:47:40

1GHz to 8GHz



Date: 15.AUG.2017 06:59:02

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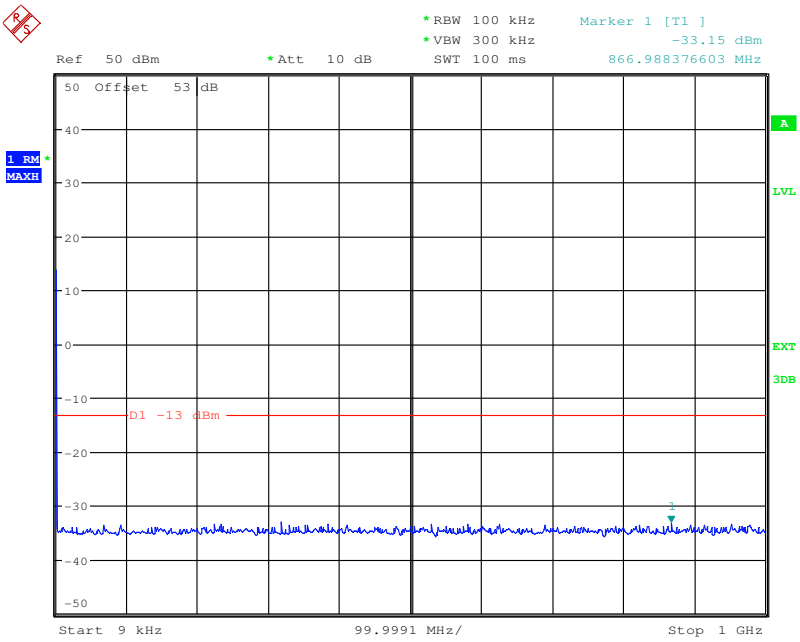
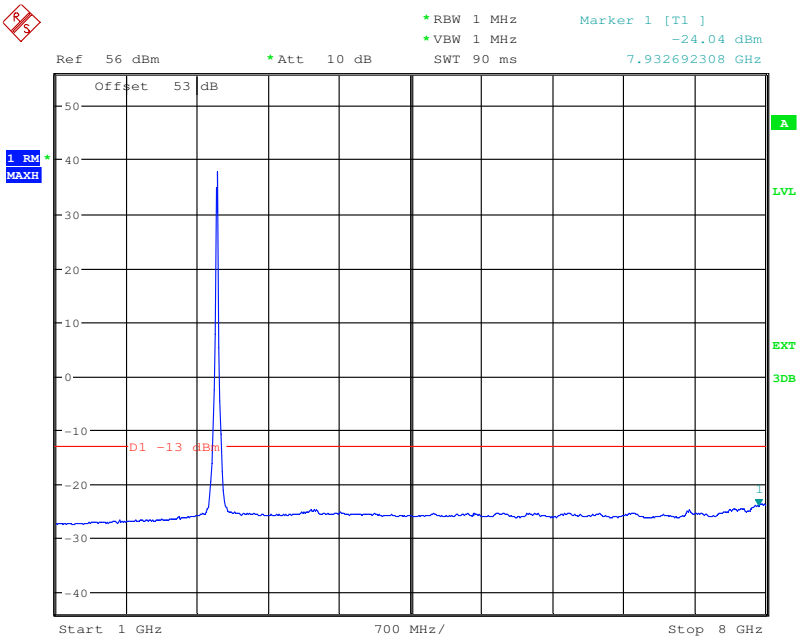
2)Middle frequency

9KHz to 1GHz



Date: 15.AUG.2017 07:47:51

1GHz to 8GHz



Date: 15.AUG.2017 07:00:15

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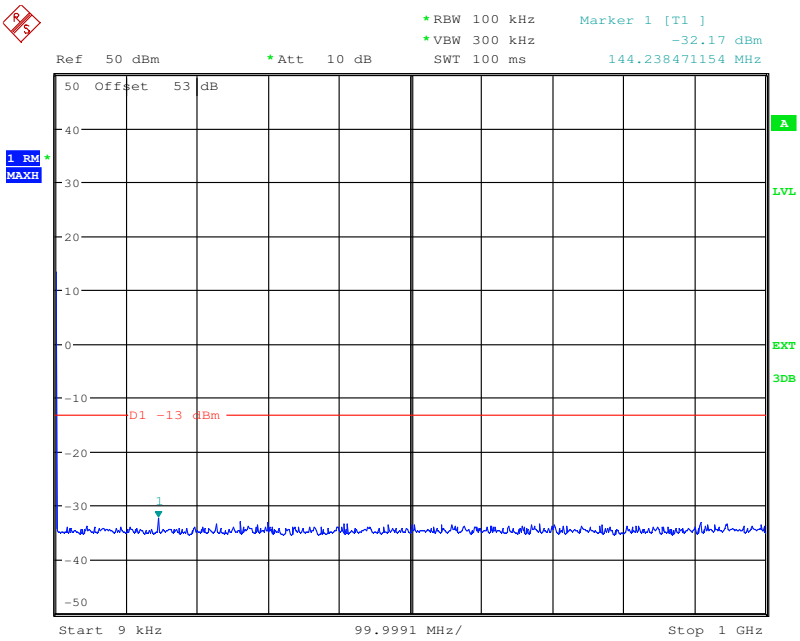
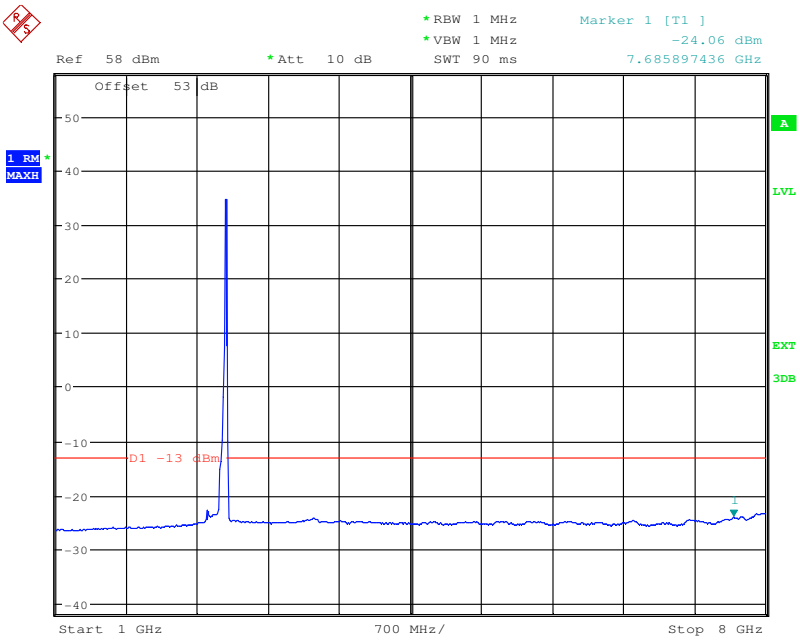
3)highest frequency

9KHz to 1GHz



Date: 15.AUG.2017 07:48:12

1GHz to 8GHz



Date: 15.AUG.2017 07:06:13

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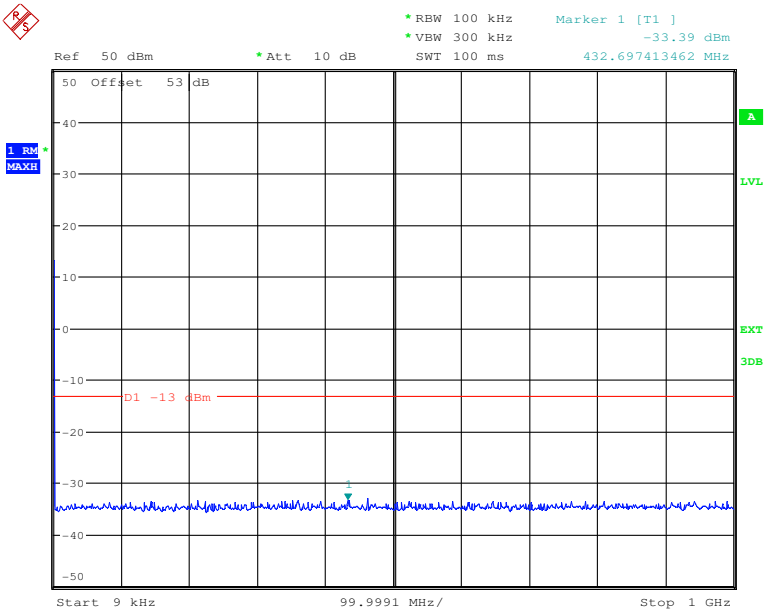
4.Downlink: MIMO:2496MHz ~ 2690MHz

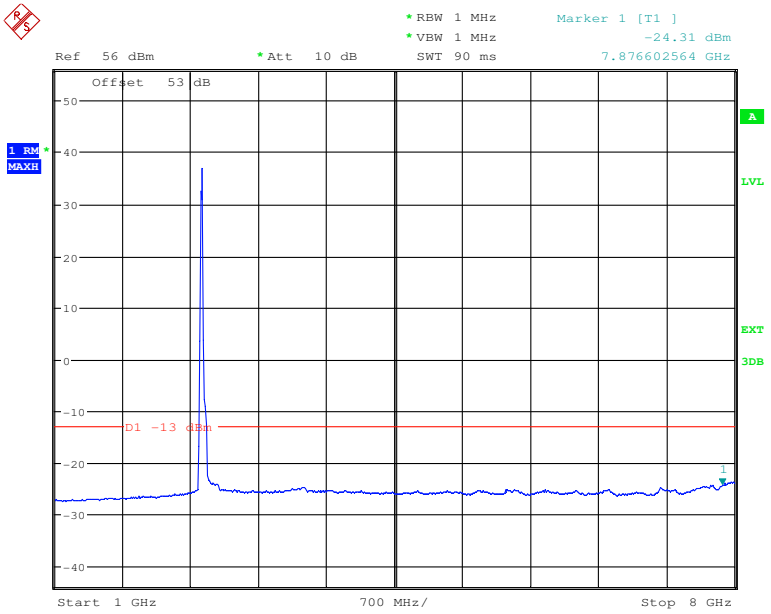
1) lowest frequency

9KHz to 1GHz



Date: 15.AUG.2017 07:48:25

1GHz to 8GHz



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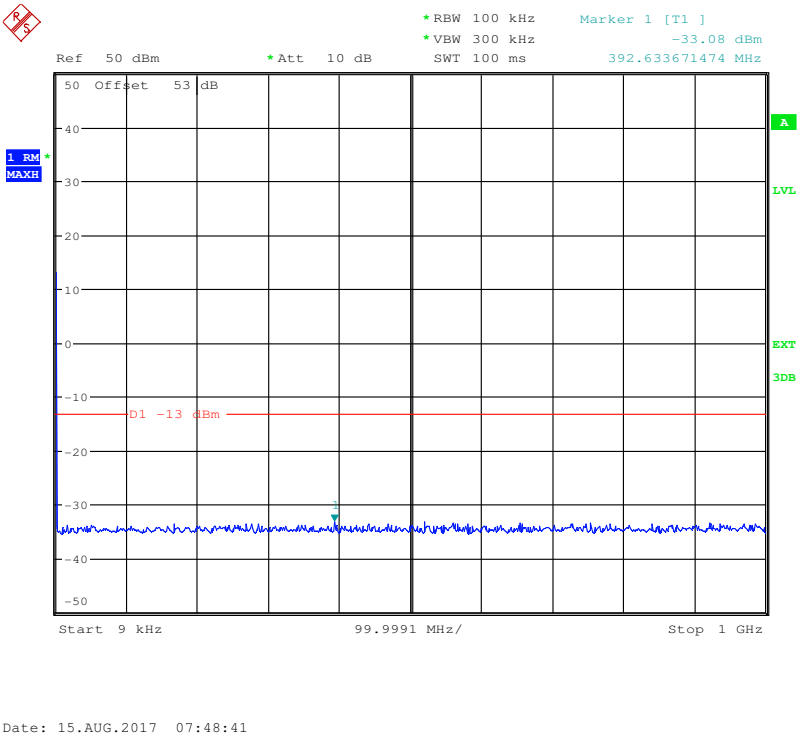
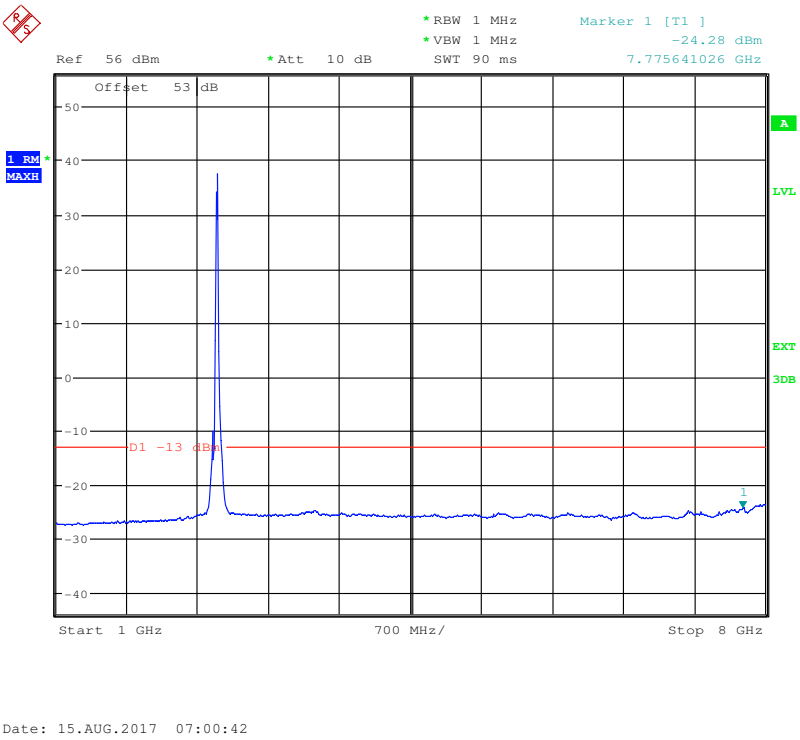
2)Middle frequency

9KHz to 1GHz



1GHz to 8GHz



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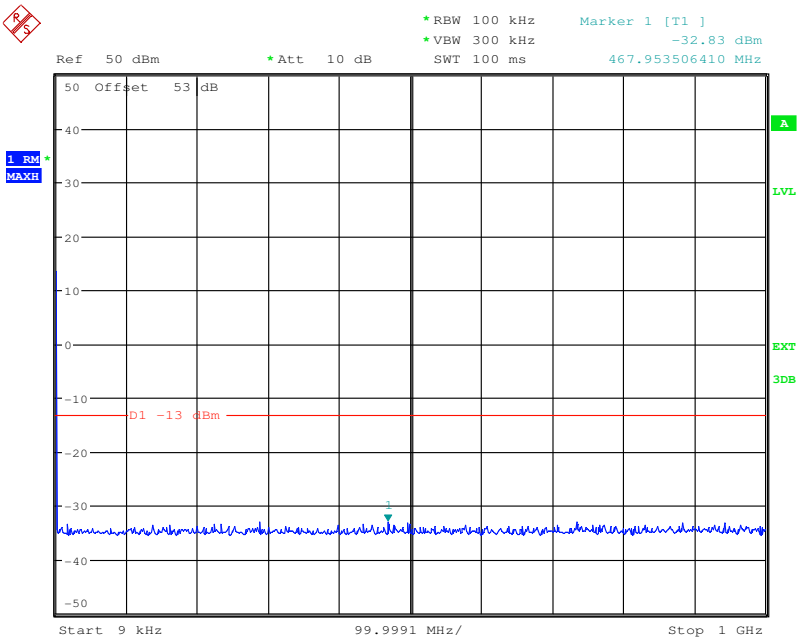
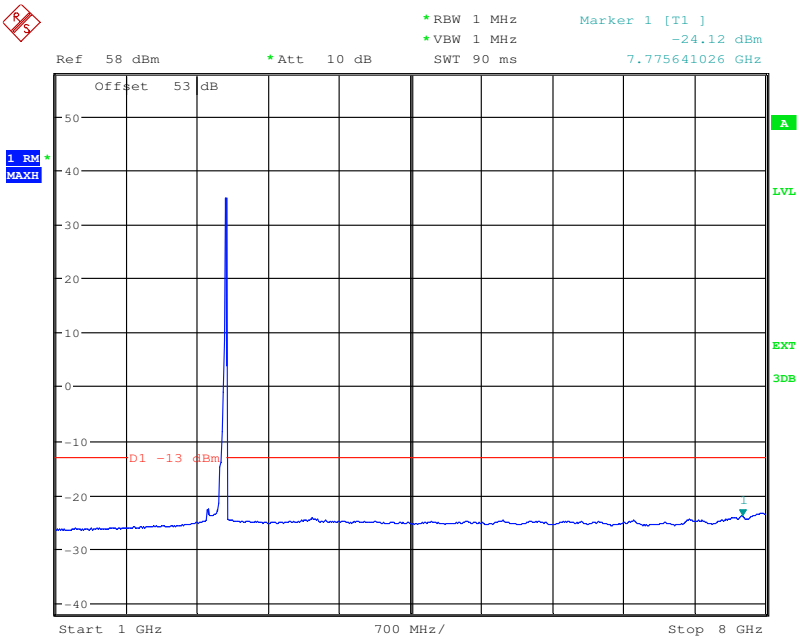
3)highest frequency

9KHz to 1GHz



Date: 15.AUG.2017 07:48:57

1GHz to 8GHz



Date: 15.AUG.2017 07:07:01

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7.2.3 Band Edge& Intermodulation

Test Date: 2017-01-22 and 2017-02-08

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&2-11-04/EAB/RF

EUT Operation:

Status: Drive the EUT to maximum output power.

Conditions: Normal conditions

Application: Cellular Band RF output ports

Test Configuration:

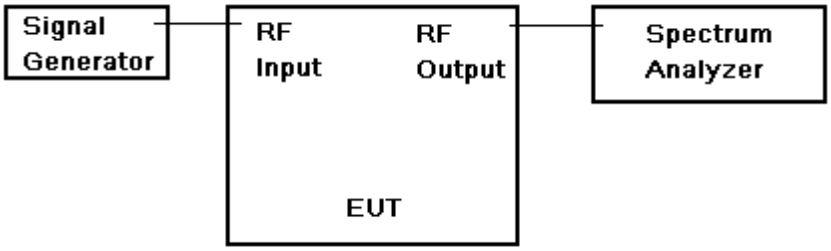
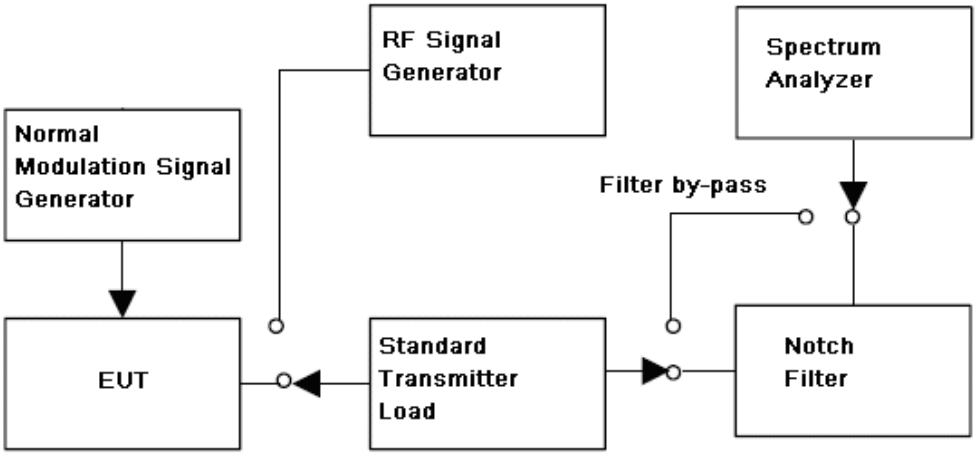


Fig.3. Band edge and Intermodulation test configuration



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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;
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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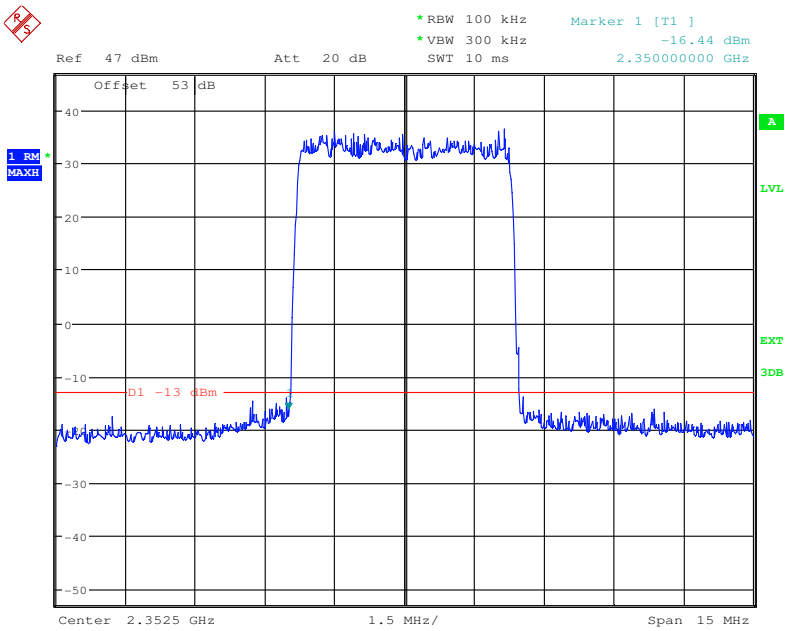
7.2.3.1 Measurement Record:

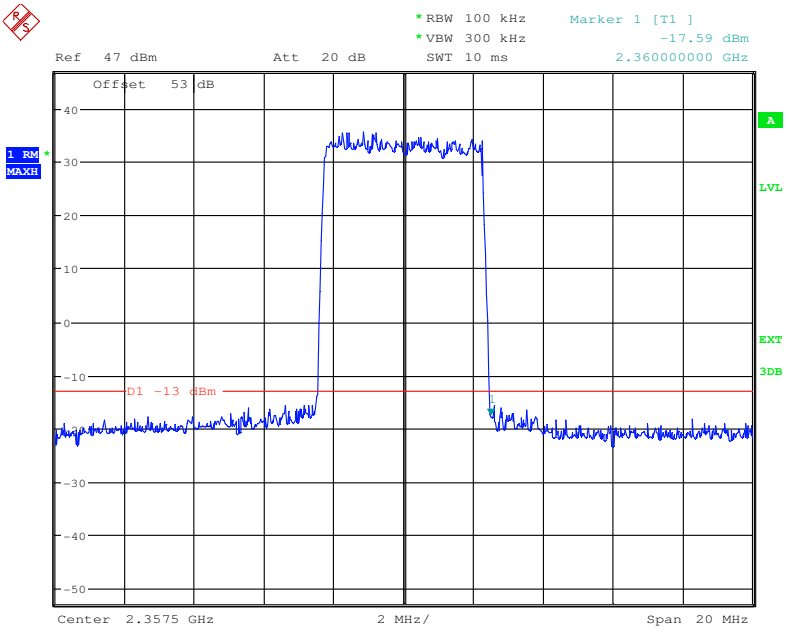
1) Downlink: 2350MHz to 2360MHz(LTE Mode)

1.1 one signal input —Lower Edge



Date: 14.AUG.2017 13:37:58

1.2 one signal input —Upper Edge



Date: 14.AUG.2017 13:42:14

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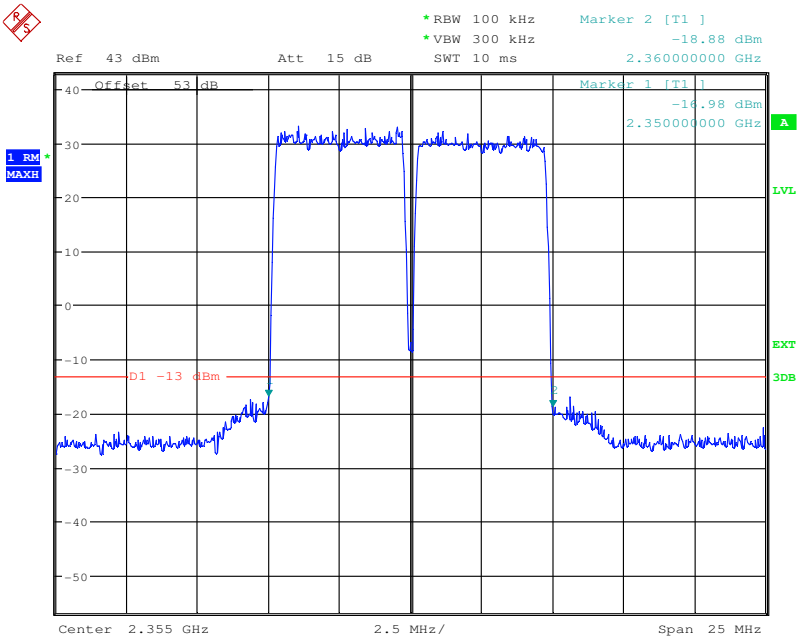
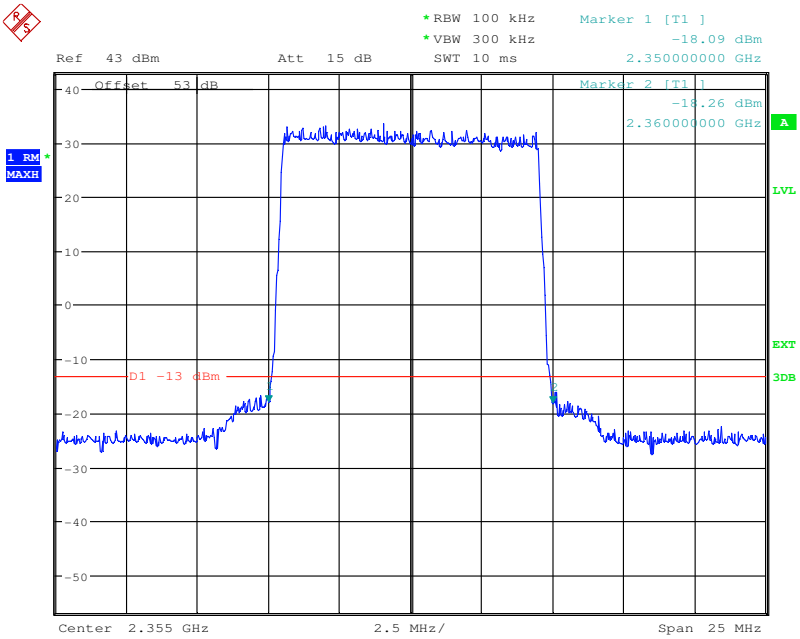
1.3 two signal input —Lower and Upper Edge



Date: 13.AUG.2017 12:37:03

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



Date: 13.AUG.2017 12:40:15

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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:-22dBm

measure frequency		product Value (dBm)	Limit (dBm)	Magin (dB)
3rd	Lower:2350MHz	-19.21	-13dBm	-6.21
	Higher:2360MHz	-18.63		-5.63
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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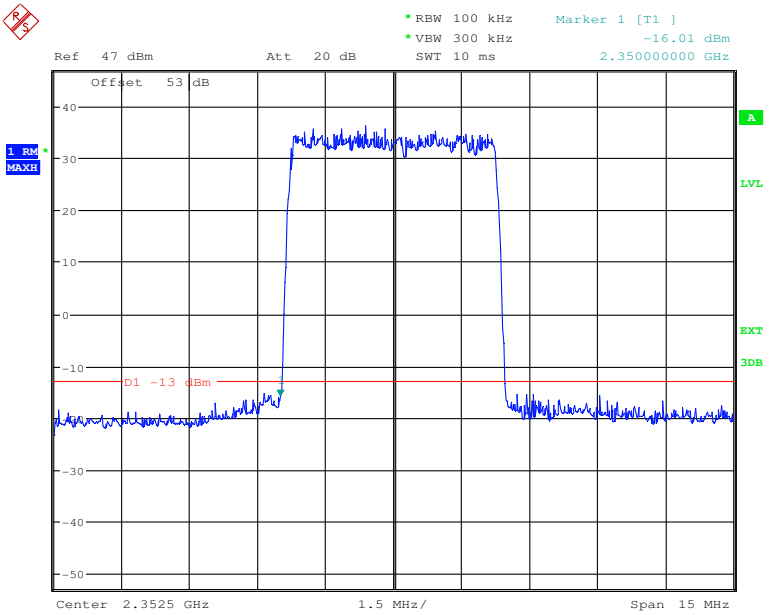
7.2.3.2 Measurement Record:

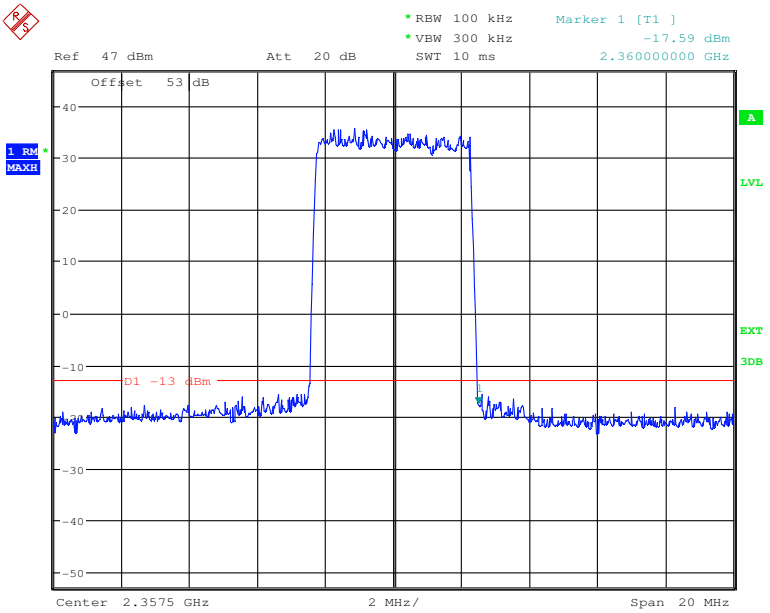
2) Downlink:MIMO: 2350MHz to 2360MHz(LTE)

1.1 one signal input —Lower Edge



Date: 14.AUG.2017 13:36:39

1.2 one signal input — Upper Edge



Date: 14.AUG.2017 13:42:14

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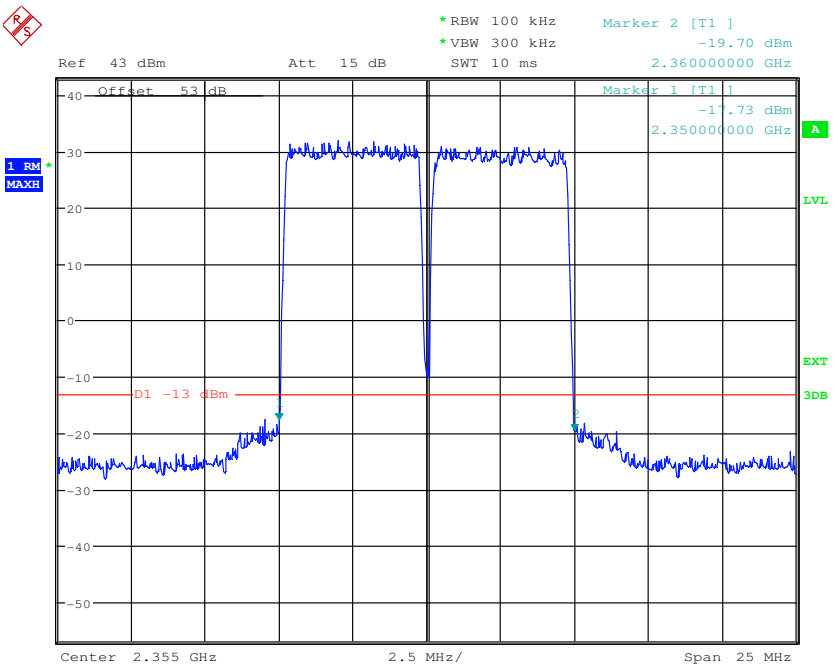
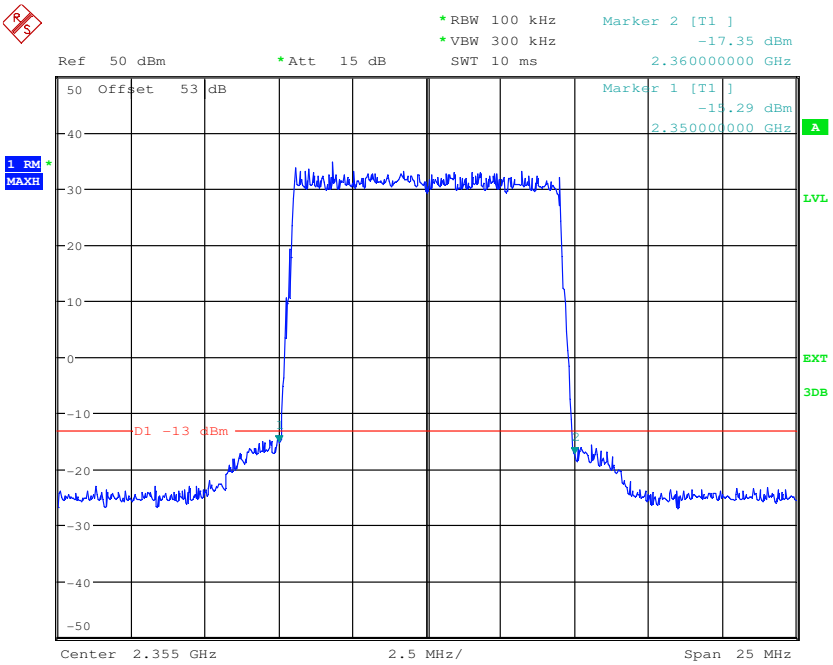
1.3 two signal input —Lower and Upper Edge



Date: 13.AUG.2017 12:37:45

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



Date: 13.AUG.2017 13:27:31

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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:-22dBm

measure frequency		product Value (dBm)	Limit (dBm)	Magin (dB)
3rd	Lower:2350MHz	-17.47	-13dBm	-4.47
	Higher:2360MHz	-18.15		-5.15
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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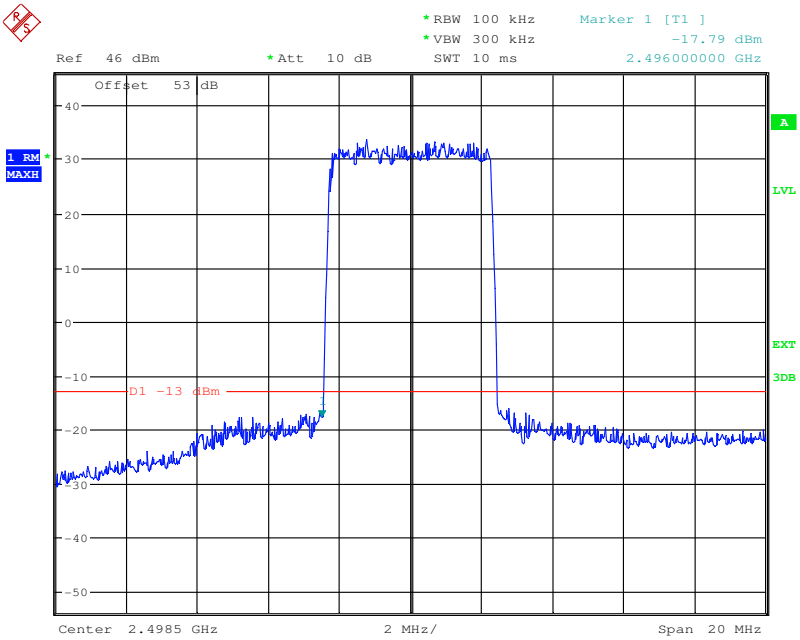
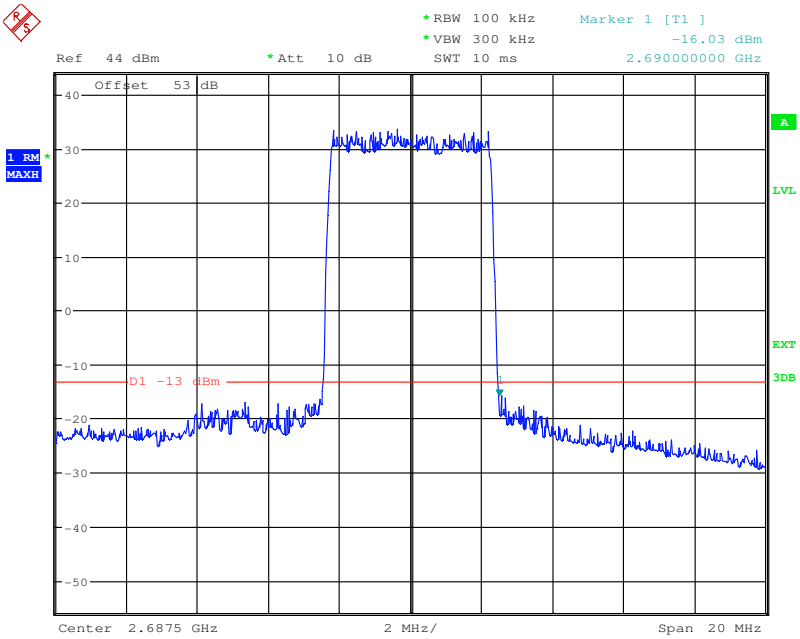
3) Downlink: 2496MHz to 2690MHz(5M Modulation)

1.1 one signal input —Lower Edge



Date: 14.AUG.2017 11:34:06

1.2 one signal input — Upper Edge



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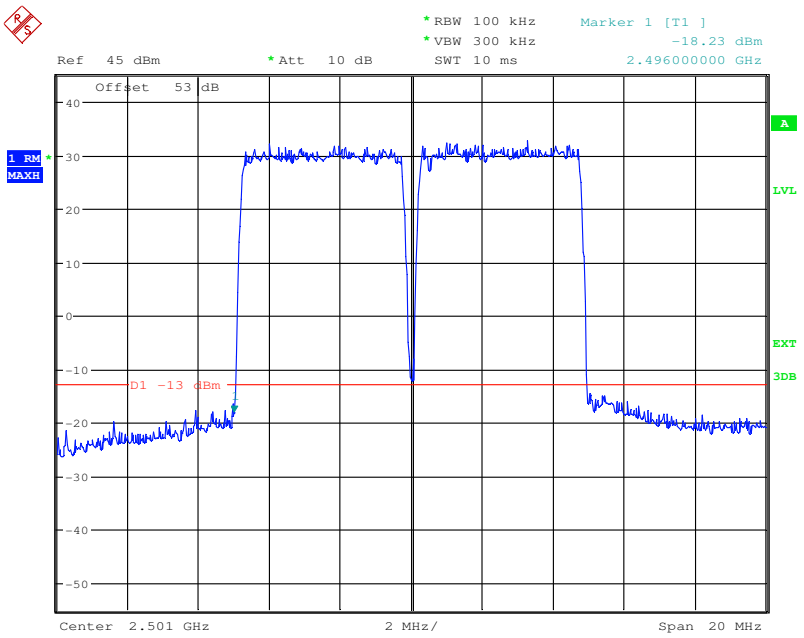
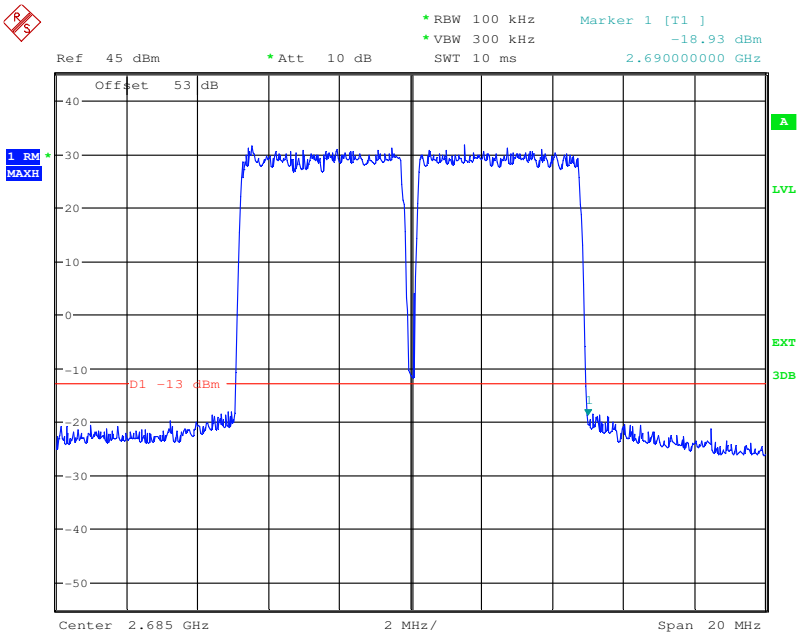
1.3 two signal input —Lower Edge



1.4 two signal input —Upper Edge



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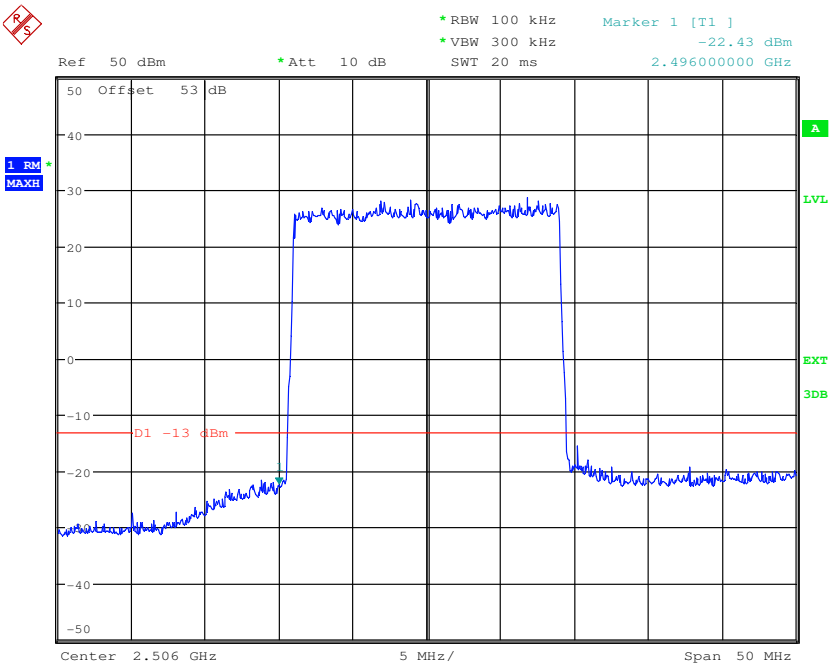
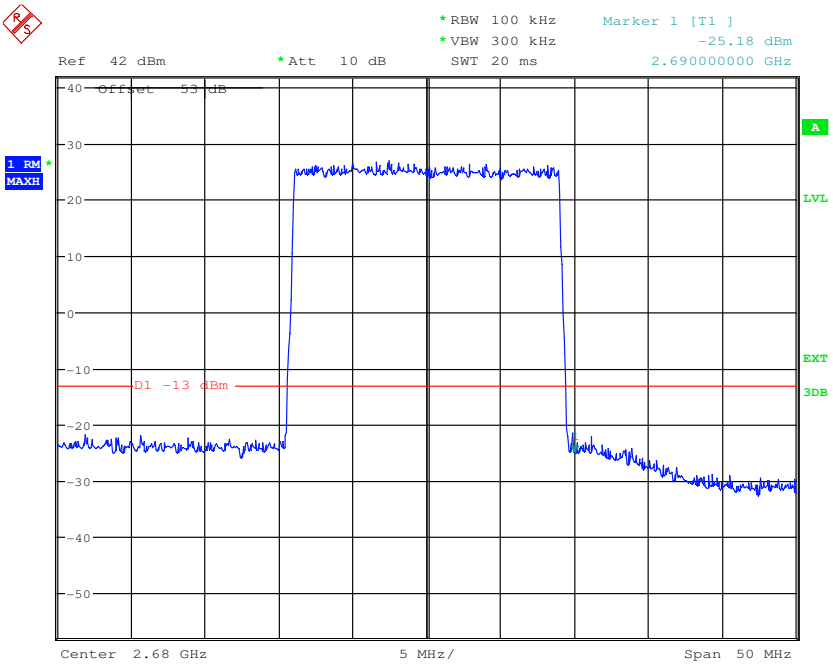
1.5 one signal input —Lower Edge(20M Modulation)



Date: 14.AUG.2017 11:25:06

1.6 one signal input — Upper Edge



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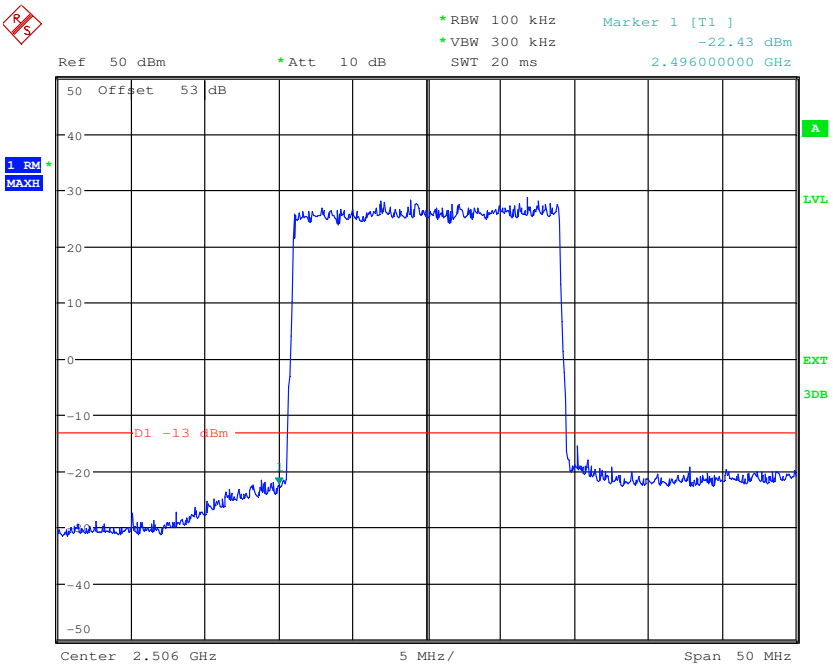
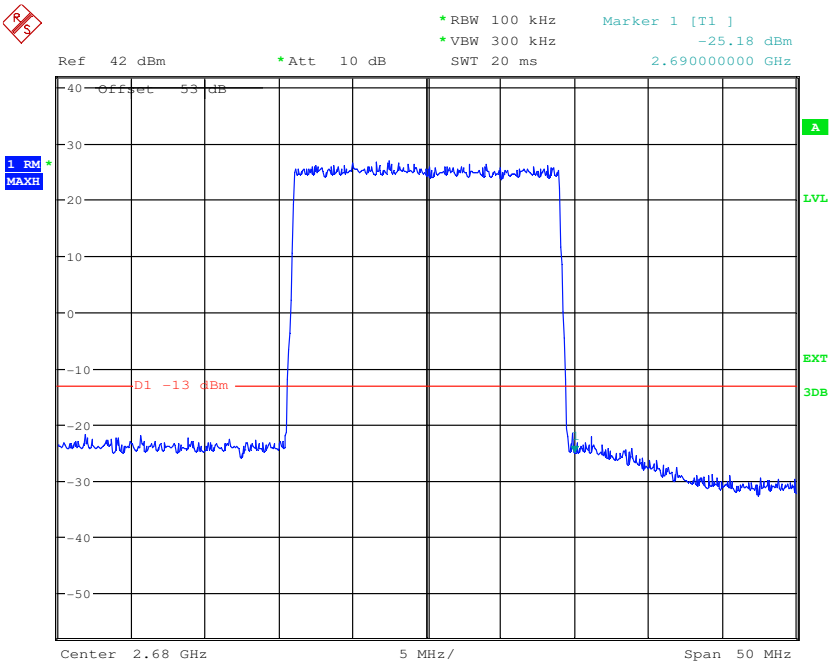
1.5 one signal input —Lower Edge(20M Modulation)



Date: 14.AUG.2017 11:25:06

1.6 one signal input — Upper Edge



Date: 14.AUG.2017 11:29:04

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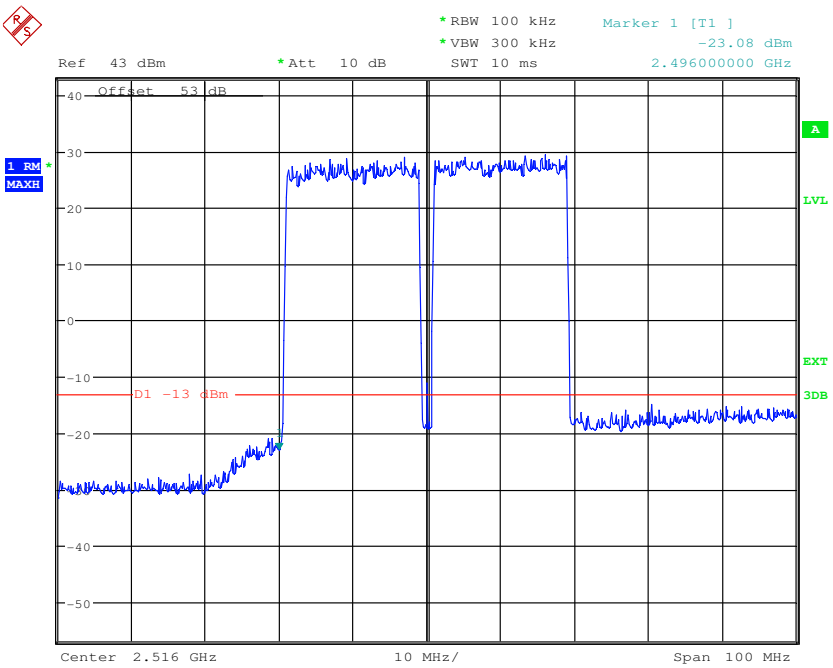
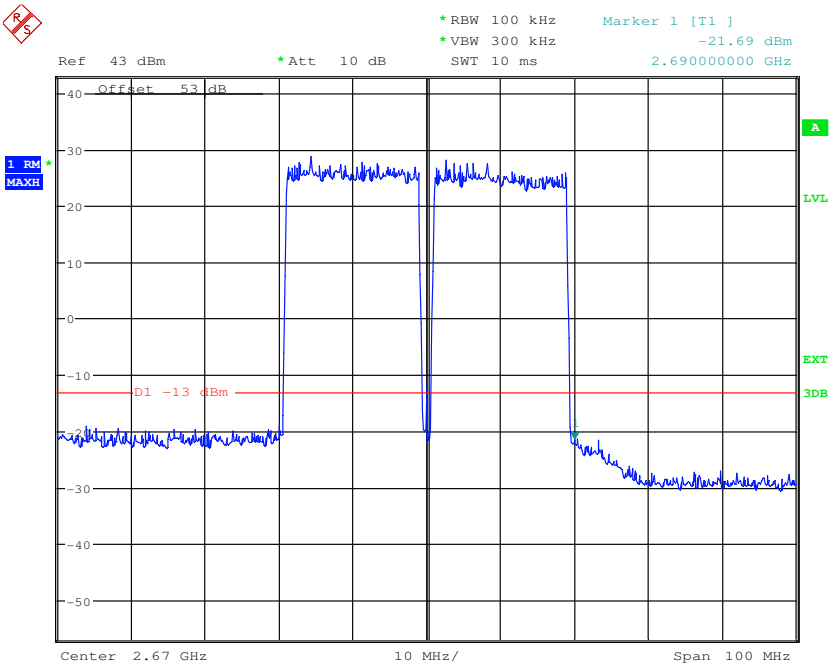
1.7 two signal input —Lower Edge



Date: 14.AUG.2017 11:42:39

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:-22dBm

measure frequency		product Value (dBm)	Limit (dBm)	Magin (dB)
3rd	Lower:2496MHz	-21.63	-13dBm	-8.63
	Higher:2690MHz	-21.98		-8.98
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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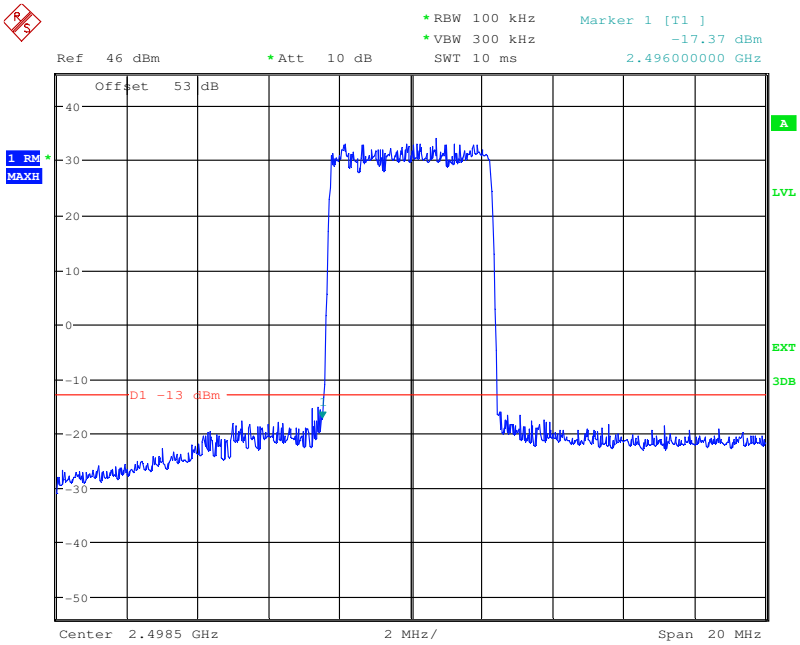
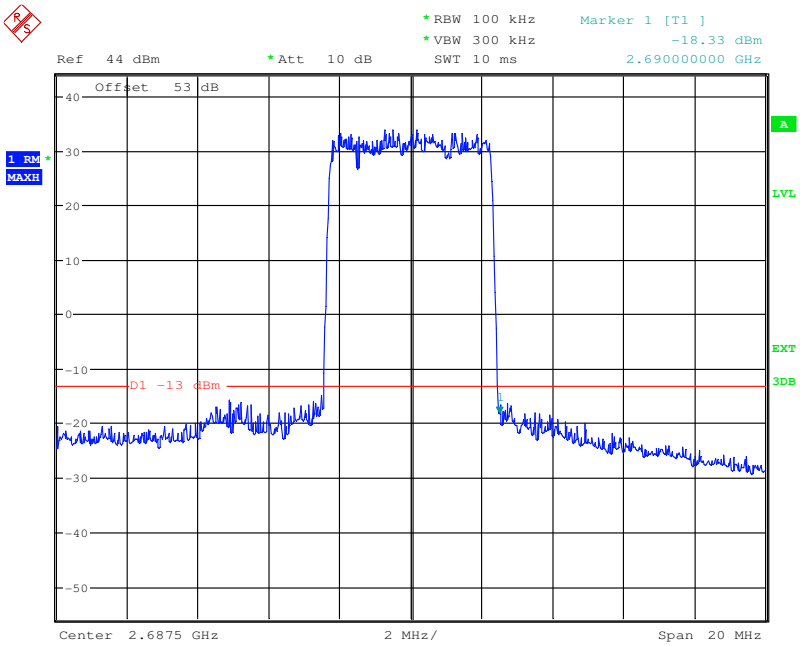
4) Downlink: MIMO:2496MHz to 2690MHz(LTE)

1.1 one signal input —Lower Edge



Date: 14.AUG.2017 11:33:48

1.2 one signal input — Upper Edge



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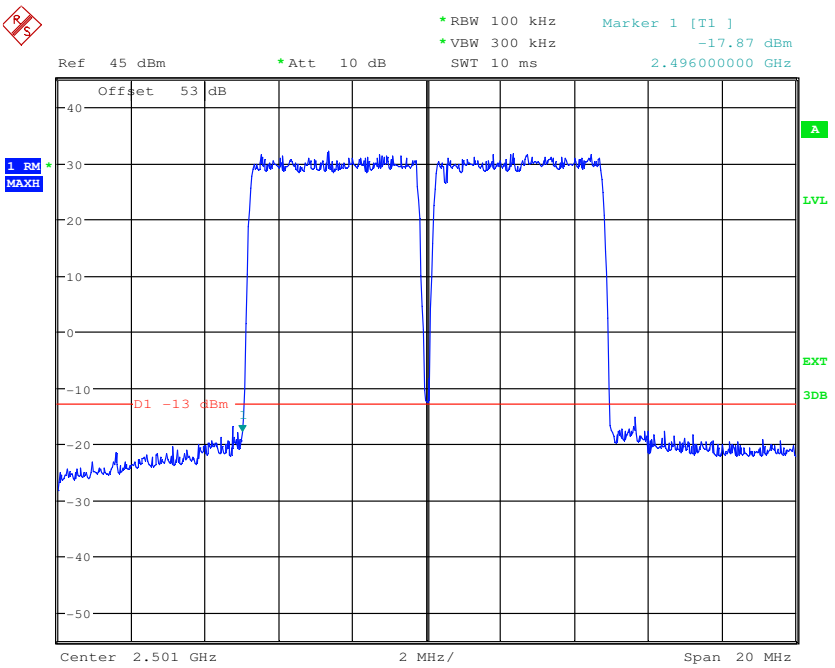
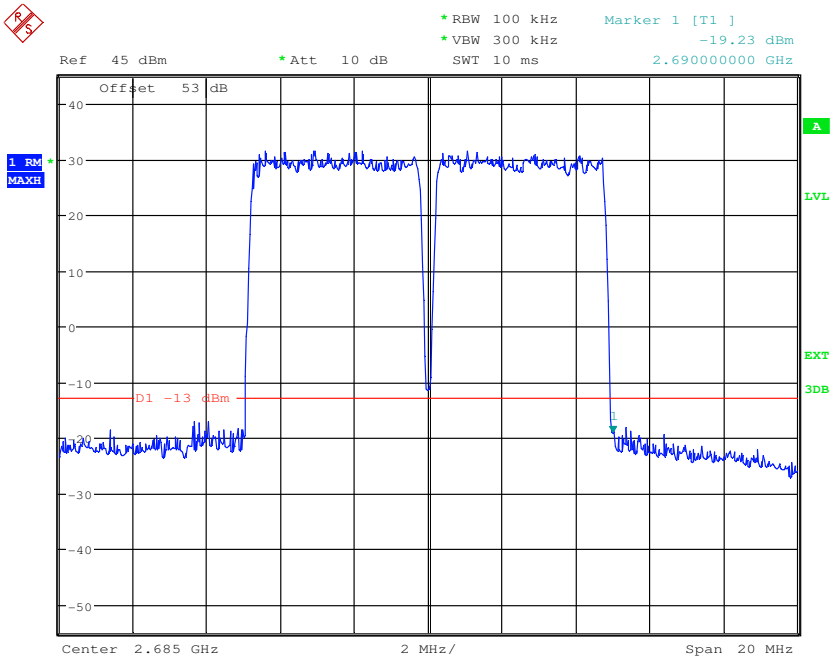
1.3 two signal input —Lower Edge



1.4 two signal input —Upper Edge



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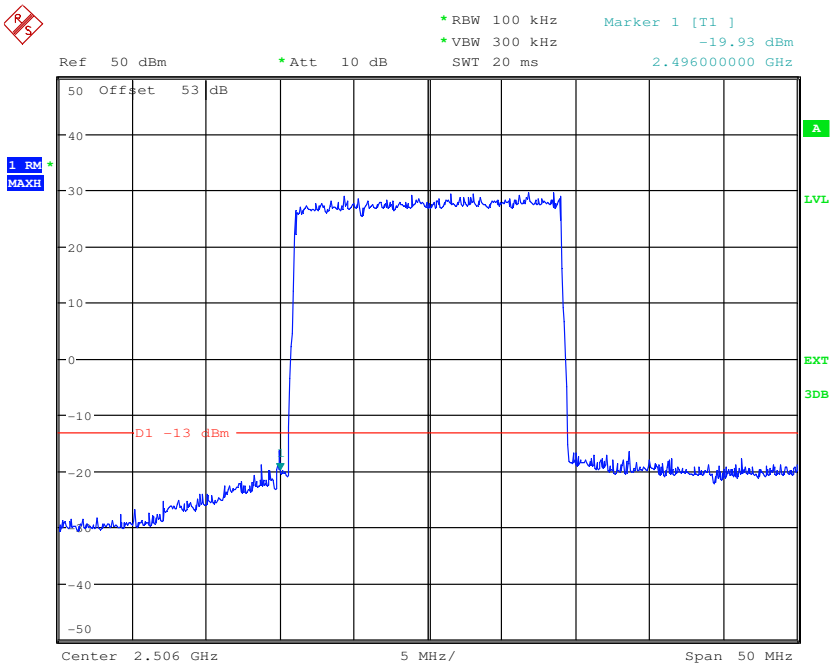
1.5 one signal input —Lower Edge(20M Modulation)



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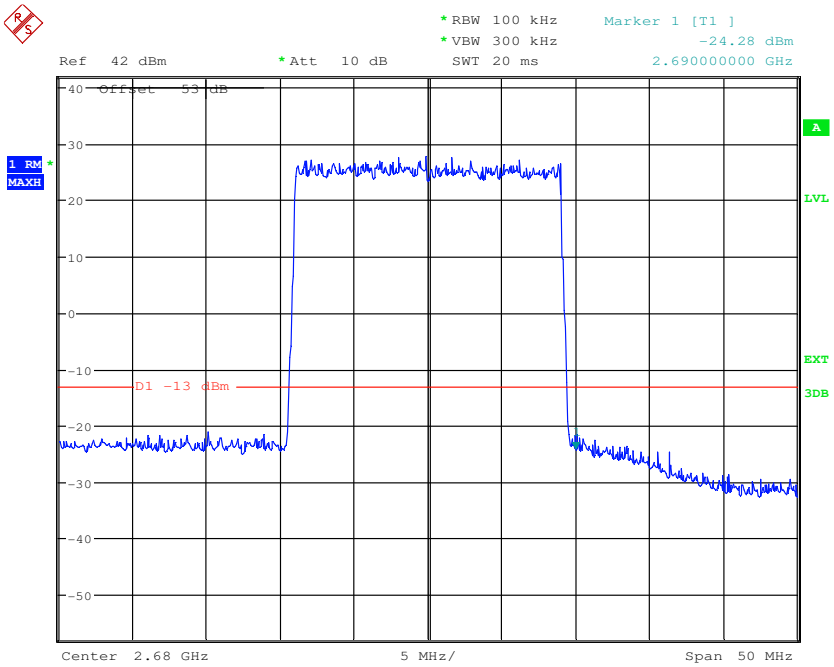
1.6 one signal input — Upper Edge



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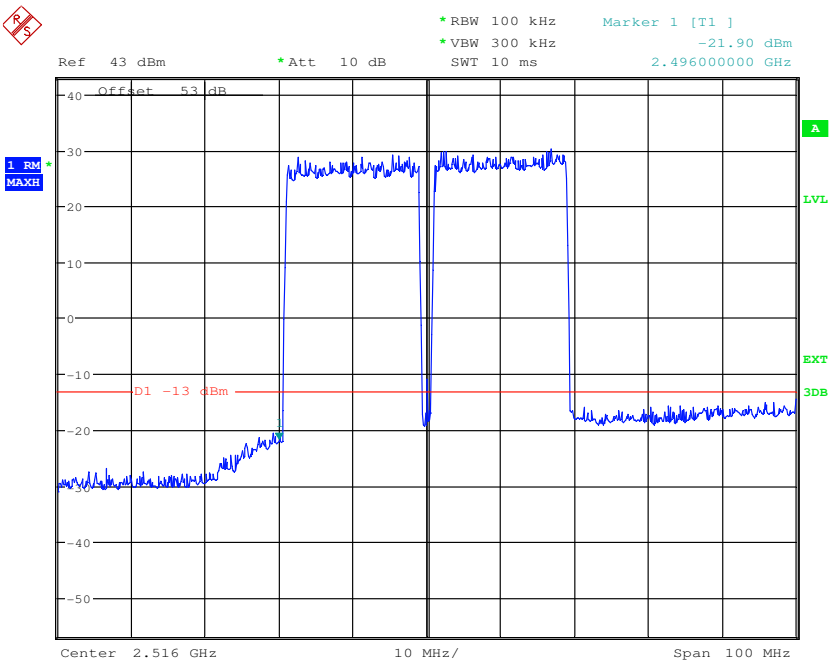
1.7 two signal input —Lower Edge



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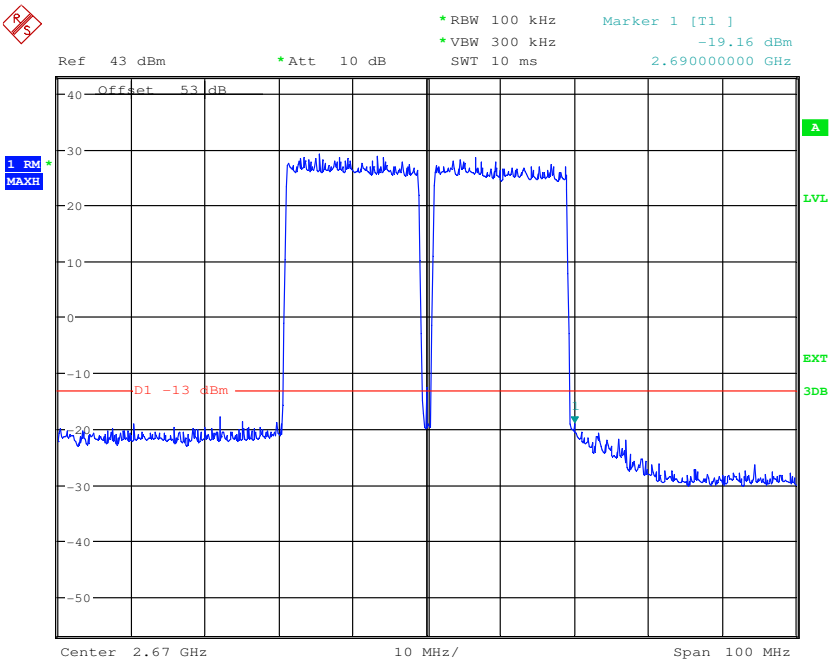
1.8 two signal input —Upper Edge



Date: 14.AUG.2017 11:41:27

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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+△f)=f1-△f=lower edge frequency;

h) 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,

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

h) 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,

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

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

F1=2486MHz,F2=2700MHz

1.9.2 Input power:-22dBm

measure frequency		product Value (dBm)	Limit (dBm)	Magin (dB)
3rd	Lower:2496MHz	-21.87	-13dBm	-8.87
	Higher:2690MHz	-22.45		-9.45
5rd	Lower:2491MHz	-23.92	-13dBm	-10.92
	Higher: 2695MHz	-22.87		-9.87
7rd	Lower: 2486MHz	-23.21	-13dBm	-10.21
	Higher: 2700MHz	-23.78		-10.78

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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7.2.4 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 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.

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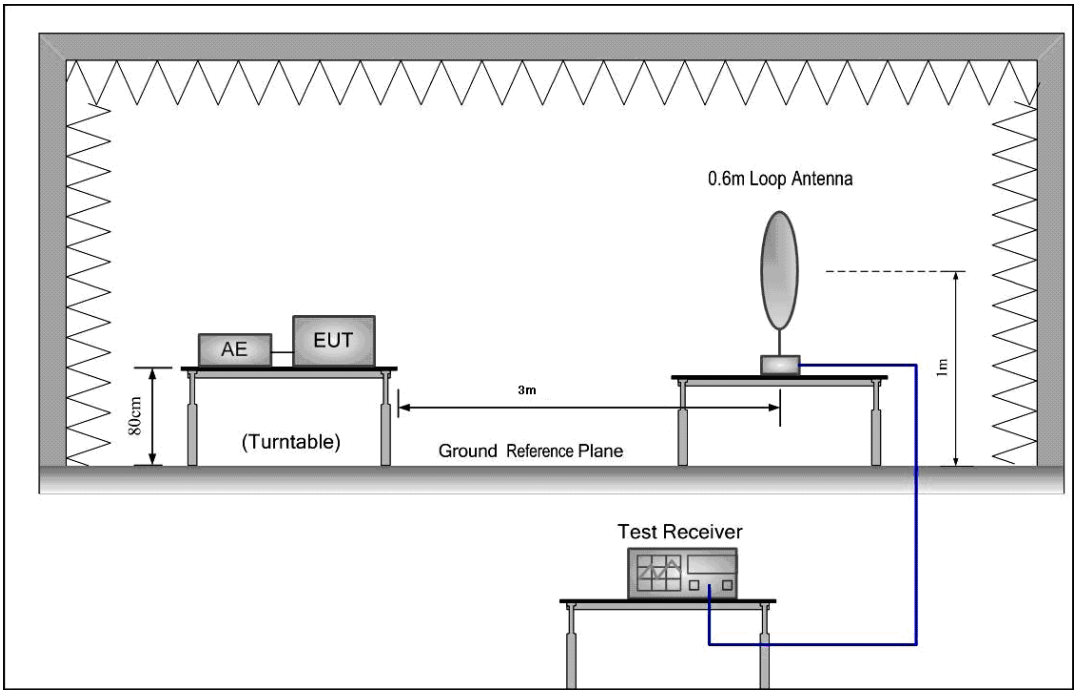
Test Method: FCC part 2.1053
ANSI/TIA-603-C-2004

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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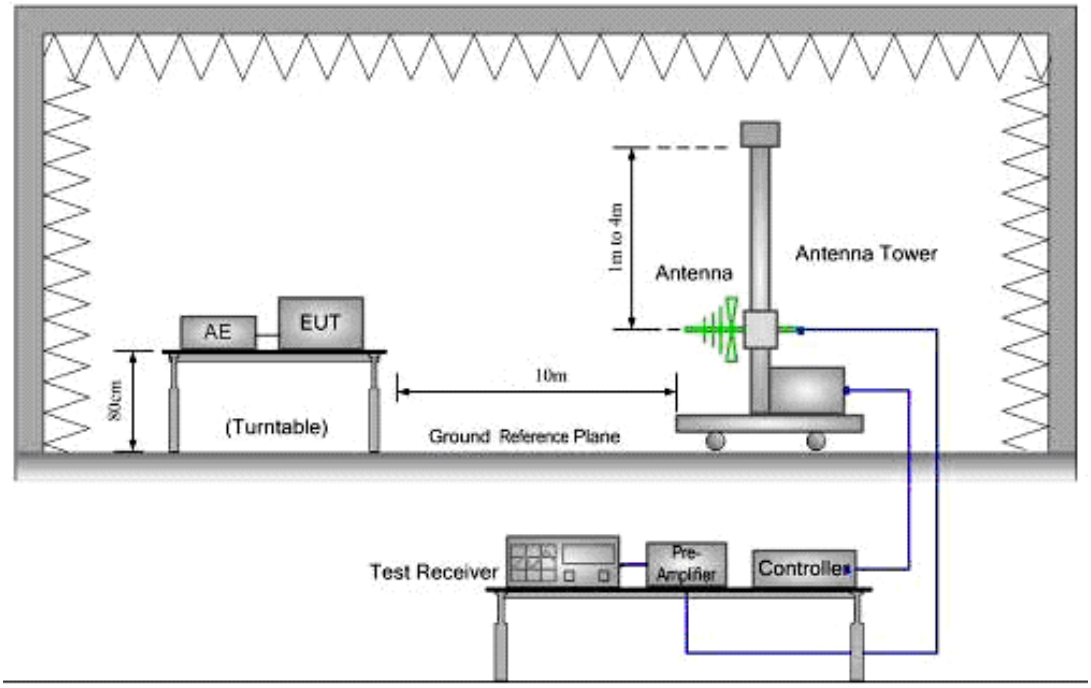
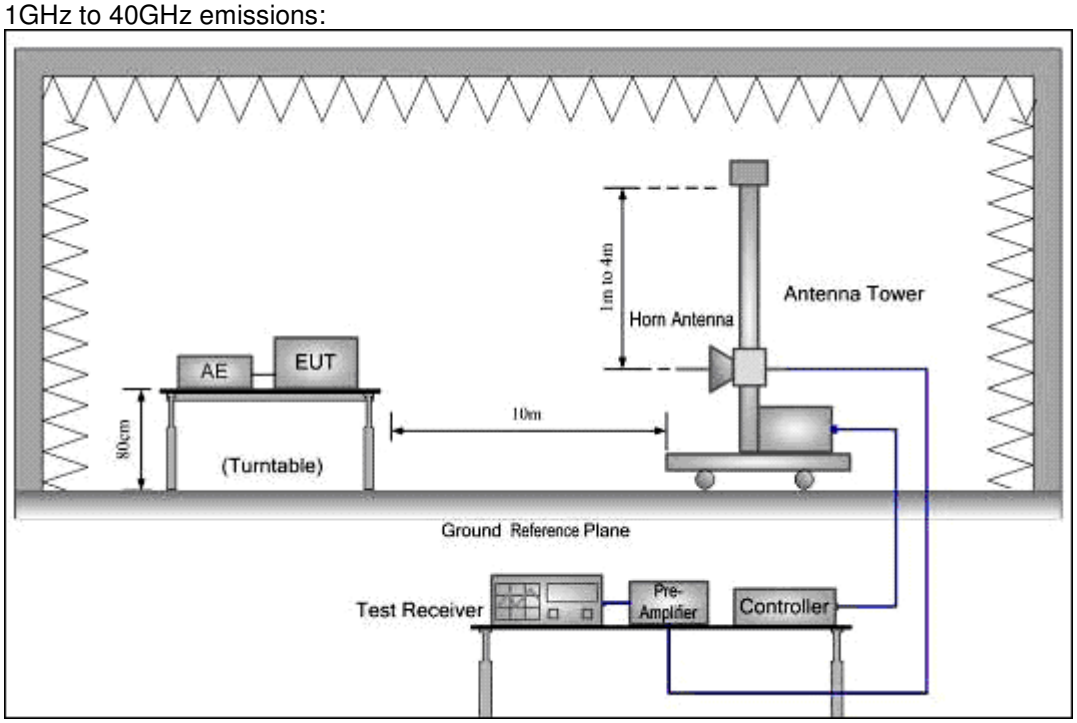
30MHz to 1GHz emissions:



1GHz to 40GHz emissions:



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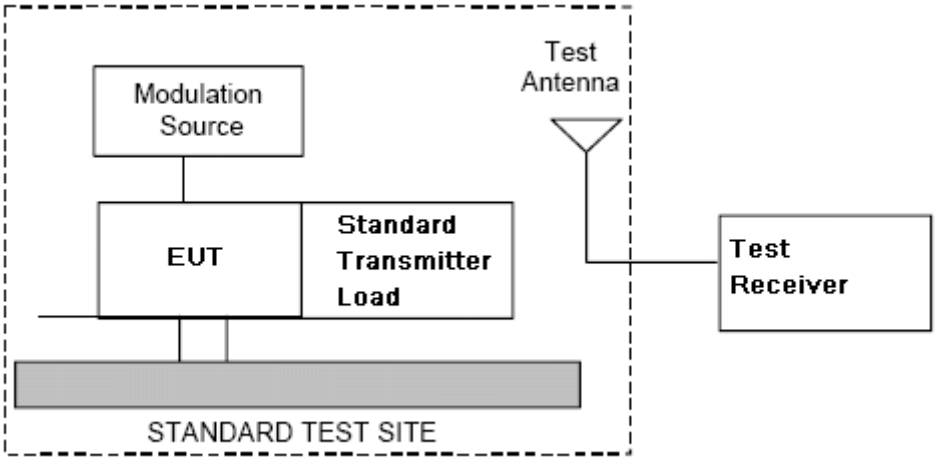
Test Procedure:

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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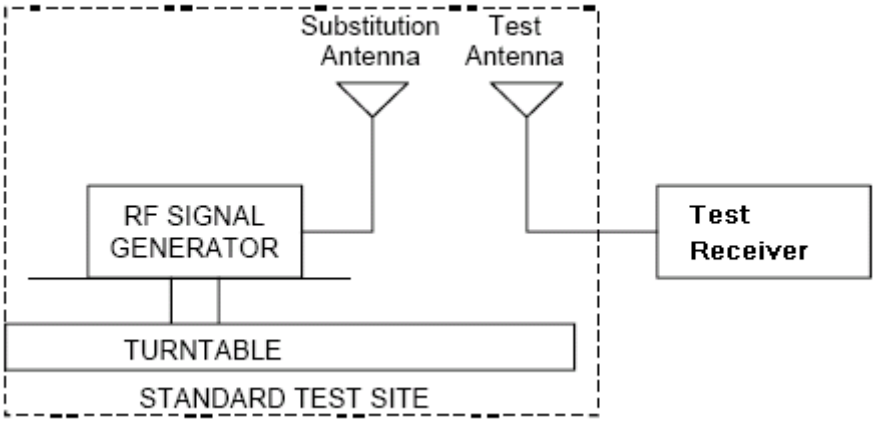

h) Reconnect the equipment as illustrated.

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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7.2.4.1 Measurement Record: (need to change data)

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

Test Result:

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

9KHz~1000 MHz Field Strength of Unwanted Emissions. Quasi-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.

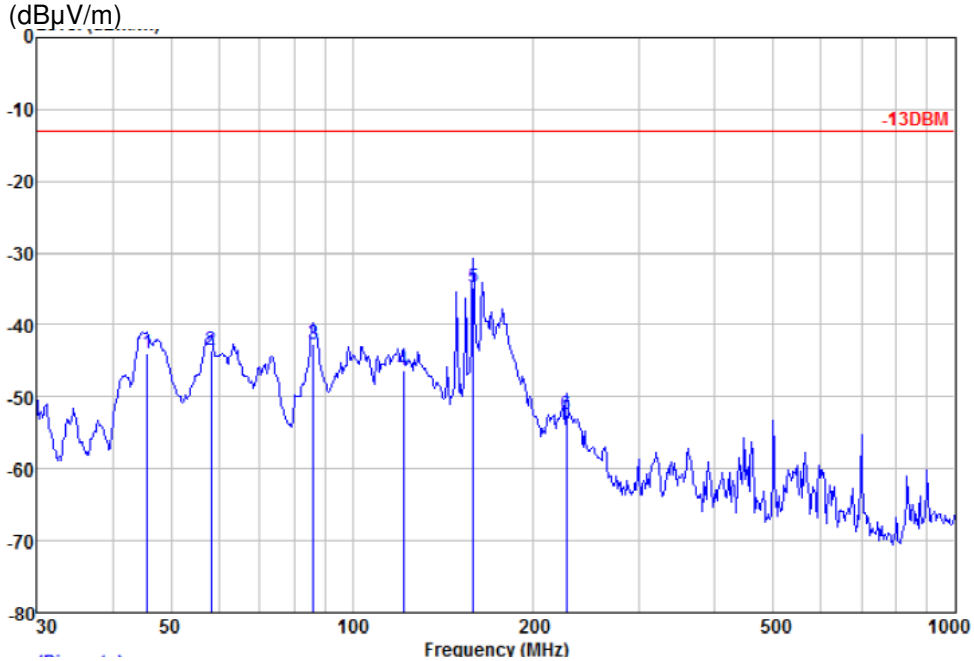
Test at Frequency (1962MHz) in transmitting status

30 MHz~1 GHz Spurious Emissions .Quasi-Peak Measurement

Vertical:

Peak scan

Level (dBμV/m)



Quasi-peak measurement

	Freq	ReadLevel	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	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	QP
2	58.407	-44.60	28.11	0.00	27.00	-43.49	-12.99	-30.50	QP
3	86.200	-46.54	30.85	0.00	26.97	-42.66	-12.99	-29.67	QP
4	121.549	-60.26	40.88	0.00	26.90	-46.28	-12.99	-33.29	QP
5	158.668	-51.97	43.92	0.00	26.74	-34.79	-12.99	-21.80	QP
6	226.894	-61.03	34.93	0.00	26.47	-52.57	-12.99	-39.58	QP

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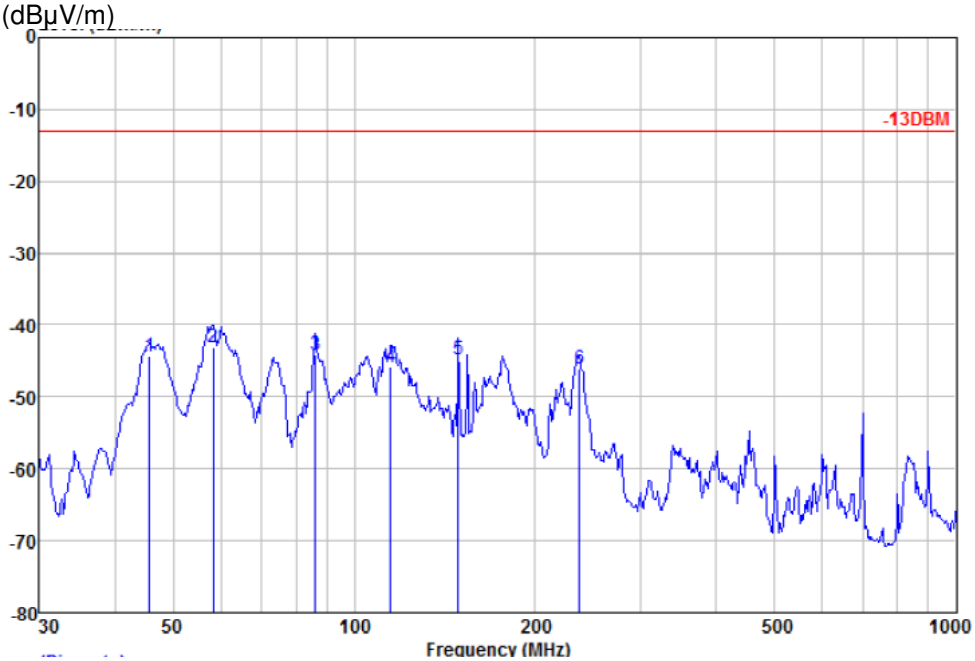
Horizontal:

Peak scan

Level (dBµV/m)



Quasi-peak measurement

	Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	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	QP
2	58.407	-47.98	31.96	0.00	27.00	-43.02	-12.99	-30.03	QP
3	86.200	-49.10	31.98	0.00	26.97	-44.09	-12.99	-31.10	QP
4	114.917	-60.42	41.52	0.00	26.90	-45.80	-12.99	-32.81	QP
5	148.963	-57.37	39.43	0.00	26.78	-44.72	-12.99	-31.73	QP
6	236.645	-58.45	38.68	0.00	26.41	-46.18	-12.99	-33.19	QP

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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 26GHz (10th Harmonic) for downlink;

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7.2.5 Occupied Bandwidth

Test Requirement: KDB935210 D02;2-11-04/EAB/RF

Test Method: FCC part 2.1049, 2-11-04/EAB/RF

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:

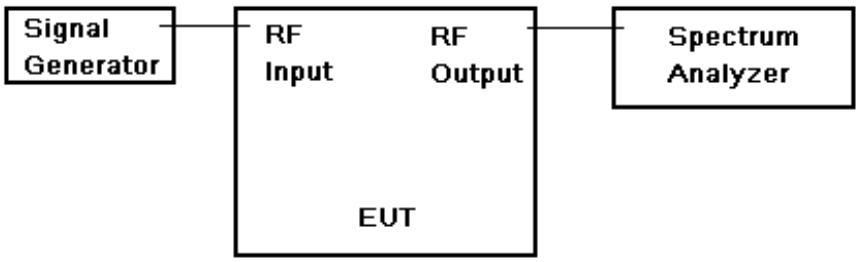

Fig.2. Conducted Spurious Emissions test configuration

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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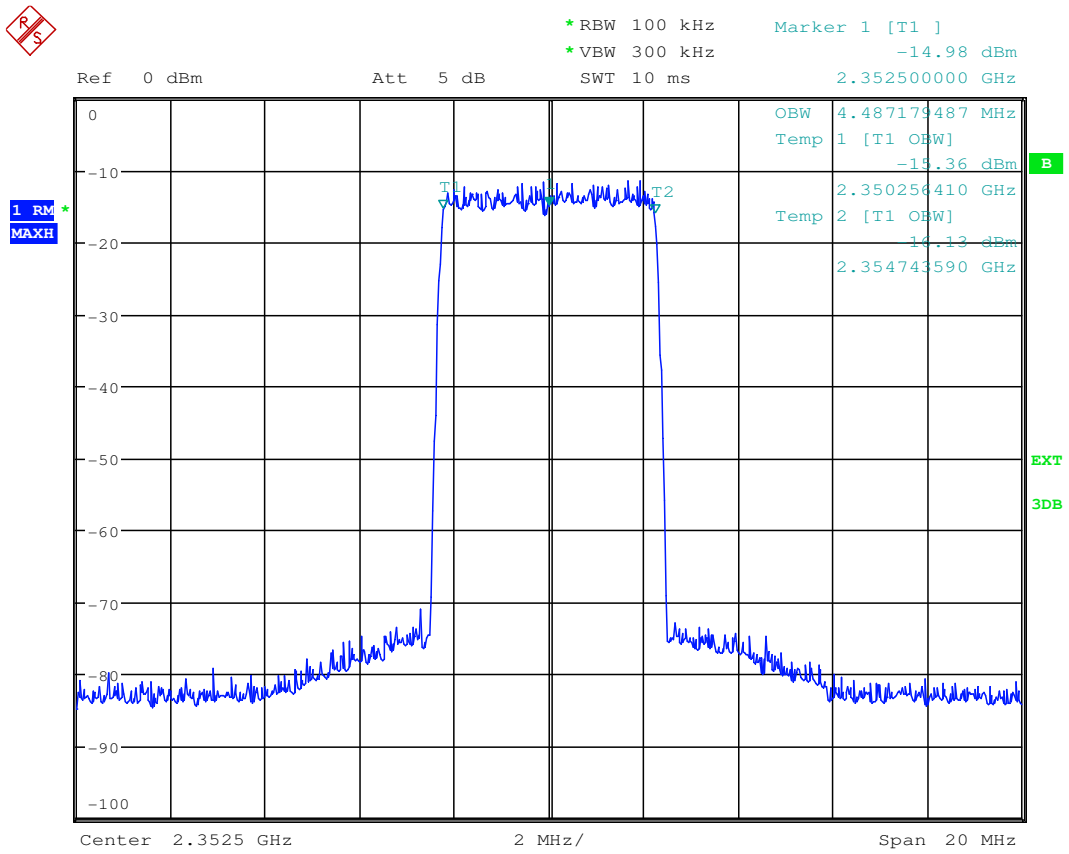
7.2.5.1 Measurement Record:

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

1.1 lowest frequency – Input



Date: 15.AUG.2017 11:27:34

1.2 lowest frequency—Output

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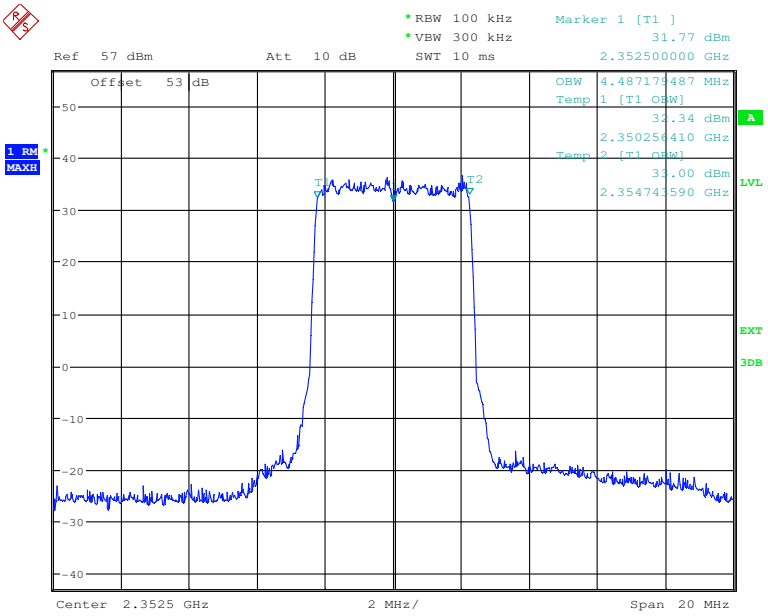

Date: 15.AUG.2017 06:42:03

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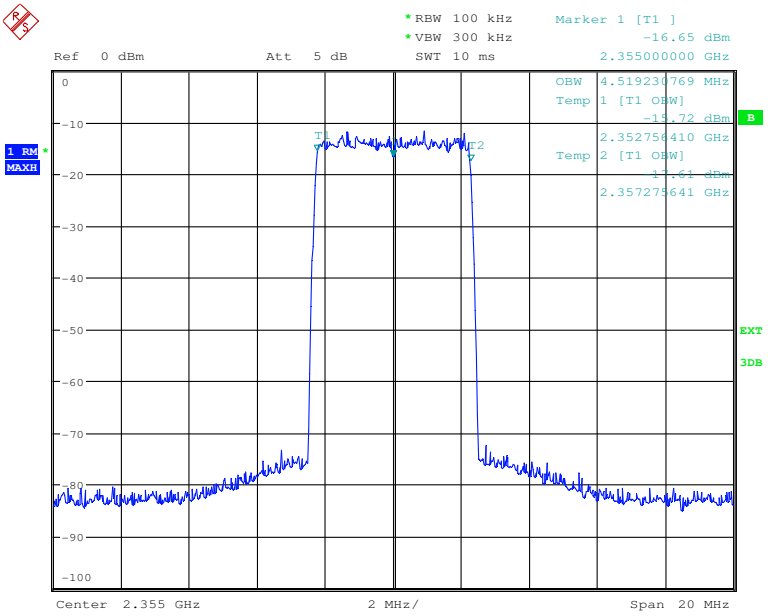
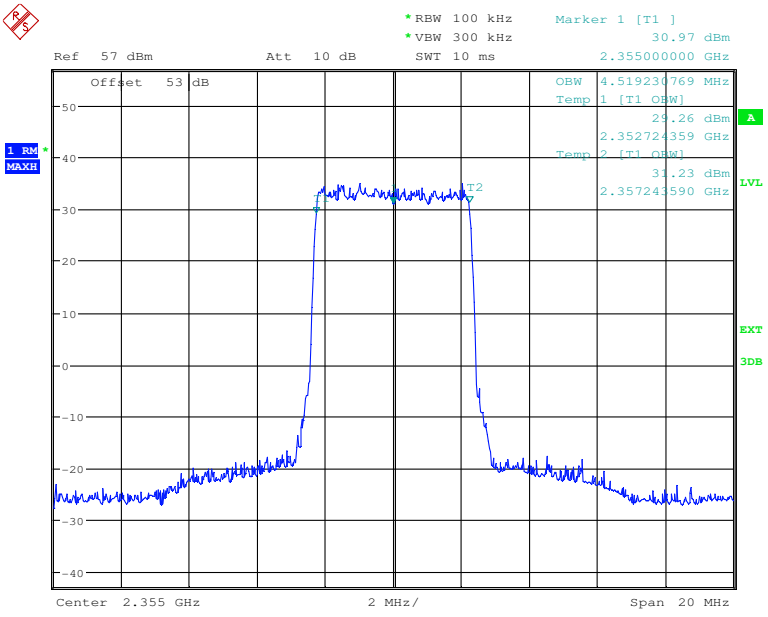
1.3 middle frequency—Input



Date: 15.AUG.2017 11:26:18

1.4 middle frequency—Output



Date: 15.AUG.2017 06:43:43

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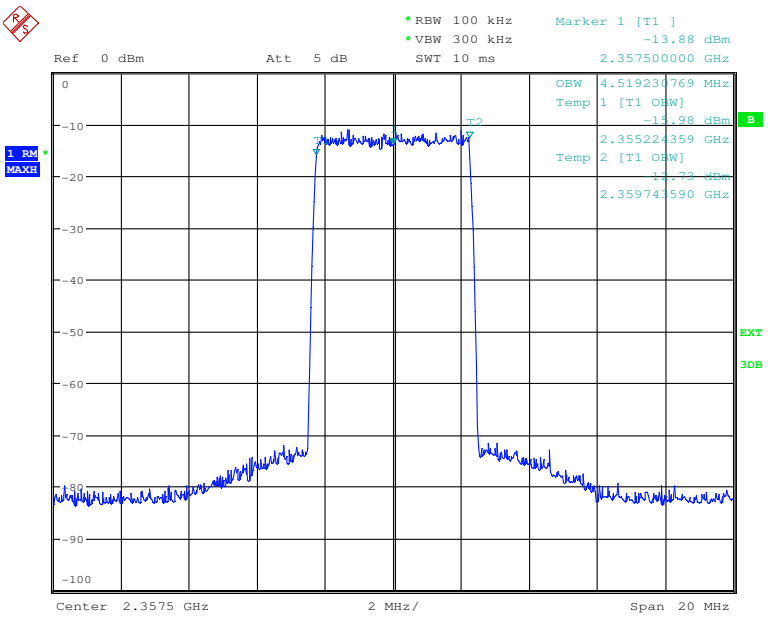
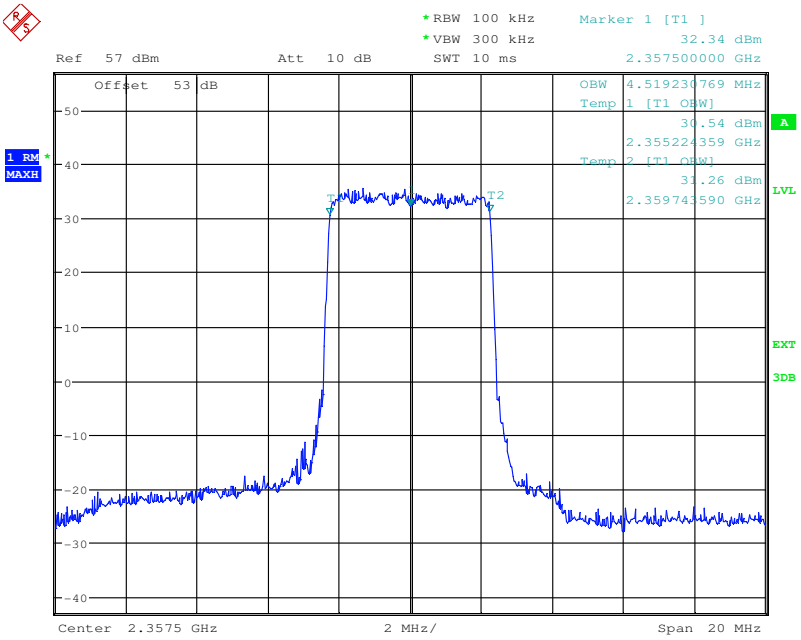
1.5 highest frequency—Input



Date: 15.AUG.2017 11:24:18

1.6 highest frequency—Output(Change right marker)



Date: 15.AUG.2017 06:45:48

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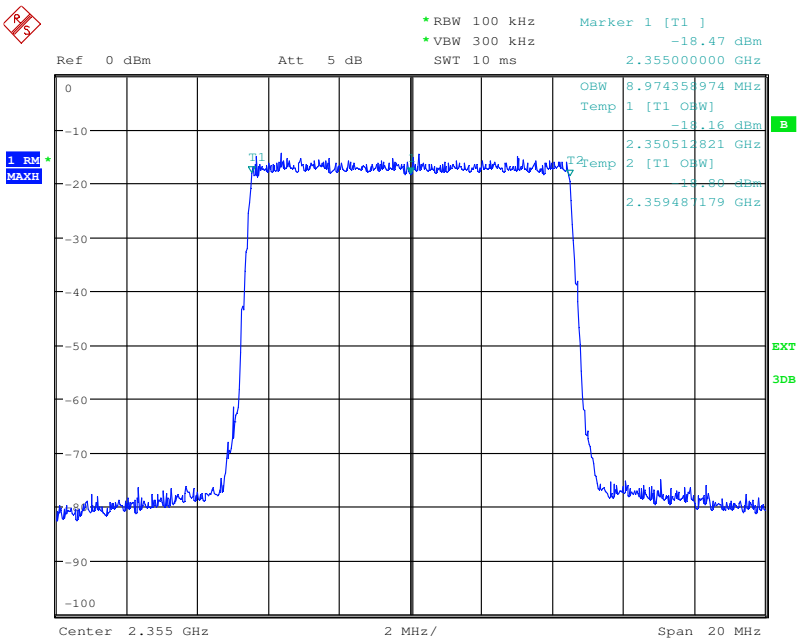
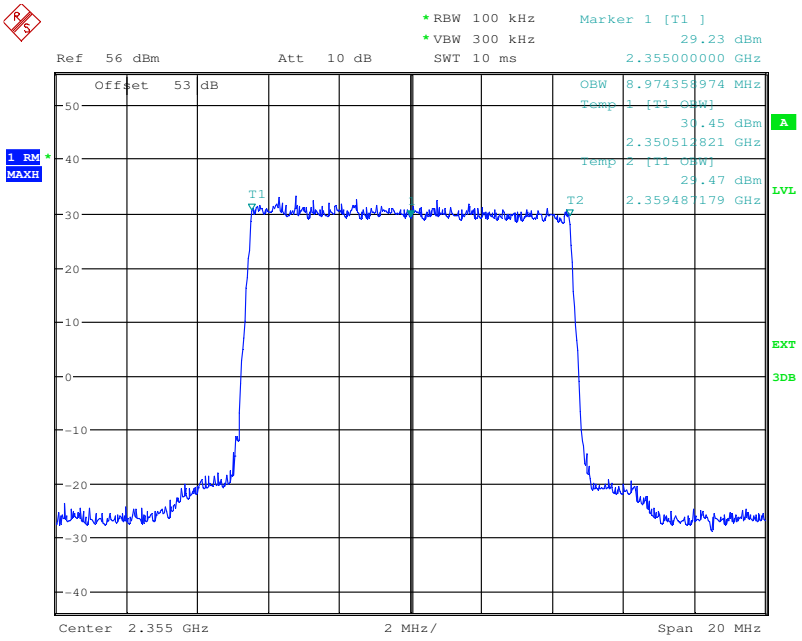
1.1 middle frequency – Input(10M Modulation)



Date: 15.AUG.2017 11:30:26

1.2 middle frequency—Output



Date: 15.AUG.2017 06:48:58

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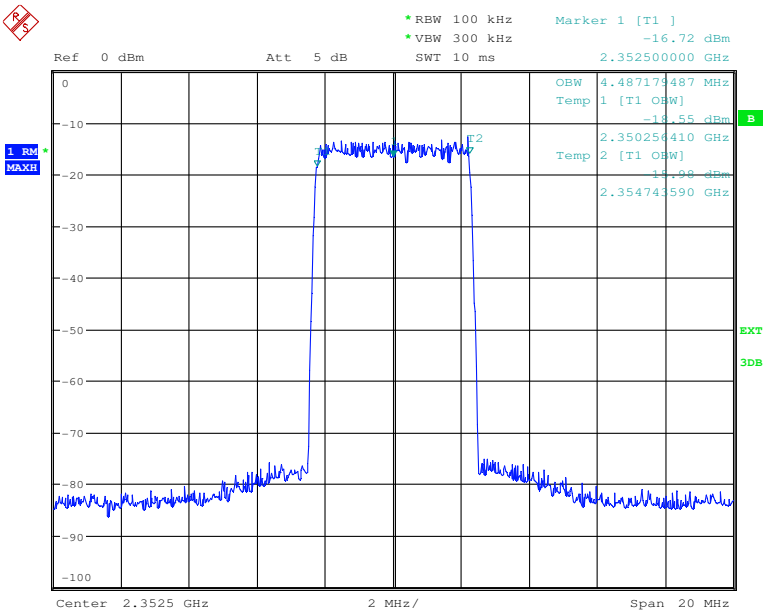
7.2.5.2 Measurement Record:

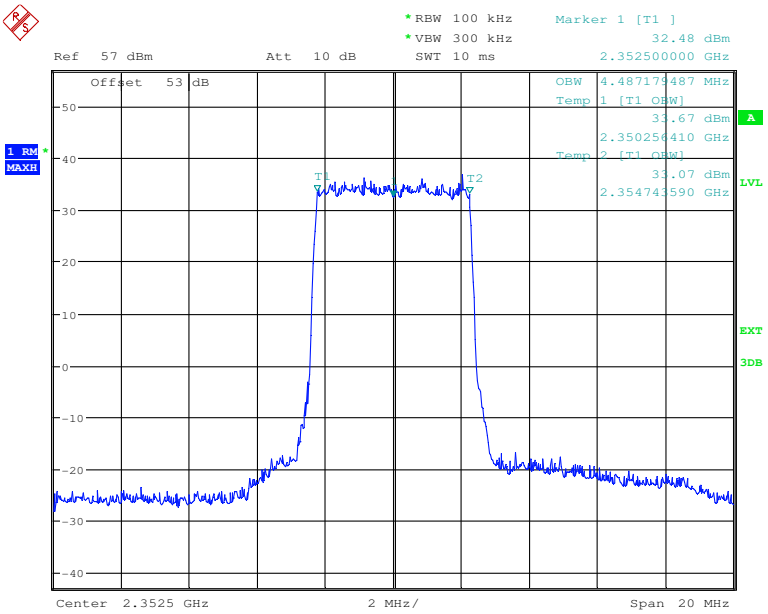
1.Downlink: MIMO: 2350MHz to 2360MHz

1.3.1 Lowest frequency—Input(5M Modulation)



Date: 15.AUG.2017 11:28:22

1.3.2 Lowest frequency—Output



Date: 15.AUG.2017 06:40:24

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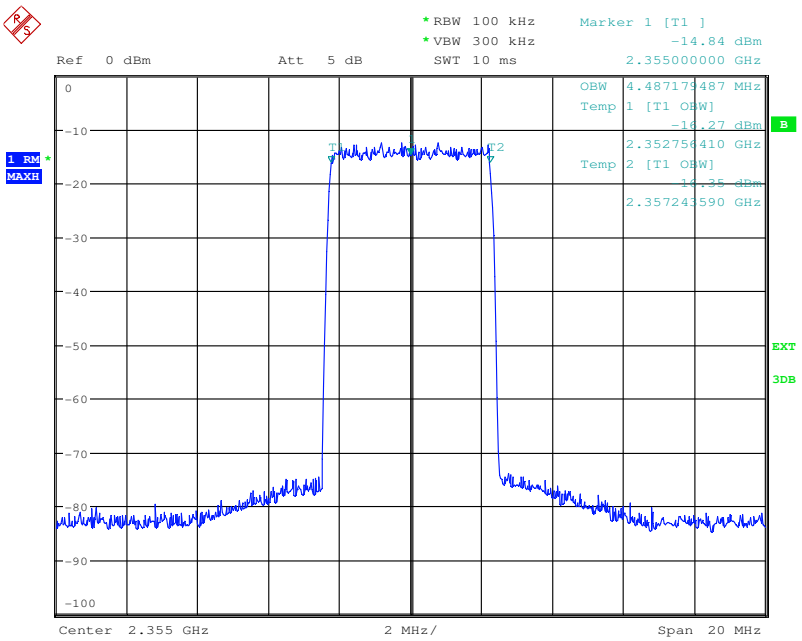
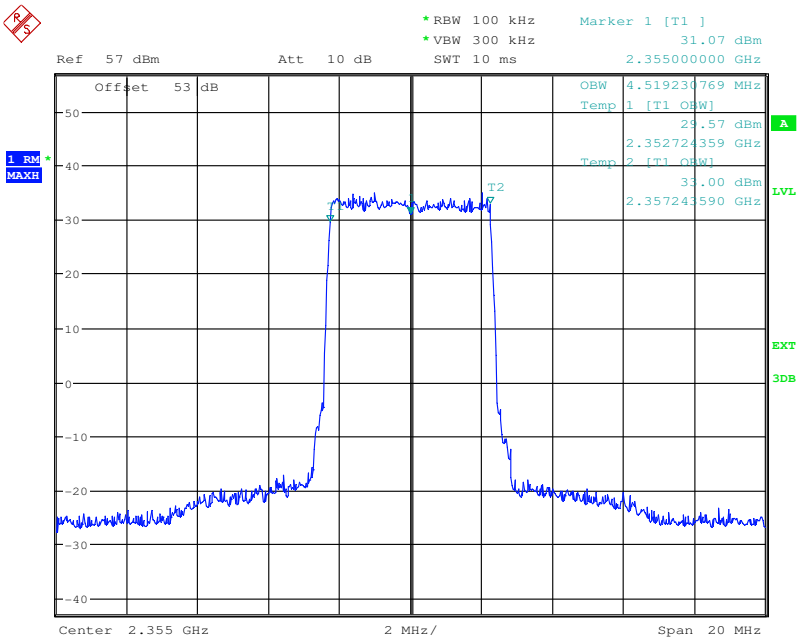
1.3.3 middle frequency-- Input



Date: 15.AUG.2017 11:25:53

1.3.4 middle frequency-- Output



Date: 15.AUG.2017 06:43:03

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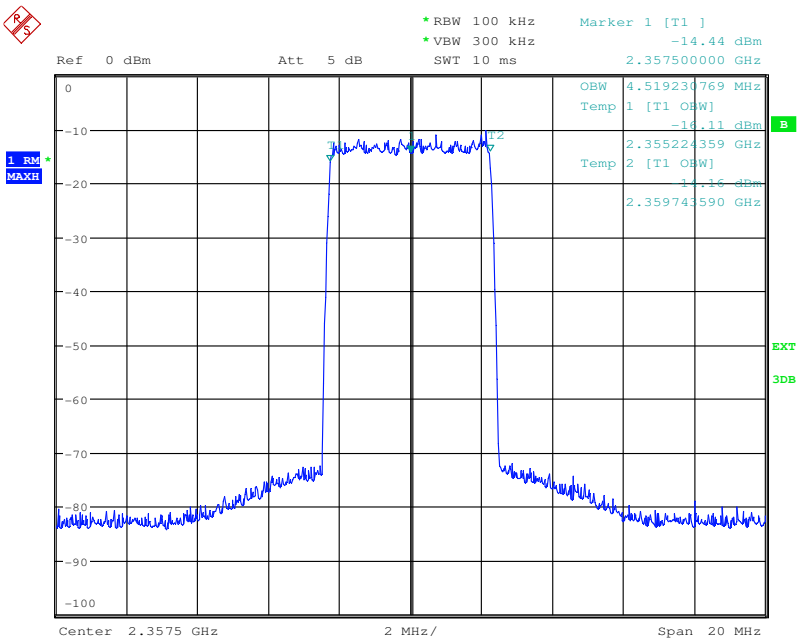
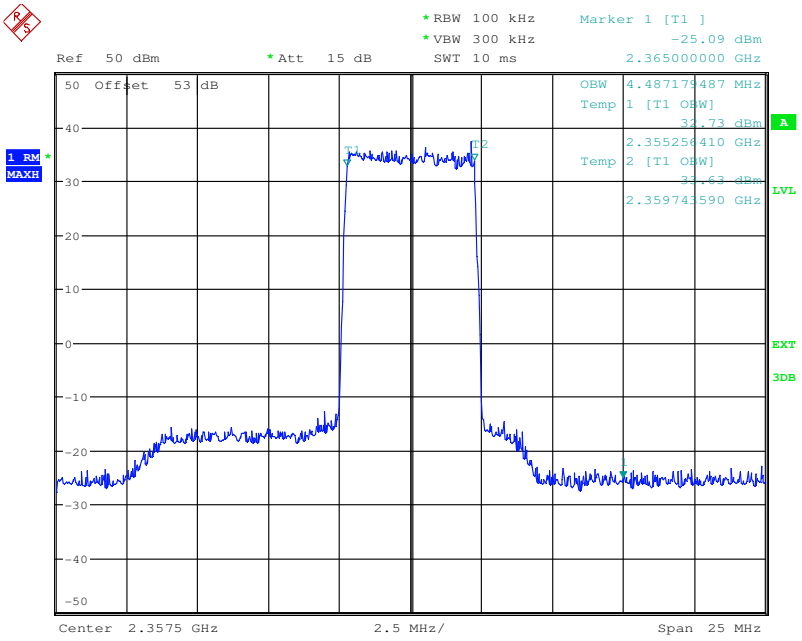
1.3.5 highest frequency-- Input



Date: 15.AUG.2017 11:24:36

1.3.6 highest frequency-- Output



Date: 13.AUG.2017 13:47:02

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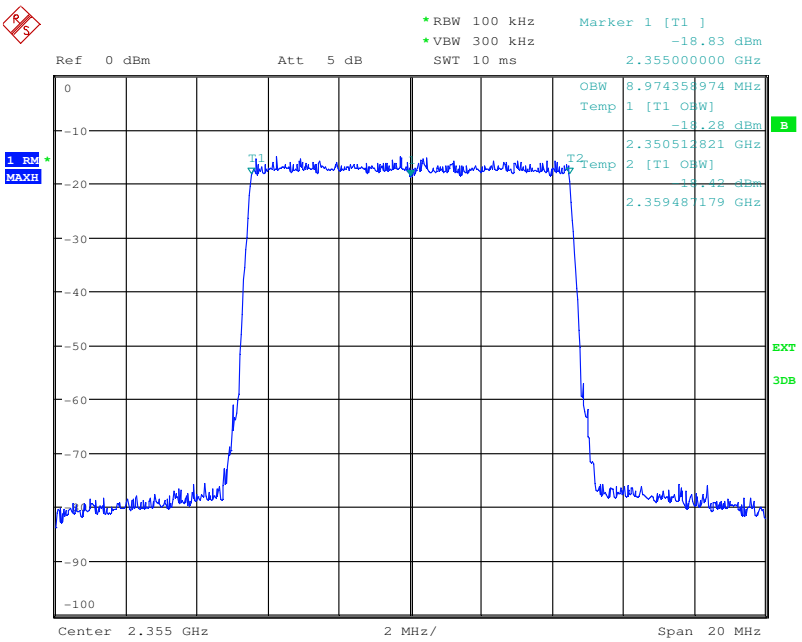
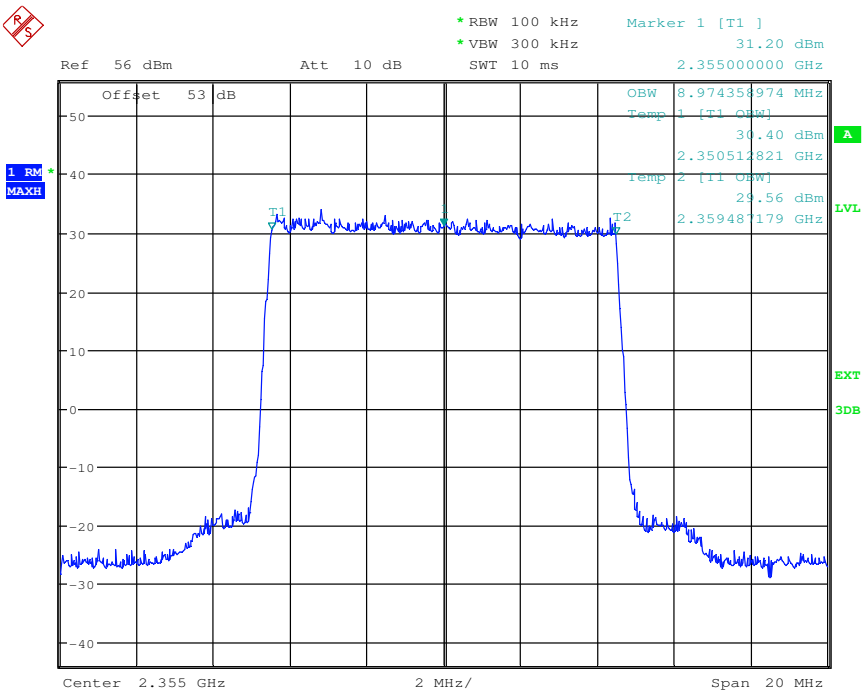
1.4 middle frequency – Input(10M Modulation)



Date: 15.AUG.2017 11:30:42

1.4 middle frequency—Output



Date: 15.AUG.2017 06:48:09

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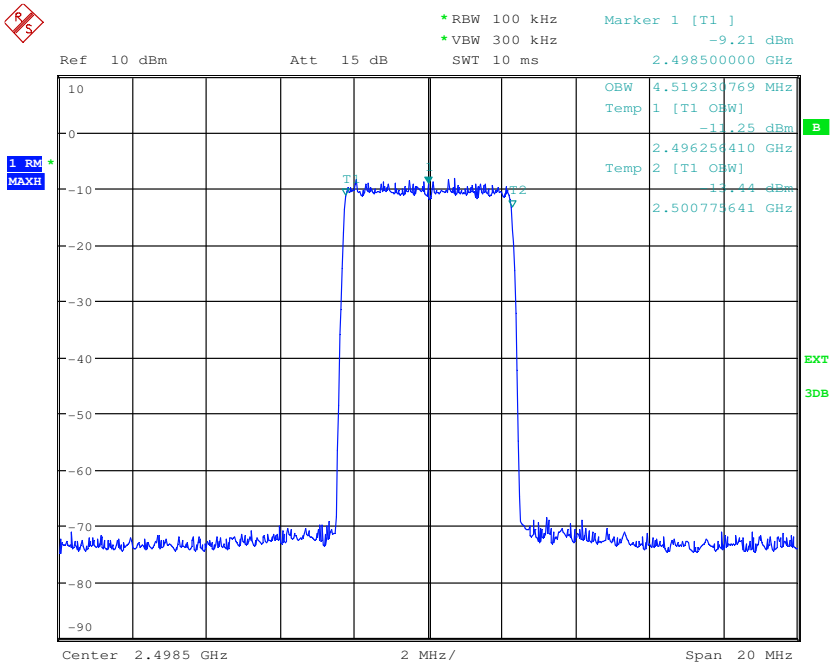
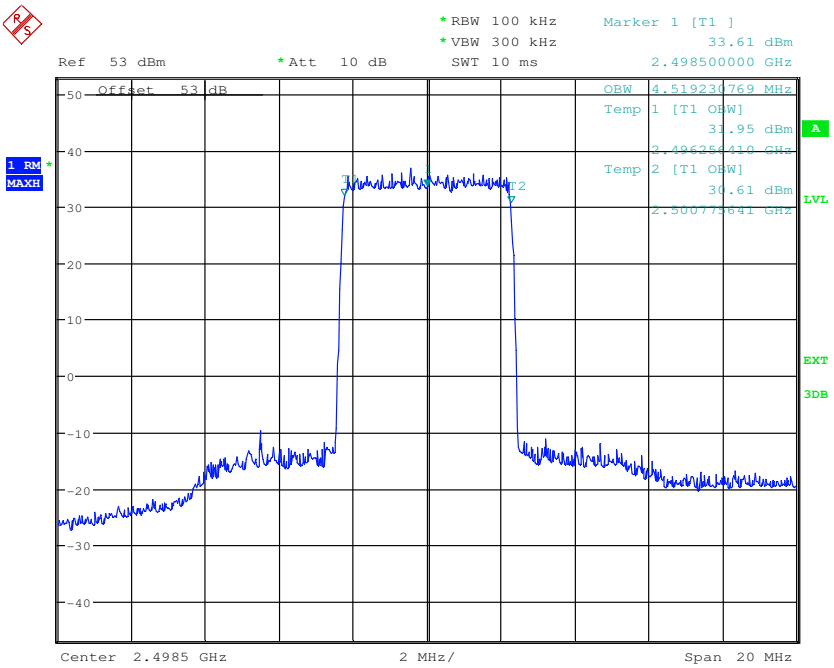
3.Downlink: 2496MHz to 2690MHz(LTE)

3.4.1 lowest frequency– Input(5M Modulation)



3.4.2 lowest frequency-- Output



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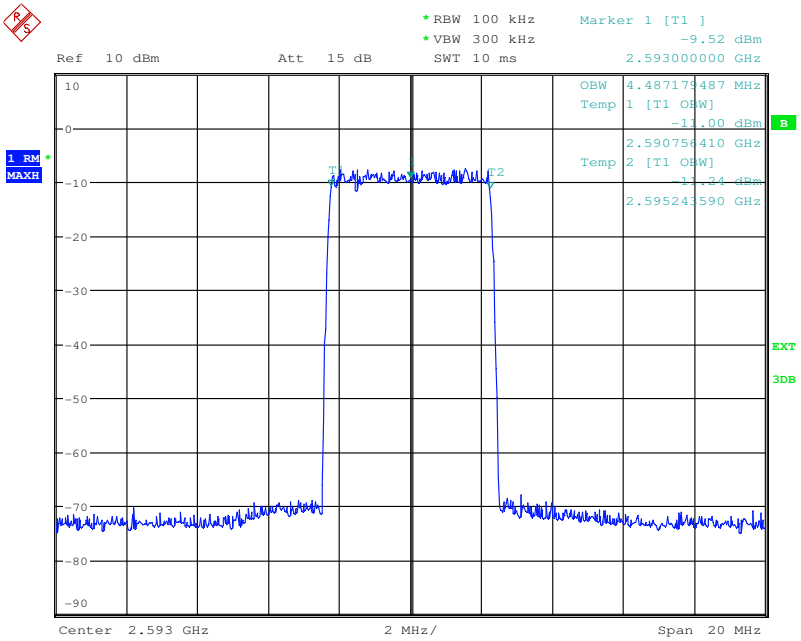
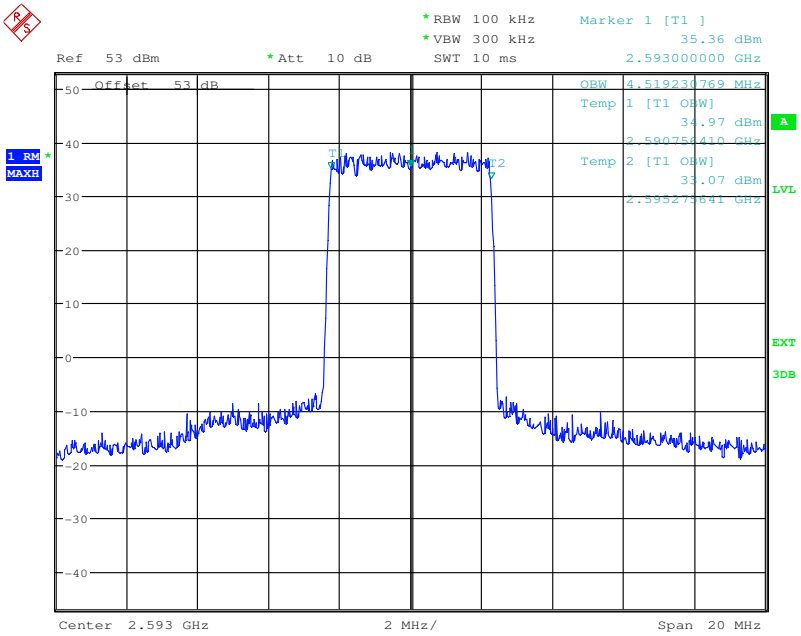
3.4.3 middle frequency-- Input



Date: 15.AUG.2017 12:05:26

3.4.4 middle frequency-- Output



Date: 15.AUG.2017 06:31:12

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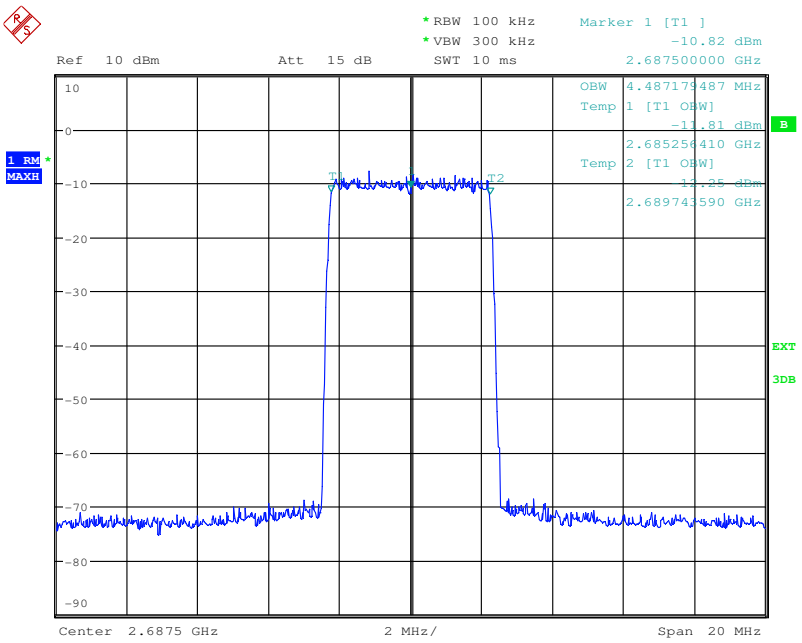
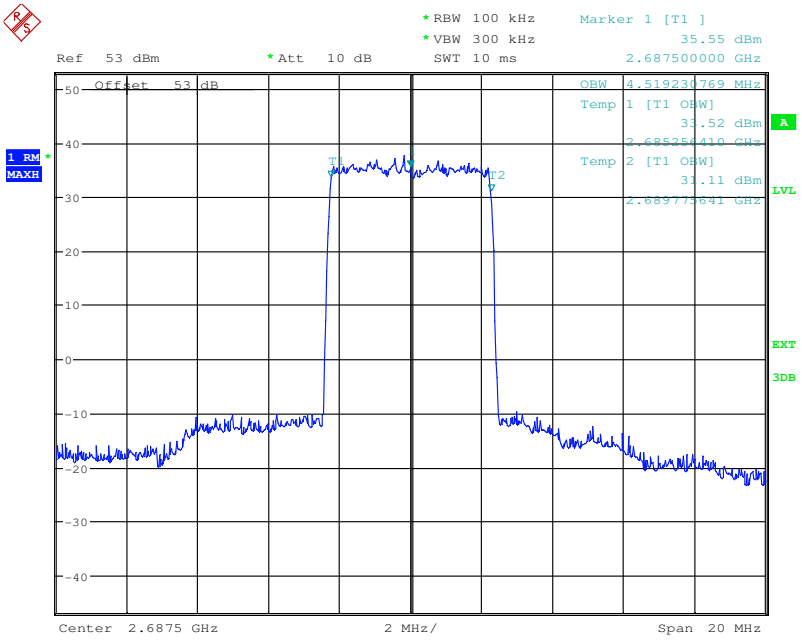
3.4.5 highest frequency—Input



Date: 15.AUG.2017 12:07:07

3.4.6 highest frequency--Output



Date: 15.AUG.2017 06:29:01

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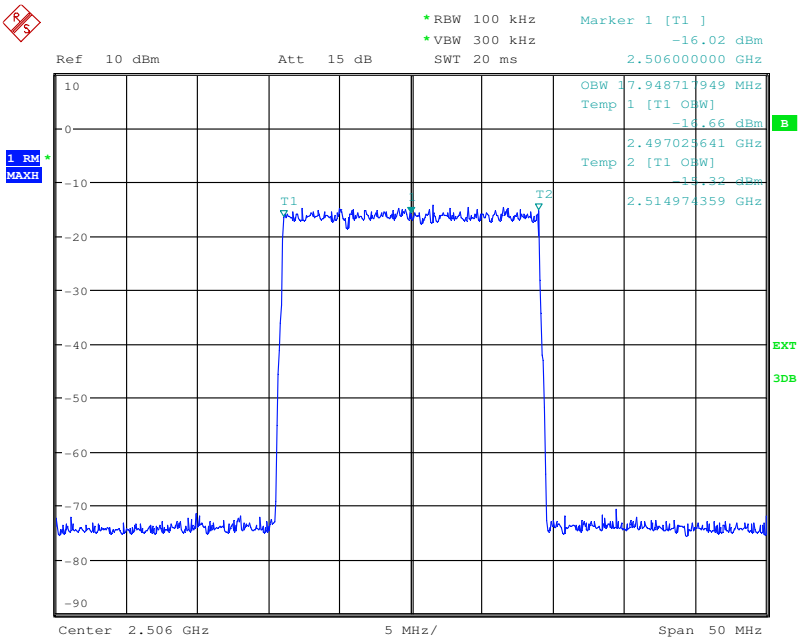
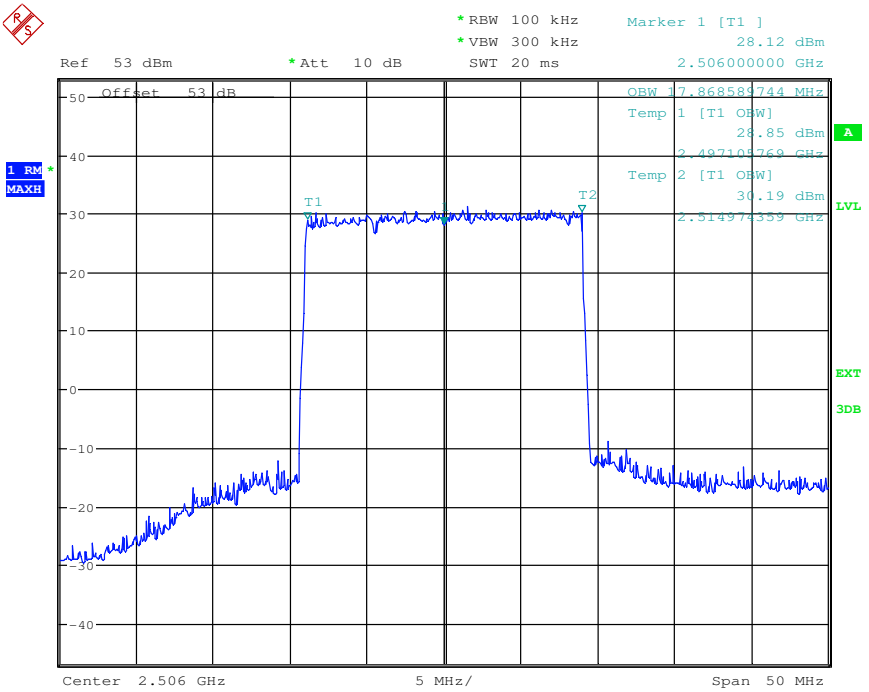
3.4 LTE Mode:20M Modulation

3.4.1 lowest frequency– Input



3.4.2 lowest frequency-- Output



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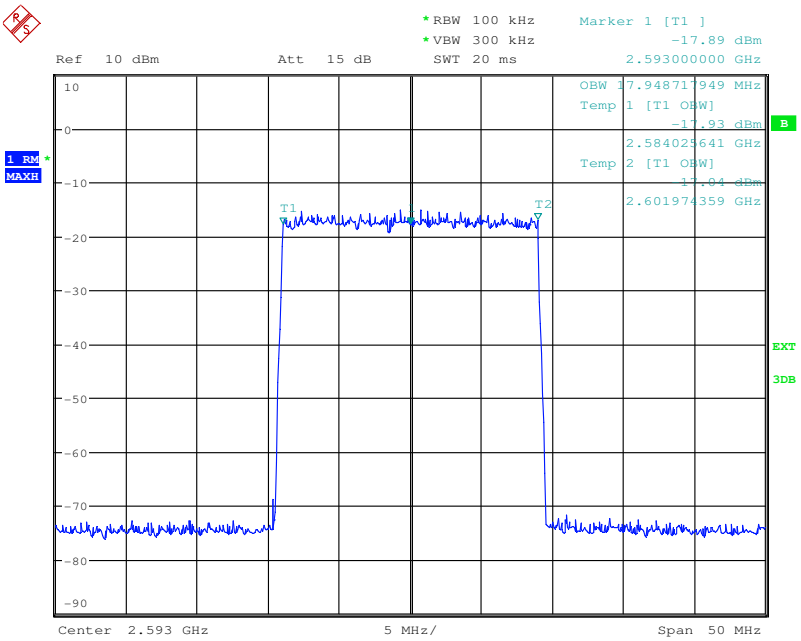
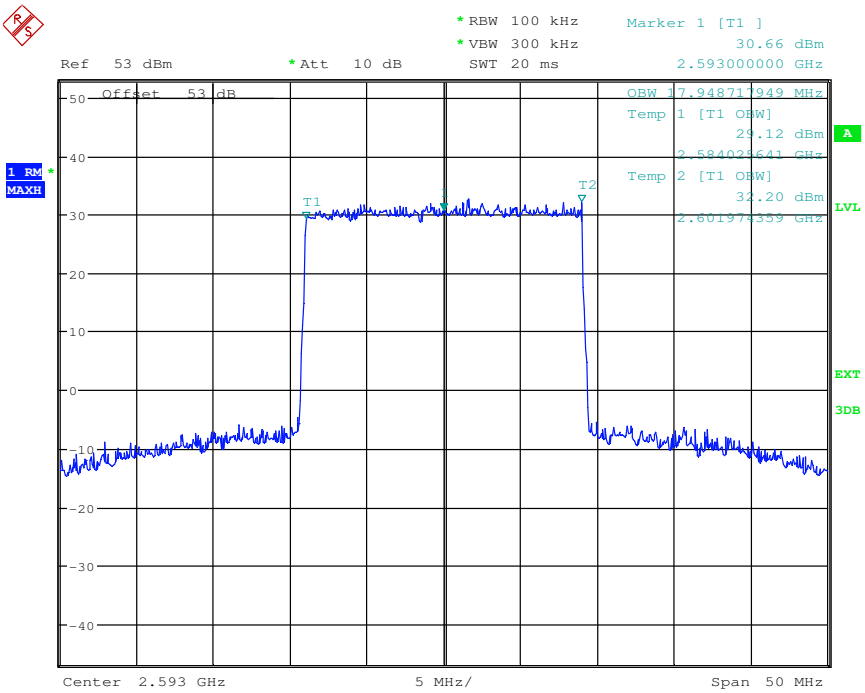
3.4.3 middle frequency-- Input



Date: 15.AUG.2017 11:39:31

3.4.4 middle frequency-- Output



Date: 15.AUG.2017 06:24:20

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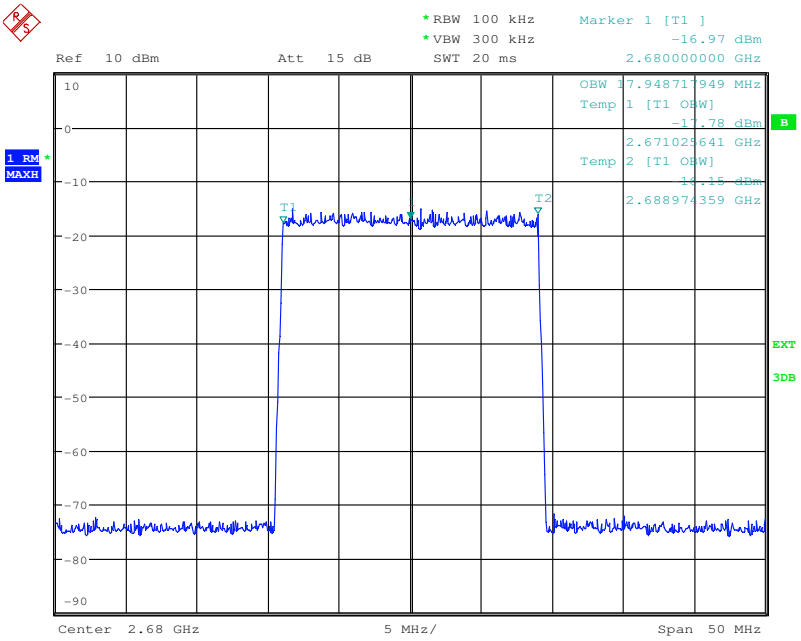
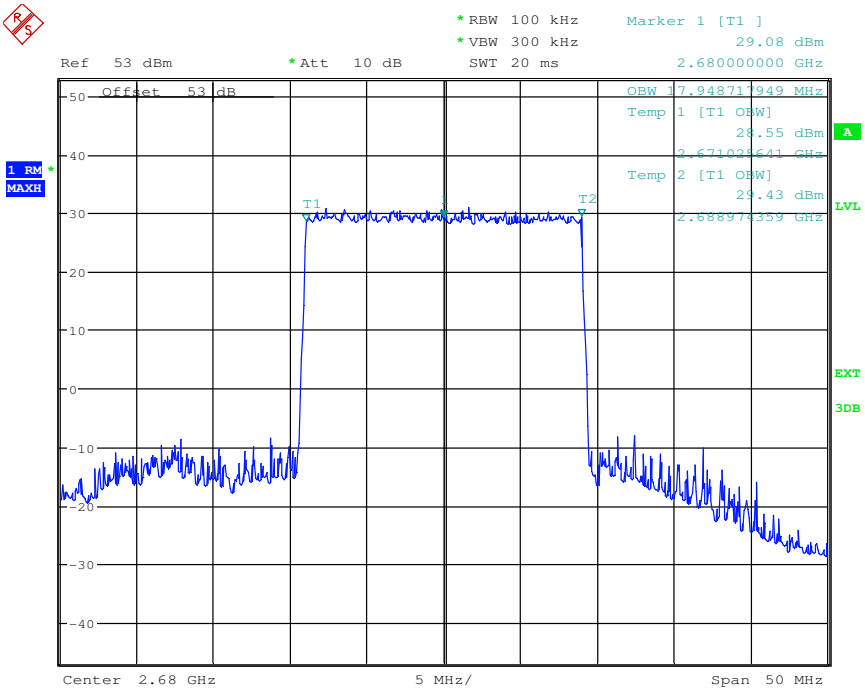
3.4.5 highest frequency—Input



Date: 15.AUG.2017 11:40:49

3.4.6 highest frequency--Output



Date: 15.AUG.2017 06:25:28

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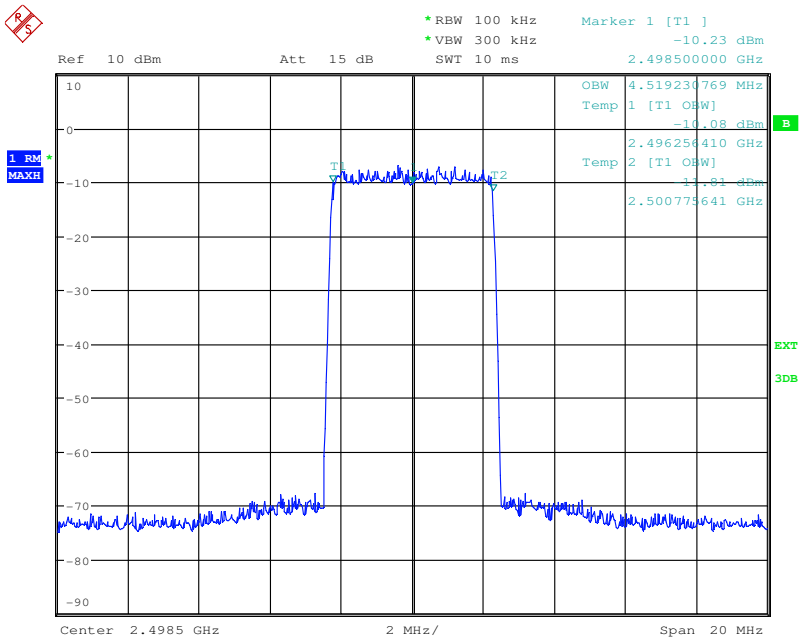
4.Downlink: MIMO:2496MHz to 2690MHz(LTE)

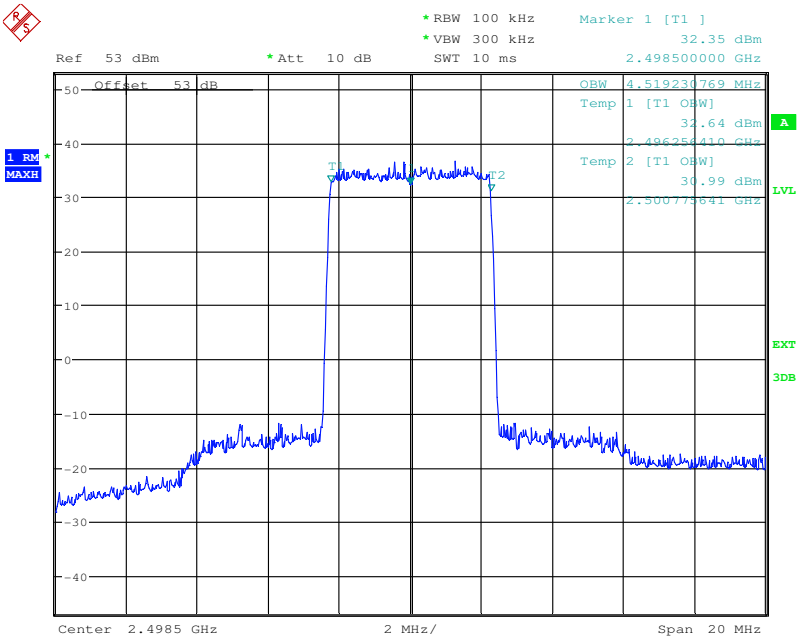
4.3 LTEMode:5M Modulation modulation

4.3.1 lowest frequency– Input



Date: 15.AUG.2017 12:04:41

4.3.2 lowest frequency—Output



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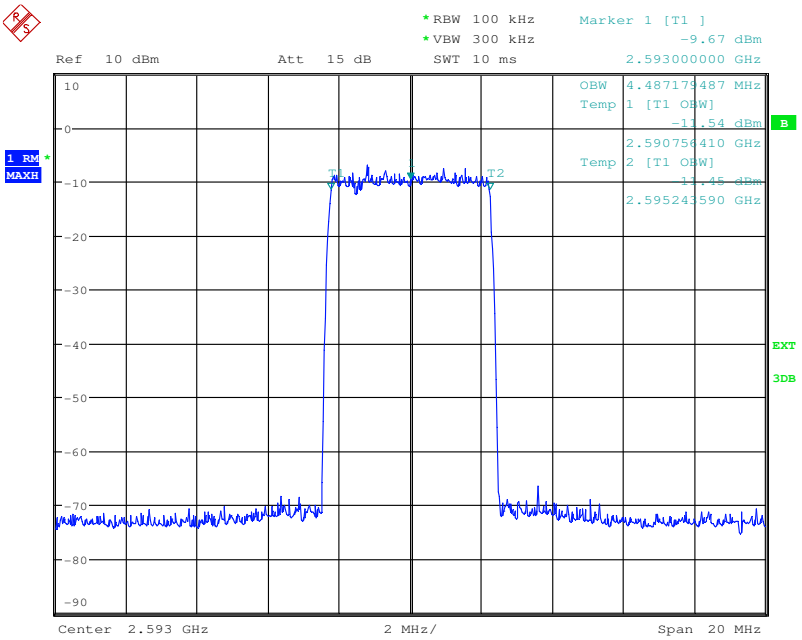
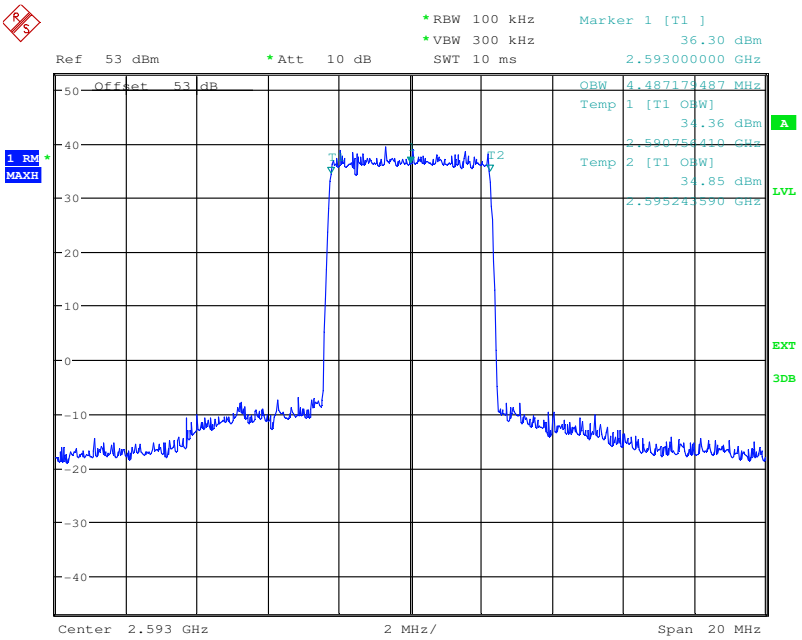
4.3.3 middle frequency-- Input



Date: 15.AUG.2017 12:06:13

4.3.4 middle frequency-- Output



Date: 15.AUG.2017 06:31:50

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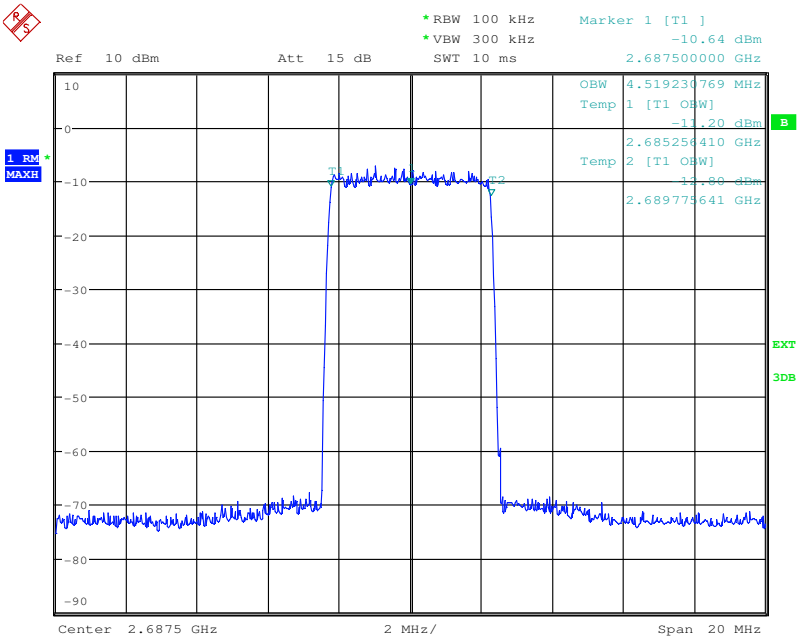
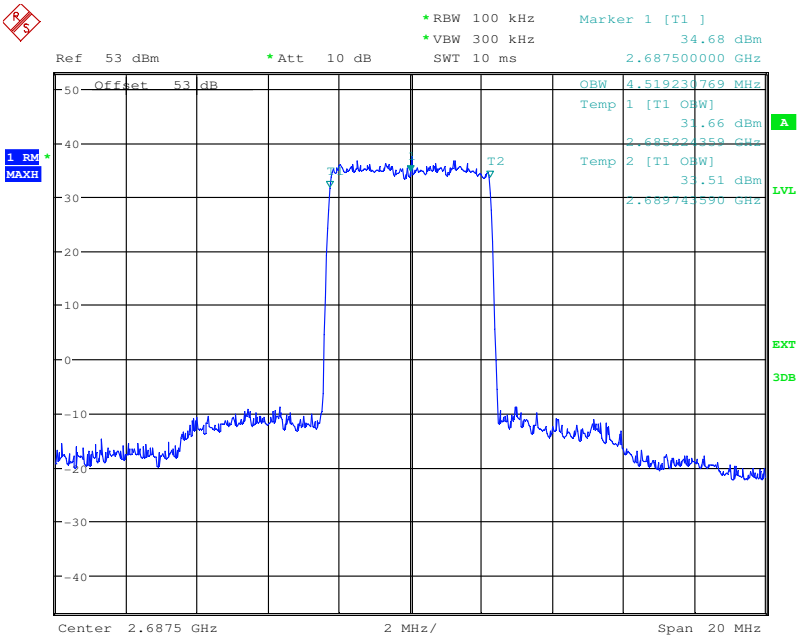
4.3.5 highest frequency—Input



Date: 15.AUG.2017 12:07:50

4.3.6 highest frequency--Output



Date: 15.AUG.2017 06:28:33

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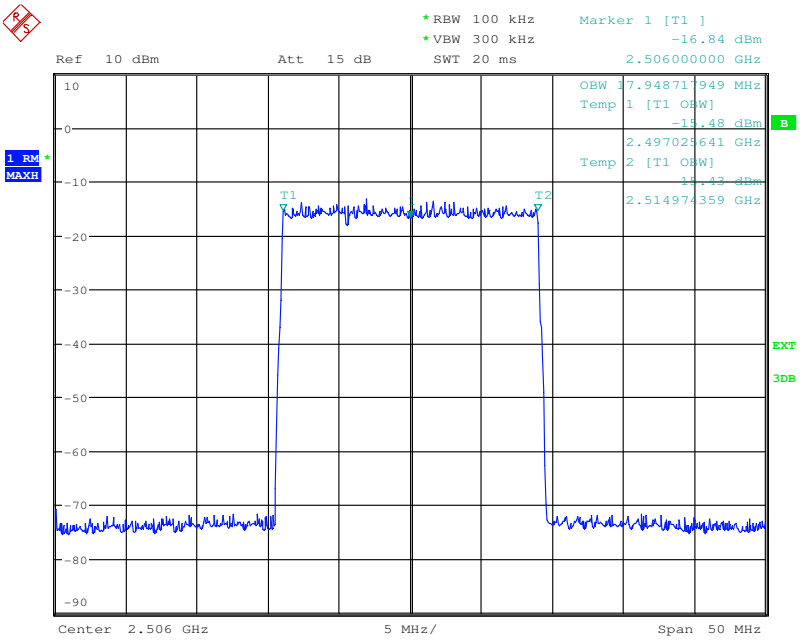
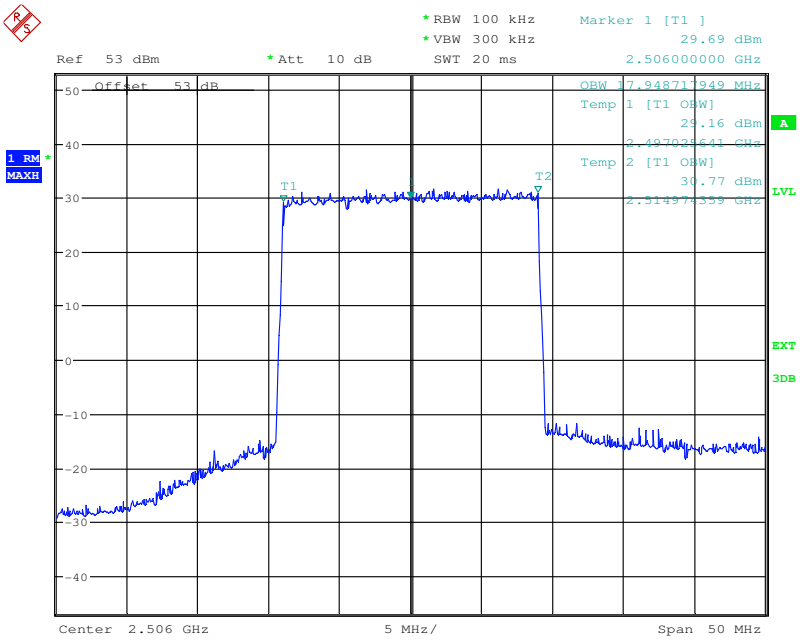
4.3 LTEMode:20M Modulation modulation

4.3.1 lowest frequency– Input



Date: 15.AUG.2017 11:38:50

4.3.2 lowest frequency-- Output



Date: 15.AUG.2017 06:21:47

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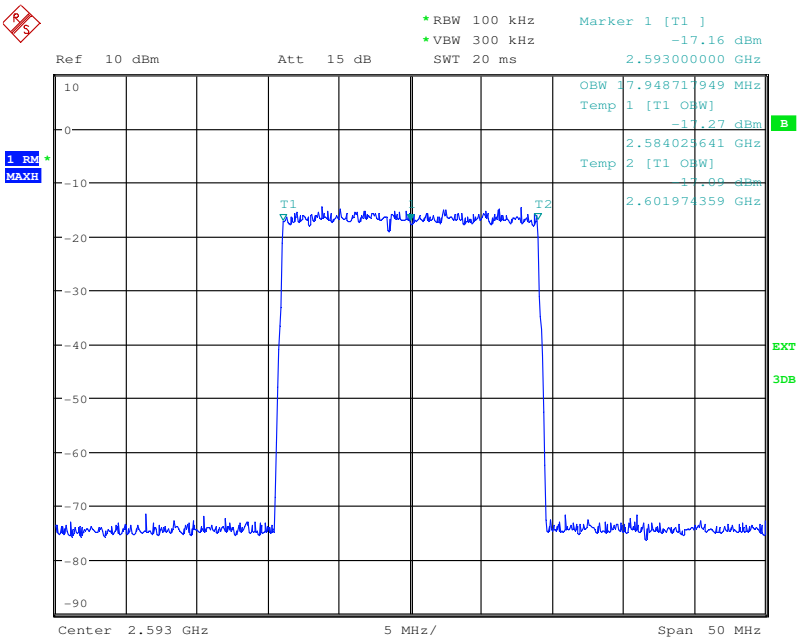
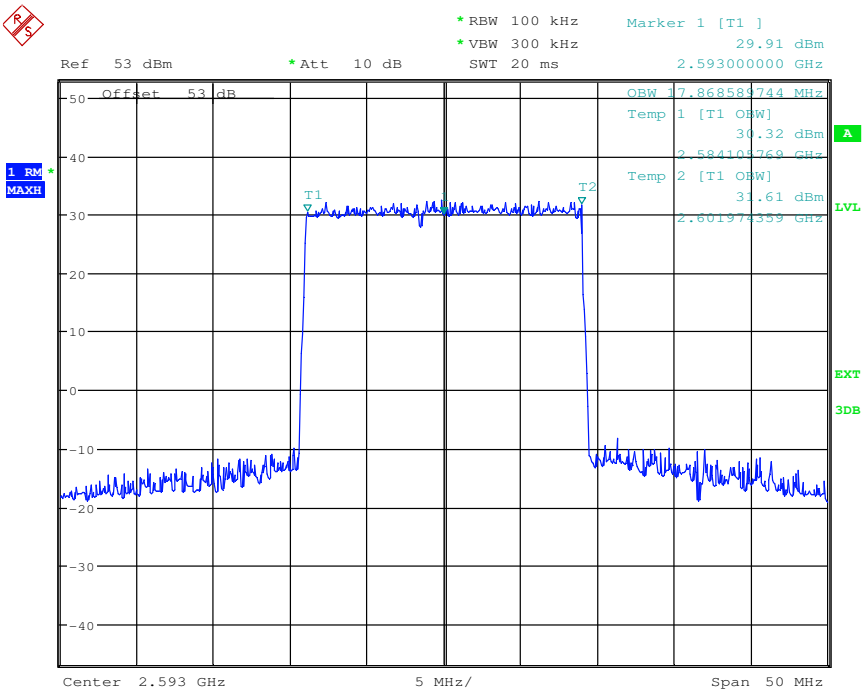
4.3.3 middle frequency-- Input



Date: 15.AUG.2017 11:39:47

4.3.4 middle frequency-- Output



Date: 15.AUG.2017 06:23:48

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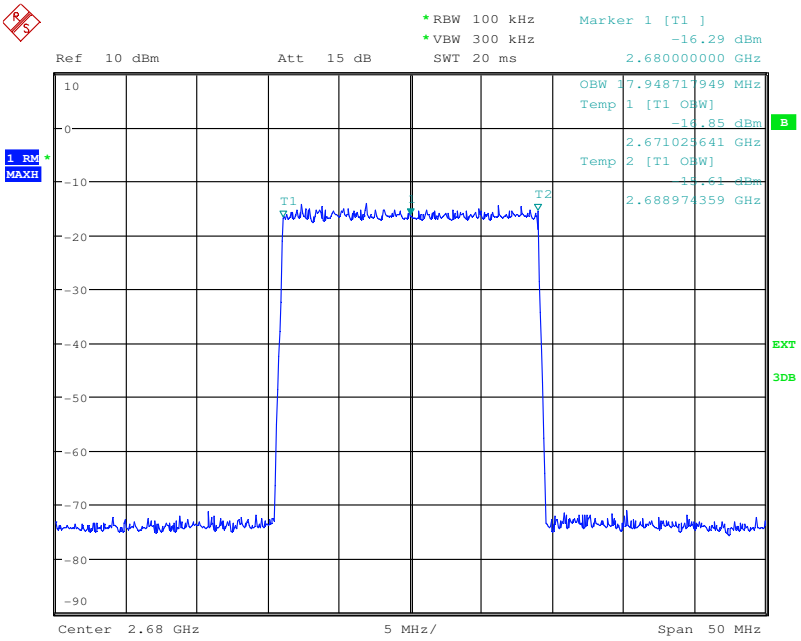
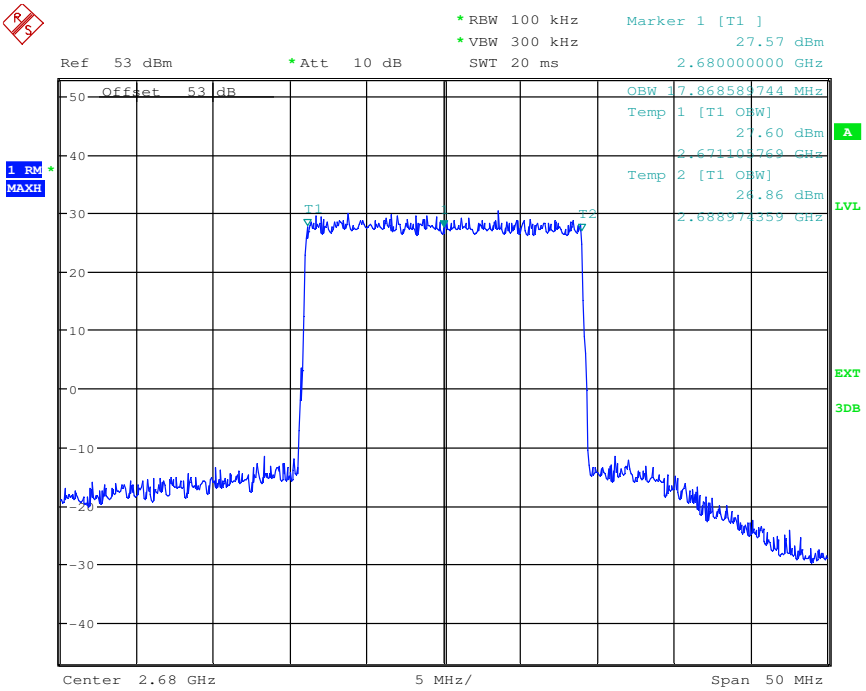
4.3.5 highest frequency—Input



Date: 15.AUG.2017 11:41:08

4.3.6 highest frequency--Output



Date: 15.AUG.2017 06:26:38

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7.2.6 Out of Band Rejection

Test Requirement: KDB935210 D02;2-11-04/EAB/RF

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

Test Method: KDB935210 D02;2-11-04/EAB/RF

EUT Operation:

Status: Drive the EUT to maximum output power. .

Conditions: Normal conditions

Application: Cellular Band RF output ports

Test Configuration:

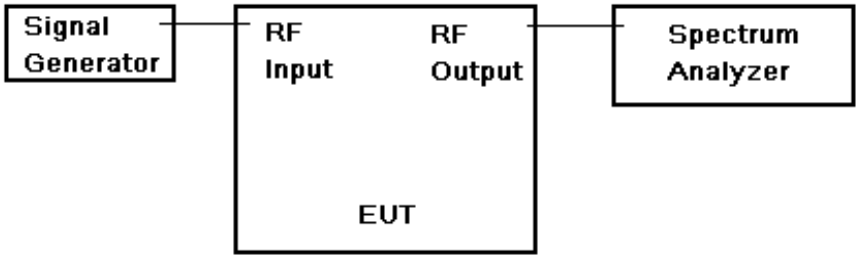

Fig.4. Out of Band rejection test configuration

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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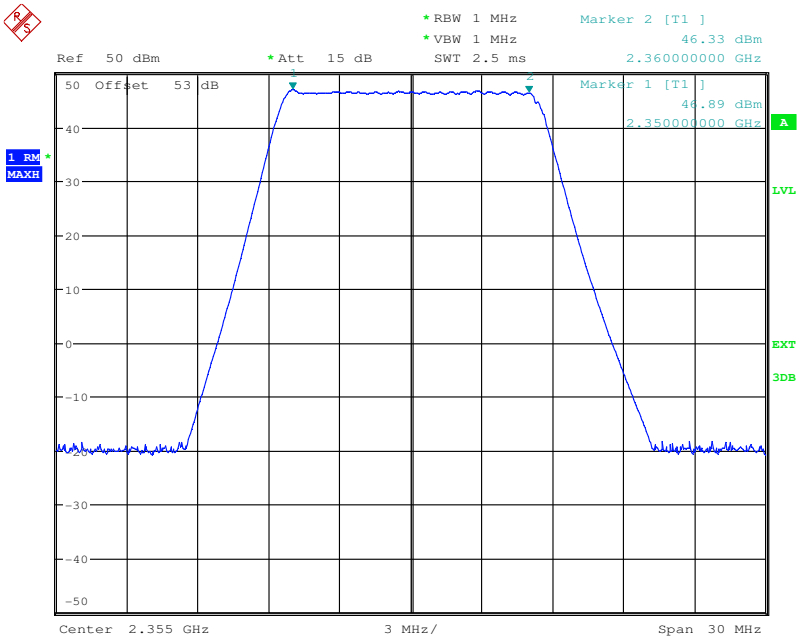
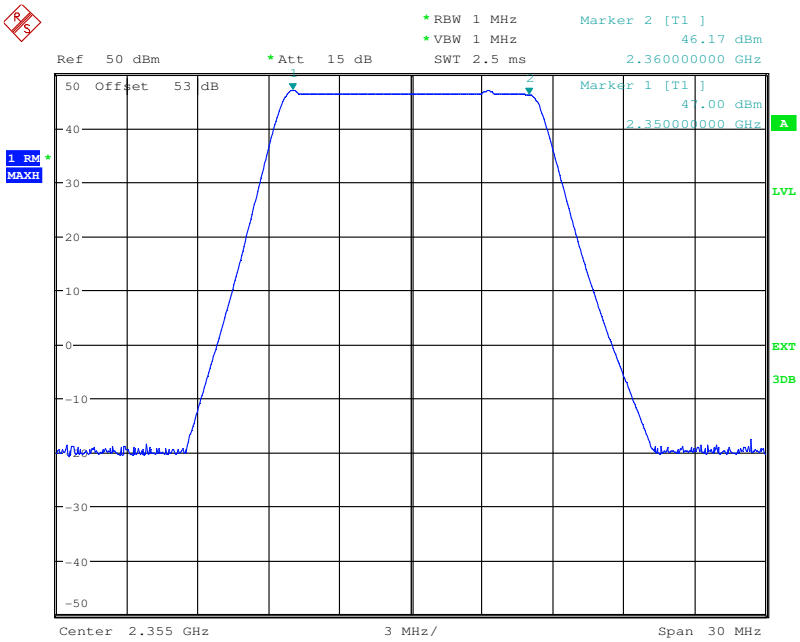
7.2.6.1 Measurement Record:

1.Test for Downlink: 2350MHz to 2360MHz



Date: 13.AUG.2017 13:06:05

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



Date: 13.AUG.2017 13:11:34

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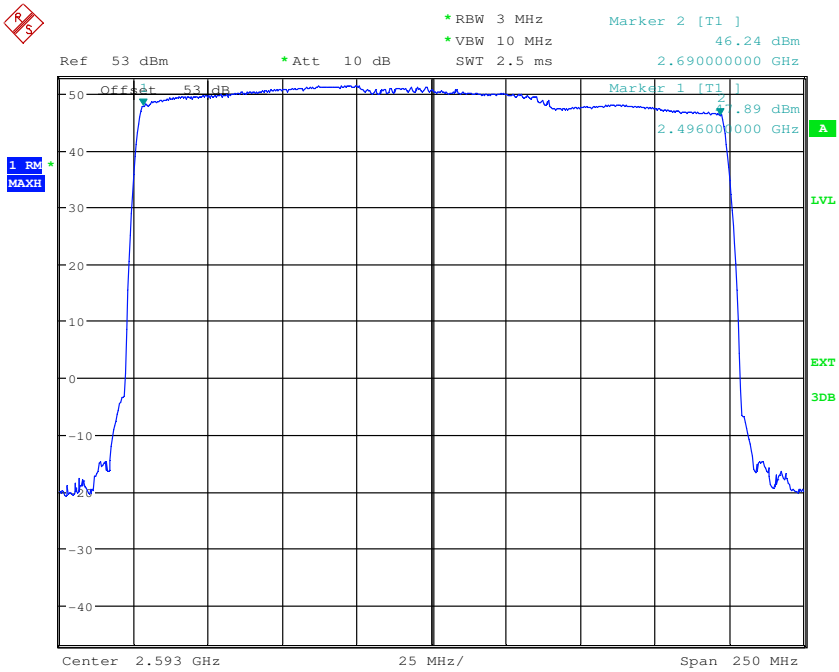
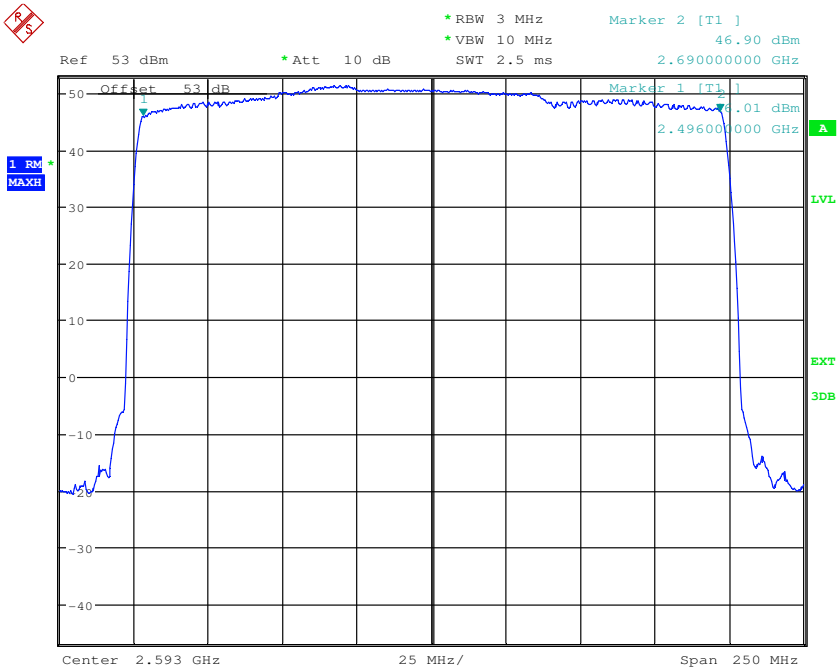
3. Test for Downlink: 2496MHz to 2690MHz



Date: 15.AUG.2017 08:00:02

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



Date: 15.AUG.2017 08:03:50

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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

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2.2) **For DC supplied:**

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

Voltage(V DC)	Frequency(MHz)	Tolerance(ppm)
-40.8 (-48.0*0.85)	2355.0000020	0.00004246
-48.0	2355.0000021	Reference
-55.2 (-48.0*1.15)	2355.0000019	-0.00008493

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

Voltage(V DC)	Frequency(MHz)	Tolerance(ppm)
-40.8 (-48.0*0.85)	2355.0000018	-0.00004246
-48.0	2355.0000017	Reference
-55.2 (-48.0*1.15)	2355.0000020	-0.00012739

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

Voltage(V DC)	Frequency(MHz)	Tolerance(ppm)
-40.8 (-48.0*0.85)	2593.0000019	0.00015426
-48.0	2593.0000015	Reference
-55.2 (-48.0*1.15)	2593.0000012	-0.00011570

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

Voltage(V DC)	Frequency(MHz)	Tolerance(ppm)
-40.8 (-48.0*0.85)	2593.0000017	-0.00007713
-48.0	2593.0000019	Reference
-55.2 (-48.0*1.15)	2593.0000021	0.00007713

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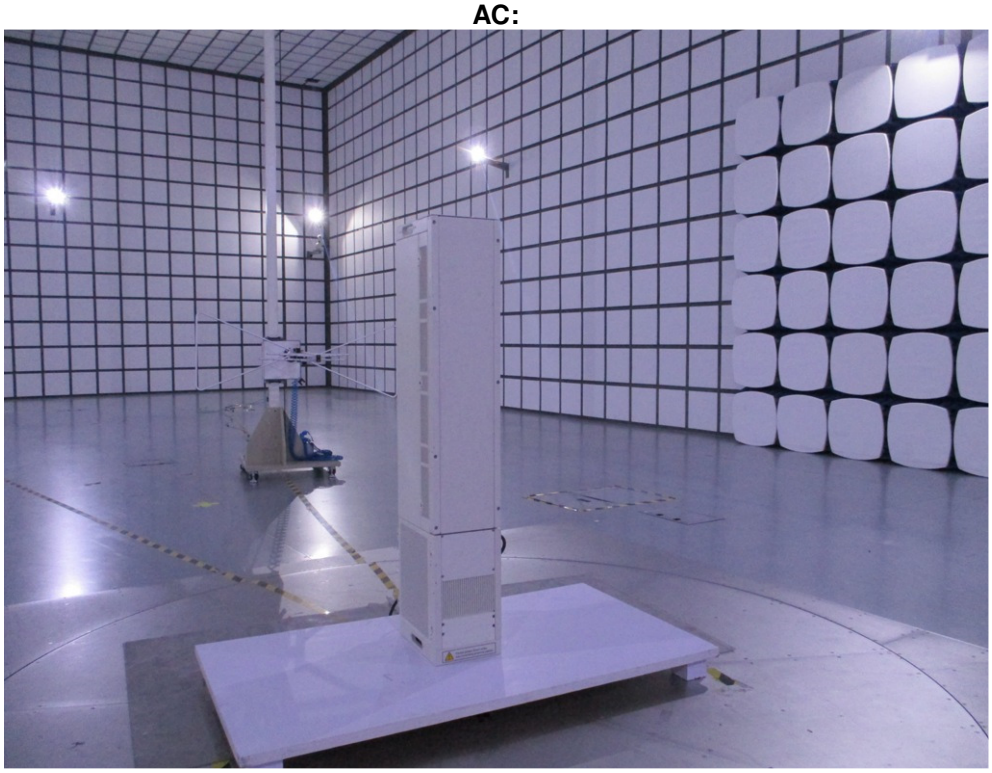
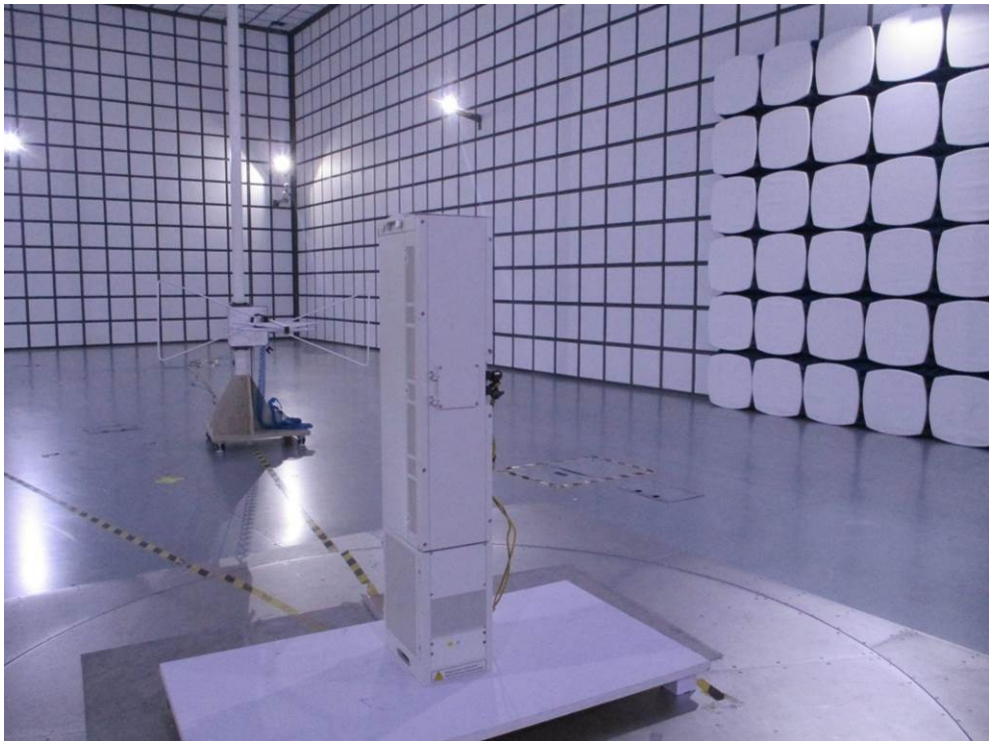
8 Photographs - Test Setup

30MHz ~ 1GHz Radiated Emission

AC:



DC:



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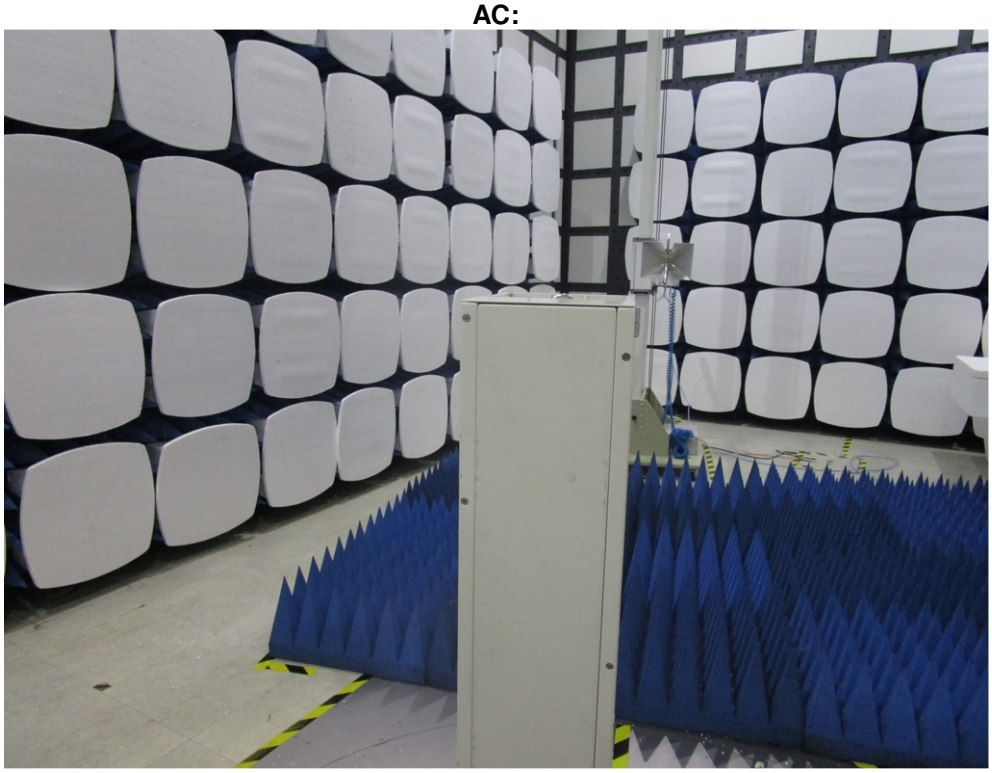
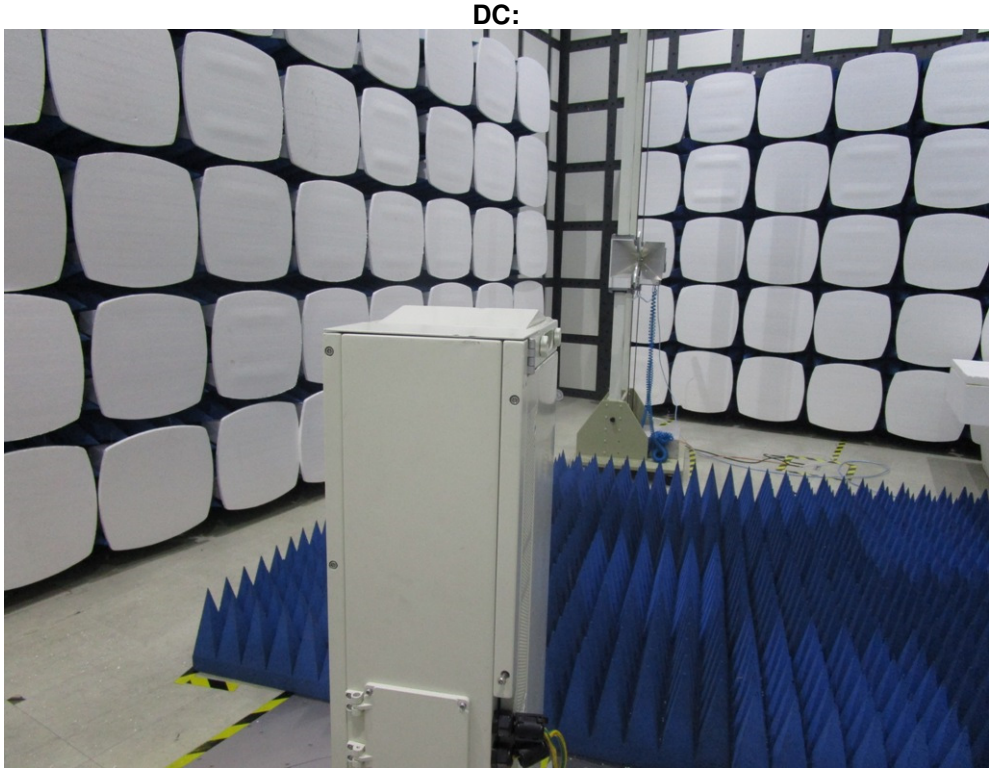
Above 1GHz Radiated Emission

AC:



DC:



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9 Photographs - EUT Constructional Details

Appendix A - GZEM1708004932CR EUT Constructional Details

--The End of Report--

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