Report On

Application for Grant of Equipment Authorization of the
Nextivity Inc.
Cel-Fi QUATRA Cellphone Signal Repeater

FCC CFR 47 Part 20
RSS-131

Report No. SD72132066-1017B **November 2017**

REPORT ON	Radio Testing of the Nextivity Inc. Cellphone Signal Repeater
TEST REPORT NUMBER	SD72132066-1017B
PREPARED FOR	Nextivity Inc. 16550 West Bernardo Drive, Bldg 5, Suite 550, San Diego, CA 92127, USA
CONTACT PERSON	CK Li Sr. Principal Engineer, Regulatory (858) 485-9442 CLi@NextivityInc.com
PREPARED BY	Xiaoying Zhang **Name** Authorized Signatory Title: EMC/Wireless Test Engineer
APPROVED BY	Ferdinand S. Custodio **Name** Authorized Signatory Title: EMC/Senior Wireless Test Engineer
DATED	November 13, 2017

Revision History

SD72132066-1017B Nextivity Inc. Cel-Fi QUATRA Cellphone Signal Repeater					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
11/13/17	Initial Release				Juan M Gonzalez

CONTENTS

SECTION 1

REPORT SUMMARY

Radio Testing of the
Nextivity Inc.
Cel-Fi QUATRA Cellphone Signal Repeater

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Nextivity Inc. Cellphone Signal Repeater to the requirements of the following:

- FCC CFR 47 Part 20
- RSS-131

Objective	To perform Radio Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Nextivity Inc.
Model Name	Cel-Fi QUATRA
Model Number(s)	NU: Q34-4/5/12/13/25NU_EXA Q34-4/5/12/13/25CU_EXA
FCC ID	NU: YETQ34-45121325NU YETQ34-45121325CU
IC Number	NU: 9298A-Q45121325NU 9298A-Q45121325CU
Serial Number(s)	Normal Mode: 258719001416 (NU) and 259706002355 (CU) Test Mode: 258719000273 (NU) and 259706002416 (CU)
Number of Samples Tested	4
Test Specification/Issue/Date	• FCC CRF 47 Part 20 (October 1, 2016). • RSS-131 – Zone Enhancers (Issue 3, May 2017)
Start of Test	October 27, 2017
Finish of Test	November 06, 2017
Name of Engineer(s)	Xiaoying Zhang
Related Document(s)	• KDB935210 (D04 Provider Specific Booster Measurements v02r01) Provider-Specific Consumer Signal Booster Compliance Measurements Guidance. • Supporting documents for EUT certification are separate exhibits.

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC CFR 47 Part 20 with cross-reference to the corresponding KDB935210 D04 is shown below.

Section	Spec Clause			Test Description	Result
	FCC Part 20	KDB935210 D04	RSS-131		
2.1 2.2	20.21 (e)(3) Frequency Bands 20.21 (e)(4) Self-Monitoring	7.1	-	Authorized Frequency Band Verification Test Authorized CMRS provider test	Compliant
2.3	20.21(e)(9)(i)(D) Power Limits 20.21(e)(9)(i)(B) Bidirectional Capability 20.21(e)(9)(i)(C)(2) Booster Gain Limits	7.2 7.3	5.1.4.2 5.1.4.3	Maximum Power measurement procedure Maximum Booster Gain Computer	Compliant
2.4	20.21(e)(9)(i)(G) Intermodulation Limit	7.4	5.1.4.6	Intermodulation Product	Compliant
2.5	20.21(e)(9)(i)(F) Out of Band Emission Limit	7.5	5.1.4.5	Out-of-Band Emissions	Compliant
-	2.1051	7.6	-	Conducted Spurious Emissions	Note*
2.6	20.21(e)(9)(i)(A) Noise Limits 20.21(e)(9)(i)(I) Transmit Power Off Mode	7.7	5.1.4.1 5.1.4.7	Noise Limits	Compliant
2.7	20.21(e)(9)(i)(J) Uplink Inactivity	7.8	5.1.4.8	Uplink inactivity	Compliant
2.8	20.21(e)(9)(i)(C)(1) Booster Gain Limits 20.21(e)(9)(i)(I) Transmit Power Off Mode	7.9	5.1.4.2 5.1.4.7	Variable Booster Gain	Compliant
-	2.1049	7.10	-	Occupied Bandwidth	Note*
2.9	20.21(e)(9)(ii)(A) Anti-Oscillation	7.11	-	Oscillation Detection	Compliant
-	20.21(e)(9)(i)(C)(2)(iii) Automatic Feedback Cancellation	7.12	-	Mobile Booster Automatic Feedback Cancellation	N/A; Applicable to Mobile Booster
-	2.1053	7.13	-	Radiated Spurious Emissions	Note*
-	20.21(e)(9)(i)(B) Bidirectional Capability 20.21(e)(3) Frequency Band	7.14	-	Spectrum Block Filtering	N/A**
2.10	20.21(e)(9)(i)(E) Out of Band Gain Limit	7.15	5.1.4.4	Out of Band Gain	Compliant
-	2.1055	7.16	-	Frequency Stability	Note*

Note* Different Standard Applies; Refer to test report SD72132066-1017A Nextivity FCC IC Part 24 LTE B25 Test Report.pdf.

N/A** Not Applicable. The EUT does not utilize spectrum block filtering.

1.3 PRODUCT INFORMATION

1.3.1 Technical Description

The Equipment Under Test (EUT) was a Nextivity Inc. Cel-Fi QUATRA Cellphone Signal Repeater. The EUT is a WCDMA/LTE Signal Booster to improve voice and data cellular performance in large enterprise environments. The EUT consists of two separate units: the Network Unit (NU) and the Coverage Unit (CU). The NU comprises a transmitter and receiver which communicate with the cell tower and the CU. Users place the NU in an area with the strongest signal from the carrier network. The CU is then placed in the centre of the home or office, or in the area where the best signal quality is best needed. The NU and CU are placed at varying distances apart and are communicated via Ethernet cables. Both NU and CU also includes Bluetooth LE connectivity. They are using the same Bluetooth module and antenna. The LTE Band 25 function of the EUT were verified in this test report.

1.3.2 EUT General Description

EUT Description	Cellphone Signal Repeater
Model Name	Cel-Fi QUATRA
Model Number(s)	NU: Q34-4/5/12/13/25NU_EXA Q34-4/5/12/13/25CU_EXA
Rated Voltage	NU: 54V DC via external AC/DC adapter CU: 54V DC via POE
Mode Verified	LTE Band 25
Frequency Bands	UL: 1850 - 1915MHz DL: 1930 - 1995MHz
Channel Bandwidth	5MHz, 10MHz, 15MHz and 20MHz
Capability	WCDMA (Band 5), LTE (Band 25, 12, 13 and 4) and BT LE
Primary Unit (EUT)	☒ Production ☐ Pre-Production ☐ Engineering
Manufacturer Declared Temperature Range	0°C to 40°C
Antenna Type	PCB PIFA
Manufacturer	Nextivity Inc.
Antenna Model	N/A

Maximum Antenna Gain

NU	CU
2.0 dBi	2.0 dBi

1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

Test Configuration	Description
A	Test Mode - Downlink (CU TX). Input signal is applied to antenna port of Donor (NU). Output is monitored from antenna port of Server (CU). (refer to 6.3.3 Figure 2)
B	Test Mode - Uplink (NU TX). Input signal is applied to antenna port of Server (CU). Output is monitored from antenna port of Donor (NU). (refer to 6.3.3 Figure 3)
C	Normal Mode - Downlink (CU TX). Base Station Simulator is employed to send a modulated signal to antenna port of Donor (NU). Antenna port of Server (CU) is terminated with a 50Ω load. (refer to 6.3.2 Figure 1)
D	Normal Mode - Uplink (NU TX). Base Station Simulator is employed to send a modulated signal to antenna port of Donor (NU). Input signal is applied to antenna port of Server (CU). (refer to 6.3.2 Figure 1)
E	Normal Mode. Base Station Simulator#1 is employed to send a modulated signal to antenna port of Donor (NU) with Simulator#2 connected to a step attenuator and then applied to the Donor (NU) through a combiner. Input signal is applied to antenna port of Server (CU) (refer to 7.1.3 Figure 4) – Applicable to Mobile Booster
F	Inter-modulation. Test setup identical to Test Configuration A and B above with the addition of another signal applied to the input of the EUT. A coupler was used in the setup to ensure that the additional signal is directed to the EUT input port. (refer to 7.4 Figure 5)
G	Max Downlink noise limit testing - A 50 Ohm Termination is connected to the Donor (NU) antenna port and Measure the Noise Limit at the Server (CU) antenna port. (refer to 7.7.1 Figure 6)
H	Max Uplink noise limit testing - A 50 Ohm Termination is connected to the Server (CU) antenna port. A signal generator is connected to a step attenuator and then applied to the Donor (NU) antenna port. Output is monitored from antenna port of Donor (NU). (refer to 7.7.1 Figure 7)
I	Max Downlink noise limit testing - A signal generator is connected to a step attenuator and then applied to the Donor (NU) antenna port. Output is monitored from antenna port of CU. (refer to 7.7.1 Figure 8)
J	Uplink Oscillation Detection testing - Base Station Simulator is connected to a step attenuator and then applied to the Donor (NU) antenna port and a signal generator is connected to the Server (CU) port. A Feedback Step Attenuator is connected between the Donor (NU) and Server (CU) antenna ports. Output is monitored from antenna port of Donor (NU). (refer to 7.11 Figure 10)
K	Downlink Oscillation Detection testing - Base Station Simulator is connected to a step attenuator and then applied to the Donor (NU) antenna port and a signal generator is connected to the Server (CU) port. A Feedback Step Attenuator is connected between the Donor (NU) and Server (CU) antenna ports. Output is monitored from antenna port of Server (CU). (refer to 7.11 Figure 11)
L	Downlink/Uplink Oscillation Mitigation testing – Signal Generator is connected to a directional coupler and then applied to the Donor (NU)/Server (CU) antenna port of Fix Unit and a spectrum analyser is connected to the Server (CU)/Donor (NU) port. A Feedback Step Attenuator is connected between the Donor (NU) and Server (CU) antenna ports. (refer to 7.11 Figure 12)

M	Downlink/Uplink Mobile Booster Automatic Feedback Cancellation – Signal Generator is connected to a directional coupler and then applied to the Donor (NU)/Server (CU) antenna port of Mobile Unit and a spectrum analyser is connected to the Server (CU)/Donor (NU) port. A Feedback Step Attenuator is connected between the Donor (NU) and Server (CU) antenna ports. (refer to 7.12 Figure 13) – Applicable to Mobile Booster

1.4.2 EUT Exercise Software

Manufacturer provided a configuration software (ConformanceTest.exe) running from a support laptop where EUT is connected via USB.

1.4.3 Support Equipment and I/O cables

Manufacturer	Equipment/Cable	Description
Nextivity	AC/DC Adapter (EUT)	Model: 290N029-001 S/N: 163400014A1 Input: 100-240V, 50/60Hz, 1.6A; Output: 54VDC 2.22A
-	Support USB cable	1.75 meters, shielded Type A to Micro B connector
-	Support USB cable	Custom 1.0 meter shielded USB Type A to Type B for the Shielded Test Enclosure
Netgear	Network patch Cable (1x NU to CU)	4.0m, unshielded, Cat5e 24AWG UTP
Sony	Support Laptop	M/N PCG-31311L S/N 27545534 3006488
Sony	Support Laptop AC Adapter	M/N PCGA-AC19V9 S/N 147839091 0023259
Rhode & Schwarz	Support Wideband Radio Communication Tester	M/N: CMW500, S/N: 1201.0002K50/103829
Agilent	ESG Vector Signal Generator	M/N: E4438C, S/N: MY47271033
Rhode & Schwarz	Feedback Attenuator	M/N: RSP, S/N: 834500/009
Agilent	11dB Step Attenuator	M/N 8494B Frequency Range DC - 18GHz S/N 2812A17193
Agilent	110dB Step Attenuator	M/N 8496B Frequency Range DC - 18GHz S/N MY42143874
Ramsey	Support Shielded Test Enclosure	With custom USB cable
Mini-Circuits	Power Splitter x 2	M/N ZN2PD-63-S+ S/N UU74001429
Weinschel Corp	Broadband Resistive Power Divider	M/N 1506A S/N RR002

1.4.4 Simplified Test Configuration Diagram

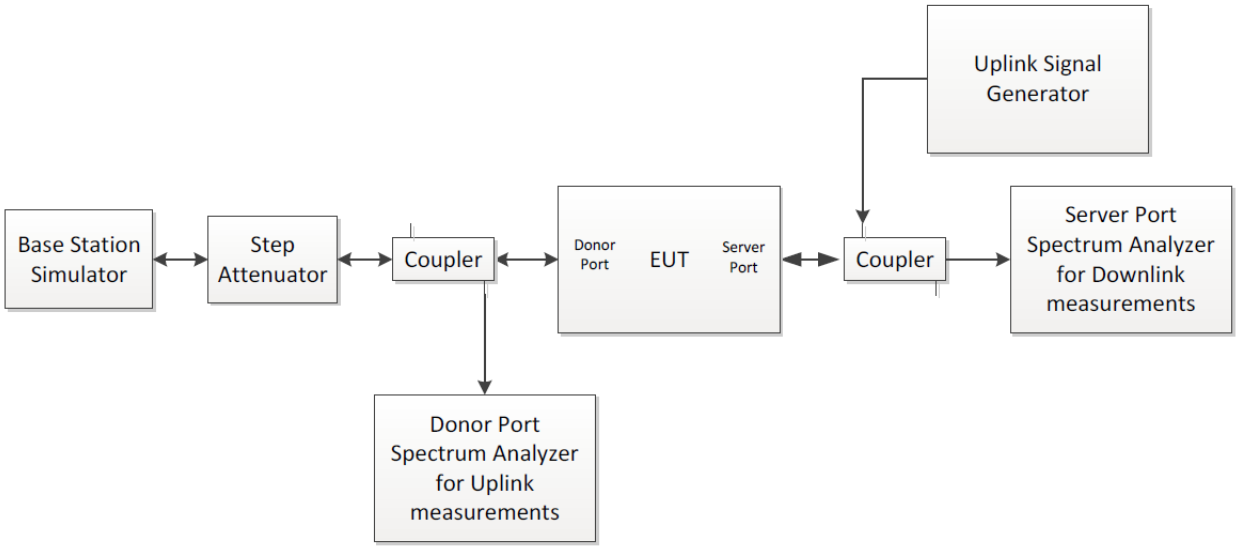


Figure 1 – Test configuration in EUT normal operational mode

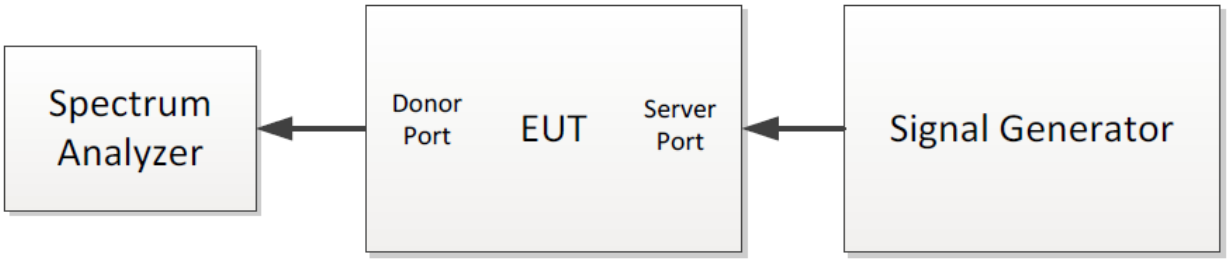


Figure 2 – Uplink test configuration in EUT test mode

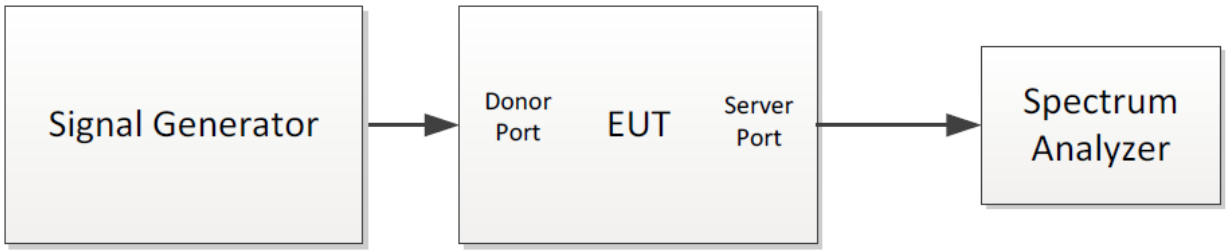


Figure 3 – Downlink test configuration in EUT test mode

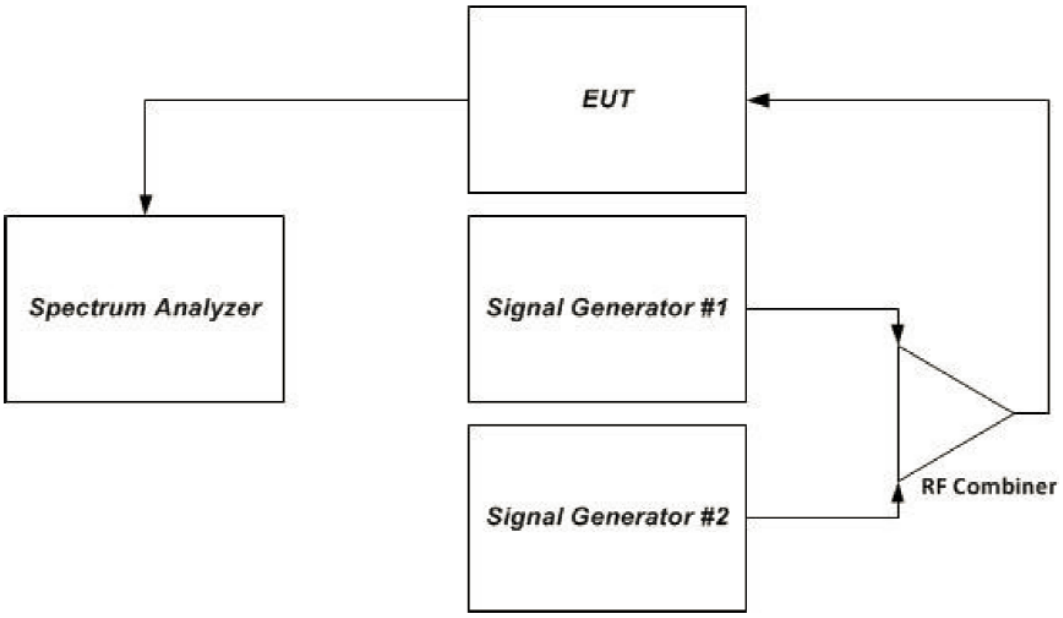


Figure 5 – Intermodulation product instrumentation test setup

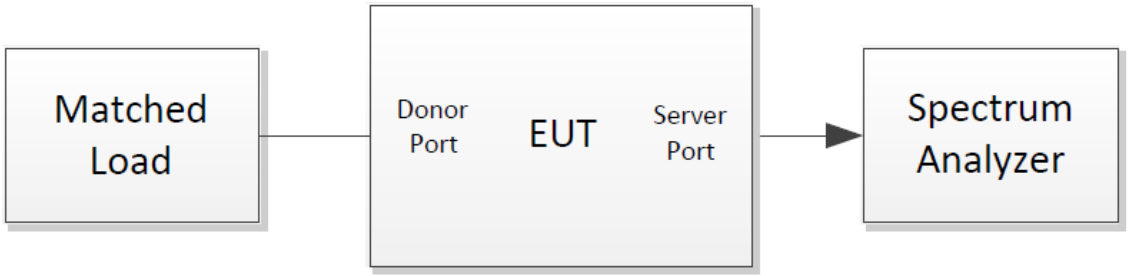


Figure 6 – Maximum downlink noise limit test configuration

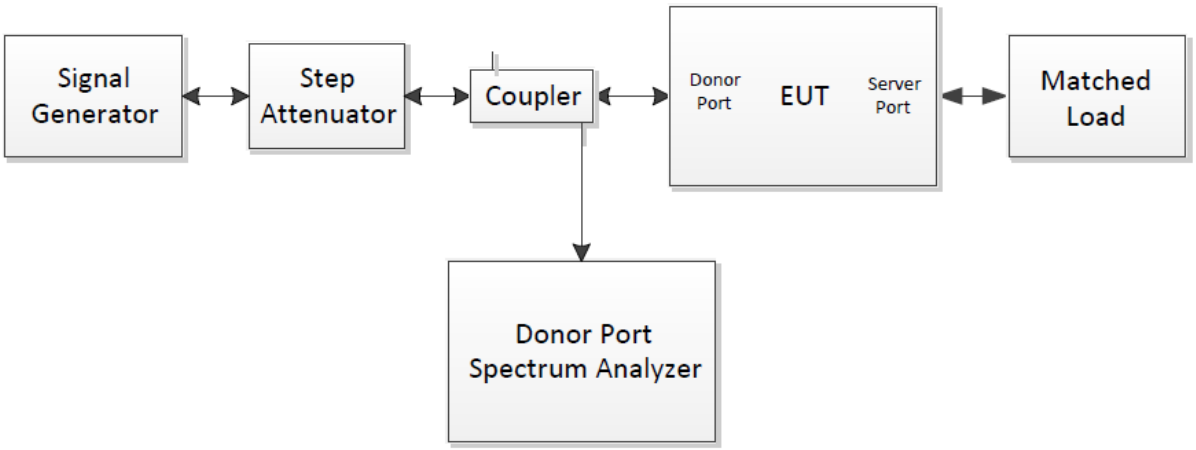


Figure 7 – Uplink RSSI-dependent noise limit test configuration

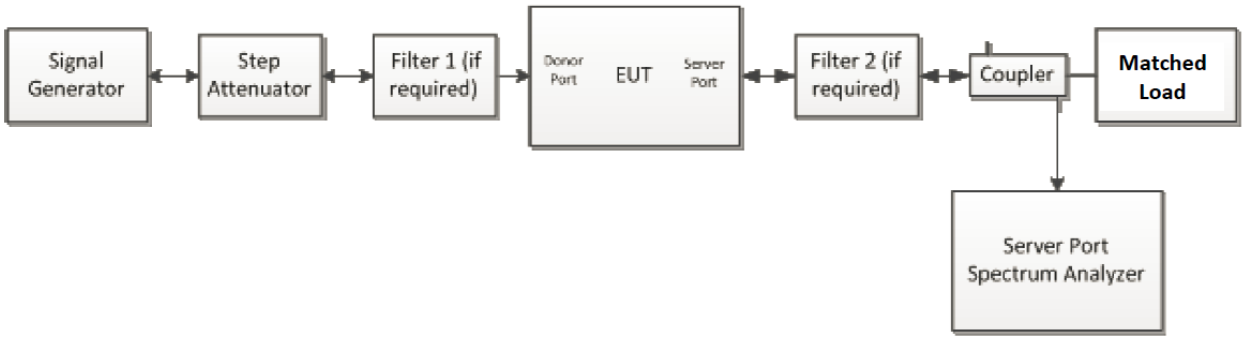


Figure 8 – Downlink RSSI-dependent noise limit test configuration

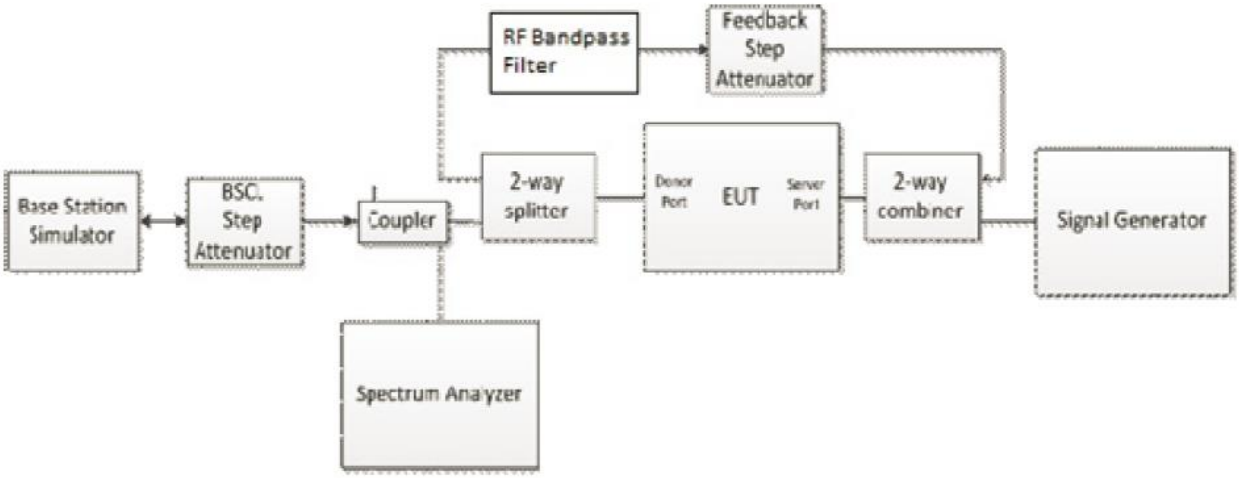


Figure 10 – Uplink oscillation detection test setup

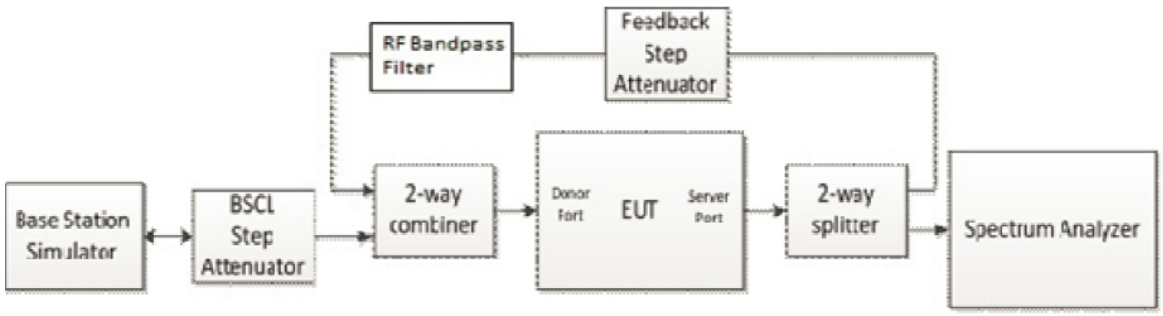


Figure 11 – Downlink oscillation detection test setup

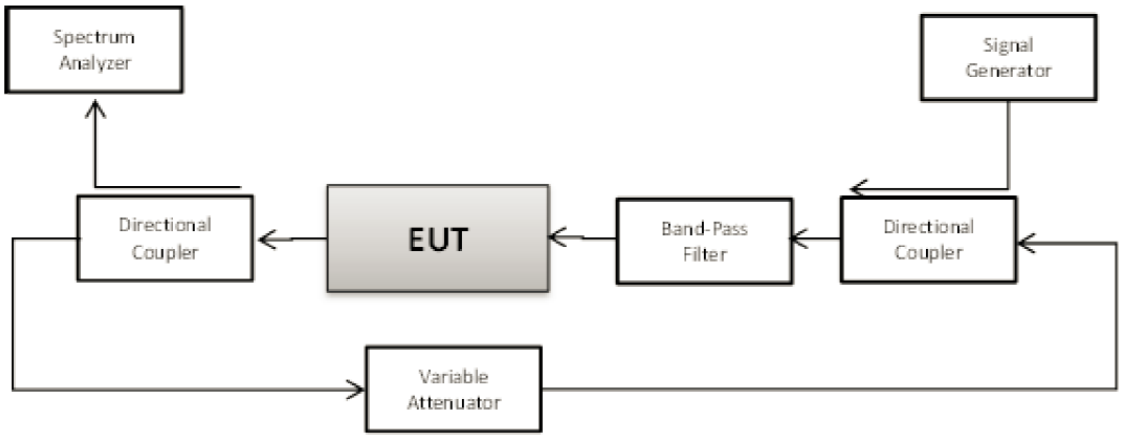


Figure 12 – Downlink oscillation mitigation test setup

1.5 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

1.6 MODIFICATION RECORD

Description of Modification	Modification Fitted By	Date Modification Fitted
Serial Number: Test Mode: 258719001416 (NU) and 259706002355 (CU); Normal Mode: 258719000273 (NU) and 259706002416 (CU)		
N/A		

The table above details modifications made to the EUT during the test programme. The modifications incorporated during each test (if relevant) are recorded on the appropriate test pages.

1.7 TEST METHODOLOGY

All measurements contained in this report were conducted as per KDB935210 D04 Provider-Specific Consumer Signal Boosters Compliance Measurements Guidance (February 12, 2016).

1.8 TEST FACILITY LOCATION

1.8.1 TÜV SÜD America Inc. (Mira Mesa)

10040 Mesa Rim Road, San Diego, CA 92121-2912 (32.901268,-117.177681). Phone: 858 678 1400 FAX: 858-546 0364

1.8.2 TÜV SÜD America Inc. (Rancho Bernardo)

16936 Via Del Campo, San Diego, CA 92127-1708 (33.018644,-117.092409). Phone: 858 678-1400 Fax: 858 546 0364.

1.9 TEST FACILITY REGISTRATION

1.9.1 FCC – DESIGNATION NO.: US1146

TUV SUD America Inc. (San Diego), is an accredited test facility with the site description report on file and has met all the requirements specified in §2.948 of the FCC rules. The acceptance letter from the FCC is maintained in our files and the Registration is US1146.

1.9.2 Innovation, Science and Economic Development Canada (ISED) Registration No.: 3067A-1 & 22806-1

The 10m Semi-anechoic chamber of TUV SUD America Inc. (San Diego Rancho Bernardo) has been registered by Certification and Engineering Bureau of Innovation, Science and Economic Development Canada for radio equipment testing with Registration No. 3067A-1.
The 3m Semi-anechoic chamber of TUV SUD America Inc. (San Diego Mira Mesa) has been registered by Certification and Engineering Bureau of Innovation, Science and Economic Development Canada for radio equipment testing with Registration No. 22806-1.

SECTION 2

TEST DETAILS

Radio Testing of the
Nextivity Inc.
Cel-Fi QUATRA Cellphone Signal Repeater

TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364

2.1 AUTHORIZED FREQUENCY BAND VERIFICATION

2.1.1 Specification Reference

FCC 47 CFR Part 20, Clause 20.21 (e)(3)
FCC 47 CFR Part 20, Clause 20.21(e)(4)
KDB935210 D04, Clause 7.1.1

2.1.2 Standard Applicable

FCC 47 CFR Part 20, Clause 20.21 (e)(3) Frequency Bands:
Consumer Signal Boosters must be designed and manufactured such that they only operate on the frequencies used for the provision of subscriber-based services under parts 22 (Cellular), 24 (Broadband PCS), 27 (AWS–1, 700 MHz Lower A–E Blocks, and 700 MHz Upper C Block), and 90 (Specialized Mobile Radio) of this chapter. The Commission will not certificate any Consumer Signal Boosters for operation on part 90 of this chapter (Specialized Mobile Radio) frequencies until the Commission releases a public notice announcing the date Consumer Signal Boosters may be used in the band.

FCC 47 CFR Part 20, Clause 20.21(e)(4) Self Monitoring:
The subscriber operates the Consumer Signal Booster on frequencies used for the provision of subscriberbased services under parts 22 (Cellular), 24 (Broadband PCS), 27 (AWS–1, 700 MHz Lower A–E Blocks, and 700 MHz Upper C Block), and 90 (Specialized Mobile Radio) of this chapter. Operation on part 90 (Specialized Mobile Radio) frequencies is permitted upon the Commission's release of a public notice announcing the date Consumer Signal Boosters may be used in the band;

2.1.3 Equipment Under Test and Modification State

Serial No: 258719000273 (NU) and 259706002416 (CU) / Test Configuration A and B

2.1.4 Date of Test/Initial of test personnel who performed the test

October 27, 2017/XYZ

2.1.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.6 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility.

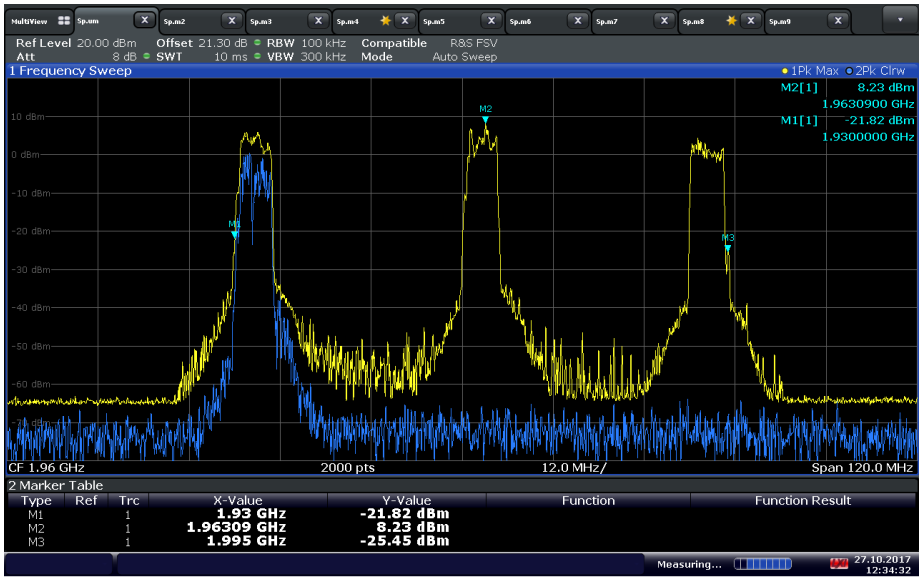
Ambient Temperature	25.5°C
Relative Humidity	26.7%
ATM Pressure	98.9kPa

2.1.7 Additional Observations

1) This is conducted Test. Test procedure is per Section 7.1.1 of KDB935210 (D04 Provider Specific Booster Measurements v02r01). Appropriate offset (line losses) applied.
2) The Unit operated in Test Mode, with the gain manually set to the maximum gain and a minimum bandwidth setting (5MHz).
3) Setup the EUT according to Figure 2 or 3 of Section 6.3.3 of KDB935210 (D04 Provider Specific Booster Measurements v02r01) as appropriate.
4) Evaluations are conducted at Server and Donor antenna ports.
5) Operational uplink and downlink bands for LTE Band 25 were tested.
6) The signal generator was set to transmit a 5MHz LTE signal.
7) DL: B25: 1930 – 1995MHz;
UL: B2: 1850 – 1915MHz;

2.1.8 Test Results

LTE Band 25 Downlink Authorized Frequency Range (1930 – 1995 MHz)



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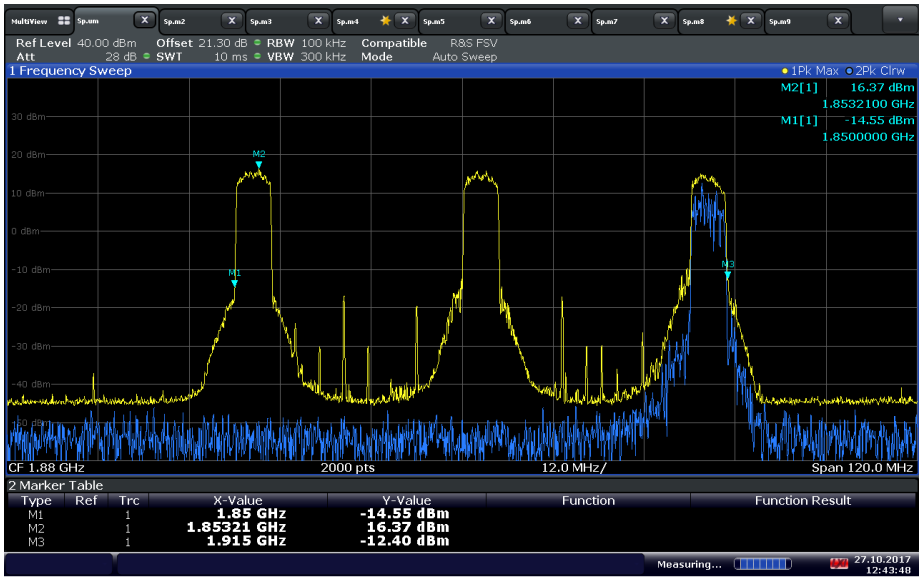
LTE Band 25 Uplink Authorized Frequency Range (1850 – 1915 MHz)



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2.2 AUTHORIZED CMRS PROVIDER

2.2.1 Specification Reference

FCC 47 CFR Part 20, Clause 20.21 (e)(3)
FCC 47 CFR Part 20, Clause 20.21(e)(4)
KDB935210 D04, Clause 7.1.2

2.2.2 Standard Applicable

FCC 47 CFR Part 20, Clause 20.21 (e)(3) Frequency Bands:
Consumer Signal Boosters must be designed and manufactured such that they only operate on the frequencies used for the provision of subscriber-based services under parts 22 (Cellular), 24 (Broadband PCS), 27 (AWS–1, 700 MHz Lower A–E Blocks, and 700 MHz Upper C Block), and 90 (Specialized Mobile Radio) of this chapter. The Commission will not certificate any Consumer Signal Boosters for operation on part 90 of this chapter (Specialized Mobile Radio) frequencies until the Commission releases a public notice announcing the date Consumer Signal Boosters may be used in the band.

FCC 47 CFR Part 20, Clause 20.21(e)(4) Self Monitoring:
The subscriber operates the Consumer Signal Booster on frequencies used for the provision of subscriberbased services under parts 22 (Cellular), 24 (Broadband PCS), 27 (AWS–1, 700 MHz Lower A–E Blocks, and 700 MHz Upper C Block), and 90 (Specialized Mobile Radio) of this chapter. Operation on part 90 (Specialized Mobile Radio) frequencies is permitted upon the Commission's release of a public notice announcing the date Consumer Signal Boosters may be used in the band;

2.2.3 Equipment Under Test and Modification State

Serial No: 258719001416 (NU) and 259706002355 (CU) / Test Configuration C and D

2.2.4 Date of Test/Initial of test personnel who performed the test

October 27, 2017/XYZ

2.2.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.6 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility.

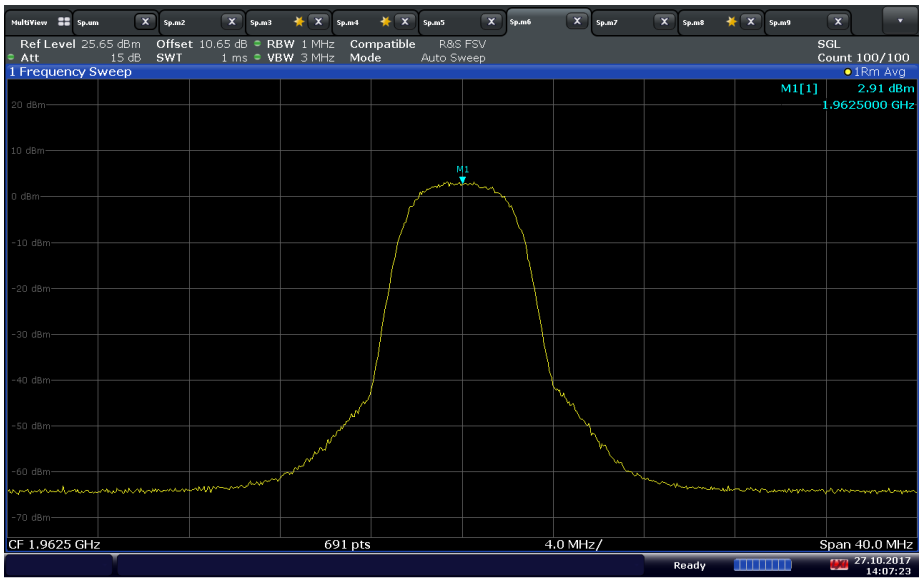
Ambient Temperature	25.5°C
Relative Humidity	26.7%
ATM Pressure	98.9kPa

2.2.7 Additional Observations

1) This is conducted Test. Test procedure is per Section 7.1.2 of KDB935210 (D04 Provider Specific Booster Measurements v02r01). Appropriate offset (line loses) applied.
2) The unit operated in Normal Mode, with the gain manually set to the maximum gain and a minimum bandwidth setting (5MHz).
3) Setup the EUT according to Figure 1 of Section 6.3.2 of KDB935210 (D04 Provider Specific Booster Measurements v02r01) with the Base Station Simulator transmitting an authorized CMRS provider signal to the booster.
4) Evaluations are conducted at Server and Donor antenna ports.
5) All operational uplink and downlink bands for WCDMA Band 5, and LTE Band 25, 12, 13 and 4 were tested.
6) The Base Station Simulator was set to transmit a 5MHz LTE signal or WCDMA.
7) The two authorized CMRS Provider IDs: 123/456 and 123.789
8) Two Non- authorized CMRS Provider signals were verified.
9) DL: B25: 1930 – 1995MHz;
UL: B25: 1850 – 1915MHz

2.2.8 Test Results

LTE Band 25 Downlink Authorized Frequency Range (1930 – 1995 MHz)
(MCC/MNC: 123/456)



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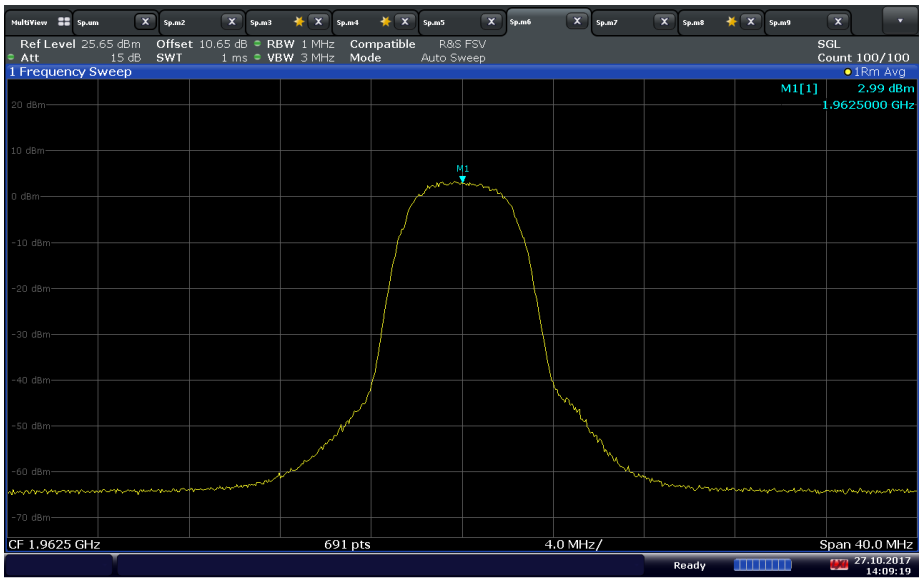
LTE Band 25 Downlink Authorized Frequency Range (1930 – 1995 MHz) (MCC/MNC: 123/789)
   14:09:19 27.10.2017
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LTE Band 25 Downlink Authorized Frequency Range (1930 – 1995 MHz) (MCC/MNC: 123/321)
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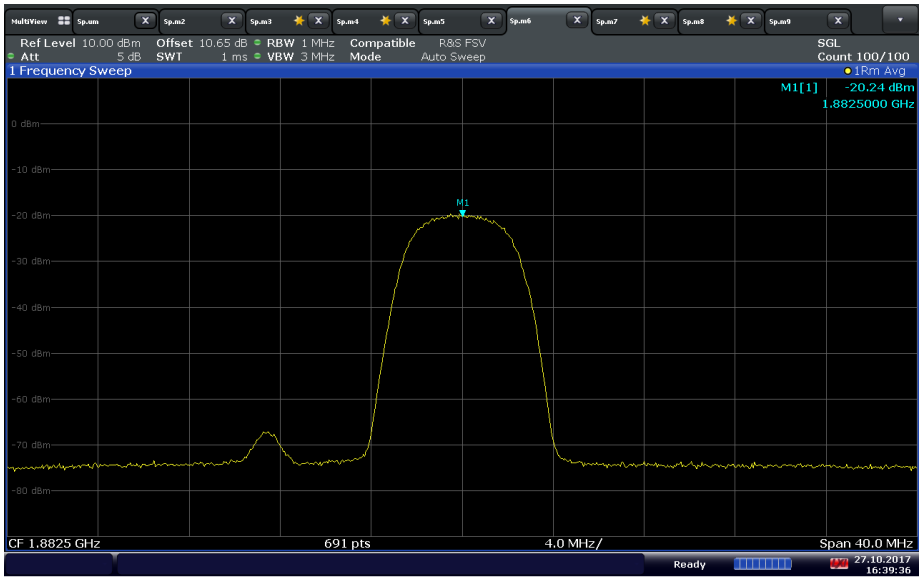
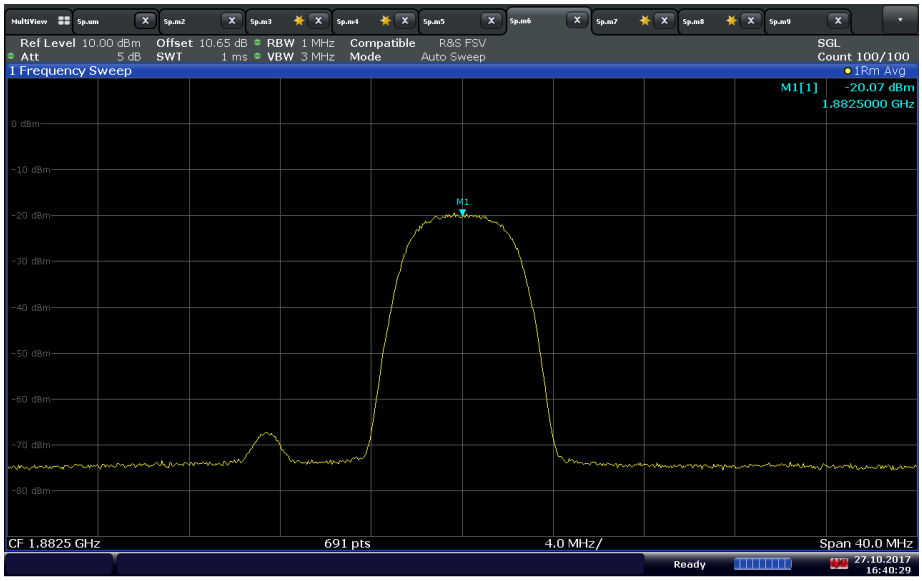
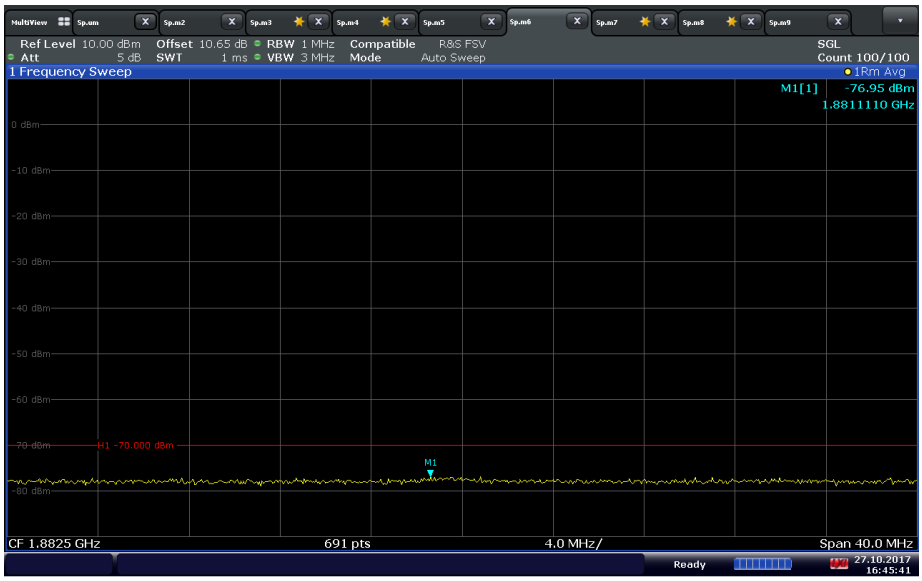
LTE Band 25 Uplink Authorized Frequency Range (1850 – 1915 MHz) (MCC/MNC: 123/456)
   16:39:37 27.10.2017

LTE Band 25 Uplink Authorized Frequency Range (1850 – 1915 MHz) (MCC/MNC: 123/789)



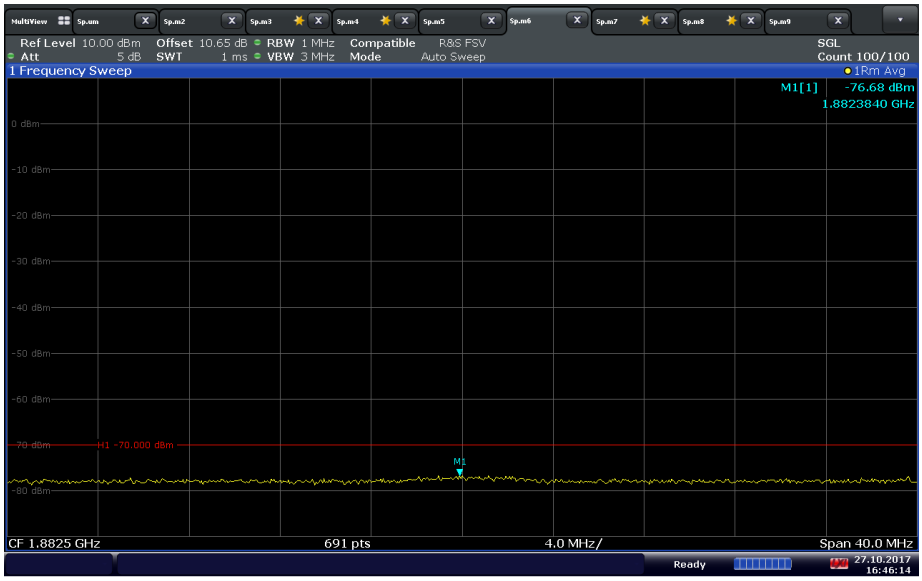
16:40:30 27.10.2017

LTE Band 25 Uplink Authorized Frequency Range (1850 – 1915 MHz) (MCC/MNC: 123/123)



16:45:42 27.10.2017

LTE Band 25 Uplink Authorized Frequency Range (1850 – 1915 MHz) (MCC/MNC: 123/321)



16:46:14 27.10.2017

LTE Band 25 Downlink Inactive time after reset (>30s)

14:23:10 27.10.2017

LTE Band 25 Uplink Inactive time after reset (>30s)

16:45:08 27.10.2017

2.3 MAXIMUM POWER MEASUREMENT AND BOOSTER GAIN COMPUTATION

2.3.1 Specification Reference

FCC 47 CFR Part 20, Clause 20.21(e)(9)(i)(D)
FCC 47 CFR Part 20, Clause 20.21(e)(9)(i)(B)
FCC 47 CFR Part 20, Clause 20.21(e)(9)(i)(C)(2)
KDB935210 D04, Clause 7.2
KDB935210 D04, Clause 7.3

2.3.2 Standard Applicable

FCC 47 CFR Part 20, Clause 20.21(e)(9)(i)(B) Bidirectional Capability:
Consumer Boosters must be able to provide equivalent (within 9dB as per ANSI ASC C63) uplink and downlink gain and conducted uplink power output that is at least 0.05 watts. One-way consumer boosters (i.e., uplink only, downlink only, uplink impaired, downlink impaired) are prohibited. Spectrum block filtering used must provide uplink filter attenuation not less than the downlink filter attenuation, and where RSSI is measured after spectrum block filtering is applied referenced to the booster's input port for each band of operation.

FCC 47 CFR Part 20, Clause 20.21(e)(9)(i)(D) Power Limits:
A booster's uplink power must not exceed 1 watt composite conducted power and equivalent isotropic radiated power (EIRP) for each band of operation. Downlink power shall not exceed 0.05 watt (17dBm) composite and 10 dBm per channel conducted and EIRP for each band of operation. Compliance with power limits will use instrumentation calibrated in terms of RMS equivalent voltage.

FCC 47 CFR Part 20, Clause 20.21(e)(9)(i)(C) Booster Gain Limits.
The gain of the frequency selective consumer booster shall meet the limits below.
(2) The uplink and downlink maximum gain of a frequency selective consumer booster referenced to its input and output ports shall not exceed 19.5 dB + 20 Log (Frequency), or 100 dB for systems having automatic gain adjustment based on isolation measurements between booster donor and server antennas.
Where, Frequency is the uplink midband frequency of the supported spectrum bands in MHz.

2.3.3 Equipment Under Test and Modification State

Serial No: 258719000273 (NU) and 259706002416 (CU) / Test Configuration A and B

2.3.4 Date of Test/Initial of test personnel who performed the test

October 31, 2017/XYZ

2.3.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.6 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility.

Ambient Temperature	25.5°C
Relative Humidity	45.7%
ATM Pressure	98.9kPa

2.3.7 Additional Observations

1) This is conducted Test. Test procedure is per Section 7.2.2 of KDB935210 (D04 Provider Specific Booster Measurements v02r01). Appropriate offset (line losses) applied.
2) The EUT operated in Test Mode, with the gain manually set to the maximum gain and a minimum bandwidth setting (5MHz).
3) Setup the EUT according to Figure 2 or 3 of Section 6.3.3 of KDB935210 (D04 Provider Specific Booster Measurements v02r01) as appropriate.
4) Evaluations are conducted at Server and Donor ports for LTE B25.
5) Maximum Gain of the booster was calculated.
6) The Gain with Maximum Transmitter Input Level (-20dBm for Downlink and 0dBm for Uplink) injected was also calculated.
7) Operational uplink and downlink bands for LTE Band 25 were tested.
8) The signal generator was set to transmit a 5MHz LTE or WCDMA signal.

2.3.8 Test Results

Maximum Gain/Maximum Power										
Band	**Frequency Range (MHz)**	**Input Power (dBm)**	**Output Power (dBm)**	**Antenna Gain (dB)**	**EIRP (dBm)**	**EIRP Limit (dBm)**	**Gain (dB)**	**Gain Limit (dB)**	**UL vs DL Gain**	**UL vs DL Gain Limit (dB)**
LTE Band 2 Downlink	1930 - 1995	-85.98	7.79	2	9.79	<17	95.77	100	2.07	9
LTE Band 25 Uplink	1850 - 1915	-77.73	18.11	2	20.11	17-30	97.84	100		

Maximum Gain/Maximum Power with Maximum Transmitter Input Level								
Band	**Frequency Range (MHz)**	**Input Power (dBm)**	**Output Power (dBm)**	**Antenna Gain (dB)**	**EIRP (dBm)**	**EIRP Limit (dBm)**	**Gain (dB)**	**Gain Limit (dB)**
LTE Band 25 Downlink	1930 - 1995	-20	7.74	2.0	9.74	<17	29.74	100
LTE Band 25 Uplink	1850 - 1915	0	18.76	2.0	20.76	17-30	20.76	100

2.4 INTERMODULATION PRODUCT

2.4.1 Specification Reference

FCC 47 CFR Part 20. Clause 20.21(e)(9)(i)(G)
KDB935210 D04, Clause 7.4

2.4.2 Standard Applicable

FCC 47 CFR Part 20. Clause 20.21(e)(9)(i)(G) Intermodulation Limits:
The transmitted intermodulation products of a consumer booster at its uplink and downlink ports shall not exceed the power level of -19 dBm for the supported bands of operation. Compliance with intermodulation limits will use boosters operating at maximum gain and maximum rated output power, with two continuous wave (CW) input signals spaced 600 kHz apart and centered in the pass band of the booster, and with a 3 kHz measurement bandwidth.

2.4.3 Equipment Under Test and Modification State

Serial No: 258719000273 (NU) and 259706002416 (CU) / Test Configuration F

2.4.4 Date of Test/Initial of test personnel who performed the test

October 31, 2017/XYZ

2.4.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.6 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility.

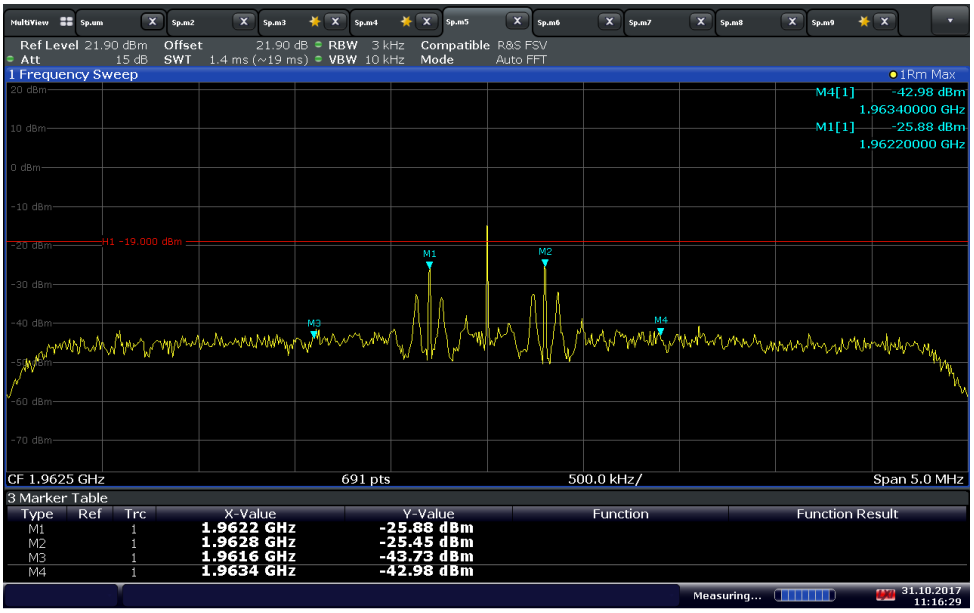
Ambient Temperature	25.5°C
Relative Humidity	45.7%
ATM Pressure	98.9kPa

2.4.7 Additional Observations

1) This is conducted Test. Test procedure is per Section 7.4 of KDB935210 (D04 Provider Specific Booster Measurements v02r01). Appropriate offset (line losses) applied.
2) The Unit operated in Test Mode with the gain manually set to the maximum gain and a minimum bandwidth setting (5MHz).
3) Setup the EUT according to Figure 5 of Section 7.4 of KDB935210 (D04 Provider Specific Booster Measurements v02r01).
4) Evaluations are conducted at Server and Donor ports antenna ports.
5) Operational uplink and downlink bands for LTE Band 25 were tested.

2.4.8 Test Results

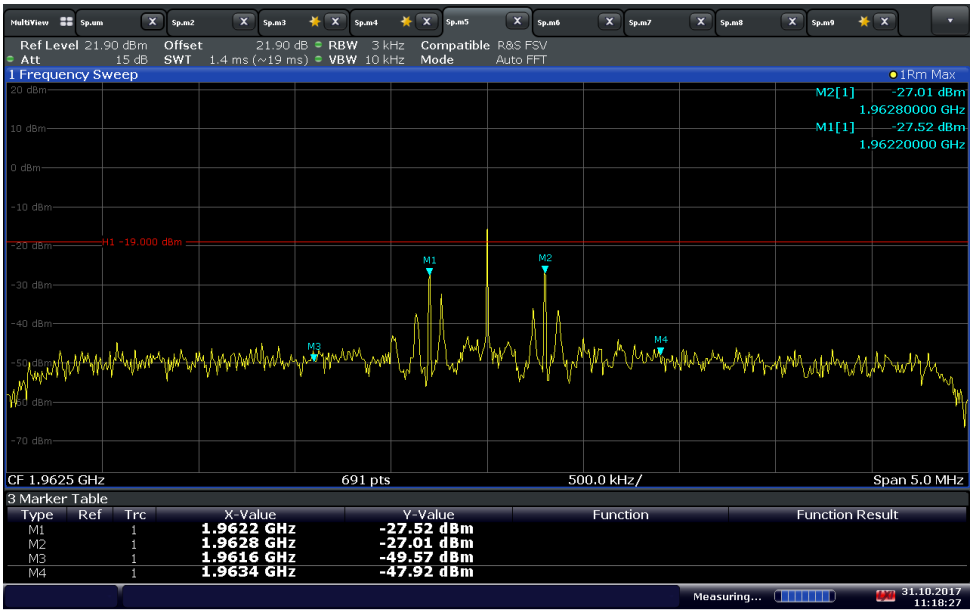
LTE Band 25 Downlink (-89.0dBm)



11:16:29 31.10.2017

Note: The spurious emission above the limit is not intermodulation products.

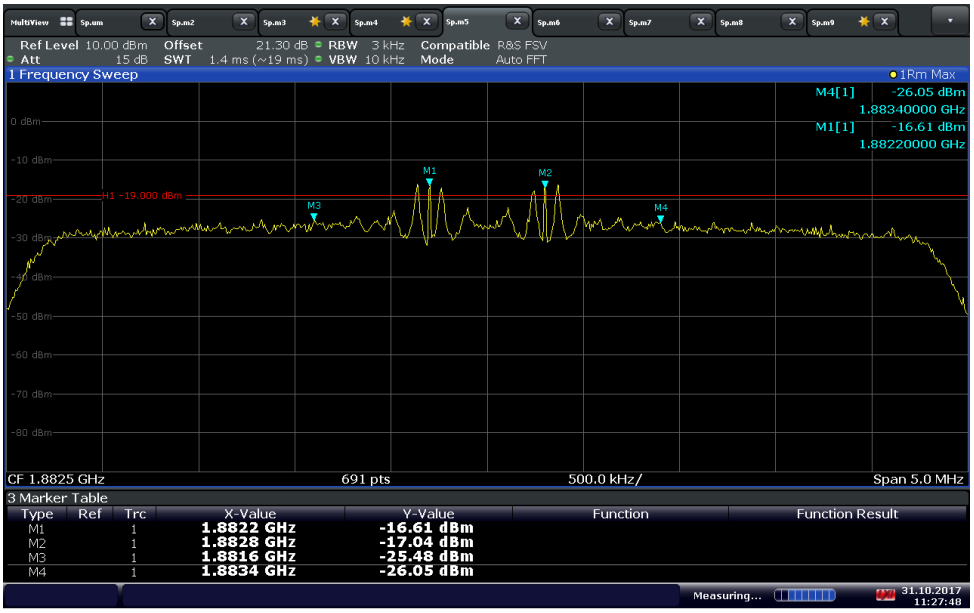
LTE Band 25 Downlink (-79.0dBm)



11:18:28 31.10.2017

Note: The spurious emission above the limit is not intermodulation products.

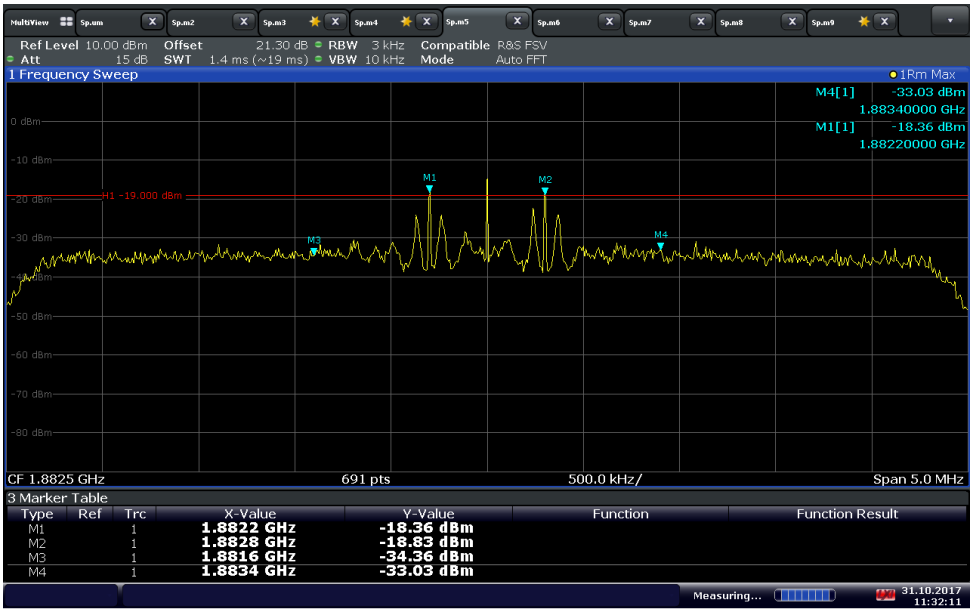
LTE Band 25 Uplink (-99.0dBm)



11:27:48 31.10.2017

Note: The spurious emissions above the limit are not intermodulation products.

LTE Band 25 Uplink (-89.0dBm)



11:32:11 31.10.2017

Note: The spurious emissions above the limit are not intermodulation products.

2.5 OUT OF BAND EMISSIONS

2.5.1 Specification Reference

FCC 47 CFR Part 20. Clause 20.21(e)(9)(i)(F)
KDB935210 D04, Clause 7.5

2.5.2 Standard Applicable

FCC 47 CFR Part 20. Clause 20.21(e)(9)(i)(F) Out of Band Emissions Limits:
Booster out of band emissions (OOBE) shall meet the FCC's mobile emission limits for the supported bands of operation. Compliance to OOBE limits will utilize high peak-to-average CMRS signal types..

2.5.3 Equipment Under Test and Modification State

Serial No: 258719000273 (NU) and 259706002416 (CU) / Test Configuration A and B

2.5.4 Date of Test/Initial of test personnel who performed the test

October 31, 2017/XYZ

2.5.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.5.6 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility.

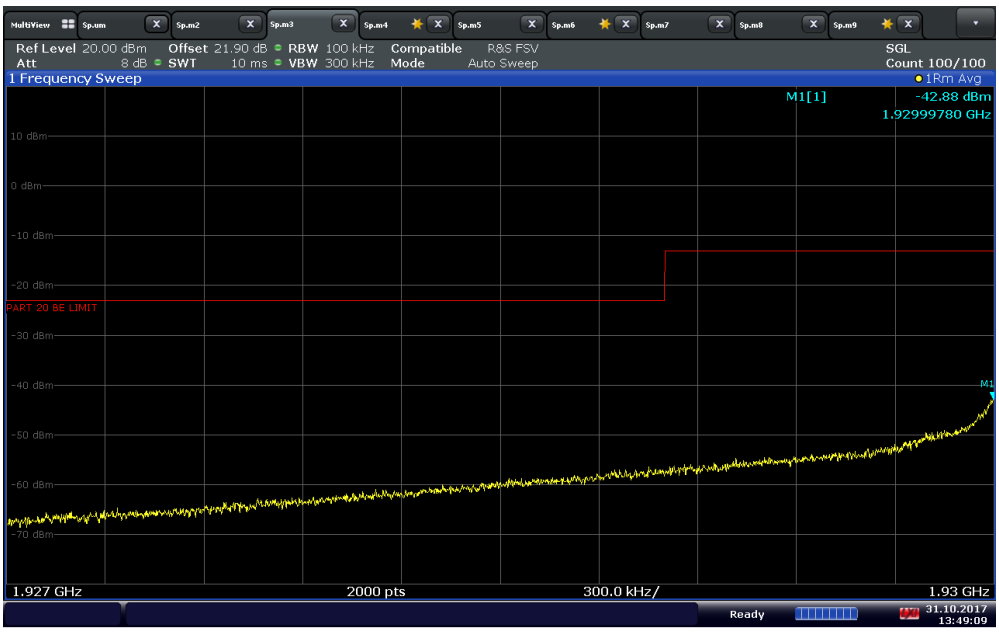
Ambient Temperature	25.5°C
Relative Humidity	45.7%
ATM Pressure	98.9kPa

2.5.7 Additional Observations

1) This is conducted Test. Test procedure is per Section 7.5 of KDB935210 (D04 Provider Specific Booster Measurements v02r01). Appropriate offset (line losses) applied.
2) The Unit operated in Test Mode, with the gain manually set to the maximum gain and a minimum bandwidth setting (5MHz).
3) Setup the EUT according to Figure 2 or 3 of Section 6.3.3 of KDB935210 (D04 Provider Specific Booster
4) Evaluations are conducted at Server and Donor antenna ports.
5) Operational uplink and downlink bands for LTE Band 25 were tested.
6) Signal: 5MHz LTE or WCDMA.

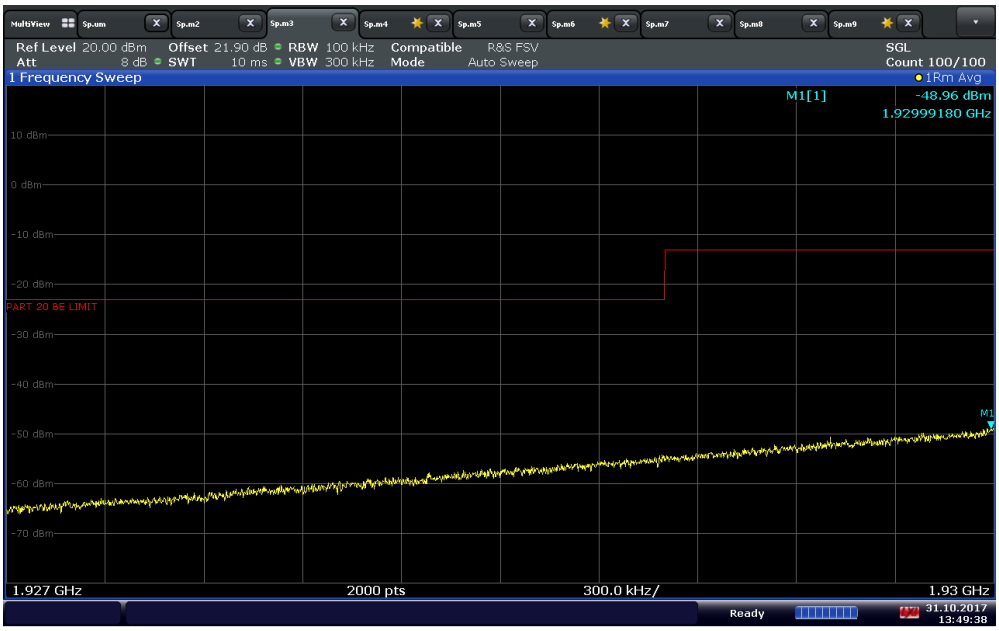
2.5.8 Test Results

LTE Band 25 Downlink 5MHz Bandwidth Low Channel (-83 dBm)



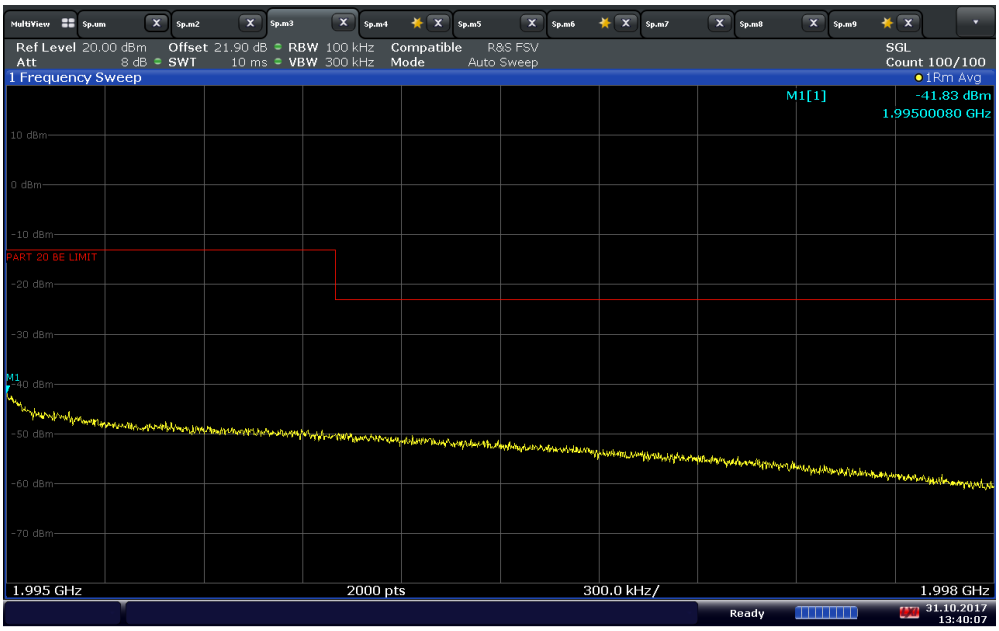
13:49:10 31.10.2017

LTE Band 25 Downlink 5MHz Bandwidth Low Channel (-20 dBm)



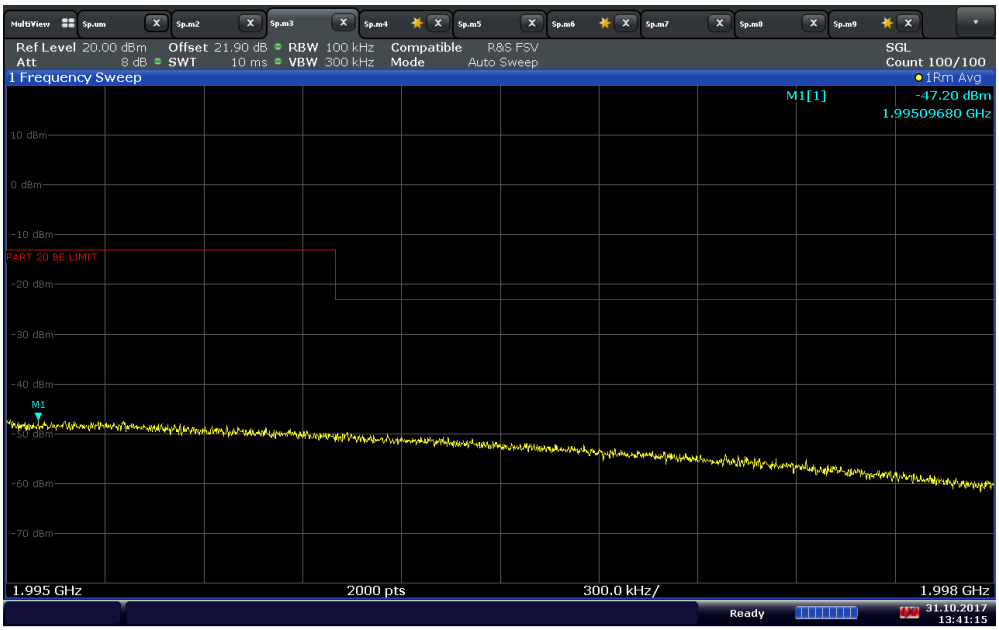
13:49:38 31.10.2017

LTE Band 25 Downlink 5MHz Bandwidth High Channel (-83 dBm)



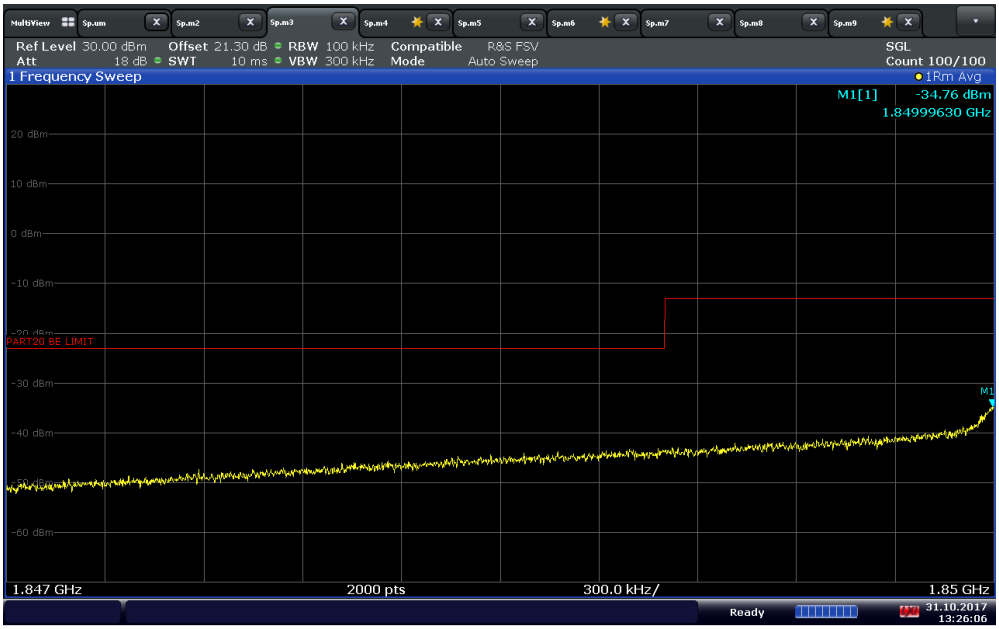
13:40:07 31.10.2017

LTE Band 25 Downlink 5MHz Bandwidth High Channel (-20 dBm)



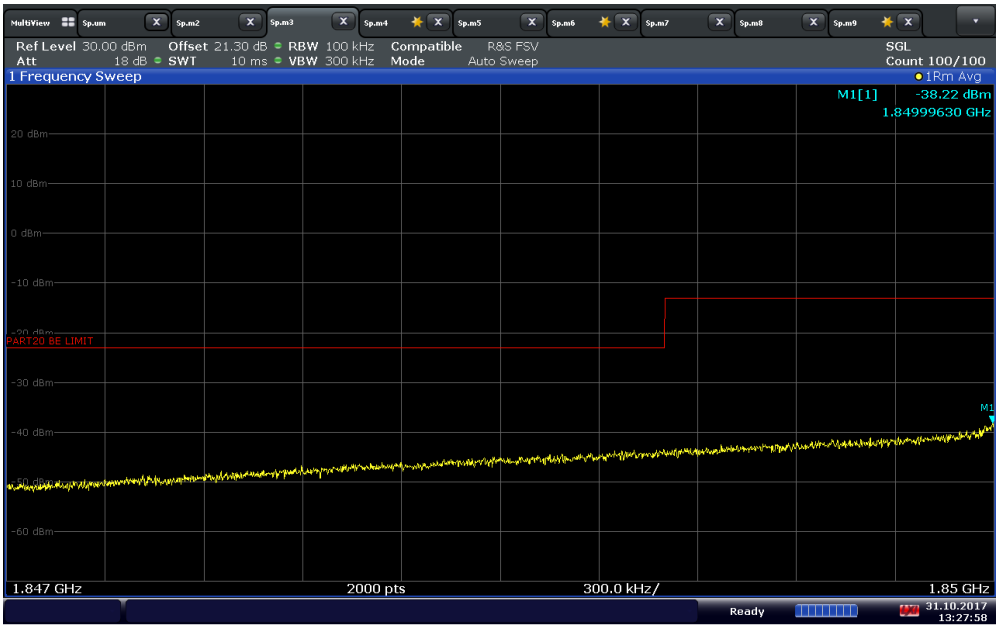
13:41:15 31.10.2017

LTE Band 25 Uplink 5MHz Bandwidth Low Channel (-75 dBm)



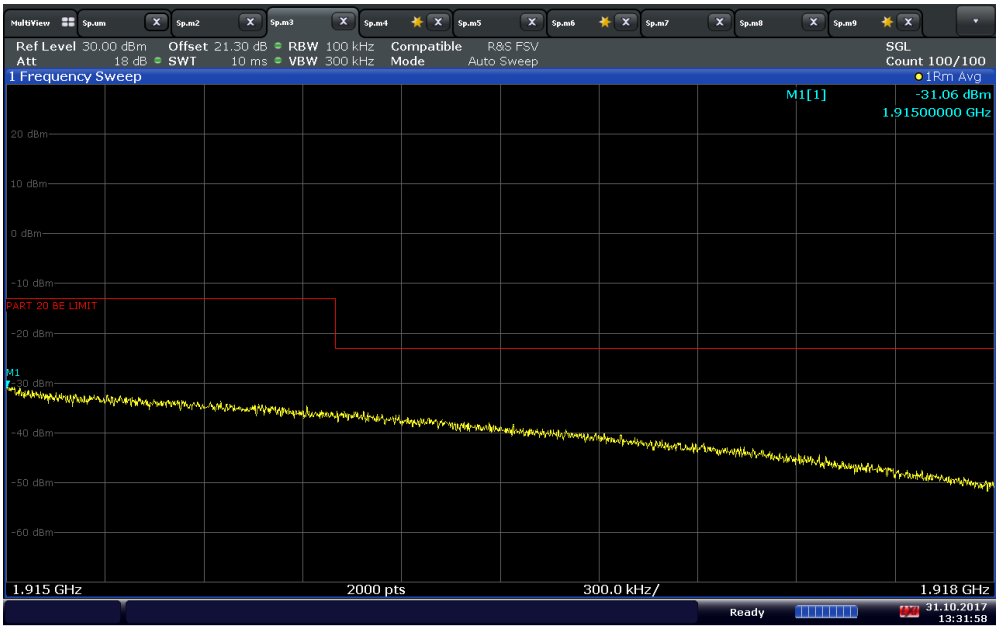
13:26:07 31.10.2017

LTE Band 25 Uplink 5MHz Bandwidth Low Channel (0 dBm)



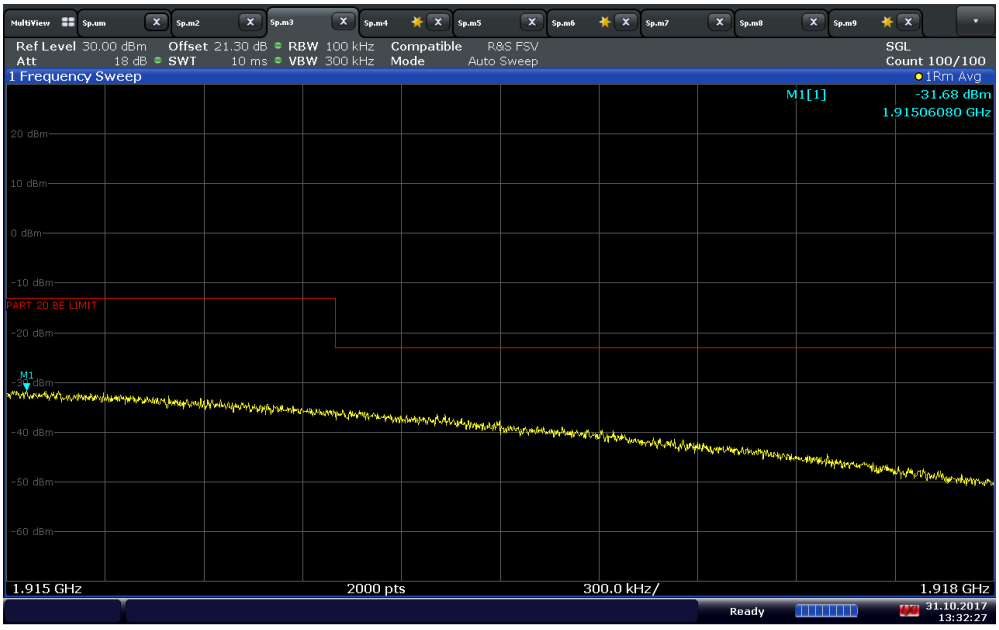
13:27:58 31.10.2017

LTE Band 25 Uplink 5MHz Bandwidth High Channel (-75 dBm)



13:31:59 31.10.2017

LTE Band 25 Uplink 5MHz Bandwidth High Channel (0 dBm)



13:32:28 31.10.2017

2.6 NOISE LIMIT

2.6.1 Specification Reference

FCC 47 CFR Part 20. Clause 20.21(e)(9)(i)(A)
FCC 47 CFR Part 20. Clause 20.21(e)(9)(i)(I)
KDB935210 D04, Clause 7.7

2.6.2 Standard Applicable

FCC 47 CFR Part 20. Clause 20.21(e)(9)(i)(A) Noise Limits.:
The transmitted noise power in dBm/MHz of frequency selective consumer boosters outside the licensee's spectrum blocks at their uplink and downlink ports shall not exceed the following limits:
(1) -103 dBm/MHz - RSSI
(i) Where RSSI is the downlink composite signal power received in dBm for frequencies in the band of operation outside the licensee's spectrum block as measured after spectrum block filtering is applied and is referenced to the booster's donor port for each band of operation. RSSI is expressed in negative dB units relative to 1 mW.
(ii) Boosters with MSCL less than 40 dB, shall reduce the Noise output in (A) by 40 dB - MSCL, where MSCL is the minimum coupling loss in dB between the wireless device and booster's server port. MSCL must be calculated or measured for each band of operation and provided in compliance test reports.

(2)(i) Fixed booster Maximum downlink noise power shall not exceed -102.5 dBm/MHz + 20 Log_{10}(Frequency), where Frequency is the uplink mid-band frequency of the supported spectrum bands in MHz.
(ii) Mobile booster maximum noise power shall not exceed -59 dBm/MHz.
(iii) Compliance with Noise limits will use instrumentation calibrated in terms of RMS equivalent voltage, and with booster input ports terminated or without input signals applied within the band of measurement.

FCC 47 CFR Part 20. Clause 20.21(e)(9)(i)(I) Transmit Power Off Mode.
When the consumer booster cannot otherwise meet the noise and gain limits defined herein it must operate in ''Transmit Power OFF Mode.'' In this mode of operation, the uplink and downlink noise power shall not exceed -70 dBm/MHz and uplink gain shall not exceed the lesser of 23 dB or MSCL.

2.6.3 Equipment Under Test and Modification State

Serial No: 258719000273 (NU) and 259706002416 (CU) / Test Configuration G, H and I

2.6.4 Date of Test/Initial of test personnel who performed the test

October 31 and November 06, 2017/XYZ

2.6.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.6.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	25.5°C
Relative Humidity	45.7%
ATM Pressure	98.9kPa

2.6.7 Additional Observations

1) This is conducted Test. Test procedure is per Section 7.7 of KDB935210 (D04 Provider Specific Booster Measurements v02r01). Appropriate offset (line losses) applied.
2) The EUT operated in Test Mode with the gain manually set to the maximum gain and a minimum bandwidth setting (5MHz).
3) For Maximum Noise (frequency Dependent) testing, setup the EUT according to Figure 6 of Section 7.7 of KDB935210 (D04 Provider Specific Booster Measurements v02r01).
4) Maximum Noise (frequency Dependent) evaluations are conducted at Server ports. Operational downlink bands for LTE Band 25 was tested.
5) For Maximum Noise (RSSI Dependent and Transmit Power off mode) and Noise Response Time tests, setup the EUT according to Figure 7 or 8 of Section 7.7 of KDB935210 (D04 Provider Specific Booster Measurements v02r01) as appropriate.
6) Maximum Noise (RSSI Dependent and Transmit Power off mode) and Noise Response Time evaluations are conducted at Server and Donor ports.
7) Operational uplink and downlink bands for LTE Band 25 were tested.
8) Signal generator was configured to transmit: 4.1 MHz AWGN.

2.6.8 Test Results

Maximum Noise (Frequency Dependent)				
Band	**Frequency Range (MHz)**	**Max Noise (dBm/MHz)**	**Limit* (dBm/MHz)**	**Margin (dB)**
LTE Band 25 Downlink	1930 - 1990	-65.68	-36.64	29.04

*: -102.5 dBm/MHz + 20 Log_{10}(Frequency), where Frequency is the uplink mid-band frequency of the supported spectrum bands in MHz. (Downlink only)

Maximum Noise (RSSI Dependent and Transmit Power off mode)					
Band	**Frequency (MHz)**	**Signal Generator Output Level (dBm)**	**Max Noise (dBm/MHz)**	**Limit (dBm/MHz)**	**Margin (dB)**
LTE Band 25 Downlink	1930 - 1995	-82.2	-72.05	-25.7	46.35
		-72.2	-72.38	-35.7	36.68
		-62.2	-72.17	-45.7	26.47
		-42.2**	-74.09	-55.7	18.39
		-32.2	-74.37	-70	4.37
		-22.2	-75.51	-70	5.51
LTE Band 25 Uplink	1850 - 1915	-86.1	-68.52	-23.7	44.82
		-76.1	-68.42	-33.9	34.52
		-56.1	-74.87	-52.6	22.27
		-46.1**	-74.94	-62.9	12.04
		-36.1	-74.77	-70	4.77
		-26.1	-74.35	-70	4.35

**: Transmit Power off mode

Noise Response Time				
Band	**Frequency (MHz)**	**Noise Response Time (Sec)**	**Limit (Sec)**	**Margin (Sec)**
LTE Band 25 Downlink	1930 - 1995	0.579	3	2.421
LTE Band 25 Uplink	1850 - 1915	0.550	3	2.681

2.7 UPLINK INACTIVITY

2.7.1 Specification Reference

FCC 47 CFR Part 20. Clause 20.21(e)(9)(i)(J)
KDB935210 D04, Clause 7.8

2.7.2 Standard Applicable

FCC 47 CFR Part 20. Clause 20.21(e)(9)(i)(J) Uplink Inactivity:
Uplink Inactivity. When a consumer booster is not serving an active device connection after 5 seconds the uplink noise power shall not exceed -70 dBm/MHz.

2.7.3 Equipment Under Test and Modification State

Serial No: 258719001416 (NU) and 259706002355 (CU) / Test Configuration D

2.7.4 Date of Test/Initial of test personnel who performed the test

October 30, 2017/XYZ

2.7.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.7.6 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility.

Ambient Temperature	26.0°C
Relative Humidity	43.5%
ATM Pressure	98.8kPa

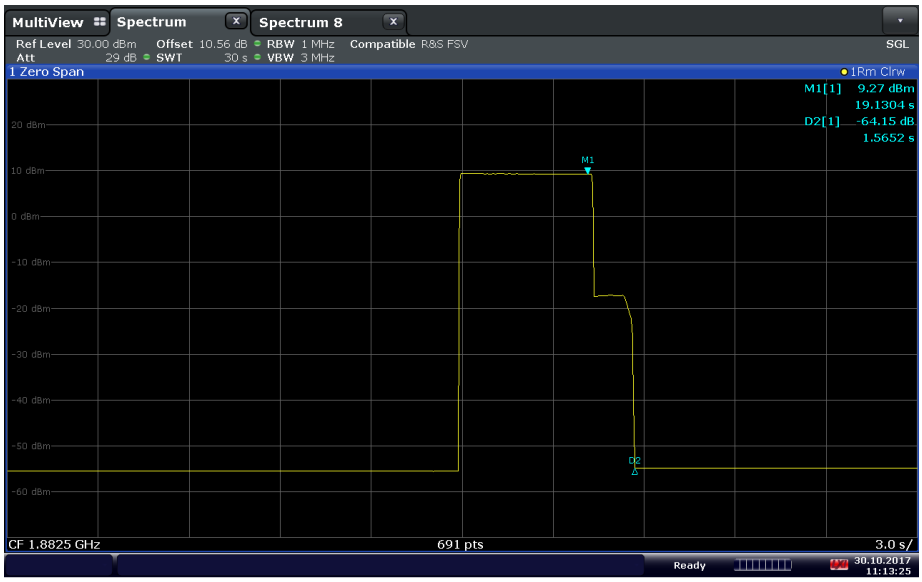
2.7.7 Additional Observations

1) This is conducted Test.
2) Test procedure is per Section 7.8 of KDB935210 (D04 Provider Specific Booster Measurements v02r01). Appropriate offset (line losses) applied.
3) The Unit operated in Normal Mode with a minimum bandwidth setting (5MHz).
4) Setup the EUT according to Figure 1 of Section 6.3.2 of KDB935210 (D04 Provider Specific Booster Measurements v02r01).
5) Evaluations are conducted at Donor (NU) antenna ports.
6) Operational uplink band for LTE Band 25 was tested.
7) Signal: 5MHz LTE or WCDMA.

2.7.8 Test Results

Uplink Inactivity				
Band	**Frequency (MHz)**	**UL Inactive Time (Sec)**	**Limit (Sec)**	**Margin (Sec)**
LTE Band 2 Uplink	1882.5	1.565	5.0	3.435

LTE Band 25 Uplink 5MHz Bandwidth Mid Channel



11:13:25 30.10.2017

2.8 VARIABLE BOOSTER GAIN

2.8.1 Specification Reference

FCC 47 CFR Part 20. Clause 20.21(e)(9)(i)(C)(1)
FCC 47 CFR Part 20. Clause 20.21(e)(9)(i)(I)
KDB935210 D04, Clause 7.9

2.8.2 Standard Applicable

FCC 47 CFR Part 20. Clause 20.21(e)(9)(i)(C)(1) Booster Gain Limits:
The gain of the frequency selective consumer booster shall meet the limits below.

1) The uplink and downlink gain in dB of a frequency selective consumer booster referenced to its input and output ports shall not exceed BSCL - 28dB - (40 dB - MSCL).
(i) Where BSCL is the coupling loss between the booster's donor port and the base station's input port, and MSCL is the minimum coupling loss in dB between the wireless device and the booster's server port. MSCL must be calculated or measured for each band of operation and provided in compliance test reports.
(ii) In order of preference, BSCL is determined as follows: determine path loss between the base station and the booster; such measurement shall be based on measuring the received forward pilot/control channel power at the booster and reading the pilot/control channel transmit power from the base station as defined in the system information messages sent by the base station; estimate BSCL by assuming that the base station is transmitting at a level of +25 dBm per channel (assume a small, lightly loaded cell) and measuring the total received signal power level within the channel in dBm (RPCH) received at the booster input port. BSCL is then calculated as 25– RPCH; or assume that the BSCL is 70dB without performing any measurement.

FCC 47 CFR Part 20. Clause 20.21(e)(9)(i)(I) Transmit Power Off Mode.
When the consumer booster cannot otherwise meet the noise and gain limits defined herein it must operate in ''Transmit Power OFF Mode.'' In this mode of operation, the uplink and downlink noise power shall not exceed -70 dBm/MHz and uplink gain shall not exceed the lesser of 23 dB or MSCL.

2.8.3 Equipment Under Test and Modification State

Serial No: 258719001416 (NU) and 259706002355 (CU) / Test Configuration C and D

2.8.4 Date of Test/Initial of test personnel who performed the test

October 30 and November 06, 2017/XYZ

2.8.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.8.6 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility.

Ambient Temperature	25.4 - 26.0°C
Relative Humidity	41.3 - 43.5%
ATM Pressure	98.8 - 99.4kPa

2.8.7 Additional Observations

1) This is conducted Test.
2) Test procedure is per Section 7.9 of KDB935210 (D04 Provider Specific Booster Measurements v02r01). Appropriate offset (line losses) applied.
3) The EUT operated in Normal Mode;
4) Setup the EUT according to Figure 1 of Section 6.3.2 of KDB935210 (D04 Provider Specific Booster Measurements v02r01).
5) Evaluations are conducted at Server and Donor antenna ports.
6) Variable Gain: Operational uplink and downlink bands for LTE Band 25 were tested.
7) Uplink Gain Timing: Operational uplink band for LTE Band 25 was tested.
8) Signal: 5MHz LTE or WCDMA.
9) MSCL:
   L_p = 20logf + 20logd - 27.5
   L_p = Basic free space path loss,
   f = frequency in MHz,
   d = separation distance in meters (2m)
   lowest MSCL value was utilized.
10) BSCL:
    The coupling loss (in dB) between the donor port (NU) of the Consumer Booster and the input port of the Base Station

2.8.8 Test Results

LTE Band 25 Downlink Gain vs RPCH and BSCL - Middle Channel					
RPCH Power (dBm)	**BSCL (dB)**	**Measured Power (dBm)**	**Gain (dB)**	**Limit (dB)**	**Margin (dB)**
-117.5	142.5	3.5	89.19	100	10.81
-107.5	132.5	10.42	89.43	100	10.57
-97.5	122.5	10.4	80.12	90	9.88
-87.5	112.5	10.4	69.98	80	10.02
-77.5	102.5	10.43	60.16	70	9.84
-67.5	92.5	10.43	50.09	60	9.91
-57.5	82.5	10.42	40.21	50	9.79

LTE Band 25 Uplink Gain vs RPCH and BSCL - Middle Channel					
RPCH Power (dBm)	**BSCL (dB)**	**Measured Power (dBm)**	**Gain (dB)**	**Limit (dB)**	**Margin (dB)**
-110.86	135.86	19.18	72.28	100	33.08
-100.86	125.86	19.34	72.44	93.36	22.92
-90.86	115.86	17.02	68.12	83.36	15.24
-80.86	105.86	8.36	59.46	73.36	13.9
-70.86	95.86	-2.48	48.62	63.36	14.74
-60.86	85.86	-11.3	39.8	53.36	13.56

Uplink Gain Timing				
Band	**Frequency (MHz)**	**UL Gain Timing (Sec)**	**Limit (Sec)**	**Margin (Sec)**
LTE Band 25 Uplink	1882.5	0.87	3	2.13

2.8.9 Sample Test Results

LTE Band 25 Uplink Gain Timing_5MHz Bandwidth Mid Channel

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2.9 OSCILLATION DETECTION

2.9.1 Specification Reference

FCC 47 CFR Part 20. Clause 20.21(e)(9)(ii)(A)
KDB935210 D04, Clause 7.11.1 & 7.11.2

2.9.2 Standard Applicable

FCC 47 CFR Part 20. Clause 20.21(e)(9)(ii)(A) Anti-Oscillation:
Consumer boosters must be able to detect and mitigate (i.e., by automatic gain reduction or shut down), any oscillations in uplink and downlink bands. Oscillation detection and mitigation must occur automatically within 0.3 seconds in the uplink band and within 1 second in the downlink band. In cases where oscillation is detected, the booster must continue mitigation for at least one minute before restarting. After five such restarts, the booster must not resume operation until manually reset.

2.9.3 Equipment Under Test and Modification State

Serial No: 258719001416 (NU) and 259706002355 (CU) / Test Configuration K and L

2.9.4 Date of Test/Initial of test personnel who performed the test

October 30 and November 01, 2017/XYZ

2.9.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.9.6 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility.

Ambient Temperature	25.5 - 26.0°C
Relative Humidity	43.5 - 46.9%
ATM Pressure	98.8 - 98.9kPa

2.9.7 Additional Observations

1) This is conducted Test.
2) Test procedure is per Section 7.11.1 and 7.11.2 of KDB935210 (D04 Provider Specific Booster Measurements v02r01). Appropriate offset (line losses) applied.
3) The Unit operated in Normal Mode when testing Oscillation Mitigation Time;
4) Setup the EUT according to Figure 10 (uplink) and Figure 11 (downlink) of Section 7.11.2 of KDB935210 (D04 Provider Specific Booster Measurements v02r01) for Normal Mode.
5) The EUT operated in Test Mode when testing Re-Try event;
6) The EUT operated in Test Mode when testing Oscillation Mitigation or shut down (The EUT in normal mode doesn't boot up when inject AWGN signal).
7) Evaluations are conducted at Server and Donor antenna ports.
8) Signal: 5MHz LTE or WCDMA.

2.9.8 Test Results Summary

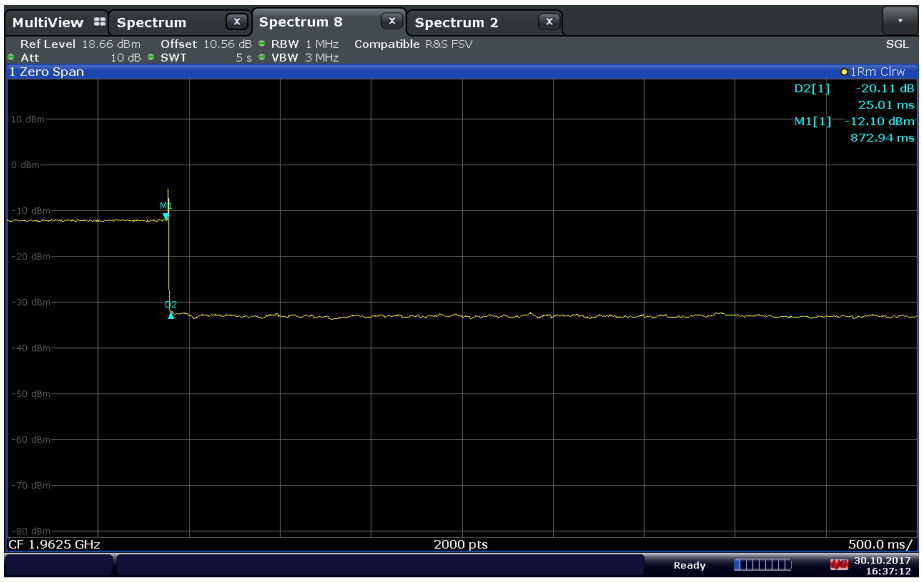
Band	Frequency (MHz)	Mitigation Time (Sec)	Limit (Sec)	Margin (Sec)
LTE Band 25 Downlink	1962.5	0.025	1	0.975
LTE Band 25 Uplink	1882.5	0.043	0.3	0.957

Band	Frequency (MHz)	Re-Try Event	Limit Event	Margin (dB)
LTE Band 25 Downlink	1962.5	0	5	-5
LTE Band 25 Uplink	1882.5	0	5	-5

Band	Frequency (MHz)	Peak Oscillation Level (dB)	Limit (dB)	Margin (dB)
LTE Band 25 Downlink	1962.5	3.58	12	
LTE Band 25 Uplink	1882.5	5.27	12	6.73

2.9.9 Test Plots

Oscillation Mitigation Time - LTE Band 25 Downlink 5MHz Bandwidth Mid Channel



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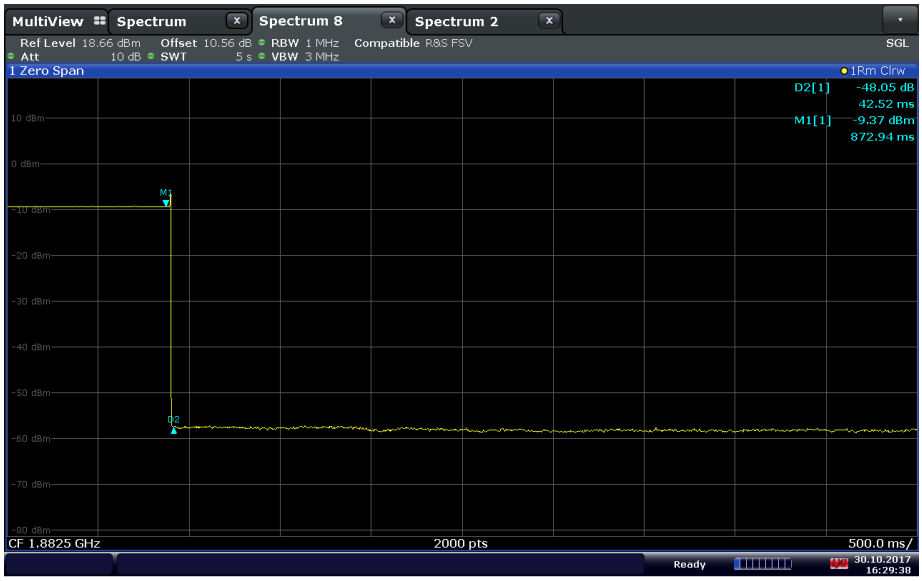
Oscillation Mitigation Time - LTE Band 25 Uplink 5MHz Bandwidth Mid Channel



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2.10 OUT OF BAND GAIN LIMIT

2.10.1 Specification Reference

FCC 47 CFR Part 20. Clause 20.21(e)(9)(i)(E)
KDB935210 D04, Clause 7.15

2.10.2 Standard Applicable

FCC 47 CFR Part 20. Clause 20.21(e)(9)(i)(E) Out of Band Gain Limits.:
(1) A frequency selective booster shall have the following minimum attenuation referenced to the gain in the center of the pass band of the booster:
(i) -20 dB at the band edge, where band edge is the end of the licensee's allocated spectrum,
(ii) -30 dB at 1 MHz offset from band edge,
(iii) -40 dB at 5 MHz offset from band edge.
(2) A frequency selective booster having maximum gain greater than 80 dB (referenced to the center of the pass band) shall limit the out of band gain to 60 dB at 0.2 MHz offset from the band edge, and 45 dB at 1 MHz offset from the band edge, where band edge is the end of the licensee's allocated spectrum.

2.10.3 Equipment Under Test and Modification State

Serial No: 258719001416 (NU) and 259706002355 (CU) / Test Configuration A and B

2.10.4 Date of Test/Initial of test personnel who performed the test

October 31, 2017 /XYZ

2.10.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.10.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	25.5°C
Relative Humidity	45.7%
ATM Pressure	98.9kPa

2.10.7 Additional Observations

1) This is conducted Test. Test procedure is per Section 7.15 of KDB935210 (D04 Provider Specific Booster Measurements v02r01). Appropriate offset (line losses) applied.
2) The Unit operated in Test Mode with the gain manually set to the maximum gain and a minimum bandwidth setting (5MHz).
3) Setup the EUT according to Figure 2 or 3 of Section 6.3.3 of KDB935210 (D04 Provider Specific Booster Measurements v02r01) as appropriate.
4) Evaluations are conducted at Server and Donor antenna ports.
5) Operational uplink and downlink bands for LTE Band 25 were tested.
6) The signal generator was set to transmit a CW signal with output power level set to that as determined in clause 7.1.2 of KDB935210 (D04 Provider Specific Booster Measurements v02r01).

2.10.8 Test Results

Out of Band Gain Limit LTE Band 25 Downlink (1930 – 1995MHz)				
Offset (MHz)	**Input Power (dBm)**	**Output Power (dBm)**	**Gain (dB)**	**Gain Limit (dB)**
Centre Frequency	-79.01	11.45	90.46	-
0 (Low Band Edge)	-79.01	-64.84	14.17	70.46
-0.2	-79.01	-63.91	15.1	60
-1	-79.01	-64.91	14.1	45
-5	-79.01	-64.81	14.2	50.46
0 (High Band Edge)	-79.01	-64.63	14.38	70.46
+0.2	-79.01	-64.79	14.22	60
+1	-79.01	-64.94	14.07	45
+5	-79.01	-65.28	13.73	50.46

Out of Band Gain Limit LTE Band 25 Uplink (1850 – 1915MHz)				
Offset (MHz)	**Input Power (dBm)**	**Output Power (dBm)**	**Gain (dB)**	**Gain Limit (dB)**
Centre Frequency	-75.3	23.23	98.53	-
0 (Low Band Edge)	-75.3	-65.97	9.33	88.53
-0.2	-75.3	-65.38	9.92	60
-1	-75.3	-64.72	10.58	45
-5	-75.3	-66.29	9.01	58.53
0 (High Band Edge)	-75.3	-67.15	8.15	88.53
+0.2	-75.3	-67.50	7.8	60
+1	-75.3	-66.49	8.81	45
+5	-75.3	-68.03	7.27	58.53

SECTION 3

TEST EQUIPMENT USED

3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

ID Number (SDGE/SDRB)	Test Equipment	Type	Serial Number	Manufacturer	Cal Date	Cal Due Date
Antenna Conducted Port Setup						
7604	P-Series Power Meter	N1912A	SG45100273	Agilent	08/14/17	07/27/18
7605	50MHz-18GHz Wideband Power Sensor	N1921A	MY51100054	Agilent	05/19/18	05/19/18
7611	Signal/Spectrum Analyzer	FSW26	102017	Rhode & Schwarz	04/25/17	04/25/18
7608	Vector Signal Generator	SMBV100A	259021	Rhode & Schwarz	09/19/17	09/19/19
7562	Wideband Radio Communication Tester	CMW 500	1201.0002k50 /103829	Rhode & Schwarz	08/10/17	08/10/18
-	Feedback Attenuator	RSP	834500/009	Rhode & Schwarz	Verified by 7611 and 7608	
-	11dB Step Attenuator	8494B	2812A17193	Agilent	Verified by 7611 and 7608	
-	110 dB Step Attenuator	8496B	MY42143874	Agilent	Verified by 7611 and 7608	
8825	20dB Attenuator	46-20-34	BK5773	Weinschel Corp.	Verified by 7611 and 7608	
-	10dB Attenuator	PE7010-10	-	Pasternack	Verified by 7611 and 7608	
-	3dB Attenuator	PE7010-6	-	Pasternack	Verified by 7611 and 7608	
Miscellaneous						
6708	Multimeter	34401A	US36086974	Hewlett Packard	07/05/17	07/05/18
7560	Barometer/Temperature /Humidity Transmitter	iBTHX-W	1240476	Omega	01/17/17	01/17/18

3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:

3.2.1 Conducted Antenna Port Measurement

	Contribution	Probability Distribution Type	Probability Distribution xi	Standard Uncertainty u(xi)	[u(xi)]2
1	Receiver/Spectrum Analyzer	Rectangular	0.08	0.05	0.00
2	Cables	Rectangular	0.30	0.17	0.03
4	EUT Setup	Rectangular	0.50	0.29	0.08
				Combined Uncertainty (u_c):	0.34
				Coverage Factor (k):	1.96
				Expanded Uncertainty:	0.67

SECTION 4

DIAGRAM OF TEST SETUP

4.1 TEST SETUP DIAGRAM

Notes: All tests were done on the bench (conducted). Please refer to Section 1.4.4 of this test report for more details.

SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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