**TEST REPORT**
FCC Rule Part 96**Applicant Name:**EUCAST Co., Ltd.
(13595) 4th FL Sungok Bldg, 262,
Hwangsaeul-ro Bundang-Gu, Seongnam-si,
Gyeonggi-do, Korea**Date of Testing:**

11/01/2021 – 11/15/2021

Test Site/Location:PCTEST KOREA Lab. Yongin-si,
Gyeonggi-do, Korea**Test Report Serial No.:**

8K21102701-R3.2AXTR

FCC ID: 2AXTR-ECL4248-2401**APPLICANT:** EUCAST Co., Ltd.**Application Type:**

Certification

Model:

ECL4248-2401

EUT Type:

LTE Pico cell base station for CBRS

FCC Classification:

Citizens Band Category B Devices (CBD)

FCC Rule Part(s):

96

Test Procedure(s):ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB 971168 D01 v03r01,
KDB 940660 D01 v02, KDB 662911 D01 v02r01

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in §2.947. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

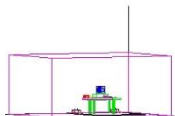
Prepared by DuJin Kim
Test EngineerReviewed by Charles Shin
Technical Manager

FCC: 2AXTR-ECL4248-2401		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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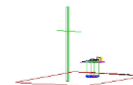
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MEASUREMENT REPORT

FCC Rule Part 96



Mode	FCC Rule Part	Tx Frequency (MHz)	Conducted MIMO Output Power		MIMO EIRP		Emission Designator	Modulation
			Max. Power (dBm/10MHz)	Max. Power /Entire Bandwidth (dBm)	Max. EIRP /Entire Bandwidth (dBm)	Max. EIRP /Entire Bandwidth (W)		
LTE_B48_10M	96	3550 - 3700	31.73	31.73	45.73	37.41	8M97G7D	QPSK
			32.00	32.00	46.00	39.81	8M97W7D	16QAM
			31.45	31.45	45.45	35.08	8M97W7D	64QAM
LTE_B48_20M	96	3550 - 3700	32.00	34.66	48.66	73.45	17M9G7D	QPSK
			31.76	34.39	48.39	69.02	17M9W7D	16QAM
			31.02	33.91	47.91	61.80	17M9W7D	64QAM

EUT Overview

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1.0 REVISION RECORD

Issue Number	Issued Date	Revision History
8K21102701.2AXTR	11/15/2021	Initial Issue
8K21102701-R1.2AXTR	11/16/2021	Revision due to revised test description and limit
8K21102701-R2.2AXTR	12/06/2021	Revision due to revised FCC Classification
8K21102701-R3.2AXTR	12/23/2021	Revision due to revised EUT Overview

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2.0 INTRODUCTION

2.1 Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Innovation, Science and Economic Development Canada.

2.2 PCTEST KOREA Test Location

These measurement tests were conducted at the PCTEST KOREA CO., LTD. facility located at (#1407) 13, Heungdeok 1-ro, Giheung-gu, Yongin-si, Gyeonggi-do 16954, Korea.

2.3 Test Facility / Accreditation

Measurements were performed at PCTEST KOREA Lab located in Yongin-si, Gyeonggi, Korea.

- PCTEST KOREA is an ISO 17025:2005 accredited test facility under the National Institute of Standards and Technology (NIST) with Certificate number 600143-0 for Specific Absorption Rate (SAR), where applicable, and Electromagnetic Compatibility (EMC) testing for IC and Innovation, Science, and Economic Development Canada rules.
- PCTEST KOREA facility is accredited, designated and recognized in accordance with the provision of Radio Wave Act and International Standard ISO/IEC 17025:2017 under the National Radio Research Agency.
 - Designation Number / CABID: KR0169
 - Test Firm Registration Number of FCC: 417945
 - Test Firm Registration Number of IC: 26168

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3.0 PRODUCT INFORMATION

3.1 Equipment Description

The Equipment Under Test (EUT) is the **EUCAST Co., Ltd. CBSD FCC ID: 2AXTR-ECL4248-2401**. The test data contained in this report pertains only to the emissions due to the EUT's LTE Band 48 operation in the CBRS band. Per FCC Part 96, this device is evaluated under Citizens Band Category B Devices (CBD).

This device supports the following conditional features:

EUT Type:	LTE Pico cell base station for CBRS		
Model Name:	ECL4248-2401		
Test Device Serial No.:	EE0F010021B010001		
Device Capabilities:	LTE		
Operating Band:	Band	Tx (Downlink)	Rx (Uplink)
	B48:	3550 MHz to 3700 MHz	3550 MHz to 3700 MHz
Supported Number of Carriers:	Max. 1 carrier		
Supported Modulation:	QPSK (E-TM 1.1), 16QAM (E-TM 3.2), 64QAM (E-TM 3.1)		
Supported Channel Bandwidth:	10MHz, 20MHz		
Maximum Output Power	10 MHz	29 dBm/Path	
	20 MHz	32 dBm/Path	
Number of Antenna ports	2		
Supported Configurations:	Single carrier		
Input Voltage:	-48 VDC		
Antenna Gain:	Max. 14 dBi		

Note

Actual antenna gain is 17dBi. And antenna cable loss as specified by the manufacture: 3dB (minimum)
Therefore, the maximum antenna gain is 14dBi.

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3.2 Test Configuration

The setup is as follows:

- The EUT "ECL4248-2401" powered by -48V DC power supply.
- The EUT is connected to a test laptop via an ethernet cable acting as backhaul.
- An RF cable connects the signal analyzer and the EUT Ports for respective measurement.

The EUT was tested per the guidance of ANSI/TIA-603-E-2016 and KDB 971168 D01 v03r01. See Section 7.0 of this test report for a description of the antenna port conducted emissions tests.

The following information is about configurations of carrier frequency and output power per port declared by the manufacturer.

* Abbreviations:

- B48: Band 48
- 10M: 10MHz Bandwidth
- 20M: 20MHz Bandwidth

Configuration	No. of Carriers	Carrier Bandwidth (MHz)	Carrier Frequency Configuration (MHz)			Rated Power (dBm/path)
			Lowest	Middle	Highest	
LTE_B48_10M	1	10	3555	3625	3695	29
LTE_B48_20M	1	20	3560	3620	3690	32

3.3 EMI Suppression Device(s)/Modifications

EMI suppression ferrite core was added.

Ferrite core Information	
Model	ZCAT3335-1330
Manufacture	TDK
Modification location	
The internal location is confidential. Please refer to internal photos.	

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4.0 DESCRIPTION OF TESTS

4.1 Measurement Procedure

The measurement procedures described in the document titled “American National Standard for Compliance Testing of Transmitter Used in Licensed Radio Service” (ANSI C63.26-2015) and the guidance provided in KDB 971168 D01 v03r01, and KDB 662911 D01 v02r01 and KDB 940660 D01 were used in the measurement of the EUT.

Occupied Bandwidth:

KDB 971168 D01 v03r01 – Section 4.3
 ANSI C63.26-2015 – Section 5.4.4

Modulation Characteristics:

ANSI C63.26 - Section 5.3

Conducted Power Measurement and EIRP and PSD

KDB 971168 D01 v03r01 – Section 5.3
 KDB 971168 D01 v03r01 – Section 5.4
 KDB 662911 D01 v02r01 – Section E)1) In-Band Power Measurements
 ANSI C63.26-2015 – Section 5.2.5
 ANSI C63.26-2015 – Section 5.2.4

Peak-to-Average Power Ratio:

KDB 971168 D01 v03r01 – Section 5.7
 ANSI C63.26-2015 – Section 5.2.3.4

Channel Edge Emissions at Antenna Terminal

KDB 971168 D01 v03r01 – Section 6
 KDB 662911 D01 v02r01 – Section E)3) Out-of-Band and Spurious Emission Measurements
 a) Absolute Emission Limits
 iii) Measure and add $10 \log(N_{ANT})$ dB

ANSI C63.26-2015 – Section 5.7

Spurious and Harmonic Emissions at Antenna Terminal

KDB 971168 D01 v03r01 – Section 6
 KDB 662911 D01 v02r01 – Section E)3) Out-of-Band and Spurious Emission Measurements
 a) Absolute Emission Limits
 iii) Measure and add $10 \log(N_{ANT})$ dB

ANSI C63.26-2015 – Section 5.7

Radiated unwanted emission

KDB 971168 D01 v03r01 – Section 7
 ANSI C63.26-2015 – Section 5.8

Frequency Stability / Temperature Variation

KDB 971168 D01 v03r01 – Section 9
 ANSI C63.26-2015 – Section 5.6

4.2 Measurement Software

Test item	Name	Version
Conducted Measurement	Node B automation	1.0

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5.0 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4-2014. All measurement uncertainty values are shown with a coverage factor of $k = 2$ to indicate a 95% level of confidence. The measurement uncertainty shown below meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Contribution	Expanded Uncertainty ($\pm$ dB)
Conducted Bench Top Measurements	1.20
Radiated Disturbance (<1GHz)	3.01
Radiated Disturbance (>1GHz)	5.56
Radiated Disturbance (>18GHz)	3.16

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6.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST). Measurements antennas used during testing were calibrated in accordance to the requirements of ANSI C63.5-2017.

Manufacture	Model	Description	Cal Date	Cal interval	Cal Due	Serial Number
KEYSIGHT	N9020B	MXA Signal Analyzer	11/13/2020	Annual	11/12/2021	MY55470135
KIKISUI	PWR1201ML	DC POWER SUPPLY	05/25/2021	Annual	05/24/2022	ZL000972
Rohde & Schwarz	FSW43	Signal & Spectrum Analyzer	09/15/2021	Annual	09/14/2022	101250
KEYSIGHT	N9030B	PXA Signal Analyzer	05/11/2021	Annual	05/10/2022	MY57142018
Rohde & Schwarz	TS-SFUNIT-Rx	Shielded Filter Unit	02/19/2021	Annual	02/18/2022	102131
Schwarzbeck	VULB9162	Broadband TRILOG Antenna	07/13/2021	Biennial	07/12/2023	9162-217
Sunol sciences	DRH-118	Horn Antenna	01/12/2021	Biennial	01/11/2023	A060215
Schwarzbeck	BBHA 9170	Horn Antenna	09/02/2020	Biennial	09/01/2022	1037
Weinschel	49-30-33	Attenuator	10/22/2021	Annual	03/16/2022	NB338
Weinschel	49-30-33	Attenuator	10/22/2021	Annual	03/16/2022	NB340
Weinschel	49-30-33	Attenuator	10/22/2021	Annual	03/16/2022	LH353
Weinschel	49-30-33	Attenuator	10/22/2021	Annual	03/16/2022	LK287
CENTRIC RF	C411-20	Attenuator	03/17/2021	Annual	03/16/2022	0001

Table 6-1. Test Equipment

Notes:

1. For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.
2. Equipment with a calibration date of "N/A" shown in this list was not used to make direct calibrated measurements.
3. All testing was performed before the calibration due date.

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7.0 SAMPLE CALCULATIONS

Emission Designator

QPSK Modulation

Emission Designator = 8M97G7D

Occupied Bandwidth = 8.97 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

QAM Modulation

Emission Designator = 8M97W7D

Occupied Bandwidth = 8.97 MHz

W = Amplitude/Angle Modulated

7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

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8.0 TEST RESULTS

8.1 Summary

Company Name: EUCAST Co., Ltd.
 FCC ID: 2AXTR-ECL4248-2401
 Type of Radio Equipment: Citizens Band Category B Devices (CBD)
 Mode(s): LTE

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
2.1049	Occupied Bandwidth	N/A	CONDUCTED	PASS	Section 8.2
2.1046 96.41(a)	Modulation Characteristics	Digital modulation		PASS	Section 8.3
2.1046 96.41(b)	Power Spectral Density (PSD)	37 dBm/MHz (PSD)		PASS	Section 8.4
2.1046 96.41(b)	Equivalent Isotropic Radiated Power (EIRP)	47 dBm/10MHz (EIRP)		PASS	Section 8.5
96.41(g)	Peak-Average Ratio	< 13 dB		PASS	Section 8.6
2.1051 96.41(e)	Out of Band Emissions	Within 0 MHz to 10 MHz above and below the assigned channel ≤ -13 dBm/MHz Greater than 10 MHz above and below the assigned channel ≤ -25 dBm/MHz Any emission below 3530 MHz and above 3720 MHz ≤ -40 dBm/MHz		PASS	Section 8.7
2.1055 96.41(e)	Frequency Stability	Fundamental emissions stay within authorized frequency block	Radiated	PASS	Section 8.9
2.1051 96.41(e)	Radiated unwanted emission	< -40dBm/MHz		PASS	Section 8.8

Table 8-1. Summary of Test Results

Notes:

- 1) All modes of operation and data rates were investigated.
The test results shown in the following sections represent the worst case emissions.
- 2) The analyzer plots were all taken with a correction table loaded into the analyzer.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.

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8.2 Occupied Bandwidth

Test Overview

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. All modes of operation were investigated and the worst case configuration results are reported in this section.

Test Procedure Used

ANSI C63.26 - Section 5.4.4
KDB 971168 D01 v0301 - Section 4.3

Test Setting

The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The spectrum analyzer setting were as follows:

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5% of the expected OBW
3. VBW $\geq 3 \times$ RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. The trace was allowed to stabilize
8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5% of the 99% occupied bandwidth observed in Step 7

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

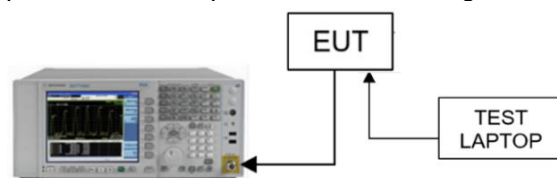


Figure 8-1. Test Instrument & Measurement Setup

Limit

The occupied bandwidth shall not exceed the equipment's channel bandwidth, which is declared by the manufacturer.

Test Notes

None.

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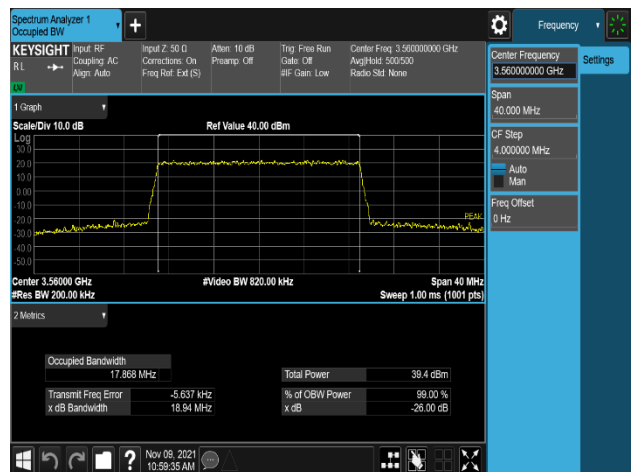
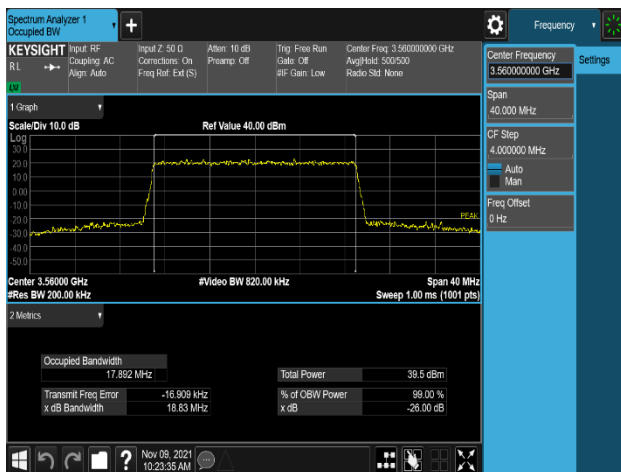
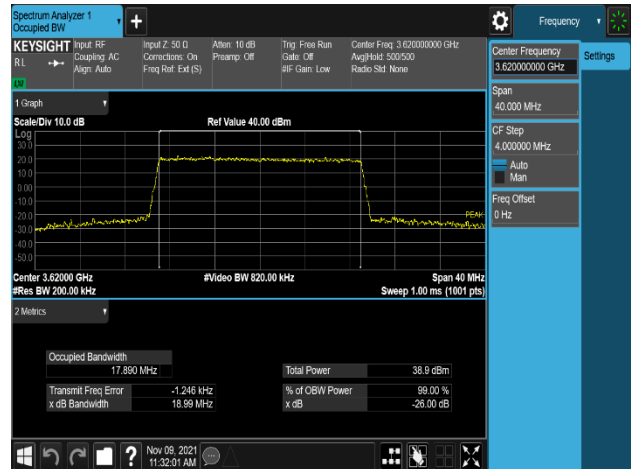
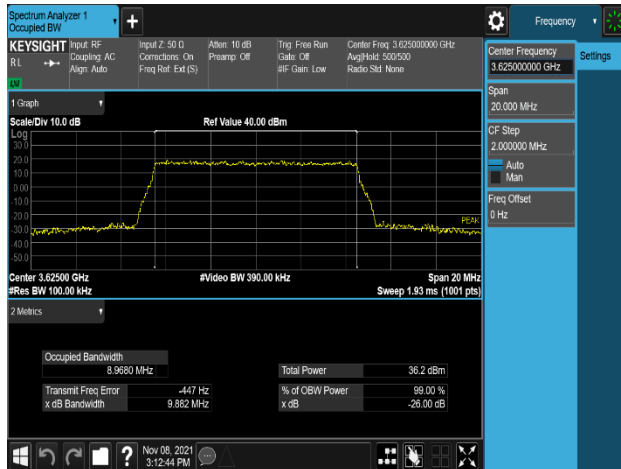
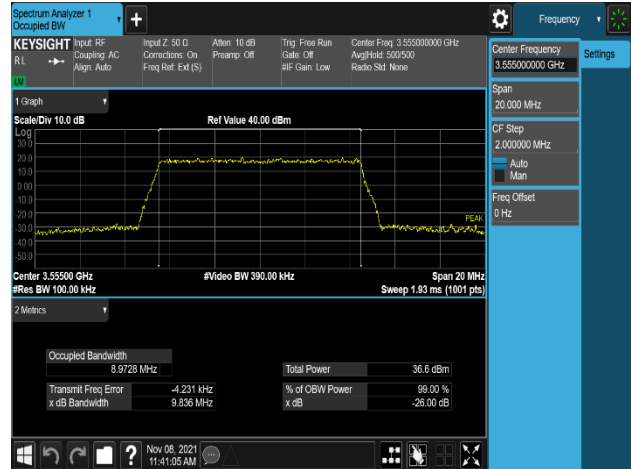
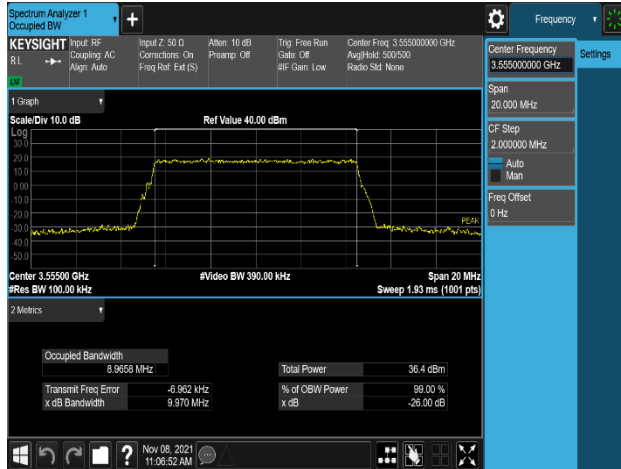
Channel	Port	OBW (MHz)		
		QPSK	16QAM	64QAM
Low	0	8.97	8.97	8.95
	1	8.97	8.96	8.96
Middle	0	8.97	8.94	8.95
	1	8.96	8.95	8.97
High	0	8.96	8.96	8.96
	1	8.96	8.96	8.97

Table 8-2. Occupied Bandwidth Summary Data (LTE_B48_10M)

Channel	Port	OBW (MHz)		
		QPSK	16QAM	64QAM
Low	0	17.86	17.89	17.87
	1	17.88	17.87	17.85
Middle	0	17.89	17.87	17.87
	1	17.86	17.86	17.87
High	0	17.85	17.88	17.84
	1	17.84	17.86	17.84

Table 8-3. Occupied Bandwidth Summary Data (LTE_B48_20M)

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8.3 Modulation Characteristics

Test Overview

Verification of a curve or equivalent data that shows that the equipment will meet the modulation requirements of the rules under which the equipment is to be licensed.

Test Procedure Used

ANSI C63.26 - Section 5.3

Test Setting

The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The spectrum analyzer setting were as modulation analyzer mode.

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

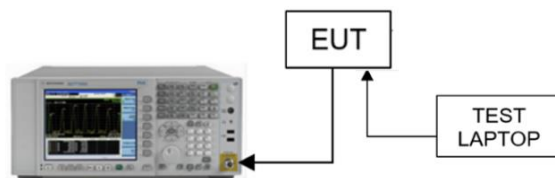


Figure 8-2. Test Instrument & Measurement Setup

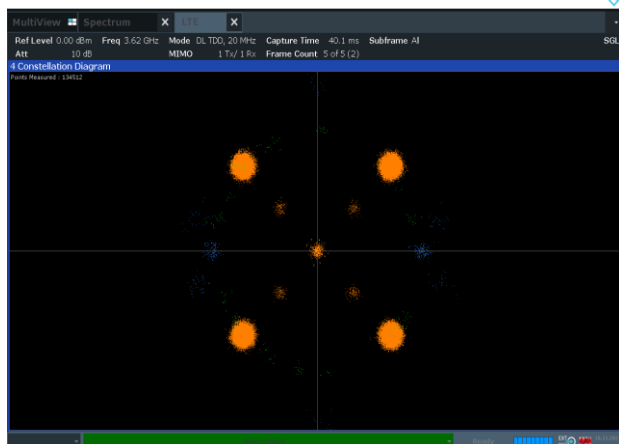
Limit

Systems operating in the Citizens Broadband Radio Service must use digital modulation techniques.

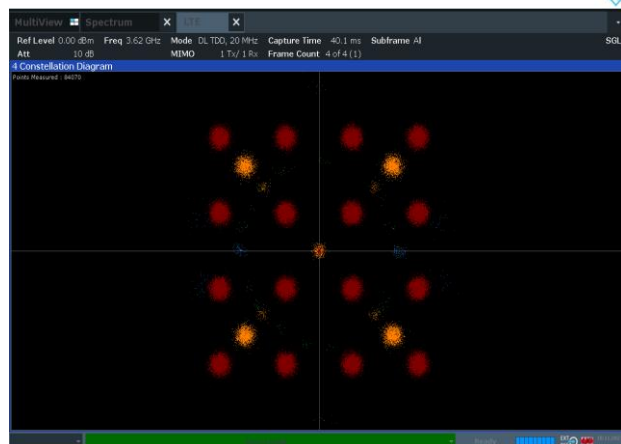
Test Notes

Systems operating used digital modulation techniques.

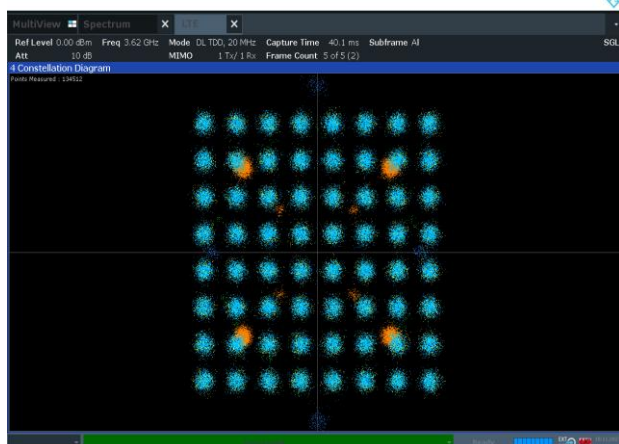
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Plot 8-7. Modulation Characteristics Plot
(LTE_B48_10M_QPSK Modulation)



Plot 8-8. Modulation Characteristics Plot
(LTE_B48_10M_16QAM Modulation)



Plot 8-9. Modulation Characteristics Plot
(LTE_B48_10M_64QAM Modulation)

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8.4 Power Spectral Density

Test Overview

A transmitter port of EUT is connected to the input of a signal analyzer. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

Test Procedure Used

ANSI C63.26 - Section 5.2.4
 ANSI C63.26 - Section 5.2.5
 KDB 971168 D01 v0301 - Section 5.3

ANSI C63.26 - Section 6.4.3.2.3
 KDB 662911 D01 v02r01
 - Section E)2) In-Band Power Spectral Density (PSD) Measurements
 b) Measure and sum spectral maxima across the outputs.

Test Setting

The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The spectrum analyzer settings were as follows:

The PSD is measured following the same procedures described in 5.2.4.4 of ANSI C63.26 for measuring the total average power, but with the RBW set to the reference bandwidth specified by the applicable regulatory requirement, and by using the marker function to identify the maximum PSD instead of summing the power across the OBW. If the fundamental measurement condition cannot be realized, then one of the alternative procedures in 5.2.4.4.2 or 5.2.4.4.3 should be selected, based on whether the transmitter duty cycle is constant (variations $\leq \pm 2\%$) or non-constant (variations $> \pm 2\%$), respectively.

1. Conducted power measurements are performed using the signal analyzer's "SA mode" measurement capability for signals with continuous operation.
2. Set span to $2 \times$ to $3 \times$ the OBW.
3. Set RBW = 1 MHz (the reference bandwidth)
4. Set VBW $\geq 3 \times$ RBW.
5. Set number of measurement points in sweep $\geq 2 \times$ span / RBW.
6. Sweep time:
 - a) Set $\geq$ auto-couple, and enable trace averaging, or
 - b) Set $\geq [10 \times (\text{number of points in sweep}) \times (\text{transmission symbol period})]$ and enable a single sweep (automation-compatible) measurement. The sweep time should never be faster than the auto-coupled sweep time.
7. Detector = power averaging (rms).
8. The trace was allowed to stabilize
9. Use the peak marker function to determine the maximum amplitude level. ($=P_{\text{Meas}}$)
10. The relevant equation for determining the maximum EIRP from the measured RF output power is given in Equation as follows:

$$\text{EIRP} = P_{\text{Meas}} + G_T$$
 where
 GT: gain of the transmitting antenna, in dBi (EIRP).

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Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

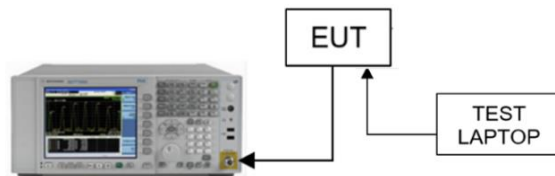


Figure 8-3. Test Instrument & Measurement Setup

Limit

Category B CBSD : 37 dBm/MHz

Test Notes

- Consider the following factors for MIMO Power Spectral Density:
The power spectral density is measured as dBm / MHz, with the resolution bandwidth of 1 MHz PSDs are summed up in linear using the measure-and-sum technique defined in KDB 971168 D01 v03r01 - Section E) 2).
- Periodic trigger was used with gating ON. Gate sweep time, Gate delay and gate length were set accordingly to capture ON time of the transmission.
- PSD per port (dBm / MHz) is converted to a linear value (mW). A summation of linear powers for all ports gives us the total MIMO conducted Power (mW). We convert this back to logarithmic scale for further PSD calculations.
- Antenna Gains (dBi) are provided by the client.
- All transmit signals from different antennas are completely uncorrelated with each other. So the e.i.r.p. shall be calculated based on the aggregate power conducted across all antennas and maximum antenna gain G_{max} .
- Sample Calculation:
Let us assume the following numbers:
 - Total MIMO Conducted Power as 185.52 mW
 - Antenna Gain = 14.0 dBi

Factors		Value	Unit
Summed MIMO Conducted Power (linear sum)		185.52	mW
Summed MIMO Conducted Power (dBm)	$= 10 * \log (185.52) =$	22.68	mW/MHz
Antenna Gain		14.00	dBi
Total MIMO EIRP		36.68	mW
Limit		37.00	dBm/MHz
Margin = Limit - Total MIMO EIRP	$= 36.68 - 37.00 =$	-0.32	dB

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Low Channel	Port	QPSK	16QAM	64QAM
Conducted Power (dBm/MHz)	0	19.31	19.53	19.60
	1	19.56	19.61	19.93
Total MIMO Conducted Power (mW/MHz)		175.77	181.13	189.51
Total MIMO Conducted Power (dBm/MHz)		22.45	22.58	22.78
Ant. Gain (dBi)		14.00	14.00	14.00
e.i.r.p PSD (dBm/MHz)		36.45	36.58	36.78
e.i.r.p PSD Limit(dBm/MHz)		37.00	37.00	37.00
Margin (dB)		-0.55	-0.42	-0.22
Mid Channel	Port	QPSK	16QAM	64QAM
Conducted Power (dBm/MHz)	0	19.72	19.87	20.00
	1	19.28	19.44	19.56
Total MIMO Conducted Power (mW/MHz)		178.49	185.03	190.35
Total MIMO Conducted Power (dBm/MHz)		22.52	22.67	22.80
Ant. Gain (dBi)		14.00	14.00	14.00
e.i.r.p PSD (dBm/MHz)		36.52	36.67	36.80
e.i.r.p PSD Limit(dBm/MHz)		37.00	37.00	37.00
Margin (dB)		-0.48	-0.33	-0.20
High Channel	Port	QPSK	16QAM	64QAM
Conducted Power (dBm/MHz)	0	19.75	19.99	19.87
	1	19.60	19.74	19.67
Total MIMO Conducted Power (mW/MHz)		185.52	194.14	189.84
Total MIMO Conducted Power (dBm/MHz)		22.68	22.88	22.78
Ant. Gain (dBi)		14.00	14.00	14.00
e.i.r.p PSD (dBm/MHz)		36.68	36.88	36.78
e.i.r.p PSD Limit(dBm/MHz)		37.00	37.00	37.00
Margin (dB)		-0.32	-0.12	-0.22

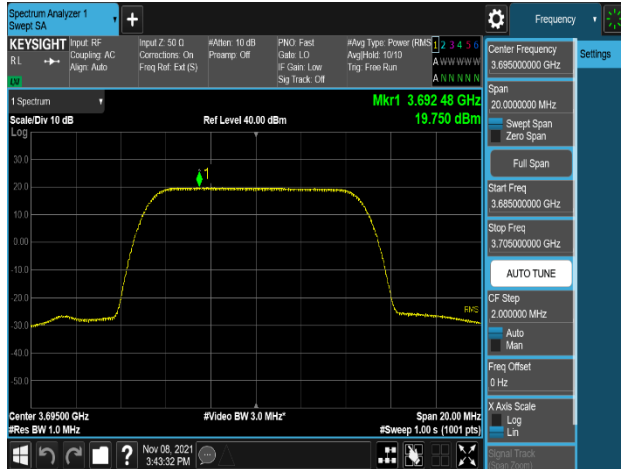
Table 8-4. Peak Power Spectral Density Table (LTE_B48_10M)

FCC: 2AXTR-ECL4248-2401		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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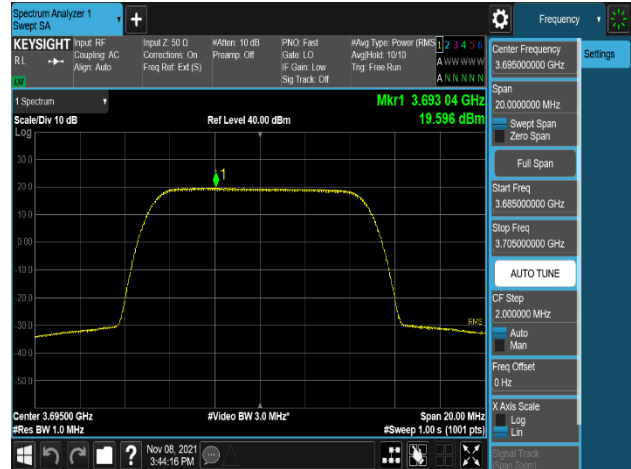
Low Channel	Port	QPSK	16QAM	64QAM
Conducted Power (dBm/MHz)	0	19.14	18.91	18.96
	1	19.29	19.00	19.06
Total MIMO Conducted Power (mW/MHz)		167.07	157.27	159.17
Total MIMO Conducted Power (dBm/MHz)		22.23	21.97	22.02
Ant. Gain (dBi)		14.00	14.00	14.00
e.i.r.p PSD (dBm/MHz)		36.23	35.97	36.02
e.i.r.p PSD Limit(dBm/MHz)		37.00	37.00	37.00
Margin (dB)		-0.77	-1.03	-0.98
Mid Channel	Port	QPSK	16QAM	64QAM
Conducted Power (dBm/MHz)	0	19.43	19.84	19.95
	1	19.16	19.56	19.62
Total MIMO Conducted Power (mW/MHz)		170.00	186.83	190.63
Total MIMO Conducted Power (dBm/MHz)		22.30	22.71	22.80
Ant. Gain (dBi)		14.00	14.00	14.00
e.i.r.p PSD (dBm/MHz)		36.30	36.71	36.80
e.i.r.p PSD Limit(dBm/MHz)		37.00	37.00	37.00
Margin (dB)		-0.70	-0.29	-0.20
High Channel	Port	QPSK	16QAM	64QAM
Conducted Power (dBm/MHz)	0	19.77	19.71	19.71
	1	19.51	19.53	19.45
Total MIMO Conducted Power (mW/MHz)		184.20	183.37	181.63
Total MIMO Conducted Power (dBm/MHz)		22.65	22.63	22.59
Ant. Gain (dBi)		14.00	14.00	14.00
e.i.r.p PSD (dBm/MHz)		36.65	36.63	36.59
e.i.r.p PSD Limit(dBm/MHz)		37.00	37.00	37.00
Margin (dB)		-0.35	-0.37	-0.41

Table 8-5. Power Spectral Density Table (LTE_B48_20M)

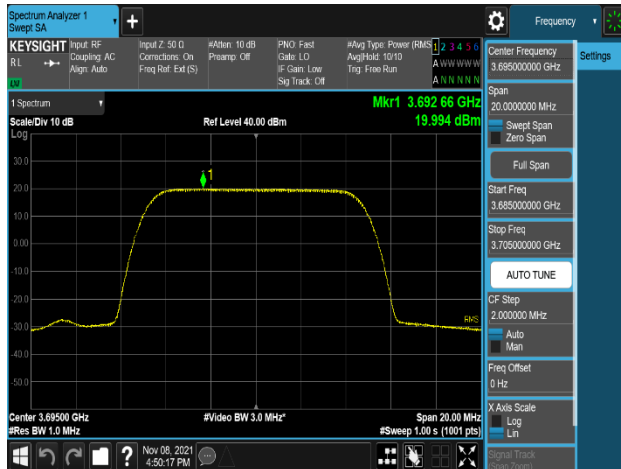
FCC: 2AXTR-ECL4248-2401		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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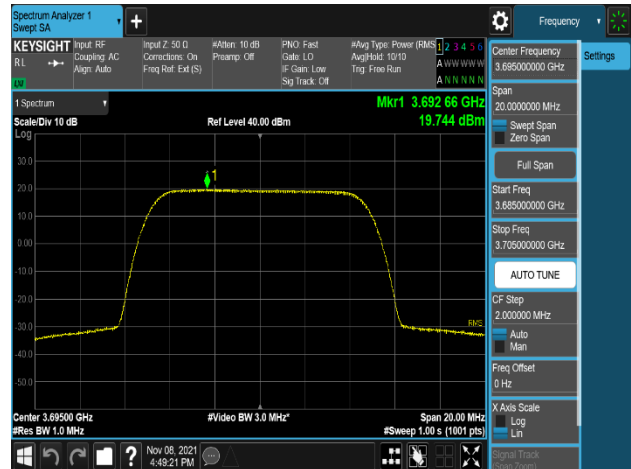
Plot 8-10. Power Spectral Density Plot
(LTE_B48_10M_QPSK - High Channel, Port 0)



Plot 8-11. Power Spectral Density Plot
(LTE_B48_10M_QPSK - High Channel, Port 1)



Plot 8-12. Power Spectral Density Plot
(LTE_B48_10M_16QAM - High Channel, Port 0)



Plot 8-13. Power Spectral Density Plot
(LTE_B48_10M_16QAM - High Channel, Port 1)

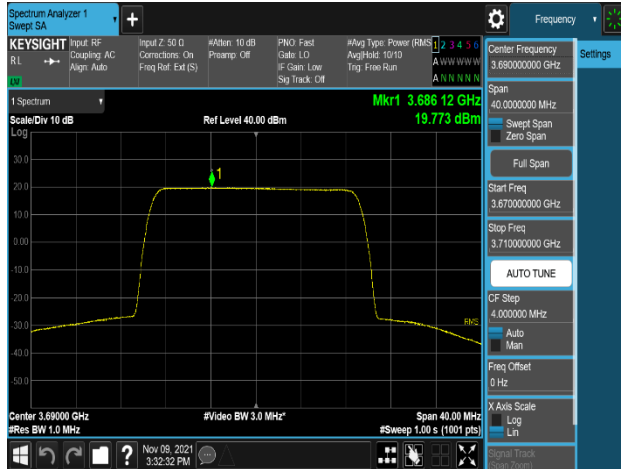


Plot 8-14. Power Spectral Density Plot
(LTE_B48_10M_64QAM - Mid Channel, Port 0)

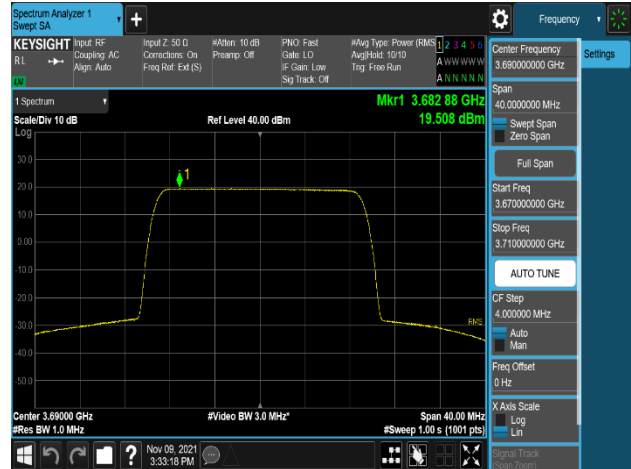


Plot 8-15. Power Spectral Density Plot
(LTE_B48_10M_64QAM - Mid Channel, Port 1)

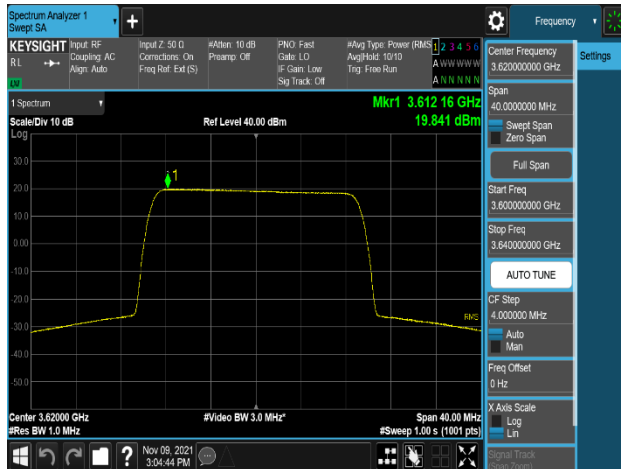
FCC: 2AXTR-ECL4248-2401	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	EUCAST	Approved by: Technical Manager
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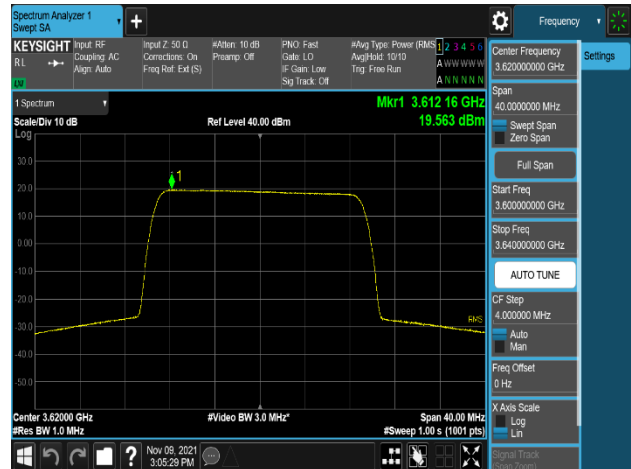
Plot 8-16. Power Spectral Density Plot
(LTE_B48_20M_QPSK - High Channel, Port 0)



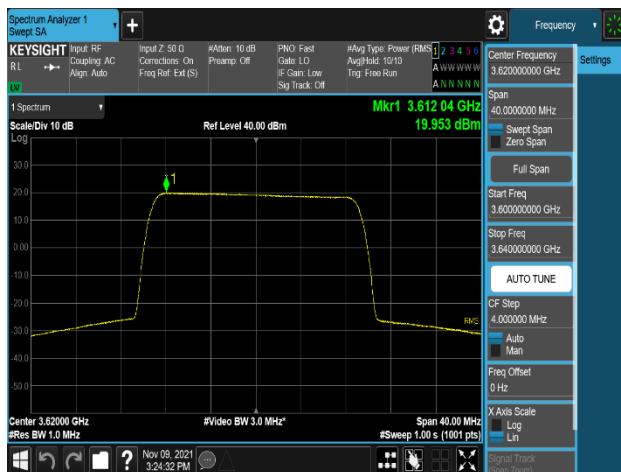
Plot 8-17. Power Spectral Density Plot
(LTE_B48_20M_QPSK - High Channel, Port 1)



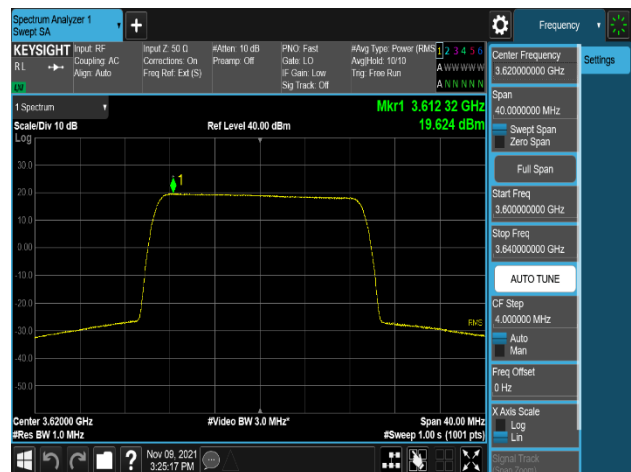
Plot 8-18. Power Spectral Density Plot
(LTE_B48_20M_16QAM - Mid Channel, Port 0)



Plot 8-19. Power Spectral Density Plot
(LTE_B48_20M_16QAM - Mid Channel, Port 1)



Plot 8-20. Power Spectral Density Plot
(LTE_B48_20M_64QAM - Mid Channel, Port 0)



Plot 8-21. Power Spectral Density Plot
(LTE_B48_20M_64QAM - Mid Channel, Port 1)

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8.5 Equivalent Isotropic Radiated Power (EIRP)

Test Overview

A transmitter port of EUT is connected to the input of a signal analyzer. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

Test Description

KDB 971168 D01 v03r01 – Section 5.4

KDB 662911 D01 v02r01 – Section E)1) In-Band Power Measurements

ANSI C63.26-2015 - Section 5.2.4

ANSI C63.26-2015 - Section 5.2.5

The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The spectrum analyzer setting were as follows:

1. Conducted power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
2. IBW = 10 MHz (the reference bandwidth)
3. RBW = 1 ~ 5% of the expected OBW
4. VBW $\geq 3 \times$ RBW
5. Span = 2 ~ 3 x OBW
6. No. of sweep points $\geq 2 \times$ span / RBW
7. Detector = RMS
8. Trace mode = Trace-Averaging (RMS) set to average over 100 sweeps
9. The trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

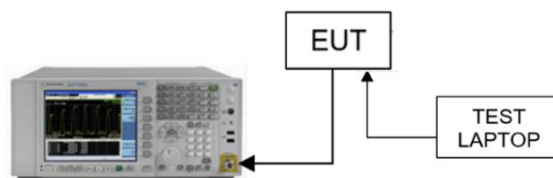


Figure 8-4. Test Instrument & Measurement Setup

Limit

Category B CBSD: 47dBm/10 MHz

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Note

1. Periodic trigger was used with gating ON. Gate sweep time, Gate delay and gate length were set accordingly to capture ON time of the transmission.
2. MIMO Calculations are done considering output channel power for all ports and respective margins are calculated according to procedures in section 6.4 of ANSI C63.26 and section D of KDB 971168 D01 v03r01.
3. Consider the following factors for MIMO Power:
 - c) Conducted power for each port is measured in dBm.
 - d) Powers are summed up in linear using the measure-and-sum technique defined in KDB 971168 D01 v03r01-Section D.
 - e) Conducted power per port (dBm) is converted to a linear value (mW). A summation of linear powers for all ports gives us the total MIMO conducted power in milliWatts (mW).
4. All transmit signals from different antennas are completely uncorrelated with each other. So the e.i.r.p. shall be calculated based on the aggregate power conducted across all antennas and maximum antenna gain G_{max} .
5. Sample Calculation:
 Let us assume the following numbers:
 - c) Total MIMO Conducted Power as 1488.18 mW
 - d) Antenna Gain = 14.0 dBi

Factors		Value	Unit
Summed MIMO Conducted Power (linear sum)		1488.18	mW
Summed MIMO Conducted Power (dBm)	$= 10 * \log (1488.18) =$	31.73	dBm/10MHz
Antenna Gain		14.00	dBi
Total MIMO EIRP		45.73	dBm/10MHz
Limit		47.00	dBm/10 MHz
Margin = Limit - Total MIMO EIRP	$= 45.73 - 47.00 =$	-1.27	dB

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Low Channel	Port	QPSK	16QAM	64QAM
Conducted Power (dBm/10MHz)	0	28.61	28.90	28.31
	1	28.82	28.89	28.56
Total MIMO Conducted Power (mW/10MHz)		1488.18	1550.71	1395.44
Total MIMO Conducted Power (dBm/10MHz)		31.73	31.91	31.45
Ant. Gain (dBi)		14.00	14.00	14.00
e.i.r.p (dBm/10MHz)		45.73	45.91	45.45
e.i.r.p Limit(dBm/10MHz)		47.00	47.00	47.00
Margin (dB)		-1.27	-1.09	-1.55
Mid Channel	Port	QPSK	16QAM	64QAM
Conducted Power (dBm/10MHz)	0	28.85	29.16	28.53
	1	28.39	28.65	28.04
Total MIMO Conducted Power (mW/10MHz)		1457.60	1556.96	1349.65
Total MIMO Conducted Power (dBm/10MHz)		31.64	31.92	31.30
Ant. Gain (dBi)		14.00	14.00	14.00
e.i.r.p (dBm/10MHz)		45.64	45.92	45.30
e.i.r.p Limit(dBm/10MHz)		47.00	47.00	47.00
Margin (dB)		-1.36	-1.08	-1.70
High Channel	Port	QPSK	16QAM	64QAM
Conducted Power (dBm/10MHz)	0	28.78	29.14	28.33
	1	28.56	28.84	28.03
Total MIMO Conducted Power (mW/10MHz)		1472.89	1585.95	1316.10
Total MIMO Conducted Power (dBm/10MHz)		31.68	32.00	31.19
Ant. Gain (dBi)		14.00	14.00	14.00
e.i.r.p (dBm/10MHz)		45.68	46.00	45.19
e.i.r.p Limit(dBm/10MHz)		47.00	47.00	47.00
Margin (dB)		-1.32	-1.00	-1.81

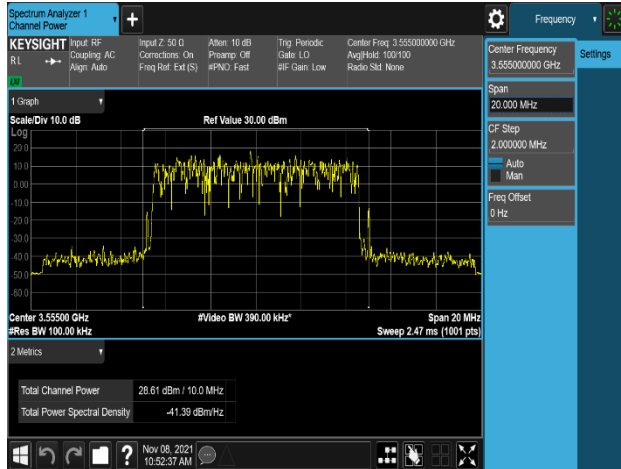
Table 8-6. Equivalent Isotropic Radiated Power Table (LTE_B48_10M)

FCC: 2AXTR-ECL4248-2401		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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Low Channel	Port	QPSK	16QAM	64QAM
Conducted Power (dBm/10MHz)	0	28.94	28.46	27.84
	1	29.03	28.34	27.86
Total MIMO Conducted Power (mW/10MHz)		1583.26	1383.79	1219.08
Total MIMO Conducted Power (dBm/10MHz)		32.00	31.41	30.86
Ant. Gain (dBi)		14.00	14.00	14.00
e.i.r.p (dBm/10MHz)		46.00	45.41	44.86
e.i.r.p Limit(dBm/10MHz)		47.00	47.00	47.00
Margin (dB)		-1.00	-1.59	-2.14
Mid Channel	Port	QPSK	16QAM	64QAM
Conducted Power (dBm/10MHz)	0	28.42	28.58	28.18
	1	28.25	28.30	27.84
Total MIMO Conducted Power (mW/10MHz)		1363.37	1397.19	1265.79
Total MIMO Conducted Power (dBm/10MHz)		31.35	31.45	31.02
Ant. Gain (dBi)		14.00	14.00	14.00
e.i.r.p (dBm/10MHz)		45.35	45.45	45.02
e.i.r.p Limit(dBm/10MHz)		47.00	47.00	47.00
Margin (dB)		-1.65	-1.55	-1.98
High Channel	Port	QPSK	16QAM	64QAM
Conducted Power (dBm/10MHz)	0	29.02	28.82	27.94
	1	28.73	28.67	27.75
Total MIMO Conducted Power (mW/10MHz)		1544.44	1498.29	1217.96
Total MIMO Conducted Power (dBm/10MHz)		31.89	31.76	30.86
Ant. Gain (dBi)		14.00	14.00	14.00
e.i.r.p (dBm/10MHz)		45.89	45.76	44.86
e.i.r.p Limit(dBm/10MHz)		47.00	47.00	47.00
Margin (dB)		-1.11	-1.24	-2.14

Table 8-7. Equivalent Isotropic Radiated Power Table (LTE_B48_20M)

FCC: 2AXTR-ECL4248-2401		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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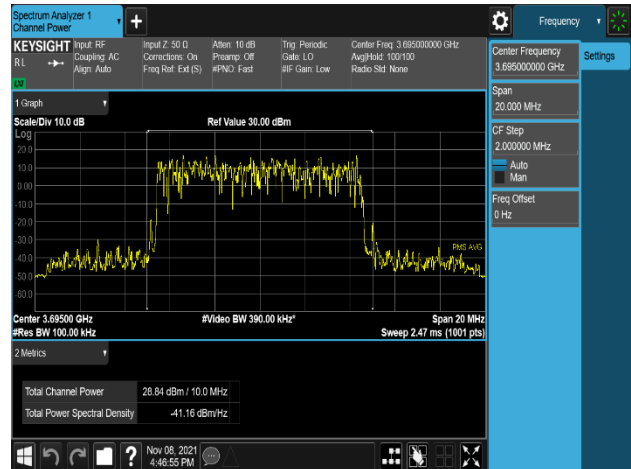
Plot 8-22. Equivalent Isotropic Radiated Power Plot
(LTE_B48_10M_QPSK – Low Channel, Port 0)



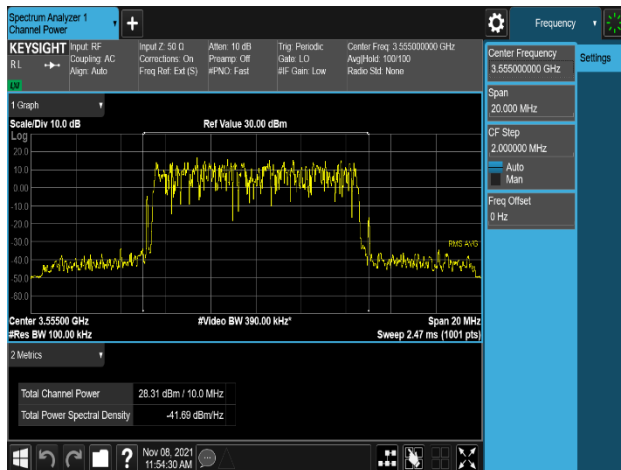
Plot 8-23. Equivalent Isotropic Radiated Power Plot
(LTE_B48_10M_QPSK - Low Channel, Port 1)



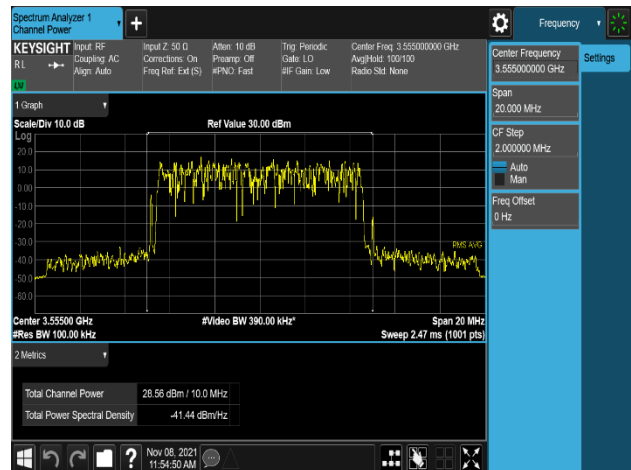
Plot 8-24. Equivalent Isotropic Radiated Power Plot
(LTE_B48_10M_16QAM - High Channel, Port 0)



Plot 8-25. Equivalent Isotropic Radiated Power Plot
(LTE_B48_10M_16QAM - High Channel, Port 1)

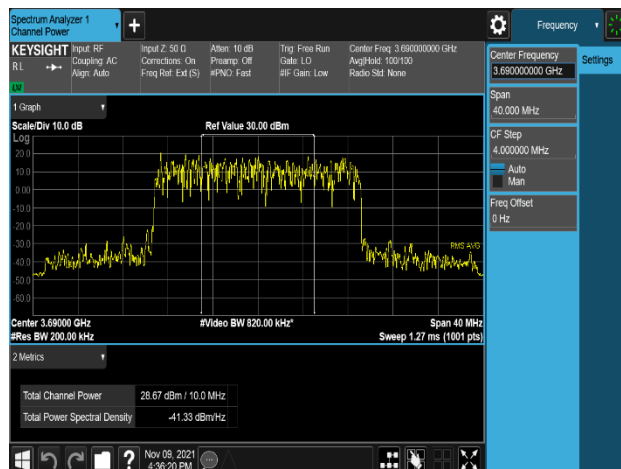
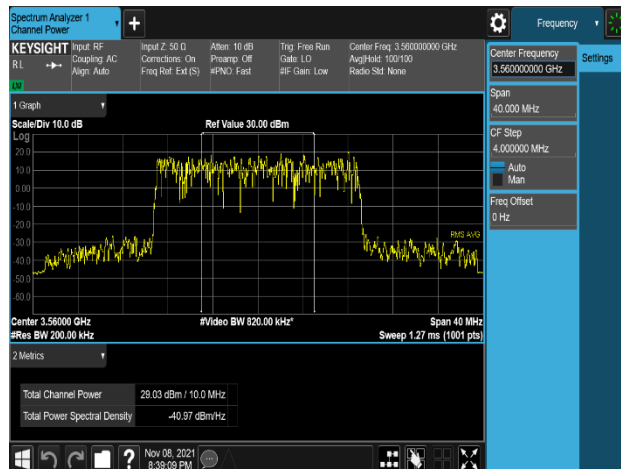
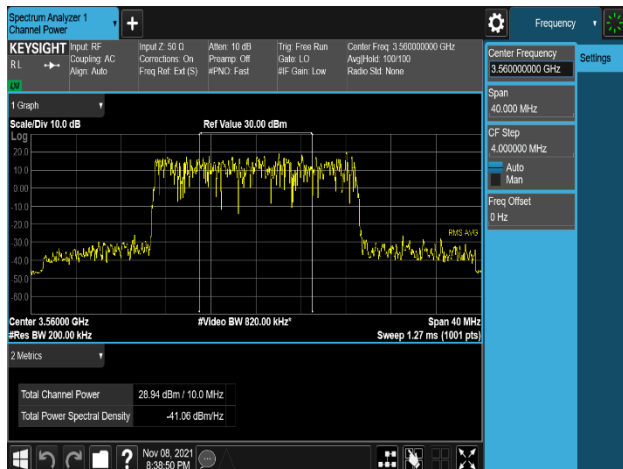


Plot 8-26. Equivalent Isotropic Radiated Power Plot
(LTE_B48_10M_64QAM - Low Channel, Port 0)



Plot 8-27. Equivalent Isotropic Radiated Power Plot
(LTE_B48_10M_64QAM - Low Channel, Port 1)

FCC: 2AXTR-ECL4248-2401	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	EUCAST	Approved by: Technical Manager
Test Report S/N: 8K21102701-R3.2AXTR	Test Dates: 11/01/2021 – 11/15/2021	EUT Type: LTE Pico cell base station for CBRS		Page 28 of 60



FCC: 2AXTR-ECL4248-2401	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 8K21102701-R3.2AXTR	Test Dates: 11/01/2021 – 11/15/2021	EUT Type: LTE Pico cell base station for CBRS	Page 29 of 60

8.6 Peak To Average Power Ratio (PAPR)

Test Overview

A peak to average ratio measurement is performed at the conducted port of the EUT. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level.

Test Procedure Used

ANSI C63.26 - Section 5.2.3.4.
KDB 971168 D01 v0301 - Section 5.7

Test Setting

The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The spectrum analyzer setting were as follows:

1. The signal analyzer's CCDF function is enabled.
2. Frequency = carrier center frequency
3. Measurement BW $\geq$ OBW or specified reference bandwidth
4. The signal analyzer was set to collect one million samples to generate the CCDF curve
5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms.

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

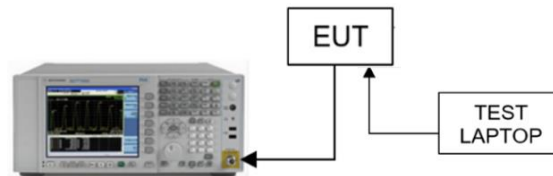


Figure 8-5. Test Instrument & Measurement Setup

Limit

Peak-to-average power ratio (PAPR) limit shall not exceed 13 dB for more than 0.1% of the time.

Test Notes

None.

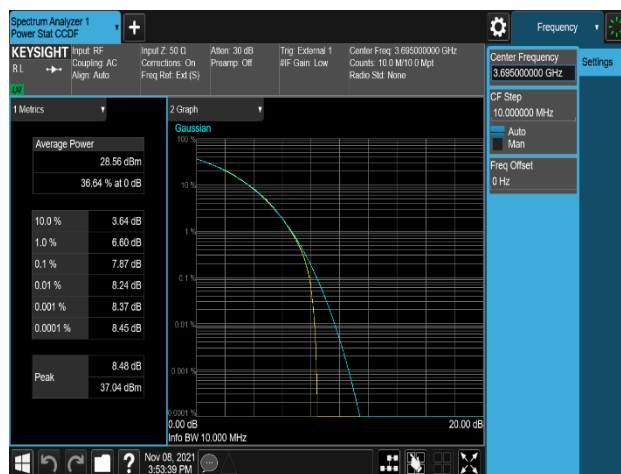
FCC: 2AXTR-ECL4248-2401	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	EUCAST	Approved by: Technical Manager
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Channel	Port	PAPR (dB)			Limit (dB)
		QPSK	16QAM	64QAM	
Low	0	7.75	7.74	7.80	< 13
	1	7.75	7.77	7.76	< 13
Middle	0	7.79	7.75	7.78	< 13
	1	7.75	7.86	7.77	< 13
High	0	7.85	7.72	7.76	< 13
	1	7.87	7.76	7.72	< 13

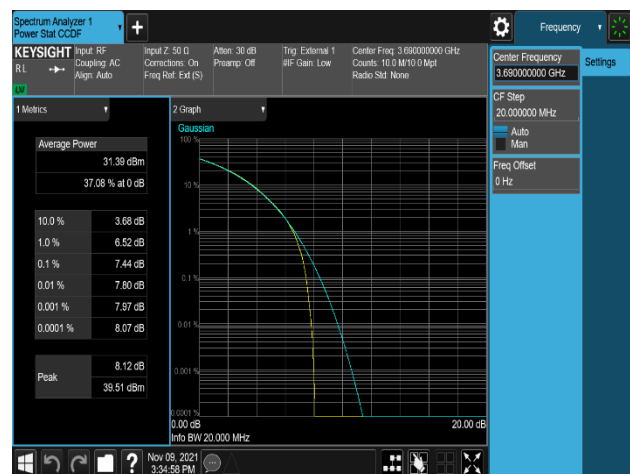
Table 8-8. Peak To Average Power Ratio Summary Data (LTE_B48_10M)

Channel	Port	PAPR (dB)			Limit (dB)
		QPSK	16QAM	64QAM	
Low	0	7.33	7.35	7.35	< 13
	1	7.32	7.33	7.35	< 13
Middle	0	7.35	7.36	7.37	< 13
	1	7.41	7.34	7.39	< 13
High	0	7.35	7.41	7.39	< 13
	1	7.44	7.38	7.40	< 13

Table 8-9. Peak To Average Power Ratio Summary Data (LTE_B48_20M)



Plot 8-34. Peak To Average Power Ratio Plot (LTE_B48_10M_QPSK - High Channel, Port 1)



Plot 8-35. Peak To Average Power Ratio Plot (LTE_B48_20M_QPSK - High Channel, Port 1)

FCC: 2AXTR-ECL4248-2401	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	EUCAST	Approved by: Technical Manager
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8.7 Channel Edge Emissions at Antenna Terminal

Test Overview

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

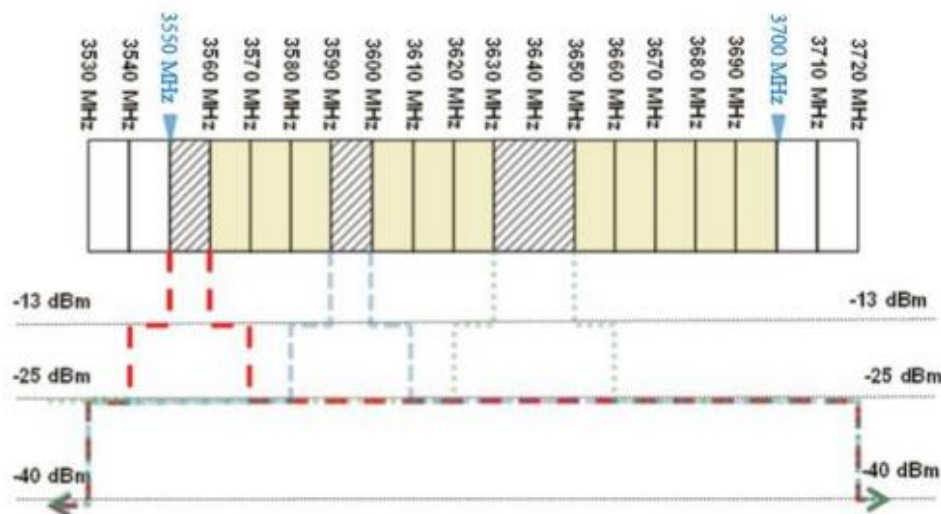
Test Procedure Used

ANSI C63.26 - Section 5.2.3.4.
KDB 971168 D01 v0301 - Section 5.7
KDB 662911 D01 v02r01 - Section E)3)

Test Setting

1. Start and stop frequency were set such that the Channel Edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the Channel Edge
3. RBW: 1% of fundamental for measurements within 1 MHz immediately outside the authorized channel
1 MHz for beyond 1 MHz outside the authorized channel.
4. VBW $\geq 3 \times$ RBW
5. Detector = RMS
6. Number of sweep points $\geq 2 \times$ Span/RBW
7. Trace mode = trace average
8. Sweep time = auto couple
9. The trace was allowed to stabilize

Limit



- Within 0 MHz to 10 MHz above and below the assigned channel ≤ -13 dBm/MHz
- Greater than 10 MHz above and below the assigned channel ≤ -25 dBm/MHz
- Any emission below 3530 MHz and above 3720 MHz ≤ -40 dBm/MHz

FCC: 2AXTR-ECL4248-2401	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	EUCAST	Approved by: Technical Manager
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Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



Figure 8-6. Test Instrument & Measurement Setup

Test Notes

1. All the measurement has been tested but test table result, and test plots are referred from the worst of value of each of modulation of each antenna ports.
2. When detected Emission, this value has been applied as reference offset in the spectrum analyzer.
Duty cycle correction factor was added to spectrum analyzer.
Duty cycle = transmit on-time / transmitter period = 3.639 ms / 5 ms = 0.73
Duty cycle correction factor = $10 \cdot \log(1/\text{duty cycle}) = 10 \cdot \log(1/0.73) = 1.38 \text{ dB}$
3. Per Section 96.41(e)(3)—resolution bandwidth 1% of fundamental for measurements within 1 MHz immediately outside the authorized channel; and 1 MHz for beyond 1 MHz outside the authorized channel.
4. The limits were adjusted by a factor of $[-10 \cdot \log(2)] \text{ dB}$ to account for the device operation as a 2 port MIMO transmitter, as per FCC KDB 622911. MIMO Factor calculation as below:
MIMO Factor = $10 \cdot \log(2) = 3.01 \text{ dB}$

Frequency range	Basic Limit (dBm/MHz)	MIMO Factor (dB)	RBW Factor (dB)	Adjusted limit (dBm)
0 MHz to 10 MHz above and below the assigned channel	-13	3.01	-	-16.01
10 MHz above and below the assigned channel	-25	3.01	-	-28.01
below 3530 MHz and above 3720 MHz	-40	3.01	-	-43.01

Note: Adjusted limit (dBm/MHz) = Basic limit (dBm/1MHz) - MIMO Factor

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Test Report S/N: 8K21102701-R3.2AXTR	Test Dates: 11/01/2021 – 11/15/2021	EUT Type: LTE Pico cell base station for CBRS		Page 33 of 60

Channel	Port	Measured Range (GHz)	Max. Value (dBm)			Limit (dBm)	Worst Margin(dB)
			QPSK	16QAM	64QAM		
Low	0	3.51 to 3.53	-49.06	-49.09	-48.95	-43.01	-5.94
	0	3.53 to 3.54	-39.51	-39.39	-39.69	-28.01	-11.38
	0	3.54 to 3.549	-21.95	-19.80	-21.53	-16.01	-3.79
	0	3.549 to 3.55	-22.70	-22.40	-23.27	-16.01	-6.39
	0	3.56 to 3.561	-23.67	-24.38	-23.00	-16.01	-6.99
	0	3.561 to 3.57	-21.05	-21.65	-20.99	-16.01	-4.98
	0	3.57 to 3.60	-38.08	-37.14	-37.63	-28.01	-9.13
	1	3.51 to 3.53	-49.02	-49.21	-49.18	-43.01	-6.01
	1	3.53 to 3.54	-40.49	-38.65	-39.44	-28.01	-10.64
	1	3.54 to 3.549	-21.94	-21.52	-20.59	-16.01	-4.58
	1	3.549 to 3.55	-20.73	-22.76	-24.11	-16.01	-4.72
	1	3.56 to 3.561	-23.13	-24.87	-23.50	-16.01	-7.12
	1	3.561 to 3.57	-20.95	-20.78	-20.31	-16.01	-4.30
	1	3.57 to 3.60	-37.47	-35.46	-36.20	-28.01	-7.45
Mid	0	3.58 to 3.61	-37.45	-37.90	-37.70	-28.01	-9.44
	0	3.61 to 3.619	-19.71	-20.53	-20.97	-16.01	-3.70
	0	3.619 to 3.62	-24.18	-24.37	-22.63	-16.01	-6.62
	0	3.63 to 3.631	-24.55	-24.14	-21.74	-16.01	-5.73
	0	3.631 to 3.64	-21.13	-22.36	-21.02	-16.01	-5.01
	0	3.64 to 3.67	-36.80	-36.81	-36.75	-28.01	-8.74
	1	3.58 to 3.61	-35.15	-35.43	-37.42	-28.01	-7.14
	1	3.61 to 3.619	-21.24	-21.52	-21.45	-16.01	-5.23
	1	3.619 to 3.62	-23.25	-23.18	-22.50	-16.01	-6.49
	1	3.63 to 3.631	-24.59	-25.41	-23.11	-16.01	-7.10
	1	3.631 to 3.64	-22.10	-21.85	-22.09	-16.01	-5.84
	1	3.64 to 3.67	-35.05	-34.96	-37.25	-28.01	-6.95
High	0	3.65 to 3.68	-35.35	-35.45	-34.99	-28.01	-6.98
	0	3.68 to 3.689	-20.89	-21.10	-20.80	-16.01	-4.79
	0	3.689 to 3.69	-22.29	-22.74	-22.48	-16.01	-6.28
	0	3.7 to 3.701	-23.60	-23.73	-23.96	-16.01	-7.59
	0	3.701 to 3.71	-20.91	-21.33	-21.24	-16.01	-4.90
	0	3.71 to 3.72	-39.64	-39.37	-39.13	-28.01	-11.12
	0	3.72 to 3.74	-49.51	-49.54	-49.53	-43.01	-6.50
	1	3.65 to 3.68	-38.46	-38.61	-38.78	-28.01	-10.45
	1	3.68 to 3.689	-21.91	-21.17	-21.64	-16.01	-5.16
	1	3.689 to 3.69	-23.44	-22.55	-23.30	-16.01	-6.54
	1	3.7 to 3.701	-24.55	-24.39	-24.02	-16.01	-8.01
	1	3.701 to 3.71	-22.54	-22.21	-22.83	-16.01	-6.20
	1	3.71 to 3.72	-39.39	-39.10	-39.90	-28.01	-11.09
	1	3.72 to 3.74	-49.54	-49.55	-49.73	-43.01	-6.53

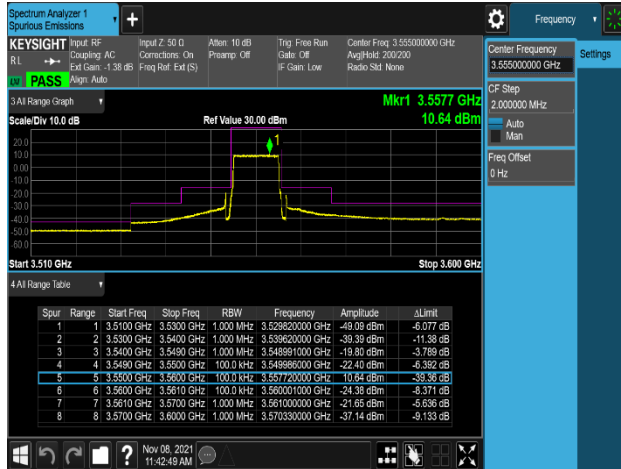
Table 8-10. Channel Edge Emission Summary Data (LTE_B48_10M)

FCC: 2AXTR-ECL4248-2401		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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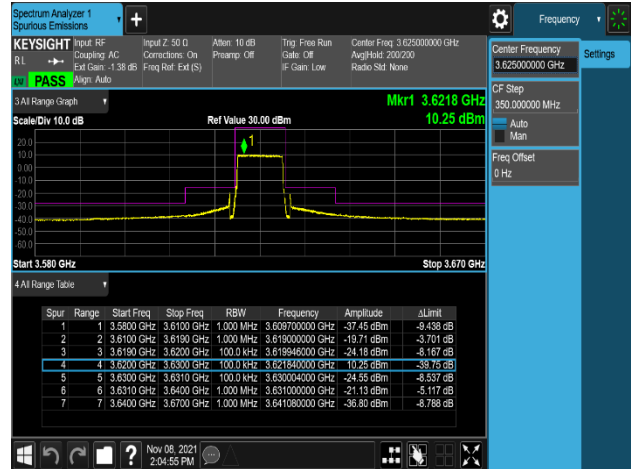
Channel	Port	Measured Range (GHz)	Max. Value (dBm)			Limit (dBm)	Worst Margin(dB)
			QPSK	16QAM	64QAM		
Low	0	3.51 to 3.53	-48.68	-48.73	-48.55	-43.01	-5.54
	0	3.53 to 3.54	-34.05	-35.15	-35.02	-28.01	-6.04
	0	3.54 to 3.549	-27.52	-27.47	-27.46	-16.01	-11.45
	0	3.549 to 3.55	-31.78	-32.30	-32.97	-16.01	-15.77
	0	3.57 to 3.571	-31.59	-33.23	-33.23	-16.01	-15.58
	0	3.571 to 3.58	-26.93	-28.08	-28.22	-16.01	-10.92
	0	3.58 to 3.61	-32.02	-33.73	-32.98	-28.01	-4.01
	1	3.51 to 3.53	-48.89	-48.80	-48.90	-43.01	-5.79
	1	3.53 to 3.54	-35.45	-35.39	-35.52	-28.01	-7.38
	1	3.54 to 3.549	-25.82	-26.84	-26.75	-16.01	-9.81
	1	3.549 to 3.55	-30.81	-32.50	-31.53	-16.01	-14.80
	1	3.57 to 3.571	-31.46	-32.14	-31.68	-16.01	-15.45
	1	3.571 to 3.58	-26.79	-27.24	-26.60	-16.01	-10.59
	1	3.58 to 3.61	-32.45	-32.93	-32.35	-28.01	-4.34
Mid	0	3.57 to 3.6	-33.11	-32.66	-33.08	-28.01	-4.65
	0	3.6 to 3.609	-28.07	-26.63	-26.60	-16.01	-10.59
	0	3.609 to 3.61	-33.07	-31.62	-30.92	-16.01	-14.91
	0	3.63 to 3.631	-32.61	-32.29	-32.22	-16.01	-16.21
	0	3.631 to 3.64	-28.90	-28.05	-27.47	-16.01	-11.46
	0	3.64 to 3.67	-32.78	-33.14	-32.86	-28.01	-4.77
	1	3.57 to 3.6	-33.30	-33.63	-33.75	-28.01	-5.29
	1	3.6 to 3.609	-27.76	-27.60	-27.57	-16.01	-11.56
	1	3.609 to 3.61	-32.36	-32.12	-31.56	-16.01	-15.55
	1	3.63 to 3.631	-33.41	-32.42	-33.34	-16.01	-16.41
	1	3.631 to 3.64	-28.76	-28.02	-28.47	-16.01	-12.01
	1	3.64 to 3.67	-33.63	-33.35	-33.80	-28.01	-5.34
High	0	3.64 to 3.67	-33.54	-32.55	-33.89	-28.01	-4.54
	0	3.67 to 3.679	-28.03	-26.85	-27.57	-16.01	-10.84
	0	3.679 to 3.68	-32.57	-30.56	-31.24	-16.01	-14.55
	0	3.7 to 3.701	-33.17	-31.50	-32.75	-16.01	-15.49
	0	3.701 to 3.71	-28.64	-27.33	-29.56	-16.01	-11.32
	0	3.71 to 3.72	-38.58	-37.96	-38.48	-28.01	-9.95
	0	3.72 to 3.74	-49.39	-49.53	-49.50	-43.01	-6.38
	1	3.64 to 3.67	-34.89	-34.86	-34.54	-28.01	-6.53
	1	3.67 to 3.679	-28.79	-27.92	-28.56	-16.01	-11.91
	1	3.679 to 3.68	-33.92	-31.66	-32.64	-16.01	-15.65
	1	3.7 to 3.701	-33.32	-33.82	-32.94	-16.01	-16.93
	1	3.701 to 3.71	-29.18	-29.82	-28.71	-16.01	-12.70
	1	3.71 to 3.72	-37.03	-36.95	-36.61	-28.01	-8.60
	1	3.72 to 3.74	-49.66	-49.72	-49.65	-43.01	-6.64

Table 8-11. Channel Edge Emission Summary Data (LTE_B48_20M)

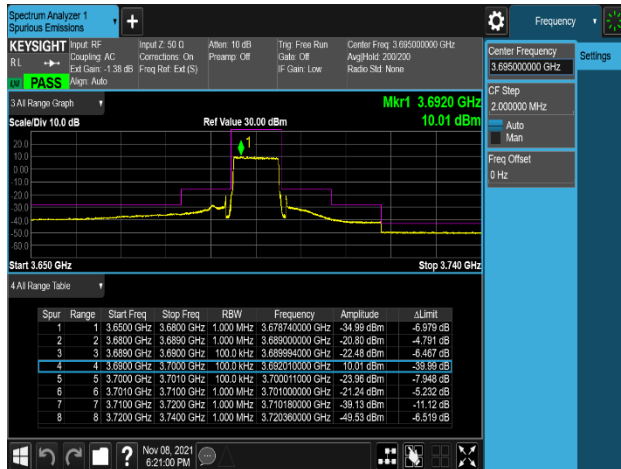
FCC: 2AXTR-ECL4248-2401		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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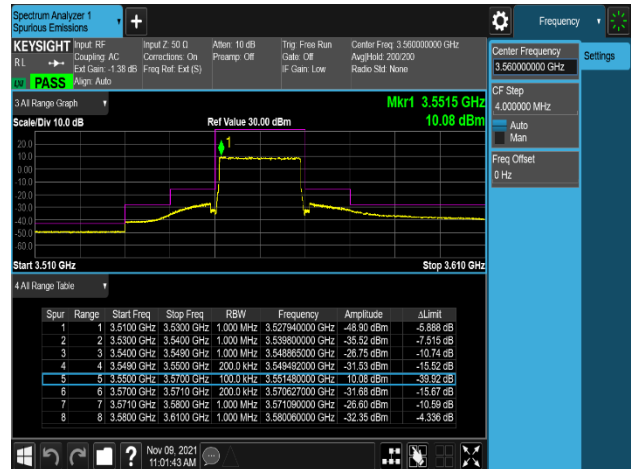
Plot 8-36. Channel Edge Emission Plot
(LTE_B48_10M_16QAM – Low Channel, Port 0)



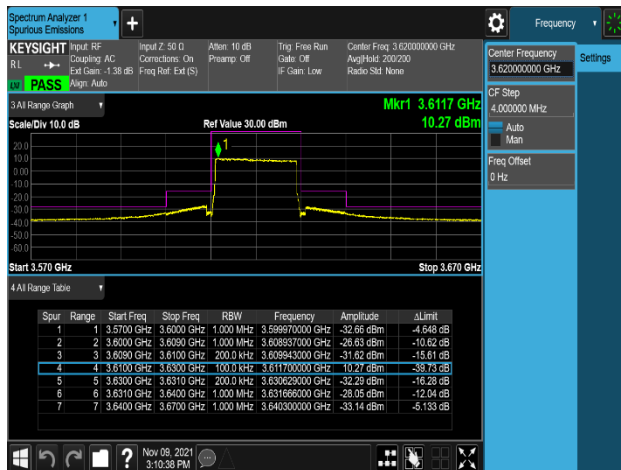
Plot 8-37. Channel Edge Emission Plot
(LTE_B48_10M_QPSK – Mid Channel, Port 0)



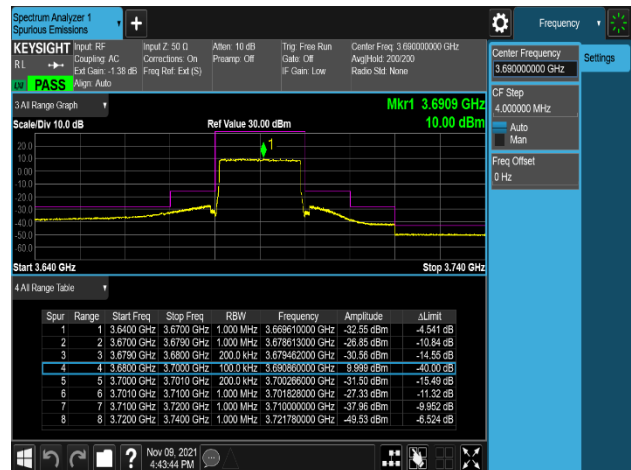
Plot 8-38. Channel Edge Emission Plot
(LTE_B48_10M_64QAM – High Channel, Port 0)



Plot 8-39. Channel Edge Emission Plot
(LTE_B48_20M_64QAM – Low Channel, Port 1)



Plot 8-40. Channel Edge Emission Plot
(LTE_B48_20M_16QAM – Mid Channel, Port 0)



Plot 8-41. Channel Edge Emission Plot
(LTE_B48_20M_16QAM – High Channel, Port 0)

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8.8 Spurious and Harmonic Emissions at Antenna Terminal

Test Overview

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

Test Procedure Used

ANSI C63.26 - Section 5.2.3.4.
KDB 971168 D01 v0301 - Section 6
KDB 662911 D01 v02r01 - Section E)3)

Test Setting

1. Start frequency was set to 30 MHz and stop frequency was set to at least 10 * the fundamental frequency excluding the frequency range of the Channel Edge measurement.
2. RBW: 1 MHz
3. VBW $\geq 3 \times$ RBW
4. Detector = RMS
5. Number of sweep points $\geq 2 \times$ Span/RBW
6. Trace mode = trace average
7. Sweep time = auto couple
8. The trace was allowed to stabilize

Limit

- Greater than 10 MHz above and below the assigned channel ≤ -25 dBm/MHz
- Any emission below 3530 MHz and above 3720 MHz ≤ -40 dBm/MHz

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



Figure 8-7. Test Instrument & Measurement Setup

FCC: 2AXTR-ECL4248-2401	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	EUCAST	Approved by: Technical Manager
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Test Notes

1. All the measurement has been tested but test table result, and test plots are referred from the worst of value of each of modulation of each antenna ports.
2. When detected Emission, this value has been applied as reference offset in the spectrum analyzer.
 Duty cycle correction factor was added to spectrum analyzer.
 Duty cycle = transmit on-time / transmitter period = 3.639 ms / 5 ms = 0.73
 Duty cycle correction factor = $10 \cdot \log(1/\text{duty cycle}) = 10 \cdot \log(1/0.73) = 1.38 \text{ dB}$
3. The limits were adjusted by a factor of $[-10 \cdot \log(2)] \text{ dB}$ to account for the device operation as a 2 port MIMO transmitter, as per FCC KDB 622911. MIMO Factor calculation as below:
 MIMO Factor = $10 \cdot \log(2) = 3.01 \text{ dB}$

Frequency range	Basic Limit (dBm/MHz)	MIMO Factor (dB)	RBW Factor (dB)	Adjusted limit (dBm)
10 MHz above and below the assigned channel	-25	3.01	-	-28.01
below 3530 MHz and above 3720 MHz	-40	3.01	-	-43.01
Note: Adjusted limit (dBm/MHz) = Basic limit (dBm/1MHz) - MIMO Factor				

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Channel	Port	Measurement Range	Level (dBm)			Limit (dBm)	Worst Margin (dB)
			QPSK	16QAM	64QAM		
Low	0	30 MHz to 3530 MHz	-46.07	-46.01	-46.06	-43.01	-3.00
		3600 MHz to 3720 MHz	-30.85	-30.68	-30.93	-28.01	-2.67
		3.72 GHz to 6.2 GHz	-53.87	-54.65	-54.79	-43.01	-10.86
		6.2 GHz to 18 GHz	-54.72	-54.85	-54.85	-43.01	-11.71
		18 GHz to 37 GHz	-54.14	-55.02	-54.50	-43.01	-11.13
	1	30 MHz to 3530 MHz	-46.20	-46.13	-46.14	-43.01	-3.12
		3600 MHz to 3720 MHz	-43.51	-43.72	-43.92	-28.01	-15.50
		3.72 GHz to 6.2 GHz	-53.77	-53.78	-53.26	-43.01	-10.25
		6.2 GHz to 18 GHz	-52.58	-53.77	-54.06	-43.01	-9.57
		18 GHz to 37 GHz	-54.52	-54.51	-54.85	-43.01	-11.50
Middle	0	30 MHz to 3530 MHz	-46.15	-46.10	-46.26	-43.01	-3.09
		3530 MHz to 3580 MHz	-36.71	-36.77	-37.05	-28.01	-8.70
		3670 MHz to 3720 MHz	-31.98	-32.00	-32.01	-28.01	-3.97
		3.72 GHz to 6.2 GHz	-54.32	-54.06	-54.27	-43.01	-11.05
		6.2 GHz to 18 GHz	-54.97	-55.28	-54.08	-43.01	-11.07
		18 GHz to 37 GHz	-54.87	-54.39	-54.48	-43.01	-11.38
	1	30 MHz to 3530 MHz	-46.39	-46.39	-46.36	-43.01	-3.35
		3530 MHz to 3580 MHz	-38.90	-39.15	-38.54	-28.01	-10.53
		3670 MHz to 3720 MHz	-40.82	-40.96	-41.11	-28.01	-12.81
		3.72 GHz to 6.2 GHz	-53.10	-52.89	-53.21	-43.01	-9.88
		6.2 GHz to 18 GHz	-53.97	-53.05	-53.57	-43.01	-10.04
		18 GHz to 37 GHz	-54.98	-54.92	-54.27	-43.01	-11.26
High	0	30 MHz to 3530 MHz	-46.24	-46.10	-46.19	-43.01	-3.09
		3530 MHz to 3650 MHz	-37.91	-37.42	-37.18	-28.01	-9.17
		3.72 GHz to 6.2 GHz	-53.90	-53.62	-54.25	-43.01	-10.61
		6.2 GHz to 18 GHz	-54.96	-54.72	-54.98	-43.01	-11.71
		18 GHz to 37 GHz	-53.74	-54.48	-54.40	-43.01	-10.73
	1	30 MHz to 3530 MHz	-46.28	-46.32	-46.32	-43.01	-3.27
		3530 MHz to 3650 MHz	-40.47	-40.15	-40.51	-28.01	-12.14
		3.72 GHz to 6.2 GHz	-53.93	-51.68	-51.82	-43.01	-8.67
		6.2 GHz to 18 GHz	-53.82	-53.93	-54.01	-43.01	-10.81
		18 GHz to 37 GHz	-54.67	-54.67	-54.52	-43.01	-11.51

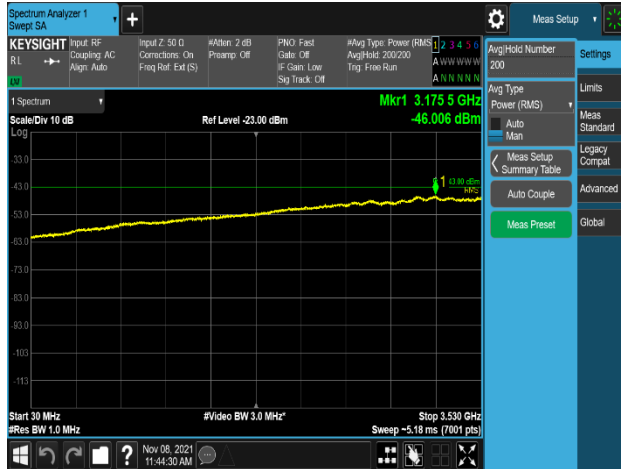
Table 8-12. Conducted Spurious Emission Summary Data (LTE_B48_10M)

FCC: 2AXTR-ECL4248-2401		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 8K21102701-R3.2AXTR	Test Dates: 11/01/2021 – 11/15/2021	EUT Type: LTE Pico cell base station for CBRS		Page 39 of 60

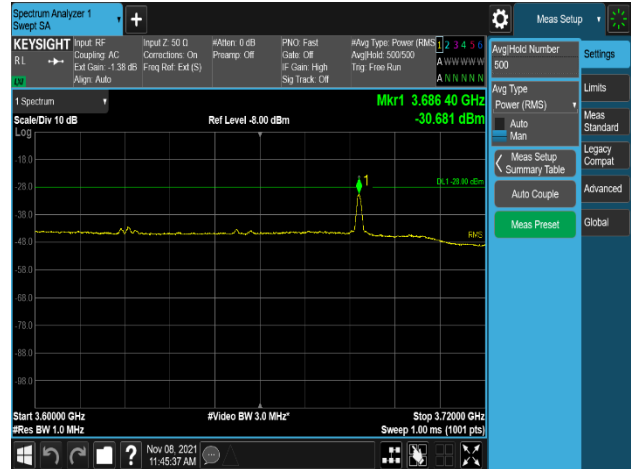
Channel	Port	Measurement Range	Level (dBm)			Limit (dBm)	Worst Margin (dB)
			QPSK	16QAM	64QAM		
Low	0	30 MHz to 3530 MHz	-46.01	-45.74	-45.74	-43.01	-2.73
		3600 MHz to 3720 MHz	-31.51	-31.57	-31.63	-28.01	-3.50
		3.72 GHz to 6.2 GHz	-55.05	-53.97	-54.36	-43.01	-10.96
		6.2 GHz to 18 GHz	-54.19	-53.88	-55.23	-43.01	-10.87
		18 GHz to 37 GHz	-54.40	-54.71	-54.57	-43.01	-11.39
	1	30 MHz to 3530 MHz	-46.06	-45.78	-45.60	-43.01	-2.59
		3600 MHz to 3720 MHz	-41.02	-41.15	-41.19	-28.01	-13.01
		3.72 GHz to 6.2 GHz	-52.73	-53.49	-53.57	-43.01	-9.72
		6.2 GHz to 18 GHz	-53.60	-54.07	-54.20	-43.01	-10.59
		18 GHz to 37 GHz	-54.68	-54.67	-54.82	-43.01	-11.66
Middle	0	30 MHz to 3530 MHz	-45.88	-46.05	-46.23	-43.01	-2.87
		3530 MHz to 3580 MHz	-36.23	-36.46	-36.32	-28.01	-8.22
		3670 MHz to 3720 MHz	-33.91	-31.03	-30.95	-28.01	-2.94
		3.72 GHz to 6.2 GHz	-54.01	-54.23	-54.36	-43.01	-11.00
		6.2 GHz to 18 GHz	-54.95	-54.91	-54.60	-43.01	-11.59
		18 GHz to 37 GHz	-54.64	-54.68	-54.63	-43.01	-11.62
	1	30 MHz to 3530 MHz	-45.99	-46.30	-46.25	-43.01	-2.98
		3530 MHz to 3580 MHz	-38.62	-39.03	-38.97	-28.01	-10.61
		3670 MHz to 3720 MHz	-39.87	-40.07	-40.19	-28.01	-11.86
		3.72 GHz to 6.2 GHz	-53.99	-53.53	-53.40	-43.01	-10.39
		6.2 GHz to 18 GHz	-53.50	-53.83	-53.53	-43.01	-10.49
		18 GHz to 37 GHz	-54.33	-54.65	-54.94	-43.01	-11.32
High	0	30 MHz to 3530 MHz	-46.22	-46.26	-46.07	-43.01	-3.06
		3530 MHz to 3650 MHz	-36.98	-36.80	-36.26	-28.01	-8.25
		3.72 GHz to 6.2 GHz	-54.33	-54.27	-53.74	-43.01	-10.73
		6.2 GHz to 18 GHz	-56.18	-56.93	-55.24	-43.01	-12.23
		18 GHz to 37 GHz	-54.85	-54.54	-54.37	-43.01	-11.36
	1	30 MHz to 3530 MHz	-46.06	-46.25	-46.26	-43.01	-3.05
		3530 MHz to 3650 MHz	-39.99	-40.30	-39.42	-28.01	-11.41
		3.72 GHz to 6.2 GHz	-53.40	-54.23	-53.58	-43.01	-10.39
		6.2 GHz to 18 GHz	-54.87	-55.98	-55.96	-43.01	-11.86
		18 GHz to 37 GHz	-54.71	-54.80	-54.71	-43.01	-11.70

Table 8-13. Conducted Spurious Emission Summary Data (LTE_B48_20M)

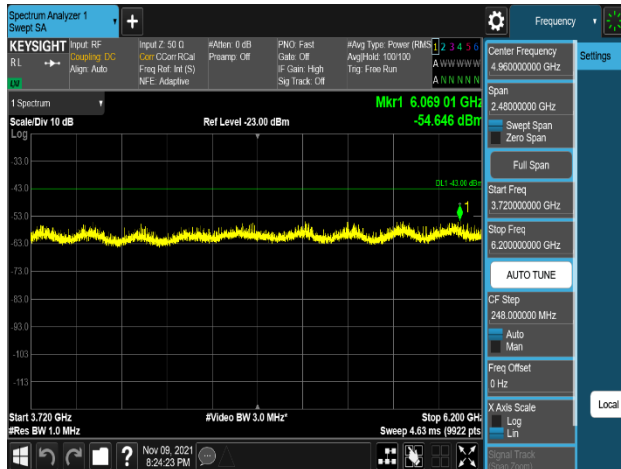
FCC: 2AXTR-ECL4248-2401		MEASUREMENT REPORT (CERTIFICATION)			Approved by: Technical Manager
Test Report S/N: 8K21102701-R3.2AXTR	Test Dates: 11/01/2021 – 11/15/2021	EUT Type: LTE Pico cell base station for CBRS			Page 40 of 60



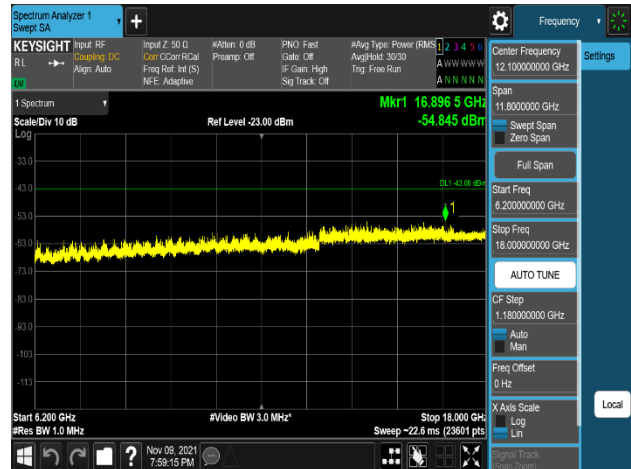
Plot 8-42. Conducted Spurious Emission Plot
30 MHz to 3530 MHz
(LTE_B48_10M_16QAM - Low Channel, Port 0)



Plot 8-43. Conducted Spurious Emission Plot
3600 MHz to 3720 MHz
(LTE_B48_10M_16QAM - Low Channel, Port 0)



Plot 8-44. Conducted Spurious Emission Plot
3.72 GHz to 6.2 GHz
(LTE_B48_10M_16QAM - Low Channel, Port 0)

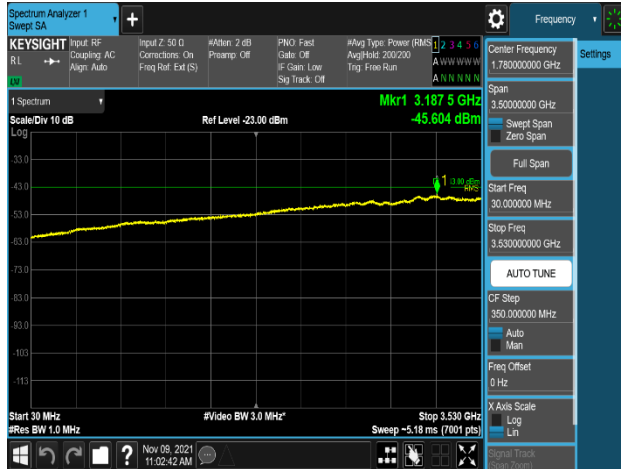


Plot 8-45. Conducted Spurious Emission Plot
6.2 GHz to 18 GHz
(LTE_B48_10M_16QAM - Low Channel, Port 0)

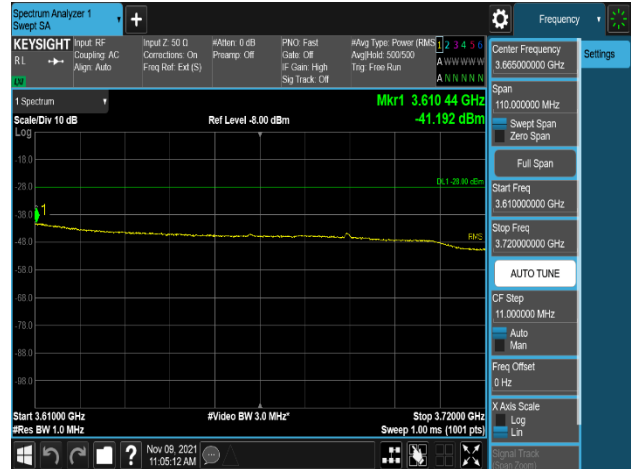


Plot 8-46. Conducted Spurious Emission Plot
18 GHz to 37 GHz
(LTE_B48_10M_16QAM - Low Channel, Port 0)

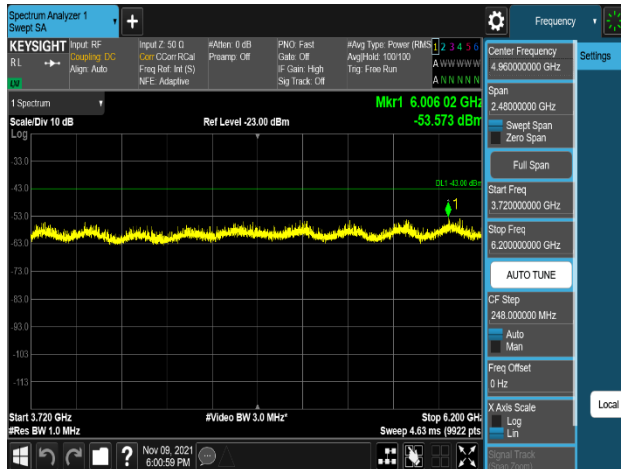
FCC: 2AXTR-ECL4248-2401	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	EUCAST	Approved by: Technical Manager
Test Report S/N: 8K21102701-R3.2AXTR	Test Dates: 11/01/2021 – 11/15/2021	EUT Type: LTE Pico cell base station for CBRS		Page 41 of 60



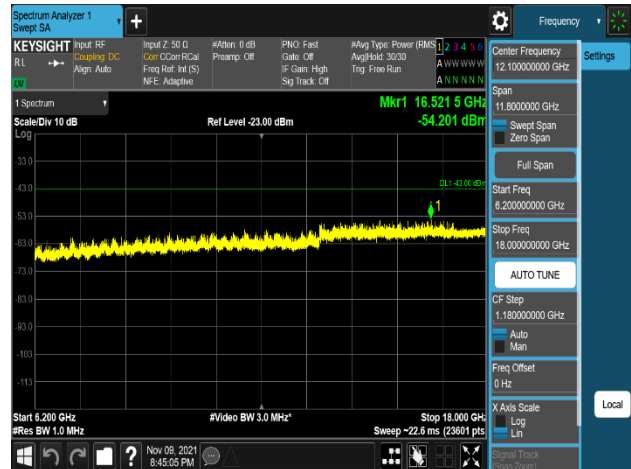
Plot 8-47. Conducted Spurious Emission Plot
30 MHz to 3530 MHz
(LTE_B48_20M_64QAM - Low Channel, Port 1)



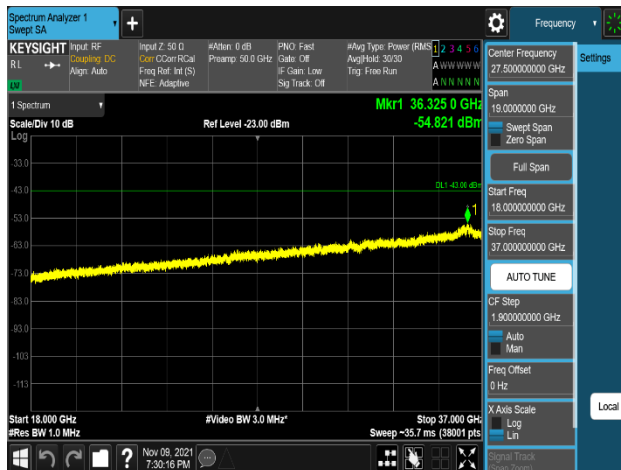
Plot 8-48. Conducted Spurious Emission Plot
3600 MHz to 3720 MHz
(LTE_B48_20M_64QAM - Low Channel, Port 1)



Plot 8-49. Conducted Spurious Emission Plot
3.72 GHz to 6.2 GHz
(LTE_B48_20M_64QAM - Low Channel, Port 1)



Plot 8-50. Conducted Spurious Emission Plot
6.2 GHz to 18 GHz
(LTE_B48_20M_64QAM - Low Channel, Port 1)



Plot 8-51. Conducted Spurious Emission Plot
18 GHz to 37 GHz
(LTE_B48_20M_64QAM - Low Channel, Port 1)

FCC: 2AXTR-ECL4248-2401	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	EUCAST	Approved by: Technical Manager
Test Report S/N: 8K21102701-R3.2AXTR	Test Dates: 11/01/2021 – 11/15/2021	EUT Type: LTE Pico cell base station for CBRS		Page 42 of 60

8.9 Radiated spurious emission

Test Overview

Radiated spurious emissions measurements are performed using the field strength method described in ANSI C63.26-2015 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized broadband trilob antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas.

Test Procedure Used

ANSI C63.26 - Section 5.5.4
 KDB 971168 D01 v03r01 - Section 7

Test Setting

1. Start frequency was set to 30 MHz and stop frequency was set to at least 10 * the fundamental frequency
2. RBW = 1 MHz
3. VBW $\geq 3 \times$ RBW
4. No. of sweep points $\geq 2 \times$ span / RBW
5. Detector = RMS
6. Trace mode = Max Hold (In cases where the level is within 2 dB of the limit, the final measurement is taken using triggering/gating and trace averaging.)
7. The trace was allowed to stabilize.

Limit

- Any emission below 3530 MHz and above 3720 MHz ≤ -40 dBm/MHz

FCC: 2AXTR-ECL4248-2401	 PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

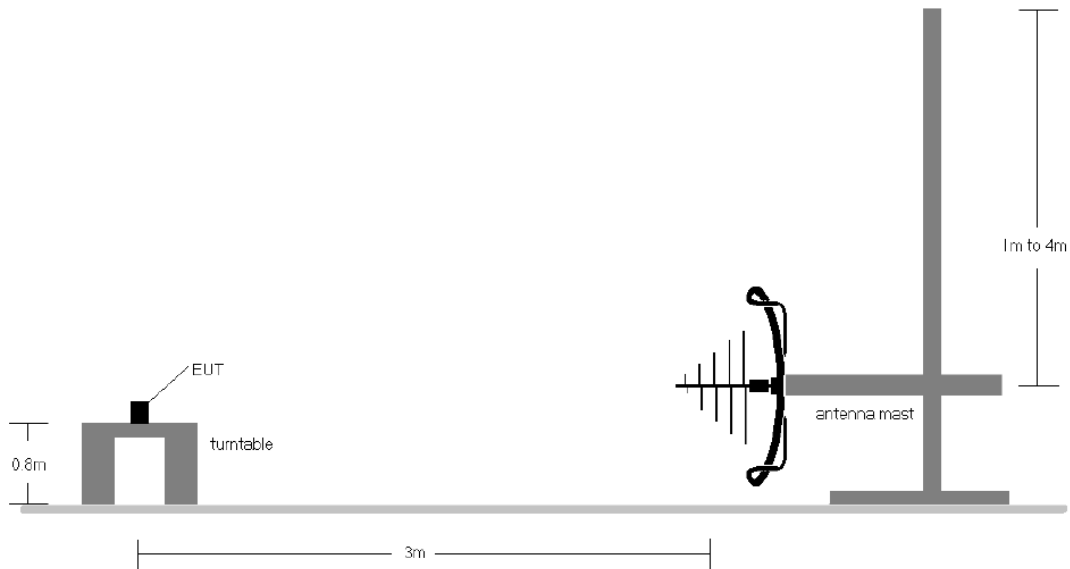


Figure 8-8. Test Instrument & Measurement Setup < 1GHz

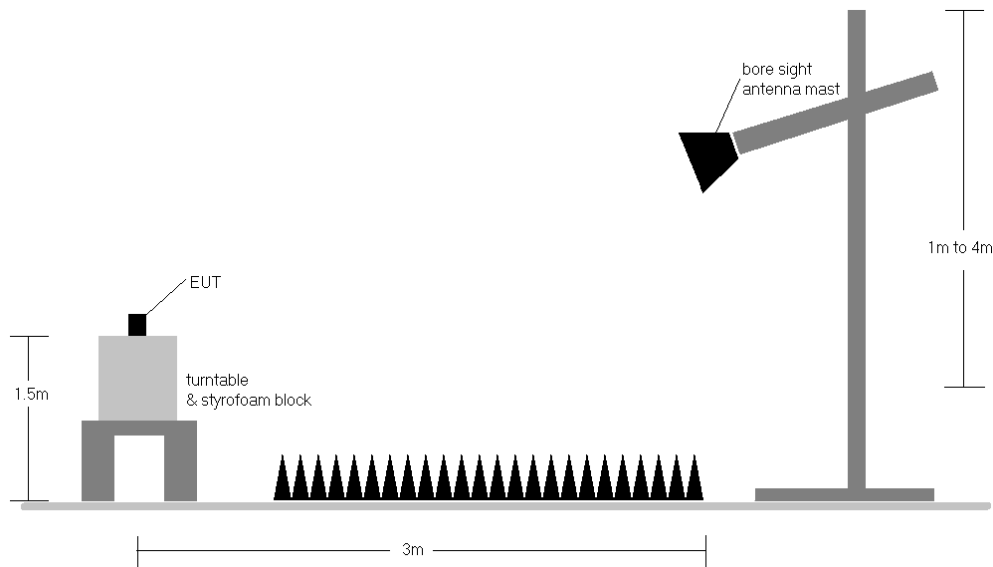


Figure 8-9. Test Instrument & Measurement Setup > 1GHz

FCC: 2AXTR-ECL4248-2401	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	EUCAST	Approved by: Technical Manager
Test Report S/N: 8K21102701-R3.2AXTR	Test Dates: 11/01/2021 – 11/15/2021	EUT Type: LTE Pico cell base station for CBRS		Page 44 of 60

Test Notes

- The average EIRP reported below is calculated per 5.2.7 of ANSI C63.26-2015 which states:

The measured e.i.r.p is converted to E-field in V/m. Then the distance correction is applied before converted back to calculated e.i.r.p.as explained in KDB 971168 D01 D01 v03r01.

Effective Isotropic Radiated Power Sample Calculation

Field Strength [dBμV/m] = Measured Value [dBm] + AFCL [dB/m] + 107

$$= -77.01 \text{ dBm} + (22.63 \text{ dBm}) + 107 = 52.62 \text{ dBμV/m}$$

e.i.r.p. [dBm] = E[dB μV/m] + 20 log₁₀(d[m]) - 104.8

$$= 52.62 + (20 \cdot \log(3)) - 104.8$$

$$= -42.64 \text{ dBm e.i.r.p.}$$

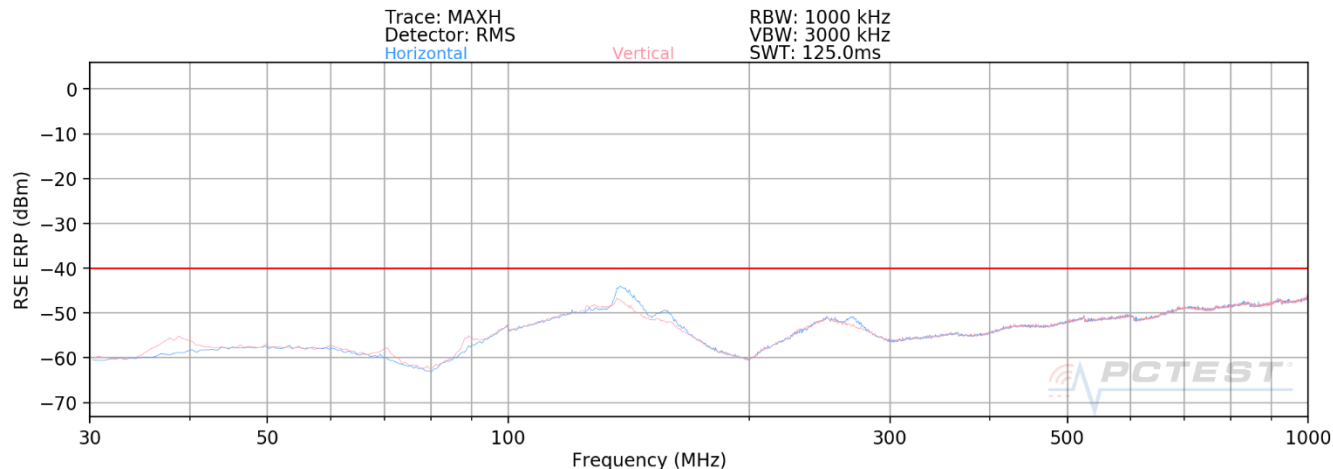
*AFCL (dB/m) contains measurement antenna factor(dB/m) and cable loss(dB) as below:

Frequency [MHz]	Antenna Factor (dB/m)	Cable loss + PAM [dB]	AFCL (dB/m)
137.66	21.67	0.95	22.63
7250.02	36.80	-28.20	8.60

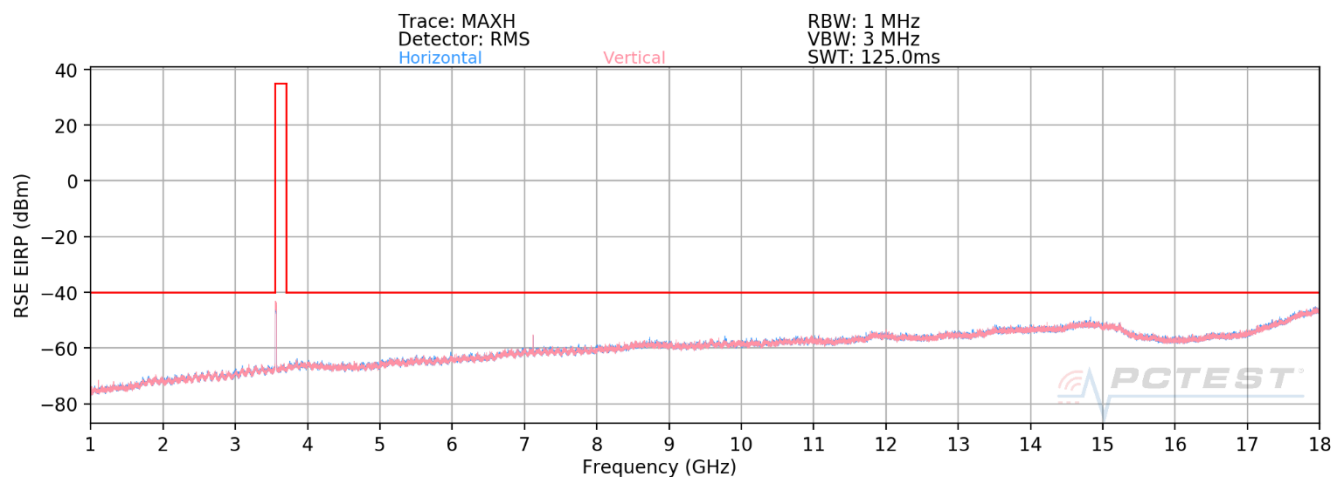
Table 8-14. Adopted AFCL value in the calculation

- The EUT was tested in both horizontal and vertical antenna polarizations and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, channel bandwidth configurations shown in the tables below.
- The spectrum is measured from 30 MHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.
- All emissions were measured at a 3 meter test distance.
- Spurious emissions were measured with all EUT antennas transmitting simultaneously and all antenna ports terminated
- The "-" shown in the following RSE tables are used to denote a noise floor measurement.

FCC: 2AXTR-ECL4248-2401		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 8K21102701-R3.2AXTR	Test Dates: 11/01/2021 – 11/15/2021	EUT Type: LTE Pico cell base station for CBRS		Page 45 of 60

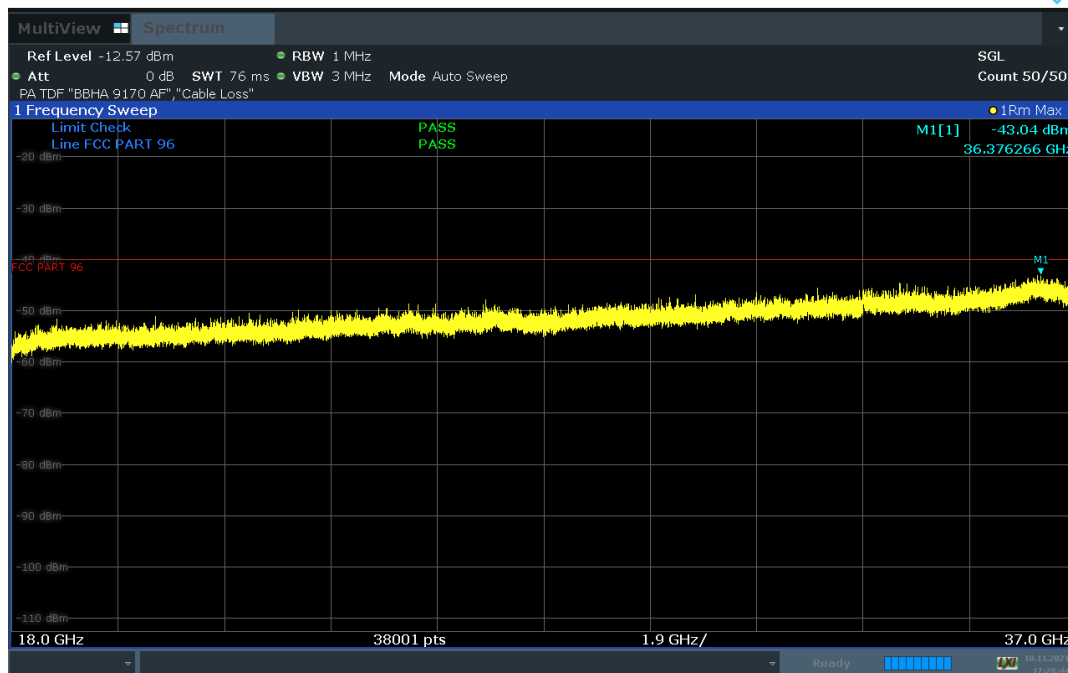


**Plot 8-52. Radiated spurious emission Plot_30 MHz to 1000 MHz
(LTE_B48_20M_QPSK - Low Channel)**

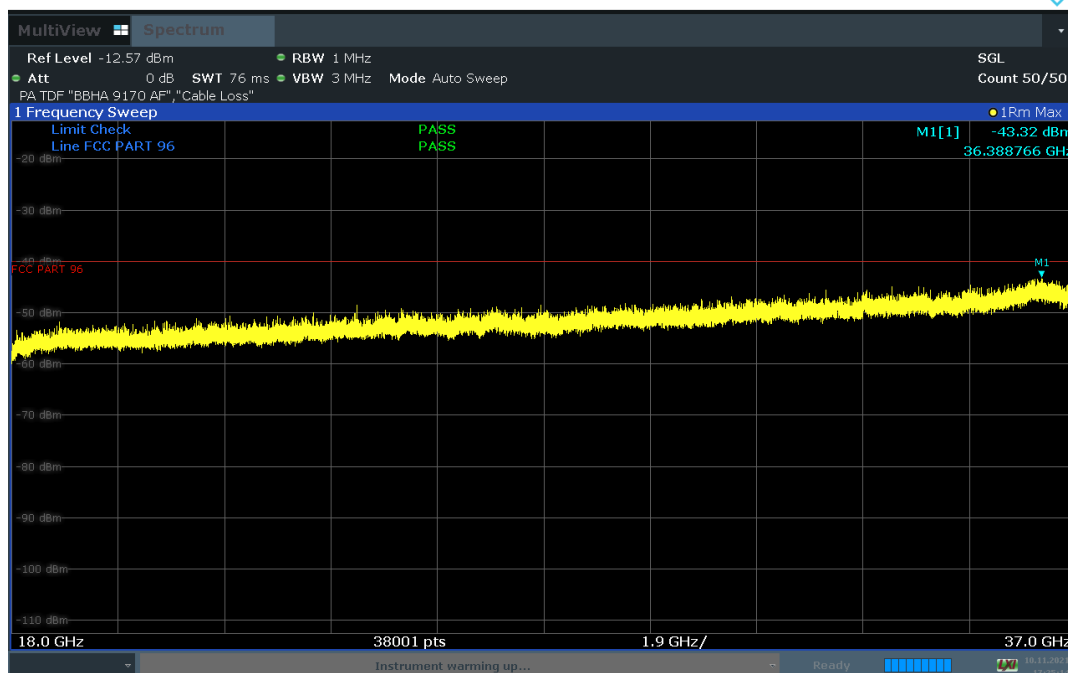


**Plot 8-53. Radiated spurious emission Plot_1 GHz to 18 GHz
(LTE_B48_20M_QPSK - Low Channel)**

FCC: 2AXTR-ECL4248-2401	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	EUCAST	Approved by: Technical Manager
Test Report S/N: 8K21102701-R3.2AXTR	Test Dates: 11/01/2021 – 11/15/2021	EUT Type: LTE Pico cell base station for CBRS		Page 46 of 60

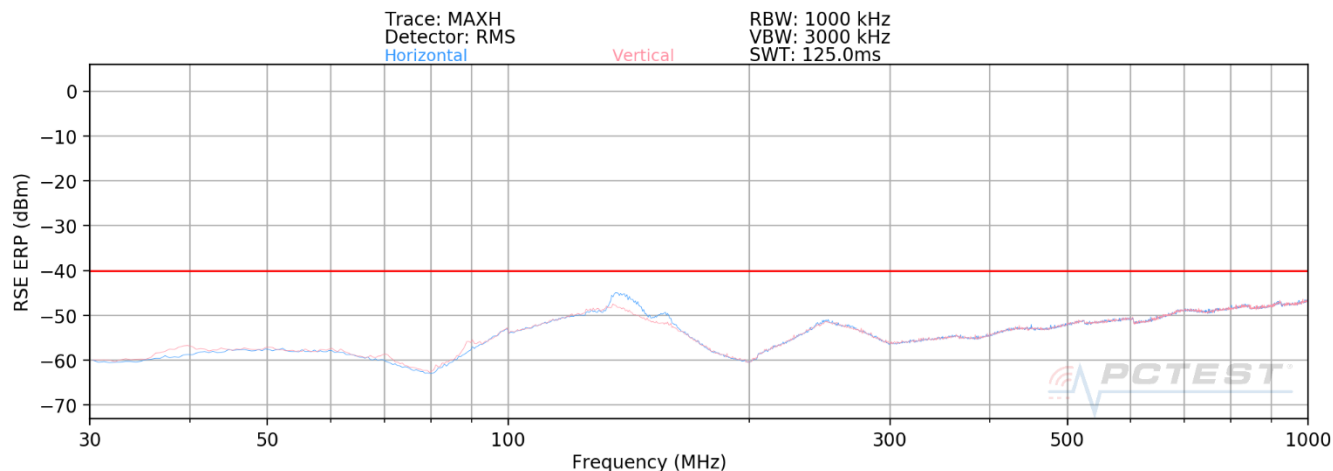


Plot 8-54. Radiated spurious emission Plot_horizontal 18 GHz to 37 GHz
(LTE_B48_20M_QPSK - Low Channel)

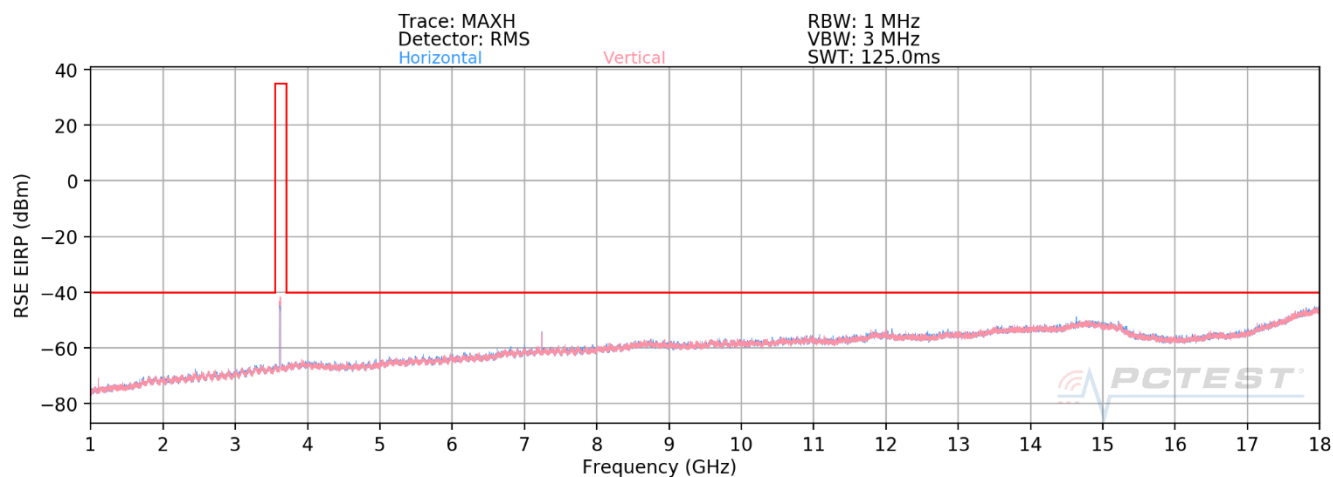


Plot 8-55. Radiated spurious emission Plot_vertical 18 GHz to 37 GHz
(LTE_B48_20M_QPSK - Low Channel)

FCC: 2AXTR-ECL4248-2401	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	EUCAST	Approved by: Technical Manager
Test Report S/N: 8K21102701-R3.2AXTR	Test Dates: 11/01/2021 – 11/15/2021	EUT Type: LTE Pico cell base station for CBRS		Page 47 of 60

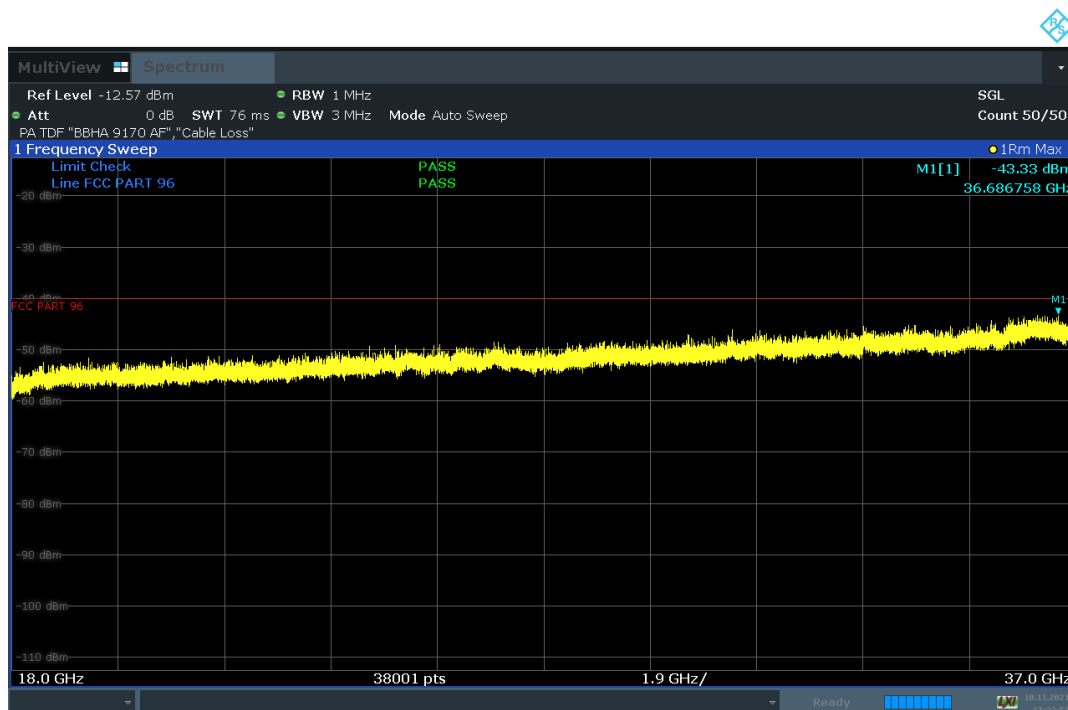


**Plot 8-56. Radiated spurious emission Plot_30 MHz to 1000 MHz
(LTE_B48_20M_QPSK - Mid Channel)**

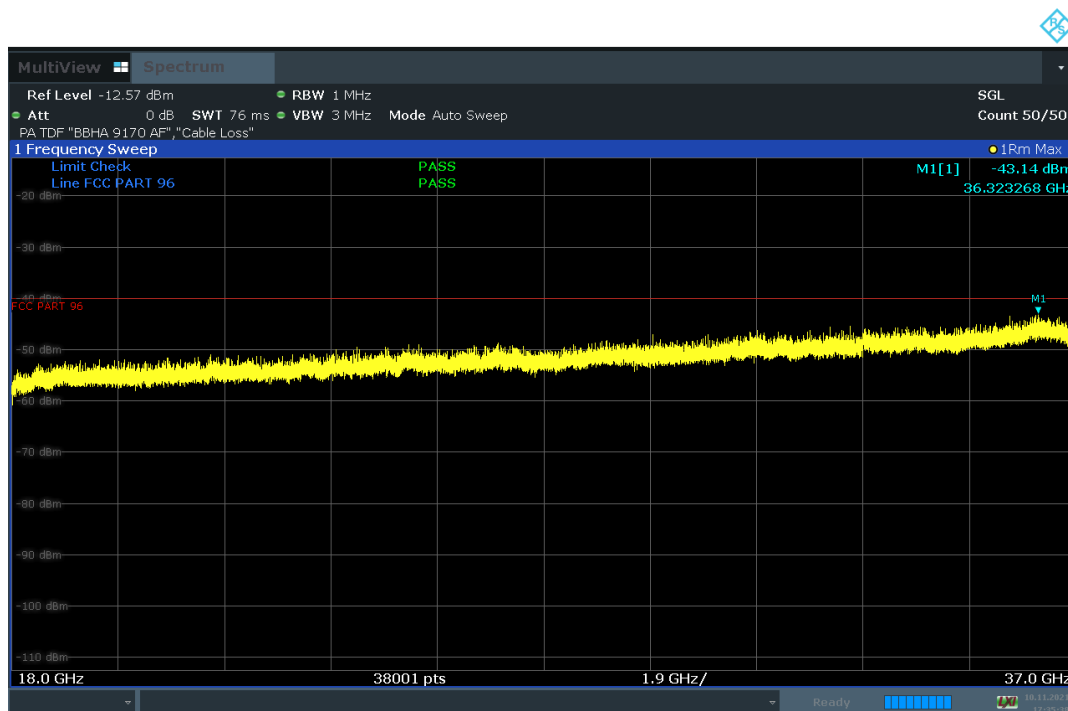


**Plot 8-57. Radiated spurious emission Plot_1 GHz to 18 GHz
(LTE_B48_20M_QPSK - Mid Channel)**

FCC: 2AXTR-ECL4248-2401	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	EUCAST	Approved by: Technical Manager
Test Report S/N: 8K21102701-R3.2AXTR	Test Dates: 11/01/2021 – 11/15/2021	EUT Type: LTE Pico cell base station for CBRS		Page 48 of 60

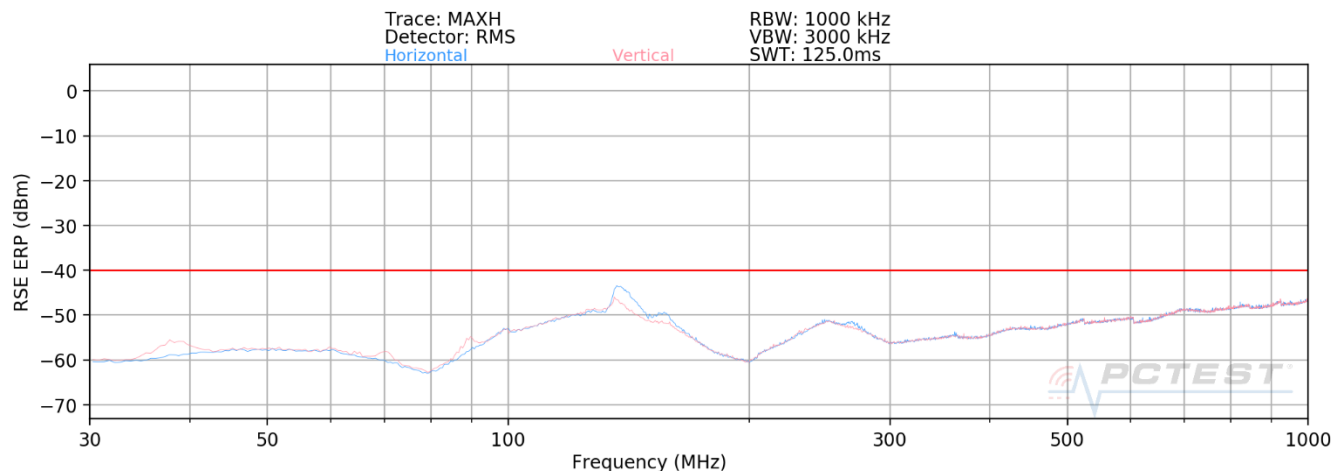


Plot 8-58. Radiated spurious emission Plot_horizontal 18 GHz to 37 GHz
(LTE_B48_20M_QPSK - Mid Channel)

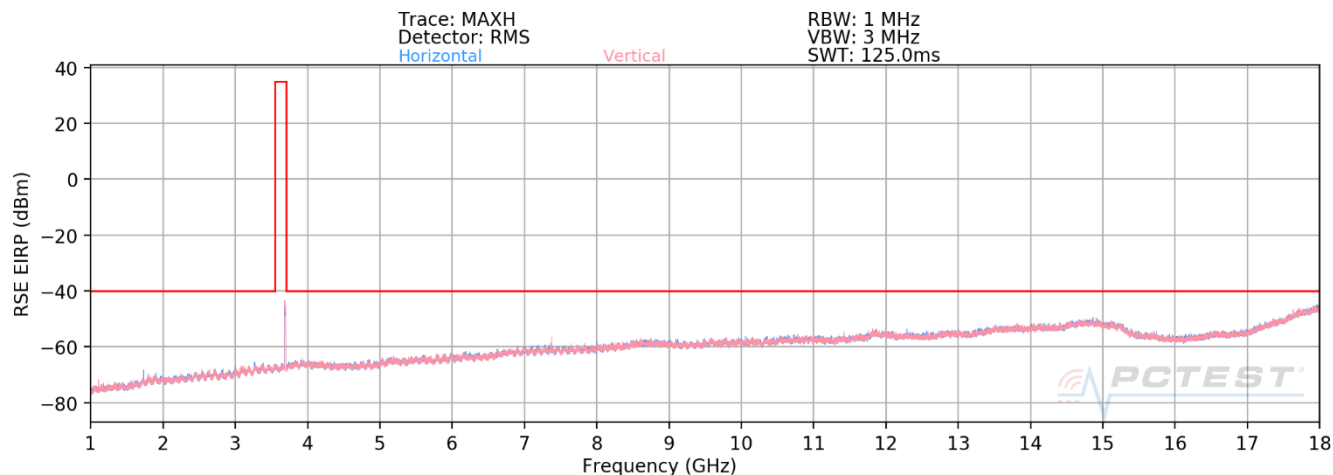


Plot 8-59. Radiated spurious emission Plot_vertical 18 GHz to 37 GHz
(LTE_B48_20M_QPSK - Mid Channel)

FCC: 2AXTR-ECL4248-2401	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	EUCAST	Approved by: Technical Manager
Test Report S/N: 8K21102701-R3.2AXTR	Test Dates: 11/01/2021 – 11/15/2021	EUT Type: LTE Pico cell base station for CBRS		Page 49 of 60

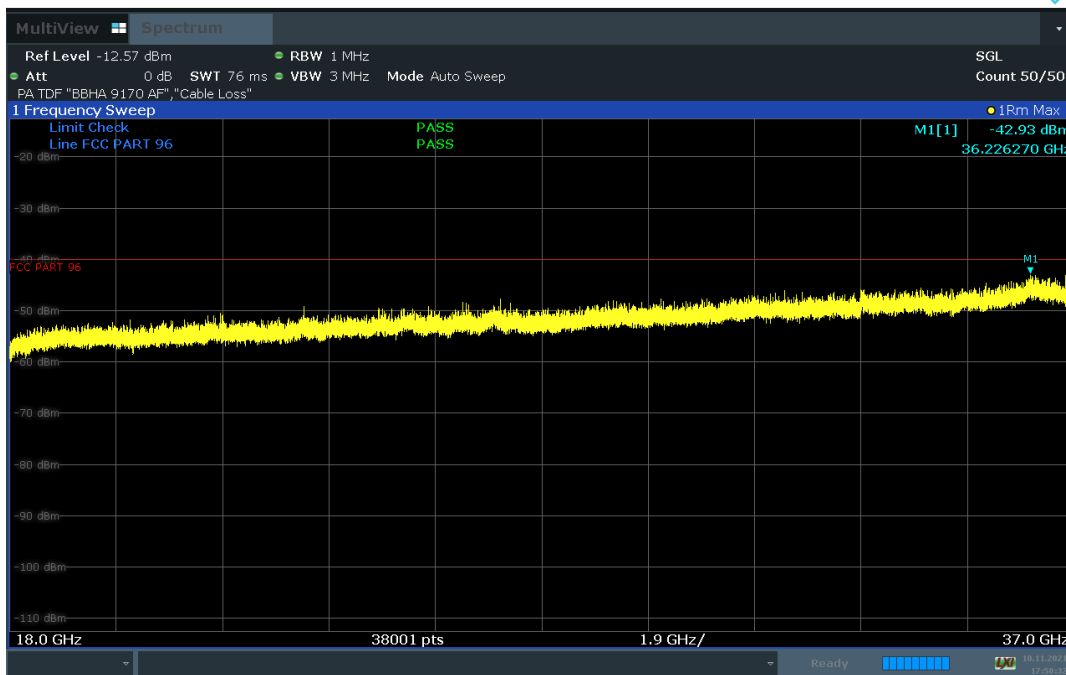


**Plot 8-60. Radiated spurious emission Plot_30 MHz to 1000 MHz
(LTE_B48_20M_QPSK - High Channel)**

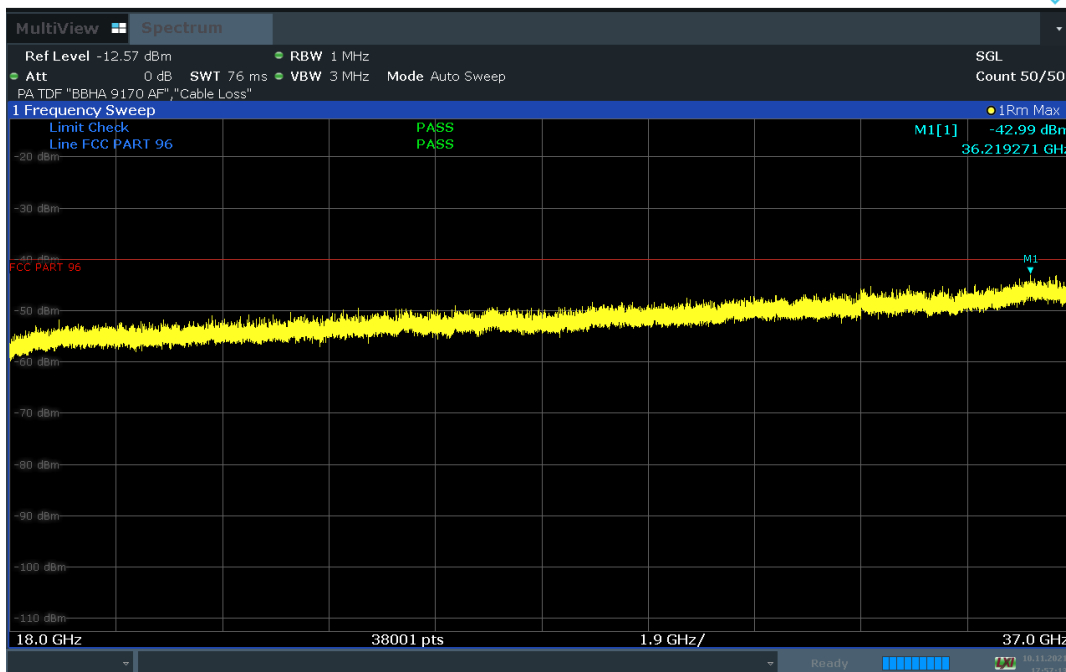


**Plot 8-61. Radiated spurious emission Plot_1 GHz to 18 GHz
(LTE_B48_20M_QPSK - High Channel)**

FCC: 2AXTR-ECL4248-2401	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	EUCAST	Approved by: Technical Manager
Test Report S/N: 8K21102701-R3.2AXTR	Test Dates: 11/01/2021 – 11/15/2021	EUT Type: LTE Pico cell base station for CBRS		Page 50 of 60

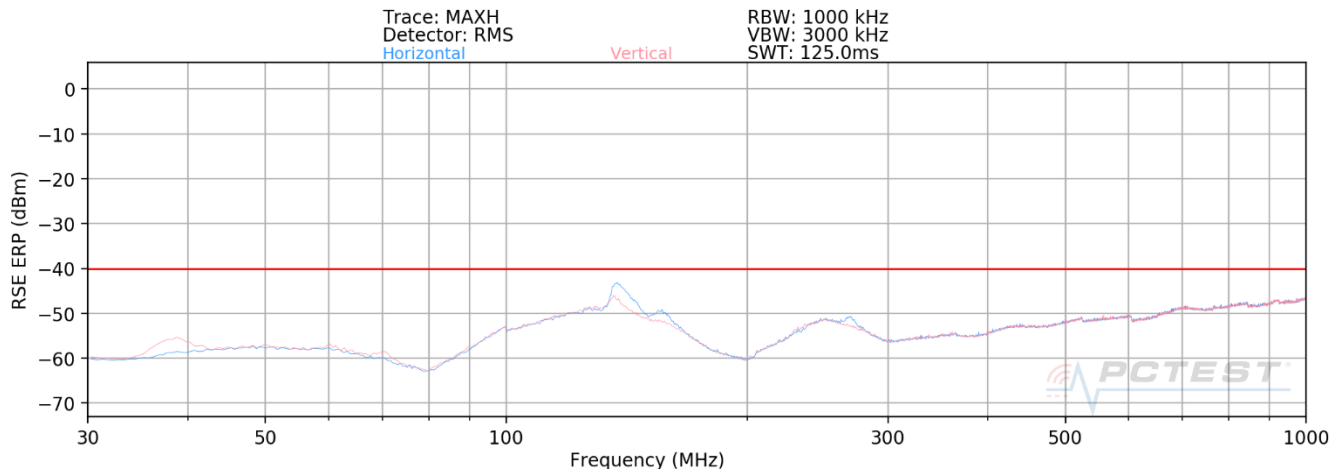


Plot 8-62. Radiated spurious emission Plot_horizontal 18 GHz to 37 GHz
(LTE_B48_20M_QPSK - High Channel)

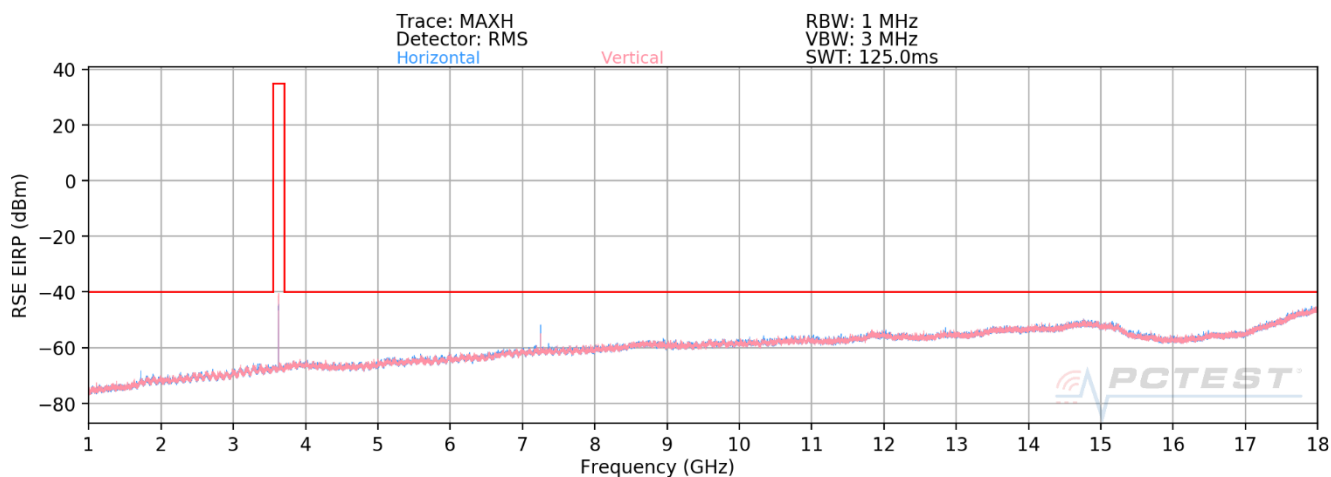


Plot 8-63. Radiated spurious emission Plot_vertical 18 GHz to 37 GHz
(LTE_B48_20M_QPSK - High Channel)

FCC: 2AXTR-ECL4248-2401	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	EUCAST	Approved by: Technical Manager
Test Report S/N: 8K21102701-R3.2AXTR	Test Dates: 11/01/2021 – 11/15/2021	EUT Type: LTE Pico cell base station for CBRS		Page 51 of 60

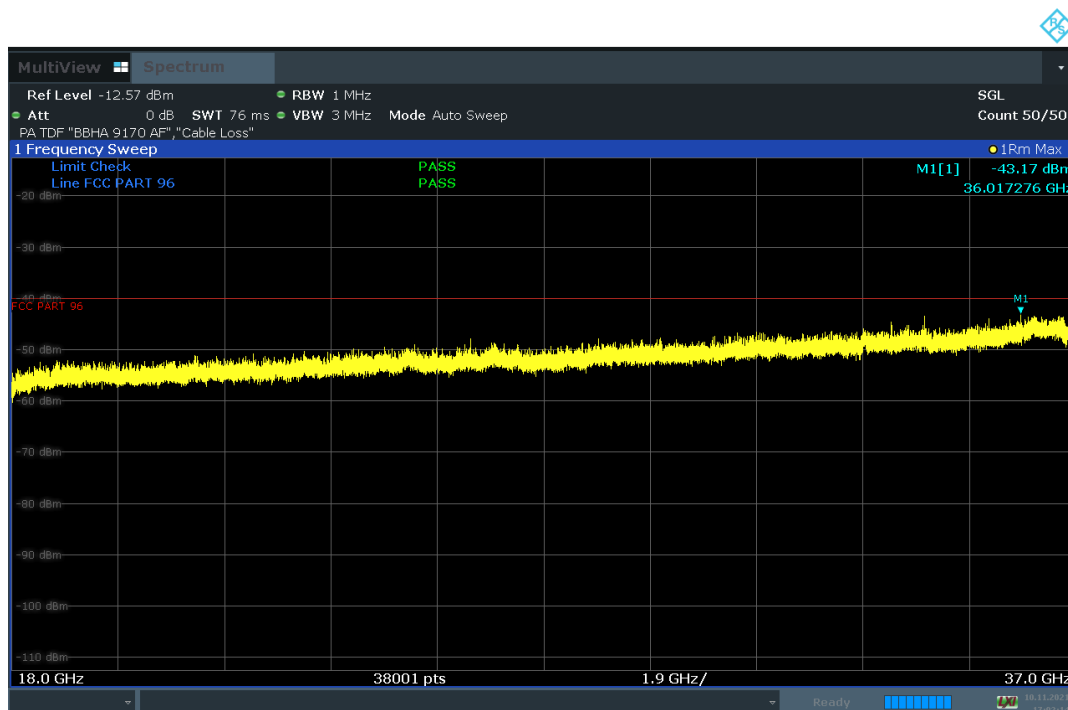


**Plot 8-64. Radiated spurious emission Plot_30 MHz to 1000 MHz
(LTE_B48_10M_QPSK - Mid Channel)**

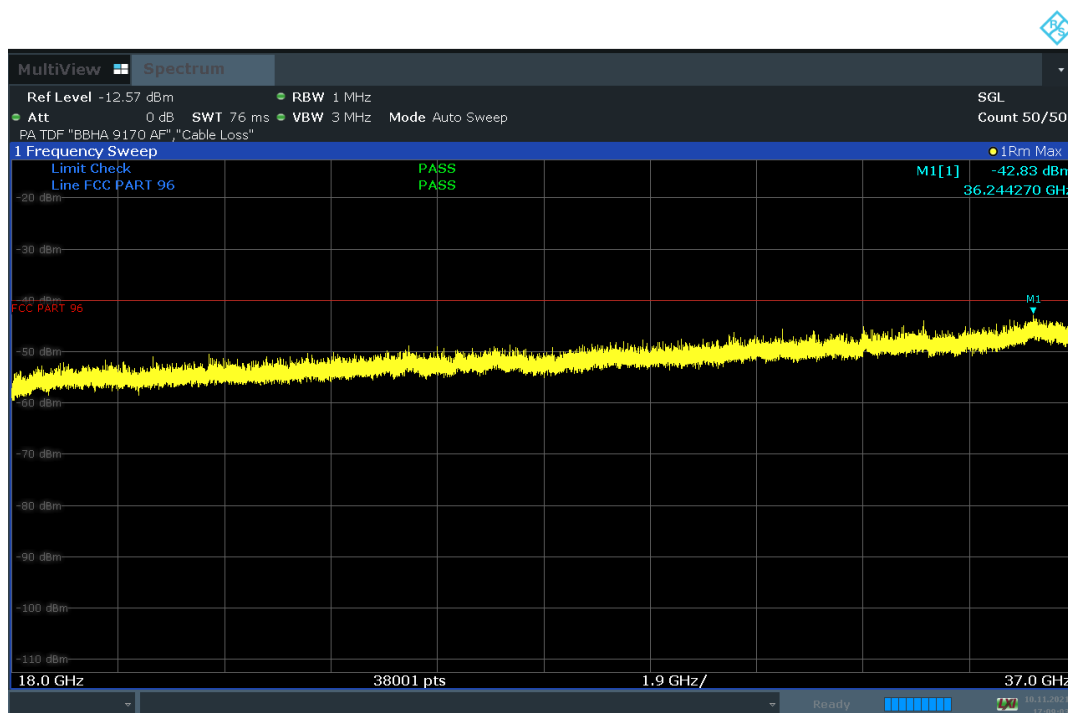


**Plot 8-65. Radiated spurious emission Plot_1 GHz to 18 GHz
(LTE_B48_10M_QPSK - Mid Channel)**

FCC: 2AXTR-ECL4248-2401	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	EUCAST	Approved by: Technical Manager
Test Report S/N: 8K21102701-R3.2AXTR	Test Dates: 11/01/2021 – 11/15/2021	EUT Type: LTE Pico cell base station for CBRS		Page 52 of 60



Plot 8-66. Radiated spurious emission Plot_horizontal 18 GHz to 37 GHz
(LTE_B48_10M_QPSK – Mid Channel)



Plot 8-67. Radiated spurious emission Plot_vertical 18 GHz to 37 GHz
(LTE_B48_10M_QPSK - Mid Channel)

FCC: 2AXTR-ECL4248-2401	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	EUCAST	Approved by: Technical Manager
Test Report S/N: 8K21102701-R3.2AXTR	Test Dates: 11/01/2021 – 11/15/2021	EUT Type: LTE Pico cell base station for CBRS		Page 53 of 60

Bandwidth (MHz):	LTE_B48_20M_QPSK - Mid Channel
Frequency (MHz):	3620
Modulation Signal:	QPSK

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable azimuth [degree]	Analyzer Level [dBm/MHz]	AFCL [dBm]	Field Strength [dBμV/m]	RSE EIRP [dBm/MHz]	Limit [dBm/MHz]	Margin [dB]
137.66	V	84	150	-77.01	22.63	52.62	-42.64	-40.00	-2.64
136.37	H	94	100	-79.92	22.64	49.72	-45.54	-40.00	-5.54
7250.02	V	210	250	-70.17	8.60	45.43	-49.82	-40.00	-9.82
7251.94	H	231	250	-75.06	8.62	40.56	-54.70	-40.00	-14.7

**Table 8-15. Radiated spurious emission Worst case Data
(LTE_B48_20M_QPSK - Mid Channel)**

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8.10 Frequency Stability

§ 2.1055

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of KDB 971168 D01 v03r01. The frequency stability of the transmitter is measured by:

- a.) **Temperature:** The temperature is varied from -30°C, +20°C and +50°C using an environmental chamber.
- b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for DC powered equipment.

Test Description

1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
2. The equipment is turned on in a “standby” condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made -30°C, +20°C and +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

Limit

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Setup

The EUT was connected via an RF cable to a spectrum analyzer with the EUT placed inside an environmental chamber.

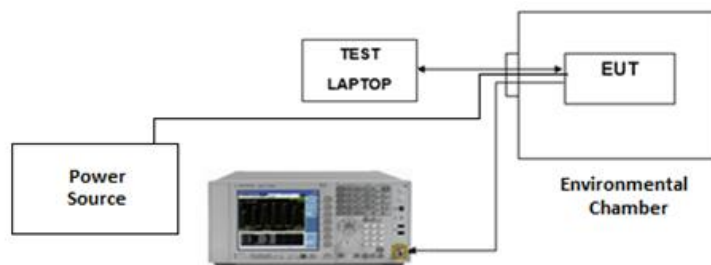


Figure 8-10. Test Instrument & Measurement Setup

Test Notes

None.

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OPERATING FREQUENCY: 3,625,000,000 Hz

REFERENCE VOLTAGE: 48.00 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	48.00	+ 20(Ref)	3,619,999,998.84	0.00	0.0000000
100 %		- 30	3,619,999,999.06	0.22	0.0000000
100 %		- 20	3,620,000,000.14	1.30	0.0000000
100 %		- 10	3,619,999,999.15	0.31	0.0000000
100 %		0	3,620,000,001.43	2.59	0.0000001
100 %		+ 10	3,619,999,998.13	-0.71	0.0000000
100 %		+ 20	3,619,999,998.84	0.00	0.0000000
100 %		+ 30	3,619,999,999.73	0.89	0.0000000
100 %		+ 40	3,619,999,999.43	0.59	0.0000000
100 %		+ 50	3,620,000,000.58	1.74	0.0000000
85 %	40.80	+ 20	3,619,999,998.50	-0.34	0.0000000
115 %	55.20	+ 20	3,619,999,997.59	-1.25	0.0000000

Table 8-16. Frequency Stability Summary Data (LTE_B48_10M)

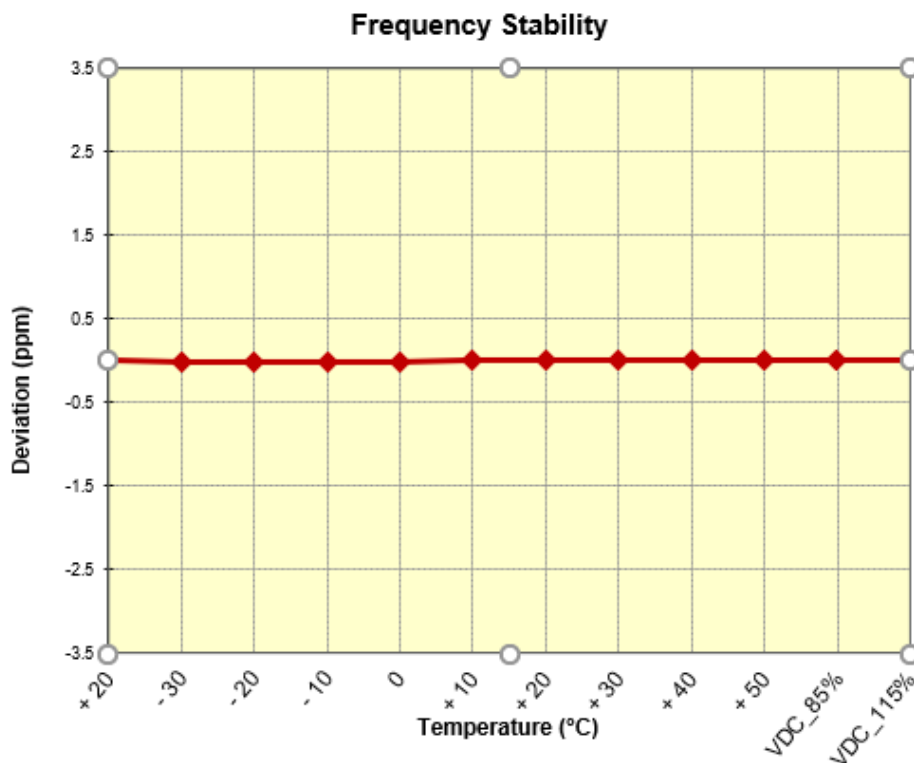


Figure 8-11. Frequency Stability Graph (LTE_B48_10M)

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9.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **EUCAST Co., Ltd. CBSD FCC ID: 2AXTR-ECL4248-2401** complies with all of the requirements of Part 96 of the FCC Rules.

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10.0 APPENDIX. A

10.1 Conducted Average Output Power (EIRP)

Test Overview

A transmitter port of EUT is connected to the input of a signal analyzer. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

Test Description

KDB 971168 D01 v03r01 – Section 5.4

KDB 662911 D01 v02r01 – Section E)1) In-Band Power Measurements

ANSI C63.26-2015 – Section 5.2.4

ANSI C63.26 - Section 5.2.5

The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The spectrum analyzer settings were as follows:

1. Conducted power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
2. RBW = 1 ~ 5% of the expected OBW
3. VBW $\geq 3 \times$ RBW
4. Span = 2 ~ 3 $\times$ OBW
5. No. of sweep points $\geq 2 \times$ span / RBW
6. Detector = RMS
7. Trigger Settings is set to "RF Power" for signals with non-continuous operation with the sweep times set to "auto". Refer test note 3 for details.
8. Trace mode = Trace-Averaging (RMS) set to average over 100 sweeps
9. The trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

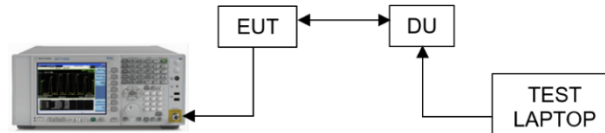


Figure 10-1. Test Instrument & Measurement Setup

Limit

N/A

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Note

1. Conducted Average Output Power test result used to Grant of Authorization power and MPE.
2. Periodic trigger was used with gating ON. Gate sweep time, Gate delay and gate length were set accordingly to capture ON time of the transmission.
3. MIMO Calculations are done considering output channel power for all ports and respective margins are calculated according to procedures in section 6.4 of ANSI C63.26 and section D of KDB 971168 D01 v03r01.
4. Consider the following factors for MIMO Power:
 - g) Conducted power for each port is measured in dBm.
 - h) Powers are summed up in linear using the measure-and-sum technique defined in KDB 971168 D01 v03r01-Section D.
 - i) Conducted power per port (dBm) is converted to a linear value (mW). A summation of linear powers for all ports gives us the total MIMO conducted power in milliWatts (mW).
5. All transmit signals from different antennas are completely uncorrelated with each other. So the e.i.r.p. shall be calculated based on the aggregate power conducted across all antennas and maximum antenna gain G_{max} .
6. Sample Calculation:
 Let us assume the following numbers:
 - e) Total MIMO Conducted Power as 1488.18 mW
 - f) Antenna Gain = 14.0 dBi

Factors		Value	Unit
Summed MIMO Conducted Power (linear sum)		1488.18	mW
Summed MIMO Conducted Power (dBm)	$= 10 * \log (1488.18) =$	31.73	dBm/10MHz
Antenna Gain		14.00	dBi
Total MIMO EIRP		45.73	dBm/10MHz

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Channel	Port	QPSK	16QAM	64QAM
Low	0	28.61	28.90	28.31
	1	28.82	28.89	28.56
	Total Conducted Power (mW)	1488.18	1550.71	1395.44
	Total Conducted Power(dBm)	31.73	31.91	31.45
	Ant. Gain (dBi)	14.00	14.00	14.00
	e.i.r.p(dBm/MHz)	45.73	45.91	45.45
Mid	0	28.85	29.16	28.53
	1	28.39	28.65	28.04
	Total Conducted Power (mW)	1457.60	1556.96	1349.65
	Total Conducted Power(dBm)	31.64	31.92	31.30
	Ant. Gain (dBi)	14.00	14.00	14.00
	e.i.r.p(dBm/MHz)	45.64	45.92	45.30
High	0	28.78	29.14	28.33
	1	28.56	28.84	28.03
	Total Conducted Power (mW)	1472.89	1585.95	1316.10
	Total Conducted Power(dBm)	31.68	32.00	31.19
	Ant. Gain (dBi)	14.00	14.00	14.00
	e.i.r.p(dBm/MHz)	45.68	46.00	45.19

Table 10-1. Conducted Average Output Power Table (LTE_B48_10M)

Channel	Port	QPSK	16QAM	64QAM
Low	0	31.61	31.35	30.84
	1	31.69	31.40	30.95
	Total Conducted Power (mW)	2924.48	2744.97	2457.90
	Total Conducted Power(dBm)	34.66	34.39	33.91
	Ant. Gain (dBi)	14.00	14.00	14.00
	e.i.r.p(dBm/MHz)	48.66	48.39	47.91
Mid	0	31.02	31.05	31.02
	1	30.84	30.79	30.76
	Total Conducted Power (mW)	2478.13	2473.00	2455.98
	Total Conducted Power(dBm)	33.94	33.93	33.90
	Ant. Gain (dBi)	14.00	14.00	14.00
	e.i.r.p(dBm/MHz)	47.94	47.93	47.90
High	0	31.61	31.44	30.83
	1	31.35	31.32	30.77
	Total Conducted Power (mW)	2813.35	2748.35	2404.59
	Total Conducted Power(dBm)	34.49	34.39	33.81
	Ant. Gain (dBi)	14.00	14.00	14.00
	e.i.r.p(dBm/MHz)	48.49	48.39	47.81

Table 10-2. Conducted Average Output Power Table (LTE_B48_20M)

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