



MEASUREMENT REPORT FCC Part 90 / RSS-140 MEASUREMENT REPORT

Applicant Name:
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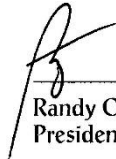
Date of Testing:
5/12 - 6/1/2021
Test Site/Location:
PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
1M2106040065-10.RI7

FCC ID:	RI7LE910CXWWX
IC:	5131A-LE910CXWWX
APPLICANT:	Telit Communications S.p.A

Application Type: Certification
Model/HVIN: LE910C4-WWX
Additional Model/HVIN (s): LE910C1-WWX
EUT Type: Data Terminal Module
FCC Classification: PCS Licensed Transmitter (PCB)
FCC Rule Part: §2.1049, §90(R)
ISED Specification: RSS-140 Issue 1
Test Procedure(s): ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB 971168 D01 v03r01

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.


Randy Ortanez
President





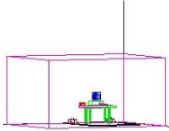
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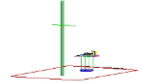
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Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	ERP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	
LTE Band 14	10 MHz	QPSK	793.0	0.174	22.40	9M01G7D
		16QAM	793.0	0.142	21.52	9M03W7D
	5 MHz	QPSK	790.5 - 795.5	0.174	22.40	4M58G7D
		16QAM	790.5 - 795.5	0.132	21.19	4M54W7D

EUT Overview

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1.0 INTRODUCTION

1.1 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.


1.2 PCTEST Test Location

These measurement tests were conducted at the PCTEST facility located at 7185 Oakland Mills Road, Columbia, MD 21046. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014.

1.3 Test Facility / Accreditations

Measurements were performed at PCTEST Engineering Lab located in Columbia, MD 21046, U.S.A.

- PCTEST is an ISO 17025-2017 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC 17065-2012 by A2LA (Certificate number 2041.03) in all scopes of FCC Rules and ISED Standards (RSS).
- PCTEST facility is a registered (2451B) test laboratory with the site description on file with ISED.

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Telit Communications S.p.A Data Terminal Module FCC ID: R17LE910CXWWX / IC:5131A-LE910CXWWX**. The test data contained in this report pertains only to the emissions due to the EUT's licensed transmitters that operate under the provisions of Part 90 and RSS-140.

This FCC and IC ID covers operations for two different versions of this module. The LE910C4-WWX is the Cat. 4 LTE version module and the LE910C1-WWX is the Cat. 1 LTE version of this module. Cat. 1 and Cat. 4 LTE only differ in the speed/throughput and have not been noted to have any impact on the RF itself. Both modules were investigated and the LE910C4-WWX was tested fully to represent both versions of the module.

Test Device Serial No.: 96014, 95001

2.2 Device Capabilities

This device contains the following capabilities:

GSM/GPRS/EDGE, WCDMA/HSPA, LTE

2.3 Test Configuration


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 radiated and antenna port conducted emissions tests.

2.4 Software and Firmware

The test was conducted with firmware version M0F.503003 for LE910C4-WWX and M0F.103003 for LE910C1-WWX installed on the EUT.

2.5 EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and no modifications were made during testing.

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3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

The measurement procedures described in the document titled “Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards” (ANSI/TIA-603-E-2016) and “Procedures for Compliance Measurement of the Fundamental Emission Power of Licensed Wideband (> 1 MHz) Digital Transmission Systems” (KDB 971168 D01 v03r01) were used in the measurement of the EUT.

3.2 Radiated Power and Radiated Spurious Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. The test site inside the chamber is a 6m x 5.2m elliptical, obstruction-free area in accordance with Figure 5.7 of Clause 5 in ANSI C63.4-2014. Absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections for measurements above 1GHz. For measurements below 1GHz, the absorbers are removed. A raised turntable is used for radiated measurement. The turn table is a continuously rotatable, remote-controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm tall test table made of Styrodur is placed on top of the turn table. A Styrodur pedestal is placed on top of the test table to bring the total table height to 1.5m.

The equipment under test was transmitting while connected to its integral antenna and is placed on a wooden turntable 80cm above the ground plane and 3 meters from the receive antenna. The receive antenna height is adjusted between 1 and 4 meter height, the turntable is rotated through 360 degrees, and the EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on the receive spectrum analyzer. Radiated power levels are also investigated with the receive antenna horizontally and vertically polarized. The maximized power level is recorded using the spectrum analyzer “Channel Power” function with the integration band set to the emissions’ occupied bandwidth, a RMS detector, RBW = 100kHz, VBW = 300kHz, and a 1 second sweep time over a minimum of 10 sweeps, per the guidelines of KDB 971168 D01 v03r01.


Per the guidance of ANSI/TIA-603-E-2016, a half-wave dipole is then substituted in place of the EUT. For emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer level previously recorded from the spurious emission from the EUT. The power of the emission is calculated using the following formula:

$$P_d \text{ [dBm]} = P_g \text{ [dBm]} - \text{cable loss [dB]} + \text{antenna gain [dBd/dBi]}$$

Where, P_d is the dipole equivalent power, P_g is the generator output into the substitution antenna, and the antenna gain is the gain of the substitute antenna used relative to either a half-wave dipole (dBd) or an isotropic source (dBi). The substitute level is equal to $P_g \text{ [dBm]} - \text{cable loss [dB]}$.

All radiated measurements are performed in a chamber that meets the site requirements per ANSI C63.4-2014. Additionally, radiated emissions below 30MHz are also validated on an Open Area Test Site to assert correlation with the chamber measurements per the requirements of KDB 414788 D01.


Radiated power and radiated spurious emission levels are investigated with the receive antenna horizontally and vertically polarized per ANSI/TIA-603-E-2016.

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4.0 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	1.13
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

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5.0 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.

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	AP1	EMC Cable and Switch System	3/9/2021	Annual	3/9/2022	AP1
-	ETS	EMC Cable and Switch System	3/4/2021	Annual	3/4/2022	ETS
-	LTx4	Licensed Transmitter Cable Set	3/12/2021	Annual	3/12/2022	LTx4
-	LTx5	Licensed Transmitter Cable Set	3/3/2021	Annual	3/3/2022	LTx5
Agilent	E5515C	Wireless Communications Test Set	N/A			GB45360985
Anritsu	MT8820C	Radio Communication Analyzer	N/A			6201300731
Anritsu	MT8821C	Radio Communication Analyzer	N/A			6201381794
Emco	3115	Horn Antenna (1-18GHz)	6/18/2020	Biennial	6/18/2022	9704-5182
Emco	3116	Horn Antenna (18 - 40GHz)	8/7/2018	Triennial	8/7/2021	9203-2178
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	3/12/2020	Biennial	3/12/2022	128337
Keysight Technologies	N9020A	MXA Signal Analyzer	9/22/2020	Annual	9/22/2021	MY54500644
Keysight Technologies	N9030A	PXA Signal Analyzer	10/16/2020	Annual	10/16/2021	MY54490576
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator	N/A			11403100002
Rohde & Schwarz	CMU200	Base Station Simulator	N/A			836536/0005
Rohde & Schwarz	CMW500	Radio Communication Tester	N/A			112347
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	7/15/2020	Annual	7/15/2021	100342
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	9/9/2020	Annual	9/9/2021	100348
Rohde & Schwarz	ESW44	EMI Test Receiver 2Hz to 44 GHz	1/21/2021	Annual	1/21/2022	101716
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	7/27/2020	Biennial	7/27/2022	A051107

Table 5-1. Summary of Test Results

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.

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6.0 SAMPLE CALCULATIONS

Emission Designator

QPSK Modulation

Emission Designator = 8M62G7D

LTE BW = 8.62 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

QAM Modulation

Emission Designator = 8M45W7D

LTE BW = 8.45 MHz

W = Amplitude/Angle Modulated


7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

Spurious Radiated Emission – LTE Band

Example: Middle Channel LTE Mode 2nd Harmonic (1564 MHz)

The average spectrum analyzer reading at 3 meters with the EUT on the turntable was -81.0 dBm. The gain of the substituted antenna is 8.1 dBi. The signal generator connected to the substituted antenna terminals is adjusted to produce a reading of -81.0 dBm on the spectrum analyzer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 2.0 dB at 1564 MHz. So 6.1 dB is added to the signal generator reading of -30.9 dBm yielding -24.80 dBm. The fundamental EIRP was 25.501 dBm so this harmonic was 25.501 dBm – (-24.80).

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7.0 TEST RESULTS

7.1 Summary


Company Name: Telit Communications S.p.A
 FCC ID: RI7LE910CXWWX
 IC: 5131A-LE910CXWWX
 FCC Classification: PCS Licensed Transmitter (PCB)
 Mode(s): LTE BAND 14

Test Condition	Test Description	FCC Part Section(s)	RSS Section(s)	Test Limit	Test Result	Reference
CONDUCTED	Transmitter Conducted Output Power/ Effective Radiated Power (LTE Band 14)	2.1046 90.542(a)(7)	RSS-140 (3.1, 4.3)	< 100 Watts (Conducted) < 3 Watts max. ERP	PASS	Section 7.2
	Occupied Bandwidth	2.1049	RSS-Gen (6.7)	N/A	PASS	Section 7.3
	Conducted Band Edge / Spurious Emissions (LTE Band 14)	2.1051, 90.543(e)	RSS-140 (4.4)	On all frequencies between 769-775 MHz and 799-805 MHz, attenuation by a factor not less than $65 + 10 \log(P)$ dB in a 6.25 kHz band segment, for mobile and portable stations. On any frequency between 775-788 MHz, above 805 MHz, and below 758 MHz, attenuation by at least $43 + 10 \log(P)$ dB	PASS	Sections 7.4, 7.5
	Peak-Average Ratio	N/A	RSS-140 (4.3)	< 13 dB	PASS	Section 7.6
	Frequency Stability	2.1055	RSS-140 (4.2)	< 2.5 ppm	PASS	Section 7.7
RADIATED	Radiated Spurious Emissions (LTE Band 14)	2.1053, 90.543e 90.543(f)	RSS-140 (3.2, 4.4)	> $43 + 10 \log_{10}(P[\text{Watts}])$ for all out-of-band emissions except emissions in the 1559 - 1610MHz band are subject to a limit of -40dBm/MHz for wideband signals	PASS	Section 7.6

Table 7-1. 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 shown in Section 7.0 were taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables, directional couplers, and attenuators used as part of the system to maintain a link between the call box and the EUT at all frequencies of interest.
- 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, attenuators, and couplers.
- 4) For conducted spurious emissions, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST EMC Software Tool V1.1.

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7.2 Transmitter Conducted Output Power/ Effective Radiated Power

Test Overview

The transmitter conducted output power is a measure of the total average power contained within an allocated channel bandwidth. All modes of operation were investigated and the worst case configuration results are reported in this section.

Test Procedure Used

ANSI C63.26-2015 – Section 5.2.4.2

Test Settings

All conducted powers were measured using the R&S CMW500's Channel Measurement function.

Test Setup

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



Figure 7-1. Test Instrument & Measurement Setup

Test Notes

The Maximum Effective Isotropic Radiated Power (EIRP) is calculated by adding the declared maximum antenna gain(dBi)

$$\text{EIRP} = \text{Conducted Power(dBm)} + \text{Antenna Gain(dBi)}$$


The Maximum Equivalent Radiated Power (ERP) is calculated from the Maximum Effective Isotropic Radiated Power (EIRP) by subtracting 2.15dB

$$\text{ERP} = \text{EIRP} - 2.15\text{dB}$$

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Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]	Ant Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
10 MHz	QPSK	23330	793.0	1 / 25	23.69	0.86	22.40	0.174	34.77	-12.37
	16-QAM	23330	793.0	1 / 25	22.80	0.86	21.52	0.142	34.77	-13.25
5 MHz	QPSK	23305	790.5	1 / 12	23.21	0.86	21.93	0.156	34.77	-12.85
		23330	793.0	1 / 12	23.69	0.86	22.40	0.174	34.77	-12.37
		23355	795.5	1 / 12	23.30	0.86	22.01	0.159	34.77	-12.76
	16-QAM	23305	790.5	1 / 12	22.29	0.86	21.00	0.126	34.77	-13.77
		23330	793.0	1 / 12	22.48	0.86	21.19	0.132	34.77	-13.58
		23355	795.5	1 / 12	22.20	0.86	20.92	0.123	34.77	-13.85

Table 7-2. ERP Data (LTE Band 14)

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7.3 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

KDB 971168 D01 v03r01 – Section 4.2

Test Settings

1. The signal analyzer’s automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB 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 x 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.

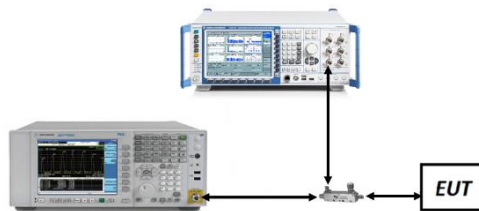



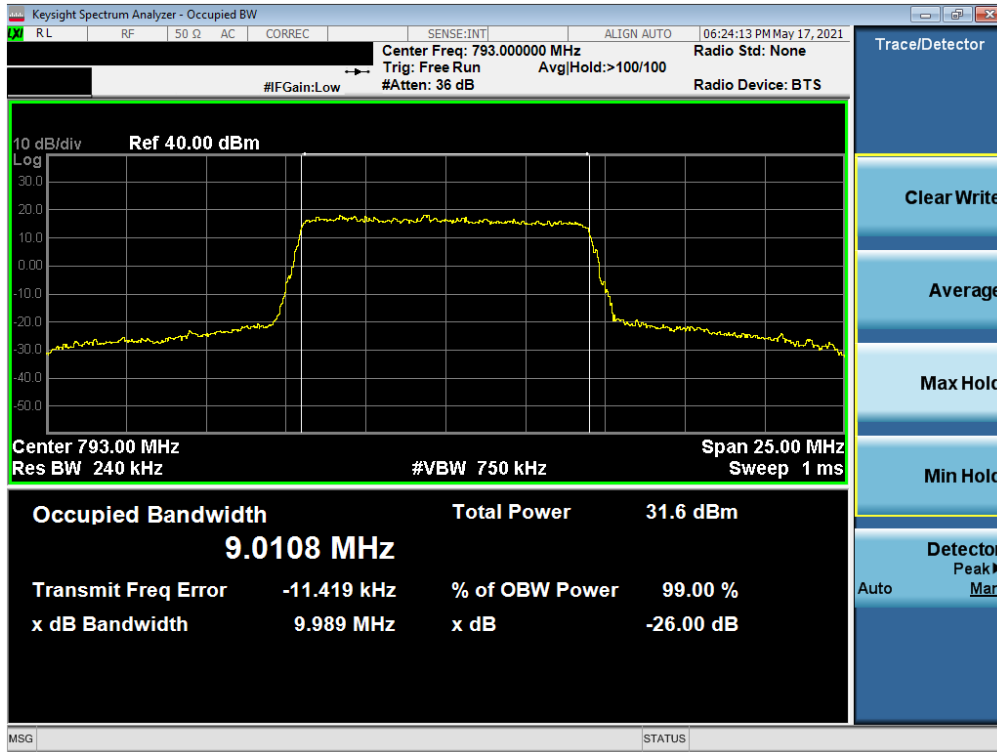
Figure 7-2. Test Instrument & Measurement Setup

Test Notes

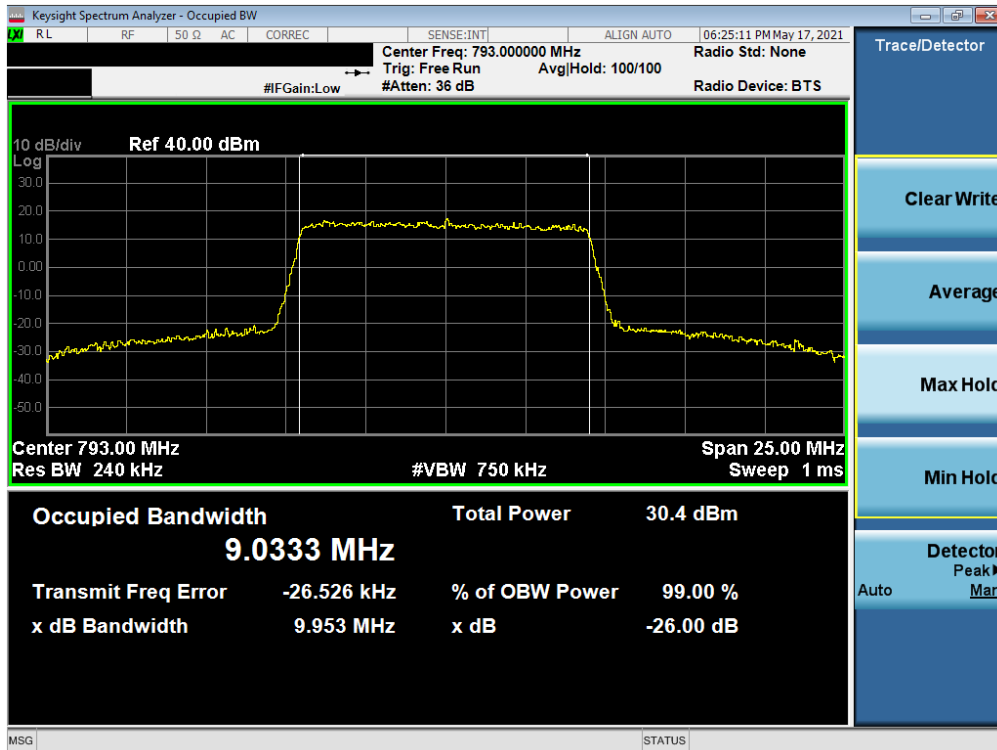
None.

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LTE Band 14

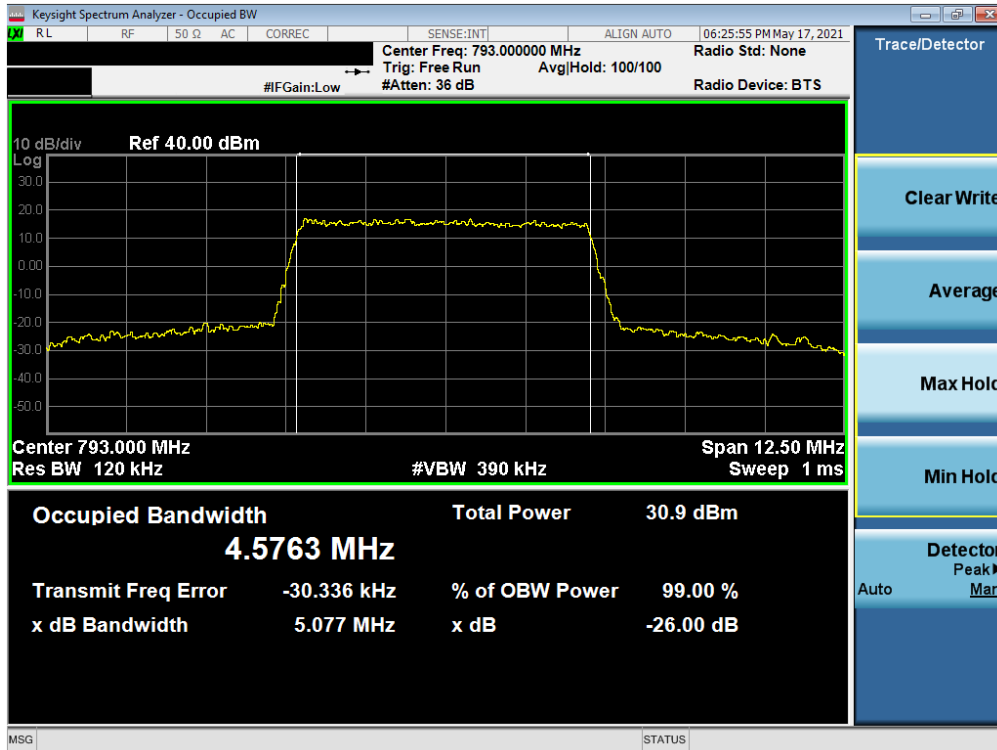


Plot 7-1. Occupied Bandwidth Plot (LTE Band 14 - 10MHz QPSK - Full RB)

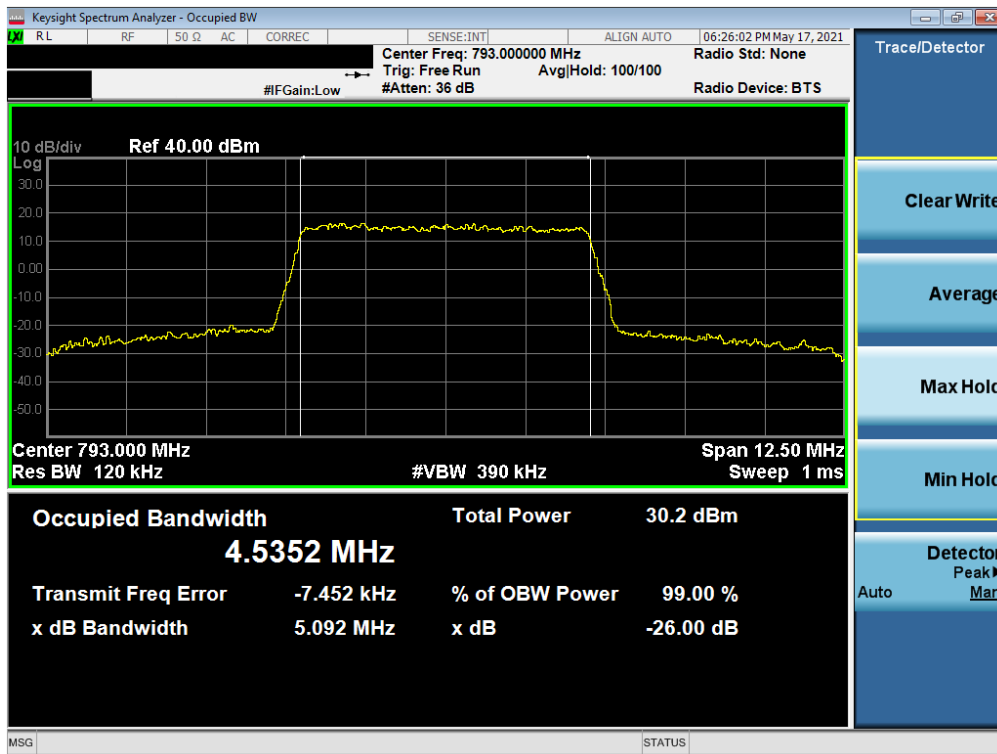


Plot 7-2. Occupied Bandwidth Plot (LTE Band 14 - 10MHz 16-QAM - Full RB)

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Plot 7-3. Occupied Bandwidth Plot (LTE Band 14 - 5MHz QPSK - Full RB)



Plot 7-4. Occupied Bandwidth Plot (LTE Band 14 - 5MHz 16-QAM - Full RB)

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7.4 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 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.

The minimum permissible attenuation level of any spurious emission is $43 + 10 \log_{10}(P_{[Watts]})$, where P is the transmitter power in Watts.

Test Procedure Used

KDB 971168 D01 v03r01 – Section 6.0

Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to 10GHz (separated into at least two plots per channel)
2. RBW \geq 100kHz
3. VBW \geq 3 x RBW
4. Detector = RMS
5. Trace mode = max hold
6. Sweep time = auto couple
7. The trace was allowed to stabilize

Test Setup

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

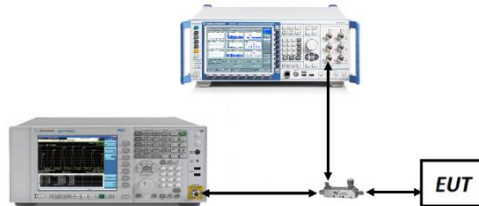


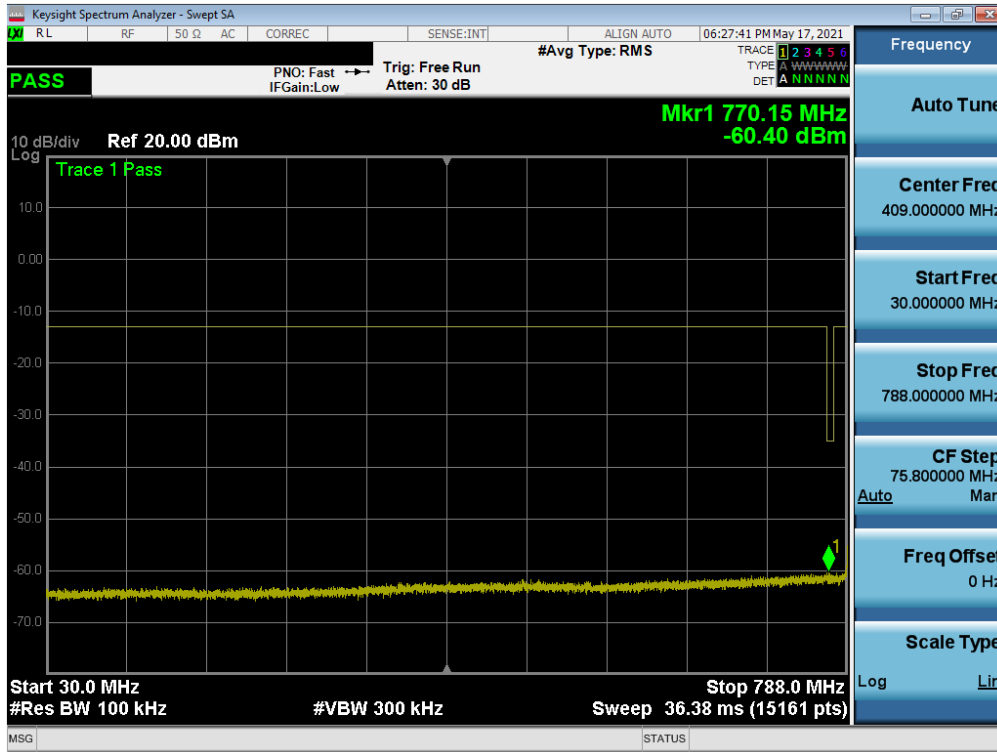
Figure 7-3. Test Instrument & Measurement Setup

Test Notes

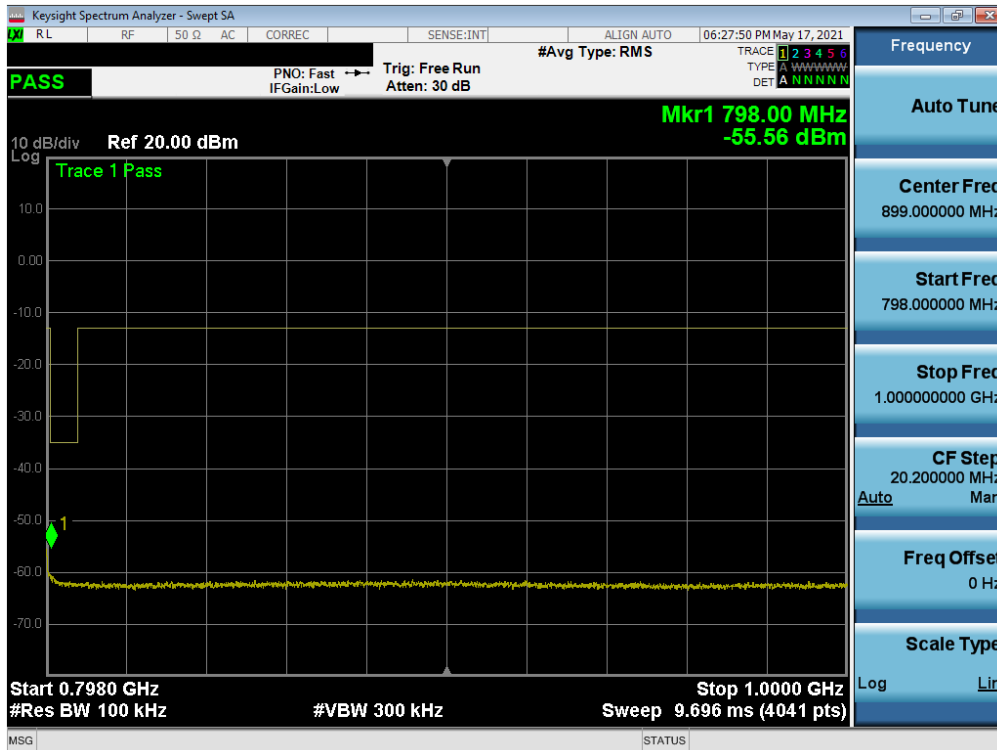
None.

FCC ID: RI7LE910CXWWX IC:5131A-LE910CXWWX	PCTEST Proud to be part of element	Part 90 / RSS-140 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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LTE Band 14

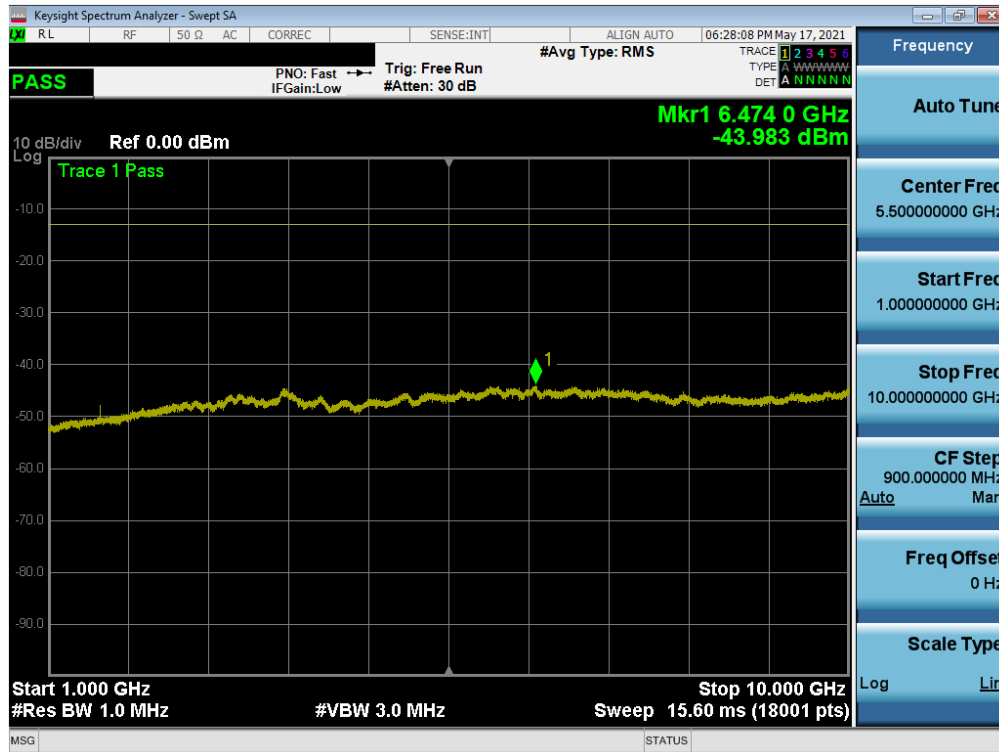


Plot 7-5. Conducted Spurious Plot (LTE Band 14 - 10MHz QPSK - RB Size 1, RB Offset 0)



Plot 7-6. Conducted Spurious Plot (LTE Band 14 - 10MHz QPSK - RB Size 1, RB Offset 0)

FCC ID: RI7LE910CXWWX IC:5131A-LE910CXWWX	PCTEST Proud to be part of element	Part 90 / RSS-140 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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Plot 7-7. Conducted Spurious Plot (LTE Band 14 - 10MHz QPSK - RB Size 1, RB Offset 0)

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7.5 Band 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 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

KDB 971168 D01 v03r01 – Section 6.0

Test Settings

1. Span was set large enough so as to capture all out of band emissions near the band edge
2. RBW = 100 kHz
3. VBW = 300 kHz
4. Detector = RMS
5. Trace mode = trace average
6. Sweep time = auto couple
7. The trace was allowed to stabilize

Test Setup

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

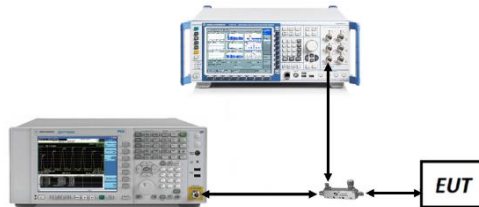


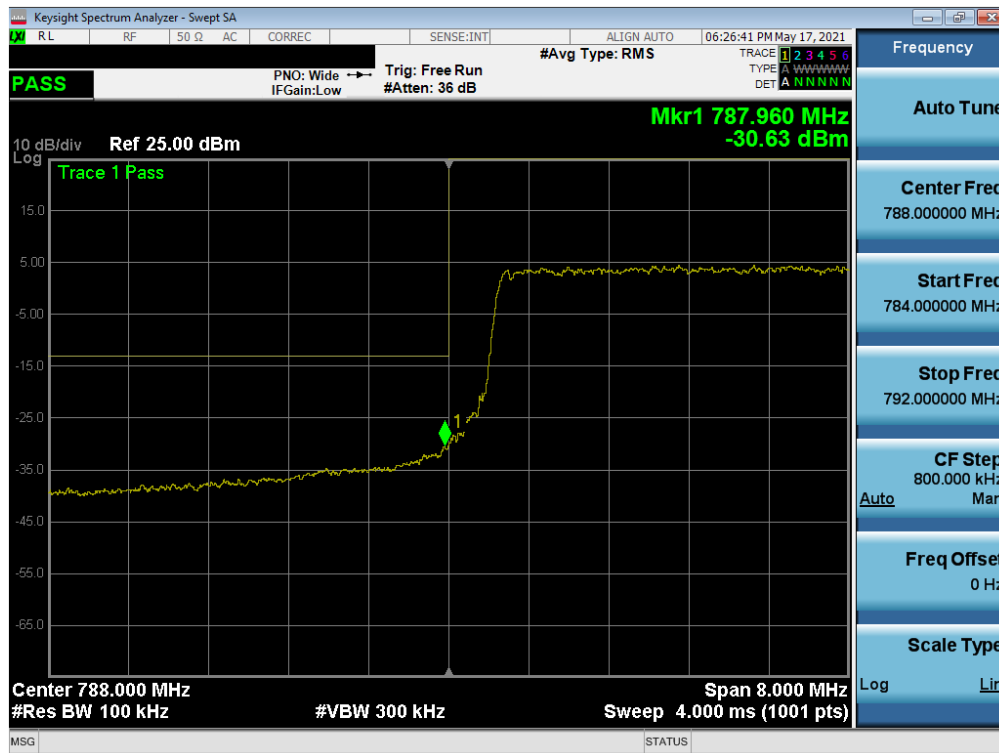
Figure 7-4. Test Instrument & Measurement Setup

Test Notes

None.

FCC ID: RI7LE910CXWWX IC:5131A-LE910CXWWX	PCTEST Proud to be part of element	Part 90 / RSS-140 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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LTE Band 14



Plot 7-8. Lower Band Edge Plot (LTE Band 14, 10MHz QPSK - RB Size 50)

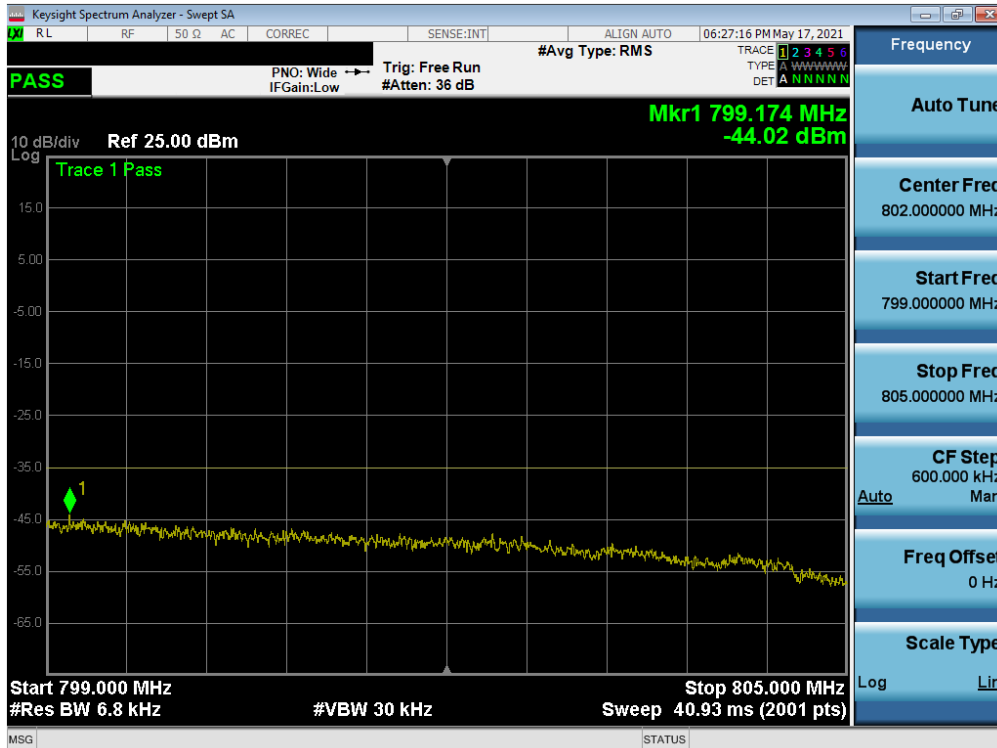


Plot 7-9. Lower Emission Mask Plot (LTE Band 14, 10MHz QPSK - RB Size 50)

FCC ID: RI7LE910CXWWX IC:5131A-LE910CXWWX		PCTEST Proud to be part of element		Part 90 / RSS-140 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager	
Test Report S/N: 1M2106040065-10.RI7		Test Dates: 5/12 - 6/1/2021		EUT Type: Data Terminal Module		Page 20 of 33	

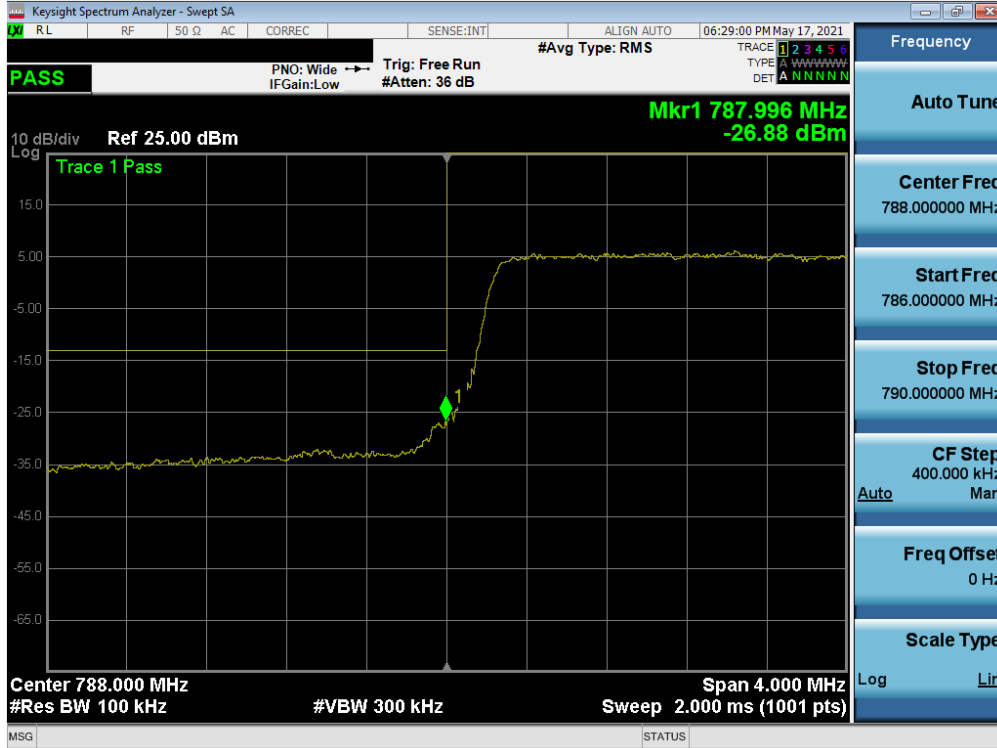


Plot 7-10. Upper Band Edge Plot (LTE Band 14, 10MHz QPSK - RB Size 50)

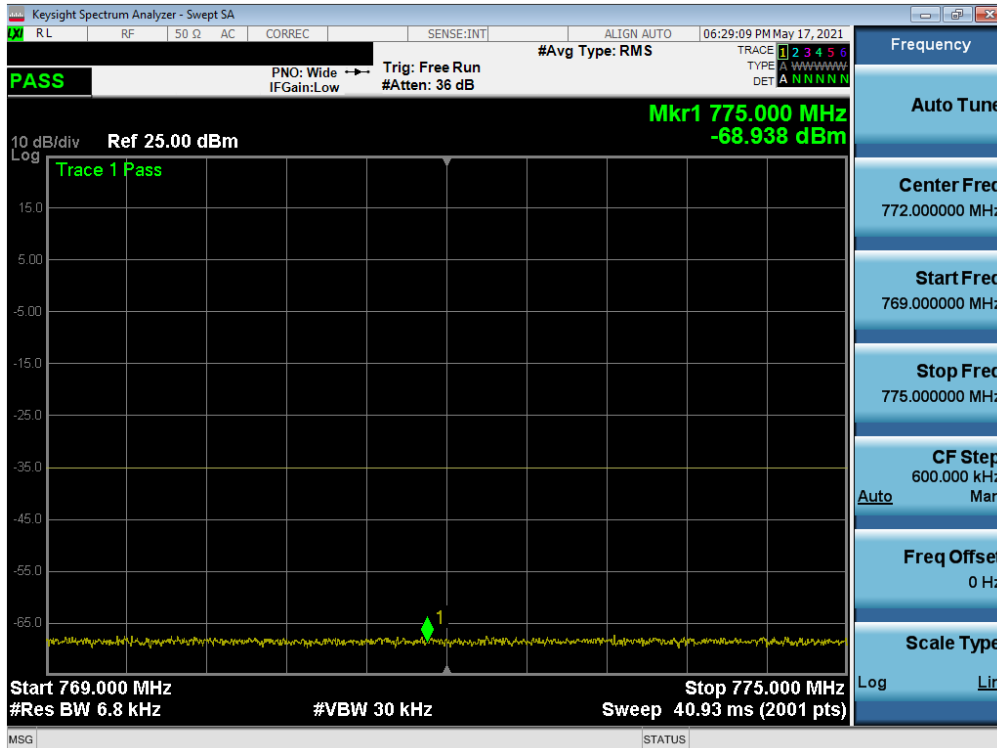


Plot 7-11. Upper Emission Mask Plot (LTE Band 14, 10MHz QPSK - RB Size 50)

FCC ID: RI7LE910CXWWX IC:5131A-LE910CXWWX	PCTEST Proud to be part of element	Part 90 / RSS-140 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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Plot 7-12. Lower Band Edge Plot (LTE Band 14, 5MHz QPSK - RB Size 25)

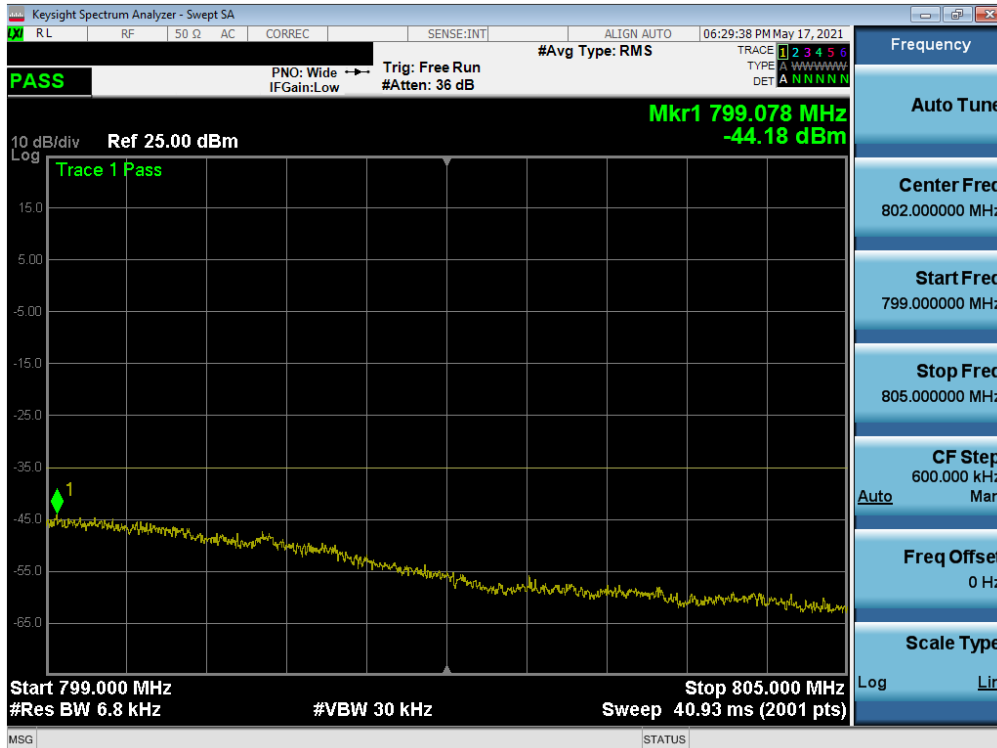


Plot 7-13. Lower Emission Mask Plot (LTE Band 14, 5MHz QPSK - RB Size 25)

FCC ID: RI7LE910CXWWX IC:5131A-LE910CXWWX	PCTEST Proud to be part of element	Part 90 / RSS-140 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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Plot 7-14. Upper Band Edge Plot (LTE Band 14, 5MHz QPSK - RB Size 25)



Plot 7-15. Upper Emission Mask Plot (LTE Band 14, 5MHz QPSK - RB Size 25)

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7.6 Peak-Average Ratio

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

KDB 971168 D01 v03r01 – Section 5.7.1

Test Settings

1. The signal analyzer’s CCDF measurement profile 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. For burst transmissions, the spectrum analyzer is set to use an internal “RF Burst” trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the “on time” of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power

Test Setup

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

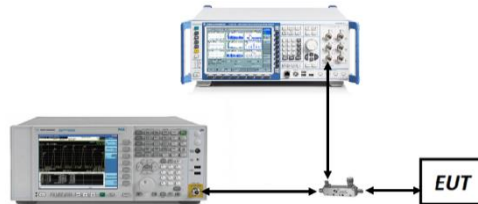


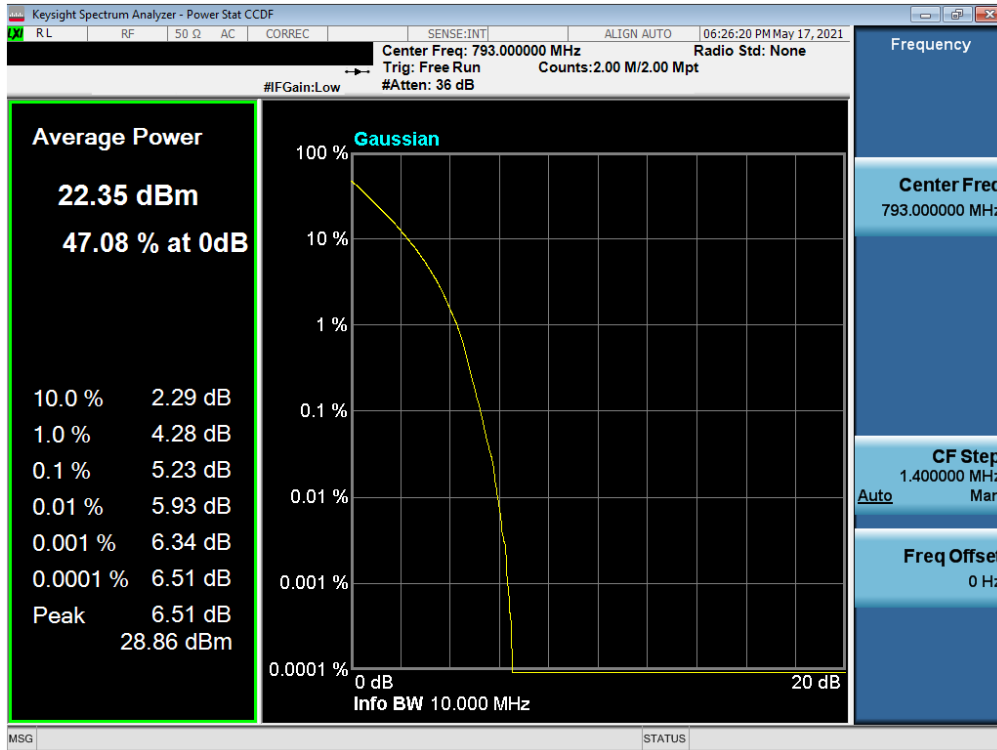
Figure 7-5. Test Instrument & Measurement Setup

Test Notes

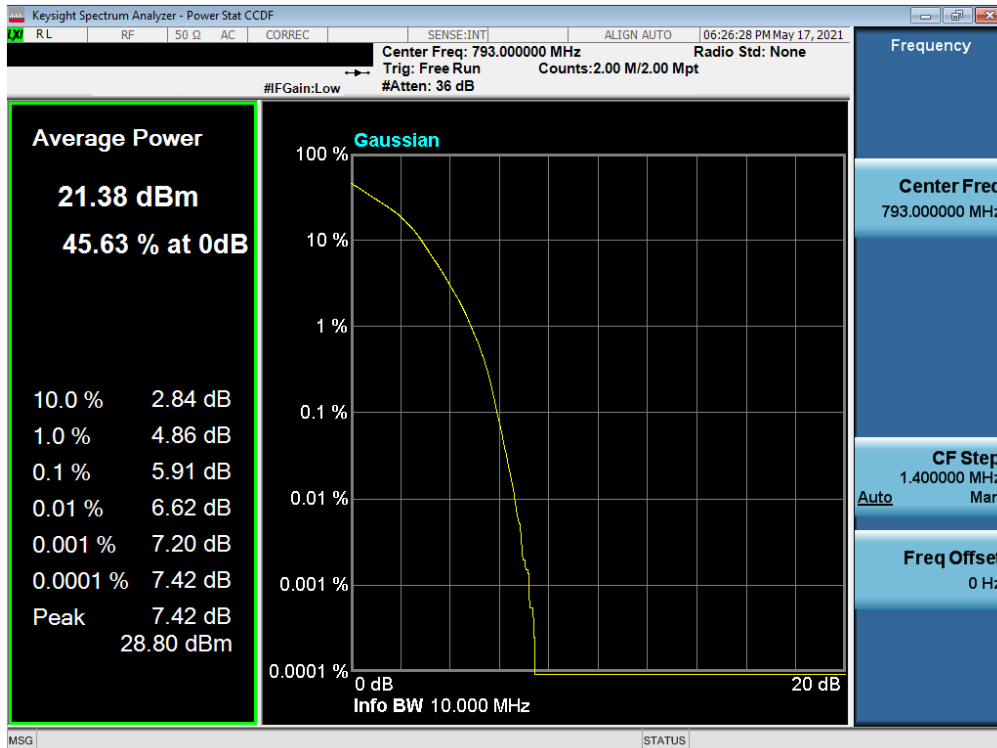
None.

FCC ID: R17LE910CXWWX IC:5131A-LE910CXWWX	PCTEST Proud to be part of element	Part 90 / RSS-140 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2106040065-10.RI7	Test Dates: 5/12 - 6/1/2021	EUT Type: Data Terminal Module	Page 24 of 33

LTE Band 14

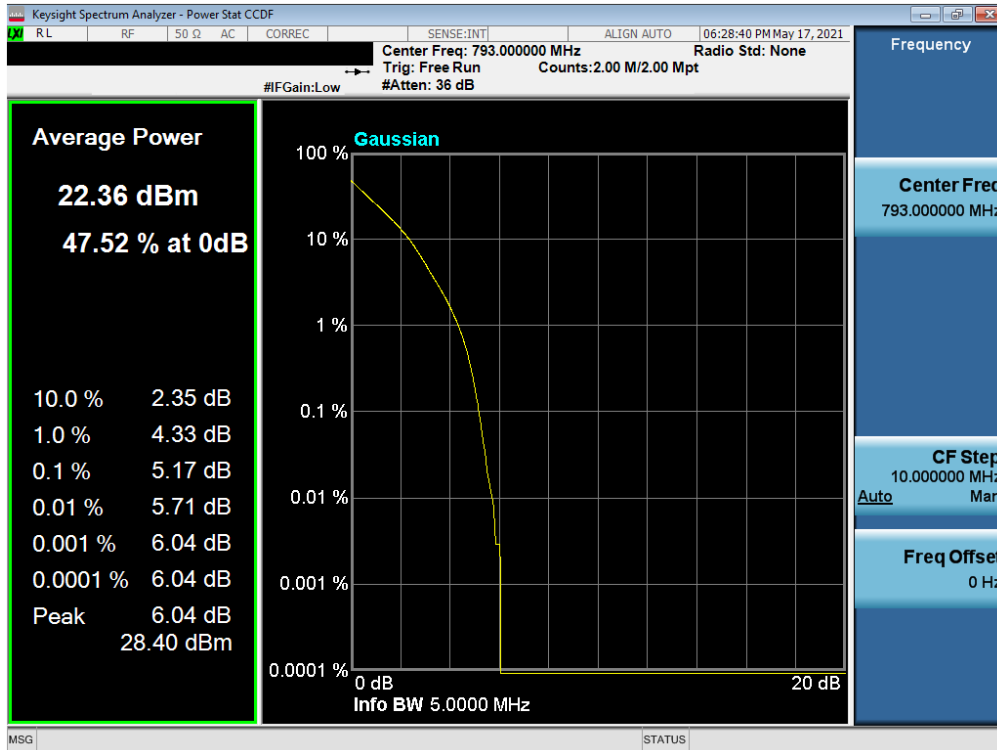


Plot 7-16. PAR Plot (LTE Band 14 - 10MHz QPSK - Full RB)

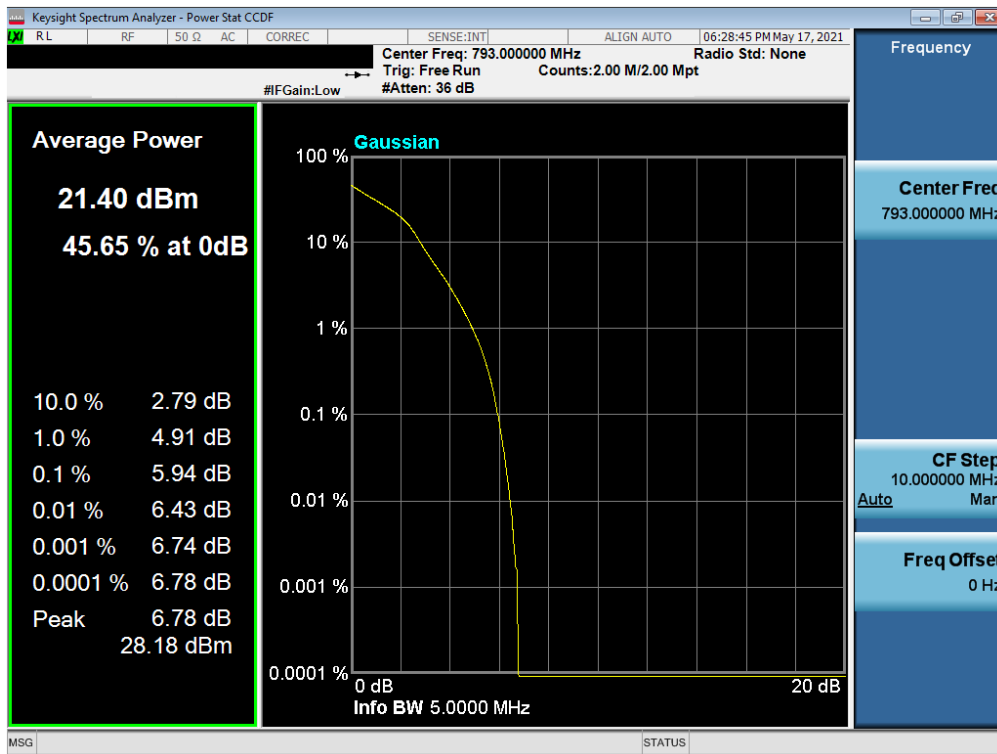


Plot 7-17. PAR Plot (LTE Band 14 - 10MHz 16-QAM - Full RB)

FCC ID: RI7LE910CXWWX IC:5131A-LE910CXWWX	PCTEST Proud to be part of element	Part 90 / RSS-140 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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Plot 7-18. PAR Plot (LTE Band 14 - 5MHz QPSK - Full RB)



Plot 7-19. PAR Plot (LTE Band 14 - 5MHz 16-QAM - Full RB)

FCC ID: RI7LE910CXWWX IC:5131A-LE910CXWWX	PCTEST Proud to be part of element	Part 90 / RSS-140 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2106040065-10.RI7	Test Dates: 5/12 - 6/1/2021	EUT Type: Data Terminal Module	Page 26 of 33

7.7 Radiated Spurious Emissions Measurements

Test Overview


Radiated spurious emissions measurements are performed using the field strength conversion method described in KDB 971168 with the EUT transmitting into an external antenna. Measurements on signals operating below 1GHz are performed using horizontally and vertically polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as peak measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.8

Test Settings

1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW $\geq 3 \times$ RBW
3. Span = 1.5 times the OBW
4. No. of sweep points $\geq 2 \times$ span / RBW
5. Detector = RMS
6. Trace mode = Average (Max Hold for pulsed emissions)
7. The trace was allowed to stabilize

FCC ID: RI7LE910CXWWX IC: 5131A-LE910CXWWX		Part 90 / RSS-140 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.

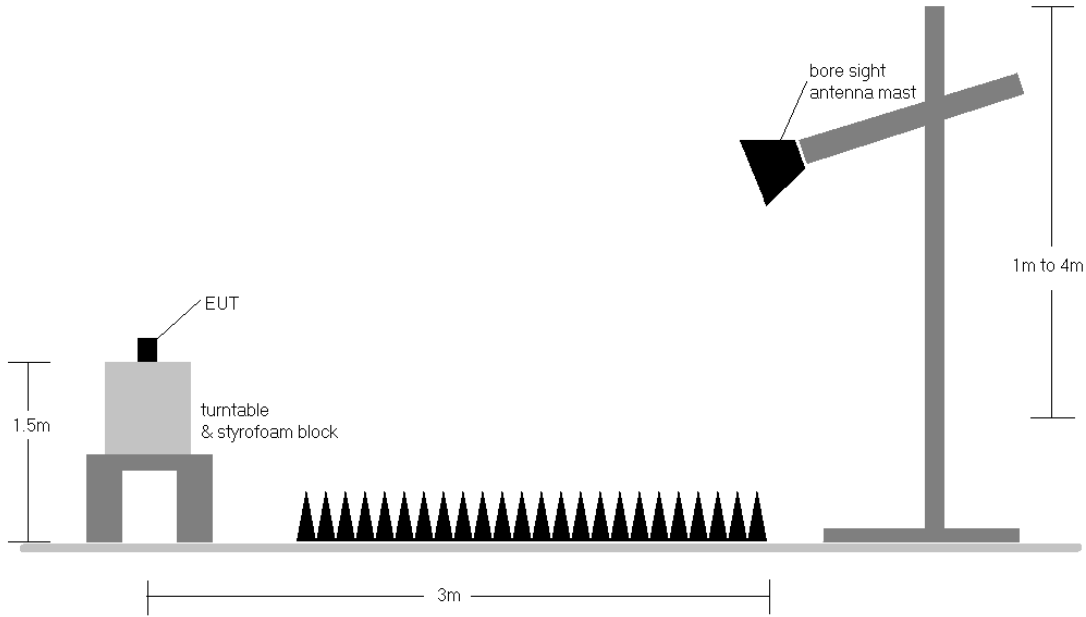


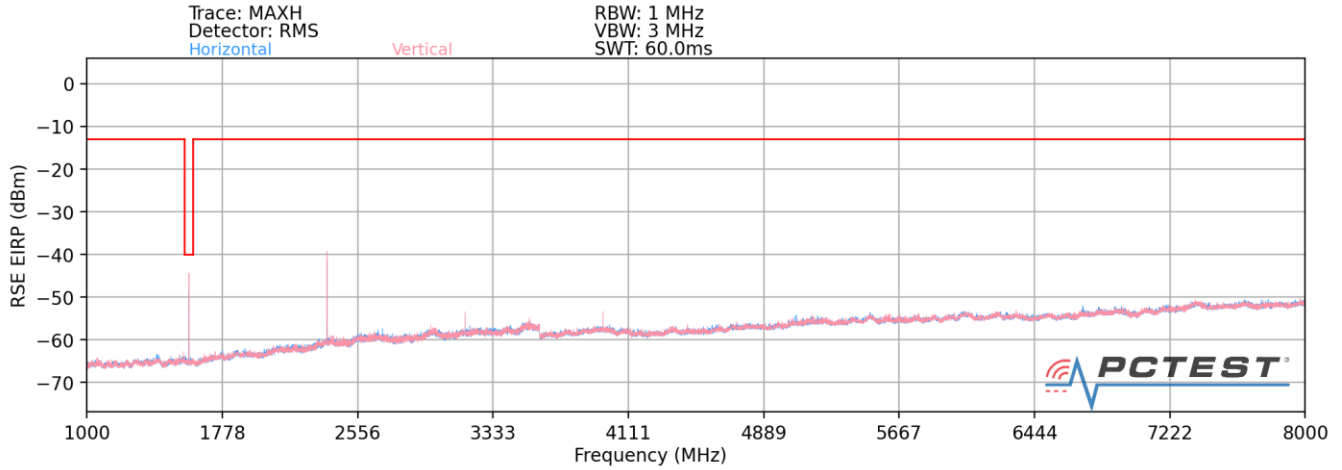
Figure 7-6. Test Instrument & Measurement Setup

Test Notes

1. For LTE mode, the device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported with 1 RB.
2. This unit was tested while powered by an DC power source.
3. The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case setup is reported in the tables below.
4. The "-" shown in the following RSE tables are used to denote a noise floor measurement.

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LTE Band 14



Plot 7-20. Radiated Spurious Plot (LTE Band 14)

Bandwidth (MHz):	5
Frequency (MHz):	790.5
RB Config (Size / Offset):	1 / 12


Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1581.0	V	169	170	-49.06	-5.84	52.10	-43.16	-40.00	-3.16
2371.5	V	387	231	-49.71	-1.89	55.40	-39.86	-13.00	-26.86
3162.0	V	276	341	-64.18	0.30	43.12	-52.14	-13.00	-39.14
3952.5	V	114	342	-70.56	3.01	39.45	-55.81	-13.00	-42.81
4743.0	V	340	256	-77.54	3.64	33.10	-62.15	-13.00	-49.15
5533.5	V	-	-	-78.86	5.49	33.63	-61.63	-13.00	-48.63
6324.0	V	-	-	-79.13	6.59	34.46	-60.79	-13.00	-47.79

Table 7-3. Radiated Spurious Data (LTE Band 14 – Low Channel)

Bandwidth (MHz):	5
Frequency (MHz):	793.0
RB Config (Size / Offset):	1 / 12

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1586.0	V	216	218	-50.77	-5.83	50.40	-44.86	-40.00	-4.86
2379.0	V	392	228	-49.89	-1.92	55.19	-40.07	-13.00	-27.07
3172.0	V	120	137	-67.20	0.36	40.16	-55.10	-13.00	-42.10
3965.0	V	119	340	-72.16	3.17	38.01	-57.25	-13.00	-44.25
4758.0	V	312	260	-78.16	3.69	32.53	-62.73	-13.00	-49.73
5551.0	V	-	-	-78.66	5.15	33.49	-61.77	-13.00	-48.77
6344.0	V	-	-	-79.30	6.76	34.46	-60.80	-13.00	-47.80


Table 7-4. Radiated Spurious Data (LTE Band 14 – Mid Channel)

FCC ID: RI7LE910CXWWX IC:5131A-LE910CXWWX		Part 90 / RSS-140 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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Bandwidth (MHz):	5
Frequency (MHz):	795.5
RB Config (Size / Offset):	1 / 12

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBμV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1591.0	V	111	164	-49.52	-5.83	51.65	-43.61	-40.00	-3.61
2386.5	V	195	209	-51.17	-1.95	53.88	-41.37	-13.00	-28.37
3182.0	V	152	135	-69.22	0.41	38.19	-57.07	-13.00	-44.07
3977.5	V	112	345	-72.78	3.03	37.25	-58.01	-13.00	-45.01
4773.0	V	-	-	-78.45	3.58	32.13	-63.12	-13.00	-50.12
5568.5	V	-	-	-78.33	5.18	33.85	-61.41	-13.00	-48.41

Table 7-5. Radiated Spurious Data (LTE Band 14 – High Channel)

FCC ID: RI7LE910CXWWX IC:5131A-LE910CXWWX	 PCTEST Proud to be part of element	Part 90 / RSS-140 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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7.8 Frequency Stability / Temperature Variation

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-E-2016. The frequency stability of the transmitter is measured by:

- a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.
- b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

Test Procedure Used

ANSI/TIA-603-E-2016

Test Settings


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 at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

Test Setup

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

Test Notes

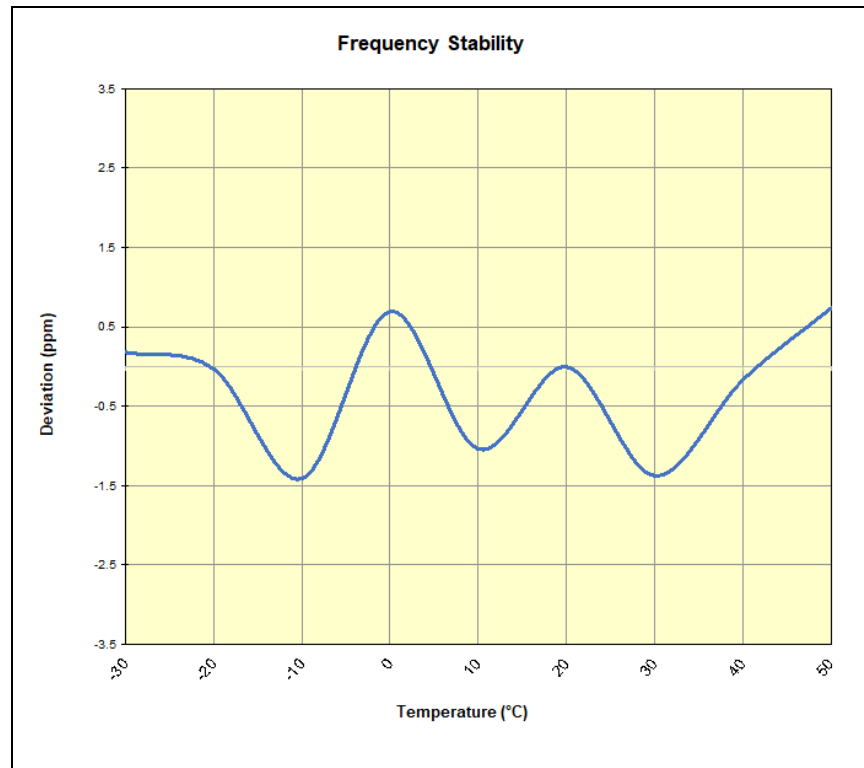
None

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Frequency Stability / Temperature Variation

LTE Band 14					
Operating Frequency (Hz):		793,000,000			
Ref. Voltage (VDC):		3.80			
Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	- 30	792,995,497	147	0.0000186
		- 20	792,995,329	-21	-0.0000026
		- 10	792,994,229	-1,121	-0.0001414
		0	792,995,908	558	0.0000703
		+ 10	792,994,525	-825	-0.0001040
		+ 20 (Ref)	792,995,350	0	0.0000000
		+ 30	792,994,258	-1,092	-0.0001377
		+ 40	792,995,225	-125	-0.0000157
85 %	3.23	+ 20	792,994,127	-1,223	-0.0001542
115 %	4.37	+ 20	792,996,864	1,514	0.0001909

Table 7-6. LTE Band 14 Frequency Stability Data




Plot 7-21. LTE Band 14 Frequency Stability Chart

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8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Telit Communications S.p.A Data Terminal Module FCC ID: RI7LE910CXWWX / IC:5131A-LE910CXWWX** complies with all the requirements of Parts 90 of the FCC rules and RSS-140 of the Innovation, Science, and Economic Development Canada rules.

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