

**Test Plan**

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Introduction

VZ_TC_SUPRCONF13_1347079

Revision History

Rev.	Author	Description of Changes	Date
1.0	Verizon Wireless	Initial release.	August 2009
2.0	Verizon Wireless	<p>Version 2.0</p> <p>Updates/Clarifications/Additions to the following sections:</p> <p>1.4, 2.1.3, 2.2.3, 2.5.4, 2.8, 3.1.2, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.2, 3.3.3, 3.4.2, 3.4.3, 4.1.1, 4.1.2, 5, 6</p>	November 2009
3.0	Verizon Wireless	<p>Version 3.0</p> <p>Updates/Clarifications/Additions to the following sections:</p> <p>1.2, 1.3, 1.4, 1.5, 2.4.2, 3.2.1, 6</p> <p>Updates to sections 2.1.2, 2.5.2, 3.1.2, 3.2.2, and 3.2.3 based on changes in the September version of 3GPP TS 36.521-1</p>	December 2009
4.0	Verizon Wireless	<p>Version 4.0</p> <p>Updates/Clarifications/Additions to the following</p>	February 2010

		<p>Sections:</p> <p>1.4, 1.5.3, 2.5.2, 2.5.3, 2.5.4, 4, 6</p> <p>Updates to sections 2.2.2, 2.3.2, 2.4.2, 2.5.2, 2.5.3, 2.6.2, 2.6.3, 2.6.4, 2.7.2, 3.1.2, 3.3.2, and 3.4.2 based on changes in the December version of 3GPP TS 36.521-1</p>	
5.0	Verizon Wireless	<p>Version 5.0</p> <p>Updates/Clarifications/Additions to the following</p> <p>Sections:</p> <p>1.4, 1.5, 1.5.4, 3.3.2, 3.4.2, 7</p>	March 2010
6.0	Verizon Wireless	<p>Version 6.0</p> <p>Updates/Clarifications/Additions to the following</p> <p>Sections:</p> <p>1.4, 2.4.3, 2.5.4, 7</p>	June 2010
7.0	Verizon Wireless	<p>Version 7.0</p> <p>Updates/Clarifications/Additions to the following</p> <p>Sections:</p> <p>2.3.3, 2.4.3, 2.6.4, 2.7.2, 3.1.2, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 5.1.1, 6</p>	September 2010

8.0	Verizon Wireless	<p>Version 8.0</p> <p>Updates/Clarifications/Additions to the following Sections:</p> <p>1.3, 1.5.5, 2.4.2, 2.4.3, 2.9, 3.2.2, 3.2.3, 3.3.3, 3.4.3, 4.1.1.2, 6</p> <p>Update to Release 9 throughout document.</p>	December 2010
9.0	Verizon Wireless	<p>Version 9.0</p> <p>Updates/Clarifications/Additions to the following Sections:</p> <p>2.3.3, 2.4.3, 2.5.3, 2.5.4, 2.9.2, 2.9.3, 3.3.2, 3.4.2, 6, 7</p>	March 2011
10.0	Verizon Wireless	<p>Version 10.0</p> <p>Updates/Clarifications/Additions to the following Sections:</p> <p>3.4.2</p>	June 2011
11.0	Verizon Wireless	<p>Version 11.0</p> <p>Updates/Clarifications/Additions to the following Sections:</p> <p>1.6, 2.4.3, 2.5.4, 2.9.3</p>	December 2011

12.0	Verizon Wireless	Version 12.0 Updates to test cases 2.5, 2.6, 2.9	October 2013
13.0	Verizon Wireless	Version 13.0 Update to test case 2.5	June 2014
14.0	Verizon Wireless	Version 14.0 Corrected test case 2.3. Updates to test cases 3.3, 3.4. Added Category 1 to RMC tables.	October 2014
15.0	Verizon Wireless	Version 15.0 Added feICIC GCF tests in section 5.1.	February 2015
16.0	Verizon Wireless	Version 16.0 Moved feICIC GCF tests to section 3.5. Added DL CoMP GCF tests in section 3.6. Updated test case 2.5 to address category 1 devices.	June 2015
17.0	Verizon Wireless	Version 17.0 Added EPDCCH GCF tests in section 3.7. Added EPDCCH supplementary RF tests in section 3.8. Added 256QAM supplementary RF tests in section	October 2015

		3.9. Updated test cases 2.2, 2.4, and 2.9 to address category 1 devices.	
18.0	Verizon Wireless	Version 18.0 Updates to test cases 2.5, 2.6, 2.7, 2.9, 3.9	June 2016
19.0	Verizon Wireless	Version 19.0 Updates to test cases 2.1, 2.2, 2.3, 2.6, and 2.8	October 2016
20.0	Verizon Wireless	Version 20.0 Retired 256QAM tests in section 3.9 as GCF tests become ready.	October 2017
21.0	Verizon Wireless	Version 21.0 Reduced R11 feICIC test scope to support R10 eICIC.	October 2017
22.0	Verizon Wireless	Version 22.0 Retired test cases 3.10 and 3.11.	February 2024
23.0	Verizon Wireless	Version 23.0 Updates test cases 3.3 and 3.4 for category 1bis.	June 2024

Introduction

Verizon Wireless requires all devices designed to operate on the Verizon Wireless LTE 3GPP Band

13 network to meet Verizon Wireless-specific RF performance requirements as detailed in the Verizon Wireless LTE 3GPP Band 13 Network Access Device Requirements. This document describes the procedure for verifying that these requirements have been met. Verizon Wireless-specific RF performance requirements and testing are in addition to standard 3GPP LTE RF minimum performance requirements and conformance testing defined in 3GPP TS 36.101: Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception and 3GPP TS 36.521-1: Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing, respectively.

This publication is part of Verizon Wireless compliance with the FCC's rules for 700 MHz C Block (47 C.F.R. § 27.16), as explained in the FCC's Second Report and Order in WT Docket No. 06-150, "Service Rules for the 698-746, 747-762 and 777-792 MHz Bands" released on August 10, 2007.

In this document, the terms LTE (Long Term Evolution) and E-UTRA (Evolved Universal Terrestrial Radio Access) are considered equivalent.

Test Objectives

The objective of this document is to define the Verizon Wireless-specific RF performance test procedures for devices designed to operate on the Verizon Wireless LTE 3GPP Band 13 network. This document will be used by employees of device manufacturers, test labs, and Verizon Wireless to guide the execution of Verizon Wireless-specific LTE RF performance testing. This document will also be used to define the Verizon Wireless-specific RF performance test procedures for test automation development.

Specifically, this document includes:

- UE transmitter test cases
- UE receiver test cases

Wherever possible, this test plan uses 3GPP standard RF conformance test procedures for LTE as defined in 3GPP TS 36.521-1: Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing.

Definitions

The following terms are used in this document:

Acronym/Term	Definition
3GPP	3 rd Generation Partnership Project, manages GSM, EDGE, UMTS, HSPA, and LTE standards
A-MPR	Additional Maximum Power Reduction
ATSC	Advanced Television Systems Committee
BW	Bandwidth
CoMP	Coordinated Multi-Point
DL	Downlink
EPDCCH	Enhanced Physical Downlink Control Channel

E-UTRA	Evolved Universal Terrestrial Radio Access
FFS	For Future Study
LO	Local Oscillator
LTE	Long Term Evolution
MHz	Mega-Hertz (1 x 10 ⁶ cycles per second)
MIMO	Multiple Input-Multiple Output
MPR	Maximum Power Reduction
N/A	Not Applicable
PUCCH	Physical Uplink Control Channel
PUSCH	Physical Uplink Shared Channel
RB	Resource Block
RBstart	RB number where a RB allocation begins within the channel
REFSENS	Reference Sensitivity
TT	Test Tolerance
UE	User Equipment
UL	Uplink
VZW	Verizon Wireless

3GPP Release 9 Specifications

Refer to the 3GPP Release 9 Specifications section of the Verizon Wireless LTE 3GPP Band 13 Network Access Requirements for details on the correct version for all 3GPP specification documents referenced in this test plan.

Entrance Criteria

All devices shall successfully pass this test plan per the Verizon Wireless LTE 3GPP Band 13 Lab

Conformance Test Plan and in accordance with the Verizon Wireless LTE 3GPP Band 13 Device Conformance Test Process. Prior to testing, Verizon Wireless strongly recommends that all devices pass 3GPP standard RF conformance per 3GPP TS 36.521-1: Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing.

Test Equipment Configuration

For details on test equipment currently approved by Verizon Wireless, refer to the Verizon Wireless LTE 3GPP Band 13 Test Equipment List.

Single Receiver Testing

For single receiver testing, the transmitter of the UE shall always be connected to the primary antenna connector, including single receiver testing of the secondary/MIMO receiver.

Reference Measurement Channels

Reference measurement channels used in this test plan shall be per 3GPP TS 36.521-1: Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing and the Reference Measurement Channels section of this document.

Temperature and Voltage Test Requirements

Ambient Temperature

The ambient temperature for the device under test shall be $+25^{\circ}\text{C} \pm 1.00$ per the normal conditions as defined in 3GPP TS 36.101: Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception and 3GPP TS 36.508: Evolved Universal

Terrestrial Radio Access (E-UTRA) and Evolved Packet Core (EPC); Common test environments for User Equipment (UE) conformance testing unless indicated otherwise.

UE Power Supply/Battery Voltage

The power supply/battery voltage for the device under test shall be per the normal operating conditions as defined by the device manufacturer, 3GPP TS 36.101: Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception, and 3GPP TS 36.508: Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Packet Core (EPC); Common test environments for User Equipment (UE) conformance testing unless indicated otherwise. The device manufacturer shall provide the range of operating voltages for the device. The device shall comply with the voltage requirements in 3GPP TS 36.101: Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception, and 3GPP TS 36.508: Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Packet Core (EPC); Common test environments for User Equipment (UE) conformance testing.

IMS Test Mode Operation

Unless indicated otherwise in the test case procedure, IMS Test Mode shall be enabled in the device for the test cases in this test plan. IMS Test Mode operation is per the Verizon Wireless LTE 3GPP Band 13 Network Access Requirements.

Test Channels

All tests in this test plan shall be performed using the following channels only:

- Downlink channel number: 5230
- Uplink channel number: 23230

Test Tolerances

Test tolerances for the test cases in this test plan are included in the expected result criteria for the individual test procedures. No deviations from the test tolerances in this test plan shall be permitted.



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2.1 MAXIMUM OUTPUT POWER NO MPR OR A-MPR VZ_TC_SUPRFCONF_1626

Definition

This test verifies that the UE meets Verizon Wireless requirements for UE maximum transmit output power for uplink RB allocations when MPR and A-MPR are both 0 dB.

Traceability

- Verizon Wireless LTE 3GPP Band 13 Network Access Device Requirements, Section *Verizon Wireless-Specific LTE 3GPP Band 13 RF Performance Requirements*
- 3GPP TS 36.101: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception*, section 6.2.2
- 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*, section 6.2.2

Applicability

This test case applies to all UEs designed to operate on the Verizon Wireless LTE 3GPP Band 13 network.

Design Steps
Step Name
Step 1
Pre-Conditions
Procedures
<p>The device vendor shall execute one of the procedures below.</p> <p>Option 1 Test Procedure - GCF with Operator Limits</p> <p>Execute GCF test case 36.521-1 6.2.2 and apply the VZW operator limits in the "expected results" section below. NOTE: The device vendor may re-use the test results from GCF certification testing.</p> <p>Option 2 Test Procedure - VZW</p> <ol style="list-style-type: none"> 1. Set the initial conditions as per section 6.2.2.4.1 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i> for a 10 MHz channel in Band 13 with the following exception: set the modulation and RB allocations for the uplink and downlink reference measurement channels as per Test 1 in Table 2.1.2-1 below. 2. Follow steps 1, 2, and 3 in section 6.2.2.4.2 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i>. Message contents are as per section

6.2.2.4.3 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing.*

3. Repeat steps 1.) and 2.) for Test 2 in Table 2.1.2-1 below.
4. Repeat steps 1.) and 2.) for Test 3 in Table 2.1.2-1 below.
5. Repeat steps 1.) and 2.) for Test 4 in Table 2.1.2-1 below.
6. Repeat steps 1.) and 2.) for Test 5 in Table 2.1.2-1 below.

Table 2.1.2-1. Maximum output power DL and UL reference measurement channel modulation and RB allocation test configuration table (no MPR or A-MPR).

Test	Downlink Configuration		Uplink Configuration	
	Modulation	RB Allocation	Modulation	RB Allocation
Test 1	N/A	N/A	QPSK	12 RB with RBstart=0
Test 2	N/A	N/A	QPSK	12 RB with RBstart=20
Test 3	N/A	N/A	QPSK	12 RB with RBstart=38
Test 4	N/A	N/A	QPSK	2 RB with RBstart=0
Test 5	N/A	N/A	QPSK	2 RB with RBstart=48

Expected Results

Expected Result

The UE transmit output power for all tests shall be +23 dBm +2.7/-1.7 dB.

2.2 MAXIMUM OUTPUT POWER WITH MPR VZ_TC_SUPRFCONF_1627

Definition

This test verifies that the UE meets Verizon Wireless requirements for UE maximum transmit output power for uplink RB allocations where MPR is applicable (A-MPR is 0 dB).

Traceability

- Verizon Wireless LTE 3GPP Band 13 Network Access Device Requirements, Section *Verizon Wireless-Specific LTE 3GPP Band 13 RF Performance Requirements*
- 3GPP TS 36.101: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception*, section 6.2.3
- 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*, section 6.2.3

Applicability

This test case applies to all UEs designed to operate on the Verizon Wireless LTE 3GPP Band 13 network.

Design Steps
Step Name
Step 1
Pre-Conditions
Procedures
<p>The device vendor shall execute one of the procedures below.</p> <p>Option 1 Test Procedure - GCF with Operator Limits</p> <p>Execute GCF test case 36.521-1 6.6.2.3 and apply the VZW operator limits in the "expected results" section below. NOTE: The device vendor may re-use the test results from GCF certification testing.</p> <p>Option 2 Test Procedure - VZW</p> <ol style="list-style-type: none"> 1. Set the initial conditions as per section 6.2.3.4.1 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i> for a 10 MHz channel in Band 13 with the following exception: set the modulation and RB allocations for the uplink and downlink reference measurement channels as per Test 1 in Table 2.2.21 below. 2. Follow steps 1, 2, and 3 in section 6.2.3.4.2 of 3GPP TS 36.521-1: <i>Evolved Universal</i>

Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing. Message contents are as per section 6.2.3.4.3 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing.*

3. Repeat steps 1.) and 2.) for Test 2 in Table 2.2.2.1 below.
4. Repeat steps 1.) and 2.) for Test 3 in Table 2.2.2.1 below.
5. Repeat steps 1.) and 2.) for Test 4 in Table 2.2.2.1 below.
6. Repeat steps 1.) and 2.) for Test 5 in Table 2.2.2.1 below. NOTE: Test 5 shall be omitted for category 1 devices as the data rate for the RMC in this test exceeds the maximum data rate for a category 1 device.

Table 2.2.2.1. Maximum output power DL and UL reference measurement channel modulation and RB allocation test configuration table (with MPR).

Test	Downlink Configuration		Uplink Configuration	
	Modulation	RB Allocation	Modulation	RB Allocation
Test 1	N/A	N/A	QPSK	50 RB with RBstart=0
Test 2	N/A	N/A	16-QAM	12 RB with RBstart=0
Test 3	N/A	N/A	16-QAM	12 RB with RBstart=20
Test 4	N/A	N/A	16-QAM	12 RB with RBstart=38
Test 5	N/A	N/A	16-QAM	50 RB with RBstart=0

Expected Results

Expected Result - GCF with Operator Limits

The UE transmit output power shall meet the limits below:

Ch BW	Mod'n	UL RB allocation	Parameter (units)	Absolute value
10MHz	QPSK	12	Max output power (dBm)	+23 dBm +2.7 dB/-1.7 dB
10MHz	QPSK	50	Max output power (dBm)	+23 dBm +2.7 dB/-2.7 dB
10MHz	16QAM	12	Max output power (dBm)	+23 dBm +2.7 dB/-2.7 dB
10MHz	16QAM	50	Max output power (dBm)	+23 dBm +2.7 dB/-3.7 dB

Expected Result - VZW Test Procedure

The UE transmit output power shall be:

- +23 dBm +2.7/-2.7 dB for Test 1, Test 2, Test 3, and Test 4.
- +23 dBm +2.7/-3.7 dB for Test 5.



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2.3 TRANSMITTER SPECTRUM EMISSION MASK (NS_06) VZ_TC_SUPRCONF_1628

Definition

This test verifies that the UE meets Verizon Wireless and FCC requirements for the UE spectrum emission mask. The device shall meet the NS_06 spectrum emission mask at all times independent of whether NS_06 is signaled by the network to the device.

Traceability

- Verizon Wireless LTE 3GPP Band 13 Network Access Device Requirements, Section *Verizon Wireless-Specific LTE 3GPP Band 13 RF Performance Requirements*
- 3GPP TS 36.101: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception*, section 6.6.2.2.3
- 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*, section 6.6.2.2.3.3.
- FCC 47 C.F.R. Section 27.53-c

Applicability

This test case applies to all UEs designed to operate on the Verizon Wireless LTE 3GPP Band 13 network.

Design Steps
Step Name
Step 1
Pre-Conditions
Procedures
<p>The device vendor shall execute one of the procedures below.</p> <p>Option 1 Test Procedure - GCF with Operator Limits</p> <p>Execute GCF test case 36.521-1 6.6.2.2 and apply the VZW operator limits in the "expected results" section below. NOTE: The device vendor may re-use the test results from GCF certification testing.</p> <p>Option 2 Test Procedure - VZW</p> <ol style="list-style-type: none"> 1. Set the initial conditions as per section 6.6.2.2.4.1 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i> for a 10 MHz channel in Band 13. Message contents are as per section 6.6.2.2.4.3 of 3GPP TS 36.521-1: <i>Evolved Universal</i>

Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing. The network emulator shall signal NS_06 to the UE using the message contents as per section 6.6.2.2.4.3.3 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing.*

2. Follow steps 1, 2, and 3 in section 6.6.2.2.4.2 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing.*
3. Repeat steps 1.) and 2.) without signaling NS_06 to the UE, i.e. the network emulator shall not implement the message contents in section 6.6.2.2.4.3.3 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing.*

Expected Results

Expected Result - Option 1 - GCF with Operator Limits

The UE transmit emission shall the limits in Table 6.6.2.2.3.3-1 (as opposed to Table 6.6.2.2.5.3-1) of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*, i.e. the test tolerance for the emissions measurement in this test shall be 0 dB. The UE transmit output power shall meet the same requirements below:

Ch BW	Mod'n	UL RB allocation	Parameter (units)	Absolute value
10MHz	QPSK	50	Mean output power (dBm)	+23 dBm +2.7/-2.7 dB
10MHz	QPSK	12	Mean output power (dBm)	+23 dBm +2.7/-1.7 dB
10MHz	16QAM	12	Mean output power (dBm)	+23 dBm +2.7/-2.7 dB

Expected Result - Option 2 - VZW Test Procedure

The UE transmit emission shall fulfill the requirements in Table 6.6.2.2.3.3-1 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing.* The test tolerance for the emissions measurement in this test shall be 0 dB. The UE transmit output power shall meet the same requirements as for the corresponding tests 2.1 (Maximum Output Power No MPR or A-MPR) and 2.2 (Maximum Output Power with MPR) of this test plan. The maximum UE transmit output power shall meet the test requirements as per 2.3-1 above.



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2.4 SPURIOUS EMISSION BAND UE CO-EXISTENCE VZ_TC_SUPRFCONF_1629

Definition

This test verifies that the UE meets Verizon Wireless requirements for UE transmitter spurious emissions into the UE receive band of other 3GPP frequency bands.

Traceability

- Verizon Wireless LTE 3GPP Band 13 Network Access Device Requirements, Section *Verizon Wireless-Specific LTE 3GPP Band 13 RF Performance Requirements*
- 3GPP TS 36.101: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception*, section 6.6.3.2
- 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*, section 6.6.3.2

Applicability

This test case applies to all UEs designed to operate on the Verizon Wireless LTE 3GPP Band 13 network.

Design Steps
Step Name
Step 1
Pre-Conditions
Procedures
<p>Test Procedure</p> <ol style="list-style-type: none"> 1. Set the initial conditions as per section 6.6.3.2.4.1 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i> for a 10 MHz channel in Band 13 with the following exception: set the modulation and RB allocations for the uplink and downlink reference measurement channels as per Test 1 in Table 2.4.21 below. 2. Follow steps 1, 2, and 3 in section 6.6.3.2.4.2 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i>. Message contents are as per section 6.6.3.2.4.3 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i>. Repeat step 3 from section 6.6.3.2.4.2 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i> for the 1559-1610 MHz band using a 1 MHz measurement bandwidth: <ol style="list-style-type: none"> a. 1559.00-1574.42 MHz b. 1574.42-1576.42 MHz c. 1576.42-1610.00 MHz 3. Repeat steps 1.) and 2.) for Test 2 in Table 2.4.21 below. 4. Repeat steps 1.) and 2.) for Test 3 in Table 2.4.21 below. 5. Repeat steps 1.) and 2.) for Test 4 in Table 2.4.21 below. 6. Repeat steps 1.) and 2.) for Test 5 in Table 2.4.21 below. 7. Repeat steps 1.) and 2.) for Test 6 in Table 2.4.21 below. 8. Repeat steps 1.) and 2.) for Test 7 in Table 2.4.21 below.

9. Repeat steps 1.) and 2.) for Test 8 in Table 2.4.21 below.
10. Repeat steps 1.) and 2.) for Test 9 in Table 2.4.21 below.
11. Repeat step 1.) for Test 10 in Table 2.4.21 below. **NOTE:** Test 10 shall be omitted for category 1 devices as the data rate for the RMC in this test exceeds the maximum data rate for a category 1 device.
12. Follow steps 1 and 2 in section 6.6.3.2.4.2 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing* with the following exception: set the output power level of the UE to +8 dBm with a 2.0 dB tolerance or send uplink power control commands to the UE to ensure that the UE output is +8 dBm +/- 2.0 dB for the duration of the throughput measurement.
13. Follow step 3 in section 6.6.3.2.4.2 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*.
14. Repeat steps 1.) and 2.) for Test 11 in Table 2.4.21 below. **NOTE:** Test 11 shall be omitted for category 1 devices as the data rate for the RMC in this test exceeds the maximum data rate for a category 1 device.

Table 2.4.21. Spurious emission band UE co-existence DL and UL reference measurement channel modulation and RB allocation test configuration table.

Test	Downlink Configuration		Uplink Configuration	
	Modulation	RB Allocation	Modulation	RB Allocation
Test 1	N/A	N/A	QPSK	1 RB with RBstart=2
Test 2	N/A	N/A	QPSK	1 RB with RBstart=47
Test 3	N/A	N/A	QPSK	2 RB with RBstart=0
Test 4	N/A	N/A	QPSK	2 RB with RBstart=48
Test 5	N/A	N/A	QPSK	12 RB with RBstart=0
Test 6	N/A	N/A	QPSK	12 RB with RBstart=20
Test 7	N/A	N/A	QPSK	12 RB with RBstart=38
Test 8	N/A	N/A	QPSK	15 RB with RBstart=0
Test 9	N/A	N/A	QPSK	15 RB with RBstart=35
Test 10	N/A	N/A	16-QAM	50 RB with RBstart=0
Test 11	N/A	N/A	16-QAM	50 RB with RBstart=0

Expected Results

Expected Result

The average power of the UE transmitter spurious emissions (**NOTE: The test tolerance for these emissions measurements shall be 0 dB.**):

- For Test 1 shall not exceed
 - The UE transmit output power shall be +23 dBm +2.7/-1.7 dB.
 - -60 dBm/MHz in the downlink band of 3GPP frequency bands 12, 14*, and 17
 - -35 dBm/6.25kHz for the 769-775 MHz frequency band
- For Test 2 shall not exceed
 - The UE transmit output power shall be +23 dBm +2.7/-1.7 dB.
 - -60 dBm/MHz in the downlink band of 3GPP frequency bands 2, 4, 5, 10, and 14*
 - -35 dBm/6.25kHz for the 769-775 MHz frequency band
- For Test 3 shall not exceed
 - The UE transmit output power shall be +23 dBm +2.7/-1.7 dB.
 - -60 dBm/MHz in the downlink band of 3GPP frequency bands 12, 14*, and 17
 - -35 dBm/6.25kHz for the 769-775 MHz frequency band
- For Test 4 shall not exceed

- The UE transmit output power shall be +23 dBm +2.7/-1.7 dB.
- -60 dBm/MHz in the downlink band of 3GPP frequency bands 2, 4, 5, 10, and 14*
- -35 dBm/6.25kHz for the 769-775 MHz frequency band
- For Test 5 shall not exceed
 - The UE transmit output power shall be +23 dBm +2.7/-1.7 dB.
 - -60 dBm/MHz in the downlink band of 3GPP frequency bands 12, 14*, and 17
 - -35 dBm/6.25kHz for the 769-775 MHz frequency band
- For Test 6 shall not exceed
 - The UE transmit output power shall be +23 dBm +2.7/-1.7 dB.
 - -60 dBm/MHz in the downlink band of 3GPP frequency bands 2, 4, 5, 10, 12, 14*, and 17
 - -35 dBm/6.25kHz for the 769-775 MHz frequency band
- For Test 7 shall not exceed
 - The UE transmit output power shall be +23 dBm +2.7/-1.7 dB.
 - -60 dBm/MHz in the downlink band of 3GPP frequency bands 2, 4, 5, 10, and 14*
 - -35 dBm/6.25kHz for the 769-775 MHz frequency band
- For Test 8 shall not exceed
 - The UE transmit output power shall be +23 dBm +2.7/-2.7 dB.
 - -60 dBm/MHz in the downlink band of 3GPP frequency bands 12, 14*, and 17
 - -35 dBm/6.25kHz for the 769-775 MHz frequency band
- For Test 9 shall not exceed
 - The UE transmit output power shall be +23 dBm +2.7/-2.7 dB.
 - -60 dBm/MHz in the downlink band of 3GPP frequency bands 2, 4, 5, 10, and 14*
 - -35 dBm/6.25kHz for the 769-775 MHz frequency band
- For Test 10 shall not exceed
 - -60 dBm/MHz in the downlink band of 3GPP frequency bands 2, 4, 5, 10, 12, 14*, and 17
 - -35 dBm/6.25kHz for the 769-775 MHz frequency band
- For Test 11 shall not exceed
 - The UE transmit output power shall be +23 dBm +2.7/-3.7 dB.
 - -50 dBm/MHz in the downlink band of 3GPP frequency bands 2, 4, 5, 10, 12, 14*, and 17
 - -35 dBm/6.25kHz for the 769-775 MHz frequency band

* For emissions testing, the downlink band of Band 14 shall be defined as 758.25 MHz to 767.75 MHz.

For all tests, the average power of the UE transmitter spurious emissions into the 1559-1610 MHz shall not exceed the values in Table 2.4.3-1 below
(NOTE: The test tolerance for these emissions measurements shall be 0 dB.):

Table 2.4.3-1. Emissions limit for the 1559-1610 MHz band for spurious emission band UE co-existence tests.

Frequency	Emission Limit
1559.00-1574.42 MHz	<= -60 dBm/MHz
1574.42 MHz 1576.42 MHz	<= -80 dBm/MHz
1576.42 MHz 1610.00 MHz	<= -60 dBm/MHz

2.5 NS_07 SPURIOUS EMISSIONS VZ_TC_SUPRFCONF_1630

Definition

This test verifies that the UE meets 3GPP and Verizon Wireless requirements for UE transmitter spurious emissions for the NS_07 network signaled emissions requirement and the UE Maximum Output Power with Additional Requirements defined in 3GPP TS 36.101: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception*.

Traceability

- Verizon Wireless LTE 3GPP Band 13 Network Access Device Requirements, Section *Verizon Wireless-Specific LTE 3GPP Band 13 RF Performance Requirements*
- 3GPP TS 36.101: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception*, sections 6.2.4 and 6.6.3.3.2. 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*, sections 6.2.4 and 6.6.3.3.3.2 (**NOTE:** Table 6.2.4.2 in 3GPP TS 36.101: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception* and Table 6.2.4.3.2 in 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing* are superseded by the table in section 6.2.2.2 of the Verizon Wireless LTE 3GPP Band 13 Network Access Device Requirements.)
- 3GPP R5-093465, *Correction CR to 36.521-1: Update of Requirements for Additional Maximum Power Reduction (A-MPR) test*

Applicability

This test case applies to all UEs designed to operate on the Verizon Wireless LTE 3GPP Band 13 network.

Design Steps
Step Name
Step 1
Pre-Conditions
Procedures
<p>Test Procedure UE Maximum Output Power with Additional Requirements (A-MPR)</p> <ol style="list-style-type: none"> Set the initial conditions as per section 6.2.4.4.1 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i> for a 10 MHz channel in Band 13 with the following exception: set the modulation and RB allocations for the uplink and downlink reference measurement channels as per Test 1 in Table 2.5.21 below. Message contents are as per section 6.2.4.4.3 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i>. The network emulator shall signal NS_07 to the UE using the message contents as per section 6.2.4.4.3.5 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i>. Follow steps 1, 2, and 3 in section 6.2.4.4.2 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i>. Repeat steps 1.) and 2.) for Test 2 in Table 2.5.21 below. Repeat steps 1.) and 2.) for Test 3 in Table 2.5.21 below. Repeat steps 1.) and 2.) for Test 4 in Table 2.5.21 below. Repeat steps 1.) and 2.) for Test 5 in Table 2.5.21 below. Repeat steps 1.) and 2.) for Test 6 in Table 2.5.21 below.

8. Repeat steps 1.) and 2.) for Test 7 in Table 2.5.21 below.
9. Repeat steps 1.) and 2.) for Test 8 in Table 2.5.21 below.
10. Repeat steps 1.) and 2.) for Test 9 in Table 2.5.21 below.
11. Repeat steps 1.) and 2.) for Test 10 in Table 2.5.21 below.
12. Repeat steps 1.) and 2.) for Test 11 in Table 2.5.21 below.
13. Repeat steps 1.) and 2.) for Test 12 in Table 2.5.21 below.
14. Repeat steps 1.) and 2.) for Test 13 in Table 2.5.21 below.
15. Repeat steps 1.) and 2.) for Test 14 in Table 2.5.21 below.
16. Repeat steps 1.) and 2.) for Test 15 in Table 2.5.21 below. NOTE: Test 15 shall be omitted for category 1 devices as the data rate for the RMC in this test exceeds the maximum data rate for a category 1 device.
17. Repeat steps 1.) and 2.) for Test 16 in Table 2.5.21 below.
18. Repeat steps 1.) and 2.) for Test 17 in Table 2.5.21 below.
19. Repeat steps 1.) and 2.) for Test 18 in Table 2.5.21 below.
20. Repeat steps 1.) and 2.) for Test 19 in Table 2.5.21 below. NOTE: Test 19 shall be omitted for category 1 devices as the data rate for the RMC in this test exceeds the maximum data rate for a category 1 device.
21. Repeat steps 1.) and 2.) for Test 20 in Table 2.5.21 below.
22. Repeat steps 1.) and 2.) for Test 21 in Table 2.5.21 below. NOTE: Test 21 shall be omitted for category 1 devices as the data rate for the RMC in this test exceeds the maximum data rate for a category 1 device.
23. Repeat steps 1.) and 2.) for Test 22 in Table 2.5.21 below. NOTE: Test 22 shall be omitted for category 1 devices as the data rate for the RMC in this test exceeds the maximum data rate for a category 1 device.
24. Repeat steps 1.) and 2.) for Test 23 in Table 2.5.21 below.
25. Repeat steps 1.) and 2.) for Test 24 in Table 2.5.21 below.
26. Repeat steps 1.) and 2.) for Test 25 in Table 2.5.21 below.
27. Repeat steps 1.) and 2.) for Test 26 in Table 2.5.21 below.
28. Repeat steps 1.) and 2.) for Test 27 in Table 2.5.21 below.
29. Repeat steps 1.) and 2.) for Test 28 in Table 2.5.21 below.
30. Repeat steps 1.) and 2.) for Test 29 in Table 2.5.21 below.
31. Repeat steps 1.) and 2.) for Test 30 in Table 2.5.21 below.
32. Repeat steps 1.) and 2.) for Test 31 in Table 2.5.21 below.
33. Repeat steps 1.) and 2.) for Test 32 in Table 2.5.21 below. NOTE: Test 32 shall be omitted for category 1 devices as the data rate for the RMC in this test exceeds the maximum data rate for a category 1 device.
34. Repeat steps 1.) and 2.) for Test 33 in Table 2.5.21 below.
35. Repeat steps 1.) and 2.) for Test 34 in Table 2.5.21 below.
36. Repeat steps 1.) and 2.) for Test 35 in Table 2.5.21 below.
37. Repeat steps 1.) and 2.) for Test 36 in Table 2.5.21 below.
38. Repeat steps 1.) and 2.) for Test 37 in Table 2.5.21 below.
39. Repeat steps 1.) and 2.) for Test 38 in Table 2.5.21 below.
40. Repeat steps 1.) and 2.) for Test 39 in Table 2.5.21 below. NOTE: Test 39 shall be omitted for category 1 devices as the data rate for the RMC in this test exceeds the maximum data rate for a category 1 device.
41. Repeat steps 1.) and 2.) for Test 40 in Table 2.5.21 below.
42. Repeat steps 1.) and 2.) for Test 41 in Table 2.5.21 below.
43. Repeat steps 1.) and 2.) for Test 42 in Table 2.5.21 below.

44. Repeat steps 1.) and 2.) for Test 43 in Table 2.5.21 below.
45. Repeat steps 1.) and 2.) for Test 44 in Table 2.5.21 below. NOTE: Test 44 only applies to voice capable devices that are category 2 or higher.
46. Repeat steps 1.) and 2.) for Test 45 in Table 2.5.21 below. NOTE: Test 45 only applies to voice capable devices that are category 2 or higher. Test 45 shall be omitted for category 1 devices as the data rate for the RMC in this test exceeds the maximum data rate for a category 1 device.
47. [This step removed.]
48. [This step removed.]
49. Repeat steps 1.) and 2.) for Test 48 in Table 2.5.21 below. NOTE: Test 48 only applies to voice capable devices that are category 2 or higher.
50. Repeat steps 1.) and 2.) for Test 49 in Table 2.5.21 below. NOTE: Test 49 only applies to voice capable devices that are category 2 or higher.
51. Repeat steps 1.) and 2.) for Test 50 in Table 2.5.21 below. NOTE: Test 50 only applies to voice capable devices that are category 2 or higher.
52. Repeat steps 1.) and 2.) for Test 51 in Table 2.5.21 below. NOTE: Test 51 only applies to voice capable devices that are category 2 or higher. Test 51 shall be omitted for category 1 devices as the data rate for the RMC in this test exceeds the maximum data rate for a category 1 device.

Table 2.5.21. NS_07 spurious emissions DL and UL reference measurement channel modulation and RB allocation test configuration table.

Test	Downlink Configuration		Uplink Configuration	
	Modulation	RB Allocation	Modulation	RB Allocation
Test 1	N/A	N/A	QPSK	1 RB with RBstart=0
Test 2	N/A	N/A	QPSK	8 RB with RBstart=0
Test 3	N/A	N/A	QPSK	2 RB with RBstart=13
Test 4	N/A	N/A	QPSK	20 RB with RBstart=15
Test 5	N/A	N/A	QPSK	16 RB with RBstart=19
Test 6	N/A	N/A	QPSK	20 RB with RBstart=19
Test 7	N/A	N/A	QPSK	1 RB with RBstart=49
Test 8	N/A	N/A	QPSK	6 RB with RBstart=43
Test 9	N/A	N/A	16-QAM	1 RB with RBstart=0
Test 10	N/A	N/A	QPSK	1 RB with RBstart=2
Test 11	N/A	N/A	16-QAM	8 RB with RBstart=0
Test 12	N/A	N/A	QPSK	12 RB with RBstart=0
Test 13	N/A	N/A	16-QAM	12 RB with RBstart=0
Test 14	N/A	N/A	QPSK	50 RB with RBstart=0



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Test 15*	N/A	N/A	16-QAM	50 RB with RBstart=0
Test 16	N/A	N/A	QPSK	1 RB with RBstart=11
Test 17	N/A	N/A	QPSK	6 RB with RBstart=15
Test 18	N/A	N/A	16-QAM	6 RB with RBstart=15
Test 19*	N/A	N/A	16-QAM	20 RB with RBstart=15
Test 20	N/A	N/A	QPSK	36 RB with RBstart=13
Test 21*	N/A	N/A	16-QAM	36 RB with RBstart=13
Test 22*	N/A	N/A	16-QAM	16 RB with RBstart=19
Test 23	N/A	N/A	QPSK	6 RB with RBstart=19
Test 24	N/A	N/A	16-QAM	6 RB with RBstart=19
Test 25	N/A	N/A	QPSK	6 RB with RBstart=29
Test 26	N/A	N/A	16-QAM	6 RB with RBstart=29
Test 27	N/A	N/A	QPSK	2 RB with RBstart=35
Test 28	N/A	N/A	QPSK	1 RB with RBstart=38
Test 29	N/A	N/A	QPSK	6 RB with RBstart=37
Test 30	N/A	N/A	16-QAM	6 RB with RBstart=37
Test 31	N/A	N/A	QPSK	30 RB with RBstart=19
Test 32*	N/A	N/A	16-QAM	30 RB with RBstart=19
Test 33	N/A	N/A	QPSK	1 RB with RBstart=47
Test 34	N/A	N/A	QPSK	2 RB with RBstart=48
Test 35	N/A	N/A	16-QAM	6 RB with RBstart=43
Test 36	N/A	N/A	QPSK	6 RB with RBstart=13
Test 37	N/A	N/A	16-QAM	6 RB with RBstart=13
Test 38	N/A	N/A	QPSK	20 RB with RBstart=13
Test 39*	N/A	N/A	16-QAM	20 RB with RBstart=13
Test 40	N/A	N/A	QPSK	12 RB with RBstart=13

Test 41	N/A	N/A	16-QAM	12 RB with RBstart=13
Test 42	N/A	N/A	QPSK	12 RB with RBstart=19
Test 43	N/A	N/A	16-QAM	12 RB with RBstart=19
Test 44	N/A	N/A	QPSK	25 RB with RBstart=13
Test 45*	N/A	N/A	16-QAM	30 RB with RBstart=13
Test 46	VOID	VOID	VOID	VOID
Test 47	VOID	VOID	VOID	VOID
Test 48	N/A	N/A	QPSK	16 RB with RBstart=0
Test 49	N/A	N/A	16-QAM	16 RB with RBstart=0
Test 50	N/A	N/A	QPSK	36 RB with RBstart=0
Test 51*	N/A	N/A	16-QAM	36 RB with RBstart=0

* NOTE 1: These 16-QAM tests shall be omitted for category 1 devices as the data rate for the RMC in these tests exceeds the maximum data rate for a category 1 device.

NOTE 2: Tests 44 through 51 only apply to voice capable devices that are category 2 or higher.

Test Procedure Additional Spurious Emissions

1. Set the initial conditions as per section 6.6.3.3.4.1 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing* for a 10 MHz channel in Band 13 with the following exception: set the modulation and RB allocations for the uplink and downlink reference measurement channels as per Test 1 in Table 2.5.2.1. Message contents are as per section 6.6.3.3.4.3.2 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*. The network emulator shall signal NS_07 to the UE using the message contents as per section 6.6.3.3.4.3.2 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*.
2. Follow steps 1, 2, 3, and 4 in section 6.6.3.3.4.2 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing* with the following exceptions:
 - a. In step 3 in section 6.6.3.3.4.2 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*, the UE output power shall meet the criteria for the given test case per section 2.5.4 of this document.
 - b. In step 4 in section 6.6.3.3.4.2 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*, sweep the 769-775 MHz frequency band and 3GPP frequency band 14 using a 6.25 kHz measurement bandwidth and a 1 MHz measurement bandwidth, respectively.
3. Repeat steps 1.) and 2.) for Test 2 in Table 2.5.2.1.
4. Repeat steps 1.) and 2.) for Test 3 in Table 2.5.2.1.
5. Repeat steps 1.) and 2.) for Test 4 in Table 2.5.2.1.

6. Repeat steps 1.) and 2.) for Test 5 in Table 2.5.21.
7. Repeat steps 1.) and 2.) for Test 6 in Table 2.5.21.
8. Repeat steps 1.) and 2.) for Test 7 in Table 2.5.21.
9. Repeat steps 1.) and 2.) for Test 8 in Table 2.5.21.
10. Repeat steps 1.) and 2.) for Test 9 in Table 2.5.21.
11. Repeat steps 1.) and 2.) for Test 10 in Table 2.5.21.
12. Repeat steps 1.) and 2.) for Test 11 in Table 2.5.21.
13. Repeat steps 1.) and 2.) for Test 12 in Table 2.5.21.
14. Repeat steps 1.) and 2.) for Test 13 in Table 2.5.21.
15. Repeat steps 1.) and 2.) for Test 14 in Table 2.5.21.
16. Repeat steps 1.) and 2.) for Test 15 in Table 2.5.21. NOTE: Test 15 shall be omitted for category 1 devices as the data rate for the RMC in this test exceeds the maximum data rate for a category 1 device.
17. Repeat steps 1.) and 2.) for Test 16 in Table 2.5.21.
18. Repeat steps 1.) and 2.) for Test 17 in Table 2.5.21.
19. Repeat steps 1.) and 2.) for Test 18 in Table 2.5.21.
20. Repeat steps 1.) and 2.) for Test 19 in Table 2.5.21. NOTE: Test 19 shall be omitted for category 1 devices as the data rate for the RMC in this test exceeds the maximum data rate for a category 1 device.
21. Repeat steps 1.) and 2.) for Test 20 in Table 2.5.21.
22. Repeat steps 1.) and 2.) for Test 21 in Table 2.5.21. NOTE: Test 21 shall be omitted for category 1 devices as the data rate for the RMC in this test exceeds the maximum data rate for a category 1 device.
23. Repeat steps 1.) and 2.) for Test 22 in Table 2.5.21. NOTE: Test 22 shall be omitted for category 1 devices as the data rate for the RMC in this test exceeds the maximum data rate for a category 1 device.
24. Repeat steps 1.) and 2.) for Test 23 in Table 2.5.21.
25. Repeat steps 1.) and 2.) for Test 24 in Table 2.5.21.
26. Repeat steps 1.) and 2.) for Test 25 in Table 2.5.21.
27. Repeat steps 1.) and 2.) for Test 26 in Table 2.5.21.
28. Repeat steps 1.) and 2.) for Test 27 in Table 2.5.21.
29. Repeat steps 1.) and 2.) for Test 28 in Table 2.5.21.
30. Repeat steps 1.) and 2.) for Test 29 in Table 2.5.21.
31. Repeat steps 1.) and 2.) for Test 30 in Table 2.5.21.
32. Repeat steps 1.) and 2.) for Test 31 in Table 2.5.21.
33. Repeat steps 1.) and 2.) for Test 32 in Table 2.5.21. NOTE: Test 32 shall be omitted for category 1 devices as the data rate for the RMC in this test exceeds the maximum data rate for a category 1 device.
34. Repeat steps 1.) and 2.) for Test 33 in Table 2.5.21.
35. Repeat steps 1.) and 2.) for Test 34 in Table 2.5.21.
36. Repeat steps 1.) and 2.) for Test 35 in Table 2.5.21.
37. Repeat steps 1.) and 2.) for Test 36 in Table 2.5.21.
38. Repeat steps 1.) and 2.) for Test 37 in Table 2.5.21.
39. Repeat steps 1.) and 2.) for Test 38 in Table 2.5.21.
40. Repeat steps 1.) and 2.) for Test 39 in Table 2.5.21. NOTE: Test 39 shall be omitted for category 1 devices as the data rate for the RMC in this test exceeds the maximum data rate for a category 1 device.
41. Repeat steps 1.) and 2.) for Test 40 in Table 2.5.21.

42. Repeat steps 1.) and 2.) for Test 41 in Table 2.5.21.
43. Repeat steps 1.) and 2.) for Test 42 in Table 2.5.21.
44. Repeat steps 1.) and 2.) for Test 43 in Table 2.5.21.
45. Repeat steps 1.) and 2.) for Test 44 in Table 2.5.21. **NOTE:** Test 44 only applies to voice capable devices that are category 2 or higher.
46. Repeat steps 1.) and 2.) for Test 45 in Table 2.5.21. **NOTE:** Test 45 only applies to voice capable devices that are category 2 or higher. Test 45 shall be omitted for category 1 devices as the data rate for the RMC in this test exceeds the maximum data rate for a category 1 device.
47. [This step removed.]
48. [This step removed.]
49. Repeat steps 1.) and 2.) for Test 48 in Table 2.5.21. **NOTE:** Test 48 only applies to voice capable devices that are category 2 or higher.
50. Repeat steps 1.) and 2.) for Test 49 in Table 2.5.21. **NOTE:** Test 49 only applies to voice capable devices that are category 2 or higher.
51. Repeat steps 1.) and 2.) for Test 50 in Table 2.5.21. **NOTE:** Test 50 only applies to voice capable devices that are category 2 or higher.
52. Repeat steps 1.) and 2.) for Test 51 in Table 2.5.21. **NOTE:** Test 51 only applies to voice capable devices that are category 2 or higher. Test 51 shall be omitted for category 1 devices as the data rate for the RMC in this test exceeds the maximum data rate for a category 1 device.

Expected Results

Expected Result

For all tests, the average power of the UE transmitter spurious emissions in the 769 MHz to 775 MHz frequency band shall not exceed -57 dBm/6.25 kHz (**NOTE: The test tolerance for these emissions measurements shall be 0 dB.**).

For all tests, the average power of the UE transmitter spurious emissions into the downlink band of 3GPP frequency band 14* shall not exceed the limits in Table 2.5.41 below (**NOTE: The test tolerance for these emissions measurements shall be 0 dB.**):

Table 2.5.41. 3GPP Band 14 downlink band emissions requirement for NS_07 tests.

Uplink RB Allocation Size	UE Transmit Power	Emission Limit*
<= 15 RB	<= Maximum UE output power	-60 dBm/MHz
> 15 RB and <= 50 RB	<= +10 dBm	-60 dBm/MHz
> 15 RB and <= 50 RB	> +10 dBm	-50 dBm/MHz

* For emissions testing, the downlink band of Band 14 shall be defined as 758.25 MHz to 767.75 MHz.

The UE transmitter output power shall meet the criteria in Table 2.5.42.

Table 2.5.42. UE transmitter output power criteria for NS_07 tests.

Test	UE Transmitter Output Power (dBm)	
	Voice Capable Category 2 or Higher	Data Centric; Voice Capable Category 1
Test 1	+23 dBm +2.7/-1.7 dB	+23 dBm +2.7/-14.7 dB
Test 2	+23 dBm +2.7/-1.7 dB	+23 dBm +2.7/-10.7 dB
Test 3	+23 dBm +2.7/-1.7 dB	+23 dBm +2.7/-1.7 dB
Test 4	+23 dBm +2.7/-2.7 dB	+23 dBm +2.7/-15.7 dB
Test 5	+23 dBm +2.7/-2.7 dB	+23 dBm +2.7/-2.7 dB
Test 6	+23 dBm +2.7/-2.7 dB	+23 dBm +2.7/-9.7 dB
Test 7	+23 dBm +2.7/-1.7 dB	+23 dBm +2.7/-5.7 dB



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Test 8	+23 dBm +2.7/-1.7 dB	+23 dBm +2.7/-1.7 dB
Test 9	+23 dBm +2.7/-2.7 dB	+23 dBm +2.7/-15.7 dB
Test 10	+23 dBm +2.7/-1.7 dB	+23 dBm +2.7/-14.7 dB
Test 11	+23 dBm +2.7/-2.7 dB	+23 dBm +2.7/-11.7 dB
Test 12	+23 dBm +2.7/-1.7 dB	+23 dBm +2.7/-14.7 dB
Test 13	+23 dBm +2.7/-2.7 dB	+23 dBm +2.7/-15.7 dB
Test 14	+23 dBm +2.7/-7.7 dB	+23 dBm +2.7/-15.7 dB
Test 15*	+23 dBm +2.7/-8.7 dB	+23 dBm +2.7/-16.7 dB
Test 16	+23 dBm +2.7/-1.7 dB	+23 dBm +2.7/-14.7 dB
Test 17	+23 dBm +2.7/-1.7 dB	+23 dBm +2.7/-1.7 dB
Test 18	+23 dBm +2.7/-2.7 dB	+23 dBm +2.7/-2.7 dB
Test 19*	+23 dBm +2.7/-3.7 dB	+23 dBm +2.7/-16.7 dB
Test 20	+23 dBm +2.7/-6.7 dB	+23 dBm +2.7/-15.7 dB
Test 21*	+23 dBm +2.7/-7.7 dB	+23 dBm +2.7/-16.7 dB
Test 22*	+23 dBm +2.7/-3.7 dB	+23 dBm +2.7/-3.7 dB
Test 23	+23 dBm +2.7/-1.7 dB	+23 dBm +2.7/-1.7 dB
Test 24	+23 dBm +2.7/-2.7 dB	+23 dBm +2.7/-2.7 dB
Test 25	+23 dBm +2.7/-1.7 dB	+23 dBm +2.7/-1.7 dB
Test 26	+23 dBm +2.7/-2.7 dB	+23 dBm +2.7/-2.7 dB
Test 27	+23 dBm +2.7/-1.7 dB	+23 dBm +2.7/-1.7 dB
Test 28	+23 dBm +2.7/-1.7 dB	+23 dBm +2.7/-1.7 dB
Test 29	+23 dBm +2.7/-1.7 dB	+23 dBm +2.7/-1.7 dB
Test 30	+23 dBm +2.7/-2.7 dB	+23 dBm +2.7/-2.7 dB
Test 31	+23 dBm +2.7/-2.7 dB	+23 dBm +2.7/-9.7 dB
Test 32*	+23 dBm +2.7/-3.7 dB	+23 dBm +2.7/-10.7 dB
Test 33	+23 dBm +2.7/-1.7 dB	+23 dBm +2.7/-5.7 dB
Test 34	+23 dBm +2.7/-1.7 dB	+23 dBm +2.7/-5.7 dB
Test 35	+23 dBm +2.7/-2.7 dB	+23 dBm +2.7/-2.7 dB
Test 36	+23 dBm +2.7/-1.7 dB	+23 dBm +2.7/-1.7 dB
Test 37	+23 dBm +2.7/-2.7 dB	+23 dBm +2.7/-2.7 dB
Test 38	+23 dBm +2.7/-2.7 dB	+23 dBm +2.7/-15.7 dB
Test 39*	+23 dBm +2.7/-3.7 dB	+23 dBm +2.7/-16.7 dB
Test 40	+23 dBm +2.7/-1.7 dB	+23 dBm +2.7/-14.7 dB
Test 41	+23 dBm +2.7/-2.7 dB	+23 dBm +2.7/-15.7 dB
Test 42	+23 dBm +2.7/-1.7 dB	+23 dBm +2.7/-1.7 dB
Test 43	+23 dBm +2.7/-2.7 dB	+23 dBm +2.7/-2.7 dB
Test 44	+23 dBm +2.7/-6.7 dB	N/A
Test 45*	+23 dBm +2.7/-7.7 dB	N/A
Test 46	VOID	N/A



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Test 47	VOID	N/A
Test 48	+23 dBm +2.7/-7.7 dB	N/A
Test 49	+23 dBm +2.7/-8.7 dB	N/A
Test 50	+23 dBm +2.7/-7.7 dB	N/A
Test 51*	+23 dBm +2.7/-8.7 dB	N/A

* NOTE: These 16-QAM tests shall be omitted for category 1 devices as the data rate for the RMC in these tests exceeds the maximum data rate for a category 1 device.

2.5.2 UE Maximum Output Power with Additional Requirements (A-MPR)

VZ_TC_SUPRFCONF13-3517206

This TC is generated for TECC Creation

Patvi15s

2.5.3 Additional Spurious Emissions VZ_TC_SUPRFCONF13-3517948

TC generated for TECC Creation

Patvi15s

2.6 TRANSMITTER LO AND IMAGE SUPPRESSION (IQ COMPONENT AND IMAGE) VZ_TC_SUPRCONF_1631

Definition

This test verifies that the UE meets Verizon Wireless requirements for UE LO and image suppression (i.e. IQ component and image).

Traceability

- Verizon Wireless LTE 3GPP Band 13 Network Access Device Requirements, Section *Verizon Wireless-Specific LTE 3GPP Band 13 RF Performance Requirements*
- 3GPP TS 36.101: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception*, sections 6.5.2.2 and 6.5.2.3
- 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*, sections 6.5.2.2 and 6.5.2.3

Applicability

This test case applies to all UEs designed to operate on the Verizon Wireless LTE 3GPP Band 13 network.

Design Steps
Step Name
Step 1
Pre-Conditions
Procedures
<p>The device vendor shall execute one of the procedures below.</p> <p>Option 1 Test Procedure - GCF with Operator Limits</p> <p>Execute GCF test case 36.521-1 6.5.2.2 and 6.5.2.3 and apply the VZW operator limits in the "expected results" section below. NOTE: The device vendor may re-use the test results from GCF certification testing.</p> <p>Option 2 Test Procedure - VZW</p> <p>Test Procedure LO Leakage (i.e. IQ Component)</p> <ol style="list-style-type: none"> Set the initial conditions as per section 6.5.2.2.4.1 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i> for a 10 MHz channel in Band 13

with the following exception: set the modulation and RB allocations for the uplink and downlink reference measurement channels as per Test 1 in Table 2.6.21 below. Message contents are as per section 6.5.2.2.4.3 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*.

2. Follow step 1 in section 6.5.2.2.4.2 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*.
3. Send continuous power control "up" commands to the UE until the UE output power shall be maximum level.
4. Measure the IQ offset using Global In-Channel Tx-Test (per Annex E of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*).
5. Set the output power level of the UE to +2 dBm with a 2 dB tolerance or send uplink power control commands to the UE to ensure that the UE output is +2 dBm +/- 2 dB for the duration of the measurement.
6. Measure the IQ offset using Global In-Channel Tx-Test (per Annex E of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*).
7. Set the output power level of the UE to -28 dBm with a 2 dB tolerance or send uplink power control commands to the UE to ensure that the UE output is -28 dBm +/- 2 dB for the duration of the measurement.
8. Measure the IQ offset using Global In-Channel Tx-Test (per Annex E of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*).
9. Set the output power level of the UE to -38 dBm with a 2 dB tolerance or send uplink power control commands to the UE to ensure that the UE output is -38 dBm +/- 2 dB for the duration of the measurement.
10. Measure the IQ offset using Global In-Channel Tx-Test (per Annex E of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*).
11. Repeat steps 1.) through 10.) for Test 2 in Table 2.6.21 below.
12. Repeat steps 1.) through 10.) for Test 3 in Table 2.6.21 below.
13. Set the initial conditions as per section 6.5.2.2.4.1 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing* for a 10 MHz channel in Band 13 with the following exceptions:

1. Set the modulation and RB allocations for the uplink and downlink reference measurement channels as per Test 1 in Table 2.6.21 below.
2. Message contents are as per section 6.5.2.2.4.3 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing* with the exception that the network emulator shall signal NS_07 to the UE using the message contents defined in section 6.6.2.2.4.3.3 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*.
14. Repeat steps 2.) through 10.).
15. Repeat steps 13.) and 14.) for Test 2 in Table 2.6.21 below.
16. Repeat steps 13.) and 14.) for Test 3 in Table 2.6.21 below.

Table 2.6.21. Transmitter LO and image suppression DL and UL reference measurement channel modulation and RB allocation test configuration table.

Test	Downlink Configuration		Uplink Configuration	
	Modulation	RB Allocation	Modulation	RB Allocation
Test 1	N/A	N/A	QPSK	1 RB with RBstart=0
Test 2	N/A	N/A	QPSK	1 RB with RBstart=13
Test 3	N/A	N/A	QPSK	1 RB with RBstart=49

Test Procedure Image Suppression (i.e. In-Band Emissions for Non-Allocated RB - PUSCH)

1. Set the initial conditions as per section 6.5.2.3.4.1 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing* for a 10 MHz channel in Band 13 with the following exception: set the modulation and RB allocations for the uplink and downlink reference measurement channels as per Test 1 in Table 2.6.21. Message contents are as per section 6.5.2.3.4.3 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*.
2. Follow step 1.1 in section 6.5.2.3.4.2 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*.
3. Send continuous power control "up" commands to the UE until the UE output power shall be

maximum level.

4. Measure the image leakage using Global In-Channel Tx-Test (per Annex E of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*).
5. Set the output power level of the UE to +2 dBm with a 2 dB tolerance or send uplink power control commands to the UE to ensure that the UE output is +2 dBm +/- 2 dB for the duration of the measurement.
6. Measure the image leakage using Global In-Channel Tx-Test (per Annex E of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*).
7. Set the output power level of the UE to -28 dBm with a 2 dB tolerance or send uplink power control commands to the UE to ensure that the UE output is -28 dBm +/- 2 dB for the duration of the measurement.
8. Measure the image leakage using Global In-Channel Tx-Test (per Annex E of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*).
9. Set the output power level of the UE to -38 dBm with a 2 dB tolerance or send uplink power control commands to the UE to ensure that the UE output is -38 dBm +/- 2 dB for the duration of the measurement.
10. Measure the image leakage using Global In-Channel Tx-Test (per Annex E of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*).
11. Repeat steps 1.) through 10.) for Test 2 in Table 2.6.21.
12. Repeat steps 1.) through 10.) for Test 3 in Table 2.6.21.
13. Set the initial conditions as per section 6.5.2.3.4.1 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing* for a 10 MHz channel in Band 13 with the following exception:
 1. Set the modulation and RB allocations for the uplink and downlink reference measurement channels as per Test 1 in Table 2.6.21.
 2. Message contents are as per section 6.5.2.3.4.3 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing* with the exception that the network emulator shall signal NS_07 to the UE using the message contents defined in section 6.6.2.2.4.3.3 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*.

14. Repeat steps 2.) through 10.).
15. Repeat steps 13.) and 14.) for Test 2 in Table 2.6.21.
16. Repeat steps 13.) and 14.) for Test 3 in Table 2.6.21.

Expected Results

Expected Result - Option 1 - GCF with Operator Limits

For all tests, the LO and image leakage power shall meet the requirements in Table 2.6.4-1 below.

Table 2.6.4-1. Criteria for LO and image suppression.

UE Transmitter Output Power	Limit	
	LO	Image
Output power > 0 dBm	-27.2 dBc	-29.2 dB
-30 dBm <= Output power <= 0 dBm	-19.2 dBc	-24.2 dB
-40 dBm <= Output power < -30 dBm	-9.2 dBc	-24.2 dB

Expected Result - Option 2 - VZW Test Procedure

For all tests, the LO and image leakage power shall meet the requirements in Table 2.6.4-2 below.

Table 2.6.4-2. Criteria for LO and image suppression.

UE Transmitter Output Power	Limit	
	LO	Image
Output power > 0 dBm	-27.2 dBc	-29.2 dB
-30 dBm <= Output power <= 0 dBm	-19.2 dBc	-24.2 dB
-40 dBm <= Output power < -30 dBm	-9.2 dBc	-24.2 dB

The UE transmit output power at maximum (i.e. the network emulator sends continuous power control "up" commands to the UE) shall meet the requirements in Table 2.6.4-3 below.

Table 2.6.4-3. UE transmit output power at maximum (continuous power control "up" commands to the UE).

Test	Modulation	RB allocation	Output Power at Maximum		
			NS_07 Disabled	NS_07 Enabled (Voice Capable Category 2 or Higher)	NS_07 Enabled (Data Centric; Voice Capable Category 1)
1	QPSK	1 RB with RBstart=0	+23 dBm +2.7/-1.7 dB	+23 dBm +2.7/-1.7 dB	+23 dBm +2.7/-14.7 dB
2	QPSK	1 RB with RBstart=13	+23 dBm +2.7/-1.7 dB	+23 dBm +2.7/-1.7 dB	+23 dBm +2.7/-1.7 dB
3	QPSK	1 RB with RBstart=49	+23 dBm +2.7/-1.7 dB	+23 dBm +2.7/-1.7 dB	+23 dBm +2.7/-5.7 dB

2.6.2 LO Leakage (i.e. IQ Component) VZ_TC_SUPRFCONF13-3518647

TC generated for TECC Creation

Patvis

2.6.3 Image Suppression (i.e. In-Band Emissions for Non-Allocated RB)

VZ_TC_SUPRFCONF13-3518664

TC generated for TECC Creation

Patvi15s

2.7 PUCCH OVER-PROVISIONING FUNCTIONAL TEST VZ_TC_SUPRFCONF_1632

Definition

This test verifies that the UE meets Verizon Wireless requirements for PUCCH over-provisioning. This is a functional test. The current version of this test case is built on the reference sensitivity test in section 7.3 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*. Verizon Wireless is also evaluating the option of using a performance test from section 8.2 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing* as the foundation for this test case. As a result, this test case may be adjusted in a future version of this document.

Traceability

- Verizon Wireless LTE 3GPP Band 13 Network Access Device Requirements, Section *Verizon Wireless-Specific LTE 3GPP Band 13 RF Performance Requirements*
- 3GPP TS 36.213: *Evolved Universal Terrestrial Radio Access (E-UTRA); Physical Layer Procedures*, sections 7, 8, and 10
- 3GPP TS 36.101: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception*, section 7.3
- 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*, section 7.3

Applicability

This test case applies to all UEs designed to operate on the Verizon Wireless LTE 3GPP Band 13 network.

Design Steps
Step Name
Step 1
Pre-Conditions
Procedures
Test Procedure <ol style="list-style-type: none"> Set the initial conditions as per section 7.3.4.1 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i> for a 10 MHz channel in Band 13 with the following exceptions: <ol style="list-style-type: none"> Set the modulation and RB allocations for the uplink and downlink reference measurement channels as per Table 2.7.21 below. Set the network emulator to provision the PUCCH as per Table 2.7.22 below for Test 1. The UE shall send ACK/NACK back to the network emulator via the PUCCH. PUSCH shall not be allocated in any subframes. Follow steps 1 through 5 in section 7.3.4.2 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i> (Message contents are as per section 7.3.4.3 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i>.) with the following exceptions: <ol style="list-style-type: none"> Set the downlink signal level to REFSSENS + 6 dB where the value for REFSSENS for a 10 MHz channel in Band 13 shall be -97 dBm. The network emulator shall signal NS₀₇ to the UE using the message contents defined in section 6.6.2.2.4.3.4 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i>. (Alternatively, the network emulator may signal NS₀₇ to the UE as

part of step 1.)

c. Allocate the PUCCH and PUSCH per step 1.) above.

d. Enable SRS with the default SRS settings defined in 3GPP TS 36.508: *Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Packet Core (EPC); Common test environments for User Equipment (UE) conformance testing*.

3. Repeat steps 1.) and 2.) for Test 2 in Table 2.7.22 below.

Table 2.7.21. PUCCH over-provisioning functional test DL and UL reference measurement channel modulation and RB allocation test configuration table.

Test	Downlink Configuration		Uplink Configuration	
	Modulation	RB Allocation	Modulation	RB Allocation
All	QPSK	50	N/A	N/A

Table 2.7.22. PUCCH over-provisioning parameters.

Parameter	Test 1	Test 2
PUCCH Allocation	2 x 14 RB	2 x 15 RB
RB Utilized for PUCCH	RBs 13 and 36	RBs 14 and 35
"Blanked" PUCCH RB	RBs 0-12 and 37-49	RBs 0-13 and 36-49
PUCCH Format	1A	1A
PRACH Frequency Offset	15 RB	16 RB

Expected Results

Expected Result

Verify that the ACK/NACKs are received on the proper PUCCH assignment.

2.8 CONFIGURED OUTPUT POWER VZ_TC_SUPRFCONF_1639

Definition

This test verifies that the UE meets Verizon Wireless requirements for configured output power using the standard 3GPP test procedure. Compliance to Verizon Wireless requirements for configured output power is also indirectly verified in tests 2.1, 2.2, and 2.5.

Traceability

- Verizon Wireless LTE 3GPP Band 13 Network Access Device Requirements, Section *Verizon Wireless-Specific LTE 3GPP Band 13 RF Performance Requirements*
- 3GPP TS 36.101: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception*, section 6.2.5
- 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*, section 6.2.5

Applicability

This test case applies to all UEs designed to operate on the Verizon Wireless LTE 3GPP Band 13 network.

Design Steps
Step Name
Step 1
Pre-Conditions
Procedures
<p>The device vendor shall execute one of the procedures below.</p> <p>Option 1 Test Procedure - GCF with Operator Limits</p> <p>Execute GCF test case 36.521-1 6.2.5 and apply the VZW operator limits in the "expected results" section below. NOTE: The device vendor may re-use the test results from GCF certification testing.</p> <p>Option 2 Test Procedure - VZW</p> <ol style="list-style-type: none"> 1. Set the initial conditions as per section 6.2.5.4.1 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i> for a 10 MHz channel in Band 13. Message contents are as per section 6.2.5.4.3 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i>.

2. Follow steps 1 and 2 in section 6.2.5.4.2 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing.*

Expected Results

Expected Result

The UE maximum output power shall not exceed the values specified in Table below:

Table - Criteria for configured output power (i.e. PCMAX)

Test Point	Limit
Measured UE output power test point 1	-10 dBm +/- 7.7 dB
Measured UE output power test point 2	+10 dBm +/- 2.7 dB
Measured UE output power test point 3	+15 dBm +/- 2.7 dB

2.9 SPURIOUS EMISSIONS WITH TX GATING VZ_TC_SUPRFCONF_1633

Definition

This test verifies that the UE meets Verizon Wireless requirements for UE transmitter spurious emissions with the UE transmitter operating on a duty cycle less than 100%.

Traceability

- Verizon Wireless LTE 3GPP Band 13 Network Access Device Requirements, Section *Verizon Wireless-Specific LTE 3GPP Band 13 RF Performance Requirements*
- 3GPP TS 36.101: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception*, sections 6.2.4, 6.6.3.2, and 6.6.3.3.2
- 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*, sections 6.2.4, 6.6.3.2, and 6.6.3.3.2

Applicability

This test case applies to all UEs designed to operate on the Verizon Wireless LTE 3GPP Band 13 network.

Design Steps
Step Name
Step 1
Pre-Conditions
Procedures
<p>Test Procedure</p> <ol style="list-style-type: none"> 1. Set the initial conditions as per section 6.6.3.2.4.1 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i> for a 10 MHz channel in Band 13 with the following exception: set the modulation and RB allocations for the uplink and downlink reference measurement channels as per Test 1 in Table 2.9.2-1 below. 2. Follow steps 1, 2, and 3 in section 6.6.3.2.4.2 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i> with the following exception: the network emulator shall set the UE transmitter for a 1/2 duty cycle, i.e. the network emulator shall schedule the UE for the first subframe only out of every 2 uplink subframes. Message contents are as per section 6.6.3.2.4.3 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i>. All emissions measurements shall be averaged over 20 consecutive, active subframes. Measure the UE emissions into the downlink of 3GPP Bands 5, 12, and 14 and the 1559-1610 MHz band. The 1559-1610 MHz band shall be measured using a 1 MHz measurement bandwidth as follows. <ol style="list-style-type: none"> a. 1559.00-1574.42 MHz b. 1574.42-1576.42 MHz c. 1576.42-1610.00 MHz 3. Repeat steps 1.) and 2.) for Test 2 in Table 2.9.2-1 below. 4. Repeat steps 1.) and 2.) for Test 3 in Table 2.9.2-1 below. 5. Repeat steps 1.) and 2.) for Test 4 in Table 2.9.2-1 below. 6. Repeat steps 1.) and 2.) for Test 5 in Table 2.9.2-1 below. 7. Repeat steps 1.) and 2.) for Test 6 in Table 2.9.2-1 below.

8. Repeat steps 1.) and 2.) for Test 7 in Table 2.9.2-1 below.
9. Repeat steps 1.) and 2.) for Test 8 in Table 2.9.2-1 below.
10. Repeat steps 1.) and 2.) for Test 9 in Table 2.9.2-1 below.
11. Repeat steps 1.) and 2.) for Test 10 in Table 2.9.2-1 below.
12. Repeat steps 1.) and 2.) for Test 11 in Table 2.9.2-1 below. **NOTE:** Test 11 shall be omitted for category 1 devices as the data rate for the RMC in this test exceeds the maximum data rate for a category 1 device.
13. Set the initial conditions as per section 6.6.3.3.4.1 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing* for a 10 MHz channel in Band 13 with the following exception: set the modulation and RB allocations for the uplink and downlink reference measurement channels as per Test 12 in Table 2.9.2-1. Message contents are as per section 6.6.3.3.4.3.2 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*. The network emulator shall signal NS_07 to the UE using the message contents as per section 6.6.3.3.4.3.2 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*.
14. Follow steps 1, 2, 3, and 4 in section 6.6.3.3.4.2 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing* with the following exceptions:
 - a. The network emulator shall set the UE transmitter for a 1/2 duty cycle, i.e. the network emulator shall schedule the UE for the first subframe only out of every 2 uplink subframes.
 - b. In step 3 in section 6.6.3.3.4.2 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*, the UE output power shall meet the criteria for the given test case per section 2.9.3 of this document.
 - c. In step 4 in section 6.6.3.3.4.2 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*, sweep the 769-775 MHz frequency band and 3GPP frequency band 14 using a 6.25 kHz measurement bandwidth and a 1 MHz measurement bandwidth, respectively. All emissions measurements shall be averaged over 20 consecutive, active subframes.
15. Repeat steps 13.) and 14.) for Test 13 in Table 2.9.2-1 below.
16. Repeat steps 13.) and 14.) for Test 14 in Table 2.9.2-1 below.
17. Repeat steps 13.) and 14.) for Test 15 in Table 2.9.2-1 below. **NOTE:** Test 15 shall be omitted for category 1 devices as the data rate for the RMC in this test exceeds the maximum data rate for a category 1 device.
18. Repeat steps 13.) and 14.) for Test 16 in Table 2.9.2-1 below.
19. Repeat steps 13.) and 14.) for Test 17 in Table 2.9.2-1 below.

Table 2.9.2.1. Spurious emissions with Tx gating DL and UL reference measurement channel modulation and RB allocation test configuration table.

Test	Downlink Configuration		Uplink Configuration	
	Modulation	RB Allocation	Modulation	RB Allocation
Test 1	N/A	N/A	QPSK	1 RB with RBstart=0
Test 2	N/A	N/A	QPSK	1 RB with RBstart=49
Test 3	N/A	N/A	QPSK	2 RB with RBstart=0
Test 4	N/A	N/A	QPSK	2 RB with RBstart=48
Test 5	N/A	N/A	QPSK	12 RB with RBstart=0
Test 6	N/A	N/A	QPSK	12 RB with RBstart=20
Test 7	N/A	N/A	QPSK	12 RB with RBstart=38
Test 8	N/A	N/A	QPSK	15 RB with RBstart=0
Test 9	N/A	N/A	QPSK	15 RB with RBstart=35
Test 10	N/A	N/A	QPSK	50 RB with RBstart=0
Test 11	N/A	N/A	16-QAM	50 RB with RBstart=0

Test 12	N/A	N/A	QPSK	8 RB with RBstart=0
Test 13	N/A	N/A	QPSK	2 RB with RBstart=13
Test 14	N/A	N/A	QPSK	16 RB with RBstart=19
Test 15	N/A	N/A	16-QAM	16 RB with RBstart=19
Test 16	N/A	N/A	QPSK	6 RB with RBstart=13
Test 17	N/A	N/A	16-QAM	6 RB with RBstart=13

Expected Results

Expected Result

For tests 1 through 9, the average power of the UE transmitter spurious emissions into the downlink bands of 3GPP frequency bands 5, 12, and 14* shall not exceed -60 dBm/MHz (**NOTE: The test tolerance for these emissions measurements shall be 0 dB.**). For tests 10 and 11, the average power of the UE transmitter spurious emissions into the downlink bands of 3GPP frequency bands 5, 12, and 14* shall not exceed -50 dBm/MHz (**NOTE: The test tolerance for these emissions measurements shall be 0 dB.**). For emissions testing, the downlink band of Band 14 shall be defined as 758.25 MHz to 767.75 MHz.

For tests 1 through 11, the average power of the UE transmitter spurious emissions into the 1559-1610 MHz shall not exceed the values in Table 2.9.3-1 below (**NOTE: The test tolerance for these emissions measurements shall be 0 dB.**):

Table 2.9.3-1. Emissions limit for the 1559-1610 MHz band.

Frequency	Emission Limit
1559.00-1574.42 MHz	<= -60 dBm/MHz
1574.42 MHz 1576.42 MHz	<= -80 dBm/MHz
1576.42 MHz 1610.00 MHz	<= -60 dBm/MHz

For tests 12 through 17, the average power of the UE transmitter spurious emissions in the 769 MHz to 775 MHz frequency band shall not exceed -57 dBm/6.25 kHz (**NOTE: The test tolerance for these emissions measurements shall be 0 dB.**). For tests 12 through 17, the average power of the UE transmitter spurious emissions into the downlink band of 3GPP frequency band 14* shall not exceed the limits in Table 2.9.3-2 below (**NOTE: The test tolerance for these emissions measurements shall be 0 dB.**):

Table 2.9.3-2. 3GPP Band 14 downlink band emissions requirement for spurious emissions with Tx gating tests 12 through 17.

Uplink RB Allocation Size	UE Transmit Power	Emission Limit*
<= 15 RB	<= Maximum UE output power	-60 dBm/MHz
> 15 RB and <= 50 RB	<= +10 dBm	-60 dBm/MHz
> 15 RB and <= 50 RB	> +10 dBm	-50 dBm/MHz

* For emissions testing, the downlink band of Band 14 shall be defined as 758.25 MHz to 767.75 MHz.

The UE transmitter output power shall meet the criteria in Table 2.9.3-3 below.

Table 2.9.3-3. UE transmitter output power criteria for spurious emissions with Tx gating tests.

Test	UE Transmitter Output Power (dBm)
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	Voice Capable Category 2 or Higher	Data Centric; Voice Capable Category 1
Test 1	+23 dBm +2.7/-1.7 dB	+23 dBm +2.7/-1.7 dB
Test 2	+23 dBm +2.7/-1.7 dB	+23 dBm +2.7/-1.7 dB
Test 3	+23 dBm +2.7/-1.7 dB	+23 dBm +2.7/-1.7 dB
Test 4	+23 dBm +2.7/-1.7 dB	+23 dBm +2.7/-1.7 dB
Test 5	+23 dBm +2.7/-1.7 dB	+23 dBm +2.7/-1.7 dB
Test 6	+23 dBm +2.7/-1.7 dB	+23 dBm +2.7/-1.7 dB
Test 7	+23 dBm +2.7/-1.7 dB	+23 dBm +2.7/-1.7 dB
Test 8	+23 dBm +2.7/-2.7 dB	+23 dBm +2.7/-2.7 dB
Test 9	+23 dBm +2.7/-2.7 dB	+23 dBm +2.7/-2.7 dB
Test 10	+23 dBm +2.7/-2.7 dB	+23 dBm +2.7/-2.7 dB
Test 11	+23 dBm +2.7/-3.7 dB	+23 dBm +2.7/-3.7 dB
Test 12	+23 dBm +2.7/-1.7 dB	+23 dBm +2.7/-10.7 dB
Test 13	+23 dBm +2.7/-1.7 dB	+23 dBm +2.7/-1.7 dB
Test 14	+23 dBm +2.7/-2.7 dB	+23 dBm +2.7/-2.7 dB
Test 15	+23 dBm +2.7/-3.7 dB	+23 dBm +2.7/-3.7 dB
Test 16	+23 dBm +2.7/-1.7 dB	+23 dBm +2.7/-1.7 dB
Test 17	+23 dBm +2.7/-2.7 dB	+23 dBm +2.7/-2.7 dB

3.1 REFERENCE SENSITIVITY DUAL RECEIVER (QPSK) VZ_TC_SUPRFCONF_1634

Definition

This test verifies that the UE meets Verizon Wireless requirements for UE receiver reference sensitivity for dual receiver operation.

Traceability

- Verizon Wireless LTE 3GPP Band 13 Network Access Device Requirements, Section *Verizon Wireless-Specific LTE 3GPP Band 13 RF Performance Requirements*
- 3GPP TS 36.101: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception*, section 7.3
- 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*, section 7.3

Applicability

This test case applies to all UEs designed to operate on the Verizon Wireless LTE 3GPP Band 13 network.

Design Steps
Step Name
Step 1
Pre-Conditions
Procedures
<p>Test Procedure</p> <p>NOTE: For downlink reference measurement channels with partial RB allocations, the network emulator shall fill all unused downlink RBs with PDSCH data for "virtual UEs" using the two sided dynamic OCNG Pattern OP.2 FDD described in Annex A.5.1.2 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i>. The power per RB shall be the same across the channel. For reference sensitivity tests with partial downlink RB allocations, the downlink signal strength refers to the power of the entire channel.</p> <ol style="list-style-type: none"> 1. Set the initial conditions as per section 7.3.4.1 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i> for a 10 MHz channel in Band 13 with the following exception: set the modulation and RB allocations for the uplink and downlink reference measurement channels as per Test 1 in Table 3.1.2-1 below. 2. Follow steps 1 through 5.) in section 7.3.4.2 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i> with the following exception: set the downlink signal level to $REFSENS + 0.7 \text{ dB (TT)}$ where the value for REFSENS for a 10 MHz channel in Band 13 shall be -97 dBm. Message contents are as per section 7.3.4.3 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i>. 3. Repeat steps 1.) and 2.) for Test 2 in Table 3.1.2-1 below. 4. Repeat steps 1.) and 2.) for Test 3 in Table 3.1.2-1 below. 5. Repeat steps 1.) and 2.) for Test 4 in Table 3.1.2-1 below. 6. Repeat steps 1.) and 2.) for Test 5 in Table 3.1.2-1 below. 7. Repeat steps 1.) and 2.) for Test 6 in Table 3.1.2-1 below. 8. Repeat steps 1.) and 2.) for Test 7 in Table 3.1.2-1 below.

9. Repeat steps 1.) and 2.) for Test 8 in Table 3.1.2-1 below.
10. Repeat steps 1.) and 2.) for Test 9 in Table 3.1.2-1 below.
11. Repeat steps 1.) and 2.) for Test 10 in Table 3.1.2-1 below.
12. Repeat steps 1.) and 2.) for Test 11 in Table 3.1.2-1 below.
13. Repeat step 1.) for Test 12 in Table 3.1.2-1 below.
14. Follow steps 1 and 2 in section 7.3.4.2 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing.*
15. Set the output power level of the UE to -2 dBm with a 2.0 dB tolerance or send uplink power control commands to the UE to ensure that the UE output is -2 dBm +/- 2.0 dB for the duration of the throughput measurement.
16. Follow steps 3 and 4 in section 7.3.4.2 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing* with the following exception: set the downlink signal level to REFSENS + 0.7 dB (TT) where the value for REFSENS for a 10 MHz channel in Band 13 shall be -97 dBm. Message contents are as per section 7.3.4.3 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing.*

Table 3.1.2-1. Reference sensitivity (with dual receiver operation) DL and UL reference measurement channel modulation and RB allocation test configuration table.

Test	Downlink Configuration		Uplink Configuration	
	Modulation	RB Allocation	Modulation	RB Allocation
Test 1	QPSK	1 RB with RBstart=0	QPSK	1 RB with RBstart=0
Test 2	QPSK	1 RB with RBstart=25	QPSK	1 RB with RBstart=0
Test 3	QPSK	1 RB with RBstart=49	QPSK	1 RB with RBstart=0
Test 4	QPSK	2 RB with RBstart=0	QPSK	2 RB with RBstart=0
Test 5	QPSK	2 RB with RBstart=24	QPSK	2 RB with RBstart=0
Test 6	QPSK	2 RB with RBstart=48	QPSK	2 RB with RBstart=0
Test 7	QPSK	6 RB with RBstart=0	QPSK	6 RB with RBstart=0
Test 8	QPSK	6 RB with RBstart=22	QPSK	6 RB with RBstart=0
Test 9	QPSK	6 RB with RBstart=44	QPSK	6 RB with RBstart=0
Test 10	QPSK	50	QPSK	12 RB with RBstart=0
Test 11	QPSK	50	QPSK	15 RB with RBstart=0
Test 12	QPSK	50	QPSK	50 RB with RBstart=0

Expected Results

Expected Result

The throughput shall be >= 95% of the maximum throughput of the reference measurement channel as specified in Table 3.1.3-1 below.

Table 3.1.3-1. Maximum throughput for reference measurement channel for reference sensitivity with dual receiver operation tests.

Test	Maximum Throughput Averaged Over 1 Frame (kbps)*
Test 1	64.8
Test 2	60.0
Test 3	64.8
Test 4	158.4
Test 5	148.0
Test 6	158.4
Test 7	453.6
Test 8	428.8
Test 9	453.6
Test 10	3952.8
Test 11	3952.8
Test 12	3952.8

* As per Annex A.3.2 in 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing and the Reference Measurement Channels* section of this document.

The UE transmit output power at maximum (i.e. the network emulator sends continuous power control "up" commands to the UE) shall meet the requirements in Table 3.1.3-2 below.

Table 3.1.3-2. UE transmit output power at maximum (continuous power control "up" commands to the UE).

Test	Modulation	RB allocation	Output Power at Maximum
1	QPSK	1 RB with RBstart=0	+23 dBm +2.7/-1.7 dB
2	QPSK	1 RB with RBstart=0	+23 dBm +2.7/-1.7 dB
3	QPSK	1 RB with RBstart=0	+23 dBm +2.7/-1.7 dB
4	QPSK	2 RB with RBstart=0	+23 dBm +2.7/-1.7 dB
5	QPSK	2 RB with RBstart=0	+23 dBm +2.7/-1.7 dB
6	QPSK	2 RB with RBstart=0	+23 dBm +2.7/-1.7 dB
7	QPSK	6 RB with RBstart=0	+23 dBm +2.7/-1.7 dB
8	QPSK	6 RB with RBstart=0	+23 dBm +2.7/-1.7 dB



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9	QPSK	6 RB with RBstart=0	+23 dBm +2.7/-1.7 dB
10	QPSK	12 RB with RBstart=0	+23 dBm +2.7/-1.7 dB
11	QPSK	15 RB with RBstart=0	+23 dBm +2.7/-2.7 dB

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3.2 REFERENCE SENSITIVITY SINGLE RECEIVER (QPSK) VZ_TC_SUPRFCONF_1635

Definition

This test verifies that the UE meets Verizon Wireless requirements for UE receiver reference sensitivity with single receiver operation. This test is required to support radiated performance testing as per the Verizon Wireless LTE Over-the-Air Radiated Performance Test Plan.

Traceability

- Verizon Wireless LTE 3GPP Band 13 Network Access Device Requirements, Section *Verizon Wireless-Specific LTE 3GPP Band 13 RF Performance Requirements*
- 3GPP TS 36.101: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception*, section 7.3
- 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*, section 7.3

Applicability

This test case applies to all UEs designed to operate on the Verizon Wireless LTE 3GPP Band 13 network.

Design Steps
Step Name
Step 1
Pre-Conditions
Procedures
<p>Test Procedure Primary Receiver</p> <p>NOTE: For downlink reference measurement channels with partial RB allocations, the network emulator shall fill all unused downlink RBs with PDSCH data for "virtual UEs" using the two sided dynamic OCNG Pattern OP.2 FDD described in Annex A.5.1.2 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i>. The power per RB shall be the same across the channel. For reference sensitivity tests with partial downlink RB allocations, the downlink signal strength refers to the power of the entire channel.</p> <ol style="list-style-type: none"> 1. Set the initial conditions as per section 7.3.4.1 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i> for a 10 MHz channel in Band 13 with the following exceptions: <ol style="list-style-type: none"> a. Set the modulation and RB allocations for the uplink and downlink reference measurement channels as per Test 1 in Table 3.2.21 below. b. Terminate the secondary/MIMO receiver in 50 ohms. (Alternatively, the test platform may present AWGN to the secondary/MIMO receiver at a power level equal to the downlink signal level presented to the primary receiver during the test.) 2. Follow steps 1.) through 5.) in section 7.3.4.2 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i> with the following exception: set the downlink signal level to $REFSENS + 0.7$ dB (TT) where the value for REFSENS for a 10 MHz channel in Band 13 for single receiver operation shall be -94 dBm. Message contents are as per section 7.3.4.3 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i>. 3. Repeat steps 1.) and 2.) for Test 2 in Table 3.2.21 below. 4. Repeat steps 1.) and 2.) for Test 3 in Table 3.2.21 below. 5. Repeat steps 1.) and 2.) for Test 4 in Table 3.2.21 below.

6. Repeat steps 1.) and 2.) for Test 5 in Table 3.2.2.1 below.
7. Repeat steps 1.) and 2.) for Test 6 in Table 3.2.2.1 below.
8. Repeat steps 1.) and 2.) for Test 7 in Table 3.2.2.1 below.
9. Repeat steps 1.) and 2.) for Test 8 in Table 3.2.2.1 below.
10. Repeat steps 1.) and 2.) for Test 9 in Table 3.2.2.1 below.
11. Repeat steps 1.) and 2.) for Test 10 in Table 3.2.2.1 below.
12. Repeat steps 1.) and 2.) for Test 11 in Table 3.2.2.1 below.
13. Repeat step 1.) for Test 12 in Table 3.2.2.1 below.
14. Follow steps 1.) through 5.) in section 7.3.4.2 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing* with the following exceptions:
 - a. Set the output power level of the UE to -2 dBm with a 2.0 dB tolerance or send uplink power control commands to the UE to ensure that the UE output is -2 dBm +/- 2.0 dB for the duration of the throughput measurement.
 - b. Set the downlink signal level to REFSENS + 0.7 dB (TT) where the value for REFSENS for a 10 MHz channel in Band 13 for single receiver operation shall be -94 dBm. Message contents are as per section 7.3.4.3 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*.

Table 3.2.2.1. Reference sensitivity (with single receiver operation) DL and UL reference measurement channel modulation and RB allocation test configuration table.

Test	Downlink Configuration		Uplink Configuration	
	Modulation	RB Allocation	Modulation	RB Allocation
Test 1	QPSK	1 RB with RBstart=0	QPSK	1 RB with RBstart=0
Test 2	QPSK	1 RB with RBstart=25	QPSK	1 RB with RBstart=0
Test 3	QPSK	1 RB with RBstart=49	QPSK	1 RB with RBstart=0
Test 4	QPSK	2 RB with RBstart=0	QPSK	2 RB with RBstart=0
Test 5	QPSK	2 RB with RBstart=24	QPSK	2 RB with RBstart=0
Test 6	QPSK	2 RB with RBstart=48	QPSK	2 RB with RBstart=0
Test 7	QPSK	6 RB with RBstart=0	QPSK	6 RB with RBstart=0
Test 8	QPSK	6 RB with RBstart=22	QPSK	6 RB with RBstart=0
Test 9	QPSK	6 RB with RBstart=44	QPSK	6 RB with RBstart=0
Test 10	QPSK	50	QPSK	12 RB with RBstart=0
Test 11	QPSK	50	QPSK	15 RB with RBstart=0
Test 12	QPSK	50	QPSK	50 RB with RBstart=0

Test Procedure Secondary/MIMO Receiver

NOTE: For downlink reference measurement channels with partial RB allocations, the network emulator shall fill all unused downlink RBs with PDSCH data for "virtual UEs" using the two sided dynamic OCNG Pattern OP.2 FDD described in Annex A.5.1.2 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*. The power per RB shall be the same across the channel. For reference sensitivity tests with partial downlink RB allocations, the

downlink signal strength refers to the power of the entire channel.

1. Set the initial conditions as per section 7.3.4.1 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing* for a 10 MHz channel in Band 13 with the following exceptions:
 - a. Set the modulation and RB allocations for the uplink and downlink reference measurement channels as per Test 1 in Table 3.2.21.
 - b. Terminate the primary receiver in 50 ohms. (Alternatively, the test platform may present AWGN to the primary receiver at a power level equal to the downlink signal level presented to the secondary/MIMO receiver during the test.)
2. Follow steps 1.) through 5.) in section 7.3.4.2 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing* with the following exception: set the downlink signal level to REFSENS + 0.7 dB (TT) where the value for REFSENS for a 10 MHz channel in Band 13 for single receiver operation shall be -94 dBm. Message contents are as per section 7.3.4.3 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*.
3. Repeat steps 1.) and 2.) for Test 2 in Table 3.2.21.
4. Repeat steps 1.) and 2.) for Test 3 in Table 3.2.21.
5. Repeat steps 1.) and 2.) for Test 4 in Table 3.2.21.
6. Repeat steps 1.) and 2.) for Test 5 in Table 3.2.21.
7. Repeat steps 1.) and 2.) for Test 6 in Table 3.2.21.
8. Repeat steps 1.) and 2.) for Test 7 in Table 3.2.21.
9. Repeat steps 1.) and 2.) for Test 8 in Table 3.2.21.
10. Repeat steps 1.) and 2.) for Test 9 in Table 3.2.21.
11. Repeat steps 1.) and 2.) for Test 10 in Table 3.2.21.
12. Repeat steps 1.) and 2.) for Test 11 in Table 3.2.21.
13. Repeat step 1.) for Test 12 in Table 3.2.21.
14. Follow steps 1.) through 5.) in section 7.3.4.2 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing* with the following exceptions:
 - a. Set the output power level of the UE to -2 dBm with a 2.0 dB tolerance or send uplink power control commands to the UE to ensure that the UE output is -2 dBm +/- 2.0 dB for the duration of the throughput measurement.
 - b. Set the downlink signal level to REFSENS + 0.7 dB (TT) where the value for REFSENS for a 10 MHz channel in Band 13 for single receiver operation shall be -94 dBm. Message contents are as per section 7.3.4.3 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*.

Expected Results

Expected Result

The throughput for the single receiver (i.e. the primary receiver or the secondary/MIMO receiver tested) shall be $\geq 95\%$ of the maximum throughput of the reference measurement channel as specified in Table 3.2.4-1 below.

Table 3.2.4-1. Maximum throughput for reference measurement channel for reference sensitivity with single receiver operation tests.

Test	Maximum Throughput Averaged Over 1 Frame (kbps)*
Test 1	64.8
Test 2	60.0

Test 3	64.8
Test 4	158.4
Test 5	148.0
Test 6	158.4
Test 7	453.6
Test 8	428.8
Test 9	453.6
Test 10	3952.8
Test 11	3952.8
Test 12	3952.8

* As per Annex A.3.2 in 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing and the Reference Measurement Channels* section of this document.

The UE transmit output power at maximum (i.e. the network emulator sends continuous power control "up" commands to the UE) shall meet the requirements in Table 3.2.4-2 below.

Table 3.2.4-2. UE transmit output power at maximum (continuous power control "up" commands to the UE).

Test	Modulation	RB allocation	Output Power at Maximum
1	QPSK	1 RB with RBstart=0	+23 dBm +2.7/-1.7 dB
2	QPSK	1 RB with RBstart=0	+23 dBm +2.7/-1.7 dB
3	QPSK	1 RB with RBstart=0	+23 dBm +2.7/-1.7 dB
4	QPSK	2 RB with RBstart=0	+23 dBm +2.7/-1.7 dB
5	QPSK	2 RB with RBstart=0	+23 dBm +2.7/-1.7 dB
6	QPSK	2 RB with RBstart=0	+23 dBm +2.7/-1.7 dB
7	QPSK	6 RB with RBstart=0	+23 dBm +2.7/-1.7 dB
8	QPSK	6 RB with RBstart=0	+23 dBm +2.7/-1.7 dB
9	QPSK	6 RB with RBstart=0	+23 dBm +2.7/-1.7 dB
10	QPSK	12 RB with RBstart=0	+23 dBm +2.7/-1.7 dB
11	QPSK	15 RB with RBstart=0	+23 dBm +2.7/-2.7 dB



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Patvi5s

3.2.2 Primary Receiver VZ_TC_SUPRFCONF13-3523393

PatV15S

3.2.3 Secondary/MIMO Receiver VZ_TC_SUPRFCONF13_3523440

Patv15s

3.3 RECEIVER BLOCKING VZ_TC_SUPRCONF_1636

Definition

This test verifies that the UE meets Verizon Wireless requirements for UE receiver blocking.

Traceability

- Verizon Wireless LTE 3GPP Band 13 Network Access Device Requirements, Section *Verizon Wireless-Specific LTE 3GPP Band 13 RF Performance Requirements*
- 3GPP TS 36.101: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception*, sections 7.6
- 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*, section 7.6

Applicability

This test case applies to all UEs designed to operate on the Verizon Wireless LTE 3GPP Band 13 network.

Design Steps
Step Name
Step 1
Pre-Conditions
Procedures
<p>Test Procedure</p> <ol style="list-style-type: none"> Set the initial conditions as per section 7.6.2.4.1 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i> for a 10 MHz channel in Band 13 with the following exception: set the modulation and RB allocations for the uplink and downlink reference measurement channels as per Table 3.3.21 below. Follow steps 1 through 6 in section 7.6.2.4.2 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i> using the message contents per section 7.6.2.4.3 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i> with the following exceptions: <ol style="list-style-type: none"> Set the downlink signal level to REFSSENS + the REFSSENS offset value for Test 1 in Table 3.3.23 where the value for REFSSENS for a 10 MHz channel in Band 13 shall be -97 dBm for an LTE category 1 and higher device and -94 dBm for an LTE category 1bis device. Send continuous uplink power control "up" commands to the UE to ensure that the UE transmits at its maximum power. The signal generator in step 3 shall be set up to generate the interfering signal for Test 1 per Table 3.3.22 below. Repeat step 2.) for Test 2 in Table 3.3.22 below. Repeat step 2.) for Test 3 in Table 3.3.22 below. Repeat step 2.) for Test 4 in Table 3.3.22 below. Repeat step 2.) for Test 5 in Table 3.3.22 below. Repeat step 2.) for Test 6 in Table 3.3.22 below. Repeat step 2.) for Test 7 in Table 3.3.22 below. Repeat step 2.) for Test 8 in Table 3.3.22 below.

- I 0. Repeat step 2.) for Test 9 in Table 3.3.22 below.
I 1. Repeat step 2.) for Test 10 in Table 3.3.22 below.
I 2. Repeat step 2.) for Test 11 in Table 3.3.22 below.
I 3. Repeat step 2.) for Test 12 in Table 3.3.22 below.

Table 3.3.21. Receiver blocking DL and UL reference measurement channel modulation and RB allocation test configuration table.

Test	Downlink Configuration		Uplink Configuration	
	Modulation	RB Allocation	Modulation	RB Allocation
All	QPSK	50 RB	QPSK	15 RB with RB _{start} =0

Table 3.3.22. Interferers for receiver blocking tests.

Test	Signal Type	Center Frequency	Channel BW	Signal Level
Test 1	ATSC	689 MHz	6 MHz	-15 dBm
Test 2	ATSC	695 MHz	6 MHz	-15 dBm
Test 3	LTE	719 MHz	5 MHz	-44 dBm
Test 4	LTE	723 MHz	10 MHz	-44 dBm
Test 5	LTE	731.5 MHz	5 MHz	-44 dBm
Test 6	LTE	735 MHz	10 MHz	-44 dBm
Test 7	LTE	741 MHz	10 MHz	-44 dBm
Test 8	LTE	743.5 MHz	5 MHz	-44 dBm
Test 9	LTE	760.5 MHz	5 MHz	-44 dBm
Test 10	LTE	763 MHz	10 MHz	-44 dBm
Test 11	CW tone	769 MHz	N/A	-30 dBm
Test 12	CW tone	775 MHz	N/A	-30 dBm

For additional details on ATSC signals, refer to A/53: *ATSC Digital Television Standard, Parts 1-6, 2007*.

Table 3.3.23. REFSENS offset values for receiver blocking tests.

Test	REFSENS Offset Value (dB)
Test 1	6
Test 2	6
Test 3	6
Test 4	6
Test 5	6
Test 6	6
Test 7	14
Test 8	14
Test 9	14

Test 10	14
Test 11	6
Test 12	6

Expected Results

Expected Result

The throughput shall be $\geq 95\%$ of the maximum throughput of the reference measurement channel as specified in Table 3.3.3-1 below.

Table 3.3.3-1. Maximum throughput for reference measurement channel for reference receiver blocking tests.

Test	Maximum Throughput Averaged Over 1 Frame (kbps)
All	3952.8*

* As per Annex A.3.2 in 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing.*

The UE transmit output power shall be $+23 \text{ dBm} \pm 2.7/-2.7 \text{ dB}$ for all tests.

3.4 RECEIVER INTERMODULATION CHARACTERISTICS VZ_TC_SUPRFCONF_1637

Definition

This test verifies that the UE meets Verizon Wireless requirements for UE receiver intermodulation characteristics.

Traceability

- Verizon Wireless LTE 3GPP Band 13 Network Access Device Requirements, Section *Verizon Wireless-Specific LTE 3GPP Band 13 RF Performance Requirements*
- 3GPP TS 36.101: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception*, sections 7.8
- 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*, section 7.8

Applicability

This test case applies to all UEs designed to operate on the Verizon Wireless LTE 3GPP Band 13 network.

Design Steps
Step Name
Step 1
Pre-Conditions
Procedures
<p>Test Procedure</p> <ol style="list-style-type: none"> Set the initial conditions as per section 7.8.1.4.1 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i> for a 10 MHz channel in Band 13 with the following exception: set the modulation and RB allocations for the uplink and downlink reference measurement channels as per Table 3.4.21 below. Follow steps 1 through 6 in section 7.8.1.4.2 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i> using the message contents per section 7.8.1.4.3 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i> with the following exceptions: <ol style="list-style-type: none"> Set the downlink signal level to REFSSENS + the REFSSENS offset value for Test 1 in Table 3.4.23 where the value for REFSSENS for a 10 MHz channel in Band 13 shall be -97 dBm for an LTE category 1 and higher device and -94 dBm for an LTE category 1bis device. Send continuous uplink power control "up" commands to the UE to ensure that the UE transmits at its maximum power. The signal generators in step 5 shall be set up to generate the interfering signals for Test 1 per Table 3.4.22 below. Repeat step 2.) for Test 2 in Table 3.4.22 below. Repeat step 2.) for Test 3 in Table 3.4.22 below. Repeat step 2.) for Test 4 in Table 3.4.22 below. Repeat step 2.) for Test 5 in Table 3.4.22 below. Repeat step 2.) for Test 6 in Table 3.4.22 below. Repeat step 2.) for Test 7 in Table 3.4.22 below. Repeat step 2.) for Test 8 in Table 3.4.22 below.

- I 0. Repeat step 2.) for Test 9 in Table 3.4.22 below.
- I 1. Repeat step 2.) for Test 10 in Table 3.4.22 below.
- I 2. Repeat step 2.) for Test 11 in Table 3.4.22 below.
- I 3. Repeat step 2.) for Test 12 in Table 3.4.22 below.
- I 4. Repeat step 2.) for Test 13 in Table 3.4.22 below.
- I 5. Repeat step 2.) for Test 14 in Table 3.4.22 below.
- I 6. Repeat step 2.) for Test 15 in Table 3.4.22 below.

Table 3.4.21. Receiver intermodulation DL and UL reference measurement channel modulation and RB allocation test configuration table.

Test	Downlink Configuration		Uplink Configuration	
	Modulation	RB Allocation	Modulation	RB Allocation
All	QPSK	50 RB	QPSK	15 RB with RBstart=0

Table 3.4.22. Interferers for receiver intermodulation tests.

Test	Interferer #1 (type, center frequency, channel BW, level)	Interferer #2 (type, center frequency, channel BW, level)
1	ATSC, 689 MHz, 6 MHz, -15 dBm	LTE, 719.5 MHz, 5 MHz, -44 dBm
2	ATSC, 695 MHz, 6 MHz, -15 dBm	LTE, 723 MHz, 10 MHz, -44 dBm
3	LTE, 738.5 MHz, 5 MHz, -44 dBm	LTE, 743.5 MHz, 5 MHz, -44 dBm
4	LTE, 719.5 MHz, 5 MHz, -44 dBm	LTE, 735 MHz, 10 MHz, -44 dBm
5	LTE, 719.5 MHz, 5 MHz, -44 dBm	LTE, 739 MHz, 10 MHz, -44 dBm
6	LTE, 723 MHz, 10 MHz, -44 dBm	LTE, 735 MHz, 10 MHz, -44 dBm
7	LTE, 723 MHz, 10 MHz, -44 dBm	LTE, 739 MHz, 10 MHz, -44 dBm
8	LTE, 731.5 MHz, 5 MHz, -44 dBm	LTE, 741 MHz, 10 MHz, -44 dBm
9	LTE, 735 MHz, 10 MHz, -44 dBm	LTE, 743.5 MHz, 5 MHz, -44 dBm
10	LTE, 760.5 MHz, 5 MHz, -44 dBm	LTE, 765.5 MHz, 5 MHz, -44 dBm
11	LTE, 763 MHz, 10 MHz, -44 dBm	CW tone, 775 MHz, -30 dBm
12	LTE, 760.5 MHz, 5 MHz, -44 dBm	CW tone, 770 MHz, -30 dBm
13	LTE, 765.5 MHz, 5 MHz, -44 dBm	CW tone, 775 MHz, -30 dBm
14	LTE, 701.5 MHz, 5 MHz, -25 dBm	LTE, 723 MHz, 10 MHz, -44 dBm
15	LTE, 712.5 MHz, 5 MHz, -25 dBm	LTE, 734 MHz, 10 MHz, -44 dBm

For additional details on ATSC signals, refer to A/53: *ATSC Digital Television Standard, Parts 1-6, 2007*.

Table 3.4.23. REFSENS offset values for receiver intermodulation tests.

Test	REFSENS Offset Value (dB)
Test 1	6
Test 2	6

Test 3	14
Test 4	6
Test 5	14
Test 6	6
Test 7	14
Test 8	14
Test 9	14
Test 10	14
Test 11	14
Test 12	14
Test 13	6
Test 14	6
Test 15	6

Expected Results

Expected Result

The throughput shall be $\geq 95\%$ of the maximum throughput of the reference measurement channel as specified in Table 3.4.3-1 below.

Table 3.4.3-1. Maximum throughput for reference measurement channel for receiver intermodulation tests.

Test	Maximum Throughput Averaged Over 1 Frame (kbps)
All	3952.8*

* As per Annex A.3.2 in 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing.*

The UE transmit output power shall be $+23 \text{ dBm} \pm 2.7/-2.7 \text{ dB}$ for all tests.

PUCCH Report of the Channel Quality (CQI) for Blind Data IC VZ_TC_SUPRFCONF13_6178280

Definition:

This procedure is to verify that CQI report performance meets 3GPP defined requirement for Type B enhanced receiver.

Traceability:

1. "Verizon Wireless LTE 3GPP Band 13 Network Access Requirements"
2. 3GPP TS 36.101: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception*, section 9.3.8.1.1
3. 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification Radio transmission and reception Part 1: Conformance Testing*, section 9.3.8.1.1

Applicability:

This test applies to all devices that are designed to support Blind Data IC receiver in the Verizon Wireless LTE 3GPP Band 13 network.

System Simulator:

The test configuration shall follow definition in section 9.3.8.1.1 except that SS does NOT need to set NAICS-AssistanceInfo as per TS 36.508 and TE does not need to set NeighCellsInfo-r12 (omit step 2, 4 and 7)

Design Steps
Step Name
PUCCH Report of the Channel Quality (CQI) for Blind Data IC
Pre-Conditions
Procedures
Step 1 Disable Blind data IC on the DUT
Step 2 Execute test procedure as described in section 9.3.8.1.1 of TS 36.521-1 and record the corresponding throughput of Cell1 for each reported wideband CQIindex subject to interference

from both Cell2 and Cell 3
 Step 3 Enable Blind Data IC on the DUT
 Step 4 Execute test procedure as described in section 9.3.8.1.1 of TS 36.521-1 and record the corresponding throughput of Cell1 for each reported wideband CQIindex subject to interference from both Cell2 and Cell 3
 Step 5 Obtain the ratio of the throughput obtained in step 4 with that obtained in step 6, the ratio shall be = $\gamma_{\text{ama}}(0.915)$

Expected Results

UE shall meet the verdict above.

3.6 DL CoMP GCF RF Conformance Test Cases VZ_TC_SUPRFCONF13-9438

Definition

In order to comply with Verizon Wireless DL CoMP (Coordinated Multi-Point) requirements, devices shall pass all applicable RF performance test cases listed in

- 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); User Equipment (UE) conformance specification Radio Transmission and Reception Part 1: conformance testing*, Release 12.

Traceability:

- "Verizon Wireless LTE 3GPP Band 13 Network Access Device Requirements,"
- 3GPP TS 36.101: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment(UE); Radio Transmission and Reception*, Release 11
- 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); User Equipment (UE) conformance specification Radio Transmission and Reception Part 1: conformance testing*, Release 12.

Applicability:

This test applies to all devices that are designed to support the Verizon Wireless LTE 3GPP Band 13 network.

Design Steps	
Step Name	
Step 1	
Pre-Conditions	
Procedures	
All the test steps in the following sections in TS 36.521-1 shall be followed for DL CoMP 3GPP RF conformance tests:	
<ul style="list-style-type: none"> 3GPP TM10 tests: 	
3GPP TS 36.521-1 RF conformance test cases	Title
8.3.1.3.1_F	FDD PDSCH Performance with DCI format 2D, non Quasi Co-located Antenna Ports, Same Cell ID and single NZP CSI-RS resource for CoMP
8.3.1.3.2_F	FDD PDSCH Performance with DCI format 2D, non Quasi Co-located Antenna Ports, Same Cell ID and multiple NZP CSI-RS resources for CoMP

8.3.1.3.3_F	FDD PDSCH Performance with DCI format 2D, non Quasi Co-located Antenna Ports, Different Cell ID, Colliding CRS and single NZP CSI-RS resource for CoMP
9.2.4.1_F	FDD CQI Reporting under AWGN conditions - Single CSI Process for CoMP
9.3.6.1_F	FDD CQI Reporting under fading conditions Multiple CSI processes for CoMP
9.5.5.1_F.1	FDD RI Reporting with Single CSI processes for CoMP
9.5.5.1_F.2	FDD RI Reporting with Multiple CSI processes for CoMP
<ul style="list-style-type: none"> 3GPP TM9 tests: 	
3GPP TS 36.521-1 RF conformance test cases	Title
8.3.1.1.1_D	FDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 without a simultaneous transmission for eDL-MIMO
8.3.1.1.2_D	FDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 with a simultaneous transmission for eDL-MIMO
8.3.1.2.1_D	FDD PDSCH Dual-layer Spatial Multiplexing for eDL-MIMO
8.3.1.2.1_D_1	FDD PDSCH Dual-layer Spatial Multiplexing for eDL-MIMO (Release 11 and forward)
9.2.3.1_D	FDD CQI Reporting under AWGN conditions - PUCCH 1-1 for eDL-MIMO
9.3.1.2.1_D	FDD CQI Reporting under fading conditions - PUSCH 3-1 for eDL-MIMO
9.3.2.2.1_D	FDD CQI Reporting under fading conditions - PUCCH 1-1 for eDL-MIMO
9.4.1.3.1_D	FDD PMI Reporting - PUSCH 3-1 (Single PMI) for eDL-MIMO
9.4.2.3.1_D	FDD PMI Reporting - PUSCH 1-2 (Multiple PMI) for eDL-MIMO
9.5.2.1_D	FDD RI Reporting - PUCCH 1-1 for eDL-MIMO
Expected Results	
As specified in 3GPP (36.521-1).	

3.7 EPDCCH GCF RF Conformance Test Cases VZ_TC_SUPRFCONF13-9804

Definition

In order to comply with Verizon Wireless EPDCCH (Enhanced Physical Downlink Control Channel) requirements, devices shall pass all applicable RF performance test cases listed in

- 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); User Equipment (UE) conformance specification Radio Transmission and Reception Part 1: conformance testing*, Release 12.

Traceability:

- "Verizon Wireless LTE 3GPP Band 13 Network Access Device Requirements,"
- 3GPP TS 36.101: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment(UE); Radio Transmission and Reception*, Release 11
- 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); User Equipment (UE) conformance specification Radio Transmission and Reception Part 1: conformance testing*, Release 12.

Applicability:

This test applies to all devices that are designed to support the Verizon Wireless LTE 3GPP Band 13 network.

Design Steps	
Step Name	
Step 1	
Pre-Conditions	
Procedures	
All the test steps in the following sections in TS 36.521-1 shall be followed for EPDCCH 3GPP RF conformance tests:	
3GPP TS 36.521-1 RF conformance test cases	Title
8.7.3.1	FDD sustained data rate performance for EPDCCH scheduling
8.8.1.1	FDD distributed EPDCCH performance
8.8.2.1	FDD localized EPDCCH performance with TM9
8.8.3.1	FDD localized EPDCCH transmission with TM10 Type B quasi co-location type



Verizon Wireless LTE 3GPP Band
13 Supplementary RF Conformance
Test Plan

NOTE: For test case 8.7.3.1, Test 1, 2, and 3A apply to a 10 MHz channel in Band 13. Test 1 applies to Category 1 device, Test 2 applies to Category 2 device, and Test 3A applies to device Category 3 and above.

Expected Results

As specified in 3GPP (36.521-1).

Patvi15s

3.8 EPDCCH Supplementary RF Conformance Test Cases VZ_TC_SUPRFCONF13_9805

Definition

These tests further verify EPDCCH (Enhanced Physical Downlink Control Channel) performance, in addition to the RF conformance test cases listed in

- 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); User Equipment (UE) conformance specification Radio Transmission and Reception Part 1: conformance testing*, Release 12.

The test cases are summarized in table below.

Test	Description
Test 1	EPDCCH performance under low SNR, distributed transmission, ECCE aggregation level 32 (based on Test Number 2 in Table 8.8.1.1.3-2 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i>)
Test 2	EPDCCH performance in MBSFN subframes (based on Test Number 2 in Table 8.8.3.1.3-2 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i>)

Traceability:

- "Verizon Wireless LTE 3GPP Band 13 Network Access Device Requirements,"
- 3GPP TS 36.101: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment(UE); Radio Transmission and Reception*, Release 11
- 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); User Equipment (UE) conformance specification Radio Transmission and Reception Part 1: conformance testing*, Release 12.

Applicability:

This test applies to all devices that are designed to support the Verizon Wireless LTE 3GPP Band 13 network.

Design Steps
Step Name
Step 1
Pre-Conditions
Procedures
Test Procedure Test 1 <ol style="list-style-type: none"> Set the initial conditions as per section 8.8.1.1.4.1 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i> for a 10 MHz channel in Band 13. Follow the test procedure as per section 8.8.1.1.4.2 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i>, as specified for Test Number 2 in Table 8.8.1.1.5-1 with the following exceptions: <ol style="list-style-type: none"> Set the ECCE aggregation level to 32. Set SNR to -5.3 dB.

Test 2

1. Set the initial conditions as per section 8.8.3.1.4.1 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing* for a 10 MHz channel in Band 13, with the following exceptions:
 - a. TP 2 is configured such that Subframes #1 and #6 are MBSFN subframes in each radio frame. That is, radioframeAllocationPeriod is set to n1, radioframeAllocationOffset is set to 0, oneFrame pattern in subframeAllocation is set to 100100, in MBSFN-SubframeConfig configuration. When transmitting PDSCH and EPDCCH from TP 2, both non-MBSFN and MBSFN subframes are utilized.
2. Follow the test procedure as per section 8.8.3.1.4.2 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*, to execute Test Number 2 in Table 8.8.3.1.5-1.

Expected Results

The average probability of a missed downlink scheduling grant (Pm-dsg), as specified in section 8.8.1.1.4.2 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*, shall be below 1% for both Test 1 and Test 2.

3.9 256QAM Supplementary RF Conformance Test Cases VZ_TC_SUPRCONF13-9810

Definition

These tests verify 256QAM performance.

Note: When RF conformance test cases for 256QAM are defined in 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); User Equipment (UE) conformance specification Radio Transmission and Reception Part 1: conformance testing*, Release 12, and are included in GCF, some of these tests may be retired.

The test cases are summarized in table below.

Test	Description
Test 1 (retired)	Maximum input level test (based on test in Table 7.4.3-1 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i>)
Test 2 (retired)	CQI reporting under AWGN (based on test in Table 9.2.1.1.3-1 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i>)
Test 3	CQI reporting under fading (based on test in Table 9.3.1.2.1_D.3-1 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i>)
Test 4 (void)	eMBMS performance test (based on Test 3 in Table 10.1.3-3 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i>)

Traceability:

- "Verizon Wireless LTE 3GPP Band 13 Network Access Device Requirements,"
- 3GPP TS 36.101: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment(UE); Radio Transmission and Reception*, Release 12
- 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); User Equipment (UE) conformance specification Radio Transmission and Reception Part 1: conformance testing*, Release 12.

Applicability:

This test applies to all devices that support 256QAM and are designed to operate on Verizon Wireless LTE 3GPP Band 13 network.

Design Steps
Step Name
Step 1
Pre-Conditions
Procedures
<p>Test Procedure</p> <p>Test 1 (retired)</p> <ol style="list-style-type: none"> Set the initial conditions as per section 7.4.4.1 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i> for a 10 MHz channel in Band 13, with the following exceptions: <ol style="list-style-type: none"> The DL Reference Measurement channel shall be set according to Table A.3.2-5 of 3GPP TS 36.101: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment(UE); Radio Transmission and Reception</i>, Release 12, with 256QAM and target coding rate $R=0.8$. UE is configured with higher layer parameter <i>altCQI-Table-r12</i> with the setting of <i>allSubframes</i>. Follow the test procedure as per section 7.4.4.2 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i>, with the following exceptions: <ol style="list-style-type: none"> SS transmits PDSCH via PDCCH DCI format 1 for C_RNTI. The downlink signal level shall be set to -27 dBm. <p>Test 2 (retired)</p> <ol style="list-style-type: none"> Set the initial conditions as per section 9.2.1.1.4.1 of 3GPP TS 36.521-1: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing</i> for a 10 MHz channel in Band 13, with the following exceptions: <ol style="list-style-type: none"> The parameter settings for the cell are set up according to Table 9.2.1.7-1 of 3GPP TS 36.101: <i>Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment(UE); Radio Transmission and Reception</i>, Release 12.

2. UE is configured with higher layer parameter *altCQI-Table-r12* with the setting of *allSubframes*.
2. Follow the test procedure as per section 9.2.1.1.4.2 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*, with the following exceptions:
 1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration and the SNR according to Table 9.2.1.7-1 of 3GPP TS 36.101: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment(UE); Radio Transmission and Reception*, Release 12.
 2. SS transmits PDSCH via PDCCH DCI format 1 for C_RNTI.

Test 3

1. Set the initial conditions as per section 9.3.1.2.1_D.4.1 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing* for a 10 MHz channel in Band 13, with the following exceptions:
 1. The parameter settings for the cell are set up according to Table 9.3.1.2.3-1 of 3GPP TS 36.101: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment(UE); Radio Transmission and Reception*, Release 12.
 2. UE is configured with higher layer parameter *altCQI-Table-r12* with the setting of *allSubframes*.
2. Follow the test procedure as per section 9.3.1.2.1_D.4.2 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*, with the following exceptions:
 1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration and the SNR according to Table 9.3.1.2.3-1 of 3GPP TS 36.101: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment(UE); Radio Transmission and Reception*, Release 12.
 2. The minimum requirement shall be per Table 9.3.1.2.3-2 of 3GPP TS 36.101: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment(UE); Radio Transmission and Reception*, Release 12.
 3. Skip step 8 as only one test is defined.

Test 4 (void)

1. Set the initial conditions as per section 10.1.4.1 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio*

transmission and reception; Part 1: conformance testing for a 10 MHz channel in Band 13, with the following exceptions:

1. In *MBSFNAreaConfiguration* message, *dataMCS-r12* field shall be configured for the PMCH and shall be set to a higherOrder-r12 value of 23.
2. In SIB13, the *mcch-Config* shall have *signallingMCS-r9* set to n19.
2. Follow the test procedure as per section 10.1.4.2 of 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*, with the following exceptions:
 1. The Reference Channel shall be set per Table 3.9.1 below ("Reference Channel for eMBMS test, 256QAM").
 2. The propagation conditions shall be set per Table 3.9.2 below ("Propagation Conditions for eMBMS test, 256QAM").
 3. The SNR shall be set to 30 dB.
 4. Skip step 5 as only one test is defined.

Table 3.9.1: Reference Channel for eMBMS test, 256QAM

Parameter	PMCH	
	Unit	Value
Reference channel		eMBMS, 256QAM
Channel bandwidth	MHz	10
Allocated resource blocks		50
Allocated subframes per Radio Frame(Note 1)		6
Modulation		256QAM
Target Coding Rate		0.90
Information Bit Payload (Note 2)		
For Sub-Frames 1,2,3,6,7,8	Bits	36696
For Sub-Frames 0,4,5,9	Bits	n/a
Number of Code Blocks per Sub-Frame (Note 3)		6
Binary Channel Bits Per Subframe		
For Sub-Frames 1,2,3,6,7,8	Bits	40800
For Sub-Frames 0,4,5,9	Bits	n/a

MBMS UE Category		>= 11
Note 1: For FDD mode, up to 6 subframes (#1/2/3/6/7/8) are available for MBMS, in line with TS 36.331.		
Note 2: 2 OFDM symbols are reserved for PDCCH; and reference signal allocated as per TS 36.211.		
Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).		
Table 3.9.2: Propagation Conditions for eMBMS test, 256QAM		
Extended Delay Spread		
Maximum Doppler frequency [5Hz]		
Relative Delay [ns]	Relative Mean Power [dB]	
0	0	
30	-1.5	
150	-1.4	
310	-3.6	
370	-0.6	
1090	-7.0	
12490	-10	
12520	-11.5	
12640	-11.4	
12800	-13.6	
12860	-10.6	
13580	-17.0	
Expected Results		
For Test 1 (retired), the average throughput shall meet or exceed 36 Mbps.		
For Test 2 (retired) and Test 3, the pass fail decision is as specified in the test procedure.		
For Test 4 (void), the PMCH BLER shall be below 1%.		



Patvi15s

4.1 RF PERFORMANCE OVER TEMPERATURE AND VOLTAGE

VZ_TC_SUPRFCONF_1638

Definition

This test verifies that the UE meets Verizon Wireless requirements for UE RF performance over the operating temperature and voltage ranges of the device.

Traceability

- Verizon Wireless LTE 3GPP Band 13 Network Access Device Requirements, section *Verizon Wireless-Specific LTE 3GPP Band 13 RF Performance Requirements*
- 3GPP TS 36.101: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception*
- 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*

Applicability

This test case applies to all UEs designed to operate on the Verizon Wireless LTE 3GPP Band 13 network.

Devices designed to operate over a temperature range of -10°C to +55°C shall repeat the tests in Table 4.1.1.1 below at the designated temperature and voltage extremes:

Table 4.1.1.1. Test cases over temperature and voltage for devices designed to operate over a temperature range of -10°C to +55°C.

Temperature	Applicable Voltage(s)*		3GPP Standard RF Test Cases per 36.521-1	VZW 3GPP Band 13 Supplementary RF Test Cases (per this document)
	High	Low		
-10°C	X	X	6.5.1 Frequency Error 6.5.2.1 Error Vector Magnitude (EVM)	2.1 Maximum Output Power No MPR or A-MPR 2.2 Maximum Output Power with MPR 2.3 Transmitter Spectrum Emissions Mask (NS_06) 2.4 Spurious Emissions Band UE Co-Existence 2.5 NS_07 Spurious Emissions 2.8 Configured Output Power 2.9 Spurious Emissions with Tx Gating 3.1 Reference Sensitivity Dual Receiver (QPSK) 3.2 Reference Sensitivity Single Receiver (QPSK)
+55°C	X	X	6.5.1 Frequency Error 6.5.2.1 Error Vector Magnitude (EVM)	2.1 Maximum Output Power No MPR or A-MPR 2.2 Maximum Output Power with MPR 2.3 Transmitter Spectrum Emissions Mask (NS_06) 2.4 Spurious Emissions Band UE Co-Existence 2.5 NS_07 Spurious Emissions 2.8 Configured Output Power 2.9 Spurious Emissions with Tx Gating 3.1 Reference Sensitivity Dual Receiver (QPSK) 3.2 Reference Sensitivity Single Receiver (QPSK)

* Per the device manufacturer, 3GPP TS 36.101: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception*, and 3GPP TS 36.508: *Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Packet Core (EPC); Common test environments for User Equipment (UE) conformance testing*.

Devices designed to operate over a temperature range of -30°C to +60°C shall repeat the tests in Table 4.1.12 below at the designated temperature and voltage extremes:

Table 4.1.12. Test cases over temperature and voltage for devices designed to operate over a temperature range of -30°C to +60°C.

Temperature	Applicable Voltage(s)*		3GPP Standard RF Test Cases per 36.521-1	VZW 3GPP Band 13 Supplementary RF Test Cases (per this document)
	High	Low		
-30°C	X	X	6.5.1 Frequency Error 6.5.2.1 Error Vector Magnitude (EVM)	2.1 Maximum Output Power No MPR or A-MPR 2.2 Maximum Output Power with MPR 2.3 Transmitter Spectrum Emissions Mask (NS_06) 2.4 Spurious Emissions Band UE Co-Existence 2.5 NS_07 Spurious Emissions 2.8 Configured Output Power 2.9 Spurious Emissions with Tx Gating 3.1 Reference Sensitivity Dual Receiver (QPSK) 3.2 Reference Sensitivity Single Receiver (QPSK)
+45°C		X	6.5.1 Frequency Error 6.5.2.1 Error Vector Magnitude (EVM)	2.1 Maximum Output Power No MPR or A-MPR 2.5 NS_07 Spurious Emissions 3.1 Reference Sensitivity Dual Receiver (QPSK) 3.2 Reference Sensitivity Single Receiver (QPSK)
+60°C	X	X	6.5.1 Frequency Error 6.5.2.1 Error Vector Magnitude (EVM)	2.1 Maximum Output Power No MPR or A-MPR 2.2 Maximum Output Power with MPR 2.3 Transmitter Spectrum Emissions Mask (NS_06) 2.4 Spurious Emissions Band UE Co-Existence 2.5 NS_07 Spurious Emissions 2.8 Configured Output Power 2.9 Spurious Emissions with Tx Gating 3.1 Reference Sensitivity Dual Receiver (QPSK) 3.2 Reference Sensitivity Single Receiver (QPSK)

* Per the device manufacturer, 3GPP TS 36.101: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception*, and 3GPP TS 36.508: *Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Packet Core (EPC); Common test environments for User Equipment (UE) conformance testing*.

Design Steps
Step Name
Step 1
Pre-Conditions
Procedures
Test Procedure Devices Designed for -10°C to +55°C Operation

1. Place the device under test in the temperature chamber.
2. Set the temperature of the chamber to -10°C and the voltage to the device under test to "High". After the chamber reaches temperature, let the device soak in the chamber for 30 minutes.
3. Perform the tests per Table 4.1.1.1 for a temperature of -10°C and a voltage to the device under test of "High".
4. Set the voltage to the device under test to "Low".
5. Perform the tests per Table 4.1.1.1 for a temperature of -10°C and a voltage to the device under test of "Low".
6. Set the temperature of the chamber to $+55^{\circ}\text{C}$ and the voltage to the device under test to "Low". After the chamber reaches temperature, let the device soak in the chamber for 30 minutes.
7. Perform the tests per Table 4.1.1.1 for a temperature of $+55^{\circ}\text{C}$ and a voltage to the device under test of "Low".
8. Set the voltage to the device under test to "High".
9. Perform the tests per Table 4.1.1.1 for a temperature of $+55^{\circ}\text{C}$ and a voltage to the device under test of "High".

Test Procedure Devices Designed for -30°C to $+60^{\circ}\text{C}$ Operation

1. Place the device under test in the temperature chamber.
2. Set the temperature of the chamber to -30°C and the voltage to the device under test to "High". After the chamber reaches temperature, let the device soak in the chamber for 30 minutes.
3. Perform the tests per Table 4.1.1.2 for a temperature of -30°C and a voltage to the device under test of "High".
4. Set the voltage to the device under test to "Low".
5. Perform the tests per Table 4.1.1.2 for a temperature of -30°C and a voltage to the device under test of "Low".
6. Set the temperature of the chamber to $+45^{\circ}\text{C}$ and the voltage to the device under test to "Low". After the chamber reaches temperature, let the device soak in the chamber for 30 minutes.
7. Perform the tests per Table 4.1.1.2 for a temperature of $+45^{\circ}\text{C}$ and a voltage to the device under test of "Low".
8. Set the temperature of the chamber to $+60^{\circ}\text{C}$ and the voltage to the device under test to "Low". After the chamber reaches temperature, let the device soak in the chamber for 30 minutes.
9. Perform the tests per Table 4.1.1.2 for a temperature of $+60^{\circ}\text{C}$ and a voltage to the device under test of "Low".
10. Set the voltage to the device under test to "High".
11. Perform the tests per Table 4.1.1.2 for a temperature of $+60^{\circ}\text{C}$ and a voltage to the device under test of "High".

NOTE: For devices designed to operate over a temperature range of -30°C to $+60^{\circ}\text{C}$, the value for REFSENS for a 10 MHz channel in Band 13 may be relaxed by 2 dB at $+60^{\circ}\text{C}$ to:

- -95 dBm for dual receiver
- -92 dBm for single receiver

Expected Results

Expected Result

For 3GPP standard RF test cases, the UE shall meet the expected results per 3GPP TS 36.521-1: *Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: conformance testing*.

For Verizon Wireless supplementary RF test cases, the UE shall meet the expected results per this document with the following exception:

For devices designed to operate over a temperature range of -30°C to $+60^{\circ}\text{C}$, the UE output power may be relaxed by 2 dB at $+60^{\circ}\text{C}$, i.e. the lower limit for all output power expected results may be relaxed by 2 dB. Refer to the *Test Results Template* section of this document for additional details.

RequirementCoverageForTestPlan

2.1 MAXIMUM OUTPUT POWER NO MPR OR A-MPR VZ_TC_SUPRCONF_1626

Requirement Name	Requirement Plan Id	Created By	Created Date
LTE RF AND RRM CONFORMANCE REQUIREMENTS	LTEB13NAC	Admin User	11-07-0013 14:27:28
MAXIMUM CONDUCTED OUTPUT POWER	LTEB13NAC	Admin User	11-07-0013 14:27:33

2.2 MAXIMUM OUTPUT POWER WITH MPR VZ_TC_SUPRCONF_1627

Requirement Name	Requirement Plan Id	Created By	Created Date
LTE RF AND RRM CONFORMANCE REQUIREMENTS	LTEB13NAC	Admin User	11-07-0013 14:27:28
MAXIMUM CONDUCTED OUTPUT POWER	LTEB13NAC	Admin User	11-07-0013 14:27:33

2.3 TRANSMITTER SPECTRUM EMISSION MASK (NS_06) VZ_TC_SUPRCONF_1628

Requirement Name	Requirement Plan Id	Created By	Created Date
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NS_06 EMISSIONS	LTEB13NAC	Admin User	11-07-0013 14:27:37
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2.4 SPURIOUS EMISSION BAND UE CO-EXISTENCE VZ_TC_SUPRCONF_1629

Requirement Name	Requirement Plan Id	Created By	Created Date
SPURIOUS EMISSIONS FOR UE CO-EXISTENCE WITH GPS	LTEB13NAC	Admin User	11-07-0013 14:27:43
SPURIOUS EMISSIONS FOR UE CO-EXISTENCE WITH OTHER 3GPP FREQUENCY BANDS	LTEB13NAC	Admin User	11-07-0013 14:27:40

2.5 NS_07 SPURIOUS EMISSIONS VZ_TC_SUPRCONF_1630

Requirement Name	Requirement Plan Id	Created By	Created Date
CONFIGURED OUTPUT POWER	LTEB13NAC	Admin User	11-07-0013 14:27:36
NS_07 EMISSIONS	LTEB13NAC	Admin User	11-07-0013 14:27:39

2.6 TRANSMITTER LO AND IMAGE SUPPRESSION (IQ COMPONENT AND IMAGE) VZ_TC_SUPRCONF_1631

Requirement Name	Requirement Plan Id	Created By	Created Date
UE TRANSMITTER LO AND IMAGE SUPPRESSION	LTEB13NAC	Admin User	11-07-0013 14:27:42

2.7 PUCCH OVER-PROVISIONING FUNCTIONAL TEST VZ_TC_SUPRCONF_1632

Requirement Name	Requirement Plan Id	Created By	Created Date
NS_07 EMISSIONS	LTEB13NAC	Admin User	11-07-0013 14:27:39

2.8 CONFIGURED OUTPUT POWER VZ_TC_SUPRCONF_1639

Requirement Name	Requirement Plan Id	Created By	Created Date
CONFIGURED OUTPUT POWER	LTEB13NAC	Admin User	11-07-0013 14:27:36
LTE RF AND RRM CONFORMANCE REQUIREMENTS	LTEB13NAC	Admin User	11-07-0013 14:27:28

2.9 SPURIOUS EMISSIONS WITH TX GATING VZ_TC_SUPRCONF_1633

Requirement Name	Requirement Plan Id	Created By	Created Date
NS_07 EMISSIONS	LTEB13NAC	Admin User	11-07-0013 14:27:39
SPURIOUS EMISSIONS FOR UE CO-EXISTENCE WITH GPS	LTEB13NAC	Admin User	11-07-0013 14:27:43
SPURIOUS EMISSIONS FOR UE CO-EXISTENCE WITH OTHER 3GPP FREQUENCY BANDS	LTEB13NAC	Admin User	11-07-0013 14:27:40

3.1 REFERENCE SENSITIVITY DUAL RECEIVER (QPSK) VZ_TC_SUPRCONF_1634

Requirement Name	Requirement Plan Id	Created By	Created Date
CONDUCTED SENSITIVITY	LTEB13NAC	Admin User	11-07-0013 14:27:45
LTE RF AND RRM CONFORMANCE REQUIREMENTS	LTEB13NAC	Admin User	11-07-0013 14:27:28

3.2 REFERENCE SENSITIVITY SINGLE RECEIVER (QPSK) VZ_TC_SUPRCONF_1635

Requirement Name	Requirement Plan Id	Created By	Created Date
CONDUCTED SENSITIVITY	LTEB13NAC	Admin User	11-07-0013 14:27:45

LTE RF AND RRM CONFORMANCE REQUIREMENTS	LTEB13NAC	Admin User	11-07-0013 14:27:28
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3.3 RECEIVER BLOCKING VZ_TC_SUPRFCONF_1636

Requirement Name	Requirement Plan Id	Created By	Created Date
BLOCKING	LTEB13NAC	Admin User	11-07-0013 14:27:52

3.4 RECEIVER INTERMODULATION CHARACTERISTICS VZ_TC_SUPRFCONF_1637

Requirement Name	Requirement Plan Id	Created By	Created Date
INTERMODULATION	LTEB13NAC	Admin User	11-07-0013 14:27:54

3.6 DL CoMP GCF RF Conformance Test Cases VZ_TC_SUPRFCONF13_9438

Requirement Name	Requirement Plan Id	Created By	Created Date
CSI (Channel State Information) Reporting	LTEB13NAC	Admin	01-27-0015

in TM ₉		User	16:35:20
CSI Reporting in TM ₁₀	LTEB ₁₃ NAC	Admin User	01-27-0015 16:37:04
PDSCH Decoding in Transmission Mode 10 (TM ₁₀)	LTEB ₁₃ NAC	Admin User	01-27-0015 16:36:41
PDSCH Decoding in Transmission Mode 9 (TM ₉)	LTEB ₁₃ NAC	Admin User	01-27-0015 16:34:43
RF and RRM Performance for LTE TM ₁₀ DL CoMP	LTEB ₁₃ NAC	Admin User	01-27-0015 17:56:21
RF and RRM Performance for LTE TM ₉ DL CoMP	LTEB ₁₃ NAC	Admin User	01-27-0015 17:54:56
RRC Signaling for TM ₁₀	LTEB ₁₃ NAC	Admin User	01-27-0015 16:38:03
RRC Signaling for TM ₉	LTEB ₁₃ NAC	Admin User	01-27-0015 16:35:43

3.7 EPDCCH GCF RF Conformance Test Cases VZ_TC_SUPRFCONF₁₃₋₉₈₀₄

Requirement Name	Requirement Plan Id	Created By	Created Date
EPDCCH RF Performance	LTEB ₁₃ NAC	Admin User	05-14-0015 11:38:42
Enhanced Physical Downlink Control Channel (ePDCCH)	LTEB ₁₃ NAC	Admin User	05-14-0015 11:35:59

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3.8 EPDCCH Supplementary RF Conformance Test Cases VZ_TC_SUPRCONF13_9805

Requirement Name	Requirement Plan Id	Created By	Created Date
EPDCCH RF Performance	LTEB13NAC	Admin User	05-14-0015 11:38:42
Enhanced Physical Downlink Control Channel (ePDCCH)	LTEB13NAC	Admin User	05-14-0015 11:35:59

3.9 256QAM Supplementary RF Conformance Test Cases VZ_TC_SUPRCONF13_9810

Requirement Name	Requirement Plan Id	Created By	Created Date
256QAM RF Performance	LTEB13NAC	Admin User	09-17-0015 21:18:43
DL 256QAM Support	LTEB13NAC	Admin User	09-17-0015 20:31:06

4.1 RF PERFORMANCE OVER TEMPERATURE AND VOLTAGE VZ_TC_SUPRCONF_1638

Requirement Name	Requirement Plan Id	Created By	Created Date
AMBIENT OPERATING TEMPERATURE RANGE	LTEB13NAC	Admin User	11-07-0013 14:27:55

AMBIENT TEMPERATURE	LTEDATA	Admin User	11-07-0013 14:36:58
EXTENDED AMBIENT OPERATING TEMPERATURE RANGE	LTEB13NAC	Admin User	11-07-0013 14:27:57
LTE RF AND RRM CONFORMANCE REQUIREMENTS	LTEDATA	Admin User	11-07-0013 14:36:57
POWER SUPPLY/BATTERY VOLTAGE	LTEB13NAC	Admin User	11-07-0013 14:27:59