LBT(Listen Before Talk) Test Results

1 Description

The product complies with the requirements of an unrestricted contention based protocol. It employs spectrum sensing to determine if other devices are transmitting based on thresholds which can be configured by the operator. When the Listen Before Talk feature is enabled, transmission will be disabled when detected interference levels is above the higher threshold; similarly transmission will be enabled when detected interference levels is below the lower threshold. This test is to verify the LBT functionality of product.

2 Test Summary

2.1 Technical Requirement

Specification Reference	§90.7 of US FCC rules
Specification Description of Connection Based Protocol(CBP)	A protocol that allows multiple users to share the same spectrum by defining the events that must occur when two or more transmitters attempt to simultaneously access the same channel and establishing rules by which a transmitter provides reasonable opportunities for other transmitters to operate. Such a protocol may consist of procedures for initiating new transmissions, procedures for determining the state of the channel (available or unavailable), and procedures for managing retransmissions in the event of a busy channel. The “Listen before Talk” (LBT) operational procedure is the most well-known Contention-based Protocol(CBP)

2.2 Summary of Test Results

Reference	Part	Measurement	Result
§90.7 of US FCC rules	90	Verification of Unrestricted Contention	PASS

		Based Protocol operation	

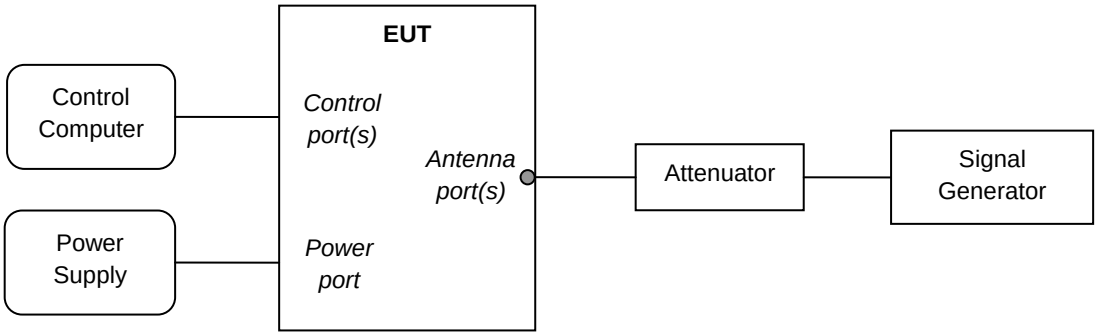
2.3 Product Specification

Characteristics	Description	
Name	RRU3256	
Radio System Type	☐ GSM (GO) ☐ UMTS (UO) ☒ LTE (LO) ☐ CDMA (CO) ☐ GSM & UMTS (GU) ☐ GSM & LTE (GL) ☐ GSM & UMTS & LTE (GUL) ☐ CDMA & LTE (CL) ☐ P2P	
Equipment Type	Type #1	☒ Base Station Equipment ☐ CPE (Customer Premises Equipment) Equipment ☐ Subscriber Equipment (User Equipment) ☐ Fixed Point-to-Point Equipment
	Type #2	☒ Fixed ☐ Mobile ☐ Portable
	Type #3	☒ Indoor ☒ Outdoor
Frequency Range (Transmission (TX) and Receiving (RX))	#1	TX: 3650 to 3700MHz RX: 3650 to 3700MHz
TX and RX	TX & RX port: 4, TX-only port: 0, RX-only port: 0	

Characteristics	Description	
Antenna Ports		
Multiple Carrier Supported	4	
Maximum RF Bandwidth	50 MHz	
TX Output Power	Max. 1.25 W (per antenna port) Max. 4*1.25 W (four antenna ports)	
Supported Channel Bandwidth	10 MHz, 20MHz	
Modulation Type	LTE system:	Base-band: QPSK, 16QAM, 64QAM Carrier: OFDM/OFDMA
Power Supply	Type:	☐ External AC mains, ☒ External DC mains, ☐ AC/DC Adapter, ☐ Powered over Ethernet (PoE)
	Nominal Voltage, Input to EUT:	-48 VDC
	Voltage Range, Input to EUT:	-36 to -60 VDC

3 Configuration of Test

3.1 Test Setup



3.2 Test Procedure

All tests were performed as conducted measurements, the antenna ports gave independent access to horizontal and vertical antenna connections.

1) Power on EUT, set LBT state including Channel on Threshold level and Channel off Threshold level(these two levels can be configured by operator);
2) Adjust output power of signal generator to act as an interference at the antenna port;
3) Monitor EUT state on the control computer;

4 Test Results

P_i: interference power level

P1: channel off threshold power level

P2: channel on threshold power level

DL: down link

Concurrent: clock alignment between interference signal and wanted signal

Non-concurrent: no clock alignment between interference signal and wanted signal

LBT State	Channel BW	Channel off Threshold Level	Channel on Threshold Level	Interference Signal	Result

ON	20MHz	-72 dBm	-76 dBm	Same frequency; Concurrent	Observed P_i > P1: DL off; Observed P_i < P2: DL on
ON	20MHz	-72 dBm	-76 dBm	Adjacent channel; Concurrent	Observed P_i > P1: DL off; Observed P_i < P2: DL on
ON	20MHz	-72 dBm	-76 dBm	Same frequency; Non-concurrent	Observed P_i > P1: DL off; Observed P_i < P2: DL on
ON	20MHz	-72 dBm	-76 dBm	Different frequency; Non-concurrent	Observed P_i > P1: DL off; Observed P_i < P2: DL on
ON	10MHz	-75 dBm	-79 dBm	Same frequency; Concurrent	Observed P_i > P1: DL off; Observed P_i < P2: DL on
OFF	20MHz	-72 dBm	-76 dBm	Same frequency; Concurrent	Observed P_i > P1 (long term): DL always on;

Notes:

CW signal was used as an interference for unlike systems;

Interference power level at antenna port can be detected by EUT and observed on the control computer.

END