RedwoodComm

LoRaWAN TEST SOLUTION

RedwoodComm is a leading company for development of wireless communication test solutions. RedwoodComm develops and provides measurement system for R&D, mass-production of broadcast system and wireless communications such as DAB, DRM, RDS, NFC and LoRa technologies.
We will keep making every effort to be the world best company of test & measurement system based on technical know-how and experience of test & measurement system for wireless communications.

NEW !

RWC5020M

RWC2020A

RWC5020B

Wide Area Network for IoT

LoRaWAN®

RWC5020B
LoRaWAN Tester

RWC5020B is a compact all-in-one tester, providing a perfect solution for test and measurement of LoRa and LoRaWAN technology, which is fully suitable for R&D, QC, and manufacturers.
It provides various test functions that can be performed in signaling mode, e.g. including activation procedures, as well as non-signaling mode. Automated PC software will help users test and debug their devices by performing pre-certification tests, as specified by LoRa Alliance.

LoRaWAN Compliance

Confirming that the end device meets the functional requirements of the LoRaWAN® protocol specification

RWC5020B certification test is recommended for the purpose of pre-qualification. Some of the certificaion test items could be limited or not fully covered due to the limitation of maximum number of channels supported simultaneously.

Supported Pre-certification Test Option

- LoRa Alliance European EU 863-870MHz Region End Device Certification Requirements
- LoRa Alliance US + Canada US902-928MHz Region End Device Certification Requirements
- LoRa Alliance Asia AS 923MHz Region End Device Certification Requirements
- LoRa Alliance South Korea 920-923MHz Region End Device Certification Requirements
- LoRa Alliance India 865-867MHz Region End Device Certification Requirements

Supported LoRaWAN® Region

EU 868 // EU 433 // US 915 // AU 915 // CN 470 // KR 920 // AS 923 // IN 865 // RU 864

Supported LoRaWAN® Protocol

- Compatible with LoRaWAN version of V1.0.x and V1.1.x
- Class A/B/C

Key Features

3 main operational modes

END DEVICE TEST

EDT

RWC5020B acts as the reference Gateway/Server to communicate with End Device Under Test, while analyzing protocol messages and measuring the signal quality and performance of DUT.

Link Analyzer | Power Measure CH/TIME | Receiver Sensitivity

GATEWAY TEST

GWT

RWC5020B acts as the reference End Device to communicate with Gateway Under Test, while analyzing protocol messages and measuring the signal quality and performance of DUT.

Link Analyzer | Power Measure CH/TIME | Receiver Sensitivity

NON-SIGNALING TEST

NST

This is a menu for generating a continuous waveform signal or a LoRa test frame and measuring the power and frequency of DUT signal.

Signal Generator | Signal Analyzer | MFG

Protocol & Functional Test

- Support of LoRaWAN Pre-Certification Tests – EU, US/CA, AS, KR and IN
- Scenarios for transmission of MAC commands and user application data
- FUOTA Test with user firmware binaries

RF Test Solutions

- RF Performance Tests for End-device – TX Power and RX Sensitivity (downlink: RX1, RX2, RXC or Ping-slot)
- RF Performance Tests for Gateway – TX Power and RX Sensitivity (uplink)
- Semtech's Non-regression Tests for Gateway – integrated with RWC2020A Interference Generator
- LBT Test Solution for end-devices and gateways – integrated with RWC2020A Interference Generator

Manufacturing Test Solutions

- Separate TX/RX Tests with DUT controls – power, frequency and sensitivity
- Simultaneous TX/RX Tests (MFG) without wired DUT controls

Link Analyzer

Analyzing frames for MAC/PHY analysis

RWC5020B provides a function of Link Analyzer for EDT and GWT. Link Analyzer in EDT (or GWT) helps to create a link between RWC5020B and an End Device (or Gateway/Server) Under Test and to analyze the protocol messages.

MAC command Test

- Multiple MAC commands in a single frame
- All MAC commands defined in LoRaWAN with user-configurable parameters
- Field selection: frame payload or frame options
- Message type selection: confirmed or unconfirmed
- User defined message: editable payload data and port field

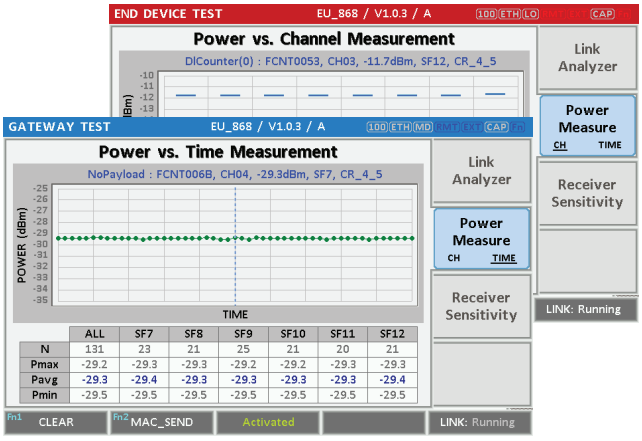
Link Analyzer for EDT/GWT

Power Measure CH/TIME

Continuously monitoring TX power of DUT with respect to channels and data rates(SF)

RWC5020B provides a function of Power vs. Channel/Time measurement for EDT and GWT. It helps to create a link between RWC5020B and an End Device (or Gateway/Server) Under Test and to measure the received power with RF channels or respect to data rates.

- Continuous monitoring of DUT's TX Power w.r.t. Channel
- Calculating the maximum/average/minimum values



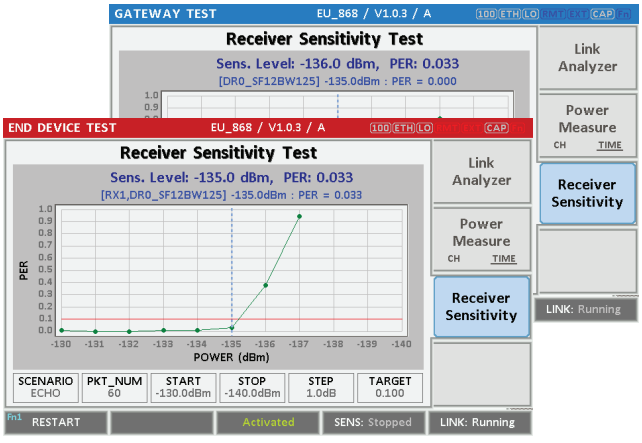
Power Measure CH/TIME for EDT/GWT

Receiver Sensitivity

Finding the minimum power level at which DUT can receive frames from the Tester

Receiver Sensitivity is a function of testing the receiver performance of DUT. RWC5020B sweeps its power level from the start value to the stop value with the step value and checks whether DUT functions properly, and stops immediately after DUT does not function properly to find the minimum sensitivity level.

- Determine power range and step for testing
- The result value is the minimum power level at which DUT can receive the Tester's frame

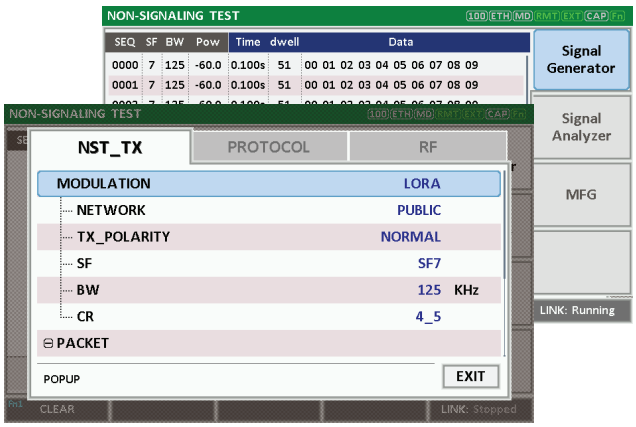


Receiver Sensitivity Test for EDT/GWT

Signal Generator

Transmiting LoRa test frames/CW

Signal Generator is a function of transmitting the defined test waveform to DUT repeatedly. Three different modes are provided; LoRa, FSK and CW. Especially in case of LoRa and FSK modes, various parameters are configurable to compose a LoRa test frame.



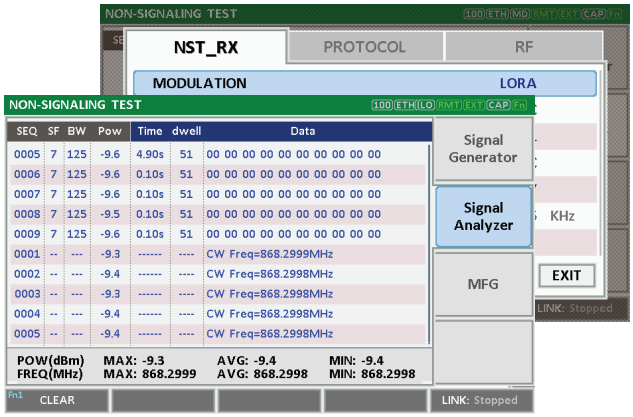
DUT's RX Performance Test

- Set the DUT to always listen the pre-defined packet
- Tester transmits pre-defined number of packets
- DUT needs to calculate PER by itself

Signal Analyzer

Receiving LoRa frames and measuring the power

Signal Analyzer is a function of analyzing LoRa frames received from DUT repeatedly. Various parameters are configurable to receive a specific LoRa or FSK frame. Additionally TX power and frequency of DUT is measured in LoRa or CW mode.



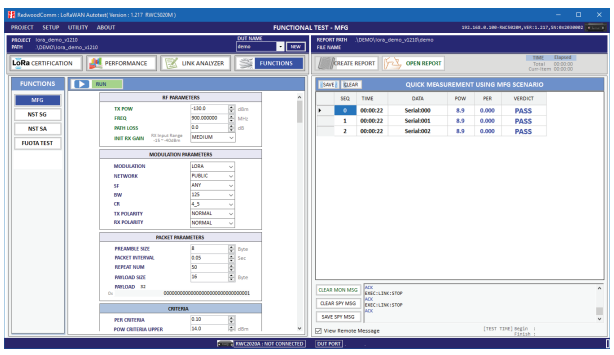
DUT's TX Performance Test

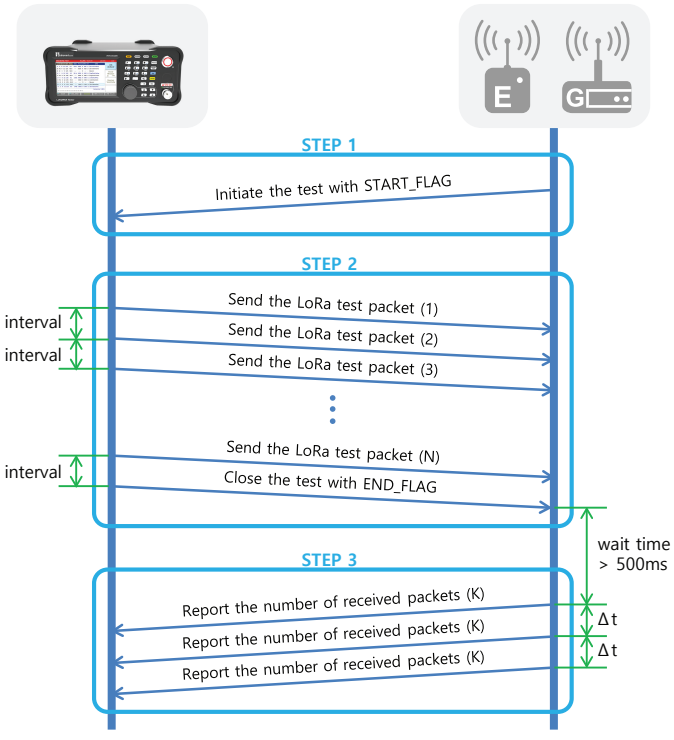
- Set the DUT to always transmit the pre-defined packet
- Tester measures TX power and CW frequency

MFG

Speeding up the test in production lines

MFG is a function of manufacturing tests to measure the TX and RX performances of DUT simultaneously; power measurement for TX and sensitivity measurement for RX respectively. Basically manufacturing test of LoRa products should be performed in non-signaling mode because of two reasons; test time and a type of DUT.



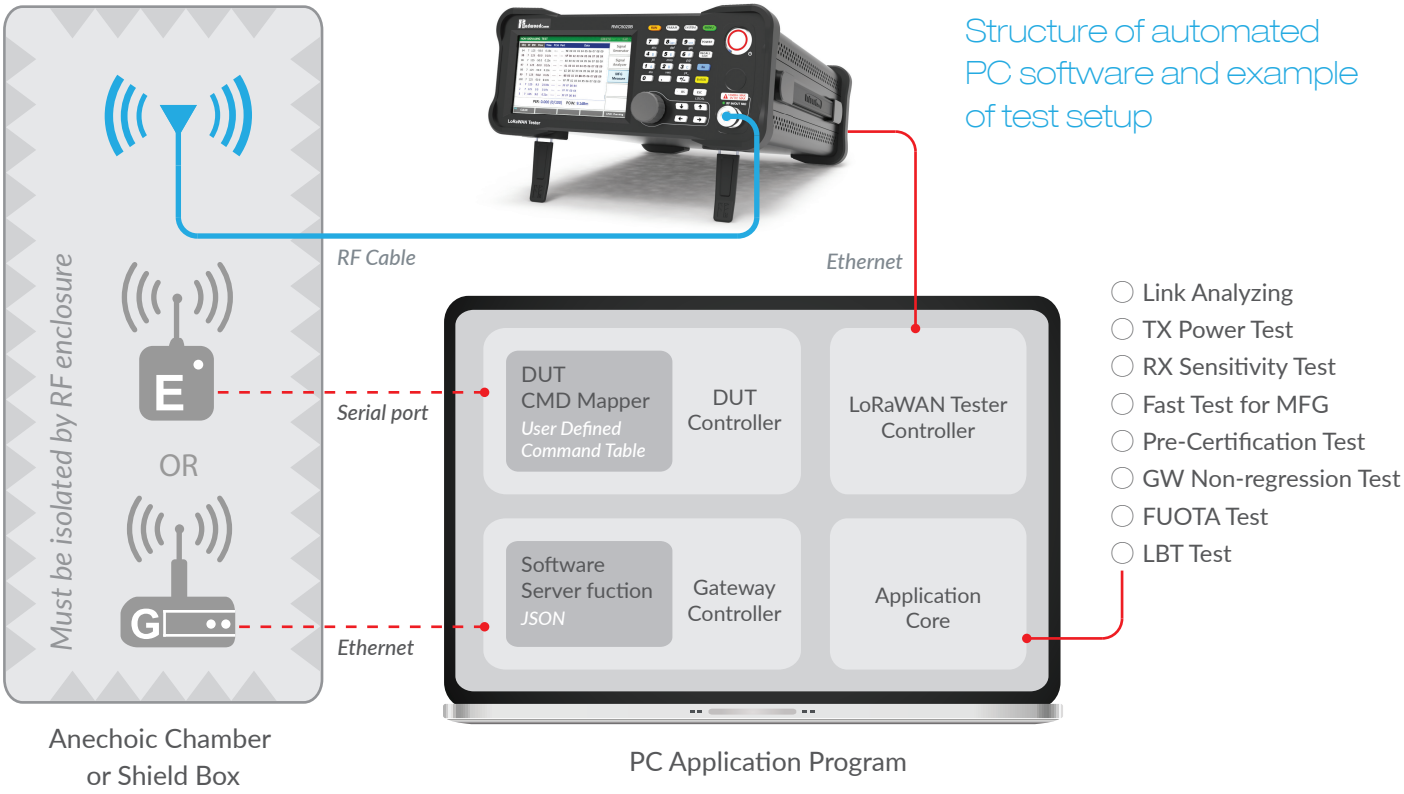


Test Procedure for MFG Test

PC Software

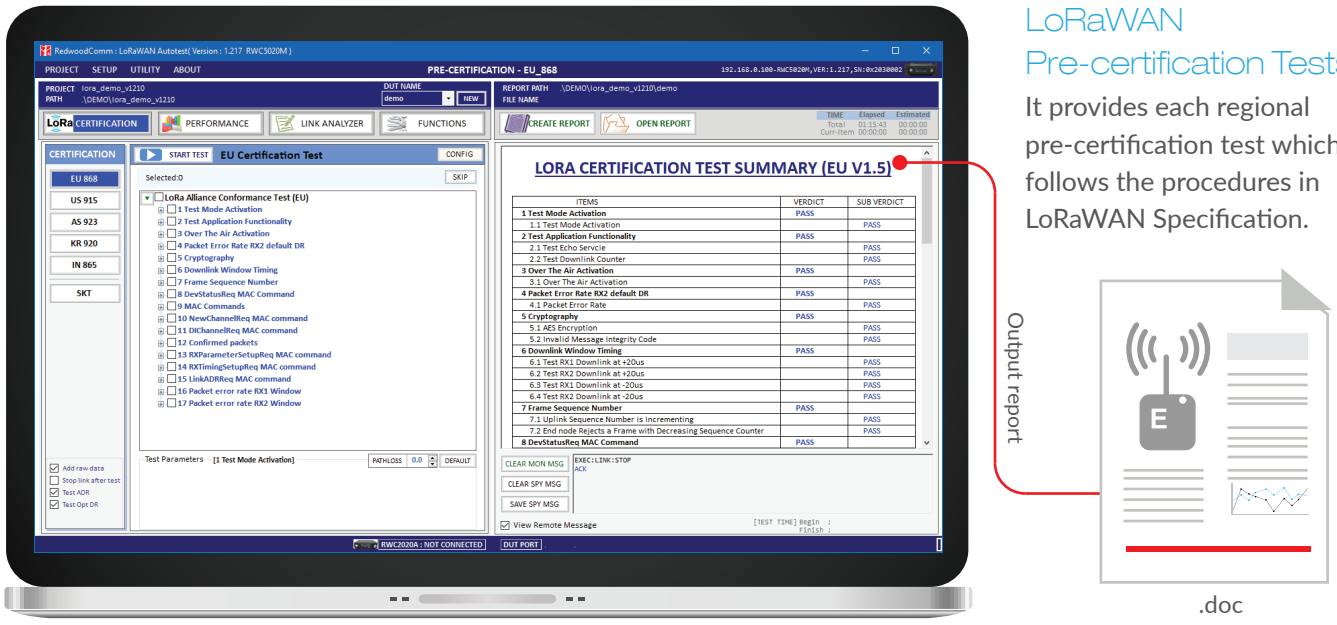
This PC application provides a variety of special measurement functions such as LoRaWAN pre-certificaion test, performance measurement, link message logging and DUT control. The RWC5020B automatically measures specified characteristics such as the PER of the DUT, obtains data such as link messages or measurement data according to the LoRa Alliance standard, and summarizes and creates the report in one click.

Structure of automated PC software and example of test setup

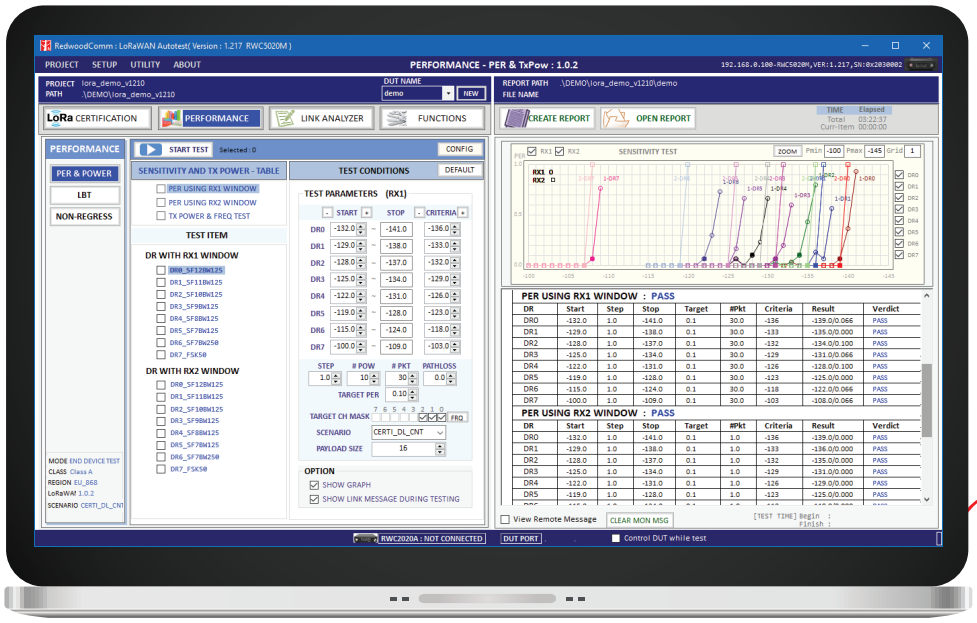


LoRaWAN Pre-certification Tests

It provides each regional pre-certification test which follows the procedures in LoRaWAN Specification.



PC Software



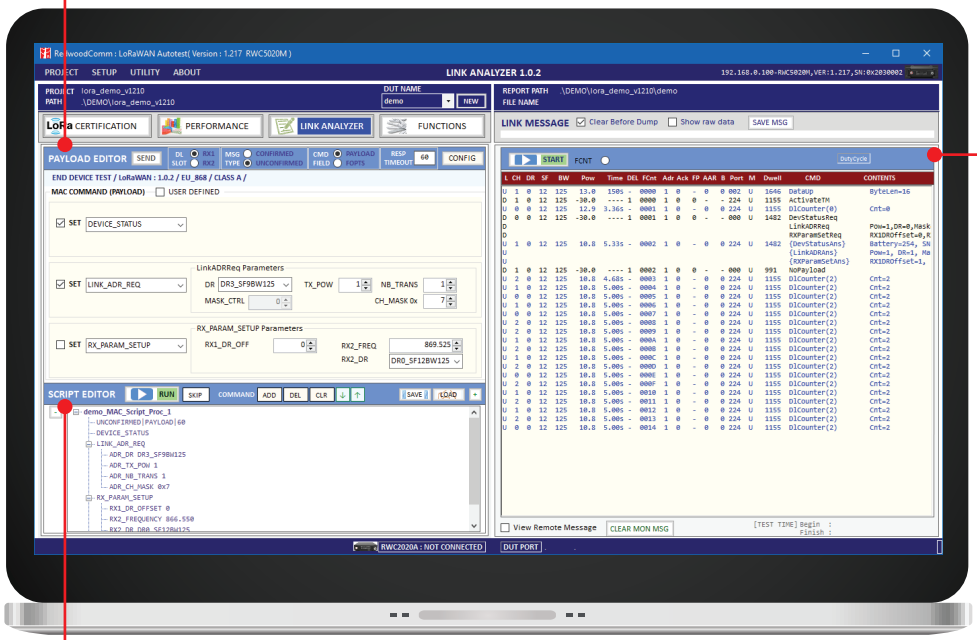
TX/RX Performance Tests

It provides fully automated RF performance measurement functions such as TX Power, CW Frequency and RX sensitivity.

Ethernet

Payload Editor

Any type of LoRa MAC commands defined in LoRa protocol can be transmitted.



Link Analyzer

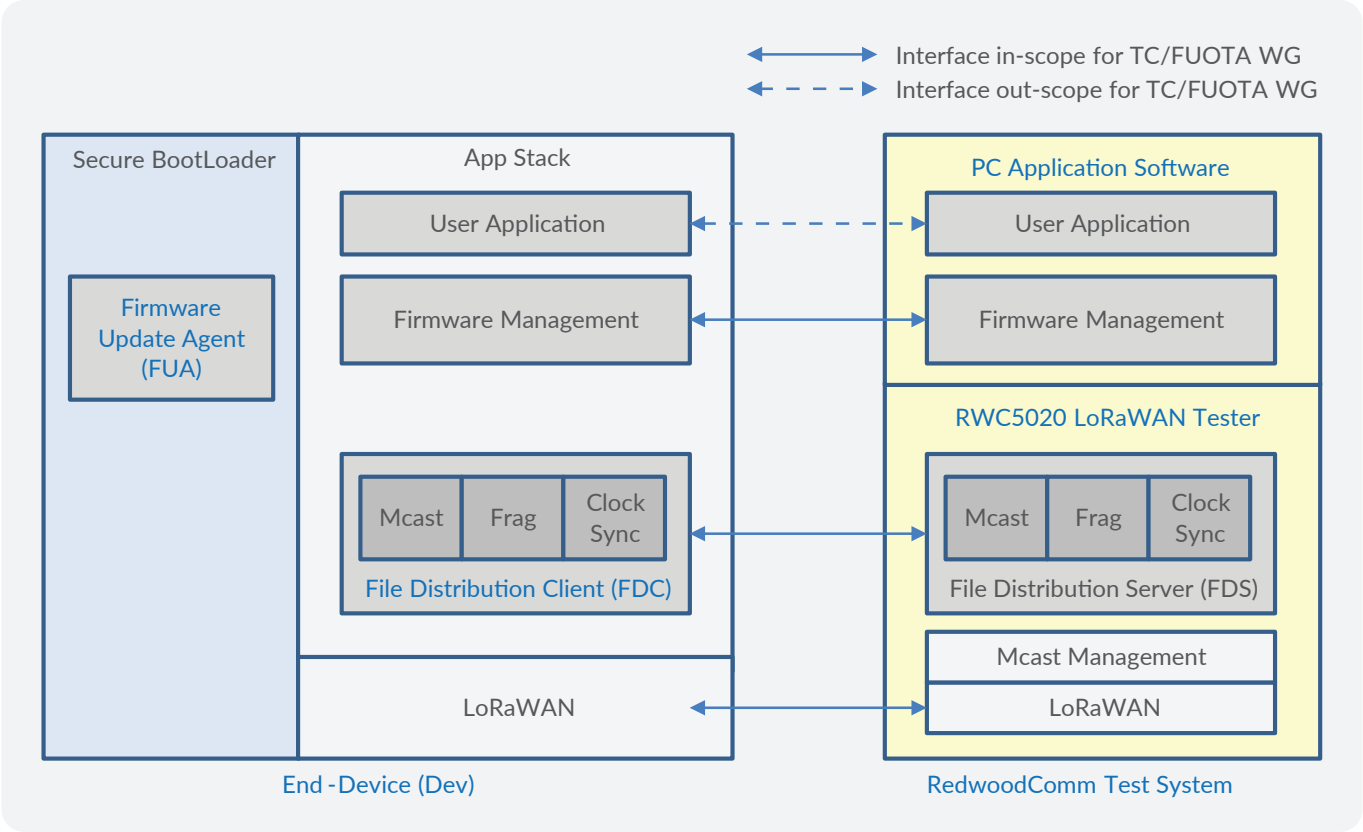
All protocol messages with link analyzer function can be captured and saved.

Script Editor

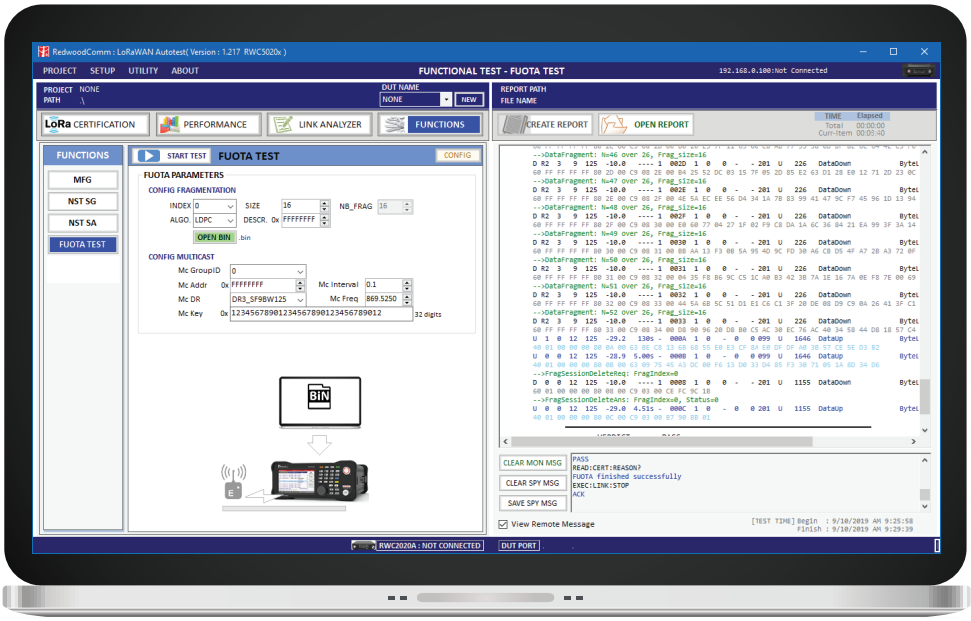
Add, remove or edit MAC command scenarios as needed.

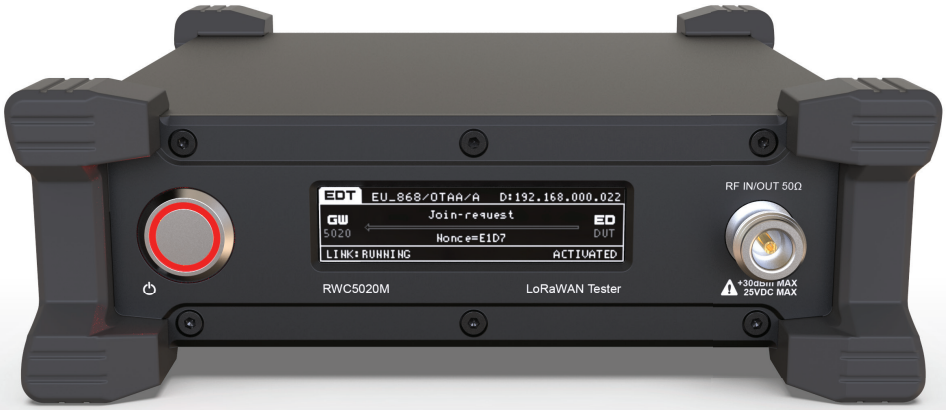
FUOTA Test

RWC5020B provides two kinds of FUOTA test function; one is Unicast Method which just uses data fragmentation to send user's firmware file, and the other is Multicast Method which uses Clock synchronization, Multicast, and Data fragmentation. The System block diagram is as follows.



User can load the firmware binary file for FUOTA test. Fragmentation parameters as well as Multicast parameters are editable using this GUI. Multicast function is optional. The clock Synchronization function will be performed automatically when Multicast function is selected.





RWC5020M
LoRaWAN Tester

The RWC5020M is a compact all-in-one LoRa/LoRaWAN tester, which offers most of the industry-leading features of RWC5020B at a very attractive price. It supports both engineering and manufacturing tests with a single tester: RF Performance, LoRaWAN Pre-certification, Firmware Update Over The Air (FUOTA), and more.

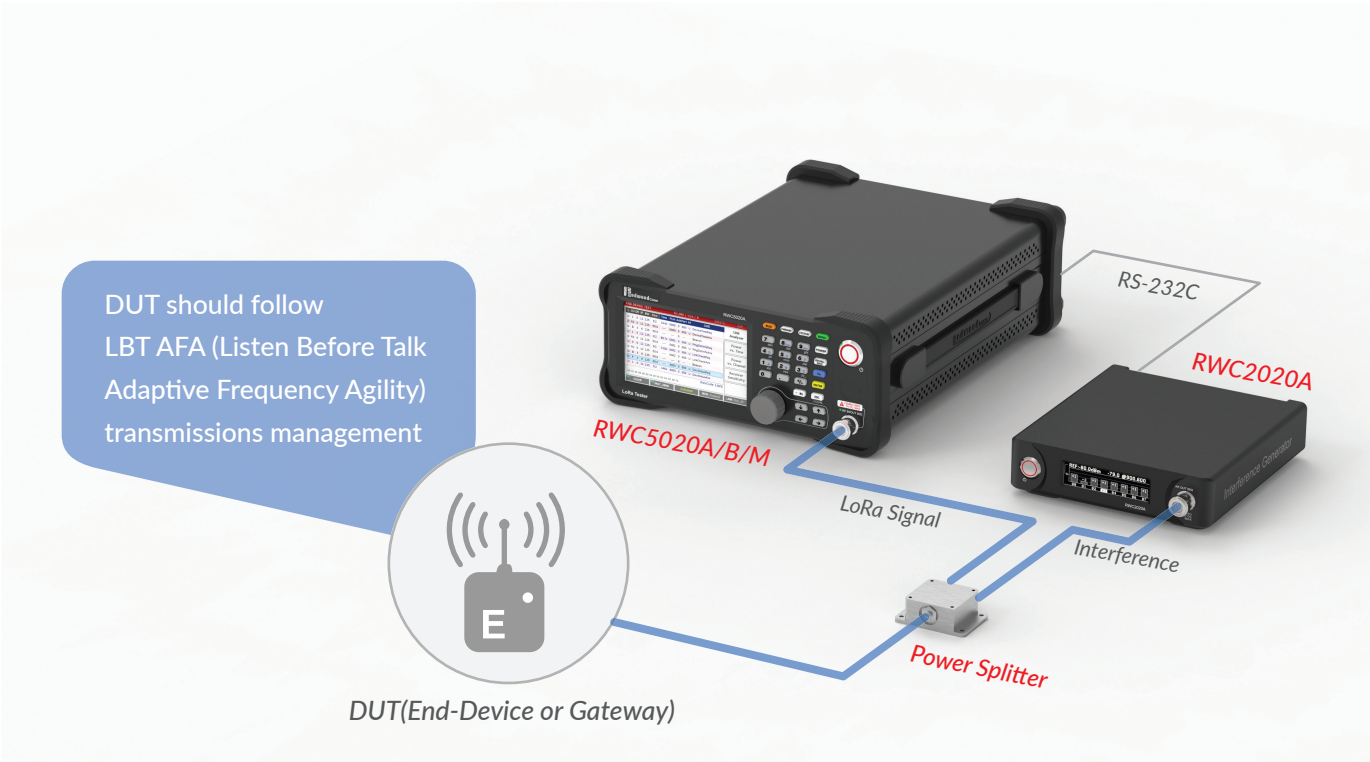
Differences between RWC5020M and RWC5020B		RWC5020M 	RWC5020B 
Stand-alone Capability		NO	YES
Exterior	▪ Dimension	200(w)x70(h)x220(d) mm	250(w)x110(h)x348(d) mm
	▪ Weight	2.2 kg	5 kg
	▪ Display	2.8", 256x64, 16 gray, OLED	5", 800x480, 16M color, TFT LCD
	▪ Front Keypad	NO	YES
	▪ Power Input	12V/3A VDC (AC/DC adapter provided)	100 to 240 VAC, 50/60Hz
	▪ Control Interface	Ethernet, RS-232C	Ethernet, RS-232C
Frequency Bands	▪ 400MHz to 510MHz	Selectable	Included
	▪ 862MHz to 960MHz	Selectable	Included
RF Power Level	▪ Output Power	0dBm to -150dBm	0dBm to -150dBm
	▪ Input for Power Measurement	+30dBm to -80dBm	+30dBm to -80dBm
	▪ Input for Frequency Measurement	+30dBm to -50dBm	+30dBm to -50dBm
Operational Modes	▪ End-device Test	Selectable	Selectable
	▪ Gateway Test	Selectable	Selectable
	▪ Non-signaling Test	Selectable	Included
Protocol Compliance Tests (end-device only)	▪ LoRaWAN Pre-Certification Tests	Optional	Optional
	▪ Operator Pre-Certification Tests	Optional	Optional
RF Performance Tests	▪ Receiver Sensitivity Test	YES	YES
	▪ Output Power Measurement	YES	YES
	▪ Carrier Frequency Measurement	YES	YES
	▪ LBT Test	YES (2020A required)	YES (2020A required)
	▪ Gateway Non-regression Test	YES (2020A required partly)	YES (2020A required partly)
Link Analyzer	▪ Message Logging and Analysis	YES	YES
	▪ MAC Commands Transmission	YES	YES
	▪ Application/User Data Transmission	YES	YES
	▪ User Script Generation	YES	YES
Functionalities	▪ FUOTA Test	YES	YES
	▪ Manufacturing Test (MFG)	YES	YES

RWC2020A
Interference Generator

RWC2020A is an interference generator being able to be used for the purpose of various tests or measurements, e.g. the Listen Before Talk(LBT) test, the Gateway Non-regression tests, the Intermodulation Immunity test and so on. It can generate up to eight multi-tone signals with different output levels per each tone for the LBT test and two tones of up to 20MHz distant for the Intermodulation Immunity test.
It also can generate a single tone with phase noise of high performance for the Gateway Non-regression tests.
RWC2020A shall be connected to RWC5020x via RS-232C for control and setup of the full automation tests.

LBT Test

Listen Before Talk (LBT) is a technique that device enters RX mode and senses the interference signal level before it starts a transmission. It is used to prevent interference or collision between devices that use common frequency bands. RWC2020A provides a perfect solution to verify LBT functionality of DUT, gateways or end-devices, as a supplementary equipment synchronized with RWC5020x. It generates up to eight interference signals to occupy frequency bands. The interference signal level, the number of channels, and channel frequencies are editable through RWC5020B LoRaWAN tester GUI or PC software.



Semtech's Non-regression Tests for Gateway

RWC5020x provides the Semtech's Non-regression tests for gateway performance. The application software will manage RWC5020A/B/M and RWC2020A, and will internally run a simple network server fuction which can communicate with a gateway under test via the JSON interface. It consists of TX output power measurement, sensitivity, PER, RSSI, SNR, frequency error tolerance, and CW interferer/blocker immunity.

Specifications

	RWC5020B	RWC5020M
Frequency	• Range : 400MHz to 510MHz, 862MHz to 960MHz • Resolution : 100Hz • Stability vs. +25℃ : ± 0.5ppm standard • Stability vs. Aging : ±1ppm/1st year	
Output Level	• Range : 0dBm to -150dBm • Resolution : 0.1dB • Accuracy : ±1dB • Impedance : 50Ω	
Input Level	• +30dBm to 80dBm for Power Measurement • +30dBm to 50dBm for Frequency Measurement	
Measurement Accuracy	• ±1dB for Power • ±1KHz for Frequency (Single Tone)	
VSWR	• Better than 1:1.5	
External Reference Frequency Input	• Frequency : 10MHz • Power Range : 0dBm to +20dBm	
Remote Programming Ports	• RJ45(Ethernet) • RS-232C	
Miscellaneous	• Operating temperature : 5 to 40℃ • Line Voltage : 100 to 240 VAC, 50/60Hz • Dimension : 250(w) x 110(h) x 348(d) mm • Weight : 5kg	• Operating temperature : 5 to 40℃ • Input : 12V/3A VDC • Dimension : 200(w) x 70(h) x 220(d) mm • Weight : 2.2kg
	RWC2020A	
Frequency	• Range : 400MHz to 1000MHz • Resolution : 100Hz • Accuracy : ±2ppm/year@operating temperature	
Output Level	• Range : 10dBm to -100dBm • Resolution : 0.1dB • Accuracy : ±1dB	
RF Characteristics	• Phase Noise (Single tone mode) : -103dBc@1kHz / -110dBc@10kHz / -110dBc@100kHz / -138dBc@1MHz • VSWR : Better than 1:1.5 • Impedance : 50Ω	
Remote Programming Ports	• RJ45(Ethernet) • RS-232C	
Miscellaneous	• Operating temperature : 5 to 40℃ • Input : 12V/3A VDC • Dimension : 166(w) x 50(h) x 194(d) mm • Weight : 950g	