

RWC5020x

Tester for
LoRa®/LoRaWAN®



Description

RWC5020x Tester for LoRa® / LoRaWAN® 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 pre-certification test is recommended for the purpose of pre-qualification. Some of the test items could be limited or not fully covered due to the limitation of maximum number of channels supported simultaneously.

Supported LoRaWAN® Protocol

- o Class A/B/C
- o Compatible with LoRaWAN® version of V1.0.2, 1.0.3, 1.0.4 and V1.1.0
- o Optionally up to 64(125kHz)+8(500kHz) channels for US/CA/AU915, 96(125kHz) channels for CN470



RWC5020x supports 64/96 channels

Supported LoRaWAN® Region

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

Supported Pre-certification Test Option

LoRaWAN® Specification 1.0.2:

- o LoRaWAN® European EU 863-870MHz Region End Device Certification Requirements
- o LoRaWAN® US + Canada 902-928MHz Region End Device Certification Requirements
- o LoRaWAN® Asia AS 923MHz Region End Device Certification Requirements
- o LoRaWAN® South Korea 920-923MHz Region End Device Certification Requirements
- o LoRaWAN® India IN865-867MHz Region End Device Certification Requirements

- o LoRaWAN® Certification Requirement for All Regions
- o LoRaWAN® Class B/C Certification Requirement for All Regions
- o Supported Regions: EU868, US/CA915, AS923-1/2/3/4, KR920, IN865, AU915, RU865, and EU433

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.

END DEVICE TEST

EU_868 / V1.0.3 / B

100 (ETH/MD)

(CAP)

L	CH	DR	SF	BW	Pow	Time	FCnt	AckPort	M	dwell	CMD
U	0	0	12	125	-29.4	REF	---	0	---	---	1482 Join-request
D	0	0	12	125	-10.0	-----	---	0	---	---	1155 Join-accept
U	1	0	12	125	-29.3	11.5s	0000	0	000	U	1155 DeviceTimeReq

Link Analyzer

Power Measure

CH TIME

Receiver Sensitivity

GATEWAY TEST

EU_868 / V1.0.3 / B

100 (ETH/MD)

(CAP)

L	CH	DR	SF	BW	Pow	Time	FCnt	AckPort	M	dwell	CMD
U	0	0	12	125	-10.0	REF	---	0	---	---	1482 Join-request
D	0	0	12	125	-29.2	---	---	---	---	---	1155 Join-accept
U	1	0	12	125	-10.0	11.7s	0000	0	000	U	1155 DeviceTimeReq
D	1	0	12	125	-29.1	-----	0000	0	---	---	1318 DeviceTimeAns
D	B	3	9	125	-29.9	-----	---	---	---	---	152 Beacon
U	2	0	12	125	-10.0	66.8s	0001	0	000	U	1155 PingSlotInfoReq
D	2	0	12	125	-29.1	-----	0001	0	000	U	1155 PingSlotInfoAns
U	1	0	12	125	-10.0	6.35s	0002	0	000	C	1155 LinkCheckReq
D	1	0	12	125	-29.1	-----	0002	1	000	U	1155 LinkCheckAns
D	B	3	9	125	-29.9	-----	---	---	---	---	152 Beacon

Link Analyzer

Power Measure

CH TIME

Receiver Sensitivity

LINK: Run_051

offset=368, Nb=8, period=512, accuracy=4294967ms

fn1

CLEAR

fn2

MAC_SEND

Activated

LINK: Running

MAC command Test

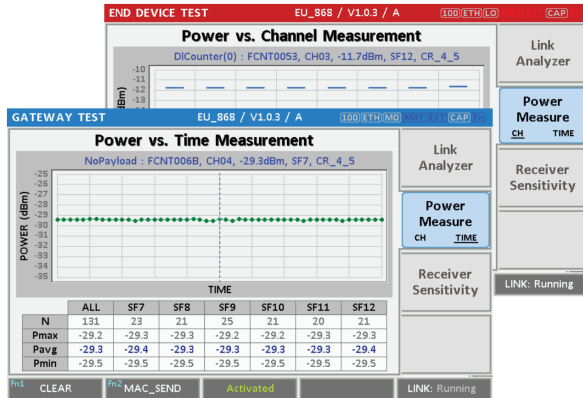
- o Multiple MAC commands in a single frame
- o All MAC commands defined in LoRaWAN with user-configurable parameters
- o Field selection: frame payload or frame options
- o Message type selection: confirmed or unconfirmed
- o User defined message: editable payload data and port field

Power Measurement vs. 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.

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



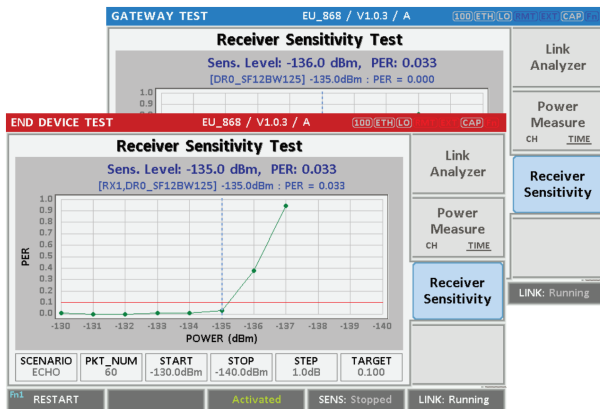
Power Measure CH/TIME in EDT/GWT

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.

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



Receiver Sensitivity Test for ED/GW

Signal Generator

Transmitting 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

- o Set the DUT to always listen the pre-defined packet
- o Tester transmits pre-defined number of packets
- o 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.

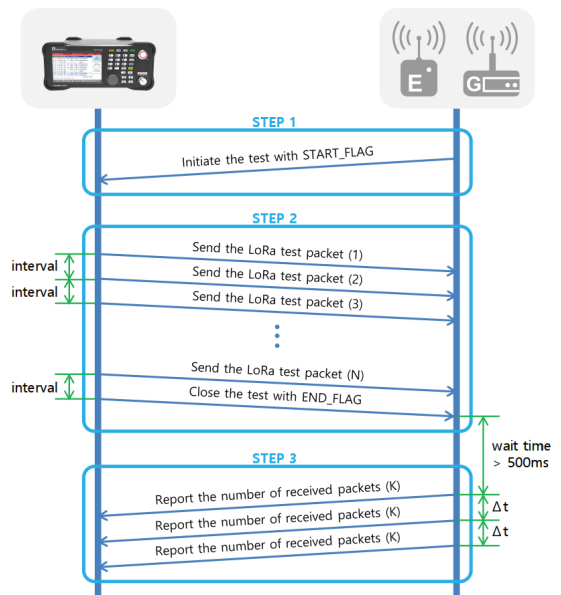
DUT's TX Performance Test

- o Set the DUT to always transmit the pre-defined packet
- o 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 tests of LoRa products should be performed in non-signaling mode because of two reasons; test time and a type of DUT.



MFG Test Procedure

PC Application Program

Automated test

This PC application provides a variety of special measurement functions such as LoRaWAN pre-certification test, RF 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, summarizes and creates the report in one click.



PC Application Program connected to RWC5020x

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 function 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 immunity.



Semtech's Non-regression test

Specification

Frequency	Range: 400MHz ~ 510MHz, 862MHz ~ 960MHz Resolution: 100Hz Stability vs. +25°C: ±0.5ppm standard Stability vs. Aging: ±1ppm/1st year
Output Level	Range: 0dBm ~ -150dBm Resolution: 0.1dB Accuracy: ±1dB Impedance: 50Ω
Input Level	+30dBm ~ -80dBm for Power Measurement +30dBm ~ -50dBm for Frequency Measurement
Measurement Accuracy	±1dB for Power ±1KHz for Frequency (Single Tone)
VSWR	Better than 1:1.5
External Frequency Reference	Frequency: 10MHz Power Range: 0dBm ~ +20dBm
Remote Programming Ports	RJ45(Ethernet) RS-232C
Miscellaneous	Operating temperature: 5 ~ 40°C Line Voltage: 100 to 240 VAC50/60Hz Dimension: 250(w)x110(h)x348(d)mm Weight: 5kg

RWC5020B Order Codes

Main Product

Order Code	Part Name
C5020B-00	EDT+GWT+NST
C5020B-01	EDT+GWT
C5020B-02	NST
C5020B-03	EDT
C5020B-04	GWT
C5020B-05	EDT+NST
C5020B-06	GWT+NST

Options

Order Code	Part Name
O5020B-01	LoRaWAN Pre-Cert EU868
O5020B-03	LoRaWAN Pre-Cert US915
O5020B-04	LoRaWAN Pre-Cert AS923
O5020B-05	LoRaWAN Pre-Cert KR920
O5020B-06	LoRaWAN Pre-Cert IN865
O5020B-09	LoRaWAN Pre-Cert AU915
O5020B-11	LoRaWAN Pre-Cert RU864
O5020B-12	LoRaWAN Pre-Cert EU433
O5020B-64	64CH/SF5/SF6 Option
O5020B-98	Calibration
O5020B-99	SW/FW Maintenance

Contact

sales@redwoodcomm.com
<https://www.redwoodcomm.com/>