

Equipment: RWC5020A LoRaWAN Tester

Revision History

Version	Date	Description
V1.17	17/June/2019	<p>[LoRaWAN]</p> <p>[Pre-Certification]</p> <ol style="list-style-type: none">1. Improve EU10.2 certification procedure to verify behavior of confirmed uplink retrnsmission with NAK reply and without any response.2. Fixed the bug by adding NewChannelReq procedure in IN13.1 certificaion for FSK PER testing. <p>[RF Performance]</p> <ol style="list-style-type: none">3. In TX Power measurement, added the parameter to set the minimum number of packets per channel [3~100].4. In Scenarion of sensitivitiy, DL_CNT mode is added. In this mode RWC5020A uses DiCounter packets to test PER.5. DL channel frequency parameters are added to modify downlink frequeucny in sensitivity of EDT.6. Target channel mask parameter is added in sensitivity test of GWT.7. Change Pop-up value list of UPLINK_DR, RX2_DR, PING_DR, BEACON_DR, REJOIN_DR parameters from [DR_0, DR_1, DR_2, DR_3, DR_4, DR_5, DR_6, DR_7] to [DR0_SF12BW125, DR1_SF11BW125, DR2_SF10BW125, DR3_SF9BW125, DR4_SF8BW125, DR5_SF7BW125, DR6_SF7BW250, DR7_FSK50].8. Combine Power channel and Power time screen into Power measure screen. In this single screen, user can select one of power channel and power time mode.9. Added TX Power measure scenario to measure TX power of DUT in specific scenarios. <p>[NST]</p> <p>[Link Analyzer]</p> <ol style="list-style-type: none">10. Add CONF:LINK:ABNORMAL remote command for abnormal behaiver testing like NO_RSP, MIC_ERR, etc...

		<ol style="list-style-type: none"> 11. Modify PING_FREQ, PING_DR, BC_FREQ, CW_TIMEOUT, CW_FREQ, CW_POWER, ECHO_LEN parameters as array type for mulit mac command function with different setting value. 12. Delete CONF:LINK:BEACON:DR, READ:LINK:BEACON:DR? remote command 13. Add READ:RF:PING_FREQ?, READ:RF:PING_DR?, READ:RF:BC_FREQ?, READ:RF:BC_DR? 14. Add CONF:LINK:RX2_FREQ, READ:LINK:RX2_FREQ?, CONF:LINK:RX2_DR, READ:LINK:RX2_DR?, CONF:LINK:RECEIVE_DELAY, READ:LINK:RECEIVE_DELAY?
V1.16	12/APR/2019	<p>[LoRaWAN]</p> <ol style="list-style-type: none"> 1. Chang the default DEV_ADDR value from 0 to 1. <p>[Pre-Certification]</p> <ol style="list-style-type: none"> 2. Warning message was not appropriate when DUT can not receive Join accept message in US Cert 2.1 3. In US Cert 4.3, RWC5020A checked ACK flag only in DL_Counter packet. If DUT transmitted ACK flag using other packets, RWC5020A ignored. It is fixed to check any kind of packets. 4. Chang the Max DR value from 7 to 5 in AS Cert 10.2 & 10.4 <p>[RF Performance]</p> <ol style="list-style-type: none"> 5. The TX power measurement function had an error that only worked when the EU Certi option was present. <p>[NST]</p> <p>[Link Analyzer]</p> <ol style="list-style-type: none"> 6. Added function to modify foption field for customer MAC command. 7. For Class B testing in GWT mode, serveral scenarios are equired to create Class B connection. In previous version, RWC5020A sent User MAC command with Class B flag. The RWC5020A now uses LinkCheckReq MAC command for Class B switching.
V1.15	15/DEC/2018	<p>[LoRaWAN]</p> <ol style="list-style-type: none"> 1. Changed to display all of KEY and EUI values regardless of activation mode. 2. Fixed a bug of NETWORK parameter setting. Sometimes, NETWORK parameter was not applied to RF signal. 3. Added NTT operator to AS923 and LIANSHU operator to

		<p>CN470.</p> <p>[Pre-Certification]</p> <ol style="list-style-type: none"> Some DUT transmit confirmed DL_counter packets after enabling test mode. EU Cert 15.12 Redundancy test item must be tested with unconfirmed DL_counter packets. So it is improved to transmit Unconfirmed frame command at the beginning stage of this Certification test. Fixed a bug of Echo response decoder. When DUT re-transmit Echo response, RWC5020A displayed it as another type of command instead of Echo response. <p>[RF Performance]</p> <ol style="list-style-type: none"> Added receiver sensitivity test mode for Class B. If the class is set as B, RWC5020A uses ping slot for PER testing. Fixed a bug in RX sensitivity test by checking ACK flag too when DUT sends Confirmed UL message periodically. In previous version, only FCnt value was checked for error counting. Extended the range of TIME_OFFSET value to +/- 10ms. Added TX power measurement with Normal UL mode. Improved to display comment messages while RX sensitivity test is running. <p>[NST]</p> <ol style="list-style-type: none"> Fixed a bug of SF in MFG. If SF set as ANY, RWC5020A should have received any type of SF from DUT. <p>[Link Analyzer]</p> <ol style="list-style-type: none"> Added Remote commands (READ:LINK:MAC_SEND_STATUS?, READ:LINK:MAC_SEND_RESULT?) to read MAC command transmission status and result.
V1.14	10/OCT/2018	<p>[LoRaWAN]</p> <ol style="list-style-type: none"> Improved Class B operation by compatibility test with real Class B products. In Link Analyzer, graphical display was added for understanding of Class B operation. In End Device Test, downlink packets can be transmitted periodically via ping slots. Added a special downlink channel other than RX1 and RX2 in Class C, named as RX_C. Renamed channel plan of regional parameters as common

		<p>name defined in LoRaWAN Regional Parameters v1.0.3.</p> <p>4. Fixed a bug of decryption in case MAC command is contained in FOption field.</p> <p>5. Updated definition of UL DR in AU915 by adding SF12 and SF11.</p> <p>6. Applied Effective_RX1DROffset (RX1DROffset is 6 or 7) for AS and IN regions.</p> <p>[Pre-Certification]</p> <p>7. Added test cases for optional DR (SF7BW250, FSK50)</p> <p>[RF Performance]</p> <p>8. Changed PER test item from SF to DR and added optional DR.</p> <p>9. Added 500kHz uplink channel for receiver sensitivity test for Gateway Test</p> <p>10. Added ANY as a type of SF in MFG test, in order to make it possible to receive any type of SF which DUT sends. So the SF of test packets can be determined same as the one of START FLAG packet of DUT. Added FSK modulation.</p> <p>11. Fixed a bug in TX power measurement by eliminating the first unexpected power measurement.</p> <p>[NST]</p> <p>12. Added ANY as a type of SF in NST RX, the tester can receive any type of SF using 125kHz BW.</p> <p>13. Added FSK modulation.</p> <p>[Link Analyzer]</p> <p>14. When MAC command is selected as USER_DEFINED, CMD FIELD is restricted to PAYLOAD.</p> <p>15. In case MAC command is contained in FOption field, { } is used in command name to distinguish.</p> <p>16. Removed SET_CH_MASK parameter, which was applicable only to 64 channels of US915 and AU915 and became useless.</p>
V1.13	19/JUL/2018	<p>[LoRaWAN]</p> <p>1. Certified by LoRa End Device Certification EU868</p> <p>2. Certified by LoRa End Device Certification KR920</p> <p>3. Support of LoRaWAN V1.0.3</p> <p>4. Support of Russian regional parameters</p> <p>[Pre-Certification]</p> <p>5. Implemented updated versions of LoRaWAN Certifications; US</p>

		<p>V1.3, KR V1.2, AS V1.1 and IN V1.0 (new)</p> <ol style="list-style-type: none"> Fixed a bug in case of PACKET_NUM less than 10 in US Pre-Certification 10.1 and 10.2 Receive Window Tests. Fixed a bug of tester reset in case when the tester receives Join-request message again from DUT in OTAA test Implemented additional test items for SKT 41 to 46 <p>[RF Performance]</p> <ol style="list-style-type: none"> Improved TX Power measurement of DUT in RF Performance Test by adding CW mode, which is the same way as used in LoRaWAN RF Performance Test Added MFG function for fast receiver sensitivity tests in NST mode, applicable to manufacturing lines <p>[NST]</p> <ol style="list-style-type: none"> Fixed bugs of running status in Signal Analyzer of NST Disabled automatic running of Signal Analyzer in NST mode due to inconvenience <p>[Link Analyzer]</p> <ol style="list-style-type: none"> Added a function of Periodic Downlink in Class C mode of EDT Added the stop function of MAC command transmission Added calculation of dwell time in Link Analyzer Implemented reply retransmission of RxParamSetupAns, RxTimingSetupAns, and DLChannelAns in case of absence of a downlink message Renamed a parameter SET_TM_AT_OTAA as SET_TEST_MODE and moved to sub-parameter of ACTIVATION Renamed a parameter SET_CH_AT_OTAA as SET_CH_MASK and moved to sub-parameter of ACTIVATION, shown only in case of US915 region
V1.12	25/APR/2018	<ol style="list-style-type: none"> Added a standard test solution for manufacturing lines to test TX and RX of devices simultaneously Verified and improved all test procedures of EU, US/CA, AS, and KR Certification Tests based on comparison of KR Certification with other test lab Modified default channel frequencies of Europe to be matched with the local regulation Changed the max number of channels supported in Europe

		<p>and India to 7 due to limitation of hardware.</p> <ol style="list-style-type: none"> Added MAC commands related with certification test mode; COMFIRMED_TM, UNCONFIRMED_TM, ECHO_REQUEST_TM, TRIGGER_JOIN_REQ_TM, and ENABLE_CW_MODE_TM Added a function of duty cycle measurement in EDT Link Analyzer Added protocol parameters in Link Analyzer screen for users' convenience such as DR, RxDelay, ADRACKReq and FPending Minor bug fixes and updates
V 1.11	20/MAR/2018	<ol style="list-style-type: none"> Improved Signal Generator and Signal Analyzer of NST; providing various configurable MAC parameters in order to send and receive LoRaWAN frames Enabled modification of part of channel frequencies; the first frequency of the second channel group (4~7) can be modified Added more commands in MAC command transmission: <i>ForceRejoinReq</i>, <i>RejoinParamSetupReq</i>, and <i>ADRParamSetupReq</i> for EDT; <i>ResetInd</i> for GWT. Added display of Activation status at the bottom of the screen Minor bug fixes and updates
V 1.10	22/DEC/2017	<ol style="list-style-type: none"> Support of LoRaWAN V1.1 Changed Class B operation to match with LoRaWAN V1.0.2classB-draft4 Improved control of minimum TX power level for DUT's RX sensitivity test <ul style="list-style-type: none"> the minimum TX power is -150dBm Added a flag to determine whether to force DUT to enter Test Mode by sending <i>Activate Test Mode</i> command actions after activation Added a flag to determine whether to configure channel masks by sending multiple <i>LinkADRReq</i> commands actions after activation Added a flag to determine whether to display erroneous frames in Link Analyzer screen
V 1.06	08/NOV/2017	<ol style="list-style-type: none"> Release of implementation of Certification Tests <ul style="list-style-type: none"> Final version of implementation for US/CA V1.2

		<ol style="list-style-type: none"> Support of Class B in LoRaWAN V1.0.2 Included V1.051 patch <ul style="list-style-type: none"> fixed bugs in implementation of Certification EU V1.5 in Firmware version of V1.05 Added display items in Link Analyzer <ul style="list-style-type: none"> Measured power, ADR flag, and Class B flag Changed position of contents in Link Analyzer <ul style="list-style-type: none"> from right column to bottom Enhanced functionality and stability of RF performance test (receiver sensitivity and TX power) Added or modified remote control commands (refer to the version history in User Manual) Minor bug fixes and updates
V 1.05	13/SEP/2017	<ol style="list-style-type: none"> Release of implementation of Certification Tests <ul style="list-style-type: none"> Final version of implementation for EU V1.5, AS V1.0 and KR V1.1 draft version of implementation for US/CA V1.2 In GWT, RF channels are fully supported up to 64+8 channels for US/CA 915 and AU 921, and up to 96 channels for CN 490. Improved a function of MAC commands transmission <ul style="list-style-type: none"> Support for multiple MAC commands in a single frame Added commands: DL_CHANNEL, ACTIVATE_TM, DEACTIVATE_TM Added or modified remote control commands (refer to the version history in User Manual) Improved RF Performance Test function <ul style="list-style-type: none"> Test Scenario: Normal Uplink or CERTI_ECHO Gateway testing available TX Power measurement according to TXPower index More reliable by using ACK flag instead of FCntUp Added parameters to control timing offset in us and frequency offset in ppm. Modified the concept of Channel Group from one group with 8 channels to two groups with 4 channels respectively, named as CH_GROUP_A and CH_GROUP_B, in cases of US/CA 915, AU 921 and CN 490.

V 1.04	01/AUG/2017	<ol style="list-style-type: none"> 1. Class C support 2. Fixed bugs in implementation of LoRaWAN Certification EU V1.2 3. Improved Sensitivity Test function <ul style="list-style-type: none"> - adding Test mode method using Echo Request - selecting RX window and DR 4. Fixed a bug in measuring power of unconfirmed frames 5. Improved the minimum of TX power level down to -143dBm 6. Renamed remote commands for transmission of MAC commands according to hierarchy structure 7. Minor fixes and updates
V 1.03	04/JUL/2017	<ol style="list-style-type: none"> 1. Fixed bugs in execution of EU Certification Tests 2. Added channel group function 3. Fixed a bug of mis-handling RX1DELAY value 4. Added 'M' field to indicate MTYPE in Link Analyzer and renamed MAC commands to follow the definition of LoRaWAN Spec. 5. Updated a remote command for reading of link messages 6. Added 'PREAMBLE_TYPE' parameter in NST mode 7. Added selection of downlink messages in EDT Sensitivity Test; ACK or user-defined data 8. Added and improved 'pre_alc_calibration' function in normal mode to guarantee the stability of TX power level
V 1.01	07/JUN/2017	<ol style="list-style-type: none"> 1. Added an optional function of SKT Certification Profile (partly verified) 2. Modified the unit for input of path loss and TX power 3. Changed pictures of Main Menu 4. Re-arranged Signal Generator function in NST 5. Defined remote commands fully 6. Verified Save/Recall functions 7. Updated User Manual
V 1.00	31/MAY/2017	1 st Official Firmware Release