

# RYZ014A

## LR5.4.1.2-58697 MR1.7 Software Release Note

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## 1. Software Release Overview

Compared to the last official maintenance release LR5.4.1.0-57140 (also called MR1.5), this new maintenance release LR5.4.1.2-58697 introduces bug fixes in terms of stability and robustness.

### 1.1 Software Version History

Modem Version (ATI)	Compatible Module	Build Number	PTCRB SVN	Description	Certification status of RYZ014
UE5.4.0.2	RYZ014A	LR5.4.1.0-50671 Current release in Renesas Module Manufacturing	5	Initial SW release	PTCRB approved Request #86993
UE5.4.1.1	RYZ014A	LR5.4.1.1-57830 Maintenance release through software update at customer level	8	Production release candidate MR1.6. This release can be used by customer for development and qualification.	<i>Not certified</i>
UE5.4.1.2	RYZ014A	LR5.4.1.2-58697 Maintenance release through software update at customer level	9	Release for production candidate MR1.7. This release can be used in customer production.	<i>PTCRB certification planned</i>

### 1.2 Bugs Fixed in this New Software Release

- Bug 117823

Description	Unnecessary PHR trigger after each reconfiguration
Renesas Case	N/A
Conditions for the issue to happen	Step1: eNB configure PHR Step2: eNB sends RRC reconfiguration without changing PHR configuration
Root cause	RRC always provides stored PHR configuration to MAC but MAC did not check if it has changed or not.
Occurrence	Systematic
Severity	Medium
How to detect the issue	Monitoring MAC PDU. Step1: eNB configure PHR Step2: eNB send RRC reconfiguration without changing PHR configuration. UE sends PHR in MAC PDU.

• Bug 117812

Description	SR is not stopped in right conditions
Renesas Case	N/A
Conditions for the issue to happen	Step1: UE receives a UL grant less than UL data to transmit, L1 stops SR before MAC sends BSR
Root cause	L1 always stop SR after receiving UL grant, not cooperating with MAC
Occurrence	Systematic
Severity	Medium
How to detect the issue	Monitoring PUCCH SR and MAC PDU. Step1: Send a big packet in UL. UE sends SR. Step2: eNB only allocates UL grant less than UL packet size. UE stops sending SR before MAC sends BSR.

• Bug 125038

Description	Command AT11 returns wrong output
Renesas Case	N/A
Conditions for the issue to happen	Run AT11 command. Expected result: ===== UE5.4.1.1 LR5.4.1.1-57830  Actual result: ===== UE5.4.1.1 LR5.4.1.8-57830
Root cause	Wrong interpretation of maintenance flag.
Occurrence	Systematic
Severity	Medium
How to detect the issue	Use AT11 command

• Bug 125048

Description	Reboot with error message I1DIScheduler.c@2126
Renesas Case	32996
Conditions for the issue to happen	Step1: UE attaches to network run MO ping for several days.
Root cause	Race condition in L1 for PDSCH scheduling.
Occurrence	Low
Severity	Medium
How to detect the issue	Step1: UE attaches to live network and runs MO ping periodically. Monitor it for several days to see if a fatal error occurs: I1DIScheduler.c@2126

- Bug 119424

Description	Reboot with error l1DspReset.c@244
Renesas Case	N/A
Conditions for the issue to happen	Step1: UE attaches to network and runs periodic MT ping test for several days.
Root cause	ZSP trying to decode PDSCH, which is not defined.
Occurrence	Once
Severity	Medium
How to detect the issue	Step1: UE attaches to network and run periodic MT ping test. Check if Fatal error l1DspReset.c@244 occurs.

- Bug 122497

Description	Reboot with error l1MacDrv.c@197
Renesas Case	32707 (RYZ024A)
Conditions for the issue to happen	Step1: UE attach to network with eDRX enabled 81.92s / 1.28s Step2: MT ping every 180s.
Root cause	Race condition in L1.
Occurrence	Random
Severity	Medium
How to detect the issue	Step1: UE attach to network. Step2: MT ping every 180s. Running for several days to see if fatal error l1MacDrv.c@197 occurred in console log and MCU will receive URC ^EXIT and +SYSSTART (reboot).

- Bug 114242

Description	AT+COPS sometimes fails to attach.
Renesas Case	N/A
Conditions for the issue to happen	Step1: In a place with several carrier's LTE-M cells, use AT+COPS=1,2,<PLMN> to manual select PLMN and attach.
Root cause	When scanning too many bands and cells, NAS timer expires before RRC reports the required PLMN's cell.
Occurrence	Random
Severity	Medium
How to detect the issue	Step1: In a place with several carrier's LTE-M cells, configure UE to scan several bands, use AT+COPS=1, 2, <PLMN> to manually select PLMN and attach. Check if UE could attach successfully after AT+COPS command.

- Bug 117714

Description	COPS=1 request is sometimes rejected by the modem.
Renesas Case	N/A
Conditions for the issue to happen	Step1: UE attaches to the network and in manual PLMN selection mode. Step2: Send AT+COPS=1, 2, <PLMNID> to manually select PLMN.
Root cause	PMM (responsible for manual/automatic PLMN selection) replied directly to the user with an error, whereas PMM has the possibility to slightly delay the request from the user.
Occurrence	Reproducible
Severity	Medium
How to detect the issue	Step1: UE attaches and in manual PLMN selection mode. Step2: Send AT+COPS=1, 2, <PLMNID> to manually select PLMN. Check if AT command returns error.

- Bug 121005

Description	Cell Search Manual PLMN Selection.
Renesas Case	N/A
Conditions for the issue to happen	Step1: UE attaches to network. Step2: Test manual detach/attach loop with AT commands " " AT+COPS=2, AT+COPS=?, AT+COPS=1, 2, "PLMNID".
Root cause	NAS considers RRC in camped state, whereas RRC has lost the PLMN just before the AT+COPS command.
Occurrence	Random
Severity	High
How to detect the issue	Step1: UE attached to network. Step2: Test manual detach/attach loop with AT commands " " AT+COPS=2, AT+COPS=?, AT+COPS=1, 2, "PLMNID" Check if AT+COPS=1, 2, "PLMNID" return +CME ERROR: phone failure

- Bug 124970

Description	Reboot with error l1DIScheduler.c@2677.
Renesas Case	32921
Conditions for the issue to happen	Step1: UE attached to network and pings every 1 minute.
Root cause	PDSCH received just after receiving RRC connection release.
Occurrence	Reproducible
Severity	High
How to detect the issue	Step1: UE attached to network and pings every 1 minute. Running for several hours and on several devices, check if fatal l1DIScheduler.c@2677 and MCU will receive URC ^EXIT and +SYSSTART (reboot).

- Bug 126071

Description	Manual PLMN Selection (Docomo).
Renesas Case	N/A
Conditions for the issue to happen	<p>Step1: Use 1NCE Roaming MVNO. Power on UE in Docomo, Softbank and KDDI CAT-M1 coverage</p> <p>Step2: Use AT+COPS=0 (automatic PLMN selection) attaches to SoftBank</p> <p>Step3: Use AT+COPS=2 to deregister</p> <p>Step4: Use AT+COPS=1, 2, "44010" (manual PLMN selection)</p> <p>Step5: Expect 1NCE/carrier to reject the attach request with cause #15 "No Suitable Cell in Tracking Area"</p> <p>Step6: Repeat from step 4 until 1NCE/carrier sends attach accept. Due to 1NCE policy (which has now changed) and 7 or more attach requests need to be rejected before attach accept is sent.</p>
Root cause	<p>The forbidden Tracking Area list was considered during Manual PLMN selection. After an attach reject was received, that TA was added to the list and not tried the next time. The software has changed to clear the forbidden PLMN TA list when requesting Manual PLMN Selection.</p> <p>After an attach request failure, the UE would attempt to attach on the Last Registered PLMN (which was SoftBank). This was changed to stay in manual PLMN mode and report an error code instead.</p> <p>These changes allow the UE to send multiple attach requests (which are rejected) to roaming using Docomo.</p>
Occurrence	Systematic
Severity	High
How to detect the issue	<p>Step1: Use 1NCE Roaming MVNO. Power on UE in Docomo, Softbank and KDDI CAT-M1 coverage.</p> <p>Step2: Use AT+COPS=0 (automatic PLMN selection) attaches to SoftBank.</p> <p>Step3: Use AT+COPS=2 to deregister.</p> <p>Step4: Use AT+COPS=1, 2, "44010" (manual PLMN selection).</p> <p>Step5: The UE would send an attach request to SoftBank, instead of Docomo.</p>

- Bug 126245

Description	RRC JSON algorithm limits PLMN reporting to NAS
Renesas Case	N/A
Conditions for the issue to happen	<p>Step1: UE attached to PLMN2 with AT+COPS=0.</p> <p>Step2: AT+CFUN=0/1. Manual select PLMN2 by AT+COPS=1, 2, &lt;PLMN2&gt;.</p>
Root cause	When RRC finds a PLMN during MRU scan, it will stop to scan other bands to find the requested PLMN from NAS.
Occurrence	Systematic
Severity	High
How to detect the issue	<p>Step1: UE attached to PLMN2 with AT+COPS=0</p> <p>Step2: AT+CFUN=0/1. Manual select PLMN2 by AT+COPS=1, 2, &lt;PLMN2&gt;.</p> <p>Check if PLMN2 is selected and attach succeeds.</p>

- Bug 126247

Description	Manual PLMN Selection when query does not return String name of the Docomo Operator
Renesas Case	N/A
Conditions for the issue to happen	Step1: In an area with Docomo, SoftBank and KDDI coverage, use AT+COPS=? to scan PLMNs
Root cause	44010 and 44000 are not in the PLMN list
Occurrence	Systematic
Severity	Low
How to detect the issue	Step1: In an area with Docomo, Softbank and KDDI coverage, use AT+COPS=? to scan PLMNs Check if Docomo is reported instead of 44000 and 44010.

- Bug 126184

Description	AT+SQNSUPGRADE? Wrong URC +SQNSUPGRADE : +SQNSUPGRADE : "downloading
Renesas Case	N/A
Conditions for the issue to happen	+SQNSUPGRADE header was added twice to the URC
Root cause	
Occurrence	Systematic
Severity	High
How to detect the issue	Step1: UE attaches to HPLMN Step2: Start FOTA update Check if duplicate +SQNSUPGRADE: was returned in URC.

- Bug 126499

Description	When doing Random Access Procedure during handover, wrong TBS is calculated by UE when MCS 10 is used for MSG3 grant
Renesas Case	N/A
Conditions for the issue to happen	Step 1: UE is connected to an LTE eNB and it is RRC Connected mode Step 2: When handover criteria is met, eNB sends a handover command to the UE Step 3: The UE triggers the Random Access Procedure for handover Step 4: During RAR, eNB provides MSG3 grant size with MCS=10, LCRB=2, RB_start=2 Step 5: The UE makes a wrong calculation of the TBS for this MSG3 grant Note: Issue was detected with an eNB simulator.
Root cause	Incorrect 3GPP TS 36.213 table used for MSG3 TBS calculation: Table 7.1.7.1-1 instead of Table 8.6.1-1.
Occurrence	Low
Severity	Low
How to detect the issue	Issue can only be detected with the DM tool.

- Bug 123463

Description	Reboot with an error message: File: lpuDebug.c@163
Renesas Case	32910, 32931
Conditions for the issue to happen	Step 1: UE attaches to network Step 2: UE sends a ping to an IPV4 address every 60s. During 2 pings, the UE enters low power mode. The DM tool is connected to the UE.
Root cause	The L1 processing unit is in Low Power mode and in Wait For Interrupt. It does not receive an interrupt and does not wake up.
Occurrence	Rare
Severity	High
How to detect the issue	MCU will receive URC ^EXIT and +SYSSTART.

- Bug 126428

Description	When using AT+SQNSUPGRADE? MCU gets double <CR><LF> instead of one single <CR><LF>
Renesas Case	33014
Conditions for the issue to happen	Do a FOTA upgrade using SQNSUPGRADE AT command.
Root cause	Remove double <CR><LF> on the AT+SQNSUPGRADE? intermediate response.
Occurrence	Systematic
Severity	Medium
How to detect the issue	Do a FOTA upgrade using SQNSUPGRADE AT command.

- Bug 126183

Description	AT+SQNSUPGRADE did not work in Manual mode. This has been fixed in MR 1.7.
Renesas Case	33014
Conditions for the issue to happen	Do a FOTA upgrade using SQNSUPGRADE AT command.
Root cause	Save the new firmware version after downloading, not on rebooting. Go to UPDATER mode on next reboot in SQNSUPGRADE mode. Updated MR1.7 firmware is required; hence this works when upgrading from MR1.7.
Occurrence	Systematic
Severity	Medium
How to detect the issue	Do a FOTA upgrade using SQNSUPGRADE AT command.

## 1.3 How to Upgrade to this Software

### 1.3.1 Local Upgrade using UART

This section introduces how to upgrade software to LR5.4.1.2-58697. Please make sure to install and use SFU version >= 1.1-447. Make sure that the module is awake by asserting the wake source (RTS0 by default).

- Download and unzip the dup package: RYZ014A\_ LR5.4.1.2-58697.dup.tgz
- Copy the dup file to the SFU folder
- Open cmd window with admin permission and enter SFU installation folder.
- Run the following command:

```
sfu.exe upgrade -b 921600 -z 2 COMxx xxx.dup
```

Where COMxx is UART2 or UART0

Important Note: In case SFU upgrade tool is connected to UART2, the host MCU must keep the module awake using UART0 - RTS0 wake pin.



### 1.3.2 Upgrade Over the Air

For differential upgrade, you can use the file:

RYZ014A\_from\_LR5.4.1.1-57830\_to\_LR5.4.1.2-58697.dup

If you need upgrade from another release, please contact your Renesas representative to get differential packages and instructions for the exact release you want to upgrade from.

### 1.4 Initial Procedure for Attach

Whenever using a MVNO's SIM card and the software release LR5.4.1.2-58697, please configure the operator mode to standard using +SQNCTM and configure the needed bands using +SQNBANDSEL. You can refer to **Use Cases with AT Commands** user document for more detailed information.

## 2. General Feature Support Overview

Feature description	Comments / limitations
PTCRB v5.42	Bands 2 / 4 / 5 /12 / 25
GCF 3.76	Bands 13 / 4
JATE/Telec	Bands 1/18/19/26
<b>Modem features</b>	
3GPP Release 13 LTE-M compliancy	
+23 dBm TX support	
CE (coverage enhancement) mode A	
Power Saving feature support: cDRX, PSM	
Dual-stack IPv4/v6	
<b>Services open for customer</b>	
SMS over NAS	
TCP/UDP/IP socket support	
HTTP(S)/FTP(S)	
SSL/TLS/DTLS secure socket support	
MQTT(S)	
PPP	
Local firmware upgrade	
Firmware update over the air (FOTA)	

## 3. MNO and MVNO Support Status

This software release has been tested and monitored with several setups on the field with MVNO SIM with iBasis (US), 1nce (Japan), Iijmio (Japan) and Ymobile (Japan).

This software release has not been tested nor certified with: Docomo, KDDI, AT&T, Verizon, T-Mobile or other MNO.

## 4. New Features and Limitations

### 4.1 New Features

This new software release fixes defects for improved field stability in the Japan market.

### 4.2 Known Limitations

- General recommendation: the use of a connection manager running on a host MCU connected to the module is mandatory to maximize cellular connectivity uptime. Some useful information for implementing a connection manager can be found in the **System Integration Guide** document.
- AT+SQNCTM: only the standard mode is supported, other modes are unsupported.
- SIM auto-detection is disabled. Consequently, with a MVNO SIM card, the user shall configure the operator mode in standard mode with AT+SQNCTM. Instructions are available in both **AT command use case** and **System Integration Guide** documents.
- JTAG: Access to JTAG cannot be permanently disabled when using AT+SQNHWCFG command. This limitation is not planned to be fixed in future software releases.
- LED status: Status LED pad is disabled by default software configuration.  
**Solution:** Use AT+SQNHWCFG command to enable it. This limitation is not planned to be fixed in future software releases.
- PoLTE location service is not available.
- External Hosted Crypto Engine (HCE) is not supported with AT commands such as AT+SQNFGET, AT+SQNHTTSPND, AT+SQNFPUT, AT+SQNHTTTPQRY, AT+SQNSD.
- AT+SQNFOTACFG: Only automatic mode is supported. Manual mode is not supported.
- AT&T and Version FOTA service (LWM2M feature), not supported: this limitation is not planned to be fixed in future software releases.
- WolfSSL version 4.2.0 vulnerability information: <https://www.wolfssl.com/docs/security-vulnerabilities/>. We have fixed one high risk issue with MR1.6 (CVE-2020-36177).
- AT+SQNSPCFG: session resumption (feature of the core TLS/DTLS specifications) that allows a client to continue with an earlier established session state is not supported.
- LTE bands have been tested with lab equipment and/ or field testing on the following bands:
  - Bands for lab testing: bands 1, 4, 19, 26.
  - Bands for field testing: bands: 1, 8, 18, 19 and 26 (Japan), 12 (US).
- LTE relaxed monitoring is not supported.
- eDRX feature is not supported and there is no plan to support in a future release.  
Note: For customers requesting eDRX feature, the RYZ024A module supports it.
- Manual PLMN selection (AT+COPS=1) is not fully functional and should not be used for a commercial deployment.

- For a FOTA full image upgrade, there will be no URC +SQNSUPGRADE: "installed". This URC is present after a diff FOTA image upgrade.
- AT+SQNSUPGRADE with manual reboot option was fixed in MR1.7. This feature will only work when upgrading from MR1.7 to later software releases.

• Bug 126013

Description	MO Ping Failure 20 hrs Recovered by Periodic-TAU
Renesas Case	32995
Conditions for the issue to happen	Step 1: The UE is connected to the eNB on Docomo network with a Soracom SIM card Step 2: Collect signal and cell stats with AT+CESQ and AT+SQNMONI=9 Step 3: Send a ping with AT+PING="8.8.8.8" Step 4: Wait 60s and repeat from step 2
Root cause	To be identified.
Occurrence	Rare
Severity	High
How to detect the issue	After sending AT+PING="8.8.8.8", the UE returns the following URC: +CME ERROR: Network failure
Mitigation plan	Use a Connection manager to handle the URC and re-establish the connection by doing a reboot of the UE and a re-attach.

• Bug 126685

Description	Reboot with error lpuDebug.c@172
Renesas Case	33110
Conditions for the issue to happen	Step 1: The UE is connected to the eNB on Docomo network with a Soracom or Iljmio SIM card or to KDDI network with a 1NCE SIM card Step 2: Send a ping with AT+PING="8.8.8.8" Step 3: Wait 60 s and repeat to step 2 The test loop is repeated until the issue happens. The DM Tool is connected.
Root cause	To be identified.
Occurrence	Low
Severity	Low
How to detect the issue	MCU will receive URC +SYSSTART
Mitigation plan	Use a Connection manager to handle the UE reboot and perform a reattach.
Status	Seen six times during internal validation of pre-MR1.7 and MR1.7 SW release for a total test duration of 2816 hours.

- Bug 124865

Description	Exception: 7 ITYPE: 0xe0 PC: 0x1c378246 happened after execution of AT+SQNFOTACFG
Renesas Case	N/A
Conditions for the issue to happen	Step 1: Configure upgrade profile via AT+SQNDMCFG Step 2: Enable upgrade profile via AT+SQNFOTACFG and attach UE to ENB (issue may occur here with low reproducibility rate) Step 3: Register on BS/DM server Step 4: Perform dup download via CoAP by writing a link for UE FW dup diff image at DM server and wait for downloading process to start
Root cause	To be identified.
Occurrence	Medium
Severity	Medium
How to detect the issue	Issue observed during dup downloading over CoAP .
Mitigation plan	Connection manager should handle the URC and re-initiate its state machine, re-establish connection.
Status	Seen during internal validation of one candidate MR1.6 SW and another pre-MR1.7 SW.

- Bug 126445

Description	Manual PLMN Selection Failure with AT+COPS=1 to SoftBank. Error message "+CME ERROR: no network service" is returned.
Renesas Case	N/A
Conditions for the issue to happen	Step 1: Attach the UE with AT+CFUN=1 to Softbank, using a SIM from 1NCE Step 2: Deregister with AT+COPS=2 Step 3: Manually select Softbank with AT+COPS=1, 2, "44020" Step 4: Send a Ping to a IPV4 address Step 5: Detach and repeat from step1 This loop is executed many times until the issue occurs.
Root cause	To be identified.
Occurrence	Low
Severity	Low
How to detect the issue	" +CME ERROR: no network service" is returned after sending AT+COPS=1, 2, "44020".
Mitigation plan	Use automatic PLMN selection
Status	Seen during internal validation of MR1.7 release candidates.

- Bug 126845

Description	Reboot with qki_timer.c@212
Renesas Case	N/A
Conditions for the issue to happen	<p>Step 1: The UE is connected to the eNB on Softbank network with a Ymobile SIM card.</p> <p>Step 2: Send a ping with AT+PING</p> <p>Step 3: Detach from network</p> <p>Step 4: Repeat from step 1</p> <p>The test loop is repeated until the issue happens. The DM tool is connected.</p>
Root cause	To be identified.
Occurrence	Low Triggered once.
Severity	Low
How to detect the issue	MCU will receive URC +SYSSTART.
Mitigation plan	Use a Connection manager to handle the UE reboot and perform a reattach.
Status	Seen once during internal validation of candidate MR1.7 SW release.

- Bug 127086

Description	Reboot error message rrc_persist.cc@861
Renesas Case	N/A
Conditions for the issue to happen	<p>Step 1: The UE is connected to the eNB on Docomo network with a IJ Mio SIM card.</p> <p>Step 2: Send 4 pings with AT+PING</p> <p>Step 3: Wait 60 seconds</p> <p>Step 4: Repeat from step 2</p> <p>The test loop is repeated until the issue happens. The DM tool is connected. In our case, this issue occurred about 16 h 42 mins after the SIM card was deactivated.</p>
Root cause	This issue occurs because the SIM card was deactivated (eNB deactivated the USIM on UE side, which follows 3GPP req).
Occurrence	Low Triggered once. Found during internal testing on the remote setup at Renesas.
Severity	Low
How to detect the issue	MCU will receive URC +SYSSTART
Mitigation plan	Use a connection manager to handle the UE reboot and perform a reattach.
Status	Seen once during internal validation of candidate MR1.7 SW release.

## 5. Power Consumption Measurements

### 5.1 Hardware Setup

Following power consumption values are provided with Win<sup>TM</sup>10 PC, using the RYZ014 module board supplied at 3.8V, connected over UART to the PC.

### 5.2 Reference Network Configuration

- eNB UE Inactivity timer (Rx active or C-DRX): 10 sec (not a 3GPP timeout)
- C-DRX / Inactivity timer: 200 ms, long cycle: 1280 ms, On duration: 10 ms
- I-DRX cycle: 1280 ms
- T3324 (Active Timer): 10 sec (Note: 3GPP minimum = 16 sec)
- T3412-ext (Periodic TAU Timer): 24h

### 5.3 Measurements

Power Down	Unit	Value
Power Down Current (switched off)	μA	1.14
Boot (toggling of ON pin to +SYSSTART URC)	Unit	Value
Total duration	sec	1.18
Average power	mW	95
Airplane	Unit	Value
Sleep mode / Rock bottom	μW	1727
Suspend (Deep sleep mode)/ Rock bottom	μW	4.34
RRC Connected	Unit	Value
Active Tx / Frame configuration: UUUGDDDDDG / Tx@0dBm / Average power	mW	512
Active Tx / Frame configuration: UUUGDDDDDG / Tx@23dBm / Average power	mW	745
Sleep / RRC Idle	Unit	Value
RRC idle / DRX / 1.28s / UART active / Average power	mW	64.7
RRC idle / DRX / 1.28s / Average power	mW	13.9
RRC idle / DRX / 2.56s / Average power	mW	8.00
Suspend / PSM (good radio conditions)	Unit	Value
PSM / Rock bottom current	μW	4.34
PSM (periodic TAU each T3412=180s)- IPV4V6- Average power	mW	6.61

## 6. Deliverables

### 6.1 RYZ014A Module Files

- DUP file  
RYZ014A\_LR5.4.1.2-58697.dup.tgz
- Diff package file for FOTA upgrade  
RYZ014A\_from\_LR5.4.1.1-57830\_to\_LR5.4.1.2-58697.dup

### 6.2 Tool

SFU tool for modem software upgrade version 1.1-447 or later.

### 6.3 Documentation

Hardware and software designers can refer to the available RYZ014 documentation:

- RYZ014A LTE Category M1 Module Datasheet
- RYZ014 Module System Integration Guide
- RYZ014A Module Integration Guide
- RYZ014 Modules AT Commands User's Manual
- RYZ014 Modules User Cases with AT Commands
- RYZ014A Evaluation Kit RYZ014AAA User's Manual Rev.1.04
- RYZ014 Power Consumption Measurements on RYZ014-Based Modules
- RYZ014A Firmware Upgrade Quick Start Guide
- RYZ014 Firmware Over-the-Air Upgrade Application Note

## 7. Appendix 1: Naming Convention

Starting from MR1.6 (LR5.4.1.0-57830), RYZ014A releases follow a software versioning scheme as described below:

P.V.M.m-dist-meta

Where

- P = Platform (RYZ014=5).
- V = Product version (Product version, in our case 4).
- M = major; M is incremented every time there is a software delivery that is subject to maintenance.
- m = minor; m shall increment for each additional delivery for a given Major release.
- dist = distribution (optional)
- meta= metadata (optional, typically build number)

A software release note is available for each M.m, it describes the new features, fixes, limitations and performances.

## 8. Appendix 2: List of Open Source 3<sup>rd</sup> Party Packages

Name	Version	Description	URL	Licenses
cryptocpp	5.5.2	C++ class library of cryptographic schemes	<a href="https://www.cryptopp.com">https://www.cryptopp.com</a>	Public Domain ( <a href="https://www.cryptopp.com/License.txt">https://www.cryptopp.com/License.txt</a> )
md5deep	4.3	C implementation of the MD5 message-digest algorithm	<a href="http://md5deep.sourceforge.net/">http://md5deep.sourceforge.net/</a>	Public Domain ( <a href="https://raw.githubusercontent.com/jessek/shdeep/master/COPYING">https://raw.githubusercontent.com/jessek/shdeep/master/COPYING</a> )
sha2	2/2/2007	Fast software implementation in C of FIPS 180-2 hash algorithms	<a href="https://github.com/ogay/sha2">https://github.com/ogay/sha2</a>	3-clause BSD License ( <a href="http://ouah.org/ogay/sha2/">http://ouah.org/ogay/sha2/</a> )
Yaffs	3.1.92	File system designed to be fast, robust and suitable for embedded use with NAND and NOR Flash	<a href="https://yaffs.net/">https://yaffs.net/</a>	Commercial License ( <a href="https://yaffs.net/commercial-licences">https://yaffs.net/commercial-licences</a> )
minibsdiff	minibsdiff/ master@cf9822b	minibsdiff: a miniature, portable version of bsdiff	<a href="https://github.com/thoughtpolice/minibsdiff">https://github.com/thoughtpolice/minibsdiff</a>	2-clause BSD License ( <a href="https://raw.githubusercontent.com/thoughtpolice/minibsdiff/master/LICENSE.txt">https://raw.githubusercontent.com/thoughtpolice/minibsdiff/master/LICENSE.txt</a> )
LZMA	16.04	Compression algorithm providing a high compression ratio and fast decompression suitable for embedded applications	<a href="https://www.7-zip.org/sdk.html">https://www.7-zip.org/sdk.html</a>	Public Domain ( <a href="https://www.7-zip.org/sdk.html">https://www.7-zip.org/sdk.html</a> )
STLport	5.2.1	Multiplatform ANSI C++ Standard Library implementation	<a href="http://stlport.sourceforge.net/">http://stlport.sourceforge.net/</a>	Specific License <a href="http://www.stlport.org/doc/license.html">http://www.stlport.org/doc/license.html</a> )
wolfSSL	4.2.0	Lightweight, portable, C-language-based SSL/TLS library targeted at IoT	<a href="https://www.wolfssl.com/">https://www.wolfssl.com/</a>	Commercial License ( <a href="https://www.wolfssl.com/license/">https://www.wolfssl.com/license/</a> )
bcrypt	1.57	C implementation of the bcrypt password hashing algorithm	<a href="https://www.openbsd.org/">https://www.openbsd.org/</a>	BSD License ( <a href="https://www.openbsd.org/policy.html">https://www.openbsd.org/policy.html</a> )
libedit	1.19	Command line editor library providing generic line editing, history and tokenization functions, similar to those found in GNU Readline	<a href="http://cvsweb.netbsd.org/bsdweb.cgi/src/lib/libedit/#dirlist">http://cvsweb.netbsd.org/bsdweb.cgi/src/lib/libedit/#dirlist</a>	NetBSD Foundation's License ( <a href="https://www.netbsd.org/about/redistribution.html">https://www.netbsd.org/about/redistribution.html</a> )
SNOW3G algorithm	1.1	Stream cipher for the 3GPP algorithms UEA2 & UIA2	<a href="http://www.3gpp.org/DynaReport/35216.htm">http://www.3gpp.org/DynaReport/35216.htm</a>	ETSI License ( <a href="https://www.etsi.org/security-algorithms-and-codes/cellular-algorithm-licences">https://www.etsi.org/security-algorithms-and-codes/cellular-algorithm-licences</a> )
MILENAGE algorithm	v11	Example algorithm set for the 3GPP authentication and key generation functions f1, f1*, f2, f3, f4, f5 and f5*	<a href="http://www.3gpp.org/DynaReport/35206.htm">http://www.3gpp.org/DynaReport/35206.htm</a>	ETSI License ( <a href="https://www.etsi.org/security-algorithms-and-codes/cellular-algorithm-licences">https://www.etsi.org/security-algorithms-and-codes/cellular-algorithm-licences</a> )



Name	Version	Description	URL	Licenses
c-ares	1.13.0	C library for asynchronous DNS requests including name resolves	<a href="https://c-ares.haxx.se/">https://c-ares.haxx.se/</a>	MIT ( <a href="https://c-ares.haxx.se/license.html">https://c-ares.haxx.se/license.html</a> )
cJSON	1.5.7	Ultralightweight JSON parser in ANSI C	<a href="https://github.com/DaveGamble/cJSON">https://github.com/DaveGamble/cJSON</a>	MIT ( <a href="https://raw.githubusercontent.com/DaveGamble/cJSON/master/LICENSE">https://raw.githubusercontent.com/DaveGamble/cJSON/master/LICENSE</a> )
curl	7.57.0	Library for transferring data specified with URL syntax	<a href="https://c-ares.haxx.se/">https://c-ares.haxx.se/</a>	curl license ( <a href="https://curl.haxx.se/docs/copyright.html">https://curl.haxx.se/docs/copyright.html</a> )
Jansson	2.10.0	C library for encoding, decoding and manipulating JSON data	<a href="https://github.com/akheron/jansson">https://github.com/akheron/jansson</a>	MIT ( <a href="https://raw.githubusercontent.com/akheron/jansson/master/LICENSE">https://raw.githubusercontent.com/akheron/jansson/master/LICENSE</a> )
jwtxx	1.1.6	C++ library to work with JSON Web Tokens	<a href="https://github.com/madf/jwtxx">https://github.com/madf/jwtxx</a>	MIT ( <a href="https://raw.githubusercontent.com/madf/jwtxx/master/LICENSE">https://raw.githubusercontent.com/madf/jwtxx/master/LICENSE</a> )
wakaama	wakaama/ master@8 0 4118d	OMA Lightweight M2M C implementation designed to be portable on POSIX compliant systems	<a href="https://www.eclipse.org/wakaama/">https://www.eclipse.org/wakaama/</a>	Eclipse Public License - v 1.0 ( <a href="https://raw.githubusercontent.com/eclipse/mosquitto/master/edl-v10">https://raw.githubusercontent.com/eclipse/mosquitto/master/edl-v10</a> )
mosquitto	1.4.13	Lightweight message broker implementing the MQTT protocol versions 3.1 and 3.1.1	<a href="https://mosquitto.org/">https://mosquitto.org/</a>	Eclipse Public License - v 1.0 ( <a href="https://raw.githubusercontent.com/eclipse/mosquitto/master/edl-v10">https://raw.githubusercontent.com/eclipse/mosquitto/master/edl-v10</a> )
eCosPro	3.1.83	Real-time operating system (RTOS) for embedded application	<a href="https://www.ecoscentric.com/">https://www.ecoscentric.com/</a>	commercial ( <a href="https://doc.ecoscentric.com/user-guide/licensing.html#ecos-licensing">https://doc.ecoscentric.com/user-guide/licensing.html#ecos-licensing</a> )
lwIP	1.4.1	Lightweight C implementation of the TCP/IP protocol	<a href="https://savannah.nongnu.org/projects/lwip/">https://savannah.nongnu.org/projects/lwip/</a>	BSD ( <a href="http://lwip.wikia.com/wiki/License">http://lwip.wikia.com/wiki/License</a> )
zlib	1.2.3	General purpose lossless data-compression library	<a href="https://zlib.net/">https://zlib.net/</a>	zlib license ( <a href="https://zlib.net/zlib_license.html">https://zlib.net/zlib_license.html</a> )

Revision History

Rev.	Date	Description	
		Page	Summary
1.00	Jan.25.23	—	Initial release
1.10	Apr.21.23	—	Updated for MR1.7

## General Precautions in the Handling of Microprocessing Unit and Microcontroller Unit Products

The following usage notes are applicable to all Microprocessing unit and Microcontroller unit products from Renesas. For detailed usage notes on the products covered by this document, refer to the relevant sections of the document as well as any technical updates that have been issued for the products.

### 1. Precaution against Electrostatic Discharge (ESD)

A strong electrical field, when exposed to a CMOS device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop the generation of static electricity as much as possible, and quickly dissipate it when it occurs. Environmental control must be adequate. When it is dry, a humidifier should be used. This is recommended to avoid using insulators that can easily build up static electricity.

Semiconductor devices must be stored and transported in an anti-static container, static shielding bag or conductive material. All test and measurement tools including work benches and floors must be grounded. The operator must also be grounded using a wrist strap. Semiconductor devices must not be touched with bare hands. Similar precautions must be taken for printed circuit boards with mounted semiconductor devices.

### 2. Processing at power-on

The state of the product is undefined at the time when power is supplied. The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the time when power is supplied. In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the time when power is supplied until the reset process is completed. In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the time when power is supplied until the power reaches the level at which resetting is specified.

### 3. Input of signal during power-off state

Do not input signals or an I/O pull-up power supply while the device is powered off. The current injection that results from input of such a signal or I/O pull-up power supply may cause malfunction and the abnormal current that passes in the device at this time may cause degradation of internal elements. Follow the guideline for input signal during power-off state as described in your product documentation.

### 4. Handling of unused pins

Handle unused pins in accordance with the directions given under handling of unused pins in the manual. The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of the LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible.

### 5. Clock signals

After applying a reset, only release the reset line after the operating clock signal becomes stable. When switching the clock signal during program execution, wait until the target clock signal is stabilized. When the clock signal is generated with an external resonator or from an external oscillator during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Additionally, when switching to a clock signal produced with an external resonator or by an external oscillator while program execution is in progress, wait until the target clock signal is stable.

### 6. Voltage application waveform at input pin

Waveform distortion due to input noise or a reflected wave may cause malfunction. If the input of the CMOS device stays in the area between  $V_{IL}$  (Max.) and  $V_{IH}$  (Min.) due to noise, for example, the device may malfunction. Take care to prevent chattering noise from entering the device when the input level is fixed, and also in the transition period when the input level passes through the area between  $V_{IL}$  (Max.) and  $V_{IH}$  (Min.).

### 7. Prohibition of access to reserved addresses

Access to reserved addresses is prohibited. The reserved addresses are provided for possible future expansion of functions. Do not access these addresses as the correct operation of the LSI is not guaranteed.

### 8. Differences between products

Before changing from one product to another, for example to a product with a different part number, confirm that the change will not lead to problems. The characteristics of a microprocessing unit or microcontroller unit products in the same group but having a different part number might differ in terms of internal memory capacity, layout pattern, and other factors, which can affect the ranges of electrical characteristics, such as characteristic values, operating margins, immunity to noise, and amount of radiated noise. When changing to a product with a different part number, implement a system-evaluation test for the given product.

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