Release Notes

DA14531/DA14585/DA14586 SDK v. 6.0.18.1182.1

SW-B-002

Abstract

This document contains the release notes for Renesas DA14531/DA14585/DA14586 Software Development Kit, version 6.0.18.1182.1

Contents

Tables

1 Terms and Definitions

GA	General access
LA	Limited access
BLE	Bluetooth® Low Energy
SDK	Software Development Kit
SUOTA	Software Update Over The Air
TRNG	True Random Number Generator
FW	Firmware
API	Application Programming Interface

2 Release Data

Table 1: Information Table

Software	DA14585 DA14531 SDK
Device Number	DA14531, DA14531-01, DA14585, DA14586
Software Release Date	26 October 2022
Software Version Number	6.0.18.1182.1
Software Release Type (Note 1)	FULL (GA)

Note 1 Releases can be of the following types: FULL (GA), FULL (LA), RELEASE CANDIDATE, ENGINEERING, PATCH or BINARY.

3 License

Licenses covering this SDK release are listed in the license.txt file in the SDK doc folder.

4 Related Documentation and References

DA14531 Getting Started Guide User Manual	UM-B-117
DA14585/DA14531 SDK Porting Guide	UM-B-118
DA14585/DA14531 SW Platform Reference Manual	UM-B-119

5 Release Description

5.1 Overview

This is a GA release of SDK6 that runs on the DA14531/531-01 and DA14585/6 devices. This release can be used for application development.

5.2 Features of 6.0.18.1182.1

Table 2: 6.0.18.1182.1 New Features

Feature Number	Description
1182_001	Added support for DA14531-01 device which is a ROM variant of DA14531.

5.3 Fixes and Improvements since 6.0.18.1182.1

Table 3: 6.0.18.1182.1 Fixes and Improvements

Fix Number	Description
1182/01	DA14531/585/586: Default C compiler change in Keil projects. All the released Keil projects are built with ARM v6 C compiler with LTO support enabled.
1182/02	DA14531/585/586: The default RAM retention mode changed. All the RAM cells will be retained during extended sleep. The user can still select which RAM cells can be retained during extended sleep. As a consequence of the default retention mode change, the sleep current will increase in some BLE examples compared to the previous SDK6 releases.
1182/03	DA14531: Removed redundant 1144/06 patch from the DA14531 library files. The 1144/06 patch had been accidentally added to SDK 6.0.16 patches.

5.4 Known Issues of 6.0.18.1182.1

Table 4: 6.0.18.1182.1 Known Issues

An active list of known limitations is maintained online:

http://lpccs-docs.renesas.com/sdk6_kll/index.html

6 Release History

6.1 Version 6.0.16.1144

This is a GA release of SDK6 that runs on the DA14531 and DA14585/6 devices. This release can be used for application development.

6.2 Features of 6.0.16.1144

Table 5: 6.0.16.1144 New Features

Feature Number	Description
1143_001	Added support for the following SPI flash memories: AT25DF021A, AT25XE041D, AT25EU0021A.
1143_002	DA14531: The maximum external DC load current on the VBAT_HIGH rail during booting in boost mode is 50uA. As a result of this, an external SPI flash memory that is connected to VBAT_HIGH (when the DA14531 is working in boost mode) may not be operational for certain values of VBAT_LOW. This means that the DA14531 will not boot from the SPI flash memory. To overcome this limitation, a dedicated DA14531 pin has been selected in the SPI flash driver to control the SPI flash powering up procedure.
1143_003	The SPI flash driver can disable by default the SPI flash memory protection (some SPI flash memories, such as the AT25DF021A, are memory protected after the power cycle), using a compile-time flag.
1143_004	DA14531: Added 1-wire UART support to the secondary bootloader.
1143_005	DA14531: Added the capability to enable/disable the UART or JTAG support in the secondary bootloader.

6.3 Fixes and Improvements since 6.0.14.1114

Table 6: 6.0.16.1144 Fixes and Improvements

Fix Number	Description
1144/01	DA14531: Fixed issue with waking up from hibernation with no RAM retained. The device was overwriting the booter-applied values of the BANDGAP_REG, CLK_RC32M_REG, and CLK_RC32K_REG registers.
1144/02	DA14585/586: Fixed secondary bootloader issue with large images. During the run, the decryption of a large image might take longer than the default load value of the watchdog causing the watchdog timer to expire.
1144/03	DA14585/586: Fixed issue with XTAL16M trimmed devices, where the booter applied CLK_FREQ_TRIM_REG value was overwritten with zeros after device wake-up.
1144/04	Corrected the BMS Server. It was allowing delete operations without an authorization code to happen when an authorization code was required.
1144/05	Fixed: There is a possibility of using a Long Term Key (LTK) with all zeros in the Bluetooth subsystem if the Link Layer Encryption procedure occurs before the completion of the pairing procedure. This is fixed in the default app handler in SDK BLE examples.
1144/06	Improved the stack behavior during the setting of data length (HCI_Set_Data_Length command) and Data Length Update procedure to improve interoperability.
1144/07	Fixed: On unexpected reception of Data Physical Channel PDU, the Bluetooth Controller stack terminate the connection using the Link Layer ACL Termination

Fix Number	Description
	procedure instead of abandoning the connection as specified by the Link Layer part of Bluetooth core specification v5.2.
1144/08	DA14531: Fixed a rare occurrence of a race condition while accessing the exchange memory, which is shared between hardware and firmware, which can result in the loss of the LE ACL packet which was successfully received over the air.
1144/09	Additional checks are added in the Security Manager protocol (SMP) of the Bluetooth Host stack to detect reflected random values (Confirm value and Random value) during the LE legacy pairing procedure. On detection of the reflected public key, the pairing procedure will fail. This improvement addresses the security vulnerability reported by the researchers in ANSSI regarding the “Authentication of the LE Legacy Pairing Protocol”.
1144/10	While operating as an LE slave (peripheral role), the Link Layer validates the fields in the received LL_CONNECT_IND / LL_CONNECT_REQ PDU. The connection is considered lost if the received PDU contains one or more fields that are specified as Reserved for Future Use (RFU). This improvement is in accordance with the Link Layer Part of Bluetooth core specification v5.2.

6.4 Known Issues of 6.0.16.1144

Table 7: 6.0.16.1144 Known Issues

An active list of known limitations is maintained online:

http://lpccs-docs.renesas.com/sdk6_kll/index.html

6.5 Version 6.0.14.1114

This was a GA release of SDK6 that runs on the DA14531 and DA14585/6 devices. This release can be used for application development.

6.5.1 Features of 6.0.14.1114

Table 8: 6.0.14.1114 New Features

Feature Number	Description
1114_001	Whitelist support in a peripheral role. This feature provides limited functionality on Link Layer privacy by enabling the application to add devices to the white list while operating in the Peripheral role. It facilitates the device to allow connection only from the peer (remote) device that is listed in the white list. The feature works when the peer (remote) device uses a Public device address or Static Random device address or Resolvable Private device address. The number of devices that can be added to the white list depends upon the chipset used.
1114_002	DA14531: Adapt VDD clamp level in hibernation mode based on static temperature range selection.
1114_003	IAR v8.40.2 support (prox_reporter).
1114_004	WiFi coexistence support.
1114_005	DA14531: State-aware hibernation.

6.5.2 Fixes and Improvements since 6.0.12.1020.2

Table 9: 6.0.14.1114 Fixes and Improvements

Fix Number	Description
1114/01	Fixed known limitation 1020.05: (DA14531) The peripheral examples inside the SDK did not work in boost mode due to the deactivation of the internal DCDC converter in the system initialization function.
1114/02	Defined extra free RAM area to be used by applications.
1114/03	DA14531: Improved ADC_VBAT command to read VBAT_LOW (prod_test).
1114/04	Added new HCI command to trigger h/w reset (prod_test).
1114/05	Added extra prod_test binaries per UART configuration.
1114/06	DA14531: Trigger TRNG mechanism every time RAM3 block was previously off.
1114/07	Fixed Issue: Incorrect handling on the reception of wrongly formed Security Manager Protocol PDU (packets that are less than what is expected for a specific opcode but with correct L2CAP length).
1114/08	Improvement: Incorrect SM_Pairing_Request is ignored without response. This behavior is as per the Bluetooth specification recommendation for handling invalid behavior of peer (remote) device.
1114/09	Fixed Issue (only for DA14585): Device instability when handling fragmented data packets is received from the peer (remote) device. If the start of the data packet received is fragmented within L2CAP & ATT header (i.e. 7 bytes), then corruption happens on heap memory.
1114/10	Swapped RTS/CTS signals in external processor projects.
1114/11	Passed connection index to application in custom profile write handler.
1114/12	Fixed write request in custom profile when RI is enabled.
1114/13	DA14531: Added support for ADC differential mode through existing ADC configuration structure.
1114/14	DA14531: Restored booter applied register values after hibernation wake-up.
1114/15	Fixed known issue 1020.01 (DA14531). The Transmit Power Level characteristic represents the current radiated transmit power level in dBm for the specified Bluetooth connection. This is as per the Tx Power Service Specification.
1114/16	Fixed UART peripheral example to not get stuck in loopback mode.
1114/17	DA14531: Pointer arp_table placed in the retention memory area.
1114/18	DA14531: Changed the order of the ADC registers being restored in conditionally_run_radio_cals().
1114/19	DA14531: Disabled certain ROM SDK functions (SDK functions which have been placed in ROM) which may lead to s/w breakpoint.
1114/20	Added function callback to handle line status errors in the UART driver.
1114/21	Enabled by default the DMA support when booting from SPI flash memory (secondary bootloader).
1114/22	Added support to alter the default pairing response message.
1114/23	Moved range extender initialization function call before GPIO initialization.
1114/24	Handled properly the I2C_INT_TX_ABORT interrupt when a read operation is performed in DMA mode.
1114/25	Fixed known limitation 1020.02 (DA14585/586/531): In external processor configuration the GPIO used for waking up is not programmed immediately after UART flow off. This may lead to missing communication over UART with the external processor if the external processor tries to wake up the device too soon.

Fix Number	Description
1114/26	Improved RSSI calculation formula.
1114/27	Handled properly the ATT_Handle_Value_Indication by the GATT Client. The device responds with ATT_HANDLE_VALUE_CFM for the ATT_HANDLE_VALUE_IND received for Characteristics where Client Changed Characteristics is NOT configured for Indication. This change in behavior is as per Generic Attribute Profile (GATT) specification and improves the interoperability with some Android-based phones running Android OS P & Q.
1114/28	DA14531: Used properly the transparent light sleep (TLS) mode of the RAM cells.
1114/29	Fixed inconsistent behavior when trying to start a new ADV event while a previous one is already started.
1114/30	Fixed known issue (DA14531) 1020.04_ DA14531: when _EXCLUDE_ROM_PRF_ is not defined and no BLE profiles are used in the application context, BLE_NB_USED_PROFILES must be set to 0. If not, the first four addresses of the executable – initial Stack Pointer, Reset Handler, NMI Handler, and HardFault Handler – will be overwritten with zeros. Affected SDK projects: hci; ble_app_noncon; prod_test.
1114/31	DA14531: Fixed OTP header layout used by SmartSnippets Studio.
1114/32	DA14531: Added support for OTP write command.
1114/33	Added support for P25Q11U SPI flash memory.
1114/34	DA14531: Added support for 1-wire UART to prod_test.exe utility.
1114/35	DA14531: Corrected temperature coefficient value in ADC driver.
1114/36	DA14531: Modified flash programmer (UART version) scatter file.
1114/37	Fixed toolchain version used by SmartSnippets Studio (instead of being "7-2018-q2" was "7-2018q2").
1114/38	DA14585: The processing of LL_CHANNEL_MAP_IND PDU after the Connection Event Counter is specified as an Instant field in the PDU does not lead to the termination of the connection. This change improves the behavior of the stack if the peer device (master) erroneously performs the Link Layer Channel Map Update procedure while the Link Layer Connection Parameters Request procedure is ongoing by processing the LL_CHANNEL_MAP_IND PDU after the Connection Parameters Request procedure is completed. This change in behavior may result in keeping the connection alive during this out-of-specification behavior of the smartphone. Prior to this change, the processing of such LL_CHANNEL_MAP_IND would result in the termination of the connection. This change in DA14585 aligns with DA14531 behavior in the handling of LL_CHANNEL_MAP_IND PDU received during an ongoing Connection Parameters Request procedure.

6.5.3 Known Issues of 6.0.14.1114

Table 10: 6.0.14.1114 Known Issues

Issue Number	Description
933.04	DA14585/586/531: Default system rand() function is not true random (not NIST compliant). It is suggested to use the alternative chacha20() function when true random numbers are required (NIST compliant).
722.08	DA14585/586: HCI ACL fragmentation does not work correctly.

6.6 Version 6.0.12.1020.2

Version 6.0.12.1020.2 was released on 9-Dec-2019.

6.6.1 Overview

This was the second GA release of SDK6 that runs on the DA14531 devices. It also supported DA14585/6 devices. This release can be used for application development.

6.6.2 Fixes and Improvements since 6.0.12.1020

Table 11: 6.0.12.1020.2 Fixes and Improvements

Fix Number	Description
1020.02.01	DA14531: Updated calibration for improved radio functionality in applications with fast temperature swings

6.6.3 Known Issues of 6.0.12.1020.2

Table 12: 6.0.12.1020.2 Known Issues

Issue Number	Description
1020.01	DA14531: Wrong TX power level value is returned by Tx Power GATT service. The returned value is the setting of the register, not the dBm. Furthermore, the returned value refers to the advertising power, even if the connection power is different.
1020.02	DA14585/586/531: In external processor configuration the GPIO used for waking up is not programmed immediately after UART flow off. This may lead to missing communication over UART with the external processor if the external processor tries to wake up the device too soon.
1020.03	The prod_test.hex file might have memory alignment issues preventing its usage In SmartSnippets Toolbox RF Master or with Bluetooth tester equipment. The corresponding prod_test.bin files should be used instead.
1020.04	DA14531: when *_EXCLUDE_ROM_PRF_* is not defined and no BLE profiles are used in the application context, BLE_NB_USED_PROFILES must be set to 0. If not, the first four addresses of the executable – initial Stack Pointer, Reset Handler, NMI Handler, and HardFault Handler – will be overwritten with zeros. Affected SDK projects: hci; ble_app_noncon; prod_test.
933.04	DA14585/586/531: Default system rand() function is not true random (not NIST compliant). It is suggested to use the alternative chacha20() function when true random numbers are required (NIST compliant).

6.6.4 Known Limitations of 6.0.12.1020.2

Table 13: 6.0.12.1020.2 Known Limitations

Issue Number	Description
1020.05	DA14531: The peripheral examples inside the SDK do not work in boost mode due to the deactivation of the internal DCDC converter in the system initialization function.

6.7 Version 6.0.12.1020

Version 6.0.12.1020 of SDK6 was released on 31-Oct-2019.

6.7.1 Overview

This was the first GA release of SDK6 that runs on the DA14531 devices. It also supported DA14585/6 devices. This release can be used for application development.

6.7.2 Features of 6.0.12.1020

Table 14: 6.0.12.1020 Features

Feature Number	Description
1020/001	Supports DA14531, DA14585 and DA14586 devices.
1020/002	Includes Eclipse/GCC project example (prox_reporter).
1020/003	Supported by SmartSnippets tools version 2.0.10.
1020/004	Doxygen documentation of all API functions.
1020/011	Updated 531 radio driver.
1020/012	RF driver for DA14531.
1020/013	DA14531: API function to dynamically control radio TX power.
1020/014	DA14531: RF power control -20 ...3 dBm.
1020/015	SPI driver for DA14531 (master/slave buffered and DMA driven transactions).
1020/016	I2C driver for DA14585/586/531.
1020/017	RTC driver for DA14531.
1020/018	OTP driver for DA14531.
1020/019	Support for OTP configuration script in 531.
1020/020	Support for DA14531 ROM functions.
1020/021	Near field mode API for DA14531.
1020/022	API function to enable/disable the H/W Reset pin in DA14531.
1020/023	DA14531 support in Wakeup and Quadrature Decoder driver.
1020/024	DA14531 support in GPIO driver.
1020/025	Added DA14531 target in the project: ble_app_peripheral.
1020/026	Added DA14531 target in the project: ble_app_profile.
1020/027	Added DA14531 target in the project: ble_app_barebone.
1020/028	Added DA14531 target in the project: prox_monitor_ext.
1020/029	Added DA14531 target in the project: hci.
1020/030	Peripheral examples ported to DA14531.
1020/031	Batt_lvl peripheral example project DA14531.
1020/032	DA14531: Support for 1-wire UART (driver and flash programmer).
1020/033	Temperature sensor driver.
1020/034	Readout of internal temperature.
1020/035	AES driver (data and link).
1020/036	DCDC converter API to control VBAT_H for OTP and GPIOs in Boost mode.
1020/037	Use of temperature sensor to trigger RF calibration during run-time.

Feature Number	Description
1020/038	Secondary bootloader project.
1020/039	Proximity reporter example.
1020/040	Prox_reporter application wakeup using RTC or Timer 1 (apart from GPIO).
1020/041	Template example.
1020/042	Prod_Test firmware.
1020/043	OTA example project.
1020/044	Security example.
1020/045	Sleep Example.
1020/046	Add support for shipping (hibernation) mode.
1020/047	ADC Driver with DMA support.
1020/048	RCX-only operation - no need for XTAL32K.
1020/049	Added extra power optimization method using the XTAL16M adaptive settling time algorithm. It is enabled by default and can offer power savings of up to 10% for a 10-ms connection interval.
1020/050	Used the default XTAL16M trim value when the XTAL16M is uncalibrated.
1020/051	POR on Vbat high/low Voltage Monitor.
1020/052	Deep sleep support.
1020/053	Timer1/2 support.
1020/054	Disabled DC-DC auto calibration (Buck and Boost mode).
1020/055	Added 38K4 baud rate support in production test f/w.
1020/056	Added support for Boost mode.
1020/057	Added API for AES-CCM, AES-CBC, and AES-CMAC operations.
1020/101	Compliant with BLE 5.0 (DA14585/6) and BLE 5.1 (DA14531) Core specifications.
1020/102	Data Packet Length Extension.
1020/103	Enhanced Privacy 1.2.
1020/104	Efficient non-connectable advertising.
1020/105	Added API to support controller privacy (peripheral role).
1020/106	BLE LE Secure Connections.
1020/107	Function for the unique static random BD address generation using OTP header values.
1020/108	Adds a key renewal command that can be called after a number of failed pairing attempts
1020/109	Added support to disable the ROM ECC key generation calculations if the Secure Connections feature is not used.
1020/110	Added support for URI advertising data type.
1020/111	Added support for the GATT service layer changed the characteristic of the application layer.

6.7.3 Known Issues of 6.0.12.1020

Table 15: 6.0.12.1020 Known Issues

Issue Number	Description
1020.01	DA14531: Wrong TX power level value is returned by Tx Power GATT service. The returned value is the setting of the register, not the dBm. Furthermore, the returned value refers to the advertising power, even if the connection power is different.
1020.02	DA14585/586/531: In external processor configuration the GPIO used for waking up is not programmed immediately after UART flow off. This may lead to missing communication over UART with the external processor if the external processor tries to wake up the device too soon.
1020.03	The prod_test.hex file might have memory alignment issues preventing its usage In SmartSnippets Toolbox RF Master or with Bluetooth tester equipment. The corresponding prod_test.bin files should be used instead.
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933.04	DA14585/586/531: Default system rand() function is not true random (not NIST compliant). It is suggested to use the alternative chacha20() function when true random numbers are required (NIST compliant).

6.7.4 Known Limitations of 6.0.12.1020

Table 16: 6.0.12.1020 Known Limitations

Issue Number	Description
1020.05	DA14531: The peripheral examples inside the SDK do not work in boost mode due to the deactivation of the internal DCDC converter in the system initialization function.

Appendix A Software Versioning Rules

This describes the software version numbers and does not apply to documentation version numbers (as found in the footer of this document).

Each software version number string consists of four numbers: MAJOR. BRANCH. MINOR. and BUILD.

#MAJOR: It is increased (by one only) if the project undergoes a major modification, for example, major ROM changes. It usually changes only when the project sources undergo major restructuring affecting most of the repository. It is initialized at 1.

#BRANCH: Used in the case of concurrent projects that for special reasons need to be spun off the major repository. It corresponds to different versions of the repository code that have to be supported concurrently. In this case, each branch number corresponds to a different GIT branch. The basic project has BRANCH id 0.

#MINOR: Odd numbers indicate Engineering (or Patch or Binary) versions, and even numbers indicate Full release versions or Release Candidates of Full versions. Each Full release increases this number by one. After the Full release, the number is increased by one again. Therefore, Project releases correspond to release numbers like 2.0.1.xxx, 2.0.2.xxx, and so forth. The #MINOR number is initialized at 1.

#BUILD: The # BUILD number increases by one at every repository update and thus indicates the total number of changes since repository initialization. The BUILD number is initialized at 1.

Document Revision History

This section summarizes the changes made to this document and not to the Software that this document describes.

Revision	Date	Description
6.0.18.1182.1	25-Nov-2022	Release including features and improvements
This is the fifth release of this document.		
6.0.16.1144	28-Sep-2021	Release including fixes and improvements.
This is the fourth release of this document, adding entries for SDK 6.0.16		
6.0.14.1114	29-Apr-2020	Release supporting final DA14531 silicon and DA14585/6. GA
This is the third release of this document.		
6.0.12.1020.2	9-Dec-2019	Improves radio calibration on DA14531 release. GA
This is the second release of this document.		
6.0.12.1020	31-Oct-2019	Release supporting final DA14531 silicon and DA14585/6. GA
This is the first release of this document.		

Status Definitions

Status	Definition
DRAFT	The content of this document is under review and subject to formal approval, which may result in modifications or additions.
APPROVED or unmarked	The content of this document has been approved for publication.

RoHS Compliance

Renesas' suppliers certify that its products are in compliance with the requirements of Directive 2011/65/EU of the European Parliament on the restriction of the use of certain hazardous substances in electrical and electronic equipment. RoHS certificates from our suppliers are available on request.

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(Rev.1.0 Mar 2020)

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