Quick Start Guide

Development Kit S128 (DK-S128)

Quick Start Guide

Renesas Synergy™ Platform
Synergy Tools & Kits
Kits: DK-S128

All information contained in these materials, including products and product specifications, represents information on the product at the time of publication and is subject to change by Renesas Electronics Corp. without notice. Please review the latest information published by Renesas Electronics Corp. through various means, including the Renesas Electronics Corp. website (http://www.renesas.com).

Renesas Electronics
www.renesas.com

Rev. 1.02 May 2018

Downloaded from Arrow.com.

Notice

1. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation or any other use of the circuits, software, and information in the design of your product or system. Renesas Electronics disclaims any and all liability for any losses and damages incurred by you or third parties arising from the use of these circuits, software, or information.
2. Renesas Electronics hereby expressly disclaims any warranties against and liability for infringement or any other claims involving patents, copyrights, or other intellectual property rights of third parties, by or arising from the use of Renesas Electronics products or technical information described in this document, including but not limited to, the product data, drawings, charts, programs, algorithms, and application examples.
3. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
4. You shall not alter, modify, copy, or reverse engineer any Renesas Electronics product, whether in whole or in part. Renesas Electronics disclaims any and all liability for any losses or damages incurred by you or third parties arising from such alteration, modification, copying or reverse engineering.
5. Renesas Electronics products are classified according to the following two quality grades: "Standard" and "High Quality". The intended applications for each Renesas Electronics product depends on the product's quality grade, as indicated below.

   "Standard": Computers; office equipment; communications equipment; test and measurement equipment; audio and visual equipment; home electronic appliances; machine tools; personal electronic equipment; industrial robots; etc.

   "High Quality": Transportation equipment (automobiles, trains, ships, etc.); traffic control (traffic lights); large-scale communication equipment; key financial terminal systems; safety control equipment; etc.

   Unless expressly designated as a high reliability product or a product for harsh environments in a Renesas Electronics data sheet or other Renesas Electronics document, Renesas Electronics products are not intended or authorized for use in products or systems that may pose a direct threat to human life or bodily injury (artificial life support devices or systems; surgical implantations; etc.), or may cause serious property damage (space system; undersea repeaters; nuclear power control systems; aircraft control systems; key plant systems; military equipment; etc.). Renesas Electronics disclaims any and all liability for any damages or losses incurred by you or any third parties arising from the use of any Renesas Electronics product that is inconsistent with any Renesas Electronics data sheet, user's manual or other Renesas Electronics document.
6. When using Renesas Electronics products, refer to the latest product information (data sheets, user's manuals, application notes, "General Notes for Handling and Using Semiconductor Devices" in the reliability handbook, etc.), and ensure that usage conditions are within the ranges specified by Renesas Electronics with respect to maximum ratings, operating power supply voltage range, heat dissipation characteristics, installation, etc. Renesas Electronics disclaims any and all liability for any malfunctions, failure or accident arising out of the use of Renesas Electronics products outside of such specified ranges.
7. Although Renesas Electronics endeavors to improve the quality and reliability of Renesas Electronics products, semiconductor products have specific characteristics, such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Unless designated as a high reliability product or a product for harsh environments in a Renesas Electronics data sheet or other Renesas Electronics document, Renesas Electronics products are not subject to radiation resistance design. You are responsible for implementing safety measures to guard against the possibility of bodily injury, injury or damage caused by fire, and/or danger to the public in the event of a failure or malfunction of Renesas Electronics products, such as safety design for hardware and software, including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult and impractical, you are responsible for evaluating the safety of the final products or systems manufactured by you.
8. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. You are responsible for carefully and sufficiently investigating applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive, and using Renesas Electronics products in compliance with all these applicable laws and regulations. Renesas Electronics disclaims any and all liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
9. Renesas Electronics products and technologies shall not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations. You shall comply with any applicable export control laws and regulations promulgated and administered by the governments of any countries asserting jurisdiction over the parties or transactions.
10. It is the responsibility of the buyer or distributor of Renesas Electronics products, or any other party who distributes, disposes of, or otherwise sells or transfers the product to a third party, to notify such third party in advance of the contents and conditions set forth in this document.
11. This document shall not be reprinted, reproduced or duplicated in any form, in whole or in part, without prior written consent of Renesas Electronics.
12. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products.

(Note 1) "Renesas Electronics" as used in this document means Renesas Electronics Corporation and also includes its directly or indirectly controlled subsidiaries.

(Note 2) "Renesas Electronics product(s)" means any product developed or manufactured by or for Renesas Electronics.

(Rev.4.0-1 November 2017)

Downloaded from Arrow.com.

General Precautions

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.

Downloaded from Arrow.com.

Renesas Synergy™ Platform

Development Kit S128 (DK-S128)

R12QS0018EU0102
Rev.1.02
May 15, 2018

1. Introduction

This is the Quick Start Guide for the Renesas Synergy™ Development Kit S128 (DK-S128).

2. In the box

The following components are included in the Development Kit (DK-S128):

- DK-S128 Main Board
- One USB Type A to Micro-B cable
- One Pmod™ LCD screen
- Quick Start Guide (QSG, this document)

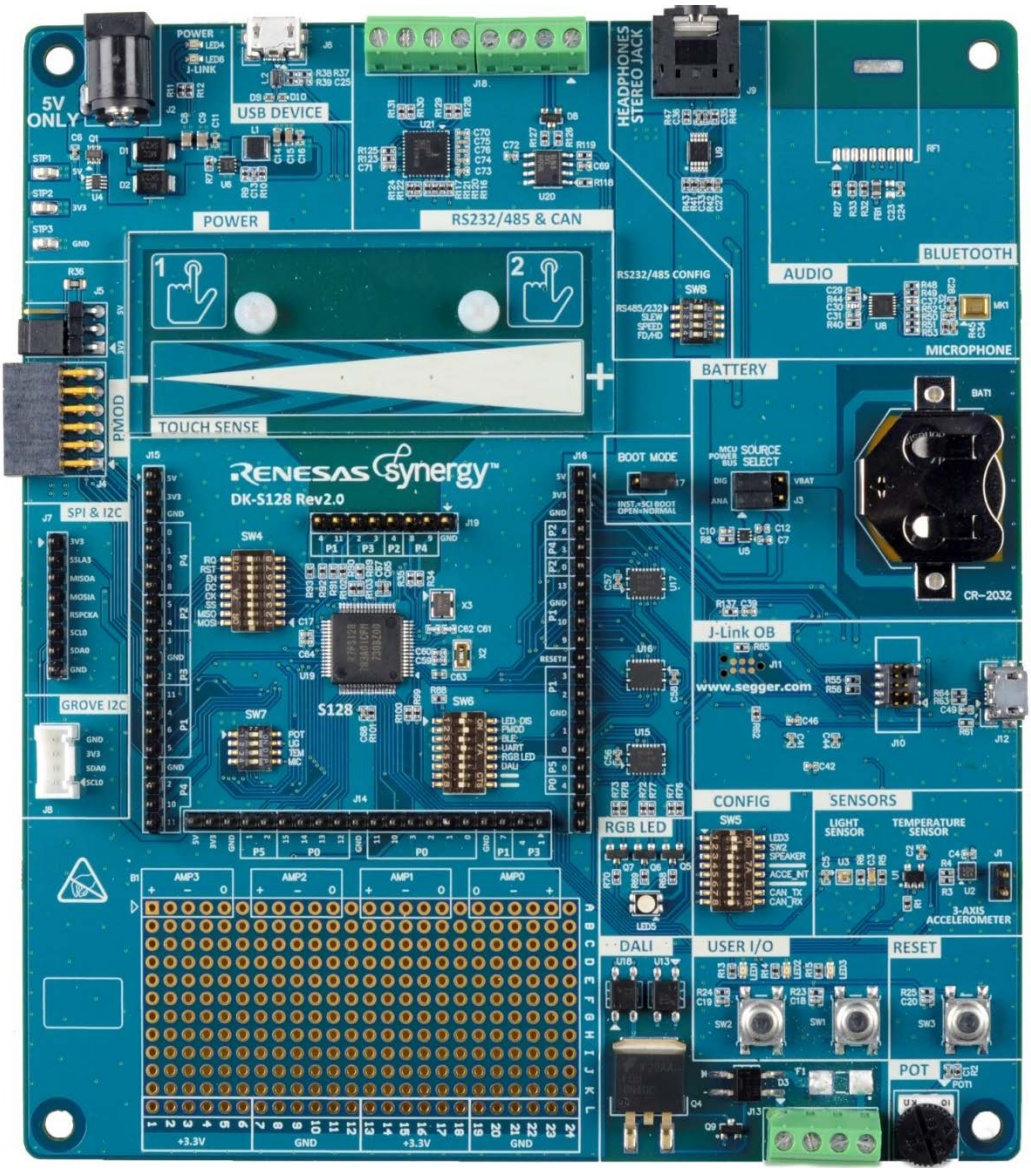
3. Overview

This Synergy Development Kit and the associated development tools allow you to evaluate the Synergy Platform using the DK-S128. This development board uses a device from the Synergy S128 Microcontrollers (MCUs) Group. This QSG walks you through the Out-of-Box Demonstration application. It also points you to the website that guides you through downloading and installing additional software.

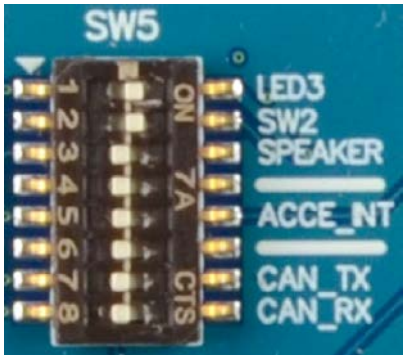
Downloaded from Arrow.com.

4. Connecting the board components

To power up the board and get started with the preloaded Out-of-Box Demo, follow these steps:



1. Ensure that the jumper settings on your board are in the configuration as shown in the following configuration. This should be the default out-of-box configuration.



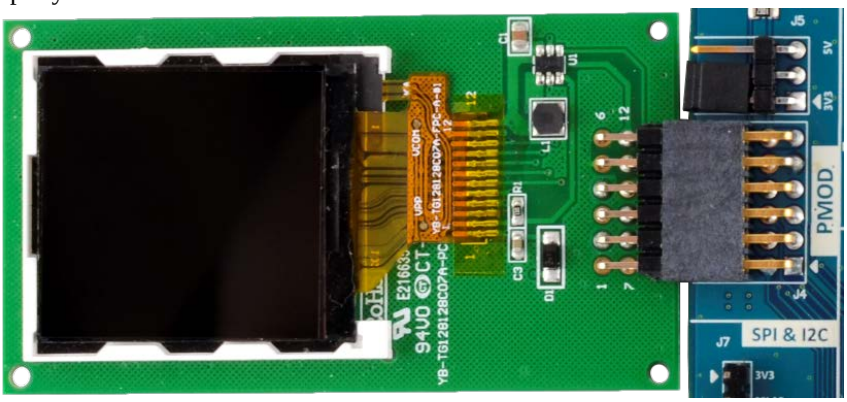




Downloaded from Arrow.com.

SW5			SW6			SW7		
Switch Number	**Function**	**Default State**	**Switch Number**	**Function**	**Default State**	**Switch Number**	**Function**	**Default State**
1	LED3 Enable	On	1	LED1 Disable	OFF	1	Potiometer Enable	On
2	SW2 Enable	On	2	PMOD Enable	On	2	Light Sensor Enable	On
3	Speaker Enable	OFF	3	RSPI Enable	OFF	3	Temperature Sensor Enable	On
4	Not used	OFF	4	UART Enable	On	4	Microphone Enable	On
5	Accelerometer INT	OFF	5	RGB LED Enable	OFF			
6	Not used	OFF	6	DALI Enable	OFF			
7	CAN TX	OFF	7	Not used	OFF			
8	CAN RX	OFF	8	Not used	OFF			

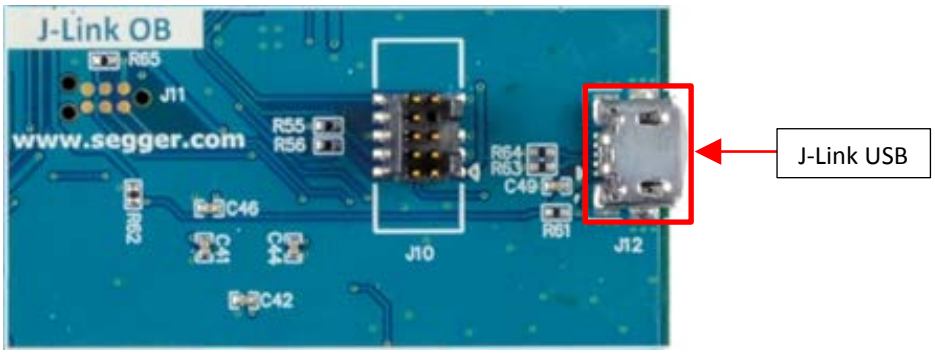
2. With the screen facing upward, plug the enclosed Pmod LCD Display into the Pmod connector (J4). Make sure that the pins line up properly.



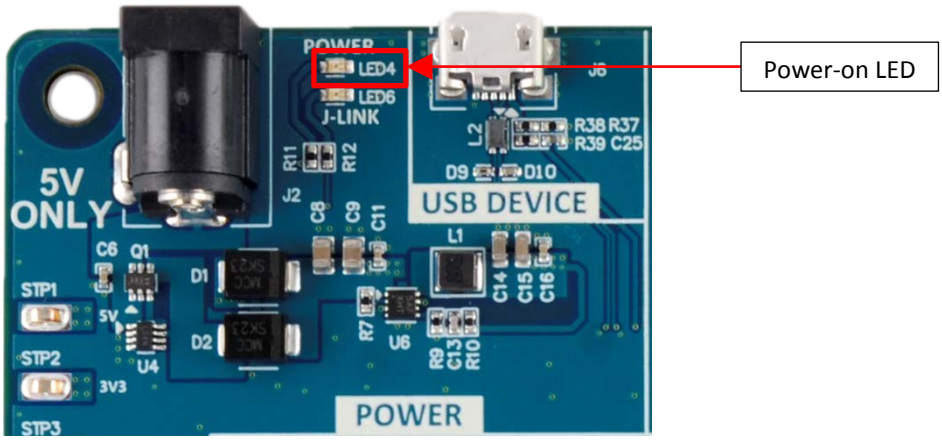
3. Connect the Micro USB end of the supplied USB cable to the DK-S128 board J12 connector (DEBUG_USB).

Note: The kit contains a SEGGER J-Link® OB (On-board). The J-Link provides full debug and programming capabilities for the DK-S128 kit.

Downloaded from Arrow.com.

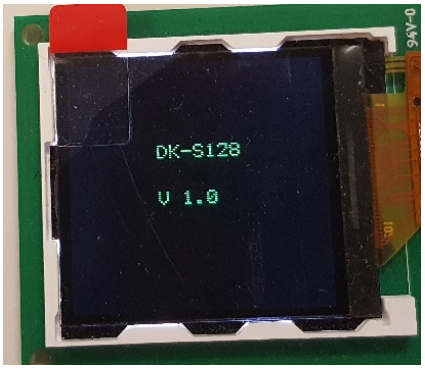


4. Connect the other end of the USB cable to the USB port on your workstation. LED4 turns green, indicating power is on. LED6 flashes red when communication between the J-Link OB and the workstation is not yet established, and turns off indicating a good data connection.



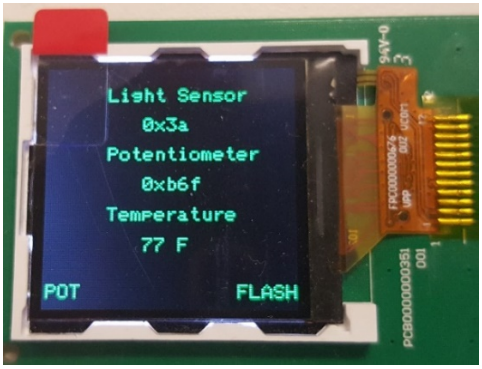
5. Running the Out-of-Box application

Once the DK-S128 is plugged-in, it powers up. It immediately starts flashing the three LEDs (LED1, LED2, and LED3) and displays a simple splash screen on the Pmod LCD for two seconds. This splash screen will show the board number and the version of the out-of-box demonstration software that shipped with the board shown as follows.



Downloaded from Arrow.com.

After two seconds, the screen will change to the measurement screen shown in the following image. The SSP Out-Of-Box Demonstration application uses the A/D converter to read the voltage values present on the Potentiometer (POT1), the Light Sensor U3 (APDS-9005), and the Temperature Sensor U1 (TMP35). The program displays the raw hex value read from the Light Sensor and the Potentiometer. It converts the raw value read from the Temperature Sensor to the equivalent Fahrenheit temperature.



You may interact with the Out-of-Box Demonstration program in the following ways:

1. The three LEDs, (LED1, LED2, and LED3) will all flash at once or chase each other. Pushing the momentary switch SW2 will alternate between flashing and chasing. The bottom right corner of the screen will indicate which mode the LEDs are operating in (FLASH/CHASE).
2. The flashing rate of the LEDs is determined by the value read from the Light Sensor or the Potentiometer. You toggle between these two by pushing momentary switch SW1. The bottom left corner of the screen will indicate which sensor is driving the LEDs flashing rate. (POT/LIGHT).
3. Push SW1 to select POT mode, then push SW2 to select FLASH mode. Rotate POT1 clockwise and counterclockwise. The flashing of the LEDS will increase or decrease appropriately. The screen will display the raw value reported by the A/D converter.
4. Push SW1 to select LIGHT mode, then push SW2 to select CHASE mode. Move a light source (a flashlight, for example) closer and farther away from the Light Sensor U3. Observe that the flashing rate of the LEDs will change while the raw hex value displayed to the screen also changes.

6. Next Steps

1. Visit: renesassynergy.com/tools to learn more about development Tools & Utilities. Visit http://www.renesassynergy.com/gallery to download them.
2. Visit: http://renesassynergy.com/kits/dk-s128 for more information such as board schematics, application projects collateral about the DK-S128 Kit.
3. If you need technical support or want to live chat with a Synergy Platform Expert, visit: http://renesassynergy.com/support.
4. Learn more about:

- Synergy Kits: http://www.renesassynergy.com/kits
- Synergy Microcontrollers: http://www.renesassynergy.com/microcontrollers
- Synergy Software: http://www.renesassynergy.com/software
- Synergy Solutions: http://www.renesassynergy.com/solution

Downloaded from Arrow.com.

Website and Support

Support: https://synergygallery.renesas.com/support

Technical Contact Details:

- America: https://www.renesas.com/en-us/support/contact.html
- Europe: https://www.renesas.com/en-eu/support/contact.html
- Japan: https://www.renesas.com/ja-jp/support/contact.html

All trademarks and registered trademarks are the property of their respective owners.

Downloaded from Arrow.com.

Revision History

		Description	
Rev.	**Date**	**Page**	**Summary**
1.00	May 17, 2017	-	First release
1.01	Apr 9, 2018	-	Minor update
1.02	May 15, 2018	-	Revised for Rev.1.02

Downloaded from Arrow.com.

Development Kit S128 (DK-S128) Quick Start Guide

Publication Date: Rev.1.02 May 15, 2018

Published by: Renesas Electronics Corporation

Downloaded from Arrow.com.



SALES OFFICES

Renesas Electronics Corporation

http://www.renesas.com

Refer to "http://www.renesas.com/" for the latest and detailed information.

Renesas Electronics America Inc.
1001 Murphy Ranch Road, Milpitas, CA 95035, U.S.A.
Tel: +1-408-432-8888, Fax: +1-408-434-5351

Renesas Electronics Canada Limited
9251 Yonge Street, Suite 8309 Richmond Hill, Ontario Canada L4C 9T3
Tel: +1-905-237-2004

Renesas Electronics Europe Limited
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K
Tel: +44-1628-651-700, Fax: +44-1628-651-804

Renesas Electronics Europe GmbH
Arcadiastrasse 10, 40472 Düsseldorf, Germany
Tel: +49-211-6503-0, Fax: +49-211-6503-1327

Renesas Electronics (China) Co., Ltd.
Room 1709 Quantum Plaza, No.27 ZhichunLu, Haidian District, Beijing, 100191 P. R. China
Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

Renesas Electronics (Shanghai) Co., Ltd.
Unit 301, Tower A, Central Towers, 555 Langao Road, Putuo District, Shanghai, 200333 P. R. China
Tel: +86-21-2226-0888, Fax: +86-21-2226-0999

Renesas Electronics Hong Kong Limited
Unit 1601-1611, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong
Tel: +852-2265-6688, Fax: +852 2886-9022

Renesas Electronics Taiwan Co., Ltd.
13F, No. 363, Fu Shing North Road, Taipei 10543, Taiwan
Tel: +886-2-8175-9600, Fax: +886 2-8175-9670

Renesas Electronics Singapore Pte. Ltd.
80 Bendemeer Road, Unit #06-02 Hyflux Innovation Centre, Singapore 339949
Tel: +65-6213-0200, Fax: +65-6213-0300

Renesas Electronics Malaysia Sdn.Bhd.
Unit 1207, Block B, Menara Amcorp, Amcorp Trade Centre, No. 18, Jln Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: +60-3-7955-9390, Fax: +60-3-7955-9510

Renesas Electronics India Pvt. Ltd.
No.777C, 100 Feet Road, HAL 2nd Stage, Indiranagar, Bangalore 560 038, India
Tel: +91-80-67208700, Fax: +91-80-67208777

Renesas Electronics Korea Co., Ltd.
17F, KAMCO Yangjae Tower, 262, Gangnam-daero, Gangnam-gu, Seoul, 06265 Korea
Tel: +82-2-558-3737, Fax: +82-2-558-5338

© 2018 Renesas Electronics Corporation. All rights reserved.

Colophon 5.0

Downloaded from Arrow.com.

Renesas Synergy™ Platform
Development Kit S128 (DK-S128)

Renesas Electronics Corporation

R12QS0018EU0102

Downloaded from Arrow.com.