

ISL9104xxxxEVAL1Z, ISL9104AxxxxEVAL1Z

Evaluation Board

AN1522
Rev 1.00
March 15, 2010

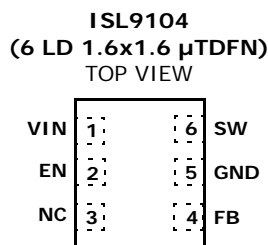
Description

The ISL9104 evaluation kit provides a test platform for the ISL9104 4.3MHz low quiescent current, high efficiency integrated step-down regulator. The ISL9104 is capable of delivering 500mA output current. For adjustable output option, the output voltage can be programmed through the external feedback resistors R1 and R2 on the board (on board the default output voltage is set to be 1.6V but it can be programmed for the range of 0.8V to V_{IN}). It is also offered in many fixed output voltage options including 1.2V, 1.5V, 1.8V, 2.0V, 2.5V, 2.8V and 3.3V.

The complete ISL9104 regulator is located at the center of the board. On the left side of the board are the connectors for the input power source (V_{IN} and GND). The output connectors are located on the right side (V_O and GND). Jumper JP1 allows the user to enable or disable the IC.

The evaluation board schematic, layout and bill of materials (BOM) can be found at the end of this application note.

Pinout



Features

- A Complete Evaluation Platform for ISL9104, ISL9104A
- Convenient Jumpers for Enable/Disable Operation
- Pb-Free (RoHS Compliant)

Recommended Equipment

The following instruments are recommended for testing:

- Power supplies: DC 6.5V/1A
- Electronic load: 0mA to 500mA
- Multimeters
- Function generator
- Oscilloscope
- Cables and wires

Recommended Operating Conditions

- Input voltage: from 2.7V or ($V_{OUT} + V_{DROP}$) whichever is higher to 6.0V. Here $V_{DROP} = I_{LOAD} * (r_{DSON_PFET} + R_L)$. r_{DSON_PFET} is the ON-resistance of the high-side power P-MOSFET and R_L is the DCR of the inductor.
- Loading current: 0mA ~ 500mA
- Ambient temperature range: -40°C ~ +85°C

NOTE: For the fixed output options, the output voltage is pre-set in the factory. For the adjustable output options, the output voltage can be programmed through the external resistor network from V_{OUT} to FB to GND, where $V_{OUT} = 0.8V * (1 + R2/R1)$, please refer to ISL9104, ISL9104A data sheet [FN6829](#) for recommended component values. On board, the default output voltage is set at 1.6V for the adjustable output options.

Setup Guide

1. Place shunt on JP1 at the position of "Enable" to enable the device. Put shunt on JP1 at the position of "Disable" will disable the device.
2. Connect the DC power supply between V_{IN} and GND connectors. Make sure the power supply has enough supply current capability. Do not adjust the V_{IN} higher than the recommended maximum supply voltage (6.0V).
3. Connect the output to a load (resistor or electronic load).
4. Turn on the input power supply and evaluate the device.

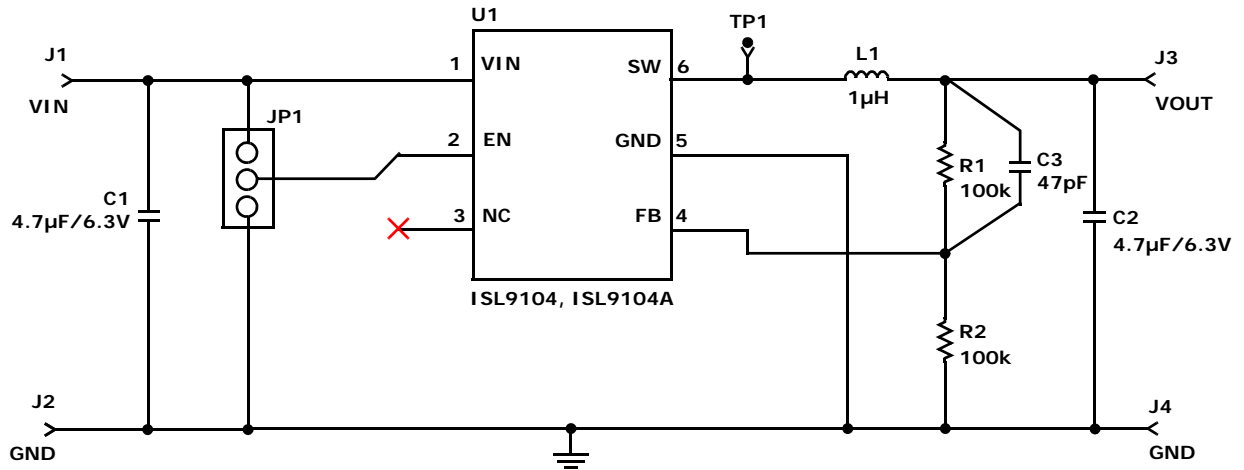
Ordering Information

PART NUMBER	DESCRIPTION
ISL9104IRUNEVAL1Z	Evaluation Board for ISL9104IRUNZ-T (3.3V)
ISL9104IRUJEVAL1Z	Evaluation Board for ISL9104IRUJZ-T (2.8V)
ISL9104IRUFEVAL1Z	Evaluation Board for ISL9104IRUFZ-T (2.5V)
ISL9104IRUDEVAL1Z	Evaluation Board for ISL9104IRUDZ-T (2.0V)
ISL9104IRUCEVAL1Z	Evaluation Board for ISL9104IRUCZ-T (1.8V)
ISL9104IRUBEVAL1Z	Evaluation Board for ISL9104IRUBZ-T (1.5V)
ISL9104IRUWEVAL1Z	Evaluation Board for ISL9104IRUWZ-T (1.2V)
ISL9104IRUAEVAL1Z	Evaluation Board for ISL9104IRUAZ-T (Adjustable)
ISL9104AIRUNEVAL1Z	Evaluation Board for ISL9104AIRUNZ-T (3.3V)

Ordering Information (Continued)

PART NUMBER	DESCRIPTION
ISL9104AIRUJEVAL1Z	Evaluation Board for ISL9104AIRUJZ-T (2.8V)
ISL9104AIRUFEVAL1Z	Evaluation Board for ISL9104AIRUFZ-T (2.5V)
ISL9104AIRUDEVAL1Z	Evaluation Board for ISL9104AIRUDZ-T (2.0V)
ISL9104AIRUCEVAL1Z	Evaluation Board for ISL9104AIRUCZ-T (1.8V)
ISL9104AIRUBEVAL1Z	Evaluation Board for ISL9104AIRUBZ-T (1.5V)
ISL9104AIRUWEVAL1Z	Evaluation Board for ISL9104AIRUWZ-T (1.2V)
ISL9104AIRUAEVAL1Z	Evaluation Board for ISL9104AIRUAZ-T (Adjustable)

Evaluation Board Schematic



NOTE: FOR THE FIXED OUTPUT VOLTAGE OPTIONS, R1 = 0, C3 AND R2 NOT POPULATED

FIGURE 1. ISL9104, ISL9104A EVALUATION BOARD SCHEMATIC

Bill of Materials (BOM)

ITEM	QTY	REFERENCE	PART DESCRIPTION	PCB FOOTPRINT	PART NUMBER	VENDOR	NOTE
1	1	U1	ISL9104 or ISL9104A	1.6x1.6 6 Ld μ TDFN		Intersil	
2	2	C1, C2	Capacitor, SMD, 4.7 μ F, 10%, X5R	0603	GRM188R60J475KE19D	Murata	
3	1	C3	Capacitor, SMD 47pF, 5%, X7R	0402	GRM36COG470J050AQ	Murata	Only populated for boards with part numbers ISL9104IRUAEVAL1Z and ISL9104AIRUAEVAL1Z. For boards with other part numbers, it is unpopulated.
4	1	R1	Resistor, SMD, 100k Ω , 1%, 0.1W	0402	ERJ2RKF1003	Panasonic	Only populated for boards with part numbers ISL9104IRUAEVAL1Z and ISL9104AIRUAEVAL1Z. For boards with other part numbers, it is unpopulated.
5	1	R1	Resistor, SMD, 0 Ω	0402	Generic	Generic	Populated for all boards with other part numbers EXCEPT ISL9104IRUAEVAL1Z and ISL9104AIRUAEVAL1Z
6	1	R2	Resistor, SMD, 100k Ω , 1%	0402	ERJ2RKF1003	Panasonic	Only populated for boards with part numbers ISL9104IRUAEVAL1Z and ISL9104AIRUAEVAL1Z. For boards with other part numbers, it is unpopulated.
7	1	L1	Inductor, 1 μ H		L1207C1R0MPWS	KEMET	
8	4	VIN, VO, GND(x2)	Connector	-	3156-1-00-15-00-00-08-0	Mill-Max	
9	1	TP1	Scope Probe Test Point	-	131503100	Tektronix	Not populated
10	1	JP1	Connect Header, 1X3	-	68000-236-1X3	BERG/FCI	

PCB Layout

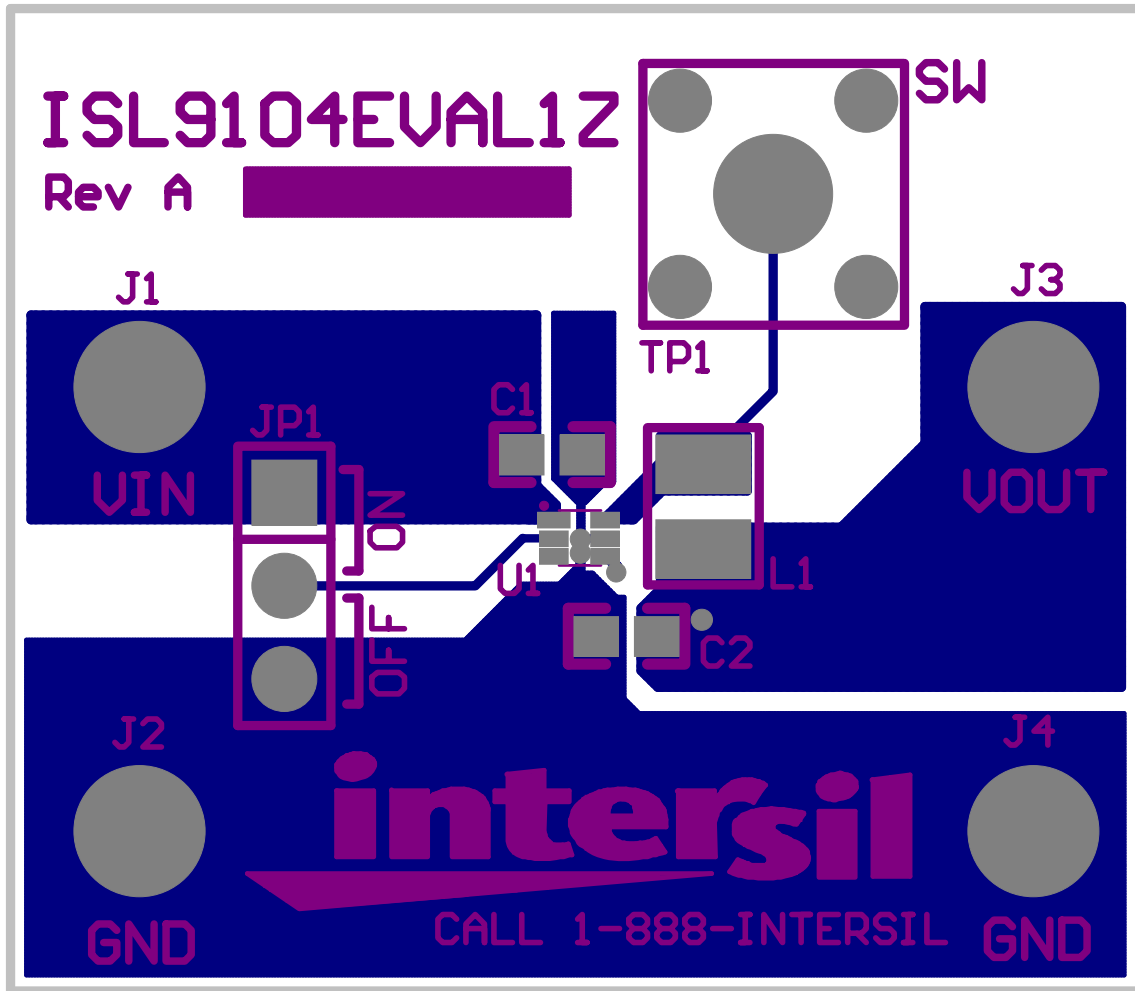


FIGURE 2. TOP SILK LAYER

PCB Layout (Continued)

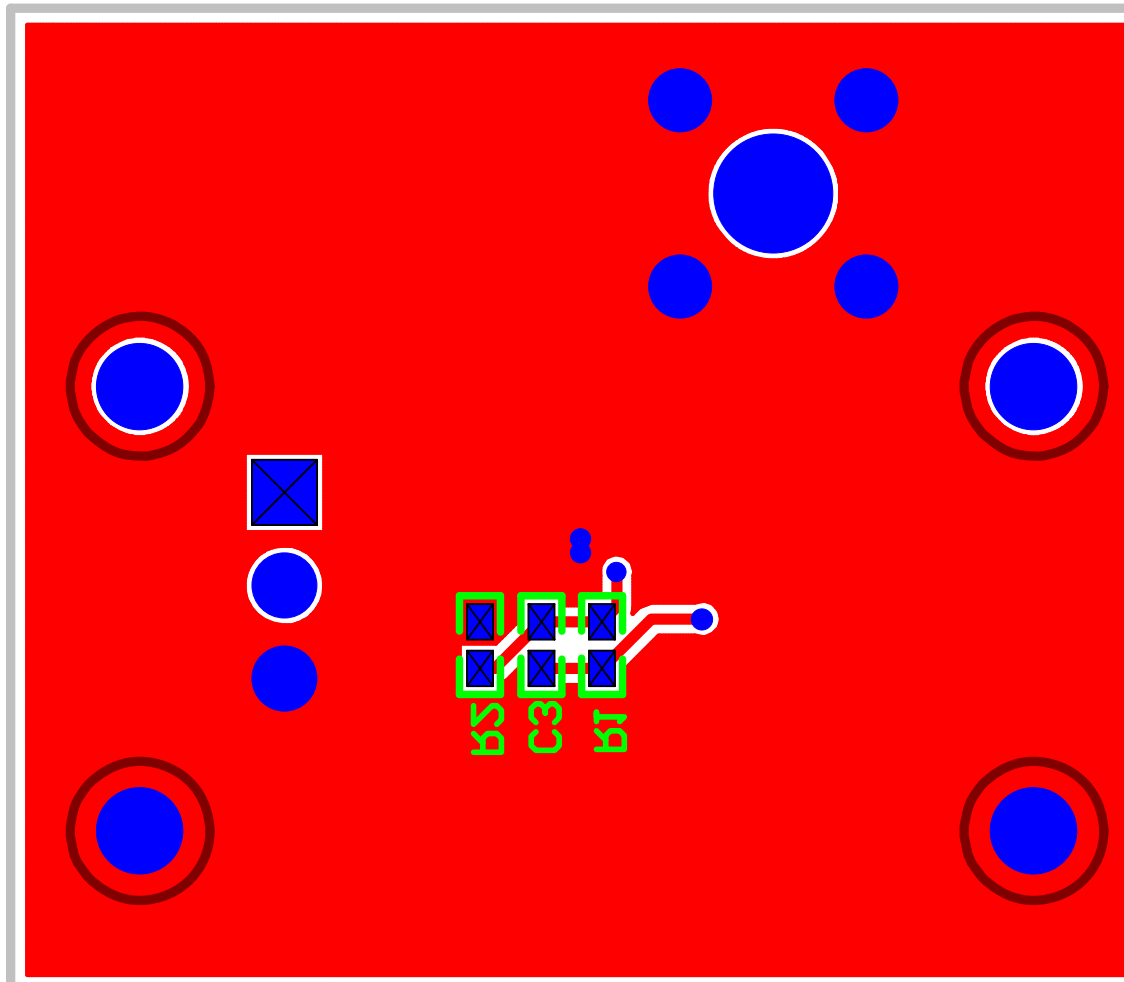


FIGURE 3. BOTTOM SILK LAYER

PCB Layout (Continued)

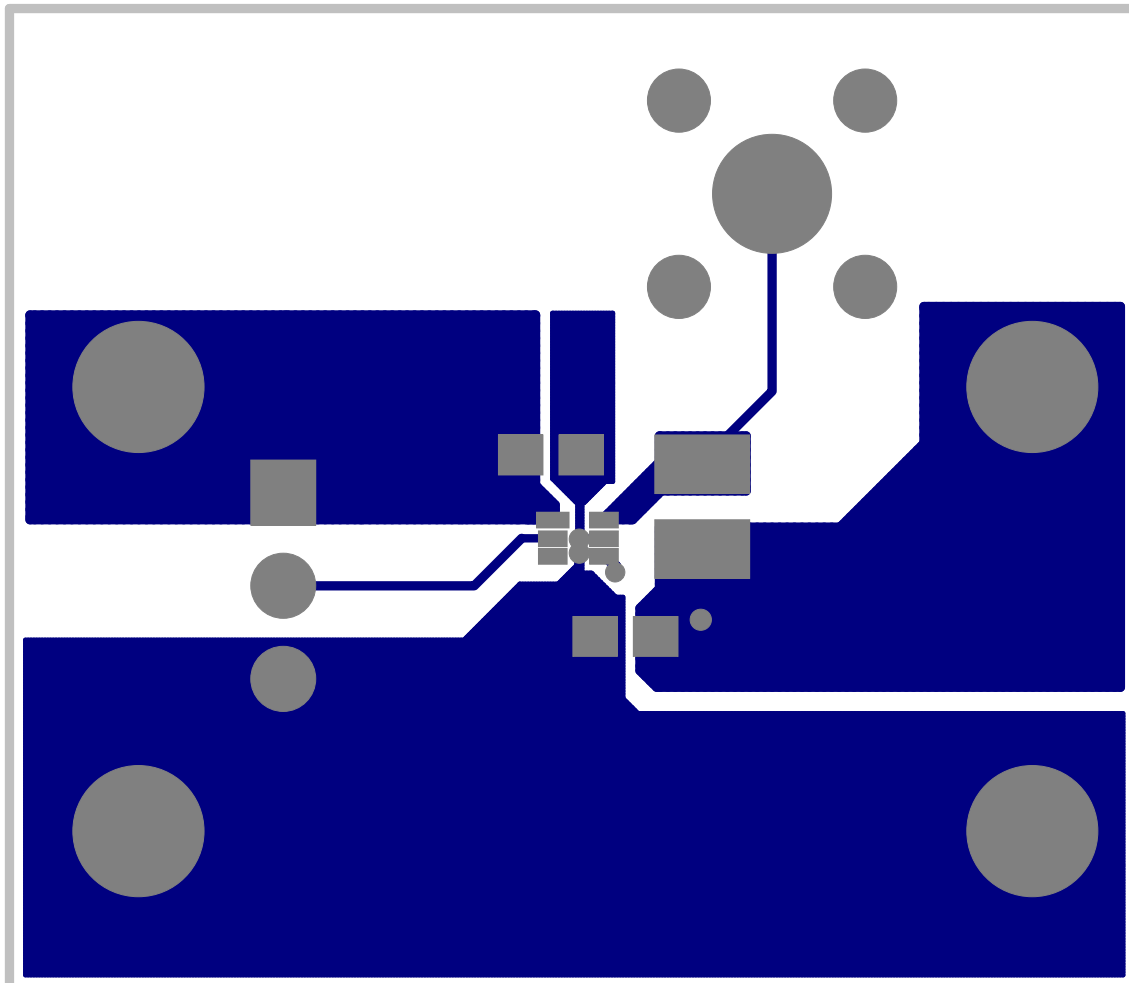


FIGURE 4. TOP LAYER

PCB Layout (Continued)

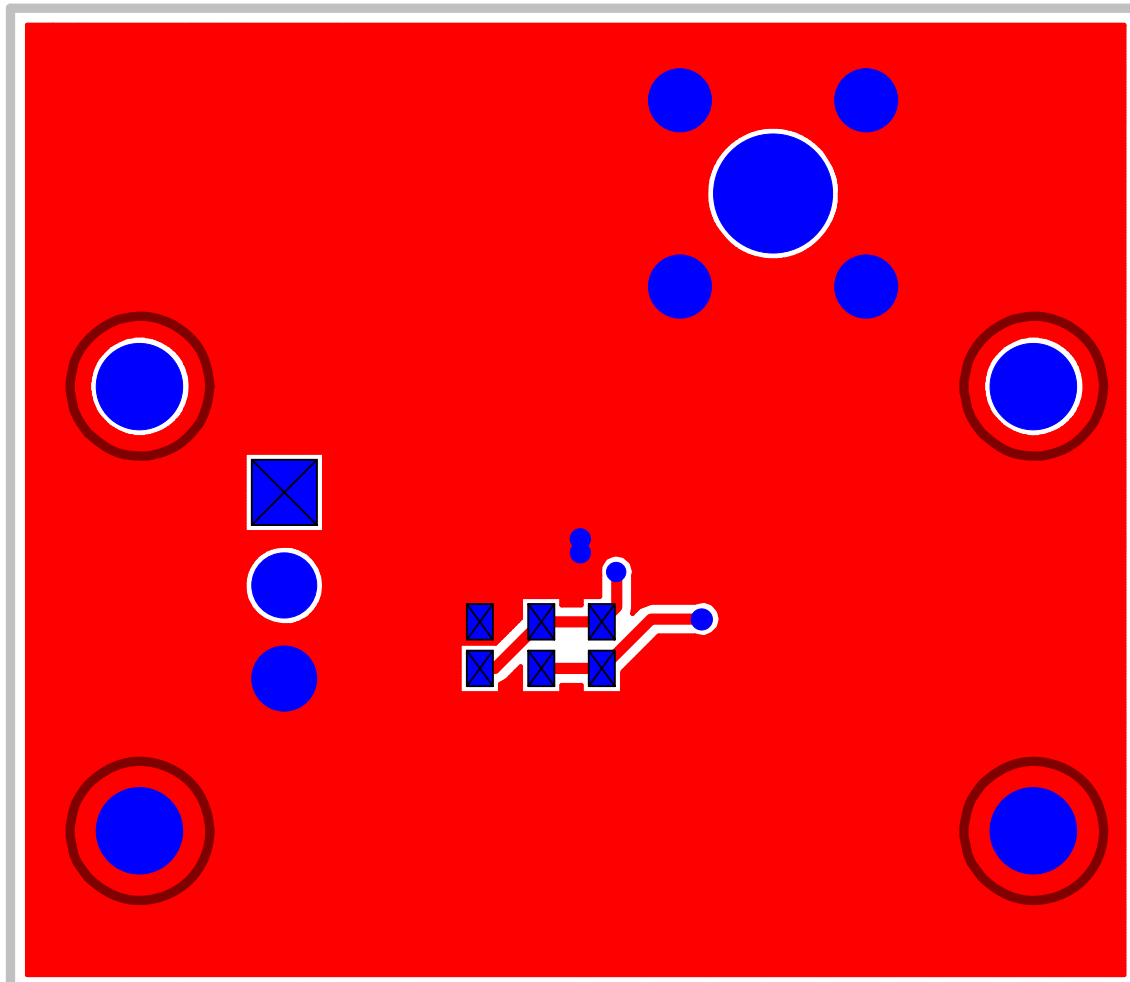


FIGURE 5. BOTTOM LAYER

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)



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