

ISL8500EVAL1Z

2A Regulator Standard Buck PWM

AN1372
Rev 0.00
November 21, 2007

Description

The ISL8500EVAL1Z REV A kit is intended for use by individuals with requirements for Point-of-Load applications sourcing from 4.5V to 25V. The ISL8500EVAL1Z evaluation board is used to demonstrate the performance of the ISL8500 standard buck regulator.

The ISL8500 is offered in a 4mmx3mm 12 Ld DFN package with 1mm maximum height. The complete converter occupies less than 0.425in² area.

Features

- Standard Buck Controller with Integrated Switching Power MOSFET
- Integrated Boot Diode
- Input Voltage Range
 - Fixed 5V ±10%
 - Variable 5.5V to 25V
- PWM Output Voltage Adjustable from 0.6V to 20V with Continuous Output Current up to 2A
- Voltage Mode Control with Voltage Feed Forward
- Fixed 500kHz Switching Frequency
- Externally Adjustable Soft-Start Time
- Output Undervoltage Protection
- PGOOD Output
- Overcurrent Protection
- Thermal Overload Protection
- Internal 5V LDO regulator

Applications

- General Purpose
- WLAN Cards-PCMCIA, Cardbus32, MiniPCI Cards-Compact Flash Cards
- Hand-Held Instruments

What's Inside

The Evaluation Board Kit contains the following materials:

- The ISL8500 EVAL REV D board
- The ISL8500 datasheet
- This EVAL KIT document

Recommended Equipment

The following materials are recommended to perform testing:

- 0V to 25V power supply with at least 5A source current capability, battery, notebook AC adapter
- One electronic load capable of sinking current up to 5A
- Digital Multimeters (DMMs)
- 100MHz quad-trace oscilloscope
- Signal generator

Quick Setup Guide

1. Ensure that the circuit is correctly connected to the supply and loads prior to applying any power.
2. Connect the bias supply to VIN, the plus terminal to TP1 (VIN) and the negative return to TP2 (GND).
3. Verify that SW1 is on ENABLE.
4. Turn on the power supply.
5. Verify the PG is on and the output voltage is 2.5V for VOUT(TP3).

Evaluating the Other Output Voltage

The ISL8500EVAL kit outputs are preset to 2.5V; however, it can be programmed using resistor dividers using Equation 1:

$$R_2 = \frac{R_1 \cdot 0.6V}{V_{OUT} - 0.6V} \quad (\text{EQ. 1})$$

The output voltage programming resistor R₂ will depend on on the feedback resistor R₁, as referred to in Figure 1. The value of R₁ is typically between 1kΩ and 10kΩ. If the output voltage desired is 0.6V, then R₂ is left opened.

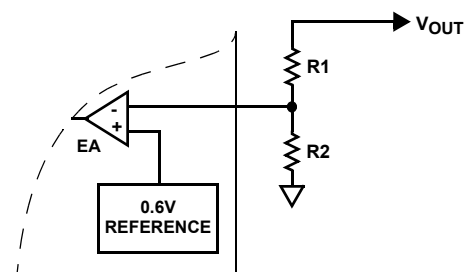
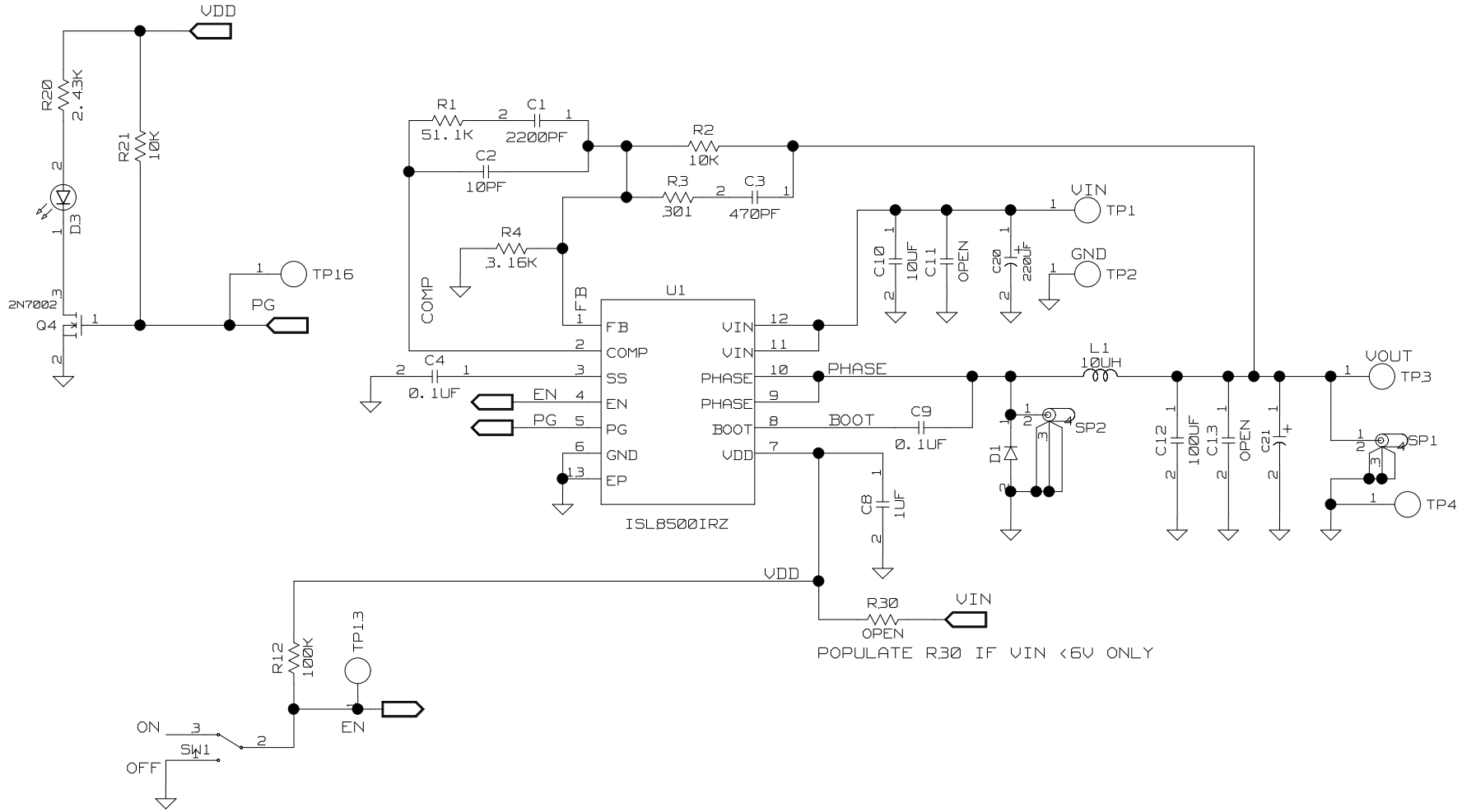


FIGURE 1. EXTERNAL RESISTOR DIVIDER

TABLE 1. SWITCH 1 SETTINGS

SW1	ENABLE	OPERATING MODE
1	SW1	Enable or disable the buck controller

Schematic



ISL8500EVAL1Z Bill of Materials

PART NUMBER	QTY	UNITS	REFERENCE DESIGNATOR	DESCRIPTION	MANUFACTURER	MANUFACTURER PART
ISL8500EVAL1ZREVAPCB	1	ea		PWB-PCB, ISL8500EVAL1Z, REVA, ROHS	TITAN	ISL8500EVAL1ZREVAPCB
H1044-00222-50V10-T	1	ea	C1	CAP, SMD, 0402, 2200pF, 50V, 10%, X7R, ROHS	PANASONIC	ECJ-0EB1H222K
H1065-00106-25V10-T	1	ea	C10	CAP, SMD, 1206, 10µF, 25V, 10%, X5R, ROHS	VENKEL	C1206X5R250-106KNE
DNP	0	ea	C11, C13, C20, C21	DO NOT POPULATE OR PURCHASE		
H1082-00107-6R3V20-T	1	ea	C12	CAP, SMD, 1210, 100µF, 6.3V, 20%, X5R, ROHS	TDK	C3225X5R0J107M
					PANASONIC	ECJ-4YB0J107M
					AVX	12106D107MAT
H1044-00100-50V5-T	1	ea	C2	CAP, SMD, 0402, 10pF, 50V, 5%, NPO, ROHS	VENKEL	C0402COG500-100JNE
H1044-00471-50V10-T	1	ea	C3	CAP, SMD, 0402, 470pF, 50V, 10%, X7R, ROHS	PANASONIC	ECJ-0EB1H471K
					VENKEL	C0402X74500-471KNE
H1044-00104-16V10-T	1	ea	C4	CAP, SMD, 0402, 0.1µF, 16V, 10%, X7R, ROHS	MURATA	GRM36X7R104K016AD
					VENKEL	C0402X7R160-104KNE
H1045-00105-6R3V10-T	1	ea	C8	CAP, SMD, 0603, 1µF, 6.3V, 10%, X5R, ROHS	PANASONIC	ECJ1VB0J105K
C1608X7R1H104K-T	1	ea	C9	CAPACITOR, SMD, 0603, 0.10µF, 50V, 10%, X7R	TDK	C1608X7R1H104K
B340LB-13-F-T	1	ea	D1	DIODE-SCHOTTKY SMD, SMB, 2P, 40V, 3A LOW VF, ROHS	DIODES INC.	B340LB-13-F
LTST-C170CKT	1	ea	D3	LED-GaAs RED, SMD, 2x1.25mm, 100mW, 40mA, 10mcd, ROHS	LITEON/VISHAY	LTST-C170CKT
					ROHM	SML-210LTT86
					STANLEY ELECTRIC	BR112H-TR
IHLP2525CZRZ100M01	1	ea	L1	COIL-PWR INDUCTOR, SMD, 6.9x6.5, 10µH, 20%, 3A, ROHS	VISHAY	IHLP2525CZRZ100M01
2N7002-7-F-T	1	ea	Q4	TRANSISTOR,N-CHANNEL, 3LD, SOT-23, 60V, 115mA, ROHS	DIODES, INC.	2N7002-7-F
					ON SEMICONDUCTOR	2N7002LT1G
H2510-05112-1/16W1-T	1	ea	R1	RES, SMD, 0402, 51.1k, 1/16W, 1%, TF, ROHS	PANASONIC	ERJ-2RKF5112X
					VENKEL	CR0402-16W-5112FT
H2510-01003-1/16W1-T	1	ea	R12	RES, SMD, 0402, 100k, 1/16W, 1%, TF, ROHS	PANASONIC	ERJ2RKF1003
H2510-01002-1/16W1-T	1	ea	R2	RES, SMD, 0402, 10k, 1/16W, 1%, TF, ROHS	PANASONIC	ERJ-2RKF1002
					VENKEL	CR0402-16W-1002FT
H2511-02431-1/10W1-T	1	ea	R20	RES, SMD, 0603, 2.43k, 1/10W, 1%, TF, ROHS	VENKEL	CR0603-10W-2431FT
					YAGEO	RC0603FR-072K43L
H2511-01002-1/10W1-T	1	ea	R21	RES, SMD, 0603, 10k, 1/10W, 1%, TF, ROHS	KOA	RK73H1JT1002F
					VENKEL	CR0603-10W-1002FT

ISL8500EVAL1Z Bill of Materials (Continued)

PART NUMBER	QTY	UNITS	REFERENCE DESIGNATOR	DESCRIPTION	MANUFACTURER	MANUFACTURER PART
H2510-03010-1/16W1-T	1	ea	R3	RES, SMD, 0402, 301 Ω , 1/16W, 1%, TF, ROHS	PANASONIC	ERJ-2RKF3010X
					VENKEL	CR0402-16W-3010-FT
H2511-DNP	0	ea	R30	RES, SMD, 0603, DNP-PLACE HOLDER, ROHS		
H2510-03161-1/16W1-T	1	ea	R4	RES, SMD, 0402, 3.16k, 1/16W, 1%, TF, ROHS	VENKEL	CR0402-16W-3161FT
					PANASONIC	ERJ-2RKF3161X
					VISHAY/DALE	CRCW04023K16FKED
131-4353-00	2	ea	SP1,SP2	CONN-SCOPE PROBE TEST PT, COMPACT, PCB MNT, ROHS	TEKTRONIX	131-4353-00
GT11MSCBE-T	1	ea	SW1	SWITCH-TOGGLE, SMD, ULTRAMINI, 1P, SPST MINI	C&K COMPONENTS	GT11MSCKE
5002	2	ea	TP13,TP16	CONN-MINI TEST POINT, VERTICAL, WHITE, ROHS	KEYSTONE	5002
1514-2	4	ea	TP1-TP4	CONN-TURRET, TERMINAL POST, TH, ROHS	KEYSTONE	1514-2
ISL8500IRZ	1	ea	U1	IC-2A BUCK REGULATOR, 12P, DFN, 4x3, ROHS	INTERSIL	ISL8500IRZ

ISL8500EVAL1Z Board Layout

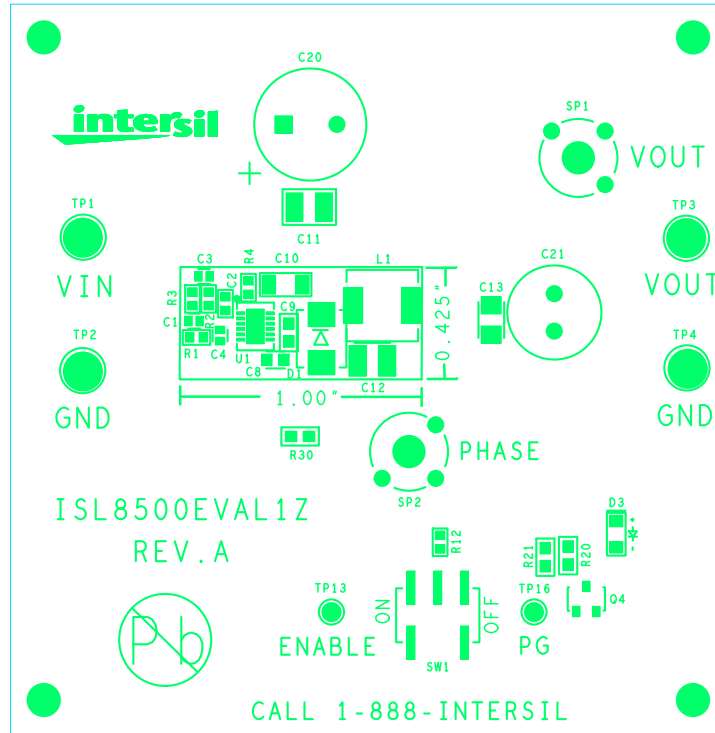


FIGURE 2. TOP COMPONENTS

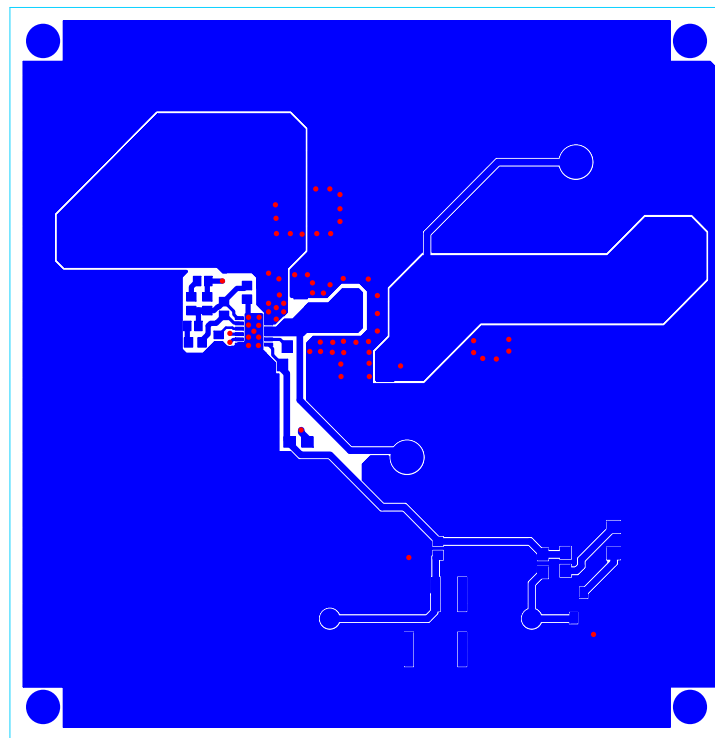


FIGURE 3. TOP LAYER ETCH

ISL8500EVAL1Z Board Layout (Continued)

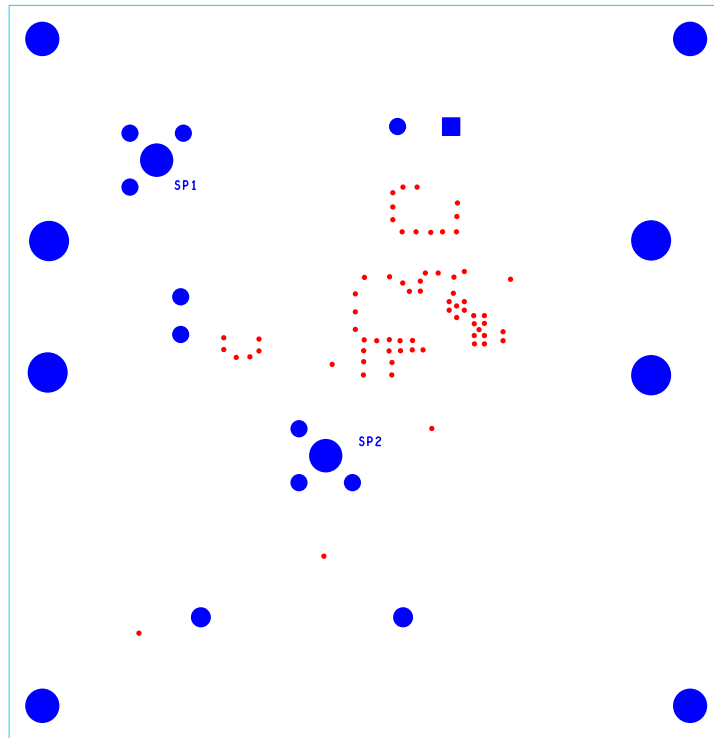


FIGURE 4. BOTTOM LAYER COMPONENTS (MIRRORED)

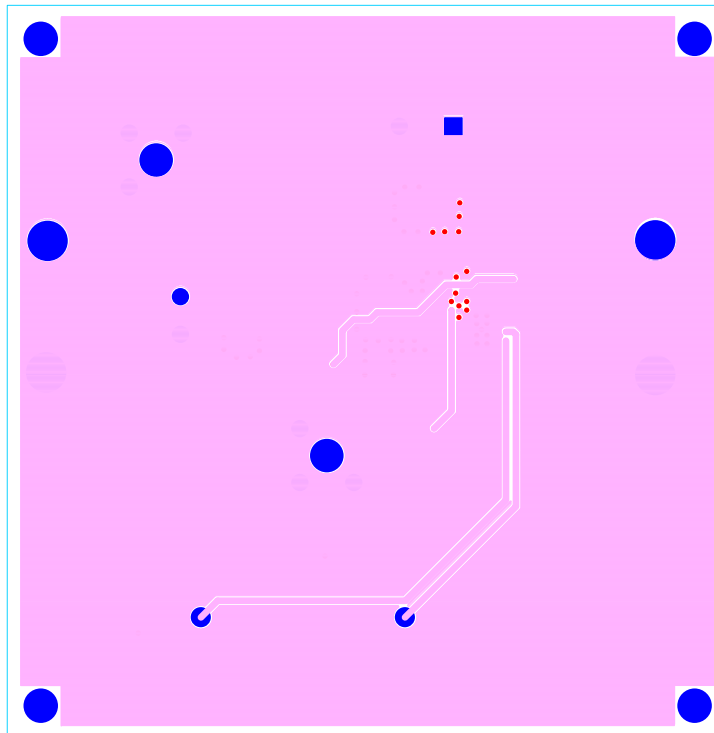


FIGURE 5. BOTTOM LAYER ETCH (MIRRORED)

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