

**ZLUSBREF01**  
**USB to SMBus Reference Design**

AN1469  
 REV.0.00  
 May 07, 2009

**Description**

The USB to SMBus™ Interface board allows communication between a Zilker Labs Digital-DC™ evaluation board and a PC. This interface board has been designed to bridge PMBus commands from a PC application program to the SMBus. The PMBus command set is used to configure a Digital-DC device as well as monitor the power supply. PMBus™ commands are accessed using the Zilker Labs interface software from a PC running Microsoft Windows. Refer to AN13 – *PMBus Command Set* for more information on PMBus commands.

The USB to SMBus interface board is used by connecting the SMBus interface connector directly to a Zilker Labs evaluation board. The SMBus connector is found on the lower left-hand side of each evaluation board. Refer to the Zilker Labs' product evaluation board quick start guide and product data sheet for more information.

**Features**

- SMBus control via USB
- SMBus 2.0 and I<sup>2</sup>C 2.1 compatible
- PMBus compliant
- Self powered from USB
- Pre-installed firmware
- Provides SMBus reference rail

**Applications**

This board has been designed to operate for the following conditions:

- Interface to Digital-DC EVBs
- $f_{SMBus} = 100 \text{ kHz}$
- Temperature range: 0°C to +70°C



Figure 1. USB to SMBus Interface

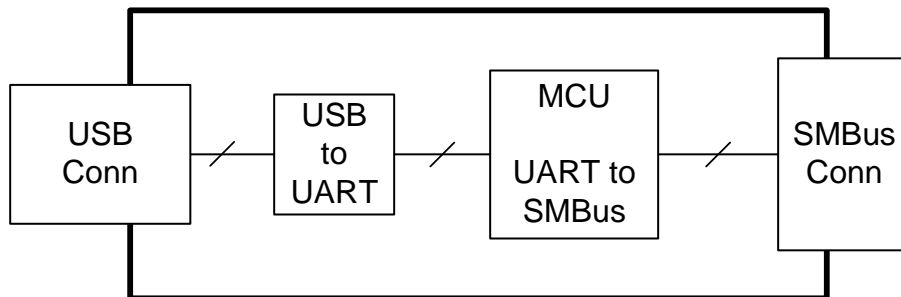


Figure 2. Block Diagram

Schematics

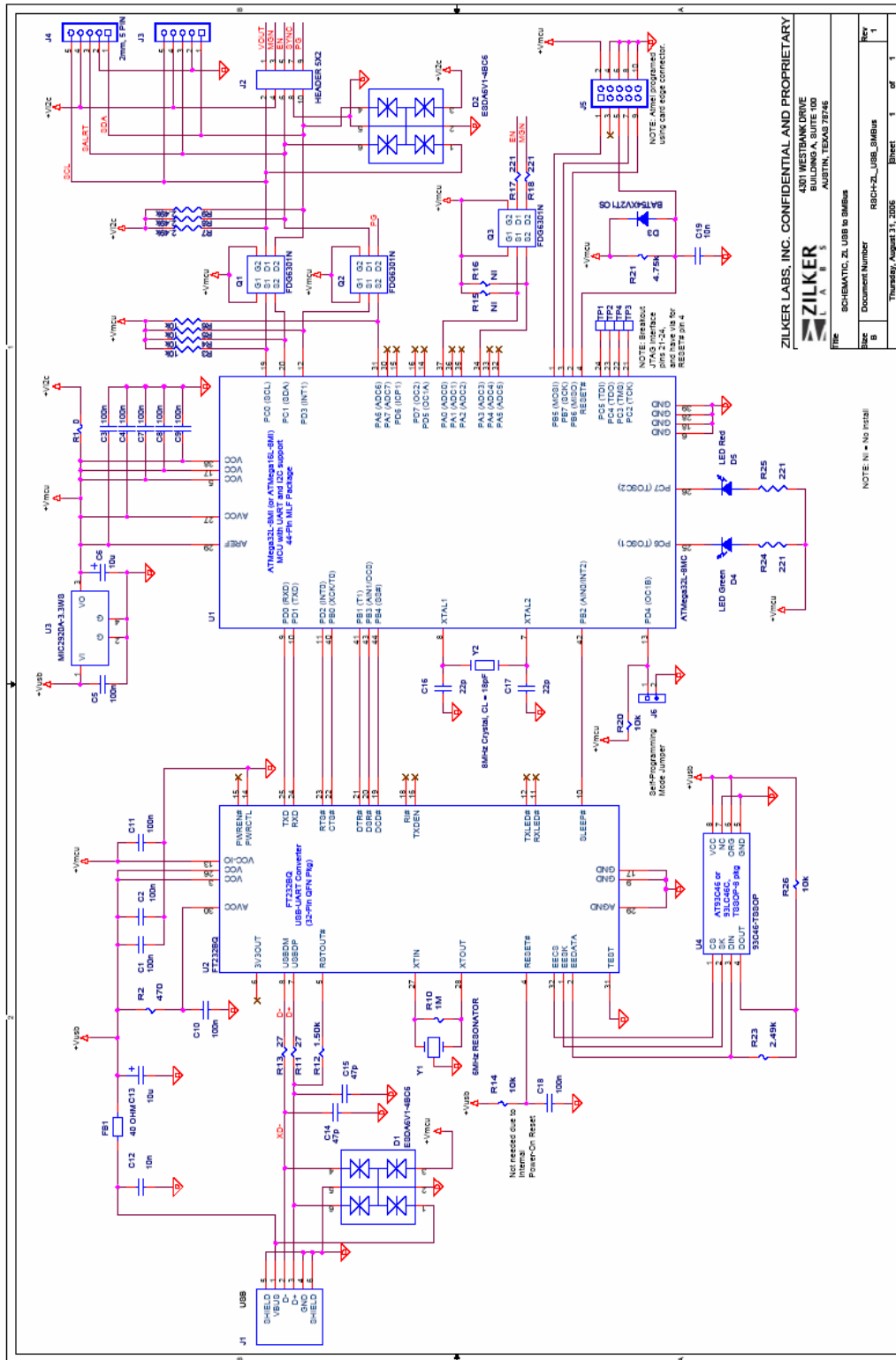


Figure 1. USB to SMBus

## Bill of Materials

Item	Quan	Reference	Value	Tol	Rating	Type	PCB Footprint	Manufacturer	Part Number
1	11	C1,C2,C3,C4,C5,C7,C8,C9,C10,C11	100n	10%	10V	X7R	SM0603	KEMET	C0603C104K8RACTU
2	2	C6,C13	10u	20%	6.3V		SM0603	PANASONIC-ECG	ECJ-1VB0J106M
3	2	C12,C19	10n	10%	25V	X7R	SM0603	PANASONIC-ECG	ECJ-1VB1E103K
4	2	C14,C15	47p	5%	50V	COG	SM0603	TDK	C1608C0G1H470J
5	2	C16,C17	22p	5%	50V	COG	SM0603	MURATA	GRM1885C1H220JA01D
6	2	D1,D2	ESDA6V1-4BC6		6.1V, 80W		SOT23_6L	ST MICRO	ESDA6V1-4BC6
7	1	D3	BAT54XV2T1OS		200mA		SOD-523	ON SEMI	BAT54XV2T1OS
8	1	D4	LED Green		20mA	CLR	SM0805_DIO_1C2A	CHICAGO MINI	CMD17-21VGC
9	1	D5	LED Red		20mA	CLR	SM0805_DIO_1C2A	CHICAGO MINI	CMD17-21VRC
10	1	FB1	40 OHM		1.5A	MLF	SM0805	STEWART	MI0805K400R-00 MI0805K400R-01
11	1	J1	USB TYPE B				USB/B	MOLEX	67068-0000
12	1	J2	HEADER 5X2				HDRF5DUALRA100X100	SAMTEC	SSQ-105-02-T-D-RA
13	1	J3	5 PIN			SN	HDR5LK100	AMP	640456-5
14	1	J4	2mm, 5 PIN			SN	SIP_5P_2.0MM	Sullins	PRPN051PAEN
15	1	J6	2 PIN			SN	SIP2/100	TYCO	644456-2
16	3	Q1,Q2,Q3	FDG6301N		25V	DUAL N-CH	SC70-6	FAIRCHILD SEMI	FDG6301N
17	1	R1	0			THK FILM	SM0805	YAGEO	RC0805JR-070RL
18	1	R2	470	5%	63mW	THK FILM	SM0402	ROHM	MCRMZPF4700
19	2	R3,R5	10k	1%	100mW	THK FILM	SM0603	ROHM	MCR03EZPFX1002
20	5	R4,R6,R20,R26	10k	1%	63mW	THK FILM	SM0402	YAGEO	RC0402FR-0710KL
21	3	R7,R8,R9	2.49k	1%	100mW	THK FILM	SM0603	ROHM	MCR03EZPFX2491
22	1	R10	1M	1%	63mW	THK FILM	SM0402	ROHM	MCR01MZPF1004
23	2	R11,R13	27	5%	63mW	THK FILM	SM0402	YAGEO	RC0402JR-0727RL
24	1	R12	1.50k	1%	63mW	THK FILM	SM0402	YAGEO	RC0402FR-071K5L
25	4	R17,R18,R24,R25	221	1%	63mW	THK FILM	SM0402	YAGEO	RC0402FR-07221L
26	1	R21	4.75k	0.01	63mW	THK FILM	SM0402	PANASONIC-ECG	ERJ-2RKF4751X
27	1	R23	2.49k	0.01	63mW	THK FILM	SM0402	PANASONIC-ECG	ERJ-2RKF2491X
28	1	U1	ATMega32L-8MC			MCU	MLF44_7X7_DP	ATMEL	ATMEGA32L-8MC
29	1	U2	FT232BQ				TQFP32/.8P/9X9	FTDI	FT232BQ
30	1	U3	MIC2920A-3.3WS		400mA		SOT223_1234_REV1	MICREL	MIC2920A-3.3WS TR
31	1	U4	93C46-TSSOP		1.8 - 5.5V	93C46	TSSOP8/.65P/6.4	ATMEL	AT93C46-10TI-1.8
32	1	Y1	6MHz RESONATOR	0.01		COMM	CERALOCK	MURATA	CSTCR6M00G53-R0
33	1	Y2	8MHz Crystal, CL = 18pF	30ppm		CSM-7	X575CT	ECS INC	ECS-80-18-5P
NI		TP1,TP2,TP3,TP4	T POINT S				TP_020H		
NI		R15,R16	NI	1%			SM0402		
NI		J5	AVRISP_10PinConn				HDR10DUAL100X100		
NI		R14	10k	1%	63mW	THK FILM	SM0402	YAGEO	RC0402FR-0710KL
NI		C18	100n	0.1	10V	X7R	SM0603	KEMET	C0603C104K8RACTU

NI = Not Installed

## References

---

- [1] AN13 – *PMBus Command Set*, Zilker Labs, Inc., 2007.
- [2] *ZL2005 Data Sheet*, Zilker Labs, Inc., 2006.
- [3] *ZL2105 Data Sheet*, Zilker Labs, Inc., 2007.
- [4] *ZL2005EV1 Quick Start Guide*, Zilker Labs, Inc., 2006.
- [5] *ZL2105EV1 Quick Start Guide*, Zilker Labs, Inc., 2006.

## Ordering Information

---

Orderable Part Number	Description
ZLUSBREF01	USB to SMBus Interface

## Revision History

---

Date	Rev. #	
3/27/2007	0.5	Preliminary Release
4/26/2007	1.0	Final Release

**NOTES**

# 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 Corporation**  
TOYOSU FORESIA, 3-2-24 Toyosu, Koto-ku, Tokyo 135-0061, Japan

**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

**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

## X-ON Electronics

Largest Supplier of Electrical and Electronic Components

*Click to view similar products for [Power Management IC Development Tools](#) category:*

*Click to view products by [Renesas](#) manufacturer:*

Other Similar products are found below :

[EVAL-ADM1168LQEBZ](#) [EVB-EP5348UI](#) [MIC23451-AAAYFL EV](#) [MIC5281YMME EV](#) [DA9063-EVAL](#) [ADP122-3.3-EVALZ](#) [ADP130-0.8-EVALZ](#) [ADP130-1.2-EVALZ](#) [ADP130-1.5-EVALZ](#) [ADP130-1.8-EVALZ](#) [ADP1714-3.3-EVALZ](#) [ADP1716-2.5-EVALZ](#) [ADP1740-1.5-EVALZ](#) [ADP1752-1.5-EVALZ](#) [ADP1828LC-EVALZ](#) [ADP1870-0.3-EVALZ](#) [ADP1871-0.6-EVALZ](#) [ADP1873-0.6-EVALZ](#) [ADP1874-0.3-EVALZ](#) [ADP1882-1.0-EVALZ](#) [ADP199CB-EVALZ](#) [ADP2102-1.25-EVALZ](#) [ADP2102-1.875EVALZ](#) [ADP2102-1.8-EVALZ](#) [ADP2102-2-EVALZ](#) [ADP2102-3-EVALZ](#) [ADP2102-4-EVALZ](#) [ADP2106-1.8-EVALZ](#) [ADP2147CB-110EVALZ](#) [AS3606-DB](#) [BQ24010EVM](#) [BQ24075TEVM](#) [BQ24155EVM](#) [BQ24157EVM-697](#) [BQ24160EVM-742](#) [BQ24296MEVM-655](#) [BQ25010EVM](#) [BQ3055EVM](#) [NCV891330PD50GEVB](#) [ISLUSBI2CKIT1Z](#) [LM2744EVAL](#) [LM2854EVAL](#) [LM3658SD-AEV/NOPB](#) [LM3658SDEV/NOPB](#) [LM3691TL-1.8EV/NOPB](#) [LM4510SDEV/NOPB](#) [LM5033SD-EVAL](#) [LP38512TS-1.8EV](#) [EVAL-ADM1186-1MBZ](#) [EVAL-ADM1186-2MBZ](#)