



**SANYO SiP** (System in Package) *technology*

**ISB**

(Integrated System in Board)

# ISB-E48-0, — Ultrathin Miniature Package ISB-E48-1 — **Charger Circuit Voltage Sensor + 3 P-channel MOSFETs**

## Overview

The ISB-E48-0, ISB-E48-1 incorporates in its power input block a high-precision voltage detector that provides protection against overvoltage. The ISB-E48-0, ISB-E48-1 also includes three P-channel MOSFET chips and allows for easy implementation of a charger circuit for cell phones and other portable equipment by incorporating the IC in a current interrupting switch activated by a voltage-detector or in an output block of a charger control IC.

## Application

- Battery charger for portable equipment including cell phones.

## Features

- On-chip high-precision voltage detector and three P-channel MOSFET chips.
- Miniature package makes this IC ideal for miniaturization of electronic devices and high-density mounting on printed circuit boards.

- ISB is a registered trademark of SANYO Electric Co., Ltd.

■ Any and all SANYO Semiconductor Co.,Ltd. products described or contained herein are, with regard to "standard application", intended for the use as general electronics equipment (home appliances, AV equipment, communication device, office equipment, industrial equipment etc.). The products mentioned herein shall not be intended for use for any "special application" (medical equipment whose purpose is to sustain life, aerospace instrument, nuclear control device, burning appliances, transportation machine, traffic signal system, safety equipment etc.) that shall require extremely high level of reliability and can directly threaten human lives in case of failure or malfunction of the product or may cause harm to human bodies, nor shall they grant any guarantee thereof. If you should intend to use our products for applications outside the standard applications of our customer who is considering such use and/or outside the scope of our intended standard applications, please consult with us prior to the intended use. If there is no consultation or inquiry before the intended use, our customer shall be solely responsible for the use.

■ Specifications of any and all SANYO Semiconductor Co.,Ltd. products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.

**SANYO Semiconductor Co., Ltd.**

TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

# ISB-E48-0, ISB-E48-1

## Specifications

**Absolute Maximum Ratings** at  $T_a = 25^\circ\text{C}$

Internal Device	Parameter	Symbol	Conditions	Ratings	Unit
IC	Input voltage	$V_{IN}$		12	V
	Output current	$I_{OUT}$		50	mA
	Output voltage	$V_{OUT}$		$V_{SS}-0.3$ to $V_{IN}+0.3$	V
	Allowable power dissipation	$P_{D-IC}$	When mounted on a specified board *	0.65	W
TR1	Drain-to-source voltage	$V_{DSS}$		-20	V
	Gate-to-source voltage	$V_{GSS}$		$\pm 10$	V
	Drain current	$I_D$		-2.0	A
	Allowable power dissipation	$P_{D-T}$	When mounted on a specified board *	1.4	W
TR2 and TR3	Drain-to-source voltage	$V_{DSS}$		-20	V
	Gate-to-source voltage	$V_{GSS}$		$\pm 10$	V
	Drain current	$I_D$		-4	A
	Allowable power dissipation	$P_{D-T}$	When mounted on a specified board *	1.5	W
Operating ambient temperature		$T_{opr}$		-30 to +85	$^\circ\text{C}$
Storage ambient temperature		$T_{stg}$		-40 to +125	$^\circ\text{C}$

\* Specified board: 40mm×25mm×0.8mm FR4 board

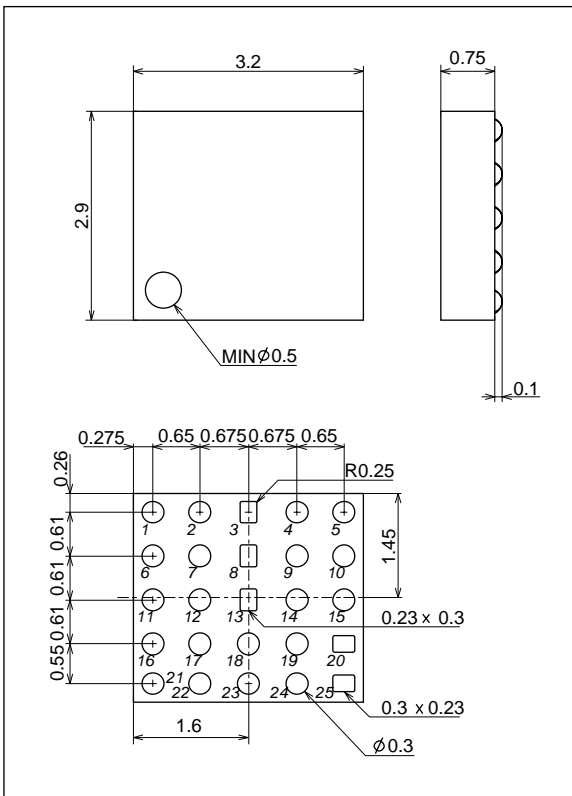
## Electrical Characteristics

**Overall Operating Characteristics** at  $T_a = 25^\circ\text{C}$ , with a dedicated test circuit

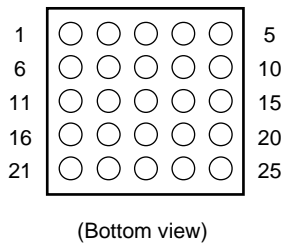
Internal Device	Parameter	Symbol	Conditions	Ratings			Unit
				min	typ	max	
IC	Detecting voltage	$V_{DF}$	ISB-E48-0	2.646	2.7	2.754	V
			ISB-E48-1	3.234	3.3	3.366	V
	Current consumption	$I_{SS}$	$V_{IN}=3.0\text{V}$		0.9	3.0	$\mu\text{A}$
	Output current	$I_{OUT1}$	ISB-E48-0 Nch $V_{DS}=0.5\text{V}$ , $V_{IN}=2.0\text{V}$	3.0	7.7		mA
			ISB-E48-1 Nch $V_{DS}=0.5\text{V}$ , $V_{IN}=3.0\text{V}$	5.0	10.1		mA
	$I_{OUT2}$	Pch $V_{DS}=2.1\text{V}$ , $V_{IN}=8.0\text{V}$		-10.0	-2.0	mA	
TR1	Drain-to-source breakdown voltage	$V_{DSS}$	$I_D=-1\text{mA}$ , $V_{GS}=0\text{V}$	-20			V
	Drain-to-source cutoff current	$I_{DSS}$	$V_{DS}=-20\text{V}$ , $V_{GS}=0\text{V}$			-10	$\mu\text{A}$
	Gate-to-source leakage current	$I_{GSS}$	$V_{GS}=\pm 8\text{V}$ , $V_{DS}=0\text{V}$			$\pm 10$	$\mu\text{A}$
	Gate-to-source cutoff voltage	$V_{GS(off)}$	$V_{DS}=-10\text{V}$ , $I_D=-1\text{mA}$	-0.3		-1.0	V
	Drain-to-source on resistance	$R_{DS(on)1}$	$I_D=-1\text{A}$ , $V_{GS}=-4\text{V}$		125	165	$\text{m}\Omega$
			$I_D=-0.5\text{A}$ , $V_{GS}=-2.5\text{V}$		155	220	$\text{m}\Omega$
$I_D=-0.1\text{A}$ , $V_{GS}=-1.8\text{V}$				195	280	$\text{m}\Omega$	
TR2 and TR3	Drain-to-source breakdown voltage	$V_{DSS}$	$I_D=-1\text{mA}$ , $V_{GS}=0\text{V}$	-20			V
	Drain-to-source cutoff current	$I_{DSS}$	$V_{DS}=-20\text{V}$ , $V_{GS}=0\text{V}$			-1.0	$\mu\text{A}$
	Gate-to-source leakage current	$I_{GSS}$	$V_{GS}=\pm 8\text{V}$ , $V_{DS}=0\text{V}$			$\pm 10$	$\mu\text{A}$
	Gate-to-source cutoff voltage	$V_{GS(off)}$	$V_{DS}=-10\text{V}$ , $I_D=-1\text{mA}$	-0.4		-1.3	V
	Drain-to-source on resistance	$R_{DS(on)1}$	$I_D=-2\text{A}$ , $V_{GS}=-4.5\text{V}$ * Design guaranteed value			63	$\text{m}\Omega$
			$I_D=-1\text{A}$ , $V_{GS}=-2.5\text{V}$ * Design guaranteed value			96	$\text{m}\Omega$

**Package Dimensions**

unit : mm

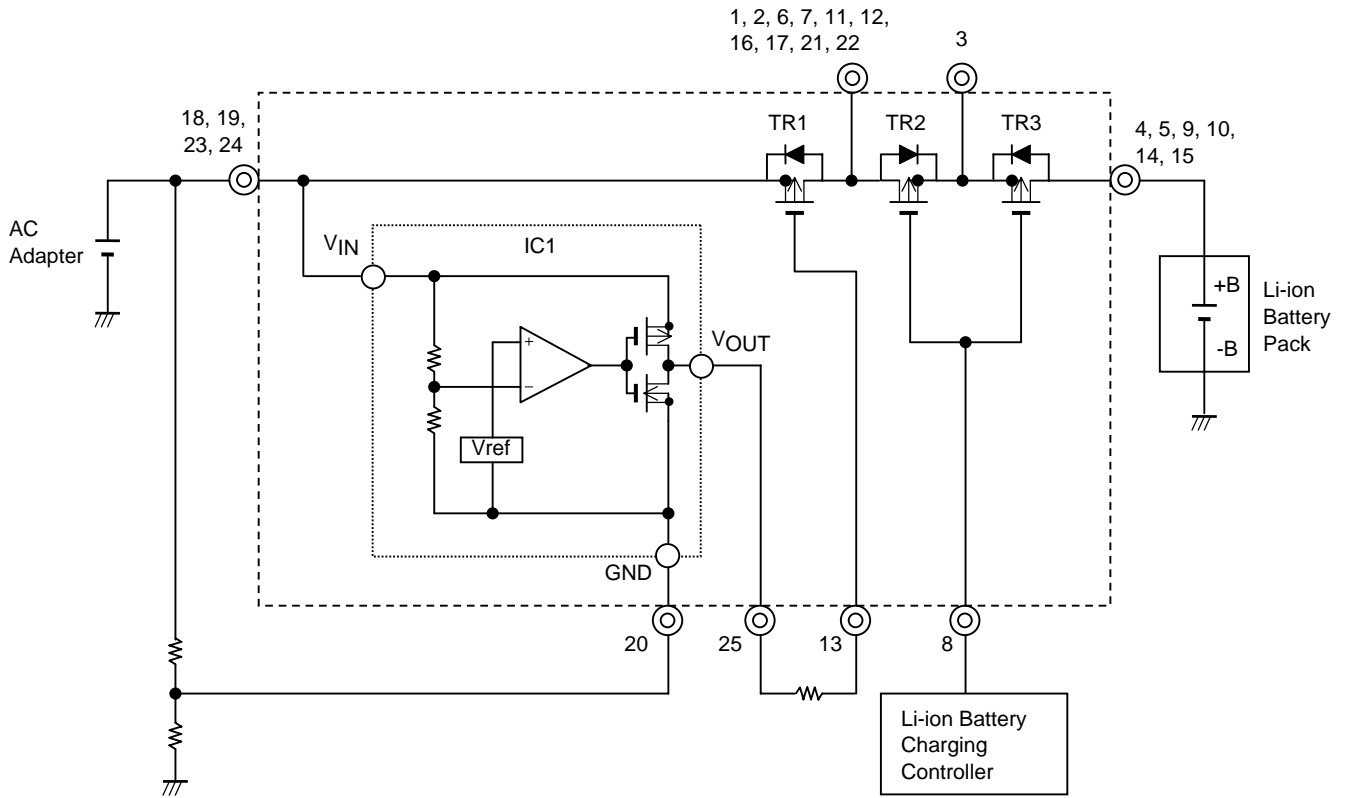


**Pin Assignments Diagram**

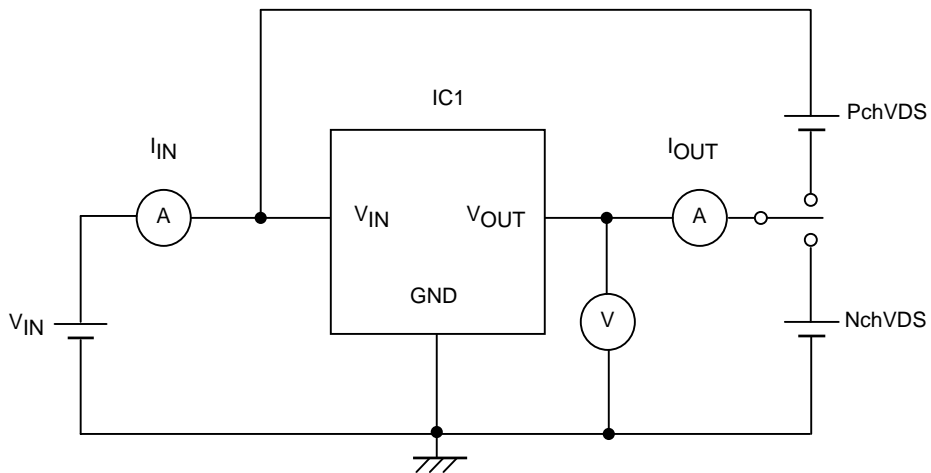


1	TR1, 2 Drain	TR1, 2 Drain	TR2, 3 Source	TR3 Drain	TR3 Drain	5
6	TR1, 2 Drain	TR1, 2 Drain	TR2, 3 Gate	TR3 Drain	TR3 Drain	10
11	TR1, 2 Drain	TR1, 2 Drain	TR1 Gate	TR3 Drain	TR3 Drain	15
16	TR1, 2 Drain	TR1, 2 Drain	IC V <sub>IN</sub> TR1 Source	IC V <sub>IN</sub> TR1 Source	IC GND	20
21	TR1, 2 Drain	TR1, 2 Drain	IC V <sub>IN</sub> TR1 Source	IC V <sub>IN</sub> TR1 Source	IC V <sub>OUT</sub>	25

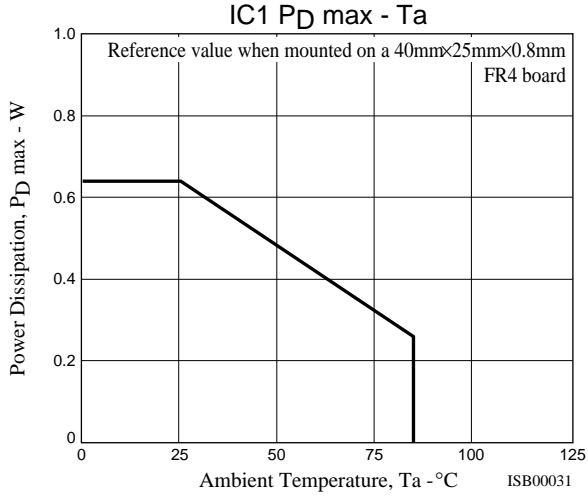
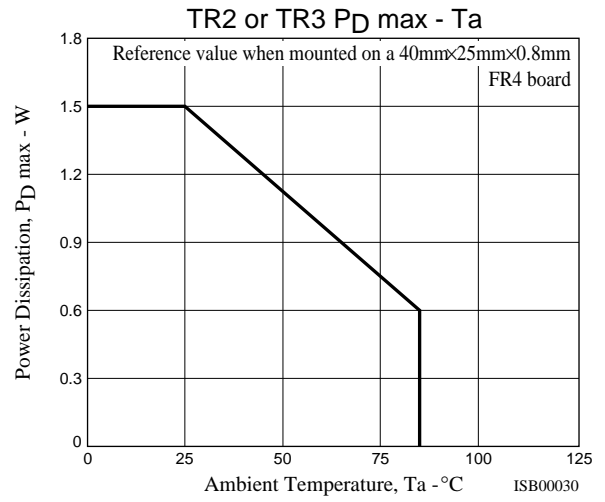
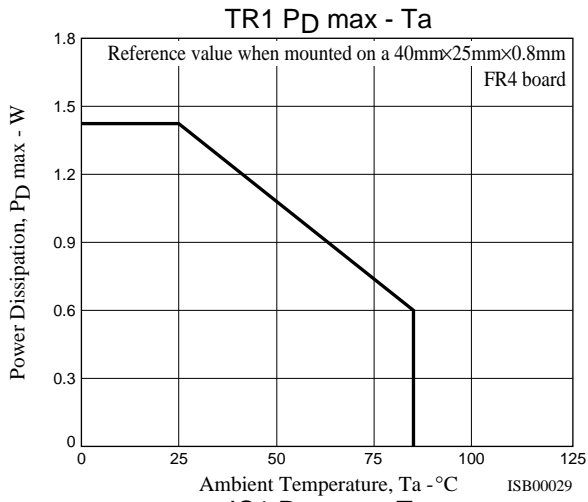
Internal Equivalent Circuit and Sample Peripheral Circuit



IC Test Circuit



# ISB-E48-0, ISB-E48-1



<Manufactured by>

ISB Management Department, Custom Module Division, Electronic Device  
Company, Component & Device Group, SANYO Electric Co., Ltd.

- SANYO Semiconductor Co.,Ltd. assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all SANYO Semiconductor Co.,Ltd. products described or contained herein.
- SANYO Semiconductor Co.,Ltd. strives to supply high-quality high-reliability products, however, any and all semiconductor products fail or malfunction with some probability. It is possible that these probabilistic failures or malfunction could give rise to accidents or events that could endanger human lives, trouble that could give rise to smoke or fire, or accidents that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.
- In the event that any or all SANYO Semiconductor Co.,Ltd. products described or contained herein are controlled under any of applicable local export control laws and regulations, such products may require the export license from the authorities concerned in accordance with the above law.
- No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or any information storage or retrieval system, or otherwise, without the prior written consent of SANYO Semiconductor Co.,Ltd.
- Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. When designing equipment, refer to the "Delivery Specification" for the SANYO Semiconductor Co.,Ltd. product that you intend to use.
- Information (including circuit diagrams and circuit parameters) herein is for example only; it is not guaranteed for volume production.
- Upon using the technical information or products described herein, neither warranty nor license shall be granted with regard to intellectual property rights or any other rights of SANYO Semiconductor Co.,Ltd. or any third party. SANYO Semiconductor Co.,Ltd. shall not be liable for any claim or suits with regard to a third party's intellectual property rights which has resulted from the use of the technical information and products mentioned above.

This catalog provides information as of May, 2007. Specifications and information herein are subject to change without notice.