



**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.

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# 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

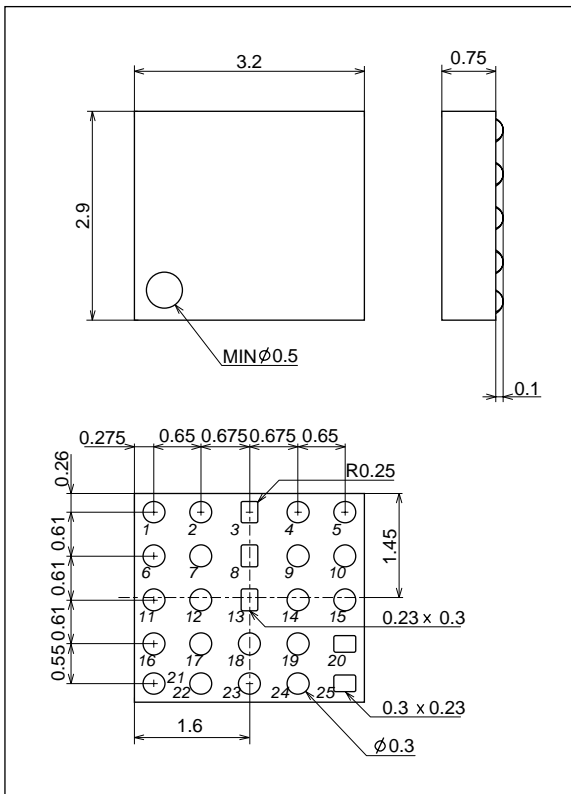
## Electrical Characteristics

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

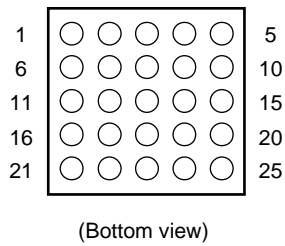
Internal Device	Parameter	Symbol	Conditions	Ratings			Unit
				min	typ	max	
IC	Detecting voltage	$V_{DF}$	ISB-E48-0	2.646	2.7	2.754	V
			ISB-E48-1	3.234	3.3	3.366	V
	Current consumption	$I_{SS}$	$V_{IN}=3.0\text{V}$		0.9	3.0	$\mu\text{A}$
	Output current	$I_{OUT1}$	ISB-E48-0 Nch $V_{DS}=0.5\text{V}, V_{IN}=2.0\text{V}$	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

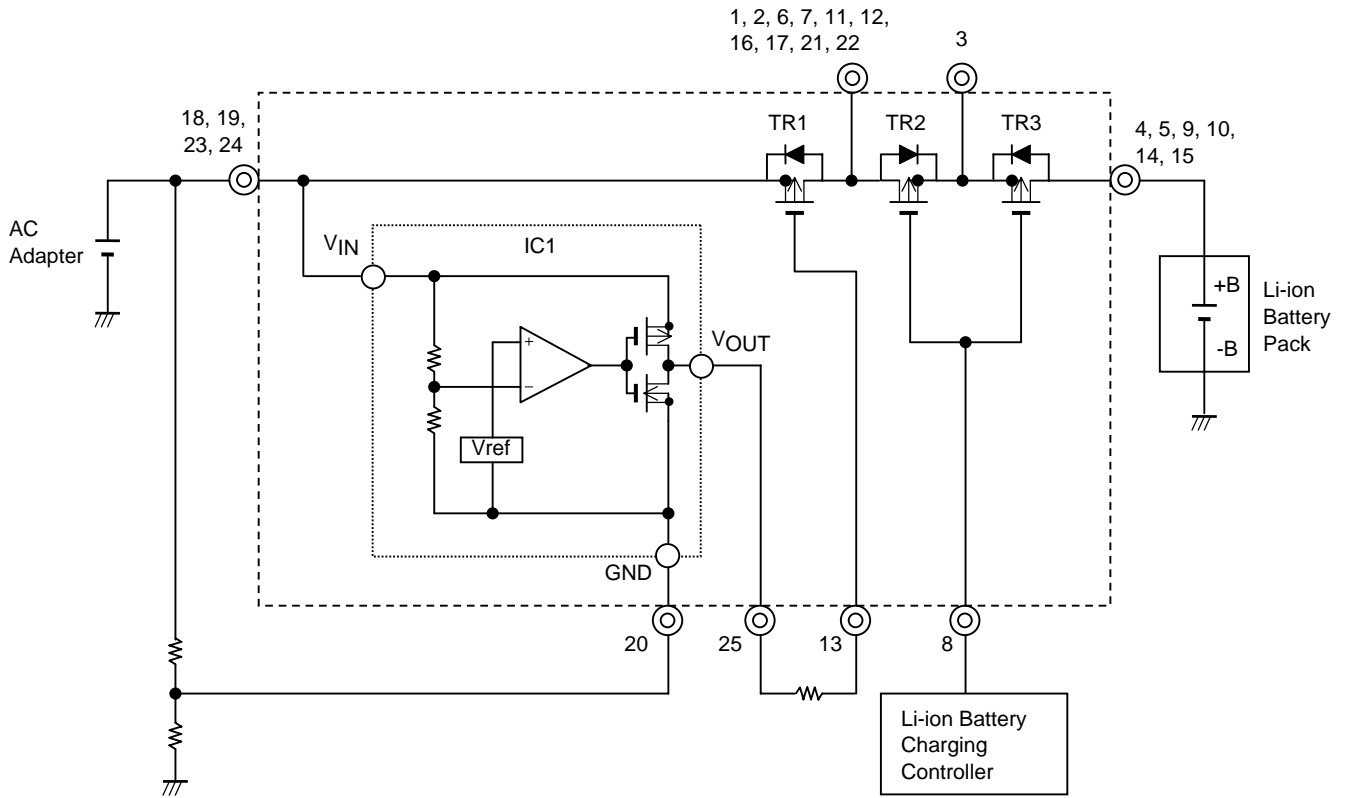


## Pin Assignments Diagram

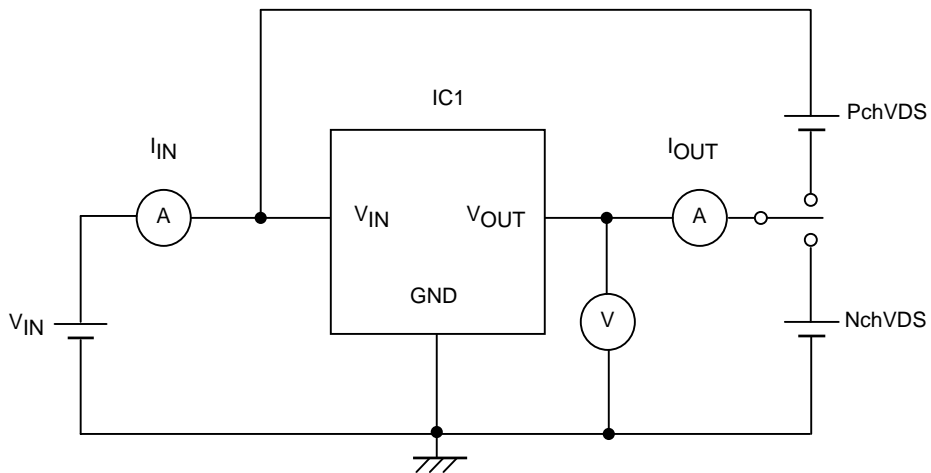


1	TR1, 2 Drain	TR1, 2 Drain	TR2, 3 Source	TR3 Drain	TR3 Drain	5
6	TR1, 2 Drain	TR1, 2 Drain	TR2, 3 Gate	TR3 Drain	TR3 Drain	10
11	TR1, 2 Drain	TR1, 2 Drain	TR1 Gate	TR3 Drain	TR3 Drain	15
16	TR1, 2 Drain	TR1, 2 Drain	IC V <sub>IN</sub> TR1 Source	IC V <sub>IN</sub> TR1 Source	IC GND	20
21	TR1, 2 Drain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

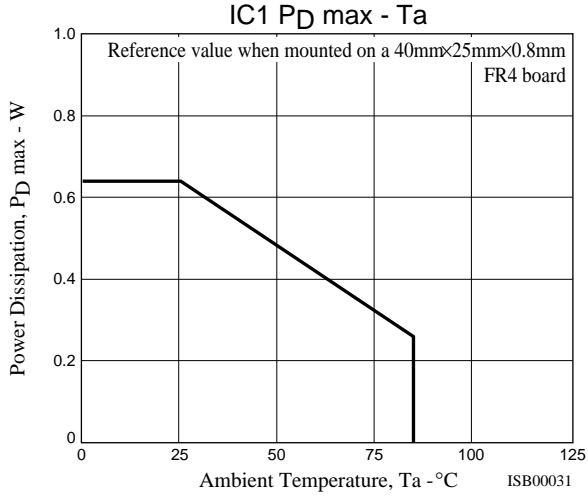
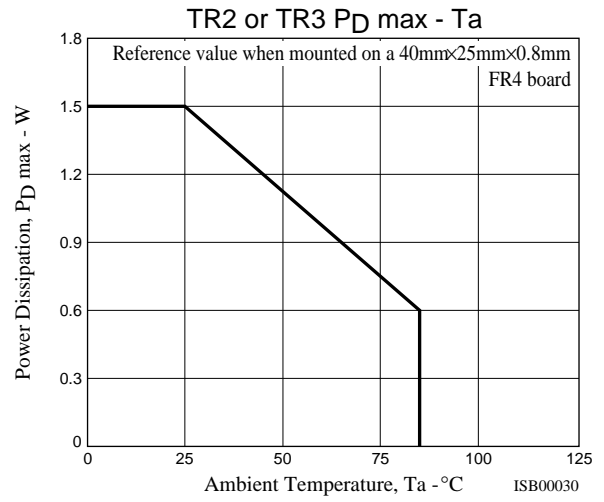
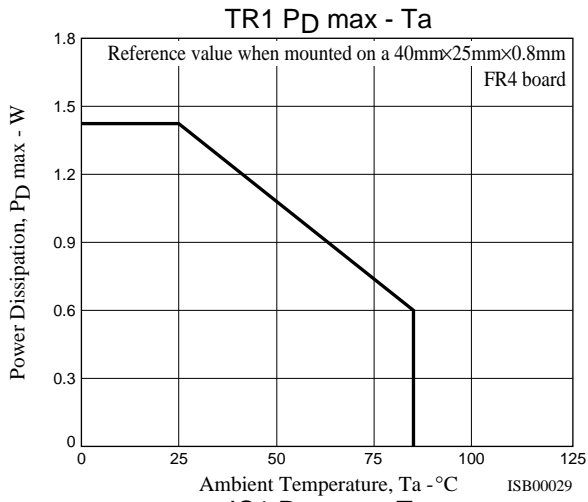
Internal Equivalent Circuit and Sample Peripheral Circuit



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.

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