

## **RT4801H Dual Output LCD Bias for Smartphones and Tablets**

### ***Purpose***

The RT4801H is a dual output LCD bias with the input voltage range from 2.5V to 5.5V and provides 80mA output current. This document explains the function and use of the RT4801H evaluation board (EVB), and provides information to enable operation, output voltage setting of the evaluation board.

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## Introduction

### General Product Information

The RT4801H is a highly integrated Boost and LDO and inverting charge pump to generate positive and negative output voltage. The output voltages can be adjusted from  $\pm 4V$  to  $\pm 6V$  with 100mV steps by I<sup>2</sup>C interface protocols. With its input voltage range of 2.5V to 5.5V, RT4801H is optimized for products powered by single-cell batteries and symmetrical output currents up to 80mA. The RT4801H is available in the WL-CSP-15B 1.31x2.07 (BSC) package.

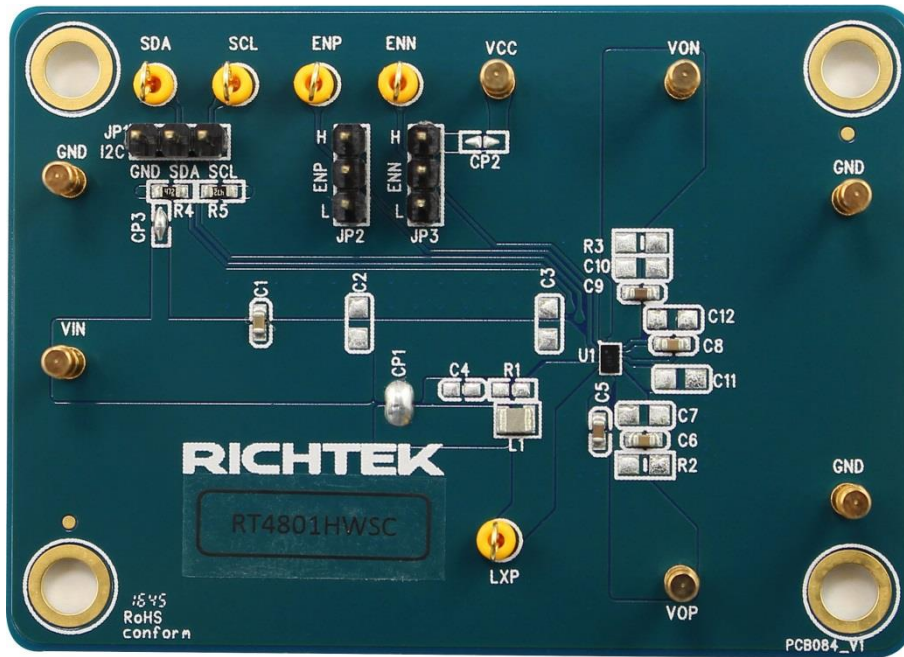
### Product Feature

- 2.5V to 5.5V Supply Voltage Range
- Up to 90% Efficiency with Small Magnetics
- Support Up to 80mA Output Current
- Low 1 $\mu$ A Shutdown Current
- Internal Soft-start Function
- Short Circuit Protection Function
- Over-Voltage Protection Function
- Over-Current Protection Function
- Over-Temperature Protection Function
- Elastic Positive and Negative Voltage On/Off Control by ENP/ENN
- Voltage Output from 4V to 6V per 0.1V
- Low Input Noise and EMI
- Output with Programmable Fast Discharge when IC Shutdown
- Adjustable Output Voltage by I<sup>2</sup>C Compatible Interface
- Available in the 15-Ball WL-CSP Package

### Key Performance Summary Table

Key Features	Evaluation Board Number: PCB084_V1
Default Input Voltage	3.7V
Max Output Current	80mA
Default Output Voltage	V <sub>OP</sub> = 5V, V <sub>ON</sub> = -5V
Default Marking & Package Type	RT4801HWSC, WL-CSP-15B 1.31x2.07 (BSC)

**Bench Test Setup Conditions**



Carefully inspect all the components used in the EVB according to the following Bill of Materials table, and then make sure all the components are undamaged and correctly installed. If there is any missing or damaged component, which may occur during transportation, please contact our distributors or e-mail us at [evb\\_service@richtek.com](mailto:evb_service@richtek.com).

**Test Points**

The EVB is provided with the test points and pin names listed in the table below.

Test point/ Pin name	Signal	Comment (expected waveforms or voltage levels on test points)
VIN	Input voltage	Input voltage with range 2.5V to 5.5V.
ENP	VOP Enable	Enable control pin for VOP.
ENN	VON Enable	Enable control pin for VON.
GND	Ground	Ground.
I2C	I <sup>2</sup> C Control	Pins to set function and output voltage.
VOP	Positive output voltage	Default voltage: 5V±1%.
VON	Negative output voltage	Default voltage: -5V±1%.
LXP	Switching Node of Boost Converter Test Pin	Switching Node of Boost Converter.

### Power-up & Measurement Procedure

Connect input voltage ( $2.5V < V_{IN} < 5.5V$ ).

1. To use a jumper at “H” option to tie ENP or ENN test pin to input voltage  $V_{IN}$  via CP3 or external voltage via CP2 for enabling the device. Inversely, to use a jumper at “L” option to tie ENP or ENN test pin to ground GND for disabling the device.
2. To verify the output voltage VOP and VON ( $\pm 5V$ ) via I<sup>2</sup>C connector.
3. To connect an external load up to 80mA and verify the output voltage and current.

### Output Voltage Setting

The output voltage can be programmed by a MCU through the dedicated I<sup>2</sup>C interface according to the VOP/VON voltage selection table. The device slave address is 0xE6.

**Table1. VOP Voltage Selection**

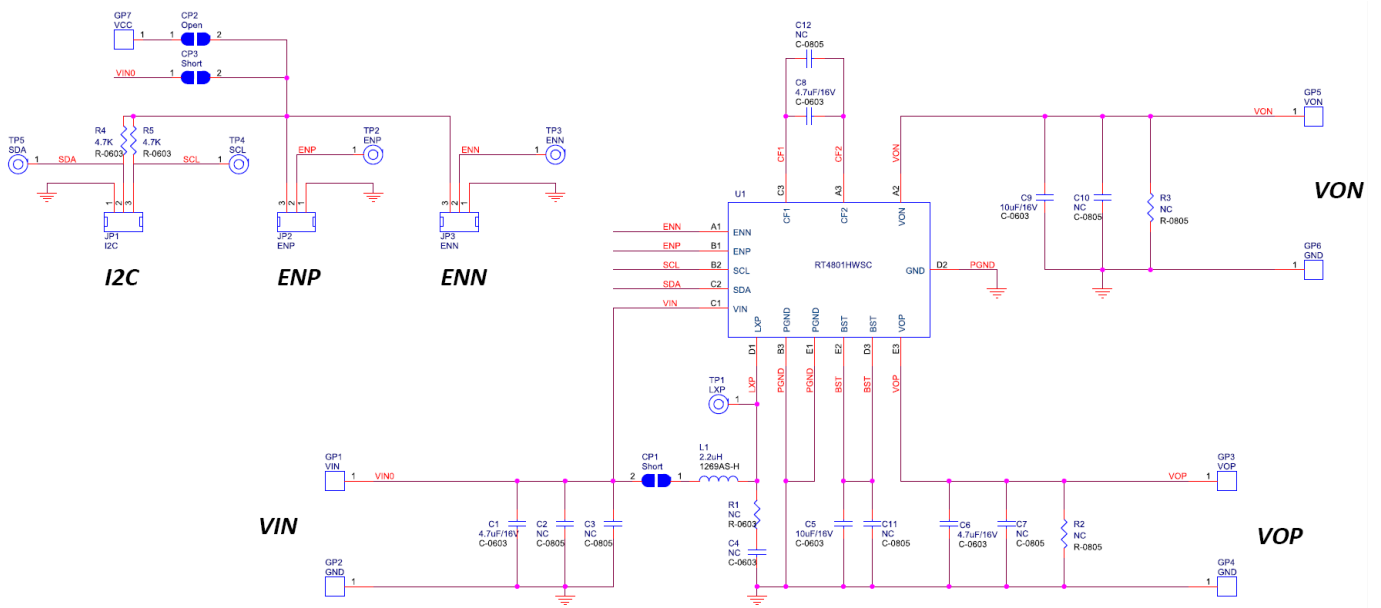
Name	Register Address	DATA	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0	VOP (V)
VOP	00h	00h	Reserved	Reserved	Reserved	0	0	0	0	0	4
VOP	00h	01h	Reserved	Reserved	Reserved	0	0	0	0	1	4.1
VOP	00h	02h	Reserved	Reserved	Reserved	0	0	0	1	0	4.2
VOP	00h	03h	Reserved	Reserved	Reserved	0	0	0	1	1	4.3
VOP	00h	04h	Reserved	Reserved	Reserved	0	0	1	0	0	4.4
VOP	00h	05h	Reserved	Reserved	Reserved	0	0	1	0	1	4.5
VOP	00h	06h	Reserved	Reserved	Reserved	0	0	1	1	0	4.6
VOP	00h	07h	Reserved	Reserved	Reserved	0	0	1	1	1	4.7
VOP	00h	08h	Reserved	Reserved	Reserved	0	1	0	0	0	4.8
VOP	00h	09h	Reserved	Reserved	Reserved	0	1	0	0	1	4.9
VOP	00h	0Ah	Reserved	Reserved	Reserved	0	1	0	1	0	5
VOP	00h	0Bh	Reserved	Reserved	Reserved	0	1	0	1	1	5.1
VOP	00h	0Ch	Reserved	Reserved	Reserved	0	1	1	0	0	5.2
VOP	00h	0Dh	Reserved	Reserved	Reserved	0	1	1	0	1	5.3
VOP	00h	0Eh	Reserved	Reserved	Reserved	0	1	1	1	0	5.4
VOP	00h	0Fh	Reserved	Reserved	Reserved	0	1	1	1	1	5.5
VOP	00h	10h	Reserved	Reserved	Reserved	1	0	0	0	0	5.6
VOP	00h	11h	Reserved	Reserved	Reserved	1	0	0	0	1	5.7
VOP	00h	12h	Reserved	Reserved	Reserved	1	0	0	1	0	5.8
VOP	00h	13h	Reserved	Reserved	Reserved	1	0	0	1	1	5.9
VOP	00h	14h	Reserved	Reserved	Reserved	1	0	1	0	0	6

Table 2. VON Voltage Selection

Name	Register Address	DATA	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0	VON (V)
VON	01h	00h	Reserved	Reserved	Reserved	0	0	0	0	0	-4
VON	01h	01h	Reserved	Reserved	Reserved	0	0	0	0	1	-4.1
VON	01h	02h	Reserved	Reserved	Reserved	0	0	0	1	0	-4.2
VON	01h	03h	Reserved	Reserved	Reserved	0	0	0	1	1	-4.3
VON	01h	04h	Reserved	Reserved	Reserved	0	0	1	0	0	-4.4
VON	01h	05h	Reserved	Reserved	Reserved	0	0	1	0	1	-4.5
VON	01h	06h	Reserved	Reserved	Reserved	0	0	1	1	0	-4.6
VON	01h	07h	Reserved	Reserved	Reserved	0	0	1	1	1	-4.7
VON	01h	08h	Reserved	Reserved	Reserved	0	1	0	0	0	-4.8
VON	01h	09h	Reserved	Reserved	Reserved	0	1	0	0	1	-4.9
VON	01h	0Ah	Reserved	Reserved	Reserved	0	1	0	1	0	-5
VON	01h	0Bh	Reserved	Reserved	Reserved	0	1	0	1	1	-5.1
VON	01h	0Ch	Reserved	Reserved	Reserved	0	1	1	0	0	-5.2
VON	01h	0Dh	Reserved	Reserved	Reserved	0	1	1	0	1	-5.3
VON	01h	0Eh	Reserved	Reserved	Reserved	0	1	1	1	0	-5.4
VON	01h	0Fh	Reserved	Reserved	Reserved	0	1	1	1	1	-5.5
VON	01h	10h	Reserved	Reserved	Reserved	1	0	0	0	0	-5.6
VON	01h	11h	Reserved	Reserved	Reserved	1	0	0	0	1	-5.7
VON	01h	12h	Reserved	Reserved	Reserved	1	0	0	1	0	-5.8
VON	01h	13h	Reserved	Reserved	Reserved	1	0	0	1	1	-5.9
VON	01h	14h	Reserved	Reserved	Reserved	1	0	1	0	0	-6

**Schematic, Bill of Materials & Board Layout**

**EVB Schematic Diagram**



**Bill of Materials**

Reference	Qty	Part number	Description	Package	Manufacturer
U1	1	RT4801HWSC	Dual Output LCD Bias IC	WL-CSP-15B 1.31x2.07 (BSC)	RICHTEK
C1, C6, C8	3	GRM188R61C475KAAJ	4.7μF/16V/0603	C-0603	Murata
C5, C9	2	GRM188R61C106KAAL	10μF/16V/0603	C-0603	Murata
L1	1	1269AS-H	2.2μH	2520	TOKO
R4, R5	2	RC0603JR-074K7L	4.7K/0603	R-0603	Yageo



### ***More Information***

For more information, please find the related datasheet or application notes from Richtek website <http://www.richtek.com>.

### ***Important Notice for Richtek Evaluation Board***

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