



# LHC4913 SERIES

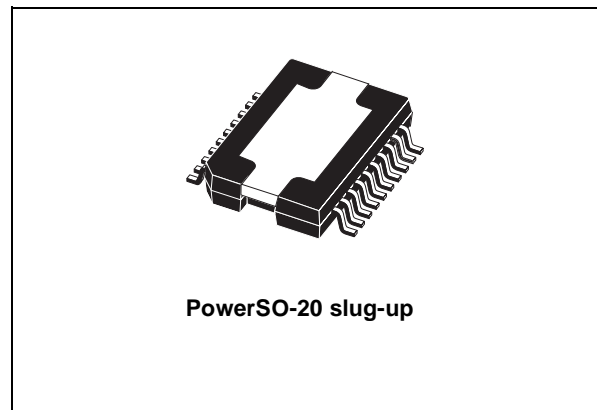
## 3A POSITIVE LOW DROP VOLTAGE REGULATOR WITH INHIBIT FUNCTION

ADVANCE DATA

- LOW OUTPUT CAPACITANCE: 1 $\mu$ F
- LOW DROP VOLTAGE:  
0.5V @ I<sub>O</sub>=1A  
1.5V @ I<sub>O</sub>=3A
- OVERTEMPERATURE PROTECTION
- OVERCURRENT PROTECTION
- OUTPUT SHORT CIRCUIT MONITORING,  
SIGNALLED BY TTL OUTPUT
- ON/OFF EXTERNAL CONTROL BY MEANS  
OF TTL COMPATIBLE INPUT
- ADJUSTABLE CURRENT LIMITATION  
PROTECTS OUTPUTS FROM DAMAGING  
SHORTCIRCUITS
- REMOTE SENSING OPERATION

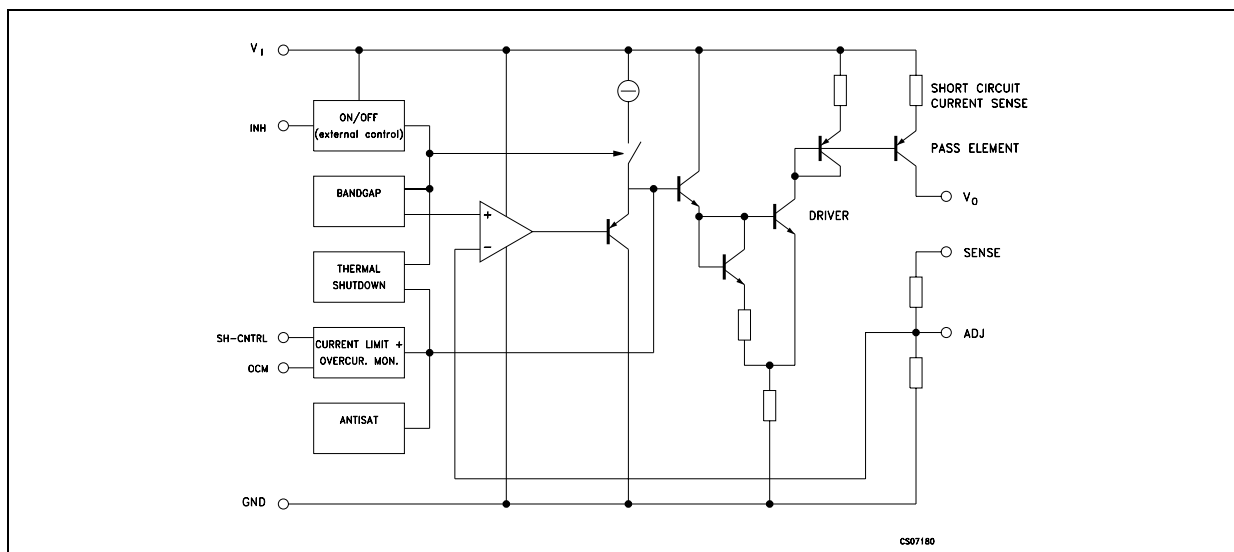
### DESCRIPTION

The LHC4913 is a positive Voltage Regulator family including both fixed and adjustable versions. Housed into SO-20 slug-up package with stand off zero, it is specifically intended for



applications in rugged environments, such as Nuclear Physics, in which it has to withstand large amounts of radiation doses during operating life. The fixed output voltages available are 2.5, 3.0, 3.3, 5.0 and 8.0V. Input voltage ranges from 3 to 12V.

### SCHEMATIC DIAGRAM



## LHC4913 SERIES

### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_I$	DC Input Voltage	14	V
$V_{INH}$	INHIBIT Input Voltage	$V_I + 0.5$	V
$I_O$	Output Current	Internally limited	
$P_{tot}$	Power Dissipation	Internally limited	
$T_{stg}$	Storage Temperature Range	-40 to +150	°C
$T_{op}$	Operating Junction Temperature Range	-40 to +125	°C

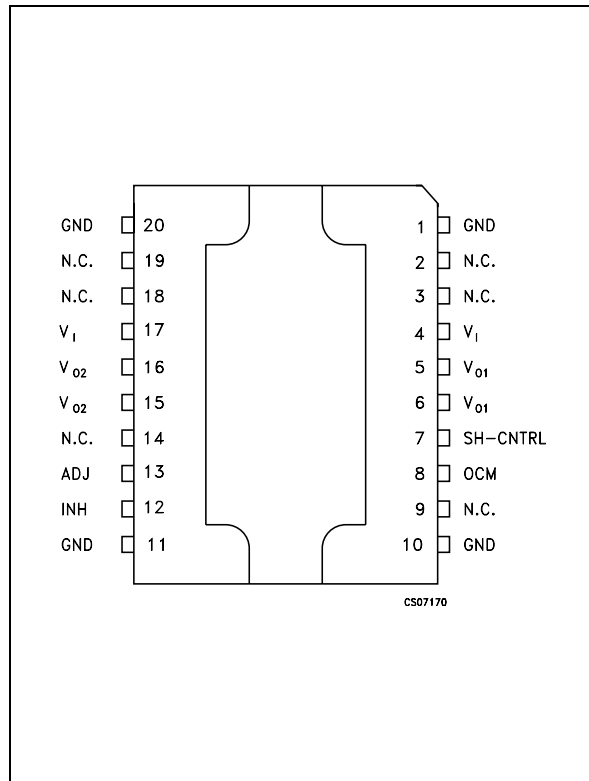
Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.

Note: ESD performance are not guaranteed on ADJ and SH-CNTRL pins.

### THERMAL DATA

Symbol	Parameter	PowerSO-20 slug-up	Unit
$R_{thj-case}$	Thermal Resistance Junction-case	2	°C/W

### CONNECTION DIAGRAM (top view)



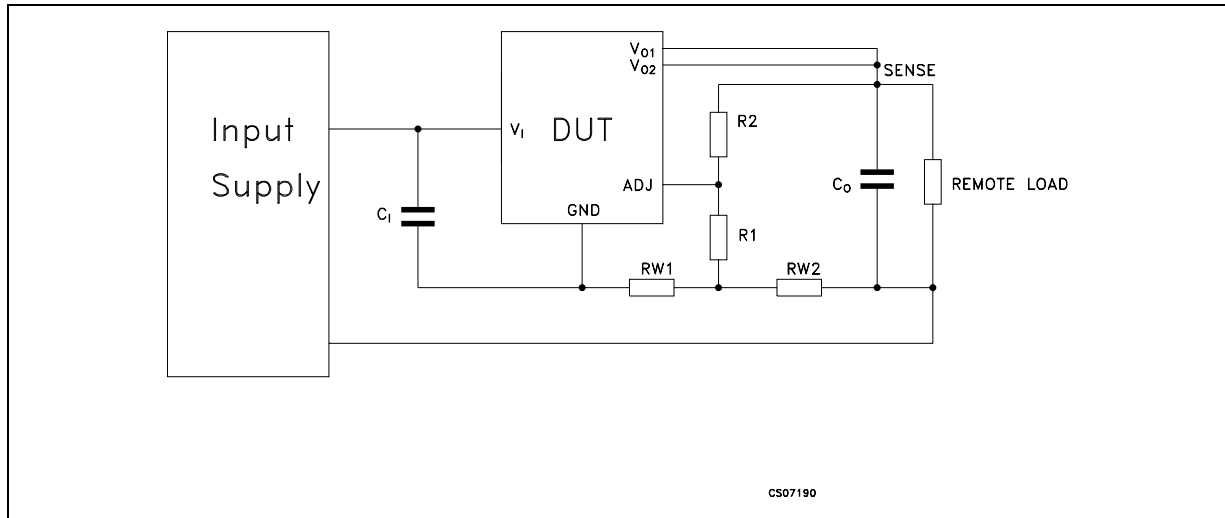
### PIN DESCRIPTION FOR ADJUSTABLE VERSION

Pin N°	Symbol	Name and Function
1	GND	Ground Pin
2	NC	Not Connected
3	NC	Not Connected
4	$V_I$	Positive Supply Voltage
5	$V_{O1}$	Output Pin
6	$V_{O1}$	Output Pin
7	SH-CNTRL	Short Circuit Valve Controlling
8	OCM	Over Current Monitoring
9	NC	Not Connected
10	GND	Ground Pin
11	GND	Ground Pin
12	INH	Inhibit
13	ADJ	Adjustable pin
14	NC	Not Connected
15	$V_{O2}$	Output Pin
16	$V_{O2}$	Output Pin
17	$V_I$	Positive Supply Voltage
18	NC	Not Connected
19	NC	Not Connected
20	GND	Ground Pin

### ORDERING CODES

TYPE	Power-SO20 slug-up	OUTPUT VOLTAGES
LHC4913	LHC4913PDU	Adjustable

## APPLICATION DIAGRAM FOR REMOTE SENSING OPERATION FOR ADJUSTABLE VERSION



## FUNCTIONAL DESCRIPTION

## ADJUSTABLE VERSION

The ADJUST pin shall be set at 1.225V with the adequate fraction of  $V_O$  generated by a resistive divider inserted between  $V_O$  and GND. The ADJ-GROUND resistor value must not be greater than 2.5 K $\Omega$ . For a given  $V_O$  the following holds:  
 $V_O = V_{ADJ}(1 + R_2/R_1)$ .

## OVERTEMPERATURE PROTECTION OPTION

The LHC4913 is protected by a junction-temperature detection circuit, turning the device "OFF" when the temperature attains 175°C. The recovery of the ON mode occurs with a hysteresis of 40 °C.

## OVERCURRENT PROTECTION

The device is equipped with a circuit having the purpose of limiting the maximum load current, in order to protect the output stage against possible overcurrent-related damages. Its threshold can be modified externally by means of a resistor put between the pins SH-CNTRL and  $V_I$ . For this characteristic, when the load current gets close to the above threshold, the regulation is inhibited. Thus, an excellent operation is granted only up to 66% of preset maximum current.

## SHORT CIRCUIT MONITORING / SIGNALLING

In the event of an overcurrent at the output, a voltage level of 0.4V is present at the OCM pin. In

others conditions, this voltage equals  $V_I$ .

## REMOTE SENSING FOR ADJ VERSION

As pointed out in the pin configuration plot,  $V_O$  and SENSE are not linked to each other in order to get a regulation with a load located far away from the chip. Under ordinary applications, the SENSE shall be connected to both  $V_{O1}$  &  $V_{O2}$ . To obtain the best performances it is recommended to be compliant with the configuration shown in the figure at top page.

What can degrade the regulation performances of this configuration is the variable voltage drop between the chip ground and the load termination  $V_L$ .

This is brought mostly by the current  $I_b$  coming from the output power base and going to ground through the driver stage. The degradation amount to  $(1 + R_2/R_1) \times R_{W1} \times I_{Bmax} + R_{W2} \times I_{Bmax}$

## APPLICATION INFORMATION

Recommended  $V_I = 12V$  Max,  $V_O = 1.225V$  Min.

The device is designed to operate with any  $V_I - V_O$  value according to above mentioned and thermal dissipation limits.

An input filtering capacitor of 100nF is always mandatory.

The two  $V_I$  pins shall always be connected in parallel, this applies also for the four  $V_O$  pins.

Device stability is granted in any circumstance with a 1 $\mu$ F output capacitor.

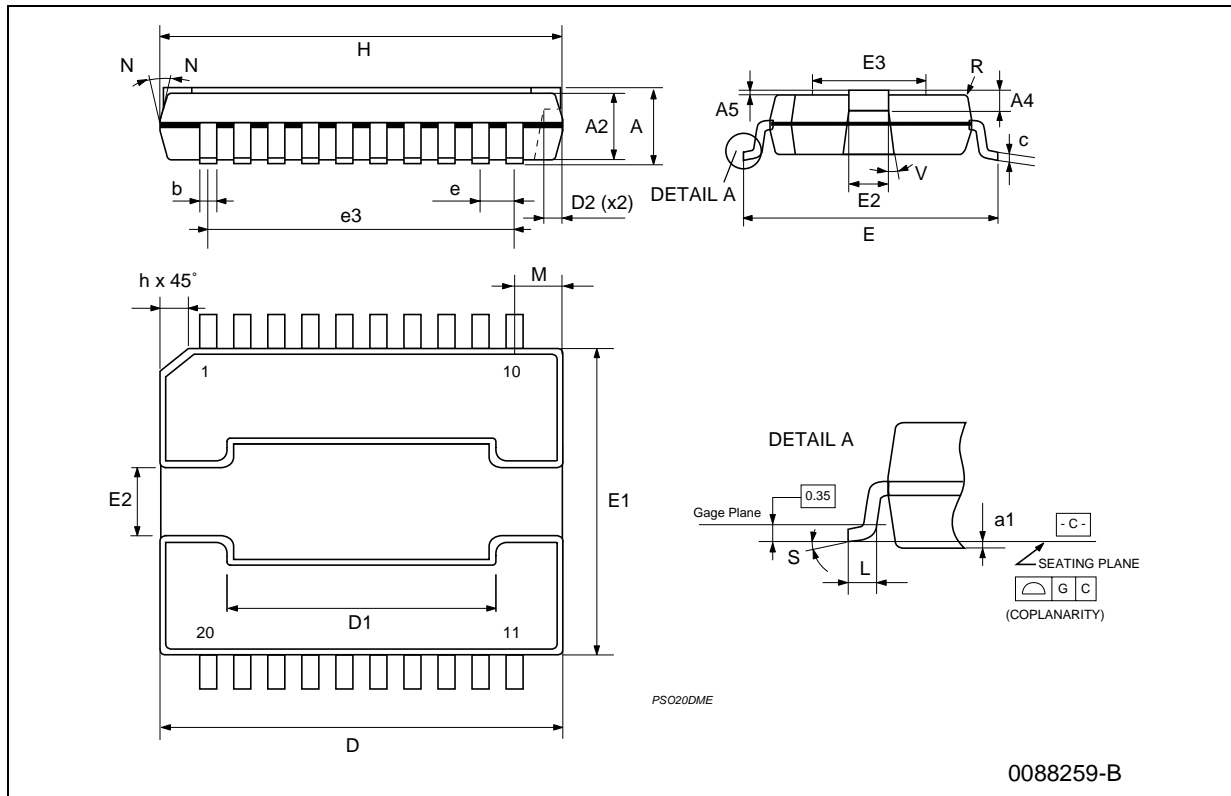
## LHC4913 SERIES

**ELECTRICAL CHARACTERISTICS** ( $T_J = 25^\circ\text{C}$ ,  $V_I = V_O + 2.5\text{V}$ ,  $V_O = 3\text{V}$ ,  $C_I = 0.1\mu\text{F}$ ,  $C_O = 1\mu\text{F}$  (tantalum), unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_I$	Input Voltage	$I_O = 3\text{A}$ $T_J = -55$ to $125^\circ\text{C}$	3		12	V
$V_O$	Output Voltage	$I_O = 5\text{mA}$ $T_J = -55$ to $125^\circ\text{C}$	2		2	%
		$I_O = 3\text{A}$ $T_J = -55$ to $125^\circ\text{C}$	1.22		9	V
$I_{\text{SHORT}}$	Output Current Limit	Adjustable		4		A
$\Delta V_O / \Delta V_I$	Line Regulation	$V_I = V_O + 2.5\text{V}$ to $12\text{V}$ , $I_O = 5\text{mA}$		0.1		%
$\Delta V_O / \Delta V_I$	Load Regulation	$I_O = 5\text{mA}$ to $3\text{A}$		0.4		%
$V_d$	Dropout Voltage	$I_O = 400\text{mA}$ $T_J = -55$ to $125^\circ\text{C}$		0.35	0.7	V
		$I_O = 1\text{A}$ $T_J = -55$ to $125^\circ\text{C}$		0.5	1	V
		$I_O = 2\text{A}$ $T_J = -55$ to $125^\circ\text{C}$		0.75	1.5	V
		$I_O = 3\text{A}$ $T_J = -55$ to $125^\circ\text{C}$		1	2	V
$I_d$	Quiescent Current	$V_I = V_O + 2.5\text{V}$ to $12\text{V}$ , $V_O = 1.22\text{V}$ $I_O = 5\text{mA}$ On Mode		1.6	4	mA
		$V_I = V_O + 2.5\text{V}$ to $12\text{V}$ , $V_O = 1.22\text{V}$ $I_O = 30\text{mA}$ On Mode		2.7	8	mA
		$V_I = V_O + 2.5\text{V}$ to $12\text{V}$ , $V_O = 1.22\text{V}$ $I_O = 300\text{mA}$ On Mode		11	24	mA
		$V_I = V_O + 2.5\text{V}$ to $12\text{V}$ , $V_O = 1.22\text{V}$ $I_O = 1\text{A}$ On Mode		32	64	mA
		$V_I = V_O + 2.5\text{V}$ to $12\text{V}$ , $V_O = 1.22\text{V}$ $I_O = 2\text{A}$ On Mode		64	130	mA
		$V_I = V_O + 2.5\text{V}$ to $12\text{V}$ , $V_O = 1.22\text{V}$ $I_O = 3\text{A}$ On Mode		94	200	mA
		$V_I = 12\text{V}$ $V_{\text{INH}} = 3\text{V}$ Off Mode		1.1		mA
SVR	Supply Voltage Rejection	$V_I = V_O + 2.5\text{V} \pm 0.5\text{V}$ , $I_O = 5\text{mA}$	$f = 120\text{Hz}$	70		dB
			$f = 33\text{KHz}$	50		
$V_{\text{INH(OFF)}}$	Turn Off Voltage	$T_J = 0$ to $125^\circ\text{C}$	2			V
		$T_J = -55$ to $0^\circ\text{C}$	2.4			V
$V_{\text{INH(ON)}}$	Turn On Voltage	$T_J = -55$ to $125^\circ\text{C}$			0.8	V
$I_{\text{INH}}$	Shutdown Input Current	$V_I = 12\text{V}$ $V_{\text{INH}} = 5\text{V}$		120		$\mu\text{A}$
$C_O$	Output Capacitance	$I_O = 5\text{mA}$ to $3\text{A}$		1		$\mu\text{F}$
ESR	Electrical Series Resistance	$I_O = 5\text{mA}$ to $3\text{A}$	2		6	$\Omega$
$V_{\text{OCML}}$	Overcurrent Monitor Voltage Low	$I_{\text{OCM}} = 10\text{mA}$ (sunked current) $V_I = 12\text{V}$		0.4		V
$V_{\text{OCMH}}$	Overcurrent Monitor Voltage High	$I_{\text{OCM}} = -10\mu\text{A}$ (sourced current)	$V_I = 5.5\text{V}$	5.4		V
			$V_I = 12\text{V}$	8.4		
eN	Output Noise Voltage	$B = 10\text{Hz}$ to $100\text{KHz}$ $I_O = 1\text{A}$		66		$\mu\text{Vrms/V}$

**PowerSO-20 Slug-up MECHANICAL DATA**

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	3.25		3.5	0.128		0.138
a1	3	3.15	3.3	0.118	0.124	0.130
A2			0.1			0.039
A4	0.8		1	0.031		0.039
A5	0.15	0.2	0.25	0.006	0.008	0.010
b	0.4		0.53	0.016		0.021
c	0.23		0.32	0.09		0.013
D	15.8		16	0.622		0.630
D1	9.4		9.8	0.370		0.386
D2		1			0.039	
E	13.9		14.5	0.547		0.571
e	1.12	1.27	1.42	0.044	0.050	0.056
e3		11.43			0.450	
E1	10.9		11.1	0.429		0.437
E2			2.9			0.114
E3	5.8		6.2	0.228		.0244
G	0		0.1	0.000		0.004
h			1.1			0.043
H	15.5		15.9	0.610		0.626
L	0.8		1.1	0.031		0.043
N			10°			10°
R		0.6			0.024	
S	0°		8°	0°		8°
V	5°		7°	5°		7°



Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

© The ST logo is a registered trademark of STMicroelectronics

© 2002 STMicroelectronics - Printed in Italy - All Rights Reserved  
STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - Canada - China - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco  
Singapore - Spain - Sweden - Switzerland - United Kingdom - United States.

© <http://www.st.com>