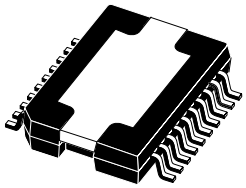
LHC4913 SERIES

3A POSITIVE LOW DROP VOLTAGE REGULATOR WITH INHIBIT FUNCTION

ADVANCE DATA

- LOW OUTPUT CAPACITANCE: 1µF
- LOW DROP VOLTAGE:
  0.5V @ I_O=1A
  1.5V @ I_O=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

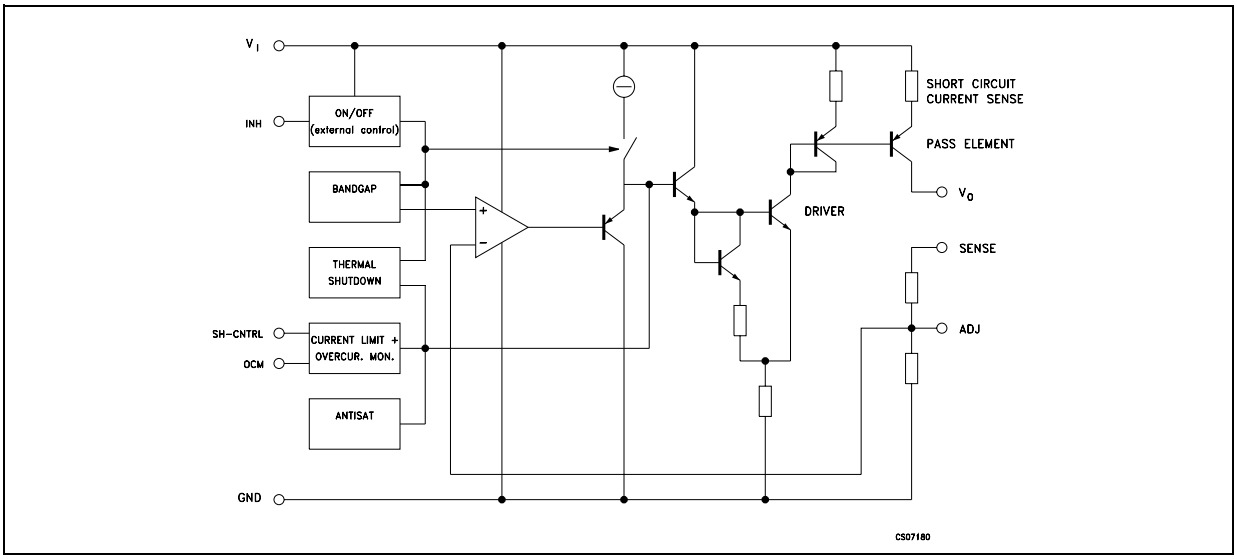


PowerSO-20 slug-up

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



ABSOLUTE MAXIMUM RATINGS

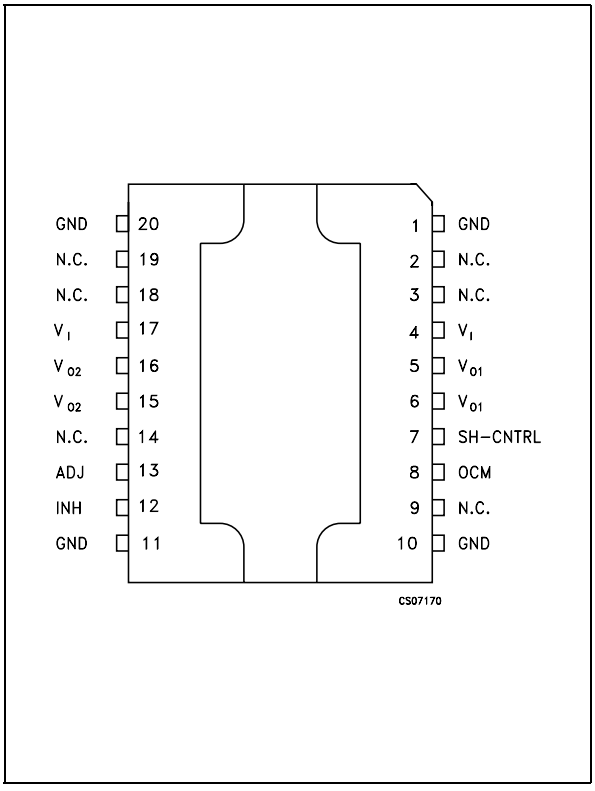
Symbol	Parameter	Value	Unit
V_I	DC Input Voltage	14	V
V_{INH}	INHIBIT Input Voltage	V_I + 0.5	V
I_O	Output Current	Internally limited	
P_{tot}	Power Dissipation	Internally limited	
T_{stg}	Storage Temperature Range	-40 to +150	°C
T_{op}	Operating Junction Temperature Range	-40 to +125	°C

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

THERMAL DATA

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

CONNECTION DIAGRAM (top view)



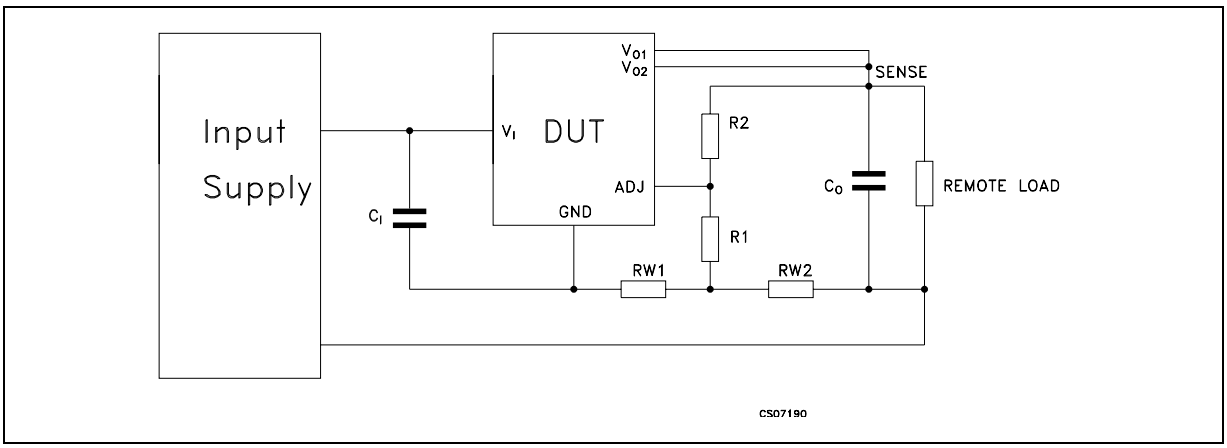
PIN DESCRIPTION FOR ADJUSTABLE VERSION

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 SENSINS OPERATION FOR ADJUSTABLE VERSION



FUNCTIONAL DESCRIPTION

ADJUSTABLE VERSION

The ADJUST pin shall be set at 1.225V with the adequated 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 KΩ. 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 hysteresys 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 Lv.

This is brought mostly by the current Ib 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 1µF output capacitor.

The device operation is guaranteed with any Vin-Vout dropout under the above thermal constraints.

Although two embedded protections first mentioned (the overtemperature and the overcurrent) ensure the L4913 integrity against any fault load condition, it is recommended to comply with the specified absolute maximum ratings also in applications involving fast switching of output currents.

To achieve this, a polyester capacitor of at least 470nF, put close to the regulator between input and ground, improves the L4913 reliability by

filtering the overvoltages spikes coming out during this particular operation.
To avoid undervoltages spikes leading both input and output well below ground, it is in addition recommended to put one reverse-biased Schottky diodes between output and ground.

ELECTRICAL CHARACTERISTICS (T_J = 25°C, V_I=V_O+2.5V, V_O=3V, C_I = 0.1µF, C_O = 1µF (tantalium), unless otherwise specified)

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
V_I	Input Voltage	I_O = 3A T_J= -55 to 125°C		3		12	V
V_O	Output Voltage	I_O = 5mA T_J= -55 to 125°C		2		2	%
		I_O = 3A T_J= -55 to 125°C		1.23		9	V
I_{SHORT}	Output Current Limit	Adjustable			3.8		A
$\Delta V_O/\Delta V_I$	Line Regulation	V_I = V_O+2.5V to 12V, I_O = 5mA			0.1		%
$\Delta V_O/\Delta V_I$	Load Regulation	I_O = 5mA to 3A			0.4		%
V_d	Dropout Voltage	I_O = 400mA T_J= -55 to 125°C			0.35	0.7	V
		I_O = 1A T_J= -55 to 125°C			0.5	1	V
		I_O = 2A T_J= -55 to 125°C			0.75	1.5	V
		I_O = 3A T_J= -55 to 125°C			1	2	V
I_d	Quiescent Current	V_I = V_O+2.5V to 12V, On Mode V_O = 1.23V I_O = 5mA			1.6	4	mA
		V_I = V_O+2.5V to 12V, On Mode V_O = 1.23V I_O = 30mA			2.7	8	mA
		V_I = V_O+2.5V to 12V, On Mode V_O = 1.23V I_O = 300mA			11	24	mA
		V_I = V_O+2.5V to 12V, On Mode V_O = 1.23V I_O = 1A			32	64	mA
		V_I = V_O+2.5V to 12V, On Mode V_O = 1.23V I_O = 2A			64	130	mA
		V_I = V_O+2.5V to 12V, On Mode V_O = 1.23V I_O = 3A			94	200	mA
		V_I = 12V V_{INH} = 3V Off Mode			0.3		mA
SVR	Supply Voltage Rejection	V_I = V_O+2.5V ± 0.5V, I_O = 5mA	f = 120Hz		70		dB
			f = 33KHz		50		
$V_{INH(OFF)}$	Turn Off Voltage	T_J= 0 to 125°C		2			V
		T_J= -55 to 0°C		2.4			V
$V_{INH(ON)}$	Turn On Voltage	T_J= -55 to 125°C				0.8	V
I_{INH}	Shutdown Input Current	V_I = 12V V_{INH} = 5V			120		µA
C_O	Output Capacitance	I_O = 5mA to 3A			1		µF
ESR	Electrical Series Resistance	I_O = 5mA to 3A		2		6	Ω
V_{OCML}	Overcurrent Monitor Voltage Low	I_{OCM} = 10mA (sinked current) V_I = 12V			0.4		V
V_{OCMH}	Overcurrent Monitor Voltage High	I_{OCM} = -10µA (sourced current)	V_I = V_O+2.5V		V_O+2.5		V
			V_I = 12V		12		
eN	Output Noise Voltage	B= 10Hz to 100KHz	I_O = 1A		66		µVrms/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°