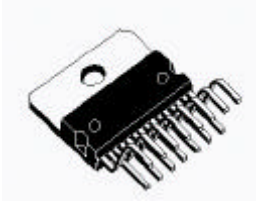
3 Amp Positive Low Drop VOLTAGE REGULATOR with Inhibit

FEATURES:

- x Low output capacitance: 1 µF
- x Low drop voltage: 0.5 volt @ Iout=1A and 1.5 V @ Iout=3A
- x Overtemperature protection
- x Overvoltage protection
- x Overcurrent protection
- x Output short circuit monitoring, signalled by TTL output
- x ON/OFF external control by means of TTL compatible input.
- x Adjustable current limitation protects outputs from damaging shortcircuits.
- x Remote sensing operation

Issue 2.1 July 2000 ***DRAFT from FT***

POWER SO-20 (SLUG-UP)

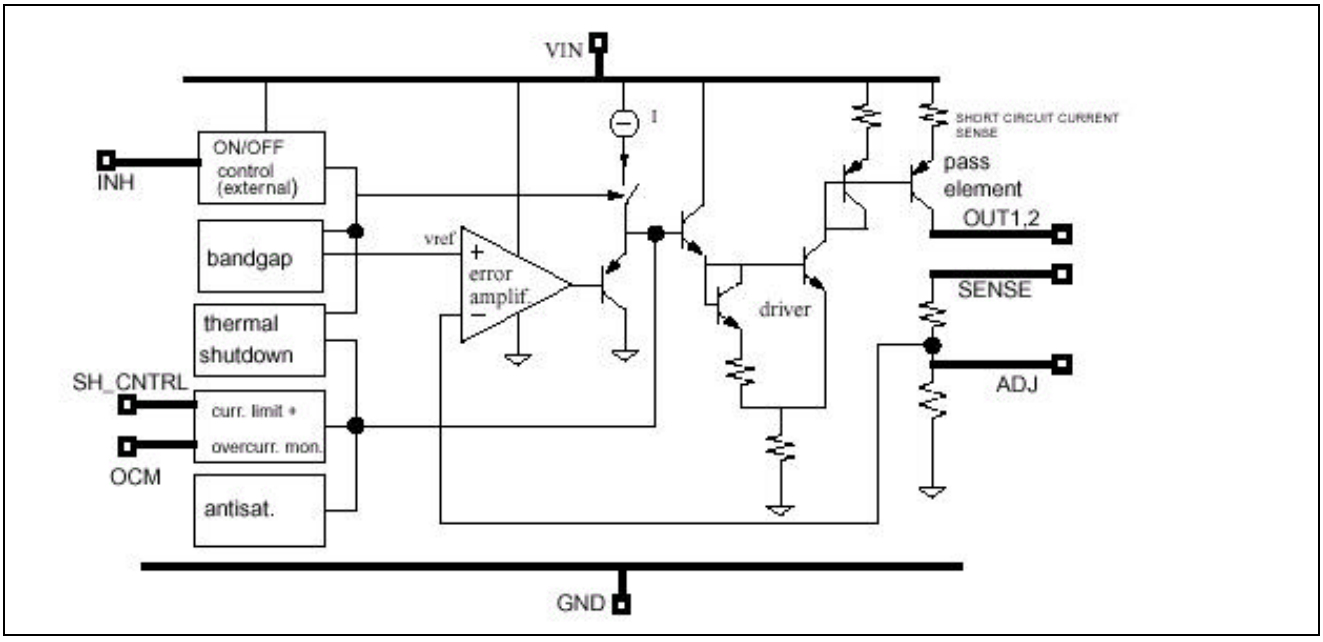


MULTIWATT-15

GENERAL DESCRIPTION:

The LHC4913 is a positive Voltage Regulator family including both fixed and adjustable versions. Housed into Multiwatt-15 and SO-20 slug-up, it is specifically intended for applications in rugged environments, such as Nuclear Physics, in which it will have 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 8.0 V. Input voltage ranges from 3 to 12 volts.

BLOCK DIAGRAM:



ABSOLUTE MAXIMUM RATINGS (Note1)

Symbol	Parameter	Value	Unit
Vi	DC input voltage	14	V
Io	Output current	internally limited	V
Ptot	Power dissipation	internally limited	W
Tstg	Storage temperature range	-40° to 150°	°C
Top	Operating junction temperature range	-40° to 125°	°C

Note 1. Exceeding one absolute maximum rating may damage the device.

THERMAL DATA

Symbol	Parameter	Value	Unit
Rthj-case	Thermal Resistance Junction-Case (SO-20)	2	°C/W
Rthj-case	Thermal Resistance Junction-Case (Multiwatt -15)	2	°C/W

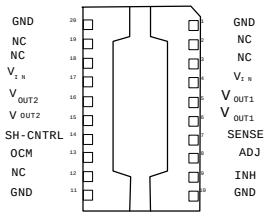
PIN CONFIGURATION:

Pin Number MULTIWATT-15	Pin Name	Pin Function
1	INH	INHIBIT
2	ADJ	ADJ (FOR ADJUSTABLE VERSION)
3	SENSE	SENSE OUTPUT
4	NC	NOT CONNECTED
5	V_{OUT1}	OUTPUT OF A HALF-POWER
6	NC	NOT CONNECTED
7	V_{IN}	SUPPLY (POSITIVE) VOLTAGE
8	GND	GROUND
9	NC	NOT CONNECTED
10	GND	GROUND
11	V_{OUT2}	OUTPUT OF A HALF-POWER
12	NC	NOT CONNECTED
13	SH-CNTRL	SHORT CIRCUIT VALVE CONTROLLING
14	OCM	SHORT CIRCUIT MONITORING
15	NC	NOT CONNECTED

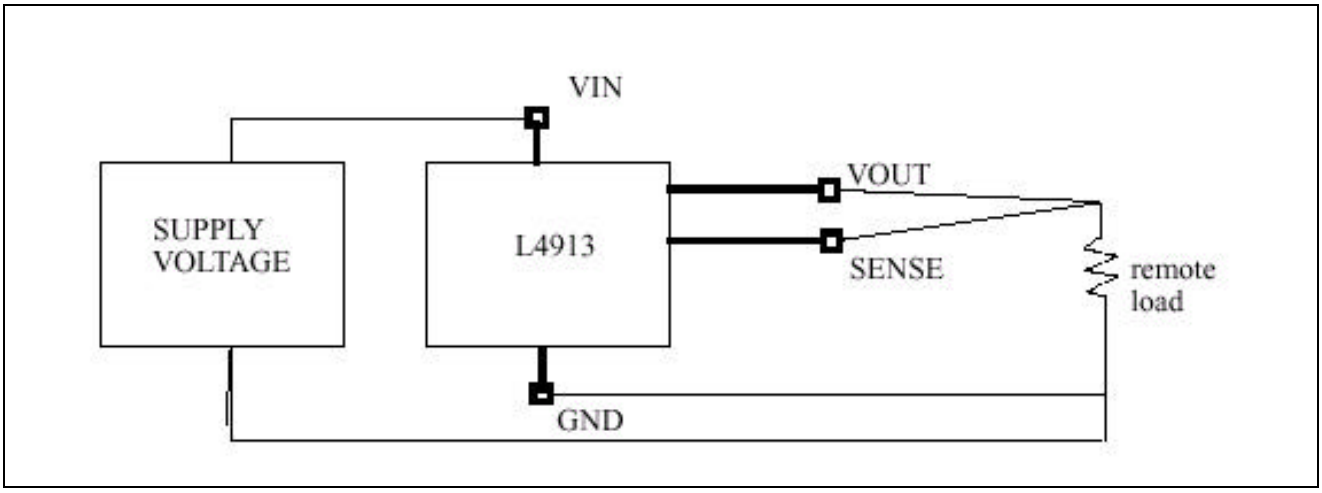
PIN CONFIGURATION:

Pin Number SO-20 slug-up	Pin Name	Pin Function
1	GND	GROUND
2	NC	NOT CONNECTED
3	NC	NOT CONNECTED
4	V_{IN}	SUPPLY (POSITIVE) VOLTAGE
5	V_{OUT2}	OUTPUT OF A HALF-POWER (right of Vin)
6	V_{OUT2}	OUTPUT OF A HALF-POWER (right of Vin)
7	SH-CNTRL	SHORT CIRCUIT VALVE CONTROLLING
8	OCM	SHORT CIRCUIT MONITORING
9	NC	NOT CONNECTED
10	GND	GROUND
11	GND	GROUND
12	INH	INHIBIT
13	ADJ	ADJ (FOR ADJUSTABLE VERSION)
14	SENSE	SENSE OUTPUT
15	V_{OUT1}	OUTPUT OF A HALF-POWER (left of Vin)
16	V_{OUT1}	OUTPUT OF A HALF-POWER (left of Vin)
17	V_{IN}	SUPPLY (POSITIVE) VOLTAGE
18	NC	NOT CONNECTED
19	NC	NOT CONNECTED
20	GND	GROUND

Power SO20 slug up



APPLICATION DIAGRAM FOR REMOTE SENSING OPERATION:



FUNCTIONAL DESCRIPTION:

x**ADJUSTABLE version:** The SENSE pin shall be connected to Voutput. The ADJUST pin shall be biased at 1.225volt with the adequated fraction of Vout generated by a resistive divider bridge set between Vout and GROUND. The ADJ-GROUND resistor value shall not be greater than 10 KΩ.

x**OVERTEMPERATURE Protection option:** The LHC4913 can be internally protected by a junction temperature detection circuit. The device becomes “OFF” when junction temperature exceeds100°C standard preset temperature, returning to “ON-mode” when below. The preset temperature limit is mask adjustable for custom versions between 100° to 175°C.

x**Optional OVERVOLTAGE Protection option:** Shall the Input voltage accidentally reaches the max preset standard 13.5volt Vin value, LHC4913 is automatically set “OFF” in order to protect it from low magnitude, **low slew rate** overvoltage excursions. The voltage limit is mask adjustable for custom versions.

x**OVERCURRENT Protection**: When Output current reaches the preset current limit, the Output current is automatically limited to preset limit, irrespective of Output voltage. Device excellent regulation is granted only up to 66% of preset Output current limit. The preset limit can be either the standard preset value (4.5A), or

i) a User mask adjusted value, or

ii) a User adjusted value by connecting an external resistor between Vin and SH_CNTRL:

A 100 KΩ resistor would reduce it down to 40% of the silicon preset value.

x**SHORT CIRCUIT MONITORING / SIGNALLING**. Whenever a short between output and ground happens, on the OCM terminal is present a voltage level of nearly 0.38 volt. In other cases this signal equals Vin .

x**REMOTE SENSING:** As pointed out in pin configuration plot, Vout and SENSE terminals are independent from each other, so to allow the load be far away from the regulator. Under ordinary applications, SENSE pin shall be connected to both Vout1 & Vout2. Please notice the necessity of independent “no-current” load ground connection.

APPLICATION INFORMATION:

x**Max recommended Vin is 12volts. Min Vout is 1.225v.** The device is designed to operate with any Vin-Vout value according to above mentioned and thermal dissipation limits.

x**An input filtering** capacitor of 100nF is always mandatory.

x**The two Vin pins and the two Vout pins shall always be connected in parallel.**

xDevice stability is granted in any circumstance with a 1000nF output capacitor.

x**LHC4913 is built with high speed technology**: PCB lay-out shall be made with very low industance lines otherwise high frequency parasitic signals can be caugth, triggering self oscillations. At high output currents, a 100nF capacitor between SENSE and ADJ pins prevents oscillations.

ELECTRICAL CHARACTERISTICS:

Unless otherwise specified , Vin = Vout + 2.5 V, Tj =25°C, Cin = 0.1 μF, Cout = 1μF

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Vin	Operating input voltage	Iout = 3A , 10° C < Temp <70° C	3		12	V
Vout	Output voltage accuracy	Vin = Vout + 2V, Iout =5mA 10°C < Tj < 70° C	-2		2	%
Vout	Operating output voltage	Iout= 3A 10°C < Tj < 70° C	1.25		9	V
Ishort	Output current limit	Adjustable		4.5		A
$\Delta Vo/VoI_{Li}$	Line regulation	Vout +2.5 <Vin <12 volt Iout=5mA		0.1		%
$\Delta Vo/VoI_{Lo}$	Load regulation	Vin =Vout +2.5V 5mA < Iout <3A		0.2		%
Zout	Output impedance	Iout =100 mA DC and 20 mArms		100		mΩ
Iq	Quiescent Current	Vout + 2.5 < Vin < 12 V , On mode Iout= 0 mA		2		mA
		Vout + 2.5 < Vin < +12 V, On mode Iout = 30 mA		4	8	
		Vout + 2.5 < Vin < +12 V, On mode Iout = 300 mA		12	24	
		Vout + 2.5 < Vin < 12 V, On mode Iout = 1 A		30	60	
		Vout + 2.5 < Vin < 12 V, On mode Iout = 2 A		70	130	
		Vout + 2.5 < Vin < 12 V, On mode Iout = 3 A		110	200	
		Off mode; Vinh > 2 V ; Vin = Vout + 2 V		0.13		
Vd	Dropout voltage	Iout= 400 mA, 10°C < Tj < 70°C		0.25	0.4	V
		Iout= 1 A, 10°C < Tj < 70° C		0.5	0.65	
		Iout = 2 A 10°C < Tj < 70° C		1	1.3	
		Iout =3 A, 10°C < Tj < 70° C		1.5		
V_{INH} V_{INH},Off V_{INH},On	Inhibit voltage turn,Off voltage	10°C < TJ < 70°C	2			V
	turn-On voltage				0.8	
SVR	Supply voltage rejection	Vin=Vout +2 ±1 V I_{OUT} =5mA f=120 Hz f= 33 Khz		 60 30		dB
I_{INH}	Shutdown input current	V_{INH} = 5 volts		15		μA
Cout	Output capacitance	Iout=0 to 3A		1		μF
V_{OCM}	Overcurrent monitor voltage	I_{OCM} = 24 mA (sinked current)		0.36		V
e_N	Output noise voltage	10Hz < freq < 100 Khz Iout= 5mA to 3 A		300		μV_{rms}