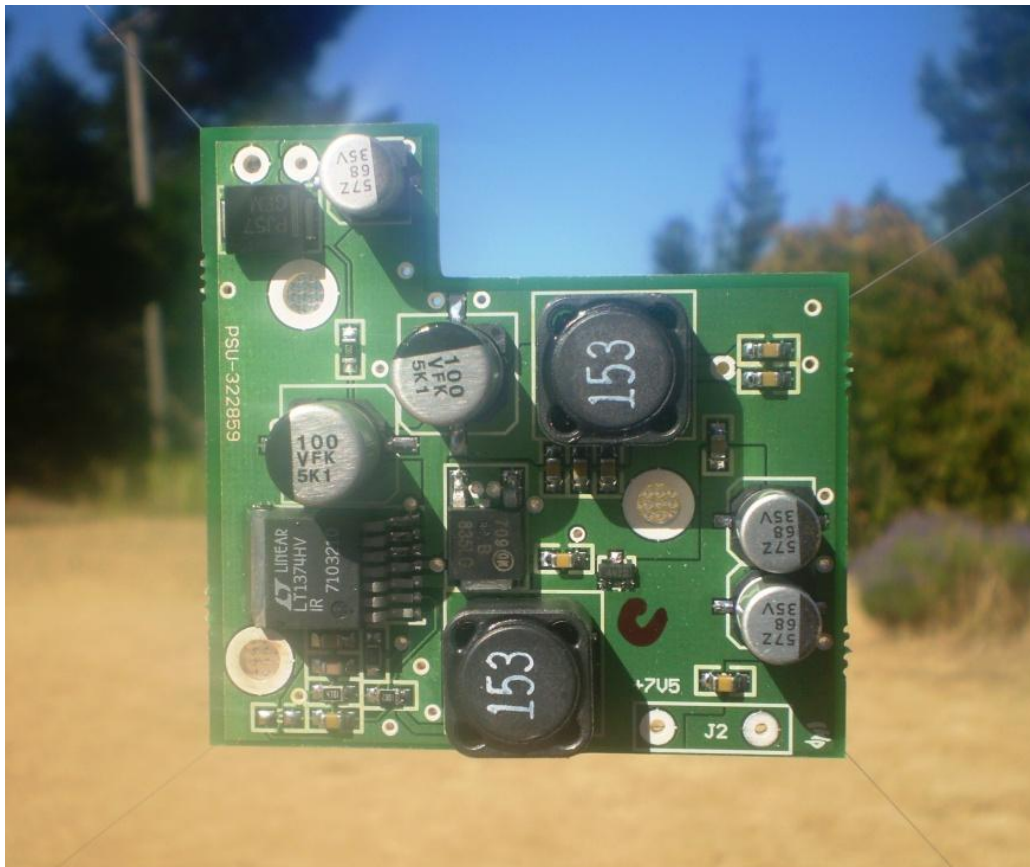


DC-DC converter manual © (PSU-322859)
Input voltage 10 to 28Volt
Output voltage 7.5 Volt



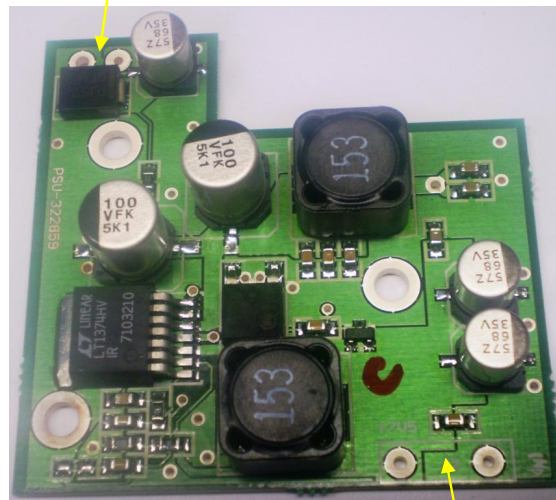
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1 Summary:

Described in this manual is the Rotronix Ltd propriety DC-DC converter. The DC-DC converter is designed especially to power a Motorola Professional Portable Radio. The DC-DC converter is a high efficient 500 kHz monolithic buck-mode switching regulator.

Input, 10 to 28 Volts



Output, 7.5 Volts

2 Introduction:

This manual provides information about the DC-DC converter, Part-number PSU-322859. The DC-DC converter is build around the LT1374 switching regulator from Linear Technology.

2.1 ASSOCIATED MOTOROLA PROPRIETY DOCUMENTATION:

Motorola service manual : (Part No: 6804110J64-H)

2.1.1 LT1374 DATASHEET:

<http://www.linear.com/pc/downloadDocument.do?navId=H0,C1,C1003,C1042,C1032,C1064,P1620,D5227>

2.2 SUPPORTED PORTABLE RADIOS:

GP140, GP320, GP328, GP329, GP338, GP339, GP340, GP360, GP380, GP640, GP680, GP1280, HT750, HT1250, HT1250LS, HT1550XLS, MTX850, MTX850LS, MTX900, MTX950, MTX960, MTX8250, MTX8250LS, MTX9250, PR860, PRO5150, PRO5350, PRO5450, PRO5550, PRO5750, PRO7150, PRO7350, PRO7450, PRO7550, PRO7750, PRO9150, PTX700, PTX760, PTX780 .

2.3 PUBLICATION RECORD:

Issue	Publication Date	Author	Description
1.01	December 2008	Hans de Roode	First issue

2.4 ALERT NOTICES:

Within this manual, four types of alerts are given to the reader: warning, caution, important and note. The following paragraphs illustrate each type of alert and its associated symbol.



Warning!!

This alert is used when there is a potential risk of death or serious injury.



Caution

This alert is used when there is the risk of minor or moderate injury to people.



Important

This alert is used to warn about the risk of equipment damage or malfunction.



Note

This alert is used to highlight information that is required to ensure that procedures are performed correctly.

2.5 CONTACT DETAILS:

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Technical hans@rotronix.co.nz

2.6 COPYRIGHT:

Copyright protects original works, regardless of whether the work is published or unpublished. Under the Copyright Act 1994, copyright automatically applies as soon as the work is put into material form, whether in print, stored on computer or recorded in some way. As a signatory to the Berne convention, New Zealand protects the rights of copyright owners from other countries in the same way it does for our own copyright owners. It is unlawful to copy all or part of this manual without a license or without approval from the copyright owner, unless there is a statutory exception to such infringement.

2.6 ABBREVIATIONS

Abbreviation	Description
3DK	Third-Party Developer's Kit
ASCII	American Standard Code for Information Interchange
AVL	Automatic Vehicle Location
CCRI	Computer Controlled Radio Interface
CRC	Cyclic Redundancy Check
CTCSS	Continuous Tone Coded Squelch System
CTS	Clear to Send
DC	Direct current
DCE	Data Circuit-Terminating Equipment
DCS	Data Carrier System
DTE	Data Terminal Equipment
DTMF	Dual Tone Multi-Frequency
FEC	Forward Error Correction
FFSK	Fast Frequency Shift Keying
GPIO	General Purpose Input/Output
IPN	Internal Part Number
LED	Light-Emitting Diode
MSD	Most Significant Digit
MPPR	Motorola Professional Portable Radio
NMEA	National Marine Electronics Association standard. Combined electrical and data specification for communication between marine electronics and GPS
IOB	Interface Option Board
PC	Personal Computer
PTT	Press To Talk
PCB	Printed Circuit Board
PROIS	Motorola proprietary Professional Radio Option Interface Specification
RMC	Recommended Minimum sentence C. NMEA GPS message type for the minimum recommended
RTS	Request to Send
Rx	Receive mode
RXD	Receive Data
SDM	Short Data Message
SMC	Switched Mode Converter (12 to 7.5V)
TX	Transmit mode
TXD	Transmit Data
UART	Universal Asynchronous Receiver -Transmitter
XON	Data Transmitter On
XOFF	Data Transmitter Off
ZIF	Zero Insertion Force Connector

3 Technical description:

3.0 DC-DC CONVERTER

The DC-DC converter consists of the following components :

- Printed Circuit Board (PCB)
- LT1374 Switching Regulator
- Filtering
- Input protection

3.1 PRINTED CIRCUIT BOARD (PCB)

The PCB has Trough-Hole Plating and electrical tracks on the bottom and top of the PCB, and has the following dimensions:
56 mm long X 54 mm wide.

3.2 LT1374 SWITCHING REGULATOR:

The LT®1374 is a 500 kHz monolithic buck-mode switching regulator. A 4.5A switch is included on the die along with all the necessary oscillator, control and logic circuitry. High switching frequency allows a considerable reduction in the size of external components. The topology is current mode for fast transient response and good loop stability. Both fixed output voltage and adjustable parts are available. A special high-speed bipolar process and new design techniques achieve high efficiency at high switching frequency. Efficiency is maintained over a wide output current range by using the output to bias the circuitry and by utilizing a supply boost capacitor to saturate the power switch. The LT1374HVIR is used, this has a maximum input voltage of 32 Volt and has a temperature range of – 40°C to 125°C in a 7-LEAD PLASTIC DD package. Full cycle-by-cycle short-circuits protection and thermal shutdown is provided. Standard surface mount external parts are used, including the inductor and capacitors.

3.3 FILTERING:

The DC-DC converter operates on a frequency near 500 kHz, the exact frequency depends on the load, temperature and input voltage. Because of the high frequency it is relatively easy to filter the input and output voltages from switching noise. Particular care has been given to the input filter because most switching noise is produced on the input of the DC-DC converter. The filter consists of C16, C23, and C27 to filter the high frequency noise (fundamental and higher harmonics.) C14 and C15 act as energy buffers. C31, C11 and inductor L2 make a low pass filter towards the power - supply.

This filter reduces the switching noise on the input of the DC-DC converter from 500 mV to 20 mV under full load (4 Amp.)

A "of the board" ferrite inductor on the output of the DC -DC converter is added to stop the 500 kHz signal from entering the radio and frequency modulating the transmitter VCO.

3.4 INPUT PROTECTION:

A Transient diode on the input of the DC -DC converter protects the converter from supply voltage spikes, e.g. a lightning discharge. If the input voltage exceeds 33 Volt, the Transient diode starts to conduct, if a reversed voltage is applied then the Transient diode acts like a normal diode, in both cases it will blow the "of the board" fuse. This diode can dissipate 1500 Watt for 1 mS.

3.5 OUTPUT VOLTAGE:

The output voltage is set with the resistors R37 and R38, which is a voltage divider from the output voltage to the internal reference voltage (2.24 Volt).

The output voltage is set to 7.5 Volts

The output voltage can be calculated with the following formula:

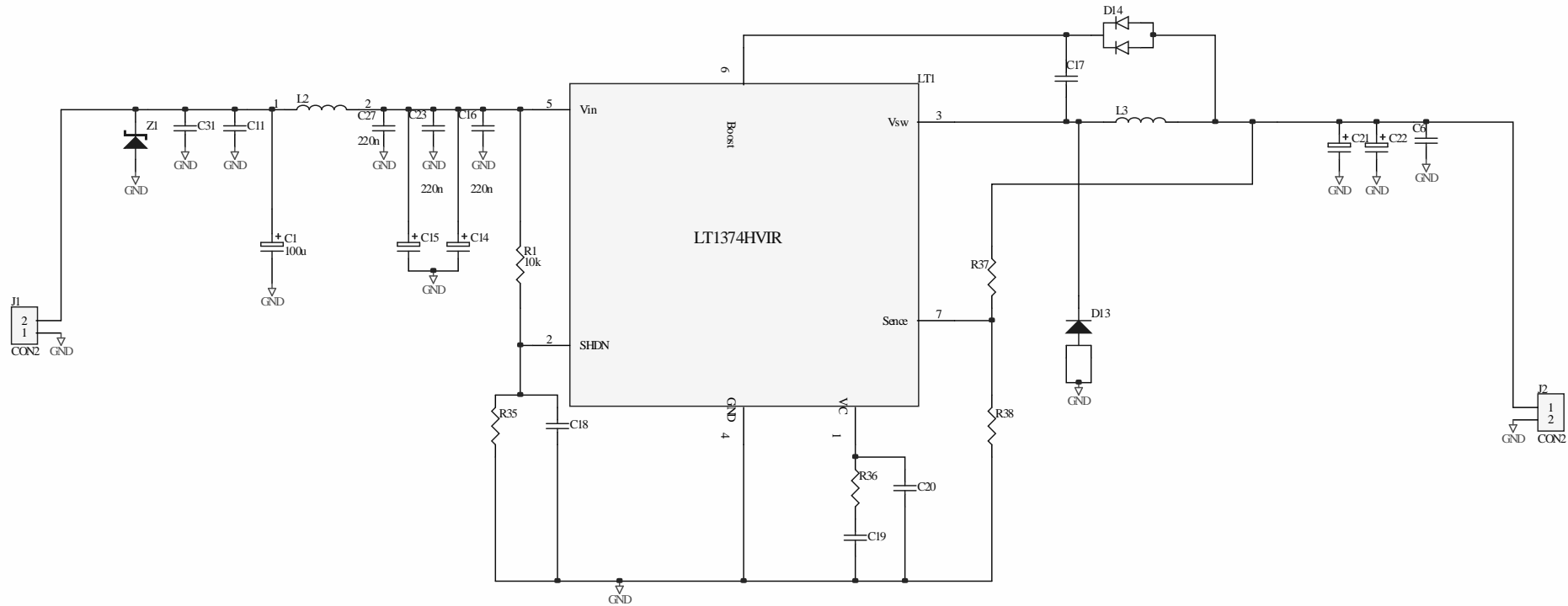
$$V_{out} = (2.42(R37+R38))/R37$$

Output Voltage stability is 7.5 Volt plus or minus 0.2 Volt between no load and full load (4 Amp.)

Output Voltage accuracy is 7.5 Volts plus or minus 3%.

4 Bill of materials, Schematics, PCB layout:

Designator	Footprint	Comment
C1	2220	100u
C6	0805	220n
C11	0805	470n 757-688
C14	2220	100u 35V
C15	2220	100u 35V
C16	0805	220n
C17	0805	220n
C18	0805	220n
C19	0805	2n2
C20	0805	470pF
C21	2220	100u 35V
C22	2220	100u 35V
C23	0805	220n
C27	0805	220n
C31	0805	470n 757-688
D13	Dpak	DIODE_DPAK
D14	SOT-23	bav70
J1	molex02	CON2
J2	GP328batt	CON2
L2	coilcraft 10u	10u
L3	coilcraft 10u	10u
LT1	LT1374	LT1374
R1	0805	10k
R35	0805	N/U
R36	0805	3K3
R37	0805	10k
R38	0805	4k7
Z1	SMC	Transil 33V



Title		
Switch mode regulator 8V4 4.5Amp		
Size	Number	Revision
B	03-01-002	0
Date	Sheet of	2 of 2
15/12/2008	2	
File	Drawn By:	HDR
C:\99SE\...LT1374_V2.sch		

