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HE104-75W Manual

High Efficiency
Vehicle Power Supply
DC to DC Converter

Manufactured by
TRI-M ENGINEERING
Engineered Solutions for Embedded Applications

Technical Manual

P/N: HE104-75W MAN

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TRI-M Technologies Inc.
#101 1530 Kingsway
Port Coquitlam, BC V3C 6N6
Canada
http://www.Tri-M.com
Tel 604.945.9565
North America 800.665.5600
Fax 604.945.9566

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PREFACE

This manual is for integrators of applications of embedded systems. It contains information on hardware requirements and interconnection to other embedded electronics.

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CHAPTER 1 INTRODUCTION

1.1 GENERAL DESCRIPTION

The HE104-75W is a high efficiency, high performance DC-to-DC converter that supplies +5V, +12V & -12V outputs to the PC/104 bus. The HE104-75W is designed for low noise embedded computer systems, has a wide input range of 6-40V(>6:1) and is ideal for battery or unregulated input applications. The HE104-75W is specifically designed for vehicular applications and has heavy-duty transient suppressors (9000W on main input) that clamp the input voltage to safe levels, while maintaining normal power supply operation.

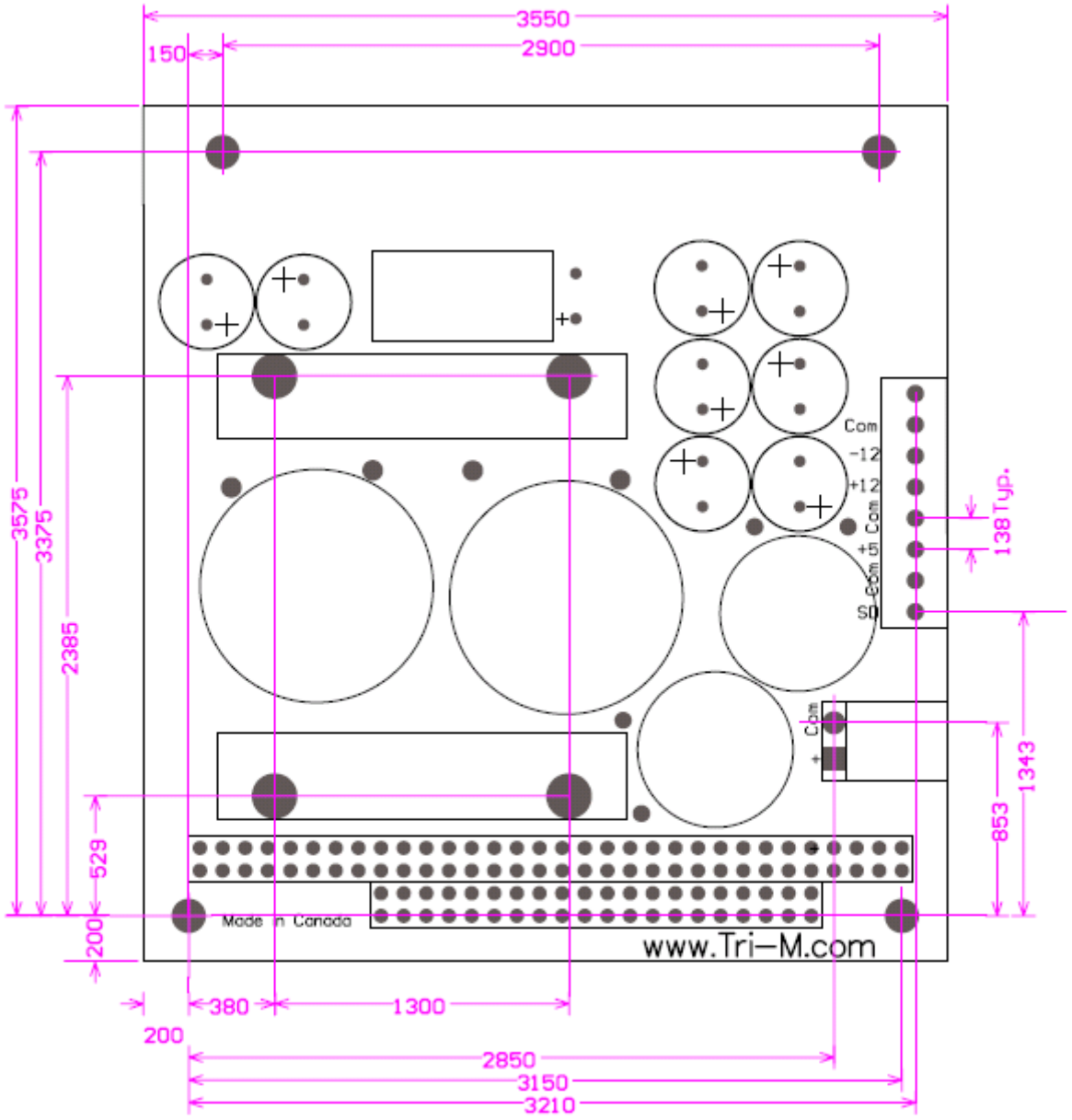
The HE104-75W is a state-of-the-art Mosfet based design that provides outstanding line and load regulation with efficiencies up to 90 percent. Organic Semiconductor Capacitors provide filtering that reduces ripple noises below 20mV. The low noise design makes the HE104-75W ideal for use aboard aircraft or military applications or wherever EMI or RFI must be minimized. The +5VDC and +12VDC outputs are controlled by a constant frequency architecture regulator that provides excellent line and load transient response.

The HE104-75W has an opto-coupled on/off input (SD) to control the outputs of the HE104-75W. To enable the HE104-75W outputs, a 6 to 40V signal must be connected to the SD input. If remote control is not required, the SD input can be connected to the main power input. The common for the remote 6 to 40V signal must be connected to the HE104-75W common. If the SD input is connected directly to the main input power connector, the common for the SD input is already done.

1.2 FEATURES

- DC to DC converter for embedded applications.
- 9000 watt “Load Dump” transient suppression on input power supply.
- Operates from 6VDC to 40VDC input.
- PC/104 compliant.
- 5V, 12V, -12V outputs.
- Temperature range -40 to 85C.
- Opto-coupled input for remote control of the outputs.

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HE104-75W Mechanical

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Note: All dimensions in mils (1000mils = 1 inch)

1.3 SPECIFICATIONS

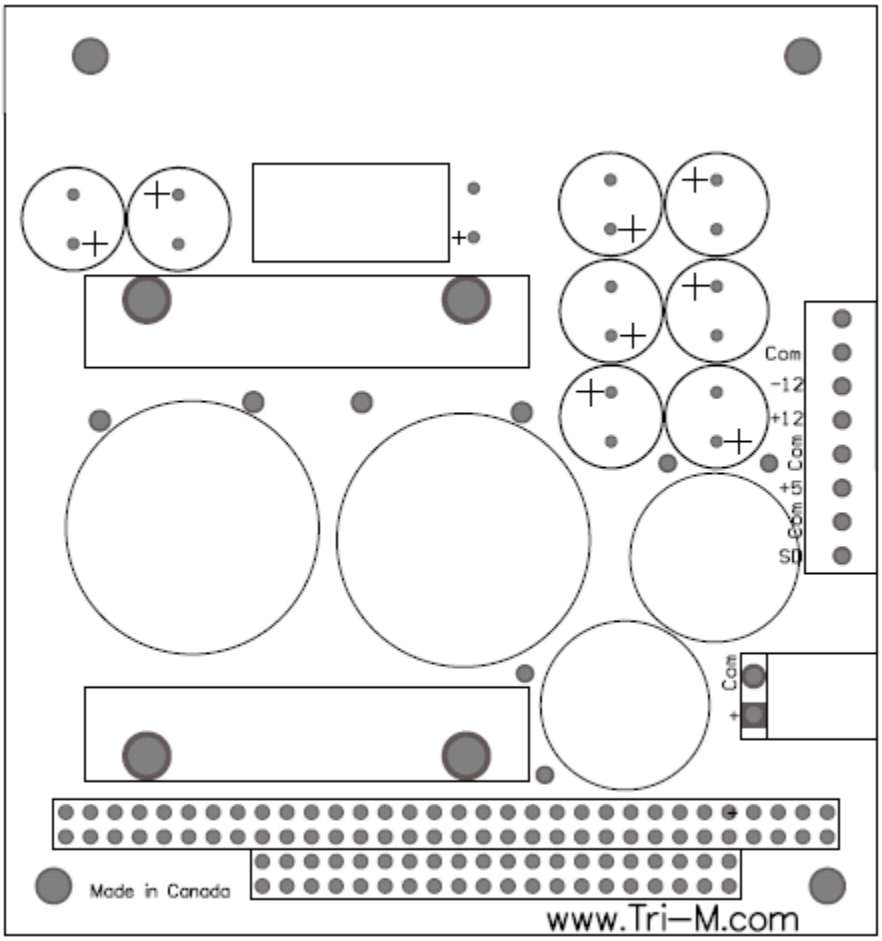
Power Supply Specifications	
Model	**HE104-75W**
5V output	15A
12V output	3A
-12V output	0.5A
Input Voltage Range	6 to 40V
Load Regulation (5V output)	< 60mV
Line Regulation (5V output)	40mV
Output temp. drift (5V output)	< 40mV
Switching Freq.	300kHz
Max. Input Transient	125V for 250msec
Output Ripple (5V output)	< 20mV
Conducted Susceptibility (5V output)	> 57db
Efficiency (5V output)	Up to 90%
Temp. Range	-40 to 85C *1
Size, PC/104 size & mounting holes with PC/104 bus	3.55”W. x 3.75”L. x 0.6”H.

*1 As measured on the heat sink/spreader

CHAPTER 2 CONFIGURATION AND INSTALLATION

2.1 Introduction

This chapter describes the configuration and installation of the HE104-75W power supply. In addition, section 2.2 provides a formula to calculate the available +5VDC. Figure 2-1 shows the HE104-75W connectors.



CN4-1: Not Used
CN4-2: Common
CN4-3: -12VDC output
CN4-4: +12VDC output
CN4-5: Common
CN4-6: +5VDC output
CN4-7: Common
CN4-8: SD, Shut Doun input

CN2-2: Common
CN2-1: Main Power input, 6-40VDC

PC/104
Connector CN1

2.2 Power Considerations.

The +5V switching regulator is rated at 15A maximum output, however the +5V output supplies power to the +12, and -12VDC regulators. To obtain the usable range of +5V output, "derate" according to the use of +12, -5, and -12VDC. Use the following formulae to calculate the maximum usable output.

$$U_{+5Vs} = 15A - \frac{(I[-12] * 2.4) + (I[12] * 2.4)}{0.9}$$

Where: I[-12] = -12VDC current load
I[12] = 12VDC current load
Assuming 90 percent converter efficiency (actual efficiency may vary).

2.3 Main (CN2) Input Power Connector

Input power is connected to the HE104-75W by removable connector blocks CN2. The power supply accepts DC input voltages in the range of 6VDC to 40VDC.

Unregulated vehicle power is connected as follows:

- Terminal 1:"hot" polarity (6-40VDC)
- Terminal 2: Common (0VDC)

2.4 Output (CN4) Power Connector

Output power is available for use via connector block CN4 and is applied directly to the power and ground connections on the PC/104 bus (refer to 2.2.3 for a listing of power and ground connections on the PC/104 bus).

Note: SD is an opto-coupled input signal used to turn on/off the outputs. To enable the HE104-75W outputs, a 6 to 40V signal must be connected to the SD input. If remote control is not required, the SD input can be connected to the main power input. The common for the remote 6 to 40V signal must be connected to the HE104-75W common. If the SD input is connected directly to the main input power connector, the common for the SD input is already done.

CN4 Connections
- CN4-1: Not populated
- CN4-2: Common
- CN4-3: -12VDC output
- CN4-4: +12VDC output
- CN4-5: Common
- CN4-6: +5VDC output
- CN4-7: Common
- CN4-8: SD (i.e. maintained contact closure)

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2.5 PC/104 Bus Connector

The table below lists the pins used by the HE104-75W for power and ground on the PC/104 bus.

Pin #	Signal	Pin #	Signal	Pin #	Signal	Pin #	Signal
A1	Not Used	B1	GND	C0	GND	D0	GND
A2	Not Used	B2	Not Used	C1	Not Used	D1	Not Used
A3	Not Used	B3	+5V	C2	Not Used	D2	Not Used
A4	Not Used	B4	Not Used	C3	Not Used	D3	Not Used
A5	Not Used	B5	Not Used	C4	Not Used	D4	Not Used
A6	Not Used	B6	Not Used	C5	Not Used	D5	Not Used
A7	Not Used	B7	-12V	C6	Not Used	D6	Not Used
A8	Not Used	B8	Not Used	C7	Not Used	D7	Not Used
A9	Not Used	B9	+12V	C8	Not Used	D8	Not Used
A10	Not Used	B10	Not Used	C9	Not Used	D9	Not Used
A11	Not Used	B11	Not Used	C10	Not Used	D10	Not Used
A12	Not Used	B12	Not Used	C11	Not Used	D11	Not Used
A13	Not Used	B13	Not Used	C12	Not Used	D12	Not Used
A14	Not Used	B14	Not Used	C13	Not Used	D13	Not Used
A15	Not Used	B15	Not Used	C14	Not Used	D14	Not Used
A16	Not Used	B16	Not Used	C15	Not Used	D15	Not Used
A17	Not Used	B17	Not Used	C16	Not Used	D16	+5V
A18	Not Used	B18	Not Used	C17	Not Used	D17	Not Used
A19	Not Used	B19	Not Used	C18	Not Used	D18	GND
A20	Not Used	B20	Not Used	C19	Not Used	D19	GND
A21	Not Used	B21	Not Used				
A22	Not Used	B22	Not Used				
A23	Not Used	B23	Not Used				
A24	Not Used	B24	Not Used				
A25	Not Used	B25	Not Used				
A26	Not Used	B26	Not Used				
A27	Not Used	B27	Not Used				
A28	Not Used	B28	Not Used				
A29	Not Used	B29	+5V				
A30	Not Used	B30	Not Used				
A31	Not Used	B31	GND				
A32	GND	B32	GND				

2.6 LED Enable/Disable

There are no jumpers on the HE104-75W to disable the LED. If the LEDs must be disabled then the current limiting resistor can be easily removed. The HE104-75W can be factory ordered in this configuration for OEM quantities. Please contact Tri-M sales for details.

2.7 Connector Part Numbers

Description	Part Number	Manufacturer	Part Location
2Pos Plug, MOLEX 0.156"	09-50-8021-P	MOLEX	Plug for CN2
CRIMP TERMINAL, 24-18AWG .156"	08-50-0106	MOLEX	Crimps for CN2

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