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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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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

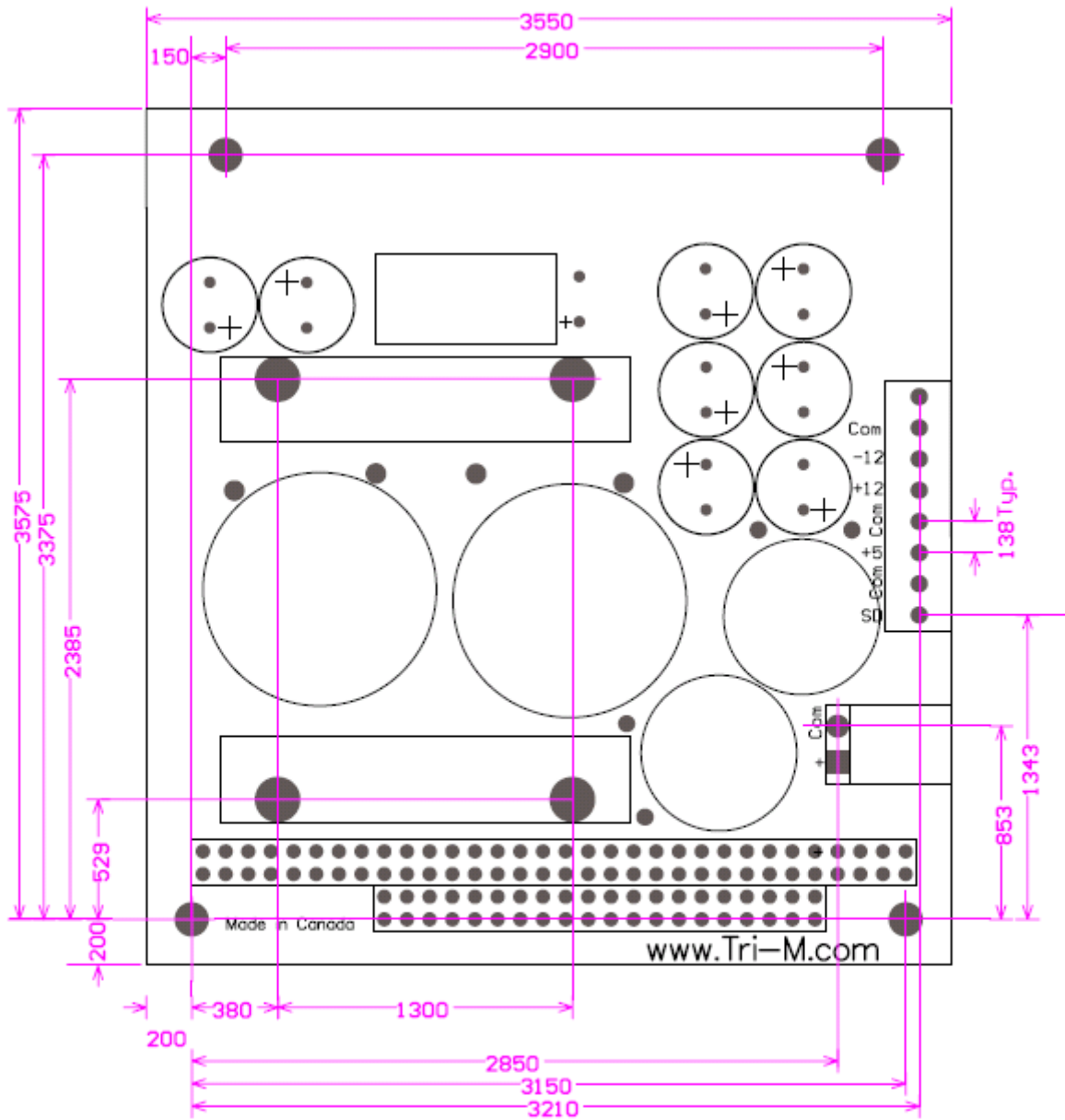
The HE104-75W is a high efficiency, high performance DC-to-DC converter that supplies +5V, +12V & -12V outputs to the PC/104 bus. The HE104-75W is designed for low noise embedded computer systems, has a wide input range of 6-40V(>6:1) and is ideal for battery or unregulated input applications. The HE104-75W 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.



HE104-75W Mechanical
www.Tri-M.com

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

1.3 SPECIFICATIONS

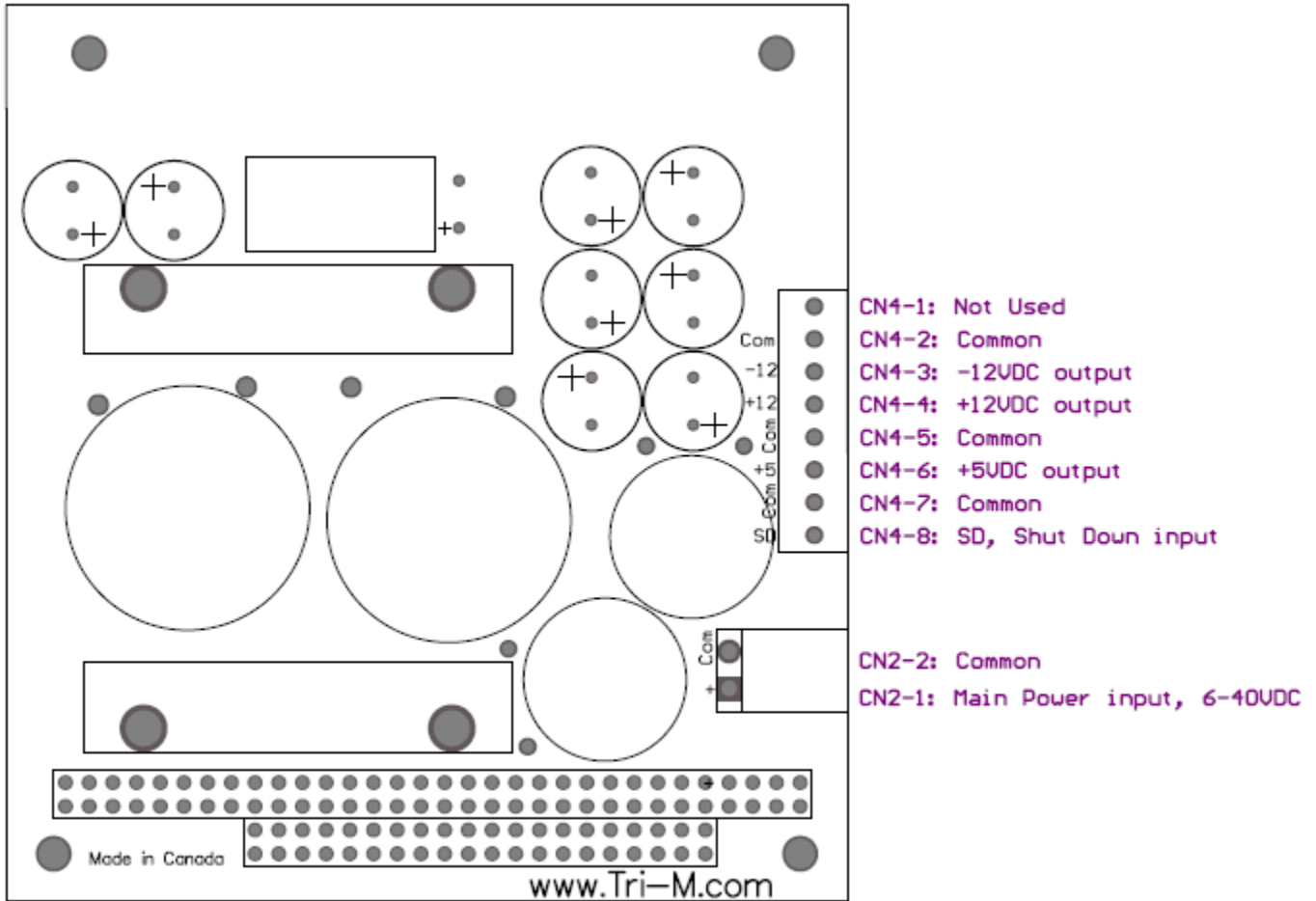
| Power Supply Specifications | |
|----------------------------------------------------|----------------------------|
| Model | HE104-75W |
| 5V output | 15A |
| 12V output | 3A |
| -12V output | 0.5A |
| Input Voltage Range | 6 to 40V |
| Load Regulation (5V output) | < 60mV |
| Line Regulation (5V 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.



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.

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

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)

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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