HE-HP2 Manual

High Efficiency
Vehicle Power Supply
DC to DC Converter

Manufactured by
TRI-M ENGINEERING
Engineered Solutions for Embedded Applications

Technical Manual

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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 HE-HP2 is a high efficiency, high performance DC to DC 100 watt converter that supplies +5V and +12V outputs. The HE-HP2 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 HE-HP2 is specifically designed for vehicular applications and has three heavy-duty transient suppressors (providing 9000W of protection) on each of the main and secondary power inputs that clamp the input voltage to safe levels, while maintaining normal power supply operation.

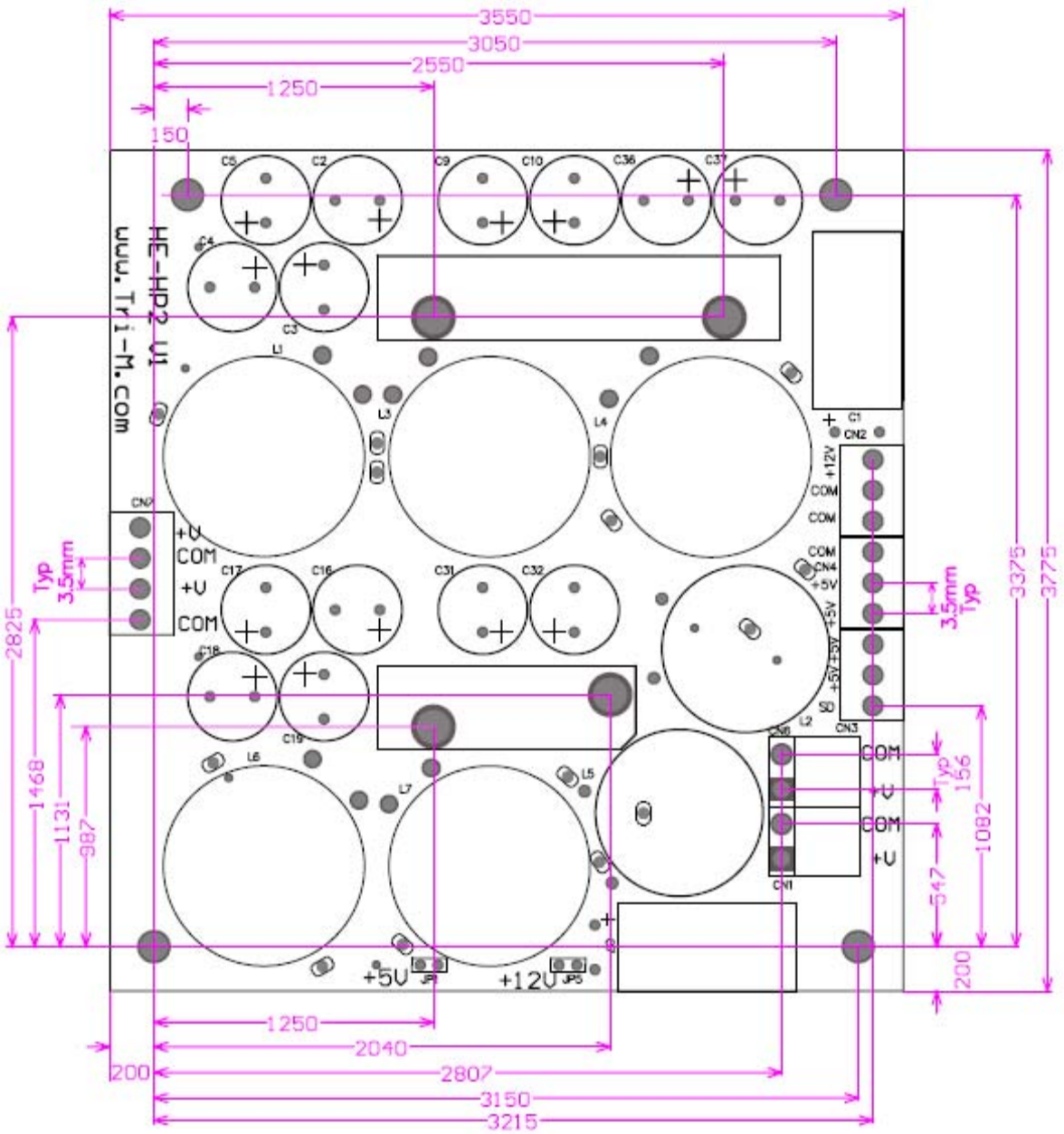
The HE-HP2 is a state-of-the-art Mosfet based design that provides outstanding line and load regulation with efficiencies up to 90 percent. Organic Semiconductor Capacitors provide filtering that reduces ripple noises below 20mV. The low noise design makes the HE-HP2 ideal for use aboard aircraft or military applications or wherever EMI or RFI must be minimized. The +5VDC and +12VDC outputs are controlled by a constant off-time current-mode architecture regulator that provides excellent line and load transient response.

The HE-HP2 has an opto-isolated on/off input (SD), allowing for remote control.

The HE-HP2 has a PC/104 footprint with PC/104 mounting holes. All generated voltages are provided to a connector block.

FEATURES

- DC to DC converter for embedded applications.
- “Load Dump” transient suppression on input power supply.
- Operates from 6VDC to 40VDC input.
- PC/104 size and mounting holes.
- 100 watt power supply outputs.
- 5V and 12V outputs.
- Temperature range -40 to 85C.
- Opto-isolated input for remote operation.



1.2 SPECIFICATIONS

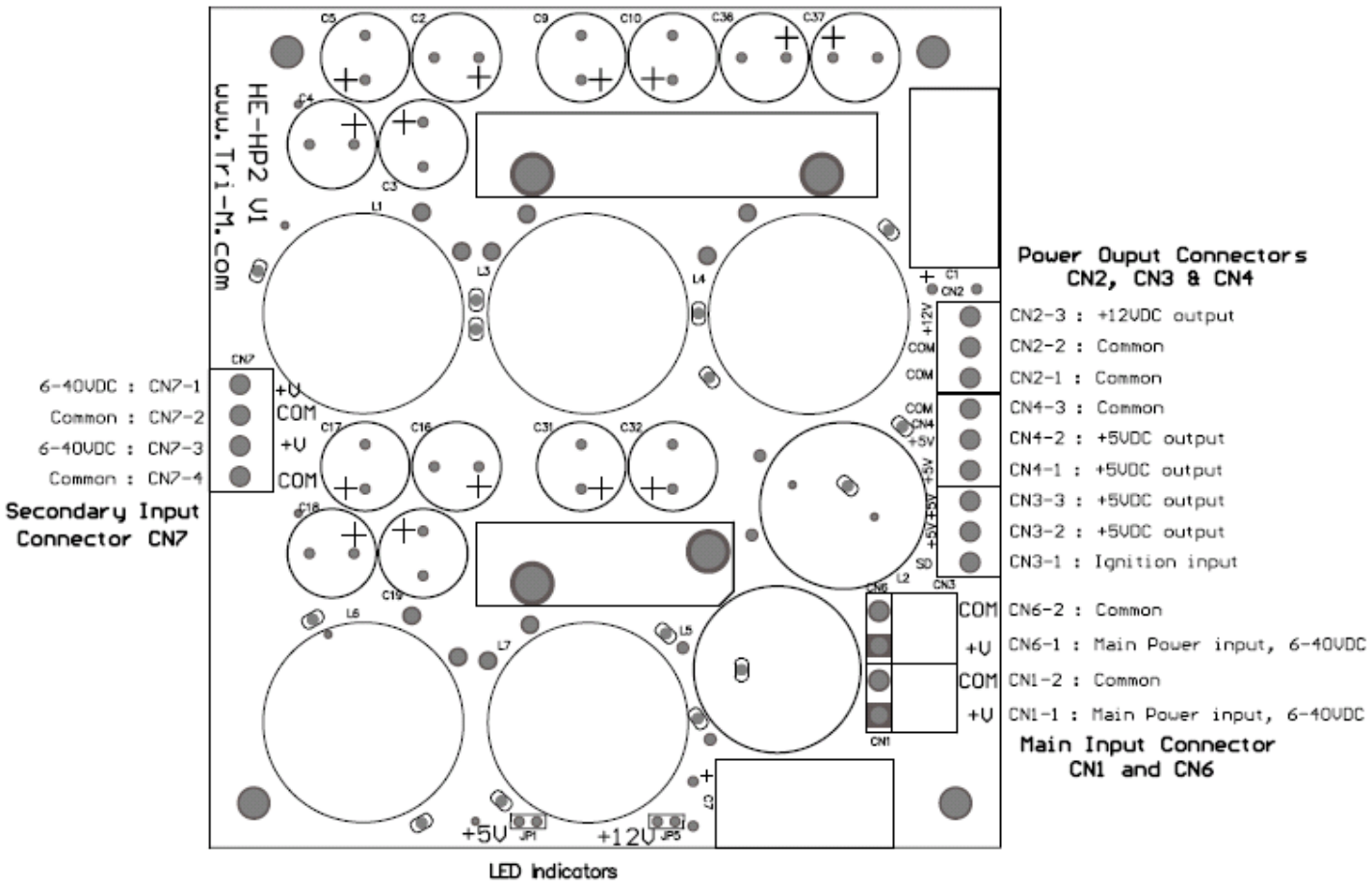
Power Supply Specifications	
Model	**HE-HP2**
5V output*	20 A
12V output	2.5 A
Input Voltage Range	6 to 40V
Load Regulation**	< 60mV
Line Regulation	40mV
Output temp. drift**	< 40mV
Switching Freq.	75kHz
Max. Input Transient	125V for 100msec
Output Ripple**	< 20mV
Conducted Susceptibility**	> 57db
Efficiency	Up to 95%
Temp. Range	-40 to 85C
Quiescent current***	1.3 mA
Size, PC/104 form factor compliant***	3.55”W. x 3.75”L. x 0.6”H.

*Current rating includes current supplied to 12Vregulators.
**Measured on the 5V output.
***LED’s disabled.

CHAPTER 2 CONFIGURATION AND INSTALLATION

2.1 Introduction

This chapter describes the configuration and installation of the HE-HP2 power supply. In addition, section 2.2 provides a formula to calculate the available +5VDC. Figure 2-1 shows the HE-HP2 connectors, jumpers and other options.



2.2 Power Considerations.

The +5V switching regulator is rated at 20A maximum output, however the +5V output supplies power to the +12 VDC regulators. To obtain the usable range of +5V output, "derate" according to the use of +12VDC. Use the following formulae to calculate the maximum usable output.

$$Usable + 5Voutput = 20A - \frac{I[12] * 2.4}{0.9}$$

Where: I[12] = 12VDC current load

Assuming 90 percent converter efficiency (actual efficiency may vary).

2.2.1 Main Input Power Connector

Input power of 6VDC to 40VDC is connected to the HE-HP2 by two removable connector block CN1 and CN6. Power should be connected to both CN1 and CN6 to prevent exceeding the connector current limits.

Unregulated vehicle power 6VDC to 40VDC is connected as follows:

- CN1, Terminal 1:"hot" polarity
- CN1, Terminal 2: Common (0VDC)
- CN6, Terminal 1:"hot" polarity
- CN6, Terminal 2: Common (0VDC)

2.2.2 Output Power Connector

Output power is available via connector blocks CN2, CN3 & CN4. CN2, CN3 & CN4 are located immediately side-by-side.

- CN3-1: Position 4, SD (Ignition input, ie maintained contact closure) 6 – 40 VDC input
- CN3-2: Position 5, +5VDC output
- CN3-3: Position 6, +5VDC output
- CN4-1: Position 7, +5VDC output
- CN4-2: Position 8, +5VDC output
- CN4-3: Position 9, common
- CN2-1: Position 10, common
- CN2-2: Position 11, common
- CN2-3: Position 12, +12VDC output

2.2.3 Ignition input

Output power is applied directly to the power and ground connections on the terminal blocks CN2, 3 and 4.

The HE-HP2 power supply outputs are turned on when 6VDC to 40VDC is applied to the ignition input signal SD on connector CN3-1.

If no remote control is required, this input can be tied to the main input power connector.

Note: SD is an opto-coupled input signal used to turn on/off the outputs. To enable the HE-HP2 outputs, a 6 to 40V signal must be connected to the SD input. The common for the remote 6 to 40V signal must be connected to the HE-HP2 common. If the SD input is connected directly to the main input power connector, the common for the SD input is already done.

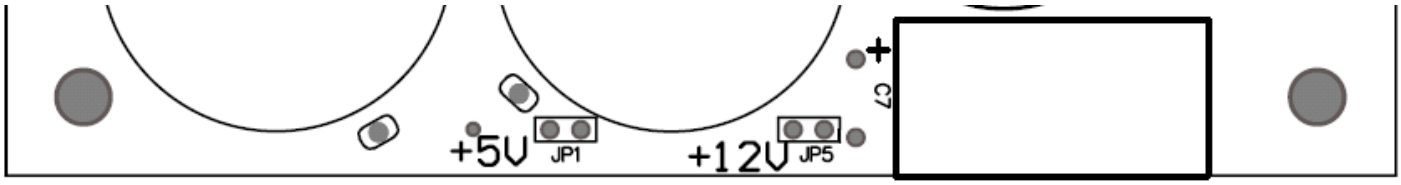
2.3 Jumper Selection

This section describes the function of each jumper, the location of it, the default setting, and how to change it.

2.3.1 LED Jumper Enable/Disable

These jumpers allow the LEDs to be disabled. This is to be used when absolute minimum power consumption must be maintained, such as when operating off a limited battery source.

The location of each LED jumper (JP1 for 5V LED, and JP5 for 12V LED) are shown in the diagram below.



Each LED is enabled by factory default. To disable any LED, remove the LED jumper (or cut the small PCB trace if no jumper is installed) associated with the LED. To re-enable any LED, re-install the associated jumper (or solder a short jumper wire between each of the jumper pads).