



Dearborn Group eDPA (Embedded DPA)

Engineering Integration Manual

DPA 4 Plus Driver Version: 5.49
eDPA Firmware Version: 64.003.01 (UNTESTED)

Permission is granted to copy any or all portions of this manual, provided that such copies are for use with the eDPA product and that "© 2009 Dearborn Group Technology, Inc." remains on all copies.

The accompanying software, the DPA 4 Plus RP1210A-compliant API (at version 5.49) provided for use with the eDPA, is also copyrighted. Permission is granted to copy this software for back-up purposes only.

IMPORTANT

To ensure your success with integrating this product, it is essential that you read this document carefully before trying to use or integrate the hardware. Damage caused by misuse of the hardware, or by mis-integrating the hardware (such as not staying within product power guidelines) is not covered under product warranty.

When using this manual, please remember the following:

- ❑ This manual may be changed, in whole or in part, without notice.
- ❑ Dearborn Group Technology assumes no responsibility for any damage resulting from the use of this hardware and software.
- ❑ Specifications presented herein are provided for illustration purposes only and may not accurately represent the latest revisions of hardware, software or cabling.
- ❑ No license is granted, by implication or otherwise, for any patents or other rights of Dearborn Group Technology or of any third party.

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The DPA product line has been awarded the following U.S. Patents:

Patent #	Date	Patent Overview
6,772,248	08-03-04	Protocol adapter for in-vehicle networks.
7,152,133	12-19-06	Expanded functionality protocol adapter for in-vehicle networks.
7,337,245	02-26-08	Protocol Adapter for Passing Diagnostic Messages between Vehicle Networks and a Host Computer.

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2. Safety First

It is essential that the user read this document carefully before using, or even connecting, the eDPA hardware to a 5VDC power source.

The eDPA device is to be integrated by engineers who are familiar with the terms and tolerances listed within this manual. The engineer is also assumed to have a very good understanding of the electronic systems contained on the vehicles and the potential hazards related to working in a shop-floor or on-vehicle environment.

Dearborn Group Technology understands that there are numerous safety hazards that cannot be foreseen, so we recommend that the user read and follow all safety messages in this manual, on all of your equipment, from your vehicle manuals, as well as internal documents and operating procedures.

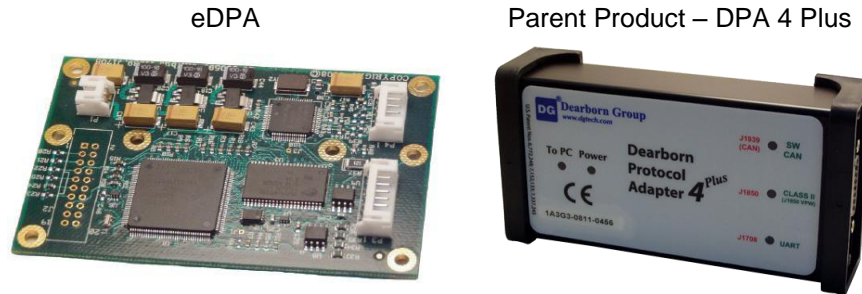


- ✓ Always block drive and steer wheels both front and back when testing on a vehicle.
- ✓ Use extreme caution when working around electricity. There is always a risk of electric shock from battery-level voltage, vehicle voltages, and from building voltages.
- ✓ Do not smoke or allow sparks or open flames near any part of the vehicle fueling system or vehicle batteries.
- ✓ Always work in an adequately ventilated area, and route vehicle exhaust outdoors.
- ✓ Do not use this product in an environment where fuel, fuel vapor, exhaust fumes, or other potentially hazardous liquids, solids, or gas/vapors could collect and/or possibly ignite, such as in an unventilated area or other confined space, including below-ground areas.

3. Introducing the eDPA

The Embedded DPA, herein called the “eDPA”, is an embedded version of the highly successful Dearborn Group Technology DPA 4 Plus. The eDPA is being used to fill a growing market where Windows-based PCs are rapidly becoming present on medium and heavy-duty vehicles. These PCs are usually in specialty roles such as Telematics, driver and fuel monitoring.

This product and the parent product (DPA 4 Plus) are used to connect vehicle communication networks and Windows XP/2000/Vista PCs. This allows programs written for the PC using the TMC RP1210 standard to retrieve pertinent vehicle information such as fault codes, component information, as well as perform vehicle and component level diagnostics.



3.1. What Exactly is the eDPA?

The eDPA is a DPA 4 Plus minus the case, 5V power supply circuitry, standard vehicle connectors, and support for not-so-common-anymore protocols (i.e. ISO9141, ALDL), etc. This drives down the cost significantly, making the eDPA an easy and logical solution for embedding into an on-board PC.

3.2. Wording for “Hardware” and “Drivers”

In this document, when the word “drivers” is used, it refers to the DPA 4 Plus RP1210A compliant drivers version 5.49, which are required for software applications to communicate with the eDPA. These drivers can be readily downloaded from <http://www.dgtech.com> under the support downloads page. This manual will not cover installing the drivers, configuring OEM applications, or troubleshooting, as the DPA 4 Plus User Manual covers these topics. The word “hardware” will refer to the eDPA board.

4. Product Specifications

4.1. eDPA Physical and Electrical

Feature	Data
Dimensions	L=90mm, W=59.25mm, H=15mm
Power Requirements	4.75 to 5.25 VDC
Current Draw	No more than 250mA in the above voltage range
Operating Temperature Range	-40 to +85C
USB Communications	USB Version 2.0 (12 Mbps)
Mating Power Connector	JST Part # PHR-3 (Mates with S3B-PH-K-S)
Mating Vehicle Connector	JST Part # PHR-8 (Mates with S8B-PH-K-S)
Mating USB Connector	JST Part # PHR-6 (Mates with S6B-PH-K-S)
Crimp Terminals for Mating Connectors	JST Part # SPH-002T-P0.5S

- ❑ In the event of a complete power loss, the eDPA will not interfere with normal vehicle data bus operation.
- ❑ Although the USB connection on a PC is a prime candidate for powering of the module, care must be taken that the USB port of that PC has enough current capability to operate the eDPA properly.
- ❑ All mating connectors and crimp terminals can be ordered from JST <http://www.jst.com> .

4.1. Operating Systems and Standards Supported

Feature	Data
Operating Systems	Windows XP/2000/Vista*
TMC RP1210 Version	RP1210A-Compliant Drivers (5.49)

- DG has tested under various 32-bit Windows Vista operating systems; however we have not yet tested the DPA drivers with Vista x64. Testing on Vista x64 is slated for a future DPA release.

4.2. RP1210 Protocols Supported

Feature	Data
CAN	CAN@250k
CAN	CAN@500k/J2284/GMLAN (under "IESCAN" protocol)
J1939	J1939@250k (default)
J1708/J1587	J1708/J1587@9600 baud (default)

4.1. PC Requirements

Item	Data
PC	IBM-Compatible
Processor	1GHz or Faster
RAM	256 MB (512MB Preferred)
USB	1.1 or higher (2.0 Preferred)

5. Power, USB, Vehicle Connections

5.1. Power Connection – Connector P1

Pin	Function
1	Ground
2	5 Volts DC
3	Ground

JST Part Number is S3B-PH-K-S, Mating Part Number is PHR-3

5.2. Vehicle Connector – Connector P3

Pin	Function
1	J1708+
2	J1708-
3	Not Connected
4	CAN/J1939+
5	CAN/J1939-
6	Not Connected
7	Reserved
8	Reserved

JST Part Number is S8B-PH-K-S, Mating Part Number is PHR-8

5.3. USB Interface – Connector P4

Pin	Function
1	VBUS
2	DM
3	DP
4	Ground
5	Cable Shield
6	Not Connected

JST Part Number is S6B-PH-K-S, Mating Part Number is PHR-6

5.4. Crimp Terminals for Connectors

The terminals required for the connectors are JST Part # SPH-002T-P0.5S.

5.5. J1939 Bus Termination Option – Connector P2 (Bottom of PCB)

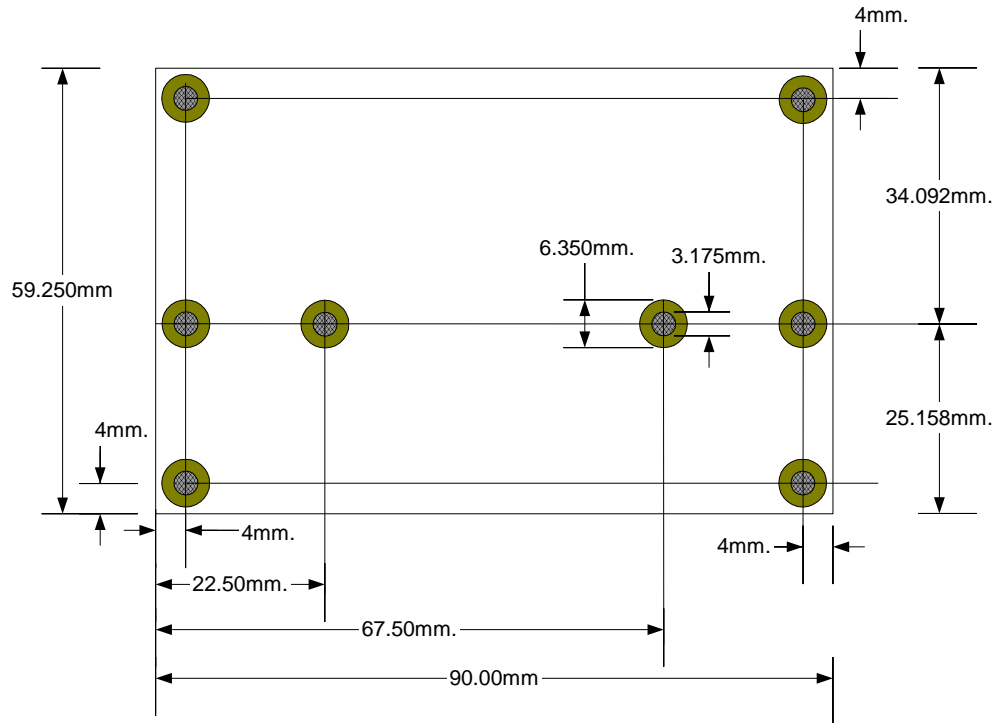
An optional 120 ohm bus termination resistor may be added to the CAN network by shorting pins 1 and 2 on the 2-pin connector designated as P2 on the bottom of the PCB.

6. Hardware

6.1. Length, Width and Height

Looking down onto the top of the eDPA PCB, it forms a rectangle of the following dimensions:

- Length=90 mm, Width=59.25 mm, Height=15 mm



6.1. Mounting and Ventilation

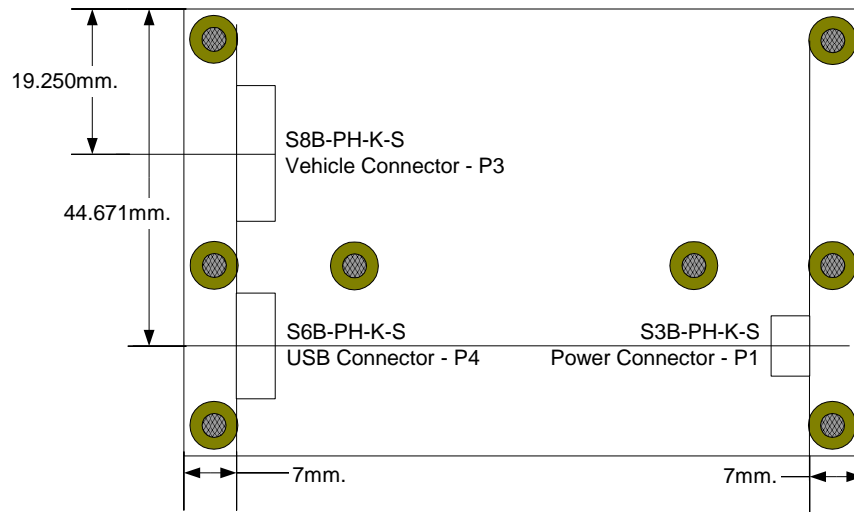
The eDPA has 8 through-holes of the dimension 3.175mm, and they are surrounded by copper padding to 6.35mm as per the above drawing. This allows for mounting via common off the shelf “standoff” hardware. It is recommended that the eDPA be mounted with the electronic components in the up position and with appropriate standoffs to provide at least 1cm of air flow above and below the board. This will allow heat to dissipate naturally. The eDPA has components rated for -40 C to +85 C, so adjust your design accordingly.

6.2. Environmental and EMC Considerations

- The eDPA shall be installed in a semi-permanent environment where it is not directly or indirectly exposed to weather (rain, snow, salt spray, etc.).
- No EMC operating characteristics shall be guaranteed by Dearborn Group Technology.
- No environmental operating characteristics shall be guaranteed by Dearborn Group Technology.
- Any mechanical, environmental and EMC validation will be conducted by the end user as a part of a test of the complete system, including the PC host computer.

6.3. Connector Locations

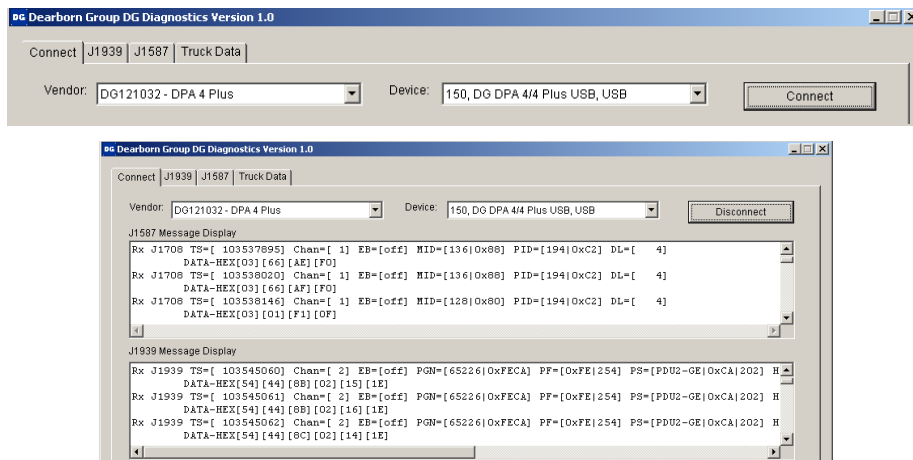
Looking down onto the top of the eDPA PCB, the connectors are located as follows:



The area from the connectors to the outside of the board is clear of components, easing cable insertion.

7. Connecting and Testing the eDPA

1. Install the latest DPA 4 Plus Drivers by downloading them from the <http://www.dgtech.com> website under support downloads for the DPA 4 Plus.
2. Connect the eDPA to the vehicle data bus, 5VDC power, and then to the PC USB port.
3. Allow the “New Hardware Found” wizard to install the device drivers on the PC.
4. Run an RP1210-compliant application such as “DG Diagnostics” (provided free of charge with the DPA 4 Plus drivers). The following example shows how to run the DG Diagnostics application using the eDPA:
 - a. Start->Programs->Dearborn Group Products->DPA 4 Plus->DG Diagnostics
 - b. Select “DG121032 – DPA 4 Plus” as the Vendor.
 - c. Select “150, DG DPA 4/4 Plus USB, USB” as the Device.
 - d. Click the “Connect” button, and if vehicle communications have been established correctly, you will begin seeing messages flow.



8. Sample Source Code to Use with the eDPA

Since the eDPA is most likely part of a custom engineered solution and being used for a specific purpose, Dearborn Group provides sample source code for the integration engineering team. This allows the team to rapidly build a custom application.

The sample source code gets installed with the DPA 4 Plus drivers, and can be found in “Utilities/SampleSource” under the directory where the DPA 4 Plus drivers were installed (normally C:\Program Files\Dearborn Group Products\DPA 4 Plus).

The sample source code is written in “plain” C, is easy to understand, and is very well structured and commented. It is in one contiguous source file, and runs under a DOS command prompt. The application performs every function necessary to code a complete diagnostic or data-gathering application. Some features are:

- ❑ Allowing the user to connect to a DPA (or eDPA) on either the J1708 or J1939 data bus.
- ❑ Displays all bus traffic (both sent or received).
- ❑ Decodes one J1939 PGN into English text values:
 - 61444 - EEC1 - Electronic Engine Controller #1
- ❑ Decodes one J1587 PID into English text values:
 - 190 - Engine Speed
- ❑ Sends a request message every 15 seconds for :
 - J1939 PGN 65260 (VIN)
 - J1587 PID 237 (VIN)

9. Warranty Information & Limitation Statements

9.1. Warranty Information

The Dearborn Group Technology eDPA is warranted against defects in materials and workmanship for two (2) years following date of shipment. Cables (both USB and vehicle) are warranted for 90 days.

Dearborn Group Technology will, at its option, repair or replace, at no cost to the customer, products which prove to be defective during the warranty period, provided the defect or failure is not due to misuse, abuse, or alteration of the product. The customer is responsible for shipment of the defective product to DG. This warranty does not cover damage to any item that Dearborn Group Technology determines has been damaged by the customer's abuse, misuse, negligence, improper assembly, modification, or operation of the product.

A Return Merchandise Authorization (RMA) number must be issued to the customer from our Technical Support Department at (248) 488-2080 and must be included with the product being returned (for more details, see section 7. "Return Merchandise Authorization (RMA)").

9.2. Limitation Statements

9.2.1. General Limitation and Risk Assignment

To the maximum extent permitted by applicable law, Dearborn Group Technology, Inc. and its suppliers provide support services on an "as-is" basis and disclaim all other warranties and conditions not specifically stated herein, whether express, implied or statutory, including, but not limited to, any warranties of merchantability or fitness for a particular purpose, lack of viruses, accuracy or completeness of responses, results, lack of negligence or lack of workmanlike effort, and correspondence to description. The user assumes the entire risk arising out of the use or performance of the device, its operating system components, and any support services.

9.2.2. Exclusion of Incidental, Consequential and Certain Other Damages

To the maximum extent permitted by applicable law, in no event shall Dearborn Group Technology Inc. or its suppliers be liable for any special, incidental, indirect or consequential damages whatsoever, including but not limited to: damages for loss of profit, loss of confidential or other information; business interruption; personal injury; loss of privacy, failure to meet any duty (including good faith or of reasonable care); negligence; and any

other pecuniary or other loss related to the use of or the inability to use the device, components or support services or the provision of or failure to provide support services or otherwise in connection with any provision, even if Dearborn Group Technology, Inc. or any supplier has been advised of the possibility of such damages.

9.2.3. Limitation of Liability and Remedies

Notwithstanding any damages that you might incur for any reason whatsoever (including, without limitation, all damages referenced above and all direct or general damages), in no event shall the liability of Dearborn Group Technology, Inc. and any of its suppliers exceed the price paid for the device. The user assumes the entire risk and liability from the use of this device.

9.2.4. Right to Revise or Update without Notice

Dearborn Group Technology, Inc. reserves the right to revise or update its products, software and/or any or all documentation without obligation to notify any individual or entity.

9.2.5. Governance

The user agrees to be governed by the laws of the State of Michigan, USA, and consents to the jurisdiction of the state court of Michigan in all disputes arising out of or relating to the use of this device.

9.2.6. Contact

Please direct all inquiries to:

Dearborn Group Technology, Inc.
27007 Hills Tech Court
Farmington Hills, MI 48331 USA

10. Return Merchandise Authorization (RMA)



Under no circumstances will Dearborn Group Technology accept a returned DPA product without that product first having been assigned an RMA number by Dearborn Group Technology technical support.

Once technical support has deemed that there may be a physical problem with your DPA, technical support will issue you an RMA number. You would then return the product along with any documentation of ownership you have (proof of purchase/price) to the following address:

Dearborn Group Technology
Product Service/Repairs
Attn: RMA# xxxxxxx
27007 Hills Tech Court
Farmington Hills, MI 48331

Telephone: (248) 488-2080
Fax: (248) 488-2082

11. Implementation and Technical Support

For users in the United States, technical support is available from 9 a.m. to 5 p.m. Eastern Time. You may also fax or e-mail your questions to us. For prompt assistance, please include your voice telephone number.

Users not residing in the United States should contact your local Dearborn Group Technology representative.

Phone:	(248) 488-2080
Fax:	(248) 488-2082
E-mail:	techsupp@dgtech.com
Web site:	www.dgtech.com

12. Software Developer/Integrator Notes

12.1. Bundling the eDPA with Your Installation Script

12.1.1. Silent Installation Available

With the 5.49 release of the DPA 4 Plus, DG introduced a “silent” installation that software installation engineers can call that will install all needed eDPA files. This includes manuals, quick start guide, “DG Diagnostics”, “DPA Options”, “DPA Flash Updater”, and the troubleshooting application “Adapter Validation Tool - AVT”. All DPA files that would be installed interactively are installed by the silent installation.

- ❑ The silent installation will not prompt the user or display a screen at any point.
- ❑ After the install, a reboot of the PC is necessary!

12.1.2. Silent Install Command Line to Install the eDPA (DPA 4 Plus USB)

DPAInstall.exe /s /d_SILENT_=C

C = DPA 4, DPA 4 Plus, and eDPA USB

Please test and ensure that the command line you provide to DPAInstall.exe is correct. Otherwise, only the “baseline” components will be installed, but the RP1210 API will not be functional and no PC to eDPA communications will be possible!