

# **EPM-1712** (Rev. C0)

**Vehicle 100Watt Smart DC/ DC Converter**

## **User's Manual**

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**1<sup>st</sup> Ed – 22 July 2016**

## FCC Statement



THIS DEVICE COMPLIES WITH PART 15 FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS:

- (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE.
- (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRE OPERATION.

THIS EQUIPMENT HAS BEEN TESTED AND FOUND TO COMPLY WITH THE LIMITS FOR A CLASS "A" DIGITAL DEVICE, PURSUANT TO PART 15 OF THE FCC RULES.

THESE LIMITS ARE DESIGNED TO PROVIDE REASONABLE PROTECTION AGAINST HARMFUL INTERFERENCE WHEN THE EQUIPMENT IS OPERATED IN A COMMERCIAL ENVIRONMENT. THIS EQUIPMENT GENERATES, USES, AND CAN RADIATE RADIO FREQUENCY ENERGY AND, IF NOT INSTALLED AND USED IN ACCORDANCE WITH THE INSTRUCTION MANUAL, MAY CAUSE HARMFUL INTERFERENCE TO RADIO COMMUNICATIONS.

OPERATION OF THIS EQUIPMENT IN A RESIDENTIAL AREA IS LIKELY TO CAUSE HARMFUL INTERFERENCE IN WHICH CASE THE USER WILL BE REQUIRED TO CORRECT THE INTERFERENCE AT HIS OWN EXPENSE.

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# 1. Getting Started

## 1.1 Safety Precautions

### Warning!



Always completely disconnect the power cord from your chassis whenever you work with the hardware. Do not make connections while the power is on. Sensitive electronic components can be damaged by sudden power surges. Only experienced electronics personnel should open the PC chassis.

### Caution!



Always ground yourself to remove any static charge before touching the CPU card. Modern electronic devices are very sensitive to static electric charges. As a safety precaution, use a grounding wrist strap at all times. Place all electronic components in a static-dissipative surface or static-shielded bag when they are not in the chassis.

**Always note** that improper disassembling action could cause damage to the motherboard. We suggest not removing the heatsink without correct instructions in any circumstance. If you really have to do this, please contact us for further support.

## 1.2 Packing List

Before you begin installing your single board, please make sure that the following materials have been shipped:

- 1 x EPM-1712 Vehicle DC/ DC Converter Module
- 1 x 4-pin Power Cable



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If any of the above items is damaged or missing, contact your retailer.

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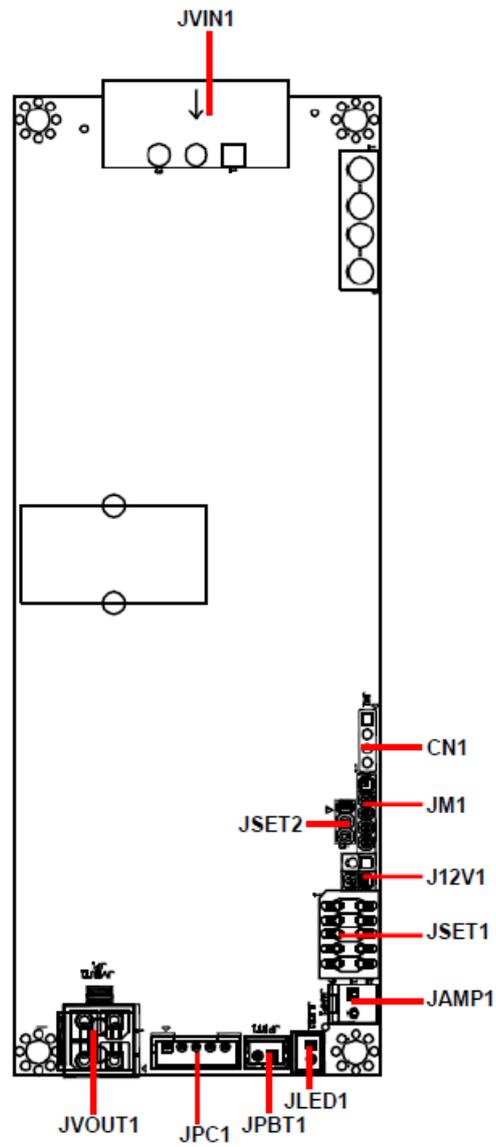
### 1.3 Document Amendment History

Revision	Date	By	Comment
1 <sup>st</sup>	July 2016	Avalue	Initial Release

# 2. Hardware Configuration

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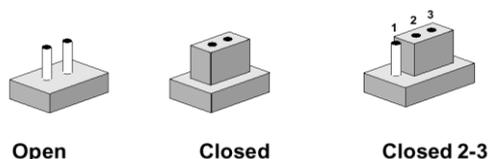
## 2.1 Product Overview



## 2.2 Jumper and Connector List

You can configure your board to match the needs of your application by setting jumpers. A jumper is the simplest kind of electric switch.

It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To “close” a jumper you connect the pins with the clip. To “open” a jumper you remove the clip. Sometimes a jumper will have three pins, labeled 1, 2, and 3. In this case, you would connect either two pins.



The jumper settings are schematically depicted in this manual as follows:



A pair of needle-nose pliers may be helpful when working with jumpers.

Connectors on the board are linked to external devices such as hard disk drives, a keyboard, or floppy drives. In addition, the board has a number of jumpers that allow you to configure your system to suit your application.

If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any changes.

The following tables list the function of each of the board's jumpers and connectors.

### Jumpers

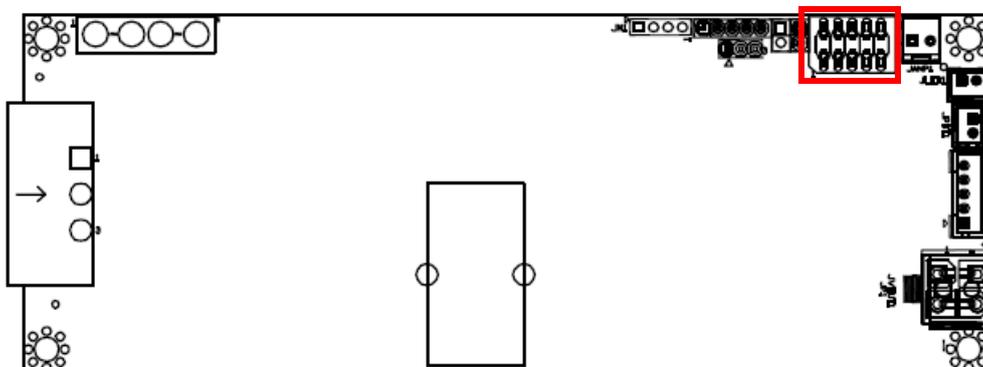
Label	Function	Note
JSET1	Delay mode select	5 x 2 header, pitch 2.00mm
JSET2	Low Battery signal setting	3 x 1 header, pitch 2.00mm

### Connectors

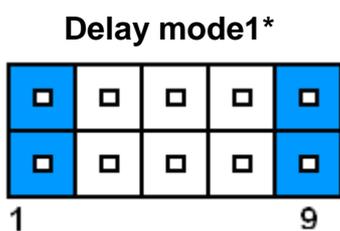
Label	Function	Note
CN1	USB connector	4 x 1 header, pitch 2.00mm
JM1	PIC Microcontroller connector	5 x 1 header, pitch 2.00mm
JVIN1	Power Input Connector	2ESDVM-03P, pitch 5.08mm
J12V1	Power-on LED signal connector	2 x 1 header, pitch 2.00mm
JAMP1	Amplifier connector	2 x 1 wafer, pitch 2.54mm
JLED1	Low Battery LED signal Connector	2 x 1 wafer, pitch 2.00mm
JPBT1	Power switch Connector (External)	2 x 1 wafer, pitch 2.00mm
JPC1	System connector	6 x 1 wafer, pitch 2.00mm
JVOUT1	+12V Output Power Connector	2 x 2 wafer, pitch 4.2mm

## 2.3 Setting Jumpers & Connectors

### 2.3.1 Delay mode selector (JSET1)



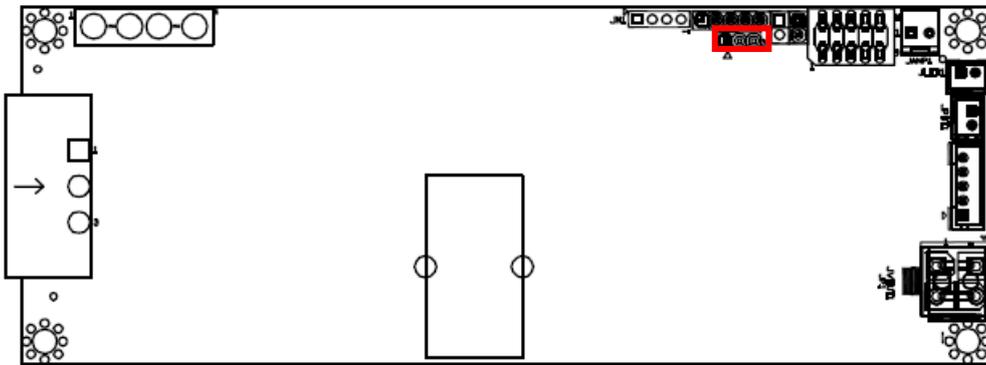
\*Default



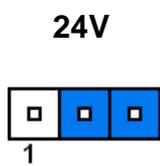
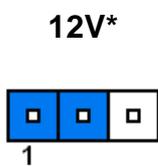
Signal	PIN	PIN	Signal
GND	1	2	MODE_1
GND	3	4	MODE_2
GND	5	6	MODE_3
GND	7	8	MODE_4
GND	9	10	MODE_5

Delay mode						Soft Off Delay Time	Hard Off Delay
	JSET1(1-2)	JSET2(3-4)	JSET3(5-6)	JSET4(7-8)	JSET5(9-10)		
<b>1</b>	<b>Short</b>	<b>Open</b>	<b>Open</b>	<b>Open</b>	<b>Open</b>	After 20 seconds, shut down motherboard.	After 30 seconds,shut down motherboard and cut off 5vsb rail.
<b>2</b>	<b>Open</b>	<b>Short</b>	<b>Open</b>	<b>Open</b>	<b>Open</b>	After 40 seconds, shut down motherboard.	After 30 seconds,shut down motherboard and cut off 5vsb rail.
<b>3</b>	<b>Short</b>	<b>Short</b>	<b>Open</b>	<b>Open</b>	<b>Open</b>	After 60 seconds, shut down motherboard.	After 30 seconds,shut down motherboard and cut off 5vsb rail.
<b>4</b>	<b>Open</b>	<b>Open</b>	<b>Short</b>	<b>Open</b>	<b>Open</b>	After 80 seconds, shut down motherboard.	After 60 seconds,shut down motherboard and cut off 5vsb rail.
<b>5</b>	<b>Short</b>	<b>Open</b>	<b>Short</b>	<b>Open</b>	<b>Open</b>	After 100 seconds, shut down motherboard.	After 60 seconds,shut down motherboard and cut off 5vsb rail.
<b>6</b>	<b>Open</b>	<b>Short</b>	<b>Short</b>	<b>Open</b>	<b>Open</b>	After 2minutes, shut down motherboard.	After 60 seconds,shut down motherboard and cut off 5vsb rail.
<b>Auto On</b>	<b>Open</b>	<b>Open</b>	<b>Open</b>	<b>Open</b>	<b>Short</b>		
<b>Manual On</b>	<b>Open</b>	<b>Open</b>	<b>Open</b>	<b>Open</b>	<b>Open</b>		

2.3.2 Low Battery signal setting (JSET2)

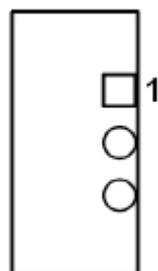
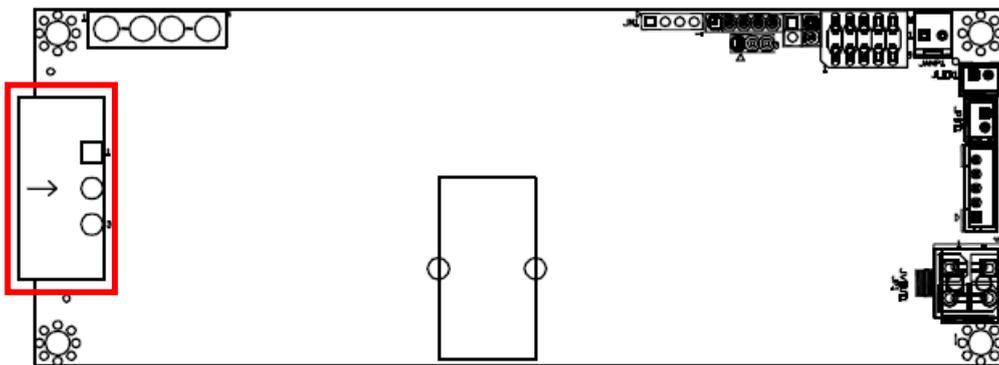


\*Default



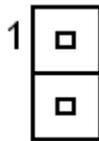
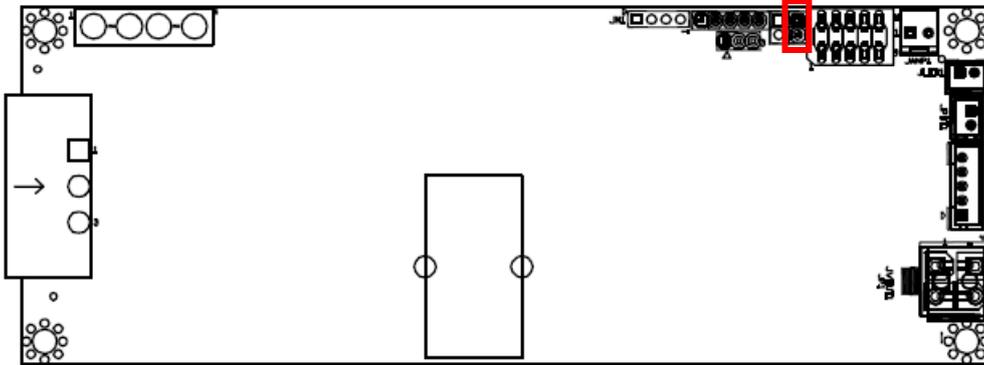
Signal	PIN
10.6V	1
COM	2
21.2V	3

2.3.3 Power Input Connector (JVIN1)



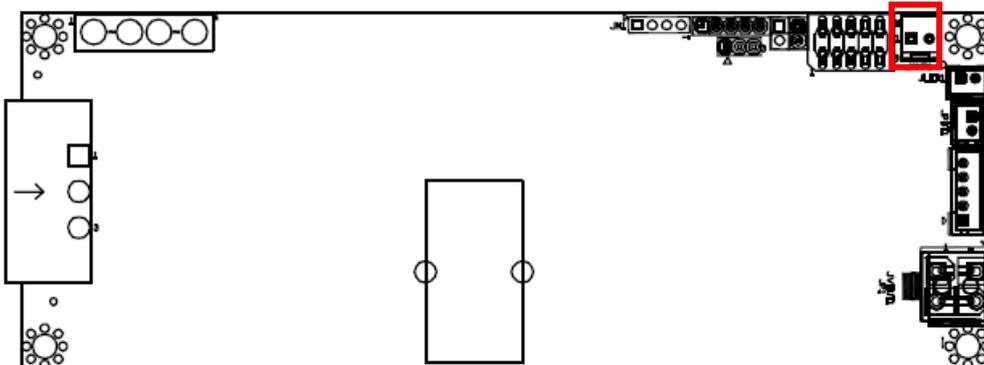
Signal	PIN
+VBAT	1
ACC_ON(Ignition)	2
-VBAT (GND)	3

### 2.3.4 Power-on LED signal connector (J12V1)



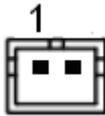
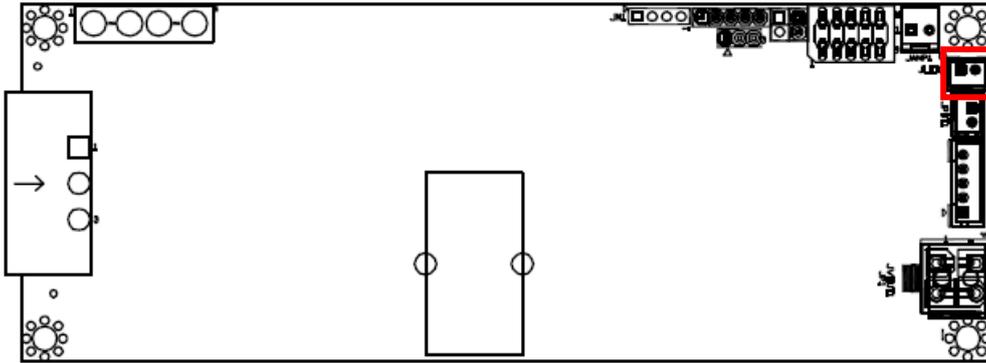
Signal	PIN
+5V Output	1
Detect PIN	2

### 2.3.5 Amplifier connector (JAMP1)



Signal	PIN
12V Output to Car Amplifier	1
GND	2

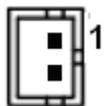
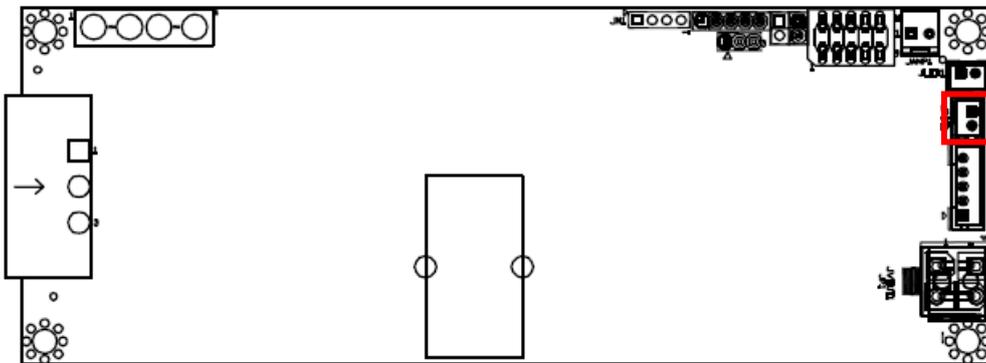
2.3.6 Low Battery LED signal Connector (JLED1)



Signal	PIN
+5V	1
BAT LOW Signal	2

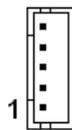
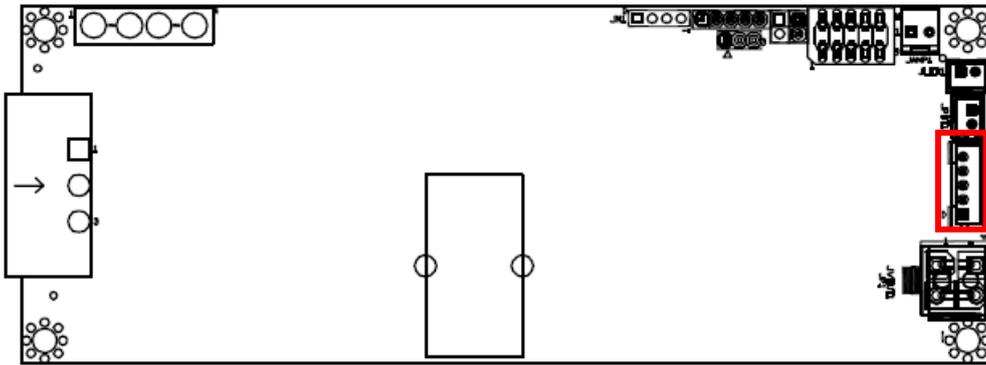
LED Status (See Page 15)

2.3.7 Power switch Connector (External) (JPBT1)



Signal	PIN
PWR_IN	1
GND	2

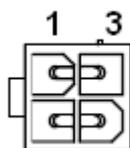
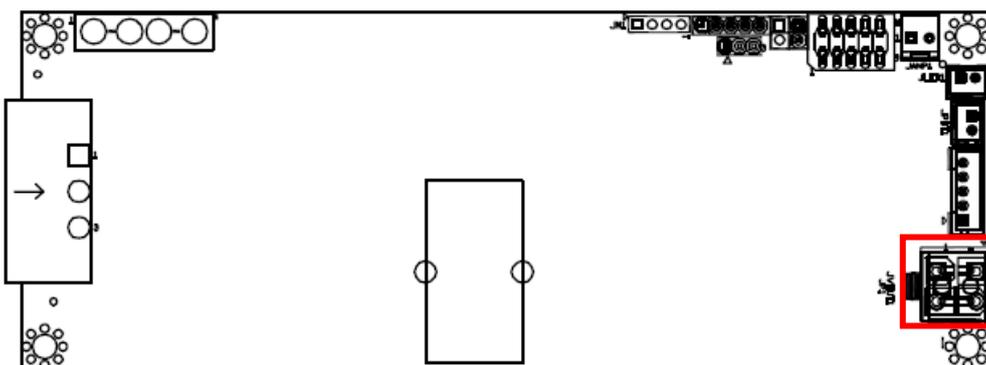
### 2.3.8 System connector (JPC1)



Signal	PIN
Alarm-OUT for Software Debug	5
5VSB-OUT	4
PWR-SW-OUT1 to Motherboard power on pin. (PS_ON or GND)	3
PWR-SW-OUT2 to Motherboard power on pin. (PS_ON or GND)	2
GND	1

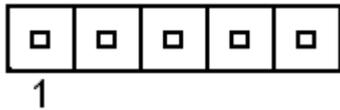
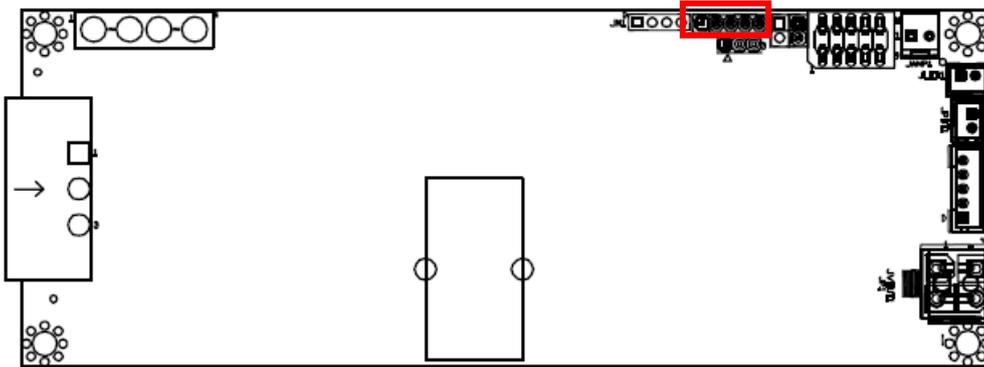
ALARM-Out / 5VSB-out LED Status (See Page 15)

### 2.3.9 +12V Output Power Connector (JVOUT1)



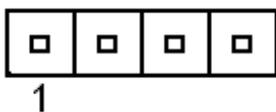
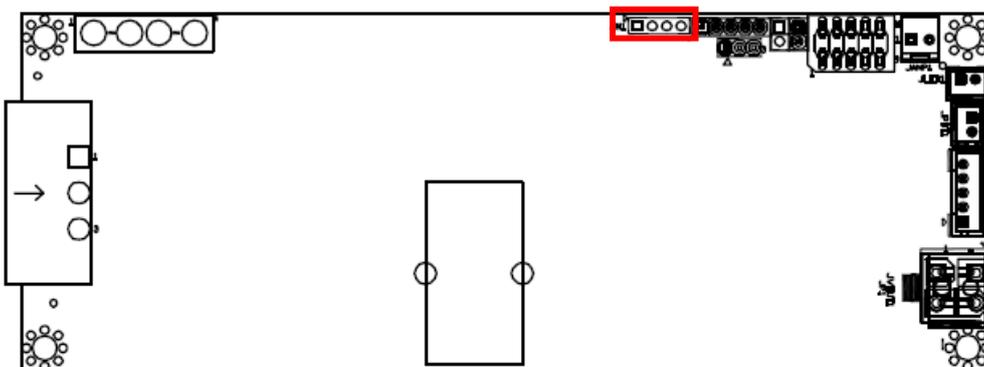
Signal	PIN	PIN	Signal
GND	1	3	+12V
GND	2	4	+12V

2.3.10 PIC microcontroller (MCU) connector (JM1)



Signal	PIN
+MCU	1
MCU_RST	2
ICSP-CLK	3
ICSP-DAT	4
GND	5

2.3.11 USB connector (CN1)



Signal	PIN
+5V	1
CL1	2
DA1	3
GND	4

## 2.4 Operation Mode explained

### **Delay mode Condition = Auto on**

1) Ignition=OFF. Nothing happens. EPM-1712 is waiting for ignition signals.  
 2) Ignition=ON. EPM-1712 waits for 10 seconds then turns on the 5VSB rail. After another second EPM-1712 sends an "ON" signal to the motherboard via the 2 wires connected to the motherboard's ON/OFF pins. The motherboard will turn ON and your system should start booting. The Ignition state will be kept for 60 more seconds so that the motherboard will start in normal condition.

3) Ignition=ON. Your computer will keep ON.

4) Ignition=OFF. EPM-1712 waits for "Delay-off" in seconds (*see jumper chart, Page 9*) and then it turns the motherboard OFF. Your computer should smoothly turn off (shutdown procedure). After shutdown, 5VSB will still be provided for another "HARDOFF" seconds. In the event where the shutdown process is longer than "HARDOFF" (Operating System is stalled, etc), power will be shut down hard, turning off all power rails. During the HARDOFF procedure, the battery levels will be constantly monitored to prevent deep discharge situations.

### **Low Battery Protection:**

- 1) When the battery Voltage is under 10.6V, Low Battery LED will light continually.
- 2) The battery recovers 10.6V; the Low Battery LED won't light.
- 3) After keeping the battery above 10.6V for 180 seconds, EPM-1712 can be automatically turned on again.
- 4) If the system is at ON situation, it will automatically shut down if low battery voltage (10.6V) lasts over 30 seconds.

### **Start-Protection is active during the first 60s of PC operation**

If Ignition is turned ON and then OFF right away, EPM-1712 will keep Ignition signal in ON position for 60 seconds, allowing your operating system to fully run. Then system will shut down according to "Off-delay" settings.

### **ALARM-Out LED Status:**

ALARM LED for EPM-1712 Status, please use LED to connect JPC1 pin1 and pin2.

LED Status	Mode
Flashes, every 1 Sec.	Low Battery Protection
Flashes, every 2 Sec.	Start-Protection procedure
Continually On	Delay-off procedure

