M2-ATX

6-24V Intelligent Automotive ATX Power Supply

Installation Guide

Version 1.4 (firmware v1.4, 06/06/2008)
P/N M2-ATX-01

Before you start…

Please take a moment and read this manual before you install the M2-ATX in your vehicle. Often times, rushing into installing the unit can result in serious damage to your M2-ATX board, computer and probably your car's electrical system.

The M2-ATX board has several wires that need to be installed in various places. When installing, **always double check the polarity** of your wires with a voltmeter.

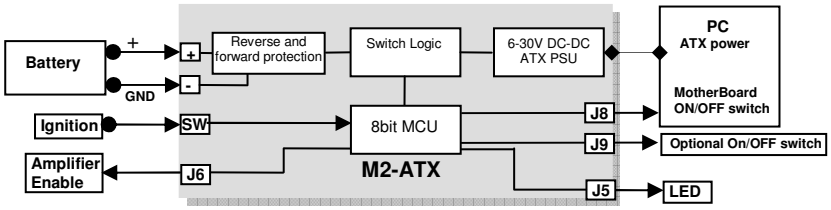
Avoid using the cigarette plug as a power source, often times the contacts are not capable of delivering high current to your PC.

1.0 Introduction

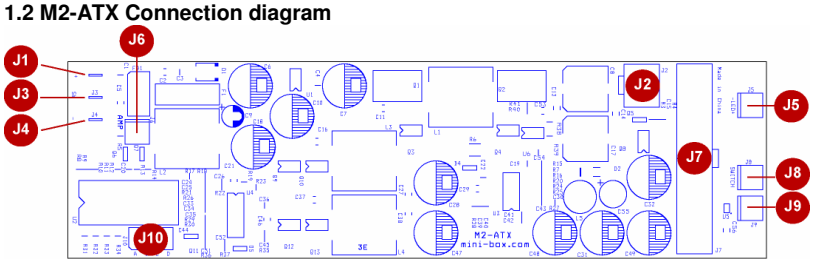
Thank you for purchasing the M2-ATX power sequencer / vehicle ATX power supply.

The M2-ATX was designed to work with a wide variety of main boards such as the VIA mini-ITX motherboards as well as Pentium-M, Celeron or certain full power Core Duo systems.

1.1 M2-ATX Logic Diagram



1.2 M2-ATX Connection diagram



M2-ATX, top view

Power Input Connectors

J1 Battery + (un-switched battery, positive)
J3 Ignition (switched battery, positive. Can test by connecting it to Battery +)
J4 Battery - (negative)

Controls and Settings

J6 Controls amplifier via remote ON/OFF. Left pin is RMT, Right pin is GND
J8 To motherboard ON/OFF switch
J10 User jumper settings (A,B,C,D)
J9 To external ON/OFF switch (optional, J8 is in parallel with J9)

Power Output Connectors

J2 Optional P4-12V power
J7 ATX power connector (to motherboard)
J5 To LED (optional)

Jumper attached=ON						
A	B	C	D	P	Off-delay (All rails ON)	Hard-off (5VSB)
OFF	OFF	OFF	OFF	P0	Standard PSU mode	
ON	OFF	OFF	OFF	P1	5s + 1min AutoLatch*	1 min
OFF	ON	OFF	OFF	P2	5s+ 1min AutoLatch*	2 hour
ON	ON	OFF	OFF	P3	5s+ 1min AutoLatch*	NEVER
OFF	OFF	ON	OFF	P4	30s + 1min AutoLatch*	2 hour
ON	OFF	ON	OFF	P5	30s + 1min AutoLatch*	NEVER
OFF	ON	ON	OFF	P6	30min	NEVER
ON	ON	ON	OFF	P7	3 hour	NEVER
OFF	OFF	OFF	ON	P8	10 min	1 hour
ON	OFF	OFF	ON	P9	15 min	2 hours
OFF	ON	OFF	ON	P10	1 hour	75min

IMPORTANT: Always use the "Hibernate" feature, never use "Standby" as it can severely discharge your battery over extended periods of time.

NEVER use "Hard-off = NEVER" settings unless you understand the risks of battery depletion. "Hard-off=NEVER always keeps 5VSB rail ON!

***AutoLatch** is active during the fist 60s of PC operation (and only during the first 60 seconds). For example, If Ignition is turned ON and then OFF right away, M2-ATX will latch Ignition in ON position for the next 60 seconds, allowing your operating system to fully come up. This will prevent disk drive corruption or systems that remain hung in the ON position. After the first 60 seconds of system operation, the AutoLatch feature will be removed and system will shut down at as governed by the "Off-delay" setting.

P0: In this mode, the M2-ATX behaves like a regular ATX power supply. If J6 is connected to the motherboard, M2-ATX will also send a gratuitous "ON pulse" to the motherboard right after power is first applied. **If IGNITION is connected to the battery, the unit will shut down if battery is < 11.2V**. This is to protect the battery from over-discharging. If Ignition is not hooked up, M2-ATX will operate from as low as 6V. For more information, please consult the "UPS mode" documentation on the product page.

P1 (recommended): Sends ON pulse to motherboard when ignition is ON for more than 5 seconds, sends OFF pulse to motherboard **5 seconds** after ignition is turned off. Waits another **60 seconds** and then shuts down 5VSB to conserve battery. In this mode, the M2-ATX consumes less than 0.5mA. **This is our recommended setting.**

1.2 Power challenges in a Vehicle PC

The 5V Standby Problem: One of most difficult tasks of operating a PC in a vehicle is power consumption while the computer is OFF. Even when your computer is OFF or in Suspend, it will still consume about 50-150mA on the 5VSB rail. *No matter how big your battery is, you will eventually drain it if proper actions are not taken.*

The M2-ATX is addressing these issues by cutting off the 5VSB rail after a pre-defined amount of time (see jumper chart, HARDOFF). When 5VSB is always active (HARDOFF=Never), M2-ATX constantly monitors the battery levels. When battery level drops below 11V for more than one minute, M2-ATX will shut down and re-activate only when the input voltage is > 12V.

Engine Cranks, under-voltage and over-voltage situations. Another difficult task is maintaining stable 3.3V, 5V, 12V and -12V power to your PC. While car batteries are rated at 12V, they actually provide voltages in between 7-16V (engine cranks) or as high as 80 volts (load dump). Most of the times, your battery will stay at 13.5V (while car is running) but extra precautions need to take place in order to prevent such situations. M2-ATX can operate as low as 6V and as high as 28V while providing strict regulation on all rails along with input voltage clamping and reverse protection.

Loud amplifier pops when PC starts. If your PC is connected to your car amplifier, you will hear a loud pop when the computer is first started. The M2-ATX has an 'anti-thump' control that will keep your amp OFF while the PC starts. Simply connect J6 to your amplifier remote control pins to activate the 'anti-thump' feature.

2.0 Mode of operation

1) Ignition=OFF. Nothing happens. M2-ATX is waiting for ignition signals.

2) Ignition=ON. M2-ATX waits for few seconds then turns on the 5VSB rail. After another second M2-ATX 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 latched for 60 more seconds so that the motherboard will have a change to come up in a clean manner.

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

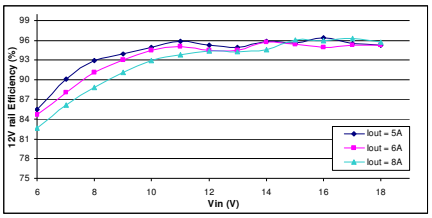
4) Ignition=OFF. M2-ATX waits for "OFFDELAY" in seconds (see jumper chart) and then it turns the motherboard OFF by sending a signal to the motherboard's ON/OFF switch. Your computer should turn off gracefully (shutdown procedure). After shutdown, 5VSB will still be provided for another "HARDOFF" seconds. In the event where the shutdown process is longer than "HARDOFF" (Operating System gets frozen, 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.

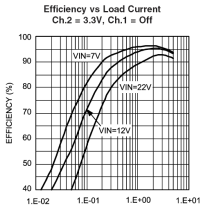
5) M2-ATX will go to step 1, if ignition is tuned ON again.

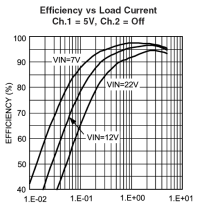
3.0 M2-ATX Characteristics

Minimum Input Operating. voltage	6V
Maximum input Operating voltage	24V (clamping will occur at 25-27V)
Deep-Discharge shutdown threshold	11.2V
Input current limit (fuse protected)	15A (15A mini-blade fuse)
Max Output Power	160 Watts
Operating temperature	-40 to +85* degrees Celsius
Storage temperature	-55 to +125 degrees Celsius
MTBF	192,000 hrs @ 50C, 96,000 hrs @65C
Efficiency (Input 9-16V)	>94%, all rails combined, 50% load.
PCB size	160x45mm
Input connectors	Faston 0.25" terminal
Output Connector	ATX Power 20 pin (Molex P/N 39-01-2200)

*Units starts failing at ~115 Celsius. Operating at temperatures above 85C / 185F will drastically reduce the MTBF. When operating at high temperatures or fanless operation, must reduce PSU load by 25%.







Maximum Power Characteristics

Output Rail	Current (Max)	Current Peak (<60 seconds)	Regulation
5V	8A	10A	1.5%
3.3V	8A	10A	1.5%
5VSB	1.5A	2A	1.5%
-12V	0.15A	0.2A	5-%
12V	8A* (see below)	10A	2%

Total power = 169.9 Watts
When operating at 24V or extreme temperatures, de-rate by 30%, ventilation will be required.

12V Rail Output Current

Input (V)	12V rail current	Input (V)	12V rail current
6V	4A	11V	8A
7V	5A	12V	8A
8V	6A	14V	8.5A
9V	7A	14-18V	9A
10V	8A	20-26V	7A

For low input voltage (6-10V) ventilation might be required for peak load