

160W DC/DC POWER SUPPLY FOR AUTOMOBILE

1 Function Description

DC/DC ATX power supply for automobile application, 6-30V (6-36V optional) DC input, +5V,+12V,+3.3V,-12V,+5VSB and PG (power good signal) outputs.

2 Operation Environment

Item	Unit	Minimum	Typical	Maximum	Test Conditon
Temperature	°C	-20		50	
RH	%RH	40		90	No Condensation

3 Technique Requirement

3.1 Input Characteristic

Item	Unit	Minimum	Typical	Maximum	Test Conditon
DC INPUT	Vdc	6	12	30	
Input Current	A		13		

3.2 Output Characteristic

3.2.1 Output Voltage Regulation

Output	Min. Load	Max. Load	Peak Load	Output Voltage range	Ripple (pk-pk) (rated load、20MHz limit) *
+5V	0.5A	8A		4.75~5.25V	50mV
+12V	0.3A	8A		11.40~12.60V	120mV
+3.3V	0.5A	8A		3.14~3.55V	50mV
-12V	0A	0.1A		-11.0~-13.2V	120mV
+5VSB	0.1A	2A		4.75~5.25V	100mV

*: Need to add 47 μ F tantalum capacitor and 0.1 μ F high frequency capacitor on test point when testing.

3.2.2 Others Output Characteristics

Item	Unit	Minimum	Typical	Maximum	Test Conditon
Output Power	W		160		DC output power
Efficiency	%		92		Rated load
Turn on Overshoot	%			10	
Rise Time	ms		20		Output voltage up from 0% to 95%, rated load
Hold up Time	ms		2		Rated load

3.3 EMC Requirement

Item	Request	Standard	Judgement Grade
Conducted interference	CLASS B, 3dB margin	EN55022	Ensure system pass the CLASS B and have 3dB margin
Radiation interference	CLASS B, 3dB margin	EN55022	Ensure system pass the CLASS B and have 3dB margin

3.4 Protection Function

Item	Unit	Yes/No	Minimum	Typical	Maximum	Recovery Characteristic
Input inversion protection		Yes				
+5V OVP	V	Yes	5.8		6.8	Latched, need to re-apply DC input to recovery
+12V OVP	V	Yes	13.2		15.6	Latched
+3.3V OVP	V	Yes	3.9		4.3	Latched
Short Circuit Protection (+5V,+12V,+3.3V)		Yes				Latched

4 Monitoring ,Signal Control

4.1 Process Sequence

Item	Name	Characteristic
1	Ignition (The Ignition signal controlled by the voltage signal from the key)	<ol style="list-style-type: none"> 1) Ignition=OFF, Nothing happens , waiting for Ignition signal ON. 2) Ignition=ON, wait for 3-4s, open +5VSB output, after another 1s the MCU 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. 3) Ignition=ON , nothing happens , your computer will remain ON. 4) Ignition=OFF ,wait about 10s and then it turned motherboard OFF by sending a signal to the motherboard's ON/OFF switch. Your computer should turn off gracefully. During this time, power will still be available for your PC to perform shutdown. 5) Ignition=OFF after 10s. Power will still be provided for another 50s, long enough for most soft shutdown processes. In the event where the shutdown processes is hanging, power will be shutdown hard, turn off your computer's main power source to prevent battery drain. 6) Go back to step 1, until ignition is turned ON again.
2	Controlled motherboard signal (PS-ON)	PS-ON is to control motherboard ON/OFF switch for 'soft' start/stop sequence.. PS-ON is activated 5s after the ignition circuit is turned on and 10s after the ignition turned off.
3	Power good signal (PG)	<p>The PG signal comes from the No. pin8 of the 20pin output connector, it indicate the power supply working condition, this 'TTL' signal is the result of "AND" relationship with DC output and DC input voltage . On working condition, if the DC input voltage is well within it's operation range, then the PG signal is sent out (PG is in H logic) after 100-500ms delay. If the DC input voltage down and below to 11V, or the one of DC output voltage out of it's normal range, then send out Power Fall signal (that is: PG is in L logic). The Power Fall signal fall to below 0.3V, should have 1ms (at least) before the +5V output down to 4.5V,. And the PG signal's slop during the rise up and fall down</p> <p>Should be smooth and no any oscillation happened. PG signal should have the capacity to drive 6 standard TTL</p>

		loading. Following is the under voltage level of each output:										
		<table border="1"> <thead> <tr> <th>Output</th> <th>+5V</th> <th>+12V</th> <th>+3.3V</th> <th>-12V</th> </tr> </thead> <tbody> <tr> <td>UVP level</td> <td>+4.5V</td> <td>+10.8V</td> <td></td> <td>-10.4V</td> </tr> </tbody> </table>	Output	+5V	+12V	+3.3V	-12V	UVP level	+4.5V	+10.8V		-10.4V
Output	+5V	+12V	+3.3V	-12V								
UVP level	+4.5V	+10.8V		-10.4V								
4	Sleeping mode control (ON/OFF)	The ON/OFF signal comes from the No. pin14 of the 20pin output connector, is to control the power supply's working state. (Be active in 'L' level). If the ON/OFF signal is in floating, the power supply will have no output (except 5VSB) and in sleeping mode . The 5VSB should be within the range of 4.75-5.25V under 1.5A loading condition, and no any audible noise can be heard. If the ON/OFF signal is shorted to ground, the power supply will be in normal working condition and have normal output voltage.										
5	Battery Protection	The power supply will shutdown hard when the battery voltage below 11V, and the power supply will recovery ON when the battery voltage back and exceed 12V.										

6	Hand control	<p>The power output set by the jumper wire. when it's set in automation mode, the power supply will work according to the process of the item 1.</p> <p>When it's set to hand control mode, it controlled by external switch:</p> <ol style="list-style-type: none"> 1) Ignition=OFF, Nothing happens , waiting for Ignition signal ON。 2) Ignition=ON, wait for 3-4s, open +5VSB output, the power supply go into sleeping mode, waiting for switch ON/OFF. 3) Ignition=ON, press the switch button one time, sends an "ON" signal to the motherboard .The motherboard will turn ON and your system should start booting。 4) Ignition=ON, during power be in ON condition, press the switch button one time (<1s transient time). Nothing happens. 5) Ignition=ON, during power be in ON condition, press the switch button for 3-4s, then send an "OFF" signal to the motherboard, the power supply go into sleeping mode. 6) Ignition=OFF, during power be in ON condition, wait about 10s and then it turned motherboard OFF by sending a signal to the motherboard's ON/OFF switch. Your computer should turn off gracefully. During this time, Power will still be provided for another 50s, long enough for most soft shutdown processes. In the event where the shutdown processes is hanging, power will be shutdown hard, turn off your computer's main power source to prevent battery drain. 7) Ignition=OFF after 10s. during power be in OFF condition. Power will be shutdown include +5VSB output. 8) Go back to step 1, until ignition is turned ON again。
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4.2 PG signal Sequence

Parameter	Value Request			Test Condition		Figure
	Name	Minimum	Typical	Maximum	Input voltage	
tp.G	100ms		500ms	Normal	Normal	FIG1
tp.F	0.5ms	1ms		24VDC	100%	FIG2

tr		5ns	50 μ s	24VDC	100%	FIG3
tf		500ns	10 μ s	24VDC	100%	FIG4

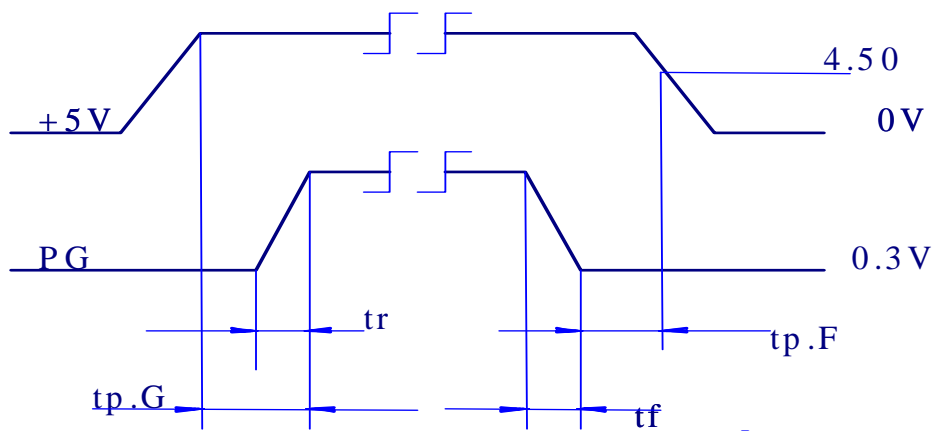


FIG1

5 Mechanical Requirement

5.1 Outline and Connection

V+: Positive DC input from battery

V-: Negative DC input from battery

ACC: Control Signal from Ignition

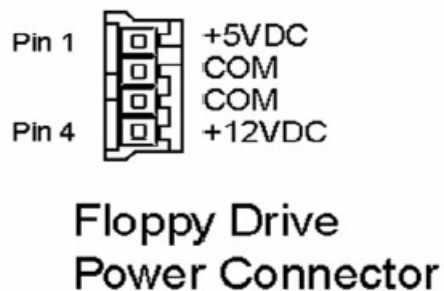
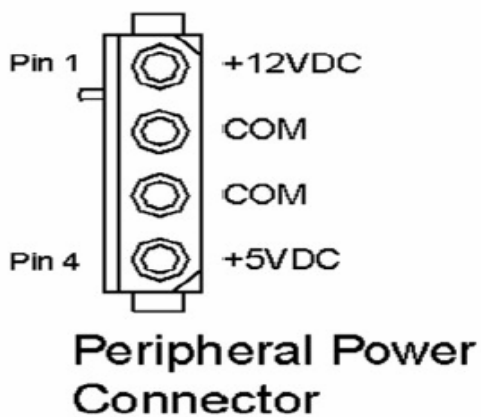
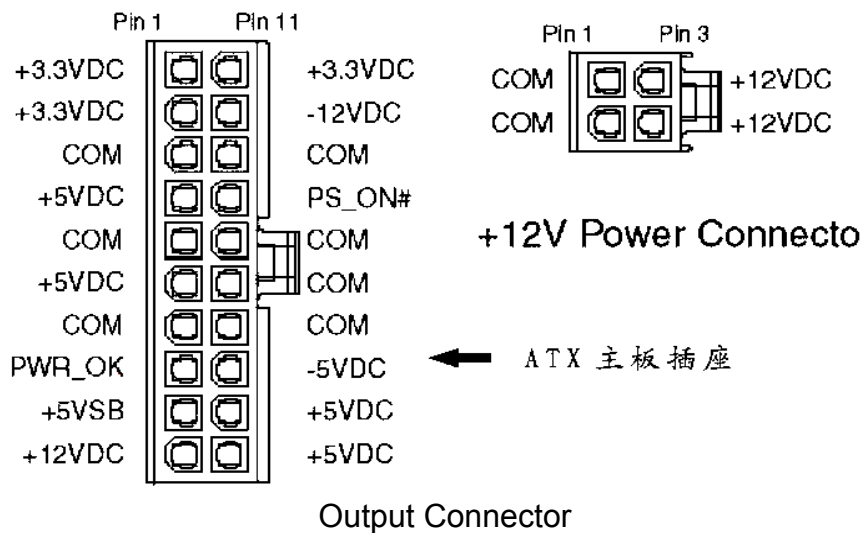
J4/J9-MB: ITPS control signal to Motherboard “power off “Pin

J5: Controls amplifier via remote on/off

J6: To ATX Motherboard 20 power pin Connector

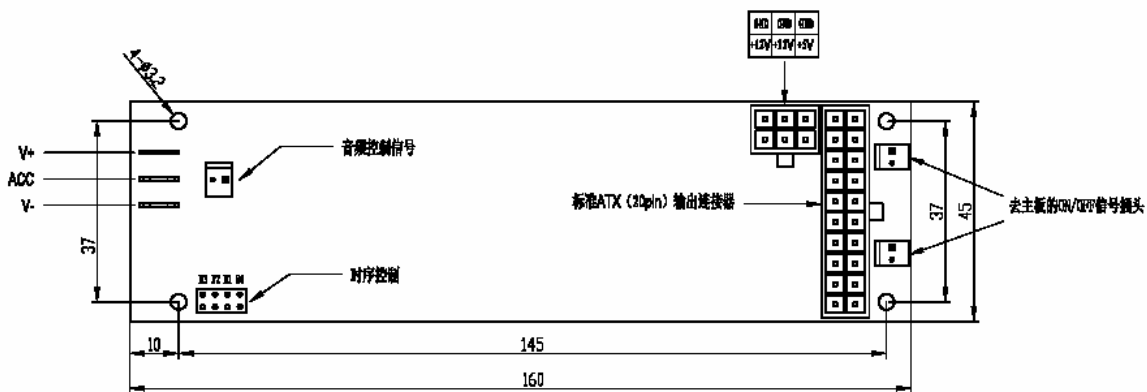
J7: To peripheral power Connector for 12V and +5V

DC Input Fuse: two ATO series SMT fuse 15A



Output Connector

5.2 Dimension



Dimension: 160mmX45mmX18mm

Jump Wire(Short Pin) Selection

A, Jump Wire(Short Pin) Connection

The Product can be set to the different ITPS control function through the selection of the jump wires.

B0,B1,B2 is the jump wires location of the time sequence control selectors .

B3 is the jump wire location of the input UVP function selector.

when B3 is set to "1"---have no UVP function; B3 is "0"---have UVP function.

Jump wire logic definition:

Status "1"---jump wire is "OPEN" (Does not insert the jumper wire)

Status "0"---jump wire is "Short" (jumper wire be in used)

B.Time Sequence Description

Ton-d: Turn on delay time. When the ACC signal turn to effected, the power supply will be turn on and the computer system will be start after the "Ton_d" ---turn on delay time.

Toff-d: Turn off delay time. When the ACC signal turned to off, the power supply will be go in-to the automatically turn off procedure after the "Toff_d" ---turn off delay time.

Toff: Power supply shut down delay time. When the automatic turn off procedure start, the 5VSB output will be turned off after the "Toff" time.

Input UVP : When the input voltage is drop to the lower voltage(UVP point) and keep for 30s, the power supply will be turned off automatically.

C. Jump wire selection and time sequence

Jump wire Selection				Time Sequence			Remark
B0	B1	B2	B3	Ton-d	Toff-d	Toff	
1	1	1	--- *	5s	30s	60s	suggested
1	0	1	--- *	5s	1800s	60s	
1	1	0	--- *	5s	3600s	60s	
1	0	0	0/1	5s	5s	Never	Note 1
0	1	1	--- *	5s	5s	60s	
0	0	1	--- *	5s	30s	1200s	
0	1	0	0/1	5s	30s	Never	Note 1
0	0	0	1	---	---	---	Note 2
0	0	0	0	---	---	---	Note 3

"---*": Can select logic "1" or "0" to turn off or turn on the input UVP function.

Note1: When "Toff" time is set to "Never" , the 5VSB output will not shut down until the input voltage drop to a lower voltage(UVP point) and automatically start the input UVP procedure. (Whatever the status of the B3).

Note2: Have no time sequence control and the input UVP function.

Note3: Have no time sequence control, but have the input UVP function.