INGENIERIA
ELECTRONICA, MICROPROCESADORES, ENERGIA
T. DE LOQUI 58 - 9400 RIO GALLEGOS

Selection of Components – Circuit Board for the supply of the Powers3A

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1. Possible configurations of the Powers3a board

The POWERS3A board allows for a number of configurations, according to the special application. It is possible to use only the +5V output, allowing for the full current (1A or 3A) availability of the LM257x ICs, or use one or both DC/DC modules that draw power from the +5V output.

The cost of these modules (which is not negligible) must be balanced according to the benefits of full protection, tight regulation, reliability and reduced component count compared to other solutions. If the current consumption of the +5V circuits and the analogue front end is low (<0.6A), module #1 can be used with the 1A LM2575 version. If more current is necessary, the configurations shown in the following table can be evaluated. Higher battery voltages at higher currents usually make forced ventilation necessary. Also, in the cases of 48

Furthermore, cases with a Vbat=48V require the installation of a resistance pre-regulator, which avoids that the integrated circuit receives more than specified max. "Input" of +60V.

Powers3a Board - Configurations

Nº	Input Voltage	+5V Rated Output Current	Module #1	Module #2	Available +5V Output Curr.	Forced Ventilation	IC	Pre-Regulator
1	12V	1A	(*)	-	0.7 to 1A	-	LM2575	-
2	24V	1A	(*)	-	0.7 to 1A	-	LM2575	-
3	48V	1A	(*)	-	0.7 to 1A	*Recommended*	LM2575HV	(**)
4	12V	3A	+/-12 ó +/-15	-	2A	-	LM2576	-
5	24V	3A	+/-12 ó +/-15	-	2A	-	LM2576	-
6	48V	3A	+/-12 ó +/-15	-	2A	*Recommended*	LM2576HV	(**)
7	12V	3A	+/-12 ó +/-15	+/-12 ó +/-15	1A	-	LM2576	-
8	24V	3A	+/-12 ó +/-15	+/-12 ó +/-15	1A	*Necessary*	LM2576	-
9	48V	3A	+/-12 ó +/-15	+/-12 ó +/-15	1A	*Necessary*	LM2576HV	(**)

(*) Not recommended unless current required in +/-12 or +/-15 is less than 0.1A.

(**) Required if Vbat can exceed 60V.

Table 1 - Possible Configurations

2. Components that vary according to "Entrance"- Voltage and Capacity

The variable components of this version are shown in table 2. The number of every variant refers to table 1. Furthermore, table 3 contains a list of all the required components for the different variants of the board.

Concerning the “entrance” diodes, the diode D11 prevents errors in the polarity of the connection and can be short-circuited under circumstances where false polarity is improbable. The Zener – diode D13 is also optional and has the task to protect over-voltages at U11. Important with respect to the clamping diode D12 at the “outlet” of the converter is of use of an “Schottky–Type” diode or a similar high velocity model. The recommended components in table 2 have a minimum voltage specification of 1.2times the maximum “output” current and also an adequate voltage rating.

In the case of the inductor L11, the circuit permits the installation of two possible commercial models: RS - inductors with 100uH, 5.4A (code in table 3) or RM-6 induction coils with iron core. For the capacitors (C12 and C13a1) it is possible to use isolation of a lower value, although the indicated isolation produces a higher ESR value. Also you can exchange the capacitors by models with lower capacity if the regulation necessities are lower. The absolute minimum values are 220uF for 1A “output” and 680uF for 3A “output”. With respect to the jumpers JS1 – JS3 you can use conventional types like Berg 0.1”. The function of these three jumpers is to form a Logic OR – circuit: JS1 defines the continuous functioning (always ON), with the JS2 you can select an external TTL (ON/OFF-state) and JS3 is for the control by the integrated monitoring ICL7665. The last configuration is the normal selection for the protection against excessive discharge of a battery.

Components of the Powers3a with respect to different variants:

Nº	Tensión de Entrada	Corriente de Salida (sólo +5V)	D11	D12	D13	C11	C12	C13a1	R1
1	12V	1A	1N4007	1N5821	Zener 40V/5W	100uF/50V	100uF/50V	330uF/50V	22K/0.25W
2	24V	1A	1N4007	1N5822	Zener 40V/5W	100uF/50V	100uF/50V	330uF/50V	47K/0.25W
3	48V	1A	1N4007	MUR310	Zener 60V/5W	100uF/100V	100uF/50V	330uF/50V	100K/0.25W
4	12V	3A	1N5402	1N5824	Zener 40V/5W	100uF/50V	220uF/63V	1000uF/50V	22K/0.25W
5	24V	3A	1N5402	MBR340	Zener 40V/5W	100uF/50V	220uF/63V	1000uF/50V	47K/0.25W
6	48V	3A	1N5402	50SQ100	Zener 60V/5W	100uF/100V	220uF/63V	1000uF/50V	100K/0.25W
7	12V	3A	1N5402	1N5824	Zener 40V/5W	100uF/50V	220uF/63V	1000uF/50V	22K/0.25W
8	24V	3A	1N5402	MBR340	Zener 40V/5W	100uF/50V	220uF/63V	1000uF/50V	47K/0.25W
9	48V	3A	1N5402	50SQ100	Zener 60V/5W	100uF/100V	220uF/63V	1000uF/50V	100K/0.25W

Table 2 - Component variations.

For the special functions of the components in table 3, please refer to the additional documentation: **SchemPowers3As.pdf** (Diagram) and **Powers3a DescripEn rev2001b.pdf** (Application and Description).

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Table 3

COMPONENTS Powers3a.pcb Rev.

Number	Descriptio	Code on
1	Capacitor Electrolytic	C1
1	Capacitor Electrolytic	Cb1,C2
9	Capacitor Ceramic	C13-C19,C110-
1	Capacitor	C11
1	Capacitor	C12
1	Capacitor	C13
1	Base 2x8	IC1
1	27K Resistor	RL1
1	4K7 Resistor	RL2
1	470R Resistor	RL3
2	10K Resistor MF	R11,R1
1	330R Resistor	R3
1	6K8 Resistor	R7
1	100K Resistor	R11A
1	Resistor 1/8W,5%	R1
2	Connector milimetric	J1,J
1	Diode Conventional	D11
1	Diode Zener (*)	D13
1	Diode Schottky or Fast	D12
2	Diode Zener 1W -	D14,DZ
2	Diode Zener 1W -	D15,D1
3	Diode Switching	D1,D2,D1
1	Inductor 100uH / 5.4A	L11 (RS228-416 ó RM6 coil)
3	Terminal type SYBID 2	J11,CN1,C
2	Terminal type SYBID 3	CN3,CN
1	IDC Macho Double Strip	JS1-JS2-
1	IDC Macho Double	J3
1	Fusible Resetable	F1-R (RS183-
4	Presets Bourns 10K 25V	R2,R8,R31,R
2	Presets Bourns 100K 25V	R22,R2
1	Dissipater Negro TO220	Connected
1	Regulator Integrated -5V	VR1
1	Regulator Switching	U11
1	Batt. Monitor ICL7665	IC1 / con base
1	BC327 - PNP	Q1
1	NPN	Q4
2	NMXD0515SO,NMXD051	Modules (+/-12 ó +/-

(*) See Table 2

(**) See Table 1