QUASAR PROJECT AS8860-24 – 24Vdc, 0.6A REGULATED POWER SUPPLY

General Guidelines for Electronic Kits and Assembled Modules

Thank you for choosing one of our products. Please take some time to carefully read the important information below concerning use of this product. The assembly and operating instructions are on the following pages. Help with component identification can be found on our website at quasarelectronics.co.uk/component-identification-help. If you are unsure about any aspect of the assembly oruse of this product please contact our Support Team before proceeding.

WEEE Directive (Waste Electrical and Electronic Equipment)
Notice To All European Union Citizens. Important environmental informationabout this product.
The crossed out wheeled bin symbol on this product, package or documentation indicates that disposal of this product after its lifecycle could harm the environment.Do not dispose of this product (or batteries if used) as unsorted municipal waste. It should be disposed by a specialized company for recycling.
The unit should be returned to your distributor or to a local recycling service. Please respect the local environmental rules. If in doubt contact your local authorities about waste disposal rules.

Safety: General rules concerning safe use of our Kits or Modules.
To ensure your safety, please observe these safety measures. In no way are these complete. As safety requirements vary, please check with your local authorities, in order to comply with localrequirements. If in doubt, seek the help of a qualified person.

Battery or wall-adaptor operated devices are safe devices. They do not require special attention unless mains voltage is connected to an output e.g. a relay.

To ensure electrical safety, and also protection from fire or personal injury, make sure your mains operated equipment complies with these safety hints:

- Use a suitable plastic enclosure. If a metal enclosure is used, make sure it is properly earthed.
- Use a power switch if the device consumes more than 10W. Use a double pole switch for mains operated, transformer-less kits.
- Mount a fuse in series with the mains switch. Use a slow blow (T) 50mA fuse for transformers up to 10W and a 100mA fuse for transformers up to 20W.
- Use a mains input connector, or a robust power cord with a clamp.
- Internal wiring carrying mains voltages must have a minimum cross-sectional area of 0.5mm^2.

If supplied, attach the power rating label near the power cord of the device and fill-out the mains voltage, frequency, power consumption and fuse values.

Troubleshooting and Support

90% of non-working kits are due to poor soldering.
We operate a Get-You-Going service for non-working kits but there is a charge based on the time and components needed to complete the repair. Quite often it is not economically viable for us to repair and itis cheaper to supply a new ready-made product at full cost.

Disclaimer

Quasar Electronics reserves the right to change product specifications or to discontinue products without notice. Quasar Electronics cannot be held responsible for any loss or damage, direct or indirect, which might occur from the use of a product. Quasar Electronics Kits or Modules are intended for educational and demonstration purposes only. They are not intended for use in commercial applications. If they are used in such applications the purchaser assumes all responsibility for ensuring compliance with all local laws. In addition, they are not suitable for use as or as a part of life support systems, or systems that might create a hazardous situation of any kind.

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24Vdc single rail power supply board using an L7824 voltage regulator with the following general features:

- input voltage up to 26Vac or 35Vdc
- 600mA maximum current rating
- 24Vdc +/- 1Vdc output voltage accuracy
- output short circuit & thermal overload protection

Input voltage must be a minimum of 3Vdc above the output voltage for full output voltage to be achieved.

Please see the L7824 datasheet pages on the following page for more technical details and characteristics.

Connections

Apply 20-26Vac or 27-35Vdc to the terminal block marked "AC".

Take care to connect load with **correct polarity** to the terminal block marked "V-" (GROUND) and "V+" (+24Vdc).

Please note that both the heatsink and the fixing hole next to the "V-" output are at ground potential.

Heat Dissipation

The temperature generated by the voltage regulator is dissipated by the heatsink. The degree of heating is determined by the input to output voltage difference and the current drawn by the load. **If the application causes the heatsink to get hot then adequate ventilation should be employed and/or a larger heatsink fitted.**

Circuit Description

Two 470uF/35V electrolytic capacitors and a ceramic capacitor provide smoothing of the rectified AC input voltage prior to regulation. Further smoothing capacitors are provided on the regulator output side making the board suitable for a wide range of applications.

Background Info

For most non-critical applications, the best and simplest choice for a voltage regulator is the 3- terminal type. The 3 terminals are input, ground and output. The 7800 series can provide up to 1A load current and it has on-chip circuitry to prevent damage in the event of overheating or excessive current. That is, the chip simply shuts down rather than blowing out. These regulators are inexpensive, easy to use, and they make it practical to design a system with many PCBs in which an unregulated supply is brought in and regulation is done locally on each circuit board.

There is also a 79xx series of negative regulators. And we could have designed this PCB to accommodate them. However, there is so little call for regulated negative supplies these days that we decided to just design the board for the positive regulators. (Also note that the pinout for the 79 series is different to that for the 78.)

There are over 20 types of positive 3 terminal regulators available. The 78L00 series (100 mA maximum current in a transistor-type TO-92 package) and the 7800 series (1A current in TO-220AB package) are the most common for the hobbyist. The LM340T-xx series has slightly superior performance to the 78 series & can directly replace it.

Technical Support

For Technical Support on this product please email:
support@quasarelectronics.co.uk

See our website at **quasarelectronics.co.uk** for more great products

L78 Series Datasheet - Maximum Ratings

3 Maximum ratings

Table 1: Absolute maximum ratings

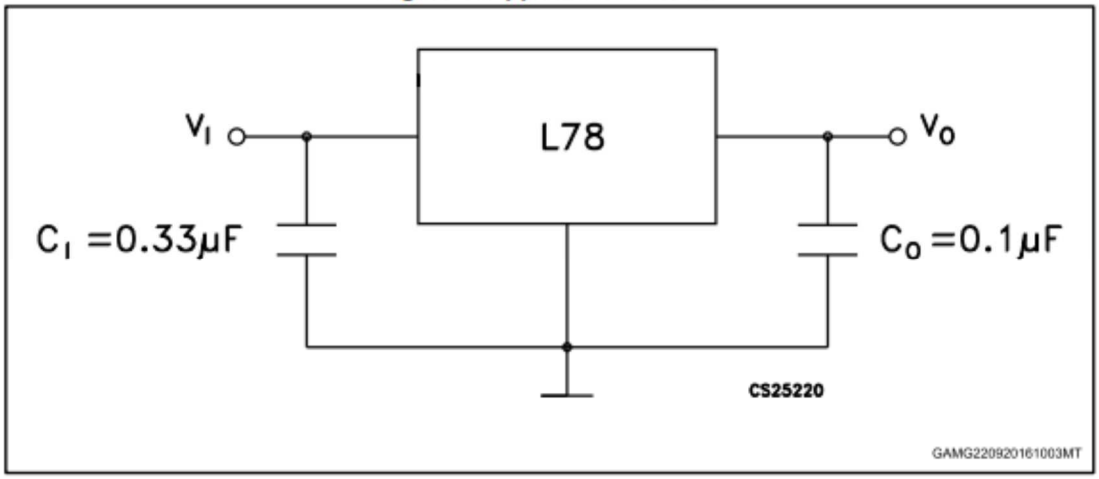
Symbol	Parameter		Value	Unit
V_I	DC input voltage	for V_O= 5 to 18 V	35	V
		for V_O= 20, 24 V	40	
I_O	Output current		Internally limited	
P_D	Power dissipation		Internally limited	
T_{STG}	Storage temperature range		-65 to 150	°C
T_{OP}	Operating junction temperature range	for L78xxC, L78xxAC	0 to 125	°C
		for L78xxAB	-40 to 125	

Absolute maximum ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.

Table 2: Thermal data

Symbol	Parameter	D²PAK	DPAK	TO-220	TO-220FP	Unit
R_{thJC}	Thermal resistance junction-case	3	8	5	5	°C/W
R_{thJA}	Thermal resistance junction-ambient	62.5	100	50	60	°C/W

Figure 4: Application circuits



ELECTRICAL CHARACTERISTICS FOR L7824C (refer to the test circuits, T_j = 0 to 125 °C, V_i = 33V, I_o = 500 mA, C_i = 0.33 µF, C_o = 0.1 µF unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_o	Output Voltage	T_j = 25 °C	23	24	25	V
V_o	Output Voltage	I_o = 5 mA to 1 A $P_o \leq$ 15 W V_i = 27 to 38 V	22.8	24	25.2	V
ΔV_o*	Line Regulation	V_i = 27 to 38 V T_j = 25 °C V_i = 30 to 36 V T_j = 25 °C			480 240	mV mV
ΔV_o*	Load Regulation	I_o = 5 to 1500 mA T_j = 25 °C I_o = 250 to 750 mA T_j = 25 °C			480 240	mV mV
I_d	Quiescent Current	T_j = 25 °C			8	mA
ΔI_d	Quiescent Current Change	I_o = 5 to 1000 mA			0.5	mA
ΔI_d	Quiescent Current Change	V_i = 27 to 38 V			1	mA
$\frac{\Delta V_o}{\Delta T}$	Output Voltage Drift	I_o = 5 mA		-1.5		mV/°C
eN	Output Noise Voltage	B = 10Hz to 100KHz T_j = 25 °C		170		µV
SVR	Supply Voltage Rejection	V_i = 28 to 38 V f = 120 Hz	50			dB
V_d	Dropout Voltage	I_o = 1 A T_j = 25 °C		2		V
R_o	Output Resistance	f = 1 KHz		28		mΩ
I_{sc}	Short Circuit Current	V_i = 35 V T_j = 25 °C		150		mA
I_{scp}	Short Circuit Peak Current	T_j = 25 °C		2.1		A

* Load and line regulation are specified at constant junction temperature. Changes in V_o due to heating effects must be taken into account separately. Pulce testing with low duty cycle is used.