12V Power Supply - 30A

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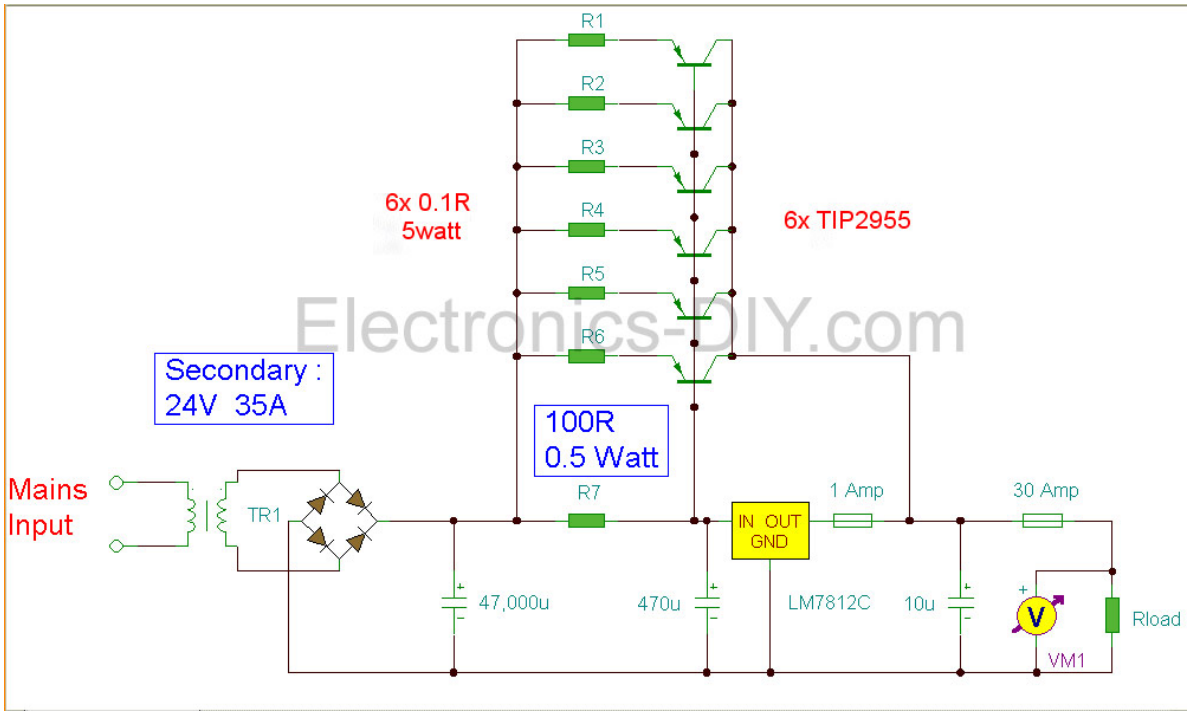
This is high current 12V power supply. Power supply uses LM7812 IC and can deliver up to 30A to the load by the help of the TIP2955 pass transistors. Each transistor can handle up to 5A and six of them result an total output current of 30A. You can increase or reduce the number of TIP2955s to get higher or lower current outputs. In this design the IC delivers about 800mA. A 1 amp fuse is connected after the LM7812 to protect the IC against high current transients. The transistors and the 12V regulator IC both require adequate heatsinking. When the load current is high, the power dissipation of each transistor also increases so excess heat may cause the transistors to fail. Then you will need a very large heatsink or fan cooling. 100Ω resistors are used for stability and prevent current swamping as the tolerances of dc current gain will be different for each transistor. The bridge rectifier diodes must be capable of passing at least 100 amps.



Notes

The input transformer is likely to be the most expensive part of the entire project. As an alternative, a couple of 12 Volt car batteries could be used. The input voltage to the regulator must be at least several volts higher than the output voltage (12V) so that the regulator can maintain its output. If a transformer is used, then the rectifier diodes must be capable of passing a very high peak forward current, typically 100amps or more. The 7812 IC will only pass 1 amp or less of the output current, the remainder being supplied by the outboard pass transistors. As the circuit is designed to handle loads of up to 30 amps, then six TIP2955 are wired in parallel to meet this demand. The dissipation in each power transistor is one sixth of the total load, but adequate heat sinking is still required. Maximum load current will generate maximum dissipation, so a very large heat sink is required. In considering a heat sink, it may be a good idea to look for either a fan or water cooled heat sink. In the event that the power transistors should fail, then the regulator would have to supply full load current and would fail with catastrophic results. A 1 amp fuse in the regulators output prevents a safeguard. The 400mohm load is for test purposes only and should not be included in the final circuit. A simulated performance is shown below:

Calculations

This circuit is a fine example of Kirchhoff's current and voltage laws. To summarize, the sum of the currents entering a junction, must equal the current leaving the junction, and the voltages around a loop must equal zero. For example, in the diagram above, the input voltage is 24 volts. 4 volts is dropped across R7 and 20 volts across the regulator input, 24 -4 -20 =0. At the output :- the total load current is 30 amps, the regulator supplies 0.866 A and the 6 transistors 4.855 Amp each , 30 = 6 * 4.855 + 0.866. Each power transistor contributes around 4.86 A to the load. The base current is about 138 mA per transistor. A DC current gain of 35 at a collector current of 6 amp is required. This is well within the limits of the TIP2955. Resistors R1 to R6 are included for stability and prevent current swamping as the manufacturing tolerances of dc current gain will be different for each transistor. Resistor R7 is 100 ohms and develops 4 Volts with maximun load. Power dissipation is hence (4^2)/200 or about 160 mW. I recommend using a 0.5 Watt resistor for R7. The input current to the regulator is fed via the emitter resistor and base emitter junctions of the power transistors. Once again using Kirchhoff's current laws, the 871 mA regulator input current is derived from the base chain and the 40.3 mA flowing through the 100 Ohm resistor. 871.18 = 40.3 + 830. 88. The current from the regulator itself cannot be greater than the input current. As can be seen the regulator only draws about 5 mA and should run cold.

Initial Testing and Faulting

For the initial test, do not connect a load. First use a voltmeter across the output terminals, you should measure 12 Volts, or very close to it. Then connect a 100 ohm, 3 Watt resistor or other small load. The reading on the voltmeter should not change. If you do not see 12 Volt, power off and check all connections.

I have heard from one reader whose supply was 35 Volt, not the regulated 12 Volts. This was caused by a short circuited power transistor. Should a short in any of the output transistors, occur, all 6 need to be un-soldered. Check with a multimeter set to resistance and measure between collector and emitter terminals. Power transistors usually fail short circuit so should be easy to find the faulty one.

A Finished Project

I've recently heard from Ryan Laurenciana in the Philippines who has built himself a 12V 30A power supply. Below are

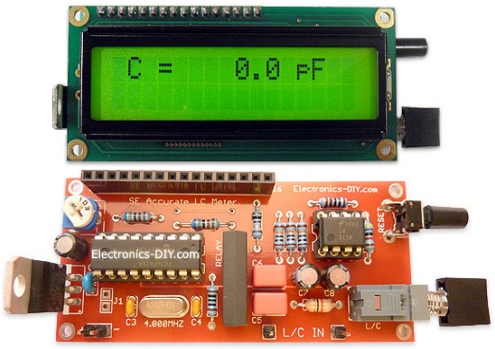
images from Ryans power supply.

Related Links

- Accurate LC Meter
- 60MHz Frequency Meter / Counter
- 1Hz - 2MHz Function Generator
- Voltmeter Ammeter
- ESR Meter / Transistor Tester
- Accurate 0-500MHz RF Power Meter
- DS18S20 Dual Temperature Meter
- BA1404 HI-FI Stereo FM Transmitter
- BH1417 Stereo PLL FM Transmitter
- 500mW FM / VHF Transmitter Amplifier / Booster
- 50mW BH1417 Stereo PLL FM Transmitter
- Phone FM Transmitter
- TV Transmitter with Audio
- 5 Watt FM Amplifier
- TDA7000 FM Receiver / TV Tuner / Aircraft Receiver
- NJM2035 HI-FI Stereo Encoder / Multiplexer
- USB Voltmeter
- USB IO Board

Downloads

12V Power Supply - 30A - Link



Accurate LC Meter

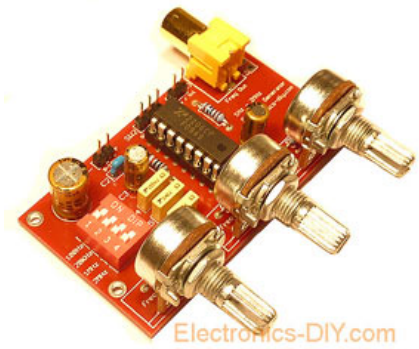
Build your own Accurate LC Meter (Capacitance Inductance Meter) and start making your own coils and inductors. This LC Meter allows to measure incredibly small inductances making it perfect tool for making all types of RF coils and inductors. LC Meter can measure inductances starting from 10nH - 1000nH, 1uH - 1000uH, 1mH - 100mH and capacitances from 0.1pF up to 900nF. The circuit includes an auto ranging as well as reset switch and produces very accurate and stable readings.

PIC Volt Ampere Meter

Volt Ampere Meter measures voltage of 0-70V or 0-500V with 100mV resolution and current consumption 0-10A or more with 10mA resolution. The meter is a perfect addition to any power supply, battery chargers and other electronic projects where voltage and current must be monitored. The meter uses PIC16F876A microcontroller with 16x2 backlighted LCD.

60MHz Frequency Meter / Counter

Frequency Meter / Counter measures frequency from 10Hz to 60MHz with 10Hz resolution. It is a very useful bench test equipment for testing and finding out the frequency of various devices with unknown frequency such as oscillators, radio receivers, transmitters, function generators, crystals, etc.

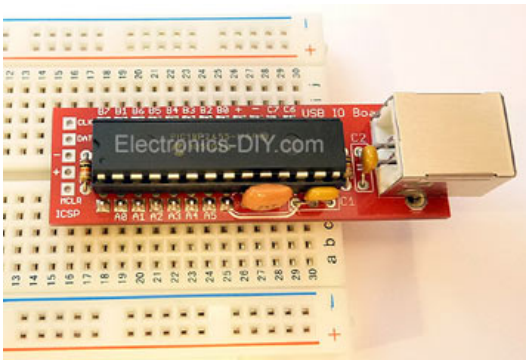


1Hz - 2MHz XR2206 Function Generator

1Hz - 2MHz XR2206 Function Generator produces high quality sine, square and triangle waveforms of high-stability and accuracy. The output waveforms can be both amplitude and frequency modulated. Output of 1Hz - 2MHz XR2206 Function Generator can be connected directly to 60MHz Counter for setting precise frequency output.

BA1404 HI-FI Stereo FM Transmitter

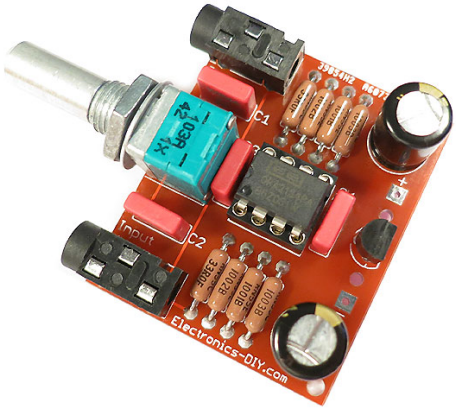
Be "On Air" with your own radio station! BA1404 HI-FI Stereo FM Transmitter broadcasts high quality stereo signal in 88MHz - 108MHz FM band. It can be connected to any type of stereo audio source such as iPod, Computer, Laptop, CD Player, Walkman, Television, Satellite Receiver, Tape Deck or other stereo system to transmit stereo sound with excellent clarity throughout your home, office, yard or camp ground.



USB IO Board

USB IO Board is a tiny spectacular little development board / parallel port replacement featuring PIC18F2455/PIC18F2550 microcontroller. USB IO Board is compatible with Windows / Mac OSX / Linux computers. When attached to Windows IO board will show up as RS232 COM port. You can control 16 individual microcontroller I/O pins by sending simple serial commands. USB IO Board is self-powered by USB port and can provide up to 500mA for electronic projects. USB IO Board is breadboard compatible.

ESR Meter / Capacitance / Inductance / Transistor Tester Kit

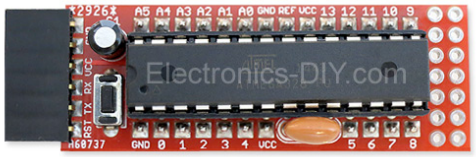


Audiophile Headphone Amplifier Kit

Audiophile headphone amplifier kit includes high quality audio

ESR Meter kit is an amazing multimeter that measures ESR values, capacitance (100pF - 20,000uF), inductance, resistance (0.1 Ohm - 20 MOhm), tests many different types of transistors such as NPN, PNP, FETs, MOSFETs, Thyristors, SCRs, Triacs and many types of diodes. It also analyzes transistor's characteristics such as voltage and gain. It is an irreplaceable tool for troubleshooting and repairing electronic equipment by determining performance and health of electrolytic capacitors. Unlike other ESR Meters that only measure ESR value this one measures capacitor's ESR value as well as its capacitance all at the same time.

grade components such as Burr Brown OPA2134 opamp, ALPS volume control potentiometer, Ti TLE2426 rail splitter, Ultra-Low ESR 220uF/25V Panasonic FM filtering capacitors, High quality WIMA input and decoupling capacitors and Vishay Dale resistors. 8-DIP machined IC socket allows to swap OPA2134 with many other dual opamp chips such as OPA2132, OPA2227, OPA2228, dual OPA132, OPA627, etc. Headphone amplifier is small enough to fit in Altoids tin box, and thanks to low power consumption may be supplied from a single 9V battery.



Arduino Prototype Kit

Arduino Prototype is a spectacular development board fully compatible with Arduino Pro. It's breadboard compatible so it can be plugged into a breadboard for quick prototyping, and it has VCC & GND power pins available on both sides of PCB. It's small, power efficient, yet customizable through onboard 2 x 7 perfboard that can be used for connecting various sensors and connectors. Arduino Prototype uses all standard through-hole components for easy construction, two of which are hidden underneath IC socket. Board features 28-PIN DIP IC socket, user replaceable ATmega328 microcontroller flashed with Arduino bootloader, 16MHz crystal resonator and a reset switch. It has 14 digital input/output pins (0-13) of which 6 can be used as PWM outputs and 6 analog inputs (A0-A5). Arduino sketches are uploaded through any USB-Serial adapter connected to 6-PIN ICSP female header. Board is supplied by 2-5V voltage and may be powered by a battery such as Lithium Ion cell, two AA cells, external power supply or USB power adapter.

200m 4-Channel 433MHz Wireless RF Remote Control

Having the ability to control various appliances inside or outside of your house wirelessly is a huge convenience, and can make your life much easier and fun. RF remote control provides long range of up to 200m / 650ft and can find many uses for controlling different devices, and it works even through the walls. You can control lights, fans, AC system, computer, printer, amplifier, robots, garage door, security systems, motor-driven curtains, motorized window blinds, door locks, sprinklers, motorized projection screens and anything else you can think of.