

sign up log in tour help

Electrical Engineering Stack Exchange is a question and answer site for electronics and electrical engineering professionals, students, and enthusiasts. It's 100% free, no registration required.

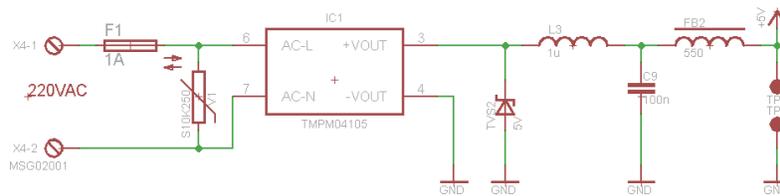
Take the 2-minute tour x

AC/DC 4W vs 2A GSM transmission bursts

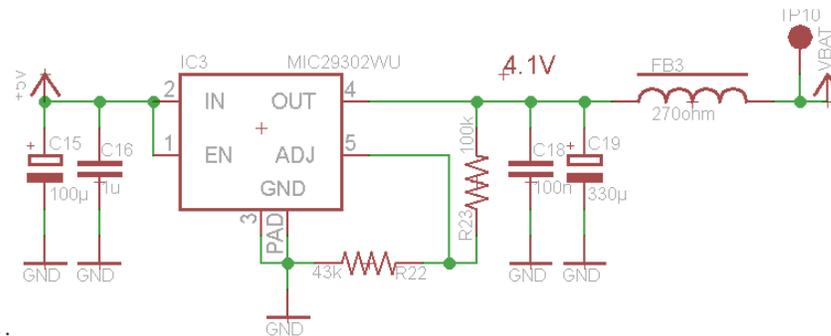
I have a big problem with the power supply of a SIM900. I designed my own board with a 220VAC-5VDC traco power, an ARM9 CPU, and a GSM/GPRS SIM900 module. The output of the traco power is 5V - 800 mA (so 4W). To supply my GSM module, I use a LDO 5V - 4.1V. When SIM900 is transmitting its 2A burst, 4.1V GSM supply don't have any voltage drop. But with the 5V supply, I go from 5V to 4.3V, so the CPU reset.

I know that I did a big mistake when I designed the board because I can not supply the CPU directly from the AC/DC. The best solution would have been to use a AC/DC 9V and then create a 5V for the CPU and a 4.1V (from the 9V source) for the GSM. But I can't change the AC/DC so I need to use this AC/DC 5V-800mA.

So do you have a solution to avoid a voltage drop on the 5V ? For information, the 4.1V can drop to 3.2 (the Sim900 supports that).



This is my 5V power supply :



And this is the GSM power supply :

Many thanks for your help.

power-supply cpu gsm

edited Jun 4 at 6:18

asked May 16 at 14:11

 Damgot
38 5

Have you tried adding some capacitors on the 4.1V supply of the module? Preferably *after* the inductor.

– Hanno Binder May 16 at 14:23

How long is the 2A burst for? How long before it happens again (minimum)? – Andy aka May 16 at 14:28

@AndyAka GSM 2A bursts are 577 μ s every 4.6 ms. – trosley May 16 at 16:11

@Damgot I would try adding 2000 μ F on the 4.1 rail, just before the GSM module. – trosley May 16 at 16:15

1 Answer

2A bursts are 577 μ s every 4.6 ms

The power for those bursts is equivalent to about 1.25 watts¹ - if the 4.1V supply were 100% efficient at taking energy from the 5V traco then the power needed would be 1.028 watts but because you are using a linear voltage regulator to create the 4.1 volts then it's 1.25 watts from the traco.

The question is, from your 4 watt traco supply, is the remaining 2.75 watts enough to power the circuits that don't take the 2 A pulse. If it is then that's OK you don't necessarily need to change the traco and you can provide the "surge" power with a large capacitor, preferably directly on the power feeds to the SIM900.

How big? 2 amps at 4.1 volts for 0.577 ms is an energy of 4.73 milli joules so rearranging the well-know energy-capacitance-voltage formula gives you: -

$$C = 2 \frac{\text{energy}}{V^2} = 2 \frac{4.73mJ}{16.81} = 563 \text{ uF}$$

BUT this needs to be at least 5 times bigger so the voltage at the terminals doesn't droop - consider that it needs to be about 3000 uF and use a low ESR type.

¹ average power is 5 volts x 2 amps x 0.577 / 4.6 = 1.25 watts.

edited May 16 at 18:13

answered May 16 at 16:42



Andy aka

64.2k 1 24 97

Many thanks for your answer. I tried with 5 220µF tantale low ESR on a breadboard but it's not sufficient. So I developed a little board to solder until 20 Low ESR 1500µF electrolytic Capa (EEEEFPoJ152AP) and connect this little board "as I can" on the 4.1V of my own board. I saw an application note from siemens which says that, for class 10 GPRS, I need between 9400 and 14400 µF Low ESR. So I will test with different values. - [Damgot](#) : May 22 at 9:10

@Damgot did the 1500uF work? How many 20? Seems a lot!! - [Andy aka](#) May 22 at 9:46

I've just ordered my little board today, so I will make my tests next week. 20 is to many, but I desgined my "test" board for 20 in case I will need it. I think I will need at least 8, according to the Siemens Application note. But capacitance is not the only things, I need to have at least 3A ripple current and ESR not higher than 50 mohm. And 8 EEEFPoJ152AP should do it. - [Damgot](#) : May 22 at 11:09

I received my little board and I tried with 8 EEEFPoJ152AP and 1 TCJD337M006R0040 so 12330 µF and the result is not so good : i.stack.imgur.com/dVgk7.png (Yellow is GSM Supply : 4.3V and Blue is 5V). I don't know what to do to have a better result... - [Damgot](#) : Jun 3 at 12:13

Can you supply data sheet links to the caps. How much has it improved things? What ESR does the capacitor bank have now? - [Andy aka](#) Jun 3 at 14:02
