

Atelier 2 - Les alimentations de laboratoire

Une alimentation de laboratoire est un équipement qui permet de produire une source de tension continue ou bien une source de courant continu. Cet atelier est dédié à son utilisation.

1 Configurer une alimentation de laboratoire

1. Débranchez l'alimentation et vérifiez que l'alimentation est isolée galvaniquement du secteur. Pour cela, avec un multimètre en mode "test de continuité", vérifiez que le connecteur "−" de l'alimentation n'est pas relié à la terre.

Deux cas se présentent :

- le connecteur "−" de l'alimentation est relié à la terre. Le symbole \perp devrait être présent sur l'alimentation, à côté du connecteur "−". Dans ce cas, le connecteur "−" DOIT toujours être connecté à la terre de votre circuit (et donc généralement à la masse!). Si vous connectez le "−" à tout autre point du circuit vous provoquerez un court-circuit.
 - L'alimentation n'est pas relié à la terre et vous pouvez placez le "+" et le "−" de l'alimentation n'importe où dans le circuit.
2. Allumez l'alimentation de laboratoire qui est à votre disposition. Configurez l'alimentation de sorte à ce qu'elle sorte +12V entre le + et le − pour un courant d'intensité maximale de 200mA.
 3. Utilisez un voltmètre et vérifiez que l'alimentation sort bien +12V. Dans ce cas, l'alimentation est utilisée en générateur de tension puisque la tension est fixe et pas le courant.
 4. À l'aide d'un fil, mettez en court-circuit l'alimentation et vérifiez que le courant est limité à 200mA. Dans ce cas, l'alimentation est utilisée en générateur de courant puisque le courant est fixe, mais pas la tension.

2 Utiliser une alimentation de laboratoire dans un cas concret

1. Prenez le circuit de la Figure 1 mis à disposition avec ce document. Configurez une alimentation de laboratoire de façon à faire fonctionner ce circuit, en limitant le courant à 60mA (une LED consomme 20mA maximum).

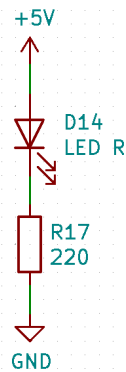


FIGURE 1 – Un circuit pour allumer une LED.

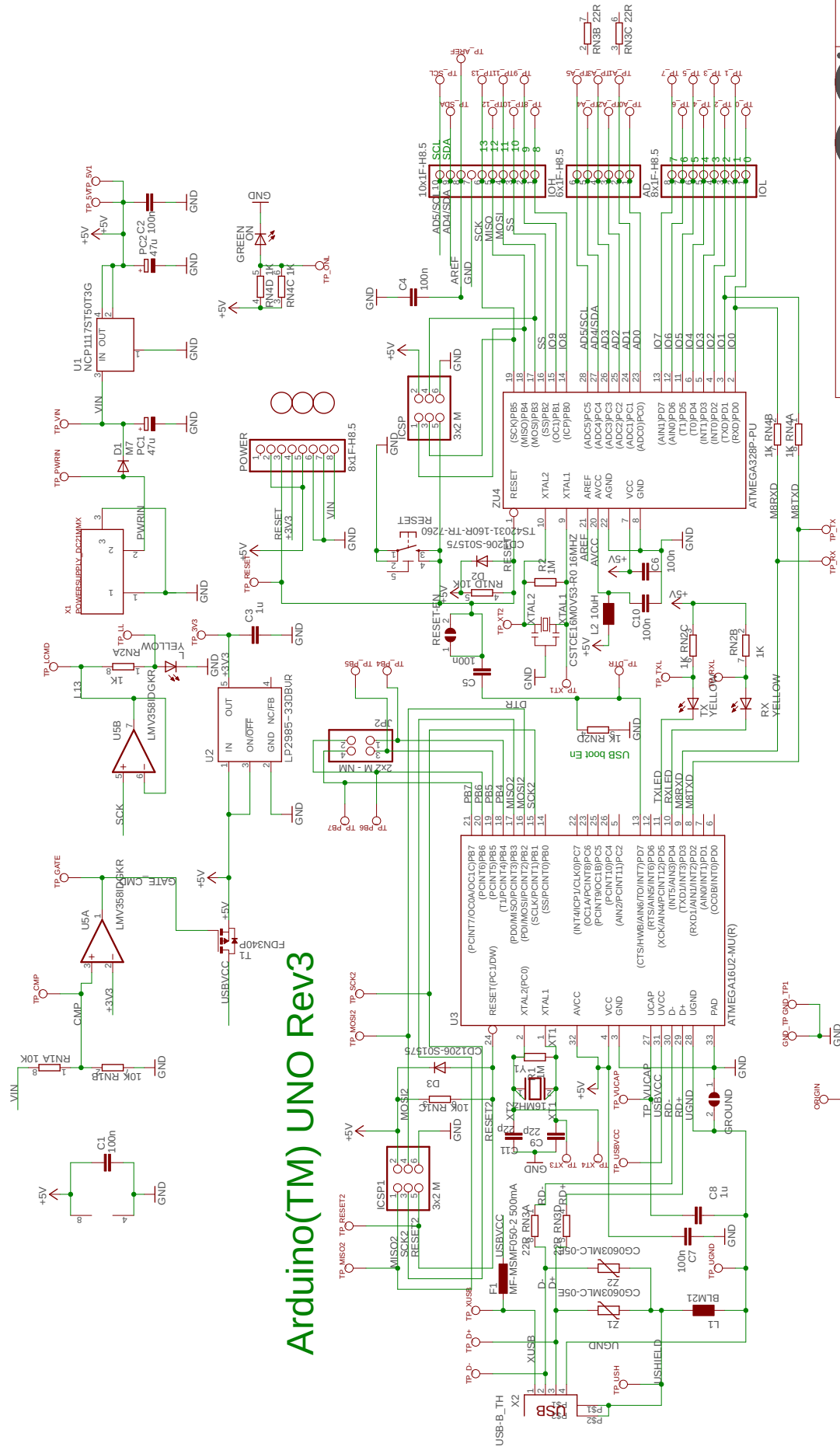
2. Prenez un arduino uno. Consultez son schéma électronique mis en annexe. En utilisant certaines spécifications de composants mis aussi en annexe, déduisez-en le courant électrique nécessaire à sa consommation. Alimentez ensuite l'arduino directement à l'aide d'une alimentation de laboratoire, sans utiliser de pile, batterie ou bloc d'alimentation fourni avec l'arduino.

Utilisez maintenant le multimètre pour mesurer le courant électrique dépensé par l'arduino. Quelle puissance consomme-t-il ? (n'oubliez pas, sur le multimètre, de reconnecter la sonde "+" sur le connecteur "V" à la fin cette expérimentation)

3. Prenez maintenant l'ordinateur portable ci-joint. Consulter les données techniques au dos de cet ordinateur. Quel est la tension de fonctionnement de cet ordinateur ? Faut-il une tension continue ou alternative ? Quel partie du connecteur doit être connecté à la masse ? Quel courant doit être capable de fournir l'alimentation pour que l'ordinateur fonctionne correctement ? Configurez l'alimentation de laboratoire en conséquence et connectez-les à l'ordinateur pour le faire fonctionner directement avec l'alimentation de laboratoire, sans autre alimentation.

DATASHEETS

Arduino(TM) UNO Rev3



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ARDUINO

NCP1117, NCV1117

1.0 A Low-Dropout Positive Fixed and Adjustable Voltage Regulators

The NCP1117 series are low dropout positive voltage regulators that are capable of providing an output current that is in excess of 1.0 A with a maximum dropout voltage of 1.2 V at 800 mA over temperature. This series contains nine fixed output voltages of 1.5 V, 1.8 V, 1.9 V, 2.0 V, 2.5 V, 2.85 V, 3.3 V, 5.0 V, and 12 V that have no minimum load requirement to maintain regulation. Also included is an adjustable output version that can be programmed from 1.25 V to 18.8 V with two external resistors. On chip trimming adjusts the reference/output voltage to within $\pm 1.0\%$ accuracy. Internal protection features consist of output current limiting, safe operating area compensation, and thermal shutdown. The NCP1117 series can operate with up to 20 V input. Devices are available in SOT-223 and DPAK packages.

Features

- Output Current in Excess of 1.0 A
- 1.2 V Maximum Dropout Voltage at 800 mA Over Temperature
- Fixed Output Voltages of 1.5 V, 1.8 V, 1.9 V, 2.0 V, 2.5 V, 2.85 V, 3.3 V, 5.0 V, and 12 V
- Adjustable Output Voltage Option
- No Minimum Load Requirement for Fixed Voltage Output Devices
- Reference/Output Voltage Trimmed to $\pm 1.0\%$
- Current Limit, Safe Operating and Thermal Shutdown Protection
- Operation to 20 V Input
- NCV Prefix for Automotive and Other Applications Requiring Site and Control Changes
- Pb-Free Packages are Available

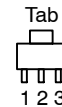
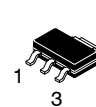
Applications

- Consumer and Industrial Equipment Point of Regulation
- Active SCSI Termination for 2.85 V Version
- Switching Power Supply Post Regulation
- Hard Drive Controllers
- Battery Chargers



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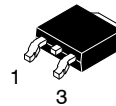


SOT-223
ST SUFFIX
CASE 318H

(Top View)

Pin: 1. Adjust/Ground
2. Output
3. Input

Heatsink tab is connected to Pin 2.



DPAK
DT SUFFIX
CASE 369C

(Top View)

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 12 of this data sheet.

DEVICE MARKING INFORMATION

See general marking information in the device marking section on page 15 of this data sheet.

TYPICAL APPLICATIONS

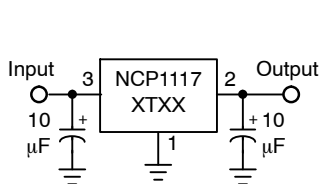


Figure 1. Fixed Output Regulator

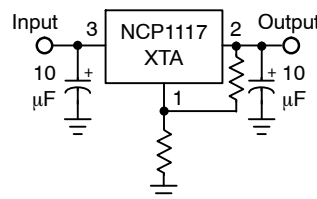


Figure 2. Adjustable Output Regulator

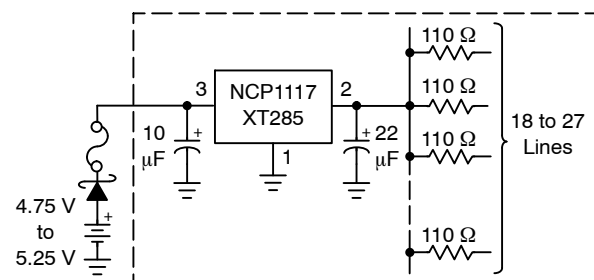


Figure 3. Active SCSI Bus Terminator

LP2985 150-mA Low-noise Low-dropout Regulator With Shutdown

1 Features

- Output Tolerance of
 - 1% (A Grade)
 - 1.5% (Standard Grade)
- Ultra-Low Dropout, Typically
 - 280 mV at Full Load of 150 mA
 - 7 mV at 1 mA
- Wide V_{IN} Range: 16 V Max
- Low I_Q : 850 μ A at Full Load at 150 mA
- Shutdown Current: 0.01 μ A Typ
- Low Noise: 30 μ V_{RMS} With 10-nF Bypass Capacitor
- Stable With Low-ESR Capacitors, Including Ceramic
- Overcurrent and Thermal Protection
- High Peak-Current Capability
- ESD Protection Exceeds JESD 22
 - 2000-V Human-Body Model (A114-A)
 - 200-V Machine Model (A115-A)

2 Applications

- Portable Devices
- Digital Cameras and Camcorders
- CD Players
- MP3 Players

3 Description

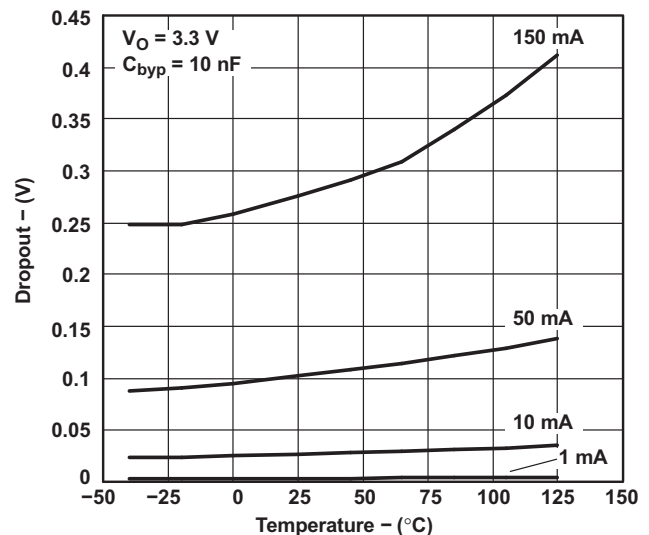
The LP2985 family of fixed-output, low-dropout regulators offers exceptional, cost-effective performance for both portable and nonportable applications. Available in voltages of 1.8 V, 2.5 V, 2.8 V, 2.9 V, 3 V, 3.1 V, 3.3 V, 5 V, and 10 V, the family has an output tolerance of 1% for the A version (1.5% for the non-A version) and is capable of delivering 150-mA continuous load current. Standard regulator features, such as overcurrent and overtemperature protection, are included.

Device Information⁽¹⁾

PART NUMBER	PACKAGE	BODY SIZE (NOM)
LP2985	SOT-23 (5)	2.90 mm x 1.60 mm

(1) For all available packages, see the orderable addendum at the end of the data sheet.

Dropout Voltage vs Temperature



Features

- High Performance, Low Power AVR[®] 8-Bit Microcontroller
- Advanced RISC Architecture
 - 125 Powerful Instructions – Most Single Clock Cycle Execution
 - 32 x 8 General Purpose Working Registers
 - Fully Static Operation
 - Up to 16 MIPS Throughput at 16 MHz
- Non-volatile Program and Data Memories
 - 8K/16K/32K Bytes of In-System Self-Programmable Flash
 - 512/512/1024 EEPROM
 - 512/512/1024 Internal SRAM
 - Write/Erase Cycles: 10,000 Flash/ 100,000 EEPROM
 - Data retention: 20 years at 85°C/ 100 years at 25°C⁽¹⁾
 - Optional Boot Code Section with Independent Lock Bits
 - In-System Programming by on-chip Boot Program hardware-activated after reset
 - True Read-While-Write Operation
 - Programming Lock for Software Security
- USB 2.0 Full-speed Device Module with Interrupt on Transfer Completion
 - Complies fully with Universal Serial Bus Specification REV 2.0
 - 48 MHz PLL for Full-speed Bus Operation : data transfer rates at 12 Mbit/s
 - Fully independent 176 bytes USB DPRAM for endpoint memory allocation
 - Endpoint 0 for Control Transfers: from 8 up to 64-bytes
 - 4 Programmable Endpoints:
 - IN or Out Directions
 - Bulk, Interrupt and Isochronous Transfers
 - Programmable maximum packet size from 8 to 64 bytes
 - Programmable single or double buffer
 - Suspend/Resume Interrupts
 - Microcontroller reset on USB Bus Reset without detach
 - USB Bus Disconnection on Microcontroller Request
- Peripheral Features
 - One 8-bit Timer/Counters with Separate Prescaler and Compare Mode (two 8-bit PWM channels)
 - One 16-bit Timer/Counter with Separate Prescaler, Compare and Capture Mode (three 8-bit PWM channels)
 - USART with SPI master only mode and hardware flow control (RTS/CTS)
 - Master/Slave SPI Serial Interface
 - Programmable Watchdog Timer with Separate On-chip Oscillator
 - On-chip Analog Comparator
 - Interrupt and Wake-up on Pin Change
- On Chip Debug Interface (debugWIRE)
- Special Microcontroller Features
 - Power-On Reset and Programmable Brown-out Detection
 - Internal Calibrated Oscillator
 - External and Internal Interrupt Sources
 - Five Sleep Modes: Idle, Power-save, Power-down, Standby, and Extended Standby
- I/O and Packages
 - 22 Programmable I/O Lines
 - QFN32 (5x5mm) / TQFP32 packages
- Operating Voltages
 - 2.7 - 5.5V
- Operating temperature
 - Industrial (-40°C to +85°C)
- Maximum Frequency
 - 8 MHz at 2.7V - Industrial range
 - 16 MHz at 4.5V - Industrial range

Note: 1. See "Data Retention" on page 6 for details.



**8-bit AVR[®]
Microcontroller
with
8/16/32K Bytes
of ISP Flash
and USB
Controller**

ATmega8U2

ATmega16U2

ATmega32U2



ATMEL 8-BIT MICROCONTROLLER WITH 4/8/16/32KBYTES IN-SYSTEM PROGRAMMABLE FLASH

Features

- High Performance, Low Power Atmel®AVR® 8-Bit Microcontroller Family
- Advanced RISC Architecture
 - 131 Powerful Instructions – Most Single Clock Cycle Execution
 - 32 x 8 General Purpose Working Registers
 - Fully Static Operation
 - Up to 20 MIPS Throughput at 20MHz
 - On-chip 2-cycle Multiplier
- High Endurance Non-volatile Memory Segments
 - 4/8/16/32KBytes of In-System Self-Programmable Flash program memory
 - 256/512/512/1KBytes EEPROM
 - 512/1K/1K/2KBytes Internal SRAM
 - Write/Erase Cycles: 10,000 Flash/100,000 EEPROM
 - Data retention: 20 years at 85°C/100 years at 25°C⁽¹⁾
 - Optional Boot Code Section with Independent Lock Bits
 - In-System Programming by On-chip Boot Program
 - True Read-While-Write Operation
 - Programming Lock for Software Security
- Atmel® QTouch® library support
 - Capacitive touch buttons, sliders and wheels
 - QTouch and QMatrix® acquisition
 - Up to 64 sense channels
- Peripheral Features
 - Two 8-bit Timer/Counters with Separate Prescaler and Compare Mode
 - One 16-bit Timer/Counter with Separate Prescaler, Compare Mode, and Capture Mode
 - Real Time Counter with Separate Oscillator
 - Six PWM Channels
 - 8-channel 10-bit ADC in TQFP and QFN/MLF package
 - Temperature Measurement
 - 6-channel 10-bit ADC in PDIP Package
 - Temperature Measurement
 - Programmable Serial USART
 - Master/Slave SPI Serial Interface
 - Byte-oriented 2-wire Serial Interface (Philips I²C compatible)
 - Programmable Watchdog Timer with Separate On-chip Oscillator
 - On-chip Analog Comparator
 - Interrupt and Wake-up on Pin Change
- Special Microcontroller Features
 - Power-on Reset and Programmable Brown-out Detection
 - Internal Calibrated Oscillator
 - External and Internal Interrupt Sources
 - Six Sleep Modes: Idle, ADC Noise Reduction, Power-save, Power-down, Standby, and Extended Standby
- I/O and Packages
 - 23 Programmable I/O Lines
 - 28-pin PDIP, 32-lead TQFP, 28-pad QFN/MLF and 32-pad QFN/MLF
- Operating Voltage:
 - 1.8 - 5.5V
- Temperature Range:
 - -40°C to 85°C
- Speed Grade:
 - 0 - 4MHz@1.8 - 5.5V, 0 - 10MHz@2.7 - 5.5V, 0 - 20MHz @ 4.5 - 5.5V
- Power Consumption at 1MHz, 1.8V, 25°C
 - Active Mode: 0.2mA
 - Power-down Mode: 0.1µA
 - Power-save Mode: 0.75µA (Including 32kHz RTC)