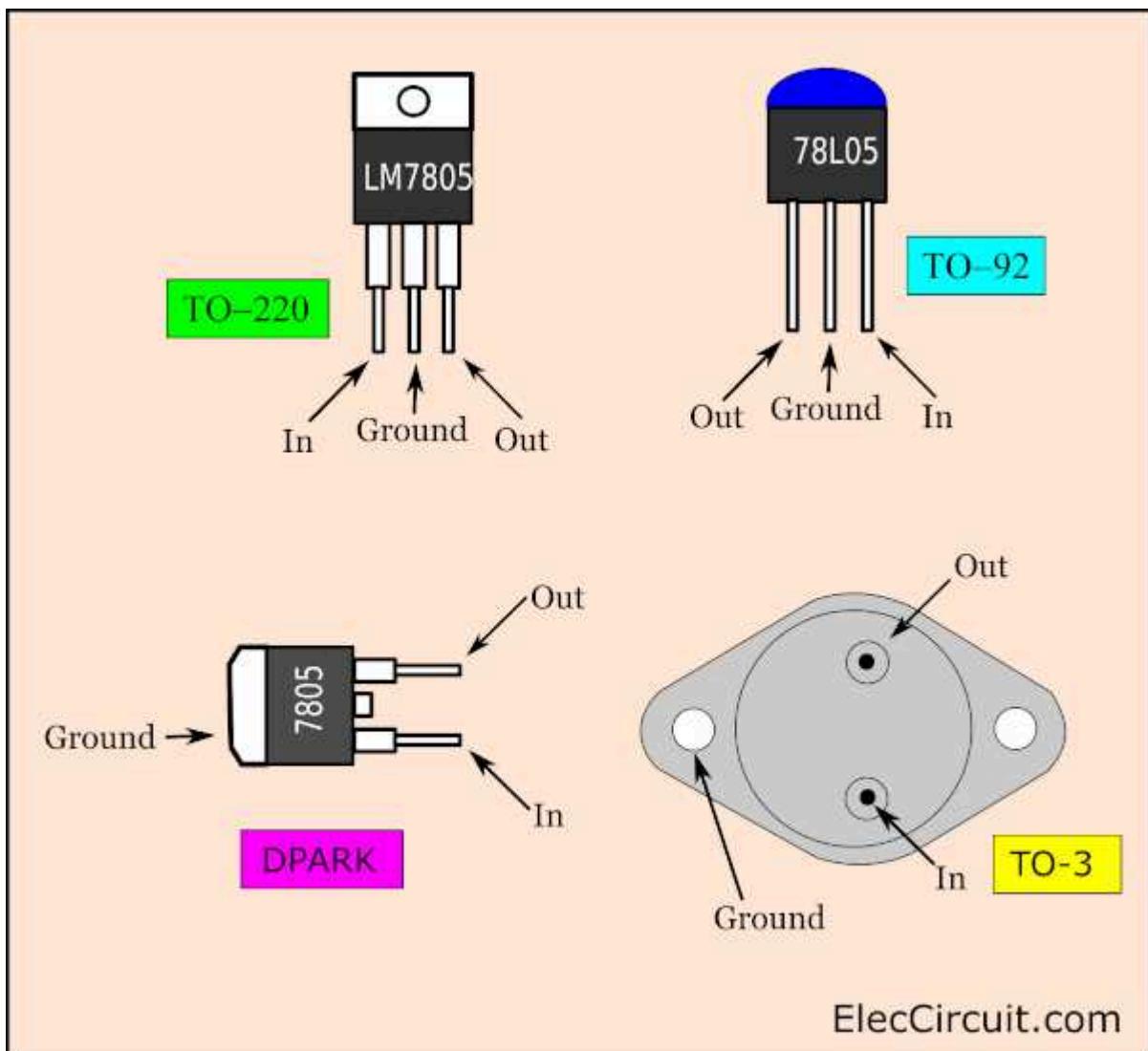


Download 78xx Voltage Regulator Datasheet

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April 27, 2025

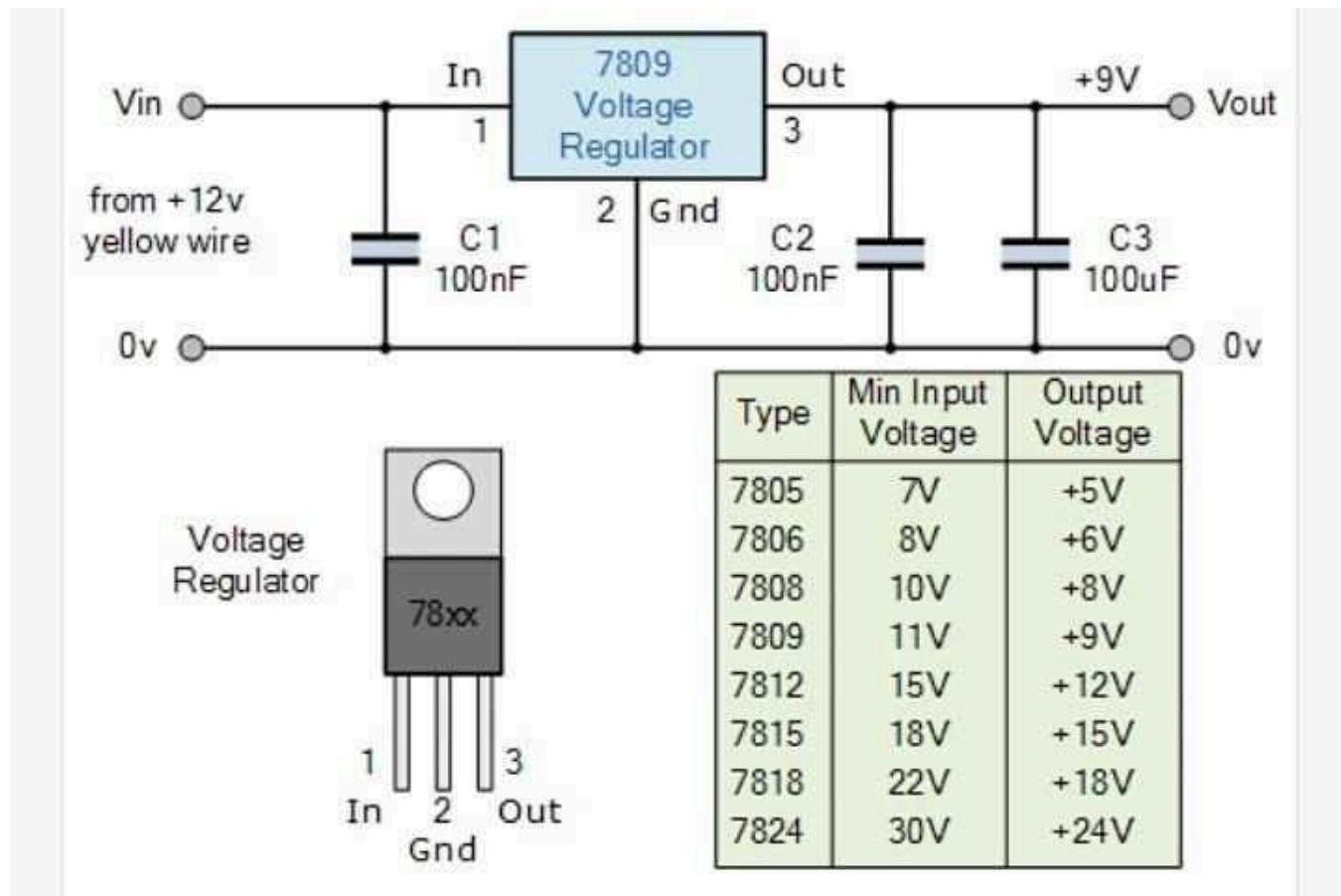


The world of electronic components is a vast and intricate realm, filled with an array of devices and tools that power the technology we rely on every day. Among these essential components, voltage regulators play a crucial role in ensuring a stable supply of power to various electronic systems and circuits. In this article, we delve into the realm of 78xx voltage regulator datasheets, deciphering the intricate details and specifications that guide engineers and enthusiasts in their quest for efficient power management solutions.

When it comes to voltage regulation, precision and reliability are paramount. The 78xx series of voltage regulators, with their versatile and dependable nature, have become the go-to choice for countless applications. These regulators are designed to provide a fixed output voltage, eliminating the need for intricate circuits or manual adjustments. Whether it's powering up a microcontroller, driving LEDs, or stabilizing a power supply for industrial machinery, the 78xx series has proven to be a reliable companion.

Within a datasheet lies a treasure trove of information that unlocks the true potential of a voltage regulator. Exquisite details about the electrical characteristics, operating conditions, and thermal properties shed light on the regulator's optimal usage, ensuring engineers can make informed decisions during the design phase. From input and output voltage ranges to maximum load currents and temperature coefficients, every parameter has its importance, enabling engineers to unleash the full potential of their circuits.

Understanding the Key Features of 78xx Voltage Regulator Datasheets



When it comes to comprehending the essential aspects of 78xx voltage regulator datasheets, it is crucial to delve into the pertinent details that can provide valuable insights into the device's functionalities and specifications.

These datasheets serve as comprehensive documents that offer a plethora of crucial information about the 78xx voltage regulator model. By perusing the contents of these datasheets, individuals can gain a better understanding of the various features and characteristics that the voltage regulator possesses.

Examining these datasheets reveals an abundance of key parameters and significant figures that are tailor-made for engineers, designers, and other professionals working in the field of electrical engineering. These figures provide valuable insights into aspects such as input and output voltage ranges, current capacity, and thermal characteristics.

One aspect covered extensively in these datasheets is the device's package outline and pinout configuration. Understanding how the pins of the voltage regulator are assigned and connected can facilitate the seamless integration of the device into a circuit design.

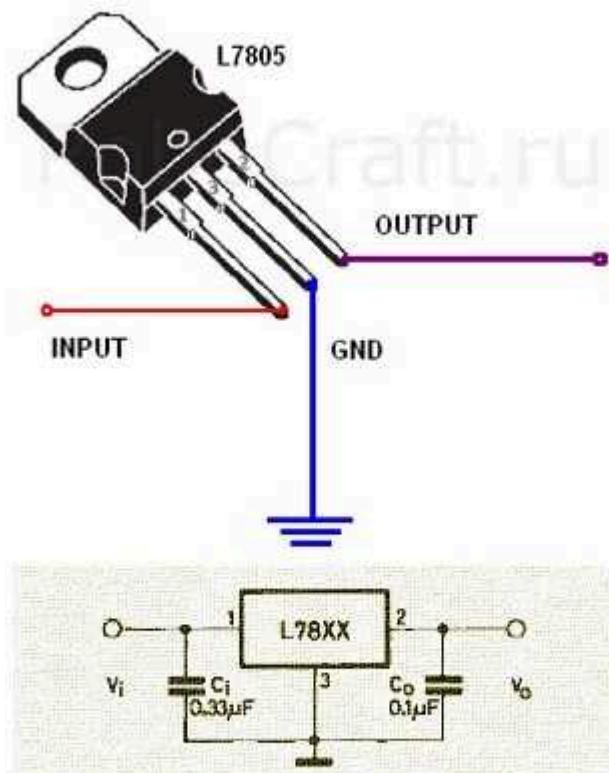
An important consideration when using 78xx voltage regulators is their tolerance levels, which determine the device's ability to maintain a stable output voltage even in the face of external disturbances. These datasheets shed light on the voltage regulator's tolerance specification and how it plays a crucial role in achieving reliable and consistent power regulation.

In addition to these essential specifications, the datasheets also outline various protection features incorporated into the voltage regulator design. These protections serve to safeguard the device and the surrounding circuitry from potential damage due to excessive heat, overcurrent, and short circuits.

Furthermore, these datasheets often provide detailed information about the electrical characteristics of the voltage regulators, including input and output voltage variations, load regulation, and line regulation. By understanding these characteristics, designers can ensure that the voltage regulator meets the specific requirements of their application.

In conclusion, the comprehensive data provided in 78xx voltage regulator datasheets allows individuals to gain a deeper understanding of the device's key features and functionalities. The information contained within these datasheets serves as a vital resource for engineers and designers, empowering them to make informed decisions and effectively incorporate the voltage regulator into their circuit designs.

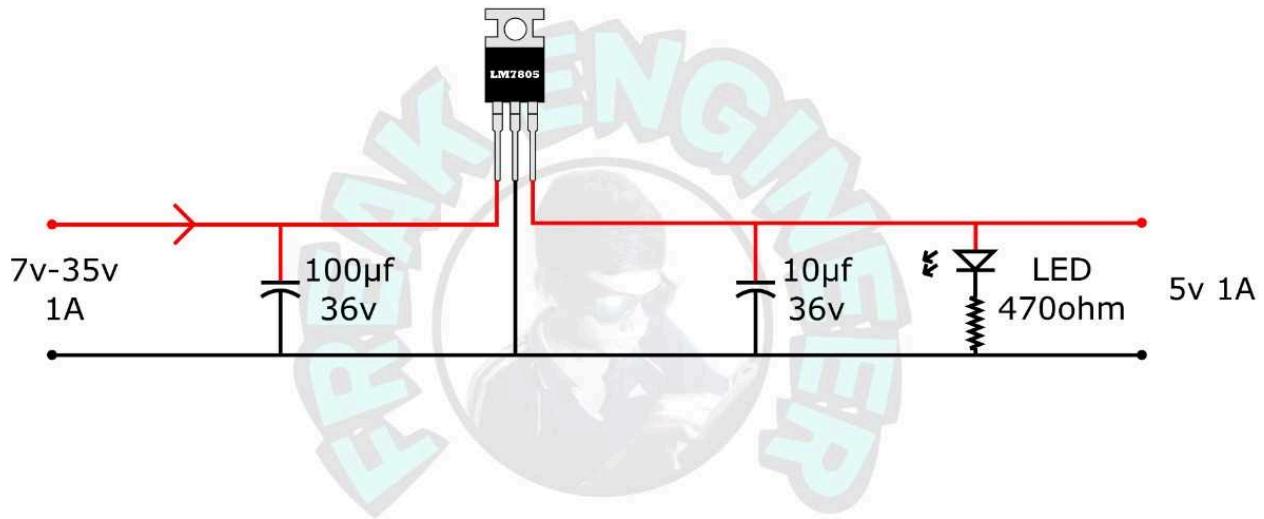
Important specifications to consider



The following are key factors to take into account when evaluating voltage regulators like the 78xx series:

1. Output Voltage Range

Linear Voltage Regulator



One of the most critical specifications when selecting a voltage regulator is its output voltage range. This range determines the voltages that the regulator can provide to power various electronic devices. It is crucial to choose a regulator that can supply the voltage levels required for your specific application.

2. Load Regulation

UTCLM78XX LINEAR INTEGRATED CIRCUIT

3-TERMINAL 1A POSITIVE VOLTAGE REGULATOR

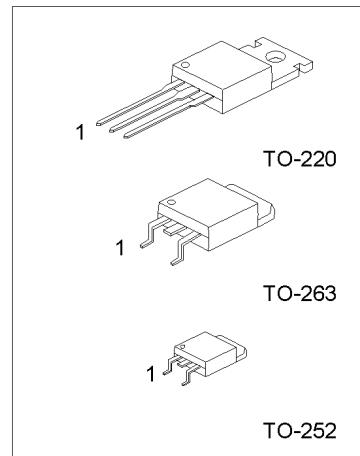
DESCRIPTION

DESCRIPTION

The UTC 78XX family is monolithic fixed voltage regulator integrated circuit. They are suitable for applications that required supply current up to 1 A.

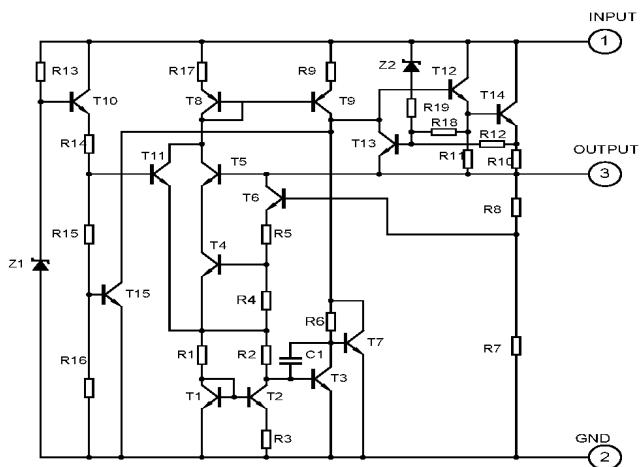
FEATURES

- *Output current up to 1.5 A
- *Fixed output voltage of 5V, 6V, 8V, 9V, 10V, 12V, 15V, 18V and 24V available
- *Thermal overload shutdown protection
- *Short circuit current limiting
- *Output transistor SOA protection



1: Input 2: GND 3: Output

TEST CIRCUIT



UTC UNISONIC TECHNOLOGIES CO., LTD.

1

QW-R101-006,C

Load regulation is a measure of how well a regulator can maintain a stable output voltage when the load changes. It indicates the regulator's ability to compensate for fluctuations in the current drawn by the devices connected to it. A low load regulation is important to ensure the stable operation of your electronic circuit.

3. Dropout Voltage

The dropout voltage refers to the minimum voltage required for the regulator to maintain its specified output voltage. It is crucial to consider this specification, especially when working with a low input voltage source. A low dropout voltage enables the regulator to operate effectively even with a limited supply voltage.

4. Quiescent Current



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KA78XX/KA78XXA

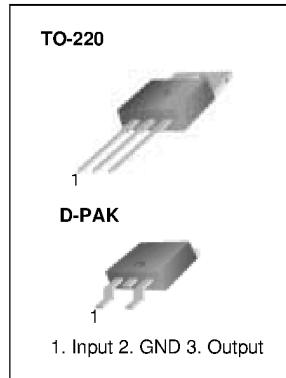
3-Terminal 1A Positive Voltage Regulator

Features

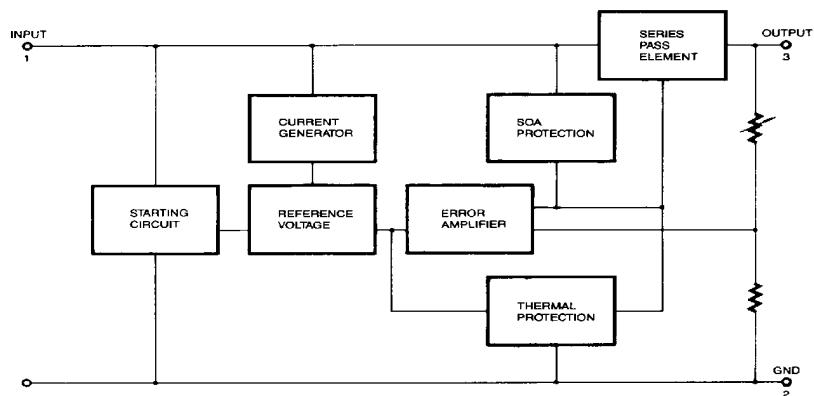
- Output Current up to 1A
- Output Voltages of 5, 6, 8, 9, 10, 12, 15, 18, 24V
- Thermal Overload Protection
- Short Circuit Protection
- Output Transistor Safe Operating Area Protection

Description

The KA78XX/KA78XXA series of three-terminal positive regulator are available in the TO-220/D-PAK package and with several fixed output voltages, making them useful in a wide range of applications. Each type employs internal current limiting, thermal shut down and safe operating area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver over 1A output current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents.



Internal Block Diagram



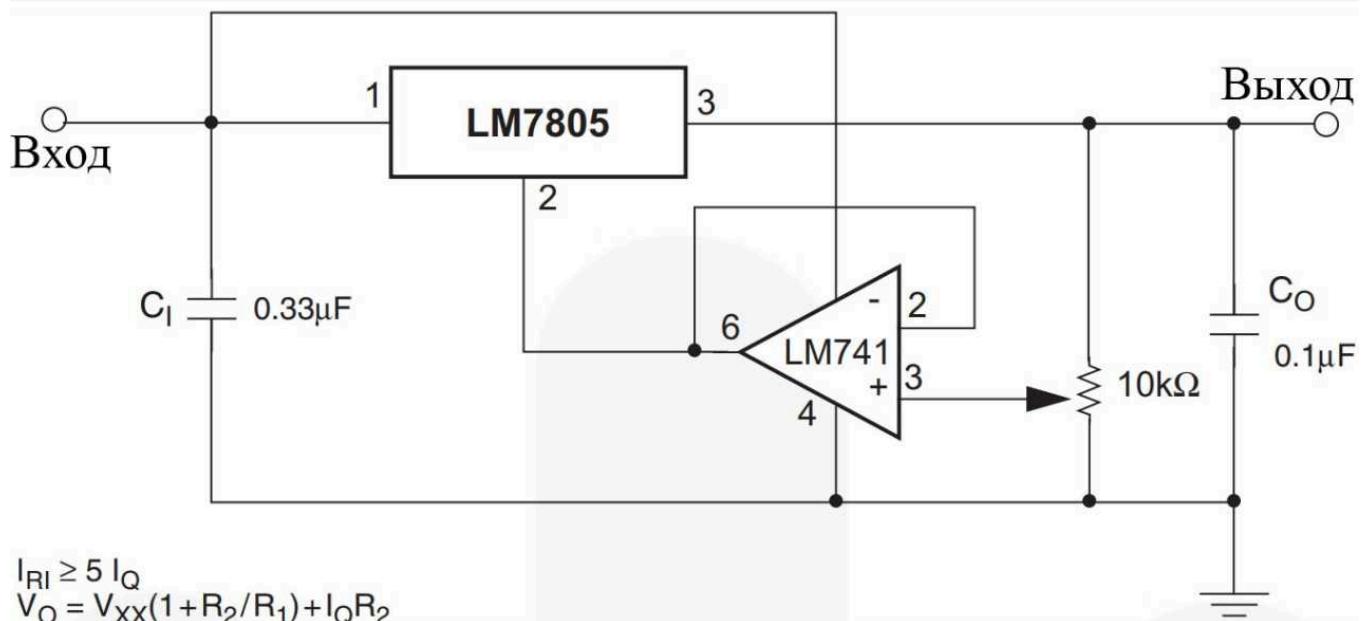
Rev. 1.0.0

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The quiescent current, also known as the ground current or the supply current, is the current consumed by the regulator when no load is connected. It is important to consider this specification, as it can directly impact the overall power efficiency of your system. A lower

quiescent current is generally desirable to minimize power wastage.

5. Thermal Considerations

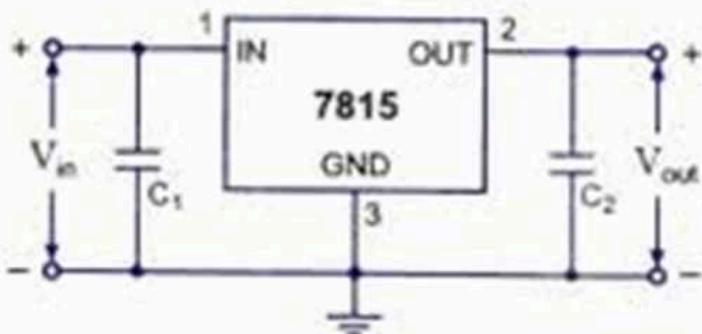


Thermal considerations are crucial when selecting a voltage regulator, as they impact the device's reliability and lifespan. It is essential to review the regulator's thermal resistance and junction-to-case thermal resistance, as well as carefully consider the installation and heat dissipation requirements to ensure proper thermal management.

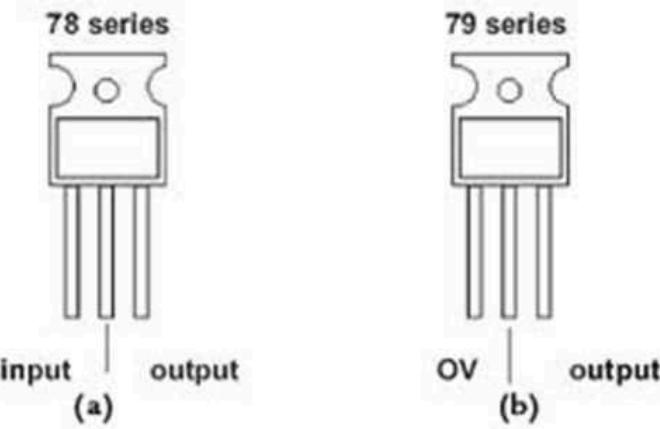
These are just a few of the important specifications to consider when evaluating voltage regulators. By thoroughly understanding and comparing these specifications, you can choose the most suitable regulator for your specific application, ensuring reliable and stable power supply.

How to Select the Right 78xx Voltage Regulator for Your Application

The **78xx** (sometimes **LM78xx**) is a family of self-contained fixed linear voltage regulator integrated circuits.



Connection of 7815 Voltage Regulator



Prof.Dr.Sezgin ALSAN

Rectifiers

75

Choosing the ideal voltage regulator is crucial when designing a electronic system for your specific application. In this section, we will explore the key factors to consider in order to make an informed decision without relying solely on the datasheet or specific product information.

Firstly, it is important to assess the power requirements of your application. By understanding the voltage and current specifications, you can determine the appropriate voltage regulator to ensure reliable and stable power supply. Furthermore, evaluating the desired output voltage range and the maximum allowable deviation can help in determining the suitable regulator.

Next, consider the thermal characteristics of the voltage regulator. Efficiency and heat dissipation play a vital role in ensuring the longevity and reliability of the regulator. Look for regulators that incorporate features like thermal shutdown, over-temperature protection, and thermal resistance specifications to ensure optimal performance in your specific application.

Furthermore, it is important to examine the input voltage range and input/output capacitor requirements. Some applications may have specific input voltage constraints, and using a voltage regulator that can operate within that range is crucial for the success of your design. Understanding the required input/output capacitors can also help in choosing a regulator that can handle the specific load and transient response requirements.

Lastly, consider the package type and form factor of the voltage regulator. Depending on the size and layout constraints of your application, choosing a suitable package style is essential. Common options include through-hole, surface mount, and different pin configurations. Ensuring compatibility between the regulator package and your design layout can save time and resources in the long run.

In conclusion, selecting the right voltage regulator for your application involves a thorough assessment of power requirements, thermal characteristics, input/output specifications, and package considerations. By carefully evaluating these factors, you can confidently choose a voltage regulator that will meet the specific needs of your electronic system.

Factors to consider in choosing the appropriate voltage regulator



LM340-N, LM78xx

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SNOSBT0J –FEBRUARY 2000–REVISED DECEMBER 2013

LM340-N/LM78XX Series 3-Terminal Positive Regulators

Check for Samples: [LM340-N](#), [LM78xx](#)

FEATURES

- Complete Specifications at 1A Load
- Output Voltage Tolerances of $\pm 2\%$ at $T_j = 25^\circ\text{C}$ and $\pm 4\%$ Over the Temperature Range (LM340A)
- Line Regulation of 0.01% of V_{OUT}/V of ΔV_{IN} at 1A Load (LM340A)
- Load Regulation of 0.3% of V_{OUT}/A (LM340A)
- Internal Thermal Overload Protection
- Internal Short-circuit Current Limit
- Output Transistor Safe Area Protection
- P⁺ Product Enhancement Tested

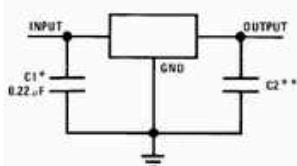
DESCRIPTION

The LM140/LM340A/LM340-N/LM78XXC monolithic 3-terminal positive voltage regulators employ internal current-limiting, thermal shutdown and safe-area compensation, making them essentially indestructible. If adequate heat sinking is provided, they can deliver over 1.0A output current. They are intended as fixed voltage regulators in a wide range of applications including local (on-card) regulation for elimination of noise and distribution problems associated with single-point regulation. In addition to use as fixed voltage regulators, these devices can be used with external components to obtain adjustable output voltages and currents.

Considerable effort was expended to make the entire series of regulators easy to use and minimize the number of external components. It is not necessary to bypass the output, although this does improve transient response. Input bypassing is needed only if the regulator is located far from the filter capacitor of the power supply.

The 5V, 12V, and 15V regulator options are available in the steel TO-3 power package. The LM340A/LM340-N/LM78XXC series is available in the TO-220 plastic power package, and the LM340-N-5.0 is available in the SOT-223 package, as well as the LM340-5.0 and LM340-12 in the surface-mount DDPACK/TO-263 package.

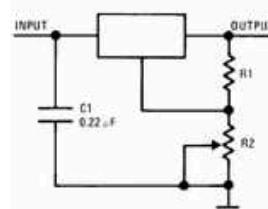
Typical Applications



*Required if the regulator is located far from the power supply filter.

**Although no output capacitor is needed for stability, it does help transient response. (If needed, use 0.1 μF, ceramic disc).

Figure 1. Fixed Output Regulator



$V_{\text{OUT}} = 5V + (5V/R1 + I_0) R2$ $5V/R1 > 3 I_0$,
load regulation (L_r) = $[(R1 + R2)/R1] (L_r$ of LM340-5).

Figure 2. Adjustable Output Regulator



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When selecting a suitable voltage regulator for a specific electronics project, it is important to carefully consider a range of factors that can impact its performance and compatibility with the desired application. By evaluating these factors, engineers and designers can make informed

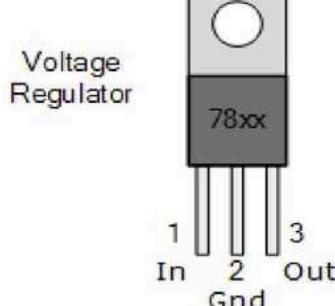
decisions to ensure reliable and efficient voltage regulation.

- **Input Voltage Range:** One crucial aspect to consider is the acceptable input voltage range of the voltage regulator. This range determines the minimum and maximum voltage levels that the regulator can handle without malfunctioning or causing damage to the connected components.
- **Output Voltage Regulation:** The ability of the voltage regulator to maintain a stable output voltage is crucial, particularly in applications where precise voltage levels are critical for the proper functioning of electronic devices. It is important to evaluate the regulator's output voltage tolerance and its ability to handle load variations.
- **Current Capacity:** Another important factor is the current capacity of the voltage regulator. It is necessary to assess the maximum current that the regulator can deliver continuously without overheating or exceeding its limitations. This ensures that the selected regulator can adequately power the devices connected to it.
- **Efficiency:** Efficiency plays a significant role in the selection process as it determines how well the voltage regulator converts input voltage into the desired output voltage. Higher efficiency regulators are desirable as they minimize power loss and heat generation, resulting in improved overall performance.
- **Package Type:** The physical package type of the voltage regulator is also a consideration, as it determines the ease of integration into a circuit or system. Different package types such as through-hole or surface-mount options may be more suitable depending on the specific requirements of the project.
- **Protection Features:** Voltage regulators with built-in protection features, such as overcurrent protection, overtemperature shutdown, and reverse polarity protection, provide an added level of reliability and safeguard the connected components from potential damage or failure.
- **Price and Availability:** Lastly, the cost and availability of the voltage regulator must be taken into account. It is important to consider the budget constraints of the project and ensure that the chosen regulator is readily accessible for purchase.

In conclusion, selecting the appropriate voltage regulator entails careful consideration of factors such as input voltage range, output voltage regulation, current capacity, efficiency, package type, protection features, and affordability. Evaluating these factors holistically ensures optimal performance and compatibility with the specific application requirements.

Common Pitfalls to Avoid When Using a 78xx Voltage Regulator

Voltage Regulator IC 780XX



Type	Min Input Voltage	Output Voltage
7805	7V	+5V
7806	8V	+6V
7808	10V	+8V
7809	11V	+9V
7812	15V	+12V
7815	18V	+15V
7818	22V	+18V
7824	30V	+24V

Fig: Voltage Regulator IC 7812

Fig: Voltage Regulator IC Chart

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When working with a popular type of voltage regulator known as the 78xx, it is important to be aware of some common mistakes that can occur during its use. By understanding and avoiding these pitfalls, you can ensure the reliable and efficient operation of your electronic circuits.

One common mistake is overlooking the importance of proper heat dissipation. The 78xx voltage regulator can generate a significant amount of heat during operation, particularly when used with high input voltages or high load currents. Failing to adequately dissipate this heat can result in thermal issues, such as overheating and decreased performance. It is essential to provide appropriate heat sinks and ensure proper ventilation to avoid these problems.

Another potential pitfall is ignoring the input and output capacitors. These capacitors play a crucial role in stabilizing the voltage regulator and reducing noise and ripple in the output voltage. Neglecting to include the recommended input and output capacitors specified in the datasheet can lead to voltage fluctuations, instability, and even damage to connected devices. It is important to carefully follow the guidelines provided in the appropriate documentation.

Additionally, it is crucial to consider the maximum input and output voltage limits of the 78xx voltage regulator. Exceeding these limits can result in irreversible damage to the device and connected components. Careful attention should be paid to the datasheet to ensure that the

input voltage does not exceed the specified maximum, and that the output voltage remains within the acceptable range for the intended application.

Lastly, it is important to properly calculate and select the appropriate input and output capacitors to ensure optimal performance and stability. Using capacitors with incorrect values or inadequate voltage ratings can lead to unpredictable behavior, such as oscillations and unexpected voltage fluctuations. Detailed calculations and consideration of the specific requirements of the circuit are necessary to avoid such issues.

By being aware of and avoiding these common pitfalls, you can maximize the performance and reliability of your circuits when using a 78xx voltage regulator. It is essential to carefully read and understand the relevant documentation and specifications, and to follow best practices to ensure the successful integration of this component into your electronic designs.

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