

**3.4 Transistor als Schalter**

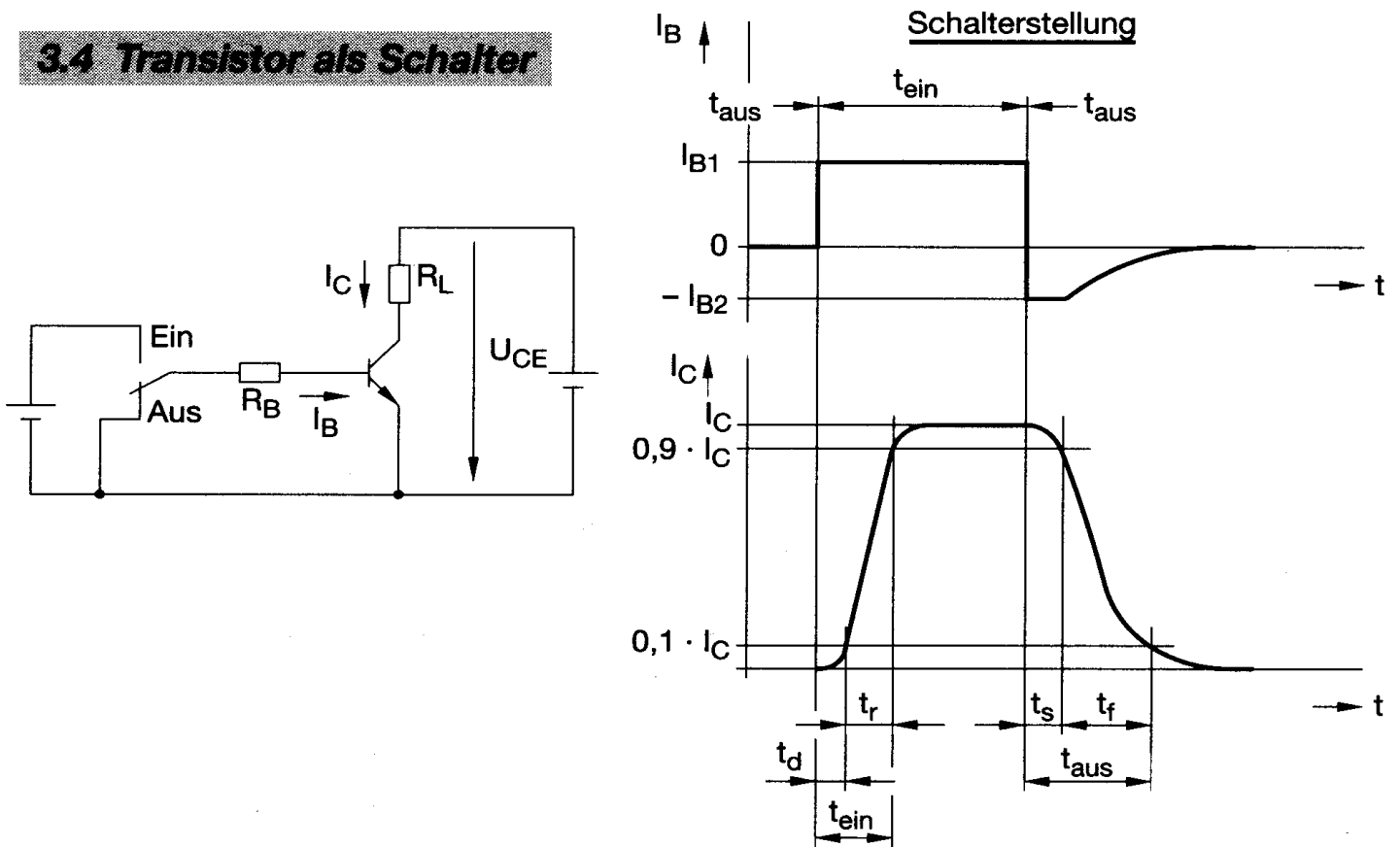


Abb. 3.42: Schaltung und Impulsdiagramm mit dem zeitlichen Verlauf im Ein- und Ausgangsbereich des Transistors, wenn er als Schalter betrieben wird

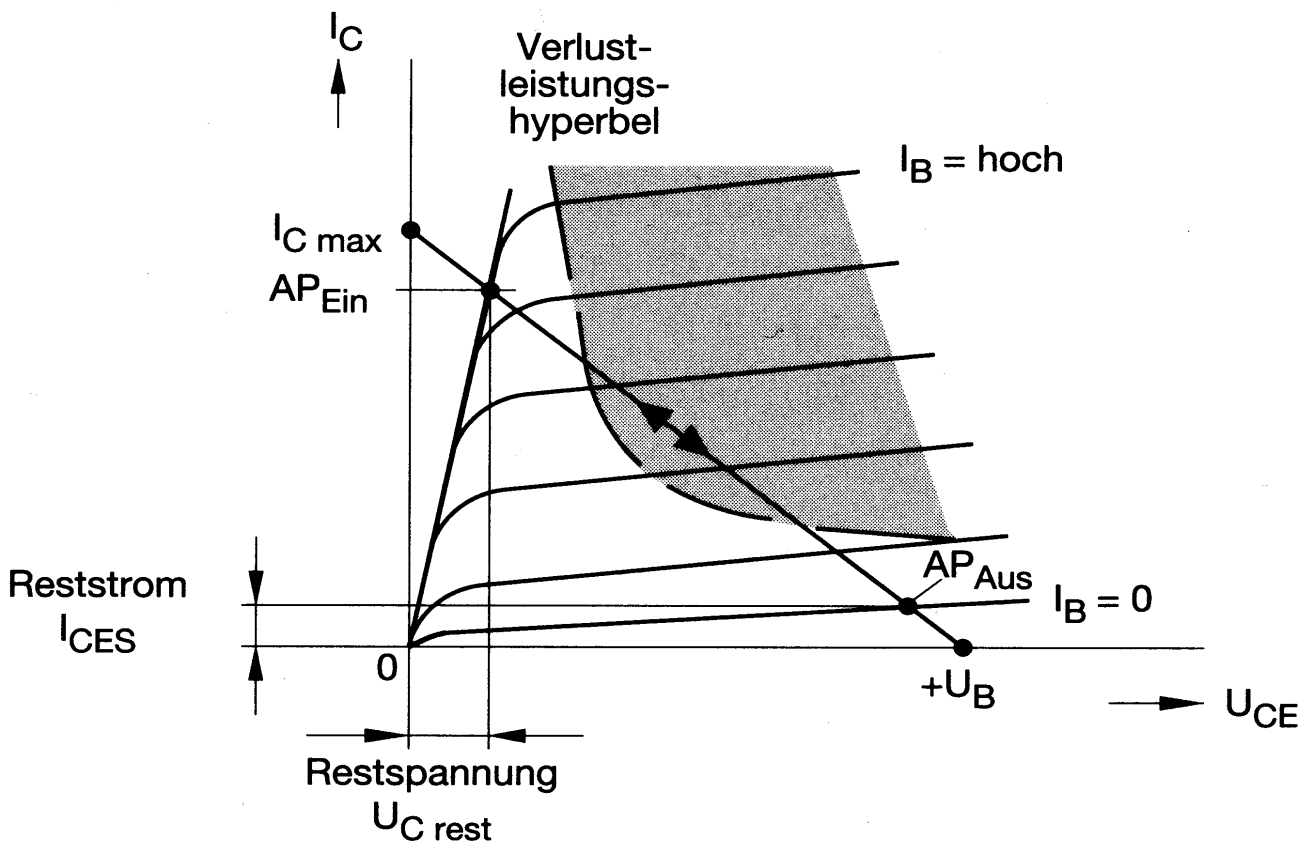
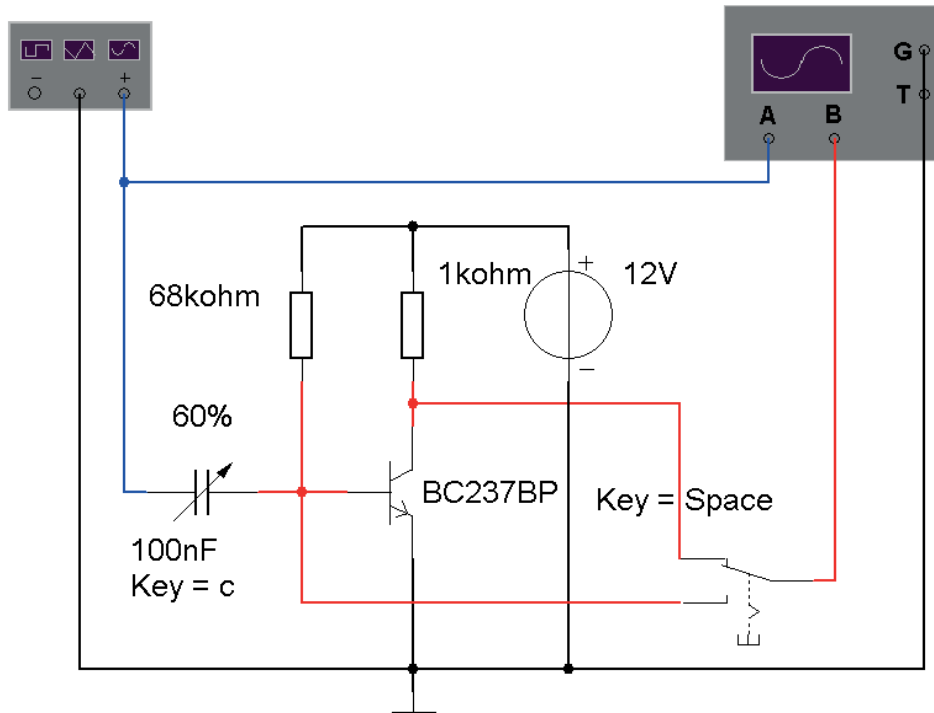
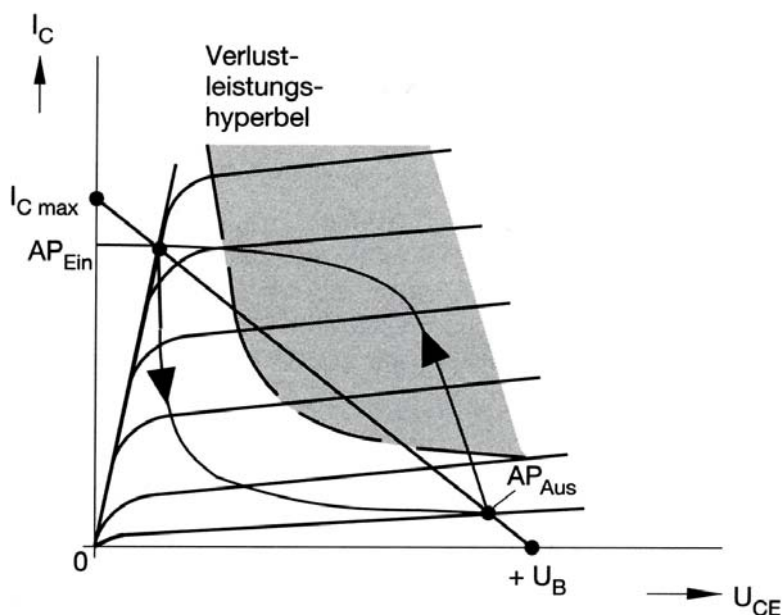


Abb. 3.44: Arbeitspunkte im Kennlinienfeld eines geschalteten Transistors mit einer ohmschen Belastung



### Schalten einer kapazitiven Last mit einem Transistor

In allgemeinen technischen Anwendungen ist das Schalten einer kapazitiven Last eher von untergeordneter Bedeutung.



In Rechnersystemen (Computernetzwerken) stellen jedoch die Leitungen unter Umständen erhebliche Kapazitäten dar und diese müssen berücksichtigt werden.

Der sehr hohe Anfangsstrom beim Umladen des Kondensators würde zu einer unzulässigen Überschreitung der Verlustleistung führen. Dies kann durch einen zusätzlichen Reihenwiderstand beschränkt werden.

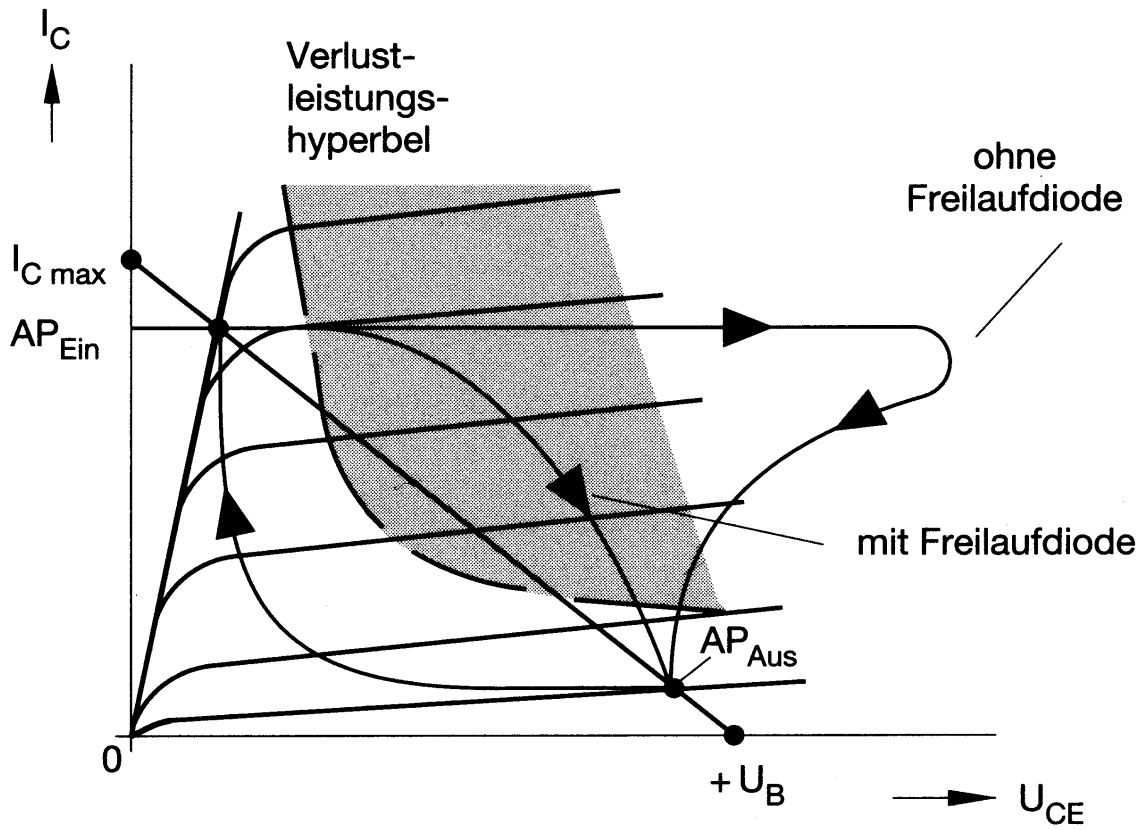
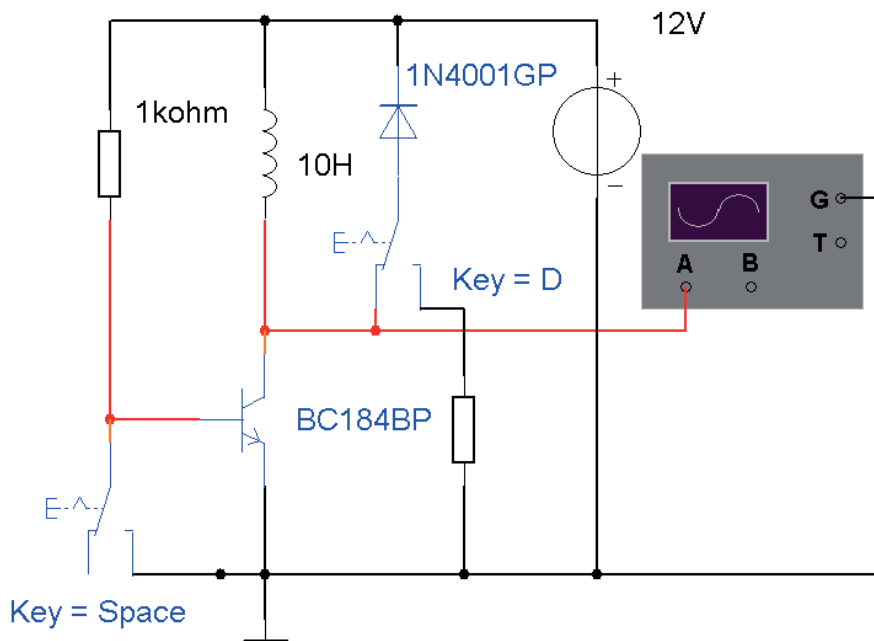
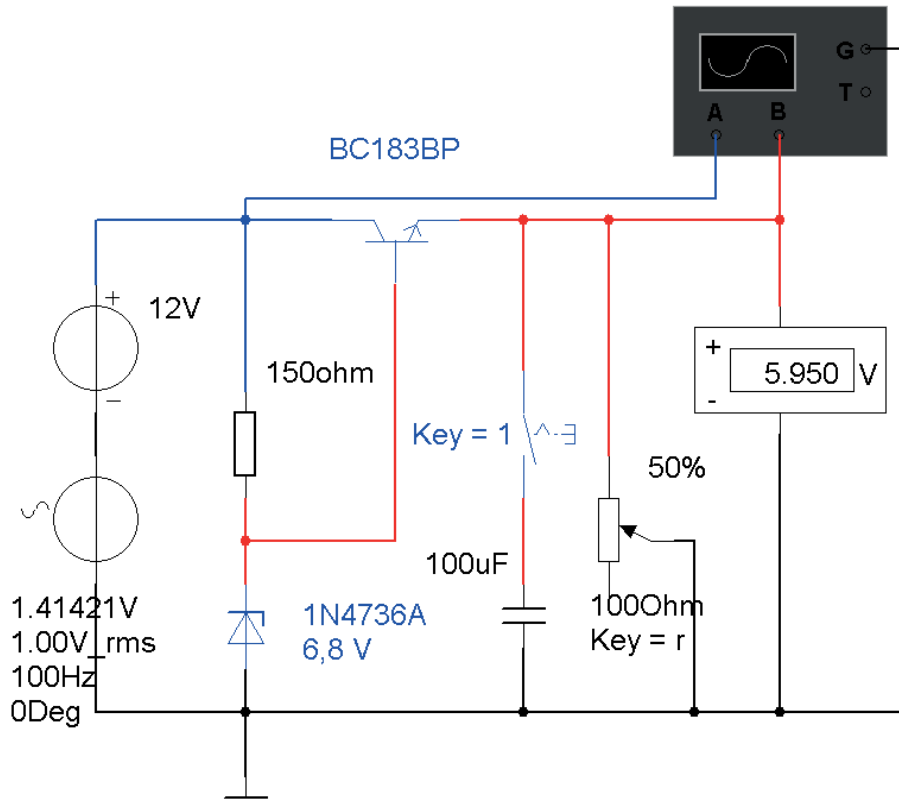


Abb. 3.48: Kurvenverlauf im Kennlinienfeld des Schalttransistors, wenn eine Induktivität ein- und ausgeschaltet wird



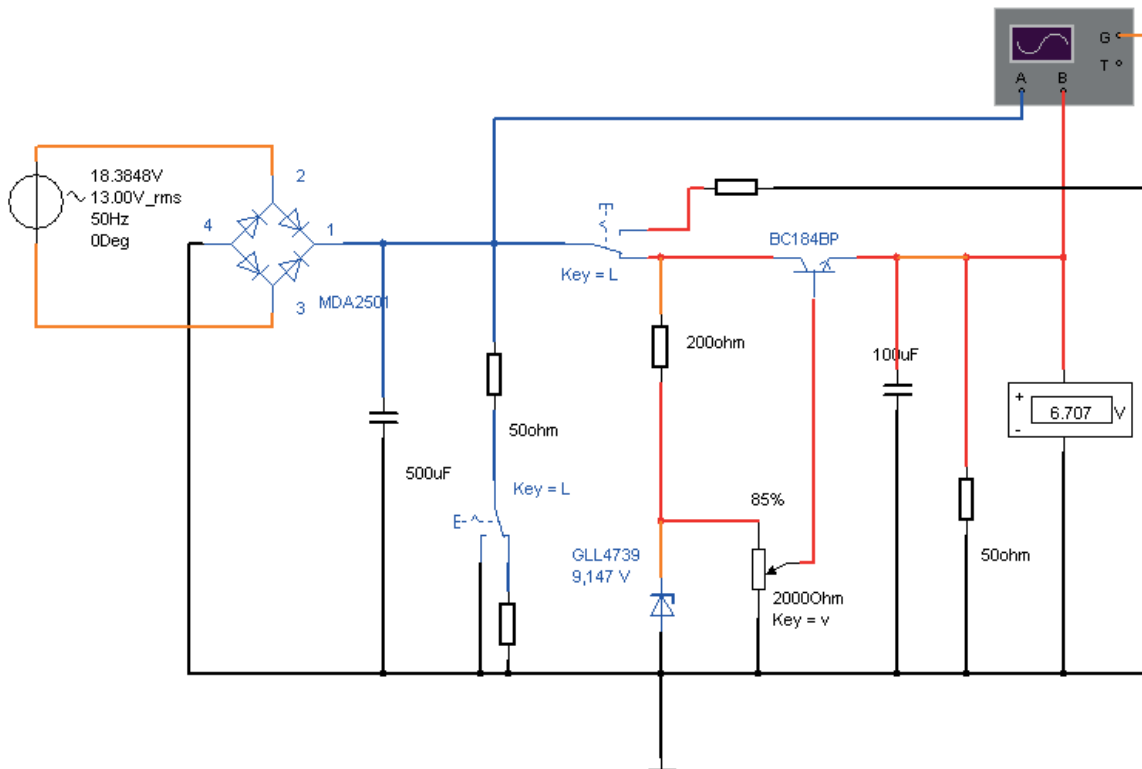
# Konstantspannungsquelle



E. Riedle

Physik <sup>LMU</sup>

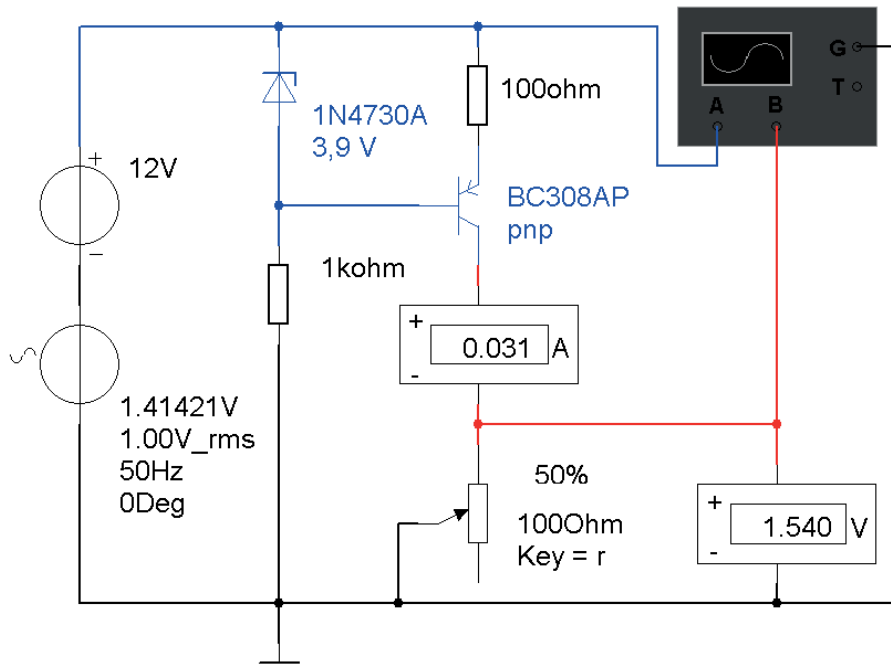
# Netzteil



E. Riedle

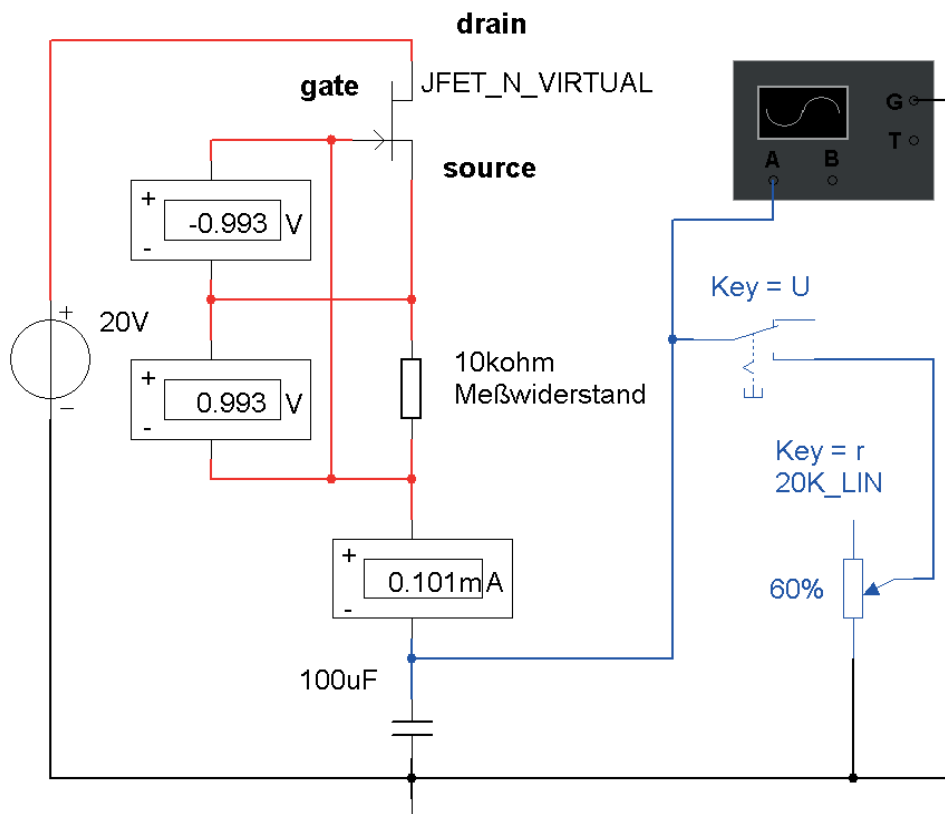
Physik <sup>LMU</sup>

# Konstant-Strom-Quelle



E. Riedle

Physik<sup>LMU</sup>



E. Riedle

Physik<sup>LMU</sup>

## LM117/LM317A/LM317 3-Terminal Adjustable Regulator

### General Description

The LM117 series of adjustable 3-terminal positive voltage regulators is capable of supplying in excess of 1.5A over a 1.2V to 37V output range. They are exceptionally easy to use and require only two external resistors to set the output voltage. Further, both line and load regulation are better than standard fixed regulators. Also, the LM117 is packaged in standard transistor packages which are easily mounted and handled.

In addition to higher performance than fixed regulators, the LM117 series offers full overload protection available only in IC's. Included on the chip are current limit, thermal overload protection and safe area protection. All overload protection circuitry remains fully functional even if the adjustment terminal is disconnected.

Normally, no capacitors are needed unless the device is situated more than 6 inches from the input filter capacitors in which case an input bypass is needed. An optional output capacitor can be added to improve transient response. The adjustment terminal can be bypassed to achieve very high ripple rejection ratios which are difficult to achieve with standard 3-terminal regulators.

Besides replacing fixed regulators, the LM117 is useful in a wide variety of other applications. Since the regulator is "floating" and sees only the input-to-output differential volt-

age, supplies of several hundred volts can be regulated as long as the maximum input to output differential is not exceeded, i.e., avoid short-circuiting the output.

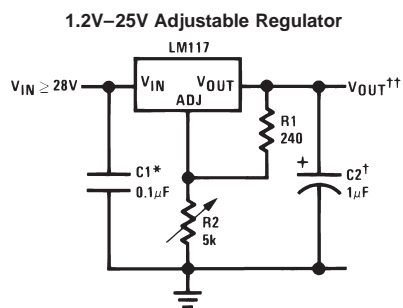
Also, it makes an especially simple adjustable switching regulator, a programmable output regulator, or by connecting a fixed resistor between the adjustment pin and output, the LM117 can be used as a precision current regulator. Supplies with electronic shutdown can be achieved by clamping the adjustment terminal to ground which programs the output to 1.2V where most loads draw little current.

For applications requiring greater output current, see LM150 series (3A) and LM138 series (5A) data sheets. For the negative complement, see LM137 series data sheet.

### Features

- Guaranteed 1% output voltage tolerance (LM317A)
- Guaranteed max. 0.01%/V line regulation (LM317A)
- Guaranteed max. 0.3% load regulation (LM117)
- Guaranteed 1.5A output current
- Adjustable output down to 1.2V
- Current limit constant with temperature
- P<sup>+</sup> Product Enhancement tested
- 80 dB ripple rejection
- Output is short-circuit protected

### Typical Applications



DS009063-1

Full output current not available at high input-output voltages

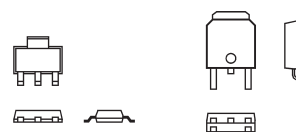
- Needed if device is more than 6 inches from filter capacitors.
- Optional—improves transient response. Output capacitors in the range of 1 μF to 1000 μF of aluminum or tantalum electrolytic are commonly used to provide improved output impedance and rejection of transients.

$$\dagger\dagger V_{OUT} = 1.25V \left( 1 + \frac{R_2}{R_1} \right) + I_{ADJ}(R_2)$$

### LM117 Series Packages and Power Capability

Part Number Suffix	Package	Rated Power Dissipation	Design Load Current
K	TO-3	20W	1.5A
H	TO-39	2W	0.5A
T	TO-220	20W	1.5A
E	LCC	2W	0.5A
S	TO-263	4W	1.5A
MP	SOT-223	2W	1A

### Comparison between SOT-223 and D-Pak (TO-252) Packages



SOT-223

TO-252  
DS009063-54

Scale 1:1

# Differenzverstärker

