

Additional Information

mp6 – controller options

The supply voltage of the double actuator pump mp6 can be generated with simple circuits either from battery or line voltage.

If the electronics is not re-used, both versions can be integrated in the pump body due to their small size. While the line voltage version does not add a significant amount of space, the battery driven system has an increased volume of approximately $30 \times 15 \times 8 \text{ mm}^3$ for a combined housing of pump and electronics.



Figure 1: Sample of a mp6 with integrated electronics (left hand) and a single mp6 (right hand)

Reference designs for the different concepts are available, for the supply from battery voltage the mp6-OEM is available as a standard component.

The parameters and performance values mentioned in the following are reference values that need to be verified for the specific application. Based on the general driver concepts, the performance should be tailored to the individual customer demand. Based on requirements and production quantities, the driver costs are quoted individually.

Supply from line voltage

From line voltage (both 110/120 V and 230 V) a voltage of at maximum 250 V amplitude is generated. To drive the actuators, it is shifted as shown in Figure 2 and two signals with 180 ° phase shift are provided.

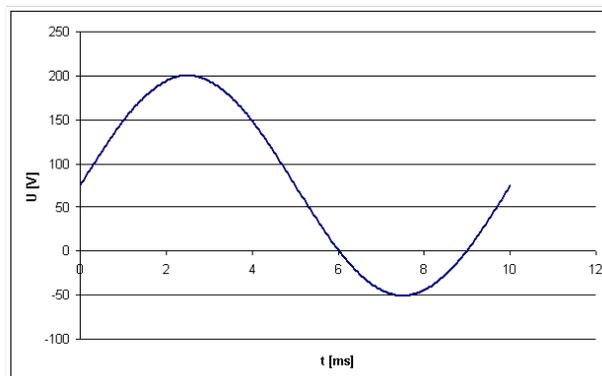


Figure 2: Signal form of the line driver

The electronic components can be placed either inside the pump housing or on the flex connector of the pump that provides the electrical connection to the line voltage.

A maximum flow rate of 3500 $\mu\text{l}/\text{min}$ can be achieved; it can be adjusted by limiting the voltage amplitude. As only the voltage can be varied, at low flow rates bubble tolerance will be significantly decreased.

Due to the sine shape of the waveform, this driver operates at very low noise.

As the driver does not provide an electric insulation from line voltage, suitable protection means need to be added dependent on the field of operation.

Supply from battery voltage

From a battery voltage, an AC voltage with an amplitude of up to 235 V is generated by an integrated circuit. Supply voltages from 3 – 5 V can be used directly, the driver can be adjusted to higher input voltages as well. The power consumption for maximum flow performance is mostly lower than 150 mW.

The flow rate can be adjusted by both amplitude and frequency.

Again, two signals with 180° phase shift according to Figure 3 are generated.

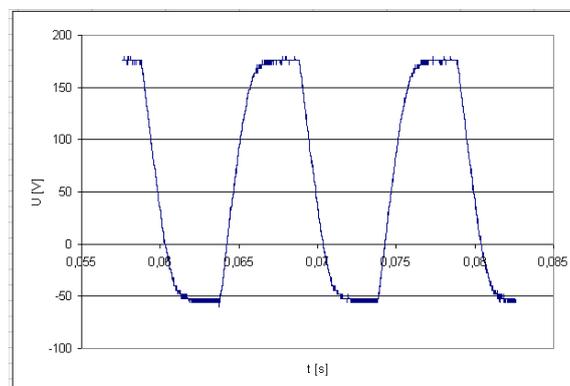


Figure 3: Signal form of the battery driver

The flow rate can be adjusted approximately in the range of 20 $\mu\text{l}/\text{min}$ to 5000 $\mu\text{l}/\text{min}$. The noise level can be compared to driving the pump with the mp-x evaluation kit using the SRS signal. The evaluation and adjustment of the noise level needs to be done application specific. As a standard component the mp6-OEM is available, which can be directly mounted on a customer PCB.



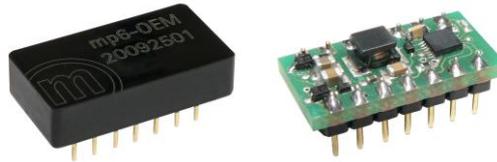


Figure 4: The mp6-OEM with and without encapsulation

For higher quantities, customizations include the integration of the electronics inside an enlarged pump housing. A possible PCB layout is shown in Figure 5 the complete unit is shown in Figure 1. In addition, the reference circuit design can be licensed for direct implementation into the customers system electronics.

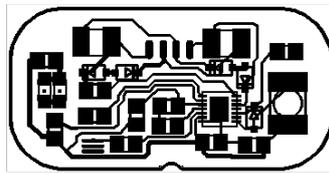


Figure 5: Sample PCB layout on area of the mp6 housing, height approx. 3mm

Supply from an ASIC

If the application requires customer specific waveforms or control of different functionalities from the external side, the development of an ASIC should be considered. In terms of performance, approximately the same range as mentioned for the battery driven circuits can be realized.

As the development costs of an ASIC are very much dependent on the customers requirements, the cost level need to be estimated on basis of a specific application. In general most of the ASIC developments are in the order of 100 000 Euro, while the ASIC itself will be available at about 1 Euro per piece at higher quantities. The requirement of additional external components needs to be decided on an individual level.

All values are approximate and no guarantee of specific technical properties.

Changes in the course of technical progress are possible without notice.



Contact Data:

Bartels Mikrotechnik GmbH
Konrad-Adenauer-Allee 11
44263 Dortmund Germany
www.bartels-mikrotechnik.de
info@bartels-mikrotechnik.de
Tel: +49-231-47730-500
Fax: +49-231-47730-501

Visit our Website

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