



**THE DATASHEET OF
MLX81108KDC-CAE-000-RE**



Features

Application Controller

- Internal RC-Oscillator (12..24 Mhz programmable)
- 16-bit RISC MCU with 24kB..32kB User Flash, 1kByte RAM, 384 Byte EEPROM with ECC

LIN Protocol Controller according to LIN 2.x and SAE J2602

- Baudrate up to 19.2 kBaud
- Frame processing
- Low interrupt load to the application

LIN Transceiver according to LIN 2.x and SAE J2602

- Support for Autoconfig according bus shunt

IO Configuration

- Up to 12 IOs (MLX81107/9) or 4 IOs (MLX81106/8)
- 4 programmable constant current (max 30mA)/high voltage capable IOs
- 4 times 16-bit PWM outputs
- Interrupt capable Inputs
- 10-bit ADC with integrated pre-divider connected to all IOs,
- Battery and LED threshold voltage monitor via ADC
 - can be used for aging and temperature compensation of LEDs
- Integrated temperature sensor for thermal management
- Configurable Wake up sources (LIN and IOs)
- Serial Interface (SPI)
- Voltage output for supply external 5V loads via npn transistor (MLX81107)

Voltage Regulator

- Low standby current consumption of typ 25 μ A (max 30 μ A) in sleep mode
- Over-temperature shutdown, 40V load dump protected

Other Features

- Automotive Temperature Range of -40°C to 125°C
 - MLX81106/8 – Thermally enhanced SOIC8 Package
 - MLX81107/9 – QFN5x5 20 pins
-

Short Description

This IC is a fully integrated low end LIN Slave for switch and PWM applications in automotive environment. It is suitable for bus systems according to LIN 2.x as well as SAE J2602.

The combination of physical layer LIN transceiver and LIN protocol controller in combination with easy to configure switch inputs and PWM outputs make it possible to develop in a short timeframe simple, but powerful and cheap switch slave nodes for LIN Bus systems.

Contents

| | |
|--|-----------|
| 1. General Overview | 3 |
| 1.1 <i>Memory Configuration</i> | 3 |
| 1.2 <i>Block Diagram</i> | 3 |
| 2. Electrical Characteristics | 4 |
| 2.1 <i>Absolute Maximum Ratings</i> | 4 |
| 2.2 <i>Operating Conditions</i> | 5 |
| 3. Functional Description | 6 |
| 3.1 <i>MCU</i> | 6 |
| 3.2 <i>LIN Transceiver and Controller</i> | 6 |
| 3.3 <i>Memory</i> | 6 |
| 3.4 <i>HV0..3 IO</i> | 6 |
| 3.5 <i>LV0..7 IO (MLX81107/9 only)</i> | 6 |
| 3.6 <i>Software Debug Interface</i> | 6 |
| 3.7 <i>ADC</i> | 7 |
| 3.8 <i>PWM</i> | 7 |
| 3.9 <i>Power Supply</i> | 7 |
| 4. Application Hints | 8 |
| 4.1 <i>General Application Examples MLX81106/8</i> | 8 |
| 4.2 <i>LIN RGB Application Examples MLX81106/8</i> | 9 |
| 4.3 <i>Application Examples MLX81107/9</i> | 10 |
| 5. Soldering information | 11 |
| 6. Disclaimer | 11 |

1. General Overview

1.1 Memory Configuration

| Part | Flash | User EEPROM | RAM | Package |
|----------|---------|-------------|--------|---------|
| MLX81106 | 24kByte | 384Byte | 1kByte | SOIC8 |
| MLX81107 | 24kByte | 384Byte | 1kByte | QFN 5x5 |
| MLX81108 | 32kByte | 384Byte | 1kByte | SOIC8 |
| MLX81109 | 32Kbyte | 384Byte | 1kByte | QFN 5x5 |

1.2 Block Diagram

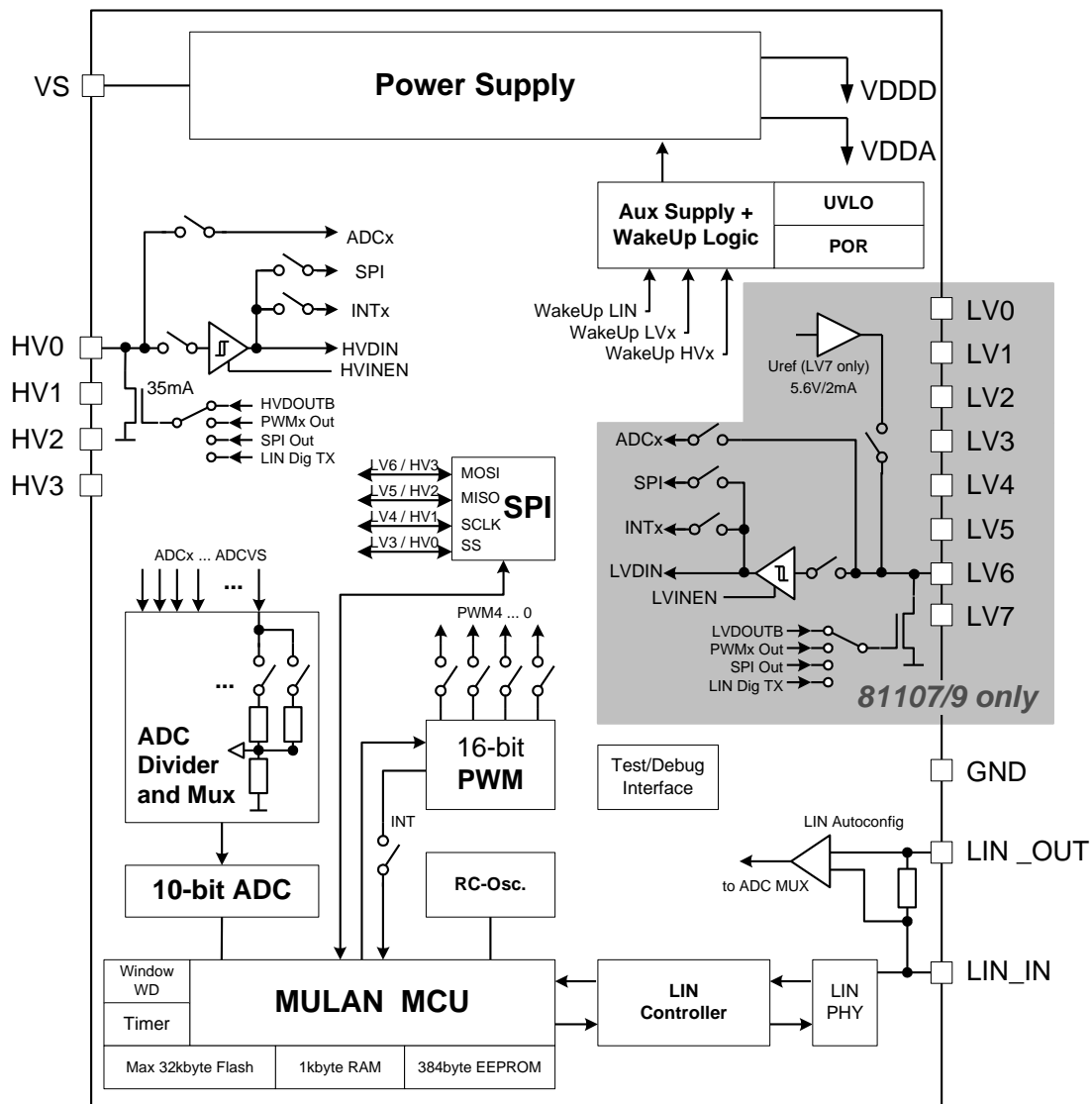


Figure 1 - Block Diagram

2. Electrical Characteristics

All voltages are referenced to ground (GND). Positive currents flow into the IC.

2.1 Absolute Maximum Ratings

In accordance with the Absolute Maximum Rating System (IEC60134). The absolute maximum ratings given in the table below are limiting values that do not lead to a permanent damage of the device but exceeding any of these limits may do so. Long term exposure to limiting values may affect the reliability of the device. Reliable operation is only specified within the limits shown in „Operating conditions”.

| Parameter | Symbol | Condition | Min | Max | Unit |
|--|---|---|------|------|------|
| Battery Supply Voltage | V _S | | -0.3 | 40 | V |
| Short term supply voltage | V _{S_id} | ISO 7637/2 pulse 5; t < 400 ms | -0.3 | 40 | V |
| Transients at supply voltage | V _{S_tr1} | ISO 7637/2 pulse 1 ^[1] | -100 | | V |
| Transients at supply voltage | V _{S_tr2} | ISO 7637/2 pulses 2 ^[1] | | +50 | V |
| Transients at high voltage signal pins | V _{LINx_tr1} | ISO 7637/3 pulse 1 ^[2] | -100 | | V |
| Transients at high voltage signal pins | V _{LINx_tr2} | ISO 7637/3 pulses 2 ^[2] | | +50 | V |
| Transient at high voltage signal and power supply pins | V _{HV_tr3} | ISO 7637/2 pulses 3A, 3B ^[3] | -150 | +100 | V |
| DC voltage on LIN, HVx | V _{LIN_DC} | T<500ms | -22 | 40 | V |
| DC voltage on D0..7 | V _{logic_DC} | | -0.3 | 7 | V |
| ESD voltage | V _{ESDIEC} | IEC 61000-4-2 Pin BUS, VS to GND | -6 | 6 | kV |
| | V _{ESDHBM} | HBM (CDF-AEC-Q100-002) ^[4] Pin BUS, VS to GND Other pins | -6 | 6 | kV |
| | | | -2 | 2 | kV |
| | V _{ESDCDM} | CDM (AEC-Q100-011) Pin BUS, VS to GND | -750 | 750 | V |
| V _{ESDMM} | MM (AEC-Q100-003) Pin BUS, VS to GND | -100 | 100 | V | |
| Maximum latch – up free current at any pin | I _{LATCH} | | -500 | 500 | mA |
| Storage temperature | T _{stg} | | -55 | +150 | °C |
| Junction temperature | T _{vj} | | -40 | +150 | °C |

Table 1 - Absolute Maximum Ratings

- [1] ISO 7637/2 test pulses are applied to VS via a reverse polarity diode and >2uF blocking capacitor.
 [2] ISO 7637/3 test pulses are applied to LIN via a coupling capacitance of 100nF.
 [3] ISO 7637/3 test pulses are applied to LIN via a coupling capacitance of 1nF.
 [4] ISO 7637/2 test pulses are applied to VS via a reverse polarity diode and >2uF blocking capacitor.
 Equivalent to discharging a 100pF capacitor through a 1.5kΩ resistor conforms to MIL STD 883 method 3015.7.

2.2 Operating Conditions

| Parameter | Symbol | Min | Max | Unit |
|---------------------------------------|------------------|-----|------|------|
| Battery supply voltage ^[1] | V _s | 5.5 | 18 | V |
| High battery supply voltage | V _{s,s} | 18 | 27 | V |
| Operating ambient temperature | T _{amb} | -40 | +125 | °C |

Table 2 - Operating Conditions

1) V_s is the IC supply voltage including voltage drop of reverse battery protection diode, V_{DROP} = 0.4...1V, V_{BAT_ECU} = 6...27V.

3. Functional Description

3.1 MCU

- 16-bit RISC MCU

3.2 LIN Transceiver and Controller

- Support for LIN 2.x and J2602
- Support Autoconfig according bus shunt

3.3 Memory

- 24kByte User Flash MLX81106/7
- 32kByte User Flash MLX81108/9
- 1kByte RAM
- 384Byte User EEPROM
- 128byte MLX EEPROM for LIN IDs, Calibration data

3.4 HV0..3 IO

- High voltage capable open drain output (max 600ohm R_{DS(on)})
- High voltage capable constant current output of max. 30mA per IO (max. 48mA short term)
- 16-bit PWM Output
- Digital output (5V)
- High voltage capable input
- Digital (5V) input
- 10-bit ADC Input inc. pre-devider for direct measurement of VS
- Differential SC-Amplifier for detection of very small voltage changes for LED threshold measurement
- SPI Interface
- Interrupt capable input

3.5 LV0..7 IO (MLX81107/9 only)

- Open drain output (3mA)
- PWM output
- Low voltage output (5V)
- Low voltage (5V) input
- ADC Input inc. pre-devider for direct measurement
- SPI Interface
- Interrupt capable input
- LV7 - Voltage output for supply external 5V loads via npn transistor (See appl example for details)

3.6 Software Debug Interface

- Available at HV0..3pins (MLX81106/8)
- Available at LV0..3pins (MLX81107/9)
- HV2(MLX81106/8) and LV2(MLX81107/9) needs pull up against 3.3V supplied from emulator
- For full debug function on 81106/8 the MLX81107/9 can be used as software development device.

3.7 ADC

- 10-bit ADC
- Up to 20 channels (HVO..3, LV0..7, VS, internal references, temp sensor)
- Full Scale 5V via internal pre-divider
- Continuous Mode: Automatic measuring of enabled channels. Result stored via DMA. If new result available old will be overwritten

3.8 PWM

- Max 16-bit resolution, min 370Hz
- Configurable from 8-bit to 16-bit, 8-bit mode with max possible frequency – approx 60kHz
- 4 independent PWM channels
- Programmable PWM frequency per channel
- Programmable interrupt generation at the beginning and/or end of every PWM period
- Synchronous switch of duty cycle change

3.9 Power Supply

- Internal compensated
- Primary Cap min 2.2uF

4. Application Hints

4.1 General Application Examples MLX81106/8

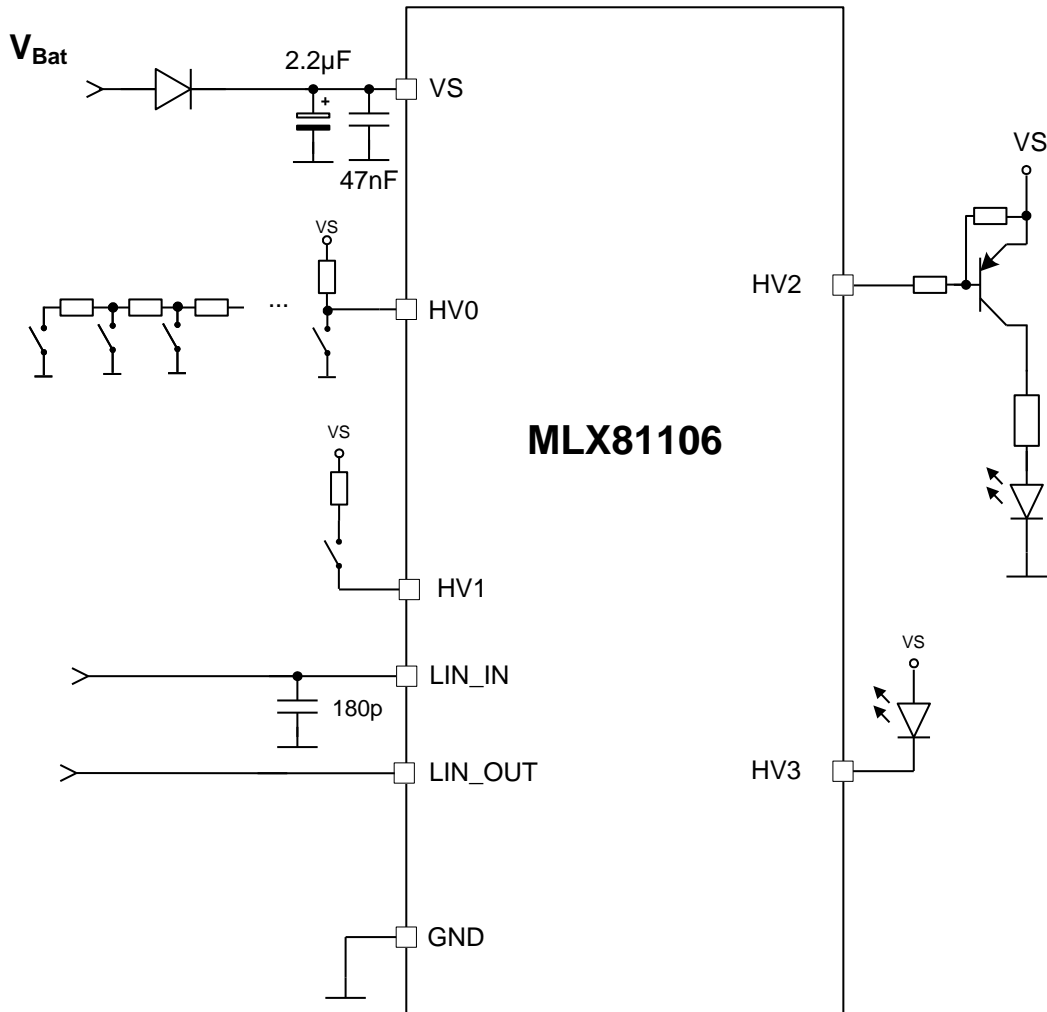


Figure 2 - Application schematic sample

4.2 LIN RGB Application Examples MLX81106/8

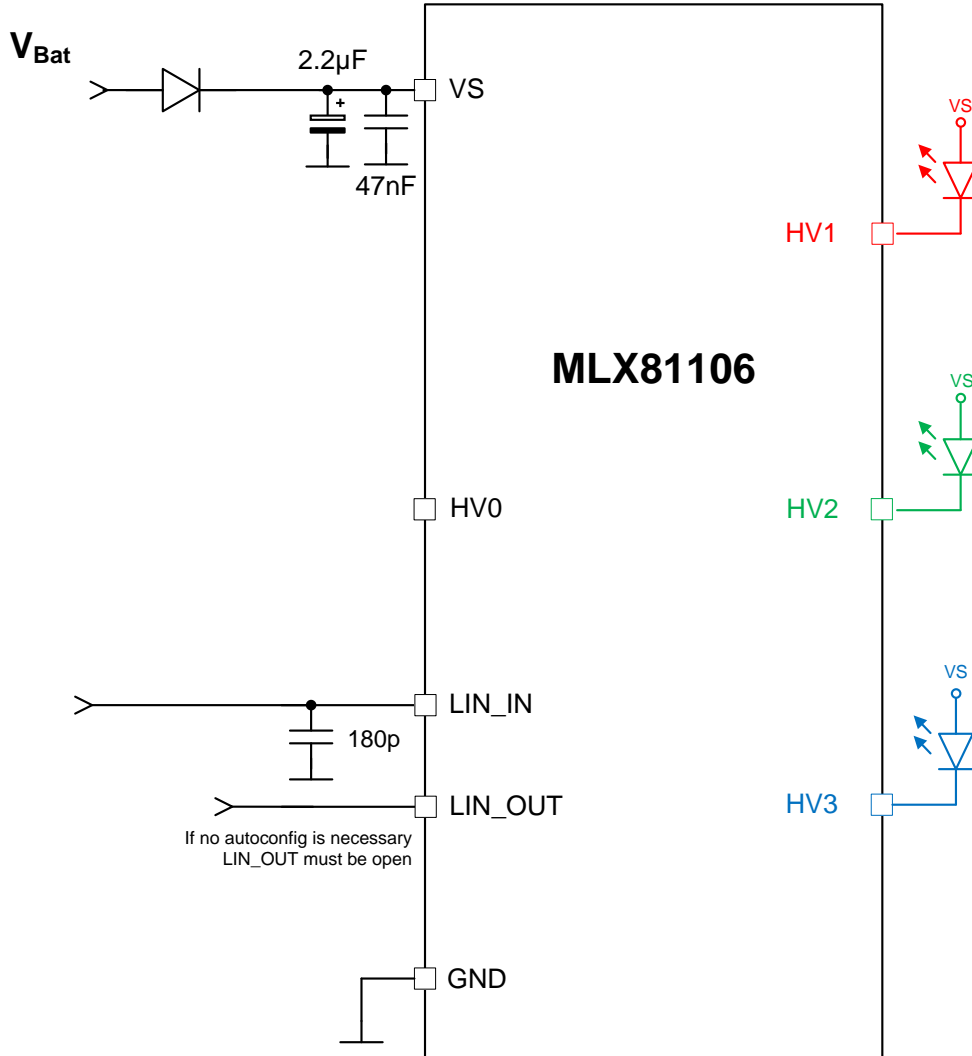


Figure 3 - LIN RGB Slave

4.3 Application Examples MLX81107/9

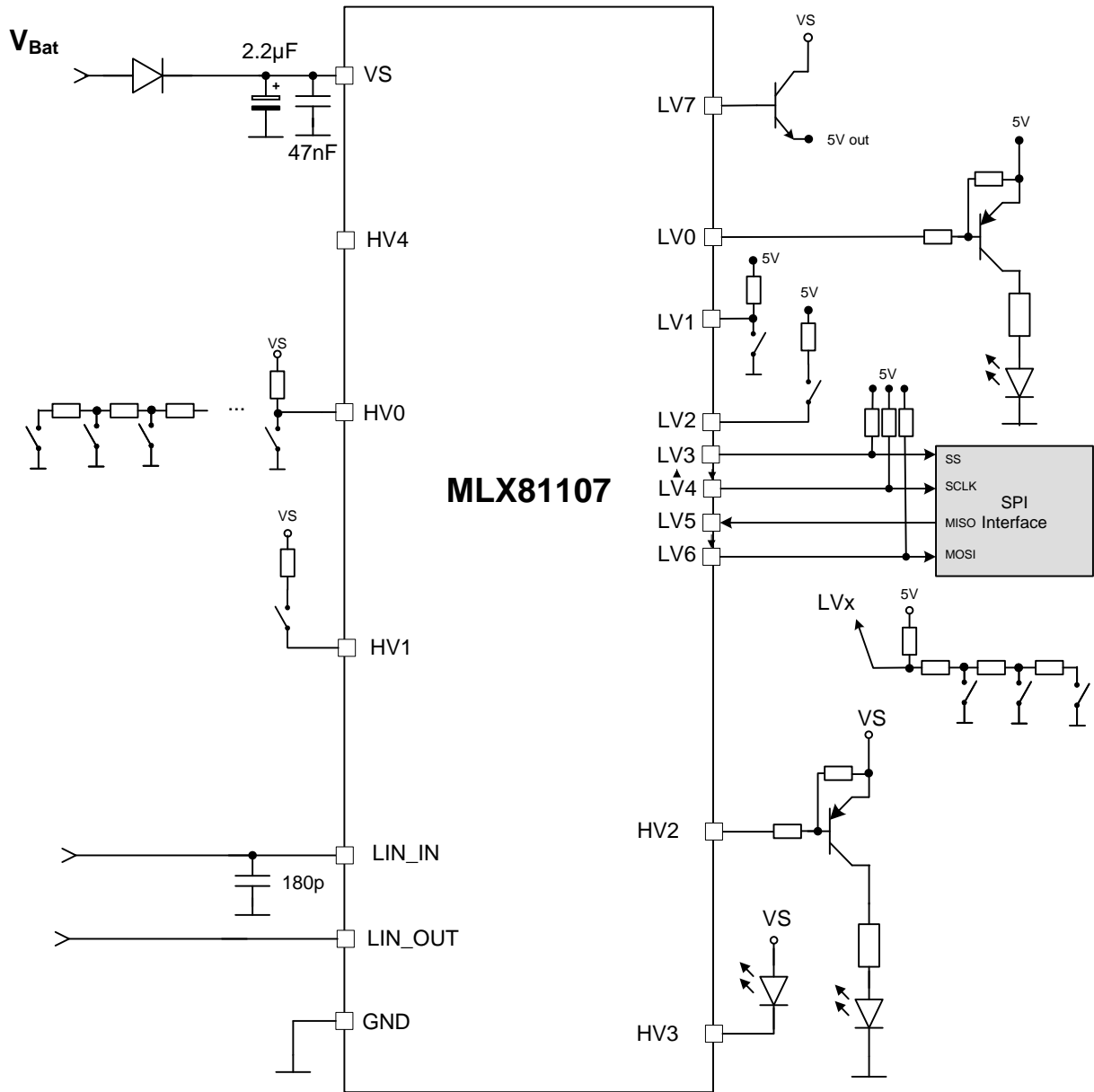


Figure 4 - Application schematic sample

5. Soldering information

Please see

<http://www.melexis.com/Assets/Soldering-Application-Note-and-Recommendations-5446.aspx>

6. Disclaimer

Devices sold by Melexis are covered by the warranty and patent indemnification provisions appearing in its Term of Sale. Melexis makes no warranty, express, statutory, implied, or by description regarding the information set forth herein or regarding the freedom of the described devices from patent infringement. Melexis reserves the right to change specifications and prices at any time and without notice. Therefore, prior to designing this product into a system, it is necessary to check with Melexis for current information. This product is intended for use in normal commercial applications. Applications requiring extended temperature range, unusual environmental requirements, or high reliability applications, such as military, medical life-support or life-sustaining equipment are specifically not recommended without additional processing by Melexis for each application.

The information furnished by Melexis is believed to be correct and accurate. However, Melexis shall not be liable to recipient or any third party for any damages, including but not limited to personal injury, property damage, loss of profits, loss of use, interrupt of business or indirect, special incidental or consequential damages, of any kind, in connection with or arising out of the furnishing, performance or use of the technical data herein. No obligation or liability to recipient or any third party shall arise or flow out of Melexis' rendering of technical or other services.

© 2014 Melexis N.V.

For the latest version of this document. Go to our website at
www.melexis.com

Or for additional information contact Melexis Direct:

| | |
|---|--|
| Europe and Japan: Phone: +32 1367 0495 E-mail: sales_europe@melexis.com | All other locations: Phone: +1 603 223 2362 E-mail: sales_usa@melexis.com |
|---|--|

ISO/TS16949 and ISO14001 Certified

Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

- [View MLX81108KDC-CAE-000-RE on WIN SOURCE](#)
- [Melexis Technologies NV Information](#)

Optimize Your Supply Chain with WIN SOURCE Solutions

- ✓ Global Sourcing Solution
- ✓ Obsolete Management
- ✓ Cost Control Management
- ✓ Shortage Management
- ✓ Alternative Solution
- ✓ Excess Inventory Management