TCM 3x0(C) - Circuit Application Examples

1 RELATED DOCUMENTS

This document describes some typical application examples of TCM 300 / 300C, TCM 310 / 310C and TCM 320 / 320C modules. It is assumed that the following detailed information is well known.

- TCM 300 / 320
- TCM 310

In addition we recommend following EnOcean documentation and application notes:

- AN101: Power Supply Layout - Layout considerations for line-power supplies
- AN102: Antenna Basics - Antenna design considerations for EnOcean based products
- AN105: 315MHz Internal Antenna Design - Considerations for EnOcean based products
- AN402: Standby power reduction- Line-power supplies with lowest power dissipation
- AN403: Dolphin Migration - Replacing RCM 1xy / TCM 1x0 / TCM2x0C by TCM 3xy(C)
- AN602: USB based EnOcean Transceiver - Easy Realization of an EnOcean/PC Gateway
- EnOcean Serial Protocol 3 (ESP3): EnOcean Serial Protocol 3

Using TCM 3x0(C) transceivers it is easy for everyone to implement typical functions like e.g. serial interface, repeater, switch actuators or dimmer.

This document only shows some simple circuit application example solutions like gateway, actuator or repeater based on TCM 3x0(C) family. For more details please consult the related documentation. Please also note that the following examples are basic concepts only.

Some specific TCM 3x0(C) features:

- The standard TCM 300 /320(C) provides a possibility to select between some predefined operating modes. The operating mode is defined at start-up of the device via reading of the corresponding voltage level at the ADIO_0 input. Please refer to the information regarding mode selection in the user manual. In addition repeater functionality (1 or 2 level) can be independently activated and configured (at power-up).
- The TCM 310(C) has just one operating mode, as Gateway Controller. This dedicated firmware can also be directly implemented into both TCM 300(C) and TCM 320(C) modules.

Due to its reduced pin count (only 16 pins) and similar form factor with predecessor products, TCM 320(C) offers the simplest way for implementation of standard functions as shown in the following examples. However due to its reduced number of pins, not all hardware features of the Dolphin chip are accessible for the user. The most important TCM 320(C) limitations refer to reduced supply voltage range, considerably higher sleep current (IOVDD internally always connected to VDD) and reduced number of I/Os.

So if you use the TCM 300(C) / 310(C), please note the specific differences vs. TCM 320(C) platform. Don't forget to connect the IOVDD externally to the appropiate supply voltage (in TCM 320 / 320C IOVDD is already internally connected to VDD). Apart from that the implementation is absolutely similar to the TCM320, the pin names are the same.

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2 TYPICAL APPLICATION EXAMPLES

a. Actuator: in opposite to the RCMxxx modules (open collector outputs up to 35 V, 100 mA, which can directly drive relays), the TCM 3x0(C) have digital outputs. Due to its lower supply voltage i.e. 2.6 to 3.3 V for the TCM 320(C) and lower output current drive capability (max. 2 mA @ 3 V) external output drivers for actuators like relays may be required, as shown Fig. 1.

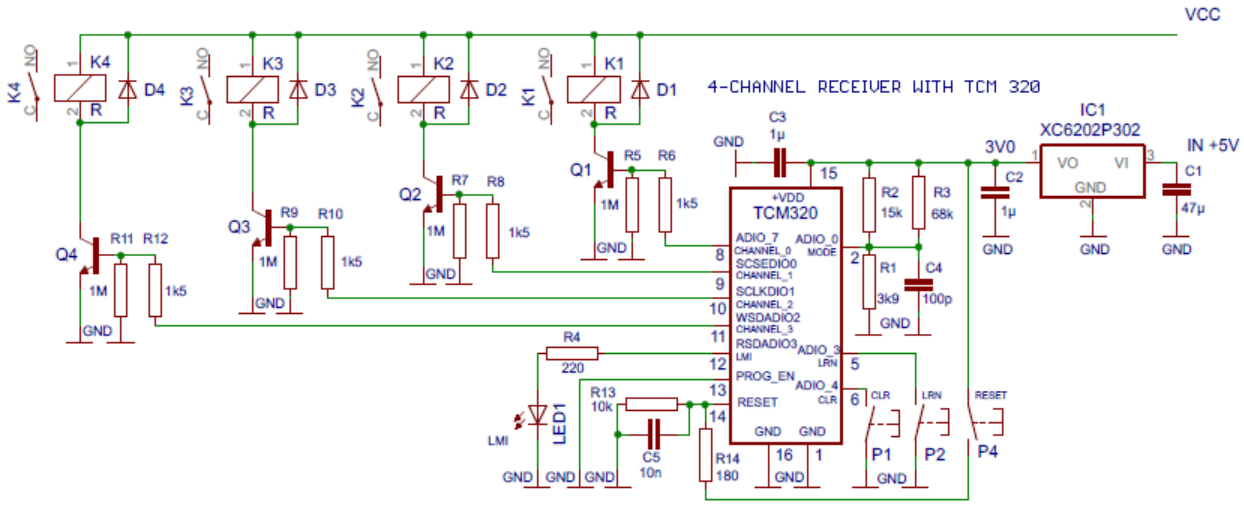

Fig.1: 4 channel actuator circuit diagram example (TCM320, Mode 3, switch actuator).

Using ADIO_1 and ADIO_2 inputs like illustrated in Fig.2 the additional repeater functionality can be realized. Similar (using Mode 2 respectively Mode 4) a one channel switch or a one channel dimming receiver can be implemented.

b. Repeater: the example shows a simple configurable repeater based on TCM 320(C):

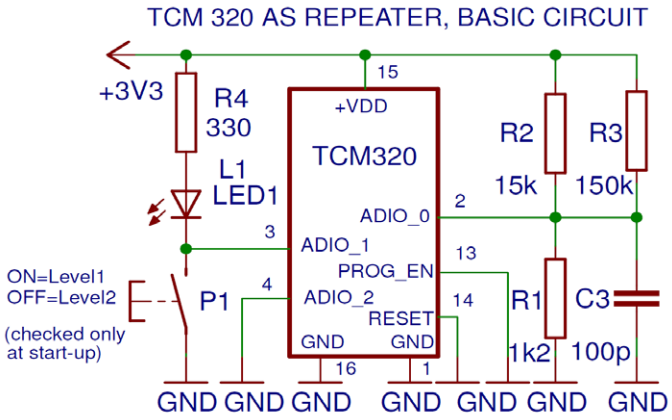

Fig.2: Repeater with TCM320

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c. Serial Interface: one of the most common applications is the EnOcean serial interface. If you use the standard TCM 300(C) / 320(C) modules (ESP2) this can be easily implemented as shown in the example in Fig. 3, bidirectional serial interface (ESP2), Mode 1.

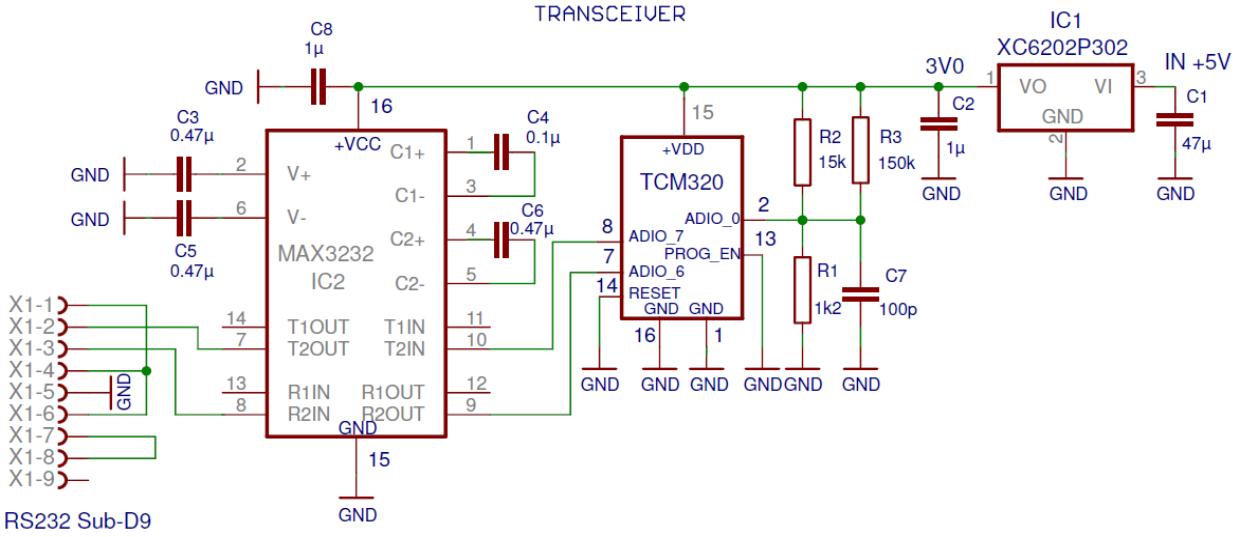

Fig.3: RS232 Interface using TCM 320(C). Using ADIO_1 and ADIO_2 inputs like illustrated in Fig.2 the additional repeater functionality can be realized.

NOTE: The best way to realize a gateway is to use the TCM 310 / 310C Gateway Controller module, or alternatively to flash the EnOcean Gateway Controller firmware (see Gateway Controller Firmware, Gateway Controller User Manual) in any TCM 3x0(C) standard module.

The TCM 310 Gateway Controller firmware uses the new version of EnOcean´s Serial Protocol 3 (ESP3). ESP3 is a bidirectional serial protocol between the TCM 310 module and an external host. It provides a transparent channel for radio messages and a serial interface to control the module from the host. Compared to the previous EnOcean Serial Protocol 2 (ESP2) which has been used in the past, ESP3 adds several new features, such as:

- Information about the received radio signal strength (RSSI) and number of the received sub-telegrams
- Improved data security and consistency by CRC8 data verification
- Higher serial data rate
- Support for longer special telegrams with more data for future requirements
- Support for EnOcean Equipment Profiles according to EEP
- Programmable Repeater functionality
- High flexibility for future requirements.

By using the Gateway Controller firmware for any TCM 3x0(C), no external hardware "mode select" network elements at (ADIO_0) must be added, see also TCM 310 User Manual.