
5.4. HF COMMUNICATION

The RF communication is fully described in the BMW specification [11].

When the transmitter send a message, the current supply is at 8mA corresponding has a simultaneous operation of the micro STARC 7942 and the RF IC TDA5100.

SHORT PULSE :

1- The user push the button number X.

2- The micro STARC 7942 wakes up.

The current is ~0.5 mA.

3- The PLL in the RF IC is started and the battery voltage is measured by the micro. The current is ~4.5 mA.

4- The RF power stage is started and the message is send.

The current is ~9 mA.

5- After the message, the RF IC is stopped, and the micro is slept.

The steps number 1,2,3 and 5 are very short, and the total current for the short pulse operation is equal at 8 mA.

LONG PULSE :

The operation is different, because the micro STARC stop the RF power stage between the confort messages.

The average current is equal at 5 mA.

5.5. LF COMMUNICATION

LF communication allows to load the battery through the 125 KHz coming from the CAS.

The communication with the CAS is fully described in the BMW specification [11].

5.6. HOMOLOGATION MODE

The purpose of this mode is to switch the transmitter into a continuous transmission allowing homologation tests. The different continuous modes are the following :

- Carrier frequency wave type 1

If buttons TRUNK and UNLOCK are pressed simultaneously, a carrier frequency is transmitted (a continuous "0" on DOUT) with a 2 mn timeout.

- Carrier frequency wave type 2

If buttons PANIC and UNLOCK are pressed simultaneously, a carrier frequency is transmitted (a continuous "1" on DOUT) with a 2 mn timeout.

- Carrier modulated wave frequency

If buttons LOCK and PANIC are pressed simultaneously, a modulated frequency is sent (continuous "0" Manchester coded at 2 kbits/s or 4 kbits/s) with a 10 s timeout.

5.7. BATTERY MANAGEMENT

The transmitter is supplied by a Panasonic VL2020 battery

It must be able to function under the conditions defined by BMW in the document number :

LH 8 387 444.4 E65-66.12 L.

In remote control mode, the battery supply the power for the key, conversely in BF communications the RF key is charged by the CAS. This load is carried out via the energy recovered on the 125 KHz LF connection. In this way whatever is the state of load of the accumulator, connection LF (immobilizer) remains always functional.

A management system of load (micro STARC 7942) makes it possible to optimize to the maximum the lifetime of the accumulator according to a load profile contained in E2prom.

5.7.1. Remote mode

In remote mode, 3 different cases are possible concerning the battery voltage level :

- $V_{bat} > 2.6 \text{ V}$ Battery **OK**,
- $2.2 \text{ V} \leq V_{bat} \leq 2.6 \text{ V}$ Battery **LOW**
- $V_{bat} < 2.2 \text{ V}$ NO RF message is sent.

5.7.2. Charging mode

When a LF field is detected, a battery charging is carry out as long as the battery voltage is under 3.4V. The battery charging is realized according to a battery profile registered in an EEPROM table.

6. ENVIRONMENTAL REQUIREMENTS

6.1. MECHANICAL CHARACTERISTICS

6.1.1. Operating range

Operating and storage temperature : -10°C to 60 °C (due to the accumulator)

6.1.2. Dropping tests

Remote control functions : 100 times from 1.2m accidental on to concrete ground

Immobilization function : 10 times from 5m accidental on to concrete ground

6.1.3. Vibration resistance

The key has to be inserted into the CAS.

Requirements as describe in the BMW N 600 13.0-A

6.2. ELECTRICAL CHARACTERISTICS

6.2.1. Immunity to power supply cuts (microcuts)

The transmitter is specifically designed to ensure no loss of any function, after power recovery, should a micro-cut (temporary loss of power) condition occur.

This ensures that critical parameters such as the rolling code are updated to the EEPROM, even if a transmission occurs during vibration or drop conditions.

6.2.2. Battery

The transmitter is supplied by a Panasonic VL2020 battery

VL2020 specifications :

Characteristic	Value
Nominal voltage	3V
Charging voltage	3.4V $\pm$ 0.1V
Nominal Capacity (Load 30kOhms,End 2.5V at 20°C)	20 mAh
Internal resistance (at 1 kHz)	< 30 Ω
Temperature range	-10°C to + 60°C

END OF DOCUMENT