EXTENDEDTIMEOUT). When enabled, the receiver delays idling the interface until the allocated and undelivered bytes for this interface reach 4 kB. This feature is especially useful when using the TX-ready feature with a message output rate of less than once per second, and fetching data only when available, determined by the TX_READY pin becoming active.

3.3 Antenna

This section explains the antenna supervisor feature and the available implementation options.

3.3.1 Antenna supervisor

An active antenna supervisor provides the means to check the antenna for open and short circuits and to shut off the antenna supply if a short circuit is detected. Once enabled, the active antenna supervisor produces status messages that are reported in NMEA and/or UBX protocols. MAX-M10S supports two antenna supervisor variants: three-pin and two-pin implementations.

The three-pin antenna supervisor is able to detect short and open circuits and control the antenna supply. The two-pin antenna supervisor is a reduced version which is able to control the antenna supply and detect short circuits.

An overview of the two antenna supervisor variants is given in Table 17. It is recommended to make use of the full capabilities of the antenna supervisor (detect open and short circuits, and control the antenna supply).

The antenna supervisor can be configured through the CFG-HW-ANT_* configuration items. This includes enabling and disabling as well as changing the polarity of each signal. The current configuration of the active antenna supervisor can also be checked by polling the related CFG-HW_ANT_* configuration items.

The active antenna status can be determined by polling the UBX-MON-RF message or checking the NMEA notice messages. If an antenna is connected, the initial state after power-up is reported in the UBX-MON-RF message in *antStatus* and *antPower* fields. For more information, refer to Interface description [3]

Features	Three-pin	Two-pin
Short detection	Yes	Yes
Open detection	Yes	No
External components	Discrete and IC	Discrete and IC
Number of PIOs needed	Three	Two

Table 17: Antenna supervisor overview

3.3.1.1 Three-pin antenna supervisor

An active antenna supervisor circuit uses the ANT_DETECT, ANT_OFF_N, and ANT_SHORT_N signals. The ANT_OFF_N signal is already enabled and assigned to the LNA_EN pin in MAX-M10S. The ANT_DETECT and ANT_SHORT_N signals can be assigned to any unused PIOs, which may require disabling the previous function of the PIOs. For example, the open circuit detection uses the ANT_DETECT signal, "high" = Antenna detected (antenna consumes current); "low" = Antenna not detected (no current drawn). To enable the three-pin antenna supervisor, the ANT_DETECT and ANT_SHORT_N signals must be enabled in the receiver configuration. The polarity of the ANT_DETECT and ANT_SHORT_N signals must also be defined in the receiver configuration based on the design use case.

The antenna can be supplied by VCC_RF or an external supply. Note that the supply voltage must be clean, as any noise could directly couple into the RF part of the GNSS receiver which affecting the overall GNSS performance.

Refer to Reference designs for antenna supervisor examples and the required configuration.

Figure 10 presents the required three-pin antenna supervisor circuit and subsequent sections describe how to enable and monitor each feature.

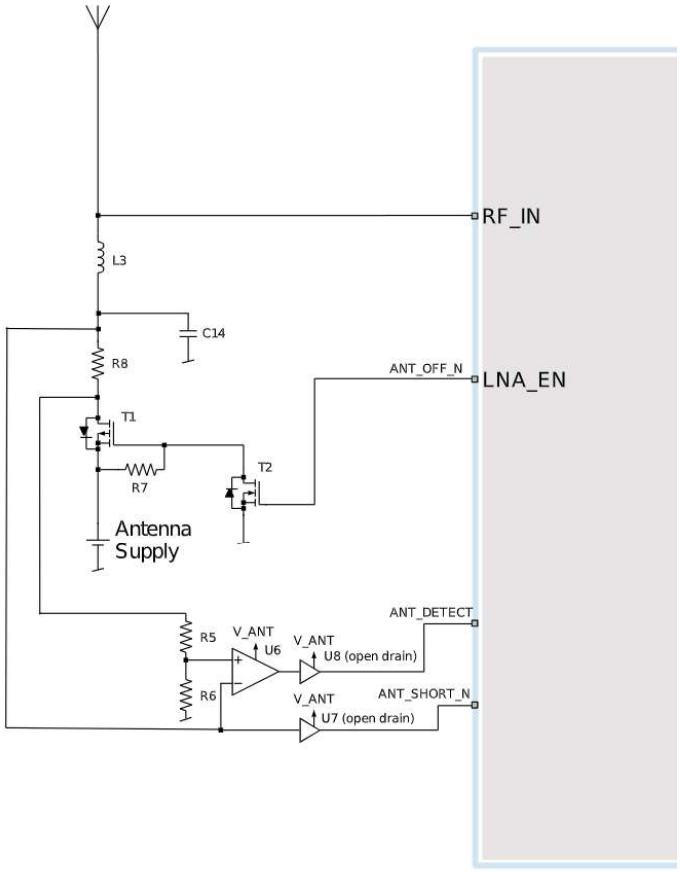

Figure 10: MAX-M10S three-pin antenna supervisor

Table 18 presents a list of the external components required for implementing the three-pin antenna supervisor design in Figure 10. Refer to External components for the recommended parts and specification.

Part	Description
C14	Filtering capacitor
L3	DC infeed inductor
T1, T2	p-channel, n-channel MOSFET acting as a switch to control the antenna supply
U6	Comparator (op-amp)
U7, U8	Open drain buffers to shift voltage levels
R7	Passive pull-up to control T1
R8	Current limiter in the event of a short circuit
R5	Defines the threshold of the comparator

Part	Description
R6	Defines the threshold of the comparator

Table 18: Components in antenna supervisor

The threshold voltage (V_REF) of the comparator is defined by R5 and R6. It can be calculated as: *V_REF = R6/(R6+R5)*V_ANT*.

☞ The open drain buffers shown in Figure 10 are not needed if V_ANT has the same voltage level as V_IO.

3.3.1.2 Two-pin antenna supervisor

The reduced functionality antenna supervisor circuit is connected to two signals: antenna control (ANT_OFF_N) and antenna status detection (ANT_SHORT_N). The ANT_OFF_N signal is already enabled and assigned to the LNA_EN pin in MAX-M10S and the ANT_SHORT_N signal can be assigned to any unused PIO, which may require disabling the previous function of the PIO. To enable the reduced antenna supervisor, the ANT_SHORT_N signal must be enabled in the receiver configuration. The polarity of the ANT_SHORT_N signal must also be defined in the receiver configuration based on the design use case.

The antenna can be supplied by VCC_RF or an external supply. Note that the supply voltage must be clean, as any noise could directly couple into the RF part of the GNSS receiver affecting the overall GNSS performance.

Refer to Reference designs for antenna supervisor examples and the required configuration.

Figure 11 presents the required two-pin antenna supervisor circuit and subsequent sections describe how to enable and monitor each feature.

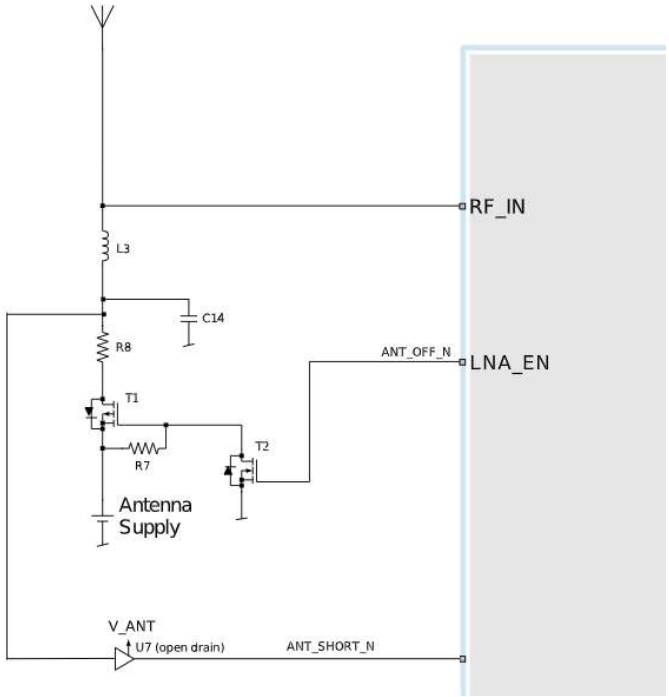

Figure 11: MAX-M10S two-pin antenna supervisor