Jupiter Antenna Monitoring Application Note

80403NT11218A Rev.0 – 2013-12-04

APPLICABILITY TABLE

PRODUCT
JF2
JN3

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

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Contents

1. Introduction

1.1. Scope

This document provides information regarding active antenna monitoring for Jupiter GPS receiver modules.

1.2. Audience

This document is intended for Jupiter GPS module customers who are interested in using an active antenna for their application.

1.3. Contact Information, Support

For general contact, technical support, to report documentation errors and to order manuals, contact Telit Technical Support Center (TTSC) at:

TS-EMEA@telit.com
TS-NORTHAMERICA@telit.com
TS-LATINAMERICA@telit.com
TS-APAC@telit.com

Alternatively, use:

http://www.telit.com/en/products/technical-support-center/contact.php

For detailed information about where you can buy the Telit modules or for recommendations on accessories and components visit:

http://www.telit.com

To register for product news and announcements or for product questions contact Telit Technical Support Center (TTSC).

Our aim is to make this guide as helpful as possible. Keep us informed of your comments and suggestions for improvements.

Telit appreciates feedback from the users of our information.

1.4. Document Organization

This document contains the following chapters:

Chapter 1: “Introduction” provides a scope for this document, target audience, contact and support information, and text conventions.

Chapter 2: “Background” gives an overview of the antenna monitoring features of Jupiter GPS modules.

Chapter 3: “Antenna Monitoring Circuits” provides examples of antenna monitoring circuitry that can be implemented by GPS module customers.

Chapter 4: “Document History” lists the revisions made to this document.

1.5. Text Conventions

Danger – This information MUST be followed or catastrophic equipment failure or bodily injury may occur.

Caution or Warning – Alerts the user to important points about integrating the module, if these points are not followed, the module and end user equipment may fail or malfunction.

Tip or Information – Provides advice and suggestions that may be useful when integrating the module.

All dates are in ISO 8601 format, i.e. YYYY-MM-DD.

1.6. Related Documents

- JF2 Product Description, 80403ST10103A
- JN3 Product Description, 80403ST10104A
- JF2 Hardware User Guide, 1vv0300985
- JN2 Hardware User Guide, 1vv0300984
- JF2 EVK User Guide, 1vv0300987

2. Background

2.1. Description

Active antenna monitoring in the Host platform notifies the user or Host device when either an open-circuit or short-circuit condition occurs on the active antenna connection. It can also provide for protection against a persistent short-circuit condition. Example circuits for monitoring the active antenna and generating status signals are illustrated later in this document.

2.2. Firmware Support

An Antenna Sense support feature that reports antenna status using proprietary NMEA messages is available by request in versions of GPS firmware modified by Telit for flash-based Jupiter-F2 (JF2) GPS modules. A form of this feature can also be realized on ROM-only and EEPROM versions of the JF2 module that are based on CSR ROM 2.2 or higher, or CSR firmware version 4.1.2 or higher. When using firmware support the antenna monitoring circuitry interfaces with the JF2 module using GPIO pins.

More information on this firmware feature can be obtained by request under a Telit Non-Disclosure Agreement (NDA).

Note:
The Antenna Sense support feature is not available for Jupiter-N3 (JN3) modules.

3. Antenna Monitoring Circuits

3.1. Overview

External antenna monitoring circuitry is implemented by the OEM customer to provide two status signals. One status signal indicates an Open-Circuit state of the antenna supply voltage, i.e. whether the antenna has been disconnected. The other status signal indicates a Short-Circuit state, in which case a fault within the antenna or a short in the supply voltage has occurred. Optionally, the antenna monitoring circuitry also accepts a control signal from an external source and which is used to switch the antenna supply voltage on and off.

3.2. Short-circuit Detection

A current-limiting circuit or switch within the external monitoring circuitry causes the Short-Circuit status signal to be asserted to a logic Low when it detects an over-current condition.

3.2.1. Current-limit Switches

For circuit designs that use a current-limit switch on the antenna supply voltage, the switch is turned off when an over-current condition occurs in the switch. Some switches enter a latch-off state in which the switch remains off until input power is cycled or the ON control signal to the switch is toggled. Other switches may have an auto-retry capability, whereby the switch is periodically turned back on to test whether the over-current condition is still present. If the condition is still present, the switch turns itself back off. If it disappears, the switch remains on.

3.2.2. Antenna Shut-off On Short

For circuit designs that do not provide over-current protection such as with a current-limit switch, the circuit instead can be designed to accept a signal provided by the Host platform. The signal is used to shut off the antenna supply when a persistent short-circuit (for example more than one second) is detected. In the reference diagrams below, logic High is used to turn on and logic Low used to turn off the antenna supply voltage.

3.3. Open-circuit Detection

A low current sensor within the antenna monitoring circuitry is used to generate the Open-Circuit signal. The circuits in the reference diagrams below assert a logic Low on this signal when low-current or no-current is detected.

3.4. Reference Circuit Diagrams

The basic difference between the two reference designs shown in the subsections below is that one circuit uses a MAXIM current-limit switch IC whereas the other circuit diagram uses discrete components. The latter circuit typically incurs a smaller cost in the customer BOM.

3.4.1. Switch IC

The circuit shown in Figure 1 is derived from the circuit used in Revision 2 of the Jupiter-F2 EVK. The NOLD and FFLG outputs from the MAXIM switch are used as the Open-circuit and Short-circuit Detect signals, which are labeled ANT_OC and ANT_SC respectively. The Antenna Control output is not used because, depending upon the part number, the switch has either a latch-off state or auto-retry feature that manages the antenna supply voltage (OUT signal) when FFLG (short-circuit) is asserted low. For example, the MAX4831 indicated in the diagram has an auto-retry feature, whereas the MAX4830 would enter a latch-off state.

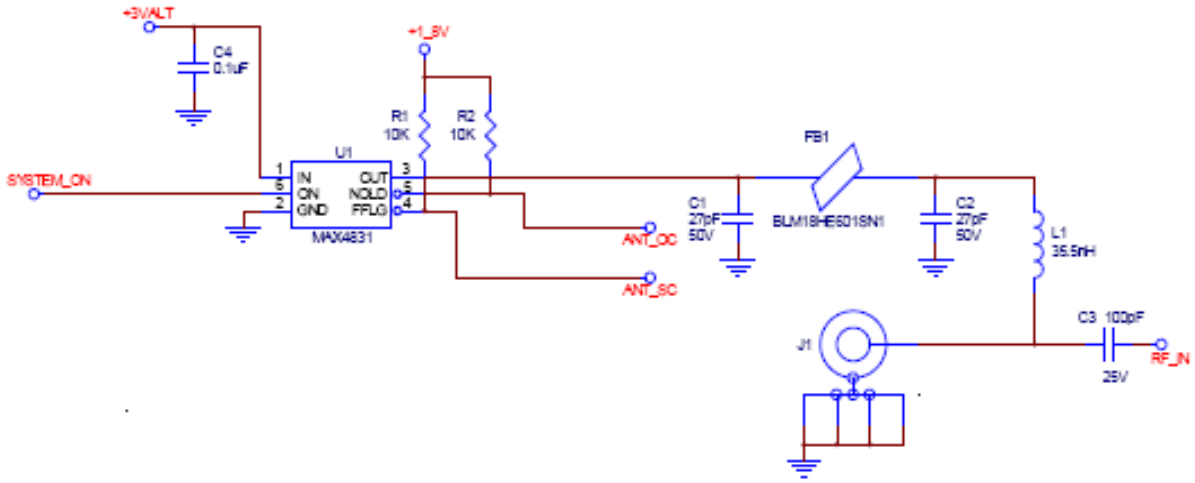

Figure 1. Antenna Monitoring Circuit – MAXIM Switch

3.4.2. Discrete Components

The circuit shown in Figure 2 is an example of an antenna monitoring circuit comprised of discrete components. The Antenna Control signal (ANT_CTRL) is used by the Host to shut off the antenna supply voltage when a persistent short-circuit condition is detected and reported via the ANT_SC signal.

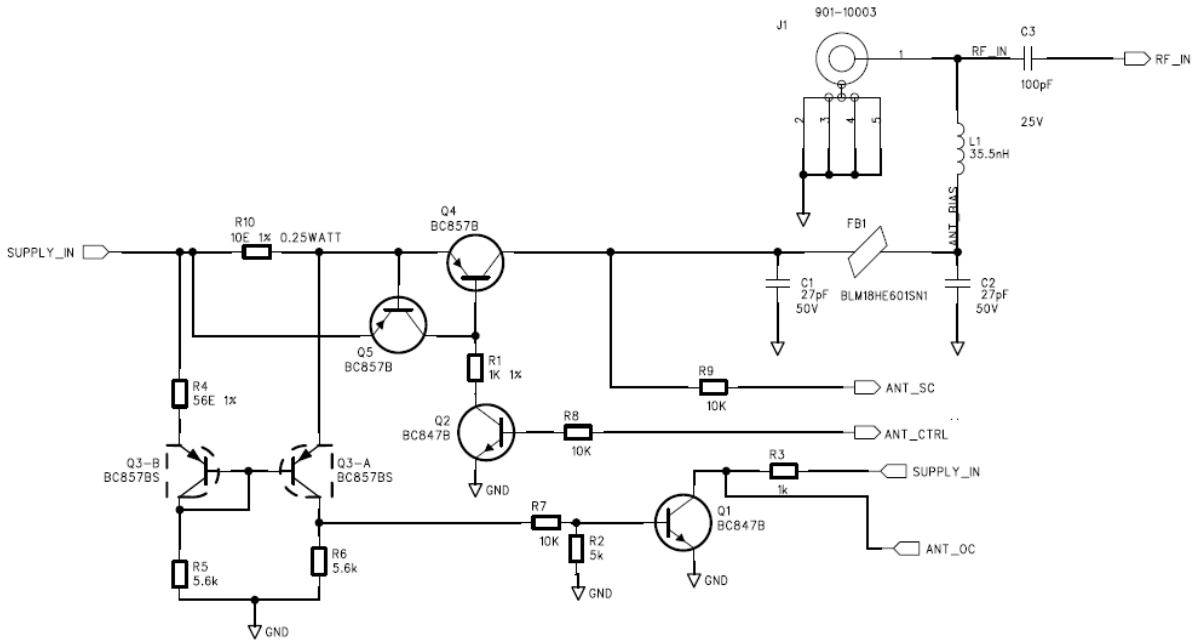

Figure 1. Antenna Monitoring Circuit – Discrete Components

4. Document History

Revision	Date	Changes
0	2013-12-04	First issue