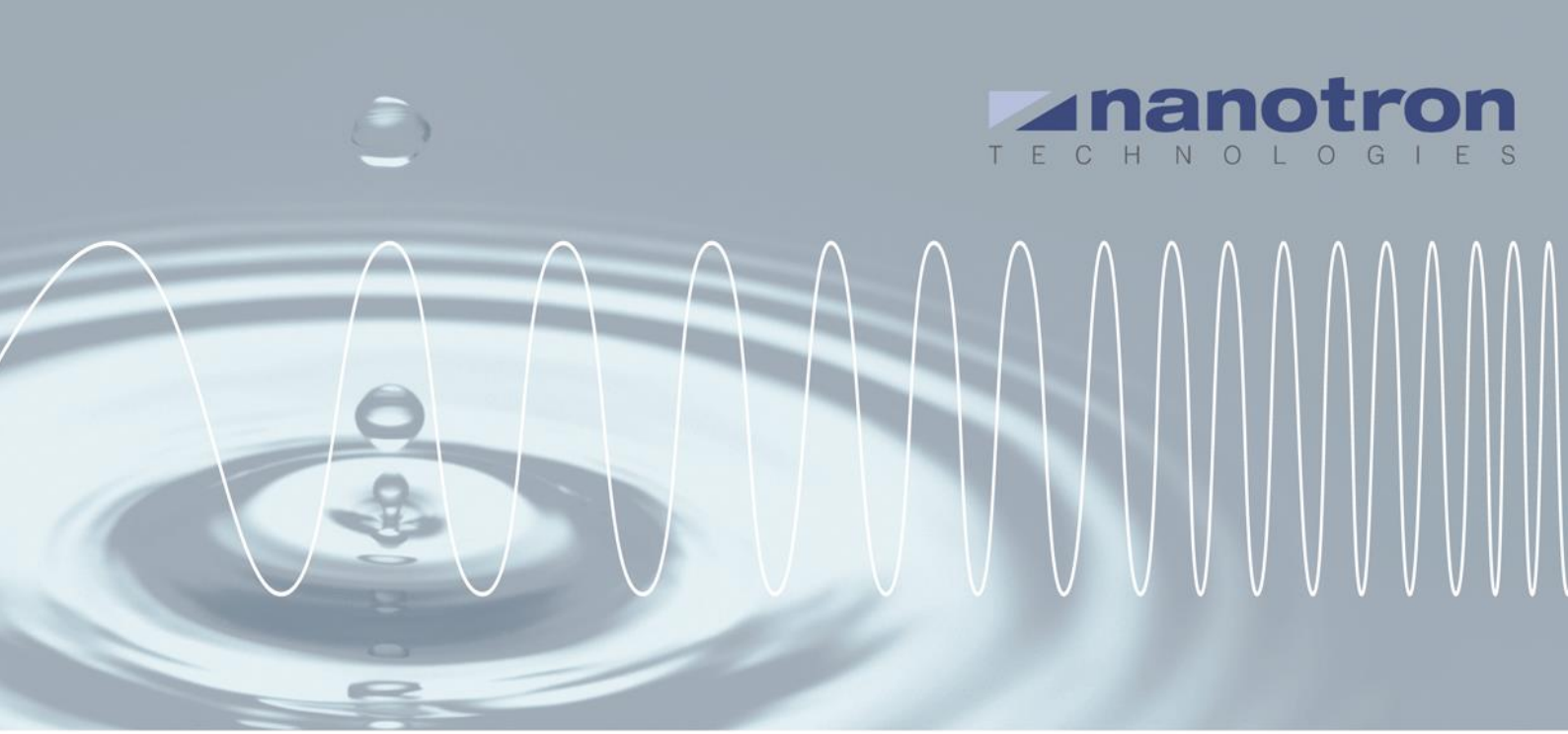

AN0518 - How to power up and control a *swarm* bee

1.0

NA-17-0356-0005

Document Information

Document Title:	AN0518 - How to power up and control a swarm bee
Document Version:	1.0
Current Date:	2017-03-20
Print Date:	2017-03-20
Document ID:	NA-17-0356-0005
Document Author:	Maria Luisa Arbulo

Contents

1. Introduction

In order to properly power up the *swarm* bee devices, the user will obviously control the pins Vcc and GND. However, there are other pins that affect the status or even the behavior of the module. The user should take all of them into account to properly power up and control the device. Not doing so could lead to behaviors unexpected by the user.

This document guides the user on how to power up the devices *swarm* bee LE v1, *swarm* bee LE v2 and *swarm* bee ER.

2. Relevant pins

This relevant pins used to power up and control the *swarm* devices are explained in the following subsections.

For more information the data sheet of the product should be checked.

2.1. VIN and GND

VIN and GND (ground circuit) are used to power up the *swarm* bee device.

swarm bee LE: VIN + 3.0 V … + 5.5 V, max. 120mA @3.3V

swarm bee ER: VIN + 3.3 V … + 5.5 V, max. 170mA @3.3V

2.2. MOD_EN

This pin controls the current supply inside the *swarm* module. To enable the module the MOD_EN pin must be kept to high level.

Electrical characteristics:
- High level: between +1.5 V and VIN
- Low level: <0.4 V
- Buffered with a 1 kΩ series resistor
- Default status: high via internal 5.6 MΩ resistor

2.3. A_MODE

This is the pin used to set the device to power mode 2 (SPSA 2). While in power mode 2 the *swarm* module will periodically transmit blinks and open its reception window (according to the user settings) and will go to snooze mode the rest of the time. While in low power mode the GPIOs are not controlled, the register values not retained and communication over the UART is not possible.

To work in any other power mode 0, 1 or 3, the A_MODE pin should be kept low.

Electrical characteristics:
- 5 volt tolerant
- Default status: High level via internal pull-up 45 kΩ resistor
- *swarm* bee LE V1: Buffered with a 2.7 kΩ series resistor
- *swarm* bee LE V2 and ER: Buffered with a 1 kΩ series resistor

2.4. UART_RX

Although the UART port is not related to the power up process, the way this pin is connected can affect the behavior of the *swarm* module even if no serial communication is required. The idle state of this port is the logic high level because taking this low for a certain period of time causes a break condition that brings the module into bootloader mode. The only way to exit the bootloader mode is by performing a reset.

If the UART is not used: the UART pins should be set high or left open. If used, it should be connected to the respective UART_TX and UART_RX of the host controller.

Electrical characteristics:
- 5 volt tolerant
- *swarm* bee LE V1: Buffered with a 2.7 kΩ series resistor
- *swarm* bee LE V2 and ER: Buffered with a 1 kΩ series resistor

2.5. /NRST

Reset active low, the pin should be kept open (pull-up resistor) or high.

Although the reset pin is not necessary to control de *swarm* module, it is recommended to connect it to the host controller. It can be very useful for debugging.

3. Connection of the relevant pins

3.1. *swarm* module working autonomously

A good solution for this scenario would be to connect the A_MODE pin to GND and the pins UART_RX and MOD_EN to VIN, all by hardware. In this way the user makes sure that when the *swarm* bee module is powered up and all the pins are controlled.

The UART_RX and MODE_EN pins could also be left open, but our previous option is recommended.

3.2. *swarm* module connected to a host controller

In this case VIN and MOD_EN could be connected by hardware. The rest of the pins should be kept independent, to give freedom to the application.

In any case, they should all be controlled by the host. This means that the VIN pins should also be controlled by the host and not powered up at the same time as the host controller.

If both devices, the host controller and the *swarm* bee module are powered up simultaneously, the UART port of the *swarm* device could be ready earlier than the UART port of the host. This will imply that, for a period of time the UART would not be controlled and could be at low level for a certain time, which would cause the break condition. To avoid this the MODE_EN could be kept low for a while, until the host controller is ready.

Document History

Date	Author	Version	Description
3/3/2017	MLA	1.0	Initial version

Life Support Policy

These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Nanotron Technologies GmbH customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify nanotron Technologies GmbH for any damages resulting from such improper use or sale.

About Nanotron Technologies GmbH

Today nanotron's *embedded location platform* delivers location-awareness for safety and productivity solutions across industrial and consumer markets. The platform consists of chips, modules and software that enable precise real-time positioning and concurrent wireless communication. The ubiquitous proliferation of interoperable location platforms is creating the location-aware Internet of Things.

Further Information

For more information about products from nanotron Technologies GmbH, contact a sales representative at the following address:

nanotron Technologies GmbH
Alt-Moabit 60
10555 Berlin, Germany
Phone: +49 30 399 954 – 0
Fax: +49 30 399 954 – 188
Email: sales@nanotron.com
Internet: www.nanotron.com