



SPRINGCARD K531 AND K632 WITH ANTENNA

Hardware and integration manual

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1. INTRODUCTION

1.1. ABSTRACT

SpringCard **K531** and **K632** are OEM contactless couplers without antenna. They are available as ready-to-use couplers, ideal to bring support for RFID tags or contactless smartcard to any industrial or embedded system.

This document provides all necessary information to integrate those OEM modules with antenna, in your design.

1.2. SUPPORTED PRODUCTS

At the date of writing, this document refers to:

- SpringCard K531-TTL (K531 + antenna, no line driver),
- SpringCard K531-232 (K531 + antenna, RS-232 driver),
- SpringCard K531-485 (K531 + antenna, RS-485 driver),
- SpringCard K632-TTL (K632 + antenna, no line driver),
- SpringCard K632-232 (K632 + antenna, RS-232 driver),
- SpringCard K632-485 (K632 + antenna, RS-485 driver).

Please refer to the product leaflets for a detailed list of features.

1.3. AUDIENCE

This manual is designed for use by electronic hardware integrators. It assumes that the reader has expert knowledge of digital electronics.

1.4. SUPPORT AND UPDATES

Interesting related materials (product datasheets, application notes, sample software, HOWTOs and FAQs...) are available at SpringCard's web site:

www.springcard.com

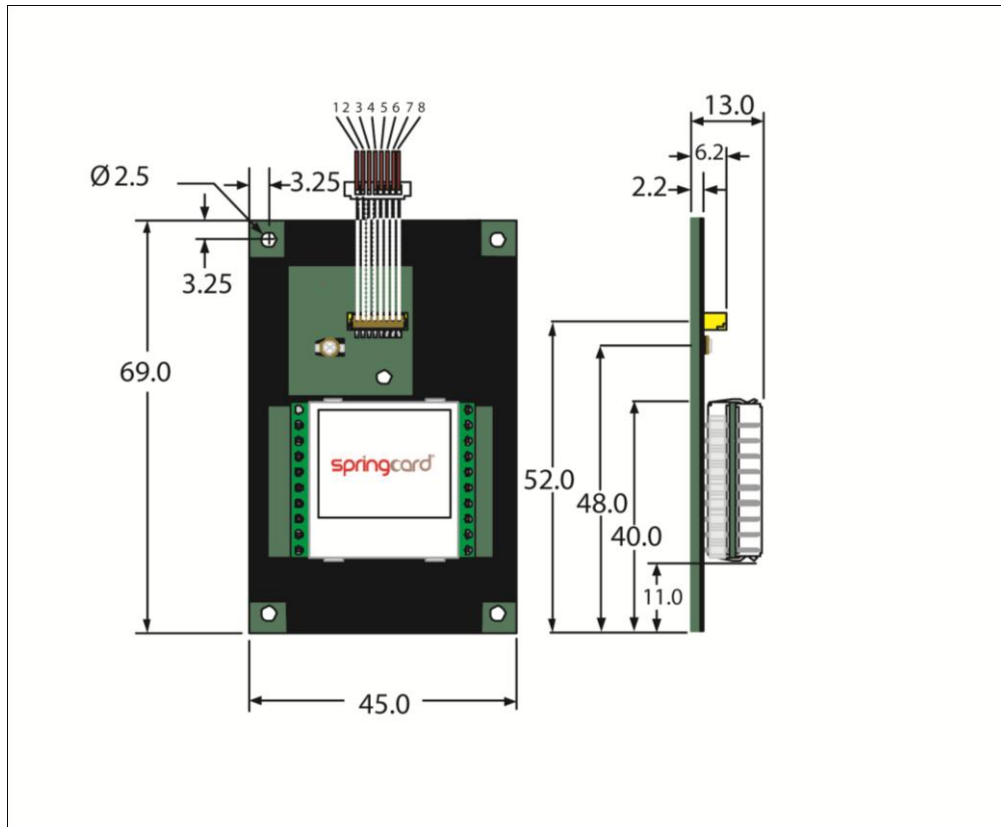
Updated versions of this document and others will be posted on this web site as soon as they are made available.

For technical support enquiries, please refer to SpringCard support page, on the web at address www.springcard.com/support .

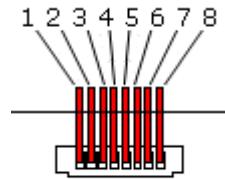
2. HARDWARE AND PINOUT

All products share the same external dimensions and connector.

2.1. DIMENSIONS



2.2. CONNECTOR AND PINOUT



Connector: JST BM08B-SRSS-TB(LF)(SN)

Table 1: Common pinout details

PIN	NAME	Type	Description	Remark
1	/SUSPEND	IN	Hard power-down (active low)	internal pull-up unconnected if not used
2	/FLASH	IN	Firmware upgrade (active low)	internal pull-up unconnected if not used
3	GND	Ground	Ground	
4	/RESET	IN	Reset (active low)	internal pull-up unconnected if not used
5	VCC	Power	Power supply – 5V DC	
6			Communication lines	See the following paragraphs
7				
8	GND	Ground	Ground	

2.3. COMMUNICATION LINES

2.3.1. K531-TTL and K632-TTL

a. Pinout

Table 2: K531-TTL and K632-TTL communication lines

PIN	NAME	Type	Description	Remark
6	RX	IN	Serial port – host to module	0 - 5V ext. pull-up required
7	TX	OUT	Serial port – module to host	0 - 5V

b. Details and precautions

- **Digital input pins** (/FLASH, RX, /RESET and /SUSPEND) are TTL inputs (0-5V). They are CMOS-tolerant (0-3V),
- **Digital output pin** (TX) is a TTL output (0-5V). It could drive CMOS logic as well.
- Do not connect the RX/TX pins directly to an RS-232 interface. Use appropriate line buffers (MAX232 or equivalent).
- Default baudrate is 38400bps and could be switched to 115200bps.

2.3.2. K531-232 and K632-232

a. Pinout

Table 3: K531-232 and K632-232 communication lines

PIN	NAME	Type	Description	Remark
6	RX	IN	Serial port – host to module	0 - 5V
7	TX	OUT	Serial port – module to host	0 - 5V ext. pull-up required

b. Details and precautions

- **Digital input pins** (/FLASH, RX, /RESET and /SUSPEND) are TTL inputs (0-5V). They are CMOS-tolerant (0-3V),
- **Digital output pin** (TX) is a TTL output (0-5V). It could drive CMOS logic as well.
- Do not connect the RX/TX pins directly to an RS-232 interface. Use appropriate line buffers (MAX232 or equivalent).
- Default baudrate is 38400bps and could be switched to 115200bps.

2.3.3. K531-485 and K632-485

a. Pinout

Table 4: K531-485 and K632-485 communication lines

PIN	NAME	Type	Description	Remark
6	B	IN	Serial port – RS-485 B	
7	A	OUT	Serial port – RS-485 A	

b. Details and precautions

- **Digital input pins** (/FLASH, /RESET and /SUSPEND) are TTL inputs (0-5V). They are CMOS-tolerant (0-3V),
- Baudrate is fixed to 38400bps.

3. ELECTRICAL CHARACTERISTICS

Table 5: Operating conditions

SYMBOL	Parameter	Condition	Min	Typ	Max	Unit
VCC	Supply voltage		4.5	5.0	5.5	V
<i>K531-TTL and K632-TTL</i>						
ICC	Power supply current	Hard power down			6	mA
		RF field OFF		30	35	
		RF field ON ¹		150	250	
<i>K531-232 and K632-232</i>						
ICC	Power supply current	Hard power down			15	mA
		RF field OFF		40	45	
		RF field ON ¹		160	270	
<i>K531-485 and K632-485</i>						
ICC	Power supply current	Hard power down			15	mA
		RF field OFF		40	45	
		RF field ON ¹		160	270	

Table 6: I/Os characteristics

SYMBOL	Parameter	Condition	Min	Typ	Max	Unit
V _{OH}	Output "High" voltage (TX)	I _{OH} = -1mA	VCC -0.6		VCC	V
V _{OL}	Output "Low" voltage (TX)	I _{OL} = 1mA			0.6	V
I _{IH}	Input "High" current (RX, /SUSPEND)	V _I = 3V			4	μA
I _{IL}	Input "Low" current (RX, /SUSPEND)	V _I = 0V			-4	μA

Table 7: Limiting values

SYMBOL	Parameter	Limits	Unit
VCC	Supply voltage	-0.3 to 6.0	V
T _{OPERATION}	Operating temperature	-20 to +70	°C
T _{STORAGE}	Storage temperature	-40 to +85	°C
I _{OH(PEAK)}	Peak output "High" current (TX)	-10	mA
I _{OH(AVG)}	Average output "High" current (TX)	-5	mA
I _{OL(PEAK)}	Peak output "Low" current (TX)	10	mA
I _{OL(AVG)}	Average output "Low" current (TX)	5	mA

¹ The antenna has a strong impact on the current consumed by the module. Typical value is observed when the antenna is correctly tuned. Adjust trimming-capacitor value if needed.

4. INTEGRATION GUIDE

4.1. RESET

When /RESET is set LOW, the module's CPU stops. When /RESET is set HIGH again, firmware execution restarts.

Note that the /RESET pin has no effect on the RF front-end (NXP RC531 or RC632). If the RF field was ON before reset, it remains ON until the firmware instructs it to go OFF, or the module is powered down.

Depending on the firmware release, the module takes 10 to 50ms to be ready after a reset.

The module is ready as soon as it sends its identifier (either "K531" or "K632" on the serial line).

4.2. HARD-POWER DOWN

When /SUSPEND state is set LOW, the module stops its RF field, deactivate its RF front-end (NXP RC531 or RC632), and stops its clock to limit power consumption to its minimum.

When /SUSPEND state is set HIGH again, firmware execution resumes after 1 to 10ms.

NB: this feature is implemented only in firmware version ≥ 1.54 .

4.3. FIRMWARE UPGRADE

Hold to /FLASH pin to LOW level and RESET the module to enter FIRMWARE UPGRADE mode.

The FIRMWARE UPGRADE is made through the serial line, using to the CPU's integrated bootloader. To flash the module, use RENESAS FLASH DEVELOPMENT TOOLKIT (FDT) version ≥ 4.04 .

- **K531:** CPU is Renesas R8C/25 with a 32kB flash. Configure your FDT project to use **R5F21256** kernel.
- **K632:** CPU is Renesas R8C/25 with a 64kB flash. Configure your FDT project to use **R5F21258** kernel.

NB: it is not recommended to upgrade the firmware while the RF field is switched ON. Before entering FIRMWARE UPGRADE mode, please either invoke firmware's SET RF FIELD OFF command or set the /SUSPEND pin LOW.

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