OEM Serial Contactless Couplers
K663
K663-TTL / K663-232 / K663-485
TwistyWriter
SpringCard ‘K’ Series

WHY CHOOSING SPRINGCARD ‘K’ SERIES?

SpringCard ‘K’ Series is a complete family of OEM readers/writers covering 13.56MHz RFID and NFC standards.

Designed with ease of use, interoperability and compliance to standards as primary objectives, SpringCard ‘K’ Series takes benefit of a fast CPU to ensure short transaction times, a key feature when it comes to card reading or issuing in-the-field.

Moreover, special attention was paid on consumption: SpringCard ‘K’ Series is designed to work in low power modes. Applications using the coupler modules in battery mode are possible.

SpringCard ‘K’ Series requires only a simple serial line to operate. The feature-rich SpringProx API is available freely within the SDK, and allows a seamless integration from virtually any hardware or system featuring no more than a serial link. In-field firmware upgrade is even possible provided that two module’s control lines are driven by the host.

MADE FOR OEMS

The SpringCard OEM Couplers are designed to be integrated in a larger equipment: automated vending machine, POS, turnstyle at a gate, card printer, card issuing machine, kiosk...

SpringCard has a strong experience and commitment in providing industrial-grade solutions. This Couplers family is a guaranteed long-life product line. Most products in our portfolio share the same dimensions and electrical characteristics, which allows a smooth transition from one generation to the next one.
NFC / RFID @ 13.56MHz Reader/Writer

MIFARE* Classic, MIFARE DESFire*, MIFARE Plus*, MIFARE Ultralight*, SmartMX*, NTAG*...

FeliCa (ID only), FeliCa Lite-S
Calypso CD21, CD99, GTML (incl. Innovation Radio Protocol)

Infineon SLE66, ST Microelectronics ST19, Atmel AT88
ST Microelectronics SR, SR, SRIX, Atmel CryptoRF
Inside Secure PicoTag / HID iClass etc.

NCR, IC-ONE, IC-ONE, ICODE
Texas Instruments Tag-it™
ST Microelectronics LR etc.

NFC Tags types 1, 2, 3 and 4
Reader mode
NFC objects in card emulation mode

Associated services

Product customization
Consultation
Expertise
Training

Springcard®
OEM Serial Couplers

springcard®
Contact & contactless smartcard readers
KEY POINTS

- The K663S and K663A are 'bare' NFC / RFID (HF) modules: they require the addition of a matched antenna to operate.
- Both modules accept either 3.3V or 5V as single power supply source, with preserved performance.
- I/O and communication lines support both TTL (5V) and CMOS (3.3V) logic levels, allowing to connect the module directly to a MCU’s UART.
- No external component is needed.

K663S for balanced antenna

The K663S targets a balanced antenna, which provides the best performance but must remain in short distance of the module.

K663A for unbalanced antenna

The K663A targets an unbalanced antenna, that must be 50-ohm matched and could be connected through a longer distance with a coaxial cable.

Versions and order codes

- SC2193: K663S RFID/NFC Coupler core (serial) - designed for a balanced antenna
- SC3028: K663A RFID/NFC Coupler core (serial) - designed for an unbalanced antenna
CHOOSING BETWEEN A BALANCED OR AN UNBALANCED ANTENNA

**UNBALANCED (ASYMMETRIC)**
- The antenna is made of a single coil and a ground layer for shielding.
- A 50ohm matching circuit is required to connect the antenna to the reader through a single-core coaxial cable.
- Thanks to the coaxial cable, the distance between the reader and the antenna may reach 1.5m.
- Due to the tolerances on the PCB, a trimming capacitor is required to achieve the exact match.
- In some situations, the trim may also be used to adapt the antenna's tuning to a particular environment (conductive materials in the nearby).

**BALANCED (SYMMETRIC)**
- The antenna is made of two coils. One turns clockwise, the other anti-clockwise.
- There's no matching circuit. The antenna is connected to the reader using 3 lines: P, M and Gnd (ground).
- We recommend using 2 twisted pairs [P+Gnd, M+Gnd]. The cable shall be no longer than 30cm.
- No trimming and no shielding are required.
- A balanced antenna offers better performances than an unbalanced antenna of the same size and is easier to design.

**PRODUCTS?**
- Choose K663A module if you plan to use a custom unbalanced antenna.
- All TwistyWriters are contactless coupler modules with a remote balanced antenna.
- K663-TTL, -232 and -485 have a balanced antenna (but not remote).
- Choose K663S module if you plan to use a custom balanced antenna.

**SOLUTIONS?**
- Contact us to choose the antenna that will match to your specific requirement (greater or shorter operating distance, tag smaller than class 6 PICC, ...)
- SpringCard services is able to draw prototype and validate the very antenna you need. Contact us for a quote!

‘BARE’ MODULE WITHOUT ANTENNA OR READY-TO-USE COUPLER WITH ANTENNA?

**WITH ANTENA**
- SpringCard OEM contactless couplers feature a 45x69mm antenna.
- This size is optimized for ID-1 cards, and will work out of the box with all classes of PICCs [1,2,3,4, 5 and 6].
- Typical range is up to 0.5 to 5cm for most cards, more to 7.5cm for some of them.
- You’ll find also in SpringCard’s portfolio a few different antennas.

**WITHOUT ANTENNA**
- A custom antenna (PCB or flex) will fit exactly into your design. Smaller sizes are possible.
- Knowing precisely the requirements of your system is the key to designing the perfect antenna that would cover your needs.
- There are application notes to draw the coil and calculate the tuning circuit, but designing a RFID antenna remains touchy!
- SpringCard has a strong experience in the matter.
K663-TTL, -232, -485
Ready-to-use RFID/NFC Coupler module with integrated antenna

KEY POINTS

- The K633-TTL, K663-232 and K663-485 are ready-to-use NFC / RFID (HF) coupler boards, designed for a fast and easy integration by OEMs.
- Based on industrial-grade state-of-the-art components and SpringCard’s know-how in versatile and high-performance contactless readers, these couplers are the solution of choice to add an NFC / RFID interface into an existing device, kiosk or machine.
- Thanks to the integrated ferrite shielding at the rear of the antenna, the performances are preserved in most environments and remain consistent with even with various sizes of card/tag.
- In most situations, the K663-TTL, -232 and -485 could be used as substitutes of previous K531- and K632-based products.

Versions and order codes

- SC13137: K663-TTL RFID/NFC coupler with integrated antenna - RS-TTL
- SC3064: K663-232 RFID/NFC coupler with integrated antenna - RS-232
- SC14180: K663-485 RFID/NFC coupler with integrated antenna - RS-485
The **TwistyWriter-TTL, -232, -485** are ready-to-use NFC / RFID (HF) coupler assemblies, that mix the key characteristics of K633-TTL, -232 and -485 with the benefits of a remote antenna:

- ability to place the ‘flat’ antenna virtually anywhere in the target machine or kiosk,
- ability to choose a different antenna size in SpringCard’s portfolio, or to design easily a custom antenna in order to match a specific card/tag size,
- improved performance with NFC mobile phones.

### Versions and order codes

- **SC15111: TwistyWriter-TTL** RFID/NFC coupler with remote balanced antenna - RS-TTL
- **SC14303: TwistyWriter-232** RFID/NFC coupler with remote balanced antenna - RS-332
- **SC15109: TwistyWriter-485** RFID/NFC coupler with remote balanced antenna - RS-485
## Technical data

<table>
<thead>
<tr>
<th></th>
<th>K663S</th>
<th>K663A</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RFID/NFC Standards</strong></td>
<td>ISO 14443 A-B, ISO 15693, NFC peer-to-peer [ISO 18092 initiator, passive communication model]</td>
<td></td>
</tr>
<tr>
<td>Carrier frequency</td>
<td>13.56MHz (RFID HF, NFC)</td>
<td></td>
</tr>
<tr>
<td>RF field level - Operating distance</td>
<td>Depends on antenna</td>
<td></td>
</tr>
<tr>
<td>Card/tag baudrate</td>
<td>26kbps (ISO 15693), 106/212/424/848kbps (ISO 14443)</td>
<td></td>
</tr>
<tr>
<td>Antenna</td>
<td>Balanced, not included</td>
<td>Unbalanced, not included</td>
</tr>
<tr>
<td>Distance antenna/module</td>
<td>Up to 25cm (using 2 twisted pairs)</td>
<td>Up to 150cm using a 50Ω coax.</td>
</tr>
<tr>
<td>Connectors</td>
<td>2 x 10 pins, 2.54mm step</td>
<td></td>
</tr>
<tr>
<td>Communication with host</td>
<td>Serial communication - Baudrate 38400 or 115200bps</td>
<td></td>
</tr>
<tr>
<td>Standard</td>
<td>RS at TTL level [0-5V], CMOS compatible [0-3V]</td>
<td></td>
</tr>
<tr>
<td>Protocol</td>
<td>'SpringProx' binary or ASCII protocol</td>
<td></td>
</tr>
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<td>SDK</td>
<td>Free SDK feat. 'SpringProx API' [full ANSI C source code + binary for Windows &amp; Linux]</td>
<td></td>
</tr>
<tr>
<td>In-field firmware upgrade</td>
<td>Yes [external computer required]</td>
<td></td>
</tr>
<tr>
<td>I/O lines - Beeper</td>
<td>4 output lines (for LEDs) - 1 PWM output (for beeper)</td>
<td></td>
</tr>
<tr>
<td>Control lines</td>
<td>/RESET, /FLASH, /SUSPEND</td>
<td></td>
</tr>
<tr>
<td>Power</td>
<td>3 to 5V DC</td>
<td></td>
</tr>
<tr>
<td>Power requirement</td>
<td>LPCD: 3V→10mA / 5V→6mA, RF OFF: 3V→60mA max / 5V→35mA max, RF ON: 3V→250mA typ., 420mA peak / 5V→150mA typ., 250mA peak</td>
<td></td>
</tr>
<tr>
<td>Size (WxHxD)</td>
<td>27 x 31 x 9mm</td>
<td>69 x 45 x 13mm / Antenna: 69 x 45 x 1,5mm</td>
</tr>
<tr>
<td>Environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td>Operating: -20°C – +70°C / Storage: -40°C – +80°C</td>
<td></td>
</tr>
<tr>
<td>Humidity</td>
<td>0 – 90% (non condensing)</td>
<td></td>
</tr>
<tr>
<td>MTBF</td>
<td>500 000 hours</td>
<td></td>
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<td>Approvals</td>
<td>Radio : EN 300 330 - EMC : EN 301 489 - CE mark – FCC class B part 15 [pending/on request]</td>
<td>RoHS, WEEE</td>
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<td>Environmental</td>
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<td></td>
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<td>Warranty</td>
<td>2 years</td>
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[1] The actual max. operating distance depends heavily on the card/tag’s characteristics, on the baudrate and on the environment. SpringCard’s portfolio contains various antenna sizes and shapes. Don’t hesitate to contact our sales team in order to select the best antenna for your very project. [3] Other lengths available on request.
### RFID/NFC Standards
- ISO 14443 A-B, ISO 15693, NFC peer-to-peer [ISO 18092 initiator, passive communication mode]

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<td>RF field level - Op. dist.</td>
<td>Typ. 3A/m at 0.5cm - Typ.: 0.5-5cm, up to 10cm (1)</td>
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<td>26kbps [ISO 15693], 106/212/424/848kbps [ISO 14443]</td>
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#### Antenna
- Integrated - Size optimised for communication with ID-1 sized cards/tags. Ferrite shield on the back (2)
- Remote - Size optimised for communication with ID-1 sized cards/tags. Ferrite shield on the back (2)

<table>
<thead>
<tr>
<th>Dist. antenna/module</th>
<th>N/A</th>
</tr>
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#### Connectors
- JST SHR-8

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#### Environment
- Operating: -20°C – +70°C / Storage: -40°C – +80°C
- 0 – 90% (non condensing)
- 500 000 hours

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YOUR EXPERT IN CONTACTLESS SOLUTIONS

SpringCard offers a wide range of products to meet as many needs and use cases as possible.

With a 15-year experience in contactless smartcards, communication technologies and development on embedded or mobile systems, SpringCard R&D Team is also a valuable partner to design your own solution or product.

SpringCard in the world

Angers - Paris - Strasbourg
San Diego - San Francisco - Sydney - Tokyo

www.springcard.com