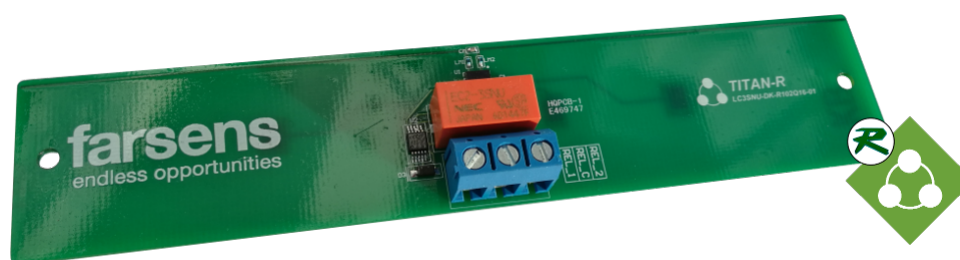


EPC C1G2 BATTERYLESS BISTABLE RELAY

Check for samples: [EVAL01-TITAN-R](#)



FEATURES

- EPC C1G2 compliant
- ISO 18000-6 Type C compliant
- 160-bit EPC Bank: Up to 128-bit EPC
- 96-bit TID Bank: Up to 48-bit Serial Number
- Available User Memory: Up to 1008-bit Non Volatile User Data
- Long range in passive mode: 5m
- Extended range in battery assisted passive mode: 20m
- Bistatic relay to open/close/switch electrical circuits

DESCRIPTION

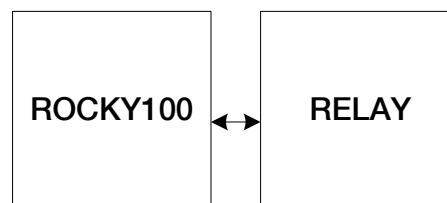
TITAN-R is an EPC Class-1 Generation-2 (C1G2) RFID tag based on Farsens' batteryless sensor technology. Built in a compact PCB format, the tag includes a bistatic relay.

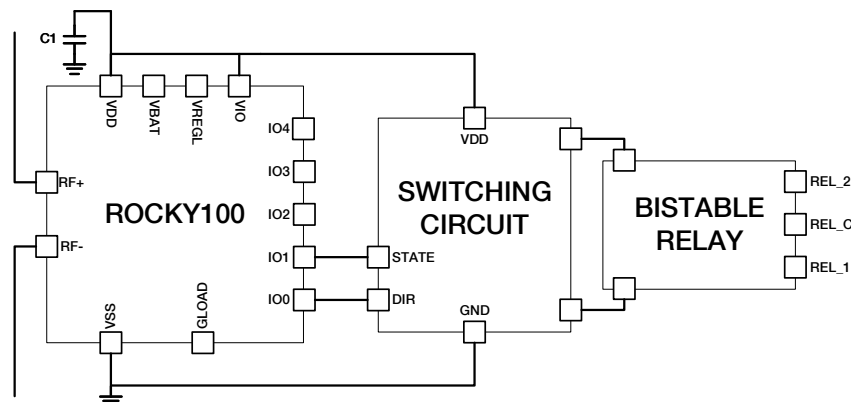
These RFID sensor tags are compatible with commercial UHF RFID readers (EPC C1G2). With a 2W ERP setup the battery-less resistance meter can communicate to over 5 meters - 16 feet.

The TITAN-R can be customized with different antenna design and sizes, depending on the specific application. It can be encapsulated in an IP67 or IP68 casing for usage in harsh environments. It may also be possible to customize the specifications of the relay upon request.

BLOCK DIAGRAM

The TITAN-R tag consists of a ROCKY100 IC for energy harvesting and wireless communication and a bistatic relay with its switching circuitry.





The ROCKY100 IC includes the RF frontend for UHF RFID power harvesting and communication, a power supply module to generate the required voltage levels, and an EPC C1G2/ISO18000-6C digital processor including a PWM module.

The capacitor C1 is included in the device in order to support the current peaks during the switching of the relay. Using the GPIO bypass of the ROCKY100, the direction of the current through the coil can be established. Upon receiving a PWM directed read request from the UHF RFID reader, the ROCKY100 PWM module connects the negative supply of the current loop of the relay coil to VSS through the GLOAD switch. TITAN-R will switch the status of the bistatic relay to the selected state. The relay will keep the new state even after powering off the device.

Additionally, the GPIO bypass can be also used to read the current status of the relay.

CHARACTERISTICS

SYMBOL	PARAMETER	MIN	TYP	MAX	UNIT
RFID					
$r_{operation}$	Operation range full passive		5		m
	Operation range BAP		15		m
	Operation range EBAP		20		m
OPERATING CONDITIONS					
T_{OP_TOP}	Operating temperature range	-40		85	°C
BISTATIC RELAY					
CT_{type}	Contact type	2 Form C			
$CT_{material}$	Contact material	Silver alloy with gold alloy overlay			
R_{ON}	Contact resistance			75	mΩ
VAC_{max}	Switching voltage (AC)			250	V
VDC_{max}	Switching voltage (DC)			220	V
I_{max}	Switching current			2	A
P_{max}	Switching power			60	W
S_{max}	Switching apparent power			120	VA
D_{LOAD}	Durability with load	1.000.000			ops
D_{NOLOAD}	Durability with no load	10.000.000			ops

OPERATION

EPC READING

In order to read the EPC of the tag, commercial EPC C1G2 readers can be used. However, some considerations have to be taken into account.

As the tag has a significant supply capacitor connected to VDD, the power-up of the system will be slow. It can last several seconds. In order to speed up the charge process, the reader shall be configured to send power as continuously as possible.

Once the supply capacitor is charged, the tag will respond with its EPC. From this point on, memory access commands can be used to control additional functionalities via the SPI bridge.

READ RELAY STATE

The current state of the relay in TITAN-R can be retrieved using standard EPC read commands. The command can be directed to a unique tag using its known EPC number.

Read relay state Operation: Read
 Memory bank: User Memory
 Word Pointer: 0x92
 Wordcount: 1

The answer from the tag to such a request will contain 2 bytes of data. Assuming that the reader returns the received data in the buffer of bytes *rawdata*, the content of the answer is defined as follows:

rawdata	Byte 0	Byte 1
content	RFU	GPIO_IN[4:0]

- GPIO_IN (uint5): input values in GPIOs of ROCKY100. Bit 1 is connected to relay state.
 - GPIO_IN[1]='0': Relay is in position 1 (REL_C connected to REL_1).
 - GPIO_IN[1]='1': Relay is in position 2 (REL_C connected to REL_2).

SET RELAY STATE

Prior to triggering a relay operation, the direction of the current through the relay's coil has to be established. In order to do so, the GPIO output bit 0 has to be set to the desired value. Note that this operation will not trigger the operation of the relay, but only configure it.

Set relay direction Operation: Write
Memory bank: User Memory
Word Pointer: 0x93
Data: 0x00 or 0x01

In order to configure the direction of the current flow through the relay's coil, the GPIO_OUT register is used.

- GPIO_OUT (uint5): output values in GPIOs of ROCKY100. Bit 0 is connected to the direction control circuitry of TITAN-R .
 - GPIO_OUT[0]='0': Relay configured to switch to position 1 (REL_C connected to REL_1).
 - GPIO_OUT[0]='1': Relay configured to switch to position 2 (REL_C connected to REL_2).

Once the direction of the relay operation is configured, the PWM module is used to trigger the operation of the relay.

Trigger relay operation Operation: Write
Memory bank: User Memory
Word Pointer: 0x91
Data: 0x01

Upon receiving a not-null value write command directed to the PWM trigger register, TITAN-R will generate the PWM signalling which will make the relay to switch to the configured position.

DEMO SOFTWARE

Demonstration software to read and control the TITAN-R is available in the web. Download the latest software and user guide at: <http://www.farsens.com/software.php>. Check the website for updated reader compatibility list. Up to the date of writing this document, this is the status of the compatibility list:

Fixed readers			
Manufacturer	Model	Tested HW rev.	Tested FW rev.
Impinj	R420	HLA: 1.00 PCBA: 4.00	5.12.1
Impinj	R220	-	-
Impinj	R120	-	-
Nordic ID	Sampo	PWM00282	5.4 A
Nordic ID	Stix	PWM00226	5.10 A

REFERENCES

The next table shows the available references of the TITAN-R.

Ref.	Name	Description
41302	EVAL01-TITAN-R-DKWB	TITAN-R, dipole wideband antenna, PCB format

For custom references with other antennas and housings, please contact us at sales@farsens.com.

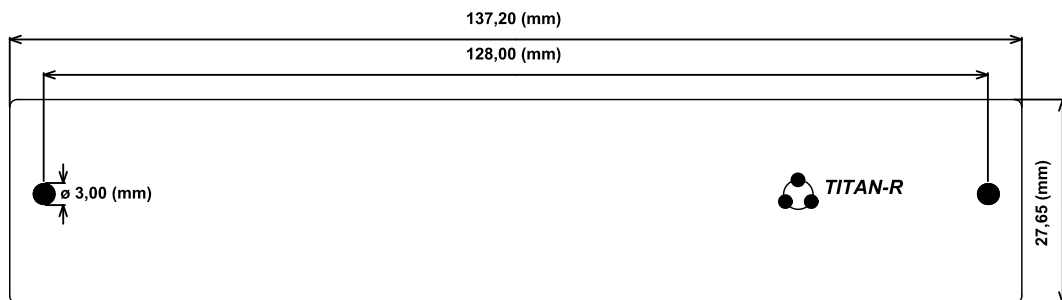
MECHANICAL DIMENSIONS

All dimensions are in millimeters.

DKWB

Valid for reference(s): 41302

2D VIEW



Maximum height: 10mm

3D VIEW

