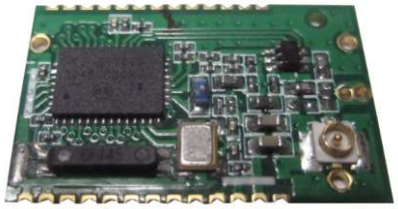
Sub 1GHz Multichannel Radio Transceiver with Hirose antenna connector

It is a low cost sub 1GHz multichannels transceiver designed for low-consumption wireless applications. The hardware is based on Silicon Labs Si1000 component. The main features of this device are: Output power up to +20 dBm (100mWatt) Microcontroller Integrated (8051core), modulation selectable (OOK, FSK, GFSK), low power consumption.

Embedded Software SENSØNET

RadioControlli has developed an WSN (wireless sensor network) architecture of a network of control and measurement. This application allows to manage and customize the WSN via the UART interface connected to a host system.



Technical Characteristics

Characteristics		MIN	TYP	MAX	UNIT
V_{CC}	Supply Voltage	2.2	3	3.6	VDC
I_S	Supply Current (RX mode / TX mode)		20/34		mA
I_S	Assorbimento Corrente (TX mode / +20dBm)		85.0		mA
I_S	Assorbimento Corrente (TX mode / 0 dBm)		10		mA
I_S	Assorbimento Corrente sleep mode		< 0.1		µA
T	StartUp Time (Sleep to RX/TX mode)		< 2		µS
P_O	RF Output Power	- 3.0		+20	dBm
T_{OP}	Operating Temperature Range	-10		+55	°C
	RF Sensitivity (1.2 Kb/sec Data Rate)		-121		dBm
	RX Frequency Range CEPT/ERC/REC 70-03	433/868		434/870	MHZ
	Max Data Rate		500		Kbit/s

Applications :

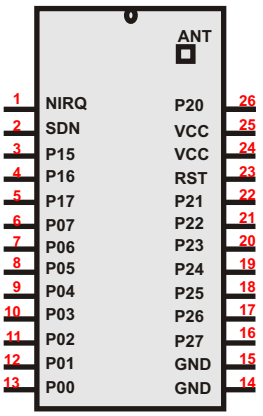
- Wireless security systems
- Home and building automation
- Automatic Measure Reading
- Industrial Control and Monitoring
- Wireless Sensor Network

Feature :

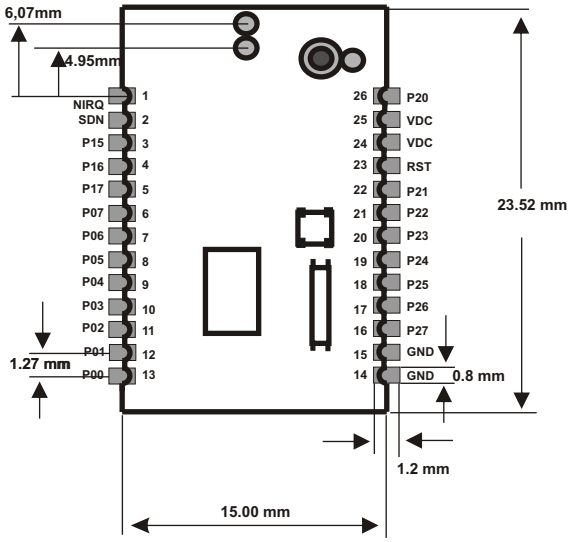
- Bidirectional multichannel Link
- RF Power until +20dBm (100mW)
- Low consumption technology
- High Speed 8051 µC Core.

PIN OUT RCS1KSMT-XXX

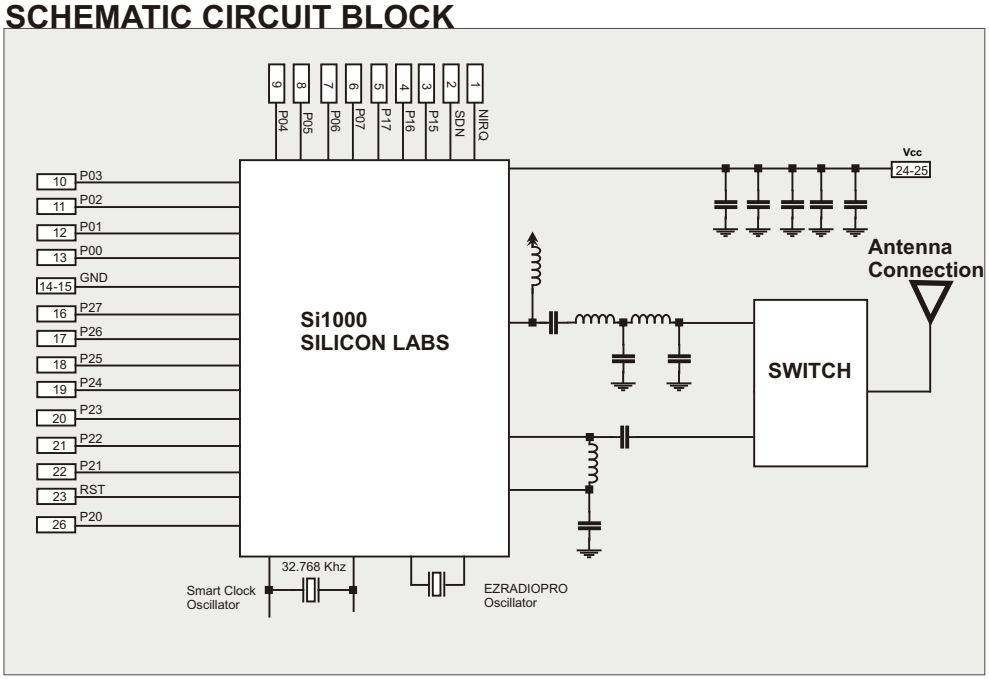
Pads	Name	Type	Description
1	NIRQ	D O	EZRadioPRO peripheral interrupt status pin.
2	SDN	D I	EZRadioPRO peripheral shutdown pin.
3	P15	D I/O or A I	Digital I/O or Analog I
4	P16	D I/O or A I	Digital I/O or Analog I
5	P17	D I/O or A I	Digital I/O or Analog I
6	P07	D I/O or A I	Digital I/O or Analog I
7	P06	D I/O or A I	Digital I/O or Analog I
8	P05	D I/O or A I	Digital I/O or Analog I - UART RX Pin
9	P04	D I/O or A I	Digital I/O or Analog I - UART TX Pin
10	P03	D I/O or A I	Digital I/O or Analog I
11	P02	D I/O or A I	Digital I/O or Analog I
12	P01	D I/O or A I	Digital I/O or Analog I
13	P00	D I/O or A I	Digital I/O or Analog I
14	GND	Ground	Ground
15	GND	Ground	Ground
16	P27/C2D	D I/O or A I	Digital I/O or Analog I - C2 debug interface
17	P26	D I/O or A I	Digital I/O or Analog I
18	P25	D I/O or A I	Digital I/O or Analog I
19	P24	D I/O or A I	Digital I/O or Analog I
20	P23	D I/O or A I	Digital I/O or Analog I
21	P22	D I/O or A I	Digital I/O or Analog I
22	P21	D I/O or A I	Digital I/O or Analog I
23	RST/C2CK	D I/O	Device Reset C2 Debug Interface
24	VCC	Power	Power supply voltage
25	VCC	Power	Power supply voltage
26	P20	D I/O or A I	Digital I/O or Analog I

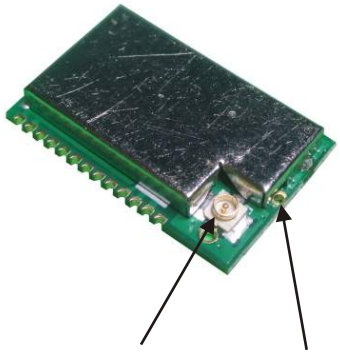


Mechanical dimensions



SCHEMATIC CIRCUIT BLOCK





The wireless network for control and measurement denominated **SENSØNET** is composed from a gateway and from a series of unit for Control and Measurement at Low Power (sensor) connected at star.

Each Unit for Control and Measurement (sensor) is characterized by a unique address "sensor address" and the address of a gateway that can communicate "gateway address".

SENSØNET can be managed by an external control unit (an embedded system or a PC) connected to the gateway via UART interface.

SENSØNET integrates the low consumption technology.

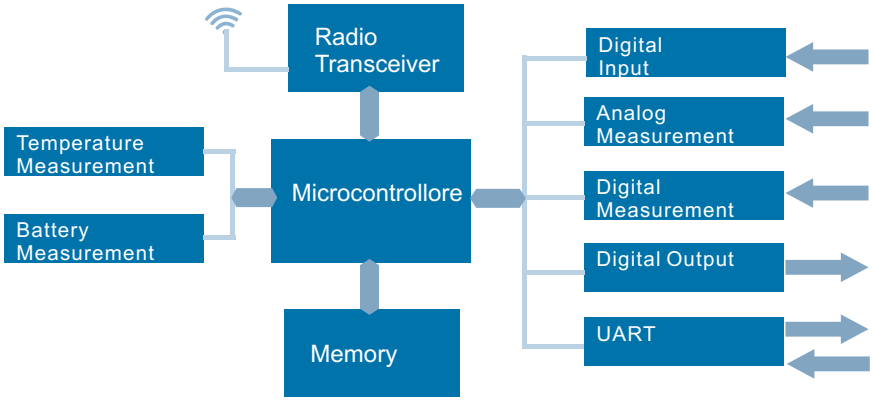
SENSØNET can be customized according to customer requirements (firmware), it is always possible to integrate the intelligent functions of the sensor by using the MCU resources of the unit control and measurement.

SENSØNET User Manual.pdf

Estimated consumption for the application SENSØNET

The average absorption depends of many factors (time of wake up, transmission power, a radio bit rate, type of modulation ect) .
follow an average estimate of consumption (modulation GFSK 50K Manchester).

Wake-Up Timer (secondi)	**Power RF** (dBm)	**Average consumption** (µA)
5	0	117,0
15	0	39,30
30	0	19,60
60	0	9,80
5	+ 20	188,00
15	+ 20	62,60
30	+ 20	31,30
60	+ 20	15,60



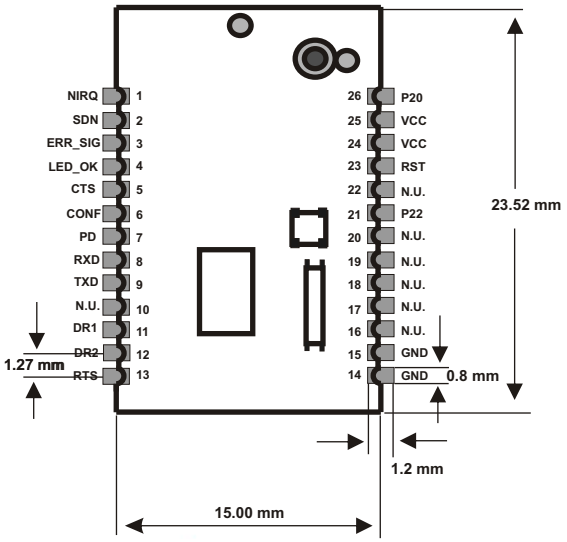
Hardware Resoureces

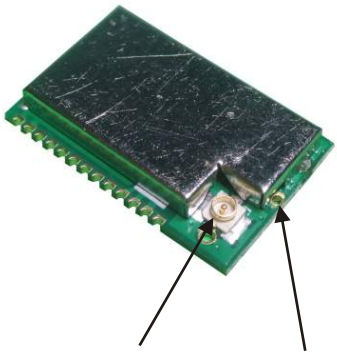
N. 4 Digital Input with interrupt (DIN1,DIN2,DIN3)
N. 2 Digital measurement (DIN4,DIN5)
N. 3 Analog Input (ADC1,ADC2,ADC3)
N. 3 Digital Output (OUT1, OUT2)
N. 1 Digital Counter (DIN6)
N. 1 Battery voltage meter
N. 1 Temperature meter
N. 1 UART interface

RCS1KSMT-XXX configured as CONCENTRATOR/GATEWAY

Pads	Name	Type	Description
1	NIRQ	CONTROL	In the SENSONET application must be connected with pin 21 (see schematic below)..
2	SDN	CONTROL	In the SENSONET application must be connected with pin 26 (see schematic below).
3	ERR_SIG	CONTROL	LED Error
4	LED_OK	CONTROL	Led OK / Programming
5	CTS	UART	UART Clear to Send
6	CONF	CONTROL	Configuration
7	PD	CONTROL	Power Down Mode
8	RXD	UART	Uart TX
9	TXD	UART	Uart RX
10	N.U.	N.U.	Not Used
11	DR1	D I/O	DR1 Baude rate selection
12	DR2	D I/O	DR2 Baude rate selection
13	RTS	UART	UART Request to Send
14	GND	Ground	Ground
15	GND	Ground	Ground
16	N.U.	N.U.	Not Used
17	N.U.	N.U.	Not Used
18	N.U.	N.U.	Not Used
19	N.U.	N.U.	Not Used
20	N.U.	N.U.	Not Used
21	P22	CONTROL	Connected with pin1 (see schematics below).
22	N.U.	N.U.	Not Used
23	RST	D I/O	Device Reset
24	VCC	Power	Power supply voltage
25	VCC	Power	Power supply voltage
26	P20	CONTROL	Connected with pin 2 (see schematics below).

Mechanical dimensions

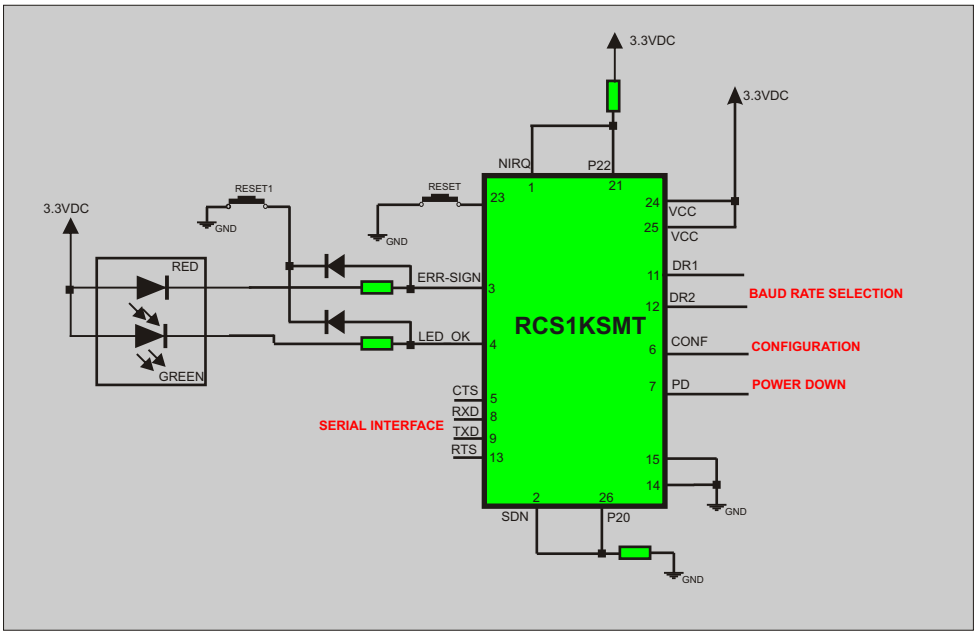




Antenna HIRose connector

Antenna connection

CONCENTRATOR/GATEWAY Application Note



BAUDE RATE SELECTION

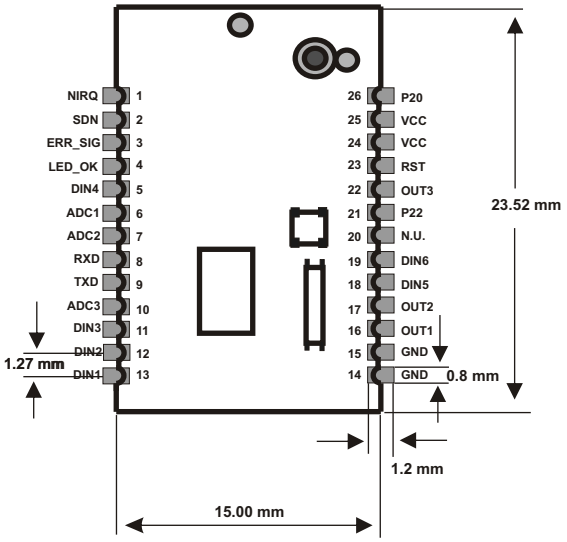
baud/rate	DR1	DR2
9600	Low	Low
19200	High	Low
38400	Low	High
115200	High	High

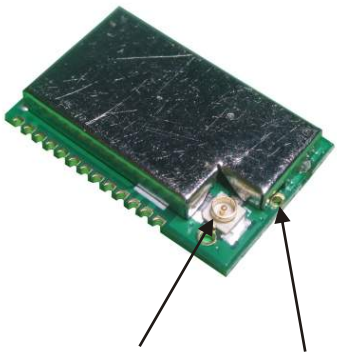
RCS1KSMT-XXX configured as SENSOR (Low consumption unit)

PIN OUT

Pads	Name	Type	Description
1	NIRQ	CONTROL	In the SENSONET application must be connected with pin 21 (see schematic below)..
2	SDN	CONTROL	In the SENSONET application must be connected with pin 26 (see schematic below).
3	ERR_SIG	CONTROL	LED Error
4	LED_OK	CONTROL	Led OK / Programming
5	DIN4	D I/O	Digital Input
6	ADC1	A I	Analog Input (0 - Vcc)
7	ADC2	A I	Analog Input (0 - Vcc)
8	RXD	UART	Uart TX
9	TXD	UART	Uart RX
10	ADC3	A I	Analog Input (0 - Vcc)
11	DIN3	D I/O	Digital Input
12	DIN2	D I/O	Digital Input
13	DIN1	D I/O	Digital Input .
14	GND	Ground	Ground
15	GND	Ground	Ground
16	OUT1	DOUT	Digital Output
17	OUT2	DOUT	Digital OutputDigitale
18	DIN5	D I/O	Digital Measurement
19	DIN6	D I/O	Digital Measurement and Counter
20	N.U.	N.U.	Not Used
21	P22	CONTROL	Connected with pin1 (see schematics below).
22	OUT3	DOUT	Digital Output
23	RST	D I/O	Device Reset
24	VCC	Power	Power supply voltage
25	VCC	Power	Power supply voltage
26	P20	CONTROL	Connected with pin 2 (see schematics below).

Mechanical dimensions

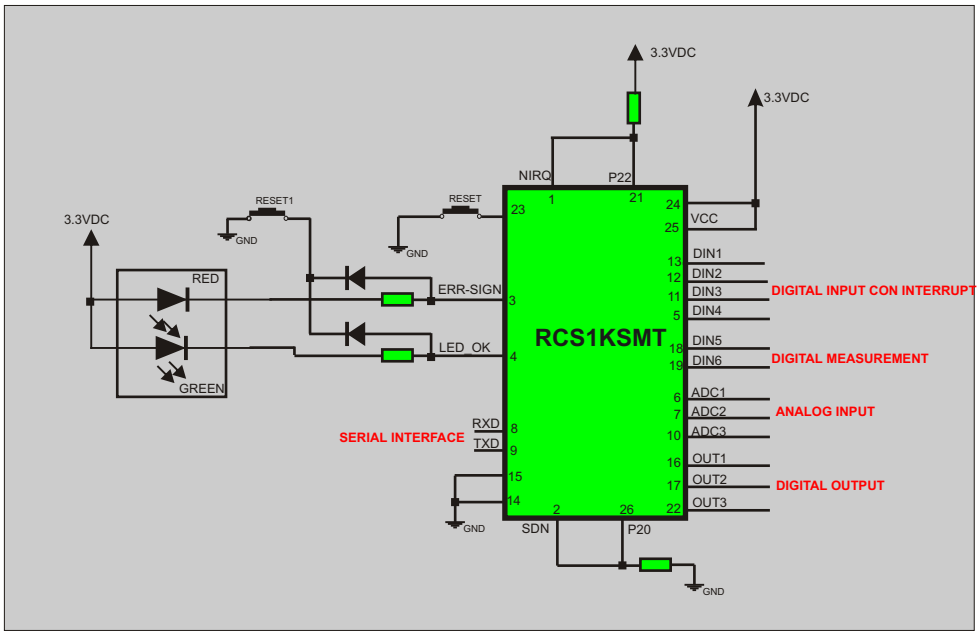




Antenna HIRose connector

Antenna connection

SENSOR Low Consumption Unit Application Note

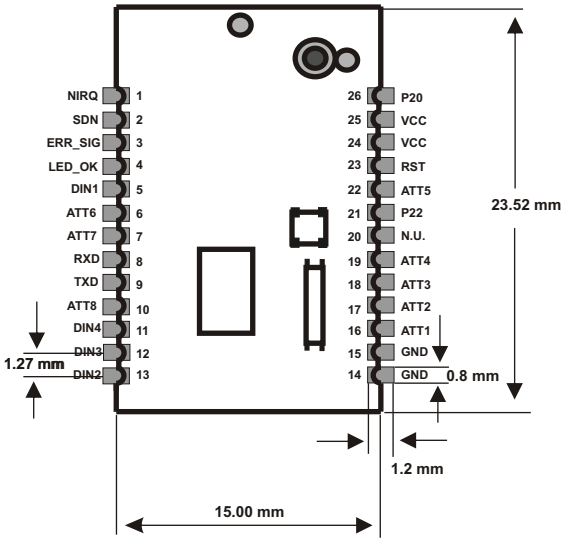


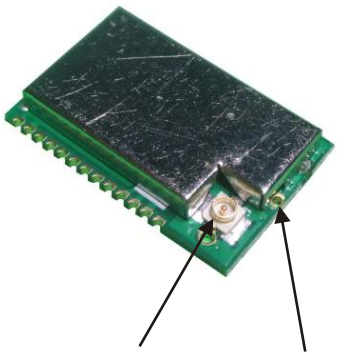
RCS1KSMT-XXX configured as Actuator / PWM 8channels Actuator)

PIN OUT

Pads	Name	Type	Description
1	NIRQ	CONTROL	In the SENSONET application must be connected with pin 21 (see schematic below)..
2	SDN	CONTROL	In the SENSONET application must be connected with pin 26 (see schematic below).
3	ERR_SIG	CONTROL	LED Error
4	LED_OK	CONTROL	Led OK / Programming
5	DIN1	D I/O	Digital Input
6	ATT6	DOUT	Digital Output
7	ATT7	DOUTI	Digital Output
8	RXD	UART	Uart TX
9	TXD	UART	Uart RX
10	ATT8	DOUTI	Digital Output
11	DIN4	D I/O	Digital Input
12	DIN3	D I/O	Digital Input
13	DIN2	D I/O	Digital Input
14	GND	Ground	Ground
15	GND	Ground	Ground
16	ATT1	DOUT	Digital Output
17	ATT2	DOUT	Digital Output
18	ATT3	DOUT	Digital Output
19	ATT4	DOUT	Digital Output
20	N.U.	N.U.	Not Used
21	P22	CONTROL	Connected with pin1 (see schematics below).
22	ATT5	DOUT	Digital Output
23	RST	D I/O	Device Reset
24	VCC	Power	Power supply voltage
25	VCC	Power	Power supply voltage
26	P20	CONTROL	Connected with pin 2 (see schematics below).

Mechanical dimensions

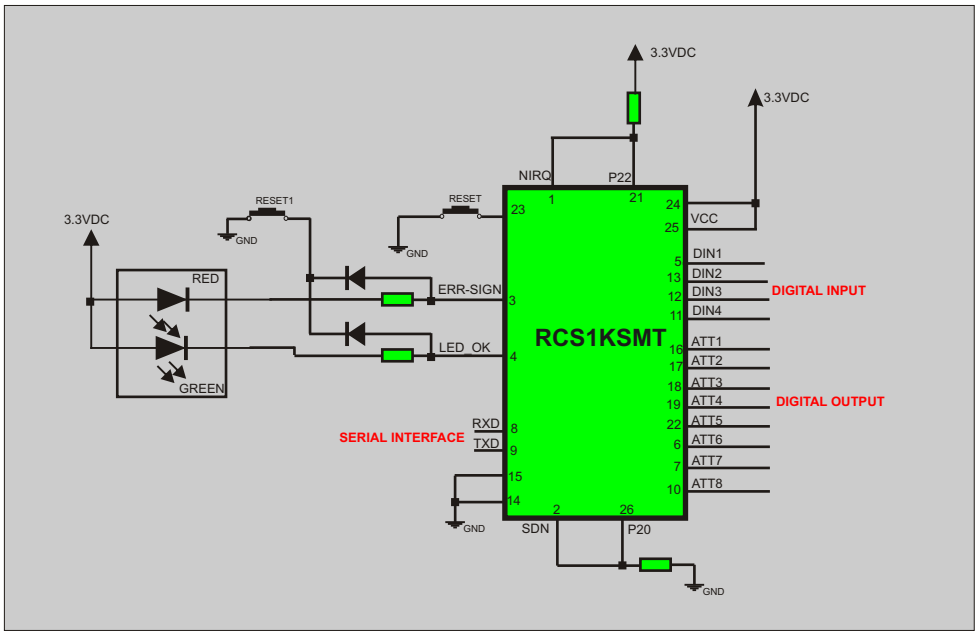




Antenna HIRose connector

Antenna connection

Actuator and Actuator PWM (8 channels) Application Note

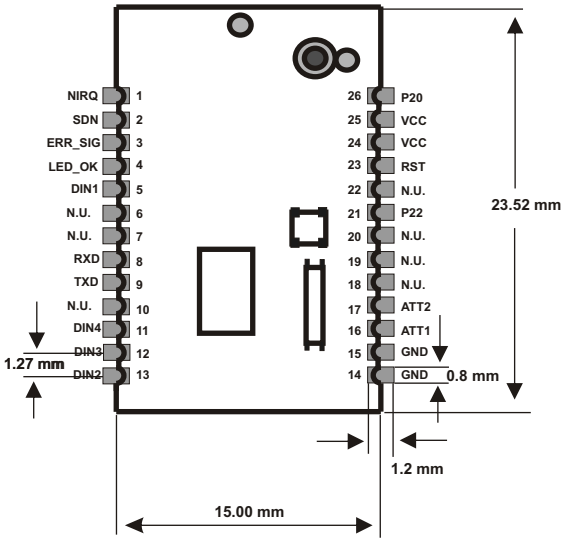


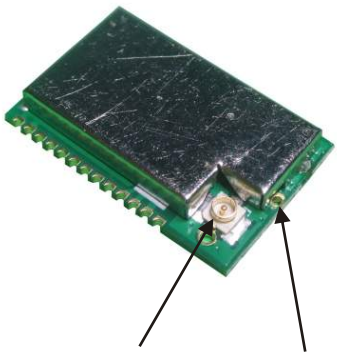
RCS1KSMT-XXX configured as Actuator / PWM 2channels Actuator

PIN OUT

Pads	Name	Type	Description
1	NIRQ	CONTROL	In the SENSONET application must be connected with pin 21 (see schematic below)..
2	SDN	CONTROL	In the SENSONET application must be connected with pin 26 (see schematic below).
3	ERR_SIG	CONTROL	LED Error
4	LED_OK	CONTROL	Led OK / Programming
5	DIN1	D I/O	Digital Input
6	N.U.	N.U.	Not used
7	N.U.	N.U.	Not Used
8	RXD	UART	Uart TX
9	TXD	UART	Uart RX
10	N.U.	N.U.	Not Used
11	DIN4	D I/O	Digital Input
12	DIN3	D I/O	Digital Input
13	DIN2	D I/O	Digital Input
14	GND	Ground	Ground
15	GND	Ground	Ground
16	ATT1	DOUT	Digital Output
17	ATT2	DOUT	Digital Output
18	N.U.	N.U.	Not used
19	N.U.	N.U.	Not Used
20	N.U.	N.U.	Not Used
21	P22	CONTROL	Connected with pin1 (see schematics below).
22	N.U.	N.U.	Not Used
23	RST	D I/O	Device Reset
24	VCC	Power	Power supply voltage
25	VCC	Power	Power supply voltage
26	P20	CONTROL	Connected with pin 2 (see schematics below).

Mechanical dimensions

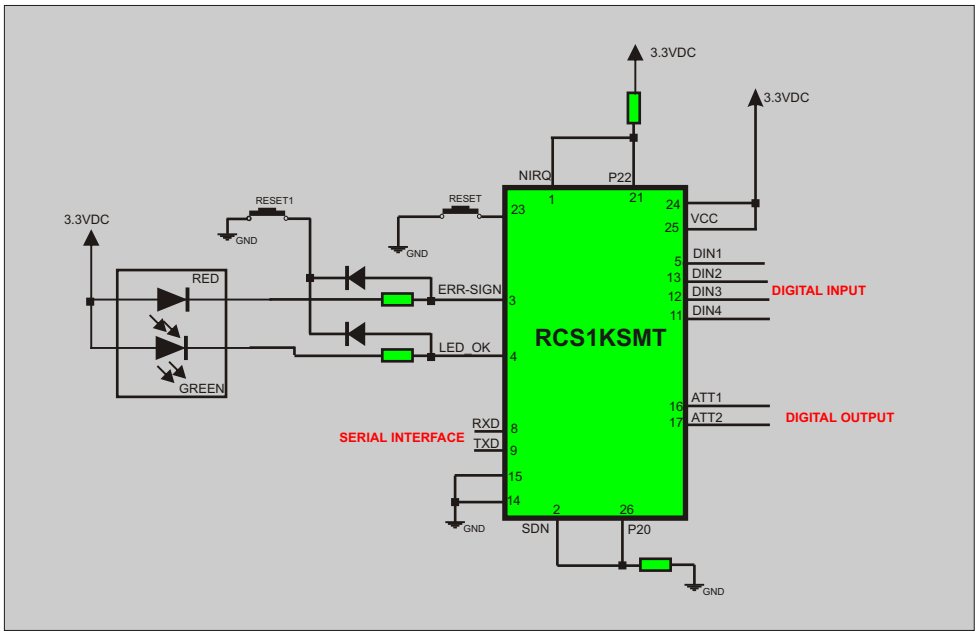




Antenna HIRose connector

Antenna connection

Actuator and Actuator PWM (2 channels) Application Note

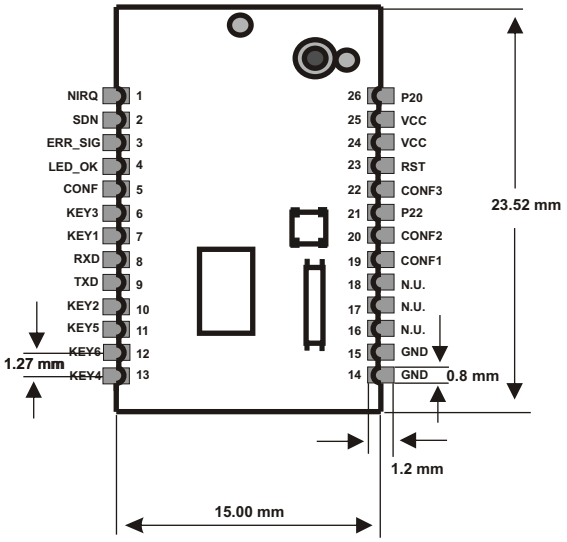


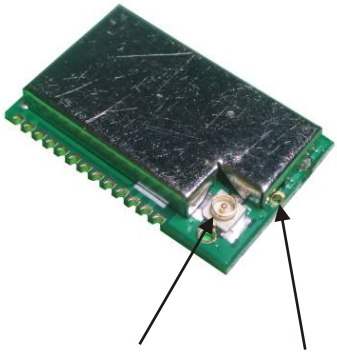
RCS1KSMT-XXX configured as Bidirectional Remote Control

PIN OUT

Pads	Name	Type	Description
1	NIRQ	CONTROL	In the SENSONET application must be connected with pin 21 (see schematic below)..
2	SDN	CONTROL	In the SENSONET application must be connected with pin 26 (see schematic below).
3	ERR_SIG	CONTROL	LED Error
4	LED_OK	CONTROL	Led OK / Programming
5	CONF	D I/O	Digital Input
6	KEY 3	KEYS	Digital Input
7	KEY 1	KEYS	Digital Input
8	RXD	UART	Uart TX
9	TXD	UART	Uart RX
10	KEY 2	KEYS	Digital Input
11	KEY 5	KEYS	Digital Input
12	KEY 6	KEYS	Digital Input
13	KEY 4	KEYS	Digital Input
14	GND	Ground	Ground
15	GND	Ground	Ground
16	N.U.	N.U.	Not used
17	N.U.	N.U.	Not used
18	N.U.	N.U.	Not used
19	CONF1	D I/O	Digital Input
20	CONF2	D DI/O	Digital Input
21	P22	CONTROL	Connected with pin1 (see schematics below).
22	CONF3	D I/O	Digital Input
23	RST	D I/O	Device Reset
24	VCC	Power	Power supply voltage
25	VCC	Power	Power supply voltage
26	P20	CONTROL	Connected with pin 2 (see schematics below).

Mechanical dimensions





Antenna HIRose connector

Antenna connection

Bidirectional Remote Control Application Note