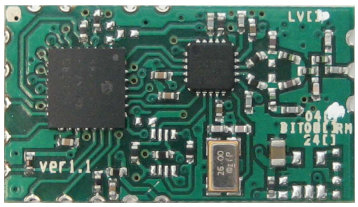
RF Transceiver Module (Radio Modem)

Application

- o Ultra low power wireless Transceiver
- o 433/868/915 and 2400 Mhz ISM/SRD band systems
- o Consumer Electronics
- o Wireless audio
- o Alarm and security systems
- o Home and building automation
- o Wireless sensor networks
- o Industrial monitoring and control
- o Low power Telemetry
- o



Product Description

The **BITxxRMx** is a very low cost transceiver module designed for very low power wireless applications.
This module is intended for ISM (Industrial, Scientific and Medical) and SRD (Short Range Device) frequency band at 433, 868/915 and 2400 Mhz., but can easily be programmed for operation at other frequencies:

BIT04RMx 400 – 464 Mhz
BIT08RMx 800 – 928 Mhz
BIT24RMx 2400 – 2483 Mhz.

It is designed to realize RF solutions easy to use providing a reliable data transfer among remote equipments.
The module can operate with a UART (up to 76.8 kbps) connected host or as a stand alone complete RF module.
BITxxRM has up to 11 I/O pins (2 analog) completely programmable from a remote controller; so it can act as an RF I/O expander (battery operated sensor solution).
It's fully programmable in a very small package: only 15 x 28 mm ready for SMT assembly.

Key Features

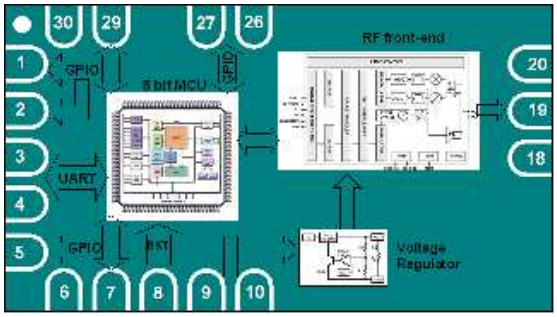
- o Small size (15 x 28 mm package, 17 pins).
- o Frequency bands:
  - BIT04RMx 430 – 434 MHz
  - BIT08RMx 866 – 870 Mhz
    905 – 925 MHz
  - BIT24RMx 2410 – 2470 Mhz.
- o High sensitivity (-110 dbm at 1.2 kpbs, 1% PER at 433 and 868 Mhz and –106 dbm at 2.4 kbps, 1% PER at 2,4 Ghz).
- o Programmable output power up to + 10 dBm for BIT04RMx/BIT08RMx and +1 dBm for BIT24RMx.
- o Low current consumption (18,4 mA in RX,1,2 kbps,433 Mhz and 16,3 mA in RX, 250 kbps,input 30 dB above sensitivity limit)
- o Operating Voltage :
  - BITxxRML 1.8 to 3.6 V.
  - BITxxRM 2.7 to 5.5 V.
- o UART Data rate up to 38.4 kBaud
- o Modulation: GFSK e MSK.

Features (continued from front page)

- Fully customizable upon request.
- Programmable data rate up to 250 kbps
- Ideal for multi-channel operation.
- Forwad Error Correction with interleaving.
- Excellent receiver selectivity and blocking performance.
- BIT04RMx/BIT08RMx suited for system compliant with EN 300 220 (Europe) and FCC CFR Part 15 (US).
- BIT24RMx suited for system compliant with EN 300 328 and EN 300 440 class 2 (Europe), CFR47 Part 15 (US) and ARIB STD-T66 (Japan).

1. Pin-Out

The radio modem is equipped with a certain number of pin available for the host application. Some are already used (see next sections); for the others it is possible to agree a product customization.



PIN #	Config y #	PIN NAME	Pin Type	Buffer Type	Description
P01		RC0/RTS/T1OSO/T13CKI			**RC0 (default config: 1)**
	0	RC0	O	-	Digital Output.
	1	RC0	I	ST	Digital Input.
	2	RTS	I	ST	Request to send (active low)
	-	T1OSO	O	-	Timer1 oscillator output.
	-	T13CKI	I	ST	Timer1/Timer3 external clock input.
P02		RC1/T1OSI			**RC1 (default config: 1)**
	0	RC1	O	-	Digital Output.
	1	RC1	I	ST	Digital Input.
	-	T1OSI	I	CMOS	Timer1 oscillator input.
P03		RC6/TX			**TX (default config: 2)**
	0	RC6	O	-	Digital Output.
	1	RC6	I	ST	Digital Input.
	2	TX	O	-	EUSART asynchronous trasmit.
P04		RX/RC7			**RX (default config: 2)**
	0	RC7	O	-	Digital Output.
	1	RC7	I	ST	Digital Input.
	2	RX	I	-	EUSART asynchronous receive.
P05		CONFIG /WAKE-UP/SLEEP			**CONFIG/WAKE-UP (default config: 0)**
	0	CONFIG/WAKE-UP	I	TTL/ST	Enter in configuration mode (active-low) Wake-up from sleep (active high)
	1	CONFIG /WAKE-UP/SLEEP	I	TTL	Enter in Sleep mode after configured time-out (active-low).

PIN #	Config y #	PIN NAME	Pin Type	Buffer Type	Description
P06		CTS/RB2/INT2/AN8/DIR			**CTS(default config: 2)**
	0	RB2	O	-	Digital Output.
	1	RB2	I	TTL	Digital Input.
	2	CTS	O	-	Clear to send (active low).
	3	DIR	O	-	Rx Tx Switch (Rx active low).
	4	INT2	I	ST	Interrupt-on-change pin
	-	AN8	I	Analog	Analog Input 8.
P07		RB3/AN9/CCP2			**RB3(default config: 1)**
	0	RB3	O	-	Digital Output.
	1	RB3	I	TTL	Digital Input.
	2	RSSI	O	-	PWM at 31,25 KHz
	-	AN9	I	Analog	Analog Input 9.
		CCP2	I/O	ST	Capture 2 input/Compare 2 output/PWM 2 output.
P08		MCLR/Vpp			**MCLR/Vpp**
		MCLR	I	ST	Master Clear(Reset) input.This pin is active-low
		Vpp	Power	-	Programming voltage input
P09		Vss	Power	-	Ground connection
P10		Vdd	Power	-	2.7V – 5.5V power supply connection
P18		AVss1	Power	-	Antenna Ground
P19		ANT	RF I/O	-	RF input/output to Antenna
P20		AVss2	Power	-	Antenna Ground
P26		PA_EN/RB6/KBI2/PGC			**PA_EN (default config : 2)**
	0	RB6	O	-	Digital Outut.
	1	RB6	I	TTL	Digital Input
	2	PA_EN	O	-	External PA enable (active high)
	3	KBI2	I	TTL	Interrupt-on-change pin
	-	PGC	I/O	ST	In-Circuit debugger and ICSP Programming clock pin
P27		LNA_EN/RB7/KBI3/PGD			**LNA_EN (default config : 2)**
	0	RB7	O	-	Digital Outut.
	1	RB7	I	TTL	Digital Input
	2	LNA_EN	O	-	External LNA enable (active high)
	3	KBI3	I	TTL	Interrupt-on-change pin
	-	PGD	I/O	ST	In-Circuit debugger and ICSP Programming data pin
P29		RA7/OSC1/CLKIN			**RA7 (default config: 1)**
	0	RA7	O	-	Digital Outut.
	1	RA7	I	TTL	Digital Input.
	-	OSC1	O	-	Oscillator crystal input or external clock source input. ST buffer when configured in RC mode; analog otherwise.
	-	CLKI	O	-	External clock source input. Always associated with pin function OSC1.
P30		RA6/OSC2/CLKOUT			**RA6 (default config: 1)**
	0	RA6	O	-	Digital Output.
	1	RA6	I	TTL	Digital Input.
	-	OSC2	I	ST	Oscillator crystal output. Connects to crystal or resonator in Crystal Oscillator mode.
	-	CLKO	I	CMOS	In RC mode, OSC2 pin outputs CLKO which has ¼ the frequency of OSC1 and denotes the instruction cycle rate.

Table 1.1: Pin Description

2. Absolute Maximum Ratings

Parameter	Min.	Max.	Units	Remarks
Supply Voltage, VDD	-0.3 -03	5.5 3.9	V V	BITxxRM version BITxxRML version
Voltage on any pin	-0.3	VDD+0.3	V	
Input RF level		10	dBm	
Storage temperature range	-40	850	℃	

3. Operating Conditions and Specifications

Parameter	Min.	Typ.	Max.	Units	Remarks
RF Frequency Range	433.32 864.00 2.410	433.92 868.30 2.440	434.52 869.90 2.470	MHz MHz GHz	04 version 08 version 24 version
Operation ambient temperature	-30		+85	℃	
Supply voltage	2.7 1.8	- -	5.5 3.6	V V	BITxxRM version BITxxRML version
Current Consumption		5 30 20		uA mA	Sleep mode Transmit mode @ max output power Receive mode @ 1.2 kbps
Sensitivity		-109 -93		dBm dBm	@ 1.2 kbps @ 125 kbps

4. Available Versions

The product is available in three different versions that can be identified and ordered as follows:

BIT04RMx
Operating in the frequency band range between 433.320-434.520 MHz .

BIT08RMx
Operating in the frequency band range between 864.000-869.900 MHz and 905.000-925.000 MHz.

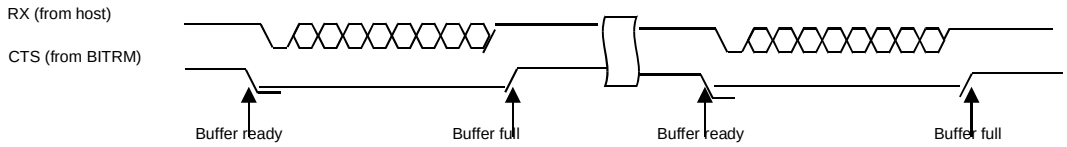
BIT24RMx
Operating in the frequency band range between 2.410-2.470 GHz.

4.1. Product customization

The product is fully customizable upon request; it is possible to customize operating frequencies, data-rate, pin use, functions, etc. Please contact the Distributors closest to you for further information.

5. Data Transmission

When not set in configuration mode (see below), the radio modem receives the characters on the RX line that must be sent in 8 bit data mode, 1 bit stop, no parity and baud rate equal to the one set in configuration (19.200 kbps from manufacturer); when the number of characters received and not transmitted by radio reaches the number set as package length, they are sent; if between one character and the other there is a time interval equal or higher than Timeout setting, the radio modem sends out the characters all the same, even if the quantity he got was not equal to the package length. The modem has got an UART reception buffer with the length of 256 characters; when the buffer is full and it is therefore no longer possible to receive other UART characters, the CTS pin go high, showing that it can no longer receive further characters until it is able to send them by radio, emptying the UART reception buffer.



6. Configuration Controls

The modem is equipped with a complete set of commands to control and program all the modem's functionalities.

Local Mode:

All commands are accessible with the UART interface. The UART interface is a standard type with 8 bit of data, 1 bit of stop, no parity and settable Baud Rate. It is possible to change the configuration in any moment. In that case one has to operate in the following way:

Bring the CONFIG pin to GND or send ESCAPE SEQUENCE;

the radio modem replies with the form feed character <FF(Hex=0C)> <CR><LF> send the command: AT+***cmd***=***val***<CR>

cmd is one of the commands mentioned in the next table;

val is always formed by 3 characters with values that depend on the performed command; as an alternative the 3 characters ??? (Hex=3F) bring back to the current configuration value <CR> is the carriage return character (Hex=0D).

The modem reply messages always start and end with <CR><LF> (Hex=0D0A),except Ok and ERR where the modem reply with <CR><LF> Ok or ERR <LF><CR> ; we will skip them to be shorter.

If the command has been correctly performed the modem will reply with Ok; otherwise it will reply with ERR.

At the end you have to send the command AT+CF=SET<CR>.

Wait until the radio modem gives back the form feed character <FF> (Hex=0C) and realease high the CONFIG. Now new configuration is active.

Remote Mode:

It is also possible to program a radio modem in remote mode via RF link.

Just append the "RC" (Remote Command) suffix after "+" in the command.

Example: AT+RCPL=003
AT+RCCF=SET
Set remote device packet length = 3.

The next table shows the command set to be used in configuration.

***The use of RF frequencies, maximum allowed RF power and duty-cycles are limited by national regulations. The BIT04RM and BIT08RM is complying with the applicable directives within the European Union when used within these limitations (see Appendix A:* CEPT ERC RECOMMENDATION 70-03).**

Comm	Syntax	Description (see 6.1-6.10)	Possible Values val	Factory Default Value
BR	AT+ [RC]BR=***val***<CR>	Sets the baud rate for the UART interface	000, , 006	003
TO	AT+ [RC]TO=***val***<CR>	Sets the character reception timeout after which it will send out the RF package in any way	000, , 255	000
PL	AT+[RC]PL=***val***<CR>	Sets the length of the RF package	001, , 050	001
PA	AT+[RC]PA=***val***<CR>	Sets the output power	000, , 008	See 6.4
RF	AT+[RC]RF=***val***<CR>	Sets one of the five RF configurations to be used	000, , 009	000
CH	AT+ [RC]CH=***val***<CR>	Sets the RF channel on which to operate	See 6.6	See 6.6
NA	AT+ [RC]NA=***val***<CR>	Sets the Net Address on which to filter the package	000, , 255	211
MA	AT+ [RC]MA=***val***<CR>	Sets My Address on which to filter the package	000, , 255	000
DA	AT+ [RC]DA=***val***<CR>	Sets the Destination Address to send the package	000, , 255	000
CS	AT+ [RC]CS=***val***<CR>	Sets the TX criteria on CCA (Clear Channel Assessment)	000, , 003	000
CP	AT+ [RC]CP=***val***<CR>	Config pin function	See 6.9	-
RW	AT+ [RC]RW=***val***<CR>	Read and write pin	See 6.10	-
PS	AT+[RC]PS=***val***<CR>	Send Pins-State on input change	SET, RST	RST
PD	AT+ [RC]PD=***val***<CR>	Puts the radio modem in SLEEP mode	000, , 255	-
FS	AT+[RC]FS=***val***<CR>	Sets the timeout after which the radio modem goes in sleep through the pin CONFIG/SLEEP/WAKE-UP	001, , 255	001
CF	AT+[RC]CF=***val***<CR>	Return or Saves the actual configuration	SET, RST	-

Table 6.1: Configuration Commands

6.1. ESCAPE SEQUENCE

The Serial Port can be in two different modes AT mode and data mode. It is possible enter in AT mode by sending an escape sequence. The escape sequence consists of three consecutive forward plus characters '+'.
The following criteria must be met for the Serial Port Adapter to interpret the sequence as a valid escape sequence:

Before the escape sequence there must be silence for 1 second. After the escape sequence there must be silence for 1 second and max 75ms the silence between two + charater .
If the module enter in AT Mode with escape sequence use the "AT+CF " command to move from AT mode to data mode,

6.2. BR: UART Baud Rate

The UART baud rate can be set to 5 different values; the character reception TimeOut is linked to this setting (see section 6.2).
The possible settings are shown in next table.

BR	UART Baud Rate (bps)
0	2400
1	4800
2	9600
3 (default)	**19200**
4	38400
5	57600
6	76800

Table 6.2: UART Baud Rate

6.3. TO: Timeout

With timeout it is meant the inactivity time on the serial in input to the radio modem, after that the acquired characters are sent out by RF anyway without waiting for the package length to be filled; it is expressed as multiple of the bit length $T_o = val * T_b$; setting "val" equal to 000 (default), the timeout is disabled.

$$T_b = \frac{10^6}{BR(bps)}(\mu s)$$

6.4. PL: Package Length

The package length is the number of characters that the radio modem waits to receive from the UART before *packaging them* in the frame and send them in the air.

If the time that passes between one character and the next if higher than Timeout (see section 6.2), then the radio modem sends out the received characters in any way.

6.5. PA: Output Power

Is the settable output power.
The listed power consumption refers only to the radio side. To this typically have to be added 3mA for the microcontroller with only the EUSART active. Following table shows the possible settings.

PA	433 MHz		868 MHz		915 MHz		2.4 GHz	
	Output Power (dbm)	Current consumption, typ. [mA]	Output Power (dbm)	Current consumption, typ. [mA]	Output Power (dbm)	Current consumption, typ. [mA]	Output Power (dbm)	Current consumption, typ. [mA]
0	-30	11.5	-30	11.9	-30	11.8	-30	9.9
1	-20	12.0	-20	12.4	-20	12.3	-26	10.2
2	-15	12.7	-15	13.0	-15	13.0	-20	10.1
3	-10	14.0	-10	14.5	-10	14.0	-16	10.8
4	-5	13.7	-5	14.1	-5	13.9	-12	11.1
5	+0	15.5	+0	16.9	+0	16.7	-8	14.1
6	+5	19.0	+5	20.0	+5	19.3	-4	16.2
7	+7	24.2	**+7(def)**	25.8	+7	25.8	0	21.2
8	**+10(def)**	28.9	+10	30.7	+10	32.3	**+1.5(def)**	21.5

Table 6.3: TX Output Power

6.6. RF: RF Configurations

All five RF configurations have following characteristics in common:
8 byte header (0xAA)
2 byte SYNC WORD (0xD391)
Network address (settable with command NA)
CRC
Error correction method.
Following table shows the peculiar characteristics of each configuration:

Config	Kbps	RX filter bandwidth	Modulation	Typical Sensitivity (dbm)			
				BIT04RM	BIT08RM		BIT24RM
				433 MHz	868 MHz	915 MHz	2.4 GHz
0	1.2	58 KHz	GFSK	-110	-110	-	-104
1	4.8	100 KHz	GFSK	-107	-107	-	-99
2	19.2	100 KHz	GFSK	-102	-103	-	-97
3	38.4	230 KHz	GFSK	-99	-99	-	-95
4	125.0	540 KHz	MSK	-93	-93	-	-89
5	1.2	58 KHz	GFSK	-	-	-110	-
6	4.8	100 KHz	GFSK	-	-	-107	-
7	19.2	100 KHz	GFSK	-	-	-103	-
8	38.4	230 KHz	GFSK	-	-	-99	-
9	125.0	540 KHz	MSK	-	-	-93	-

Table 6.4: Characteristics of the RF configurations

6.7. CH: RF Channel

6.7.1. Versions 04 and 08 (868 MHz)

13 channels placed at a distance of 100 KHz one from another are available for the versions 433 and 868. A particular attention goes to the use of the various available channels, as they are strictly linked to the adopted RF configuration (channel length, baud rate, etc.) in order to respect the approval specifications.

Channel	Central Frequency(MHz)	
	04 version	**08 version**
0	433.32	863.50
1	433.42	863.75
2	433.52	864.00
3	433.62	864.25
4	433.72	864.50
5	433.82	864.75
6	433.92	868.20
7	434.02	**868.30(default)**
8	434.12	868.40
9	**434.22 (default)**	868.85
10	434.32	868.95
11	434.42	869.05
12	434.52	869.85

Table 6.5: Available channels for 04 and 08 versions

6.6.2Version 08 (915 MHz)

In the 915 Mhz version there are 50 channels available placed at a distance of 400 Khz, it is possible to achieve the carrier frequency (f_c) with following formula:

$$f_c = f_{cm} + val * 0{,}4(Mhz)$$

fcm = minimum fc equal to 905 Mhz
val = set value from 0 to 50

6.6.3Version 24

In the 2.4 Ghz version there are 256 channels available placed at a distance of 250 Khz, it is possible to achieve the carrier frequency (f_c) with following formula:

$$f_c = f_{cm} + val * 0{,}25(Mhz)$$

fcm = minimum fc equal to 2410 Mhz
val = set value from 0 to 255

6.8. Addressing

The module allows addressed packet transmissions and broadcast transmissions. Each module has a *Network Address* (one byte) and its own *My Address* (one byte). The Network Address and My Address can be programmed for each module using the configuration interface (Remote Mode or Local Mode). The use of addressing can be enabled writing My Address and Destination Address with a number different of 000.
Each module also has a *Destination Address*. This address will be added to the data packet If value is different of 000.
All Node in one system should have the same Network Address, and each node should be set to a different My Address.

6.8.1. NA: Network Address

The network address helps to filter the RF packets with its own network address; briefly, all radio modems with the same network address are able to communicate among themselves.

6.8.2. MA: My Address

My address filter all the RF packets that don't have in the destination address field the same value of MA.

MA=000 disable function
MA = 255 receive all message

6.8.3. DA: Destination Address

The Destination Address value is added to the RF packets.

DA=000 disable function
DA=255 broadcast message

6.9. CS: TX On CCA

The TX criteria on CCA (Clear Channel Assessment) imposes to the radio modem to estimate the presence of an air carrier (Carrier Sense) before going into transmission; if a carrier with the convenient power is present, then the radio modem does not transmit to avoid conflicts. The carrier is evaluated as positive offset compared to the bottom noise situation to permit more flexibility compared to different exercise situations with different *noise floor*. The offset is settable according to following table.

CS	Relative Carrier Sense Threshold (db)
0	Disabled
1	6
2	10
3	14

Table 6.6: Relative Carrier Sense Threshold

6.10. CP: Set pin function

With this command it is possible to configure the pin function.
Syntax is AT+CP=xxz.
xx: is pin number as described in pin out (**Table 1.1**);
z=y: is specific function as described in pin out (**Table 1.1**) Radio modem Return "Ok"

If z= ? → Radio modem Return:
y=y#

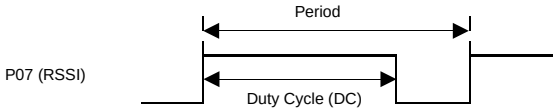
If xxz = ??? → Radio modem Return all pins state:
P01 :y=y#<CR><LF> …. P30 :=y#<CR><LF>

6.10.1. Interrupt on change

When a Interrupt-on-change occours radio modem send pins state to the Destination Address. If Destination Address is equal to "000" radio modem send pins state to host UART.

6.10.2. RSSI

When pin P07 is configured in RSSI mode (y=2) the radio modem generated a PWM at 31,25 Khz with 8 bits resolution.



Duty cycle is an estimate of the signal power level and the following procedure can be used to convert duty cycle to an absolute power level (RSSI_dBm)

$$RSSI_{Norm} = DC(ms) * f_{pwm}(KHz)$$

It is comprised between 0 and 1.

$$RSSI_{dBm} = 127{,}5 * RSSI_{Norm} - RSSI_{offset}$$

Kbps	RSSI_offset			
	BIT04RM	BIT08RM		BIT24RM
	433 MHz	868 MHz	915 MHz	2.4 GHz
1.2	138	138	138	135
4.8	138	138	138	133
19.2	138	138	138	134
38.4	138	138	138	135
125.0	138	138	138	136

Table 6.7: Typical RSSI_offset values

6.11. RW: Read/Write Pin

With this command is possible to set pins High/Low, if pin is configured in output mode, or is possible to read pin (no save command needed).
Syntax is AT+RW=xxz.
xx: is pin number as described in pin out (**Table 1.1**);
z=H → pin at VDD and return State(s);
z=L → pin at GND and return State(s);
z=? → return State(s);
Radio Modem Return State(s):
s=L/H<CR><LF>

If xxz = ??? → Radio Modem return all pins state:
P01: s=L/H<CR><LF>...P30: s=L/H<CR><LF>

6.12. PS: Send Pins-State on input change

If this function is enable (SET), when a pin configured in input (y# =1 see **Table 1.1**) change state (H→L or L→ H) radio modem send pins state to the Destination Address. If Destination Address is equal to “000” radio modem send pins state to host UART.

6.13. PD: Power Down Mode

With this command the RF part is set in power down and the control logic shut down; in this way la board goes into low consumption mode.

Local Mode: Syntax is AT+PD=xxx (value is don’t care), after Radio Modem retun “Ok”, Module wait to CONFIG pin return to logic high before enter in Power Down.
To release from power down bring CONFIG pin to the Low logic level. Module replies with the form feed, carriage return and new line characters <FF><CR><LF> (Hex=0C 0D 0A): it is now in configuration mode; set CONFIG pin to the High logic level to return to normal operation mode.

Remote Mode:Value define the time (T_{wup}) after release from power down.
Syntax is AT+RCPD=xyz

$$T_{wup} = N\text{cycle} * watchdogtimeot$$

$$Ncycle = 2^x * 2^y$$

$$watchdogtimeot = 2^z * 65{,}5ms \text{ (typical)}$$

Watchdog Timeout Accuracy: +/- 15% (-40℃ to +85℃ and Vdd=2.7-5.5V)

N.B.:The device exit from power down also if any enabled interrupt occurs.

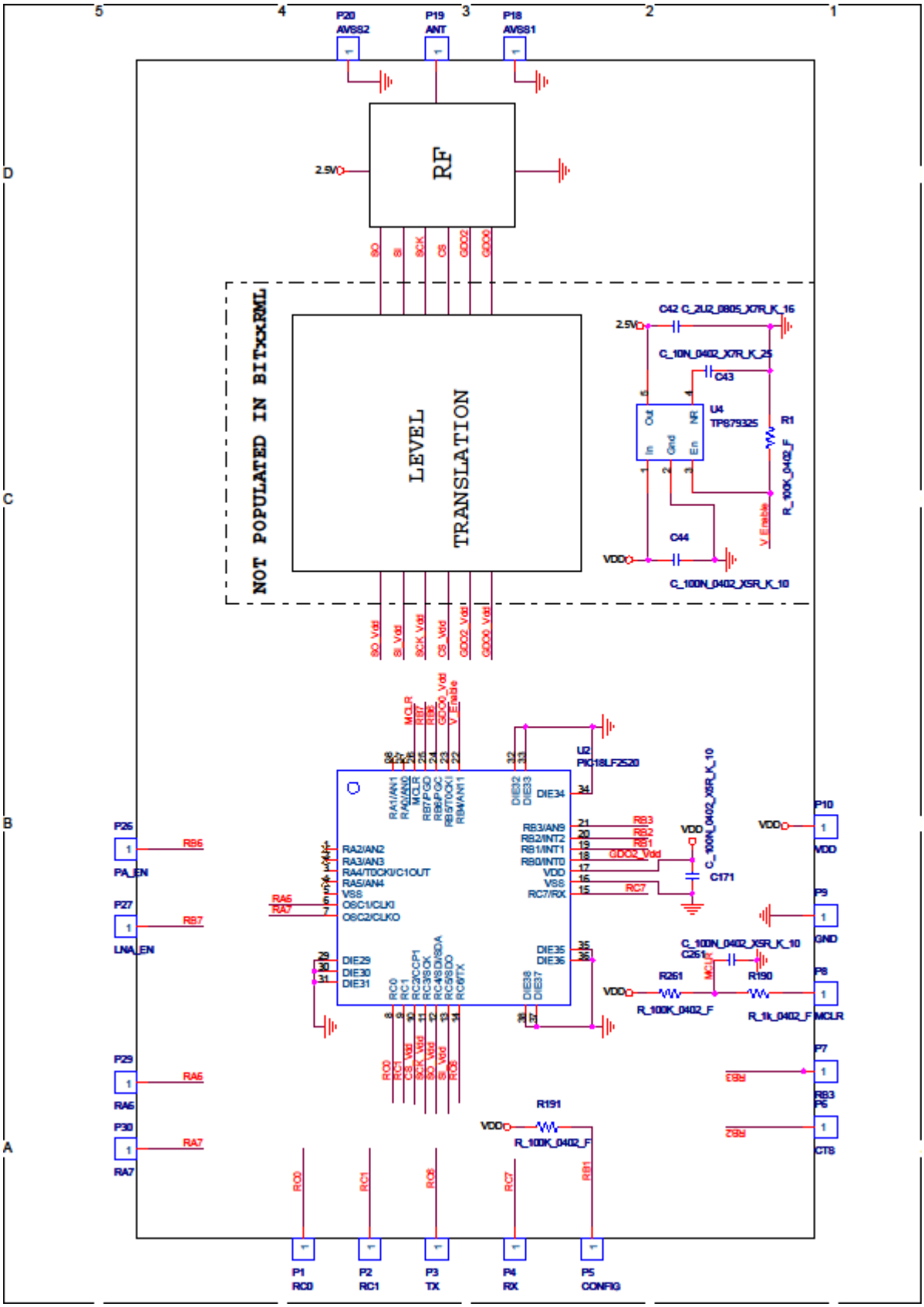
6.14. FS: Fast Sleep

Starting from the moment when the CONFIG/SLEEP/WAKE-UP pin is lowered, it sets the time, after which the radio modem goes into Sleep Mode if during that period no activity on the input serial is performed; it is expressed as multiple of the extend of one byte; default setting it equal to 001. After this time Module wait to CONFIG pin return to logic high before enter in Power Down.

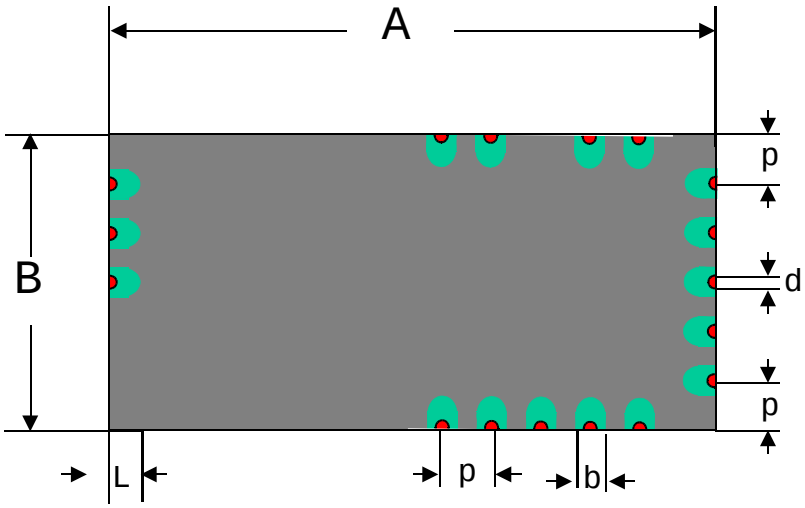
6.15. CF: Save current Configuration

With this command it is possible to save the current configuration (AT+CF=SET) or restore default configuration (AT+CF=RST) in the non volatile memory. By issuing the command AT+CF=???, all the config parameters are returned. To restart the normal operations bring back the CONFIG pin to a high logic level.

7. Schematic


P20
AVSS2
P19
ANT
P18
AVSS1
RF
2.5V
SO
SI
SCK
CS
GDO2
GDO0
NOT POPULATED IN BITxxRML
LEVEL
TRANSLATION
SO_Vdd
SI_Vdd
SCK_Vdd
CS_Vdd
GDO2_Vdd
GDO0_Vdd
C42 C_2U2_0805_X7R_K_16
C_10N_0402_X7R_K_25
C43
U4
TP879325
R1
R_100K_0402_F
V Enable
C44
C_100N_0402_X5R_K_10
VDD
U2
PIC18LF2520
MCLR
RB7
RB6
RA1/AN1
RA0/AN0
RB7/PGD
RB6/PGC
RB5/T0CKI
RB4/AN11
RA2/AN2
RA3/AN3
RA4/T0CKI/C1OUT
RA5/AN4
VSS
OSC1/CLKI
OSC2/CLKO
RB3/AN9
RB2/INT2
RB1/INT1
RB0/INT0
VDD
VSS
RC7/RX
RC0
RC1
RC2/CCP1
RC3/SCK
RC4/SDI/SDA
RC5/SDO
RC6/TX
C171
C_100N_0402_X5R_K_10
C261
R261
R190
R_100K_0402_F
R_1k_0402_F
R191
P25
RB6
PA_EN
P27
RB7
LNA_EN
P29
RA6
P30
RA7
P10
P9
GND
P8
MCLR
P7
RB3
P6
CTS
P1
RC0
P2
RC1
P3
TX
P4
RX
P5
CONFIG

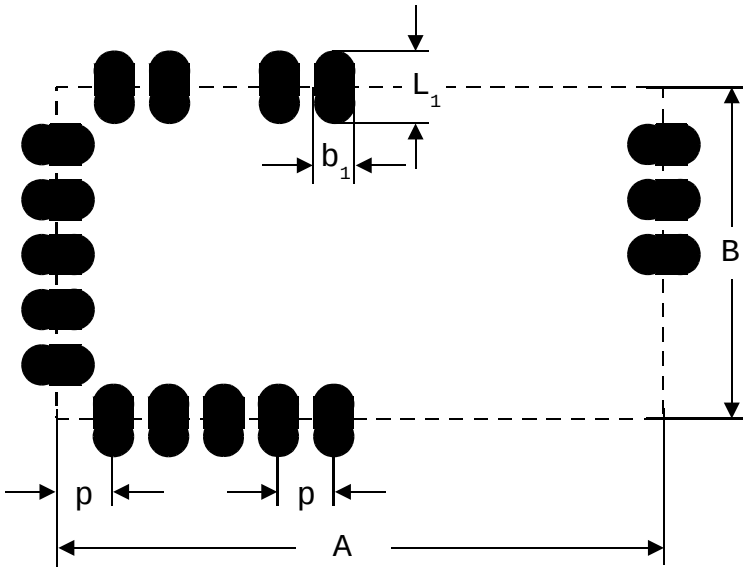
8. Package Description



	mm	mils
A	27,94	1100
B	15,24	600
L	1,47	58
b	1,52	60
d	0,56	22
p	2,54	100

BOTTOM VIEW

9. Recommended Footprint



	mm	mils
A	27,94	1100
B	15,24	600
L_1	3,15	124
b_1	1,72	68
p	2,54	100

The area underneath the module should be covered with solder resist in order to prevent short circuiting the test pads on the back side of the module. A solid ground plane is preferred.

10. Appendix A: CEPT ERC RECOMMENDATION 70-03

A summary of the recommendation for the 433MHz and 868MHz band SRDs follows based on the 19 August 1999 edition. The complete document can be downloaded from www.ero.dk.

Class	Frequency band	Power e.r.p.	Duty cycle	Channel spacing	Comments
1e	433.050-434.790	10mW	10%	No channel spacing specified	
10c	863.000 –865.000	10mW	100%	200kHz	Consumer radio microphones
13a	863.000 –865.000	10mW	100%	No channel spacing specified (300kHz for analogue systems)	Wireless audio (cordless loudspeakers and headphones) Integrated antenna only
1f	868.000 - 868.600	25mW	1%	25kHz, wideband,100kHz spread spectrum	
7a	868.600 - 868.700	10mW	0.1%	25kHz	Alarms in general
1g	868.700 - 869.200	25mW	0.1%	25kHz wideband,100kHz spread spectrum	
7d	869.200 - 869.250	10mW	0.1%	25kHz	Social Alarms
7b	869.250 - 869.300	10mW	0.1%	25kHz	Alarms in general
1h	869.300 – 869.400	t.b.d.	t.b.d.	25kHz	
1i	869.400 - 869.650	500mW	10%	25kHz. Or one broadband channel	
7c	869.650 - 869.700	25mW	10%	25kHz	Alarms in general
1k	869.700 - 870.000	5mW	100%	25kHz or 50kHz, or wideband	

11. General Information

11.1. Disclaimer

B.I.T. srl believes the information contained herein is correct and accurate at the time of this printing. However, B.I.T. srl reserves the right to make changes to this product without notice. B.I.T. srl does not assume any responsibility for the use of the described product; neither does it convey any license under its patent rights, or the rights of others. The latest updates are available at the BIT website or by contacting BIT directly.
As far as possible, major changes of product specifications and functionality, will be stated in product specific Errata Notes published at the BIT website. Customers are encouraged to sign up to the Developers Newsletter for the most recent updates on products and support tools.
Compliance with regulations is dependent on complete system performance. It is the customer's responsibility to ensure that the system complies with regulations.

11.2. Life Support Policy

This BIT product is not designed for use in life support appliances, devices, or other systems where malfunction can reasonably be expected to result in significant personal injury to the user, or as a critical component in any life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness. B.I.T. srl customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify B.I.T. srl for any damages resulting from any improper use or sale.

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