

# **PTR9022** *Multiprotocol ANT™/Bluetooth Low Energy Module Embedded ARM Cortex™ M0*

## **Features**

- Worldwide 2.4GHz ISM Band, 250 kbps/1 Mbps/2 Mbps on-air data rate options
- ARM® Cortex™-M0 32 bit processor, 256 kB flash memory, 16 kB RAM
- TX Power -20 to +4 dBm in 4 dB steps
- -90 dBm sensitivity in ANT mode
- -93 dBm sensitivity in Bluetooth® low energy mode
- 10.5 mA peak TX (0 dBm), 13 mA peak RX, RSSI (1 dBm resolution)
- Flexible real-time counter and Two 16 bit and one 24 bit timers with counter mode
- Rich set of digital interfaces including: SPI, 2-wire , and UART
- Programmable Peripheral Interconnect(PPI)
- 32.768Khz crystal on board
- 8/9/10 bit ADC - 8 configurable channels
- AES encryption/decryption accelerator
- Minimum Size about 26mmx19mm x2mm with Antenna, 1.27mm pin pitch.
- The Module Design with nRF51422

## **Typical Applications:**

- Personal Area Networks
- Health/fitness sensor and monitor devices
- Medical devices
- Key-fobs + wrist watches
- Remote control toys
- Home/industrial automation
- Environmental sensor networks
- Active RFID
- Logistics/goods tracking
- Audience-response systems
- Interactive entertainment devices
- Remote control
- 3D Glasses
- Gaming controller

## Transmitter specification:

Symbol	Description	Min.	Typ.	Max.	Units	Test level
$P_{RF}$	Maximum output power		4		dBm	4
$P_{RFC}$	RF power control range	20	24		dB	2
PRFCR	RF power accuracy			$\pm 4$	dB	1

## Receiver specification:

Symbol	Description	Min.	Typ.	Max.	Units	Test level
<b>Receiver operation</b>						
$PRX_{MAX}$	Maximum received signal strength at < 0.1% PER		0		dBm	1
$PRX_{SENS,2M}$	Sensitivity (0.1% BER) @ 2 Mbps		-85		dBm	2
$PRX_{SENS,1M}$	Sensitivity (0.1% BER) @ 1 Mbps		-90		dBm	2
$PRX_{SENS,250k}$	Sensitivity (0.1% BER) @ 250 kbps		-96		dBm	2
$P_{SENS IT}$ 1 Mbps BLE	Receiver sensitivity: Ideal transmitter		-93		dBm	2
$P_{SENS DT}$ 1 Mbps BLE	Receiver sensitivity: Dirty transmitter		-91		dBm	2

## Radio current consumption:

Symbol	Description	Min.	Typ.	Max.	Units	Test level
$I_{TX,+4dBm}$	TX only run current @ $P_{OUT} = +4$ dBm		16		mA	4
$I_{TX,0dBm}$	TX only run current @ $P_{OUT} = 0$ dBm		10.5		mA	4
$I_{TX,-4dBm}$	TX only run current @ $P_{OUT} = -4$ dBm		8		mA	2
$I_{TX,-8dBm}$	TX only run current @ $P_{OUT} = -8$ dBm		7		mA	2
$I_{TX,-12dBm}$	TX only run current @ $P_{OUT} = -12$ dBm		6.5		mA	2
$I_{TX,-16dBm}$	TX only run current @ $P_{OUT} = -16$ dBm		6		mA	2
$I_{TX,-20dBm}$	TX only run current @ $P_{OUT} = -20$ dBm		5.5		mA	2
$I_{TX,-30dBm}$	TX only run current @ $P_{OUT} = -30$ dBm		5.5		mA	2
$I_{START,TX}$	TX startup current <sup>1</sup>		7		mA	1
$I_{RX}$	RX only run current @ 1 Mbps		13		mA	4
$I_{START,RX}$	RX startup current <sup>2</sup>		8.7		mA	1

1. Average current consumption (at 0 dBm TX output power) for TX startup (130  $\mu$ s), and when changing mode from RX to TX (130  $\mu$ s).
2. Average current consumption for RX startup (130  $\mu$ s), and when changing mode from TX to RX (130  $\mu$ s).

### CPU current consumption:

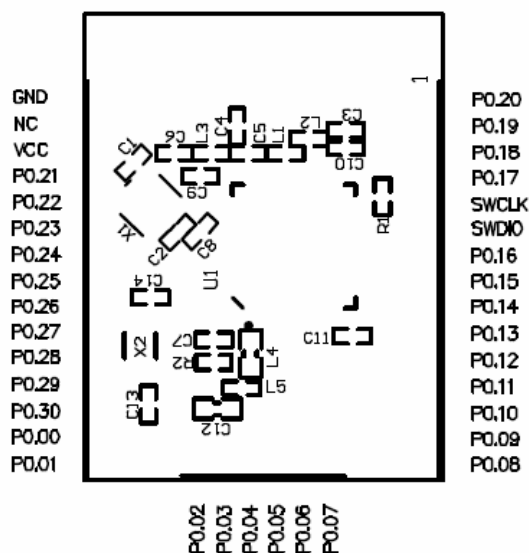
Symbol	Description	Min.	Typ.	Max.	Units	Test level
$I_{CPU,Flash}$	Run current @ 16 MHz, Executing code from flash memory		4.4 <sup>1</sup>		mA	2
$I_{CPU,RAM}$	Run current @ 16 MHz, Executing code from RAM		2.4 <sup>2</sup>		mA	1
$I_{START,CPU}$	CPU startup current		600		$\mu$ A	1
$t_{START,CPU}$	IDLE to CPU execute	0	3		$\mu$ s	1

1. Includes CPU, flash, 1V2, 1V7, RC16M
2. Includes CPU, RAM, 1V2, RC16M
3.  $t_{1V2}$  if 1V2 regulator is not running already

### Power management:

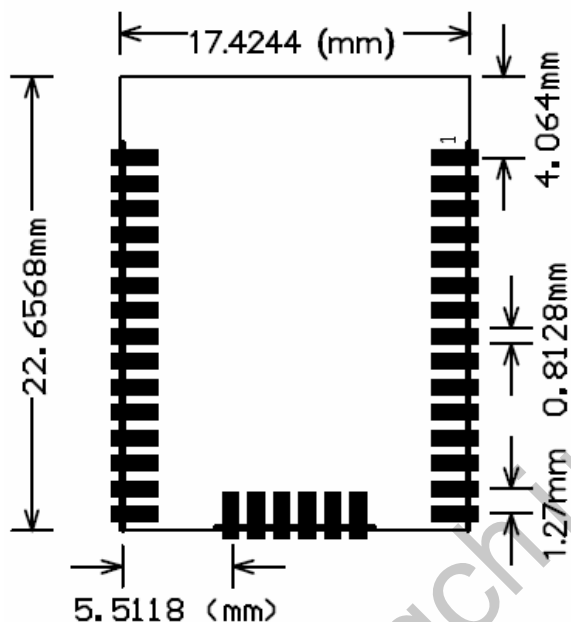
Symbol	Description	Note	Min.	Typ.	Max.	Units	Test level
$I_{OFF}$	Current in SYSTEM-OFF, no RAM retention			420		nA	1
$I_{OFF,16k}$	Current in SYSTEM-OFF mode 16 kB SRAM retention			740		nA	1
$I_{OFF,8k}$	Current in SYSTEM-OFF mode 8 kB SRAM retention			530		nA	1
$I_{OFF2ON}$	OFF to CPU execute transition current			400		$\mu$ A	1
$t_{OFF2ON}$	OFF to CPU execute			9.6	10.6	$\mu$ s	1
$I_{ON}$	SYSTEM-ON base current			2.3		$\mu$ A	2

### Pin Description (Top View) :



Pin	Name	Description	Note
Pin1	P0.20	Digital I/O	
Pin2	P0.19	Digital I/O	
Pin3	P0.18	Digital I/O	
Pin4	P0.17	Digital I/O	
Pin5	SWCLK	HW debug and flash programming I/O	
Pin6	SWDIO	HW debug and flash programming I/O	
Pin7	P0.16	Digital I/O	
Pin8	P0.15	Digital I/O	
Pin9	P0.14	Digital I/O	
Pin10	P0.13	Digital I/O	
Pin11	P0.12	Digital I/O	
Pin12	P0.11	Digital I/O	
Pin13	P0.10	Digital I/O	
Pin14	P0.09	Digital I/O	
Pin15	P0.08	Digital I/O	
Pin16	P0.07	Digital I/O	
Pin17	P0.06	Digital I/O	
Pin18	P0.05	Digital I/O	
Pin19	P0.04	Digital I/O	
Pin20	P0.03	Digital I/O	
Pin21	P0.02	Digital I/O	
Pin22	P0.01	Digital I/O	
Pin23	P0.00	Digital I/O	
Pin24	P0.30	Digital I/O	
Pin25	P0.29	Digital I/O	
Pin26	P0.28	Digital I/O	
Pin27	P0.27	Digital I/O	
Pin28	P0.26	Digital I/O	
Pin29	P0.25	Digital I/O	
Pin30	P0.24	Digital I/O	
Pin31	P0.23	Digital I/O	
Pin32	P0.22	Digital I/O	
Pin33	P0.21	Digital I/O	
Pin34	VCC	Power Supply (1.8~3.6V)	
Pin35	NC		
Pin36	GND	Ground	

**Overall Dimensions (Top View):**



For more application information, please refer nRF51422 datasheet.

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- Reserves the right to make corrections, modifications, and/or improvements to the product and/or its specifications at any time without notice.
- Assumes no liability for the user's product and/or applications.
- Products are not authorized for use in safety-critical applications, including but not limited to life-support applications.

**ATTENTION!**

Electrostatic Sensitive Device  
Observe Precaution for handling.



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