4RF

ANATEL 902-907.5 and
915-928 MHz unlicensed

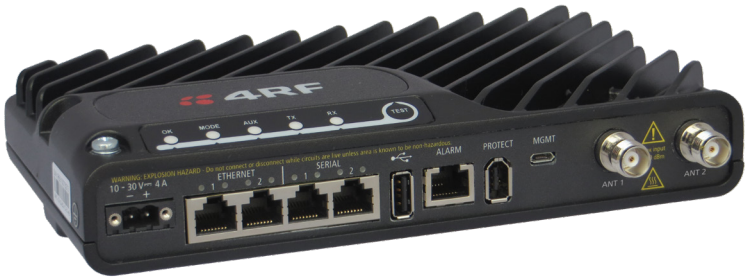
Datasheet

Now with
576 kbit/s

Aprisa SRi

UTILITY-GRADE UNLICENSED NOW DOUBLE STRENGTH

902-907.5 and 915-928 MHz Industrial Licence Free Spread Spectrum



Utility-grade unlicensed radio for Aprisa edge-of-network extension and other field area network applications up to 100 km range

The Aprisa SRi is a licence free 902-907.5 and 915-928 MHz ANATEL radio with unprecedented flexibility and security. Now with the Aprisa SRi Modem 2 software update.

- **Secure:** with its defense in depth approach including AES encryption, authentication, address filtering and user access control, the Aprisa SRi protects against malicious attacks and consumer-grade wireless vulnerabilities.
- **Flexible hopping channel and zone arrangements:** full band and reduced non-overlapping zone options allow a tailored approach to interference mitigation. Unique combination of advanced forward error correction (FEC) with packet synchronized selective ARQ combats interference. Time-sliced fast hop and advanced access control MAC delivers more usable throughput and reduced latency.
- **Future-proof:** the Aprisa SRi supports dual serial and dual Ethernet ports in a single, compact form factor, designed to cryptographically secure legacy serial, protect existing device investment, and enable new applications. Old and new application protocols can be run side by side.
- **Aprisa SR family:** the Aprisa SRi now offers two modes, 100 kHz double strength and the original 50 kHz mode. The Aprisa SRi fully integrated with the Aprisa SR family and includes all family features including networking, management, and security. Most existing Aprisa SRi users can upgrade to Modem 2 with a simple firmware update.
- **Advanced L2 / L3 capabilities:** selectable L2 bridge, L3 router, or advanced gateway router combination L2/L3 modes with VLAN, QoS, NAT, and filtering attributes to maximize capacity in constrained bandwidth and prioritize mission critical traffic while meeting tough security and IP network policy imperatives.
- **Link efficiency:** Adaptive Coding and Modulation (ACM) and forward error correction maintains the integrity of the wireless connection while an effective channel access scheme and advanced IP routing features ensure efficient transfer of data across the Aprisa SRi network.
- **Reliable and robust:** the Aprisa SRi requires no manual component tuning and maintains its performance over a wide temperature range using full specification industrially rated components and shared Aprisa family heritage.
- **Easily managed:** an easy to use GUI supports local element management via HTTPS and remote element management over the air, and SNMP support allows network-wide monitoring and control via a third party network management system.

The Aprisa SRi in brief

- 902-907.5 and 915-928 MHz band
- RS-232 and IEEE 802.3 protocols
- Software selectable frequency hop sets with black list capability
- Gross data rates up to 320 kbit/s in 50 kHz mode and up to 576 kbit/s in 100 kHz mode
- Half duplex operation
- 256, 192 or 128 bit AES encryption
- Adaptive Coding and Modulation: QPSK to 256 QAM
- Enhanced Noise Rejection Mode enabled by default with programmable receive attenuator option Note 4
- 31 Level Multi-Hop Store & Forward Repeaters
- Software selectable dual / single antenna modes Note 4
- AES-CCM to NIST SP 800-38C
- 1W peak output power
- Advanced FEC, packet synchronized selective ARQ
- Dedicated alarm port
- Protected station and legacy product migration options
- Smart Sleep power option Note 4
- Layer 2 bridge (VLAN aware), layer 3 router, and advanced gateway router combination L2/L3 modes
- VLAN tagging and Q-in-Q
- Flexible QoS priority enforcement – by port or traffic type, VLAN, PCP/DSCP, rule including SMAC/DMAC, IP address and IP protocol, and EtherType
- L2 / L3 / L4 filtering
- Substation hardened to IEEE 1613 class 2 and IEC 61850-3
- 30 kV ESD antenna protection
- Class 1, Division 2 for hazardous protection
- –40 to +70 °C operational temperature without fans

Aprisa SRi applications

- Electricity grid: distribution automation DA/DFA/DR and Volt/VAR cap banks
- Smart grid: concentrator communications and GPRS replacement
- Renewables: distributed energy DER/DERM for solar and wind farms
- Water and wastewater: flow, level, and pressure modulation
- Oil & Gas: wellhead automation, production metering, lift pump automation

Aprisa SRi typical application deployment

- Relieve capacity constrained unlicensed field area networks
- On site applications: intra-substation 'inside the fence' MV substation automation, water treatment plants, single and multi-well pads
- Tail-end links: Aprisa SR licensed network extensions and secure communications
- Medium range applications: water catchment management and coalbed methane (CBM) production

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SYSTEM SPECIFICATION

GENERAL			
NETWORK TOPOLOGY	Point-to-multipoint (PMP); Base, Remote, Repeater		
NETWORK INTEGRATION	Serial and Ethernet (router or bridge mode)		
PROTOCOLS			
ETHERNET	IEEE 802.3, 802.1d/q/p		
SERIAL	Legacy RS-232 transport, Mirrored Bits ®, SLIP and Terminal Server support		
WIRELESS	Proprietary FHSS		
SCADA	Transparent to all common SCADA protocols such as Modbus, IEC 60870-5-101/104, DNP3 or similar		
RADIO			
FREQUENCY BAND	902-907.5 and 915-928 MHz		
CHANNEL SIZE	100 kHz and 50 kHz		
NUMBER OF CHANNELS PER HOP ZONE	35 in 50 kHz mode, 18 in 100 kHz mode		
NUMBER OF STANDARD HOP ZONES	8 (non-overlapping)		
FULL BAND OPTION	280 channels in 50 kHz mode 144 channels in 100 kHz mode		
ZONE / CHANNEL SELECTION	Zone selection list and channel black list		
FREQUENCY STABILITY	± 1.0 ppm		
FREQUENCY AGING	< 1 ppm / annum		
TRANSMITTER			
MAX PEAK ENVELOPE POWER (PEP)	1.0 W (+30 dBm)		
AVERAGE POWER OUTPUT	256 QAM	0.01 – 0.16 W (+10 to +22 dBm, in 1 dB steps)	
	64 QAM	0.01 – 0.2 W (+10 to +23 dBm, in 1 dB steps)	
	16 QAM	0.01 – 0.25 W (+10 to +24 dBm, in 1 dB steps)	
	QPSK	0.01 – 0.4 W (+10 to +26 dBm, in 1 dB steps)	
SPURIOUS EMISSIONS	< –37 dBm		
ATTACK TIME	< 1.5 ms		
RELEASE TIME	< 0.5 ms		
DATA TURNAROUND TIME	< 2 ms		
RECEIVER		**100 kHz**	**50 kHz**
SENSITIVITY (BER < 10^{-6})	256 QAM	–87 dBm	–90 dBm
	64 QAM	–93 dBm	–96 dBm
	16 QAM	–101 dBm	–104 dBm
	QPSK	–106 dBm	–109 dBm
RECEIVER PERFORMANCE			
ADJACENT CHANNEL SELECTIVITY	> –37 dBm		
	(Note 1) [> 58 dB]		
CO-CHANNEL REJECTION QPSK	> –10 dB		
CO-CHANNEL REJECTION 256 QAM	> –26 dB		
INTERMODULATION RESPONSE REJECTION	> –35 dBm [> 60 dB Note 1]		
BLOCKING OR DESENSITISATION	> –17 dBm [> 78 dB Note 1]		
SPURIOUS RESPONSE REJECTION	> –32 dBm [> 63 dB Note 1]		
MODEM		**100 kHz**	**50 kHz**
GROSS DATA RATE	256 QAM	576 kbit/s	320 kbit/s
	64 QAM	432 kbit/s	240 kbit/s
	16 QAM	288 kbit/s	160 kbit/s
	QPSK	144 kbit/s	80 kbit/s
OCCUPIED BANDWIDTH	50 kHz or 100 kHz		
FORWARD ERROR CORRECTION	Variable Reed Solomon plus convolutional code		
ADAPTIVE BURST SUPPORT	Adaptive Coding and Modulation		

SECURITY		
DATA ENCRYPTION		256, 192 or 128 bit AES
DATA AUTHENTICATION		CCM
CRYPTOGRAPHIC PROTECTION		FIPS 140-2
IPSEC		Transparent
INTERFACES		
ETHERNET		2 ports RJ45 10/100Base-T switch
SERIAL		2 ports RJ45 RS-232 Additional RS-232 / RS-485 port via USB converter (optional)
GPS RECEIVER		Support for NMEA GPS receiver with radio coordinates
MANAGEMENT		1 x USB micro type B (device port) 1 x USB standard type A (host port) 1 x Alarm port RJ45
ANTENNA		2 x TNC 50 ohm female ANT 1 & ANT 2
LEDs		Status: OK, MODE, AUX, TX, RX Diagnostics: RSSI, traffic port status
TEST BUTTON		Toggles LEDs between diagnostics / status
PRODUCT OPTIONS (specified at order)		
PROTECTED STATION OPTION		Providing hot-swappable / hot-standby redundant hardware switching (10-60 VDC)
POWER		
INPUT VOLTAGE	Radio	10 – 30 VDC negative earth
	Protected Station	10 – 60 VDC floating
RECEIVE		< 4.5 W (326 mA at 13.8 VDC) in active receive state
		< 2.0 W (145 mA at 13.8 VDC) in idle receive state
		< 0.5 W (36 mA at 13.8 VDC) in sleep mode
		< 0.04 W (3 mA at 13.8 VDC) in smart sleep mode
TRANSMIT		< 15 W (1086 mA at 13.8 VDC)
MECHANICAL		
DIMENSIONS	Radio	210 mm (W) x 130 mm (D) x 41.5 mm (H) 8.27" (W) x 5.12" (D) x 1.63" (H)
	Protected Station	434 mm (W) x 372 mm (D) x 88.9 mm (H) 2 RU 17.1" (W) 14.6" (D) 3.5" (H)
WEIGHT		1.25 kg (2.81 lbs)
MOUNTING		Wall, Rack or DIN rail
ENVIRONMENTAL		
OPERATING TEMPERATURE		–40 to +70 °C (–40 to +158 °F)
HUMIDITY		Maximum 95 % non-condensing
MANAGEMENT & DIAGNOSTICS		
LOCAL ELEMENT		SSH and HTTP/S web servers with full control / diagnostics Partial diagnostics via LEDs and test button Software upgrade from PC or USB flash drive
REMOTE ELEMENT		SSH and HTTP/S over-the-air remote element management with control / diagnostics Network software upgrade over-the-air
NETWORK		SNMPv2 and SNMPv3 security support for integration with external network management systems
OVER THE AIR		Low overhead SuperVisor Extended Network Management (EXM)
COMPLIANCE		
RF / EMC		Resolution No. 680
SAFETY		EN 60950 Class 1 division 2 for hazardous locations
ENVIRONMENTAL		ETS 300 019 Class 3.4, Ingress Protection IP51 Substation hardened to IEEE 1613 class 2 and IEC 61850-3

Notes:

1. The receiver figures are shown in typical fixed interference dBm values and dB values [in brackets] relative to the sensitivity. Relative values are given for QPSK modulation and coded FEC.
2. This device must be professionally installed. The installer must adjust the output power to meet ANATEL Resolution No. 680 after considering cable loss and antenna gain.
3. Modem 2 software available for Hardware Type B and later, 100 kHz channels available only on Type C and later.
4. Switchable front-end attenuator, dual antennas, and Smart Sleep available only for Hardware Type D and later.

ABOUT 4RF

Operating in more than 150 countries, 4RF provides radio communications equipment for critical infrastructure applications. Customers include utilities, oil and gas companies, transport companies, telecommunications operators, international aid organisations, public safety, military and security organisations. 4RF point-to-point and point-to-multipoint products are optimized for performance in harsh climates and difficult terrain, supporting IP, legacy analogue, serial data and PDH applications.

Made in USA from local and imported parts.

4RF

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