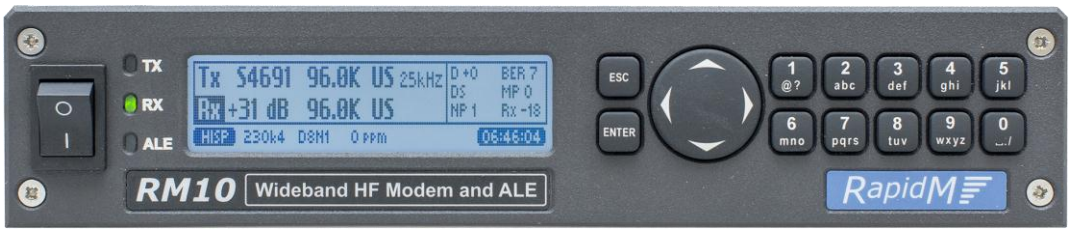
# RM10

# WIDEBAND SDM
## V/UHF 25 KHZ CIRCUIT MODEM

DATASHEET

WBHF 24 kHz | ALE 4G, 3G & 2G | V/UHF 25 kHz




### RM10 Product Overview

The *RM10* Wideband Software Defined Modem (SDM) provides a purpose-built standalone hardware platform for strategic and maritime WBHF Beyond Line-of-Sight (BLOS) and V/UHF Line-of-Sight (LOS) radio communications.

The *RM10* data modem waveforms address the need for higher throughput needed for high-capacity HF & V/UHF data communication over wideband radio channels.

The UHF data modems are specified in STANAG 4691 Annex B, providing a suite of LOS data modem waveforms occupying a bandwidth and a maximum user data rate of 96 kbps. The STANAG 4691 waveform is used in a TDMA systems, together with the MARLIN Network Controller as specified in STANAG 4691 Annex A. The MARLIN Network Controller is provided in the *RC10*, and implements an *ad hoc routing and relaying protocol* for Extended Line-Of-Sight (ELOS) (via a 2 or 3 hop MANET) over UHF communications channels.

A *RapidM* proprietary VHF waveform offers user data rates up to 128 kbps in a 24 kHz bandwidth.

### V/UHF Data Modem

The *RM10* offers standards-based UHF data modems as specified in the NATO STANAG 4691 Annex B, providing user data rates between 12k8 bps and 96 kbps. This waveform is primarily used with legacy radios that provide a wideband (25 kHz) audio interface and is used for both broadcast and Automatic Repeat reQuest (ARQ) and TDMA operation.

The *RM10* modem features a high performance adaptive equalizer to deal with dynamic multi-path distortion associated with mobile communications. The S4691 is an AUTOBAUD (self-identifying) waveform family. Four block interleavings lengths of 20 ms, 80 ms, 320 ms and 1.28 s are provided. The FEC is based on a full-tail-biting constraint length 9 convolutional code.

| S4691-B, DATA RATES [BPS] | | | | | |
|---|---|---|---|---|---|
| 64-QAM | 32-QAM | 16-QAM | 16-QAM | 8-PSK | Q-PSK |
| 96 000 | 80 000 | 64 000 | 48 000 | 32 000 | 16 000 |

The RM10's low data rates (non-QAM) are suitable for use with a non-linear power amplifier (PA). Higher rates require a linear PA or can work with wideband FM or AM radios. The Ultra Short interleaver is intended for IP traffic and Medium is for video streaming; Long is for high-capacity data traffic at low vehicle speeds (slow fading channels).

### Integration with the RC10 MARLIN Node Controller

A typical UHF LOS node consists of a *RC10* STANAG 4691 MARLIN Node Controller and a *RM10* V/UHF Data Modem, with optional link encryption between the controller and the modem. The modem audio output is connected to a radio (half or full duplex) forming a single frequency network. Normally an IP router is connected to the node controller, enabling local area networks (LANs) to be interconnected via the *RC10* Node Controller.

Single nodes, typically deployed on ships, may connect to the network given that they utilize the same operation frequency, parameter set and encryption.

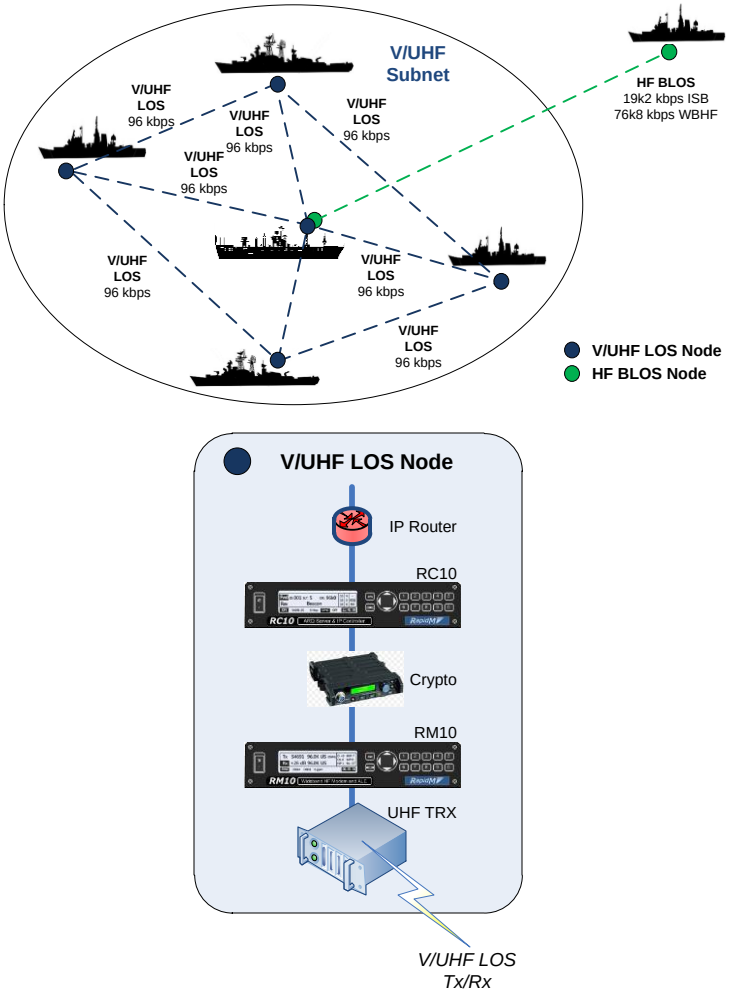



*Figure 1:* V/UHF LOS & HF BLOS Network & V/UHF Node



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| Physical Characteristics | | | | |
|---|---|---|---|---|
| *Size, Weight & Color* | Width: 212.2 mm<br>Depth: 225.6 mm | Height: 41.1 mm (excl. front panel)<br>Height: 44.1 mm (incl. front panel) | Weight: 2.2 kg | Color: Black Grey (RAL 7021), Saddlewood Powder (VX 7517) |
| *Environmental Specifications* | Climatic | ○ Storage/Operation: -30 ˚C to +70 ˚C (MIL-STD-810F)<br>○ Humidity: 90% non-condensing at 30 ˚C (MIL-STD-810F) | | |
| | Mechanical | ○ Vibration: Surface Ship, Marine Vehicles, Aircraft, Min. Integrity (MIL-STD-810F)<br>○ Shock: 40 G, 11 ms (MIL-STD-810F) | | |
| | EMC | ○ MIL-STD-461E (RE101, RE102, CE102, CS101, CS114, RS101, RS103) | | |
| | Safety/CE Marking | ○ CE Marking - Directives 2006/95/EC as amended<br>○ SANS 60950-1:2010 / IEC 60950-1:2012 | ○ LVD - Low Voltage Directive 2014/35/UE<br>○ EMC - Electromagnetic Compatibility Directive 2014/30/UE<br>○ EDD – Eco-Design Directive 2009/125/EC | |
| | MTBF | ○ > 40,000 hours | | |
| *Installation* | Compact design: The unit occupies a width less than ½ of an 1U 19" rack slot, *RapidM* 19" rack-mountable tray available. | | | |
| *Presets* | Factory and Custom Presets | | | |

| Interfaces | |
|---|---|
| *DTE (Data) Port (DB25F)* | RS-422 balanced, RS-423, RS-232 unbalanced., MIL-STD-188-114 (interoperable), EIA 530A compliant<br>Half & Full Duplex operation, Synchronous, Standard and High-speed Async modes |
| *Remote Control/ GPS Port (DE9M)* | Remote Control Pins: RS-422 balanced or RS-232<br>Protocol: Control Protocol (RAP1 + RIPC, ASCII S5066 Annex E) |
| | External GPS Control Pins: RS-232 (nominally input)<br>Data Rate: 300 to 19200 bps, 1/2 stop bits, 7/8 bit data. PPS line: RS 232/422 (NMEA) or TTL |
| *GPS* | Built-in GPS receiver: Time reference for 2G ALE Linking protection (AL-2). |
| *Ethernet CTRL Port (RJ45)* | Remote Control: 10/100 Base T (IEEE 802.3U compatible), embedded TCP/IP Stack<br>Protocol: Control Protocol (RAP1 + RIPC) |
| *Ethernet DATA Port (RJ45)* | IP Packet Data: 10/100 Base T (IEEE 802.3U compatible), embedded TCP/IP Stack<br>Protocol: Raw IP packet data, requires 3G ALE |
| *Ethernet AUX LAN Port (RJ45)* | IP Packet Data: 10/100 Base T (IEEE 802.3U compatible), embedded TCP/IP Stack<br>Reserved for Radio over IP (RoIP) |
| *User Interface* | Local control via 32x202 pixel graphical LCD display and 16-key keypad. 3 bi-colour LED indicators<br>Alphanumeric and digit keypad for fast data entry, 4-way navigation button |
| *Radio Control & Audio Ports (DB25M)* | Radio Control Pins (2 channels): RS-232, up to 115200 bps, 1/2 stop bits, 7/8 bit data<br>Supports for various radio control protocols are built-in. |
| | Input Audio (2 channels): 600 Ohm balanced, –20 to +10 dBm without adjustment<br>Output Audio (2 channels): Balanced, –40 to +10 dBm adjustable into 600 ohm load<br>Keyline: Non-polarized contact closure (<45 V, 200 mA).<br>PTT Sense Input: Pull to ground to indicate external PTT. |
| | Aux Audio Pins: Connection of microphone for ALE voice calling<br>Input Audio: 600 ohm balanced, –20 to +10 dBm without adjustment or MIC input (selectable)<br>Output Audio: Balanced, –40 to +10 dBm adjustable into 600 ohm load |
| *Supply* | AC Supply: 90-264 VAC, 40–440 Hz, 2A; 100-370 VDC |

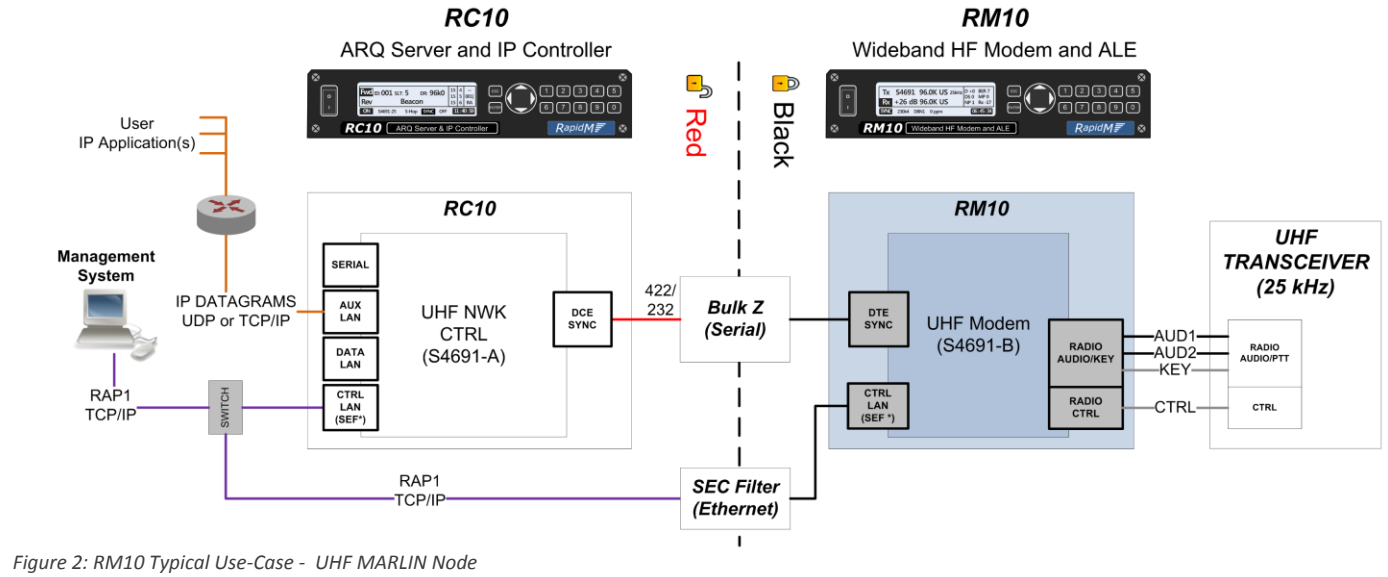


*Figure 2: RM10 Typical Use-Case - UHF MARLIN Node*

| RM10 UHF Modem Ordering Information | | Stock Number | Description |
|---|---|---|---|
| UHF | RM10 Wideband SDM - UHF Modem (STANAG 4691) | RME-M0-RA-U4V06 | SDM: RM10 U4 (UHF 4691-B, 25kHz) V06 |

| Other RM10 Variants (Datasheets Available) | | Stock Number | Description |
|---|---|---|---|
| VHF | RM10 Wideband SDM - VHF Modem RM V6 | RME-M0-RA-V6V06 | SDM: RM10 V6 (V/UHF 25kHz 128kbps) V06 |
| HF | RM10 Wideband SDM - WBHF Modem *(MS-188-141C-D)* | RME-M0-RA-W1V06 | SDM: RM10 W1 (110C 24kHz 120kbps) V06 |


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