

RC12

Wideband ARQ & IP Controller – 240 kbps



S4591 MELP 1200/2400

S4691 MARLIN – 48 kHz

S5066 Ed 4 WB-ARQ

PRODUCT OVERVIEW

Features and Benefits

- **STANAG 4591 MELPe**
 - Version 8.3MC: based on Compandent Inc., MELPe library
 - Sync Sequences: modes 1 and 2 as specified in Annex O
 - 2400 bps: digital voice in less noisy channels (SNR>10 dB, CCIR-P)
 - 1200 bps: digital voice in noisier channels (SNR>7 dB, CCIR-P)
- **Operational Modes**
 - Real Time Voice, 2400 bps: digital voice in less noisy channels
 - Real Time Voice, 1200 bps: digital voice in noisier channels
 - Non-Real Time Voice, 2400 bps: clear voice at lower data rates (future)
 - Broadcast Mode: initiated by pressing press-to-talk
 - Private Line Mode: using 3G ALE to establish point-to-point call (future)
- **Supported Modem Waveforms**
 - Narrowband, MS110A W/F: voice over streaming modem (3 kHz)
 - Narrowband, S4197 W/F: voice over streaming modem (3 kHz)
 - Wideband MS110C W/F: voice over streaming modem (3 to 48 kHz)
- **Intercom I/F:** integrates with existing voice system
- **Serial DTE I/F:** interfaces with serial cryptographic equipment
- **REM Ctrl I/F:** connects to Trusted Filter, serial I/F (optional)
- **Interoperability:** Endianess compatibility change
- **Factory Presets:** Fast set-up of standard operational profiles
- **Deployment:** ship-borne & shore station incl. split-site

STANAG 4591 MELPe Voice Coder Function

The RC12 includes a standards-conformant STANAG 4591 digital voice coder based on the Enhanced Mixed Excitation Linear Prediction (MELPe) algorithm standard. This is intended to enable seamless end-to-end interoperability among and between the strategic and tactical NATO and Allied radio communication systems.

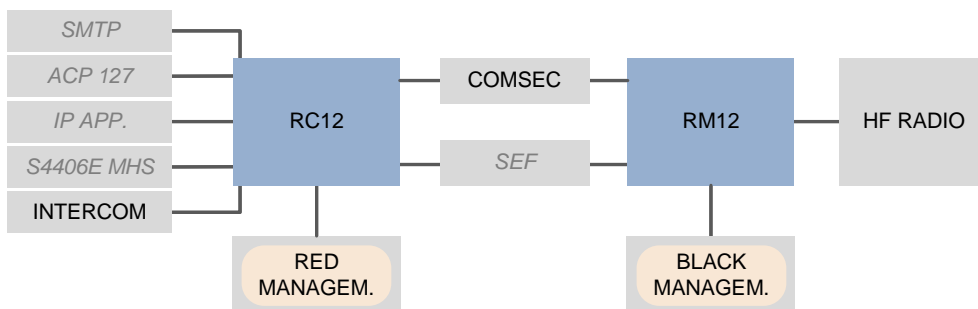
The MELPe coder, known as military standard MIL-STD-3005 and NATO STANAG 4591, is a triple-rate low rate coder that operates at 600, 1200 and 2400 bps.

The RC12 provides streams generated by the 1200 bps MELPe and the 2400 bps MELPe voice-coding algorithm.

Note that the STANAG also calls for 600 bps/MELPe which is not provided in the RC12 product due to export control restrictions. Under the Wassenaar Arrangement, low rate voice coders are listed as munitions under export control for data rates below 700 bps.

The RC12 STANAG 4591 implementation is based on the Compandent Inc. MELPe library (version 8.3MC). The implemented coder suite includes also compressed bit-stream transcoding between the rates, plus postfilter, noise pre-processor, and transcoding.

The RC12 STANAG 4591 MELPe, 1200 bps and 2400 bps functionality is unlocked with the CN activation key as described under "Ordering Information".



RapidM product
RapidM product, not included
CUSTOMER FURNISHED ITEM

Figure 1: HF Circuit Architecture

Conformance To STANAG 4591

The MELPe voice coder, known as military standard MIL-STD-3005 and NATO STANAG 4591, is a triple-rate low rate coder that operates at 600, 1200 and 2400 bps. The RC12 does not offer the 600 bps due to export restrictions.

The table below summarizes the RC12 MELPe voice coder compliance to STANAG 4591 Edition 1. The current version of the RC12 Software does not provide the optional compressed bit-stream transcoding between the rates.

Conformance with STANAG 4591					
ANNEX A	Description of the STANAG 4591 MELPe Algorithm	✓	ANNEX I	Test Vectors for 2400 bps STANAG 4591	✓
ANNEX B	Perf. Verification Requirements for 2400 bps and 1200 bps Impl.	✓	ANNEX J	Test Vectors for 1200 bps STANAG 4591	✓
ANNEX C	Codebooks used by STANAG 4591	✓	ANNEX K	Desc. of 1200 bps S4591 to 2400 bps S4591 Transcoder (optional)	-
ANNEX D	Description of the 1200 bps MELPe Variation	✓	ANNEX L	Desc. of 2400 bps S4591 to 2400 bps S4198 Transcoder (optional)	-
ANNEX E	Description of the Noise Preprocessor	✓	ANNEX M	MELPe Variation for 600 Bit/s NATO Narrow Band Voice Coder	N/A
ANNEX F	Definitions and Acronyms (information)	N/A	ANNEX N	Desc. of 600 bps to 2400 bps and 2400 bps to 600 bps MELPe Trans.	-
ANNEX G	Fixed Point C Source Code (information)	N/A	ANNEX O	Description of MELPe Frame Synchronization	✓
ANNEX H	Floating Point C Source Code (information)	N/A	ANNEX P	Test Vectors for 600 bit/s STANAG 4591	N/A

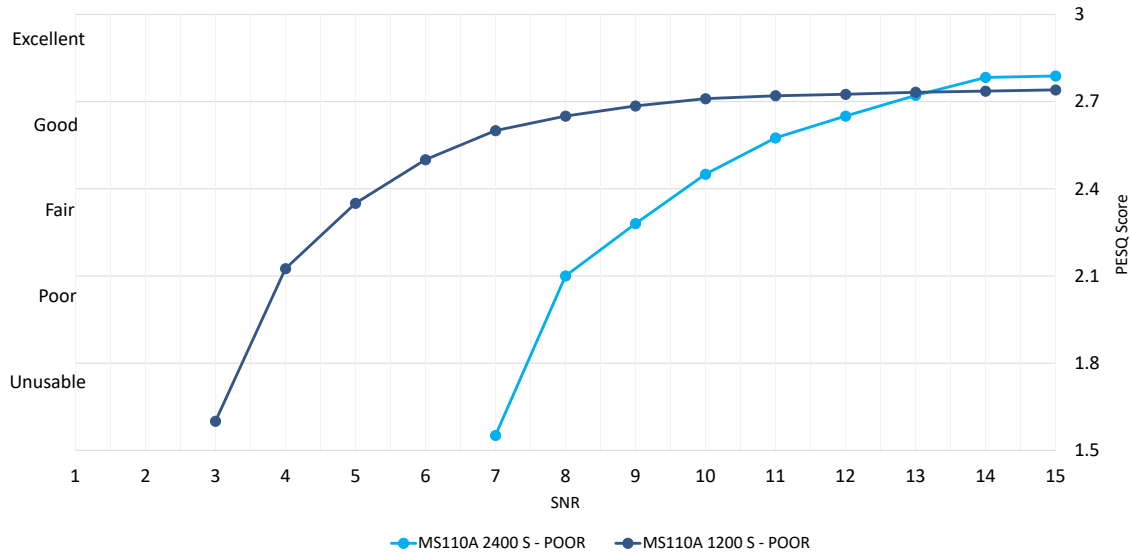
Voice Coder Performance

The table and figure below provide a summary of the RC12's voice coder performance using the MIL-STD-188-110A data modem for 2400 & 1200 bps and SHORT interleaver for AWGN & CCIR Poor (CCIR-P) Channels.

The table also indicates the end-to-end latency (for SHORT interleaver), the Perceptual Evaluation Of Speech Quality (PESQ) metric, channel use, speech quality and understandability limit (in SNR) for the two voice coder rates.

MELPe Digital Voice Performance								
Voice Coder Rate (bps)	End-to-End Latency (s)	PESQ	Channel Use	Speech Quality			Understandability Limit SNR (dB)	
				Intelligibility	Speaker Recognition	Latency and Emotional	CCIR Poor	AWGN
2400	2.1	2.8	Ground/Surface Wave	Very Good	Good	Acceptable	9.5	3.5
1200	2.5	2.7	Skywave	Good	Acceptable	Fair	5.2	1.0

MELPe 2400 bps/MS110A 2400 SHORT vs MELPe 2400 bps/MS110A 2400 SHORT CCIR Poor Channel



RC12 Ordering Information (STANAG 4591 Focus)

RC12 Ordering Information	Stock Number	Description
RC12 Hardware, S5066 ARQ & IP Controller (CD)	RME-C2-RA-CDV06	SDC: RC12 CD (5066WB ARQ IP 240kbps) V06
Software Option: S4591 MELPe Voice Coder (CN)	C12-SW-O-CN-V06	SW MDL-CN (DV MELPe 1200, 2400bps) V06

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