

SRT Marine Systems plc

Raymarine AIS700 Transceiver Operating Description

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1. Introduction

This document describes the operation of the Raymarine AIS700 Transceiver.

The product numbers are:

- Raymarine AIS700 Transceiver – 428-0004B

2. Summary

The Raymarine AIS700 Transceiver is a combined 5W SOTDMA Class B AIS Transceiver / Splitter. It is compliant to ITU-R M.1371-5 and IEC 62287-2 Edition 2.

The Raymarine AIS700 Transceiver contains a module (called Mercury PCA) inside a PC/ABS enclosure. The module itself performs all functionality and all its serial, power, RF, and GPS connections are routed directly to the outside of the casing.

The operation of the Raymarine AIS700 Transceiver can be split into functional blocks as follows:

- Tx to Rx Channel A and Channel B Switching
- VHF Receivers
- GNSS receiver
- VHF Transmitters
- Base band / signal processing
- Serial ports
- Power supply
- Splitter

Note that the operational requirements for the unit are defined in IEC62287-2



Figure 1 – AIS700 Product

3. Connections



Figure 2: Iris Front connections



Figure 3: Raymarine AIS700 Transceiver Back connections

4. Block Diagram

The block diagram below, illustrates the main system and electronic components of Raymarine AIS700 Transceiver product.

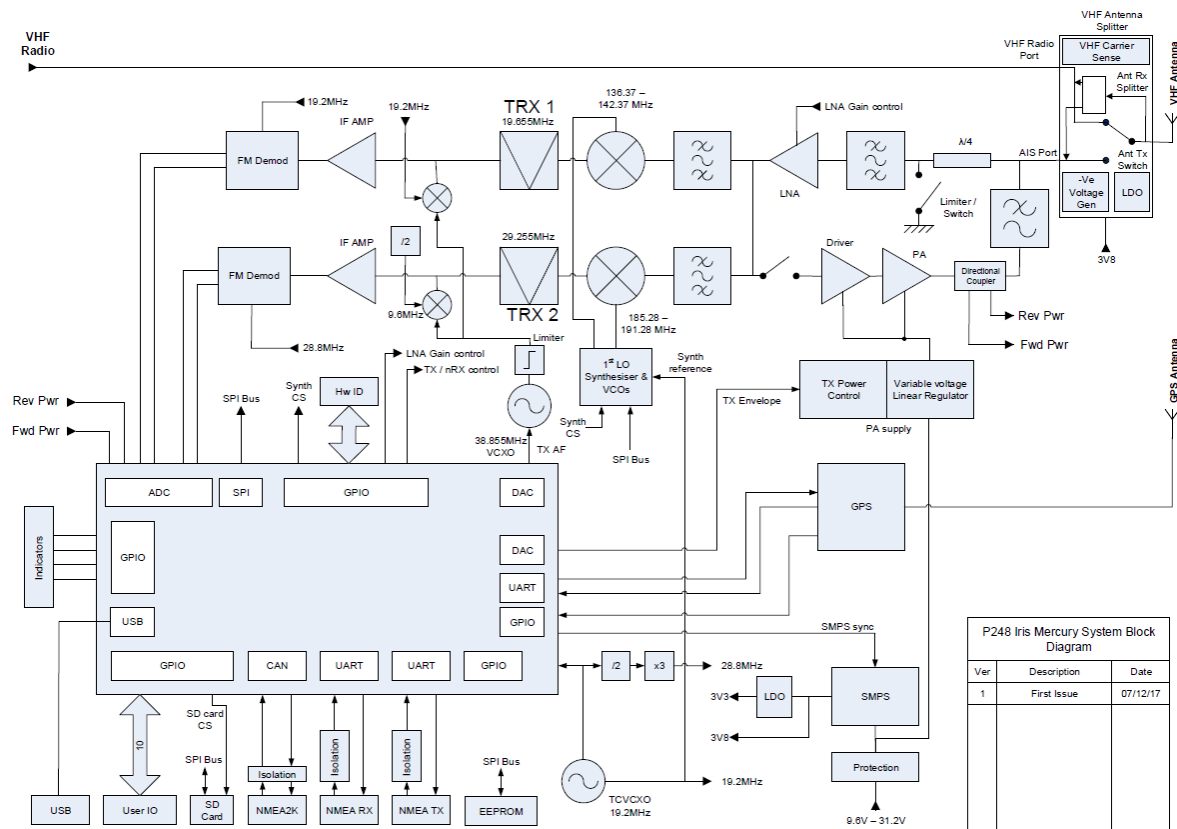


Figure 4: Raymarine AIS700 Transceiver Block diagram

5. SUBSYSTEMS

5.1 Tx to Rx Channel A and Channel B Switching

A common VHF antenna is used for both AIS transceiver chains. The transceiver chains A & B are nominally tuned to receive on AIS A and AIS B (169.975MHz and 162.025MHz), the RF switch allows the amplification and transmission of an AIS encoded signal on the Transceiver Chain A or B for the correct calculated timeslot, then return to receive mode for the beginning of the next timeslot.

5.2 VHF Receivers

VHF Receiver 1 and VHF Receiver 2 cover the marine VHF band from 156.025MHz to 162.025MHz. The audio input is demodulated and used by the baseband.

To allow simultaneous reception on two different marine band VHF channels each receiver uses a different intermediate frequency. The receivers are configured as shown in the table below.

Receiver	Intermediate frequency
1	19.2 MHz
2	28.8 MHz

5.3 GNSS Receiver

The GNSS receiver is a 72 channel MAX-M8W module manufactured by u-blox. The module is configured to operate with an external GNSS antenna incorporating a low noise amplifier. A 5V DC bias to power the antenna LNA is provided at the GNSS antenna connector centre pin.

The GNSS receiver provides position information and timing information for use by the base band subsystems.

5.4 VHF Transmitter

The transmitters directly synthesise modulated signal at the required output frequency from digital data provided by the baseband processor. The synthesiser generates RF output in the frequency band 156.025MHz to 162.025MHz.

The audio output of the baseband while transmitting is modulated into VHF GMSK signals.

Forward and reverse power measurement are made by the baseband / signal processor. Power measurement is used to actively control the output power amplification in the switcher during transmission. The RF output power of the unit is 37dBm as required by IEC62287-2.

5.5 Baseband / signal Processing

The base band subsystem consists of a microprocessor and associated volatile and non-volatile memory.

All RF modulation and demodulation functions, all layers of AIS protocol, serial communications, DSC demodulation and internal data interface and signal controls are carried out by software implemented on the microprocessor.

5.6 Power supply

The power supply runs from either nominal 12VDC or 24VDC, while rated between the ranges of 9.6VDC to 31.2VDC, generating low voltage DC supplies for internal subsystems.

5.7 Serial ports

Five serial ports are provided. All relevant AIS related data is output according to sentences defined by the NMEA 0183 specification. Control and configuration messages can be sent to the unit via the USB serial port.

Serial port 1 operates at 38.4k Baud using NMEA 0183 levels. The receiver is optically isolated from the internal power supplies.

Serial port 2 operates at 4.8k Baud using NMEA 0183 levels. The receiver is optically isolated from the internal power supplies.

Serial port 3 operates at 38.4kBaud using USB levels and used for configuring the unit. The receiver is optically isolated from the internal power supplies.

Serial port 4 is unused on this product.

A proprietary NMEA2000 interface is also provided.

5.8 Splitter

Raymarine AIS700 Transceiver includes a loop-through coaxial socket for connecting a separate VHF radiotelephone to the same VHF antenna. This feature avoids the problem of installing two VHF antennas in close proximity to each other.