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Monolithic Crystal Filters — Product Overview & Applications

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Introduction: What is a Crystal Filter?

- **Definition:** A **crystal filter** is a **high-selectivity frequency filter** built using **quartz resonators** to pass a narrow band of signals and reject unwanted signals nearby

- **What it does :**
  - **Passes the desired channel** (the wanted signal band)
  - **Rejects adjacent interference** and noise near the channel
  - Improves **receiver selectivity** and overall signal quality

- **When to choose a crystal filter (often vs. SAW):**
  - **Very narrow bandwidth and sharp selectivity** close to the channel are needed
  - **Frequency stability** over temperature and aging is needed
  - **Strong adjacent-signal rejection** is needed in a channel/IF filtering stage

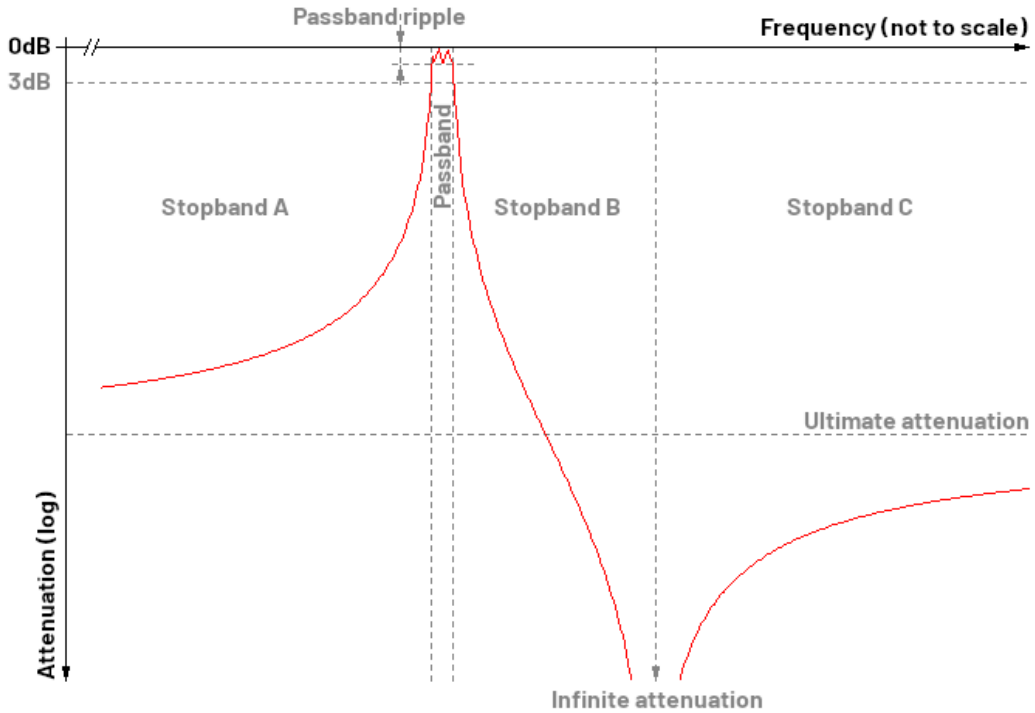
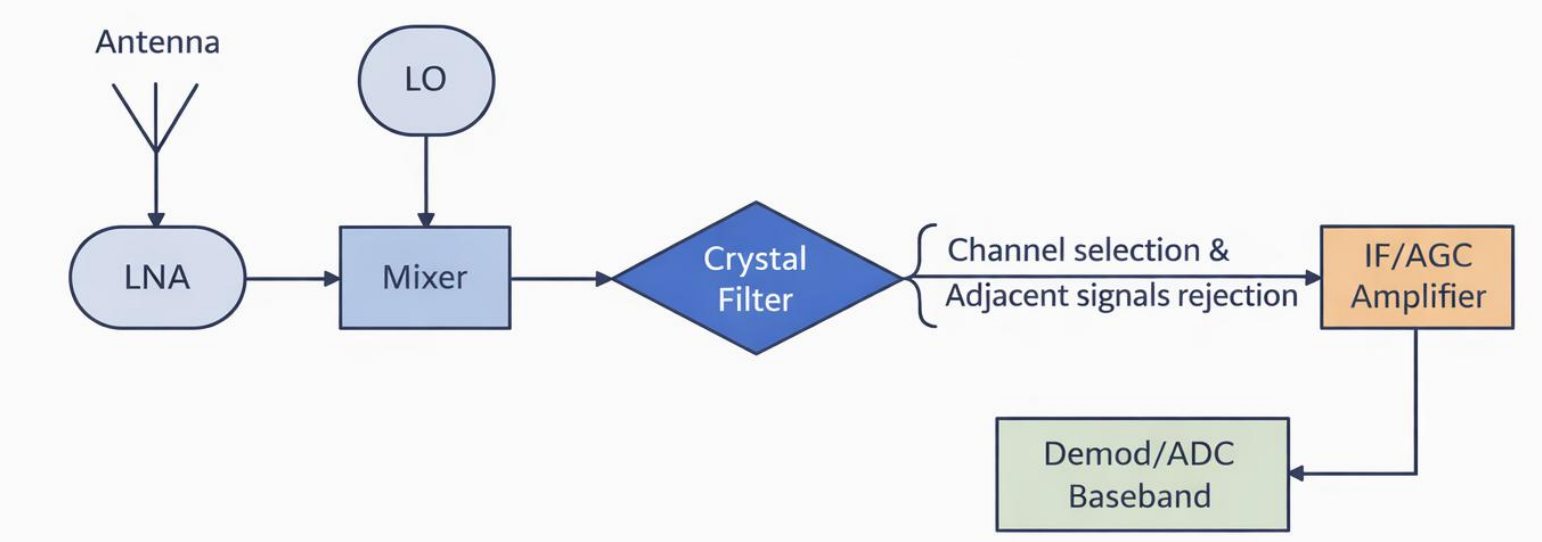


Figure 1: Typical crystal filter band-pass response — relative amplitude (or insertion loss) vs. frequency, showing a **narrow passband** at the center frequency with **steep skirts** that reject adjacent-channel interference.

Source: Narrow band-pass crystal ladder filters

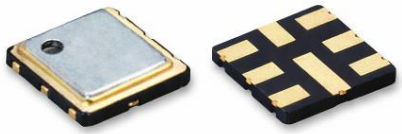
Where Crystal Filters Fit in RF Systems

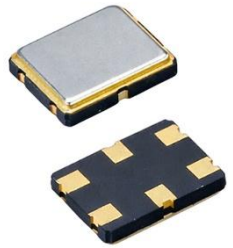
Crystal filters are typically used in the **receiver signal chain** to provide **channel selectivity:**



- After frequency conversion, the filter defines the wanted channel bandwidth
- Improves adjacent-channel rejection and reduces interference entering later stages
- Helps protect IF/ADC/baseband stages from strong nearby signals

Monolithic Crystal Filters Portfolio Overview





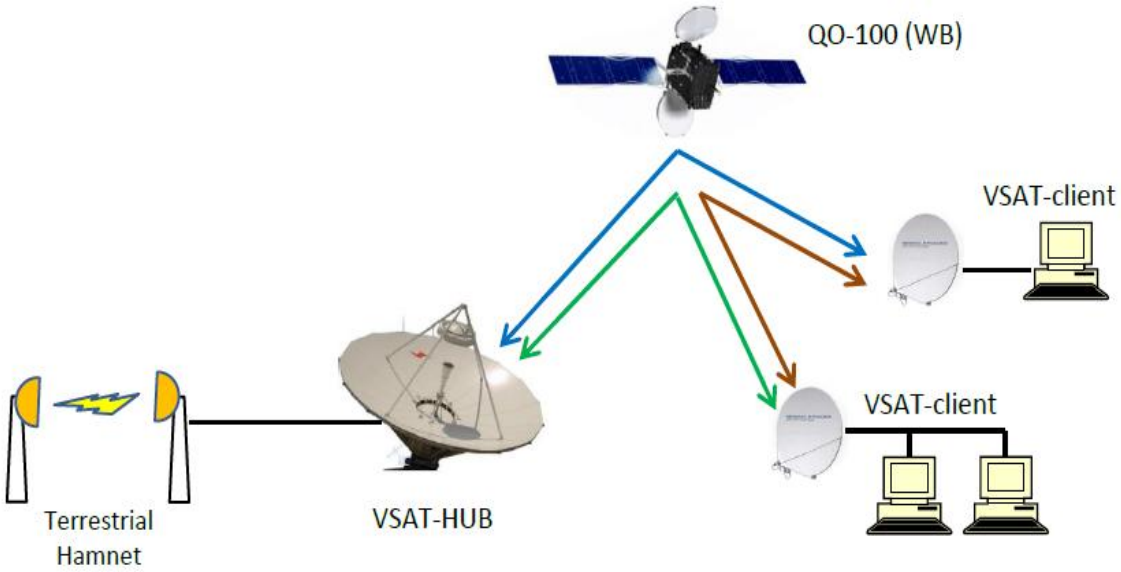
- **Frequency range :** 20.000 to 162.025 MHz
- **Package sizes:**
  - 3.0 × 3.0 mm
  - 3.8 × 3.8 mm
  - 6.0 × 3.5 mm
  - 7.0 × 5.0 mm
- **Poles:** 2 - 4 poles
- **Guaranteed attenuation:** ≥45 dB to ≥85 dB
- **3 dB BW options:** 3.5–30 kHz (common: 7.5/10/12/15/20 kHz)
- **Insertion Loss (max):** 2.0–8.5 dB depending on frequency

Applications

Satellite Communications (VSAT, LEO), Maritime AIS, Public Safety / Professional Radio (P25, DMR), Patient Monitoring

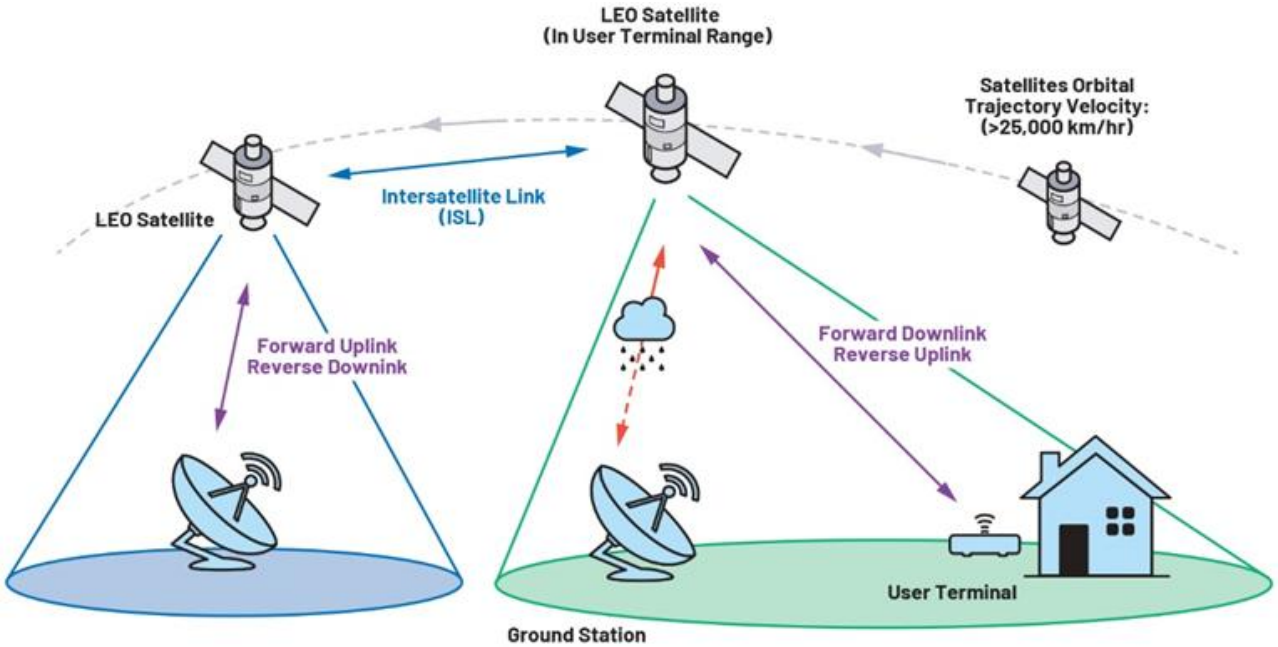
Satellite Communications (VSAT & LEO)

VSAT:
Fixed satellite terminals for broadband connectivity (ground dish terminals)



Source: NPR-VSAT

LEO:
Low-Earth orbit satellite terminals for global coverage and low latency services



Source: Low Latency LEO Satellite deployments

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Monolithic Crystal Filters Solutions for Satellite Communications

Part #	Size(mm)	Frequency (MHz)	Pass Band (kHz)	Insertion Loss (dB)	Guaranteed Attenuation (dB)	Application	Datasheet
RXF-50.000-3.5-3838-8-2	3.8 x 3.8	50.000	± 1.8	4.0	50	VSAT	PDF
RXF-100.000-20-6035-6-4	6.0 x 3.5	100.000	± 10	4.0	65	LEO	PDF
RXF-150.000-15-7050-6-2	7.0 x 5.0	150.000	± 7.5	4.0	45	LEO	PDF

Digital Mobile Radio (DMR)

Where Crystal Filters fit:

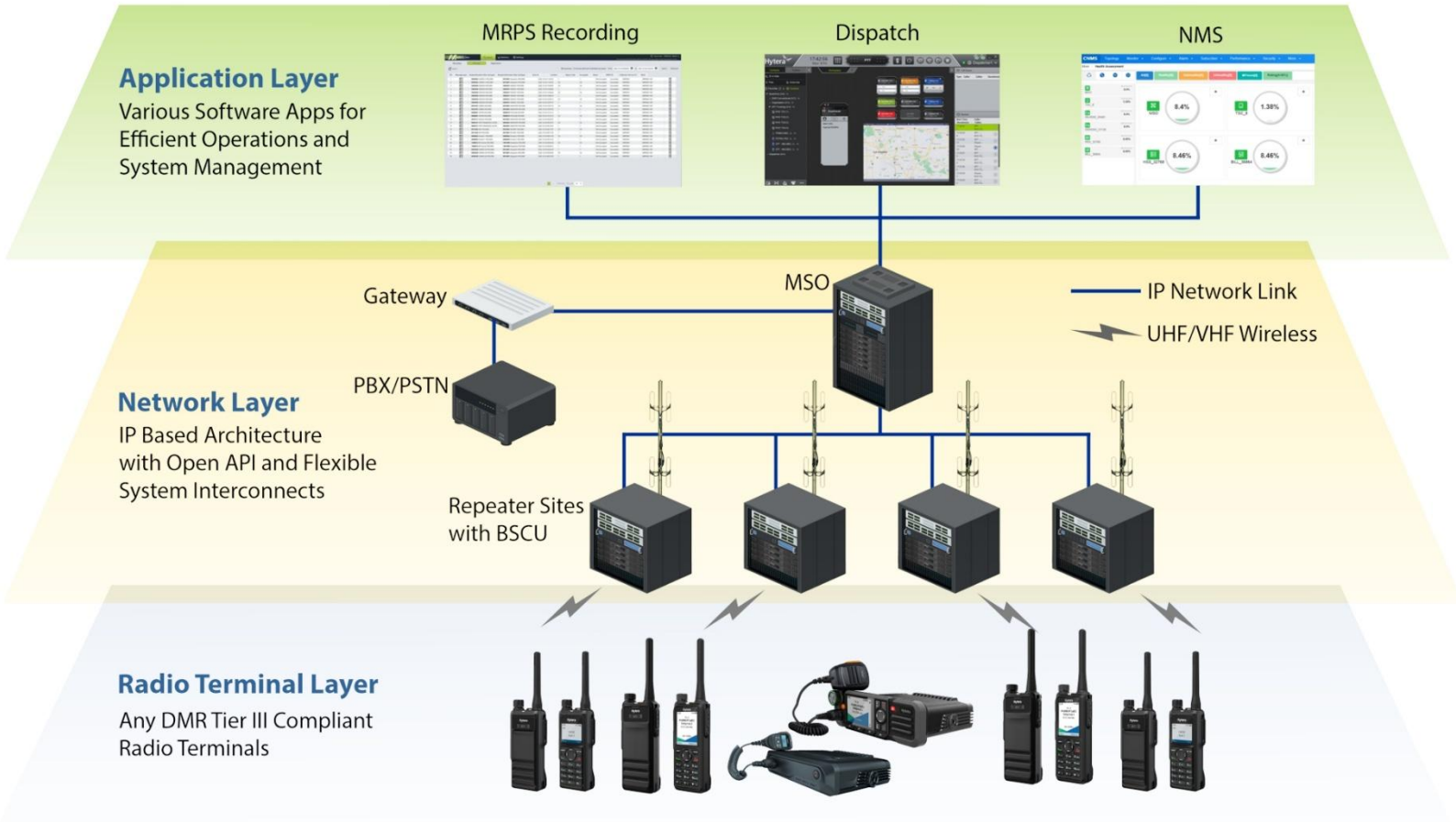
- Inside DMR receivers
- Provide narrow channel / IF select filtering

Common locations:

- Radio terminals (handheld/mobile)
- Repeater/base-station receivers

Selection based on:

- Customer's receiver frequency plan (IF)
- Required bandwidth / rejection



Source: DMR Tier III Trunking Systems | Hytera US

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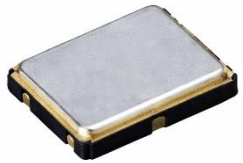
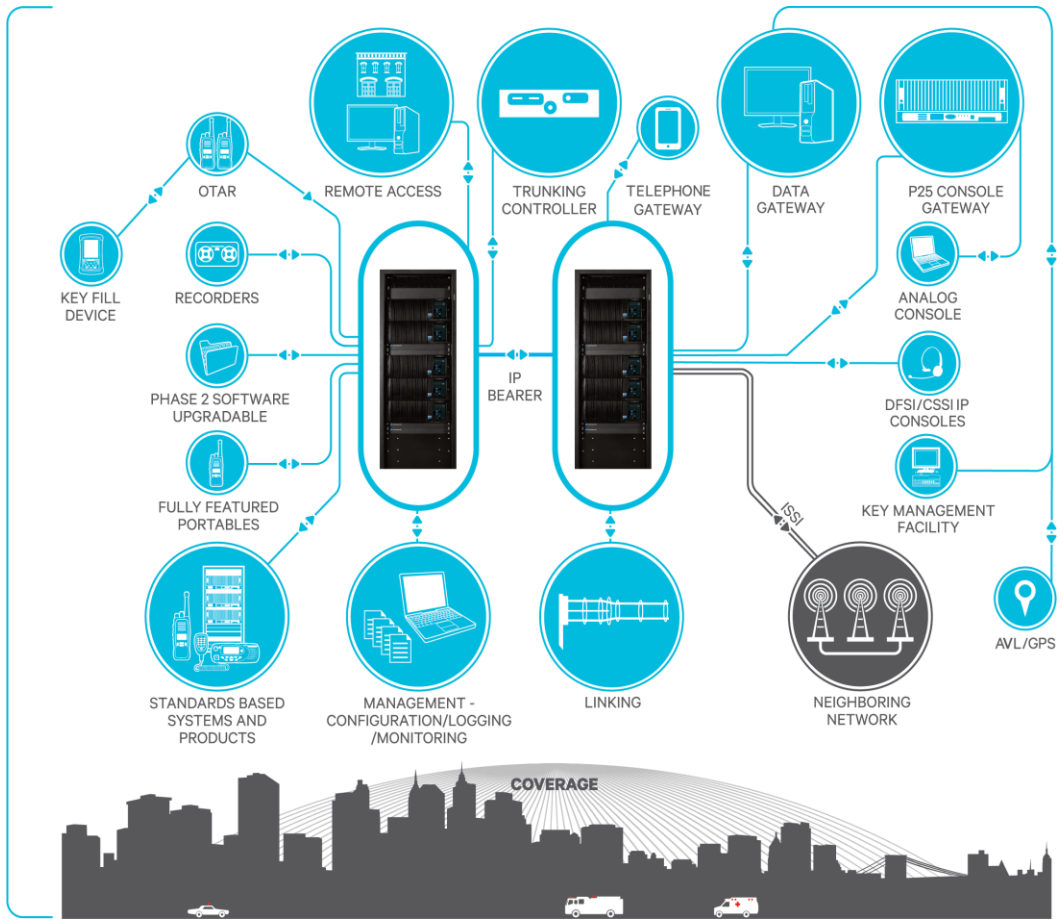
Monolithic Crystal Filters Solutions for Digital Mobile Radio (DMR)

Part #	Size(mm)	Frequency (MHz)	Pass Band (kHz)	Insertion Loss (dB)	Guaranteed Attenuation (dB)	Application	Datasheet
RXF-58.050-10-7050-6-4	7.0 x 5.0	58.050	± 5.0	5.0	85	DMR	PDF
RXF-73.350-12-7050-6-4	7.0 x 5.0	73.350	± 6.0	5.0	65	DMR	PDF



P25 Land Mobile Radio



Source: taitradioacademy.com/topic/p25-gateways-1/

Where Crystal Filters fit:

- Inside P25 receiver signal chains
- Provide narrow channel / IF select filtering for high selectivity

Common locations:

- Subscriber radios (portable / mobile)
- Base station / repeater receivers (conventional & trunked sites)

Selection based on:

- Customer's receiver frequency plan (IF)
- Required bandwidth / rejection
- Acceptable insertion loss and package/size constraints

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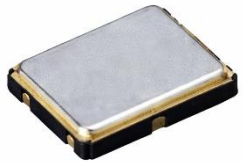
Monolithic Crystal Filter Solutions for P25 Land Mobile

Part #	Size(mm)	Frequency (MHz)	Pass Band (kHz)	Insertion Loss (dB)	Guaranteed Attenuation (dB)	Application	Datasheet
RXF-130.000-30-7050-6-4	7.0 x 5.0	130.000	± 15.0	6.0	70	P25 Land Mobile	PDF
RXF-130.050-15-7050-6-4	7.0 x 5.0	130.050	± 7.5	7.0	80	P25 Land Mobile	PDF



Maritime Automatic Identification System (AIS)

Where Crystal Filters fit:

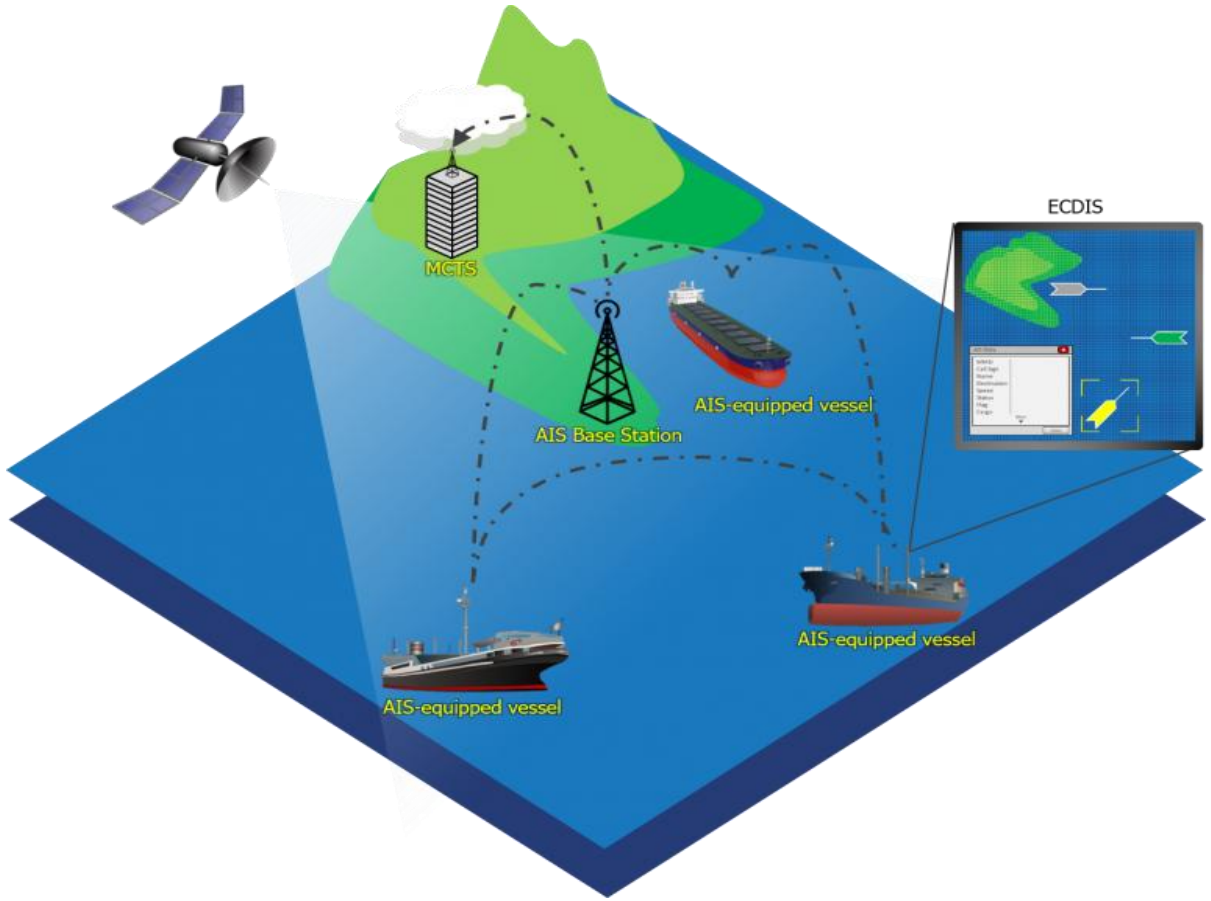
- Inside AIS receiver signal chains
- Provide narrow channel / IF select filtering for high selectivity

Common locations:

- AIS transceivers on vessels
- AIS base stations / shore stations and coastal monitoring equipment
- AIS receivers integrated into marine navigation / tracking systems

Selection based on:

- Customer's receiver frequency plan (IF)
- Required bandwidth / rejection



Source: Automatic Identification System (AIS) on the Ships – Maritime Education

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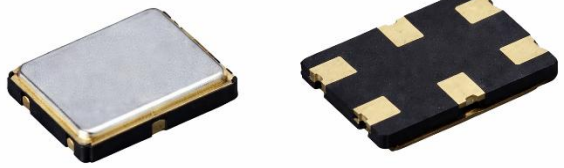
Monolithic Crystal Filter Solutions for Maritime AIS

Part #	Size(mm)	Frequency (MHz)	Pass Band (kHz)	Insertion Loss (dB)	Guaranteed Attenuation (dB)	Application	Datasheet
RXF-161.975-12-7050-6-4	7.0 x 5.0	161.975	± 6.0	8.5	70	Maritime AIS	PDF
RXF-162.025-12-7050-6-4	7.0 x 5.0	162.025	± 6.0	8.5	70	Maritime AIS	PDF

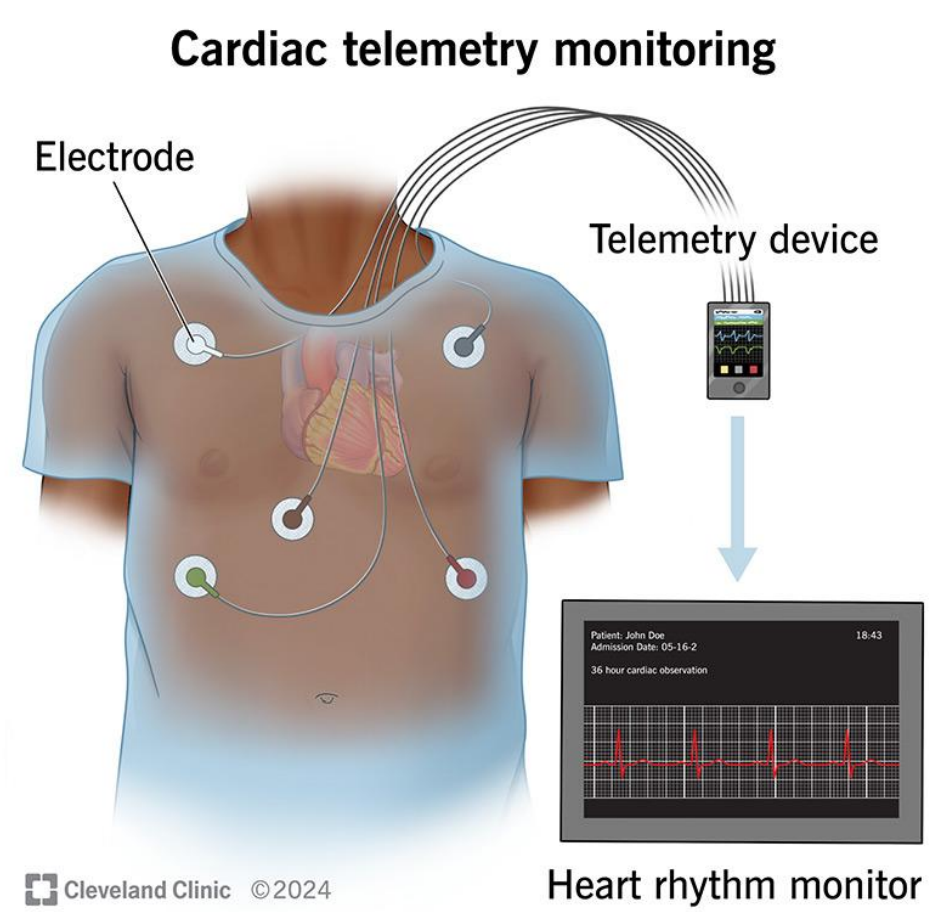


RoHS

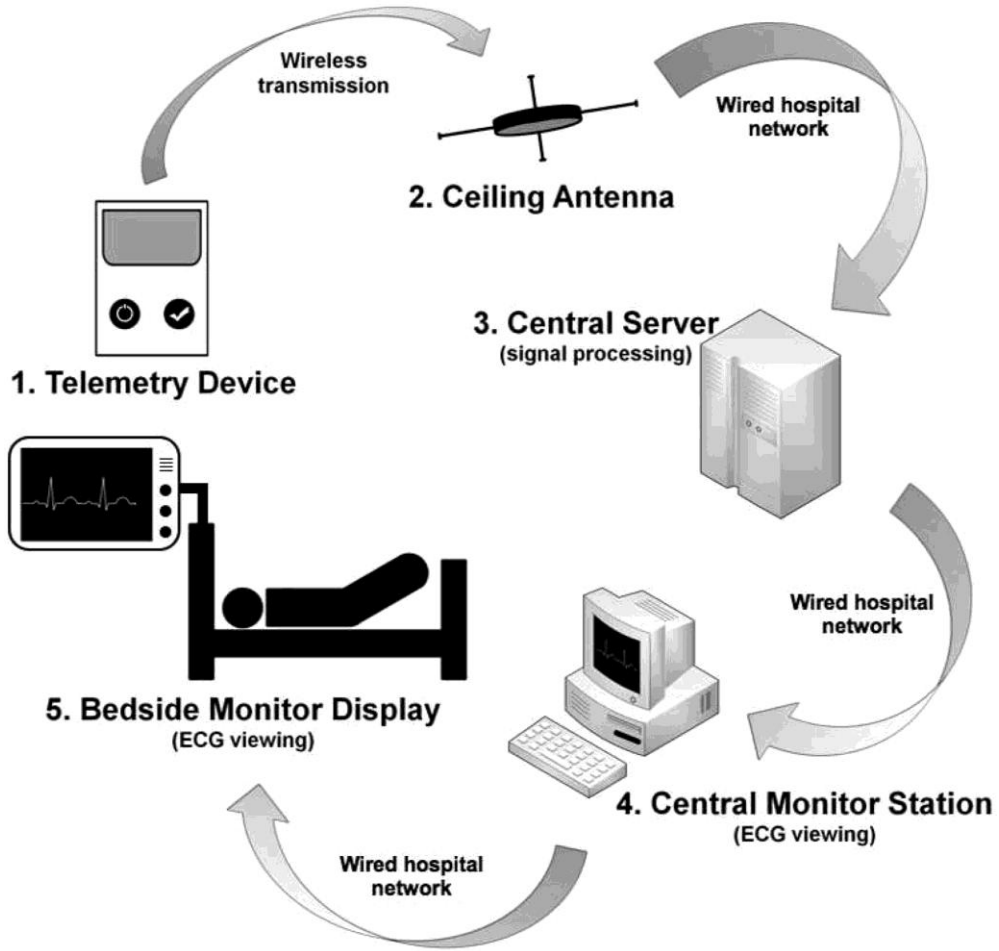
REACH COMPLIANT

RESPONSIBLE MINERALS INITIATIVE

Patient Monitoring - Wireless Telemetry



Source: What Is Cardiac Telemetry Monitoring?



Source: Latency of ECG Displays of Hospital Telemetry Systems | Circulation

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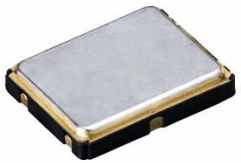
Monolithic Crystal Filter Solutions for Patient Monitoring

Part #	Size(mm)	Frequency (MHz)	Pass Band (kHz)	Insertion Loss (dB)	Guaranteed Attenuation (dB)	Application	Datasheet
RXF-135.900-15-7050-6-4	7.0 x 5.0	135.900	± 7.5	7.0	80	Patient Monitoring	PDF



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