

The Murata logo consists of the word "murata" in a white, italicized, serif font, set against a solid red rectangular background.

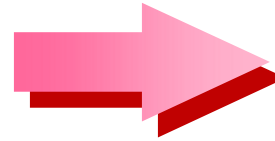
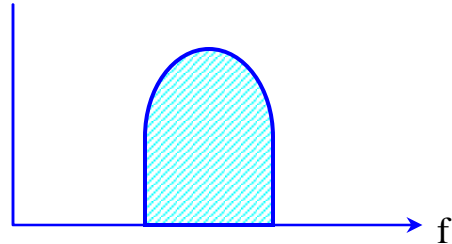
*murata*

*Innovator in Electronics*

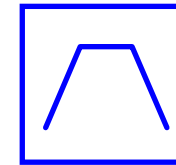
**TTI RF Products Webinar  
SAW Devices for  
GPS, RKE and RFID**

# Filter Response Types

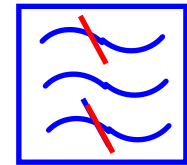
## ■ BPF (Bass Pass Filter)



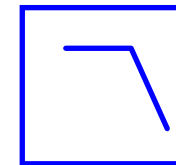
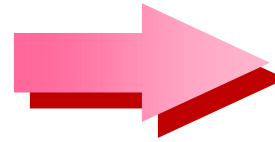
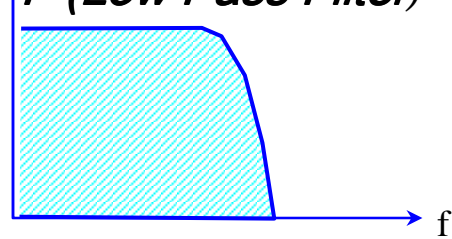
## Functional Representation



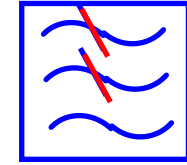
OR



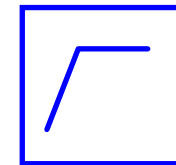
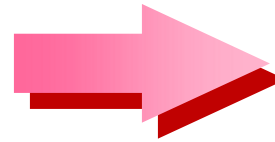
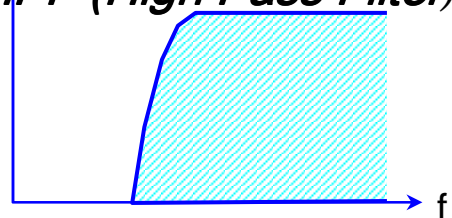
## ■ LPF (Low Pass Filter)



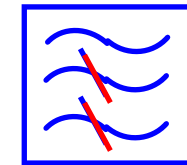
OR



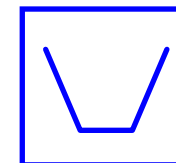
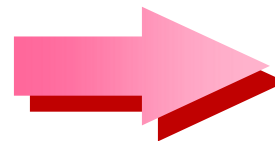
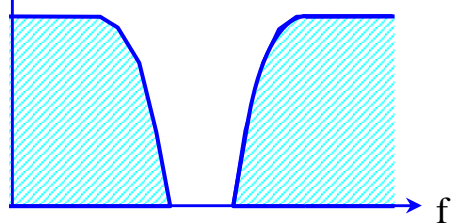
## ■ HPF (High Pass Filter)



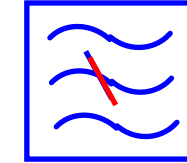
OR



## ■ BEF (Band Elimination Filter)



OR



# Various Ceramic Filter Technologies



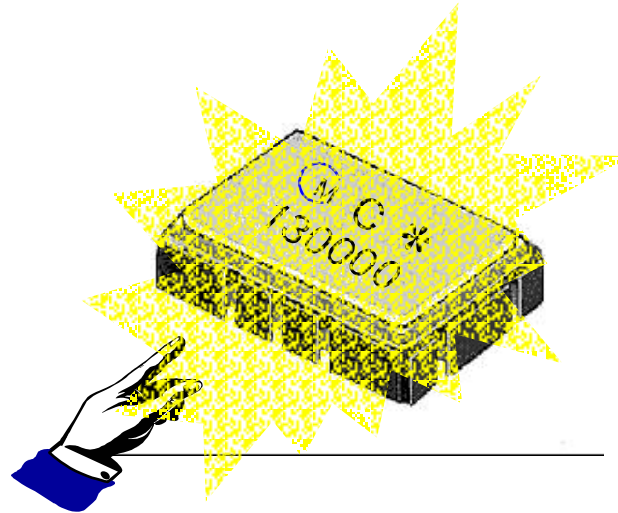
## DIELECTRIC FILTER

Temperature Stable  
Very Low Insertion Loss  
300 MHz – 6 GHz



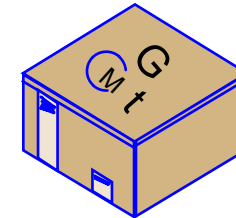
## LC FILTER

Low Price  
Small Size  
150 MHz – 6 GHz



## SAW FILTER

Highly Selective  
Temperature Stable  
Small Size  
30 MHz – 3 GHz



## CERAMIC FILTER

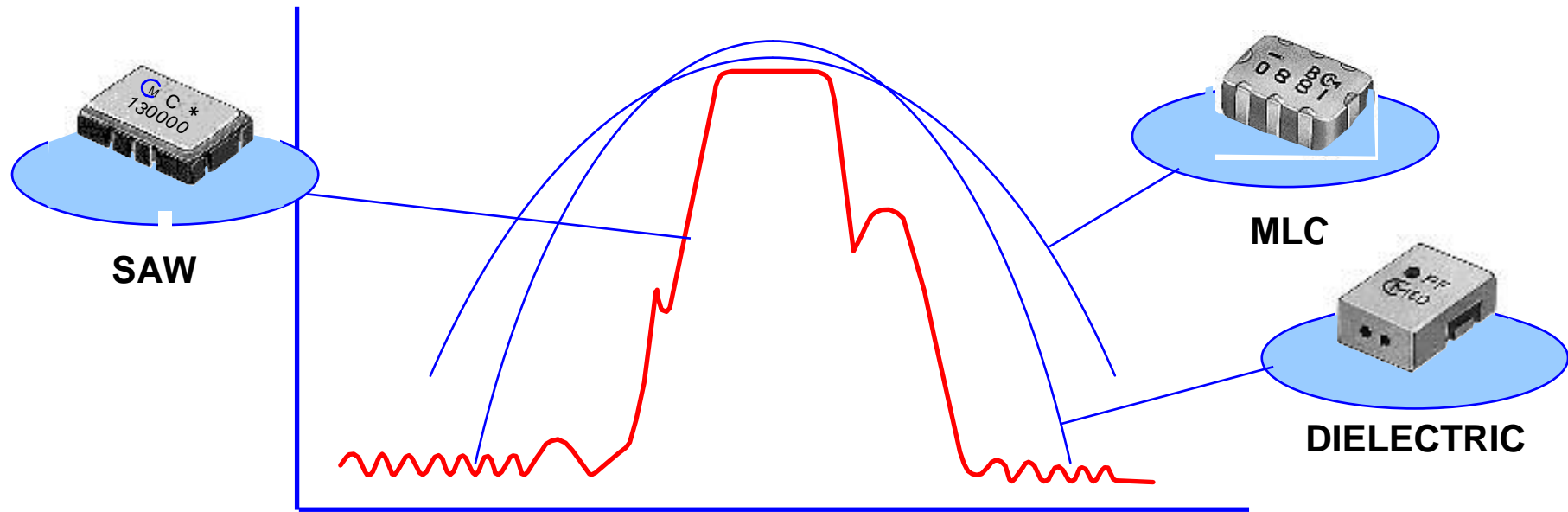
Adjustment-Free  
Moderate Cost  
Small Size  
10 kHz – 30 MHz



## CRYSTAL FILTER

Highly Temperature Stable  
Highly Selective  
10 kHz – 200 MHz

# Filter Technology Comparison



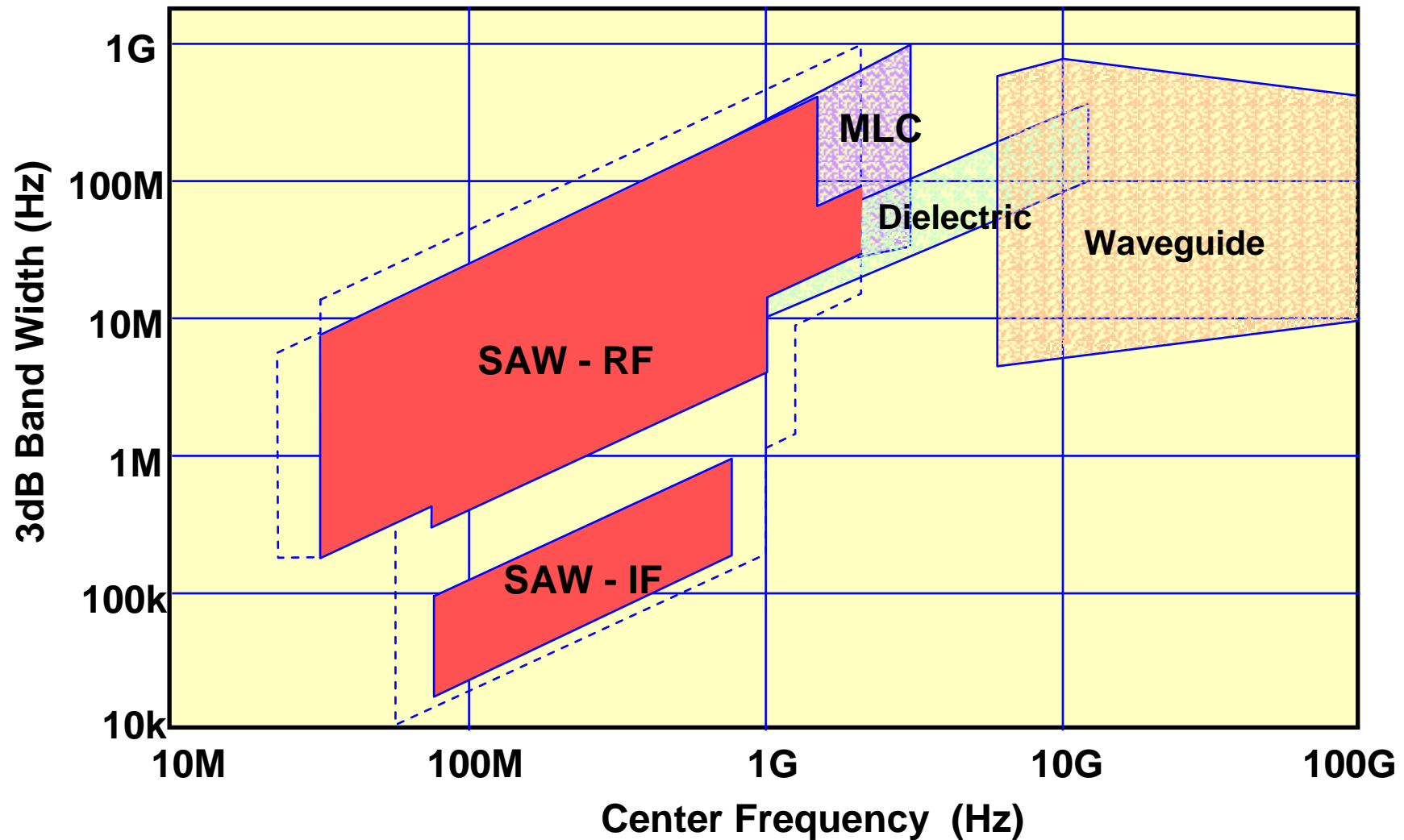
## SAW Filter Features

- Small Size**
- Excellent Selectivity**
- High Stop-Band Rejection**

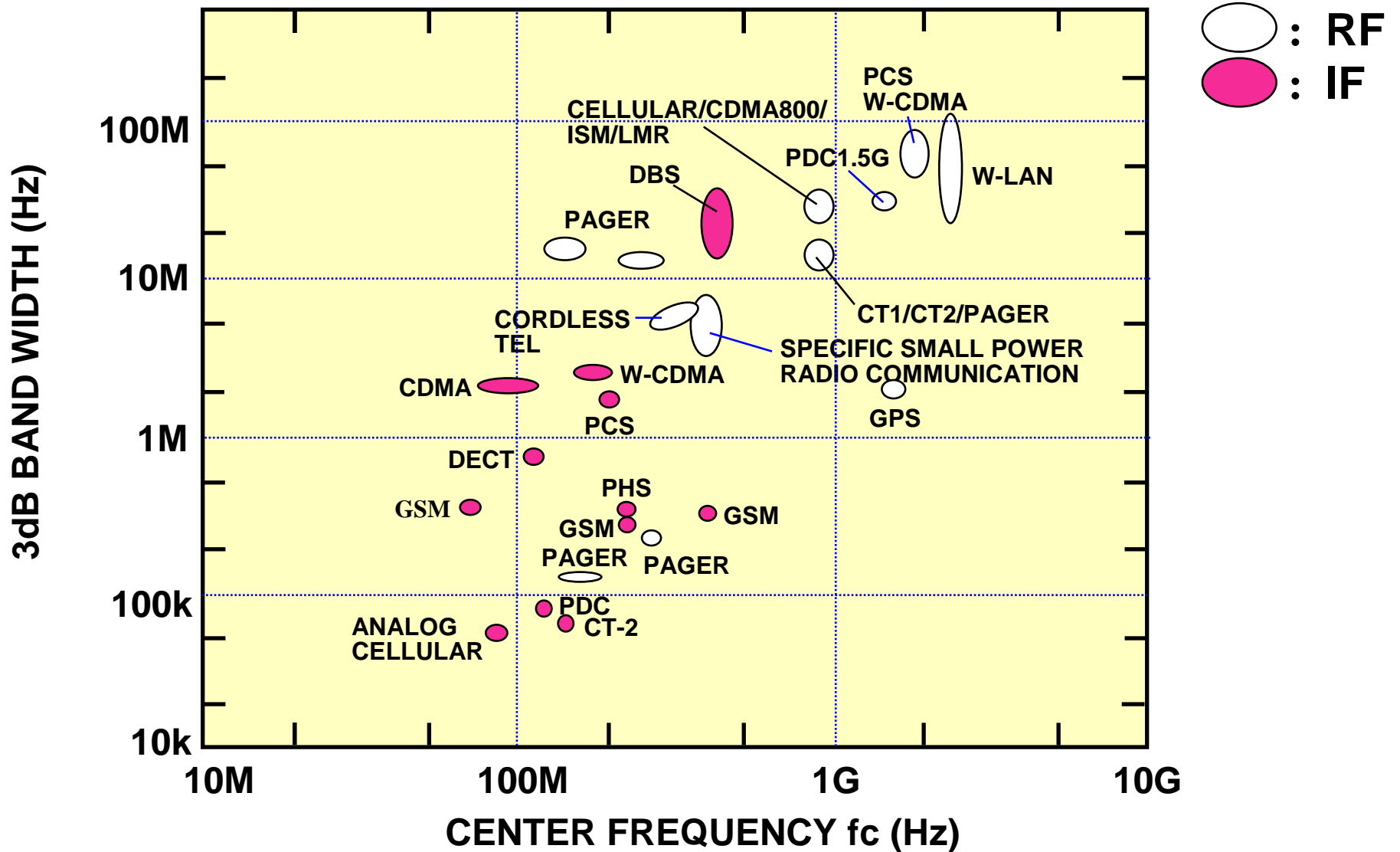
	SAW	DIEL	MLC
I.L.	○	⊙	○
Atten	⊙	△	×
Size	⊙	×	⊙

⊙ : Excellent, ○ : Good, △ : Average, × : Not so good

# FILTER TECHNOLOGY SELECTION GUIDE

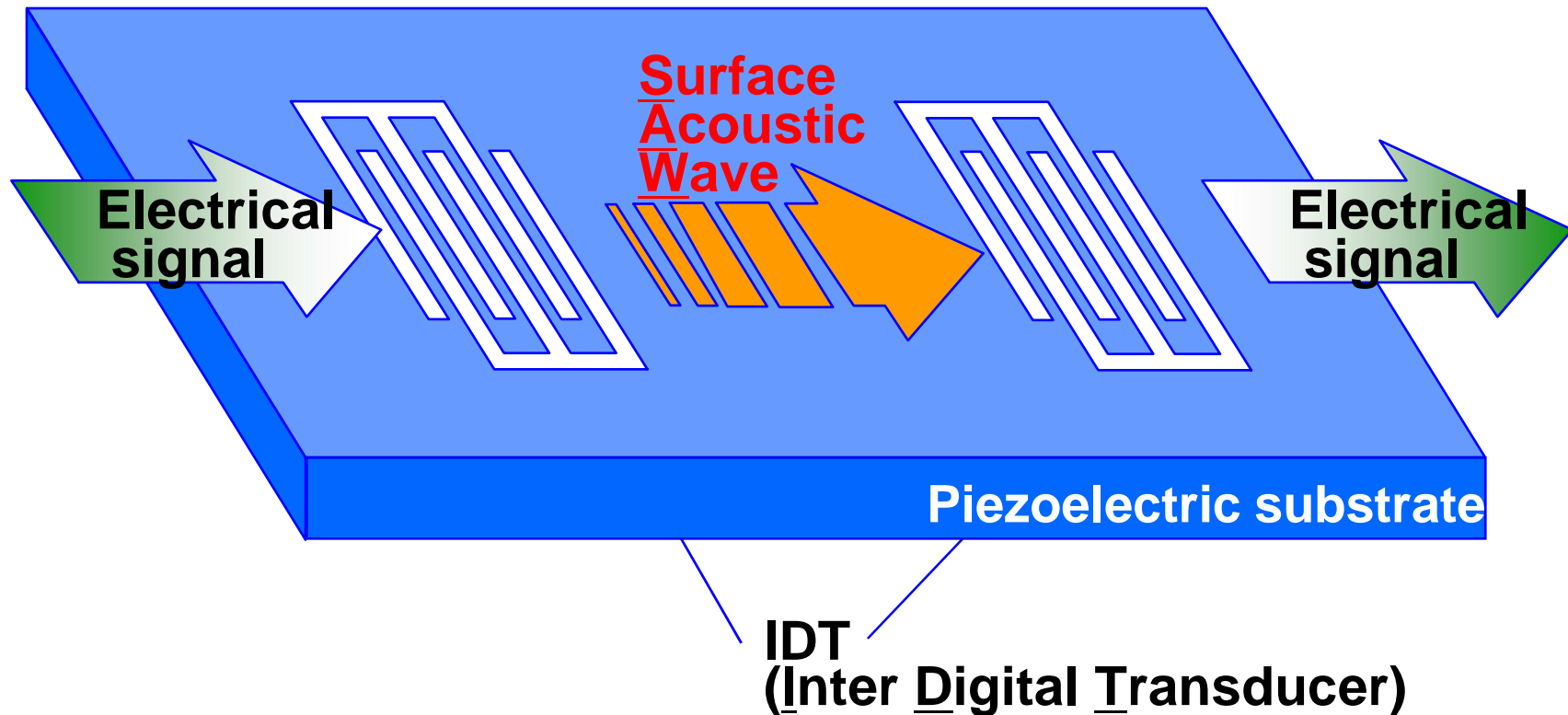


# SAW Filter Application Map



# SAW Filter Operating Principle

Electrical propagation → Propagation by mechanical vibration → Electrical propagation



# SAW Filter Target Applications & Markets



## 1.57GHz

- **GPS/E-911**

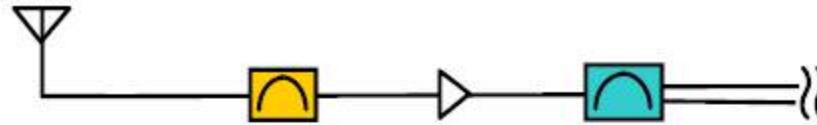
## 315 and 433.92MHz

- **RKE**
- **TPMS**
- **Security**

## ISM915

- **RFID**
- **Automated Meter Reading,**
- **Wireless Data Radios**

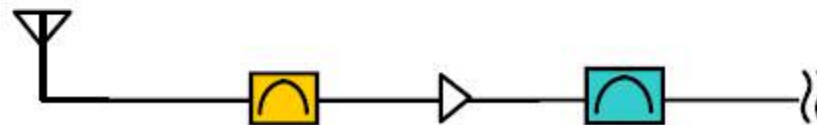
# SAW Filters for GPS



**2520 Package**

**Mass-Production**

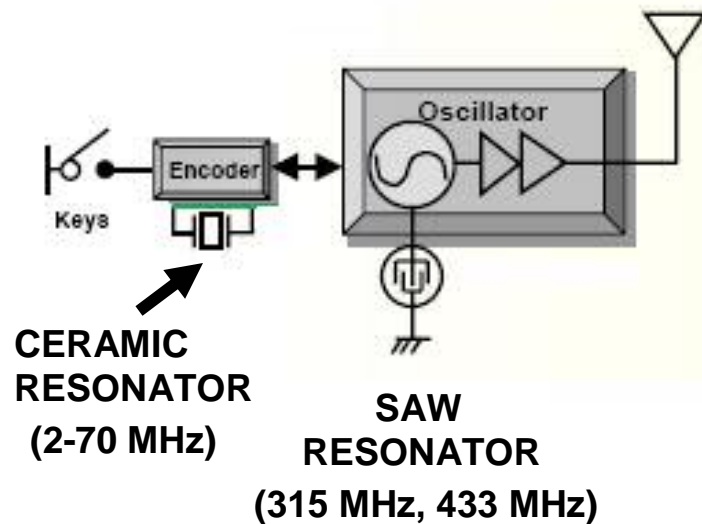
**Samples Available**



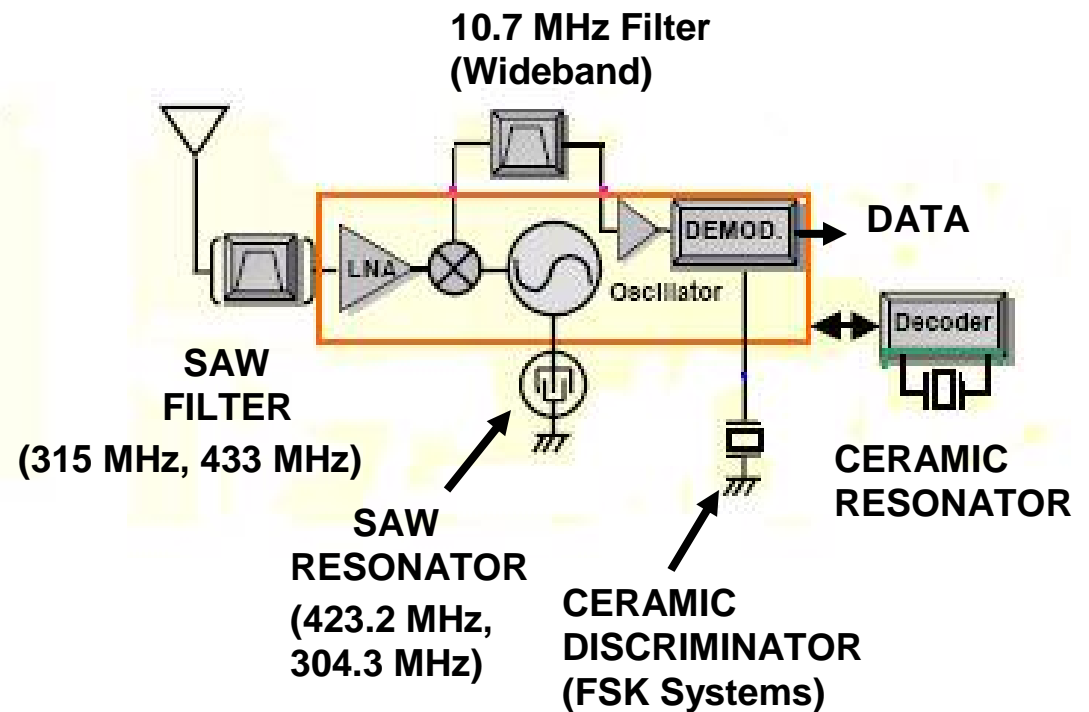
	murata P/N	Imp
Standard	SAFSE1G57KA0T05	50ohm UnBalance
for Automotive	SAFSE1G57KA0T09	50ohm UnBalance
High Attenuation	SAFSE1G57KC0T00	50ohm UnBalance
100ohm Balance	SAFSD1G57FA0T00	50//100ohm Balance

# SAW & Other PZT Devices in RKE

## TRANSMITTER



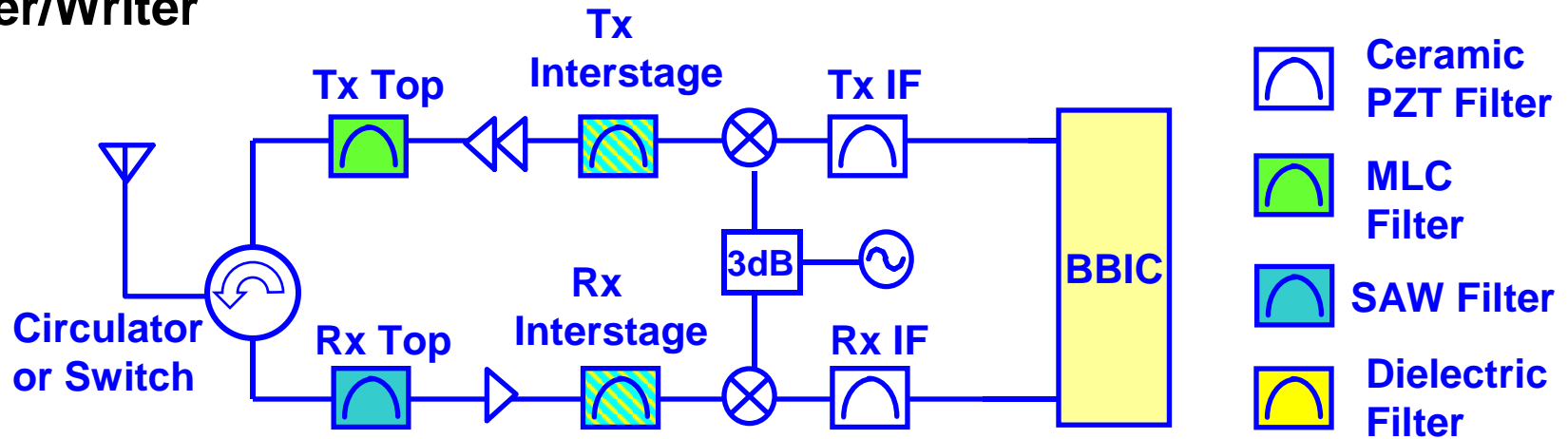
## RECEIVER



# RFID Application Example for 915 MHz



## Reader/Writer



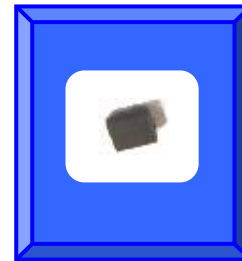
### Tx/Rx Interstage Filter



P/N : SAFCH915MAL0N00  
In Mass Production

Size : 3.8 x 3.8 x 1.5mm Max.

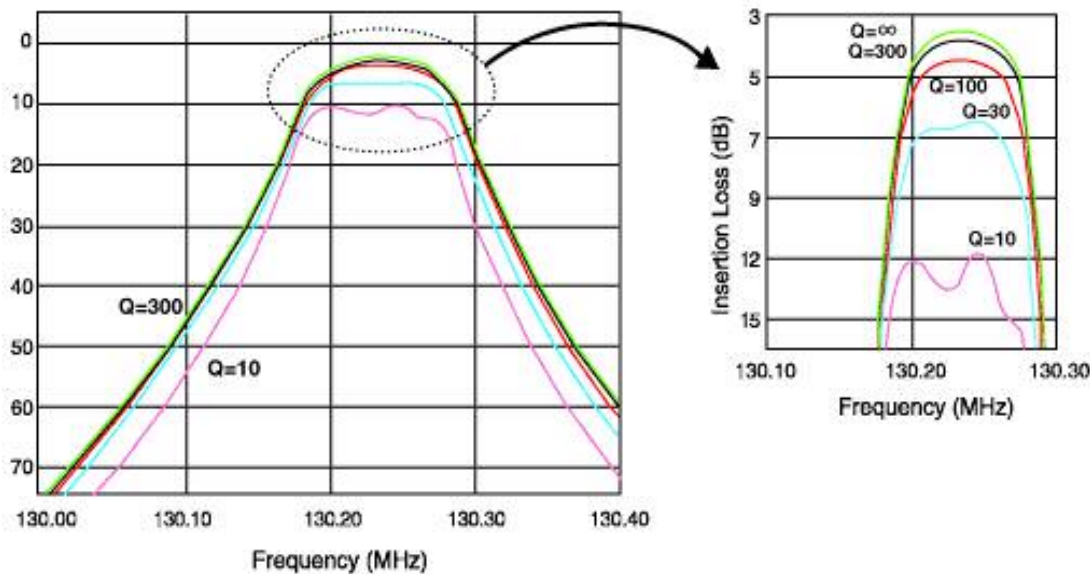
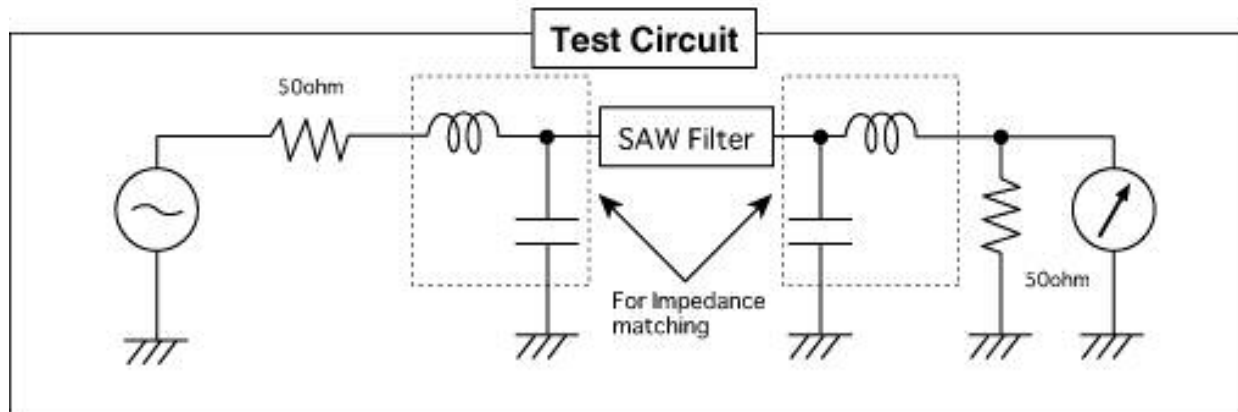
### Rx Top Filter



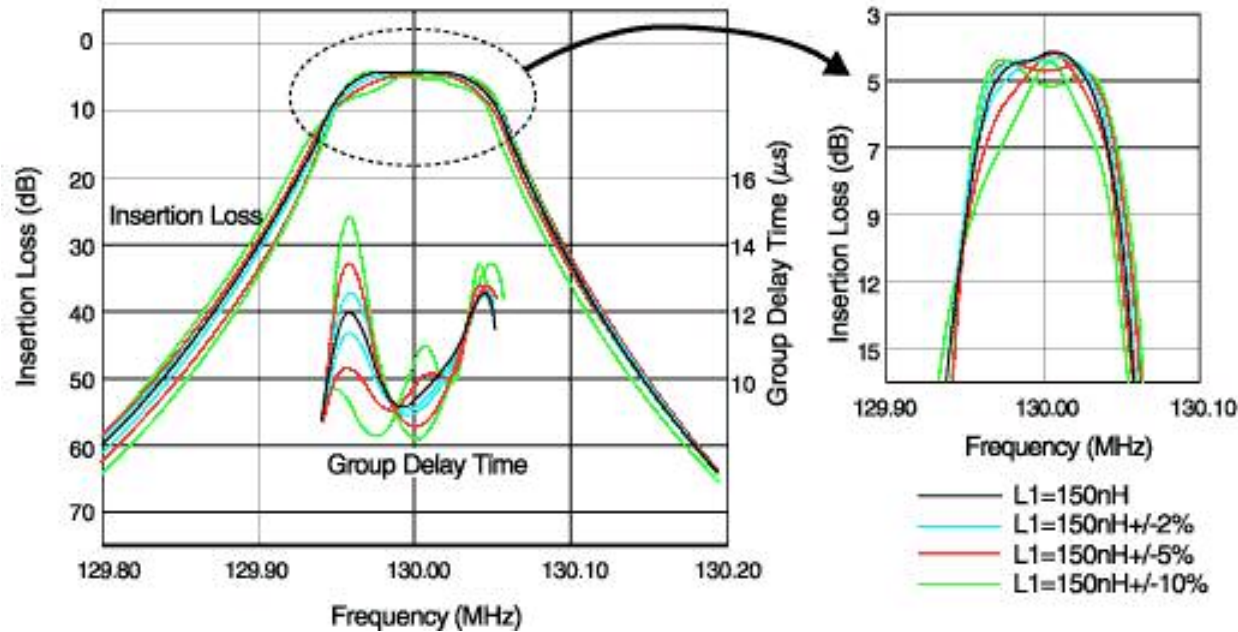
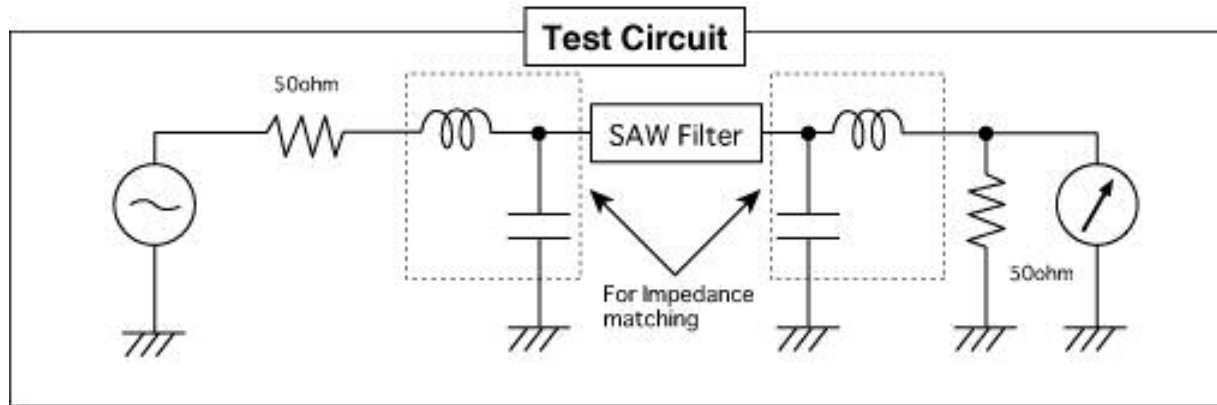
P/N : SAFEB915MAL0F00  
Under Development

Size : 1.35 x 1.05 x 0.6mm Max.

# Impedance Matching Considerations



# Impedance Matching Considerations



# Technology & Products Summary



- **Primary Technologies for Passive Electronic Filters:**
  - Dielectric (Cavity) Resonator**
  - Multi-Layer Ceramic**
  - Surface-Acoustic Wave (SAW)**
- **Modern Design and Manufacturing Processes Need:**
  - Miniaturization**
  - Functionality**
  - Mass-Production**
- **The “best” choice depends on many factors, but SAW Devices fulfill many fundamental requirements of today’s Designs and Products.**

# SAW Features & Benefits



- ✓ **Broad Product Offering serves Growing, Popular Markets**
- ✓ **Miniaturized Packages meet needs for Smaller, Lighter, Lower-Profile Products**
- ✓ **Superior Technical Performance provides Solutions for New Design Challenges.**
- ✓ **Competitive Pricing & Availability Supports Mass-Production Requirements.**

# How to Find What You Need



(1.) Go to [www.murata.com](http://www.murata.com)

(2.) Enter SAF\* to find all Surface Acoustic Wave filters.

The screenshot shows the Murata Electronics North America website. At the top left is the Murata logo and tagline 'Innovator in Electronics'. To its right is a 'Region' dropdown menu set to 'North America' and a 'Part Number Search' input field containing 'SAF' with a 'Search' button. Below the logo is a navigation bar with links for Home, Products, Search, Support, and About Us. A large banner image features a person's hand holding a circuit board, with the text 'Murata Electronics North America, Inc. Innovator in Electronics' overlaid. To the right of the banner is a sidebar with links for Contact Us, Sales, News, FAQs, Trade Shows, and ISO 9001:2000 certification. Below the banner is a main content area with four columns: Products, Search, Support, and Updates. The Products column lists various electronic components like capacitors, resistors, and filters. The Search column contains a 'PRODUCT Search Engine' section with a 'Part Number Search' input field containing 'SAF' and a 'Search' button, and a 'Check Distributor Stock' section with an empty input field and a 'Search' button. The Support column lists links for PDF catalogs, application guides, design tools, and technical articles. The Updates column features a 'Spherical Speaker Products' section with a small image. At the bottom of the page, there is a 'Privacy Statement and Copyright' link and a copyright notice for 2006 Murata Electronics North America, Inc.

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# How to Find What You Need



**(3.) To narrow your search, try wild cards**

**(a.) For a 915MHz SAW**

**Enter: SAF\*915M\***

**(b.) For all SAW products from 900MHz-999MHz**

**Enter: SAF\*9??M\***

**(c.) For GPS (1.57GHZ) SAW**

**Enter: SAF\*1G57\***

**(d.) For all SAW products from 100MHz-1999MHz**

**Enter: SAF\*1G??\***

**(e.) For SAW Resonators, Enter: SAR\***