# TMX IT03

## SAW Filter datasheet

1.4 x 1.1 mm, SMD

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Issue: Rev 6, 9 January 2023

# TMX IT03

SAW Bandpass Filters | Wireless Communications

## Features

Features

- 869 MHz center frequency
- Ceramic package for Surface Mounted Technology
- Low Loss: 2.9 dB typical value within PassBand Width 868 to 870 MHz
- Unbalanced to unbalanced operation
- No matching network required for operation at 50 Ω

Applications

- Remote control - RF
- Wireless applications:
  - Home appliances
  - Security systems

1.4 x 1.1 mm


## Maximum Ratings

| Parameter | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|
| Storage temperature range ($T_{stg}$) | -40 | | 85 | °C |
| Operating temperature range ($T_A$) | -40 | | 85 | °C |
| DC permissive voltage | | | 10 | V |
| Maximum Input Power Handling (at 25°C during 50,000 hours) | | | 20 | dBm |
| Maximum pulse input power | | | 24 | dBm |

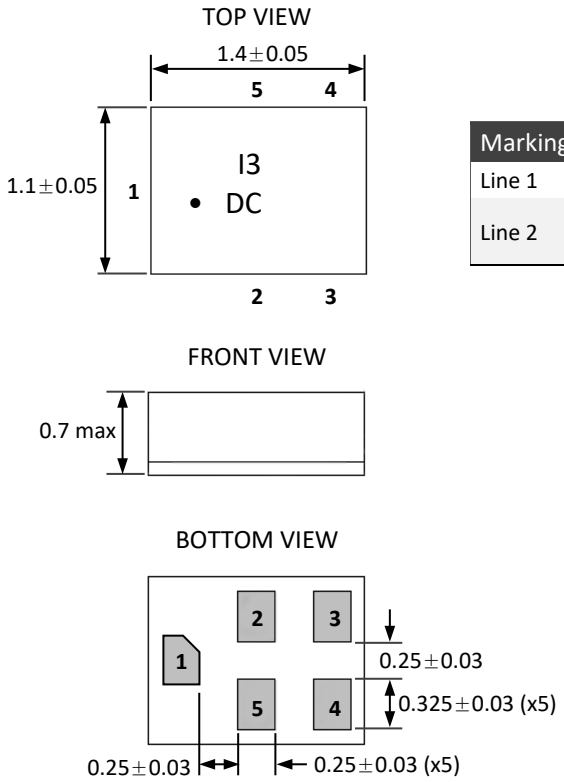
## Frequency and Electrical Characteristics (Reference temperature @ 25°C)

| Parameter | Min. | Typ.[1] | Max. | Unit |
|---|---|---|---|---|
| Center frequency (fc) | | 869.0 | | MHz |
| Bandwidth (BW, passband width) | | 2.00 | | MHz |
| Maximum Insertion Loss (IL, 868 – 870 MHz) | 2.4 | 2.9 | 3.2 | MHz |
| Amplitude Ripple (868 – 870 MHz) | | 0.5 | 1.0 | dB |
| Absolute Attenuation | | | | |
| From 0 to 791.00 MHz | 45 | 63 | | dB |
| From 791.00 to 835.00 MHz | 45 | 56 | | dB |
| From 835.00 to 847.00 MHz | 40 | 53 | | dB |
| From 847.00 to 862.00 MHz | 24 | 39 | | dB |
| From 880.00 to 883.00 MHz | 30 | 34 | | dB |
| From 883.00 to 915.00 MHz | 37 | 47 | | dB |
| From 915.00 to 1000.0 MHz | 50 | 62 | | dB |
| From 1000.0 to 3000.0 MHz | 30 | 37 | | dB |
| From 3000.0 to 4000.0 MHz | 24 | 28 | | dB |
| From 4000.0 to 5400.0 MHz | 20 | 23 | | dB |
| From 5400.0 to 6000.0 MHz | 18 | 21 | | dB |
| VSWR (868 – 870 MHz) | | 1.5 | 1.8 | Ω |
| Input Impedance[2] (Single ended) | | 50 | | Ω |
| Output impedance[2] (Single ended) | | 50 | | Ω |

[1] Typical values are nominal performances at room temperature

[2] No external matching is required

## Model Outline, Pin Connection and Marking




| Marking | | Note |
|---|---|---|
| Line 1 | I3 | RakonXpress designation (TMX IT03) |
| Line 2 | • DC | • = Identify black dot<br>DC = Date code (See the tables below) |

| Pin | Connections |
|---|---|
| **1** | Input unbalanced |
| **4** | Output unbalanced |
| **2, 3, 5** | To be grounded |

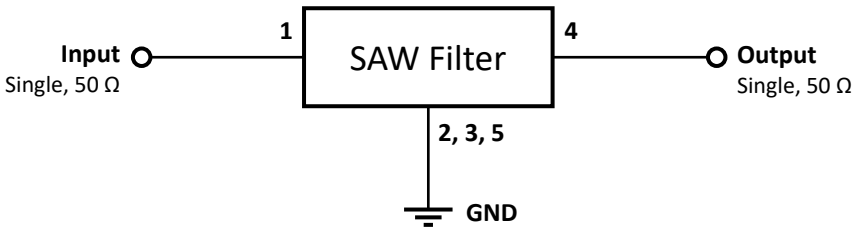
Unit: mm

| Year Code (1st digit) | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2016 & 2020 | n | p | q | r | s | t | u | v | w | X | y | z |
| 2017 & 2021 | A | B | C | D | E | F | G | H | I | K | L | M |
| 2018 & 2022 | N | P | Q | R | S | T | U | V | W | X | Y | Z |
| 2019 & 2023 | a | b | c | d | e | f | g | h | i | j | k | m |

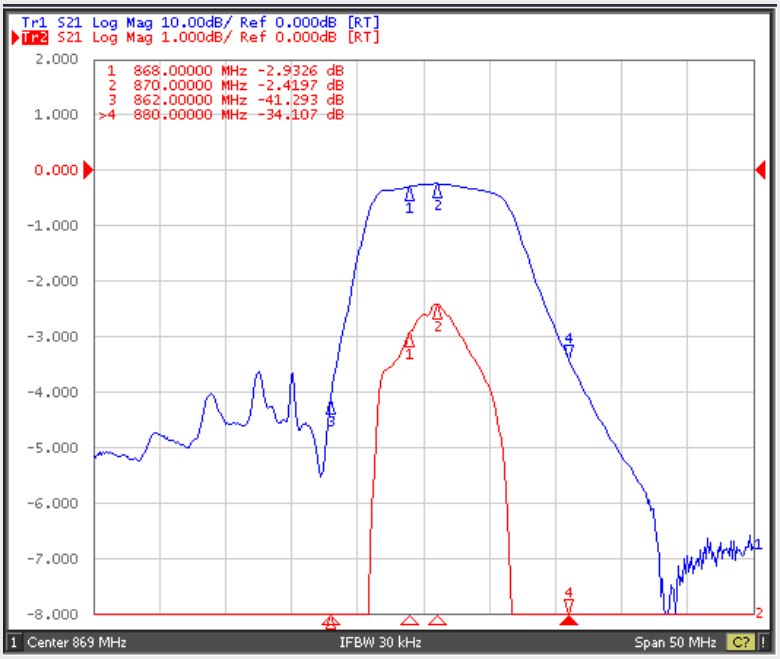
| Date Code (2nd digit) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th | 10th | 11th | 12th | 13th | 14th | 15th | 16th |
| A | B | C | D | E | F | G | H | J | K | L | M | N | P | Q | R |
| 17th | 18th | 19th | 20th | 21st | 22nd | 23rd | 24th | 25th | 26th | 27th | 28th | 29th | 30th | 31st | |
| S | T | U | V | W | X | Y | Z | a | b | d | e | f | g | h | |

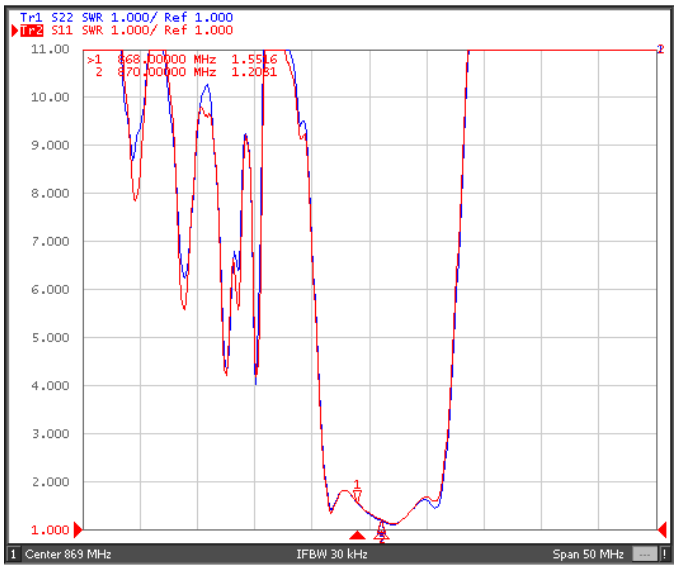
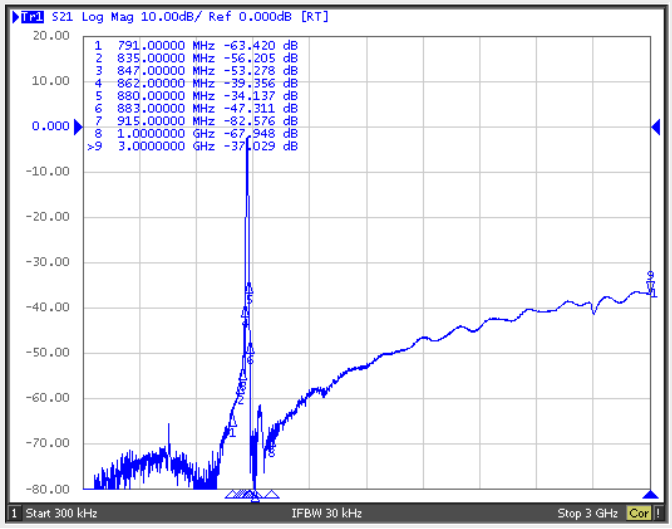
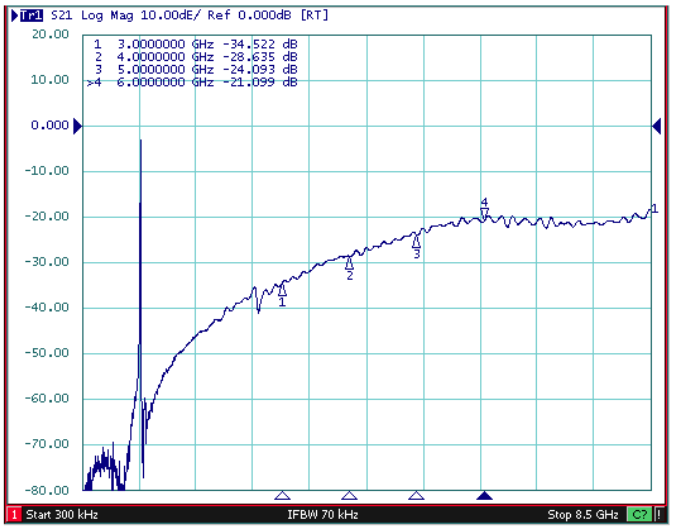
## Test Circuit

50 Ω / 50 Ω Configuration




## Frequency Characteristics

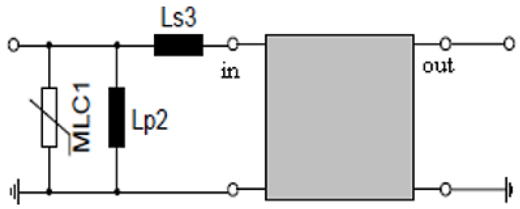
| Parameters | Graphs |
|---|---|
| Typical S21 Response |  |

| | |
|---|---|
| S11 and Group Delay |  |
| Far Side |  <br>  |

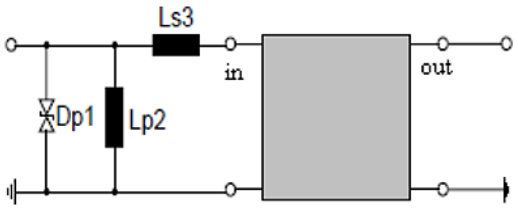
## EDS Protection

This product is electrostatic sensitive device. When you install or measure it, you should be careful not to add antistatic electricity or high voltage. Please be advised that you had better check anti serge voltage.

To reduce the probability of damages caused by ESD, the following matching topologies should be applied.




MLC varistor + ESD matching

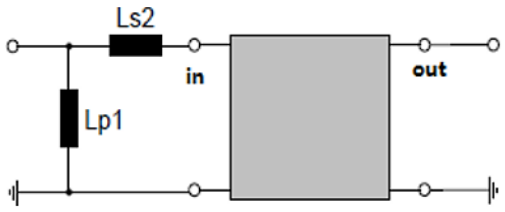


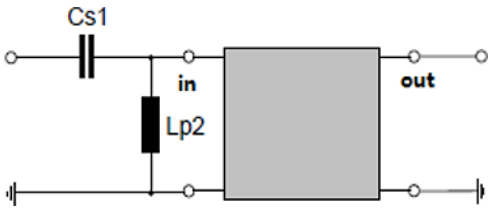

Suppressor diode + ESD matching

ESD matching" should be added to the filter port, where electrostatic discharge is expected. It predominantly appears at the antenna input of RF receivers. Therefore "ESD matching" should be designed to short circuit or block the ESD pulse.

Depending on the input impedance of the SAW filter and the source impedance, the needed component values have to be determined from case to case.

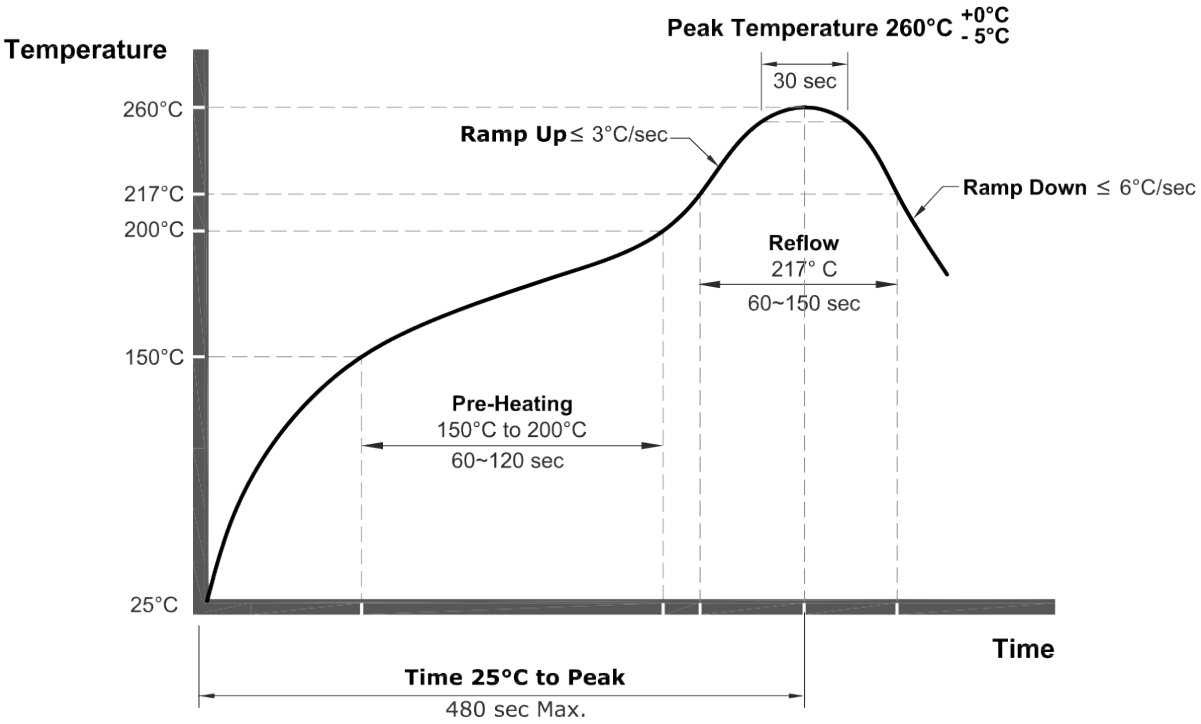
In cases where ESD is minor, the following simplified "ESD matching" topologies can be used:




Effectiveness of the applied ESD protection has to be checked according to relevant industry standards or customer specific requirements.

## Recommended Reflow Soldering Profile

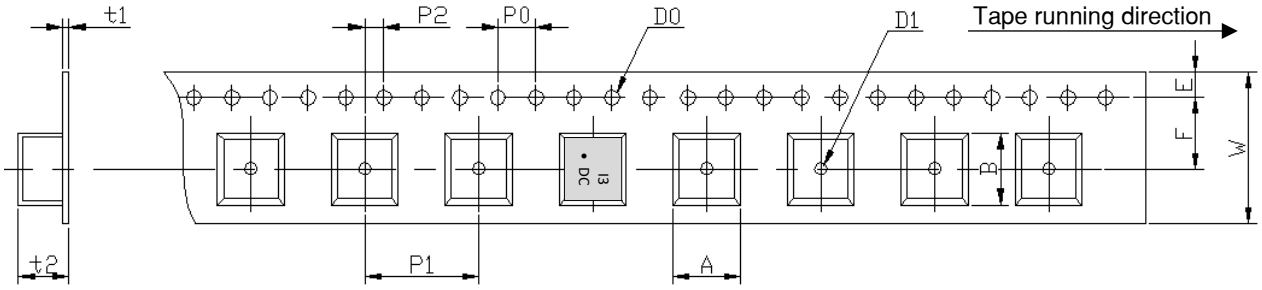



**NOTE:**

- The components shall remain within the electrical specifications after it soldered on the 1mm thickness PCB board and dipped in the solder at 260 ± 5°C during 10 ± 1 seconds.
- The components shall remain within the electrical specifications after it soldered by electric iron, solder at 350 ± 10 °C during 3~4 seconds. Recovery time: 2 ± 0.5 hour.
- Ultrasonic cleaning may cause deterioration and destruction of the component. Please avoid ultrasonic cleaning.
- Only leads of components may be soldered. Please avoid soldering another part of the component.

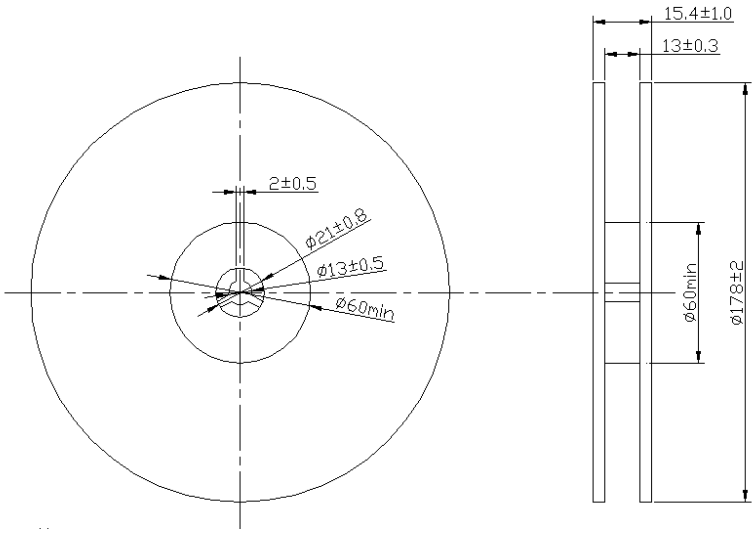
## Tape and Reel Specifications

TAPE DETAILS:




| Parameter | Code | Dimension | Tolerance |
|---|---|---|---|
| Height of component hole | A | 1.4 max | |
| Width of component hole | B | 1.7 max | |
| Diameter of sprocket hole | $D_0$ | Φ 1.5 | ± 0.1 |
| Diameter of feed hole | $D_1$ | Φ 0.5 min | ± 0.1 |
| Pitch of sprocket hole | $P_0$ | 4.0 | ± 0.1 |
| Length from hole center to component center | $P_1$ | 4.0 | ± 0.1 |
| Length from Pocket hole center to sprocket hole center | $P_2$ | 2.0 | ± 0.05 |
| Width of carrier tape | W | 8.0 | ± 0.1 |
| Width of adhesive tape | F | 3.5 | ± 0.05 |
| Gap of hold down tape and carrier tape | E | 1.75 | ± 0.1 |
| Thickness of Ebossed tape sheet | t1 | 0.25 max | |
| Thickness of Ebossed tape | t2 | 1.0 max | |

REEL DETAILS:




NOTE:

- Unit: mm
- Standard Packing Quantity (SPQ) is 4000 pieces/ reel

## Reliability Test

| Parameter | Test condition / Description | |
|---|---|---|
| Mechanical shock | (a) Drops: 3 times on concrete floor<br>(b) Height: 1.0 m | |
| Vibration resistance | (a) Frequency of vibration: 10~55Hz<br>(b) Amplitude: 1.5 mm | (c) Directions: X, Y and Z<br>(d) Duration: 2 hours |
| Moisture resistance | (a) Condition: 40℃±2℃, 93+2 -3% RH<br>(b) Duration: 96 hours | (c) Wait 4 hours before measurement |
| Climatic sequence | (a) +70°C for 16 hours<br>(b) +55°C for 24 hours, 90~9 5% RH<br>(c) -25°C for 2 hours | (d) +40°C for 24 hours, 90~95 % RH<br>(e) Wait 4 hours before measurement |
| High temperature exposure | (a) Temperature: 85°C<br>(b) Duration: 250 hours | (c) Wait 4 hours before measurement |
| Temperature cycling | (a) +85°C for 30 minutes ⍰ -40°C for 30 minutes repeated 120 times<br>(b) Wait 4 hours before measurement | |
| Note | As a result of the particularity of inner structure of SAW products, the components can easily be breakdown by electrostatic shock; so it's mandatory to pay attention to ESD protect during the tests. | |