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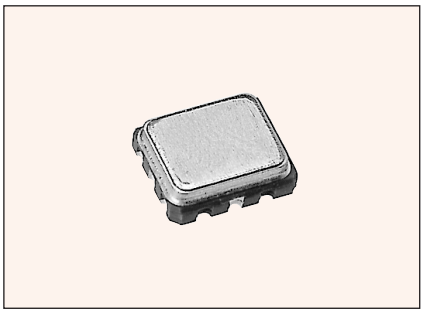
# Surface Acoustic Wave Filter (SAW Filter)



# TQS-444F-7R

## Features

- Miniature size : 5.2(W) x 4.5(D) x 1.55(H)mm
- High selectivity

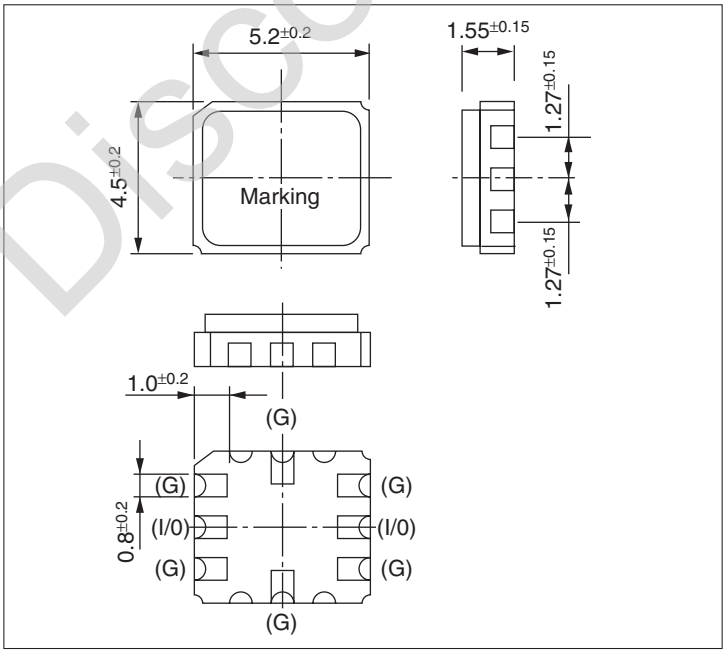
## Application

- IF filter for Wireless LAN

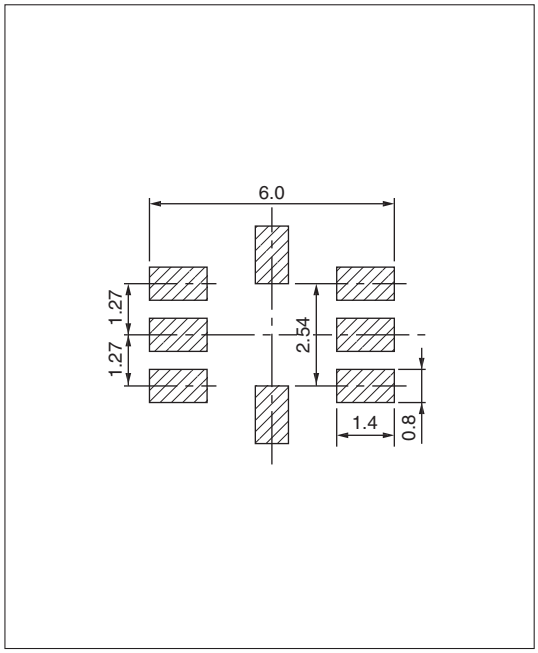
## Specifications

| Type | TQS-444F-7R |
|---|---|
| Nominal frequency [fo] | 280 MHz |
| Pass band | fo ±8.5 MHz min. |
| Insertion loss | 10.0 dB max. |
| Stop band attenuation<br>fo ±38.8 MHz | 50 dB min. |
| Terminating impedance | 270 Ω // -5pF |
| Operating temperature range | -10 °C to +50 °C |

## Package Outlines [Dimensions in mm]




## Footprint [Dimensions in mm]



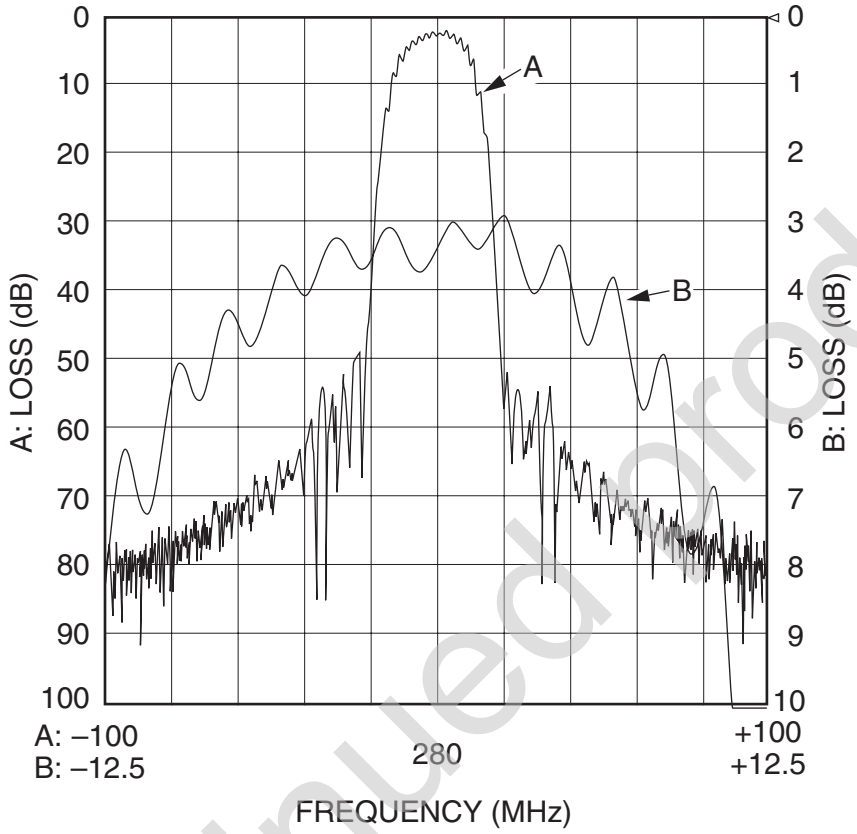



(2001. 3.)

**TQS-444F-7R**

**IF Filter for Wireless LAN system** **280 MHz**

## Electrical Data



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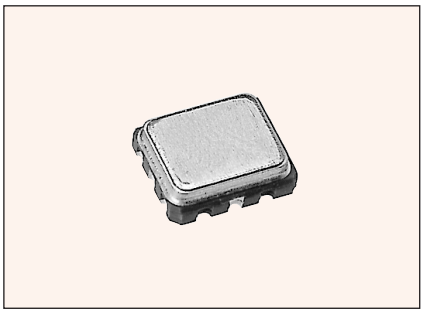
## Surface Acoustic Wave Filter (SAW Filter)



# TQS-450A-7R

## Features

- Miniature size : 5.2(W) x 4.5(D) x 1.55(H)mm
- High selectivity

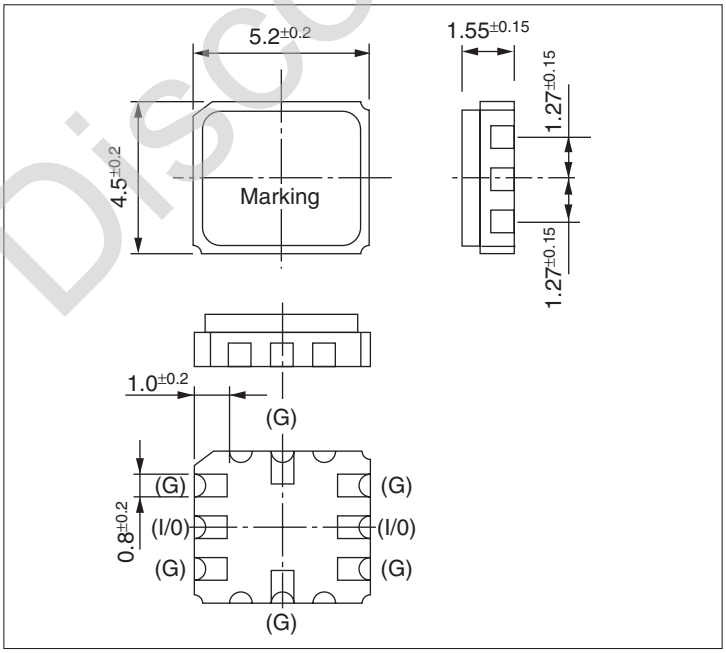
## Application

- IF filter for Wireless LAN

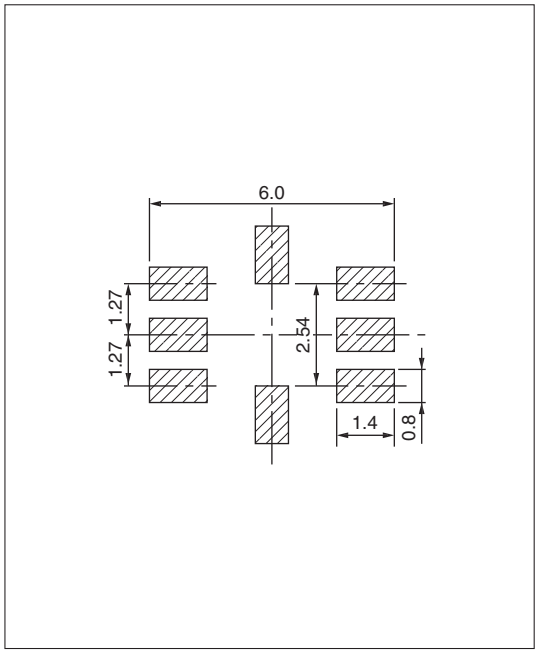
## Specifications

| Type | TQS-450A-7R |
|---|---|
| Nominal frequency [fo] | 280 MHz |
| 5dB Pass band | fo ±17 MHz min. |
| Insertion loss | 8.5 dB max. |
| Group delay distortion | 100 ns max. |
| Stop band attenuation<br>fo -45 MHz<br>fo +45 MHz | <br>33 dB min.<br>33 dB min. |
| Terminating impedance | 480 Ω // -3.5pF |
| Operating temperature range | -10 °C to +50 °C |

## Package Outlines [Dimensions in mm]




## Footprint [Dimensions in mm]



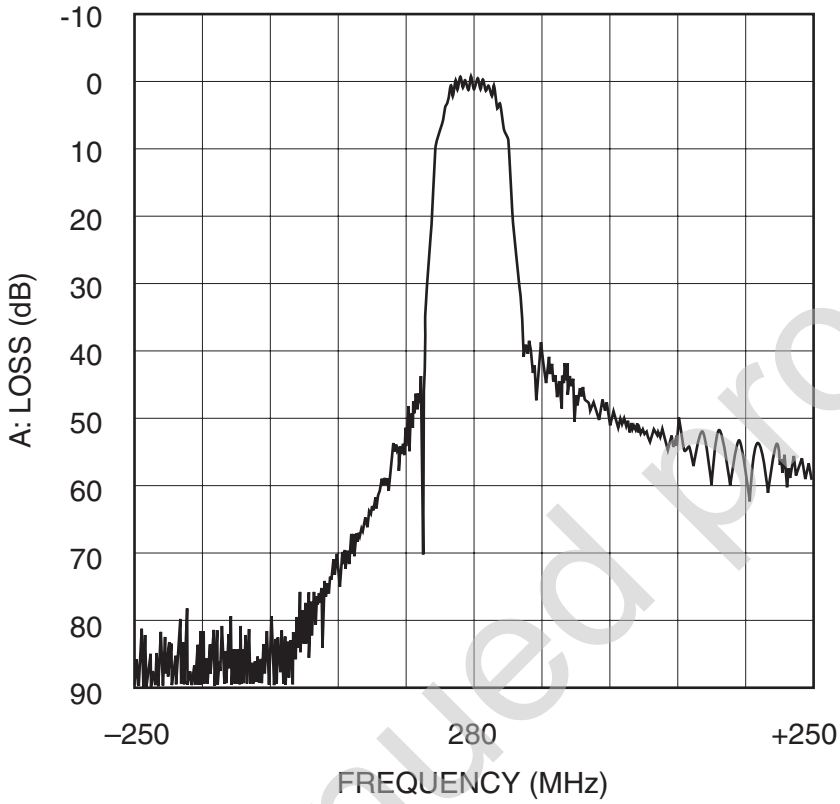


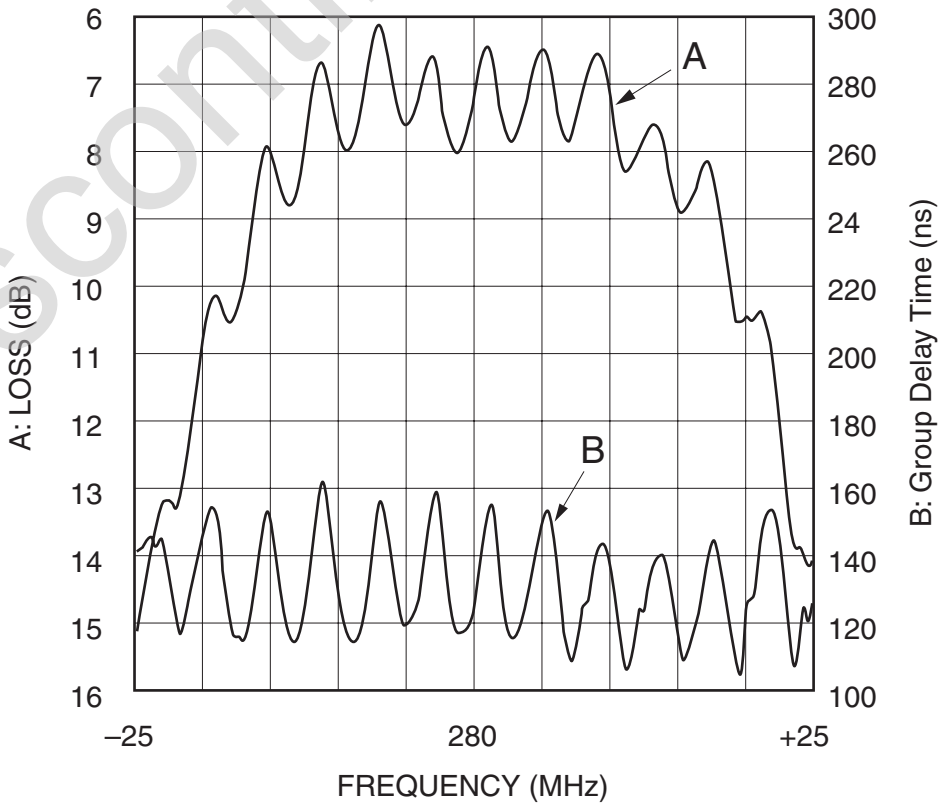

(2000.12.)

**TQS-450A-7R**

**IF Filter for Wireless LAN system** **280 MHz**

## Electrical Data






(2000.12.)

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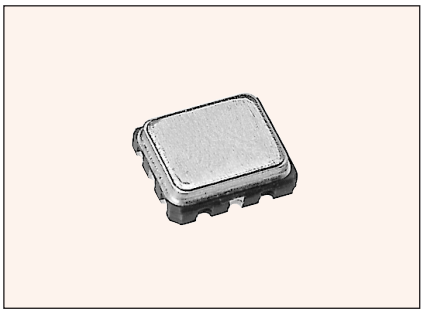
## Surface Acoustic Wave Filter (SAW Filter)



# TQS-453C-7R

## Features

- Miniature size : 5.2(W) x 4.5(D) x 1.55(H)mm
- High selectivity

## Application

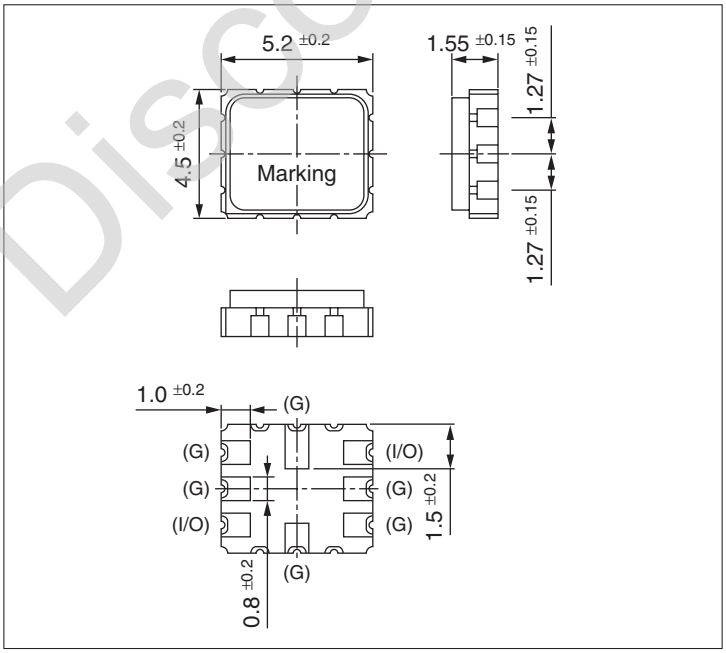
- ETC system



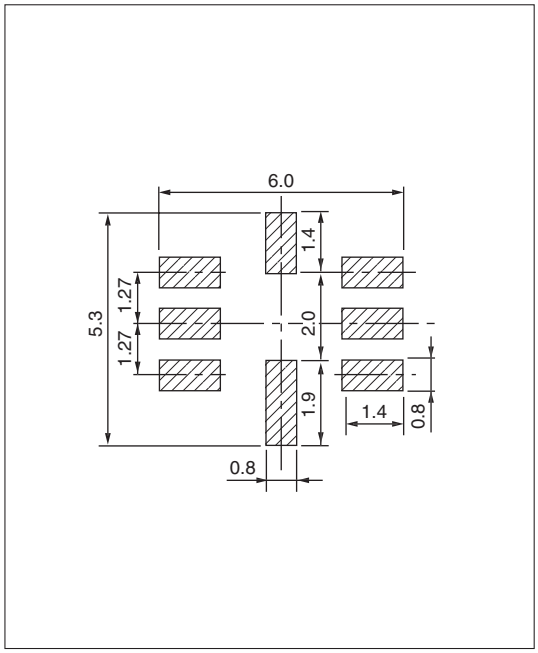
## Specifications

| Type | TQS-453C-7R |
|---|---|
| Nominal frequency [fo] | 40 MHz |
| Pass band | fo ±2.5 MHz min. |
| Insertion loss | 13.0 dB max. |
| Stop band attenuation<br>fo ±10 MHz | 35 dB min. |
| Terminating impedance | 840 Ω // -7.7pF |
| Operating temperature range | -25 °C to +90 °C |

## Package Outlines [Dimensions in mm]



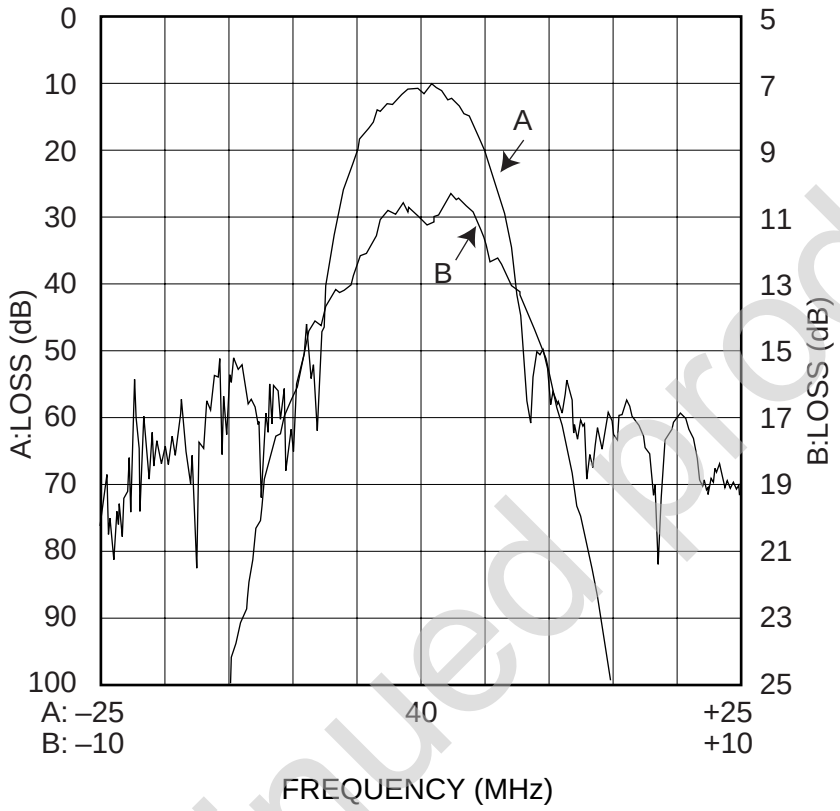

## Footprint [Dimensions in mm]



**TQS-453C-7R**

**IF Filter for ETC system** **40 MHz**

## Electrical Data



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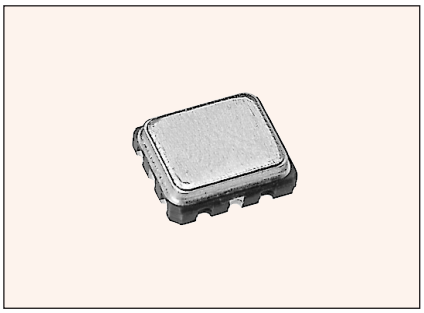
# Surface Acoustic Wave Filter (SAW Filter)



## TQS-457A-7R

## Features

- Miniature size : 5.2(W) x 4.5(D) x 1.55(H)mm
- High selectivity

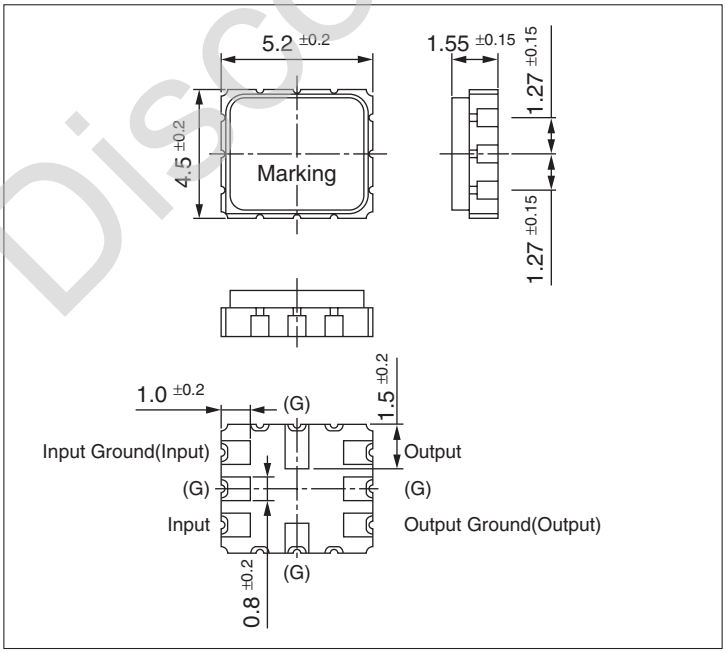
## Application

- IF filter for Wireless LAN

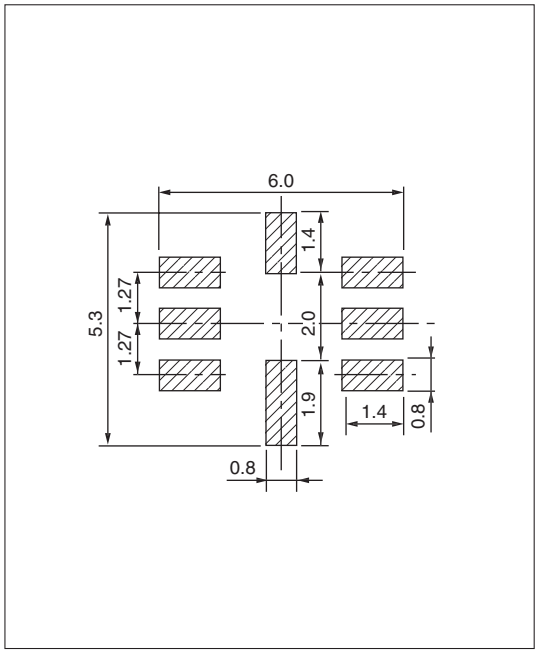
## Specifications

| Type | TQS-457A-7R |
|---|---|
| Nominal frequency [fo] | 374 MHz |
| Pass band | fo ±8.5 MHz min. |
| Insertion loss | 12.0 dB max. |
| Pass band ripple | 1.5 dB max. |
| Group delay distortion | 100 ns max. |
| Stop band attenuation<br>fo ± (16.5 to 22) MHz<br>fo ± (22 to 33) MHz<br>fo ± (33 to 100) MHz | <br>30 dB min.<br>33 dB min.<br>38 dB min. |
| Terminating impedance | Input (Balanced or unbalanced) : 160 Ω // -8 pF<br>Output (Balanced or unbalanced) : 50 Ω // -15 pF |
| Operating temperature range | -40 °C to +85 °C |

## Package Outlines [Dimensions in mm]




## Footprint [Dimensions in mm]



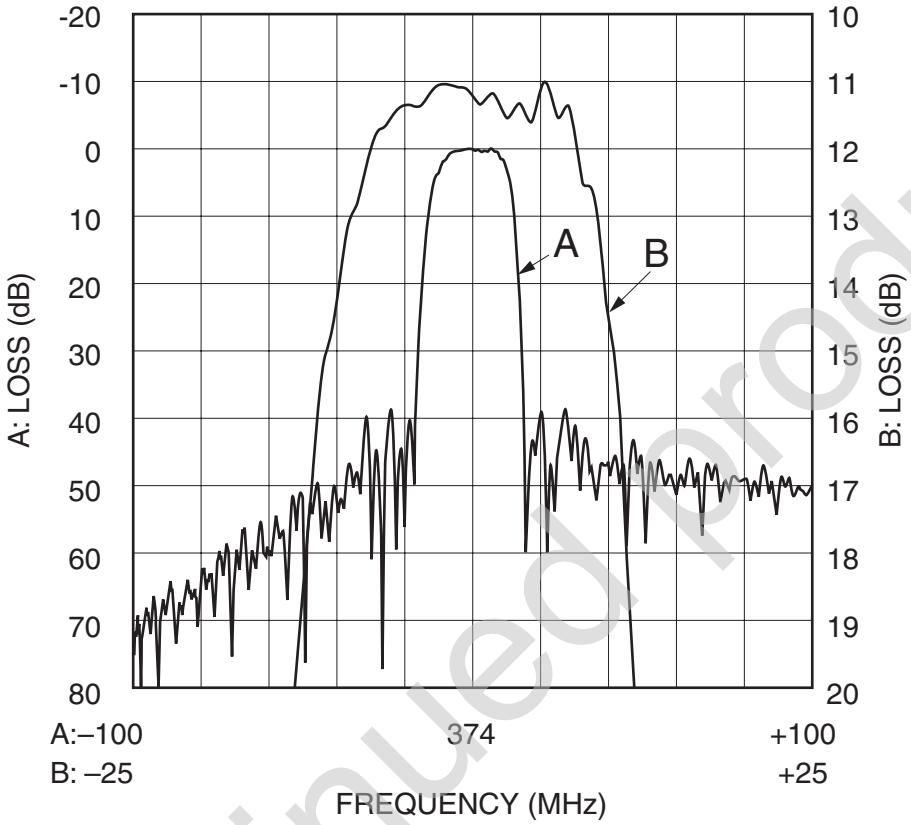



(2001. 5.)

**TQS-457A-7R**

**IF Filter for Wireless LAN system** **374 MHz**

## Electrical Data



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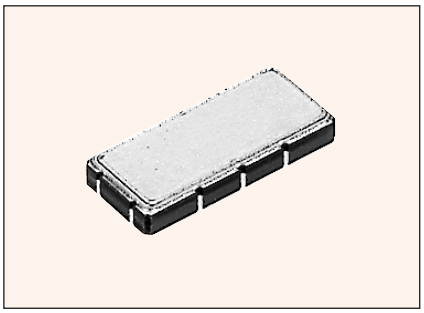
Surface Acoustic Wave Filter (SAW Filter)



# TQS-458B-7R

## Features

- Miniature size : 11.4(W) x 5.0(D) x 1.40(H)mm
- Low group delay distortion
- High selectivity

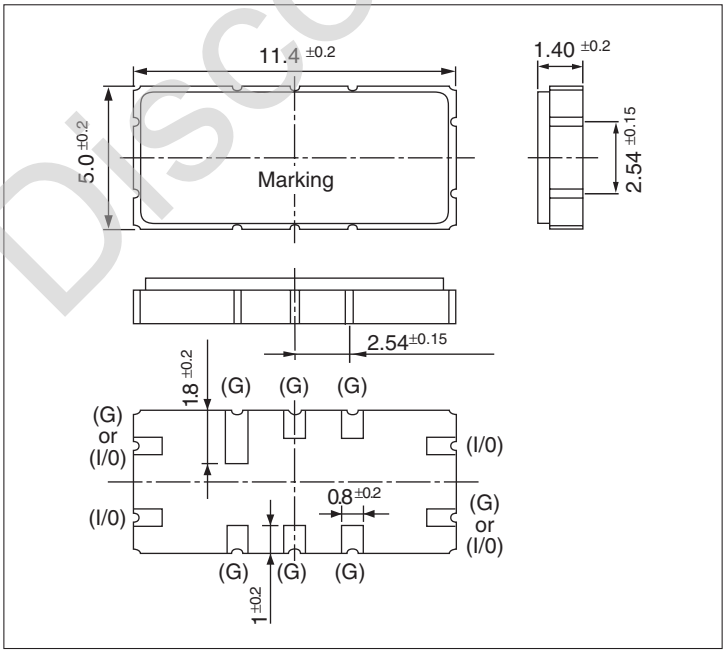
## Application

- IF filter for Cellular Phone
  CDMA system

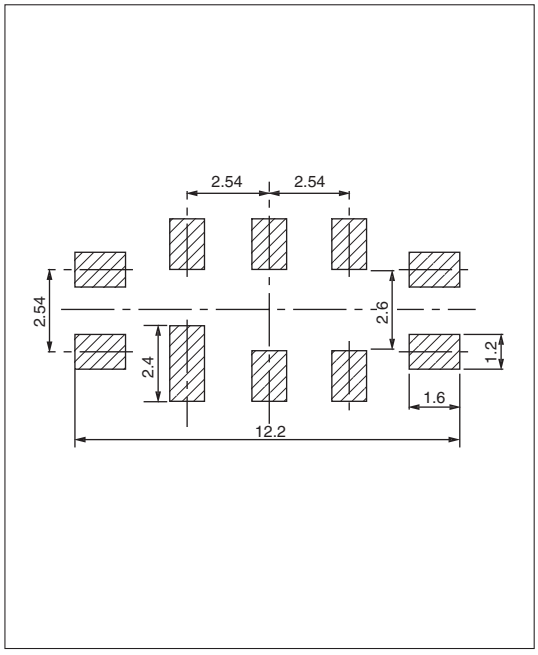
## Specifications

| Type | TQS-458B-7R |
|---|---|
| Nominal frequency (fo) | 85.38 MHz |
| 5dB Pass band (relative to loss at fo) | fo ±600 kHz min. |
| Insertion loss | 10.5 dB max. |
| Amplitude ripple | 1.0 dB max. (fo ±0.3 MHz) |
| Group delay distortion | 400 ns max. (fo ±0.3 MHz) |
| Stop band attenuation (relative to loss at fo)<br>fo ± 0.9 MHz<br>fo ± 1.7 MHz<br>fo ± 9 MHz to ± 50 MHz | <br>33 dB min.<br>33 dB min.<br>45 dB min. |
| Terminating impedance | Input (Balanced or Unbalanced) : 1.8 kΩ // -10pF<br>Output (Balanced or Unbalanced) : 1.5 kΩ // -9pF |
| Operating temperature range | -30 °C to +80 °C |

## Package Outlines [Dimensions in mm]




## Footprint [Dimensions in mm]



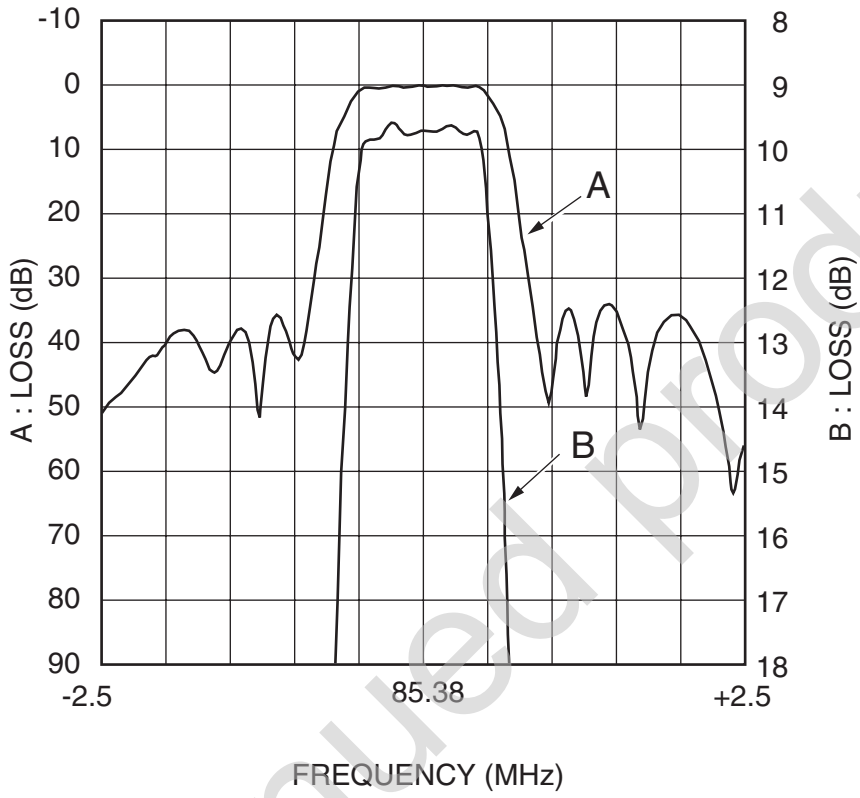



(2001. 1.)

**IF Filter for Cellular Phone**
**CDMA system**

**TQS-458B-7R**
**85.38 MHz**

## Electrical Data



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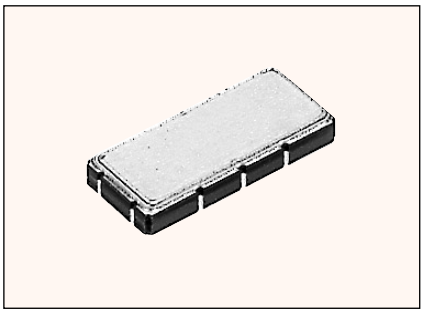
## Surface Acoustic Wave Filter (SAW Filter)



# TQS-458F-7R

## Features

- Miniature size : 11.4(W) x 5.0(D) x 1.40(H)mm
- Phase linearity improved model
- High selectivity

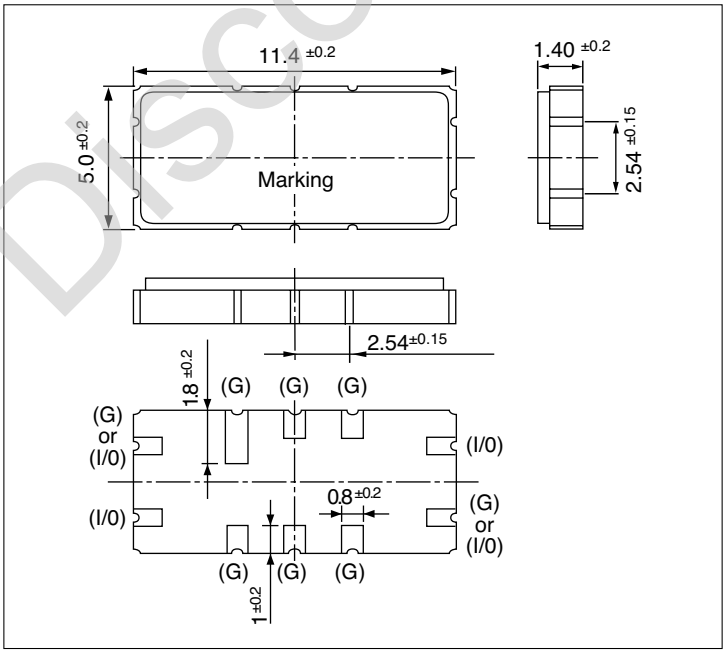
## Application

- IF filter for Cellular Phone
  CDMA system

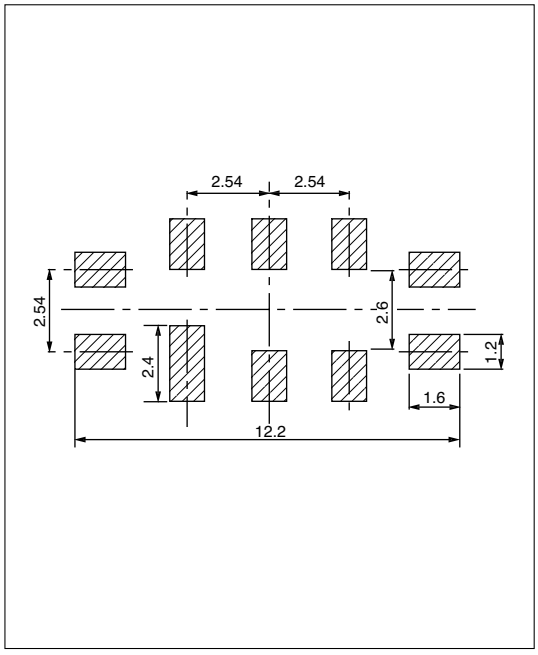
## Specifications

| Type | | TQS-458F-7R |
|---|---|---|
| Nominal frequency [fo] | | 110 MHz |
| 5dB Pass band (Relative to I.L. at fo) | | fo ± 0.60 MHz min. |
| Insertion loss (at fo) | | 11.5 dB max. |
| Ripple (peak to peak within fo ± 300 kHz) | | 0.7 dB max. |
| Group delay distortion (within fo± 300 kHz) | | 500 ns max. |
| Phase linearity (within fo ± 600 kHz) | | 1.5°RMS typ. |
| Stop band attenuation<br>(Referred to I.L. at fo)<br>at fo ± 0.9 MHz<br>at fo ± 1.70 MHz<br>at fo ± 9.00 MHz | | <br><br>33 dB min.<br>33 dB min.<br>40 dB min. |
| Terminating impedance | Input | Balanced or Unbalanced : 770 Ω // -15 pF |
| | Output | Balanced or Unbalanced : 1370 Ω // -12 pF |
| Operating temperature range | | -20 °C to +75 °C |

## Package Outlines [Dimensions in mm]




## Footprint [Dimensions in mm]



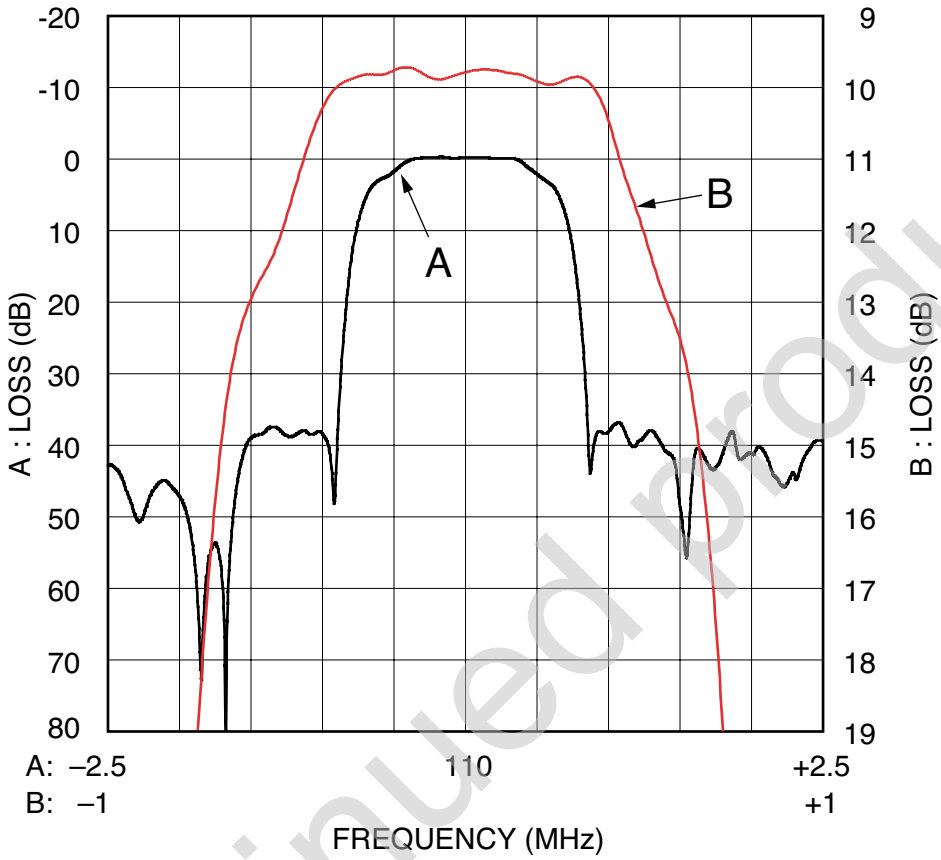



(2001.11.)

**IF Filter (Phase linearity improved model) for Cellular Phone**
**CDMA system**

**TQS-458F-7R**
**110 MHz**

## Electrical Data



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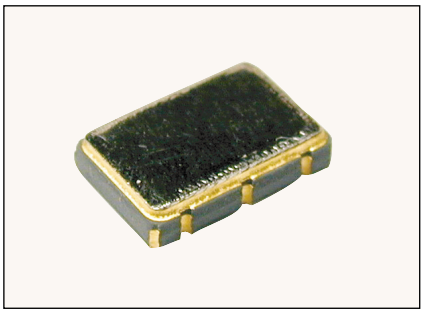
## Surface Acoustic Wave Filter (SAW Filter)



# TQS-459C-7R

## Features

- Miniature size : 5.0(W) x 3.2(D) x 1.05(H)mm
- High selectivity

## Application

- IF filter for W-CDMA

## Specifications

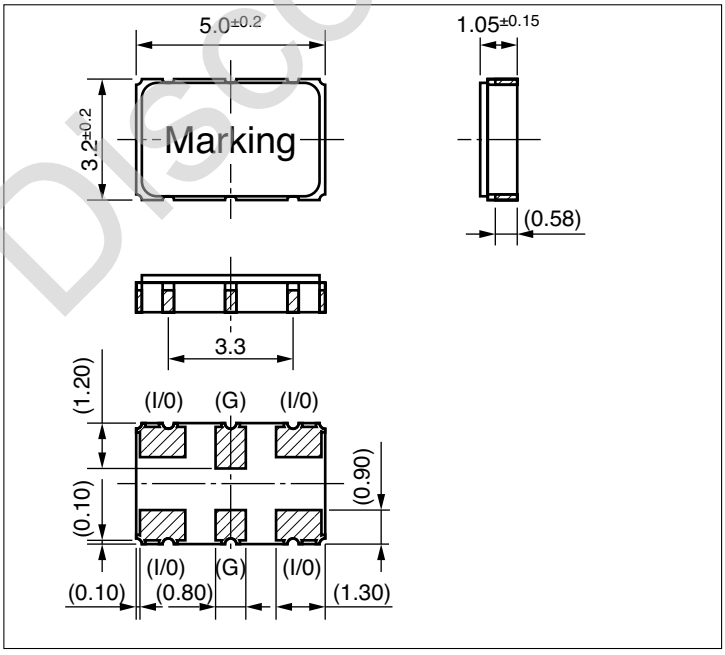
| Type | | TQS-459C-7R |
|---|---|---|
| Nominal frequency [fo] | | 190 MHz |
| 3dB Pass band (Relative to I.L. at fo) | | fo ±1.92 MHz min. |
| Ripple (peak to peak within fo ± 1.92 MHz) | | 1.5 dB max. |
| Insertion loss (at fo) | | 8.0 dB max. |
| Group delay distortion (within fo ± 1.92 MHz) | | 130 ns max. |
| Effective Attenuation Note.1)<br>(Referred to I.L. at fo)<br>at fo ± 5 MHz± 1.92 MHz<br>at fo ± 10 MHz± 1.92 MHz<br>at fo ± 20 MHz± 1.92 MHz | | <br><br>23 dB min.<br>40 dB min.<br>40 dB min. |
| Terminating impedance | Input | Balanced or unbalanced : 325Ω// -16pF |
| | Output | Balanced or unbalanced : 276Ω// -12pF |
| Operating temperature range | | -20 °C to +70 °C |

Note1.) The definition of Effective Attenuation
The Effective Attenuation is defined as logarithm of the root mean square of $S_{21}$ absolute value, and is calculated with the equation below.

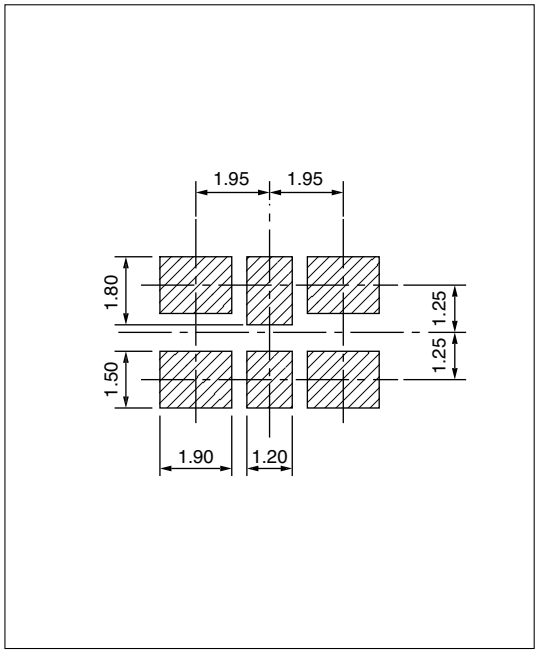
$$10\log_{10}\frac{1}{n}\sum_{k=1}^{n}\left\{\mathrm{Re}(S_{21})^2+\mathrm{Im}(S_{21})^2\right\}_k$$

($n$ : number of point)

## Package Outlines [Dimensions in mm]




## Footprint [Dimensions in mm]



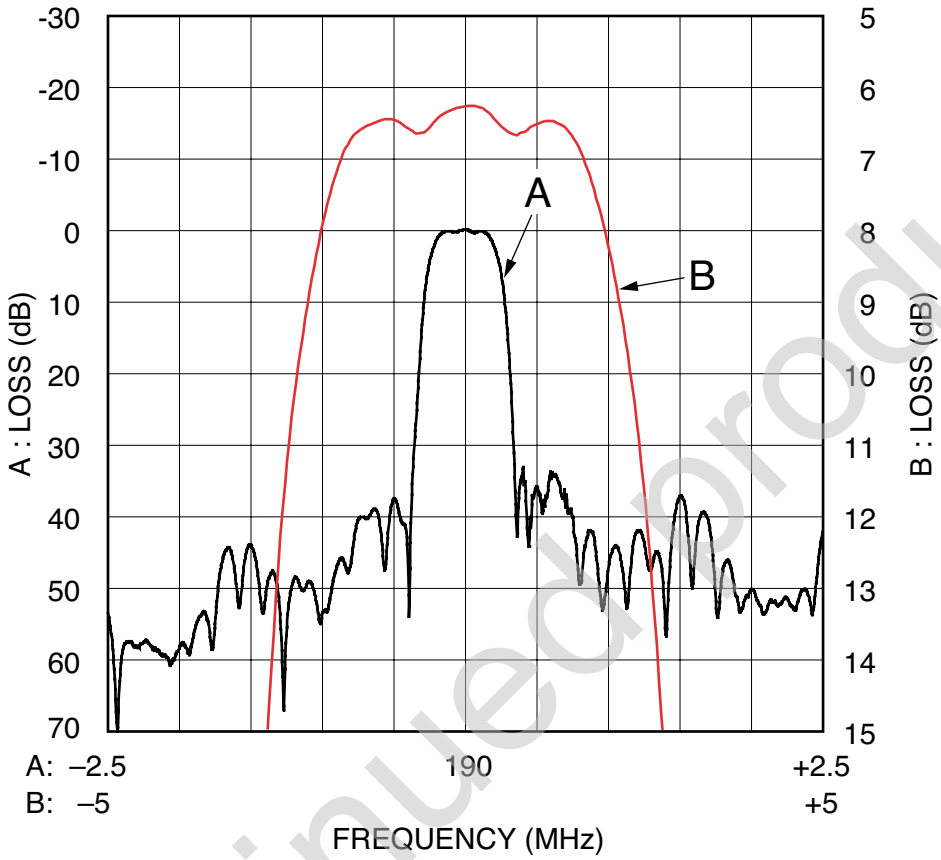



(2001.11.)

**IF Filter for Cellular Phone**
**W-CDMA system (Rx)**

**TQS-459C-7R**
**190 MHz**

## Electrical Data



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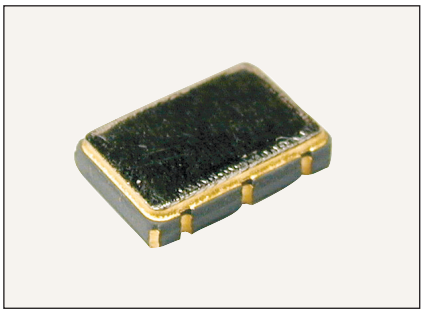
# Surface Acoustic Wave Filter (SAW Filter)



# TQS-460A-7R

## Features

- Miniature size : 5.0(W) x 3.2(D) x 1.05(H)mm
- High selectivity
- Balanced I/O or Unbalanced I/O

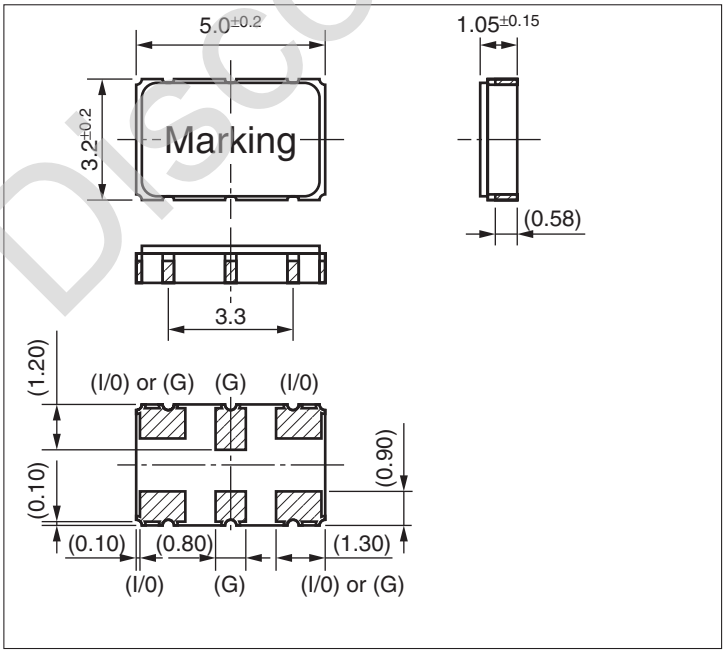
## Application

- IF filter for W-CDMA

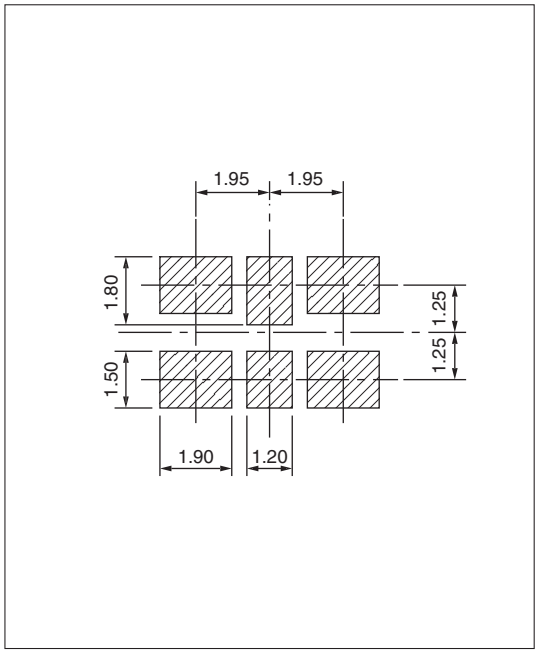
## Specifications

| Type | | TQS-460A-7R |
|---|---|---|
| Nominal frequency [fo] | | 380 MHz |
| 3dB Pass band (Relative to I.L. at fo) | | 4.20 MHz min. |
| Insertion loss (at fo) | | 12.0 dB max. |
| Passband ripple (within fo±1.50 MHz) | | 1.5 dB max. |
| Group delay distortion (within fo±1.50 MHz) | | 160 ns max. |
| Stop band attenuation<br>(Referred to I.L. at fo)<br>fo + 5 MHz<br>fo – 5 MHz<br>fo ± 10 MHz | | <br><br>25 dB min.<br>30 dB min.<br>40 dB min. |
| Terminating impedance | Input | Balanced or Unbalanced : 520 Ω // -4 pF |
| | Output | Balanced or Unbalanced : 360 Ω // -6 pF |
| Operating temperature range | | -20 °C to +70 °C |

## Package Outlines [Dimensions in mm]




## Footprint [Dimensions in mm]



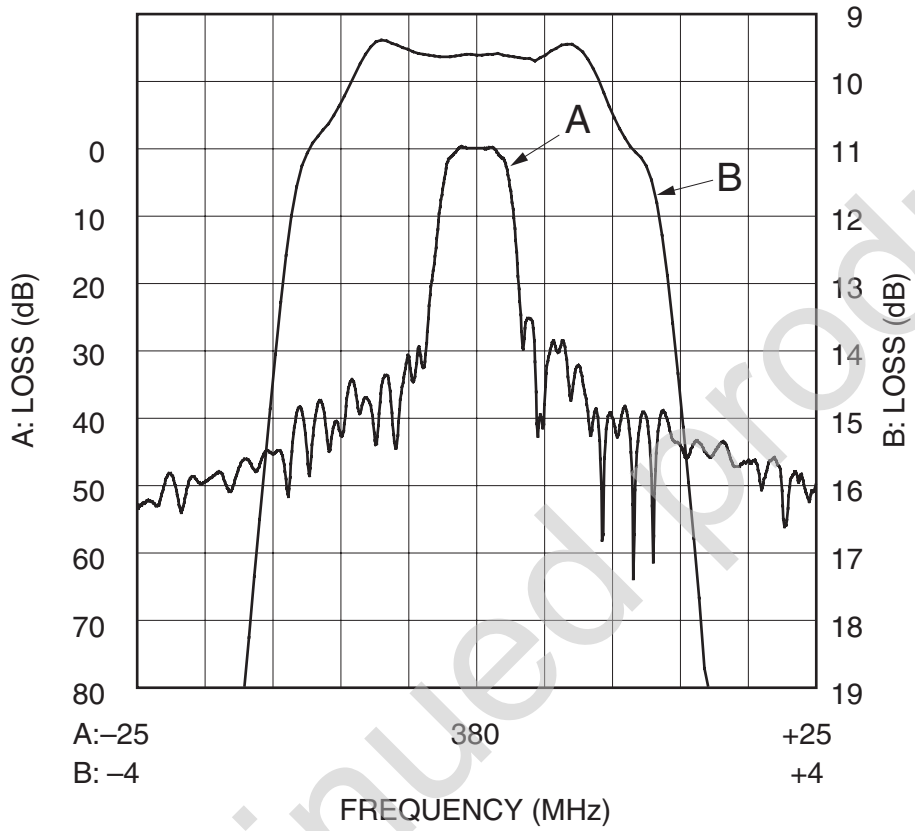



(2001. 4.)

**IF Filter for Cellular Phone**
**W-CDMA system (Rx)**

**TQS-460A-7R**
**380 MHz**

## Electrical Data



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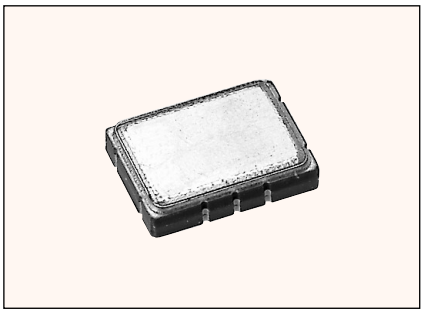
Surface Acoustic Wave Filter (SAW Filter)



# TQS-461E-7R

## Features

- Miniature size : 7.0(W) x 5.0(D) x 1.5 max.(H)mm
- High attenuation
- High selectivity

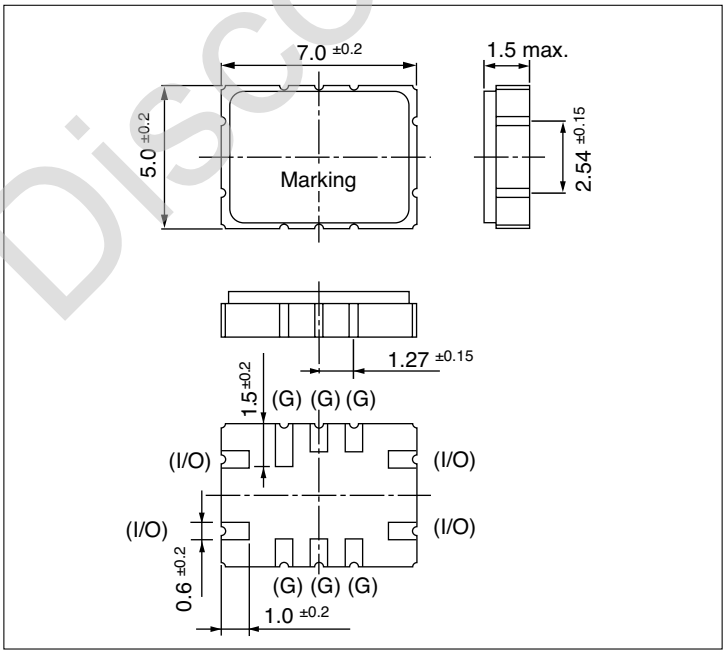
## Application

- IF filter for Cellular Phone
  CDMA system

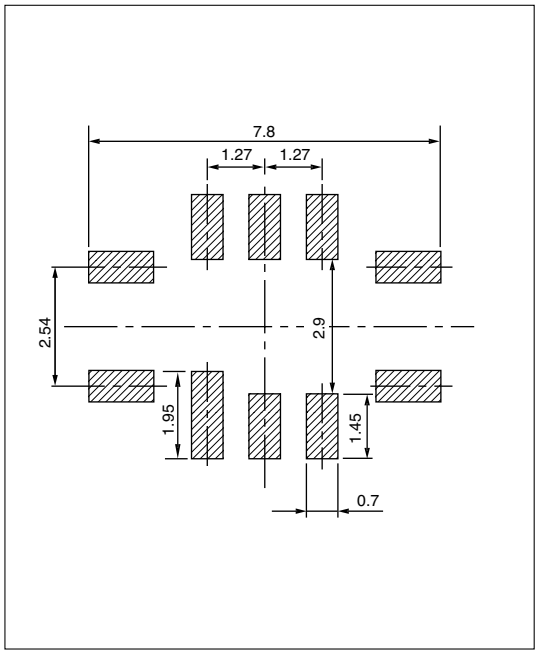
## Specifications

| Type | | TQS-461E-7R |
|---|---|---|
| Nominal frequency [fo] | | 110 MHz |
| 5dB Pass band (Relative to I.L. at fo) | | fo ± 600 kHz min. |
| Insertion loss (at fo) | | 11.0 dB max. |
| Passband deviation (within fo±300 kHz) | | 1.5 dB max. |
| Group delay distortion (within fo±300 kHz) | | 500 ns max. |
| Phase linearity (within fo ± 615 kHz) | | Typical 3.4°RMS |
| Stop band attenuation<br>(Referred to I.L. at fo)<br>at fo ± 0.9 MHz<br>at fo ± 1.70 MHz<br>at fo ± 9.00 MHz | | <br><br>33 dB min.<br>33 dB min.<br>40 dB min. |
| Terminating impedance | Input | Balanced or Unbalanced : 2.9k Ω // -7.4 pF |
| | Output | Balanced or Unbalanced : 2.2k Ω // -6.0 pF |
| Operating temperature range | | -25 °C to +75 °C |

## Package Outlines [Dimensions in mm]




## Footprint [Dimensions in mm]



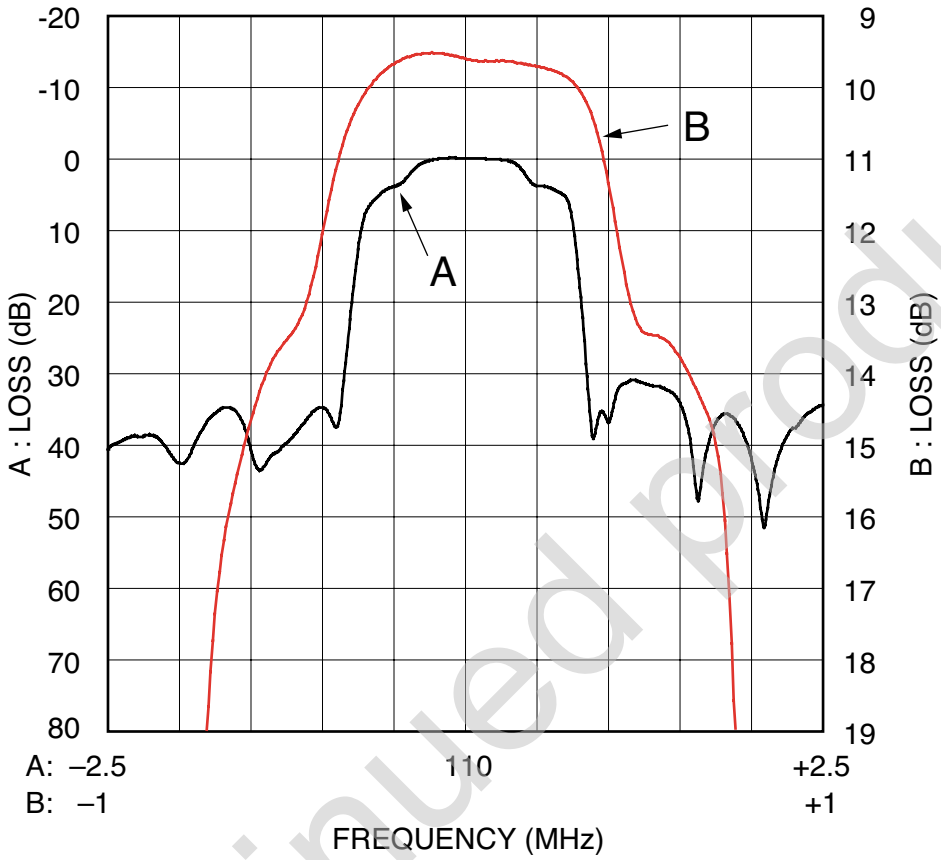



(2002. 1.)

**IF Filter for Cellular Phone**
**CDMA system**

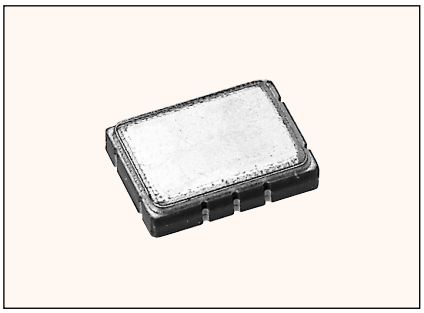
**TQS-461E-7R**
**110 MHz**

## Electrical Data



TOYOCOM

Surface Acoustic Wave Filter (SAW Filter)



# TQS-461F-7R

## Features

- Miniature size : 7.0(W) x 5.0(D) x 1.5 max.(H)mm
- High attenuation
- High selectivity

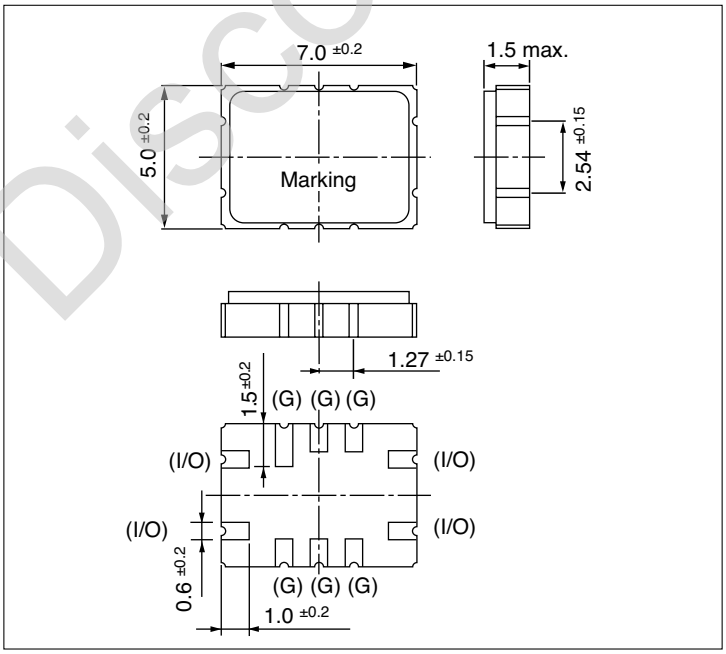
## Application

- IF filter for Cellular Phone
  CDMA system

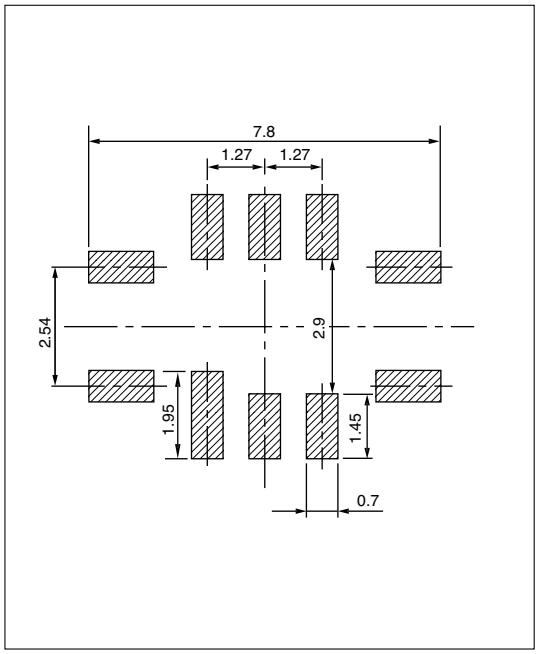
## Specifications

| Type | TQS-461F-7R |
|---|---|
| Nominal frequency [fo] | 183.6 MHz |
| 5dB Pass band (Relative to I.L. at fo) | fo ± 625 kHz min. |
| Insertion loss (at fo) | 10.0 dB max. |
| Passband deviation (within fo±300 kHz) | 1.5 dB max. |
| Passband ripple (within fo±300 kHz) | 0.8 dB max. |
| Group delay distortion (within fo±300 kHz) | 600 ns max. |
| Phase linearity (within fo ± 615 kHz) | Typical 2.5°RMS |
| Stop band attenuation<br>(Referred to I.L. at fo)<br>at fo ± 0.9 MHz<br>at fo ± 1.25 MHz<br>at fo ± 1.70 MHz<br>at fo ± 2.05 MHz<br>10MHz to fo-9MHz<br>fo+9MHz to fo+50MHz | <br><br>33 dB min.<br>33 dB min.<br>35 dB min.<br>35 dB min.<br>45 dB min.<br>40 dB min. |
| Terminating impedance | T.B.D. |
| Operating temperature range | -30 °C to +85 °C |

## Package Outlines [Dimensions in mm]




## Footprint [Dimensions in mm]



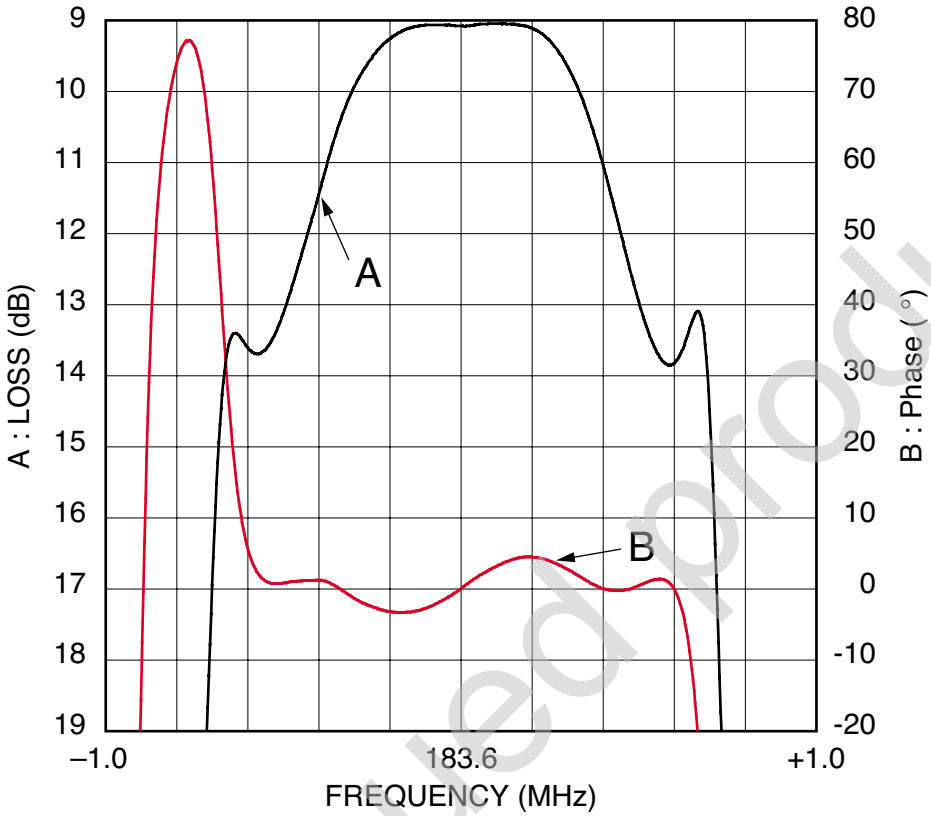


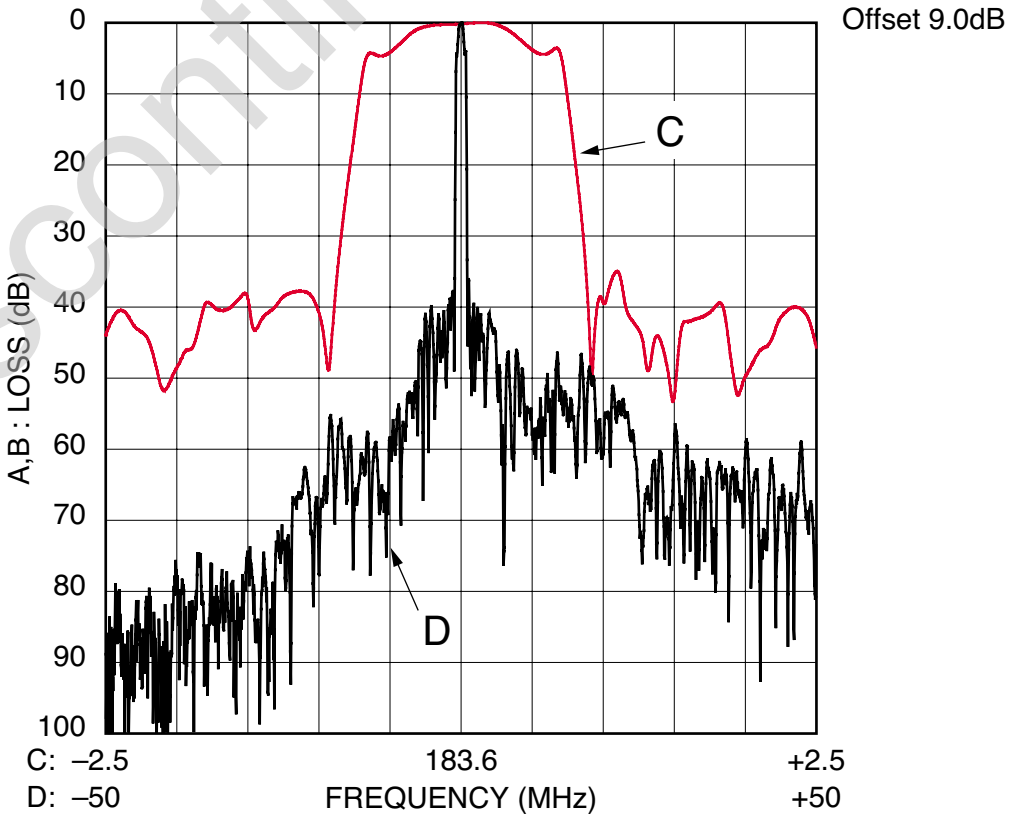

(2002. 2.)

**IF Filter for Cellular Phone**
**CDMA system**

**TQS-461F-7R**
**183.6 MHz**

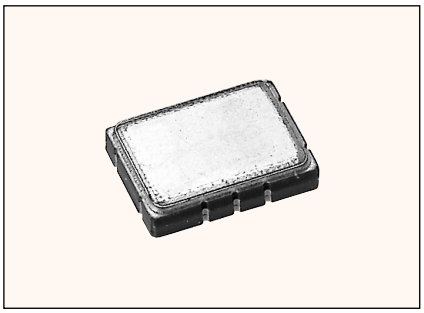
## Electrical Data



TOYOCOM

Surface Acoustic Wave Filter (SAW Filter)



# TQS-461G-7R

## Features

- Miniature size : 7.0(W) x 5.0(D) x 1.5 max.(H)mm
- High attenuation
- High selectivity

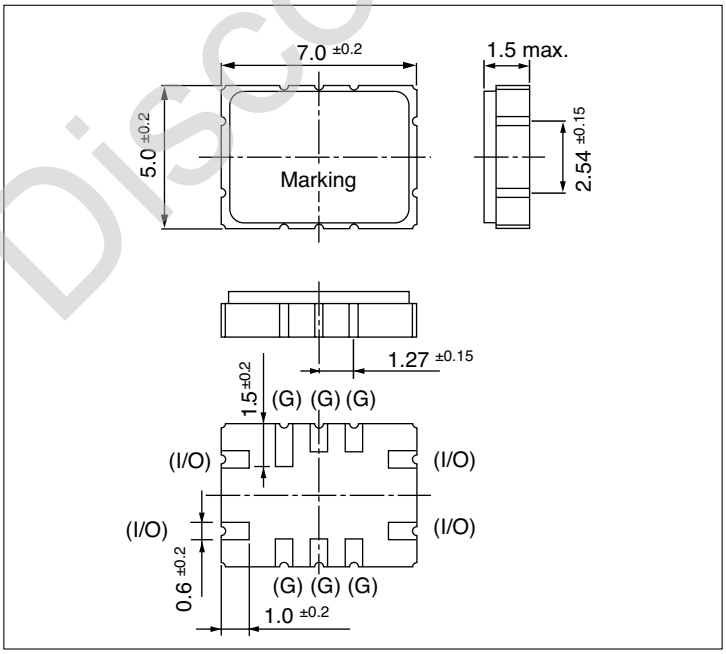
## Application

- IF filter for Cellular Phone
  CDMA system

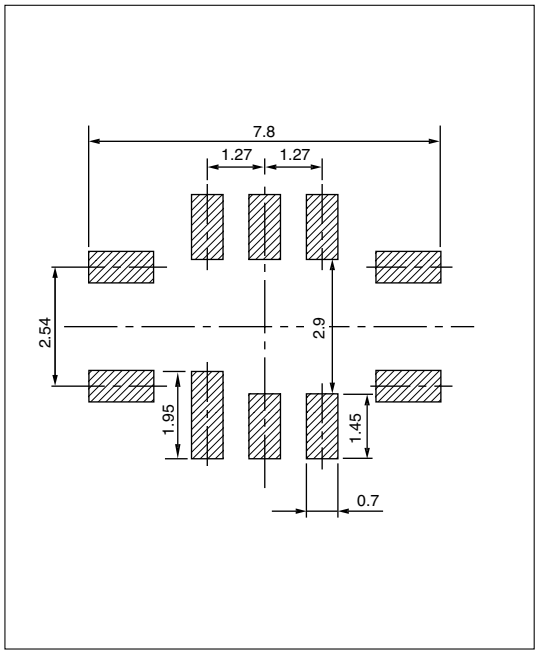
## Specifications

| Type | | TQS-461G-7R |
|---|---|---|
| Nominal frequency [fo] | | 183.6 MHz |
| 5dB Pass band (Relative to I.L. at fo) | | fo ± 615 kHz min. |
| Insertion loss (at fo) | | 11.0 dB max.<br>Including losses in matching circuit.<br>Matching inductor size is 0603(inch). |
| Passband deviation (within fo±300 kHz) | | 1.2 dB max. |
| Passband ripple (within fo±300 kHz) | | 1.2 dB max. |
| Phase linearity (within fo ± 615 kHz) | | Typical 2.2°RMS |
| Stop band attenuation<br>(Referred to I.L. at fo)<br>10MHz to fo-9MHz<br>fo-9MHz to fo-0.9MHz<br>fo+0.9MHz to fo+9MHz<br>fo+9MHz to fo+25MHz<br>fo+25MHz to fo+100MHz<br>at fo ± 0.9 MHz<br>at fo ±1.25 MHz, ±1.70 MHz, ±2.05 MHz | | <br><br>45 dB min.<br>33 dB min.<br>33 dB min.<br>40 dB min.<br>45 dB min.<br>33 dB min.<br>35 dB min. |
| Terminating impedance | Input | 360 Ω // -11.4 pF |
| | Output | 260 Ω // -17.3 pF |
| Operating temperature range | | -30 °C to +85 °C |

## Package Outlines [Dimensions in mm]




## Footprint [Dimensions in mm]



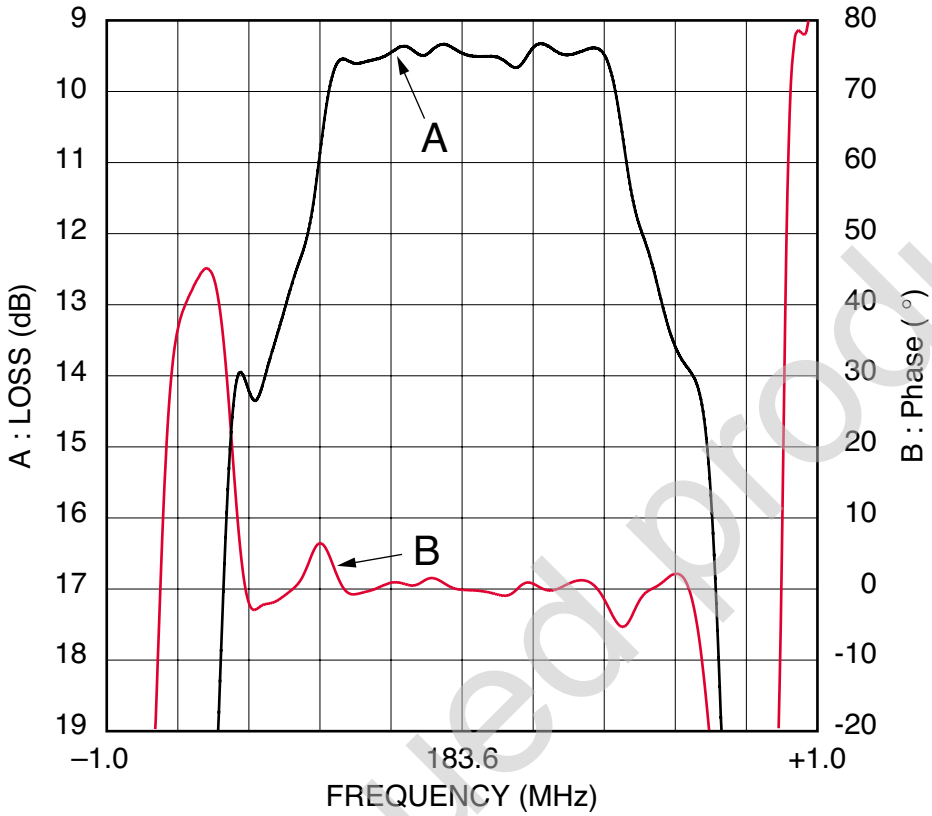


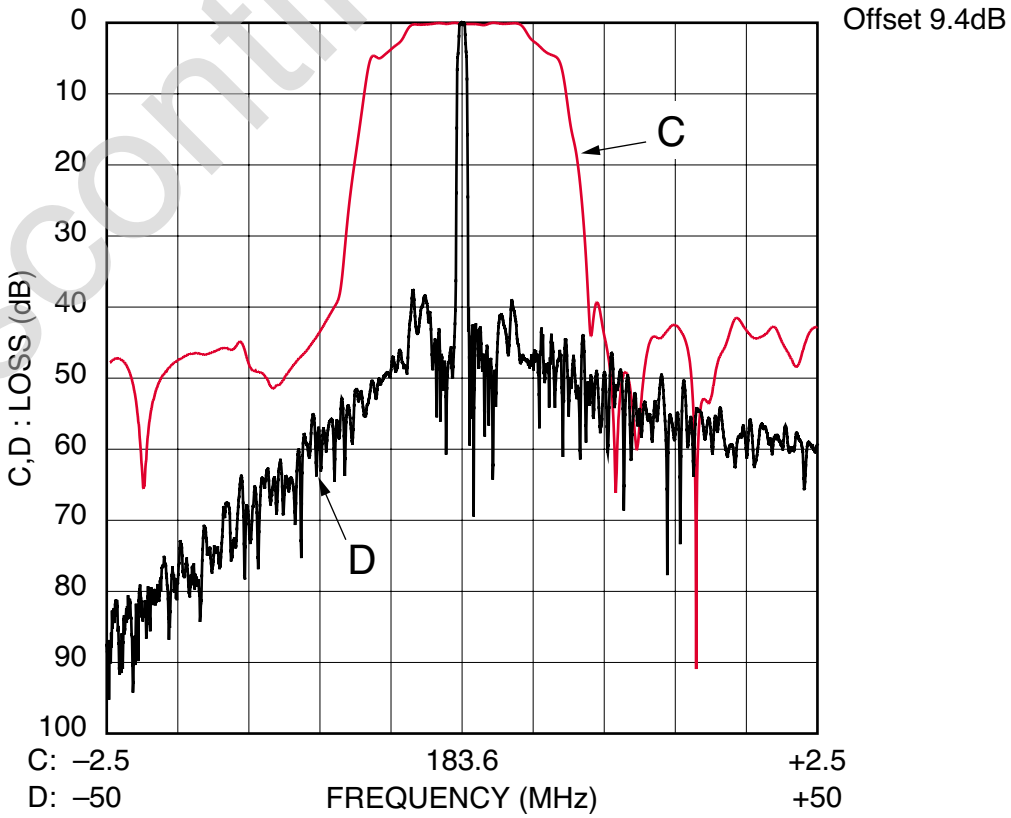

(2002. 6.)

**IF Filter for Cellular Phone**
**CDMA system**

**TQS-461G-7R**
**183.6 MHz**

## Electrical Data



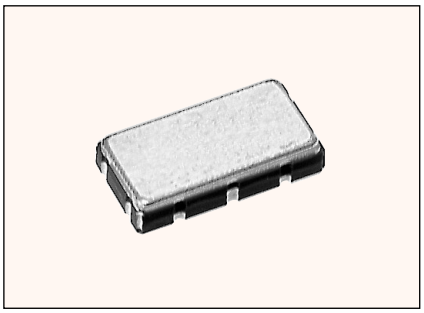






(2002. 6.)

TOYOCOM

Surface Acoustic Wave Filter (SAW Filter)



# TQS-462A-7R

## Features

- Miniature size : 9.1(W) x 4.8(D) x 1.55(H)mm
- High attenuation
- High selectivity

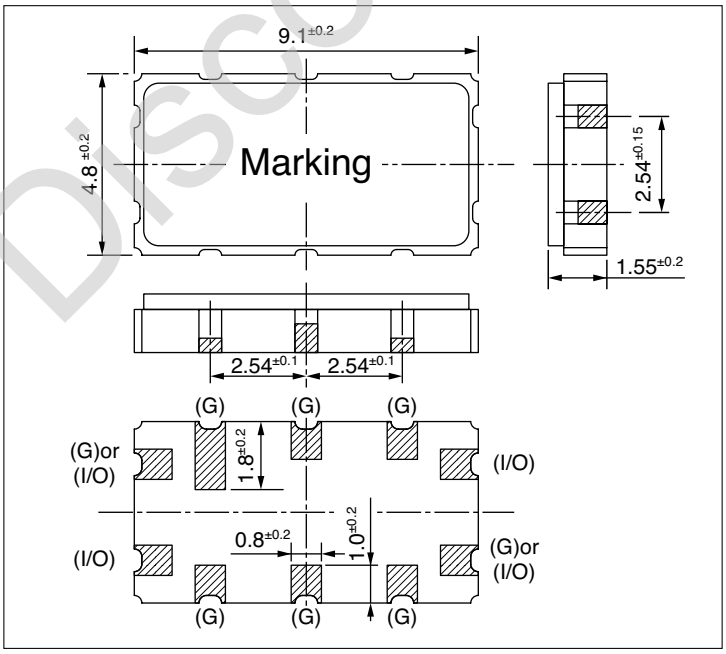
## Application

- IF filter for Cellular Phone
  CDMA system

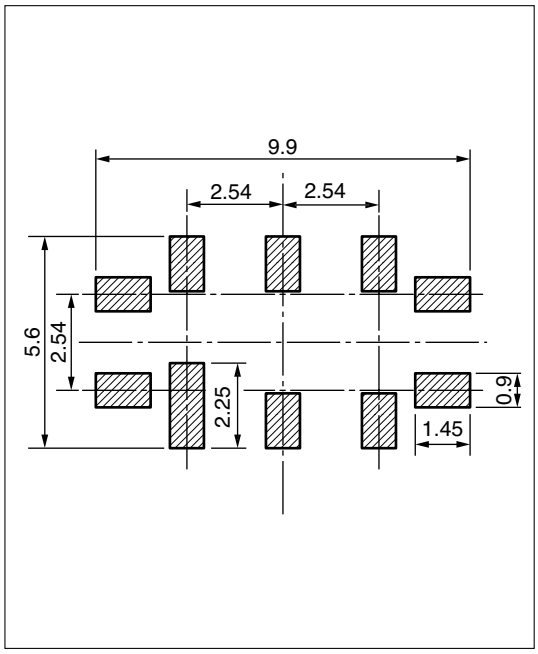
## Specifications

| Type | | TQS-462A-7R |
|---|---|---|
| Nominal frequency [fo] | | 183.6 MHz |
| 5dB Pass band (Relative to I.L. at fo) | | fo ± 0.62 MHz min. |
| Insertion loss (at fo) | | 9.0 dB max. |
| Ripple (peak to peak within fo ± 300 kHz) | | 0.7 dB max. |
| Group delay distortion (within fo± 300 kHz) | | 0.6 μs max. |
| Phase linearity (within fo ± 600 kHz) | | 4.0°RMS max. |
| Stop band attenuation<br>(Referred to I.L. at fo)<br>at fo ± 0.9 MHz<br>at fo ± 1.25 MHz<br>at fo ± 1.70 MHz<br>at fo ± 2.05 MHz<br>at fo ± 9.00 MHz | | <br><br>33 dB min.<br>33 dB min.<br>33 dB min.<br>33 dB min.<br>40 dB min. |
| Terminating impedance | Input | Balanced or Unbalanced : 500 Ω // -16 pF |
| | Output | Balanced or Unbalanced : 380 Ω // -14 pF |
| Operating temperature range | | -30 °C to +85 °C |

## Package Outlines [Dimensions in mm]




## Footprint [Dimensions in mm]



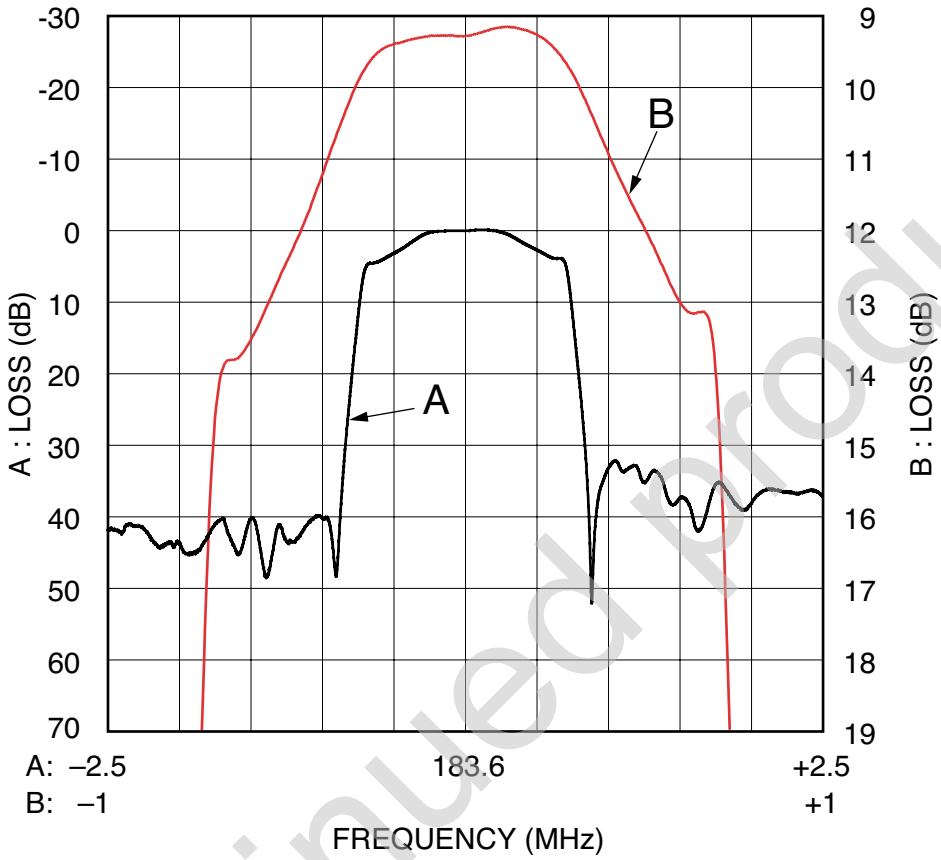



(2001.11.)

**IF Filter for Cellular Phone**
**CDMA system**

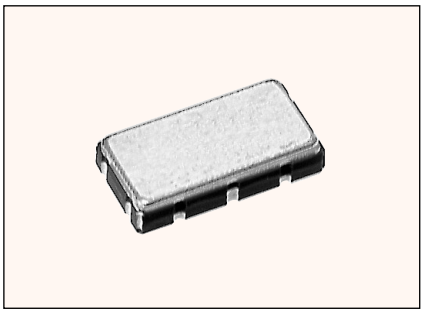
**TQS-462A-7R**
**183.6 MHz**

## Electrical Data



TOYOCOM

Surface Acoustic Wave Filter (SAW Filter)



# TQS-462B-7R

## Features

- Miniature size : 9.1(W) x 4.8(D) x 1.55(H)mm
- High attenuation
- High selectivity

## Application

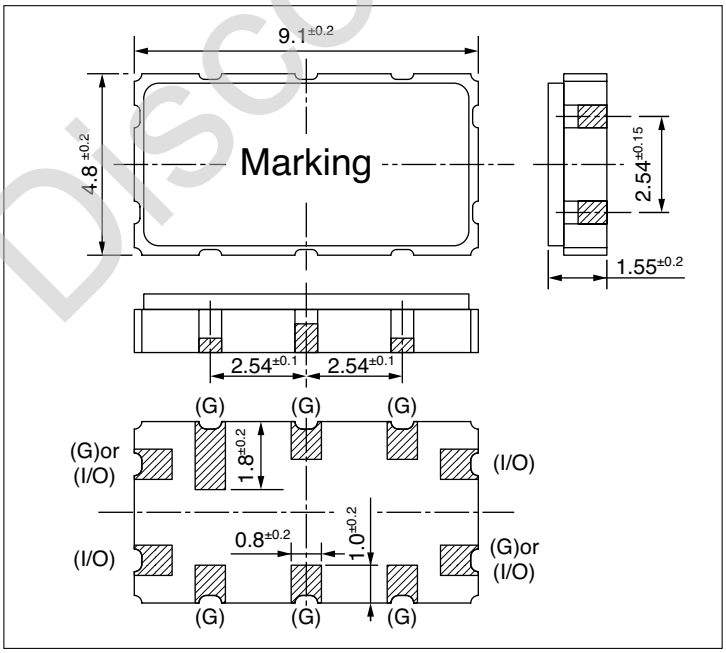
- IF filter for Cellular Phone
  CDMA system



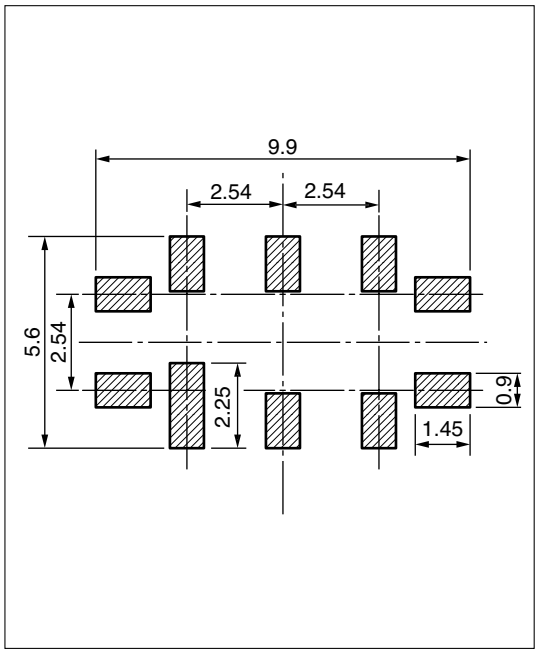
## Specifications

| Type | | TQS-462B-7R |
|---|---|---|
| Nominal frequency [fo] | | 183.6 MHz |
| 5dB Pass band (Relative to I.L. at fo) | | fo ± 610 kHz min. |
| Insertion loss (at fo) | | 11.0 dB max. |
| Passband deviation (within fo±300 kHz) | | 0.8 dB max. |
| Phase linearity (within fo ± 615 kHz) | | 3.2°RMS max. |
| Stop band attenuation<br>(Referred to I.L. at fo)<br>at fo ± 0.9 MHz<br>at fo ± 1.25 MHz<br>at fo ± 1.70 MHz<br>at fo ± 2.05 MHz<br>f < fo-9.00 MHz or f > fo+9.00 MHz | | <br><br>33 dB min.<br>35 dB min.<br>35 dB min.<br>35 dB min.<br>40 dB min. |
| Terminating impedance | Input | Balanced or Unbalanced : 660 Ω // -12 7 pF |
| | Output | Balanced or Unbalanced : 720 Ω // -13.8 pF |
| Operating temperature range | | -30 °C to +85 °C |

## Package Outlines [Dimensions in mm]




## Footprint [Dimensions in mm]

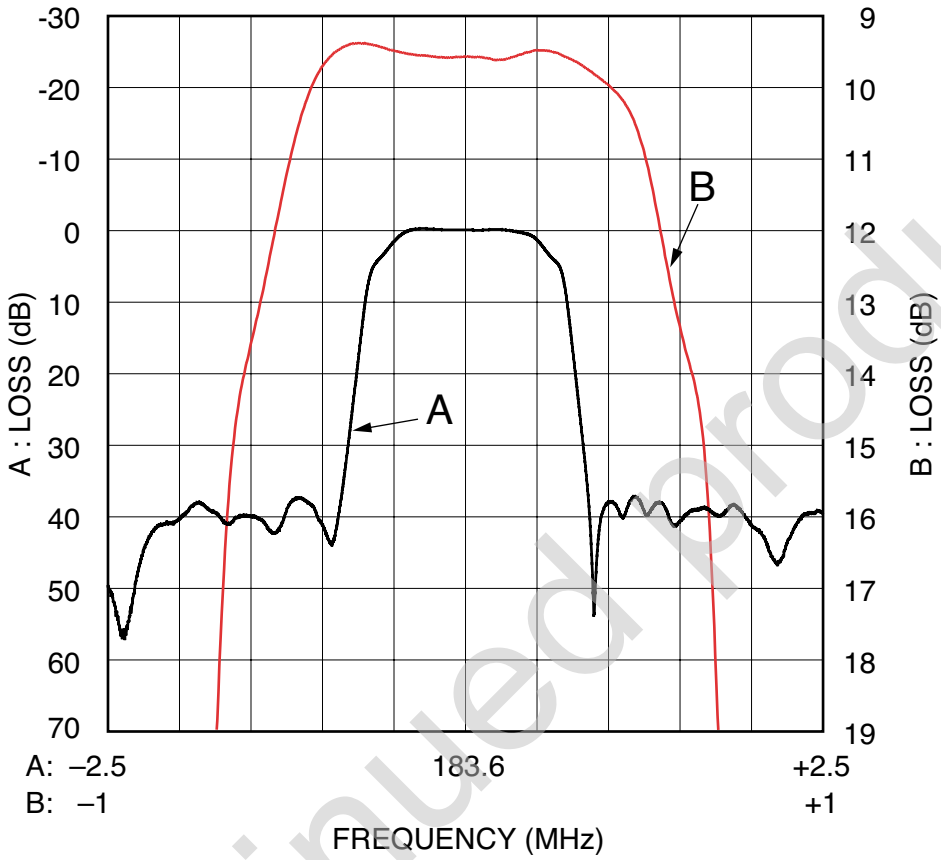



(2001.11.)

**IF Filter for Cellular Phone**
**CDMA system**

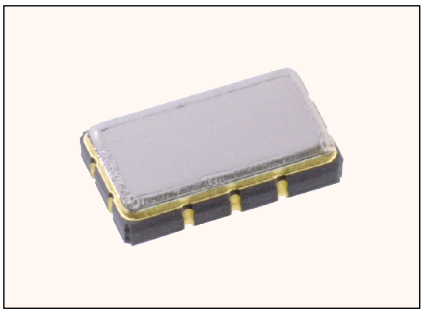
**TQS-462B-7R**
**183.6 MHz**

## Electrical Data



TOYOCOM

## Surface Acoustic Wave Filter (SAW Filter)



# TQS-465AA-7R

## Features

- Miniature size : 6.0(W) x 3.5(D) x 1.15(H)mm
- High attenuation
- High selectivity

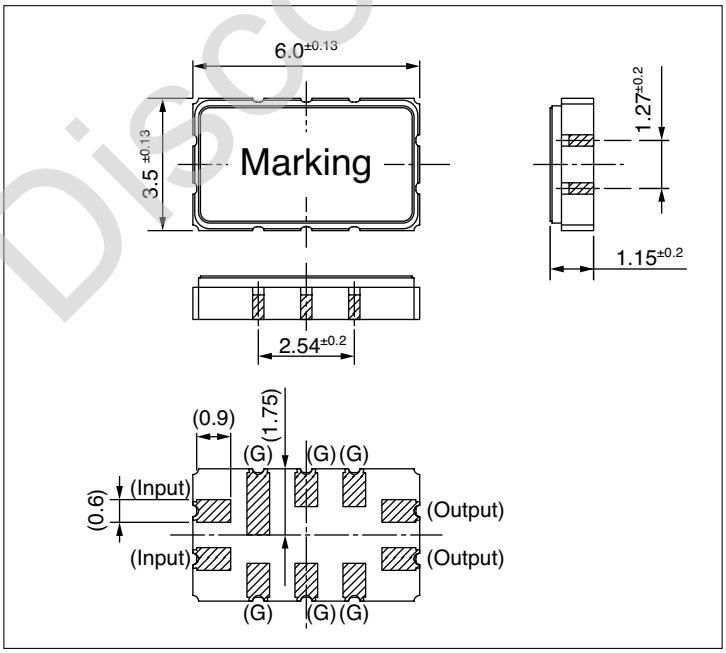
## Application

- IF filter for Cellular Phone
  CDMA system

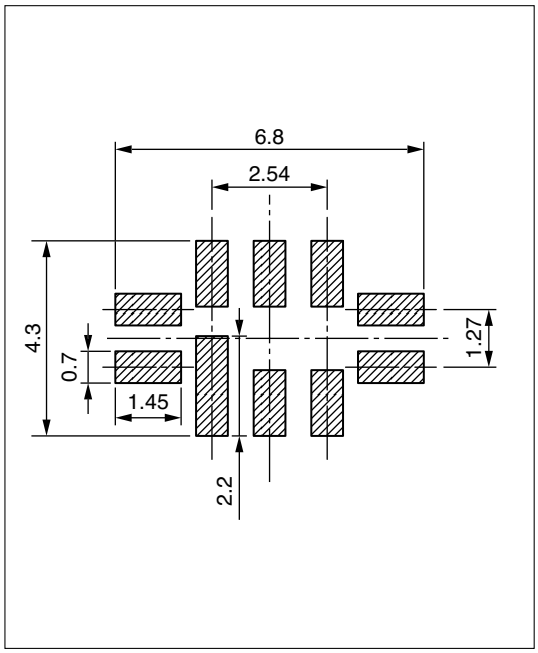
## Specifications

| Type | | TQS-465AA-7R | typ. |
|---|---|---|---|
| Nominal frequency [fo] | | 183.6 MHz | |
| 5dB Pass band (Relative to I.L. at fo) | | fo ± 615 kHz min. | fo ± 663 kHz |
| Insertion loss (at fo)<br>Including losses in matchng circuit | | 11.0 dB max.<br>(1) Matching inductor size is 1008 (inch)<br>(2) Matching inductor size is 0603 (inch) | 8.0 dB (1)<br>9.0 dB (2) |
| Passband deviation (within fo±300 kHz) | | 1.2 dB max. | 0.4 dB |
| Pass band ripple (within fo±300 kHz) | | 1.2 dB max. | 0.4 dB |
| Phase linearity (within fo ± 615 kHz) | | 3.2°RMS max. | 1.9°RMS |
| Stop band attenuation<br>(Referred to I.L. at fo)<br>at fo ± 0.9 MHz<br>at fo ± 1.25 MHz<br>at fo ± 1.70 MHz<br>at fo ± 2.05 MHz<br>10MHz ≤ f ≤ fo-9.0 MHz<br>fo+9.0MHz ≤ f ≤ fo+15.0 MHz<br>fo+15.0MHz < f ≤ fo+100 MHz | | <br><br>33 dB min.<br>33 dB min.<br>33 dB min.<br>33 dB min.<br>40 dB min.<br>35 dB min.<br>45 dB min. | <br><br>40 dB<br>41 dB<br>43 dB<br>38 dB<br>45 dB<br>41 dB<br>50 dB |
| Terminating impedance | Input | Balanced or Unbalanced : 1020 Ω // -2.5 pF | |
| | Output | Balanced or Unbalanced : 810 Ω // -4.4 pF | |
| Operating temperature range | | -30 °C to +85 °C | |

## Package Outlines [Dimensions in mm]




## Footprint [Dimensions in mm]






(2002.12.)

**IF Filter for Cellular Phone**
**CDMA system**

**TQS-465AA-7R**
**183.6 MHz**

## Electrical Data