

Data Sheet B4233





**Low-Loss Dual Band Filter for Mobile Communication** 

390,0 / 420,0 MHz

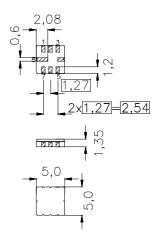
**Data Sheet** 



#### Ceramic package QCC8C

#### **Features**

- Low-loss filter for TETRA
- Usable passband: 20 MHz
- Ceramic package for Surface Mounted Technology (SMT)
- RoHS compliant



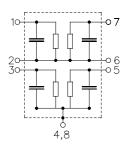
#### **Terminals**

■ Ni, gold-plated

Dimensions in mm, approx. weight 0,10 g

## Pin configuration

| 1    | Input [Filter 1]  |
|------|-------------------|
| 3    | Input [Filter 2]  |
| 5    | Output [Filter 2] |
| 7    | Output [Filter 1] |
| 2, 6 | To be grounded    |
| 4.8  | Case ground       |



| Туре  | Ordering code     | Marking and Package according to | Packing according to |
|-------|-------------------|----------------------------------|----------------------|
| B4233 | B39421-B4233-U310 | C61157-A7-A56                    | F61074-V8070-Z000    |

## Electrostatic Sensitive Device (ESD)

## **Maximum ratings**

| Operable temperature range | Τ            | - 30 / + 85        | °C  |                          |
|----------------------------|--------------|--------------------|-----|--------------------------|
| Storage temperature range  | $T_{stg}$    | <b>- 40 / + 85</b> | °C  |                          |
| DC voltage                 | $V_{\rm DC}$ | 3                  | V   |                          |
| ESD voltage                | $V^*_{ESD}$  | 100*               | V   | Machine Model, 10 pulses |
| Source power (CW)          | $P_{\rm S}$  | 12                 | dBm |                          |

<sup>\*-</sup>acc. to JESD22-A115A (Machine Model), 10 negative & 10 positive pulses



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#### **Characteristics Filter 1**

Operating temperature range:  $T = +25^{\circ}\text{C}$ Terminating source impedance:  $Z_{\text{S}} = 50 \ \Omega$ Terminating load impedance:  $Z_{\text{L}} = 50 \ \Omega$ 

|                               |                       | min. | typ.  | max. |     |
|-------------------------------|-----------------------|------|-------|------|-----|
| Center frequency              | f <sub>C</sub>        | _    | 390,0 | _    | MHz |
|                               |                       |      |       |      |     |
| Maximum insertion attenuation | $\alpha_{\text{max}}$ |      |       |      |     |
| 380,0 400,0 MH                | Z                     | _    | 1,9   | 2,2  | dB  |
| Amplitude ripple (p-p)        | Δα                    |      |       |      |     |
| 380,0 400,0 MH                |                       |      | 0,7   | 1,1  | dB  |
| 300,0 400,0 10111             | Z                     |      | 0,7   | 1,1  | ub  |
| Input return loss             |                       |      |       |      |     |
| 380,0 400,0 MH                | Z                     | 10,0 | 11,0  | _    | dB  |
|                               |                       |      |       |      |     |
| Output return loss            |                       |      |       |      |     |
| 380,0 400,0 MH                | Z                     | 10,0 | 12,0  | _    | dB  |
| A.,                           |                       |      |       |      |     |
| Attenuation                   | $\alpha_{abs}$        | 05.0 | 40.0  |      | -ID |
| 0,1 150,0 MH                  |                       | 35,0 | 42,0  | _    | dB  |
| 190,0 200,0 MH                |                       | 30,0 | 41,0  | _    | dB  |
| 228,0 250,0 MH                |                       | 30,0 | 41,0  | _    | dB  |
| 252,0 275,0 MH                |                       | 30,0 | 39,0  | _    | dB  |
| 275,0 287,0 MH                |                       | 33,0 | 37,0  | _    | dB  |
| 304,0 320,0 MH                |                       | 30,0 | 34,0  | _    | dB  |
| 320,0 335,0 MH                |                       | 30,0 | 33,0  | _    | dB  |
| 342,0 360,0 MH                |                       | 20,0 | 25,0  | _    | dB  |
| 418,0 440,0 MH                |                       | 20,0 | 22,0  | _    | dB  |
| 442,0 455,0 MH                |                       | 25,0 | 31,0  | _    | dB  |
| 456,0 480,0 MH                |                       | 30,0 | 39,0  | _    | dB  |
| 492,0 531,0 MH                |                       | 30,0 | 42,0  | _    | dB  |
| 532,0 560,0 MH                |                       | 33,0 | 39,0  | _    | dB  |
| 570,0 600,0 MH                |                       | 25,0 | 35,0  | _    | dB  |
| 632,0 668,0 MH                |                       | 35,0 | 46,0  | _    | dB  |
| 684,01000,0 MH                | Z                     | 27,0 | 34,0  | _    | dB  |



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#### **Characteristics Filter 1**

Operating temperature range:  $T = -30 \text{ to } +60^{\circ}\text{C}$ 

|  |                | min. | typ.  | max. |      |
|--|----------------|------|-------|------|------|
| Center frequency                             | f <sub>C</sub> | _    | 390,0 | _    | MHz  |
| Mandana ta anti-a attanzata                  |                |      |       |      |      |
| Maximum insertion attenuation 380,0 400,0 MH | $\alpha_{max}$ |      | 2,6   | 3,3  | dB   |
| 380,0 400,0 Mi                               | 12             | _    | 2,0   | 3,3  | иь   |
| Amplitude ripple (p-p)                       | Δα             |      |       |      |      |
| 380,0 400,0 MH                               | Ηz             | _    | 1,4   | 2,3  | dB   |
|  |                |      |       |      |      |
| Input return loss                            |                |      |       |      |      |
| 380,0 400,0 MH                               | Ηz             | 10,0 | 11,0  | _    | dB   |
| Output return less                           |                |      |       |      |      |
| Output return loss 380,0 400,0 MH            | -l-z           | 10,0 | 12,0  |      | dB   |
| 300,0 400,0 1                                | 12             | 10,0 | 12,0  |      | uD . |
| Attenuation                                  | $\alpha_{abs}$ |      |       |      |      |
| 0,1 150,0 MH                                 |                | 35,0 | 42,0  | _    | dB   |
| 190,0 200,0 MH                               | Ηz             | 30,0 | 41,0  | _    | dB   |
| 228,0 250,0 MH                               | Ηz             | 30,0 | 41,0  | _    | dB   |
| 252,0 275,0 MH                               | Ηz             | 30,0 | 39,0  | _    | dB   |
| 275,0 287,0 MF                               | Ηz             | 33,0 | 37,0  | _    | dB   |
| 304,0 320,0 MH                               | Ηz             | 30,0 | 33,0  | _    | dB   |
| 320,0 335,0 MH                               | Ηz             | 30,0 | 33,0  | _    | dB   |
| 342,0 360,0 MF                               | Ηz             | 20,0 | 25,0  | _    | dB   |
| 418,0 440,0 MF                               | Ηz             | 20,0 | 21,0  | _    | dB   |
| 442,0 455,0 MH                               | Ηz             | 25,0 | 31,0  | _    | dB   |
| 456,0 480,0 MH                               | Ηz             | 30,0 | 39,0  | _    | dB   |
| 492,0 531,0 MH                               | Ηz             | 30,0 | 42,0  | _    | dB   |
| 532,0 560,0 MH                               | Ηz             | 33,0 | 39,0  | _    | dB   |
| 570,0 600,0 MH                               | Ηz             | 25,0 | 35,0  | _    | dB   |
| 632,0 668,0 MH                               | Ηz             | 35,0 | 46,0  | _    | dB   |
| 684,01000,0 MH                               | Ηz             | 27,0 | 34,0  | _    | dB   |



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**Data Sheet** 



#### **Characteristics Filter 1**

Operating temperature range:  $T = -30 \text{ to } +85^{\circ}\text{C}$ 

|                               |                    | min. | typ.  | max. |     |
|-------------------------------|--------------------|------|-------|------|-----|
| Center frequency              | $f_{\rm c}$        | _    | 390,0 | _    | MHz |
| Maximum insertion attenuation |                    |      |       |      |     |
| 380,0 400,0 MH                | $\alpha_{max}$     |      | 2,7   | 3,3  | dB  |
| 300,0 400,0 10111             | _                  | _    | 2,1   | 3,3  | ub  |
| Amplitude ripple (p-p)        | Δα                 |      |       |      |     |
| 380,0 400,0 MH                | Z                  | _    | 1,5   | 2,3  | dB  |
|                               |                    |      |       |      |     |
| Input return loss             |                    |      |       |      |     |
| 380,0 400,0 MH                | Z                  | 10,0 | 11,0  | _    | dB  |
| Output return loss            |                    |      |       |      |     |
| 380,0 400,0 MH                | 7                  | 10,0 | 12,0  | _    | dB  |
| 333,5                         | _                  |      | , 0   |      |     |
| Attenuation                   | $\alpha_{\sf abs}$ |      |       |      |     |
| 0,1 150,0 MH                  | Z                  | 35,0 | 42,0  | _    | dB  |
| 190,0 200,0 MH                |                    | 30,0 | 41,0  | _    | dB  |
| 228,0 250,0 MH                | Z                  | 30,0 | 41,0  | _    | dB  |
| 252,0 275,0 MH                | Z                  | 30,0 | 39,0  | _    | dB  |
| 275,0 287,0 MH                | Z                  | 33,0 | 37,0  | _    | dB  |
| 304,0 320,0 MH                | Z                  | 30,0 | 33,0  | _    | dB  |
| 320,0 335,0 MH                | Z                  | 30,0 | 33,0  | _    | dB  |
| 342,0 360,0 MH                | z                  | 20,0 | 25,0  | _    | dB  |
| 418,0 440,0 MH                | z                  | 20,0 | 21,0  | _    | dB  |
| 442,0 455,0 MH                | z                  | 25,0 | 31,0  | _    | dB  |
| 456,0 480,0 MH                | z                  | 30,0 | 39,0  | _    | dB  |
| 492,0 531,0 MH                | Z                  | 30,0 | 42,0  | _    | dB  |
| 532,0 560,0 MH                | Z                  | 33,0 | 39,0  | _    | dB  |
| 570,0 600,0 MH                | Z                  | 25,0 | 35,0  | _    | dB  |
| 632,0 668,0 MH                | Z                  | 35,0 | 46,0  | _    | dB  |
| 684,01000,0 MH                | Z                  | 27,0 | 34,0  | _    | dB  |



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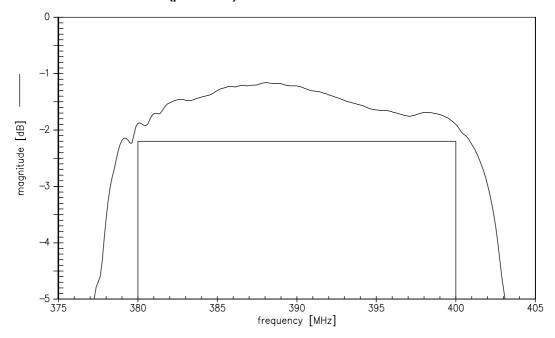
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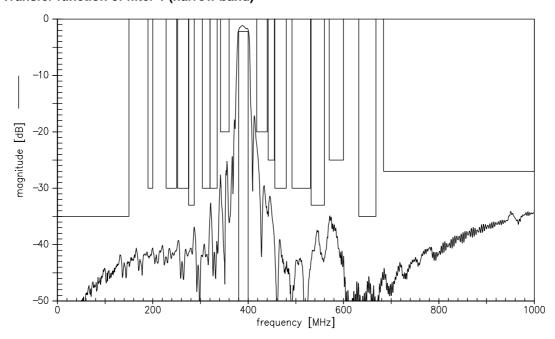
**Data Sheet** 



# Transfer function of filter 1 (passband)



# Transfer function of filter 1 (narrow band)





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390,0 / 420,0 MHz

**Data Sheet** 



#### **Characteristics Filter 2**

 $\begin{array}{lll} \mbox{Operating temperature range:} & T = +25\,^{\circ}\mbox{C} \\ \mbox{Terminating source impedance:} & Z_{\rm S} = 50\,\Omega \\ \mbox{Terminating load impedance:} & Z_{\rm L} = 50\,\Omega \end{array}$ 

|                               |  | min. | typ.  | max. |     |
|-------------------------------|--|------|-------|------|-----|
| Center frequency              | $f_{\rm C}$  | _    | 420,0 | _    | MHz |
| Maximum insertion attenuation |  |      |       |      |     |
| 410,0 430,0                   | $\begin{array}{c} \alpha_{\text{max}} \\ \text{MHz} \end{array}$ |      | 1,9   | 2,2  | dB  |
| 410,0 430,0                   | IVII IZ  | _    | 1,3   | 2,2  | ab  |
| Amplitude ripple (p-p)        | $\Delta \alpha$  |      |       |      |     |
| 410,0 430,0                   | MHz  | _    | 0,6   | 1,0  | dB  |
|                               |  |      |       |      |     |
| Input return loss             |  |      |       |      |     |
| 410,0 430,0                   | MHz  | 10,0 | 11,5  | _    | dB  |
| Output return loss            |  |      |       |      |     |
| -                             | MHz  | 10,0 | 13,5  |      | dB  |
| ,                             |  | ,    | ,     |      |     |
| Attenuation                   | $\alpha_{\text{abs}}$  |      |       |      |     |
| 0,1 150,0                     | MHz  | 35,0 | 42,0  | _    | dB  |
| 204,0 216,0                   | MHz  | 30,0 | 41,0  | _    | dB  |
| •                             | MHz  | 30,0 | 41,0  | _    | dB  |
| 272,0 301,0                   | MHz  | 35,0 | 41,0  | _    | dB  |
| •                             | MHz  | 30,0 | 42,0  | _    | dB  |
| 345,0 360,0                   | MHz  | 25,0 | 31,0  | _    | dB  |
| ·                             | MHz  | 18,0 | 23,0  | _    | dB  |
| 451,0 473,0                   | MHz  | 20,0 | 23,0  | _    | dB  |
| 477,0 491,0                   | MHz  | 25,0 | 35,0  | _    | dB  |
| 492,0 516,0                   | MHz  | 30,0 | 39,0  | _    | dB  |
| •                             | MHz  | 30,0 | 38,0  | _    | dB  |
| 574,0 602,0                   | MHz  | 33,0 | 39,0  | _    | dB  |
| 602,01000,0                   | MHz  | 27,0 | 34,0  | _    | dB  |



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**Characteristics Filter 2** 

Operating temperature range:  $T = -30 \text{ to } +60^{\circ}\text{C}$ 

|                               |        |     |                | min.        | typ.  | max. |     |
|-------------------------------|--------|-----|----------------|-------------|-------|------|-----|
| Center frequency              |        |     | f <sub>C</sub> | _           | 420,0 | _    | MHz |
| Maximum insertion attenuation | on     |     | $\alpha_{max}$ |             |       |      |     |
| 410,0                         | 430,0  | MHz |                | <del></del> | 2,4   | 3,3  | dB  |
| Amplitude ripple (p-p)        |        |     | Δα             |             |       |      |     |
| 410,0                         | 430,0  | MHz |                | <u> </u>    | 1,1   | 2,2  | dB  |
| Input return loss             |        |     |                |             |       |      |     |
| 410,0                         | 430,0  | MHz |                | 10,0        | 11,5  | _    | dB  |
| Output return loss            |        |     |                |             |       |      |     |
| 410,0                         | 430,0  | MHz |                | 10,0        | 13,5  | _    | dB  |
| Attenuation                   |        |     | $\alpha_{abs}$ |             |       |      |     |
| 0,1                           | 150,0  | MHz | abo            | 35,0        | 42,0  | _    | dB  |
| 204,0                         | 216,0  | MHz |                | 30,0        | 41,0  | _    | dB  |
| 246,0                         | 270,0  | MHz |                | 30,0        | 41,0  | _    | dB  |
| 272,0                         | 301,0  | MHz |                | 35,0        | 41,0  | _    | dB  |
| 328,0                         | 344,0  | MHz |                | 30,0        | 35,0  | _    | dB  |
| 345,0                         | 360,0  | MHz |                | 25,0        | 31,0  | _    | dB  |
| 369,0                         | 387,0  | MHz |                | 18,0        | 23,0  | _    | dB  |
| 451,0                         | 473,0  | MHz |                | 20,0        | 21,0  | _    | dB  |
| 477,0                         | 491,0  | MHz |                | 25,0        | 35,0  | _    | dB  |
| 492,0                         | 516,0  | MHz |                | 30,0        | 39,0  | _    | dB  |
| 532,0                         | 573,0  | MHz |                | 30,0        | 38,0  | _    | dB  |
| 574,0                         | 602,0  | MHz |                | 33,0        | 39,0  | _    | dB  |
| 602,0                         | 1000,0 | MHz |                | 27,0        | 34,0  | _    | dB  |



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390,0 / 420,0 MHz

**Data Sheet** 

**Characteristics Filter 2** 

Operating temperature range:  $T = -30 \text{ to } +85^{\circ}\text{C}$ 

|                                |                    | min. | typ.  | max. |     |
|--------------------------------|--------------------|------|-------|------|-----|
| Center frequency               | f <sub>c</sub>     |      | 420,0 | _    | MHz |
|                                |                    |      |       |      |     |
| Maximum insertion attenuation  | $\alpha_{\sf max}$ |      |       |      |     |
| 410,0 430,0                    | MHz                |      | 2,5   | 3,3  | dB  |
| Amplitude ripple (p-p)         | $\Delta \alpha$    |      |       |      |     |
|                                | MHz                | _    | 1,2   | 2,2  | dB  |
|                                |                    |      |       |      |     |
| Input return loss              |                    |      |       |      |     |
| 410,0 430,0                    | MHz                | 10,0 | 11,5  | _    | dB  |
| Output return less             |                    |      |       |      |     |
| Output return loss 410,0 430,0 | MHz                | 10,0 | 13,5  |      | dB  |
| 410,0 430,0                    | IVII IZ            | 10,0 | 13,3  | _    | UD  |
| Attenuation                    | $lpha_{abs}$       |      |       |      |     |
| 0,1 150,0                      | MHz                | 35,0 | 42,0  | _    | dB  |
| 204,0 216,0                    | MHz                | 30,0 | 41,0  | _    | dB  |
| 246,0 270,0                    | MHz                | 30,0 | 41,0  | _    | dB  |
| 272,0 301,0                    | MHz                | 35,0 | 41,0  | _    | dB  |
| 328,0 344,0                    | MHz                | 30,0 | 35,0  | _    | dB  |
| 345,0 360,0                    | MHz                | 25,0 | 31,0  | _    | dB  |
| 369,0 387,0                    | MHz                | 18,0 | 23,0  | _    | dB  |
| 451,0 473,0                    | MHz                | 20,0 | 21,0  | _    | dB  |
| 477,0 491,0                    | MHz                | 25,0 | 35,0  | _    | dB  |
| 492,0 516,0                    | MHz                | 30,0 | 39,0  | _    | dB  |
| 532,0 573,0                    | MHz                | 30,0 | 38,0  | _    | dB  |
| 574,0 602,0                    | MHz                | 33,0 | 39,0  | _    | dB  |
| 602,01000,0                    | MHz                | 27,0 | 34,0  | _    | dB  |



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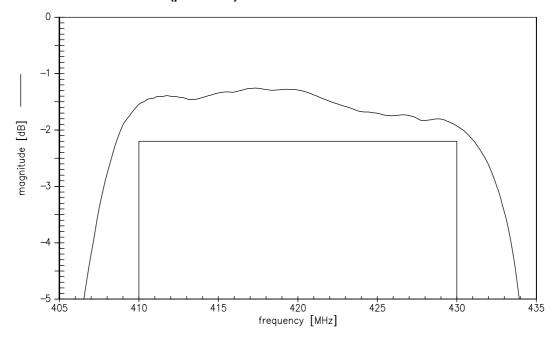
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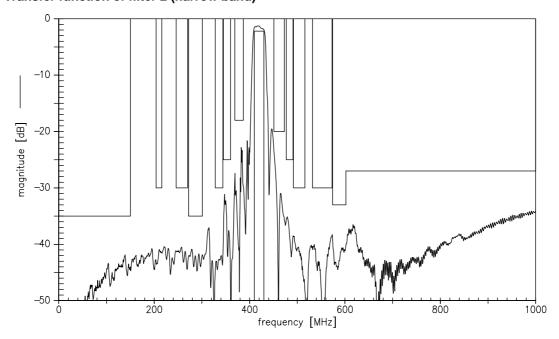
**Data Sheet** 



# Transfer function of filter 2 (passband)



# Transfer function of filter 2 (narrow band)





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## Published by EPCOS AG Surface Acoustic Wave Components Division, SAW COM WT PD P.O. Box 80 17 09, 81617 Munich, GERMANY

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