



# IF Filters for Narrowband Cellular Phones

## Series/Type: B4864

The following products presented in this data sheet are being withdrawn.

Ordering Code	Substitute Product	Date of Withdrawal	Deadline Last Orders	Last Shipments
B39181B4864Z710		14.06.2006	31.08.2006	30.09.2006

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SAW Components

B4864

Low Loss Filter for Mobile Communication

183,60 MHz

Data Sheet



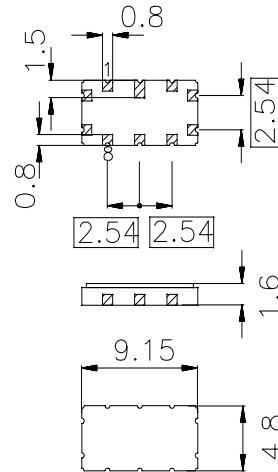
**Features**

- Low-loss IF filter for mobile telephone
- Channel selection in AMPS systems
- Filter surface passivated
- Balanced or unbalanced operation possible
- Package for **Surface Mounted Technology (SMT)**

**Terminals**

- Ni, gold plated

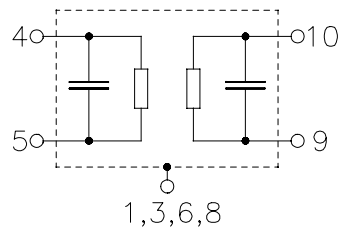
Ceramic package **QCC10B**



Dimensions in mm, approx. weight 0,23 g

**Pin configuration**

- |         |                                  |
|---------|----------------------------------|
| 10      | Input                            |
| 5       | Output                           |
| 9       | Balanced input or input ground   |
| 4       | Balanced output or output ground |
| 1,3,6,8 | Case ground                      |
| 2,7     | Not connected                    |



Type	Ordering code	Marking and Package according to	Packing according to
B4864	B39181-B4864-Z710	C61157-A7-A49	F61064-V8035-Z000

Electrostatic Sensitive Device (ESD)

**Maximum ratings**

Operable temperature range	$T$	- 25/+ 75	°C
Storage temperature range	$T_{stg}$	- 40/+ 85	°C
DC voltage	$V_{DC}$	13	V
Source power	$P_s$	10	dBm



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**Characteristics**

Operating temperature range:  $T = -25^{\circ}\text{C} \dots 75^{\circ}\text{C}$   
 Terminating source impedance:  $Z_S = 410 \Omega \parallel -0,4 \text{ pF}$   
 Terminating load impedance:  $Z_L = 410 \Omega \parallel -0,4 \text{ pF}$

		<b>min.</b>	<b>typ.</b>	<b>max.</b>	
<b>Nominal center frequency</b>	$f_N$	—	183,60	—	MHz
<b>Filter bandwidth at -5 dB</b>		+/-11	62	—	kHz
<b>Minimum insertion attenuation</b> (including losses in the matching network without loss of the balun)	$\alpha_{\min}$	—	4,8	6,0	dB
<b>Group delay ripple (p-p)</b> $f_N - 13,0 \text{ kHz} \dots f_N + 13,0 \text{ kHz}$	$\Delta\tau$	—	2,0	10,0	$\mu\text{s}$
<b>Relative attenuation (relative to <math>\alpha_{\min}</math>)</b>	$\alpha_{\text{rel}}$				
$f_N - 11,0 \text{ kHz}$		—	0,5	5	dB
$f_N + 11,0 \text{ kHz}$		—	0,5	5	dB
$f_N - 120,0 \text{ kHz} \dots f_N - 60,0 \text{ kHz}$		11	30	—	dB
$f_N + 60,0 \text{ kHz} \dots f_N + 120,0 \text{ kHz}$		11	24	—	dB
$f_N \pm 120,0 \text{ kHz} \dots f_N \pm 130,0 \text{ kHz}$		43	50	—	dB
$f_N \pm 130,0 \text{ kHz} \dots f_N \pm 360,0 \text{ kHz}$		45	55	—	dB
$f_N \pm 360,0 \text{ kHz} \dots f_N \pm 1,4 \text{ MHz}$		40	60	—	dB
<b>Impedance within the passband</b>					
Input: $Z_{\text{IN}} = R_{\text{IN}} \parallel C_{\text{IN}}$		—	410 $\parallel$ 0,4	—	$\Omega \parallel \text{pF}$
Output: $Z_{\text{OUT}} = R_{\text{OUT}} \parallel C_{\text{OUT}}$		—	410 $\parallel$ 0,4	—	$\Omega \parallel \text{pF}$
<b>Temperature coefficient of frequency</b> <sup>1)</sup>	$TC_f$	—	-0,036	—	ppm/K <sup>2</sup>
<b>Turnover temperature</b>	$T_0$	—	25	—	$^{\circ}\text{C}$

<sup>1)</sup> Temperature dependence of  $f_c$ :  $f_c(T) = f_c(T_0)(1 + TC_f(T - T_0)^2)$



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**Characteristics**

Operating temperature range:  $T = -30^{\circ}\text{C} \dots 80^{\circ}\text{C}$   
 Terminating source impedance:  $Z_S = 410 \Omega \parallel -0,4 \text{ pF}$   
 Terminating load impedance:  $Z_L = 410 \Omega \parallel -0,4 \text{ pF}$

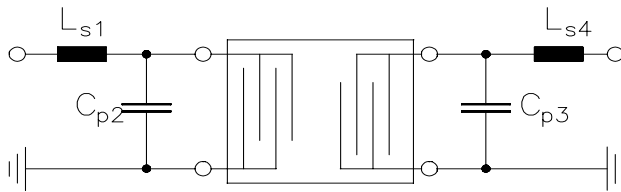
		min.	typ.	max.	
<b>Nominal center frequency</b>	$f_N$	—	183,60	—	MHz
<b>Filter bandwidth at -5 dB</b>		+/-11	62	—	kHz
<b>Minimum insertion attenuation</b> (including losses in the matching network without loss of the balun)	$\alpha_{\min}$	—	4,8	6,0	dB
<b>Group delay ripple (p-p)</b> $f_N - 13,0 \text{ kHz} \dots f_N + 13,0 \text{ kHz}$	$\Delta\tau$	—	2,0	10,0	$\mu\text{s}$
<b>Relative attenuation (relative to <math>\alpha_{\min}</math>)</b>	$\alpha_{\text{rel}}$				
$f_N - 11,0 \text{ kHz}$		—	0,5	5	dB
$f_N + 11,0 \text{ kHz}$		—	0,5	5	dB
$f_N - 120,0 \text{ kHz} \dots f_N - 60,0 \text{ kHz}$		8	30	—	dB
$f_N + 60,0 \text{ kHz} \dots f_N + 120,0 \text{ kHz}$		8	24	—	dB
$f_N \pm 120,0 \text{ kHz} \dots f_N \pm 130,0 \text{ kHz}$		40	50	—	dB
$f_N \pm 130,0 \text{ kHz} \dots f_N \pm 360,0 \text{ kHz}$		42	55	—	dB
$f_N \pm 360,0 \text{ kHz} \dots f_N \pm 1,4 \text{ MHz}$		40	60	—	dB
<b>Impedance within the passband</b>					
Input: $Z_{\text{IN}} = R_{\text{IN}} \parallel C_{\text{IN}}$		—	410 $\parallel$ 0,4	—	$\Omega \parallel \text{pF}$
Output: $Z_{\text{OUT}} = R_{\text{OUT}} \parallel C_{\text{OUT}}$		—	410 $\parallel$ 0,4	—	$\Omega \parallel \text{pF}$
<b>Temperature coefficient of frequency <sup>1)</sup></b>	$TC_f$	—	-0,036	—	ppm/K <sup>2</sup>
<b>Turnover temperature</b>	$T_0$	—	25	—	$^{\circ}\text{C}$

<sup>1)</sup> Temperature dependance of  $f_c$ :  $f_c(T) = f_c(T_0)(1 + TC_f(T - T_0)^2)$



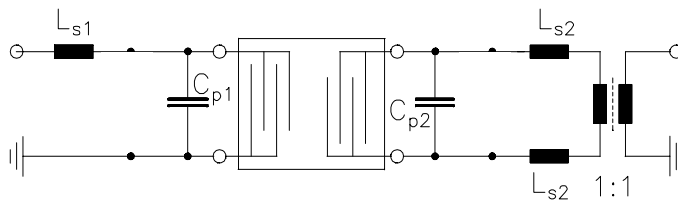
**Recommended pin configurations / test matching networks:**

**a) single-ended 50Ω / single-ended 50Ω**



**Input :** Pin 10  
**Output :** Pin 5  
 $L_{s1} = 100 \text{ nH}$   
 $C_{p2} = 3,9 \text{ pF}$   
 $C_{p3} = 3,9 \text{ pF}$   
 $L_{s4} = 100 \text{ nH}$

**b) single-ended 50Ω / balanced 50Ω**



**Input :** Pin 10  
**Output :** Pins 5 and 4  
 $L_{s1} = 100 \text{ nH}$   
 $C_{p1} = 3,9 \text{ pF}$   
 $C_{p2} = 3,9 \text{ pF}$   
 $L_{s2} = 39 / 47 \text{ nH}$

**Note :**

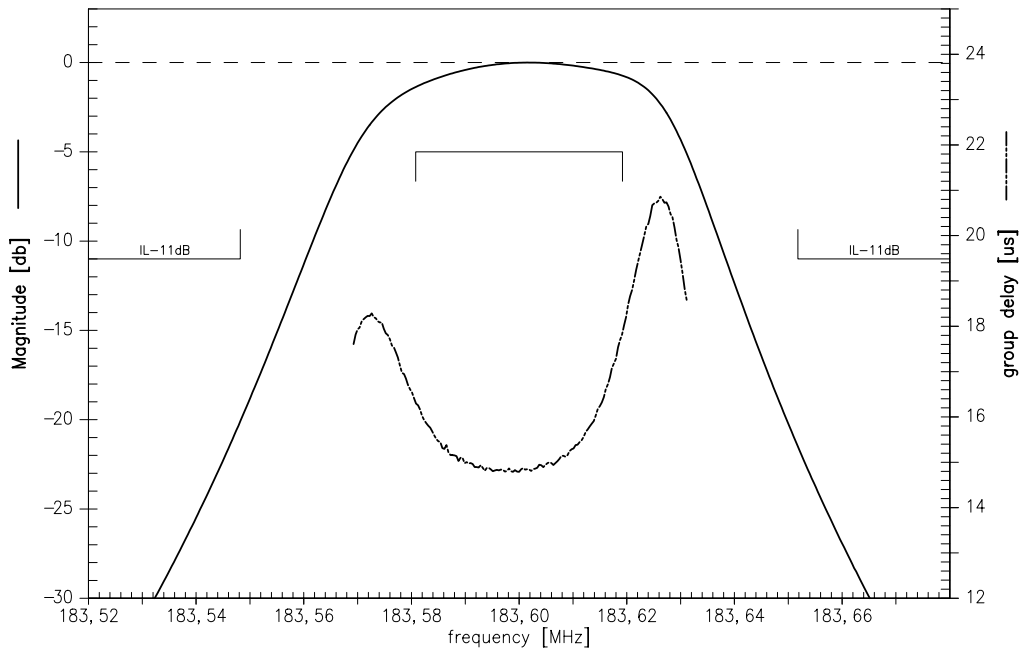
The balanced network is realized using TOKO 1:1 balun B5FL. The insertion attenuation of a balun is 0.3 dB at 183.6 MHz. The loss of the balun is not included in the specified filter insertion attenuation.

The level of ultimate suppression may be limited by electromagnetic feedthrough depending on the layout of the pcb and the arrangement of the matching components.

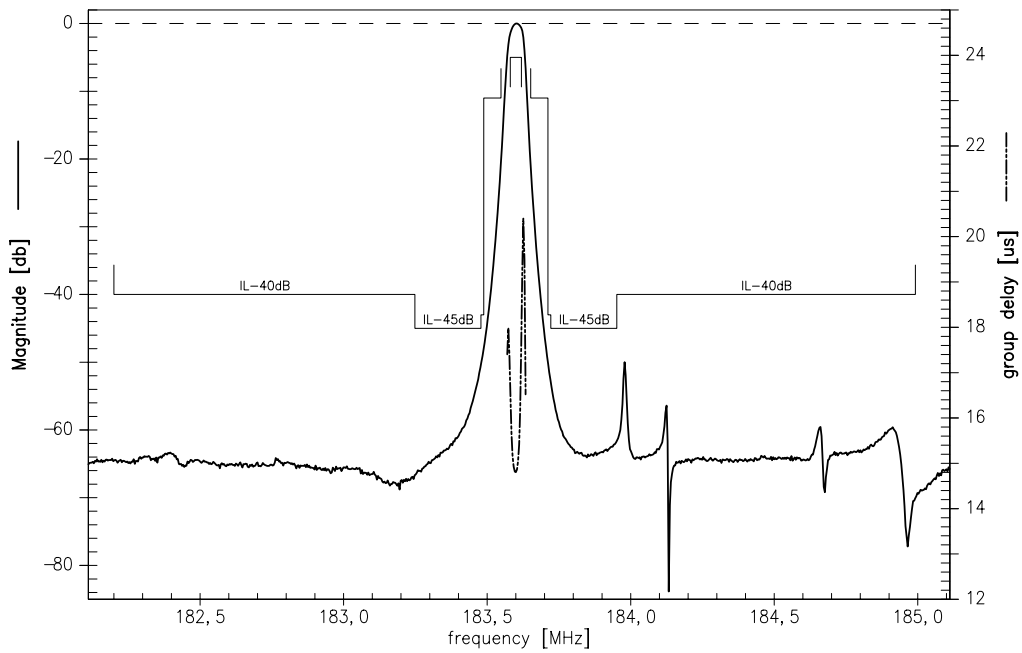
The above mentioned characteristics can be realized either in balanced or in unbalanced mode of operation.



**Normalized transfer function passband** (measured single ended / single ended)



**Normalized transfer function wideband** (measured single ended / single ended)





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