SAW Components

SAW Rx 2in1 filter

GSM 1800 / GSM 1900

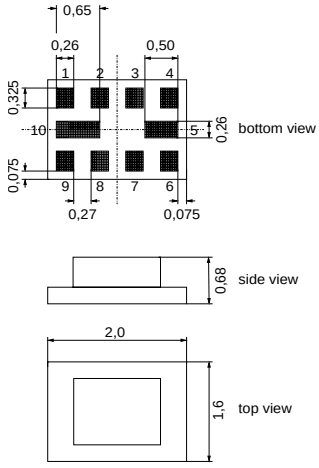
Series/type:	**B9303**
Ordering code:	**B39202B9303G110**
Date:	August 22, 2006
Version:	2.0

Application

- Low-loss 2in1 RF filter for mobile telephone GSM 1800 and GSM 1900 systems, receive path (Rx)
- Usable passband:
  Filter 1 (GSM 1800): 75 MHz
  Filter 2 (GSM 1900): 60 MHz
- Unbalanced to balanced operation for both filters
- Very low insertion attenuation
- Low amplitute ripple
- Impedance transformation from 50 Ω to 150 Ω for both filters
- Suitable for GPRS class 1 to 12

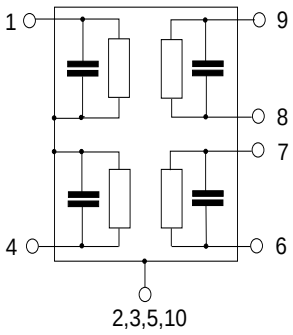
Features

- Package size 2.0 x1.6 x 0.68 mm^3
- Package code QCS10H
- RoHS compatible
- Approx. weight 0.008 g
- Package for **S**urface **M**ount **T**echnology (**SMT**)
- Ni, gold-plated terminals
- **E**lectrostatic **S**ensitive **D**evice (**ESD**)



Pin configuration

- 1 Input [Filter 1]
- 4 Input [Filter 2]
- 6,7 Output, balanced [Filter 2]
- 8,9 Output, balanced [Filter 1]
- 2,3,5,10 Case-ground



Characteristics of Filter 1 (GSM 1800)

Temperature range for specification: T = -20 ˚C to +85 ˚C
Terminating source impedance: Z_S = 50 Ω
Terminating load impedance: Z_L = 150 Ω || 15 nH (balanced)

		min.	typ. @25˚C	max.	
Center frequency	f_C	—	1842.5	—	MHz
Maximum insertion attenuation	α_{max}				
1805.0 ... 1880.0 MHz		—	1.6[1)]	2.3[2)]	dB
Amplitude ripple (p-p)	$\Delta\alpha$				
1805.0 ... 1880.0 MHz		—	0.7	1.3[3)]	dB
Input VSWR					
1805.0 ... 1880.0 MHz		—	1.8	2.2	
Output VSWR					
1805.0 ... 1880.0 MHz		—	1.7	2.2	
Output amplitude balance ($\|S_{31}/S_{21}\|$)					
1805.0 ... 1880.0 MHz		–1.0	-0.5/0.7	1.0	dB
Output phase balance ($\phi(S_{31})-\phi(S_{21})+180^\circ$)					
1805.0 ... 1880.0 MHz		–10	-3/+3	10	°
Attenuation	α				
10.0 ... 902.0 MHz		45	54	—	dB
902.0 ... 940.0 MHz		45	54	—	dB
940.0 ... 1705.0 MHz		28	36	—	dB
1705.0 ... 1785.0 MHz		12[4)]	18	—	dB
1920.0 ... 1980.0 MHz		17	23	—	dB
1980.0 ... 2030.0 MHz		25	30	—	dB
2030.0 ... 2400.0 MHz		28	35	—	dB
2400.0 ... 2500.0 MHz		32	37	—	dB
2500.0 ... 2775.0 MHz		28	31	—	dB
2775.0 ... 2880.0 MHz		38	43	—	dB
2880.0 ... 3610.0 MHz		28	41	—	dB
3610.0 ... 3760.0 MHz		38	41	—	dB
3760.0 ... 5415.0 MHz		28	40	—	dB
5415.0 ... 5640.0 MHz		35	39	—	dB
5640.0 ... 6000.0 MHz		28	39	—	dB

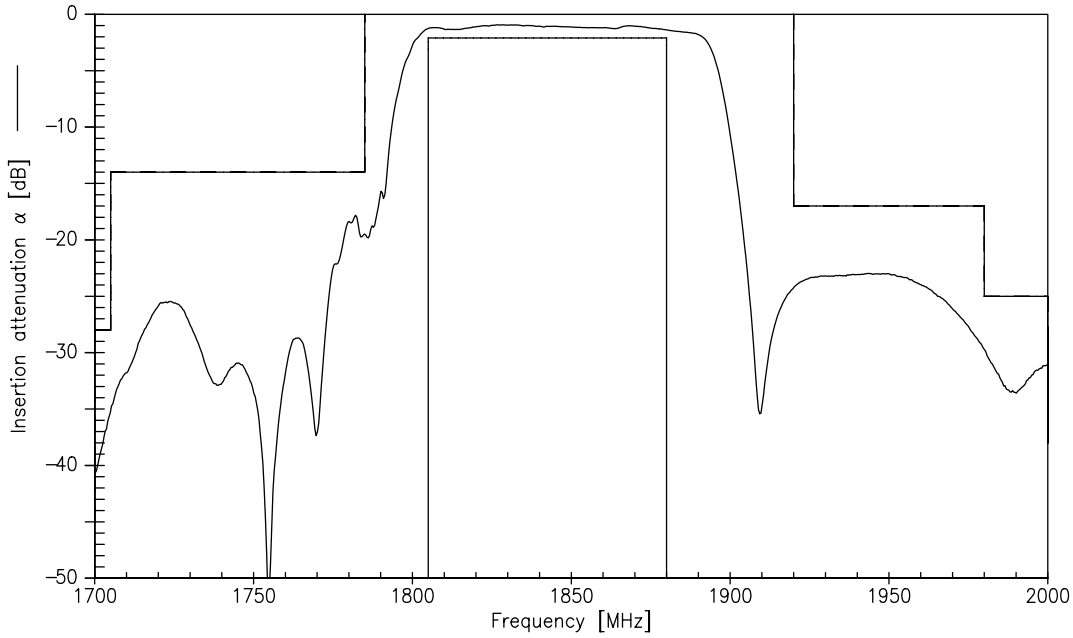
1) Typical value excluding PCB losses of 0.19 dB.
2) 2.1 dB at 25 ˚C.
3) 1.0 dB at 25 ˚C.
4) 14 dB at 25 ˚C.

Maximum ratings of Filter 1

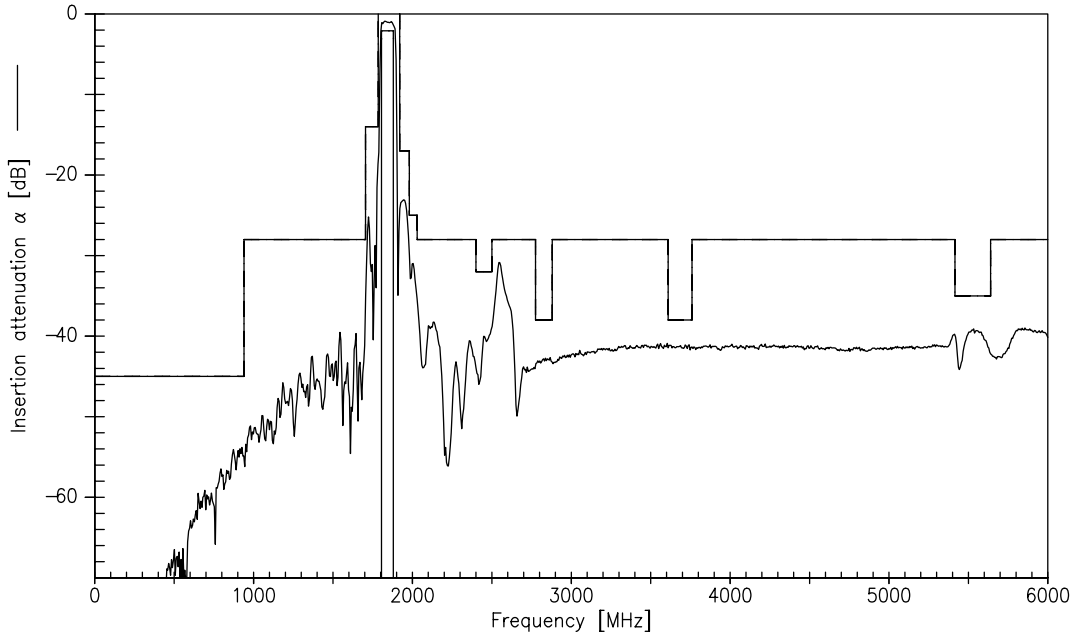
Operable temperature range	T	–40/+85	˚C	
Storage temperature range	T_{stg}	–40/+85	˚C	
DC voltage	V_{DC}	5	V	
ESD voltage	V_{ESD}	50[1)]	V	machine model, 10 pulses
Input power at				
GSM 850, GSM 900	P_{IN}	15	dBm	effective power in the on-state,
GSM 1800, GSM 1900	P_{IN}	15	dBm	duty cycle 4:8
Tx bands				

1) acc. to JESD22-A115A (machine model), 10 negative & 10 positive pulses.

Transfer function of Filter 1



Transfer function of Filter 1 (wideband)



Characteristics of Filter 2 (GSM 1900)

Temperature range for specification: T = –20 ˚C to +85 ˚C
Terminating source impedance: Z_S = 50 Ω
Terminating load impedance: Z_L = 150 Ω || 15 nH (balanced)

		min.	typ. @ 25 ˚C	max.	
Center frequency	f_C	—	1960.0	—	MHz
Maximum insertion attenuation	α_{max}				
1930.0 ... 1990.0 MHz		—	1.6[1)]	2.3[2)]	dB
Amplitude ripple (p-p)	$\Delta\alpha$				
1930.0 ... 1990.0 MHz		—	0.6	1.3[3)]	dB
Input VSWR					
1930.0 ... 1990.0 MHz		—	1.7	2.0	
Output VSWR					
1930.0 ... 1990.0 MHz		—	1.7	2.0	
Output amplitude balance ($\lvert S_{31}/S_{21}\rvert$)					
1930.0 ... 1990.0 MHz		–1.2	–0.7/0.7	1.2	dB
Output phase balance ($\phi(S_{31}) - \phi(S_{21})+180^\circ$)					
1930.0 ... 1990.0 MHz		–10	–5.0/3.0	10	°
Differential to common mode suppression	S_{sc12}				
1930.0 ... 1990.0 MHz		22	30	—	dB
Attenuation	α				
10.0 ... 1200.0 MHz		40	48	—	dB
1200.0 ... 1510.0 MHz		35	43	—	dB
1510.0 ... 1830.0 MHz		30	35	—	dB
1830.0 ... 1850.0 MHz		26	31	—	dB
1850.0 ... 1890.0 MHz		23	27	—	dB
1890.0 ... 1910.0 MHz		12[4)]	17	—	dB
2010.0 ... 2070.0 MHz		12[5)]	15	—	dB
2070.0 ... 2400.0 MHz		21	25	—	dB
2400.0 ... 2500.0 MHz		35	43	—	dB
2500.0 ... 3860.0 MHz		28	35	—	dB
3860.0 ... 3980.0 MHz		35	49	—	dB
3980.0 ... 5790.0 MHz		28	45	—	dB
5790.0 ... 6000.0 MHz		35	45	—	dB

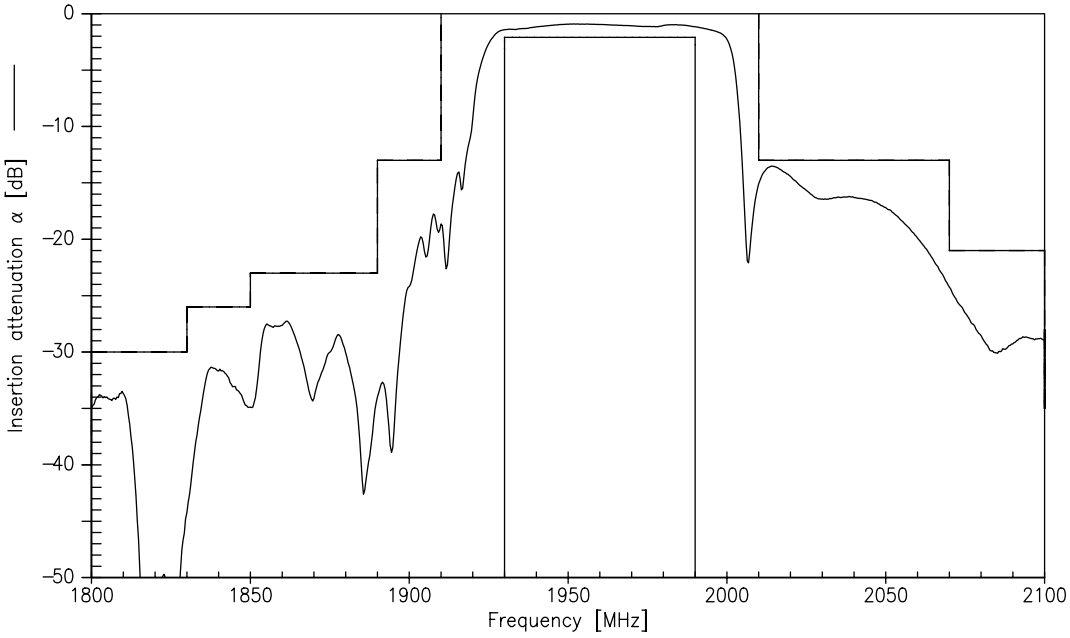
1) Typical value excluding PCB losses of 0.20 dB
2) 2.1 dB max at +25 ˚C
3) 1.0 dB max at +25 ˚C
4) 13 dB max at +25 ˚C
5) 13 dB max at +25 ˚C

Maximum ratings of Filter 2

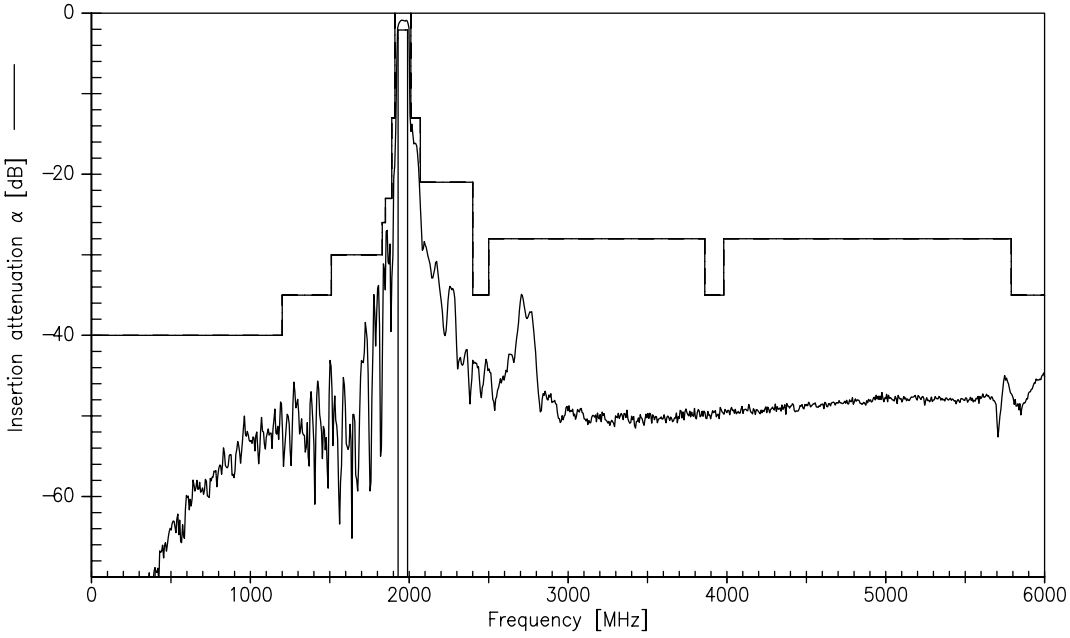
Operable temperature range	T	–40/+85	˚C	
Storage temperature range	T_{stg}	–40/+85	˚C	
DC voltage	V_{DC}	5	V	
ESD voltage	V_{ESD}	50[1)]	V	machine model, 10 pulses
Input power at				
GSM 850, GSM 900	P_{IN}	15	dBm	effective power in the on-state,
GSM 1800, GSM 1900	P_{IN}	15	dBm	duty cycle 4:8
Tx bands				

1) acc. to JESD22-A115A (machine model), 10 negative & 10 positive pulses.

Transfer function of Filter 2



Transfer function of Filter 2 (wideband)



References

Type	B9303
Ordering code	B39202B9303G110
Marking and package	C61157-A7-A141
Packaging	F61074-V8152-Z000
Date code	L_1126
S-parameters	B9303_LB_NB.s3p B9303_LB_WB.s3p B9303_UB_NB.s3p B9303_UB_WB.s3p
Soldering profile	S_6001
RoHS compatible	defined as compatible with the following documents: "DIRECTIVE 2002/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment. 2005/618/EC from April 18th, 2005, amending Directive 2002/95/EC of the European Parliament and of the Council for the purposes of establishing the maximum concentration values for certain hazardous substances in electrical and electronic equipment."

For further information please contact your local EPCOS sales office or visit our webpage at www.epcos.com .

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

For questions on technology, prices and delivery please contact the Sales Offices of EPCOS AG or the international Representatives.

Due to technical requirements components may contain dangerous substances. For information on the type in question please also contact one of our Sales Offices.

Important notes

The following applies to all products named in this publication:

1. Some parts of this publication contain **statements about the suitability of our products for certain areas of application**. These statements are based on our knowledge of typical requirements that are often placed on our products in the areas of application concerned. We nevertheless expressly point out **that such statements cannot be regarded as binding statements about the suitability of our products for a particular customer application.** As a rule, EPCOS is either unfamiliar with individual customer applications or less familiar with them than the customers themselves. For these reasons, it is always ultimately incumbent on the customer to check and decide whether an EPCOS product with the properties described in the product specification is suitable for use in a particular customer application.
2. We also point out that **in individual cases, a malfunction of passive electronic components or failure before the end of their usual service life cannot be completely ruled out in the current state of the art, even if they are operated as specified.** In customer applications requiring a very high level of operational safety and especially in customer applications in which the malfunction or failure of a passive electronic component could endanger human life or health (e.g. in accident prevention or life-saving systems), it must therefore be ensured by means of suitable design of the customer application or other action taken by the customer (e.g. installation of protective circuitry or redundancy) that no injury or damage is sustained by third parties in the event of malfunction or failure of a passive electronic component.
3. The warnings, cautions and product-specific notes must be observed.
4. In order to satisfy certain technical requirements, **some of the products described in this publication may contain substances subject to restrictions in certain jurisdictions (e.g. because they are classed as "hazardous")**. Useful information on this will be found in our Material Data Sheets on the Internet (www.epcos.com/material). Should you have any more detailed questions, please contact our sales offices.
5. We constantly strive to improve our products. Consequently, **the products described in this publication may change from time to time**. The same is true of the corresponding product specifications. Please check therefore to what extent product descriptions and specifications contained in this publication are still applicable before or when you place an order.
   We also **reserve the right to discontinue production and delivery of products**. Consequently, we cannot guarantee that all products named in this publication will always be available.
6. Unless otherwise agreed in individual contracts, **all orders are subject to the current version of the "General Terms of Delivery for Products and Services in the Electrical Industry" published by the German Electrical and Electronics Industry Association (ZVEI)**.
7. The trade names EPCOS, CeraDiode, CSSP, PhaseCap, PhaseMod, SIFI, SIKOREL, SilverCap, SIMID, SIOV, SIP5D, SIP5K, TOPcap, UltraCap, WindCap are **trademarks registered or pending** in Europe and in other countries. Further information will be found on the Internet at www.epcos.com/trademarks.