



SAW Components

SAW Rx 2in1 filter

GSM 850 / GSM 1900

Series/type:	B9310
Ordering code:	B39202B9310G110
Date:	Aug 17, 2006
Version:	2.1



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881.5 / 1960.0 MHz

Data sheet



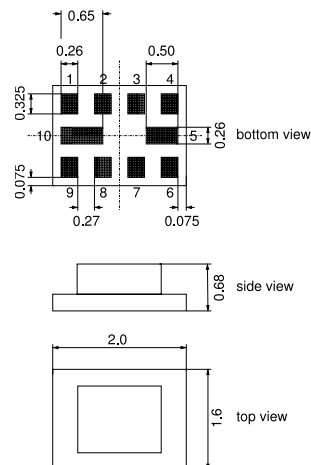
Application

- Low-loss 2-in-1 RF filter for mobile telephone
GSM 850 and GSM 1900 bands, receive path (Rx)
- Usable passband:
Filter 1 (GSM 1900): 60 MHz
Filter 2 (GSM 850): 25 MHz
- Unbalanced to balanced operation for both filters
- Very low insertion attenuation
- Low amplitude ripple
- Impedance transformation from 50 Ω to 150 Ω for both filters
- Suitable for GPRS class 1 to 12



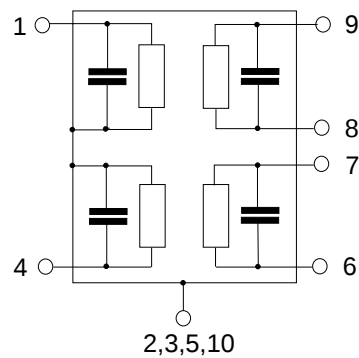
Features

- Package size 2.0 x 1.6 x 0.68 mm³
- Package code QCS10H
- RoHS compatible
- Approximate weight 0.008 g
- Package for **Surface Mount Technology (SMT)**
- Ni, gold-plated terminals
- **Electrostatic Sensitive Device (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 To be grounded





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Characteristics of Filter 1 (GSM 1900)

Temperature range for specification:

$T = -20\text{ °C to }+85\text{ °C}$

Terminating source impedance:

$Z_S = 50\ \Omega$

Terminating load impedance:

$Z_L = 150\ \Omega \parallel 18\text{ nH (balanced)}$

		min.	typ. @ 25 °C	max.	
Center frequency	f_C	—	1960.0	—	MHz
Maximum insertion attenuation	$\alpha_{\max}$	—	1.6 ¹⁾	2.3 ²⁾	dB
1930.0 ... 1990.0 MHz		—	1.6 ¹⁾	2.3 ²⁾	dB
Amplitude ripple (p-p)	$\Delta\alpha$	—	0.6	1.3 ³⁾	dB
1930.0 ... 1990.0 MHz		—	0.6	1.3 ³⁾	dB
Input VSWR		—	1.7	2.0	
1930.0 ... 1990.0 MHz		—	1.7	2.0	
Output VSWR		—	1.7	2.0	
1930.0 ... 1990.0 MHz		—	1.7	2.0	
Output amplitude balance (S_{31} / S_{21})		—1.2	—0.7/0.7	1.2	dB
1930.0 ... 1990.0 MHz		—1.2	—0.7/0.7	1.2	dB
Output phase balance ($\phi(S_{31}) - \phi(S_{21}) + 180^\circ$)		—10	—5.0/3.0	10	°
1930.0 ... 1990.0 MHz		—10	—5.0/3.0	10	°
Differential to common mode suppression	S_{sc12}	22	30	—	dB
1930.0 ... 1990.0 MHz		22	30	—	dB
Attenuation	α				
10.0 ... 1200.0 MHz		40	43	—	dB
1200.0 ... 1510.0 MHz		35	40	—	dB
1510.0 ... 1830.0 MHz		30	35	—	dB
1830.0 ... 1850.0 MHz		26	32	—	dB
1850.0 ... 1890.0 MHz		23	27	—	dB
1890.0 ... 1910.0 MHz		12 ⁴⁾	16	—	dB
2010.0 ... 2070.0 MHz		12 ⁵⁾	15	—	dB
2070.0 ... 2400.0 MHz		21	25	—	dB
2400.0 ... 2500.0 MHz		35	45	—	dB
2500.0 ... 3860.0 MHz		28	32	—	dB
3860.0 ... 3980.0 MHz		35	45	—	dB
3980.0 ... 5790.0 MHz		28	40	—	dB
5790.0 ... 6000.0 MHz		35	41	—	dB

¹⁾ Typical value excluding PCB losses of 0.29 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

Please read *cautions and warnings* and *important notes* at the end of this document.



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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	peak power of GSM signal
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.



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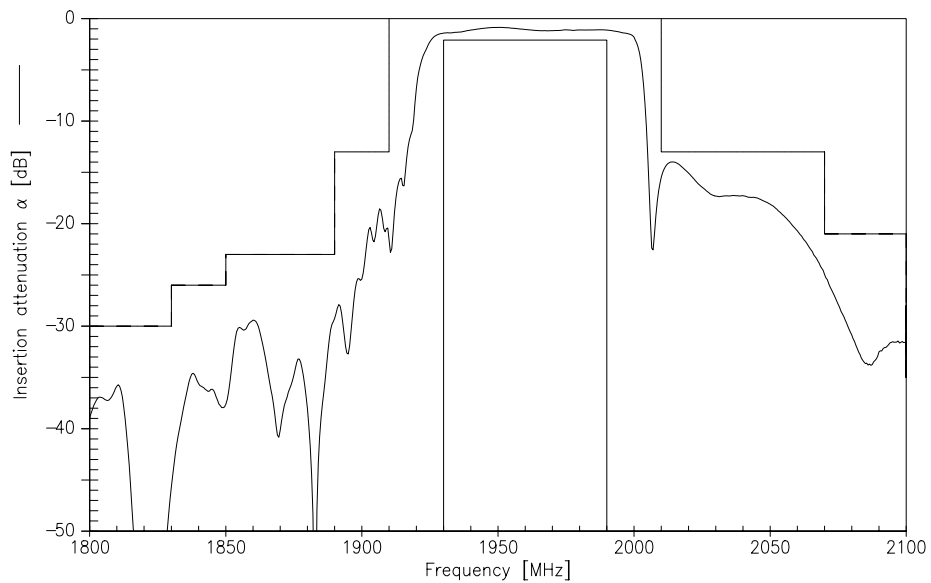
SAW Rx 2in1 filter

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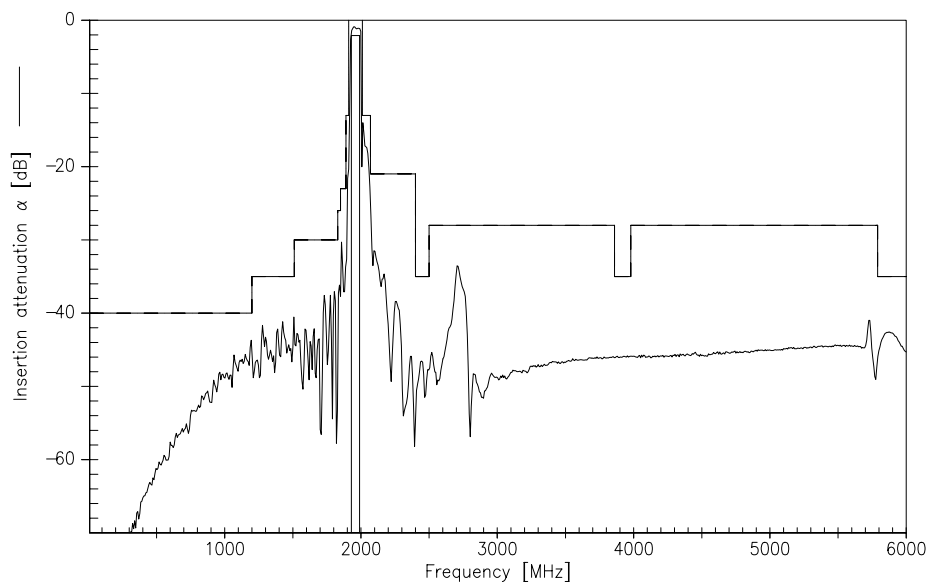
Data sheet



Transfer function of Filter 1



Transfer function of Filter 1 (wideband)



Please read *cautions and warnings* and *important notes* at the end of this document.



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Characteristics of Filter 2 (GSM 850)

Temperature range for specification:

$T = -20\text{ °C to }+85\text{ °C}$

Terminating source impedance:

$Z_S = 50\ \Omega$

Terminating load impedance:

$Z_L = 150\ \Omega \parallel 82\text{ nH (balanced)}$

		min.	typ. @ 25 °C	max.	
Center frequency	f_C	—	881.5	—	MHz
Maximum insertion attenuation	$\alpha_{\max}$				
869.0 ... 894.0 MHz		—	1.2 ¹⁾	1.8 ²⁾	dB
Amplitude ripple (p-p)	$\Delta\alpha$				
869.0 ... 894.0 MHz		—	0.5	1.0 ³⁾	dB
Input VSWR					
869.0 ... 894.0 MHz		—	1.7	2.0	
Output VSWR					
869.0 ... 894.0 MHz		—	1.7	2.0	
Output amplitude balance (S_{31}/S_{21})					
869.0 ... 894.0 MHz		−1.0	−0.2/0.5	1.0	dB
Output phase balance ($\phi(S_{31}) - \phi(S_{21}) + 180^\circ$)					
869.0 ... 894.0 MHz		−10	−4.0/3.0	10	°
Attenuation	α				
10.0 ... 447.0 MHz		45	53	—	dB
447.0 ... 849.0 MHz		30	34	—	dB
914.0 ... 1000.0 MHz		25	27	—	dB
1000.0 ... 1738.0 MHz		28	37	—	dB
1738.0 ... 1788.0 MHz		40	60	—	dB
1788.0 ... 3476.0 MHz		35	50	—	dB
3476.0 ... 6000.0 MHz		40	48	—	dB

¹⁾ Typical value excluding PCB losses of 0.15 dB

²⁾ 1.7 dB max at +25 °C

³⁾ 0.9 dB max at +25 °C



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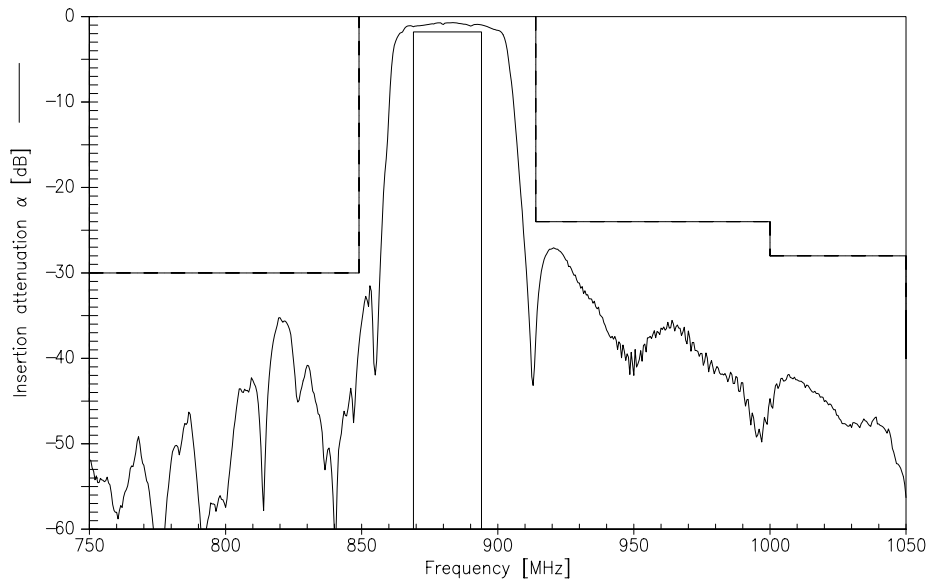
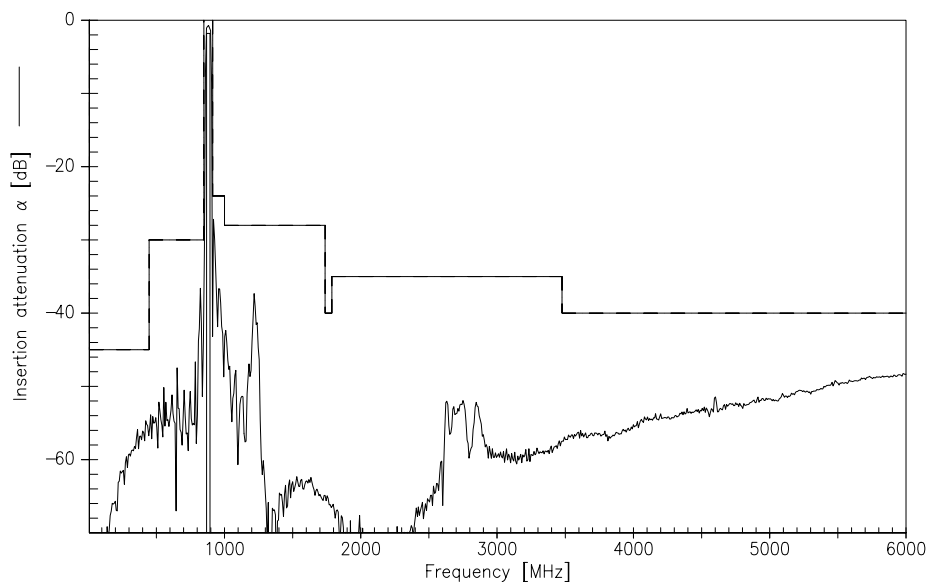
Data sheet



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}	100 ¹⁾	V	machine model, 10 pulses
Input power at				
GSM 850, GSM 900	P _{IN}	15	dBm	peak power of GSM signal
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)**

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**References**

Type	B9310
Ordering code	B39202B9310G110
Marking and package	C61157-A7-A141
Packaging	F61074-V8152-Z000
Date codes	L_1126
S-parameters	B9310_LB_NB.s3p B9310_LB_WB.s3p B9310_UB_NB.s3p B9310_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."

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