



SAW Components

SAW Rx 2in1 filter

GSM 850 / GSM 900

Series/type:	B9304
Ordering code:	B39941B9304G110
Date:	April 24, 2006
Version:	2.0

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Data sheet



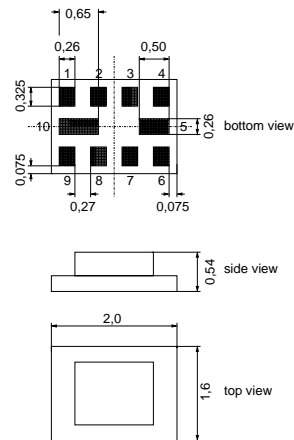
Application

- Low-loss 2-in-1 RF filter for mobile telephone GSM850 and GSM900 bands, receive path (RX)
- Impedance transformation from 50Ω to 100Ω for both filters
- Unbalanced to balanced operation for both filters
- Very low insertion attenuation
- Low amplitude ripple
- Usable passband:
 - Filter 1 (GSM850): 25 MHz
 - Filter 2 (GSM900): 35 MHz
- Suitable for GPRS class 1 to 12



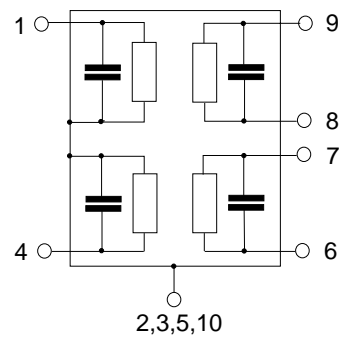
Features

- Package size $2.0 \times 1.6 \times 0.68 \text{ mm}^3$
- 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



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



Data sheet



Characteristics of Filter 1 (GSM850)

Temperature range for specification: T = -10 °C to +85 °C
 Terminating source impedance: Z_S = 50 Ω
 Terminating load impedance: Z_L = 100 Ω

		min.	typ. @ 25 °C	max.	
Center frequency	f _C	—	881.5	—	MHz
Maximum insertion attenuation	α _{max}				
869.0 ... 894.0 MHz		—	1.3	2.1 ¹⁾	dB
Amplitude ripple (p-p)	Δα				
869.0 ... 894.0 MHz		—	0.7	1.4	dB
Input VSWR					
869.0 ... 894.0 MHz		—	1.7	2.1	
Output VSWR					
869.0 ... 894.0 MHz		—	1.8	2.2	
Output amplitude balance (S₃₁/S₂₁)					
869.0 ... 894.0 MHz		-1.0	-0.5/0.5	1.0	dB
Output phase balance (φ(S₃₁) - φ(S₂₁)+180°)					
869.0 ... 894.0 MHz		-5	-2.0/2.0	5	°
Common mode suppression	S _{cs21}				
869.0 ... 894.0 MHz		20	27	—	dB
824.0 ... 995.0 MHz		20	25	—	dB
1648.0 ... 1990.0 MHz		20	40	—	dB
3296.0 ... 3980.0 MHz		20	33	—	dB
Inter band isolation	α				
925.0 ... 960.0 MHz		35	44	—	dB
Attenuation	α				
0.3 ... 480.0 MHz		45	54	—	dB
480.0 ... 824.0 MHz		30	35	—	dB
824.0 ... 849.0 MHz		23	35	—	dB
914.0 ... 1738.0 MHz		23	25	—	dB
1738.0 ... 2400.0 MHz		30	52	—	dB
2400.0 ... 2500.0 MHz		40	50	—	dB
2500.0 ... 6000.0 MHz		30	45	—	dB
6000.0 ... 12750.0 ²⁾ MHz		20	32	—	dB

¹⁾ 2.5 dB max at -30 °C ... -10 °C and 85 °C ... 95 °C

²⁾ values based on measurement data on PCB layout given in document "Test PWB and electrical verification methods", dated 11.04.2005; they may vary with different PCB layout

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



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881.5 & 942.5 MHz MHz

Data sheet



Maximum ratings

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				
GSM850, GSM900	P _{IN}	15	dBm	peak power of GSM signal
GSM1800, GSM1900	P _{IN}	15	dBm	duty cycle 4:8
Tx bands				

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

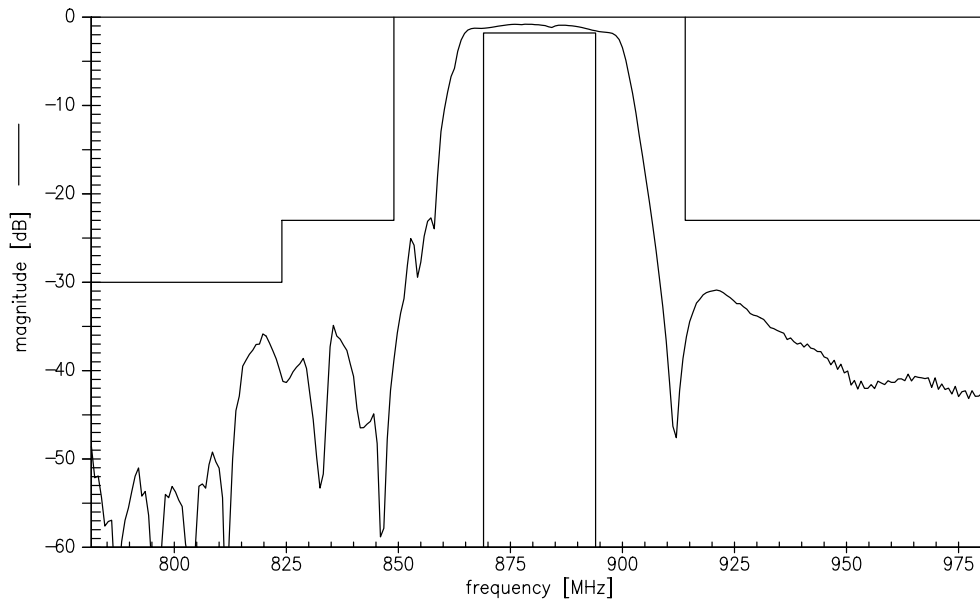
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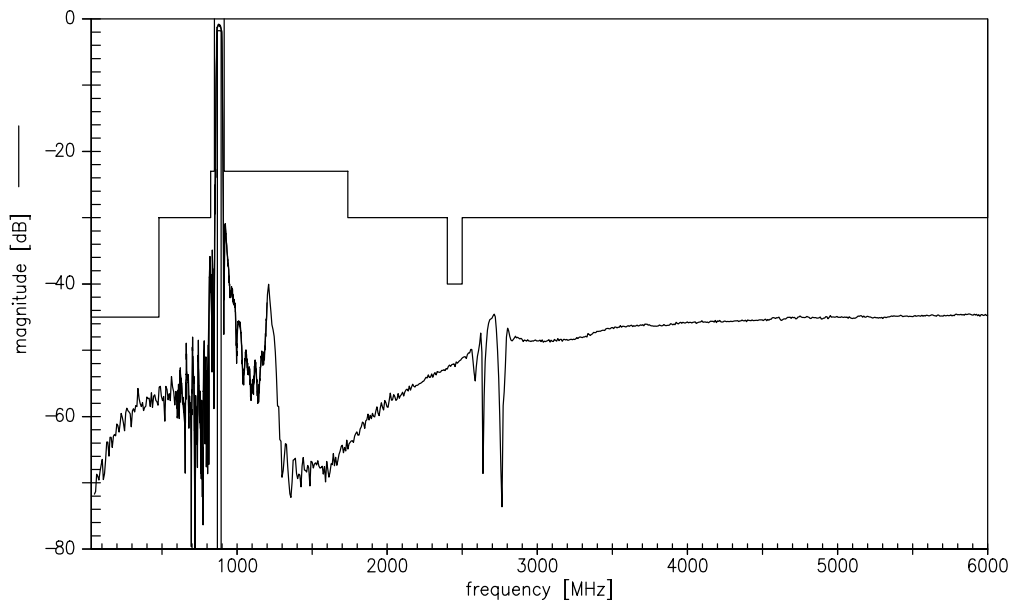
Data sheet



Transfer function



Transfer function (wideband)



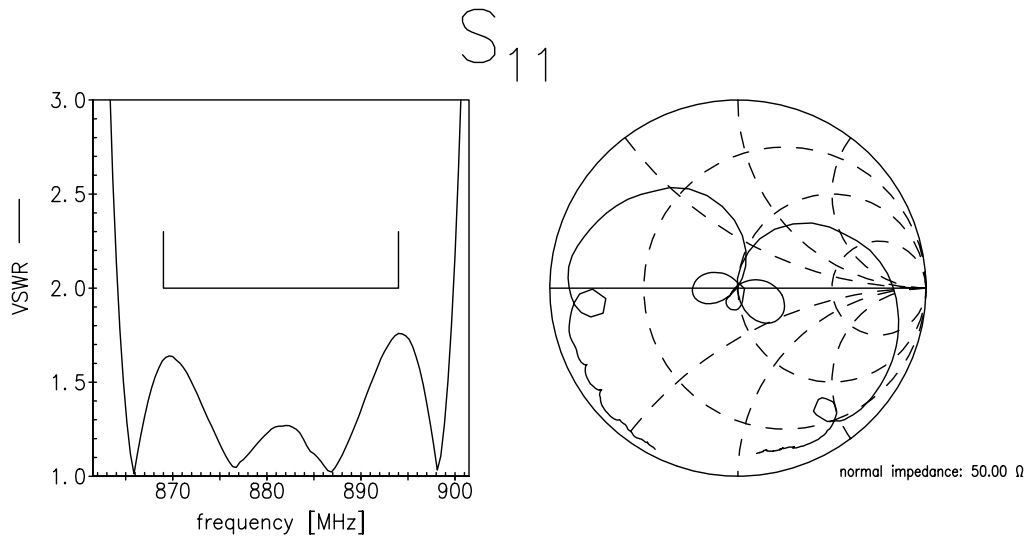
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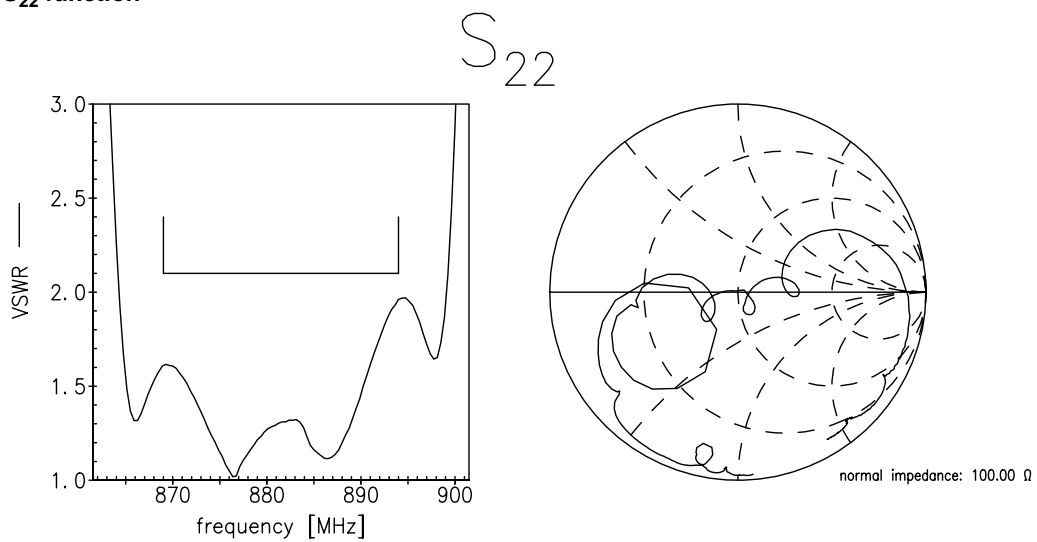


Smith charts

S₁₁ function



S₂₂ function



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Data sheet



Characteristics of Filter 2 (GSM900)

Temperature range for specification: T = -10 °C to +85 °C
 Terminating source impedance: Z_S = 50 Ω
 Terminating load impedance: Z_L = 100 Ω

		min.	typ. @ 25 °C	max.	
Center frequency	f _C	—	942.5	—	MHz
Maximum insertion attenuation	α _{max}				
925.0 ... 960.0 MHz		—	1.8	2.6 ¹⁾	dB
Amplitude ripple (p-p)	Δα				
925.0 ... 960.0 MHz		—	1.1	1.7	dB
Input VSWR					
925.0 ... 960.0 MHz		—	1.9	2.3	
Output VSWR					
925.0 ... 960.0 MHz		—	2.0	2.4	
Output amplitude balance (S₃₁/S₂₁)					
925.0 ... 960.0 MHz		-1.2	-0.7/0.7	1.2	dB
Output phase balance (φ(S₃₁) - φ(S₂₁)+180°)					
925.0 ... 960.0 MHz		-5	-2.0/2.0	5	°
Common mode suppression	S _{cs21}				
925.0 ... 960.0 MHz		20	27	—	dB
824.0 ... 995.0 MHz		20	25	—	dB
1648.0 ... 1990.0 MHz		20	47	—	dB
3296.0 ... 3980.0 MHz		20	35	—	dB
Inter band isolation	α				
869.0 ... 894.0 MHz		35	40	—	dB
Attenuation	α				
0.3 ... 480.0 MHz		45	54	—	dB
480.0 ... 880.0 MHz		30	33	—	dB
880.0 ... 905.0 MHz		23	32	—	dB
905.0 ... 915.0 MHz		18	20	—	dB
980.0 ... 1850.0 MHz		23	30	—	dB
1850.0 ... 1920.0 MHz		30	47	—	dB
1920.0 ... 2400.0 MHz		25	45	—	dB
2400.0 ... 2500.0 MHz		40	45	—	dB
2500.0 ... 6000.0 MHz		30	40	—	dB
6000.0 ... 12750.0 MHz		20	26	—	dB

¹⁾ 3.3 dB max. at -30 °C ... -10 °C and 85 °C ... 95 °C

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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				
GSM850, GSM900	P _{IN}	15	dBm	peak power of GSM signal
GSM1800, GSM1900	P _{IN}	15	dBm	duty cycle 4:8
Tx bands				

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

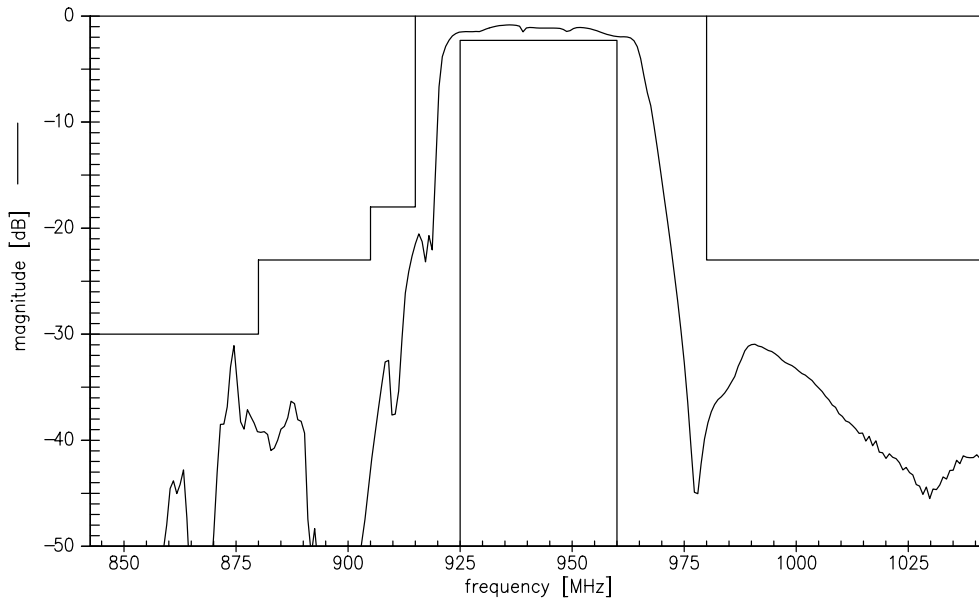
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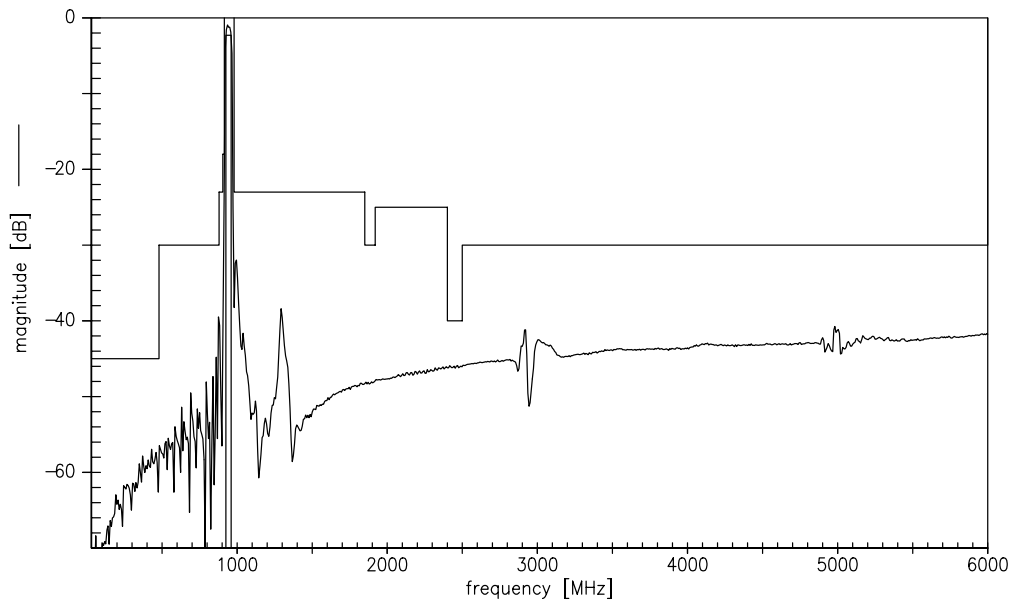
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Transfer function



Transfer function (wideband)



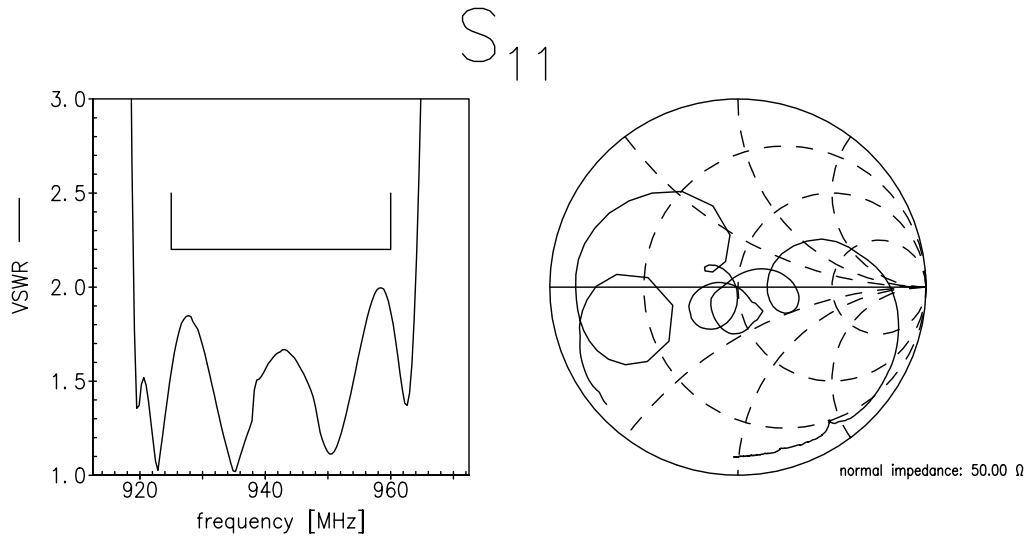
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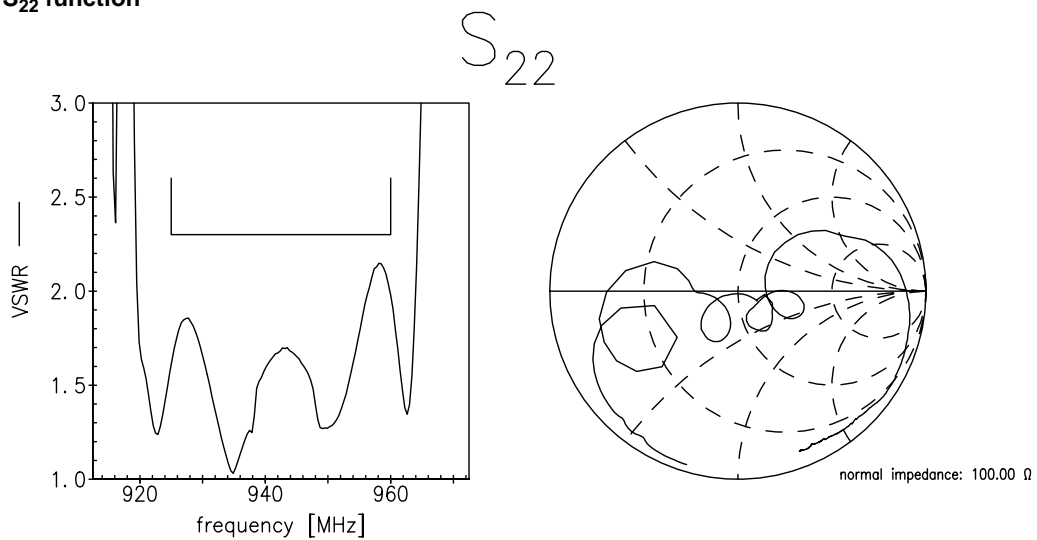


Smith charts

S_{11} function



S_{22} function





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References

Type	B9304
Ordering code	B39941B9304G110
Marking and package	C61157-A7-A1
Packaging	F61074-V8252-Z000
Date codes	L_1126
S-parameters	B9304_LB_NB.s3p B9304_LB_WB.s3p B9304_UB_NB.s3p B9304_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."
Moldability	Before using in overmolding environment, please contact your EPCOS sales office.

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11 April 24, 2006



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