



SAW Components

SAW Rx 2in1 output diplex filter
GSM 850 / GSM 900

Series/type:	B9509
Ordering code:	B39941B9509L310
Date:	January 30, 2009
Version:	2.0



Data sheet



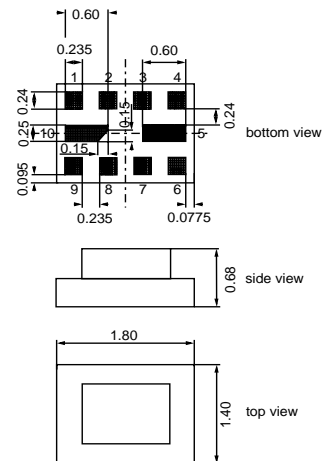
Application

- Low-loss 2in1 RF filter for mobile telephone GSM 900 and GSM 850 systems, receive path (Rx)
- Usable passband:
 Filter 1 (GSM 800): 25 MHz
 Filter 2 (GSM 900): 35 MHz
- Unbalanced to balanced operation for all filters
- Impedance transformation from 50 Ω to 150 Ω for both filters
- Low amplitude ripple
- Suitable for GPRS class 1 to 12



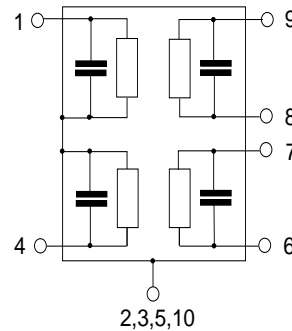
Features

- Package size 1.8 x 1.4 x 0.68 mm³
- Package code QCS10V
- RoHS compatible
- Approx. weight 0.006 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]
- 8,9 Output, balanced [diplex]
- 6,7 To be grounded
- 2,3,5,10 Case-ground





Data sheet



Characteristics of filter 1 (GSM 850)

Temperature range for specification: $T = -20\text{ °C to }+85\text{ °C}$
 Terminating source impedance: $Z_S = 50\ \Omega$
 Terminating load impedance: $Z_L = 150\ \Omega \parallel 21\text{ nH (balanced)}$

		min.	typ. @ 25 °C	max.	
Center frequency	f_C	—	881.5	—	MHz
Maximum insertion attenuation 869.0 ... 894.0 MHz	α_{max}	—	1.8 ¹⁾	2.6	dB
Amplitude ripple (p-p) 869.0 ... 894.0 MHz	$\Delta\alpha$	—	0.5	1.3	dB
Input VSWR 869.0 ... 894.0 MHz		—	1.9	2.3	
Output VSWR 869.0 ... 894.0 MHz		—	1.8	2.3	
Common mode rejection ratio 869.0 ... 894.0 MHz		19	24	—	dB
Attenuation	α				
10.0 ... 447.0 MHz		45	54	—	dB
447.0 ... 849.0 MHz		30	38	—	dB
914.2 ... 1000.0 MHz		24	30	—	dB
1000.0 ... 1850.0 MHz		28	40	—	dB
1850.0 ... 1920.0 MHz		40	61	—	dB
1920.0 ... 6000.0 MHz		35	39	—	dB

1) Typical value excluding PCB losses.



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SAW Rx 2in1 output duplex filter

881.5 / 942.5 MHz

Data sheet



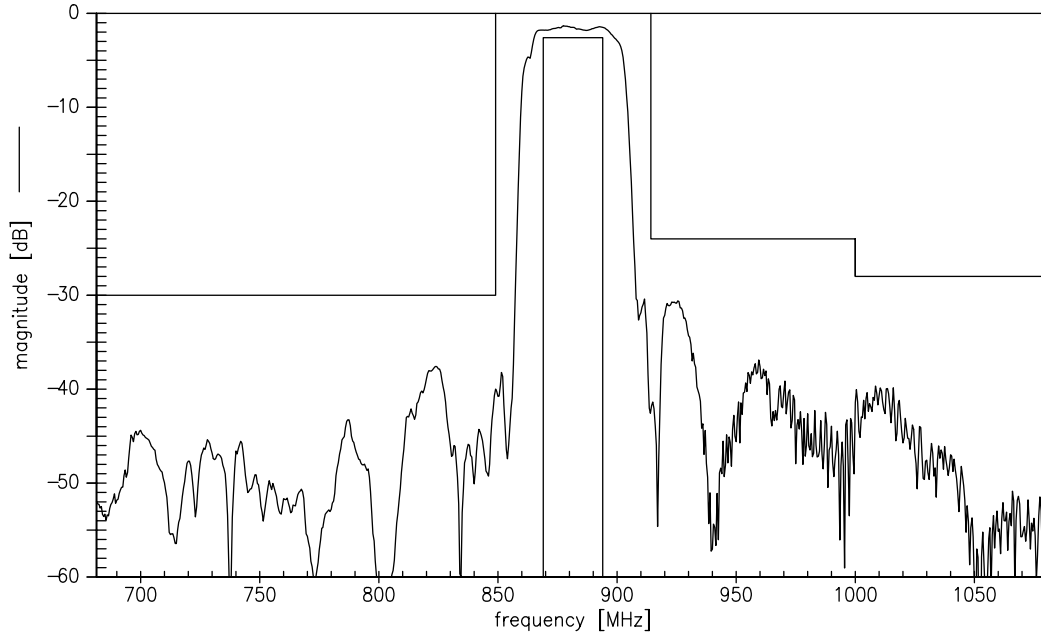
Maximum ratings of filter 1

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}	100 ¹⁾	V	machine model, 1 pulse
Input power at				
GSM 850, GSM 900	P _{IN}	15	dBm	effective power in the on-state, duty cycle 4:8
GSM 1800, GSM 1900	P _{IN}	15	dBm	
Tx bands				

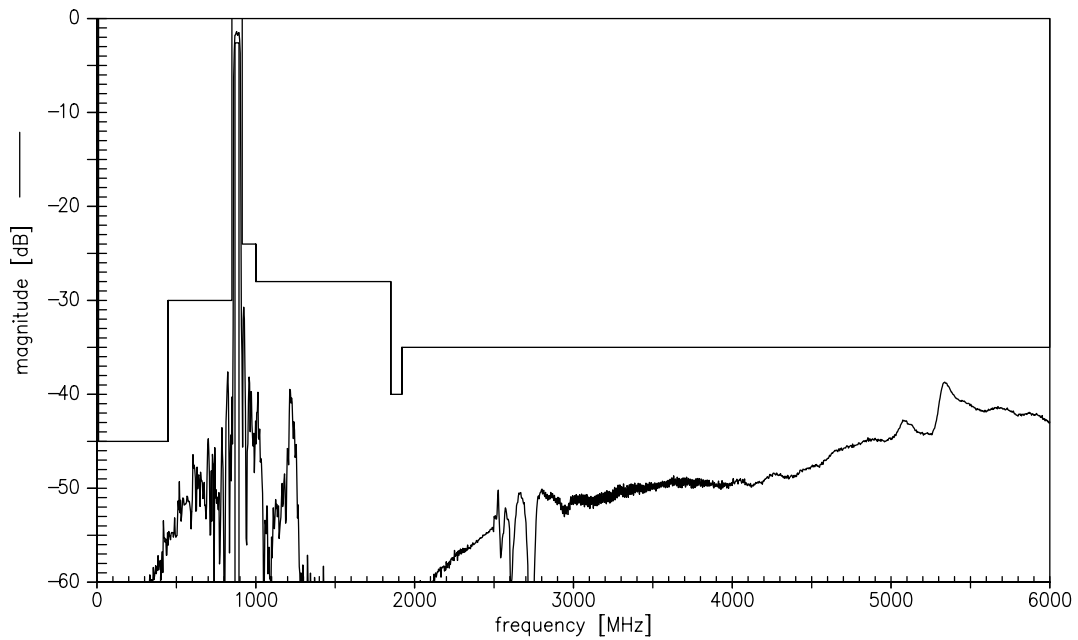
¹⁾ acc. to JESD22-A115A (machine model), 1 negative & 1 positive pulse.



Transfer function of filter 1



Transfer function of filter 1 - wideband

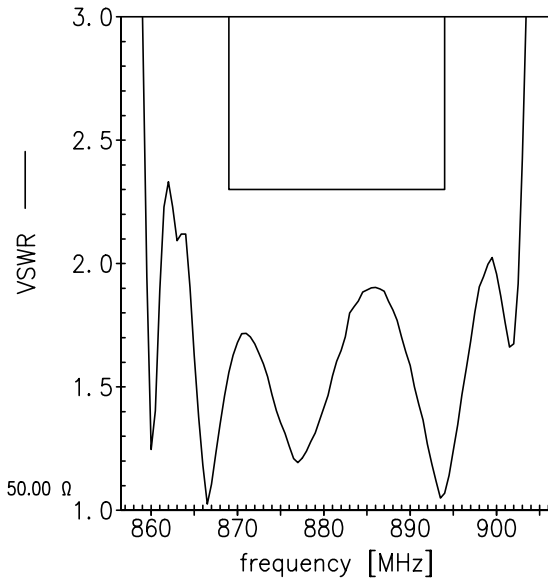
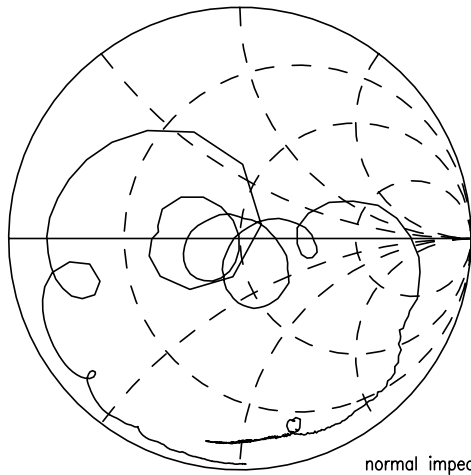


Data sheet

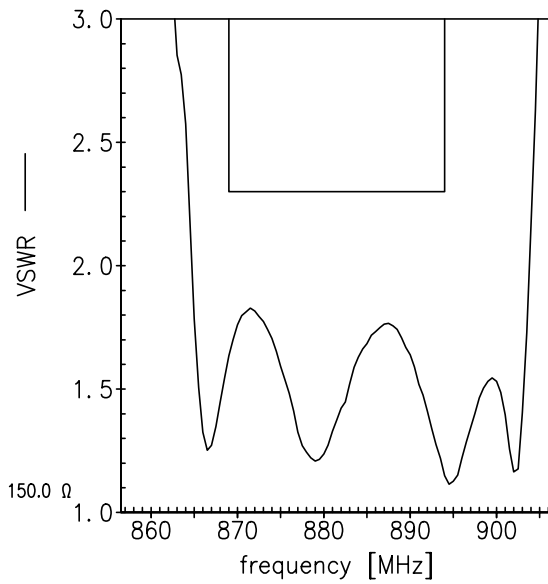
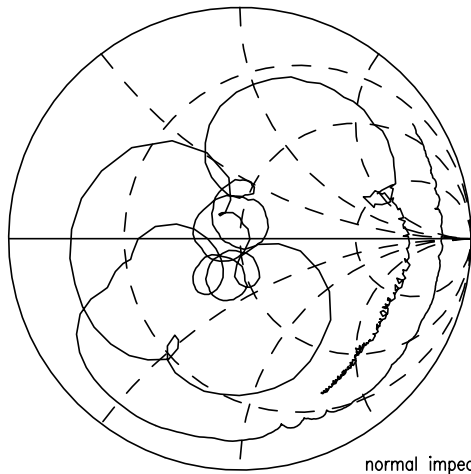


Smith Charts filter 1

S_{11} function



S_{22} function





Data sheet



Characteristics of filter 2 (GSM 900)

Temperature range for specification: $T = -20\text{ °C to }+85\text{ °C}$
 Terminating source impedance: $Z_S = 50\ \Omega$
 Terminating load impedance: $Z_L = 150\ \Omega \parallel 21\text{ nH (balanced)}$

		min.	typ. @ 25 °C	max.	
Center frequency	f_C	—	942.5	—	MHz
Maximum insertion attenuation 925.0 ... 960.0 MHz	α_{max}	—	2.2 ¹⁾	2.9	dB
Amplitude ripple (p-p) 925.0 ... 960.0 MHz	$\Delta\alpha$	—	0.9	1.6	dB
Input VSWR 925.0 ... 960.0 MHz		—	1.8	2.1	
Output VSWR 925.0 ... 960.0 MHz		—	1.8	2.1	
Common mode rejection ratio 925.0 ... 960.0 MHz		18	22	—	dB
Attenuation	α				
10.0 ... 480.0 MHz		45	54	—	dB
480.0 ... 905.0 MHz		30	36	—	dB
905.0 ... 915.0 MHz		15	23	—	dB
980.2 ... 1000.0 MHz		25	28	—	dB
1000.0 ... 1850.0 MHz		28	33	—	dB
1850.0 ... 1920.0 MHz		40	49	—	dB
1920.0 ... 6000.0 MHz		35	43	—	dB

¹⁾ Typical value excluding PCB losses.



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SAW Rx 2in1 output duplex filter

881.5 / 942.5 MHz

Data sheet



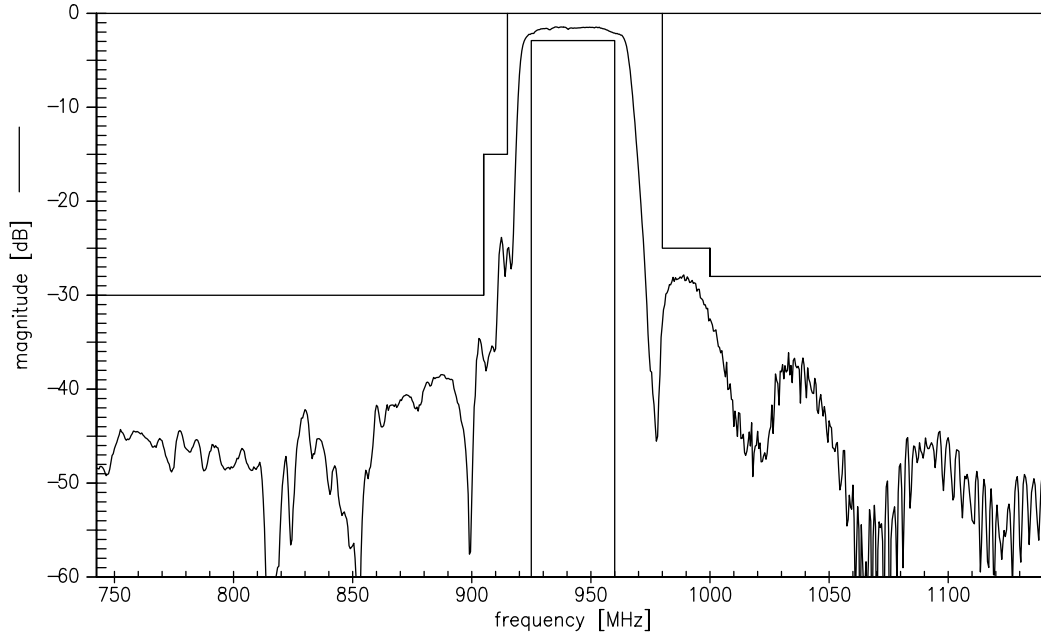
Maximum ratings of filter 2

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, 1 pulse
Input power at				
GSM 850, GSM 900	P _{IN}	15	dBm	effective power in the on-state, duty cycle 4:8
GSM 1800, GSM 1900	P _{IN}	15	dBm	
Tx bands				

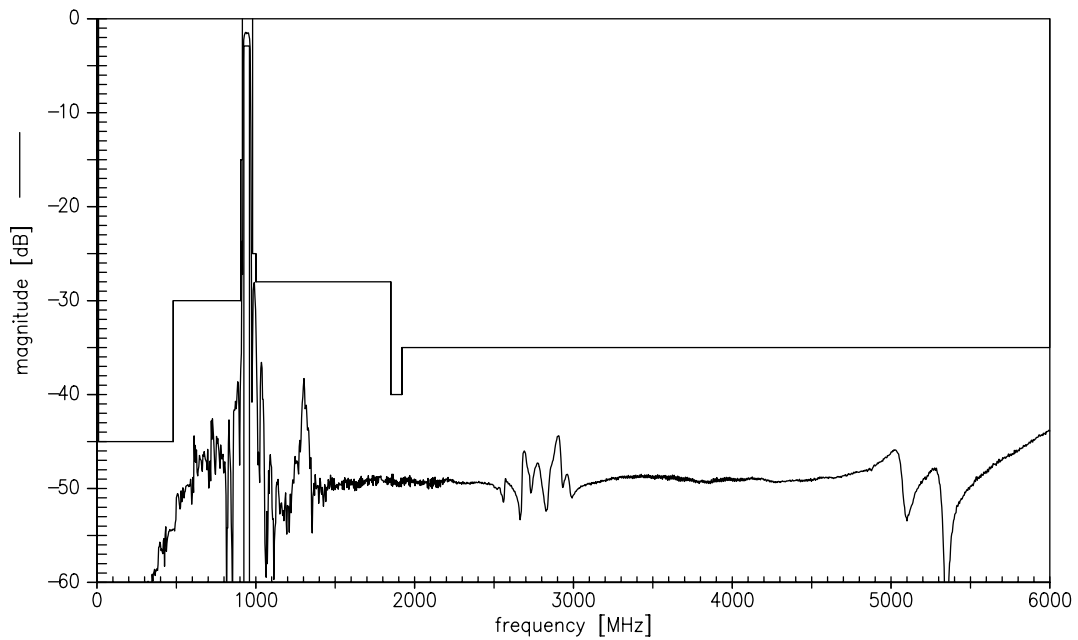
¹⁾ acc. to JESD22-A115A (machine model), 1 negative & 1 positive pulse.



Transfer function of filter 2



Transfer function of filter 2 - wideband

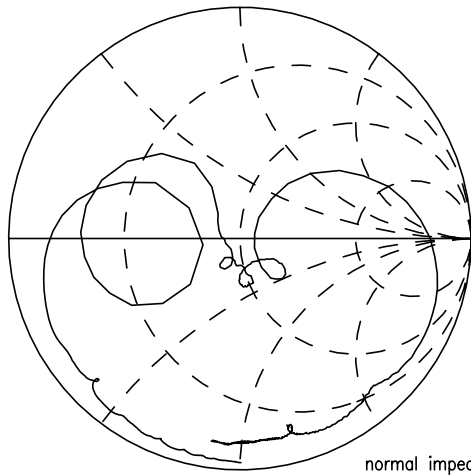


Data sheet

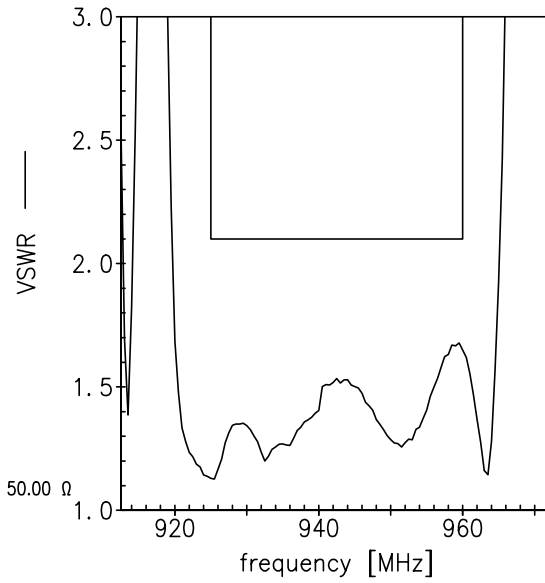


Smith Charts filter 2

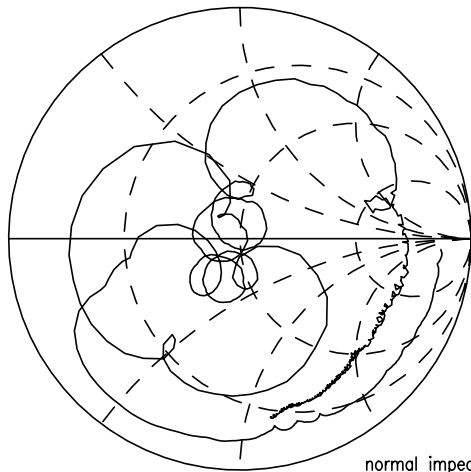
S_{11} function



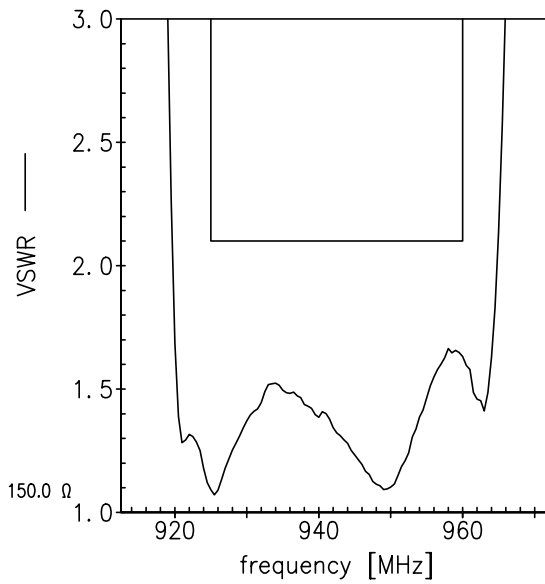
normal impedance: 50.00 Ω



S_{22} function



normal impedance: 150.0 Ω





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881.5 / 942.5 MHz

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References

Type	B9509
Ordering code	B39941B9509L310
Marking and package	C61157-A7-A153
Packaging	F61074-V8226-Z000
Date codes	L_1126
S-parameters	B9509_LB_NB.s3p B9509_LB_WB.s3p B9509_UB_NB.s3p B9509_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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