



SAW Components

SAW Rx 2in1 filter

GSM 900 / GSM 850

Series/type:	B9504
Ordering code:	B39941B9504L310
Date:	July 08, 2008
Version:	2.0



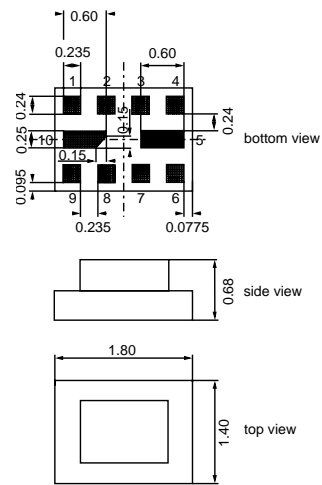
Application

- Low-loss 2in1 RF filter for mobile telephone GSM 850 and GSM 900 systems, receive path (Rx)
- Usable passband:
 Filter 1 (GSM 900): 35 MHz
 Filter 2 (GSM 850): 25 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



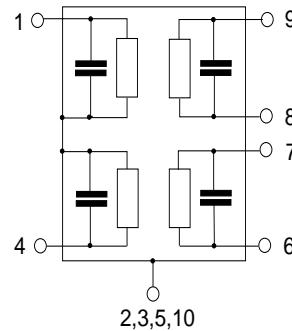
Features

- Package size 1.8 x 1.4 x 0.68 mm³
- Package code QCS10U
- RoHS compatible
- Approx. weight 0.006g
- 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 Case ground





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942.5 / 881.5 MHz

Data sheet



Characteristics of filter 1 (GSM 900)

Temperature range for specification: $T = -20\text{ °C to }+75\text{ °C}$
 Terminating source impedance: $Z_S = 50\ \Omega$
 Terminating load impedance: $Z_L = 150\ \Omega \parallel 56\text{ nH (balanced)}$

		B9504			
		min.	typ. @25°C	max.	
Center frequency	f_C	—	942.5	—	MHz
Maximum insertion attenuation	α_{max}	—	1.5 ¹⁾	2.1 ²⁾	dB
925.0 ... 960.0 MHz					
Amplitude ripple (p-p)	$\Delta\alpha$	—	0.6	1.3 ³⁾	dB
925.0 ... 960.0 MHz					
Input VSWR		—	1.6	2.0	
925.0 ... 960.0 MHz					
Output VSWR		—	1.6	2.0	
925.0 ... 960.0 MHz					
Output amplitude balance (S_{31}/S_{21})		-1.0	-0.6/+0.6	1.0	dB
925.0 ... 960.0 MHz					
Output phase balance ($\phi(S_{31})-\phi(S_{21})+180^\circ$)		-10	-3/+3	10	°
925.0 ... 960.0 MHz					
Attenuation	α				
10.0 ... 480.0 MHz		45	56	—	dB
480.0 ... 900.0 MHz		30	35	—	dB
900.0 ... 905.0 MHz		26	33	—	dB
905.0 ... 915.0 MHz		20	32	—	dB
980.0 ... 1000.0 MHz		25	30	—	dB
1000.0 ... 1850.0 MHz		28	33	—	dB
1850.0 ... 1920.0 MHz		40	49	—	dB
1920.0 ... 3700.0 MHz		35	43	—	dB
3700.0 ... 6000.0 MHz		32	38	—	dB

1) Typical value excluding PCB losses of 0.16 dB.
 2) 1.9 dB at 25°C.
 3) 1.2 dB at 25°C.



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942.5 / 881.5 MHz

Data sheet



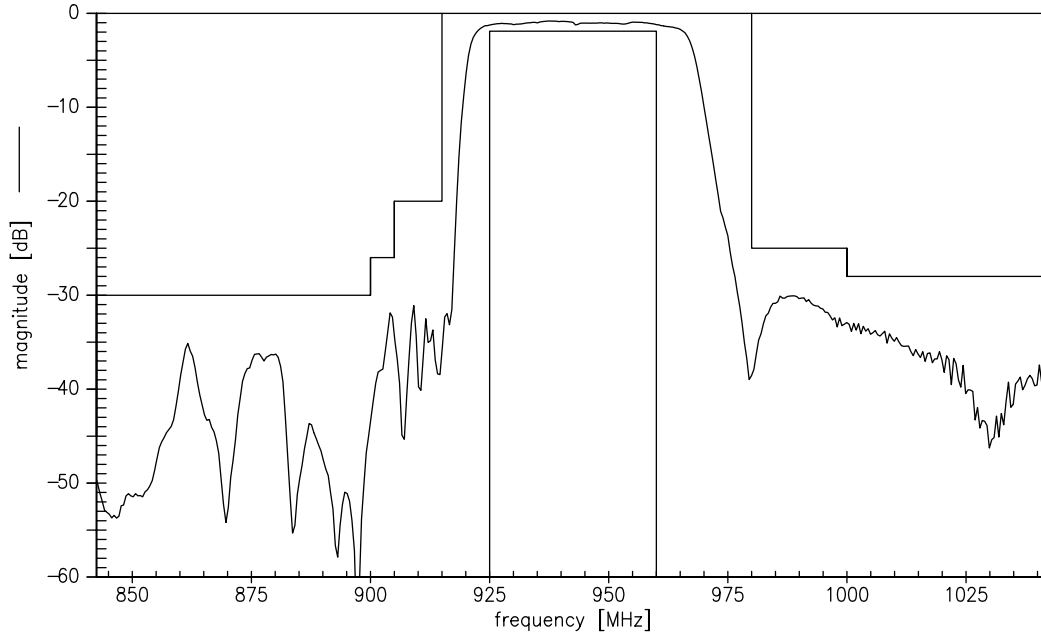
Maximum ratings of filter 1

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				

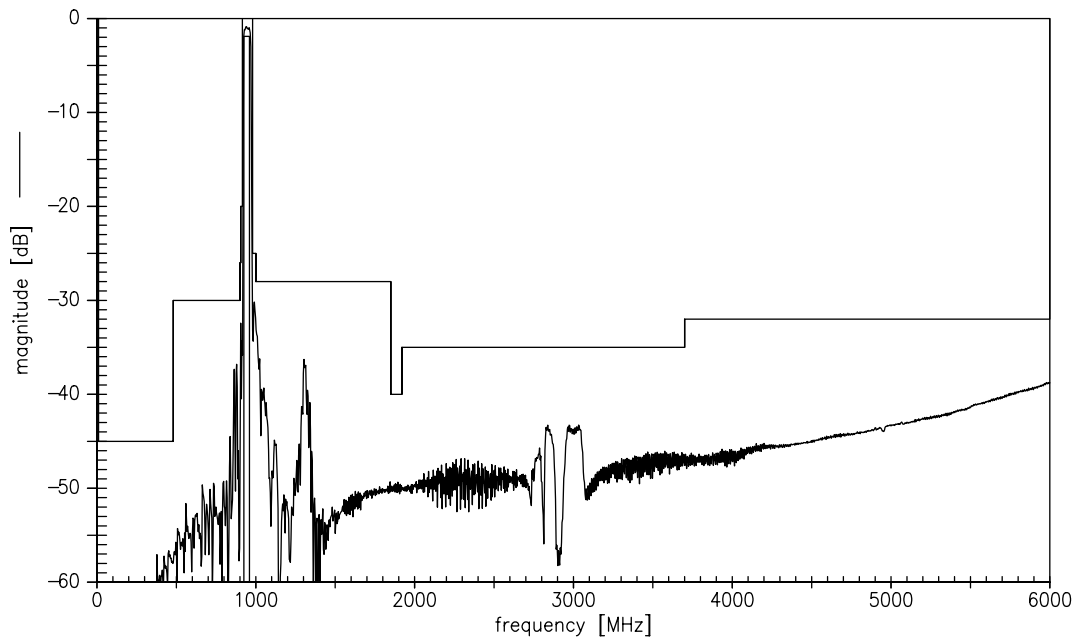
¹⁾ acc. to JESD22-A115A (machine model), 1 negative & 1 positive pulse.



Transfer function of filter 1 - narrowband



Transfer function of filter 1 - wideband

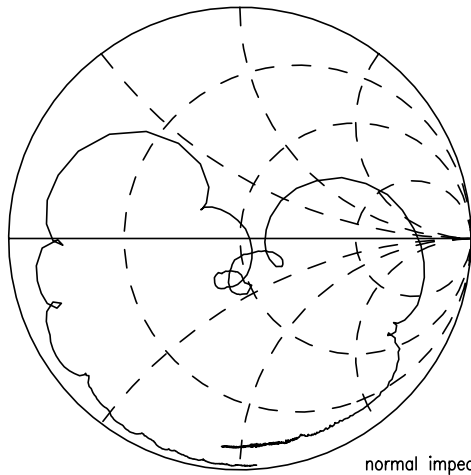


Data sheet

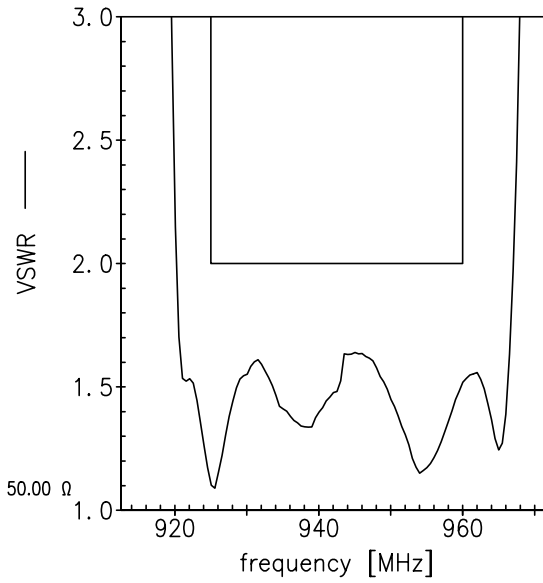


Smith charts filter 1

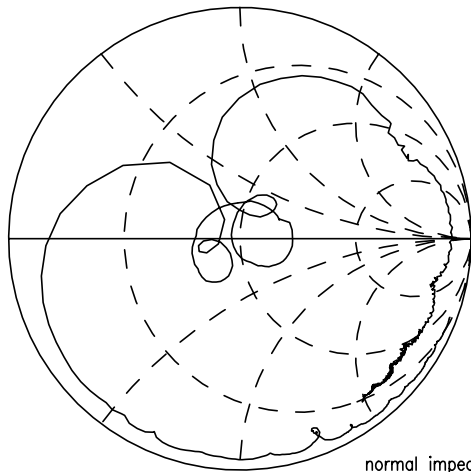
S_{11} function



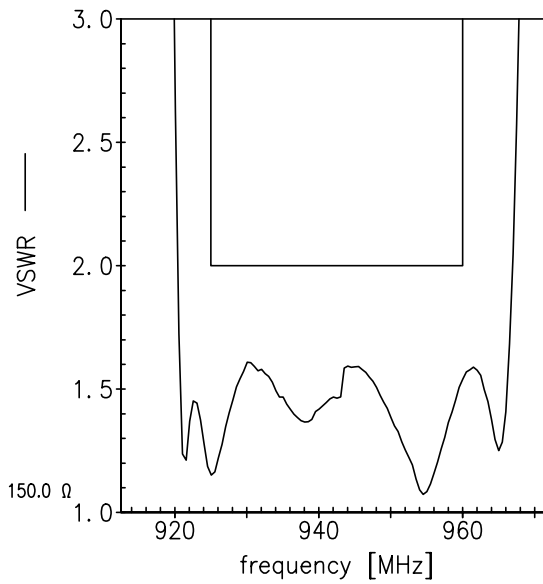
normal impedance: 50.00 Ω



S_{22} function



normal impedance: 150.0 Ω





SAW Components

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SAW Rx 2in1 filter

942.5 / 881.5 MHz

Data sheet



Characteristics of filter 2 (GSM 850)

Temperature range for specification: $T = -20\text{ °C to }+75\text{ °C}$
 Terminating source impedance: $Z_S = 50\ \Omega$
 Terminating load impedance: $Z_L = 150\ \Omega \parallel 82\text{ nH (balanced)}$

		B9504			
		min.	typ. @25°C	max.	
Center frequency	f_C	—	881.5	—	MHz
Maximum insertion attenuation	α_{max}	—	1.4 ¹⁾	2.0 ²⁾	dB
869.0 ... 894.0 MHz					
Amplitude ripple (p-p)	$\Delta\alpha$	—	0.5	1.2 ³⁾	dB
869.0 ... 894.0 MHz					
Input VSWR		—	1.6	2.0	
869.0 ... 894.0 MHz					
Output VSWR		—	1.6	2.0	
869.0 ... 894.0 MHz					
Output amplitude balance (S_{31}/S_{21})		-1.2	-1.0/+1.0	1.2	dB
869.0 ... 894.0 MHz					
Output phase balance ($\phi(S_{31})-\phi(S_{21})+180^\circ$)		-12	-7/+7	12	°
869.0 ... 894.0 MHz					
Attenuation	α				
10.0 ... 447.0 MHz		45	49	—	dB
447.0 ... 849.0 MHz		30	37	—	dB
914.0 ... 954.0 MHz		21	26	—	dB
954.0 ... 1738.0 MHz		28	36	—	dB
1738.0 ... 1788.0 MHz		40	56	—	dB
1788.0 ... 3476.0 MHz		35	43	—	dB
3476.0 ... 6000.0 MHz		26	30	—	dB

1) Typical value excluding PCB losses of 0.11 dB.
 2) 1.7 dB at 25°C.
 3) 0.9 dB at 25°C.



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SAW Rx 2in1 filter

942.5 / 881.5 MHz

Data sheet



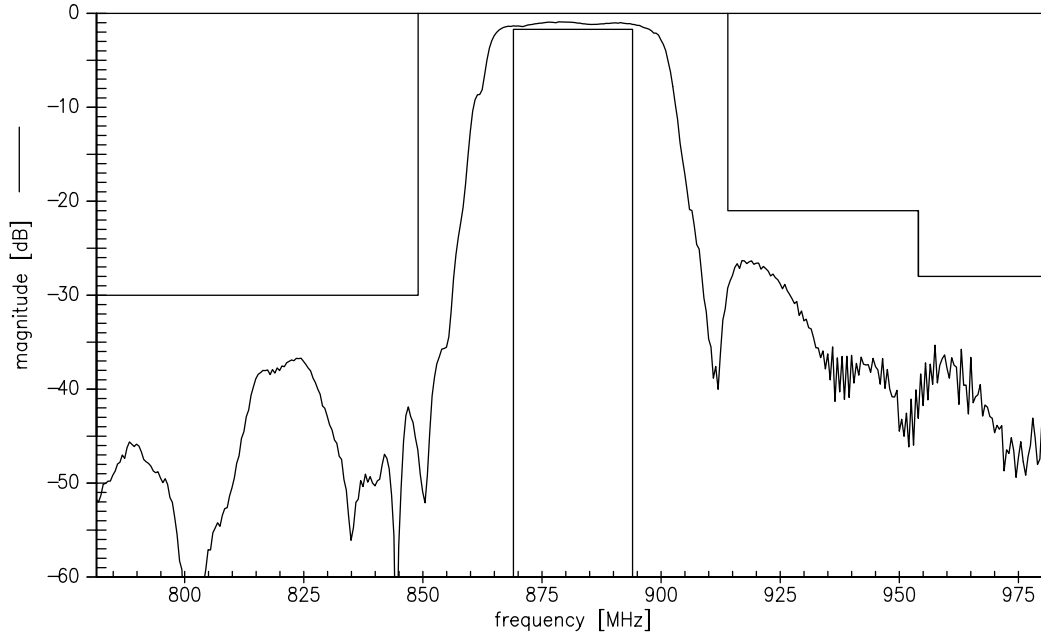
Maximum ratings of filter 2

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				

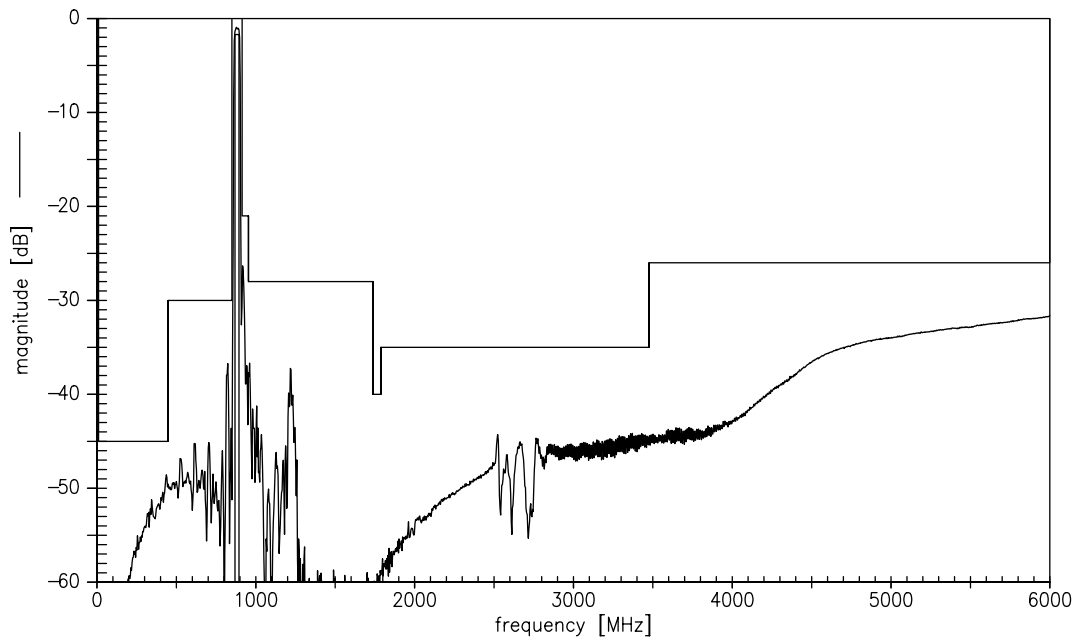
¹⁾ acc. to JESD22-A115A (machine model), 1 negative & 1 positive pulse.



Transfer function of filter 2 - narrowband



Transfer function of filter 2 - wideband

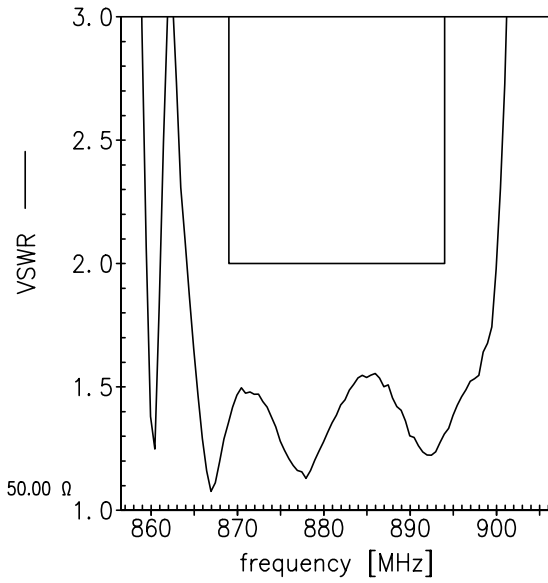
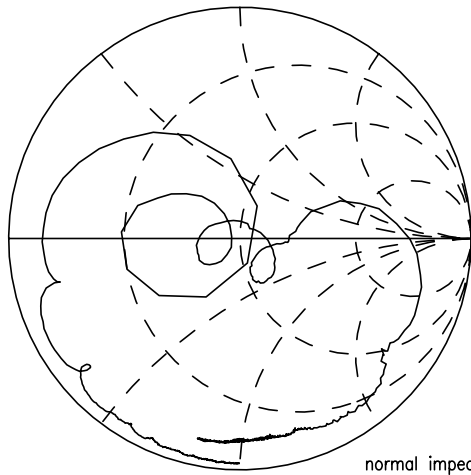


Data sheet

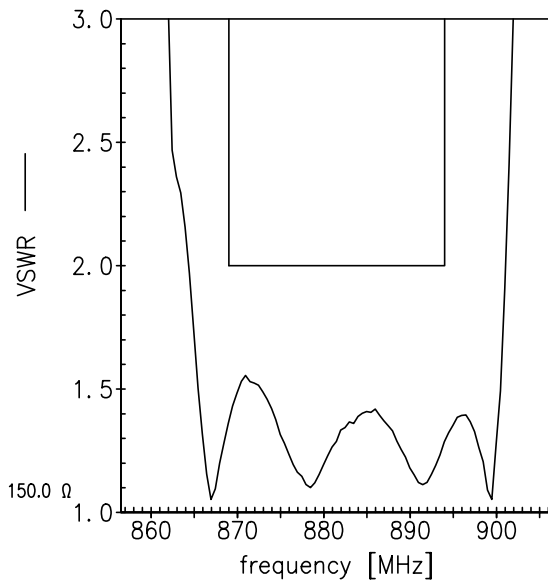
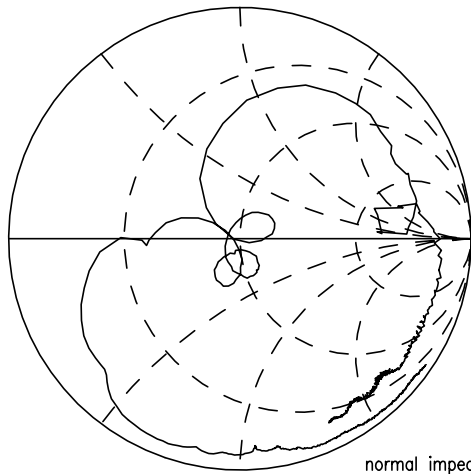


Smith charts filter 2

S_{11} function



S_{22} function



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**References**

Type	B9504
Ordering code	B39941B9504L310
Marking and package	C61157-A7-A152
Packaging	F61074-V8226-Z000
Date code	L_1126
S-parameters	B9504_LB_NB.s3p B9504_LB_WB.s3p B9504_UB_NB.s3p B9504_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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