



SAW Components

SAW Rx 4in1 input/output duplex filter

GSM850 / GSM900 / GSM1800 / GSM1900

Series/type:	B9837
Ordering code:	B39202B9837P810
Date:	September 27, 2012
Version:	2.0

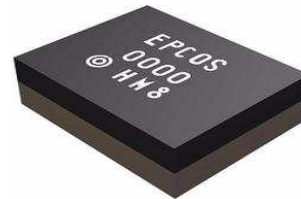
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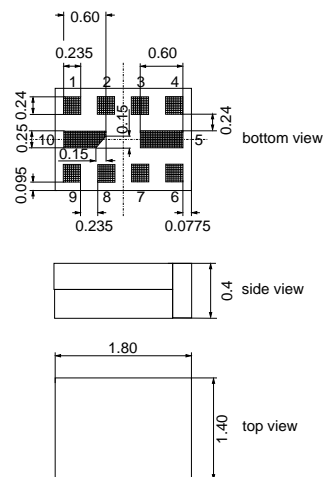
Data sheet

Application

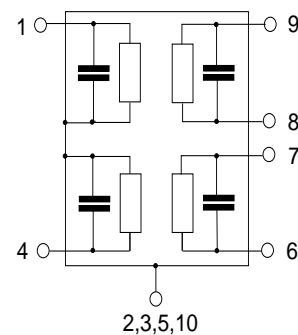
- Low-loss 4in1 RF filter for mobile telephone GSM 1900, GSM 1800, GSM 900 and GSM 850 systems, receive path (Rx)
- Usable passband:
 - Filter 1 (GSM 900): 35 MHz
 - Filter 2 (GSM 850): 25 MHz
 - Filter 3 (GSM 1900): 60 MHz
 - Filter 4 (GSM 1800): 75 MHz
- Unbalanced to balanced operation for all filters
- Impedance transformation from 50 Ω to 150 Ω for all filters
- Low amplitude ripple
- Suitable for GPRS class 1 to 12


Features

- Package size 1.8 x 1.4 x 0.4 mm³
- RoHS compatible
- Approx. weight 0.004g
- Package for Surface Mount Technology (SMT)
- Ni, gold-plated terminals
- **Electrostatic Sensitive Device (ESD)**
- **Moisture Sensitive Level 3**


Pin configuration

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



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

Data sheet


Characteristics of Filter 1 (GSM 900)

Temperature range for specification: $T = -20\text{ °C to }+85\text{ °C}$
 Terminating source impedance: $Z_S = 50\Omega \parallel 6.3\text{nH}$
 Terminating load impedance: $Z_L = 150\Omega \parallel 21\text{nH}$

		min.	typ. @25°C	max.	
Center frequency	f_C	—	942.5	—	MHz
Maximum insertion attenuation	α_{\max}	—	2.2	3.1	dB
925.0 ... 960.0 MHz					
Amplitude ripple (p-p)	$\Delta\alpha$	—	0.9	1.8	dB
925.0 ... 960.0 MHz					
Input VSWR		—	1.8	2.4	
925.0 ... 960.0 MHz					
Output VSWR		—	1.6	2.3	
925.0 ... 960.0 MHz					
CMRR ($S_{21}-S_{31} / S_{21}+S_{31}$)		17	21	—	dB
925.0 ... 960.0 MHz					
Attenuation	α				
10.0 ... 480.0 MHz		45	73	—	dB
480.0 ... 850.0 MHz		30	43	—	dB
850.0 ... 905.0 MHz		21	31	—	dB
905.0 ... 915.0 MHz		10	17	—	dB
980.2 ... 1000.0 MHz		18	23	—	dB
1000.0 ... 1850.0 MHz		28	36	—	dB
1850.0 ... 1920.0 MHz		35	42	—	dB
1920.0 ... 3300.0 MHz		28	35	—	dB
3300.0 ... 6000.0 MHz		28	33	—	dB

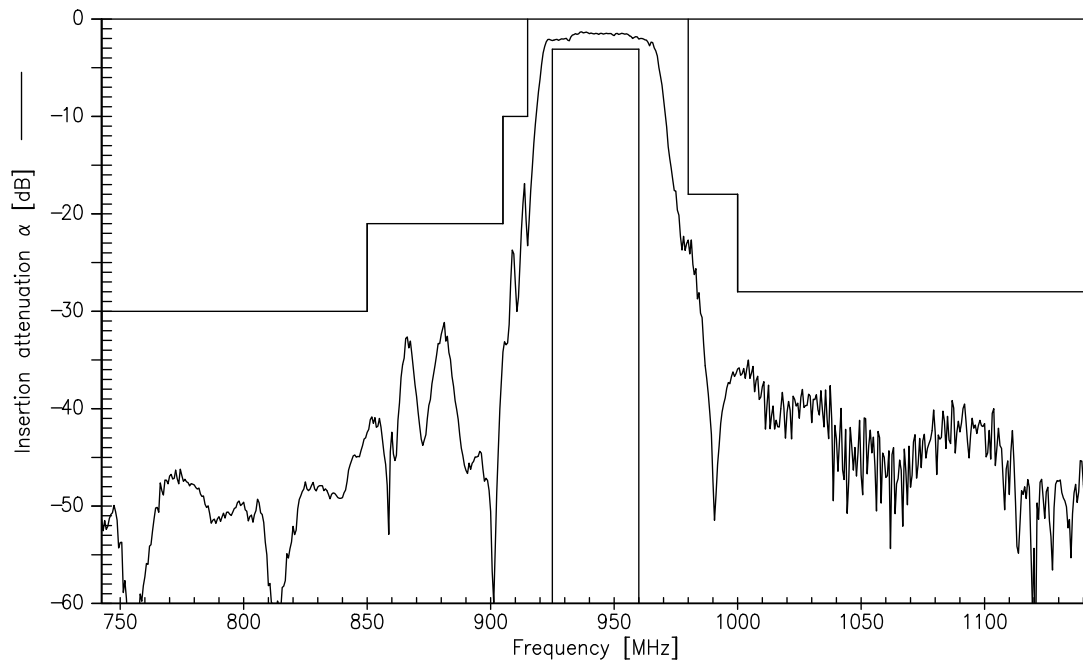
Please read *cautions and warnings and important notes* at the end of this document.

Maximum ratings of Filter 1

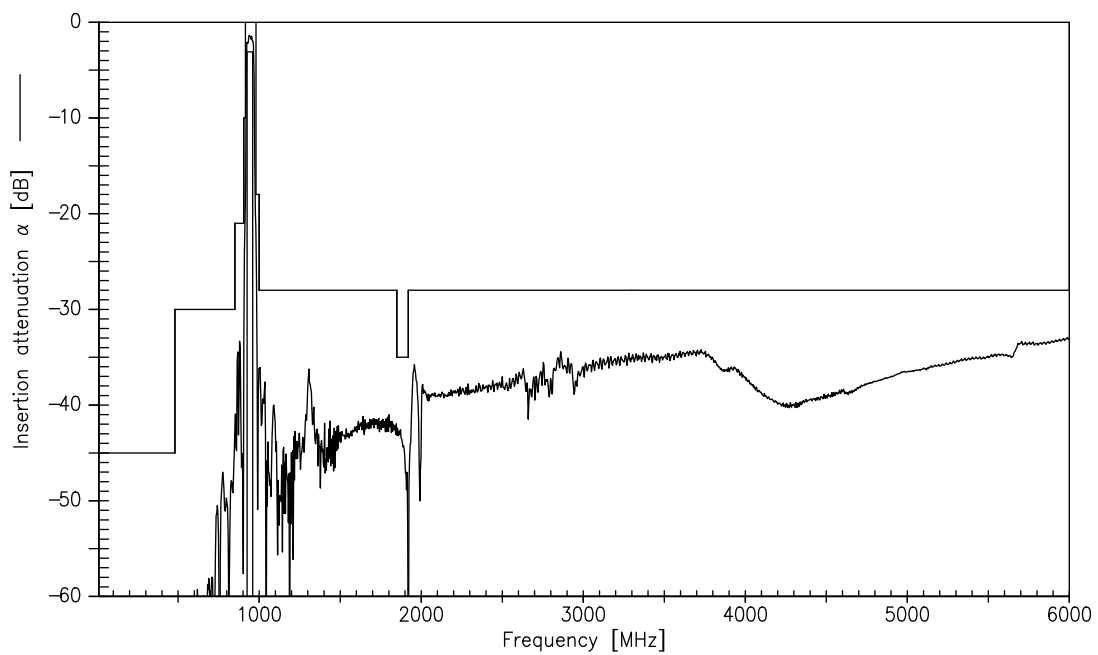
Operable temperature range	T	-40/+85	°C	
Storage temperature range	T _{stg}	-40/+85	°C	
DC voltage	V _{DC}	5	V	
ESD voltage	V _{ESD}	50 ¹⁾	V	machine model, 10 pulses
Input power at				
GSM 850, GSM 900	P _{IN}	13	dBm	effective power in the on-state, duty cycle 4:8
GSM 1800, GSM 1900	P _{IN}	13	dBm	
Tx bands				

¹⁾ acc. to JESD22-A115B (machine model), 10 negative & 10 positive pulses.

Transfer function of filter 1 - narrowband



Transfer function of filter 1 - wideband



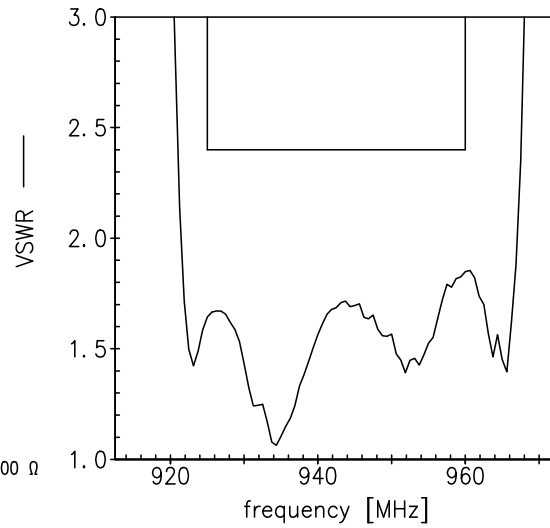
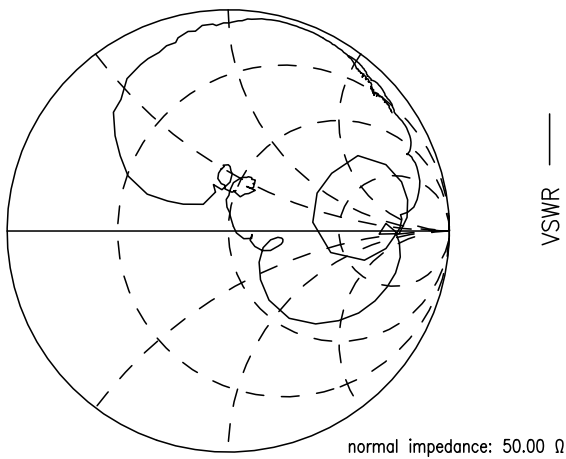
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Data sheet

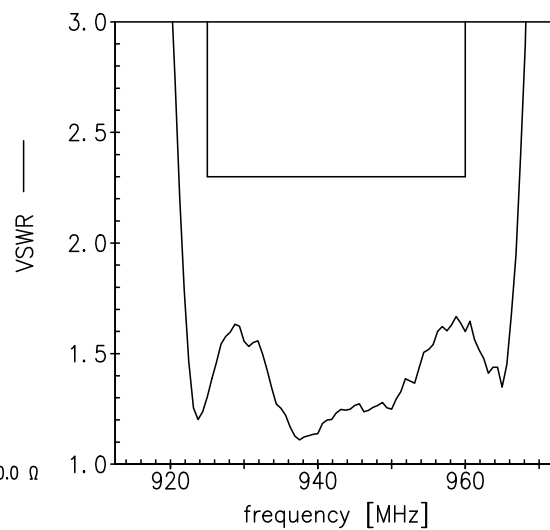
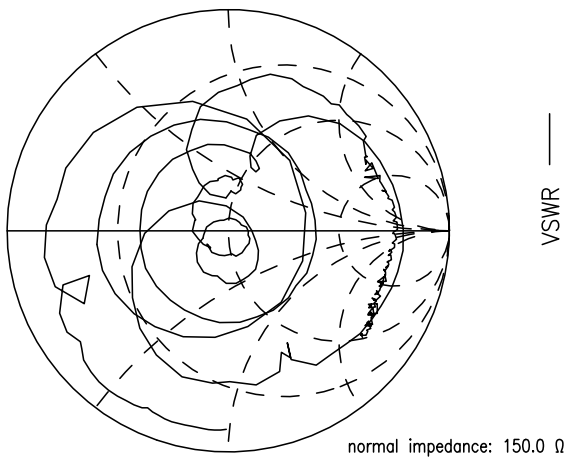


Smith Charts filter 1

S₁₁ function



S₂₂ function



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Data sheet


Characteristics of Filter 2 (GSM 850)

Temperature range for specification: $T = -20\text{ }^{\circ}\text{C to }+85\text{ }^{\circ}\text{C}$
 Terminating source impedance: $Z_S = 50\ \Omega \parallel 6.3\ \text{nH}$
 Terminating load impedance: $Z_L = 150\ \Omega \parallel 21\ \text{nH}$

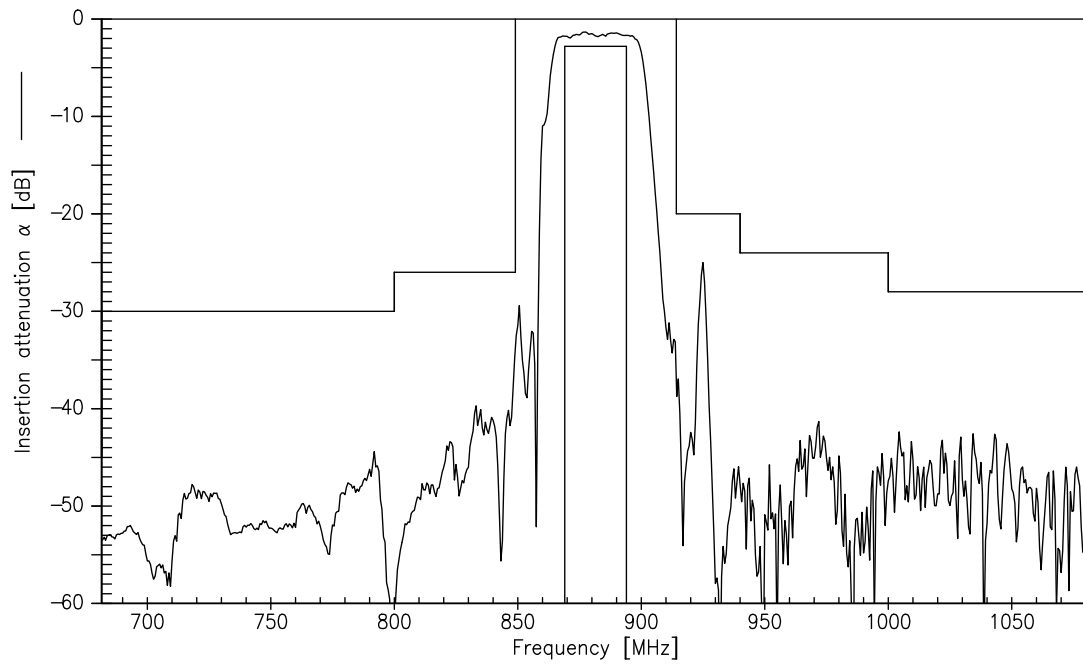
		min.	typ. @ 25°C	max.	
Center frequency	f_C	—	881.5	—	MHz
Maximum insertion attenuation 869.0 ... 894.0 MHz	α_{\max}	—	1.8	2.8	dB
Amplitude ripple (p-p) 869.0 ... 894.0 MHz	$\Delta\alpha$	—	0.5	1.5	dB
Input VSWR 869.0 ... 894.0 MHz		—	1.8	2.4	
Output VSWR 869.0 ... 894.0 MHz		—	1.7	2.3	
Common mode rejection ratio 869.0 ... 894.0 MHz		17	23	—	dB
Attenuation	α				
10.0 ... 447.0 MHz		45	68	—	dB
447.0 ... 800.0 MHz		30	44	—	dB
800.0 ... 849.0 MHz		26	32	—	dB
914.2 ... 940.0 MHz		20	25	—	dB
940.0 ... 1000.0 MHz		24	41	—	dB
1000.0 ... 1850.0 MHz		28	39	—	dB
1850.0 ... 1920.0 MHz		35	42	—	dB
1920.0 ... 6000.0 MHz		28	40	—	dB

Maximum ratings of Filter 2

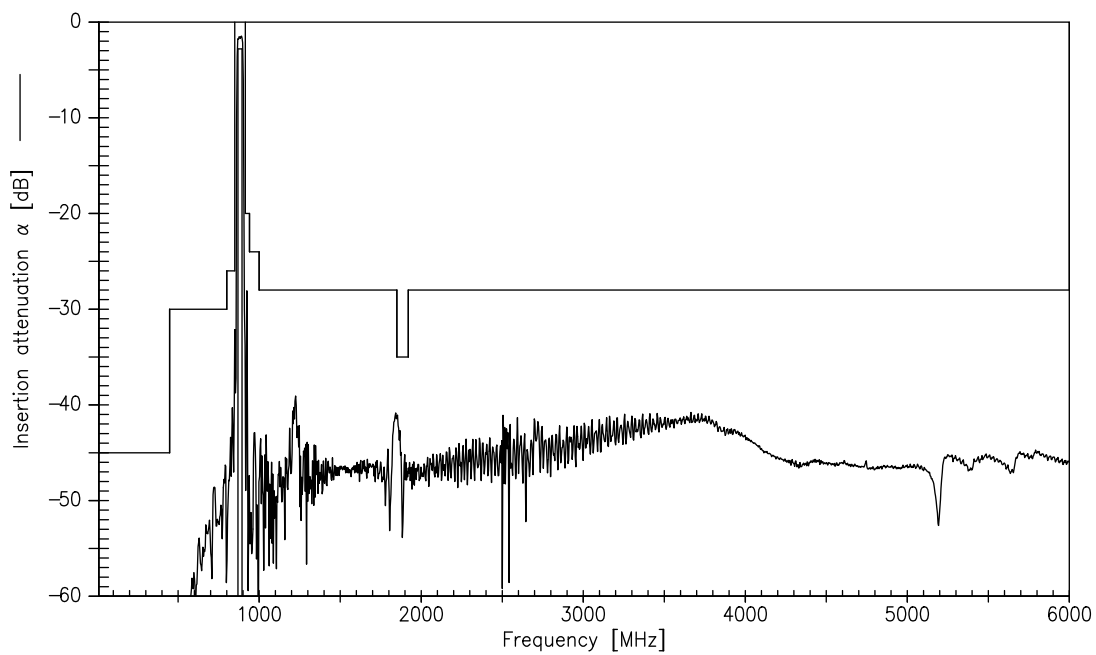
Operable temperature range	T	-40/+85	°C	
Storage temperature range	T _{stg}	-40/+85	°C	
DC voltage	V _{DC}	5	V	
ESD voltage	V _{ESD}	50 ¹⁾	V	machine model, 10 pulses
Input power at				
GSM 850, GSM 900	P _{IN}	13	dBm	effective power in the on-state, duty cycle 4:8
GSM 1800, GSM 1900	P _{IN}	13	dBm	
Tx bands				

¹⁾ acc. to JESD22-A115B (machine model), 10 negative & 10 positive pulses.

Transfer function of filter 2 - narrowband



Transfer function of filter 2 - wideband



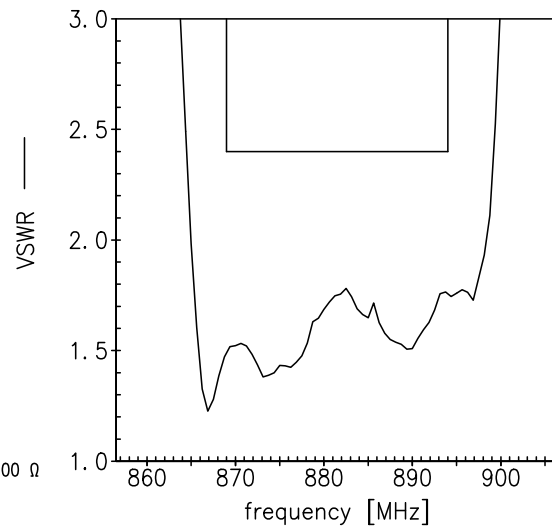
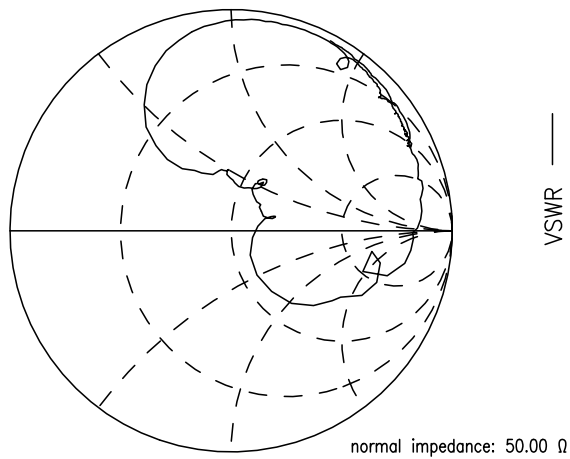
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Data sheet

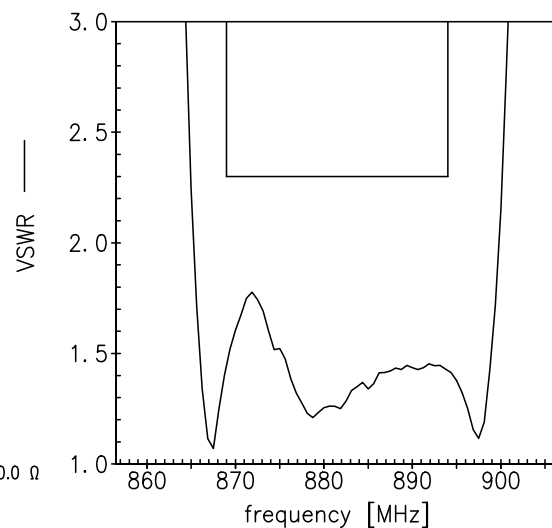
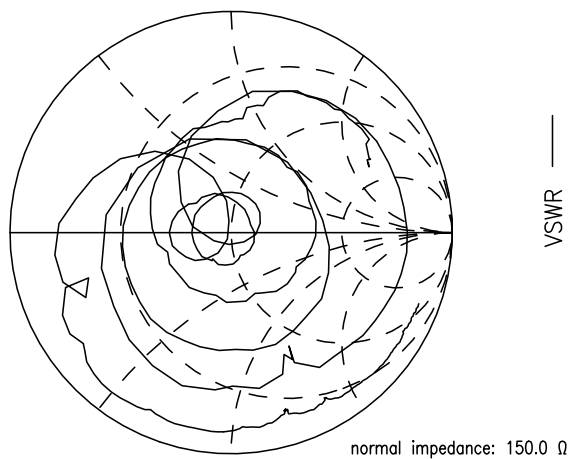


Smith Charts filter 2

S_{11} function



S_{22} function



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

Data sheet


Characteristics of Filter 3 (GSM1900)

Temperature range for specification: $T = -20\text{ °C to }+85\text{ °C}$
 Terminating source impedance: $Z_S = 50\ \Omega \parallel 6.3\text{ nH}$
 Terminating load impedance: $Z_L = 150\ \Omega \parallel 9.0\text{ nH}$

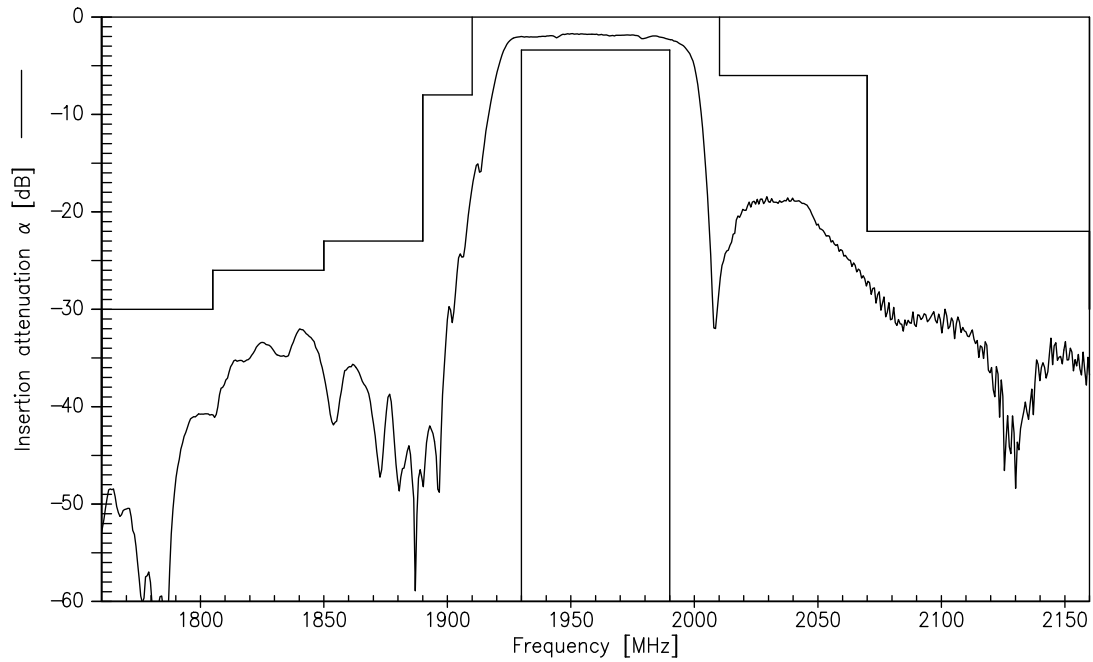
		min.	typ. @ 25 °C	max.	
Center frequency	f_C	—	1960.0	—	MHz
Maximum insertion attenuation	α_{\max}				
1930.0 ... 1990.0	MHz	—	2.3	3.4	dB
Amplitude ripple (p-p)	$\Delta\alpha$				
1930.0 ... 1990.0	MHz	—	0.6	1.7	dB
Input VSWR					
1930.0 ... 1990.0	MHz	—	1.8	2.4	
Output VSWR					
1930.0 ... 1990.0	MHz	—	2.0	2.5	
CMRR ($S_{21}-S_{31} / S_{21}+S_{31}$)					
1930.0 ... 1990.0	MHz	16	21	—	dB
Attenuation	α				
0.2 ... 1000.0	MHz	45	50	—	dB
1000.0 ... 1510.0	MHz	35	45	—	dB
1510.0 ... 1805.0	MHz	30	40	—	dB
1805.0 ... 1850.0	MHz	26	32	—	dB
1850.0 ... 1890.0	MHz	23	35	—	dB
1890.0 ... 1910.0	MHz	8	18	—	dB
2010.2 ... 2070.0	MHz	6	19	—	dB
2070.0 ... 2400.0	MHz	22	27	—	dB
2400.0 ... 3000.0	MHz	30	40	—	dB
3000.0 ... 6000.0	MHz	30	40	—	dB

Maximum ratings of Filter 3

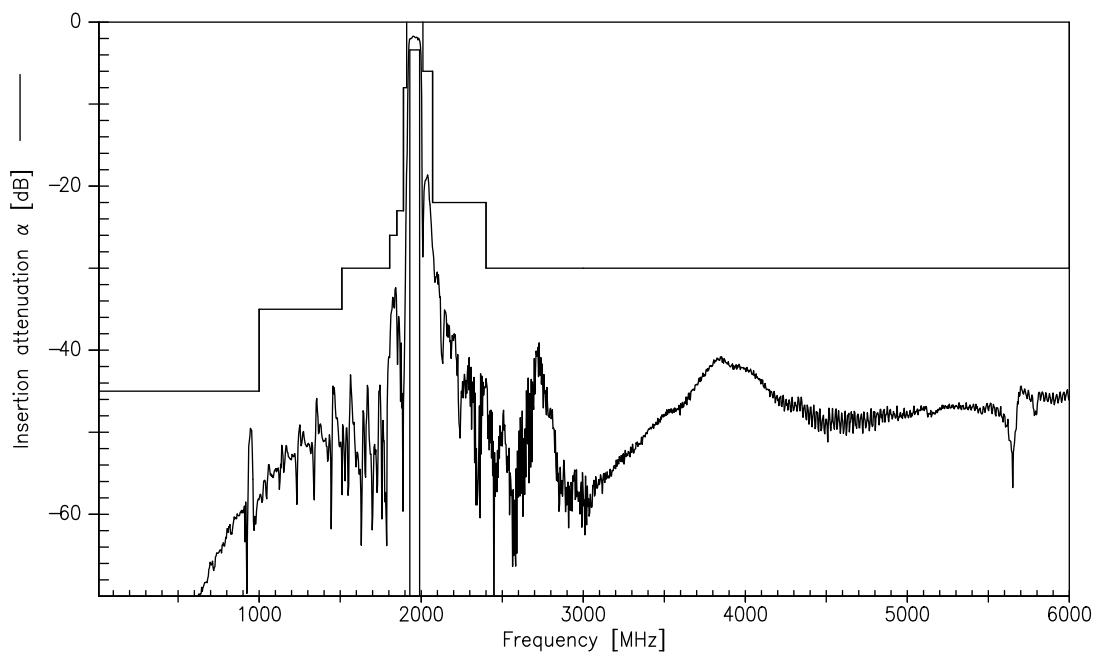
Operable temperature range	T	-40/+85	°C	
Storage temperature range	T _{stg}	-40/+85	°C	
DC voltage	V _{DC}	5	V	
ESD voltage	V _{ESD}	50 ¹⁾	V	machine model, 10 pulses
Input power at				
GSM850, GSM900	P _{IN}	13	dBm	effective power in the on-state, duty cycle 4:8
GSM1800, GSM1900	P _{IN}	13	dBm	
Tx bands				

¹⁾ acc. to JESD22-A115B (machine model), 10 negative & 10 positive pulses.

Transfer function of filter 3 - narrowband



Transfer function of filter 3 - wideband



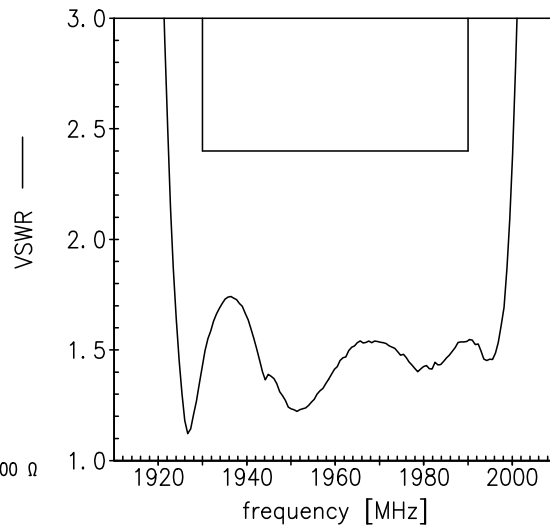
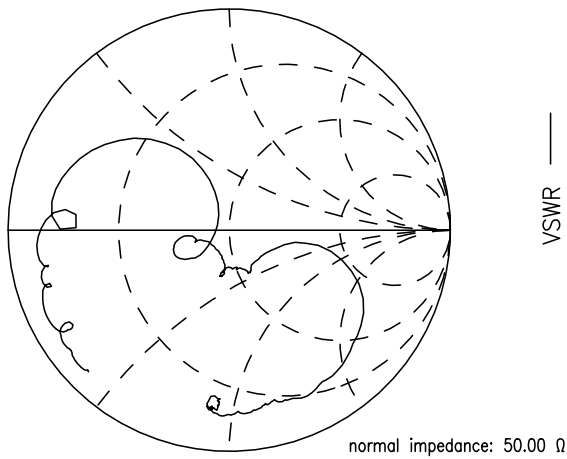
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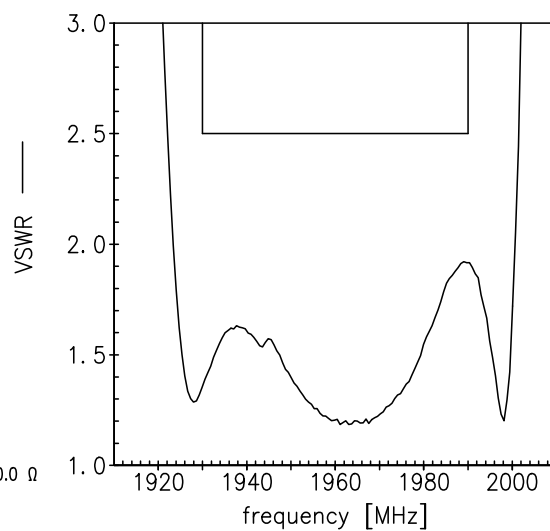
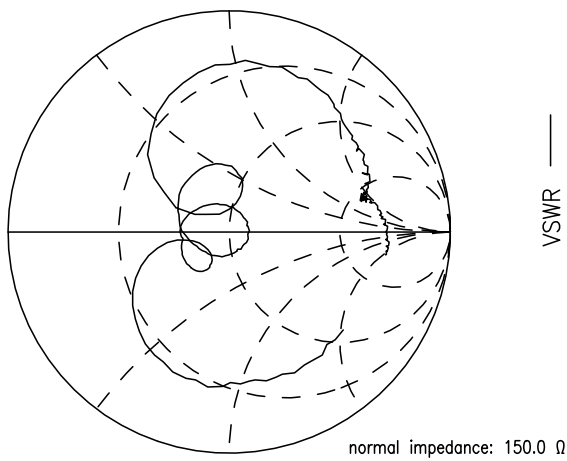


Smith Charts filter 3

S₁₁ function



S₂₂ function



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

Data sheet


Characteristics of Filter 4 (GSM1800)

Temperature range for specification: $T = -20\text{ }^{\circ}\text{C to }+85\text{ }^{\circ}\text{C}$
 Terminating source impedance: $Z_S = 50\ \Omega \parallel 6.3\ \text{nH}$
 Terminating load impedance: $Z_L = 150\ \Omega \parallel 9.0\ \text{nH}$

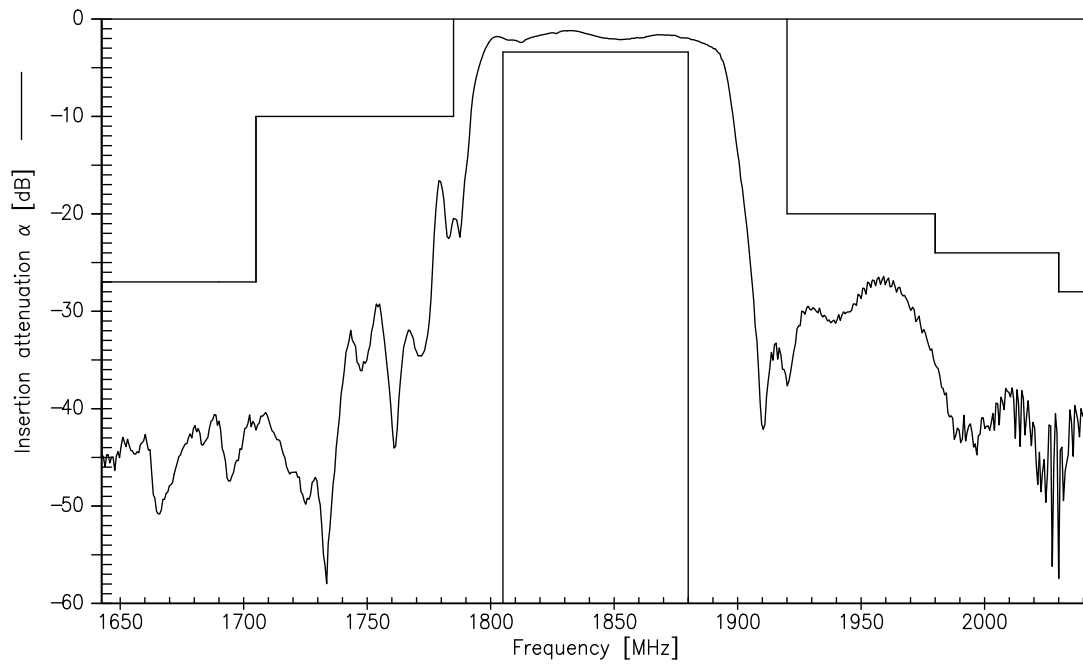
		min.	typ. @ 25 °C	max.	
Center frequency	f_C	—	1842.5	—	MHz
Maximum insertion attenuation	α_{\max}	—	2.4	3.4	dB
1805.0 ... 1880.0 MHz					
Amplitude ripple (p-p)	$\Delta\alpha$	—	0.9	2.0	dB
1805.0 ... 1880.0 MHz					
Input VSWR		—	2.0	2.5	
1805.0 ... 1880.0 MHz					
Output VSWR		—	2.0	2.4	
1805.0 ... 1880.0 MHz					
CMRR ($S_{21}-S_{31} / S_{21}+S_{31}$)		17	21	—	dB
1805.0 ... 1880.0 MHz					
Attenuation	α				
10.0 ... 824.0 MHz		45	49	—	dB
824.0 ... 940.0 MHz		41	46	—	
940.0 ... 1690.0 MHz		27	40	—	dB
1690.0 ... 1705.0 MHz		27	39	—	
1705.0 ... 1785.0 MHz		10	16	—	dB
1920.0 ... 1980.2 MHz		20	27	—	
1980.2 ... 2030.0 MHz		24	35	—	dB
2030.0 ... 2650.0 MHz		28	37	—	
2650.0 ... 6000.0 MHz		30	39	—	dB

Maximum ratings of filter 4

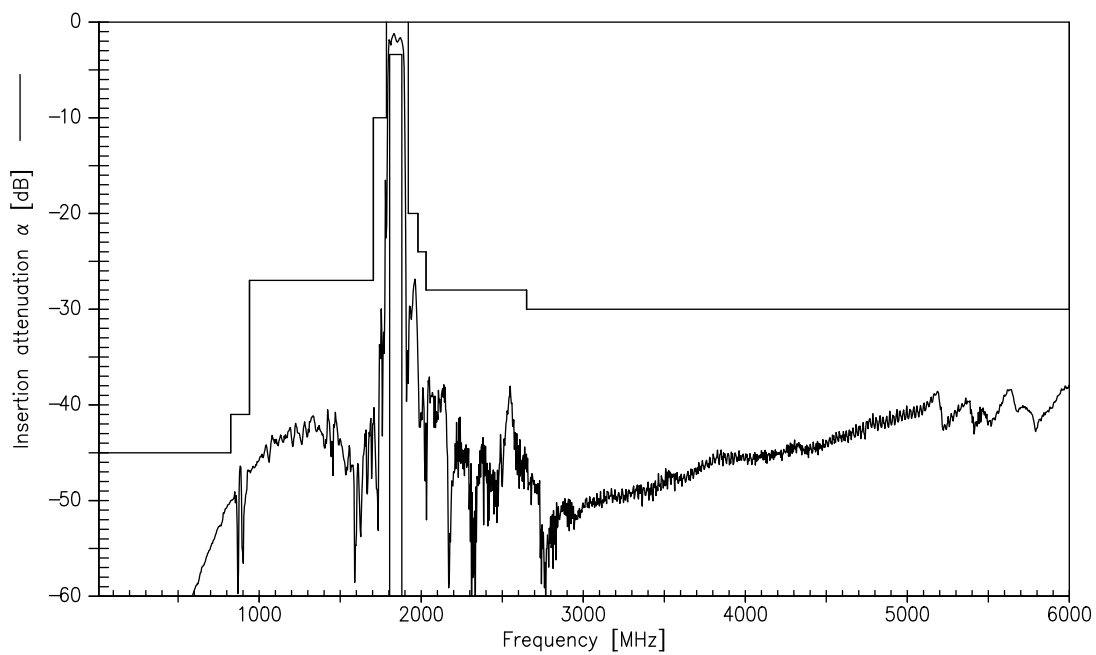
Operable temperature range	T	-40/+85	°C	
Storage temperature range	T _{stg}	-40/+85	°C	
DC voltage	V _{DC}	5	V	
ESD voltage	V _{ESD}	50 ¹⁾	V	machine model, 10 pulses
Input power at				
GSM850, GSM900	P _{IN}	13	dBm	effective power in the on-state, duty cycle 4:8
GSM1800, GSM1900	P _{IN}	13	dBm	
Tx bands				

¹⁾ acc. to JESD22-A115B (machine model), 10 negative & 10 positive pulses.

Transfer function of filter 4 - narrowband



Transfer function of filter 4 - wideband



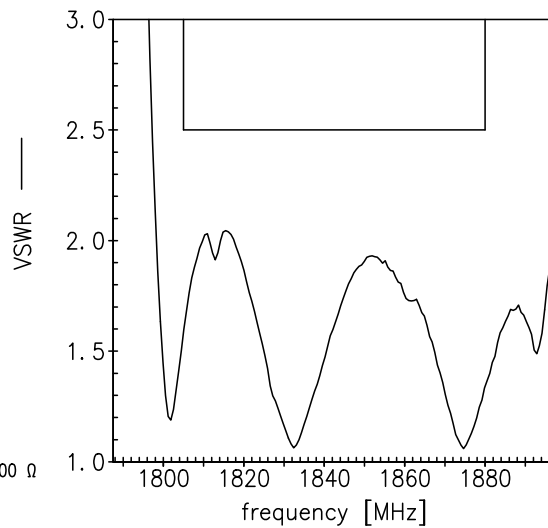
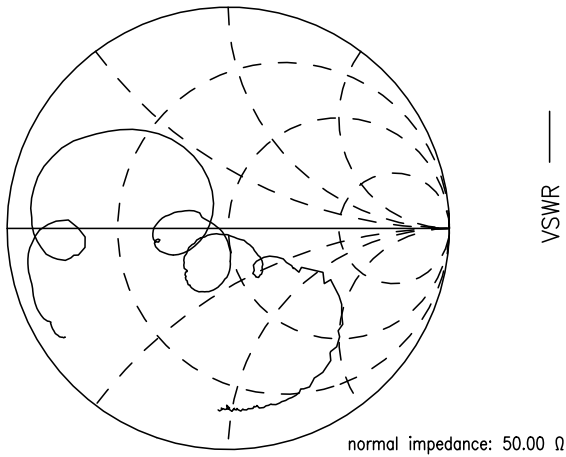
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Data sheet

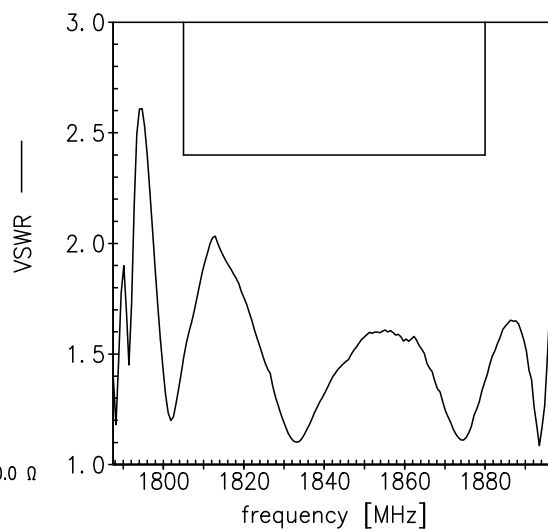
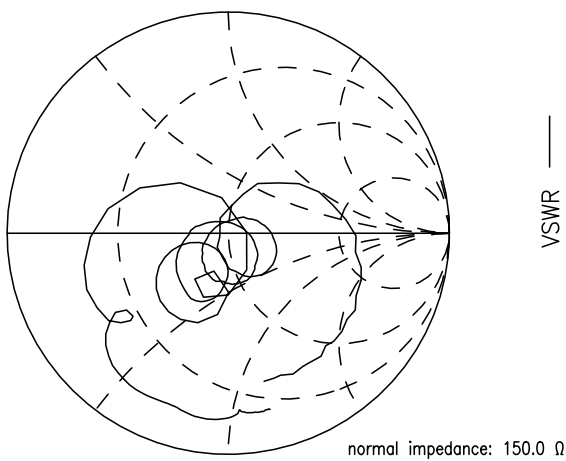
SMD

Smith Charts filter 4

S₁₁ function



S₂₂ function



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SAW Components	B9837
SAW Rx 4in1 input/output diplex filter	881.5 / 942.5 / 1842.5 / 1960.0 MHz
Data sheet	

References

Type	B9837
Ordering code	B39202B9837P810
Marking and package	C61157-A8-A60
Packaging	F61074-V8259-Z000
Date codes	L_1126
S-parameters	B9837_LB_NB.s4p, B9837_LB_WB.s4p, B9837_UB_NB.s4p, B9837_UB_WB.s4p see file header for port/pin assignment table.
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.
Matching coils	See Inductor pdf-catalog http://www.tdk.co.jp/tefe02/coil.htm#aname1 and Data Library for circuit simulation http://www.tdk.co.jp/etvcl/index.htm

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