



SAW Components

SAW Rx 2in1 filter

GSM 1900 / GSM 1800

Series/type:	B9502
Ordering code:	B39202B9502L310
Date:	January 04, 2010
Version:	2.2



SAW Components

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SAW Rx 2in1 filter

1960.0 / 1842.5 MHz

Data sheet



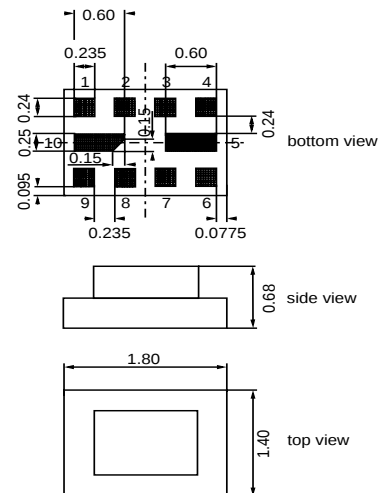
Application

- Low-loss 2in1 RF filter for mobile telephone GSM 1900 and GSM 1800 systems, receive path (Rx)
- Usable passband:
Filter 1 (GSM 1900): 60 MHz
Filter 2 (GSM 1800): 75 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



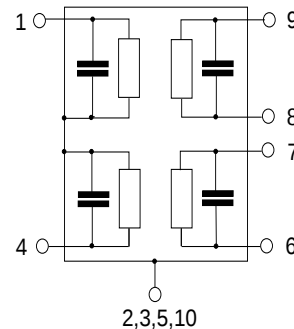
Features

- 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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Characteristics of Filter 1 (GSM 1900)

Temperature range for specification:

$T = -20$ to $+75$ °C

Terminating source impedance:

$Z_S = 50 \Omega$ (unbalanced)

Terminating load impedance:

$Z_L = 150 \Omega$ (balanced) || 13nH

		min.	typ. @ 25 °C	max.	
Center frequency	f_C	—	1960.0	—	MHz
Maximum insertion attenuation	$\alpha_{\max}$	—	1.3 ¹⁾	2.3 ²⁾	dB CTQ
1930.0 ... 1990.0 MHz		—			
Amplitude ripple (p-p)	$\Delta\alpha$	—	0.4	1.4 ³⁾	dB
1930.0 ... 1990.0 MHz		—			
Input VSWR		—	1.7	2.1	
1930.0 ... 1990.0 MHz		—			
Output VSWR		—	1.7	2.1	
1930.0 ... 1990.0 MHz		—			
Output amplitude balance (S_{31} / S_{21})		-1.3	-0.8/0.2	1.3	dB
1930.0 ... 1990.0 MHz					
Output phase balance ($\phi(S_{31})-\phi(S_{21})+180^\circ$)		-10	-7 / 5	10	°
1930.0 ... 1990.0 MHz					
Attenuation	α				
10.0 ... 1510.0 MHz		40	44	—	dB
1510.0 ... 1830.0 MHz		30	34	—	dB
1830.0 ... 1890.0 MHz		20	25	—	dB
1890.0 ... 1910.0 MHz		12	16	—	dB
2010.0 ... 2070.0 MHz		12	17	—	dB
2070.0 ... 2400.0 MHz		19	23	—	dB
2400.0 ... 2500.0 MHz		35	40	—	dB
2500.0 ... 3860.0 MHz		28	33	—	dB
3860.0 ... 3980.0 MHz		36	43	—	dB
3980.0 ... 5790.0 MHz		30	39	—	dB
5790.0 ... 6000.0 MHz		32	40	—	dB

¹⁾ Typical value excluding PCB losses of 0.29 dB

²⁾ 2.2 dB at 25 °C

³⁾ 1.3 dB at 25 °C



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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, 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.



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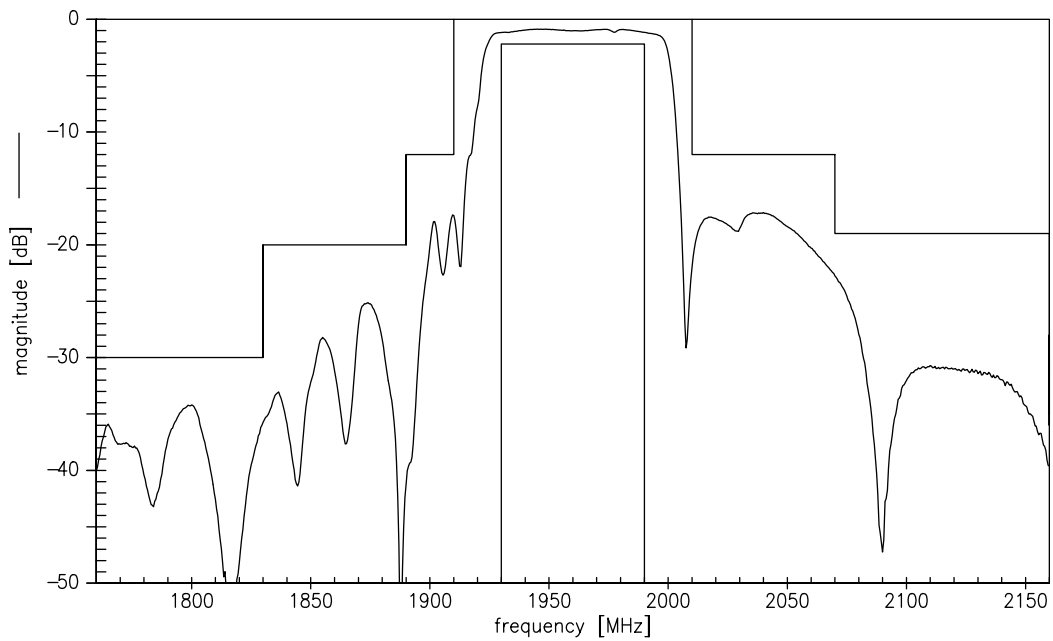
SAW Rx 2in1 filter

1960.0 / 1842.5 MHz

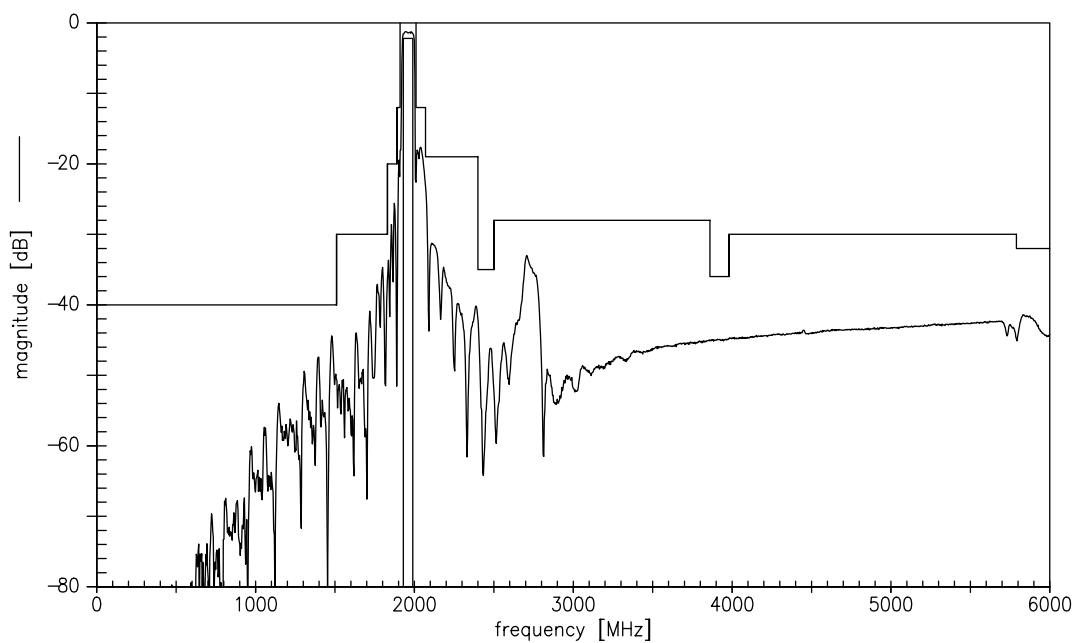
Data sheet



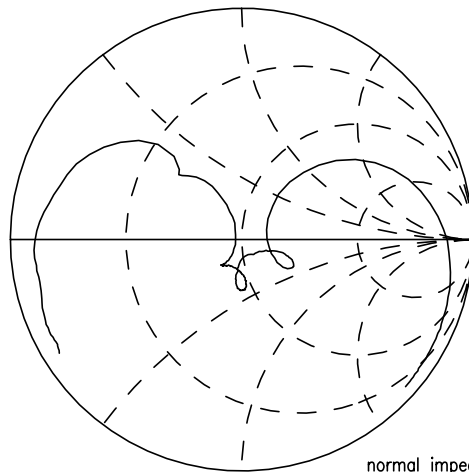
Transfer function of filter 1



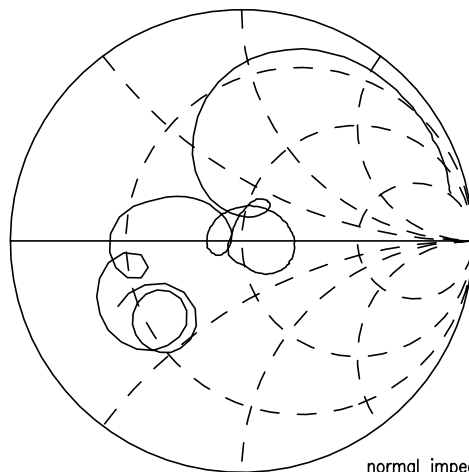
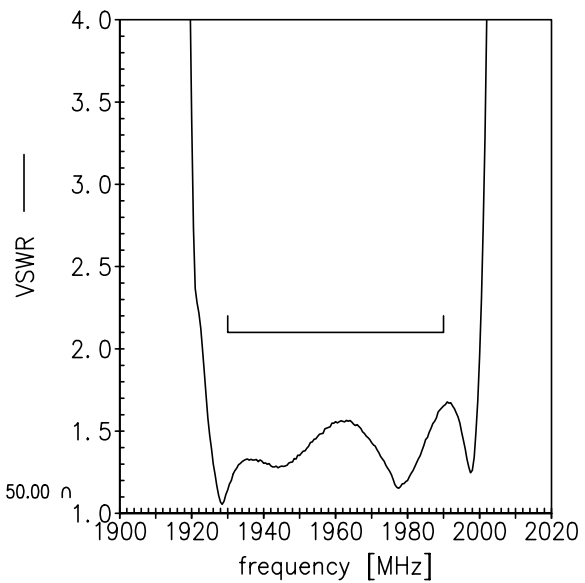
Transfer function of filter 1 - wideband



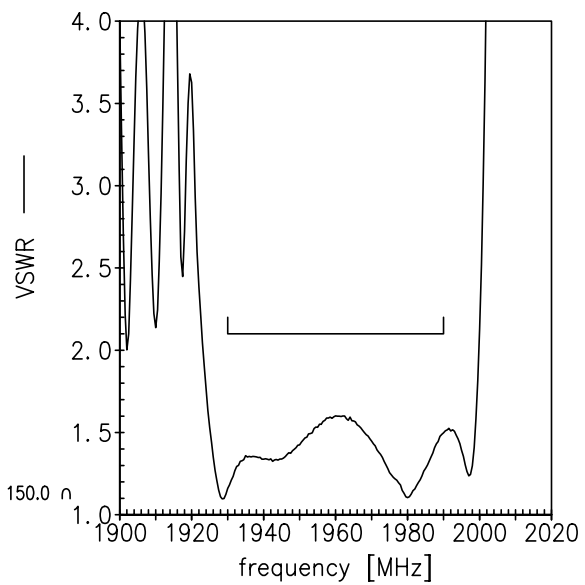
Please read *cautions and warnings* and *important notes* at the end of this document.



normal impedance: 50.00 Ω



normal impedance: 150.0 Ω





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Characteristics of filter 2 (GSM 1800)

Temperature range for specification: $T = -20$ to $+75$ °C
Terminating source impedance: $Z_S = 50 \Omega$ (unbalanced)
Terminating load impedance: $Z_L = 150 \Omega$ (balanced) || 13nH

		min.	typ. @ 25 °C	max.	
Center frequency	f_C	—	1842.5	—	MHz
Maximum insertion attenuation	$\alpha_{\max}$	—	1.4 ¹⁾	2.2 ²⁾	dB CTQ
1805.0 ... 1880.0 MHz		—			
Amplitude ripple (p-p)	$\Delta\alpha$	—	0.5	1.4 ³⁾	dB
1805.0 ... 1880.0 MHz		—			
Input VSWR		—	1.7	2.1	
1805.0 ... 1880.0 MHz		—			
Output VSWR		—	1.7	2.1	
1805.0 ... 1880.0 MHz		—			
Output amplitude balance (S_{31}/S_{21})		-1.0	-0.8/0.4	1.0	dB
1805.0 ... 1880.0 MHz					
Output phase balance ($\phi(S_{31}) - \phi(S_{21}) + 180^\circ$)		-10	-5.0/5.0	10	°
1805.0 ... 1880.0 MHz					
Attenuation	α				
10.0 ... 902.0 MHz		45	53	—	dB
902.0 ... 940.0 MHz		45	53	—	dB
940.0 ... 1705.0 MHz		28	40	—	dB
1705.0 ... 1785.0 MHz		12 ⁴⁾	16	—	dB
1920.0 ... 1980.0 MHz		17	22	—	dB
1980.0 ... 2030.0 MHz		25	30	—	dB
2030.0 ... 2400.0 MHz		28	34	—	dB
2400.0 ... 2500.0 MHz		32	39	—	dB
2500.0 ... 2775.0 MHz		28	33	—	dB
2775.0 ... 2880.0 MHz		38	46	—	dB
2880.0 ... 3610.0 MHz		28	46	—	dB
3610.0 ... 3760.0 MHz		38	46	—	dB
3760.0 ... 5415.0 MHz		28	39	—	dB
5415.0 ... 5640.0 MHz		32	38	—	dB
5640.0 ... 6000.0 MHz		28	38	—	dB

1) Typical Value excluding PCB losses of 0.27dB

2) 2.1 dB at 25 °C

3) 1.3 dB at 25 °C

4) 14 dB at 25 °C



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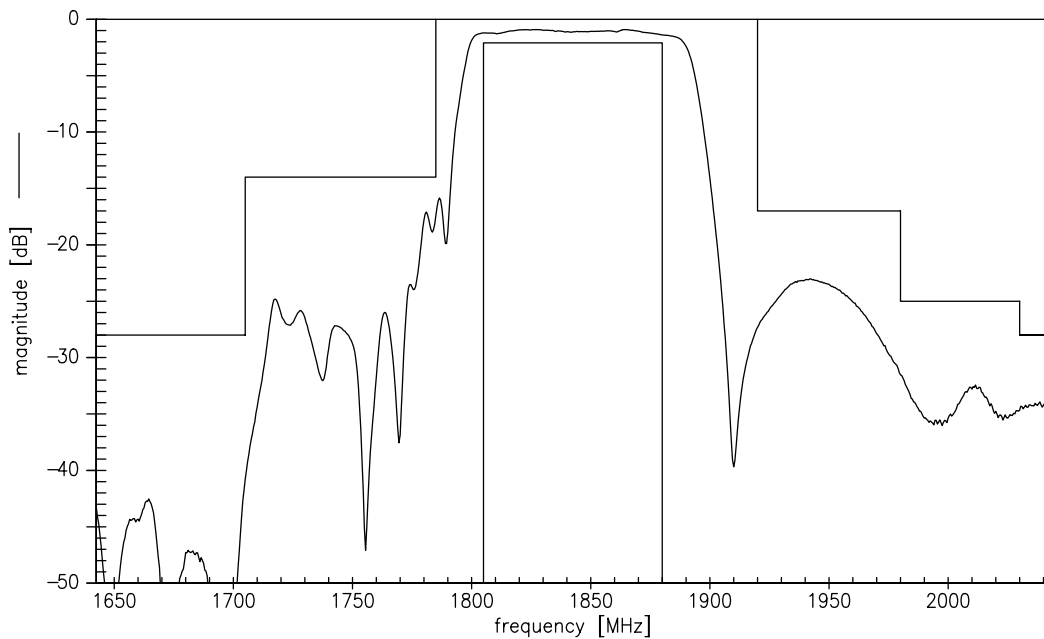
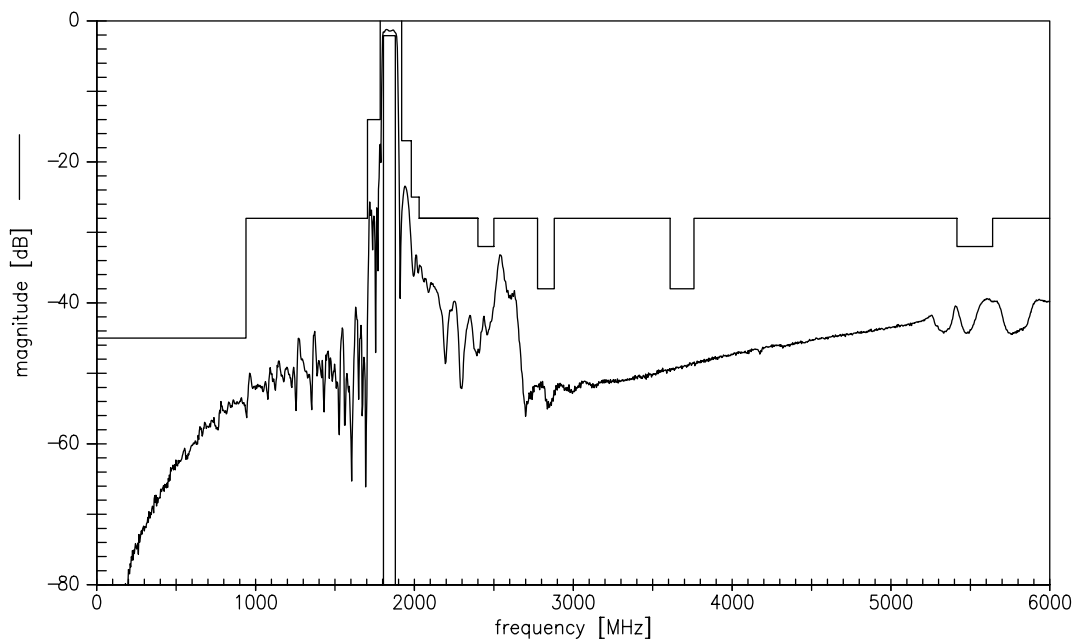
Data sheet



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}	50 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**



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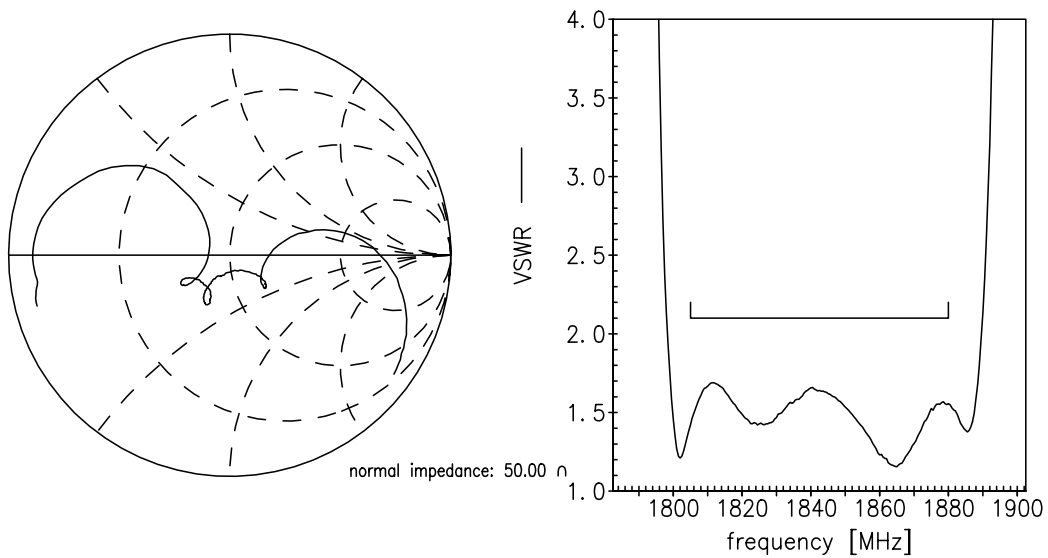
1960.0 / 1842.5 MHz

Data sheet

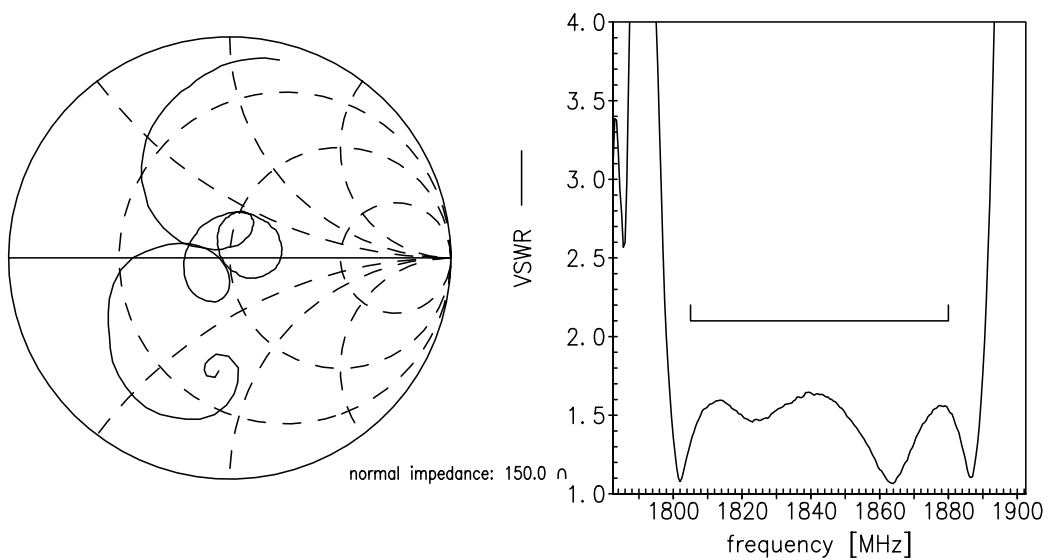


Smith charts filter 2

S_{11} function



S_{22} function



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

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**References**

Type	B9502
Ordering code	B39202B9502L310
Marking and package	C61157-A7-A152
Packaging	F61074-V8226-Z000
Date codes	L_1126
S-parameters	B9502_UB_NB.s3p B9502_UB_WB.s3p B9502_LB_NB.s3p B9502_LB_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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