SAW Components

SAW Rx 2in1 filter

WCDMA Diversity Band 2 / Band 1

Series/type:	**B9912**
Ordering code:	**B39212B9912P810**
Date:	October 01, 2013
Version:	2.0

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SAW Rx 2in1 filter 1960.0 / 2140.0 MHz

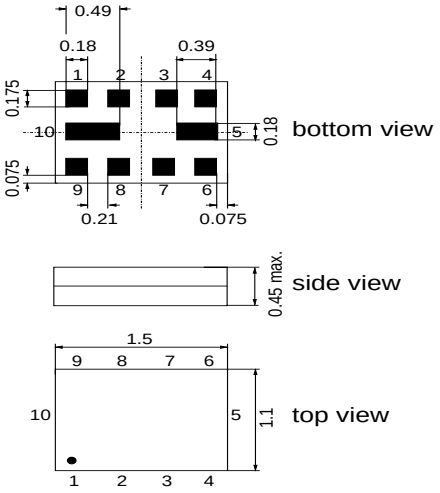
Data Sheet SMD

Application

- Low-loss 2in1 RF filter for mobile telephone WCD-MA Band 2 and Band 1 systems (diversity) receive path (Rx).
- Usable passband:
  Band 2: 60 MHz
  Band 1: 60 MHz
- Unbalanced to balanced operation for both filters
- Impedance transformation from 50 Ω to 100 Ω for both filters
- Low amplitude ripple.

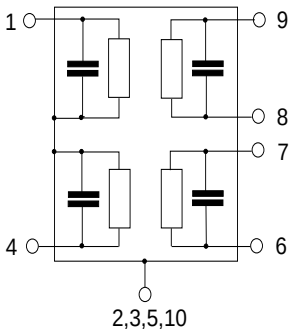
Features

- Package size 1.5 x1.1mm^2
- Max. Package height 0.45mm
- RoHS compatible
- Approx. weight 0.003g
- Package for **S**urface **M**ount **T**echnology (**SMT**)
- Ni, gold-plated terminals
- **E**lectrostatic **S**ensitive **D**evice (**ESD**)
- **M**oisture **S**ensitive **L**evel 3



Pin configuration

■	1	Input [Band 2]
■	4	Input [Band 1]
■	8,9	Output balanced [Band 2]
■	6,7	Output balanced [Band 1]
■	2,3,5,10	Case-ground



Characteristics of Band 2

Temperature range for specification: T = -20 ˚C to +85 ˚C
Terminating source impedance: Z_S = 50 Ω
Terminating load impedance: Z_L = 100 Ω ‖ 33nH

			min.	typ. @ 25˚C	max.	
Center frequency		f_C	—	1960.0	—	MHz
Maximum insertion attenuation		α_{max}				
	1930.0 ... 1990.0 MHz		—	2.7	3.7	dB
@$f_{carrier}$	1932.4 ... 1987.6 MHz	α_{WCDMA}[1]		2.4	3.6	
Amplitude ripple (p-p)		$\Delta\alpha$				
	1930.0 ... 1990.0 MHz		—	1.3	2.3	dB
Error Vector Magnitude		EVM[2]				
@$f_{carrier}$	1932.4 ... 1987.6 MHz		—	2.4	5.5	%
Input VSWR						
	1930.0 ... 1990.0 MHz		—	1.8	2.2	
Output VSWR						
	1930.0 ... 1990.0 MHz		—	1.9	2.3	
Common mode rejection ratio						
	1930.0 ... 1990.0 MHz		19[3]	22	—	dB
Attenuation		α				
	100.0 ... 810.0 MHz		50	67	—	dB
	810.0 ... 849.0 MHz		60	67	—	dB
	849.0 ... 898.0 MHz		60	67	—	dB
	898.0 ... 925.0 MHz		60	65	—	dB
	925.0 ... 1850.0 MHz		40	48	—	dB
	1850.0 ... 1910.0 MHz		30	46	—	dB
@$f_{carrier}$	1852.4 ... 1907.6 MHz	α_{WCDMA}[1]	40	44	—	dB
	2400.0 ... 2484.0 MHz		45	52	—	dB
	2484.0 ... 6000.0 MHz		33	42	—	dB

[1] Attenuation of WCDMA signal (“Powertransferfunction“).Please refer to annotation on following page.
[2] Error Vector Magnitude (EVM) based on definition given in 3GPP TS 25.141.
[3] A CMRR of 19.6dB corresponds to a phase balance of 10˚ together with an amplitude balance of 1.0dB

Annotation for characteristics section

Attenuation of WCDMA signal ("Powertransferfunction", α_{WCDMA}) is determined by

$$\int_{\infty}^{\infty} \left| S_{ds21}(f) H_{RRC}(f - f_{Carrier}) \right|^2 df$$

$f_{Carrier}$ according to 3GPP TS 25.101 (e.g. for Passband, $f_{Carrier}$ ranges from 1932.4 MHz (lowest Rx channel) to 1987.6 MHz (highest Rx channel)). $H_{RRC}(f)$ is the transfer function of the root-raised cosine transmit pulse shaping filter according to 3GPP TS 25.101 with the following normalization:

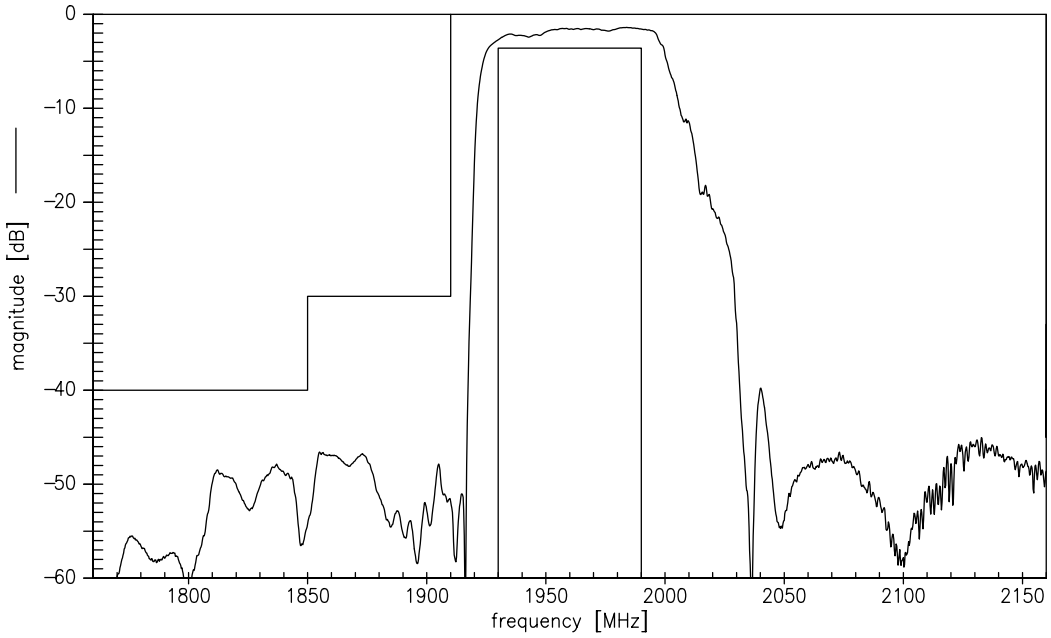
$$\int_{\infty}^{\infty} \left| H_{RRC}(f) \right|^2 df = 1$$

Maximum ratings of Band 2

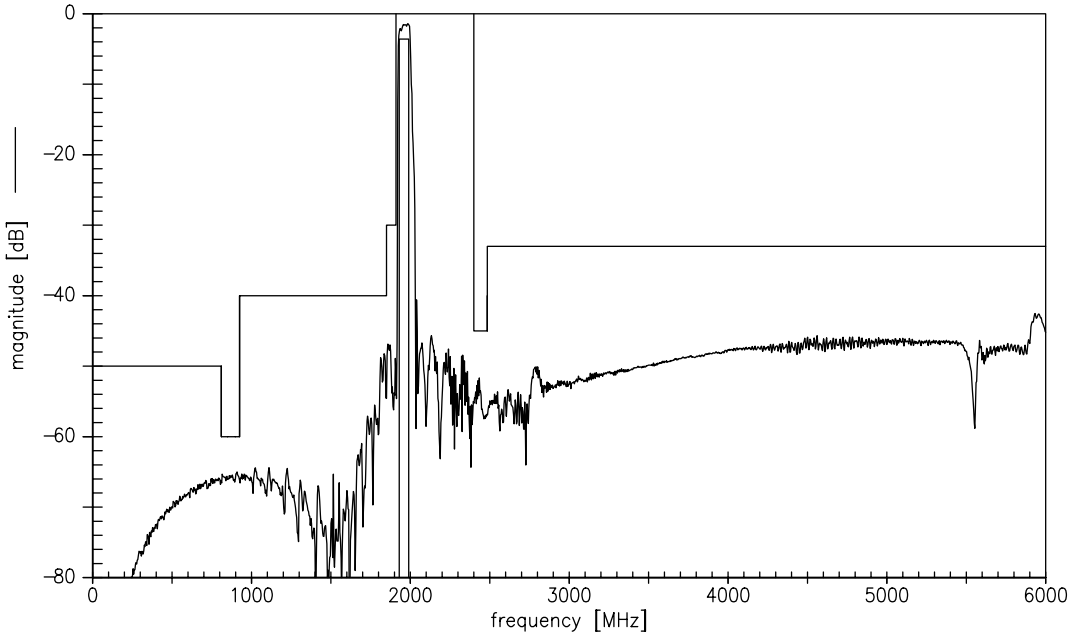
Storage temperature range	T_{stg}	–40/+85[1)]	˚C	
DC voltage	V_{DC}	5[2)]	V	
ESD voltage	V_{ESD}	50[3)]	V	Machine Model
Input Power at 1850.0 ... 1910.0MHz	P_{IN}	12	dBm	CW signal for 2000h at T = 55 ˚C

1) Extended upperlimit: 168h@125˚C acc. to IEC 60068-2-2 Bb
2) 168h Damp Heat Steady State acc. to IEC 60068-2-67 Cy
3) acc. to JESD22-A115B (MM-Machine Model), 10 negative & 10 positive pulses.

Transfer function of Band 2 - narrowband

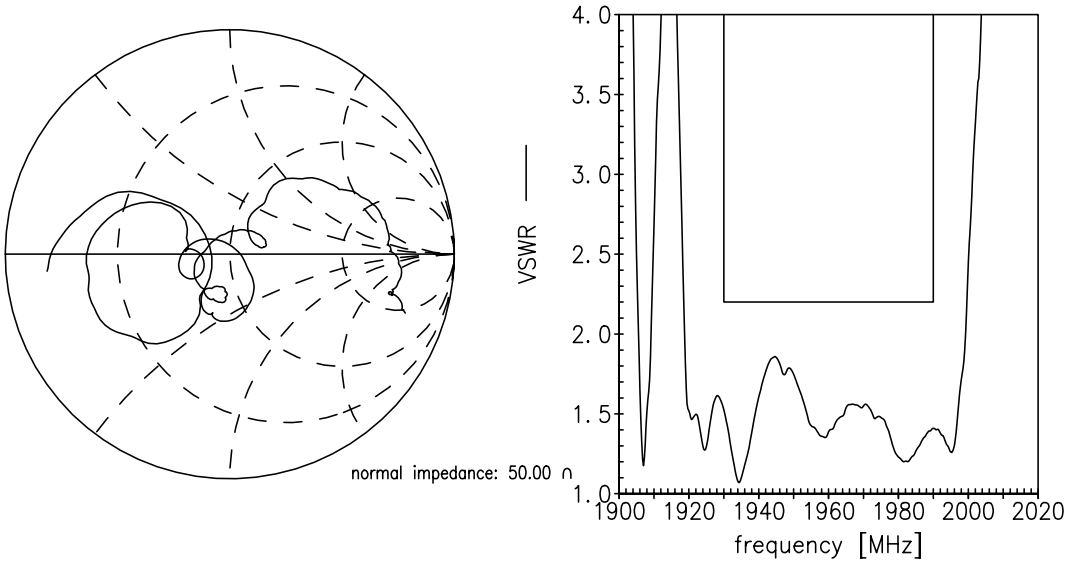


Transfer function of Band 2 - wideband

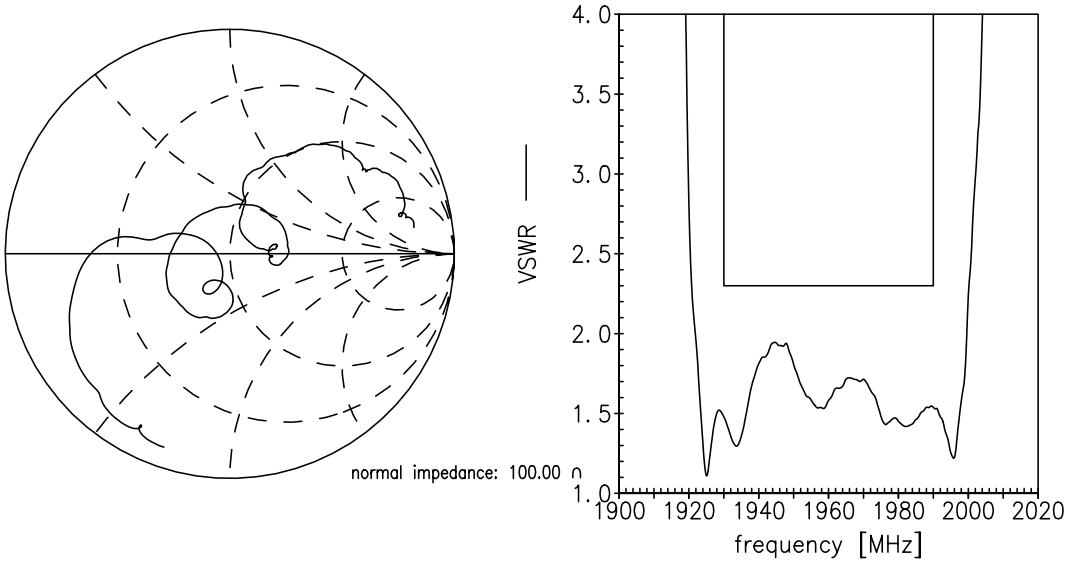


Smith Charts Band 2

S_{11} function



S_{22} function



Characteristics of Band 1

Temperature range for specification: T = -20 ˚C to +85 ˚C
Terminating source impedance: Z_S = 50 Ω
Terminating load impedance: Z_L = 100 Ω || 15nH

		min.	typ. @ 25˚C	max.	
Center frequency	f_C	—	2140.0	—	MHz
Maximum insertion attenuation	α_{max}				
2110.0 ... 2170.0 MHz		—	1.6	2.1	dB
Amplitude ripple (p-p)	$\Delta\alpha$				
2110.0 ... 2170.0 MHz		—	0.5	1.0	dB
Input VSWR					
2110.0 ... 2170.0 MHz		—	1.8	2.1	
Output VSWR					
2110.0 ... 2170.0 MHz		—	1.7	2.1	
Common mode rejection ratio					
2110.0 ... 2170.0 MHz		20[1)]	23	—	dB
Attenuation	α				
100.0 ... 810.0 MHz		40	60	—	dB
810.0 ... 849.0 MHz		50	58	—	dB
849.0 ... 898.0 MHz		40	59	—	dB
898.0 ... 925.0 MHz		50	56	—	dB
925.0 ... 1620.0 MHz		40	52	—	dB
1620.0 ... 1710.0 MHz		32	51	—	dB
1710.0 ... 1755.0 MHz		45	53	—	dB
1755.0 ... 1920.0 MHz		40	47	—	dB
1920.0 ... 1980.0 MHz		46	52	—	dB
1980.0 ... 2050.0 MHz		25	37	—	dB
2400.0 ... 2430.0 MHz		30	40	—	dB
2430.0 ... 2900.0 MHz		32	40	—	dB
2900.0 ... 4600.0 MHz		34	41	—	dB
4600.0 ... 6000.0 MHz		28	42	—	dB

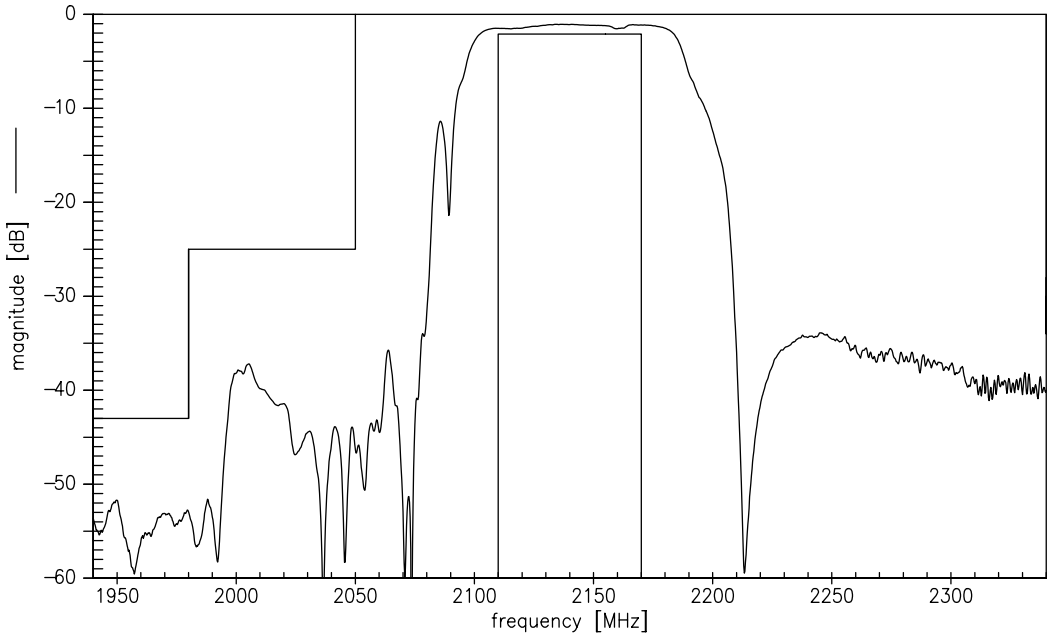
1) A CMRR of 19.6dB corresponds to a phase balance of 10˚ together with an amplitude balance of 1.0dB

Maximum ratings of Band 1

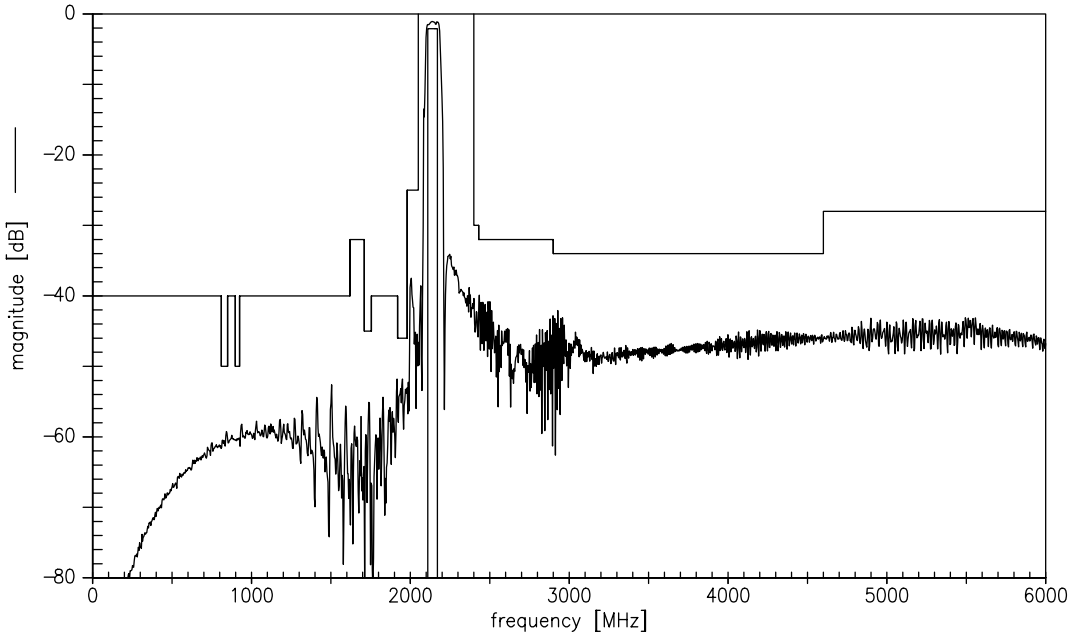
Storage temperature range	T_{stg}	–40/+85[1)]	˚C	
DC voltage	V_{DC}	5[2)]	V	
ESD voltage	V_{ESD}	50[3)]	V	Machine Model
Input power at				
1920.0 .. .1980.0MHz	P_{IN}	15	dBm	CW signal for 2000h at T = 55 ˚C

1) Extended upperlimit: 168h@125˚C acc. to IEC 60068-2-2 Bb
2) 168h Damp Heat Steady State acc. to IEC 60068-2-67 Cy
3) acc. to JESD22-A115B (Machine Model-Machine Model), 10 negative & 10 positive pulses.

Transfer function of Band 1 - narrowband

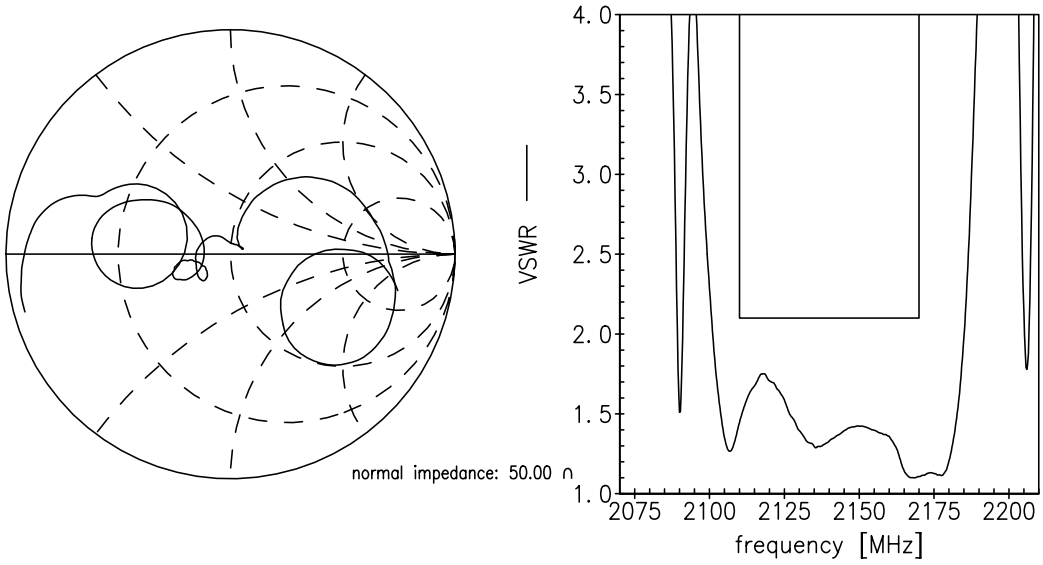


Transfer function of Band 1 - wideband

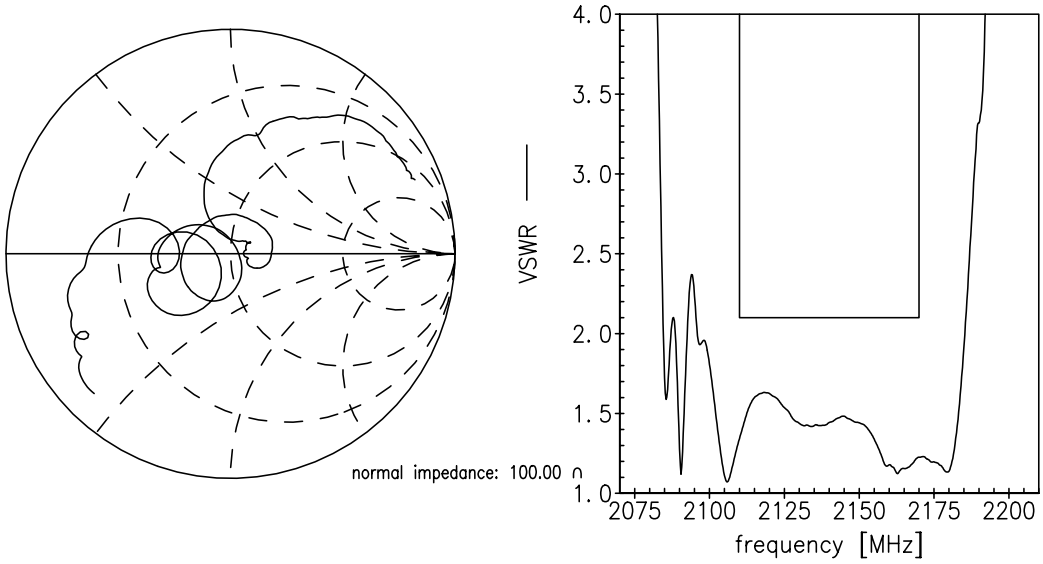


Smith Charts Band 1

S_{11} function



S_{22} function



References

Type	B9912
Ordering code	B39212B9912P810
Marking and package	C61157-A8-A71
Packaging	F61074-V8227-Z000
Date codes	L_1126
S-parameters	B9912_LB_NB.s3p, B9912_LB_WB.s3p B9912_UB_NB.s3p, B9912_UB_WB.s3p 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 http://www.tdk.co.jp/tefe02/coil.htm#aname1 http://www.tdk.co.jp/etvcl/index.htm for a large variety of matching coils.

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