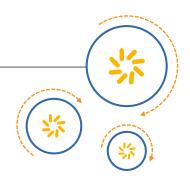


RF360 Europe GmbH

A Qualcomm - TDK Joint Venture



SAW Components

SAW Rx filter

Automotive Telematics

Series/type: B4323

Ordering code: B39941B4323P810

Date: August 13, 2013

Version: 2.1

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SAW Components

B4323

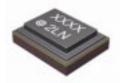
SAW Rx filter 942.5 MHz

Data sheet



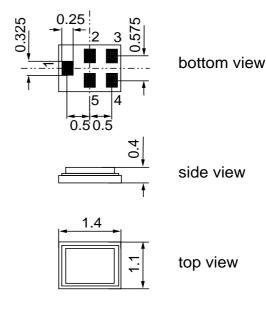
Application

- Low-loss RF filter for WCDMA Band VIII and GSM 900 systems, receive path (RX)
- Very high TX suppression suitable for diversity applications
- Usable passband: 35 MHz
- Unbalanced to balanced operation
- \blacksquare Impedance transformation from 50 Ω to 100 Ω
- Suitable for GPRS class 1 to 12



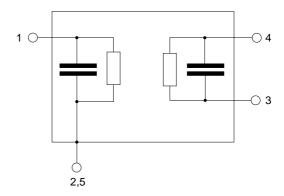
Features

- Package size 1.4 x1.1 x 0.4 mm³
- Package code QCS5P
- RoHS compatible
- Approximate weight 0.003 g
- Package for Surface Mount Technology (SMT)
- Ni, gold-plated terminals
- AEC-Q200 qualified component family (operable temperature range -40°C to +85°C)
- Electrostatic Sensitive Device (ESD)



Pin configuration

- 1 Input
- 3,4 Output, balanced
- 2,5 To be grounded





SAW Components

B4323

SAW Rx filter 942.5 MHz

Data sheet

 \leq MD

Characteristics

Temperature range for specification: = -20 °C to +85 °C

Terminating source impedance: 50Ω Terminating load impedance: $Z_1 = 100 \Omega$

						min.	typ. @ 25 °C	max.	
Center freque	ency				f _C	_	942.5	_	MHz
Maximum ins	ertion a	tten	uation						
@f _{Carrier Bd 8 RX}	927.4			MHz	$\alpha_{\text{WCDMA}}^{-1}$		2.1	2.8	dB
@f _{Carrier Bd 8 RX}	925.7		959.3		$\alpha_{\rm LTF}^{(2)}$	_	2.3	3.6	dB
Carrier Bu o TO	925.0		960.0	MHz		_	2.5	4.0	dB
Amplitude rip	ple (p-p)							
	925.0	•	960.0	MHz	$\Delta \alpha$	_	1.5	2.8	dB
Error Vector I	Magnitu	de³)							
@f _{Carrier Bd 8 RX}	_			MHz	EVM	_	3.2	6.2	%
Input VSWR									
-	925.0		960.0	MHz		_	1.8	2.3	
Output VSWR									
	925.0	•••	960.0	MHz		_	1.9	2.4	
CMRR (S ₂₁ -S									
	925.0		960.0	MHz		18	23 ⁴⁾	_	dB
Attenuation					α				
	50.0		880.0	MHz		42	55		dB
@f _{Carrier Bd 8 TX}	882.4		912.6		$\alpha_{\text{WCDMA}}^{2}$	42	47	_	dB
@f _{Carrier Bd 8 TX}	880.7		914.3		$\alpha_{LTE^{3)}}$	39	44	_	dB
	880.0		915.0	MHz	α_{GSM}	35	44	_	dB
	980.0		1045.0	MHz		21	25	_	dB
	1045.0		1700.0	MHz		35	50	_	dB
	1700.0			MHz		45	62	_	dB
	2600.0		2682.0	MHz		50	60	_	dB
	2682.0		4345.0	MHz		44	56	_	dB
	4345.0		4470.0	MHz		45	58	_	dB
	4470.0		6000.0	MHz		48	55	_	dB

¹⁾ Attenuation of WCDMA signal ("Powertransferfunction"). Please refer to annotation on page (4).

²⁾ Attenuation of LTE signal ("Powertransferfunction"). Please refer to annotation on page (4).
3) Error Vector Magnitude (EVM) based on definition given in 3GPP TS 25.141.

⁴⁾ A CMRR of 22.8 dB corresponds to a phase balance of 5° togeher an amplitude balance of 1.0 dB



Data sheet



Annotation for characteristics section

Attenuation of WCDMA and LTE signal ("Powertransferfunction", α_{WCDMA} , α_{LTE}) are determined by

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

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:

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

 $f_{Carrier}$ of WCDMA signal according to 3GPP TS 25.101 (e.g. for band VIII RX passband, $f_{Carrier}$ ranges from 927.4 MHz (f_{C} of lowest Rx channel) to 957.6 MHz (f_{C} of highest Rx channel)). $f_{Carrier}$ of LTE signal according to 3GPP TS 36.101 with a channel band width of 1.08 MHz (equals 6 Resource Blocks) and a guard band of 0.16 MHz (e.g. for band VIII RX passband, $f_{Carrier}$ ranges from 925.7 MHz (f_{C} of lowest Rx channel) to 959.3 MHz (f_{C} of highest Rx channel)).

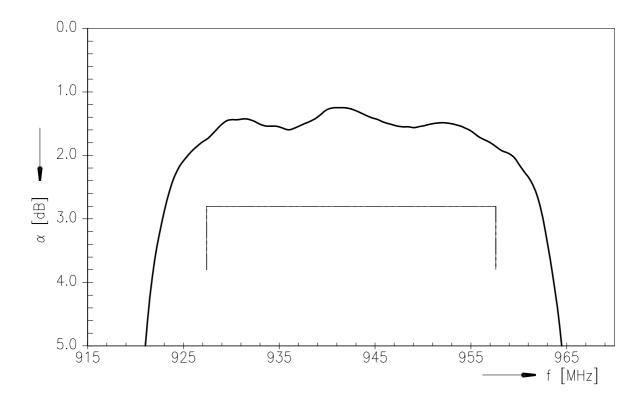
Maximum ratings

Operable temperature range	Т	-40/+85	°C	
Storage temperature range	T_{stg}	-40/+85	°C	
DC voltage	V_{DC}	0	V	
Input power at	P_{IN}	17	dBm	10000h @ 55°C

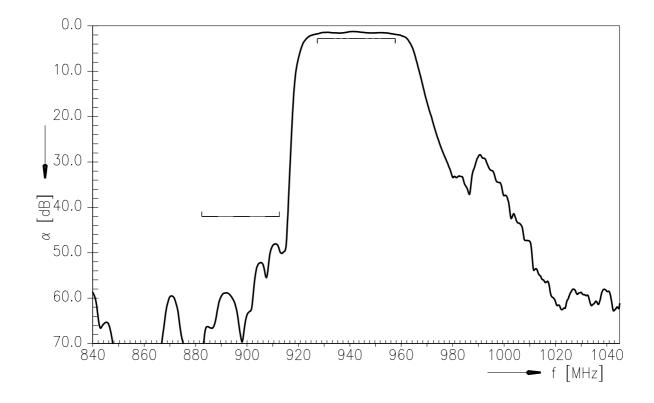


Data sheet

Transfer function for WCDMA signals (Powertransferfunction vs. carrier frequency)



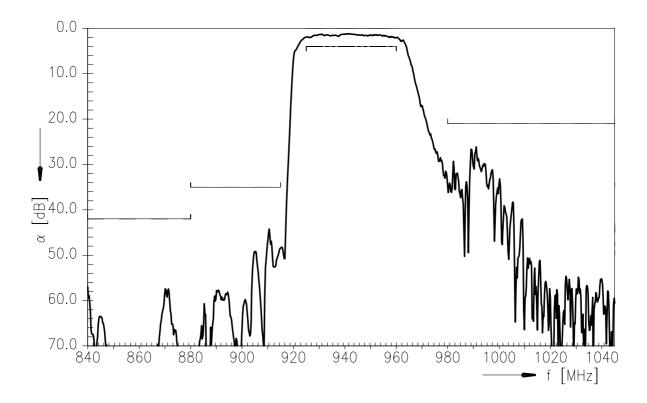
Transfer function for WCDMA signals (Powertransferfunction vs. carrier frequency)



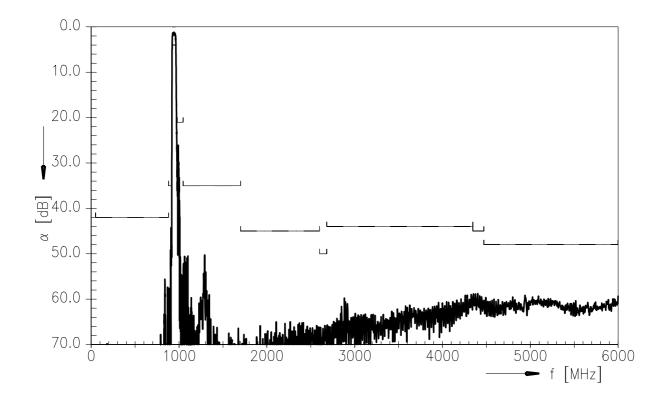


Data sheet

Transfer function for CW signals (narrowband)



Transfer function for CW signals (wideband)



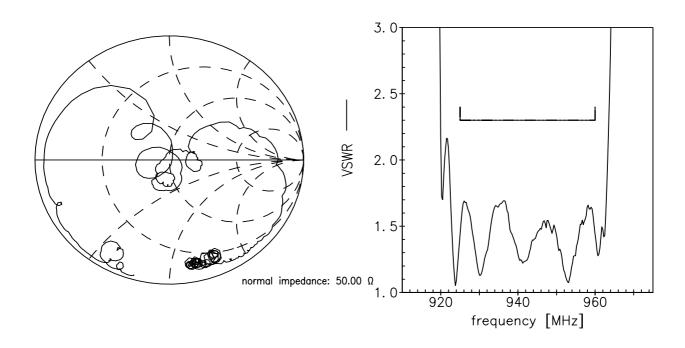


Data sheet

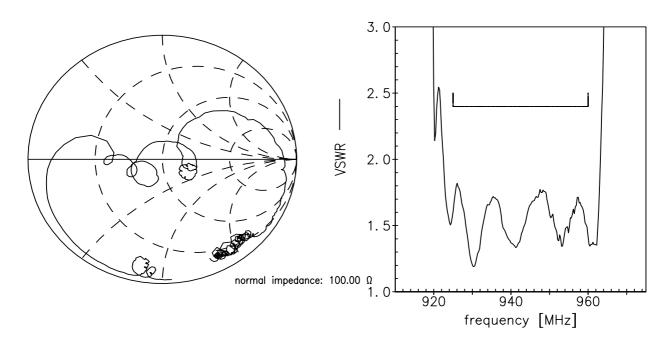


Smith chart

S₁₁ function



S₂₂ function





Data sheet



ESD protection of SAW filters

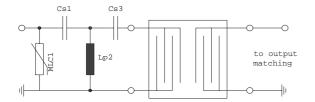
SAW filters are Electro Static Discharge sensitive devices. To reduce the probability of damages caused by ESD, special matching topologies have to be applied.

In general, "ESD matching" has to be ensured at that filter port, where electrostatic discharge is expected.

Electrostatic discharges predominantly appear at the antenna input of RF receivers. Therefore only the input matching of the SAW filter has to be designed to short circuit or to block the ESD pulse.

Below three figures show recommended "ESD matching" topologies.

For wideband filters the high-pass ESD matching structure needs to be at least of 3rd order to ensure a proper matching for any impedance value of antenna and SAW filter input. The required component values have to be determined from case to case.



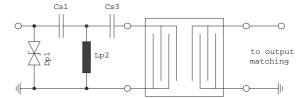


Fig. 1 MLC varistor plus ESD matching

Fig. 2 Suppressor diode plus ESD matching

In cases where minor ESD occur, following simplified "ESD matching" topologies can be used alternatively.

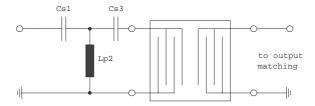


Fig. 3 3rd order high-pass structure for basic ESD protection

In all three figures the shunt inductor Lp2 could be replaced by a shorted microstrip with proper length and width. If this configuration is possible depends on the operating frequency and available pcb space.

Effectiveness of the applied ESD protection has to be checked according to relevant industry standards or customer specific requirements

For further information, please refer to EPCOS Application report:

"ESD protection for SAW filters".

This report can be found under www.epcos.com/rke.Click on "Applications Notes".



SAW Components	B4323
SAW Rx filter	942.5 MHz

Data sheet



References

Туре	B4323
Ordering code	B39941B4323P810
Marking and package	C61157-A8-A9
Packaging	F61074-V8212-Z000
Date codes	L_1126
S-parameters	B4323_NB.s3p, B4323_WB.s3p see file header for port/pin assignment table
Soldering profile	S_6001
RoHS compatible	RoHS-compatible means that products are compatible with the requirements according to Art. 4 (substance restrictions) of Directive 2011/65/EU of the European Parliament and of the Council of June 8 th , 2011, on the restriction of the use of certain hazardous substances in electrical and electronic equipment ("Directive") with due regard to the application of exemptions as per Annex III of the Directive in certain cases.
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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 for a large variety of matching coils.

For further information please contact your local EPCOS sales office or visit our webpage at $\underline{www.epcos.com}$.

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