SAW Components

SAW Tx 2in1 Filter

WCDMA band I & VIII

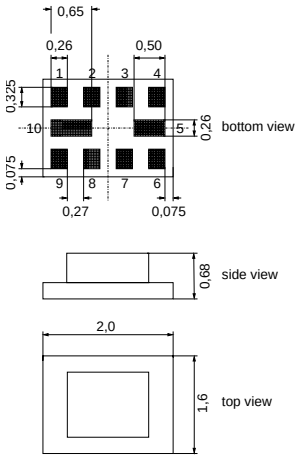
Series/type:	**B9321**
Ordering code:	**B39202B9321N410**
Date:	Feb 27, 2007
Version:	2.0

Application

- Low-loss RF filter for mobile telephone WCDMA band I / band VIII systems, transmit path (Tx)
- Usable passband:
  Filter 1 (band VIII): 35 MHz
  Filter 2 (band I): 60 MHz
- Impedance transformation from:
  Filter 1 (band VIII): 100 Ω to 50 Ω
  Filter 2 (band I): 100 Ω to 50 Ω
- Balanced to unbalanced operation

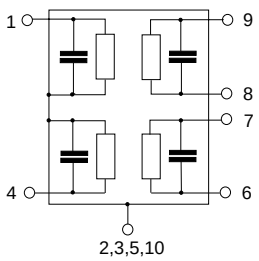
Features

- Package size 2.0 x1.6 x 0.68 mm^3
- Package code QCS10I
- RoHS compatible
- Approximate weight 0.008 g
- Package for **S**urface **M**ount **T**echnology (**SMT**)
- Ni, gold-plated terminals
- **E**lectrostatic **S**ensitive **D**evice (**ESD)**



Pin configuration

- 1 Output [Filter 1: band VIII]
- 4 Output [Filter 2: band I]
- 6,7 Input balanced [Filter 2: band I]
- 8,9 Input balanced [Filter 1: band VIII]
- 2,3,5,10 Case ground



Characteristics filter 1 (WCDMA band VIII)

Operating temperature range: T = –15 ˚C to +80 ˚C
Terminating source impedance: Z_S = 100 Ω (balanced)
Terminating load impedance: Z_L = 50 Ω (unbalanced)

		min.	typ. @ 25 ˚C	max.	
Center frequency	f_C		897.5		MHz
Maximum insertion attenuation					
880.4 ... 914.6MHz	α_{max}		2.3	4.2[1]	dB
@$f_{Carrier}$ 882.4 ... 912.6MHz	α_{WCDMA}[2]		2.3	3.0	dB
Amplitude ripple (p-p)					
880.4 ... 914.6MHz	$\Delta\alpha$		1.4	3.2	dB
Amplitude ripple at 5 MHz BW					
880.4 ... 914.6MHz	$\Delta\alpha_{5MHz}$		0.9	2.2	dB
Group delay variation at 5 MHz BW					
880.4 ... 914.6MHz	$\Delta\tau_{5MHz}$		22	40	ns
Input VSWR					
880.4 ... 914.6MHz			2.0	2.4	
Output VSWR					
880.4 ... 914.6MHz			2.0	2.4	
Input amplitude balance ($\lvert S_{31}/S_{21}\rvert$)					
880.4 ... 914.6MHz		-1.0	-0.7/0.7	1.0	dB
Input phase balance ($\phi(S_{31}) - \phi(S_{21})+180^\circ$)					
880.4 ... 914.6MHz		-10	-3/1	10	°
Attenuation	α				
DC ... 835.0MHz		30	44		dB
835.0 ... 867.0MHz		25	33		dB
867.0 ... 870.0MHz		14	16		dB
@$f_{Carrier}$ 835.0 ... 867.6MHz	α_{WCDMA}[3]	20	33		dB
925.4 ... 959.6MHz		30	34		dB
959.6 ... 1570.0MHz		30	45		dB
1570.0 ... 1580.0MHz		33	50		dB
1580.0 ... 2745.0MHz		30	40		dB
2745.0 ... 6000.0MHz		25	40		dB

[1] 4.7dB for T=–30 ˚C to+85 ˚C and 3.0dB for T= 23 ˚C to 27 ˚C.
[2] Attenuation of WCDMA signal (“Powertransferfunction”). Please refer to annotation on page 4.

Annotation for characteristics section

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

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

$f_{Carrier}$ according to 3GPP TS 25.101 (e.g. for Passband, $f_{Carrier}$ ranges from 882.4 MHz (lowest Tx channel) to 912.6 MHz (highest Tx channel)). $H_{RRC}(f)$ is the transfer function of theroot - raised cosine transmit pulse shaping filter according to 3GPP TS 25.101 with the following normalization:

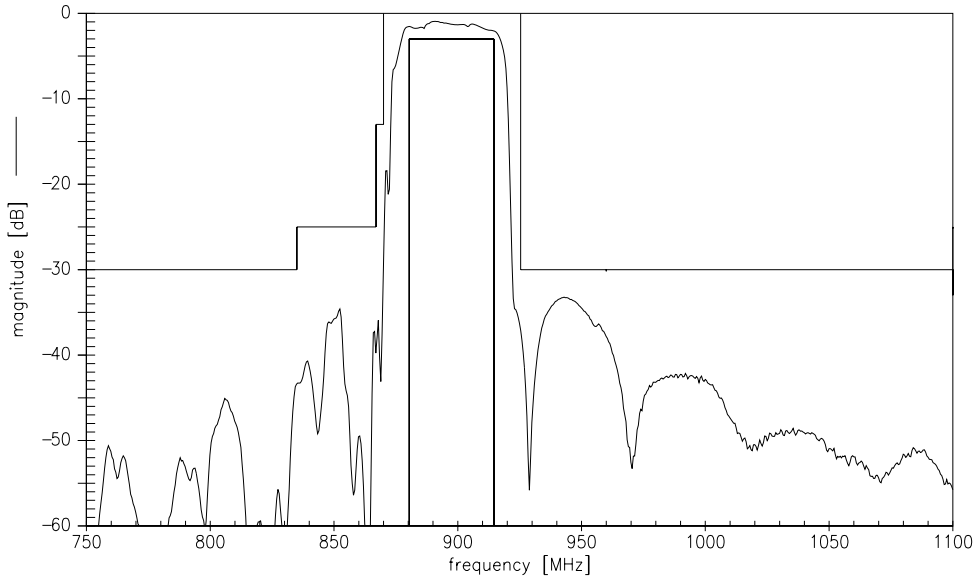
$$\int_{\infty}^{\infty} |H_{RRC}(f)|^2 df = 1$$

Maximum ratings

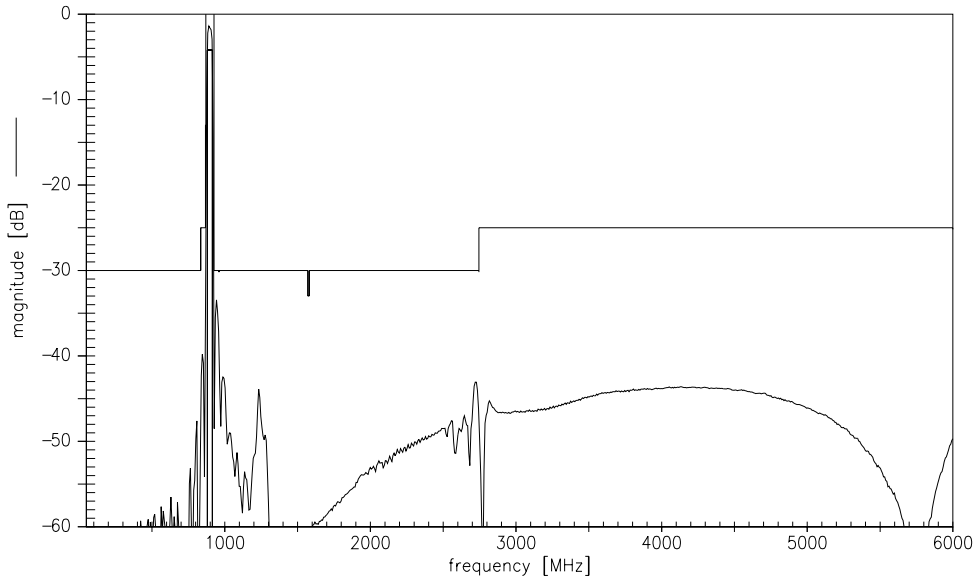
Operable temperature range	T	–30/+85	°C	
Storage temperature range	T_{stg}	–40/+85	°C	
DC voltage	V_{DC}	5	V	
ESD voltage	V_{ESD}	50[1)]	V	machine model, 10 pulses
Input power at WCDMA band VIII Tx band	P_{IN}	10	dBm	continuous wave @ +55°C ambient

1) acc. to JESD22-A115A (machine model), 10 negative & 10 positive pulses.

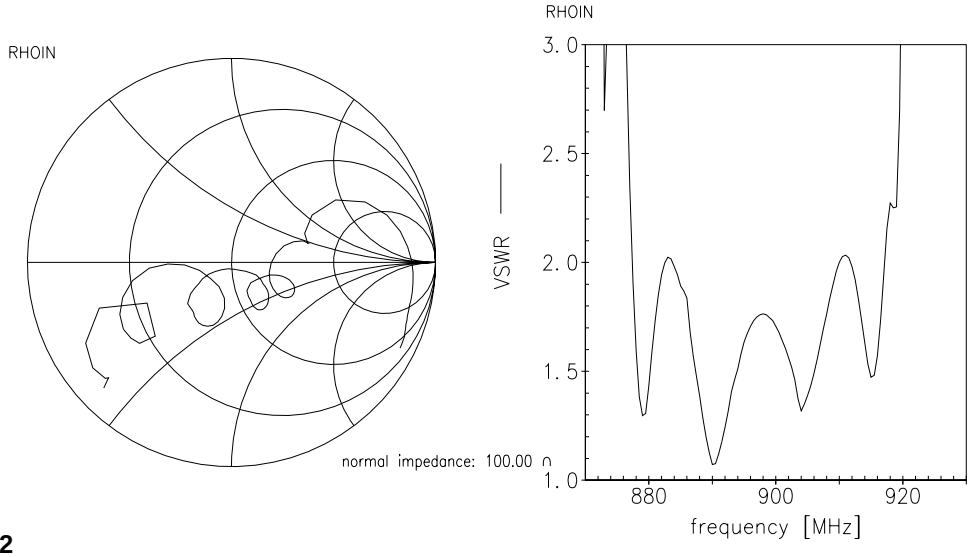
Transfer function



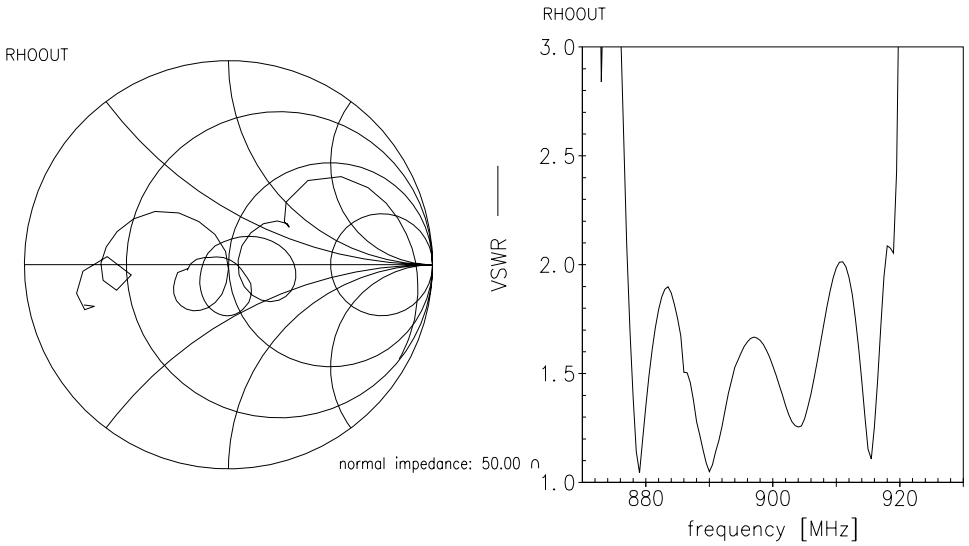
Transfer function (wideband)



S11


RHOIN
normal impedance: 100.00 Ω
RHOIN
VSWR
3.0
2.5
2.0
1.5
1.0
880
900
920
frequency [MHz]

S22


RHOOUT
normal impedance: 50.00 Ω
RHOOUT
VSWR
3.0
2.5
2.0
1.5
1.0
880
900
920
frequency [MHz]

Characteristics filter 2 (WCDMA band I)

Operating temperature range: T = –15 ˚C to +80 ˚C
Terminating source impedance: Z_S = 100 Ω (balanced) || 33nH (optional 22nH)
Terminating load impedance: Z_L = 50 Ω (unbalanced)

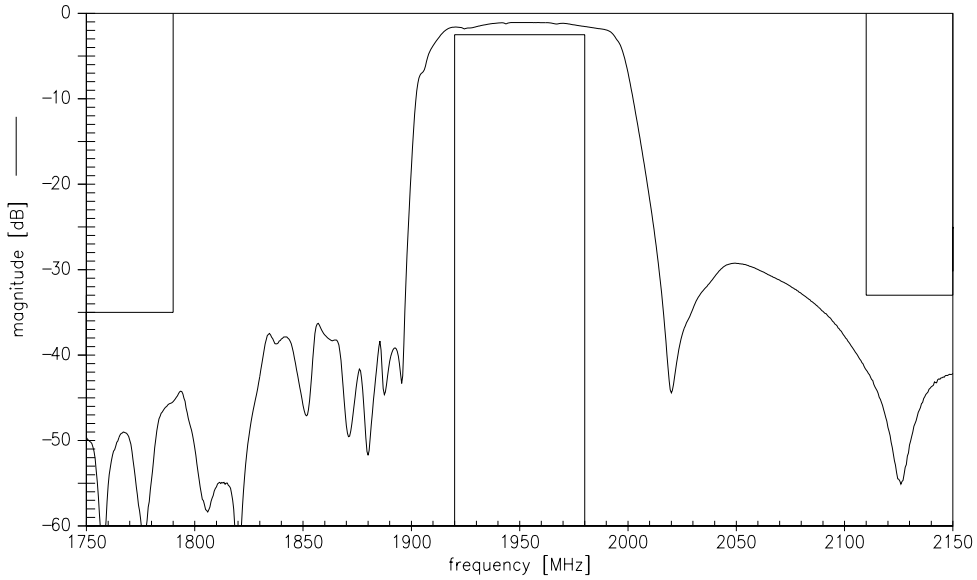
		min.	typ. @ 25 ˚C	max.	
Center frequency	f_C		1950.0		MHz
Maximum insertion attenuation	α_{max}				
1920.0 ... 1980.0 MHz			1.9	2.5[1)]	dB
Amplitude ripple (p-p)	$\Delta\alpha$				
1920.0 ... 1980.0 MHz			0.9	1.5	dB
Amplitude ripple at 5MHz BW	$\Delta\alpha$				
1920.0 ... 1980.0 MHz			0.4	0.6	dB
Group Delay variation at 5MHz BW	$\Delta\alpha$				
1920.0 ... 1980.0 MHz			8	20	ns
Input VSWR					
1920.0 ... 1980.0 MHz			1.7	2.2	
Output VSWR					
1920.0 ... 1980.0 MHz			1.7	2.2	
Input amplitude balance ($\lvert S_{31}/S_{21}\rvert$)					
1920.0 ... 1980.0 MHz		-1.0	-0.7/0.5	1.0	dB
Input phase balance ($\phi(S_{31}) - \phi(S_{21})+180^\circ$)					
1920.0 ... 1980.0 MHz		-10	-3/5	10	°
Attenuation	α				
DC ... 1570.0 MHz		33	45		dB
1570.0 ... 1580.0 MHz		40	45		dB
1580.0 ... 1790.0 MHz		35	40		dB
2110.0 ... 2250.0 MHz		33	38		dB
2250.0 ... 4000.0 MHz		30	36		dB
4000.0 ... 6000.0 MHz		25	38		dB

1) 2.7dB for T=-30 to 85˚C

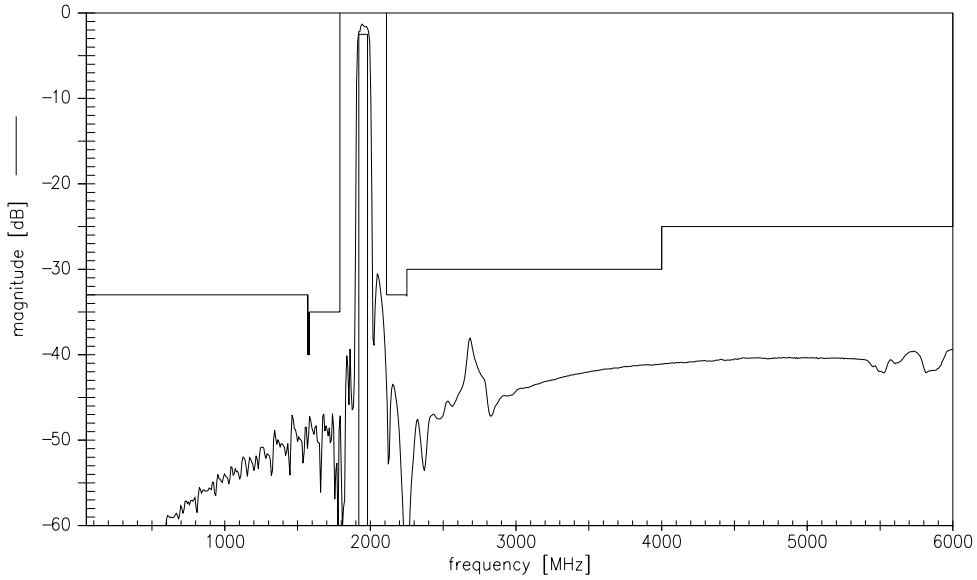
Maximum ratings

Operable temperature range	T	–30/+85	˚C	
Storage temperature range	T_{stg}	–40/+85	˚C	
DC voltage	V_{DC}	5	V	
ESD voltage	V_{ESD}	50	V	machine model, 10 pulses
Input power at				
WCDMA band I	P_{IN}	10	dBm	continuous wave
Tx band				@ +55˚C ambient

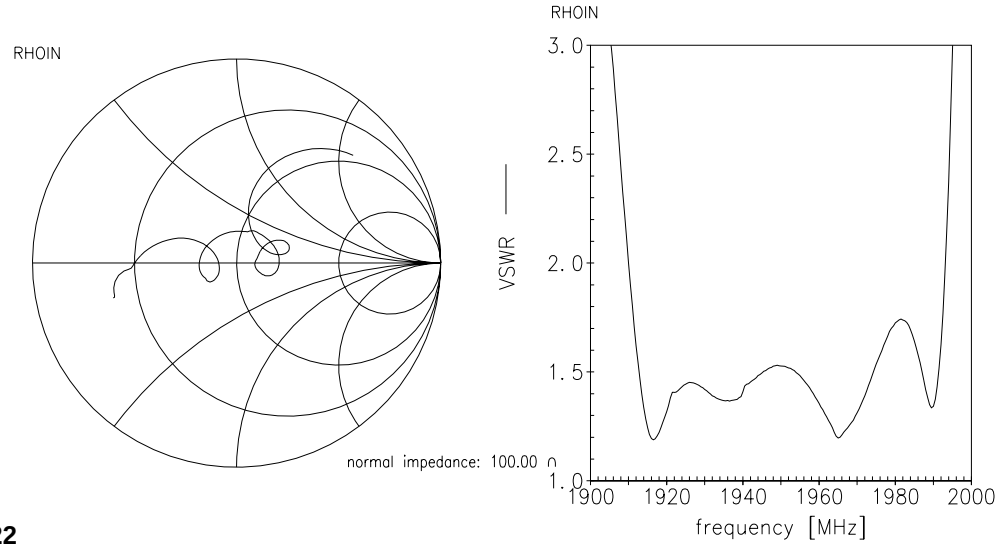
Transfer function



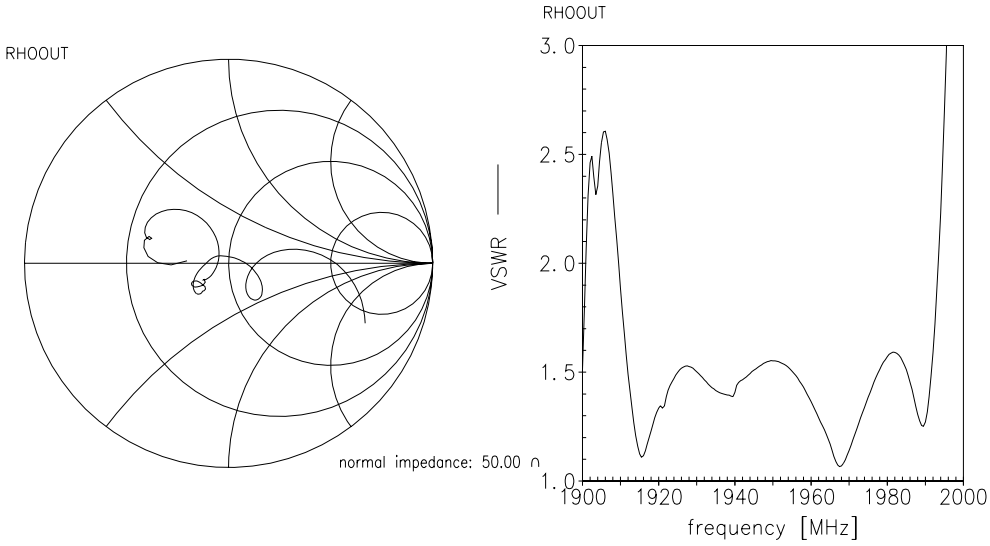
Transfer function (wideband)



S11


RHOIN
normal impedance: 100.00 Ω
RHOIN
3.0
2.5
2.0
1.5
1.0
VSWR
1900
1920
1940
1960
1980
2000
frequency [MHz]

S22


RHOOUT
normal impedance: 50.00 Ω
RHOOUT
3.0
2.5
2.0
1.5
1.0
VSWR
1900
1920
1940
1960
1980
2000
frequency [MHz]

References

Type	B9321
Ordering code	B39202B9321N410
Marking and package	C61157-A7-A146
Packaging	F61074-V8152-Z000
Date codes	L_1126
S-parameters	B9321_LB_NB.s3p, B9321_LB_WB.s3p B9321_UB_NB.s3p, B9321_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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