# SAW Components

## SAW Tx 2in1 Filter

WCDMA band IV & V

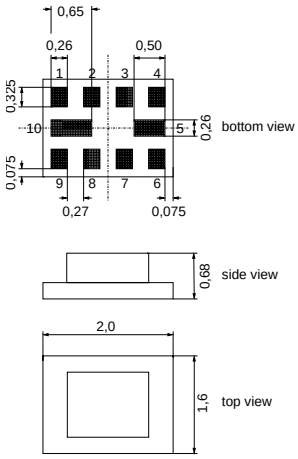
| | |
|---|---|
| **Series/type:** | **B9316** |
| **Ordering code:** | **B39172B9316N410** |
| Date: | Jan 11, 2007 |
| Version: | 2.1 |

## Application

- Low-loss RF filter for mobile telephone WCDMA band V / band IV systems, transmit path (Tx)
- Usable passband:
  Filter 1 (band V): 25 MHz
  Filter 2 (band IV): 45 MHz
- Impedance transformation from:
  Filter 1 (band V): 100 Ω to 50 Ω
  Filter 2 (band IV): 100 Ω to 50 Ω
- Balanced to unbalanced operation

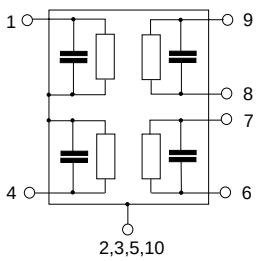
## Features

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



**Characteristics filter 1 (WCDMA band V)**

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)

| | | | LP77C | | |
|---|---|---|---|---|---|
| | | **min.** | **typ. @ 25 ˚C** | **max.** | |
| **Center frequency** | $f_C$ | | 836.5 | | MHz |
| **Maximum insertion attenuation** | $\alpha_{max}$ | | | | |
| 824.0 ... 849.0 MHz | | | 1.7 | 2.2[1)] | dB |
| **Amplitude ripple** (p-p) | $\Delta\alpha$ | | | | |
| 824.0 ... 849.0 MHz | | | 1.0 | 1.5 | dB |
| **Amplitude ripple** at 5 MHz BW | $\Delta\alpha$ | | | | |
| 824.0 ... 849.0 MHz | | | 0.7 | 0.9 | dB |
| **Group delay variation** at 5 MHz BW | | | | | |
| 824.0 ... 849.0 MHz | | | 10 | 28 | ns |
| **Error Vector Magnitude[2)]** @$f_{Carrier}$ | | | | | |
| 826.4 ... 846.6 MHz | | | 1.5 | 2.5 | % |
| **Input VSWR** | | | | | |
| 824.0 ... 849.0 MHz | | | 1.7 | 2.0 | |
| **Output VSWR** | | | | | |
| 824.0 ... 849.0 MHz | | | 1.7 | 2.0 | |
| **Input amplitude balance** ($\lvert S_{31}/S_{21}\rvert$) | | | | | |
| 824.0 ... 849.0 MHz | | -1 | -0.5/0.5 | 1 | dB |
| **Input phase balance** ($\phi(S_{31}) - \phi(S_{21})+180^\circ$) | | | | | |
| 824.0 ... 849.0 MHz | | -10 | -3/3 | 10 | ˚ |
| **Attenuation** | $\alpha$ | | | | |
| DC ... 779.0 MHz | | 35.0 | 44.0 | | dB |
| 779.0 ... 804.0 MHz | | 25.0 | 33.0 | | dB |
| 869.0 ... 1570.0 MHz | | 33.0 | 36.0 | | dB |
| 1570.0 ... 1580.0 MHz | | 43.0 | 48.0 | | dB |
| 1580.0 ... 2547.0 MHz | | 35.0 | 40.0 | | dB |
| 2547.0 ... 6000.0 MHz | | 25.0 | 35.0 | | dB |

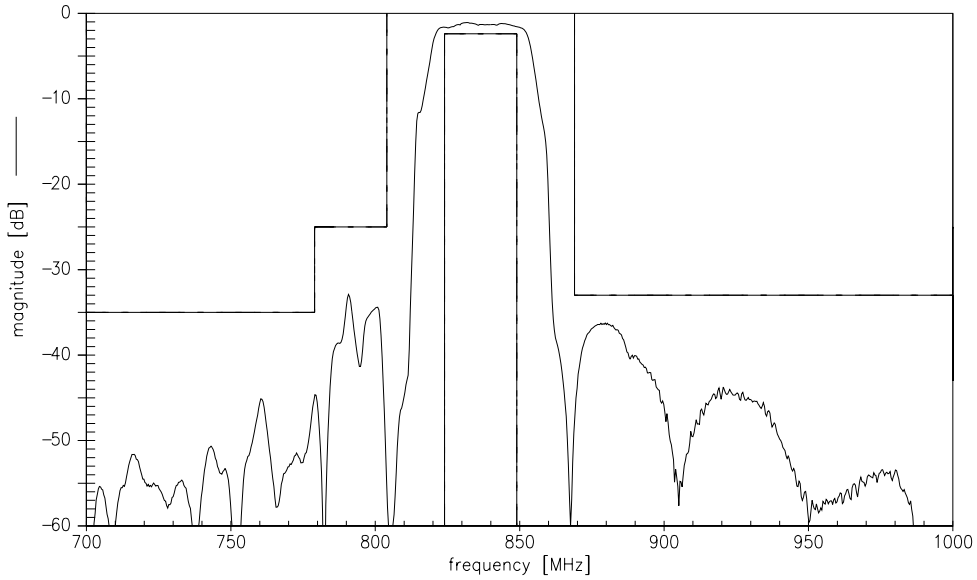
1) 2.8 dB for T=-30˚C to 85˚C
2) Error Vector Magnitude (EVM) based on definition given in 3GPP TS 25.141.

**Maximum ratings**

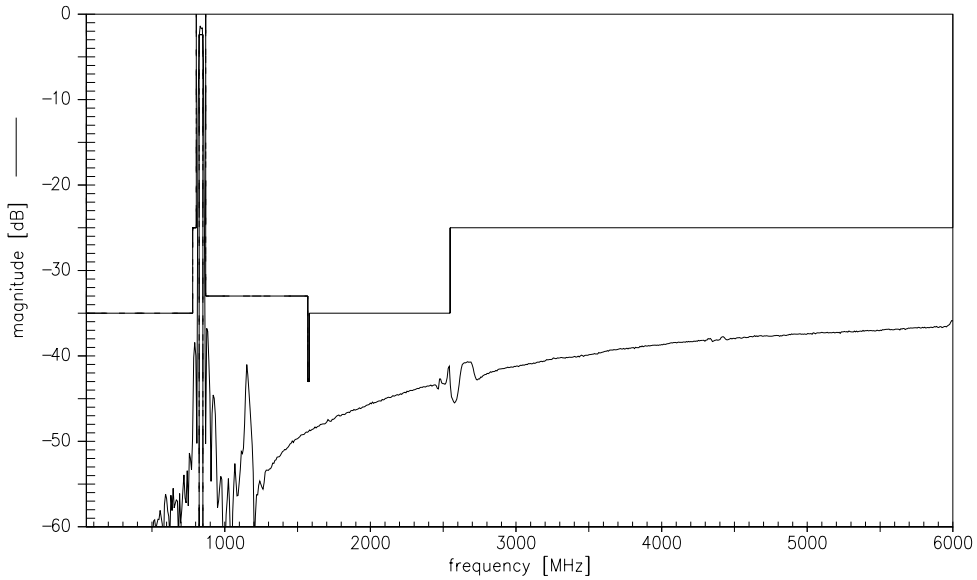
| | | | | |
|---|---|---|---|---|
| Operable temperature range | T | –30/+85 | ˚C | |
| Storage temperature range | $T_{stg}$ | –40/+85 | ˚C | |
| DC voltage | $V_{DC}$ | 5 | V | |
| ESD voltage | $V_{ESD}$ | 50[1)] | V | machine model, 10 pulses |
| Input power at | | | | |
| WCDMA band V | $P_{IN}$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

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

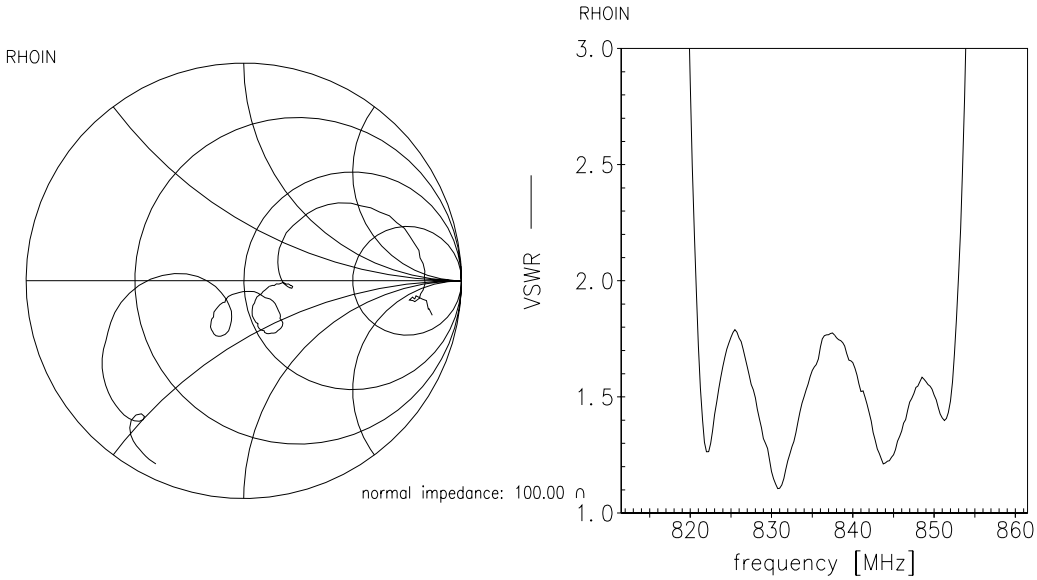
**Transfer function**



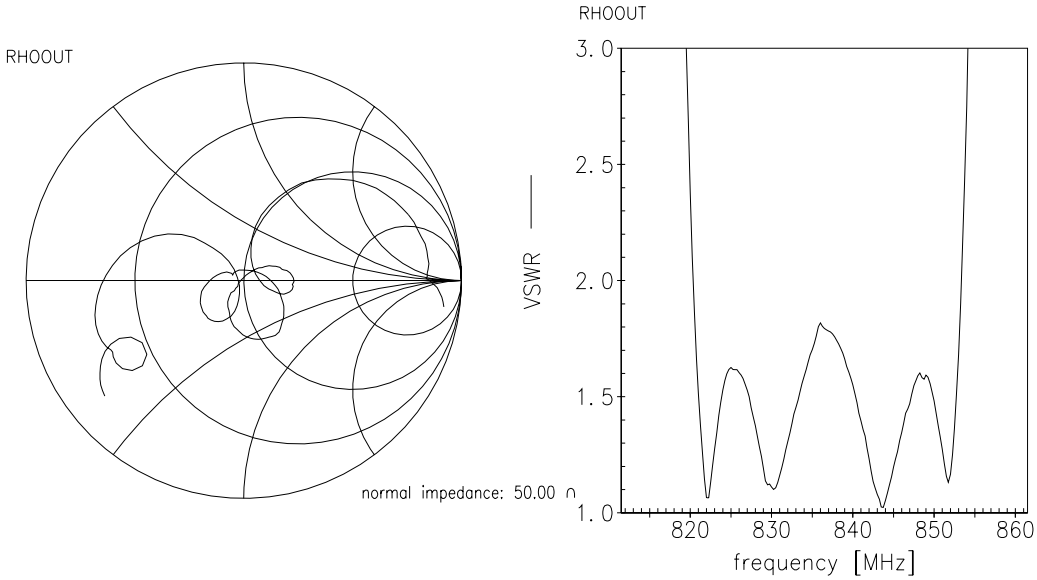

**Transfer function** (wideband)



**$S_{11}$ function**




**$S_{22}$ function**



**Characteristics filter 2 (WCDMA band IV)**

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

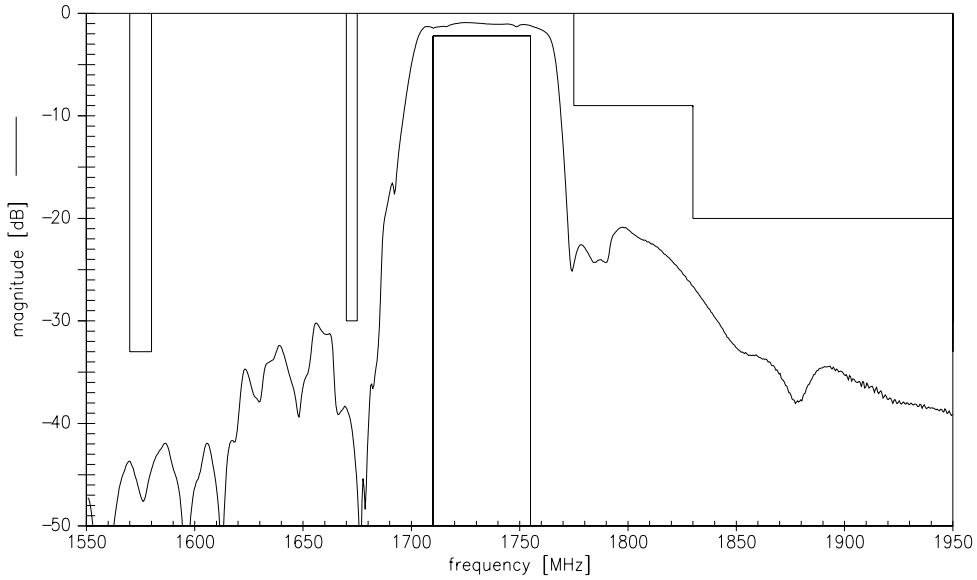
| | | LP77C | | |
|---|---|---|---|---|
| | min. | typ. | max. | |
| **Center frequency** $f_C$ | | 1732.5 | | MHz |
| **Maximum insertion attenuation** $\alpha_{max}$ | | | | |
| 1710.0 ... 1755.0 MHz | | 1.5 | 2.2[1)] | dB |
| **Amplitude ripple** (p-p) $\Delta\alpha$ | | | | |
| 1710.0 ... 1755.0 MHz | | 0.6 | 1.4 | dB |
| **Amplitude ripple** at 5MHz BW $\Delta\alpha$ | | | | |
| 1710.0 ... 1755.0 MHz | | 0.4 | 0.9 | dB |
| **Group Delay variation** at 5MHz BW $\Delta\alpha$ | | | | |
| 1710.0 ... 1755.0 MHz | | 8 | 20 | ns |
| **Error Vector Magnitude[2)]** @$f_{Carrier}$ | | | | |
| 1712.4 ... 1752.6 MHz | | 1.4 | 2.5 | % |
| **Input VSWR** | | | | |
| 1710.0 ... 1755.0 MHz | | 1.6 | 2.0 | |
| **Output VSWR** | | | | |
| 1710.0 ... 1755.0 MHz | | 1.5 | 2.0 | |
| **Input amplitude balance** ($\|S_{31}/S_{21}\|$) | | | | |
| 1710.0 ... 1755.0 MHz | -1 | -0.5/0.7 | 1 | dB |
| **Input phase balance** ($\phi(S_{31}) - \phi(S_{21})+180^\circ$) | | | | |
| 1710.0 ... 1755.0 MHz | -10 | -2/5 | 10 | ° |
| **Attenuation** $\alpha$ | | | | |
| DC ... 1310.0 MHz | 24 | 45 | | dB |
| 1310.0 ... 1355.0 MHz | 20 | 45 | | dB |
| 1570.0 ... 1580.0 MHz | 33 | 38 | | dB |
| 1670.0 ... 1675.0 MHz | 30 | 34 | | dB |
| 1775.0 ... 1830.0 MHz | 9 | 20 | | dB |
| 1830.0 ... 2110.0 MHz | 20 | 27 | | dB |
| 2110.0 ... 2155.0 MHz | 33 | 43 | | dB |
| 2250.0 ... 2500.0 MHz | 30 | 38 | | dB |
| 2500.0 ... 6000.0 MHz | 20 | 38 | | dB |

1) 2.8 dB for T= -30˚C to 85˚C
2) Error Vector Magnitude (EVM) based on definition given in 3GPP TS 25.141

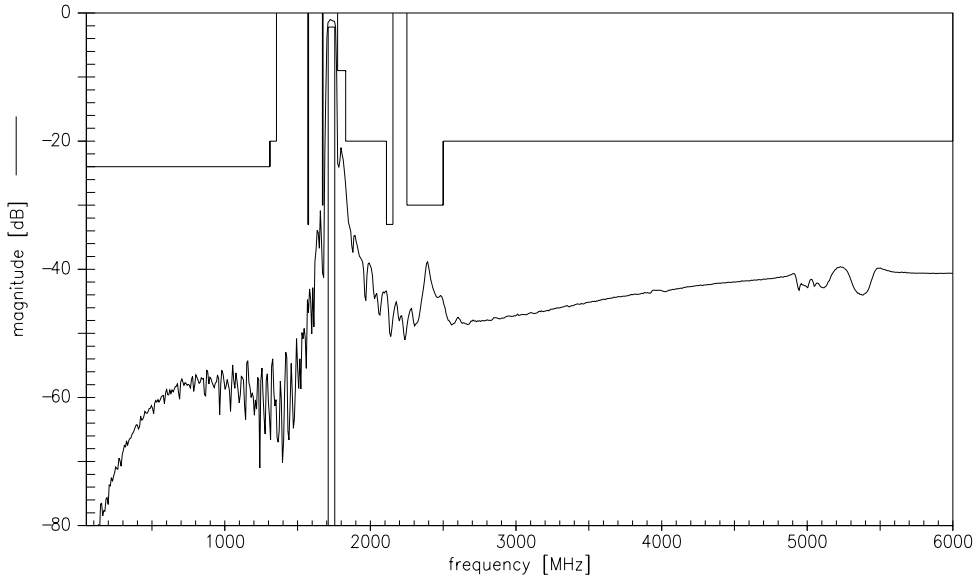
**Maximum ratings**

| | | | | |
|---|---|---|---|---|
| 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 V Tx band | $P_{IN}$ | 10 | dBm | continuous wave @ +55˚C ambient |

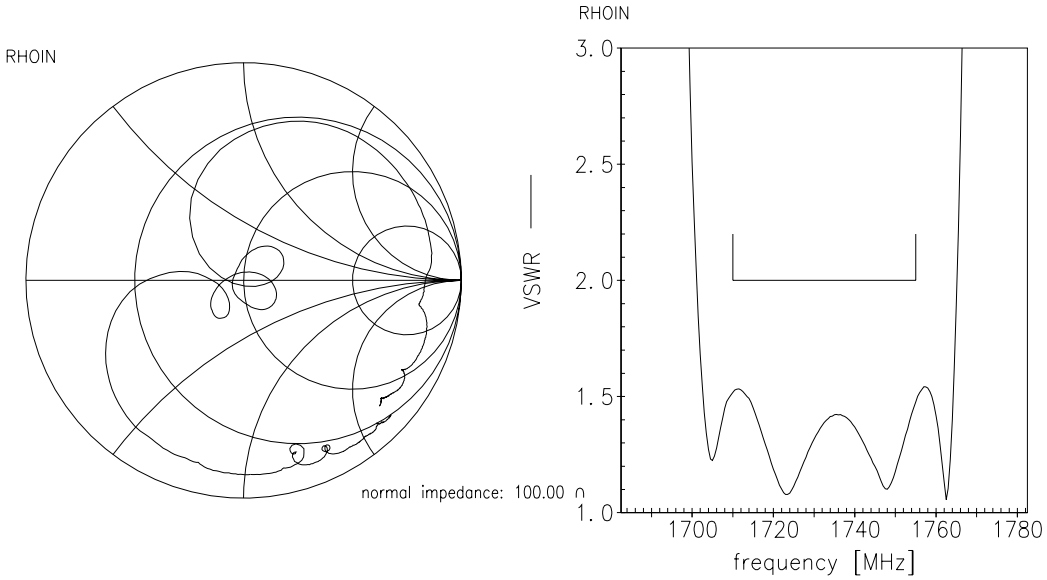
**Transfer function**



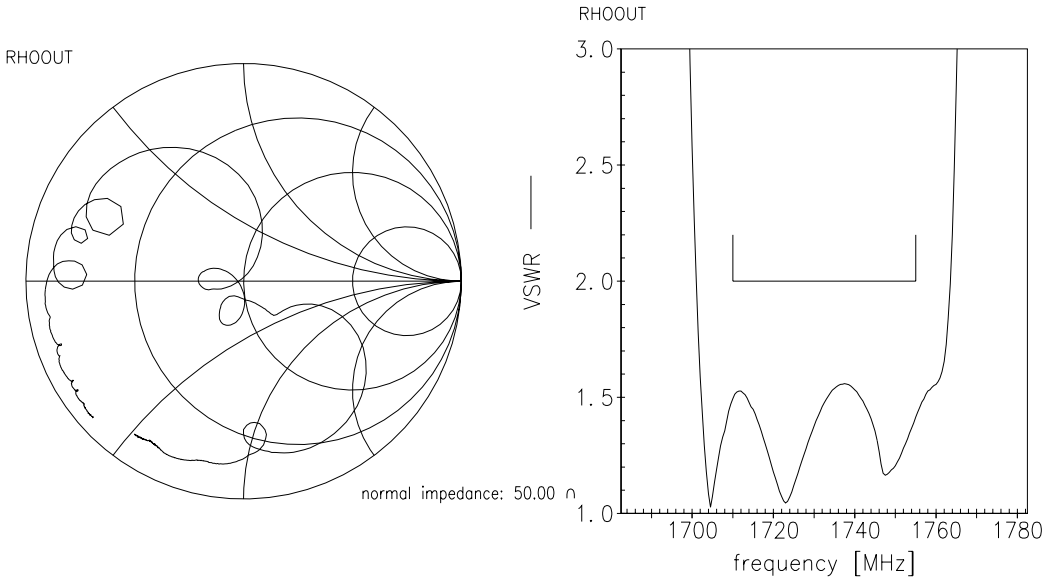

**Transfer function** (wideband)



**$S_{11}$ function**




**$S_{22}$ function**



**References**

| | |
|---|---|
| **Type** | B9316 |
| **Ordering code** | B39172B9316N410 |
| **Marking and package** | C61157-A7-A146 |
| **Packaging** | F61074-V8152-Z000 |
| **Date codes** | L_1126 |
| **S-parameters** | B9316_LB_NB.s3p, B9316_LB_WB.s3p<br>B9316_UB_NB.s3p, B9316_UB_WB.s3p |
| **Soldering profile** | S_6001 |
| **RoHS compatible** | defined as compatible with the following documents:<br>"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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