



## **SAW Components**

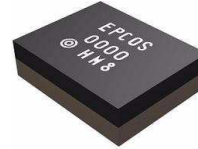
### **SAW Tx Filter**

GSM 900 / WCDMA BAND VIII

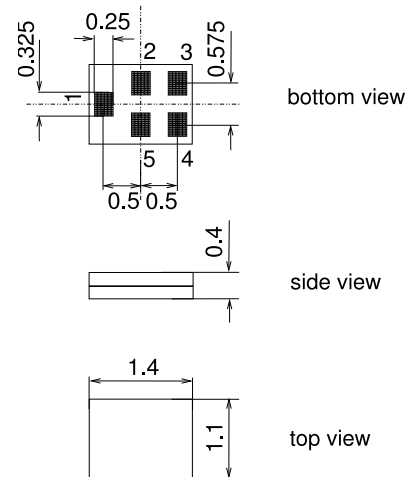
<b>Series/Type:</b>	<b>B9435</b>
<b>Ordering code:</b>	<b>B39901B9435M410</b>
Date:	May 20, 2008
Version:	2.1

**Application**

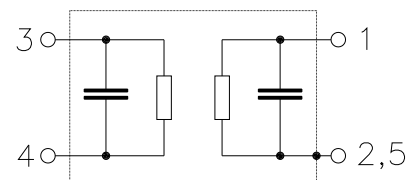
- Low loss RF filter for mobile telephone GSM900 and WCDMA Band 8 systems, transmit path (Tx)
- Low insertion attenuation
- Low amplitude ripple
- Usable passband 35.0 MHz
- Balanced to unbalanced operation
- Impedance transformation from 100  $\Omega$  to 50  $\Omega$
- Suitable for GPRS class 1 to 12


**Features**

- Package size 1.4 x 1.1 x 0.4 mm<sup>3</sup>
- Package code QCS51
- RoHS compatible
- Approx. weight 0.003g
- Package for **Surface Mount Technology (SMT)**
- Ni, gold-plated terminals
- **Electrostatic Sensitive Device (ESD)**


**Pin configuration**

- 3,4 Input, balanced
- 1 Output, unbalanced
- 2,5 Case-ground





Data Sheet



Characteristics

Temperature range for specification:  $T = -15\text{ °C to }+80\text{ °C}$   
 Terminating source impedance:  $Z_S = 100\ \Omega$  (balanced)  
 Terminating load impedance:  $Z_L = 50\ \Omega$

	min.	typ. @ 25 °C	max.	
<b>Center frequency</b> $f_C$	—	897.5	—	MHz
<b>Maximum insertion attenuation</b>				
880.0 ... 915.0 MHz $\alpha_{max}^{1)}$	—	2.2	3.5	dB
@ $f_{Carrier}$ 882.4 ... 912.6 MHz $\alpha_{WCDMA}^{2)}$	—	2.2	3.0	dB
<b>Amplitude ripple (p-p)</b>				
880.0 ... 915.0 MHz $\Delta\alpha$	—	1.1	2.0	dB
880.0 ... 915.0 MHz $\Delta\alpha_{5MHz}^{3)}$	—	0.8	1.5	dB
<b>Group delay ripple</b>				
880.0 ... 915.0 MHz $\Delta\tau_{5MHz}^{3)}$	—	15	30	ns
<b>Error Vector Magnitude<sup>4)</sup></b>				
@ $f_{Carrier}$ 882.4 ... 912.6 MHz EVM	—	2.1	3.5	%
<b>Input VSWR</b>				
880.0 ... 915.0 MHz	—	2.0	2.3	
<b>Output VSWR</b>				
880.0 ... 915.0 MHz	—	1.9	2.3	
<b>Input amplitude balance (<math> S_{31}/S_{21} </math>)</b>				
880.0 ... 915.0MHz	-1.0	-0.7/+0.6	+1.0	dB
<b>Input phase balance (<math>\phi(S_{31})-\phi(S_{21})+180^\circ</math>)</b>				
880.0 ... 915.0MHz	-10	0 / -2	+10	°
<b>Absolute attenuation</b> $\alpha_{abs}$				
0.0 ... 835.0 MHz	30	36	—	dB
835.0 ... 870.0 MHz	10	20	—	dB
925.4 ... 959.6 MHz	23	30	—	dB
960.0 ... 1452.0 MHz	15	33	—	dB
1452.0 ... 1580.0 MHz	25	49	—	dB
1580.0 ... 2400.0 MHz	10	40	—	dB
2400.0 ... 2500.0 MHz	25	39	—	dB
2500.0 ... 5150.0 MHz	10	28	—	dB
5150.0 ... 6000.0 MHz	20	24	—	dB

1) Actual frequency range is defined from 880.4 ... 914.6 MHz.  
 2) Attenuation of WCDMA signal ("Powertransferfunction"). Please refer to annotation on page (5).  
 3) Ripple determined within any 5MHz channel.  
 4) Error Vector Magnitude (EVM) based on definition given in 3GPP TS 25.141.



SAW Components

B9435

SAW Tx Filter

897.5 MHz

Data Sheet



**Characteristics**

Temperature range for specification:  $T = -30\text{ °C to }+85\text{ °C}$   
 Terminating source impedance:  $Z_S = 100\ \Omega$  (balanced)  
 Terminating load impedance:  $Z_L = 50\ \Omega$

		min.	typ. @ 25 °C	max.	
<b>Center frequency</b>	$f_C$	—	897.5	—	MHz
<b>Maximum insertion attenuation</b>					
	880.0 ... 915.0 MHz $\alpha_{\max}^{1)}$	—	2.2	4.0	dB
@ $f_{\text{Carrier}}$	882.4 ... 912.6 MHz $\alpha_{\text{WCDMA}}^{2)}$	—	2.2	3.0	dB
<b>Amplitude ripple (p-p)</b>					
	880.0 ... 915.0 MHz $\Delta\alpha$	—	1.1	2.5	dB
	880.0 ... 915.0 MHz $\Delta\alpha_{5\text{MHz}}^{3)}$	—	0.8	2.0	dB
<b>Group delay ripple</b>					
	880.0 ... 915.0 MHz $\Delta\tau_{5\text{MHz}}^{3)}$	—	15	30	ns
<b>Error Vector Magnitude<sup>4)</sup></b>					
@ $f_{\text{Carrier}}$	882.4 ... 912.6 MHz EVM	—	2.1	4.0	%
<b>Input VSWR</b>	880.0 ... 915.0 MHz	—	2.0	2.3	
<b>Output VSWR</b>	880.0 ... 915.0 MHz	—	1.9	2.3	
<b>Input amplitude balance (<math> S_{31}/S_{21} </math>)</b>	880.0 ... 915.0MHz	-1.0	-0.7/+0.6	+1.0	dB
<b>Input phase balance (<math>\phi(S_{31})-\phi(S_{21})+180^\circ</math>)</b>	880.0 ... 915.0MHz	-10	0 / -2	+10	°
<b>Absolute attenuation</b>	$\alpha_{\text{abs}}$				
	0.0 ... 835.0 MHz	30	36	—	dB
	835.0 ... 870.0 MHz	10	20	—	dB
	925.4 ... 959.6 MHz	18	30	—	dB
	960.0 ... 1452.0 MHz	15	33	—	dB
	1452.0 ... 1580.0 MHz	25	49	—	dB
	1580.0 ... 2400.0 MHz	10	40	—	dB
	2400.0 ... 2500.0 MHz	25	39	—	dB
	2500.0 ... 5150.0 MHz	10	28	—	dB
	5150.0 ... 6000.0 MHz	20	24	—	dB

1) Actual frequency range is defined from 880.4 ... 914.6 MHz.  
 2) Attenuation of WCDMA signal ("Powertransferfunction"). Please refer to annotation on page (5).  
 3) Ripple determined within any 5MHz channel.  
 4) Error Vector Magnitude (EVM) based on definition given in 3GPP TS 25.141.



**Annotation for characteristics section**

(2) Attenuation of WCDMA signal (“Powertransferfunction”,  $\alpha_{WCDMA}$ ) 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 the root-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	-40/+85	°C	
Storage temperature range	T <sub>stg</sub>	-40/+85	°C	
DC voltage	V <sub>DC</sub>	5	V	
ESD voltage	V <sub>ESD</sub>	100 <sup>1)</sup>	V	machine model, 1 pulse
	V <sub>ESD</sub>	300 <sup>2)</sup>	V	human body model, 1 pulse
	V <sub>ESD</sub>	500 <sup>3)</sup>	V	field-induced charged device model
Input Power at 880 ... 915 MHz Tx bands	P <sub>IN</sub>	15	dBm	effective power in the on-state, duty cycle 4:8

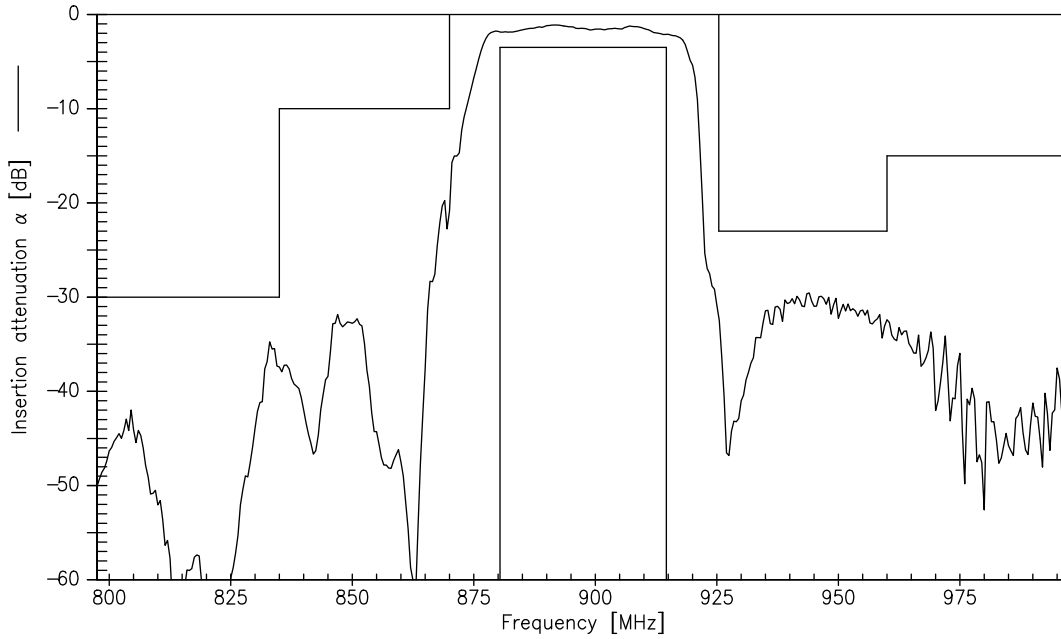
1) acc. to JESD22-A115A (machine model), 1 negative & 1 positive pulse.

2) acc. to JESD22-A114B (human body model), 1 negative & 1 positive pulse.

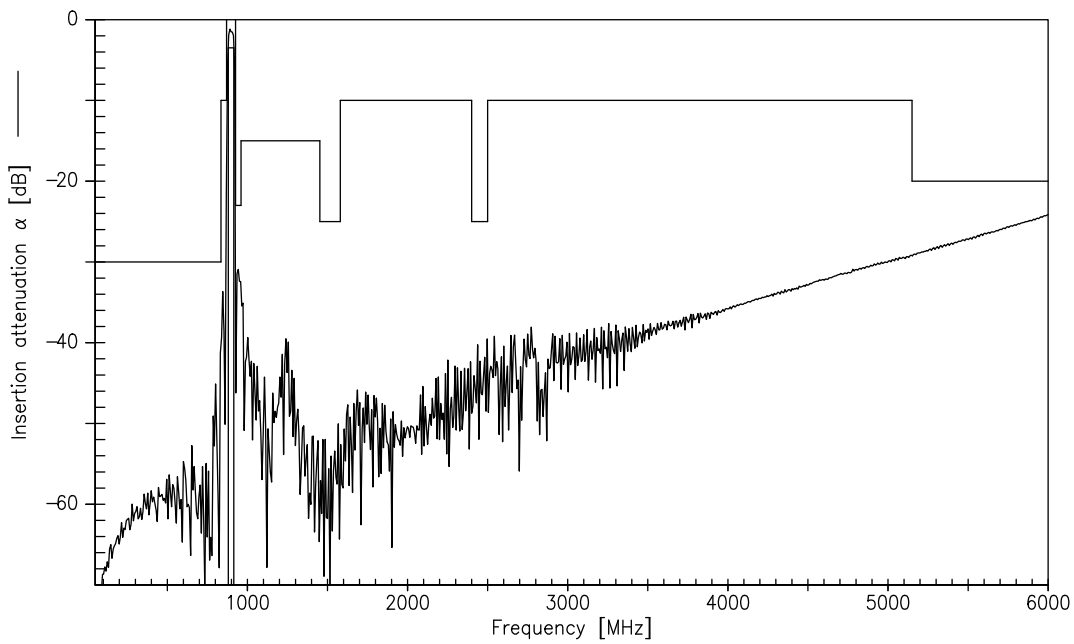
3) acc. to JESD22-C101C (field-induced charged device model).



Transfer function (narrowband)



Transfer function (wideband)

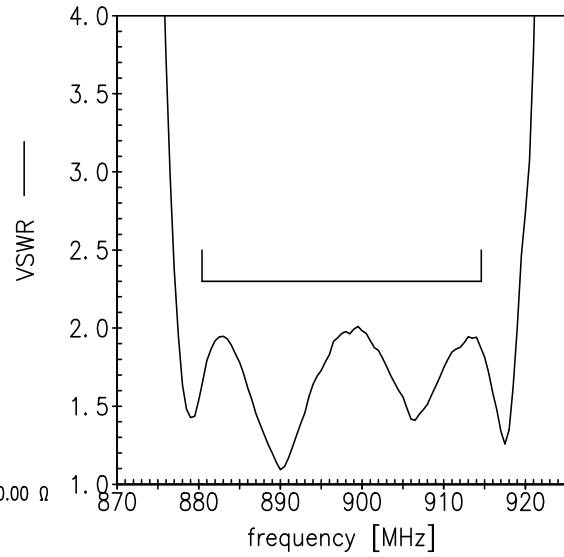
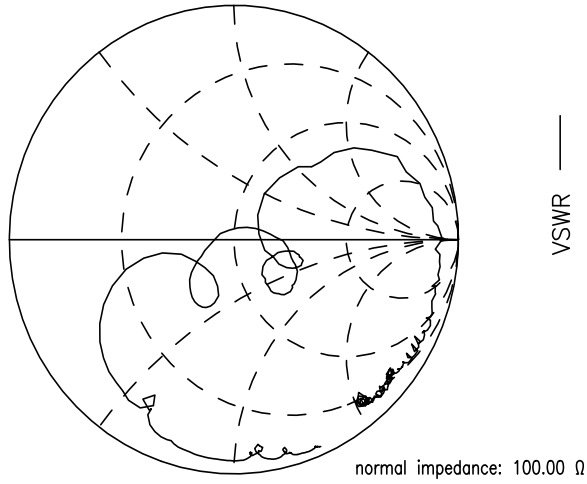


Data Sheet

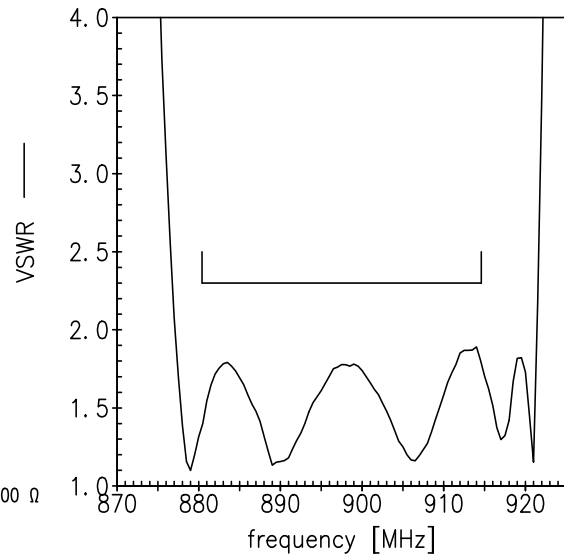
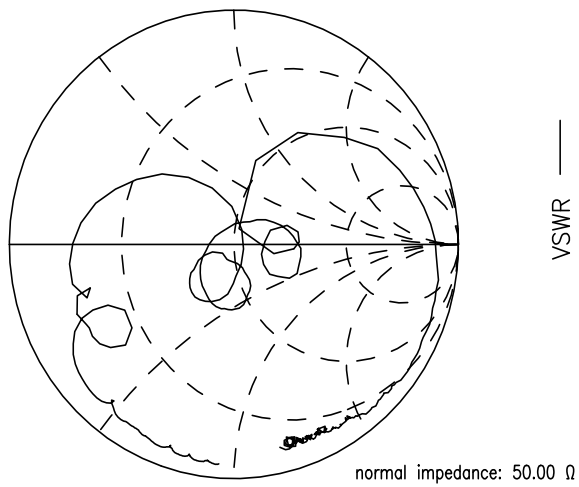
**SMD**

Smith charts

**S<sub>11</sub> function**



**S<sub>22</sub> function**





<b>SAW Components</b>	<b>B9435</b>
<b>SAW Tx Filter</b>	<b>897.5 MHz</b>

Data Sheet



## References

<b>Type</b>	B9435
<b>Ordering code</b>	B39901B9435M410
<b>Marking and package</b>	C61157-A8-A3
<b>Packaging</b>	F61074-V8212-Z000
<b>Date codes</b>	L_1126
<b>S-parameters</b>	B9435_NB.s3p B9435_WB.s3p
<b>Soldering profile</b>	S_6001
<b>RoHS compatible</b>	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."
<b>Moldability</b>	Before using in overmolding environment, please contact your EPCOS sales office.

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