



SAW Components

SAW TX Filter

Cellular / WCDMA Band V

Series/type: B9438
Ordering code: B39841B9438M410

Date: June 23, 2008
Version: 2.1

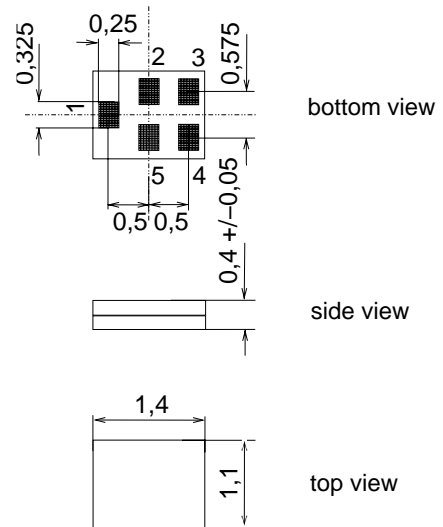
Application

- Low-loss RF filter for mobile telephone
Cellular and WCDMA systems, transmit path (TX)
- Impedance transformation from 100 Ω to 50 Ω
- Balanced to unbalanced operation
- Very low insertion attenuation
- Usable passband 25 MHz



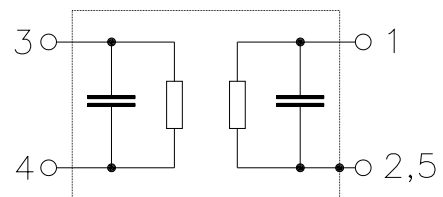
Features

- Package size 1.4 x 1.1 x 0.4 mm³
- Package code QCS5I
- RoHS compatible
- Approximate weight 0.003 g
- Package for **Surface Mount Technology (SMT)**
- Ni, gold-plated terminals
- **Electrostatic Sensitive Device (ESD)**



Pin configuration

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





Data sheet



Characteristics

Temperature range for specification: T = -15 °C to +80 °C
 Terminating source impedance: Z_S = 100 Ω (balanced)
 Terminating load impedance: Z_L = 50 Ω

					B9438			
					min.	typ. @ 25 °C	max.	
Center frequency			f_C		—	836.5	—	MHz
Maximum insertion attenuation								
	824.0 ... 849.0		MHz	α_{max}	—	1.7	2.2	dB
@ $f_{Carrier}$	826.4 ... 846.6		MHz	$\alpha_{WCDMA}^{1)}$	—	1.6	1.9	dB
Amplitude ripple (p-p)								
	824.0 ... 849.0		MHz	$\Delta\alpha$	—	0.6	1.0	dB
	824.0 ... 849.0		MHz	$\Delta\alpha_{5MHz}^{2)}$	—	0.5	0.8	dB
Group delay ripple								
	824.0 ... 849.0		MHz	$\Delta\tau_{5MHz}^{3)}$	—	20	35	ns
Error Vector Magnitude³⁾								
@ $f_{Carrier}$	826.4 ... 846.6		MHz	EVM	—	1.7	2.0	%
Input VSWR								
	824.0 ... 849.0		MHz		—	1.7	2.0	
Output VSWR								
	824.0 ... 849.0		MHz		—	1.7	2.0	
Output amplitude balance				(S_{31}/S_{21})				
	824.0 ... 849.0		MHz		-1	-0 / 0.8	+1	dB
Output phase balance				$(\phi(S_{31}) - \phi(S_{21}) + 180^\circ)$				
	824.0 ... 849.0		MHz		-8	-1 / 3	+8	°
Attenuation				α				
	0.0 ... 804.0		MHz		33	35	—	dB
	869.0 ... 894.0		MHz		33	36	—	dB
@ $f_{Carrier}$	871.4 ... 891.6		MHz	$\alpha_{WCDMA}^{1)}$	33	37	—	dB
	894.0 ... 1452.0		MHz		33	38	—	dB
	1452.0 ... 1675.0		MHz		40	55	—	dB
	1675.0 ... 2400.0		MHz		38	45	—	dB
	2400.0 ... 2500.0		MHz		35	43	—	dB
	2500.0 ... 2600.0		MHz		35	40	—	dB
	2600.0 ... 4000.0		MHz		38	45	—	dB
	4000.0 ... 5150.0		MHz		35	42	—	dB
	5150.0 ... 6000.0		MHz		28	33	—	dB

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



Data sheet



Characteristics

Temperature range for specification: T = -30 °C to +85 °C
 Terminating source impedance: Z_S = 100 Ω (balanced)
 Terminating load impedance: Z_L = 50 Ω

					B9438			
					min.	typ. @ 25 °C	max.	
Center frequency			f_C		—	836.5	—	MHz
Maximum insertion attenuation								
	824.0 ... 849.0	MHz	α_{max}		—	1.7	2.3	dB
@ $f_{Carrier}$	826.4 ... 846.6	MHz	$\alpha_{WCDMA}^{1)}$		—	1.6	1.9	dB
Amplitude ripple (p-p)								
	824.0 ... 849.0	MHz	$\Delta\alpha$		—	0.6	1.1	dB
	824.0 ... 849.0	MHz	$\Delta\alpha_{5MHz}^{2)}$		—	0.5	0.9	dB
Group delay ripple								
	824.0 ... 849.0	MHz	$\Delta\tau_{5MHz}^{3)}$		—	20	35	ns
Error Vector Magnitude³⁾								
@ $f_{Carrier}$	826.4 ... 846.6	MHz	EVM		—	1.7	2.0	%
Input VSWR								
	824.0 ... 849.0	MHz			—	1.7	2.0	
Output VSWR								
	824.0 ... 849.0	MHz			—	1.7	2.0	
Output amplitude balance								
	824.0 ... 849.0	MHz	($ S_{31}/S_{21} $)		-1	-0 / 0.8	+1	dB
Output phase balance								
	824.0 ... 849.0	MHz	($\phi(S_{31}) - \phi(S_{21}) + 180^\circ$)		-8	-1 / 3	+8	°
Attenuation								
	0.0 ... 804.0	MHz	α		33	35	—	dB
	869.0 ... 894.0	MHz			33	37	—	dB
@ $f_{Carrier}$	871.4 ... 891.6	MHz	$\alpha_{WCDMA}^{1)}$		33	37	—	dB
	894.0 ... 1452.0	MHz			33	38	—	dB
	1452.0 ... 1675.0	MHz			40	55	—	dB
	1675.0 ... 2400.0	MHz			38	45	—	dB
	2400.0 ... 2500.0	MHz			35	43	—	dB
	2500.0 ... 2600.0	MHz			35	40	—	dB
	2600.0 ... 4000.0	MHz			38	45	—	dB
	4000.0 ... 5150.0	MHz			35	42	—	dB
	5150.0 ... 6000.0	MHz			28	33	—	dB

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



Annotation for characteristics section

(1) 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 826.4 MHz (lowest Tx channel) to 846.6 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 _{stg}	-40/+85	°C	
DC voltage	V _{DC}	5	V	
ESD voltage	V _{ESD}	100 ¹⁾	V	machine model, 10 pulses
		300 ²⁾	V	human body model, 1 pulse
		500 ³⁾	V	charged-device model, 3 pulses
Input power	P _{IN}	10	dBm	

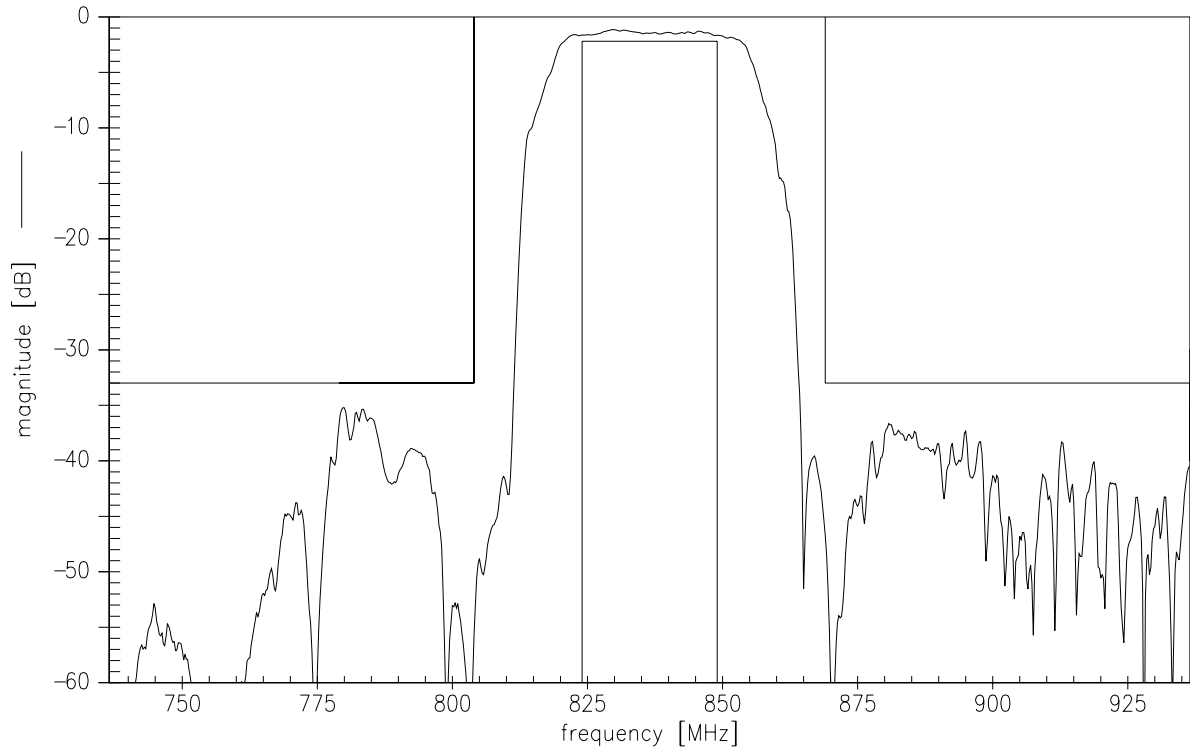
1) acc. to JESD22-A115A (machine model), 10 negative & 10 positive pulses.
 2) acc. to JESD22-A114C (human body model), 1 negative & 1 positive pulse.
 3) acc. to JESD22-C101 (charged-device model), 3 negative & 3 positive pulses.



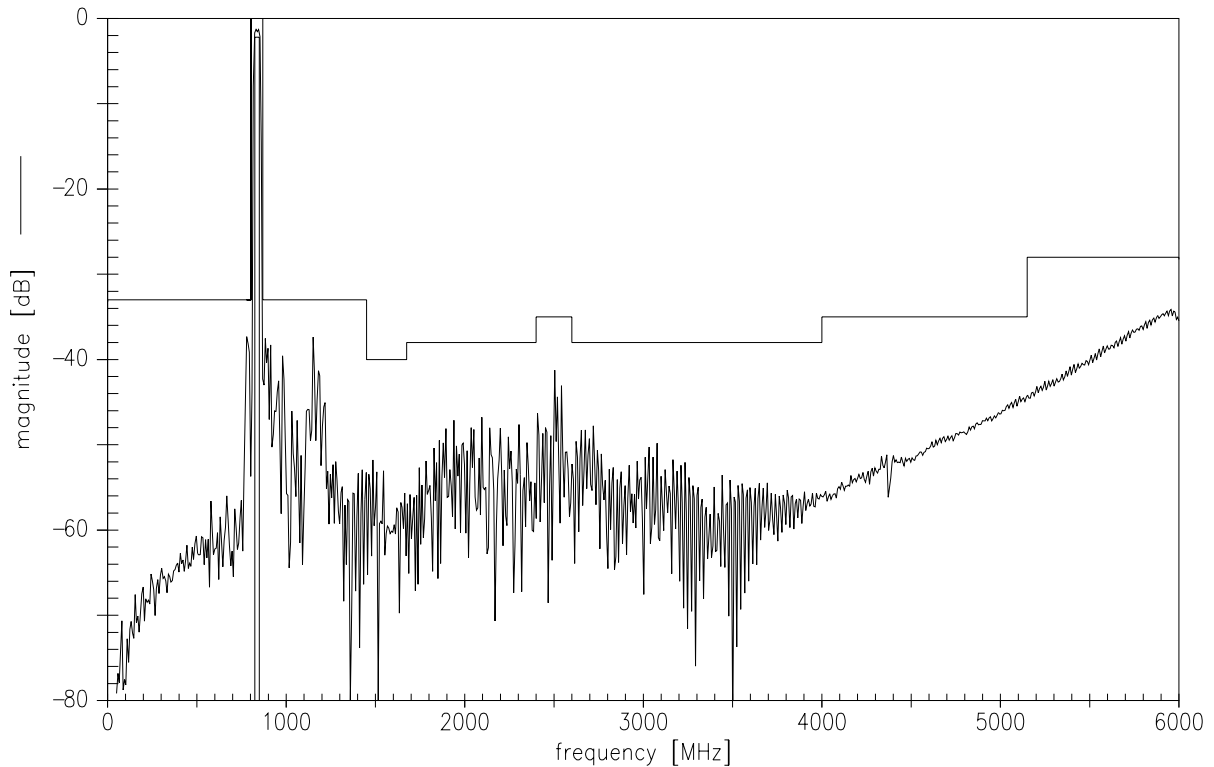
Data sheet



Transfer function



Transfer function (wideband)

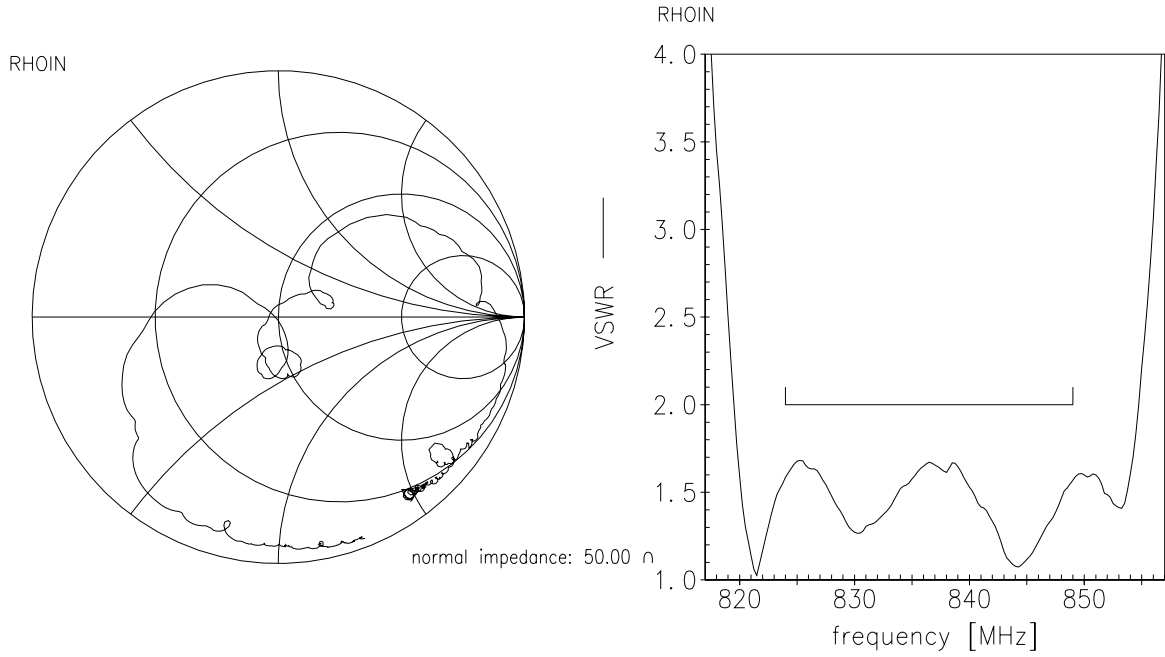


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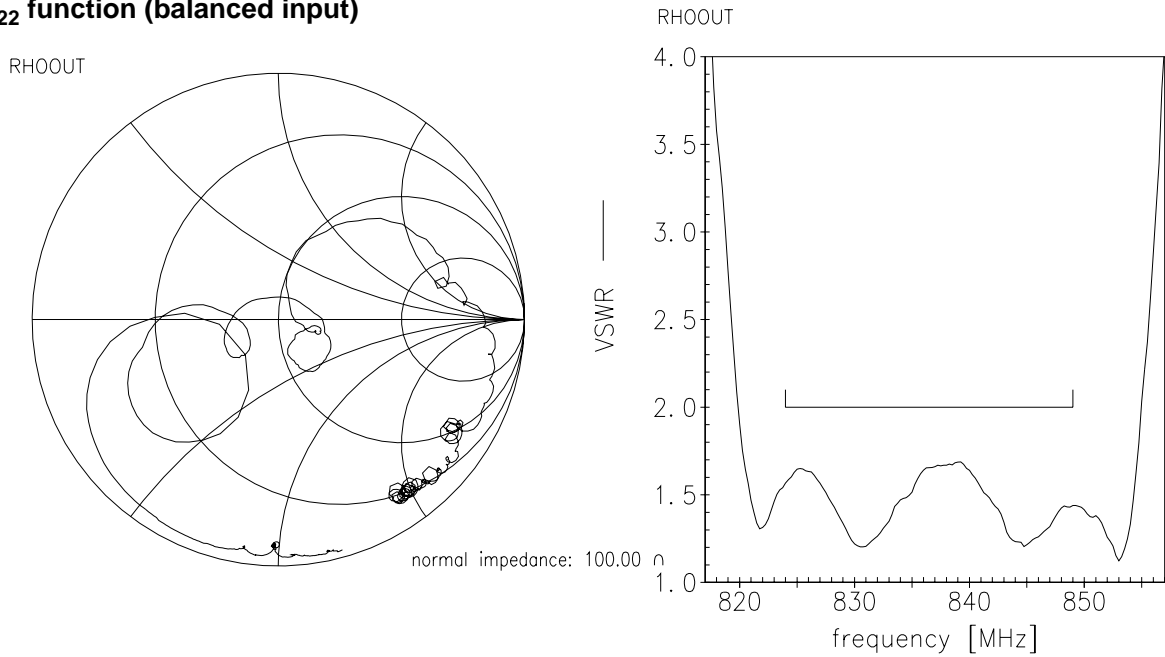


Smith charts

S₁₁ function (unbalanced output)



S₂₂ function (balanced input)



**SAW Components****B9438****SAW TX Filter****836.50 MHz**

Data sheet

**References**

Type	B9438
Ordering code	B39841B9438M410
Marking and package	C61157-A8-A3
Packaging	F61074-V8212-Z000
Date codes	L_1126
S-parameters	B9438_NB.s3p B9438_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."
Moldability	Before using in overmolding environment, please contact your EPCOS sales office.

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