



SAW Components

SAW Tx 2in1 Filter

WCDMA band I & VIII

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



Data Sheet



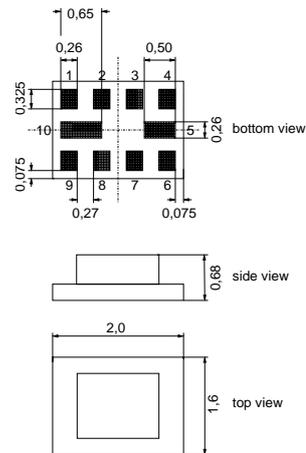
Application

- 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



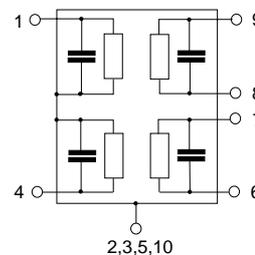
Features

- Package size 2.0 x 1.6 x 0.68 mm³
- Package code QCS10I
- RoHS compatible
- Approximate weight 0.008 g
- Package for **Surface Mount Technology (SMT)**
- Ni, gold-plated terminals
- **Electrostatic Sensitive Device (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





Data Sheet



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 Δα		1.4	3.2	dB
Amplitude ripple at 5 MHz BW				
880.4 ... 914.6MHz Δα _{5MHz}		0.9	2.2	dB
Group delay variation at 5 MHz BW				
880.4 ... 914.6MHz Δτ _{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 (S₃₁/S₂₁)				
880.4 ... 914.6MHz	-1.0	-0.7/0.7	1.0	dB
Input phase balance (φ(S₃₁) - φ(S₂₁) + 180°)				
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.



SAW Components	B9321
SAW Tx 2in1 Filter	897.5 / 1950.0 MHz
Data Sheet	SMD

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 the root-raised cosine transmit pulse shaping filter according to 3GPP TS 25.101 with the following normalization:

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

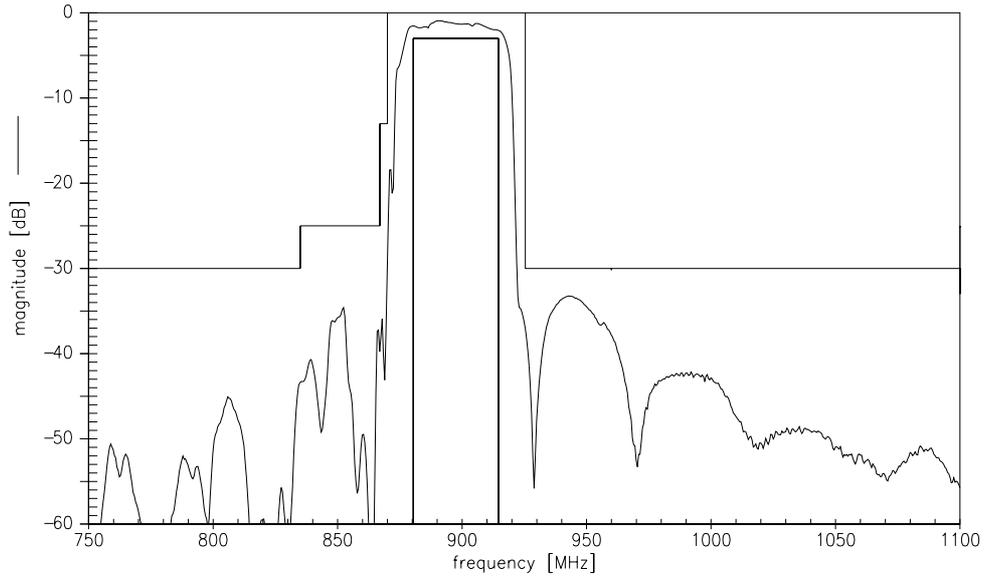
Maximum ratings

Operable temperature range	T	-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	P _{IN}	10	dBm	continuous wave @ +55°C ambient
Tx band				

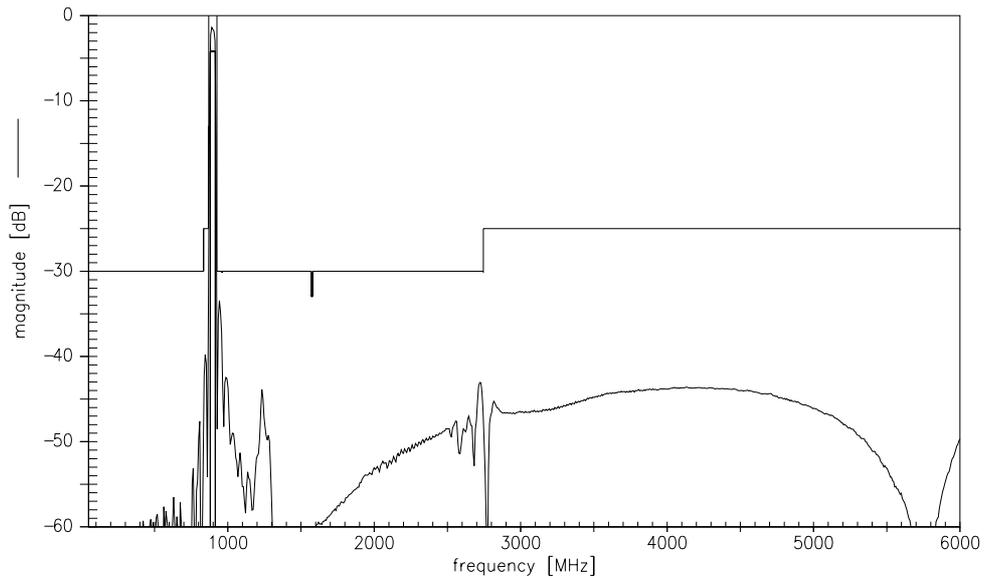
¹⁾ acc. to JESD22-A115A (machine model), 10 negative & 10 positive pulses.



Transfer function

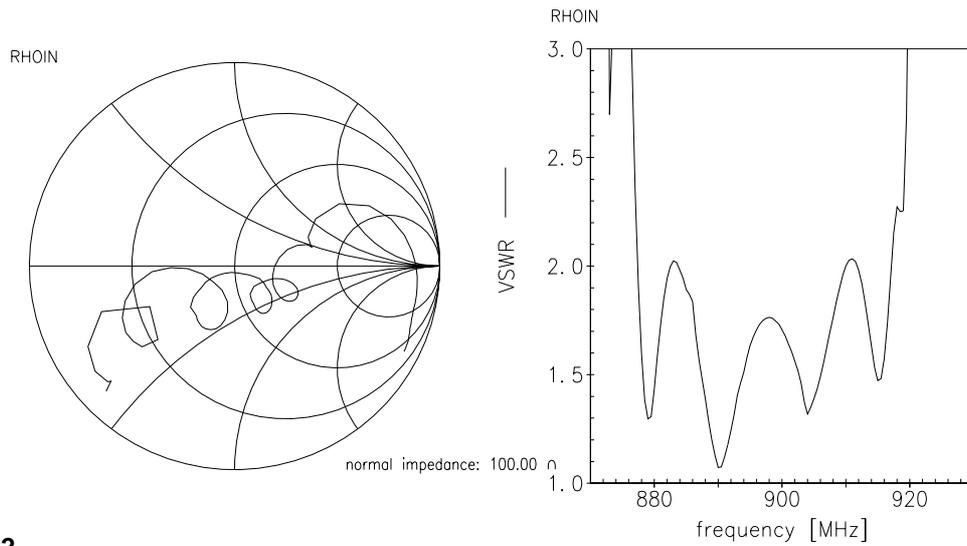


Transfer function (wideband)

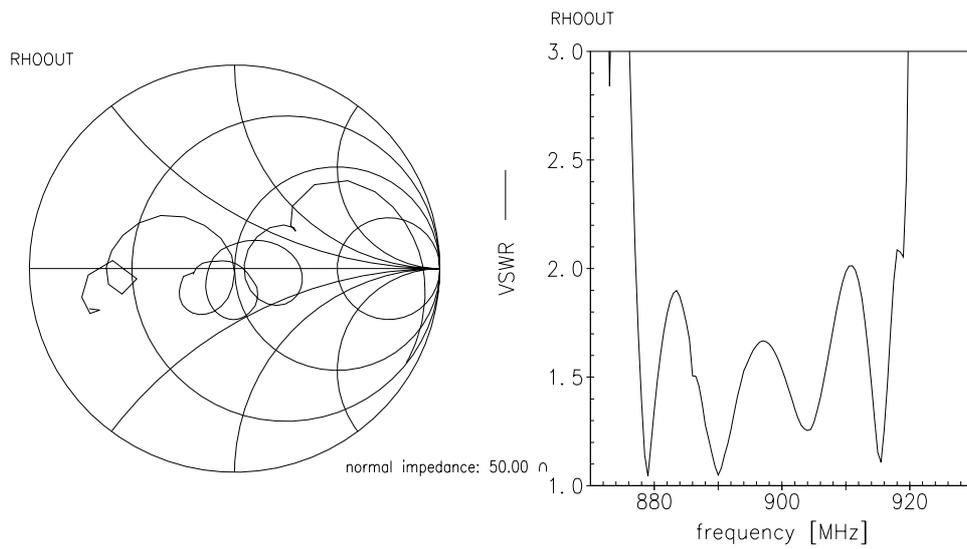




S11



S22





Data Sheet



Characteristics filter 2 (WCDMA band I)

Operating temperature range: $T = -15\text{ °C to }+80\text{ °C}$
 Terminating source impedance: $Z_S = 100\ \Omega$ (balanced) || 33nH (optional 22nH)
 Terminating load impedance: $Z_L = 50\ \Omega$ (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 (S_{31}/S_{21})					
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



SAW Components

B9321

SAW Tx 2in1 Filter

897.5 / 1950.0 MHz

Data Sheet



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 @ +55°C ambient
Tx band				



SAW Components

B9321

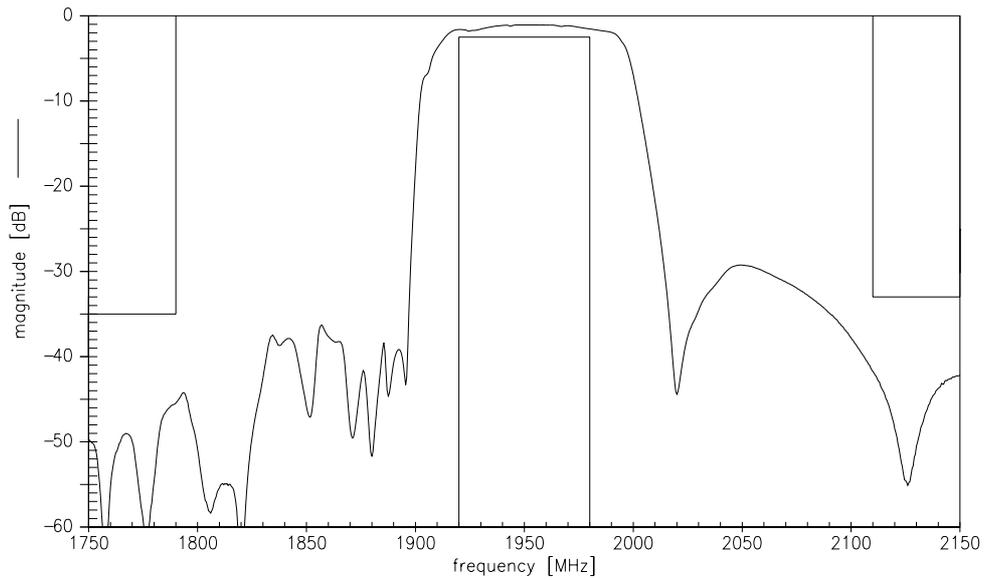
SAW Tx 2in1 Filter

897.5 / 1950.0 MHz

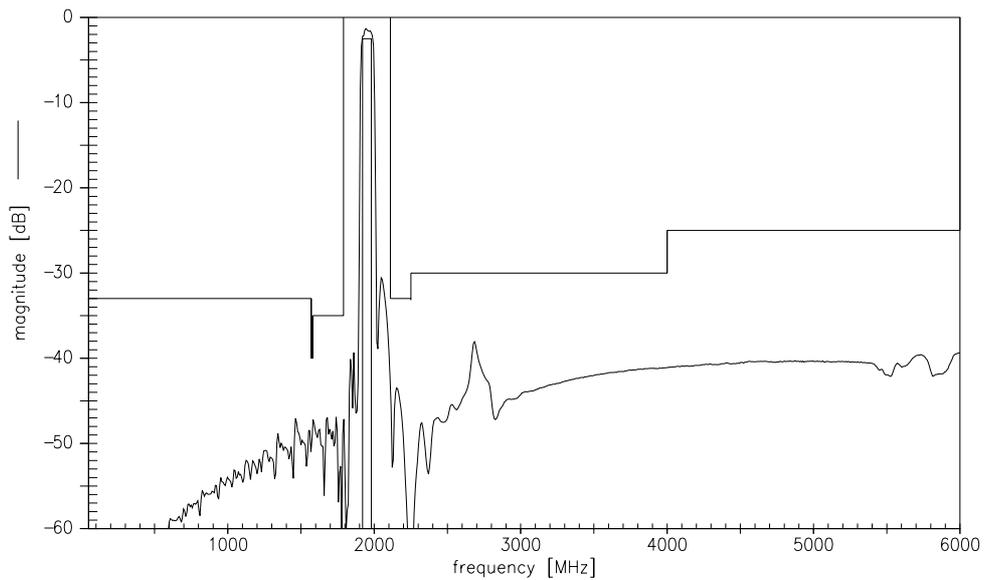
Data Sheet



Transfer function



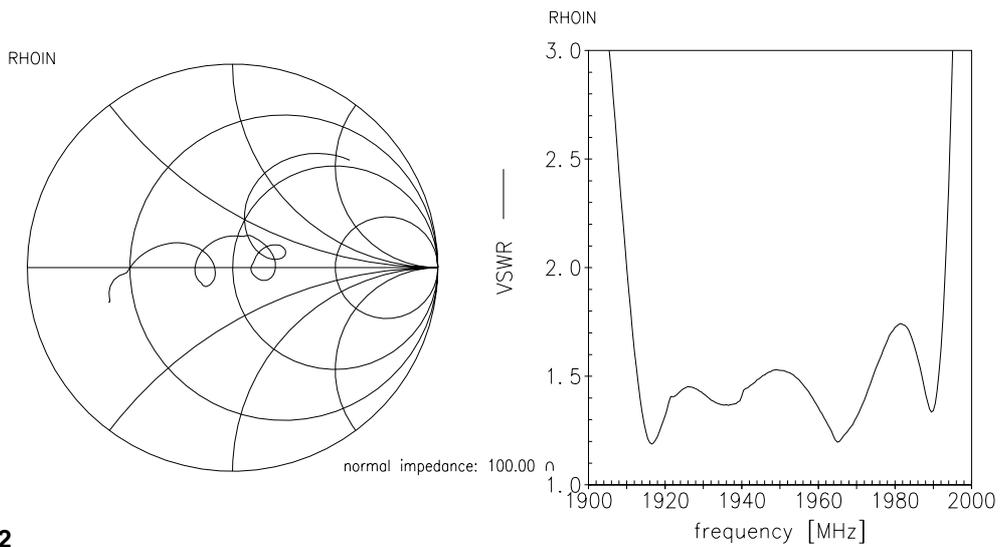
Transfer function (wideband)



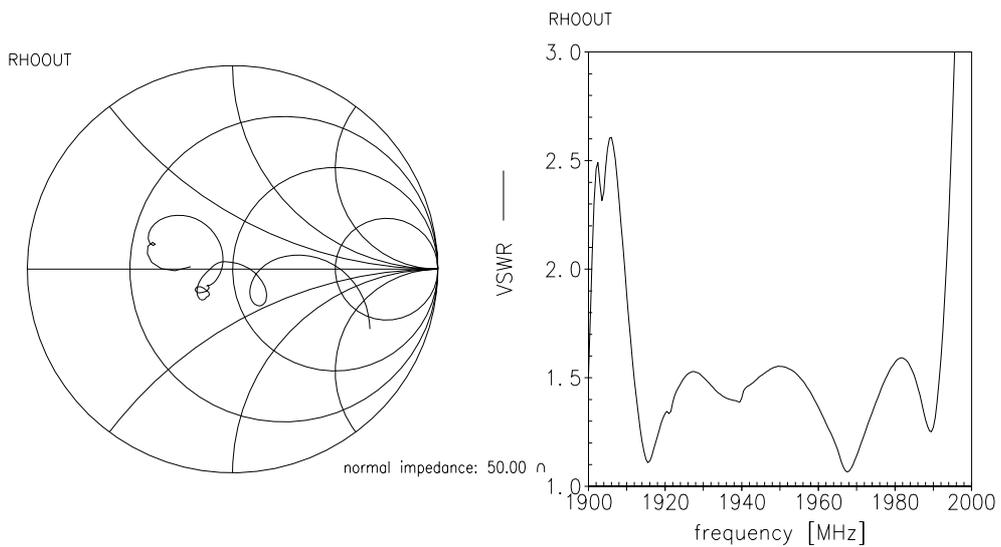
Please read *cautions and warnings* and *important notes* at the end of this document.



S11



S22





SAW Components

B9321

SAW Tx 2in1 Filter

897.5 / 1950.0 MHz

Data Sheet



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."

For further information please contact your local EPCOS sales office or visit our webpage at www.epcos.com.

Published by EPCOS AG
Surface Acoustic Wave Components Division
P.O. Box 80 17 09, 81617 Munich, GERMANY

© EPCOS AG 2007. This brochure replaces the previous edition.

For questions on technology, prices and delivery please contact the Sales Offices of EPCOS AG or the international Representatives.

Due to technical requirements components may contain dangerous substances. For information on the type in question please also contact one of our Sales Offices.

Please read *cautions and warnings and important notes* at the end of this document.



Important notes

The following applies to all products named in this publication:

1. Some parts of this publication contain **statements about the suitability of our products for certain areas of application**. These statements are based on our knowledge of typical requirements that are often placed on our products in the areas of application concerned. We nevertheless expressly point out **that such statements cannot be regarded as binding statements about the suitability of our products for a particular customer application**. As a rule, EPCOS is either unfamiliar with individual customer applications or less familiar with them than the customers themselves. For these reasons, it is always ultimately incumbent on the customer to check and decide whether an EPCOS product with the properties described in the product specification is suitable for use in a particular customer application.
2. We also point out that **in individual cases, a malfunction of passive electronic components or failure before the end of their usual service life cannot be completely ruled out in the current state of the art, even if they are operated as specified**. In customer applications requiring a very high level of operational safety and especially in customer applications in which the malfunction or failure of a passive electronic component could endanger human life or health (e.g. in accident prevention or life-saving systems), it must therefore be ensured by means of suitable design of the customer application or other action taken by the customer (e.g. installation of protective circuitry or redundancy) that no injury or damage is sustained by third parties in the event of malfunction or failure of a passive electronic component.
3. The warnings, cautions and product-specific notes must be observed.
4. In order to satisfy certain technical requirements, **some of the products described in this publication may contain substances subject to restrictions in certain jurisdictions (e.g. because they are classed as "hazardous")**. Useful information on this will be found in our Material Data Sheets on the Internet (www.epcos.com/material). Should you have any more detailed questions, please contact our sales offices.
5. We constantly strive to improve our products. Consequently, **the products described in this publication may change from time to time**. The same is true of the corresponding product specifications. Please check therefore to what extent product descriptions and specifications contained in this publication are still applicable before or when you place an order. We also **reserve the right to discontinue production and delivery of products**. Consequently, we cannot guarantee that all products named in this publication will always be available.
6. Unless otherwise agreed in individual contracts, **all orders are subject to the current version of the "General Terms of Delivery for Products and Services in the Electrical Industry" published by the German Electrical and Electronics Industry Association (ZVEI)**.
7. The trade names EPCOS, CeraDiode, CSSP, PhaseCap, PhaseMod, SIFI, SIKOREL, Silver-Cap, SIMID, SIOV, SIP5D, SIP5K, TOPcap, UltraCap, WindCap are **trademarks registered or pending** in Europe and in other countries. Further information will be found on the Internet at www.epcos.com/trademarks.