Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

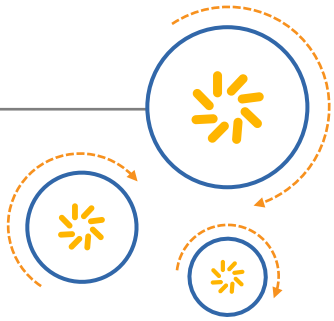
We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

RF360 Europe GmbH

A Qualcomm – TDK Joint Venture



SAW Components

SAW Duplexer

LTE Band 2

Series/type:	B8618
Ordering code:	B39202B8618P810
Date:	October 13, 2015
Version:	2.1

RF360 products mentioned within this document are offered by RF360 Europe GmbH and other subsidiaries of RF360 Holdings Singapore Pte. Ltd. (collectively, the “RF360 Subsidiaries”). RF360 Holdings Singapore Pte. Ltd. is a joint venture of Qualcomm Global Trading Pte. Ltd. and EPCOS AG. References in this documentation to EPCOS AG should properly reference, and shall be read to reference, the RF360 Subsidiaries.

RF360 Europe GmbH, Anzinger Str. 13, München, Germany

SAW Components

SAW Duplexer
LTE Band 2

Series/type:	B8618
Ordering code:	B39202B8618P810
Date:	October 13, 2015
Version:	2.1

Data sheet

Table of contents

1 Application

- Low-loss SAW duplexer for mobile telephone LTE Band 2 (PCS) systems.
- Low insertion attenuation.
- Low amplitude ripple.
- Usable pass band 60 MHz.
- Single ended to balanced transformation in Antenna – Rx path.
- Impedance transformation 50Ω to 100Ω in Antenna – Rx path.

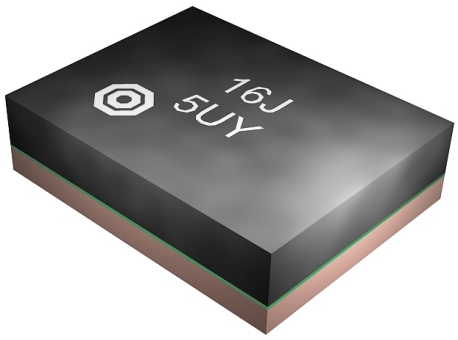


Figure 1: Picture of component with example of marking.

2 Features

- Package size 1.8 mm × 1.4 mm.
- Package height (max.) 0.475 mm.
- Approximate weight 0.0035 g.
- RoHS compatible.
- Package for Surface Mount Technology (SMT).
- Ni, gold-plated terminals.
- Electrostatic Sensitive Device (ESD).
- Moisture Sensitivity Level 3 (MSL3).

3 Package

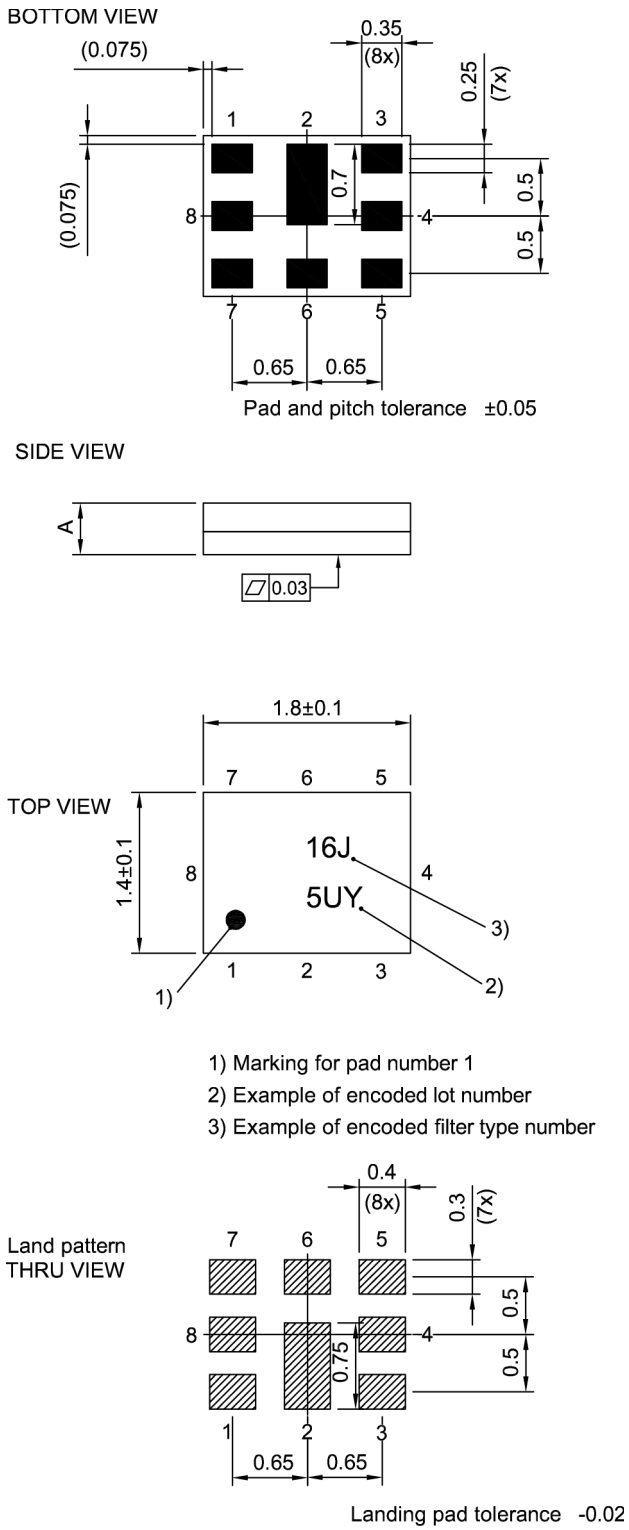


Figure 2: Drawing of package with package height A = 0.475 mm (max.). See Simplified drawings (p. 21).

4 Pin configuration

- 1, 8 RX balanced
- 3 TX
- 6 ANT
- 2, 4, 5, 7 Ground

5 Matching circuit

■ $L_{p1,8}$ = 9.5 nH

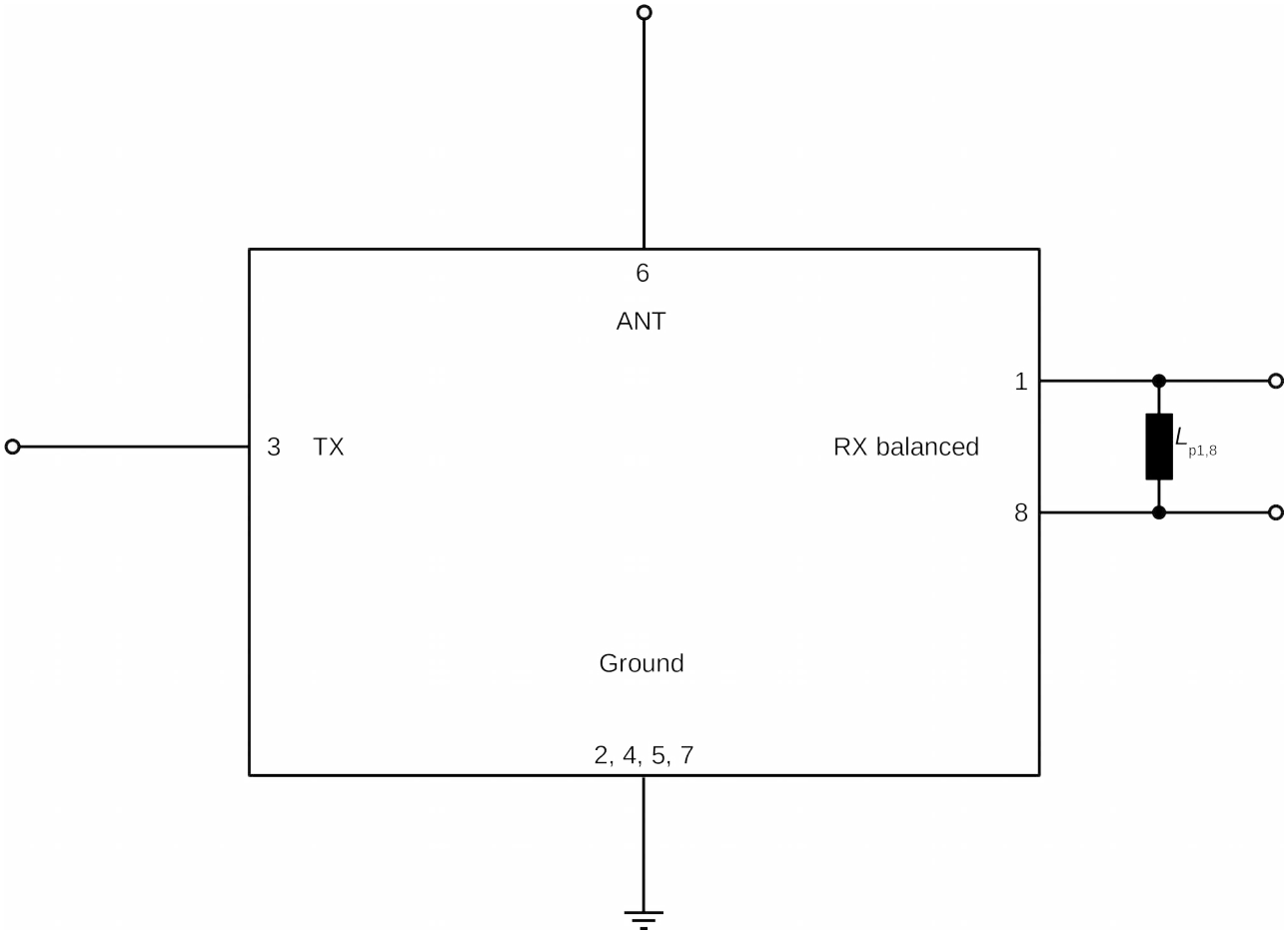


Figure 3: Schematic of matching circuit.

6 Characteristics

6.1 TX – ANT

Temperature range for specification T = −30 °C to +85 °C
TX terminating impedance Z_{TX} = 50 Ω
ANT terminating impedance Z_{ANT} = 50 Ω
RX terminating impedance Z_{RX} = 100 Ω with par. 9.5 nH (differential mode)
RX terminating impedance Z_{RX} = 25 Ω (common mode)

Characteristics TX – ANT[1]				**min.**	**typ.** @+25 °C	**max.**	
Center frequency			f_C	—	1880	—	MHz
Maximum insertion attenuation			α_{max}				
	1850.24 ... 1909.76	MHz		—	1.9	2.5	dB
Amplitude ripple (p-p)			$\Delta\alpha$[2]				
	1850.24 ... 1909.76	MHz		—	0.3	1.5	dB
Maximum VSWR			$VSWR_{max}$				
@ TX port	1850.24 ... 1909.76	MHz		—	1.4	2.0	
@ ANT port	1850.24 ... 1909.76	MHz		—	1.4	2.0	
Maximum error vector magnitude			EVM_{max}[3]				
	1852.4 ... 1907.6	MHz		—	0.5	3.0	%
Minimum attenuation			α_{min}				
	50 ... 787	MHz		30	42	—	dB
	728 ... 764	MHz		40	43	—	dB
	869 ... 894	MHz		40	43	—	dB
	1226 ... 1250	MHz		43	50	—	dB
	1559 ... 1606	MHz		43	54	—	dB
	1605.9 ... 1680	MHz		30	54	—	dB
	1930.24 ... 1989.76	MHz		44	57	—	dB
	2010 ... 2025	MHz		20	52	—	dB
	2110 ... 2155	MHz		44	49	—	dB
	2400 ... 2500	MHz		25	35	—	dB
	3700 ... 3820	MHz		26	29	—	dB
	4900 ... 5950	MHz		21	29	—	dB
	5550 ... 5730	MHz		23	27	—	dB

1) Specified min/max values are valid for a testing power of +10 dBm.
2) Over any channel with band width of 5 MHz.
3) Error Vector Magnitude (EVM) based on definition given in 3GPP TS 25.141.

6.2 ANT – RX

Temperature range for specification	T	= −30 °C to +85 °C
TX terminating impedance	Z_{TX}	= 50 Ω
ANT terminating impedance	Z_{ANT}	= 50 Ω
RX terminating impedance	Z_{RX}	= 100 Ω with par. 9.5 nH (differential mode)
RX terminating impedance	Z_{RX}	= 25 Ω (common mode)

Characteristics ANT – RX[1)]				**min.**	**typ.** @+25 °C	**max.**	
Center frequency			f_C	—	1960	—	MHz
Maximum insertion attenuation			α_{max}				
	1930.24 ... 1989.76	MHz		—	2.7	3.5	dB
Maximum VSWR			$VSWR_{max}$				
@ ANT port	1930.24 ... 1989.76	MHz		—	1.6	2.0	
@ RX port	1930.24 ... 1989.76	MHz		—	1.6	2.0	
Minimum attenuation			α_{min}				
	50 ... 1850	MHz		45	49	—	dB
	80	MHz		50	>60	—	dB
	1850.24 ... 1909.76	MHz		45	52	—	dB
	2050 ... 2075	MHz		25	39	—	dB
	2075 ... 2350	MHz		30	37	—	dB
	2350 ... 2550	MHz		20	31	—	dB
	2550 ... 6000	MHz		40	51	—	dB
	5610 ... 5845	MHz		48	52	—	dB

1) Specified min/max values are valid for a testing power of +10 dBm.

6.3 TX – RX

Temperature range for specification	T	= −30 °C to +85 °C
TX terminating impedance	Z_{TX}	= 50 Ω
ANT terminating impedance	Z_{ANT}	= 50 Ω
RX terminating impedance	Z_{RX}	= 100 Ω with par. 9.5 nH (differential mode)
RX terminating impedance	Z_{RX}	= 25 Ω (common mode)

Characteristics TX – RX[1)]			min.	typ. @+25 °C	max.	
Minimum differential-mode isolation		α_{min}				
	1574 ... 1577	MHz	40	67	—	dB
	1850.24 ... 1909.76	MHz	54	57	—	dB
	1930.24 ... 1989.76	MHz	55	61	—	dB
	3700 ... 3820	MHz	20	58	—	dB
	5550 ... 5850	MHz	20	49	—	dB
Minimum common-mode isolation		α_{min}				
	1850.24 ... 1909.76	MHz	43	48	—	dB

1) Specified min/max values are valid for a testing power of +10 dBm.

7 Maximum ratings

Storage temperature	T_{STG} =	−40 °C to +90 °C	
DC voltage	V_{DC} =	0 V (max.)[1]	
ESD voltage			
	V_{ESD} [2]	300 V (max.)	Human body model.
	V_{ESD} [3]	600 V (max.)	Charged device model.
Input power @ TX port: 1850.24 ... 1909.76 MHz elsewhere	P_{IN} =	29 dBm 10 dBm	Continuous wave for 5000 h @ 50 °C.

1) DC resistance at RX output might be less than 100 MΩ at elevated temperatures. Hence, using blocking capacitors is recommended.
2) According to JESD22-A114F (HBM – Human Body Model), 1 negative & 1 positive pulse.
3) According to JESD22-C101C (CDM – Field Induced Charged Device Model), 3 negative & 3 positive pulses.

8 Transmission coefficients

8.1 TX – ANT

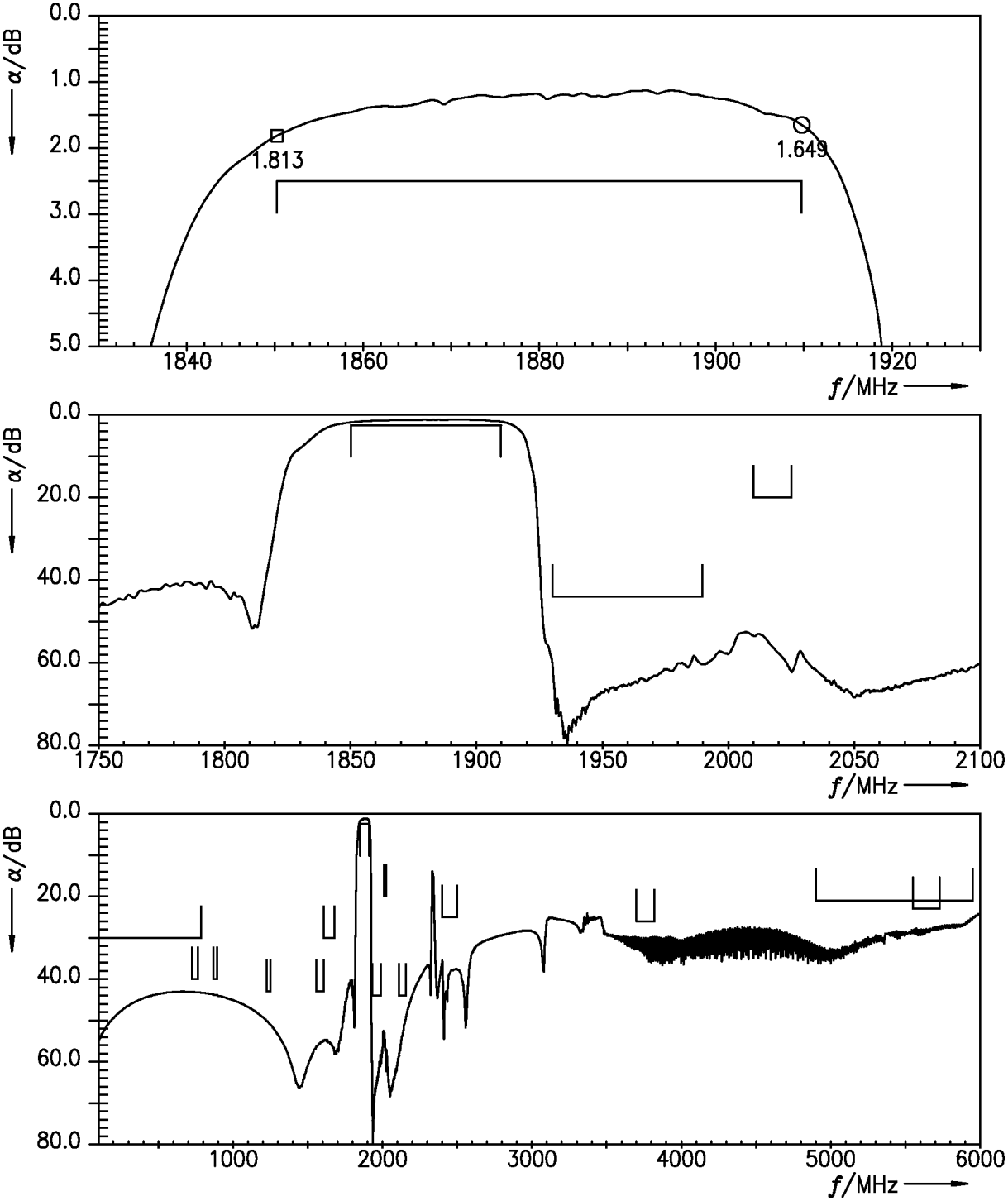


Figure 4: Attenuation TX – ANT.

8.2 ANT – RX

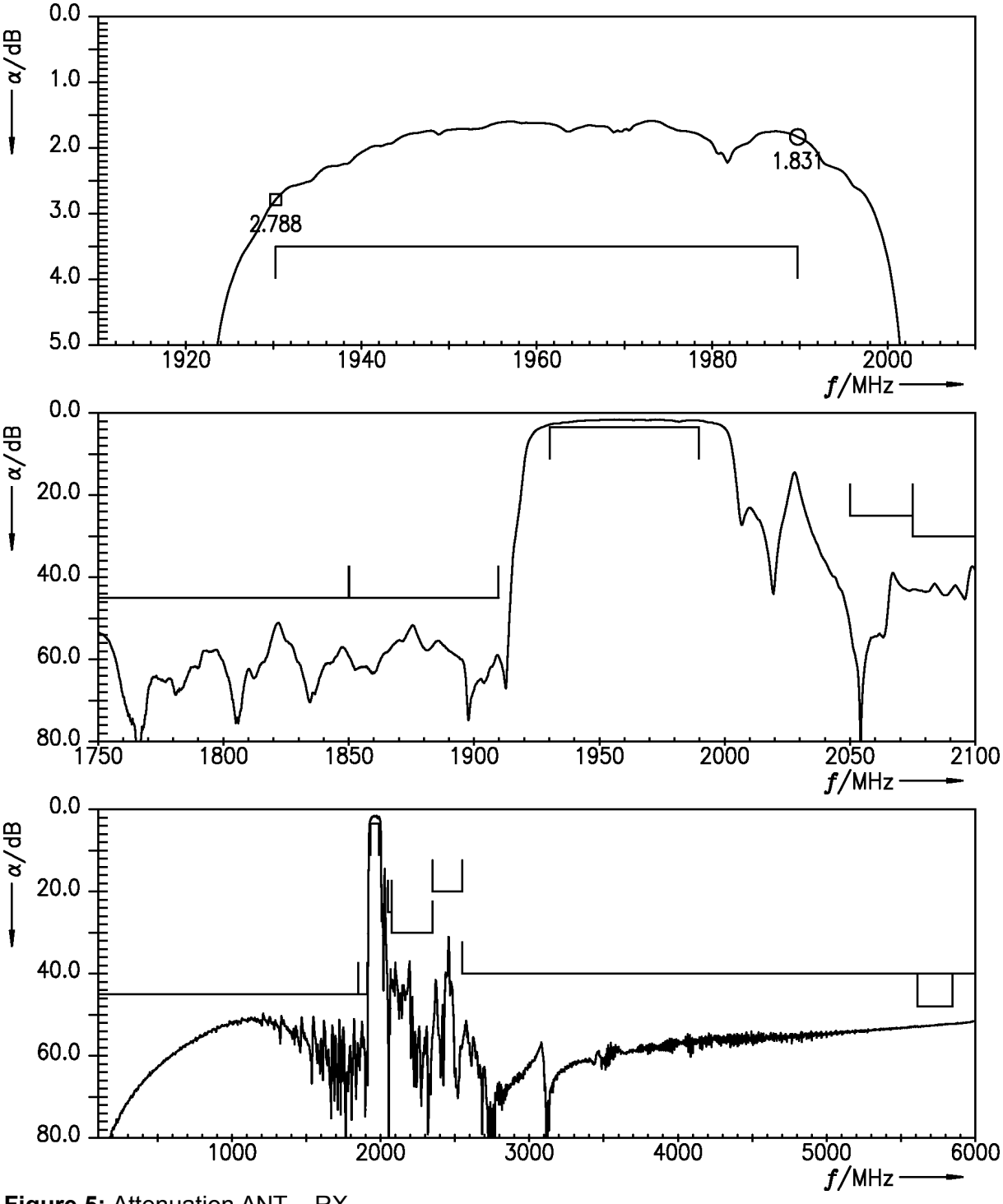


Figure 5: Attenuation ANT – RX.

8.3 TX – RX

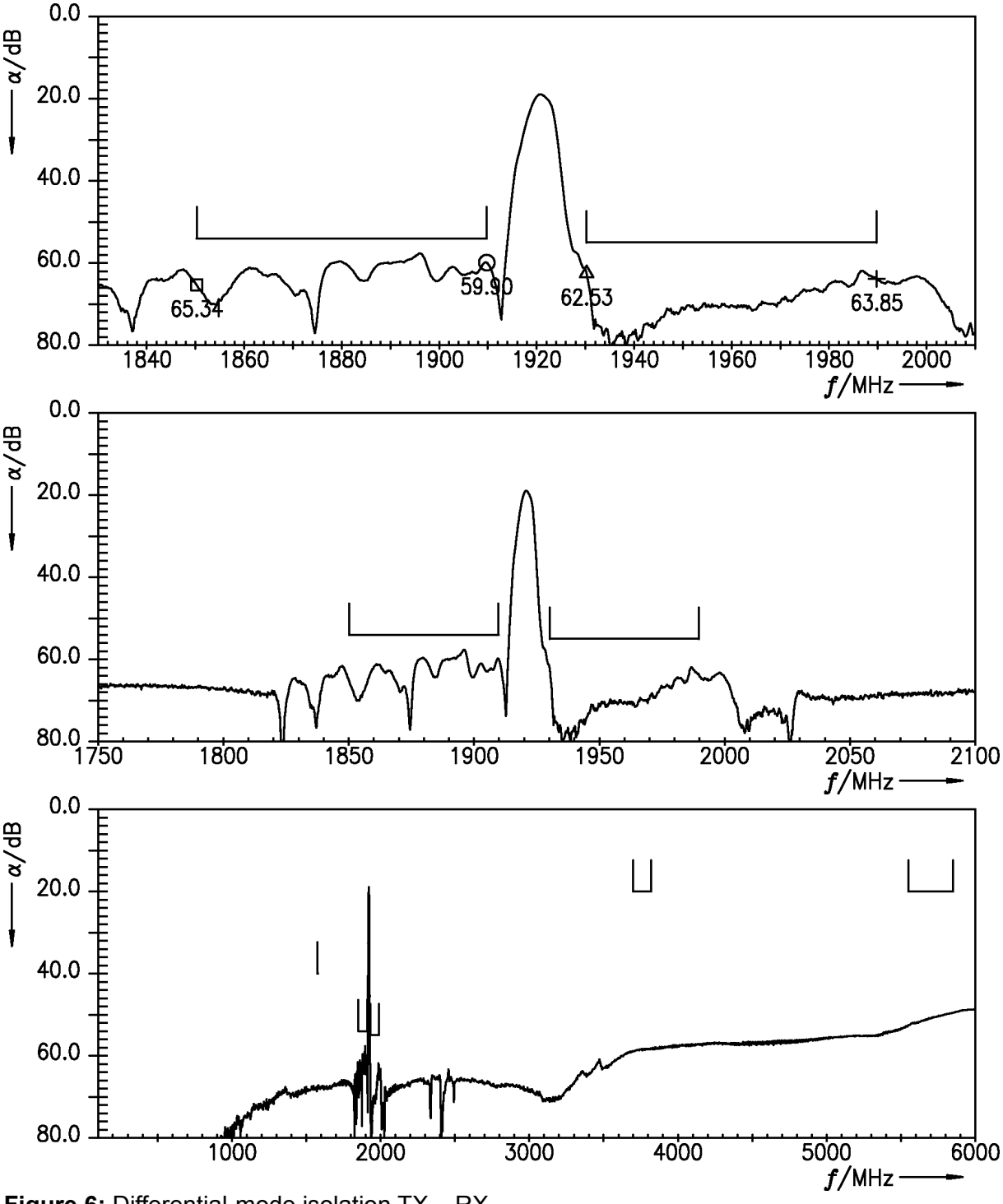


Figure 6: Differential-mode isolation TX – RX.

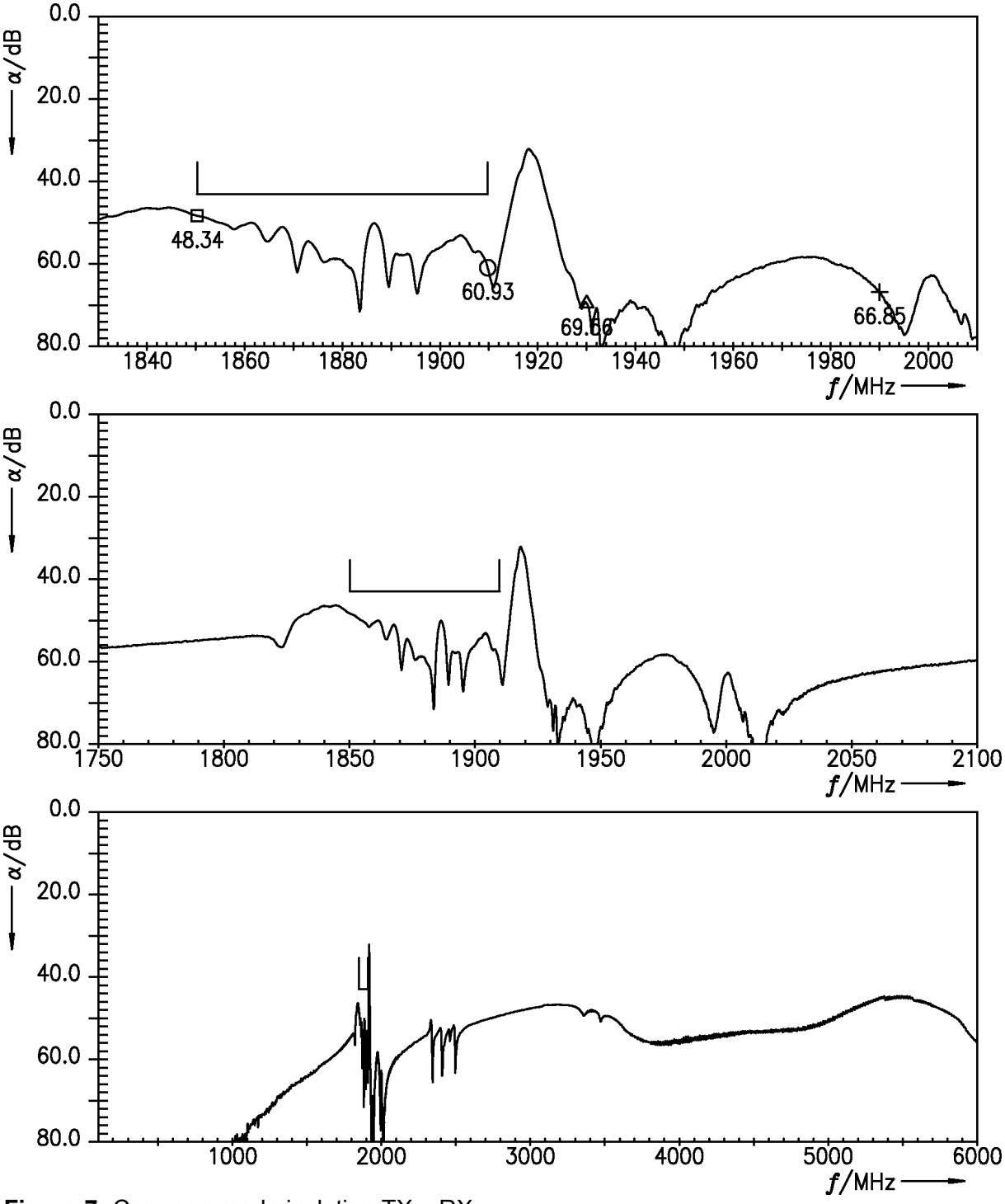


Figure 7: Common-mode isolation TX – RX.

9 Reflection coefficients

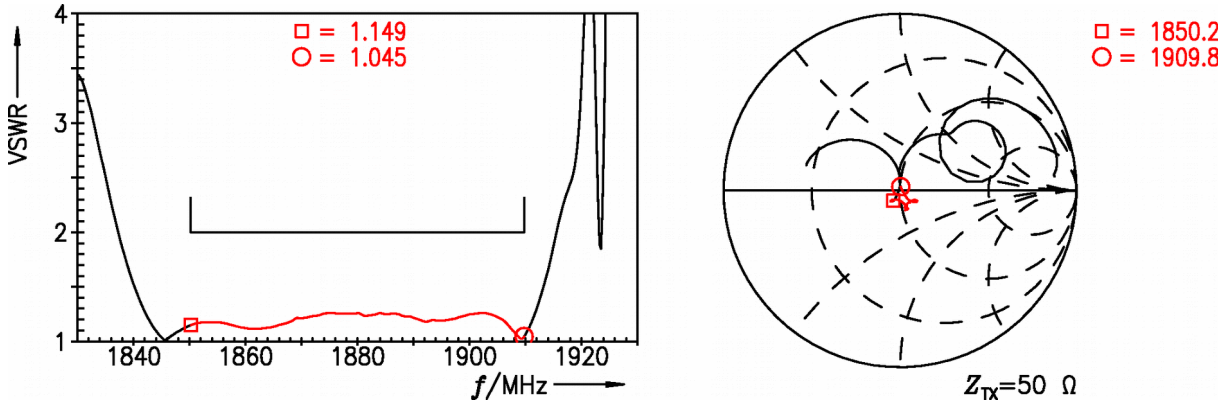


Figure 8: Reflection coefficient at TX port.

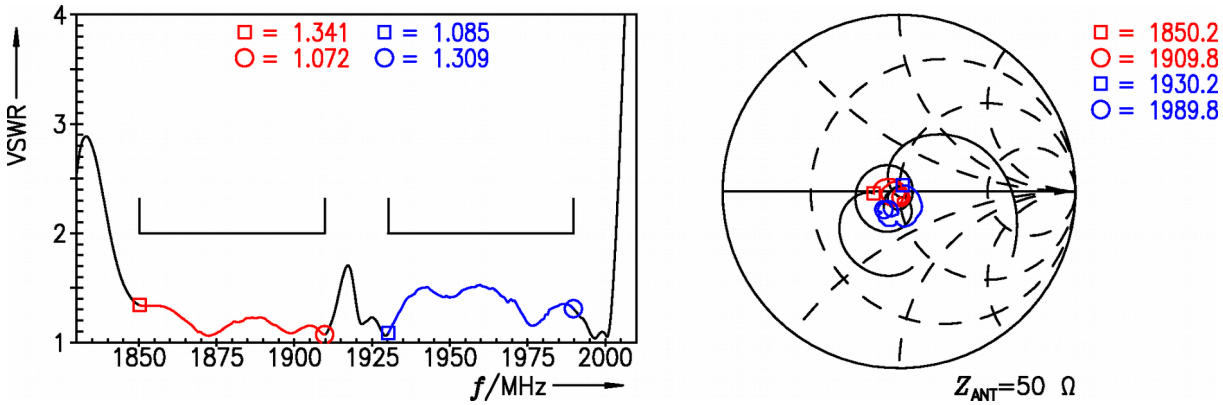


Figure 9: Reflection coefficient at ANT port (TX and RX frequencies).

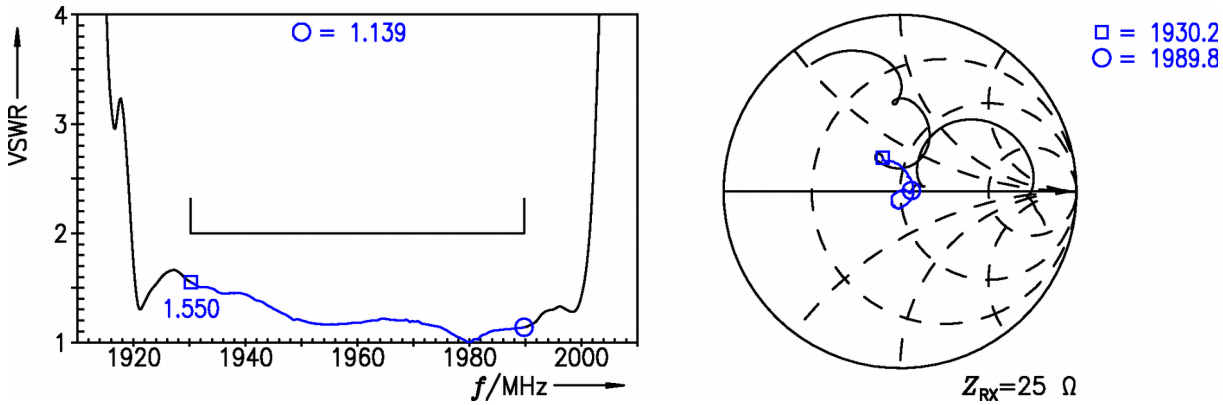


Figure 10: Reflection coefficient at RX port.

10 Packing material

10.1 Tape

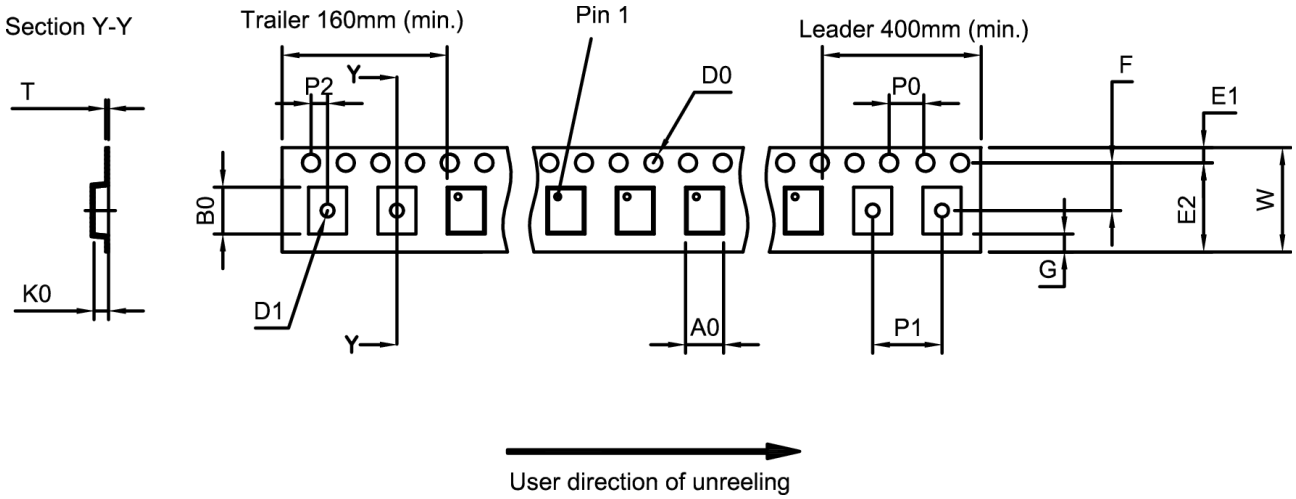


Figure 11: Drawing of tape (first-angle projection) with tape dimensions according to Table 1.

A_0	$1.62_{\pm 0.05}$ mm
B_0	$2.04_{\pm 0.05}$ mm
D_0	$1.5_{\pm 0.05}$ mm
D_1	$0.8_{\pm 0.05}$ mm
E_1	$1.75_{\pm 0.1}$ mm

E_2	6.25 mm (min.)
F	$3.5_{\pm 0.05}$ mm
G	0.75 mm (min.)
K_0	$0.62_{\pm 0.05}$ mm
P_0	$4.0_{\pm 0.1}$ mm

P_1	$4.0_{\pm 0.1}$ mm
P_2	$2.0_{\pm 0.05}$ mm
T	$0.25_{\pm 0.02}$ mm
W	$8.0_{\pm 0.1}$ mm

Table 1: Tape dimensions.

10.2 Reel with diameter of 180 mm

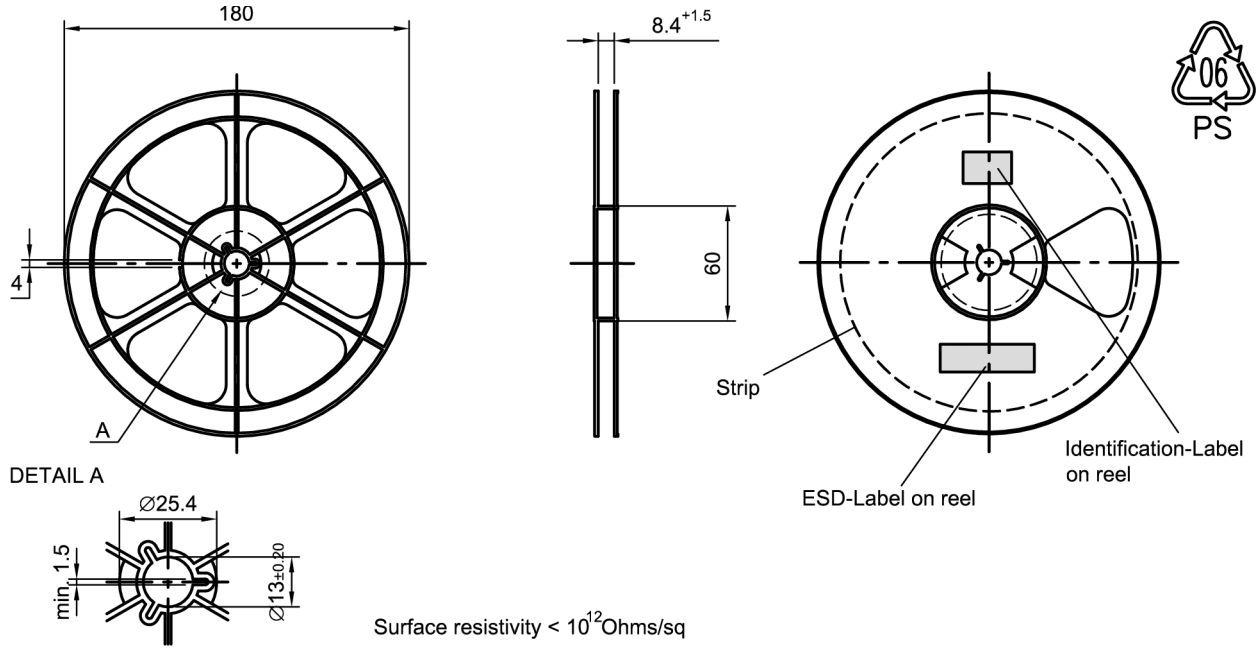


Figure 12: Drawing of reel (first-angle projection) with diameter of 180 mm.

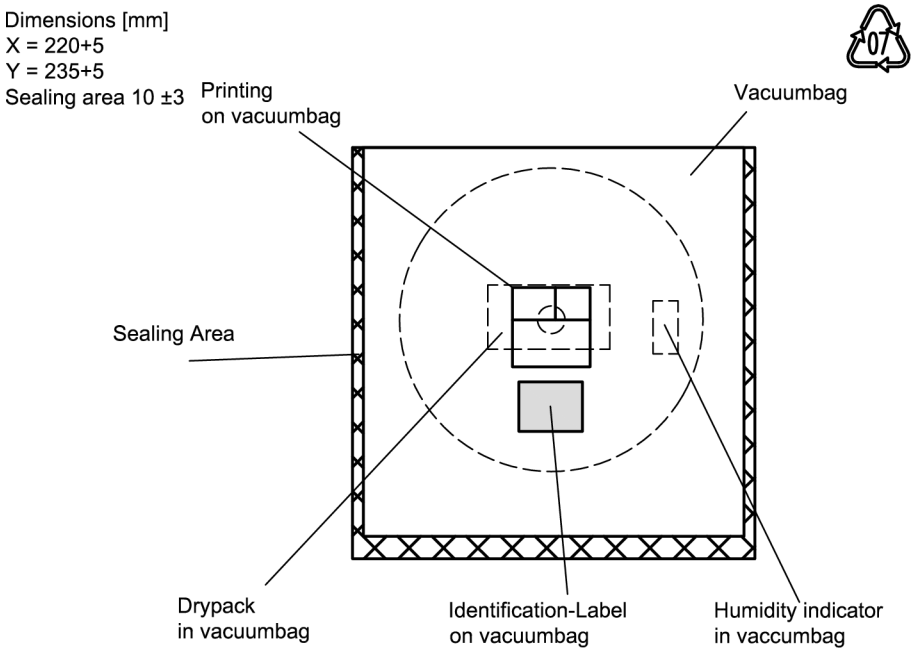


Figure 13: Drawing of moisture barrier bag (MBB) for reel with diameter of 180 mm.

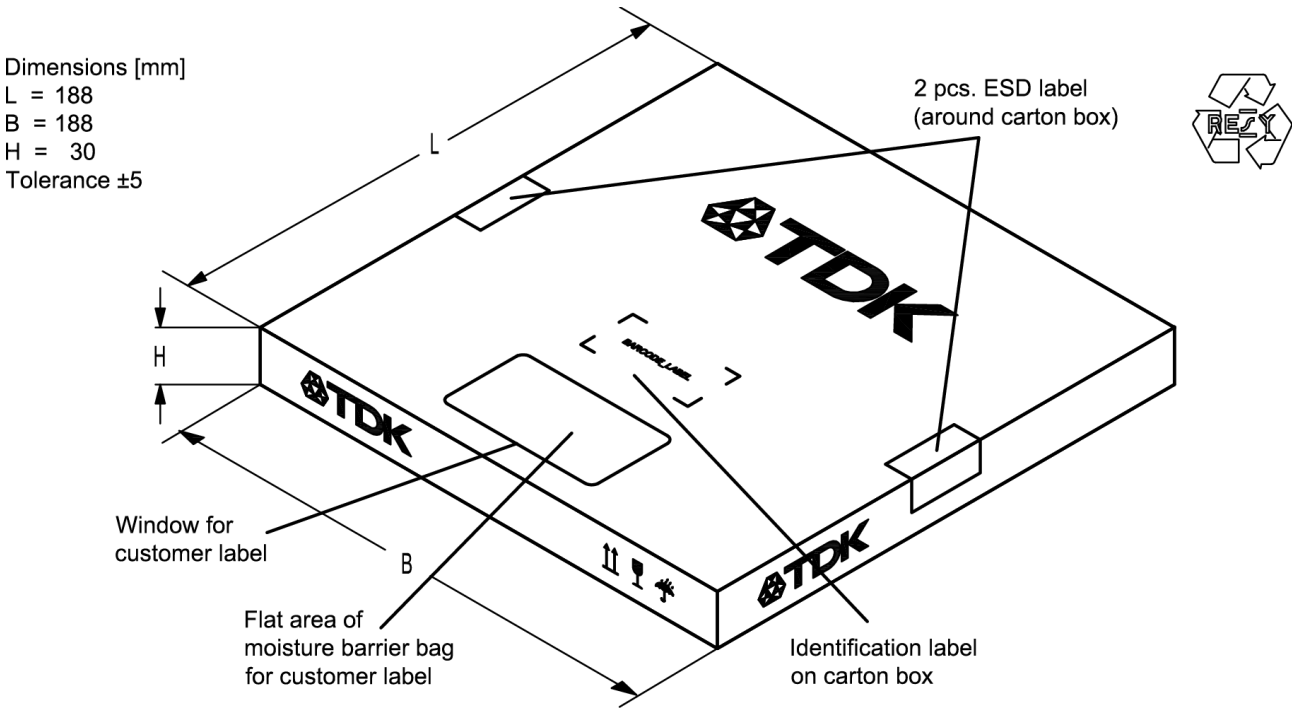


Figure 14: Drawing of folding box for reel with diameter of 180 mm.

10.3 Reel with diameter of 330 mm

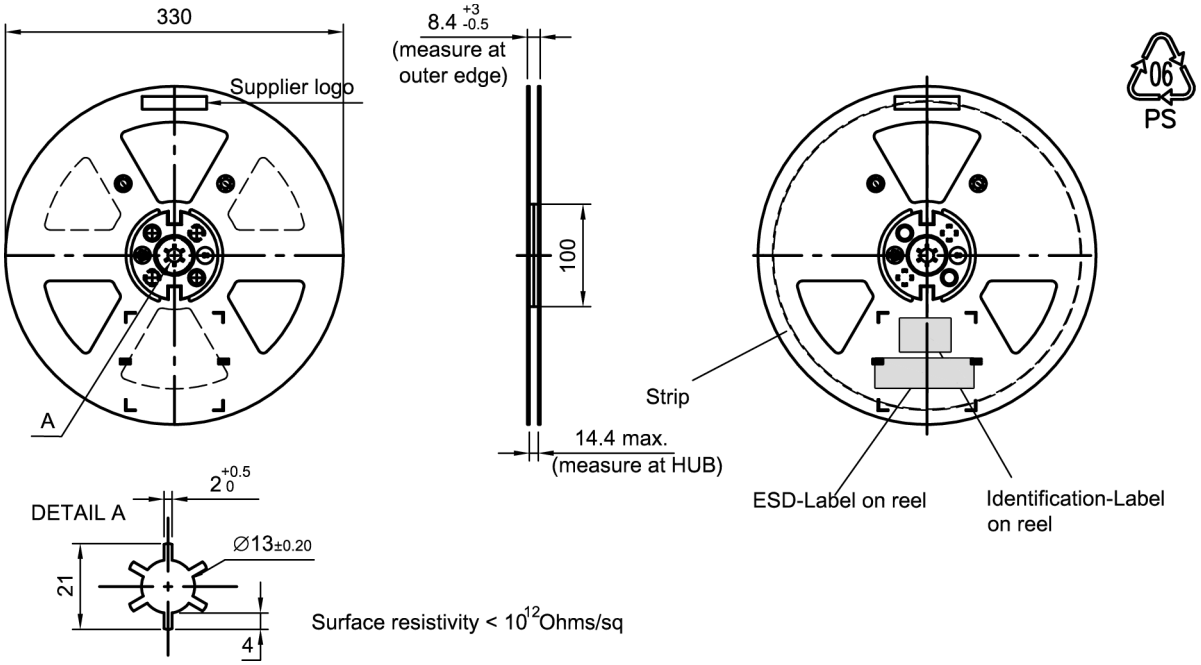


Figure 15: Drawing of reel (first-angle projection) with diameter of 330 mm.

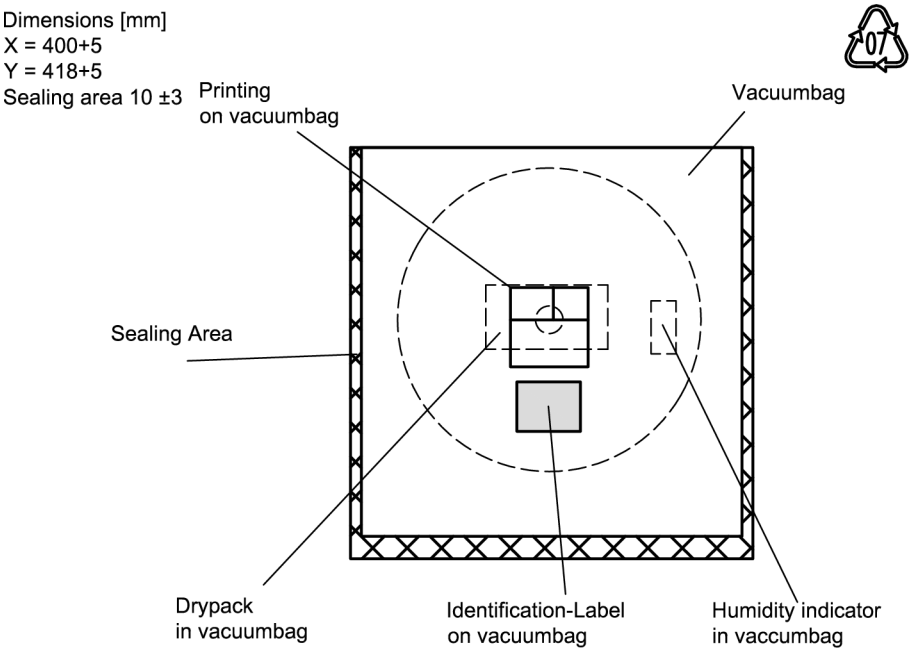


Figure 16: Drawing of moisture barrier bag (MBB) for reel with diameter of 330 mm.

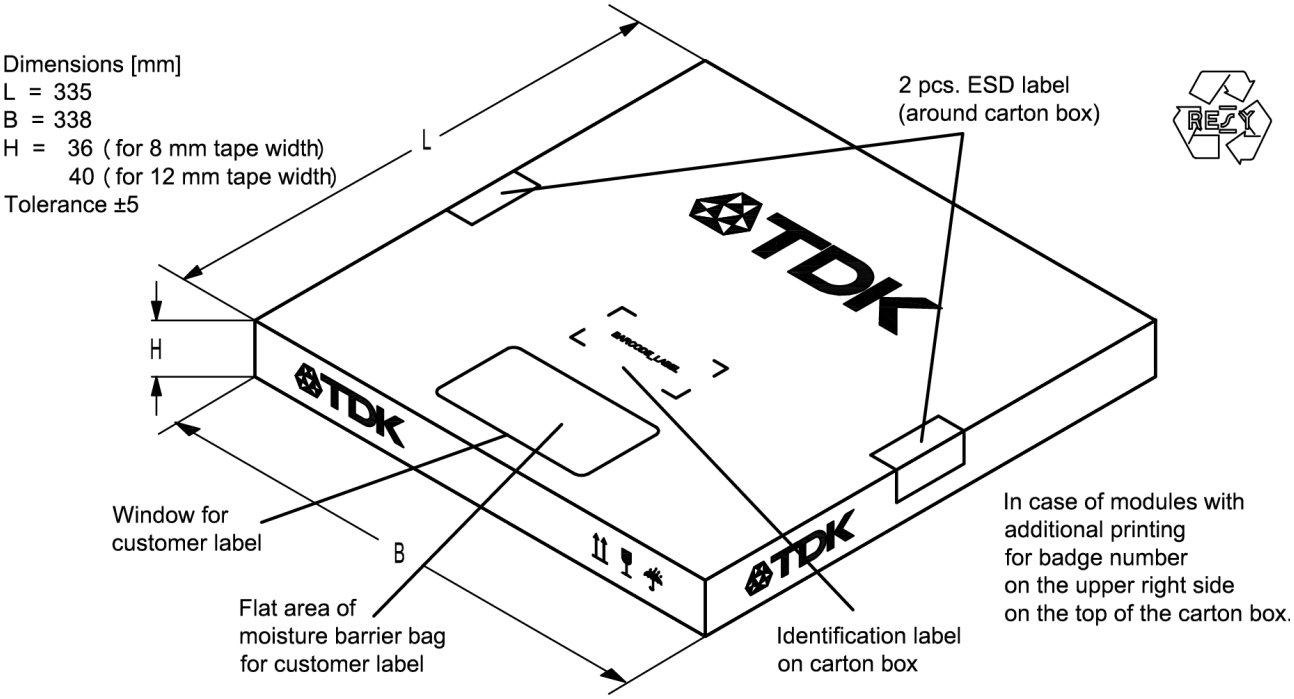


Figure 17: Drawing of folding box for reel with diameter of 330 mm.

11 Marking

Products are marked with product type number and lot number encoded according to Table 2:

- Type number:

  The 4 digit type number of the ordering code, e.g., B3xxxxB**1234**xxxx,
  is encoded by a special BASE32 code into a 3 digit marking.

  Example of decoding type number marking on device in decimal code.

16J	**=>**	**1234**
1 x 32^2 + **6** x 32^1 + **18 (=J)** x 32^0	**=**	**1234**

  The BASE32 code for product type B8618 is 8DA.

- Lot number:

  The last 5 digits of the lot number, e.g., **12345**,
  are encoded based on a special BASE47 code into a 3 digit marking.

  Example of decoding lot number marking on device in decimal code.

5UY	**=>**	**12345**
5 x 47^2 + **27 (=U)** x 47^1 + **31 (=Y)** x 47^0	**=**	**12345**

Adopted BASE32 code for type number			
Decimal value	Base32 code	Decimal value	Base32 code
0	0	16	G
1	1	17	H
2	2	18	J
3	3	19	K
4	4	20	M
5	5	21	N
6	6	22	P
7	7	23	Q
8	8	24	R
9	9	25	S
10	A	26	T
11	B	27	V
12	C	28	W
13	D	29	X
14	E	30	Y
15	F	31	Z

Adopted BASE47 code for lot number			
Decimal value	Base47 code	Decimal value	Base47 code
0	0	24	R
1	1	25	S
2	2	26	T
3	3	27	U
4	4	28	V
5	5	29	W
6	6	30	X
7	7	31	Y
8	8	32	Z
9	9	33	b
10	A	34	d
11	B	35	f
12	C	36	h
13	D	37	n
14	E	38	r
15	F	39	t
16	G	40	v
17	H	41	\
18	J	42	?
19	K	43	{
20	L	44	}
21	M	45	<
22	N	46	>
23	P		

Table 2: Lists for encoding and decoding of marking.

12 Soldering profile

The recommended soldering process is in accordance with IEC 60068-2-58 – 3rd edit and IPC/JEDEC J-STD-020B.

ramp rate	≤ 3 K/s
preheat	125 °C to 220 °C, 150 s to 210 s, 0.4 K/s to 1.0 K/s
T > 220 °C	30 s to 70 s
T > 230 °C	min. 10 s
T > 245 °C	max. 20 s
T ≥ 255 °C	–
peak temperature T_{peak}	250 °C +0/-5 °C
wetting temperature T_{min}	230 °C +5/-0 °C for 10 s ± 1 s
cooling rate	≤ 3 K/s
soldering temperature T	measured at solder pads

Table 3: Characteristics of recommended soldering profile for lead-free solder (Sn95.5Ag3.8Cu0.7).

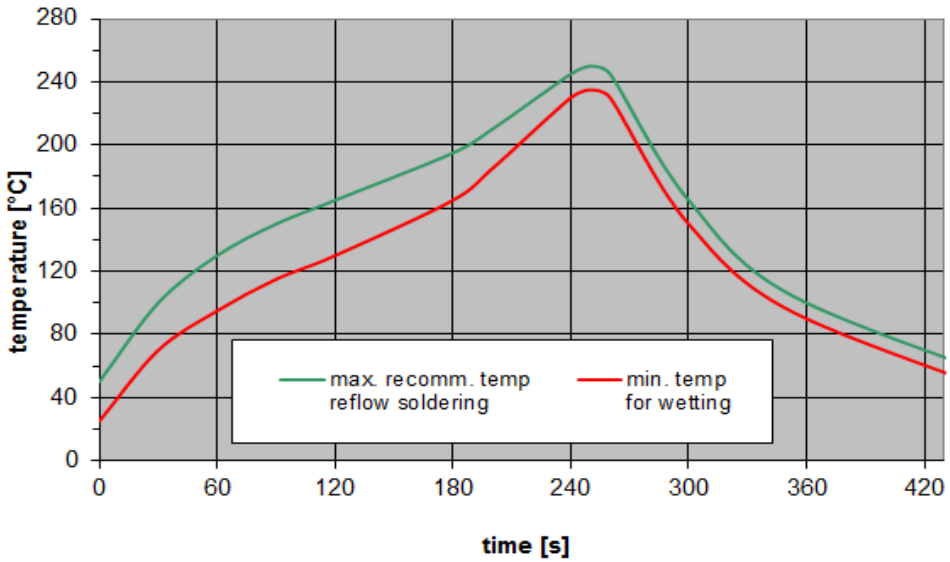


Figure 18: Recommended reflow profile for convection and infrared soldering – lead-free solder.

13 Annotations

13.1 Matching coils

See TDK inductor pdf-catalog http://www.tdk.co.jp/tefe02/coil.htm#aname1 and Data Library for circuit simulation http://www.tdk.co.jp/etvcl/index.htm.

13.2 RoHS compatibility

ROHS-compatible means that products are compatible with the requirements according to Art. 4 (substance restrictions) of Directive 2011/65/EU of the European Parliament and of the Council of June 8th, 2011, on the restriction of the use of certain hazardous substances in electrical and electronic equipment ("Directive") with due regard to the application of exemptions as per Annex III of the Directive in certain cases.

13.3 Scattering parameters (S-parameters)

The pin/port assignment is available in the headers of the S-parameter files. Please contact your local EPCOS sales office.

13.4 Ordering code and packing units

Ordering code	Packing units
B39202B8618P810	15000 pcs
B39202B8618P810S 5	5000 pcs

Table 4: Ordering codes and packing units.

14 Cautions and warnings

14.1 Moldability

Before using in overmolding environment, please contact your local EPCOS sales office.

14.2 Simplified drawings

Landing area

The printed circuit board (PCB) land pattern (landing area) shown is based on EPCOS internal development and empirical data and illustrated for example purposes, only. As customers' SMD assembly processes may have a plenty of variants and influence factors which are not under control or knowledge of EPCOS, additional careful process development on customer side is necessary and strongly recommended in order to achieve best soldering results tailored to the particular customer needs.

Dimensions

Unless otherwise specified all dimensions are understood using unit millimeter (mm).

Projection method

Unless otherwise specified first-angle projection is applied.

Contact and Important notes

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

Published by EPCOS AG
Systems, Acoustics, Waves Business Group
P.O. Box 80 17 09, 81617 Munich, GERMANY

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.

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 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 an 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 an 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.
   The aforementioned does not apply in the case of individual agreements deviating from the foregoing for customer-specific products.
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, Alu-X, CeraDiode, CeraLink, CeraPad, CeraPlas, CSMP, CSSP, CTVS, DeltaCap, DigiSiMic, DSSP, ExoCore, FilterCap, FormFit, LeaXield, MiniBlue, MiniCell, MKD, MKK, MotorCap, PCC, PhaseCap, PhaseCube, PhaseMod, PhiCap, PQSine, SIFERRIT, SIFI, SIKOREL, SilverCap, SIMDAD, SiMic, SIMID, SineFormer, SIOV, SIP5D, SIP5K, TFAP, ThermoFuse, 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.