Qualcomm

RF360
Europe GmbH

# SAW components

## SAW diplexer

Automotive telematics
TD-SCDMA bands 34 & 39

| | |
|---|---|
| Series/type: | B4384 |
| Ordering code: | B39202B4384P810 |
| Date: | March 07, 2016 |
| Version: | 2.0 |

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

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## Table of contents

## 1 Application

- Low-loss 2in1 RF filter for TD-SCDMA band 34 and TD-SCDMA band 39 systems
- TD-SCDMA B34: 15MHz
- TD-SCDMA B39: 40MHz
- Low amplitude ripple

## 2 Features

- Package size 1.5±0.1 mm × 1.1±0.1 mm
- Package height 0.45 mm (max.)
- Package code QCS10W
- Approximate weight 3 mg
- RoHS compatible
- Package for Surface Mount Technology (SMT)
- Ni/Au-plated terminals
- Filter surface passivated
- AEC-Q200 qualified component family (operable temperature range −40 °C to +85 °C)
- Electrostatic Sensitive Device (ESD)

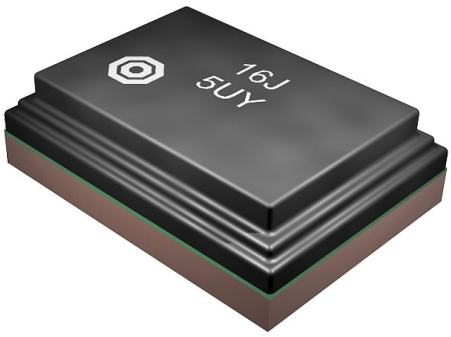


**Figure 1:** Picture of component with example of product marking.

## 3 Package

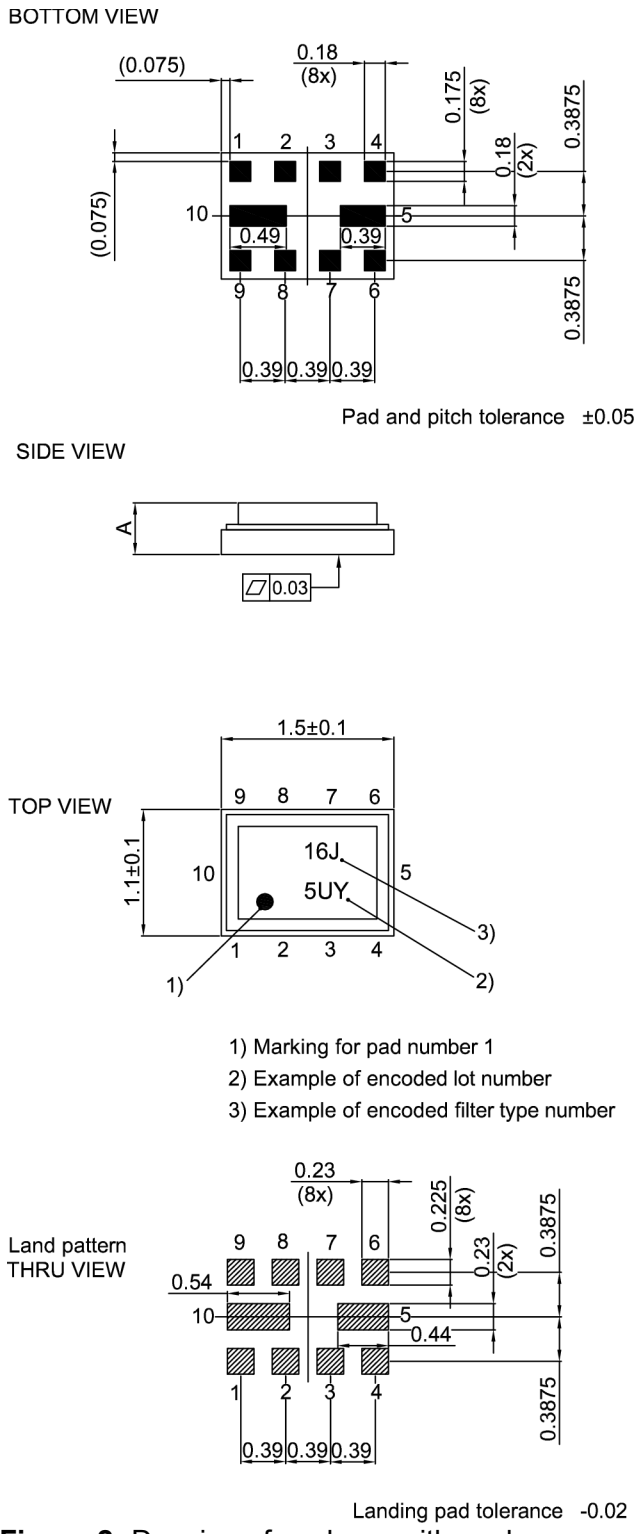


**Figure 2:** Drawing of package with package height A = 0.45 mm (max.). See Simplified drawings (p. 18).

## 4 Pin configuration

- 1 Input (B34 & B39)
- 6 Output (B34)
- 9 Output (B39)
- 2, 3, 4, 5, 7, 8, 10 Ground

## 5 Matching circuit

■ $L_{p1}$ = 4.6 nH

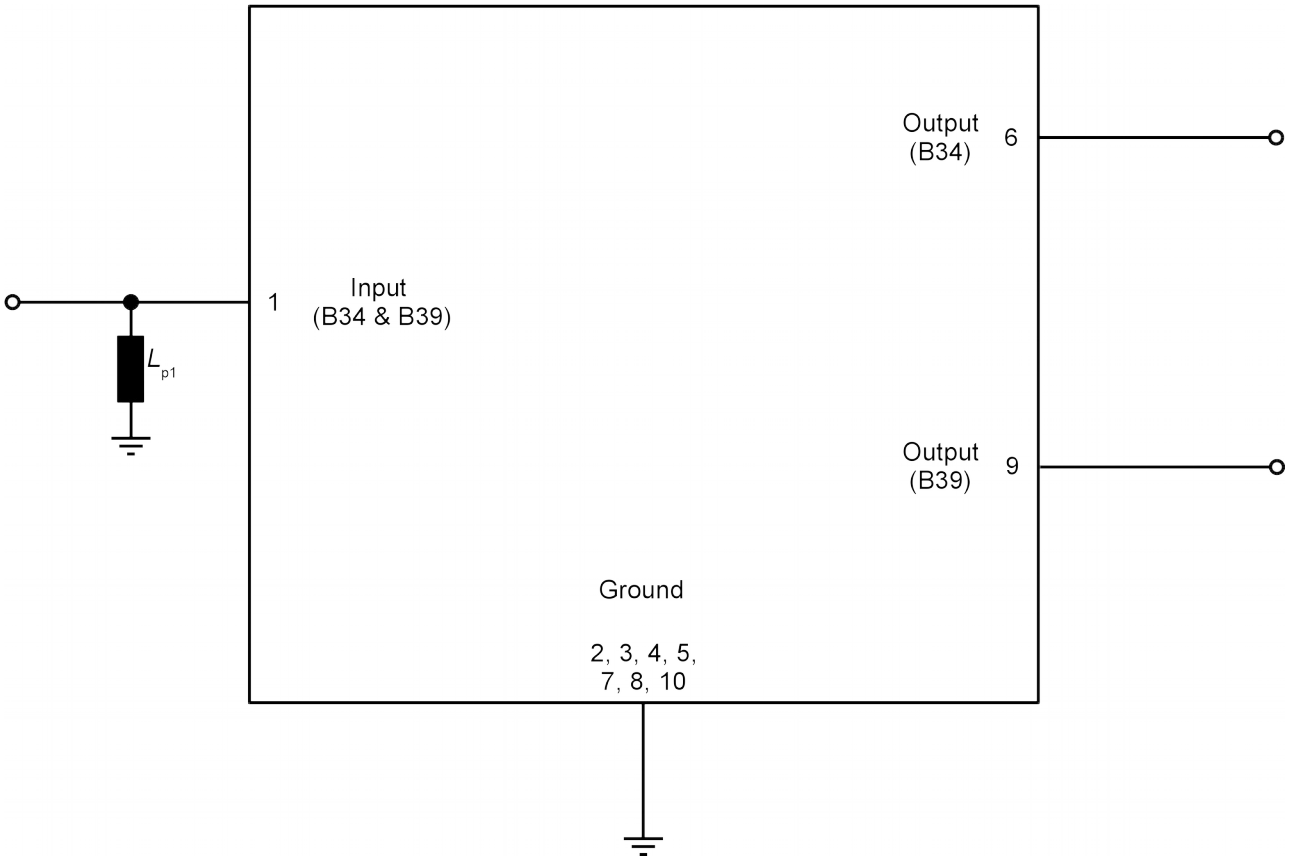


**Figure 3:** Schematic of matching circuit.

## 6 Characteristics TD-SCDMA B34

Temperature range for specification $T_{SPEC}$ = −30 °C ... +85 °C
B34 B39 input terminating impedance $Z_{B34\ B39\ IN}$ = 50 Ω with par. 4.6 nH[1)]
B34 output terminating impedance $Z_{B34\ OUT}$ = 50 Ω
B39 output terminating impedance $Z_{B39\ OUT}$ = 50 Ω

| **Characteristics TD-SCDMA B34** | | | | **min.** for $T_{SPEC}$ | **typ.** @+25 °C | **max.** for $T_{SPEC}$ | |
|---|---|---|---|---|---|---|---|
| **Center frequency** | | | $f_C$ | — | 2017.5 | — | MHz |
| **Maximum insertion attenuation** | | | $\alpha_{max}$ | | | | |
| | 2010... 2025 | MHz | | — | 1.7 | 2.3 | dB |
| **Amplitude ripple (p-p)** | | | Δα | | | | |
| | 2010... 2025 | MHz | | — | 0.4 | 0.9 | dB |
| **Maximum VSWR** | | | $VSWR_{max}$ | | | | |
| @ B34 B39 input port | 2010... 2025 | MHz | | — | 1.4 | 1.9 | |
| @ B34 output port | 2010... 2025 | MHz | | — | 1.4 | 1.9 | |
| **Minimum attenuation** | | | $\alpha_{min}$ | | | | |
| | 50... 1000 | MHz | | 35 | 38 | — | dB |
| | 1000... 1850 | MHz | | 30 | 34 | — | dB |
| | 1850... 1930 | MHz | | 33 | 38 | — | dB |
| | 1930... 1950 | MHz | | 30 | 35 | — | dB |
| | 1950... 1980 | MHz | | 7 | 18 | — | dB |
| | 2050... 2075 | MHz | | 2.8 | 10 | — | dB |
| | 2075... 2100 | MHz | | 27 | 33 | — | dB |
| | 2100... 2800 | MHz | | 33 | 38 | — | dB |
| | 2800... 4100 | MHz | | 35 | 40 | — | dB |
| | 4100... 4900 | MHz | | 29 | 36 | — | dB |
| | 4900... 6000 | MHz | | 23 | 30 | — | dB |

1) See Matching circuit (p. 5).

## 7 Characteristics TD-SCDMA B39

Temperature range for specification $T_{SPEC}$ = −30 °C ... +85 °C
B34 B39 input terminating impedance $Z_{B34\ B39\ IN}$ = 50 Ω with par. 4.6 nH[1)]
B34 output terminating impedance $Z_{B34\ OUT}$ = 50 Ω
B39 output terminating impedance $Z_{B39\ OUT}$ = 50 Ω

| **Characteristics TD-SCDMA B39** | | | | **min.** for $T_{SPEC}$ | **typ.** @+25 °C | **max.** for $T_{SPEC}$ | |
|---|---|---|---|---|---|---|---|
| **Center frequency** | | | $f_C$ | — | 1900 | — | MHz |
| **Maximum insertion attenuation** | | | $\alpha_{max}$ | | | | |
| | 1880... 1920 | MHz | | — | 1.9 | 2.4 | dB |
| **Amplitude ripple (p-p)** | | | Δα | | | | |
| | 1880... 1920 | MHz | | — | 0.6 | 1.2 | dB |
| **Maximum VSWR** | | | $VSWR_{max}$ | | | | |
| @ B34 B39 input port | 1880... 1920 | MHz | | — | 1.6 | 2.0 | |
| @ B39 output port | 1880... 1920 | MHz | | — | 1.7 | 2.0 | |
| **Minimum attenuation** | | | $\alpha_{min}$ | | | | |
| | 50... 925 | MHz | | 31 | 34 | — | dB |
| | 925... 960 | MHz | | 31 | 34 | — | dB |
| | 960... 1805 | MHz | | 25 | 29 | — | dB |
| | 1805... 1840 | MHz | | 27 | 35 | — | dB |
| | 1840... 1850 | MHz | | 26 | 34 | — | dB |
| | 1982... 2005 | MHz | | 28 | 32 | — | dB |
| | 2005... 2800 | MHz | | 28 | 33 | — | dB |
| | 2800... 3700 | MHz | | 32 | 38 | — | dB |
| | 3700... 5400 | MHz | | 20 | 27 | — | dB |
| | 5400... 6000 | MHz | | 16 | 24 | — | dB |

1) See Matching circuit (p. 5).

## 8 Maximum ratings

| | | |
|---|---|---|
| Operable temperature | $T_{OP}$ = −40 °C ... +85 °C | |
| Storage temperature | $T_{STG}$ = −40 °C ... +85 °C | |
| DC voltage | $V_{DC}$ = 0 V | |
| Input power | $P_{IN}$ | |
| @ B34 B39 input port: 1880 ... 1920 MHz | 10 dBm | Continuous wave for 100000 h @ 85 °C. |
| @ B34 B39 input port: 2010 ... 2025 MHz | 10 dBm | Continuous wave for 100000 h @ 85 °C. |

## 9 Transmission coefficient TD-SCDMA B34

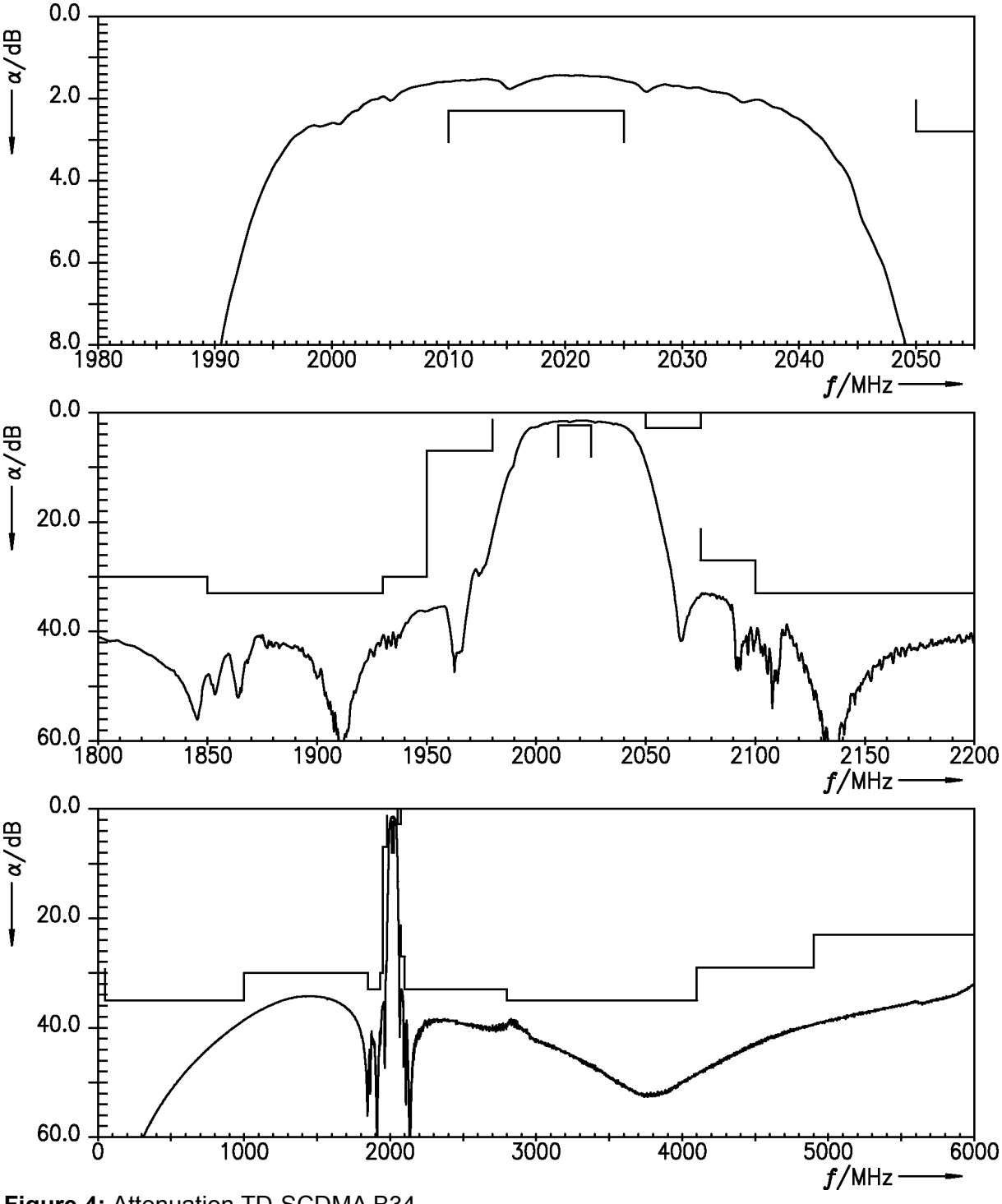


**Figure 4:** Attenuation TD-SCDMA B34.

## 10 Reflection coefficients TD-SCDMA B34

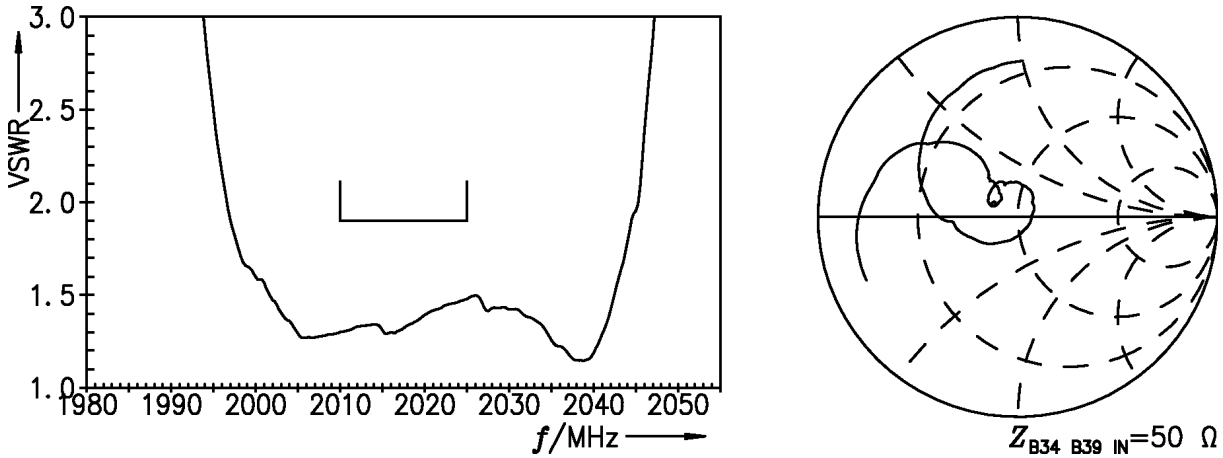


**Figure 5:** Reflection coefficient TD-SCDMA B34 at IN port.

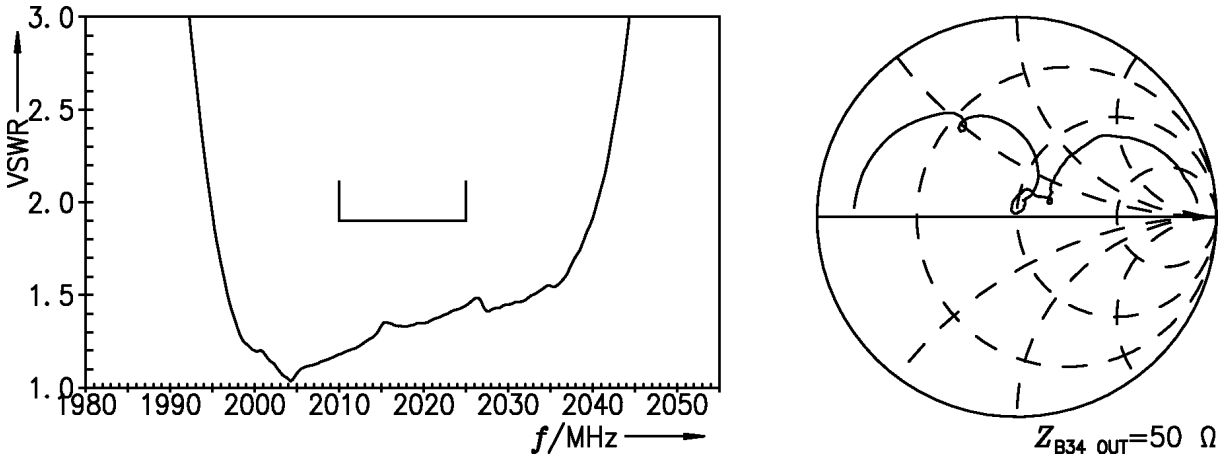


**Figure 6:** Reflection coefficient TD-SCDMA B34 at OUT port.

## 11 Transmission coefficient TD-SCDMA B39

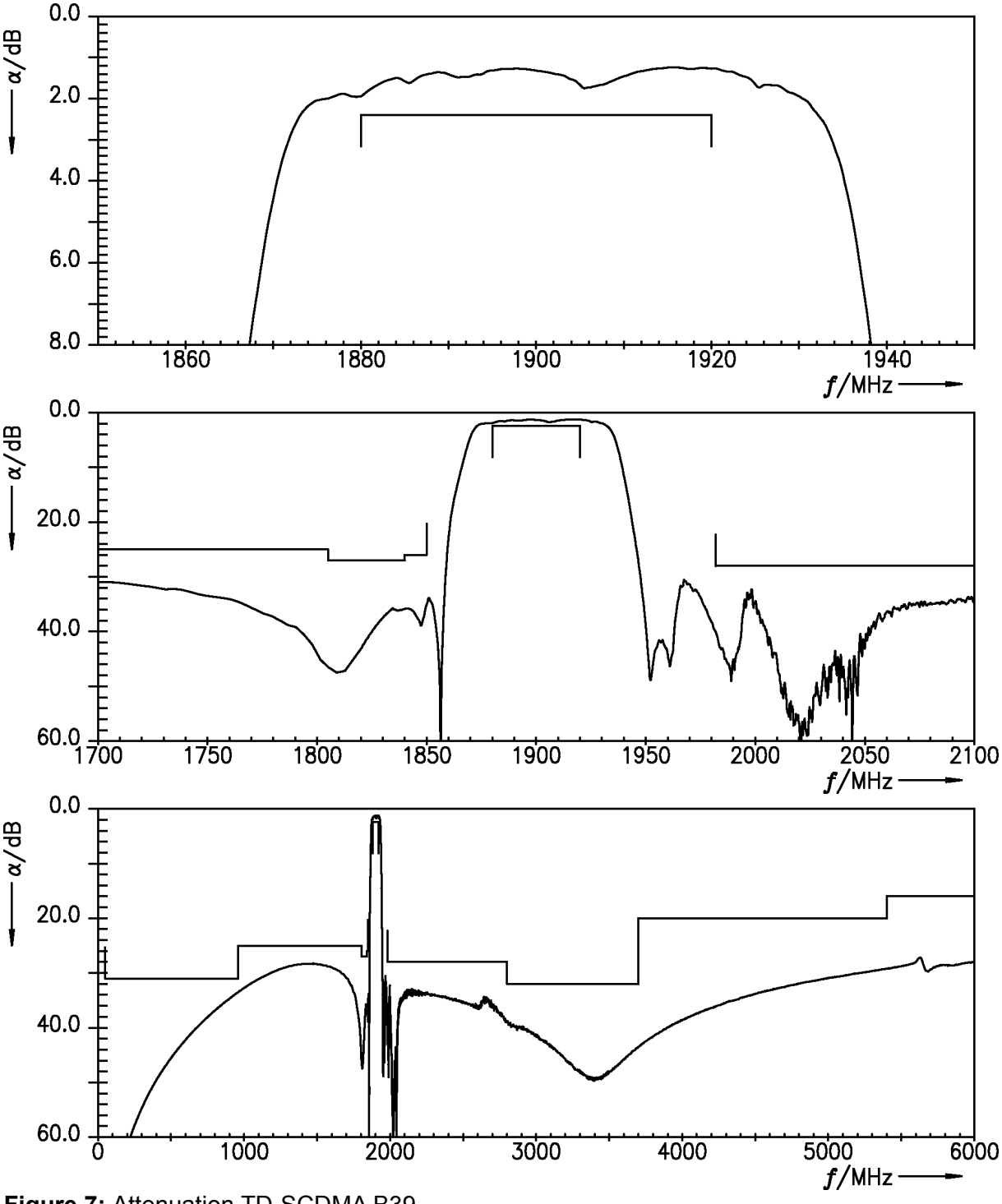


**Figure 7:** Attenuation TD-SCDMA B39.

## 12 Reflection coefficients TD-SCDMA B39

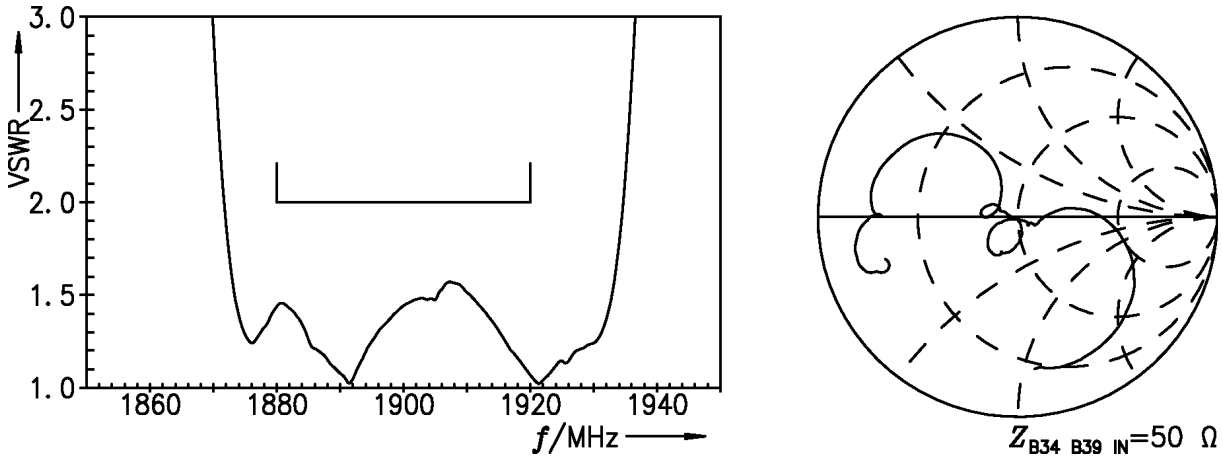


**Figure 8:** Reflection coefficient TD-SCDMA B39 at IN port.

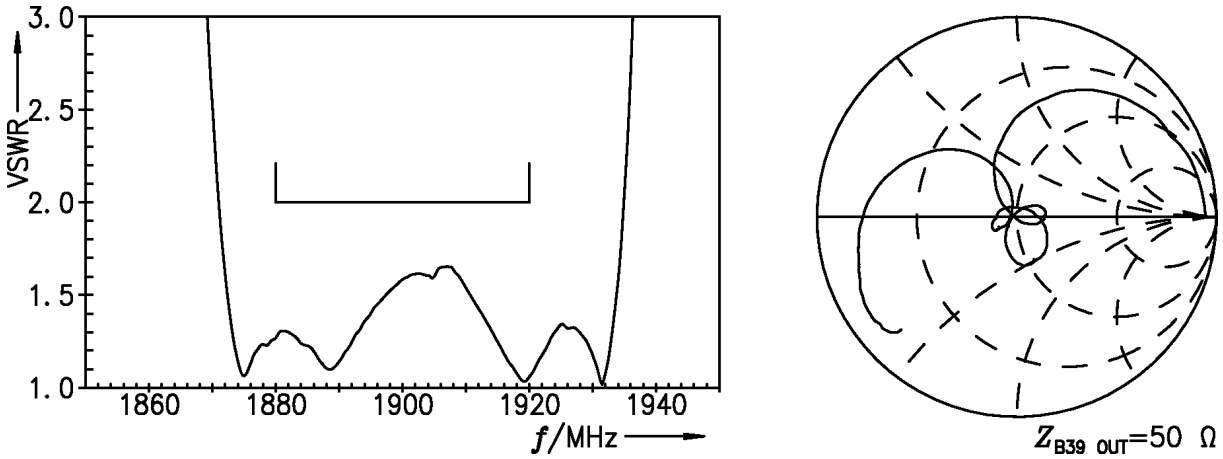


**Figure 9:** Reflection coefficient TD-SCDMA B39 at OUT port.

## 13 Packing material

### 13.1 Tape

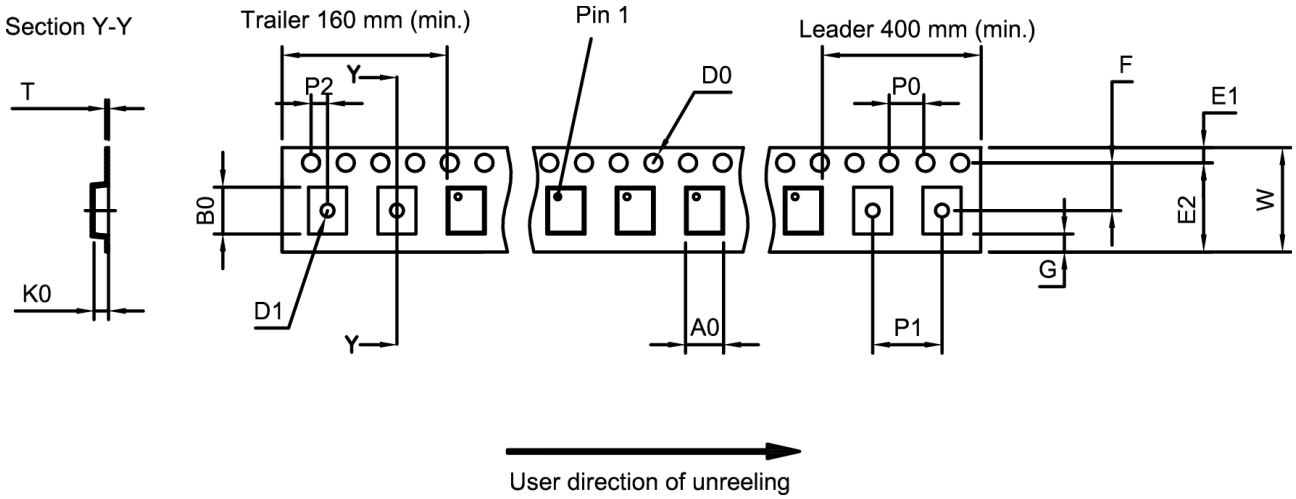


**Figure 10:** Drawing of tape (first-angle projection) with tape dimensions according to Table 1.

| | |
|---|---|
| $A_0$ | $1.27_{\pm 0.05}$ mm |
| $B_0$ | $1.67_{\pm 0.05}$ mm |
| $D_0$ | $1.5_{+0.1/-0}$ mm |
| $D_1$ | $0.5_{+0.1/-0}$ 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.) |
| $K_0$ | $0.55_{\pm 0.05}$ 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 | $0.25_{\pm 0.03}$ mm |
| W | $8.0_{+0.3/-0.1}$ mm |

**Table 1:** Tape dimensions.

### 13.2 Reel with diameter of 180 mm

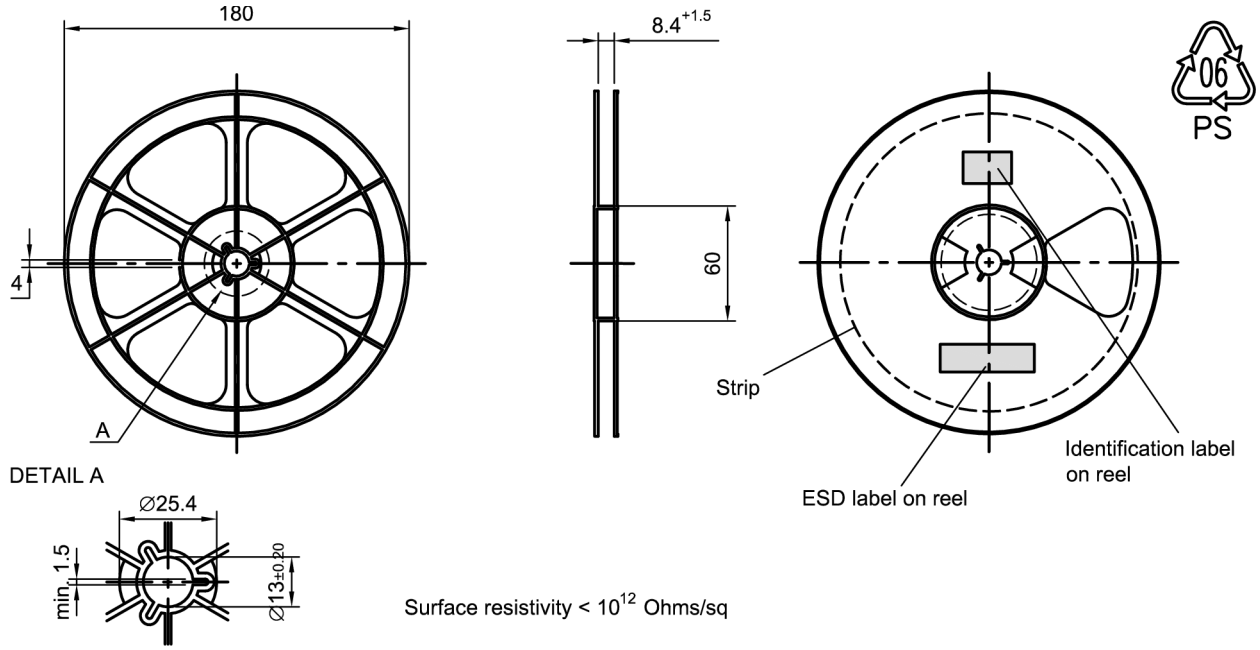


**Figure 11:** Drawing of reel (first-angle projection) with diameter of 180 mm.

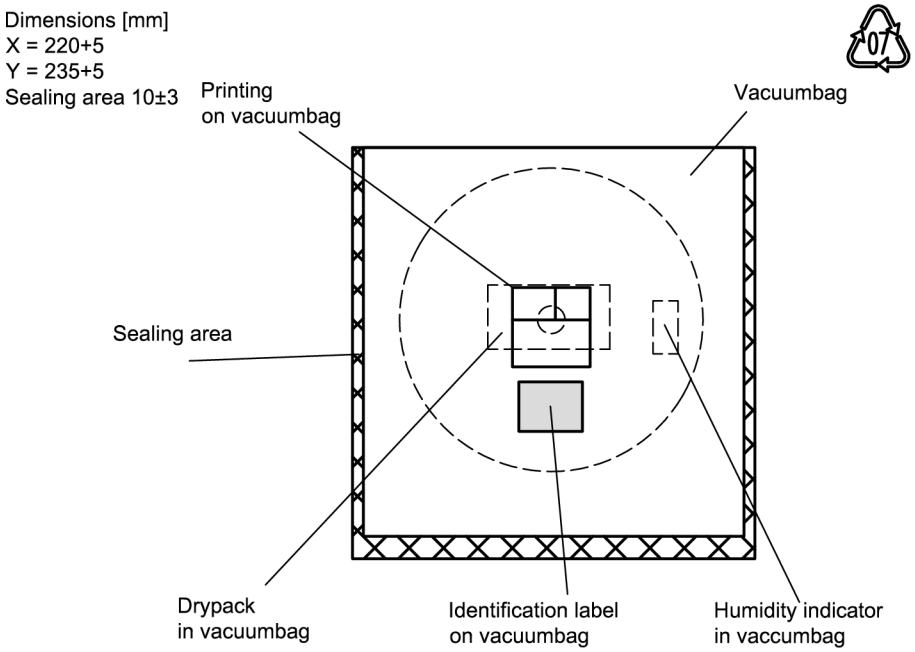


**Figure 12:** Drawing of moisture barrier bag (MBB) for reel with diameter of 180 mm.

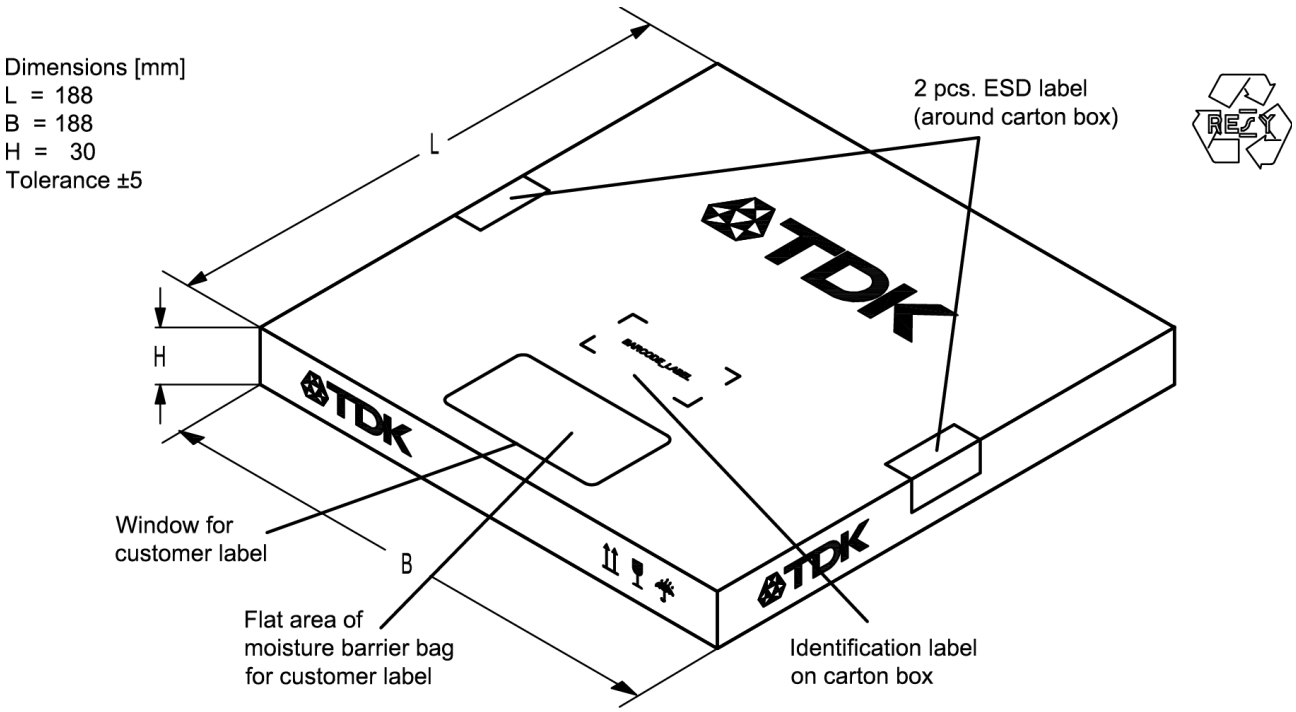


**Figure 13:** Drawing of folding box for reel with diameter of 180 mm.

## 14 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 B4384 is 490.

■ 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.

## 15 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).

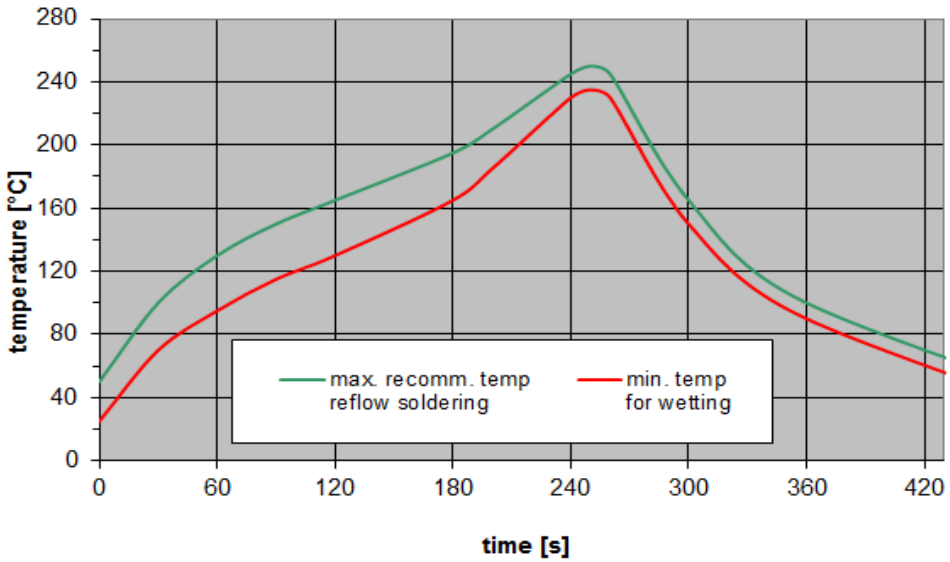


**Figure 14:** Recommended reflow profile for convection and infrared soldering – lead-free solder.

# 16 Annotations

## 16.1 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.

## 16.2 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.

## 16.3 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.

# 17 Cautions and warnings

## 17.1 Display of ordering codes for EPCOS products

The ordering code for one and the same product can be represented differently in data sheets, data books, other publications and the website of EPCOS, or in order-related documents such as shipping notes, order confirmations and product labels. The varying representations of the ordering codes are due to different processes employed and do not affect the specifications of the respective products. Detailed information can be found on the Internet under **www.epcos.com/orderingcodes**.

## 17.2 Material information

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

## 17.3 Moldability

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

## 17.4 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).

Dimensions do not include burrs.

### Projection method

Unless otherwise specified first-angle projection is applied.

## Important notes

The following applies to all products named in this publication:

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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.
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