



RF360 Europe GmbH

A Qualcomm – TDK Joint Venture

## SAW Components

### SAW IF filter

Satellite radio

|                |                   |
|----------------|-------------------|
| Series/type:   | B1728             |
| Ordering code: | B39725B1728H810   |
| Date:          | December 19, 2012 |
| Version:       | 2.2               |

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| <b>Date:</b>          | <b>December 19, 2012</b> |
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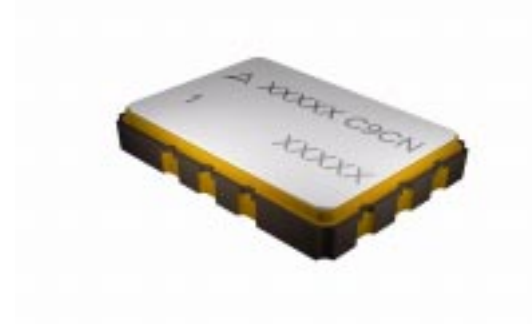
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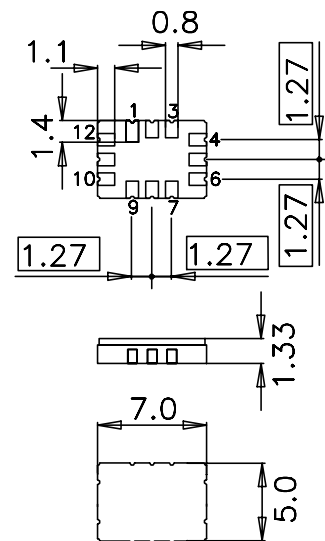
Data sheet


**Application**

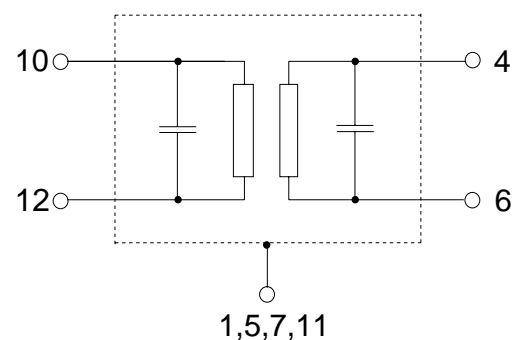
- IF filter for digital radio
- Usable bandwidth 3.7 MHz
- Low insertion attenuation
- Constant group delay
- Unbalanced or balanced operation


**Features**

- Package size 7.0 x 5.0 x 1.33 mm<sup>3</sup>
- Package code QCC12E
- Maximum package height 1.48 mm
- RoHS compatible
- Approximate weight 0.25 g
- Ceramic package for **Surface Mount Technology (SMT)**
- Ni, gold-plated terminals
- AEC-Q200 qualified component family
- **Electrostatic Sensitive Device (ESD)**


**Pin configuration**

- 4            Balanced input or input ground
- 6            Input
- 10          Balanced output or output ground
- 12          Output
- 1,5,7,11   Case – ground
- 2,3,8,9    To be grounded



**Data sheet**

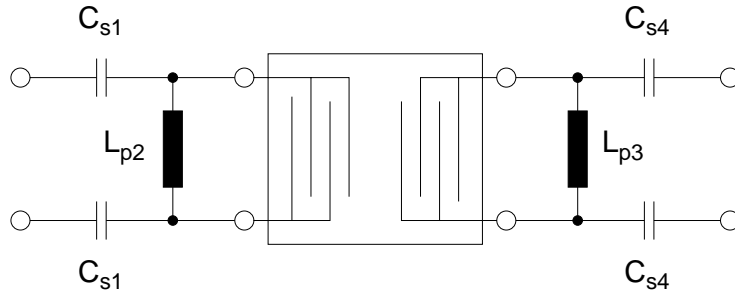
**Characteristics**

|                                      |  |
|--------------------------------------|--|
| Temperature range for specification: | T = -40 °C to (+85 °C) +105 °C             |
| Terminating source impedance:        | Z <sub>S</sub> = 27 Ω and matching network |
| Terminating load impedance:          | Z <sub>L</sub> = 1 kΩ and matching network |

|  |                           | min. | typ.<br>@ 25 °C | max.      |       |
|--|---------------------------|------|-----------------|-----------|-------|
| <b>Nominal frequency</b>   | f <sub>N</sub>            | —    | 72.54           | —         | MHz   |
| <b>Minimum insertion attenuation<sup>1)</sup></b>                              | α <sub>min</sub>          | —    | 14.5            | 16.0      | dB    |
| <b>Maximum voltage gain source – load</b><br>(V <sub>L</sub> /V <sub>S</sub> ) | α <sub>vgsL</sub>         | -4.2 | -2.7            | —         | dB    |
| <b>Amplitude ripple (p-p)</b>  | Δα                        |      |                 |           |       |
|  | f <sub>N</sub> ± 1.85 MHz | —    | 1.0             | (1.3) 1.5 | dB    |
| <b>Pass bandwidth</b>  |                           |      |                 |           |       |
| α <sub>rel</sub> ≤ 1.5 dB  | B <sub>1.5dB</sub>        | —    | 4.0             | —         | MHz   |
| α <sub>rel</sub> ≤ 3 dB  | B <sub>3dB</sub>          | —    | 4.3             | —         | MHz   |
| α <sub>rel</sub> ≤ 15 dB   | B <sub>15dB</sub>         | —    | 5.7             | 5.9       | MHz   |
| α <sub>rel</sub> ≤ 30 dB   | B <sub>30dB</sub>         | —    | 6.6             | 7.0       | MHz   |
| <b>Mean attenuation</b> (relative to α <sub>min</sub> )                        | α <sub>rel</sub>          |      |                 |           |       |
| Upper sidelobe 86.47 ... 91.53 MHz   |                           | 48.0 | 53.0            | —         | dB    |
| <b>Relative attenuation</b> (relative to α <sub>min</sub> )                    | α <sub>rel</sub>          |      |                 |           |       |
| Lower sidelobe 50.00 ... 65.00 MHz   |                           | 40.0 | 44.0            | —         | dB    |
| 65.00 ... 66.48 MHz  |                           | 33.0 | 38.0            | —         | dB    |
| 66.48 ... 68.08 MHz  |                           | 32.0 | 36.0            | —         | dB    |
| Upper sidelobe 77.30 ... 78.60 MHz   |                           | 32.0 | 36.0            | —         | dB    |
| 78.60 ... 86.47 MHz  |                           | 36.0 | 41.0            | —         | dB    |
| 86.47 ... 91.53 MHz  |                           | 44.0 | 48.0            | —         | dB    |
| 91.53 ... 95.21 MHz  |                           | 44.0 | 48.0            | —         | dB    |
| 95.21 ... 100.00 MHz   |                           | 46.0 | 50.0            | —         | dB    |
| <b>Group delay ripple (p-p)</b>  | Δτ                        |      |                 |           |       |
| Aperture 50 kHz  | f <sub>N</sub> ± 1.85 MHz | —    | 210             | —         | ns    |
| <b>Temperature coefficient of frequency</b>                                    | TC <sub>f</sub>           | —    | -18             | —         | ppm/K |

1) Including losses in the matching network

Data sheet


**Matching network<sup>1)</sup>** (based on four port measurement, quality factors  $Q_L = 40$ ,  $Q_C = 90$ )


$$C_{s1} = 20 \text{ pF}$$

$$L_{p2} = 220 \text{ nH}$$

$$L_{p3} = 620 \text{ nH}$$

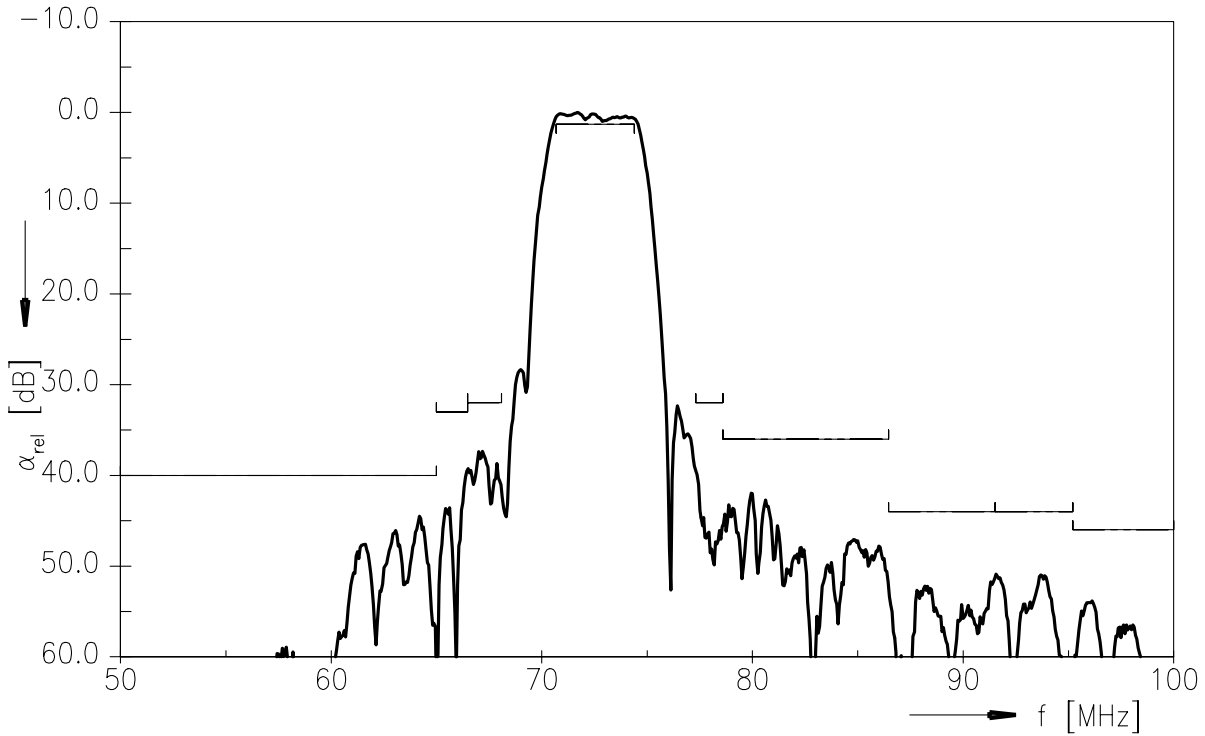
$$C_{s4} = 3.6 \text{ pF}$$

1) The input matching circuit has been designed as a power match of the filter's input port to 175  $\Omega$ . In a second step it has been optimized in a narrow range in order to operate at 27  $\Omega$  with optimum filter performance.

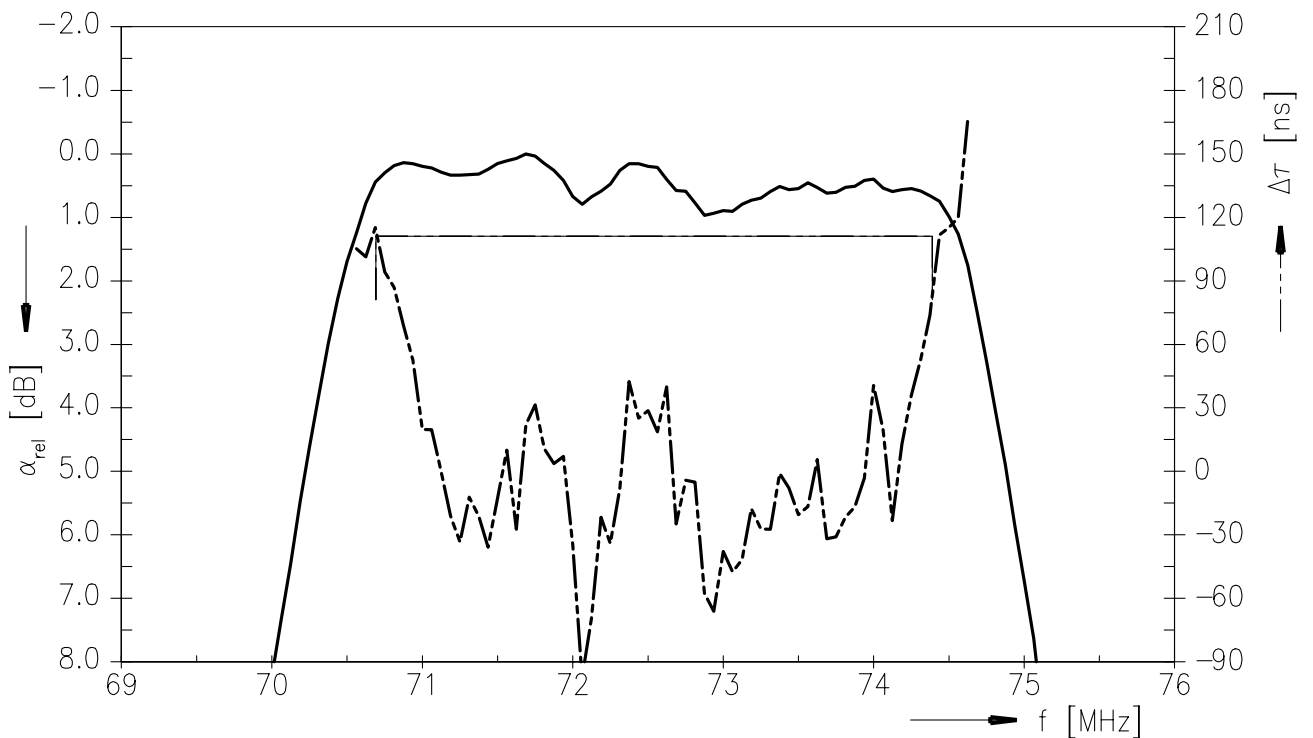
Data sheet



**Transfer function**



**Transfer function (pass band)**



Data sheet


**Characteristics**

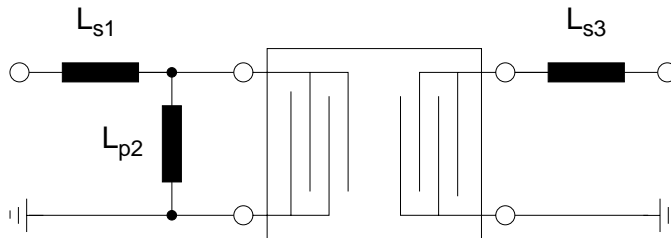
Temperature range for specification:  $T = -40\text{ °C to }+85\text{ °C}$   
 Terminating source impedance:  $Z_S = 50\ \Omega$  (single ended) and matching network  
 Terminating load impedance:  $Z_L = 50\ \Omega$  (single ended) and matching network

|  |                           | min. | typ.<br>@ 25 °C | max. |       |
|--|---------------------------|------|-----------------|------|-------|
| <b>Nominal frequency</b>   | $f_N$                     | —    | 72.54           | —    | MHz   |
| <b>Minimum insertion attenuation<sup>1)</sup></b>                    | $\alpha_{\min}$           | —    | 12.9            | 14.4 | dB    |
| <b>Amplitude ripple (p-p)</b>  | $\Delta\alpha$            |      |                 |      |       |
|  | $f_N \pm 1.85\text{ MHz}$ | —    | 1.2             | 1.5  | dB    |
| <b>Pass bandwidth</b>  |                           |      |                 |      |       |
| $\alpha_{\text{rel}} \leq 1.5\text{ dB}$                             | $B_{1.5\text{dB}}$        | —    | 4.0             | —    | MHz   |
| $\alpha_{\text{rel}} \leq 3\text{ dB}$                               | $B_{3\text{dB}}$          | —    | 4.4             | —    | MHz   |
| $\alpha_{\text{rel}} \leq 15\text{ dB}$                              | $B_{15\text{dB}}$         | —    | 5.8             | 6.0  | MHz   |
| $\alpha_{\text{rel}} \leq 30\text{ dB}$                              | $B_{30\text{dB}}$         | —    | 6.7             | 7.0  | MHz   |
| <b>Mean attenuation (relative to <math>\alpha_{\min}</math>)</b>     | $\alpha_{\text{rel}}$     |      |                 |      |       |
| Upper sidelobe   | 86.47 ... 91.53 MHz       | 48.0 | 52.0            | —    | dB    |
| <b>Relative attenuation (relative to <math>\alpha_{\min}</math>)</b> | $\alpha_{\text{rel}}$     |      |                 |      |       |
| Lower sidelobe   | 50.00 ... 65.00 MHz       | 34.0 | 38.0            | —    | dB    |
|  | 65.00 ... 66.48 MHz       | 36.0 | 42.0            | —    | dB    |
|  | 66.48 ... 68.08 MHz       | 34.0 | 38.0            | —    | dB    |
| Upper sidelobe   | 77.30 ... 78.60 MHz       | 28.0 | 32.0            | —    | dB    |
|  | 78.60 ... 86.47 MHz       | 34.0 | 39.0            | —    | dB    |
|  | 86.47 ... 91.53 MHz       | 42.0 | 46.0            | —    | dB    |
|  | 91.53 ... 95.21 MHz       | 44.0 | 48.0            | —    | dB    |
|  | 95.21 ... 100.00 MHz      | 48.0 | 53.0            | —    | dB    |
| <b>Group delay ripple (p-p)</b>                                      | $\Delta\tau$              |      |                 |      |       |
| Aperture 50 kHz  | $f_N \pm 1.85\text{ MHz}$ | —    | 190             | —    | ns    |
| <b>Temperature coefficient of frequency</b>                          | $TC_f$                    | —    | -18             | —    | ppm/K |

1) Including losses in the matching network



Data sheet


**Matching network** (based on four port measurement, quality factors  $Q_L = 40$ ,  $Q_C = 90$ )


$$L_{s1} = 620 \text{ nH}$$

$$L_{p2} = 750 \text{ nH}$$

$$L_{s3} = 560 \text{ nH}$$

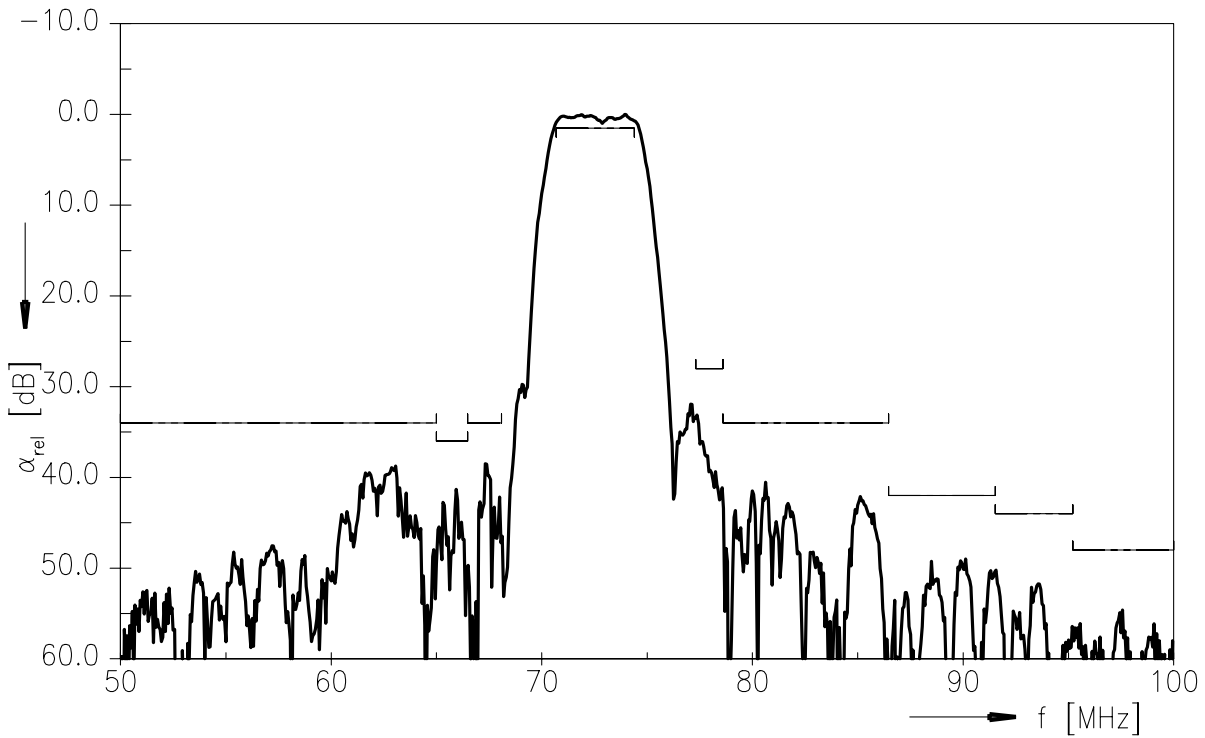
**Maximum ratings**

|                            |           |            |     |                              |
|----------------------------|-----------|------------|-----|------------------------------|
| Operable temperature range | T         | -40 / +105 | °C  |                              |
| Storage temperature range  | $T_{stg}$ | -40 / +105 | °C  |                              |
| DC voltage                 | $V_{DC}$  | 6          | V   |                              |
| Source power               | $P_S$     | 10         | dBm | source impedance 50 $\Omega$ |

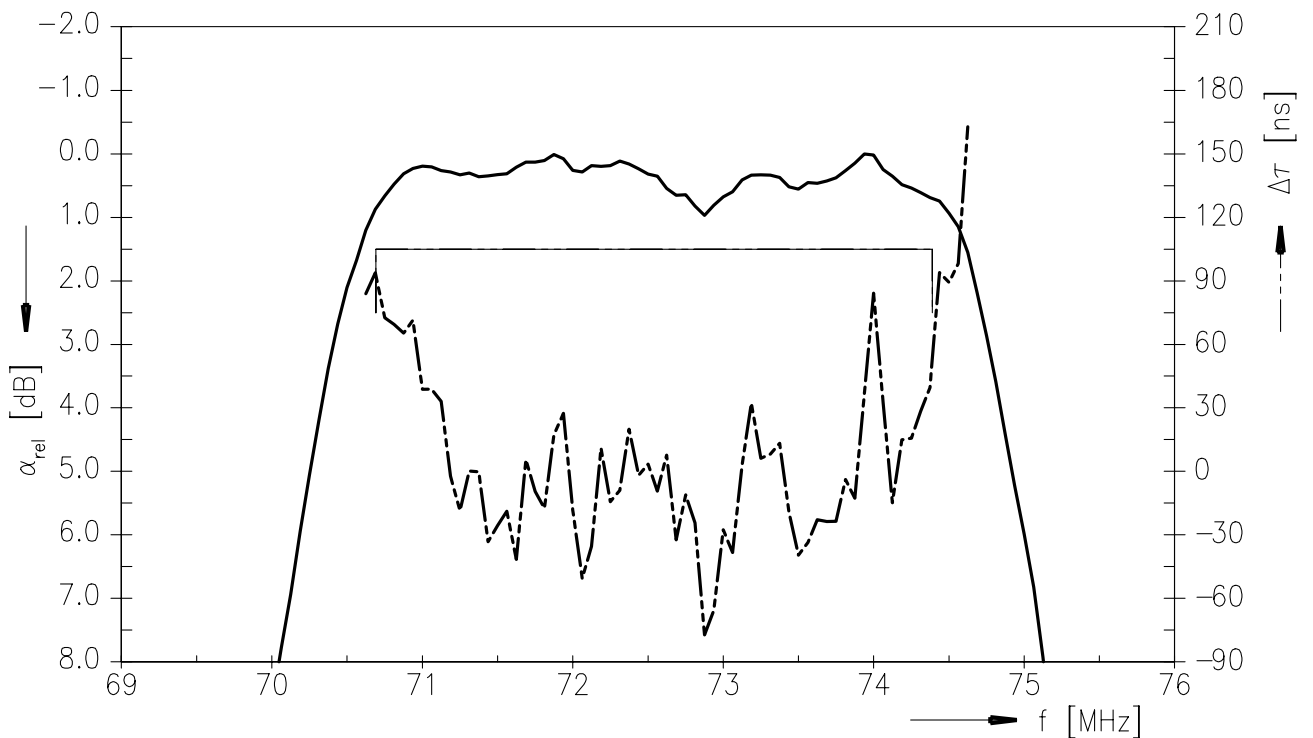
Data sheet



**Transfer function**



**Transfer function (pass band)**




**References**

|                            |   |
|----------------------------|---|
| <b>Type</b>                | B1728   |
| <b>Ordering code</b>       | B39725B1728H810   |
| <b>Marking and package</b> | C61157-A7-A103  |
| <b>Packaging</b>           | F61074-V8170-Z000   |
| <b>Date codes</b>          | L_1126  |
| <b>S-parameters</b>        | B1728_NB_UN.s4p<br>See file header for port/pin assignment table.   |
| <b>Soldering profile</b>   | S_6001  |
| <b>RoHS compatible</b>     | 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 8 <sup>th</sup> , 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. |
| <b>Matching coils</b>      | See Inductor pdf-catalog<br><a href="http://www.tdk.co.jp/tefe02/coil.htm#aname1">http://www.tdk.co.jp/tefe02/coil.htm#aname1</a><br>and Data Library for circuit simulation<br><a href="http://www.tdk.co.jp/etvcl/index.htm">http://www.tdk.co.jp/etvcl/index.htm</a><br>for a large variety of matching coils.   |

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