



SAW Components

BAW/SAW Duplexer

WCDMA Band II

| | |
|-----------------------|------------------------|
| Series/type: | B8004 |
| Ordering code: | B39202B8004P810 |
| Date: | September 02, 2014 |
| Version: | 2.0 |

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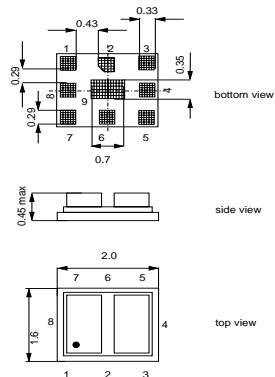
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Application

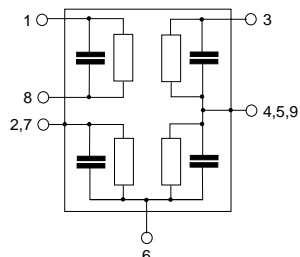
- Low-loss BAW/SAW duplexer for mobile telephone WCDMA Band II systems
- Low insertion attenuation
- Low amplitude ripple
- Usable passband 60 MHz
- Single ended to balanced transformation in Antenna - Rx path
- Impedance transformation 50Ω to 100Ω in Antenna - Rx path


Features

- Package size 2.0 x 1.6 mm², max. height 0.45 mm
- RoHS compatible
- Approx. weight 0.0056g
- Package for **Surface Mount Technology (SMT)**
- Ni, gold-plated terminals
- Fully matched by integrated matching network
- **Electrostatic Sensitive Device (ESD)**
- **Moisture Sensitivity Level 3**


Pin configuration

- 3 TX Input
- 1, 8 RX Output (balanced)
- 6 Antenna
- 4, 5, 9 To be grounded
- 2, 7 To be grounded



Data sheet

Characteristics

| | |
|---|---|
| Temperature range for specification: | T = -20 °C to +85 °C |
| ANT terminating impedance: | Z _{ANT} = 50 Ω |
| RX differential mode terminating impedance: | Z _{RXd} = 100 Ω and matching (refer to page 6) |
| RX common mode terminating impedance: | Z _{RXc} = 25 Ω |
| TX terminating impedance: | Z _{TX} = 50 Ω |

| Characteristics TX - ANT | | min. | typ. @ 25°C | max. | |
|---|----------------------------------|------|----------------|-------------------|-----|
| Center frequency | f _C | — | 1880.0 | — | MHz |
| Maximum insertion attenuation | | | | | |
| @f _{Carrier} 1852.4 ... 1907.6 MHz | α _{WCDMA} ¹⁾ | — | 2.2 | 3.0 | dB |
| @f _{Carrier} 1852.4 ... 1907.6 MHz | α _{WCDMA} ¹⁾ | — | 2.2 | 2.5 ³⁾ | dB |
| Error Vector Magnitude | | | | | |
| @f _{Carrier} 1852.4 ... 1907.6 MHz | EVM ²⁾ | — | 1.1 | 3.0 | % |
| @f _{Carrier} 1852.4 ... 1907.6 MHz | EVM ²⁾ | — | 1.1 | 2.0 ³⁾ | % |
| Input VSWR (TX port) | | | | | |
| 1850.0 ... 1910.0 MHz | | — | 1.5 | 2.0 | |
| Output VSWR (ANT port) | | | | | |
| 1850.0 ... 1910.0 MHz | | — | 1.7 | 2.0 | |
| Attenuation | | | | | |
| | α | | | | |
| 10.0 ... 728.0 MHz | | 30 | 32 | — | dB |
| 728.0 ... 764.0 MHz | | 30 | 33 | — | dB |
| 869.0 ... 894.0 MHz | | 30 | 34 | — | dB |
| 1574.0 ... 1577.0 MHz | | 36 | 38 | — | dB |
| 1577.0 ... 1680.0 MHz | | 30 | 38 | — | dB |
| @f _{Carrier} 1932.4 ... 1987.6 MHz | α _{WCDMA} ¹⁾ | 45 | 50 | — | dB |
| 2110.0 ... 2155.0 MHz | | 35 | 41 | — | dB |
| 2400.0 ... 2500.0 MHz | | 23 | 27 | — | dB |
| 3690.0 ... 3830.0 MHz | | 20 | 25 | — | dB |
| 5150.0 ... 5350.0 MHz | | 16 | 21 | — | dB |
| 5540.0 ... 5860.0 MHz | | 14 | 17 | — | dB |

1) Attenuation of WCDMA signal ("Powertransferfunction"). Please refer to annotation on page (6).

2) Error Vector Magnitude (EVM) based on definition given in 3GPP TS 25.141.

3) Valid for room temperature 25 °C

Data sheet

Characteristics

| | |
|---|---|
| Temperature range for specification: | T = -20 °C to +85 °C |
| ANT terminating impedance: | Z _{ANT} = 50 Ω |
| RX differential mode terminating impedance: | Z _{RXd} = 100 Ω and matching (refer to page 6) |
| RX common mode terminating impedance: | Z _{RXc} = 25 Ω |
| TX terminating impedance: | Z _{TX} = 50 Ω |

| Characteristics ANT - RX | | min. | typ. @ 25°C | max. | |
|--------------------------------------|---|------|----------------|-------------------|-----|
| Center frequency | f _C | — | 1960.0 | — | MHz |
| Maximum insertion attenuation | | | | | |
| @f _{Carrier} | 1932.4 ... 1987.6MHz α _{WCDMA} ¹⁾ | — | 2.5 | 3.7 | dB |
| @f _{Carrier} | 1932.4 ... 1987.6MHz α _{WCDMA} ¹⁾ | — | 2.5 | 3.0 ²⁾ | dB |
| Error Vector Magnitude | | | | | |
| @f _{Carrier} | 1932.4 ... 1987.6MHz EVM ³⁾ | — | 1.6 | 6.0 | % |
| @f _{Carrier} | 1932.4 ... 1987.6MHz EVM ³⁾ | — | 1.6 | 3.5 ⁵⁾ | % |
| @f _{Carrier} | 1932.4 ... 1987.6MHz EVM ³⁾ | — | 1.6 | 3.2 ⁴⁾ | % |
| Input VSWR (ANT port) | | | | | |
| | 1930.0 ... 1990.0MHz | — | 2.0 | 2.6 | |
| | 1935.0 ... 1990.0MHz | — | 1.5 | 2.0 ⁵⁾ | |
| Output VSWR (RX port) | | | | | |
| | 1930.0 ... 1990.0MHz | — | 1.8 | 2.4 | |
| | 1930.0 ... 1990.0MHz | — | 1.8 | 2.0 ⁵⁾ | |
| Attenuation | | | | | |
| | 10.0 ... 1765.0MHz α | 30 | 49 | — | dB |
| | 1835.0 ... 1850.0MHz | 30 | 52 | — | dB |
| @f _{Carrier} | 1852.4 ... 1907.6MHz α _{WCDMA} ¹⁾ | 45 | 56 | — | dB |
| | 2025.0 ... 2050.0MHz | 10 | 27 | — | dB |
| | 2050.0 ... 2075.0MHz | 25 | 31 | — | dB |
| | 2400.0 ... 2484.0MHz | 30 | 52 | — | dB |
| | 2810.0 ... 2910.0MHz | 30 | 56 | — | dB |
| | 3775.0 ... 3905.0MHz | 30 | 60 | — | dB |
| | 5625.0 ... 5815.0MHz | 30 | 63 | — | dB |
| | 2075.0 ... 6000.0MHz | 30 | 35 | — | dB |

1) Attenuation of WCDMA signal ("Powertransferfunction"). Please refer to annotation on page (6).

2) Valid for the temperature range from 0 °C to 85 °C.

3) Error Vector Magnitude (EVM) based on definition given in 3GPP TS 25.141.

4) Valid for room temperature 25 °C.

5) Valid for the temperature range from 25 °C to 85 °C.

Data sheet

Characteristics

| | | |
|---|------------------|--|
| Temperature range for specification: | T | = -20 °C to +85 °C |
| ANT terminating impedance: | Z _{ANT} | = 50 Ω |
| RX differential mode terminating impedance: | Z _{RXd} | = 100 Ω and matching (refer to page 6) |
| RX common mode terminating impedance: | Z _{RXc} | = 25 Ω |
| TX terminating impedance: | Z _{TX} | = 50 Ω |

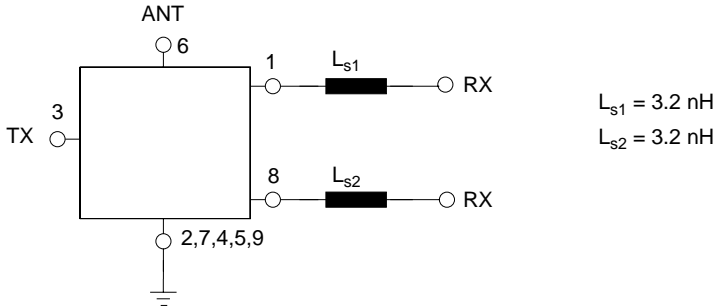
| Characteristics ANT - RX | min. | typ. @ 25 °C | max. | |
|--|------------------|-----------------|------|-----|
| Common Mode Rejection Ratio CMRR 1930.0 ... 1990.0 MHz | 21 ¹⁾ | 26 | — | dB |
| IMD Product Level Limits²⁾ at f_{TX}=1880MHz, f_{RX}=1960MHz | | | | |
| Blocker 1 80.0 MHz | — | -94 | — | dBm |
| Blocker 2 1800.0 MHz | — | -115 | — | dBm |
| Blocker 3 3840.0 MHz | — | -110 | — | dBm |

- ¹⁾ A combination of 10° phase balance and 1dB amplitude balance corresponds to 19.6 dB CMRR
²⁾ IMD product level limits for power levels P_{TX}=21.5dBm (antenna port output power) and P_{Blocker}=-15dBm (antenna port input power)

| Characteristics TX - RX | min. | typ. @ 25 °C | max. | |
|---|------|-----------------|------|----|
| Isolation | | | | |
| @f _{Carrier} 1852.4 ... 1907.6 MHz α _{WCDMA} ¹⁾ | 50 | 57 | — | dB |
| @f _{Carrier} 1852.4 ... 1907.6 MHz α _{WCDMA} ^{1) 2)} | 53 | 57 | — | dB |
| @f _{Carrier} 1932.4 ... 1987.6 MHz α _{WCDMA} ¹⁾ | 46 | 52 | — | dB |

- ¹⁾ Attenuation of WCDMA signal ("Powertransferfunction"). Please refer to annotation on page (6).
²⁾ Valid for the temperature range from -20 °C to +25 °C.

Data sheet


Matching network (element values depend on PCB layout)

Maximum ratings

| | | | | |
|--|------------------|------------------|-----|--|
| Operable temperature range ¹⁾ | T | -30/+85 | °C | machine model, 10 pulses source and load impedance 50 Ω } continuous wave T = 55° C, 50.000 h |
| Storage temperature range | T _{stg} | -40/+85 | °C | |
| DC voltage | V _{DC} | 5.0 | V | |
| ESD voltage | V _{ESD} | 50 ²⁾ | V | |
| Input power at 1850.0 ... 1910.0 MHz | P _{IN} | 29 | dBm | |
| elsewhere | | 10 | dBm | |

1) Defines the temperature range in which the BAW / SAW device keeps its typical characteristics, however the specification values are not valid for the extended range.

2) acc. to JESD22-A115B (machine model), 10 negative & 10 positive pulses.

Annotation for characteristics section

Attenuation of WCDMA signal ("Powertransferfunction", α_{WCDMA}) is determined by

$$\int_{-\infty}^{\infty} |S_{ds21}(f)H_{\text{RRC}}(f - f_{\text{Carrier}})|^2 df$$

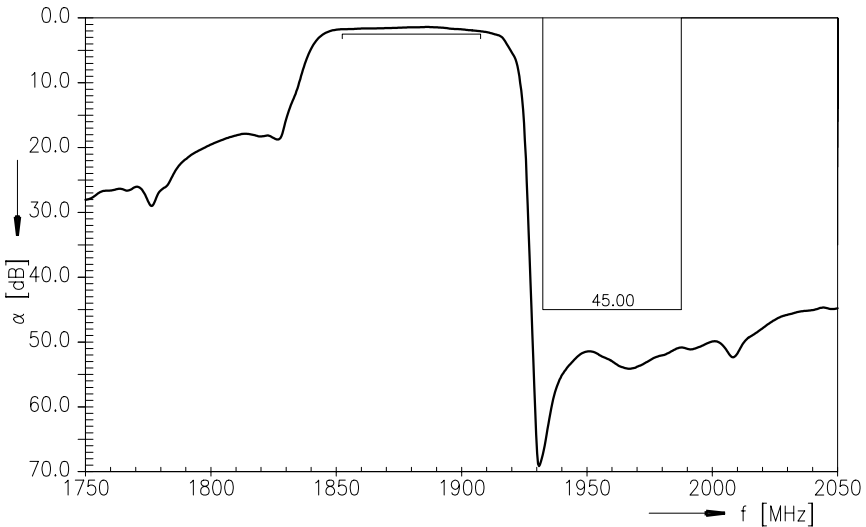
f_{Carrier} according to 3GPP TS 25.101 (e.g. for WCDMA Band 2 Passband, f_{Carrier} ranges from 1852.4 MHz (lowest Tx channel) to 1907.6 MHz (highest Tx channel)). $H_{\text{RRC}}(f)$ is the transfer function of the root-raised cosine transmit pulse shaping filter according to 3GPP TS 25.101 with the following normalization:

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

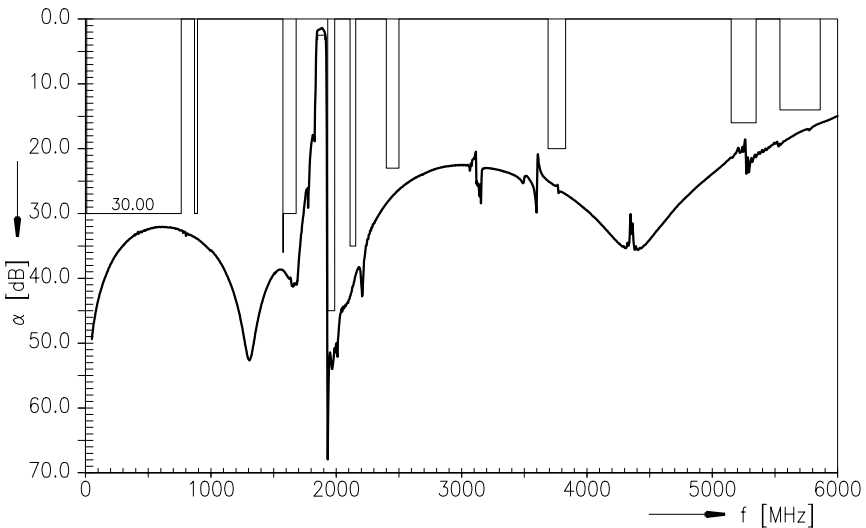
Data sheet



Frequency Response TX-ANT (PTF)



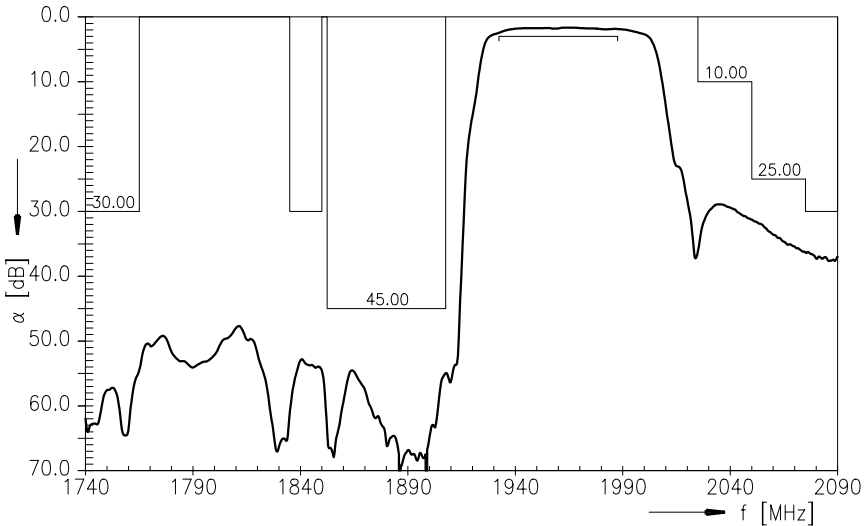
Frequency Response TX-ANT (wideband)



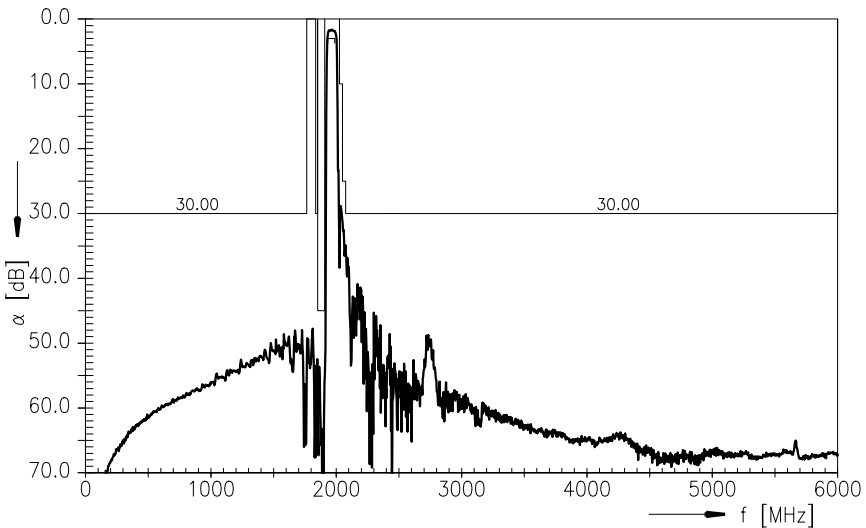
Data sheet



Frequency Response ANT-RX (PTF), also spec lines for CW plotted



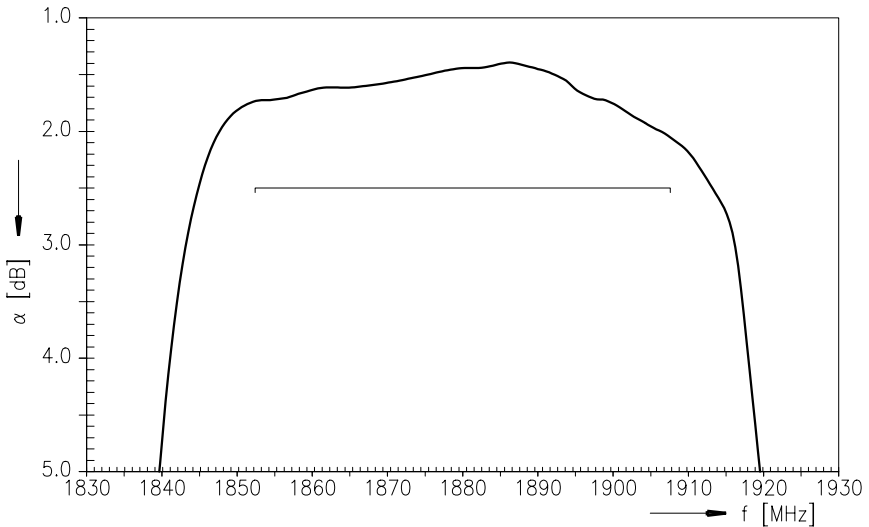
Frequency Response ANT-RX (wideband)



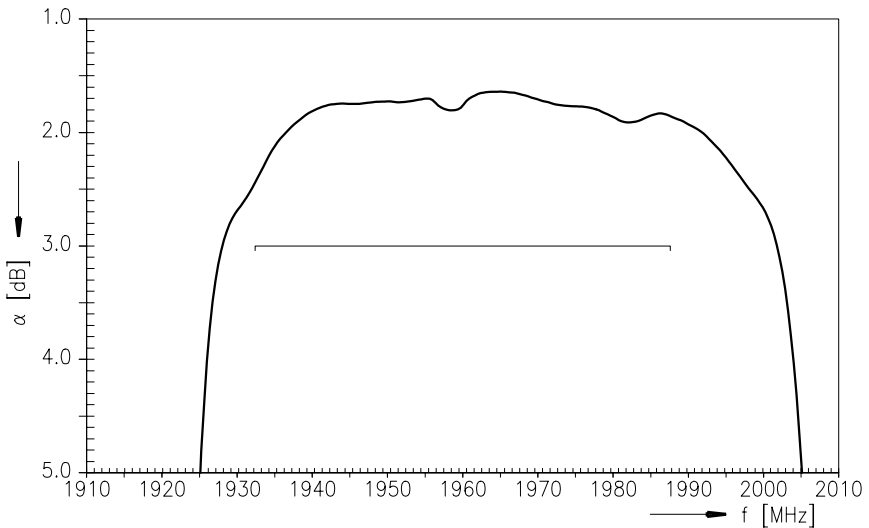
Data sheet



Frequency Response TX-ANT Passband (PTF)



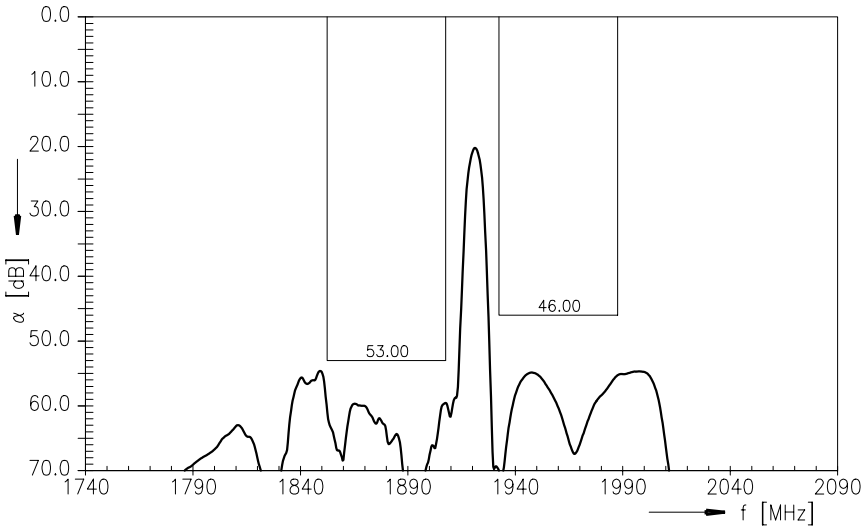
Frequency Response ANT-RX Passband (PTF)



Data sheet



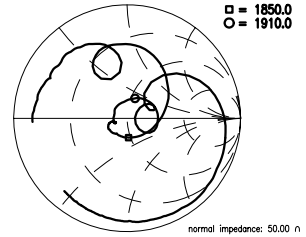
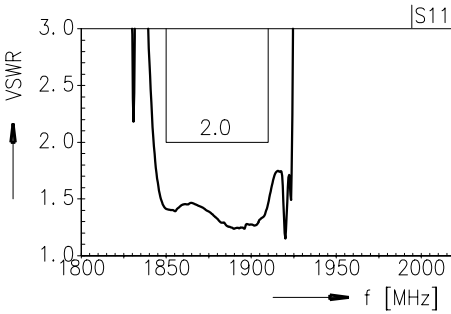
Frequency Response TX-RX (PTF)



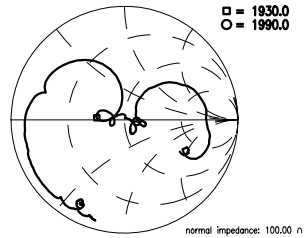
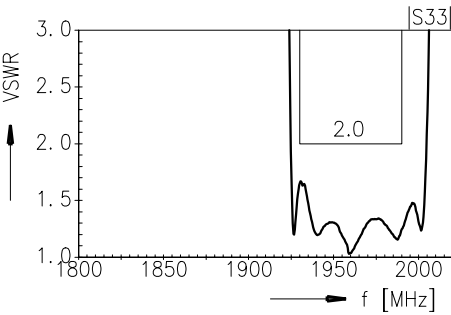
Data sheet



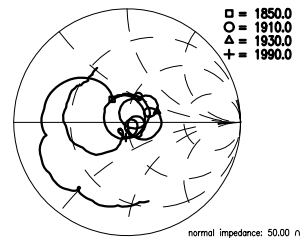
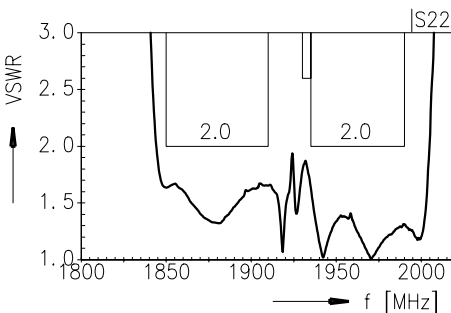
VSWR TX-port



VSWR RX-port (differential mode)



VSWR ANT-port



| | |
|-------------------------|----------------------------|
| SAW Components | B8004 |
| BAW/SAW Duplexer | 1880.0 / 1960.0 MHz |

Data sheet



| | |
|----------------------------|---|
| Type | B8004 |
| Ordering code | B39202B8004P810 |
| Marking and package | C61157-A8-A81 |
| Packaging | F61074-V8247-Z000 |
| Date codes | L_1126 |
| S-parameters | B8004_NB_UN.s4p (unmatched, nearby) B8004_WB_UN.s4p (unmatched, wideband) see file header for port/pin assignment table |
| Soldering profile | S_6001 |
| RoHS compatible | 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 th , 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. |
| Moldability | Before using in overmolding environment, please contact your EPCOS sales office. |
| Matching coils | See 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 |

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

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