



RF360
Europe GmbH

SAW Components

SAW Duplexer

Automotive telematics

| | |
|----------------|-------------------|
| Series/type: | B4400 |
| Ordering code: | B39212B4400P810 |
| Date: | November 07, 2014 |
| Version: | 2.3 |

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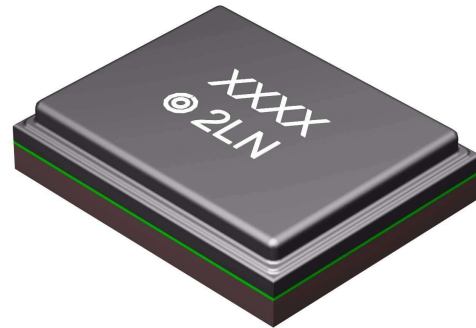
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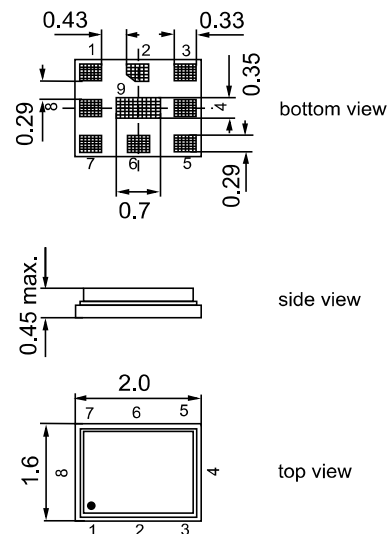
Data sheet

Application

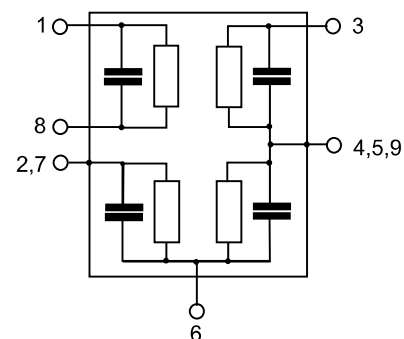
- Low-loss SAW duplexer for W-CDMA Band 1 (UMTS) systems
- Low insertion attenuation
- Low amplitude ripple
- Usable passband 60 MHz
- Single-ended to balanced transformation in Antenna-Rx path
- Impedance transformation 50 Ω to 100 Ω in Antenna-Rx path
- High isolation between Tx and Rx


Features

- Package size 2.0 * 1.6 mm²
- Package height max. 0.45mm
- RoHS compatible
- Approximate weight 0.005 g
- Package for **Surface Mount Technology (SMT)**
- Ni terminals, Au-plated
- AEC-Q200 qualified component family (operable temperature range -40°C to +85°C)
- **Electrostatic Sensitive Device (ESD)**


Pin configuration

- 3 Tx input
- 1, 8 Rx output (balanced)
- 6 Antenna
- 2, 4, 5, 7, 9 To be grounded



Data sheet

Characteristics

| | |
|--------------------------------------|---|
| Temperature range for specification: | T = -20 °C to +85 °C |
| TX terminating impedance: | Z _{Tx} = 50 Ω 6.0 nH |
| ANT terminating impedance: | Z _{Ant} = 50 Ω 2.2 nH |
| RX terminating impedance: | Z _{Rx} = 100 Ω (balanced) 17 nH |

| Characteristics Tx-Antenna | | min. | typ. @ 25 °C | max. | |
|--------------------------------------|-----------------------------------|------|-----------------|------|-----|
| Center frequency | f _c | | 1950.0 | | MHz |
| Maximum insertion attenuation | α _{W-CDMA} ¹⁾ | | | | |
| 1922.4 ... 1977.6 MHz | | — | 1.7 | 2.3 | dB |
| Amplitude ripple (p-p) | α _{W-CDMA} ¹⁾ | | | | |
| 1922.4 ... 1977.6 MHz | | — | 0.5 | 1.1 | dB |
| Error Vector Magnitude | EVM ²⁾ | | | | |
| 1922.4 ... 1977.6 MHz | | — | 1.4 | 2.3 | % |
| TX port VSWR | | | | | |
| 1920.0 ... 1980.0 MHz | | — | 1.6 | 2.0 | |
| ANT port VSWR | | | | | |
| 1920.0 ... 1980.0 MHz | | — | 1.4 | 2.0 | |
| Attenuation | α | | | | |
| 10.0 ... 410.0 MHz | | 45 | 69 | — | dB |
| 420.0 ... 494.0 MHz | | 43 | 64 | — | dB |
| 843.0 ... 894.0 MHz | | 40 | 47 | — | dB |
| 1565.0 ... 1574.0 MHz | | 41 | 45 | — | dB |
| 1574.0 ... 1577.0 MHz | | 42 | 46 | — | dB |
| 1577.0 ... 1586.0 MHz | | 42 | 47 | — | dB |
| 1597.0 ... 1605.0 MHz | | 43 | 48 | — | dB |
| 1605.0 ... 1805.0 MHz | | 34 | 39 | — | dB |
| 1805.0 ... 1865.0 MHz | | 30 | 36 | — | dB |
| 1865.0 ... 1880.0 MHz | | 12 | 33 | — | dB |
| 2112.4 ... 2167.6 MHz | α _{W-CDMA} ¹⁾ | 46 | 54 | — | dB |
| 2400.0 ... 2500.0 MHz | | 31 | 38 | — | dB |
| 2620.0 ... 2690.0 MHz | | 30 | 36 | — | dB |
| 3830.0 ... 3970.0 MHz | | 28 | 34 | — | dB |
| 5150.0 ... 5950.0 MHz | | 18 | 22 | — | dB |

1) Attenuation of W-CDMA signal (Power Transfer Function). Please, refer to page 7 of this document.

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

Data sheet


Characteristics

| | |
|--------------------------------------|---|
| Temperature range for specification: | T = -20 °C to +85 °C |
| TX terminating impedance: | Z _{Tx} = 50 Ω 6.0 nH |
| ANT terminating impedance: | Z _{Ant} = 50 Ω 2.2 nH |
| RX terminating impedance: | Z _{Rx} = 100 Ω (balanced) 17 nH |

| Characteristics Antenna-Rx | | min. | typ. @ 25 °C | max. | |
|--------------------------------------|-----------------------------------|------|-----------------|------|-----|
| Center frequency | f _c | | 2140.0 | | MHz |
| Maximum insertion attenuation | α _{W-CDMA} ¹⁾ | | | | |
| 2112.4 ... 2167.6 MHz | | — | 2.2 | 2.4 | dB |
| Amplitude ripple (p-p) | α _{W-CDMA} ¹⁾ | | | | |
| 2112.4 ... 2167.6 MHz | | — | 0.4 | 0.8 | dB |
| Error Vector Magnitude | EVM ²⁾ | | | | |
| 2112.4 ... 2167.6 MHz | | — | 1.0 | 2.0 | % |
| ANT port VSWR | | | | | |
| 2110.0 ... 2170.0 MHz | | — | 1.8 | 2.2 | |
| RX port VSWR | | | | | |
| 2110.0 ... 2170.0 MHz | | — | 1.6 | 2.0 | |

1) Attenuation of W-CDMA signal (Power Transfer Function). Please, refer to page 7 of this document.

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

Data sheet


Characteristics

| | |
|--------------------------------------|---|
| Temperature range for specification: | T = -20 °C to +85 °C |
| TX terminating impedance: | Z _{Tx} = 50 Ω 6.0 nH |
| ANT terminating impedance: | Z _{Ant} = 50 Ω 2.2 nH |
| RX terminating impedance: | Z _{Rx} = 100 Ω (balanced) 17 nH |

| Characteristics Antenna-Rx | | | | min. | typ. @ 25 °C | max. | | |
|----------------------------|--------|-----|--------|------|-----------------|------|---|----|
| Attenuation | | | α | | | | | |
| | 10.0 | ... | 1920.0 | MHz | 45 | 53 | — | dB |
| | 1922.4 | ... | 1977.6 | MHz | 50 | 55 | — | dB |
| | 1980.0 | ... | 2025.0 | MHz | 33 | 49 | — | dB |
| | 2255.0 | ... | 2400.0 | MHz | 25 | 45 | — | dB |
| | 2400.0 | ... | 2484.0 | MHz | 41 | 44 | — | dB |
| | 2484.0 | ... | 5600.0 | MHz | 40 | 45 | — | dB |
| | 5600.0 | ... | 6000.0 | MHz | 28 | 32 | — | dB |

1) Attenuation of W-CDMA signal (Power Transfer Function). Please, refer to page 7 of this document.

Data sheet


Characteristics

| | |
|--------------------------------------|---|
| Temperature range for specification: | T = -20 °C to +85 °C |
| TX terminating impedance: | Z _{Tx} = 50 Ω 6.0 nH |
| ANT terminating impedance: | Z _{Ant} = 50 Ω 2.2 nH |
| RX terminating impedance: | Z _{Rx} = 100 Ω (balanced) 17 nH |

| Characteristics Tx-Rx | | | | min. | typ. @ 25 °C | max. | |
|------------------------------------|-------------------|-----|-----------------------------------|------|-----------------|------|----|
| Differential Mode Isolation | | | | | | | |
| | | α | | | | | |
| | 1574.0 ... 1577.0 | MHz | | 40 | 79 | — | dB |
| | 1922.4 ... 1977.6 | MHz | α _{W-CDMA} ¹⁾ | 52 | 57 | — | dB |
| | 2112.4 ... 2167.6 | MHz | α _{W-CDMA} ¹⁾ | 53 | 59 | — | dB |
| | 3830.0 ... 3970.0 | MHz | | 30 | 61 | — | dB |
| | 5750.0 ... 5950.0 | MHz | | 30 | 44 | — | dB |
| Common Mode Isolation | | | | | | | |
| | | α | | | | | |
| | 1922.4 ... 1977.6 | MHz | α _{W-CDMA} ¹⁾ | 42 | 45 | — | dB |

¹⁾ Attenuation of W-CDMA signal (Power Transfer Function). Please, refer to page 7 of this document.

Data sheet


Annotation for characteristics section

Attenuation of W-CDMA signal (Power Transfer Function, α_{W-CDMA}) is determined by

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

with $f_{Carrier}$ according to 3GPP TS 25.101 (e.g. for UMTS pass band, $f_{Carrier}$ ranges from 1922.4 MHz (lowest Tx channel) to 2167.6 MHz (highest Tx channel)). Here, $H_{RRC}(f)$ is the transfer function of the root-raised cosine transmit pulse shaping filter according to 3GPP TS 25.101 with the following normalization:

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

Data sheet


Maximum Ratings

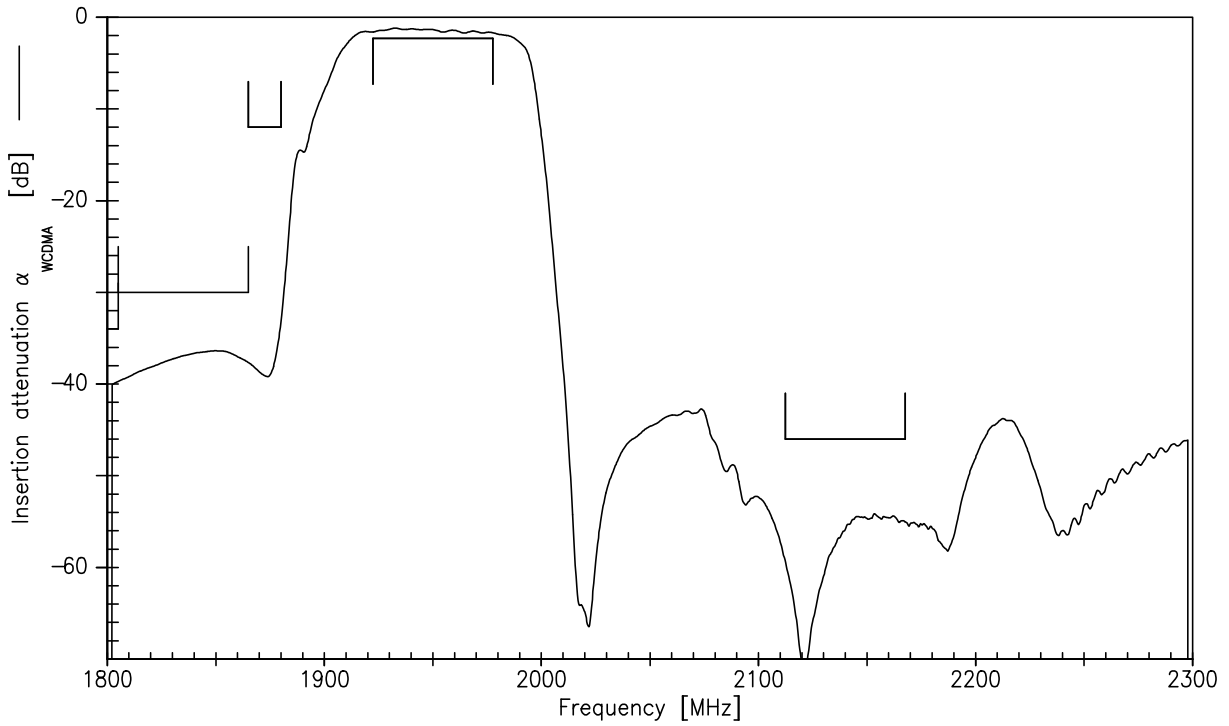
| | | | | |
|----------------------------|------------------|------------------|-----|-----------------------------------|
| Operable temperature range | T | -40/+85 | °C | |
| Storage temperature range | T _{stg} | -40/+85 | °C | |
| DC voltage | V _{DC} | 0 | V | |
| ESD voltage | V _{ESD} | 50 ¹⁾ | V | machine model, 10 pulses |
| Input power at | | | | |
| 1920.0 ... 1980.0 MHz | P _{in} | 29 | dBm | } continuous wave 50 °C, 5000h |
| elsewhere | P _{in} | 10 | dBm | |

¹⁾ According to JESD22-A115A (machine model), 10 negative and 10 positive pulses.

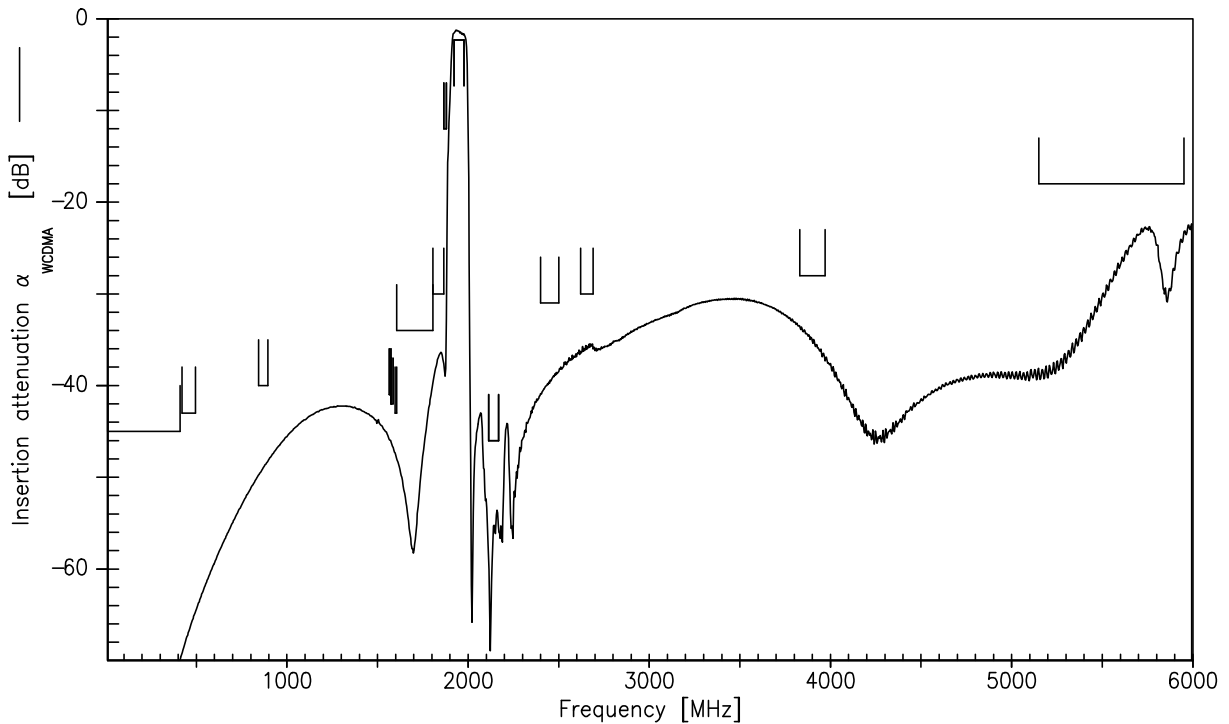
Data sheet



Frequency Response TX-ANT



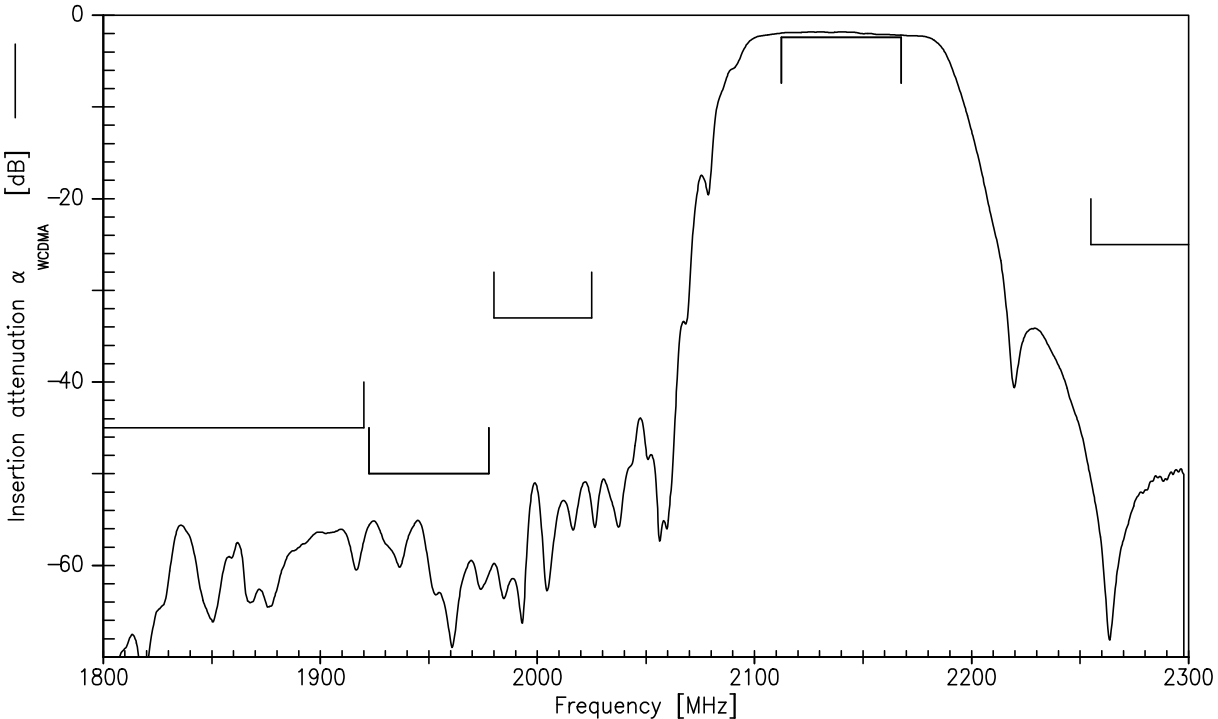
Frequency Response TX-ANT (wideband)



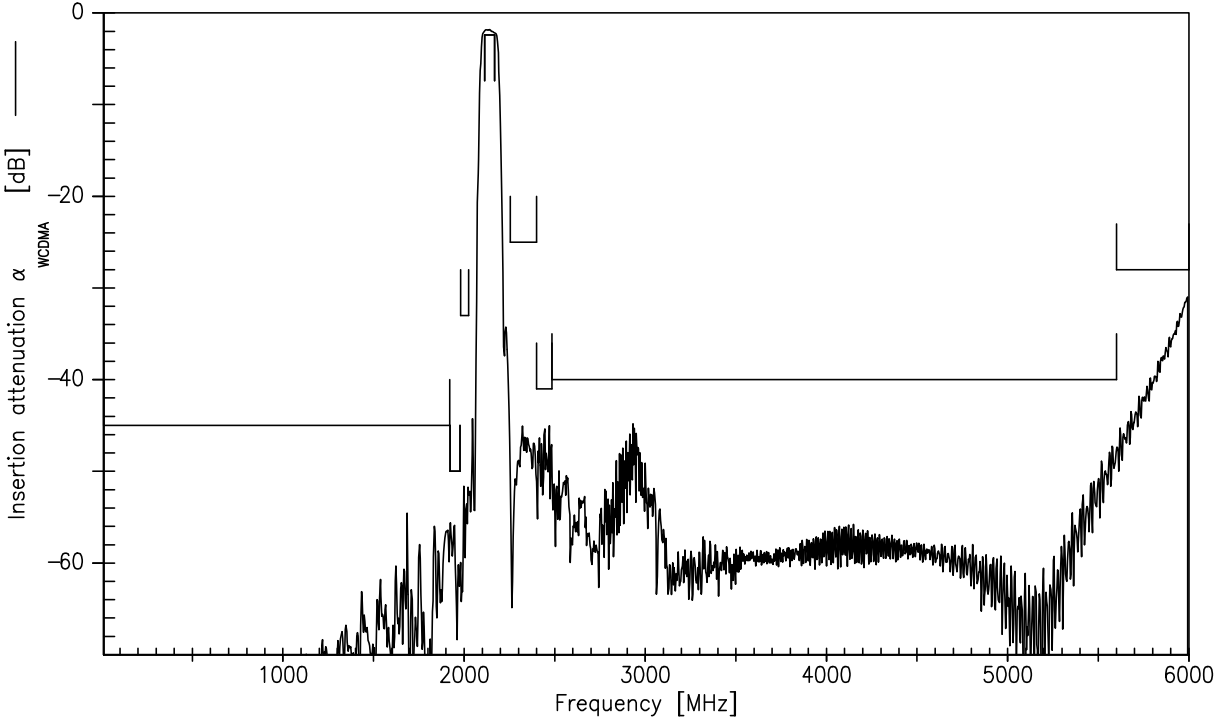
Data sheet



Frequency Response RX-ANT



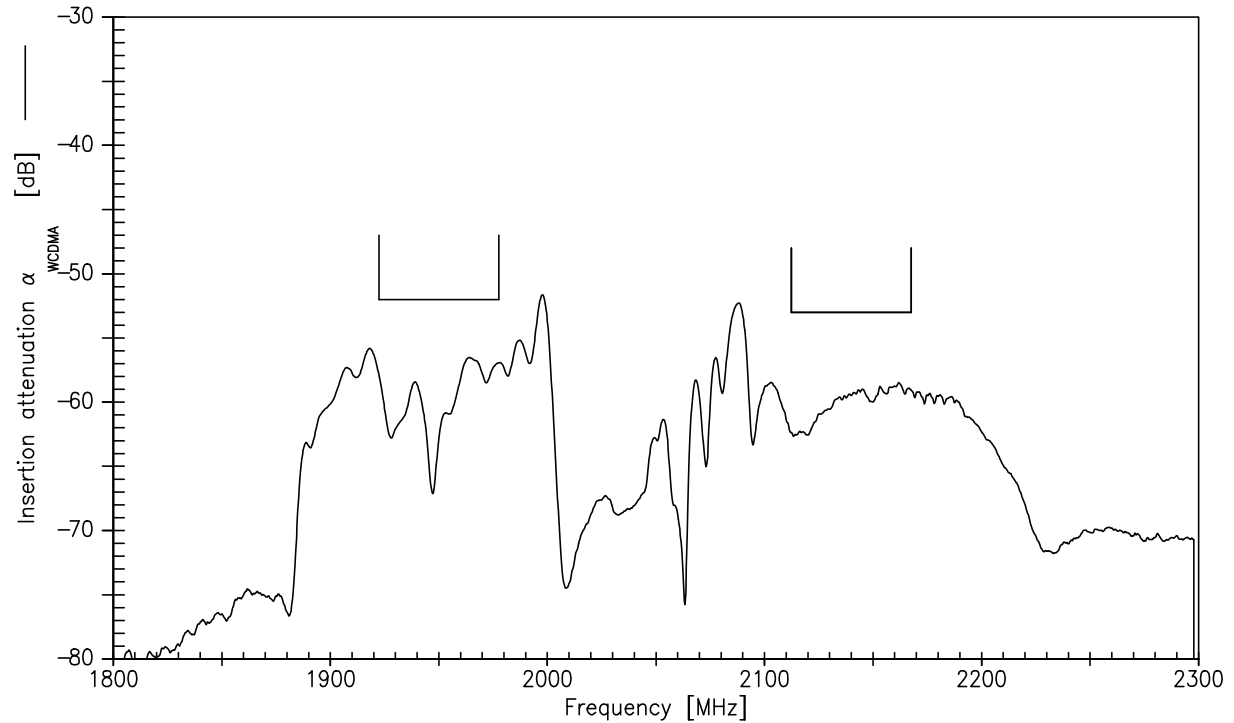
Frequency Response RX-ANT (wideband)



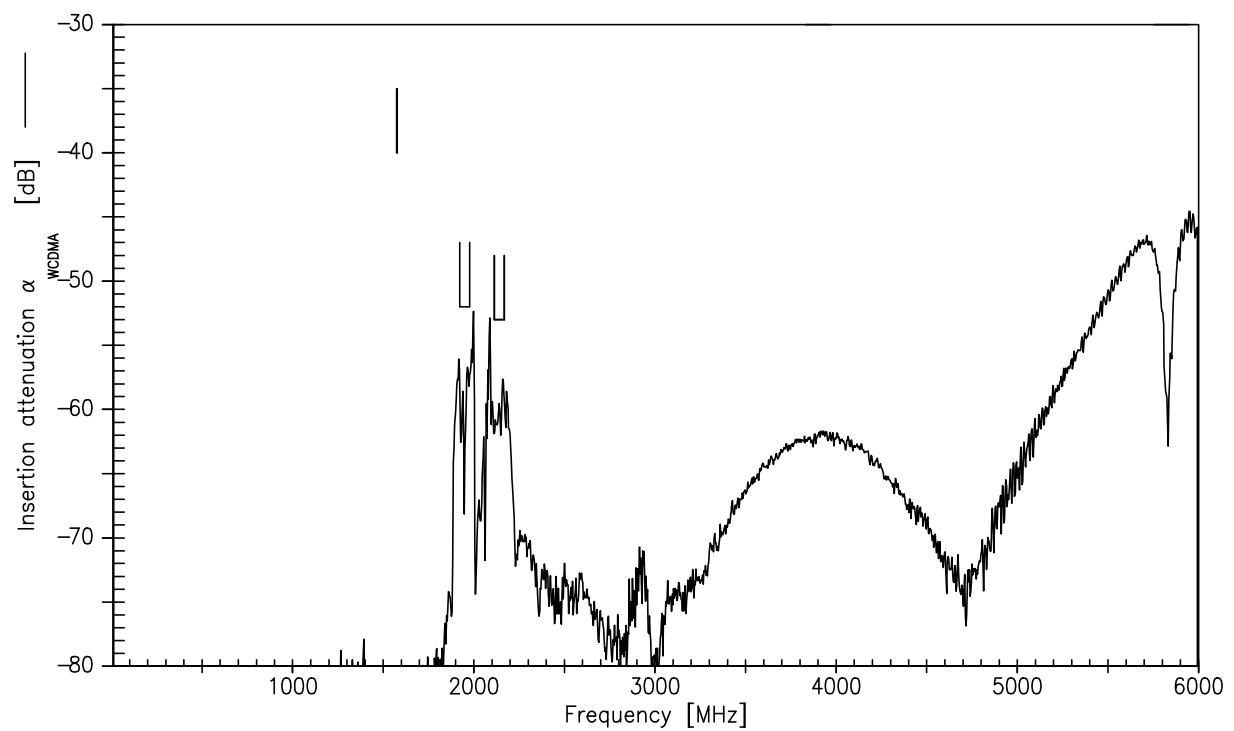
Data sheet



Frequency Response TX-RX



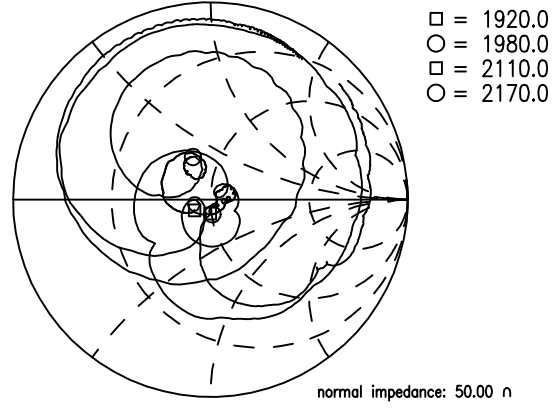
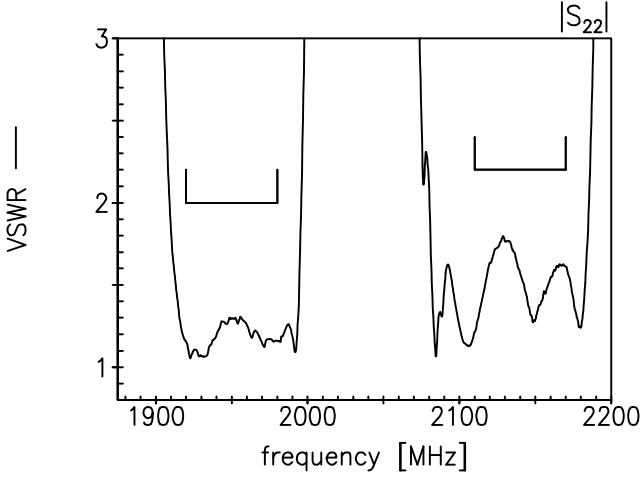
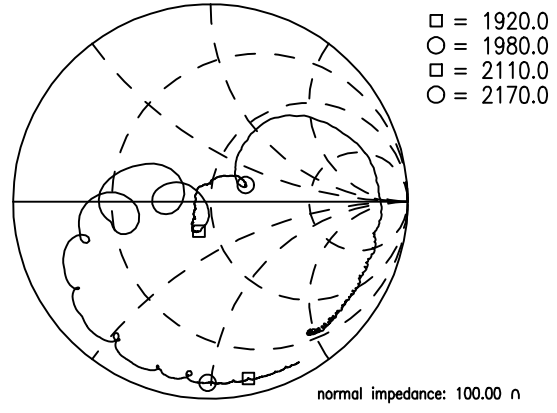
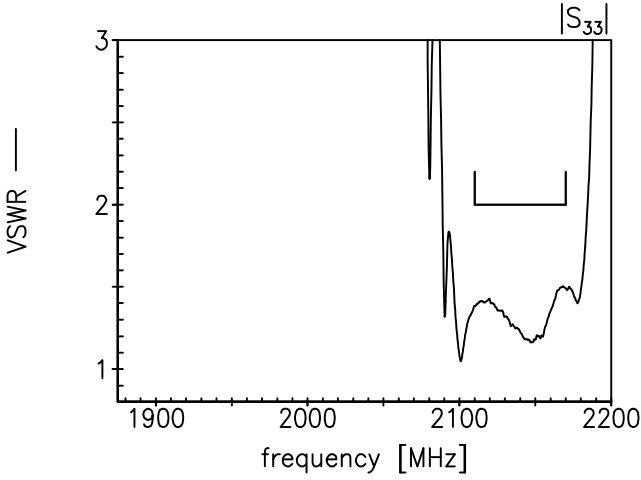
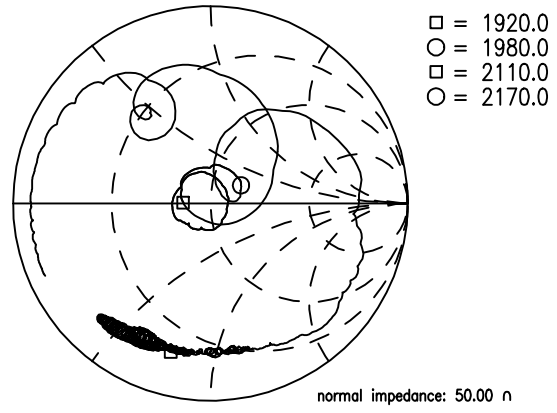
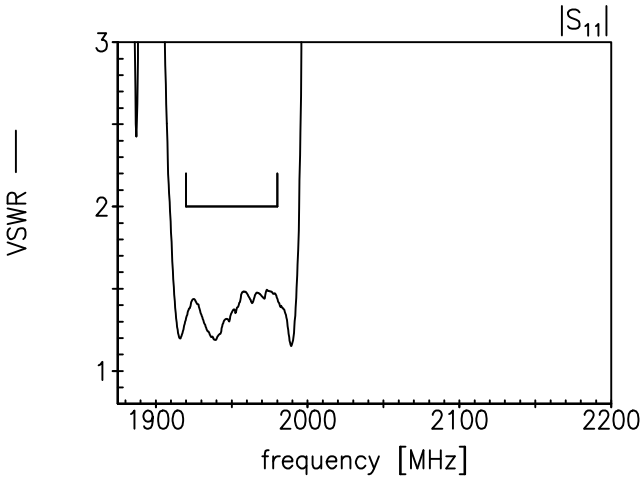
Frequency Response TX-RX (wideband)



SAW Components **B4400**
SAW Duplexer **1950.0 / 2140.0 MHz**

Data sheet **SMD**

Return Loss **S₁₁ TX-port** **S₃₃ RX-port** **S₂₂ ANT-port**



| | |
|-----------------------|----------------------------|
| SAW Components | B4400 |
| SAW Duplexer | 1950.0 / 2140.0 MHz |

Data sheet



References

| | |
|----------------------------|---|
| Type | B4400 |
| Ordering code | B39212B4400P810 |
| Marking and package | C61157-A8-A50 |
| Packaging | F61074-V8247-Z000 |
| Date codes | L_1126 |
| S-parameters | B4400_NB_UN.s4p, B4400_WB_UN.s4p 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 |

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