



SAW Components

SAW Duplexer

W-CDMA Band 1

| | |
|-----------------------|---------------------------|
| Series/type: | B8510 |
| Ordering code: | B39212B8510P810 |
| Date: | September 09, 2013 |
| Version: | 2.0 |

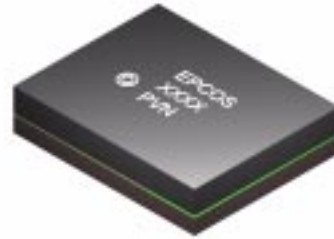
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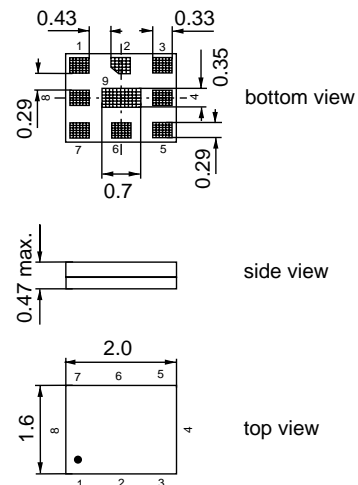
Data sheet


Application

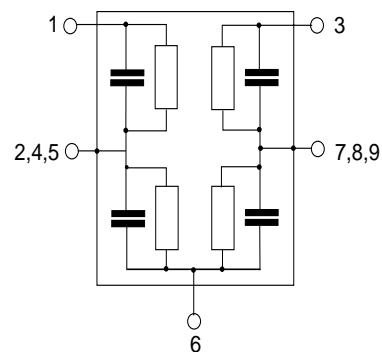
- Low-loss SAW duplexer for mobile telephone W-CDMA Band 1 (UMTS) systems
- Low insertion attenuation
- Low amplitude ripple
- Usable passband 60 MHz
- High isolation between Tx and Rx


Features

- Package size 2.0 x 1.6 mm²
- max. Package height 0.47mm
- RoHS compatible
- Approximate weight 0.005 g
- Package for **Surface Mount Technology (SMT)**
- Ni terminals, Au-plated
- **Electrostatic Sensitive Device (ESD)**
- Fully matched by integrated matching network
- **Moisture Sensitive Level 3**


Pin configuration

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


 Please read *cautions and warnings and important notes* at the end of this document.

Data sheet


Characteristics

| | |
|--------------------------------------|----------------------------------|
| Temperature range for specification: | T = -30 °C to +85 °C |
| TX terminating impedance: | Z _{Tx} = 50 Ω |
| ANT terminating impedance: | Z _{Ant} = 50 Ω 2.9nH |
| RX terminating impedance: | Z _{Rx} = 50 Ω 11.8nH |

| | | B8510 | | | |
|---|-----------------------------------|-------|-----------------|------|-----|
| Characteristics Tx-Antenna | | min. | typ. @ 25 °C | max. | |
| Center frequency | f _c | | 1950.0 | | MHz |
| Maximum insertion attenuation | | | | | |
| @f _{Carrier} 1922.4 ... 1977.6 MHz | α _{W-CDMA} ¹⁾ | — | 1.2 | 1.7 | dB |
| 1920.0 ... 1980.0 MHz | α _{CW} | — | 1.4 | 1.8 | dB |
| Amplitude ripple (p-p) | | | | | |
| 1920.0 ... 1980.0 MHz | Δα | — | 0.5 | 0.9 | dB |
| 1920.0 ... 1980.0 MHz | Δα _{5MHz} | — | 0.3 | 0.5 | dB |
| Error Vector Magnitude | | | | | |
| @f _{Carrier} 1922.4 ... 1977.6 MHz | EVM ²⁾ | — | 1.1 | 2.0 | % |
| TX port VSWR | | | | | |
| 1920.0 ... 1980.0 MHz | | — | 1.7 | 2.0 | |
| ANT port VSWR | | | | | |
| 1920.0 ... 1980.0 MHz | | — | 1.6 | 1.9 | |
| Attenuation | α | | | | |
| 10.0 ... 1574.0 MHz | | 30 | 40 | — | dB |
| 420.0 ... 494.0 MHz | | 44 | 51 | — | dB |
| 843.0 ... 894.0 MHz | | 38 | 43 | — | dB |
| 1559.0 ... 1563.0 MHz | | 39 | 44 | — | dB |
| 1565.42 ... 1573.374 MHz | | 39 | 44 | — | dB |
| 1573.374... 1577.466 MHz | | 40 | 45 | — | dB |
| 1577.466... 1585.42 MHz | | 40 | 45 | — | dB |
| 1597.5515... 1605.886 MHz | | 41 | 46 | — | dB |
| 1605.886... 1805.0 MHz | | 25 | 36 | — | dB |
| 1805.0 ... 1865.0 MHz | | 25 | 33 | — | dB |
| 1865.0 ... 1880.0 MHz | | 15 | 28 | — | dB |
| 2110.0 ... 2170.0 MHz | α _{CW} | 42 | 46 | — | dB |
| @f _{Carrier} 2112.4 ... 2167.6 MHz | α _{W-CDMA} ¹⁾ | 42 | 46 | — | dB |
| 2400.0 ... 2500.0 MHz | | 30 | 35 | — | dB |
| 2620.0 ... 2690.0 MHz | | 25 | 32 | — | dB |
| 3830.0 ... 3970.0 MHz | | 20 | 32 | — | dB |

 Please read *cautions and warnings and important notes* at the end of this document.



| Characteristics Tx-Antenna | B8510 | | | |
|----------------------------|-------|-----------------|------|----------|
| | min. | typ. @ 25 °C | max. | |
| Attenuation (cont.) | | | | |
| | | | | α |
| 4900.0 ... 5150.0 MHz | 15 | 29 | — | dB |
| 5150.0 ... 5950.0 MHz | 8 | 12 | — | dB |
| 7670.0 ... 7930.0 MHz | — | 9 | — | dB |
| 9590.0 ... 9910.0 MHz | — | 10 | — | dB |
| 11510.0 ... 11890.0 MHz | — | 14 | — | dB |

- 1) Attenuation of W-CDMA signal (Power Transfer Function). Please, refer to page 8 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 = -30 °C to +85 °C |
| TX terminating impedance: | Z _{Tx} = 50 Ω |
| ANT terminating impedance: | Z _{Ant} = 50 Ω 2.9nH |
| RX terminating impedance: | Z _{Rx} = 50 Ω 11.8nH |

| | | | | B8510 | | | |
|--------------------------------------|-------------------|----------------|-----------------------------------|-------|-----------------|------|-----|
| Characteristics Antenna-Rx | | | | min. | typ. @ 25 °C | max. | |
| Center frequency | | f _c | | | 2140.0 | | MHz |
| Maximum insertion attenuation | | | | | | | |
| @f _{Carrier} | 2112.4 ... 2167.6 | MHz | α _{W-CDMA} ¹⁾ | — | 1.8 | 2.3 | dB |
| | 2110.0 ... 2170.0 | MHz | α _{CW} | — | 1.9 | 2.4 | dB |
| Amplitude ripple (p-p) | | | | | | | |
| | 2110.0 ... 2170.0 | MHz | Δα | — | 0.4 | 0.9 | dB |
| | 2110.0 ... 2170.0 | MHz | Δα _{5MHz} | — | 0.3 | 0.5 | dB |
| Error Vector Magnitude | | | | | | | |
| @f _{Carrier} | 2112.4 ... 2167.6 | MHz | EVM ²⁾ | — | 1.0 | 2.0 | % |
| ANT port VSWR | 2110.0 ... 2170.0 | MHz | | — | 1.5 | 1.8 | |
| RX port VSWR | 2110.0 ... 2170.0 | MHz | | — | 1.5 | 1.8 | |
| Attenuation | | | α | | | | |
| | 10.0 ... 1920.0 | MHz | | 40 | 50 | — | dB |
| | 190.0 | MHz | | 50 | >80 | — | dB |
| | 814.0 ... 849.0 | MHz | | 50 | 62 | — | dB |
| | 880.0 ... 915.0 | MHz | | 50 | 61 | — | dB |
| | 1730.0 ... 1790.0 | MHz | | 40 | 52 | — | dB |
| | 1920.0 ... 1980.0 | MHz | α _{CW} | 50 | 57 | — | dB |
| @f _{Carrier} | 1922.4 ... 1977.6 | MHz | α _{W-CDMA} ¹⁾ | 50 | 57 | — | dB |
| | 1980.0 ... 2015.0 | MHz | | 30 | 52 | — | dB |
| | 2015.0 ... 2075.0 | MHz | | 10 | 23 | — | dB |
| | 2255.0 ... 2400.0 | MHz | | 40 | 54 | — | dB |
| | 2400.0 ... 2500.0 | MHz | | 40 | 52 | — | dB |
| | 2500.0 ... 6000.0 | MHz | | 30 | 40 | — | dB |
| | 4030.0 ... 4150.0 | MHz | | 38 | 44 | — | dB |
| | 4220.0 ... 4340.0 | MHz | | 35 | 41 | — | dB |
| | 4900.0 ... 5950.0 | MHz | | 30 | 47 | — | dB |
| | 5725.0 ... 5875.0 | MHz | | 30 | 48 | — | dB |
| | 5950.0 ... 6130.0 | MHz | | — | 48 | — | dB |
| | 6130.0 ... 6330.0 | MHz | | — | 48 | — | dB |

Please read *cautions and warnings and important notes* at the end of this document.

| Characteristics Antenna-Rx | B8510 | | | |
|--|------------|-----------------|-------------------|---------|
| | min. | typ. @ 25 °C | max. | |
| Attenuation (cont.) α | | | | |
| 6330.0 ... 6510.0 MHz | — | 47 | — | dB |
| 6510.0 ... 13020.0 MHz | — | 29 | — | dB |
| 8440.0 ... 8680.0 MHz | — | 42 | — | dB |
| 10550.0 ... 10850.0 MHz | — | 48 | — | dB |
| 12660.0 ... 13020.0 MHz | — | 29 | — | dB |
| IMD product level limits³⁾ | | | | |
| at $f_{TX}=1950.0$ MHz, $f_{RX}=2140.0$ MHz | | | | |
| Blocker 1 | 190.0 MHz | — | 129 ⁴⁾ | 115 dBm |
| Blocker 2 | 1760.0 MHz | — | 108 | 95 dBm |
| Blocker 3 | 4090.0 MHz | — | 116 | 105 dBm |
| Blocker 4 | 6040.0 MHz | — | 115 | 105 dBm |

1) Attenuation of W-CDMA signal (Power Transfer Function). Please, refer to page 8 of this document.

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

3) IMD product level limits for power levels $P_{TX}=21.5$ dBm (antenna port output power) and $P_{Blocker}=-15$ dBm (antenna port input power)

4) Value at noise level of test setup

Data sheet


Characteristics

| | |
|--------------------------------------|----------------------------------|
| Temperature range for specification: | T = -30 °C to +85 °C |
| TX terminating impedance: | Z _{Tx} = 50 Ω |
| ANT terminating impedance: | Z _{Ant} = 50 Ω 2.9nH |
| RX terminating impedance: | Z _{Rx} = 50 Ω 11.8nH |

| Characteristics Tx-Rx | | | | B8510 | | | |
|-----------------------|-------------------|-----|-----------------------------------|-------|-----------------|------|----|
| | | | | min. | typ. @ 25 °C | max. | |
| Isolation | | | α | | | | |
| | 1920.0 ... 1980.0 | MHz | α _{CW} | 55 | 59 | — | dB |
| | 1922.4 ... 1977.6 | MHz | α _{W-CDMA} ¹⁾ | 55 | 59 | — | dB |
| | 2110.0 ... 2170.0 | MHz | α _{CW} | 50 | 55 | — | dB |
| | 2112.4 ... 2167.6 | MHz | α _{W-CDMA} ¹⁾ | 50 | 55 | — | dB |
| | 1574.0 ... 1577.0 | MHz | | 40 | 66 | — | dB |
| | 3830.0 ... 3970.0 | MHz | | 20 | 66 | — | dB |
| 5750.0 ... 5950.0 | MHz | | 20 | 51 | — | dB | |

¹⁾ Attenuation of W-CDMA signal (Power Transfer Function). Please, refer to page 8 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 1967.6 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:

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

Maximum Ratings

| | | | | |
|---------------------------|-----------|-------------------|-----|--|
| Storage temperature range | T_{stg} | -40/+85 | °C | |
| DC voltage | V_{DC} | 5 ¹⁾ | V | |
| ESD voltage | V_{ESD} | 50 ²⁾ | V | MM - machine model HBM - human body model CDM - field induced charged device model |
| | | 200 ³⁾ | V | |
| | | 500 ⁴⁾ | V | |
| Input power at | P_{in} | 29 | dBm | } continuous wave |
| | | | | |
| elsewhere | P_{in} | 10 | dBm | } 50 °C, 5000h |

1) 168h Damp Heat Steady State acc. to IEC 60068-2-67 Cy

2) Acc. to JESD22-A115B (MM - Machine Model) , 10 negative & 10 positive pulses.

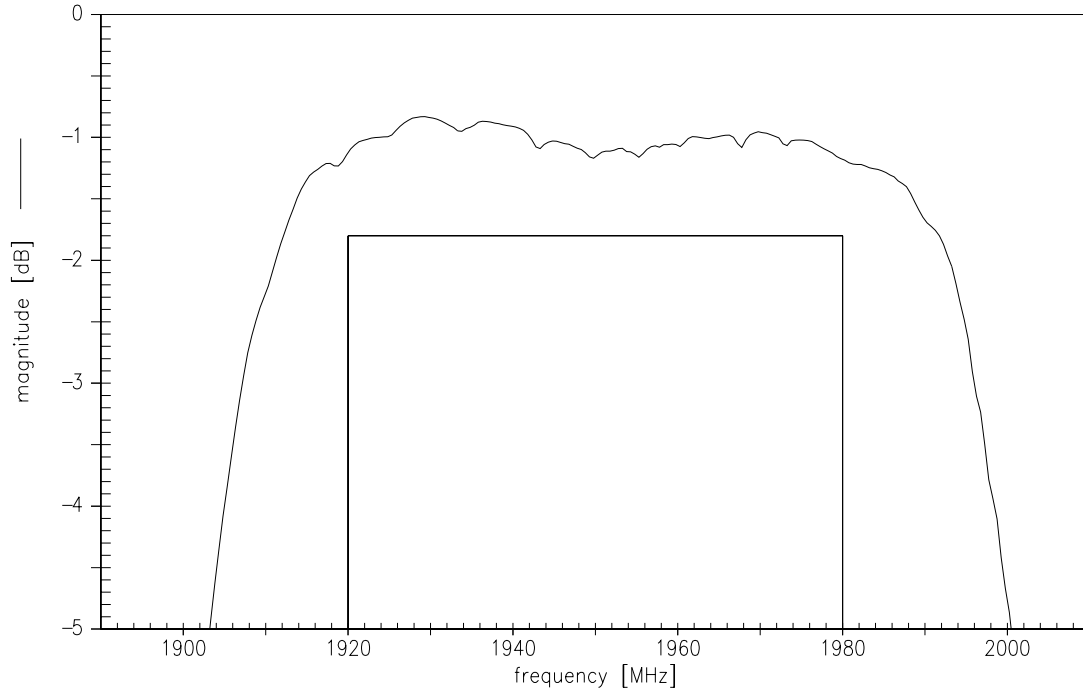
3) Acc. to JESD22-A114F (HBM - Human Body Model) , 1 negative & 1 positive pulses

4) Acc. to JESD22-C101C (CDM - Field Induced Charged Device Model) , 3 negative & 3 positive pulses

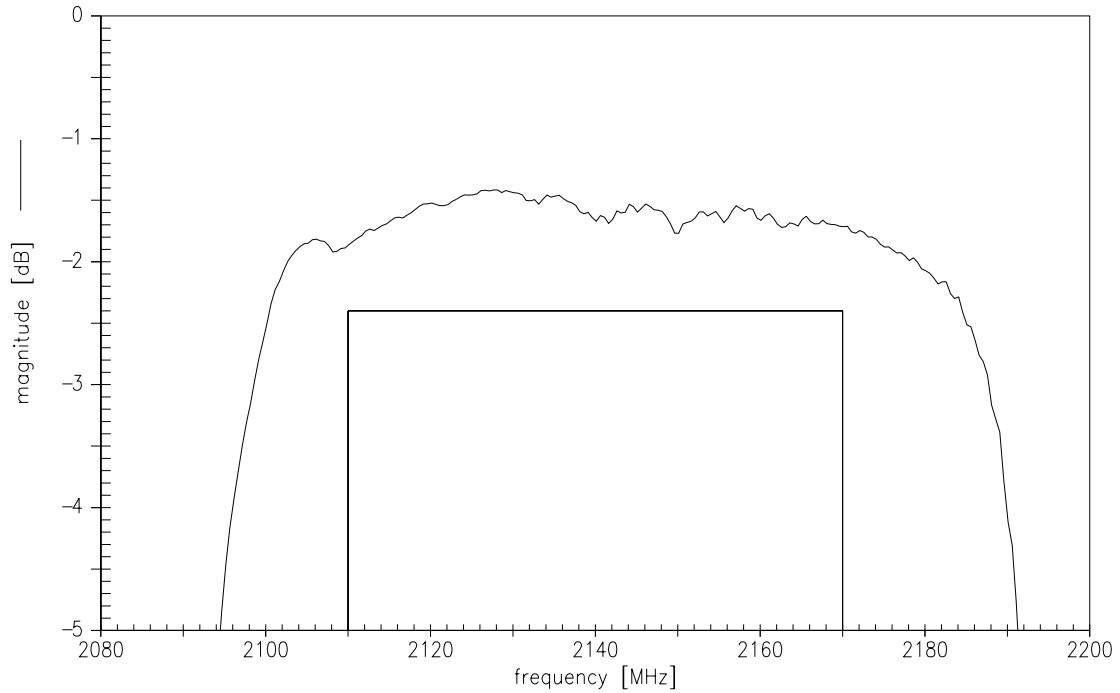
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Frequency Response TX-ANT (CW signal)



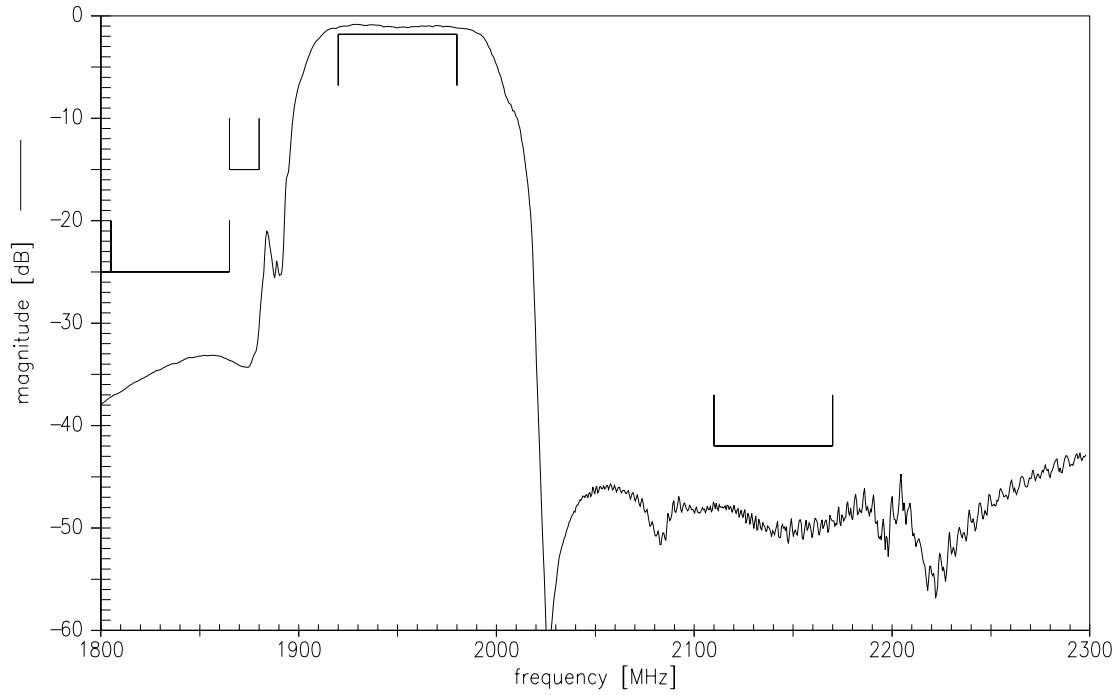
Frequency Response RX-ANT (CW signal)



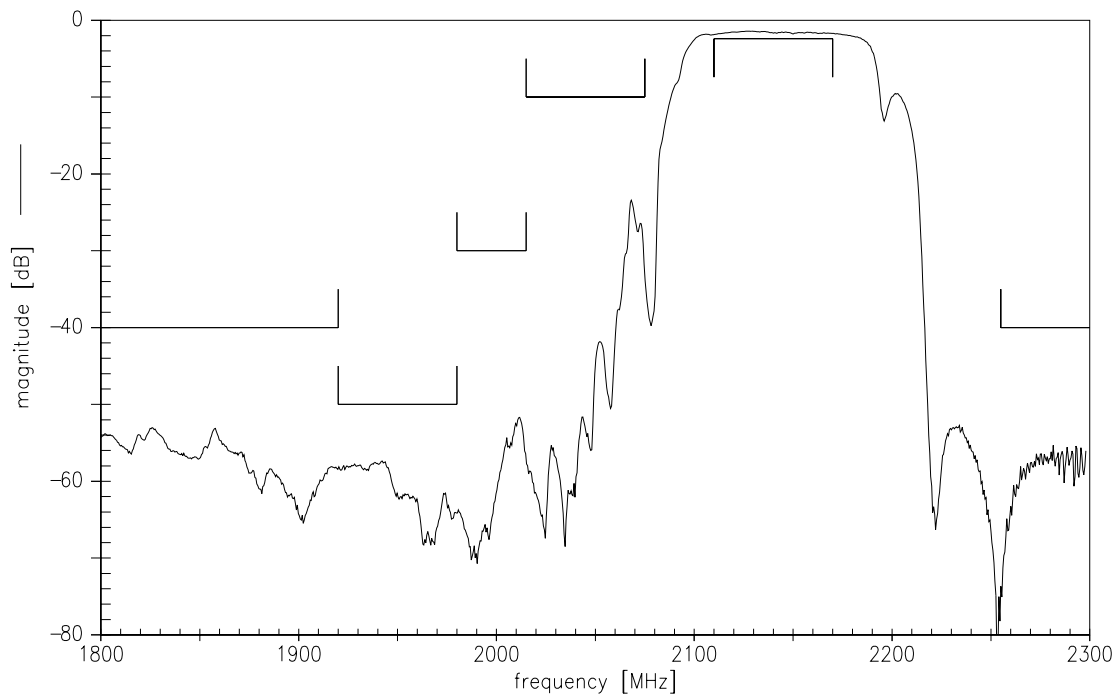
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Frequency Response TX-ANT (CW signal)



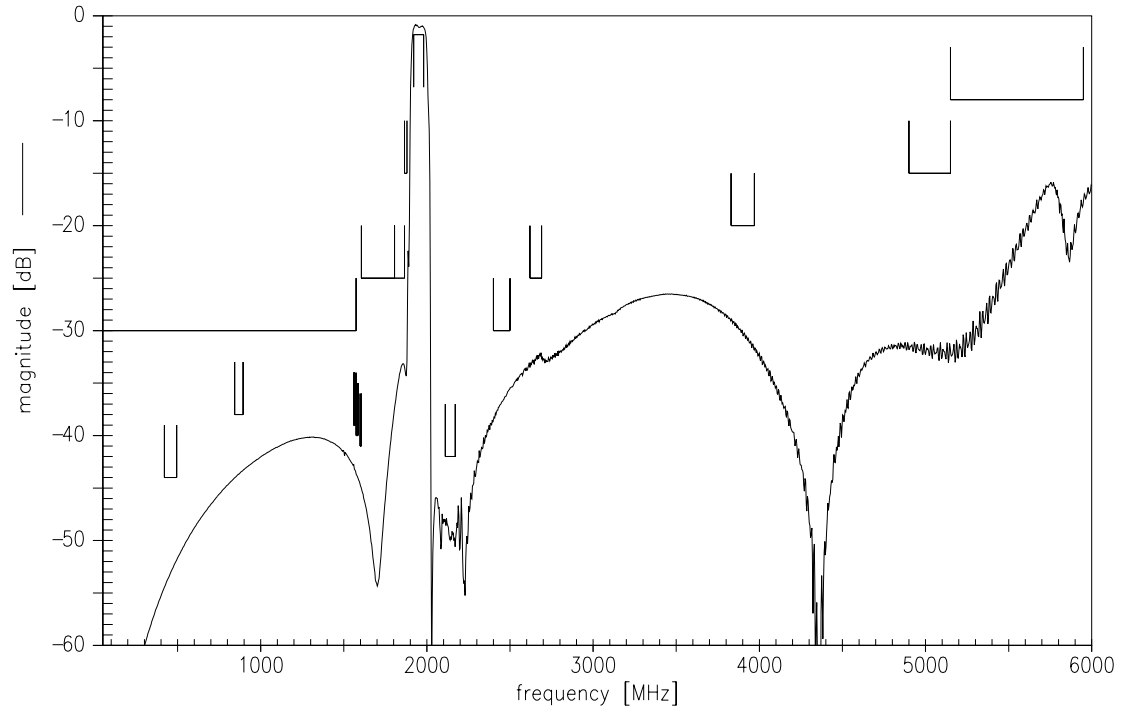
Frequency Response RX-ANT (CW signal)



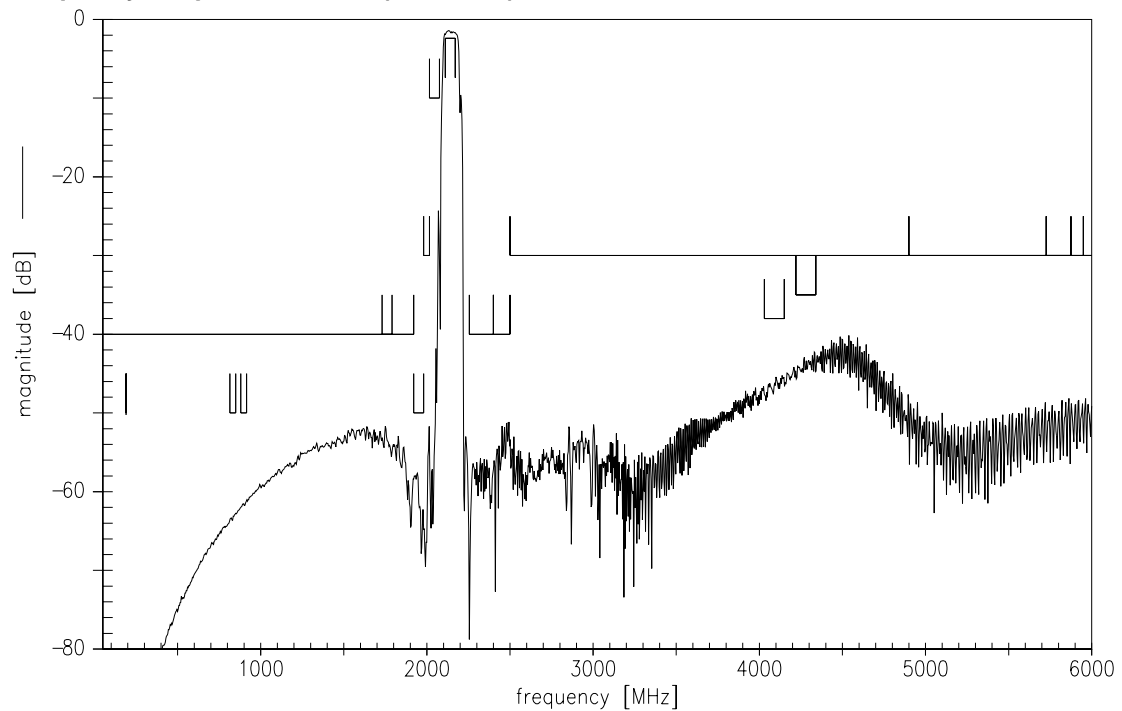
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Frequency Response TX-ANT (wideband)



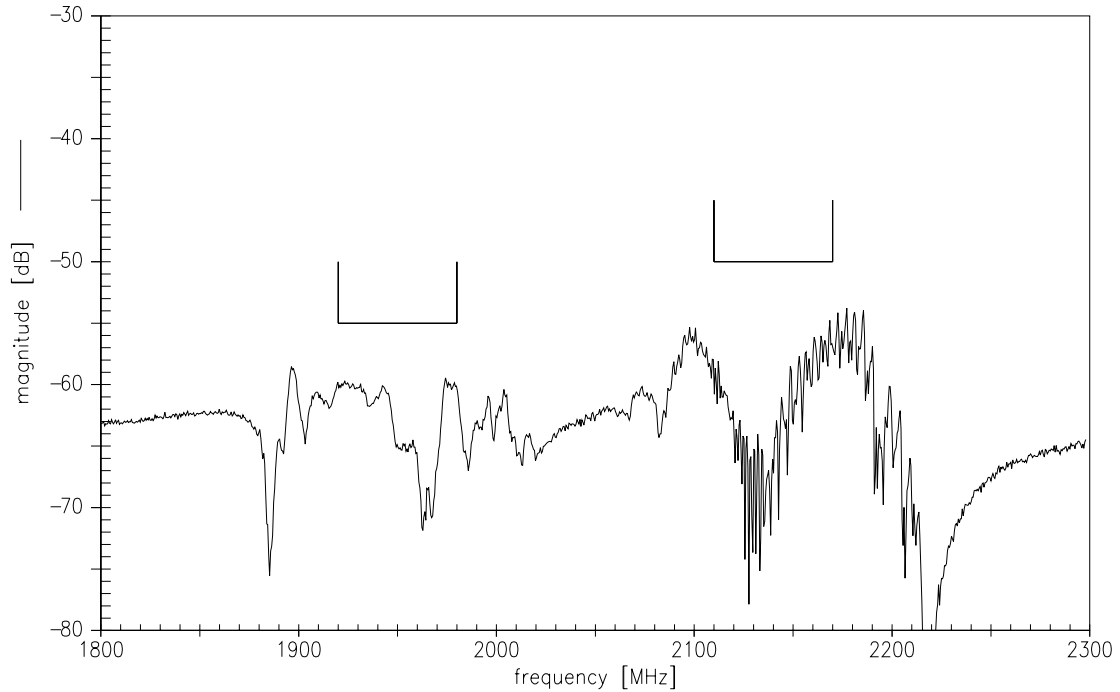
Frequency Response RX-ANT (wideband)



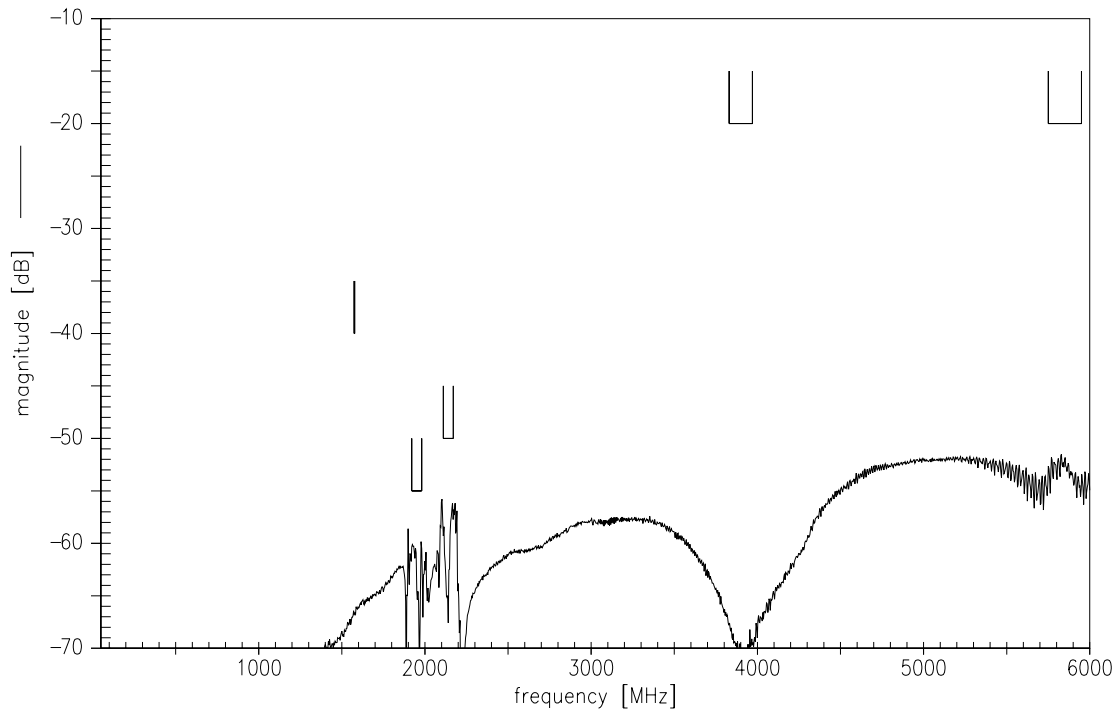
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Frequency Response TX-RX (CW signal)



Frequency Response TX-RX (wideband)



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Data sheet

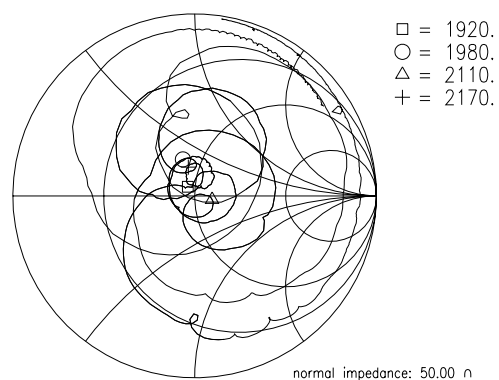
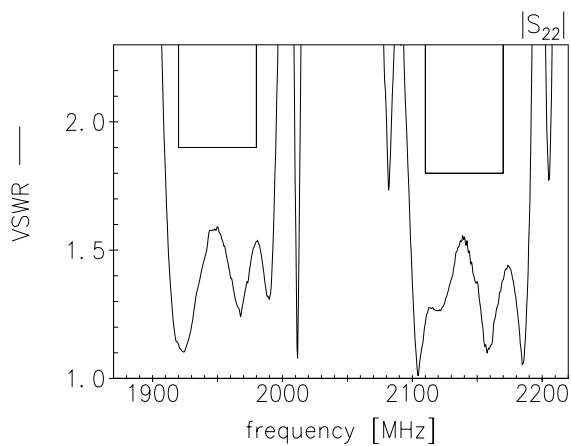
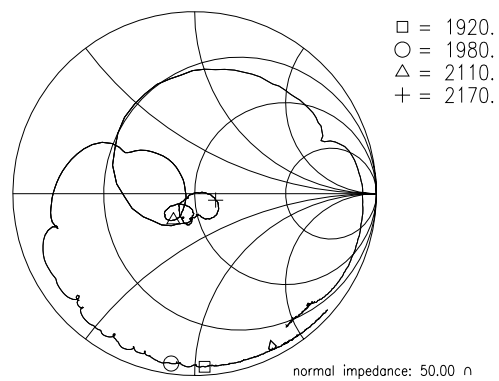
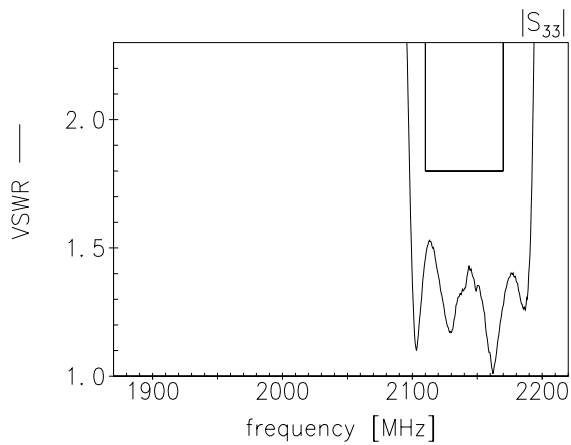
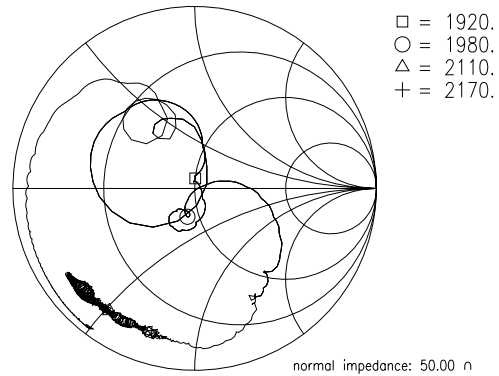
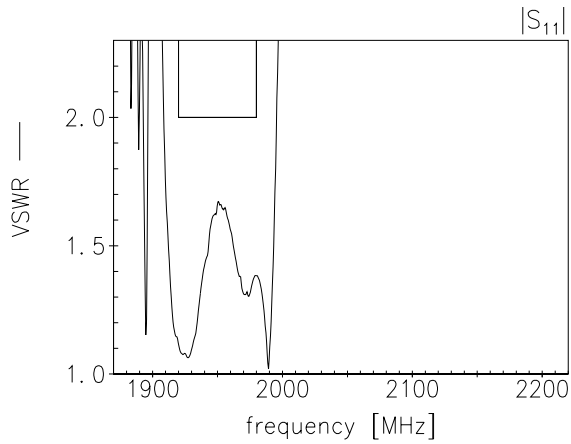


Return Loss

S_{11} TX- port

S_{33} RX-port

S_{22} ANT-port



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Data sheet



References

| | |
|----------------------------|---|
| Type | B8510 |
| Ordering code | B39212B8510P810 |
| Marking and package | C61157-A8-A76 |
| Packaging | F61074-V8247-Z000 |
| Date codes | L_1126 |
| S-parameters | B8510_NB.s3p B8510_WB.s3p 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 a large variety of matching coils. |

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