



SAW Components

SAW Duplexer

WCDMA Band 4/ CDMA 1x AWS Band

| | |
|-----------------------|-------------------------|
| Series/type: | B8563 |
| Ordering Code: | B39212B8563P810 |
| Date: | January 27, 2012 |
| Version: | 2.0 |

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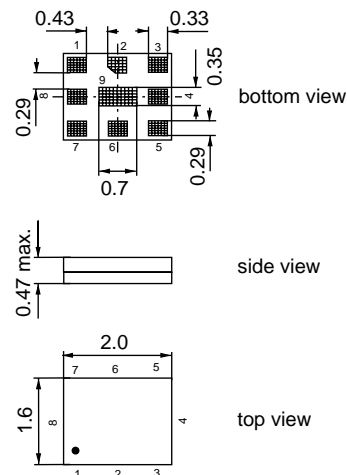
Data sheet


Application

- Low-loss SAW duplexer for mobile telephone WCDMA Band 4 / CDMA 1x AWS systems
- Low insertion attenuation
- Low amplitude ripple
- Usable passband 45 MHz
- Single-ended to balanced transformation in Antenna-Rx path
- Impedance transformation 50Ω to 100Ω in Antenna-Rx path
- High isolation between Tx and Rx


Features

- Package size 2.0 x 1.6 mm², package height 0.47 mm max.
- RoHS compatible
- Approx. weight 0.005 g
- Package for Surface Mount Technology (SMT)
- Ni, Au-plated terminals
- Balanced Rx port, unbalanced Tx port
- **E**lectrostatic **S**ensitive **D**evice (**ESD**)
- **M**oisture **S**ensitivity **L**evel 3


Pin configuration

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

Data sheet

Characteristics for W-CDMA Band 4

| | |
|--------------------------------------|--|
| Temperature range for specification: | T = -15 °C to +80 °C |
| Antenna terminating impedance: | Z _{ANT} = 50 Ω 2.4nH |
| RX terminating impedance: | Z _{RX} = 100 Ω (balanced) 11nH |
| TX terminating impedance: | Z _{TX} = 50 Ω |

| Characterisitcs TX - Antenna | | B8563 | | |
|---|-----------------------------------|-------|-----------------|--------|
| | | min. | typ. @ 25 °C | max. |
| Center frequency | f _C | | 1732.5 | MHz |
| Maximum insertion attenuation | α | | | |
| @f _{Carrier} 1712.4 ... 1752.6 MHz | α _{WCDMA} ¹⁾ | | 1.3 | 1.8 dB |
| Amplitude ripple (p-p) | Δα | | | |
| @f _{Carrier} 1712.4 ... 1752.6 MHz | Δα _{WCDMA} ¹⁾ | | 0.3 | 0.8 dB |
| Error vector magnitude | EVM ²⁾ | | | |
| @f _{Carrier} 1712.4 ... 1752.6 MHz | | | 1.1 | 2.5 % |
| Input VSWR (TX port) | | | | |
| 1710.0 ... 1755.0 MHz | | | 1.4 | 1.9 |
| Output VSWR (ANT port) | | | | |
| 1710.0 ... 1755.0 MHz | | | 1.4 | 1.9 |
| Attenuation | α | | | |
| 1.0 ... 728.0 MHz | | 30 | 45 | dB |
| 728.0 ... 764.0 MHz | | 35 | 45 | dB |
| 851.0 ... 894.0 MHz | | 35 | 43 | dB |
| 1310.0 ... 1355.0 MHz | | 24 | 38 | dB |
| 1565.42 ... 1573.374MHz | | 40 | 50 | dB |
| 1573.374 ... 1577.466MHz | | 45 | 52 | dB |
| 1577.466 ... 1585.42 MHz | | 40 | 52 | dB |
| 1597.5515... 1605.886MHz | | 40 | 45 | dB |
| 1805.0 ... 1880.0 MHz | | 20 | 47 | dB |
| 1930.0 ... 1990.0 MHz | | 40 | 49 | dB |
| @f _{Carrier} 2112.4 ... 2152.6 MHz | α _{WCDMA} ¹⁾ | 42 | 46 | dB |
| 2400.0 ... 2500.0 MHz | | 30 | 38 | dB |
| 2565.0 ... 2677.0 MHz | | 5 | 33 | dB |
| 3410.0 ... 3510.0 MHz | | 25 | 32 | dB |
| 5000.0 ... 5120.0 MHz | | 10 | 21 | dB |
| 5120.0 ... 5350.0 MHz | | 15 | 25 | dB |
| 5350.0 ... 5725.0 MHz | | 10 | 28 | dB |
| 5725.0 ... 5850.0 MHz | | 20 | 28 | dB |
| 5850.0 ... 6000.0 MHz | | 10 | 25 | dB |

¹⁾ Attenuation of WCDMA signal ("Powertransferfunction"). Please refer to annotation on page (10).

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

Data sheet

Characteristics for W-CDMA Band 4

| | |
|--------------------------------------|---|
| Temperature range for specification: | T = -15 °C to +80 °C |
| Antenna terminating impedance: | Z _{ANT} = 50 Ω 2.4nH |
| RX terminating impedance: | Z _{RX} = 100 Ω (balanced) 11nH. |
| TX terminating impedance: | Z _{TX} = 50 Ω |

| Characterisitcs Antenna - Rx | | B8563 | | |
|---|-----------------------------------|------------------|-----------------|--------|
| | | min. | typ. @ 25 °C | max. |
| Center frequency | f _C | | 2132.5 | MHz |
| Maximum insertion attenuation | α | | | |
| @f _{Carrier} 2112.4 ... 2152.6 MHz | α _{WCDMA} ¹⁾ | | 1.8 | 2.2 dB |
| Amplitude ripple (p-p) | Δα | | | |
| @f _{Carrier} 2112.4 ... 2152.6 MHz | Δα _{WCDMA} ¹⁾ | | 0.3 | 0.7 dB |
| Error vector magnitude | EVM ²⁾ | | | |
| @f _{Carrier} 2112.4 ... 2152.6 MHz | | | 1.1 | 2.5 % |
| Input VSWR (RX port) | | | | |
| 2110.0 ... 2155.0 MHz | | | 1.4 | 2.0 |
| Output VSWR (ANT port) | | | | |
| 2110.0 ... 2155.0 MHz | | | 1.7 | 2.0 |
| CMRR (S₃₂-S₄₂ / S₃₂+S₄₂) | | | | |
| 2110.0 ... 2155.0 MHz | | 20 ³⁾ | 26 | dB |

1) Attenuation of WCDMA signal ("Powertransferfunction"). Please refer to annotation on page (10).

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

3) A combination of 10 ° phase balance and 1 dB amplitude balance corresponds to 19.6 dB CMRR.

Data sheet

Characteristics for W-CDMA Band 4

| | |
|--------------------------------------|--|
| Temperature range for specification: | T = -15 °C to +80 °C |
| Antenna terminating impedance: | Z _{ANT} = 50 Ω 2.4nH |
| RX terminating impedance: | Z _{RX} = 100 Ω (balanced) 11nH |
| TX terminating impedance: | Z _{TX} = 50 Ω |

| Characterisitcs Antenna - Rx | | | | B8563 | | |
|------------------------------|-------------------|-----|------------------------------|-------|-----------------|------|
| | | | | min. | typ. @ 25 °C | max. |
| Attenuation | | | α | | | |
| | 1.0 ... 400.0 | MHz | | 57 | 70 | dB |
| | 400.0 ... 1310.0 | MHz | | 40 | 70 | dB |
| | 1310.0 ... 1355.0 | MHz | | 43 | 68 | dB |
| | 1355.0 ... 1710.0 | MHz | | 35 | 51 | dB |
| @f _{Carrier} | 1712.4 ... 1752.6 | MHz | $\alpha_{\text{WCDMA}}^{1)}$ | 45 | 63 | dB |
| | 1755.0 ... 1910.0 | MHz | | 15 | 52 | dB |
| | 1910.0 ... 1955.0 | MHz | | 35 | 57 | dB |
| | 1955.0 ... 2025.0 | MHz | | 15 | 39 | dB |
| | 2240.0 ... 2300.0 | MHz | | 15 | 38 | dB |
| | 2300.0 ... 2400.0 | MHz | | 30 | 46 | dB |
| | 2400.0 ... 2496.0 | MHz | | 40 | 45 | dB |
| | 2496.0 ... 2690.0 | MHz | | 40 | 54 | dB |
| | 2690.0 ... 3300.0 | MHz | | 35 | 48 | dB |
| | 3300.0 ... 3800.0 | MHz | | 45 | 56 | dB |
| | 3820.0 ... 3910.0 | MHz | | 40 | 56 | dB |
| | 3910.0 ... 4220.0 | MHz | | 35 | 55 | dB |
| | 4220.0 ... 4310.0 | MHz | | 40 | 54 | dB |
| | 4310.0 ... 5150.0 | MHz | | 35 | 50 | dB |
| | 5150.0 ... 5850.0 | MHz | | 40 | 44 | dB |
| | 5850.0 ... 6475.0 | MHz | | 35 | 43 | dB |

1) Attenuation of WCDMA signal ("Powertransferfunction"). Please refer to annotation on page (10).

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Characteristics for W-CDMA Band 4

| | |
|--------------------------------------|--|
| Temperature range for specification: | T = -15 °C to +80 °C |
| Antenna terminating impedance: | Z _{ANT} = 50 Ω 2.4nH |
| RX terminating impedance: | Z _{RX} = 100 Ω (balanced) 11nH |
| TX terminating impedance: | Z _{TX} = 50 Ω |

| | | | | B8563 | | | |
|------------------------------------|-------------------|-----|----------------------------------|--------------|-------------------------|-------------|----|
| Characterisitcs Tx - Rx | | | | min. | typ. @ 25 °C | max. | |
| Differential Mode Isolation | | | | | | | |
| | | | α | | | | |
| | 1574.0 ... 1577.0 | MHz | | 40 | 70 | | dB |
| @f _{Carrier} | 1712.4 ... 1752.6 | MHz | α _{WCDMA} ¹⁾ | 55 | 60 | | dB |
| @f _{Carrier} | 2112.4 ... 2152.6 | MHz | α _{WCDMA} ¹⁾ | 50 | 62 | | dB |
| | 3410.0 ... 3520.0 | MHz | | 20 | 70 | | dB |
| | 5120.0 ... 5275.0 | MHz | | 20 | 59 | | dB |
| Common Mode Isolation | | | | | | | |
| | | | α | | | | |
| @f _{Carrier} | 1712.4 ... 1752.6 | MHz | α _{WCDMA} ¹⁾ | 48 | 51 | | dB |

¹⁾ Attenuation of WCDMA signal ("Powertransferfunction"). Please refer to annotation on page (10).

Data sheet


Characteristics for CDMA 1x AWS Band

| | |
|--------------------------------------|--|
| Temperature range for specification: | T = -30 °C to +85 °C |
| Antenna terminating impedance: | Z _{ANT} = 50 Ω 2.4nH |
| RX terminating impedance: | Z _{RX} = 100 Ω (balanced) 11nH |
| TX terminating impedance: | Z _{TX} = 50 Ω |

| | | | | | B8563 | | | |
|--------------------------------------|----------------|--|--|--|-------|-----------------|------|-----|
| Characterisitcs TX - Antenna | | | | | min. | typ. @ 25 °C | max. | |
| Center frequency | f _C | | | | | 1732.5 | | MHz |
| Maximum insertion attenuation | α | | | | | | | |
| 1710.0 ... 1755.0 | MHz | | | | | 1.4 | 2.0 | dB |
| Amplitude ripple (p-p) | Δα | | | | | | | |
| 1710.0 ... 1755.0 | MHz | | | | | 0.4 | 1.2 | dB |
| Input VSWR (TX port) | | | | | | | | |
| 1710.0 ... 1755.0 | MHz | | | | | 1.4 | 1.9 | |
| Output VSWR (ANT port) | | | | | | | | |
| 1710.0 ... 1755.0 | MHz | | | | | 1.4 | 1.9 | |
| Attenuation | α | | | | | | | |
| 1.0 ... 728.0 | MHz | | | | 30 | 45 | | dB |
| 728.0 ... 764.0 | MHz | | | | 35 | 45 | | dB |
| 851.0 ... 894.0 | MHz | | | | 35 | 43 | | dB |
| 1310.0 ... 1355.0 | MHz | | | | 24 | 38 | | dB |
| 1565.42 ... 1573.374 | MHz | | | | 40 | 50 | | dB |
| 1573.374 ... 1577.466 | MHz | | | | 45 | 52 | | dB |
| 1577.466 ... 1585.42 | MHz | | | | 40 | 52 | | dB |
| 1597.5515... 1605.886 | MHz | | | | 40 | 45 | | dB |
| 1805.0 ... 1880.0 | MHz | | | | 20 | 47 | | dB |
| 1930.0 ... 1990.0 | MHz | | | | 40 | 49 | | dB |
| 2110.0 ... 2155.0 | MHz | | | | 42 | 46 | | dB |
| 2400.0 ... 2500.0 | MHz | | | | 30 | 38 | | dB |
| 2565.0 ... 2677.0 | MHz | | | | 5 | 33 | | dB |
| 3410.0 ... 3510.0 | MHz | | | | 25 | 32 | | dB |
| 5000.0 ... 5120.0 | MHz | | | | 10 | 21 | | dB |
| 5120.0 ... 5350.0 | MHz | | | | 15 | 25 | | dB |
| 5350.0 ... 5725.0 | MHz | | | | 10 | 28 | | dB |
| 5725.0 ... 5850.0 | MHz | | | | 20 | 28 | | dB |
| 5850.0 ... 6000.0 | MHz | | | | 10 | 25 | | dB |

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| RX terminating impedance: | Z _{RX} = 100 Ω (balanced) 11nH |
| TX terminating impedance: | Z _{TX} = 50 Ω |

| | | | | B8563 | | | |
|---|----------------|-------------------|-----|------------------|-----------------|------|-----|
| Characterisitcs Antenna - Rx | | | | min. | typ. @ 25 °C | max. | |
| Center frequency | f _C | | | | 2132.5 | | MHz |
| Maximum insertion attenuation | α | 2110.0 ... 2155.0 | MHz | | 1.8 | 2.3 | dB |
| Amplitude ripple (p-p) | Δα | 2110.0 ... 2155.0 | MHz | | 0.4 | 0.8 | dB |
| Input VSWR (RX port) | | 2110.0 ... 2155.0 | MHz | | 1.4 | 2.0 | |
| Output VSWR (ANT port) | | 2110.0 ... 2155.0 | MHz | | 1.7 | 2.0 | |
| CMRR (S₃₂-S₄₂ / S₃₂+S₄₂) | | 2110.0 ... 2155.0 | MHz | 20 ¹⁾ | 26 | | dB |
| Attenuation | α | | | | | | |
| | | 1.0 ... 400.0 | MHz | 57 | 70 | | dB |
| | | 400.0 ... 1310.0 | MHz | 40 | 70 | | dB |
| | | 1310.0 ... 1355.0 | MHz | 43 | 68 | | dB |
| | | 1355.0 ... 1710.0 | MHz | 35 | 51 | | dB |
| | | 1710.0 ... 1755.0 | MHz | 45 | 63 | | dB |
| | | 1755.0 ... 1910.0 | MHz | 15 | 52 | | dB |
| | | 1910.0 ... 1955.0 | MHz | 35 | 57 | | dB |
| | | 1955.0 ... 2025.0 | MHz | 15 | 39 | | dB |
| | | 2240.0 ... 2300.0 | MHz | 15 | 38 | | dB |
| | | 2300.0 ... 2400.0 | MHz | 30 | 46 | | dB |
| | | 2400.0 ... 2496.0 | MHz | 40 | 45 | | dB |
| | | 2496.0 ... 2690.0 | MHz | 40 | 54 | | dB |
| | | 2690.0 ... 3300.0 | MHz | 35 | 48 | | dB |
| | | 3300.0 ... 3800.0 | MHz | 45 | 56 | | dB |
| | | 3820.0 ... 3910.0 | MHz | 40 | 56 | | dB |
| | | 3910.0 ... 4220.0 | MHz | 35 | 55 | | dB |
| | | 4220.0 ... 4310.0 | MHz | 40 | 54 | | dB |
| | | 4310.0 ... 5150.0 | MHz | 35 | 50 | | dB |
| | | 5150.0 ... 5850.0 | MHz | 40 | 44 | | dB |
| | | 5850.0 ... 6475.0 | MHz | 35 | 43 | | dB |

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Characteristics for CDMA 1x AWS Band

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| RX terminating impedance: | Z _{RX} = 100 Ω (balanced) 11nH |
| TX terminating impedance: | Z _{TX} = 50 Ω |

| | | | | B8563 | | | |
|------------------------------------|--------|------------|-----|--------------|-------------------------|-------------|----|
| Characterisitcs Tx - Rx | | | | min. | typ. @ 25 °C | max. | |
| Differential Mode Isolation | | | | | | | |
| | | | α | | | | |
| | 1574.0 | ... 1577.0 | MHz | 40 | 70 | | dB |
| | 1710.0 | ... 1755.0 | MHz | 55 | 58 | | dB |
| | 2110.0 | ... 2155.0 | MHz | 50 | 60 | | dB |
| | 3410.0 | ... 3520.0 | MHz | 20 | 70 | | dB |
| | 5120.0 | ... 5275.0 | MHz | 20 | 59 | | dB |
| Common Mode Isolation | | | | | | | |
| | | | α | | | | |
| | 1710.0 | ... 1755.0 | MHz | 48 | 51 | | dB |


Annotation for characteristics section

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

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

f_{Carrier} according to 3GPP TS 25.101 (e.g. for UMTS-Passband, f_{Carrier} ranges from 882.4 MHz (lowest Tx channel) to 912.6 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

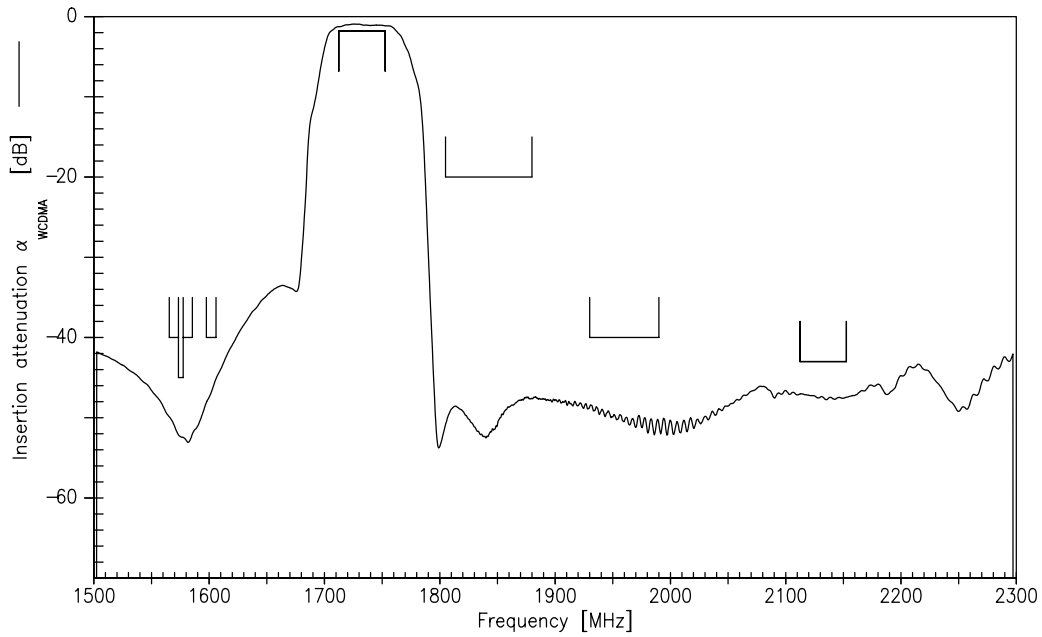

Maximum Ratings

| | | | | |
|---|------------------|------------------|-----|---|
| Storage temperature range | T _{stg} | -40/+85 | °C | machine model, 10 pulses source and load impedance 50 Ω } continuous wave 50 °C, 5.000 h |
| DC voltage | V _{DC} | 5 | V | |
| ESD voltage | V _{ESD} | 50 ¹⁾ | V | |
| Input power at 1710.0 ... 1755.0 MHz | P _{IN} | 29 | dBm | |
| elsewhere | | 10 | dBm | |

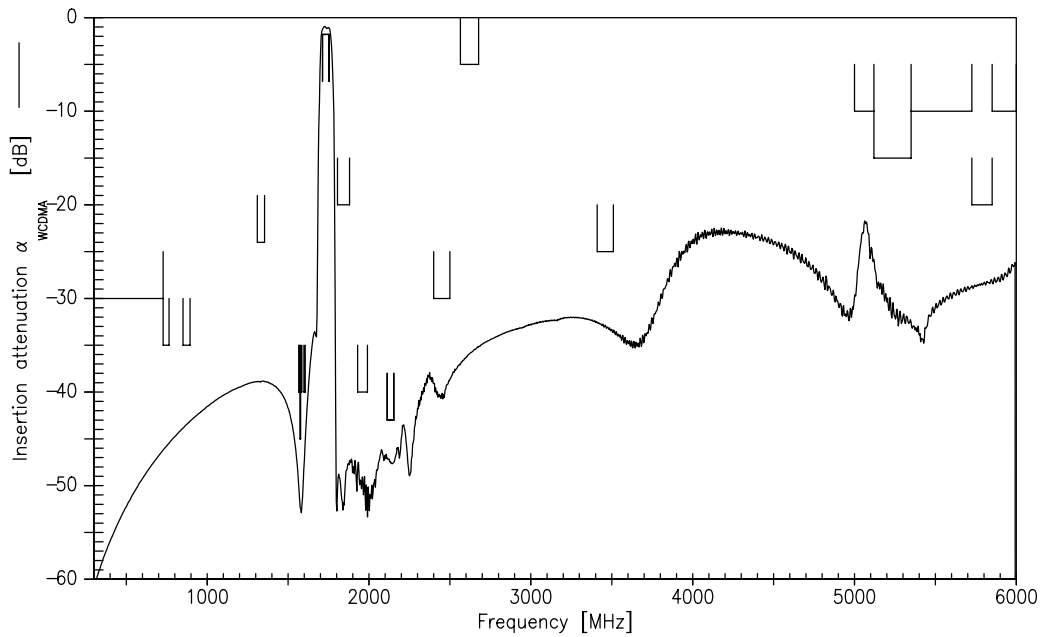
¹⁾ acc. to JESD22-A115A (machine model), 10 negative & 10 positive pulses.



Power Transfer Function Tx-Ant:

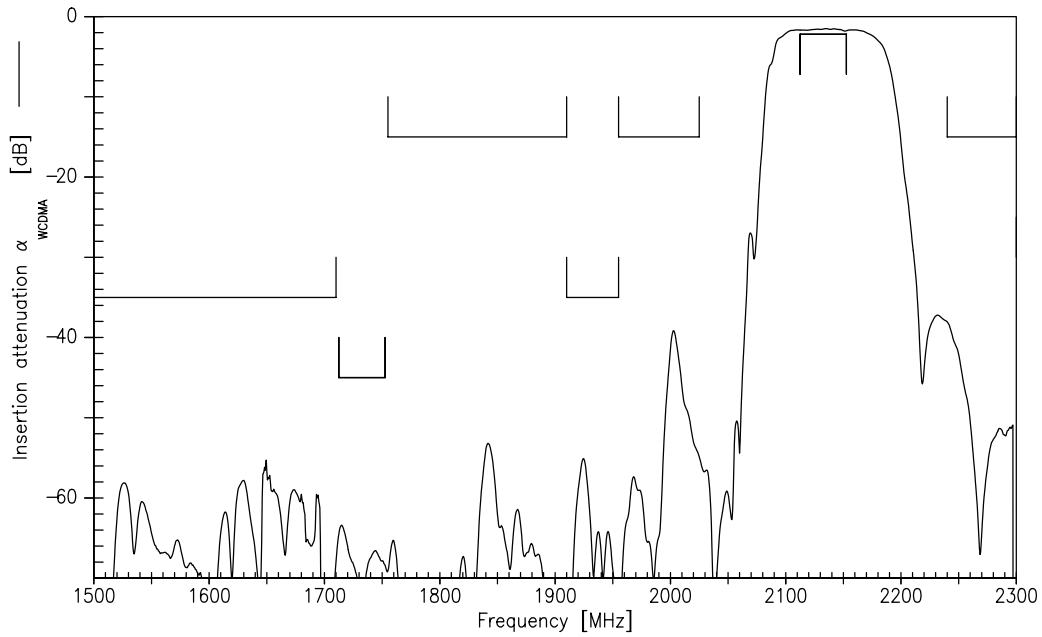


Power Transfer Function Tx-Ant (Wideband):

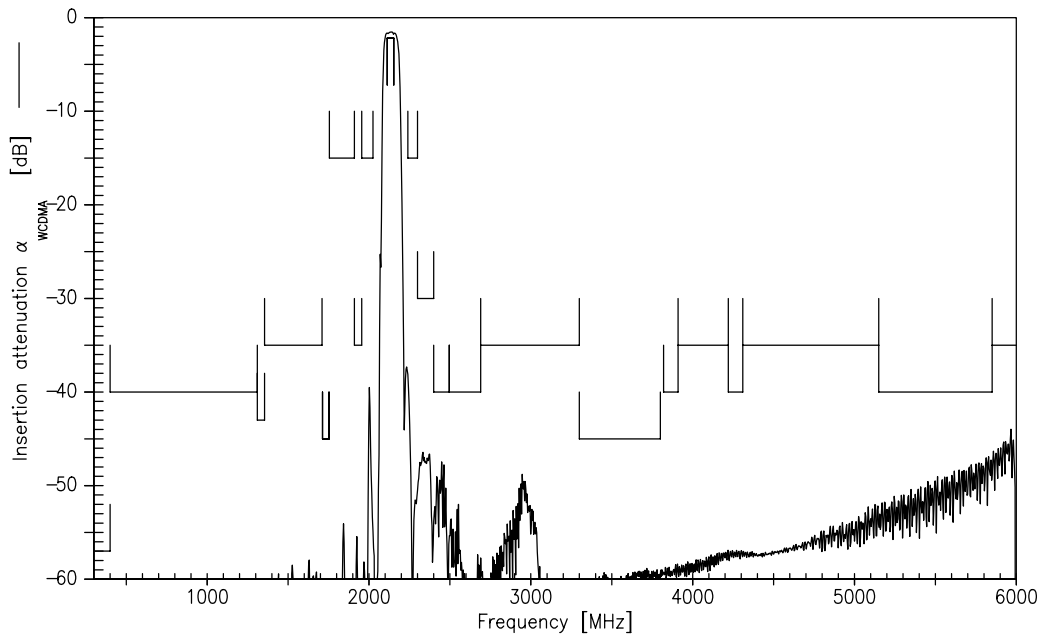




Power Transfer Function Ant-Rx:



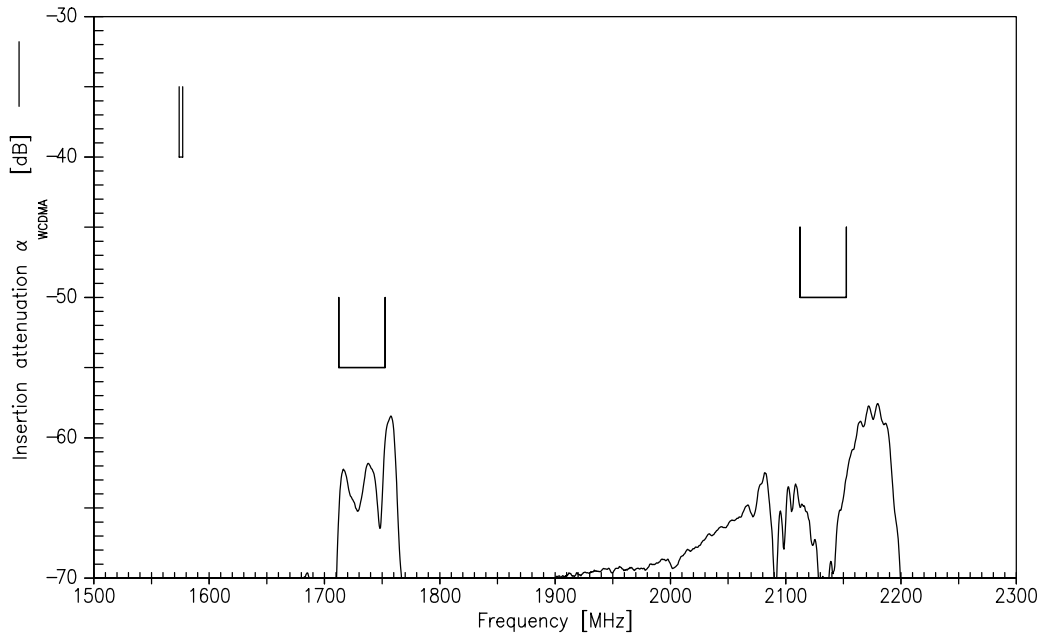
Power Transfer Function Ant-Rx (Wideband):



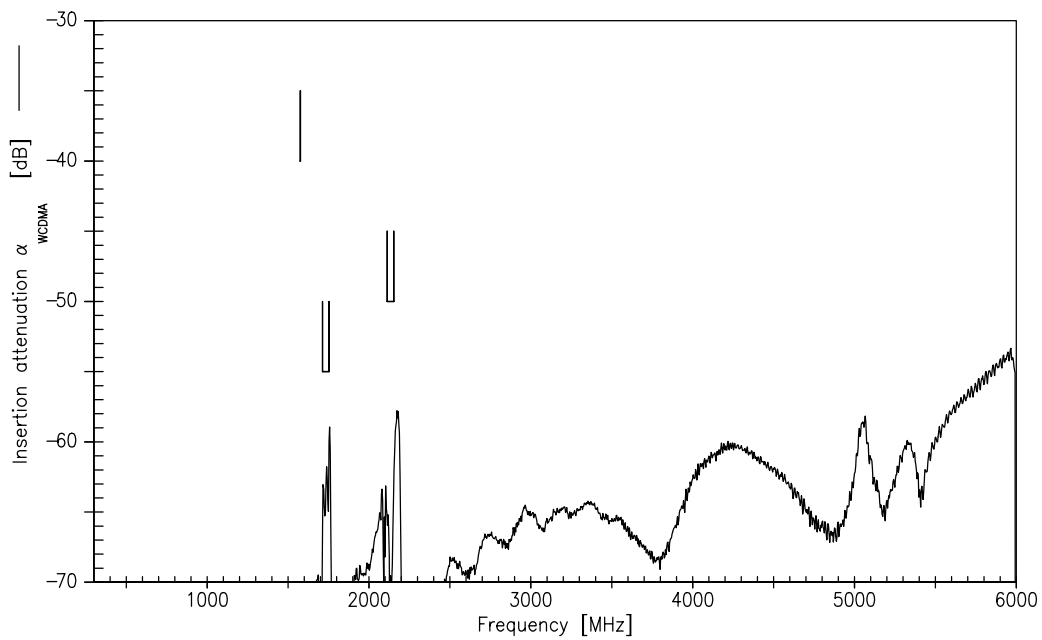
Please read *cautions and warnings* and *important notes* at the end of this document.



Power Transfer Function Tx-Rx isolation:



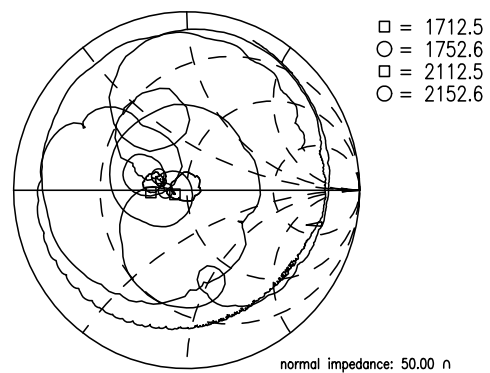
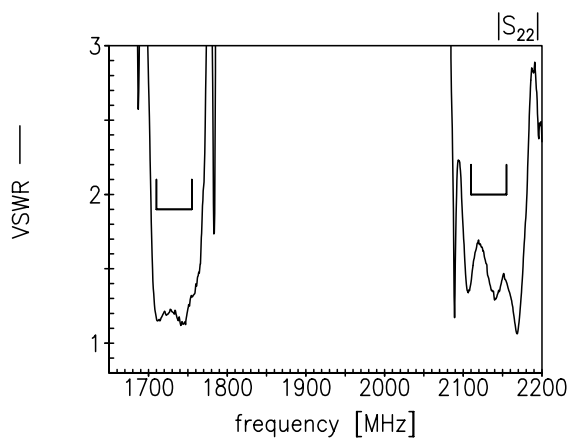
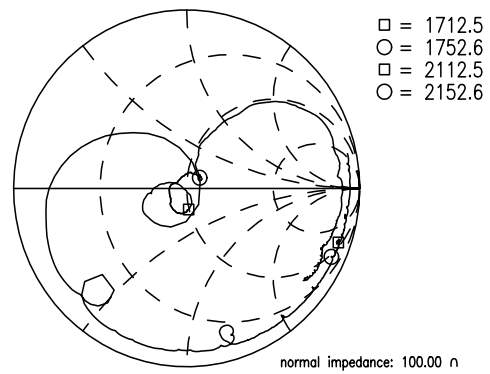
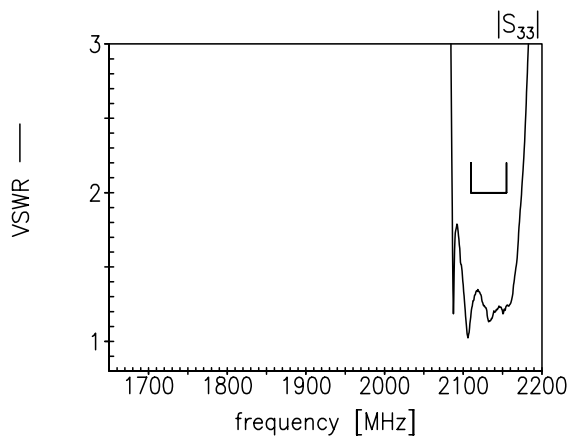
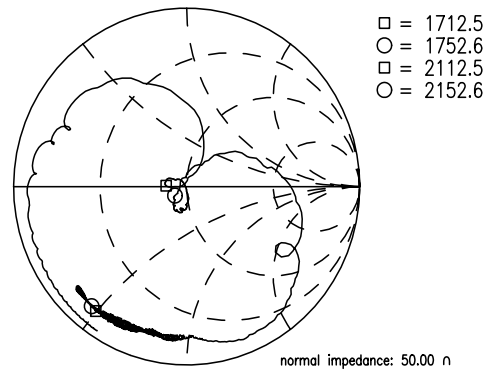
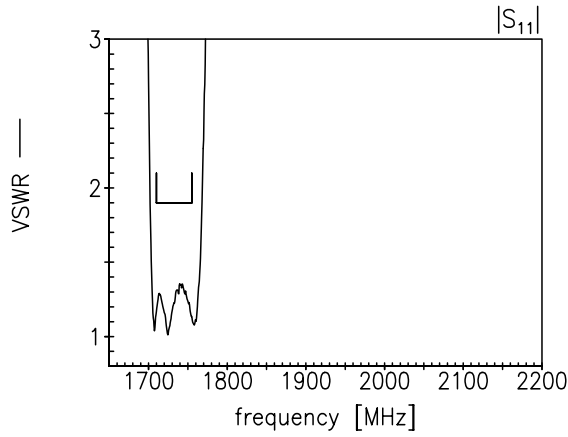
Power Transfer Function Tx-Rx isolation (Wideband):



Data sheet



VSWRs at Tx, Rx and Ant:



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


References

| | |
|----------------------------|--|
| Type | B8563 |
| Ordering code | B39212B8563P810 |
| Marking and package | C61157-A8-A45-51-27 |
| Packaging | F61074-V8247-Z000-3-27 |
| Date codes | L_1126 |
| S-parameters | B8563_NB_UN.s4p, B8563_WB_UN.s4p See file header for pin/port assignement. |
| Soldering profile | S_6001 |
| RoHS compatible | defined as compatible with the following documents: "DIRECTIVE 2002/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment. 2005/618/EC from April 18th, 2005, amending Directive 2002/95/EC of the European Parliament and of the Council for the purposes of establishing the maximum concentration values for certain hazardous substances in electrical and electronic equipment." |
| 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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Published by EPCOS AG
Systems, Acoustics, Waves Business Group
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