

RF360 Europe GmbH

A Qualcomm – TDK Joint Venture

## SAW Components

### BAW/SAW Duplexer

WCDMA Band II

Series/type: B8078  
Ordering code: B39202B8078P810

Date: February 13, 2015  
Version: 2.7

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## BAW/SAW Duplexer

WCDMA Band II

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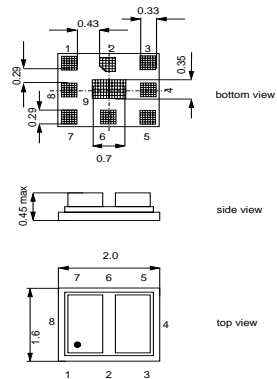
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**Application**

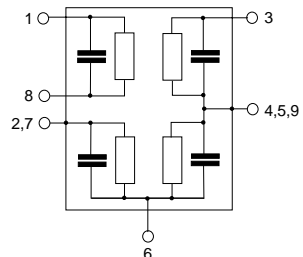
- Low-loss BAW/SAW duplexer for mobile telephone WCDMA Band II systems
- Low insertion attenuation
- Low amplitude ripple
- Usable passband 60 MHz
- Single ended to balanced transformation in Antenna - Rx path
- Impedance transformation 50Ω to 100Ω in Antenna - Rx path


**Features**

- Package size 2.0 x 1.6 mm<sup>2</sup>, 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 <sub>ANT</sub> = 50 Ω
RX terminating impedance:	Z <sub>RX</sub> = 100 Ω (balanced)    10nH
TX terminating impedance:	Z <sub>TX</sub> = 50 Ω

Characteristics TX - ANT		min.	typ. @ 25°C	max.	
<b>Center frequency</b>	f <sub>C</sub>	—	1880.0	—	MHz
<b>Maximum insertion attenuation</b>					
@f <sub>Carrier</sub> 1852.4 ... 1907.6 MHz	α <sub>WCDMA</sub> <sup>1)</sup>	—	2.0	3.0	dB
@f <sub>Carrier</sub> 1852.4 ... 1907.6 MHz	α <sub>WCDMA</sub> <sup>1)</sup>	—	2.0	2.5 <sup>3)</sup>	dB
<b>Error Vector Magnitude</b>					
@f <sub>Carrier</sub> 1852.4 ... 1907.6 MHz	EVM <sup>2)</sup>	—	1.0	3.0	%
@f <sub>Carrier</sub> 1852.4 ... 1907.6 MHz	EVM <sup>2)</sup>	—	1.0	2.0 <sup>3)</sup>	%
<b>Input VSWR (TX port)</b>					
1850.0 ... 1910.0 MHz		—	1.5	2.0	
<b>Output VSWR (ANT port)</b>					
1850.0 ... 1910.0 MHz		—	1.5	2.0	
<b>Attenuation</b>	α				
10.0 ... 728.0 MHz		30	33	—	dB
728.0 ... 764.0 MHz		30	33	—	dB
869.0 ... 894.0 MHz		30	34	—	dB
1574.0 ... 1577.0 MHz		36	42	—	dB
1577.0 ... 1680.0 MHz		30	42	—	dB
@f <sub>Carrier</sub> 1932.4 ... 1987.6 MHz	α <sub>WCDMA</sub> <sup>1)</sup>	45	50	—	dB
2110.0 ... 2155.0 MHz		35	44	—	dB
2400.0 ... 2500.0 MHz		25	30	—	dB
3690.0 ... 3830.0 MHz		20	25	—	dB
5150.0 ... 5350.0 MHz		16	23	—	dB
5540.0 ... 5860.0 MHz		16	22	—	dB

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

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

<sup>3)</sup> Valid for room temperature 25 °C

<b>SAW Components</b>	<b>B8078</b>
<b>BAW/SAW Duplexer</b>	<b>1880.0 / 1960.0 MHz</b>

Data Sheet



**Characteristics**

Temperature range for specification:  $T = -20\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$   
 ANT terminating impedance:  $Z_{ANT} = 50\ \Omega$   
 RX terminating impedance:  $Z_{RX} = 100\ \Omega$  (balanced) || 10nH  
 TX terminating impedance:  $Z_{TX} = 50\ \Omega$

Characteristics ANT-RX	min.	typ. @ 25°C	max.	
<b>Center frequency</b> $f_C$	—	1960.0	—	MHz
<b>Maximum insertion attenuation</b>				
@ $f_{Carrier}$ 1932.4 ... 1987.6MHz $\alpha_{WCDMA}^{1)}$	—	3.0	3.7	dB
@ $f_{Carrier}$ 1932.4 ... 1987.6MHz $\alpha_{WCDMA}^{1)}$	—	3.0	3.5 <sup>2)</sup>	dB
<b>Error Vector Magnitude</b>				
@ $f_{Carrier}$ 1932.4 ... 1987.6MHz EVM <sup>3)</sup>	—	1.8	6.0	%
@ $f_{Carrier}$ 1932.4 ... 1987.6MHz EVM <sup>3)</sup>	—	1.8	3.5 <sup>2)</sup>	%
@ $f_{Carrier}$ 1932.4 ... 1987.6MHz EVM <sup>3)</sup>	—	1.8	2.8 <sup>4)</sup>	%
<b>Input VSWR (ANT port)</b>				
1930.0 ... 1990.0MHz	—	1.8	2.6	
<b>Output VSWR (RX port)</b>				
1930.0 ... 1990.0MHz	—	1.8	2.4	
<b>Attenuation</b> $\alpha$				
1.0 ... 1765.0MHz	30	46	—	dB
1835.0 ... 1850.0MHz	30	58	—	dB
@ $f_{Carrier}$ 1852.4 ... 1907.6MHz $\alpha_{WCDMA}^{1)}$	45	56	—	dB
2025.0 ... 2050.0MHz	10	28	—	dB
2050.0 ... 2075.0MHz	25	36	—	dB
2400.0 ... 2484.0MHz	30	54	—	dB
2810.0 ... 2910.0MHz	30	58	—	dB
3775.0 ... 3905.0MHz	30	60	—	dB
5625.0 ... 5815.0MHz	30	61	—	dB
2075.0 ... 6000.0MHz	30	37	—	dB

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

<sup>2)</sup> Valid only for reduced temperature range from 0 °C to 85 °C.

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

<sup>4)</sup> Valid for room temperature 25 °C

**Data Sheet**

**Characteristics**

Temperature range for specification:	T = -20 °C to +85 °C
Antenna terminating impedance:	Z <sub>ANT</sub> = 50 Ω
RX terminating impedance:	Z <sub>RX</sub> = 100 Ω (balanced)    10nH
TX terminating impedance:	Z <sub>TX</sub> = 50 Ω

Characteristics ANT - RX		min.	typ. @ 25 °C	max.	
<b>Common mode suppression</b>	$S_{cs21}$				
1930.0 ... 1990.0 MHz		23	28	—	dB
<b>IMD Product Level Limits<sup>1)</sup></b>					
<b>at f<sub>TX</sub>=1880MHz, f<sub>RX</sub>=1960MHz</b>					
Blocker 1	80.0 MHz	—	-98	—	dBm
Blocker 2	1800.0 MHz	—	-107	—	dBm
Blocker 3	3840.0 MHz	—	-102	—	dBm

<sup>1)</sup> IMD product level limits for power levels P<sub>TX</sub>=21.5dBm (antenna port output power) and P<sub>Blocker</sub>=-15dBm (antenna port input power)

Characteristics TX - RX		min.	typ. @ 25 °C	max.	
<b>Isolation</b>	$\alpha$				
@f <sub>Carrier</sub> 1852.4 ... 1907.6 MHz	$\alpha_{WCDMA}^{1)}$	50	58	—	dB
@f <sub>Carrier</sub> 1932.4 ... 1987.6 MHz	$\alpha_{WCDMA}^{1)}$	46	51	—	dB
<b>Common Mode Isolation</b>	$\alpha$				
@f <sub>Carrier</sub> 1852.4 ... 1907.6 MHz	$\alpha_{WCDMA}^{1)}$	46	50	—	dB

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


**Maximum ratings**

Operable temperature range <sup>1)</sup>	T	-30/+85	°C	machine model, 10 pulses human body model, 1 pulse, field induced charged device model, 3 pulses, source and load impedance 50 Ω } continuous wave T = 55°C, 50.000 h
Storage temperature range	T <sub>stg</sub>	-40/+85	°C	
DC voltage	V <sub>DC</sub>	5.5	V	
ESD voltage	V <sub>ESD</sub>	50 <sup>2)</sup>	V	
	V <sub>ESD</sub>	100 <sup>3)</sup>	V	
	V <sub>ESD</sub>	500 <sup>4)</sup>	V	
Input power at 1850.0 ... 1910.0 MHz elsewhere	P <sub>IN</sub>	29	dBm	
		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.

3) acc. to JESD22-A114F (human body model), 1 negative & 1 positive pulses.

4) acc. to JESD22-C101C (field induced charged device model), 3 negative & 3 positive pulses.

**Annotation for characteristics section**

Attenuation of WCDMA signal ("Powertransferfunction",  $\alpha_{\text{WCDMA}}$ ) is determined by

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

$f_{\text{Carrier}}$  according to 3GPP TS 25.101 (e.g. for WCDMA Band 2 Passband,  $f_{\text{Carrier}}$  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:

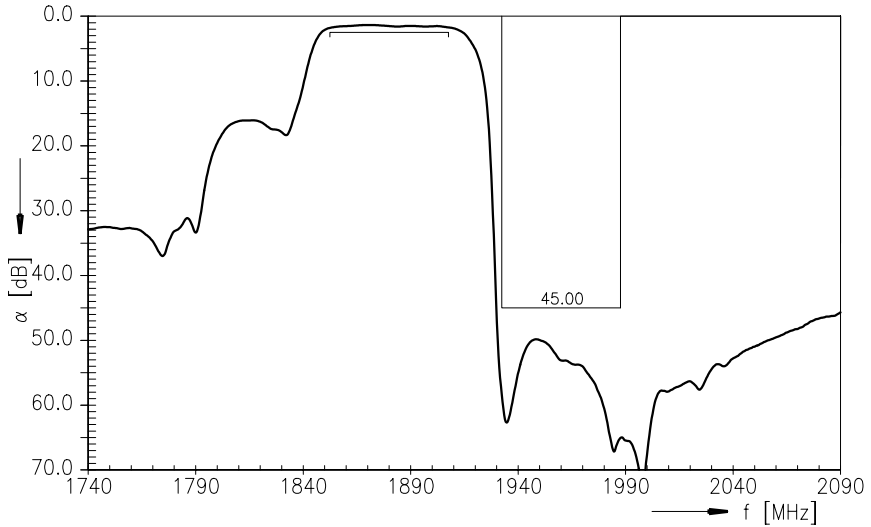
$$\int_{-\infty}^{\infty} |H_{\text{RRC}}(f)|^2 df = 1$$



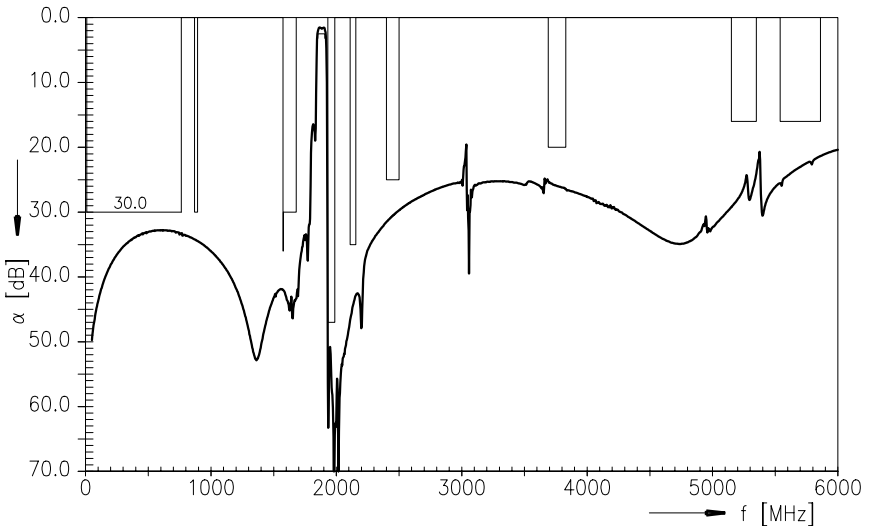
Data Sheet



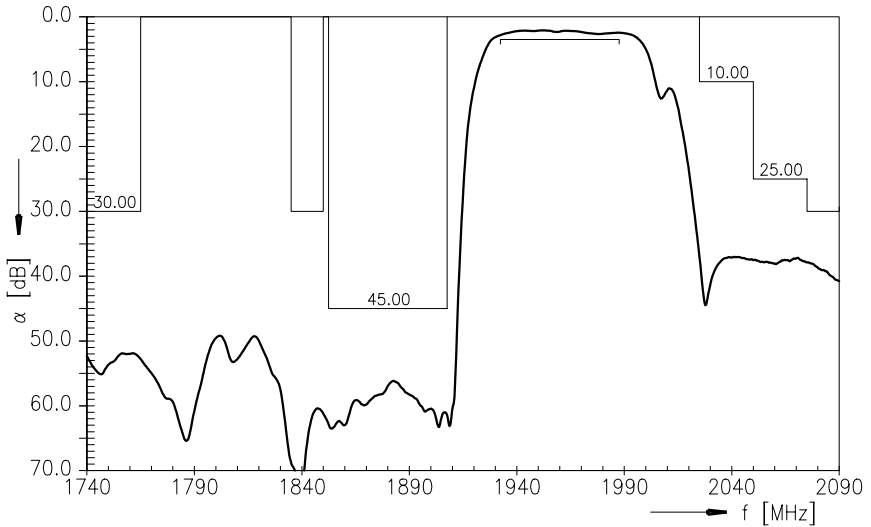
**Frequency Response TX-ANT (PTF)**



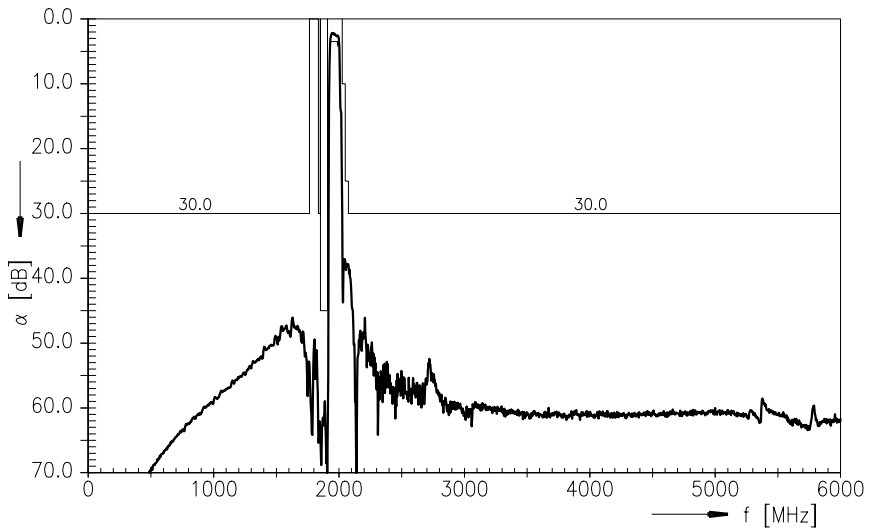
**Frequency Response TX-ANT (wideband)**

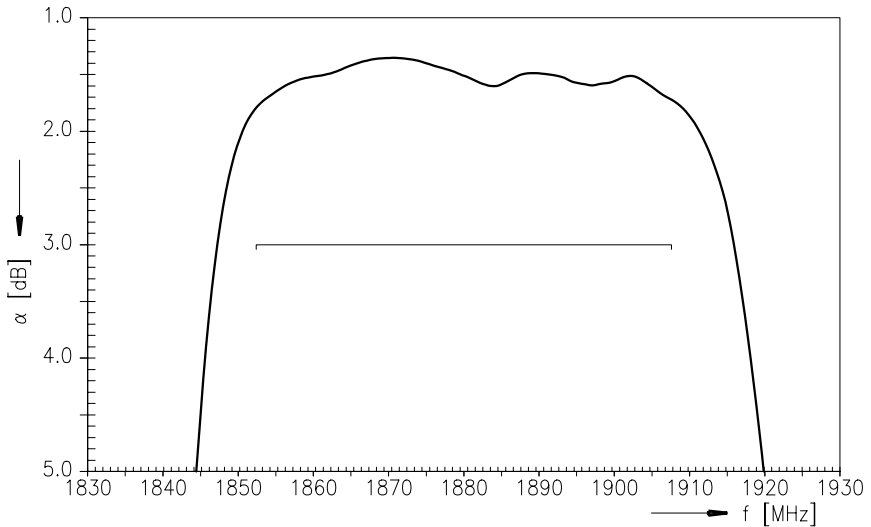
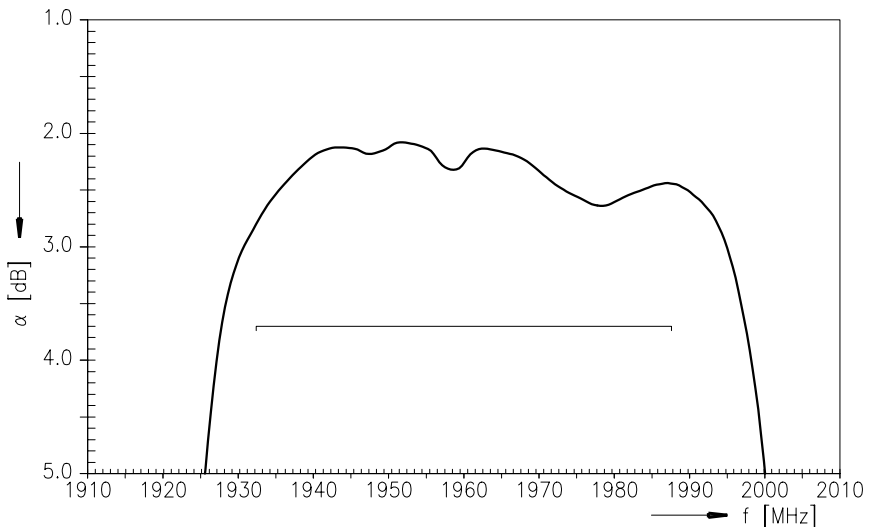


**Frequency Response ANT-RX (PTF)**



**Frequency Response ANT-RX (wideband)**

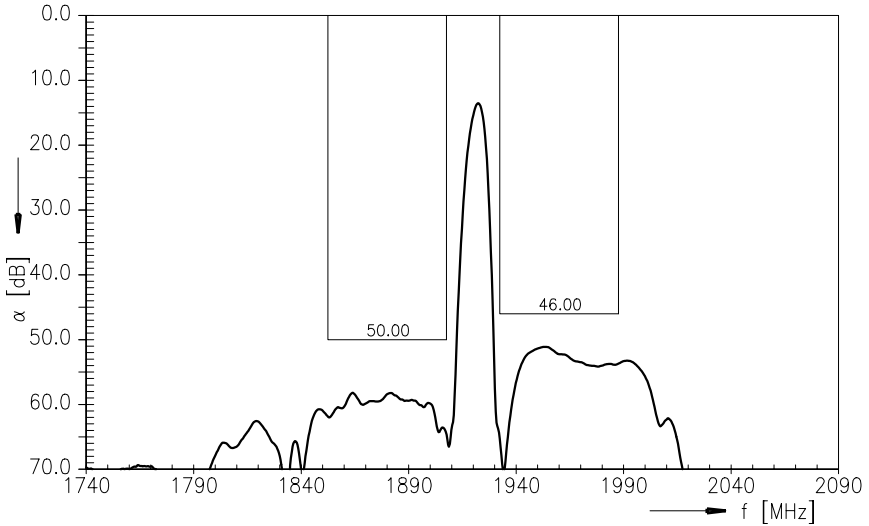



**Frequency Response TX-ANT Passband (PTF)**

**Frequency Response ANT-RX Passband (PTF)**


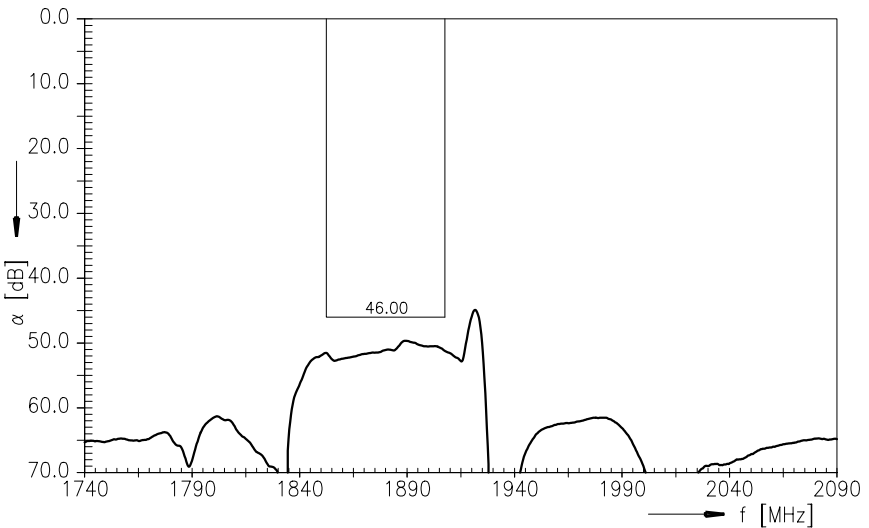
Data Sheet



**Frequency Response TX-RX (PTF)**



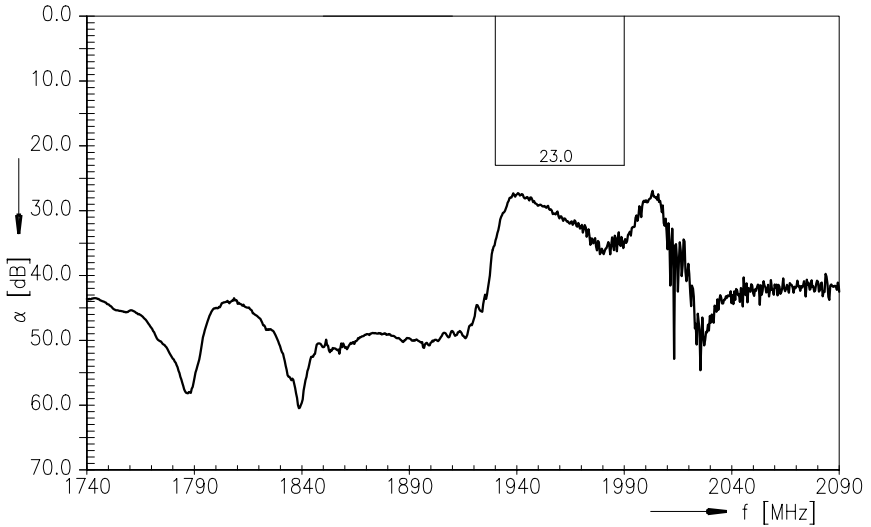
**Frequency Response Tx-Rx (PTF) Common Mode Isolation**



Data Sheet

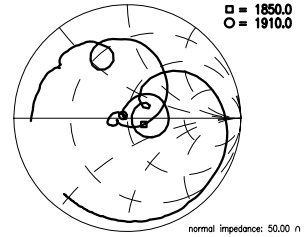
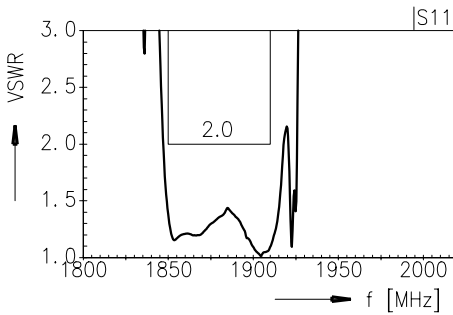


**Frequency Response RX-ANT Common Mode Suppression**

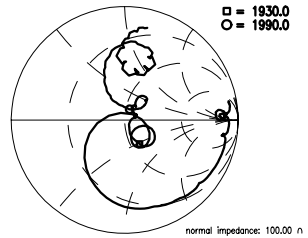
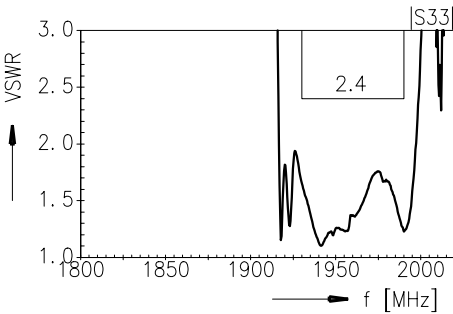




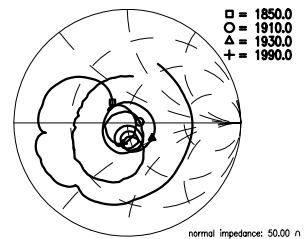
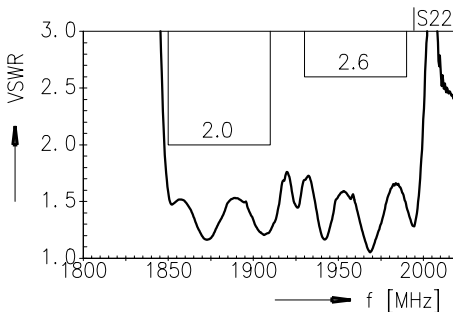
**VSWR TX-port**



**VSWR RX-port (differential mode)**



**VSWR ANT-port**



<b>SAW Components</b>	<b>B8078</b>
<b>BAW/SAW Duplexer</b>	<b>1880.0 / 1960.0 MHz</b>

Data Sheet



<b>Type</b>	B8078
<b>Ordering code</b>	B39202B8078P810
<b>Marking and package</b>	C61157-A8-A48
<b>Packaging</b>	F61074-V8247-Z000
<b>Date codes</b>	L_1126
<b>S-parameters</b>	B8078_NB_UN.s4p (unmatched, nearby) B8078_WB_UN.s4p (unmatched, wideband) 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>Moldability</b>	Before using in overmolding environment, please contact your EPCOS sales office.
<b>Matching coils</b>	See Inductor pdf-catalog <a href="http://www.tdk.co.jp/tefe02/coil.htm#aname1">http://www.tdk.co.jp/tefe02/coil.htm#aname1</a> and Data Library for circuit simulation <a href="http://www.tdk.co.jp/etvcl/index.htm">http://www.tdk.co.jp/etvcl/index.htm</a>

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