



SAW Components

BAW/SAW Duplexer

WCDMA Band II (PCS)

Series/type: B7686

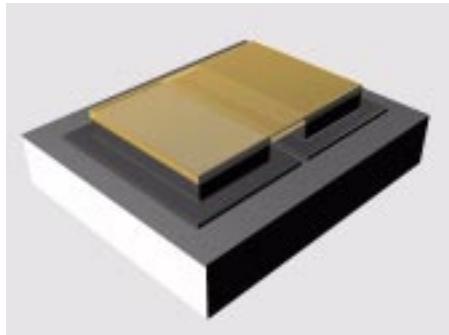
Ordering code: B39202B7686L313

Date: June 23, 2008

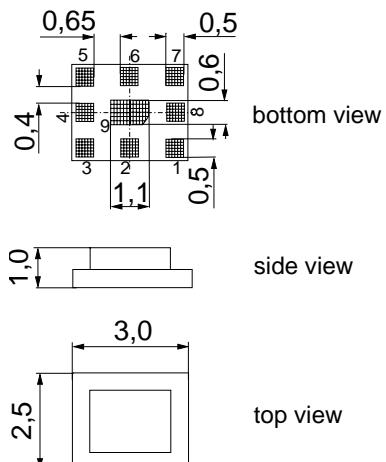
Version: 2.0

Application

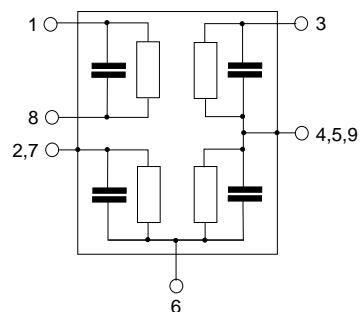
- Low-loss BAW/SAW duplexer for mobile telephone WCDMA Band II (PCS) systems
- Low insertion attenuation
- Low amplitude ripple
- Usable passband 60 MHz
- Single ended to balanced transformation in Antenna - Rx path
- Impedance transformation 50Ω to 100Ω in Antenna - Rx path


Features

- Package size $3.0 \times 2.5 \text{ mm}^2$, max. height 1.2 mm
- RoHS compatible
- Approx. weight 0.03 g
- Package for **Surface Mount Technology (SMT)**
- Ni, gold-plated terminals
- Fully matched by integrated matching network
- **Electrostatic Sensitive Device (ESD)**


Pin configuration

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



**SAW Components****B7686****BAW/SAW Duplexer****1880.0 / 1960.0 MHz****Data Sheet****Characteristics**

Temperature range for specification:

 $T = -15^{\circ}\text{C}$ to $+80^{\circ}\text{C}$

ANT terminating impedance:

 $Z_{\text{ANT}} = 50 \Omega$

RX terminating impedance:

 $Z_{\text{RX}} = 100 \Omega$ (balanced) $\parallel 15\text{nH}$

TX terminating impedance:

 $Z_{\text{TX}} = 50 \Omega$

Characteristics TX-ANT		min.	typ. @ 25°C	max.	
Center frequency	f_{C}	—	1880	—	MHz
Maximum insertion attenuation	$\alpha_{\text{WCDMA}}^1)$	—	2.4	3.2	dB
Amplitude ripple (p-p)	$\alpha_{\text{WCDMA}}^1)$	—	0.9	1.6	dB
Error Vector Magnitude	$\alpha_{\text{WCDMA}}^1)$	—	2.0	4.0	%
Input VSWR (TX port)	1850.0 ... 1910.0 MHz	—	1.8	2.3	
Output VSWR (ANT port)	1850.0 ... 1910.0 MHz	—	1.7	2.2	
Attenuation	α				
470.0 ... 750.0 MHz		30	43	—	dB
1450.0 ... 1480.0 MHz		30	37	—	dB
1570.0 ... 1580.0 MHz		35	41	—	dB
1670.0 ... 1675.0 MHz		30	44	—	dB
1770.0 ... 1824.0 MHz		20	23	—	dB
1824.0 ... 1830.0 MHz		10	23	—	dB
$\alpha_{\text{WCDMA}}^1)$		45	52	—	dB
2400.0 ... 2500.0 MHz		25	31	—	dB
3700.0 ... 3820.0 MHz		18	21	—	dB
3820.0 ... 5150.0 MHz		10	16	—	dB
5150.0 ... 5550.0 MHz		10	14	—	dB
5550.0 ... 5730.0 MHz		10	13	—	dB

¹⁾ Attenuation of WCDMA signal ("Powertransferfunction"). Please refer to annotation on page (7).²⁾ Error Vector Magnitude (EVM) based on definition given in 3GPP TS 25.141.³⁾ Valid only for room temperature 25 °C

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 $T = -15^{\circ}\text{C}$ to $+80^{\circ}\text{C}$

ANT terminating impedance:

 $Z_{\text{ANT}} = 50 \Omega$

RX terminating impedance:

 $Z_{\text{RX}} = 100 \Omega$ (balanced) $\parallel 15\text{nH}$

TX terminating impedance:

 $Z_{\text{TX}} = 50 \Omega$

Characteristics ANT-RX		min.	typ. @ 25°C	max.	
Center frequency	f_{C}	—	1960	—	MHz
Maximum insertion attenuation					
@ f_{Carrier} 1932.4 ... 1987.6 MHz	$\alpha_{\text{WCDMA}}^{1)}$	—	3.0	3.7	dB
1930.0 ... 1935.0 MHz		—	3.3	4.6	dB
1935.0 ... 1990.0 MHz		—	2.9	3.5	dB
Amplitude ripple (p-p)					
@ f_{Carrier} 1932.4 ... 1987.6 MHz	$\alpha_{\text{WCDMA}}^{1)}$	—	1.1	2.0	dB
Error Vector Magnitude					
@ f_{Carrier} 1932.4 ... 1987.6 MHz	EVM ²⁾	—	2.0	4.0	%
@ f_{Carrier} 1932.4 ... 1987.6 MHz	EVM ^{2) 3)}	—	1.8	2.8	%
Input VSWR (ANT port)					
1930.0 ... 1990.0 MHz		—	1.6	2.2	
Output VSWR (RX port)					
1930.0 ... 1990.0 MHz		—	2.0	2.3	
Attenuation	α				
0.3 ... 1770.0 MHz		35	57	—	dB
1770.0 ... 1850.0 MHz		38	58	—	dB
@ f_{Carrier} 1852.4 ... 1907.6 MHz	$\alpha_{\text{WCDMA}}^{1)}$	50	54	—	dB
1910.0 ... 1915.0 MHz		9	35	—	dB
2010.0 ... 2070.0 MHz		5	8	—	dB
2070.0 ... 2500.0 MHz		30	55	—	dB
2500.0 ... 3780.0 MHz		35	58	—	dB
3780.0 ... 3980.0 MHz		35	57	—	dB
3980.0 ... 6000.0 MHz		35	52	—	dB

¹⁾ Attenuation of WCDMA signal ("Powertransferfunction"). Please refer to annotation on page (7).²⁾ Error Vector Magnitude (EVM) based on definition given in 3GPP TS 25.141.³⁾ Valid for reduced temperature range 0°C to 80°C

**SAW Components****B7686****BAW/SAW Duplexer****1880.0 / 1960.0 MHz****Data Sheet****Characteristics**

Temperature range for specification:

 $T = -15^{\circ}\text{C}$ to $+80^{\circ}\text{C}$

ANT terminating impedance:

 $Z_{\text{ANT}} = 50 \Omega$

RX terminating impedance:

 $Z_{\text{RX}} = 100 \Omega$ (balanced) $\parallel 15\text{nH}$

TX terminating impedance:

 $Z_{\text{TX}} = 50 \Omega$

Characteristics ANT-RX		min.	typ. @ 25°C	max.	
Common mode suppression	S_{cs21}				
1930.0 ... 1990.0 MHz		23	28	—	dB
IMD Product Level Limits¹⁾					
at $f_{\text{TX}}=1880\text{MHz}$, $f_{\text{RX}}=1960\text{MHz}$					
Blocker 1	80.0 MHz	—	-117	—	dBm
Blocker 2	1800.0 MHz	—	-101	—	dBm
Blocker 3	3840.0 MHz	—	-87	—	dBm

¹⁾ IMD product level limits for power levels $P_{\text{TX}}=21\text{dBm}$ (antenna port output power) and $P_{\text{Blocker}}=-15\text{dBm}$ (antenna port input power)

Characteristics TX-RX		min.	typ. @ 25°C	max.	
Isolation	α				
@ $f_{\text{Carrier}}=1852.4 \dots 1907.6 \text{ MHz}$	$\alpha_{\text{WCDMA}}^{1)}$	53	57	—	dB
@ $f_{\text{Carrier}}=1932.4 \dots 1987.6 \text{ MHz}$	$\alpha_{\text{WCDMA}}^{1)}$	48	54	—	dB

¹⁾ Attenuation of WCDMA signal ("Powertransferfunction"). Please refer to annotation on page (7).

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**Maximum ratings**

Temperature range for specification ¹⁾	T	-15/+80	°C	
Operable temperature range ²⁾	T	-25/+85	°C	
Storage temperature range	T _{stg}	-40/+85	°C	
DC voltage	V _{DC}	3	V	
ESD voltage	V _{ESD}	50 ³⁾	V	machine model, 10 pulses
Input power at 1850.0 ... 1910.0 MHz elsewhere	P _{IN}	30 10	dBm dBm	source and load impedance 50 Ω continuous wave T = 55 °C, 50.000 h

¹⁾ Defines the temperature range in which the specification values are warranted.

²⁾ Defines the temperature range in which the SAW / BAW device keeps its typical characteristics, however the specification values are not guaranteed.

³⁾ acc. to JESD22-A115A (machine model), 10 negative & 10 positive pulses.

Annotation for characteristics section

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

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

$f_{Carrier}$ 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)). $H_{RRC}(f)$ is the transfer function of the root-raised cosine transmit pulse shaping filter according to 3GPP TS 25.101 with the following normalization:

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

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B7686

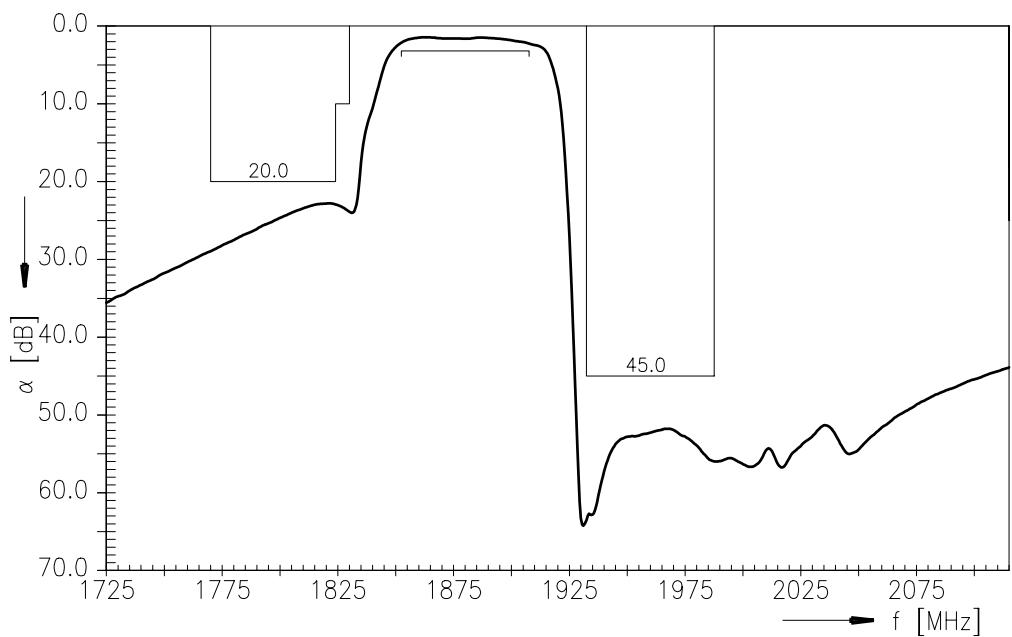
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1880.0 / 1960.0 MHz

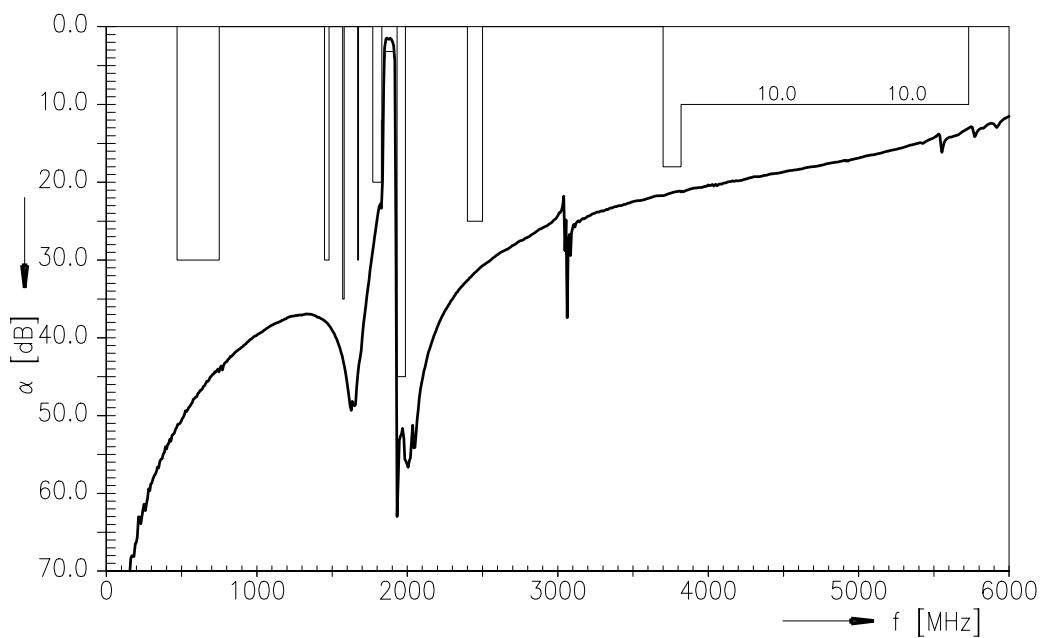
Data Sheet



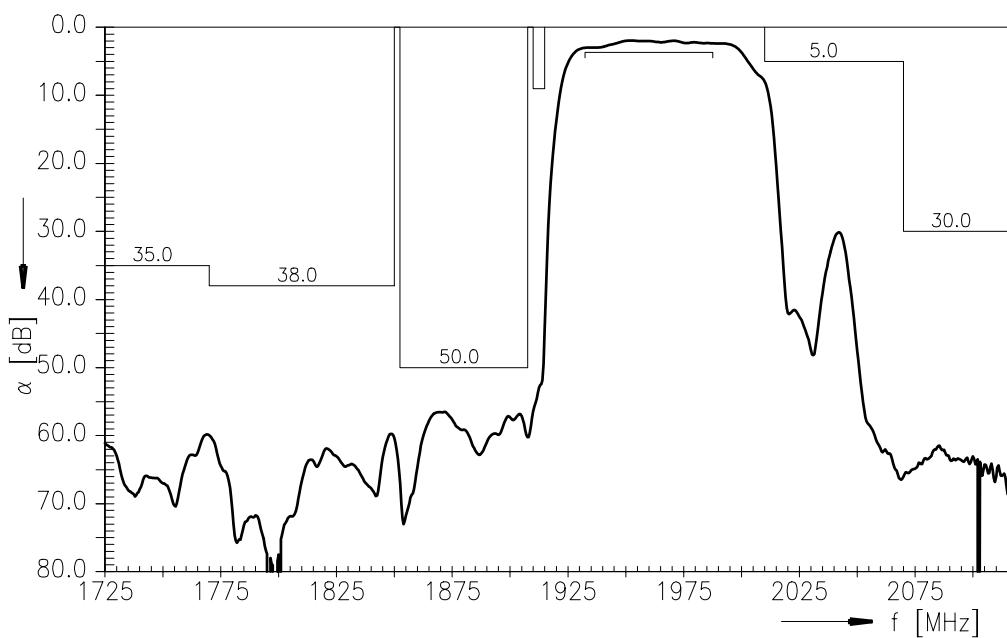
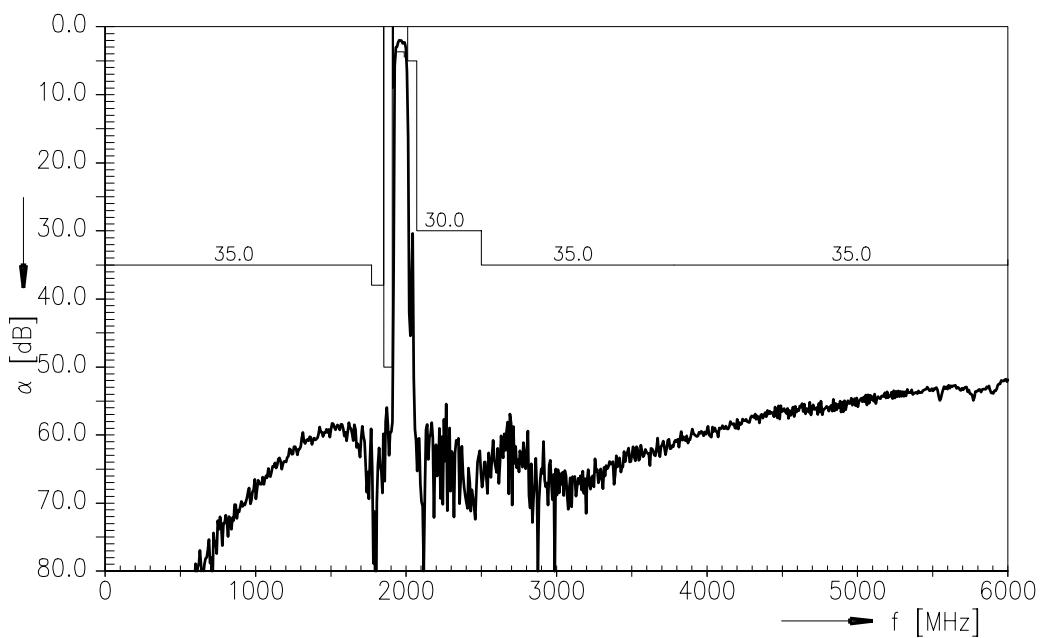
Frequency Response TX-ANT (PTF)

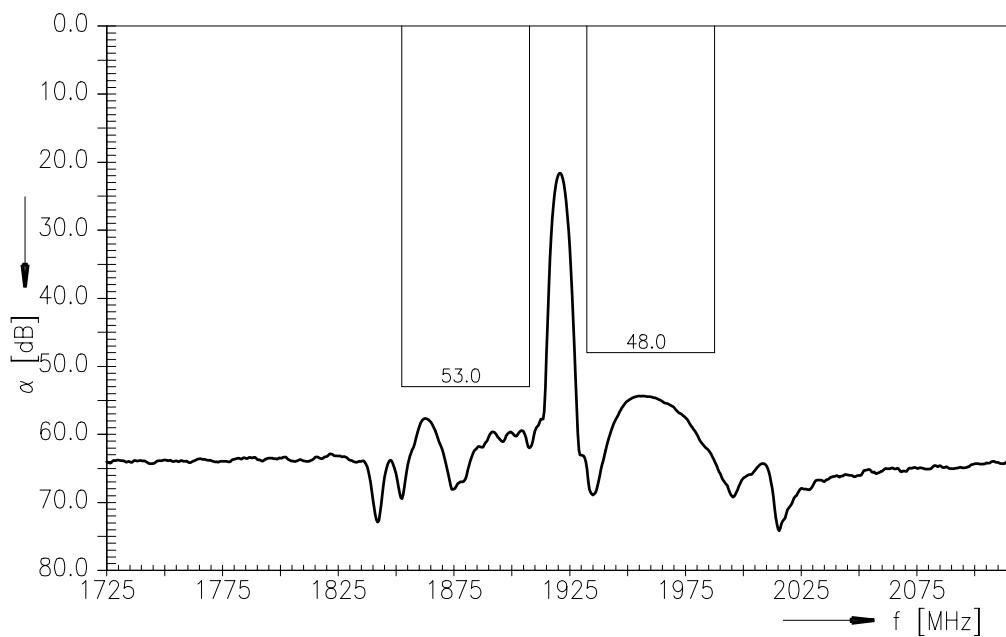
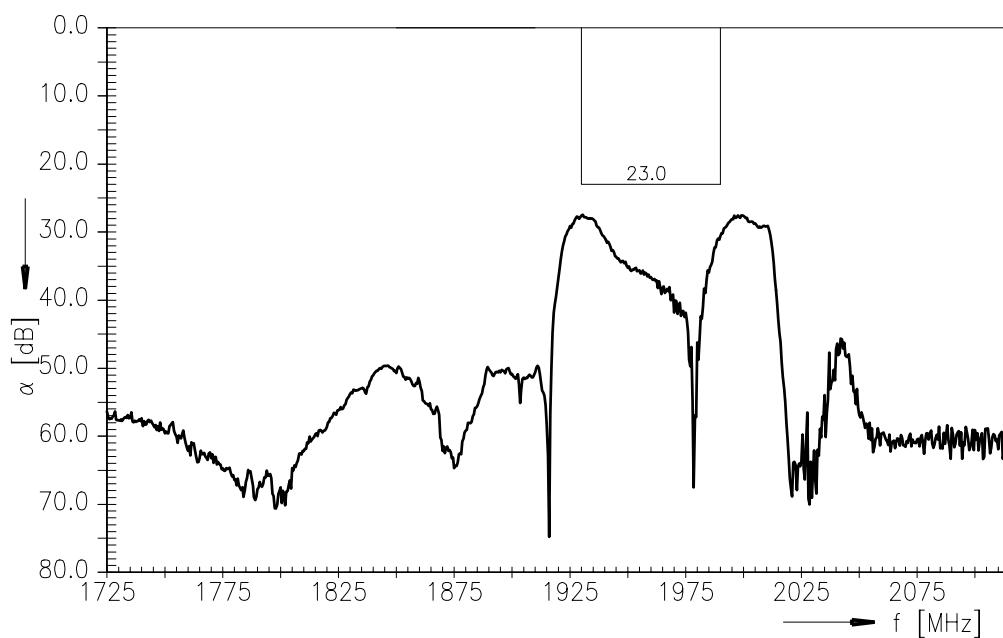


Frequency Response TX-ANT (wideband)



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

Frequency Response ANT-RX (PTF)

Frequency Response ANT-RX (wideband)


Frequency Response TX-RX (PTF)

Frequency Response RX-ANT Common Mode Suppression


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**References**

Type	B7686
Ordering code	B39202B7686L313
Marking and package	C61157-A3-A40
Packaging	F61074-V8211-Z000
Date codes	L_1126
S-parameters	B7686_NB_UN.s4p B7686_WB_UN.s4p See file header for pin/port assignment.
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."

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