



# SAW Components

SAW Duplexer  
WCDMA/LTE Band IX

<b>Series/type:</b>	<b>B7676</b>
<b>Ordering code:</b>	
Date:	August 09, 2010
Version:	1.1



**SAW Components**

**B7676**

**SAW Duplexer**

**1767.4 / 1862.4 MHz**

Preliminary Data



### Revision History

Changes compared to previously issued iteration

<b>Issue</b>	<b>Originator</b>	<b>Detailed specification changes</b>	<b>Date</b>
1.0	S.Mochizuka	Initial release	March 18, 2010
1.1	S.Mochizuka	Improved design version: <ul style="list-style-type: none"><li>- Reduced Txport VSWR to 2.0 max.</li><li>- Increased Tx attenuation values esp. at WLAN to 35dB and harmonics to 17dB min.</li><li>- Slightly worse values for GPS</li><li>- Increased Tx band isolation to 53dB min.</li><li>- Increased Tx band common mode isolation to 53dB min.</li></ul>	August 09, 2010

Preliminary Data



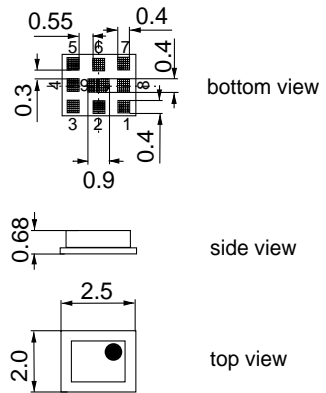
Application

- Low-loss SAW duplexer for mobile telephone WCDMA/LTE Band IX systems
- Low insertion attenuation
- Low amplitude ripple
- Usable passband 35 MHz
- Single ended to balanced transformation in Antenna - Rx path
- Impedance transformation 50Ω to 100Ω in Antenna - Rx path



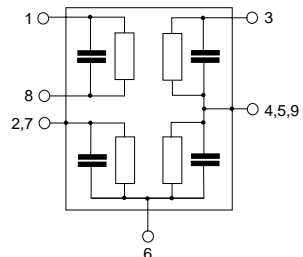
Features

- Package size 2.5 x 2.0 mm<sup>2</sup>, package height 0.74 mm max.
- RoHS compatible
- Approx. weight 0.013g
- Package for **Surface Mount Technology (SMT)**
- Ni, gold-plated terminals
- **Electrostatic Sensitive Device (ESD)**



Pin configuration

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



**Preliminary Data**

**Characteristics**

Temperature range for specification:	T = -20 °C to +85 °C
Antenna terminating impedance:	Z <sub>ANT</sub> = 50 Ω    4.1 nH
RX terminating impedance:	Z <sub>RX</sub> = 100 Ω (balanced)    8.2 nH
TX terminating impedance:	Z <sub>TX</sub> = 50 Ω

<b>Characterisitcs TX - ANT</b>				<b>min.</b>	<b>typ. @ 25 °C</b>	<b>max.</b>	
<b>Center frequency</b>	f <sub>C</sub>			—	1767.4	—	MHz
<b>Maximum insertion attenuation</b>							
1749.9 ... 1784.9 MHz					1.4	1.9	dB
@f <sub>carrier</sub> 1752.4 ... 1782.4 MHz	α <sub>WCDMA</sub> <sup>1)</sup>				1.3	1.8	dB
<b>Amplitude ripple(p-p)</b>							
1749.9 ... 1784.9 MHz					0.4	0.9	dB
@f <sub>carrier</sub> 1752.4 ... 1782.4 MHz	α <sub>WCDMA</sub> <sup>1)</sup>				0.3	0.8	dB
<b>Error Vector Magnitude</b>							
@f <sub>carrier</sub> 1752.4 ... 1782.4 MHz	EVM <sup>2)</sup>				1.3	2.0	%
<b>Input VSWR (TX port)</b>							
1749.9 ... 1784.9 MHz					1.6	2.0	
<b>Output VSWR (ANT port)</b>							
1749.9 ... 1784.9 MHz					1.6	2.0	
<b>Attenuation</b>	α						
10.0 ... 1565.42 MHz				30	38		dB
1565.42 ... 1573.374 MHz				35	38		dB
1573.374 ... 1577.466 MHz				36	39		dB
1577.466 ... 1585.42 MHz				37	39		dB
1597.5515 ... 1605.886 MHz				39	42		dB
1605.886 ... 1680.0 MHz				25	32		dB
1844.9 ... 1879.9 MHz				45	50		dB
@f <sub>carrier</sub> 1847.4 ... 1877.4 MHz	α <sub>WCDMA</sub> <sup>1)</sup>			45	51		dB
1884.5 ... 1919.6 MHz				40	42		dB
2110.0 ... 2170.0 MHz				27	40		dB
2400.0 ... 2500.0 MHz				35	41		dB
3500.0 ... 3570.0 MHz				20	31		dB
5150.0 ... 5355.0 MHz				17	21		dB
5725.0 ... 5850.0 MHz				15	19		dB

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

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

**Preliminary Data**

**Characteristics**

Temperature range for specification:	T = -20 °C to +85 °C
Antenna terminating impedance:	Z <sub>ANT</sub> = 50 Ω    4.1 nH
RX terminating impedance:	Z <sub>RX</sub> = 100 Ω (balanced)    8.2 nH
TX terminating impedance:	Z <sub>TX</sub> = 50 Ω

Characteristics ANT - RX		min.	typ. @ 25 °C	max.	
<b>Center frequency</b>	f <sub>C</sub>	—	1862.4	—	MHz
<b>Maximum insertion attenuation</b>					
1844.9 ... 1879.9 MHz			2.0	2.4	dB
@f <sub>carrier</sub> 1847.4 ... 1877.4 MHz	α <sub>WCDMA</sub> <sup>1)</sup>		1.9	2.4	dB
<b>Amplitude ripple(p-p)</b>					
1844.9 ... 1879.9 MHz			0.6	0.8	dB
@f <sub>carrier</sub> 1847.4 ... 1877.4 MHz	α <sub>WCDMA</sub> <sup>1)</sup>		0.5	0.8	dB
<b>Common Mode Rejection Ratio CMRR</b>					
1844.9 ... 1879.9 MHz		23 <sup>2)</sup>	28		dB
<b>Input VSWR (ANT port)</b>					
1844.9 ... 1879.9 MHz			1.5	2.0	
<b>Output VSWR (RX port)</b>					
1844.9 ... 1879.9 MHz			1.5	2.0	
<b>Attenuation</b>	α				
10.0 ... 1750.0 MHz		35	54		dB
1749.9 ... 1784.9 MHz		48	54		dB
@f <sub>carrier</sub> 1752.4 ... 1782.4 MHz	α <sub>WCDMA</sub> <sup>1)</sup>	48	55		dB
1965.0 ... 2400.0 MHz		15	52		dB
2400.0 ... 2484.0 MHz		30	52		dB
2484.0 ... 5650.0 MHz		35	42		dB
<b>IMD Product Level Limits<sup>3)</sup></b>					
<b>at f<sub>TX</sub> = 1749.9~1784.9 MHz</b>					
Blocker 1	95.0 MHz		-130	-105	dBm
Blocker 2	1672.4 MHz		-123	-108	dBm
Blocker 3	3629.8 MHz		-124	-105	dBm
Blocker 4	5397.2 MHz		-129	-108	dBm

- 1) Attenuation of WCDMA signal("Powertransferfunction").Please refer to annotation on page (7).
- 2) A combination of 10° phase balance and 1dB amplitude balance corresponds to 19.6 dB CMRR.
- 3) IMD product level limits for power levels P<sub>TX</sub>=21.5dB (antenna port output power) and P<sub>BLOCKER</sub>=-15dBm (antenna port input power).

**Preliminary Data**

**Characteristics**

Temperature range for specification:

$$T = -20\text{ °C to }+85\text{ °C}$$

Antenna terminating impedance:

$$Z_{ANT} = 50\ \Omega \parallel 4.1\text{ nH}$$

RX terminating impedance:

$$Z_{RX} = 100\ \Omega \text{ (balanced)} \parallel 8.2\text{ nH}$$

TX terminating impedance:

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

<b>Characteristics TX - RX</b>				<b>min.</b>	<b>typ. @ 25 °C</b>	<b>max.</b>	
<b>Differential Mode Isolation</b>							
			$\alpha$				
	1749.9 ... 1784.9 MHz			52	55		dB
@ $f_{carrier}$	1752.4 ... 1782.4 MHz	$\alpha_{WCDMA}^{1)}$		53	56		dB
	1844.9 ... 1879.9 MHz			50	54		dB
@ $f_{carrier}$	1847.4 ... 1877.4 MHz	$\alpha_{WCDMA}^{1)}$		50	55		dB
<b>Common Mode Isolation</b>							
			$\alpha$				
	1749.9 ... 1784.9 MHz			53	56		dB
@ $f_{carrier}$	1752.4 ... 1782.4 MHz	$\alpha_{WCDMA}^{1)}$		53	56		dB

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

**Preliminary Data**

**Maximum ratings**

Storage temperature range	T <sub>stg</sub>	-40/+85	°C	
DC voltage	V <sub>DC</sub>	5	V	
ESD voltage	V <sub>ESD</sub>	50 <sup>1)</sup>	V	machine model, 10 pulses
Input power at 1749.9 ... 1784.9 MHz elsewhere	P <sub>IN</sub>	29 10	dBm dBm	source and load impedance 50 Ω } continuous wave } T = 50°C, 5,000 h

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

**Annotation for characteristics section**

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

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

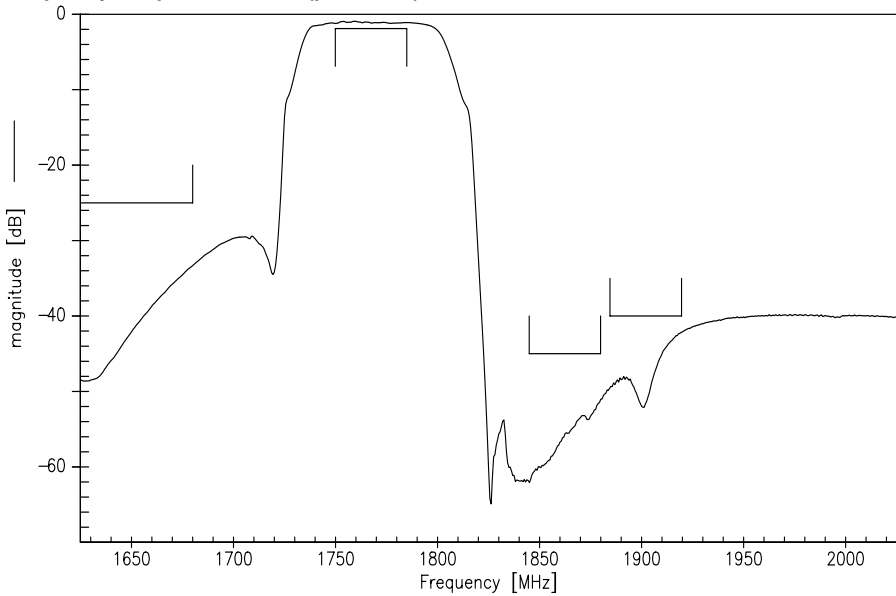
$f_{\text{Carrier}}$  according to 3GPP TS 25.101 (e.g. for WCDMA Band 9-Passband,  $f_{\text{Carrier}}$  ranges from 1752.4 MHz (lowest Tx channel) to 1782.4 MHz (highest Tx channel).  $H_{\text{RRC}}(f)$  is the transfer function of the root-raised cosine transmit pulse shaping filter according to 3GPP TS 25.101 with the following normalization:

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

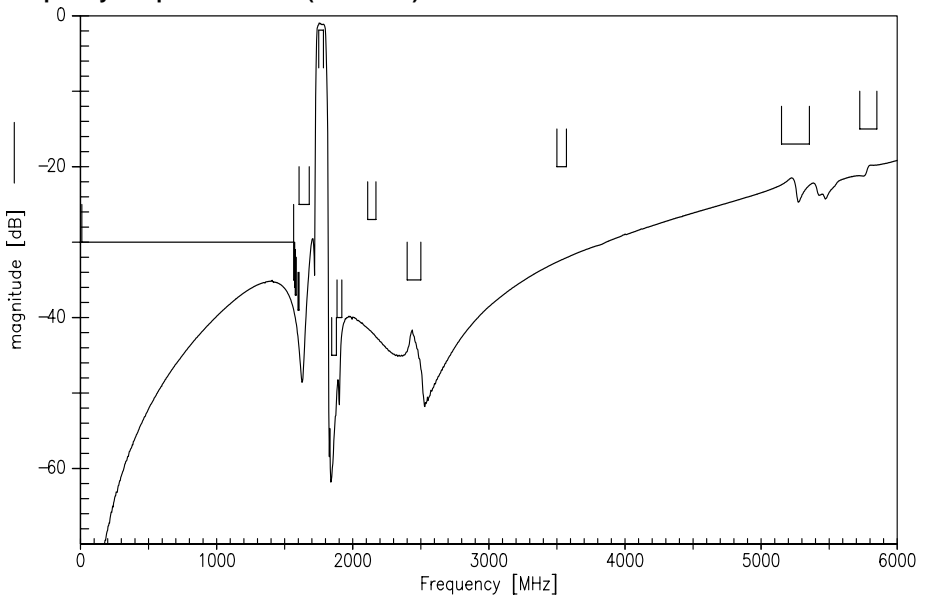
Preliminary Data



## Frequency Response Tx-ANT (passband)



## Frequency Response Tx-ANT (wideband)

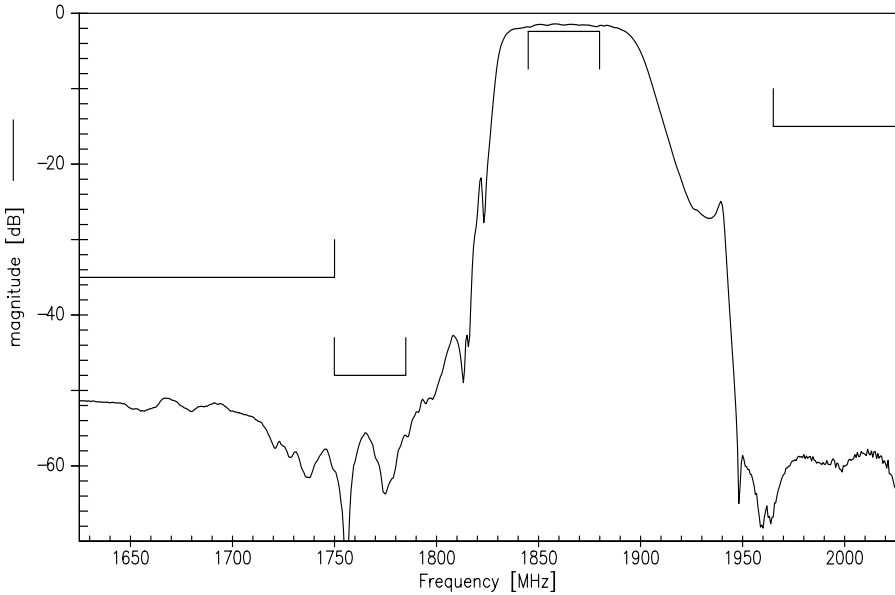




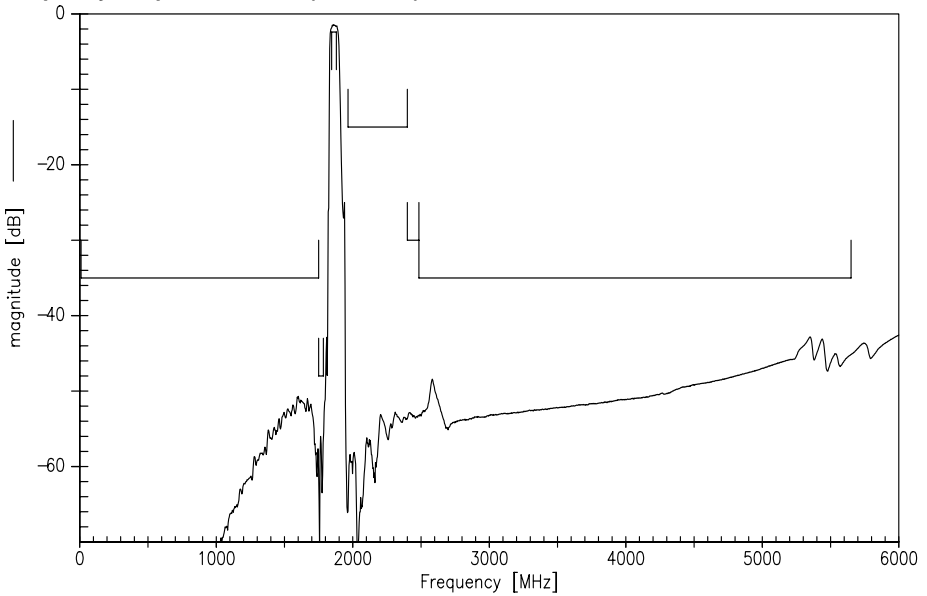
Preliminary Data



Frequency Response ANT-Rx (passband)



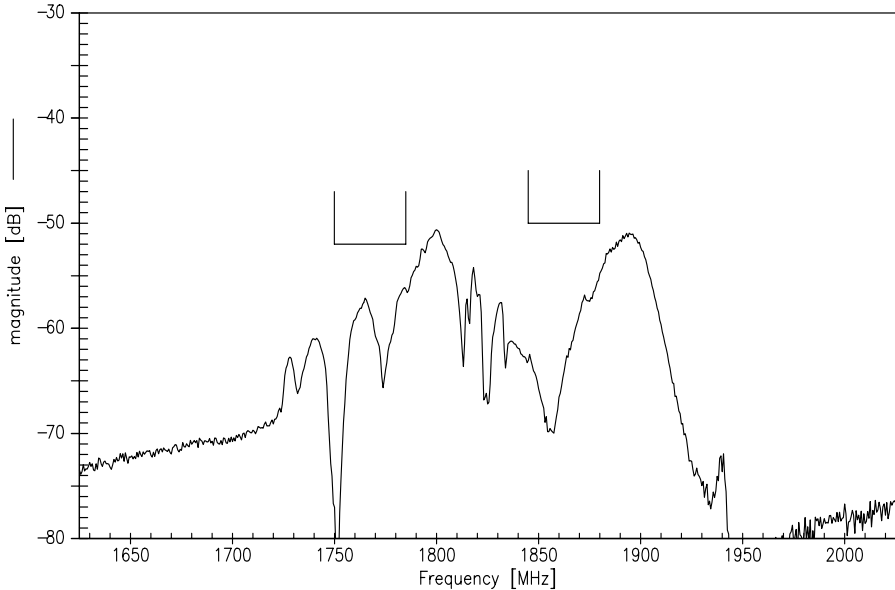
Frequency Response ANT-Rx (wideband)



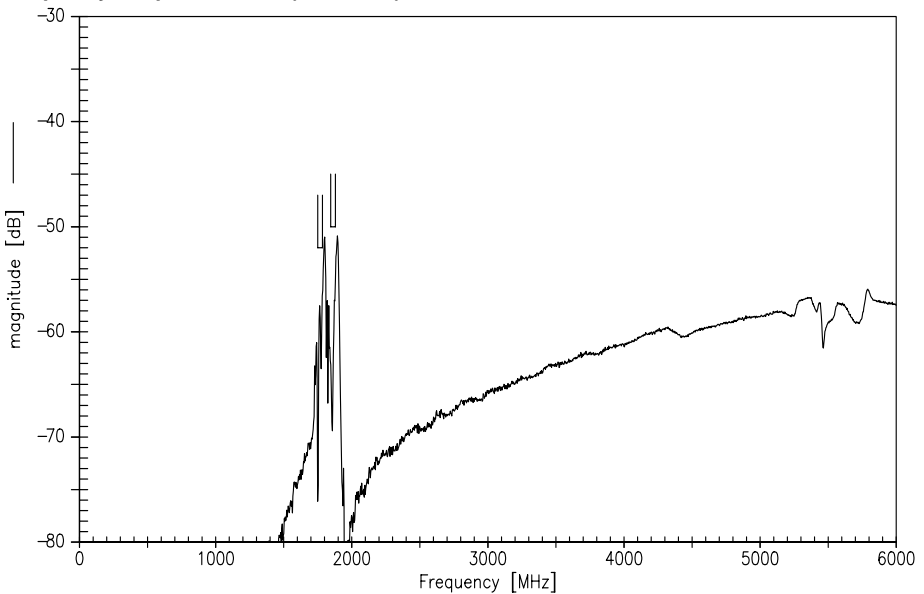
## Preliminary Data



## Frequency Response Tx-Rx (passband) / Differential Mode



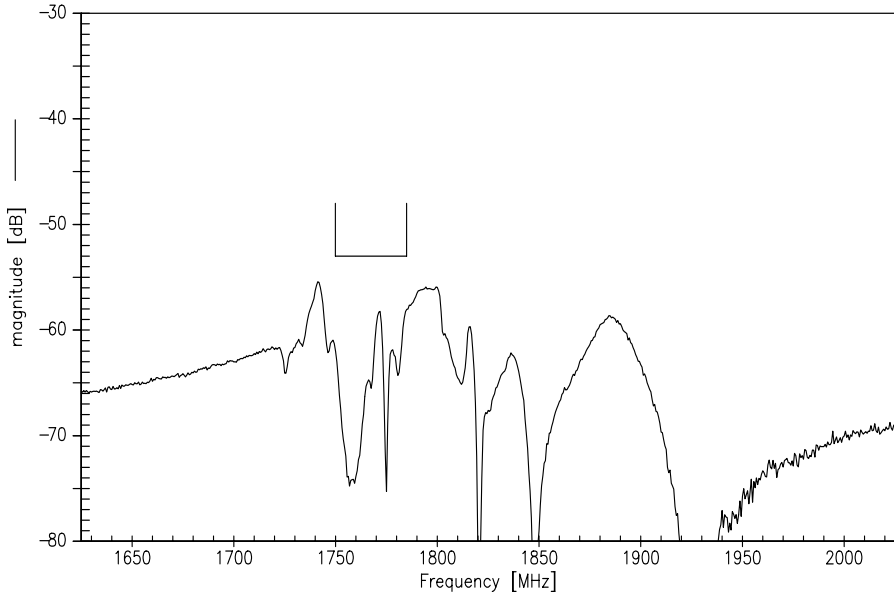
## Frequency Response Tx-Rx (wideband) / Differential Mode



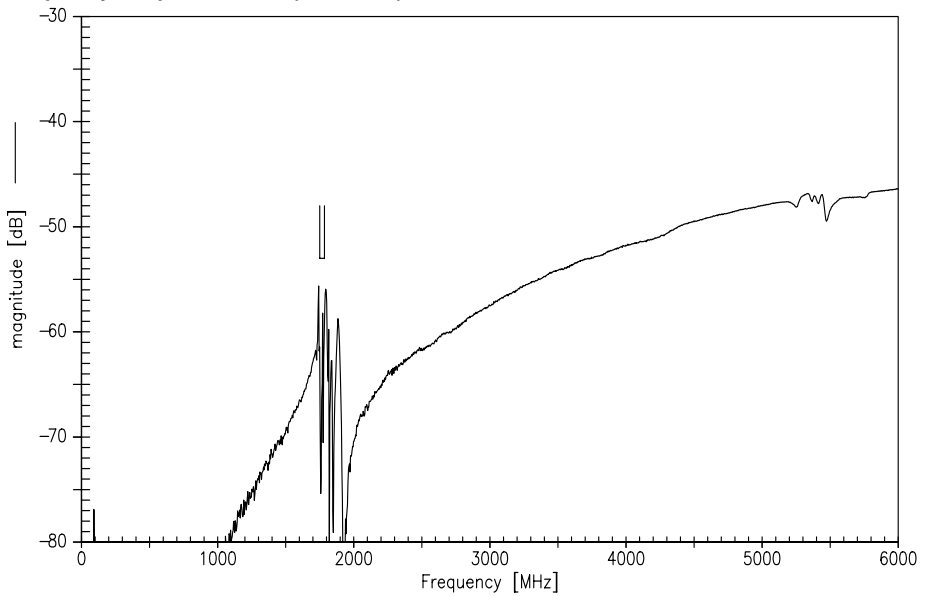
Preliminary Data



Frequency Response Tx-Rx (passband) / Common Mode



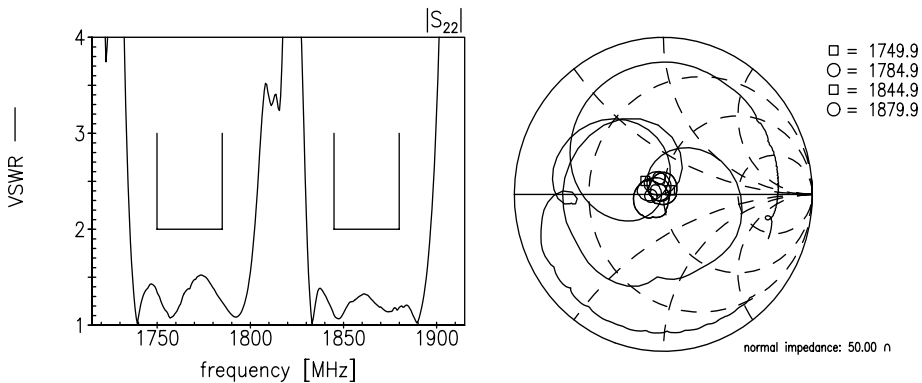
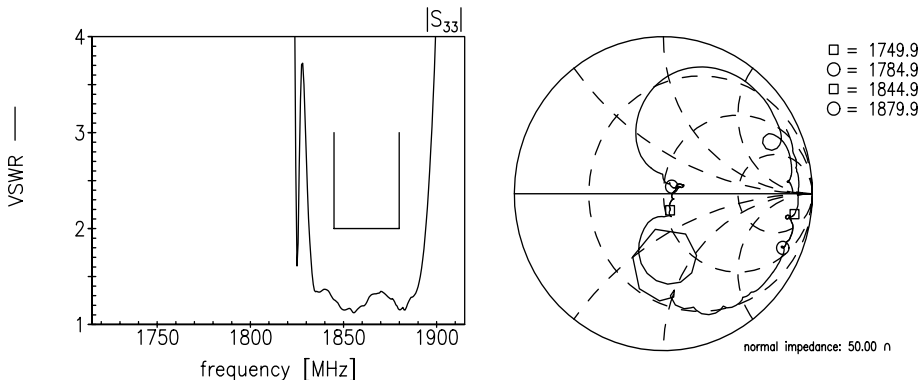
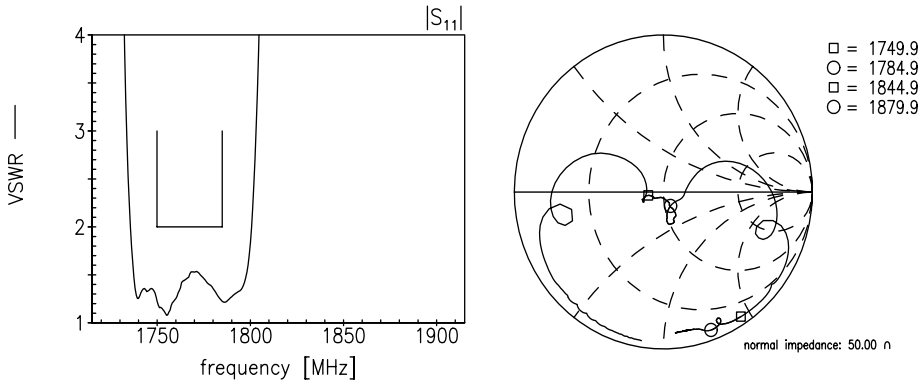
Frequency Response Tx-Rx (wideband) / Common Mode



Preliminary Data



Return Loss  $S_{11}$  Tx - port  $S_{22}$  ANT - port  $S_{33}$  Rx - port



**SAW Components****B7676****SAW Duplexer****1767.4 / 1862.4 MHz**

Preliminary Data

**References**

<b>Type</b>	B7676
<b>Ordering code</b>	
<b>Marking and package</b>	C61157-A3-A61
<b>Packaging</b>	F61074-V8153-Z000
<b>Date codes</b>	L_1126
<b>S-parameters</b>	B7676_NB.s4p, B7676_WB.s4p see file header for port/pin assignment table
<b>Soldering profile</b>	S_6001
<b>RoHS compatible</b>	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."
<b>Moldability</b>	Before using in overmolding environment, please contact your EPCOS sales office.
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