



## **SAW Components**

### **SAW Duplexer**

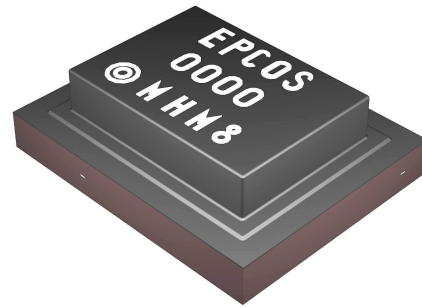
Cellular / WCDMA Band V

<b>Series/type:</b>	<b>B7923</b>
<b>Ordering code:</b>	<b>B39881B7923P810</b>
<b>Date:</b>	<b>January 26, 2011</b>
<b>Version:</b>	<b>2.0</b>



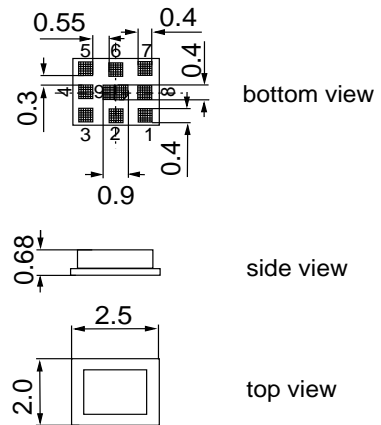
**Application**

- Multimode SAW duplexer for mobile telephone Cellular/WCDMA Band V, Band VI (830-840 MHz) and Band IXX (830-845 MHz) systems
- Low insertion attenuation
- Low amplitude ripple
- High Tx band isolation
- Single ended to balanced transformation in Antenna - Rx path
- Impedance transformation 50Ω to 100Ω in Antenna - Rx path



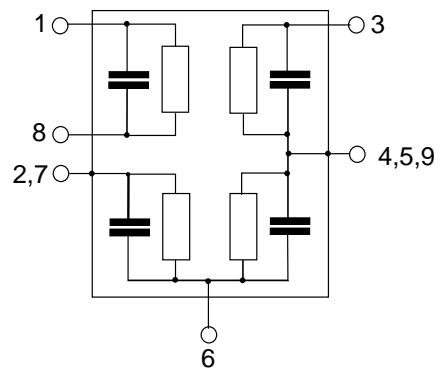
**Features**

- Component size 2.5 x 2.0 mm<sup>2</sup>
- Component height 0.68 mm max.
- RoHS compatible
- Package for **Surface Mount Technology (SMT)**
- Ni, gold-plated terminals
- **Electrostatic Sensitive Device (ESD)**
- **Moisture Sensitivity Level 3**



**Pin configuration**

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





Data Sheet



Characteristics

Temperature range for specification:  $T = -30\text{ °C to }+85\text{ °C}$   
 Antenna terminating impedance:  $Z_{ANT} = 50\ \Omega \parallel 11\text{ nH}^4)$   
 RX terminating impedance:  $Z_{RX} = 100\ \Omega + 2\text{ nH (balanced)}^4)$   
 TX terminating impedance:  $Z_{TX} = 50\ \Omega$

Characteristics TX - ANT		min.	typ. @ 25 °C	max.	
<b>Center frequency</b>	$f_C$		836.5		MHz
<b>Maximum insertion attenuation</b>	$\alpha_{max}$				
824.0 ... 849.0 MHz			1.7	2.4	dB
@ $f_{Carrier}$ 826.4 ... 846.6 MHz	$\alpha_{WCDMA}^1)$		1.4	2.0 <sup>2)</sup>	dB
<b>Amplitude ripple</b>	$\Delta\alpha$				
824.0 ... 849.0 MHz			0.8	1.4	dB
@ $f_{Carrier}$ 826.4 ... 846.6 MHz	$\alpha_{WCDMA}^1)$		0.4	0.9 <sup>2)</sup>	dB
<b>Error Vector Magnitude</b>					
@ $f_{Carrier}$ 826.4 ... 846.6 MHz	EVM <sup>3)</sup>		2.5	3.2 <sup>2)</sup>	%
<b>Input VSWR (TX port)</b>					
824.0 ... 849.0 MHz			2.0	2.3	
<b>Output VSWR (ANT port)</b>					
824.0 ... 849.0 MHz			1.8	2.2	

1) Attenuation of WCDMA signal ("Powertransferfunction"). Please refer to annotation on page (8).  
 2) Temperature range for this parameter is -20°C to +85°C.  
 3) Error Vector Magnitude (EVM) based on definition given in 3GPP TS 25.141.  
 4) Please refer to recommended matching circuit on page (9).



Data Sheet



Characteristics

Temperature range for specification: T = -30 °C to +85 °C  
 Antenna terminating impedance: Z<sub>ANT</sub> = 50 Ω || 11 nH<sup>1)</sup>  
 RX terminating impedance: Z<sub>RX</sub> = 100 Ω + 2 nH (balanced)<sup>1)</sup>  
 TX terminating impedance: Z<sub>TX</sub> = 50 Ω

Characteristics TX - ANT				min.	typ. @ 25 °C	max.	
<b>Absolute attenuation</b>							
			α				
10.0	...	420.0	MHz	30	48		dB
420.0	...	494.0	MHz	40	45		dB
494.0	...	701.0	MHz	30	42		dB
701.0	...	728.0	MHz	35	43		dB
728.0	...	764.0	MHz	40	44		dB
764.0	...	804.0	MHz	30	40		dB
860.0	...	869.0	MHz	3	22		dB
869.0	...	894.0	MHz	44	56		dB
1565.42	...	1573.374	MHz	35	49		dB
1573.374	...	1577.466	MHz	40	49		dB
1577.466	...	1585.42	MHz	35	49		dB
1597.5515	...	1605.886	MHz	40	48		dB
1638.0	...	1708.0	MHz	20	45		dB
1844.9	...	1879.9	MHz	30	42		dB
1884.5	...	1919.6	MHz	30	41		dB
1930.0	...	1990.0	MHz	35	40		dB
2110.0	...	2170.0	MHz	33	38		dB
2400.0	...	2557.0	MHz	30	34		dB
3286.0	...	3406.0	MHz	20	30		dB
4110.0	...	4255.0	MHz	20	26		dB
4934.0	...	5350.0	MHz	10	25		dB
5725.0	...	5953.0	MHz	7	14		dB

<sup>1)</sup> Please refer to recommended matching circuit on page (9).



Data Sheet



Characteristics

Temperature range for specification:  $T = -30\text{ °C to }+85\text{ °C}$   
 Antenna terminating impedance:  $Z_{ANT} = 50\ \Omega \parallel 11\text{ nH}^4)$   
 RX terminating impedance:  $Z_{RX} = 100\ \Omega + 2\text{ nH (balanced)}^4)$   
 TX terminating impedance:  $Z_{TX} = 50\ \Omega$

Characteristics ANT - RX		min.	typ. @ 25 °C	max.	
<b>Center frequency</b>	$f_C$		881.5		MHz
<b>Maximum insertion attenuation</b>	$\alpha_{max}$				
869.0 ... 894.0 MHz			1.8	2.7	dB
@ $f_{Carrier}$ 871.4 ... 891.6 MHz	$\alpha_{WCDMA}^1)$		1.8	2.4 <sup>2)</sup>	dB
<b>Amplitude ripple (p-p)</b>	$\Delta\alpha$				
869.0 ... 894.0 MHz			0.7	1.5	dB
@ $f_{Carrier}$ 871.4 ... 891.6 MHz	$\alpha_{WCDMA}^1)$		0.5	1.0 <sup>2)</sup>	dB
<b>Input VSWR (ANT port)</b>					
869.0 ... 894.0 MHz			1.7	2.2	
<b>Output VSWR (RX port)</b>					
869.0 ... 894.0 MHz			1.9	2.3	
<b>Common mode rejection ratio</b>					
869.0 ... 894.0 MHz	CMRR	23 <sup>3)</sup>	35		dB

1) Attenuation of WCDMA signal ("Powertransferfunction"). Please refer to annotation on page (8).  
 2) Temperature range for this parameter is -20°C to +85°C.  
 3) A combination of 10° phase balance and 1 dB amplitude balance corresponds to 19.6 dB CMRR  
 4) Please refer to recommended matching circuit on page (9).



<b>SAW Components</b>	<b>B7923</b>
<b>SAW Duplexer</b>	<b>836.50 / 881.50 MHz</b>

Data Sheet



**Characteristics**

Temperature range for specification: T = -30 °C to +85 °C  
 Antenna terminating impedance: Z<sub>ANT</sub> = 50 Ω || 11 nH<sup>2</sup>  
 RX terminating impedance: Z<sub>RX</sub> = 100 Ω + 2 nH (balanced)<sup>2</sup>  
 TX terminating impedance: Z<sub>TX</sub> = 50 Ω

Characteristics ANT - RX	min.	typ. @ 25 °C	max.	
<b>IMD product level limits<sup>1)</sup></b>				
<b>at f<sub>TX</sub> = 836.5 MHz f<sub>RX</sub> = 881.5 MHz</b>				
Blocker 1                    45.0    MHz		-135	-106	dBm
Blocker 2                    791.5   MHz		-112	-109	dBm
Blocker 3                    1718.0   MHz		-92	-89	dBm
Blocker 4                    2554.5   MHz		-120	-109	dBm
<b>Attenuation</b>				
	α			
10.0    ...    447.0    MHz	45	85		dB
447.0    ...    824.0    MHz	30	68		dB
824.0    ...    849.0    MHz	55	63		dB
849.0    ...    854.0    MHz	10	48		dB
909.0    ...    1000.0   MHz	13	25		dB
1000.0    ...    1850.0   MHz	28	66		dB
1850.0    ...    1920.0   MHz	40	67		dB
1920.0    ...    6000.0   MHz	35	63		dB

1) Power levels: 21.5 dBm Tx signal, -15dBm blocker at antenna port.  
 2) Please refer to recommended matching circuit on page (9).



Data Sheet



Characteristics

Temperature range for specification:  $T = -30\text{ °C to }+85\text{ °C}$   
 Antenna terminating impedance:  $Z_{ANT} = 50\ \Omega \parallel 11\text{ nH}^3$   
 RX terminating impedance:  $Z_{RX} = 100\ \Omega + 2\text{ nH (balanced)}^3$   
 TX terminating impedance:  $Z_{TX} = 50\ \Omega$

Characteristics TX - RX					min.	typ. @ 25 °C	max.	
<b>Isolation</b>								
	824.0	...	849.0	MHz	55	63		dB
@f <sub>Carrier</sub>	826.4	...	846.6	MHz $\alpha_{WCDMA}^1$	55 <sup>2)</sup>	65		dB
	869.0	...	894.0	MHz	50	59		dB
@f <sub>Carrier</sub>	871.4	...	891.6	MHz $\alpha_{WCDMA}^1$	50	60		dB
	1574.0	...	1577.0	MHz	40	67		dB
	1638.0	...	1708.0	MHz	20	66		dB
	2462.0	...	2557.0	MHz	20	61		dB
<b>Common Mode Isolation</b>								
	824.0	...	849.0	MHz	55	65		dB
@f <sub>Carrier</sub>	826.4	...	846.6	MHz $\alpha_{WCDMA}^1$	55 <sup>2)</sup>	65		dB

<sup>1)</sup> Attenuation of WCDMA signal ("Powertransferfunction"). Please refer to annotation on page (8).

<sup>2)</sup> Temperature range for this parameter is -20°C to +85°C.

<sup>3)</sup> Please refer to recommended matching circuit on page (9).



**SAW Components** **B7923**

**SAW Duplexer** **836.50 / 881.50 MHz**

**Data Sheet** **SMD**

**Maximum ratings**

Storage temperature range	T <sub>stg</sub>	-40/+85	°C	machine model, 10 pulses source and load impedance 50 Ω } continuous wave T = 50°C, 5.000 h
DC voltage	V <sub>DC</sub>	5	V	
ESD voltage	V <sub>ESD</sub>	100 <sup>1)</sup>	V	
Input power at	P <sub>IN</sub>			
824.0 ... 849.0 MHz		28	dBm	
elsewhere		10	dBm	

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

**Annotation for characteristics section**

Attenuation of WCDMA signal ("Powertransferfunction",  $\alpha_{WCDMA}$ ) 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 WCDMA Band 5-Passband,  $f_{Carrier}$  ranges from 826.4 MHz (lowest Tx channel) to 846.6 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:

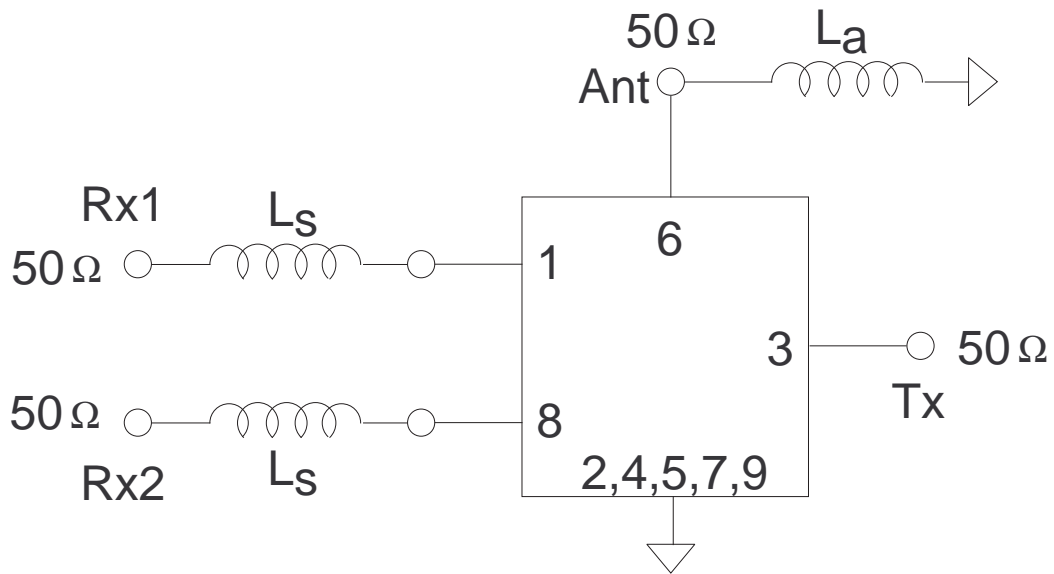
$$\int_{-\infty}^{\infty} |H_{RRC}(f)|^2 df = 1$$





Matching circuit to terminating impedances

(Element values depend upon PCB layout)



$L_a$	11	nH
$L_s$	2	nH



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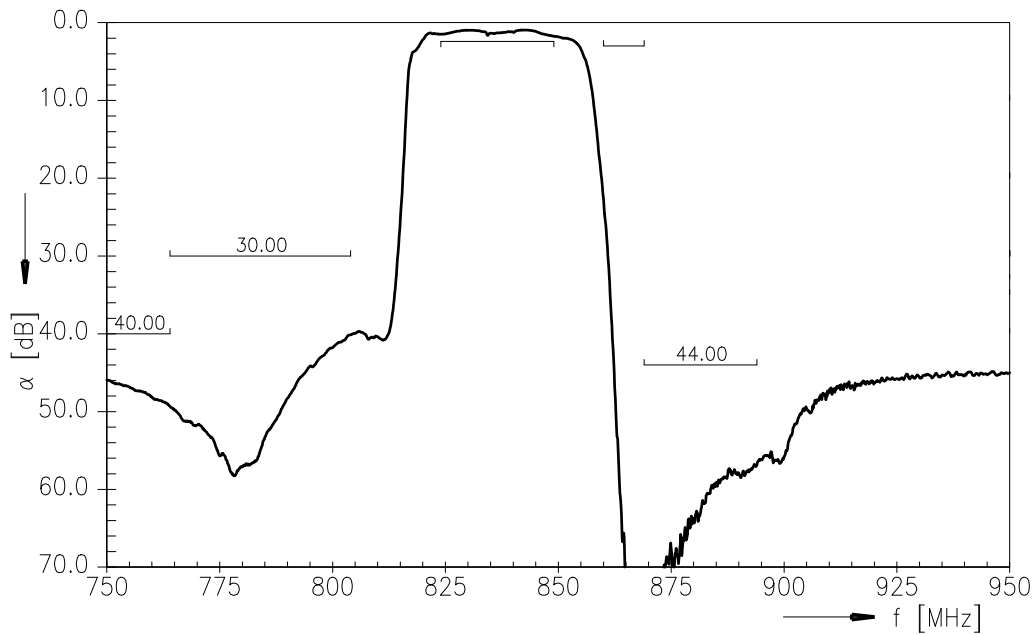
SAW Duplexer

836.50 / 881.50 MHz

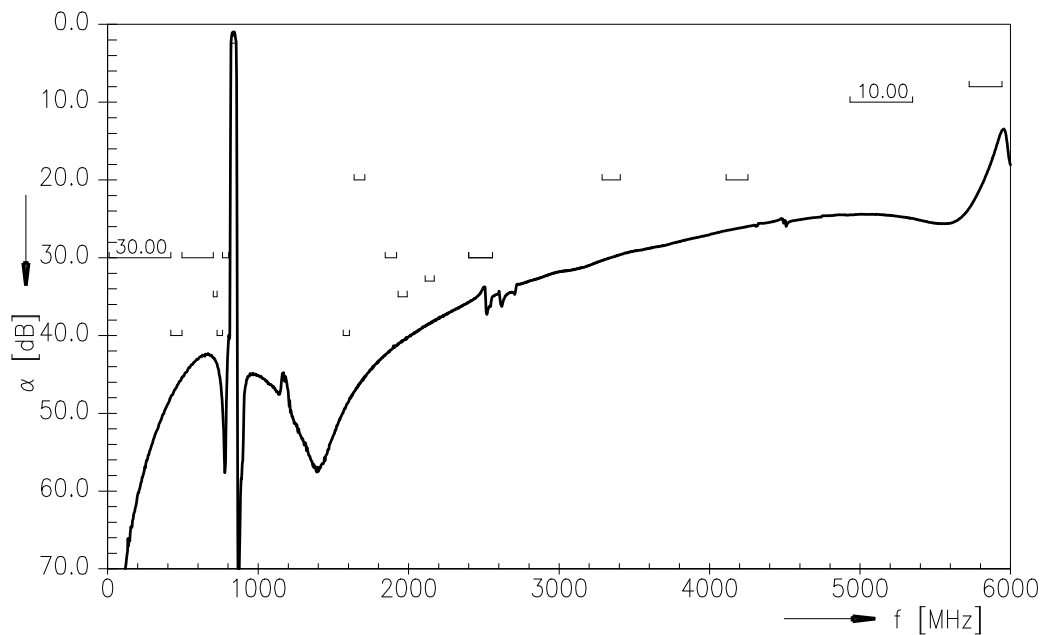
Data Sheet



Frequency Response TX-ANT (Passband)



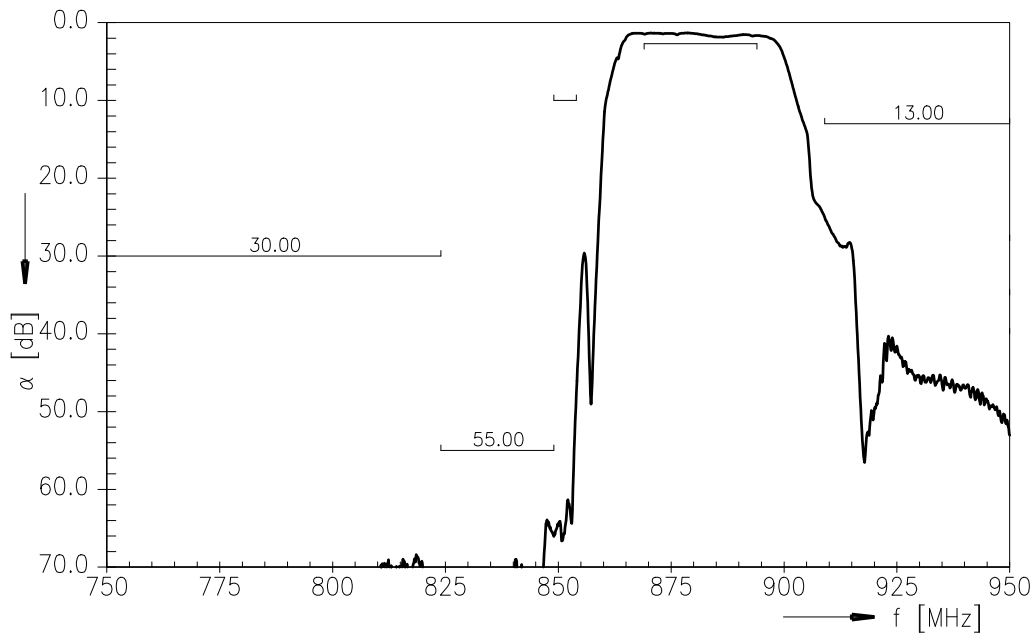
Frequency Response TX-ANT (Wideband)



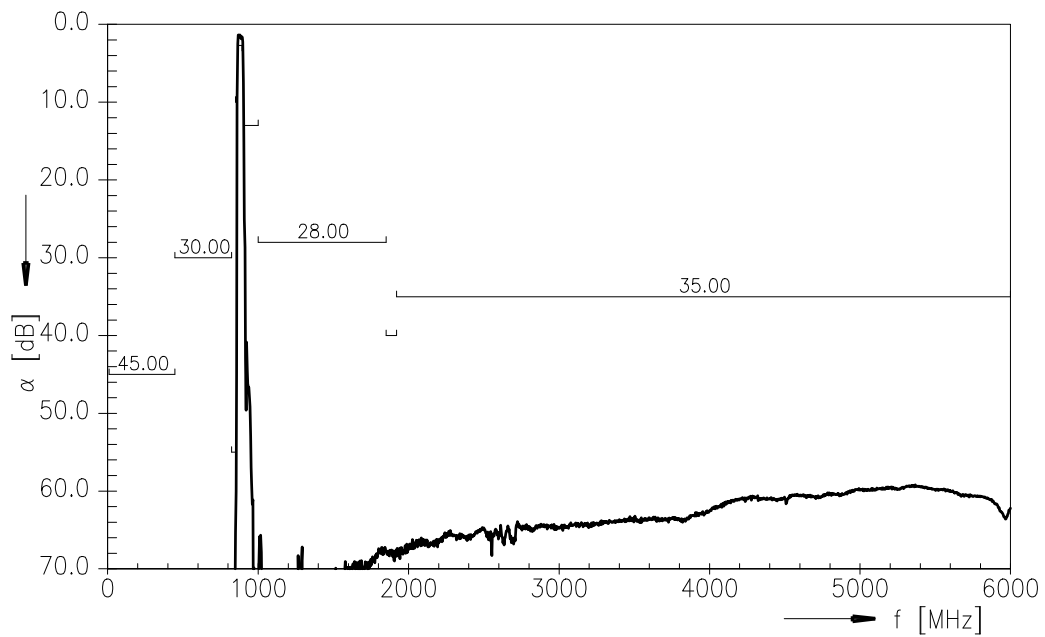
Please read *cautions and warnings* and *important notes* at the end of this document.



Frequency Response RX-ANT (Passband)



Frequency Response RX-ANT (Wideband)





SAW Components

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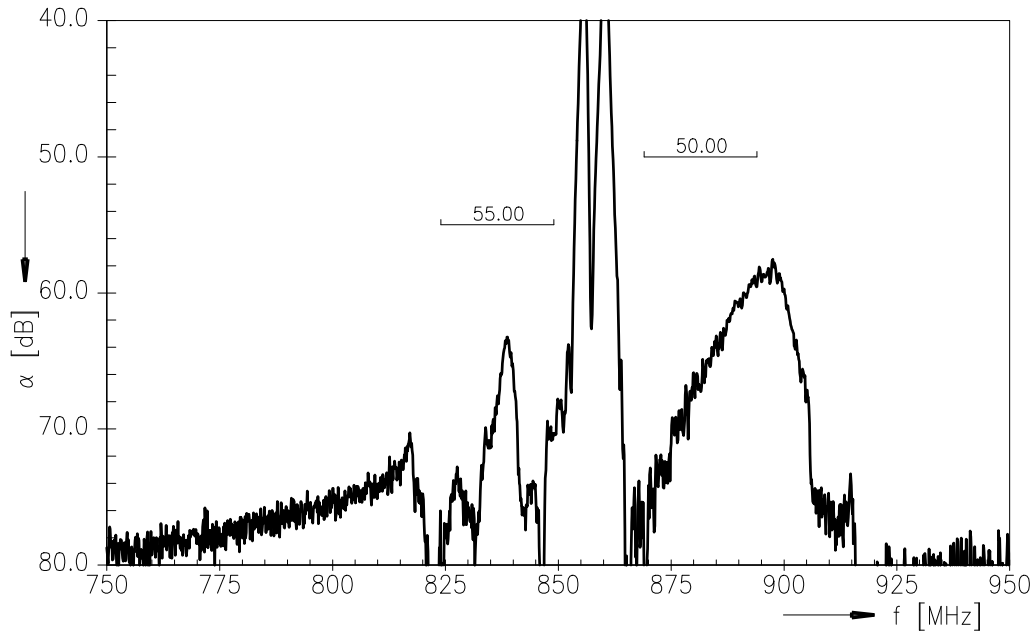
SAW Duplexer

836.50 / 881.50 MHz

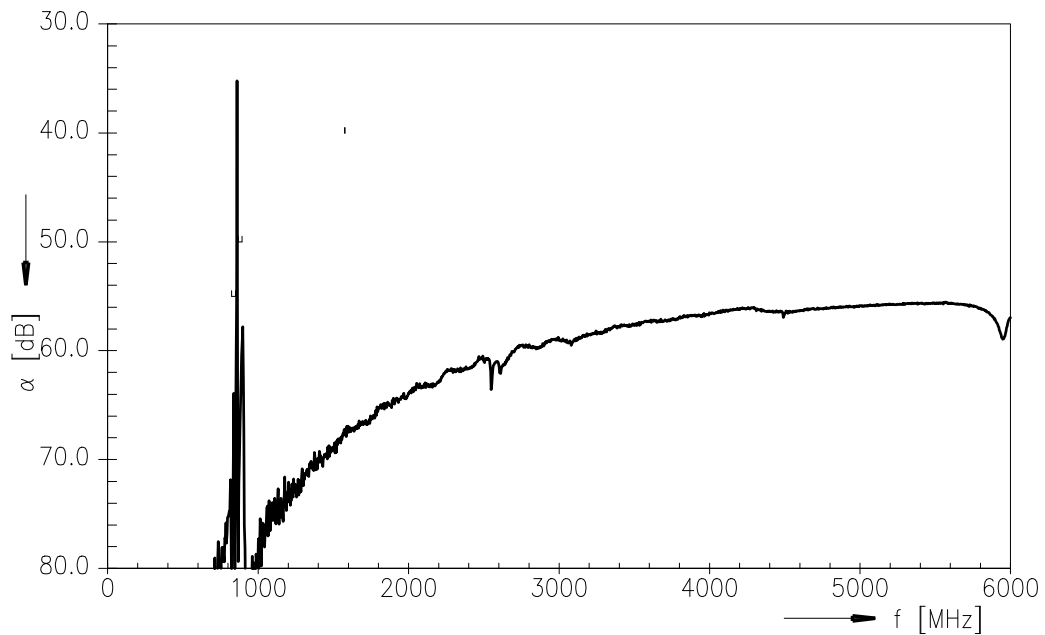
Data Sheet



Frequency Response TX-RX (Passband Differential Mode Isolation)



Frequency Response TX-RX (Wideband Differential Mode Isolation)



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



SAW Components

B7923

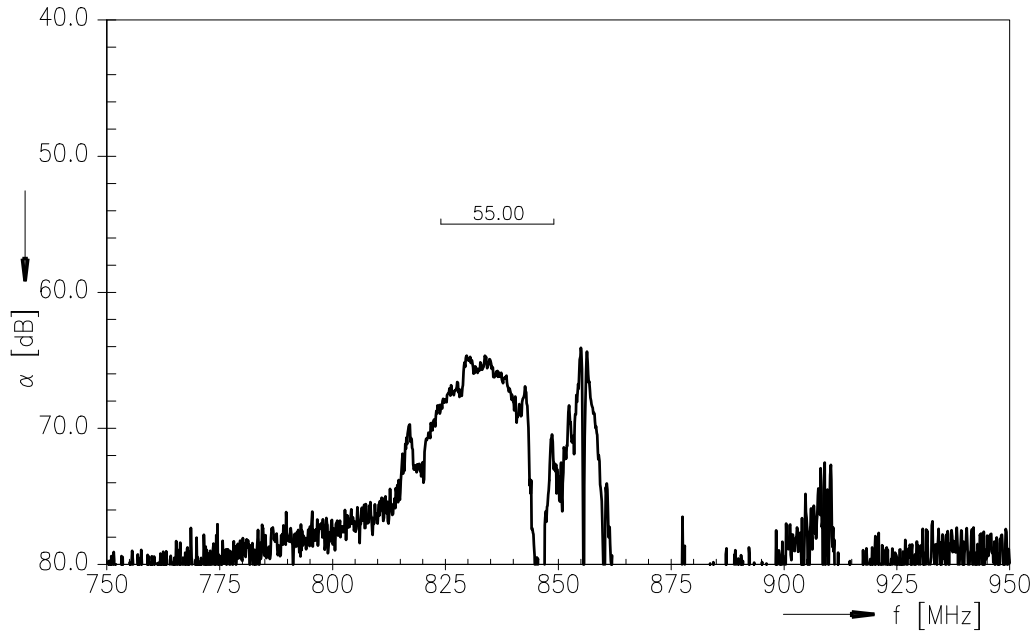
SAW Duplexer

836.50 / 881.50 MHz

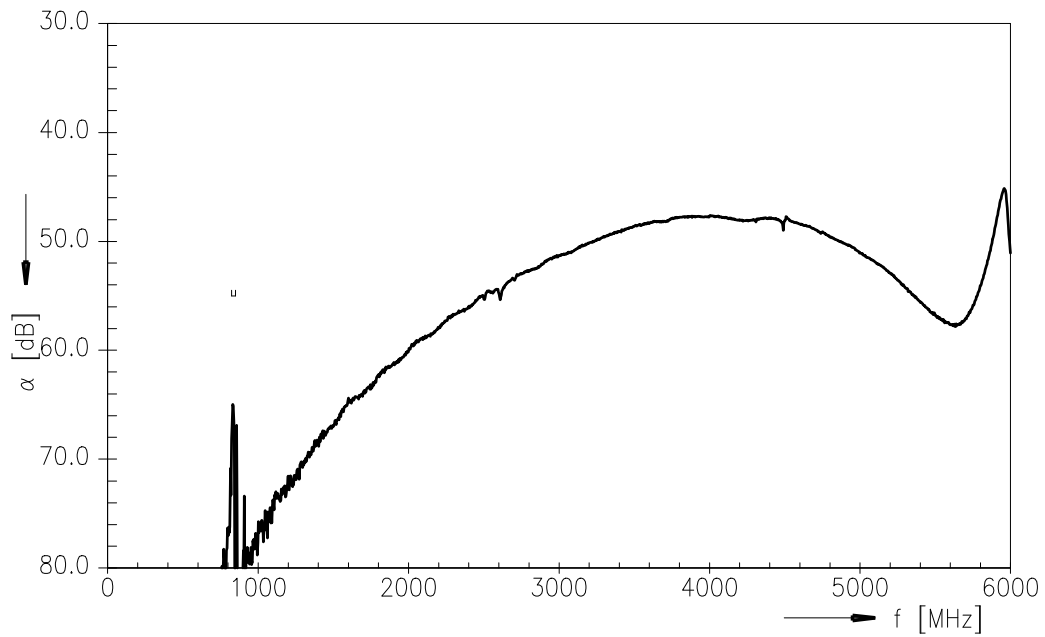
Data Sheet



Frequency Response TX-RX (Passband Common Mode Isolation)



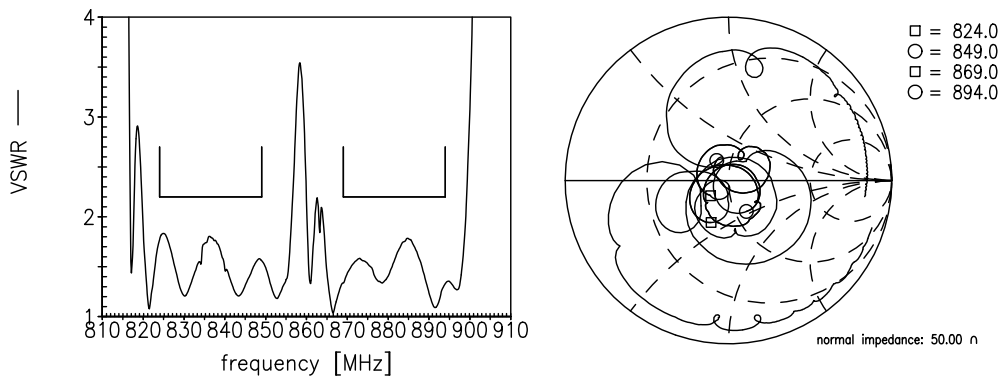
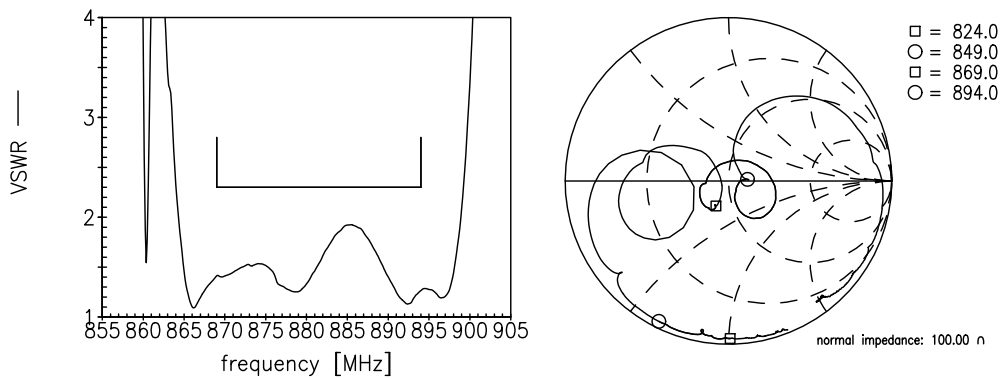
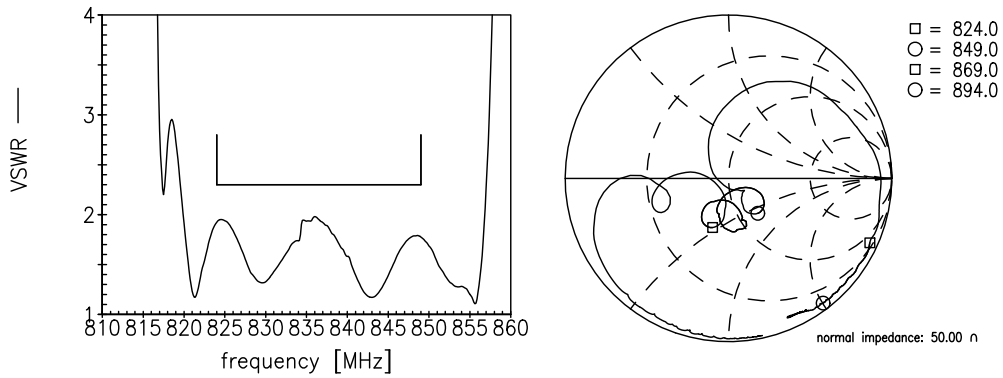
Frequency Response TX-RX (Wideband Common Mode Isolation)



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Matching (TX, RX, ANT)





<b>SAW Components</b>	<b>B7923</b>
<b>SAW Duplexer</b>	<b>836.50 / 881.50 MHz</b>
Data Sheet	<b>SMD</b>

## References

<b>Type</b>	B7923
<b>Ordering code</b>	B39881B7923P810
<b>Marking and package</b>	C61157-A3-A61
<b>Packaging</b>	F71074-V8153-Z000
<b>Date codes</b>	L_1126
<b>S-parameters</b>	B7923_NB.s4p, B7923_WB.s4p; see file header for pin/port assignments;
<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>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> for a large variety of matching coils.

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