



SAW Components

SAW Duplexer

LTE Band 12 + 17

Series/type:	B7931
Ordering code:	B39741B7931A710
Date:	November 12, 2012
Version:	2.2

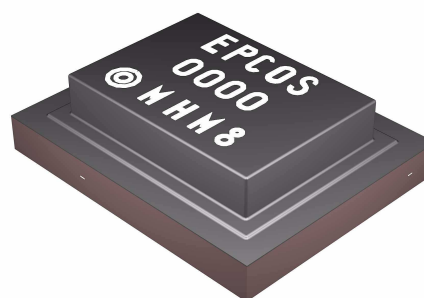
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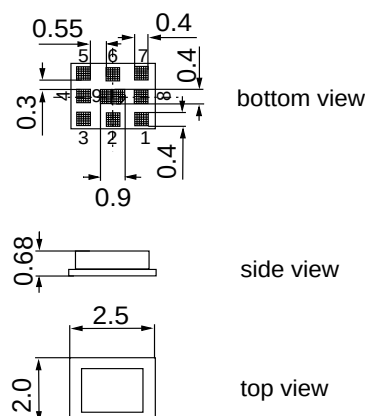
Data sheet

Application

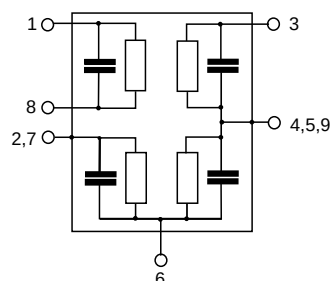
- Low-loss SAW duplexer for mobile telephone LTE Band 12 and 17 systems
- Low insertion attenuation
- Usable passband 17 MHz
- Single-ended to balanced transformation in Antenna-Rx path
- Impedance transformation 50 Ω to 100 Ω in Antenna-Rx path
- Very small size and low height


Features

- Package size 2.5 * 2.0 * 0.68 mm³
- RoHS compatible
- Package for **Surface Mount Technology (SMT)**
- Ni, Au-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



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707.5 / 737.5 MHz
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Characteristics

Temperature range for specification:	$T = -20\text{ °C to }+85\text{ °C}$
TX terminating impedance:	$Z_{Tx} = 50\ \Omega$
ANT terminating impedance:	$Z_{Ant} = 50\ \Omega \parallel 12\text{nH}$
RX terminating impedance:	$Z_{Rx} = 100\ \Omega$ (balanced)

Characteristics Tx-Antenna				min.	typ. @ 25 °C	max.	
Center frequency	f_c				707.5		MHz
Maximum insertion attenuation	α						
699.0 ... 716.0 MHz					1.5	2.5	dB CTQ ¹⁾
704.0 ... 716.0 MHz					1.5	2.5	dB CTQ ¹⁾
Amplitude ripple (p-p)	$\Delta\alpha$						
699.0 ... 716.0 MHz					0.6	1.3	dB
Amplitude ripple (p-p)	$\Delta\alpha_{W\text{-CDMA}}^{2)}$						
@ $f_{Carrier}$ 701.4 ... 713.6 MHz					0.2	0.6	dB
Input VSWR (Tx port)							
699.0 ... 716.0 MHz					1.6	2.0	
Output VSWR (Ant Port)							
699.0 ... 716.0 MHz					1.5	2.0	

¹⁾ CTQ: Critical To Quality

²⁾ Attenuation of WCDMA signal ("Powertransferfunction"). Please refer to annotation on page (7).

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RX terminating impedance:	$Z_{Rx} = 100\ \Omega$ (balanced)

Characteristics Tx-Antenna				min.	typ. @ 25 °C	max.	
Absolute attenuation							
			α				
10.0	...	470.0	MHz	30	36		dB
470.0	...	686.0	MHz	35	45		dB
728.0	...	746.0	MHz	45	53		dB
746.0	...	776.0	MHz	35	44		dB
776.0	...	806.0	MHz	30	41		dB
869.0	...	894.0	MHz	30	41		dB
1398.0	...	1432.0	MHz	40	58		dB
1559.0	...	1610.0	MHz	45	50		dB
1710.0	...	1995.0	MHz	30	42		dB
2110.0	...	2170.0	MHz	32	41		dB
2400.0	...	2500.0	MHz	35	38		dB
2796.0	...	2864.0	MHz	20	36		dB
Absolute mean attenuation¹⁾							
			α_{mean}				
686.0	...	692.0	MHz	15	27		dB
686.0	...	692.0	MHz ²⁾	25	27		dB
692.0	...	698.0	MHz	2.5	4.5		dB
692.0	...	698.0	MHz ²⁾	4.0	4.5		dB

¹⁾ Mean attenuation is the integrated value of attenuation (linear scale) over the specified band

²⁾ At 25 °C

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Temperature range for specification:	T = -20 °C to +85 °C
TX terminating impedance:	Z _{Tx} = 50 Ω
ANT terminating impedance:	Z _{Ant} = 50 Ω 12nH
RX terminating impedance:	Z _{Rx} = 100 Ω (balanced)

Characteristics Antenna-Rx				min.	typ. @ 25 °C	max.	
Center frequency	f _c				737.5		MHz
Maximum insertion attenuation	α						
729.0 ... 746.0 MHz					2.4	3.0	dB CTQ ¹⁾
734.0 ... 746.0 MHz					2.4	3.0	dB CTQ ¹⁾
Amplitude ripple (p-p)	Δα						
729.0 ... 746.0 MHz					0.9	1.5	dB
Input VSWR (Ant port)							
729.0 ... 746.0 MHz					1.8	2.0	
Output VSWR (Rx Port)							
729.0 ... 746.0 MHz					1.6	2.0	
Common mode rejection ratio							
729.0 ... 746.0 MHz				23	30		dB
Absolute attenuation	α						
10.0 ... 686.0 MHz				45	70		dB
686.0 ... 716.0 MHz				50	60		dB
716.0 ... 722.0 MHz				20	38		dB
776.0 ... 798.0 MHz				36	52		dB
798.0 ... 806.0 MHz				45	71		dB
806.0 ... 3000.0 MHz				40	60		dB
3000.0 ... 6000.0 MHz				25	50		dB
Absolute mean attenuation ²⁾	α _{mean}						
716.0 ... 722.0 MHz				27	47		dB
716.0 ... 722.0 MHz ³⁾				35	47		dB
722.0 ... 728.0 MHz				4.0	8		dB
722.0 ... 728.0 MHz ²⁾				7.0	8		dB

¹⁾ CTQ: Critical to Quality

²⁾ Mean attenuation is the integrated value of attenuation (linear scale) over the specified band

³⁾ At 25°C

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Temperature range for specification:	$T = -20\text{ °C to }+85\text{ °C}$
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ANT terminating impedance:	$Z_{Ant} = 50\ \Omega \parallel 12\text{nH}$
RX terminating impedance:	$Z_{Rx} = 100\ \Omega$ (balanced)

Characteristics Tx-Rx				min.	typ. @ 25 °C	max.	
Differential mode isolation							
			α				
699.0	...	716.0	MHz	56	60		dB CTQ ¹⁾
729.0	...	732.0	MHz	53	66		dB CTQ ¹⁾
732.0	...	739.0	MHz	55	61		dB CTQ ¹⁾
739.0	...	746.0	MHz	52	55		dB CTQ ¹⁾
1398.0	...	1432.0	MHz	30	68		dB CTQ ¹⁾
2097.0	...	2148.0	MHz	30	63		dB CTQ ¹⁾
2796.0	...	2864.0	MHz	30	60		dB CTQ ¹⁾
Common mode isolation							
			α				
699.0	...	716.0	MHz	45	50		dB CTQ ¹⁾

¹⁾ CTQ: Critical To Quality

Maximum Ratings

Storage temperature range	T_{stg}	-40/+85	°C	
DC voltage	V_{DC}	5	V	
ESD voltage	V_{ESD}	100 ¹⁾	V	machine model, 1 pulse
Input power at Tx Port				
701.5 ... 713.5 MHz	P_{in}	28	dBm	} LTE Up Link Signal 55 °C, 50000h
elsewhere	P_{in}	10	dBm	

¹⁾ According to JESD22-A115A (machine model), 1 negative and 1 positive pulses.

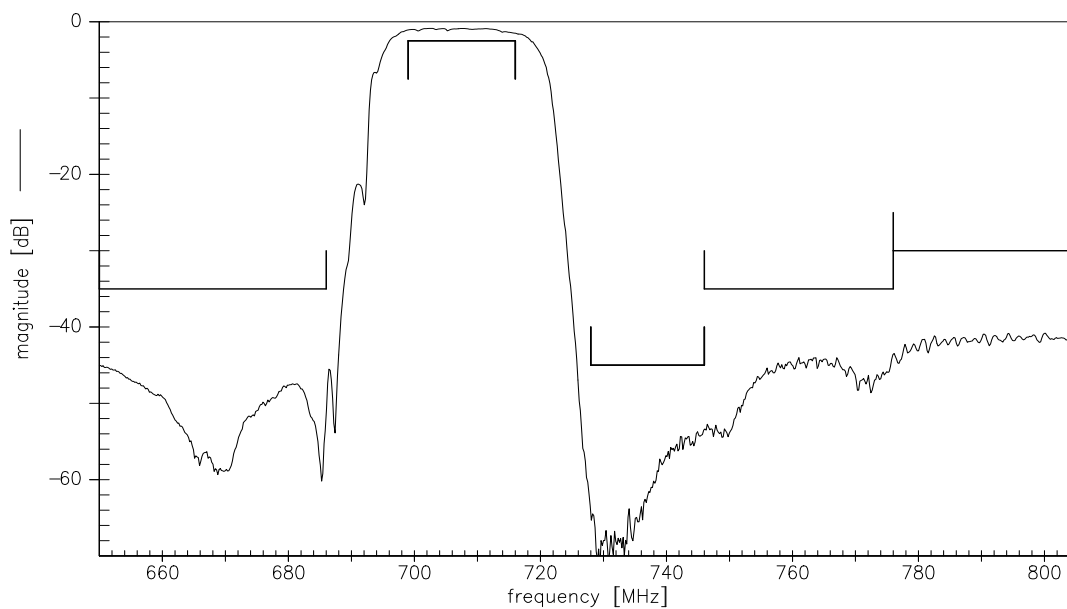
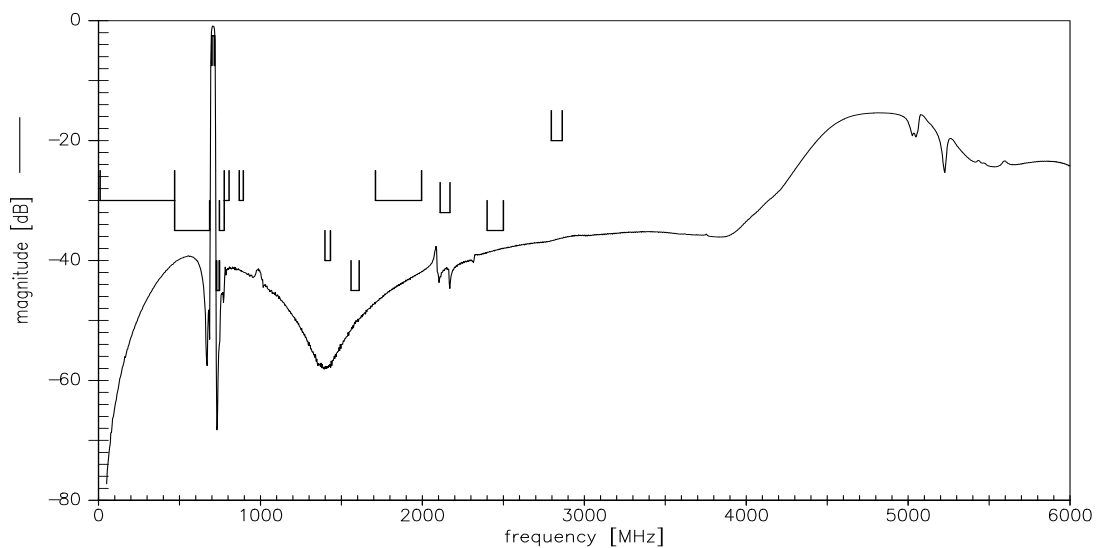
Annotation for characteristics section

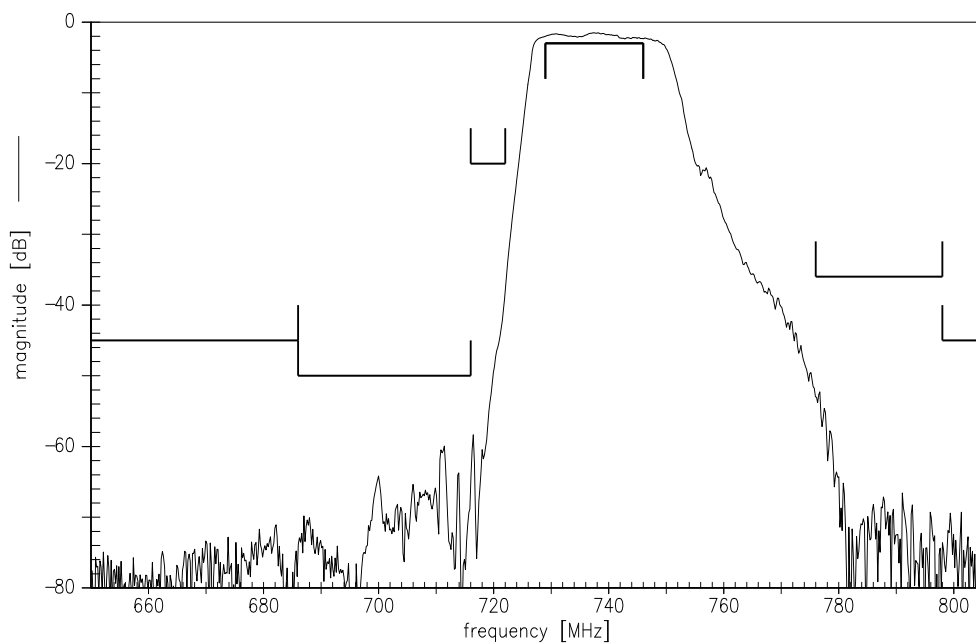
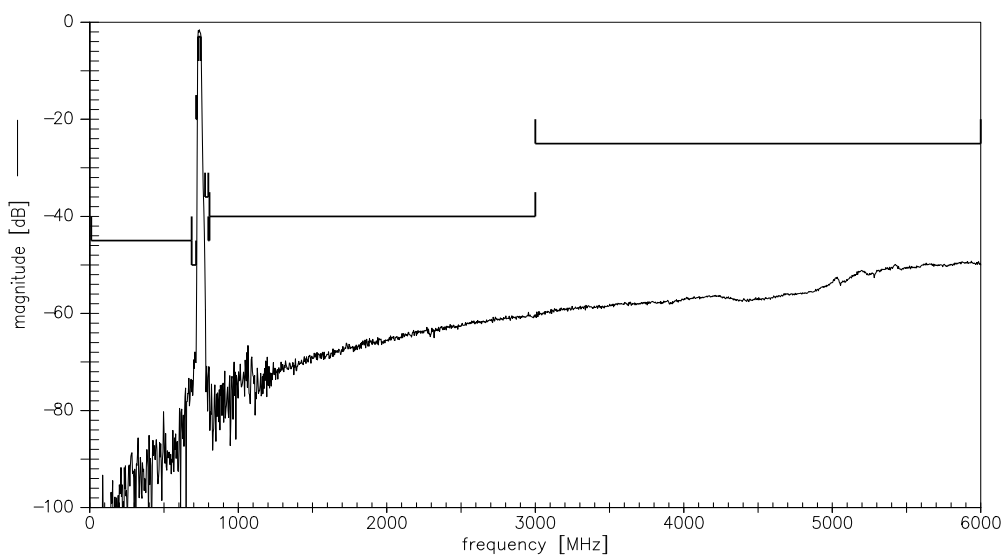
Attenuation of WCDMA signal ("Powertransferfunction", α_{WCDMA}) is determined by

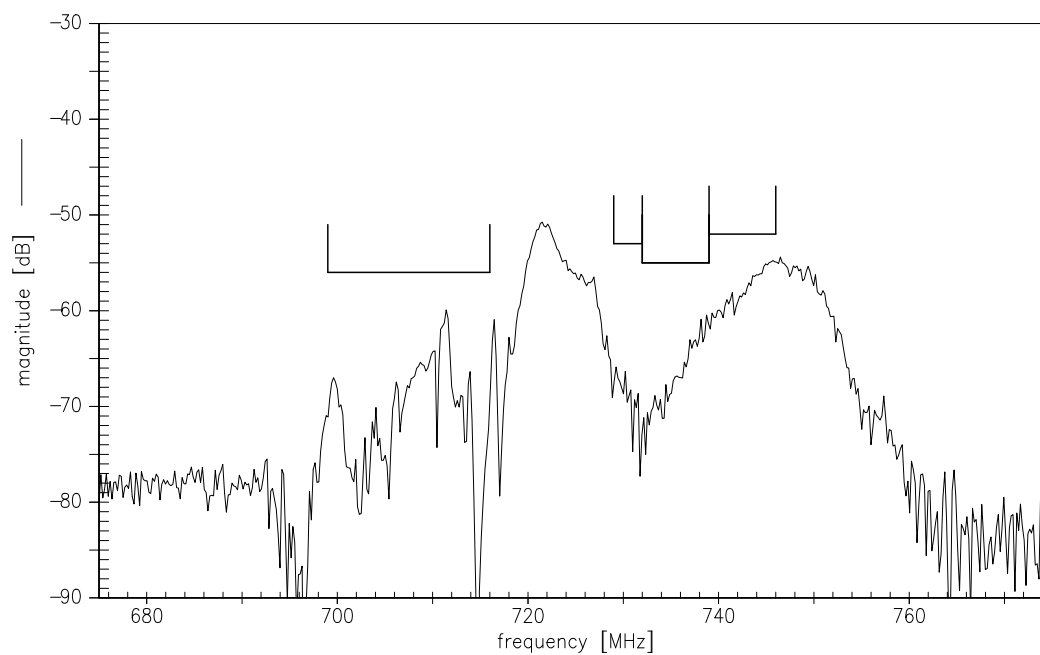
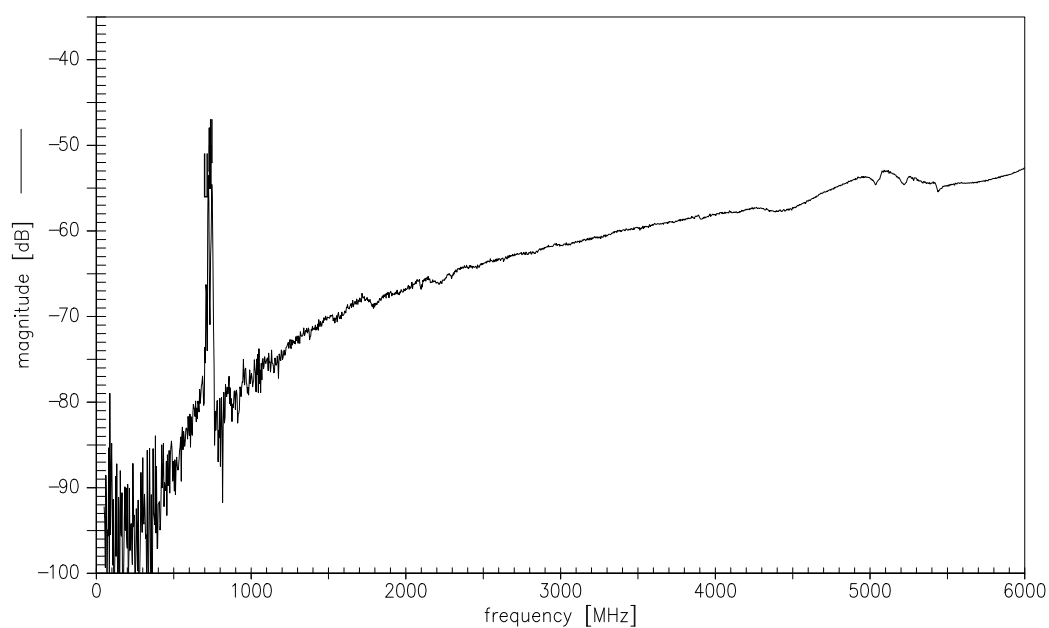
$$\int_{-\infty}^{\infty} |S_{\text{ds21}}(f) H_{\text{RRC}}(f - f_{\text{Carrier}})|^2 df$$

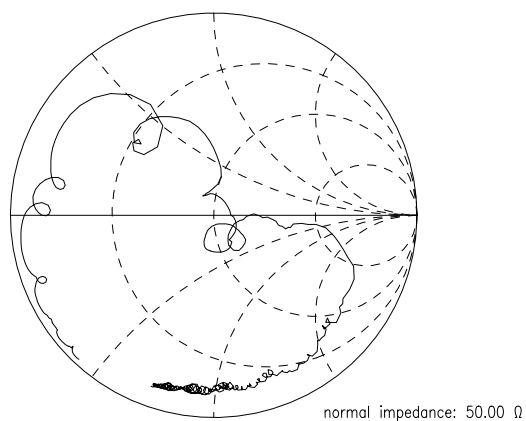
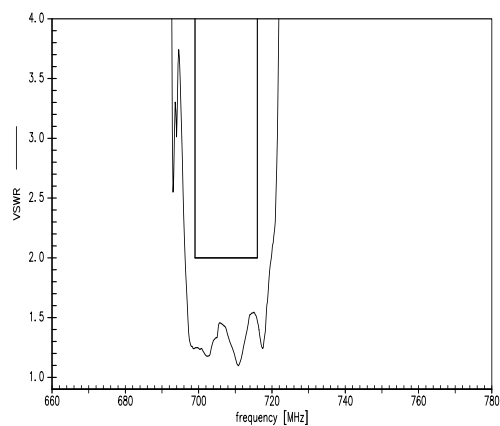
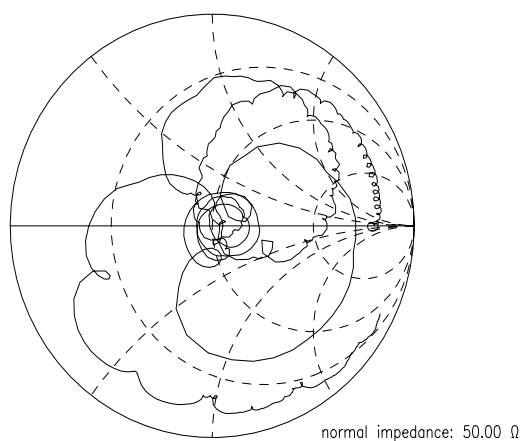
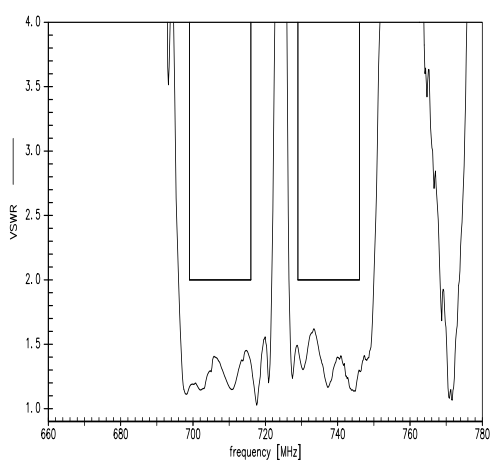
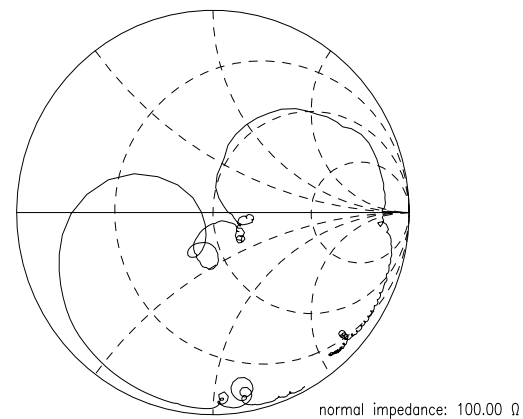
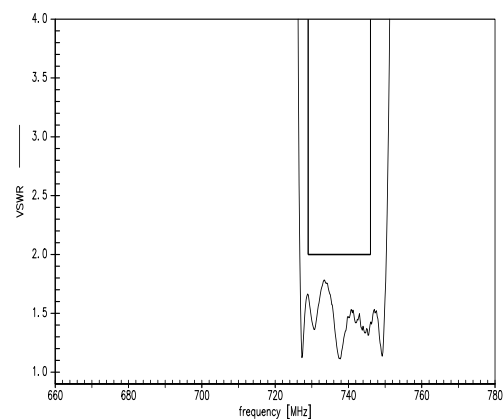
f_{Carrier} according to 3GPP TS 25.101 (e.g. for UMTS-Passband, f_{Carrier} ranges from 882.4 MHz (lowest Tx channel) to 912.6 MHz (highest Tx channel)). $H_{\text{RRC}}(f)$ is the transfer function of the root-raised cosine transmit pulse shaping filter according to 3GPP TS 25.101 with the following normalization:

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

Frequency Response TX-ANT

Frequency Response TX-ANT


Frequency Response ANT-RX

Frequency Response ANT-RX


Frequency Response TX-RX

Frequency Response TX-RX


S11 VSWR (TX)

S22 VSWR (ANT)

S33 VSWR (RX)


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References

Type	B7931
Ordering code	B39741B7931A710
Marking and package	C61157-A3-A61
Packaging	F61074-V8153-Z000
Date codes	L_1126
S-parameters	B7931_NB.S4P B7931_WB.S4P
Soldering profile	S_6001
RoHS compatible	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 th , 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.
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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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