



SAW Components

SAW Duplexer

Cellular Band / WCDMA Band 5

Series/type:	B8594
Ordering code:	B39881B8594P810
Date:	June 27, 2013
Version:	2.3

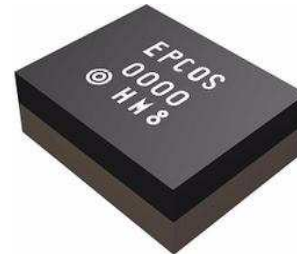
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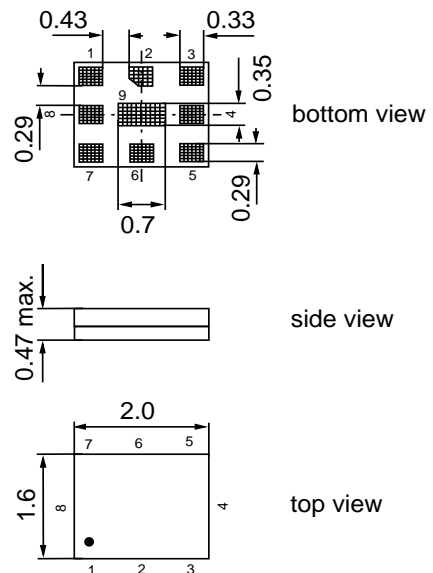
Data sheet

Application

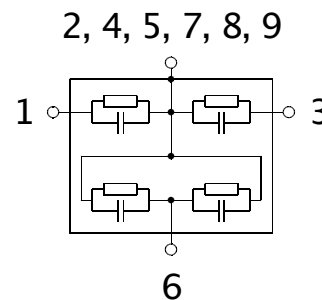
- Low-loss SAW duplexer for mobile telephone
Cellular Band / WCDMA Band 5, 6 and 19 systems
- Low insertion attenuation
- Low amplitude ripple


Features

- Package size 2.0 x 1.6 mm²
- Max. package height 0.47 mm
- RoHS compatible
- Approx. weight 0.006g
- Package for **Surface Mount Technology (SMT)**
- Ni, gold-plated terminals
- **Electrostatic Sensitive Device (ESD)**
- **Moisture Sensitive Level 3**


Pin configuration

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



Data sheet

Characteristics

Temperature range for specification:	T = -30 °C to +90 °C
Antenna terminating impedance:	Z _{ANT} = 50 Ω 8.2 nH
RX terminating impedance:	Z _{RX} = 50 Ω
TX terminating impedance:	Z _{TX} = 50 Ω

Characterisitcs TX - ANT				min.	typ. @ 25 °C	max.	
Center frequency		f _C		—	836.5	—	MHz
Maximum insertion attenuation							
	824.0 ... 849.0	MHz	α _{max}	—	1.4	2.1	dB
	@f _{Carrier} 826.4 ... 846.6	MHz	α _{WCDMA} ¹⁾	—	1.2	1.7	dB
Amplitude ripple (p-p)							
	824.0 ... 849.0	MHz	Δα	—	0.6	1.2	dB
	@f _{Carrier} 826.4 ... 846.6	MHz	Δα _{WCDMA} ³⁾	—	0.4	0.8	dB
Amplitude ripple over any 5MHz channel			Δα				
	824.0 ... 849.0	MHz	Δα	—	0.5	0.8	dB
Error Vector Magnitude							
	@f _{Carrier} 826.4 ... 846.6	MHz	EVM ²⁾	—	2.8	4.0	%
Input VSWR (TX port)							
	824.0 ... 849.0	MHz		—	1.8	2.1	
Output VSWR (ANT port)							
	824.0 ... 849.0	MHz		—	1.6	2.0	

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

2) Error Vector Magnitude (EVM) based on definition given in 3GPP TS 25.141

Data sheet


Characteristics

Temperature range for specification:	T = -30 °C to +90 °C
Antenna terminating impedance:	Z _{ANT} = 50 Ω 8.2 nH
RX terminating impedance:	Z _{RX} = 50 Ω
TX terminating impedance:	Z _{TX} = 50 Ω

Characterisitcs TX - ANT				min.	typ. @ 25 °C	max.	
Attenuation			α				
	10.0 ... 420.0		MHz	30	43	—	dB
	420.0 ... 494.0		MHz	32	41	—	dB
	494.0 ... 701.0		MHz	30	37	—	dB
	701.0 ... 728.0		MHz	30	37	—	dB
	728.0 ... 764.0		MHz	33	37	—	dB
	764.0 ... 804.0		MHz	30	40	—	dB
	860.0 ... 864.0		MHz	2	10	—	dB
	864.0 ... 869.0		MHz	10	36	—	dB
	869.0 ... 894.0		MHz	43	51	—	dB
@f _{Carrier}	871.4 ... 891.6		MHz $\alpha_{\text{WCDMA}}^{1)}$	44	51	—	dB
	1565.42 ... 1573.374		MHz	45	48	—	dB
	1573.374... 1577.466		MHz	45	49	—	dB
	1577.466... 1585.42		MHz	45	49	—	dB
	1597.5515... 1605.866		MHz	45	50	—	dB
	1648.0 ... 1698.0		MHz	45	51	—	dB
	1844.9 ... 1879.9		MHz	38	45	—	dB
	1884.5 ... 1919.6		MHz	38	45	—	dB
	1930.0 ... 1990.0		MHz	37	43	—	dB
	2110.0 ... 2170.0		MHz	34	40	—	dB
	2400.0 ... 2547.0		MHz	32	36	—	dB
	3296.0 ... 3396.0		MHz	23	30	—	dB
	4120.0 ... 4245.0		MHz	22	28	—	dB
	4900.0 ... 5943.0		MHz	12	18	—	dB

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

Data sheet

Characteristics

Temperature range for specification:	T = -30 °C to +90 °C
Antenna terminating impedance:	Z _{ANT} = 50 Ω 8.2 nH
RX terminating impedance:	Z _{RX} = 50 Ω
TX terminating impedance:	Z _{TX} = 50 Ω

Characterisitcs ANT - RX				min.	typ. @ 25 °C	max.	
Center frequency	f _C			—	881.5	—	MHz
Maximum insertion attenuation							
	869.0 ... 894.0MHz	α _{max}		—	1.7	2.1	dB
	@f _{Carrier} 871.4 ... 891.6MHz	α _{WCDMA} ¹⁾		—	1.6	2.0	dB
Amplitude ripple (p-p)							
	869.0 ... 894.0MHz	Δα		—	0.6	1.0	dB
	@f _{Carrier} 871.4 ... 891.6MHz	Δα _{WCDMA} ³⁾		—	0.4	0.8	dB
Amplitude ripple over any 5MHz channel							
	869.0 ... 894.0MHz	Δα		—	0.5	0.8	dB
Error Vector Magnitude							
	@f _{Carrier} 871.4 ... 891.6MHz	EVM ²⁾		—	2.0	3.5	%
Input VSWR (ANT port)							
	869.0 ... 894.0MHz			—	1.6	2.0	
Output VSWR (RX port)							
	869.0 ... 894.0MHz			—	1.7	2.0	

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

2) Error Vector Magnitude (EVM) based on definition given in 3GPP TS 25.141

Data sheet

Characteristics

Temperature range for specification:	T = -30 °C to +90 °C
Antenna terminating impedance:	Z _{ANT} = 50 Ω 8.2 nH
RX terminating impedance:	Z _{RX} = 50 Ω
TX terminating impedance:	Z _{TX} = 50 Ω

Characterisitcs ANT - RX				min.	typ. @ 25 °C	max.	
Attenuation			α				
	10.0 ... 824.0	MHz		40	59	—	dB
		45.0	MHz	50	95	—	dB
	824.0 ... 849.0	MHz		51	59	—	dB
@f _{Carrier}	826.4 ... 846.6	MHz	$\alpha_{\text{WCDMA}}^{1)}$	55	61	—	dB
	849.0 ... 854.0	MHz		26	36	—	dB
	909.0 ... 920.0	MHz		10	18	—	dB
	920.0 ... 979.0	MHz		25	30	—	dB
	979.0 ... 1710.0	MHz		40	56	—	dB
	1710.0 ... 1785.0	MHz		50	61	—	dB
	1785.0 ... 4100.0	MHz		40	48	—	dB
	4100.0 ... 4500.0	MHz		35	42	—	dB
	4500.0 ... 5000.0	MHz		31	39	—	dB
	5000.0 ... 6000.0	MHz		28	34	—	dB
IMD product level limits²⁾							
at f_{TX}=836.5MHz, f_{RX}=881.5MHz							
Blocker 1	45.0	MHz		—	-126	-109	dBm
Blocker 2	791.5	MHz		—	-113	-100	dBm
Blocker 3	1718.0	MHz		—	-106	-94	dBm
Blocker 4	2554.5	MHz		—	-122	-102	dBm

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

²⁾ IMD product level limits for power levels P_{TX}=21.5 dBm (antenna port output power) and P_{Blocker}=-15dBm (antenna port input power).

Data sheet


Characteristics

Temperature range for specification:	T = -30 °C to +90 °C
Antenna terminating impedance:	Z _{ANT} = 50 Ω 8.2 nH
RX terminating impedance:	Z _{RX} = 50 Ω
TX terminating impedance:	Z _{TX} = 50 Ω

Characterisitcs TX - RX					min.	typ. @ 25 °C	max.		
Isolation				α					
	824.0	...	849.0	MHz	α	55	61	—	dB
@f _{Carrier}	826.4	...	846.6	MHz	α _{WCDMA} ¹⁾	57	64	—	dB
	869.0	...	894.0	MHz	α	48	53	—	dB
@f _{Carrier}	871.4	...	891.6	MHz	α _{WCDMA} ³⁾	50	54	—	dB
	1574.0	...	1577.0	MHz	α	40	63	—	dB
	1638.0	...	1708.0	MHz	α	40	62	—	dB
	2462.0	...	2557.0	MHz	α	40	57	—	dB

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

Maximum ratings

Storage temperature range	T_{stg}	-40/+90 ¹⁾	°C	Machine Model source and load impedance 50 Ω } continuous wave } $T = 50^\circ\text{C}, 3000\text{ h}$
DC voltage	V_{DC}	5 ²⁾	V	
DC impedance to ground		>100	MΩ	
ESD voltage	V_{ESD}	100 ³⁾	V	
Input power at 824.0 ... 849.0 MHz	P_{IN}	28	dBm	
elsewhere		10	dBm	

1) extended upperlimit: 168h@125°C acc. to IEC 60068-2-2 Bb

2) 168h Damp Heat Steady State acc. to IEC 60068-2-67 Cy

3) acc. to JESD22-A115B (MM - Machine Model), 10 negative and 10 positive pulses.

Annotation for characteristics section

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

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

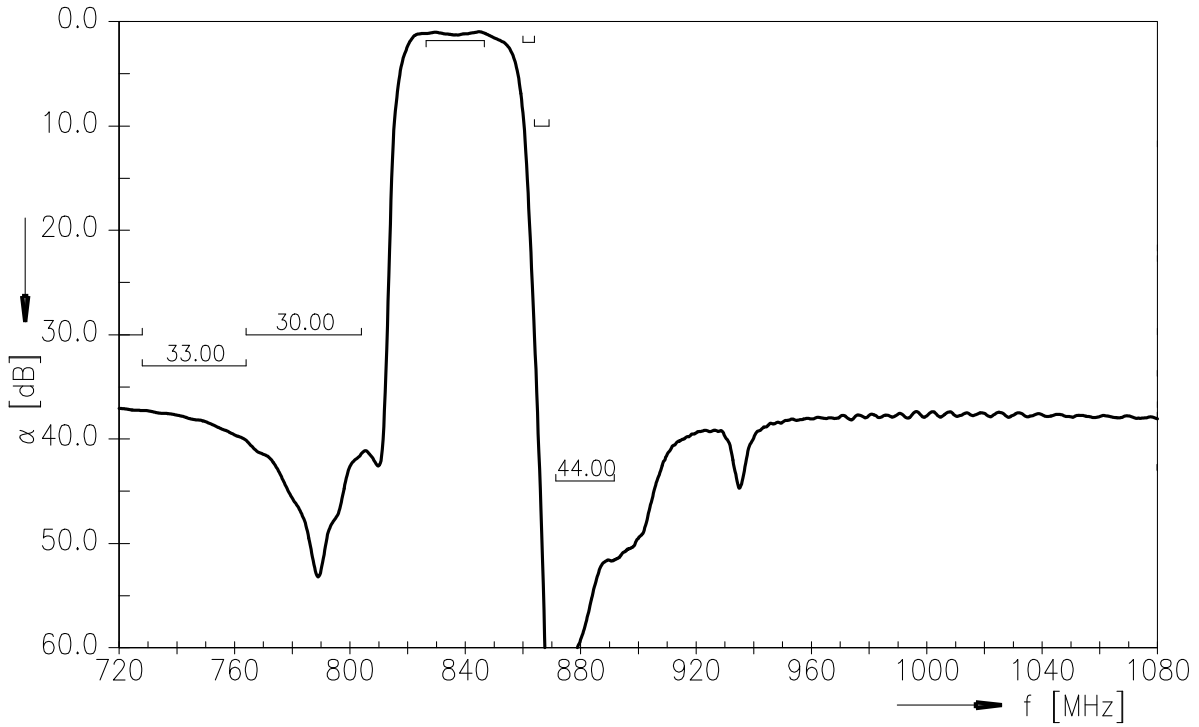
$f_{Carrier}$ according to 3GPP TS 25.101 (e.g. for WCDMA Band 5-Passband, $f_{Carrier}$ ranges from 826.4 MHz (lowest Tx channel) to 846.6 MHz (highest Tx channel)). $H_{RRC}(f)$ is the transfer function of the root-raised cosine transmit pulse shaping filter according to 3GPP TS 25.101 with the following normalization:

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

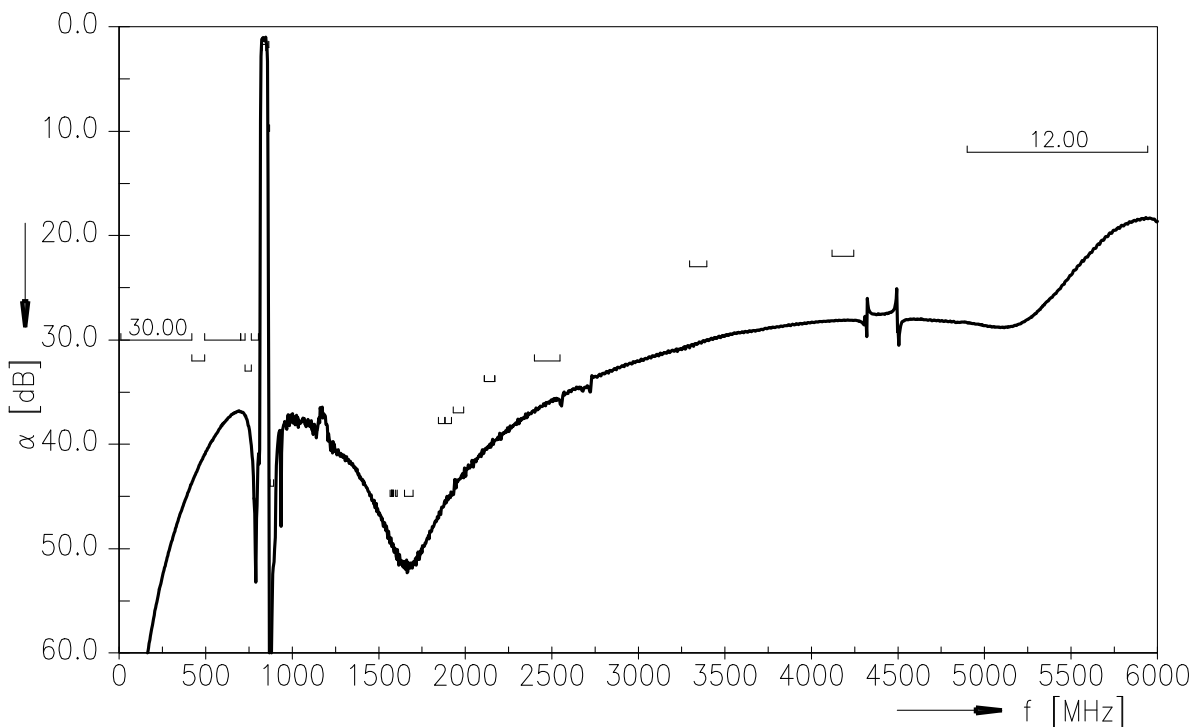
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Frequency Response TX-ANT (Power transfer function)



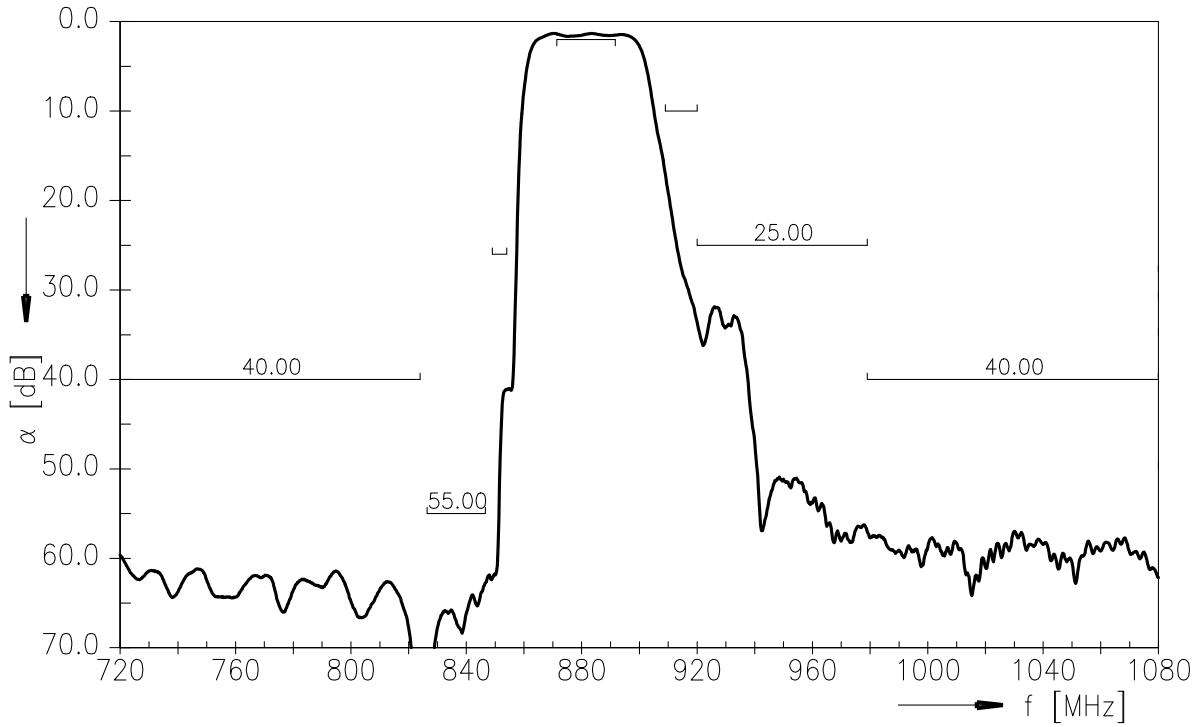
Frequency Response TX-ANT (wideband)



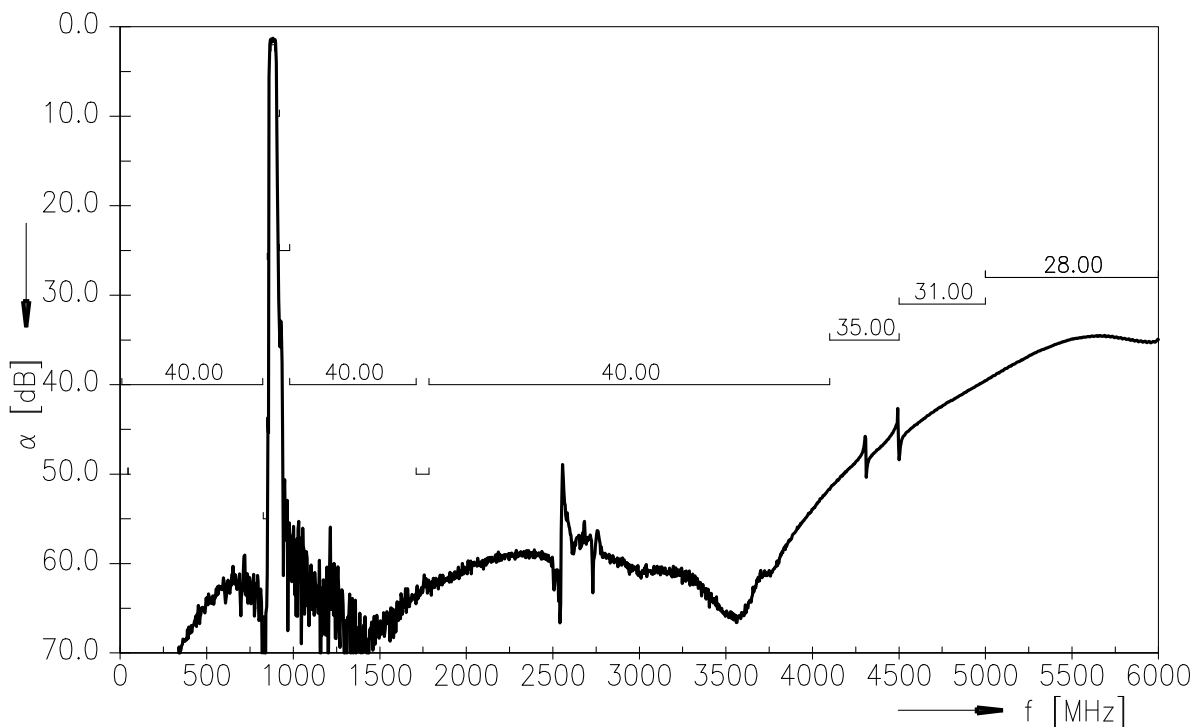
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Frequency Response RX-ANT (Power transfer function)



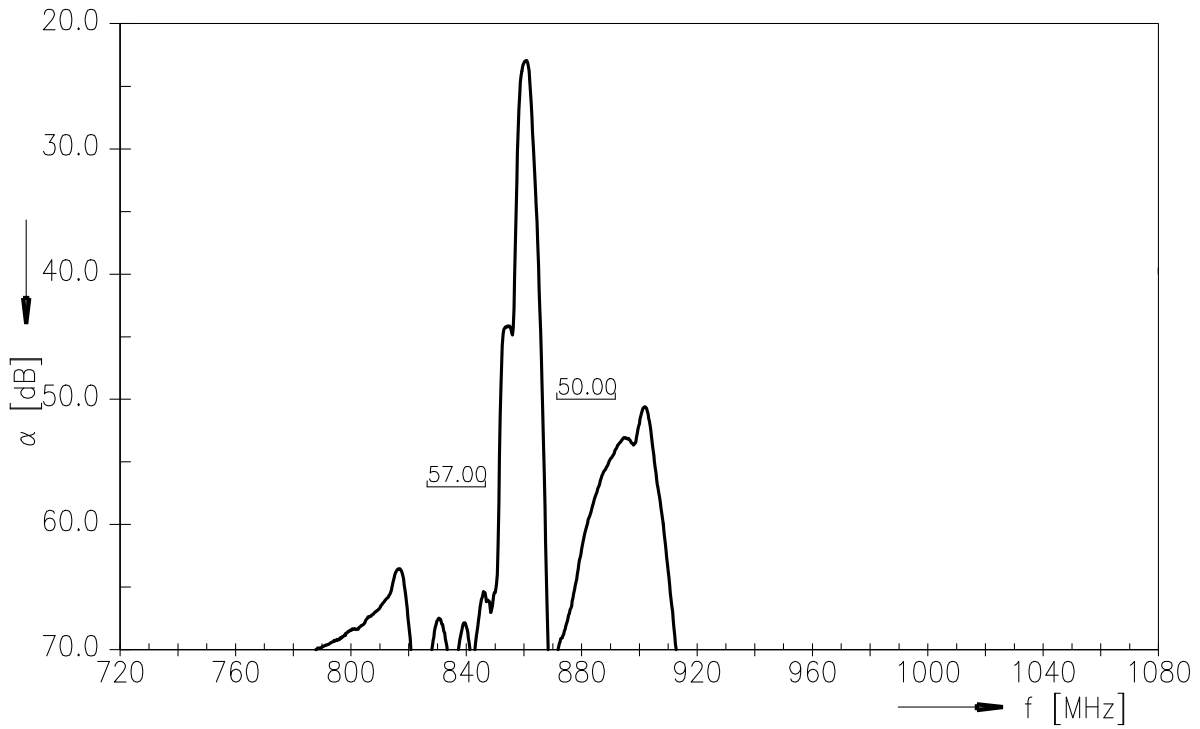
Frequency Response RX-ANT (wideband)



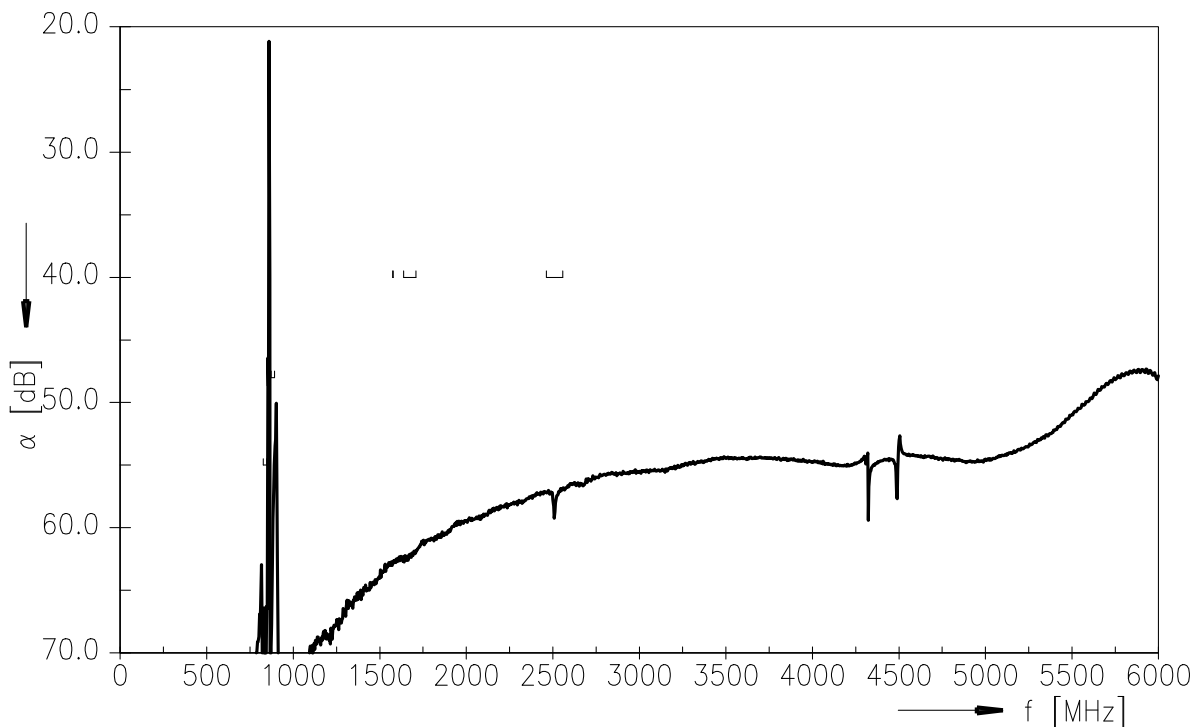
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Frequency Response TX-RX (Power transfer function)



Frequency Response TX-RX (wideband)



Data sheet

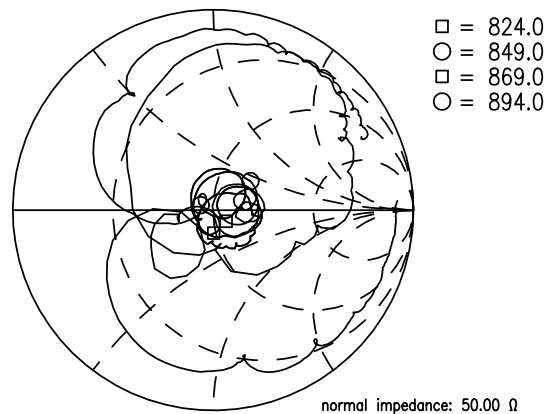
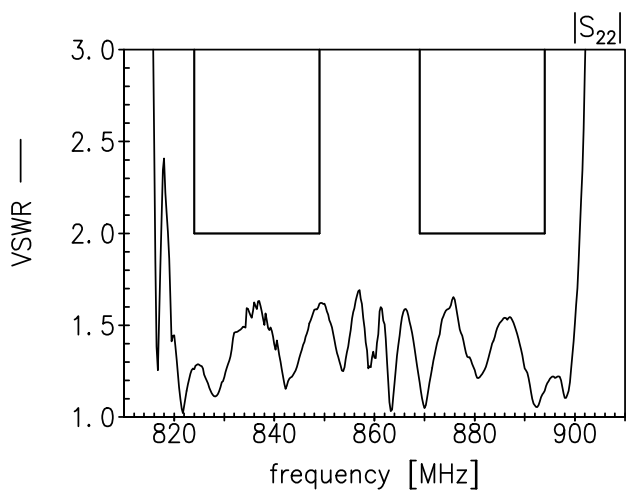
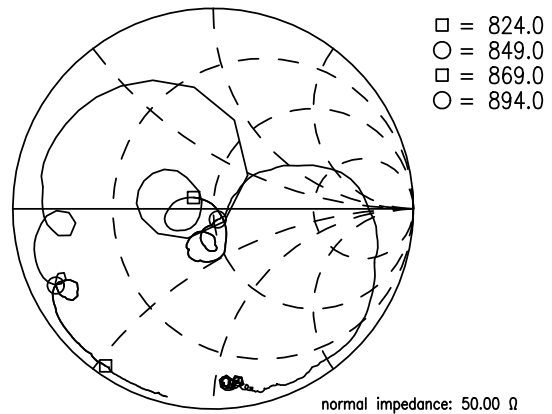
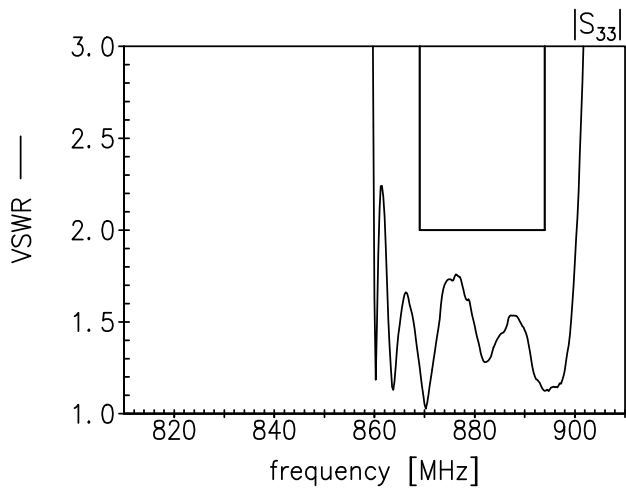
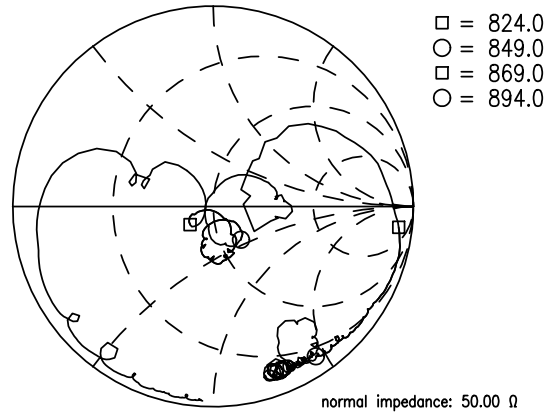
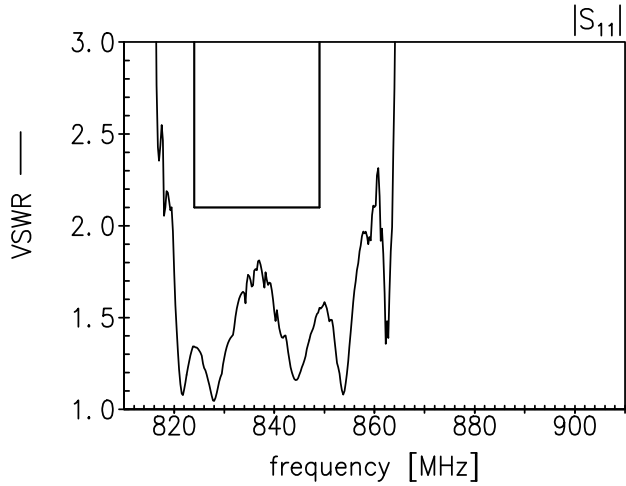


Return Loss

S_{11} TX- port

S_{22} ANT-port

S_{33} RX-port



Data sheet



References

Type	B8594
Ordering code	B39881B8594P810
Marking and package	C61157-A8-A38
Packaging	F61074-V8247-Z000
Date codes	L_1126
S-parameters	B8594_NB_UN.s3p, B8594_WB_UN.s3p see file header for port/pin assignment table
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.
Moldability	Before using in overmolding environment, please contact your EPCOS sales office.
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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