SAW Components

SAW Duplexer

WCDMA/LTE Band IX

Series/type: **B8557**
Ordering code: **B39182B8557P810**

Date: July 21, 2011
Version: 2.0

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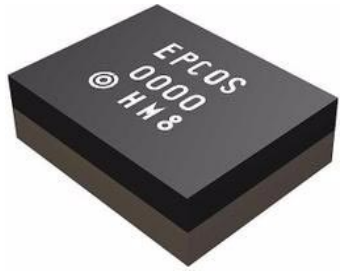
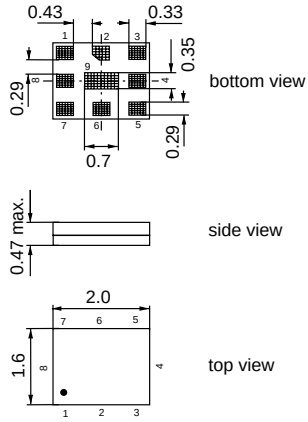
Application

- 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



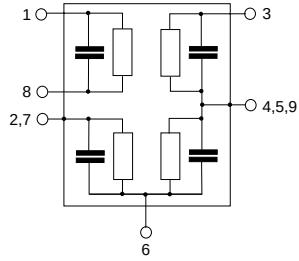
Features

- Package size 2.0 * 1.6 mm²
- Max. height 0.47 mm
- RoHS compatible
- Approximate weight 0.006g
- Package for **S**urface **M**ount **T**echnology (**SMT**)
- Ni terminals, Au-plated
- Balanced Rx port, unbalanced Tx port
- **E**lectrostatic **S**ensitive **D**evice (**ESD**)
- **M**oisture **S**ensitivity **L**evel (**MSL**) 3



Pin configuration

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



Characteristics

Temperature range for specification: T = -30˚C to +85 ˚C
Antenna terminating impedance: Z_{ANT}= 50 Ω || 3.6 nH
RX terminating impedance: Z_{RX} = 100 Ω (balanced) || 8.2 nH
TX terminating impedance: Z_{TX} = 50 Ω

Characterisitcs TX - ANT		min.	typ. @ 25 ˚C	max.	
Center frequency	f_C	—	1767.4	—	MHz
Maximum insertion attenuation					
1749.9 ... 1784.9 MHz			1.4	1.8	dB
@$f_{carrier}$1752.4 ... 1782.4 MHz	α_{WCDMA} 1)		1.4	1.8	dB
Amplitude ripple(p-p)					
1749.9 ... 1784.9 MHz			0.4	0.8	dB
@$f_{carrier}$1752.4 ... 1782.4 MHz	α_{WCDMA} 3)		0.4	0.8	dB
Error Vector Magnitude					
@$f_{carrier}$1752.4 ... 1782.4 MHz	EVM 2)		1.3	2.0	%
Input VSWR (TX port)					
1749.9 ... 1784.9 MHz			1.4	1.8	
Output VSWR (ANT port)					
1749.9 ... 1784.9 MHz			1.5	1.8	

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.

Characteristics

Temperature range for specification: T = -30˚C to +85 ˚C
Antenna terminating impedance: Z_{ANT}= 50 Ω || 3.6 nH
RX terminating impedance: Z_{RX} = 100 Ω (balanced) || 8.2 nH
TX terminating impedance: Z_{TX} = 50 Ω

Characterisitcs TX - ANT					min.	typ. @ 25 ˚C	max.	
Attenuation				α				
10.0	...	95.0	MHz		30	80		dB
470.0	...	770.0	MHz		30	48		dB
810.0	...	828.0	MHz		30	47		dB
860.0	...	895.0	MHz		30	46		dB
921.0	...	960.0	MHz		30	45		dB
1475.9	...	1500.9	MHz		30	40		dB
1500.9	...	1565.42	MHz		30	40		dB
1565.42	...	1573.374	MHz		40	43		dB
1573.374	...	1577.466	MHz		40	43		dB
1577.466	...	1585.42	MHz		40	44		dB
1597.5515	...	1605.886	MHz		40	46		dB
1605.886	...	1680.0	MHz		25	31		dB
1805.0	...	1845.0	MHz		1	4		dB
1844.9	...	1879.9	MHz		45	50		dB
@$f_{carrier}$ 1847.4	...	1877.4	MHz	α_{WCDMA}[1)]	45	50		dB
1884.5	...	1919.6	MHz		40	46		dB
2110.0	...	2170.0	MHz		27	42		dB
2400.0	...	2500.0	MHz		35	40		dB
3500.0	...	3570.0	MHz		20	31		dB
5150.0	...	5355.0	MHz		20	23		dB
5725.0	...	5850.0	MHz		18	21		dB

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

Characteristics

Temperature range for specification: T = –30 ˚C to +85 ˚C
Antenna terminating impedance: Z_{ANT} = 50 Ω || 3.6 nH
RX terminating impedance: Z_{RX} = 100 Ω (balanced) || 8.2 nH
TX terminating impedance: Z_{TX} = 50 Ω

Characterisitcs ANT - RX		min.	typ. @ 25 ˚C	max.	
Center frequency	f_C	—	1862.4	—	MHz
Maximum insertion attenuation					
1844.9 ... 1879.9 MHz			2.0	2.5	dB
@$f_{carrier}$ 1847.4 ... 1877.4 MHz	α_{WCDMA} [1]		2.0	2.5	dB
Amplitude ripple(p-p)					
1844.9 ... 1879.9 MHz			0.4	0.7	dB
@$f_{carrier}$ 1847.4 ... 1877.4 MHz	α_{WCDMA} [3]		0.3	0.7	dB
Common Mode Rejection Ratio CMRR					
1844.9 ... 1879.9 MHz		21 [2]	26		dB
Input VSWR (ANT port)					
1844.9 ... 1879.9 MHz			1.4	1.8	
Output VSWR (RX port)					
1844.9 ... 1879.9 MHz			1.4	1.8	

[1] Attenuation of WCDMA signal("Powertransferfunction").Please refer to annotation on page (8).
[2] A combination of 10º phase balance and 1dB amplitude balance corresponds to 19.6 dB CMRR.

Characteristics

Temperature range for specification: T = –30 ˚C to +85 ˚C
Antenna terminating impedance: Z_{ANT}= 50 Ω || 3.6 nH
RX terminating impedance: Z_{RX} = 100 Ω (balanced) || 8.2 nH
TX terminating impedance: Z_{TX} = 50 Ω

Characterisitcs ANT - RX					min.	typ. @ 25 ˚C	max.	
Attenuation				α				
10.0	...	95.0	MHz		70	79		dB
614.9	...	626.7	MHz		45	80		dB
922.5	...	940.0	MHz		45	72		dB
1654.9	...	1689.9	MHz		35	60		dB
1689.9	...	1750.0	MHz		35	56		dB
1749.9	...	1784.9	MHz		48	58		dB
@$f_{carrier}$ 1752.4	...	1782.4	MHz	α_{WCDMA} [1]	48	58		dB
1965.0	...	2400.0	MHz		15	52		dB
2400.0	...	2497.0	MHz		30	57		dB
3594.8	...	3664.8	MHz		40	59		dB
3689.8	...	3759.8	MHz		35	58		dB
5344.7	...	5449.7	MHz		40	51		dB
5534.7	...	5639.7	MHz		35	51		dB
5639.7	...	5650.0	MHz		35	51		dB
IMD Product Level Limits [2]								
at f_{TX} = 1767.4 MHz f_{RX} = 1862.4 MHz								
Blocker 1		95.0	MHz			-130	-105	dBm
Blocker 2		1672.4	MHz			-111	-105	dBm
Blocker 3		3629.8	MHz			-120	-105	dBm
Blocker 4		5397.2	MHz			-124	-105	dBm

1) Attenuation of WCDMA signal("Powertransferfunction").Please refer to annotation on page (8).
2) IMD product level limits for power levels P_{TX}=21.5dB (antenna port output power) and $P_{BLOCKER}$=-15dBm (antenna port input power).

Characteristics

Temperature range for specification: T = –30 ˚C to +85 ˚C
Antenna terminating impedance: Z_{ANT}= 50 Ω || 3.6 nH
RX terminating impedance: Z_{RX} = 100 Ω (balanced) || 8.2 nH
TX terminating impedance: Z_{TX} = 50 Ω

Characterisitcs TX - RX					min.	typ. @ 25 ˚C	max.	
Differential Mode Isolation				α				
1749.9	...	1784.9	MHz		55	58		dB
@$f_{carrier}$ 1752.4	...	1782.4	MHz	α_{WCDMA} [1)]	55	58		dB
1844.9	...	1879.9	MHz		50	56		dB
@$f_{carrier}$ 1847.4	...	1877.4	MHz	α_{WCDMA} [3)]	50	57		dB
Common mode Isolation				α				
1749.9	...	1784.9	MHz		53	56		dB
@$f_{carrier}$ 1752.4	...	1782.4	MHz	α_{WCDMA} [3)]	53	56		dB

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

Maximum ratings

Storage temperature range	T_{stg}	–40/+85	°C	
DC voltage	V_{DC}	5	V	
ESD voltage	V_{ESD}	50[1)]	V	machine model, 10 pulses
Input power at	P_{IN}			source and load impedance 50 Ω
1749.9 ... 1784.9 MHz		29	dBm	} continuous wave
elsewhere		10	dBm	} T = 50°C, 5.000 h

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

Annotation for characteristics section

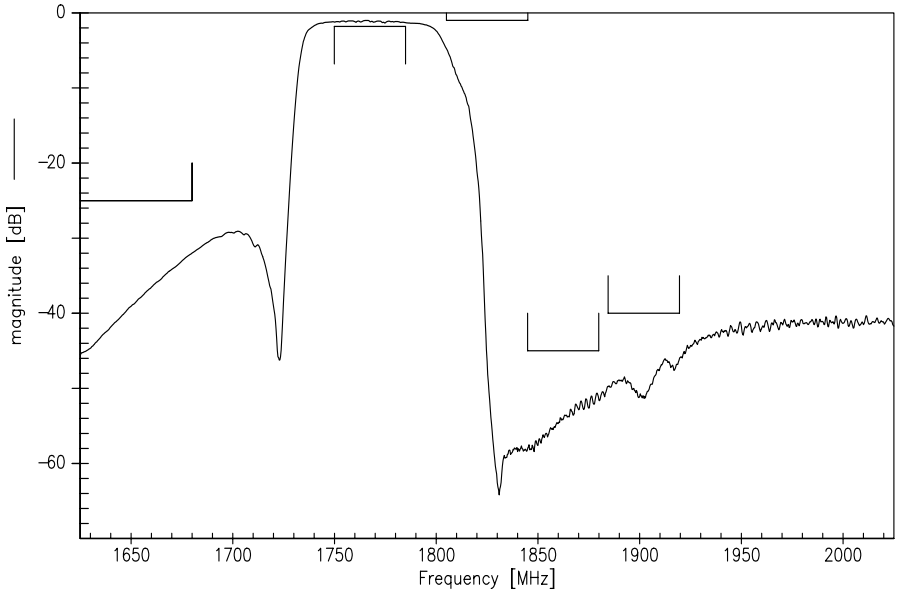
Attenuation of WCDMA signal ("Powertransferfunction", α_{WCDMA}) is determined by

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

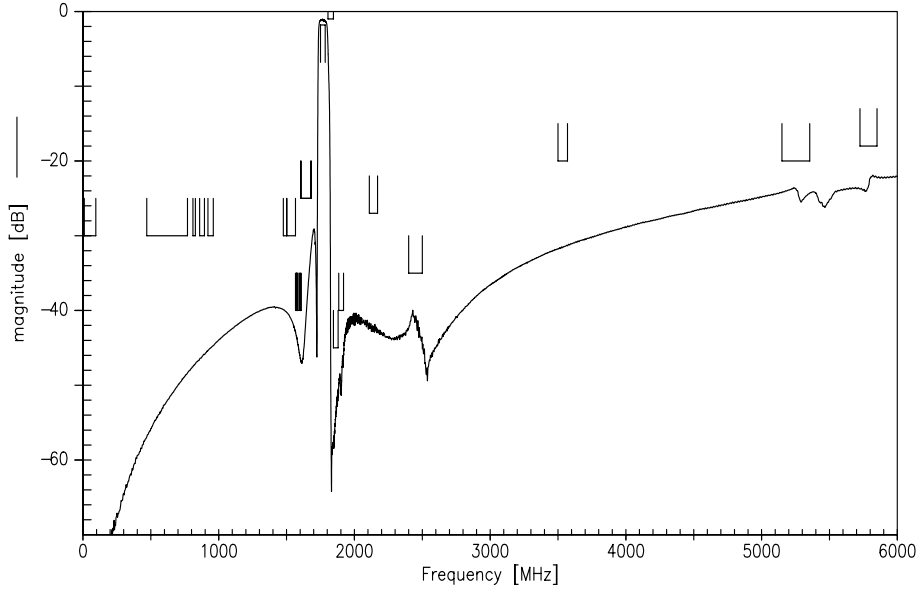
$f_{Carrier}$ according to 3GPP TS 25.101 (e.g. for WCDMA Band 9-Passband, $f_{Carrier}$ ranges from 1752.4 MHz (lowest Tx channel) to 1782.4 MHz (highest Tx channel)). $H_{RRC}(f)$ is the transfer function of the root-raised cosine transmit pulse shaping filter according to 3GPP TS 25.101 with the following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

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

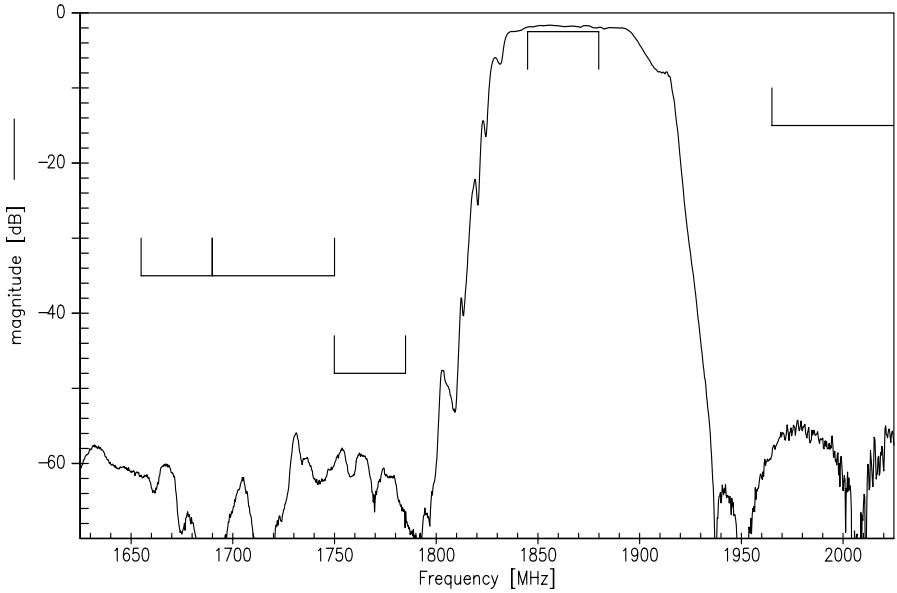
Frequency Response Tx-ANT (passband)



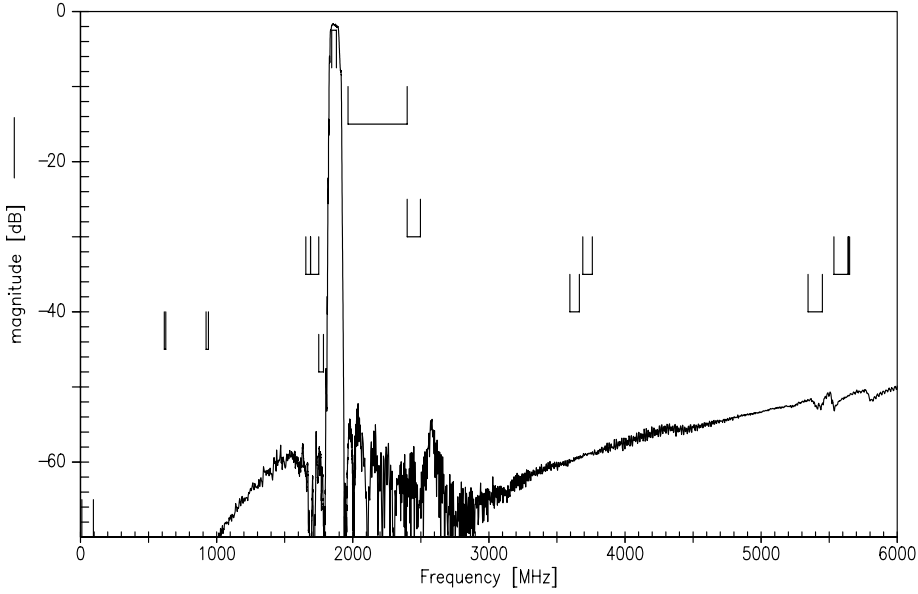
Frequency Response Tx-ANT (wideband)



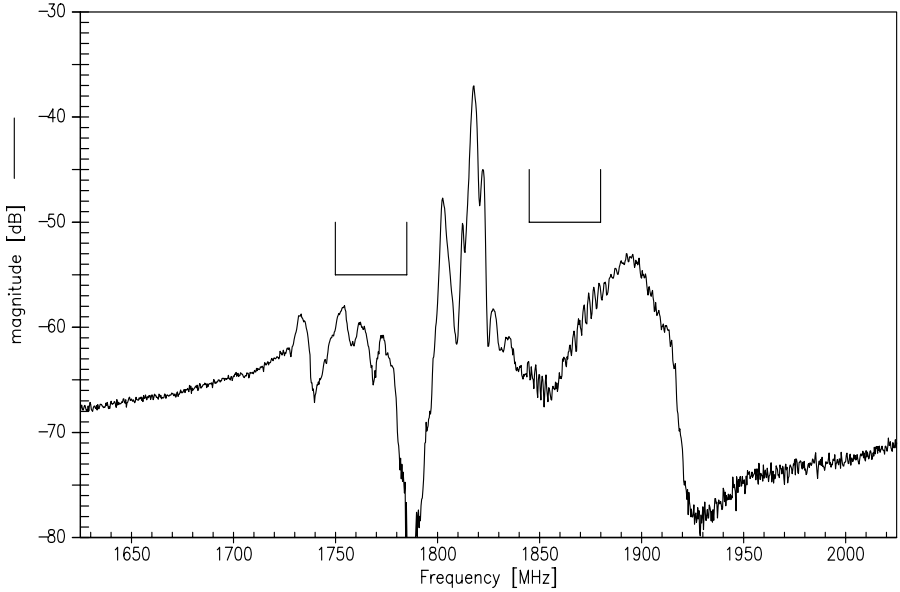
Frequency Response ANT-Rx (passband)



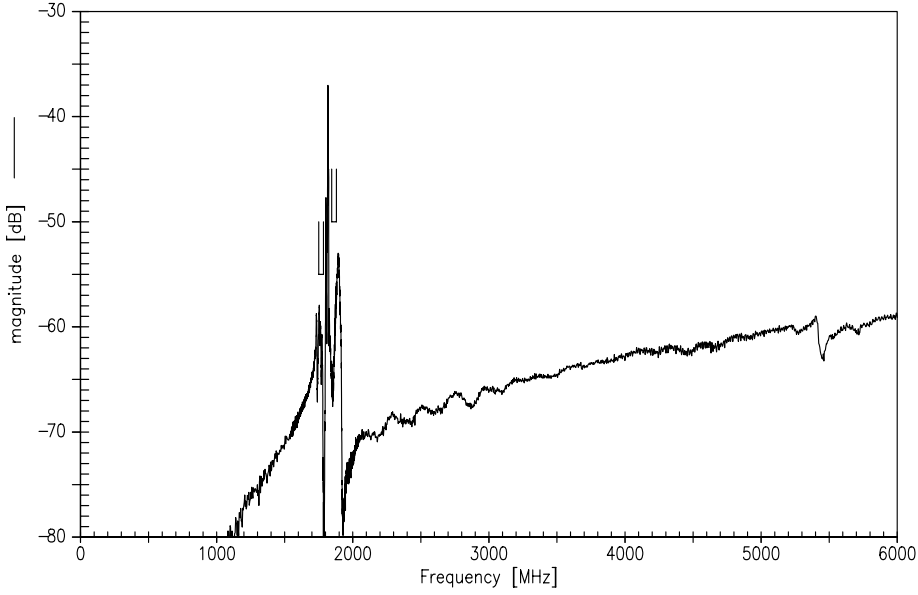
Frequency Response ANT-Rx (wideband)



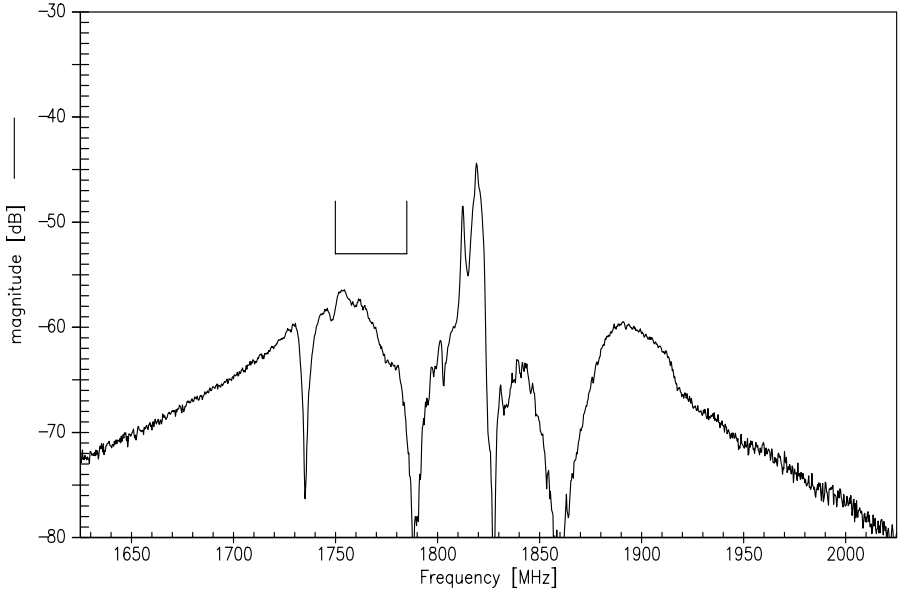
Frequency Response Tx-Rx (passband) / Differential Mode



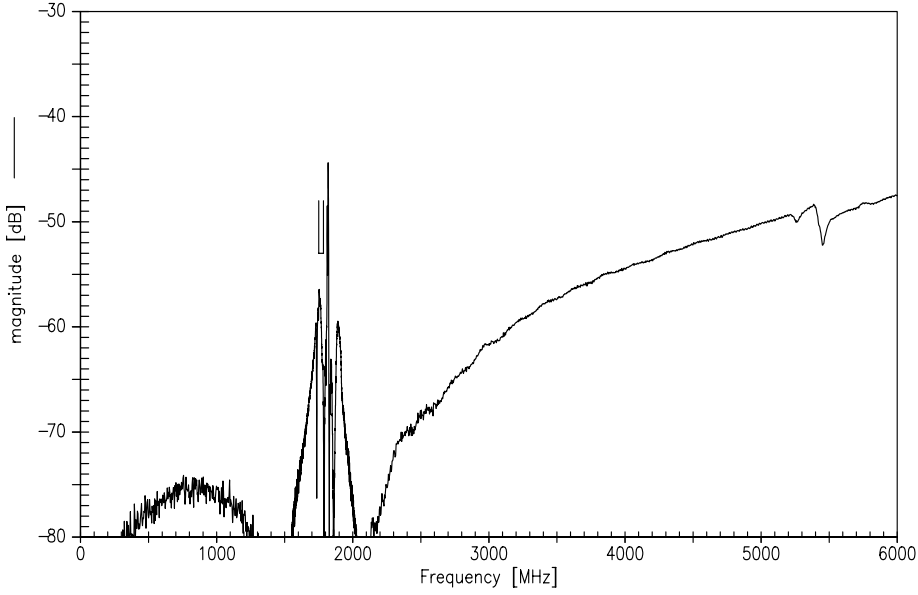
Frequency Response Tx-Rx (wideband) / Differential Mode



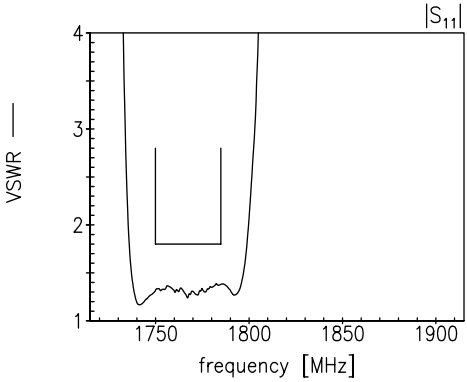
Frequency Response Tx-Rx (passband) / Common Mode

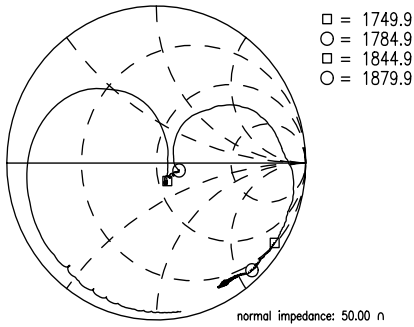


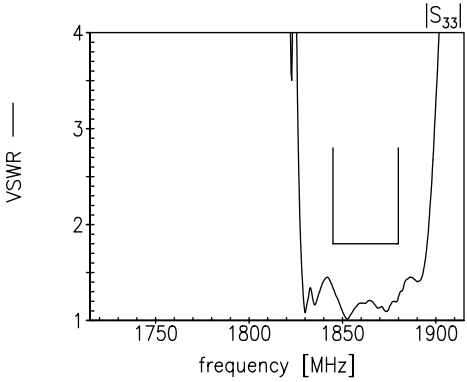
Frequency Response Tx-Rx (wideband) / Common Mode

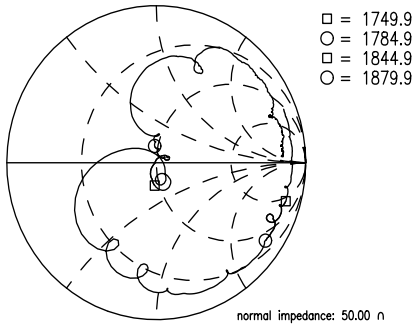


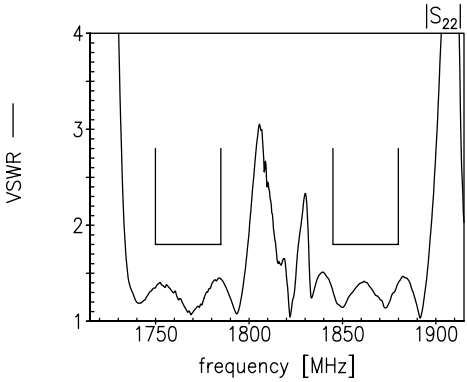
Return Loss S_{11} Tx - port S_{22} ANT - port S_{33} Rx - port

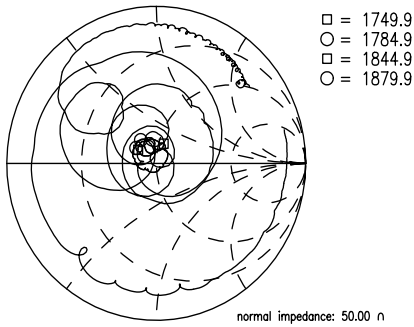












References

Type	B8557
Ordering code	B39182B8557P810
Marking and package	C61157-A8-A38
Packaging	F61074-V8247-Z000
Date codes	L_1126
S-parameters	B8557_NB.s4p, B8557_WB.s4p See file header for port/pin assignment table.
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."
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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