SAW Components

SAW RF filter for base station

LTE

Series/type:	**B5159**
Ordering code:	**B39172B5159U410**
Date:	February 15, 2012
Version:	2.0

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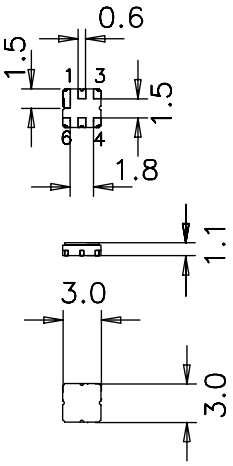
Application

- RF filter for LTE base station
- Usable passband 75 MHz
- High rejection in upper stopband
- Unbalanced operation

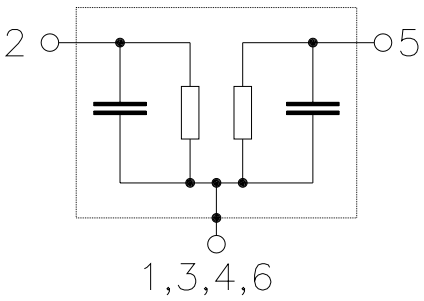
Features

- Package size 3.0 x 3.0 x 1.10 mm^3
- Package code DCC6C
- RoHS compatible
- Approximate weight 0.037 g
- Ceramic Package for **S**urface **M**ount **T**echnology (**SMT**)
- Ni, gold-plated terminals
- **E**lectrostatic **S**ensitive **D**evice (**ESD**)
- Filter surface passivated
- Moisture Sensitivity Level 1



Pin configuration

- 2 Input
- 5 Output
- 1, 3, 4, 6 To be grounded



Characteristics

Temperature range for specification: T = –33 ˚C to +100 ˚C
Terminating source impedance: Z_S = 50 Ω unbalanced and matching network
Terminating load impedance: Z_L = 50 Ω unbalanced and matching network

		min.	typ. @ 25 ˚C	max.	
Nominal frequency	f_N	—	1747.5	—	MHz
Maximum insertion attenuation (including matching network)	α_{max}	—	2.2	3.3	dB
Amplitude ripple (p-p)	$\Delta\alpha$				
1710 ... 1785 MHz		—	0.3	1.2	dB
1710 ... 1785 MHz (in any contiguous 5MHz band)		—	0.1	0.8	dB
Group delay ripple (p-p)	$\Delta\tau$				
1710 ... 1785 MHz		—	6	20	ns
Phase ripple (p-p)	$\Delta\varphi$				
1710 ... 1785 MHz		—	12	—	°
Error vector magnitude[1)]	EVM				
1710 ... 1785 MHz		—	0.2	1.0[2)]	%
Absolute group delay	τ				
1710 ... 1785 MHz		—	13	20	ns
Relative attenuation (relative to α_{max})	α_{rel}				
70 ... 110 MHz		30	78	—	dB
300 ... 400 MHz		30	61	—	dB
852 ... 1291 MHz		25	44	—	dB
1205 ... 1250 MHz		30	45	—	dB
1372 ... 1603 MHz		25	34	—	dB
1603 ... 1681 MHz		10	17	—	dB
1885 ... 1960 MHz		20	31	—	dB
2110 ... 2170 MHz		25	48	—	dB
2422 ... 2507 MHz		45	52	—	dB
3775 ... 3915 MHz		25	66	—	dB
4295 ... 4942 MHz		15	50	—	dB

	min.	typ. @ 25 ˚C	max.	
VSWR				
input 1710 ... 1785 MHz	—	1.6:1	2.2:1	
output 1710 ... 1785 MHz	—	1.5:1	2.2:1	
Temperature Drift				
high temperature[3] 1710 ... 1785 MHz	—	0.2	0.5[4]	dB
low temperature[5] 1710 ... 1785 MHz	—	0.15	0.4[6]	dB

1) EVM calculation based on root raised cosine filtered QPSK signal (fc_{RRC} within 1717.5 ... 1782.5 MHz, bw_{RRC}= 3.84 MHz)
2) EVM relaxed to 2.5 % for fc_{RRC} = 1712.5 MHz for temperatures below 0 ˚C
3) $T_{25°C}$ is transmission at 25 ˚C in dB,$T_{100°C}$ at 100 ˚C in dB

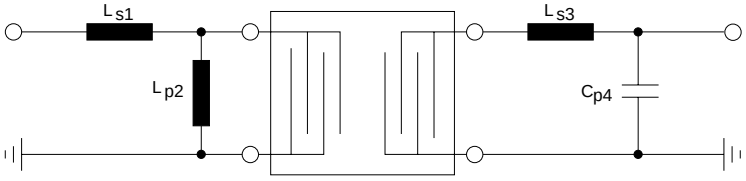
$$\text{tempdrift}_{\text{hightemp}} = \left| \frac{\max(T_{25°C} - T_{100°C}) - \min(T_{25°C} - T_{100°C})}{2} \right|$$

4) 0.35 dB for frequency range 1715 ... 1780 MHz (roll-offs excluded)
5) $T_{25°C}$ is transmission at 25 ˚C in dB,$T_{-33°C}$ at -33 ˚C in dB

$$\text{tempdrift}_{\text{lowtemp}} = \left| \frac{\max(T_{25°C} - T_{-33°C}) - \min(T_{25°C} - T_{-33°C})}{2} \right|$$

6) 0.35 dB for frequency range 1715 ... 1780 MHz (roll-offs excluded)

Matching network to 50 Ω unbalanced input and output



L_{s1} = 13.0 nH
L_{p2} = 5.6 nH
L_{s3} = 4.3 nH
C_{p4} = 1.5 pF

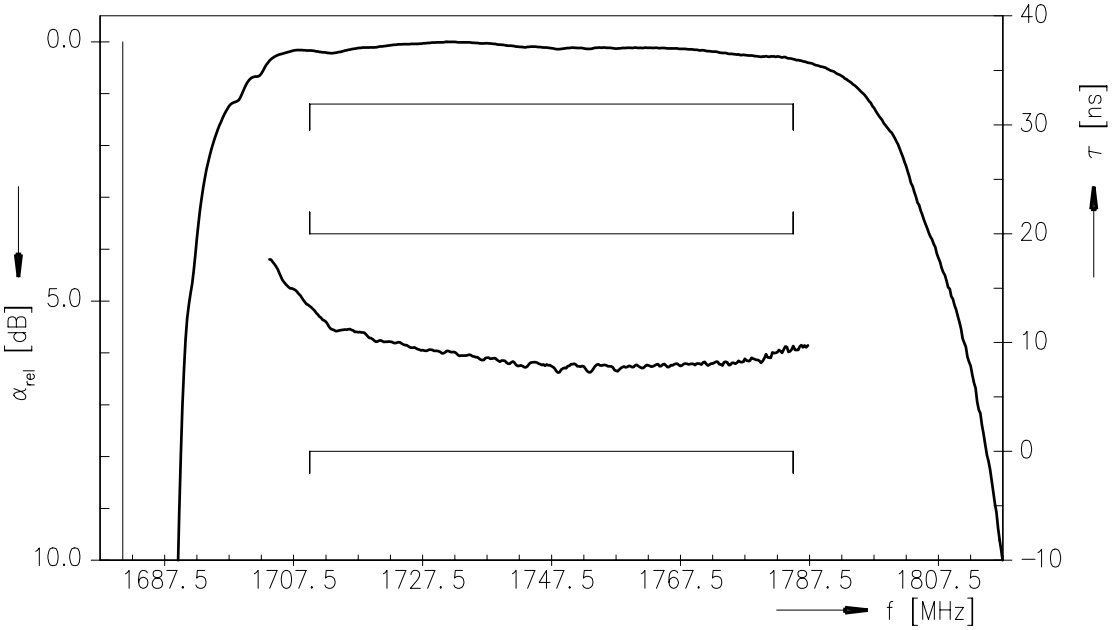
Element values depend upon board layout and properties.

Maximum ratings

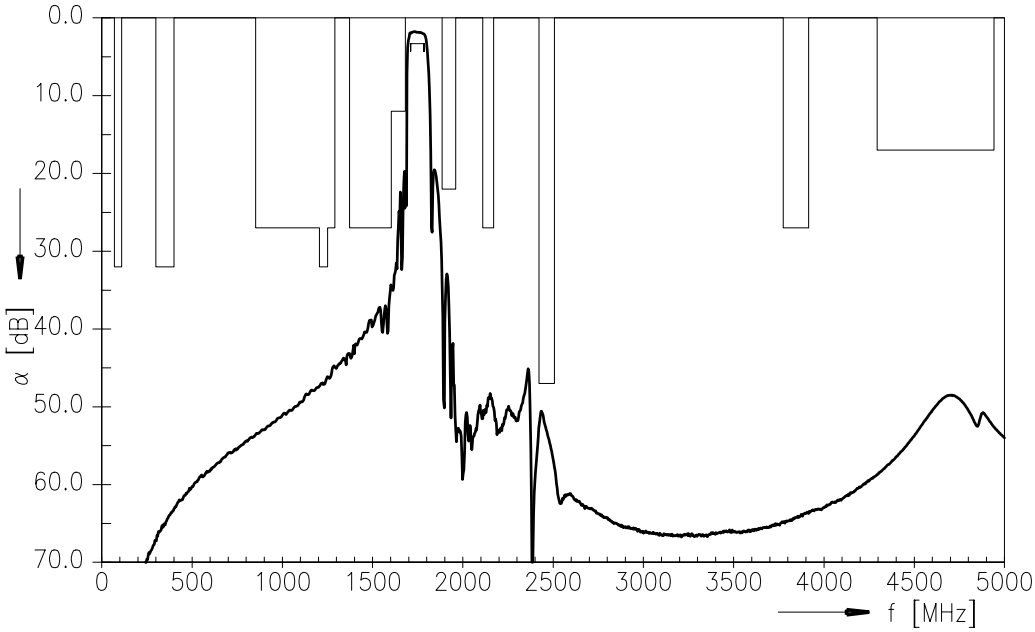
Operable temperature range	T	–40/+100	˚C	
Storage temperature range	T_{stg}	–40/+100	˚C	
DC voltage	V_{DC}	5	V	
ESD voltage	V_{ESD}	50[1]	V	machine model, 1 pulse
Input power at				
1710...1785MHz	P_{IN}	22	dBm	24 h, 55 °C, CW

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

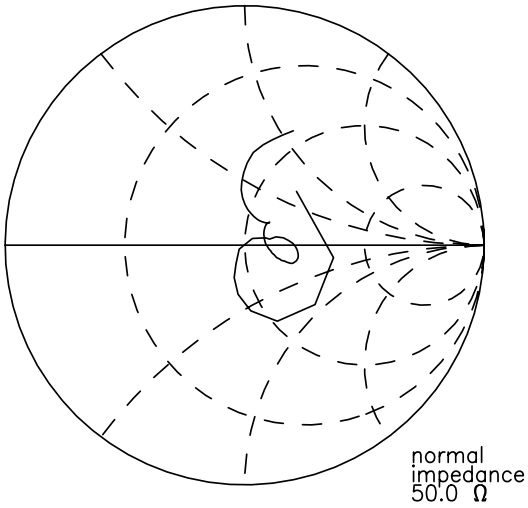
Transfer function (S21, narrowband, normalized)

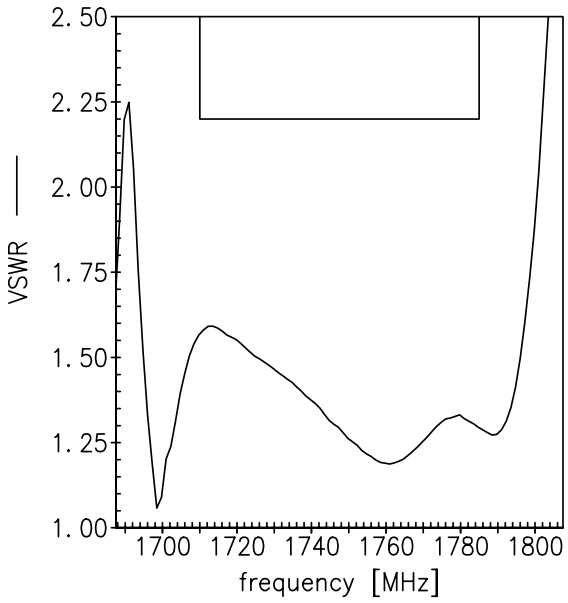


Transfer function (S21, wideband)

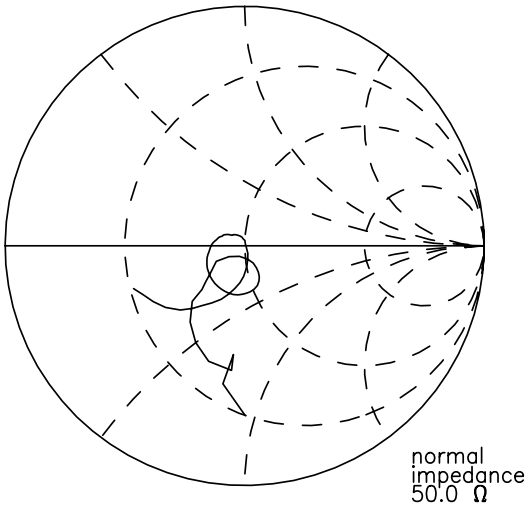


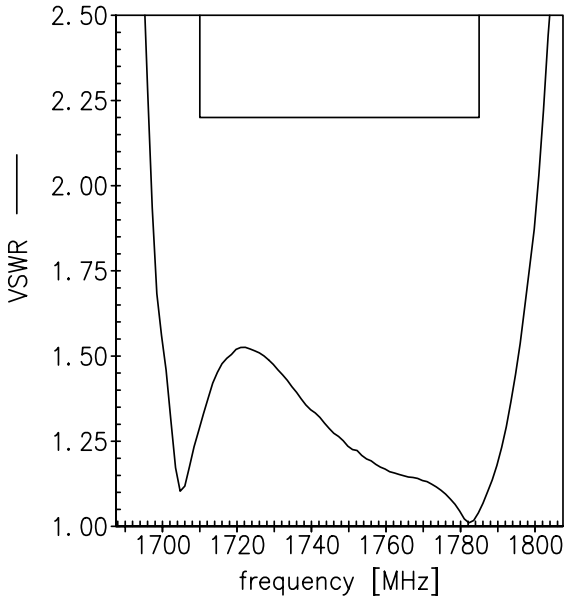
Smith charts
S_{11} function





S_{22} function





References

Type	B5159
Ordering code	B39172B5159U410
Marking and package	C61157-A7-A67
Packaging	F61074-V8168-Z000
Date codes	L_1126
S-parameters	B5159_NB.s2p, B5159_WB.s2p 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."
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 for a large variety of matching coils.

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