SAW Components

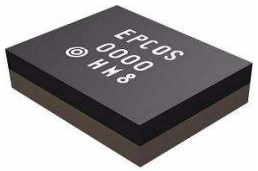
SAW Rx 2in1 filter

GSM 1800 / GSM 1900

Series/type:	**B9804**
Ordering code:	**B39202B9804P810**
Date:	June 15, 2010
Version:	2.0

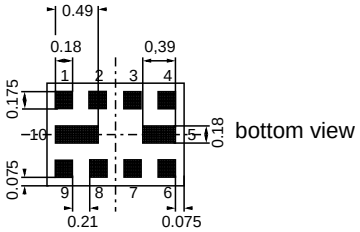
Application

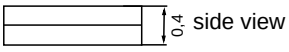
- Low-loss 2in1 RF filter for mobile telephone GSM 1800 and GSM 1900 systems, receive path (Rx)
- Usable passband:
  Filter 1 (GSM 1800): 75 MHz
  Filter 2 (GSM 1900): 60 MHz
- Unbalanced to balanced operation for all filters
- Impedance transformation from 50 Ω to 150 Ω for both filters
- Low amplitude ripple
- Suitable for GPRS class 1 to 12

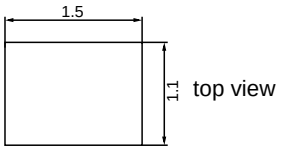


Features

- Package size 1.5 x1.1 x 0.4 mm^3
- RoHS compatible
- Approx. weight 0.003g.
- Package for **S**urface **M**ount **T**echnology (**SMT**)
- Ni, gold-plated terminals
- **E**lectrostatic **S**ensitive **D**evice (**ESD**)
- **M**oisture **S**ensitive **L**evel 3

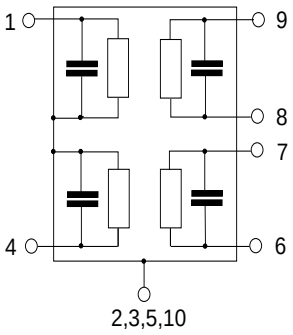






Pin configuration

■	1	Input [Filter 1]
■	4	Input [Filter 2]
■	6,7	Output balanced [Filter 2]
■	8,9	Output balanced [Filter 1]
■	2,3,5,10	Case ground



Characteristics of Filter 1 (GSM 1800)

Temperature range for specification: T = -20 ˚C to +75 ˚C
Terminating source impedance: Z_S = 50 Ω
Terminating load impedance: Z_L = 150 Ω || 15 nH (balanced)

		min.	typ. @25˚C	max.	
Center frequency	f_C	—	1842.5	—	MHz
Maximum insertion attenuation	α_{max}				
1805.0 ... 1880.0 MHz		—	1.4 [1]	2.4 [2]	dB
Amplitude ripple (p-p)	$\Delta\alpha$				
1805.0 ... 1880.0 MHz		—	0.7	1.4 [3]	dB
Input VSWR					
1805.0 ... 1880.0 MHz		—	1.7	2.0	
Output VSWR					
1805.0 ... 1880.0 MHz		—	1.7	2.0	
Output amplitude balance ($\|S_{31}/S_{21}\|$)					
1805.0 ... 1880.0 MHz		–1.2	-0.8/0.9	1.2	dB
Output phase balance ($\phi(S_{31})-\phi(S_{21})+180^\circ$)					
1805.0 ... 1880.0 MHz		–10	-2/+9	10	˚
Attenuation	α				
10.0 ... 940.0 MHz		45	50	—	dB
940.0 ... 1705.0 MHz		28	40	—	dB
1705.0 ... 1785.0 MHz		12 [4]	16	—	dB
1920.0 ... 1980.0 MHz		17 [5]	23	—	dB
1980.0 ... 2030.0 MHz		25	30	—	dB
2030.0 ... 2400.0 MHz		28	33	—	dB
2400.0 ... 2500.0 MHz		32	37	—	dB
2500.0 ... 2775.0 MHz		28	31	—	dB
2775.0 ... 2880.0 MHz		38	46	—	dB
2880.0 ... 3610.0 MHz		28	44	—	dB
3610.0 ... 3760.0 MHz		38	43	—	dB
3760.0 ... 5415.0 MHz		28	36	—	dB
5415.0 ... 5640.0 MHz		32	36	—	dB
5640.0 ... 6000.0 MHz		28	35	—	dB

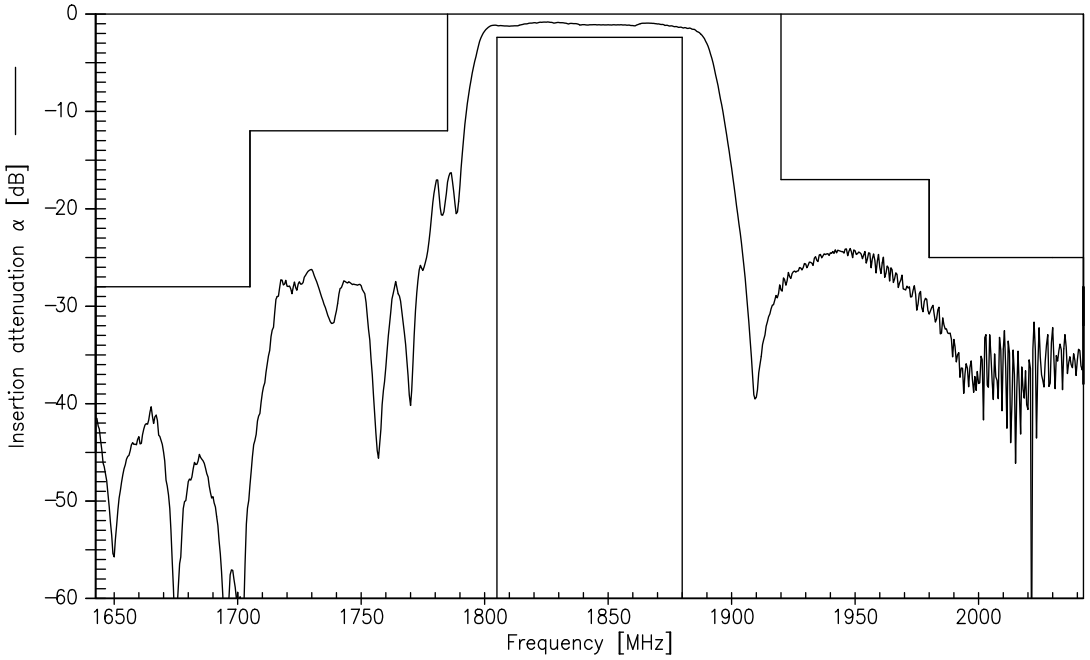
[1] Typical value excluding PCB losses of 0.24 dB.
[2] 2.0 dB at 25 ˚c
[3] 1.4 dB at 25 ˚c
[4] 14.0 dB at 25 ˚c
[5] 20.0 dB at 25 ˚c

Maximum ratings of Filter 1

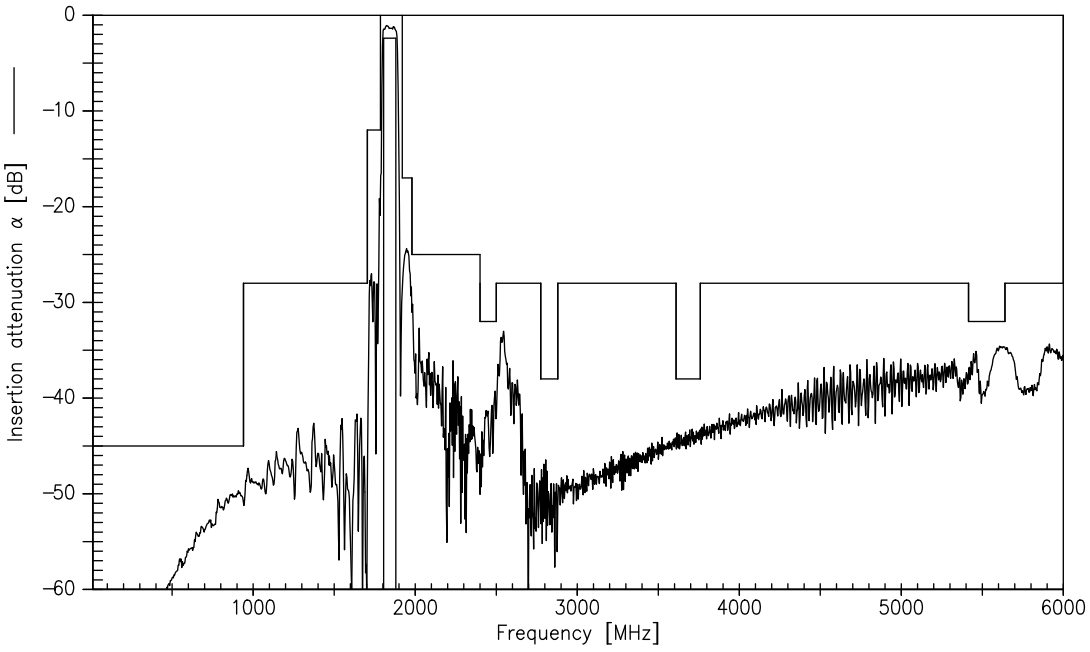
Operable temperature range	T	–40/+85	˚C	
Storage temperature range	T_{stg}	–40/+85	˚C	
DC voltage	V_{DC}	5	V	
ESD voltage	V_{ESD}	50[1)]	V	machine model, 1 pulse
Input power at				
GSM 850, GSM 900	P_{IN}	15	dBm	effective power in the on-state,
GSM 1800, GSM 1900	P_{IN}	15	dBm	duty cycle 4:8
Tx bands				

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

Transfer function of Filter 1 - narrowband

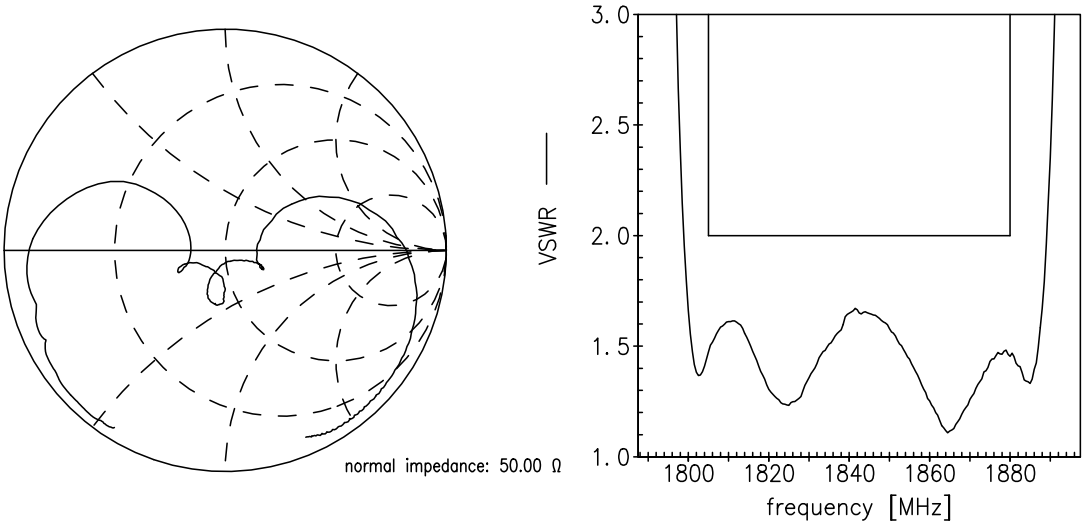


Transfer function of Filter 1 - wideband

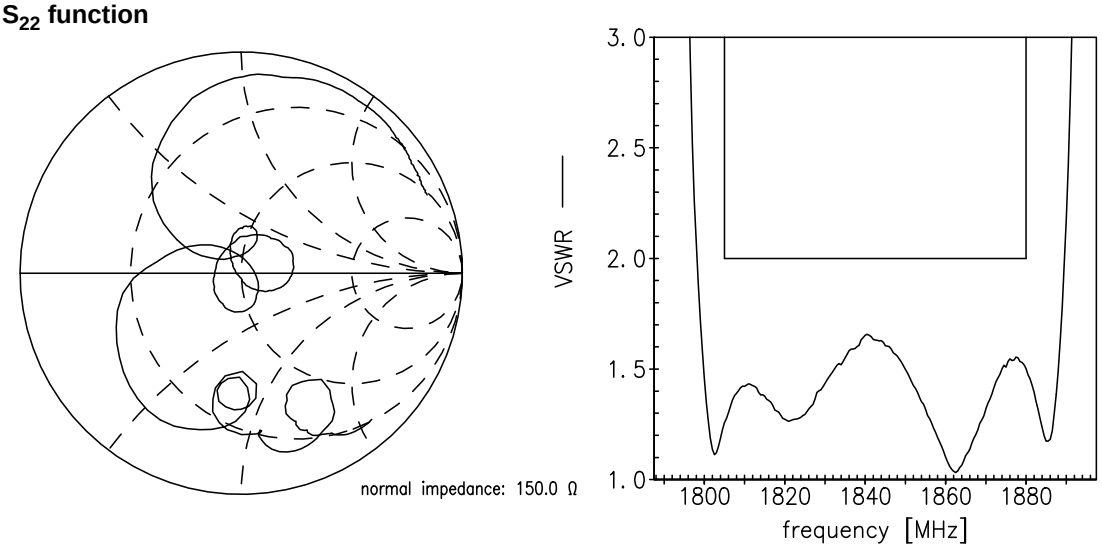


Smith Charts Filter 1

S_{11} function



S_{22} function



Characteristics of Filter 2 (GSM 1900)

Temperature range for specification: T = -20 ˚C to +75 ˚C
Terminating source impedance: Z_S = 50 Ω
Terminating load impedance: Z_L = 150 Ω || 15 nH (balanced)

		min.	typ. @25˚C	max.	
Center frequency	f_C	—	1960.0	—	MHz
Maximum insertion attenuation	α_{max}				
1930.0 ... 1990.0 MHz		—	1.4 1)	2.5 2)	dB
Amplitude ripple (p-p)	$\Delta\alpha$				
1930.0 ... 1990.0 MHz		—	0.5	1.6 3)	dB
Input VSWR					
1930.0 ... 1990.0 MHz		—	1.7	2.0	
Output VSWR					
1930.0 ... 1990.0 MHz		—	1.7	2.0	
Output amplitude balance ($\lvert S_{31}/S_{21}\rvert$)					
1930.0 ... 1990.0 MHz		–1.2	-0.3/0.8	1.2	dB
Output phase balance ($\phi(S_{31})-\phi(S_{21})+180^\circ$)					
1930.0 ... 1990.0 MHz		–10	-6/+8	10	°
Attenuation	α				
10.0 ... 1510.0 MHz		40	47	—	dB
1510.0 ... 1830.0 MHz		30	32	—	dB
1830.0 ... 1850.0 MHz		26	30	—	dB
1850.0 ... 1890.0 MHz		23	25	—	dB
1890.0 ... 1910.0 MHz		12 4)	17	—	dB
2010.0 ... 2070.0 MHz		12 5)	17	—	dB
2070.0 ... 2400.0 MHz		20	22	—	dB
2400.0 ... 2500.0 MHz		35	41	—	dB
2500.0 ... 3860.0 MHz		28	32	—	dB
3860.0 ... 3980.0 MHz		36	43	—	dB
3980.0 ... 5790.0 MHz		30	37	—	dB
5790.0 ... 6000.0 MHz		32	37	—	dB

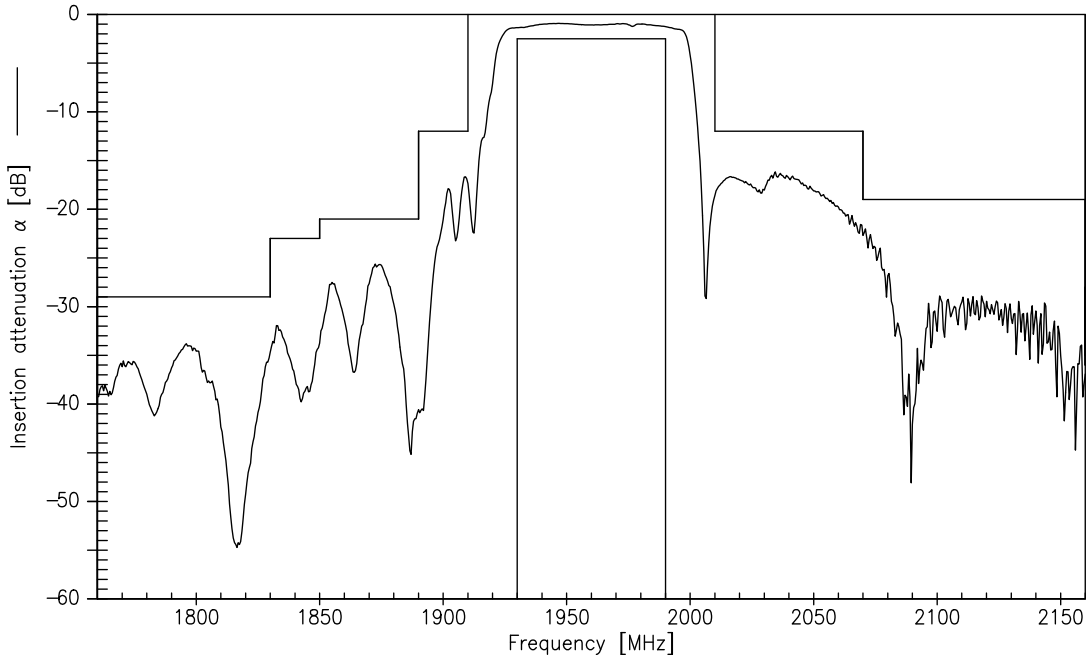
1) Typical value excluding PCB losses of 0.24 dB.
2) 2.0 dB at 25 ˚c
3) 1.3 dB at 25 ˚c
4) 14 dB at 25 ˚c
5) 14 dB at 25 ˚c

Maximum ratings of Filter 2

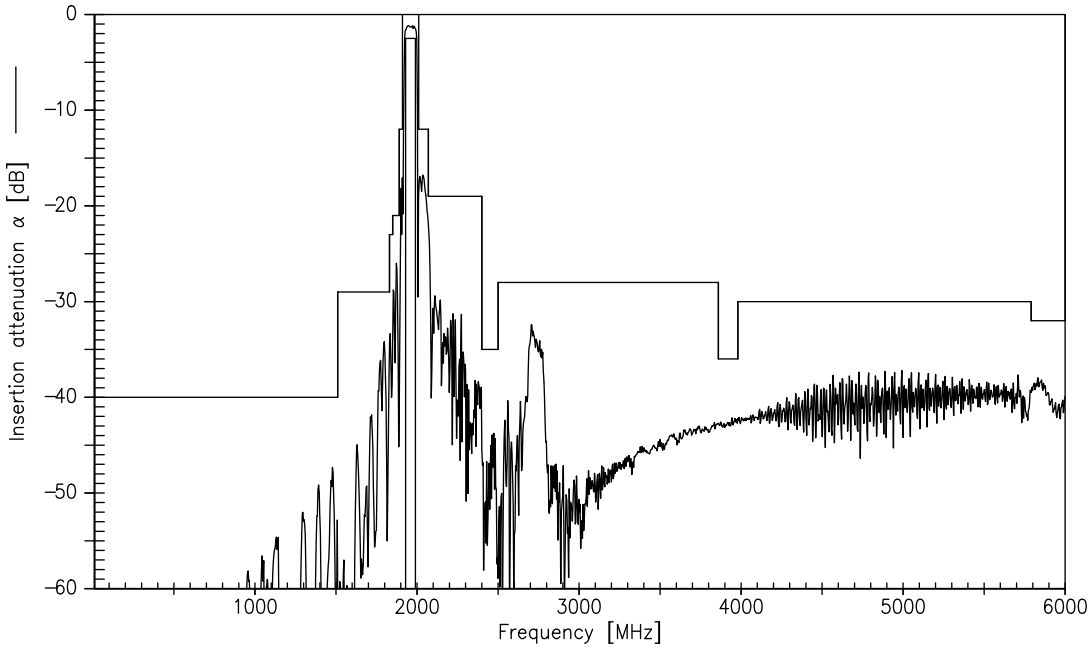
Operable temperature range	T	–40/+85	˚C	
Storage temperature range	T_{stg}	–40/+85	˚C	
DC voltage	V_{DC}	5	V	
ESD voltage	V_{ESD}	50[1)]	V	machine model, 1 pulse
Input power at				
GSM 850, GSM 900	P_{IN}	15	dBm	effective power in the on-state,
GSM 1800, GSM 1900	P_{IN}	15	dBm	duty cycle 4:8
Tx bands				

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

Transfer function of Filter 2 - narrowband

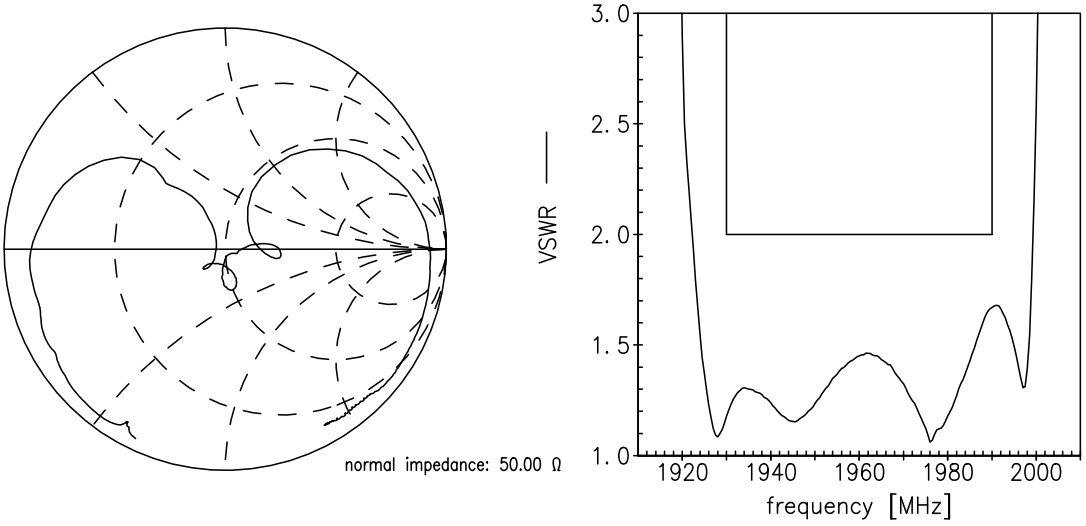


Transfer function of Filter 2 - wideband

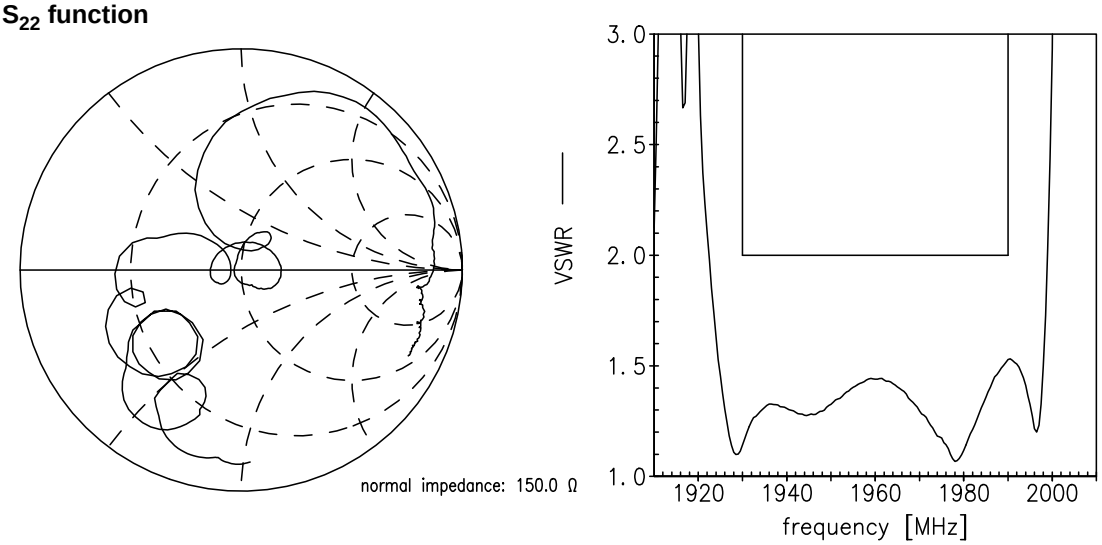


Smith Charts Filter 2

S_{11} function



S_{22} function



References

Type	B9804
Ordering code	B39202B9804P810
Marking and package	C61157-A8-A19
Packaging	F61074-V8227-Z000
Date codes	L_1126
S-parameters	B9804_LB_NB.s3p B9804_LB_WB.s3p B9804_UB_NB.s3p B9804_UB_WB.s3p 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."
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