



SAW Components

SAW Rx 2in1 filter

GSM 1800 / GSM 900

Series/type: **B9500**

Ordering code:

Date: **March 06, 2008**

Version: **1.1**



SAW Components

B9500

SAW Rx 2in1 filter

1842.5 / 942.5 MHz

Preliminary data



Revision History: Changes compared to previous iteration issue

ISSUE	ORIGINATOR	DETAIL SPEC CHANGES	DATE
B9500_1.2	Ong WL	Insertion of filter type in datasheet	06.03.2008



Preliminary data



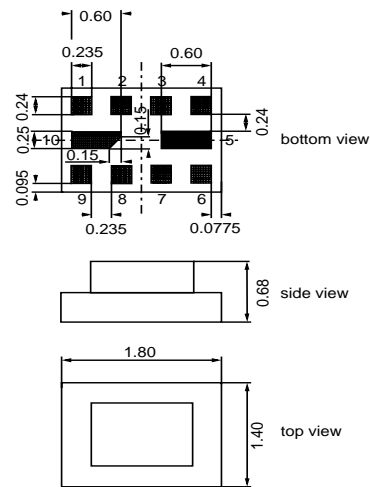
Application

- Low-loss 2in1 RF filter for mobile telephone GSM 900 and GSM 1800 systems, receive path (Rx)
- Usable passband:
 Filter 1 (GSM 1800): 75 MHz
 Filter 2 (GSM 900): 35 MHz
- Unbalanced to balanced operation for both filters
- Very low insertion attenuation
- Low amplitude ripple
- Impedance transformation from 50 Ω to 150 Ω for both filters
- Suitable for GPRS class 1 to 12



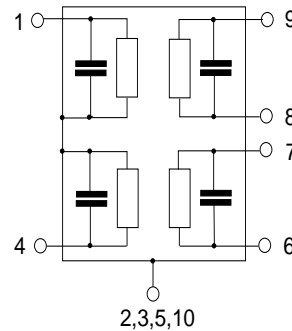
Features

- Package size 1.8 x 1.4 x 0.68 mm³
- Package code QCS10V
- RoHS compatible
- Approx. weight 0.006 g
- Package for Surface Mount Technology (SMT)
- Ni, gold-plated terminals
- Electrostatic Sensitive Device (ESD)



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





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Characteristics of filter 1 (GSM 1800)

Temperature range for specification: $T = -20\text{ °C to }+75\text{ °C}$
 Terminating source impedance: $Z_S = 50\ \Omega$
 Terminating load impedance: $Z_L = 150\ \Omega \parallel 13\text{ nH (balanced)}$

		B9500 1)			DGL 2)	
		min.	typ. @25°C	max.		
Center frequency	f_C	—	1842.5	—		MHz
Maximum insertion attenuation	α_{max}					
1805.0 ... 1880.0 MHz		—	1.3 3)	2.2 4)		dB
Amplitude ripple (p-p)	$\Delta\alpha$					
1805.0 ... 1880.0 MHz		—	0.5	1.4 5)		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		-1.0	-0.6/0.6	1.0		dB
Output phase balance ($\phi(S_{31})-\phi(S_{21})+180^\circ$)						
1805.0 ... 1880.0 MHz		-10	-6/+5	10		°
Attenuation	α					
10.0 ... 902.0 MHz		45	54	—		dB
902.0 ... 940.0 MHz		45	54	—		dB
940.0 ... 1705.0 MHz		28	41	—		dB
1705.0 ... 1785.0 MHz		12 6)	16	—		dB
1920.0 ... 1980.0 MHz		17	23	—		dB
1980.0 ... 2030.0 MHz		25	33	—		dB
2030.0 ... 2400.0 MHz		28	34	—		dB
2400.0 ... 2500.0 MHz		32	41	—		dB
2500.0 ... 2775.0 MHz		28	34	—		dB
2775.0 ... 2880.0 MHz		38	50	—		dB
2880.0 ... 3610.0 MHz		28	47	—		dB
3610.0 ... 3760.0 MHz		38	46	—		dB
3760.0 ... 5415.0 MHz		28	39	—		dB
5415.0 ... 5640.0 MHz		32	38	—		dB
5640.0 ... 6000.0 MHz		28	37	—		dB

1) Values in columns min, typ and max indicate the development status of the current version.

2) Values in column DesignGoal (DGL) indicate the target performance.

3) Typical value excluding PCB losses of 0.27 dB.

4) 2.1 dB at 25 °c

5) 1.3 dB at 25 °c

6) 14 dB at 25 °c



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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, duty cycle 4:8
GSM 1800, GSM 1900	P _{IN}	15	dBm	
Tx bands				

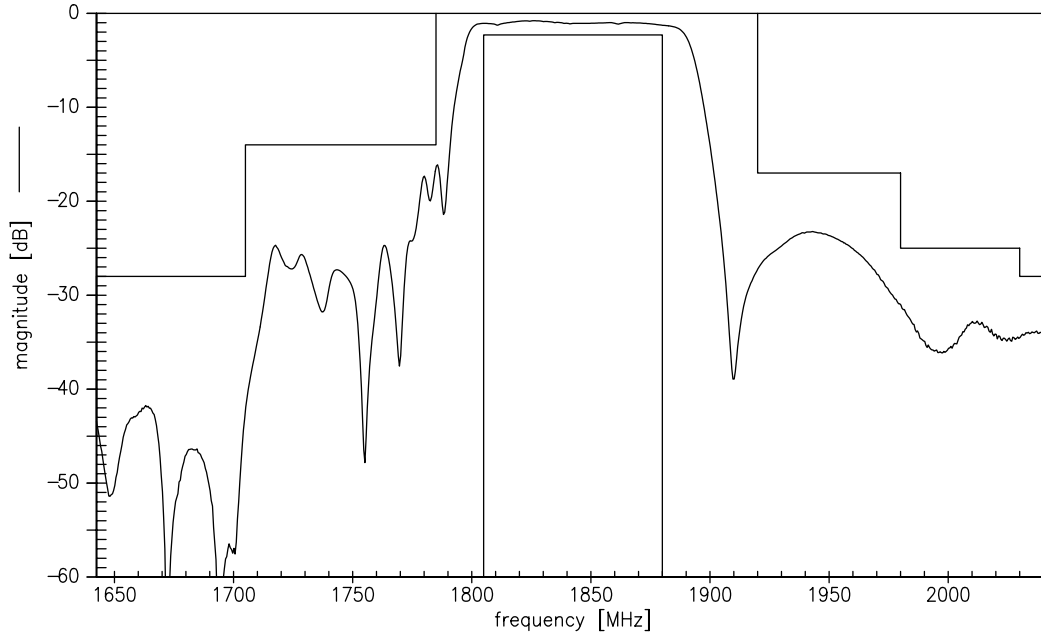
¹⁾ acc. to JEDEC22-A115A (machine model), 1 negative & 1 positive pulse.



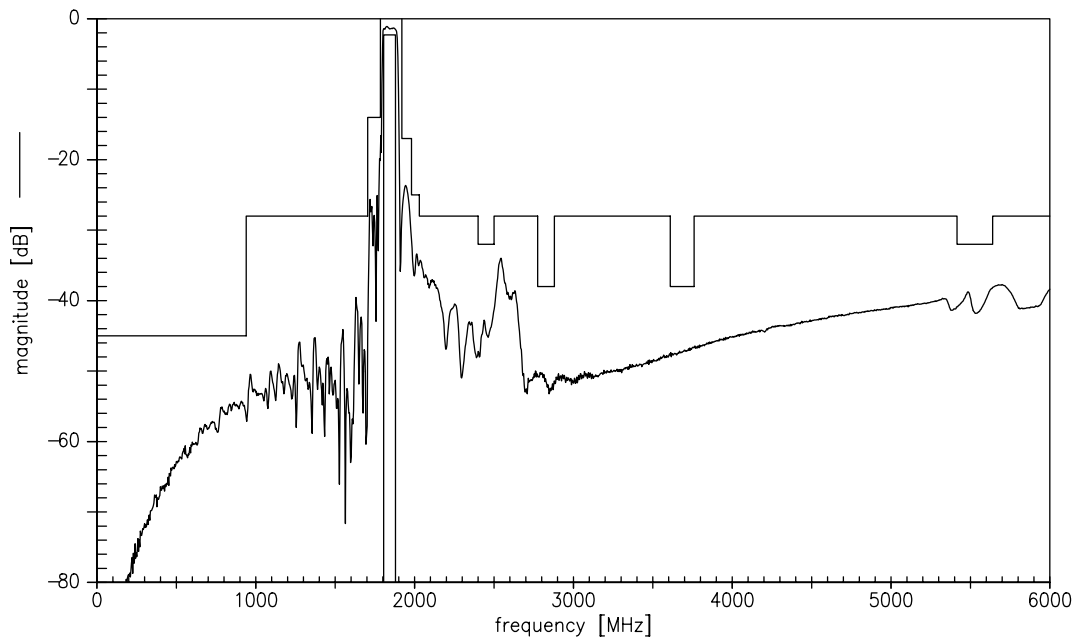
Preliminary data



Transfer function of filter 1



Transfer function of filter 1 - wideband



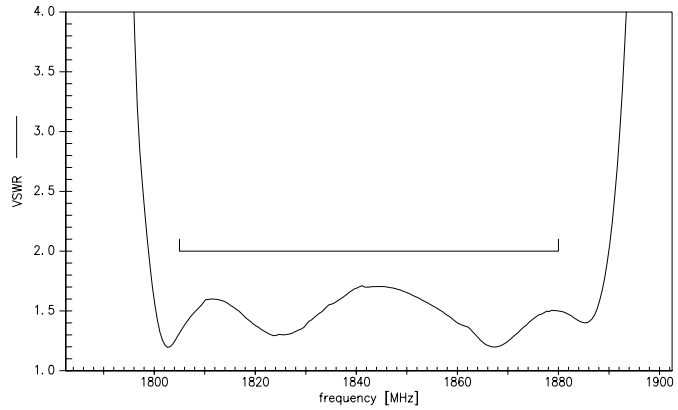
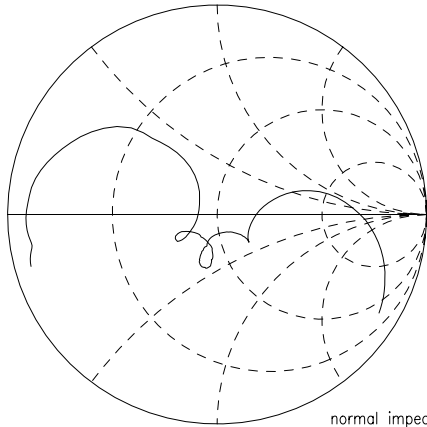


Preliminary data

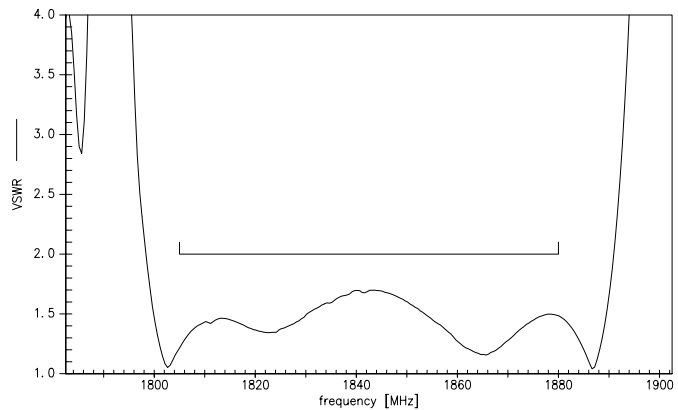
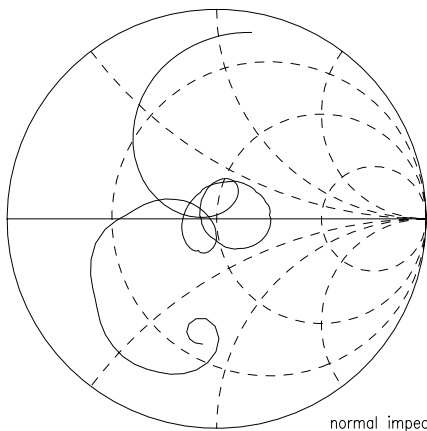


Smith Charts filter 1

S_{11} function



S_{22} function





SAW Components	B9500
SAW Rx 2in1 filter	1842.5 / 942.5 MHz

Preliminary data



Characteristics of filter 2 (GSM 900)

Temperature range for specification: $T = -20\text{ °C to }+75\text{ °C}$
 Terminating source impedance: $Z_S = 50\ \Omega$
 Terminating load impedance: $Z_L = 150\ \Omega \parallel 56\text{ nH (balanced)}$

		B9500 1)			DGL 2)	
		min.	typ. @ 25 °C	max.		
Center frequency	f_C	—	942.5	—		MHz
Maximum insertion attenuation	α_{max}					
925.0 ... 960.0 MHz		—	1.2 ³⁾	2.1 ⁴⁾		dB
Amplitude ripple (p-p)	$\Delta\alpha$					
925.0 ... 960.0 MHz		—	0.5	1.3 ⁵⁾		dB
Input VSWR						
925.0 ... 960.0 MHz		—	1.7	2.0		
Output VSWR						
925.0 ... 960.0 MHz		—	1.7	2.0		
Output amplitude balance (S_{31}/S_{21})						
925.0 ... 960.0 MHz		-1.0	-0.7/0.2	1.0		dB
Output phase balance ($\phi(S_{31})-\phi(S_{21})+180^\circ$)						
925.0 ... 960.0 MHz		-10	-3/+3	10		°
Attenuation	α					
10.0 ... 480.0 MHz		45	55	—		dB
480.0 ... 900.0 MHz		30	34	—		dB
900.0 ... 905.0 MHz		26	31	—		dB
905.0 ... 915.0 MHz		20	30	—		dB
980.0 ... 1000.0 MHz		25	30	—		dB
1000.0 ... 1850.0 MHz		28	36	—		dB
1850.0 ... 1920.0 MHz		40	59	—		dB
1920.0 ... 3700.0 MHz		35	38	—		dB
3700.0 ... 6000.0 MHz		32	38	—		dB

1) Values in columns min, typ and max indicate the development status of the current version.
 2) Values in column DesignGoal (DGL) indicate the target performance.
 3) Typical value excluding PCB losses of 0.16 dB.
 4) 1.9 dB at 25 °c
 5) 1.2 dB at 25 °c



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Preliminary data



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}	100 ¹⁾	V	machine model, 1 pulse
Input power at				
GSM 850, GSM 900	P _{IN}	15	dBm	effective power in the on-state, duty cycle 4:8
GSM 1800, GSM 1900	P _{IN}	15	dBm	
Tx bands				

¹⁾ acc. to JEDEC22-A115A (machine model), 1 negative & 1 positive pulse.



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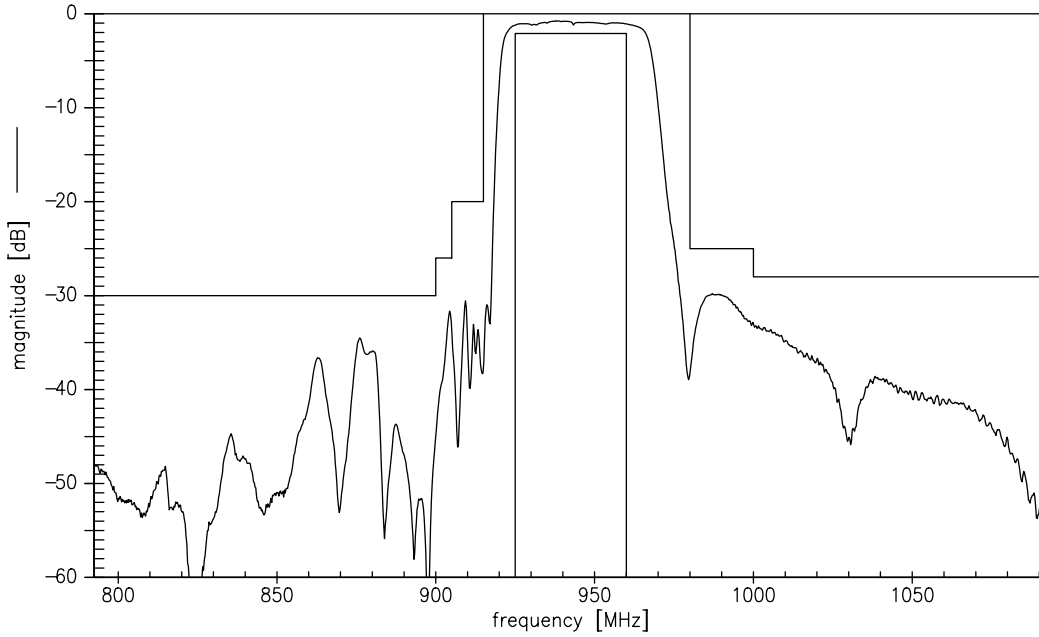
SAW Rx 2in1 filter

1842.5 / 942.5 MHz

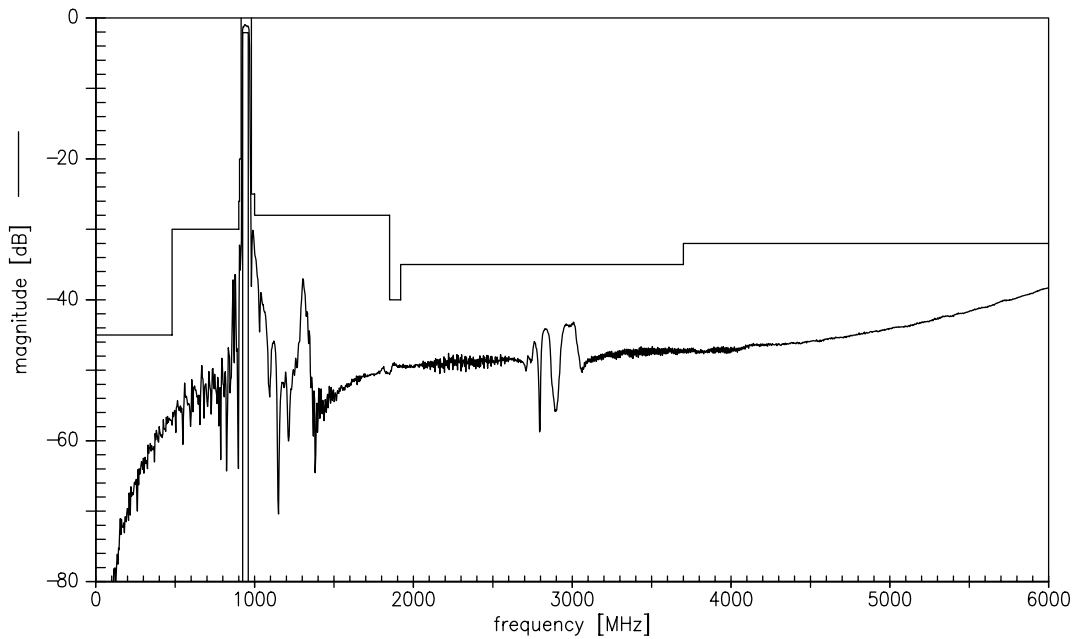
Preliminary data



Transfer function of filter 2



Transfer function of filter 2 - wideband



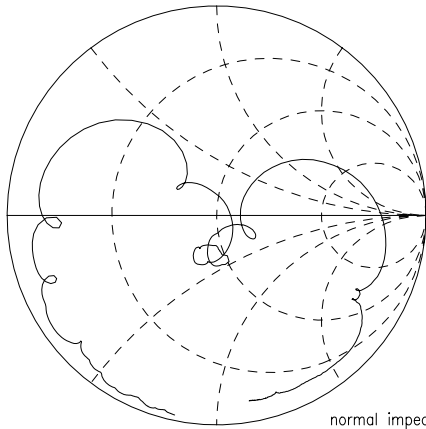
Please read *cautions and warnings* and *important notes* at the end of this document.

Preliminary data

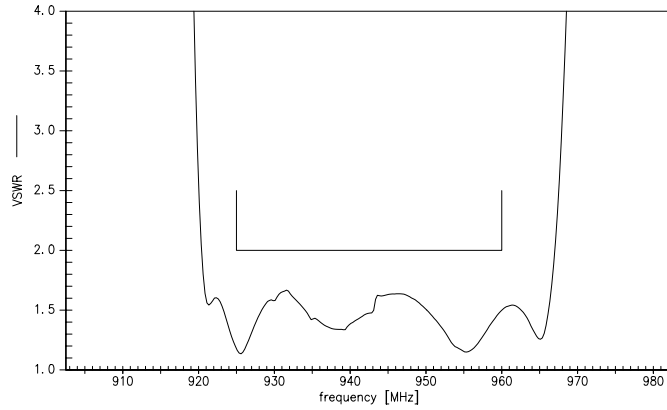


Smith Charts filter 2

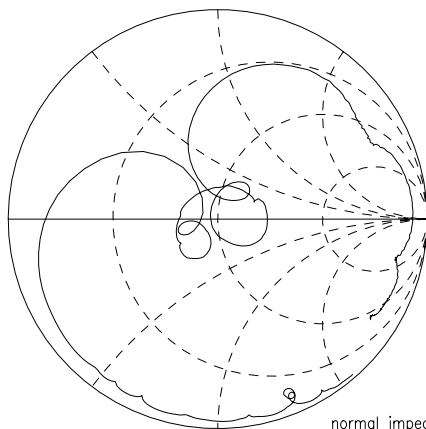
S_{11} function



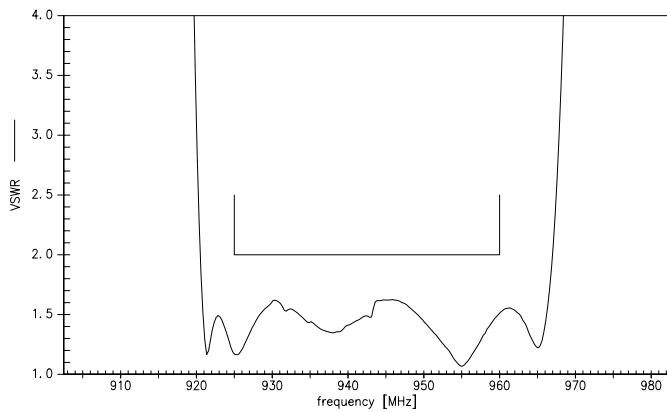
normal impedance: 50.00 Ω



S_{22} function



normal impedance: 150.0 Ω





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SAW Rx 2in1 filter

1842.5 / 942.5 MHz

Preliminary data



References

Type	B9500
Ordering code	
Marking and package	C61157-A7-A153
Packaging	F61074-V8226-Z000
Date code	L_1126
S-parameters	B9500_LB_NB.s3p B9500_LB_WB.s3p B9500_UB_NB.s3p B9500_UB_WB.s3p
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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