



SAW Components

SAW IF filter

Satellite Radio

Series/type: X3402
Ordering code: B39800-X3402-U910
Date: February 26, 2007
Version: 1.1

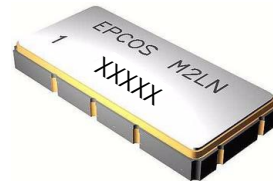


Data sheet



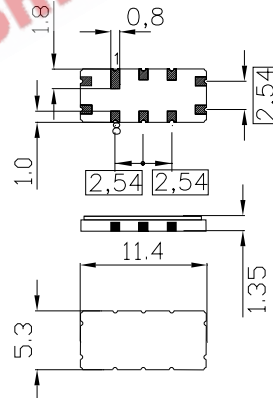
Application

- IF filter for Sirius Digital Satellite Radio
- Diplexing of TDM1 and TDM2 satellite signal
- One balanced input and two balanced outputs
- Constant group delay
- Usable bandwidths of 3.7 MHz in TDM1 and TDM2
- Low voltage loss



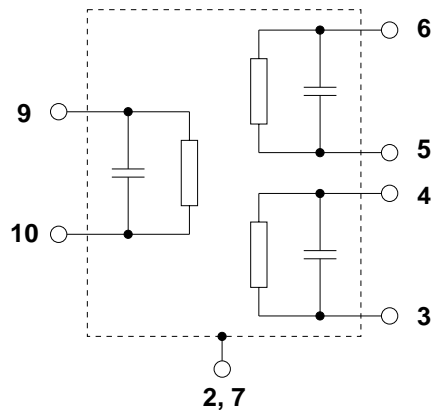
Features

- Package size 11.4 x 5.3 x 1.35 mm³
- Maximum package height 1.5 mm
- Package code QCC10C
- RoHS compliant
- Approximate weight 0.24 g
- Package for Surface Mount Technology (SMT)
- Ni, gold-plated terminals



Pin configuration

- 9,10 Input, balanced
- 5,6 Output TDM1, balanced
- 3,4 Output TDM2, balanced
- 1,8 To be grounded
- 2,7 Case-grounds





SAW Components	X3402
SAW IF filter	72.54 and 80.46 MHz

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Characteristics of TDM1 channel

Temperature range for specification: $T = -10\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$
 Terminating source impedance: $Z_S = 27\ \Omega$ and matching network
 Terminating load impedance: $Z_L = 1\ \text{k}\Omega$ and matching network

		min.	typ. @ 25 °C	max.	
Nominal frequency	f_N	—	72.54	—	MHz
Minimum insertion attenuation (including losses in the matching network)	α_{\min}	—	18.3	19.8	dB
Maximum voltage gain source – load (V_L/V_S)	α_{vgsI}	-7.0	-5.0	—	dB
Amplitude ripple (p-p)	$\Delta\alpha$ $f_N \pm 1.85\ \text{MHz}$	—	0.8	1.5	dB
Pass bandwidth					
$\alpha_{\text{rel}} \leq 1.5\ \text{dB}$	$B_{1.5\text{dB}}$	—	4.1	—	MHz
$\alpha_{\text{rel}} \leq 3\ \text{dB}$	$B_{3\text{dB}}$	—	4.5	—	MHz
$\alpha_{\text{rel}} \leq 15\ \text{dB}$	$B_{15\text{dB}}$	—	5.6	6.1	MHz
$\alpha_{\text{rel}} \leq 30\ \text{dB}$	$B_{30\text{dB}}$	—	6.2	6.7	MHz
Mean attenuation (relative to α_{\min})	α_{rel}				
Upper sidelobe	86.47 ... 91.53 MHz	52.0	57.0	—	dB
Relative attenuation (relative to α_{\min})	α_{rel}				
Lower sidelobe	50.00 ... 65.00 MHz	40.0	45.0	—	dB
	65.00 ... 66.48 MHz	39.0	44.0	—	dB
	66.48 ... 68.08 MHz	37.0	42.0	—	dB
Upper sidelobe	77.30 ... 78.60 MHz	40.0	45.0	—	dB
	78.60 ... 86.47 MHz	42.0	46.0	—	dB
	86.47 ... 91.53 MHz	46.0	52.0	—	dB
	91.53 ... 95.21 MHz	48.0	54.0	—	dB
	95.21 ... 100.00 MHz	50.0	54.0	—	dB
Group delay ripple (p-p)	$\Delta\tau$ $f_N \pm 1.85\ \text{MHz}$	—	70	—	ns
Temperature coefficient of frequency	TC_f	—	-18	—	ppm/K



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Characteristics of TDM2 channel

Temperature range for specification: T = -10 °C to +85 °C
 Terminating source impedance: Z_S = 27 Ω and matching network
 Terminating load impedance: Z_L = 1 kΩ and matching network

		min.	typ. @ 25 °C	max.	
Nominal frequency	f _N	—	80.46	—	MHz
Minimum insertion attenuation (including losses in the matching network)	α _{min}	—	18.1	19.6	dB
Maximum voltage gain source – load (V _L /V _S)	α _{vgsL}	-9.6	-7.6	—	dB
Amplitude ripple (p-p)	Δα	—	0.8	1.5	dB
	f _N ± 1.84 MHz				
Pass bandwidth					
α _{rel} ≤ 1.5 dB	B _{1.5dB}	—	4.2	—	MHz
α _{rel} ≤ 3 dB	B _{3dB}	—	4.5	—	MHz
α _{rel} ≤ 15 dB	B _{15dB}	—	5.6	6.1	MHz
α _{rel} ≤ 30 dB	B _{30dB}	—	6.2	6.7	MHz
Mean attenuation (relative to α_{min})	α _{rel}				
Upper sidelobe	86.47 ... 91.53 MHz	52.0	55.0	—	dB
Relative attenuation (relative to α_{min})	α _{rel}				
Lower sidelobe	55.00 ... 67.00 MHz	50.0	58.0	—	dB
	67.00 ... 75.99 MHz	43.0	47.0	—	dB
Upper sidelobe	85.21 ... 86.47 MHz	40.0	48.0	—	dB
	86.47 ... 91.53 MHz	46.0	53.0	—	dB
	91.53 ... 95.21 MHz	50.0	58.0	—	dB
	95.21 ... 105.00 MHz	52.0	60.0	—	dB
Group delay ripple (p-p)	Δτ				
	f _N ± 1.84 MHz	—	80	—	ns
Temperature coefficient of frequency	TC _f	—	-18	—	ppm/K

Maximum ratings

Operable temperature range	T	-40/+85	°C	
Storage temperature range	T _{stg}	-40/+85	°C	
DC voltage	V _{DC}	0	V	
Source power	P _S	10	dBm	source impedance 50 Ω

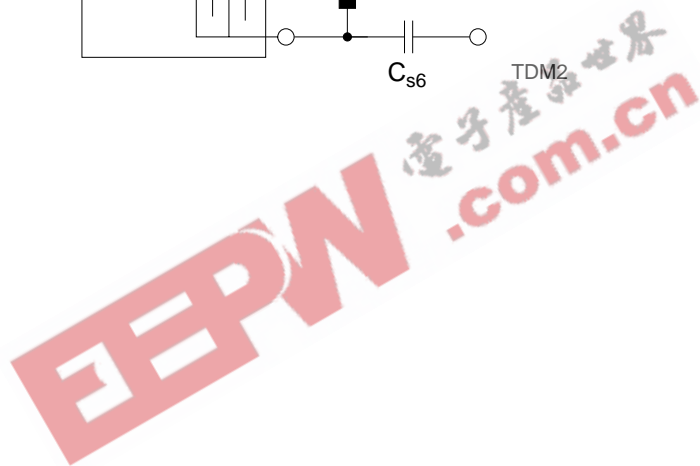
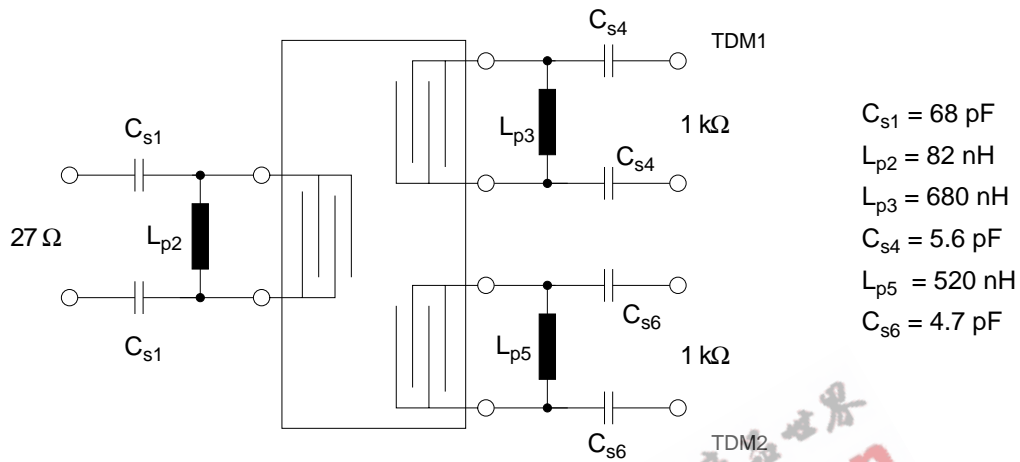
Please read *cautions and warnings and important notes* at the end of this document.



Data sheet

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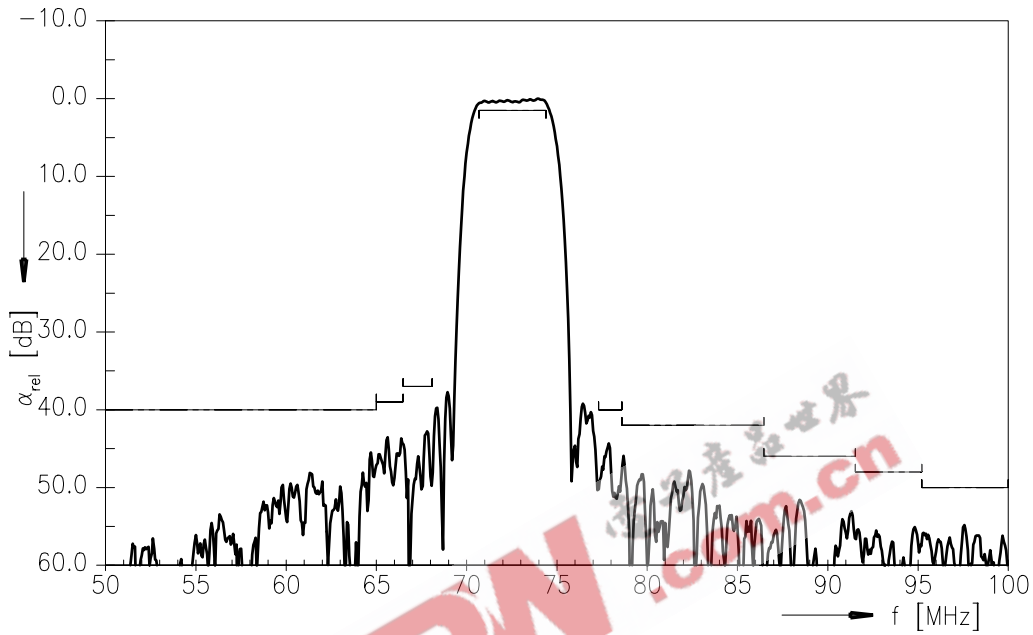
Matching network¹⁾ (based on four port measurement, quality factors $Q_L = 40$, $Q_C = 90$)



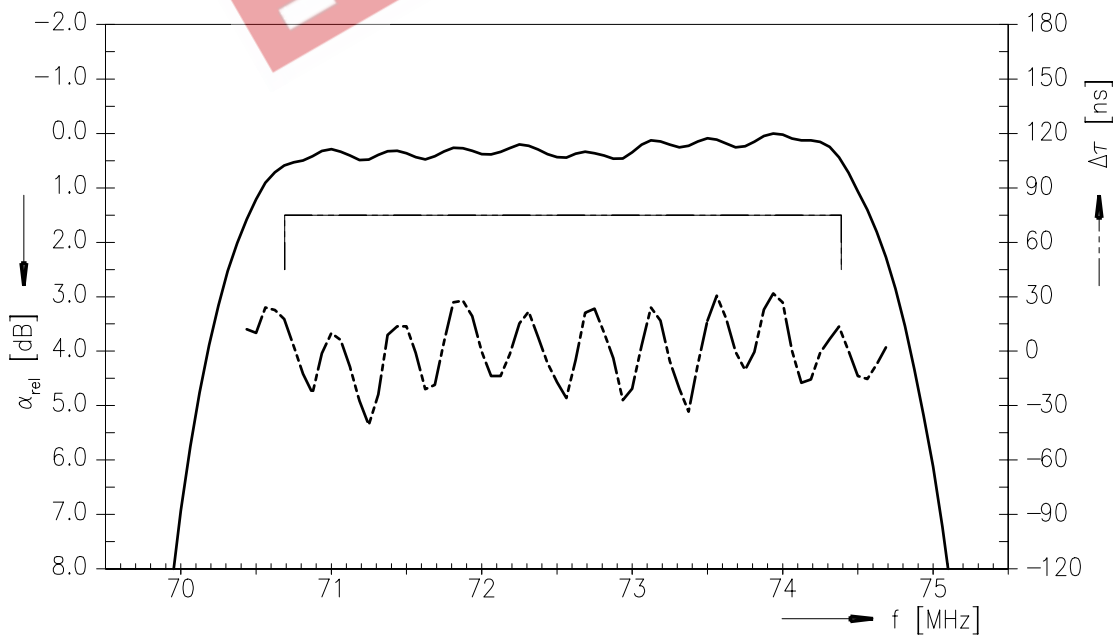
1) The input matching circuit has been designed as a power match of the filter's input port to 175 Ω . In a second step it has been optimized in a narrow range in order to operate at 27 Ω input termination with optimum filter performance.



Transfer function TDM1 channel

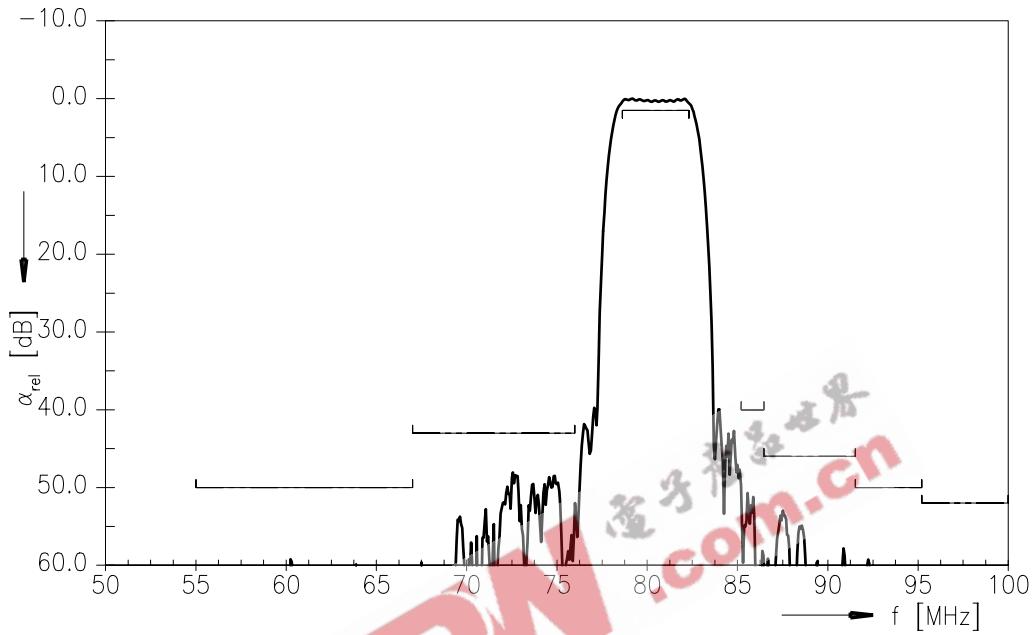


Transfer function TDM1 channel (pass band)

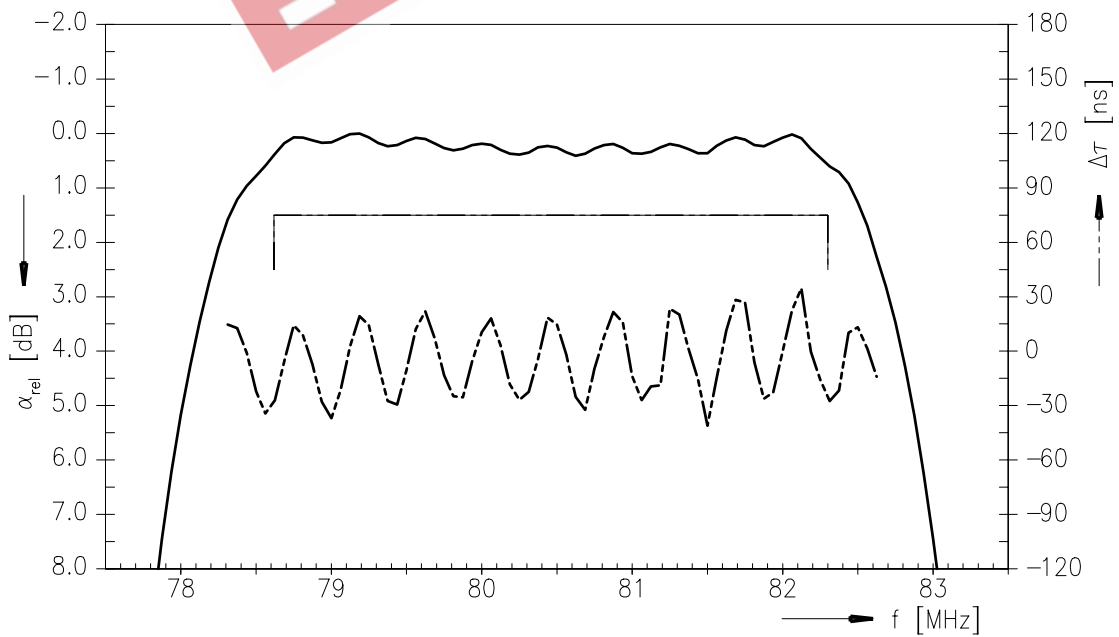




Transfer function TDM2 channel



Transfer function TDM2 channel (pass band)





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X3402

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72.54 and 80.46 MHz

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References

Type	X3402
Ordering code	B39800-X3402-U910
Marking and package	C61157-A7-A73
Packaging	F61074-V8176-Z000
Date codes	L_1126
S-parameters	X3402_NB.s6p (matched), X3402_NB_UN.s6p (unmatched)
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."

For further information please contact your local EPCOS sales office or visit our webpage at www.epcos.com.

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