Microchip Filter specification TFS 400K 1/5

Measurement condition

Ambient temperature: 23 °C
Input power level: 0 dBm
Terminating impedance: *
Input: 375 Ω || -1,9 pF
Output: 375 Ω || -1,9 pF
External coil: 47 nH

Characteristics

Remark:
Reference level for the relative attenuation a_{rel} of the TFS400K is the minimum of the pass band attenuation a_{min}. The minimum of the pass band attenuation a_{min} is defined as the insertion loss a_e. The centre frequency f_c is the arithmetic mean value of the upper and lower frequencies at the 1 dB filter attenuation level relative to the insertion loss a_e. The nominal frequency f_N is fixed at 400 MHz without tolerance. The given values for the relative attenuation a_{rel} and for the group delay ripple have to be reached at the frequencies given below even if the centre frequency f_c is shifted due to the temperature coefficient of frequency TC_f in the operating temperature range and due to a production tolerance for the centre frequency f_c.

D a t a		**typ. value**		**tolerance / limit**		
Insertion Loss (reference level)	a_e	4,9	dB	max.	6,5	dB
Nominal Frequency	f_N	400,04	MHz		400	MHz
Bandwidth	B W					
3 dB		480	kHz		-	
Relative Attenuation	a_{rel}					
f_N ... f_N ± 82,5 kHz		0,4	dB	max.	1	dB
f_N ± 500 kHz ... f_N ± 700 kHz		28	dB	min.	15	dB
f_N ± 700 kHz ... f_N ± 1 MHz		43	dB	min.	27	dB
f_N ± 1 MHz ... f_N ± 13 MHz		50	dB	min.	40	dB
Group Delay Ripple						
f_N ± 82,5 kHz		0,6	µs	max.	1	µs
Operating Temperature Range	OTR	-		-40 °C ... + 85 °C		
Storage Temperature Range		-		- 40 °C ... + 85 °C		
Frequency Inversion Temperature		20	°C	-		
Temperature Coefficient of Frequency	TC_f **	-0,036	ppm/K²	-		

*) The terminating impedances depend on parasites and q-values of matching elements and the board used, and are to be understood as reference values only. Should there be additional questions do not hesitate to ask for an application note or contact our design team.
**) $\Delta f(Hz) = TC_f(ppm/K) \times (T-T_0)^2 \times f_{TO}(MHz)$.

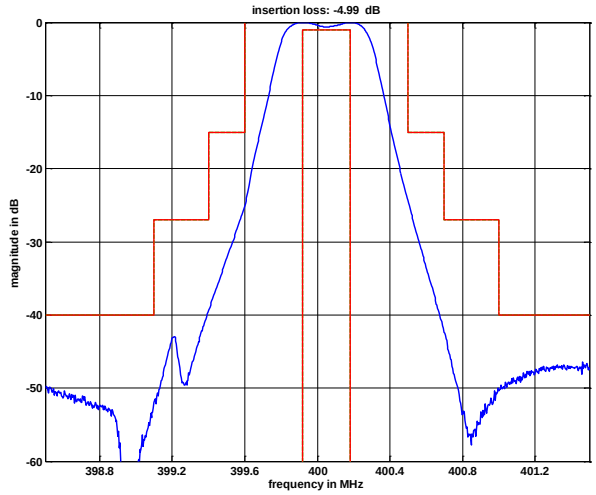
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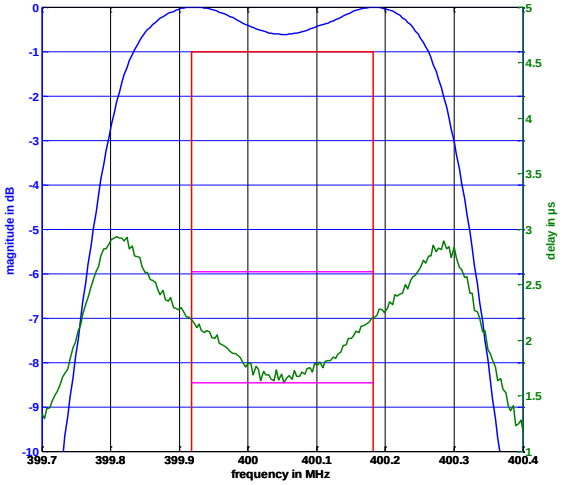
Checked / Approved:

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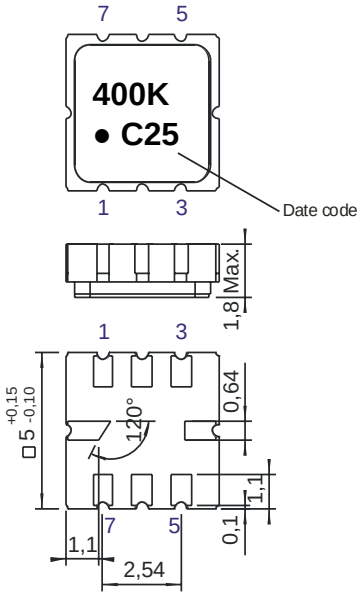
Filter characteristic





Construction and pin connection

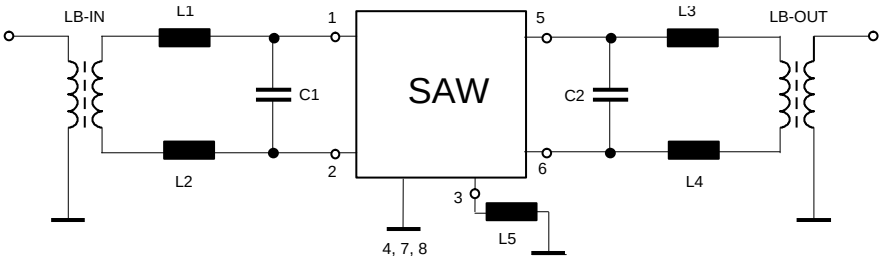
(All dimensions in mm)



1	Input
2	Input
3	External Coil
4	Ground
5	Output
6	Output
7	Ground
8	Ground

Date code:	Year + week
C	2012
D	2013
E	2014
...	

50 Ω Test circuit



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Stability characteristics, reliability

After the following tests the filter shall meet the whole specification:

1. Shock:	500g, 1 ms, half sine wave, 3 shocks each plane; DIN IEC 68 T2 - 27
2. Vibration:	10 Hz to 500 Hz, 0,35 mm or 5 g respectively, 1 octave per min, 10 cycles per plan, 3 plans; DIN IEC 68 T2 - 6
3. Change of temperature:	-55 °C to 125°C / 30 min. each / 10 cycles DIN IEC 68 part 2 – 14 Test N
4. Resistance to solder heat (reflow):	reflow possible: three times max.; for temperature conditions refer to the attached "Air reflow temperature conditions" on page 4;

This filter is RoHS compliant (2002/95/EG, 2005/618/EG)

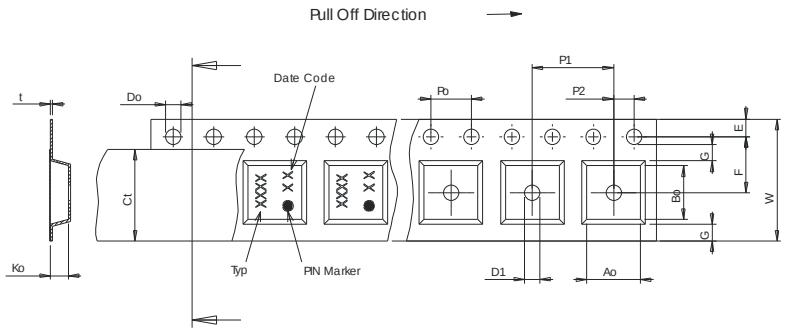
Packing

Tape & Reel: IEC 286 – 3, with exception of value for N and minimum bending radius;
tape type II, embossed carrier tape with top cover tape on the upper side;

max. pieces of filters per reel:	3000
reel of empty components at start:	min. 300 mm
reel of empty components at start including leader:	min. 500 mm
trailer:	min. 300 mm

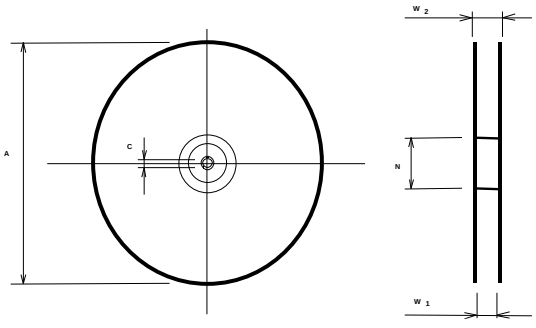
Tape (all dimensions in mm)

W	:	12,00
Po	:	4,00
Do	:	1,50
E	:	1,75
F	:	5,50
G(min)	:	0,75
P2	:	2,00
P1	:	8,00
D1(min)	:	1,50
Ao	:	5,30
Bo	:	5,30
Ct	:	9,5



Reel (all dimensions in mm)

A	:	330
W1	:	12,4
W2(max)	:	18,4
N(min)	:	50
C	:	13,0



The minimum bending radius is 45 mm.

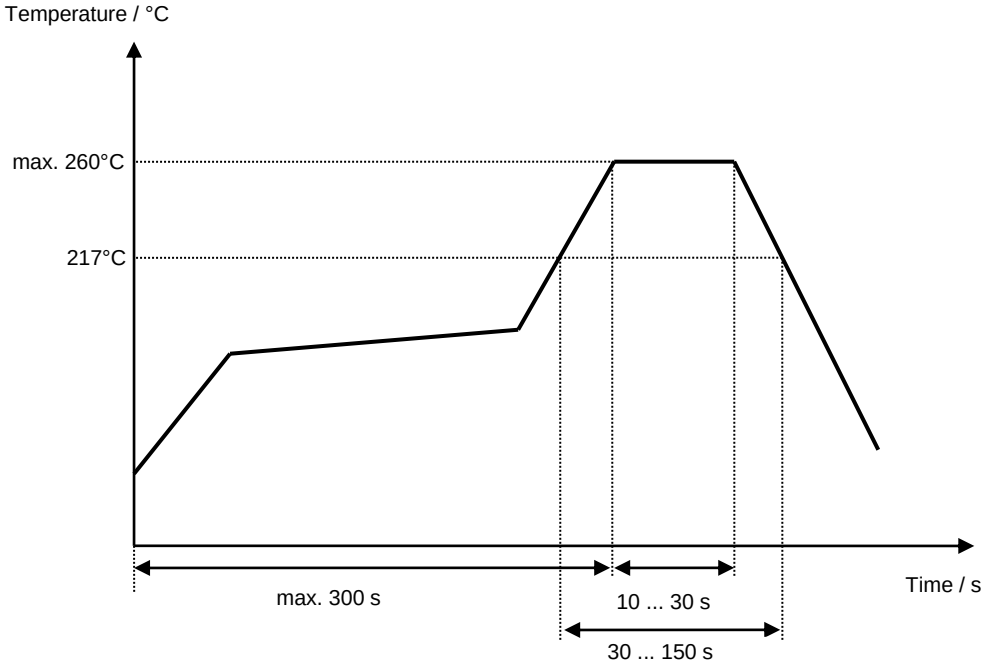
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Air reflow temperature conditions

Conditions	**Exposure**
Average ramp-up rate (30°C to 217°C)	less than 3°C/second
> 100°C	between 300 and 600 seconds
> 150°C	between 240 and 500 seconds
> 217°C	between 30 and 150 seconds
Peak temperature	max. 260°C
Time within 5°C of actual peak temperature	between 10 and 30 seconds
Cool-down rate (Peak to 50°C)	less than 6°C/second
Time from 30°C to Peak temperature	no greater than 300 seconds

Chip-mount air reflow profile



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History

Version	Reason of Changes	Name	Date
1.0	- Generate development specification.	Pfeiffer	12.05.2003
2.0	- Modification of electrical data based on TFS400B to support a group delay ripple of 1 µs maximum. - Correct reel dimensions.	Dr. Wall	11.06.2003
3.0	- Add 1 dB pass band of 160 kHz. - Shift 15 dB limit line to +-500 kHz - Shift 27 dB limit line to +-700 kHz - Remove values for termination impedances and coupling coil. - Add 50 Ohm test circuit configuration.	Dr. Wall	19.06.2003
3.1	- Change frequency band for 1 dB pass band and group delay ripple requirement	Dr. Wall	03.07.2003
3.2	- Change from development specification to preliminary specification - Add preliminary values for termination impedances - Add typical values	Dr. Wall	01.12.2003
3.3	- Rework layout of specification	Martens	23.11.2009
3.4	- Updated test circuit drawing	Martens	21.06.2012

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